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Semtech Databook

Power Discretes Product-Lines

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Semtech Corporation Power Discretes

This publication presents technical information for the several product families that comprise the Semtech Corporation Power Discretes Product-Lines. The families include Hi-Rel qualified rectifiers, bridges, ceramic capacitors, transient voltage suppressors and custom assemblies. These are available in a variety of packages. Complete device specifications and typical performance curves are given on individual data sheets, which are grouped by various families.

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Table of Contents

Chapter	Description	Page #
1	Qualified Parts List (QPL)	15
2	Half Wave Discrete Rectifiers	27
3	Half Wave, High Current Assemblies Features our Semtech proprietary ISOPAC and CUPAC package types.	163
4	Single Phase Full Wave Bridge Assemblies Features our Semtech proprietary ISOPAC , ALPAC and COMPAC package types.	199
5	Three Phase Full Wave Bridge Assemblies Features our Semtech proprietary ISOPAC , ALPAC and COMPAC package types.	259
6	Half Wave, High Voltage Assemblies Features our Semtech proprietary SLIMPAC , FINPAC , KV-STAC , STACPAC , KV-PAC and KW-PAC package types.	303
7	Single Phase Center Tap and Doubler Assemblies Features our Semtech proprietary ISOPAC , ALPAC , CUPAC , KV-PAC , STACPAC and KW-PAC package types.	369
8	TVS Rectifiers	405
9	High Voltage Capacitors	445
10	Application Notes for TVS	455

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PART NUMBER INDEX

PART No	PAGE No	PART No	PAGE No	PART No	PAGE No
1N3611	2-28	3SM6	2-42	FF15	2-63
1N3612	2-28	3SM8	2-42	1N6076	2-67
1N3613	2-28	3SM0	2-42	1N6077	2-67
1N3614	2-28	1N5614	2-46	1N6078	2-67
1N3957	2-28	1N5616	2-46	3FF05	2-67
1N3645	2-30	1N5618	2-46	3FF10	2-67
1N3646	2-30	1N5620	2-46	3FF15	2-67
1N3647	2-30	1N5622	2-46	1N6079	2-69
SM20	2-30	S2M	2-46	1N6080	2-69
SM25	2-30	S4M	2-46	1N6081	2-69
SM30	2-30	S6M	2-46	5FF05	2-69
1N4245	2-33	S8M	2-46	5FF10	2-69
1N4246	2-33	S0M	2-46	5FF15	2-69
1N4247	2-33	1N5615	2-49	2PFF6	2-73
1N4248	2-33	1N5617	2-49	2PFF8	2-77
1N4249	2-33	1N5619	2-49	2PFF0	2-77
1N4942	2-35	1N5621	2-49	2PFT05	2-80
1N4944	2-35	1N5623	2-49	2PFT1	2-80
1N4946	2-35	S2F	2-49	2PFT15	2-80
1N4947	2-35	S4F	2-49	2PFT2	2-80
1N4948	2-35	S6F	2-49	3FF30	2-84
1N5415	2-37	S8F	2-49	3FF40	2-84
1N5416	2-37	S0F	2-49	3FF50	2-84
1N5417	2-37	1N5802	2-53	3FF60	2-84
1N5418	2-37	1N5804	2-53	3PF8	2-88
1N5419	2-37	1N5806	2-53	3PF0	2-88
1N5420	2-37	1N5802US	2-56	3PFR0	2-92
3SF05	2-37	1N5804US	2-56	3PFT05	2-96
3SF1	2-37	1N5806US	2-56	3PFT1	2-96
3SF2	2-37	1N5807	2-58	3PFT15	2-96
3SF4	2-37	1N5809	2-58	3PFT2	2-96
3SF5	2-37	1N5811	2-58	3SFR0	2-100
3SF6	2-37	1N5807US	2-61	F15	2-104
1N5550	2-42	1N5809US	2-61	F20	2-104
1N5551	2-42	1N5811US	2-61	F25	2-104
1N5552	2-42	1N6073	2-63	F30	2-104
1N5553	2-42	1N6074	2-63	F40A	2-107
1N5554	2-42	1N6075	2-63	F50A	2-107
3SM2	2-42	FF05	2-63	F60A	2-107
3SM4	2-42	FF10	2-63	M20	2-110

PART NUMBER INDEX

PART No	PAGE No	PART No	PAGE No	PART No	PAGE No
M30	2-110	ISOPAC0203	3-164	SET040203	3-183
M50A	2-113	ISOPAC0219	3-164	SET040219	3-183
M60A	2-113	ISOPAC0212	3-164	SET040212	3-183
PF20	2-116	ISOPAC0204	3-164	SET040204	3-183
PF8	2-120	ISOPAC0211	3-164	SET040211	3-183
PFO	2-120	ISOPAC0403	3-164	SET050203	3-188
PFF2	2-123	ISOPAC0419	3-164	SET050219	3-188
PFF4	2-123	ISOPAC0412	3-164	SET050212	3-188
PFF6	2-123	ISOPAC0404	3-164	SET050204	3-188
PFF50	2-127	ISOPAC0411	3-164	SET050211	3-188
PFF8	2-129	ISOPAC0603	3-164	SET100203	3-193
PFF0	2-129	ISOPAC0619	3-164	SET100219	3-193
PFM50A	2-133	ISOPAC0612	3-164	SET100212	3-193
PFM75A	2-133	ISOPAC0604	3-164	SET100204	3-193
PFR0	2-136	ISOPAC0611	3-164	SET100211	3-193
PM6	2-140	ISOPAC1203	3-164	3SBMA2	4-200
PM8	2-140	ISOPAC1219	3-164	3SBMA4	4-200
PM0	2-140	ISOPAC1212	3-164	3SBMA6	4-200
S15F	2-143	ISOPAC1204	3-164	3SBMA8	4-200
S20F	2-143	ISOPAC1211	3-164	3SBMA0	4-200
S25F	2-143	SCSF05	3-170	3SBMB2	4-200
SFF30	2-146	SCSF1	3-170	3SBMB4	4-200
SFR0	2-149	SCSF2	3-170	3SBMB6	4-200
SM40	2-153	SCSF4	3-170	3SBMB8	4-200
SM50	2-153	SCSF0	3-170	3SBMB0	4-200
SM75	2-153	SCSFF05	3-173	3SBMC2	4-200
SM100	2-153	SCSFF10	3-173	3SBMC4	4-200
SM75F	2-156	SCSFF15	3-173	3SBMC6	4-200
SM100F	2-156	SCSM05	3-175	3SBMC8	4-200
USC1104	2-159	SCSM1	3-175	3SBMC0	4-200
USC1105	2-159	SCSM2	3-175	3SBMA05F	4-202
USC1106	2-159	SCSM4	3-175	3SBMA1F	4-202
USC1304	2-161	SCSM6	3-175	3SBMA2F	4-202
USC1305	2-161	SCSM8	3-175	3SBMA4F	4-202
USC1306	2-161	SCSM0	3-175	3SBMB05F	4-202
ISOPAC0103	3-164	SET010203	3-178	3SBMB1F	4-202
ISOPAC0119	3-164	SET010219	3-178	3SBMB2F	4-202
ISOPAC0112	3-164	SET010212	3-178	3SBMB4F	4-202
ISOPAC0104	3-164	SET010204	3-178	3SBMC05F	4-202
ISOPAC0111	3-164	SET010211	3-178	3SBMC1F	4-202

PART NUMBER INDEX

PART No	PAGE No	PART No	PAGE No	PART No	PAGE No
3SBMC2F	4-202	SBR20	4-208	SCBA05F	4-228
3SBMC4F	4-202	SBR25	4-208	SCBA1F	4-228
SBMA2	4-204	SBR30	4-208	SCBA2F	4-228
SBMA4	4-204	SBR05F	4-210	SCBA4F	4-228
SBMA6	4-204	SBR1F	4-210	SCBA05FF	4-230
SBMA8	4-204	SBR2F	4-210	SCBA10FF	4-230
SBMA0	4-204	SBR4F	4-210	SCBA15FF	4-230
SBMB2	4-204	SBR6F	4-210	SCBAR05	4-232
SBMB4	4-204	SBR8F	4-210	SCBAR1	4-232
SBMB6	4-204	SBR10F	4-210	SCBAR2	4-232
SBMB8	4-204	SBR25F	4-210	SCBAR4	4-232
SBMB0	4-204	SBR05FF	4-212	SCBAR6	4-232
SBMC2	4-204	SBR10FF	4-212	SCBAR8	4-232
SBMC4	4-204	SBR15FF	4-212	SCBAR10	4-232
SBMC6	4-204	SCAJ2	4-214	SCBAR05F	4-234
SBMC8	4-204	SCAJ4	4-214	SCBAR1F	4-234
SBMC0	4-204	SCAJ6	4-214	SCBAR2F	4-234
SBMA05F	4-206	SCAJ05F	4-216	SCBAR4F	4-234
SBMA1F	4-206	SCAJ1F	4-216	SCBAR05FF	4-236
SBMA2F	4-206	SCAJ2F	4-216	SCBAR10FF	4-236
SBMA4F	4-206	SCAJ4F	4-216	SCBAR15FF	4-236
SBMA6F	4-206	SCAJ6F	4-216	SCBH2	4-238
SBMB05F	4-206	SCAJ05FF	4-218	SCBH4	4-238
SBMB1F	4-206	SCAJ10FF	4-218	SCBH6	4-238
SBMB2F	4-206	SCAJ15FF	4-218	SCBH05F	4-240
SBMB4F	4-206	SCAS05	4-220	SCBH1F	4-240
SBMB6F	4-206	SCAS1	4-220	SCBH2F	4-240
SBMC05F	4-206	SCAS2	4-220	SCBH4F	4-240
SBMC1F	4-206	SCAS4	4-220	SCBH05FF	4-242
SBMC2F	4-206	SCAS6	4-220	SCBH10FF	4-242
SBMC4F	4-206	SCAS05F	4-222	SCBH15FF	4-242
SBMC6F	4-206	SCAS1F	4-222	SCBK05	4-244
SBR05	4-208	SCAS2F	4-222	SCBK1	4-244
SBR1	4-208	SCAS4F	4-222	SCBK2	4-244
SBR2	4-208	SCAS05FF	4-224	SCBK4	4-244
SBR4	4-208	SCAS10FF	4-224	SCBK6	4-244
SBR6	4-208	SCAS15FF	4-224	SCBK05F	4-246
SBR8	4-208	SCBA2	4-226	SCBK1F	4-246
SBR10	4-208	SCBA4	4-226	SCBK2F	4-246
SBR15	4-208	SCBA6	4-226	SCBK4F	4-246

PART NUMBER INDEX

PART No	PAGE No	PART No	PAGE No	PART No	PAGE No
SCBK05FF	4-248	SC3AS2F	5-268	SC3BJ10FF	5-288
SCBK10FF	4-248	SC3AS4F	5-268	SC3BJ15FF	5-288
SCBK15FF	4-248	SC3AS05FF	5-270	SC3BK05	5-290
SET061203	4-250	SC3AS10FF	5-270	SC3BK1	5-290
SET061219	4-250	SC3AS15FF	5-270	SC3BK2	5-290
SET061212	4-250	SC3BA05	5-272	SC3BK4	5-290
SET061204	4-250	SC3BA1	5-272	SC3BK6	5-290
SET061211	4-250	SC3BA2	5-272	SC3BK05F	5-292
SET121203	4-254	SC3BA4	5-272	SC3BK1F	5-292
SET121219	4-254	SC3BA6	5-272	SC3BK2F	5-292
SET121212	4-254	SC3BA05F	5-274	SC3BK4F	5-292
SET121204	4-254	SC3BA1F	5-274	SC3BK05FF	5-294
SET121211	4-254	SC3BA2F	5-274	SC3BK10FF	5-294
S3BR05	5-260	SC3BA4F	5-274	SC3BK15FF	5-294
S3BR1	5-260	SC3BA05FF	5-276	SC6BA2	5-296
S3BR2	5-260	SC3BA10FF	5-276	SC6BA4	5-296
S3BR4	5-260	SC3BA15FF	5-276	SC6BA6	5-296
S3BR6	5-260	SC3BH05	5-278	SC6BA8	5-296
S3BR8	5-260	SC3BH1	5-278	SET111403	5-299
S3BR10	5-260	SC3BH2	5-278	SET111419	5-299
S3BR15	5-260	SC3BH4	5-278	SET111412	5-299
S3BR20	5-260	SC3BH6	5-278	SET111404	5-299
S3BR25	5-260	SC3BH05F	5-280	SET111411	5-299
S3BR30	5-260	SC3BH1F	5-280	S1KW16KA-1	6-304
S3BR05F	5-262	SC3BH2F	5-280	S1KW32KA-2	6-304
S3BR1F	5-262	SC3BH4F	5-280	S1KW48KA-3	6-304
S3BR2F	5-262	SC3BH05FF	5-282	S1KW64KA-4	6-304
S3BR4F	5-262	SC3BH10FF	5-282	S1KW80KA-5	6-304
S3BR6F	5-262	SC3BH15FF	5-282	S1KW96KA-6	6-304
S3BR25F	5-262	SC3BJ05	5-284	S2HVM2.5	6-306
S3BR05FF	5-264	SC3BJ1	5-284	S2HVM5	6-306
S3BR10FF	5-264	SC3BJ2	5-284	S2HVM7.5	6-306
S3BR15FF	5-264	SC3BJ4	5-284	S2HVM10	6-306
SC3AS05	5-266	SC3BJ6	5-284	S2HVM12.5	6-306
SC3AS1	5-266	SC3BJ05F	5-286	S2HVM15	6-306
SC3AS2	5-266	SC3BJ1F	5-286	S2HVM2.5F	6-308
SC3AS4	5-266	SC3BJ2F	5-286	S2HVM5F	6-308
SC3AS6	5-266	SC3BJ4F	5-286	S2HVM7.5F	6-308
SC3AS05F	5-268	SC3BJ6F	5-286	S3HVM2.5F	6-308
SC3AS1F	5-268	SC3BJ05FF	5-288	S3HVM5F	6-308

PART NUMBER INDEX

PART No	PAGE No	PART No	PAGE No	PART No	PAGE No
S6HVM2.5F	6-308	SCH12500	6-327	SDH15KM	6-350
S2HVS2.5	6-311	SCH15000	6-327	SDH5KS	6-352
S2HVS5	6-311	SCH20000	6-327	SDH10KS	6-352
S2HVS7.5	6-311	SCH25000	6-327	SDHF2.5KM	6-354
S2HVS2.5F	6-313	SCHJ15K	6-330	SDHF5KM	6-354
S2HVS5F	6-313	SCHJ22.5K	6-330	SDHF7.5KM	6-354
S2HVS7.5F	6-313	SCHJ30K	6-330	SDHF2.5KS	6-356
S2KW8KA-1	6-315	SCHJ37.5K	6-330	SDHF5KS	6-356
S2KW16KA-2	6-315	SCHJ45K	6-330	SHVM2.5	6-358
S2KW24KA-3	6-315	SCHS2500	6-333	SHVM5	6-358
S2KW32KA-4	6-315	SCHS5000	6-333	SHVM7.5	6-358
S2KW40KA-5	6-315	SCHS7500	6-333	SHVM10	6-358
S2KW48KA-6	6-315	SCHS10000	6-333	SHVM12.5	6-358
S3HVM2.5	6-317	SCHS12500	6-333	SHVM15	6-358
S3HVM5	6-317	SCHS15000	6-333	SHVM2.5F	6-360
S3HVM7.5	6-317	SCKV33K12	6-336	SHVM5F	6-360
S3HVM10	6-317	SCKV45K12	6-336	SHVM7.5F	6-360
S6HVM2.5	6-317	SCKV66K12	6-336	SHVM10F	6-360
S6HVM5	6-317	SCKV100K3	6-338	SHVM12.5F	6-360
S9HVM2.5	6-317	SCKV150K3	6-338	SHVM15F	6-360
S4KW4KA-1	6-319	SCKV200K3	6-338	SHVS7.5	6-362
S4KW8KA-2	6-319	SCKV12K30	6-340	SHVS10	6-362
S4KW12KA-3	6-319	SCKV18K30	6-340	SHVS5F	6-364
S4KW16KA-4	6-319	SCKV25K30	6-340	SHVS7.5F	6-364
S4KW20KA-5	6-319	SCKV12K40	6-342	SHVS10F	6-364
S4KW24KA-6	6-319	SCKV18K40	6-342	SLF2500	6-366
SCF2500	6-321	SCKV25K40	6-342	SLF5000	6-366
SCF5000	6-321	SCKV30K12F	6-344	SLF10000	6-366
SCF7500	6-321	SCKV45K12F	6-344	SLF15000	6-366
SCF10000	6-321	SCKV60K12F	6-344	S1KW8C-1D	7-370
SCF12500	6-321	SCPHN6	6-346	S1KW16C-2D	7-370
SCFS2000	6-324	SCPHN10	6-346	S1KW24C-3D	7-370
SCFS4000	6-324	SCPHN16	6-346	S1KW32C-4D	7-370
SCFS6000	6-324	SCPHN20	6-346	S1KW40C-5D	7-370
SCFS8000	6-324	SCPHN26	6-346	S1KW48C-6D	7-370
SCFS10000	6-324	SCPHN30	6-346	S1KW8C-1N	7-370
SCFS12000	6-324	SDH7.5K	6-348	S1KW16C-2N	7-370
SCH5000	6-327	SDH15K	6-348	S1KW24C-3N	7-370
SCH7500	6-327	SDH5KM	6-350	S1KW32C-4N	7-370
SCH10000	6-327	SDH10KM	6-350	S1KW40C-5N	7-370

PART NUMBER INDEX

PART No	PAGE No	PART No	PAGE No	PART No	PAGE No
S1KW48C-6N	7-370	S4KW8C-4P	7-375	SCDAR1	7-383
S1KW8C-1P	7-370	S4KW10C-5P	7-375	SCDAR2	7-383
S1KW16C-2P	7-370	S4KW12C-6P	7-375	SCDAR4	7-383
S1KW24C-3P	7-370	SCDA05	7-377	SCDAR6	7-383
S1KW32C-4P	7-370	SCDA1	7-377	SCDAR8	7-383
S1KW40C-5P	7-370	SCDA2	7-377	SCDAR10	7-383
S1KW48C-6P	7-370	SCDA4	7-377	SCNAR05	7-383
S2KW4C-1D	7-373	SCDA6	7-377	SCNAR1	7-383
S2KW8C-2D	7-373	SCNA05	7-377	SCNAR2	7-383
S2KW12C-3D	7-373	SCNA1	7-377	SCNAR4	7-383
S2KW16C-4D	7-373	SCNA2	7-377	SCNAR6	7-383
S2KW20C-5D	7-373	SCNA4	7-377	SCNAR8	7-383
S2KW24C-6D	7-373	SCNA6	7-377	SCNAR10	7-383
S2KW4C-1N	7-373	SCPA05	7-377	SCPDAR05	7-383
S2KW8C-2N	7-373	SCPA1	7-377	SCPAR1	7-383
S2KW12C-3N	7-373	SCPA2	7-377	SCPAR2	7-383
S2KW16C-4N	7-373	SCPA4	7-377	SCPAR4	7-383
S2KW20C-5N	7-373	SCPA6	7-377	SCPAR6	7-383
S2KW24C-6N	7-373	SCDA05F	7-379	SCPAR8	7-383
S2KW4C-1P	7-373	SCDA1F	7-379	SCPAR10	7-383
S2KW8C-2P	7-373	SCDA2F	7-379	SCDAR05F	7-385
S2KW12C-3P	7-373	SCDA4F	7-379	SCDAR1F	7-385
S2KW16C-4P	7-373	SCNA05F	7-379	SCDAR2F	7-385
S2KW20C-5P	7-373	SCNA1F	7-379	SCDAR4F	7-385
S2KW24C-6P	7-373	SCNA2F	7-379	SCNAR05F	7-385
S4KW2C-1D	7-375	SCNA4F	7-379	SCNAR1F	7-385
S4KW4C-2D	7-375	SCPA05F	7-379	SCNAR2F	7-385
S4KW6C-3D	7-375	SCPA1F	7-379	SCNAR4F	7-385
S4KW8C-4D	7-375	SCPA2F	7-379	SCPDAR05F	7-385
S4KW10C-5D	7-375	SCPA4F	7-379	SCPAR1F	7-385
S4KW12C-6D	7-375	SCDA05FF	7-381	SCPAR2F	7-385
S4KW2C-1N	7-375	SCDA10FF	7-381	SCPAR4F	7-385
S4KW4C-2N	7-375	SCDA15FF	7-381	SCDAR05FF	7-387
S4KW6C-3N	7-375	SCNA05FF	7-381	SCDAR10FF	7-387
S4KW8C-4N	7-375	SCNA10FF	7-381	SCDAR15FF	7-387
S4KW10C-5N	7-375	SCNA15FF	7-381	SCNAR05FF	7-387
S4KW12C-6N	7-375	SCPA05FF	7-381	SCNAR10FF	7-387
S4KW2C-1P	7-375	SCPA10FF	7-381	SCNAR15FF	7-387
S4KW4C-2P	7-375	SCPA15FF	7-381	SCPAR05FF	7-387
S4KW6C-3P	7-375	SCDAR05	7-383	SCPAR10FF	7-387

PART NUMBER INDEX

PART No	PAGE No	PART No	PAGE No	PART No	PAGE No
SCPAR15FF	7-387	SCPNN5	7-395	1N6115	8-406
SCDAS05	7-389	SCPNN10	7-395	1N6116	8-406
SCDAS1	7-389	SCPNN15	7-395	1N6117	8-406
SCDAS2	7-389	SCPNP5	7-395	1N6118	8-406
SCDAS4	7-389	SCPNP10	7-395	1N6119	8-406
SCDAS6	7-389	SCPNP15	7-395	1N6120	8-406
SCNAS05	7-389	SDHD7.5K	7-397	1N6121	8-406
SCNAS1	7-389	SDHD15K	7-397	1N6122	8-406
SCNAS2	7-389	SDHN7.5K	7-397	1N6123	8-406
SCNAS4	7-389	SDHN15K	7-397	1N6124	8-406
SCNAS6	7-389	SDHP7.5K	7-397	1N6125	8-406
SCPAS05	7-389	SDHP15K	7-397	1N6126	8-406
SCPAS1	7-389	SET030603	7-399	1N6127	8-406
SCPAS2	7-389	SET030619	7-399	1N6128	8-406
SCPAS4	7-389	SET030612	7-399	1N6129	8-406
SCPAS6	7-389	SET030604	7-399	1N6130	8-406
SCDAS05F	7-391	SET030611	7-399	1N6131	8-406
SCDAS1F	7-391	SET030803	7-399	1N6132	8-406
SCDAS2F	7-391	SET030819	7-399	1N6133	8-406
SCDAS4F	7-391	SET030812	7-399	1N6134	8-406
SCNAS05F	7-391	SET030804	7-399	1N6135	8-406
SCNAS1F	7-391	SET030811	7-399	1N6136	8-406
SCNAS2F	7-391	SET031003	7-399	1N6137	8-406
SCNAS4F	7-391	SET031019	7-399	1N6102A	8-409
SCPAS05F	7-391	SET031012	7-399	1N6103A	8-409
SCPAS1F	7-391	SET031004	7-399	1N6104A	8-409
SCPAS2F	7-391	SET031011	7-399	1N6105A	8-409
SCPAS4F	7-391	1N6102	8-406	1N6106A	8-409
SCDAS05FF	7-393	1N6103	8-406	1N6107A	8-409
SCDAS10FF	7-393	1N6104	8-406	1N6108A	8-409
SCDAS15FF	7-393	1N6105	8-406	1N6109A	8-409
SCNAS05FF	7-393	1N6106	8-406	1N6110A	8-409
SCNAS10FF	7-393	1N6107	8-406	1N6111A	8-409
SCNAS15FF	7-393	1N6108	8-406	1N6112A	8-409
SCPAS05FF	7-393	1N6109	8-406	1N6113A	8-409
SCPAS10FF	7-393	1N6110	8-406	1N6114A	8-409
SCPAS15FF	7-393	1N6111	8-406	1N6115A	8-409
SCPND5	7-395	1N6112	8-406	1N6116A	8-409
SCPND10	7-395	1N6113	8-406	1N6117A	8-409
SCPND15	7-395	1N6114	8-406	1N6118A	8-409

PART NUMBER INDEX

PART No	PAGE No	PART No	PAGE No	PART No	PAGE No
1N6119A	8-409	1N6123US	8-411	1N6128AUS	8-414
1N6120A	8-409	1N6124US	8-411	1N6129AUS	8-414
1N6121A	8-409	1N6125US	8-411	1N6130AUS	8-414
1N6122A	8-409	1N6126US	8-411	1N6131AUS	8-414
1N6123A	8-409	1N6127US	8-411	1N6132AUS	8-414
1N6124A	8-409	1N6128US	8-411	1N6133AUS	8-414
1N6125A	8-409	1N6129US	8-411	1N6134AUS	8-414
1N6126A	8-409	1N6130US	8-411	1N6135AUS	8-414
1N6127A	8-409	1N6131US	8-411	1N6136AUS	8-414
1N6128A	8-409	1N6132US	8-411	1N6137AUS	8-414
1N6129A	8-409	1N6133US	8-411	1N6138	8-417
1N6130A	8-409	1N6134US	8-411	1N6139	8-417
1N6131A	8-409	1N6135US	8-411	1N6140	8-417
1N6132A	8-409	1N6136US	8-411	1N6141	8-417
1N6133A	8-409	1N6137US	8-411	1N6142	8-417
1N6134A	8-409	1N6103AUS	8-414	1N6143	8-417
1N6135A	8-409	1N6104AUS	8-414	1N6144	8-417
1N6136A	8-409	1N6105AUS	8-414	1N6145	8-417
1N6137A	8-409	1N6106AUS	8-414	1N6146	8-417
1N6102US	8-411	1N6107AUS	8-414	1N6147	8-417
1N6103US	8-411	1N6108AUS	8-414	1N6148	8-417
1N6104US	8-411	1N6109AUS	8-414	1N6149	8-417
1N6105US	8-411	1N6110AUS	8-414	1N6150	8-417
1N6106US	8-411	1N6111AUS	8-414	1N6151	8-417
1N6107US	8-411	1N6112AUS	8-414	1N6152	8-417
1N6108US	8-411	1N6113AUS	8-414	1N6153	8-417
1N6109US	8-411	1N6114AUS	8-414	1N6154	8-417
1N6110US	8-411	1N6115AUS	8-414	1N6155	8-417
1N6111US	8-411	1N6116AUS	8-414	1N6156	8-417
1N6112US	8-411	1N6117AUS	8-414	1N6157	8-417
1N6113US	8-411	1N6118AUS	8-414	1N6158	8-417
1N6114US	8-411	1N6119AUS	8-414	1N6159	8-417
1N6115US	8-411	1N6120AUS	8-414	1N6160	8-417
1N6116US	8-411	1N6121AUS	8-414	1N6161	8-417
1N6117US	8-411	1N6122AUS	8-414	1N6162	8-417
1N6118US	8-411	1N6123AUS	8-414	1N6163	8-417
1N6119US	8-411	1N6124AUS	8-414	1N6164	8-417
1N6120US	8-411	1N6125AUS	8-414	1N6165	8-417
1N6121US	8-411	1N6126AUS	8-414	1N6166	8-417
1N6122US	8-411	1N6127AUS	8-414	1N6167	8-417

PART NUMBER INDEX

PART No	PAGE No	PART No	PAGE No	PART No	PAGE No
1N6168	8-417	1N6172A	8-422	1N6141AUS	8-427
1N6169	8-417	1N6173A	8-422	1N6142AUS	8-427
1N6170	8-417	1N6138US	8-424	1N6143AUS	8-427
1N6171	8-417	1N6139US	8-424	1N6144AUS	8-427
1N6172	8-417	1N6140US	8-424	1N6145AUS	8-427
1N6173	8-417	1N6141US	8-424	1N6146AUS	8-427
1N6138A	8-422	1N6142US	8-424	1N6147AUS	8-427
1N6139A	8-422	1N6143US	8-424	1N6148AUS	8-427
1N6140A	8-422	1N6144US	8-424	1N6149AUS	8-427
1N6141A	8-422	1N6145US	8-424	1N6150AUS	8-427
1N6142A	8-422	1N6146US	8-424	1N6151AUS	8-427
1N6143A	8-422	1N6147US	8-424	1N6152AUS	8-427
1N6144A	8-422	1N6148US	8-424	1N6153AUS	8-427
1N6145A	8-422	1N6149US	8-424	1N6154AUS	8-427
1N6146A	8-422	1N6150US	8-424	1N6155AUS	8-427
1N6147A	8-422	1N6151US	8-424	1N6156AUS	8-427
1N6148A	8-422	1N6152US	8-424	1N6157AUS	8-427
1N6149A	8-422	1N6153US	8-424	1N6158AUS	8-427
1N6150A	8-422	1N6154US	8-424	1N6159AUS	8-427
1N6151A	8-422	1N6155US	8-424	1N6160AUS	8-427
1N6152A	8-422	1N6156US	8-424	1N6161AUS	8-427
1N6153A	8-422	1N6157US	8-424	1N6162AUS	8-427
1N6154A	8-422	1N6158US	8-424	1N6163AUS	8-427
1N6155A	8-422	1N6159US	8-424	1N6164AUS	8-427
1N6156A	8-422	1N6160US	8-424	1N6165AUS	8-427
1N6157A	8-422	1N6161US	8-424	1N6166AUS	8-427
1N6158A	8-422	1N6162US	8-424	1N6167AUS	8-427
1N6159A	8-422	1N6163US	8-424	1N6168AUS	8-427
1N6160A	8-422	1N6164US	8-424	1N6169AUS	8-427
1N6161A	8-422	1N6165US	8-424	1N6170AUS	8-427
1N6162A	8-422	1N6166US	8-424	1N6171AUS	8-427
1N6163A	8-422	1N6167US	8-424	1N6172AUS	8-427
1N6164A	8-422	1N6168US	8-424	1N6173AUS	8-427
1N6165A	8-422	1N6169US	8-424	1N6461	8-430
1N6166A	8-422	1N6170US	8-424	1N6462	8-430
1N6167A	8-422	1N6171US	8-424	1N6463	8-430
1N6168A	8-422	1N6172US	8-424	1N6464	8-430
1N6169A	8-422	1N6173US	8-424	1N6465	8-430
1N6170A	8-422	1N6139AUS	8-427	1N6466	8-430
1N6171A	8-422	1N6140AUS	8-427	1N6467	8-430

PART NUMBER INDEX

PART No	PAGE No	PART No	PAGE No
1N6468	8-430	1500pF	9-446
1N6461US	8-432	1800pF	9-446
1N6462US	8-432	2200pF	9-446
1N6463US	8-432	2700pF	9-446
1N6464US	8-432	3300pF	9-446
1N6465US	8-432	3900pF	9-446
1N6466US	8-432	4700pF	9-446
1N6467US	8-432	5600pF	9-446
1N6468US	8-432	6800pF	9-446
1N6469	8-435	8200pF	9-446
1N6470	8-435	0.01uF	9-446
1N6471	8-435	0.012uF	9-446
1N6472	8-435	0.015uF	9-446
1N6473	8-435	0.018uF	9-446
1N6474	8-435	0.022uF	9-446
1N6475	8-435	0.027uF	9-446
1N6476	8-435	0.033uF	9-446
1N6469US	8-437	0.039uF	9-446
1N6470US	8-437	0.047uF	9-446
1N6471US	8-437	0.056uF	9-446
1N6472US	8-437	0.068uF	9-446
1N6473US	8-437	0.082uF	9-446
1N6474US	8-437	0.1uF	9-446
1N6475US	8-437	0.12uF	9-446
1N6476US	8-437	0.15uF	9-446
60KS200C	8-440	0.18uF	9-446
90KS200C	8-440	0.22uF	9-446
704-15K36	8-442	0.27uF	9-446
704-15K36T	8-442	0.33uF	9-446
180pF	9-446	0.39uF	9-446
220pF	9-446	High Voltage Ceramic Capacitors	9-450
270pF	9-446	SI96-01	10-456
330pF	9-446	SI96-02	10-457
390pF	9-446	SI96-03	10-458
470pF	9-446	SI96-04	10-459
560pF	9-446	SI96-09	10-460
680pF	9-446	SI96-10	10-461
820pF	9-446	SI97-02	10-462
1000pF	9-446	SI97-03	10-463
1200pF	9-446		

Chapter 1

Qualified Parts List (QPL)



Hi-Reliability Devices

Semtech Corporation offers a complete line of Hi-Reliability devices in modern production facilities located at Camarillo, California and Reynosa, Mexico. Semtech products are, by design, capable of meeting the most severe environmental requirements specified for space, military, airborne, and industrial applications. Although emphasis is placed on designed and built-in quality and reliability, a complete reliability screening program has been established. Most products offered in this data book are available in all of the following Hi-Rel configurations:

- Military Qualified Rectifiers
- Source Controlled Devices (SCD)
- Custom Level "S" Processing
- Semtech Space Level Flow

Military Qualified Rectifiers

Semtech Corporation maintains qualified status for all the devices listed in Table I. Most devices are available in four standard quality levels, JAN, JANTX, JANTXV, and JANS, as defined by MIL-PRF-19500.

JAN	Controlled lot with sample environmental and life testing
JANTX	Same as JAN plus 100% processing
JANTXV	Same as JANTX plus 100% internal visual inspection
JANS	Same as JANTXV plus 100% serialization for Space/Critical programs

Semtech maintains European qualified status for all devices listed in Table II. Most standard devices are available in two standard quality levels, F and FX as defined by DEF-STAN 59-36 part 80 and part 90 detail specifications.

- F Controlled lot with sample environmental and life testing
- FX Same as F plus 100% processing

Source Controlled Devices (SCD)

Many devices listed in this data book are available with processing defined and controlled by customer specifications, commonly referred to as SCDs. These customer specials have the screening, testing and marking as determined by the customer to meet their particular requirements. This may range from a customer-marked industrial grade product to a Hi-Rel product which is subjected to series of stringent inspections and tests to meet aerospace or special military requirements.

Using the Semtech developed HR processing programs in this section, along with the standard test methods and conditions, complete custom processing can be designed. Semtech corporation HR programs were conceived with the intent of providing our customers with a standardized, off-the-shelf, cost effective Hi-Rel product. The Hi-Rel screening and testing program for each product category is defined by a separate HR specification which utilizes MIL-PRF-19500 screening, flow concepts and the MIL-STD-750 and MIL-STD-202 test methods.

The customer who must maintain his own specification for contractual purposes can simplify his procurement by incorporating the HR document into his own specification. HR documents for each category are as follows:

Product Category	Spec. #
Rectifier assemblies	HR500A
High voltage diodes (VRWM) > 1000V)	HR500H
Rectifiers (VRWM < 1000V)	HR500R
Transient voltage suppressors	HR500T
Semtech Space Level Flow	HR500S

Table I: Military Qualified Rectifiers - Qualified product list

Device N	JAN	JANTX	JANTXV	JANS
1N3644	X	X		
1N3645	X	X		
1N3646	X	X		
1N3647	X	X		
1N5415	X	X	X	*
1N5416	X	X	X	*
1N5417	X	X	X	*
1N5418	X	X	X	*
1N5419	X	X	X	*
1N5420	X	X	X	*
1N5550	X	X	X	X
1N5551	X	X	X	X
1N5552	X	X	X	X
1N5553	X	X	X	X
1N5554	X	X	X	X
1N5614	X	X	X	
1N5615	X	X	X	
1N5616	X	X	X	
1N5617	X	X	X	
1N5618	X	X	X	
1N5619	X	X	X	
1N5620	X	X	X	
1N5621	X	X	X	
1N5622	X	X	X	
1N5623	X	X	X	
1N5802	X	X	X	*
1N5804	X	X	X	*
1N5806	X	X	X	*
1N5807	X	X	X	*
1N5809	X	X	X	*
1N5811	X	X	X	*
1N6073	X	X	X	
1N6074	X	X	X	
1N6075	X	X	X	
1N6079	X	X	X	
1N6080	X	X	X	
1N6081	X	X	X	
1N6102-73	X	X	X	*
1N6103A-73A	X	X	X	*
1N6461-6476	X	X	X	*

Table II: European Military Qualified Rectifiers - Qualified Products List

Device N	F	FX
1N3647	X	X
1N5416	X	X
1N5417	X	X
1N5418	X	X
1N5550	X	X
1N5551	X	X
1N5552	X	X
1N5553	X	X
1N5554	X	X
1N5614	X	X
1N5615	X	X
1N5616	X	X
1N5617	X	X
1N5618	X	X
1N5619	X	X
1N5620	X	X
1N5622	X	X
1N6074	X	X
1N6075	X	X
1N6080	X	X
1N6081	X	X
1N6102-73	X	X
1N6103A-73A	X	X
PFO		X
3PFO		X
2PFT2		X
3PFT2		X
F30	X	X
F60A	X	X
S25F	X	X
PFF50	X	X
SCAJ6	X	X
SCBH6	X	X
SCBA6	X	X
SCAJ4F	X	X
SCBH4F	X	X
SCBA4F	X	X
SC3BJ6	X	X
SC3BH6	X	X
SC3BA6	X	X

Device N	F	FX
SC3BJ4F	X	X
SC3BH4F	X	X
SC3BA4F	X	X
SBR10	X	X
SBR30	X	X
SBR4F	X	X
S3BR10	X	X
S3BR30	X	X
S3R4F	X	X

* Pending JANS certification

Custom Level “S” Processing

Top of the line custom built and processed devices, requiring baseline documentation, wafer lot acceptance, traceability, level “S” process controls and screening are available. Consult the factory for details.

**1 Table III:
Semtech standard test methods and conditions**

Test	MIL-STD-750 Method	Test Condition	Comments
Internal Visual	2072 2073 2074		
High Temp. Storage	1032		48 Hrs min @ rated max storage temp.
Temp. Cycle	1051	C	High temp. will be max rated storage temp., 10 cycles, 15 minutes at extremes
Hermetic Seal (Gross Leak)	1071	E	Isopropyl alcohol is used in lieu of dye penetrant; I_R performed as end point.
H.T.R.B Burn-in	1038	A	1) 125°C, 96 hours, 80% V_{RWM} min for high voltage rectifiers. 2) 150°C, 48 hrs, 80% V_{RWM} min for diodes
Power Burn-in	1038	B	1) V_{RWM} = rated or 3kV whichever is less; I_o = rated or 100mA whichever is less; T_A = 25°C, f=60Hz for diodes > 1kV. 2) V_{RWM} = rate; I_o = see HR500R; T_A = 25°C, f=60Hz for diodes ≤ 1kV.
X-Ray	2076		2 views
External Visual	2071		
Group A	-	-	MIL-PRF-19500 Table III, JANTXV
Group B	-	-	MIL-PRF-19500 TABLE IV
Group C	-	-	MIL-PRF-19500 TABLE V
Solderability	2026		LTPD=15, Electrical rejects may be used
Resistance to Solvents	1022		LTPD=15, Electrical rejects may be used

High Reliability Screening Specification and Test Procedure for Power Rectifier Assemblies

1. Purpose

This specification establishes the requirements for lot process-conditioning, testing and screening for those applications requiring a high degree of reliability assurance.

2. Scope

This specification is applicable to power rectifier assemblies.

3. Applicable Documents

The following documents form a part of this specification to the extend specified herein.

Specification: Military MIL-PRF-19500 - Semiconductor Devices, General Specification

Standard: Military MIL-STD-750- Test Methods for Semiconductor Devices

4. Requirements

All rectifier assemblies shall be process-conditioned, tested and screened in accordance with the procedure specified herein. All assemblies passing the log process-conditioning, testing and screening shall be identified (unless otherwise specified) with prefix "HR" added to the applicable part number. All assemblies with aluminum cases shall be black anodized.

4.1 Definitions, abbreviations, symbols and statistical sampling. The definitions, abbreviations, symbols and statistical sampling used herein are defined in MIL-PRF-19500 appendices.

5. Quality Assurance Provisions

5.1 Sampling and Inspection

Inspection shall be on a 100% basis unless otherwise specified.

5.2 Methods of examination and test

Methods of examination and test shall be as specified in Table 1 herein.

5.3 Process-conditioning, testing and screening.

The procedure for process-conditioning, testing and screening shall be in accordance with 5.3.1 through 5.3.4.

5.3.1 Diode screening. All diodes used in the assembly shall be subjected to 100% screening and testing in accordance with the applicable HR or equivalent military specification for the diodes being utilized.

5.3.2 Assembly screening. All assemblies shall be subjected to 100% screening and testing in accordance with 5.3.3 and 5.3.4.

5.3.3 Thermal shock (temperature cycling). All assemblies shall be subjected to thermal shock (temp. cycle) in accordance with MIL-STD-750, Method 1051, test condition F, except the low temperature shall be at minimum rated storage temperature and the time at the temperature extreme shall be 30 minutes minimum.

5.3.4 Post temperature cycling tests. All assemblies shall be subjected to Group A Inspections and Tests in accordance with Table 1. All assemblies failing to meet the limits of Table 1 shall be removed from the lot.

Table 1 - HR500A

Inspection (1)	MIL-STD-750		LTPD	Symbol	Limits
	Method	Conditions			
Visual & mechanical examination	2071		10		
Reverse current	4016	dc method VR=rated	100%	IR	Applicable part number data sheet
Forward voltage	4011	tp ≤ 8.3mS duty cycle ≤2% IF=applicable part number data sheet	100%	VF	Applicable part number data sheet
Reverse current	4016	dc method TA=100°C VR=rated	10	IR	Applicable part number data sheet

(1) All tests are performed at 25°C unless otherwise specified.

High Reliability Screening Specification and Test Procedure for Discrete, Axial, Subminiature, High Voltage Rectifiers

1

1. Purpose

This specification establishes the requirements for lot process-conditioning, testing and screening for those applications requiring a high degree of reliability assurance.

2. Scope

This specification is applicable to ceramic, discrete, axial lead, subminiature, high voltage rectifiers with $V_{RWM} > 1000$ volt.

3. Applicable Documents

The following documents form a part of this specification to the extend specified herein.

Specification: Military MIL-PRF-19500 - Semiconductor devices, general specification

Standard: MIL-STD-750 - Test Methods for Semiconductor devices

4. Requirements

All devices shall be process-conditioned, tested and screened in accordance with the procedure specified herein. All devices passing the lot process-conditioning, testing and screening shall be identified (unless otherwise specified) with prefix 'HR' added to the applicable part number.

- 4.1 **Definitions, abbreviations, symbols and statistical sampling.** The definitions, abbreviations, symbols and statistical sampling used herein are defined in MIL-PRF-19500 appendices.

5. Quality Assurance Provisions

5.1 Sampling and Inspection

Inspection shall be on a 100% basis unless otherwise specified.

5.2 Methods of examination and test

Methods of examination and test shall be as specified in Table 1 and herein.

5.2.1 Burn-In.

This test shall be conducted with a one half sine wave of the specified peak voltage impressed across the diode in the reverse direction, followed by a one half sine wave which produces the specified average rectified current. The forward conduction angle of the rectified current shall be no greater than 180 degrees nor less than 150 degrees.

5.2.2 Reverse recovery time.

When specified by the applicable part number, the

reverse recovery time (t_{rr}) shall be measured per MIL-STD-750, method 4031. The reverse recovery conditions shall be as specified for the applicable part number. The reverse recovery time is defined as the time the rectifier begins to conduct in the reverse direction (crosses $I=0$) until the reverse recovery current (I_{rr}) decays to 25% of the peak reverse current (I_R). The point of contact on the leads shall be no less than 0.375 inches from the diode body.

5.3 Process-conditioning, testing and screening.

The procedure for process-conditioning, testing and screening shall be in accordance with 5.3.1 through 5.3.8.

5.3.1 High-temperature storage

All devices shall be subjected to high temperature storage in accordance with MIL-STD-750, method 1032, for at least 48 hours at the rated maximum storage temperature.

5.3.2 Thermal shock (temperature cycling)

All devices shall be subjected to thermal shock (temperature cycling) in accordance with MIL-STD-750, method 1051, test condition C, except that the high temperature shall be at maximum rated storage temperature test duration shall be 10 continuous cycles, and the time at the temperature extremes shall be 15 minutes minimum.

5.3.3 Hermetic seal (gross leak)

All devices shall be tested for gross leaks in accordance with MIL-STD-750, method 1071, test condition E, except that isopropyl alcohol shall be used in lieu of dye penetrant, and the reverse leakage current test shall be performed as the end point.

5.3.4 Pre burn-in tests

All devices shall be measured for the applicable I_R and V_F limits. All devices which fail to meet the limits shall be removed for the lot.

5.3.5 Burn-in tests

All devices shall be subjected to burn-in accordance with 5.3.5.1 or 5.3.5.2.

5.3.5.1 High temperature reverse bias.

All devices shall be subjected to high temperature reverse bias in accordance MIL-STD-750, method 1038, condition A, for 96 hours, under the following conditions:

$$V_R = 80\% \text{ rated } V_{RWM}$$

$$T_A = 125^\circ\text{C}$$

5.3.5.2 Power burn-in.

All devices shall be subjected to power burn-in in accordance with MIL-STD-750, method 1038, condition B, for 96 hours, under the following conditions (see 5.2.1):

V_{RWM} = rated or 3kV whichever is less
 I_o = rated or 100mA whichever is less
 T_A = room ambient
 f = 60 Hz

5.3.6 Post Burn-in tests

All devices after burn-in shall be re-tested for the applicable parameters V_F and I_R . All devices which fail to meet the limits shall be removed from the lot.

5.3.7 Percent defective allowable (PDA).

When the total quantity of devices failing the post burn-in tests of 5.3.6 is less than or equal to 10%, the lot is acceptable. If the PDA is greater than 10% but less than 20%, the lot may be resubmitted for burn-in in accordance with MIL-PRF-19500 requirements. If the PDA exceeds 20%, the lot is unacceptable.

5.3.8 Other examinations and tests.

All other examinations and tests shall be performed in accordance with Table 2. All devices failing to meet the limits of Table 2 shall be removed from the lot.

Table 1 - 100% Process-conditioning, Testing and Screening

PROCESS	MIL-STD-750	
	Method	Conditions
1. High Temperature storage (Stabilization bake)	1032	48 hour mins at maximum storage temperature (see 5.3.1)
2. Thermal shock (Temperature cycling)	1051	Test condition C except T(high) = max. rated storage temperature (see 5.3.2)
3. Hermetic seal (Gross)	1071	Test condition E. Alcohol bomb at 100 psi 4 hours min. (see 5.3.3)
4. Pre burn-in tests	—	As specified in 5.3.4
5. Burn-in	1038	Test condition A or B and as specified in 5.2.1 and 5.3.5
Post burn-in tests for PDA	—	As specified in 5.3.6
7. Other examinations and tests	—	As specified in 5.3.8 and table 2.

Table 2 - HR500H Tests

INSPECTION (1)	MIL-STD-750		LTPD	Symbol	Limits
	Method	Conditions			
Visual & mechanical examination	2071		10		
Reverse Current	4061	dc method V_R - rated	100%	I_R	Applicable part number data sheet
Forward voltage	4011	$t_D \leq 8.3mS$ duty cycle $\leq 2\%$	100%	V_F	Applicable part number data sheet
Reverse recovery time	—	I_F = applicable part number data sheet See 5.2.3	10	t_{rr}	Applicable part number data sheet
Reverse current	4016	dc method $T_A = 100^\circ C$ V_R = rated	10	I_R	Applicable part number data sheet

(1) Add tests are performed at 25°C unless otherwise specified.

High Reliability Screening Specification and Test Procedure for Discrete, Axial Lead, Power Rectifiers

1

1. Purpose

This specification establishes the requirements for lot process-conditioning, testing and screening for those applications requiring a high degree of reliability assurance.

2. Scope

This specification is applicable to discrete, axial lead, power rectifiers devices with $V_{RWM} \leq 1000$ volt.

3. Applicable Documents

The following documents form a part of this specification to the extent specified herein.

Specification: Military MIL-PRF-19500 - Semiconductor devices, general specification

Standard: MIL-STD-750 - Test Methods for Semiconductor devices

4. Requirements

All devices shall be process-conditioned, tested and screened in accordance with the procedure specified herein. All devices passing the lot process-conditioning, testing and screening shall be identified (unless otherwise specified) with prefix 'HR' added to the applicable part number.

- 4.1 **Definitions, abbreviations, symbols and statistical sampling.** The definitions, abbreviations, symbols and statistical sampling used herein are defined in MIL-PRF-19500 appendices.

5. Quality Assurance Provisions

- 5.1 **Sampling and Inspection**
Inspection shall be on a 100% basis unless otherwise specified.

- 5.2 **Methods of examination and test**
Methods of examination and test shall be as specified in Table 1 and herein.

- 5.2.1 **Burn-In.**
This test shall be conducted with a one half sine wave of the specified peak voltage impressed across the diode in the reverse direction, followed by a one half sine wave which produces the specified average rectified current. The forward conduction angle of the rectified current shall be no greater than 180 degrees nor less than 150 degrees.

- 5.2.2 **Scope display evaluation**
This test shall be conducted using an oscilloscope to display the reverse voltage breakdown characteristics.

Reverse current over the knee shall be at least $50\mu A$. Each device shall exhibit a stable characteristic and any discontinuity or dynamic instability of the trace shall be cause for rejection.

- 5.2.3 **Reverse recovery time.**
When specified by the applicable part number, the reverse recovery time (t_{rr}) shall be measured per MIL-STD-750, method 4031. The reverse recovery conditions shall be as specified for the applicable part number. The reverse recovery time is defined as the time the rectifier begins to conduct in the reverse direction (crosses $I=0$) until the reverse recovery current (I_{rr}) decays to 25% of the peak reverse current (I_R). The point of contact on the leads shall be no less than 0.375 inches from the diode body.

- 5.3 **Process-conditioning, testing and screening.**
The procedure for process-conditioning, testing and screening shall be in accordance with 5.3.1 through 5.3.8.

- 5.3.1 **High-temperature storage**
All devices shall be subjected to high temperature storage in accordance with MIL-STD-750, method 1032, for at least 48 hours at the rated maximum storage temperature.

- 5.3.2 **Thermal shock (temperature cycling)**
All devices shall be subjected to thermal shock (temperature cycling) in accordance with MIL-STD-750, method 1051, test condition C, except that the high temperature shall be at maximum rated storage temperature test duration shall be 10 continuous cycles, and the time at the temperature extremes shall be 15 minutes minimum.

- 5.3.3 **Hermetic seal (gross leak)**
All devices shall be tested for gross leaks in accordance with MIL-STD-750, method 1071, test condition E, except that isopropyl alcohol shall be used in lieu of dye penetrant, and the reverse leakage current test shall be performed as the end point.

- 5.3.4 **Pre burn-in tests**
All devices shall be measured for the applicable I_R and V_F limits. All devices shall be handled or identified such that the delta end points can be determined after the burn-in test. All devices which fail to meet the limits shall be removed from the lot.

5.3.5 Power Burn-in

All devices shall be subjected to power burn-in in accordance with MIL-STD-750, method 1038, condition B, for 96 hours, under the following conditions (see 5.2.1):

V_{RWM} = rated
 I_o rated or adjust for T_j max. +0, -30°C
 T_A = room ambient
 f = 60 Hz

5.3.6 Post Burn-in tests

All devices after burn-in shall be re-tested for the applicable parameters V_F and I_R . Deltas for specified parameters shall not exceed the limits of table 2. All

devices which fail to meet the limits shall be removed from the lot.

5.3.7 Percent defective allowable (PDA).

When the total quantity of devices failing the post burn-in tests of 5.3.6 is less than or equal to 10%, the lot is acceptable. If the PDA is greater than 10% but less than 20%, the lot may be resubmitted for burn-in in accordance with MIL-PRF-19500 requirements. If the PDA exceeds 20%, the lot is unacceptable.

5.3.8 Other examinations and tests.

All other examinations and tests shall be performed in accordance with Table 2. All devices failing to meet the limits of Table 2 shall be removed from the lot.

Table 1 - 100% Process-conditioning, Testing and Screening

PROCESS	MIL-STD-750	
	Method	Conditions
1. High Temperature storage (Stabilization bake)	1032	48 hour mins at maximum storage temperature (see 5.3.1)
2. Thermal shock (Temperature cycling)	1051	Test condition C except $T(\text{high}) = \text{max. rated storage temperature}$ (see 5.3.2)
3. Hermetic seal (Gross)	1071	Test condition E. Alcohol bomb at 100 psi 4 hours min. (see 5.3.3)
4. Pre burn-in tests	—	As specified in 5.3.4
5. Burn-in	1038	Test condition A or B and as specified in 5.2.1 and 5.3.5
Post burn-in tests for PDA	—	As specified in 5.3.6
7. Other examinations and tests	—	As specified in 5.3.8 and table 2.

Table 2 - HR500R Tests

INSPECTION (1)	MIL-STD-750		LTPD	Symbol	Limits
	Method	Conditions			
Visual & mechanical examination	2071		10		
Reverse Current	4061	dc method V_R - rated	100%	I_R	Applicable part number data sheet
Forward voltage	4011	$t_D \leq 8.3\text{mS}$ duty cycle $\leq 2\%$ I_F = applicable part number data sheet	100%	V_F	Applicable part number data sheet
Scope display	—	See 5.2.2	100%	—	
Reverse recovery time	—	See 5.2.3	10	t_{rr}	Applicable part number data sheet
Reverse current	4016	dc method $T_A = 100^\circ\text{C}$ V_R = rated	10	I_R	Applicable part number data sheet
Reverse current delta	—		100%	ΔI_R	100% initial value or 25% of limit which ever is the greater
Forward voltage delta	—		100%	ΔV_F	$\pm 0.1V$

(1) All tests performed at 25°C unless otherwise specified.

High Reliability Screening Specification and Test Procedure for Discrete, Axial Lead, Bipolar, Transient Voltage Suppressors

1

1. Purpose

This specification establishes the requirements for lot process-conditioning, testing and screening for those applications requiring a high degree of reliability assurance.

2. Scope

This specification is applicable to discrete, axial lead, silicon, bipolar, transient voltage suppressor devices.

3. Applicable Documents

The following documents form a part of this specification to the extent specified herein.

Specification: Military MIL-PRF-19500 - Semiconductor devices, general specification

Standard: MIL-STD-750 - Test Methods for Semiconductor devices

4. Requirements

All devices shall be process-conditioned, tested and screened in accordance with the procedure specified herein. All devices passing the lot process-conditioning, testing and screening shall be identified (unless otherwise specified) with prefix 'HR' added to the applicable part number.

- 4.1 **Definitions, abbreviations, symbols and statistical sampling.** The definitions, abbreviations, symbols and statistical sampling used herein are defined in MIL-PRF-19500 appendices.

5. Quality Assurance Provisions

- 5.1 **Sampling and Inspection**
Inspection shall be on a 100% basis unless otherwise specified.
- 5.2 **Methods of examination and test**
Methods of examination and test shall be as specified in Table 1 and herein.
- 5.2.1 **Maximum peak pulse current (I_p)**
The peak pulse current shall be applied with a current vs time waveform such that the pulse current shall reach 100 % of I_p at $t \leq 10\mu\text{s}$ and exponentially decays to 50% of I_p at $t \geq 1\text{ ms}$ for $t_p = 1\text{ms}$.
- 5.2.2 **Clamping voltage**
The peak pulse clamping voltage shall be measured across the diode in a 1 ms time interval.

5.3 Process-conditioning, testing and screening.

The procedure for process-conditioning, testing and screening shall be in accordance with 5.3.1 through 5.3.0.

5.3.1 High-temperature storage

All devices shall be subjected to high temperature storage in accordance with MIL-STD-750, method 1032, for at least 48 hours at the rated maximum storage temperature.

5.3.2 Thermal shock (temperature cycling)

All devices shall be subjected to thermal shock (temperature cycling) in accordance with MIL-STD-750, method 1051, test condition C, except that the high temperature shall be at maximum rated storage temperature test duration shall be 10 continuous cycles, and the time at the temperature extremes shall be 15 minutes minimum.

5.3.3 Hermetic seal (gross leak)

All devices shall be tested for gross leak in accordance with MIL-STD-750, method 1071, test condition E, and the reverse leakage current test shall be performed as the end point.

5.3.4 Pre burn-in tests

All devices shall be pulsed in each direction, in accordance with paragraph 5.2.1, at the applicable $I_p(\text{max})$. All devices shall be measured in each direction for the applicable IR and VBR limits. All devices shall be handled or identified such that the delta end points can be determined after the burn-in test. All devices which fail to meet the limits shall be removed from the lot.

5.3.5 Burn-in tests

All devices shall be subjected to burn-in for 48 hours in each direction, for a total duration of 96 hours, under the following conditions:

VRWM = rated
TA = 125°C

5.3.6 Post burn-in tests

All devices after burn-in shall be rested, in each direction, for the applicable parameters IR and VBR. Deltas for specified parameters shall not exceed the limits of Table 2. All devices which fail to meet the limits shall be removed from the lot.

5.3.7 Percent defective allowable

When the total quantity of devices failing the post burn-in tests of 5.3.6 is less than or equal to 10%, the lot is acceptable. If the PDA is greater than 10% but less than 20%, the lot may be resubmitted for burn-in in accordance with MIL-PRF-19500 requirements. If the PDA exceeds 20%, the lot is unacceptable.

5.3.8 Other examinations and tests

All other examinations and tests shall be performed in accordance with Table 2. All devices failing to meet the limits of Table 2 shall be removed from the lot.

Table 1 - 100% Process-conditioning, Testing and Screening

PROCESS	MIL-STD-750	
	Method	Conditions
1. High Temperature storage (Stabilization bake)	1032	48 hour mins at maximum storage temperature (see 5.3.1)
2. Thermal shock (Temperature cycling)	1051	Test condition C except T(high) = max. rated storage temperature (see 5.3.2)
3. Hermetic seal (Gross)	1071	Test condition E. Alcohol bomb at 100 psi 4 hours min. (see 5.3.3)
4. Pre burn-in tests	—	As specified in 5.3.4
5. Burn-in	1038	Test condition A or B and as specified in 5.2.1 and 5.3.5
6. Post burn-in tests for PDA	—	As specified in 5.3.6
7. Other examinations and tests	—	As specified in 5.3.8 and table 2.

Table 2 - HR500T Tests

INSPECTION (1)	MIL-STD-750		LTPD	Symbol	Limits
	Method	Conditions			
Visual & mechanical examination	2071		10		
Reverse current	4016	dc method V_R - rated	100%	I_R	Applicable part number data sheet
Breakdown voltage (2)	4022	$t_b \leq 300\text{ms}$ duty cycle $\leq 2\%$ $I(BR)$ = applicable part number data sheet	100%	V_{BR} Min	Applicable part number data sheet
Clamping voltage max. (2) (see 5.2.2)	—	$t_p = 1.0\text{ms}$ I_p = rated (See 5.2.1)	10	V_C max	Applicable part number data sheet
Reverse current delta (2)	—		100%	ΔI_R	100% initial value or 20% of limit which ever is the greater
Breakdown voltage delta (2)	—		100%	$\pm V_{BR}$ min	$\pm 5\%$ initial value

(2) All electrical testing shall be performed twice, once in each direction.

Semtech Space Level Screening (HR500S):

Semtech Space Level test flow screening is now available for our Power Discretes product line. This screening can be applied to both our standard QPL as well as QPL equivalent diodes that are manufactured in our DSCC certified production facility. Please contact factory for details.

Chapter 2

Half Wave Discrete Rectifiers

Datasheet No.	Title:
1N3611-14, 57	Axial Leaded Hermetically Sealed Standard Recovery Rectifier Diode
1N3647	Rectifier, up to 3kV, 600mA, 2.5us
1N4245_49	General Purpose Silicon Rectifiers
1N4942_48	Axial Leaded Hermetically Sealed Standard Recovery Rectifier Diode
1N5415_1N5420	Axial Leaded Hermetically Sealed Fast Rectifier Diode
1N5550-54, 3SM2-3SM0	Axial Leaded Hermetically Sealed Standard Recovery Rectifier Diode
1N5614_22	Axial Leaded Hermetically Sealed Standard Recovery Rectifier Diode
1N5615_23	Axial Leaded Hermetically Sealed Standard Recovery Rectifier Diode
1N5802_06	Axial Leaded Hermetically Sealed Standard Recovery Rectifier Diode
1N5802_06_US	Superfast Recovery Diodes, Surface Mount, US
1N5807_11	Axial Leaded Hermetically Sealed Standard Recovery Rectifier Diode
1N5807_11US	Superfast Recovery Diodes, Surface Mount, US
1N6073	Rectifier, up to 150V, 1.8A, 30ns
1N6076	Rectifier, up to 150V, 3.1A, 30ns
1N6081	Rectifier, up to 150V, 5A, 30ns
2PFF6	Axial Leaded Hermetically Sealed Superfast Recovery Rectifier Diode
2PFF8-2PFF0	Axial Leaded Hermetically Sealed Superfast Recovery Rectifier Diode
2PFT2	Rectifier, up to 200V, 2.6A, 25ns
3FF60	Rectifier, up to 600V, 3.4A, 50ns
3PFO	Rectifier, up to 1kV, 3.25A, 300ns
3PFR0	Rectifier, 1kV, 2.7A, 150ns
3PFT2	Rectifier, up to 200V, 4A, 30ns
F30	Rectifier, up to 3kV, 350mA, 250ns
F60A	Rectifier, up to 6kV, 100mA, 300ns
M30	Rectifier, up to 3kV, 330mA, 2us
M60A	Rectifier, up to 6kV, 260mA, 5us
PF20	Axial Leaded Hermetically Sealed Fast Rectifier Diode
PF8_PFO	Axial Leaded Hermetically Sealed Fast Rectifier Diode
PFF2_4_6	Axial Leaded Hermetically Sealed Superfast Recovery Rectifier Diode
PFF50	Axial Leaded Hermetically Sealed Standard Recovery Rectifier Diode
PFF8_PFF0	Axial Leaded Hermetically Sealed Superfast Recovery Rectifier Diode
PFM50A_PFM75A	Rectifier, up to 6kV, 100mA, 300ns
PFR0	Axial Leaded Hermetically Sealed Superfast Recovery Rectifier Diode
PM6_8_0	Axial Leaded Hermetically Sealed Standard Recovery Rectifier Diode
S25F	Rectifier, up to 2.5kV, 500mA, 300ns
SFF30	Rectifier, 3kV, 360mA, 50ns
SFR0	Rectifier, 1kV, 1.6A, 150ns
SM100	Rectifier, up to 10kV, 300mA, 2.5us
SM100F	Rectifier, up to 10kV, 290mA, 300ns
USC1106	Rectifier, up to 400V, 2.1A, 50ns
USC1306	Rectifier, up to 400V, 5A, 50ns

POWER DISCRETES
Description

Quick reference data

2

$$V_R = 200 - 1000 \text{ V}$$

$$I_O = 1.0 \text{ A}$$

$$t_{rr} = 2 \mu\text{s}$$

$$V_F = 1.1 \text{ V}$$

Features

- ◆ Low reverse leakage current
- ◆ Hermetically sealed in Metoxilite fused metal oxide
- ◆ Good thermal shock resistance
- ◆ Low forward voltage drop
- ◆ Avalanche capability

These products can be supplied as JANTX levels.

Electrical Specifications

Electrical specifications @ $T_A = 25^\circ\text{C}$ unless otherwise specified.

Types	V_{RWM}	V_F	I_O		I_{FSM}	I_R	T_{RR}	T_{STG} and T_J	$R_{\theta JL}$ L=.375 inch (9.53mm)
		At: $T_J = 25^\circ\text{C}$ $I_O = 1 \text{ A}$	At: $T_A = +100^\circ\text{C}$ (1)(2)	At: $T_A = +150^\circ\text{C}$ (1)(2)	$T_A = +25^\circ\text{C}$ $I_O = 1 \text{ A dc}$ $t_p = 8.0 \text{ ms}$	V_{RWM} , $T_J = 25^\circ\text{C}$	0.5A I_O to 1.0A I_{RM} recover to 0.25A I_{RM} (REC)		
	V(pk)	V	A dc	mA dc	A(pk)	μA	μs	$^\circ\text{C}$	$^\circ\text{C/W}$
1N3611	200	1.1	1	300	30	0.5	2	-65 to +175	38
1N3612	400	1.1	1	300	30	0.5	2	-65 to +175	38
1N3613	600	1.1	1	300	30	0.5	2	-65 to +175	38
1N3614	800	1.1	1	300	30	0.5	2	-65 to +175	38
1N3957	1000	1.1	1	300	30	0.5	2	-65 to +175	38

Notes:

(1) From I_O rating is independent of heat sinking, special mounting, or leads of the device.

(2) Derate linearly at 13.3mA between $T_A = +100^\circ\text{C}$ and $T_A = +175^\circ\text{C}$

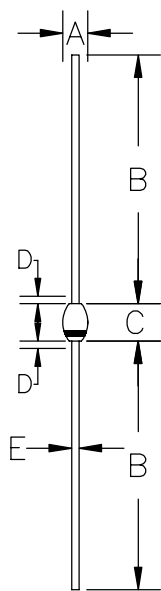
POWER DISCRETES
Ordering Information

Part Number	Description
1N3611 1N3612 1N3613 1N3614 1N3957	Axial leaded hermetically sealed ⁽¹⁾

2

Note:

(1) Available in bulk or tape and reel packaging. Please consult factory for quantities.

Outline Drawing


G2

DIMENSIONS					
DIM ^N	MM		INCHES		NOTE
	MIN	MAX	MIN	MAX	
A	1.6	2.8	.065	.110	—
B	25.4	33.0	1.00	1.30	—
C	3.5	4.2	.140	.165	—
D	—	.80	—	.030	1
E	.66	.84	.026	.033	—

NOTES:

1. LEAD DIAMETER UNCONTROLLED
OVER THIS REGION.

CATHODE IS DENOTED BY A BAND.

Contact Information

Semtech Corporation
Power Discretes Products Division
200 Flynn Road, Camarillo, CA 93012
Phone: (805)498-2111 FAX (805)498-3804



AXIAL LEADED HERMETICALLY SEALED HIGH VOLTAGE STANDARD RECOVERY RECTIFIER DIODE

QUICK REFERENCE DATA

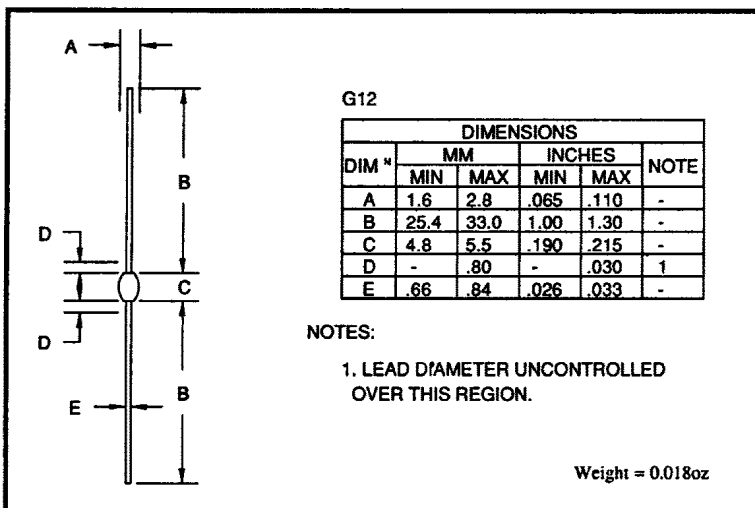
- High thermal shock resistance
- Hermetically sealed with Metoxillite fused metal oxide
- Multi-junction construction
- Low reverse leakage currents
- Subminiature body size

- $V_R = 2kV - 3kV$
- $I_F = 600mA$
- $t_{rr} = 2.5\mu s$
- $I_R = 1.0\mu A$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	1N3645 SM20	1N3646 SM25	1N3647 SM30	Unit
Working reverse voltage	V_{RWM}	2000	2500	3000	V
Repetitive reverse voltage	V_{RRM}	2000	2500	3000	V
Average forward current (@ 55°C in oil)	$I_{F(AV)}$	← 600 →			mA
Repetitive surge current (@ 55°C in oil, lead length 0.375")	I_{FRM}	← 2.5 →			A
Non-repetitive surge current ($t_p = 8.3mS$, @ V_R & T_{jmax})	I_{FSM}	← 14 →			A
Storage temperature range	T_{STG}	← -65 to +175 →			°C
Operating temperature range	T_{OP}	← -65 to +175 →			°C

MECHANICAL



These products are qualified to MIL-PRF-19500/279 and are preferred parts as listed in MIL-STD-701.

They can be supplied fully released as JAN and JANTX versions.

These products are available in Europe to DEF STAN 59-61 (PART 80)/034.



CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	1N3645 SM20	1N3646 SM25	1N3647 SM30	Unit
Average forward current for sine wave - max. pcb mounted - max. in unstirred oil	$I_F(AV)$ $I_F(AV)$	← 260 → ← 600 →			mA mA
I^2t for fusing (t = 8.3mS) max.	I^2t	← 0.026 →			A ² S
Forward voltage drop max. @ $I_F = 250mA$, $T_j = 25^\circ C$	V_F	← 5.00 →			V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ C$ @ V_{RWM} , $T_j = 100^\circ C$	I_R I_R	← 1.00 → ← 20.0 →			μA μA
Reverse recovery time max. 50mA I_F to 100mA I_R . Recover to 25mA I_{RR} .	t_{rr}	← 2.5 →			μS
Junction capacitance typ. @ $V_R = 5V$, $f = 1MHz$	C_j	← 8.0 →			pF
Thermal resistance - junction to oil Unstirred @ 55°C Stirred @ 55°C	$R_{\theta JO}$ $R_{\theta JO}$	← 30.0 → ← 18.0 →			$^\circ C/W$ $^\circ C/W$
Thermal resistance - junction to amb. on 0.06" thick pcb. 1oz copper.	$R_{\theta JA}$	← 90.0 →			$^\circ C/W$

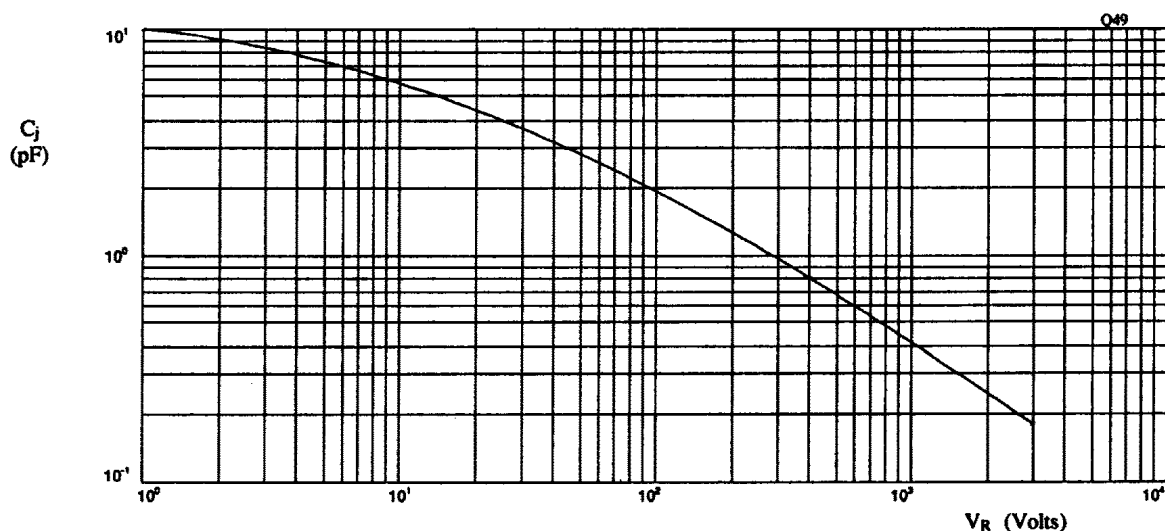


Fig 1. Typical junction capacitance as a function of reverse voltage.



2

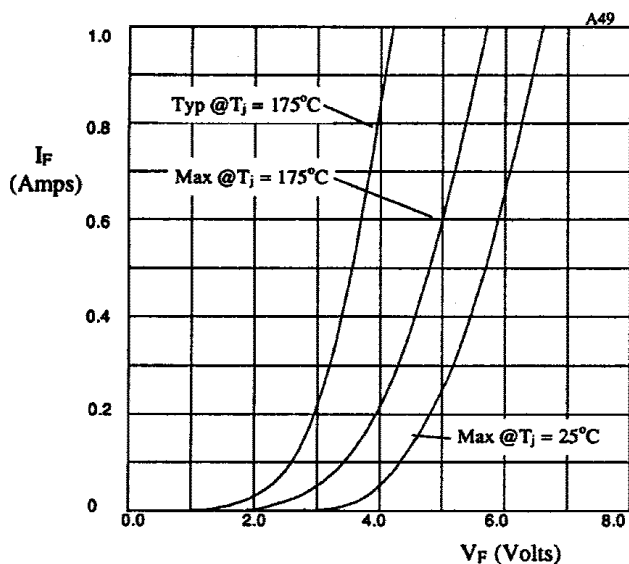


Fig 2. Forward voltage drop as a function of forward current.

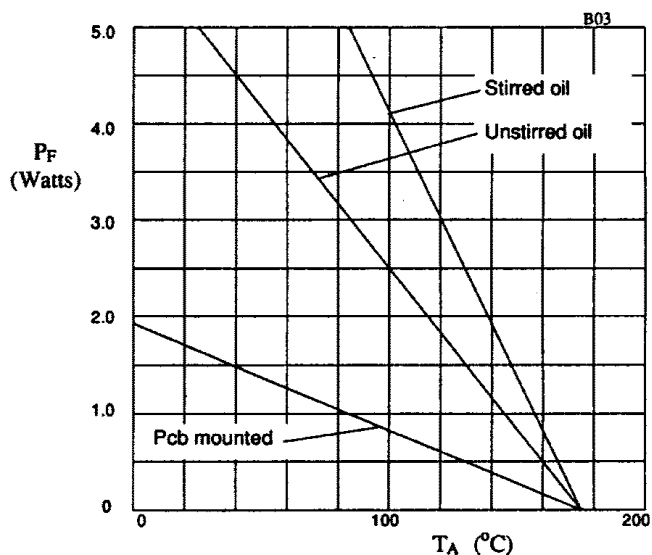


Fig 3. Power derating in oil and air.

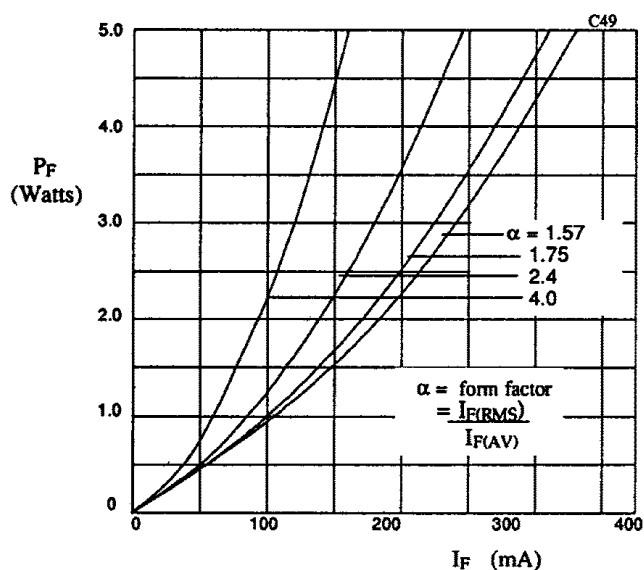


Fig 4. Forward power dissipation as a function of forward current, for sinusoidal operation.

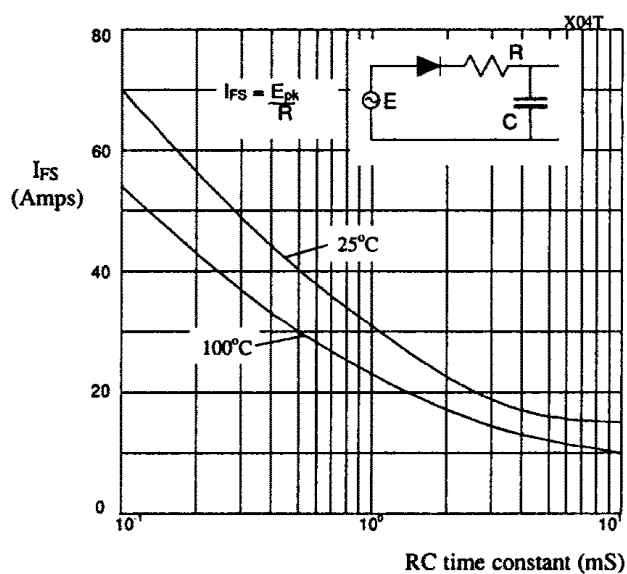


Fig 5. Maximum ratings for capacitive loads.

POWER DISCRETES
Description

Quick reference data

$$V_R = 200V - 1000V$$

$$I_F = 1.0A$$

$$t_{rr} = 2\mu S$$

$$V_F = 1.2V$$

Features

- ◆ 1 Amp 55°C/no heat sink
- ◆ Monolithic non-cavity construction
- ◆ Fused metal oxide hermetic seal
- ◆ Superior thermal shock resistance
- ◆ Low thermal impedance
- ◆ Low reverse leakage
- ◆ PIV to 1000 volts

These products can be supplied as JAN, JANTX or JANTXV per MIL-PRF-19500/286

Electrical Specifications

Electrical specifications: All temperatures are local ambient , 25°C unless otherwise specified.

Device Types	Reverse Voltage		Forward Current (1)	Reverse Current (Max)		Instantaneous Forward Voltage	Repetitive Surge Current	1 Cycle Surge Current tp = 8.3ms	Reverse Recovery Time (2)		Typical Thermal Impedance	
	V _{RWM}	V _{RRM}	Free Air 55°C	I _R		V _F @ I _F = 1.0Adc	I _{FRM}	I _{FSM}	T _{rr}		θ J - L	
				UAdc					μS		°C/Watt	
	V	V	A	25°C	100°C	Vdc	A (pk)	A (pk)	Max.	Typ.	d = 0	d = .375
1N4245	200	200	1.0	1.0	25	1.2	10	30	2	1	7	38
1N4246	400	400	1.0	1.0	25	1.2	10	30	2	1	7	38
1N4247	600	600	1.0	1.0	25	1.2	10	30	2	1	7	38
1N4248	800	800	1.0	1.0	25	1.2	10	30	2	1	7	38
1N4249	1000	1000	1.0	1.0	25	1.2	10	30	2	1	7	38

Notes:

- (1) The 1.0 amp rating @ 55°C requires no heat sinking, special mounting, or forced air across the body of the device.
- (2) Recovery conditions: 0.5 Amp forward current to -1.0 Amp reverse current. Recovery time measured when rectifier recovers to -.25 Amp.

Storage temperature: -65°C to +175°C.

POWER DISCRETES

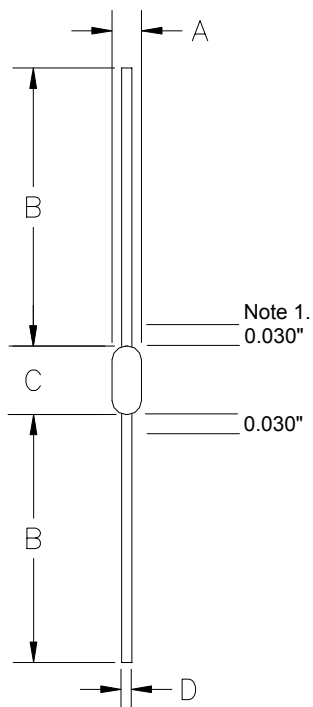
Ordering Information

Part Number	Description
1N4245 1N4246 1N4247 1N4248 1N4249	Axial leaded hermetically sealed ⁽¹⁾

Note:

(1) Available in bulk or tape and reel packaging. Please consult factory for quantities.

Outline Drawing



Dimensions					
DIM ^N	Inches		Millimeters		Note
	MIN	MAX	MIN	MAX	
A	.065	.110	1.65	2.79	-
B	1.00	1.25	25.4	31.7	-
C	.140	.165	3.56	4.19	-
D	.027	.031	.686	.786	-

Note:

1. Lead diameter not controlled in this area.

Contact Information

Semtech Corporation
Power Discretes Products Division
200 Flynn Road, Camarillo, CA 93012
Phone: (805)498-2111 FAX (805)498-3804

POWER DISCRETES
Description

Quick reference data

$$V_R = 200 - 1000 \text{ V}$$

$$I_o = 1.0 \text{ A}$$

$$t_{rr} = 150 \text{ to } 500 \text{ ns}$$

$$V_F = 1.2 \text{ V}$$

Features

- ◆ Low reverse leakage current
- ◆ Hermetically sealed in Metoxilite fused metal oxide
- ◆ Low forward voltage drop

These products are qualified to MIL-PRF-19500/359

2
Electrical Specifications

Electrical specifications @ $T_A = 25^\circ\text{C}$ unless otherwise specified.

Types	V_{RWM}	I_F (AV) @ 55°C		I_{FSM}	I_{FRM} @ $t_p=8.3\text{ms}$	T_{RR}	V_F @ I_F		I_R @ V_{RWM}		C_J @ 5V 1MHz	T_{STG}	$R\theta_{jL}$	
		-pcb mid	L = 3/8"						25°C	100°C			3/8"	0"
	V(pk)	A	A	A	A	ns	V	A	μA	μA	pF	$^\circ\text{C}$	C/W $^\circ\text{C}$	C/W $^\circ\text{C}$
1N4942	200	1.0	2.0	25	6.0	150	1.2	1.0	0.5	25	27	-65 to +175	3	7
1N4944	400	1.0	2.0	25	6.0	150	1.2	1.0	0.5	25	27	-65 to +175	3	7
1N4946	600	1.0	2.0	25	6.0	250	1.2	1.0	0.5	25	27	-65 to +175	3	7
1N4947	800	1.0	2.0	25	6.0	250	1.2	1.0	0.5	25	18	-65 to +175	3	7
1N4948	1000	1.0	2.0	25	6.0	500	1.2	1.0	0.5	25	18	-65 to +175	3	7

POWER DISCRETES

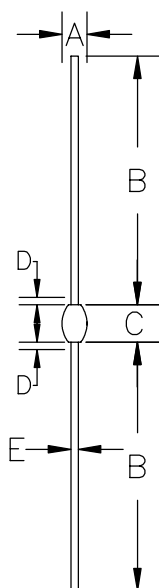
Ordering Information

Part Number	Description
1N4942 1N4944 1N4946 1N4947 1N4948	Axial leaded hermetically sealed ⁽¹⁾

Note:

(1) Available in bulk or tape and reel packaging. Please consult factory for quantities.

Outline Drawing



G2

DIMENSIONS					
DIM ^N	MM		INCHES		NOTE
	MIN	MAX	MIN	MAX	
A	1.6	2.8	.065	.110	—
B	25.4	33.0	1.00	1.30	—
C	3.5	4.2	.140	.165	—
D	—	.80	—	.030	1
F	.66	.84	.026	.033	—

NOTE:

1. LEAD DIAMETER UNCONTROLLED OVER THIS REGION.

Contact Information

Semtech Corporation
Power Discretes Products Division
200 Flynn Road, Camarillo, CA 93012
Phone: (805)498-2111 FAX (805)498-3804

POWER DISCRETES

Description

Quick reference data

$$V_R = 50 - 600V$$

$$I_F = 4.5A$$

$$t_{rr} = 150 - 400nS$$

$$I_R = 1.0\mu A$$

Features

- ◆ Very low reverse recovery time
- ◆ Hermetically sealed in fused metal oxide
- ◆ Low switching losses
- ◆ Low forward voltage drop
- ◆ Soft, non-snap off, recovery characteristics

These products are qualified to MIL-PRF-19500/411.
They can be supplied fully released as JAN, JANTX, and JANTXV versions.

2

Absolute Maximum Ratings

Electrical specifications @ $T_A = 25^\circ C$ unless otherwise specified.

	Symbol	1N5415 3SF05	1N5416 3SF1	1N5417 3SF2	1N5418 3SF4	1N5419 3SF5	1N5420 3SF6	Units
Working Reverse Voltage	V_{RWM}	50	100	200	400	500	600	V
Repetitive Reverse Voltage	V_{RRM}	50	100	200	400	500	600	V
Average Forward Current @ $55^\circ C$ in free air, lead length 0.375"	$I_{F(AV)}$	4.5						A
Repetitive Surge Current @ $55^\circ C$ in free air, lead length 0.375"	I_{FRM}	25						A
Non-Repetitive Surge Current ($t_p = 8.3mS$ @ V_R & T_{JMAX}) ($t_p = 8.3mS$, @ V_R & $25^\circ C$)	I_{FSM}	80 150						A
Storage Temperature Range	T_{STG}	-65 to +175						$^\circ C$

POWER DISCRETES
Electrical Specifications
2

	Symbol	1N5415 3SF05	1N5416 3SF1	1N5417 3SF2	1N5418 3SF4	1N5419 3SF5	1N5420 3SF6	Units
Average Forward Current max. for sine wave, $T_A = 55^\circ\text{C}$	$I_{F(AV)}$	3.0						A
Average Forward Current max. ($T_L = 55^\circ\text{C}$; $L = 3/8"$) for sine wave	$I_{F(AV)}$	4.4						A
for square wave	$I_{F(AV)}$	4.5						
Pt for fusing ($t = 8.3\text{mS}$) max	Pt	90						A^2S
Forward Voltage Drop max. @ $I_F = 3.0\text{A}$, $T_J = 25^\circ\text{C}$	V_F	1.1						V
Reverse Current max. @ V_{RWM} , $T_J = 25^\circ\text{C}$ @ V_{RWM} , $T_J = 100^\circ\text{C}$	I_R I_R	1.0 20						μA
Reverse Recovery Time max. 0.5A I_F to 1.0A I_{RM} recovers to 0.25A $I_{RM(REC)}$	trr	150	150	150	150	250	400	nS
Junction Capacitance typ. @ $V_R = 4\text{V}$, $f = 1\text{MHz}$	C_j	550	430	250	165	140	120	pF

Thermal Characteristics

	Symbol	1N5415 3SF05	1N5416 3SF1	1N5417 3SF2	1N5418 3SF4	1N5419 3SF5	1N5420 3SF6	Units
Thermal Resistance-Junction to Lead Lead length = 0.375"	$R_{\theta JL}$	20						$^\circ\text{C/W}$
Lead length = 0.0"	$R_{\theta JL}$	4						
Thermal Resistance-Junction to Ambient on 0.06" thick pcb. 1 oz. copper	$R_{\theta JA}$	75						$^\circ\text{C/W}$

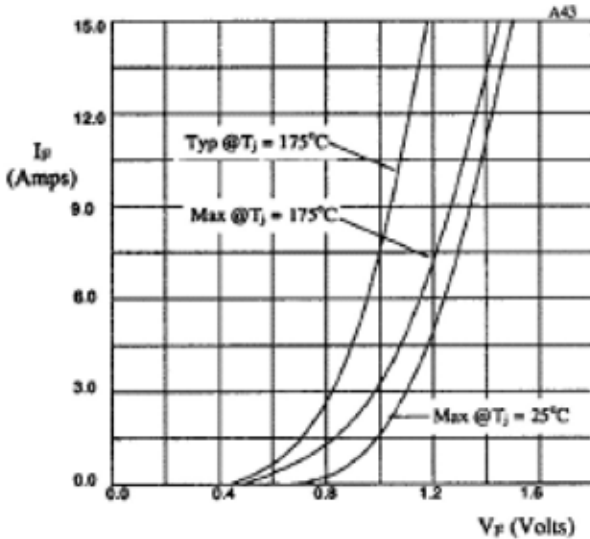
POWER DISCRETES
Typical Characteristics


Fig 1. Forward voltage drop as a function of forward current.

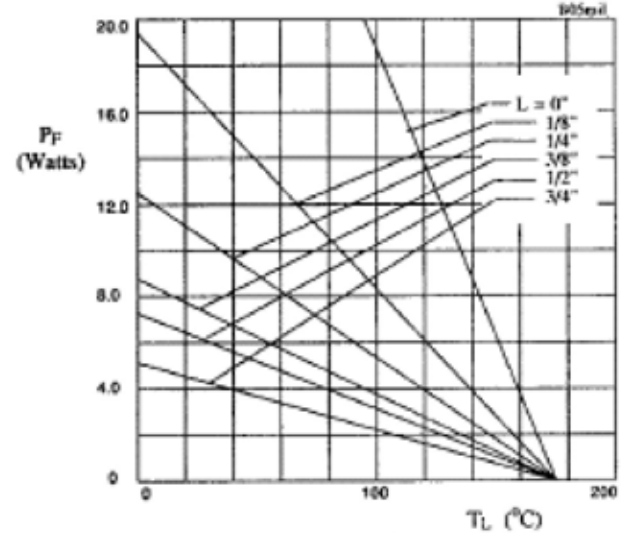


Fig 2. Maximum power versus lead temperature.

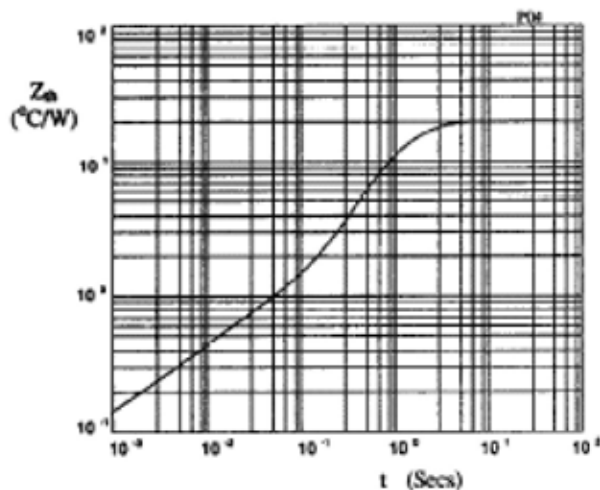


Fig 3. Transient thermal impedance characteristic.

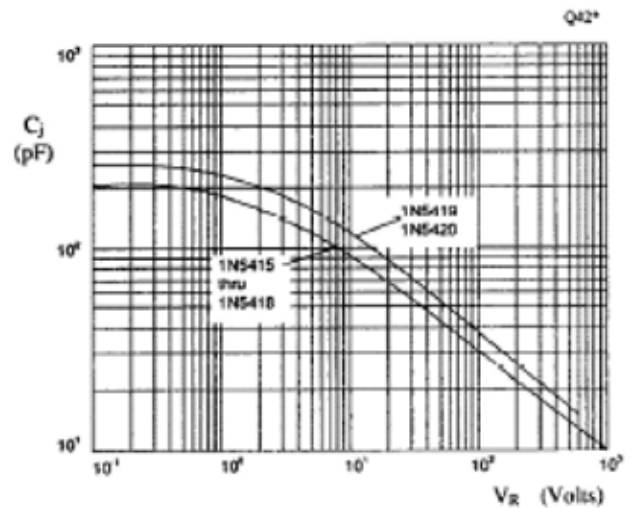


Fig 4. Typical junction capacitance as a function of reverse voltage.

POWER DISCRETES
Typical Characteristics

2

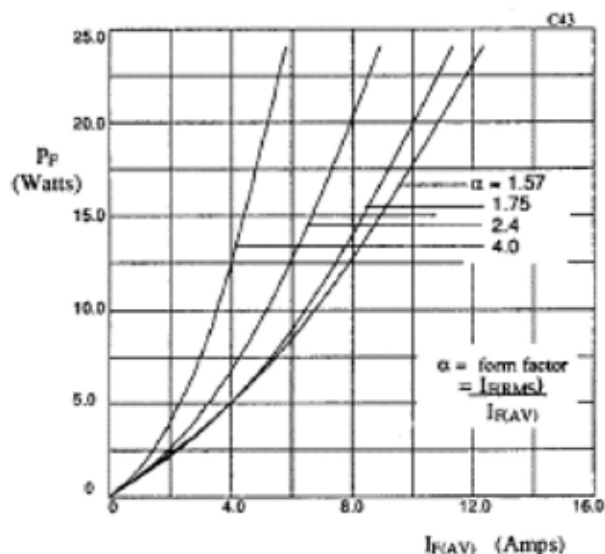


Fig 5. Forward power dissipation as a function of forward current, for sinusoidal operation.

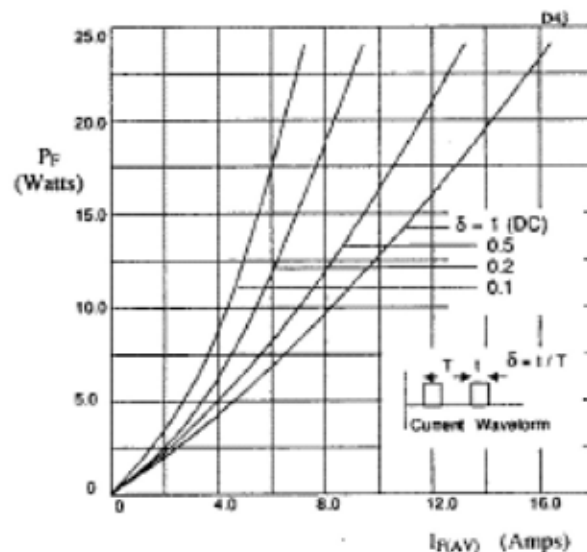


Fig 6. Forward power dissipation as a function of forward current, for square wave operation.

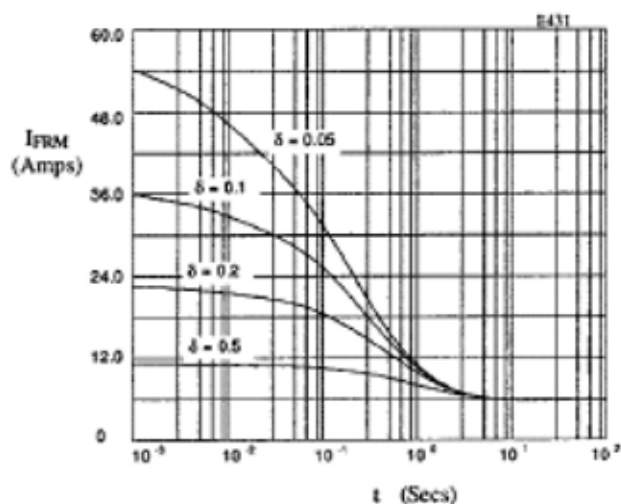


Fig 7. Typical repetitive forward current as a function of pulse width at 55°C; $R_{\theta JL} = 20^\circ\text{C/W}$; V_{RWM} during $1 - \delta$.

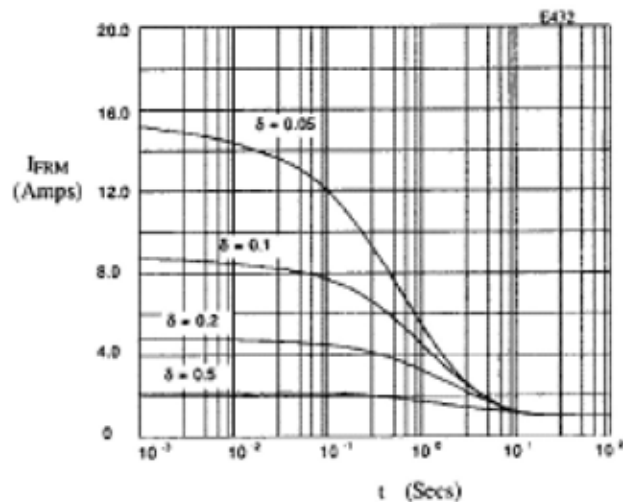


Fig 8. Typical repetitive forward current as a function of pulse width at 100°C; $R_{\theta JL} = 80^\circ\text{C/W}$; V_{RWM} during $1 - \delta$.

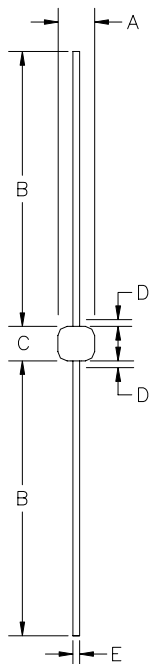
POWER DISCRETES
Ordering Information

Part Number	Description
1N5415 1N5416 1N5417 1N5418 1N5419 1N5420 3SF05 3SF1 3SF2 3SF4 3SF5 3SF6	Axial leaded hermetically sealed ⁽¹⁾

2

Note:

(1) Available in bulk and tape and reel packaging. Please consult factory for quantities.

Outline Drawing


G4

Dimensions					
DIM ^N	Inches		Millimeters		Note
	MIN	MAX	MIN	MAX	
A	0.135	0.18	3.43	4.57	-
B	0.9	1.3	22.9	33.0	-
C	0.13	0.17	3.3	4.32	-
D	-	0.05	-	1.27	1
E	0.037	0.042	0.94	1.07	-

Note:

(1) Lead diameter uncontrolled over this region.

Weight = 0.04oz

Contact Information

Semtech Corporation
Power Discretes Products Division
200 Flynn Road, Camarillo, CA 93012
Phone: (805)498-2111 FAX (805)498-3804

POWER DISCRETES
Description

Quick reference data

$$V_R = 200 - 1000V$$

$$I_F = 5.0A$$

$$t_{rr} = 2\mu S$$

$$V_F = 1.0V$$

Features

- ◆ Low reverse leakage current
- ◆ Hermetically sealed in fused metal oxide
- ◆ Good thermal shock resistance
- ◆ Low forward voltage drop
- ◆ Avalanche capability

These products are qualified to MIL-PRF-19500/420.
They can be supplied fully released as JAN, JANTX,
JANTXV, and JANS versions.

Absolute Maximum Ratings

Electrical specifications @ $T_A = 25^\circ C$ unless otherwise specified.

	Symbol	1N5550 3SM2	1N5551 3SM4	1N5552 3SM6	1N5553 3SM8	1N5554 3SM0	Units
Working Reverse Voltage	V_{RWM}	200	400	600	800	1000	V
Average Forward Current @ $55^\circ C$ in free air, lead length 0.375"	$I_{F(AV)}$	5.0					A
Repetitive Surge Current @ $55^\circ C$ in free air, lead length 0.375"	I_{FRM}	25					A
Non-Repetitive Surge Current ($t_p = 8.3mS$ @ V_R & T_{JMAX}) ($t_p = 8.3mS$, @ V_R & $25^\circ C$)	I_{FSM}	100 150					A
Storage Temperature Range	T_{STG}	-65 to +175					$^\circ C$

POWER DISCRETES

Electrical Specifications

	Symbol	1N5550 3SM2	1N5551 3SM4	1N5552 3SM6	1N5553 3SM8	1N5554 3SM0	Units
Average Forward Current (sine wave) - max. $T_A = 55^\circ\text{C}$ - max. $L = 3/8"$; $T_L = 55^\circ\text{C}$	$I_{F(AV)}$ $I_{F(AV)}$			3.0 5.0			A
Pt for fusing ($t = 8.3\text{mS}$) max	Pt			42			A ² S
Forward Voltage Drop max. @ $I_F = 3.0\text{A}$, $T_j = 25^\circ\text{C}$	V_F			1.0			V
Reverse Current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$ @ V_{RWM} , $T_j = 125^\circ\text{C}$	I_R I_R			1.0 60			μA
Reverse Recovery Time max. 0.5A I_F to 1.0A I_{RM} recovers to 0.25A $I_{RM(REC)}$	trr			2.0			μS
Junction Capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	Cj			92			pF

Thermal Characteristics

	Symbol	1N5550 3SM2	1N5551 3SM4	1N5552 3SM6	1N5553 3SM8	1N5554 3SM0	Units
Thermal Resistance-Junction to Lead Lead length = 0.375" Lead length = 0.0"	$R_{\theta JL}$ $R_{\theta JL}$			22 4			$^\circ\text{C/W}$
Thermal Resistance-Junction to Ambient on 0.06" thick pcb. 1 oz. copper	$R_{\theta JA}$			47			$^\circ\text{C/W}$

Typical Characteristics

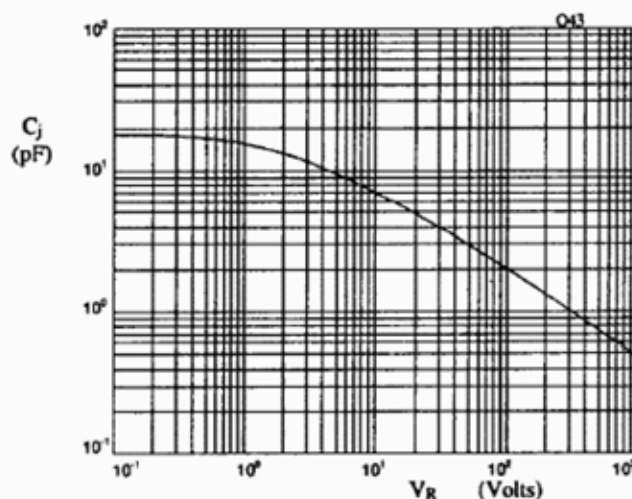


Fig 1. Typical junction capacitance as a function of reverse voltage.

POWER DISCRETES
Typical Characteristics

2

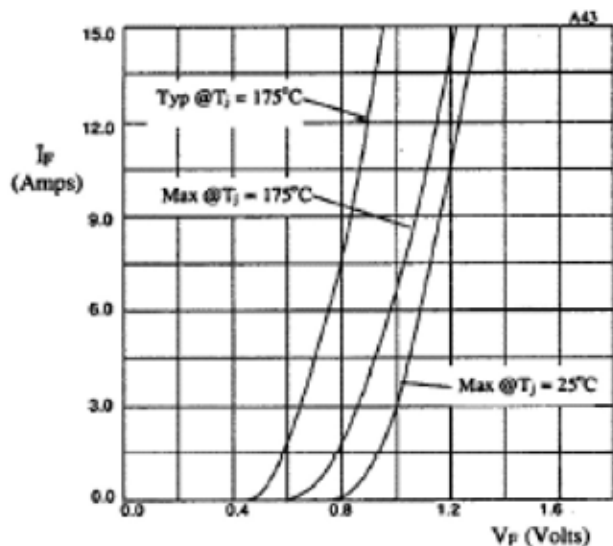


Fig 2. Forward voltage drop as a function of forward current

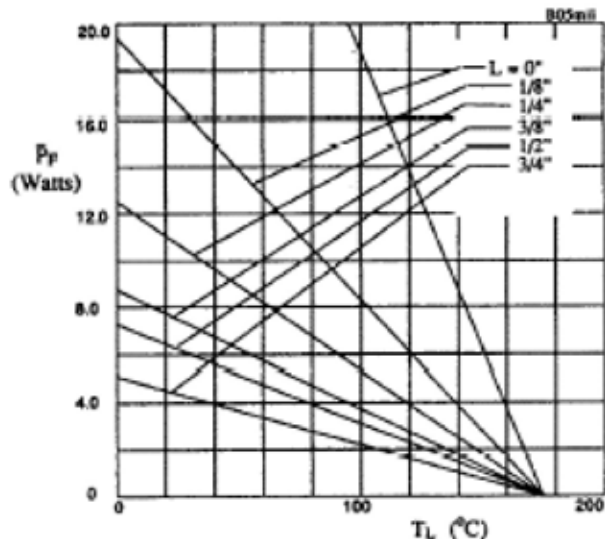


Fig 3. Maximum power versus lead temperature

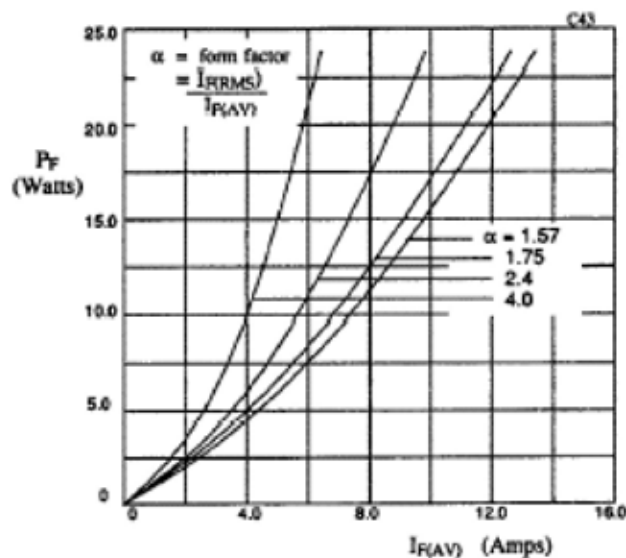


Fig 4. Forward power dissipation as a function of forward current, for sinusoidal operation.

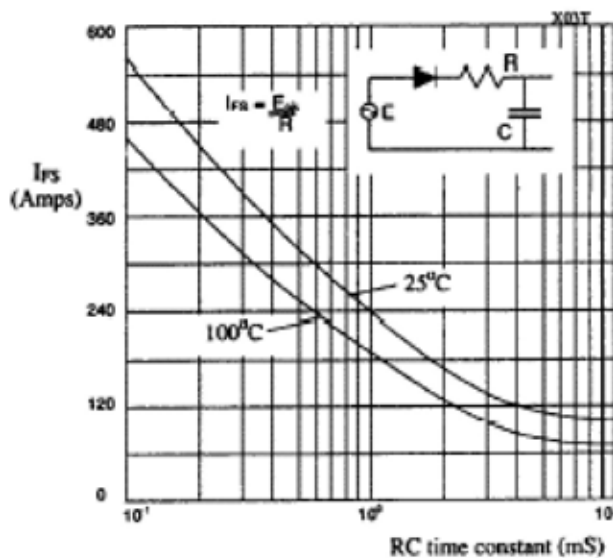


Fig 5. Maximum ratings for capacitive loads.

POWER DISCRETES

Ordering Information

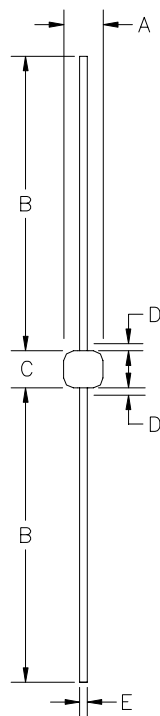
Part Number	Description
1N5550 1N5551 1N5552 1N5553 1N5554 3SM2 3SM4 3SM6 3SM8 3SM0	Axial leaded hermetically sealed ⁽¹⁾

2

Note:

(1) Available in bulk and tape and reel packaging. Please consult factory for quantities.

Outline Drawing



G4

Dimensions					
DIM ^N	Inches		Millimeters		Note
	MIN	MAX	MIN	MAX	
A	0.115	0.18	2.92	4.57	-
B	0.9	1.3	22.86	33.02	-
C	0.13	0.3	3.3	7.62	-
D	-	0.03	-	0.8	1
E	0.036	0.042	0.92	1.07	-

Note:

(1) Lead diameter uncontrolled over this region.

Weight = 0.039oz

Contact Information

Semtech Corporation
Power Discretes Products Division
200 Flynn Road, Camarillo, CA 93012
Phone: (805)498-2111 FAX (805)498-3804



QUICK REFERENCE DATA AXIAL LEADED HERMETICALLY SEALED STANDARD RECOVERY RECTIFIER DIODE

- $V_R = 200 - 1000V$
- $I_F = 2.0A$
- $t_{rr} = 2\mu s$
- $V_F = 1.1V$
- Low reverse leakage current
- Hermetically sealed in Metoxillite fused metal oxide
- Good thermal shock resistance
- Low forward voltage drop
- Avalanche capability.

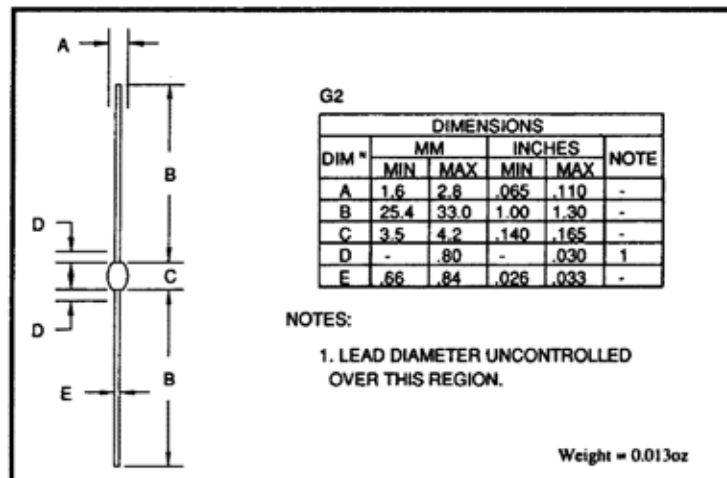
ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	1N5614 S2M	1N5616 S4M	1N5618 S6M	1N5620 S8M	1N5622 S0M	Unit
Working reverse voltage	V_{RWM}	200	400	600	800	1000	V
Repetitive reverse voltage	V_{RRM}	200	400	600	800	1000	V
Average forward current (@ 55°C, lead length 0.375")	$I_{F(AV)}$	← 2.0 →					A
Repetitive surge current (@ 55°C in free air, lead length 0.375")	I_{FRM}	← 10 →					A
Non-repetitive surge current ($t_p = 8.3ms$, @ V_R & T_{jmax})	I_{FSM}	← 30 →					A
Storage temperature range	T_{STG}	← -65 to +175 →					°C
Operating temperature range	T_{OP}	← -65 to +175 →					°C

MECHANICAL

These products are qualified to MIL-PRF-19500/427 and are preferred parts as listed in MIL-STD-701. They can be supplied fully released as JAN, JANTX, and JANTXV versions.

These products are available in Europe to DEF STAN 59-61 (PART 80)/029 to F and FX levels.





CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	1N5614 S2M	1N5616 S4M	1N5618 S6M	1N5620 S8M	1N5622 S0M	Unit
Average forward current (sine wave) - max. pcb mounted; $T_A = 55^\circ\text{C}$ - max. $L = 3/8"$; $T_L = 55^\circ\text{C}$	$I_{F(AV)}$			1.0			A
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t			5.0			A^2S
Forward voltage drop max. @ $I_F = 1.0\text{A}$, $T_j = 25^\circ\text{C}$	V_F			1.1			V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$ @ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R			0.5			μA
	I_R			25			μA
Reverse recovery time max. 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR} .	t_{rr}			2.0			μS
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j			23			pF
Thermal resistance - junction to lead Lead length = 0.375"	$R_{\theta JL}$			36			$^\circ\text{C/W}$
Lead length = 0"	$R_{\theta JL}$			7			$^\circ\text{C/W}$
Thermal resistance - junction to amb. on 0.06" thick pcb. 1 oz. copper.	$R_{\theta JA}$			95			$^\circ\text{C/W}$

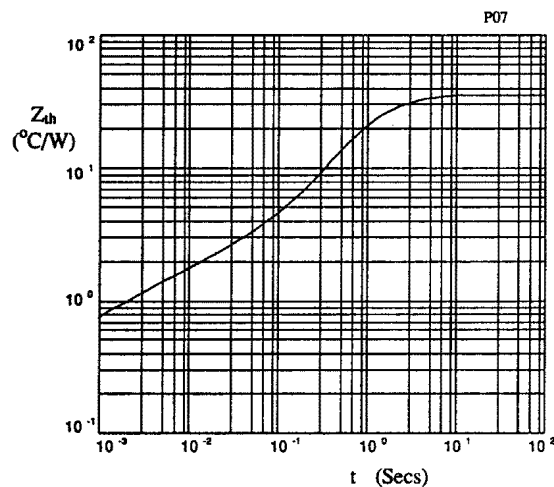


Fig 1. Transient thermal impedance characteristic.

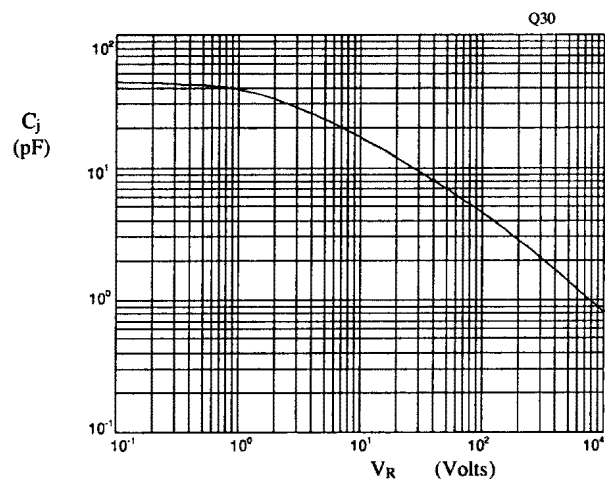


Fig 2. Typical junction capacitance as a function of reverse voltage.

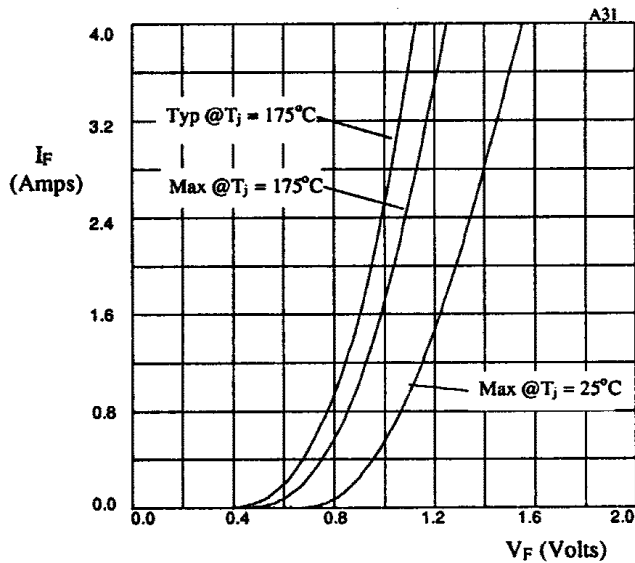


Fig 3. Forward voltage drop as a function of forward current.

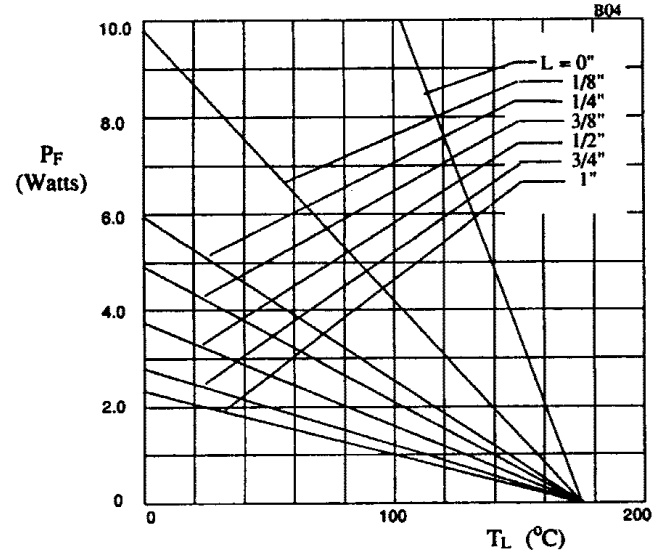


Fig 4. Maximum power versus lead temperature.

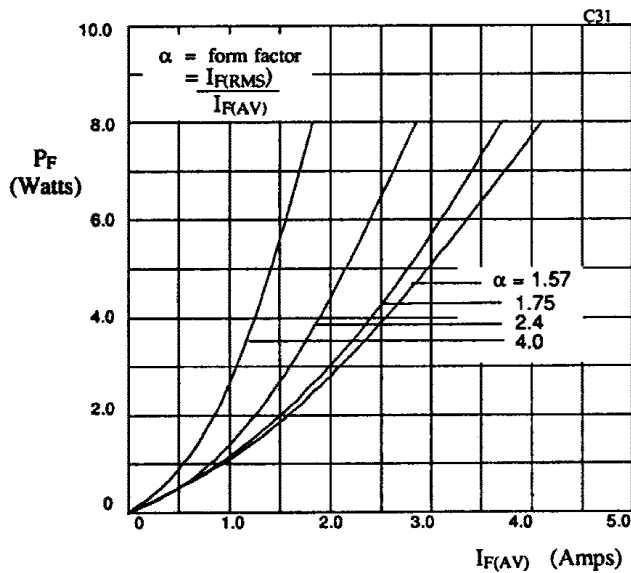


Fig 5. Forward power dissipation as a function of forward current, for sinusoidal operation.

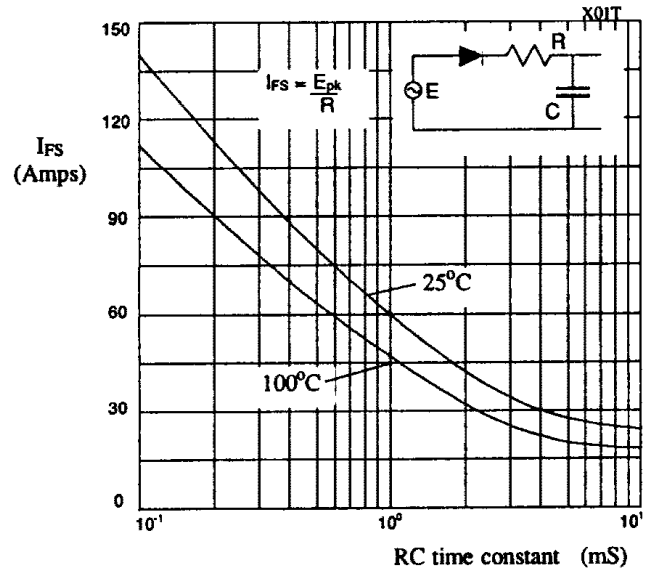


Fig 6. Maximum ratings for capacitive loads.



AXIAL LEADED HERMETICALLY SEALED FAST RECTIFIER DIODE

- Low reverse recovery time
- Hermetically sealed in Metoxilite fused metal oxide
- Low switching losses
- Low forward voltage drop
- Soft, non-snap off, recovery characteristics

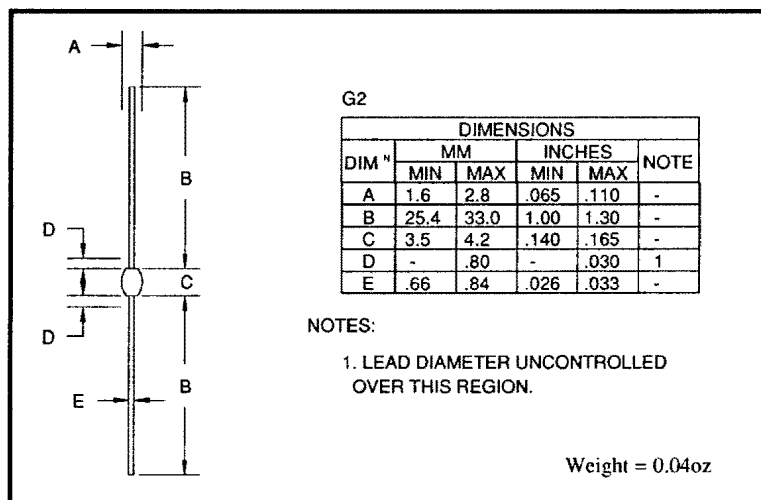
QUICK REFERENCE DATA

- $V_R = 200 - 1000V$
- $I_F = 2.00A$
- $t_{rr} = 150 - 500ns$
- $I_R = 0.5\mu A$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	1N5615 S2F	1N5617 S4F	1N5619 S6F	1N5621 S8F	1N5623 S0F	Unit
Working reverse voltage	V_{RWM}	200	400	600	800	1000	V
Repetitive reverse voltage	V_{RRM}	200	400	600	800	1000	V
Average forward current (@ 55°C, lead length 0.375")	$I_{F(AV)}$	← 2.0 →					A
Repetitive surge current (@ 55°C in free air, lead length 0.375")	I_{FRM}	← 6.0 →					A
Non-repetitive surge current ($t_p = 8.3ms$, @ V_R & T_{jmax})	I_{FSM}	← 25 →					A
Storage temperature range	T_{STG}	← -65 to +175 →					°C
Operating temperature range	T_{OP}	← -65 to +175 →					°C

MECHANICAL



These products are qualified to MIL-PRF-19500/429 and are preferred parts as listed in MIL-STD-701.

They can be supplied fully released as JAN, JANTX, and JANTXV versions.

These products are qualified in Europe to DEF STAN 59-61 (PART 80)/029.



2

ELECTRICAL CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	1N5615 S2F	1N5617 S4F	1N5619 S6F	1N5621 S8F	1N5623 S0F	Unit
Average forward current max. (pcb mounted; $T_A = 55^\circ\text{C}$) for sine wave	$I_{F(AV)}$	← 1.00 →					A
for square wave ($d = 0.5$)	$I_{F(AV)}$	← 1.05 →					A
Average forward current max. ($T_L = 55^\circ\text{C}$; $L = 3/8"$) for sine wave	$I_{F(AV)}$	← 1.95 →					A
for square wave	$I_{F(AV)}$	← 2.00 →					A
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t	← 2.5 →					A ² S
Forward voltage drop max. @ $I_F = 1.0\text{A}$, $T_j = 25^\circ\text{C}$	V_F	← 1.2 →					V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	← 0.5 →					μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	← 25 →					μA
Reverse recovery time max. 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR}	t_{rr}	150	150	250	300	500	nS
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	27	27	27	18	18	pF

THERMAL CHARACTERISTICS

	Symbol	1N5615 S2F	1N5617 S4F	1N5619 S6F	1N5621 S8F	1N5623 S0F	Unit
Thermal resistance - junction to lead Lead length = 0.375"	$R_{\theta JL}$	← 38 →					°C/W
Lead length = 0.0"	$R_{\theta JL}$	← 7 →					°C/W
Thermal resistance - junction to amb. on 0.06" thick pcb. 1 oz. copper.	$R_{\theta JA}$	← 95 →					°C/W

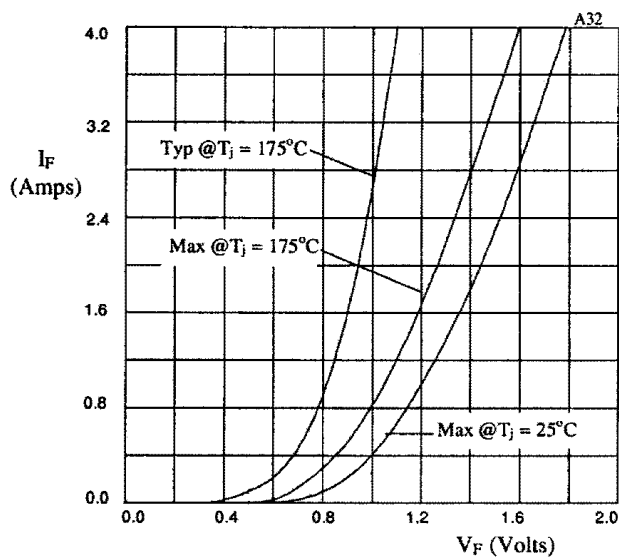


Fig 1. Forward voltage drop as a function of forward current.

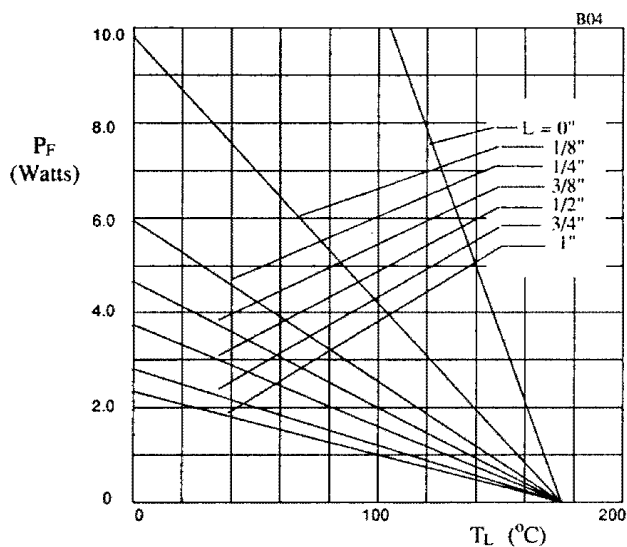


Fig 2. Maximum power versus lead temperature.

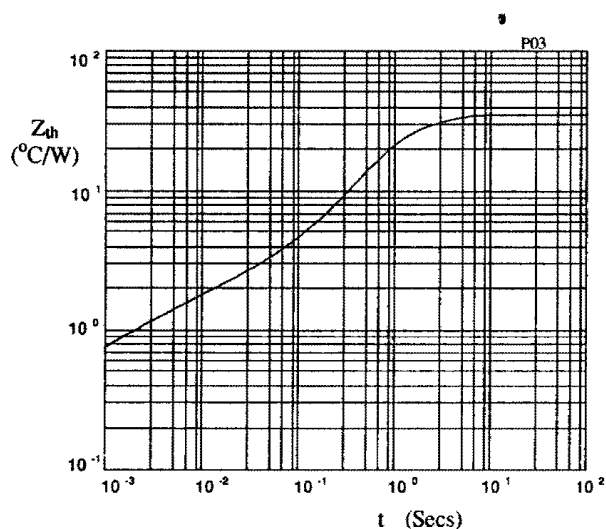


Fig 3. Transient thermal impedance characteristic.

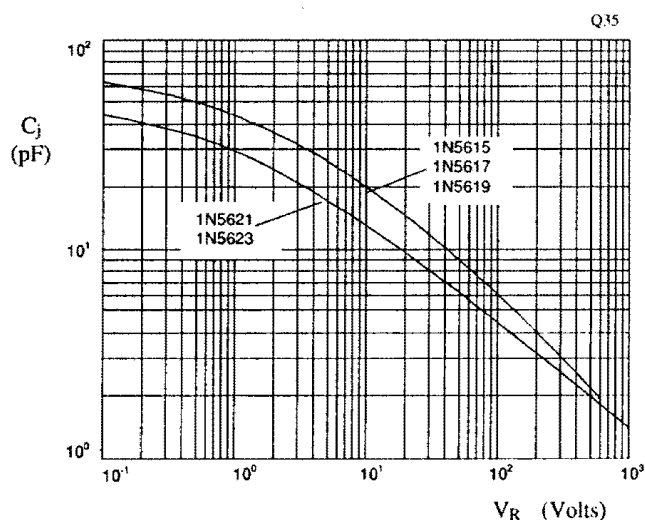


Fig 4. Typical junction capacitance as a function of reverse voltage.

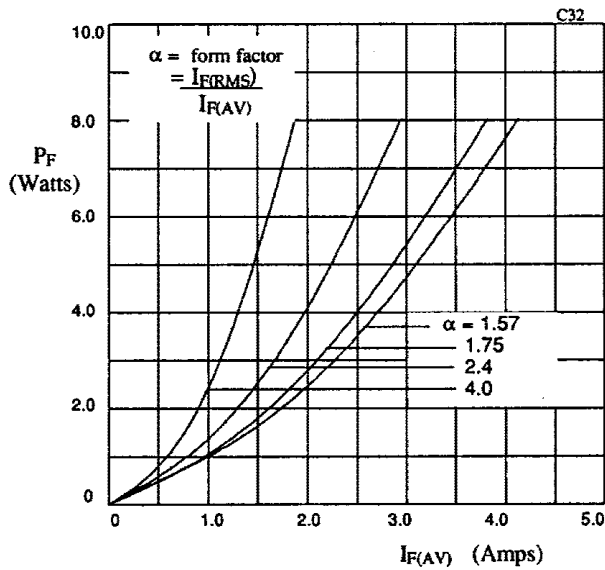


Fig 5. Forward power dissipation as a function of forward current, for sinusoidal operation.

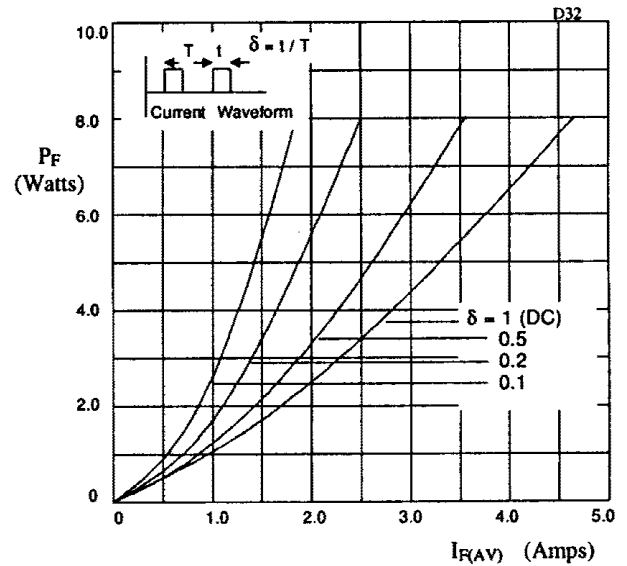


Fig 6. Forward power dissipation as a function of forward current, for square wave operation.

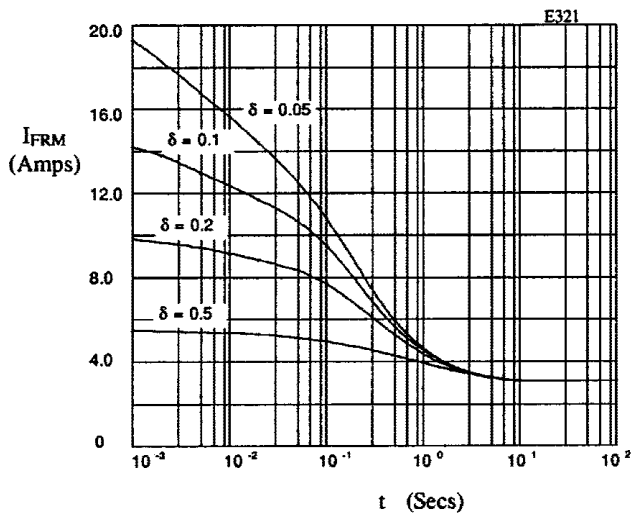


Fig 7. Typical repetitive forward current as a function of pulse width at 55°C; $R_{\theta JL} = 35^\circ\text{C/W}$; V_{RWM} during $1 - \delta$.

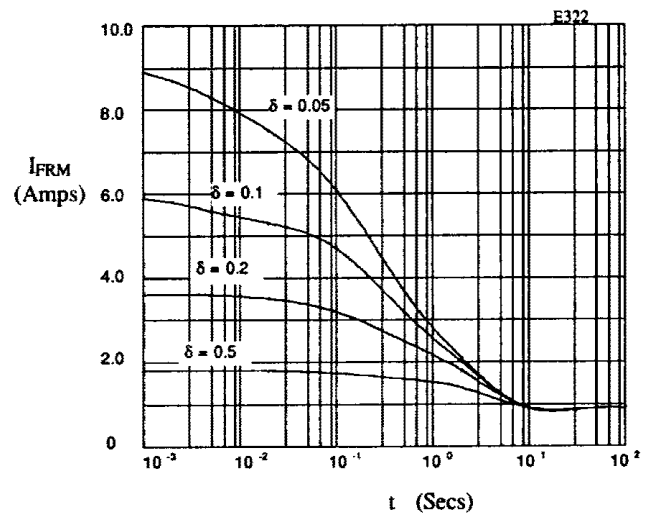


Fig 8. Typical repetitive forward current as a function of pulse width at 100°C; $R_{\theta JL} = 95^\circ\text{C/W}$; V_{RWM} during $1 - \delta$.



AXIAL LEADED HERMETICALLY SEALED SUPERFAST RECTIFIER DIODE

- Very low reverse recovery time
- Hermetical sealed in Metoxillite fused metal oxide
- Low switching losses
- Soft, non-snap off, recovery characteristics
- Very low forward voltage drop

QUICK REFERENCE DATA

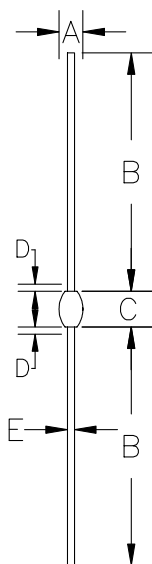
- $V_R = 50 - 150V$
- $I_F = 2.5A$
- $t_{rr} = 25nS$
- $I_R = 1\mu A$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	1N5802	1N5804	1N5806	Unit
Working reverse voltage	V_{RWM}	50	100	150	V
Repetitive reverse voltage	V_{RRM}	50	100	150	V
Average forward current (@ 75°C, lead length = 0.375")	$I_{F(AV)}$	← 2.5 →			A
Repetitive surge current (@ 55°C in free air, lead length 0.375")	I_{FRM}	← 14 →			A
Non-repetitive surge current ($t_p = 8.3mS$, @ V_R & T_{jmax})	I_{FSM}	← 35 →			A
Storage temperature range	T_{STG}	← -65 to +200 →			°C
Operating temperature range	T_{OP}	← -65 to +175 →			°C

MECHANICAL

G111



Dimensions					
DIM ^N	Millimeters		Inches		Note
	MIN	MAX	MIN	MAX	
A	1.65	2.16	0.065	0.085	-
B	17.8	33.0	0.70	1.30	-
C	3.18	6.35	0.125	0.250	-
D	-	0.80	-	0.030	1
E	0.69	0.81	0.027	0.032	-

Note:

(1) Lead diameter uncontrolled over this region.

Weight = 0.013oz

These products are qualified to MIL-PRF-19500/477 and are preferred parts as listed in MIL-STD-701. They can be supplied fully released as JANTX and JANTXV versions.



2

ELECTRICAL CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	1N5802	1N5804	1N5806	Unit
Average forward current max. (pcb mounted; $T_A = 55^\circ\text{C}$) for sine wave	$I_{F(AV)}$	← 1.3 →	← 1.4 →	← →	A
for square wave ($d = 0.5$)	$I_{F(AV)}$	← 1.3 →	← 1.4 →	← →	A
Average forward current max. ($T_L = 55^\circ\text{C}$; $L = 3/8"$) for sine wave	$I_{F(AV)}$	← 3.1 →	← 3.3 →	← →	A
for square wave	$I_{F(AV)}$	← 3.1 →	← 3.3 →	← →	A
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t	← 10.0 →	← 10.0 →	← →	A^2S
Forward voltage drop max. @ $I_F = 1.0\text{A}$, $T_j = 25^\circ\text{C}$	V_F	← 0.875 →	← 0.875 →	← →	V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	← 1.0 →	← 1.0 →	← →	μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	← 50 →	← 50 →	← →	μA
Reverse recovery time max. 1.0A I_F to 1.0A I_R . Recovers to 0.1A I_{RR} .	t_{rr}	← 25 →	← 25 →	← →	nS
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	← 25 →	← 25 →	← →	pF

THERMAL CHARACTERISTICS

	Symbol	1N5802	1N5804	1N5806	Unit
Thermal resistance - junction to lead Lead length = 0.375"	$R_{\theta JL}$	← 36 →	← 36 →	← →	$^\circ\text{C/W}$
Thermal resistance - junction to amb. on 0.06" thick pcb. 1 oz. copper.	$R_{\theta JA}$	← 100 →	← 100 →	← →	$^\circ\text{C/W}$

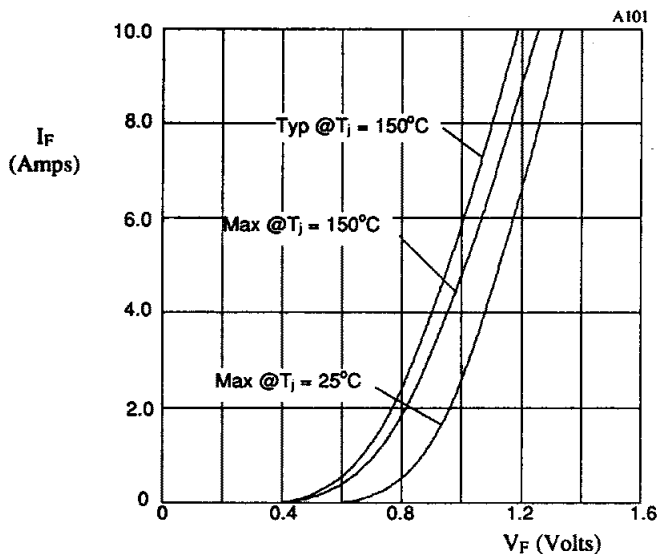


Fig 1. Forward voltage drop as a function of forward current.

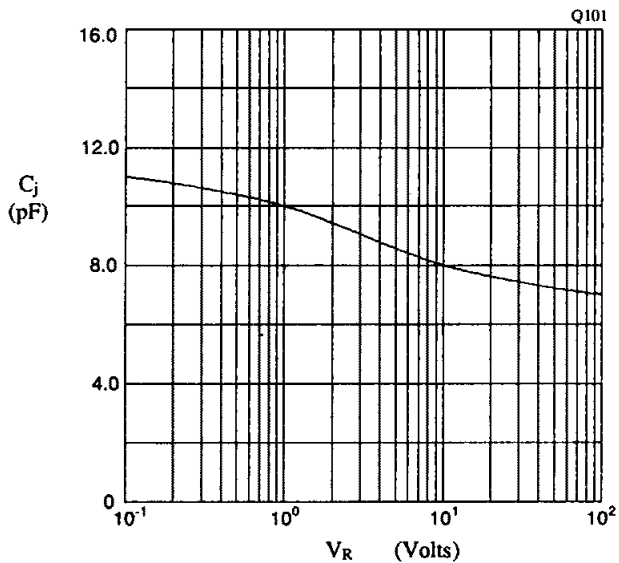


Fig 2. Typical junction capacitance as a function of reverse voltage.

POWER DISCRETES

Description

Quick reference data

V_R 50 -150 V

I_F 1N5802US to 1N5806US = 2.5A

t_{rr} 1N5802US to 1N5806US = 25nS

I_R 1N5802US to 1N5806US = 1μA

Features

- ◆ Very low reverse recovery time
- ◆ Hermetically sealed non-cavity construction
- ◆ Soft, non-snap, off recovery characteristics
- ◆ Very low forward voltage drop

These products are qualified to MIL-PRF-19500/477 and are preferred parts as listed in MIL-HDBK-5961. They can be supplied fully released as JANTX and JANTXV versions.

Electrical Specifications

Electrical specifications @ $T_A = 25^\circ\text{C}$ unless otherwise specified.

	Symbol	1N5802US	1N5804US	1N5806US	Units
Working Reverse Voltage	V_{RWM}	50	100	150	V
Repetitive Reverse Voltage	V_{RRM}	50	100	150	V
Average Forward Current (@ 75°C lead length = 0.375')	$I_{F(AV)}$	2.5			A
Repetitive Surge Current (@ 55°C lead length = 0.375')	I_{FRM}	14			A
Non-Repetitive Surge Current ($t_p = 8.3\text{ms}$ @ V_R & T_{JMAX})	I_{FSM}	35			A
Storage Temperature Range	T_{STG}	-65 to +175			$^\circ\text{C}$
Average Forward Current Max (pcb mounted: $T_A = 55^\circ\text{C}$) Sine wave Square wave ($d = 0.5$)	$I_{F(AV)}$ $I_{F(AV)}$	1.0 1.1			A
P_t for fusing ($t = 8.3\text{ms}$) max	P_t	10			A^2S
Forward Voltage Drop max @ $T_J = 25^\circ\text{C}$	V_F	0.875 @ 1A			V
Reverse Current max @ V_{WRM} , $T_J = 25^\circ\text{C}$ @ V_{WRM} , $T_J = 100^\circ\text{C}$	I_R I_R	1.0 50			μA
Reverse Recovery Time max (1.0A I_F to 1.0A I_{RM} recover to 0.25A $I_{RM(REC)}$)	t_{rr}	25			nS
Junction Capacitance typ @ $V_R = 5\text{V}$ $f = 1\text{MHz}$	C_J	25			pF
Thermal Resistance to end cap	$R_{\theta JEC}$	13			$^\circ\text{C/W}$

POWER DISCRETES

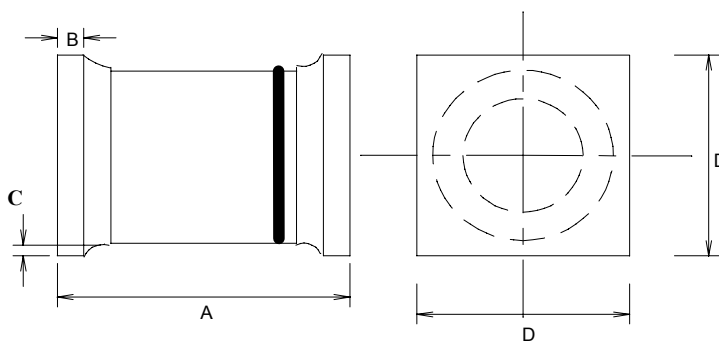
Ordering Information

Part Number	Description
1N5802US, 1N5804US, 1N5806US	Surface Mount ⁽¹⁾

Note:

(1) Available in trays and tape and reel packaging. Please consult factory for quantities.

Outline Drawing



*Cathode is denoted by a black band on a white body.

	Dimensions in Inches	
	1N5802US - 1N5806US	
	MIN	MAX
A	0.168	0.2
B	0.019	0.028
C	0.003	-
D	0.091	0.103

Contact Information

Semtech Corporation
Power Discretes Products Division
200 Flynn Road, Camarillo, CA 93012
Phone: (805)498-2111 FAX (805)498-3804



2

AXIAL LEADED HERMETICALLY SEALED SUPERFAST RECTIFIER DIODE

QUICK REFERENCE DATA

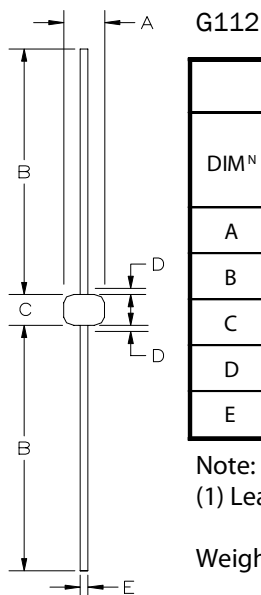
- Very low reverse recovery time
- Hermetical sealed in Metoxillite fused metal oxide
- Low switching losses
- Soft, non-snap off, recovery characteristics
- Very low forward voltage drop

- $V_R = 50 - 150V$
- $I_F = 6.0A$
- $t_{rr} = 30ns$
- $I_R = 5\mu A$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	1N5807	1N5809	1N5811	Unit
Working reverse voltage	V_{RWM}	50	100	150	V
Repetitive reverse voltage	V_{RRM}	50	100	150	V
Average forward current (@ 75°C, lead length = 0.375")	$I_{F(AV)}$	← 6.0 →			A
Repetitive surge current (@ 55°C in free air, lead length 0.375")	I_{FRM}	← 25 →			A
Non-repetitive surge current ($t_p = 8.3ms$, @ V_R & T_{jmax})	I_{FSM}	← 125 →			A
Storage temperature range	T_{STG}	← -65 to +200 →			°C
Operating temperature range	T_{OP}	← -65 to +175 →			°C

MECHANICAL



Dimensions					
DIM ^N	Millimeters		Inches		Note
	MIN	MAX	MIN	MAX	
A	2.92	3.61	.115	0.142	-
B	22.9	33.0	0.90	1.30	-
C	3.3	7.62	.130	0.3	-
D	-	0.80	-	.030	1
E	0.91	1.07	0.036	.042	-

Note:

(1) Lead diameter uncontrolled over this region.

Weight = 0.013oz

These products are qualified to MIL-PRF-19500/477 and are preferred parts as listed in MIL-STD-701. They can be supplied fully released as JANTX and JANTXV versions.


ELECTRICAL CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	1N5807	1N5809	1N5811	Unit
Average forward current max. (pcb mounted; $T_A = 55^\circ\text{C}$) for sine wave	$I_{F(AV)}$	← 1.7 →			A
for square wave ($d = 0.5$)	$I_{F(AV)}$	← 1.8 →			A
Average forward current max. ($T_L = 55^\circ\text{C}$; $L = 3/8"$) for sine wave	$I_{F(AV)}$	← 5.7 →			A
for square wave	$I_{F(AV)}$	← 6.0 →			A
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t	← 32 →			A ² S
Forward voltage drop max. @ $I_F = 4.0\text{A}$, $T_j = 25^\circ\text{C}$	V_F	← 0.875 →			V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	← 5.0 →			μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	← 150 →			μA
Reverse recovery time max. 1.0A I_F to 1.0A I_R . Recovers to 0.1A I_{RR} .	t_{rr}	← 30 →			nS
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	← 60 →			pF

THERMAL CHARACTERISTICS

	Symbol	1N5807	1N5809	1N5811	Unit
Thermal resistance - junction to lead Lead length = 0.375"	$R_{\theta JL}$	← 22 →			°C/W
Thermal resistance - junction to amb. on 0.06" thick pcb. 1 oz. copper.	$R_{\theta JA}$	← 90 →			°C/W



2

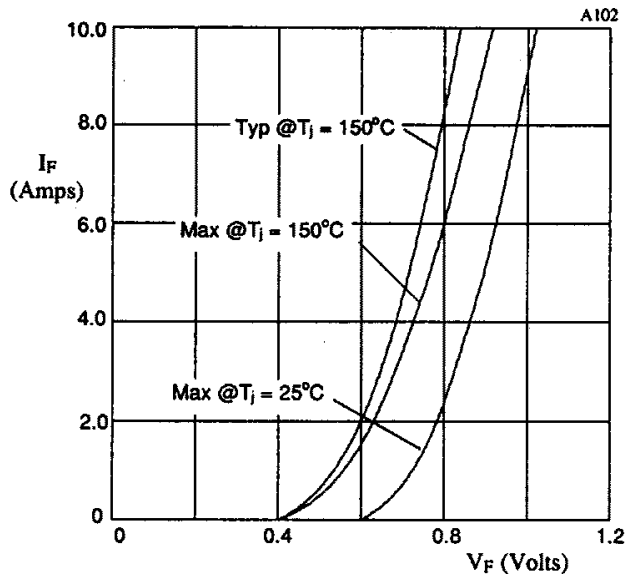


Fig 1. Forward voltage drop as a function of forward current.

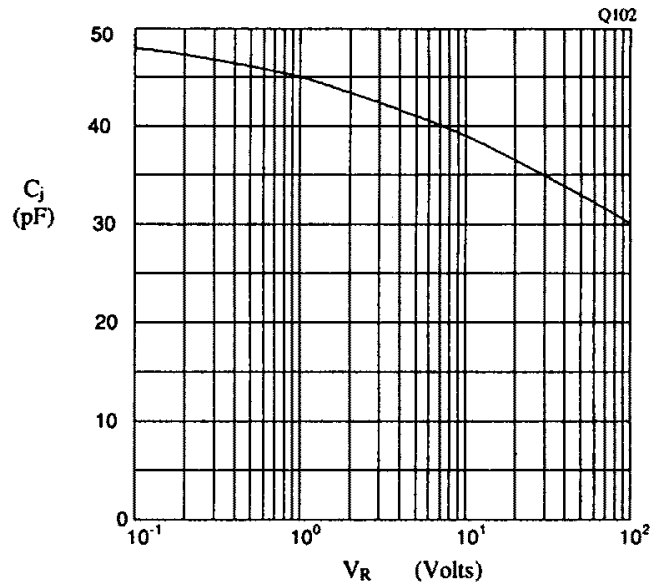


Fig 2. Typical junction capacitance as a function of reverse voltage.

POWER DISCRETES

Description

Quick reference data

V_R 50 -150 V

I_F 1N5807US to 1N5811US = 6A

t_{rr} 1N5807US to 1N5811US = 30nS

I_R 1N5807US to 1N5811US = 5 μ A

Features

- ◆ Very low reverse recovery time
- ◆ Hermetically sealed non-cavity construction
- ◆ Soft, non-snap, off recovery characteristics
- ◆ Very low forward voltage drop

These products are qualified to MIL-PRF-19500/477 and are preferred parts as listed in MIL-HDBK-5961.

They can be supplied fully released as JANTX and JANTXV versions.

2

Electrical Specifications

Electrical specifications @ $T_A = 25^\circ\text{C}$ unless otherwise specified.

	Symbol	1N5807US	1N5809US	1N5811US	Units
Working Reverse Voltage	V_{RWM}	50	100	150	V
Repetitive Reverse Voltage	V_{RRM}	50	100	150	V
Average Forward Current (@ 75°C lead length = 0.375')	$I_{F(AV)}$	6.0			A
Repetitive Surge Current (@ 55°C in free air lead length = 0.375')	I_{FRM}	25			A
Non-Repetitive Surge Current ($t_p = 8.3\text{mS}$ @ V_R & T_{JMAX})	I_{FSM}	125			A
Storage Temperature Range	T_{STG}	-65 to +175			$^\circ\text{C}$
Average Forward Current Max (pcb mounted: $T_A = 55^\circ\text{C}$) Sine wave Square wave (d = 0.5)	$I_{F(AV)}$ $I_{F(AV)}$	1.7 1.8			A
P_t for fusing (t = 8.3mS) max	P_t	32			A ² S
Forward Voltage Drop max @ $T_J = 25^\circ\text{C}$	V_F	0.875 @ 4A			V
Reverse Current max @ V_{WRM} , $T_J = 25^\circ\text{C}$ @ V_{WRM} , $T_J = 100^\circ\text{C}$	I_R I_R	5.0 150			μA
Reverse Recovery Time max (1.0A I_F to 1.0A I_{RM} recover to 0.25A $I_{RM(REC)}$)	t_{rr}	30			nS
Junction Capacitance typ @ $V_R = 5\text{V}$ f = 1MHz	C_J	60			pF
Thermal Resistance to end cap	$R_{\theta JEC}$	6.5			$^\circ\text{C/W}$

POWER DISCRETES

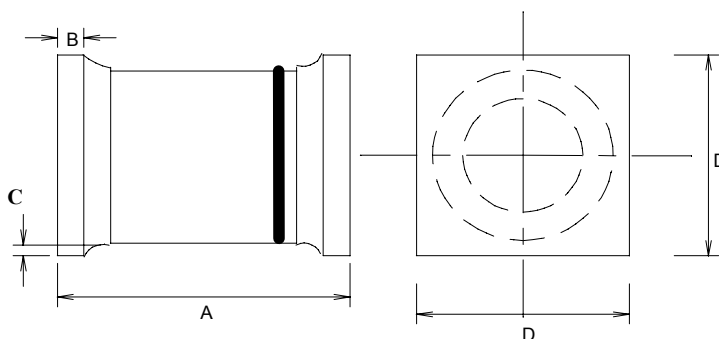
Ordering Information

Part Number	Description
1N5807US, 1N5809US, 1N5811US	Surface Mount ⁽¹⁾

Note:

(1) Available in trays and tape and reel packaging. Please consult factory for quantities.

Outline Drawing



*Cathode is denoted by a black band on a white body.

	Dimensions in Inches	
	1N5807US - 1N5811US	
	MIN	MAX
A	0.2	0.225
B	0.019	0.028
C	0.003	-
D	0.137	0.148

Contact Information

Semtech Corporation
Power Discretes Products Division
200 Flynn Road, Camarillo, CA 93012
Phone: (805)498-2111 FAX (805)498-3804



AXIAL LEADED HERMETICALLY SEALED SUPERFAST RECTIFIER DIODE

- Very low reverse recovery time
- Hermetically sealed in Metoxilite fused metal oxide
- Low switching losses
- Low forward voltage drop
- Soft, non-snap off, recovery characteristics

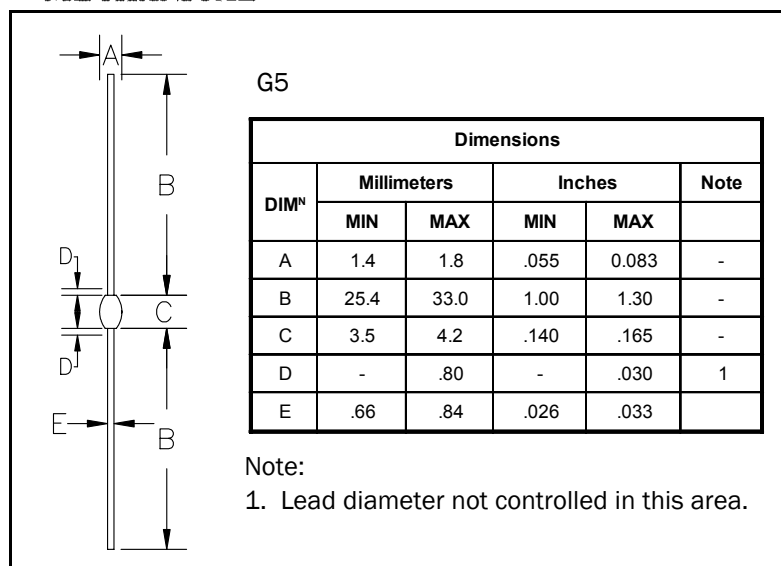
QUICK REFERENCE DATA

- $V_R = 50 - 150V$
- $I_F = 1.8A$
- $t_{rr} = 30ns$
- $V_F = 1.2V$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	1N6073 FF05	1N6074 FF10	1N6075 FF15	Unit
Working reverse voltage	V_{RWM}	50	100	150	V
Repetitive reverse voltage	V_{RRM}	50	100	150	V
Average forward current (@ 55°C, lead length = 0.375")	$I_{F(AV)}$	← 1.8 →			A
Repetitive surge current (@ 55°C, lead length = 0.375")	I_{FRM}	← 14.0 →			A
Non-repetitive surge current ($t_p = 8.3ms$, @ V_R & T_{jmax})	I_{FSM}	← 35.0 →			A
Storage temperature range	T_{STG}	← -65 to +150 →			°C
Operating temperature range	T_{OP}	← -65 to +150 →			°C

MECHANICAL



These products are qualified to MIL-PRF-19500/503.

They can be supplied fully released as JAN, JANTX, and JANTXV versions.

These products are qualified in Europe to DEF STAN 59-61 (PART 80)/029 available to F and FX levels.


ELECTRICAL CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	1N6073 FF05	1N6074 FF10	1N6075 FF15	Unit
Average forward current max. (pcb mounted; $T_A = 55^\circ\text{C}$) for sine wave	$I_{F(AV)}$	← 0.85 →			A
for square wave ($d = 0.5$)	$I_{F(AV)}$	← 0.90 →			A
Average forward current max. $T_L = 70^\circ\text{C}$; $L = 0"$	$I_{F(AV)}$	← 3.0 →			A
$T_L = 55^\circ\text{C}$; $L = 3/8"$ for sine wave	$I_{F(AV)}$	← 1.7 →			A
for square wave	$I_{F(AV)}$	← 1.8 →			A
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t	← 5.0 →			A ² S
Forward voltage drop max. @ $I_F = 1.5\text{A}$, $T_j = 25^\circ\text{C}$	V_F	← 1.2 →			V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	← 1.0 →			μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	← 50 →			μA
Reverse recovery time 0.5A I_F , 1.0A I_R , 0.25A I_{RR} .	t_{rr}	← 30 →			nS
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	← 24 →			pF

THERMAL CHARACTERISTICS

	Symbol	1N6073 FF05	1N6074 FF10	1N6075 FF15	Unit
Thermal resistance - junction to lead Lead length = 0.375"	$R_{\theta JL}$	← 46 →			°C/W
Lead length = 0.0"	$R_{\theta JL}$	← 13 →			°C/W
Thermal resistance - junction to amb. on 0.06" thick pcb. 1 oz. copper.	$R_{\theta JA}$	← 95 →			°C/W

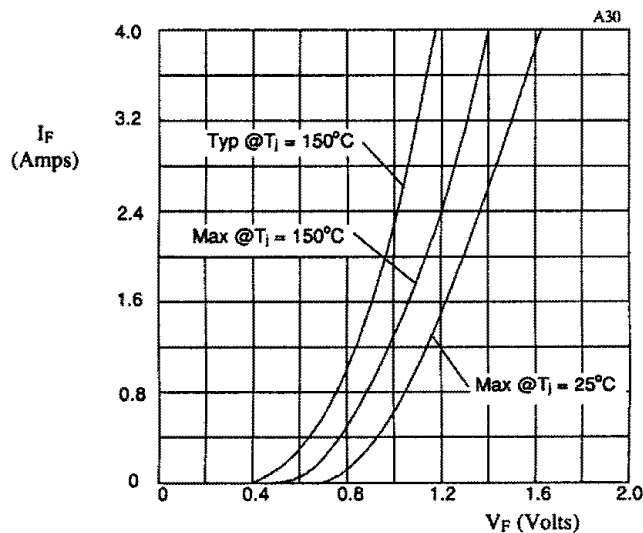


Fig 1. Forward voltage drop as a function of forward current.

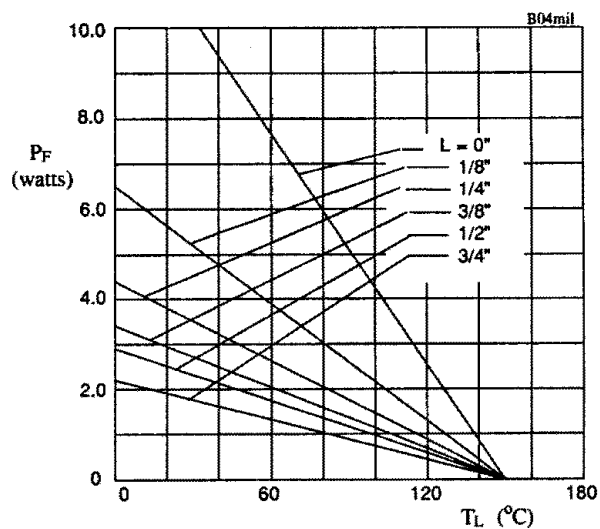


Fig 2. Maximum power versus lead temperature.

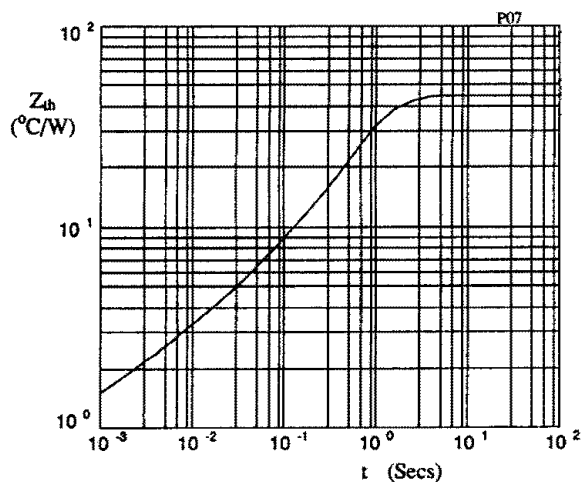


Fig 3. Transient thermal impedance characteristic.

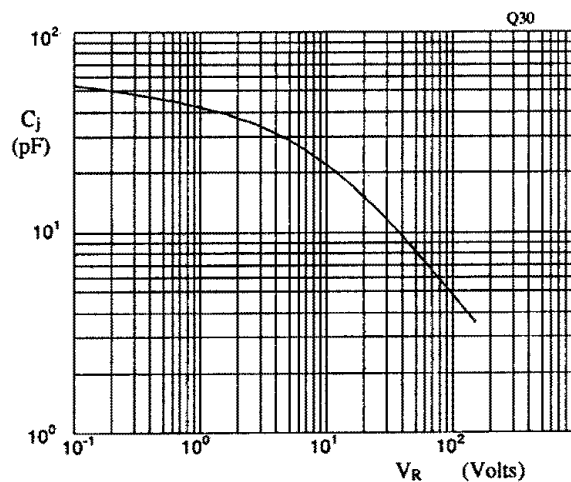


Fig 4. Typical junction capacitance as a function of reverse voltage.

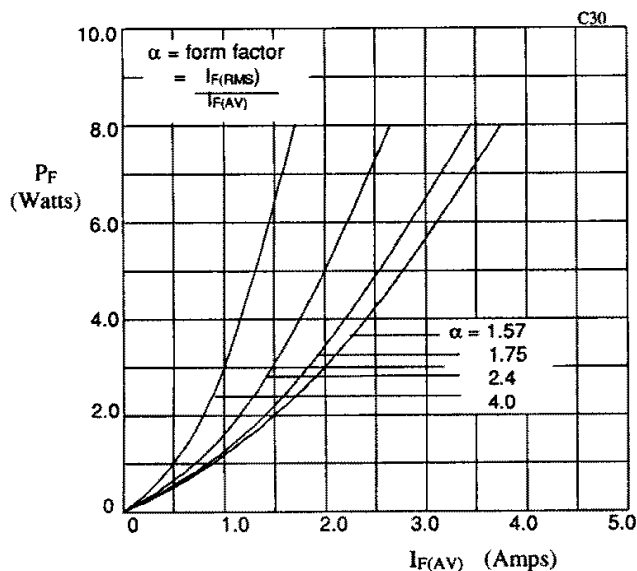


Fig 5. Forward power dissipation as a function of forward current, for sinusoidal operation.

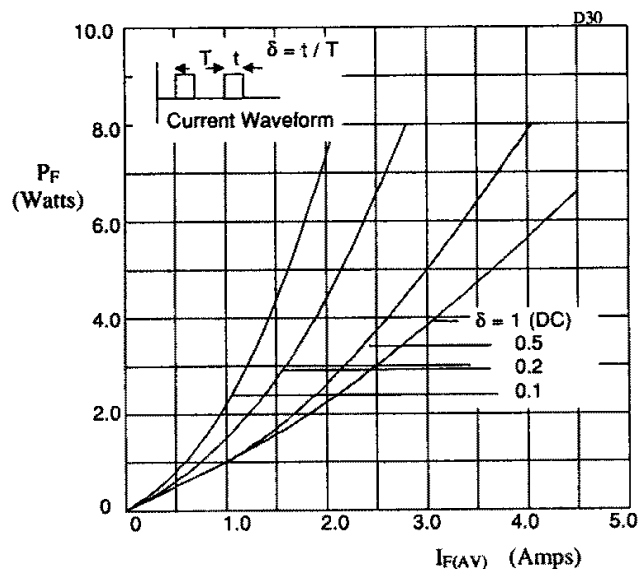


Fig 6. Forward power dissipation as a function of forward current, for square wave operation.

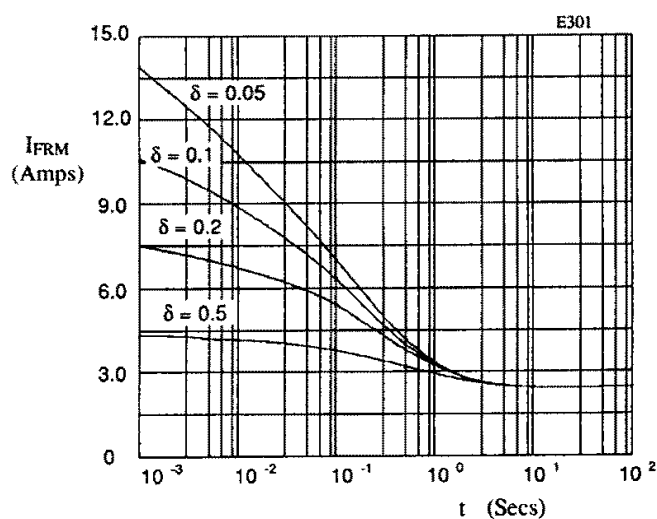


Fig 7. Maximum repetitive forward current as a function of pulse width at 55°C; $R_{\theta JL} = 45^\circ\text{C/W}$; V_{RWM} during $1 - \delta$.

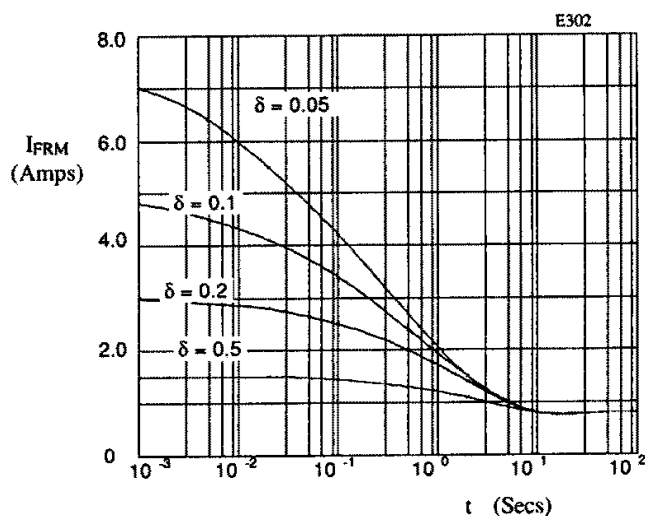


Fig 8. Maximum repetitive forward current as a function of pulse width at 100°C; $R_{\theta JL} = 110^\circ\text{C/W}$; V_{RWM} during $1 - \delta$.

**AXIAL LEADED HERMETICALLY SEALED
SUPERFAST RECTIFIER DIODE**

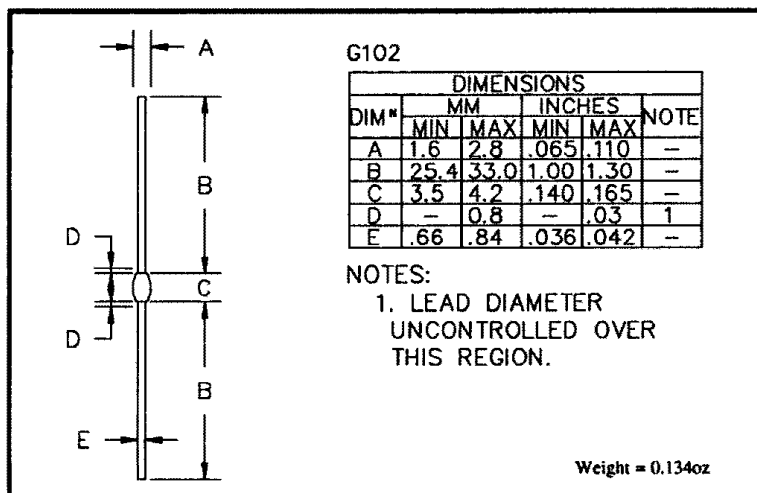
- Very low reverse recovery time
- Hermetically sealed in Metoxilite fused metal oxide
- Low switching losses
- Low forward voltage drop
- Soft, non-snap off, recovery characteristics

**QUICK REFERENCE
DATA**

- $V_R = 50 - 150V$
- $I_F = 3.1A$
- $t_{rr} = 30ns$
- $V_F = 1.2V$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	1N6076 3FF05	1N6077 3FF10	1N6078 3FF15	Unit
Working reverse voltage	V_{RWM}	50	100	150	V
Repetitive reverse voltage	V_{RRM}	50	100	150	V
Average forward current (@ 55°C, lead length = 0.375")	$I_{F(AV)}$	← 3.1 →			A
Repetitive surge current (@ 55°C in free air, lead length 0.375")	I_{FRM}	← 14.0 →			A
Non-repetitive surge current ($t_p = 8.3ms$, @ V_R & T_{jmax})	I_{FSM}	← 75.0 →			A
Storage temperature range	T_{STG}	← -65 to +150 →			°C
Operating temperature range	T_{OP}	← -65 to +150 →			°C

MECHANICAL

These products are qualified to MIL-PRF-19500/503.

They can be supplied fully released as JAN, JANTX, and JANTXV versions.

**ELECTRICAL CHARACTERISTICS** (@ 25°C unless otherwise specified)

	Symbol	1N6076 3FF05	1N6077 3FF10	1N6078 3FF15	Unit
Average forward current max. (pcb mounted; $T_A = 55^\circ\text{C}$) for sine wave	$I_F(\text{AV})$	← 1.30 →			A
for square wave ($d = 0.5$)	$I_F(\text{AV})$	← 1.40 →			A
Average forward current max. $T_L = 70^\circ\text{C}$; $L = 0"$	$I_F(\text{AV})$	← 6.0 →			A
$T_L = 55^\circ\text{C}$; $L = 3/8"$ for sine wave	$I_F(\text{AV})$	← 3.0 →			A
for square wave	$I_F(\text{AV})$	← 3.1 →			A
I^2t for fusing ($t = 8.3\text{mS}$) max.	I^2t	← 5.1 →			A ² S
Forward voltage drop max. @ $I_F = 3.0\text{A}$, $T_j = 25^\circ\text{C}$	V_F	← 1.2 →			V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	← 5.0 →			μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	← 100 →			μA
Reverse recovery time 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR} .	t_{rr}	← 30 →			nS
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	← 58 →			pF

THERMAL CHARACTERISTICS

	Symbol	1N6076 3FF05	1N6077 3FF10	1N6078 3FF15	Unit
Thermal resistance - junction to lead Lead length = 0.0"	$R_{\theta\text{JL}}$	← 8.5 →			°C/W
Lead length = 0.375"	$R_{\theta\text{JL}}$	← 25 →			°C/W
Thermal resistance - junction to amb. on 0.06" thick pcb. 1 oz. copper.	$R_{\theta\text{JA}}$	← 90 →			°C/W

AXIAL LEADED HERMETICALLY SEALED SUPERFAST RECTIFIER DIODE

- Very low reverse recovery time
- Hermetically sealed in Metoxillite fused metal oxide
- Low switching losses
- Low forward voltage drop
- Soft, non-snap off, recovery characteristics

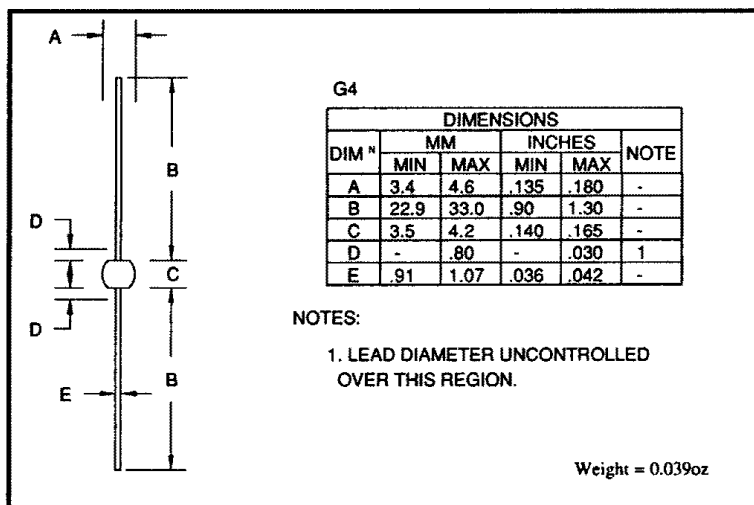
QUICK REFERENCE DATA

- $V_R = 50 - 150V$
- $I_F = 5.0A$
- $t_{rr} = 30ns$
- $V_F = 0.97V$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	1N6079 5FF05	1N6080 5FF10	1N6081 5FF15	Unit
Working reverse voltage	V_{RWM}	50	100	150	V
Repetitive reverse voltage	V_{RRM}	50	100	150	V
Average forward current (@ 55°C, lead length 0.375")	$I_{F(av)}$	← 5.0 →			A
Repetitive surge current (@ 55°C in free air, lead length 0.375")	I_{FRM}	← 24 →			A
Non-repetitive surge current ($t_p = 8.3ms$, @ V_R & T_{jmax})	I_{FSM}	← 175 →			A
Storage temperature range	T_{STG}	← -65 to +150 →			°C
Operating temperature range	T_{OP}	← -65 to +150 →			°C

MECHANICAL



These products are qualified to MIL-PRF-19500/503.

They can be supplied fully released as JAN, JANTX, and JANTXV versions.

These products are qualified in Europe to DEF STAN 59-61 (PART 80)/030 available to F and FX levels.

ELECTRICAL CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	1N6079 5FF05	1N6080 5FF10	1N6081 5FF15	Unit
Average forward current max. $T_A = 55^\circ\text{C}$ for sine wave	$I_F(AV)$	← 2.0 →			A
Average forward current max. $T_L = 70^\circ\text{C}; L = 0"$ $T_L = 55^\circ\text{C}; L = 3/8"$ for sine wave	$I_F(AV)$	← 12.0 →			A
for square wave	$I_F(AV)$	← 4.8 →			A
	$I_F(AV)$	← 5.0 →			A
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t	← 127 →			A ² S
Forward voltage drop max. @ $I_F = 5.0\text{A}$, $T_j = 25^\circ\text{C}$	V_F	← 0.97 →			V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	← 10 →			μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	← 500 →			μA
Reverse recovery time max. 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR} .	t_{rr}	← 30 →			nS
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	← 230 →			pF

THERMAL CHARACTERISTICS

	Symbol	1N6079 5FF05	1N6080 5FF10	1N6081 5FF15	Unit
Thermal resistance - junction to lead Lead length = 0.375"	$R_{\theta JL}$	← 23.5 →			°C/W
Lead length = 0.0"	$R_{\theta JL}$	← 5 →			°C/W
Thermal resistance - junction to amb. on 0.06" thick pcb. 1 oz. copper.	$R_{\theta JA}$	← 75 →			°C/W

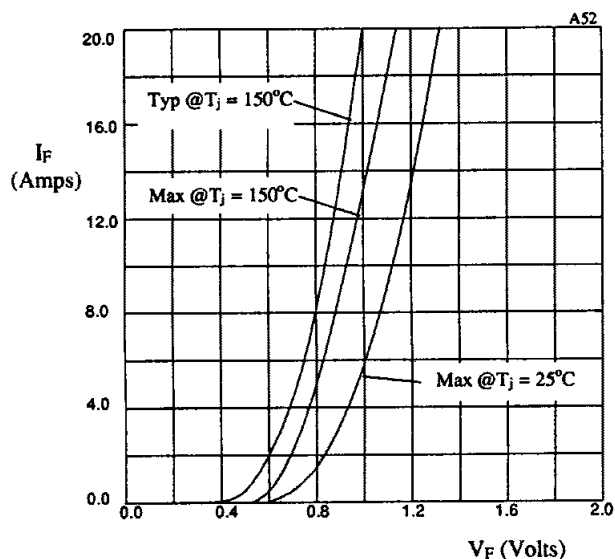


Fig 1. Forward voltage drop as a function of forward current

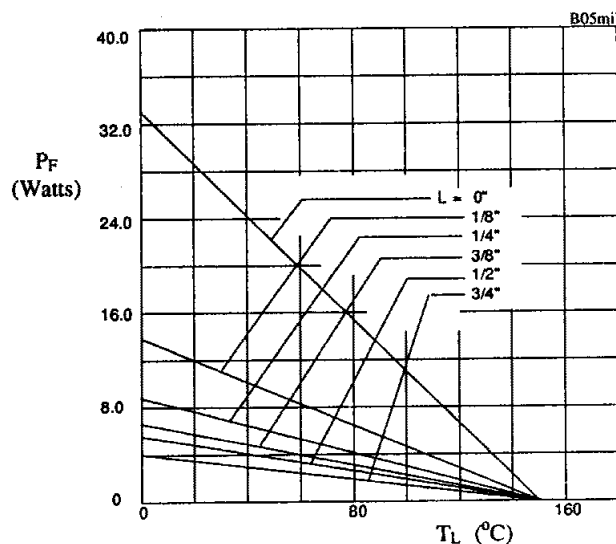


Fig 2. Maximum power versus lead temperature

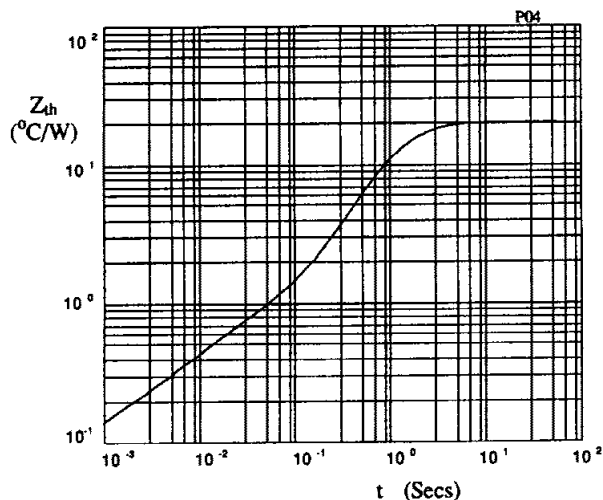


Fig 3. Transient thermal impedance characteristic.

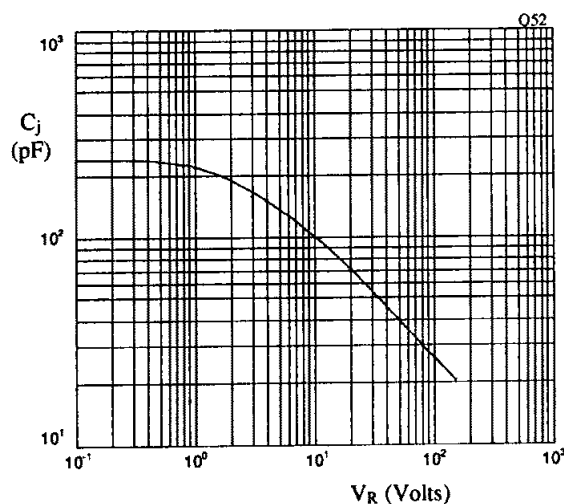


Fig 4. Typical junction capacitance as a function of reverse voltage.

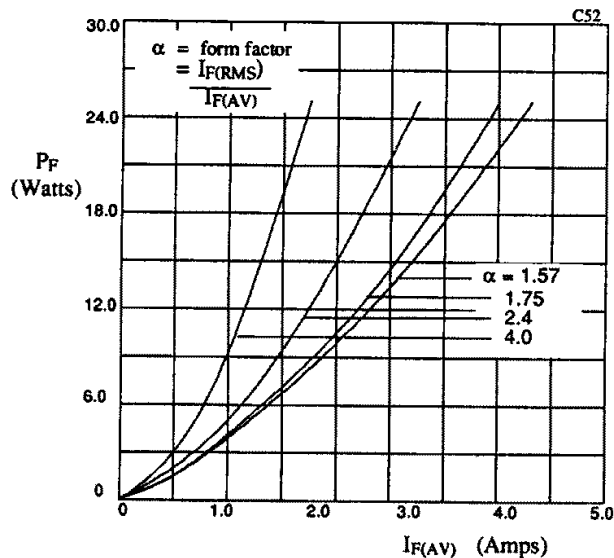


Fig 5. Forward power dissipation as a function of forward current, for sinusoidal operation.

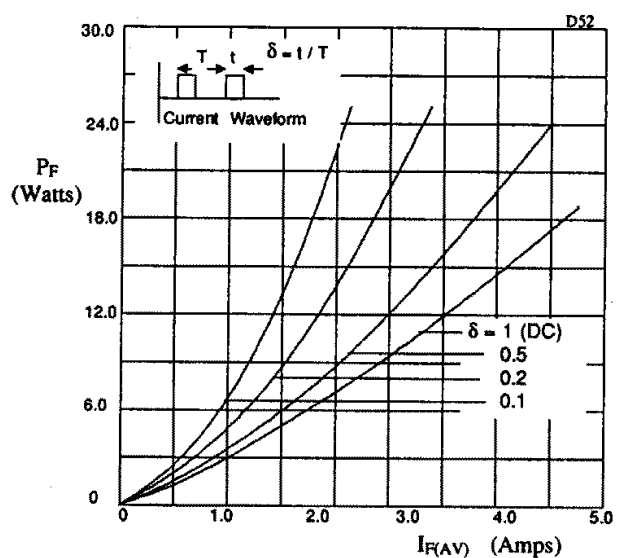


Fig 6. Forward power dissipation as a function of forward current, for square wave operation.

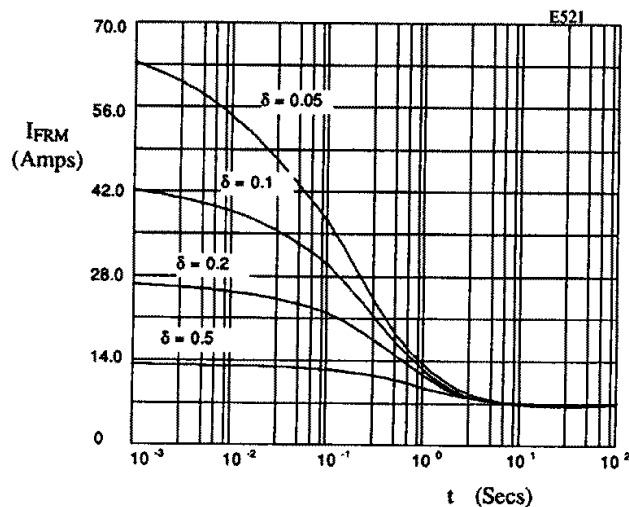


Fig 7. Maximum repetitive forward current as a function of pulse width at 55°C; $R_{\theta JL} = 20^\circ\text{C/W}$; V_{RWM} during $1 - \delta$.

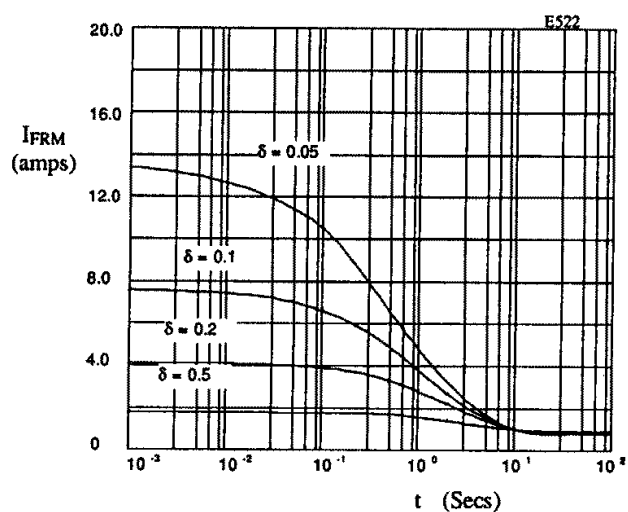


Fig 8. Maximum repetitive forward current as a function of pulse width at 100°C; $R_{\theta JL} = 80^\circ\text{C/W}$; V_{RWM} during $1 - \delta$.

POWER DISCRETES

Description

Quick reference data

$$V_R = 600V$$

$$I_F = 2.0A$$

$$t_{rr} = 60nS$$

$$I_R = 1\mu A$$

Features

- ◆ Very low reverse recovery time
- ◆ Glass passivated for hermetic sealing
- ◆ Low switching losses
- ◆ Soft, non-snap off, recovery characteristics
- ◆ Avalanche capability

2

Absolute Maximum Ratings

Electrical specifications @ $T_A = 25^\circ C$ unless otherwise specified.

	Symbol	2PFF6	Units
Working Reverse Voltage	V_{RWM}	600	V
Repetitive Reverse Voltage	V_{RRM}	600	V
Average Forward Current @ $55^\circ C$, lead length 0.375"	$I_{F(AV)}$	2.0	A
Repetitive Surge Current @ $55^\circ C$ in free air, lead length 0.375"	I_{FRM}	9.0	A
Non-Repetitive Surge Current ($t_p = 8.3mS$ @ V_R & T_{JMAX})	I_{FSM}	45.0	A
Storage Temperature Range	T_{STG}	-55 to +175	$^\circ C$

POWER DISCRETES

Electrical Specifications

	Symbol	2PFF6	Units
Average Forward Current max (pcb mounted; $T_A = 55^\circ\text{C}$) for sine wave for square wave ($d = 0.5$)	$I_{F(AV)}$ $I_{F(AV)}$	0.85 0.90	A
Average Forward Current max ($T_L = 55^\circ\text{C}$; $L = 3/8"$) for sine wave for square wave	$I_{F(AV)}$ $I_{F(AV)}$	1.9 2.0	A
Pt for fusing ($t = 8.3\text{mS}$) max	Pt	8.4	A^2S
Forward Voltage Drop max. @ $I_F = 2.0\text{A}$, $T_j = 25^\circ\text{C}$	V_F	2.1	V
Reverse Current typ. @ V_{RWM} , $T_j = 25^\circ\text{C}$ @ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R I_R	1 20	μA
Reverse Recovery Time max. 0.5A I_F to 1.0A I_{RM} recovers to 0.25A $I_{RM(REC)}$	t_{rr}	60	nS
Junction Capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	40	pF

Thermal Characteristics

	Symbol	2PFF6	Units
Thermal Resistance-Junction to Lead Lead length = 0.375"	$R_{\theta JL}$	20	$^\circ\text{C/W}$

Maximum Characteristics

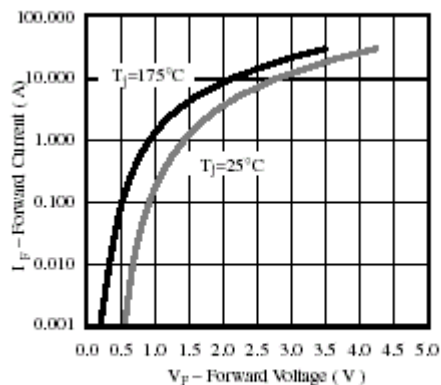


Figure 1. Forward Current vs. Forward Voltage

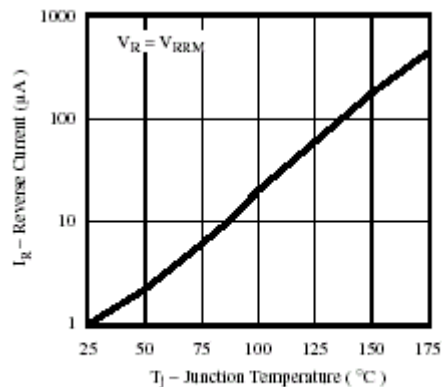


Figure 2. Reverse Current vs. Junction Temperature

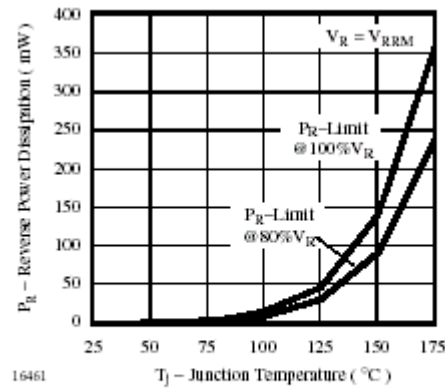
POWER DISCRETES
Maximum Characteristics (Cont.)


Figure 3. Max. Reverse Power Dissipation vs. Junction Temperature

POWER DISCRETES

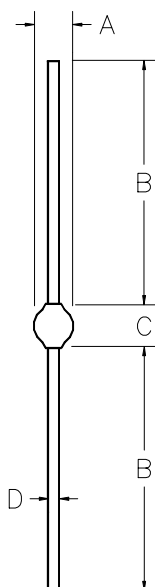
Ordering Information

Part Number	Description
2PFF6	Axial leaded hermetically sealed ⁽¹⁾

Note:

(1) Available in bulk and tape and reel packaging. Please consult factory for quantities.

Outline Drawing



Dimensions					
DIM ^N	Inches		Millimeters		Note
	MIN	MAX	MIN	MAX	
A	-	.177	-	4.50	-
B	1.02	-	26	-	-
C	-	.197	-	5.00	-
D	-	.053	-	1.35	-

Weight = 0.035oz

Contact Information

Semtech Corporation
Power Discretes Products Division
200 Flynn Road, Camarillo, CA 93012
Phone: (805)498-2111 FAX (805)498-3804

POWER DISCRETES

Description

Quick reference data

$$V_R = 800 - 1000V$$

$$I_F = 3.0A$$

$$t_{rr} = 75nS$$

$$I_R = 2\mu A$$

Features

- ◆ Very low reverse recovery time
- ◆ Glass passivated for hermetic sealing
- ◆ Low switching losses
- ◆ Soft, non-snap off, recovery characteristics
- ◆ Avalanche capability

2

Absolute Maximum Ratings

Electrical specifications @ $T_A = 25^\circ C$ unless otherwise specified.

	Symbol	2PFF8	2PFF0	Units
Working Reverse Voltage	V_{RWM}	800	1000	V
Average Forward Current @ $55^\circ C$, lead length 0.375"	$I_{F(AV)}$	3.0		A
Repetitive Surge Current @ $55^\circ C$ in free air, lead length 0.375"	I_{FRM}	9.0		A
Non-Repetitive Surge Current ($t_p = 8.3mS$ @ V_R & T_{JMAX})	I_{FSM}	45.0		A
Storage Temperature Range	T_{STG}	-55 to +175		$^\circ C$

POWER DISCRETES

Electrical Specifications

	Symbol	2PFF8	2PFF0	Units
Average Forward Current max (pcb mounted; $T_A = 55^\circ\text{C}$)	$I_{F(AV)}$	1.0		A
Average Forward Current max ($T_L = 55^\circ\text{C}$; $L = 3/8"$)	$I_{F(AV)}$	3.0		A
Pt for fusing ($t = 8.3\text{mS}$) max	Pt	8.4		A^2S
Forward Voltage Drop max. @ $I_F = 3.0\text{A}$, $T_J = 25^\circ\text{C}$	V_F	1.7		V
Reverse Current max. @ V_{RWM} , $T_J = 25^\circ\text{C}$ @ V_{RWM} , $T_J = 100^\circ\text{C}$	I_R I_R	2 50		μA
Reverse Recovery Time max. $0.5\text{A } I_F$ to $1.0\text{A } I_{RM}$ recovers to $0.25\text{A } I_{RM(REC)}$	t_{rr}	75		nS
Junction Capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	40		pF

Thermal Characteristics

	Symbol	2PFF8, 2PFF0	Units
Thermal Resistance-Junction to Lead Lead length = $0.375"$	$R_{\theta JL}$	26	$^\circ\text{C/W}$

Typical Characteristics

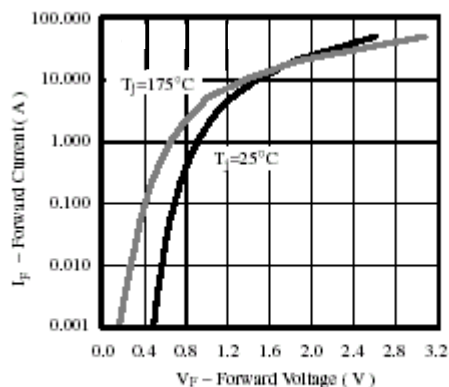


Figure 1. Max. Forward Current vs. Forward Voltage

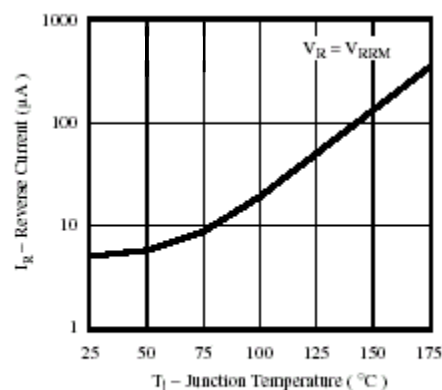


Figure 2. Max. Reverse Current vs. Junction Temperature

POWER DISCRETES

Ordering Information

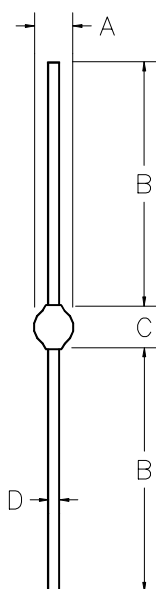
Part Number	Description
2PFF8 2PFF0	Axial leaded hermetically sealed ⁽¹⁾

Note:

(1) Available in bulk and tape and reel packaging. Please consult factory for quantities.

2

Outline Drawing



Dimensions					
DIM ^N	Inches		Millimeters		Note
	MIN	MAX	MIN	MAX	
A	-	.177	-	4.50	-
B	1.02	-	26	-	-
C	-	.197	-	5.00	-
D	-	.053	-	1.35	-

Weight = 0.035oz

Contact Information

Semtech Corporation
Power Discretes Products Division
200 Flynn Road, Camarillo, CA 93012
Phone: (805)498-2111 FAX (805)498-3804

AXIAL LEADED HERMETICALLY SEALED SUPERFAST RECTIFIER DIODE

QUICK REFERENCE DATA

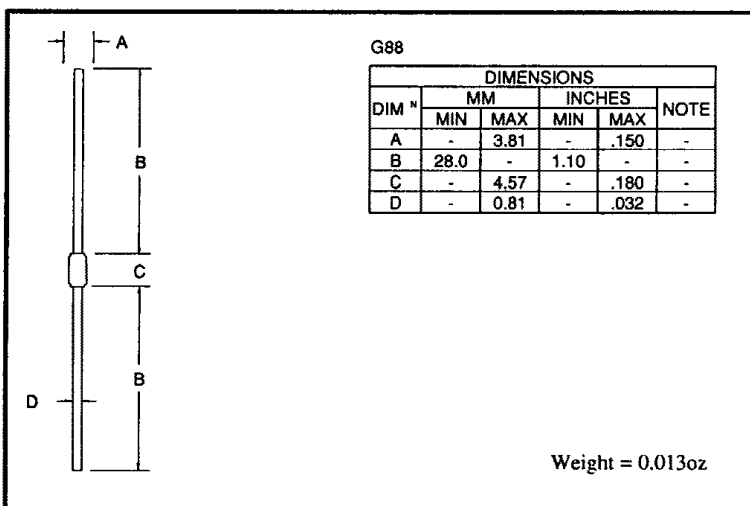
- Very low reverse recovery time
- Glass passivated for hermetic sealing
- Low switching losses
- Soft, non-snap off, recovery characteristics
- Low forward voltage drop

- $V_R = 50 - 200V$
- $I_F = 2.6A$
- $t_{rr} = 25ns$
- $V_F = 0.97V$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	2PFT05	2PFT1	2PFT15	2PFT2	Unit
Working reverse voltage	V_{RWM}	50	100	150	200	V
Repetitive reverse voltage	V_{RRM}	50	100	150	200	V
Average forward current (@ 55°C, lead length = 0.375")	$I_{F(AV)}$	← 2.6 →				A
Repetitive surge current (@ 55°C in free air, lead length 0.375")	I_{FRM}	← 15.0 →				A
Non-repetitive surge current ($t_p = 8.3ms$, @ V_R & T_{jmax})	I_{FSM}	← 50.0 →				A
Storage temperature range	T_{STG}	← -65 to +175 →				°C
Operating temperature range	T_{OP}	← -65 to +175 →				°C

MECHANICAL



These products are qualified in Europe to DEF STAN 59-61 (PART 80)/043 available to F and FX levels.

ELECTRICAL CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	2PFT05	2PFT1	2PFT15	2PFT2	Unit
Average forward current max. (pcb mounted; $T_A = 55^\circ\text{C}$) for sine wave	$I_{F(AV)}$	←	1.35	→		A
for square wave ($d = 0.5$)	$I_{F(AV)}$	←	1.40	→		A
Average forward current max. ($T_L = 55^\circ\text{C}$; $L = 3/8"$) for sine wave	$I_{F(AV)}$	←	2.4	→		A
for square wave	$I_{F(AV)}$	←	2.6	→		A
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t	←	10.6	→		A ² S
Forward voltage drop max. @ $I_F = 2.0\text{A}$, $T_j = 25^\circ\text{C}$	V_F	←	0.97	→		V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	←	1.0	→		μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	←	10	→		μA
Reverse recovery time max. 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR} .	t_{rr}	←	25	→		nS
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	←	45	→		pF

THERMAL CHARACTERISTICS

	Symbol	2PFT05	2PFT1	2PFT15	2PFT2	Unit
Thermal resistance - junction to lead Lead length = 0.375"	$R_{\theta JL}$	←	47	→		$^\circ\text{C/W}$
Lead length = 0.0"	$R_{\theta JL}$	←	19	→		$^\circ\text{C/W}$
Thermal resistance - junction to amb. on 0.06" thick pcb. 1 oz. copper.	$R_{\theta JA}$	←	100	→		$^\circ\text{C/W}$

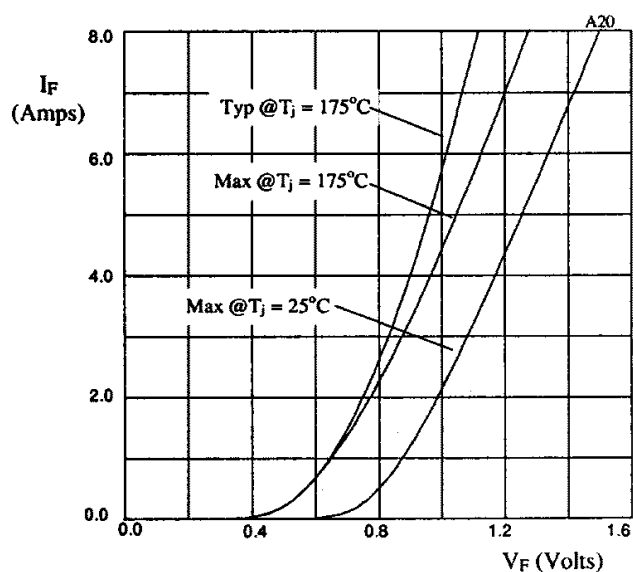


Fig 1. Forward voltage drops as a function of forward current.

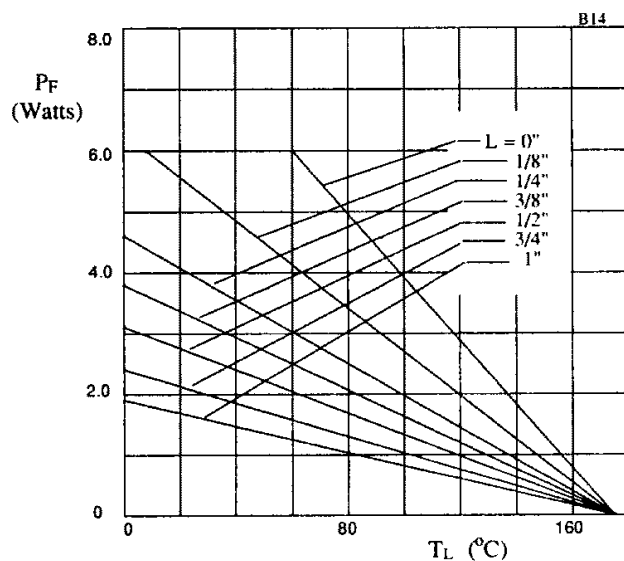


Fig 2. Maximum power versus lead temperature.

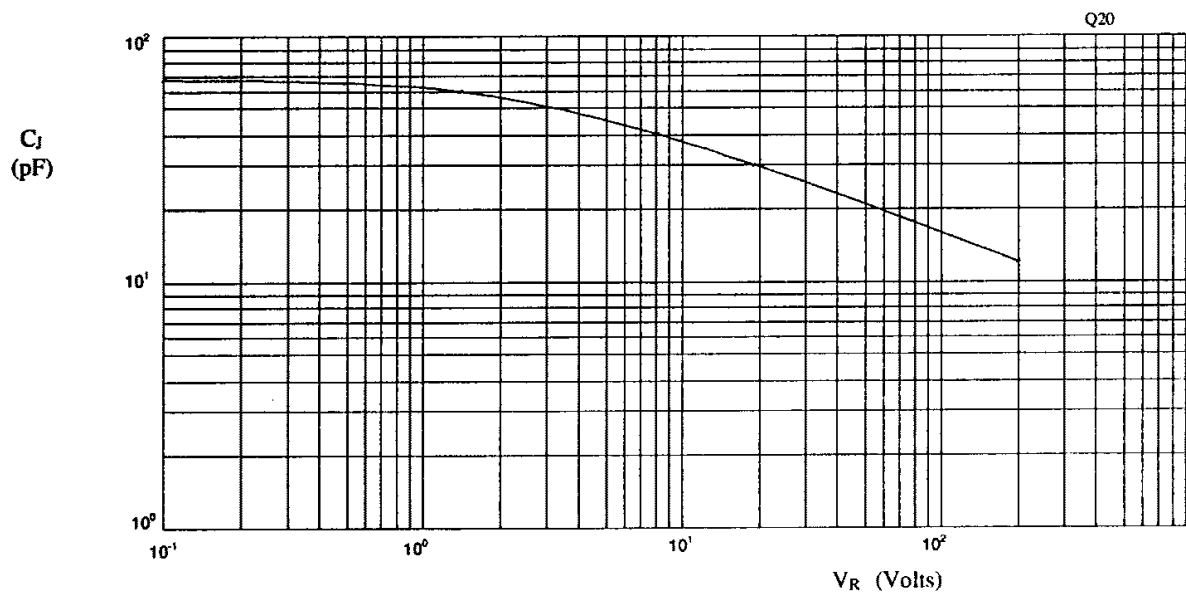


Fig 3. Typical junction capacitance as a function of reverse voltage.

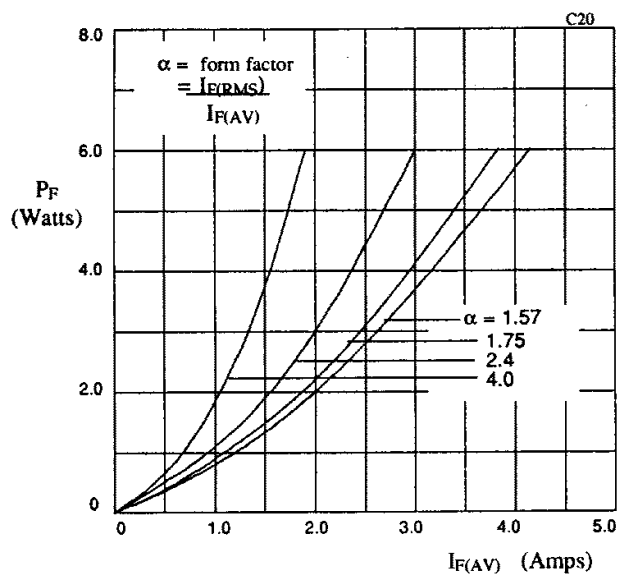


Fig 4. Forward power dissipation as a function of forward current, for sinusoidal operation.

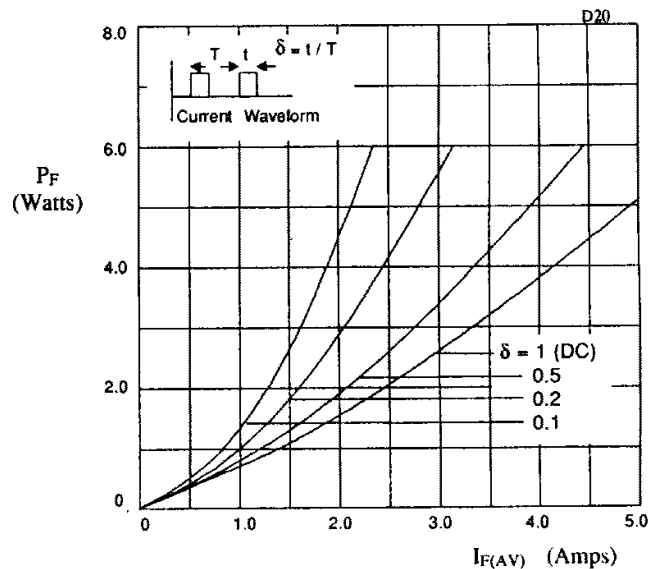


Fig 5. Forward power dissipation as a function of forward current, for square wave operation.

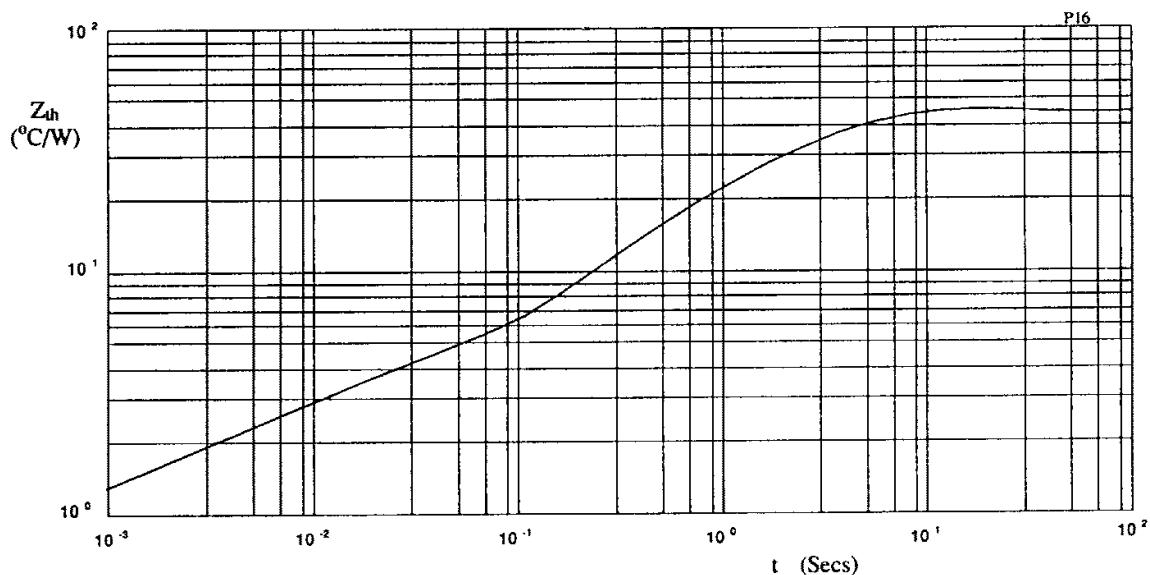


Fig 6. Transient thermal impedance characteristic.

AXIAL LEADED HERMETICALLY SEALED SUPERFAST RECTIFIER DIODE

QUICK REFERENCE DATA

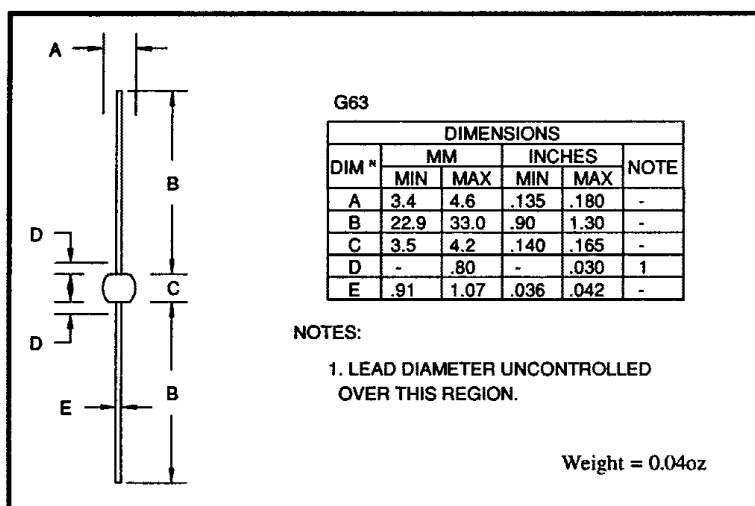
- Very low reverse recovery time
- Hermetically sealed with Metoxilite fused metal oxide
- Low switching losses
- Soft, non-snap off, recovery characteristics

- $V_R = 300 - 600V$
- $I_F = 3.4A$
- $t_{rr} = 50ns$
- $I_R = 10\mu A$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	3FF30	3FF40	3FF50	3FF60	Unit
Working reverse voltage	V_{RWM}	300	400	500	600	V
Repetitive reverse voltage	V_{RRM}	300	400	500	600	V
Average forward current (@ 55°C, lead length = 0.375")	$I_{F(AV)}$	← 3.4 →				A
Repetitive surge current (@ 55°C in free air, lead length 0.375")	I_{FRM}	← 15.0 →				A
Non-repetitive surge current ($t_p = 8.3ms$, @ V_R & T_{jmax})	I_{FSM}	← 70 →				A
Storage temperature range	T_{STG}	← -65 to +150 →				°C
Operating temperature range	T_{OP}	← -65 to +150 →				°C

MECHANICAL



ELECTRICAL CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	3FF30	3FF40	3FF50	3FF60	Unit
Average forward current max. (pcb mounted; $T_A = 55^\circ\text{C}$) for sine wave	$I_F(AV)$	←	1.0	→		A
for square wave ($d = 0.5$)	$I_F(AV)$	←	1.1	→		A
Average forward current max. ($T_L = 55^\circ\text{C}$; $L = 3/8"$) for sine wave	$I_F(AV)$	←	3.3	→		A
for square wave	$I_F(AV)$	←	3.4	→		A
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t	←	41	→		A ² S
Forward voltage drop max. @ $I_F = 3.0\text{A}$, $T_j = 25^\circ\text{C}$	V_F	←	1.40	→		V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	←	10	→		μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	←	500	→		μA
Reverse recovery time max. 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR} .	t_{rr}	←	50	→		nS
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	←	125	→		pF

THERMAL CHARACTERISTICS

	Symbol	3FF30	3FF40	3FF50	3FF60	Unit
Thermal resistance - junction to lead Lead length = 0.375"	$R_{\theta JL}$	←	20	→		°C/W
Lead length = 0.0"	$R_{\theta JL}$	←	5	→		°C/W
Thermal resistance - junction to amb. on 0.06" thick pcb. 1 oz. copper.	$R_{\theta JA}$	←	75	→		°C/W

2

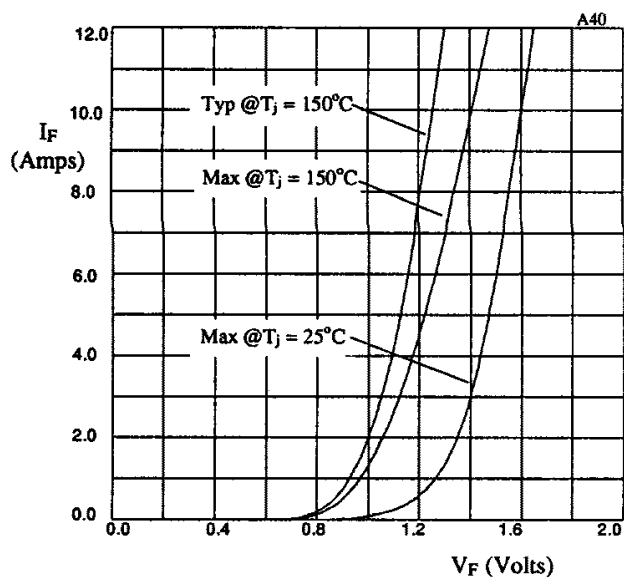


Fig 1. Forward voltage drops as a function of forward current

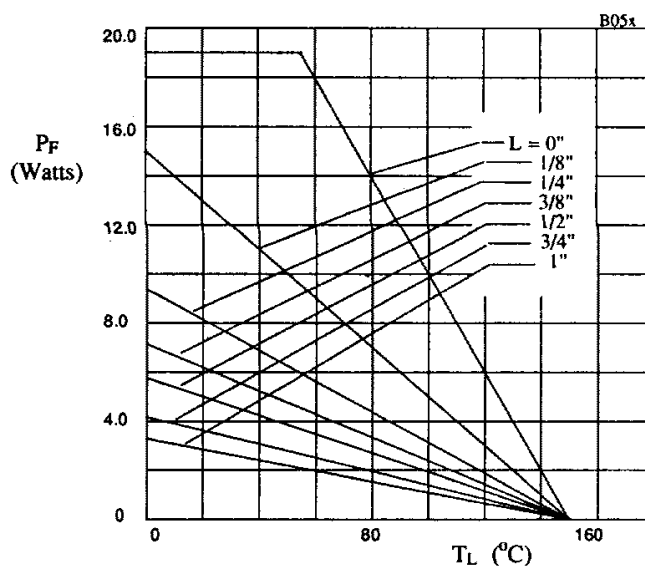


Fig 2. Maximum power versus lead temperature

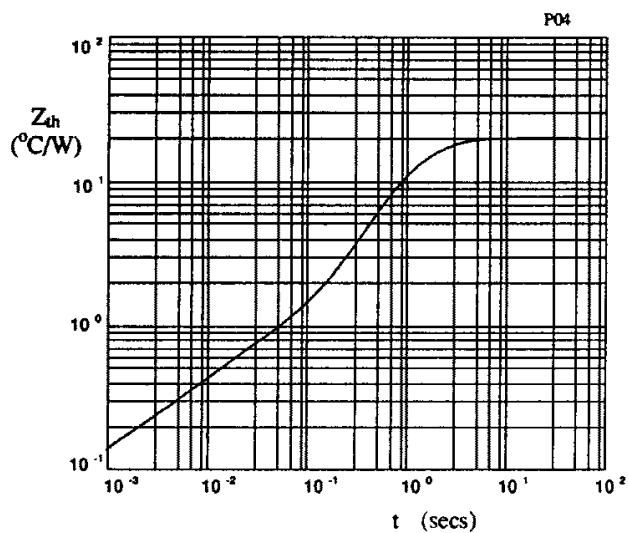


Fig 3. Transient thermal impedance characteristic.

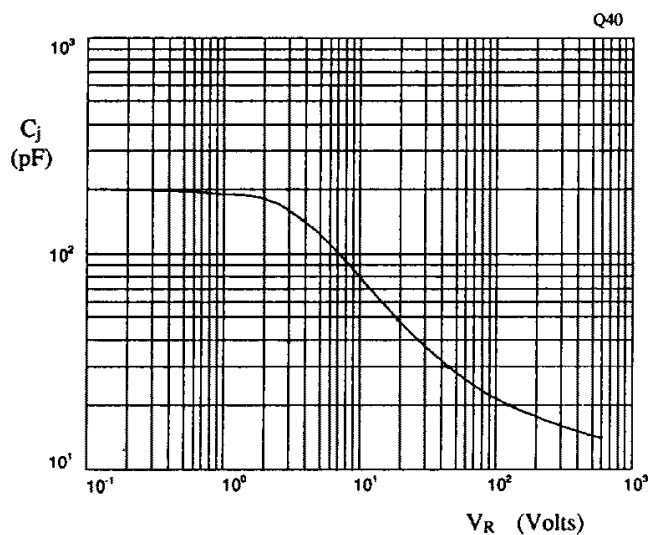


Fig 4. Typical junction capacitance as a function of reverse voltage.

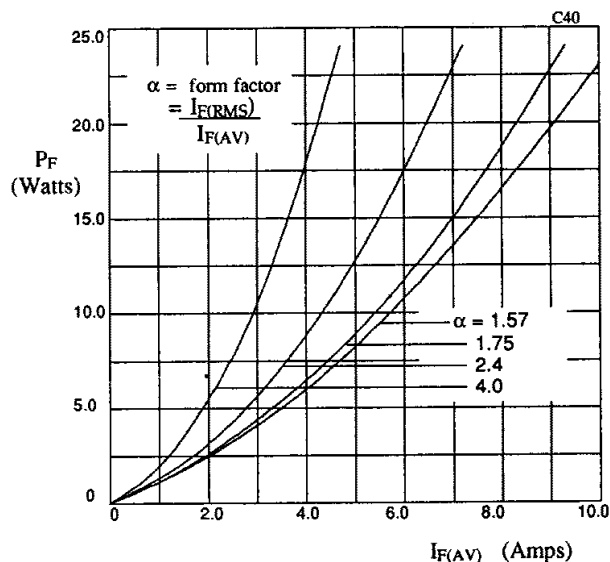


Fig 5. Forward power dissipation as a function of forward current, for sinusoidal operation.

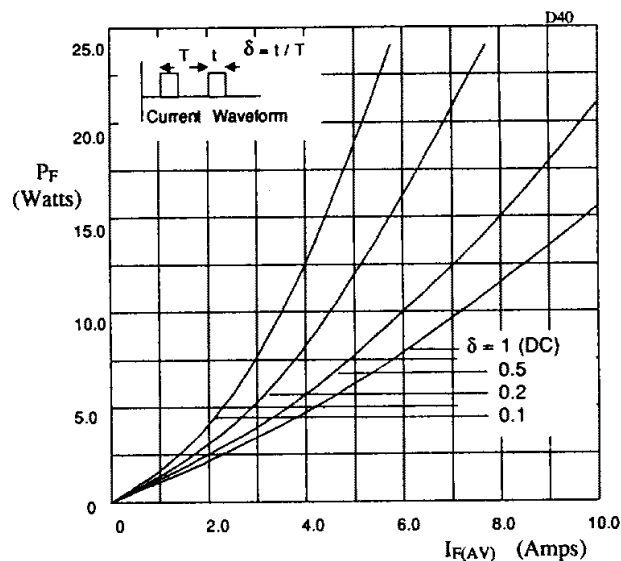


Fig 6. Forward power dissipation as a function of forward current, for square wave operation.

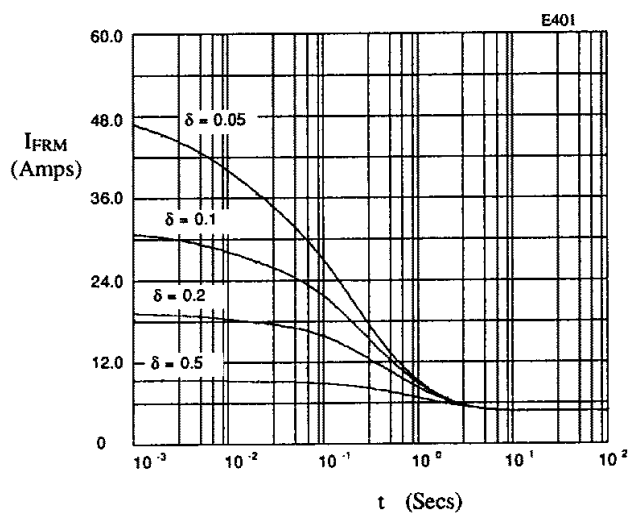


Fig 7. Typical repetitive forward current as a function of pulse width at 55°C; $R_{\theta JL} = 20 \text{ }^{\circ}\text{C/W}$; V_{RWM} during $1 - \delta$.

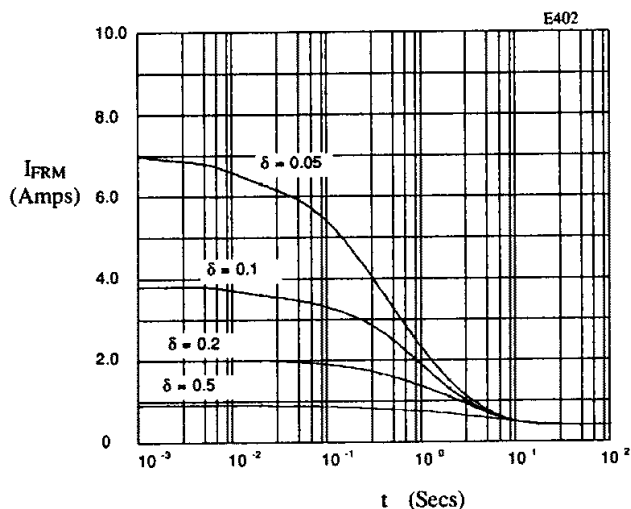


Fig 8. Typical repetitive forward current as a function of pulse width at 100°C; $R_{\theta JL} = 80 \text{ }^{\circ}\text{C/W}$; V_{RWM} during $1 - \delta$.



AXIAL LEADED HERMETICALLY SEALED FAST RECTIFIER DIODE

QUICK REFERENCE DATA

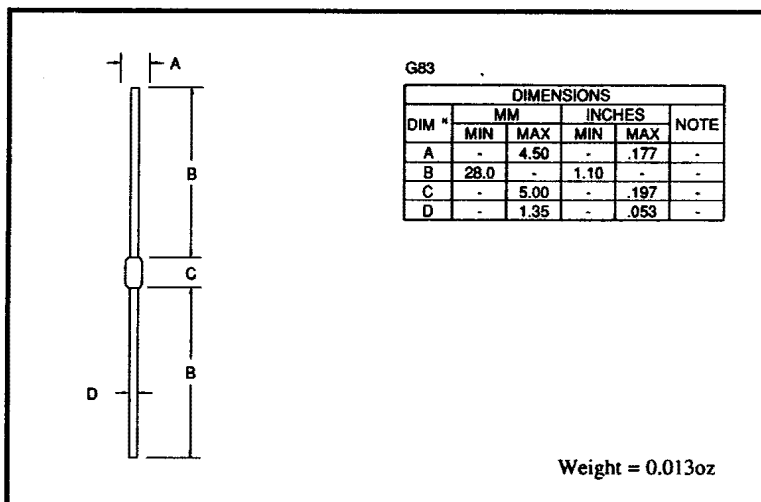
- Low reverse recovery time
- Glass passivated for hermetic sealing
- Low switching losses
- Soft, non-snap off, recovery characteristics
- Avalanche capability

- $V_R = 800 \text{ \& } 1000\text{V}$
- $I_F = 3.25\text{A}$
- $t_{rr} = 300\text{nS}$
- $I_R = 1\mu\text{A}$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	3PF8	3PF0	Unit
Working reverse voltage	V_{RWM}	800	1000	V
Repetitive reverse voltage	V_{RRM}	800	1000	V
Surge reverse voltage	V_{RSM}	900	1100	V
Average forward current (@ 55°C, lead length 0.375")	$I_{F(AV)}$	← 3.25 →		A
Repetitive surge current (@ 55°C in free air, lead length 0.375")	I_{FRM}	← 27 →		A
Non-repetitive surge current ($t_p = 8.3\text{mS}$, @ V_R & T_{jmax})	I_{FSM}	← 76 →		A
Storage temperature range	T_{STG}	-65 to +175		°C
Operating temperature range	T_{OP}	-65 to +175		°C

MECHANICAL



These products are available in Europe to DEF STAN 59-61 (PART 80)/043 to F and FX levels.


ELECTRICAL CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	3PF8	3PF0	Unit
Average forward current max. (pcb mounted; $T_A = 55^\circ\text{C}$) for sine wave	$I_{F(AV)}$	← 1.40 →		A
for square wave ($d = 0.5$)	$I_{F(AV)}$	← 1.50 →		A
Average forward current max. ($T_L = 55^\circ\text{C}$; $L = 3/8"$) for sine wave	$I_{F(AV)}$	← 3.10 →		A
for square wave	$I_{F(AV)}$	← 3.25 →		A
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t	← 24 →		A ² S
Forward voltage drop max. @ $I_F = 3.0\text{A}$, $T_j = 25^\circ\text{C}$	V_F	← 1.3 →		V
Reverse current max @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	← 1.0 →		μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	← 10 →		μA
Reverse recovery time max. 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR} .	t_{rr}	← 300 →		nS
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	← 30 →		pF

THERMAL CHARACTERISTICS

	Symbol	3PF8	3PF0	Unit
Thermal resistance - junction to lead Lead length = 0"	$R_{\theta JL}$	← 12 →		°C/W
Lead length = 0.375"	$R_{\theta JL}$	← 26 →		°C/W
Thermal resistance - junction to amb. on 0.06" thick pcb. 1 oz. copper.	$R_{\theta JA}$	← 75 →		°C/W



2

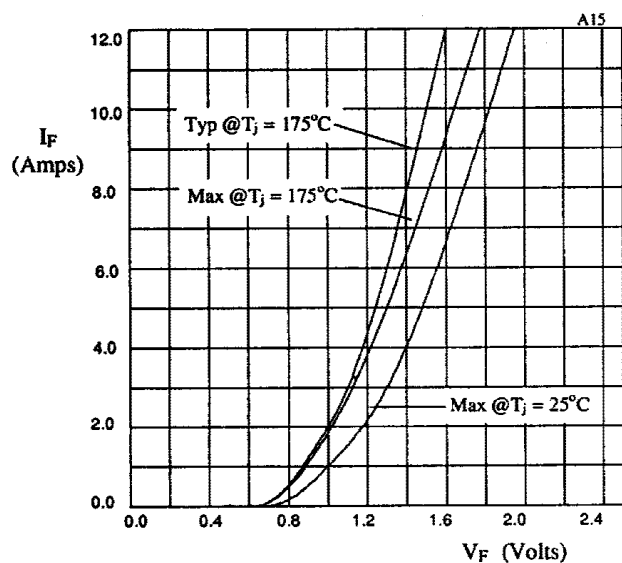


Fig 1. Forward voltage drop as a function of forward current.

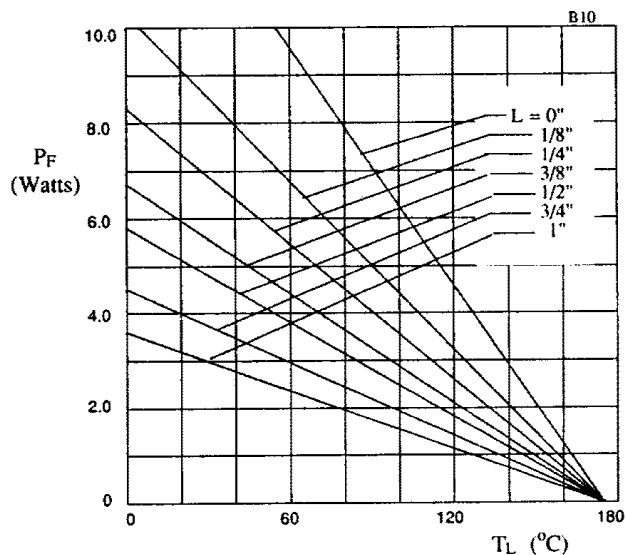


Fig 2. Maximum power versus lead temperature.

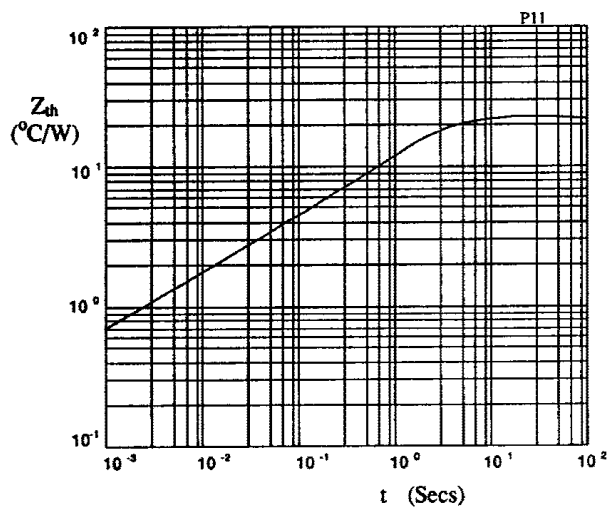


Fig 3. Transient thermal impedance characteristic.

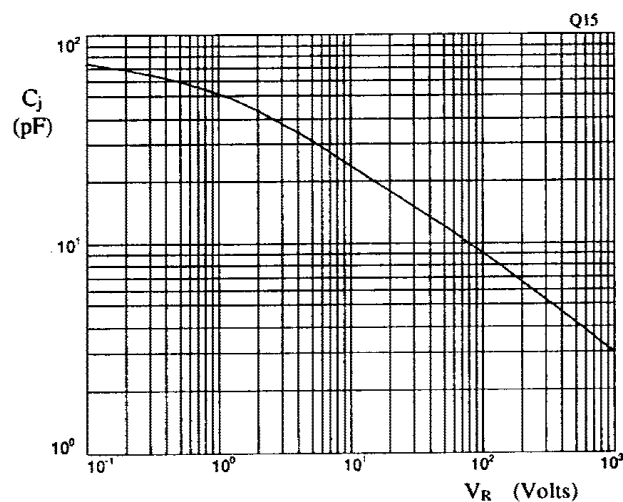


Fig 4. Typical junction capacitance as a function of reverse voltage.

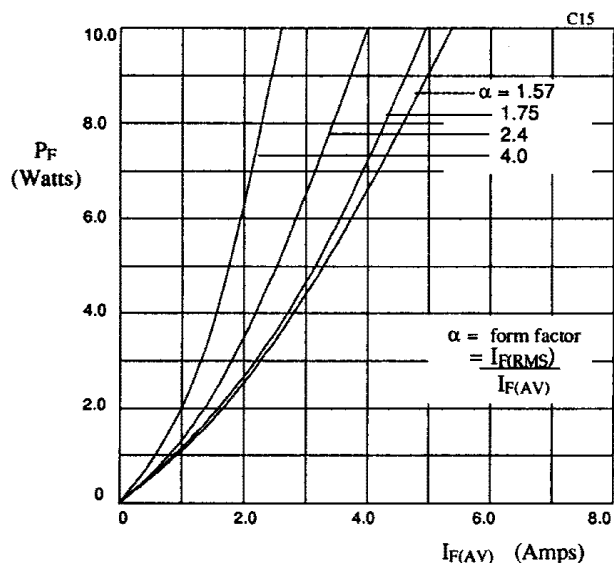


Fig 5. Forward power dissipation as a function of forward current, for sinusoidal operation.

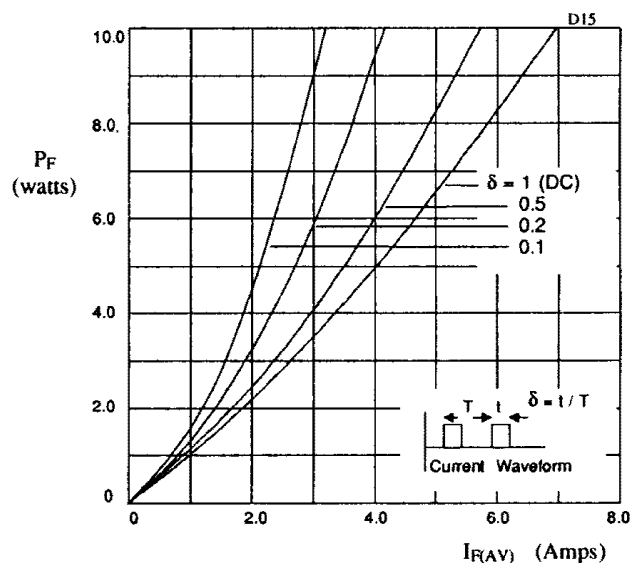


Fig 6. Forward power dissipation as a function of forward current, for square wave operation.

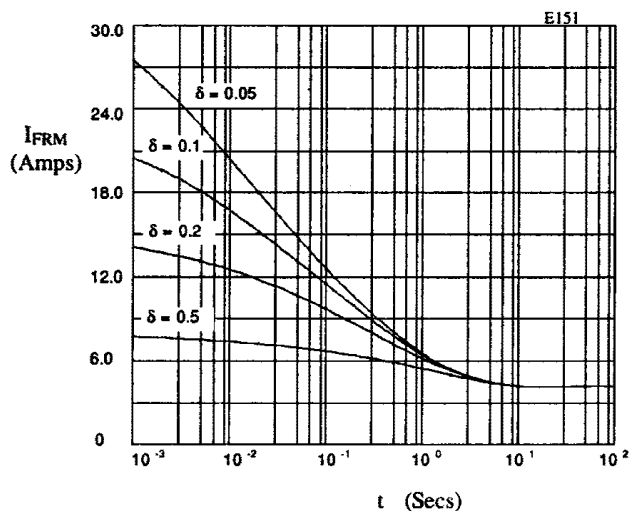


Fig 7. Typical repetitive forward current as a function of pulse width at 55°C; $R_{\theta JL} = 22^\circ\text{C/W}$; V_{RWM} during $1 - \delta$.

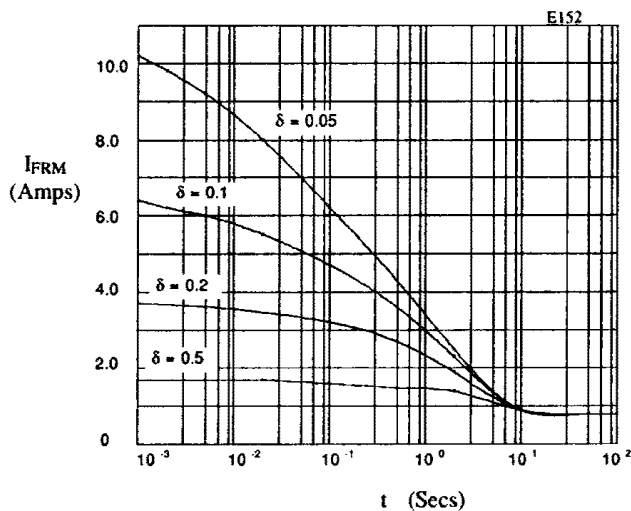


Fig 8. Typical repetitive forward current as a function of pulse width at 100°C; $R_{\theta JL} = 75^\circ\text{C/W}$; V_{RWM} during $1 - \delta$.

AXIAL LEADED HERMETICALLY SEALED FAST RECTIFIER DIODE

- Low reverse recovery time
- Glass passivated for hermetic sealing
- Low switching losses
- Soft, non-snap off, recovery characteristics
- Avalanche capability

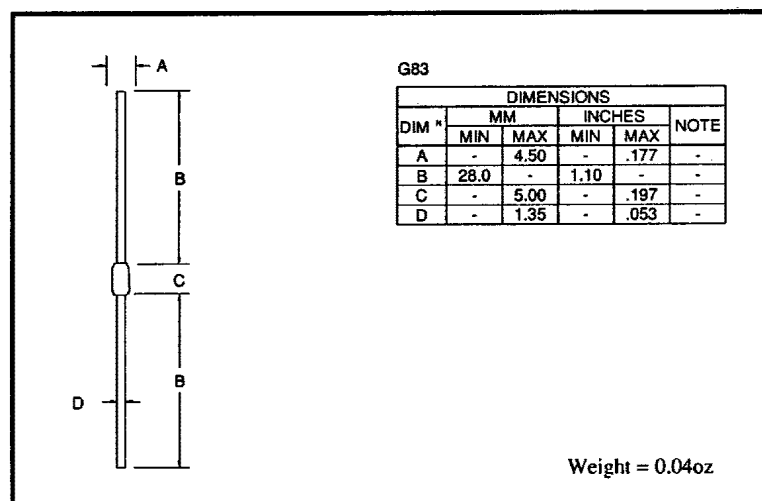
QUICK REFERENCE DATA

- $V_R = 1000V$
- $I_F = 2.7A$
- $t_{rr} = 150nS$
- $I_R = 5\mu A$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	3PFR0	Unit
Working reverse voltage	V_{RWM}	1000	V
Repetitive reverse voltage	V_{RRM}	1000	V
Surge reverse voltage	V_{RSM}	1100	V
Average forward current (@ 55°C, lead length 0.375")	$I_{F(AV)}$	2.7	A
Repetitive surge current (@ 55°C in free air, lead length 0.375")	I_{FRM}	21	A
Non-repetitive surge current ($t_p = 8.3mS$, @ V_R & T_{jmax})	I_{FSM}	70	A
Storage temperature range	T_{STG}	-65 to +175	°C
Operating temperature range	T_{OP}	-65 to +175	°C

MECHANICAL



ELECTRICAL CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	3PFR0	Unit
Average forward current max. (pcb mounted; $T_A = 55^\circ\text{C}$) for sine wave	$I_{F(AV)}$	1.15	A
for square wave ($d = 0.5$)	$I_{F(AV)}$	1.20	A
Average forward current max. ($T_L = 55^\circ\text{C}$; $L = 3/8"$) for sine wave	$I_{F(AV)}$	2.60	A
for square wave	$I_{F(AV)}$	2.70	A
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t	20	A^2S
Forward voltage drop max. @ $I_F = 2.0\text{A}$, $T_j = 25^\circ\text{C}$	V_F	1.5	V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	5.0	μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	25	μA
Reverse recovery time max. 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR} .	t_{rr}	150	nS
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	70	pF

THERMAL CHARACTERISTICS

	Symbol	3PFR0	Unit
Thermal resistance - junction to lead Lead length = 0"	$R_{\theta JL}$	12	$^\circ\text{C/W}$
Lead length = 0.375"	$R_{\theta JL}$	26	$^\circ\text{C/W}$
Thermal resistance - junction to amb. on 0.06" thick pcb. 1 oz. copper.	$R_{\theta JA}$	75	$^\circ\text{C/W}$

2

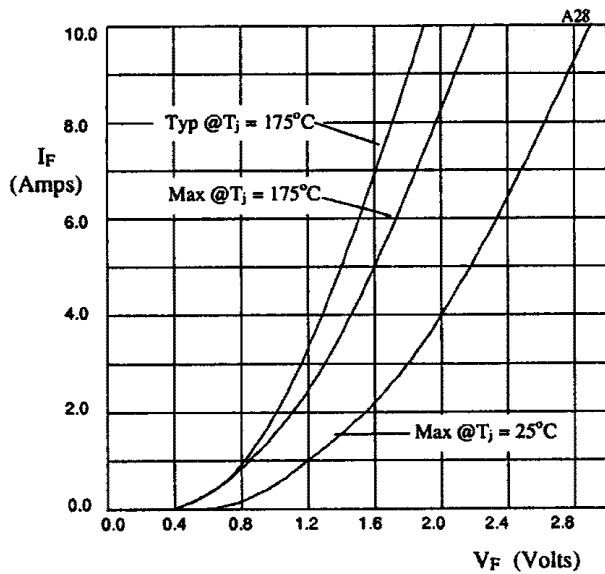


Fig 1. Forward voltage drop as a function of forward current.

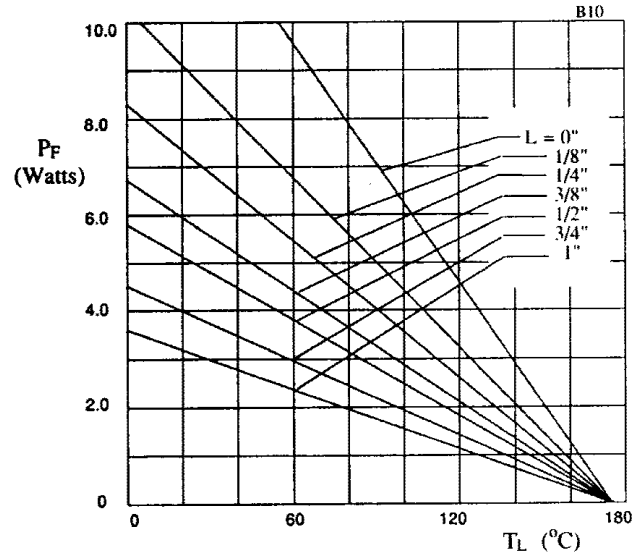


Fig 2. Maximum power versus lead temperature.

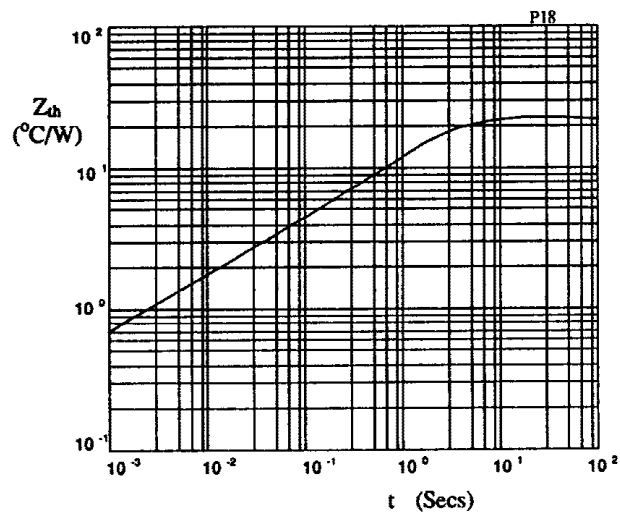


Fig 3. Transient thermal impedance characteristic.

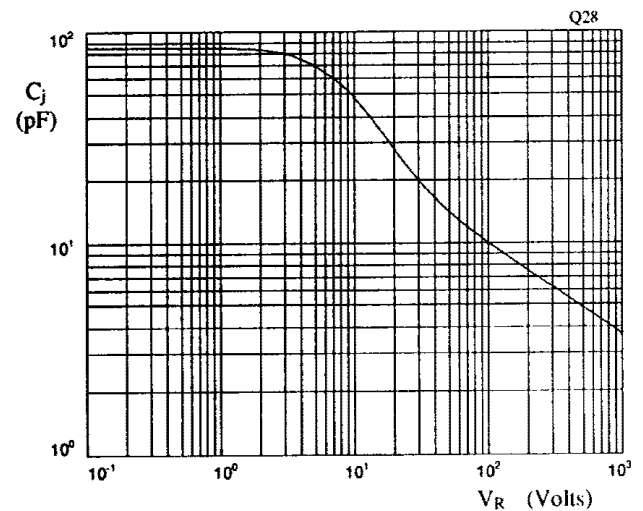


Fig 4. Typical junction capacitance as a function of reverse voltage.

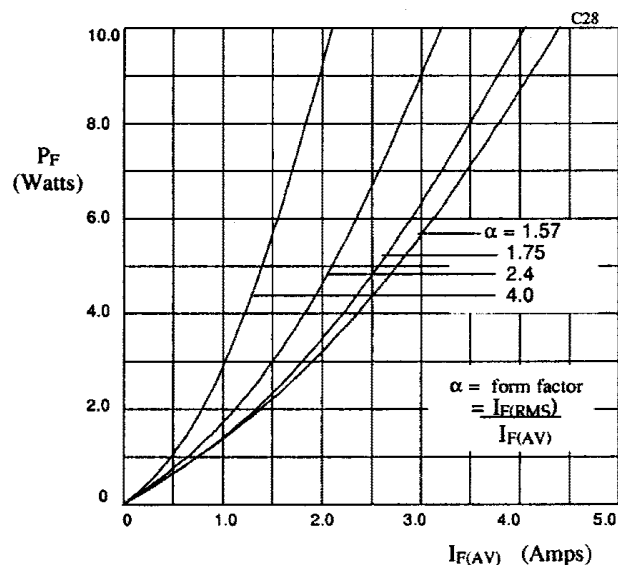


Fig 5. Forward power dissipation as a function of forward current, for sinusoidal operation.

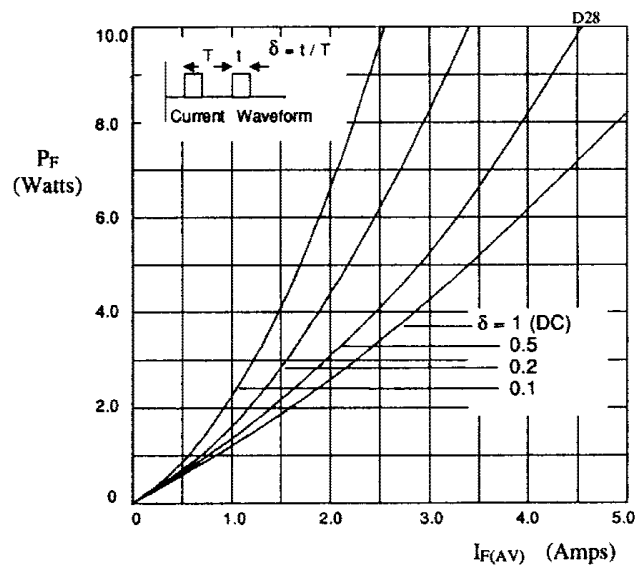


Fig 6. Forward power dissipation as a function of forward current, for square wave operation.

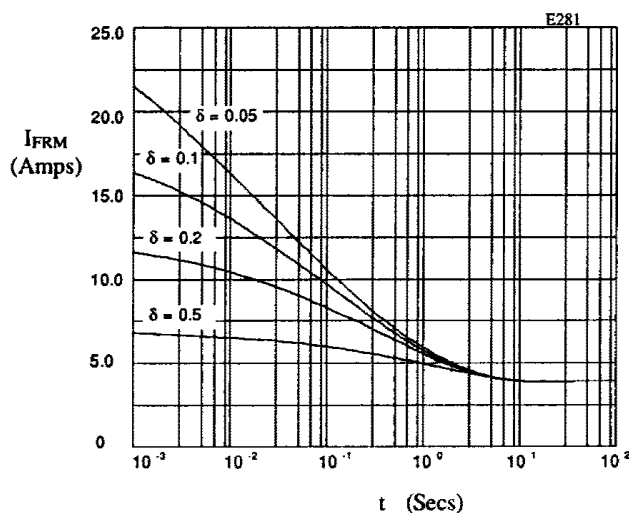


Fig 7. Typical repetitive forward current as a function of pulse width at 55°C; $R_{\theta JL} = 22^\circ\text{C/W}$; V_{RWM} during $1 - \delta$.

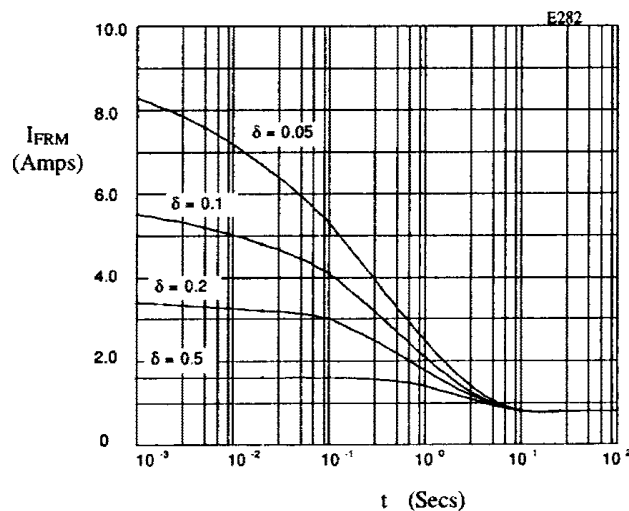


Fig 8. Typical repetitive forward current as a function of pulse width at 100°C; $R_{\theta JL} = 75^\circ\text{C/W}$; V_{RWM} during $1 - \delta$.

AXIAL LEADED HERMETICALLY SEALED SUPERFAST RECTIFIER DIODE

- Very low reverse recovery time
- Low forward voltage drop
- Glass passivated for hermetic sealing
- Low switching losses
- Soft, non-snap off, recovery characteristics

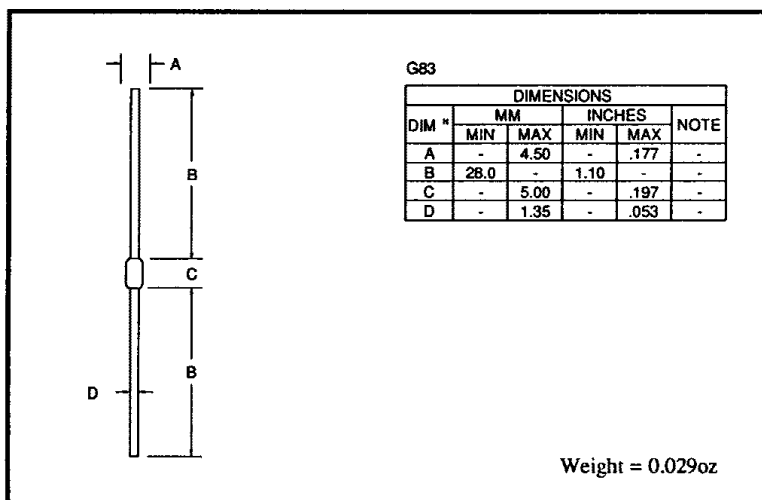
QUICK REFERENCE DATA

- $V_R = 50 - 200V$
- $I_F = 4.0A$
- $t_{rr} = 30ns$
- $V_F = 1.05V$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	3PFT05	3PFT1	3PFT15	3PFT2	Unit
Working reverse voltage	V_{RWM}	50	100	150	200	V
Repetitive reverse voltage	V_{RRM}	50	100	150	200	V
Average forward current (@ 55°C, lead length 0.375")	$I_{F(AV)}$	← 4.0 →				A
Repetitive surge current (@ 55°C in free air, lead length 0.375")	I_{FRM}	← 25 →				A
Non-repetitive surge current ($t_p = 8.3ms$, @ V_R & T_{jmax})	I_{FSM}	← 90 →				A
Storage temperature range	T_{STG}	← -65 to +175 →				°C
Operating temperature range	T_{OP}	← -65 to +175 →				°C

MECHANICAL



These products are qualified in Europe to DEF STAN 59-61 (PART 80)/029 available to F and FX levels.

ELECTRICAL CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	3PFT05	3PFT1	3PFT15	3PFT2	Unit
Average forward current max. (pcb mounted; $T_A = 55^\circ\text{C}$) for sine wave	$I_{F(AV)}$	←	1.8	→		A
for square wave ($d = 0.5$)	$I_{F(AV)}$	←	1.9	→		A
Average forward current max. ($T_L = 55^\circ\text{C}$; $L = 3/8"$) for sine wave	$I_{F(AV)}$	←	3.8	→		A
for square wave	$I_{F(AV)}$	←	4.0	→		A
I^2t for fusing ($t = 8.3\text{mS}$) max.	I^2t	←	33	→		A ² S
Forward voltage drop max. @ $I_F = 3.5\text{A}$, $T_j = 25^\circ\text{C}$	V_F	←	1.05	→		V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	←	1.0	→		μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	←	10	→		μA
Reverse recovery time max. 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR} .	t_{rr}	←	30	→		nS
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	←	92	→		pF

THERMAL CHARACTERISTICS

	Symbol	3PFT05	3PFT1	3PFT15	3PFT2	Unit
Thermal resistance - junction to lead Lead length = 0.375"	$R_{\theta JL}$	←	26	→		°C/W
Lead length = 0.0"	$R_{\theta JL}$	←	12	→		°C/W
Thermal resistance - junction to amb. on 0.06" thick pcb. 1 oz. copper.	$R_{\theta JA}$	←	75	→		°C/W

2

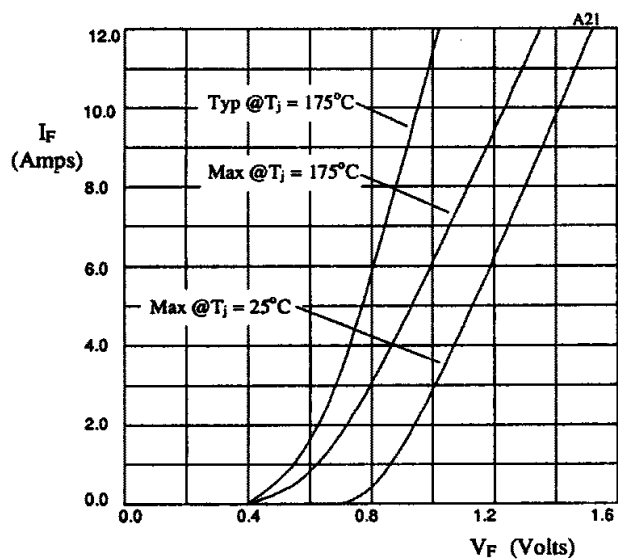


Fig 1. Forward voltage drops as a function of forward current.

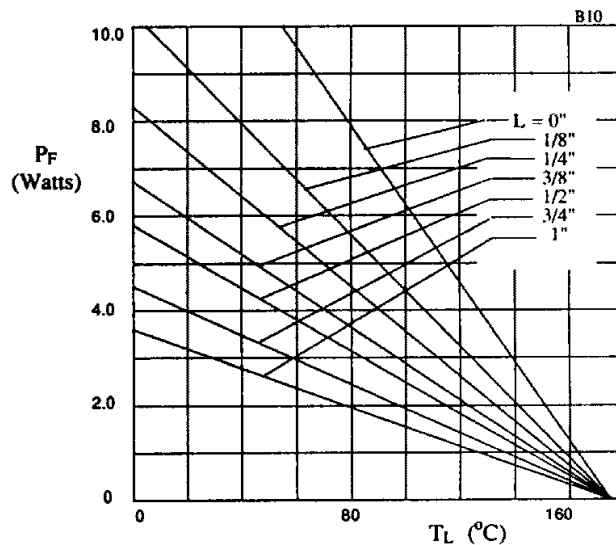


Fig 2. Maximum power versus lead temperature.

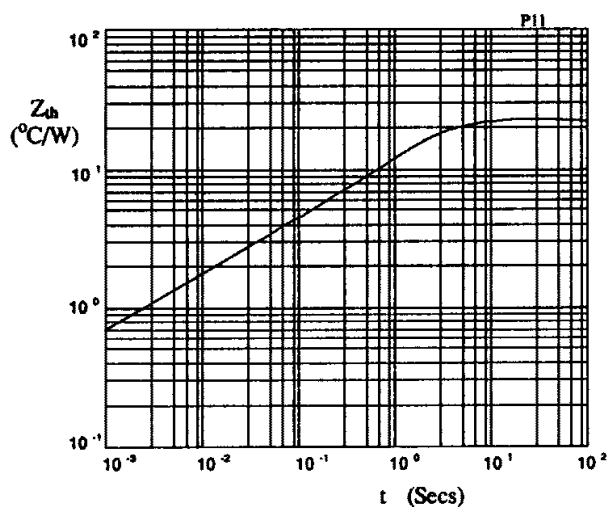


Fig 3. Transient thermal impedance characteristic.

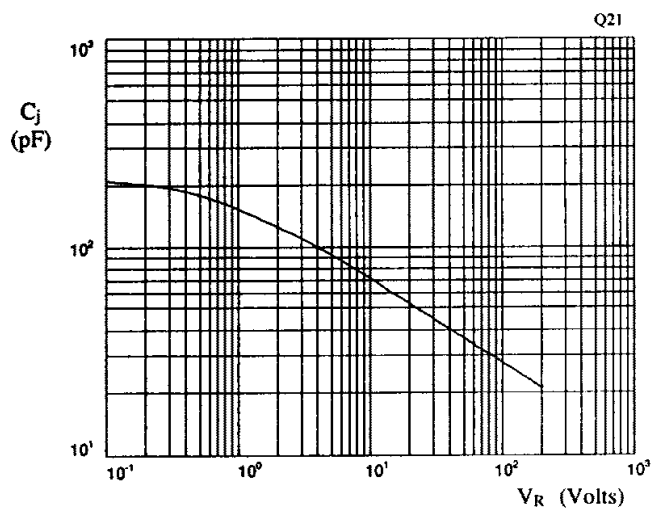


Fig 4. Typical junction capacitance as a function of reverse voltage.

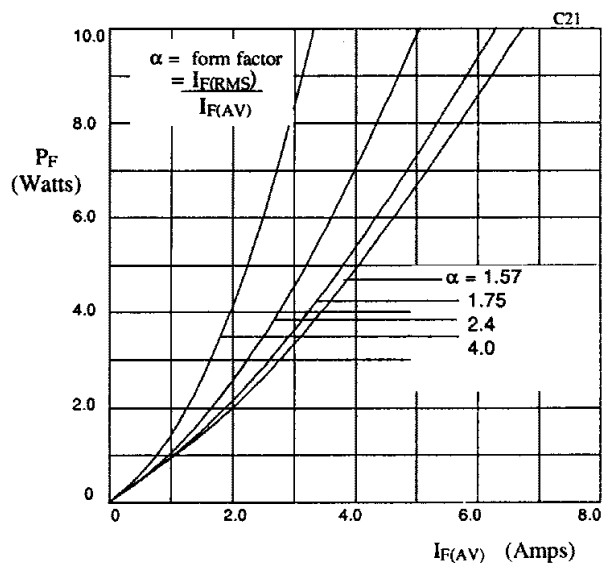


Fig 5. Forward power dissipation as a function of forward current, for sinusoidal operation.

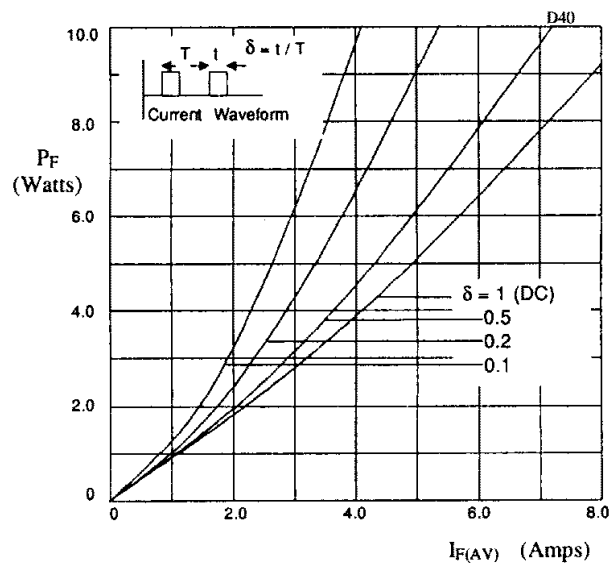


Fig 6. Forward power dissipation as a function of forward current, for square wave operation.

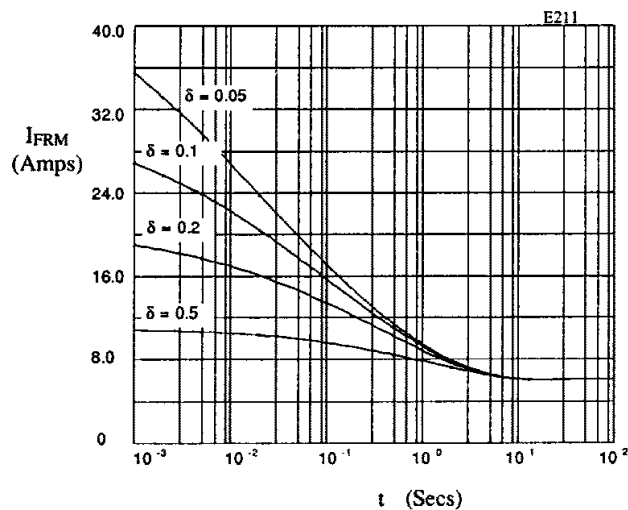


Fig 7. Typical repetitive forward current as a function of pulse width at 55°C; $R_{\theta JL} = 22^\circ\text{C/W}$; V_{RWM} during $1 - \delta$.

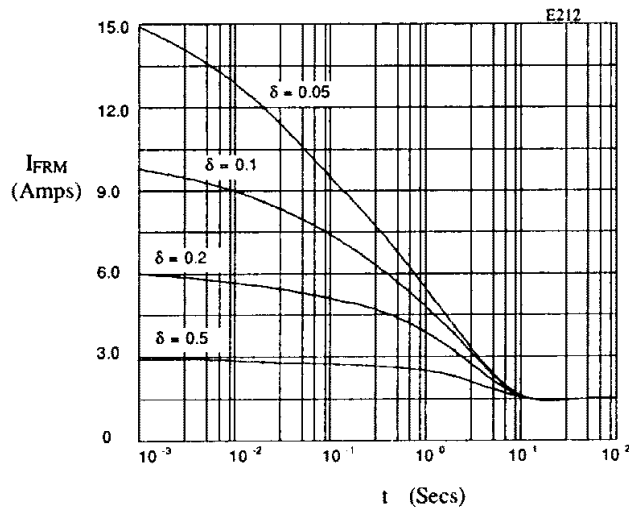


Fig 8. Typical repetitive forward current as a function of pulse width at 100°C; $R_{\theta JL} = 75^\circ\text{C/W}$; V_{RWM} during $1 - \delta$.

AXIAL LEADED HERMETICALLY SEALED FAST RECOVERY RECTIFIER DIODE

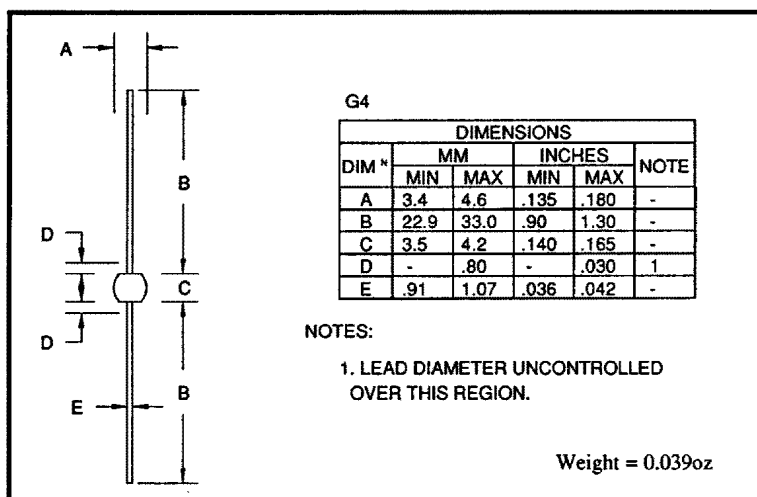
QUICK REFERENCE DATA

- Low reverse recovery time
 - Hermetically sealed in Metoxilite fused metal oxide
 - Low switching losses
 - High thermal shock resistance
 - Soft, non-snap off, recovery characteristics
- $V_R = 1000V$
 - $I_F = 3.25A$
 - $t_{rr} = 150ns$
 - $I_R = 1\mu A$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	3SFR0	Unit
Working reverse voltage	V_{RWM}	1000	V
Repetitive reverse voltage	V_{RRM}	1000	V
Average forward current (@ 55°C, lead length 0.375")	$I_{F(AV)}$	3.25	A
Repetitive surge current (@ 55°C in free air, lead length 0.375")	I_{FRM}	15.0	A
Non-repetitive surge current ($t_p = 8.3ms$, @ V_R & T_{jmax})	I_{FSM}	80.0	A
Storage temperature range	T_{STG}	-65 to +175	°C
Operating temperature range	T_{OP}	-65 to +175	°C

MECHANICAL



ELECTRICAL CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	3SFR0	Unit
Average forward current max. (pcb mounted; $T_A = 55^\circ\text{C}$) for sine wave	$I_{F(AV)}$	1.2	A
for square wave ($d = 0.5$)	$I_{F(AV)}$	1.3	A
Average forward current max. ($T_L = 55^\circ\text{C}$; $L = 3/8"$) for sine wave	$I_{F(AV)}$	3.00	A
for square wave	$I_{F(AV)}$	3.25	A
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t	26	A^2S
Forward voltage drop max. @ $I_F = 3.0\text{A}$, $T_j = 25^\circ\text{C}$	V_F	1.5	V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	1.0	μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	25	μA
Reverse recovery time max. 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR} .	t_{rr}	150	nS
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	80	pF

THERMAL CHARACTERISTICS

	Symbol	3SFR0	Unit
Thermal resistance - junction to lead Lead length = 0"	$R_{\theta JL}$	4	$^\circ\text{C}/\text{W}$
Lead length = 0.375"	$R_{\theta JL}$	20	$^\circ\text{C}/\text{W}$
Thermal resistance - junction to amb. on 0.06" thick pcb. 1 oz. copper.	$R_{\theta JA}$	75	$^\circ\text{C}/\text{W}$



2

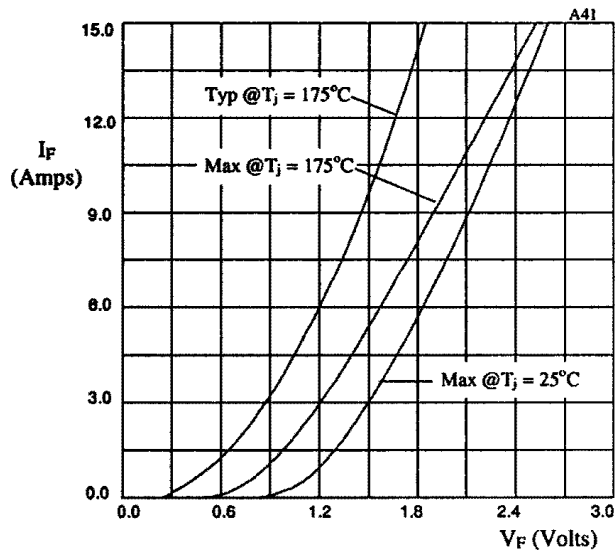


Fig 1. Forward voltage drop as a function of forward current.

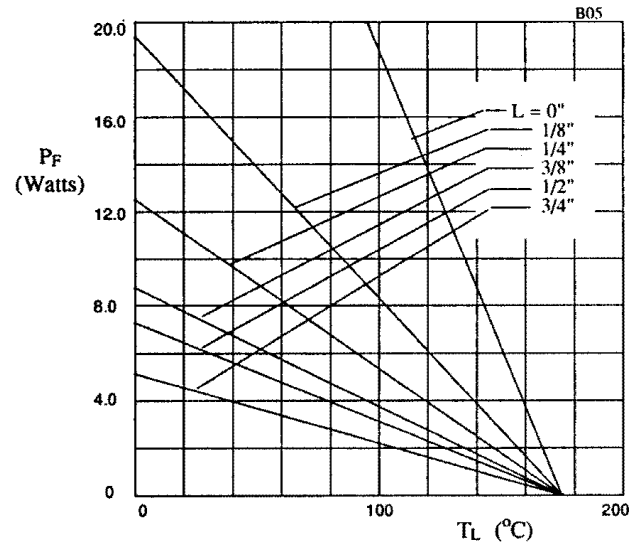


Fig 2. Maximum power versus lead temperature.

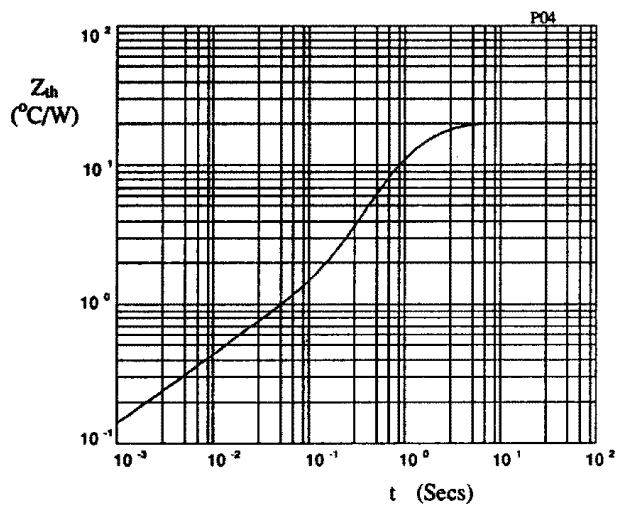


Fig 3. Transient thermal impedance characteristic.

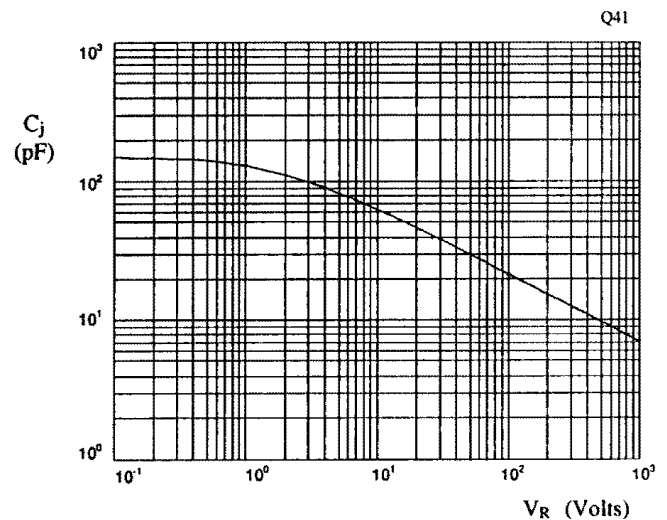


Fig 4. Typical junction capacitance as a function of reverse voltage.

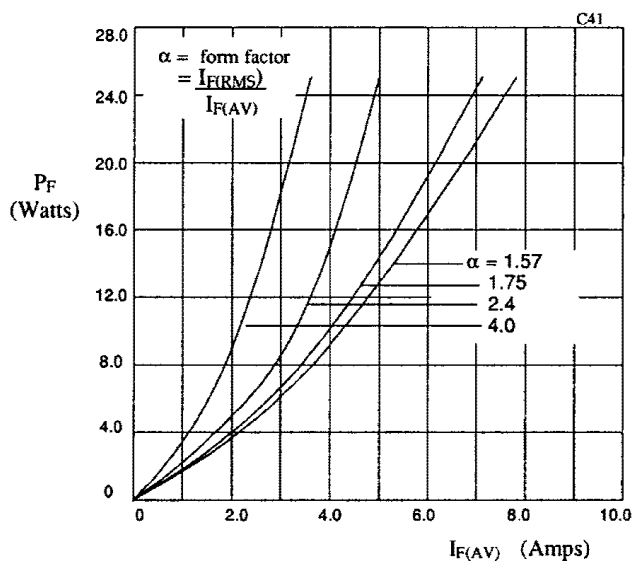


Fig 5. Forward power dissipation as a function of forward current, for sinusoidal operation.

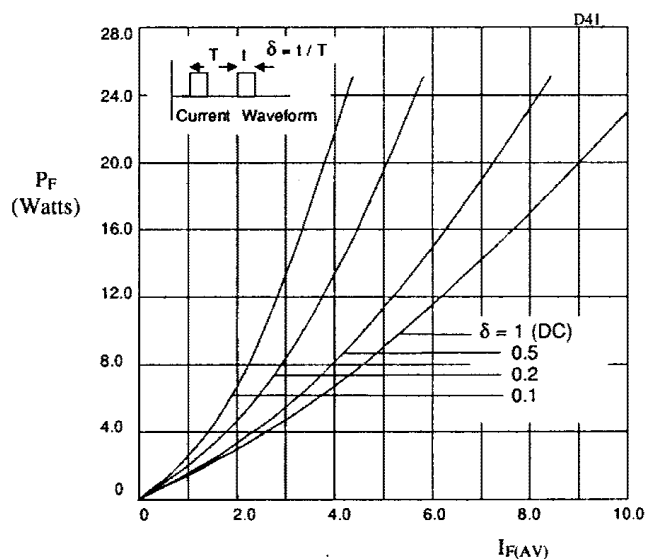


Fig 6. Forward power dissipation as a function of forward current, for square wave operation.

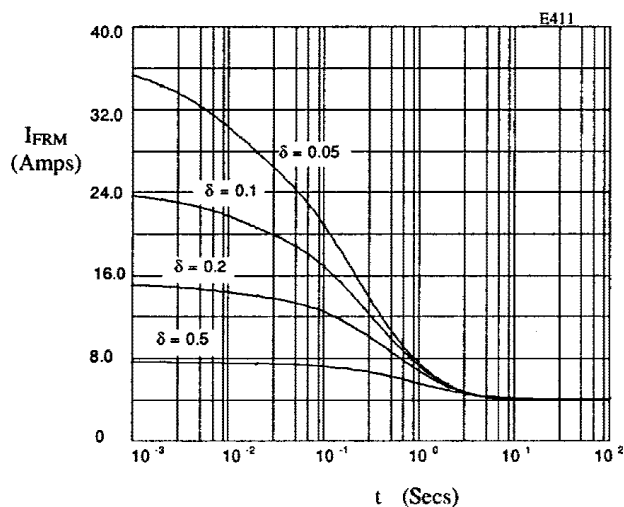


Fig 7. Typical repetitive forward current as a function of pulse width at 55°C ; $R_{\theta JL} = 20^\circ\text{C/W}$; V_{RWM} during $1 - \delta$.

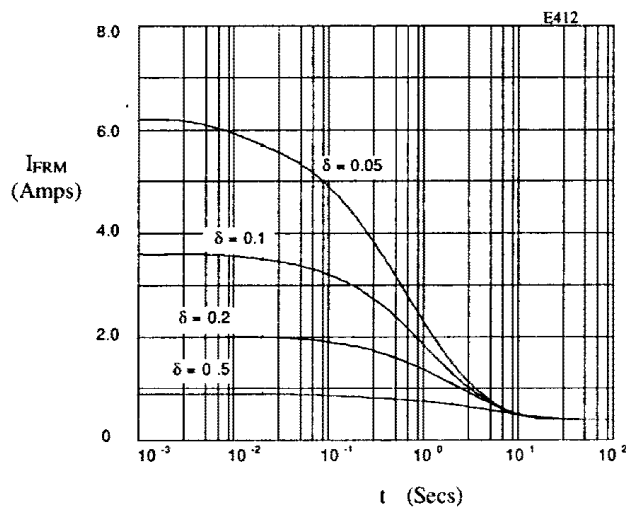


Fig 8. Typical repetitive forward current as a function of pulse width at 100°C ; $R_{\theta JL} = 80^\circ\text{C/W}$; V_{RWM} during $1 - \delta$.



QUICK REFERENCE DATA

- $V_R = 1500 - 3000V$
- $I_F = 0.35A$
- $t_{rr} = 250ns$
- $I_R = 0.25\mu A$

AXIAL LEADED HERMETICALLY SEALED HIGH VOLTAGE FAST RECTIFIER DIODE

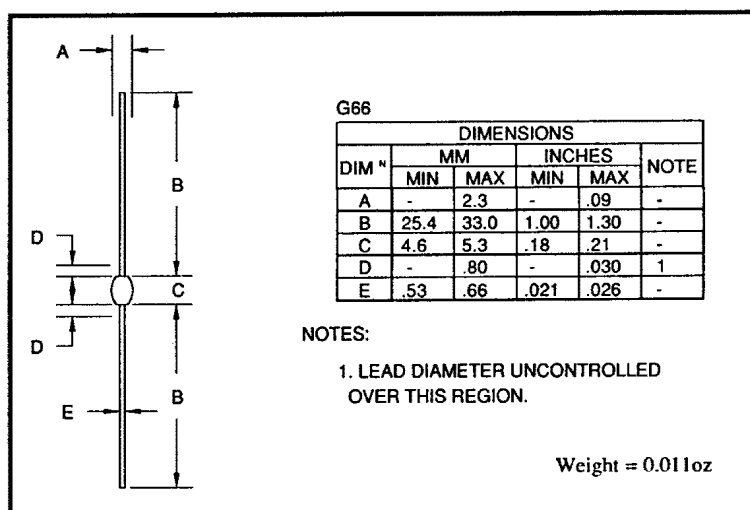
- Low reverse recovery time
- High thermal shock resistance
- Hermetically sealed with Metoxilite metal oxide
- Low switching losses
- Soft, non-snap off, recovery characteristics

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	F15	F20	F25	F30	Unit
Working reverse voltage	V_{RWM}	1500	2000	2500	3000	V
Repetitive reverse voltage	V_{RRM}	1500	2000	2500	3000	V
Average forward current (@ 55°C in oil)	$I_{F(AV)}$	← 0.35 →				A
Repetitive surge current (@ 55°C)	I_{FRM}	← 1.25 →				A
Non-repetitive surge current ($t_p = 8.3ms$, @ V_R & T_{jmax})	I_{FSM}	← 5.0 →				A
Storage temperature range	T_{STG}	← -65 to +175 →				°C
Operating temperature range	T_{OP}	← -65 to +175 →				°C

MECHANICAL

These products are available in Europe to DEF STAN 59-61 (PART 80)/034 to F and FX levels.

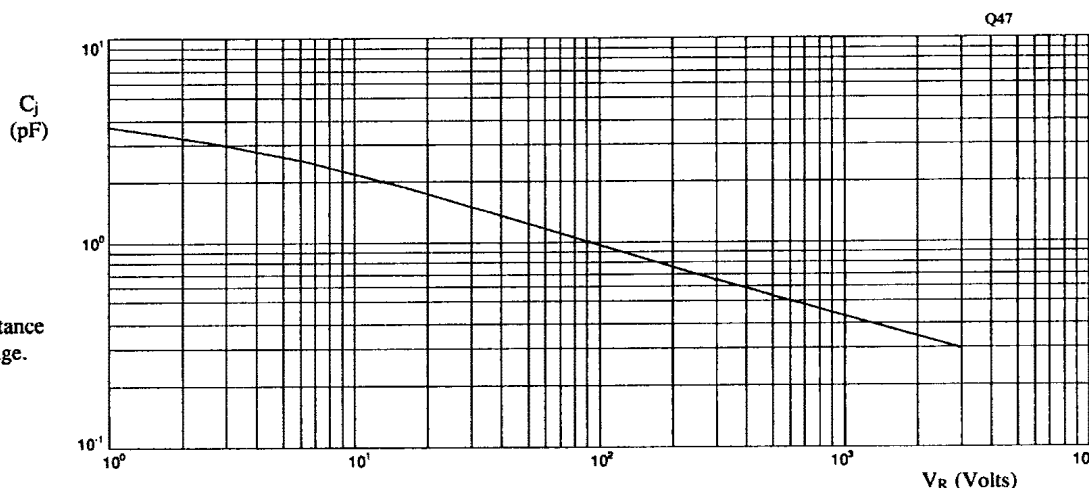




CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	F15	F20	F25	F30	Unit
Average forward current max. (pcb mounted; $T_A = 55^\circ\text{C}$) for sine wave	$I_{F(AV)}$	←	0.16	→		A
for square wave ($d = 0.5$)	$I_{F(AV)}$	←	0.20	→		A
Average forward current max. (unstirred oil at 55°C) for sine wave	$I_{F(AV)}$	←	0.33	→		A
for square wave	$I_{F(AV)}$	←	0.35	→		A
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t	←	0.10	→		A^2S
Forward voltage drop max. @ $I_F = 0.10\text{A}$, $T_j = 25^\circ\text{C}$	V_F	←	5.00	→		V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	←	0.25	→		μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	←	10	→		μA
Reverse recovery time max. 50mA I_F to 100mA I_R . Recover to 25mA I_{RR} .	t_{rr}	←	250	→		nS
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	←	2.5	→		pF
Thermal resistance - junction to oil Stirred oil	$R_{\theta JO}$	←	30	→		$^\circ\text{C/W}$
Unstirred oil	$R_{\theta JO}$	←	48	→		$^\circ\text{C/W}$
Thermal resistance - junction to amb. on 0.06" thick pcb. 1oz copper.	$R_{\theta JA}$	←	120	→		$^\circ\text{C/W}$

Fig 1. Junction capacitance
against reverse voltage.





2

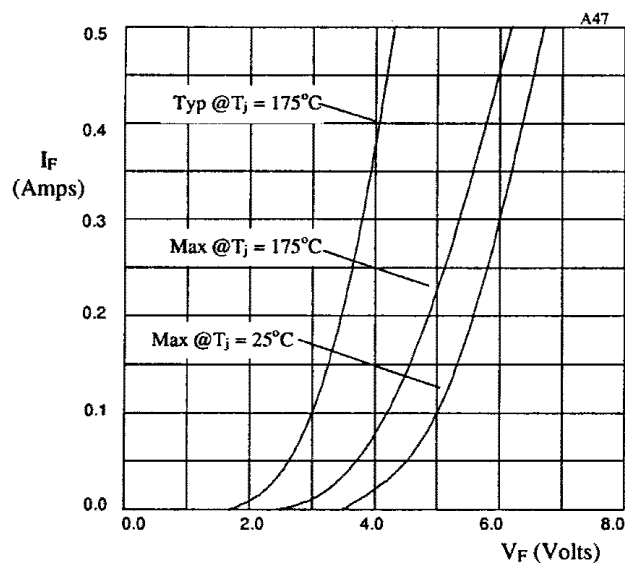


Fig 2. Forward voltage drop as a function of forward current.

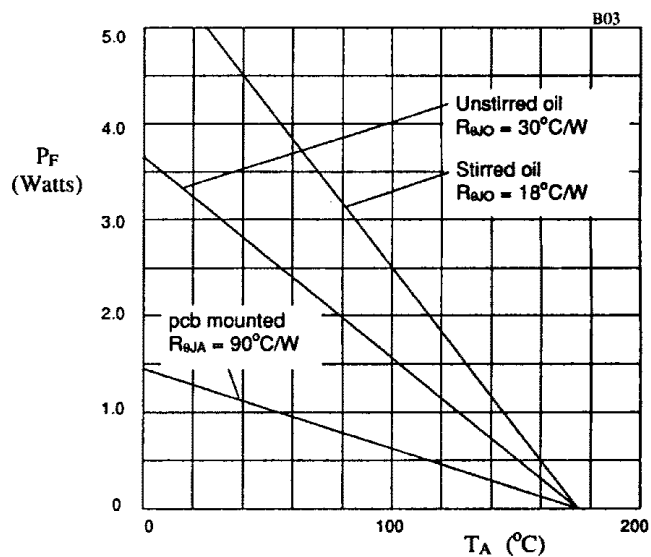


Fig 3. Power derating in air and oil.

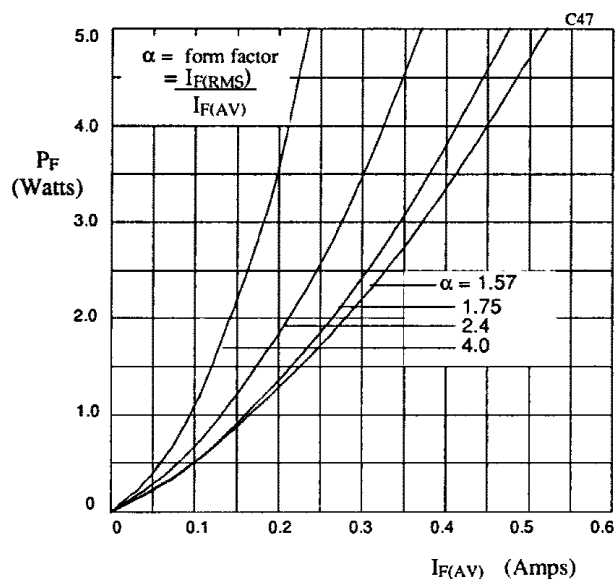


Fig 4. Forward power dissipation as a function of forward current, for sinusoidal operation.

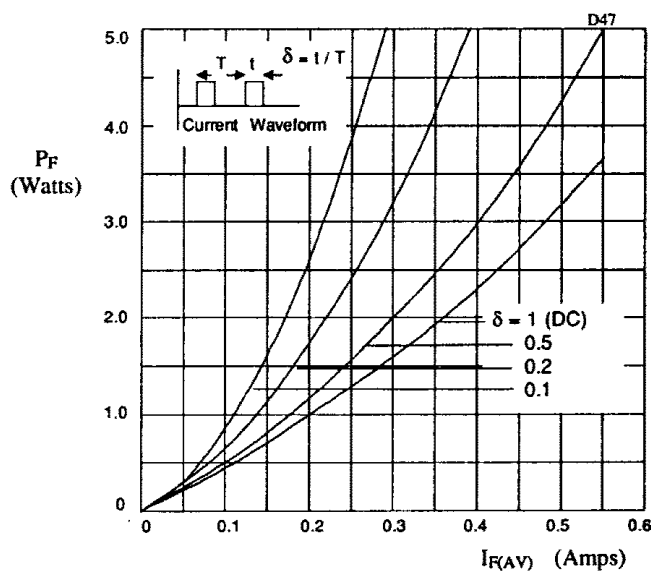


Fig 5. Forward power dissipation as a function of forward current, for square wave operation.

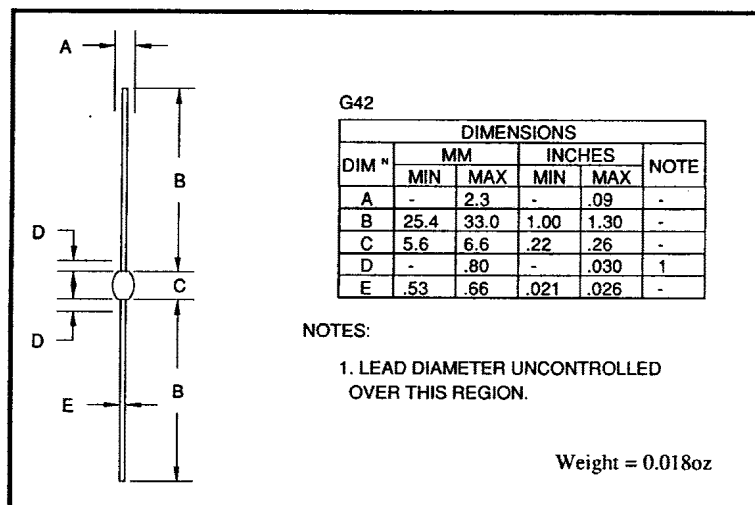
**AXIAL LEADED HERMETICALLY SEALED HIGH
VOLTAGE FAST RECTIFIER DIODE****QUICK REFERENCE
DATA**

- Low reverse recovery time
- High thermal shock resistance
- Hermetically sealed with Metoxillite metal oxide
- Low switching losses
- Soft, non-snap off, recovery characteristics

- $V_R = 4 - 6kV$
- $I_F = 0.25A$
- $t_{rr} = 300ns$
- $I_R = 1\mu A$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	F40A	F50A	F60A	Unit
Working reverse voltage	V_{RWM}	4000	5000	6000	V
Repetitive reverse voltage	V_{RRM}	4000	5000	6000	V
Average forward current (@ 55°C in oil)	$I_{F(AV)}$	← 0.10 →			A
Repetitive surge current (@ 55°C)	I_{FRM}	← 0.75 →			A
Non-repetitive surge current ($t_p = 8.3ms$, @ V_R & T_{jmax})	I_{FSM}	← 2.50 →			A
Storage temperature range	T_{STG}	← -65 to +175 →			°C
Operating temperature range	T_{OP}	← -65 to +175 →			°C

MECHANICAL

These products are available in Europe
to DEF STAN 59-61 (PART 80)/034 to
F and FX levels.



CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	F40A	F50A	F60A	Unit
Average forward current max. (pcb mounted; $T_A = 55^\circ\text{C}$) for sine wave	$I_{F(av)}$	← 0.12 →			A
for square wave ($d = 0.5$)	$I_{F(av)}$	← 0.13 →			A
Average forward current max. (unstirred oil at 55°C) for sine wave	$I_{F(av)}$	← 0.23 →			A
for square wave	$I_{F(av)}$	← 0.25 →			A
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t	← 0.026 →			A^2S
Forward voltage drop max. @ $I_F = 50\text{mA}$, $T_j = 25^\circ\text{C}$	V_F	← 8.0 →			V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	← 1.0 →			μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	← 10 →			μA
Reverse recovery time max. 50mA I_F to 100mA I_R . Recover to 25mA I_{RR} .	t_{rr}	← 300 →			nS
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	← 2.0 →			pF
Thermal resistance - junction to oil Stirred oil	$R_{\theta JO}$	← 26 →			$^\circ\text{C/W}$
Unstirred oil	$R_{\theta JO}$	← 40 →			$^\circ\text{C/W}$
Thermal resistance - junction to amb. on 0.06" thick pcb. 1oz copper.	$R_{\theta JA}$	← 95 →			$^\circ\text{C/W}$

Q54

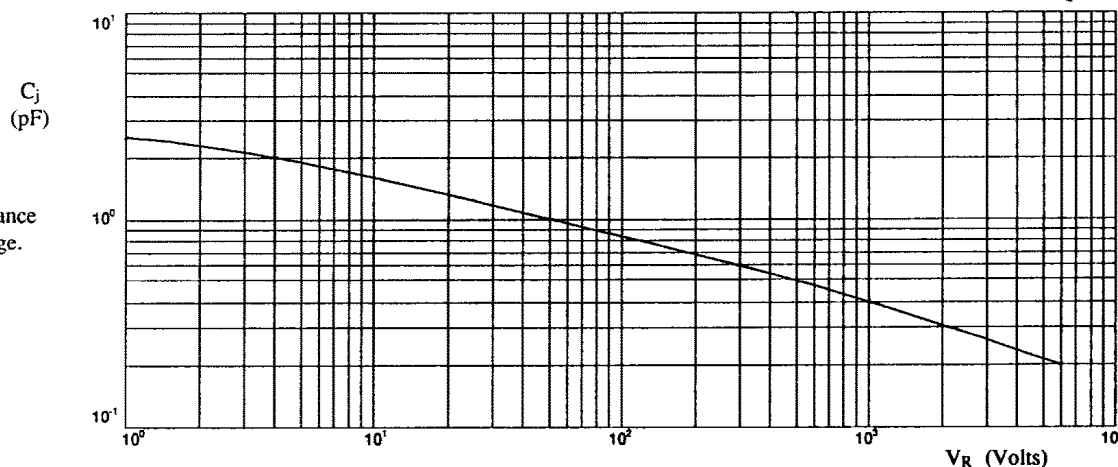


Fig 1 Junction capacitance
against reverse voltage.

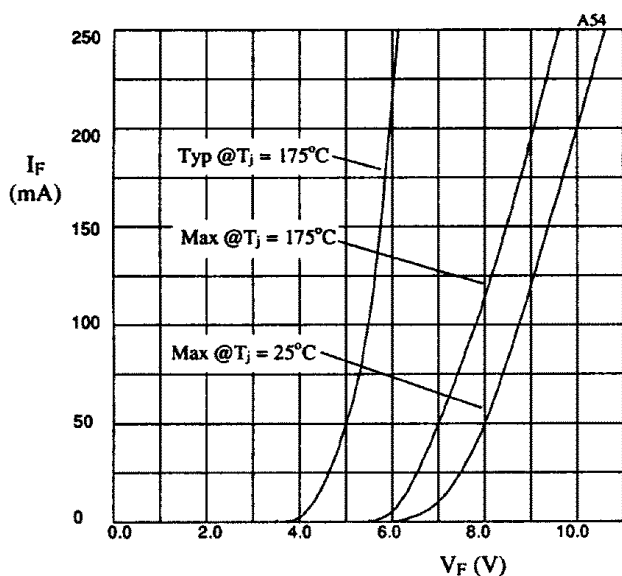


Fig 2. Forward voltage drop as a function of forward current.

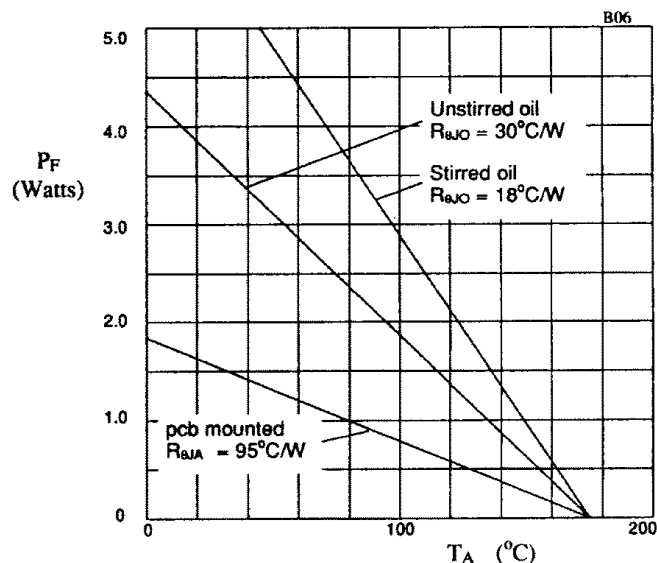


Fig 3. Power derating in air and oil.

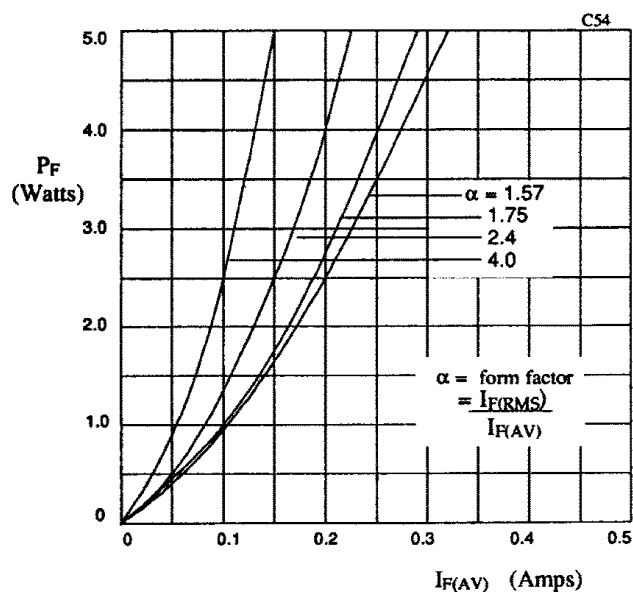


Fig 4. Forward power dissipation as a function of forward current, for sinusoidal operation.

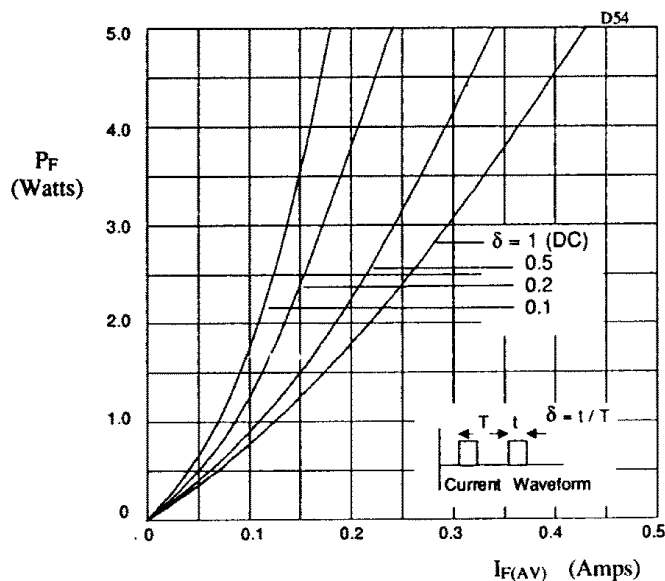


Fig 5. Forward power dissipation as a function of forward current, for square wave operation.

QUICK REFERENCE DATA

- $V_R = 2\text{kV} - 3\text{kV}$
- $I_F = 330\text{mA}$
- $t_{rr} = 2.0\mu\text{s}$
- $I_R = 0.25\mu\text{A}$

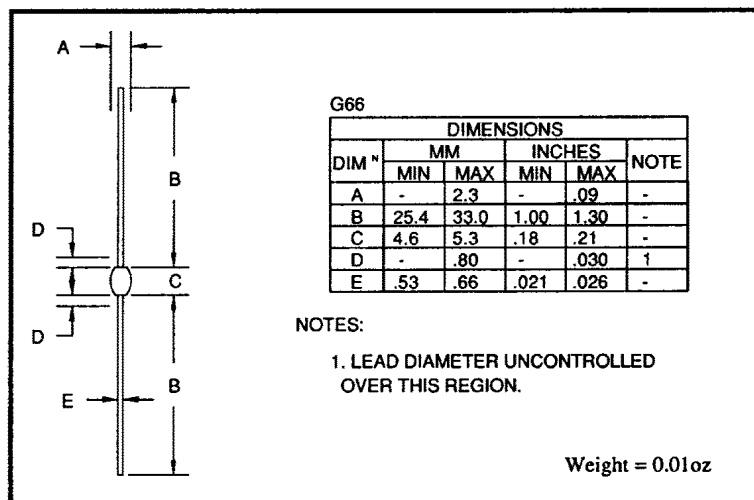
AXIAL LEADED HERMETICALLY SEALED HIGH VOLTAGE STANDARD RECOVERY RECTIFIER DIODE

- High thermal shock resistance
- Hermetically sealed with Metoxilite fused metal oxide
- Low reverse leakage currents
- Miniature packaging
- Monolithic cavity free

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	M20	M30	Unit
Working reverse voltage	V_{RWM}	2000	3000	V
Repetitive reverse voltage	V_{RRM}	2000	3000	V
Surge reverse voltage	V_{RSM}	2000	3000	V
Average forward current (@ 55°C in oil)	$I_{F(AV)}$	← 330 →		mA
Repetitive surge current (@ 55°C)	I_{FRM}	← 1.3 →		A
Non-repetitive surge current ($t_p = 8.3\text{ms}$, @ V_R & T_{jmax})	I_{FSM}	← 7.0 →		A
Storage temperature range	T_{STG}	-65 to +175		°C
Operating temperature range	T_{OP}	-65 to +175		°C

MECHANICAL



CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	M20	M30	Unit
Average forward current for sine wave				
- max. pcb mounted; $T_A = 55^\circ\text{C}$	$I_{F(AV)}$	← 175 →		mA
- max. in unstirred oil	$I_{F(AV)}$	← 330 →		mA
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t	← 0.2 →		A ² S
Forward voltage drop max. @ $I_F = 125\text{mA}$, $T_j = 25^\circ\text{C}$	V_F	← 5.0 →		V
Reverse current max.				
@ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	← 0.25 →		μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	← 10 →		μA
Reverse recovery time max. 50mA I_F to 100mA I_R . Recover to 25mA I_{RR} .	t_{rr}	← 2.0 →		μs
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	← 1.7 →		pF
Thermal resistance - junction to oil				
Unstirred @ 55°C	$R_{\theta JO}$	← 48 →		$^\circ\text{C/W}$
Stirred @ 55°C	$R_{\theta JO}$	← 30 →		$^\circ\text{C/W}$
Thermal resistance - junction to amb. on 0.06" thick pcb. 1oz copper.	$R_{\theta JA}$	← 120 →		$^\circ\text{C/W}$

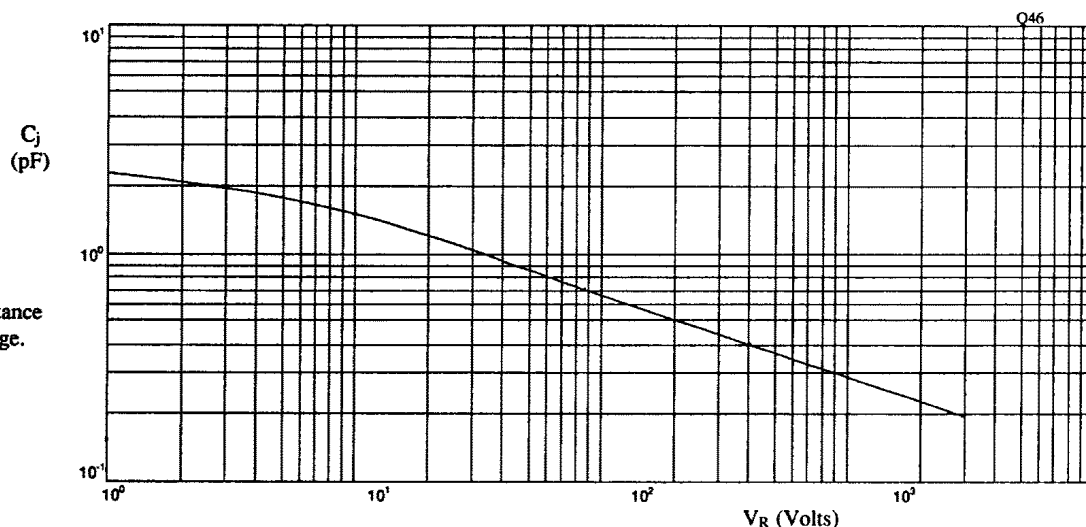


Fig 1. Junction capacitance
against reverse voltage.

2

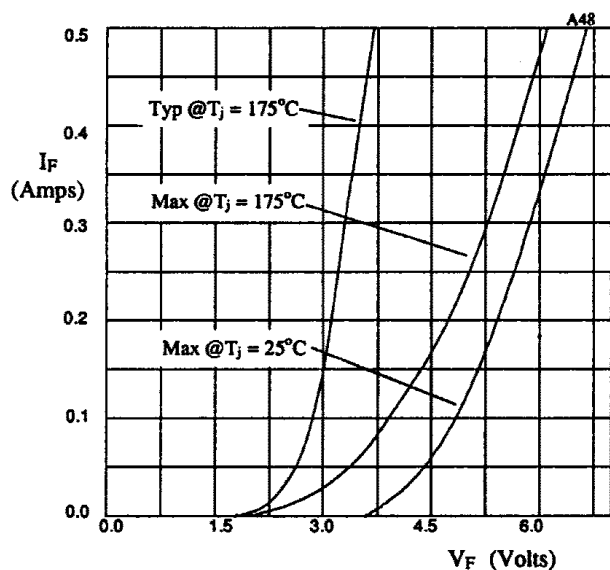


Fig 2. Forward voltage drop as a function of forward current.

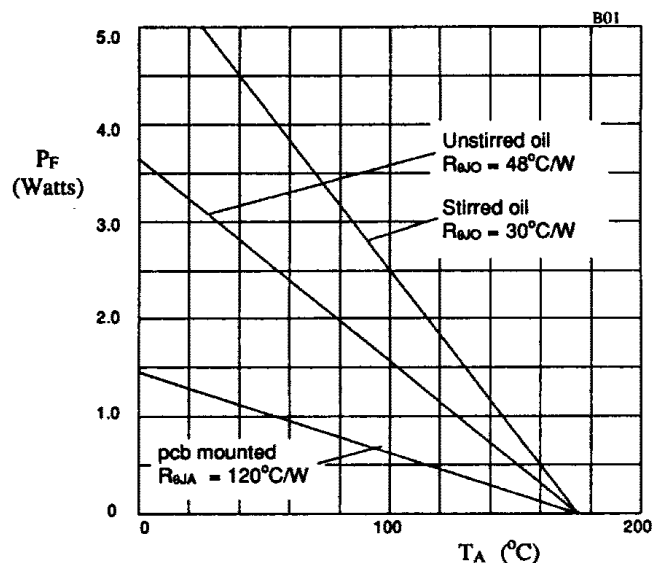


Fig 3. Power derating in air and oil.

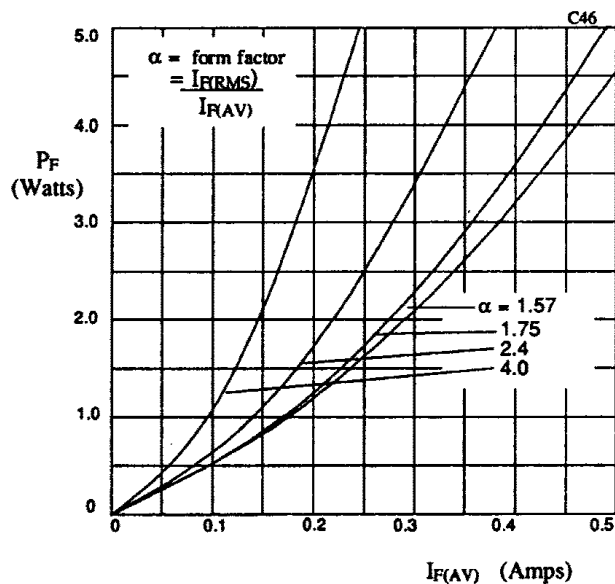


Fig 4. Forward power dissipation as a function of forward current, for sinusoidal operation.

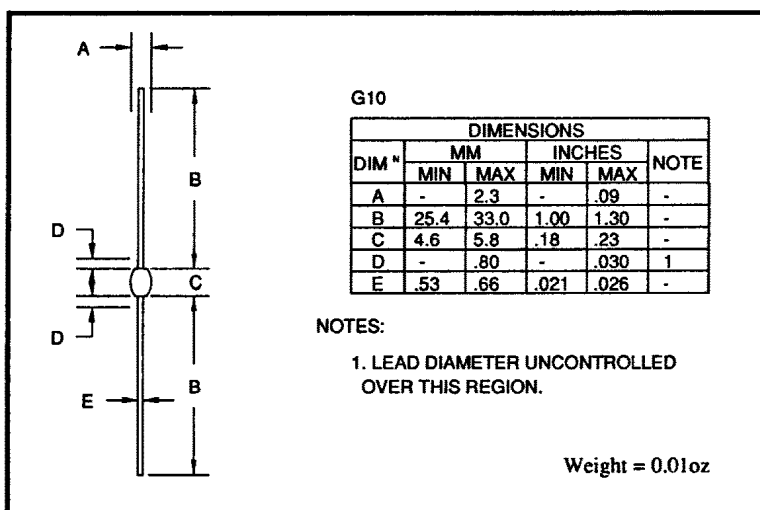
**AXIAL LEADED HERMETICALLY SEALED HIGH VOLTAGE
STANDARD RECOVERY RECTIFIER DIODE**
**QUICK REFERENCE
DATA**

- Low reverse leakage currents
- Hermetically sealed with Metoxilite fused metal oxide
- Good thermal shock resistance
- Subminiature packaging
- Multi-junction construction

- $V_R = 5\text{kV} - 6\text{kV}$
- $I_F = 260\text{mA}$
- $t_{rr} = 5\mu\text{s}$
- $I_R = 0.25\mu\text{A}$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	M50A	M60A	Unit
Working reverse voltage	V_{RWM}	5000	6000	V
Repetitive reverse voltage	V_{RRM}	5000	6000	V
Surge reverse voltage	V_{RSM}	5000	6000	V
Average forward current (@ 55°C in oil)	$I_{F(AV)}$	← 260 →		mA
Repetitive surge current (@ 55°C in oil, lead length 0.375")	I_{FRM}	← 1.0 →		A
Non-repetitive surge current ($t_p = 8.3\text{ms}$, @ V_R & T_{jmax})	I_{FSM}	← 5.0 →		A
Storage temperature range	T_{STG}	-65 to +175		°C
Operating temperature range	T_{OP}	-65 to +175		°C

MECHANICAL


CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	M50A	M60A	Unit
Average forward current for sine wave				
- max. pcb mounted $T_A = 55^\circ\text{C}$	$I_{F(AV)}$	← 145 →		mA
- max. in unstirred oil @ 55°C	$I_{F(AV)}$	← 260 →		mA
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t	← 0.10 →		A ² S
Forward voltage drop max. @ $I_F = 50\text{mA}$, $T_j = 25^\circ\text{C}$	V_F	← 6.0 →		V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	← 0.25 →		μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	← 10 →		μA
Reverse recovery time max. 50mA I_F to 100mA I_R . Recover to 25mA I_{RR} .	t_{rr}	← 5.0 →		μs
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	← 1.6 →		pF
Thermal resistance - junction to oil Stirred oil @ 55°C	$R_{\theta JO}$	← 26 →		$^\circ\text{C/W}$
Unstirred oil @ 55°C	$R_{\theta JO}$	← 40 →		$^\circ\text{C/W}$
Thermal resistance - junction to amb. on 0.06" thick pcb. 1oz copper.	$R_{\theta JA}$	← 95 →		$^\circ\text{C/W}$

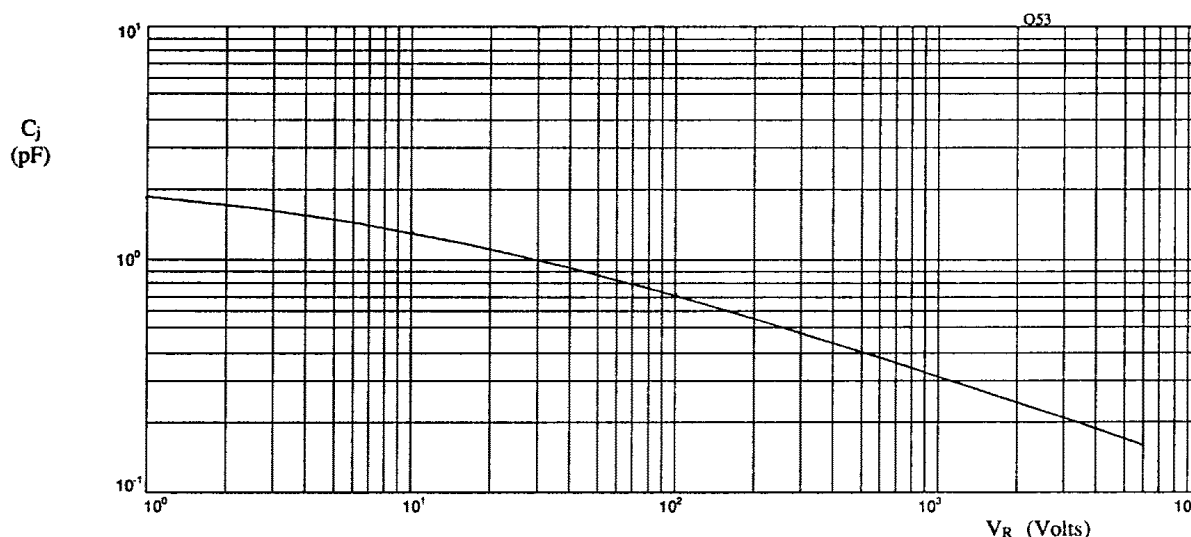


Fig 1. Typical junction capacitance as a function of reverse voltage.

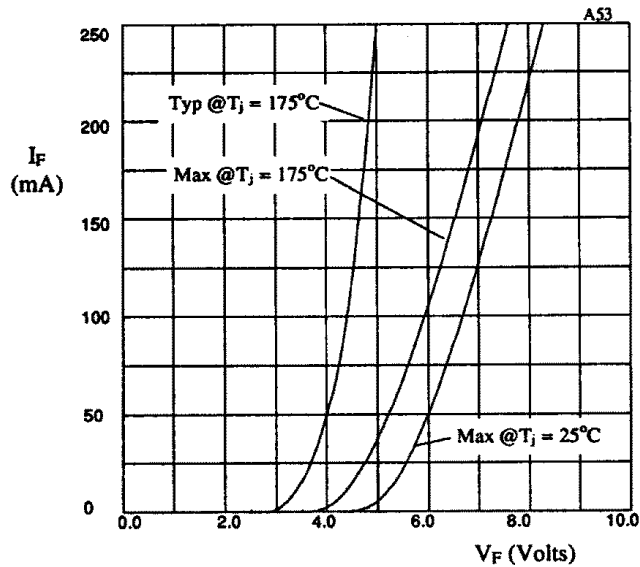


Fig 2. Forward voltage drop as a function of forward current.

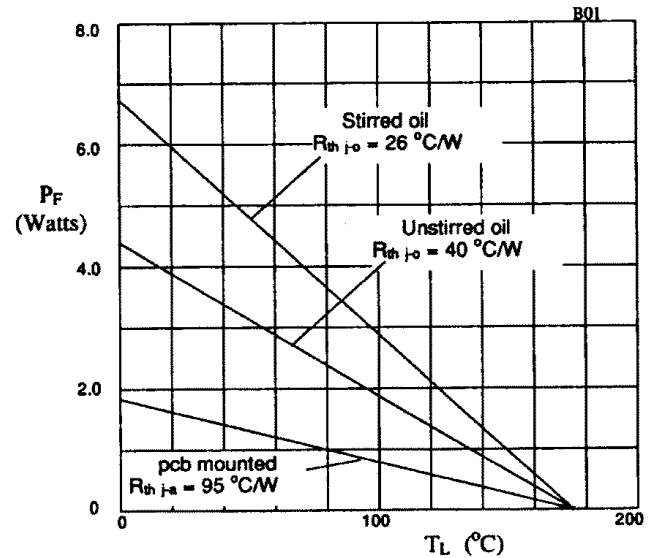


Fig 3. Power derating in air and oil.

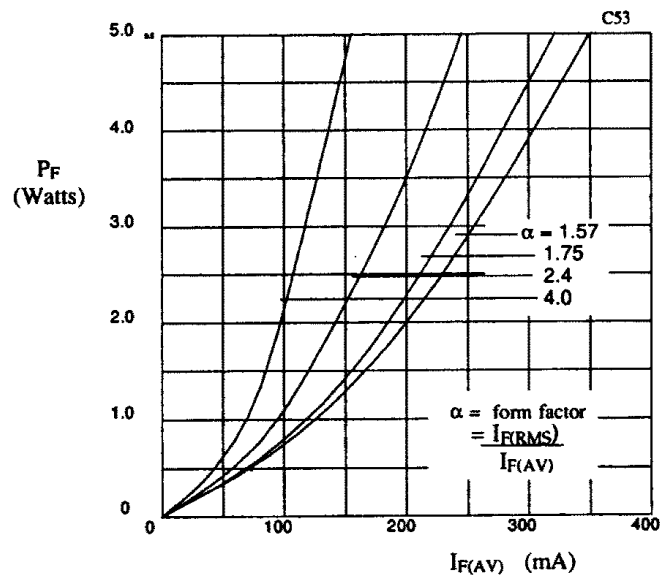


Fig 4. Forward power dissipation as a function of forward current, for sinusoidal operation.

POWER DISCRETES

Description

Quick reference data

$$\begin{aligned} V_R &= 2000V \\ I_F &= 100mA \\ t_{rr} &= 200nS \\ I_R &= 0.25\mu A \end{aligned}$$

Features

- ◆ Very low reverse recovery time
- ◆ Glass passivated for hermetic sealing
- ◆ Low switching losses
- ◆ Soft, non-snap off, recovery characteristics
- ◆ Avalanche capability

Absolute Maximum Ratings

Electrical specifications @ $T_A = 25^\circ\text{C}$ unless otherwise specified.

	Symbol	PF20	Units
Working Reverse Voltage	V_{RWM}	2000	V
Repetitive Reverse Voltage	V_{RRM}	2200	V
Average Forward Current @ 55°C in oil	$I_{F(AV)}$	100	mA
Repetitive Surge Current @ 55°C	I_{FRM}	0.5	A
Non-Repetitive Surge Current ($t_p = 8.3\text{mS}$ @ V_R & T_{JMAX})	I_{FSM}	1.0	A
Storage Temperature Range	T_{STG}	-65 to +150	$^\circ\text{C}$

POWER DISCRETES
Electrical Specifications

	Symbol	PF20	Units
Average Forward Current max (pcb mounted, $T_A = 55^\circ\text{C}$) for sine wave for square wave, $d = 0.5$	$I_{F(AV)}$ $I_{F(AV)}$	60 65	mA
Average Forward Current max (unstirred oil @ 55°C) for sine wave for square wave	$I_{F(AV)}$ $I_{F(AV)}$	90 100	mA
I^2t for fusing, $t = 8.3\text{mS}$ max	I^2t	0.004	A^2S
Forward Voltage Drop max. @ $I_F = 50\text{mA}$, $T_J = 25^\circ\text{C}$	V_F	6.0	V
Reverse Current max. @ V_{RWM} , $T_J = 25^\circ\text{C}$ @ V_{RWM} , $T_J = 100^\circ\text{C}$	I_R I_R	0.25 10	μA
Reverse Recovery Time max. 50mA I_F to 100mA I_{RM} recovers to 0.25mA $I_{RM(REC)}$	t_{rr}	200	nS
Junction Capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	2	pF

Thermal Characteristics

	Symbol	PF20	Units
Thermal Resistance-Junction to Oil Unstirred oil	$R_{\theta JO}$	75	$^\circ\text{C/W}$

POWER DISCRETES
Typical Characteristics

Figure 1.

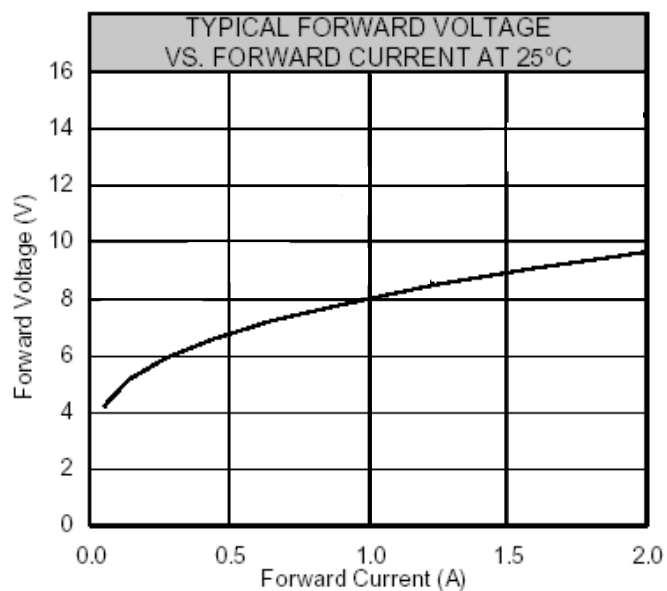


Figure 2.

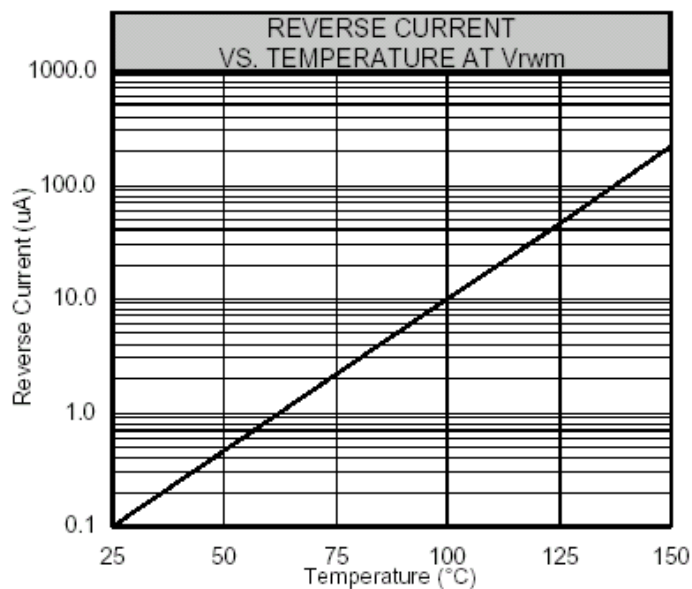
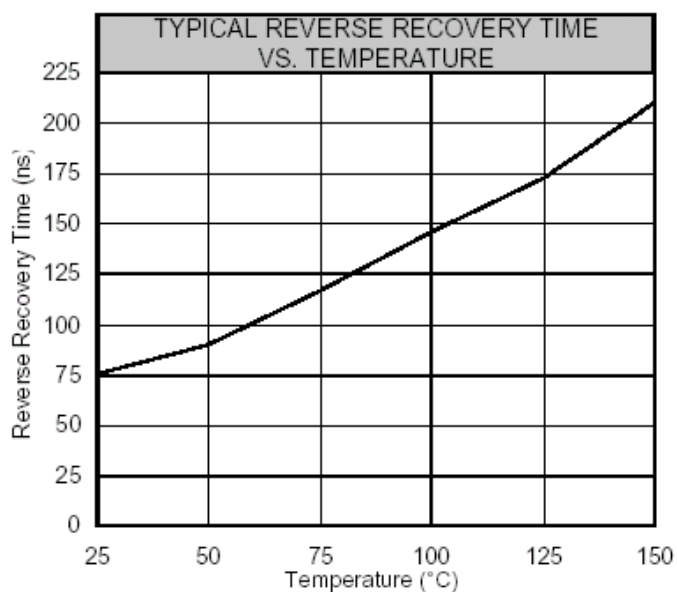


Figure 3.



POWER DISCRETES

Ordering Information

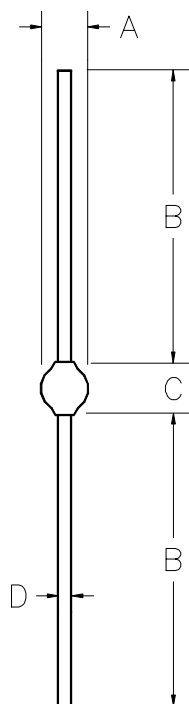
Part Number	Description
PF20	Axial leaded hermetically sealed ⁽¹⁾

Note:

(1) Available in bulk and tape and reel packaging. Please consult factory for quantities.

2

Outline Drawing



Dimensions					
DIM ^N	Inches		Millimeters		Note
	MIN	MAX	MIN	MAX	
A	-	0.13	-	3.3	-
B	1.00	-	25.4	-	-
C	-	0.300	-	7.62	-
D	-	.026	-	.65	-

Contact Information

Semtech Corporation
 Power Discretes Products Division
 200 Flynn Road, Camarillo, CA 93012
 Phone: (805)498-2111 FAX (805)498-3804

POWER DISCRETES

Description

Quick reference data

$$V_R = 800 \text{ \& } 1000V$$

$$I_F = 1.8A$$

$$t_{rr} = 300nS$$

$$I_R = 1\mu A$$

Features

- ◆ Low reverse recovery time
- ◆ Glass passivated for hermetic sealing
- ◆ Low switching losses
- ◆ Soft, non-snap off, recovery characteristic
- ◆ Avalanche capability

Absolute Maximum Ratings

Electrical specifications @ $T_A = 25^\circ C$ unless otherwise specified.

	Symbol	PF8	PF0	Units
Working Reverse Voltage	V_{RWM}	800	1000	V
Repetitive Reverse Voltage	V_{RRM}	800	1000	V
Surge Reverse Voltage	V_{RSM}	900	1100	V
Average Forward Current @ $55^\circ C$, lead length 0.375"	$I_{F(AV)}$	1.8		A
Non-Repetitive Surge Current ($t_p = 8.3mS$ @ V_R & T_{JMAX})	I_{FSM}	50		A
Storage Temperature Range	T_{STG}	-55 to +175		$^\circ C$

POWER DISCRETES
Electrical Specifications

Electrical specifications @ $T_A = 25^\circ\text{C}$ unless otherwise specified.

	Symbol	PF8/PF0	Units
Average Forward Current max. (pcb mounted)	$I_{F(AV)}$	0.85	A
Average Forward Current max. $L = 10\text{mm}$	$I_{F(AV)}$	1.8	A
Forward Voltage Drop max. @ $I_F = 1.5\text{A}$, $T_J = 25^\circ\text{C}$	V_F	1.35	V
Reverse Current max. @ V_{RWM} , $T_J = 25^\circ\text{C}$ @ V_{RWM} , $T_J = 100^\circ\text{C}$	I_R I_R	1 15	μA
Reverse Recovery Time max. $0.5\text{A } I_F$ to $1.0\text{A } I_{RM}$ recovers to $0.25\text{mA } I_{RM(REC)}$	t_{rr}	300	nS
Junction Capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	18	pF

Thermal Characteristics

	Symbol	PF8/PF0	Units
Thermal Resistance-Junction to Lead Lead length = 0" Lead length = 0.375"	$R_{\theta JL}$	19 47	$^\circ\text{C/W}$

POWER DISCRETES

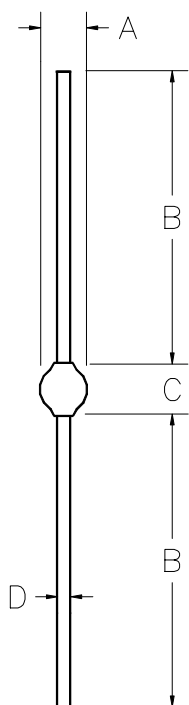
Ordering Information

Part Number	Description
PF8/PF0	Axial leaded hermetically sealed ⁽¹⁾

Note:

(1) Available in bulk and tape and reel packaging. Please consult factory for quantities.

Outline Drawing



Dimensions					
DIM ^N	Inches		Millimeters		Note
	MIN	MAX	MIN	MAX	
A	-	0.150	-	3.81	-
B	1.014	-	26	-	-
C	-	0.180	-	4.57	-
D	-	0.032	-	0.82	-

Weight = 369mg

Contact Information

Semtech Corporation
 Power Discretes Products Division
 200 Flynn Road, Camarillo, CA 93012
 Phone: (805)498-2111 FAX (805)498-3804

POWER DISCRETES

Description

Quick reference data

$$V_R = 200 - 600V$$

$$I_F = 1.25A$$

$$t_{rr} = 30nS$$

$$I_R = 1\mu A$$

Features

- ◆ Very low reverse recovery time
- ◆ Glass passivated for hermetic sealing
- ◆ Low switching losses
- ◆ Soft, non-snap off, recovery characteristics
- ◆ Avalanche capability

2

Absolute Maximum Ratings

Electrical specifications @ $T_A = 25^\circ C$ unless otherwise specified.

	Symbol	PFF2	PFF4	PFF6	Units
Working Reverse Voltage	V_{RWM}	200	400	600	V
Repetitive Reverse Voltage	V_{RRM}	200	400	600	V
Average Forward Current @ $55^\circ C$ in free air, lead length 0.375"	$I_{F(AV)}$	1.25			A
Repetitive Surge Current @ $55^\circ C$ in free air, lead length 0.375"	I_{FRM}	4.25			A
Non-Repetitive Surge Current ($t_p = 8.3mS$ @ V_R & T_{JMAX})	I_{FSM}	22.0			A
Storage Temperature Range	T_{STG}	-65 to +175			$^\circ C$
Operating Temperature Range	T_{OP}	-65 to +175			$^\circ C$

POWER DISCRETES

Electrical Specifications

2

	Symbol	PFF2	PFF4	PFF6	Units
Average Forward Current max (pcb mounted, $T_A = 55^\circ\text{C}$) for sine wave for square wave	$I_{F(AV)}$ $I_{F(AV)}$		0.7 0.75		A
Average Forward Current max. ($T_L = 55^\circ\text{C}$; $L = 3/8"$) for sine wave for square wave	$I_{F(AV)}$ $I_{F(AV)}$		1.15 1.25		A
I^2t for fusing ($t = 8.3\text{mS}$) max.	I^2t		2.00		A^2S
Forward Voltage Drop max. @ $I_F = 1.0\text{A}$, $T_j = 25^\circ\text{C}$	V_F		2.50		V
Reverse Current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$ @ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R I_R		1.0 10.0		μA
Reverse Recovery Time max. 0.5A I_F to 1.0A I_{RM} recovers to 0.25A $I_{RM(REC)}$	t_{rr}		30		nS
Junction Capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j		30		pF

Thermal Characteristics

	Symbol	PFF2, PFF4, PFF6	Units
Thermal Resistance-Junction to Lead Lead length = 0.375" Lead length = 0.0"	$R_{\theta JL}$	47 19	$^\circ\text{C/W}$
Thermal Resistance-Junction to Ambient on 0.06" thick pcb. 1 oz. copper	$R_{\theta JA}$	100	$^\circ\text{C/W}$

POWER DISCRETES

Maximum Characteristics

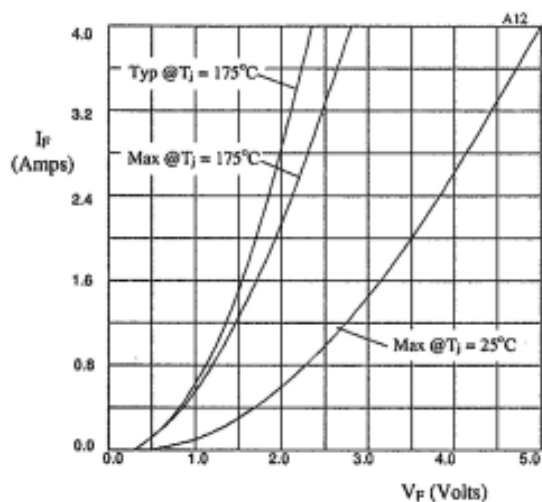


Figure 1. Forward voltage drops as a function of forward current.

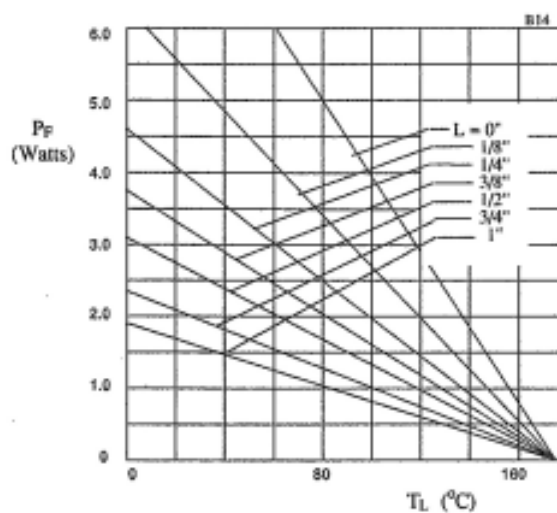


Figure 2. Maximum power versus lead temperature.

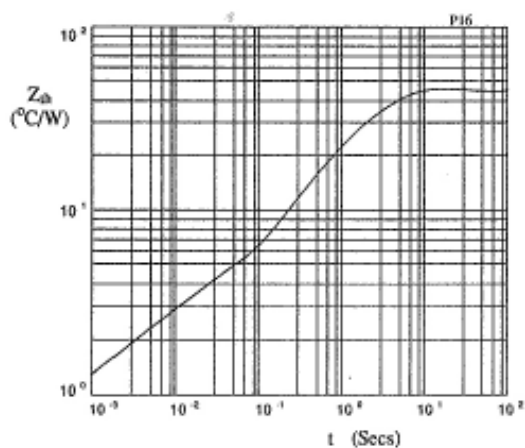


Figure 3. Transient thermal impedance characteristic

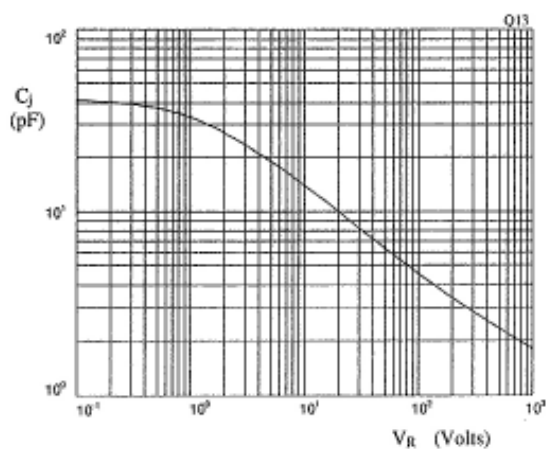


Figure 4. Typical junction capacitance as a function of reverse voltage.

POWER DISCRETES

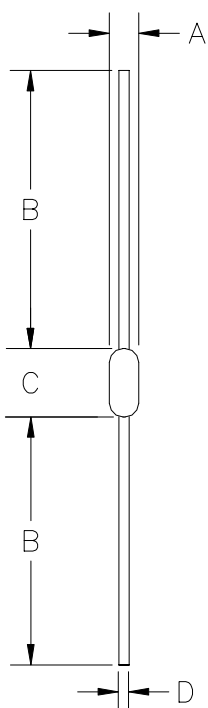
Ordering Information

Part Number	Description
PFF2, PFF4, PFF6	Axial leaded hermetically sealed ⁽¹⁾

Note:

(1) Available in bulk and tape and reel packaging. Please consult factory for quantities.

Outline Drawing



Dimensions					
DIM ^N	Inches		Millimeters		Note
	MIN	MAX	MIN	MAX	
A	-	1.50	-	3.81	-
B	1.10	-	28.0	-	-
C	-	.180	-	4.57	-
D	-	.032	-	0.81	-

Weight = 0.013oz

Contact Information

Semtech Corporation
Power Discretes Products Division
200 Flynn Road, Camarillo, CA 93012
Phone: (805)498-2111 FAX (805)498-3804

POWER DISCRETES

Features

- ◆ Very Low Reverse Recovery Time
- ◆ Avalanche Capability
- ◆ Glass Passivated for Hermetic Sealing
- ◆ Low Switching Losses
- ◆ Soft, Non-snap off, Recovery Characteristics
- ◆ These diodes can also be available as screened F and FX level parts

Absolute Maximum Rating

Parameter	Symbol	Max	Units
Working reverse voltage	V_{RWM}	5000	V
Repetitive reverse voltage	V_{RRM}	5000	V
Average forward current (@55°C, lead length 0.375")	$I_{F(AV)}$	0.36	A
Repetitive surge current @25°C	I_{FRM}	4	A
Non-repetitive surge current @25°C ($t_p = 8.3ms$)	I_{FSM}	20	A
Storage temperature range	t_{STG}	-65 to +200	°C
Operating temperature range	T_{OP}	-65 to +175	°C

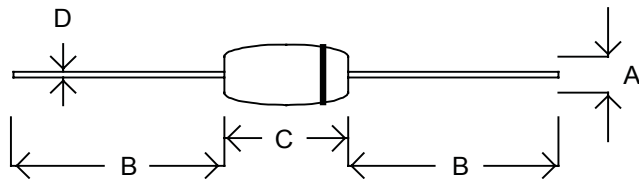
Thermal Characteristics

	Symbol	PFF50	Unit
Thermal Impedance	θ_{J-L}	L = 0.000, 3	°C/W
		L = 0.125, 6	°C/W
		L = 0.250, 12	°C/W

Electrical Characteristics

Parameter	Condition	Symbol	PFF50	Units
Average forward current	(max at 55°C)	$I_{F(AV)}$	0.36	A
	(max at 100°C)		0.18	
Forward voltage drop	(max @ $I_F = 0.2A$, $T_J = 25^\circ C$)	V_F	12.5	V
Reverse current	(max at V_{RWM} , $T_J = 25^\circ C$)	I_R	1	μA
	(max at V_{RWM} , $T_J = 100^\circ C$)		25	
Reverse recovery time	(0.5A If to 1.0A Irm. Recover to 0.25A Irm(REC))	t_{rr}	35	ns
Junction capacitance (typ)	50V _{DC} @ 1kHz	C_J	16	pF

Outline Drawing



*Cathode denoted by a black band

DIM	MM		INCHES	
	Min	Max	Min	Max
A	-	5.5	-	0.215
B	25.4	33.02	1.0	1.3
C	-	8.89	-	0.350
D	0.94	1.1	0.037	0.043

Ordering Information

Part Number	Description
PFF50	Axial leaded, hermetically sealed high-voltage superfast rectifier diode ⁽¹⁾

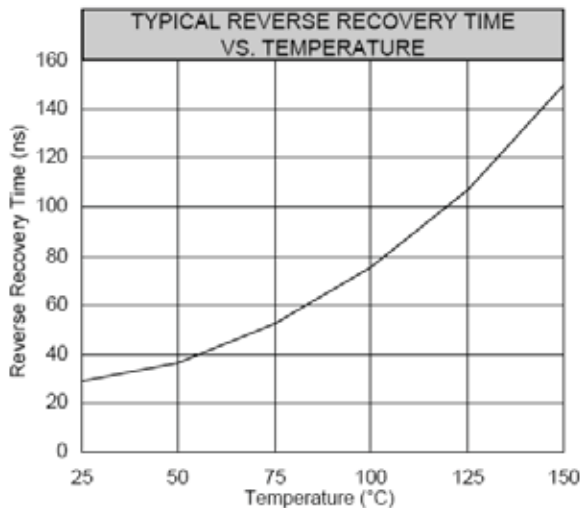
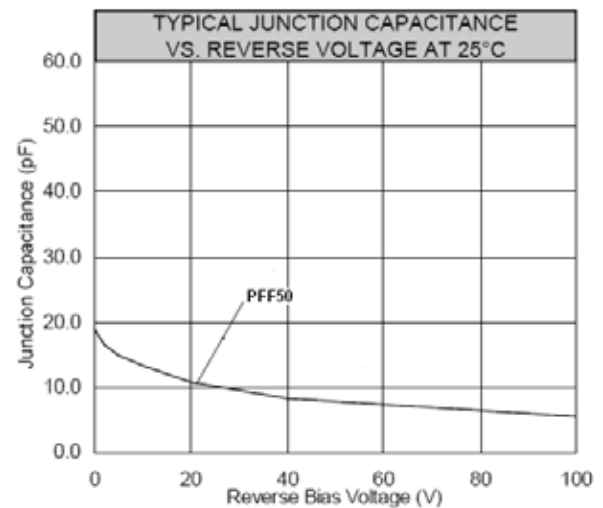
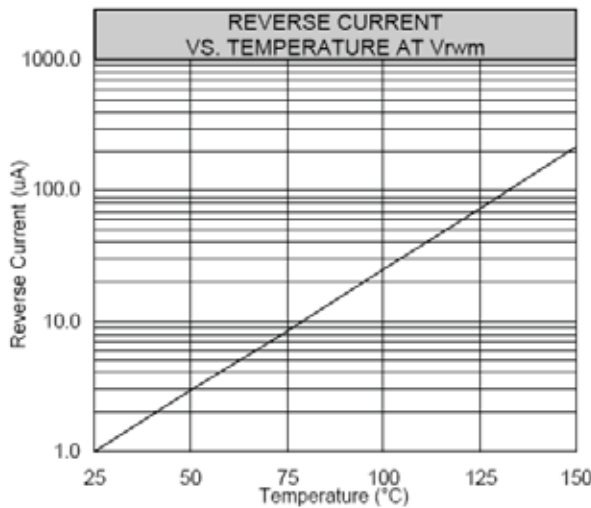
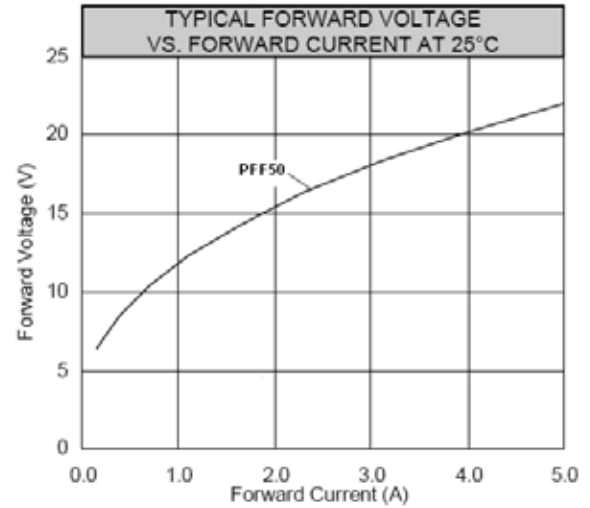
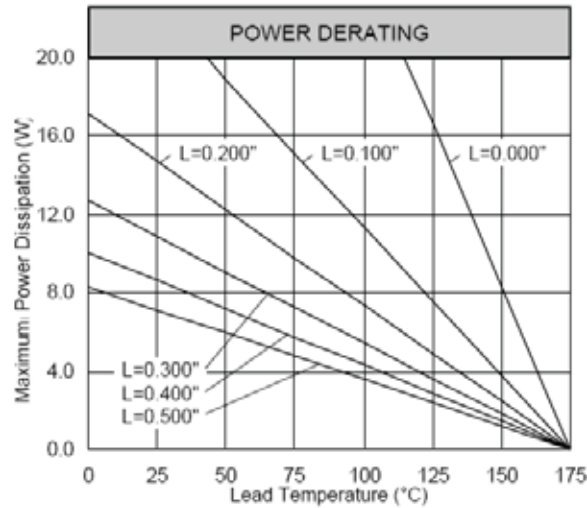
Note:

(1) Available in bulk or tape and reel packaging. Please consult factory for quantities.

POWER DISCRETES

Typical Characteristics

2



POWER DISCRETES

Description

Quick reference data

$$V_R = 800 - 1000V$$

$$I_F = 1.0A$$

$$t_{rr} = 75nS$$

$$I_R = 1\mu A$$

Features

- ◆ Very low reverse recovery time
- ◆ Glass passivated for hermetic sealing
- ◆ Low switching losses
- ◆ Soft, non-snap off, recovery characteristics
- ◆ Avalanche capability

2

Absolute Maximum Ratings

Electrical specifications @ $T_A = 25^\circ C$ unless otherwise specified.

	Symbol	PFF8	PFF0	Units
Working Reverse Voltage	V_{RWM}	800	1000	V
Average Forward Current @ $55^\circ C$, lead length 0.375"	$I_{F(AV)}$	1.0		A
Repetitive Surge Current @ $55^\circ C$ in free air, lead length 0.375"	I_{FRM}	4.25		A
Non-Repetitive Surge Current ($t_p = 8.3mS$ @ V_R & T_{JMAX})	I_{FSM}	22.0		A
Storage Temperature Range	T_{STG}	-55 to +175		$^\circ C$

POWER DISCRETES

Electrical Specifications

	Symbol	PFF8	PFF0	Units
Average Forward Current max ($T_L = 55^\circ\text{C}$; $L = 3/8"$) for sine wave for square wave	$I_{F(AV)}$ $I_{F(AV)}$	1.0 1.0		A
Forward Voltage Drop typ. @ $I_F = 1.0\text{A}$, $T_j = 25^\circ\text{C}$	V_F	2.1		V
Reverse Current typ. @ V_{RWM} , $T_j = 25^\circ\text{C}$ @ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R I_R	1 20		μA
Reverse Recovery Time max. $0.5\text{A } I_F$ to $1.0\text{A } I_{RM}$ recovers to $0.25\text{A } I_{RM(REC)}$	trr	75		nS
Junction Capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	Cj	30		pF

Thermal Characteristics

	Symbol	PFF8, PFF0	Units
Thermal Resistance-Junction to Lead Lead length = 0.375"	$R_{\theta JL}$	47	$^\circ\text{C/W}$

Maximum Characteristics

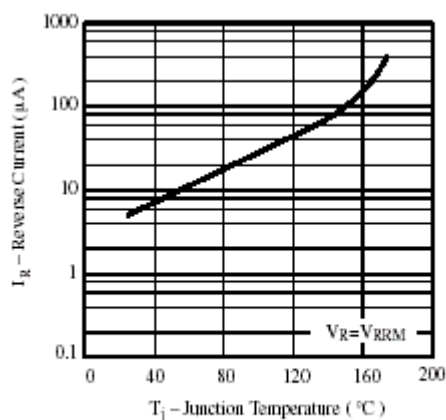


Figure 1. Max. Reverse Current vs. Junction Temperature

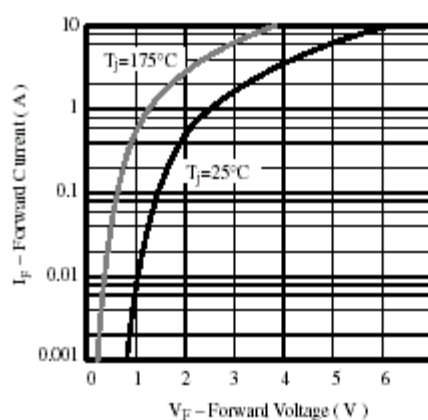


Figure 2. Max. Forward Current vs. Forward Voltage

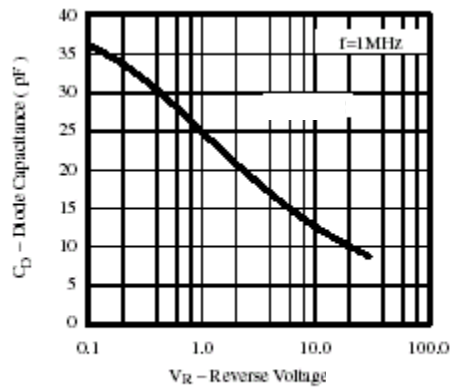
POWER DISCRETES
Maximum Characteristics (Cont.)


Figure 3. Diode Capacitance vs. Reverse Voltage

POWER DISCRETES

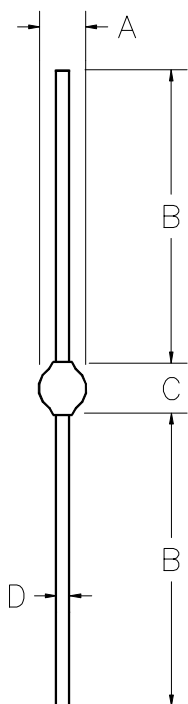
Ordering Information

Part Number	Description
PFF8, PFF0	Axial leaded hermetically sealed ⁽¹⁾

Note:

(1) Available in bulk and tape and reel packaging. Please consult factory for quantities.

Outline Drawing



Dimensions					
DIM ^N	Inches		Millimeters		Note
	MIN	MAX	MIN	MAX	
A	-	.150	-	3.81	-
B	1.02	-	26	-	-
C	-	.180	-	4.57	-
D	-	0.032	-	0.82	-

Weight = 0.013oz

Contact Information

Semtech Corporation
 Power Discretes Products Division
 200 Flynn Road, Camarillo, CA 93012
 Phone: (805)498-2111 FAX (805)498-3804

POWER DISCRETES
Description

Quick reference data

$$V_R = 5 - 7.5\text{kV}$$

$$I_F = 92\text{mA}$$

$$t_{rr} = 250\text{nS}$$

$$I_R = 0.5\mu\text{A}$$

Features

- ◆ Low reverse recovery time
- ◆ Very low leakage current
- ◆ Glass passivated for hermetic sealing
- ◆ Soft, non-snap off, recovery characteristics
- ◆ Avalanche capability
- ◆ Please contact factory regarding HR screening

2
Absolute Maximum Ratings

Electrical specifications @ $T_A = 25^\circ\text{C}$ unless otherwise specified.

	Symbol	PFM50A	PFM75A	Units
Working Reverse Voltage	V_{RWM}	5000	7500	V
Repetitive Reverse Voltage	V_{RRM}	5650	8500	V
Surge Reverse Voltage	V_{RSM}	5650	8500	V
Average Forward Current @ 55°C , in oil	$I_{F(AV)}$	92		mA
Repetitive Surge Current @ 55°C in oil, lead length 0.375"	$I_{F(AV)}$	1.0		A
Non-Repetitive Surge Current ($t_p = 8.3\text{mS}$ @ V_R & T_{JMAX})	I_{FSM}	2.0		A
Storage Temperature Range	T_{STG}	-65 to +150		$^\circ\text{C}$

POWER DISCRETES

Electrical Specifications

Electrical specifications @ $T_A = 25^\circ\text{C}$ unless otherwise specified.

	Symbol	PFM50A/PFM75A	Units
Average Forward Current max. Unstirred oil @ 55°C	$I_{F(AV)}$	92	mA
Forward Voltage Drop max. @ $I_F = 25\text{mA}$, $T_J = 25^\circ\text{C}$	V_F	12.5	V
Reverse Current max. @ V_{RWM} , $T_J = 25^\circ\text{C}$ @ V_{RWM} , $T_J = 100^\circ\text{C}$	I_R I_R	0.5 20	μA
Reverse Recovery Time max. $50\text{mA } I_F$, $100\text{mA } I_R$, $25\text{mA } I_{RM(REC)}$	t_{rr}	250	nS
Junction Capacitance typ. @ $V_R = 50\text{V}$, $f = 1\text{KHz}$	C_j	2	pF

Thermal Characteristics

	Symbol	PFM50A/PFM75A	Units
Thermal Resistance-Junction to Oil Stirred oil Unstirred oil	$R_{\theta JO}$	48 64	$^\circ\text{C/W}$
Thermal Resistance-Junction to Ambient On 0.06" thick pcb. 1oz copper	$R_{\theta JA}$	160	$^\circ\text{C/W}$

POWER DISCRETES

Ordering Information

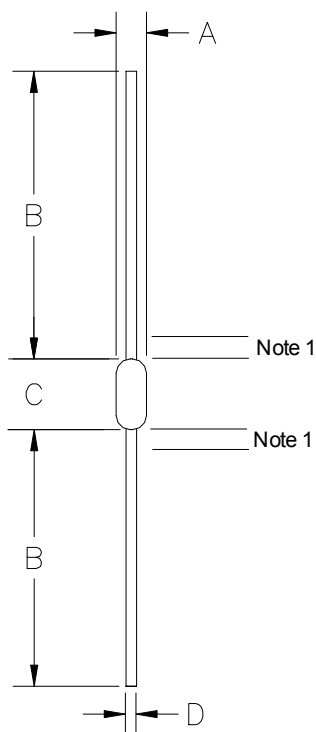
Part Number	Description
PFM50A/PFM75A	Axial leaded hermetically sealed ⁽¹⁾

Note:

(1) Available in bulk and tape and reel packaging. Please consult factory for quantities.

2

Outline Drawing



G82

Dimensions					
DIM ^N	Inches		Millimeters		Note
	MIN	MAX	MIN	MAX	
A	-	.118	-	3.0	-
B	1.0	-	25.4	-	-
C	-	.374	-	9.5	-
D	-	0.033	-	0.84	-

Note:

1. Lead diameter not controlled in this area.

Contact Information

Semtech Corporation
Power Discretes Products Division
200 Flynn Road, Camarillo, CA 93012
Phone: (805)498-2111 FAX (805)498-3804

POWER DISCRETES

Description

Quick reference data

$$\begin{aligned} V_R &= 1000V \\ I_F &= 1.25A \\ t_{rr} &= 100nS \\ I_R &= 1\mu A \end{aligned}$$

Features

- ◆ Very low reverse recovery time
- ◆ Glass passivated for hermetic sealing
- ◆ Low switching losses
- ◆ Soft, non-snap off, recovery characteristics
- ◆ Avalanche capability

Absolute Maximum Ratings

Electrical specifications @ $T_A = 25^\circ\text{C}$ unless otherwise specified.

	Symbol	PFR0	Units
Working Reverse Voltage	V_{RWM}	1000	V
Surge Reverse Voltage	V_{RSM}	1100	V
Average Forward Current @ 55°C , lead length 0.375"	$I_{F(AV)}$	1.25	A
Repetitive Surge Current @ 55°C in free air, lead length 0.375"	I_{FRM}	11	A
Non-Repetitive Surge Current ($t_p = 8.3\text{ms}$ @ V_R & T_{JMAX})	I_{FSM}	30	A
Storage Temperature Range	T_{STG}	-55 to +175	$^\circ\text{C}$

POWER DISCRETES

Electrical Specifications

	Symbol	PFR0	Units
Average Forward Current max (pcb mounted; $T_A = 55^\circ\text{C}$) for sine wave for square wave ($d = 0.5$)	$I_{F(AV)}$ $I_{F(AV)}$	0.85 0.90	A
Average Forward Current max ($T_L = 55^\circ\text{C}$; $L = 3/8"$)	$I_{F(AV)}$	1.25	A
Forward Voltage Drop max. @ $I_F = 1.0\text{A}$, $T_J = 25^\circ\text{C}$	V_F	1.5	V
Reverse Current typ. @ V_{RWM} , $T_J = 25^\circ\text{C}$ @ V_{RWM} , $T_J = 100^\circ\text{C}$	I_R I_R	1 20	μA
Reverse Recovery Time max. $0.5\text{A } I_F$ to $1.0\text{A } I_{RM}$ recovers to $0.25\text{A } I_{RM(REC)}$	t_{rr}	100	nS
Junction Capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	22	pF

Thermal Characteristics

	Symbol	PFR0	Units
Thermal Resistance-Junction to Lead Lead length = 0.375"	$R_{\theta JL}$	47	$^\circ\text{C/W}$

Maximum Characteristics

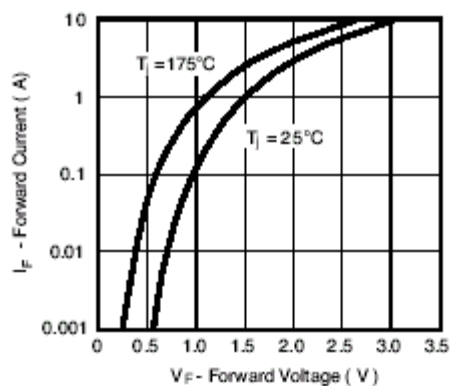


Figure 1. Forward Current vs. Forward Voltage

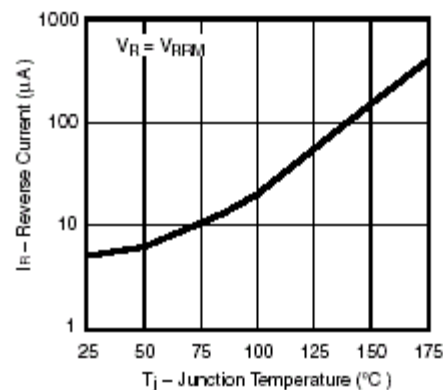


Figure 2. Reverse Current vs. Junction Temperature

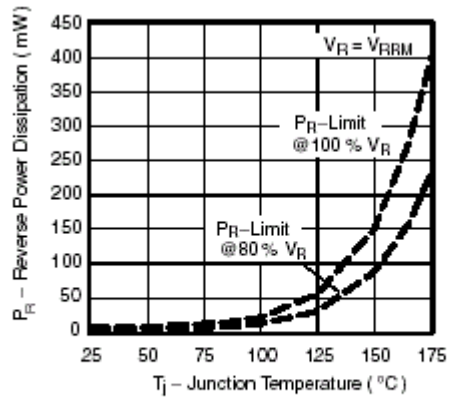
POWER DISCRETES
Maximum Characteristics (Cont.)
2


Figure 3. Max. Reverse Power Dissipation vs. Junction Temperature

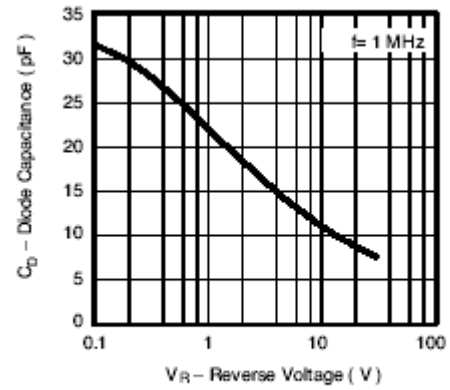


Figure 4. Diode Capacitance vs. Reverse Voltage

POWER DISCRETES

Ordering Information

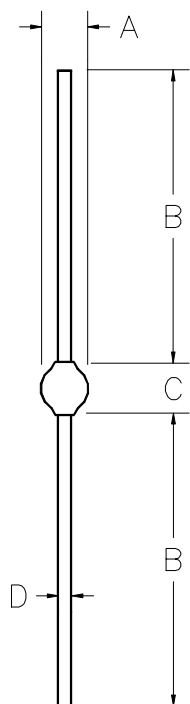
Part Number	Description
PFR0	Axial leaded hermetically sealed ⁽¹⁾

Note:

(1) Available in bulk and tape and reel packaging. Please consult factory for quantities.

2

Outline Drawing



Dimensions					
DIM ^N	Inches		Millimeters		Note
	MIN	MAX	MIN	MAX	
A	-	.150	-	3.81	-
B	1.02	-	26	-	-
C	-	.180	-	4.57	-
D	-	.032	-	0.82	-

Weight = 0.013oz

Contact Information

Semtech Corporation
 Power Discretes Products Division
 200 Flynn Road, Camarillo, CA 93012
 Phone: (805)498-2111 FAX (805)498-3804

POWER DISCRETES
Description

Quick reference data

$$V_R = 600V - 1000V$$

$$I_F = 2.0A$$

$$t_{rr} = 3\mu S$$

$$I_R = 1.0\mu A$$

Features

- ◆ Avalanche capability
- ◆ High thermal shock resistance
- ◆ Glass passivated for hermetic sealing
- ◆ Low reverse leakage currents
- ◆ Low forward voltage drop

Absolute Maximum Ratings

Electrical specifications @ $T_A = 25^\circ C$ unless otherwise specified.

	Symbol	PM6	PM8	PM0	Units
Working Reverse Voltage	V_{RWM}	600	800	1000	V
Repetitive Reverse Voltage	V_{RRM}	600	800	1000	V
Surge Reverse Voltage	V_{RSM}	650	900	1100	V
Average Forward Current @ $55^\circ C$, lead length 0.375"	$I_{F(AV)}$	2.0			A
Repetitive Surge Current @ $55^\circ C$ in free air, lead length 0.375"	I_{FRM}	12.0			A
Non-Repetitive Surge Current ($t_p = 10mS$, half sinewave)	I_{FSM}	50			A
Storage Temperature Range	T_{STG}	-55 to +175			$^\circ C$

POWER DISCRETES

Electrical Specifications

	Symbol	PM6	PM8	PM0	Units
Average Forward Current	$I_{F(AV)}$	2.0			A
I^2T for fusing ($t = 8.3ms$) max.	I^2T	8			A ² S
Forward Voltage Drop max. @ $I_F = 1.00A$, $T_j = 25^\circ C$	V_F	1.0			V
Reverse Current max. @ V_{RWM} , $T_j = 25^\circ C$ @ V_{RWM} , $T_j = 100^\circ C$	I_R I_R	1.0 10			μA
Reverse Recovery Time typ. 0.5A I_F to 1.0A I_{RM} recovers to 0.25A $I_{RM(REC)}$	t_{rr}	3			μS
Junction Capacitance typ. @ $V_r = 4V$, $f = 1MHz$	C_j	18			pF

2

Thermal Characteristics

	Symbol	PM6	PM8	PM0	Units
Thermal Resistance-Junction to Lead Lead length = 0.375"	$R_{\theta JL}$	47			$^\circ C/W$
Lead length = 0"	$R_{\theta JL}$	19			

Maximum Characteristics

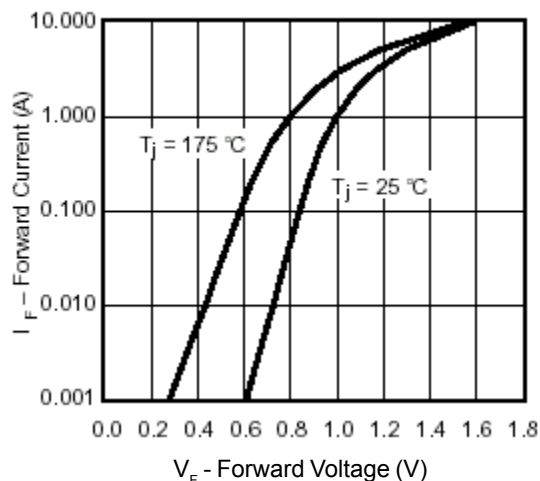


Figure 1. Forward Current vs. Forward Voltage

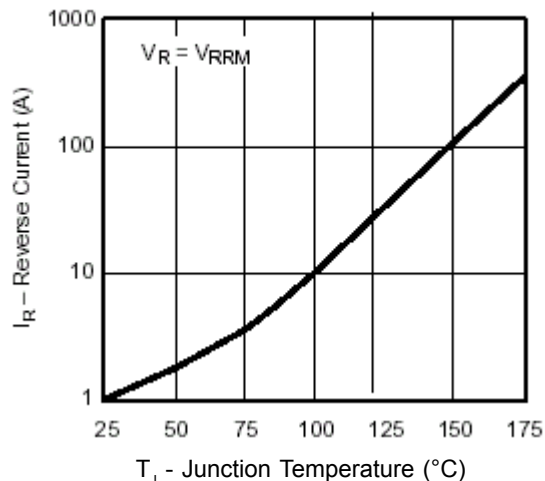


Figure 2. Reverse Current vs. Junction Temperature

POWER DISCRETES

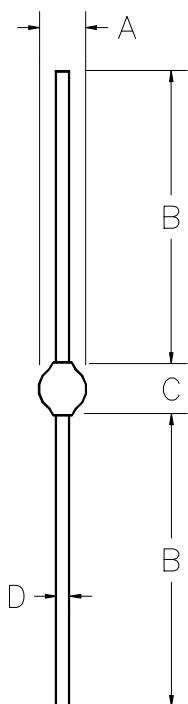
Ordering Information

Part Number	Description
PM6 PM8 PM0	Axial leaded hermetically sealed ⁽¹⁾

Note:

(1) Available in bulk and tape and reel packaging. Please consult factory for quantities.

Outline Drawing



Dimensions					
DIM ^N	Inches		Millimeters		Note
	MIN	MAX	MIN	MAX	
A	-	.150	-	3.81	-
B	1.014	-	26	-	-
C	-	.180	-	4.57	-
D	-	.032	-	0.82	-

Weight = 369mg

Contact Information

Semtech Corporation
Power Discretes Products Division
200 Flynn Road, Camarillo, CA 93012
Phone: (805)498-2111 FAX (805)498-3804



AXIAL LEADED HERMETICALLY SEALED HIGH VOLTAGE FAST RECTIFIER DIODE

- Low reverse recovery time
- High thermal shock resistance
- Hermetically sealed with Metoxilite metal oxide
- Low switching losses
- Soft, non-snap off, recovery characteristics

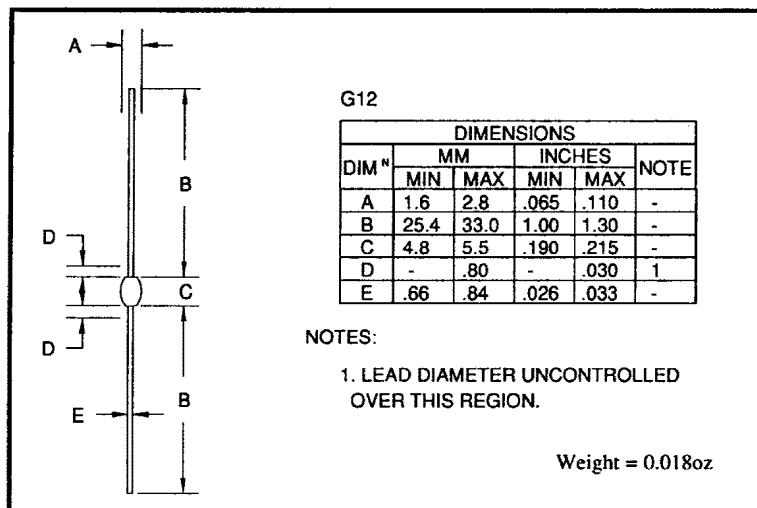
QUICK REFERENCE DATA

- $V_R = 1500 - 2500V$
- $I_F = 0.5A$
- $t_{rr} = 300nS$
- $I_R = 1\mu A$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	S15F	S20F	S25F	Unit
Working reverse voltage	V_{RWM}	1500	2000	2500	V
Repetitive reverse voltage	V_{RRM}	1500	2000	2500	V
Average forward current (@ 55°C in oil)	$I_{F(AV)}$	← 0.5 →			A
Repetitive surge current (@ 55°C in oil)	I_{FRM}	← 2.5 →			A
Non-repetitive surge current ($t_p = 8.3mS$, @ V_R & T_{jmax})	I_{FSM}	← 10.0 →			A
Storage temperature range	T_{STG}	← -65 to +175 →			°C
Operating temperature range	T_{OP}	← -65 to +175 →			°C

MECHANICAL



These products are available in Europe to DEF STAN 59-61 (PART 80)/034 to F and FX levels.



CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	S15F	S20F	S25F	Unit
Average forward current max. (pcb mounted; $T_A = 55^\circ\text{C}$) for sine wave	$I_{F(AV)}$	← 0.23 →			A
for square wave ($d = 0.5$)	$I_{F(AV)}$	← 0.24 →			A
Average forward current max. (unstirred oil at 55°C) for sine wave	$I_{F(AV)}$	← 0.50 →			A
for square wave	$I_{F(AV)}$	← 0.50 →			A
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t	← 0.4 →			A^2S
Forward voltage drop max. @ $I_F = 0.10\text{A}$, $T_j = 25^\circ\text{C}$	V_F	← 5.0 →			V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	← 1.0 →			μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	← 25 →			μA
Reverse recovery time max. 50mA I_F , 100mA I_R , Recover to 25mA I_{RR} .	t_{rr}	← 300 →			nS
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	← 4.0 →			pF
Thermal resistance - junction to oil Stirred oil	$R_{\theta JO}$	← 18 →			$^\circ\text{C/W}$
Unstirred oil	$R_{\theta JO}$	← 30 →			$^\circ\text{C/W}$
Thermal resistance - junction to amb. on 0.06" thick pcb. 1oz copper.	$R_{\theta JA}$	← 90 →			$^\circ\text{C/W}$

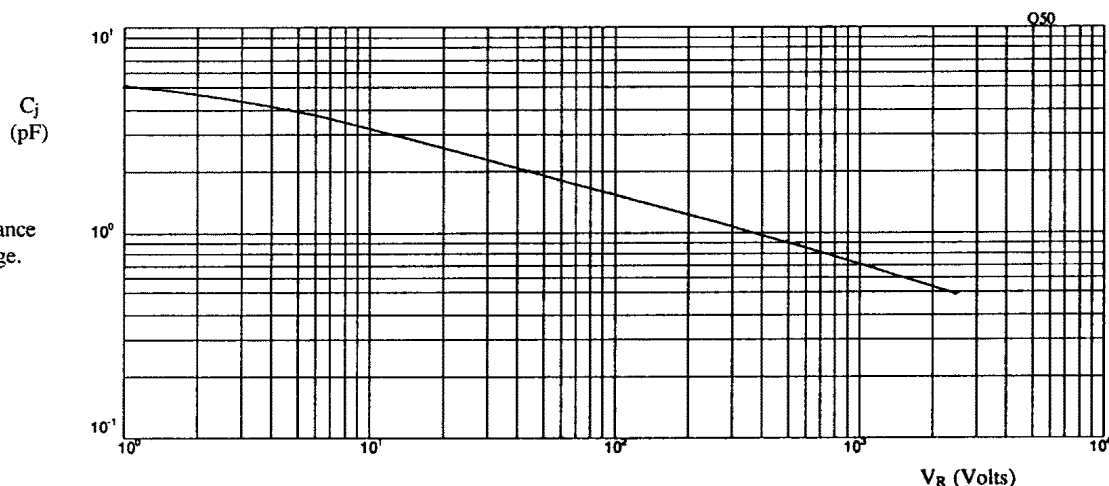


Fig 1 Junction capacitance
against reverse voltage.

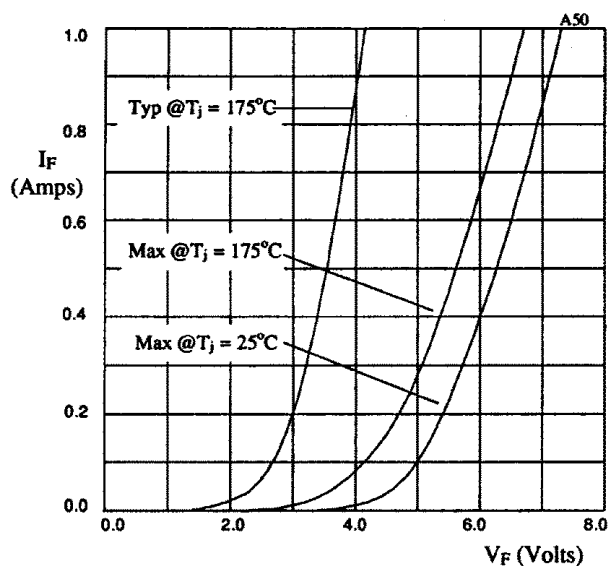


Fig 1. Forward voltage drop as a function of forward current.

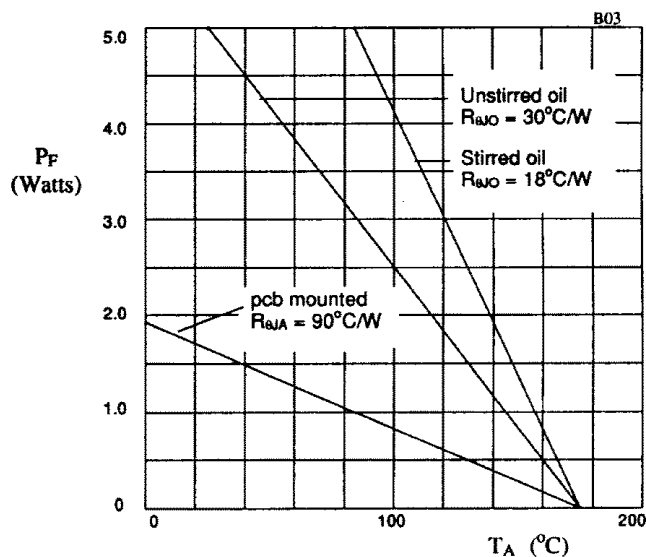


Fig 2. Power derating in air and oil.

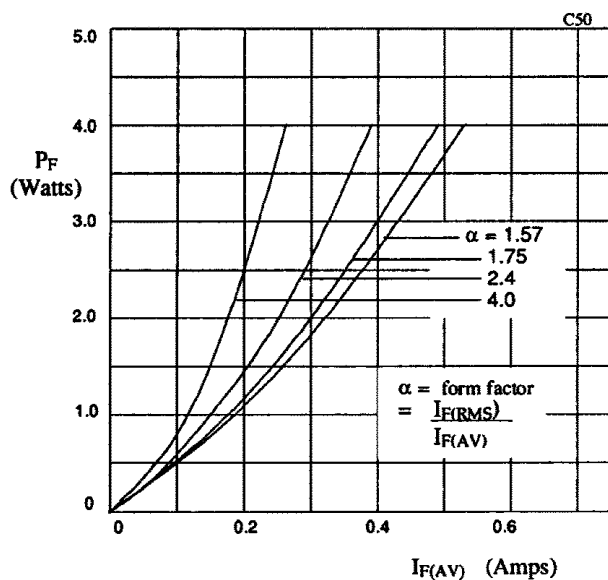


Fig 3. Forward power dissipation as a function of forward current, for sinusoidal operation.

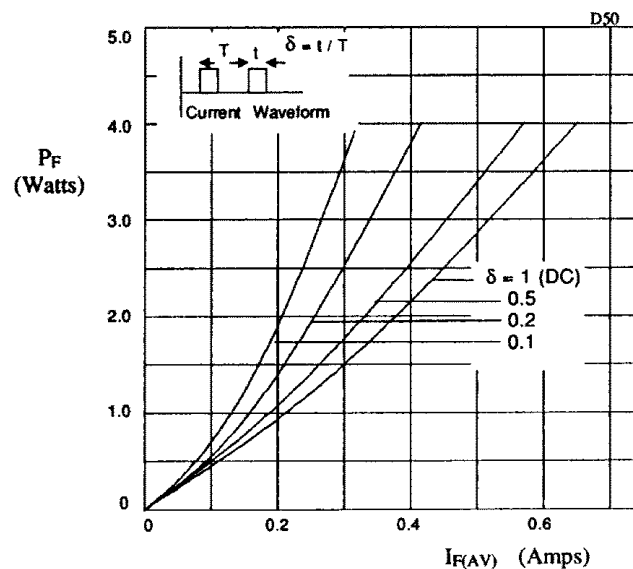


Fig 4. Forward power dissipation as a function of forward current, for square wave operation.

AXIAL LEADED HERMETICALLY SEALED HIGH VOLTAGE SUPERFAST RECTIFIER DIODE

- Very low reverse recovery time
- High thermal shock resistance
- Hermetically sealed with Metoxilite metal oxide
- Low switching losses
- Soft, non-snap off, recovery characteristics

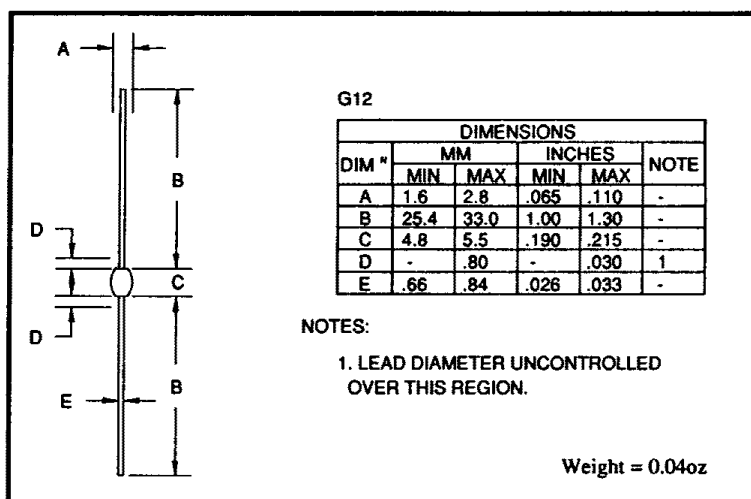
QUICK REFERENCE DATA

- $V_R = 3000V$
- $I_F = 0.36A$
- $t_{rr} = 50ns$
- $I_R = 1\mu A$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	SFF30	Unit
Working reverse voltage	V_{RWM}	3000	V
Repetitive reverse voltage	V_{RRM}	3000	V
Average forward current (@ 55°C, in oil)	$I_{F(AV)}$	0.36	A
Repetitive surge current (@ 55°C in oil)	I_{FRM}	1.0	A
Non-repetitive surge current ($t_p = 8.3ms$, @ V_R & T_{jmax})	I_{FSM}	10.0	A
Storage temperature range	T_{STG}	-65 to +175	°C
Operating temperature range	T_{OP}	-65 to +175	°C

MECHANICAL



ELECTRICAL CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	SFF30	Unit
Average forward current max. (pcb mounted; $T_A = 55^\circ\text{C}$)			
for sine wave	$I_{F(AV)}$	0.16	A
for square wave ($d = 0.5$)	$I_{F(AV)}$	0.17	A
Average forward current max. (oil at 55°C)			
for sine wave	$I_{F(AV)}$	0.33	A
for square wave	$I_{F(AV)}$	0.36	A
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t	0.42	A^2S
Forward voltage drop max. @ $I_F = 0.175\text{A}$, $T_j = 25^\circ\text{C}$	V_F	7.00	V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	1.0	μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	25	μA
Reverse recovery time max. 50mA I_F , 100mA I_R , 25mA I_{RR} .	t_{rr}	50	nS
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	6.5	ρF

THERMAL CHARACTERISTICS

	Symbol	SFF30	Unit
Thermal resistance - junction to oil			
Stirred oil	$R_{\theta JO}$	18	$^\circ\text{C/W}$
Unstirred oil	$R_{\theta JO}$	30	$^\circ\text{C/W}$
Thermal resistance - junction to amb. on 0.06" thick pcb. 1 oz. copper.	$R_{\theta JA}$	90	$^\circ\text{C/W}$

2

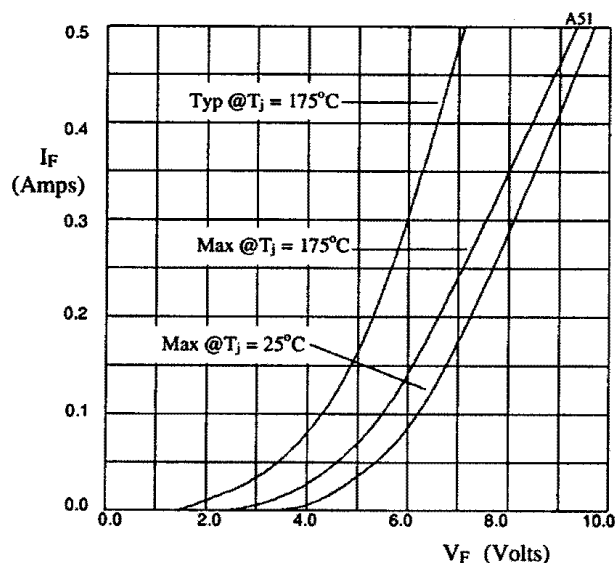


Fig 1. Forward voltage drop as a function of forward current.

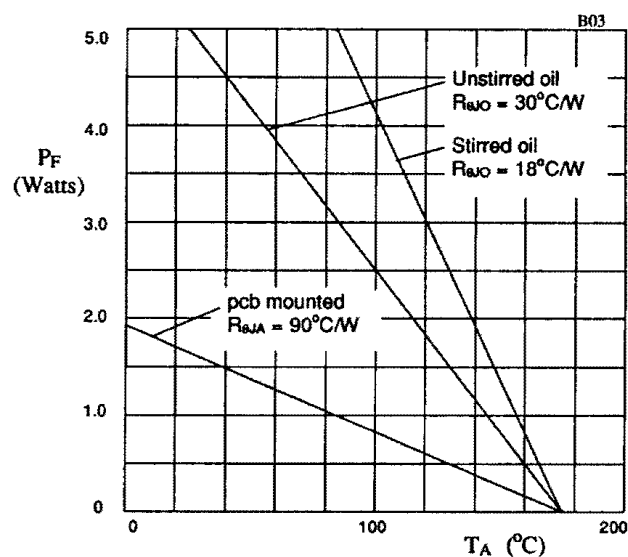


Fig 2. Power derating in air and oil.

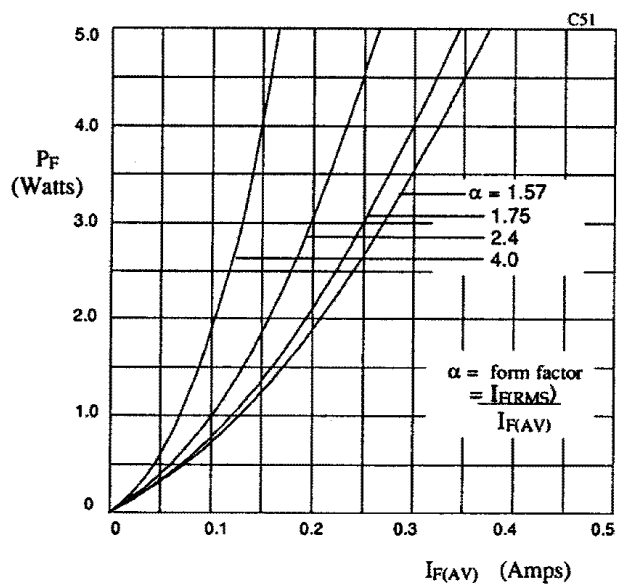


Fig 3. Forward power dissipation as a function of forward current, for sinusoidal operation.

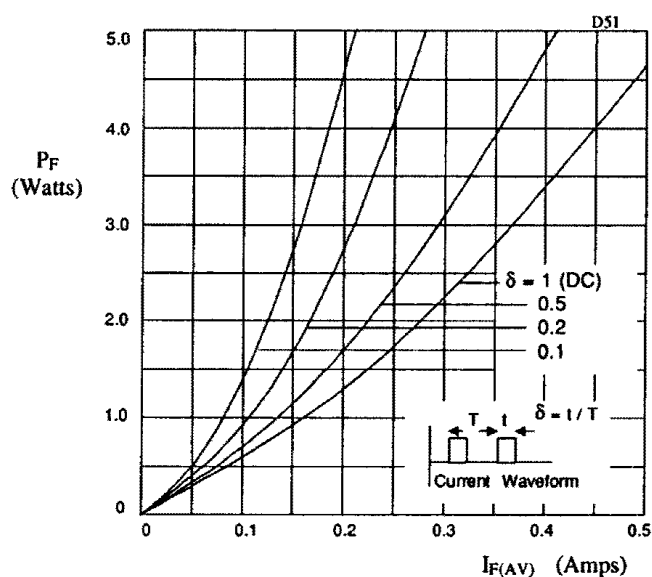


Fig 4. Forward power dissipation as a function of forward current, for square wave operation.

AXIAL LEADED HERMETICALLY SEALED FAST RECOVERY RECTIFIER DIODE

QUICK REFERENCE DATA

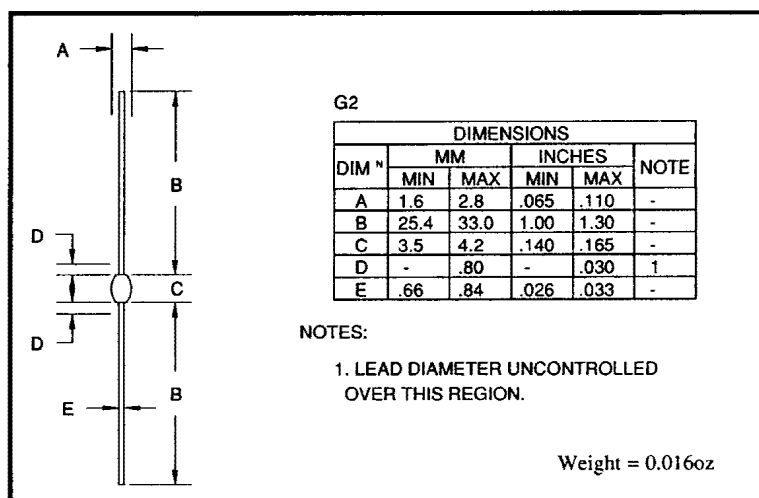
- Low reverse recovery time
- Hermetically sealed in Metoxillite fused metal oxide
- Low switching losses
- Low reverse current
- Soft, non-snap off, recovery characteristics

- $V_R = 1000V$
- $I_F = 1.6A$
- $t_{rr} = 150ns$
- $I_R = 1\mu A$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	SFR0	Unit
Working reverse voltage	V_{RWM}	1000	V
Repetitive reverse voltage	V_{RRM}	1000	V
Average forward current (@ 55°C, lead length 0.375")	$I_{F(AV)}$	1.6	A
Repetitive surge current (@ 55°C in free air, lead length 0.375")	I_{FRM}	6.0	A
Non-repetitive surge current ($t_p = 8.3ms$, @ V_R & T_{jmax})	I_{FSM}	25	A
Storage temperature range	T_{STG}	-65 to +175	°C
Operating temperature range	T_{OP}	-65 to +175	°C

MECHANICAL



ELECTRICAL CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	SFR0	Unit
Average forward current max. (pcb mounted; $T_A = 55^\circ\text{C}$) for sine wave	$I_{F(AV)}$	0.75	A
for square wave ($d = 0.5$)	$I_{F(AV)}$	0.80	A
Average forward current max. ($L = 3/8"$; $T_L = 55^\circ\text{C}$) for sine wave	$I_{F(AV)}$	1.4	A
for square wave	$I_{F(AV)}$	1.6	A
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t	2.5	A^2S
Forward voltage drop max. @ $I_F = 1.0\text{A}$, $T_j = 25^\circ\text{C}$	V_F	1.50	V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	1.0	μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	25	μA
Reverse recovery time max. 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR} .	t_{rr}	150	nS
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	20	pF

THERMAL CHARACTERISTICS

	Label	SFR0	Unit
Thermal resistance - junction to lead Lead length = 0"	$R_{\theta JL}$	14.0	$^\circ\text{C/W}$
Lead length = 0.375"	$R_{\theta JL}$	38.0	$^\circ\text{C/W}$
Thermal resistance - junction to amb. on 0.06" thick pcb. 1 oz. copper.	$R_{\theta JA}$	95.0	$^\circ\text{C/W}$

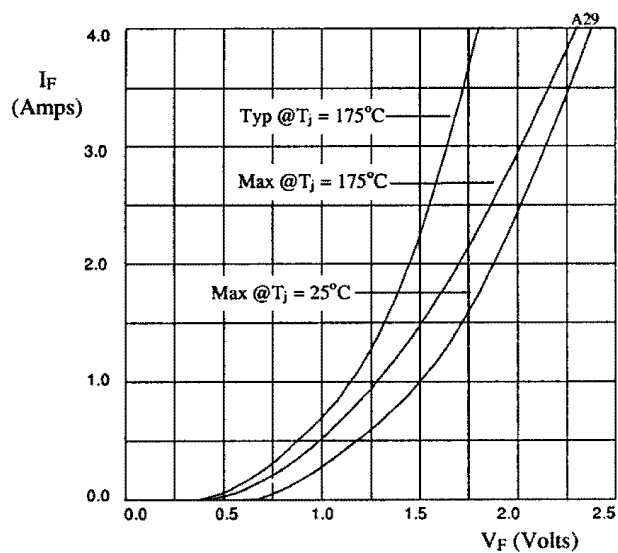


Fig 1. Forward voltage drop as a function of forward current.

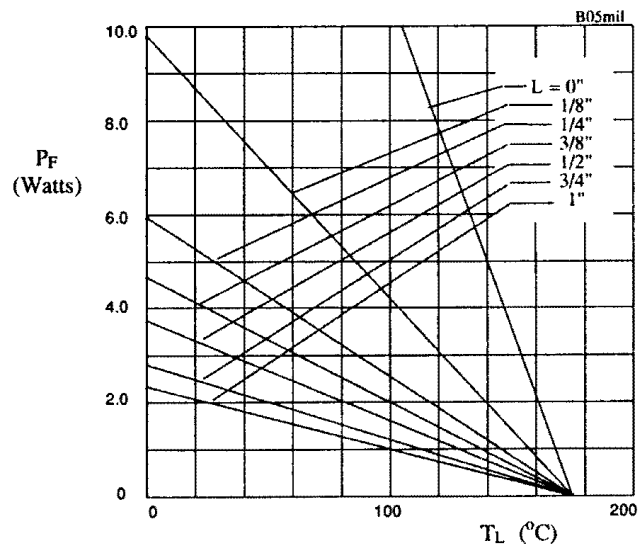


Fig 2. Maximum power versus lead temperature.

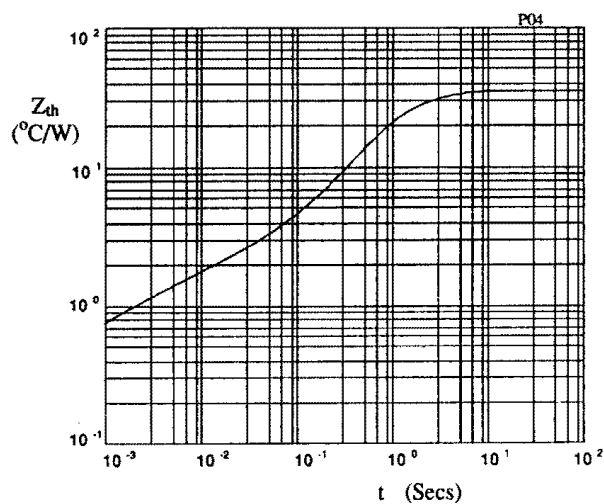


Fig 3. Transient thermal impedance characteristic.

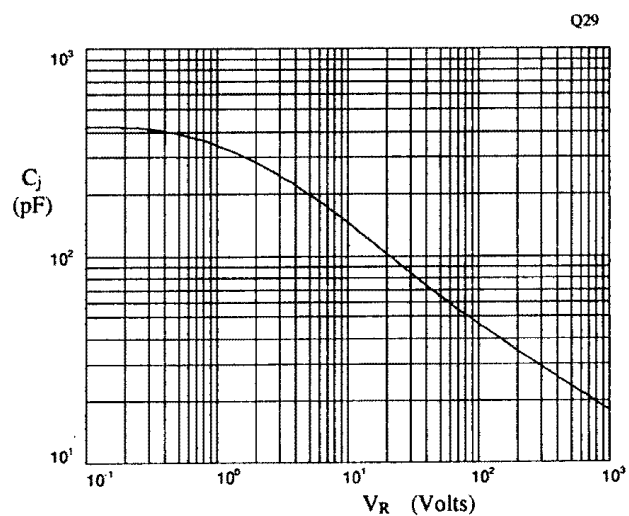


Fig 4. Typical junction capacitance as a function of reverse voltage.

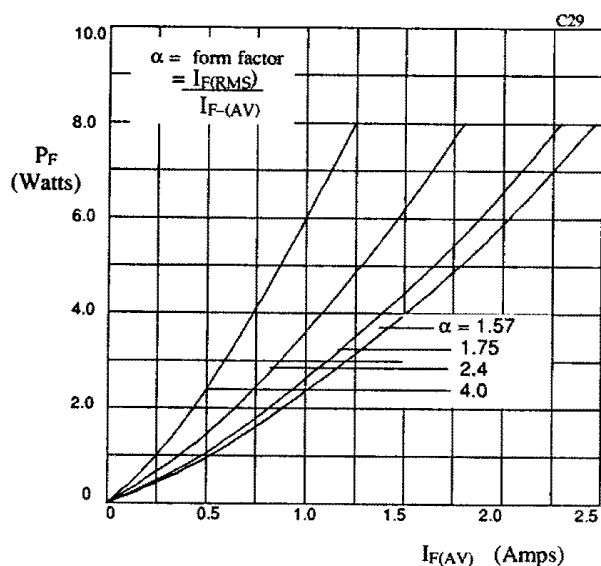


Fig 5. Forward power dissipation as a function of forward current, for sinusoidal operation.

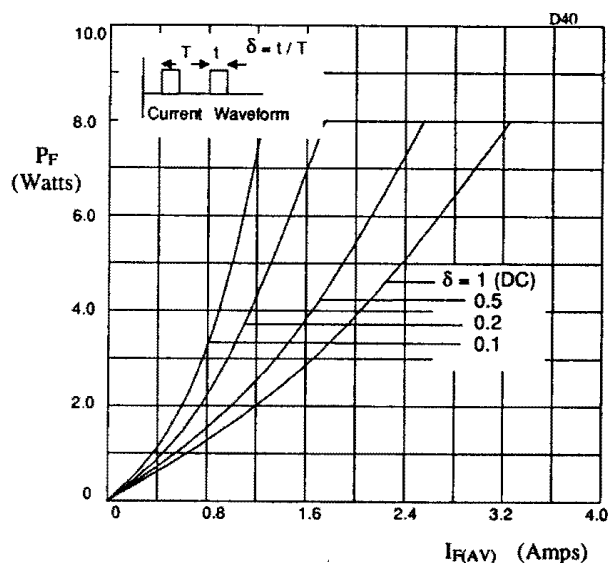


Fig 6. Forward power dissipation as a function of forward current, for square wave operation.

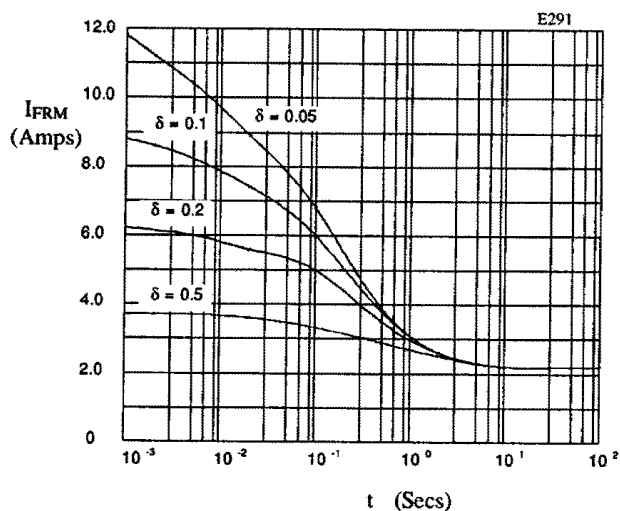


Fig 7. Typical repetitive forward current as a function of pulse width at 55°C; $R_{\theta JL} = 35^\circ\text{C/W}$; V_{RWM} during $1 - \delta$.

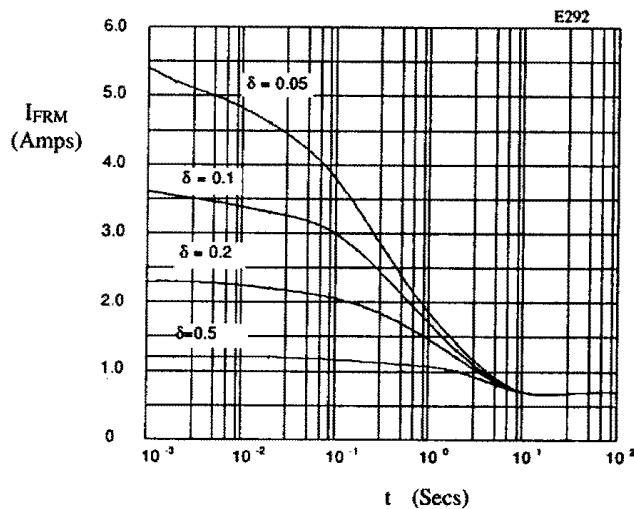


Fig 8. Typical repetitive forward current as a function of pulse width at 100°C; $R_{\theta JL} = 95^\circ\text{C/W}$; V_{RWM} during $1 - \delta$.

QUICK REFERENCE
DATA

- $V_R = 4\text{kV} - 10\text{kV}$
- $I_F = 300\text{mA}$
- $t_{rr} = 2.5\mu\text{s}$
- $I_R = 1.0\mu\text{A}$

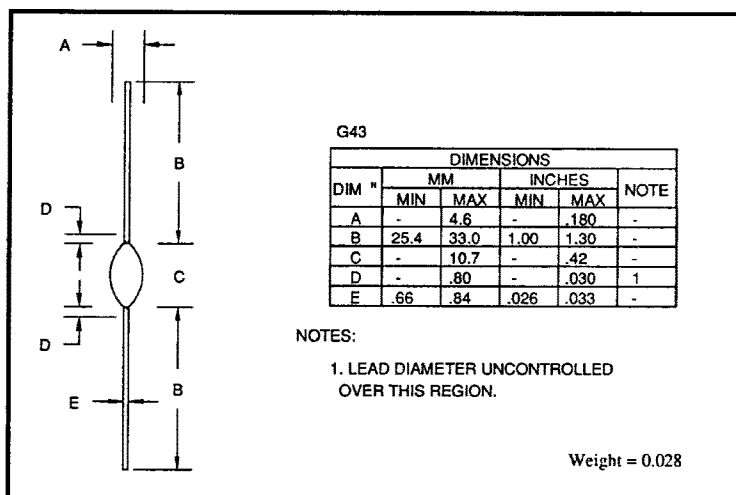
AXIAL LEADED HERMETICALLY SEALED HIGH
VOLTAGE STANDARD RECOVERY RECTIFIER DIODE

- Low reverse currents
- Hermetically sealed with Metoxilite fused metal oxide
- Good thermal shock resistance
- Monolithic cavity free construction
- Subminiature size

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	SM40	SM50	SM75	SM100	Unit
Working reverse voltage	V_{RWM}	4000	5000	7500	10000	V
Repetitive reverse voltage	V_{RRM}	4000	5000	7500	10000	V
Average forward current (@ 55°C in oil)	$I_{F(AV)}$	← 300 →				mA
Repetitive surge current (@ 55°C in oil, lead length 0.375")	I_{FRM}	← 1.0 →				A
Non-repetitive surge current ($t_p = 8.3\text{mS}$, @ V_R & T_{jmax})	I_{FSM}	← 25 →				A
Storage temperature range	T_{STG}	← -65 to +175 →				°C
Operating temperature range	T_{OP}	← -65 to +175 →				°C

MECHANICAL





CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	SM40	SM50	SM75	SM100	Unit
Average forward current (sine wave) - max. pcb mounted; $T_A = 55^\circ\text{C}$ - max. in unstirred oil	$I_{F(AV)}$ $I_{F(AV)}$	←	130	→	←	mA mA
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t	←	2.6	→	←	A^2S
Forward voltage drop max. @ $I_F = 100\text{mA}$, $T_j = 25^\circ\text{C}$	V_F	←	10.0	→	←	V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$ @ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R I_R	←	1.0	→	←	μA μA
Reverse recovery time max. 50mA I_F to 100mA I_R . Recover to 25mA I_{RR} .	t_{rr}	←	2.5	→	←	μs
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	←	3.2	→	←	pF
Thermal resistance - junction to oil Unstirred @ 55°C Stirred @ 55°C	$R_{\theta JO}$ $R_{\theta JO}$	←	28	→	←	$^\circ\text{C/W}$ $^\circ\text{C/W}$
Thermal resistance - junction to amb. on 0.06" thick pcb. 1oz copper.	$R_{\theta JA}$	←	91	→	←	$^\circ\text{C/W}$

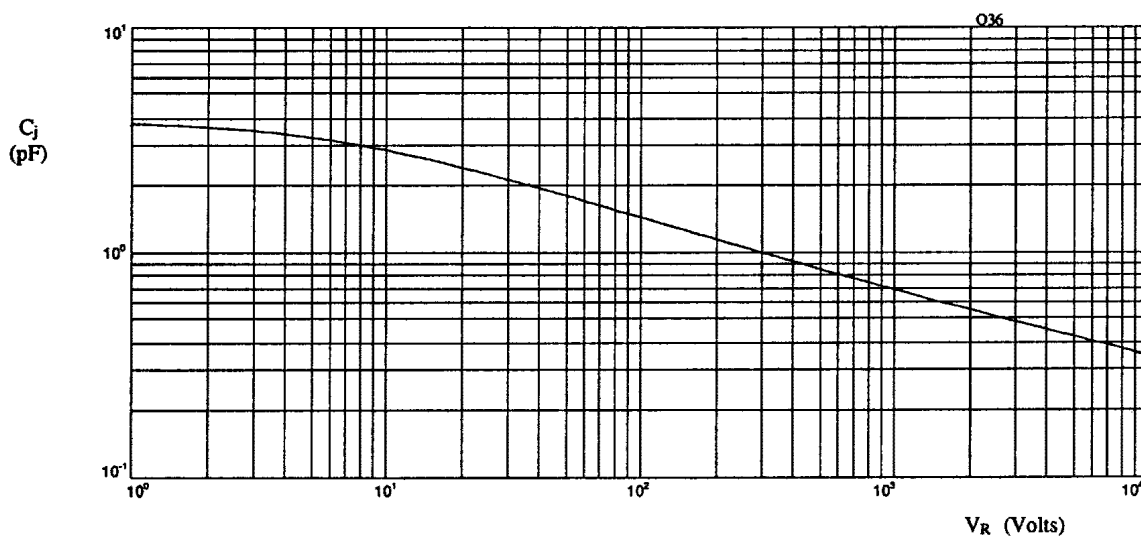


Fig 1. Typical junction capacitance as a function of reverse voltage.

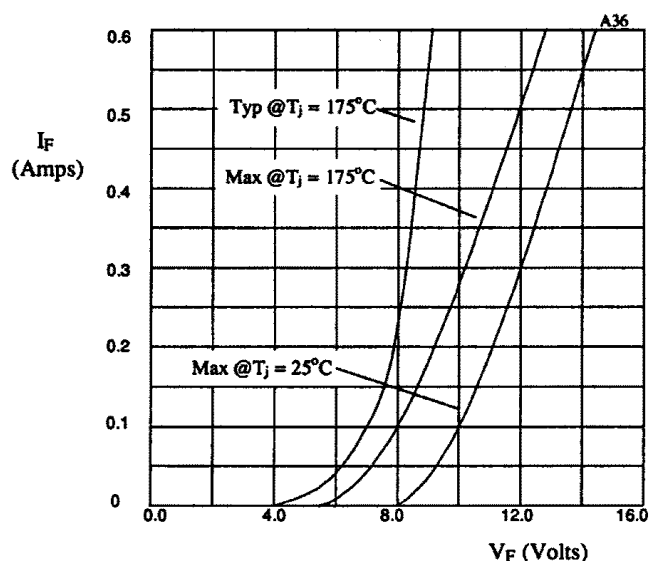


Fig 2. Forward voltage drop as a function of forward current.

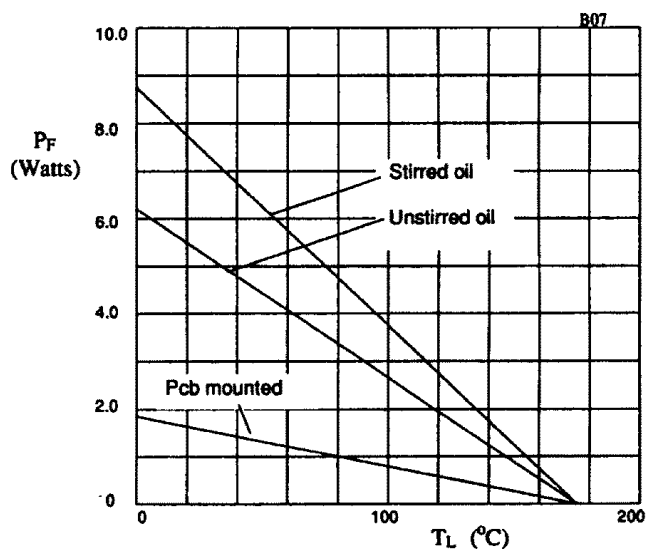


Fig 3. Power derating in air and oil.

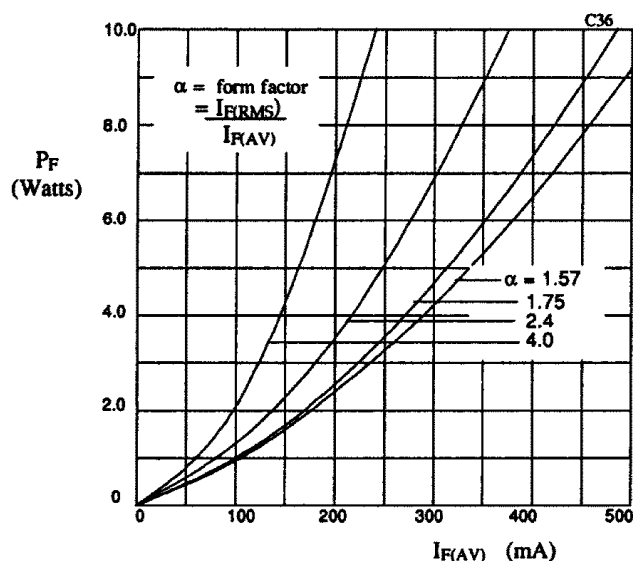


Fig 4. Forward power dissipation as a function of forward current, for sinusoidal operation.

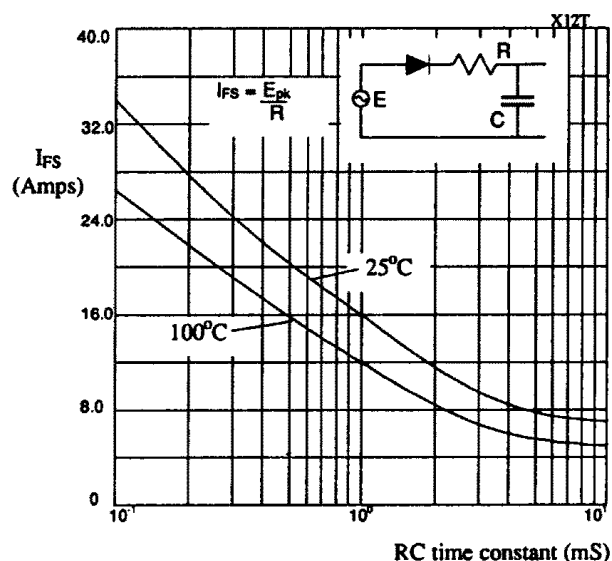


Fig 5. Maximum ratings for capacitive loads.



2

AXIAL LEADED HERMETICALLY SEALED HIGH VOLTAGE FAST RECTIFIER DIODE

QUICK REFERENCE DATA

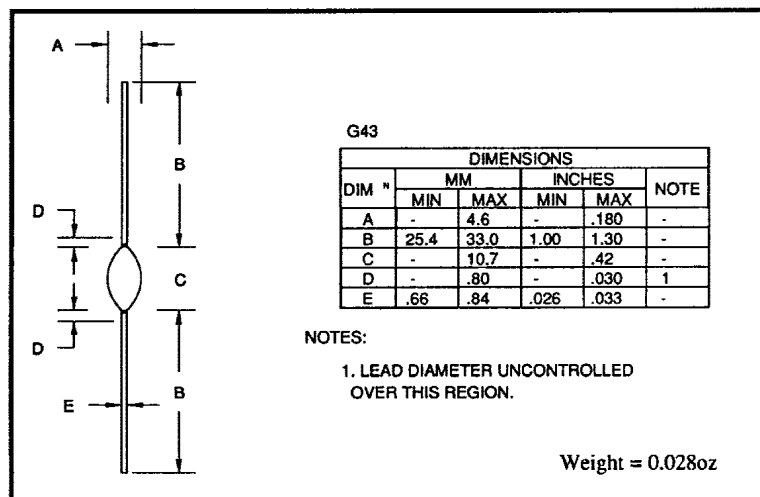
- Low reverse recovery time
- High thermal shock resistance
- Hermetically sealed with Metoxilite metal oxide
- Low switching losses
- Soft, non-snap off, recovery characteristics

- $V_R = 7.5 - 10kV$
- $I_F = 290mA$
- $t_{rr} = 300ns$
- $I_R = 1\mu A$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	SM75F	SM100F	Unit
Working reverse voltage	V_{RWM}	7500	10000	V
Repetitive reverse voltage	V_{RRM}	7500	10000	V
Average forward current (@ 55°C in oil)	$I_{F(AV)}$	← 0.29 →		A
Repetitive surge current (@ 55°C)	I_{FRM}	← 1.00 →		A
Non-repetitive surge current ($t_p = 8.3ms$, @ V_R & T_{jmax})	I_{FSM}	← 14.0 →		A
Storage temperature range	T_{STG}	← -65 to +175 →		°C
Operating temperature range	T_{OP}	← -65 to +175 →		°C

MECHANICAL





CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	SM75F	SM100F	Unit
Average forward current max. (pcb mounted; $T_A = 55^\circ\text{C}$) for sine wave	$I_F(\text{AV})$	0.11		A
for square wave ($d = 0.5$)	$I_F(\text{AV})$	0.12		A
Average forward current max. (unstirred oil at 55°C) for sine wave	$I_F(\text{AV})$	0.27		A
for square wave	$I_F(\text{AV})$	0.29		A
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t	0.81		A^2S
Forward voltage drop max. @ $I_F = 100\text{mA}$, $T_j = 25^\circ\text{C}$	V_F	12.0		V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	1.0		μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	20		μA
Reverse recovery time max. 50mA I_F to 100mA I_R . Recover to 25mA I_{RR}	t_{rr}	300		nS
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	3.0		pF
Thermal resistance - junction to oil Stirred oil	$R_{\theta\text{JO}}$	20		$^\circ\text{C/W}$
Unstirred oil	$R_{\theta\text{JO}}$	28		$^\circ\text{C/W}$
Thermal resistance - junction to amb. on 0.06" thick pcb. 1oz copper.	$R_{\theta\text{JA}}$	91		$^\circ\text{C/W}$

Q37

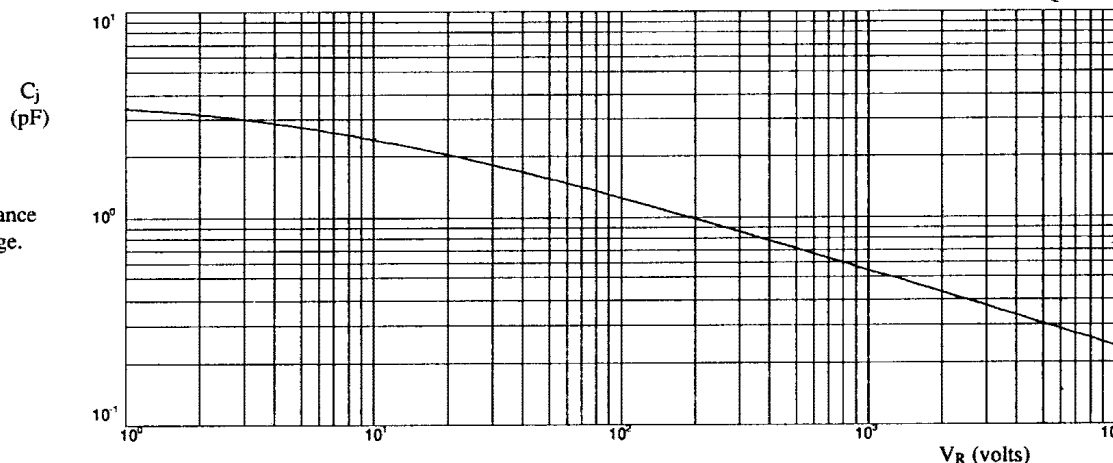


Fig 1 Junction capacitance
against reverse voltage.



2

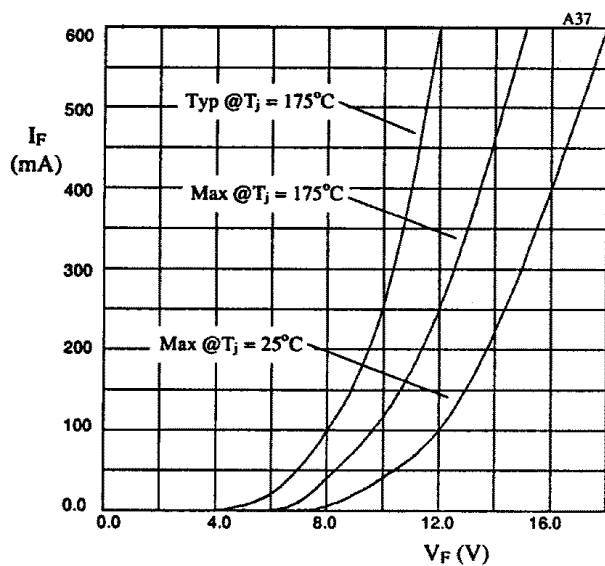


Fig 2. Forward voltage drop as a function of forward current.

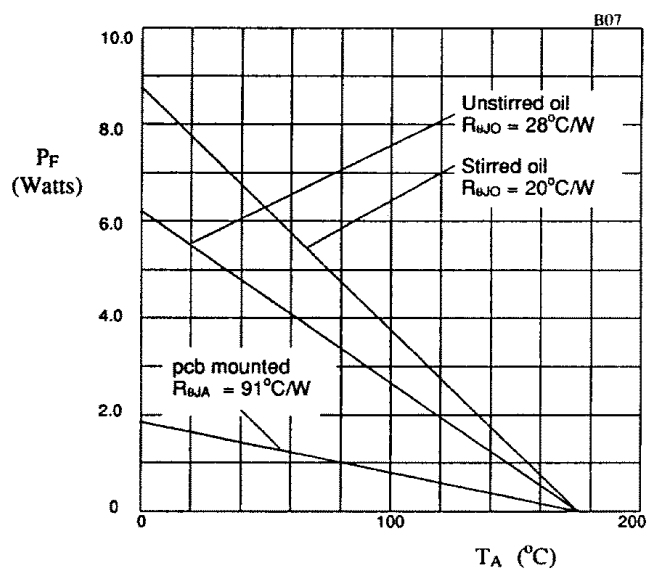


Fig 3. Power derating in air and oil.

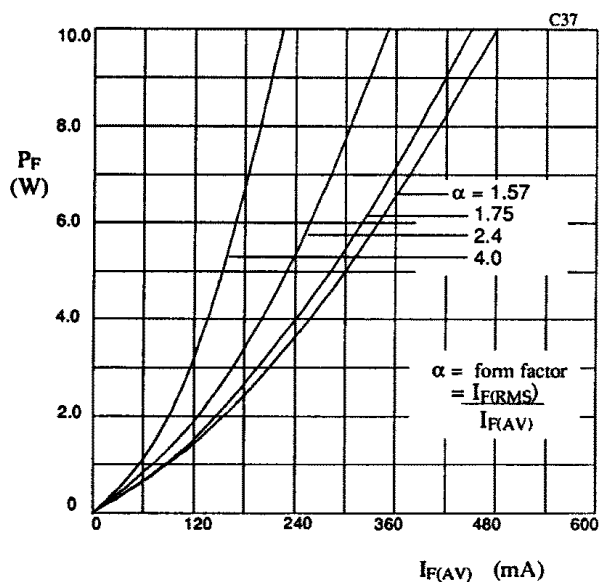


Fig 4. Forward power dissipation as a function of forward current, for sinusoidal operation.

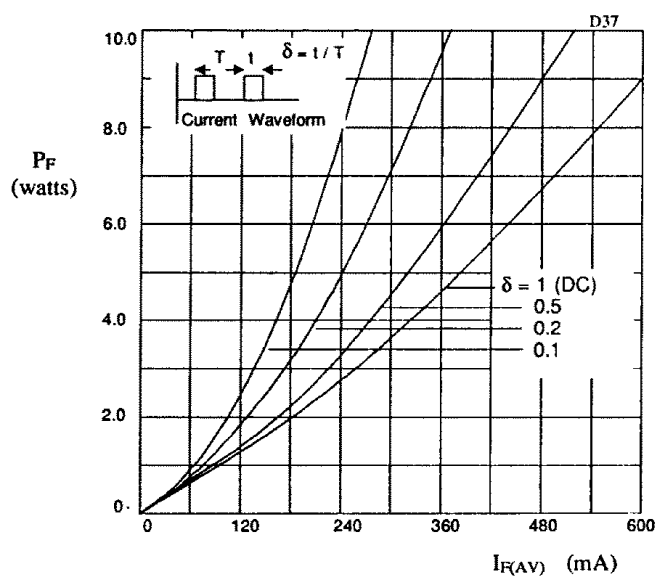


Fig 5. Forward power dissipation as a function of forward current, for square wave operation.

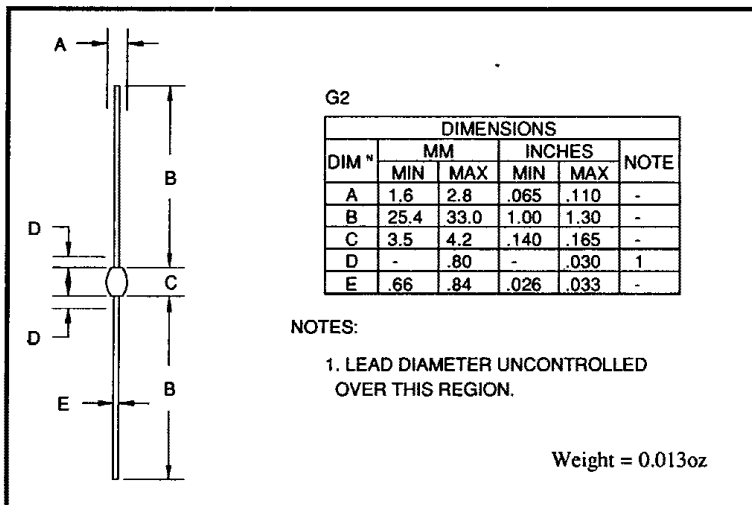
**AXIAL LEADED HERMETICALLY SEALED
SUPERFAST RECTIFIER DIODE**
**QUICK
REFERENCE DATA**

- Very low reverse recovery time
- Hermetically sealed with Metoxilite fused metal oxide
- Low thermal impedance
- Low switching losses
- Soft, non-snap off, recovery characteristics

- $V_R = 200 - 400V$
- $I_F = 2.1A$
- $t_{rr} = 50ns$
- $I_R = 10\mu A$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	USC1104	USC1105	USC1106	Unit
Working reverse voltage	V_{RWM}	200	300	400	V
Repetitive reverse voltage	V_{RRM}	200	300	400	V
Average forward current (@ 55°C, lead length = 0.375")	$I_{F(AV)}$	← 2.1 →			A
Repetitive surge current (@ 55°C in free air, lead length 0.375")	I_{FRM}	← 9.0 →			A
Non-repetitive surge current ($t_p = 8.3ms$, @ V_R & T_{jmax})	I_{FSM}	← 20 →			A
Storage temperature range	T_{STG}	← -55 to +150 →			°C
Operating temperature range	T_{OP}	← -55 to +150 →			°C

MECHANICAL


2
ELECTRICAL CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	USC1104	USC1105	USC1106	Unit
Average forward current max. (pcb mounted; $T_A = 55^\circ\text{C}$) for sine wave	$I_{F(AV)}$	← 1.0 →			A
for square wave ($d = 0.5$)	$I_{F(AV)}$	← 1.1 →			A
Average forward current max. ($T_L = 55^\circ\text{C}$; $L = 3/8"$) for sine wave	$I_{F(AV)}$	← 2.0 →			A
for square wave	$I_{F(AV)}$	← 2.1 →			A
I^2t for fusing ($t = 8.3\text{ms}$) max.	I^2t	← 1.7 →			A ² S
Forward voltage drop max. @ $I_F = 1.0\text{A}$, $T_j = 25^\circ\text{C}$	V_F	← 1.25 →			V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	← 10 →			μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	← 200 →			μA
Reverse recovery time max. 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR} .	t_{rr}	← 50 →			nS
Junction capacitance typ. @ $V_R = 5\text{V}$, $f = 1\text{MHz}$	C_j	← 25 →			pF

THERMAL CHARACTERISTICS

	Symbol	USC1104	USC1105	USC1106	Unit
Thermal resistance - junction to lead Lead length = 0.0"	$R_{\theta JL}$	← 7 →			°C/W
Lead length = 0.375"	$R_{\theta JL}$	← 38 →			°C/W
Thermal resistance - junction to amb. on 0.06" thick pcb. 1 oz. copper.	$R_{\theta JA}$	← 95 →			°C/W

AXIAL LEADED HERMETICALLY SEALED SUPERFAST RECTIFIER DIODE

QUICK REFERENCE DATA

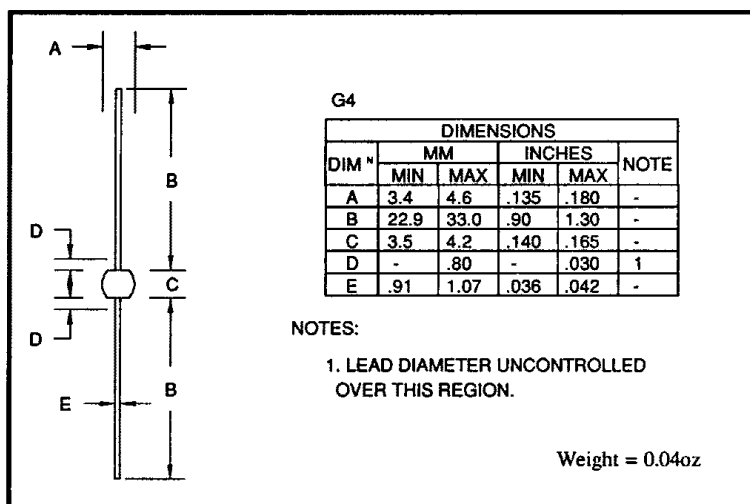
- Very low reverse recovery time
- Hermetically sealed with Metoxillite fused metal oxide
- Low thermal impedance
- Low switching losses
- Soft, non-snap off, recovery characteristics

- $V_R = 200 - 400V$
- $I_F = 5.0A$
- $t_{rr} = 50ns$
- $I_R = 20\mu A$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	USC1304	USC1305	USC1306	Unit
Working reverse voltage	V_{RWM}	200	300	400	V
Repetitive reverse voltage	V_{RRM}	200	300	400	V
Average forward current (@ 55°C, lead length = 0.375")	$I_{F(AV)}$	← 5.0 →			A
Repetitive surge current (@ 55°C in free air, lead length 0.375")	I_{FRM}	← 16 →			A
Non-repetitive surge current ($t_p = 8.3ms$, @ V_R & T_{jmax})	I_{FSM}	← 70 →			A
Storage temperature range	T_{STG}	← -55 to +150 →			°C
Operating temperature range	T_{OP}	← -55 to +150 →			°C

MECHANICAL



2

ELECTRICAL CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	USC1304	USC1305	USC1306	Unit
Average forward current max. (pcb mounted; $T_A = 55^\circ\text{C}$) for sine wave	$I_{F(AV)}$	← 2.9 →			A
for square wave ($d = 0.5$)	$I_{F(AV)}$	← 3.0 →			A
Average forward current max. ($T_L = 55^\circ\text{C}$; $L = 3/8"$) for sine wave	$I_{F(AV)}$	← 4.9 →			A
for square wave	$I_{F(AV)}$	← 5.0 →			A
I^2t for fusing ($t = 8.3\text{mS}$) max.	I^2t	← 20 →			A^2S
Forward voltage drop max. @ $I_F = 3.0\text{A}$, $T_j = 25^\circ\text{C}$	V_F	← 1.25 →			V
Reverse current max. @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	← 20 →			μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	← 500 →			μA
Reverse recovery time max. 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR} .	t_{rr}	← 50 →			nS
Junction capacitance typ. @ $V_R = 10\text{V}$, $f = 1\text{MHz}$	C_j	← 90 →			pF

THERMAL CHARACTERISTICS

	Symbol	USC1304	USC1305	USC1306	Unit
Thermal resistance - junction to lead Lead length = 0.375"	$R_{\theta JL}$	← 20 →			$^\circ\text{C/W}$
Lead length = 0.0"	$R_{\theta JL}$	← 5 →			$^\circ\text{C/W}$
Thermal resistance - junction to amb. on 0.06" thick pcb. 1 oz. copper.	$R_{\theta JA}$	← 75 →			$^\circ\text{C/W}$

Chapter 3

Half Wave, High Current Assemblies

<u>Datasheet No.</u>	<u>Title:</u>
ISOPAC_xxx	High Current Isolated Rectifier Assembly
SCSF_X	Fast Recovery High Current Rectifier Assembly
SCSFFX	Superfast Recovery High Current Rectifier Assembly
SCSMX	Standard Recovery High Current Rectifier Assembly
SET01	Ministud High Current Isolated Rectifier Assembly
SET04	D04 Stud High Current Isolated Rectifier Assembly
SET05	D05 Stud High Current Isolated Rectifier Assembly
SET100	D05 Stud High Current Isolated Rectifier Assembly



HIGH CURRENT, HIGH DENSITY, ISOLATED, SILICON POWER RECTIFIERS

QUICK REFERENCE DATA

- Low thermal impedance
- Small size and low weight
- High current applications
- Isolated for direct heatsink mounting
- High surge ratings

- $V_R = 150V - 1000V$
- $I_F = 15A$
- $t_{rr} = 10nS - 2\mu S$
- $I_{FSM} \geq 150A$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage (V_{RWM})	Average Rectified Current ($I_{F(AV)}$) @ T_{mb}			1 Cycle Surge I_{FSM} $t_p = 8.3mS$		Repetitive Surge (I_{FRM})	Operating & Storage Temperature Range	
		@ 55°C	100°C	125°C	@ 25 °C	@ 100°C	@ 25 °C	(T_{OP})	(T_{STG})
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	°C	
ISOPAC0103	1000	15	11	8	150	100	25	-55 to +175	
ISOPAC0119	1000	10	8	6	150	80	15	-55 to +175	
ISOPAC0112	600	15	11	8	150	100	25	-55 to +175	
ISOPAC0104	400	15	11	8	150	80	25	-55 to +175	
ISOPAC0111	150	15	10	7	175	175	24	-55 to +150	
ISOPAC0203	1000	15	11	8	150	100	25	-55 to +175	
ISOPAC0219	1000	10	8	6	150	80	15	-55 to +175	
ISOPAC0212	600	15	11	8	150	100	25	-55 to +175	
ISOPAC0204	400	15	11	8	150	80	25	-55 to +175	
ISOPAC0211	150	15	10	7	175	175	24	-55 to +150	
ISOPAC0403	1000	15	11	8	150	100	25	-55 to +175	
ISOPAC0419	1000	10	8	6	150	80	15	-55 to +175	
ISOPAC0412	600	15	11	8	150	100	25	-55 to +175	
ISOPAC0404	400	15	11	8	150	80	25	-55 to +175	
ISOPAC0411	150	15	10	7	175	175	24	-55 to +150	
ISOPAC0603	1000	15	11	8	150	100	25	-55 to +175	
ISOPAC0619	1000	10	8	6	150	80	15	-55 to +175	
ISOPAC0612	600	15	11	8	150	100	25	-55 to +175	
ISOPAC0604	400	15	11	8	150	80	25	-55 to +175	
ISOPAC0611	150	15	10	7	175	175	24	-55 to +150	
ISOPAC1203	1000	15	11	8	150	100	25	-55 to +175	
ISOPAC1219	1000	10	8	6	150	80	15	-55 to +175	
ISOPAC1212	600	15	11	8	150	100	25	-55 to +175	
ISOPAC1204	400	15	11	8	150	80	25	-55 to +175	
ISOPAC1211	150	15	10	7	175	175	24	-55 to +150	

**ELECTRICAL CHARACTERISTICS** (apply per junction)

Device Type	Maximum Leakage Current @ V _{RWM}		Maximum Forward Voltage @ 9.0 A	Maximum Reverse Recovery Time
	T _j = 25 °C	T _j = 100 °C		
	μA	μA	Volts	nS
ISOPAC0103	1.0	20	1.2	2000
ISOPAC0119	1.0	25	2.2	150
ISOPAC0112	1.0	20	1.2	2000
ISOPAC0104	1.0	20	1.5	150
ISOPAC0111	10.0	500	1.1	30
ISOPAC0203	1.0	20	1.2	2000
ISOPAC0219	1.0	25	2.2	150
ISOPAC0212	1.0	20	1.2	2000
ISOPAC0204	1.0	20	1.5	150
ISOPAC0211	10.0	500	1.1	30
ISOPAC0403	1.0	20	1.2	2000
ISOPAC0419	1.0	25	2.2	150
ISOPAC0412	1.0	20	1.2	2000
ISOPAC0404	1.0	20	1.5	150
ISOPAC0411	10.0	500	1.1	30
ISOPAC0603	1.0	20	1.2	2000
ISOPAC0619	1.0	25	2.2	150
ISOPAC0612	1.0	20	1.2	2000
ISOPAC0604	1.0	20	1.5	150
ISOPAC0611	10.0	500	1.1	30
ISOPAC1203	1.0	20	1.2	2000
ISOPAC1219	1.0	25	2.2	150
ISOPAC1212	1.0	20	1.2	2000
ISOPAC1204	1.0	20	1.5	150
ISOPAC1211	10.0	500	1.1	30

R_{θJMB} = 3°C/W per junction.

Non-isolated forms are available, consult factory for details.

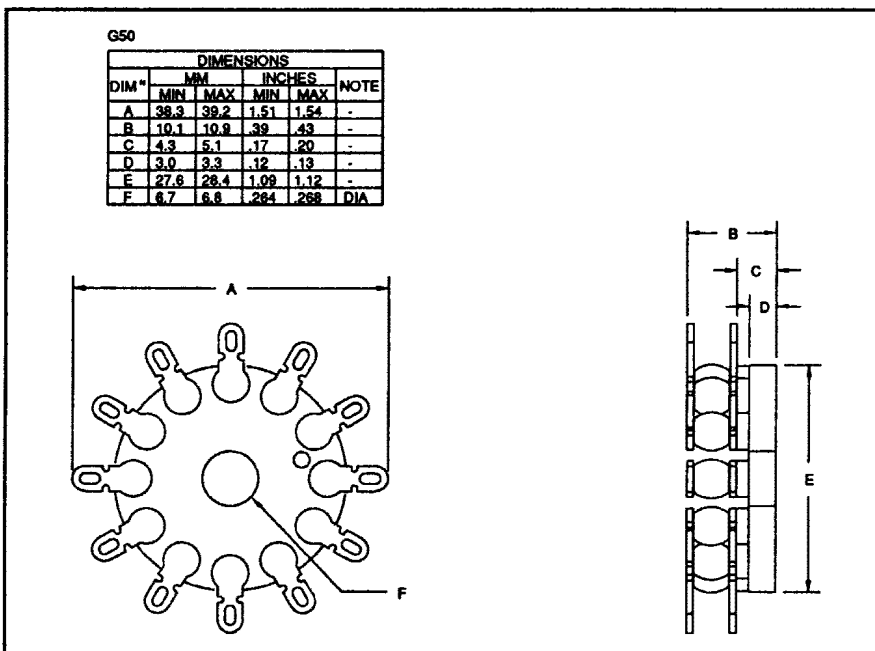
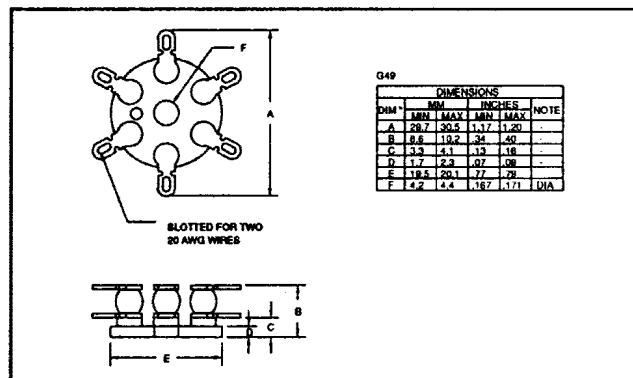
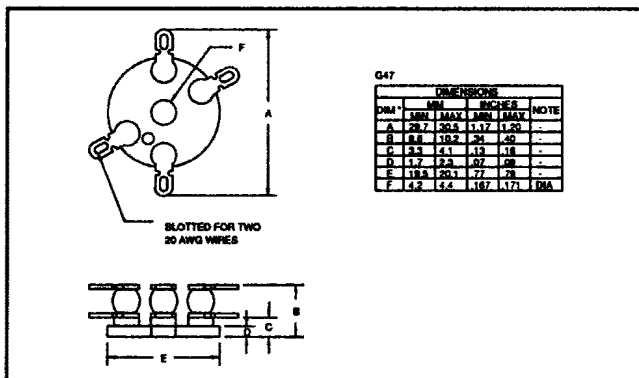
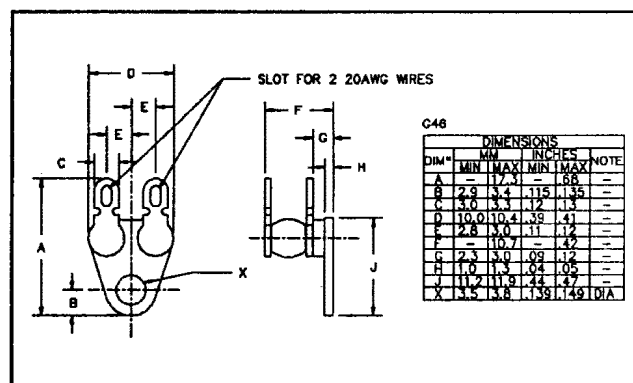
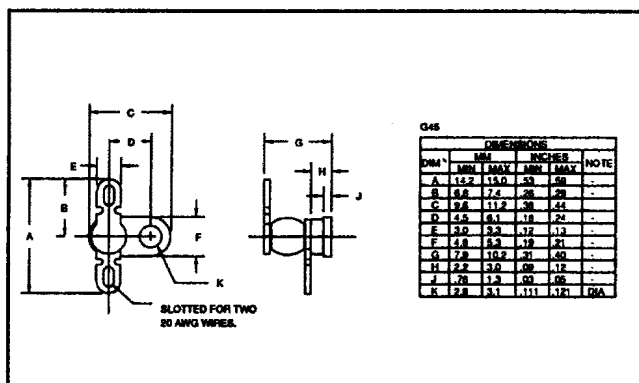


SEMTECH

HIGH CURRENT ISOLATED RECTIFIER ASSEMBLY ISOPAC®

ISOPAC01**
ISOPAC02**
ISOPAC04**
ISOPAC06**
ISOPAC12**

3



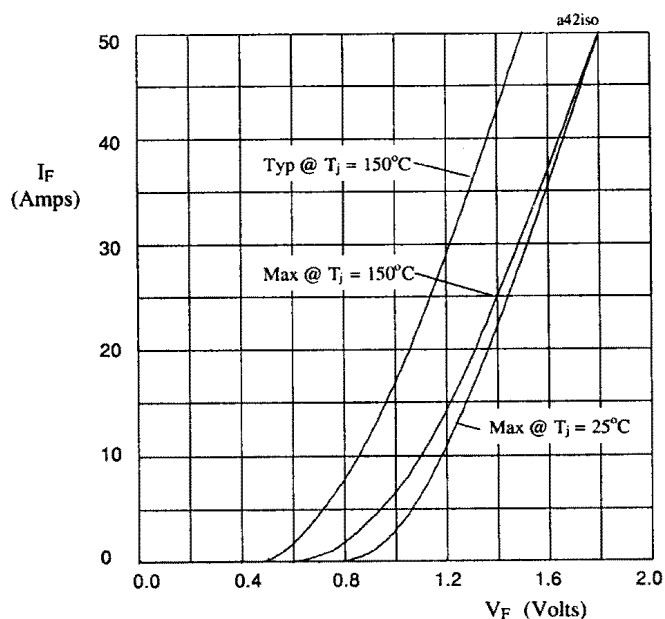


Figure 1. Forward voltage drop as a function of forward current for ISOPAC**03 & ISOPAC**12.

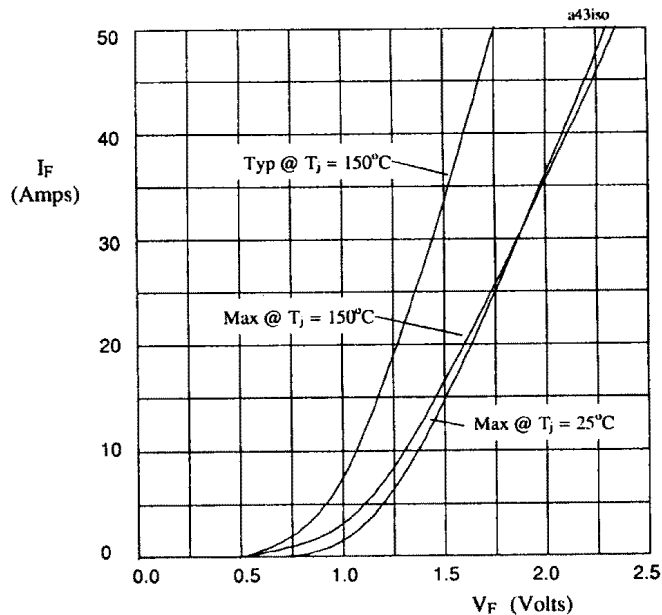


Figure 2. Forward voltage drop as a function of forward current for ISOPAC**04.

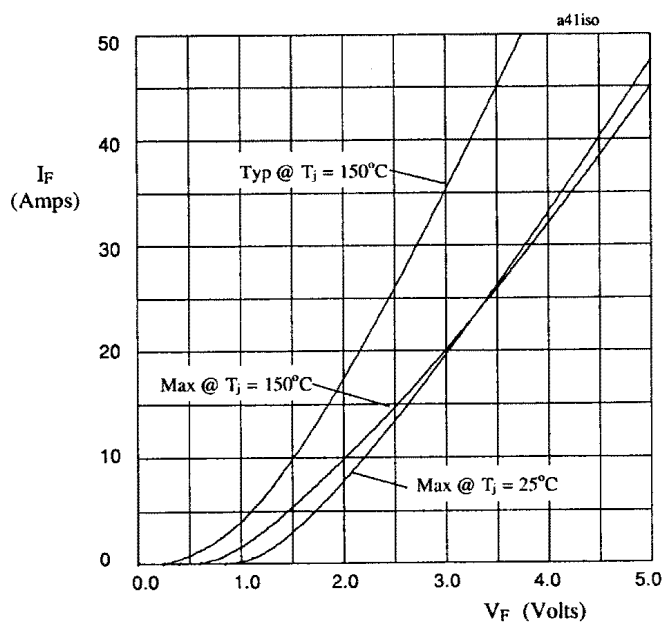


Figure 3. Forward voltage drop as a function of forward current for ISOPAC**19.

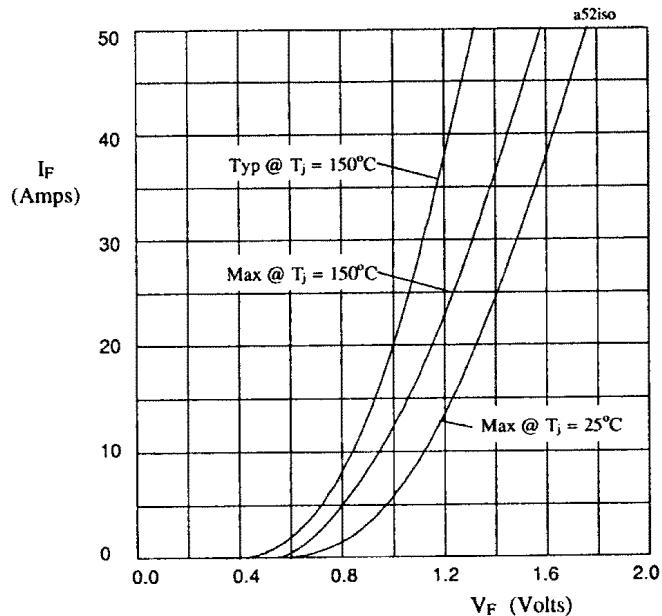


Figure 4. Forward voltage drop as a function of forward current for ISOPAC**11.

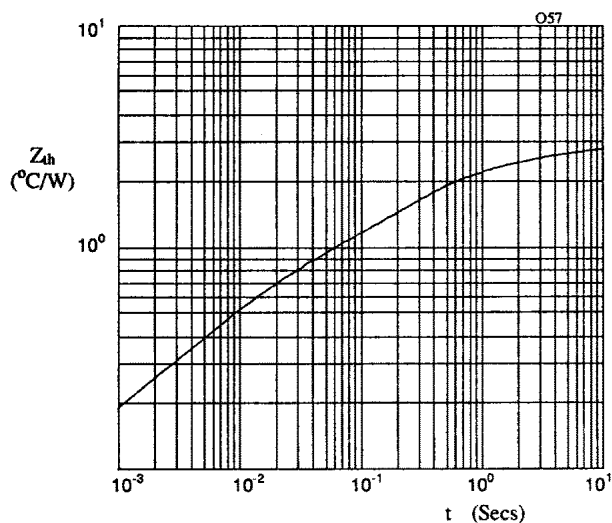


Figure 5. Typical transient thermal impedance characteristic.

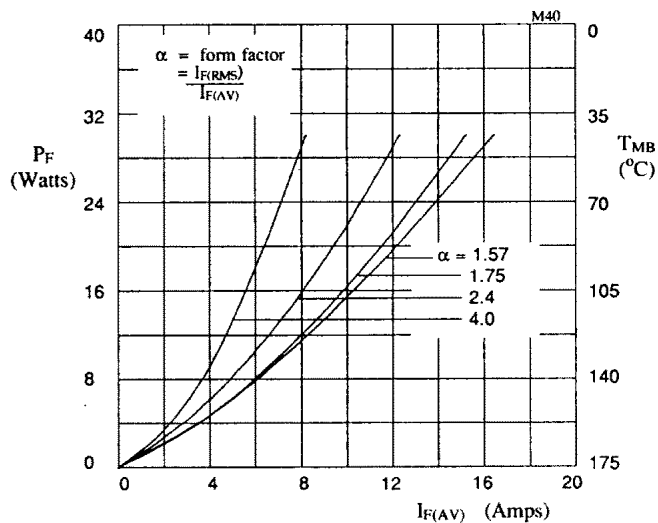


Figure 6. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for sinusoidal operation, for ISOPAC**03 and ISOPAC**12.

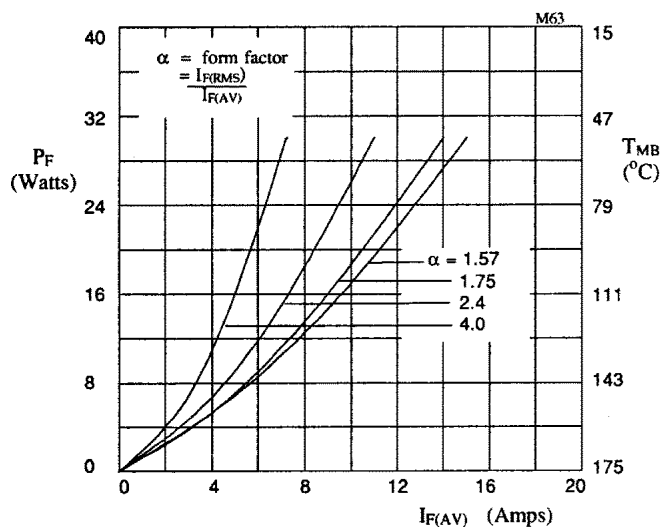


Figure 7. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for sinusoidal operation, for ISOPAC**04.

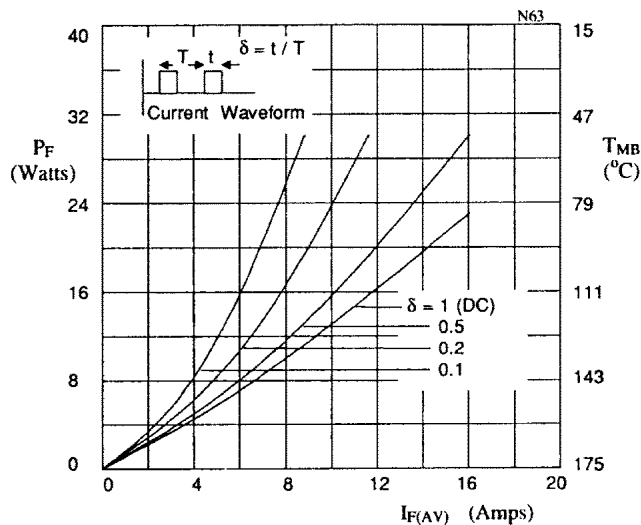


Figure 8. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for square wave operation, for ISOPAC**04.

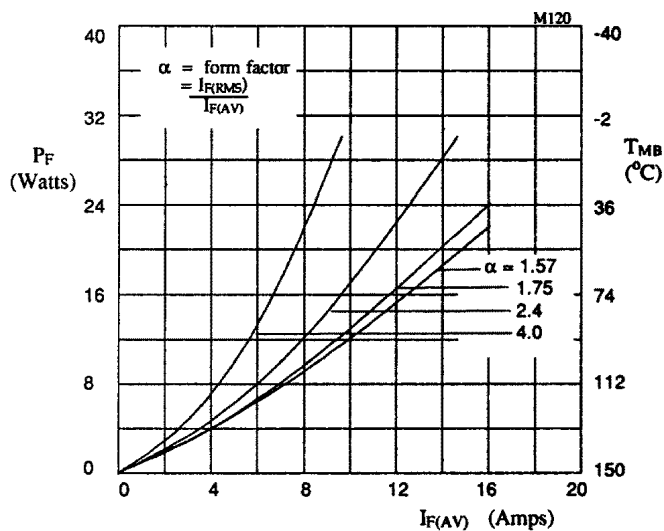


Figure 9. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for sinusoidal operation, for ISOPAC**11.

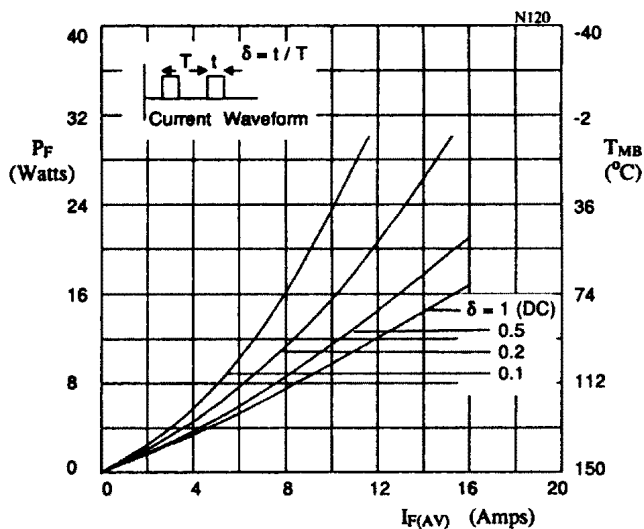


Figure 10. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for square wave operation, for ISOPAC**11.



QUICK REFERENCE DATA

- $V_R = 50V - 1000V$
- $I_F = 120A$
- $t_{rr} = 150ns$
- $I_{FSM} = 1800A$

HIGH CURRENT, HIGH DENSITY, FAST RECOVERY SILICON POWER RECTIFIER STUD

- Low thermal impedance
- Low forward voltage drop
- Low reverse recovery time
- Low reverse leakage current
- High forward and surge currents ratings

ABSOLUTE MAXIMUM RATINGS

Device Type*	Working Reverse Voltage (V _{RWM})	Average Rectified Current I _{F(AV)}					1 Cycle Surge Current I _{FSM} t _p = 8.3mS		Repetitive Surge Current I _{FRM}
		insert mounting			stud mounted	stud + insert			
		@ 25 °C	@ 55 °C	@ 100 °C	@ 55 °C	@ 55 °C	@ 25 °C	@ 100 °C	@ 25 °C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SCSF05	50	120	100	65	82.5	150	1800	1200	250
SCSF1	100	120	100	65	82.5	150	1800	1200	250
SCSF2	200	120	100	65	82.5	150	1800	1200	250
SCSF4	400	120	100	65	82.5	150	1800	1200	250
SCSF0	1000	85	70	50	60	105	1250	875	150

Normal polarity is cathode to stud

* add suffix "R" to part number for reverse polarity

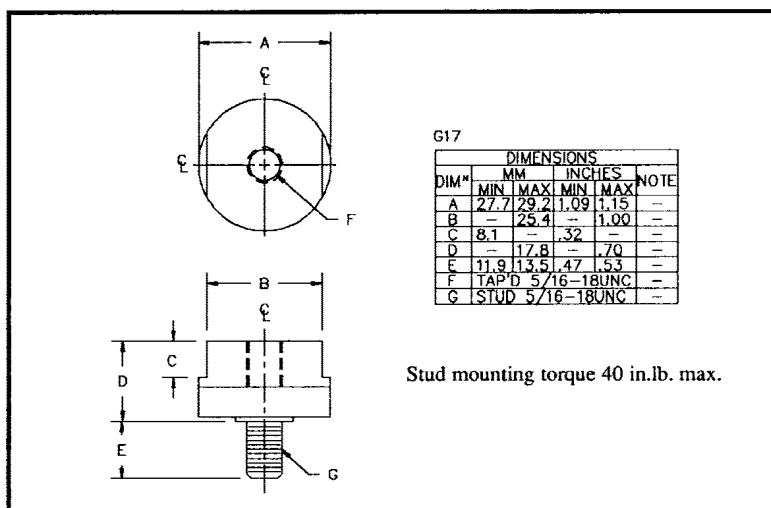
MECHANICAL

Maximum thermal impedances

Stud mounted $R_{\theta JC} < 0.67^\circ C/W$

Insert mounted $R_{\theta JC} < 0.5^\circ C/W$

Stud + insert mtd $R_{\theta JC} < 0.28^\circ C/W$



**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Forward voltage V_F @ 100A.	Reverse Recovery Time ⁽¹⁾
	@ 25 °C	@ 100 °C	Max @ 25°C	max @ 25 °C
	μA	μA	Volts	nS
SCSF05	12.0	300	1.35	150
SCSF1	12.0	300	1.35	150
SCSF2	12.0	300	1.35	150
SCSF4	12.0	300	1.35	150
SCSF0	12.0	300	2.0	150

1) Measured on discrete devices prior to assembly.

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

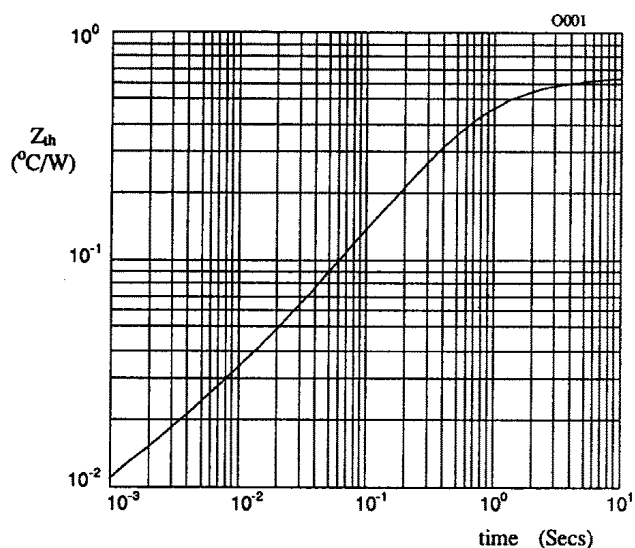


Fig 1. Transient thermal impedance characteristic when stud mounted.

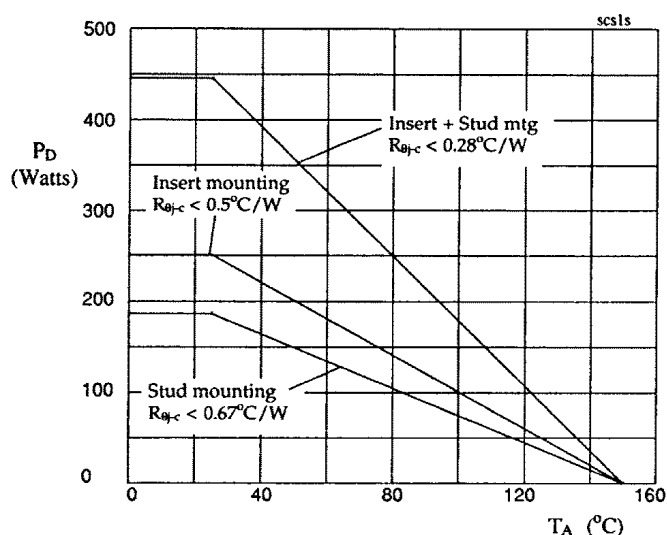


Fig 2. Power dissipation as a function of ambient temperature for different mountings.

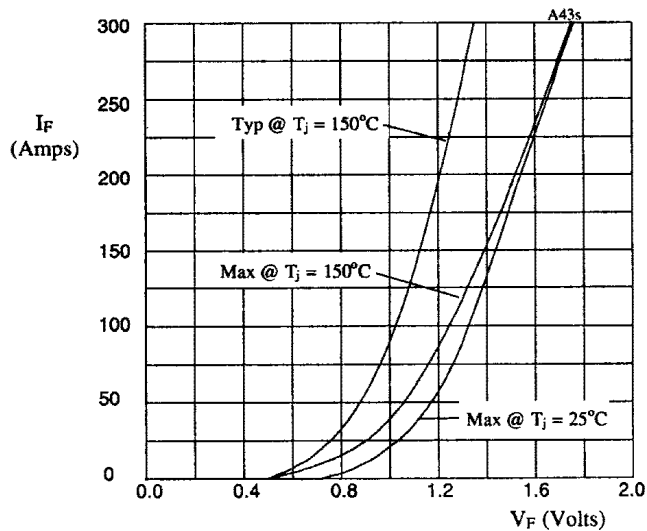


Fig 2. Forward voltage drop as a function of forward current for SCSF05 thru SCSF4.

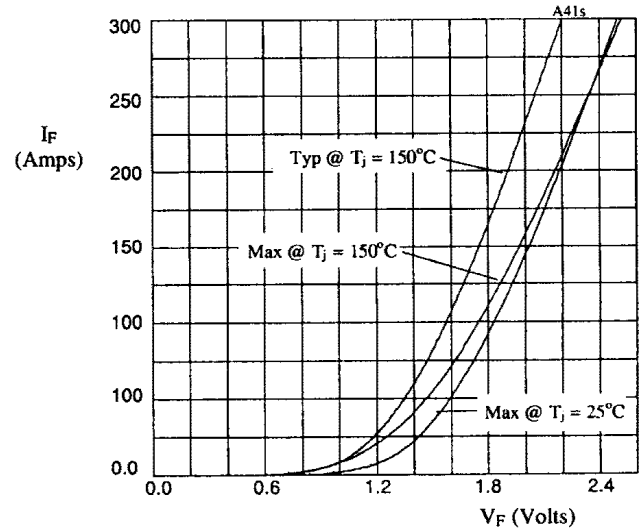


Fig 3. Forward voltage drop as a function of forward current for SCSF0.

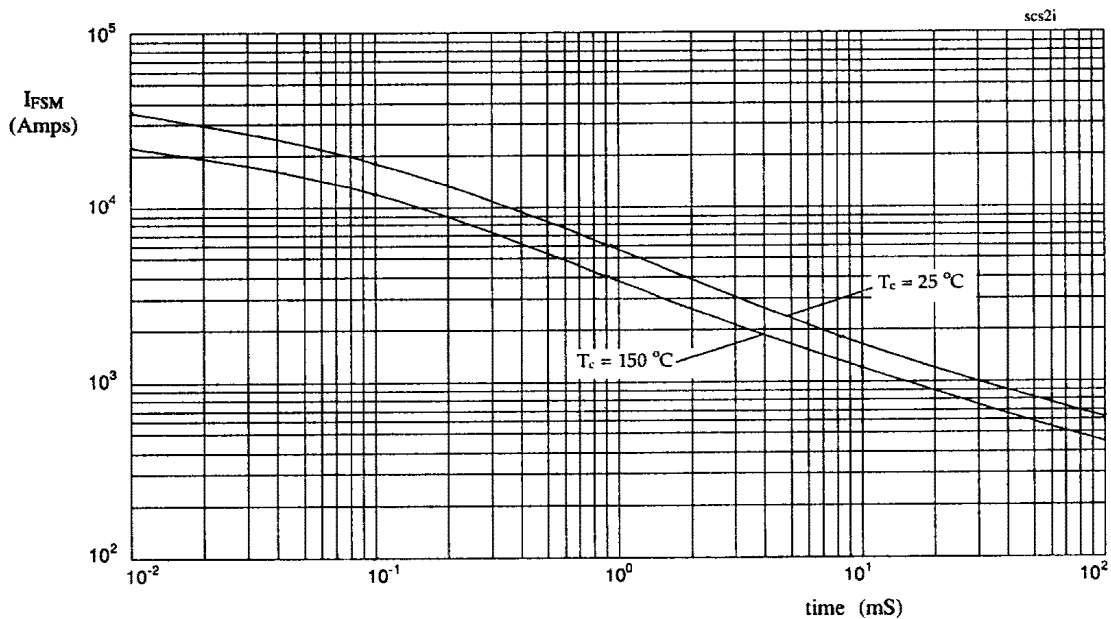


Figure 4. Maximum non-repetitive surge current against pulse width (SCSF05 thru SCSF4).



HIGH CURRENT, HIGH DENSITY, SUPERFAST RECOVERY SILICON POWER RECTIFIER STUD

- Very low reverse recovery time
- Low thermal impedance
- Low forward voltage drop
- High forward current applications
- High forward surge ratings

QUICK REFERENCE DATA

- $V_R = 50V - 150V$
- $I_F = 150A$
- $t_{rr} = 30nS$
- $I_{FSM} = 1800A$

3

ABSOLUTE MAXIMUM RATINGS & CHARACTERISTICS

Device Type *	Working Reverse Voltage (V _{RWM})	Average Rectified Current I _{F(AV)}					1 Cycle Surge Current t _p = 8.3mS I _{FSM}		Repetitive Surge Current I _{FRM}
		insert mounting			stud mounting	stud + insert mounting			
		@ 25°C	@ 55°C	@ 100°C	@ 55°C	@ 55°C	@ 25°C	@ 100°C	@ 25°C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SCSFF05	50	↑	↑	↑	↑	↑	↑	↑	↑
SCSFF10	100	150	130	85	105	190	1800	930	240
SCSFF15	150	↓	↓	↓	↓	↓	↓	↓	↓

Normal polarity is cathode to stud

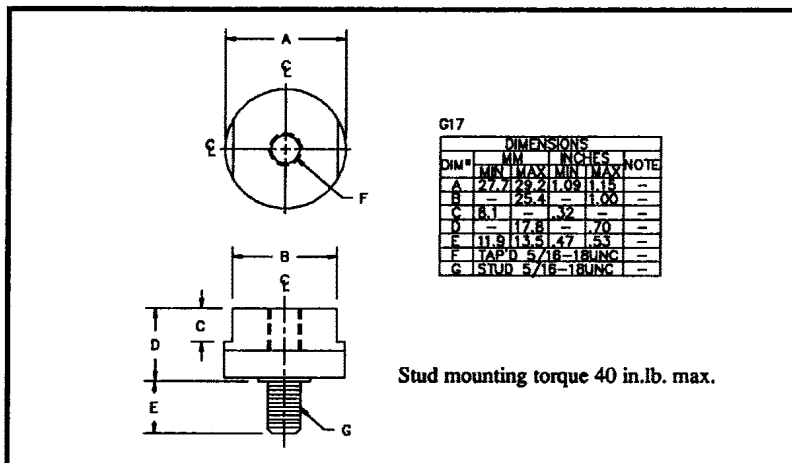
* add suffix "R" to part number for reverse polarity

Operating temperature range -55 °C to +150 °C

Storage temperature range -55 °C to +150 °C

Device Type	Reverse Leakage Current $I_R @ V_{RWM}$		Forward Voltage $V_F @ 100A$	Reverse Recovery Time ⁽¹⁾
	@ 25 °C	@ 100 °C	@ 25 °C	@ 25 °C
	μA	mA	Volts	nS
SCSFF05	↑	↑	↑	↑
SCSFF10	120	6.0	1.1	30
SCSFF15	↓	↓	↓	↓

MECHANICAL



1) Measured on discrete devices prior to assembly.

Maximum thermal impedances

Stud mounted $R_{\theta JC} < 0.67^{\circ}C/W$

Insert mounted $R_{\theta JC} < 0.5^{\circ}C/W$

Stud + insert mtd $R_{\theta JC} < 0.28^{\circ}C/W$

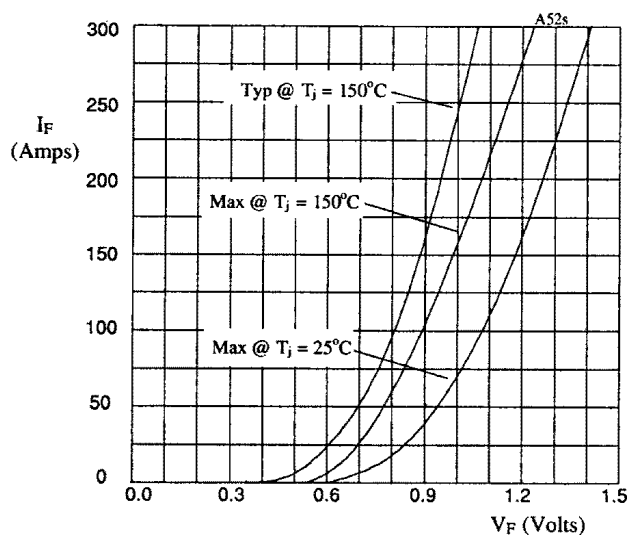


Fig 1. Forward voltage drop as a function of forward current.

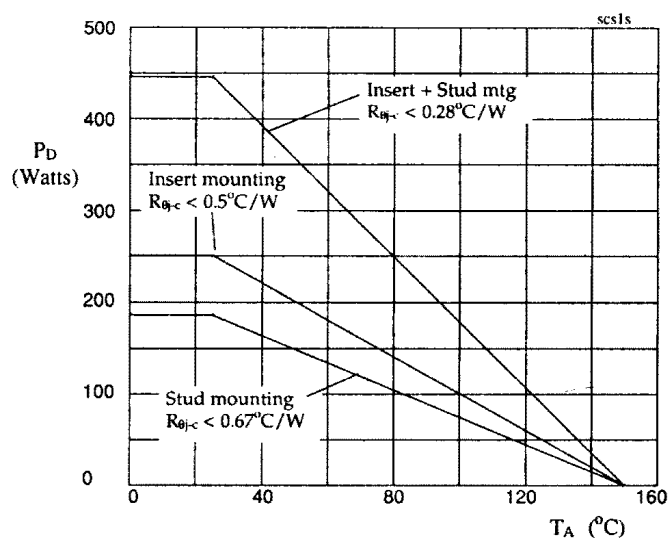


Fig 2. Power dissipation as a function of ambient temperature for different mountings.

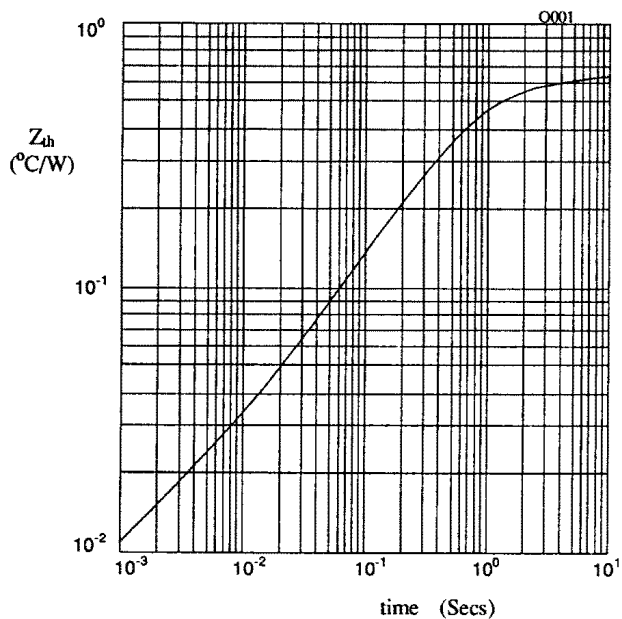


Fig 3. Transient thermal impedance characteristic when stud mounted.

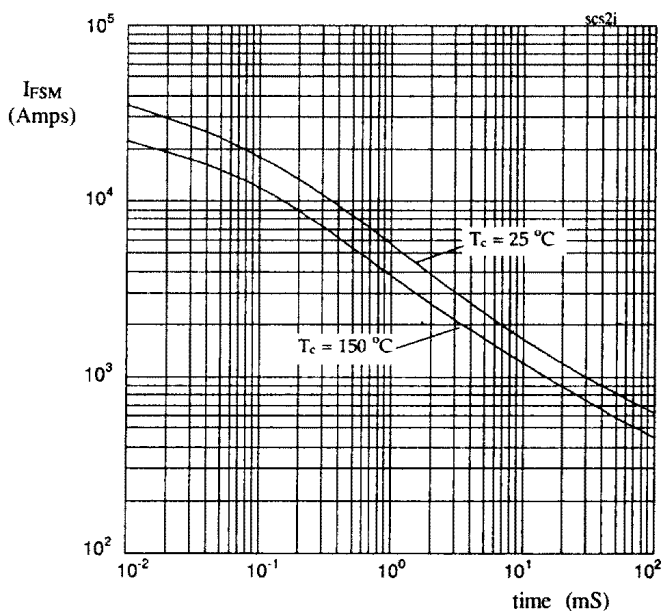


Fig 4. Maximum non-repetitive surge current against pulse width.

HIGH CURRENT, HIGH DENSITY, STANDARD RECOVERY SILICON POWER RECTIFIER STUD

- Low thermal impedance
- Low forward voltage drop
- High current applications
- Low reverse leakage current
- High surge ratings

QUICK REFERENCE DATA

- $V_R = 50V - 1000V$
- $I_F = 150A$
- $I_R = 12.0\mu A$
- $I_{FSM} = 1800A$

3

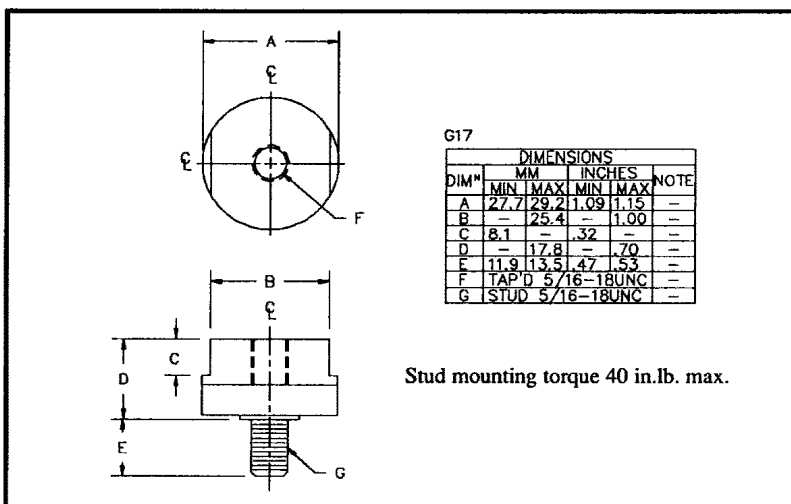
ABSOLUTE MAXIMUM RATINGS

Device Type *	Working Reverse Voltage (V _{RWM})	Average Rectified Current I _F (AV)					1 Cycle Surge Current I _{FSM} t _p = 8.3mS		Repetitive Surge Current I _{FRM}
		insert mounting			stud mounting	stud + insert mounting			
		@ 25 °C	@ 55 °C	@ 100 °C	@ 55 °C	@ 55 °C	@ 25 °C	@ 100 °C	
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SCSM05	50	↑	↑	↑	↑	↑	↑	↑	↑
SCSM1	100	↑	↑	↑	↑	↑	↑	↑	↑
SCSM2	200	↑	↑	↑	↑	↑	↑	↑	↑
SCSM4	400	150	110	70	95	175	1800	840	250
SCSM6	600	↓	↓	↓	↓	↓	↓	↓	↓
SCSM8	800	↓	↓	↓	↓	↓	↓	↓	↓
SCSM0	1000	↓	↓	↓	↓	↓	↓	↓	↓

Normal polarity is cathode to stud

* add suffix "R" to part number for reverse polarity

MECHANICAL



Maximum thermal impedances

Stud mounted $R_{\theta JC} < 0.67^\circ C/W$

Insert mounted $R_{\theta JC} < 0.5^\circ C/W$

Stud + insert mtd $R_{\theta JC} < 0.28^\circ C/W$

**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Forward Voltage V_F @ 100A.	Reverse Recovery Time ⁽¹⁾
	@ 25 °C	@ 100 °C	Max @ 25°C	max @ 25 °C
	μA	μA	Volts	μS
SCSM05	↑ 12.0 ↓	↑ 400 ↓	↑ 1.15 ↓	↑ 2.0 ↓
SCSM1				
SCSM2				
SCSM4				
SCSM6				
SCSM8				
SCSM0				

1) Measured on discrete devices prior to assembly.

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

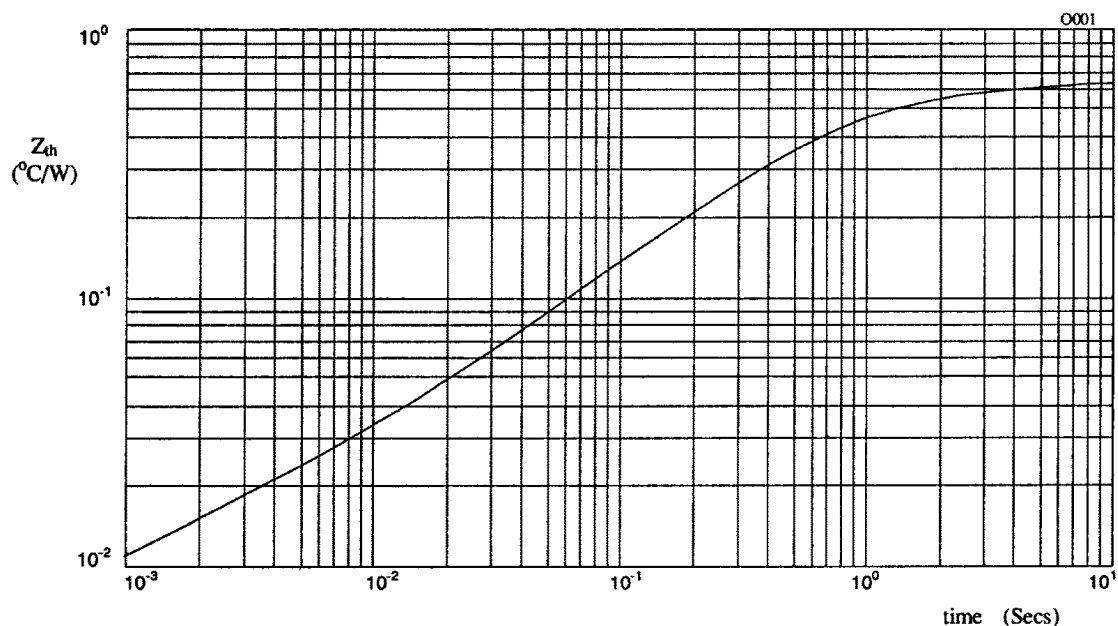


Figure 1. Transient thermal impedance characteristic when stud mounted.



SEMTECH

STANDARD RECOVERY HIGH
CURRENT RECTIFIER
ASSEMBLY

SCSM05
SCSM1 SCSM2
SCSM4 SCSM6
SCSM8 SCSM0

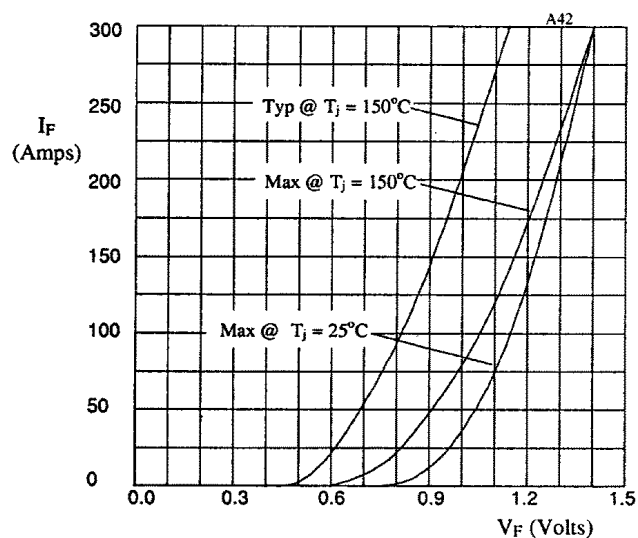


Fig 2. Forward voltage drop as a function of forward current.

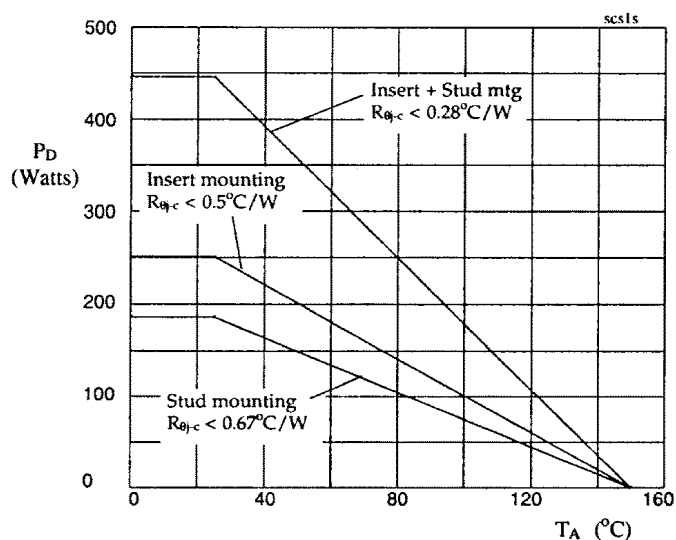


Fig 3. Power dissipation as a function of ambient temperature for different mountings.

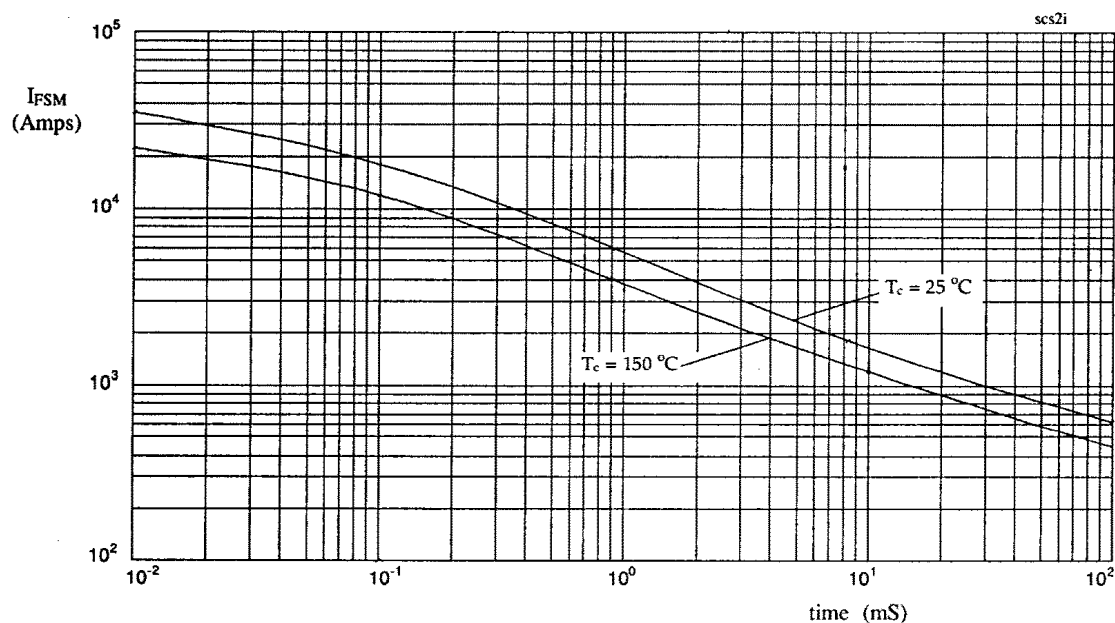


Figure 4. Maximum non-repetitive surge current against pulse width.



HIGH CURRENT, HIGH DENSITY, ISOLATED, SILICON POWER RECTIFIER STUD

- Low thermal impedance
- Small size and low weight
- High current applications
- Isolated for direct heatsink mounting
- High surge ratings

QUICK REFERENCE DATA

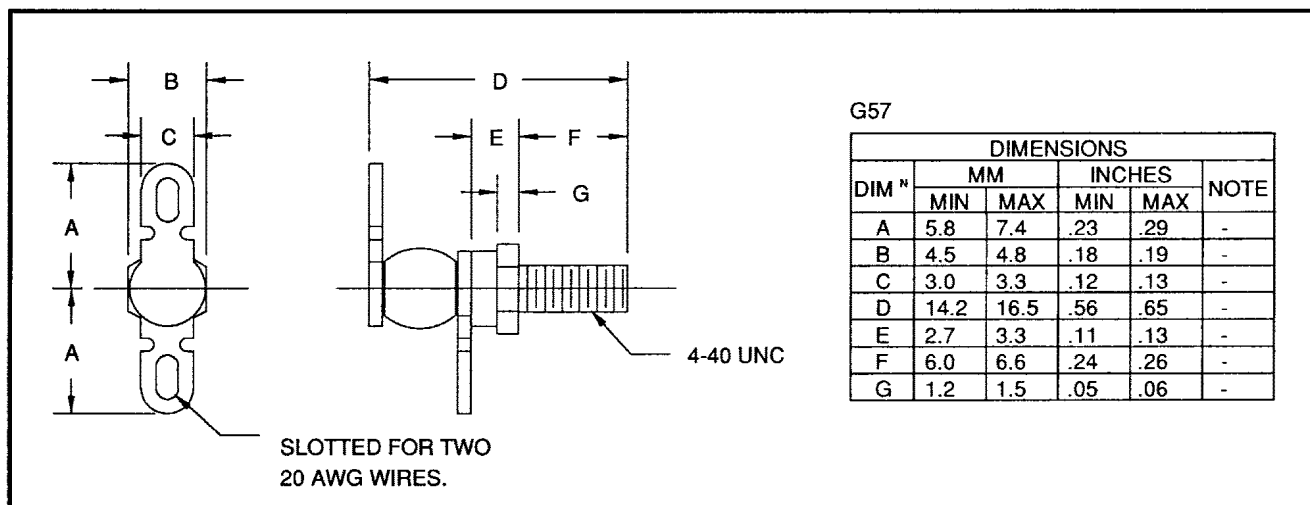
- $V_R = 150V - 1000V$
- $I_F = 15A$
- $t_{rr} = 30nS - 2\mu S$
- $I_{FSM} \geq 150A$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage (V_{RWM})	Average Rectified Current ($I_{F(AV)}$) @ T_{mb}			1 Cycle Surge I_{FSM} $t_p = 8.3mS$		Repetitive Surge (I_{FRM})	Operating & Storage Temperature Range	
		@ 55°C	100°C	125°C	@ 25 °C	@ 100°C	@ 25 °C	(T_{OP})	(T_{STG})
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	°C	
SET010203	1000	15	11	8	150	100	25	-55 to +175	
SET010219	1000	10	8	6	150	80	15	-55 to +175	
SET010212	600	15	11	8	150	100	25	-55 to +175	
SET010204	400	15	11	8	150	80	25	-55 to +175	
SET010211	150	15	10	7	175	175	24	-55 to +150	

$R_{\theta MB} = 3^{\circ}C/W$ for all varieties, other configurations available see next page for details

MECHANICAL



**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Leakage Current @ V_{RWM}		Maximum Forward Voltage @ 9.0 A	Maximum Reverse Recovery Time
	$T_j = 25^\circ\text{C}$	$T_j = 100^\circ\text{C}$		
	μA	μA	Volts	nS
SET010203	1.0	20	1.2	2000
SET010219	1.0	25	2.2	150
SET010212	1.0	20	1.2	2000
SET010204	1.0	20	1.5	150
SET010211	10.0	500	1.1	30

OTHER CONFIGURATIONS

The Part Numbers Shown in this data Sheet are Isolated with the cathode at the stud end of the device.
Part numbers for other configurations are shown below:

Isolated Cathode to Stud	Isolated Anode to Stud	Non-Isolated Cathode to Stud	Non-Isolated Anode to Stud
SET010203	SET010403	SET010103	SET010303
SET010219	SET010419	SET010119	SET010319
SET010212	SET010412	SET010112	SET010312
SET010204	SET010404	SET010104	SET010304
SET010211	SET010411	SET010111	SET010311

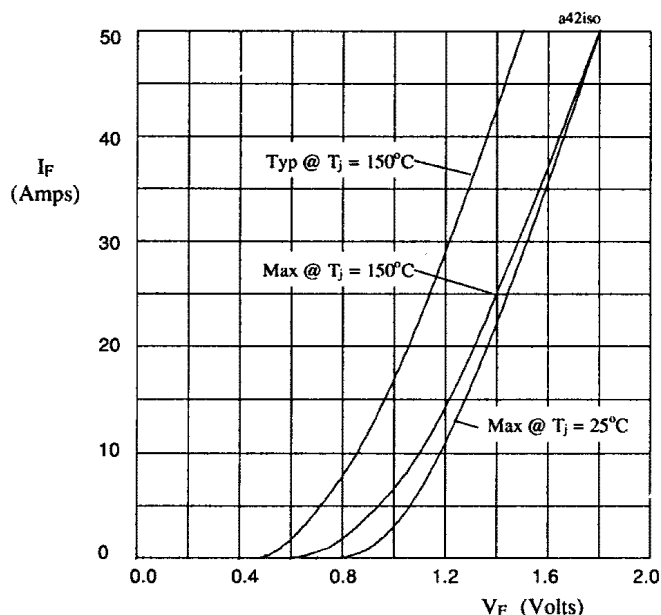


Figure 1. Forward voltage drop as a function of forward current for SET01**03 & SET01**12.

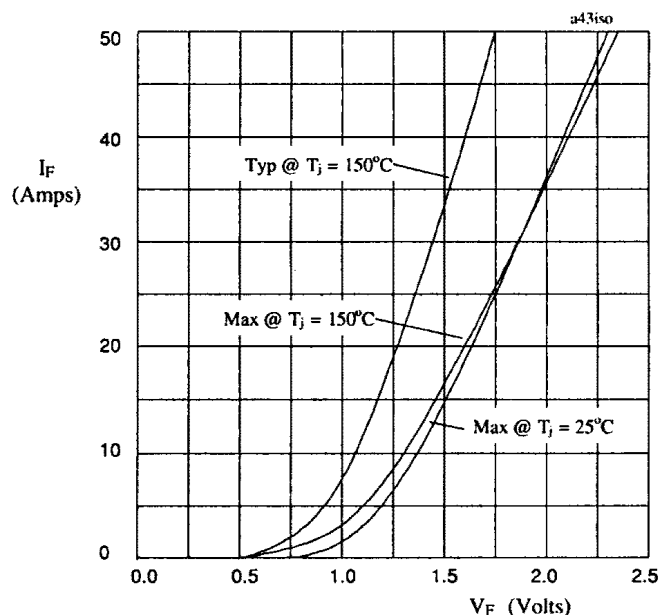


Figure 2. Forward voltage drop as a function of forward current for SET01**04.

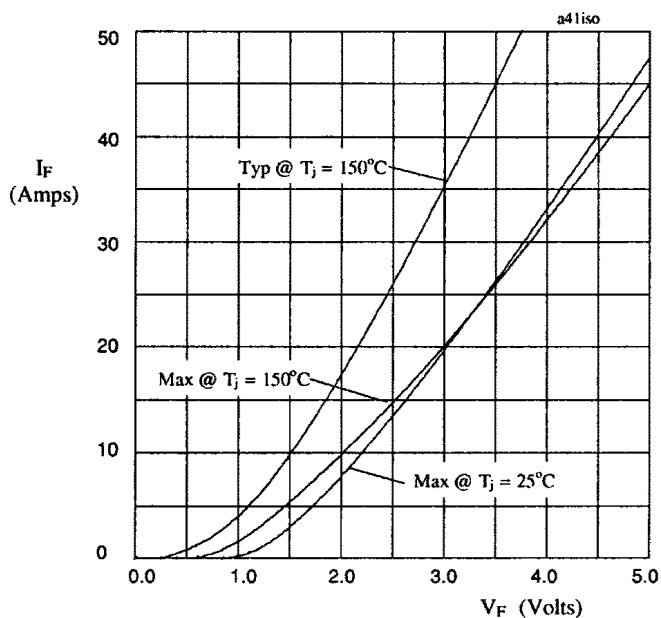


Figure 3. Forward voltage drop as a function of forward current for SET01**19.

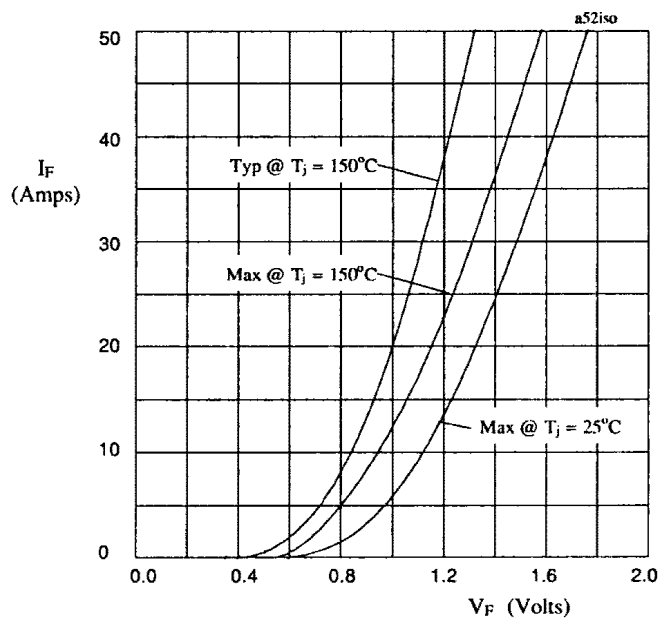


Figure 4. Forward voltage drop as a function of forward current for SET01**11.

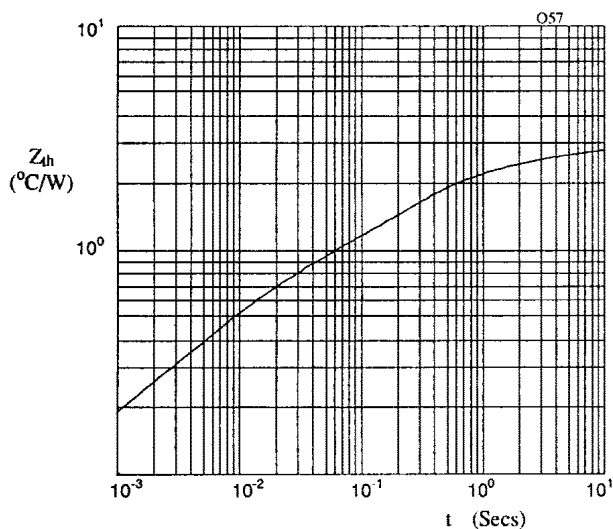


Figure 5. Typical transient thermal impedance characteristic.

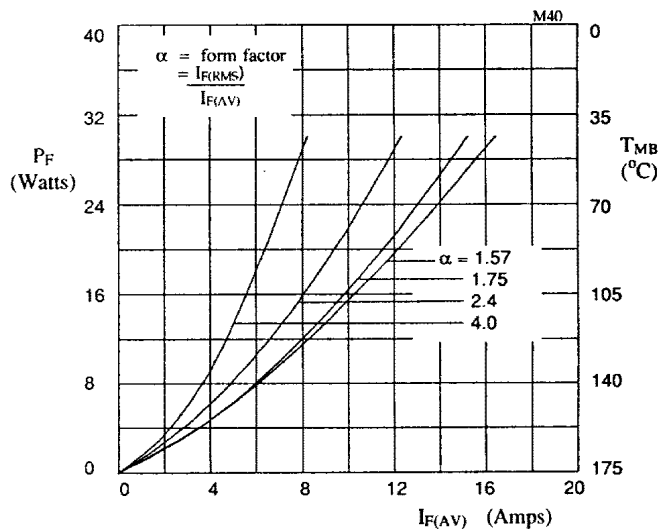


Figure 6. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for sinusoidal operation, for SET01**03 and SET01**12.

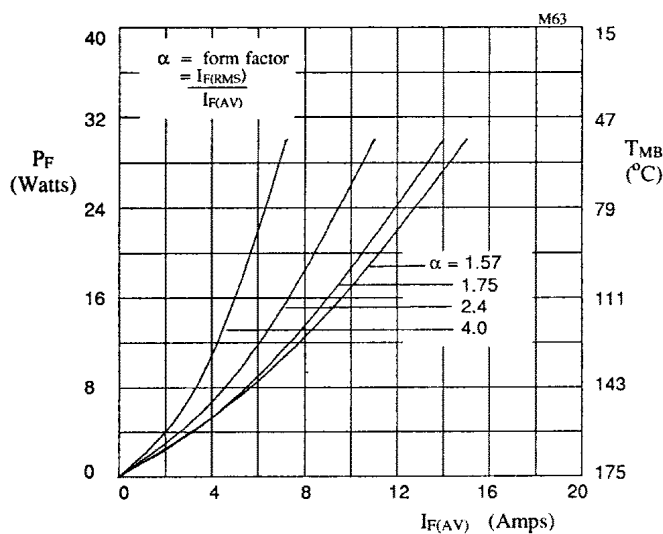


Figure 7. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for sinusoidal operation, for SET01**04.

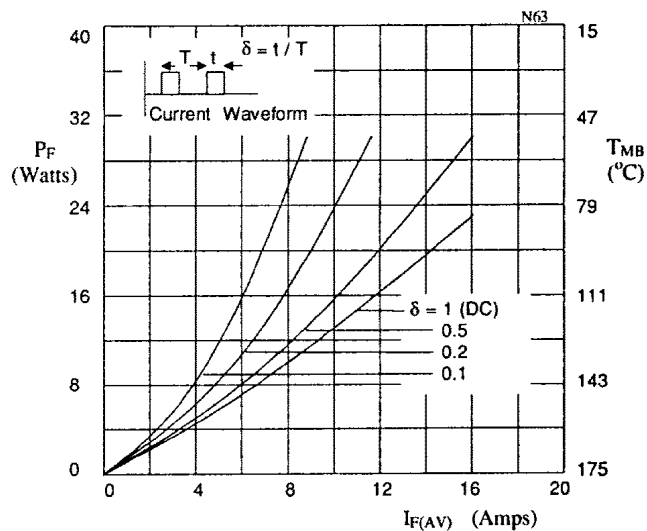


Figure 8. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for square wave operation, for SET01**04

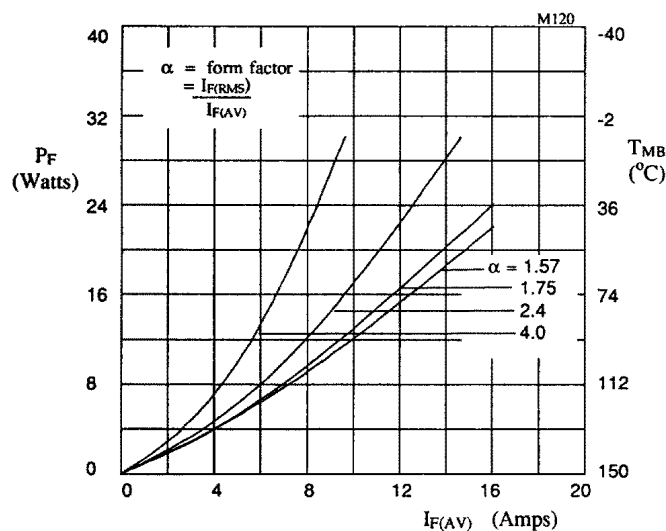


Figure 9. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for sinusoidal operation, for SET01**11.

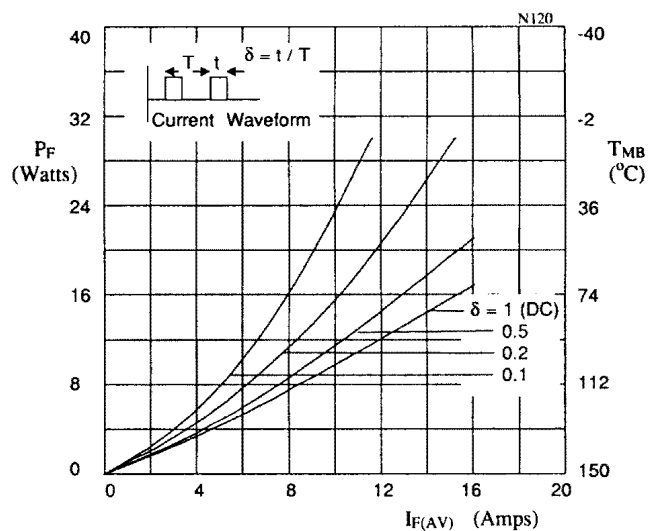


Figure 10. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for square wave operation, for SET01**11.



HIGH CURRENT, HIGH DENSITY, ISOLATED, SILICON POWER RECTIFIER DO4 STUD

- Low thermal impedance
- Small size and low weight
- High current applications
- Isolated for direct heatsink mounting
- High surge ratings

QUICK REFERENCE DATA

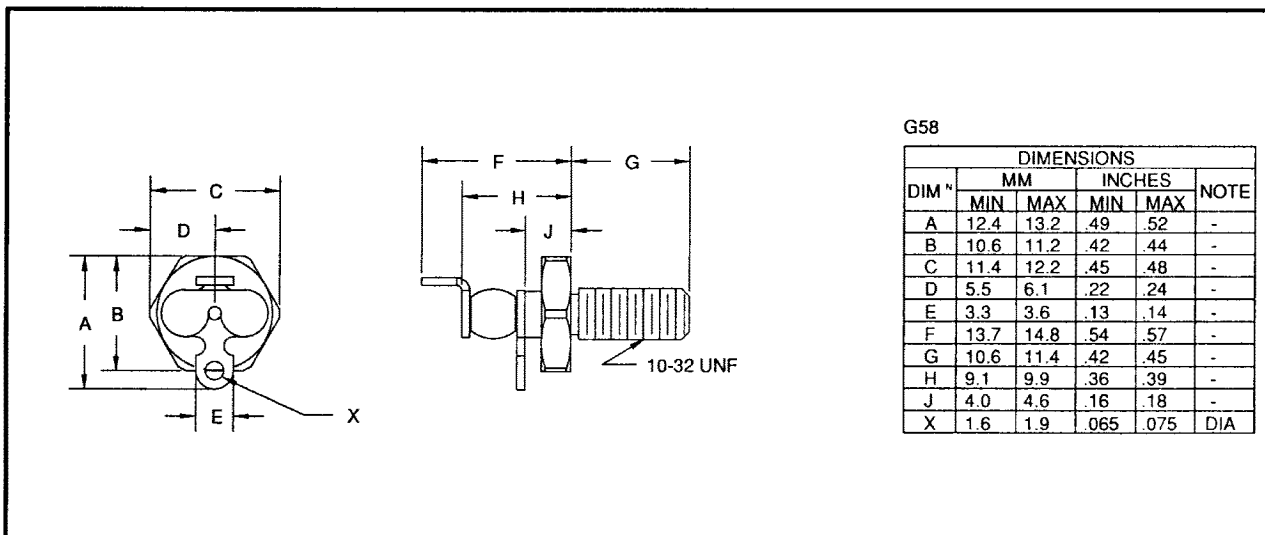
- $V_R = 150V - 1000V$
- $I_F = 30A$
- $t_{rr} = 30ns - 2\mu s$
- $I_{FSM} \geq 250A$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage (V_{RWM})	Average Rectified Current ($I_{F(AV)}$) @ T_{mb}			1 Cycle Surge I_{FSM} $t_p = 8.3ms$		Repetitive Surge (I_{FRM})	Operating & Storage Temperature Range	
		@ 55°C	100°C	125°C	@ 25 °C	@ 100°C	@ 25 °C	(T_{OP})	(T_{STC})
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	°C	
SET040203	1000	30	22	16	250	200	50	-55 to +175	
SET040219	1000	20	16	12	250	160	30	-55 to +175	
SET040212	600	30	22	16	250	200	50	-55 to +175	
SET040204	400	30	22	16	250	160	50	-55 to +175	
SET040211	150	30	20	14	290	250	48	-55 to +150	

$R_{\theta JMB} = 1.5^{\circ}C/W$ for all varieties, other configurations available see next page for details

MECHANICAL



**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Leakage Current @ V_{RWM}		Maximum Forward Voltage @ 18.0A	Maximum Reverse Recovery Time
	$T_j = 25^\circ\text{C}$	$T_j = 100^\circ\text{C}$		
	μA	μA	Volts	nS
SET040203	2.0	40	1.2	2000
SET040219	2.0	50	2.2	150
SET040212	2.0	40	1.2	2000
SET040204	2.0	40	1.5	150
SET040211	20.0	1.0mA	1.1	30

OTHER CONFIGURATIONS

The Part Numbers Shown in this data Sheet are Isolated with the cathode at the stud end of the device. Part numbers for other configurations are shown below:

Isolated Cathode to Stud	Isolated Anode to Stud	Non-Isolated Cathode to Stud	Non-Isolated Anode to Stud
SET040203	SET040403	SET040103	SET040303
SET040219	SET040419	SET040119	SET040319
SET040212	SET040412	SET040112	SET040312
SET040204	SET040404	SET040104	SET040304
SET040211	SET040411	SET040111	SET040311

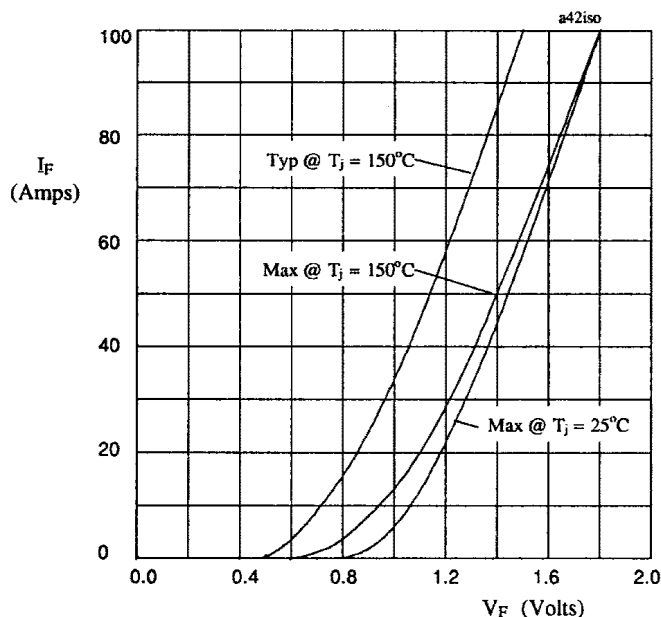


Figure 1. Forward voltage drop as a function of forward current for SET04**03 & SET04**12.

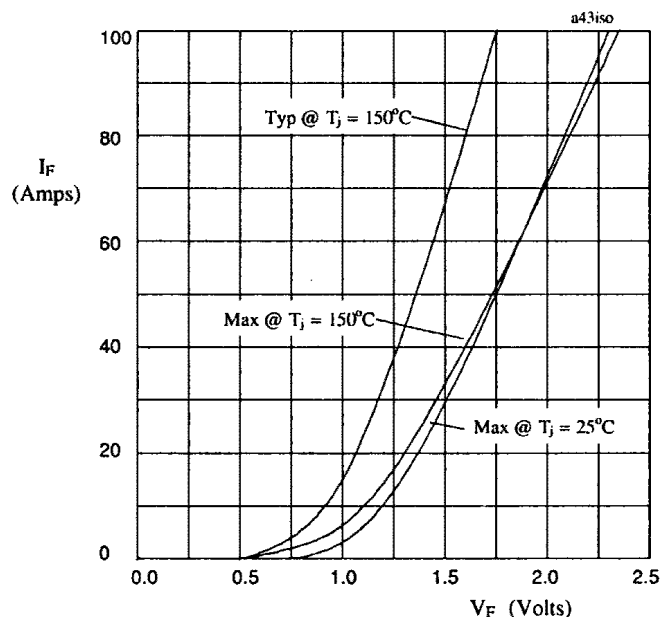


Figure 2. Forward voltage drop as a function of forward current for SET04**04.

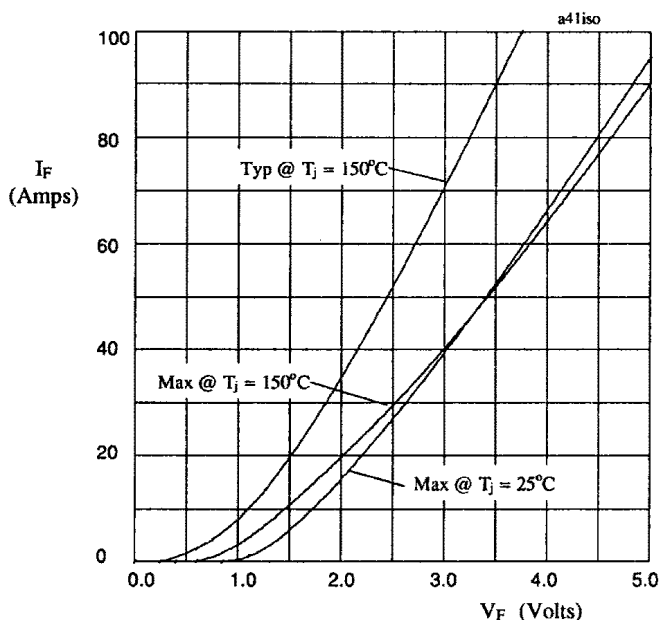


Figure 3. Forward voltage drop as a function of forward current for SET04**19.

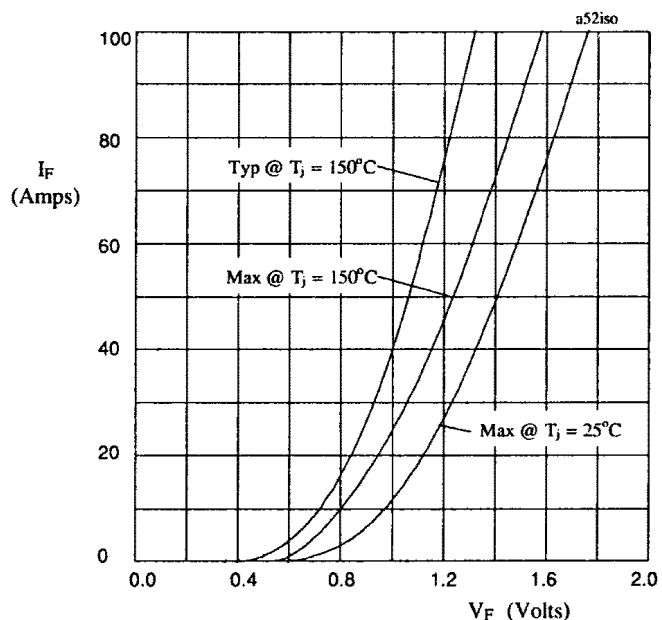


Figure 4. Forward voltage drop as a function of forward current for SET04**11.

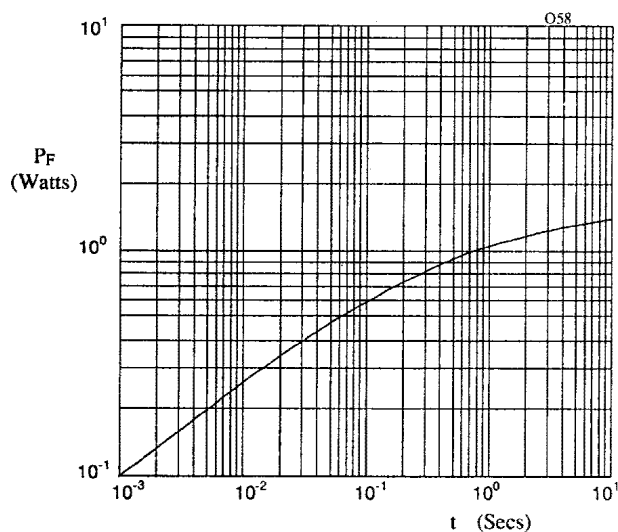


Figure 5. Typical transient thermal impedance characteristic.

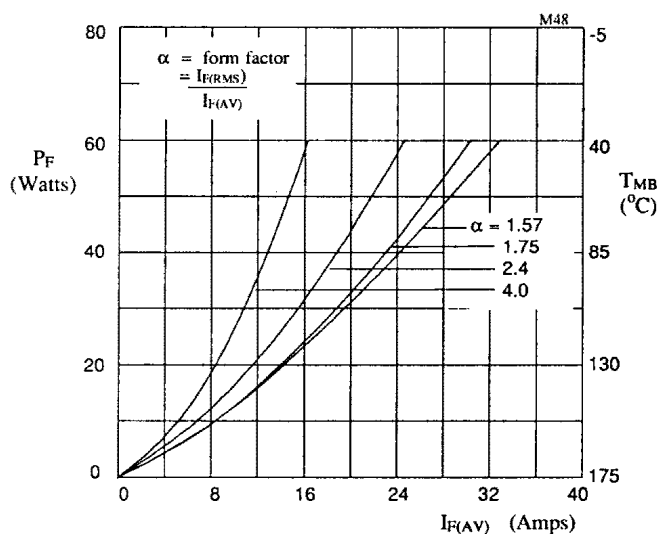


Figure 6. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for sinusoidal operation, for SET04**03 and SET04**12.

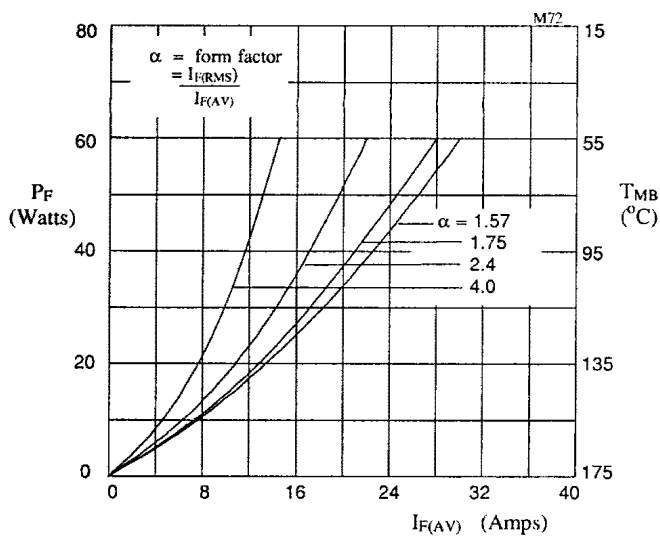


Figure 7. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for sinusoidal operation, for SET04**04.

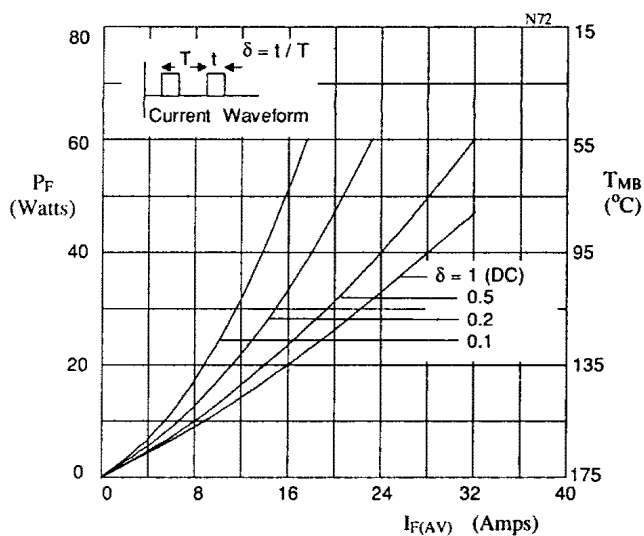


Figure 8. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for square wave operation, for SET04**04

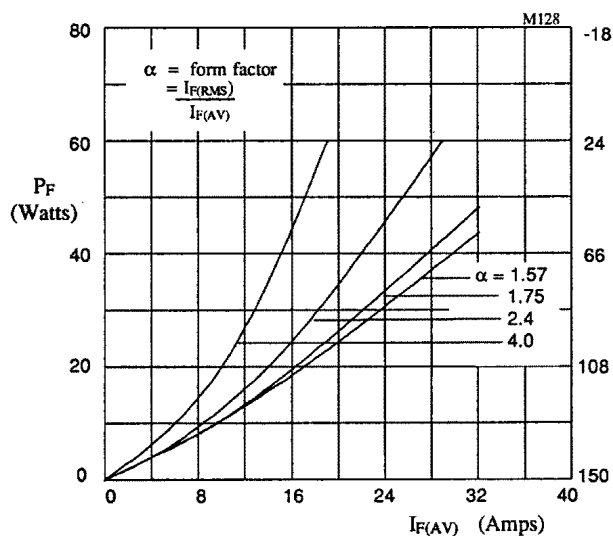


Figure 9. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for sinusoidal operation, for SET04**11.

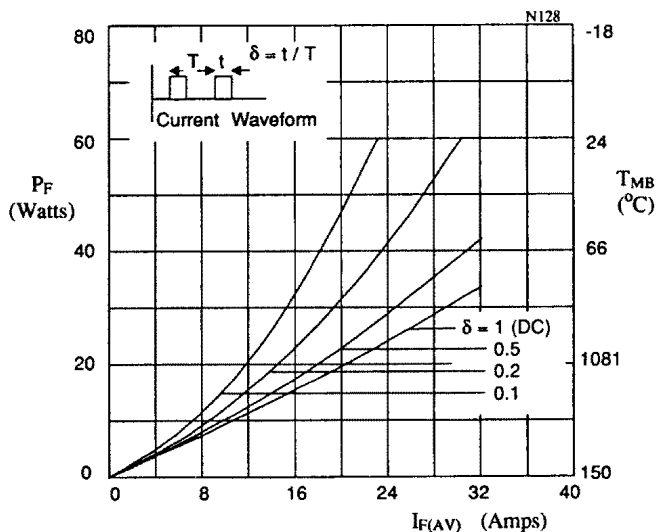


Figure 10. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for square wave operation, for SET04**11.



HIGH CURRENT, HIGH DENSITY, ISOLATED, SILICON POWER RECTIFIER DO5 STUD

QUICK REFERENCE DATA

- Low thermal impedance
- Small size and low weight
- High current applications
- Isolated for direct heatsink mounting
- High surge ratings

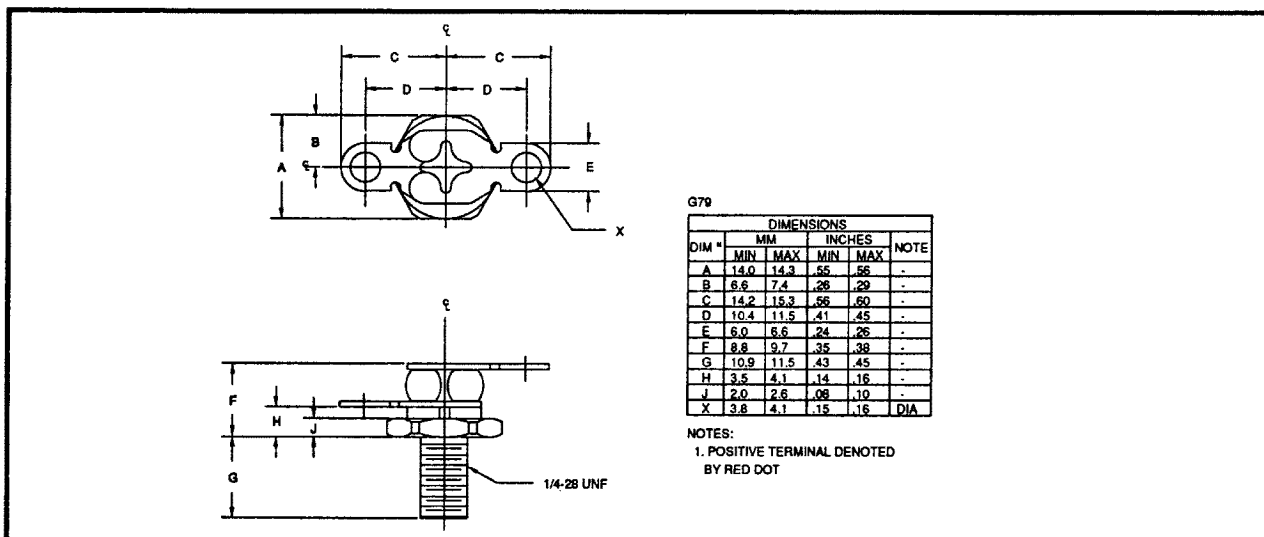
- $V_R = 150V - 1000V$
- $I_F = 60A$
- $t_{rr} = 30nS - 2\mu S$
- $I_{FSM} \geq 500A$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage (V_{RWM})	Average Rectified Current ($I_{F(AV)}$) @ T_{mb}			1 Cycle Surge I_{FSM} @ $t_P = 8.3mS$		Repetitive Surge (I_{FRM})	Operating & Storage Temperature Range	
		@ 55°C	100°C	125°C	@ 25 °C	@ 100°C	@ 25 °C	(T_{OP})	(T_{STG})
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	°C	
SET050203	1000	60	44	32	500	400	100	-55 to +175	
SET050219	1000	40	32	24	500	320	60	-55 to +175	
SET050212	600	60	44	32	500	400	100	-55 to +175	
SET050204	400	60	44	32	500	320	100	-55 to +175	
SET050211	150	60	40	28	580	500	96	-55 to +150	

$R_{\theta JMB} = 0.75^{\circ}C/W$ for all varieties, other configurations available see next page for details

MECHANICAL



**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Leakage Current @ V_{RWM}		Maximum Forward Voltage @ 36.0 A	Maximum Reverse Recovery Time
	$T_j = 25^\circ\text{C}$	$T_j = 100^\circ\text{C}$		
	μA	μA	Volts	nS
SET050203	4.0	80	1.2	2000
SET050219	4.0	100	2.2	150
SET050212	4.0	80	1.2	2000
SET050204	4.0	80	1.5	150
SET050211	40.0	2mA	1.1	30

OTHER CONFIGURATIONS

The Part Numbers Shown in this data Sheet are Isolated with the cathode at the stud end of the device.
Part numbers for other configurations are shown below:

Isolated Cathode to Stud	Isolated Anode to Stud	Non-Isolated Cathode to Stud	Non-Isolated Anode to Stud
SET050203	SET050403	SET050103	SET050303
SET050219	SET050419	SET050119	SET050319
SET050212	SET050412	SET050112	SET050312
SET050204	SET050404	SET050104	SET050304
SET050211	SET050411	SET050111	SET050311

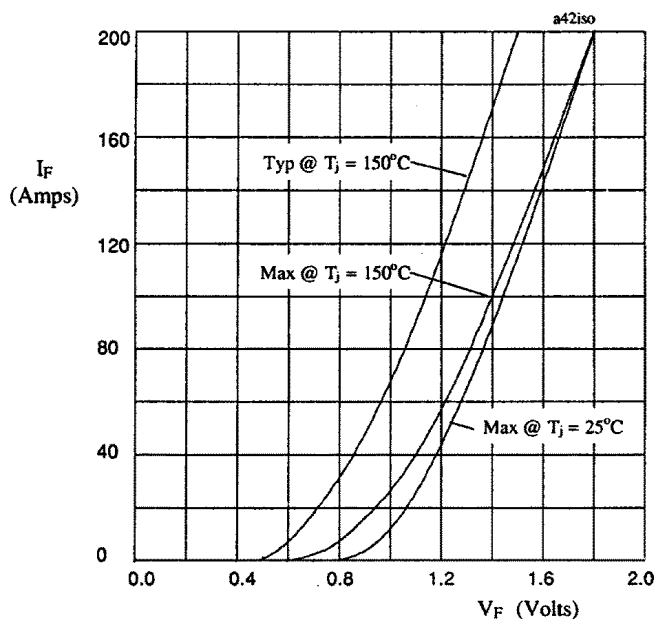


Figure 1. Forward voltage drop as a function of forward current for SET05**03 & SET05**12.

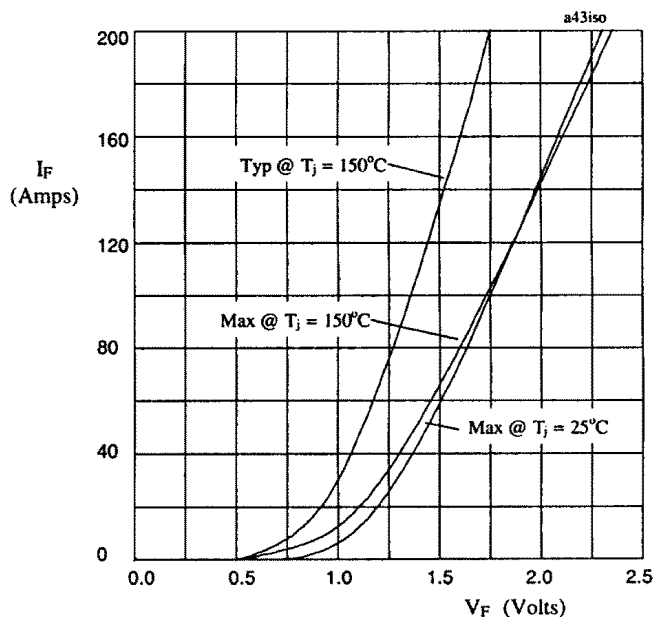


Figure 2. Forward voltage drop as a function of forward current for SET05**04.

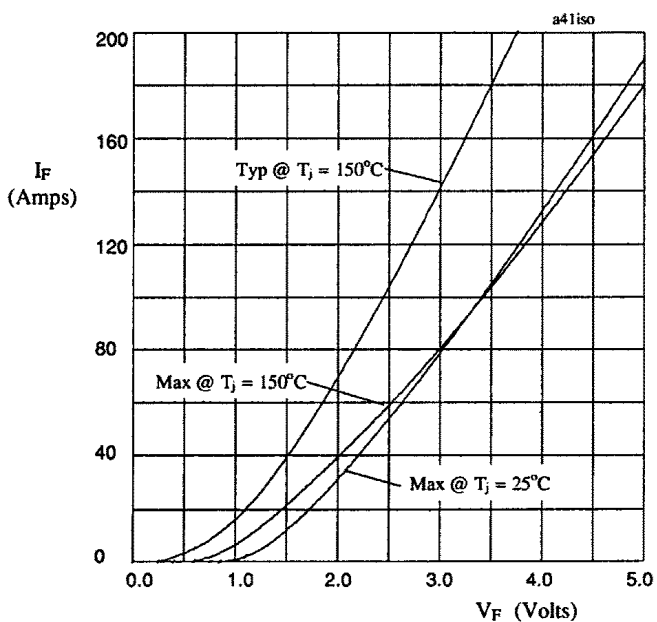


Figure 3. Forward voltage drop as a function of forward current for SET05**19.

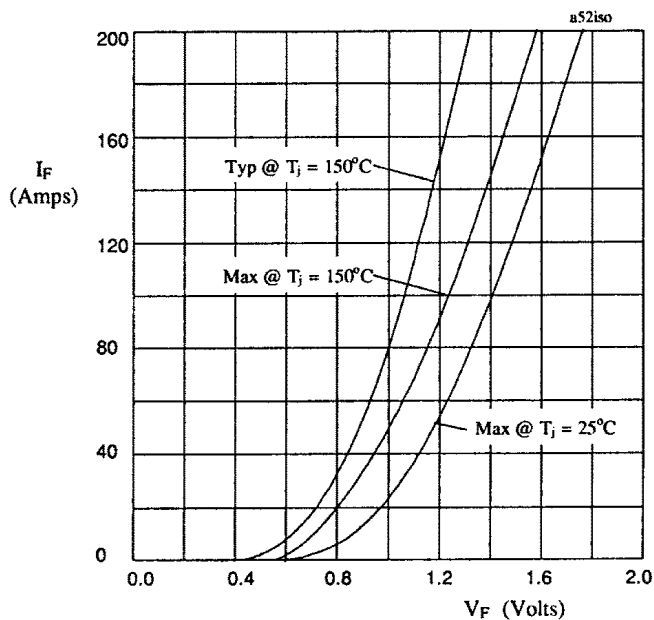


Figure 4. Forward voltage drop as a function of forward current for SET05**11.

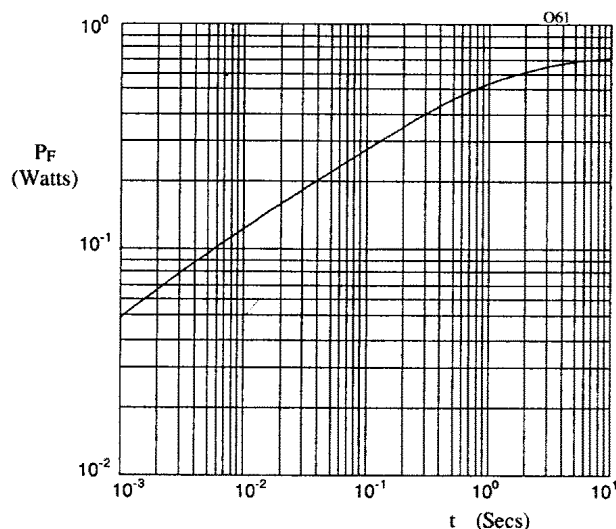


Figure 5. Typical transient thermal impedance characteristic.

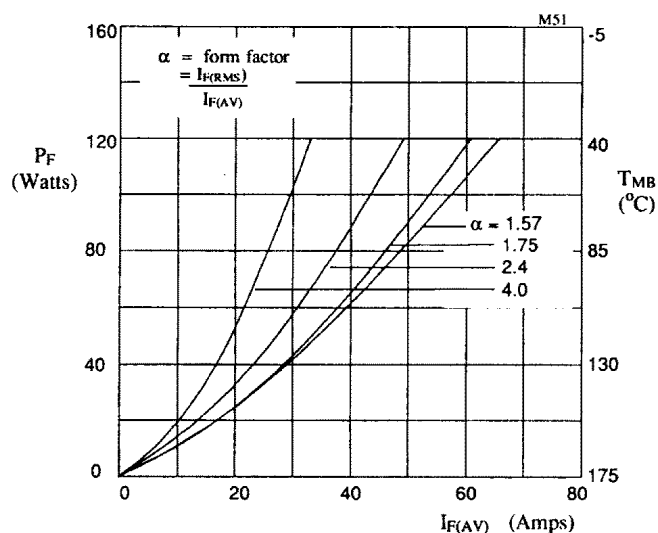


Figure 6. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for sinusoidal operation, for SET05**03 and SET05**12.

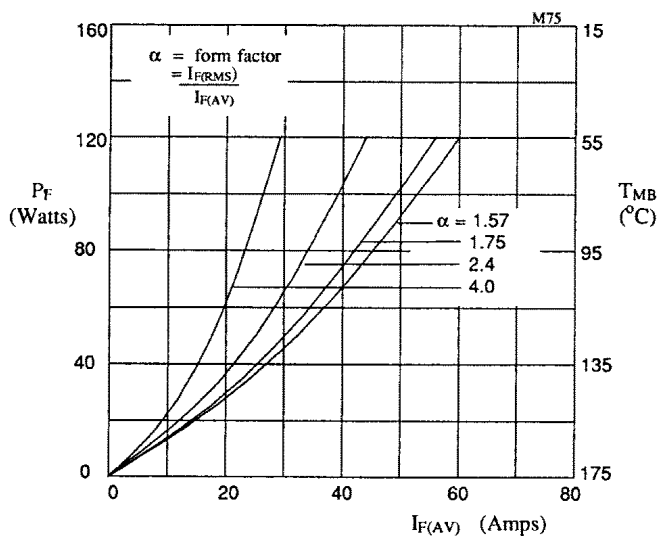


Figure 7. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for sinusoidal operation, for SET05**04.

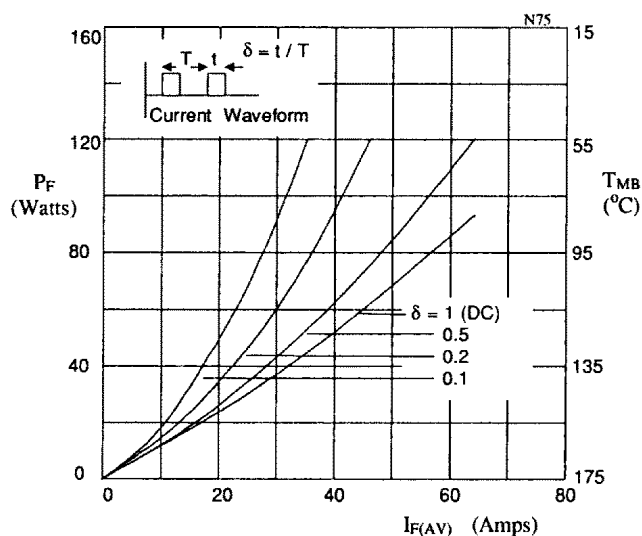


Figure 8. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for square wave operation, for SET05**04

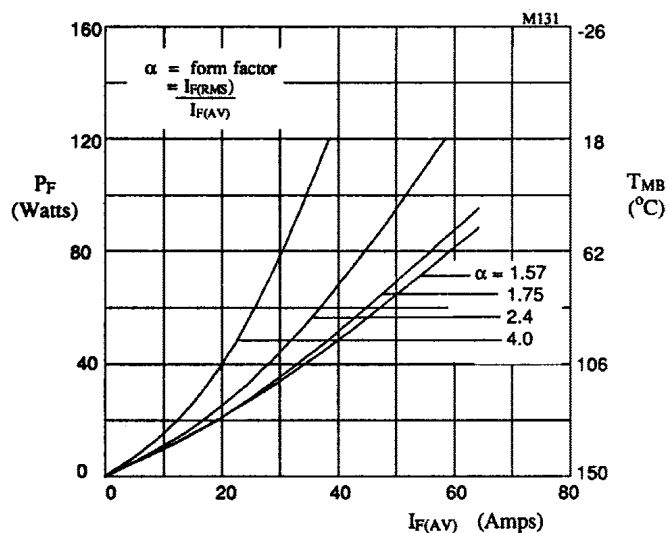


Figure 9. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for sinusoidal operation, for SET05**11.

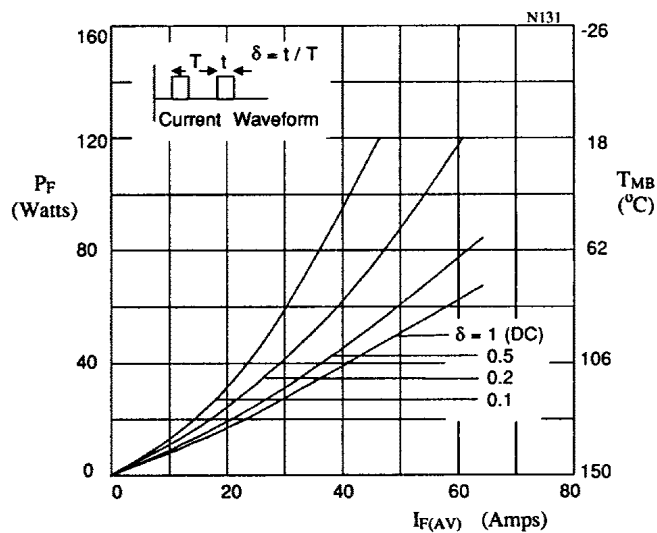


Figure 10. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for square wave operation, for SET05**11.

**HIGH CURRENT, HIGH DENSITY, ISOLATED ,
SILICON POWER RECTIFIER DO5 STUD****QUICK REFERENCE
DATA**

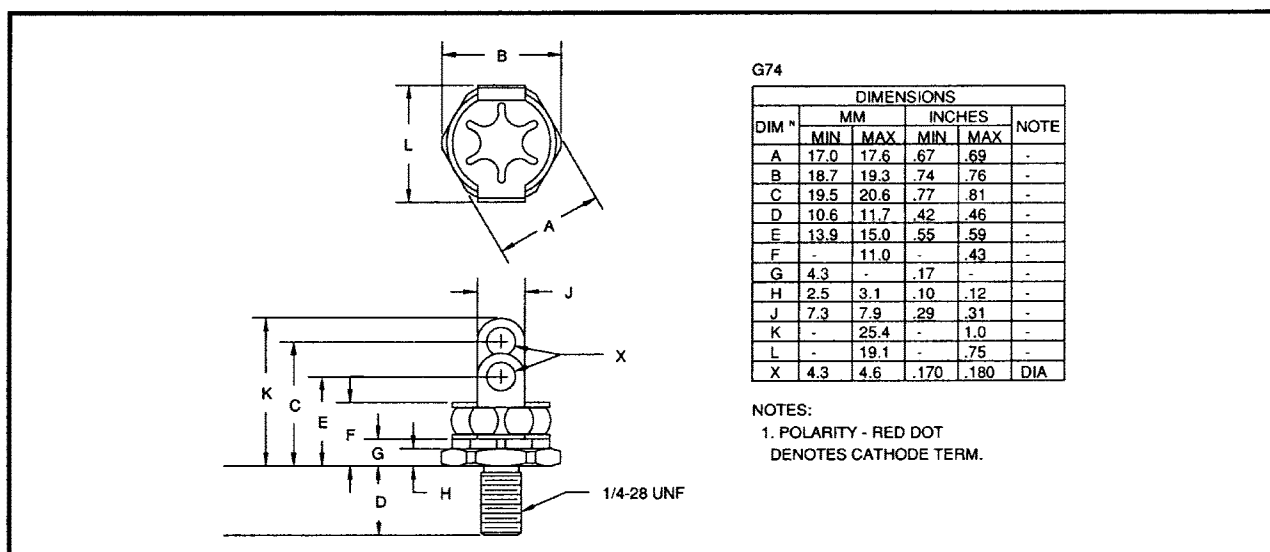
- Low thermal impedance
- Small size and low weight
- High current applications
- Isolated for direct heatsink mounting
- High surge ratings

- $V_R = 150V - 1000V$
- $I_F = 90A$
- $t_{rr} = 30nS - 2\mu S$
- $I_{FSM} \geq 750A$

3**ABSOLUTE MAXIMUM RATINGS**

Device Type	Working Reverse Voltage (V_{RWM}) Volts	Average Rectified Current ($I_{F(AV)}$) @ T_{mb}			1 Cycle Surge I_{FSM} $t_p = 8.3mS$		Repetitive Surge (I_{FRM}) Amps	Operating & Storage Temperature Range (T_{OP}) (T_{STG}) $^{\circ}C$	
		@ 55 $^{\circ}C$	100 $^{\circ}C$	125 $^{\circ}C$	@ 25 $^{\circ}C$	@ 100 $^{\circ}C$	@ 25 $^{\circ}C$		
		Amps	Amps	Amps	Amps	Amps	Amps		
SET100203	1000	90	66	48	750	600	150	-55 to +175	
SET100219	1000	60	48	36	750	480	90	-55 to +175	
SET100212	600	90	66	48	750	600	150	-55 to +175	
SET100204	400	90	66	48	750	600	150	-55 to +175	
SET100211	150	90	60	42	870	750	144	-55 to +150	

$R_{\theta JMB} = 0.5^{\circ}C/W$ for all varieties, other configurations available see next page for details

MECHANICAL

**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Leakage Current @ V _{RWM}		Maximum Forward Voltage @ 54.0 A	Maximum Reverse Recovery Time
	T _j = 25 °C	T _j = 100 °C		
	μA	μA		
SET100203	6.0	120	1.2	2000
SET100219	6.0	150	2.2	150
SET100212	6.0	120	1.2	2000
SET100204	6.0	120	1.5	150
SET100211	60.0	3mA	1.1	30

OTHER CONFIGURATIONS

The Part Numbers Shown in this data Sheet are Isolated with the cathode at the stud end of the device. Part numbers for other configurations are shown below:

Isolated Cathode to Stud	Isolated Anode to Stud	Non-Isolated Cathode to Stud	Non-Isolated Anode to Stud
SET100203	SET100403	SET100103	SET100303
SET100219	SET100419	SET100119	SET100319
SET100212	SET100412	SET100112	SET100312
SET100204	SET100404	SET100104	SET100304
SET100211	SET100411	SET100111	SET100311

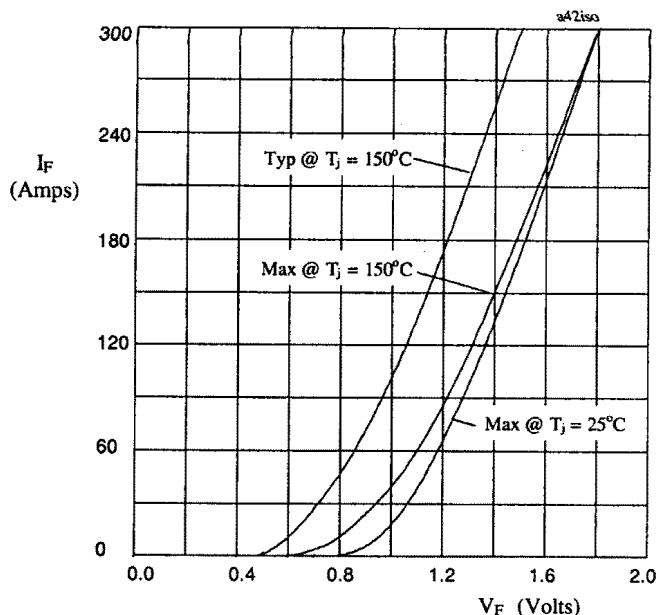


Figure 1. Forward voltage drop as a function of forward current for SET10**03 & SET10**12.

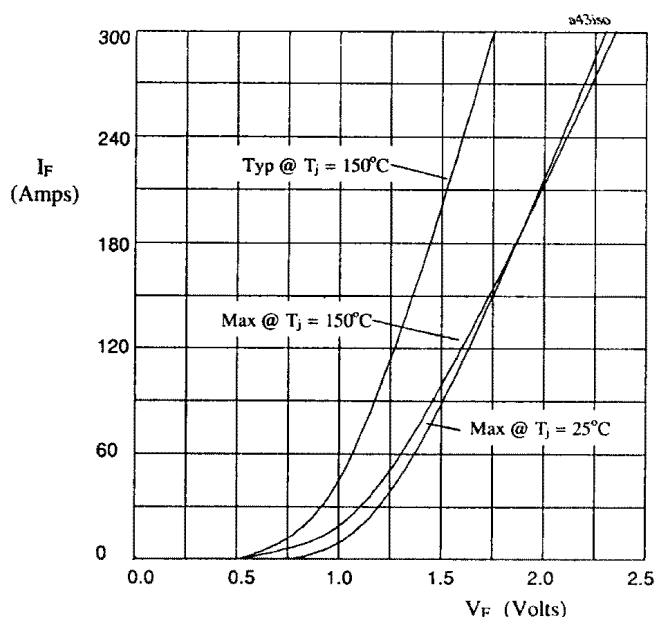


Figure 2. Forward voltage drop as a function of forward current for SET10**04.

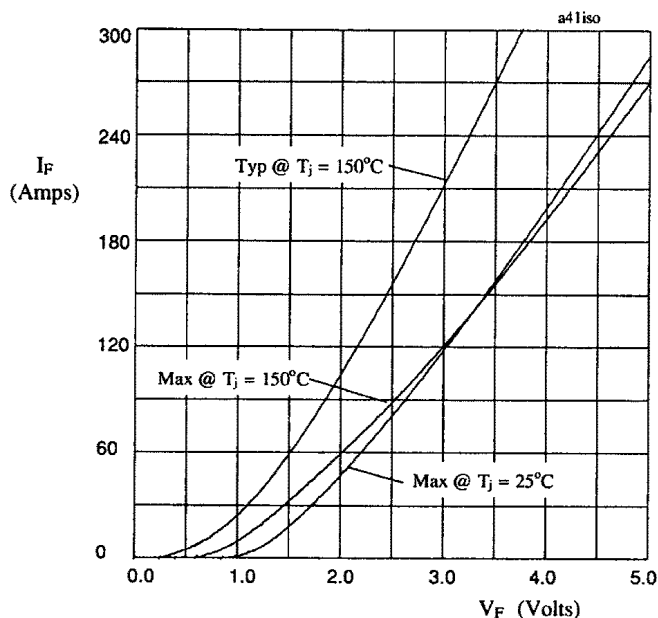


Figure 3. Forward voltage drop as a function of forward current for SET10**19.

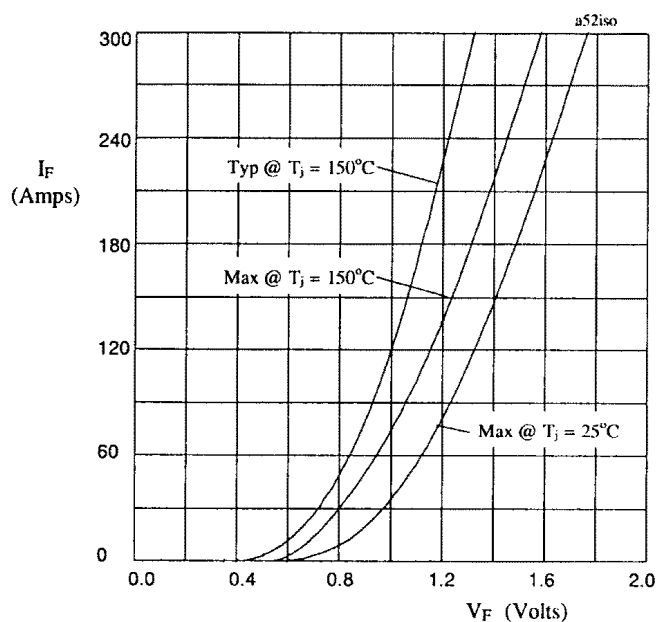


Figure 4. Forward voltage drop as a function of forward current for SET10**11.

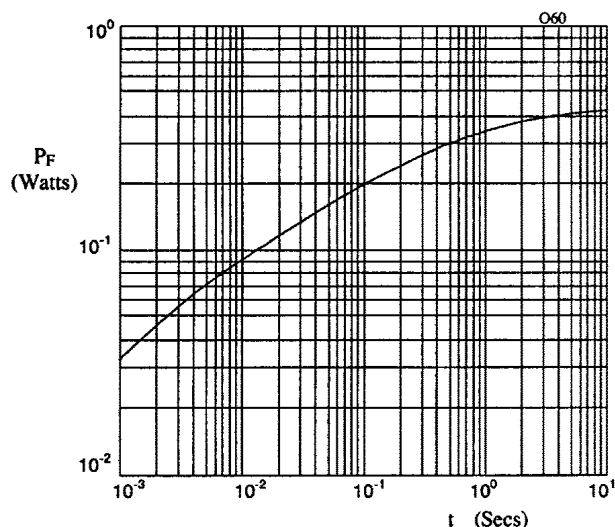


Figure 5. Typical transient thermal impedance characteristic.

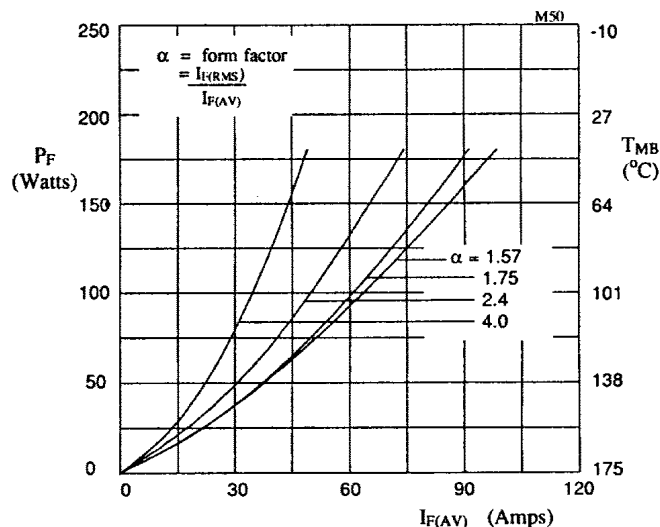


Figure 6. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for sinusoidal operation, for SET10**03 and SET10**12.

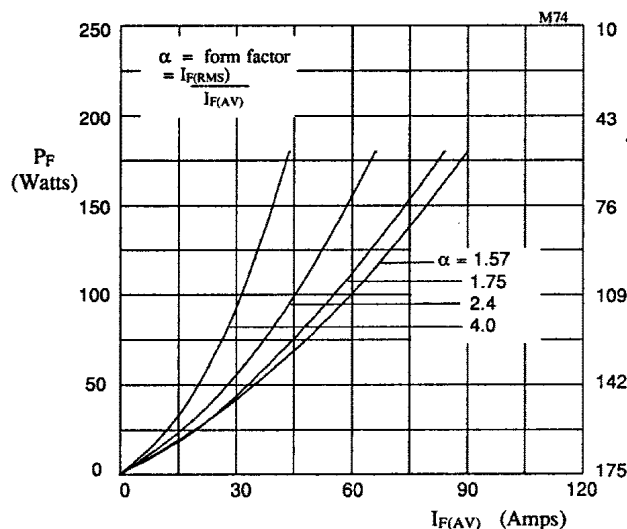


Figure 7. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for sinusoidal operation, for SET10**04.

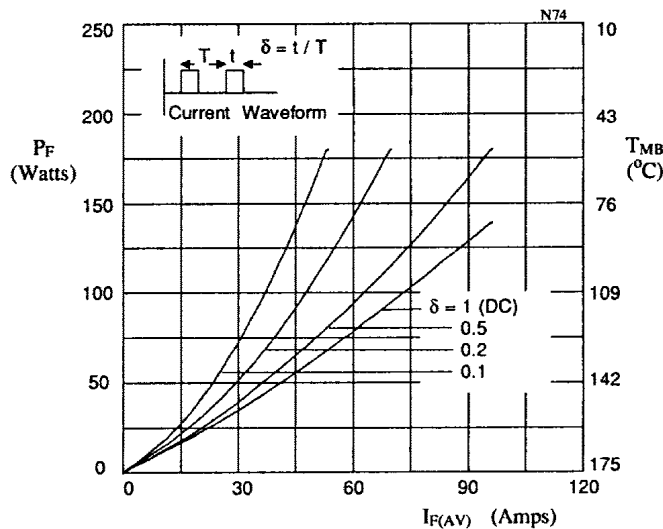


Figure 8. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for square wave operation, for SET10**04

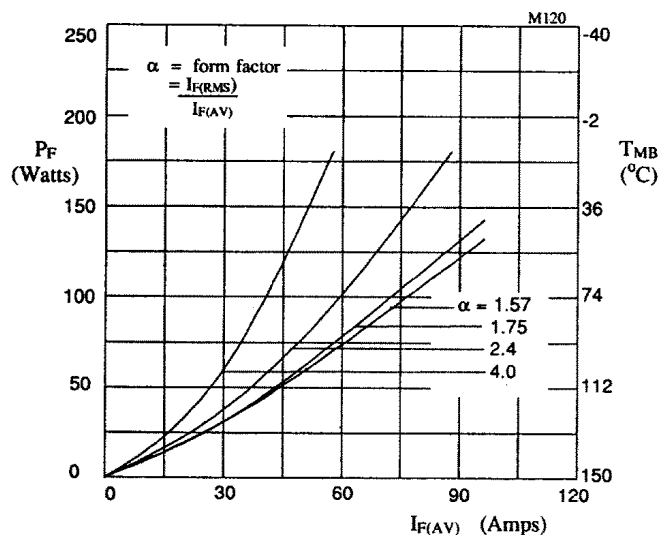


Figure 9. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for sinusoidal operation, for SET10**11.

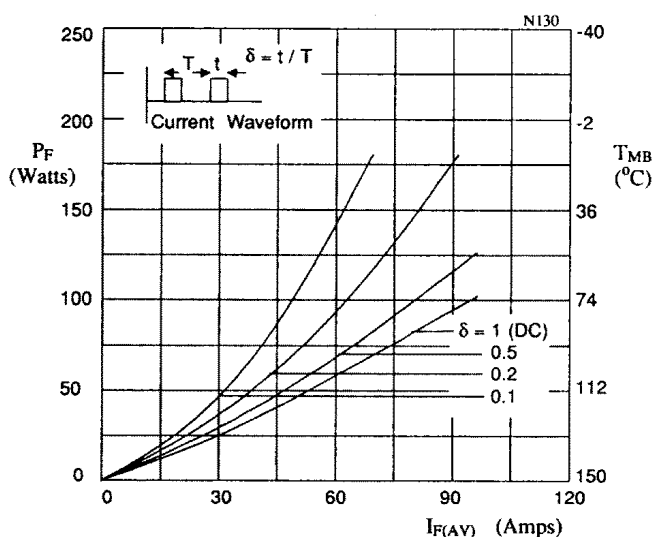


Figure 10. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for square wave operation, for SET10**11.

Chapter 4

Single Phase Full Wave Bridge Assemblies

Datasheet No.	Title:
3SBMXF	Standard Recovery 1 Phase Silicon Bridge Rectifiers
SBMXF	Standard Recovery 1 Phase Silicon Bridge Rectifiers
SBRXF	Fast Recovery 1 Phase Silicon Bridge Rectifiers
SBRXFF	Superfast Recovery 1 Phase Silicon Bridge Rectifiers
SCAJX	Standard Recovery 1 Phase Full Wave Bridge Rectifiers
SCAJXF	Fast Recovery 1 Phase Full Wave Bridge Rectifiers
SCAJXFF	Superfast Recovery 1 Phase Full Wave Bridge Rectifiers
SCASX	Standard Recovery 1 Phase Full Wave Bridge Rectifiers
SCASXF	Fast Recovery 1 Phase Full Wave Bridge Rectifiers
SCASXFF	Superfast Recovery 1 Phase Full Wave Bridge Rectifiers
SCBAX	Standard Recovery 1 Phase Full Wave Bridge Rectifiers
SCBAXF	Fast Recovery 1 Phase Full Wave Bridge Rectifiers
SCBAXFF	Superfast Recovery 1 Phase Full Wave Bridge Rectifiers
SCBARX	Standard Recovery 1 Phase Full Wave Bridge Rectifiers
SCBARXF	Fast Recovery 1 Phase Full Wave Bridge Rectifiers
SCBARXFF	Superfast Recovery 1 Phase Full Wave Bridge Rectifiers
SCBHX	Standard Recovery 1 Phase Full Wave Bridge Rectifiers
SCBHXF	Fast Recovery 1 Phase Full Wave Bridge Rectifiers
SCBHXFF	Superfast Recovery 1 Phase Full Wave Bridge Rectifiers
SCBKX	Standard Recovery 1 Phase Full Wave Bridge Rectifiers
SCBKXF	Fast Recovery 1 Phase Full Wave Bridge Rectifiers
SCBKXFF	Superfast Recovery 1 Phase Full Wave Bridge Rectifiers
SET061203,04,11,12,19	High Current, 1 Phase Full Wave Bridge Rectifier
SET121203,04,11,12,19	High Current, 1 Phase Full Wave Bridge Rectifier

**STANDARD RECOVERY, PCB MOUNTING, 1-PHASE
FULL WAVE BRIDGE RECTIFIER ASSEMBLIES**

- Low forward voltage drop
- Low reverse leakage current
- Subminiature design
- Three lead configurations
- Pcb mounting

**QUICK REFERENCE
DATA**

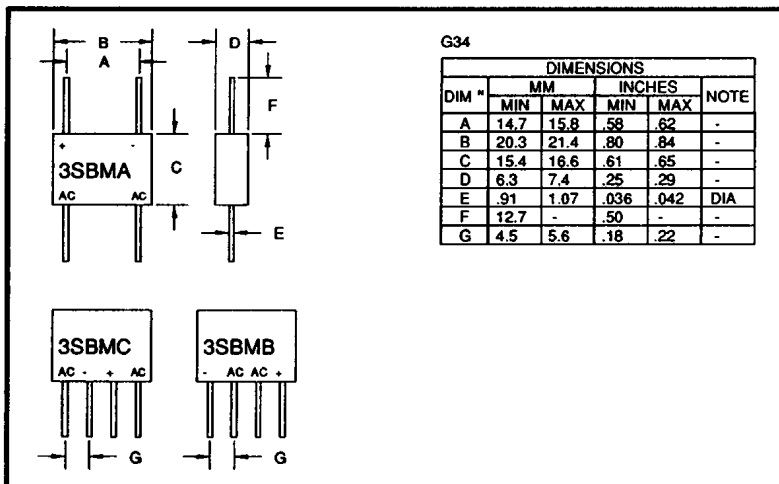
- $V_R = 200V - 1000V$
- $I_F = 3.0A$
- $I_R = 2.0 \mu A$
- $t_{rr} = 2.0 \mu s$

ABSOLUTE MAXIMUM RATINGS & CHARACTERISTICS

Device Type	Working Reverse Voltage V _{RWM}	Average Rectified Current I _{F(AV)}		1 Cycle Surge Current I _{FSM} t _p = 8.3mS	Repetitive Surge Current I _{FRM}	Reverse Leakage Current I _R @ V _{RWM}		Forward Voltage drop V _F @ 3A/leg @ 25°C	Reverse Recovery Time t _{rr}
		@ 55°C	@ 100°C	@ 25°C	@ 25°C	@ 25°C	@ 100°C		@ 25°C
	Volts	Amps	Amps	Amps	Amps	µA	µA	Volts	µS
3SBM*2	200	3.0	1.5	150	25	2.0	40	1.0	2.0
3SBM*4	400	3.0	1.5	150	25	2.0	40	1.0	
3SBM*6	600	3.0	1.5	150	25	2.0	40	1.0	
3SBM*8	800	3.0	1.5	150	25	2.0	40	1.0	
3SBM*0	1000	3.0	1.5	150	25	2.0	40	1.0	

* Add A, B, C for desired circuit configuration
(see Mechanical outline)

¹ Measured on discrete devices prior to assembly

MECHANICAL

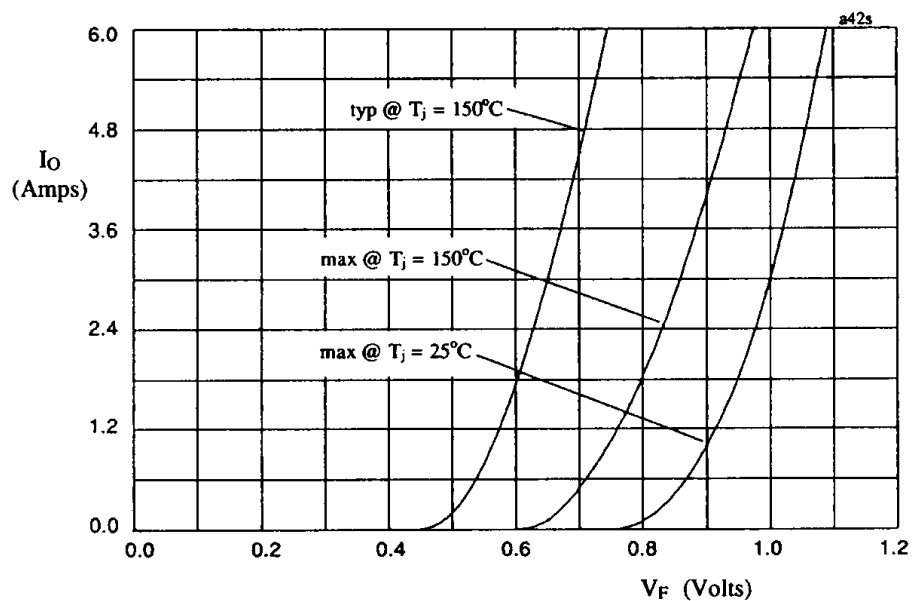


Fig 1. Forward voltage drop against output current per leg

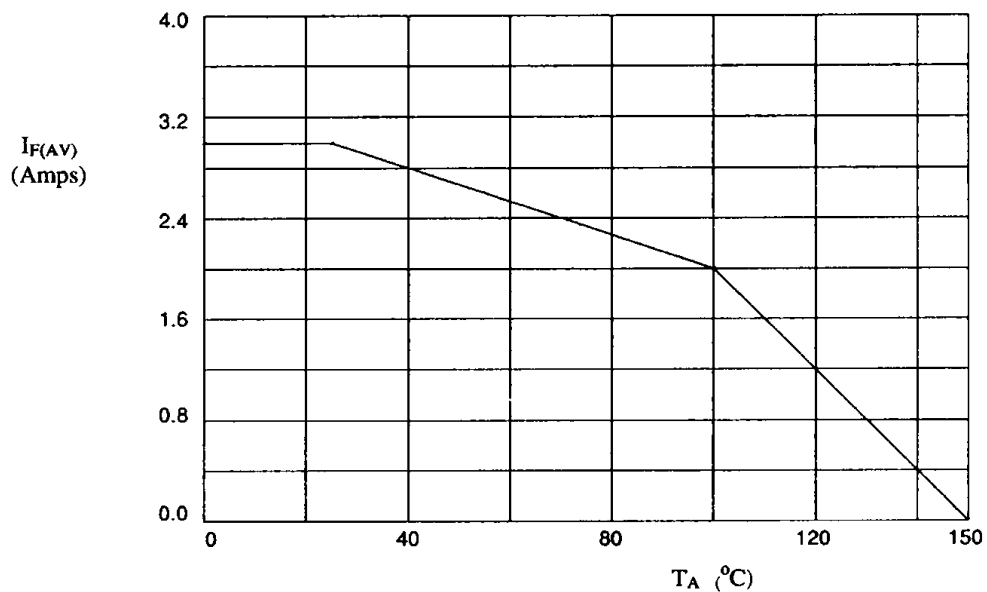


Fig 2. Maximum average forward current against ambient temperature.



FAST RECOVERY, PCB MOUNTING, 1-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Subminiature design
- Three lead configurations
- Fast reverse recovery time

QUICK REFERENCE DATA

- $V_R = 50V - 400V$
- $I_F = 3.0A$
- $I_R = 2.0 \mu A$
- $t_{rr} = 150nS$

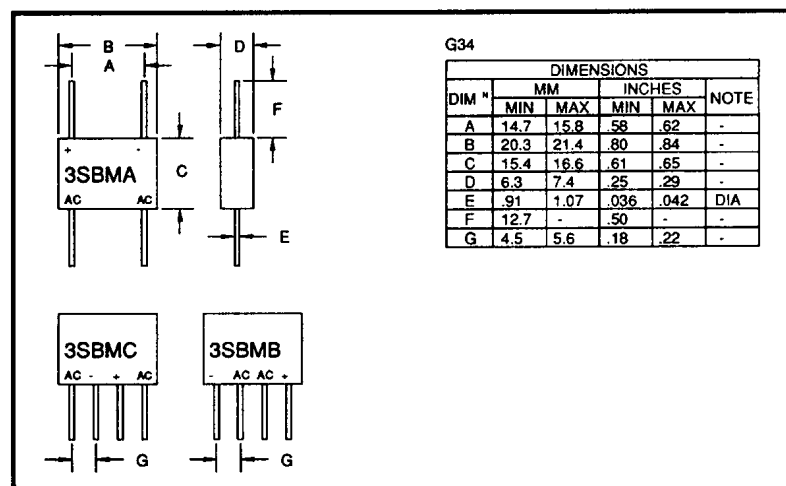
ABSOLUTE MAXIMUM RATINGS & CHARACTERISTICS

Device Type	Working Reverse Voltage V _{RWM}	Average Rectified Current I _{F(AV)}		1 Cycle Surge Current I _{FSM} t _p = 8.3mS	Repetitive Surge Current I _{FRM}	Reverse Leakage Current I _R @ V _{RWM}		Forward Voltage drop V _F @ 3A/leg @ 25°C	Reverse Recovery Time t _{rr}
		@ 55°C	@ 100°C	@ 25°C	@ 25°C	@ 25°C	@ 100°C		@ 25°C
	Volts	Amps	Amps	Amps	Amps	µA	µA	Volts	nS
3SBM*05F	50	3.0	1.5	150	25	2.0	40	1.1	150
3SBM*1F	100	3.0	1.5	150	25	2.0	40	1.1	150
3SBM*2F	200	3.0	1.5	150	25	2.0	40	1.1	150
3SBM*4F	400	3.0	1.5	150	25	2.0	40	1.1	150

* Add A, B, C for desired circuit configuration
(see Mechanical outline)

¹ Measured on discrete devices prior to assembly

MECHANICAL



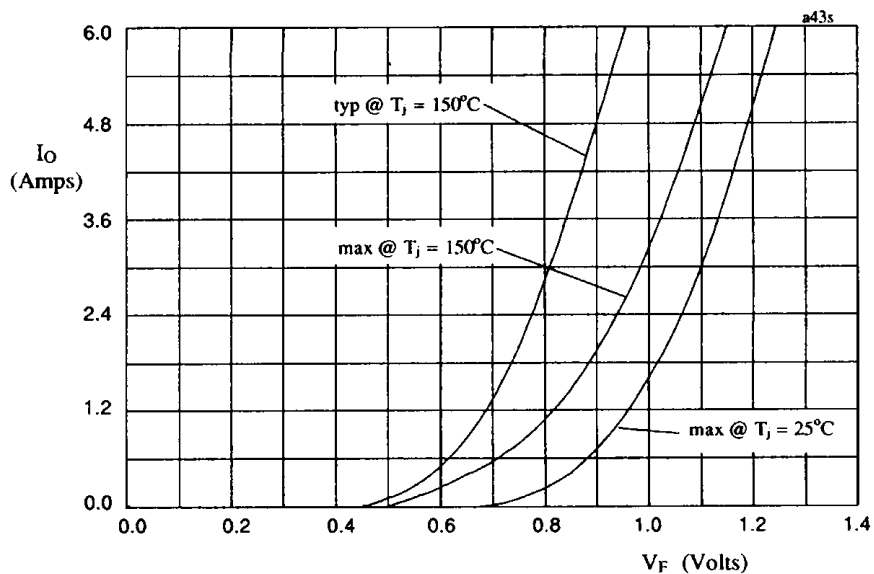


Fig 1. Forward voltage drop against output current per leg

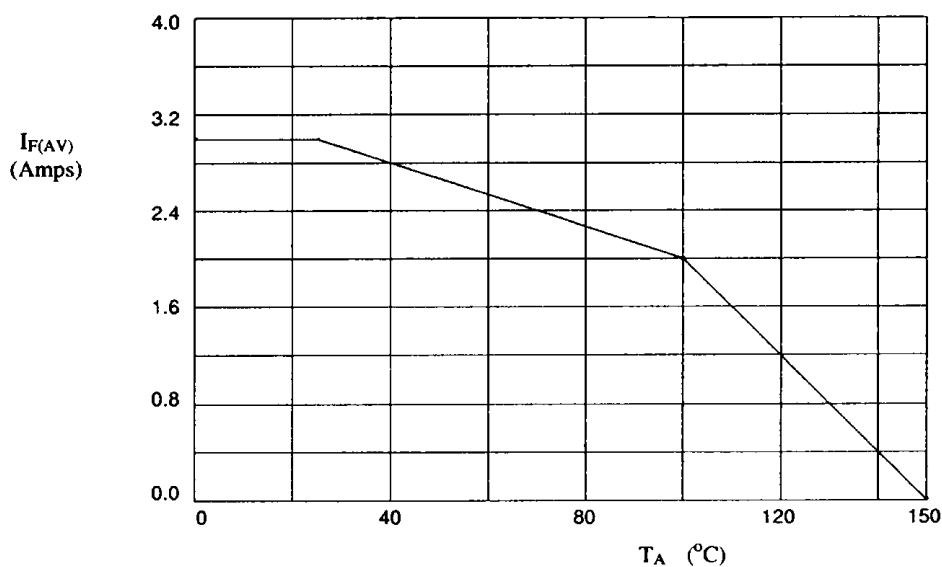


Fig 2. Maximum average forward current against ambient temperature.



STANDARD RECOVERY, PCB MOUNTING, 1-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Subminiature design
- Three lead configurations
- Pcb mounting

QUICK REFERENCE DATA

- $V_R = 200V - 1000V$
- $I_F = 1.5A$
- $I_R = 2.0 \mu A$
- $t_{rr} = 2.0 \mu s$

4

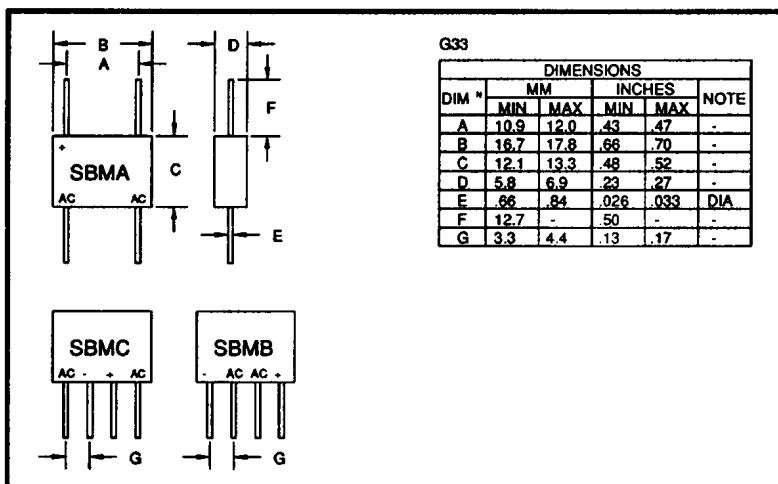
ABSOLUTE MAXIMUM RATINGS & CHARACTERISTICS

Device Type	Working Reverse Voltage V _{RWM}	Average Rectified Current I _{F(AV)}		1 Cycle Surge Current I _{FSM} t _p = 8.3mS	Repetitive Surge Current I _{FRM}	Reverse Leakage Current I _R @ V _{RWM}		Forward Voltage drop V _F @ 1A/leg @ 25°C	Reverse Recovery Time t _{rr}
		@ 55°C	@ 100°C	@ 25°C	@ 25°C	@ 25°C	@ 100°C		@ 25°C
	Volts	Amps	Amps	Amps	Amps	µA	µA	Volts	µS
SBM*2	200	1.5	1.0	50	10	2.0	50	1.1	2.0
SBM*4	400	1.5	1.0	50	10	2.0	50	1.1	
SBM*6	600	1.5	1.0	50	10	2.0	50	1.1	
SBM*8	800	1.5	1.0	50	10	2.0	50	1.1	
SBM*0	1000	1.5	1.0	50	10	2.0	50	1.1	

* Add A, B, C for desired circuit configuration
(see Mechanical outline)

¹ Measured on discrete devices prior to assembly

MECHANICAL



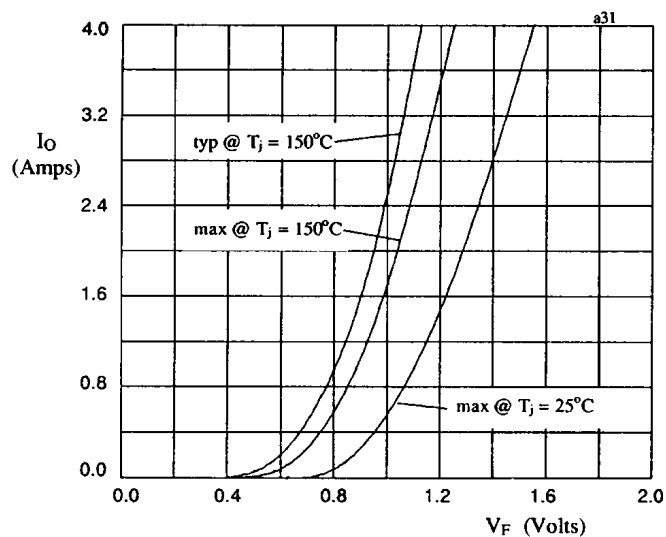


Fig 1. Forward voltage drop against output current per leg

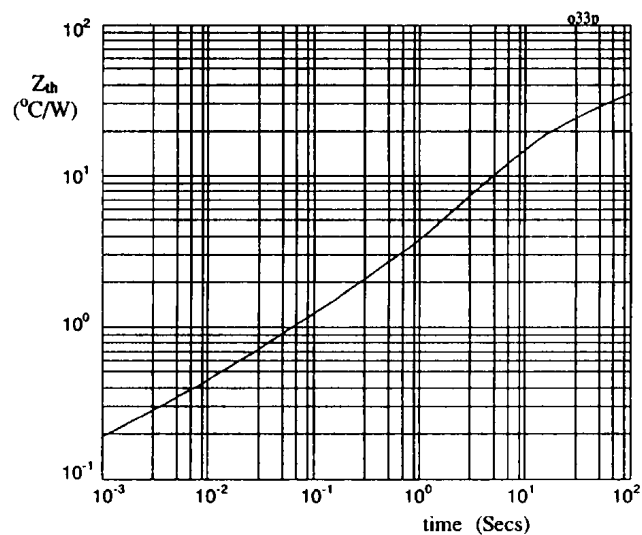


Fig 2. Transient thermal impedance characteristic per leg

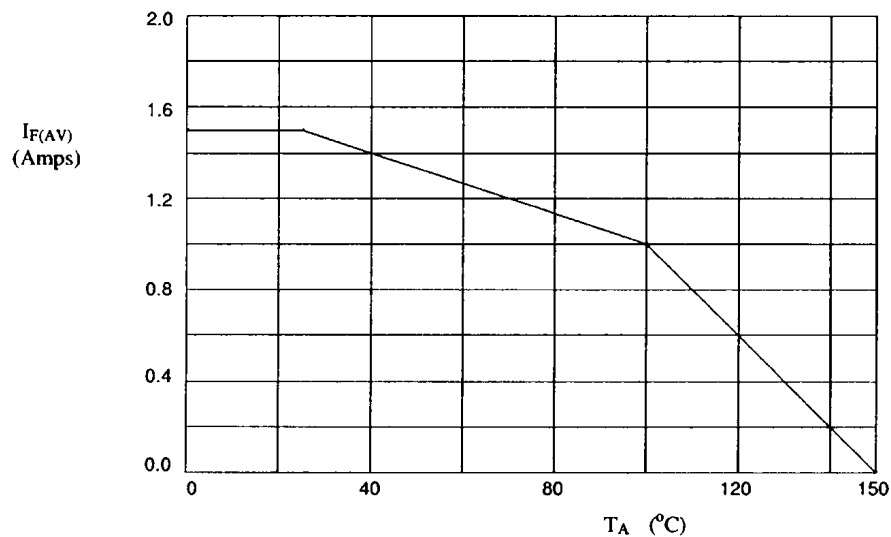


Fig 3. Maximum average forward current against ambient temperature.



FAST RECOVERY, PCB MOUNTING, 1-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Subminiature design
- Fast reverse recovery time
- Pcb mounting

QUICK REFERENCE DATA

- $V_R = 50V - 600V$
- $I_F = 1.5A$
- $I_R = 2.0 \mu A$
- $t_{rr} = 150 - 250nS$

4

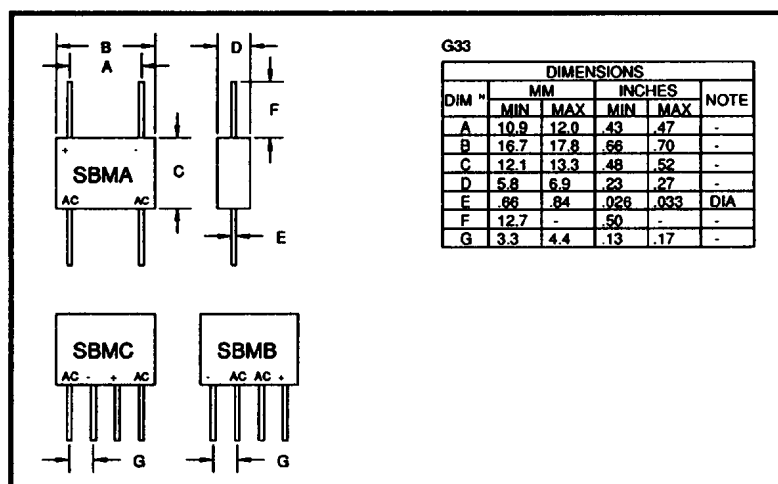
ABSOLUTE MAXIMUM RATINGS & CHARACTERISTICS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$		1 Cycle Surge Current I_{FSM} $t_p = 8.3mS$	Repetitive Surge Current I_{FRM}	Reverse Leakage Current $I_R @ V_{RWM}$		Forward Voltage drop $V_F @ 1A/leg @ 25^\circ C$	Reverse Recovery Time t_{rr}
		@ $55^\circ C$	@ $100^\circ C$	@ $25^\circ C$	@ $25^\circ C$	@ $25^\circ C$	@ $100^\circ C$	Volts	nS
	Volts	Amps	Amps	Amps	Amps	μA	μA		
SBM*05F	50	1.5	1.0	25	10	2.0	50	1.2	150
SBM*1F	100	1.5	1.0	25	10	2.0	50	1.2	150
SBM*2F	200	1.5	1.0	25	10	2.0	50	1.2	150
SBM*4F	400	1.5	1.0	25	10	2.0	50	1.2	150
SBM*6F	600	1.5	1.0	25	10	2.0	50	1.2	250

* Add A, B, C for desired circuit configuration
(see Mechanical outline)

¹ Measured on discrete devices prior to assembly

MECHANICAL



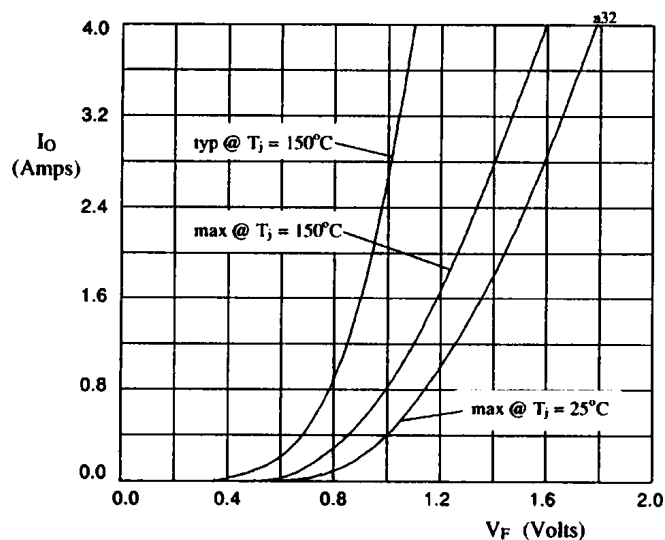


Fig 1. Forward voltage drop against output current per leg

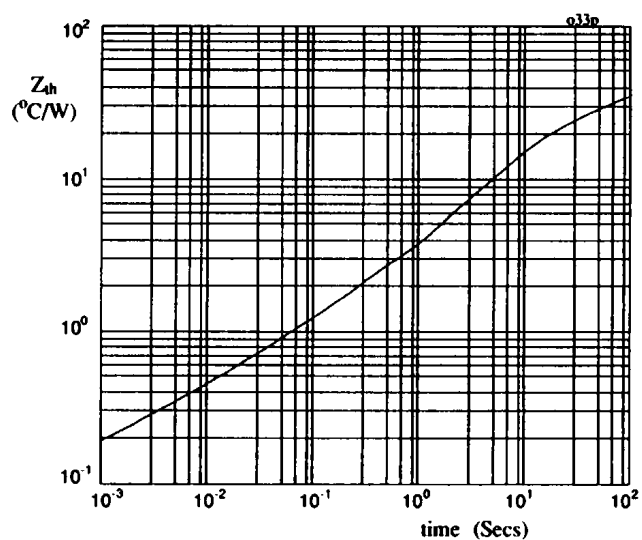


Fig 2. Transient thermal impedance characteristic per leg

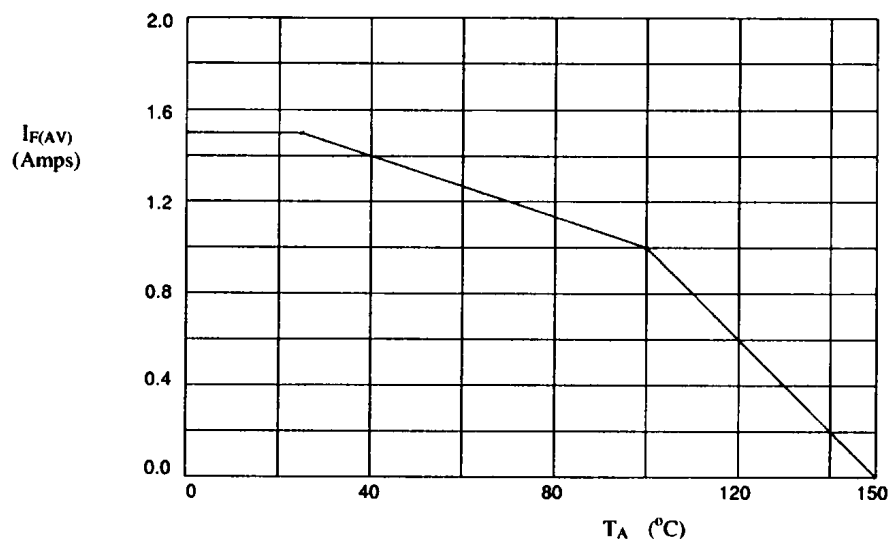


Fig 3. Maximum average forward current against ambient temperature.

**STANDARD RECOVERY, PCB MOUNTING, 1-PHASE
FULL WAVE BRIDGE RECTIFIER ASSEMBLIES**

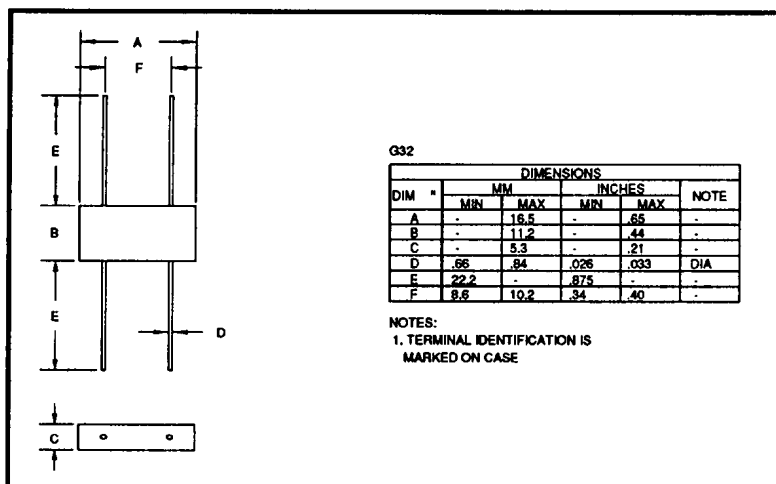
- Low forward voltage drop
- Low reverse leakage current
- Subminiature design for pcb mounting
- VRWM up to 3000V
- Pcb mounting

**QUICK REFERENCE
DATA**

- $V_R = 50V - 3000V$
- $I_F = 0.36 - 1.5A$
- $I_R = 2.0 \mu A$
- $t_{rr} = 2 - 2.5\mu S$

4
ABSOLUTE MAXIMUM RATINGS & CHARACTERISTICS

Device Type	Working Reverse Voltage VRWM	Average Rectified Current IF(AV)		Repetitive Surge Current IFRM @ 25°C	Reverse Leakage Current IR @ VRWM		Forward Voltage drop / leg VF @ 1A * @ 250mA	Reverse Recovery Time trr @ 25°C
		@ 55°C	@ 100°C		@ 25°C	@ 100°C		
		Amps	Amps		μA	μA		
SBR05	50	1.5	1.0	10	2.0	50	1.1	2.0
SBR1	100	1.5	1.0	10	2.0	50	1.1	
SBR2	200	1.5	1.0	10	2.0	50	1.1	
SBR4	400	1.5	1.0	10	2.0	50	1.1	
SBR6	600	1.5	1.0	10	2.0	50	1.1	
SBR8	800	1.5	1.0	10	2.0	50	1.1	
SBR10	1000	1.5	1.0	10	2.0	50	1.1	
SBR15	1500	0.36	0.24	2.5	2.0	50	* 5.0	2.5
SBR20	2000	0.36	0.24	2.5	2.0	50	* 5.0	
SBR25	2500	0.36	0.24	2.5	2.0	50	* 5.0	
SBR30	3000	0.36	0.24	2.5	2.0	50	* 5.0	

MECHANICAL
¹ Measured on discrete devices prior to assembly


SBR10 and SBR30 are available in Europe to DEF STAN 59-61/90/213 release to F and FX levels.

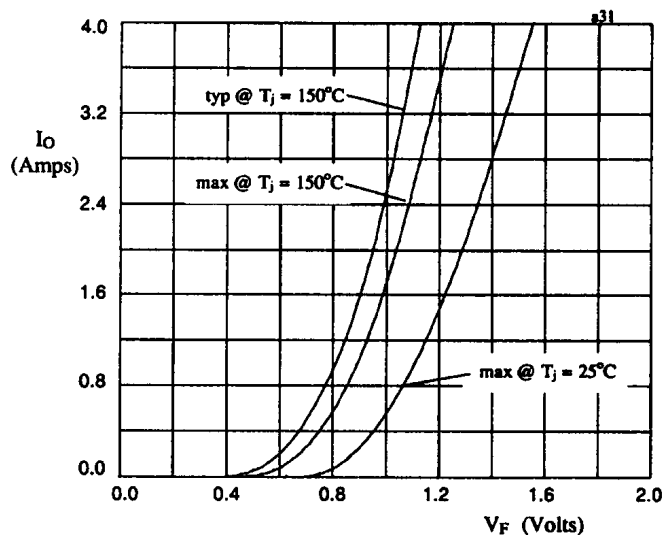


Fig 1. Forward voltage drop against output current per leg for SBR05 thru SBR10.

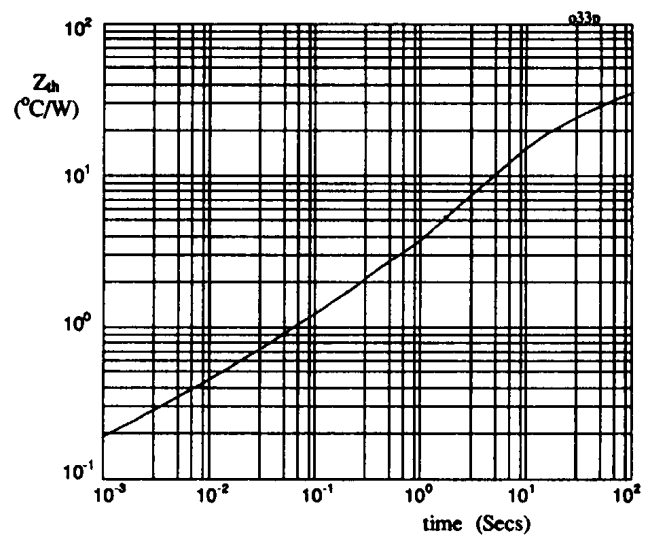


Fig 2. Transient thermal impedance characteristic per leg for SBR05 thru SBR10

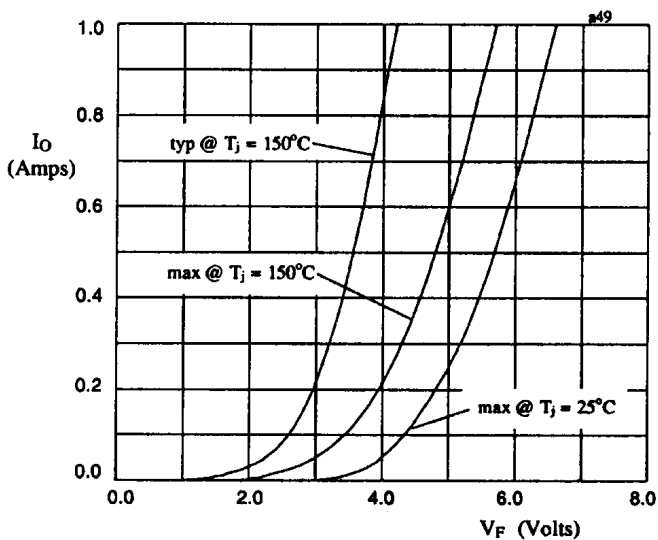


Fig 3. Forward voltage drop against output current per leg for SBR15 thru SBR30

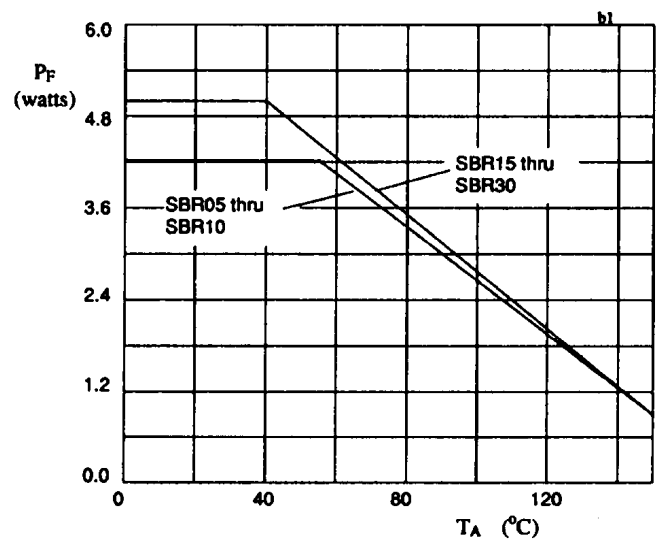


Fig 4. Power derating characteristics when p.c.b mounted



FAST RECOVERY, PCB MOUNTING, 1-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Subminiature design for pcb mounting
- V_{RWM} up to 2500V
- PCB mounting

QUICK REFERENCE DATA

- $V_R = 50V - 2500V$
- $I_F = 0.36 - 1.0A$
- $I_R = 2.0 \mu A$
- $t_{rr} = 150 - 500ns$

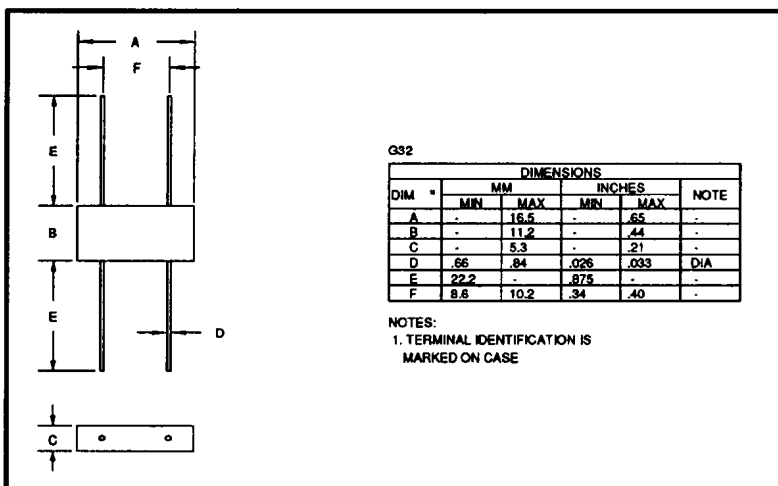
4

ABSOLUTE MAXIMUM RATINGS & CHARACTERISTICS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_F(AV)$		Repetitive Surge Current I_{FRM} @ 25 °C	Reverse Leakage Current I_R @ V_{RWM}		Forward Voltage drop / leg @ 25°C V_F @ 1A * @ 100mA	Reverse Recovery Time t_{rr} @ 25 °C
		@ 55 °C	@ 100 °C		@ 25°C	@ 100°C		
	Volts	Amps	Amps	Amps	μA	μA	Volts	nS
SBR05F	50	1.0	0.65	10	2.0	50	1.2	150
SBR1F	100	1.0	0.65	10	2.0	50	1.2	150
SBR2F	200	1.0	0.65	10	2.0	50	1.2	150
SBR4F	400	1.0	0.65	10	2.0	50	1.2	150
SBR6F	600	1.0	0.65	10	2.0	50	1.2	250
SBR8F	800	1.0	0.65	10	2.0	50	1.5	300
SBR10F	1000	1.0	0.65	10	2.0	50	1.5	500
SBR25F	2500	0.36	0.23	2.5	2.0	50	* 5.0	300

MECHANICAL

¹ Measured on discrete devices prior to assembly



SBR4F is available in Europe to DEF STAN 59-61/90/213 release to F and FX levels.

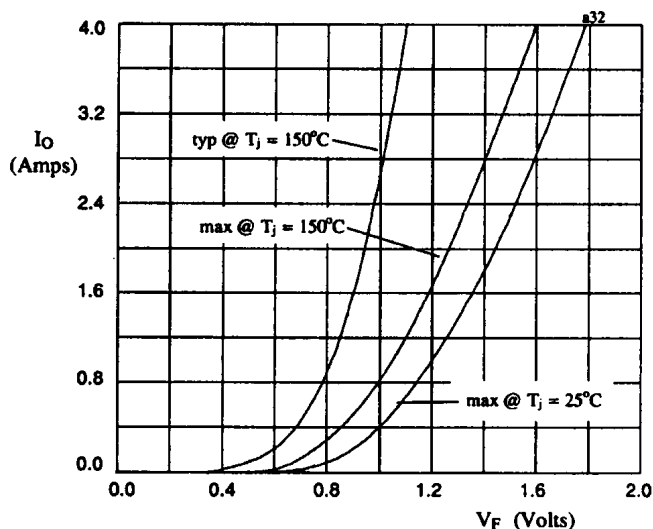


Fig 1. Forward voltage drop against output current per leg for SBR05F thru SBR6F.

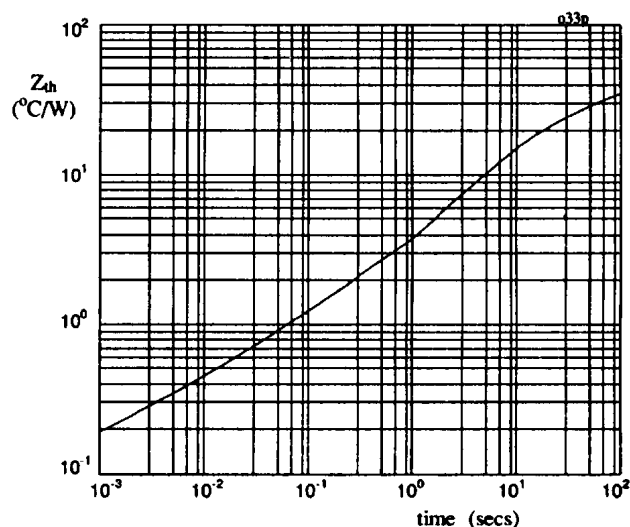


Fig 2. Transient thermal impedance characteristic per leg for SBR05F thru SBR10F

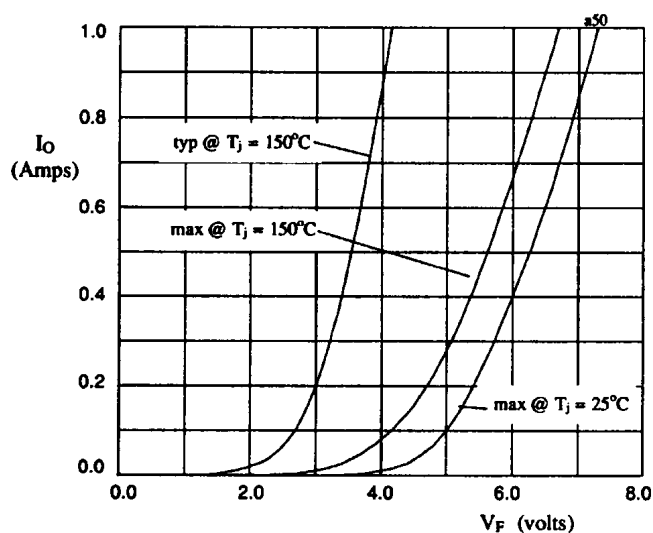


Fig 3. Forward voltage drop against output current per leg for SBR25F

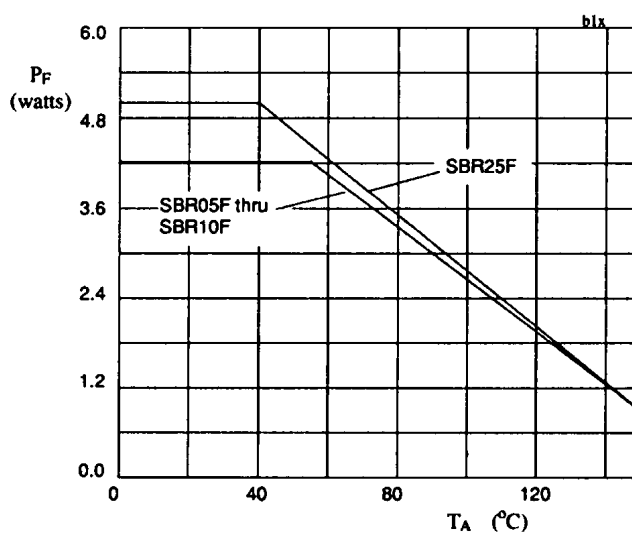


Fig 4. Power derating characteristics when p.c.b mounted

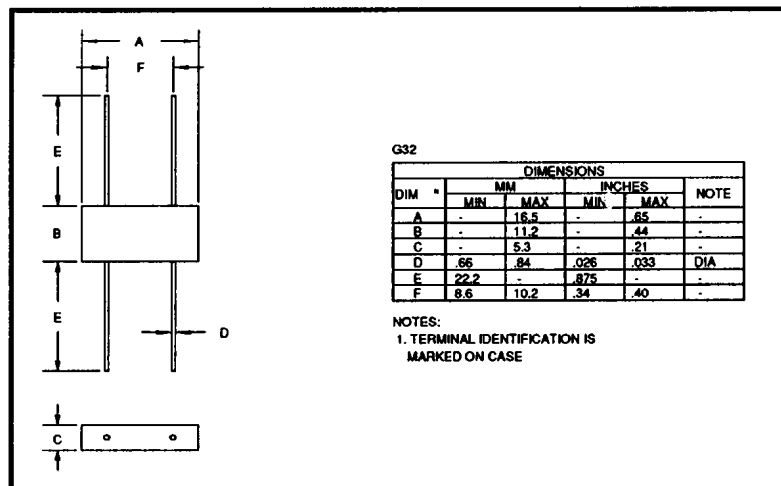
**SUPERFAST RECOVERY, PCB MOUNTING, 1-PHASE
FULL WAVE BRIDGE RECTIFIER ASSEMBLIES****QUICK REFERENCE
DATA**

- Low forward voltage drop
- Low reverse leakage current
- Subminiature design for pcb applications
- V_{RWM} up to 3000V
- Pcb mounting

- $V_R = 50V - 150V$
- $I_F = 1.0A$
- $I_R = 2.0 \mu A$
- $t_{rr} = 30nS$

4**ABSOLUTE MAXIMUM RATINGS & CHARACTERISTICS**

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_F(AV)$		Repetitive Surge Current I_{FRM}	Reverse Leakage Current $I_R @ V_{RWM}$		Forward Voltage drop / leg $V_F @ 1.5A$ @ 25°C	Reverse Recovery Time t_{rr} @ 25°C
		@ 55 °C	@ 100 °C		@ 25°C	@ 100°C		
		Volts	amps	amps	μA	μA	Volts	nS
SBR05FF	50	1.0	0.3	14	2.0	100	1.2	30
SBR10FF	100	1.0	0.3	14	2.0	100	1.2	30
SBR15FF	150	1.0	0.3	14	2.0	100	1.2	30

¹ Measured on discrete devices prior to assembly**MECHANICAL**

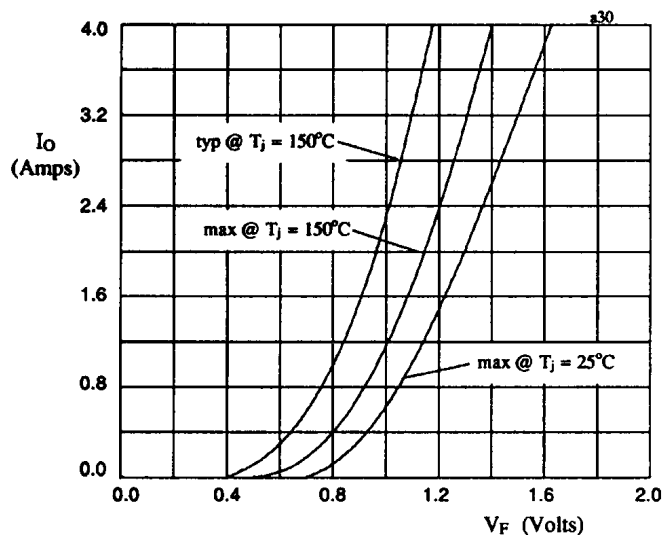


Fig 1. Forward voltage drop against output current per leg

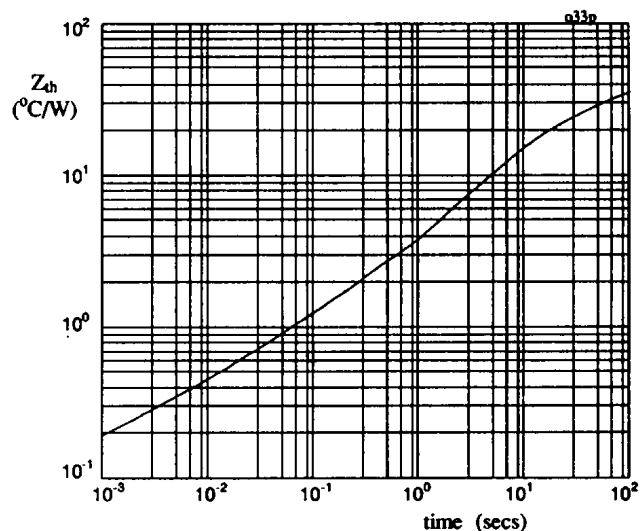


Fig 2. Transient thermal impedance characteristic per leg

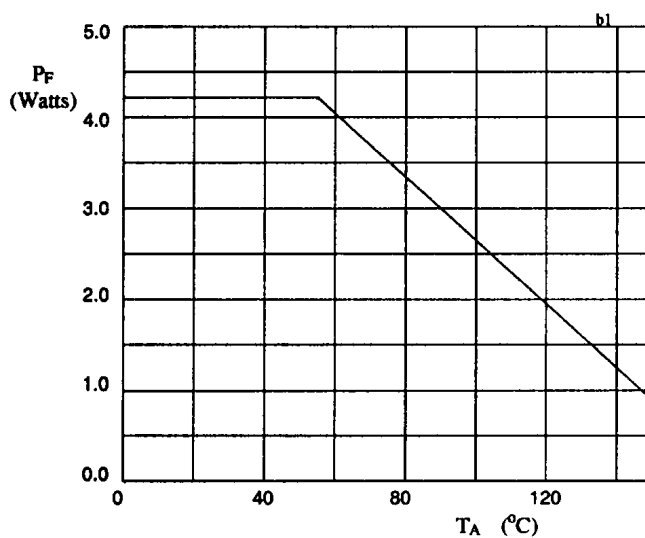


Fig 3. Power derating characteristics when p.c.b mounted



STANDARD RECOVERY, LOW CURRENT 1-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- Insulated electrical connections

QUICK REFERENCE DATA

- $V_R = 200V - 600V$
- $I_F = 5.0A$
- $I_R = 2.0\mu A$
- $t_{rr} = 2.0\mu S$

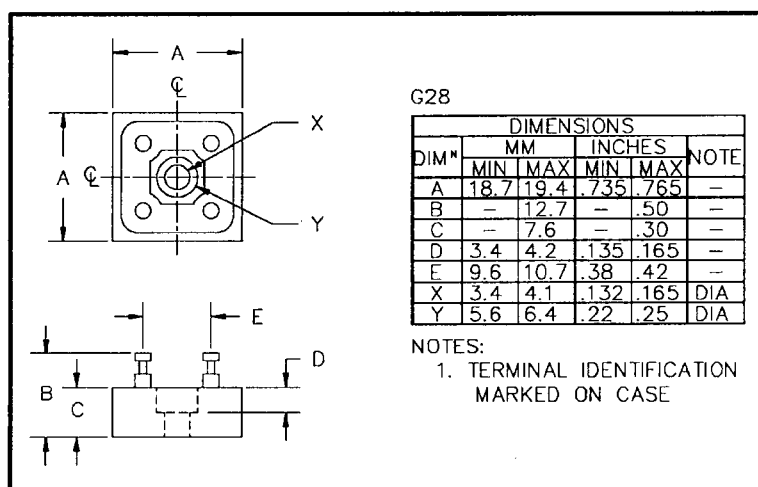
4

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V _{RWM}	Average Rectified Current I _{F(AV)}						1 Cycle Surge Current I _{FSM} t _p = 8.3mS		Repetitive Surge Current I _{FRM}
		(@ case temperature)			(@ ambient temperature)					
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C	
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SCAJ2	200									
SCAJ4	400	5.0	3.5	2.5	2.0	1.5	1.1	50	35	10
SCAJ6	600									

$$R_{\theta JC} = 5^{\circ}C/W$$

MECHANICAL



SCAJ6 is available in Europe to DEF STAN 59-61/90/207 release to F and FX levels.



ELECTRICAL CHARACTERISTICS

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 1A/leg	Reverse Recovery Time t_{rr} @ 25°C	Maximum operating & storage temp. range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	μA	Volts	μS	°C
SCAJ2 SCAJ4 SCAJ6	2.0	50	1.1	2.0	-55 to +150

¹ Measured on discrete devices prior to assembly

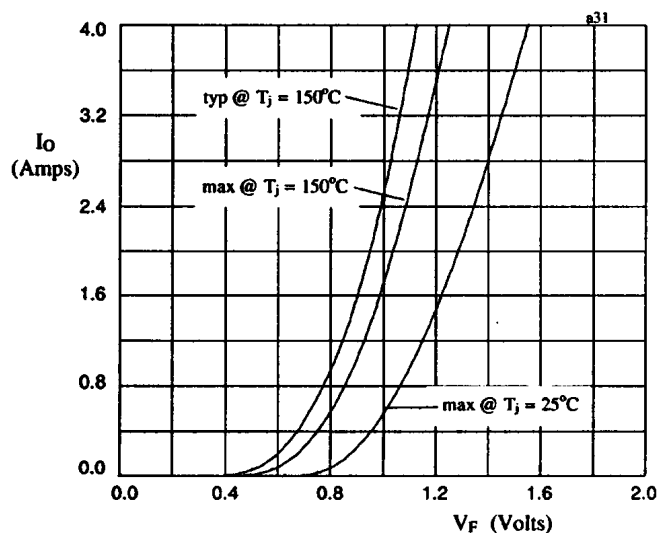


Fig 1. Forward voltage drop against output current per leg.

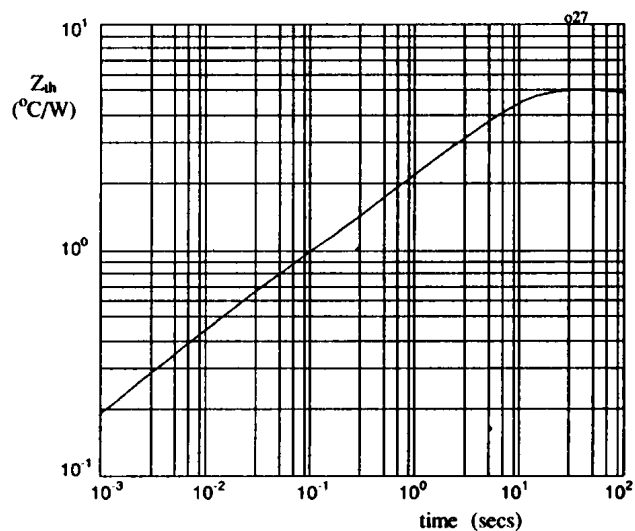


Fig 2. Transient thermal impedance characteristic per leg

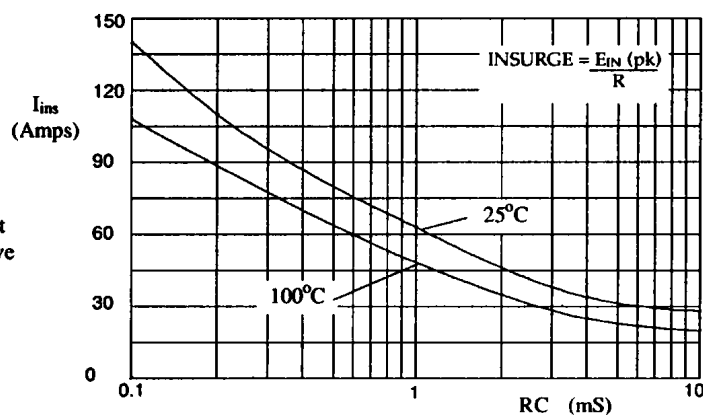


Fig 3. Maximum insurge current against time constant for capacitive loads.



FAST RECOVERY, LOW CURRENT 1-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- Fast reverse recovery time

QUICK REFERENCE DATA

- $V_R = 50V - 600V$
- $I_F = 4.5A$
- $I_R = 2.0\mu A$
- $t_{rr} = 150 - 250nS$

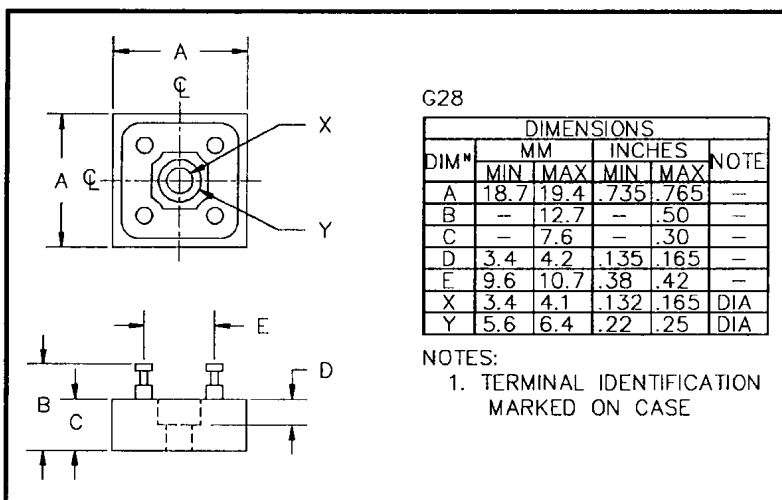
4

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$						1 Cycle Surge Current $I_{FSM} t_p = 8.3mS$	
		(@ case temperature)			(@ ambient temperature)				
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SCAJ05F	50								
SCAJ1F	100								
SCAJ2F	200	4.5	3.0	2.0	1.5	1.0	0.7	25	15
SCAJ4F	400								
SCAJ6F	600								

$$R_{\theta JC} = 5^{\circ}C/W$$

MECHANICAL



SCAJ4F is available in Europe to DEF STAN 59-61/90/207 release to F and FX levels.

**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 1A/leg	Reverse Recovery Time ¹ t_{rr} @ 25°C	Maximum operating & storage temp. range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	μA	Volts	nS	°C
SCAJ05F SCAJ1F SCAJ2F SCAJ4F SCAJ6F	2.0	50	1.2	150 150 150 150 250	-55 to +150

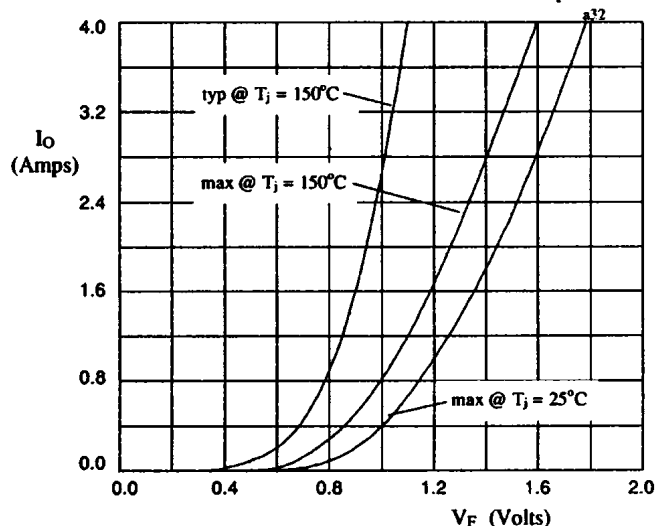
¹ Measured on discrete devices prior to assembly

Fig 1. Forward voltage drop against output current per leg.

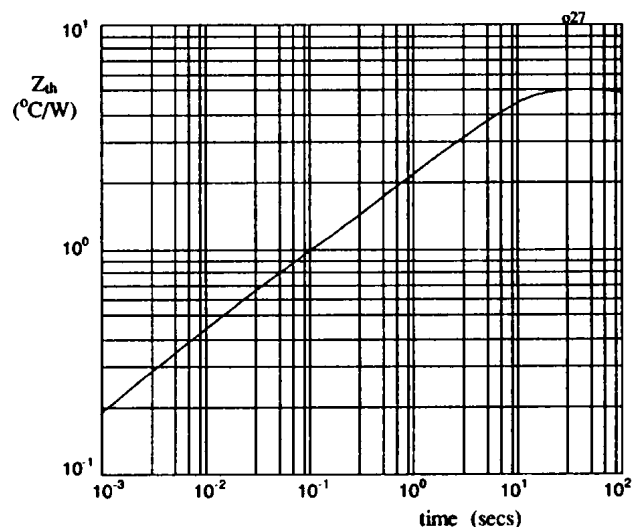


Fig 2. Transient thermal impedance characteristic per leg

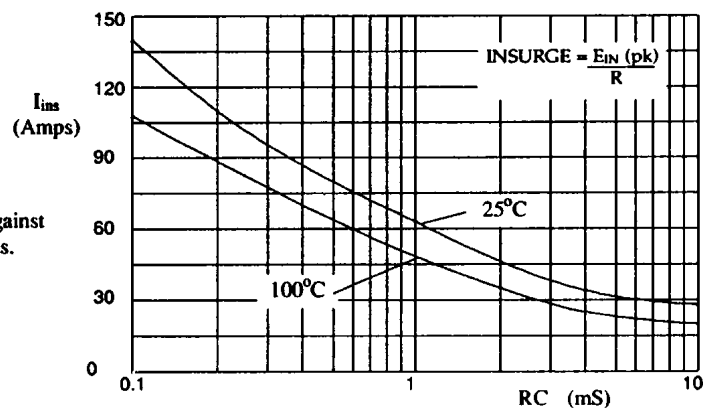


Fig 3. Maximum insurge current against time constant for capacitive loads.



SUPERFAST RECOVERY, LOW CURRENT 1-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- Very fast reverse recovery time

QUICK REFERENCE DATA

- $V_R = 50V - 150V$
- $I_F = 5A$
- $V_F = 1.2V$
- $t_{rr} = 30ns$

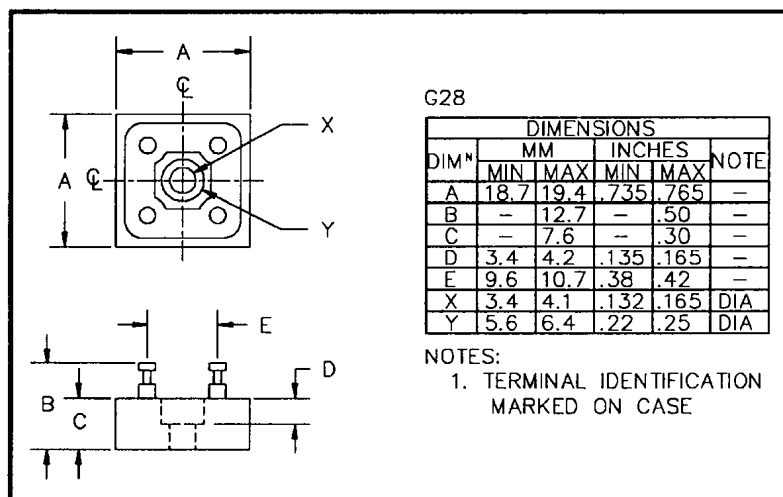
4

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V _{RWM}	Average Rectified Current I _{F(AV)}						1 Cycle Surge Current I _{FSM} t _p = 8.3mS		Repetitive Surge Current I _{FRM}
		(@ case temperature)			(@ ambient temperature)					
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C	
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SCAJ05FF	50									
SCAJ10FF	100	5.0	3.8	2.9	1.5	1.1	0.7	35	24	13
SCAJ15FF	150									

$$R_{\theta JC} = 5^{\circ}C/W$$

MECHANICAL





ELECTRICAL CHARACTERISTICS

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 1.5A/leg	Reverse Recovery Time ¹ t_{rr} @ 25°C	Maximum operating & storage temp. range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	μA	Volts	nS	°C
SCAJ05FF SCAJ10FF SCAJ15FF	2.0	100	1.2	30	-55 to +150

¹ Measured on discrete devices prior to assembly

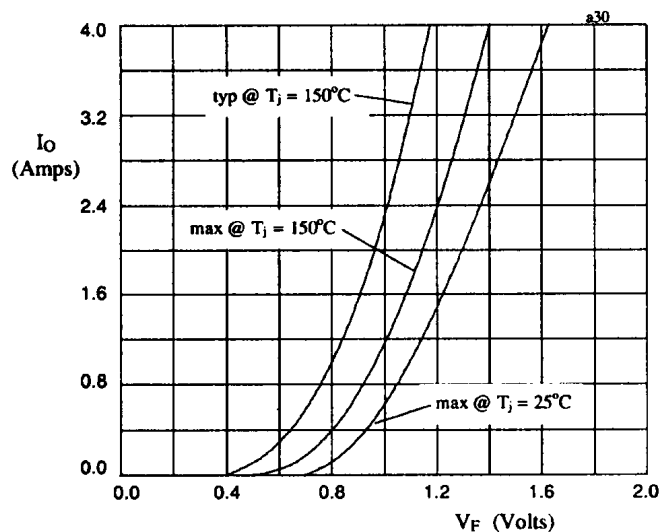


Fig 1. Forward voltage drop against output current per leg.

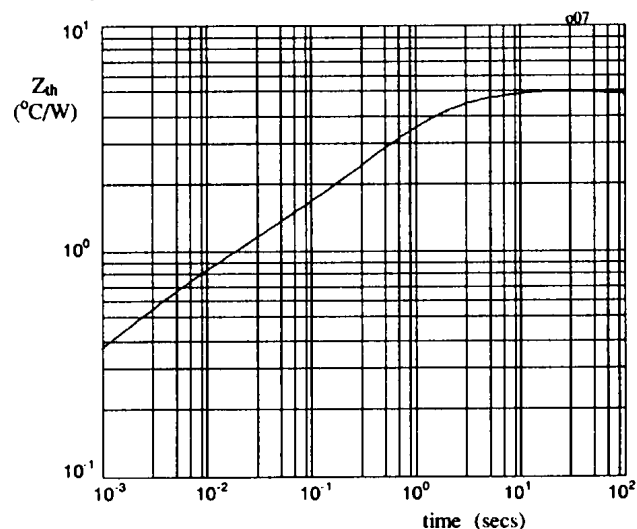


Fig 2. Transient thermal impedance characteristic per leg

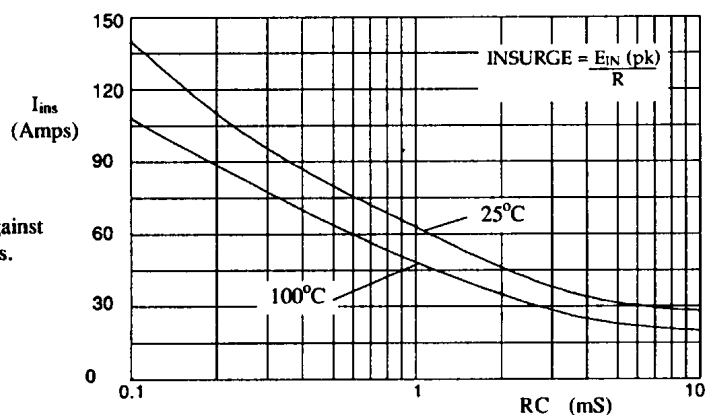


Fig 3. Maximum insurge current against time constant for capacitive loads.



STANDARD RECOVERY, HIGH CURRENT 1-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- High forward and surge current ratings

QUICK REFERENCE DATA

- $V_R = 50V - 600V$
- $I_F = 70A$
- $I_R = 12.0\mu A$
- $I_{FSM} = 750A$

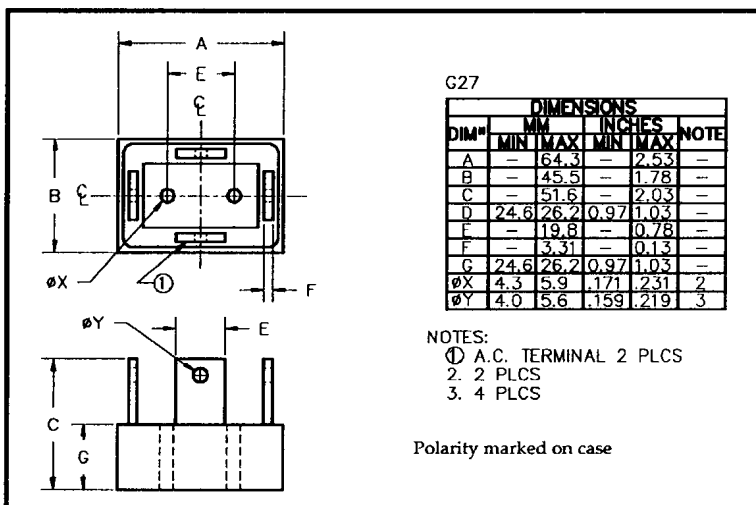
4

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V _{RWM}	Average Rectified Current I _{F(AV)}						1 Cycle Surge Current I _{FSM} t _p = 8.3mS		Repetitive Surge Current I _{FRM}
		(@ case temperature)			(@ ambient temperature)					
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C	
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SCAS05	50	70	47	33	18	14	9	750	600	120
SCAS1	100									
SCAS2	200									
SCAS4	400									
SCAS6	600									

$$R_{\theta JC} = 0.4^{\circ}C/W$$

MECHANICAL



**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 18A/leg	Reverse Recovery Time ¹ t_{rr} @ 25°C	Maximum operating & storage temp. range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	μA			
SCAS05 SCAS1 SCAS2 SCAS4 SCAS6	12.0	300	1.0	2.0	-55 to +150

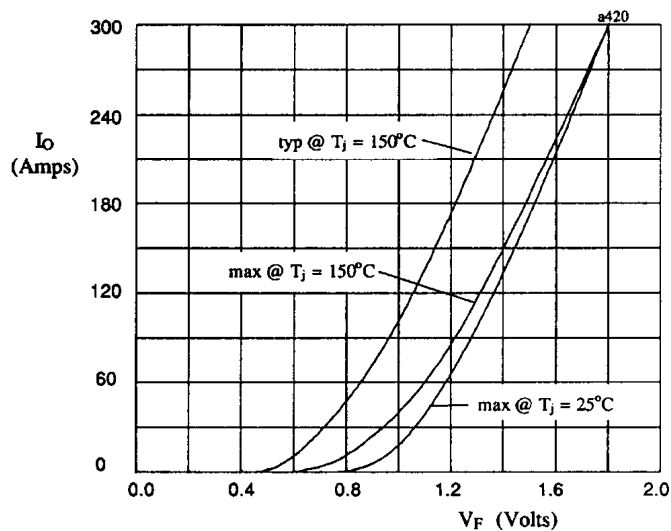
¹ Measured on discrete devices prior to assembly

Fig 1. Forward voltage drop against output current per leg.

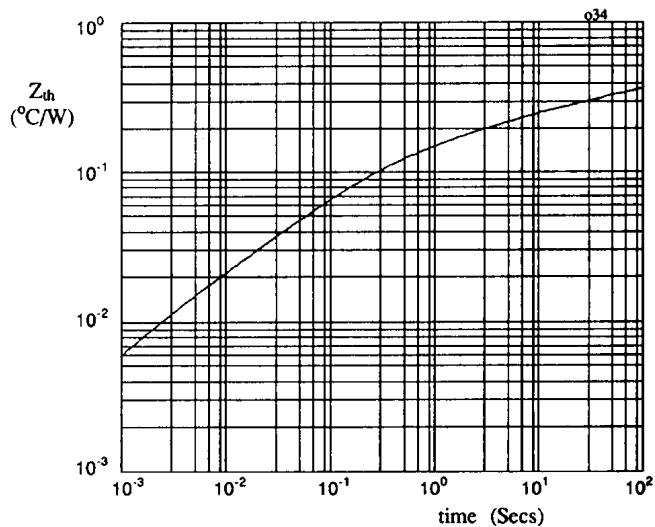


Fig 2. Transient thermal impedance characteristic per leg



FAST RECOVERY, HIGH CURRENT 1-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Low reverse recovery time
- Low thermal impedance
- High forward and surge current ratings

QUICK REFERENCE DATA

- $V_R = 50V - 400V$
- $I_F = 65A$
- $I_R = 12 \mu A$
- $t_{rr} = 150nS$

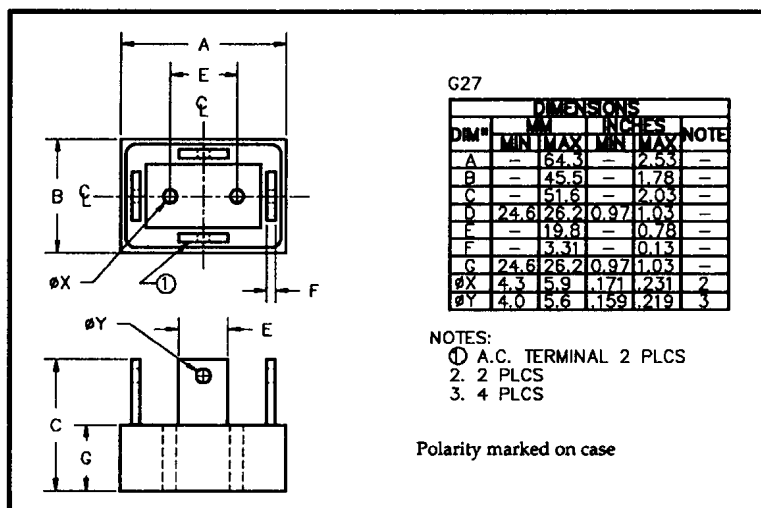
4

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V _{RWM}	Average Rectified Current I _{F(AV)}						1 Cycle Surge Current I _{FSM} t _p = 8.3mS		Repetitive Surge Current I _{FRM}
		(@ case temperature)			(@ ambient temperature)					
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C	
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SCAS05F	50									
SCAS1F	100	65	43	30	16	11.5	7.2	750	480	120
SCAS2F	200									
SCAS4F	400									

$$R_{\theta JC} = 0.4^{\circ}C/W$$

MECHANICAL



**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 18A/leg	Reverse Recovery Time ¹ t_{rr} @ 25°C	Maximum operating & storage temp. range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	μA	Volts	nS	°C
SCAS05F SCAS1F SCAS2F SCAS4F	12	300	1.1	150	-55 to +150

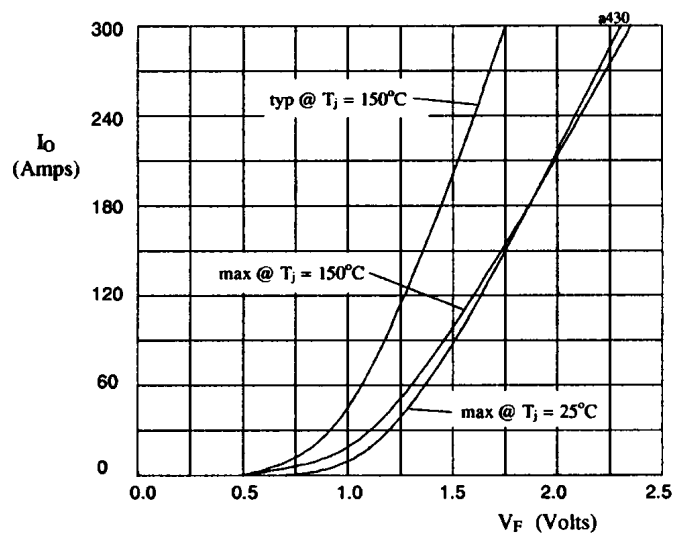
¹ Measured on discrete devices prior to assembly

Fig 1. Forward voltage drop against output current per leg.

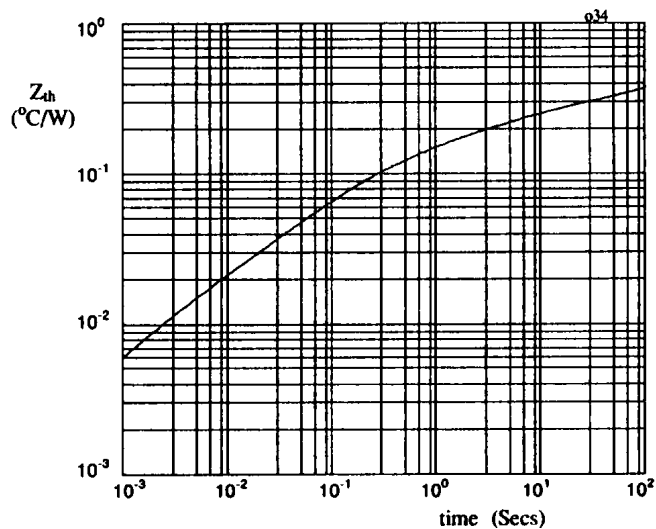


Fig 2. Transient thermal impedance characteristic per leg



SUPERFAST RECOVERY, HIGH CURRENT 1-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Very fast reverse recovery time
- Low thermal impedance
- High forward and surge current ratings

QUICK REFERENCE DATA

- $V_R = 50V - 150V$
- $I_F = 70A$
- $V_F = 0.97V$
- $t_{rr} = 30nS$

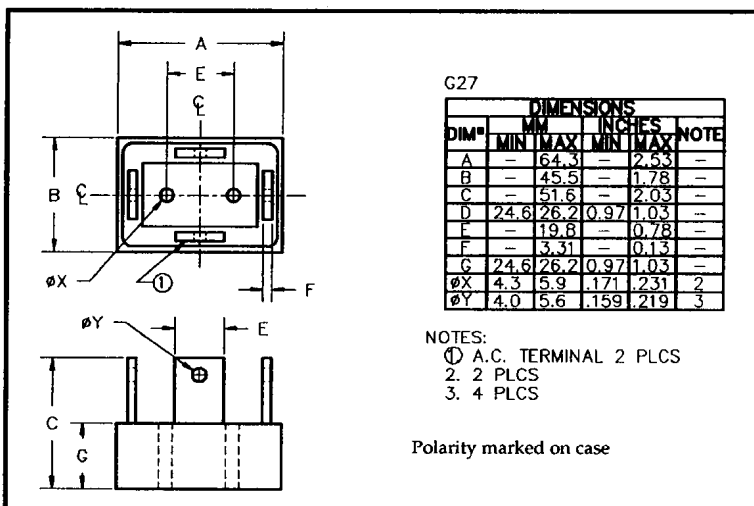
4

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_F(AV)$						1 Cycle Surge Current I_{FSM} $t_p = 8.3mS$		Repetitive Surge Current I_{FRM}
		(@ case temperature)			(@ ambient temperature)					
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C	
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	
SCAS05FF	50									
SCAS10FF	100	70	48	35	18	12.5	8.0	900	750	125
SCAS15FF	150									

$$R_{\theta JC} = 0.4^{\circ}C/W$$

MECHANICAL



**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 30A/leg	Reverse Recovery Time ¹ t_{rr} @ 25°C	Maximum operating & storage temp. range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	mA			
SCAS05FF SCAS10FF SCAS15FF	120	6.0	0.97	30	-55 to +150

¹ Measured on discrete devices prior to assembly

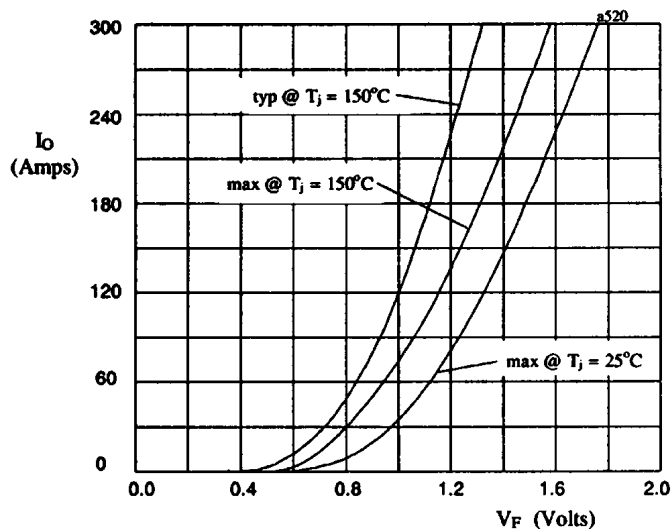


Fig 1. Forward voltage drop against output current per leg.

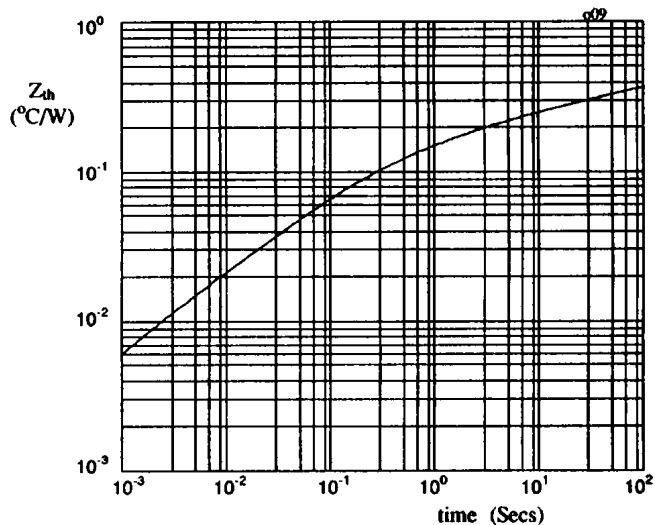


Fig 2. Transient thermal impedance characteristic per leg



STANDARD RECOVERY, MEDIUM CURRENT 1-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

QUICK REFERENCE DATA

- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- Insulated electrical connections

- $V_R = 200V - 600V$
- $I_F = 25A$
- $I_R = 2.0\mu A$
- $t_{rr} = 2.0\mu S$

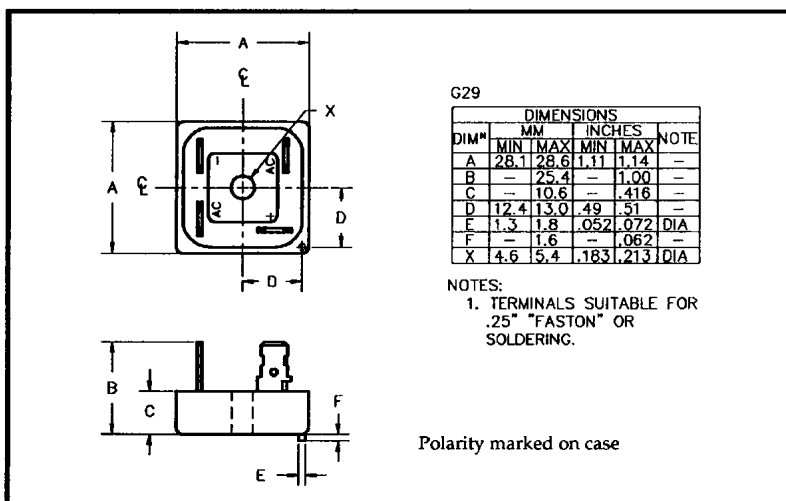
4

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_F(AV)$						1 Cycle Surge Current $I_{FSM} t_p = 8.3mS$	
		(@ case temperature)			(@ ambient temperature)				
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SCBA2	200								
SCBA4	400	25	18.5	12.5	6.0	5.0	3.0	150	100
SCBA6	600								

$$R_{\theta JC} = 2.0^{\circ}C/W$$

MECHANICAL



SCBA6 is available in Europe to DEF STAN 59-61/90/207 release to F and FX levels.



ELECTRICAL CHARACTERISTICS

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 3A/leg	Reverse Recovery Time ¹ t_{rr} @ 25°C	Maximum operating & storage temp. range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	μA	Volts	μS	°C
SCBA2 SCBA4 SCBA6	2.0	40	1.0	2.0	-55 to +150

¹ Measured on discrete devices prior to assembly

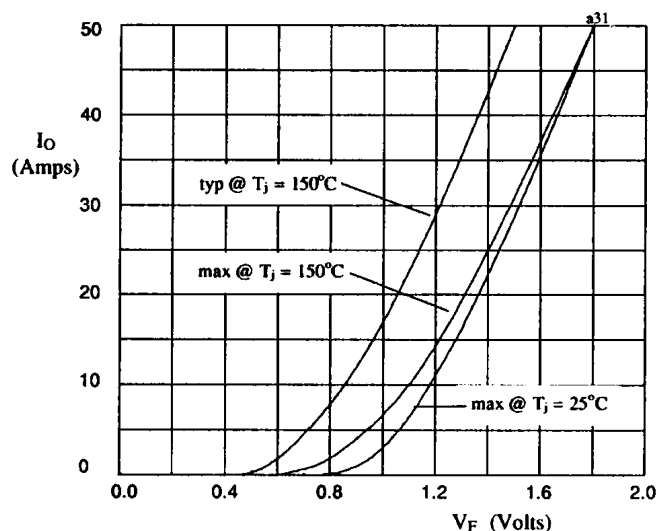


Fig 1. Forward voltage drop against output current per leg.

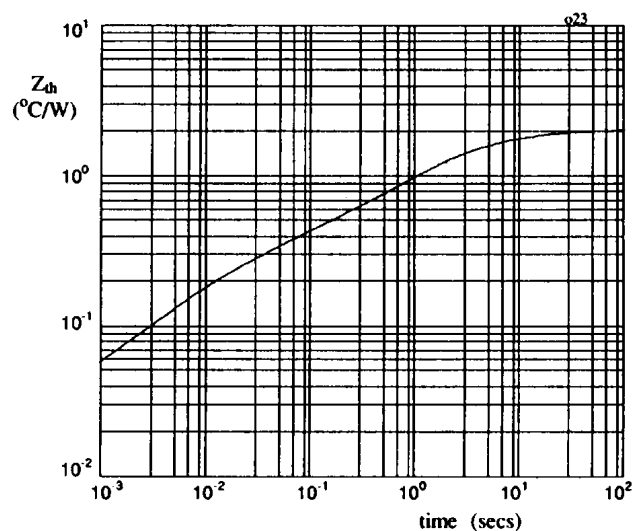


Fig 2. Transient thermal impedance characteristic per leg

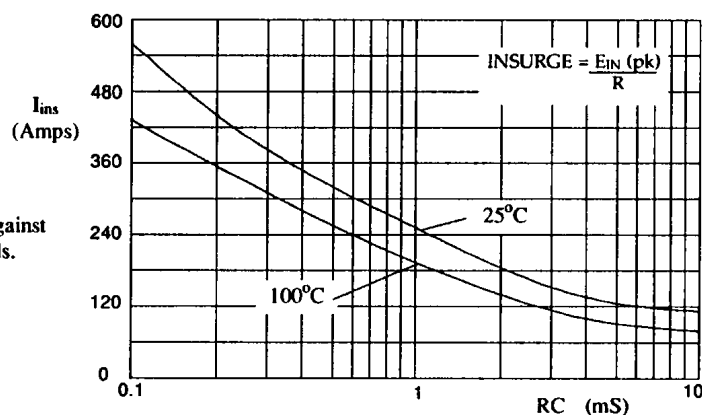


Fig 3. Maximum surge current against time constant for capacitive loads.



FAST RECOVERY, MEDIUM CURRENT 1-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- Fast reverse recovery time

QUICK REFERENCE DATA

- $V_R = 50V - 400V$
- $I_F = 20.0A$
- $I_R = 2.0 \mu A$
- $t_{rr} = 150ns$

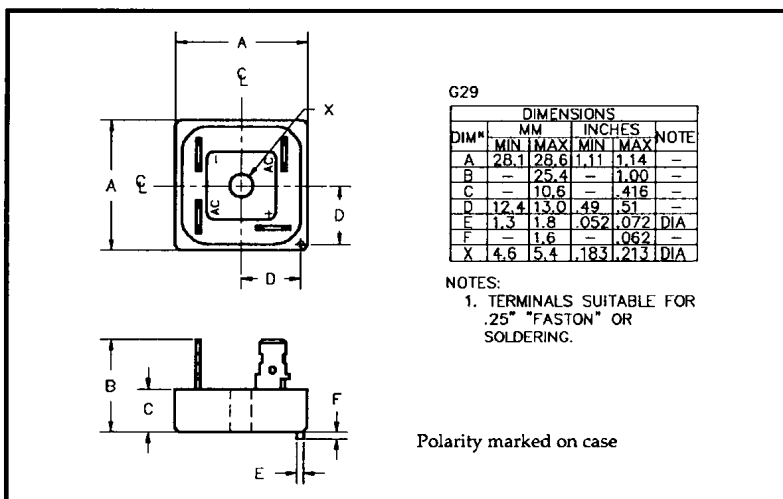
4

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$						1 Cycle Surge Current	
		(@ case temperature)			(@ ambient temperature)			$I_{FSM} t_p = 8.3mS$	
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SCBA05F	50	20	15	10	5.0	4.0	2.5	150	80
SCBA1F	100								
SCBA2F	200								
SCBA4F	400								

$$R_{\theta JC} = 2.0^{\circ}C/W$$

MECHANICAL



SCBA4F is available in Europe to DEF STAN 59-61/90/207 release to F and FX levels.



ELECTRICAL CHARACTERISTICS

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 3A/leg	Reverse Recovery Time ¹ t_{rr} @ 25°C	Maximum operating & storage temp. range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	μA	Volts	nS	°C
SCBA05F SCBA1F SCBA2F SCBA4F	2.0	50	1.1	150 150 150 150	-55 to +150

¹ Measured on discrete devices prior to assembly

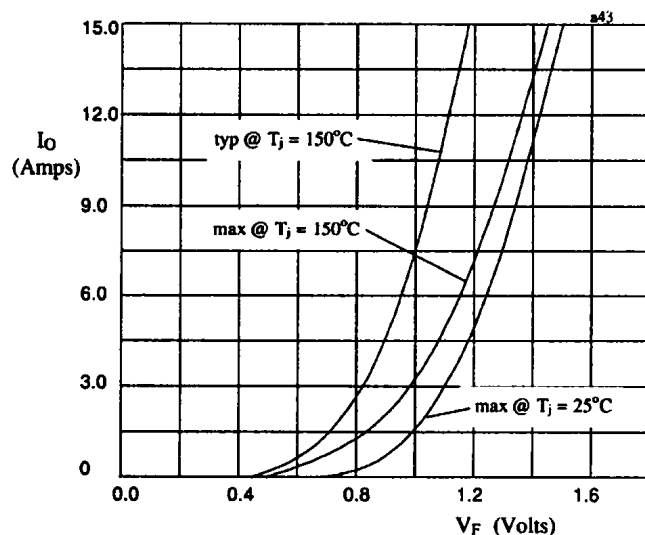


Fig 1. Forward voltage drop against output current per leg.

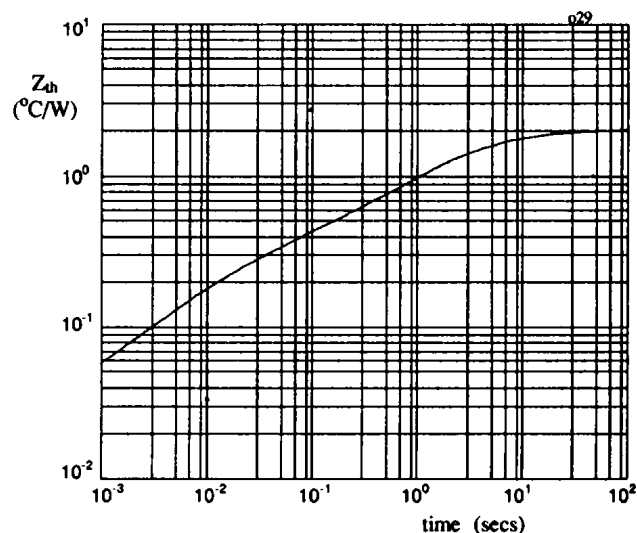


Fig 2. Transient thermal impedance characteristic per leg

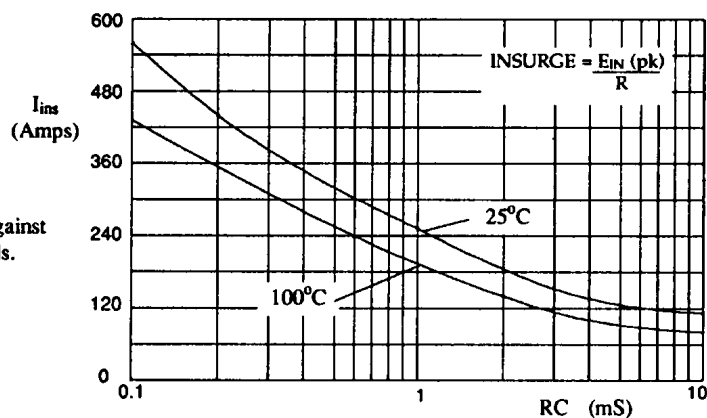


Fig 3. Maximum surge current against time constant for capacitive loads.



SUPERFAST RECOVERY, MEDIUM CURRENT 1-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

QUICK REFERENCE DATA

- Low forward voltage drop
- Low reverse leakage current
- Low thermal impedance
- Very fast reverse recovery time
- Aluminum case

- $V_R = 50V - 150V$
- $I_F = 20A$
- $V_F = 0.97V$
- $t_{rr} = 30ns$

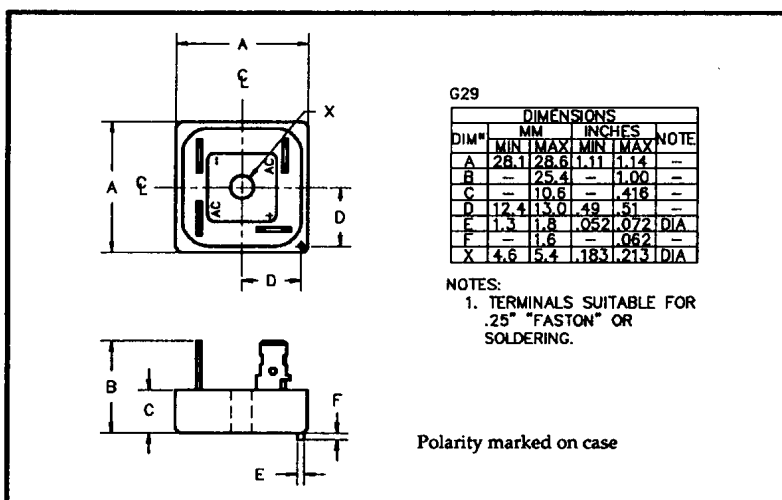
4

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_F(AV)$						1 Cycle Surge Current $I_{FSM} t_p = 8.3mS$	
		(@ case temperature)			(@ ambient temperature)				
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SCBA05FF	50								
SCBA10FF	100	25	18.5	12.8	5	3	1.8	175	120
SCBA15FF	150								

$$R_{\theta JC} = 2.0^{\circ}C/W$$

MECHANICAL





ELECTRICAL CHARACTERISTICS

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 5A/leg	Reverse Recovery Time ¹ t_{rr} @ 25°C	Maximum operating & storage temp. range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	mA			
SCBA05FF SCBA10FF SCBA15FF	20	1.0	0.97	30	-55 to +150

¹ Measured on discrete devices prior to assembly

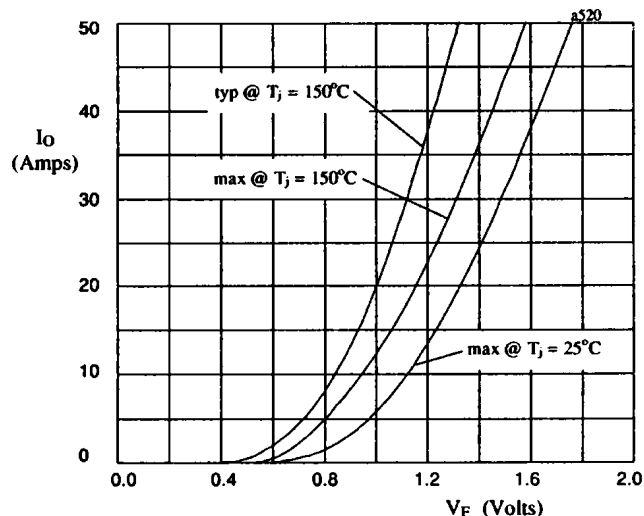


Fig 1. Forward voltage drop against output current per leg.

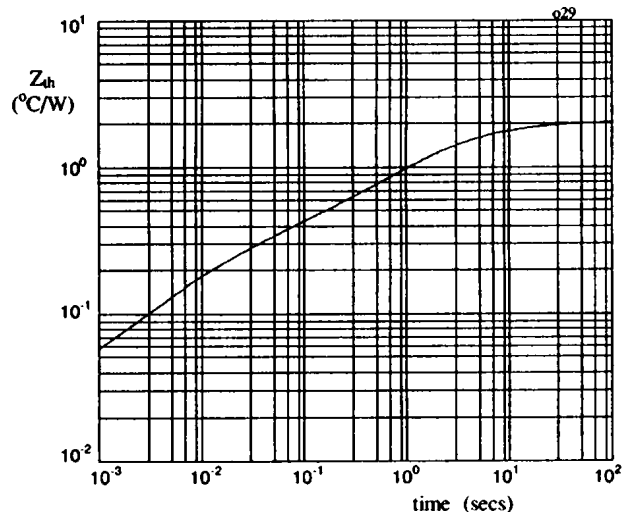


Fig 2. Transient thermal impedance characteristic per leg

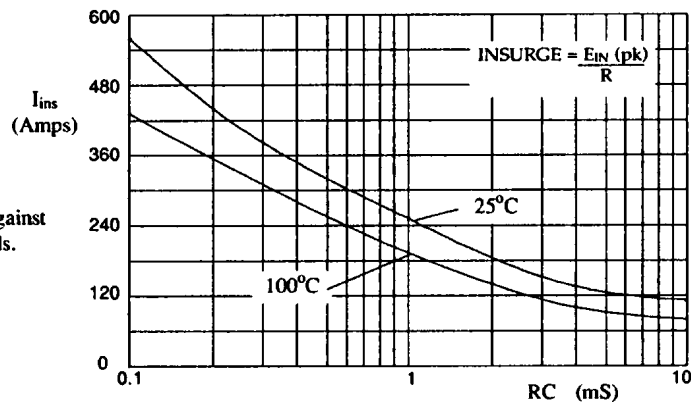


Fig 3. Maximum surge current against time constant for capacitive loads.

**STANDARD RECOVERY, HIGH CURRENT 1-PHASE
FULL WAVE BRIDGE RECTIFIER ASSEMBLIES**

- Low forward voltage drop
- Low reverse leakage current
- Aluminium case
- Low thermal impedance
- Insulated electrical connections

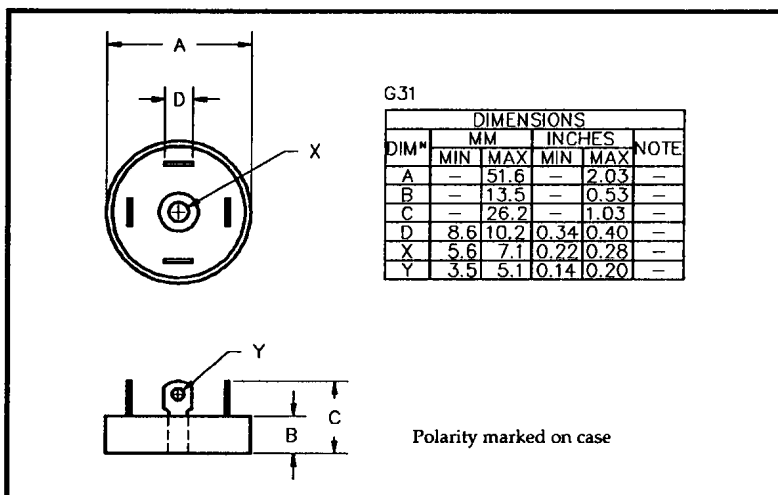
**QUICK REFERENCE
DATA**

- $V_R = 50V - 1000V$
- $I_F = 53A$
- $I_R = 6.0 \mu A$
- $t_{rr} = 2.0\mu S$

4
ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$						1 Cycle Surge Current $I_{FSM} t_p = 8.3mS$	
		(@ case temperature)			(@ ambient temperature)				
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SCBAR05	50								
SCBAR1	100								
SCBAR2	200								
SCBAR4	400	53	35	25	9.5	7.0	4.5	375	250
SCBAR6	600								
SCBAR8	800								
SCBAR10	1000								

$$R_{\theta JC} = 0.7^{\circ}C/W$$

MECHANICAL


**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current $I_R @ V_{RWM}$		Maximum Forward Voltage $V_F @ 9A/leg$	Reverse Recovery Time ¹ $t_{rr} @ 25^\circ C$	Maximum operating & storage temp. range. $T_{OP} \quad T_{STG}$
	@ 25°C	@ 100°C			
	μA	μA	Volts	μS	°C
SCBAR05 SCBAR1 SCBAR2 SCBAR4 SCBAR6 SCBAR8 SCBAR10	6.0	240	1.0	2.0	-55 to +150

¹ Measured on discrete devices prior to assembly

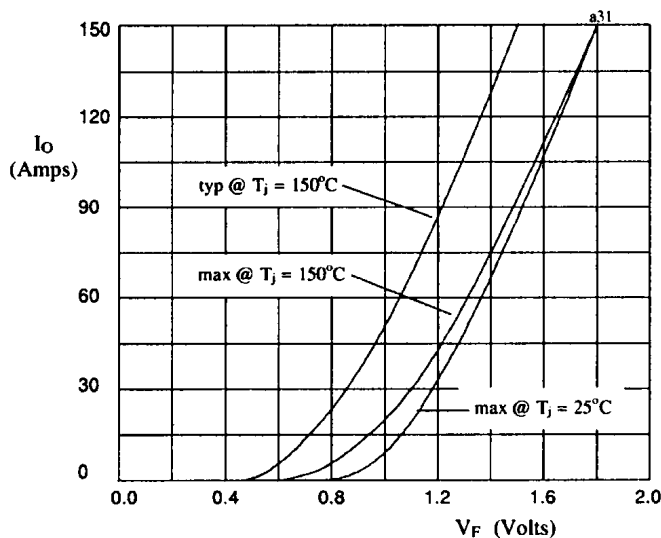


Fig 1. Forward voltage drop against output current per leg.

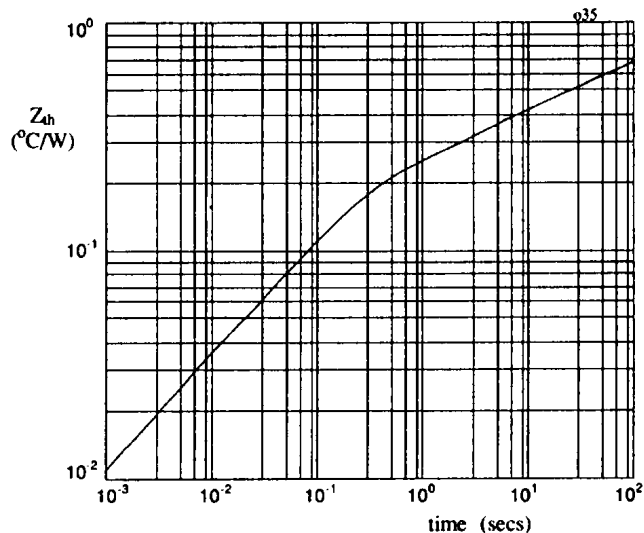


Fig 2. Transient thermal impedance characteristic per leg



FAST RECOVERY, HIGH CURRENT 1-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- Fast reverse recovery time

QUICK REFERENCE DATA

- $V_R = 50V - 400V$
- $I_F = 50A$
- $I_R = 6.0\mu A$
- $t_{rr} = 150nS$

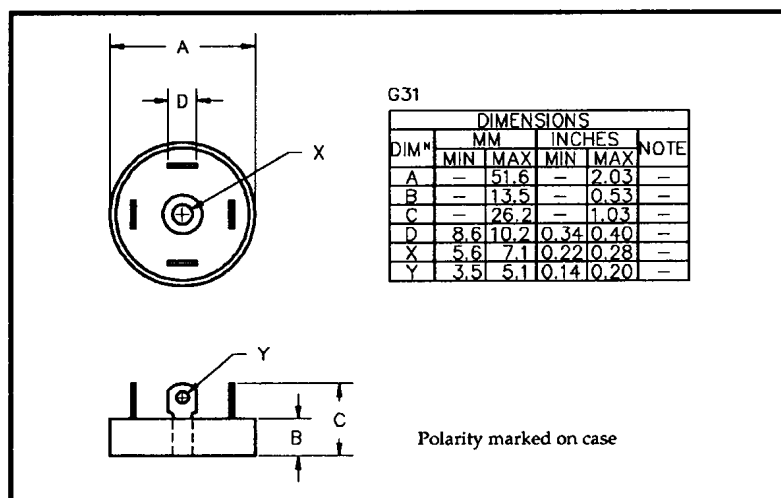
4

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$						1 Cycle Surge Current $I_{FSM} \ t_p = 8.3mS$	
		(@ case temperature)			(@ ambient temperature)			@ 25°C	@ 100°C
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C		
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SCBAR05F	50								
SCBAR1F	100	50	31	20	9.0	6.7	4.3	375	240
SCBAR2F	200								
SCBAR4F	400								

$$R_{\theta JC} = 0.7^{\circ}C/W$$

MECHANICAL



**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 9A/leg	Reverse Recovery Time ¹ t_{rr} @ 25°C	Maximum operating & storage temp. range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	μA			
SCBAR05F SCBAR1F SCBAR2F SCBAR4F	6.0	150	1.1	150	-55 to +150

¹ Measured on discrete devices prior to assembly

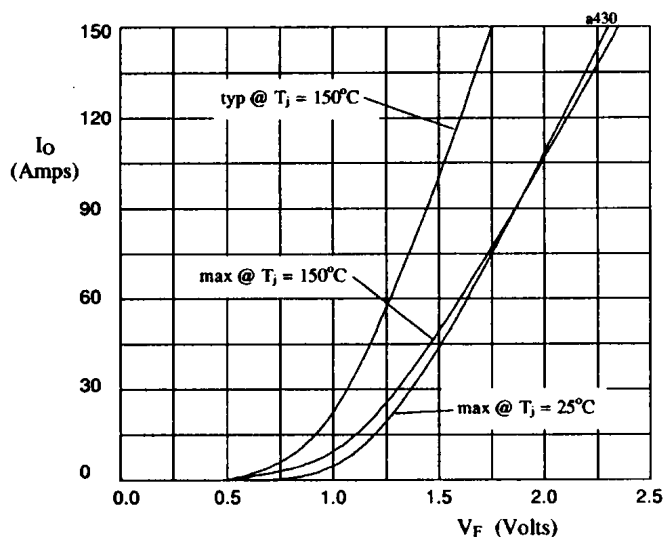


Fig 1. Forward voltage drop against output current per leg.

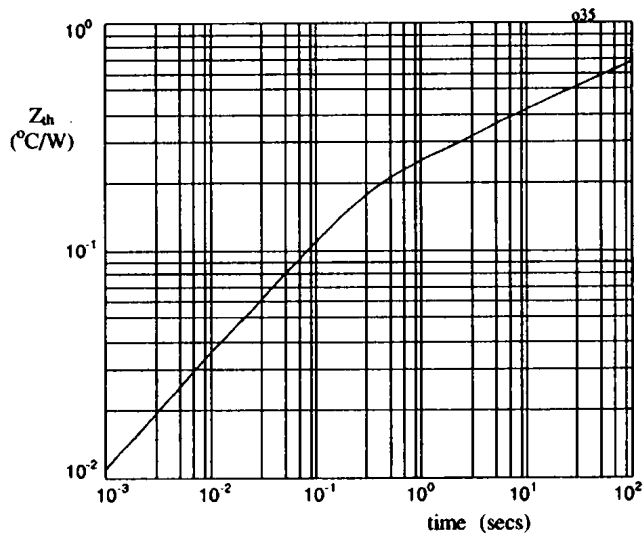


Fig 2. Transient thermal impedance characteristic per leg



SUPERFAST RECOVERY, HIGH CURRENT 1-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Low thermal impedance
- Very fast reverse recovery time
- Aluminum case

QUICK REFERENCE DATA

- $V_R = 50V - 150V$
- $I_F = 55A$
- $V_F = 0.97V$
- $t_{rr} = 30nS$

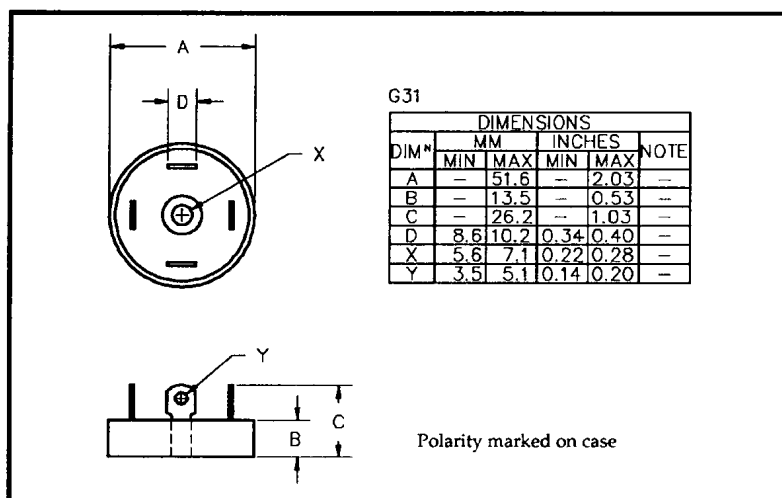
4

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$						1 Cycle Surge Current	
		(@ case temperature)			(@ ambient temperature)			$I_{FSM} \ t_p = 8.3mS$	
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SCBAR05FF	50								
SCBAR10FF	100	55	37	22	9.0	6.75	4.3	450	375
SCBAR15FF	150								

$$R_{\theta JC} = 0.7^{\circ}C/W$$

MECHANICAL





ELECTRICAL CHARACTERISTICS

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 15A/leg	Reverse Recovery Time ¹ t_{rr} @ 25°C	Maximum operating & storage temp. range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	mA	Volts	nS	°C
SCBAR05FF SCBAR10FF SCBAR15FF	60	3.0	0.97	30	- 55 to +150

¹ Measured on discrete devices prior to assembly

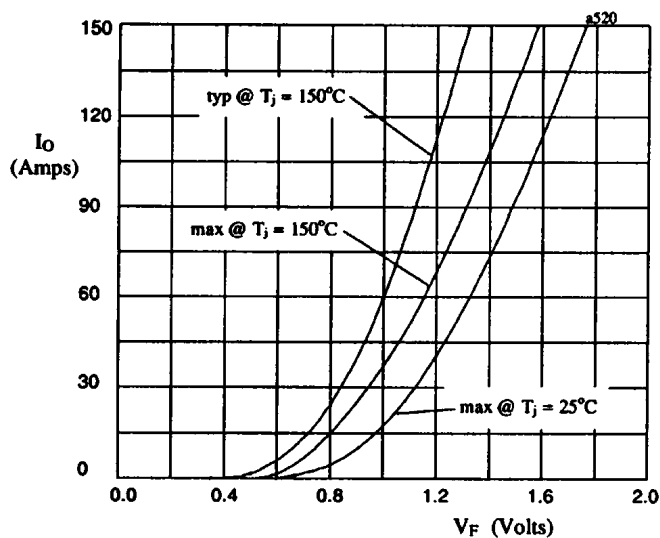


Fig 1. Forward voltage drop against output current per leg.

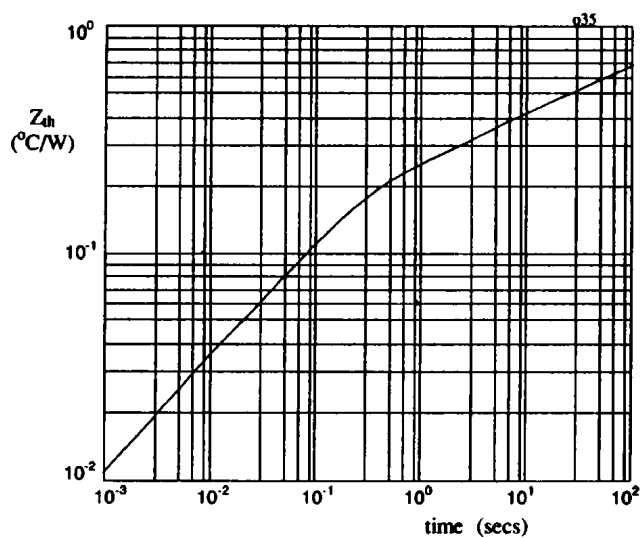


Fig 2. Transient thermal impedance characteristic per leg



STANDARD RECOVERY, LOW CURRENT 1-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- Insulated electrical connections

QUICK REFERENCE DATA

- $V_R = 200V - 600V$
- $I_F = 12A$
- $I_R = 2.0\mu A$
- $t_{rr} = 2.0\mu s$

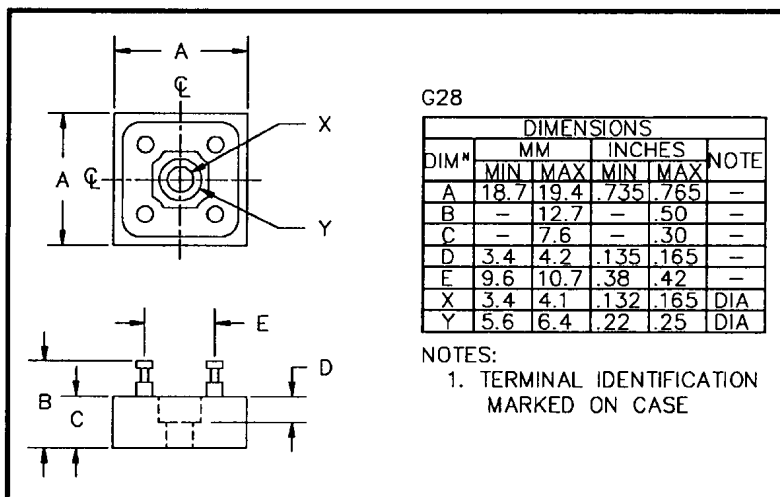
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ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V _{RWM}	Average Rectified Current I _{F(AV)}						1 Cycle Surge Current I _{FSM} t _p = 8.3mS		Repetitive Surge Current I _{FRM}
		(@ case temperature)			(@ ambient temperature)					
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C	@ 25 °C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SCBH2	200									
SCBH4	400	12	9.0	8.5	4.0	3.0	1.7	150	100	50
SCBH6	600									

$$R_{\theta JC} = 3.3^{\circ}C/W$$

MECHANICAL



SCBH6 is available in Europe to DEF STAN 59-61/90/207 release to F and FX levels.



ELECTRICAL CHARACTERISTICS

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 3A/leg	Reverse Recovery Time ¹ t_{rr} @ 25°C	Maximum operating & storage temp. range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	μA	Volts	μS	°C
SCBH2 SCBH4 SCBH6	2.0	50	1.0	2.0	-55 to +150

¹ Measured on discrete devices prior to assembly

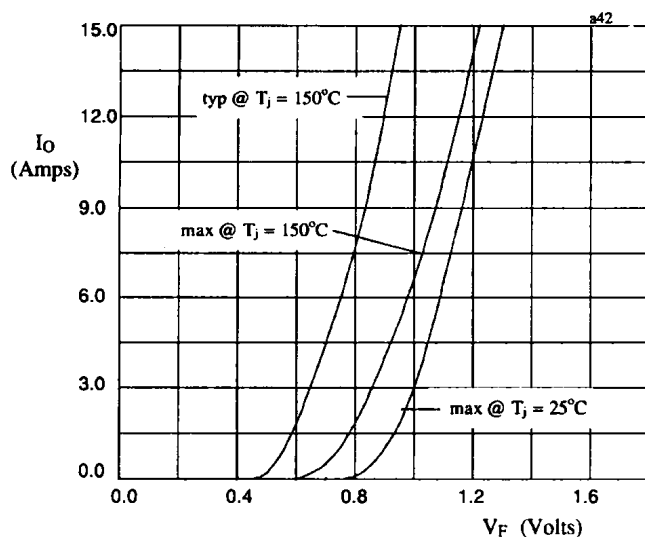


Fig 1. Forward voltage drop against output current per leg.

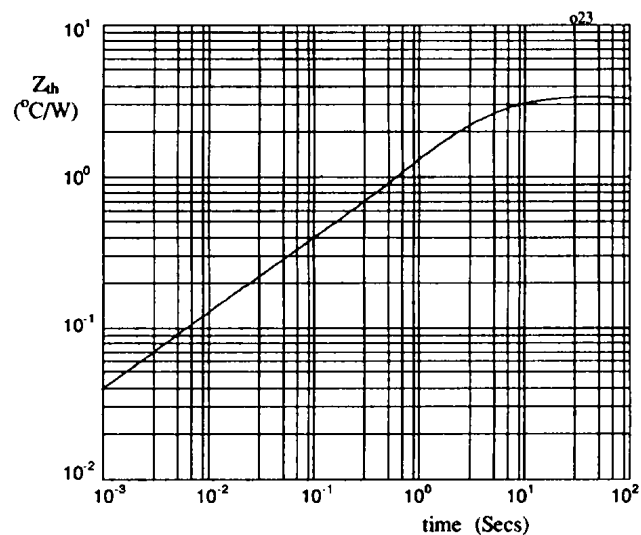


Fig 2. Transient thermal impedance characteristic per leg

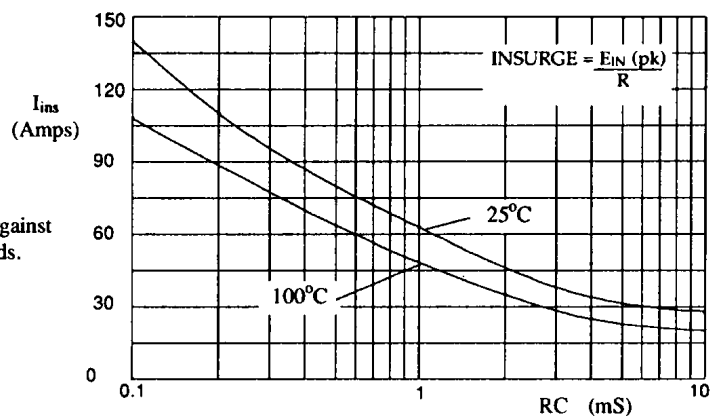


Fig 3. Maximum surge current against time constant for capacitive loads.



FAST RECOVERY, LOW CURRENT 1-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Fast reverse recovery time
- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance

QUICK REFERENCE DATA

- $V_R = 50V - 400V$
- $I_F = 10A$
- $I_R = 2.0\mu A$
- $t_{rr} = 150ns$

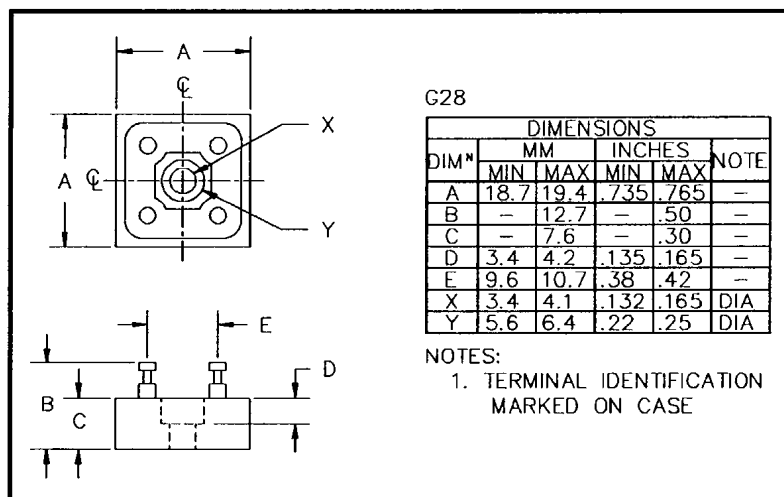
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ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V _{RWM}	Average Rectified Current I _{F(AV)}						1 Cycle Surge Current I _{FSM} t _p = 8.3mS		Repetitive Surge Current I _{FRM}
		(@ case temperature)			(@ ambient temperature)					
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C	
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SCBH05F	50	10	7.5	5.5	4.0	3.0	1.7	150	80	25
SCBH1F	100									
SCBH2F	200									
SCBH4F	400									

$$R_{\theta JC} = 3.3^{\circ}C/W$$

MECHANICAL



SCBH4F is available in Europe to DEF STAN 59-61/90/207 release to F and FX levels.

**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 3A/leg	Reverse Recovery Time ¹ t_{rr} @ 25°C	Maximum operating & storage temp. range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	μA	Volts	nS	°C
SCBH05F SCBH1F SCBH2F SCBH4F	2.0	40	1.1	150	-55 to +150

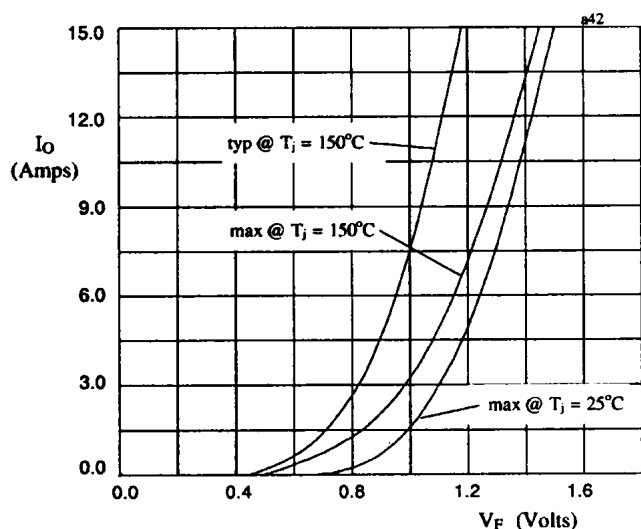
¹ Measured on discrete devices prior to assembly

Fig 1. Forward voltage drop against output current per leg.

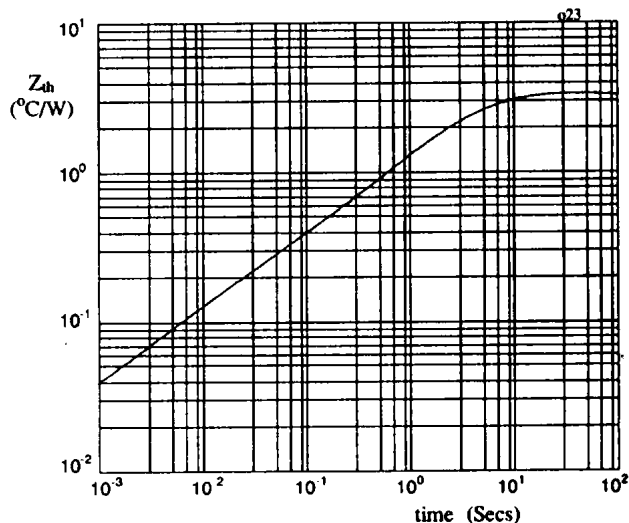


Fig 2. Transient thermal impedance characteristic per leg

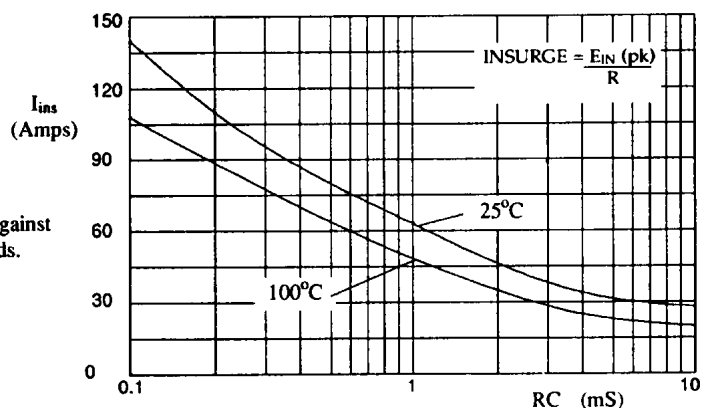


Fig 3. Maximum insurge current against time constant for capacitive loads.



SUPERFAST RECOVERY, LOW CURRENT 1-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Very fast reverse recovery time
- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance

QUICK REFERENCE DATA

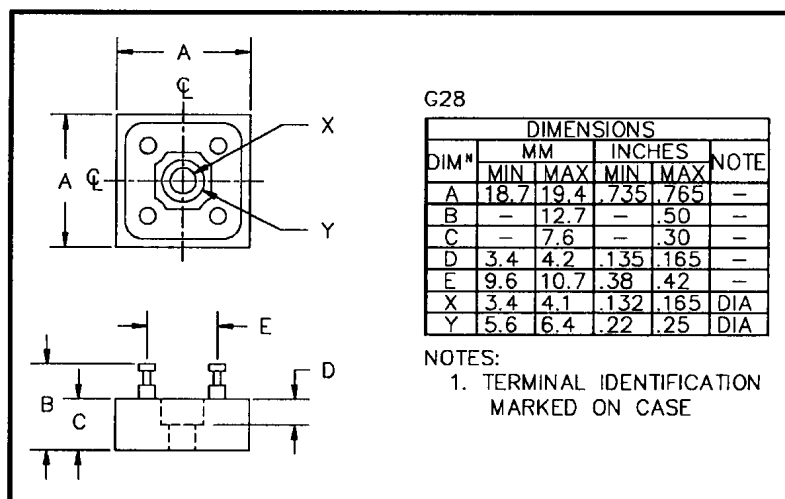
- $V_R = 50V - 150V$
- $I_F = 12A$
- $V_F = 0.97V$
- $t_{rr} = 30nS$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V _{RWM}	Average Rectified Current I _{F(AV)}						1 Cycle Surge Current I _{FSM} t _p = 8.3mS		Repetitive Surge Current I _{FRM}
		(@ case temperature)			(@ ambient temperature)					
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C	
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SCBH05FF	50									
SCBH10FF	100	12	9	7.5	5	3.8	2	175	120	24
SCBH15FF	150									

$$R_{\theta JC} = 3.3^{\circ}C/W$$

MECHANICAL





ELECTRICAL CHARACTERISTICS

Device Type	Maximum Reverse Leakage Current $I_R @ V_{RWM}$		Maximum Forward Voltage $V_F @ 5A/leg$	Reverse Recovery Time ¹ $t_{rr} @ 25^\circ C$	Maximum operating & storage temp. range. $T_{OP} \quad T_{STG}$
	@ 25°C	@ 100°C			
	μA	mA	Volts	nS	°C
SCBH05FF SCBH10FF SCBH15FF	20	1.0	0.97	30	- 55 to +150

¹ Measured on discrete devices prior to assembly

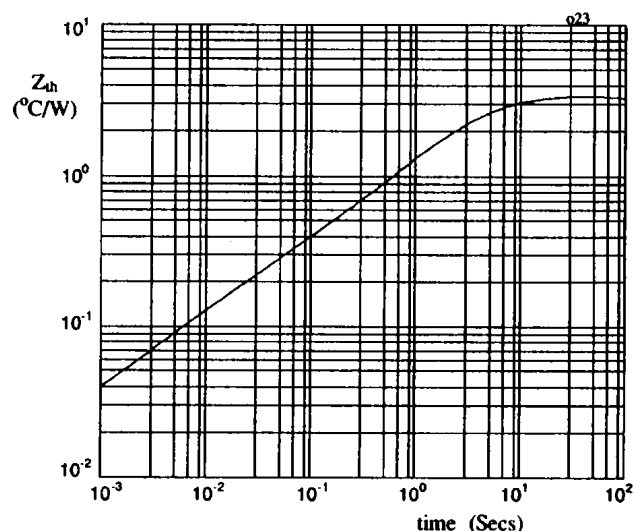
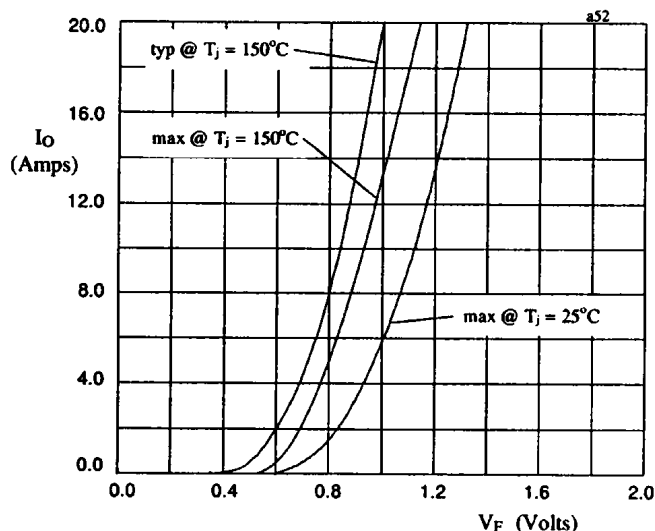
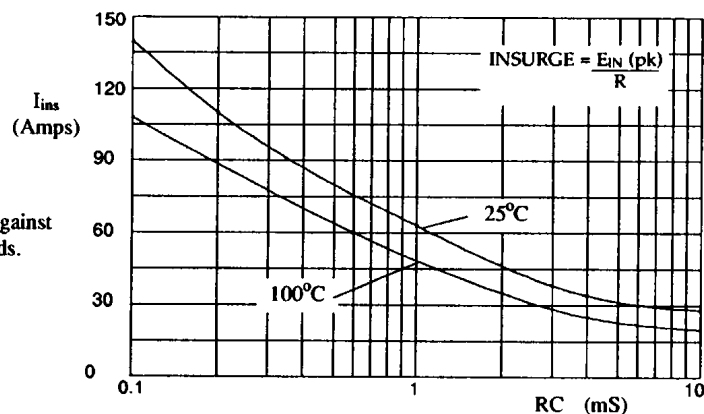


Fig 3. Maximum insurge current against time constant for capacitive loads.





STANDARD RECOVERY, HIGH CURRENT 1-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- High surge ratings

QUICK REFERENCE DATA

- $V_R = 50V - 600V$
- $I_F = 38A$
- $I_R = 8.0\mu A$
- $I_{FSM} = 500A$

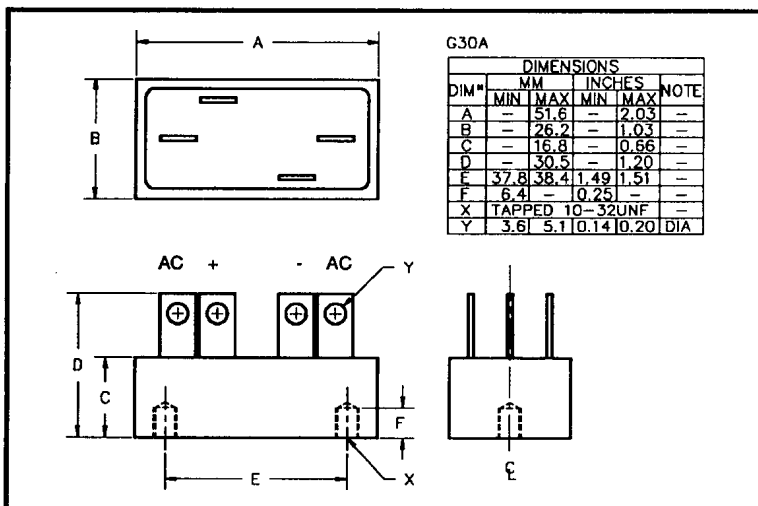
4

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_F(AV)$						1 Cycle Surge Current $I_{FSM} \ t_p = 8.3mS$		Repetitive Surge Current I_{FRM}
		(@ case temperature)			(@ ambient temperature)					
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C	
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	
SCBK05	50									
SCBK1	100									
SCBK2	200	38	24	17.5	13	10	6	500	325	80
SCBK4	400									
SCBK6	600									

$$R_{\theta JC} = 1.2^{\circ}C/W$$

MECHANICAL



**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 12A/leg	Reverse Recovery Time ¹ t_{rr} @ 25°C	Maximum operating & storage temp. range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	μA	Volts	μS	°C
SCBK05 SCBK1 SCBK2 SCBK4 SCBK6	8.0	200	1.0	2.0	-55 to +150

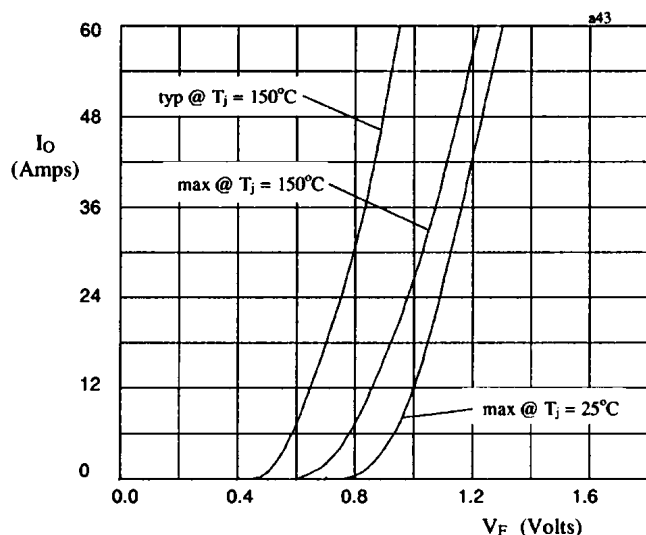
¹ Measured on discrete devices prior to assembly

Fig 1. Forward voltage drop against output current per leg.

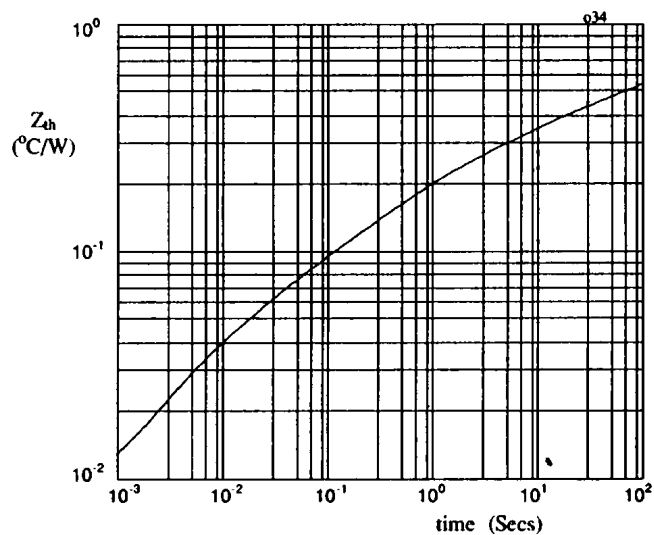


Fig 2. Transient thermal impedance characteristic per leg

**FAST RECOVERY, HIGH CURRENT 1-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES**

- Low forward voltage drop
- Low reverse leakage current
- Fast reverse recovery time
- Low thermal impedance
- High surge ratings

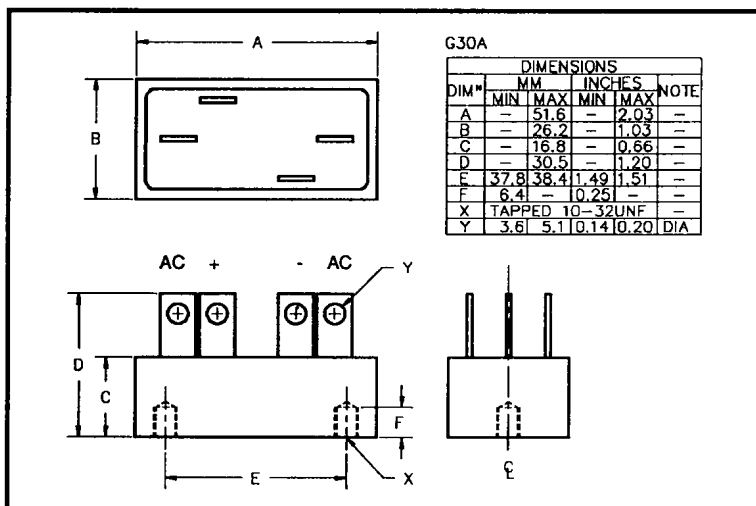
QUICK REFERENCE DATA

- $V_R = 50V - 400V$
- $I_F = 32A$
- $I_R = 8.0\mu A$
- $t_{rr} = 150nS$

4**ABSOLUTE MAXIMUM RATINGS**

Device Type	Working Reverse Voltage V _{RWM}	Average Rectified Current I _{F(AV)}						1 Cycle Surge Current I _{FSM} t _p = 8.3mS		Repetitive Surge Current I _{FRM}
		(@ case temperature)			(@ ambient temperature)					
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C	
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	
SCBK05F	50									
SCBK1F	100									
SCBK2F	200	32	20	16	11	8.5	5.0	500	320	80
SCBK4F	400									

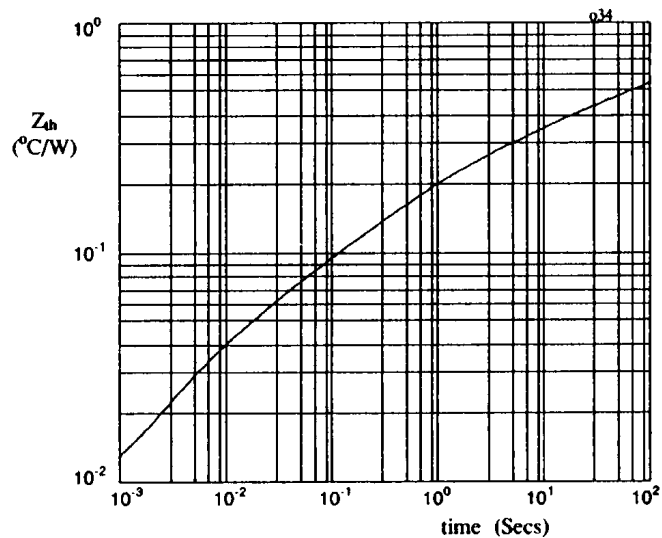
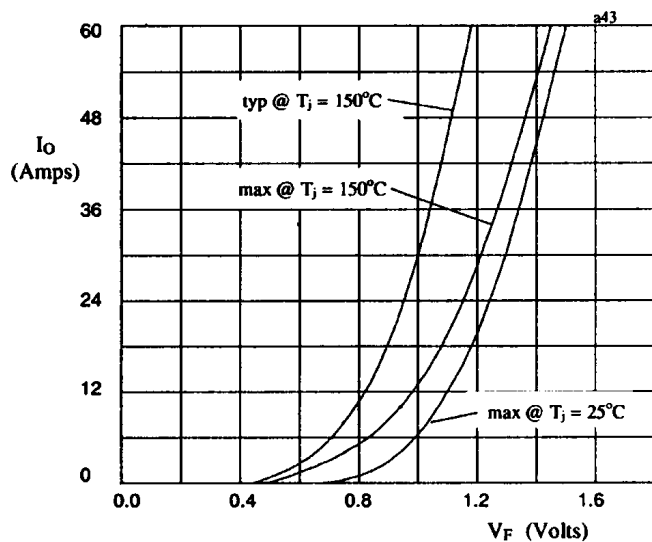
$$R_{\theta JC} = 1.2^{\circ}C/W$$

MECHANICAL

**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 12A/leg	Reverse Recovery Time ¹ t_{rr} @ 25°C	Maximum operating & storage temp. range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	μA			
SCBK05F SCBK1F SCBK2F SCBK4F	8.0	200	1.1	150	-55 to +150

¹ Measured on discrete devices prior to assembly



**SUPERFAST RECOVERY, HIGH CURRENT 1-PHASE
FULL WAVE BRIDGE RECTIFIER ASSEMBLIES****QUICK REFERENCE
DATA**

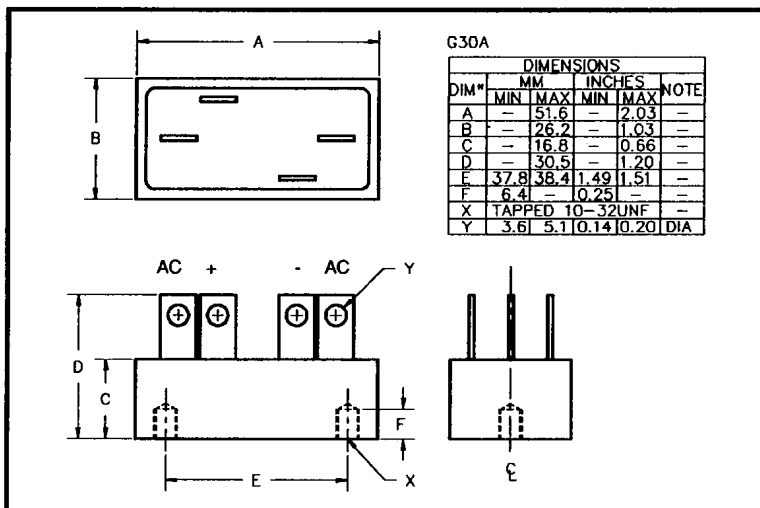
- Low forward voltage drop
- Low reverse leakage current
- Low thermal impedance
- Very fast reverse recovery time
- High surge ratings

- $V_R = 50V - 150V$
- $I_F = 38A$
- $V_F = 0.97V$
- $t_{rr} = 30nS$

4**ABSOLUTE MAXIMUM RATINGS**

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_F(AV)$						1 Cycle Surge Current I_{FSM} $t_p = 8.3mS$		Repetitive Surge Current I_{FRM}
		(@ case temperature)			(@ ambient temperature)					
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C	
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	
SCBK05FF	50									
SCBK10FF	100	38	28	20	13	9.2	5.5	600	500	80
SCBK15FF	150									

$$R_{\theta JC} = 1.2^{\circ}C/W$$

MECHANICAL



ELECTRICAL CHARACTERISTICS

Device Type	Maximum Reverse Leakage Current $I_R @ V_{RWM}$		Maximum Forward Voltage $V_F @ 20A/leg$	Reverse Recovery Time ¹ $t_{rr} @ 25^\circ C$	Maximum operating & storage temp. range. $T_{OP} T_{STG}$
	@ 25°C	@ 100°C			
	μA	mA			
SCBK05FF SCBK10FF SCBK15FF	80	4.0	0.97	30	-55 to +150

¹ Measured on discrete devices prior to assembly

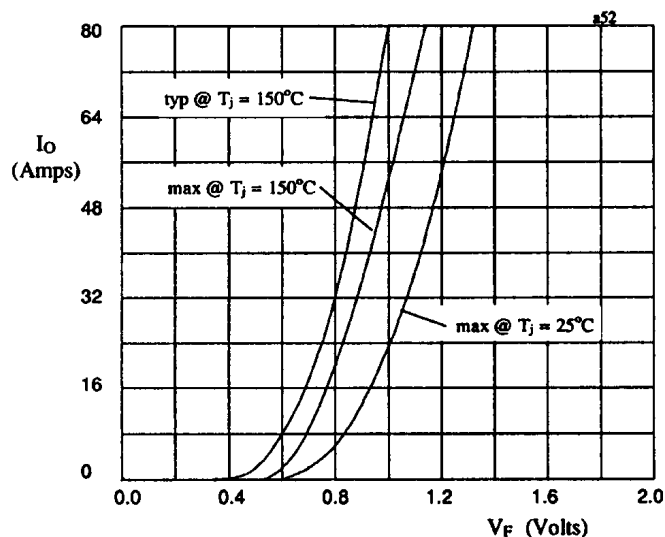


Fig 1. Forward voltage drop against output current per leg.

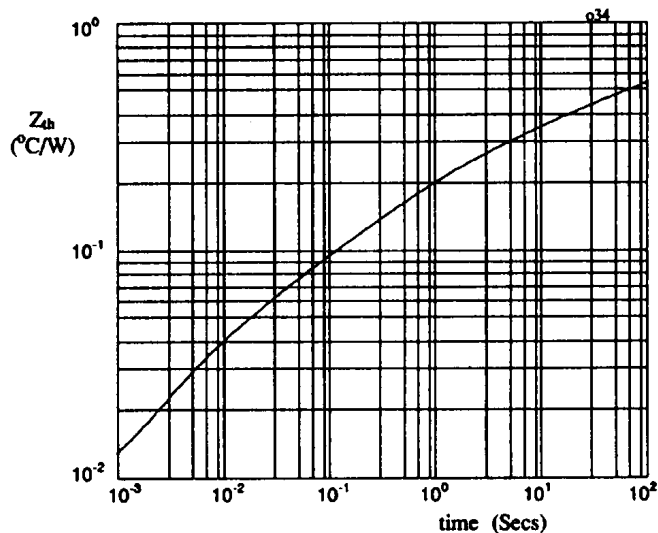


Fig 2. Transient thermal impedance characteristic per leg

**HIGH CURRENT, HIGH DENSITY, SINGLE PHASE
FULL WAVE BRIDGE RECTIFIER.****QUICK REFERENCE
DATA**

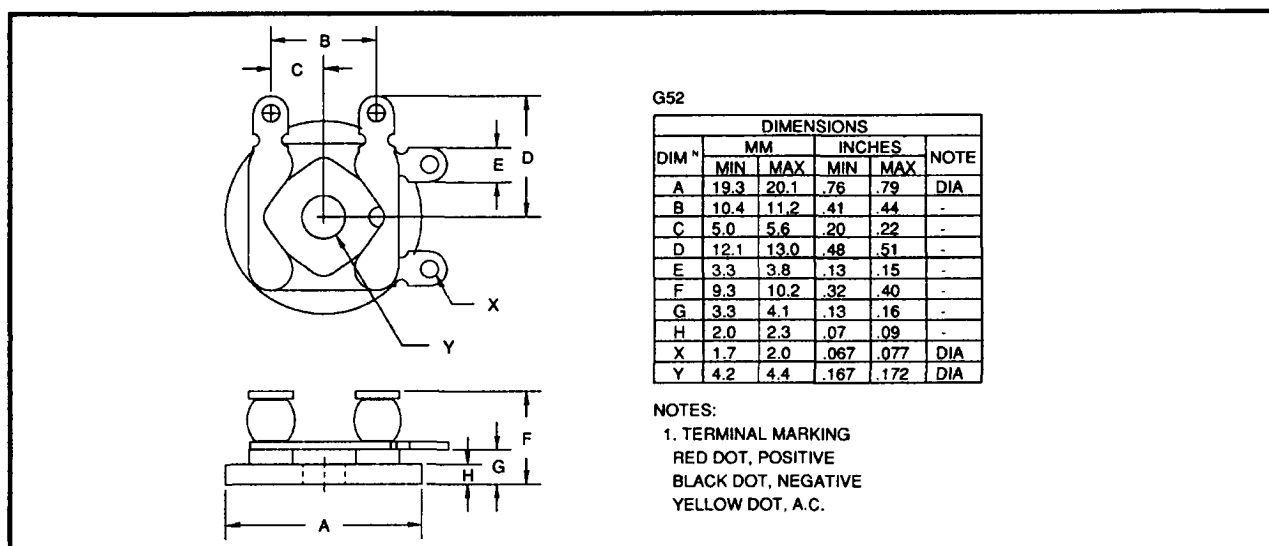
- Low thermal impedance
- Small size and low weight
- High current applications
- Isolated for direct heatsink mounting
- High surge ratings

- $V_{RWM} = 150V - 1000V$
- $I_O = 30A$
- $t_{rr} = 30nS - 2\mu S$
- $I_{FSM} \geq 150A$

4**ABSOLUTE MAXIMUM RATINGS**

Device Type	Working Reverse Voltage (V_{RWM})	Average Rectified Current (I_{FAV}) @ T_{MB}			1 Cycle Surge Current I_{FSM} @ $t_p = 8.3mS$		Operating & Storage Temperature Range	
		@ 55°C	100°C	125°C	@ 25°C	@ 100°C	(T_{OP})	(T_{STG})
	Volts	Amps	Amps	Amps	Amps	Amps	°C	
SET061203	1000	30	22	16	150	100	-55 to +175	
SET061219	1000	20	16	12	150	80	-55 to +175	
SET061212	600	30	22	16	150	100	-55 to +175	
SET061204	400	30	22	16	150	80	-55 to +175	
SET061211	150	30	20	14	175	175	-55 to +150	

$$R_{\theta JMB} = 0.75^{\circ}C/W$$

MECHANICAL

**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 9A/leg @ 25°C	Maximum Reverse Recovery Time ¹ t_{rr} @ 25°C
	$T_j = 25^\circ\text{C}$	$T_j = 100^\circ\text{C}$		
	μA	μA		
SET061203	2.0	40	1.2	2000
SET061219	2.0	50	2.2	150
SET061212	2.0	40	1.2	2000
SET061204	2.0	40	1.5	150
SET061211	20.0	1mA	1.1	30

¹ Measured on discrete devices prior to assembly

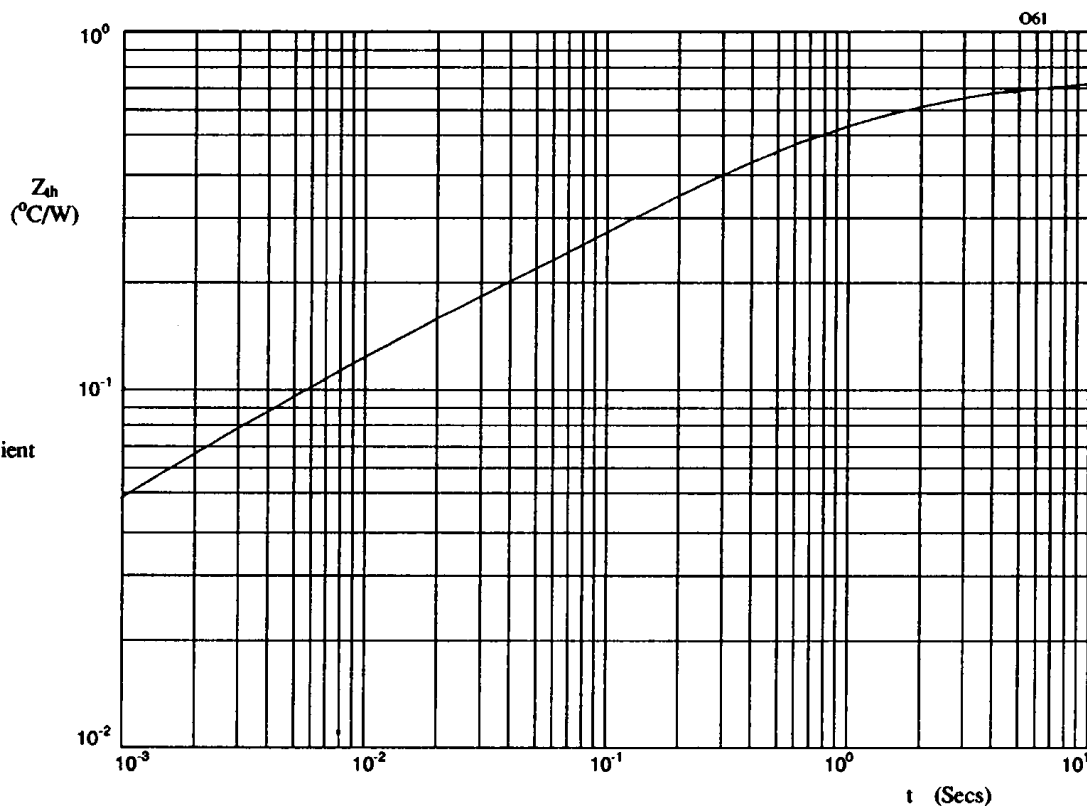


Figure 1. Typical transient thermal impedance characteristic.

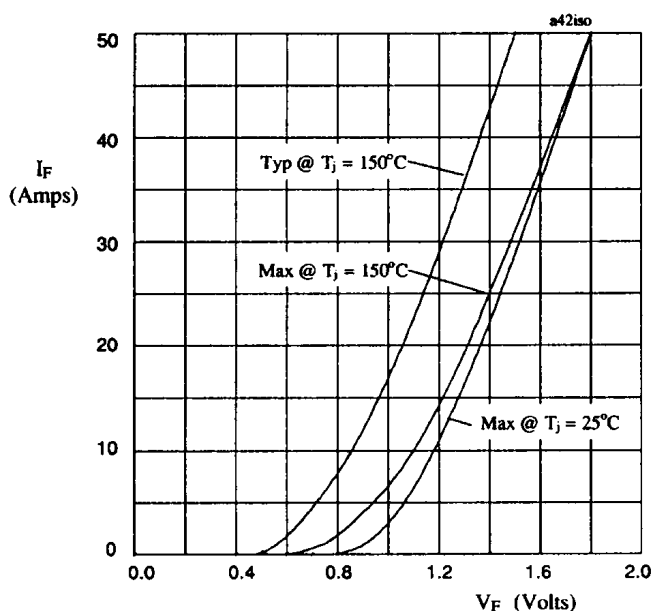


Figure 2. Forward voltage drop per leg as a function of forward current for SET061203 & SET061212.

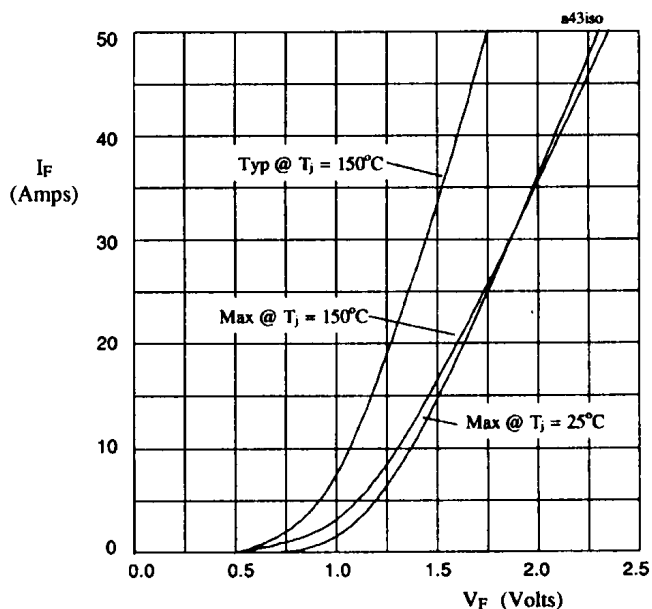


Figure 3. Forward voltage drop per leg as a function of forward current for SET061204.

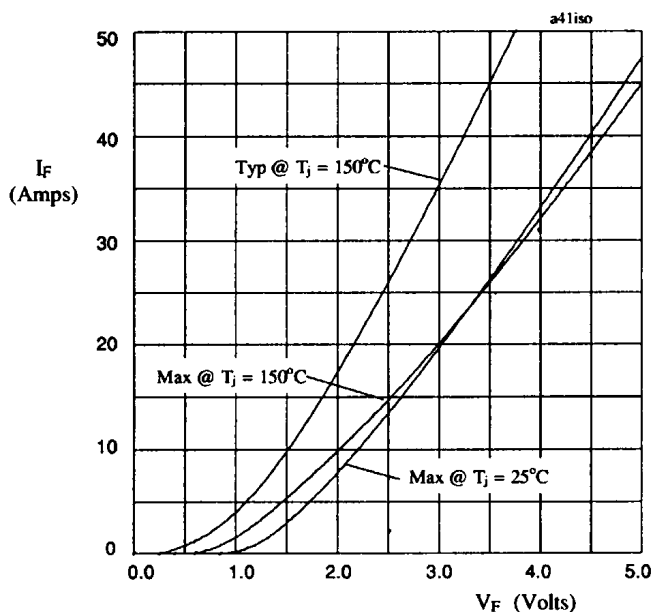


Figure 4. Forward voltage drop per leg as a function of forward current for SET061219.

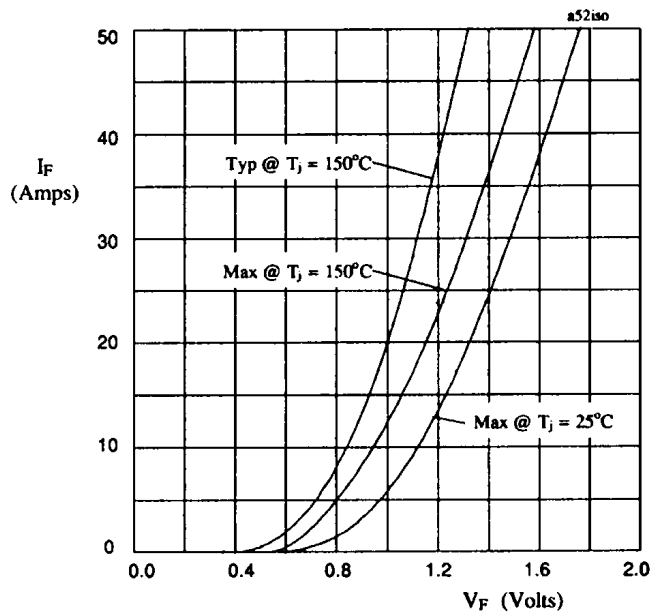


Figure 5. Forward voltage drop per leg as a function of forward current for SET061211.

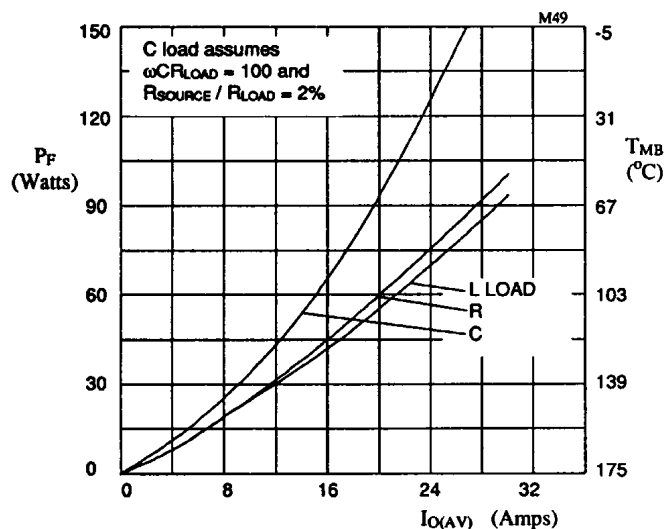


Figure 6. Forward power dissipation and maximum allowable mounting base temperature as a function of output current for sinusoidal operation, for SET061203 and SET061212.

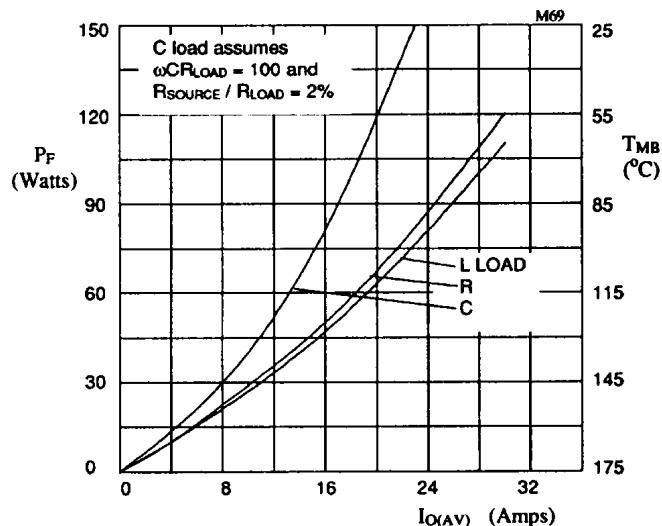


Figure 7. Forward power dissipation and maximum allowable mounting base temperature as a function of output current for sinusoidal operation, for SET061204.

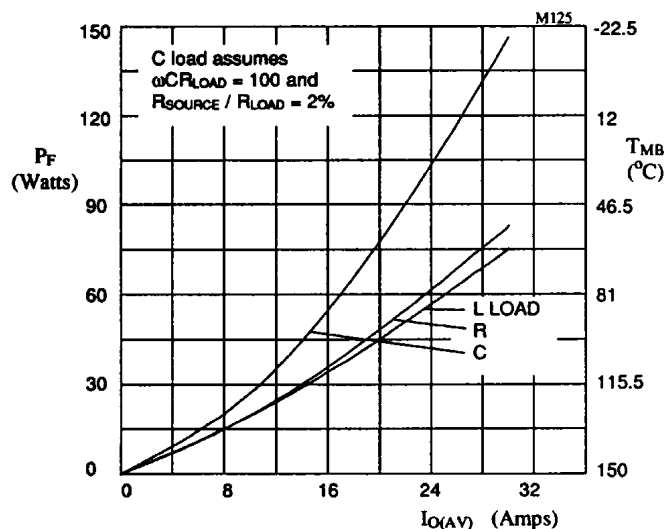


Figure 8. Forward power dissipation and maximum allowable mounting base temperature as a function of output current for sinusoidal operation, for SET061211.



HIGH CURRENT, HIGH DENSITY, SINGLE PHASE FULL WAVE BRIDGE RECTIFIER.

- Low thermal impedance
- Small size and low weight
- High current applications
- Isolated for direct heatsink mounting
- High surge ratings

QUICK REFERENCE DATA

- $V_{RWM} = 150V - 1000V$
- $I_O = 30A$
- $t_{rr} = 30nS - 2\mu S$
- $I_{FSM} \geq 150A$

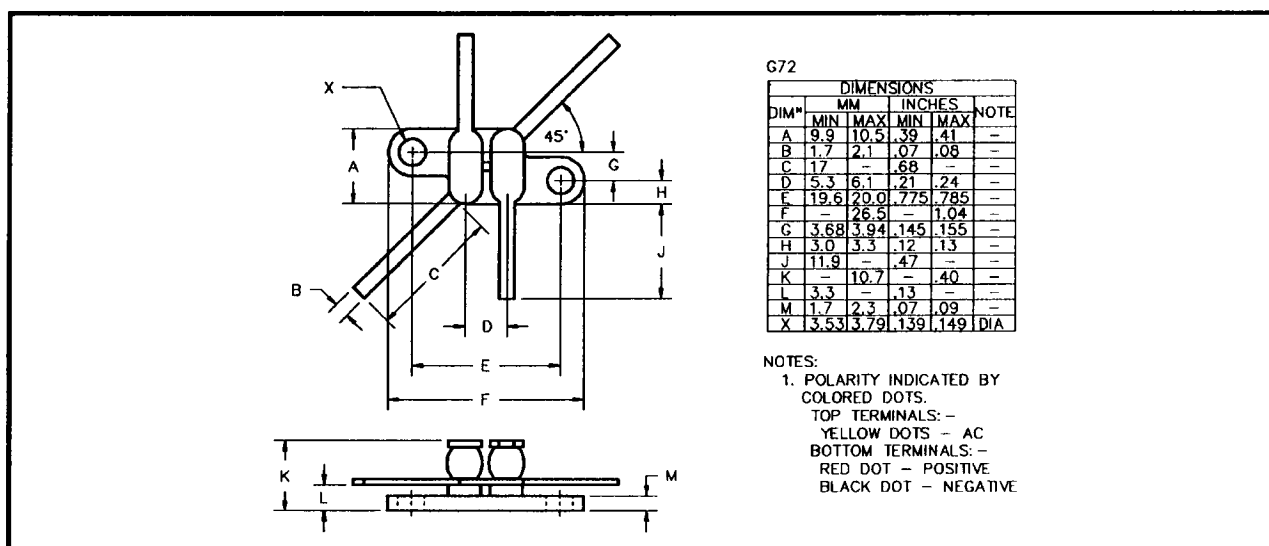
4

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage (V_{RWM})	Average Rectified Current ($I_{F(AV)}$) @ T_{MB}			1 Cycle Surge Current I_{FSM} @ $t_p = 8.3mS$		Operating & Storage Temperature Range	
		@ 55°C	100°C	125°C	@ 25°C	@ 100°C	(T_{OP})	(T_{STG})
	Volts	Amps	Amps	Amps	Amps	Amps	°C	
SET121203	1000	30	22	16	150	100	-55 to +175	
SET121219	1000	20	16	12	150	80	-55 to +175	
SET121212	600	30	22	16	150	100	-55 to +175	
SET121204	400	30	22	16	150	80	-55 to +175	
SET121211	150	30	20	14	175	175	-55 to +150	

$$R_{\theta JMB} = 0.75^{\circ}C/W$$

MECHANICAL





ELECTRICAL CHARACTERISTICS

Device Type	Maximum Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 9A/leg @ 25°C	Maximum Reverse Recovery Time t_{rr} @ 25°C
	$T_j = 25^\circ\text{C}$	$T_j = 100^\circ\text{C}$		
	μA	μA	Volts	nS
SET121203	2.0	40	1.2	2000
SET121219	2.0	50	2.2	150
SET121212	2.0	40	1.2	2000
SET121204	2.0	40	1.5	150
SET121211	20.0	1mA	1.1	30

¹ Measured on discrete devices prior to assembly

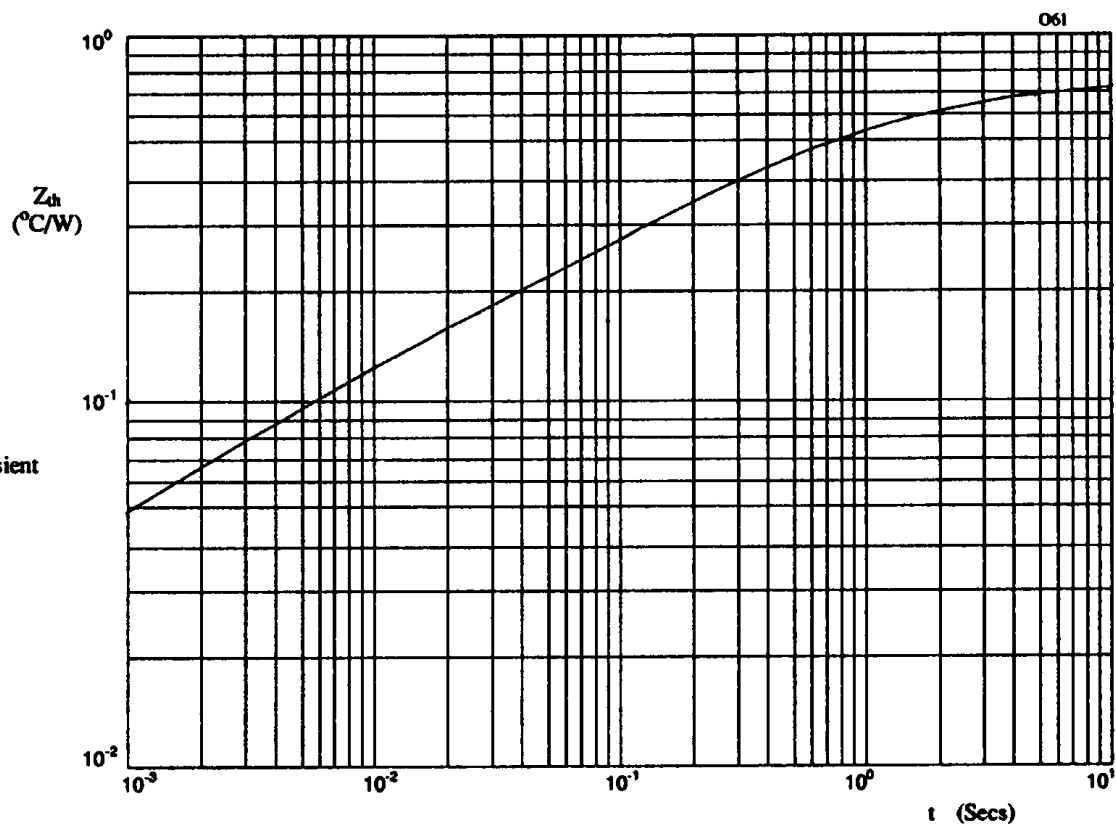


Figure 1. Typical transient thermal impedance characteristic.

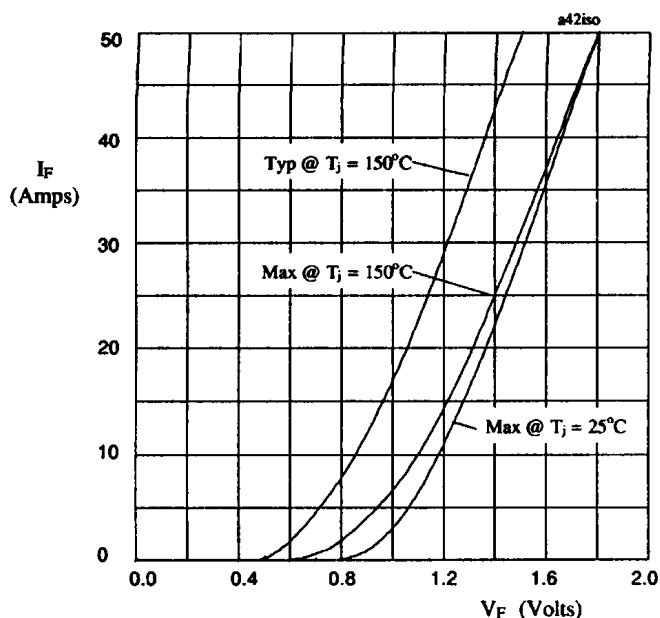


Figure 2. Forward voltage drop per leg as a function of forward current for SET121203 & SET121212.

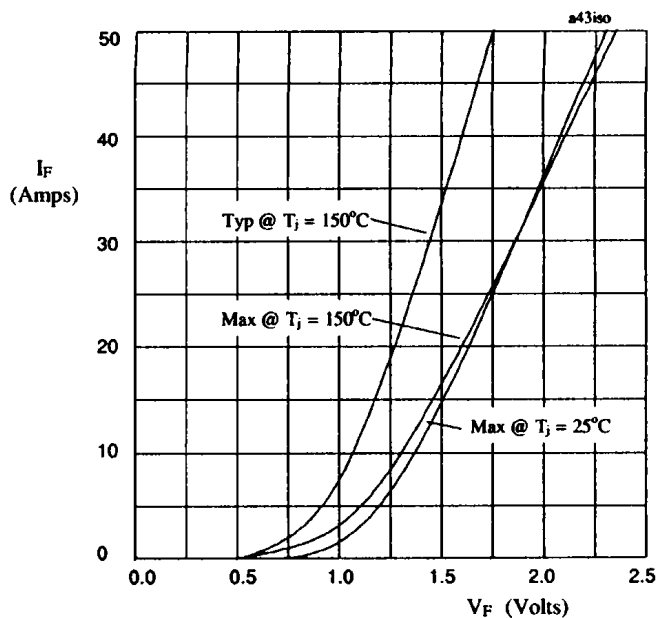


Figure 3. Forward voltage drop per leg as a function of forward current for SET121204.

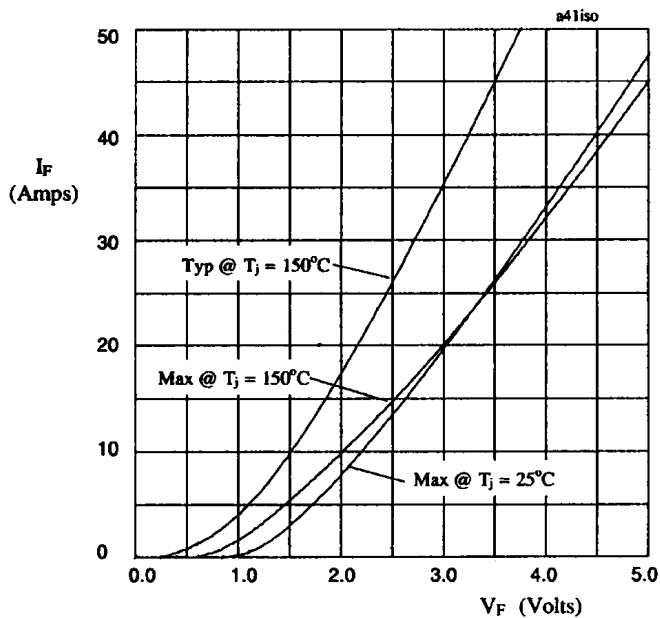


Figure 4. Forward voltage drop per leg as a function of forward current for SET121219.

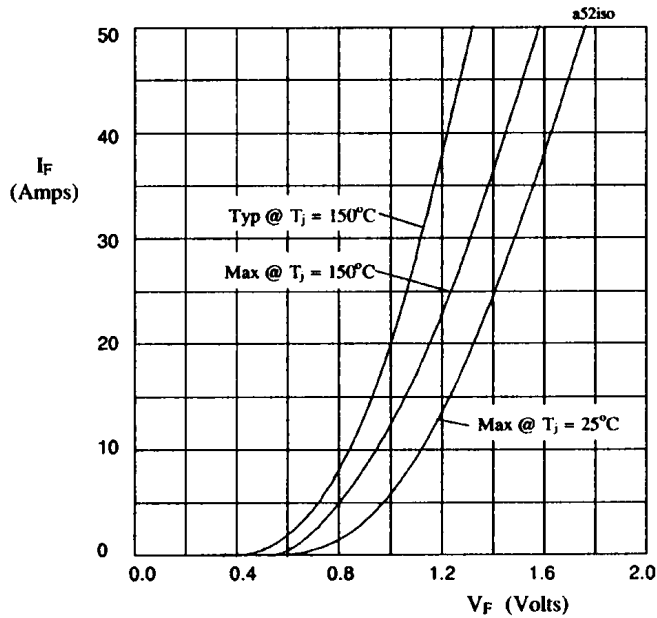


Figure 5. Forward voltage drop per leg as a function of forward current for SET121211.

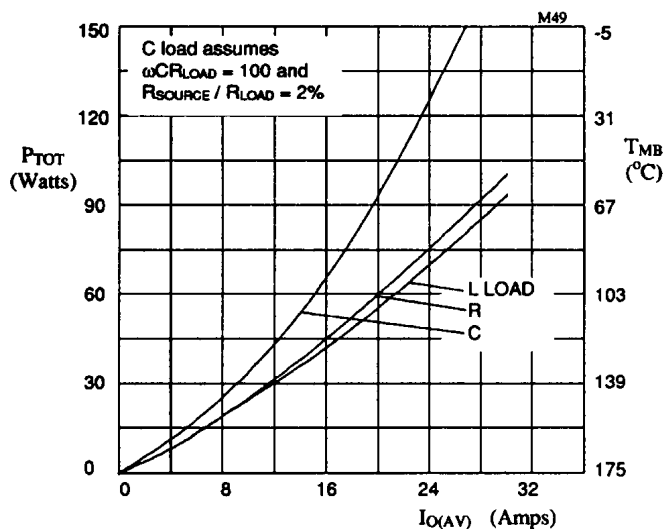


Figure 6. Forward power dissipation and maximum allowable mounting base temperature as a function of output current for sinusoidal operation, for SET121203 and SET121212.

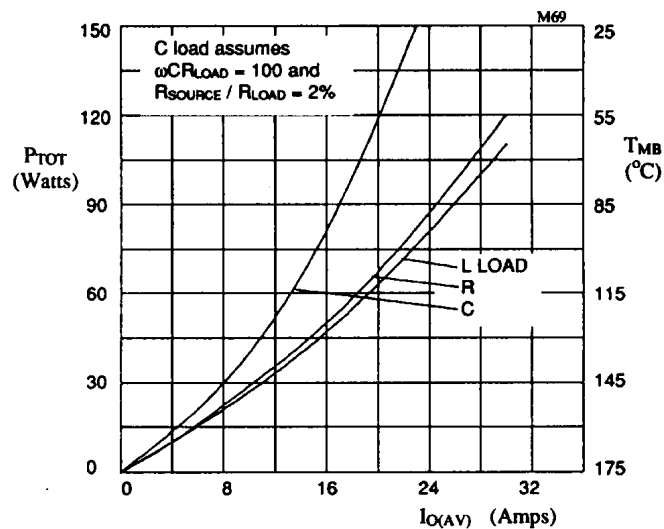


Figure 7. Forward power dissipation and maximum allowable mounting base temperature as a function of output current for sinusoidal operation, for SET121204.

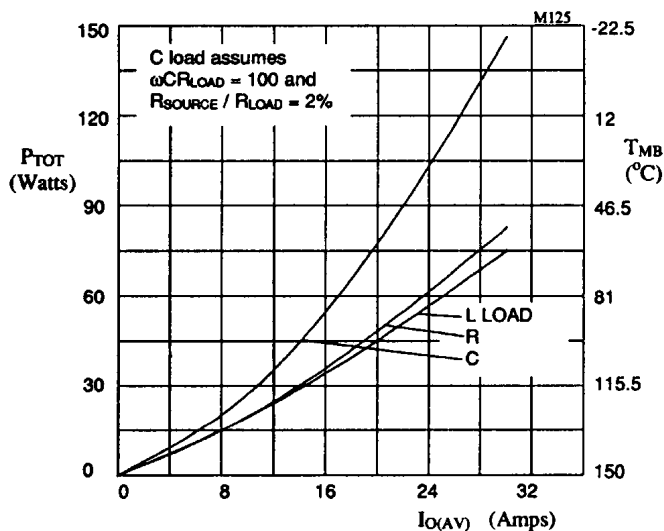


Figure 8. Forward power dissipation and maximum allowable mounting base temperature as a function of output current for sinusoidal operation, for SET121211.

Chapter 5

Three Phase Full Wave Bridge Assemblies

Datasheet No.	Title:
S3BRX	Standard Recovery 3 Phase Silicon Bridge Rectifiers
S3BRXF	Fast Recovery 3 Phase Silicon Bridge Rectifiers
S3BRXFF	Superfast Recovery 3 Phase Silicon Bridge Rectifiers
SC3ASX	Standard Recovery 3 Phase Full Wave Bridge Rectifiers
SC3ASXF	Fast Recovery 3 Phase Full Wave Bridge Rectifiers
SC3ASXFF	Superfast Recovery 3 Phase Full Wave Bridge Rectifiers
SC3BAX	Standard Recovery 3 Phase Full Wave Bridge Rectifiers
SC3BAXF	Fast Recovery 3 Phase Full Wave Bridge Rectifiers
SC3BAXFF	Superfast Recovery 3 Phase Full Wave Bridge Rectifiers
SC3BHX	Standard Recovery 3 Phase Full Wave Bridge Rectifiers
SC3BHXF	Fast Recovery 3 Phase Full Wave Bridge Rectifiers
SC3BHXFF	Superfast Recovery 3 Phase Full Wave Bridge Rectifiers
SC3BJX	Standard Recovery 3 Phase Full Wave Bridge Rectifiers
SC3BJXF	Fast Recovery 3 Phase Full Wave Bridge Rectifiers
SC3BJXFF	Superfast Recovery 3 Phase Full Wave Bridge Rectifiers
SC3BKX	Standard Recovery 3 Phase Full Wave Bridge Rectifiers
SC3BKXF	Fast Recovery 3 Phase Full Wave Bridge Rectifiers
SC3BKXFF	Superfast Recovery 3 Phase Full Wave Bridge Rectifiers
SC6BAX	Standard Recovery 3 Phase Full Wave Bridge Rectifiers
SET111403,04,11,12,19	High Current, 3 Phase Full Wave Bridge Rectifier



STANDARD RECOVERY, PCB MOUNTING 3-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Subminiature design
- V_{RWM} up to 3000V

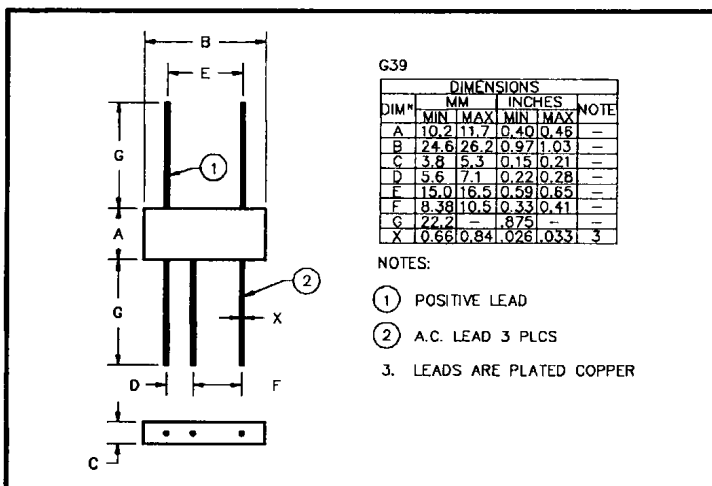
QUICK REFERENCE DATA

- $V_R = 50V - 3000V$
- $I_F = 0.5 - 2.0A$
- $I_R = 3.0\mu A$
- $t_{rr} = 2.0 - 2.5\mu S$

ABSOLUTE MAXIMUM RATINGS & CHARACTERISTICS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$		Reverse Leakage Current $I_R @ V_{RWM}$		Forward Voltage drop / leg @ 25°C $V_F @ 1A$ * @ 250mA	Reverse Recovery Time ¹ t_{rr} @ 25°C
		@ 55°C	@ 100°C	@ 25°C	@ 100°C		
	Volts	Amps	Amps	μA	μA	Volts	μS
S3BR05	50	2.0	1.2	3.0	75	1.1	$\uparrow$ 2.0 $\downarrow$
S3BR1	100	2.0	1.2	3.0	75	1.1	
S3BR2	200	2.0	1.2	3.0	75	1.1	
S3BR4	400	2.0	1.2	3.0	75	1.1	
S3BR6	600	2.0	1.2	3.0	75	1.1	
S3BR8	800	2.0	1.2	3.0	75	1.1	
S3BR10	1000	2.0	1.2	3.0	75	1.1	
S3BR15	1500	0.5	0.3	3.0	60	* 5.0	
S3BR20	2000	0.5	0.3	3.0	60	* 5.0	
S3BR25	2500	0.5	0.3	3.0	60	* 5.0	
S3BR30	3000	0.5	0.3	3.0	60	* 5.0	$\uparrow$ 2.5 $\downarrow$

MECHANICAL



¹ Measured on discrete devices prior to assembly

S3BR10 and S3BR30 are available in Europe to DEF STAN 59-61/90/208 release to F and FX levels.

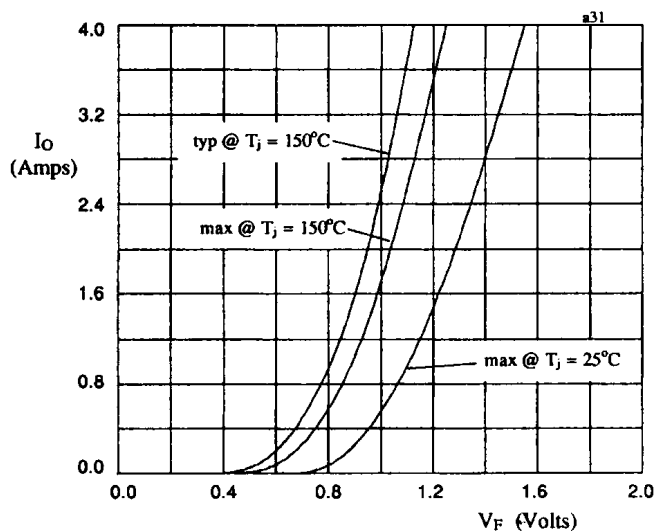


Fig 1. Forward voltage drop against output current per leg for S3BR05 thru S3BR10.

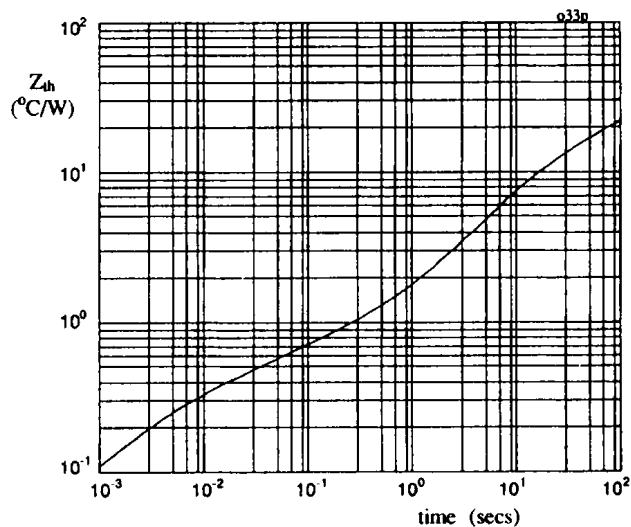


Fig 2. Transient thermal impedance characteristic per leg for S3BR05 thru S3BR10

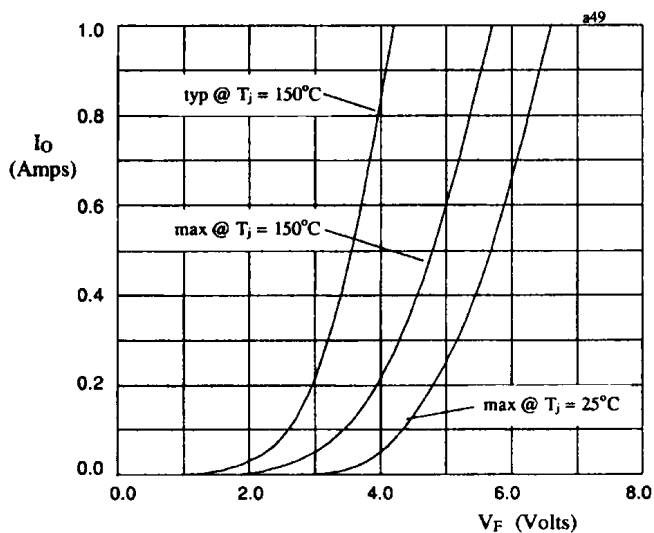


Fig 3. Forward voltage drop against output current per leg for S3BR15 thru S3BR30

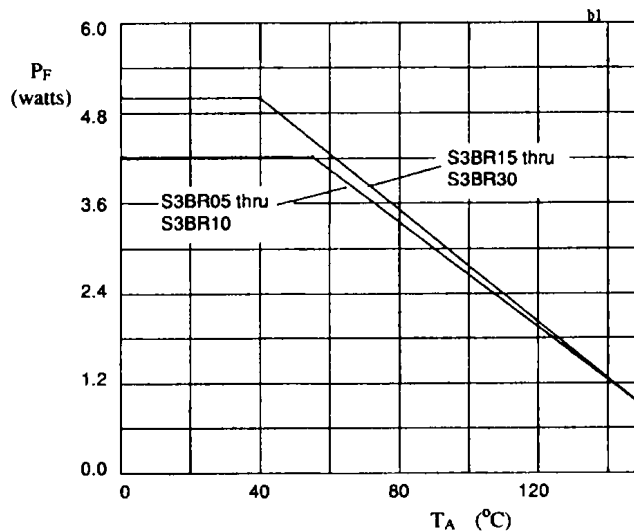


Fig 4. Power derating characteristics when p.c.b mounted



FAST RECOVERY, LOW CURRENT 3-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Subminiature design
- V_{RWM} up to 2500V
- PCB mounting

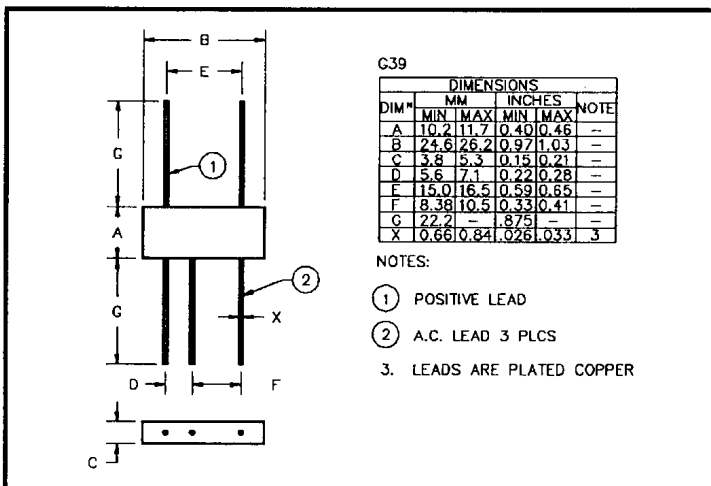
QUICK REFERENCE DATA

- $V_R = 50V - 2500V$
- $I_F = 0.5 - 2.0A$
- $I_R = 3.0\mu A$
- $t_{rr} = 150 - 300nS$

ABSOLUTE MAXIMUM RATINGS & CHARACTERISTICS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_F(AV)$		Reverse Leakage Current $I_R @ V_{RWM}$		Forward Voltage drop / leg @ 25°C $V_F @ 1A$ * @ 100mA	Reverse Recovery Time t_{rr} @ 25°C
		@ 55°C	@ 100°C	@ 25°C	@ 100°C		
	Volts	Amps	Amps	μA	μA	Volts	μS
S3BR05F	50	2.0	1.2	3.0	75	1.2	150
S3BR1F	100	2.0	1.2	3.0	75	1.2	150
S3BR2F	200	2.0	1.2	3.0	75	1.2	150
S3BR4F	400	2.0	1.2	3.0	75	1.2	150
S3BR6F	600	2.0	1.2	3.0	75	1.2	250
S3BR25F	2500	0.5	0.3	3.0	75	* 5.0	300

MECHANICAL



¹ Measured on discrete devices prior to assembly

S3BR4F is available in Europe to DEF STAN 59-61/90/208 release to F and FX levels.

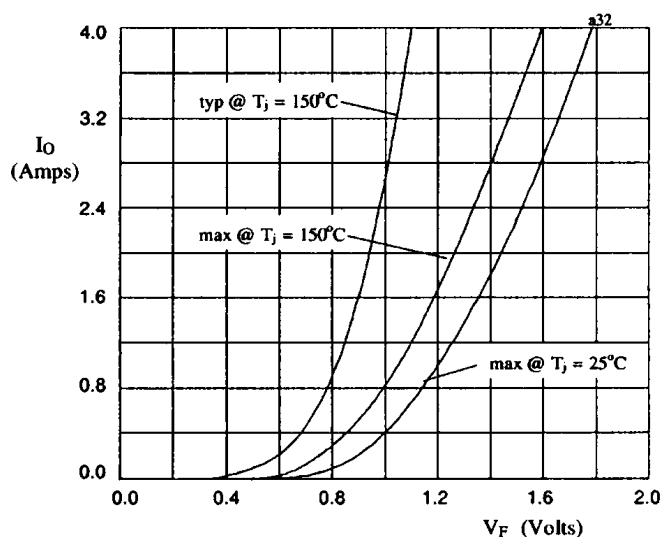


Fig 1. Forward voltage drop against output current per leg for S3BR05F thru S3BR6F.

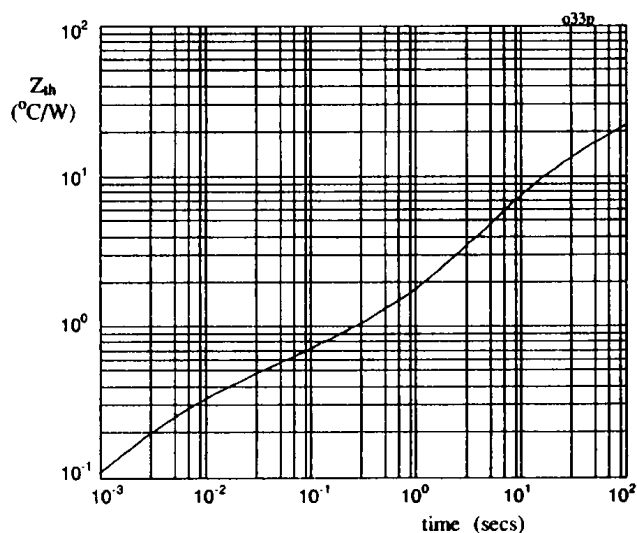


Fig 2. Transient thermal impedance characteristic per leg for S3BR05F thru S3BR6F

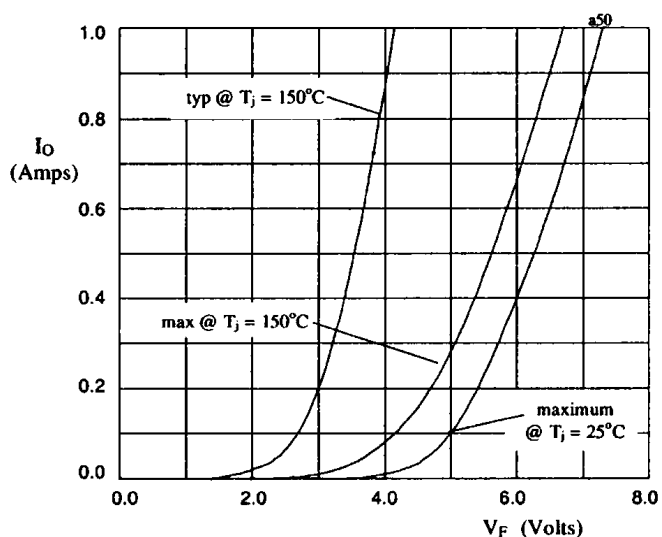


Fig 3. Forward voltage drop against output current per leg for S3BR25F.

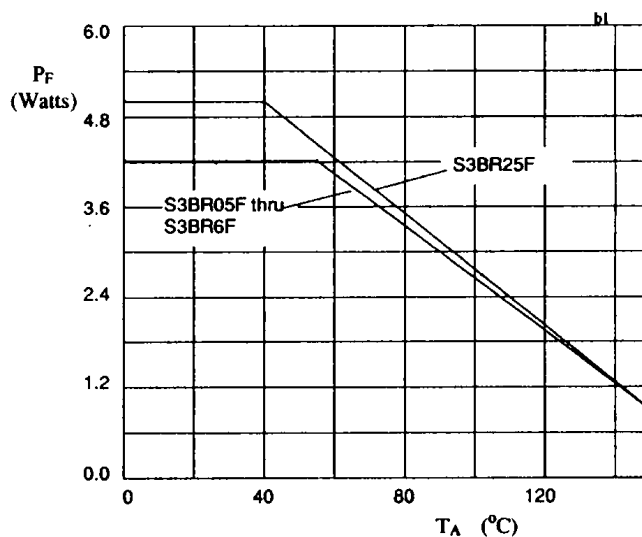


Fig 4. Power derating characteristics when p.c.b mounted



SUPERFAST RECOVERY, LOW CURRENT 3-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Subminiature design
- V_{RWM} up to 150V
- Very fast reverse recovery time

QUICK REFERENCE DATA

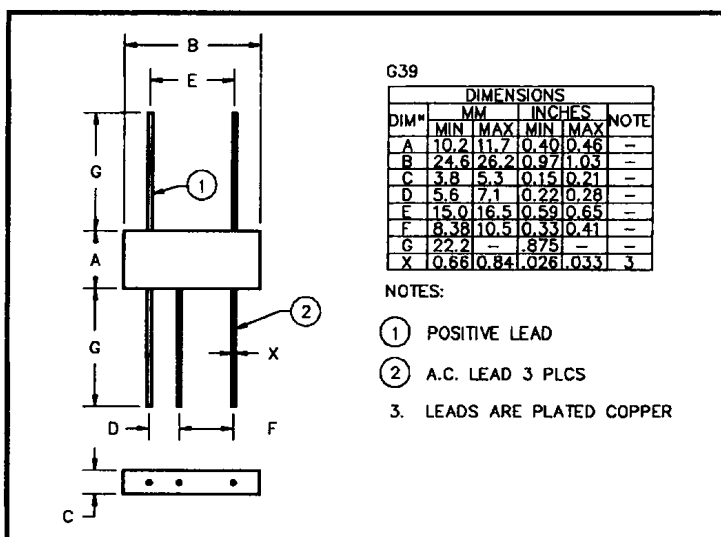
- $V_R = 50V - 150V$
- $I_F = 2.0A$
- $I_R = 3.0\mu A$
- $t_{rr} = 30nS$

ABSOLUTE MAXIMUM RATINGS & CHARACTERISTICS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_F(AV)$		Reverse Leakage Current $I_R @ V_{RWM}$		Forward Voltage drop / leg $V_F @ 1.5A$ @ 25°C	Reverse Recovery Time t_{rr} @ 25°C
		@ 55°C	@ 100°C	@ 25°C	@ 100°C		
	Volts	Amps	Amps	μA	μA	Volts	nS
S3BR05FF	50	2.0	1.1	3.0	150	1.2	30
S3BR10FF	100	2.0	1.1	3.0	150	1.2	30
S3BR15FF	150	2.0	1.1	3.0	150	1.2	30

¹ Measured on discrete devices prior to assembly

MECHANICAL



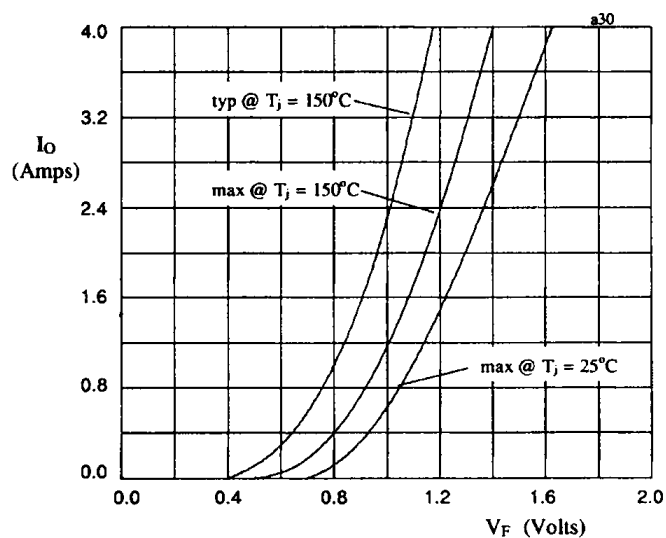


Fig 1. Forward voltage drop against output current per leg

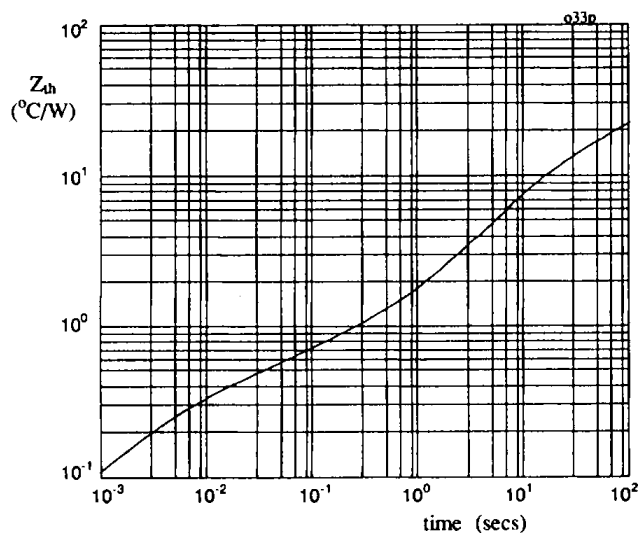


Fig 2. Transient thermal impedance characteristic per leg

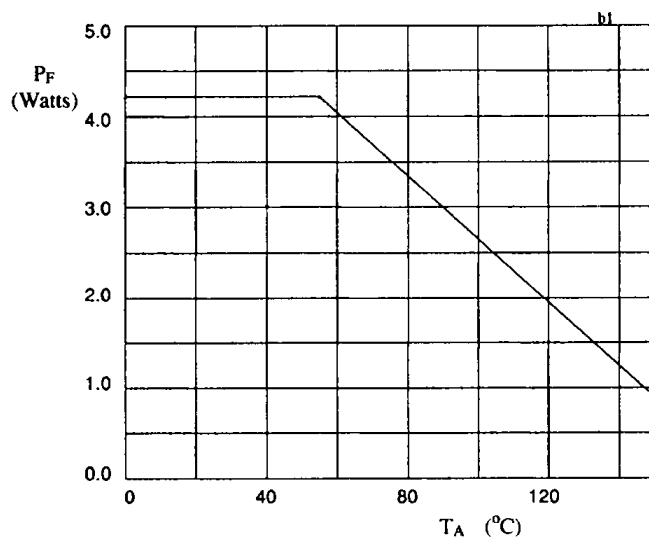


Fig 4. Power derating characteristics when p.c.b mounted

**STANDARD RECOVERY, HIGH CURRENT 3-PHASE
FULL WAVE BRIDGE RECTIFIER ASSEMBLIES**

- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- High forward and surge current ratings

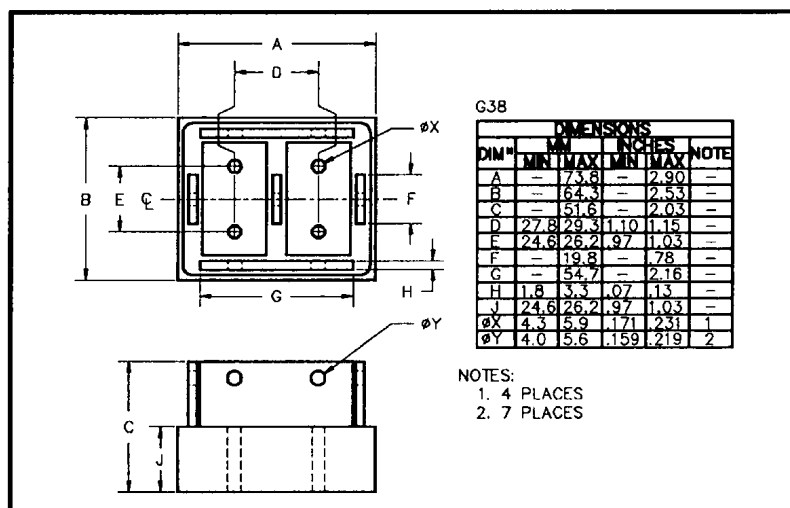
**QUICK REFERENCE
DATA**

- $V_R = 50V - 600V$
- $I_F = 130A$
- $I_R = 18 \mu A$
- $I_{FSM} = 750A$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$						1 Cycle Surge Current	
		@ case temperature			@ ambient temperature			$I_{FSM} @ t_p = 8.3mS$	
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SC3AS05	50								
SC3AS1	100								
SC3AS2	200	130	95	70	18	14	9	750	600
SC3AS4	400								
SC3AS6	600								

$$R_{\theta JC} = 0.3^{\circ}C/W$$

MECHANICAL



ELECTRICAL CHARACTERISTICS

Device Type	Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 18A/leg @ 25°C	Maximum Reverse Recovery Time t_{rr} @ 25°C	Maximum operating & storage temp range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	μA	Volts	μS	°C
SC3AS05 SC3AS1 SC3AS2 SC3AS4 SC3AS6	18.0	360	1.0	2.0	- 55 to +150

¹ Measured on discrete devices prior to assembly

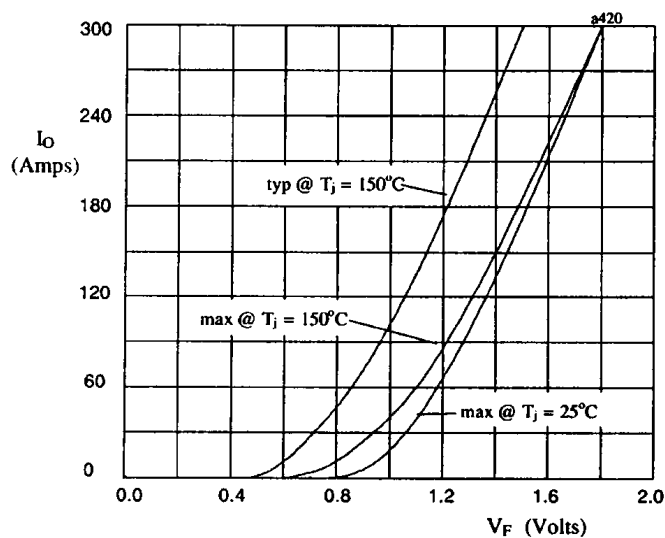


Fig 1. Forward voltage drop against output current per leg

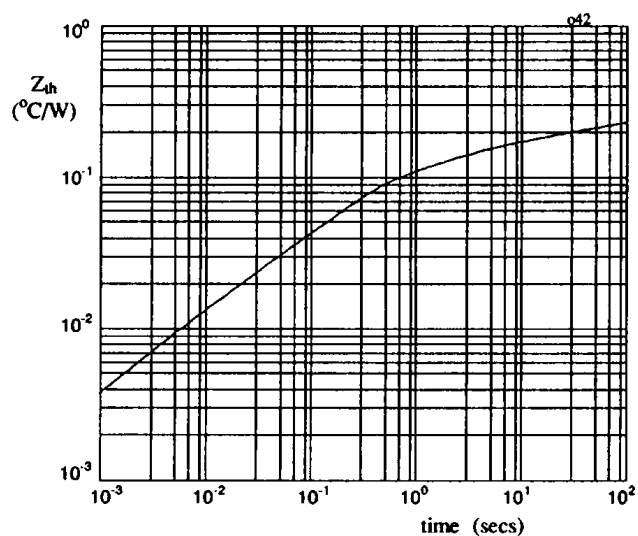


Fig 2. Transient thermal impedance characteristic per leg

**FAST RECOVERY, HIGH CURRENT 3-PHASE FULL
WAVE BRIDGE RECTIFIER ASSEMBLIES**

- Low forward voltage drop
- Low reverse leakage current
- Fast reverse recovery time
- Low thermal impedance
- High forward and surge current ratings

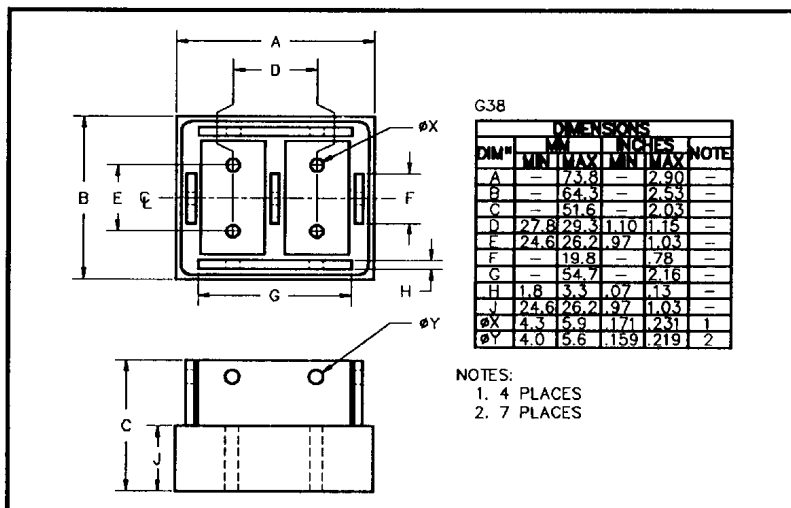
**QUICK REFERENCE
DATA**

- $V_R = 50V - 400V$
- $I_F = 110A$
- $I_R = 18\mu A$
- $t_{rr} = 150ns$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$						1 Cycle Surge Current I_{FSM} @ $t_p = 8.3ms$	
		@ case temperature			@ ambient temperature			@ 25°C	@ 100°C
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C		
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SC3AS05F	50	110	80	60	16	11.5	7.2	750	480
SC3AS1F	100								
SC3AS2F	200								
SC3AS4F	400								

$$R_{\theta JC} = 0.3^{\circ}C/W$$

MECHANICAL

**ELECTRICAL CHARACTERISTICS**

Device Type	Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage / leg V_F @ 18A @ 25°C	Maximum Reverse Recovery Time t_{rr} @ 25°C	Maximum operating & storage temp range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	μA	Volts	nS	°C
SC3AS05F SC3AS1F SC3AS2F SC3AS4F	18	450	1.1	150	-55 to +150

¹ Measured on discrete devices prior to assembly

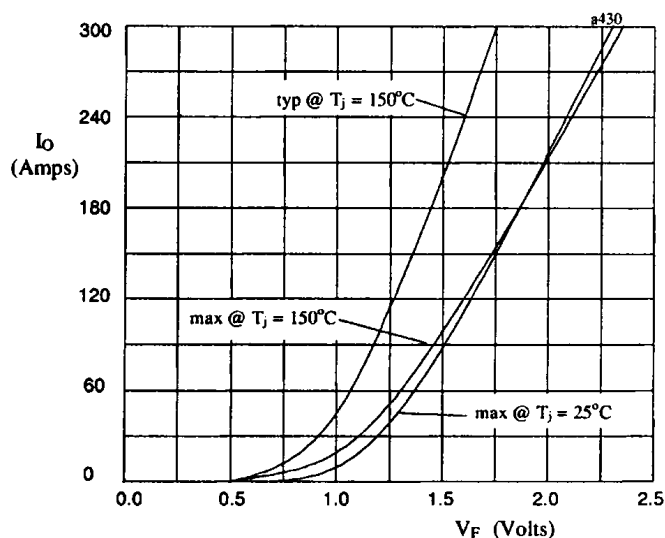
5

Fig 1. Forward voltage drop against output current per leg

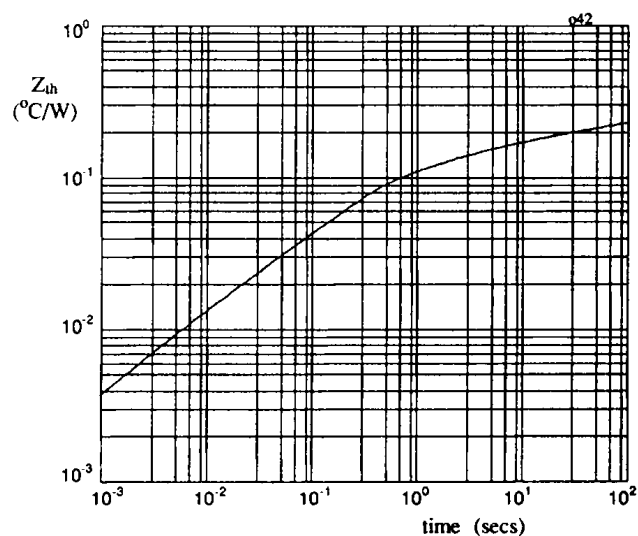


Fig 2. Transient thermal impedance characteristic per leg



SUPERFAST RECOVERY, HIGH CURRENT 3-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Low thermal impedance
- Very fast reverse recovery time
- High forward and surge current ratings

QUICK REFERENCE DATA

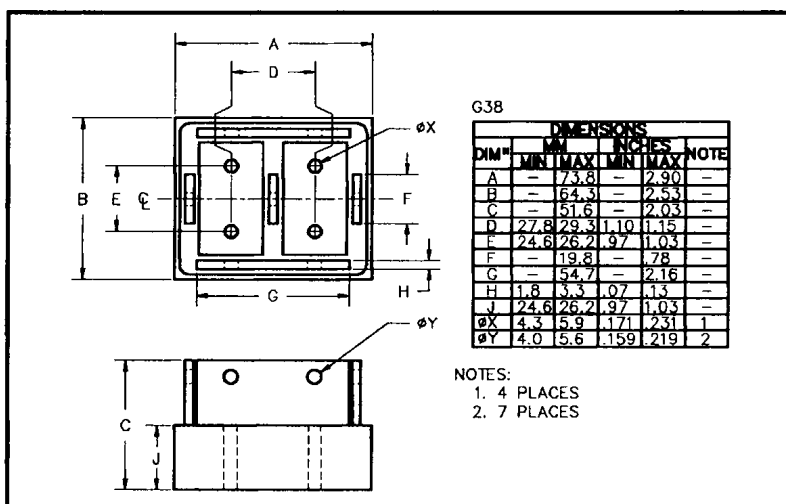
- $V_R = 50V - 150V$
- $I_F = 130A$
- $V_F = 0.97V$
- $t_{rr} = 30nS$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$						1 Cycle Surge Current	
		@ case temperature			@ ambient temperature			I_{FSM} @ $t_p = 8.3mS$	
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SC3AS05FF	50								
SC3AS10FF	100	130	80	45	18	12.5	8	900	750
SC3AS15FF	150								

$$R_{\theta JC} = 0.3^{\circ}C/W$$

MECHANICAL



**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 30A/leg @ 25°C	Maximum Reverse Recovery Time t_{rr} @ 25°C	Maximum operating & storage temp range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	mA			
SC3AS05FF	180	9.0	0.97	30	-55
SC3AS10FF					to
SC3AS15FF					+150

¹ Measured on discrete devices prior to assembly

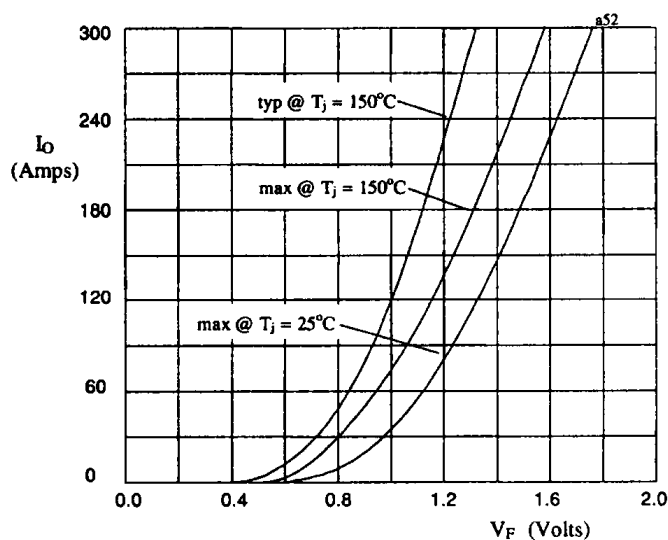


Fig 1. Forward voltage drop against output current per leg

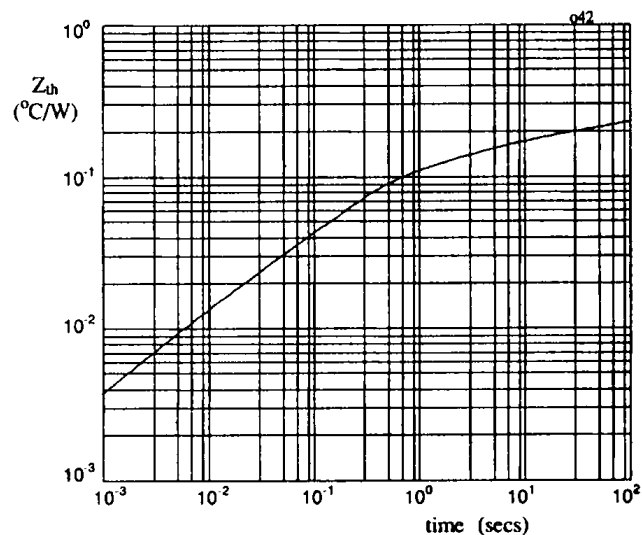


Fig 2. Transient thermal impedance characteristic per leg



STANDARD RECOVERY, MEDIUM CURRENT 3-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

QUICK REFERENCE DATA

- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- Insulated electrical connections

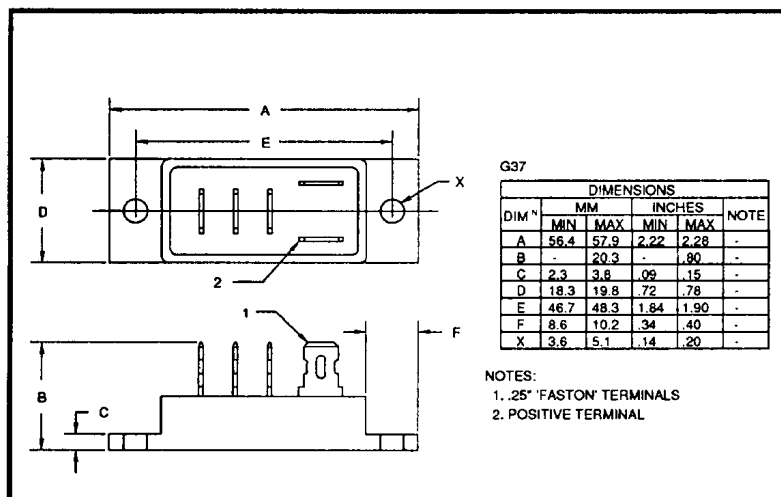
- $V_R = 50V - 600V$
- $I_F = 18A$
- $I_R = 3.0 \mu A$
- $t_{rr} = 2.0\mu S$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$						1 Cycle Surge Current I_{FSM} @ $t_p = 8.3mS$	
		@ case temperature			@ ambient temperature				
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SC3BA05	50								
SC3BA1	100								
SC3BA2	200	18	12.4	9.0	6.0	5.0	3.0	150	100
SC3BA4	400								
SC3BA6	600								

$$R_{\theta JC} = 2.5^\circ C/W$$

MECHANICAL



SC3BA6 is available in Europe to DEF STAN 59-61/90/208 release to F and FX levels.



ELECTRICAL CHARACTERISTICS

Device Type	Reverse Leakage Current $I_R @ V_{RWM}$		Maximum Forward Voltage $V_F @ 3A/leg$ @ 25°C	Maximum Reverse Recovery Time $t_{rr} @ 25°C$	Maximum operating & storage temp range. $T_{OP} \quad T_{STG}$
	@ 25°C	@ 100°C			
	μA	μA			
SC3BA05 SC3BA1 SC3BA2 SC3BA4 SC3BA6	3.0	60	1.0	2.0	- 55 to +150

¹ Measured on discrete devices prior to assembly

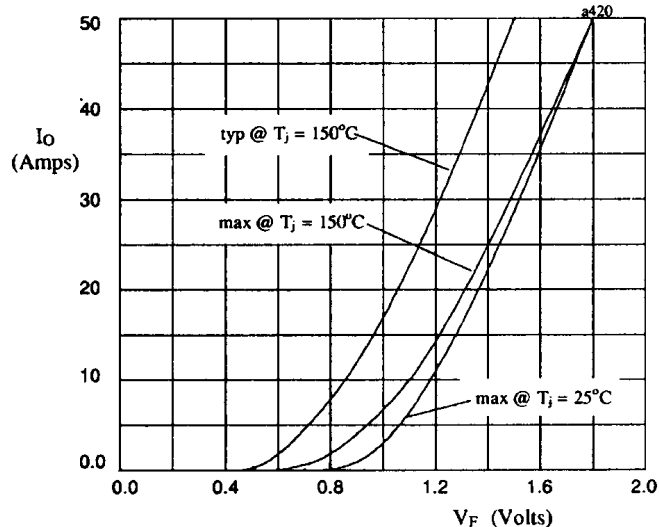


Fig 1. Forward voltage drop against output current per leg

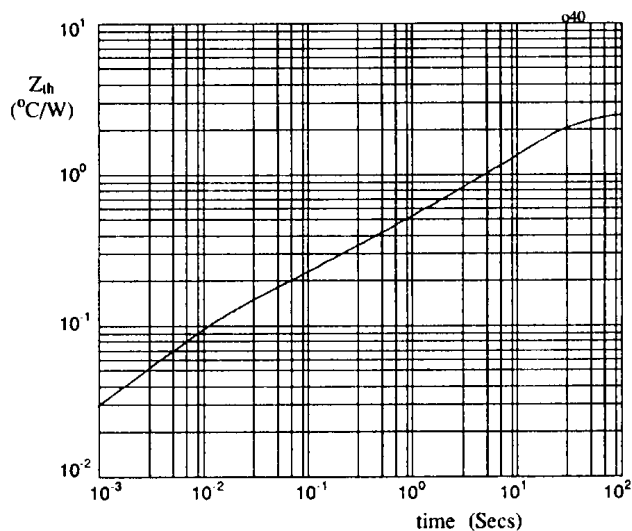
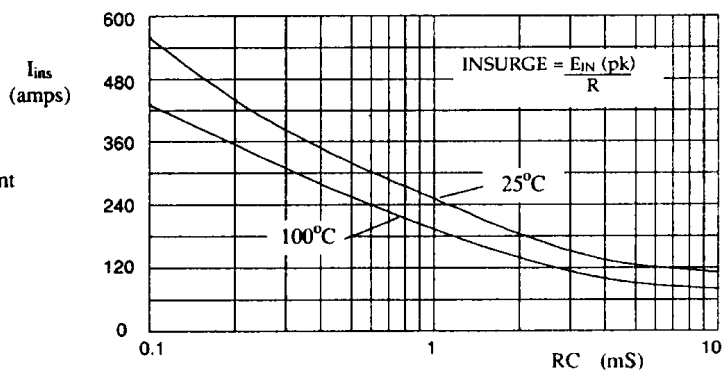


Fig 2. Transient thermal impedance characteristic per leg

Fig 3. Maximum surge current against time constant for capacitive loads.





FAST RECOVERY, MEDIUM CURRENT 3-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- Fast reverse recovery time

QUICK REFERENCE DATA

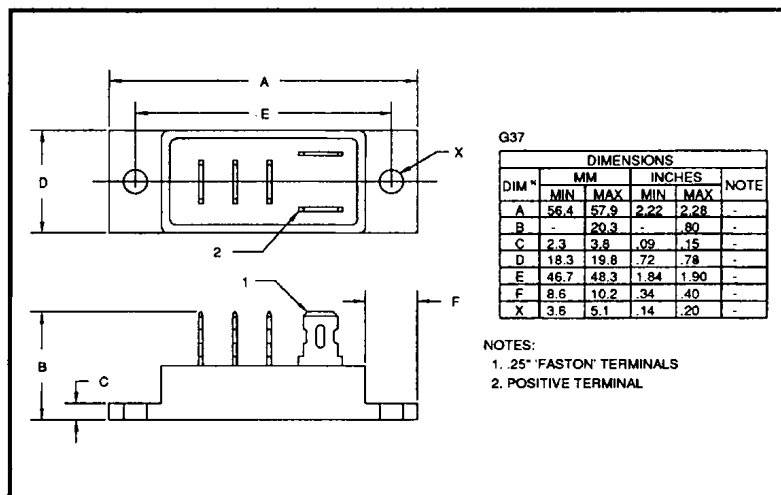
- $V_R = 50V - 400V$
- $I_F = 15A$
- $I_R = 3\mu A$
- $t_{rr} = 150ns$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$						1 Cycle Surge Current I_{FSM} @ $t_p = 8.3ms$	
		@ case temperature			@ ambient temperature			@ 25°C	@ 100°C
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C		
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SC3BA05F	50								
SC3BA1F	100	15	10.5	7.5	6	5	3	150	100
SC3BA2F	200								
SC3BA4F	400								

$$R_{\theta JC} = 2.5^{\circ}C/W$$

MECHANICAL



SC3BA4F is available in Europe to DEF STAN 59-61/90/208 release to F and FX levels.

**ELECTRICAL CHARACTERISTICS**

Device Type	Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 3A/leg @ 25°C	Maximum Reverse Recovery Time t_{rr} @ 25°C	Maximum operating & storage temp range. T_{OP} T_{STG}	
	@ 25°C	@ 100°C				
	μA	μA				
SC3BA05F SC3BA1F SC3BA2F SC3BA4F	3.0	75	1.1	150	- 55 to +150	

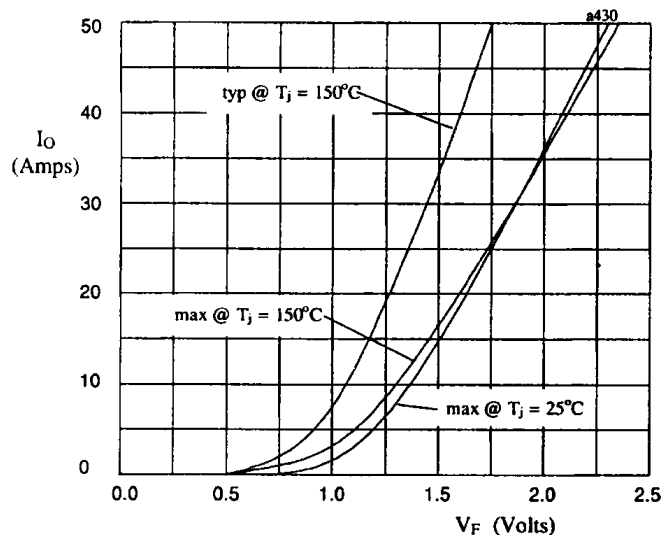
¹ Measured on discrete devices prior to assembly

Fig 1. Forward voltage drop against output current per leg

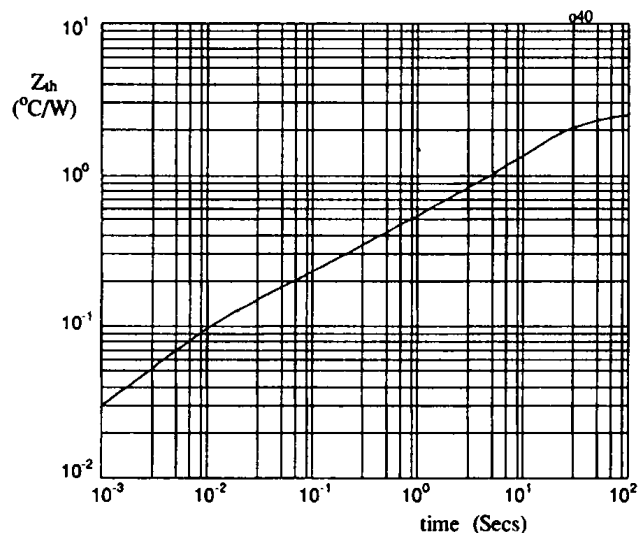
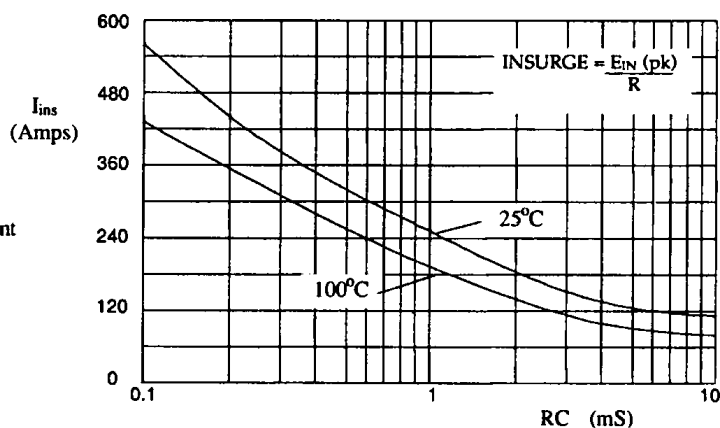


Fig 2. Transient thermal impedance characteristic per leg

Fig 3. Maximum insurge current
against time constant for
capacitive loads.

**SUPERFAST RECOVERY, MEDIUM CURRENT 3-PHASE
FULL WAVE BRIDGE RECTIFIER ASSEMBLIES****QUICK REFERENCE
DATA**

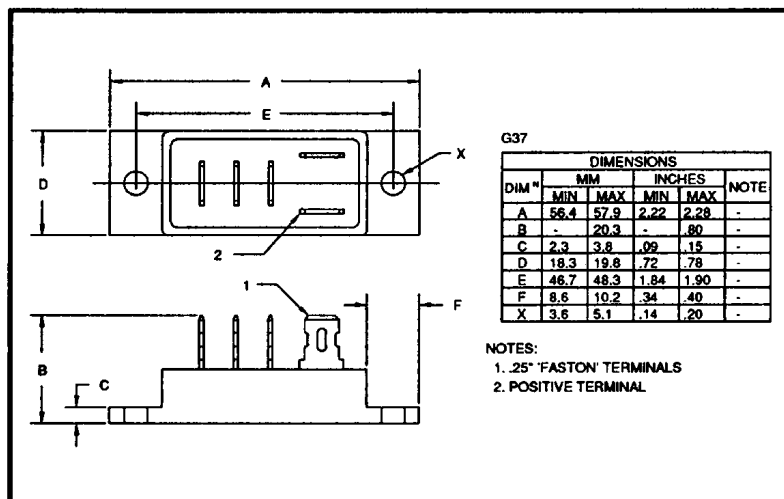
- Very fast reverse recovery time
- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance

- $V_R = 50V - 150V$
- $I_F = 17A$
- $V_F = 0.97V$
- $t_{rr} = 30nS$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_F(AV)$						1 Cycle Surge Current I_{FSM} @ $t_p = 8.3mS$	
		@ case temperature			@ ambient temperature			@ 25°C	@ 100°C
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C		
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SC3BA05FF	50								
SC3BA10FF	100	17	10	5	6	5	3	175	120
SC3BA15FF	150								

$$R_{\theta JC} = 2.5^{\circ}C/W$$

MECHANICAL

**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 5A/leg @ 25°C	Maximum Reverse Recovery Time t_{rr} @ 25°C	Maximum operating & storage temp range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	mA			°C
SC3BA05FF SC3BA10FF SC3BA15FF	30	1.5	0.97	30	- 55 to +150

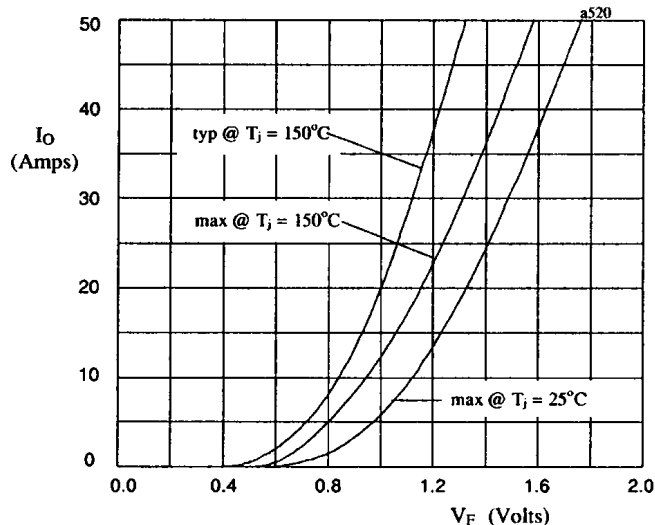
¹ Measured on discrete devices prior to assembly

Fig 1. Forward voltage drop against output current per leg

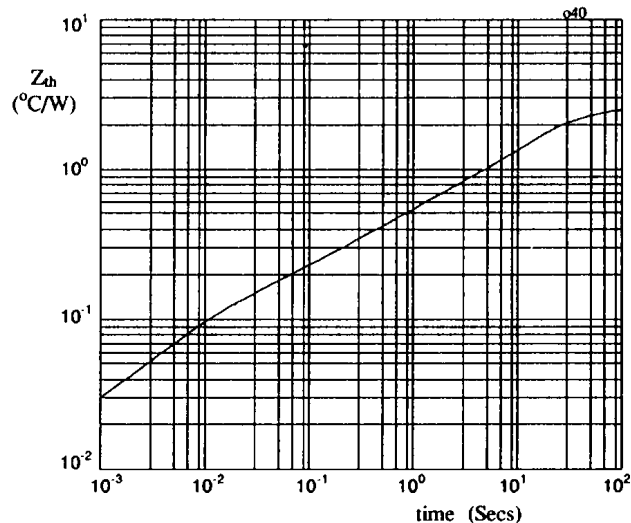
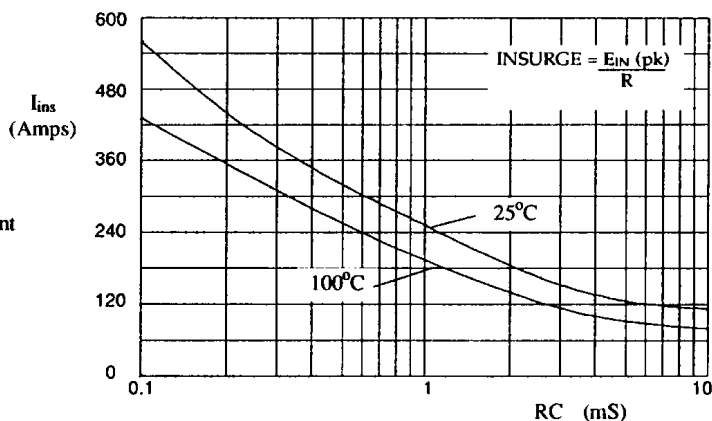


Fig 2. Transient thermal impedance characteristic per leg

Fig 3. Maximum insurge current
against time constant for
capacitive loads.



STANDARD RECOVERY, LOW CURRENT 3-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- Insulated electrical connections

QUICK REFERENCE DATA

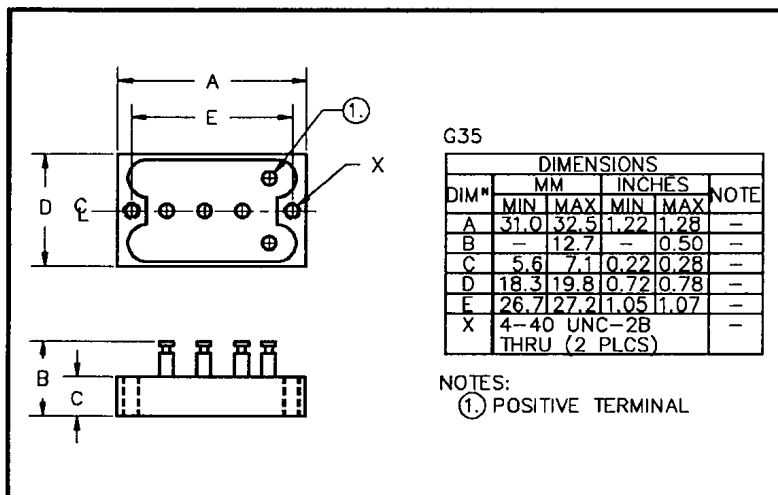
- $V_R = 50V - 600V$
- $I_F = 10A$
- $I_R = 3.0 \mu A$
- $t_{rr} = 2.0 \mu s$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$						1 Cycle Surge Current	
		@ case temperature			@ ambient temperature			I_{FSM} @ $t_p = 8.3mS$	
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SC3BH05	50								
SC3BH1	100								
SC3BH2	200	10	7	5	4	3	1.7	150	100
SC3BH4	400								
SC3BH6	600								

$$R_{\theta JC} = 4.5^{\circ}C/W$$

MECHANICAL



SC3BH6 is available in Europe to DEF STAN 59-61/90/208 release to F and FX levels.



ELECTRICAL CHARACTERISTICS

Device Type	Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 3A/leg @ 25°C	Maximum Reverse Recovery Time t_{rr} @ 25°C	Maximum operating & storage temp range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	μA			
SC3BH05 SC3BH1 SC3BH2 SC3BH4 SC3BH6	3.0	60	1.0	2.0	- 55 to +150

¹ Measured on discrete devices prior to assembly

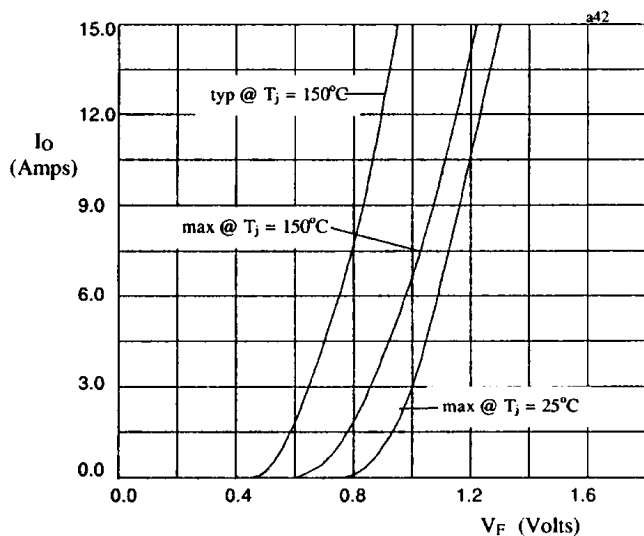


Fig 1. Forward voltage drop against output current per leg

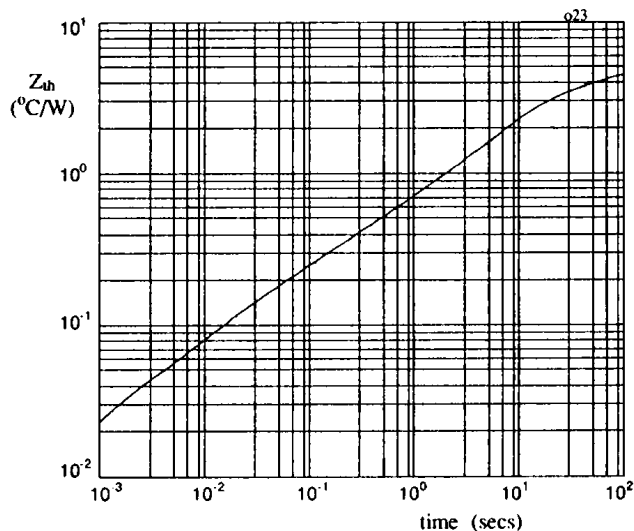


Fig 2. Transient thermal impedance characteristic per leg



FAST RECOVERY, LOW CURRENT 3-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Fast reverse recovery time
- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance

QUICK REFERENCE DATA

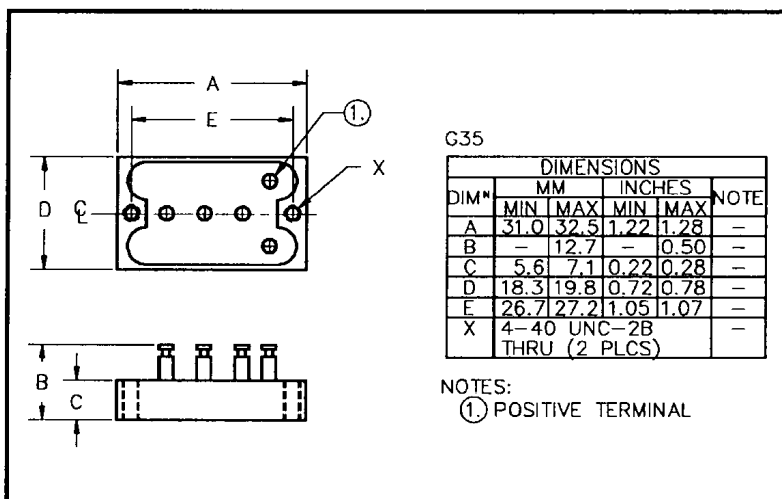
- $V_R = 50V - 400V$
- $I_F = 9.0A$
- $I_R = 3.0 \mu A$
- $t_{rr} = 150nS$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$						1 Cycle Surge Current $I_{FSM} @ t_p = 8.3mS$	
		@ case temperature			@ ambient temperature				
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SC3BH05F	50								
SC3BH1F	100								
SC3BH2F	200	9.0	6.3	4.5	3.0	2.2	1.2	150	100
SC3BH4F	400								

$$R_{\theta JC} = 4.5^{\circ}C/W$$

MECHANICAL



SC3BH4F is available in Europe to DEF STAN 59-61/90/208 release to F and FX levels.

**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 3A/leg @ 25°C	Maximum Reverse Recovery Time t_{rr} @ 25°C	Maximum operating & storage temp range.	
	@ 25°C	@ 100°C			T_{OP}	T_{STG}
	μA	μA	Volts	nS	°C	
SC3BH05F SC3BH1F SC3BH2F SC3BH4F	3.0	60	1.1	150 150 150 150	-55 to +150	

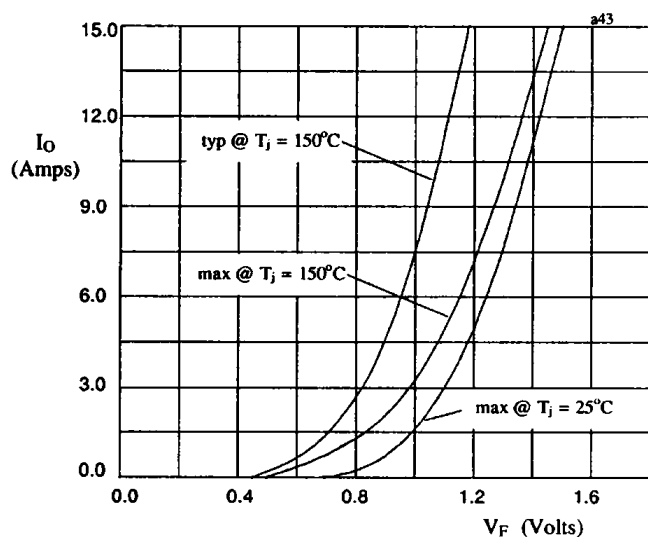
¹ Measured on discrete devices prior to assembly

Fig 1. Forward voltage drop against output current per leg

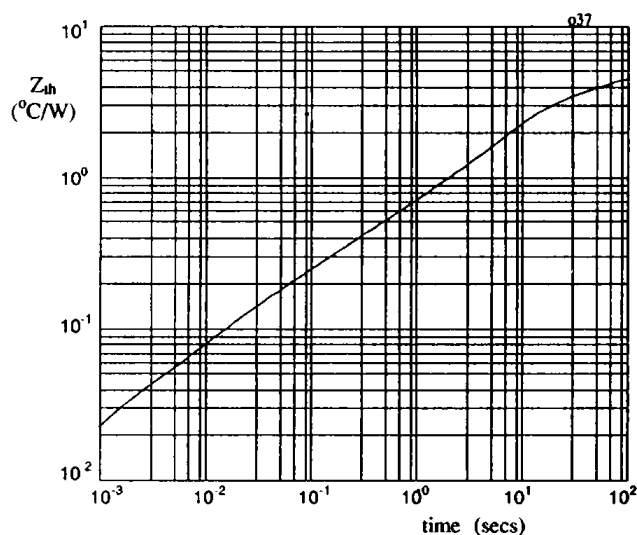


Fig 2. Transient thermal impedance characteristic per leg

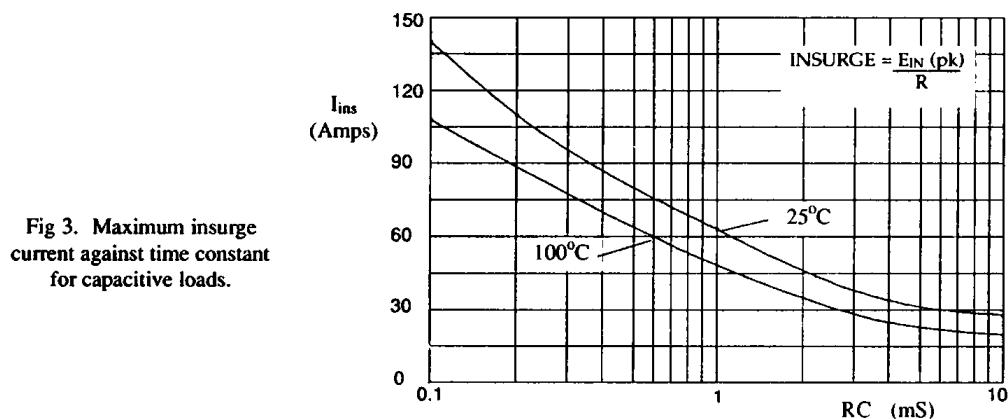


Fig 3. Maximum surge current against time constant for capacitive loads.



SUPERFAST RECOVERY, LOW CURRENT 3-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Very fast reverse recovery time
- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance

QUICK REFERENCE DATA

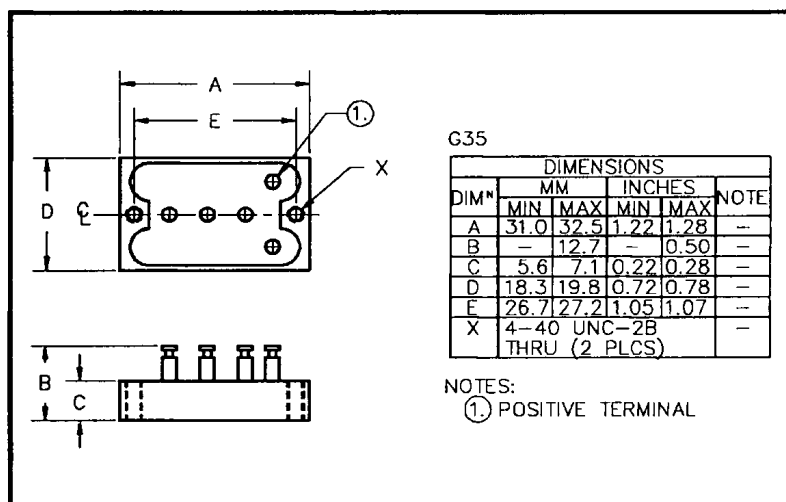
- $V_R = 50V - 150V$
- $I_F = 12A$
- $V_F = 0.97V$
- $t_{rr} = 30nS$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$						1 Cycle Surge Current	
		@ case temperature			@ ambient temperature			I_{FSM} @ $t_p = 8.3mS$	
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SC3BH05FF	50								
SC3BH10FF	100	12	9	7.5	4.0	3.0	1.7	175	120
SC3BH15FF	150								

$$R_{\theta JC} = 4.5^{\circ}C/W$$

MECHANICAL



**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 5A/leg @ 25°C	Maximum Reverse Recovery Time t_{rr} @ 25°C	Maximum operating & storage temp range. T_{OP} T_{STG}	
	@ 25°C	@ 100°C			T_{OP}	T_{STG}
	μA	mA	Volts	nS	°C	
SC3BH05FF	30	1.50	0.97	30	- 55	
SC3BH10FF					to	
SC3BH15FF					+150	

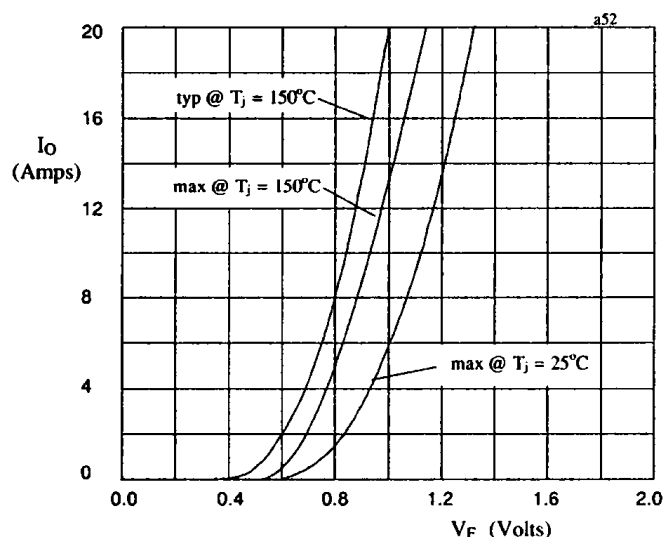
¹ Measured on discrete devices prior to assembly

Fig 1. Forward voltage drop against output current per leg

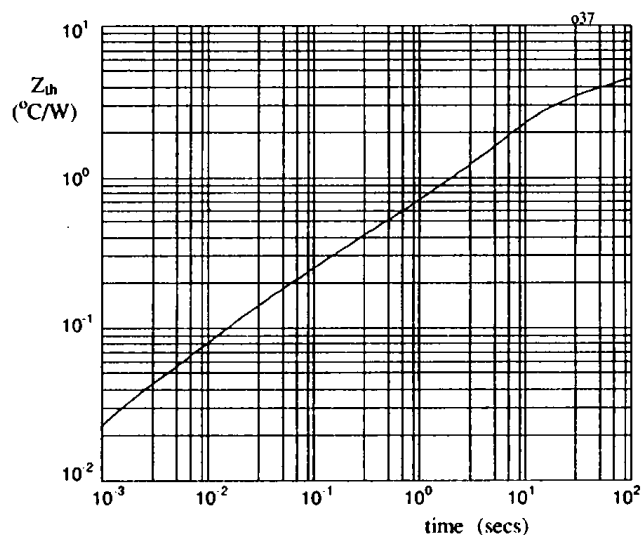


Fig 2. Transient thermal impedance characteristic per leg

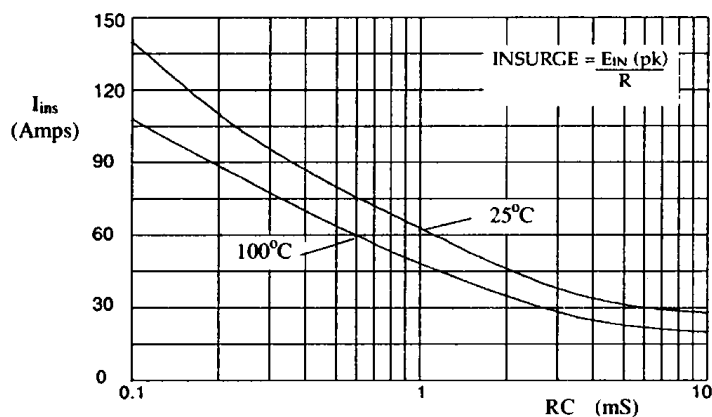


Fig 3. Maximum surge current against time constant for capacitive loads.



STANDARD RECOVERY, LOW CURRENT 3-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- Insulated electrical connections

QUICK REFERENCE DATA

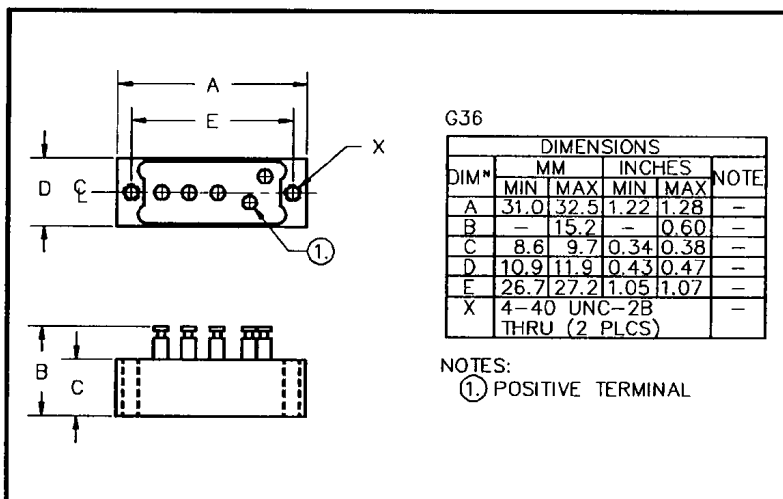
- $V_R = 50V - 600V$
- $I_F = 5A$
- $I_R = 3.0\mu A$
- $t_{rr} = 2.0\mu S$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$						1 Cycle Surge Current $I_{FSM} @ t_p = 8.3mS$	
		@ case temperature			@ ambient temperature				
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SC3BJ05	50								
SC3BJ1	100								
SC3BJ2	200	5.0	3.0	2.0	2.0	1.5	1.0	50	35
SC3BJ4	400								
SC3BJ6	600								

$$R_{\theta JC} = 6.0^{\circ}C/W$$

MECHANICAL



SC3BJ6 is available in Europe to DEF STAN 59-61/90/208 release to F and FX levels.



ELECTRICAL CHARACTERISTICS

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 1A/leg @ 25°C	Maximum Reverse Recovery Time ¹ t_{rr} @ 25°C	Maximum operating & storage temp range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	μA	Volts	μS	°C
SC3BJ05 SC3BJ1 SC3BJ2 SC3BJ4 SC3BJ6	3.0	75	1.1	2.0	-55 to +150

¹ Measured on discrete devices prior to assembly

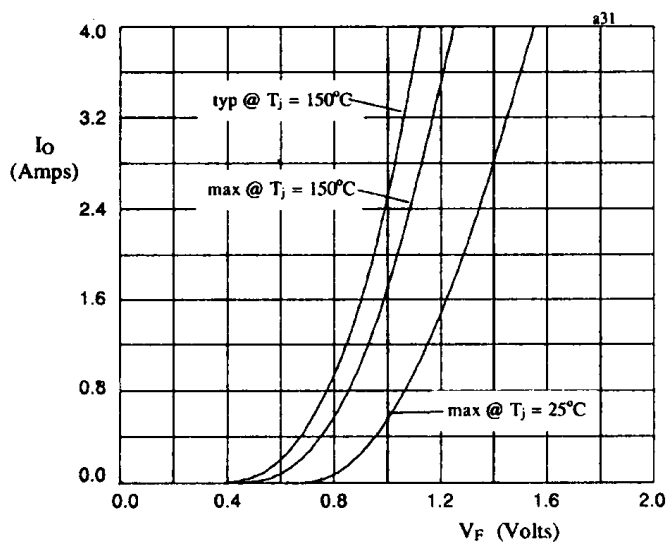


Fig 1. Forward voltage drop against output current per leg

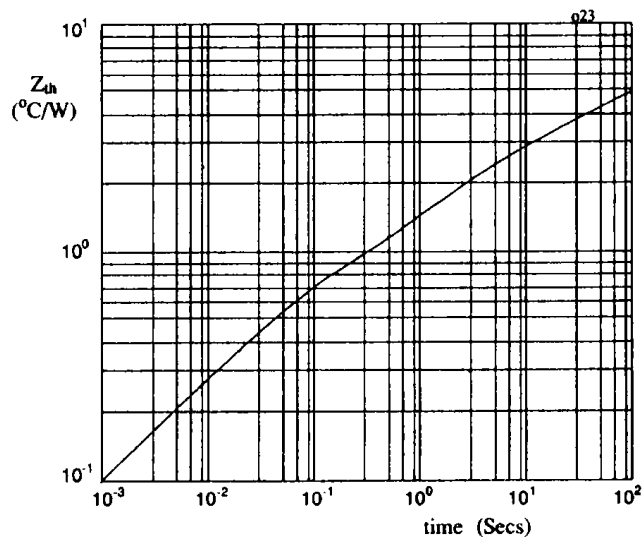


Fig 2. Transient thermal impedance characteristic per leg



FAST RECOVERY, LOW CURRENT 3-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- Fast reverse recovery time

QUICK REFERENCE DATA

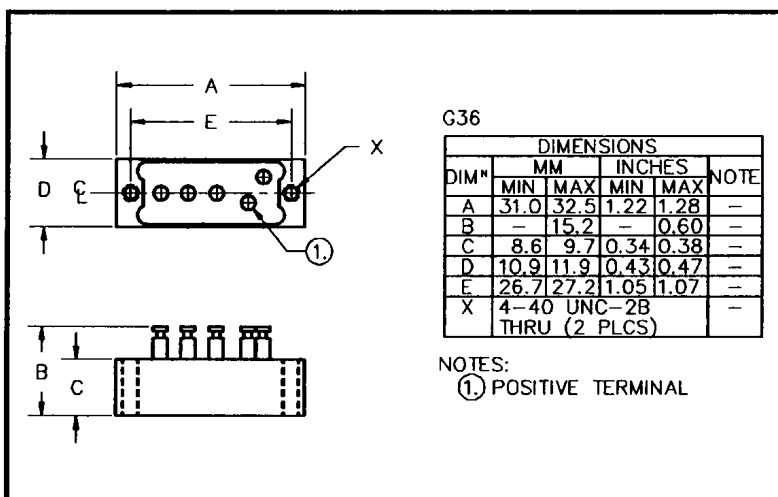
- $V_R = 50V - 600V$
- $I_F = 5.0A$
- $I_R = 3.0 \mu A$
- $t_{rr} = 150 - 250ns$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$						1 Cycle Surge Current I_{FSM} @ $t_p = 8.3ms$	
		@ case temperature			@ ambient temperature			@ 25°C	@ 100°C
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C		
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SC3BJ05F	50								
SC3BJ1F	100								
SC3BJ2F	200	5.0	3.5	2.5	1.5	1.0	0.7	25	15
SC3BJ4F	400								
SC3BJ6F	600								

$R_{\theta JC} = 6.0^\circ C/W$

MECHANICAL



SC3BJ4F is available in Europe to DEF STAN 59-61/90/208 release to F and FX levels.

**ELECTRICAL CHARACTERISTICS**

Device Type	Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 1A/leg @ 25°C	Maximum Reverse Recovery Time t_{rr} @ 25°C	Maximum operating & storage temp range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	μA	Volts	nS	°C
SC3BJ05F SC3BJ1F SC3BJ2F SC3BJ4F SC3BJ6F	3.0	75	1.2	150 150 150 150 250	-55 to +150

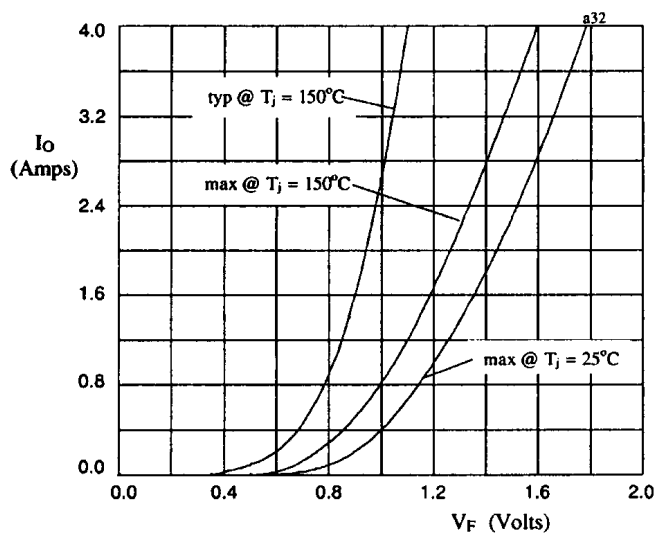
¹ Measured on discrete devices prior to assembly

Fig 1. Forward voltage drop against output current per leg

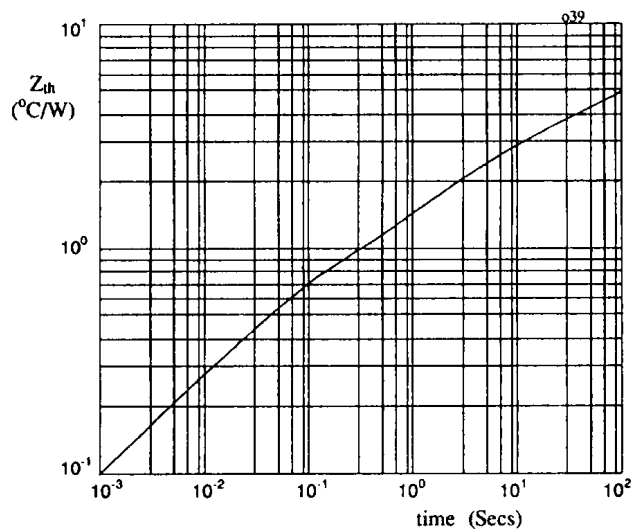


Fig 2. Transient thermal impedance characteristic per leg

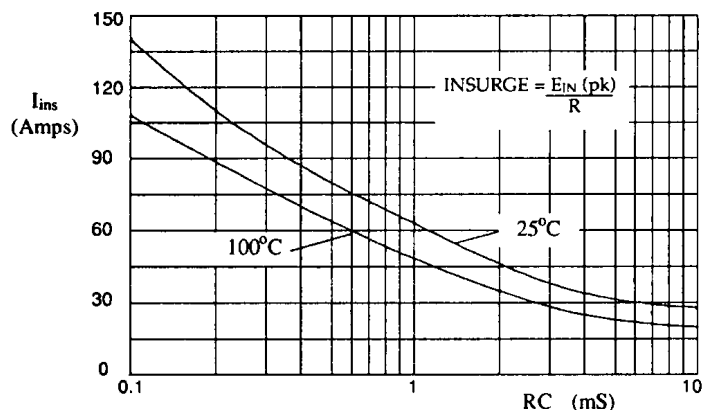


Fig 3. Maximum insurge current against time constant for capacitive loads.



SUPERFAST RECOVERY, LOW CURRENT 3-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- Very fast reverse recovery time

QUICK REFERENCE DATA

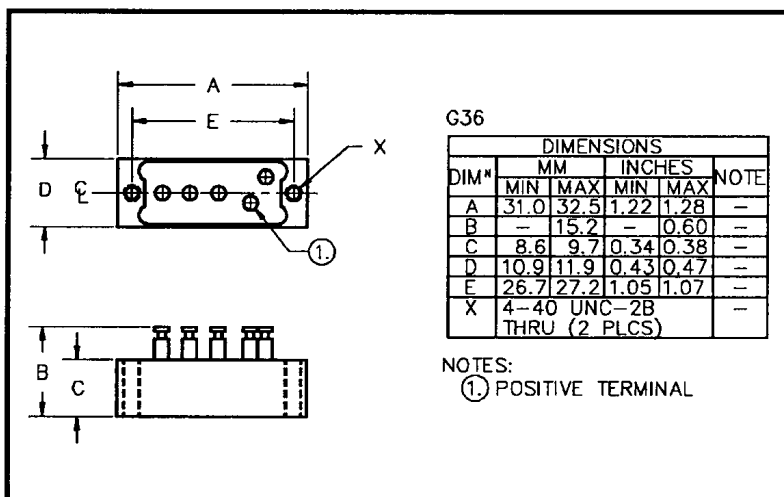
- $V_R = 50V - 150V$
- $I_F = 5.0A$
- $V_F = 1.2V$
- $t_{rr} = 30nS$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$						1 Cycle Surge Current	
		@ case temperature			@ ambient temperature			I_{FSM} @ $t_p = 8.3mS$	
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SC3BJ05FF	50								
SC3BJ10FF	100	5.0	3.1	1.8	1.5	1.1	0.7	35	24
SC3BJ15FF	150								

$$R_{\theta JC} = 6.0^{\circ}C/W$$

MECHANICAL





ELECTRICAL CHARACTERISTICS

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage / leg V_F @ 1.5A @ 25°C	Maximum Reverse Recovery Time t_{rr} @ 25°C	Maximum operating & storage temp range.	
	@ 25°C	@ 100°C			T_{OP}	T_{STG}
	μA	μA			°C	
SC3BJ05FF	3.0	150	1.2	30	- 55	
SC3BJ10FF					to	
SC3BJ15FF					+150	

¹ Measured on discrete devices prior to assembly

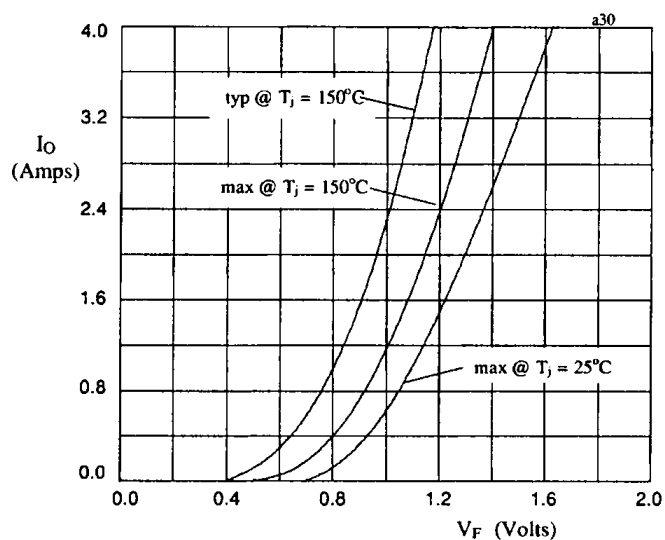


Fig 1. Forward voltage drop against output current per leg

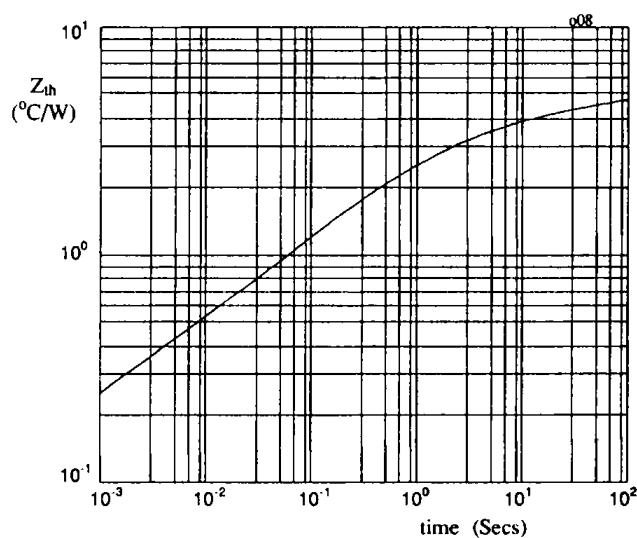


Fig 2. Transient thermal impedance characteristic per leg

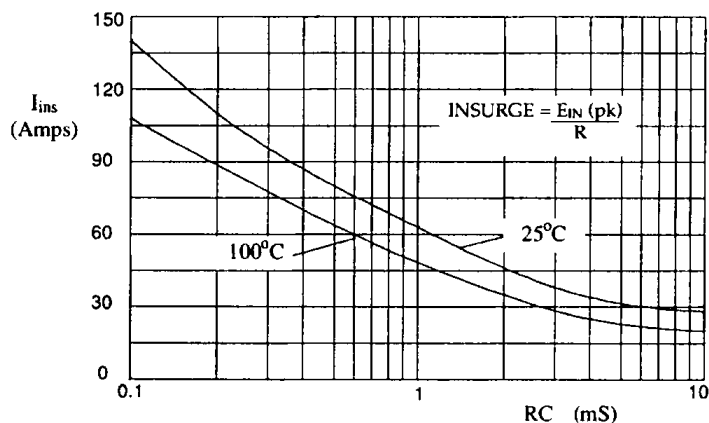


Fig 3. Maximum surge current against time constant for capacitive loads.

**STANDARD RECOVERY, HIGH CURRENT 3-PHASE
FULL WAVE BRIDGE RECTIFIER ASSEMBLIES**

- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- High surge ratings

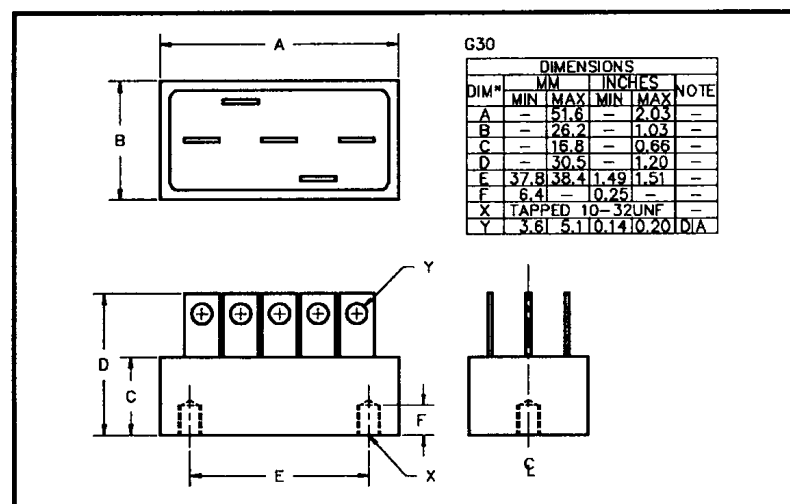
**QUICK REFERENCE
DATA**

- $V_R = 50V - 600V$
- $I_F = 38A$
- $I_R = 9.0\mu A$
- $I_{FSM} = 375A$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$						1 Cycle Surge Current I_{FSM} @ $t_p = 8.3mS$	
		@ case temperature			@ ambient temperature			@ 25°C	@ 100°C
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C		
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SC3BK05	50								
SC3BK1	100								
SC3BK2	200	38	24	17.5	13	10	6.0	375	300
SC3BK4	400								
SC3BK6	600								

$$R_{\theta JC} = 1.1^{\circ}C/W$$

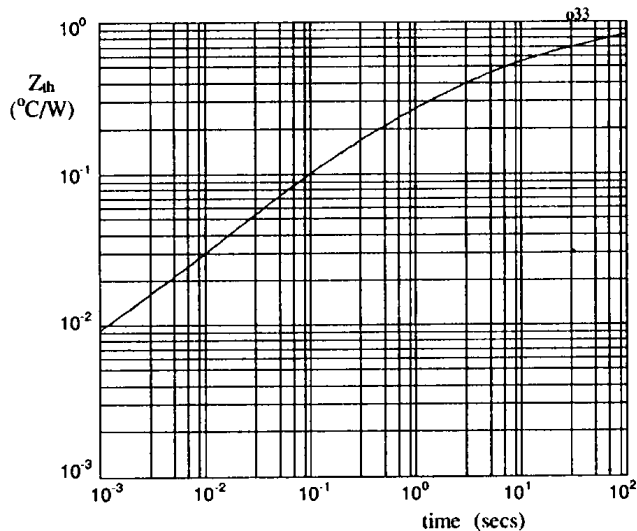
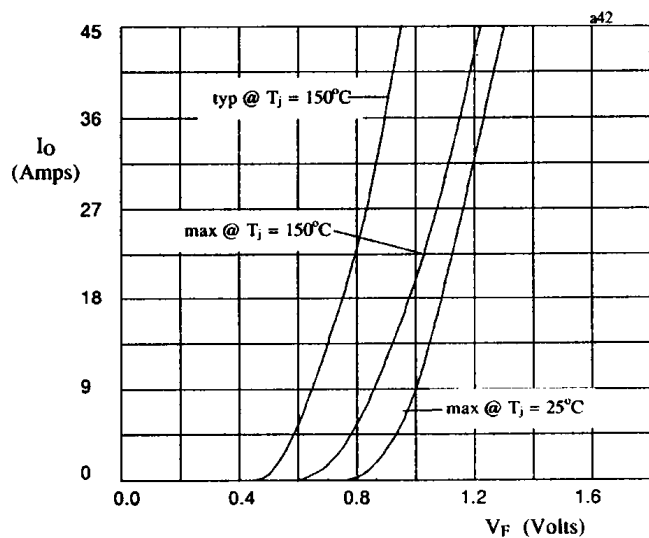
MECHANICAL



ELECTRICAL CHARACTERISTICS

Device Type	Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 9A/leg @ 25°C	Maximum Reverse Recovery Time t_{rr} @ 25°C	Maximum operating & storage temp range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	μA	Volts	μS	°C
SC3BK05 SC3BK1 SC3BK2 SC3BK4 SC3BK6	9.0	180	1.0	2.0	-55 to +150

¹ Measured on discrete devices prior to assembly



**FAST RECOVERY, HIGH CURRENT 3-PHASE FULL
WAVE BRIDGE RECTIFIER ASSEMBLIES**

- Low forward voltage drop
- Low reverse leakage current
- Fast reverse recovery time
- Low thermal impedance
- High surge ratings

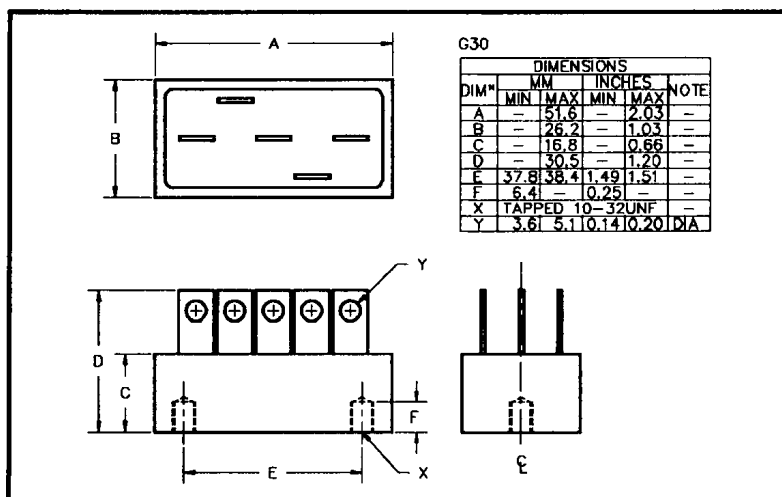
**QUICK REFERENCE
DATA**

- $V_R = 50V - 400V$
- $I_F = 42A$
- $I_R = 9.0\mu A$
- $t_{rr} = 150ns$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V _{RWM}	Average Rectified Current I _{F(AV)}						1 Cycle Surge Current I _{FSM} @ t _p = 8.3mS	
		@ case temperature			@ ambient temperature			@ 25°C	@ 100°C
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C		
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SC3BK05F	50	42	29	20	11	8.5	5	375	240
SC3BK1F	100								
SC3BK2F	200								
SC3BK4F	400								

$$R_{\theta JC} = 1.1^{\circ}C/W$$

MECHANICAL

**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 9A/leg @ 25°C	Maximum Reverse Recovery Time t_{rr} @ 25°C	Maximum operating & storage temp range. T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	μA			
SC3BK05F SC3BK1F SC3BK2F SC3BK4F	9.0	180	1.1	150 150 150 150	-55 to +150

¹ Measured on discrete devices prior to assembly

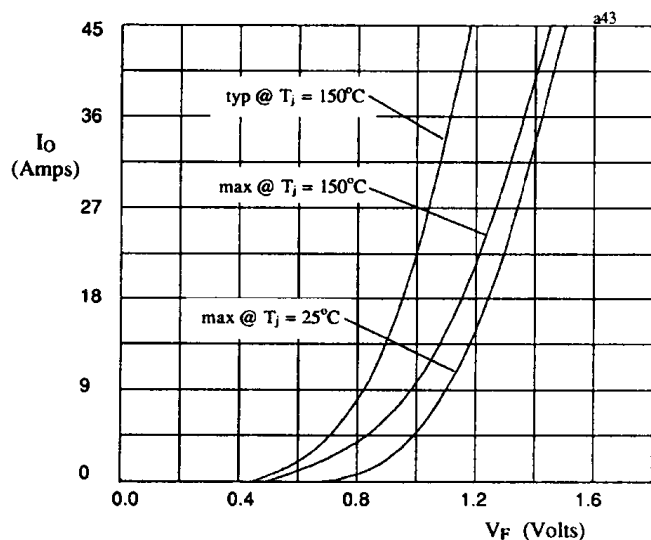
5

Fig 1. Forward voltage drop against output current per leg

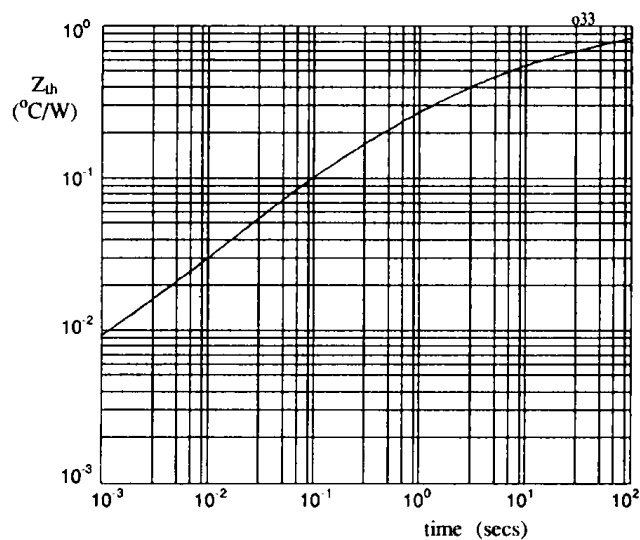


Fig 2. Typical transient thermal impedance characteristic per leg



SUPERFAST RECOVERY, HIGH CURRENT 3-PHASE FULL WAVE BRIDGE RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Very fast reverse recovery time
- Low thermal impedance
- High surge ratings

QUICK REFERENCE DATA

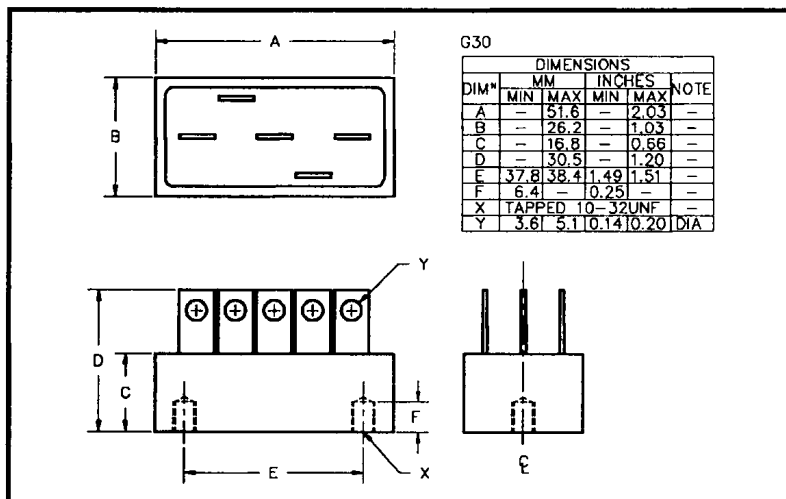
- $V_R = 50V - 150V$
- $I_F = 38A$
- $V_F = 0.97V$
- $t_{rr} = 30nS$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$						1 Cycle Surge Current I_{FSM} @ $t_p = 8.3mS$	
		@ case temperature			@ ambient temperature			@ 25°C	@ 100°C
		@ 55°C	@ 100°C	@ 125°C	@ 25°C	@ 55°C	@ 100°C		
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SC3BK05FF	50								
SC3BK10FF	100	38	25	14	13	9.25	5.5	450	360
SC3BK15FF	150								

$$R_{\theta JC} = 1.1^{\circ}C/W$$

MECHANICAL





ELECTRICAL CHARACTERISTICS

Device Type	Maximum Reverse Leakage Current $I_R @ V_{RWM}$		Maximum Forward Voltage $V_F @ 15A/leg$	Maximum Reverse Recovery Time ¹ $t_{rr} @ 25^\circ C$	Maximum operating & storage temp. range $T_{OP} \quad T_{STG}$
	@ 25°C	@ 100°C			
	μA	mA			
SC3BK05FF SC3BK10FF SC3BK15FF	90	4.5	0.97	30	-55 to +150

¹ Measured on discrete devices prior to assembly

5

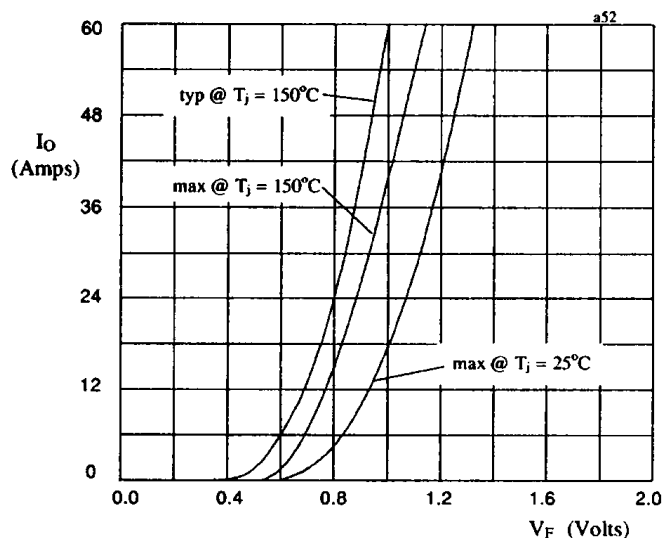


Fig 1. Forward voltage drop against output current per leg

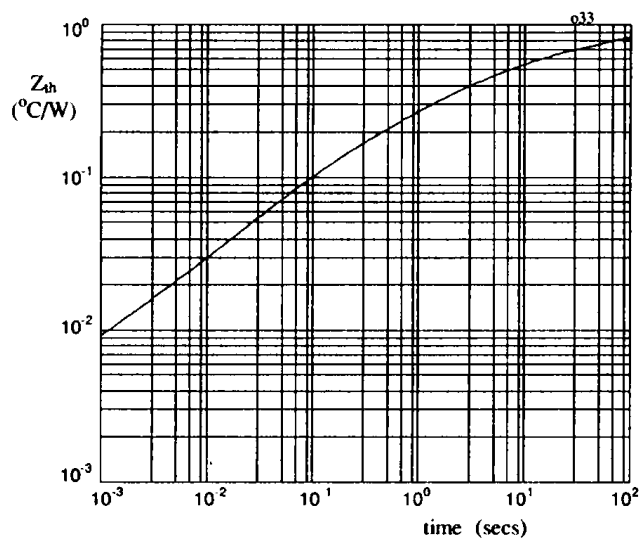


Fig 2. Typical transient thermal impedance characteristic per leg

POWER DISCRETES

Description

Standard recovery 30A three phase full wave bridge rectifier.

Features

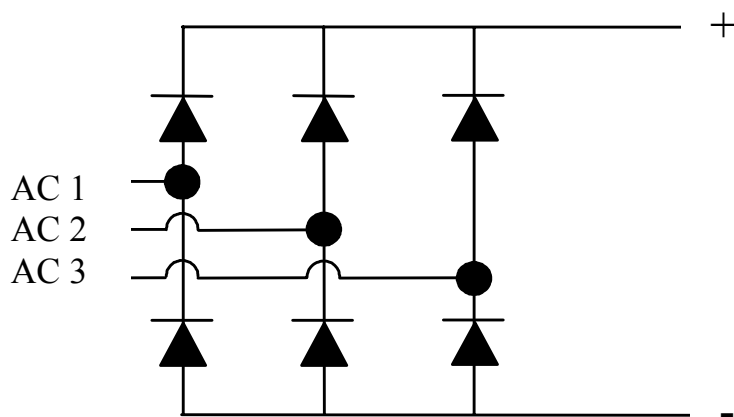
- ◆ Low forward voltage drop
- ◆ Low reverse leakage
- ◆ Black anodized aluminum case
- ◆ Low thermal impedance $< 1.2^{\circ} \text{ C/W}$
- ◆ Hi-Rel. screened version is similar to Mil-PRF-19500/483
- ◆ To order Hi-Rel. version place HR in front of the product name

Applications

Conversion of 3-phase power to DC power where high power density and rugged design is required. Typical industries are:

- ◆ Aerospace
- ◆ Military
- ◆ High end industrial

Block Diagram



POWER DISCRETES

Absolute Maximum Ratings

Part Number	Working Reverse Voltage	Average Rectifier Current $I_{F(AV)}$						1 Cycle Surge Current I_{FSM} @ $t_p = 8.3mS$	
		@ case temperature			@ ambient temperature			25°C	100°C
		55°C	100°C	125°C	25°C	55°C	100°C		
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SC6BA2	200	30	20	10	10	7	5	250	125
SC6BA4	400								
SC6BA6	600								
SC6BA8	800								

Electrical Specifications

Part Number	Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 39A/leg @ 25°	Maximum Reverse Recovery Time ⁽¹⁾ T_A @ 25°C	Maximum Operational and Storage Temperatures T_{OP} T_{STG}
	@ 25°C	@ 100°C			
	μA	μA			
SC6BA2	1.0	100	1.3	2.0	-65 to +150
SC6BA4					
SC6BA6					
SC6BA8					

(1) Measured on discrete devices prior to assembly

Ordering Information

Part Number	Description
SC6BA2, SC6BA4, SC6BA6, SC6BA8 ⁽¹⁾	Standard Recovery 3-Phase full wave bridge rectifier assembly
HRSC6BA2, HRSC6BA4, HRSC6BA6, HRSC6BA8 ⁽¹⁾⁽²⁾	

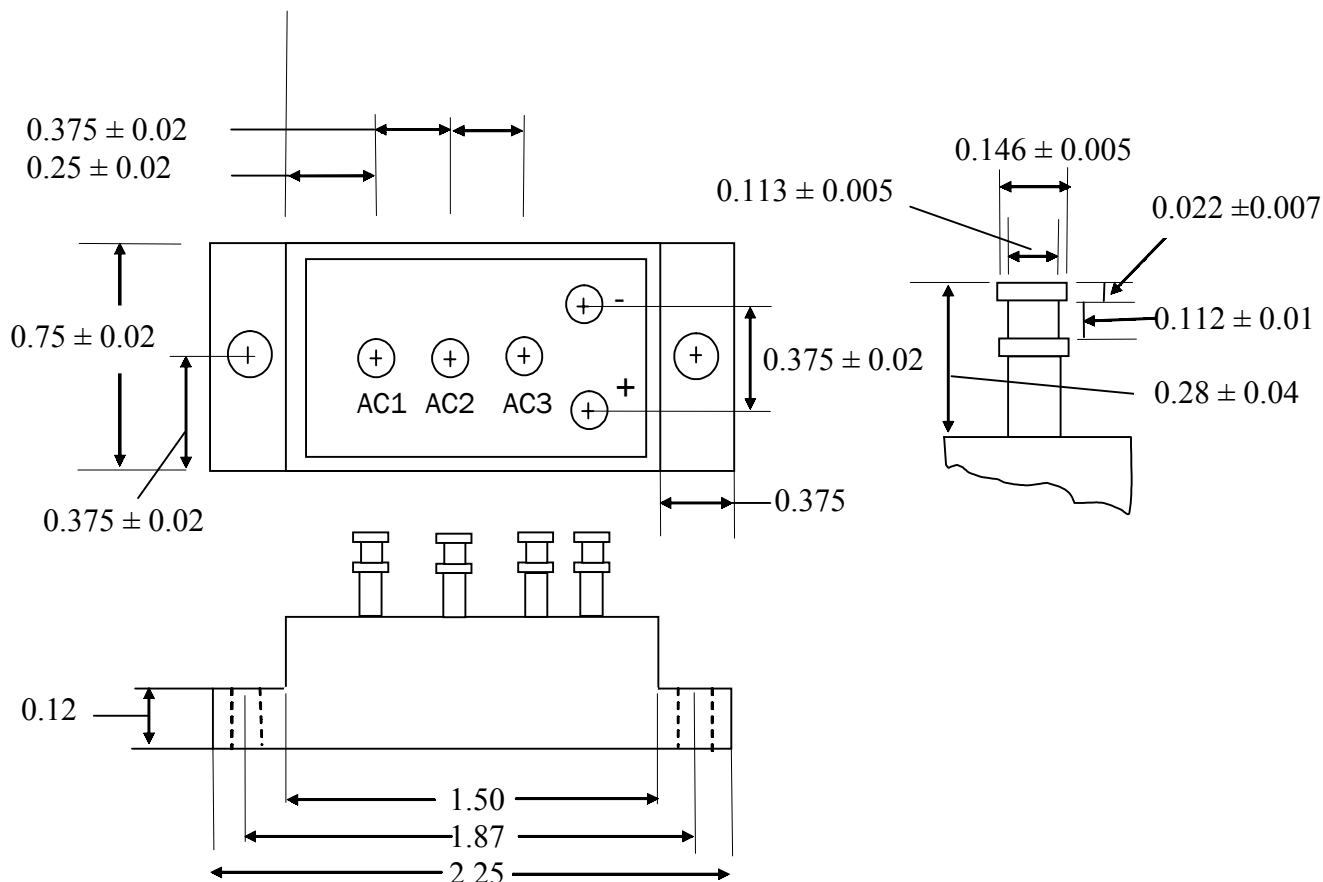
Note:

- (1) Available in trays. Please consult factory for quantity.
- (2) Hi-Rel. screened version is similar to Mil-PRF-19500/483.

POWER DISCRETES

Outline Drawing

(Dimensions in inches)



Note: Unless otherwise stated tolerance is ± 0.03

Contact Information

Semtech Corporation
 Power Discretes Products Division
 200 Flynn Road, Camarillo, CA 93012
 Phone: (805)498-2111 FAX (805)498-3804



HIGH CURRENT, HIGH DENSITY, THREE PHASE FULL WAVE BRIDGE RECTIFIER.

- Low thermal impedance
- Small size and low weight
- High current applications
- Isolated for direct heatsink mounting
- High surge ratings

QUICK REFERENCE DATA

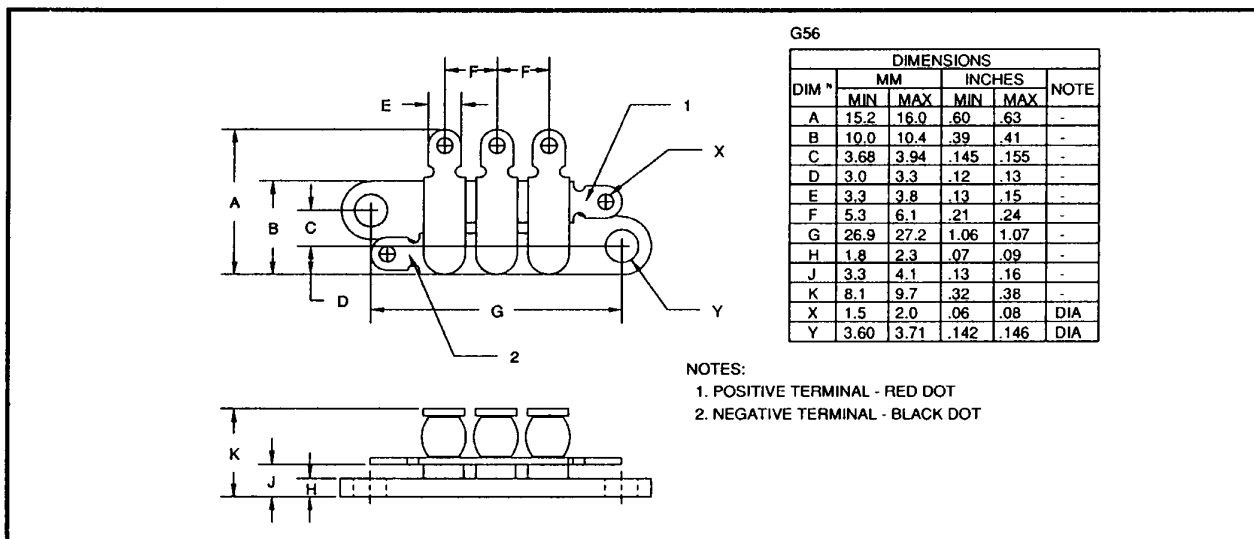
- $V_R = 150V - 1000V$
- $I_O = 45A$
- $t_{rr} = 30nS - 2\mu S$
- $I_{FSM} \geq 150A$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage (V_{RWM})	Average Rectified Current ($I_{F(AV)}$) @ T_{mb}			1 Cycle Surge I_{FSM} $t_p = 8.3mS$		Repetitive Surge (I_{FRM})	Operating & Storage Temperature Range	
		@ 55°C	100°C	125°C	@ 25 °C	@ 100°C	@ 25 °C	(T_{OP})	(T_{STG})
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	°C	
SET111403	1000	45	33	24	150	100	25	-55 to +175	
SET111419	1000	30	24	18	150	80	15	-55 to +175	
SET111412	600	45	33	24	150	100	25	-55 to +175	
SET111404	400	45	33	24	150	80	25	-55 to +175	
SET111411	150	45	30	21	175	175	24	-55 to +150	

$$R_{\theta jc} = 0.5^{\circ}C/W$$

MECHANICAL





ELECTRICAL CHARACTERISTICS

Device Type	Maximum Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 9A @ 25°C	Maximum Reverse Recovery Time. ¹ t_{rr}
	$T_j = 25^\circ\text{C}$	$T_j = 100^\circ\text{C}$		
	μA	μA	Volts	nS
SET111403	3.0	60	1.2	2000
SET111419	3.0	75	2.2	150
SET111412	3.0	60	1.2	2000
SET111404	3.0	60	1.5	150
SET111411	30.0	1.5mA	1.1	30

¹ Measured on discrete devices prior to assembly

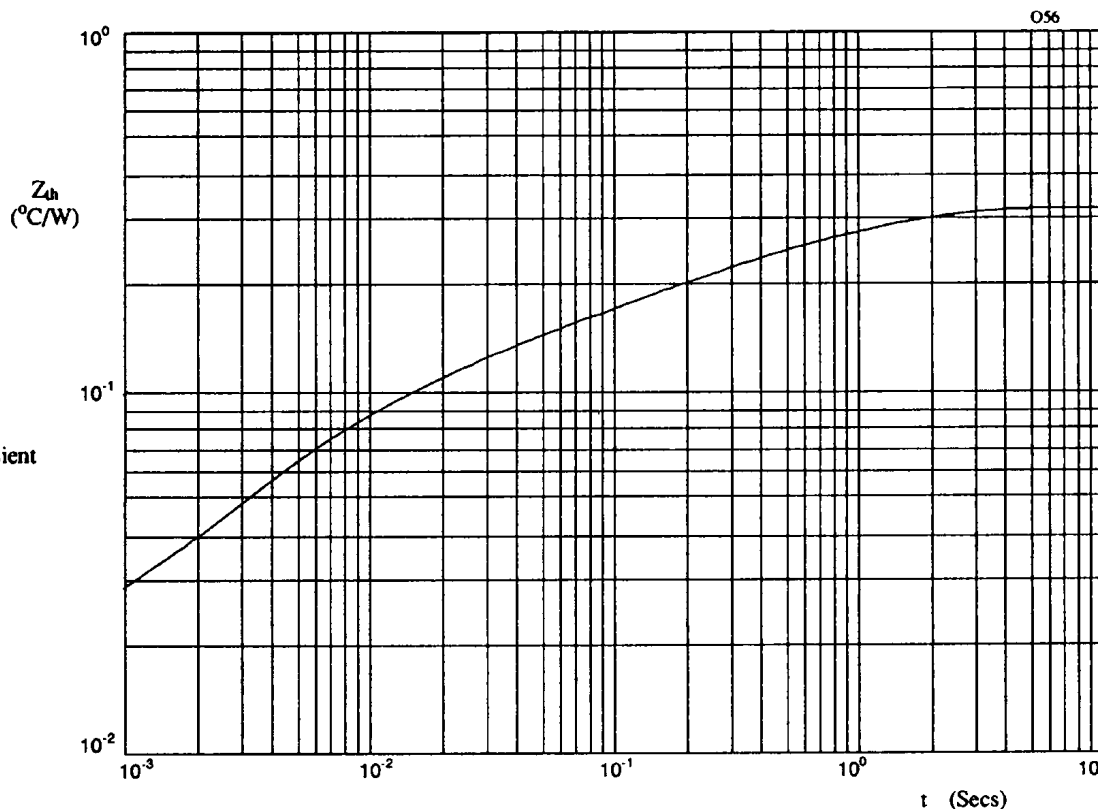


Figure 1. Typical transient thermal impedance characteristic.

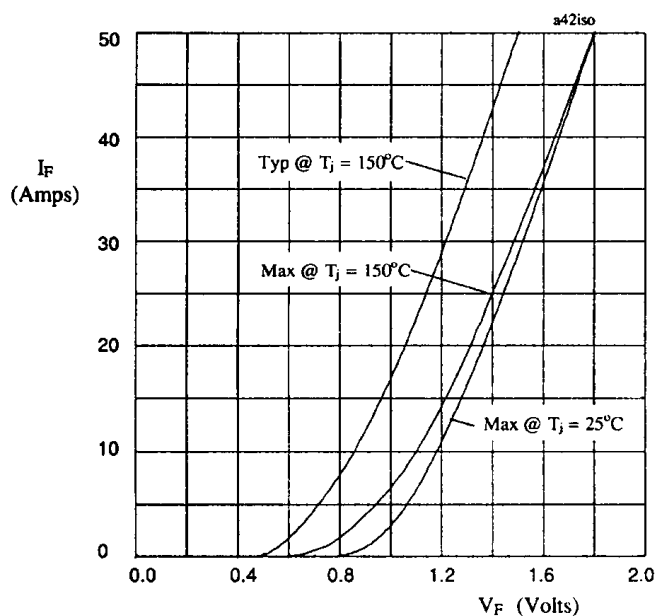


Figure 2. Forward voltage drop per leg as a function of forward current for SET111403 & SET111412.

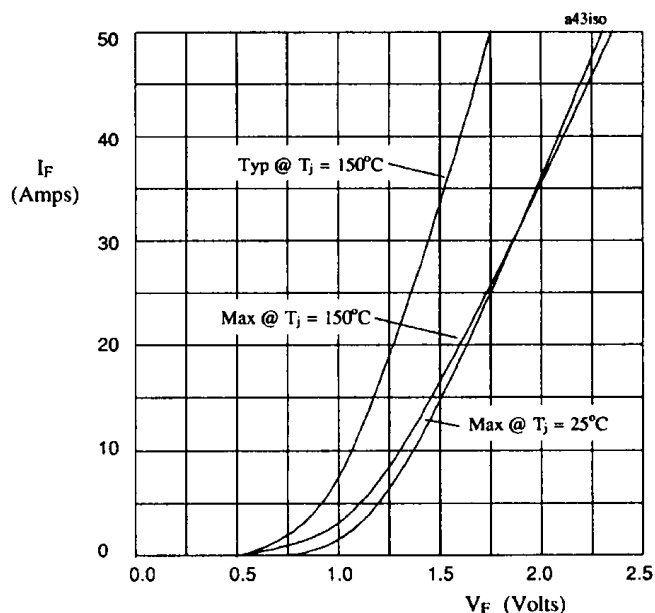


Figure 3. Forward voltage drop per leg as a function of forward current for SET111404.

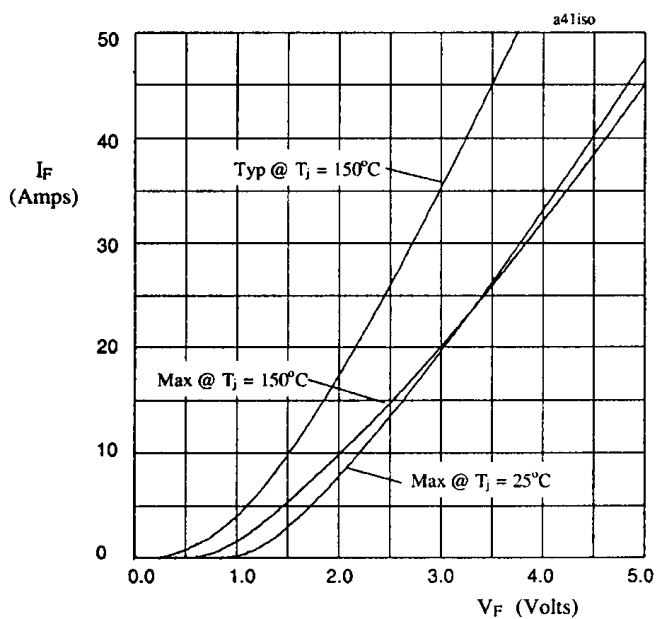


Figure 4. Forward voltage drop per leg as a function of forward current for SET111419.

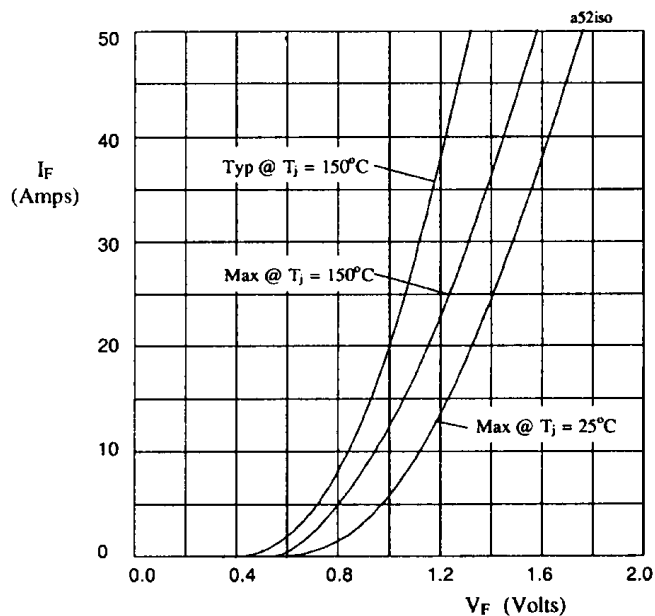


Figure 5. Forward voltage drop per leg as a function of forward current for SET111411.

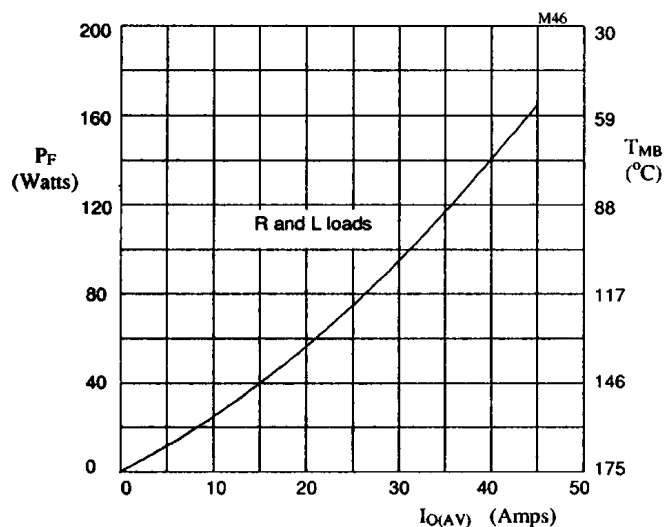


Figure 6. Forward power dissipation and maximum allowable mounting base temperature as a function of output current for sinusoidal operation, for SET111403 and SET111412.

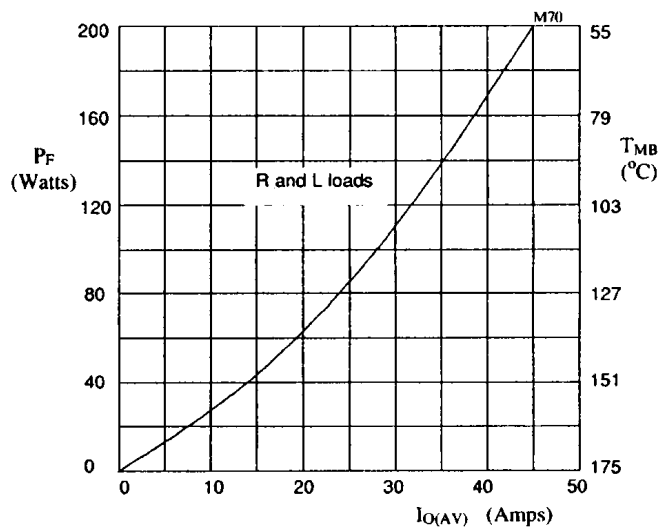


Figure 7. Forward power dissipation and maximum allowable mounting base temperature as a function of output current for sinusoidal operation, for SET111404.

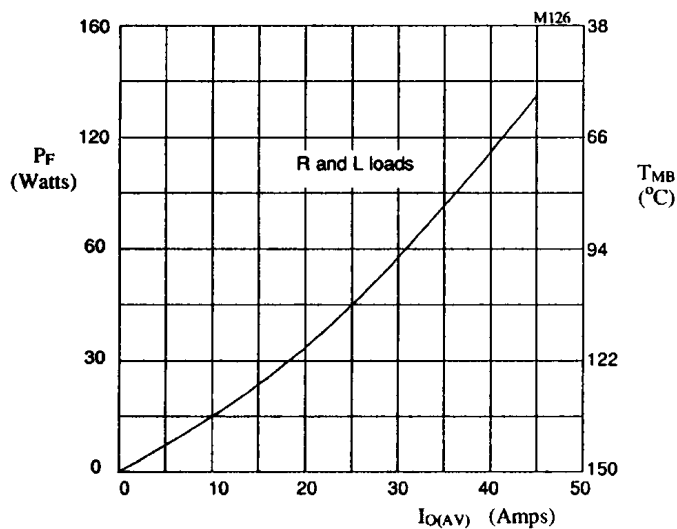


Figure 8. Forward power dissipation and maximum allowable mounting base temperature as a function of output current for sinusoidal operation, for SET111411.

Chapter 6

Half Wave, High Voltage Assemblies

Datasheet No.	Title:
S1KWXXAX	Standard Recovery High Voltage, High Current Rectifier
S2HVMX	Standard Recovery High Voltage, Rectifier Assembly
S2HVMXF	Fast Recovery High Voltage, Rectifier Assembly
S2HVSX	Standard Recovery High Voltage, Rectifier Assembly
S2HVSXF	Fast Recovery High Voltage, Rectifier Assembly
S2KWXXAX	Standard Recovery High Voltage, High Current Rectifier Assembly
S3HVMX	Standard Recovery High Voltage, Rectifier Assembly
S3HVMXF	Fast Recovery High Voltage, Rectifier Assembly
S4KWXXAX	Standard Recovery High Voltage, High Current Rectifier Assembly
SCFX	Fast Recovery High Voltage, Rectifier Assembly
SCFSX	Fast Recovery High Voltage, Rectifier Assembly
SCHX	Standard Recovery High Voltage, Rectifier Assembly
SCHJXX	Standard Recovery High Voltage, Rectifier Assembly
SCHSX	Standard Recovery High Voltage, Rectifier Assembly
SCVXXK12	Standard Recovery High Voltage, Rectifier Assembly
SCVXXK3	Standard Recovery High Voltage, Rectifier Assembly
SCVXXK3F	Fast Recovery High Voltage, Rectifier Assembly
SCVXXK30	Standard Recovery High Voltage, Rectifier Assembly
SCVXXK40	Standard Recovery High Voltage, Rectifier Assembly
SCPHNX	Standard Recovery High Voltage, High Current Rectifier Assembly
SDHXX	Standard Recovery High Voltage, Rectifier Assembly
SDHXXKM	Standard Recovery High Voltage, Rectifier Assembly
SDHXXKS	Standard Recovery High Voltage, Rectifier Assembly
SDHFXKM	Fast Recovery High Voltage, Rectifier Assembly
SDHFXKS	Fast Recovery High Voltage, Rectifier Assembly
SHVMX	Standard Recovery High Voltage, Rectifier Assembly
SHVMXF	Fast Recovery High Voltage, Rectifier Assembly
SHVSX	Fast Recovery High Voltage, Rectifier Assembly
SHVSXF	Fast Recovery High Voltage, Rectifier Assembly
SLF2500,5000,1000,15000	Fast Recovery High Voltage, Rectifier Assembly



HIGH VOLTAGE, HIGH CURRENT, HIGH DENSITY, STANDARD RECOVERY RECTIFIER ASSEMBLY

QUICK REFERENCE DATA

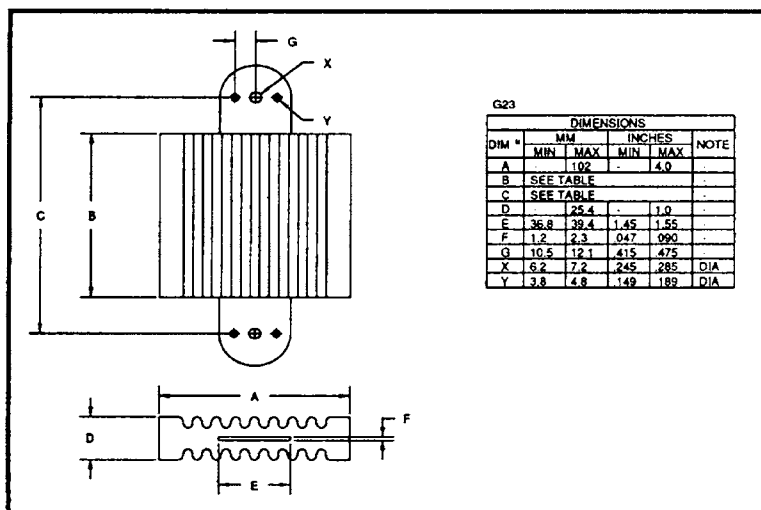
- Up to 96kV reverse voltage
- Air or oil environment
- Low reverse leakage currents
- High thermal shock resistance
- Integral cooling fins.

- $V_R = 16\text{kV} - 96\text{kV}$
- $I_F = 3.8 - 5.0\text{A}$ (in oil)
- $I_R = 1.0\mu\text{A}$
- $I_{FSM} = 150\text{A}$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_F(AV)$				1 Cycle Surge Current $t_p = 8.3\text{ms}$ I_{FSM}		Repetitive Surge Current I_{FRM}	I^2t $t_p = 8.3\text{ms}$
		air @ 25 °C	air @ 65 °C	forced air 600CFM @ 55°C	still oil @ 55 °C	@ 25 °C	@ 100 °C	@ 25 °C	@ 25 °C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	A ² S
S1KW16KA-1	16000	2.0	1.4	4.0	5.0	↑	↑	↑	↑
S1KW32KA-2	32000	1.5	1.0	3.0	3.8	↑	↑	↑	↑
S1KW48KA-3	48000	1.5	1.0	3.0	3.8	150	100	25.0	93.4
S1KW64KA-4	64000	1.5	1.0	3.0	3.8	↓	↓	↓	↓
S1KW80KA-5	80000	1.5	1.0	3.0	3.8	↓	↓	↓	↓
S1KW96KA-6	96000	1.5	1.0	3.0	3.8	↓	↓	↓	↓

MECHANICAL



Dimensions (see drawing)	
B (max)	C (max)
inches	inches
4.780	6.480
7.980	9.680
11.18	12.88
14.38	16.08
17.58	19.28
20.78	22.48



CHARACTERISTICS

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 3.0A @ 25°C	Maximum Reverse Recovery Time ¹ t_{rr} @ 25°C
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	μS
S1KW16KA-1	1.0	20	16	2.0
S1KW32KA-2			32	
S1KW48KA-3			48	
S1KW64KA-4			64	
S1KW80KA-5			80	
S1KW96KA-6			72	

¹ Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

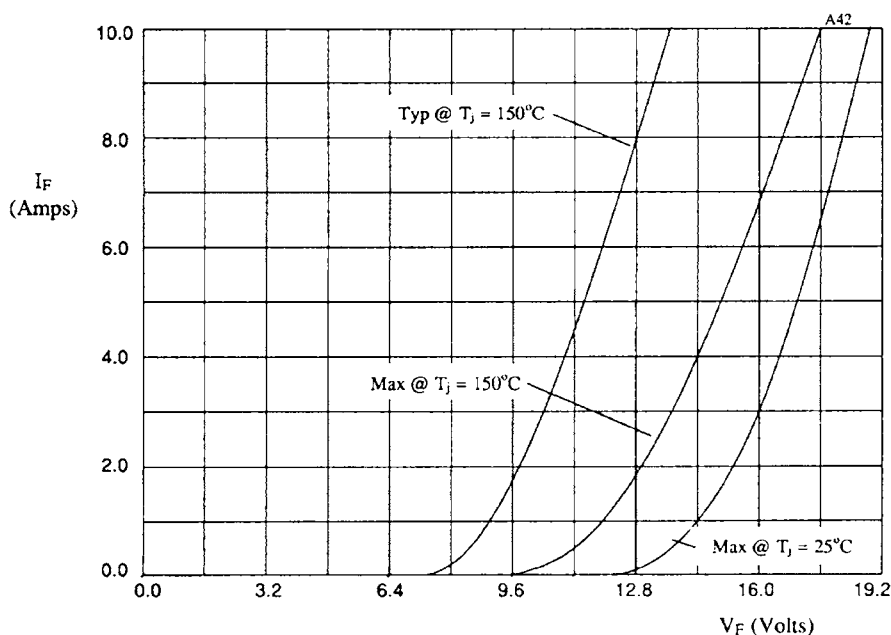


Figure 1. Forward voltage drop as a function of forward current.

TABLE 1

DEVICE	X-axis
S1KW16KA-1	x1
S1KW32KA-2	x2
S1KW48KA-3	x3
S1KW64KA-4	x4
S1KW80KA-5	x5
S1KW96KA-6	x6



HIGH VOLTAGE, HIGH DENSITY, STANDARD RECOVERY MODULAR RECTIFIER ASSEMBLY

- Up to 15kV reverse voltage
- Modular construction
- Low reverse leakage current
- High thermal shock resistance
- Provides design versatility

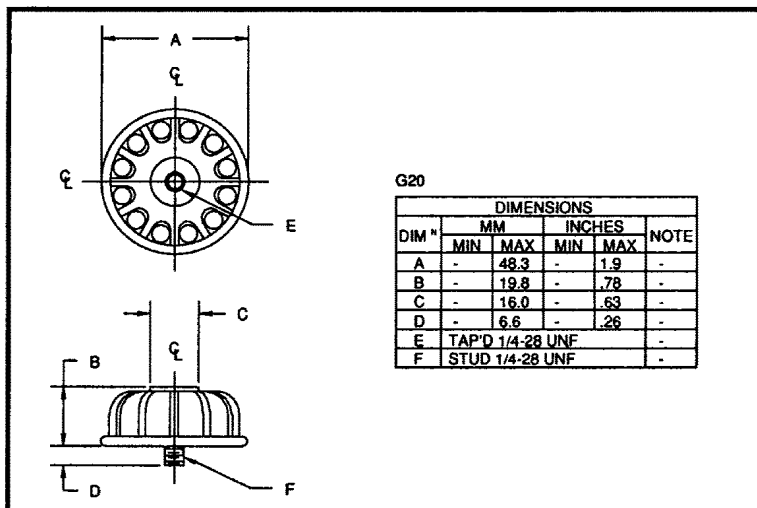
QUICK REFERENCE DATA

- $V_R = 2.5\text{kV} - 15\text{kV}$
- $I_F = 0.8 - 2.0\text{A}$ (in air)
- $I_R = 1.0\mu\text{A}$
- $I_{FSM} = 50\text{A}$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_F(AV)$				1 Cycle Surge Current I_{FSM} $t_p = 8.3\text{ms}$		Repetitive Surge Current I_{FRM} @ 25°C	I^2t $t_p = 8.3\text{ms}$ @ 25°C
		Air @ 25°C	Air @ 100°C	Stud to Heatsink @ 25 °C	Still oil @ 55 °C	@ 25°C	@ 100°C		
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	A ² S
S2HVM2.5	2500	2.0	0.8	2.0	↑	↑	↑	↑	↑
S2HVM5	5000	2.0	0.8	2.0	↑	↑	↑	↑	↑
S2HVM7.5	7500	2.0	0.8	2.0	2.0	50	20	12.0	10.0
S2HVM10	10000	1.2	0.5	2.0	↓	↓	↓	↓	↓
S2HVM12.5	12500	1.0	0.4	2.0	↓	↓	↓	↓	↓
S2HVM15	15000	0.8	0.3	1.5	↓	↓	↓	↓	↓

MECHANICAL



MAXIMUM THERMAL IMPEDANCES

Junction - Ambient $R_{\theta JA} < 12^\circ\text{C/W}$
 Junction - Stud $R_{\theta JS} < 6^\circ\text{C/W}$
 Junction - Oil $R_{\theta JO} < 4.5^\circ\text{C/W}$

**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 2.0A @ 25°C	Maximum Reverse Recovery Time ¹ t_{rr} @ 25°C
	@ 25°C	@ 100 °C		
	μA	μA	Volts	μS
S2HVM2.5	1.0 ↑ ↓	20 ↑ ↓	3.3	2.5 ↑ ↓
S2HVM5			5.5	
S2HVM7.5			8.8	
S2HVM10			11.1	
S2HVM12.5			14.4	
S2HVM15			16.6	

1. Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

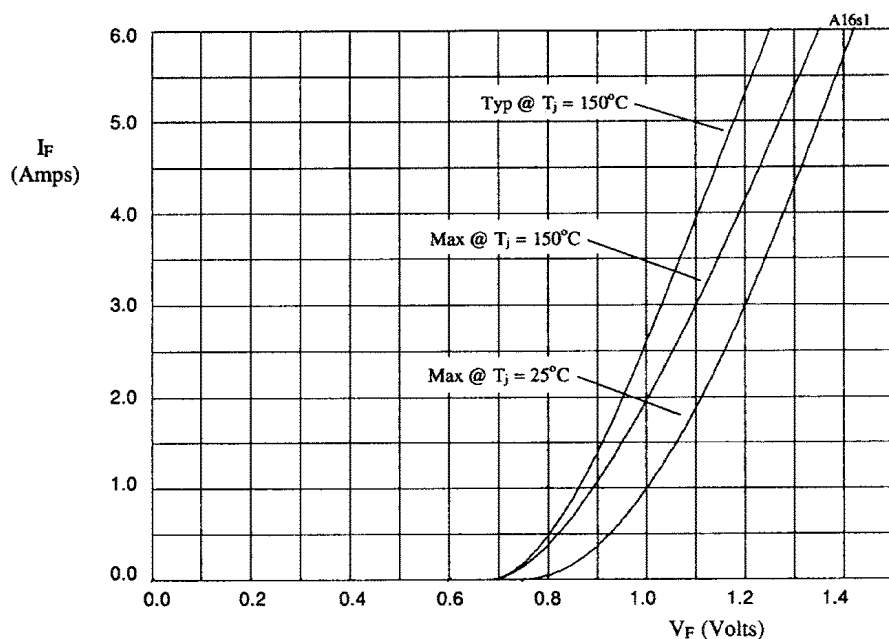
6

Figure 1. Forward voltage drop as a function of forward current for use with table 1.

TABLE 1

DEVICE	X-axis
S2HVM2.5	x3
S2HVM5	x5
S2HVM7.5	x8
S2HVM10	x10
S2HVM12.5	x13
S2HVM15	x15

**HIGH VOLTAGE, HIGH DENSITY, FAST RECOVERY
MODULAR RECTIFIER ASSEMBLY**

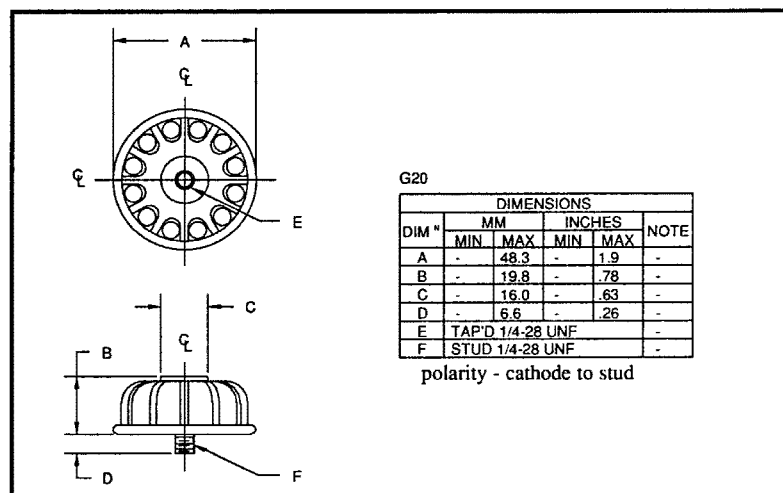
- Low reverse recovery time
- Low reverse leakage current
- High thermal shock resistance
- Modular construction
- Low distributed capacitance

**QUICK REFERENCE
DATA**

- $V_R = 2500 - 7500V$
- $I_F = 0.8 - 2.4A$
- $I_{FSM} = \text{up to } 130A$
- $t_{rr} = 150 \text{ nS}$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_F(AV)$				1 Cycle Surge Current I_{FSM} $t_p = 8.3mS$ @ T_{jMAX}	I^2t $t_p = 8.3mS$	Repetitive Surge Current I_{FRM} @ $25^\circ C$
		air $25^\circ C$	air $100^\circ C$	stud to heat-sink @ $25^\circ C$	in still oil @ $55^\circ C$			
	Volts	Amps	Amps	Amps	Amps	Amps	A^2S	Amps
S2HVM2.5F	2500	2.0	0.8	2.0	2.0	32	4.25	11
S2HVM5F	5000	1.2	0.5	2.0	2.0	32	4.25	11
S2HVM7.5F	7500	0.8	0.3	1.5	2.0	32	4.25	11
S3HVM2.5F	2500	2.4	1.0	3.0	3.0	70	20	20
S3HVM5F	5000	1.2	0.5	2.5	3.0	70	20	20
S6HVM2.5F	2500	2.4	1.0	5.0	6.0	130	70	35

MECHANICAL**MAXIMUM THERMAL IMPEDANCES**

Junction - Ambient $R_{\theta JA} < 12^\circ C/W$
Junction - Stud $R_{\theta JS} < 6^\circ C/W$
Junction - Oil $R_{\theta JO} < 4.5^\circ C/W$

**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Reverse Recovery Time t_{rr} @ 25°C	Maximum Forward Voltage V_F @ 25°C
	@ 25 °C	@ 100 °C		
	μA	μA	nS	Volts
S2HVM2.5F S2HVM5F S2HVM7.5F	1.0	25.0	150	@ 1.0A
				6
				12
S3HVM2.5F S3HVM5F	5.0	25.0	150	18
				@ 3.0A
				6
S6HVM2.5F	10.0	50.0	150	12
				@ 6.0A
				6

1. Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C

Storage temperature range -55 °C to +150 °C

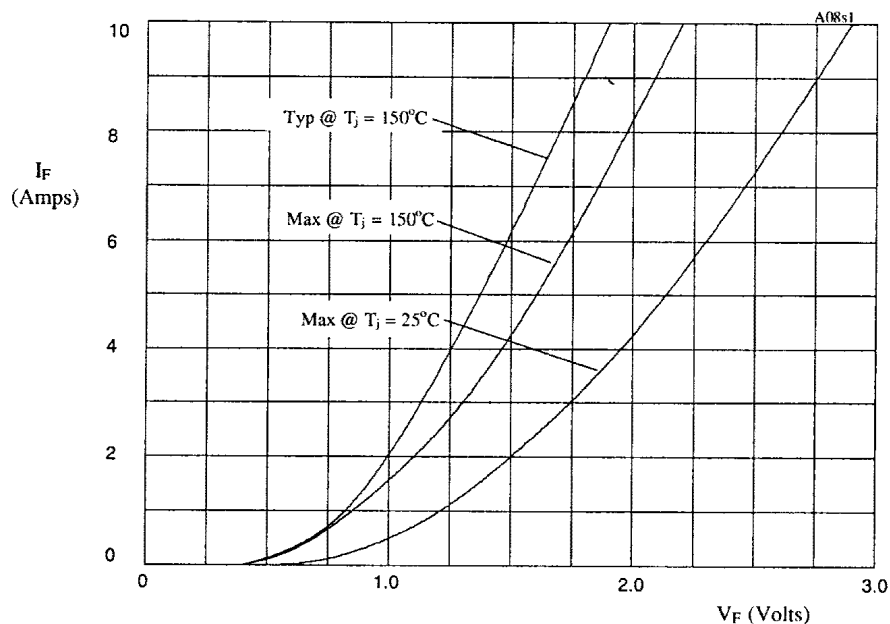


Figure 1. Forward voltage drop as a function of forward current for S2HVM**F series (see Table 1).

TABLE 1

DEVICE	X-AXIS
S2HVM2.5F	x3
S2HVM5F	x6
S2HVM7.5F	x8

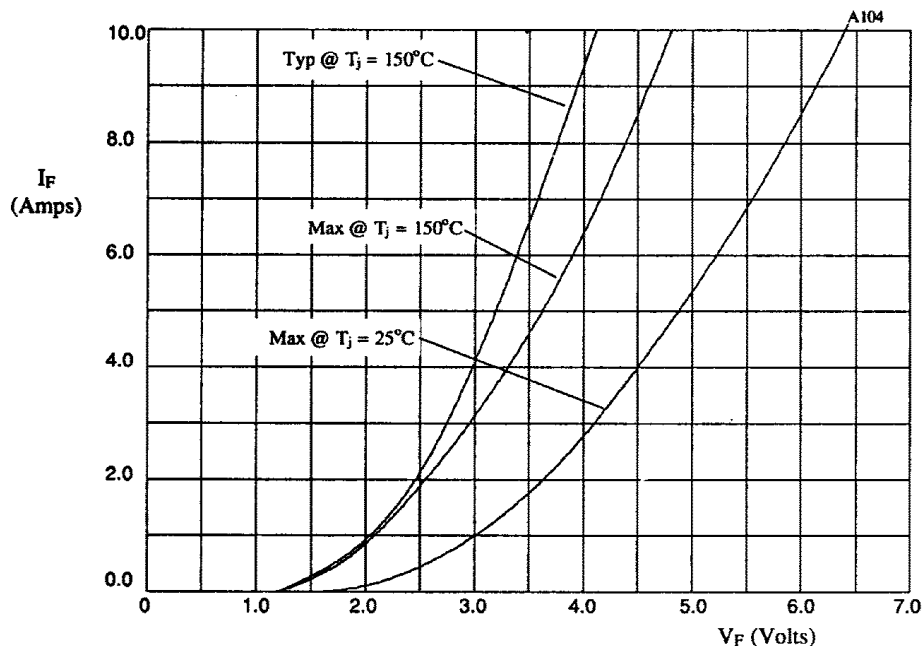


Figure 2. Forward voltage drop as a function of forward current for S3HVM**F series (see Table 2).

TABLE 2

DEVICE	X-AXIS
S3HVM2.5F	x1
S3HVM5F	x2

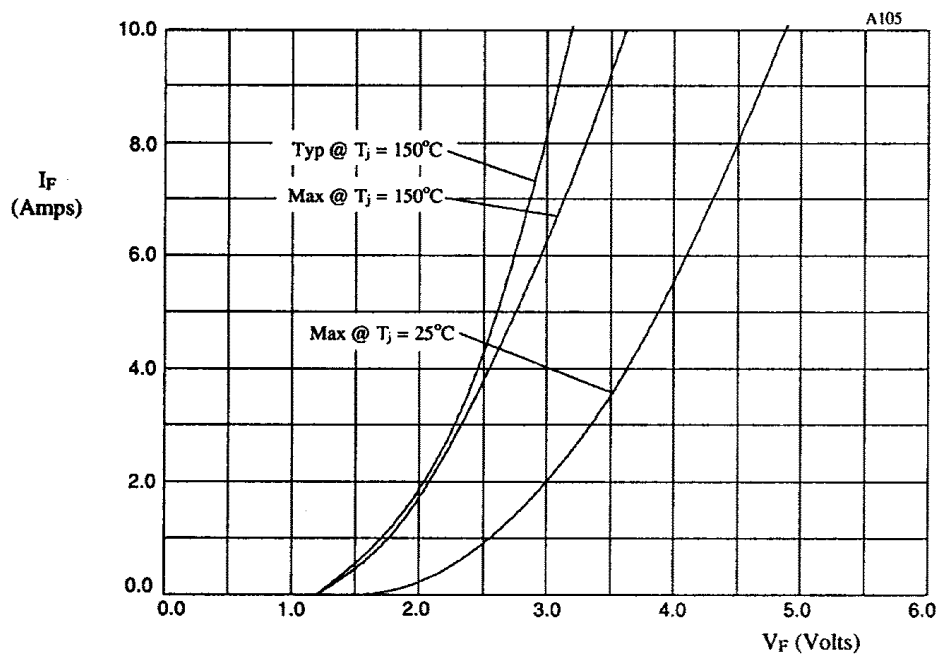


Figure 3. Forward voltage drop as a function of forward current for S6HVM2.5F.



HIGH VOLTAGE, HIGH DENSITY, STANDARD RECOVERY MODULAR RECTIFIER ASSEMBLY

- Up to 15kV reverse voltage
- Modular construction
- Low reverse leakage current
- High thermal shock resistance
- Provides design versatility

QUICK REFERENCE DATA

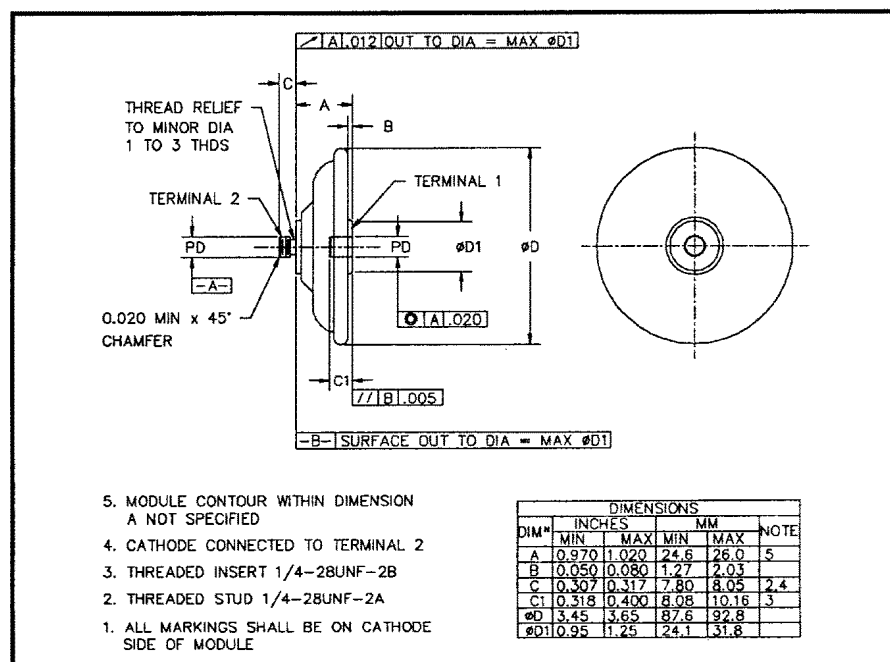
- $V_R = 2.5\text{kV} - 7.5\text{kV}$
- $I_F = \text{to } 8.5\text{A}$
- $I_R = 2.0\mu\text{A}$
- $I_{FSM} = 200\text{A}$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Rectified Current $I_{F(AV)}$			1 Cycle Surge Current I_{FSM} $t_p = 8.3\text{mS}$ @ T_{jMAX}	I^2t $t_p = 8.3\text{mS}$ @ 25°C
		Air @ 25°C	Air @ 100°C	Still oil @ 55°C		
	Volts	Amps	Amps	Amps	Amps	A^2S
S2HVS2.5	2500	5.5	3.1	8.5	200	150
S2HVS5	5000	4.4	2.4	6.8	200	150
S2HVS7.5	7500	3.2	1.7	5.1	200	150

6

MECHANICAL





ELECTRICAL CHARACTERISTICS

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 5.0A @ 25°C	Maximum Reverse Recovery Time ¹ t_{rr} @ 25°C
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	μS
S2HVS2.5	2.0	20	3.5	5.0
S2HVS5	2.0	20	5.8	5.0
S2HVS7.5	2.0	20	9.2	5.0

1. Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

6

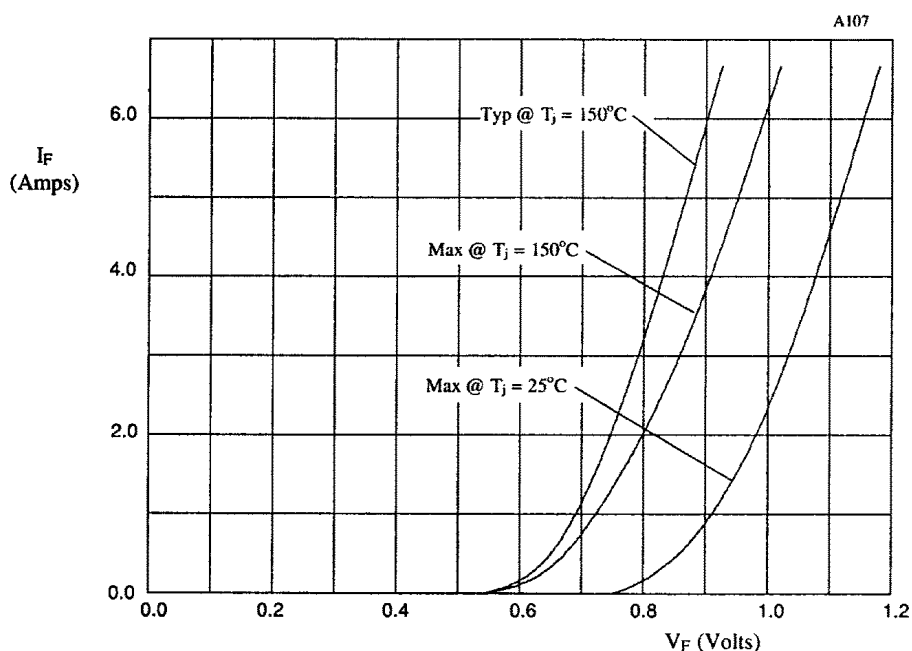


Figure 1. Forward voltage drop as a function of forward current for use with table 1.

TABLE 1

DEVICE	X-axis
S2HVS2.5	x3
S2HVS5	x5
S2HVS7.5	x8



**HIGH VOLTAGE, HIGH DENSITY, FAST RECOVERY
MODULAR RECTIFIER ASSEMBLY**

- Low reverse recovery time
- Low reverse leakage current
- High thermal shock resistance
- Modular construction
- Low distributed capacitance

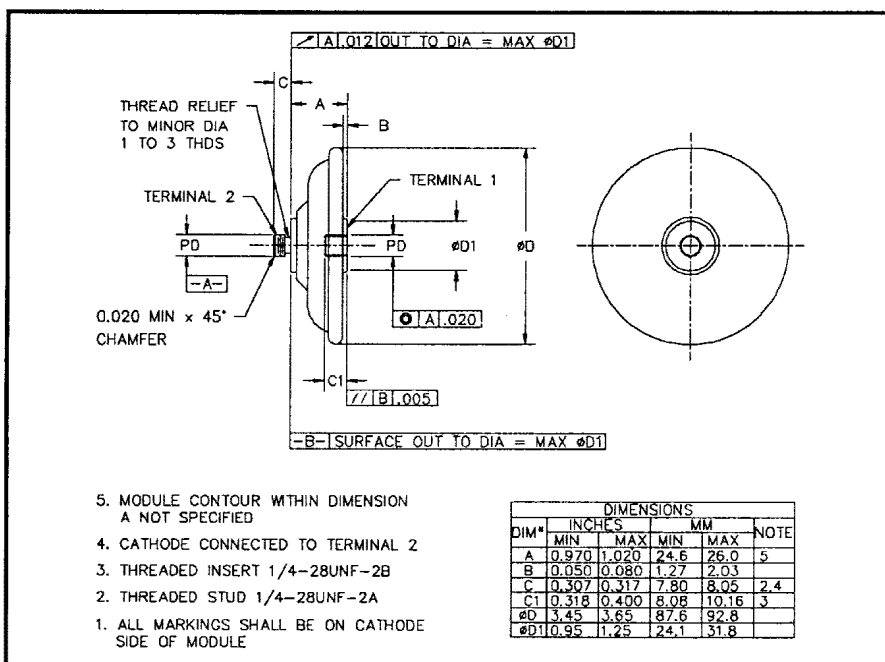
**QUICK REFERENCE
DATA**

- $V_R = 2500 - 7500V$
- $I_F = \text{to } 7.2A$
- $I_{FSM} = 150A$
- $t_{rr} = 300nS$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Rectified Current $I_{F(AV)}$			1 Cycle Surge Current I_{FSM} $t_p = 8.3mS$ @ T_{jMAX}	I^2t $t_p = 8.3mS$
		air 25 °C	air 100 °C	in still oil @ 55 °C		
		Volts	Amps	Amps	Amps	A ² S
S2HVS2.5F	2500	4.8	2.75	7.2	150	96
S2HVS5F	5000	3.8	2.1	5.8	150	96
S2HVS7.5F	7500	2.8	1.6	4.4	150	96

MECHANICAL





ELECTRICAL CHARACTERISTICS

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Reverse Recovery Time t_{rr} @ 25°C	Maximum Forward Voltage V_F @ 25°C @5A
	@ 25 °C	@ 100 °C		
	μA	μA	nS	Volts
S2HVS2.5F	2.0	20.0	300	3.9
S2HVS5F	2.0	20.0	300	6.5
S2HVS7.5F	2.0	20.0	300	10.4

1. Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

6

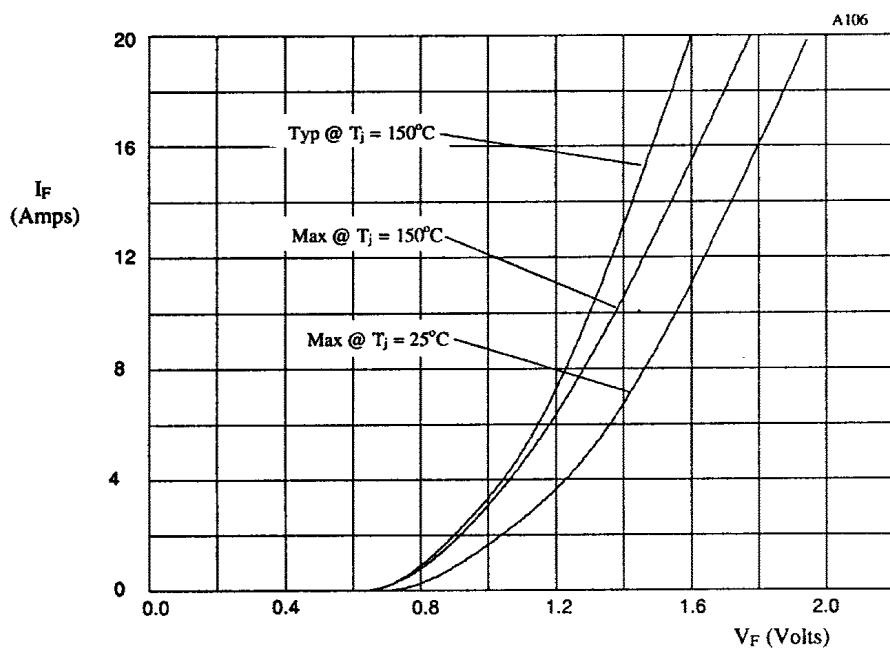


Figure 1. Forward voltage drop as a function of forward current (see TABLE 1).

TABLE 1

DEVICE	X-AXIS
S2HVS2.5F	x3
S2HVS5F	x5
S2HVS7.5F	x8



HIGH VOLTAGE, HIGH CURRENT, HIGH DENSITY, STANDARD RECOVERY RECTIFIER ASSEMBLY

QUICK REFERENCE DATA

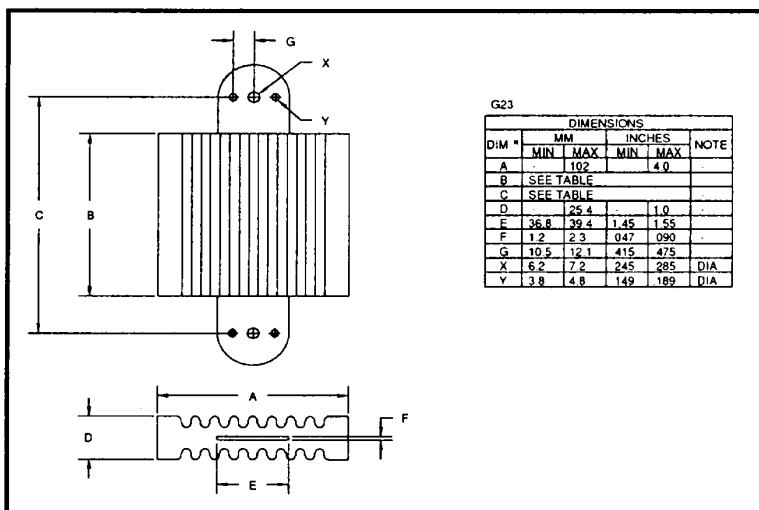
- Up to 48kV reverse voltage
- Air or oil environment
- High reverse surge current
- High thermal shock resistance
- Integral cooling fins

- $V_R = 8kV - 48kV$
- $I_F = 7.5 - 10.0A$ (in oil)
- $I_R = 2.0\mu A$
- $I_{FSM} = 250A$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_F(AV)$				1 Cycle Surge Current $t_p = 8.3mS$ I_{FSM}		Repetitive Surge Current I_{FRM}	I^2t $t_p = 8.3mS$
		air @ 25 °C	air @ 65 °C	forced air 600CFM @ 55°C	still oil @ 55 °C	@ 25 °C	@ 100 °C	@ 25 °C	@ 25 °C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	A ² S
S2KW8KA-1	8000	4.0	2.7	8.0	10.0	↑	↑	↑	↑
S2KW16KA-2	16000	3.0	2.0	6.0	7.5	↑	↑	↑	↑
S2KW24KA-3	24000	3.0	2.0	6.0	7.5	250	150	45	250
S2KW32KA-4	32000	3.0	2.0	6.0	7.5	↓	↓	↓	↓
S2KW40KA-5	40000	3.0	2.0	6.0	7.5	↓	↓	↓	↓
S2KW48KA-6	48000	3.0	2.0	6.0	7.5	↓	↓	↓	↓

MECHANICAL



Dimensions (see drawing)	
B (max)	C (max)
inches	inches
4.780	6.480
7.980	9.680
11.18	12.88
14.38	16.08
17.58	19.28
20.78	22.48

**CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 6.0A @ 25°C	Maximum Reverse Recovery Time ¹ t_{rr} @ 25°C
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	μS
S2KW8KA-1	2.0	40	8	2.0
S2KW16KA-2			16	
S2KW24KA-3			24	
S2KW32KA-4			32	
S2KW40KA-5			40	
S2KW48KA-6			48	

¹ Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

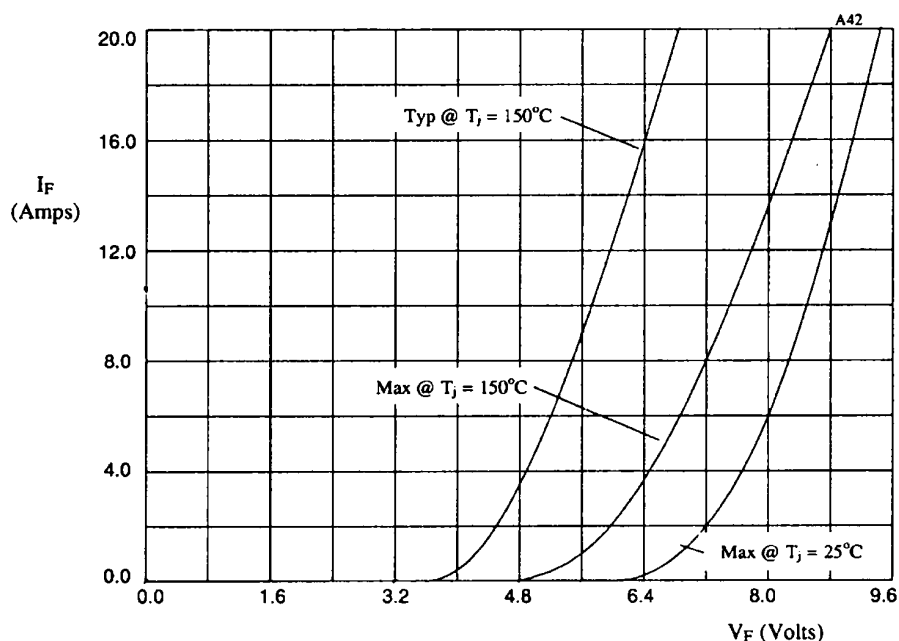


Figure 1. Forward voltage drop as a function of forward current.

TABLE I

DEVICE	X-axis
S2KW8KA-1	x1
S2KW16KA-2	x2
S2KW24KA-3	x3
S2KW32KA-4	x4
S2KW40KA-5	x5
S2KW48KA-6	x6



SEMTECH

STANDARD RECOVERY HIGH VOLTAGE RECTIFIER ASSEMBLY

S3HVM2.5 S3HVM5
S3HVM7.5 S3HVM10
S6HVM2.5 S6HVM5
S9HVM2.5

HIGH VOLTAGE, HIGH DENSITY, STANDARD RECOVERY MODULAR RECTIFIER ASSEMBLY

- Low forward voltage drop
- Low reverse leakage current
- High thermal shock resistance
- Modular construction and design versatility
- Low distributed capacitance

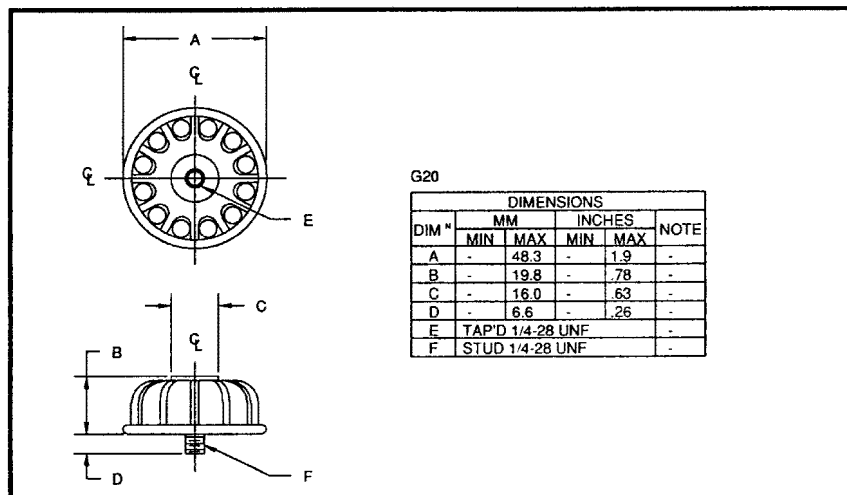
QUICK REFERENCE DATA

- $V_R = 2500 - 10000V$
- $I_F = 1.2 - 4.0A$ (in air)
- $I_R = 1 - 3 \mu A$ (max)
- $t_{rr} = 2.5\mu S$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$				1 Cycle Surge Current I_{FSM} $t_p = 8.3mS$		Repetitive Surge Current I_{FRM} @ 25°C	I^2t $t_p = 8.3mS$ @ 25°C
		Air @ 25°C	Air @ 100°C	Stud to Heatsink @ 25°C	Still oil @ 55°C	@ 25°C	@ 100°C		
		Volts	Amps	Amps	Amps	Amps	Amps	Amps	A ² S
S3HVM2.5	2500	3.0	1.25	3.0	3.0	50	20	11	10
S3HVM5	5000	2.4	1.0	3.0	3.0	50	20	11	10
S3HVM7.5	7500	1.5	0.63	3.0	3.0	50	20	11	10
S3HVM10	10000	1.2	0.5	2.5	3.0	50	20	11	10
S6HVM2.5	2500	4.0	1.5	6.0	6.0	100	40	22	41.5
S6HVM5	5000	2.4	1.0	6.0	6.0	100	40	22	41.5
S9HVM2.5	2500	5.0	1.8	7.5	10.0	150	60	33	93.3

MECHANICAL



MAXIMUM THERMAL IMPEDANCES

Junction - Ambient $R_{\theta JA} < 12^{\circ}C/W$
 Junction - Stud $R_{\theta JS} < 6^{\circ}C/W$
 Junction - Oil $R_{\theta JO} < 4.5^{\circ}C/W$

**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 25°C	Maximum Reverse Recovery Time ¹ t_{rr} @ 25°C
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	μS
S3HVM2.5	1.0	10.0	3.45 @ 3.0A	2.5
S3HVM5	1.0	10.0	5.75	
S3HVM7.5	1.0	10.0	9.20	
S3HVM10	1.0	10.0	11.5	
S6HVM2.5	2.0	20.0	3.45 @ 6.0A	
S6HVM5	2.0	20.0	5.75	
S9HVM2.5	3.0	30.0	3.45 @ 9.0A	

1. Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C

Storage temperature range -55 °C to +150 °C

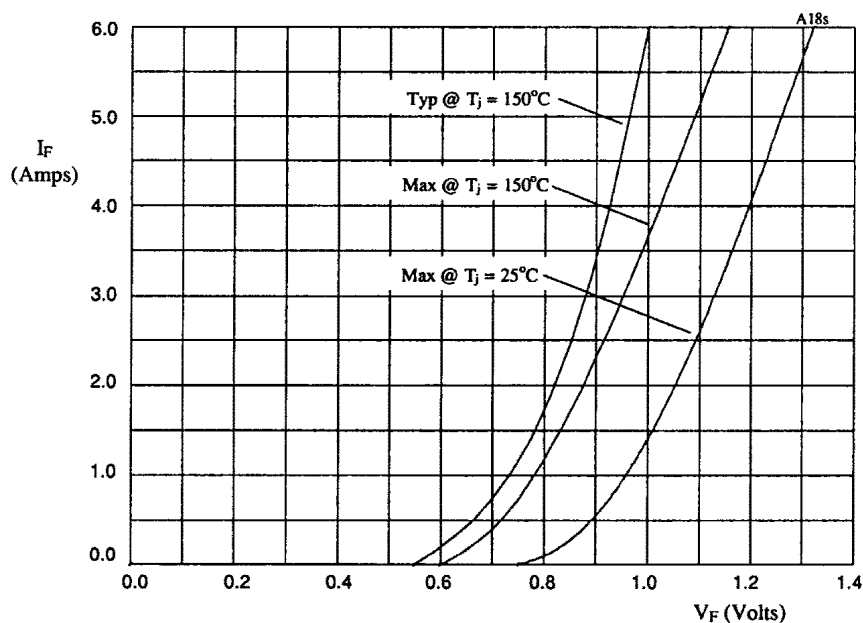


Figure 1. Forward voltage drops as a function of forward current for use with table 1.

TABLE 1

DEVICE	X-axis	Y-axis
S3HVM2.5	x3	x1
S3HVM5	x5	x1
S3HVM7.5	x8	x1
S3HVM10	x10	x1
S6HVM2.5	x3	x2
S6HVM5	x5	x2
S9HVM2.5	x3	x3

**HIGH VOLTAGE, HIGH CURRENT, HIGH DENSITY,
STANDARD RECOVERY RECTIFIER ASSEMBLY**

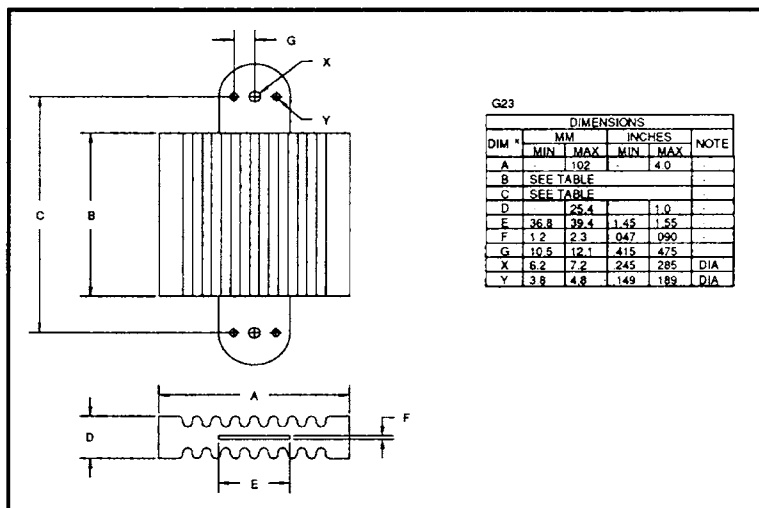
- Up to 20A forward current and 24kV reverse voltage
- Air or oil environment
- High reverse surge current
- High thermal shock resistance
- Integral cooling fins

**QUICK REFERENCE
DATA**

- $V_R = 4\text{kV} - 24\text{kV}$
- $I_F = 8.0 - 20.0\text{A}$ (in oil)
- $I_R = 4.0\mu\text{A}$
- $I_{FSM} = 500\text{A}$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_F(AV)$				1 Cycle Surge Current $t_p = 8.3\text{mS}$ I_{FSM}		Repetitive Surge Current I_{FRM}	I^2t $t_p = 8.3\text{mS}$
		air @ 25 °C	air @ 65 °C	forced air 600CFM @ 55°C	still oil @ 55 °C	@ 25 °C	@ 100 °C	@ 25 °C	@ 25 °C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	A ² S
S4KW4KA-1	4000	8.0	5.4	16.0	20.0	↑	↑	↑	↑
S4KW8KA-2	8000	6.0	4.0	12.0	15.0	↑	↑	↑	↑
S4KW12KA-3	12000	6.0	4.0	12.0	15.0	500	300	90	1000
S4KW16KA-4	16000	6.0	4.0	12.0	15.0	↓	↓	↓	↓
S4KW20KA-5	20000	6.0	4.0	12.0	15.0	↓	↓	↓	↓
S4KW24KA-6	24000	6.0	4.0	12.0	15.0	↓	↓	↓	↓

MECHANICAL

Dimensions (see drawing)	
B (max)	C (max)
inches	inches
4.780	6.480
7.980	9.680
11.18	12.88
14.38	16.08
17.58	19.28
20.78	22.48



CHARACTERISTICS

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 12.0A @ 25°C	Maximum Reverse Recovery Time ¹ t_{rr} @ 25°C
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	μS
S4KW4KA-1	4.0	80	4.0	2.0
S4KW8KA-2			8.0	
S4KW12KA-3			12.0	
S4KW16KA-4			16.0	
S4KW20KA-5			20.0	
S4KW24KA-6			24.0	

¹ Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C

Storage temperature range -55 °C to +150 °C

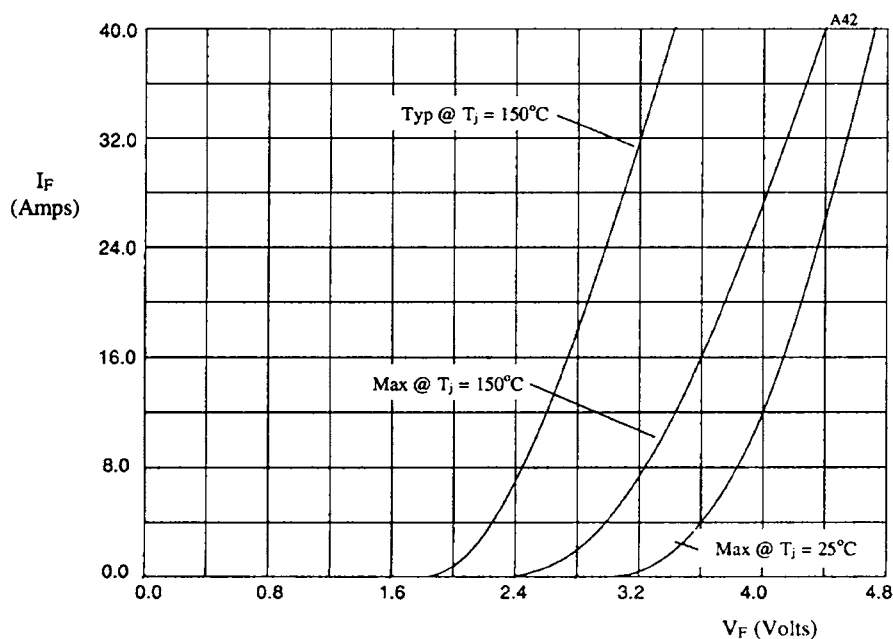


Figure 1. Forward voltage drop as a function of forward current.

TABLE I

DEVICE	X-axis
S4KW4KA-1	x1
S4KW8KA-2	x2
S4KW12KA-3	x3
S4KW16KA-4	x4
S4KW20KA-5	x5
S4KW24KA-6	x6

**HIGH VOLTAGE, HIGH DENSITY, FAST RECOVERY
LEADED SILICON RECTIFIER ASSEMBLY**

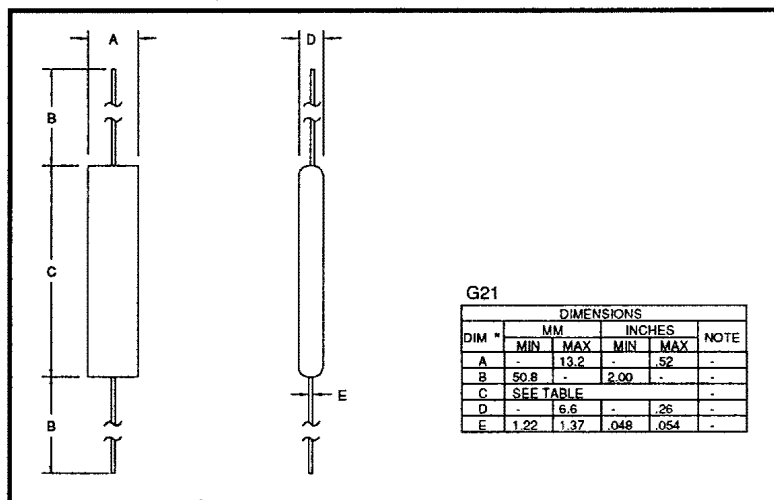
- Low reverse recovery time
- Low forward voltage drop
- High thermal shock resistance
- Corona free construction
- Low distributed capacitance

**QUICK REFERENCE
DATA**

- $V_R = 2500V - 12500V$
- $I_F = 0.5A$
- $I_R = 1.0 \mu A$
- $t_{rr} = 150nS$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage (V_{RWM})	Average Rectified Current I_{FAV}		Repetitive Surge Current @ 25 °C	1 Cycle Surge Current $t_p = 8.3mS$ (sinusoidal)		I^2t $t_p = 8.3mS$ @ 25 °C	Case Length Max dim. C
		@ 55 °C	@ 100 °C		@ 25 °C	@ 100 °C		
	Volts	Amps	Amps	Amps	Amps	Amps	A ² S	inches
SCF2500	2500	↑	↑	↑	↑	↑	↑	1.145
SCF5000	5000							2.020
SCF7500	7500	0.5	0.3	15	25	12.5	2.6	2.770
SCF10000	10000							3.520
SCF12500	12500	↓	↓	↓	↓	↓	↓	4.270

MECHANICAL



ELECTRICAL CHARACTERISTICS

Device Type	Max. Leakage Current @ V_{RWM} I_R		Maximum Forward Voltage drop V_F @ 0.5A	Maximum Reverse Recovery Time t_{rr}
	@ 25 °C	@ 100 °C	@ 25 °C	@ 25 °C
	μA	μA	Volts	nS
SCF2500	↑	↑	3.45	↑
SCF5000	↑	↑	5.75	↑
SCF7500	1.0	25	9.20	150
SCF10000	↓	↓	11.5	↓
SCF12500	↓	↓	15.0	↓

(1) measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

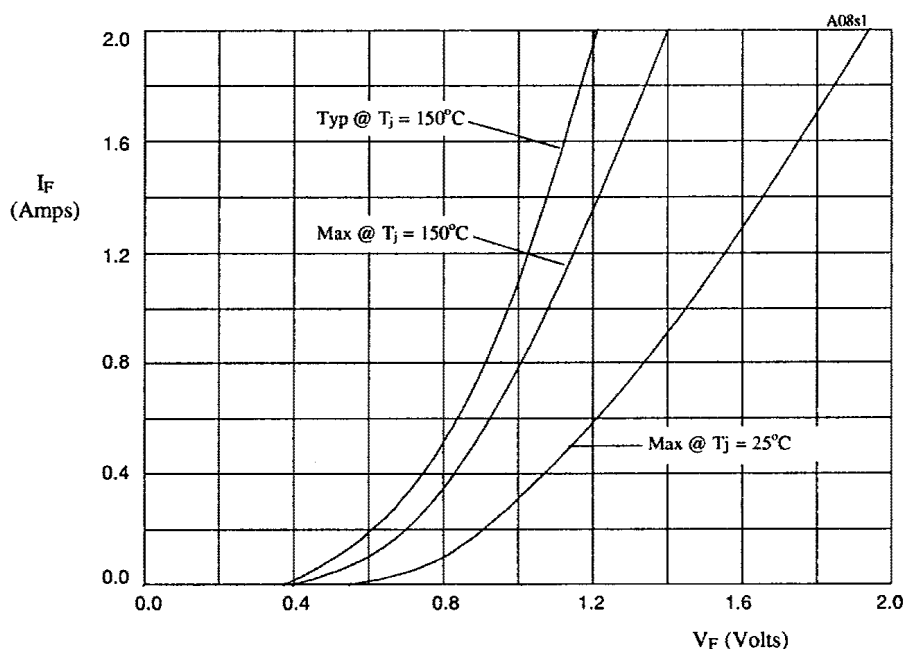


Fig 1. Forward voltage drop as a function of forward current.

TABLE 1

DEVICE	X-AXIS
SCF2500	x3
SCF5000	x5
SCF7500	x8
SCF10000	x10
SCF12500	x13

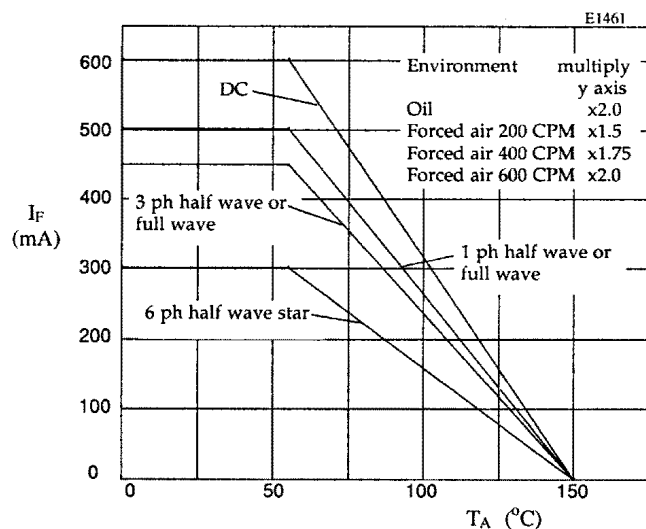


Figure 2. Maximum average forward currents against ambient temperature.

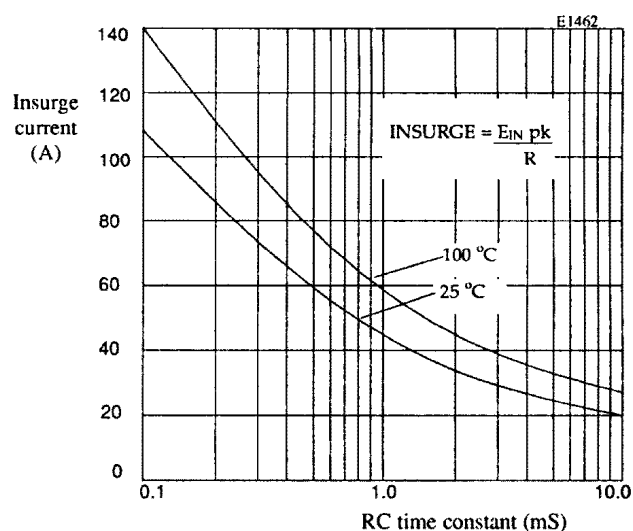


Figure 3. Maximum ratings for capacitive loads.
Insurge current versus RC time constant

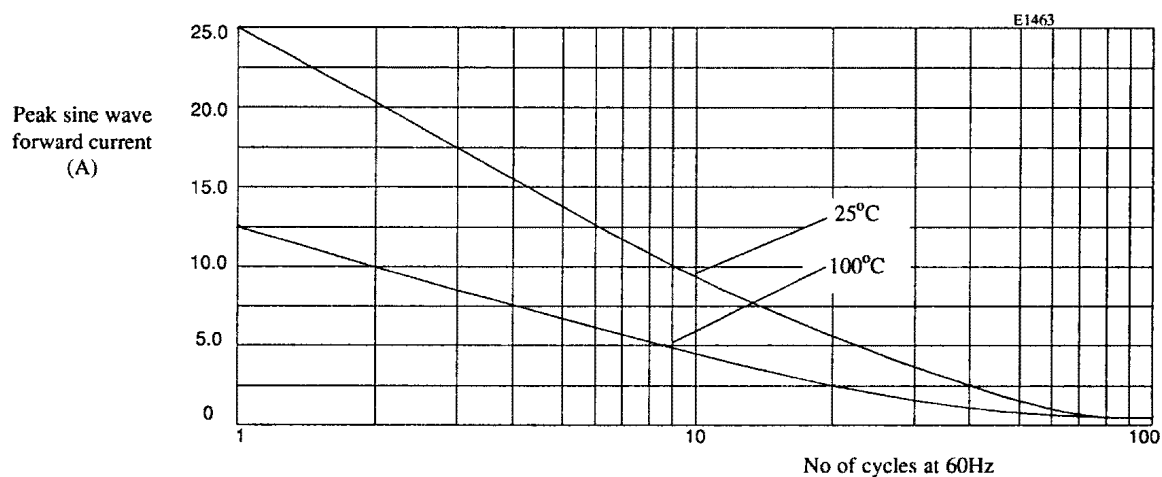


Figure 4. Non repetitive forward current surge curves.

**QUICK REFERENCE
DATA**

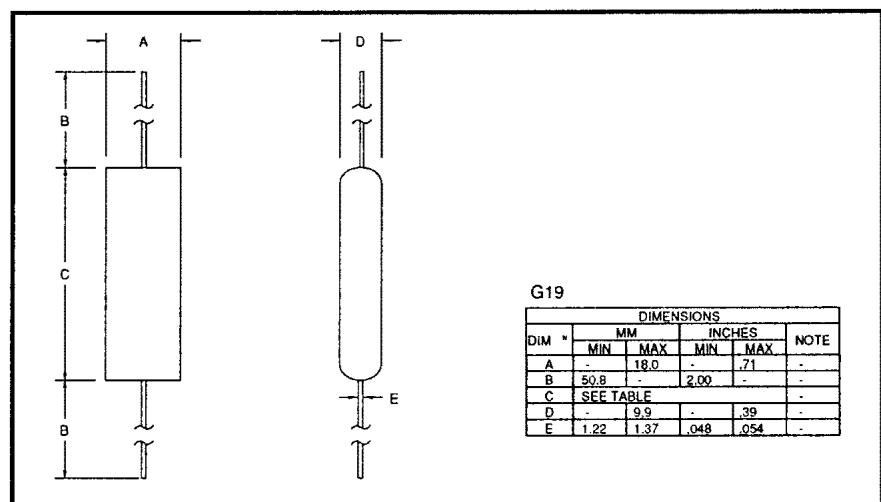
- $V_R = 2000 - 12000V$
- $I_F = 1.5A$
- $I_R = 5.0\mu A$
- $t_{rr} = 150nS$

**HIGH VOLTAGE, HIGH DENSITY, FAST RECOVERY
LEADED SILICON RECTIFIER ASSEMBLY**

- Low reverse recovery time
- Low reverse leakage currents
- High thermal shock resistance
- Corona free construction
- Low distributed capacitance

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage (V_{RWM})	Average Rectified Current $I_{F(AV)}$		Repetitive Surge Current I_{FSM}	1 Cycle Surge Current $t_p = 8.3mS$ (sinusoidal) I_{FSM}		I^2t $t_p = 8.3mS$	Case Length Max
		@ 55 °C	@ 100 °C		@ 25 °C	@ 100 °C		
	Volts	Amps	Amps	Amps	Amps	Amps	A ² S	dim. C
SCFS2000	2000	↑	↑	↑	↑	↑	↑	1.53
SCFS4000	4000	↑	↑	↑	↑	↑	↑	2.53
SCFS6000	6000	1.5	1.0	10.0	150	75	93	3.53
SCFS8000	8000	↓	↓	↓	↓	↓	↓	4.53
SCFS10000	10000	↓	↓	↓	↓	↓	↓	5.53
SCFS12000	12000	↓	↓	↓	↓	↓	↓	6.53

MECHANICAL

**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Leakage Current @ V_{RWM} I_R		Maximum Forward Voltage drop V_F @ 3.0A	Maximum Reverse Recovery Time t_{rr} @ 25 °C
	@ 25 °C	@ 100 °C	@ 25 °C	
	μA	μA	Volts	nS
SCFS2000	5.0	25	5.4	150
SCFS4000			9.0	
SCFS6000			12.6	
SCFS8000			16.2	
SCFS10000			19.8	
SCFS12000			23.4	

(1) measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

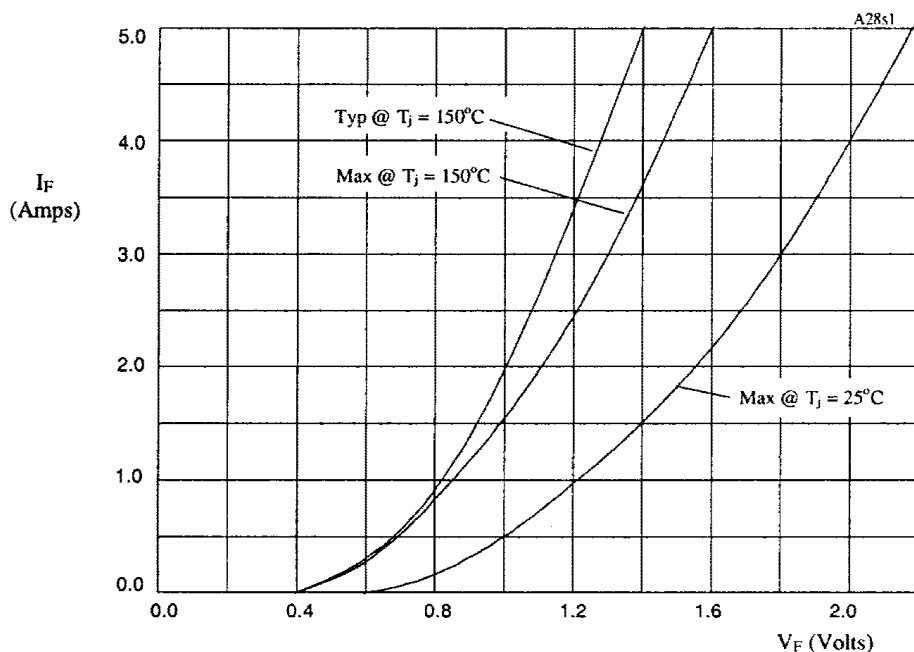


Fig 1. Forward voltage drop as a function of forward current.

TABLE 1

DEVICE	X-AXIS
SCFS2000	x3
SCFS4000	x5
SCFS6000	x7
SCFS8000	x9
SCFS10000	x11
SCFS12000	x13

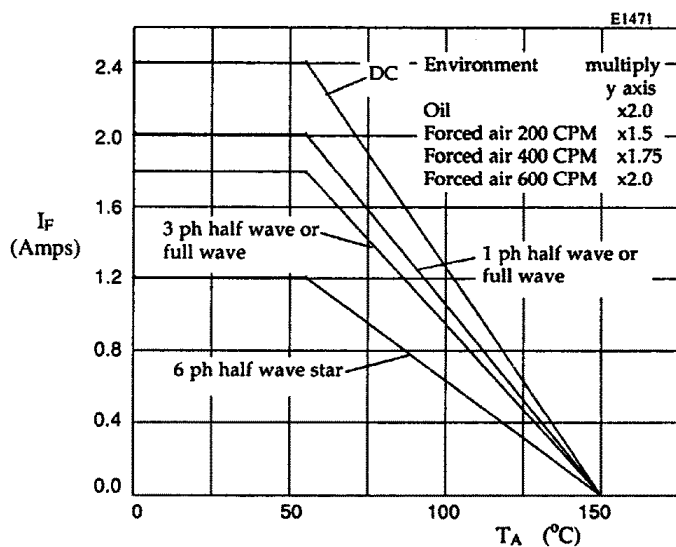


Figure 2. Maximum average forward currents against ambient temperature.

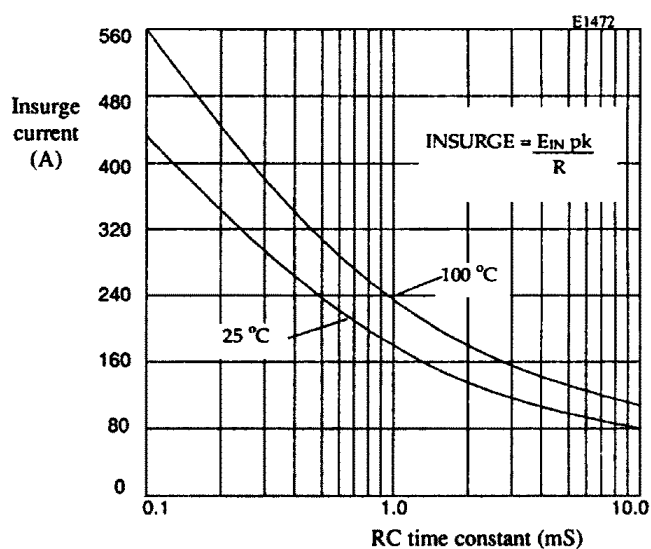


Figure 3. Maximum ratings for capacitive loads. Insurge current versus RC time constant

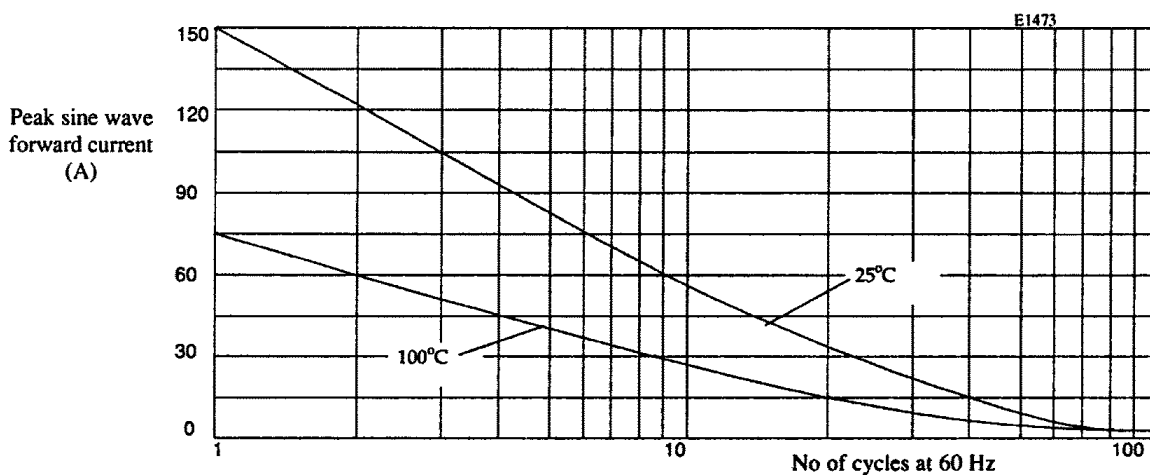


Figure 4. Non repetitive forward current surge curves for 25°C and 100°C



QUICK REFERENCE DATA

- $V_R = 5000 - 25000V$
- $I_F = 0.5A$
- $I_R = 1\mu A$
- $I_{FSM} = 50A$

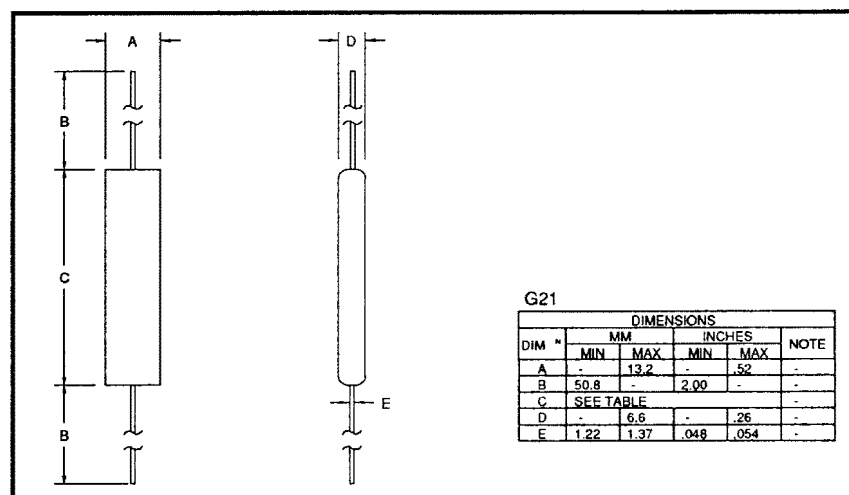
HIGH VOLTAGE, HIGH DENSITY, LEADED, SILICON RECTIFIER ASSEMBLY

- Low forward voltage drop
- Low reverse leakage current
- High thermal shock resistance
- Corona free construction
- Low distributed capacitance

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$				1 Cycle Surge Current I_{FSM} $t_p = 8.3ms$ @ T_J MAX	I^2t $t_p = 8.3ms$ @ T_J MAX	Repetitive Surge Current I_{FRM} @ $25^\circ C$	Case Length dim. C Max
		@ $55^\circ C$	@ $100^\circ C$	Forced air @ 600CFM, $55^\circ C$	in still oil @ $55^\circ C$				
	Volts	Amps	Amps	Amps	Amps	Amps	A ² S	Amps	Inches
SCH5000	5000	↑	↑	↑	↑	↑	↑	↑	1.145
SCH7500	7500	↑	↑	↑	↑	↑	↑	↑	1.645
SCH10000	10000	↑	↑	↑	↑	↑	↑	↑	2.020
SCH12500	12500	0.50	0.33	1.0	1.0	50	12	10	2.395
SCH15000	15000	↓	↓	↓	↓	↓	↓	↓	2.770
SCH20000	20000	↓	↓	↓	↓	↓	↓	↓	3.520
SCH25000	25000	↓	↓	↓	↓	↓	↓	↓	4.270

MECHANICAL



**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltages V_F @ 1.0A @ 25°C	Maximum Reverse Recovery Time ⁽¹⁾ t_{rr} @ 25°C
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	μS
SCH5000	↑	↑	5.0	↑
SCH7500			8.0	
SCH10000			10.0	
SCH12500	1.0	20	13.0	5.0
SCH15000	↓	↓	15.0	↓
SCH20000			20.0	
SCH25000	↓	↓	25.0	↓

1. Measured on discrete devices prior to assembly.

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

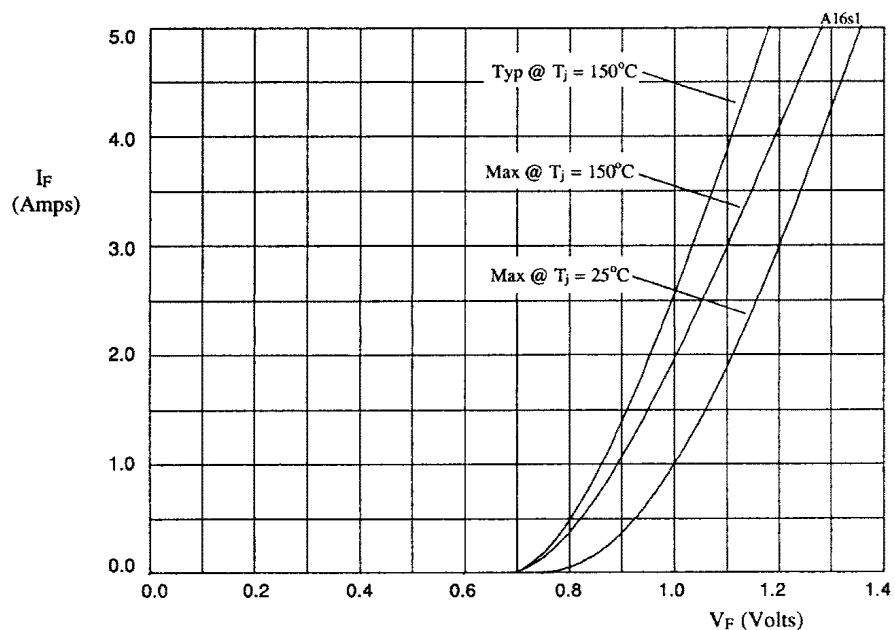


TABLE 1

DEVICE	X-AXIS
SCH5000	x5
SCH7500	x8
SCH10000	x10
SCH12500	x13
SCH15000	x15
SCH20000	x20
SCH25000	x25

Figure 1. Forward voltage drop as a function of forward current (see Table 1).

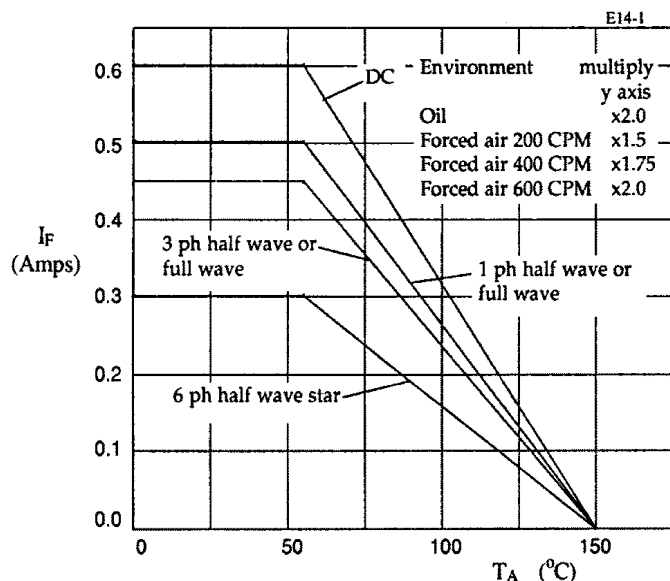


Figure 2. Maximum forward current against ambient temperature.

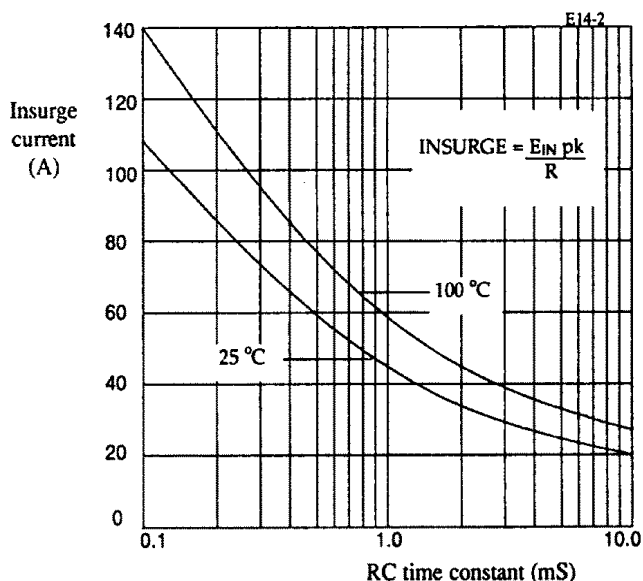


Figure 3. Maximum ratings for capacitive loads.
Insurge current versus RC time constant

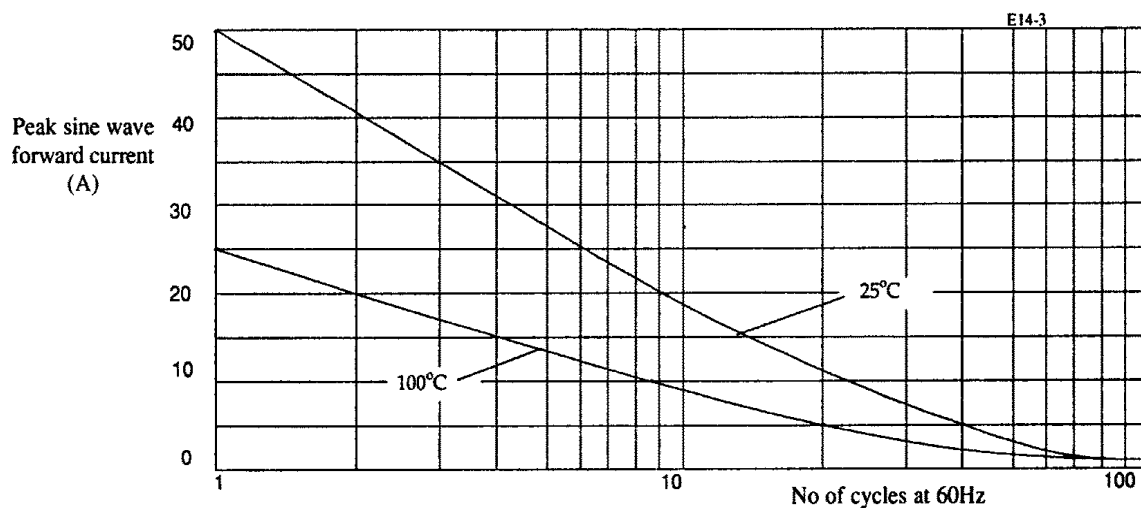


Figure 4. Non repetitive forward current surge curves.

QUICK REFERENCE DATA

- $V_R = 15\text{kV} - 45\text{kV}$
- $I_F = 50\text{mA}$ (in air)
- $I_R = 1.0\mu\text{A}$
- $I_{FSM} = 25\text{A}$

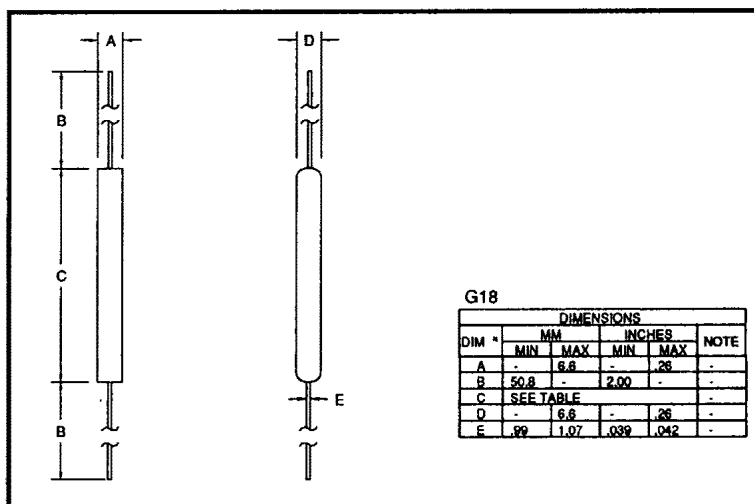
HIGH VOLTAGE, HIGH DENSITY, LEADED SILICON RECTIFIER ASSEMBLY

- Low forward voltage drops
- Low reverse leakage current
- High thermal shock resistance
- Corona free construction
- Low distributed capacitance

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current				1 Cycle Surge Current I_{FSM} $t_p = 8.3\text{mS}$ @ T_J MAX	I^2t $t_p = 8.3\text{mS}$ @ T_J MAX	Repetitive Surge Current I_{FRM} @ 25°C	Case Length Max Dim C
		@ 55°C	@ 100°C	Forced air 600CFM, 55°C	in still oil @ 55°C				
	Volts	Amps	Amps	Amps	Amps	Amps	A^2S	Amps	inches
SCHJ15K	15000	↑	↑	↑	↑	↑	↑	↑	1.52
SCHJ22.5K	22500	↑	↑	↑	↑	↑	↑	↑	2.02
SCHJ30K	30000	0.05	0.03	0.1	0.1	25	2.6	2.5	2.52
SCHJ37.5K	37500	↓	↓	↓	↓	↓	↓	↓	3.02
SCHJ45K	45000	↓	↓	↓	↓	↓	↓	↓	3.52

MECHANICAL



**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltages V_F @ 0.1A @ 25°C	Maximum Reverse Recovery Time ⁽¹⁾ @ 25°C
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	μS
SCHJ15K	1.0	20	20	2.5
SCHJ22.5K			30	
SCHJ30K			40	
SCHJ37.5K			50	
SCHJ45K			60	

1. Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

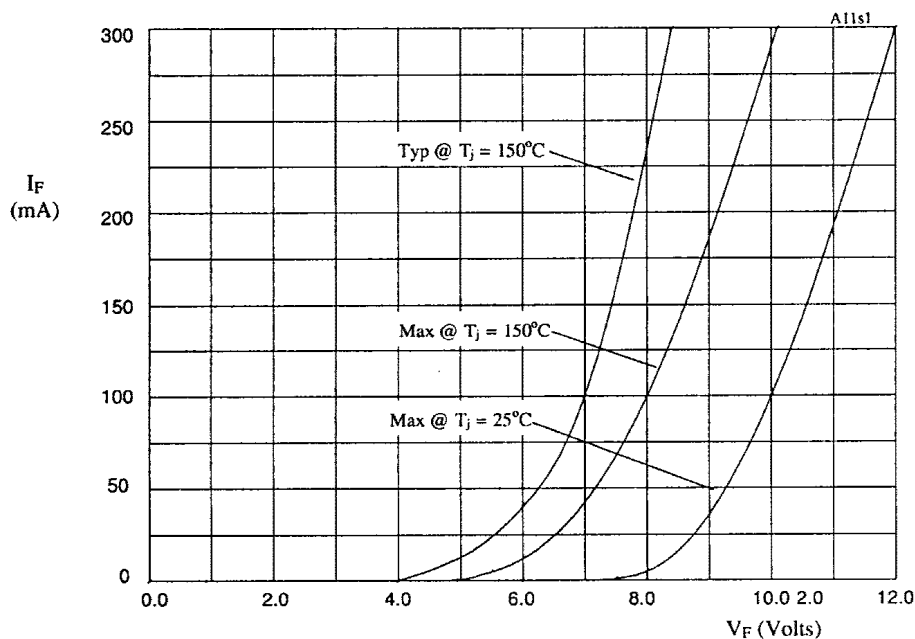


Fig 1. Forward voltage drop as a function of forward current for use with table 1.

TABLE 1

DEVICE	X-AXIS
SCHJ15K	x2
SCHJ22.5K	x3
SCHJ30K	x4
SCHJ37.5K	x5
SCHJ45K	x6

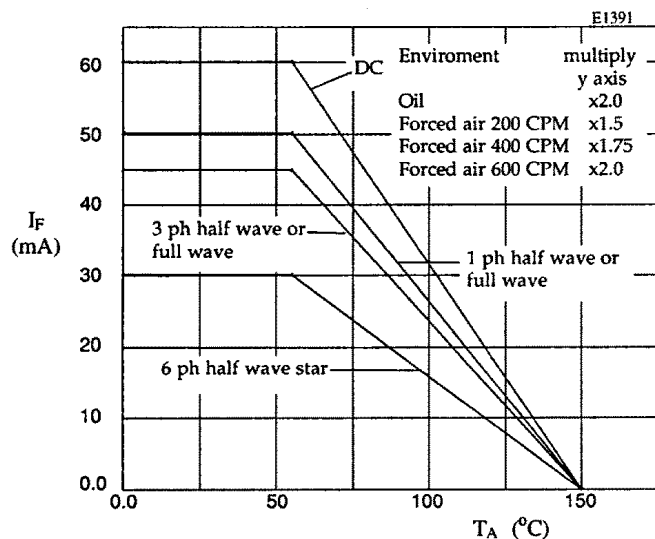


Figure 2. Maximum forward currents against ambient temperature.

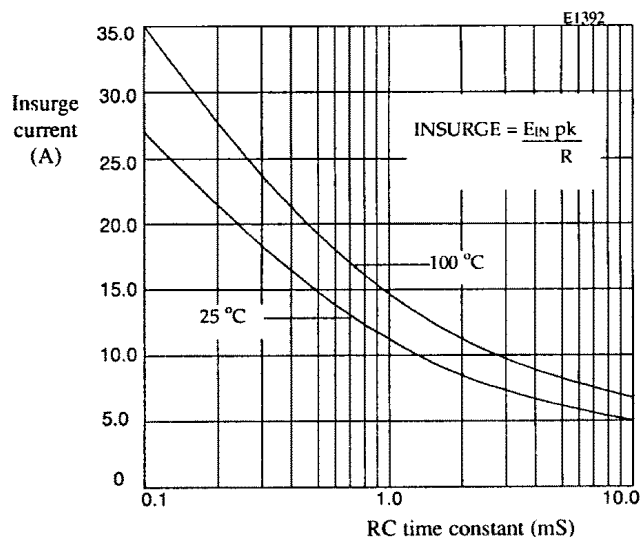


Figure 3. Maximum ratings for capacitive loads. Insurge current versus RC time constant

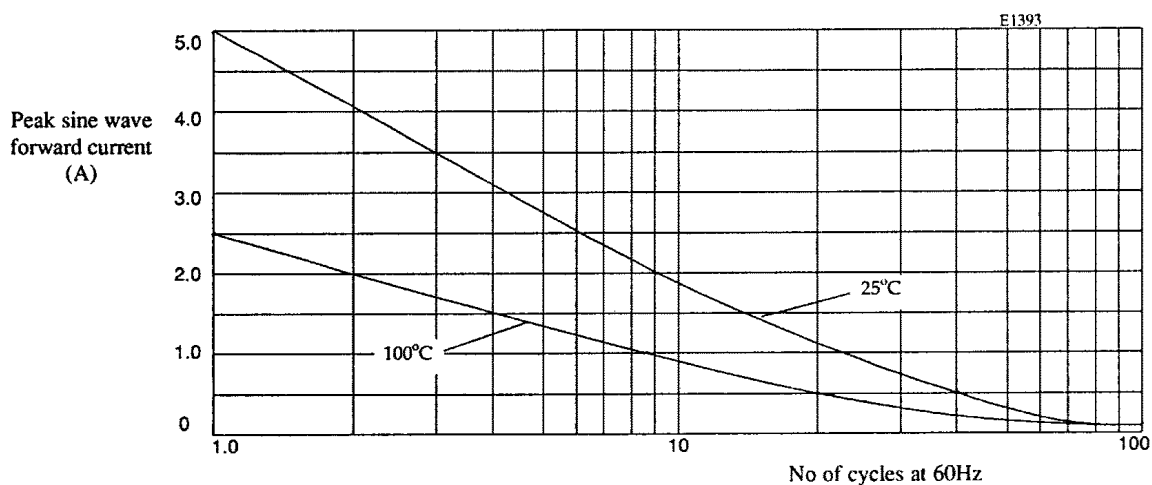


Figure 4. Non repetitive forward current surge curves for 25°C and 100°C

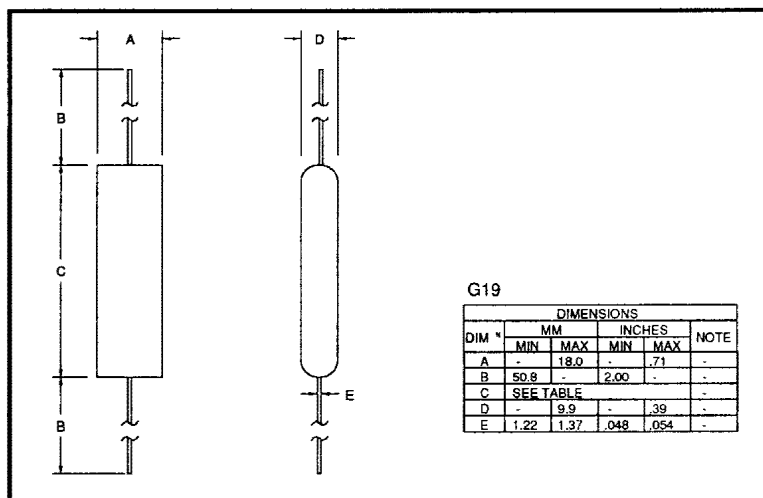
**HIGH VOLTAGE, HIGH DENSITY, STANDARD
RECOVERY LEADED SILICON RECTIFIER ASSEMBLY****QUICK REFERENCE
DATA**

- Low reverse leakage current
- Low forward voltage drop
- High thermal shock resistance
- Corona free construction
- Low distributed capacitance

- $V_R = 2500V - 15000V$
- $I_F = 2.0A$
- $I_R = 1.0 \mu A$
- $I_{FSM} = 80A$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$				1 Cycle Surge Current I_{FSM} $t_p = 8.3mS$ @ T_j MAX	I^2t $t_p = 8.3mS$ @ T_j MAX	Repetitive Surge Current @ 25°C	Case Length dim. C Max
		@ 55 °C	@ 100 °C	Forced air 600CFM, 25°C	in still oil @ 55 °C				
	Volts	Amps	Amps	Amps	Amps	Amps	A ² S	Amps	Inches
SCHS2500	2500	↑	↑	↑	↑	↑	↑	↑	1.53
SCHS5000	5000	↑	↑	↑	↑	↑	↑	↑	2.53
SCHS7500	7500	2.0	1.2	2.0	4.0	80	26	31	3.53
SCHS10000	10000	↓	↓	↓	↓	↓	↓	↓	4.53
SCHS12500	12500	↓	↓	↓	↓	↓	↓	↓	5.53
SCHS15000	15000	↓	↓	↓	↓	↓	↓	↓	6.53

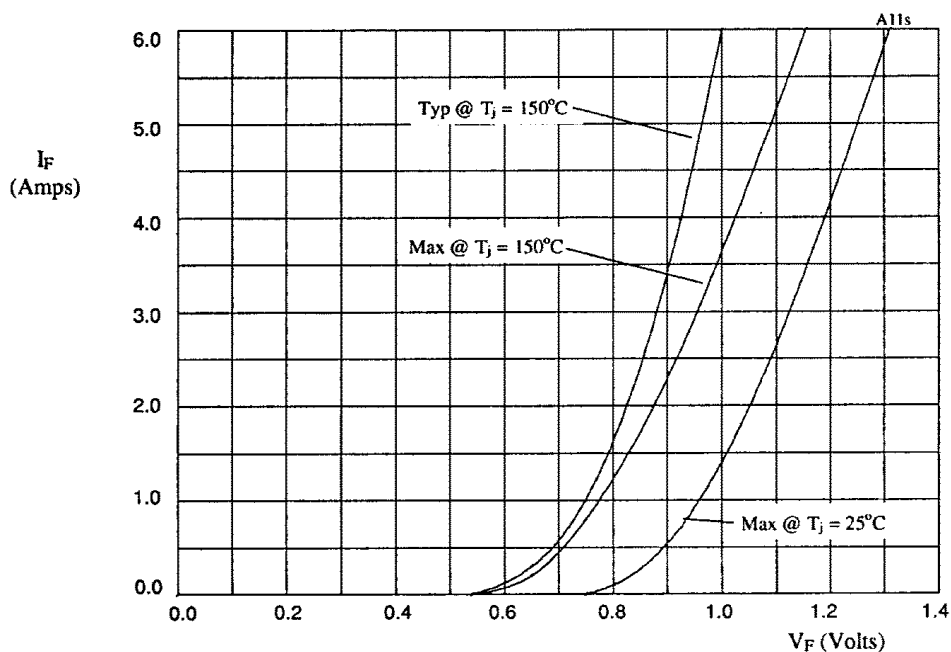
MECHANICAL

**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltages V_F @ 3.0A @ 25°C	Maximum Reverse Recovery Time ⁽¹⁾ @ 25°C
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	μS
SCHS2500	1.00 ↑ ↓	10.0 ↑ ↓	3.45	2.5 ↑ ↓
SCHS5000			5.75	
SCHS7500			9.20	
SCHS10000			11.50	
SCHS12500			14.95	
SCHS15000			18.40	

1. Measured on discrete devices prior to assembly.

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

**TABLE 1**

DEVICE	X-AXIS
SCHS2500	x3
SCHS5000	x6
SCHS7500	x8
SCHS10000	x10
SCHS12500	x13
SCHS15000	x16

Figure 1. Forward voltage drop as a function of forward current.

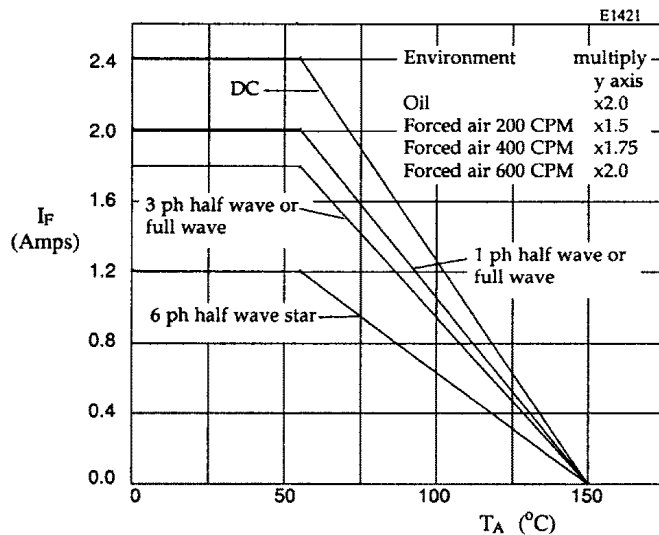


Figure 2. Maximum forward current against ambient temperature.

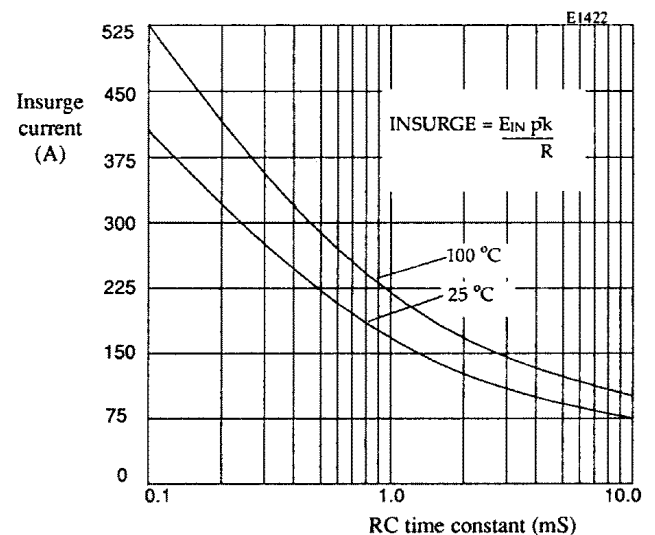


Figure 3. Maximum ratings for capacitive loads. Insurge current versus RC time constant

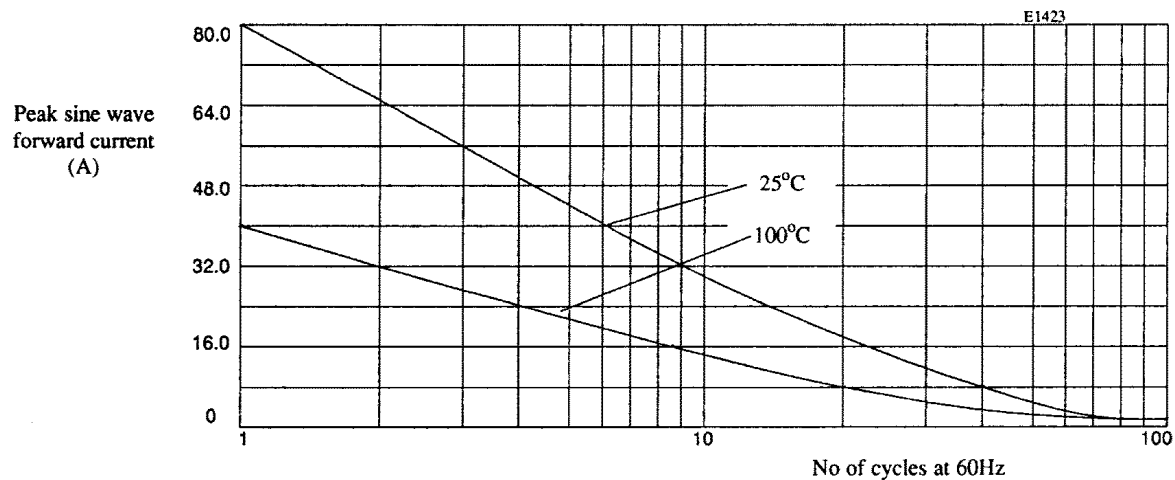


Figure 4. Non repetitive forward current surge curves.

HIGH DENSITY, HIGH VOLTAGE, STANDARD RECOVERY RECTIFIER ASSEMBLY

- High reverse voltages
- Low reverse leakage current
- Low distributed and ground capacitance
- Corona free design
- Air or oil environments

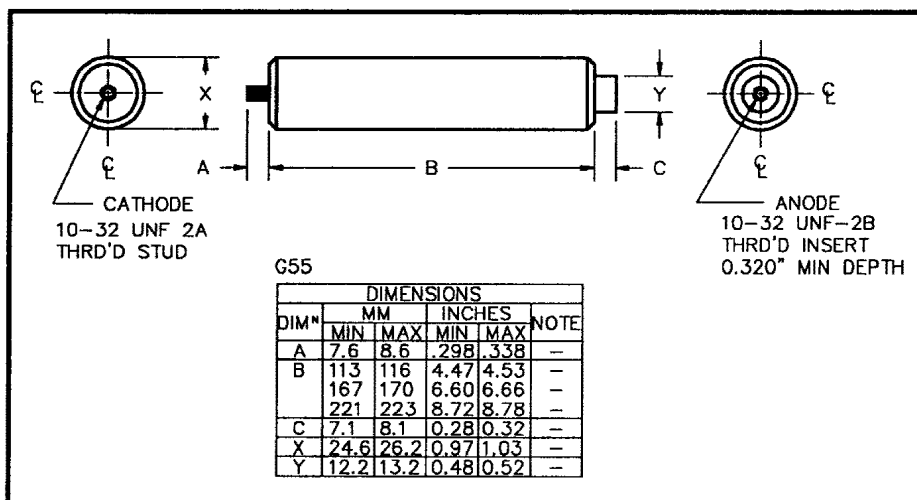
QUICK REFERENCE DATA

- $V_R = 33\text{kV} - 66\text{kV}$
- $I_F = 300\text{mA}$
- $t_{rr} = 2.5\mu\text{S}$
- $I_R = 1.0\mu\text{A}$

ABSOLUTE MAXIMUM RATINGS

	Symbol	SCKV33K12	SCKV45K12	SCKV66K12	Unit
Working reverse voltage	VRWM	33	45	66	kV
Surge reverse voltage	VRSM	36.3	49.5	72.6	kV
Average forward current in air @ 25°C in oil @ 55°C in forced air 600 CFM	IF(AV)	← 300 → ← 1200 → ← 600 →			mA mA mA
Non-repetitive surge current $t_p = 8.3\text{ms}$, @ 25°C	IFSM	← 14.0 →			A
Storage temperature range	TSTG	← -55 to +150 →			°C
Operating temperature range	TOP	← -55 to +150 →			°C
Body length Max.	dim B	4.53	6.66	8.78	inches

MECHANICAL



**ELECTRICAL CHARACTERISTICS**

	Symbol	SCKV33K12	SCKV45K12	SCKV66K12	Unit
Max. forward voltage drop @ $I_F = 1.0A$, $T_j = 25^\circ C$	V_F	60.0	95.0	125.5	V
Max. reverse leakage current @ V_{RWM} , $T_j = 25^\circ C$	I_R	←————— 1.0 —————→			μA
@ V_{RWM} , $T_j = 100^\circ C$	I_R	←————— 20 —————→			μA
Max. reverse recovery time 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR} .	t_{rr}	←————— 2.5 —————→			μS
Max. fusing current $t_p = 8.3mS$	I^2t	←————— 0.8 —————→			A^2S

1. Measured on discrete devices prior to assembly

6

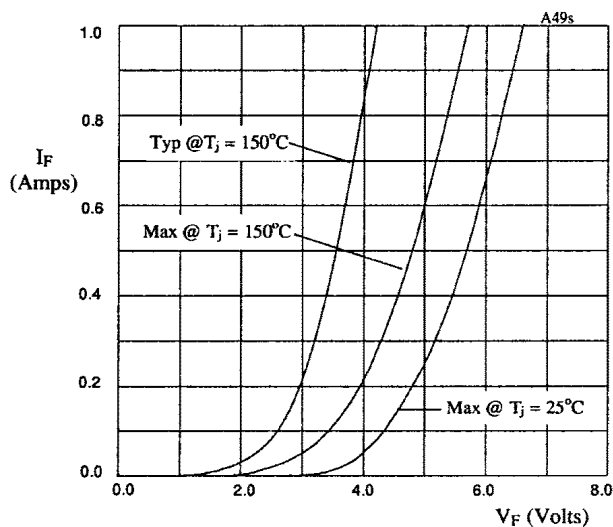


Fig 1. Forward voltage drop as a function of forward current for use with multiplication table.

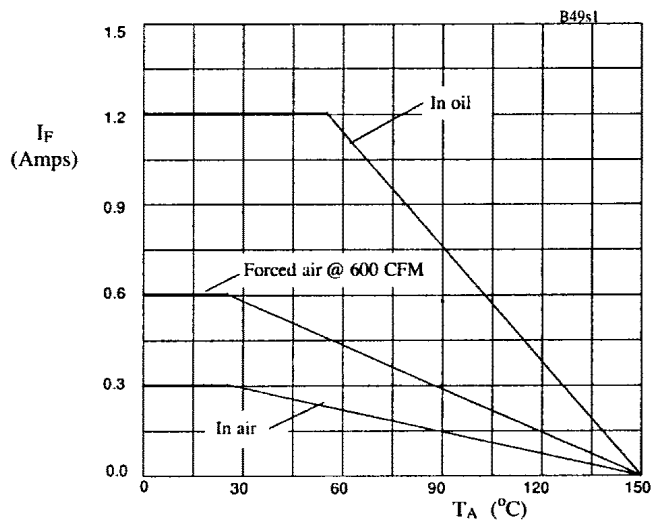


Fig 2. Maximum average forward current against ambient temperature.

Multiplication tables for fig 1.

SCKV33K12	X-axis x12
SCKV45K12	X-axis x19
SCKV66K12	X-axis x25

**HIGH DENSITY, HIGH VOLTAGE, STANDARD
RECOVERY RECTIFIER ASSEMBLY**

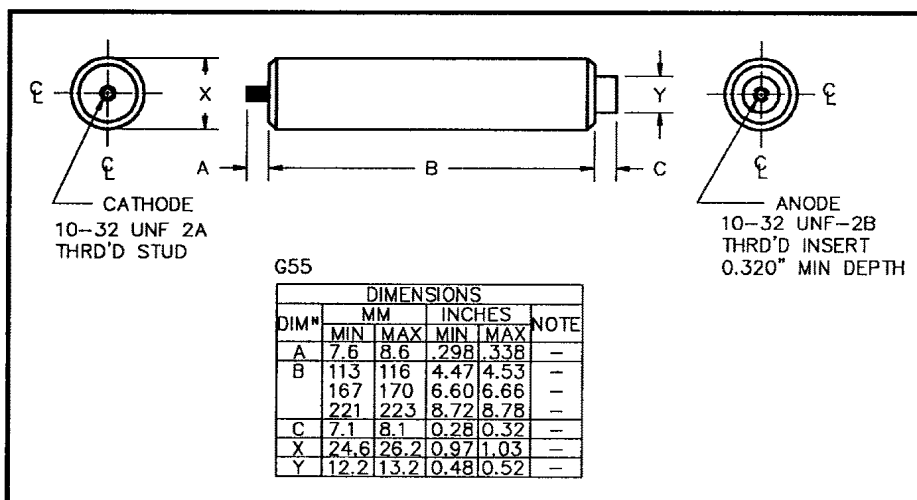
- High reverse voltages
- Low reverse leakage current
- Low distributed and ground capacitance
- Corona free design
- Air or oil environments

**QUICK REFERENCE
DATA**

- $V_R = 100 - 200\text{kV}$
- $I_F = 100\text{mA}$
- $t_{rr} = 2.5\mu\text{s}$
- $I_R = 1.0\mu\text{A}$

ABSOLUTE MAXIMUM RATINGS

	Symbol	SCKV100K3	SCKV150K3	SCKV200K3	Unit
Working reverse voltage	V_{RWM}	100	150	200	kV
Surge reverse voltage	V_{RSM}	110	165	220	kV
Average forward current in air @ 25°C in oil @ 55°C in forced air 600 CFM	$I_{F(AV)}$				mA mA mA
Non-repetitive surge current $t_p = 8.3\text{ms}$, @ 25°C	I_{FSM}				A
Storage temperature range	T_{STG}				°C
Operating temperature range	T_{OP}				°C
Body length Max.	dim B	4.53	6.66	8.78	inches

MECHANICAL



ELECTRICAL CHARACTERISTICS

	Symbol	SCKV100K3	SCKV150K3	SCKV200K3	Unit
Max. forward voltage drop @ $I_F = 100\text{mA}$, $T_j = 25^\circ\text{C}$	V_F	120	190	250	V
Max. reverse leakage current @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	←	1.0	→	μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	←	20	→	μA
Max. reverse recovery time 50mA I_F to 100mA I_R . Recovers to 25mA I_{RR} .	t_{rr}	←	2.5	→	μs
Max. fusing current $t_p = 8.3\text{mS}$	I^2t	←	2.6	→	A^2S

1. Measured on discrete devices prior to assembly

6

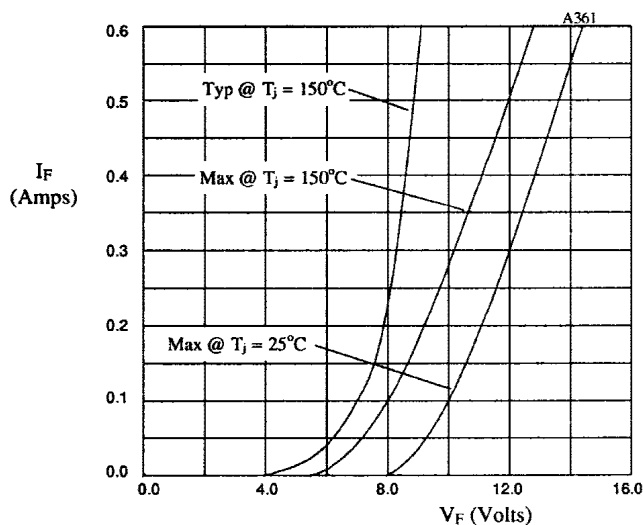


Fig 1. Forward voltage drop as a function of forward current for use with multiplication table.

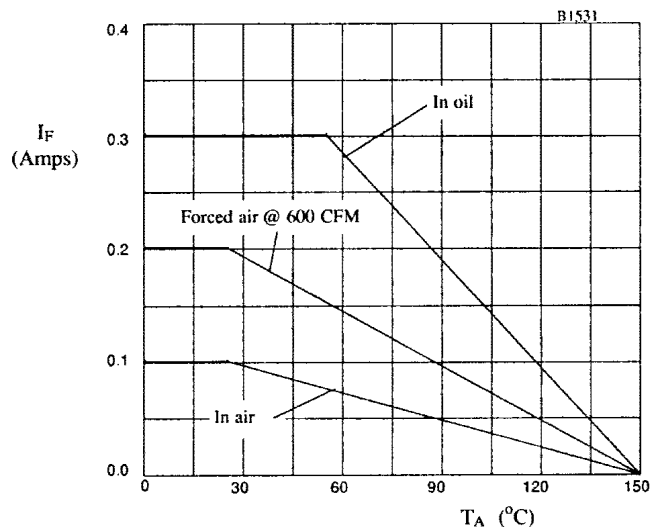


Fig 2. Maximum average forward current against ambient temperature.

Multiplication tables for fig 1.

SCKV100K3	X-axis x12
SCKV150K3	X-axis x19
SCKV200K3	X-axis x25

HIGH DENSITY, HIGH VOLTAGE, STANDARD
RECOVERY RECTIFIER ASSEMBLY

- High reverse voltages
- Low reverse leakage current
- Low distributed and ground capacitance
- Corona free design
- Air or oil environments

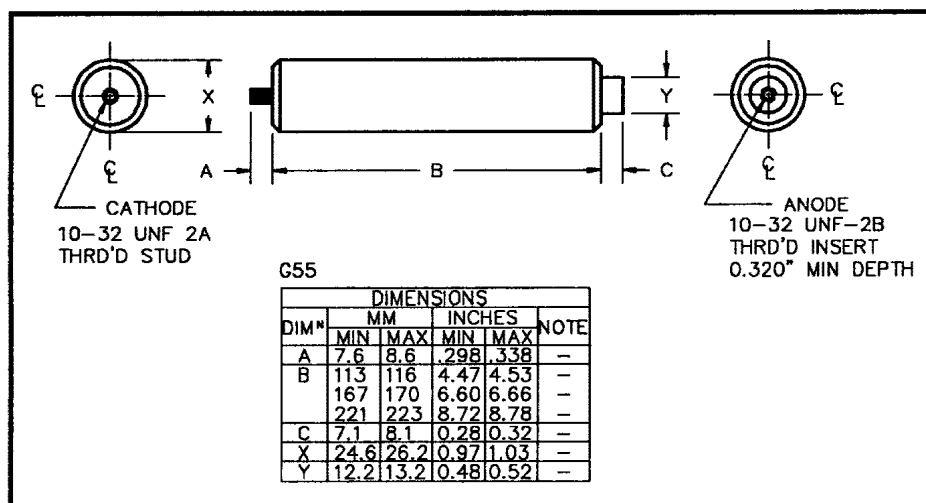
QUICK REFERENCE
DATA

- $V_R = 12\text{kV} - 25\text{kV}$
- $I_F = 1.0\text{A}$
- $t_{rr} = 2.0\mu\text{s}$
- $I_R = 1.0\mu\text{A}$

ABSOLUTE MAXIMUM RATINGS

	Symbol	SCKV12K30	SCKV18K30	SCKV25K30	Unit
Working reverse voltage	V_{RWM}	12	18	25	kV
Surge reverse voltage	V_{RSM}	13.2	19.8	27.5	kV
Average forward current in air @ 25°C	$I_{F(AV)}$	1.00			A
in oil @ 55°C		2.00			A
in forced air 600 CFM		1.50			A
Non-repetitive surge current $t_p = 8.3\text{ms}$, @ 25°C	I_{FSM}	50.0			A
Storage temperature range	T_{STG}	-55 to +150			°C
Operating temperature range	T_{OP}	-55 to +150			°C
Body length Max.	dim B	4.53	6.66	8.78	inches

MECHANICAL



ELECTRICAL CHARACTERISTICS

	Symbol	SCKV12K30	SCKV18K30	SCKV25K30	Unit
Max. forward voltage drop @ $I_F = 1.0A$, $T_j = 25^\circ C$	V_F	13.2	20.9	27.5	V
Max. reverse leakage current @ V_{RWM} , $T_j = 25^\circ C$	I_R	← 1.0 →			μA
@ V_{RWM} , $T_j = 100^\circ C$	I_R	← 25 →			μA
Max. reverse recovery time 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR} .	t_{rr}	← 2.0 →			μS
Max. fusing current $t_p = 8.3mS$	I^2t	← 10.4 →			A^2S

1. Measured on discrete devices prior to assembly

6

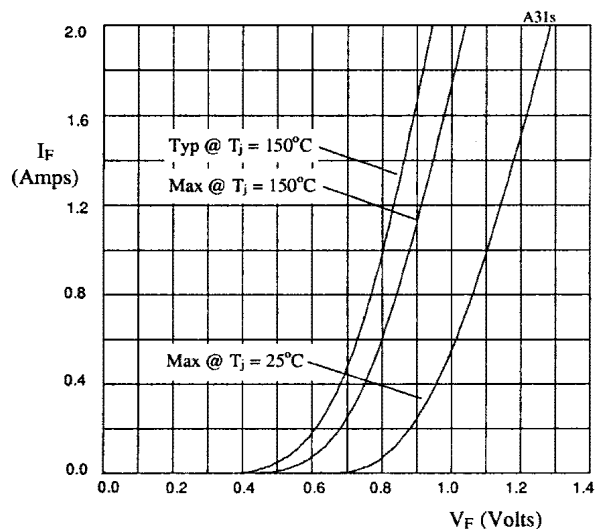


Fig 1. Forward voltage drop as a function of forward current for use with multiplication table.

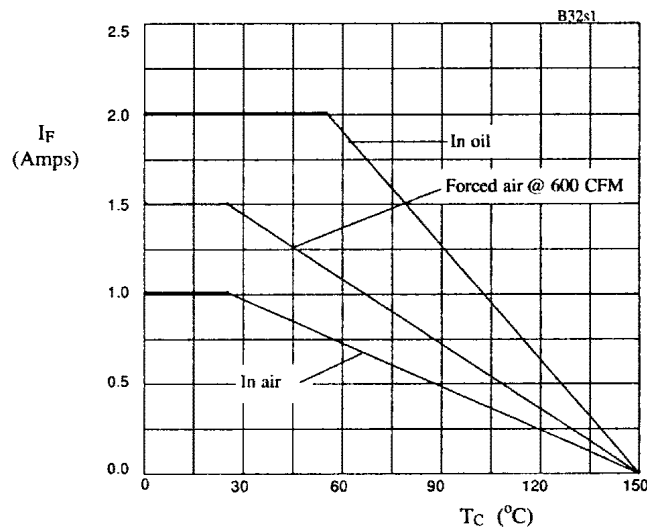


Fig 2. Maximum average forward current against ambient temperature.

Multiplication tables for fig 1.

SCKV12K30	X-axis x12
SCKV18K30	X-axis x19
SCKV25K30	X-axis x25

**HIGH DENSITY, HIGH VOLTAGE, STANDARD
RECOVERY RECTIFIER ASSEMBLY**

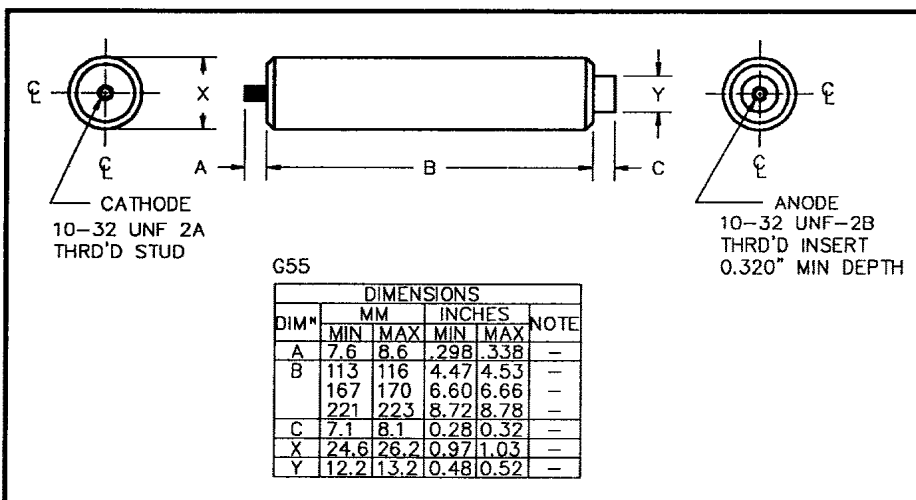
- High reverse voltages
- Low reverse leakage current
- Low distributed and ground capacitance
- Corona free design
- Air or oil environments

**QUICK REFERENCE
DATA**

- $V_R = 12\text{kV} - 25\text{kV}$
- $I_F = 1.0\text{A}$
- $t_{rr} = 2.0\mu\text{s}$
- $I_R = 1.0\mu\text{A}$

ABSOLUTE MAXIMUM RATINGS

	Symbol	SCKV12K40	SCKV18K40	SCKV25K40	Unit
Working reverse voltage	VRWM	12	18	25	kV
Surge reverse voltage	VRSM	13.2	19.8	27.5	kV
Average forward current in air @ 25°C in oil @ 55°C in forced air 600 CFM	IF(AV)	← 1.0 → ← 3.0 → ← 2.0 →			A A A
Non-repetitive surge current $t_p = 8.3\text{ms}$, @ 25°C	IFSM	← 150 →			A
Storage temperature range	TSTG	← -55 to +150 →			°C
Operating temperature range	TOP	← -55 to +150 →			°C
Body length Max.	dim B	4.53	6.66	8.78	inches

MECHANICAL

**ELECTRICAL CHARACTERISTICS**

	Symbol	SCKV12K40	SCKV18K40	SCKV25K40	Unit
Max. forward voltage drop @ $I_F = 3.0A$, $T_j = 25^\circ C$	V_F	12.0	19.0	25.0	V
Max. reverse leakage current @ V_{RWM} , $T_j = 25^\circ C$	I_R	← 1.0 →			μA
@ V_{RWM} , $T_j = 100^\circ C$	I_R	← 20 →			μA
Max. reverse recovery time ¹ 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR} .	t_{rr}	← 2.0 →			μS
Max. fusing current $t_p = 8.3ms$	I^2t	← 92 →			A^2S

1. Measured on discrete devices prior to assembly

6

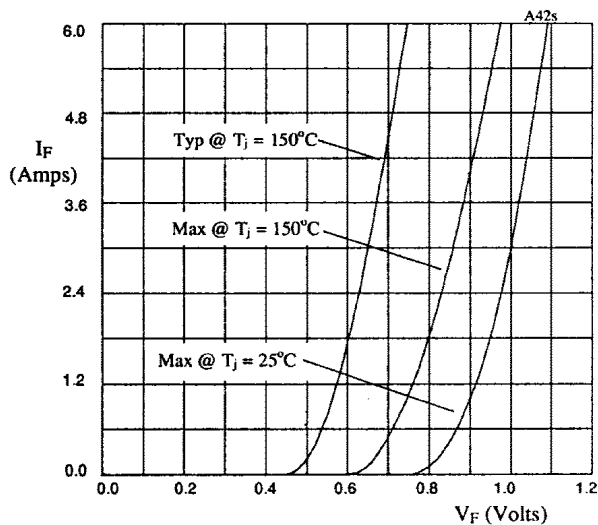


Fig 1. Forward voltage drop as a function of forward current for use with multiplication table.

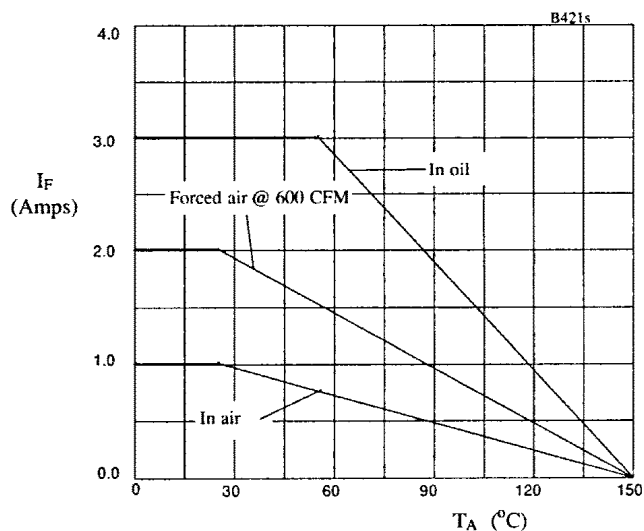


Fig 2. Maximum average forward current against ambient temperature.

Multiplication tables for fig 1.

SCKV12K40	X-axis x12
SCKV18K40	X-axis x19
SCKV25K40	X-axis x25

HIGH DENSITY, HIGH VOLTAGE, FAST RECOVERY
SILICON RECTIFIER ASSEMBLY

- Low reverse recovery time
- Low reverse leakage currents
- Low distributed and ground capacitance
- Corona free design
- Air or oil environments

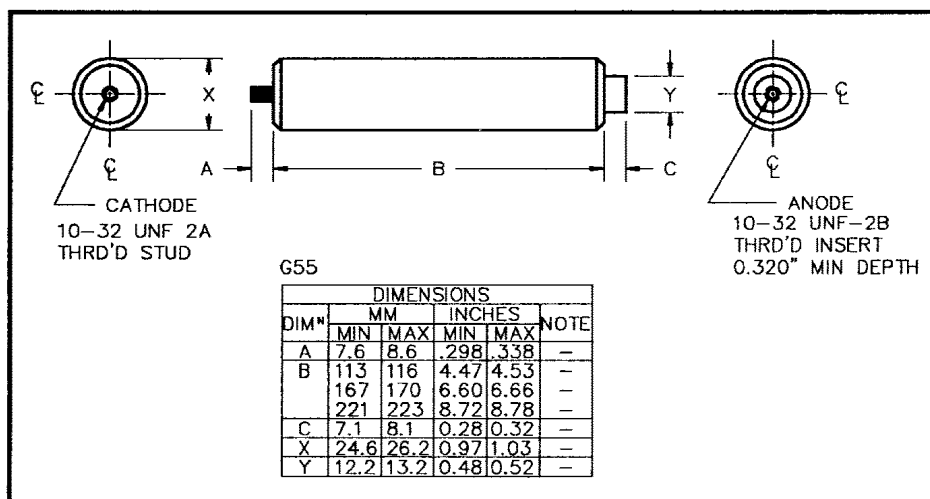
QUICK
REFERENCE DATA

- $V_R = 30\text{kV} - 60\text{kV}$
- $I_F = 200\text{mA}$
- $t_{rr} = 300\text{nS}$
- $I_R = 1.0\mu\text{A}$

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	Symbol	SCKV30K12F	SCKV45K12F	SCKV60K12F	Unit
Working reverse voltage	V_{RWM}	30	45	60	kV
Average forward current in air @ 25°C in oil @ 55°C in forced air 600CFM	$I_{F(AV)}$	← 200 →	← 800 →	← 400 →	mA mA mA
Non-repetitive surge current $t_p = 8.3\text{mS}$, @ 25°C	I_{FSM}	← 10 →			A
Storage temperature range	T_{STG}	← -55 to +150 →			°C
Operating temperature range	T_{OP}	← -55 to +150 →			°C
Body length ±0.030"	dim B	4.53	6.66	8.78	inches

MECHANICAL





ELECTRICAL CHARACTERISTICS (@ 25°C unless otherwise specified)

	Symbol	SCKV30K12F	SCKV45K12F	SCKV60K12F	Unit
Max. forward voltage drop @ $I_F = 100\text{mA}$, $T_j = 25^\circ\text{C}$	V_F	60	95	125	V
Max. reverse leakage current @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	← 1.0 →			μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	← 25 →			μA
Max. reverse recovery time ¹ 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR} .	t_{rr}	← 300 →			nS
Max. fusing current $t_p = 8.3\text{mS}$	I^2t	← 0.4 →			A^2S

¹ Measured on discrete devices prior to assembly

6

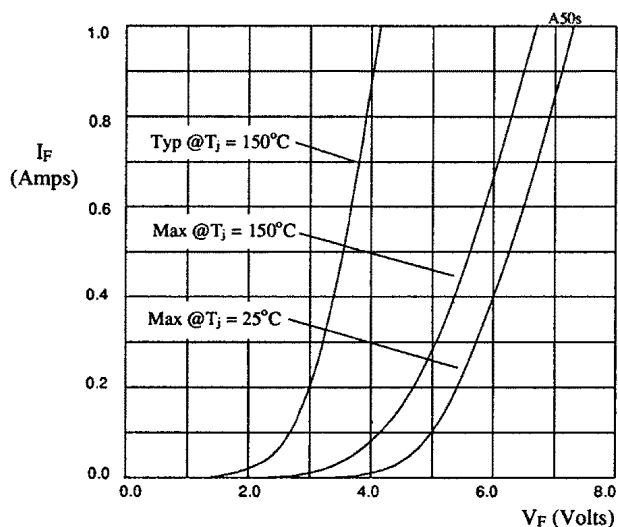


Fig 1. Forward voltage drops as a function of forward current.

Multiplication tables for fig 1.

DEVICE	X-axis
SCKV30K12F	x12
SCKV40K12F	x19
SCKV60K12F	x25

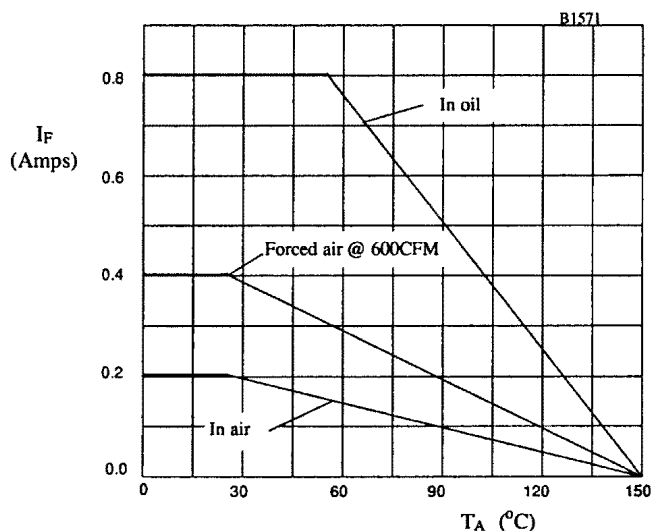


Fig 2. Maximum average forward current against ambient temperature.

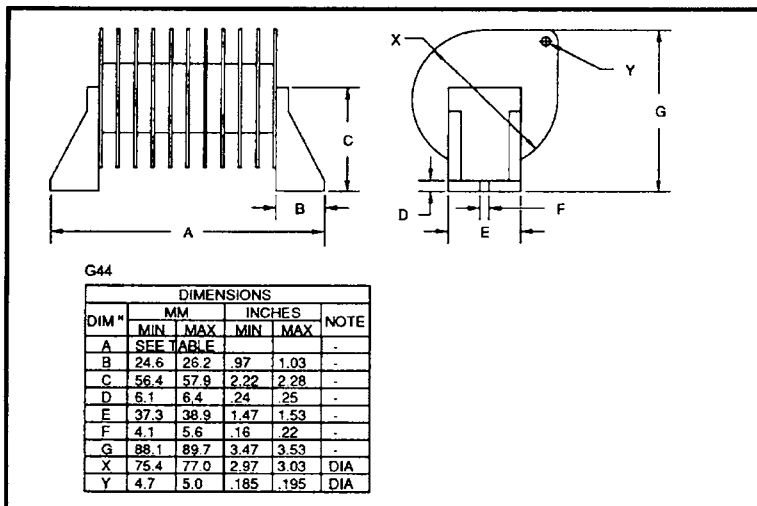
**HIGH VOLTAGE, HIGH CURRENT, HIGH DENSITY,
STANDARD RECOVERY RECTIFIER ASSEMBLY****QUICK REFERENCE
DATA**

- 5.5A forward current and 30kV reverse voltage
- Air or oil enviroment
- High reverse surge current
- High thermal shock resistance
- Integral fins for easy cooling

- $V_R = 6\text{kV} - 30\text{kV}$
- $I_F = 5.50\text{A}$
- $I_R = 1.0\mu\text{A}$
- $I_{FSM} = 150\text{A}$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$		1 Cycle Surge Current $t_p = 8.3\text{mS}$ I_{FSM}		Repetitive Surge Current I_{FRM}	I^2t $t_p = 8.3\text{mS}$	Body length
		air 55°C	air 100°C	@ 25 °C	@ 100 °C	@ 25 °C	@ 25 °C	dim A
	Volts	Amps	Amps	Amps	Amps	Amps	A ² S	inches
SCPHN6	6000	↑	↑	↑	↑	↑	↑	4.21
SCPHN10	10000	↑	↑	↑	↑	↑	↑	5.53
SCPHN16	16000	5.5	3.0	150	80	90	93.4	7.51
SCPHN20	20000	↓	↓	↓	↓	↓	↓	8.83
SCPHN26	26000	↓	↓	↓	↓	↓	↓	10.81
SCPHN30	30000	↓	↓	↓	↓	↓	↓	12.13

MECHANICAL



CHARACTERISTICS

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 3.0A. @ 25°C	Maximum Reverse Recovery Time ¹ t_{rr} @ 25°C
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	μS
SCPHN6	1.0	20	6.0	2.0
SCPHN10			10.0	
SCPHN16			16.0	
SCPHN20			20.0	
SCPHN26			26.0	
SCPHN30			30.0	

¹ Measured on discrete devices prior to assembly

Operating temperature range

-55 °C to +150 °C

Storage temperature range

-55 °C to +150 °C

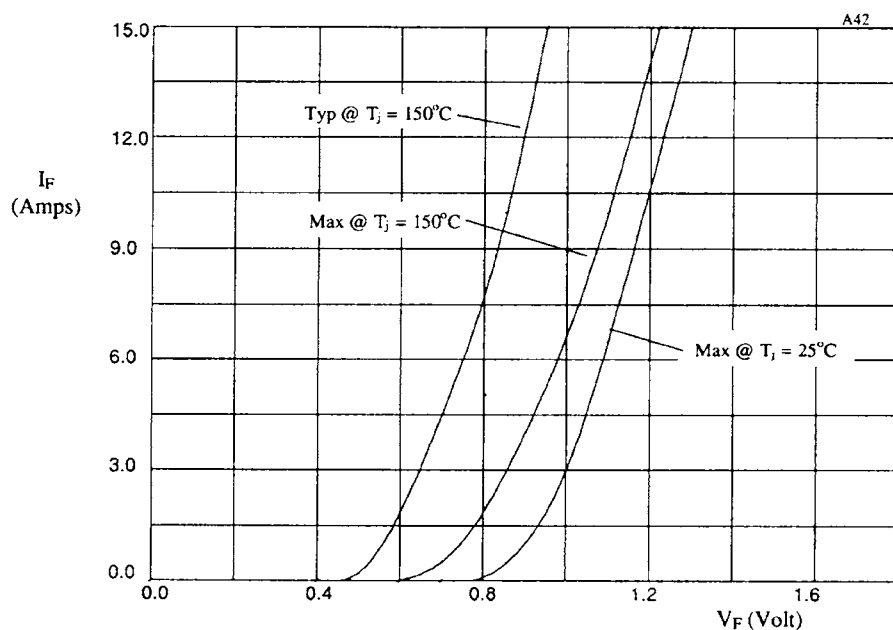


TABLE 1

DEVICE	X-axis
SCPHN6	x6
SCPHN10	x10
SCPHN16	x16
SCPHN20	x20
SCPHN26	x26
SCPHN30	x30

Figure 1. Forward voltage drop as a function of forward current for use with table 1.



HIGH DENSITY, HIGH VOLTAGE, STANDARD RECOVERY RECTIFIER ASSEMBLY

- Low reverse leakage current
- Corona free design
- Easy aluminum base mount
- Low forward voltage drop
- Up to 15kV reverse voltage

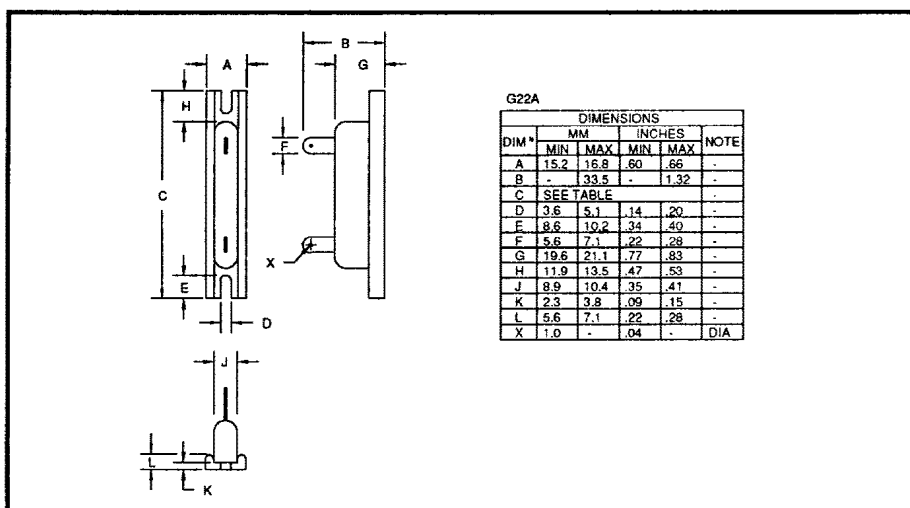
QUICK REFERENCE DATA

- $V_R = 7.5\text{kV} \text{ \& } 15\text{kV}$
- $I_F = 400\text{mA}$
- $t_{rr} = 2.5\mu\text{s}$
- $I_R = 2.0\mu\text{A}$

ABSOLUTE MAXIMUM RATINGS

	Symbol	SDH7.5K	SDH15K	Unit
Working reverse voltage	V_{RWM}	7.5	15.0	kV
Surge reverse voltage	V_{RSM}	8.25	16.50	kV
Average forward current in air @ 25°C in oil @ 55°C	$I_{F(AV)}$	← 400 → ← 400 →		mA mA
Non-repetitive surge current $t_p = 8.3\text{ms}$, @ 25°C	I_{FSM}	← 40.0 →		A
Storage temperature range	T_{STG}	← -55 to +150 →		°C
Operating temperature range	T_{OP}	← -55 to +150 →		°C
Body length ±0.030"	dim C	3.36	4.04	inches

MECHANICAL



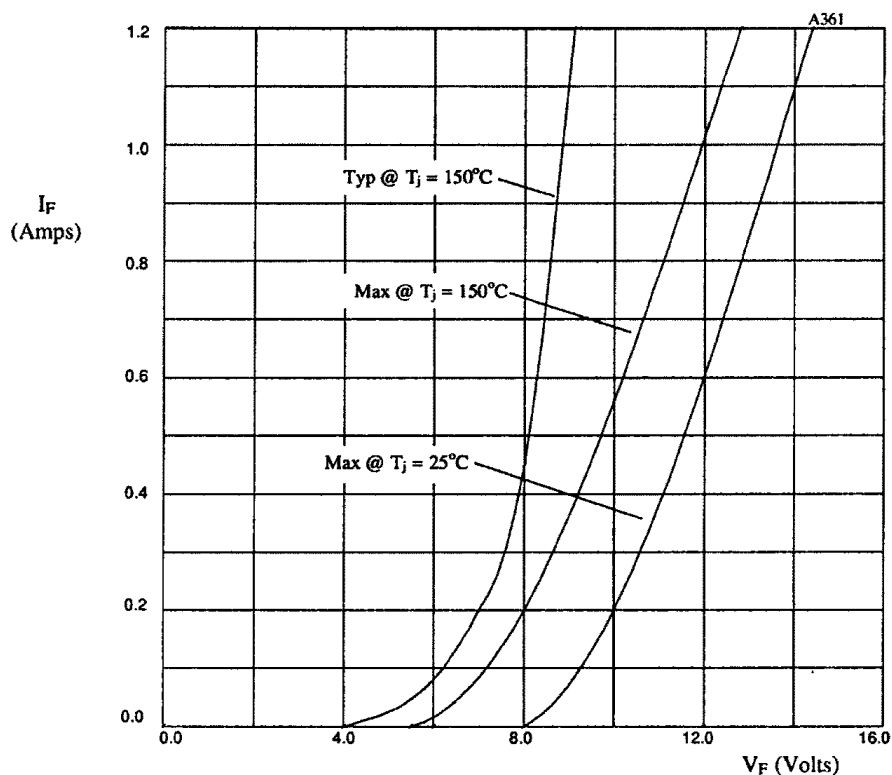


ELECTRICAL CHARACTERISTICS

	Symbol	SDH7.5K	SDH15K	Unit
Max. forward voltage drop @ $I_F = 200\text{mA}$, $T_j = 25^\circ\text{C}$	V_F	10.0	20.0	V
Max. reverse leakage current @ V_{RWM} , $T_j = 25^\circ\text{C}$	I_R	← 2.0 →	← →	μA
@ V_{RWM} , $T_j = 100^\circ\text{C}$	I_R	← 40 →	← →	μA
Max. reverse recovery time ¹ 50mA I_F to 100mA I_R . Recovers to 25mA I_{RR} .	t_{rr}	← 2.5 →	← →	μs
Max. fusing current $t_p = 8.3\text{ms}$	I^2t	← 6.64 →	← →	A^2s

¹ Measured on discrete devices prior to assembly

6



Multiplication tables for fig 1.

SDH7.5K X-axis x1
SDH15K X-axis x2

Fig 1. Forward voltage drop as a function of forward current for use with multiplication table 1.

HIGH DENSITY, HIGH VOLTAGE, STANDARD
RECOVERY RECTIFIER ASSEMBLYQUICK REFERENCE
DATA

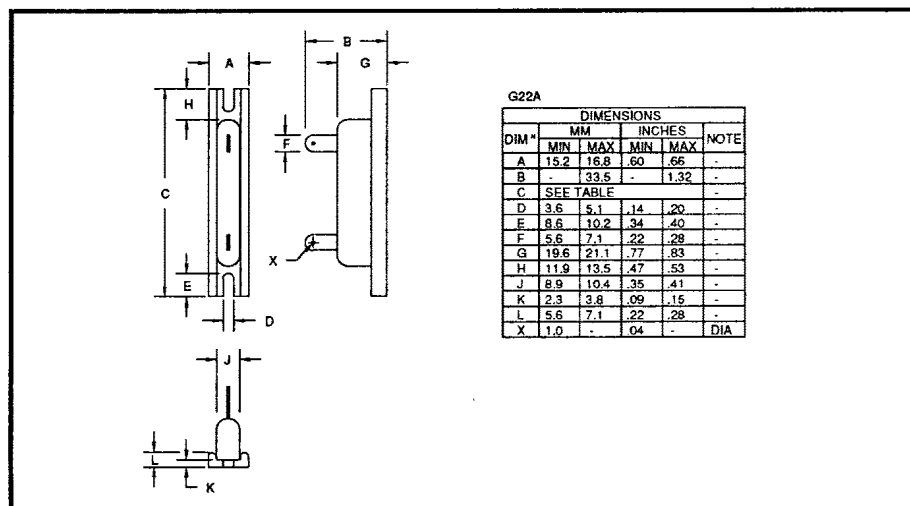
- Low reverse leakage current
- Low distributed and ground capacitance
- Corona free design
- Easy aluminium base mount
- Low forward voltage drop

- $V_R = 5\text{kV} - 15\text{kV}$
- $I_F = 1\text{A}$
- $t_{rr} = 2.0\mu\text{S}$
- $I_R = 1.0\mu\text{A}$

ABSOLUTE MAXIMUM RATINGS

	Symbol	SDH5KM	SDH10KM	SDH15KM	Unit
Working reverse voltage	V_{RWM}	5.0	10.0	15.0	kV
Surge reverse voltage	V_{RSM}	5.5	11.0	16.5	kV
Average forward current in air @ 25°C in oil @ 55°C	$I_{F(AV)}$	← 1.0 → ← 1.0 →			A A
Non-repetitive surge current $t_p = 8.3\text{ms}$, @ 25°C	I_{FSM}	← 50 →			A
Storage temperature range	T_{STG}	← -55 to +150 →			°C
Operating temperature range	T_{OP}	← -55 to +150 →			°C
Body length ±0.030"	dim C	3.36	4.04	4.04	inches

MECHANICAL



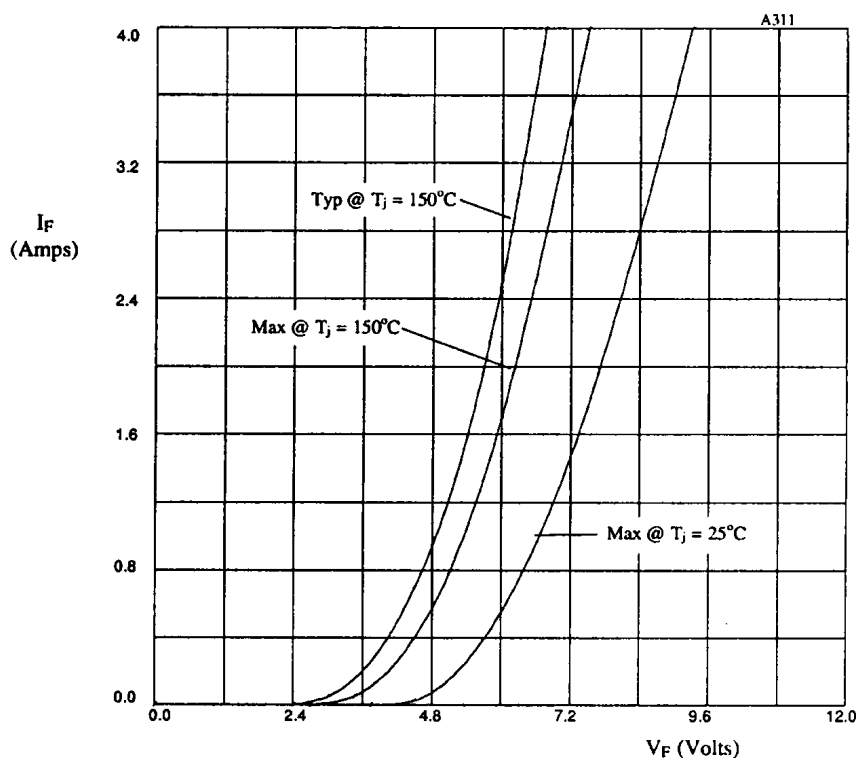


ELECTRICAL CHARACTERISTICS

	Symbol	SDH5KM	SDH10KM	SDH15KM	Unit
Max. forward voltage drop @ $I_F = 1.0A$, $T_j = 25^\circ C$	V_F	6.6	13.2	19.8	V
Max. reverse leakage current @ V_{RWM} , $T_j = 25^\circ C$	I_R	← 1.0 →			μA
@ V_{RWM} , $T_j = 100^\circ C$	I_R	← 25 →			μA
Max. reverse recovery time ¹ 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR} .	t_{rr}	← 2.0 →			μS
Max. fusing current $t_p = 8.3mS$	I^2t	← 10 →			A^2S

¹ Measured on discrete devices prior to assembly

6



Multiplication tables for fig 1.

SDH5KM X-axis x1
SDH10KM X-axis x2
SDH15KM X-axis x3

Fig 1. Forward voltage drop as a function of forward current
for use with multiplication table 1.



HIGH DENSITY, HIGH VOLTAGE, STANDARD RECOVERY RECTIFIER ASSEMBLY

- 2.5A forward current
- Low reverse leakage current
- Corona free design
- Easy aluminum base mount
- Low forward voltage drop

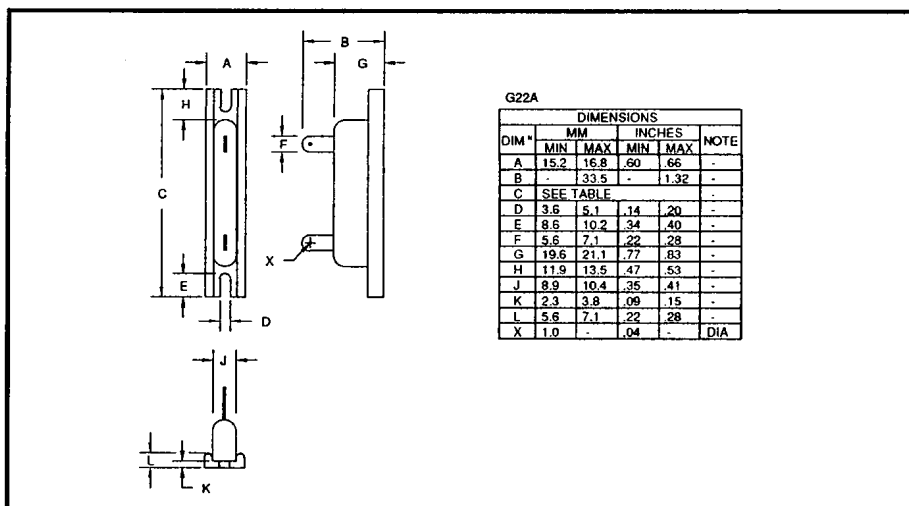
QUICK REFERENCE DATA

- $V_R = 5\text{kV} \text{ \& } 10\text{kV}$
- $I_F = 2.5\text{A}$
- $t_{rr} = 2.0\mu\text{s}$
- $I_R = 1.0\mu\text{A}$

ABSOLUTE MAXIMUM RATINGS

	Symbol	SDH5KS	SDH10KS	Unit
Working reverse voltage	VRWM	5.0	10.0	kV
Surge reverse voltage	VRSM	5.5	11.0	kV
Average forward current in air @ 25°C in oil @ 55°C	IF(AV)	← 2.5 → ← 2.5 →		A A
Non-repetitive surge current $t_p = 8.3\text{ms}$, @ 25°C	IFSM	← 150 →		A
Storage temperature range	TSTG	← -55 to +150 →		°C
Operating temperature range	TOP	← -55 to +150 →		°C
Body length ±0.030"	dim C	3.36	4.04	inches

MECHANICAL



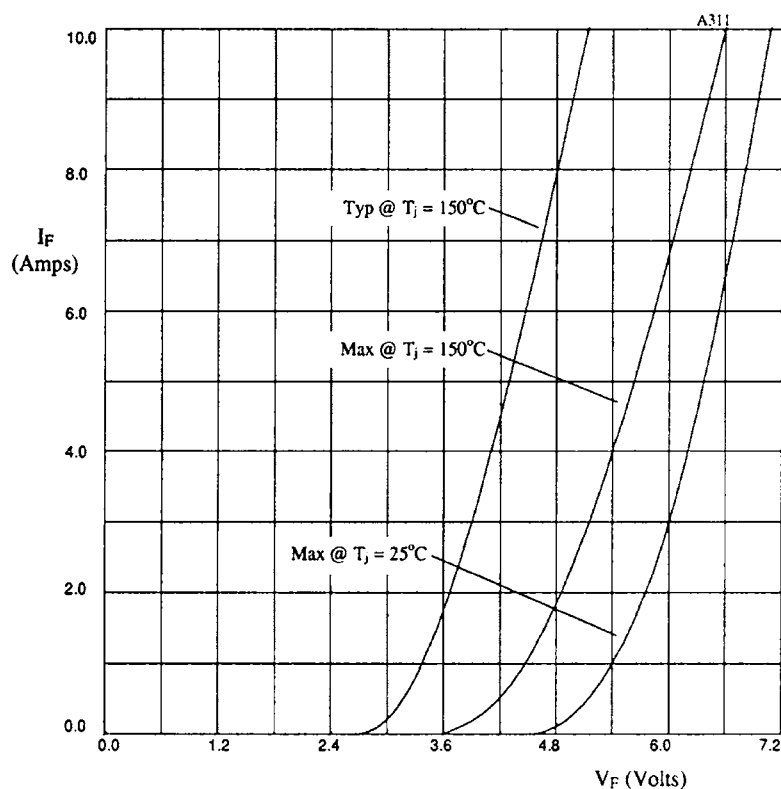


ELECTRICAL CHARACTERISTICS

	Symbol	SDH5KS	SDH10KS	Unit
Max. forward voltage drop @ $I_F = 3.0A$, $T_j = 25^\circ C$	V_F	6.0	12.0	V
Max. reverse leakage current @ V_{RWM} , $T_j = 25^\circ C$	I_R	← 1.0 →		μA
@ V_{RWM} , $T_j = 100^\circ C$	I_R	← 20 →		μA
Max. reverse recovery time ¹ 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR} .	t_{rr}	← 2.0 →		μS
Max. fusing current $t_p = 8.3mS$	I^2t	← 94 →		A^2S

¹ Measured on discrete devices prior to assembly

6



Multiplication tables for fig 1.

SDH5KS X-axis x1
SDH10KS X-axis x2

Fig 1. Forward voltage drop as a function of forward current for use with multiplication table 1.

**HIGH DENSITY, HIGH VOLTAGE, FAST
RECOVERY RECTIFIER ASSEMBLY**

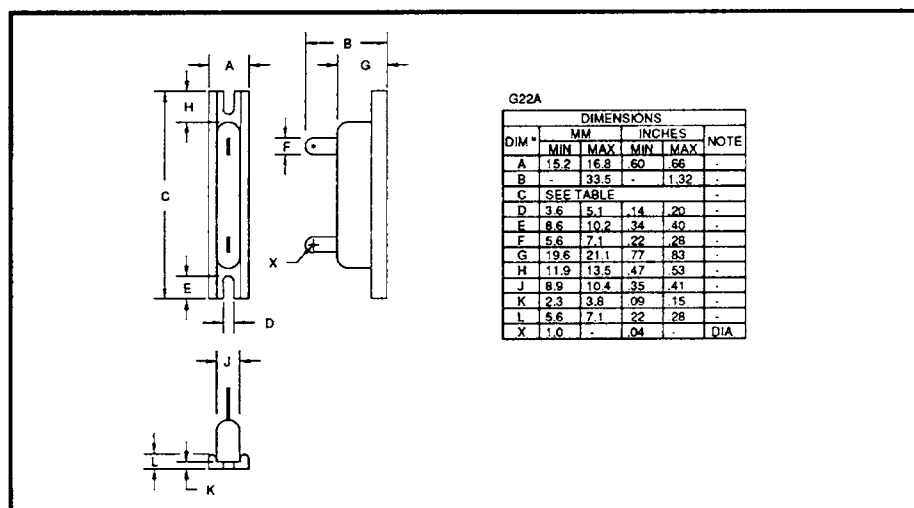
- Low reverse leakage current
- Low reverse recovery time
- Corona free design
- Easy aluminum base mount
- Low forward voltage drop

**QUICK REFERENCE
DATA**

- $V_R = 2.5 - 7.5\text{kV}$
- $I_F = 1\text{A}$
- $t_{rr} = 150\text{nS}$
- $I_R = 1.0\mu\text{A}$

ABSOLUTE MAXIMUM RATINGS

	Symbol	SDHF2.5KM	SDHF5KM	SDHF7.5KM	Unit
Working reverse voltage	VRWM	2.5	5.0	7.5	kV
Surge reverse voltage	VRSM	2.5	5.0	7.5	kV
Average forward current in air @ 25°C in oil @ 55°C	IF(AV)	$\longleftrightarrow 1.0 \longleftrightarrow$ $\longleftrightarrow 1.0 \longleftrightarrow$			A A
Non-repetitive surge current $t_p = 8.3\text{mS}$, @ 25°C	IFSM	$\longleftrightarrow 25 \longleftrightarrow$			A
Storage temperature range	TSTG	$\longleftrightarrow -55 \text{ to } +150 \longleftrightarrow$			°C
Operating temperature range	TOP	$\longleftrightarrow -55 \text{ to } +150 \longleftrightarrow$			°C
Body length ± 0.030 "	dim C	3.36	4.04	6.09	inches

MECHANICAL

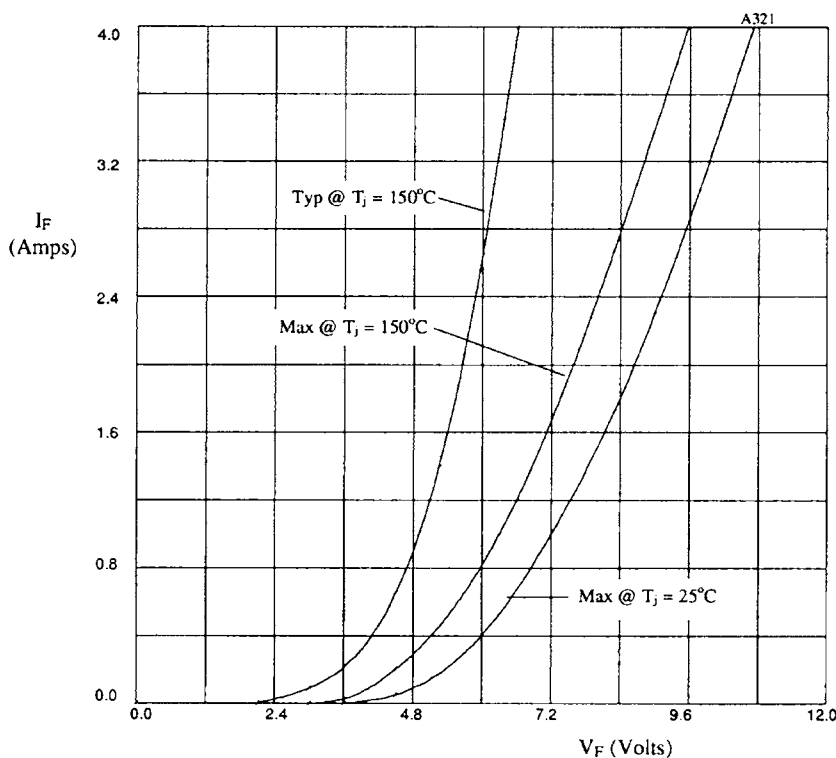


ELECTRICAL CHARACTERISTICS

	Symbol	SDHF2.5KM	SDHF5KM	SDHF7.5KM	Unit
Max. forward voltage drop @ $I_F = 1.0A$, $T_j = 25^\circ C$	V_F	7.2	14.4	21.6	V
Max. reverse leakage current @ V_{RWM} , $T_j = 25^\circ C$	I_R	← 1.0 →			μA
@ V_{RWM} , $T_j = 100^\circ C$	I_R	← 25 →			μA
Max. reverse recovery time ¹ 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR} .	t_{rr}	← 150 →			nS
Max. fusing current $t_p = 8.3mS$	I^2t	← 2.6 →			A^2S

¹ Measured on discrete devices prior to assembly

6



Multiplication tables for fig 1.

SDHF2.5KM X-axis x1
SDHF5KM X-axis x2
SDHF7.5KM X-axis x3

Fig 1. Forward voltage drop as a function of forward current for use with multiplication table 1.

**HIGH DENSITY, HIGH VOLTAGE, FAST
RECOVERY RECTIFIER ASSEMBLY**

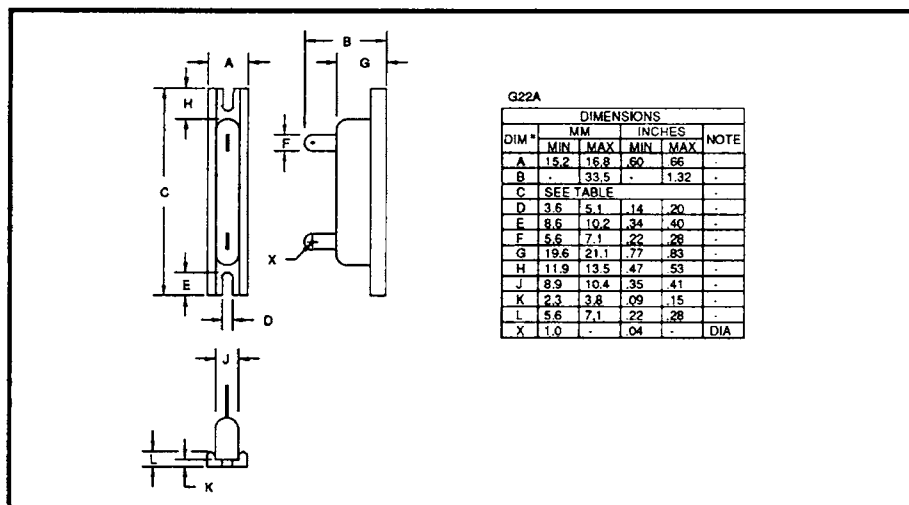
- Low reverse recovery time
- Low reverse leakage current
- Corona free design
- Easy aluminum base mount
- Low forward voltage drop

**QUICK REFERENCE
DATA**

- $V_R = 2.5\text{kV} \text{ \& } 5\text{kV}$
- $I_F = 2.5\text{A}$
- $t_{rr} = 150\text{nS}$
- $I_R = 1.0\mu\text{A}$

ABSOLUTE MAXIMUM RATINGS

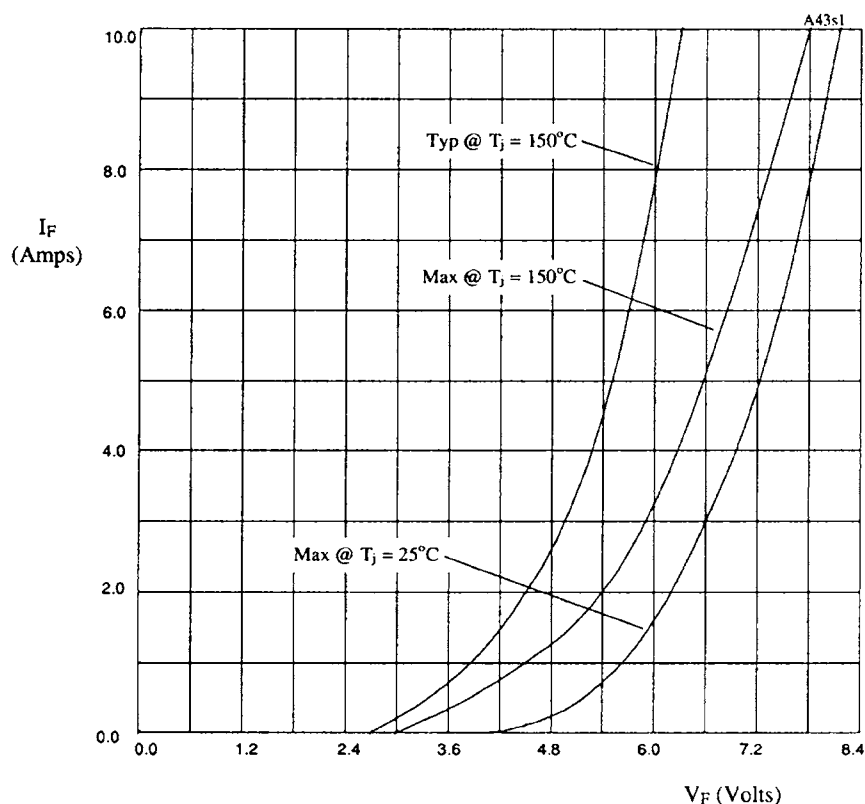
	Symbol	SDHF2.5KS	SDHF5KS	Unit
Working reverse voltage	V_{RWM}	2.5	5.0	kV
Surge reverse voltage	V_{RSM}	2.5	5.0	kV
Average forward current in air @ 25°C in oil @ 55°C	$I_{F(AV)}$	← 2.5 → ← 2.5 →		A A
Non-repetitive surge current $t_p = 8.3\text{mS}$, @ 25°C	I_{FSM}	← 150 →		A
Storage temperature range	T_{STG}	← -55 to +150 →		°C
Operating temperature range	T_{OP}	← -55 to +150 →		°C
Body length ±0.030"	dim C	3.36	4.04	inches

MECHANICAL

**ELECTRICAL CHARACTERISTICS**

	Symbol	SDHF2.5KS	SDHF5KS	Unit
Max. forward voltage drop @ $I_F = 3.0A$, $T_j = 25^\circ C$	V_F	6.6	13.2	V
Max. reverse leakage current @ V_{RWM} , $T_j = 25^\circ C$	I_R	← 1.0 →		μA
@ V_{RWM} , $T_j = 100^\circ C$	I_R	← 25 →		μA
Max. reverse recovery time ¹ 0.5A I_F to 1.0A I_R . Recovers to 0.25A I_{RR} .	t_{rr}	← 150 →		nS
Max. fusing current $t_p = 8.3mS$	I^2t	← 93 →		A^2S

¹ Measured on discrete devices prior to assembly

6

Multiplication tables for fig 1.

SDHF2.5KS X-axis x1
SDHF5KS X-axis x2

Fig 1. Forward voltage drop as a function of forward current for use with multiplication table 1.



HIGH VOLTAGE, HIGH DENSITY, STANDARD RECOVERY MODULAR RECTIFIER ASSEMBLY

QUICK REFERENCE DATA

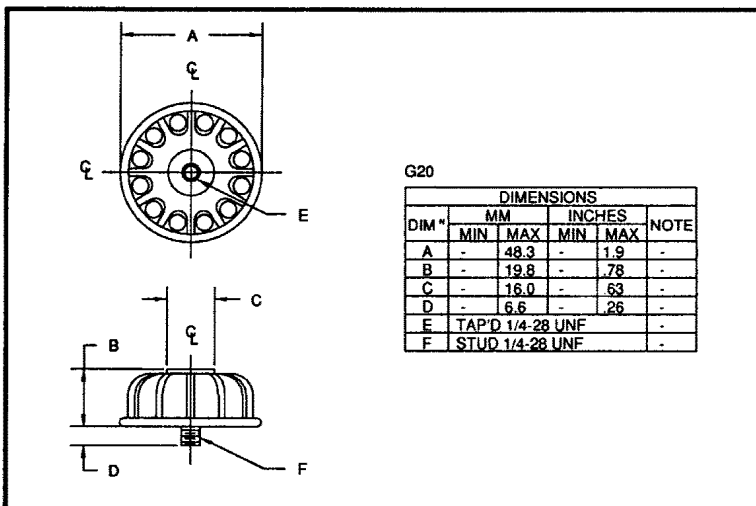
- Up to 15kV reverse voltage
- Modular construction
- Low reverse leakage currents
- High thermal shock resistance
- Provides design versatility

- $V_R = 2.5\text{kV} - 15\text{kV}$
- $I_F = 500\text{mA}$ (in air)
- $I_R = 1.0\text{ }\mu\text{A}$
- $I_{FSM} = 20\text{A}$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$				1 Cycle Surge Current I_{FSM} $t_p = 8.3\text{ms}$		Repetitive Surge Current I_{FRM} @ 25°C	I^2t $t_p = 8.3\text{ms}$ @ 25°C
		Air @ 25°C	Air @ 100°C	Stud to Heatsink @ 25 °C	Still oil @ 55 °C	@ 25°C	@ 100°C		
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	A ² S
SHVM2.5	2500	↑	↑	↑	↑	↑	↑	↑	↑
SHVM5	5000	↑	↑	↑	↑	↑	↑	↑	↑
SHVM7.5	7500	↑	↑	↑	↑	↑	↑	↑	↑
SHVM10	10000	0.5	0.2	0.5	0.5	20.0	8.0	8.0	1.67
SHVM12.5	12500	↓	↓	↓	↓	↓	↓	↓	↓
SHVM15	15000	↓	↓	↓	↓	↓	↓	↓	↓

MECHANICAL



MAXIMUM THERMAL IMPEDANCES

Junction - Ambient $R_{\theta JA} < 12^\circ\text{C/W}$
 Junction - Stud $R_{\theta JS} < 6^\circ\text{C/W}$
 Junction - Oil $R_{\theta JO} < 4.5^\circ\text{C/W}$

**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Forward Voltage V_F @ 0.8A @ 25°C	Maximum Reverse Recovery Time ¹ t_{rr} @ 25°C
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	μS
SHVM2.5	1.0	50	7.0	2.0
SHVM5			14.0	
SHVM7.5			21.0	
SHVM10			28.0	
SHVM12.5			35.0	
SHVM15			42.0	

1. Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

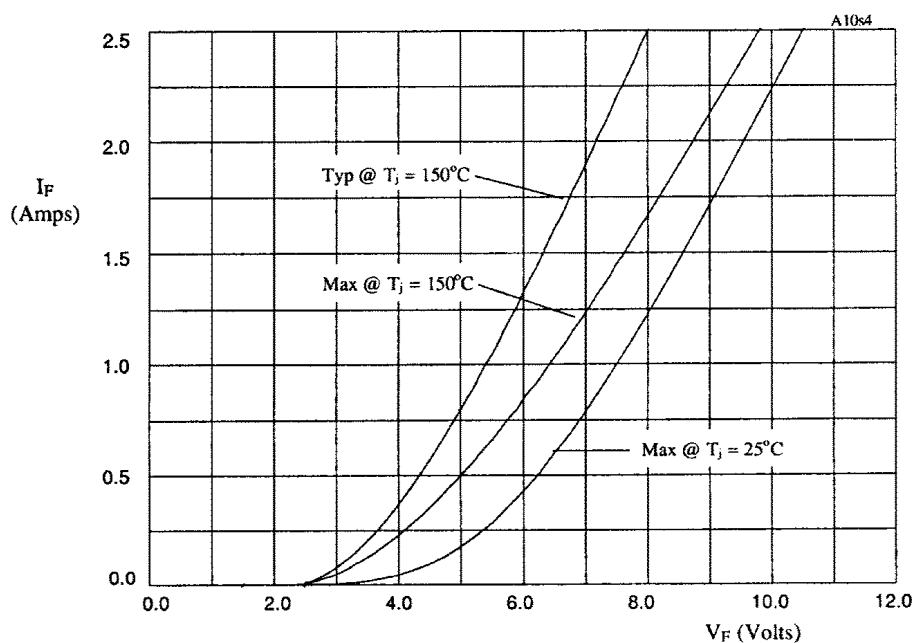


Figure 1. Forward voltage drop as a function of forward current for use with table 1.

TABLE 1

DEVICE	X-axis
SHVM2.5	x1
SHVM5	x2
SHVM7.5	x3
SHVM10	x4
SHVM12.5	x5
SHVM15	x6

**HIGH VOLTAGE, HIGH DENSITY, FAST RECOVERY
MODULAR RECTIFIER ASSEMBLY**

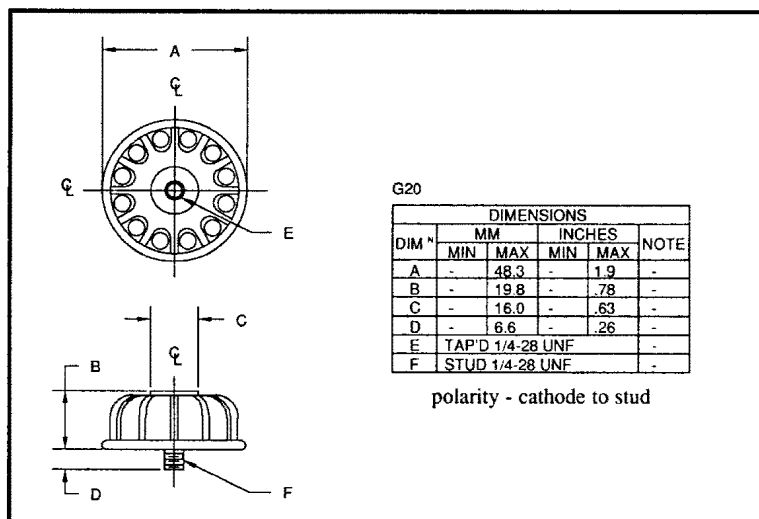
- Low reverse recovery time
- Modular construction
- Low reverse leakage current
- High thermal shock resistance
- Provides design versatility

**QUICK REFERENCE
DATA**

- $V_R = 2.5\text{kV} - 15\text{kV}$
- $I_F = 350\text{mA}$
- $I_R = 0.25\mu\text{A}$
- $t_{rr} = 350\text{nS}$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current $I_{F(AV)}$				1 Cycle Surge Current I_{FSM} $t_p = 8.3\text{ms}$ @ T_{jMAX}	Repetitive Surge Current I_{FRM} @ 25°C	I^2t $t_p = 8.3\text{ms}$
		air 25°C	air 100°C	stud to heat-sink @ 25°C	in still oil @ 55°C			
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	A^2S
SHVM2.5F	2500	↑	↑	↑	↑	↑	↑	↑
SHVM5F	5000							
SHVM7.5F	7500							
SHVM10F	10000	0.35	0.15	0.35	0.35	15.0	8.0	0.9
SHVM12.5F	12500							
SHVM15F	15000							

MECHANICAL**MAXIMUM THERMAL IMPEDANCES**

Junction - Ambient $R_{\theta JA} < 12^\circ\text{C/W}$
Junction - Stud $R_{\theta JS} < 6^\circ\text{C/W}$
Junction - Oil $R_{\theta JO} < 4.5^\circ\text{C/W}$

**ELECTRICAL CHARACTERISTICS**

Device Type	Maximum Reverse Leakage Current $I_R @ V_{RWM}$		Maximum Reverse Recovery Time ¹ $t_{rr} @ 25^\circ\text{C}$	Maximum Forward Voltage $V_F @ 0.8A @ 25^\circ\text{C}$
	@ 25 °C	@ 100 °C		
	μA	μA	nS	Volts
SHVM2.5F	1.0	50	350	7
SHVM5F				14
SHVM7.5F				21
SHVM10F				28
SHVM12.5F				35
SHVM15F				42

1. Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

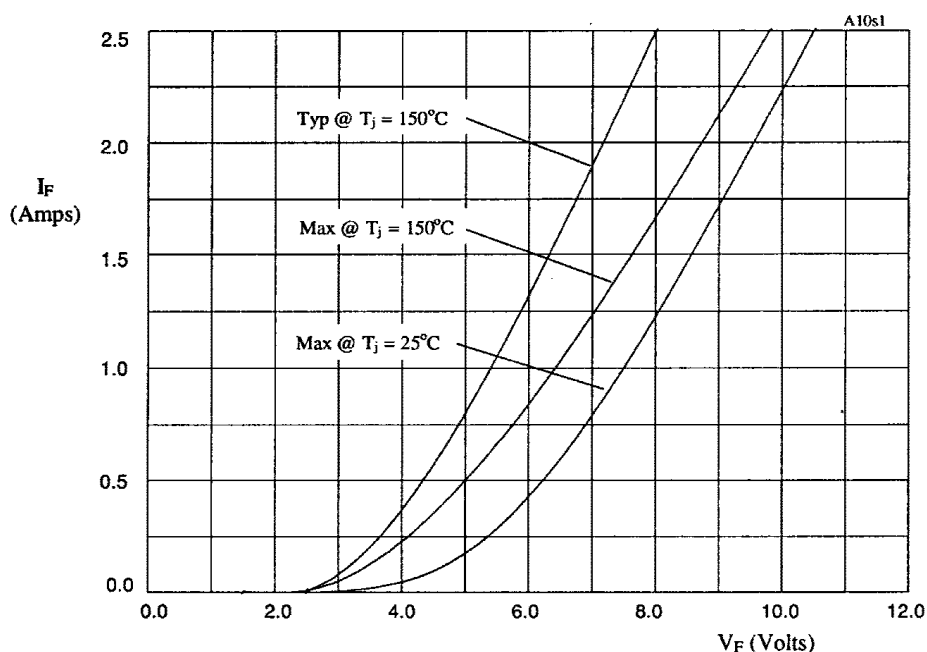


Figure 1. Forward voltage drop as a function of forward current.

TABLE 1

DEVICE	X-AXIS
SHVM2.5F	x1
SHVM5F	x2
SHVM7.5F	x3
SHVM10F	x4
SHVM12.5F	x5
SHVM15F	x6

HIGH VOLTAGE, HIGH DENSITY, STANDARD RECOVERY MODULAR RECTIFIER ASSEMBLY

- Up to 15kV reverse voltage
- Modular construction
- Low reverse leakage current
- High thermal shock resistance
- Provides design versatility

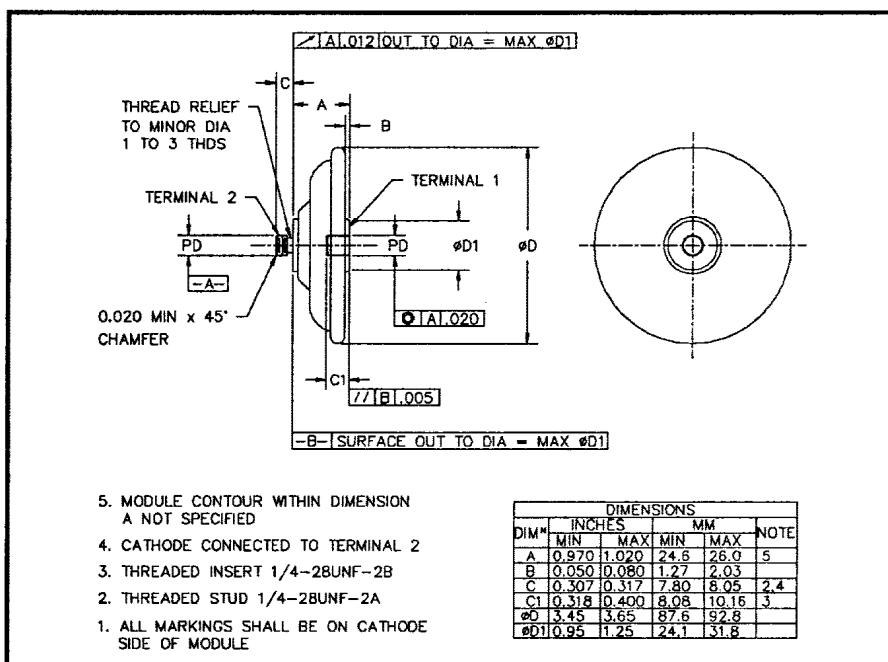
QUICK REFERENCE DATA

- $V_R = 7.5\text{kV} - 10\text{kV}$
- $I_F = \text{to } 3.75\text{A}$
- $I_R = 1.0\mu\text{A}$
- $I_{FSM} = 50\text{A}$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Rectified Current $I_{F(AV)}$			1 Cycle Surge Current I_{FSM} $t_p = 8.3mS$ @ T_{jMAX}	I^2t $t_p = 8.3mS$ @ $25^\circ C$
		Air @ $25^\circ C$	Air @ $100^\circ C$	Still oil @ $55^\circ C$		
	Volts	Amps	Amps	Amps	Amps	A^2S
SHVS7.5	7500	2.4	1.3	3.75	100	37
SHVS10	10000	2.2	1.2	3.4	100	37

MECHANICAL





ELECTRICAL CHARACTERISTICS

Device Type	Maximum Reverse Leakage Current $I_R @ V_{RWM}$		Maximum Forward Voltage $V_F @ 3.0A @ 25^\circ C$	Maximum Reverse Recovery Time ¹ $t_{rr} @ 25^\circ C$
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	μS
SHVS7.5	1.0	10	9.2	5.0
SHVS10	1.0	10	11.5	5.0

1. Measured on discrete devices prior to assembly

Operating temperature range $-55^\circ C$ to $+150^\circ C$
Storage temperature range $-55^\circ C$ to $+150^\circ C$

6

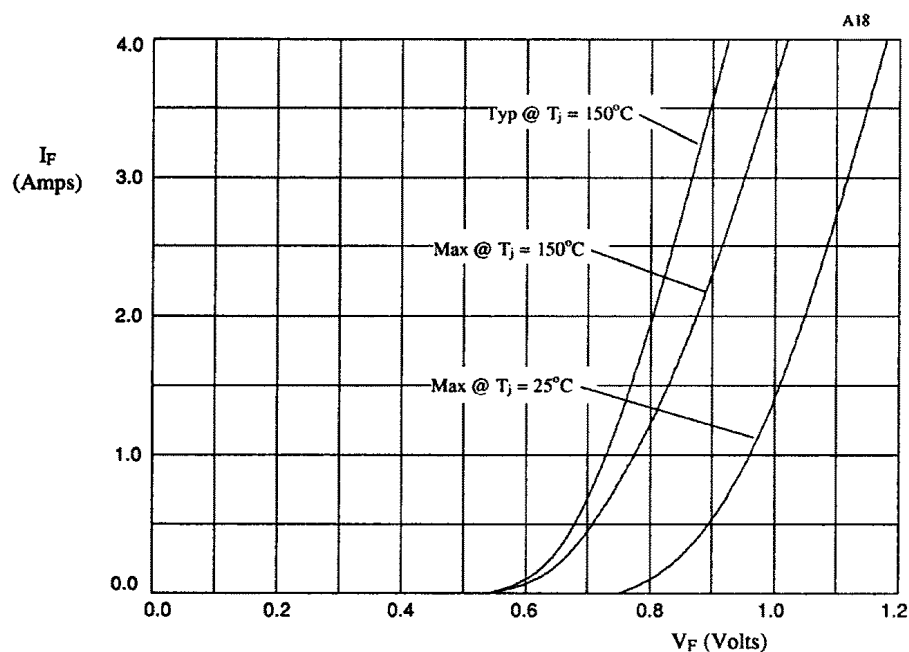


Figure 1. Forward voltage drop as a function of forward current for use with table 1.

TABLE 1

DEVICE	X-axis
SHVS7.5	x8
SHVS10	x10



HIGH VOLTAGE, HIGH DENSITY, FAST RECOVERY MODULAR RECTIFIER ASSEMBLY

- Low reverse recovery time
- Low reverse leakage current
- High thermal shock resistance
- Modular construction
- Low distributed capacitance

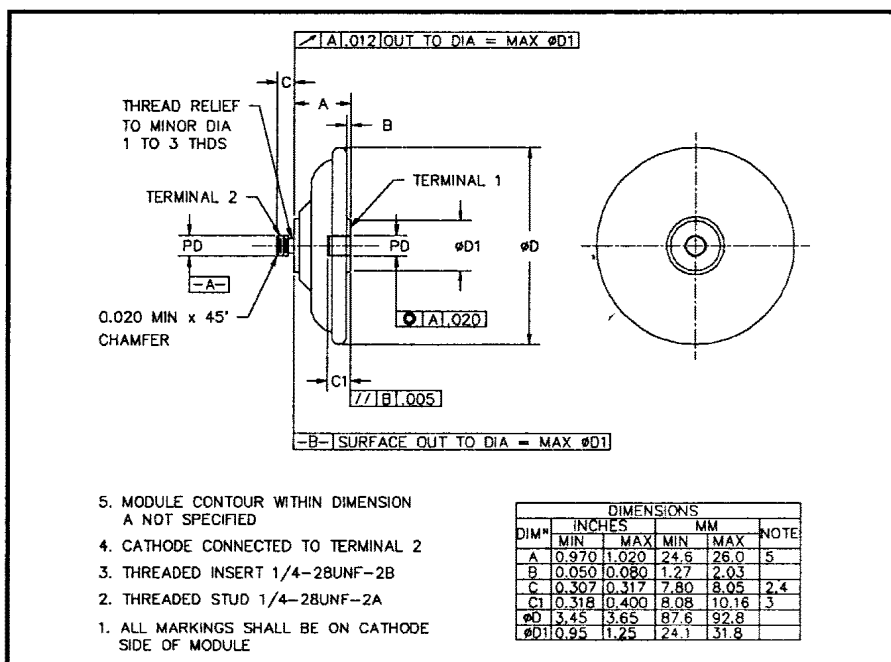
QUICK REFERENCE DATA

- $V_R = 5000 - 10000V$
- $I_F = \text{to } 4.0A$
- $I_{FSM} = 80A$
- $t_{rr} = 300nS$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Rectified Current $I_{F(AV)}$			1 Cycle Surge Current I_{FSM} $t_p = 8.3mS$ @ T_{JMAX}	I^2t $t_p = 8.3mS$
		air 25 °C	air 100 °C	in still oil @ 55 °C		
	Volts	Amps	Amps	Amps	Amps	A ² S
SHVS5F	5000	2.75	1.6	4.0	80	24
SHVS7.5F	7500	2.0	1.2	3.2	80	24
SHVM10F	10000	1.9	1.1	2.9	80	24

MECHANICAL





ELECTRICAL CHARACTERISTICS

Device Type	Maximum Reverse Leakage Current I_R @ V_{RWM}		Maximum Reverse Recovery Time t_{rr} @ 25°C	Maximum Forward Voltage V_F @ 25°C @3A
	@ 25 °C	@ 100 °C		
	μA	μA	nS	Volts
SHVS5F	1.0	10.0	300	6.5
SHVS7.5F	1.0	10.0	300	10.4
SHVM10F	1.0	10.0	300	13

1. Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C

Storage temperature range -55 °C to +150 °C

6

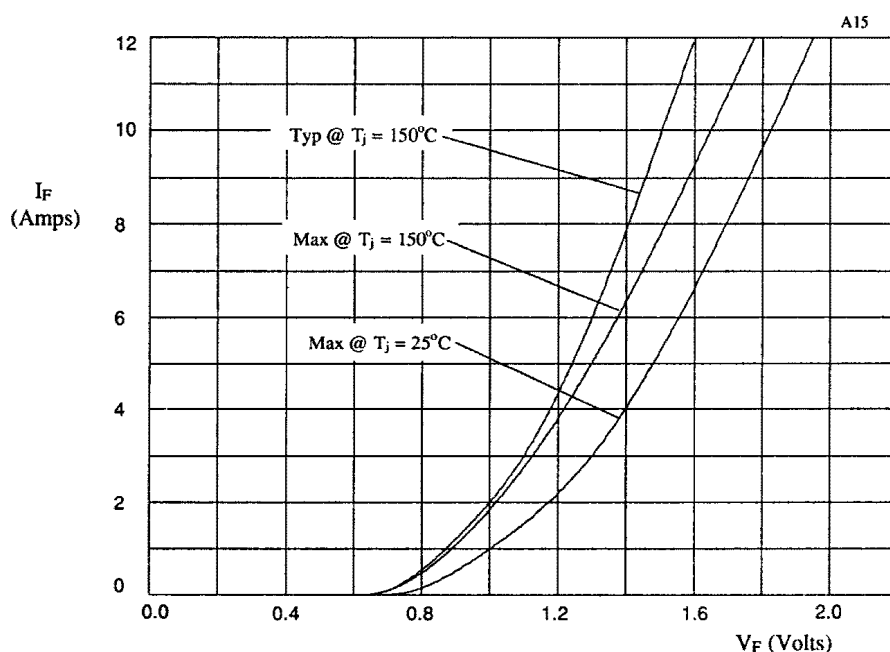


Figure 1. Forward voltage drop as a function of forward current
(See TABLE 1)

TABLE 1

DEVICE	X-AXIS
SHVS5F	x5
SHVS7.5F	x8
SHVS10F	x10

POWER DISCRETES

Description

Quick reference data

$V_R = 2500V - 15000V$

$I_F = 0.5A$

$I_r = 5\mu A$

$I_{FSM} = 35A$

Features

- ◆ Low forward voltage drop
- ◆ Low reverse leakage current
- ◆ High thermal shock resistance

Electrical Specifications

Electrical specifications @ $T_A = 25^\circ C$ unless otherwise specified.

Device Types	V_{RWM}	$I_{F(AV)} @ T_A = 25^\circ C$	$I_{F(AV)} @ T_A = 55^\circ C$	I_{FRM}	I_{FSM}	$I_R @ V_{RWM}, T_A = 25^\circ C$	$I_R @ V_{RWM}, T_A = 100^\circ C$	$V_f @ I_{F(AV)}, T_A = 25^\circ C$	t_{rr}	Dim "C" (See Table G21)
	Volts	Amps	Amps	Amps	Amps	μA	μA	Volts	ns	Inches
SLF2500	2500	0.5	0.5	10	35	5	100	4	300	1.145
SLF5000	5000	0.5	0.5	10	35	5	100	7.5	300	1.145
SLF10000	10000	0.5	0.5	10	35	5	100	15	300	2.020
SLF15000	15000	0.5	0.5	10	35	5	100	22.5	300	2.770

POWER DISCRETES

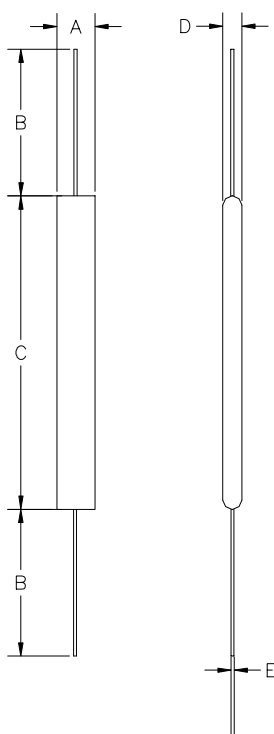
Ordering Information

Part Number	Description
SLF2500 SLF5000 SLF10000 SLF15000	Axial lead ⁽¹⁾

Note:

(1) Available in trays. Please consult factory for quantities.

Outline Drawing



G21

DIMENSIONS					
DIM ^N	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	-	.52	-	13.2	-
B	2.00	-	50.8	-	-
C	SEE TABLE (Page 1)				
D	-	.26	-	6.6	-
E	.048	.054	1.22	1.37	-

6

Contact Information

Semtech Corporation
Power Discretes Products Division
200 Flynn Road, Camarillo, CA 93012
Phone: (805)498-2111 FAX (805)498-3804

Chapter 7

Single Phase Center Tap and Doubler Assemblies

Datasheet No.	Title:
S1KWXCX	Standard Recovery High Power Doubler and Center Tap
S2KWXCXX	Standard Recovery High Power Doubler and Center Tap
KWXCXX	Standard Recovery High Power Doubler and Center Tap
SCXAX	Standard Recovery Doubler and Center Taps
SCXAXF	Fast Recovery Doubler and Center Taps
SCXAXFF	Superfast Recovery Doubler and Center Tap
SCXARX	Standard Recovery Doubler and Center Tap
SCXARXF	Fast Recovery Doubler and Center Tap
SCXARXFF	Superfast Recovery Doubler and Center Tap
SCXASX	Standard Recovery Doubler and Center Tap
SCXASXF	Fast Recovery Doubler and Center Tap
SCXASXFF	Superfast Recovery Doubler and Center Tap
SCPNXX	Standard Recovery High Voltage, Doubler and Center Taps
SDHXXK	Standard Recovery High Voltage, Doubler and Center Taps
SET03XXXX	High Current, 1 Phase Center Taps and Doubler

POWER DISCRETES
Description

Quick reference data

$$V_R = 8\text{kV} - 48\text{kV}$$

$$I_F = 7.5\text{A} - 10.0\text{A (in oil)}$$

$$I_R = 1.0\mu\text{A}$$

$$I_{FSM} = 150\text{A}$$

Features

- ◆ Up to 48kV reverse voltage
- ◆ Air or oil environment
- ◆ High reverse surge current
- ◆ High thermal shock resistance
- ◆ Integral cooling fins

Absolute Maximum Ratings

(Apply per leg)

Device Type	Working Reverse Voltage V_{RWM}	Average Rectifier Current $I_{F(AV)}$				1 Cycle Surge Current $t_p = 8.3\text{mS}$		Repetitive Surge Current	I^2t $t_p = 8.3\text{mS}$
		air @ 25°C	air @ 65°C	forced air 600CFM @ 55°C	in oil @ 25°C	@ 25°C	@ 100°C	@ 25°C	@ 25°C
		Amps	Amps	Amps	Amps				
S1KW8C-1*	8000	4.0	2.75	8.0	10.0	150	100	45.0	90
S1KW16C-2*	16000	3.0	2.0	6.0	7.5				
S1KW24C-3*	24000	3.0	2.0	6.0	7.5				
S1KW32C-4*	32000	3.0	2.0	6.0	7.5				
S1KW40C-5*	40000	3.0	2.0	6.0	7.5				
S1KW48C-6*	48000	3.0	2.0	6.0	7.5				

* add suffix for desired circuit arrangement:

D = Doubler, N = Negative center tap, P = Positive center tap

($I_o \times 0.5$ for doubler)

POWER DISCRETES

Electrical Characteristics

Device Type	Reverse Current @ V_{RWM}		Maximum Forward Voltage V_F @ 3.0A @ 25°C	Maximum Reverse Recovery Time ⁽¹⁾ t_{rr} @ 25°C
	@ 25°C	@ 100°C		
	μA	μA	Volts	μS
S1KW8C-1*	1.0	20.0	8	2.0
S1KW16C-2*			16	
S1KW24C-3*			24	
S1KW32C-4*			32	
S1KW40C-5*			40	
S1KW48C-6*			48	

Note:

(1) Measured on discrete devices prior to assembly.

Operating temperature range: -55°C to +150°C.

Storage temperature range: -55°C to +150°C.

Table 1

Device Type	X-AXIS
S1KW8C-1*	x1
S1KW16C-2*	x2
S1KW24C-3*	x3
S1KW32C-4*	x4
S1KW40C-5*	x5
S1KW48C-6*	x6

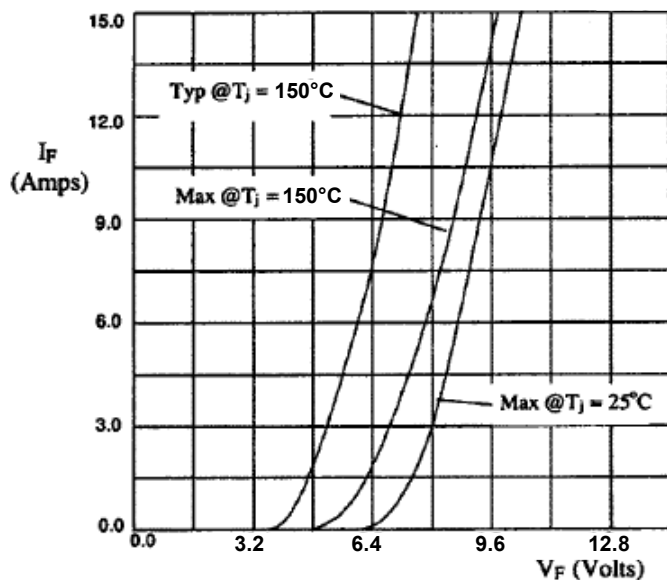
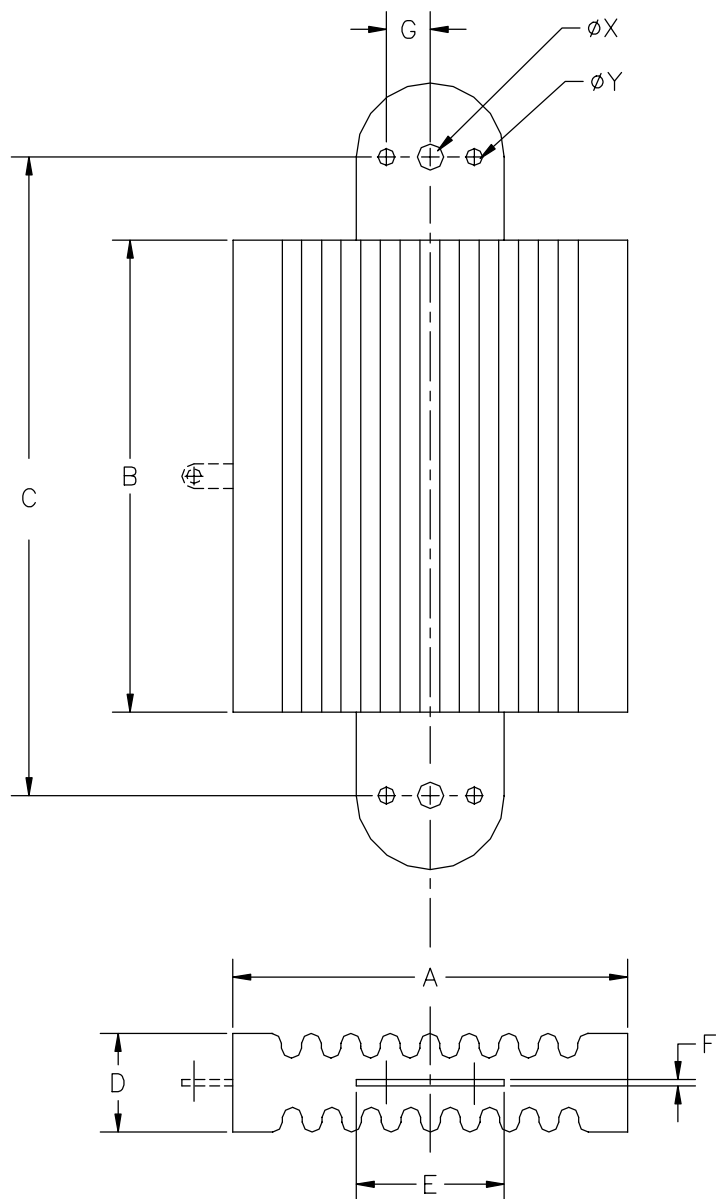


Figure 1. Forward voltage drop per leg as a function of forward current (see Table 1).

POWER DISCRETES

Outline Drawing



G23A

Dimensions					
DIM ^N	Inches		Millimeters		Note
	MIN	MAX	MIN	MAX	
A	-	4.0	-	102	-
B	See Table				-
C	See Table				-
D	-	1.0	-	25.4	-
E	1.45	1.55	36.8	39.4	-
F	.047	.090	1.2	2.3	-
G	.415	.475	10.5	12.1	-
X	.245	.285	6.2	7.2	Dia.
Y	.149	.189	3.8	4.8	Dia.

Dimensions (see drawing)	
B $\pm$ 0.030"	C $\pm$ 0.030"
inches	inches
4.78	6.48
7.98	9.68
11.18	12.88
14.38	16.08
17.58	19.28
20.78	22.48

Contact Information

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HIGH VOLTAGE, HIGH CURRENT, STANDARD RECOVERY DOUBLER AND CENTER TAPS

- Up to 24kV reverse voltage
- Air or oil environment
- High reverse surge current
- High thermal shock resistance
- Integral cooling fins

QUICK REFERENCE DATA

- $V_R = 4kV - 24kV$
- $I_F = 15 - 20A$ (in oil)
- $I_R = 2.0\mu A$
- $I_{FSM} = 250A$

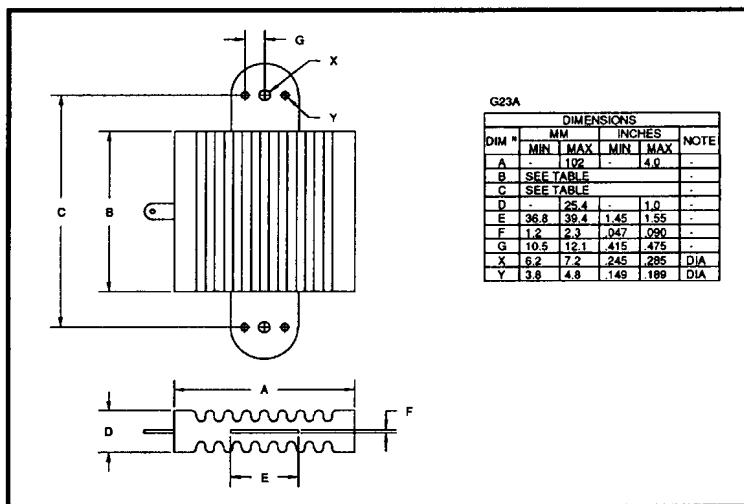
ABSOLUTE MAXIMUM RATINGS (apply per leg)

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current				1 Cycle Surge Current $t_p = 8.3mS$		Repetitive Surge Current	I^2t $t_p = 8.3mS$
		air @ 25 °C	air @ 65 °C	forced air 600CFM @ 55°C	in oil @ 25 °C	@ 25 °C	@ 100 °C	@ 25 °C	@ 25 °C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	A ² S
S2KW4C-1*	4000	8.0	5.5	16	20	↑	↑	↑	↑
S2KW8C-2*	8000	6.0	4.1	12	15	250	150	45.0	240
S2KW12C-3*	12000	6.0	4.1	12	15	↓	↓	↓	↓
S2KW16C-4*	16000	6.0	4.1	12	15				
S2KW20C-5*	20000	6.0	4.1	12	15				
S2KW24C-6*	24000	6.0	4.1	12	15				

* add suffix for desired circuit arrangement

D = doubler, N = Negative center tap, P = positive center tap
($I_O \times 0.5$ for doubler)

MECHANICAL



Dimensions (see drawing)	
B $\pm 0.030"$	C $\pm 0.030"$
inches	inches
4.78	6.48
7.98	9.68
11.18	12.88
14.38	16.08
17.58	19.28
20.78	22.48



CHARACTERISTICS (apply per leg)

Device Type	Reverse Current @ VRWM		Maximum Forward Voltage V_F @ 6.0A @ 25°C	Maximum Reverse Recovery Time ¹ t_{rr} @ 25°C
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	μS
S2KW4C-1*	2.0	40	4.0	2.0
S2KW8C-2*			8.0	
S2KW12C-3*			12	
S2KW16C-4*			16	
S2KW20C-5*			20	
S2KW24C-6*			24	

¹ Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C

Storage temperature range -55 °C to +150 °C

7

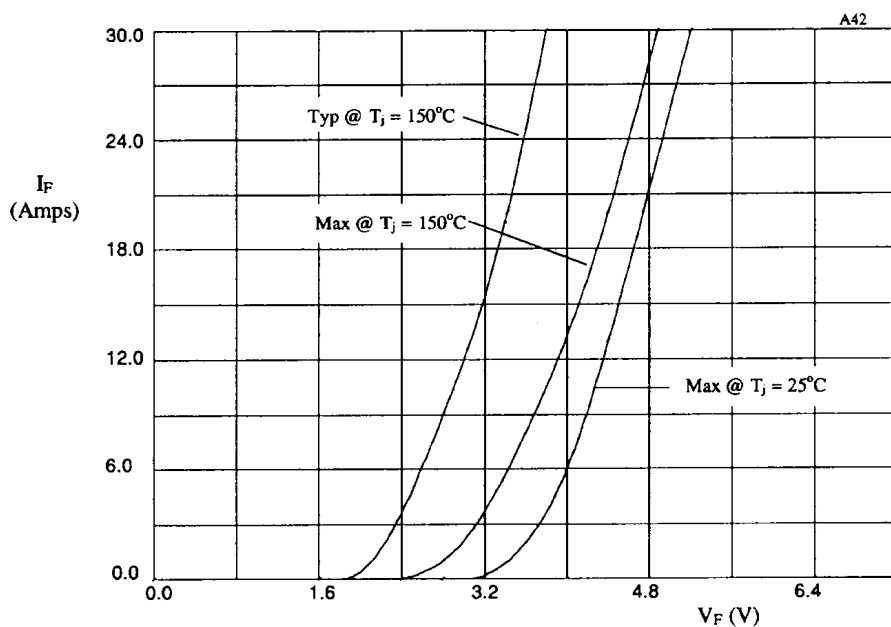


Figure 1. Forward voltage drop per leg as a function of forward current for use with table 1.

TABLE 1

DEVICE	X-axis
S2KW4C-1*	x1
S2KW8C-2*	x2
S2KW12C-3*	x3
S2KW16C-4*	x4
S2KW20C-5*	x5
S2KW24C-6*	x6

**HIGH VOLTAGE, HIGH CURRENT, STANDARD
RECOVERY DOUBLER AND CENTER TAPS**

- Up to 12kV reverse voltage
- Air or oil environment
- Low reverse leakage currents
- High forward current and surge ratings
- Integral cooling fins

**QUICK REFERENCE
DATA**

- $V_R = 2kV - 12kV$
- $I_F = 30 - 40A$ (in oil)
- $I_R = 4.0\mu A$
- $I_{FSM} = 500A$

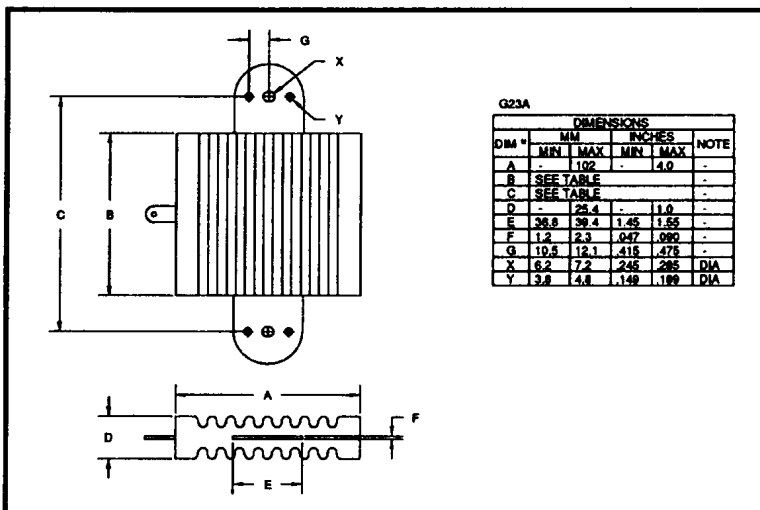
ABSOLUTE MAXIMUM RATINGS (apply per leg)

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current				1 Cycle Surge Current $t_p = 8.3mS$		Repetitive Surge Current	I^2t $t_p = 8.3mS$
		air @ 25 °C	air @ 65 °C	forced air 600CFM @ 55 °C	in oil @ 25 °C	@ 25 °C	@ 100 °C	@ 25 °C	@ 25 °C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	A ² S
S4KW2C-1*	2000	16	11	16	40	↑	↑	↑	↑
S4KW4C-2*	4000	12	8	12	30	↑	↑	↑	↑
S4KW6C-3*	6000	12	8	12	30	500	400	80	975
S4KW8C-4*	8000	12	8	12	30	↓	↓	↓	↓
S4KW10C-5*	10000	12	8	12	30	↓	↓	↓	↓
S4KW12C-6*	12000	12	8	12	30	↓	↓	↓	↓

* add suffix for desired circuit arrangement

D = doubler, N = Negative center tap, P = positive center tap

($I_o \times 0.5$ for doubler)

MECHANICAL

Dimensions (see drawing)	
B $\pm 0.030"$	C $\pm 0.030"$
inches	inches
4.78	6.48
7.98	9.68
11.18	12.88
14.38	16.08
17.58	19.28
20.78	22.48

**CHARACTERISTICS** (apply per leg)

Device Type	Reverse Current @ V_{RWM}		Maximum Forward Voltage V_F @ 12A @ 25°C	Maximum Reverse Recovery Time ¹ t_{rr} @ 25°C
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	μS
S4KW2C-1*	4.0	80	2.00	2.0
S4KW4C-2*			4.00	
S4KW6C-3*			6.00	
S4KW8C-4*			8.00	
S4KW10C-5*			10.0	
S4KW12C-6*			12.0	

¹ Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C

Storage temperature range -55 °C to +150 °C

7

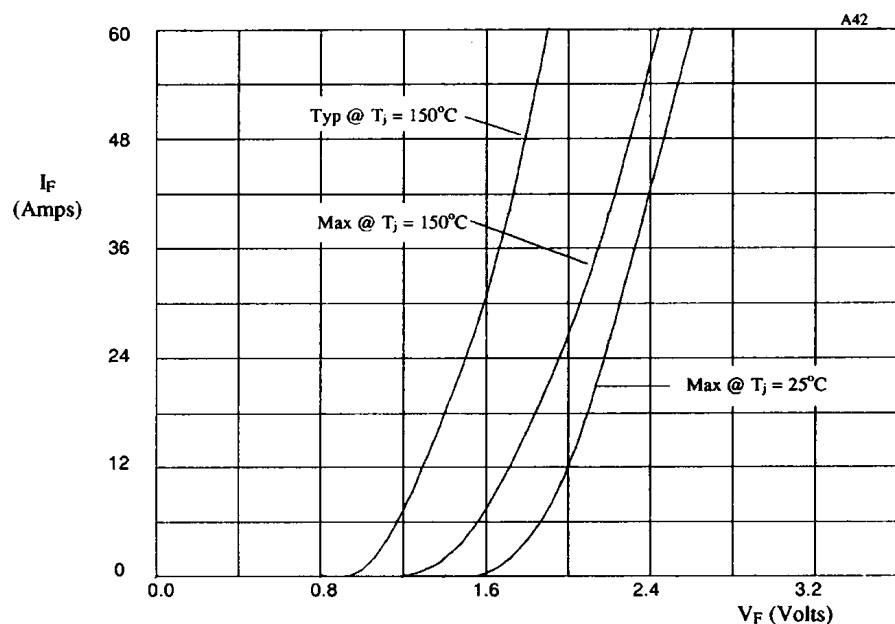


TABLE I

DEVICE	X-axis
S4KW2C-1*	x1
S4KW4C-2*	x2
S4KW6C-3*	x3
S4KW8C-4*	x4
S4KW10C-5*	x5
S4KW12C-6*	x6

Figure 1. Forward voltage drop per leg as a function of forward current for use with table 1.

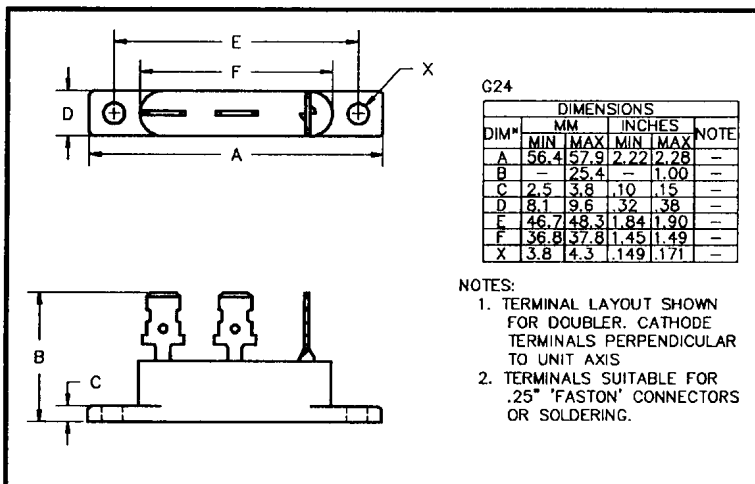
**STANDARD RECOVERY, MEDIUM CURRENT CENTER
TAP AND DOUBLER RECTIFIER ASSEMBLIES****QUICK REFERENCE
DATA**

- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- Universal 3-way terminals

- $V_R = 50V - 600V$
- $I_F = 15A$
- $I_R = 1.0 \mu A$
- $V_F = 1.0V$

ABSOLUTE MAXIMUM RATINGS

Device Type		Working Reverse Voltage V _{RWM}	Average Rectified Current						1 Cycle Surge Current t _p = 8.3mS		Repetitive Surge Current
			(@ case temperature)			(@ ambient temperature)					
			55°C	100°C	125°C	25°C	55°C	100°C	25°C	100°C	
			Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	
SCDA05		50	↑	↑	↑	↑	↑	↑	↑	↑	
SCDA1		100									
SCDA2		200	7.5	5.0	2.5	2.5	2.0	1.25	150	100	
SCDA4		400	↓	↓	↓	↓	↓	↓	↓	↓	
SCDA6		600	↓	↓	↓	↓	↓	↓	↓	↓	
SCNA05 SCPA05		50	↑	↑	↑	↑	↑	↑	↑	↑	
SCNA1 SCPA1		100									
SCNA2 SCPA2		200	15.0	10.0	5.0	5.0	4.0	2.5	150	100	
SCNA4 SCPA4		400	↓	↓	↓	↓	↓	↓	↓	↓	
SCNA6 SCPA6		600	↓	↓	↓	↓	↓	↓	↓	↓	

MECHANICAL

Maximum thermal impedance
 $R_{\theta JC} = 4^{\circ}C/W$

**ELECTRICAL CHARACTERISTICS (ratings apply per leg)**

Device Type	Reverse Current @ V_{RWM}		Maximum Forward Voltage V_F @ 3.0A @ 25°C	Maximum Reverse Recovery Time
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	μS
SCDA05 SCDA1 SCDA2 SCDA4 SCDA6	1.0	20	1.0	2.0
SCNA05 SCNA1 SCNA2 SCNA1 SCNA2 SCNA1 SCNA4 SCNA1 SCNA6 SCNA1	1.0	20	1.0	

¹ Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

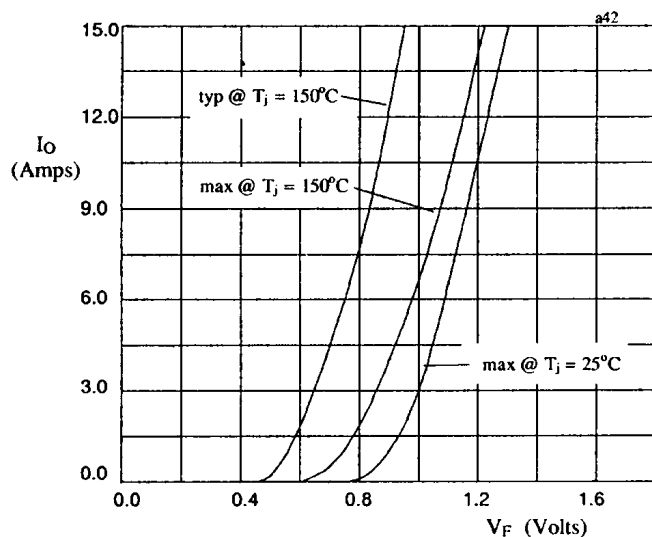


Fig 1. Forward voltage drop against current (per leg)

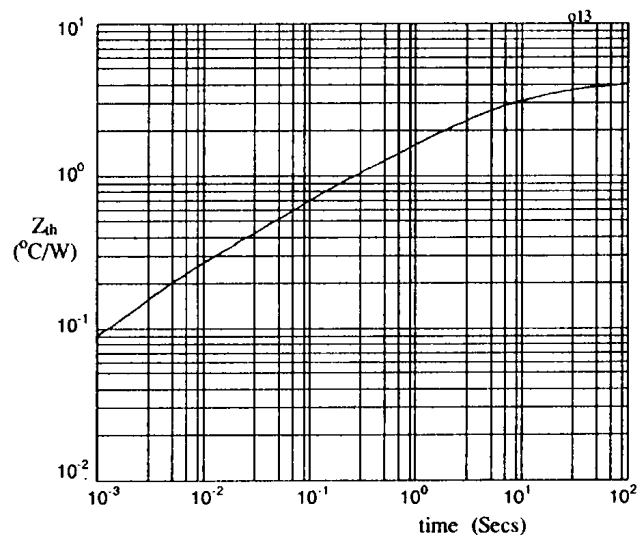


Fig 2. Transient thermal impedance characteristic per leg



FAST RECOVERY, MEDIUM CURRENT CENTER TAP AND DOUBLER RECTIFIER ASSEMBLIES

- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- Fast reverse recovery time

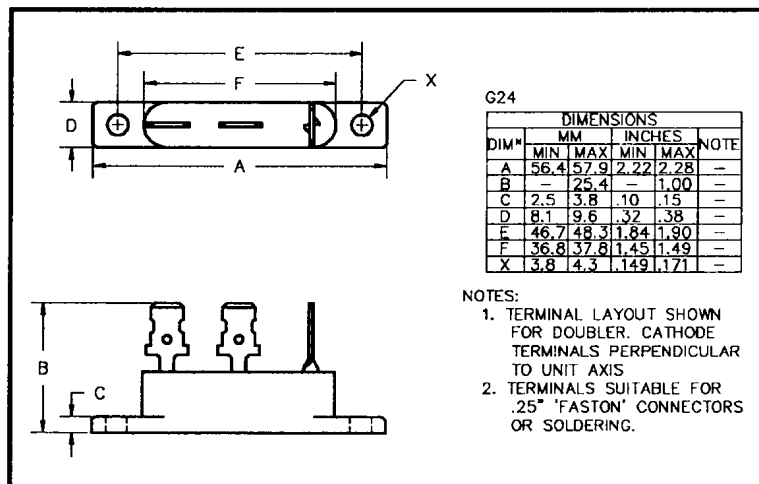
QUICK REFERENCE DATA

- $V_R = 50V - 400V$
- $I_F = 15.0A$
- $I_R = 1.0 \mu A$
- $t_{rr} = 150nS$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current						1 Cycle Surge Current $t_p = 8.3mS$		Repetitive Surge Current
		(@ case temperature)			(@ ambient temperature)			25°C	100°C	
		55°C	100°C	125°C	25°C	55°C	100°C			
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SCDA05F	50	↑	↑	↑	↑	↑	↑	↑	↑	↑
SCDA1F	100	7.5	5.0	2.5	1.50	1.15	0.6	150	100	25
SCDA2F	200	↓	↓	↓	↓	↓	↓	↓	↓	↓
SCDA4F	400	↓	↓	↓	↓	↓	↓	↓	↓	↓
SCNA05F SCPA05F	50	↑	↑	↑	↑	↑	↑	↑	↑	↑
SCNA1F SCPA1F	100	15.0	10.0	5.0	3.00	2.30	1.2	150	100	25
SCNA2F SCPA2F	200	↓	↓	↓	↓	↓	↓	↓	↓	↓
SCNA4F SCPA4F	400	↓	↓	↓	↓	↓	↓	↓	↓	↓

MECHANICAL



Maximum thermal impedance
 $R_{\theta JC} = 4^{\circ}C/W$

**ELECTRICAL CHARACTERISTICS (apply per leg)**

Device Type	Reverse Current @ V_{RWM}		Maximum Forward Voltage V_F @ 3.0A @ 25°C	Maximum Reverse Recovery Time
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	nS
SCDA05F SCDA1F SCDA2F SCDA4F	$\uparrow$ 1.0 $\downarrow$	$\uparrow$ 20 $\downarrow$	$\uparrow$ 1.1 $\downarrow$	$\uparrow$ $\downarrow$ 150
SCNA05F SCPA05F SCNA1F SCPA1F SCNA2F SCPA2F SCNA4F SCPA4F	$\uparrow$ 1.0 $\downarrow$	$\uparrow$ 20 $\downarrow$	$\uparrow$ 1.1 $\downarrow$	$\uparrow$ $\downarrow$

¹ Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C

Storage temperature range -55 °C to +150 °C

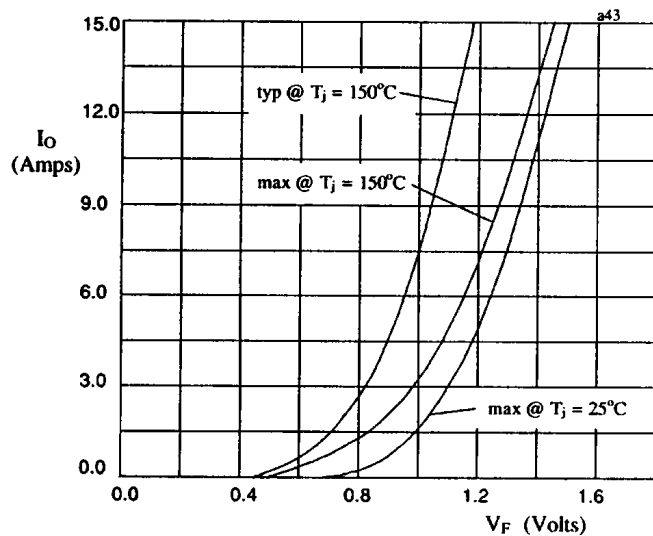


Fig 1. Forward voltage drop against current (per leg)

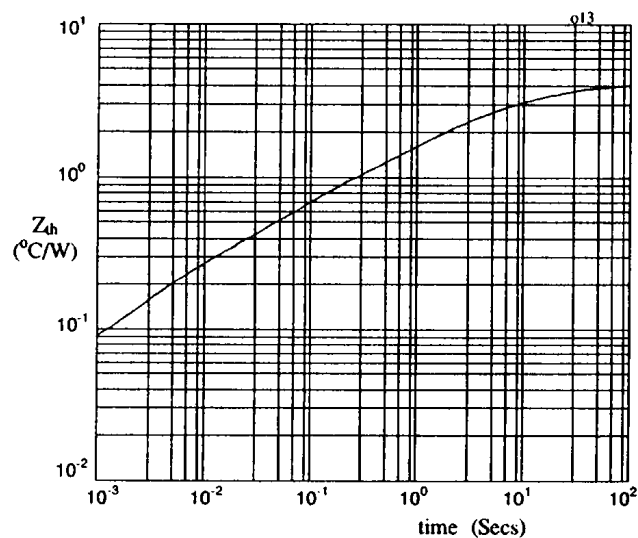


Fig 2. Transient thermal impedance characteristic per leg

**SUPERFAST RECOVERY, MEDIUM CURRENT
CENTER TAP AND DOUBLER RECTIFIER ASSEMBLIES**

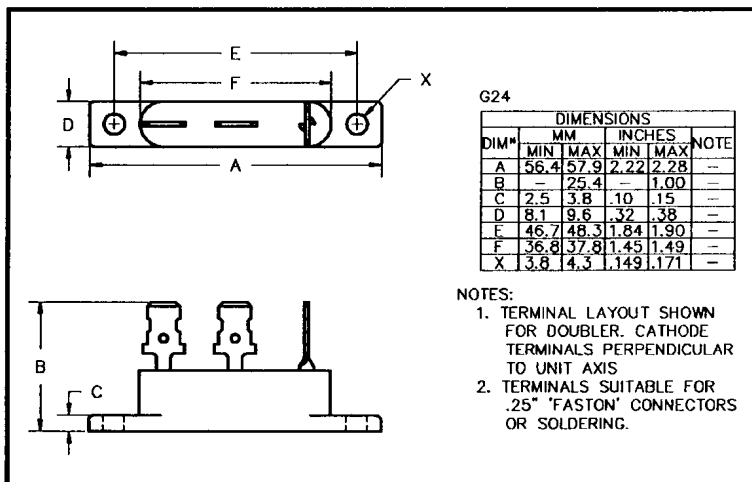
- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- Very low reverse recovery time

**QUICK REFERENCE
DATA**

- $V_R = 50V - 150V$
- $I_F = 15A$
- $I_R = 10\mu A$
- $t_{rr} = 30ns$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V _{RWM}	Average Rectified Current						1 Cycle Surge Current t _p = 8.3mS		Repetitive Surge Current
		(@ case temperature)			(@ ambient temperature)			25°C	100°C	25°C
		55°C	100°C	125°C	25°C	55°C	100°C			
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
SCDA05FF	50	7.5	5.0	2.5	2.25	1.75	1.0	175	120	24
SCDA10FF	100									
SCDA15FF	150									
SCNA05FF	50	15	10	5	4.5	3.5	2.0	175	120	24
SCNA10FF	100									
SCNA15FF	150									
SCPA05FF	50	15	10	5	4.5	3.5	2.0	175	120	24
SCPA10FF	100									
SCPA15FF	150									

MECHANICAL

Maximum thermal impedance
 $R_{\theta JC} = 4^{\circ}C/W$

**ELECTRICAL CHARACTERISTICS** (ratings apply per leg)

Device Type	Reverse Current @ V_{RWM}		Maximum Forward Voltage V_F @ 5.0A @ 25°C	Maximum Reverse Recovery Time
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	nS
SCDA05FF SCDA10FF SCDA15FF	10	500	0.97	30
SCNA05FF SCNA10FF SCNA15FF	10	500	0.97	
SCPA05FF SCPA10FF SCPA15FF	10	500	0.97	

¹ Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

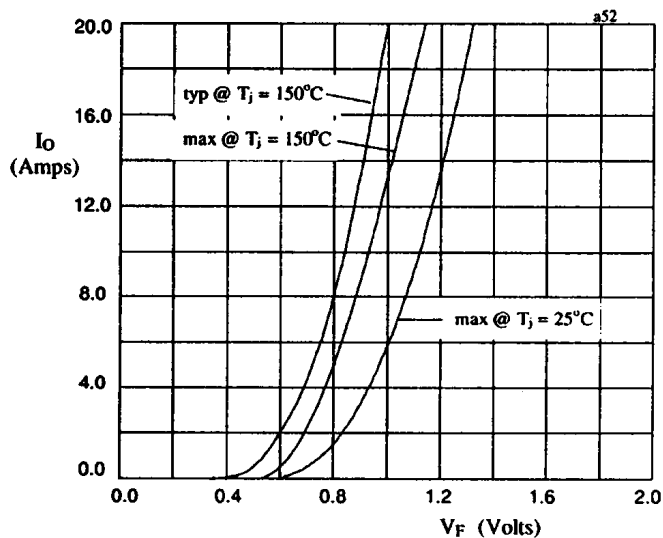


Fig 1. Forward voltage drop against current (per leg)

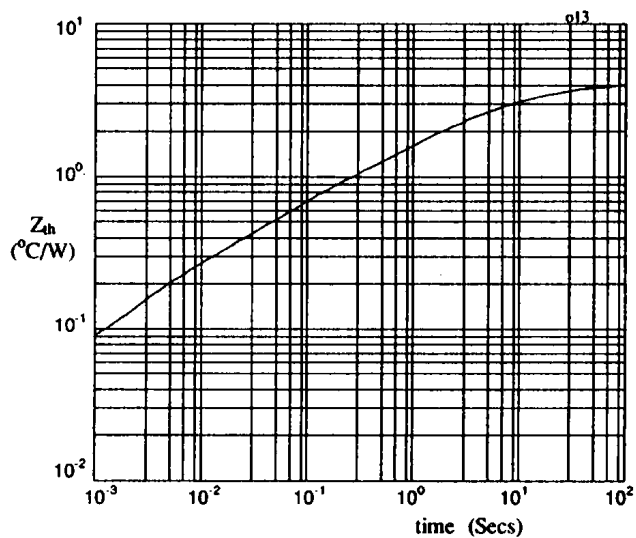


Fig 2. Transient thermal impedance characteristic per leg

**STANDARD RECOVERY, HIGH CURRENT CENTERTAP
AND DOUBLER RECTIFIER ASSEMBLIES**

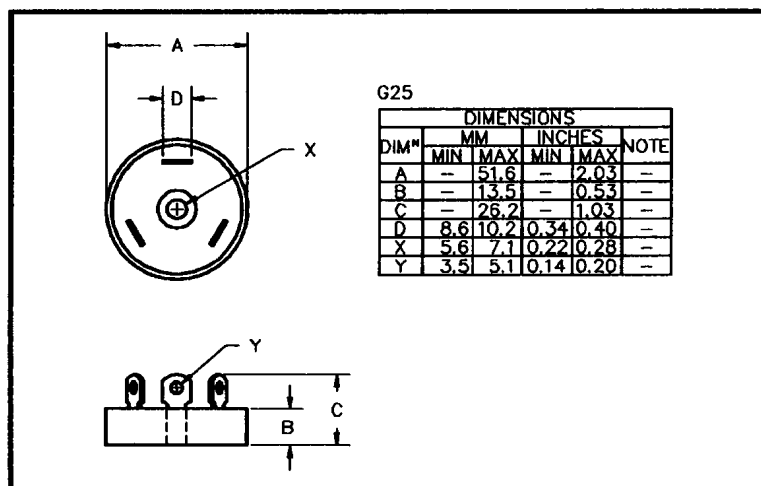
- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- High forward surge rating

**QUICK REFERENCE
DATA**

- $V_R = 50V - 1000V$
- $I_F = 45A$
- $I_R = 3.0\mu A$
- $V_F = 1.0V$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RRM}	Average Rectified Current (@ case temperature)			1 Cycle Surge Current $t_p = 8.3mS$		Repetitive Surge Current @ 25°C
		@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C	
	Volts	Amps	Amps	Amps	Amps	Amps	
SCDAR05	50	↑	↑	↑	↑	↑	↑
SCDAR1	100	↑	↑	↑	↑	↑	↑
SCDAR2	200	↑	↑	↑	↑	↑	↑
SCDAR4	400	22.5	17.5	10.0	375	300	70
SCDAR6	600	↓	↓	↓	↓	↓	↓
SCDAR8	800	↓	↓	↓	↓	↓	↓
SCDAR10	1000	↓	↓	↓	↓	↓	↓
SCNAR05	50	↑	↑	↑	↑	↑	↑
SCNAR1	100	↑	↑	↑	↑	↑	↑
SCNAR2	200	↑	↑	↑	↑	↑	↑
SCNAR4	400	45.0	35.0	20.0	375	300	70
SCNAR6	600	↓	↓	↓	↓	↓	↓
SCNAR8	800	↓	↓	↓	↓	↓	↓
SCNAR10	1000	↓	↓	↓	↓	↓	↓
SCPAR05	50	↑	↑	↑	↑	↑	↑
SCPAR1	100	↑	↑	↑	↑	↑	↑
SCPAR2	200	↑	↑	↑	↑	↑	↑
SCPAR4	400	45.0	35.0	20.0	375	300	70
SCPAR6	600	↓	↓	↓	↓	↓	↓
SCPAR8	800	↓	↓	↓	↓	↓	↓
SCPAR10	1000	↓	↓	↓	↓	↓	↓

MECHANICAL

Maximum thermal impedance
 $R_{\theta JC} = 1.5^{\circ}C/W$

Approximate mass = 75g

**ELECTRICAL CHARACTERISTICS** (ratings apply per leg)

Device Type	Reverse Current @ V_{RWM}		Maximum Forward Voltage V_F @ 9.0A @ 25°C	Maximum Reverse Recovery Time
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	μS
SCDAR05 SCDAR1 SCDAR2 SCDAR4 SCDAR6 SCDAR8 SCDAR10	3.0	60	1.0	2.0
SCNAR05 SCNAR05 SCNAR1 SCNAR1 SCNAR2 SCNAR2 SCNAR4 SCNAR4 SCNAR6 SCNAR6 SCNAR8 SCNAR8 SCNAR10 SCNAR10	3.0	60	1.0	

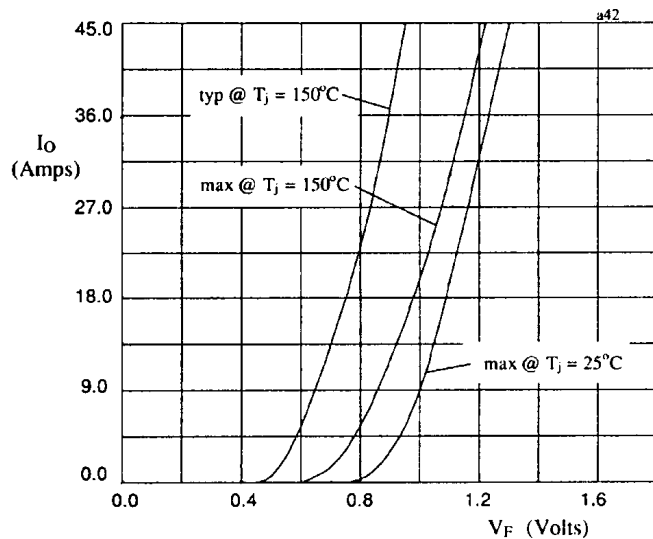
¹ Measured on discrete devices prior to assemblyOperating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

Fig 1. Forward voltage drop against current (per leg)

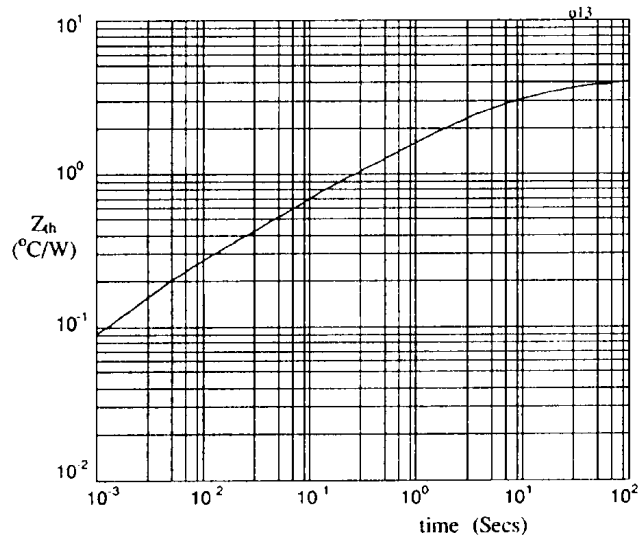


Fig 2. Transient thermal impedance characteristic per leg

**FAST RECOVERY, HIGH CURRENT CENTERTAP AND
DOUBLER RECTIFIER ASSEMBLIES**

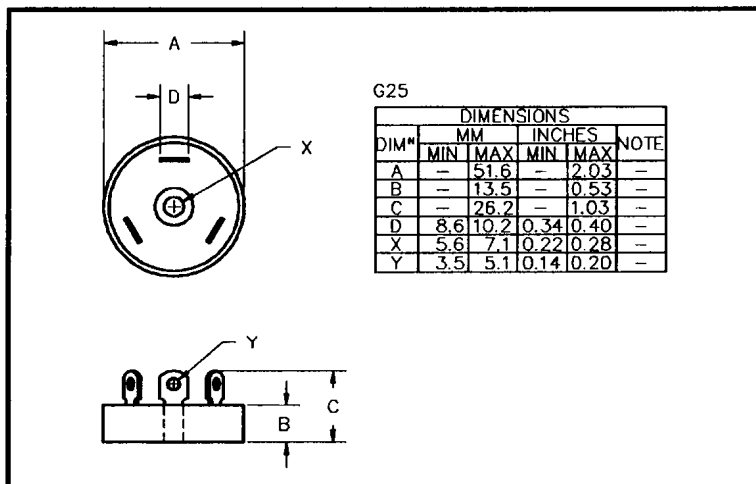
- Low forward voltage drop
- Low reverse leakage current
- Fast reverse recovery time
- Low thermal impedance
- High forward current rating

**QUICK REFERENCE
DATA**

- $V_R = 50V - 400V$
- $I_F = 40.0A$
- $t_{rr} = 150nS$
- $V_F = 1.0V$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current (@ case temperature)			1 Cycle Surge Current $t_p = 8.3mS$		Repetitive Surge Current @ 25°C
		@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C	
	Volts	Amps	Amps	Amps	Amps	Amps	
SCDAR05F	50	↑	↑	↑	↑	↑	↑
SCDAR1F	100	20.0	15.5	9.0	450	300	70.0
SCDAR2F	200	↓	↓	↓	↓	↓	↓
SCDAR4F	400	↓	↓	↓	↓	↓	↓
SCNAR05F SCPAR05F	50	↑	↑	↑	↑	↑	↑
SCNAR1F SCPAR1F	100	40.0	31.0	18.0	450	300	70.0
SCNAR2F SCPAR2F	200	↓	↓	↓	↓	↓	↓
SCNAR4F SCPAR4F	400	↓	↓	↓	↓	↓	↓

MECHANICAL

Maximum thermal impedance
 $R_{\theta JC} = 1.5^{\circ}C/W$

Approximate mass = 75g

**ELECTRICAL CHARACTERISTICS** (ratings apply per leg)

Device Type	Reverse Current @ V_{RWM}		Maximum Forward Voltage V_F @ 9.0A @ 25°C	Maximum Reverse Recovery Time
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	nS
SCDAR05F SCDAR1F SCDAR2F SCDAR4F	$\uparrow$ 3.0 $\downarrow$	$\uparrow$ 60 $\downarrow$	$\uparrow$ 1.1 $\downarrow$	$\uparrow$ $\downarrow$ 150
SCNAR05F SCPAR05F SCNAR1F SCPAR1F SCNAR2F SCPAR2F SCNAR4F SCPAR4F	$\uparrow$ 3.0 $\downarrow$	$\uparrow$ 60 $\downarrow$	$\uparrow$ 1.1 $\downarrow$	$\uparrow$ $\downarrow$

¹ Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

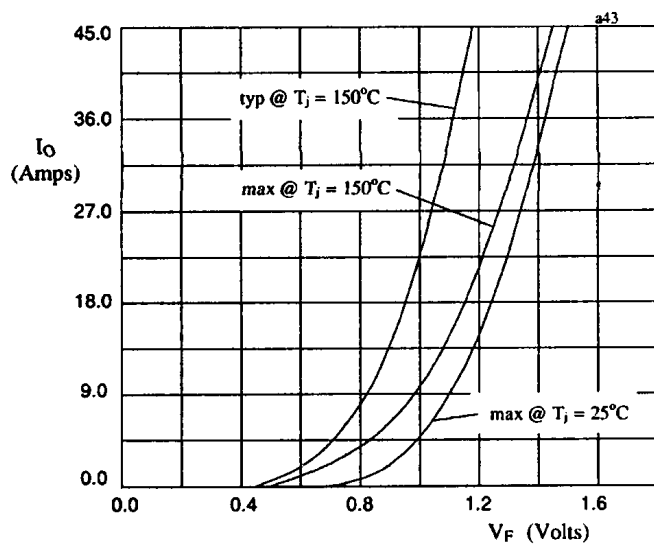


Fig 1. Forward voltage drop against current (per leg)

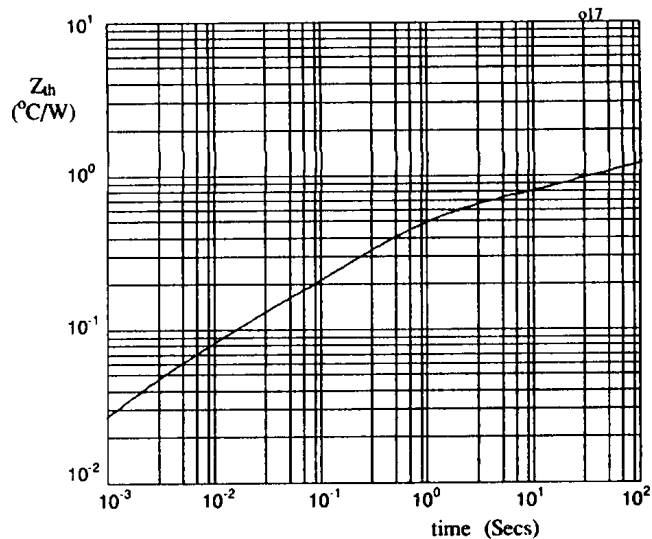


Fig 2. Transient thermal impedance characteristic per leg

**SUPERFAST RECOVERY, HIGH CURRENT CENTER TAP
AND DOUBLER RECTIFIER ASSEMBLIES**

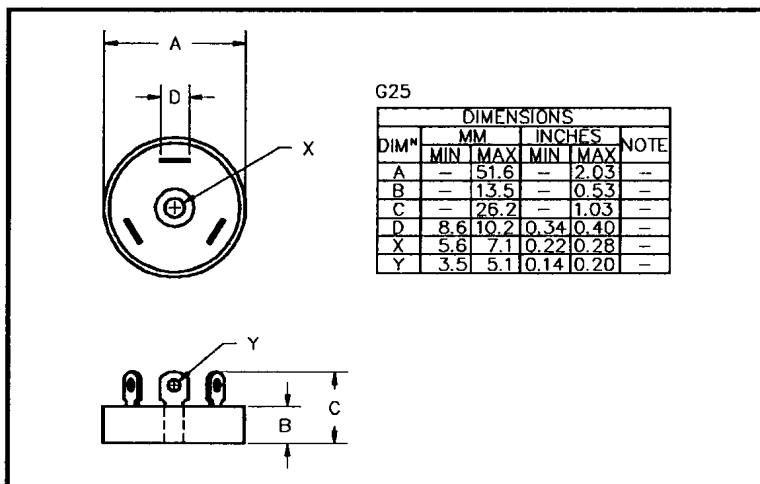
- Low forward voltage drop
- Low reverse leakage current
- Very fast reverse recovery time
- Low thermal impedance
- High forward and surge currents

**QUICK REFERENCE
DATA**

- $V_R = 50V - 150V$
- $I_F = 45A$
- $t_{rr} = 30nS$
- $V_F = 0.97V$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current (@ case temperature)			1 Cycle Surge Current $t_p = 8.3mS$		Repetitive Surge Current
		@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C	
	Volts	Amps	Amps	Amps	Amps	Amps	Amps
SCDAR05FF SCDAR10FF SCDAR15FF	50 100 150	22.5	17.5	10	450	375	70
SCNAR05FF SCNAR10FF SCNAR15FF	50 100 150	45	35	20	450	375	70
SCPAR05FF SCPAR10FF SCPAR15FF	50 100 150	45	35	20	450	375	70

MECHANICAL

Maximum thermal impedance
 $R_{\theta JC} = 1.5^{\circ}C/W$

Approximate mass = 75g

**ELECTRICAL CHARACTERISTICS** (ratings apply per leg)

Device Type	Reverse Current @ V_{RWM}		Maximum Forward Voltage V_F @ 15.0A @ 25°C	Maximum Reverse Recovery Time ¹
	@ 25 °C	@ 100 °C		
	μA	mA	Volts	nS
SCDAR05FF SCDAR10FF SCDAR15FF	30	1.5	0.97	30
SCNAR05FF SCNAR10FF SCNAR15FF	30	1.5	0.97	
SCPAR05FF SCPAR10FF SCPAR15FF	30	1.5	0.97	

¹ Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

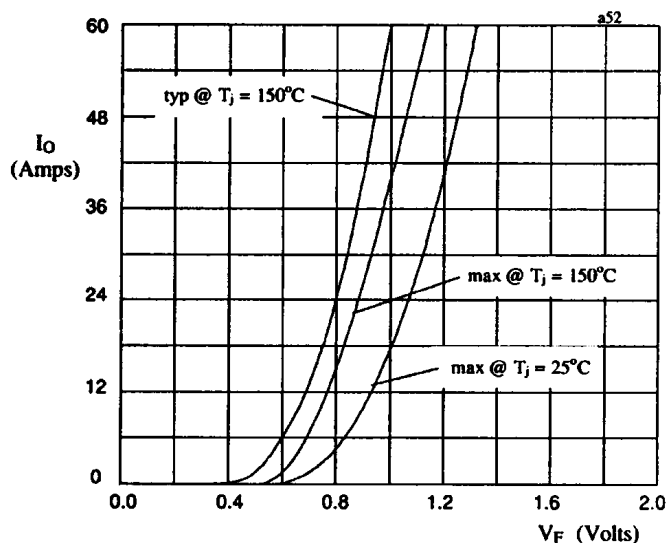


Fig 1. Forward voltage drop against current (per leg)

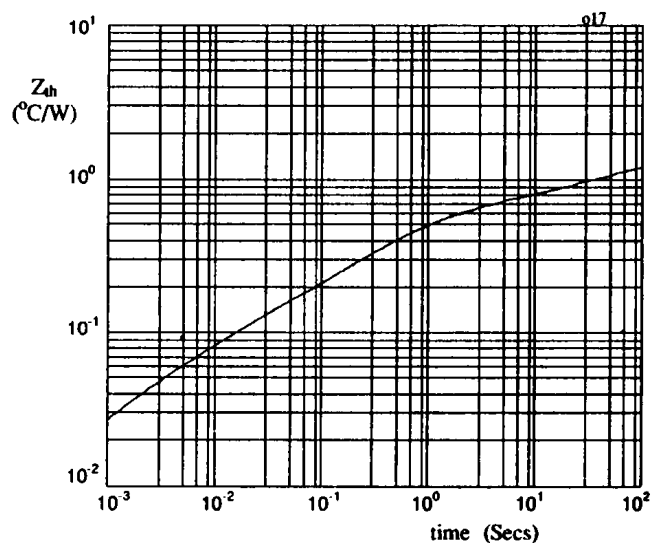


Fig 2. Transient thermal impedance characteristic per leg

**STANDARD RECOVERY, HIGH CURRENT CENTER TAP
AND DOUBLER RECTIFIER ASSEMBLIES**

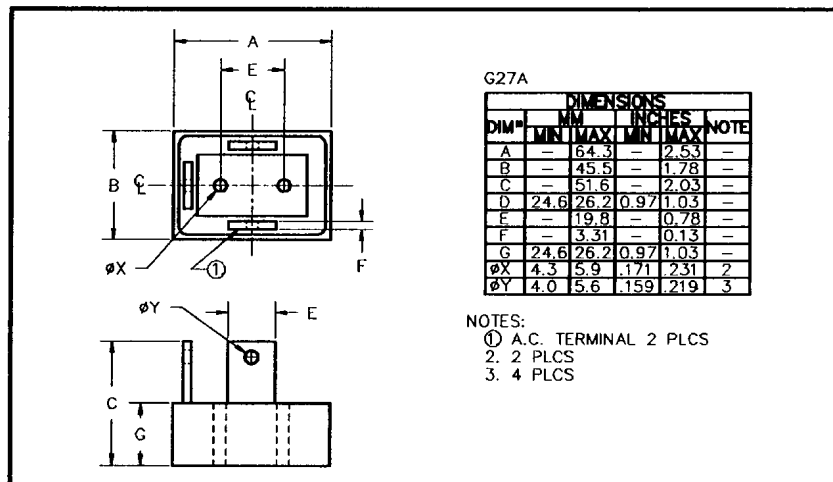
- Low forward voltage drop
- Low reverse leakage current
- Aluminum case
- Low thermal impedance
- High forward current rating

**QUICK REFERENCE
DATA**

- $V_R = 50V - 600V$
- $I_F = 85A$
- $I_R = 6.0\mu A$
- $V_F = 1.0V$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current (@ case temperature)			1 Cycle Surge Current $t_p = 8.3ms$		Repetitive Surge Current
		@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C	
	Volts	Amps	Amps	Amps	Amps	Amps	
SCDAS05	50	↑	↑	↑	↑	↑	↑
SCDAS1	100						
SCDAS2	200	42.5	35	22.5	900	600	120
SCDAS4	400	↓	↓	↓	↓	↓	↓
SCDAS6	600						
SCNAS05 SCPAS05	50	↑	↑	↑	↑	↑	↑
SCNAS1 SCPAS1	100						
SCNAS2 SCPAS2	200	85.0	70	45.0	900	600	120
SCNAS4 SCPAS4	400	↓	↓	↓	↓	↓	↓
SCNAS6 SCPAS6	600						

MECHANICAL

Maximum thermal impedance
 $R_{\theta JC} = 0.80^{\circ}C/W$

Approximate mass = 245g

**ELECTRICAL CHARACTERISTICS** (ratings apply per leg)

Device Type	Reverse Current @ V_{RWM}		Maximum Forward Voltage V_F @ 18.0A @ 25°C	Maximum Reverse Recovery Time
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	μS
SCDAS05 SCDAS1 SCDAS2 SCDAS4 SCDAS6	6.0	120	1.0	2.0
SCNAS05 SCPAS05 SCNAS1 SCPAS1 SCNAS2 SCPAS2 SCNAS4 SCPAS4 SCNAS6 SCPAS6	6.0	120	1.0	

¹ Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C

Storage temperature range -55 °C to +150 °C

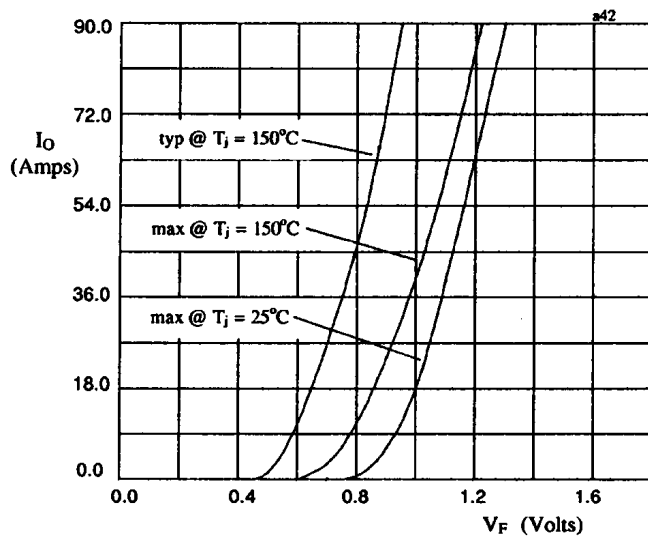


Fig 1. Forward voltage drop against output current (per leg)

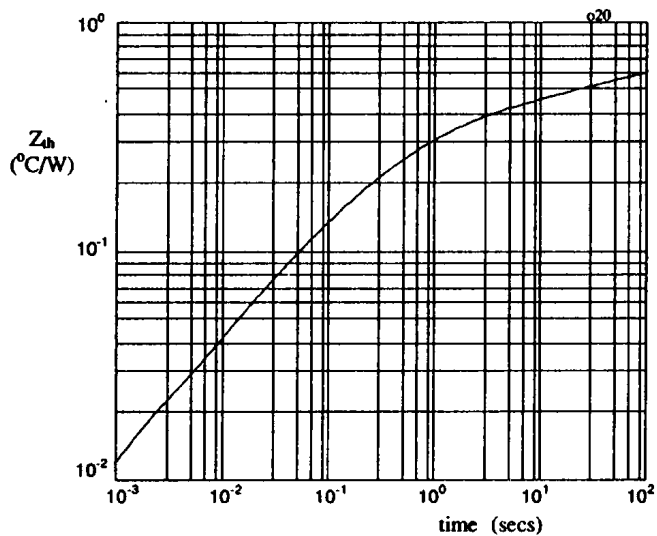


Fig 2. Transient thermal impedance characteristic per leg

**FAST RECOVERY, HIGH CURRENT CENTER TAP AND
DOUBLER RECTIFIER ASSEMBLIES**

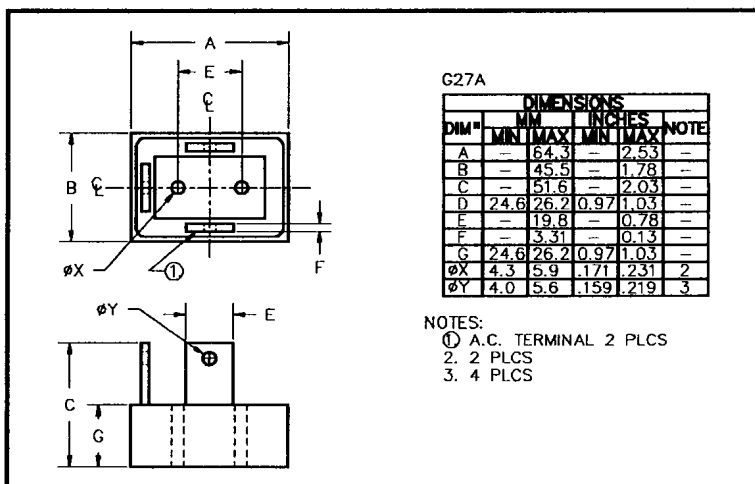
- Low forward voltage drop
- Low reverse leakage current
- Fast reverse recovery time
- Low thermal impedance
- High forward current rating

**QUICK REFERENCE
DATA**

- $V_R = 50V - 400V$
- $I_F = 80.0A$
- $t_{rr} = 150nS$
- $V_F = 1.0V$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current (@ case temperature)			1 Cycle Surge Current $t_p = 8.3mS$		Repetitive Surge Current
		@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C	@ 25°C
	Volts	Amps	Amps	Amps	Amps	Amps	Amps
SCDAS05F	50	↑	↑	↑	↑	↑	↑
SCDAS1F	100	40.0	32.5	21.0	900	600	120
SCDAS2F	200	↓	↓	↓	↓	↓	↓
SCDAS4F	400	↓	↓	↓	↓	↓	↓
SCNAS05F SCPAS05F	50	↑	↑	↑	↑	↑	↑
SCNAS1F SCPAS1F	100	80.0	65.0	42.0	900	600	120
SCNAS2F SCPAS2F	200	↓	↓	↓	↓	↓	↓
SCNAS4F SCPAS4F	400	↓	↓	↓	↓	↓	↓

MECHANICAL

Maximum thermal impedance
 $R_{\theta JC} = 0.80^{\circ}C/W$

Approximate mass = 245g



ELECTRICAL CHARACTERISTICS (ratings apply per leg)

Device Type	Reverse Current @ V_{RWM}		Maximum Forward Voltage V_F @ 18.0A @ 25°C	Maximum Reverse Recovery Time
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	nS
SCDAS05F SCDAS1F SCDAS2F SCDAS4F	↑ 6.0 ↓	↑ 120 ↓	↑ 1.1 ↓	↑ 150 ↓
SCNAS05F SCPAS05F SCNAS1F SCPAS1F SCNAS2F SCPAS2F SCNAS4F SCPAS4F	↑ 6.0 ↓	↑ 120 ↓	↑ 1.1 ↓	↑ 150 ↓

¹ Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

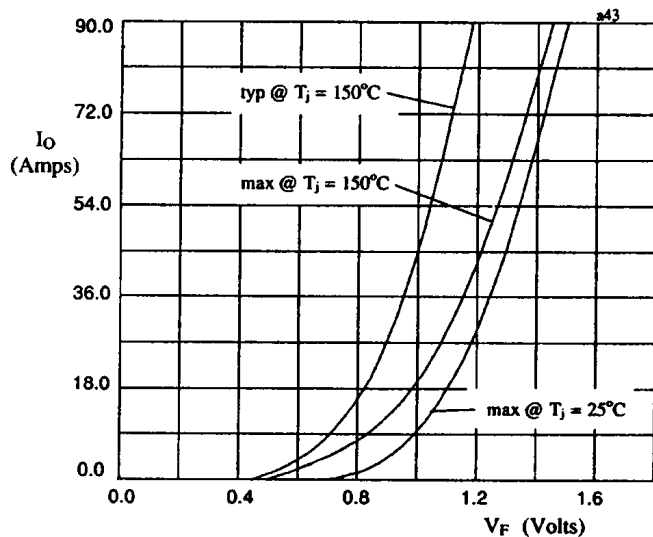


Fig 1. Forward voltage drop against current (per leg)

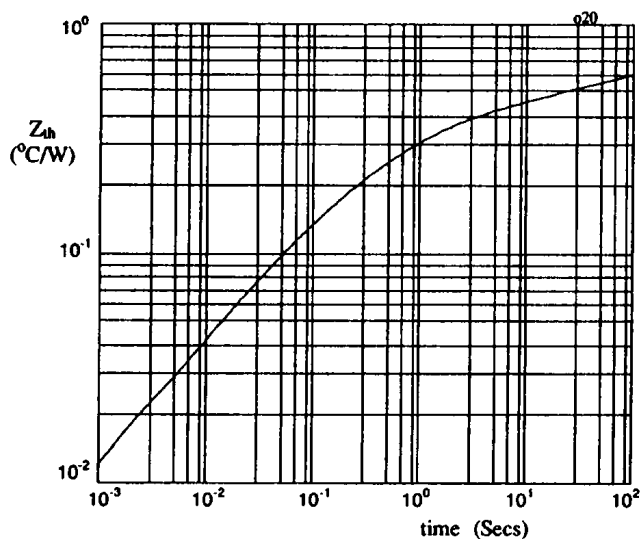


Fig 2. Transient thermal impedance characteristic per leg

**SUPERFAST RECOVERY, HIGH CURRENT CENTERTAP
AND DOUBLER RECTIFIER ASSEMBLIES**

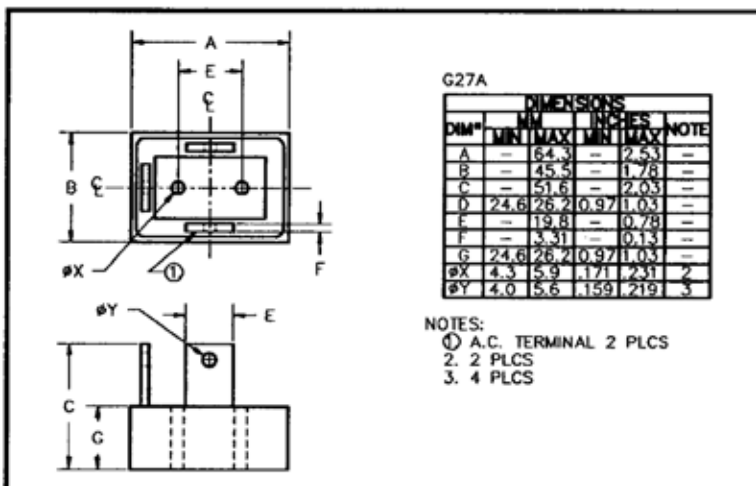
- Low forward voltage drop
- Low reverse leakage current
- Very fast reverse recovery time
- Low thermal impedance
- High forward and surge currents

**QUICK REFERENCE
DATA**

- $V_R = 50V - 150V$
- $I_F = 85A$
- $t_{rr} = 30ns$
- $V_F = 0.97V$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current (@ case temperature)			1 Cycle Surge Current $t_p = 8.3ms$		Repetitive Surge Current @ 25°C
		@ 25°C	@ 55°C	@ 100°C	@ 25°C	@ 100°C	
	Volts	Amps	Amps	Amps	Amps	Amps	
SCDAS05FF SCDAS10FF SCDAS15FF	50 100 150	42.5	35	22.5	900	700	135
SCNAS05FF SCNAS10FF SCNAS15FF	50 100 150	85	70	45	900	700	135
SCPAS05FF SCPAS10FF SCPAS15FF	50 100 150	85	70	45	900	700	135

MECHANICAL

Maximum thermal impedance
 $R_{\theta JC} = 0.80^{\circ}C/W$

Approximate mass = 245g

**ELECTRICAL CHARACTERISTICS** (ratings apply per leg)

Device Type	Reverse Current @ V_{RWM}		Maximum Forward Voltage V_F @ 30A @ 25°C	Maximum Reverse Recovery Time
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	nS
SCDAS05FF SCDAS10FF SCDAS15FF	3.0	60	0.97	30
SCNAS05FF SCNAS10FF SCNAS15FF	3.0	60	0.97	
SCPAS05FF SCPAS10FF SCPAS15FF	3.0	60	0.97	

¹ Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

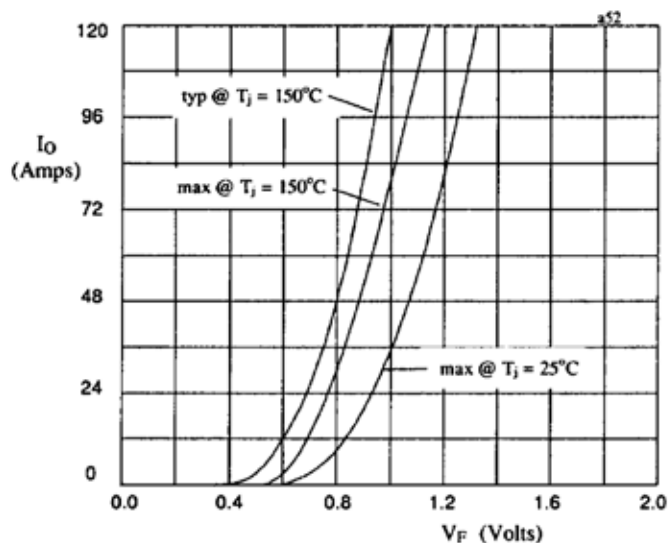


Fig 1. Forward voltage drop against current (per leg)

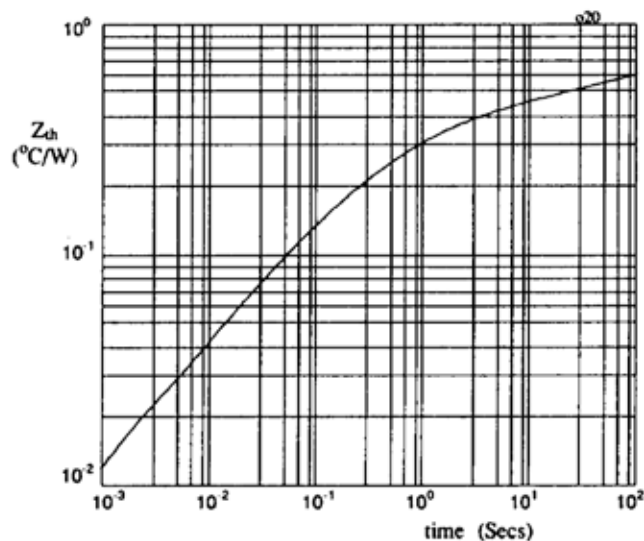


Fig 2. Transient thermal impedance characteristic per leg

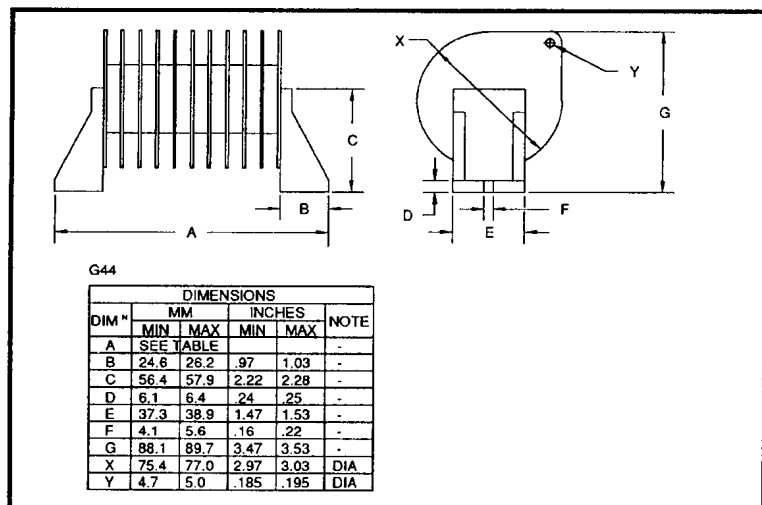
**HIGH VOLTAGE, HIGH CURRENT, STANDARD
RECOVERY DOUBLER AND CENTER TAPS****QUICK REFERENCE
DATA**

- Up to 11A forward current and 15kV reverse voltage
- Air or oil enviroment
- High reverse surge current
- High thermal shock resistance
- Integral cooling fins

- $V_R = 5kV - 15kV$
- $I_F = 11.0A$
- $I_R = 1.0 \mu A$
- $I_{FSM} = 150A$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current			1 Cycle Surge Current $t_p = 8.3mS$		Repetitive Surge Current	I^2t $t_p = 8.3mS$	Body length
		air 55°C	air 100°C	oil 55°C	@ 25 °C	@ 100 °C	@ 25 °C	@ 25 °C	dim A
	Volts	Amps	Amps	Amps	Amps	Amps	Amps	A ² S	inches
SCPND5	5000	5.5	3.0	11	150	80	25	93.4	5.53
SCPND10	10000								8.83
SCPND15	15000								12.13
SCPNN5	5000	11.0	6.0	22	150	80	25	93.4	5.53
SCPNN10	10000								8.83
SCPNN15	15000								12.13
SCPNP5	5000	11.0	6.0	22	150	80	25	93.4	5.53
SCPNP10	10000								8.83
SCPNP15	15000								12.13

MECHANICAL



CHARACTERISTICS (apply per leg)

Device Type	Reverse Current @ V_{RWM}		Maximum Forward Voltage V_F @ 3.0A. @ 25°C	Maximum Reverse Recovery Time ¹ t_{rr} @ 25°C
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	nS
SCPND5 SCPND10 SCPND15	1.0	20	5.0 10.0 15.0	2000
SCPNN5 SCPNN10 SCPNN15	1.0	20	5.0 10.0 15.0	2000
SCPNP5 SCPNP10 SCPNP15	1.0	20	5.0 10.0 15.0	2000

¹ Measured on discrete devices prior to assembly

Operating temperature range -55 °C to +150 °C
Storage temperature range -55 °C to +150 °C

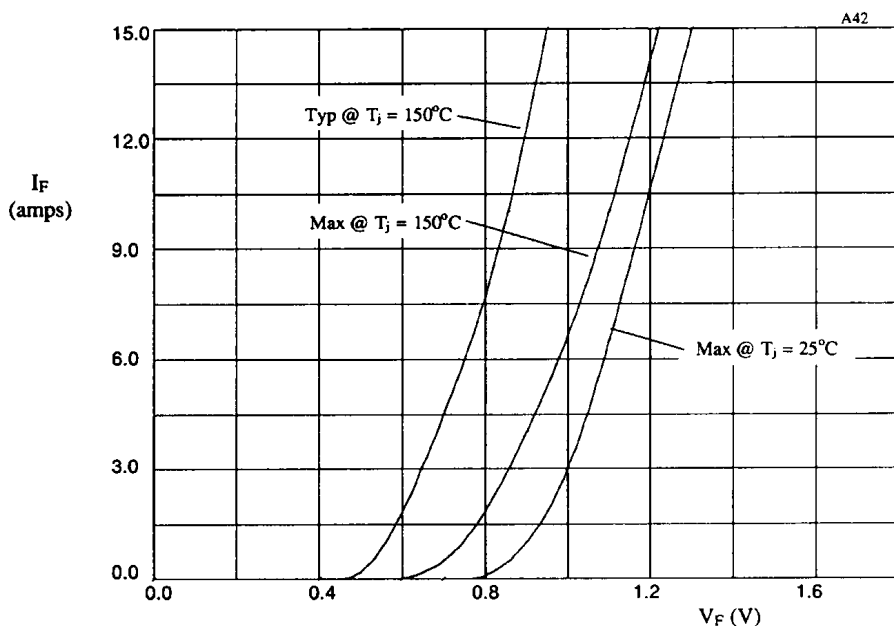


Figure 1. Maximum and typical forward voltage drops as a function of forward current ($T_j = 25^\circ\text{C}$ & 150°C) for use with table 1.

TABLE 1

DEVICE	X-axis
SCPND*5	x1
SCPND*10	x2
SCPND*15	x3

**HIGH DENSITY, HIGH VOLTAGE, STANDARD
RECOVERY DOUBLER AND CENTER TAPS**

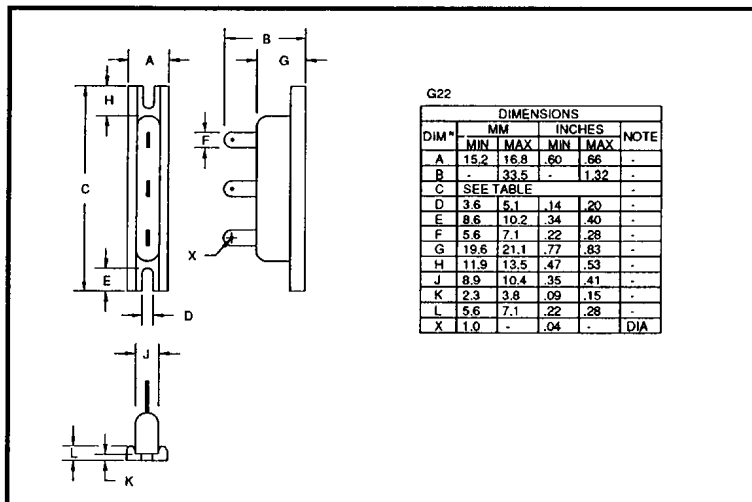
- Low reverse leakage currents
- Corona free design
- Easy aluminum base mount
- Low forward voltage drop
- Up to 15kV reverse voltage

**QUICK REFERENCE
DATA**

- $V_R = 7.5\text{kV} \text{ \& } 15\text{kV}$
- $I_F = 800\text{mA}$
- $t_{rr} = 2.0\mu\text{s}$
- $I_R = 1.0\mu\text{A}$

ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage V_{RWM}	Average Rectified Current		1 Cycle Surge Current $t_p = 8.3\text{ms}$ @ 25°C	Operating and storage temp. ranges. $T_{OP} \text{ \& } T_{STG}$	Case Length
		air 25°C	oil 55°C			dim C
	Volts	Amps	Amps	Amps	°C	inches
SDHD7.5K SDHD15K	7500	0.4	0.4	16	-55 to + 150	4.72
	15000	0.4	0.4	16		6.09
SDHN7.5K SDHN15K	7500	0.8	0.8	8	-55 to + 150	4.72
	15000	0.8	0.8	8		6.09
SDHP7.5K SDHP15K	7500	0.8	0.8	8	-55 to + 150	4.72
	15000	0.8	0.8	8		6.09

MECHANICAL

**CHARACTERISTICS** (ratings apply per leg)

Device Type	Reverse Current @ V_{RWM}		Maximum Forward Voltage V_F @ 0.2A @ 25°C	Maximum Reverse Recovery Time ¹ @ 25°C
	@ 25 °C	@ 100 °C		
	μA	μA	Volts	μS
SDHD7.5K	1.0	20	10.0	2.0
SDHD15K	1.0	20	20.0	
SDHN7.5K	1.0	20	10.0	
SDHN15K	1.0	20	20.0	
SDHP7.5K	1.0	20	10.0	
SDHP15K	1.0	20	20.0	

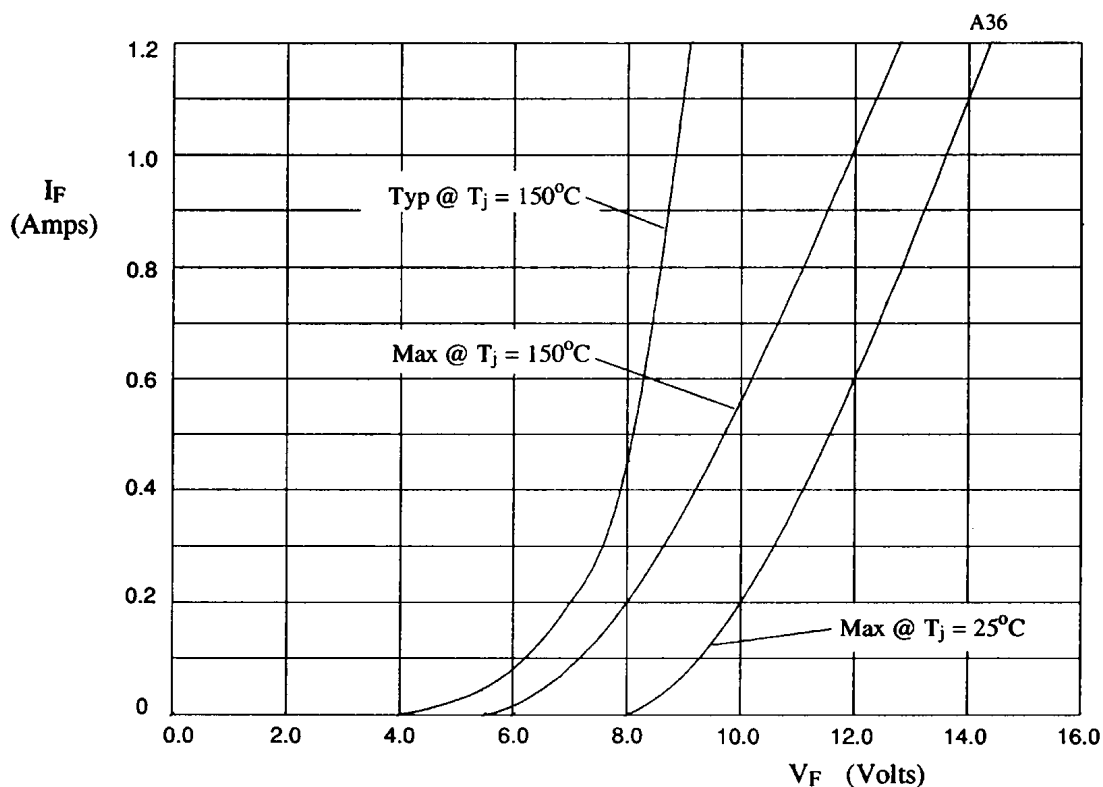
¹ Measured on discrete devices prior to assembly

Figure 1. Maximum and typical forward voltage drop per leg as a function of forward current ($T_j = 25^\circ\text{C}$ & 150°C) for SDH*7.5K.
For SDH*15K multiply X-axis by 2.



HIGH CURRENT, HIGH DENSITY, ISOLATED, SILICON POWER RECTIFIER STUD

- Low thermal impedance
- Small size and low weight
- High current applications
- Isolated for direct heatsink mounting
- High surge ratings

QUICK REFERENCE DATA

- $V_R = 150V - 1000V$
- $I_F = 15A$
- $t_{rr} = 30nS - 2\mu S$
- $I_{FSM} \geq 150A$

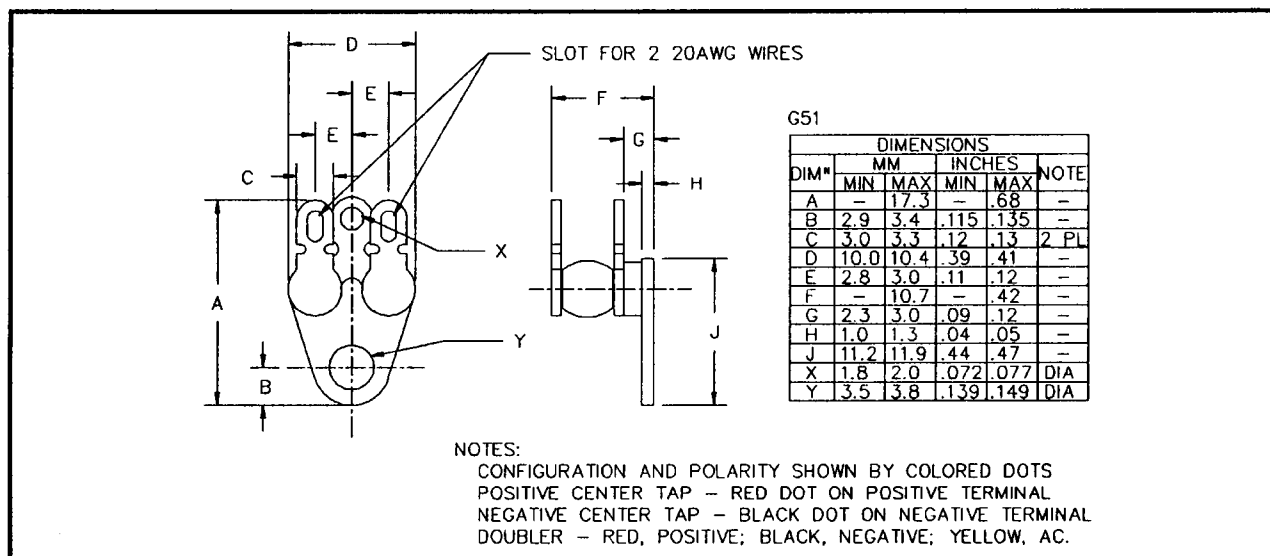
ABSOLUTE MAXIMUM RATINGS

Device Type	Working Reverse Voltage	Average Rectified Current $I_{F(AV)} @ T_{MB}$ see note 1			1 Cycle Surge $I_{FSM} @ t_p = 8.3mS$		Operating & Storage Temperature Range	
		@ 55°C	100°C	125°C	@ 25 °C	@ 100°C	(T _{OP})	(T _{STG})
	Volts	Amps	Amps	Amps	Amps	Amps	°C	
SET03**03	1000	30	22	16	150	100	-55 to +175	
SET03**19	1000	20	16	12	150	80	-55 to +175	
SET03**12	600	30	22	16	150	100	-55 to +175	
SET03**04	400	30	22	16	150	80	-55 to +175	
SET03**11	150	30	20	14	175	175	-55 to +150	

1/ Average Rectified Current = $0.5 \times I_{F(AV)}$ for Doubler

$R_{\theta JMB} = 1.5^\circ C/W$ for all varieties, see next page for circuit configurations.

MECHANICAL





ELECTRICAL CHARACTERISTICS (Apply per leg)

Device Type	Maximum Leakage Current @ V_{RWM}		Maximum Forward Voltage @ 9.0 A	Maximum Reverse Recovery Time
	$T_j = 25\text{ }^{\circ}\text{C}$	$T_j = 100\text{ }^{\circ}\text{C}$		
	μA	μA		
SET03**03	1.0	20	1.2	2000
SET03**19	1.0	25	2.2	150
SET03**12	1.0	20	1.2	2000
SET03**04	1.0	20	1.5	150
SET03**11	10.0	500	1.1	30

7

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CIRCUIT CONFIGURATIONS

- ** = 06 Positive Center Tap
- ** = 08 Negative Center Tap
- ** = 10 Doubler

eg. SET030603 = Positive Center Tap
1000V, 2000nS

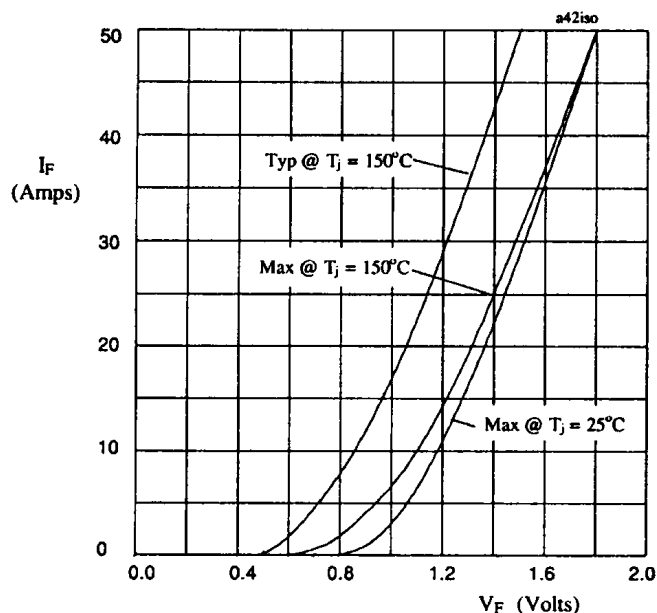


Figure 1. Forward voltage drop as a function of forward current for SET03**03 & SET03**12.

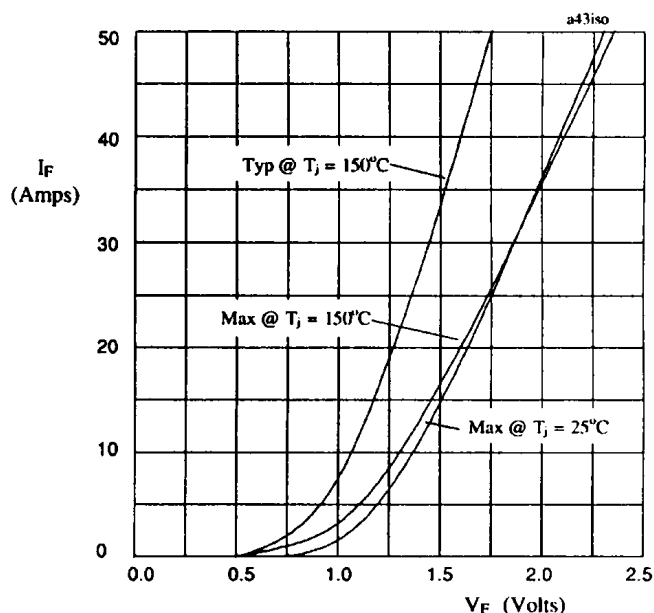


Figure 2. Forward voltage drop as a function of forward current for SET03**04.

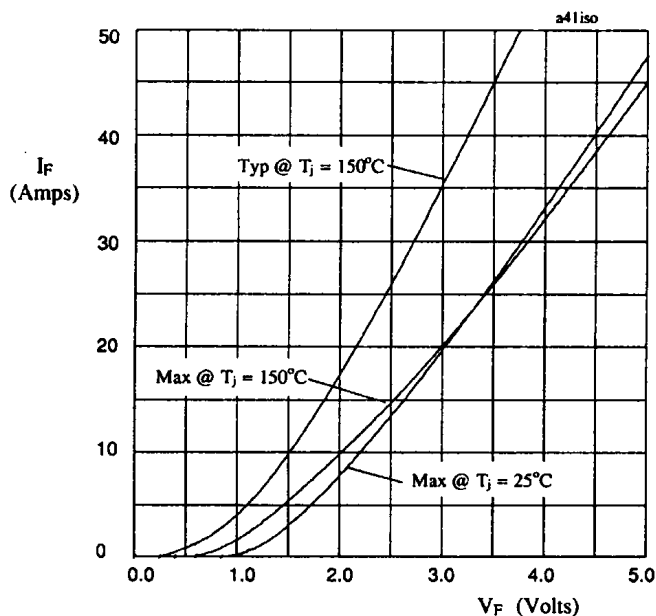


Figure 3. Forward voltage drop as a function of forward current for SET03**19.

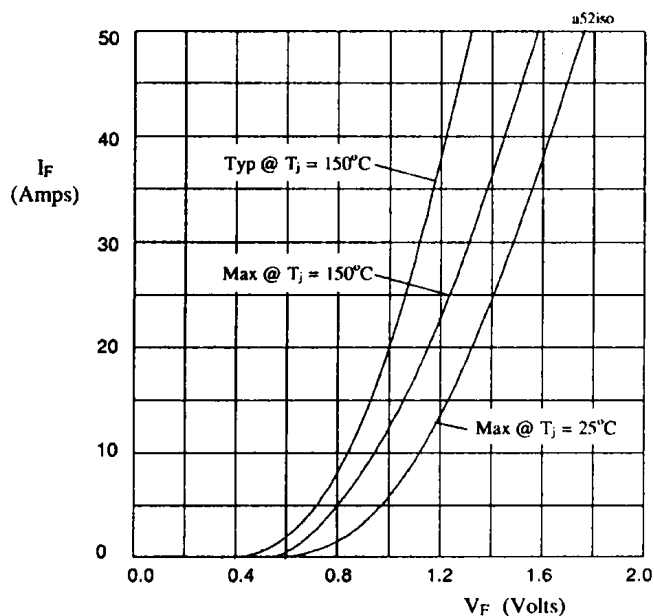


Figure 4. Forward voltage drop as a function of forward current for SET03**11.

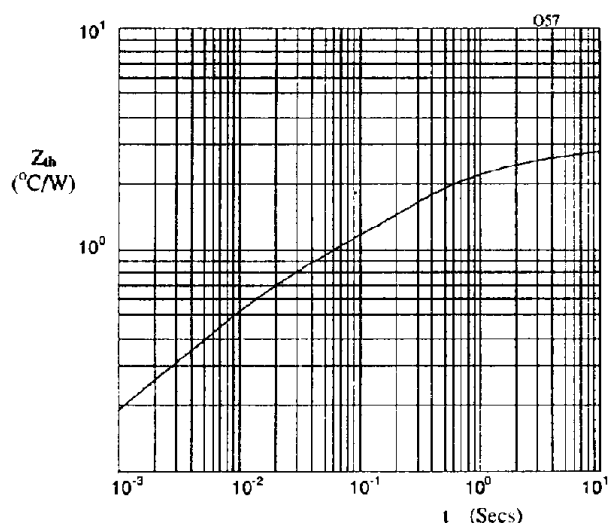


Figure 5. Typical transient thermal impedance characteristic.

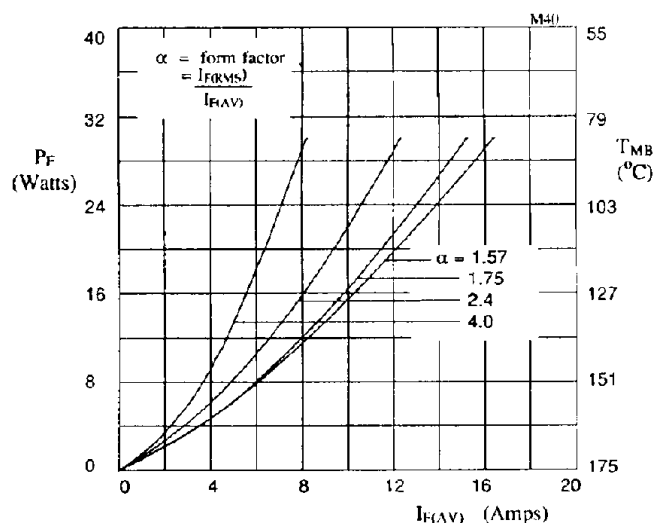


Figure 6. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for sinusoidal operation, for SET03**03 and SET03**12.

7

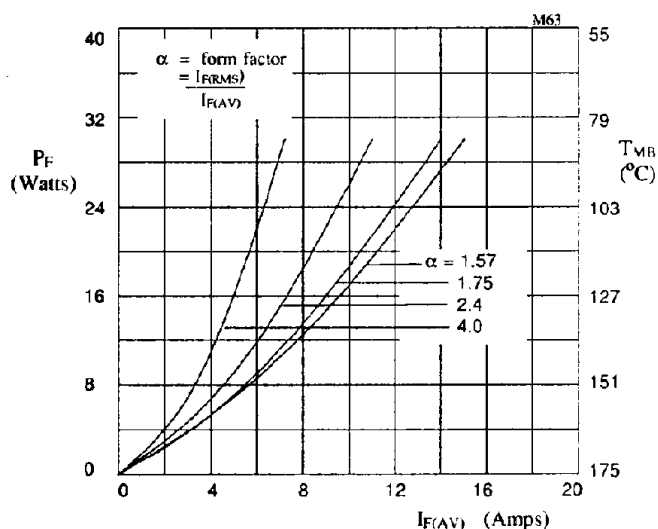


Figure 7. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for sinusoidal operation, for SET03**04.

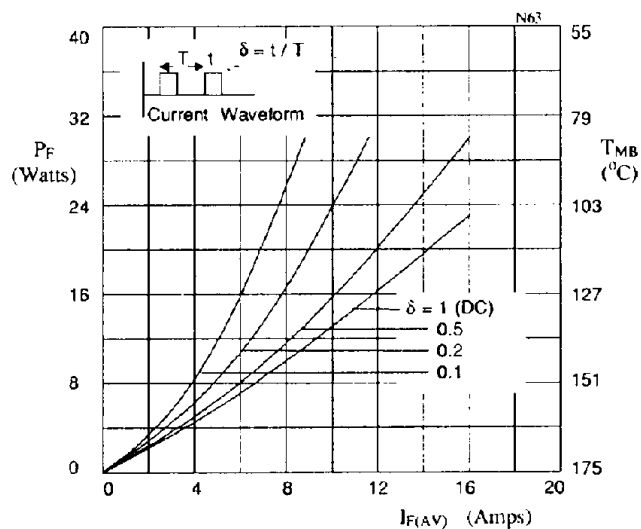


Figure 8. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for square wave operation, for SET03**04

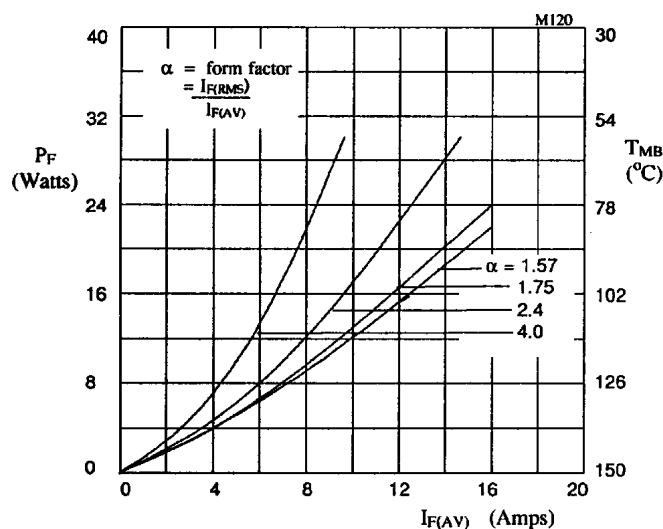


Figure 9. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for sinusoidal operation, for SET03**11.

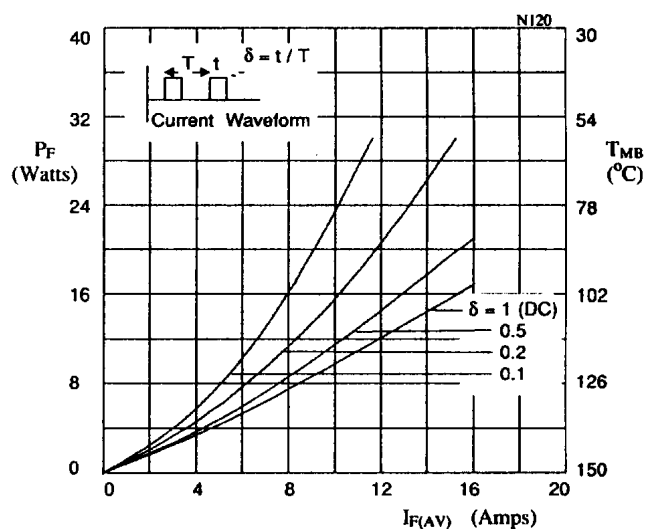


Figure 10. Forward power dissipation and maximum allowable mounting base temperature as a function of forward current for square wave operation, for SET03**11.

Chapter 8

TVS Rectifiers

Datasheet No.	Title:
1N6102-1N6137	500W Bi-Polarity Transient Voltage Suppressors
1N6102A-1N6137A	QPL 500 Watt Axial Leaded TVS
1N6102US-6137US	500W Bipolar Transient Voltage Suppressors, Surface Mount (US)
1N6103A_6137AUS	500W Bipolar Transient Voltage Suppressor Surface Mount (US)
1N6138-1N6173	1500W Bipolar Transient Voltage Suppressors
1N6138A-1N6173A	QPL 1500 Watt Axial Leaded TVS
1N6138US-6173US	1500W Bipolar Transient Voltage Suppressors Surface Mount (US)
1N6139A_6173AUS	1500W Bipolar Transient Voltage Suppressor Surface Mount (US)
1N6461-1N6468	QPL 500 Watt Axial Leaded TVS
1N6461US-6468US	QPL 500 Watt Surface Mount TVS
1N6469-1N6476	QPL 1500 Watt Axial Leaded TVS
1N6469US-1N6476US	QPL 1500 Watt Surface Mount TVS
60KS200C-90KS200C	60,000 and 90,000 Watt TVS Module
70415K36	15,000 Watt TVS Module



AXIAL LEADED, HERMETICALLY SEALED, 500 WATT TRANSIENT VOLTAGE SUPPRESSORS

- Low dynamic impedance
- Hermetically sealed in Metoxilite fused metal oxide
- 500 Watt peak pulse power
- 1.5 Watt continuous
- Available in JAN, JANTX and JANTXV versions

QUICK REFERENCE DATA

- $V_{BR\ MIN} = 6.12 - 180V$
- $I_{(BR)} = 5 - 175mA$
- $V_{RWM} = 5.2 - 152V$
- $V_C\ MAX = 11 - 273V$

ELECTRIAL SPECIFICATIONS (@ 25°C UNLESS OTHERWISE SPECIFIED)

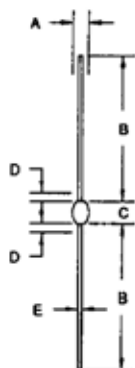
Device Type	Minimum Breakdown Voltage $V_{(BR)}$ @ $I_{(BR)}$	Test Current $I_{(BR)}$	Working Pk. Reverse Voltage V_{RWM}	Max. Reverse Current I_R	Maximum Clamping Voltage V_C @ I_P	Maximum Pk. Pulse Current I_P $t_P = 8.3mS$	Temp. Coeff of $V_{(BR)}$ α_{VZ}	Maximum Reverse Current I_R @ 150°C
	Volts	mA	Volts	μA	Volts	Amps	%/°C	μA
1N6102	6.12	175	5.2	100	11.0	45.4	.05	4000
1N6103	6.75	175	5.7	50	11.8	42.4	.06	750
1N6104	7.38	150	6.2	20	12.7	39.4	.06	500
1N6105	8.19	150	6.9	20	14.0	35.7	.06	300
1N6106	9.00	125	7.6	20	15.2	32.9	.07	200
1N6107	9.90	125	8.4	20	16.3	30.7	.07	200
1N6108	10.8	100	9.1	20	17.7	28.2	.07	150
1N6109	11.7	100	9.9	20	19.0	26.3	.08	150
1N6110	13.5	75	11.4	20	21.9	22.8	.08	100
1N6111	14.4	75	12.2	20	23.4	21.4	.08	100
1N6112	16.2	65	13.7	1	26.3	19.0	.085	100
1N6113	18.0	65	15.2	1	29.0	17.2	.085	100
1N6114	19.8	50	16.7	1	31.9	15.7	.085	100
1N6115	21.6	50	18.2	1	34.8	14.4	.09	100
1N6116	24.3	50	20.6	1	39.2	12.8	.09	100
1N6117	27.0	40	22.8	1	43.6	11.5	.09	100
1N6118	29.7	40	25.1	1	47.9	10.4	.095	100
1N6119	32.4	30	27.4	1	52.3	9.6	.095	100
1N6120	35.1	30	29.7	1	56.2	8.9	.095	100
1N6121	38.7	30	32.7	1	62.0	8.1	.095	100
1N6122	42.3	25	35.8	1	67.7	7.4	.095	100
1N6123	45.9	25	38.8	1	73.5	6.8	.095	100
1N6124	50.4	20	42.6	1	80.7	6.2	.095	100
1N6125	55.8	20	47.1	1	89.3	5.6	.100	100
1N6126	61.2	20	51.7	1	98.0	5.1	.100	100
1N6127	67.5	20	56.0	1	108.1	4.6	.100	100
1N6128	73.8	15	62.2	1	118.2	4.2	.100	100
1N6129	81.9	15	69.2	1	131.1	3.8	.100	100
1N6130	90.0	12	76.0	1	144.1	3.5	.100	100
1N6131	99.0	12	83.6	1	158.5	3.2	.100	100
1N6132	108.0	10	91.2	1	172.9	2.9	.100	100
1N6133	117.0	10	98.8	1	187.3	2.7	.100	100
1N6134	135.0	8	114.0	1	216.2	2.3	.100	100
1N6135	144.0	8	121.6	1	228.8	2.2	.100	100
1N6136	162.0	5	136.8	1	257.4	1.9	.100	100
1N6137	180.0	5	152.0	1	286.0	1.7	.100	100



These parts are qualified to MIL-PRF-19500/516 and are preferred parts as listed in MIL-STD-701

They can be supplied fully released as JAN, JANTX and JANTXV versions.

* Parts listed are 10% tolerance. 5% tolerance can be ordered by placing an "A" suffix on part numbers, eg. 1N6110A



DIM*	DIMENSIONS				NOTE
	MIN	MAX	MIN	MAX	
A	2.1	3.6	.085	.140	-
B	25.4	33.0	1.00	1.30	-
C	3.5	4.7	.140	.185	-
D	-	.80	-	.030	1
E	.66	.84	.026	.033	-

NOTES:

1. LEAD DIAMETER UNCONTROLLED OVER THIS REGION.

OPERATING TEMP -65°C to +175°C
STORAGE TEMP -65°C to +175°C

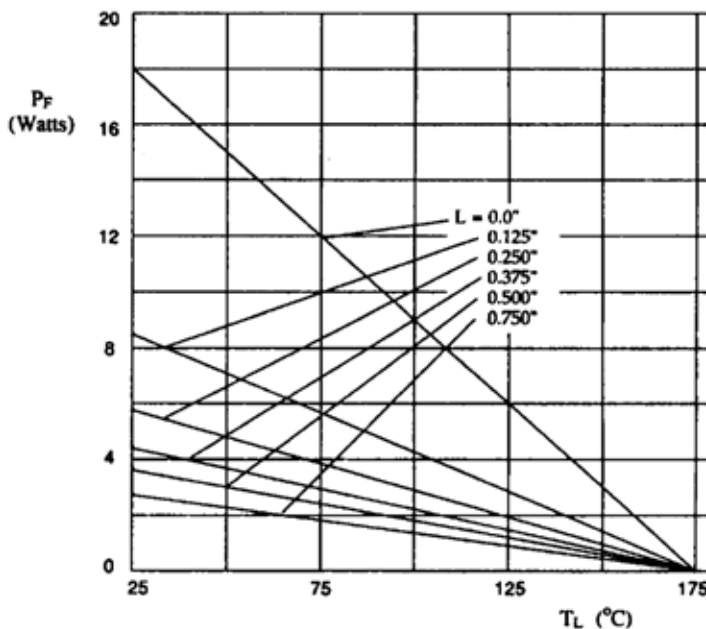


Figure 1. Maximum power versus lead temperature.

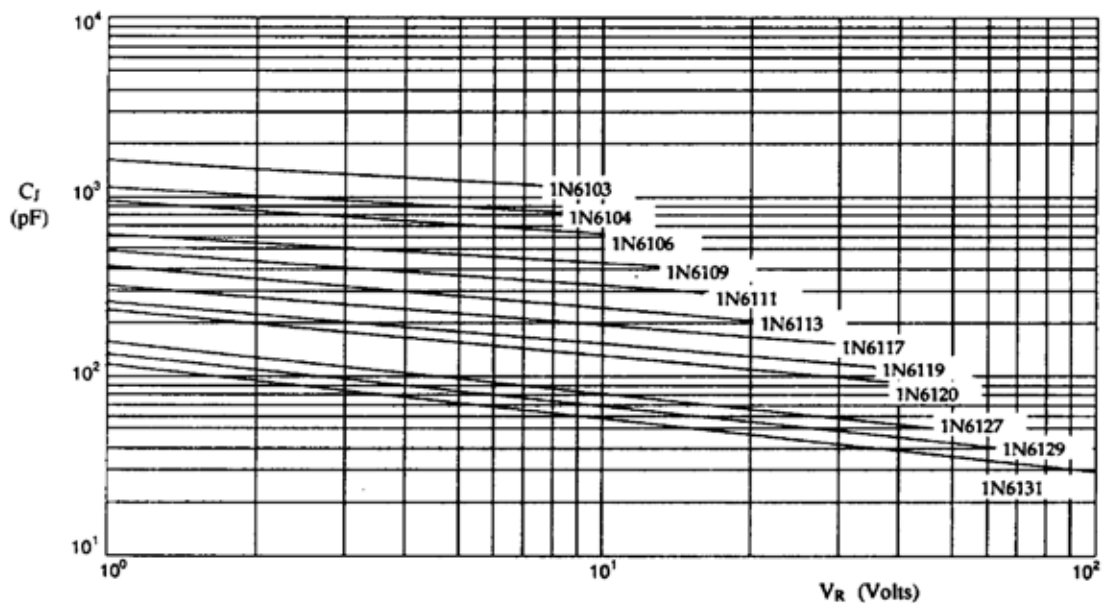


Fig 2. Typical junction capacitance versus reverse voltage.

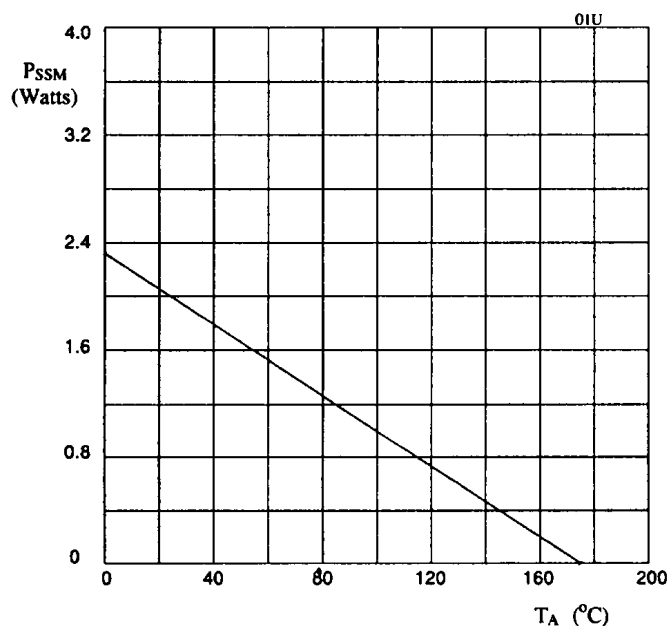


Fig 3. Steady state derating characteristic for free air mounting

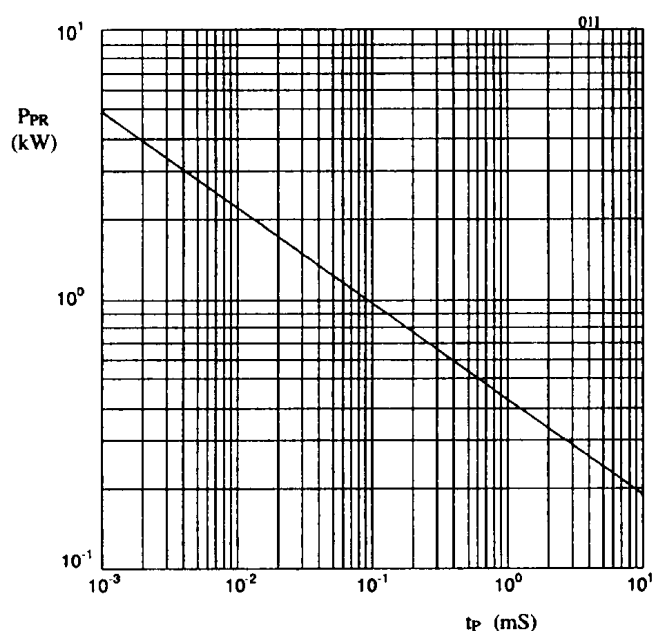


Fig 4. Peak pulse power versus pulse time.

8

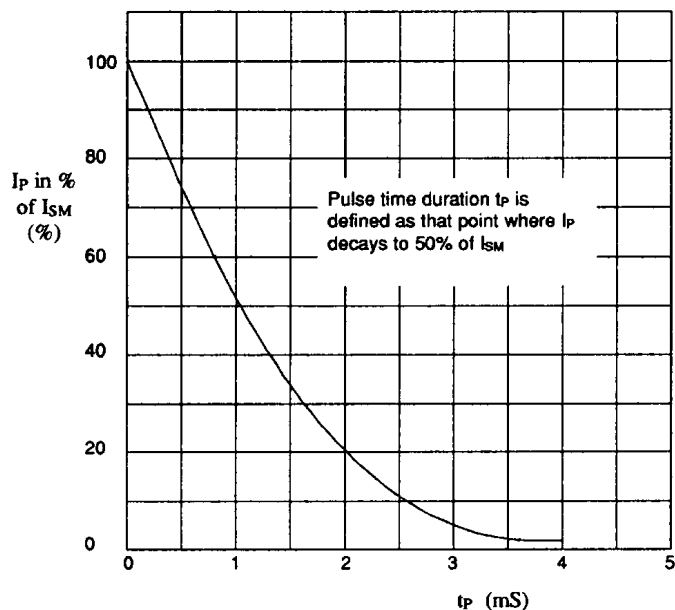


Fig 5. Pulse waveform

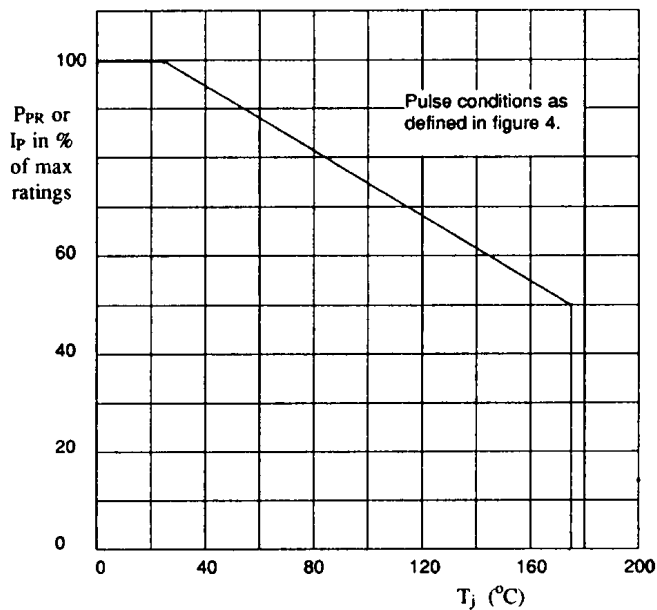


Fig 6. Pulse derating curve



DESCRIPTION

The 1N61xx series of transient voltage suppressors are designed to protect military and commercial electronic equipment from overvoltages caused by lightning, ESD, EFT, inductive load switching, and EMP. These devices are constructed using two p-n junction TVS diodes in a back-to-back configuration, hermetically sealed in a voidless glass package. The hermetically sealed package provides high reliability in harsh environmental conditions. TVS diodes are further characterized by their high surge capability, low operating and clamping voltages, and a theoretically instantaneous response time. This makes them ideal for use as board level protection for sensitive semiconductor components.

FEATURES:

- 500 Watts Peak Pulse Power ($t_p = 10/1000\mu s$)
- Voidless hermetically sealed glass package
- Metallurgically bonded
- High surge capacity
- Military & Industrial applications
- Available in **JAN**, **JTX**, and **JTXV** versions per MIL-S-19500/516

MECHANICAL CHARACTERISTICS:

- Hermetically sealed glass package
- Tinned copper leads
- Marking : P/N, date code, logo

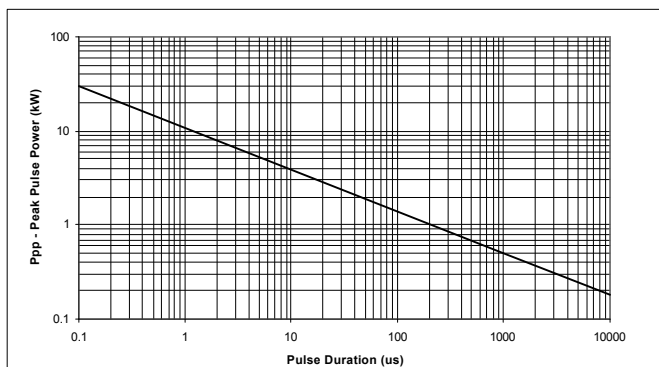
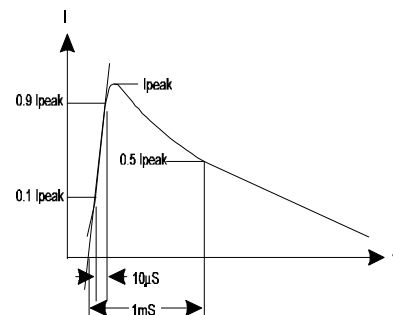
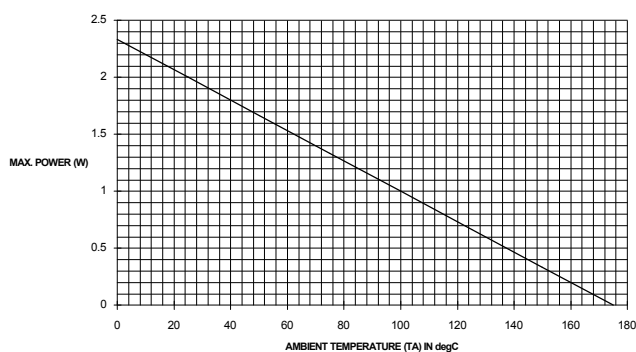
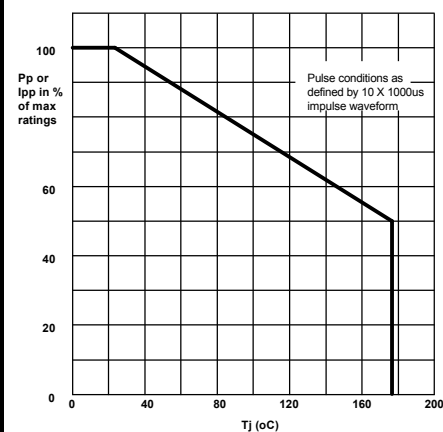
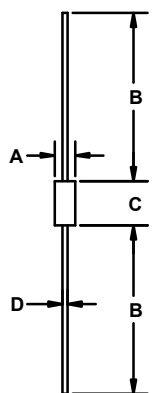
MAXIMUM RATINGS

RATING	SYMBOL	VALUE	UNIT
Peak Pulse Power ($t_p = 10 \times 1000\mu s$)	Ppk	500	Watts
Operating Temperature	Tj	-65 to +175	°C
Storage Temperature	Tstg	-65 to +175	°C
Steady-State Power Dissipation @ TL = 75°C (3/8")	PD	3	Watts

ELECTRICAL CHARACTERISTICS @ 25°C (unless otherwise specified)

DEVICE TYPE	REVERSE STAND-OFF VOLTAGE V_{RWM}	REVERSE LEAKAGE CURRENT I_R	MINIMUM BREAKDOWN VOLTAGE $V_{BR} @ I_T$	TEST CURRENT I_T	MAXIMUM CLAMPING VOLTAGE $V_C @ I_{PP}$	PEAK PULSE CURRENT I_{PP} $t_p = 1ms$	TEMPERATURE COEFFICIENT OF V_{BR} α_{VZ}	MAXIMUM REVERSE LEAKAGE CURRENT (I_{R2}) $T_A = +150^\circ C$
	(V)	(μA)	(V)	(mA)	(V)	(A)	% / °C	(A)
1N6102A	5.2	100	6.46	175	10.5	47.6	0.05	4000
1N6103A	5.7	50	7.13	175	11.2	44.6	0.06	750
1N6104A	6.2	20	7.79	150	12.1	41.3	0.06	500
1N6105A	6.9	20	8.65	150	13.4	37.3	0.06	300
1N6106A	7.6	20	9.50	125	14.5	34.5	0.07	200
1N6107A	8.4	20	10.45	125	15.6	32.0	0.07	200
1N6108A	9.1	20	11.40	100	16.9	29.6	0.07	150
1N6109A	9.9	20	12.35	100	18.2	27.5	0.08	150
1N6110A	11.4	20	14.25	75	21.0	23.8	0.08	100
1N6111A	12.2	20	15.20	75	22.3	22.4	0.08	100
1N6112A	13.7	1	17.10	65	25.1	19.9	0.085	100
1N6113A	15.2	1	19.0	65	27.7	18.0	0.085	100
1N6114A	16.7	1	20.9	50	30.5	16.4	0.085	100
1N6115A	18.2	1	22.8	50	33.3	15.0	0.09	100
1N6116A	20.6	1	25.7	50	37.4	13.4	0.09	100
1N6117A	22.8	1	28.5	40	41.6	12.0	0.09	100
1N6118A	25.1	1	31.4	40	45.7	10.9	0.095	100
1N6119A	27.4	1	34.2	30	49.9	10.0	0.095	100
1N6120A	29.7	1	37.1	30	53.6	9.3	0.095	100
1N6121A	32.7	1	40.9	30	59.1	8.5	0.095	100
1N6122A	35.8	1	44.7	25	64.6	7.7	0.095	100
1N6123A	38.8	1	48.5	25	70.1	7.1	0.095	100
1N6124A	42.6	1	53.2	20	77.0	6.5	0.095	100
1N6125A	47.1	1	58.9	20	85.3	5.9	0.100	100
1N6126A	51.7	1	64.6	20	97.1	5.1	0.100	100
1N6127A	56.0	1	71.3	20	103.1	4.8	0.100	100
1N6128A	62.2	1	77.9	15	112.8	4.4	0.100	100
1N6129A	69.2	1	86.5	15	125.1	4.0	0.100	100
1N6130A	76.0	1	95.0	12	137.6	3.6	0.100	100
1N6131A	83.6	1	104.5	12	151.3	3.3	0.100	100
1N6132A	91.2	1	114.0	10	165.1	3.0	0.100	100
1N6133A	98.8	1	123.5	10	178.8	2.8	0.105	100
1N6134A	114.0	1	142.5	8	206.3	2.4	0.105	100
1N6135A	121.6	1	152.0	8	218.4	2.3	0.105	100
1N6136A	136.8	1	171.0	5	245.7	2.0	0.110	100
1N6137A	152.0	1	190.0	5	273.0	1.8	0.110	100

1. Non-A Part has 5% higher clamping voltage, 5% lower minimum breakdown voltage, and 5% lower peak pulse current.

**PEAK PULSE POWER vs. PULSE TIME****10x1000μs IMPULSE WAVEFORM****STEADY STATE DERATING CHARACTERISTICS FOR FREE AIR MOUNTING****PULSE DERATING CURVE****MECHANICAL OUTLINE**

DIMENSIONS					
DIM ^N	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.085	0.140	2.1	3.6	
B	1.00	1.300	25.4	33.0	
C	0.140	0.245	3.5	6.3	2
D	0.026	0.033	0.66	0.84	

NOTES :

1. Controlling dimension is inches.
2. Includes uncontrolled area of device leads.

SCHEMATIC

POWER DISCRETES

Description

Quick reference data

$V_{BR\ MIN} = 6.12 - 180V$

$V_{RWM} = 5.2 - 152V$

$V_C\ (max) = 11 - 273V$

$I_{(BR)}\ 1N6102 - 1N6137 = 5mA - 175mA$

Features

- ◆ Low dynamic impedance
- ◆ Hermetically sealed non-cavity construction
- ◆ 500 watt peak pulse power
- ◆ 1.5W continuous

These products are qualified to MIL-PRF-19500/516 and are preferred parts as listed in MIL-HDBK-5961. They can be supplied fully released as JANTX and JANTXV versions.

Electrical Specifications

Electrical specifications @ $T_A = 25^\circ C$ unless otherwise specified.

Device Type	Minimum Breakdown Voltage $V_{(BR)} @ I_{(BR)}$	Test Current $I_{(BR)}$	Working Pk. Reverse Voltage V_{RWM}	Maximum Reverse Current I_{R1}	Maximum Clamping Voltage $V_C @ I_P$	Maximum Pk. Pulse Current I_P $T_P = 1mS$	Temp. Coeff. of $V_{(BR)}$ $\alpha_{(VZ)}$	Maximum Reverse Current $I_{R2} @ 150^\circ C$
	Volts	mA	Volts	μA	Volts	Amps	%/ $^\circ C$	μA
1N6102	6.12	175	5.2	100	11.0	45.4	0.05	4,000
1N6103	6.75	175	5.7	50	11.8	42.4	0.06	750
1N6104	7.38	150	6.2	20	12.7	39.4	0.06	500
1N6105	8.19	150	6.9	20	14.0	35.7	0.06	300
1N6106	9.0	125	7.6	20	15.2	32.9	0.07	200
1N6107	9.9	125	8.4	20	16.3	30.7	0.07	200
1N6108	10.8	100	9.1	20	17.7	28.2	0.07	150
1N6109	11.7	100	9.9	20	19.0	26.3	0.08	150
1N6110	13.5	75	11.4	20	21.9	22.8	0.08	100
1N6111	14.4	75	12.2	20	23.4	21.4	0.08	100
1N6112	16.2	65	13.7	1	26.3	19.0	0.085	100
1N6113	18.0	65	15.2	1	29.0	17.2	0.085	100
1N6114	19.8	50	16.7	1	31.9	15.7	0.085	100
1N6115	21.6	50	18.2	1	34.8	14.4	0.09	100
1N6116	24.3	50	20.6	1	39.2	12.8	0.09	100
1N6117	27.0	40	22.8	1	43.6	11.5	0.09	100
1N6118	29.7	40	25.1	1	47.9	10.4	0.095	100

POWER DISCRETES

Electrical Specifications

Electrical specifications @ $T_A = 25^\circ\text{C}$ unless otherwise specified.

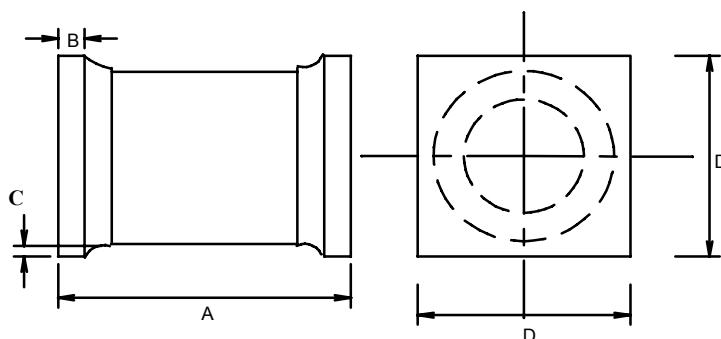
Device Type	Minimum Breakdown Voltage $V_{(BR)} @ I_{(BR)}$	Test Current $I_{(BR)}$	Working Pk. Reverse Voltage V_{RWM}	Maximum Reverse Current I_{R1}	Maximum Clamping Voltage $V_C @ I_P$	Maximum Pk. Pulse Current I_P $T_P = 1\text{mS}$	Temp. Coeff. of $V_{(BR)}$ $\alpha_{(VZ)}$	Maximum Reverse Current $I_{R2} @ 150^\circ\text{C}$
	Volts	mA	Volts	μA	Volts	Amps	$\%/^\circ\text{C}$	μA
1N6119	32.4	30	27.4	1	52.3	9.6	0.095	100
1N6120	35.1	30	29.7	1	56.2	8.9	0.095	100
1N6121	38.7	30	32.7	1	62.0	8.1	0.095	100
1N6122	42.3	25	35.8	1	67.7	7.4	0.095	100
1N6123	45.9	25	38.8	1	73.5	6.8	0.095	100
1N6124	50.4	20	42.6	1	80.7	6.2	0.095	100
1N6125	55.8	20	47.1	1	89.3	5.6	0.1	100
1N6126	61.2	20	51.7	1	98.0	5.1	0.1	100
1N6127	67.5	20	56.0	1	108.1	4.6	0.1	100
1N6128	73.8	15	62.2	1	118.2	4.2	0.1	100
1N6129	81.9	15	69.2	1	131.1	3.8	0.1	100
1N6130	90.0	12	76.0	1	144.1	3.5	0.1	100
1N6131	99.0	12	83.6	1	158.5	3.2	0.1	100
1N6132	108.0	10	91.2	1	172.9	2.9	0.1	100
1N6133	117.0	10	98.8	1	187.3	2.7	0.105	100
1N6134	135.0	8	114.0	1	216.2	2.3	0.150	100
1N6135	144	8	121.6	1	228.8	2.2	0.105	100
1N6136	162	5	136.8	1	257.4	1.9	0.11	100
1N6137	180	5	152.0	1	286.0	1.7	0.11	100

POWER DISCRETES
Ordering Information

Part Number	Description
1N6102US thru 1N6137US	Surface Mount(US) ⁽¹⁾

Note:

(1) Available in trays or tape and reel packaging. Please consult factory for quantities.

Outline Drawing


	Dimensions	
	1N6102US - 1N6137US	
	Inches	
	MIN	MAX
A	0.2	0.225
B	0.019	0.028
C	0.003	-
D	0.137	0.148

Contact Information

Semtech Corporation
Power Discretes Products Division
200 Flynn Road, Camarillo, CA 93012
Phone: (805)498-2111 FAX (805)498-3804



POWER DISCRETES

Description

Quick reference data

$V_{BR\ MIN} = 7.13 - 190V$

$V_{RWM} = 5.7 - 152V$

$V_C\ (max) = 11.2 - 273V$

$I_{(BR)}\ 1N6103A - 1N6137A = 5mA - 175mA$

Features

- ◆ Low dynamic impedance
- ◆ Hermetically sealed non-cavity construction
- ◆ 500 watt peak pulse power
- ◆ 1.5W continuous

These products are qualified to MIL-PRF-19500/516 and are preferred parts as listed in MIL-HDBK-5961. They can be supplied fully released as JANTX and JANTXV versions.

Electrical Specifications

Electrical specifications @ $T_A = 25^\circ C$ unless otherwise specified.

Device Type	Minimum Breakdown Voltage $V_{(BR)} @ I_{(BR)}$	Test Current $I_{(BR)}$	Working Pk. Reverse Voltage V_{RWM}	Maximum Reverse Current I_{R1}	Maximum Clamping Voltage $V_C @ I_P$	Maximum Pk. Pulse Current I_P $T_P = 1mS$	Temp. Coeff. of $V_{(BR)}$ $\alpha_{(VZ)}$	Maximum Reverse Current $I_{R2} @ 150^\circ C$
	Volts	mA	Volts	μA	Volts	Amps	$\%/^\circ C$	μA
1N6103A	7.13	175	5.7	50	11.2	44.6	0.06	750
1N6104A	7.79	150	6.2	20	12.1	41.3	0.06	500
1N6105A	8.65	150	6.9	20	13.4	37.3	0.06	300
1N6106A	9.50	125	7.6	20	14.5	34.5	0.07	200
1N6107A	10.45	125	8.4	20	15.6	32.0	0.07	200
1N6108A	11.4	100	9.1	20	16.9	29.6	0.07	150
1N6109A	12.35	100	9.9	20	18.2	27.5	0.08	150
1N6110A	14.25	75	11.4	20	21.0	23.8	0.08	100
1N6111A	15.2	75	12.2	20	22.3	22.4	0.08	100
1N6112A	17.1	65	13.7	1	25.1	19.9	0.085	100
1N6113A	19.0	65	15.2	1	27.7	18.0	0.085	100
1N6114A	20.9	50	16.7	1	30.5	16.4	0.085	100
1N6115A	22.8	50	18.2	1	33.3	15.0	0.09	100
1N6116A	25.7	50	20.6	1	37.4	13.4	0.09	100
1N6117A	28.5	40	22.8	1	41.6	12.0	0.09	100
1N6118A	31.4	40	25.1	1	45.7	10.9	0.095	100
1N6119A	34.2	30	27.4	1	49.9	10.0	0.095	100

POWER DISCRETES

Electrical Specifications

Electrical specifications @ $T_A = 25^\circ\text{C}$ unless otherwise specified.

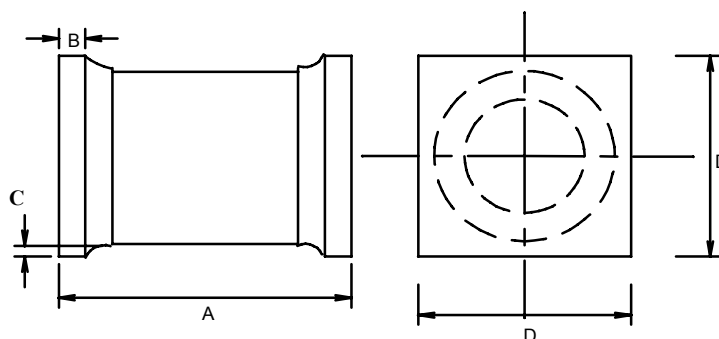
Device Type	Minimum Breakdown Voltage $V_{(BR)} @ I_{(BR)}$	Test Current $I_{(BR)}$	Working Pk. Reverse Voltage V_{RWM}	Maximum Reverse Current I_{R1}	Maximum Clamping Voltage $V_C @ I_P$	Maximum Pk. Pulse Current I_P $T_P = 1\text{mS}$	Temp. Coeff. of $V_{(BR)} \alpha_{(VZ)}$	Maximum Reverse Current $I_{R2} @ 150^\circ\text{C}$
	Volts	mA	Volts	μA	Volts	Amps	$\%/^\circ\text{C}$	μA
1N6120A	37.1	30	29.7	1	53.6	9.3	0.095	100
1N6121A	40.9	30	32.7	1	59.1	8.5	0.095	100
1N6122A	44.7	25	35.8	1	64.6	7.7	0.095	100
1N6123A	48.5	25	38.8	1	70.1	7.1	0.095	100
1N6124A	53.2	20	42.6	1	77.0	6.5	0.095	100
1N6125A	58.9	20	47.1	1	85.3	5.9	0.1	100
1N6126A	64.6	20	51.7	1	97.1	5.1	0.1	100
1N6127A	71.3	20	56.0	1	103.1	4.8	0.1	100
1N6128A	77.9	15	62.2	1	112.8	4.4	0.1	100
1N6129A	86.5	15	69.2	1	125.1	4.0	0.1	100
1N6130A	95.0	12	76.0	1	137.6	3.6	0.1	100
1N6131A	104.5	12	83.6	1	151.3	3.3	0.1	100
1N6132A	114.0	10	91.2	1	165.1	3.0	0.1	100
1N6133A	123.5	10	98.8	1	178.8	2.8	0.105	100
1N6134A	142.5	8	114.0	1	206.3	2.4	0.105	100
1N6135A	152	8	121.6	1	218.4	2.3	0.105	100
1N6136A	171	5	136.8	1	245.7	2.0	0.11	100
1N6137A	190	5	152.0	1	273.0	1.8	0.11	100

POWER DISCRETES
Ordering Information

Part Number	Description
1N6103AUS thru 1N6137AUS	Surface Mount(US) ⁽¹⁾

Note:

(1) Available in trays or tape and reel packaging. Please consult factory for quantities.

Outline Drawing


	Dimensions	
	1N6103AUS - 1N6137AUS	
	Inches	
	MIN	MAX
A	0.2	0.225
B	0.019	0.028
C	0.003	-
D	0.137	0.148

Contact Information

Semtech Corporation
Power Discretes Products Division
200 Flynn Road, Camarillo, CA 93012
Phone: (805)498-2111 FAX (805)498-3804

POWER DISCRETES

Description

Quick reference data

$V_{BR\ MIN} = 6.12 - 180V$

$I_{(BR)} = 5mA - 175mA$

$V_{RWM} = 5.2 - 152V$

$V_c\ (max) = 11V - 286V$

Features

- ◆ Low dynamic impedance
- ◆ 1500 watt peak pulse power
- ◆ 7.5W continuous at $T_L = 25^\circ C$

These products are qualified to MIL-PRF-19500/516 and are preferred parts as listed in MIL-HDBK-5961. They can be supplied fully released as JANTX and JANTXV versions.

Electrical Specifications

Electrical specifications @ $T_A = 25^\circ C$ unless otherwise specified.

Device Type	Minimum Breakdown Voltage $V_{(BR)} @ I_{(BR)}$	Test Current $I_{(BR)}$	Working Pk. Reverse Voltage V_{RWM}	Maximum Reverse Current I_R	Maximum Clamping Voltage $V_c @ I_P$	Maximum Pk. Pulse Current $I_P = {}^{(1)}$	Temp. Coeff. of $V_{(BR)} \alpha_{(VZ)}$	Maximum Reverse Current $I_{R2} @ 150^\circ C$
	Volts	mA	Volts	μA	Volts	Amps	%/ $^\circ C$	μA
1N6138	6.12	175	5.2	500	11.0	136.4	0.05	12,000
1N6139	6.75	175	5.7	300	11.8	127.1	0.06	3,000
1N6140	7.38	150	6.2	100	12.7	118.1	0.06	2,000
1N6141	8.19	150	6.9	100	14.0	107.1	0.06	1,200
1N6142	9.0	125	7.6	100	15.2	98.7	0.07	800
1N6143	9.9	125	8.4	20	16.3	92.0	0.07	800
1N6144	10.8	100	9.1	20	17.7	84.7	0.07	600
1N6145	11.7	100	9.9	20	19.0	78.9	0.08	600
1N6146	13.5	75	11.4	20	21.9	68.5	0.08	400
1N6147	14.4	75	12.2	20	23.4	64.1	0.08	400
1N6148	16.2	65	13.7	10	26.3	57.0	.085	400
1N6149	18.0	65	15.2	5	29.0	51.7	.085	400
1N6150	19.8	50	16.7	5	31.9	47.0	.085	400
1N6151	21.6	50	18.2	5	34.8	43.1	.09	400
1N6152	24.3	50	20.6	5	39.2	38.3	.09	400
1N6153	27.0	40	22.8	5	43.6	34.4	.09	400
1N6154	29.7	40	25.1	5	47.9	31.3	.095	400
1N6155	32.4	30	27.4	5	52.3	28.7	.095	400

POWER DISCRETES
Electrical Specifications

Electrical specifications @ $T_A = 25^\circ\text{C}$ unless otherwise specified.

Device Type	Minimum Breakdown Voltage $V_{(BR)} @ I_{(BR)}$	Test Current $I_{(BR)}$	Working Pk. Reverse Voltage V_{RWM}	Maximum Reverse Current I_{R1}	Maximum Clamping Voltage $V_C @ I_P$	Maximum Pk. Pulse Current I_P $T_P = {}^{(1)}$	Temp. Coeff. of $V_{(BR)}$ $\alpha_{(VZ)}$	Maximum Reverse Current $I_{R2} @ 150^\circ\text{C}$
	Volts	mA	Volts	μA	Volts	Amps	$\%/^\circ\text{C}$	μA
1N6156	35.1	30	29.7	5	56.2	26.7	0.095	400
1N6157	38.7	30	32.7	5	62.0	24.2	0.095	400
1N6158	42.3	25	35.8	5	67.7	22.2	0.095	400
1N6159	45.9	25	38.8	5	73.5	20.4	0.095	400
1N6160	50.4	20	42.6	5	80.7	18.6	0.095	400
1N6161	55.8	20	47.1	5	89.3	16.8	.100	400
1N6162	61.2	20	51.7	5	98.0	15.3	.100	400
1N6163	67.5	20	56.0	5	108.1	13.9	.100	400
1N6164	73.8	15	62.2	5	118.2	12.7	.100	400
1N6165	81.9	15	69.2	5	131.1	11.4	.100	400
1N6166	90.0	12	76.0	5	144.1	10.4	.100	400
1N6167	99.0	12	83.6	5	158.5	9.5	.100	400
1N6168	108.0	10	91.2	5	172.9	8.7	.100	400
1N6169	117.0	10	98.8	5	187.3	8.0	.100	400
1N6170	135.0	8	114.0	5	216.2	6.9	.100	400
1N6171	144.0	8	121.6	5	228.8	6.6	.100	400
1N6172	162.0	5	136.8	5	257.4	5.8	.100	400
1N6173	180.0	5	152.0	5	286.0	5.2	.100	400

Note:

(1) See Figure 4 graph.

POWER DISCRETES

Typical Characteristics

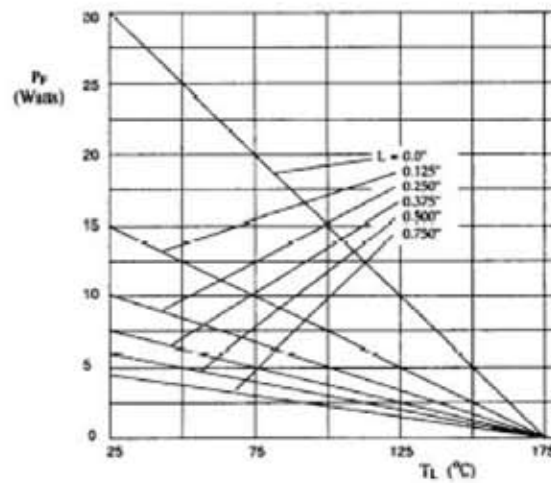


Figure 1. Maximum power vs. lead temperature

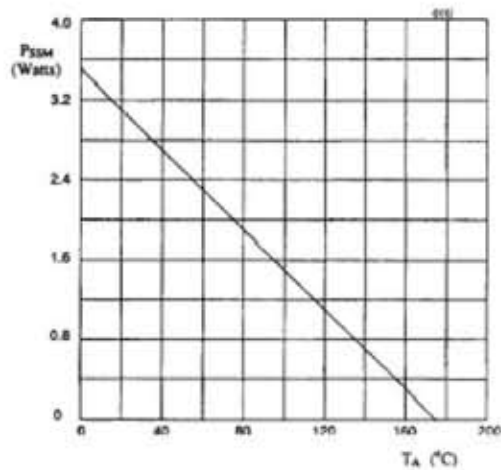


Figure 2. Steady state derating characteristic for free air mounting

POWER DISCRETES

Typical Characteristics

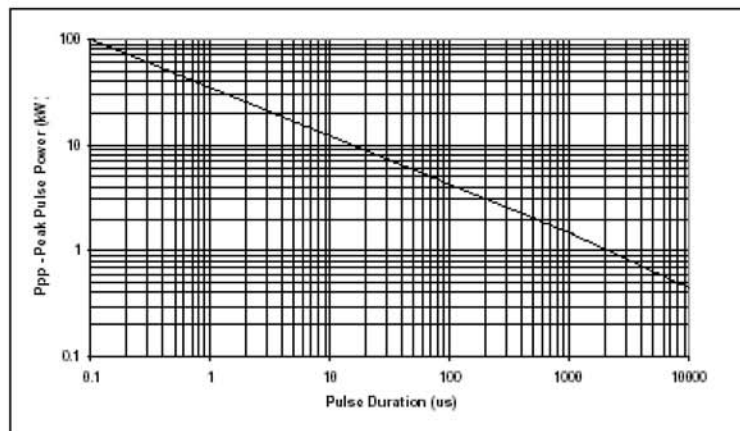


Figure 3. Peak pulse power vs. pulse time

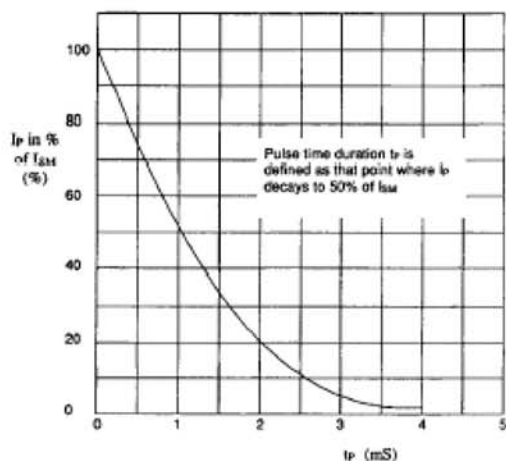


Figure 4. Pulse waveform

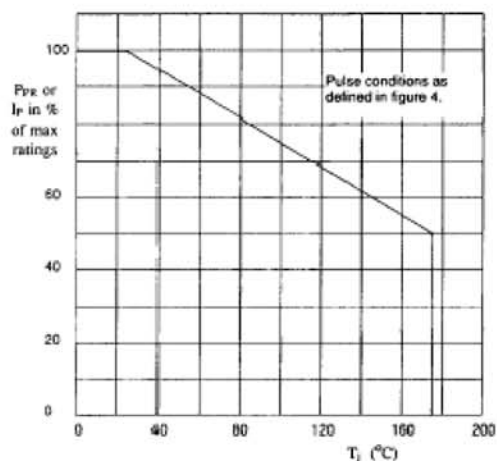


Figure 5. Pulse derating curve

POWER DISCRETES

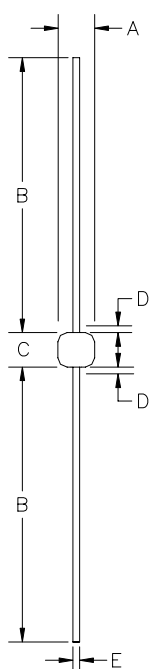
Ordering Information

Part Number	Description
1N6138 thru 1N6173	Axial leaded hermetically sealed ⁽¹⁾

Note:

(1) Available in bulk and tape and reel packaging. Please consult factory for quantities.

Outline Drawing



Dimensions					
DIM ^N	Inches		Millimeters		Note
	MIN	MAX	MIN	MAX	
A	.135	0.185	3.4	4.7	-
B	.90	1.30	22.9	33.0	-
C	.140	.195	3.5	5.0	-
D	-	.030	-	.80	1
E	0.036	.042	.91	1.07	-

Note:

(1) Lead diameter uncontrolled over this region.

Contact Information

Semtech Corporation
Power Discretes Products Division
200 Flynn Road, Camarillo, CA 93012
Phone: (805)498-2111 FAX (805)498-3804



DESCRIPTION

The 1N61xx series of transient voltage suppressors are designed to protect military and commercial electronic equipment from overvoltages caused by lightning, ESD, EFT, inductive load switching, and EMP. These devices are constructed using two p-n junction TVS diodes in a back-to-back configuration, hermetically sealed in a voidless glass package. The hermetically sealed package provides high reliability in harsh environmental conditions. TVS diodes are further characterized by their high surge capability, low operating and clamping voltages, and a theoretically instantaneous response time. This makes them ideal for use as board level protection for sensitive semiconductor components.

FEATURES:

- 1500 Watts Peak Pulse Power ($t_p = 10/1000\mu s$)
- Voidless hermetically sealed glass package
- Metallurgically bonded
- High surge capacity
- Military & Industrial applications
- Available in **JAN**, **JTX**, and **JTXV** versions per MIL-S-19500/516

MECHANICAL CHARACTERISTICS:

- Hermetically sealed glass package
- Tinned copper leads
- Marking : P/N, date code, logo

MAXIMUM RATINGS

RATING	SYMBOL	VALUE	UNIT
Peak Pulse Power ($t_p = 10 \times 1000\mu s$)	Ppk	1500	Watts
Operating Temperature	Tj	-65 to +175	°C
Storage Temperature	Tstg	-65 to +175	°C
Steady-State Power Dissipation @ TL = 75°C (3/8")	PD	5	Watts

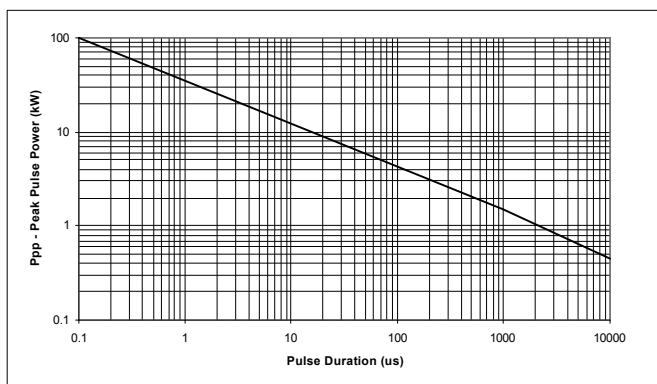
ELECTRICAL CHARACTERISTICS @ 25°C (unless otherwise specified)

DEVICE TYPE	REVERSE STAND-OFF VOLTAGE V_{RWM}	REVERSE LEAKAGE CURRENT I_R	MINIMUM BREAKDOWN VOLTAGE $V_{BR} @ I_T$	TEST CURRENT I_T	MAXIMUM CLAMPING VOLTAGE $V_C @ I_{PP}$	PEAK PULSE CURRENT I_{PP} $t_p = 1mS$	TEMPERATURE COEFFICIENT OF V_{BR} αV_Z	MAXIMUM REVERSE LEAKAGE CURRENT (I_{R2}) $T_A = +150^\circ C$
	(V)	(μA)	(V)	(mA)	(V)	(A)	% / °C	(A)
1N6138A	5.2	500	6.46	175	10.5	142.8	0.05	12000
1N6139A	5.7	300	7.13	175	11.2	133.9	0.06	3000
1N6140A	6.2	100	7.79	150	12.1	124.0	0.06	2000
1N6141A	6.9	100	8.65	150	13.4	111.9	0.06	1200
1N6142A	7.6	100	9.50	125	14.5	103.4	0.07	800
1N6143A	8.4	20	10.45	125	15.6	96.2	0.07	800
1N6144A	9.1	20	11.40	100	16.9	88.8	0.07	600
1N6145A	9.9	20	12.35	100	18.2	82.4	0.08	600
1N6146A	11.4	20	14.25	75	21.0	71.4	0.08	400
1N6147A	12.2	20	15.20	75	22.3	67.3	0.08	400
1N6148A	13.7	10	17.10	65	25.1	59.8	0.085	400
1N6149A	15.2	5	19.0	65	27.7	54.2	0.085	400
1N6150A	16.7	5	20.9	50	30.5	49.2	0.085	400
1N6151A	18.2	5	22.8	50	33.3	45.0	0.09	400
1N6152A	20.6	5	25.7	50	37.4	40.1	0.09	400
1N6153A	22.8	5	28.5	40	41.6	36.0	0.09	400
1N6154A	25.1	5	31.4	40	45.7	32.8	0.095	400
1N6155A	27.4	5	34.2	30	49.9	30.1	0.095	400
1N6156A	29.7	5	37.1	30	53.6	28.0	0.095	400
1N6157A	32.7	5	40.9	30	59.1	25.4	0.095	400
1N6158A	35.8	5	44.7	25	64.6	23.2	0.095	400
1N6159A	38.8	5	48.5	25	70.1	21.4	0.095	400
1N6160A	42.6	5	53.2	20	77.0	19.5	0.095	400
1N6161A	47.1	5	58.9	20	85.3	17.6	0.100	400
1N6162A	51.7	5	64.6	20	97.1	15.4	0.100	400
1N6163A	56.0	5	71.3	20	103.1	14.5	0.100	400
1N6164A	62.2	5	77.9	15	112.8	13.3	0.100	400
1N6165A	69.2	5	86.5	15	125.1	12.0	0.100	400
1N6166A	76.0	5	95.0	12	137.6	10.9	0.100	400
1N6167A	83.6	5	104.5	12	151.3	9.9	0.100	400
1N6168A	91.2	5	114.0	10	165.1	9.1	0.100	400
1N6169A	98.8	5	123.5	10	178.8	8.4	0.105	400
1N6170A	114.0	5	142.5	8	206.3	7.3	0.105	400
1N6171A	121.6	5	152.0	8	218.4	6.9	0.105	400
1N6172A	136.8	5	171.0	5	245.7	6.1	0.110	400
1N6173A	152.0	5	190.0	5	273.0	5.5	0.110	400

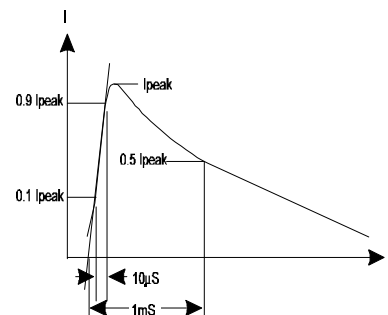
1. Non-A Part has 5% higher clamping voltage, 5% lower minimum breakdown voltage, and 5% lower peak pulse current.



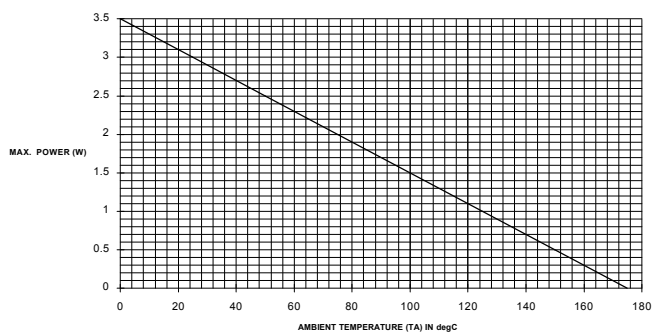
PEAK PULSE POWER vs. PULSE TIME



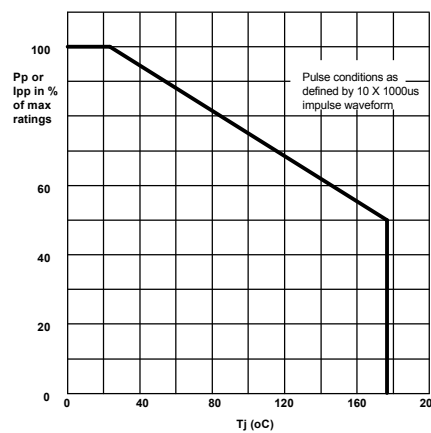
10x1000μs IMPULSE WAVEFORM



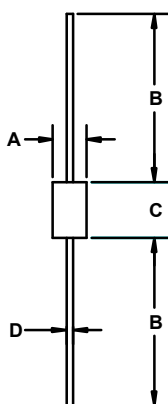
STEADY STATE DERATING CHARACTERISTICS
FOR FREE AIR MOUNTING



PULSE DERATING CURVE



MECHANICAL OUTLINE



DIMENSIONS					NOTE
DIM ^N	INCHES		MM		
	MIN	MAX	MIN	MAX	
A	0.135	0.185	3.40	4.70	
B	0.900	1.300	22.86	33.02	
C	0.140	0.195	3.5	4.95	2
D	0.036	0.042	0.91	1.07	

- NOTES :
1. Controlling dimension is inches.
 2. Includes uncontrolled area of device leads.

SCHEMATIC



POWER DISCRETES

Description

Quick reference data

$V_{BR\ MIN} = 6.12 - 180V$

$V_{RWM} = 5.2 - 152V$

$V_C\ (max) = 11 - 286V$

$I_{(BR)}\ 1N6138 - 1N6173 = 5mA - 175mA$

Features

- ◆ Low dynamic impedance
- ◆ Hermetically sealed non-cavity construction
- ◆ 1500 watt peak pulse power
- ◆ 7.5W continuous

These products are qualified to MIL-PRF-19500/516 and are preferred parts as listed in MIL-HDBK-5961. They can be supplied fully released as JANTX and JANTXV versions.

Electrical Specifications

Electrical specifications @ $T_A = 25^\circ C$ unless otherwise specified.

Device Type	Minimum Breakdown Voltage $V_{(BR)} @ I_{(BR)}$	Test Current $I_{(BR)}$	Working Pk. Reverse Voltage V_{RWM}	Maximum Reverse Current I_{R1}	Maximum Clamping Voltage $V_C @ I_P$	Maximum Pk. Pulse Current I_P $T_P = 1mS$	Temp. Coeff. of $V_{(BR)}$ $\alpha_{(VZ)}$	Maximum Reverse Current $I_{R2} @ 150^\circ C$
	Volts	mA	Volts	μA	Volts	Amps	%/ $^\circ C$	μA
1N6138	6.12	175	5.2	500	11.0	136.4	0.05	12,000
1N6139	6.75	175	5.7	300	11.8	127.1	0.06	3,000
1N6140	7.38	150	6.2	100	12.7	118.1	0.06	2,000
1N6141	8.19	150	6.9	100	14.0	107.1	0.06	1,200
1N6142	9.0	125	7.6	100	15.2	98.7	0.07	800
1N6143	9.9	125	8.4	20	16.3	92.0	0.07	800
1N6144	10.8	100	9.1	20	17.7	84.7	0.07	600
1N6145	11.7	100	9.9	20	19.0	78.9	0.08	600
1N6146	13.5	75	11.4	20	21.9	68.5	0.08	400
1N6147	14.4	75	12.2	20	23.4	64.1	0.08	400
1N6148	16.2	65	13.7	10	26.3	57.0	0.085	400
1N6149	18.0	65	15.2	5	29.0	51.7	0.085	400
1N6150	19.8	50	16.7	5	31.9	47.0	0.085	400
1N6151	21.6	50	18.2	5	34.8	43.1	0.09	400
1N6152	24.3	50	20.6	5	39.2	38.3	0.09	400
1N6153	27.0	40	22.8	5	43.6	34.4	0.09	400
1N6154	29.7	40	25.1	5	47.9	31.3	0.095	400
1N6155	32.4	30	27.4	5	52.3	28.7	0.095	400

POWER DISCRETES

Electrical Specifications

Electrical specifications @ $T_A = 25^\circ\text{C}$ unless otherwise specified.

Device Type	Minimum Breakdown Voltage $V_{(BR)} @ I_{(BR)}$	Test Current $I_{(BR)}$	Working Pk. Reverse Voltage V_{RWM}	Maximum Reverse Current I_{R1}	Maximum Clamping Voltage $V_C @ I_P$	Maximum Pk. Pulse Current I_P $T_P = 1\text{mS}$	Temp. Coeff. of $V_{(BR)} \alpha_{(VZ)}$	Maximum Reverse Current $I_{R2} @ 150^\circ\text{C}$
	Volts	mA	Volts	μA	Volts	Amps	%/ $^\circ\text{C}$	μA
1N6156	35.1	30	29.7	5	56.2	26.7	0.095	400
1N6157	38.7	30	32.7	5	62.0	24.2	0.095	400
1N6158	42.3	25	35.8	5	67.7	22.2	0.095	400
1N6159	45.9	25	38.8	5	73.5	20.4	0.095	400
1N6160	50.4	20	42.6	5	80.7	18.6	0.095	400
1N6161	55.8	20	47.1	5	89.3	16.8	0.1	400
1N6162	61.2	20	51.7	5	98.0	15.3	0.1	400
1N6163	67.5	20	56.0	5	108.1	13.9	0.1	400
1N6164	73.8	15	62.2	5	118.2	12.7	0.1	400
1N6165	81.9	15	69.2	5	131.1	11.4	0.1	400
1N6166	90.0	12	76.0	5	144.1	10.4	0.1	400
1N6167	99.0	12	83.6	5	158.5	9.5	0.1	400
1N6168	108.0	10	91.2	5	172.9	8.7	0.1	400
1N6169	117.0	10	98.8	5	187.3	8.0	0.105	400
1N6170	135.0	8	114.0	5	216.2	6.9	0.105	400
1N6171	144	8	121.6	5	228.8	6.6	0.105	400
1N6172	162	5	136.8	5	257.4	5.8	0.11	400
1N6173	180	5	152.0	5	286.0	5.2	0.11	400

POWER DISCRETES

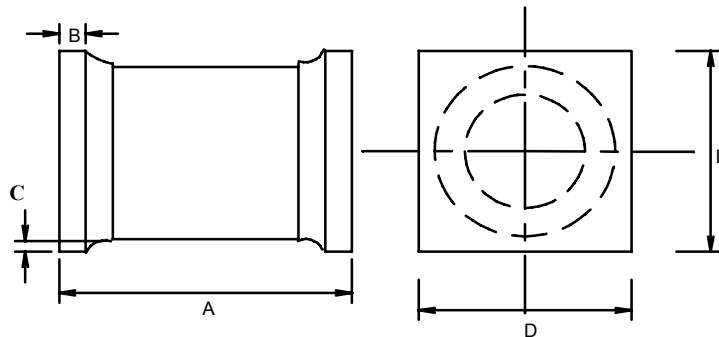
Ordering Information

Part Number	Description
1N6138US thru 1N6173US	Surface Mount(US) ⁽¹⁾

Note:

(1) Available in trays or tape and reel packaging. Please consult factory for quantities.

Outline Drawing



	Dimensions	
	1N6138US - 1N6173US	
	Inches	
	MIN	MAX
A	0.205	0.245
B	0.019	0.028
C	0.003	-
D	0.183	0.202

8

Contact Information

Semtech Corporation
 Power Discretes Products Division
 200 Flynn Road, Camarillo, CA 93012
 Phone: (805)498-2111 FAX (805)498-3804

POWER DISCRETES

Description

Quick reference data

$V_{BR\ MIN} = 7.13 - 190V$

$V_{RWM} = 5.7 - 152V$

$V_C\ (max) = 11.2 - 273V$

$I_{(BR)}\ 1N6139A - 1N6173A = 5mA - 175mA$

Features

- ◆ Low dynamic impedance
- ◆ Hermetically sealed non-cavity construction
- ◆ 1500 watt peak pulse power
- ◆ 7.5W continuous

These products are qualified to MIL-PRF-19500/516 and are preferred parts as listed in MIL-HDBK-5961. They can be supplied fully released as JANTX and JANTXV versions.

Electrical Specifications

Electrical specifications @ $T_A = 25^\circ C$ unless otherwise specified.

Device Type	Minimum Breakdown Voltage $V_{(BR)} @ I_{(BR)}$	Test Current $I_{(BR)}$	Working Pk. Reverse Voltage V_{RWM}	Maximum Reverse Current I_{R1}	Maximum Clamping Voltage $V_C @ I_P$	Maximum Pk. Pulse Current I_P $T_P = 1mS$	Temp. Coeff. of $V_{(BR)}$ $\alpha_{(VZ)}$	Maximum Reverse Current $I_{R2} @ 150^\circ C$
	Volts	mA	Volts	μA	Volts	Amps	%/ $^\circ C$	μA
1N6139A	7.13	175	5.7	300	11.2	133.9	0.06	3,000
1N6140A	7.79	150	6.2	100	12.1	124.0	0.06	2,000
1N6141A	8.65	150	6.9	100	13.4	111.9	0.06	1,200
1N6142A	9.5	125	7.6	100	14.5	103.4	0.07	800
1N6143A	10.45	125	8.4	20	15.6	96.2	0.07	800
1N6144A	11.4	100	9.1	20	16.9	88.8	0.07	600
1N6145A	12.35	100	9.9	20	18.2	82.4	0.08	600
1N6146A	14.25	75	11.4	20	21.0	71.4	0.08	400
1N6147A	15.2	75	12.2	20	22.3	67.3	0.08	400
1N6148A	17.1	65	13.7	10	25.1	59.8	0.085	400
1N6149A	19.0	65	15.2	5	27.7	54.2	0.085	400
1N6150A	20.9	50	16.7	5	30.5	49.2	0.085	400
1N6151A	22.8	50	18.2	5	33.3	45.0	0.09	400
1N6152A	25.7	50	20.6	5	37.4	40.1	0.09	400
1N6153A	28.5	40	22.8	5	41.6	36.0	0.09	400
1N6154A	31.4	40	25.1	5	45.7	32.8	0.095	400
1N6155A	34.2	30	27.4	5	49.9	30.1	0.095	400

POWER DISCRETES
Electrical Specifications

Electrical specifications @ $T_A = 25^\circ\text{C}$ unless otherwise specified.

Device Type	Minimum Breakdown Voltage $V_{(BR)} @ I_{(BR)}$	Test Current $I_{(BR)}$	Working Pk. Reverse Voltage V_{RWM}	Maximum Reverse Current I_{R1}	Maximum Clamping Voltage $V_C @ I_P$	Maximum Pk. Pulse Current I_P $T_P = 1\text{mS}$	Temp. Coeff. of $V_{(BR)} \alpha_{(VZ)}$	Maximum Reverse Current $I_{R2} @ 150^\circ\text{C}$
	Volts	mA	Volts	μA	Volts	Amps	%/ $^\circ\text{C}$	μA
1N6156A	37.1	30	29.7	5	53.6	28.0	0.095	400
1N6157A	40.9	30	32.7	5	59.1	25.4	0.095	400
1N6158A	44.7	25	35.8	5	64.6	23.2	0.095	400
1N6159A	48.5	25	38.8	5	70.1	21.4	0.095	400
1N6160A	53.2	20	42.6	5	77.0	19.5	0.095	400
1N6161A	58.9	20	47.1	5	85.3	17.6	0.1	400
1N6162A	64.6	20	51.7	5	97.1	15.4	0.1	400
1N6163A	71.3	20	56.0	5	103.1	14.5	0.1	400
1N6164A	77.9	15	62.2	5	112.8	13.3	0.1	400
1N6165A	86.5	15	69.2	5	125.1	12.0	0.1	400
1N6166A	95.0	12	76.0	5	137.6	10.9	0.1	400
1N6167A	104.5	12	83.6	5	151.3	9.9	0.1	400
1N6168A	114.0	10	91.2	5	165.1	9.1	0.1	400
1N6169A	123.5	10	98.8	5	178.8	8.4	0.105	400
1N6170A	142.5	8	114.0	5	206.3	7.3	0.105	400
1N6171A	152	8	121.6	5	218.4	6.9	0.105	400
1N6172A	171	5	136.8	5	245.7	6.1	0.11	400
1N6173A	190	5	152.0	5	273.0	5.5	0.11	400

POWER DISCRETES

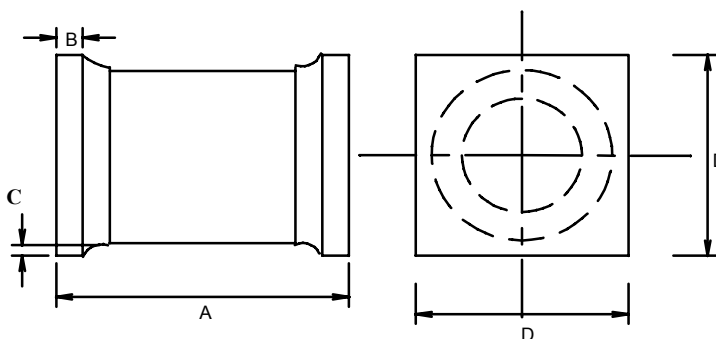
Ordering Information

Part Number	Description
1N6139AUS thru 1N6173AUS	Surface Mount(US) ⁽¹⁾

Note:

(1) Available in trays or tape and reel packaging. Please consult factory for quantities.

Outline Drawing



	Dimensions	
	1N6139AUS - 1N6173AUS	
	Inches	
	MIN	MAX
A	0.205	0.245
B	0.019	0.028
C	0.003	-
D	0.183	0.202

8

Contact Information

Semtech Corporation
 Power Discretes Products Division
 200 Flynn Road, Camarillo, CA 93012
 Phone: (805)498-2111 FAX (805)498-3804



DESCRIPTION

The 1N64xx series of transient voltage suppressors are designed to protect military and commercial electronic equipment from overvoltages caused by lightning, ESD, EFT, inductive load switching, and EMP. These devices are constructed using a p-n junction TVS diode in a hermetically sealed, voidless glass package. The hermetically sealed package provides high reliability in harsh environmental conditions. TVS diodes are further characterized by their high surge capability, low operating and clamping voltages, and a theoretically instantaneous response time. This makes them ideal for use as board level protection for sensitive semiconductor components. These devices are DESC QPL qualified to MIL-S-19500/551.

APPLICATIONS:

- Aerospace & Industrial Electronics
- Board Level Protection
- Airborne Systems
- Shipboard Systems
- Ground Systems

FEATURES:

- 500 Watts Peak Pulse Power ($t_p = 10/1000\mu s$)
- Voidless hermetically sealed glass package
- Metallurgically bonded
- High surge capacity
- Unidirectional
- Available in JTX, and JTXV versions per MIL-PRF-19500/551

MECHANICAL CHARACTERISTICS:

- Hermetically sealed glass package
- Tinned copper leads
- Marking : P/N, date code, logo, & cathode band

MAXIMUM RATINGS

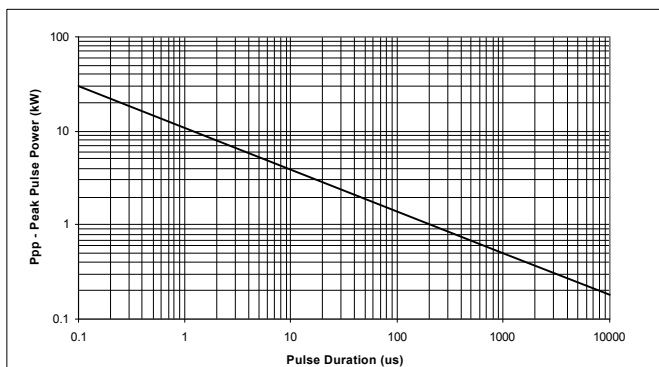
RATING	SYMBOL	VALUE	UNIT
Peak Pulse Power ($t_p = 10 \times 1000\mu s$)	Ppk	500	Watts
Operating Temperature	TJ	-65 to +175	°C
Storage Temperature	Tstg	-65 to +175	°C
Steady-State Power Dissipation @ TL = 75°C (3/8")	PD	3	Watts

ELECTRICAL CHARACTERISTICS @ 25°C (unless otherwise specified)

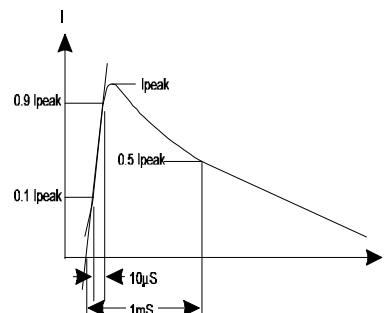
DEVICE TYPE	REVERSE STAND-OFF VOLTAGE V_{RWM}	REVERSE LEAKAGE CURRENT I_R	MINIMUM BREAKDOWN VOLTAGE $V_{BR} @ I_T$	TEST CURRENT I_T	MAXIMUM CLAMPING VOLTAGE $V_{CL} @ I_{PP}$	PEAK PULSE CURRENT I_{PP} $T_p = 1ms$	PEAK PULSE CURRENT I_{PP} $T_p = 20\mu s$	TEMPERATURE COEFFICIENT OF V_{BR} @ V_Z
	(V)	(μA)	(V)	(mA)	(V)	(A)	(A)	%/°C
1N6461	5	3000	5.6	25	9.0	56	315	0.040
1N6462	6	2500	6.5	20	11.0	46	258	0.040
1N6463	12	500	13.6	5	22.5	22	125	0.050
1N6464	15	500	16.4	5	26.5	19	107	0.060
1N6465	24	50	27.0	2	41.4	12	69	0.084
1N6466	30.5	3	33.0	1	47.5	11	63	0.093
1N6467	40.3	2	43.7	1	63.5	8	45	0.094
1N6468	51.6	2	54.0	1	78.5	6	35	0.096



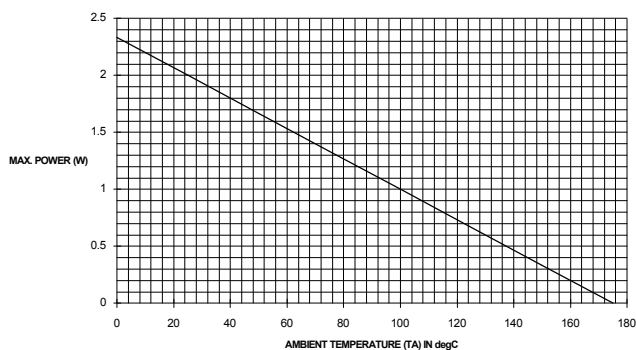
PEAK PULSE POWER vs. PULSE TIME



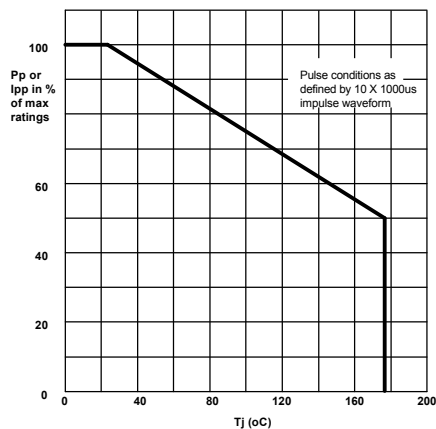
10x1000μs IMPULSE WAVEFORM



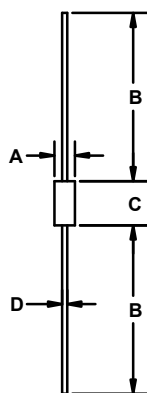
STEADY STATE DERATING CHARACTERISTICS FOR FREE AIR MOUNTING



PULSE DERATING CURVE



MECHANICAL OUTLINE



DIMENSIONS					
DIM ^N	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.115	0.140	2.92	3.56	
B	0.900	1.300	22.86	33.02	
C	0.150	0.300	3.81	7.62	2
D	0.037	0.042	0.94	1.07	2

- NOTES :
1. Controlling dimension is inches.
 2. Includes uncontrolled area of device leads.

SCHEMATIC



POWER DISCRETES

Description

The 1N64xx series of transient voltage suppressors are designed to protect military and commercial electronic equipment from overvoltages caused by lightning, ESD, EFT, inductive load switching, and EMP. These devices are constructed using a p-n junction TVS diode in a hermetically sealed, voidless glass package. The hermetically sealed package provides high reliability in harsh environmental conditions. TVS diodes are further characterized by their high surge capability, low operating and clamping voltages, and a theoretically instantaneous response time. This makes them ideal for use as board level protection for sensitive semiconductor components. These devices are DESC QPL qualified to MIL-S-19500/551.

Features

- ◆ 500 Watts peak pulse power ($t_p = 10/1000\mu s$)
- ◆ Voidless hermetically sealed glass package
- ◆ Metallurgically bonded
- ◆ High surge capacity
- ◆ Unidirectional
- ◆ Available in JTX, and JTXV versions per MIL-PRF-19500/551

Applications

- ◆ Aerospace and industrial electronics
- ◆ Board level protection
- ◆ Airborne systems
- ◆ Shipboard systems
- ◆ Ground systems

Mechanical Characteristics

- ◆ Hermetically sealed glass package

Absolute Maximum Ratings

Rating	Symbol	Value	Units
Peak Pulse Power ($t_p = 10 \times 1000\mu s$)	Ppk	500	Watts
Storage Temperature Range	T_{STG}	-65 to +175	°C
Steady-State Power Dissipation @ $T_L = 75^\circ C$ (3/8")	PD	3	Watts

Electrical Characteristics

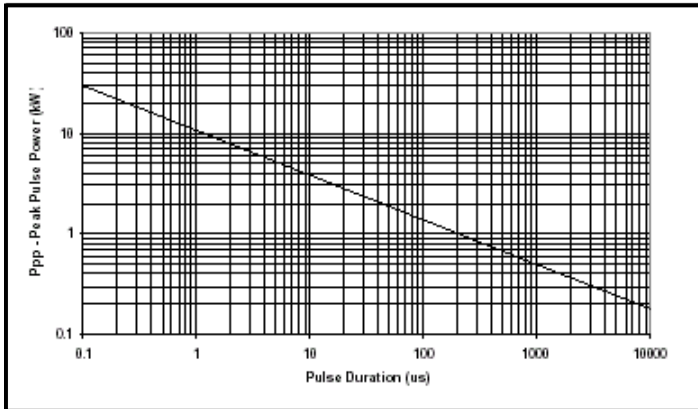
Electrical specifications @ $T_A = 25^\circ C$ unless otherwise specified.

Device Type	Reverse Standoff Voltage V_{RWM}	Reverse Leakage Current I_R	Minimum Breakdown Voltage $V_{BR} @ I_T$	Test Current I_T	Maximum Clamping Voltage $V_C @ I_{PP}$	Peak Pulse Current I_{PP} $T_p = 1ms$	Peak Pulse Current I_{PP} $T_p = 20\mu s$	Temp. Coef. of V_{BR} αV_Z
	V	μA	V	mA	V	A	A	%/°C
1N6461US	5	3000	5.6	25	9.0	56	315	0.040
1N6462US	6	2500	6.5	20	11.0	46	258	0.040
1N6463US	12	500	13.6	5	22.6	22	125	0.050
1N6464US	15	500	16.4	5	26.5	19	107	0.060
1N6465US	24	50	27.0	2	41.4	12	69	0.084
1N6466US	30.5	3	33.0	1	47.5	11	63	0.093
1N6467US	40.3	2	43.7	1	63.5	8	45	0.094
1N6468US	51.6	2	54.0	1	78.5	6	35	0.096

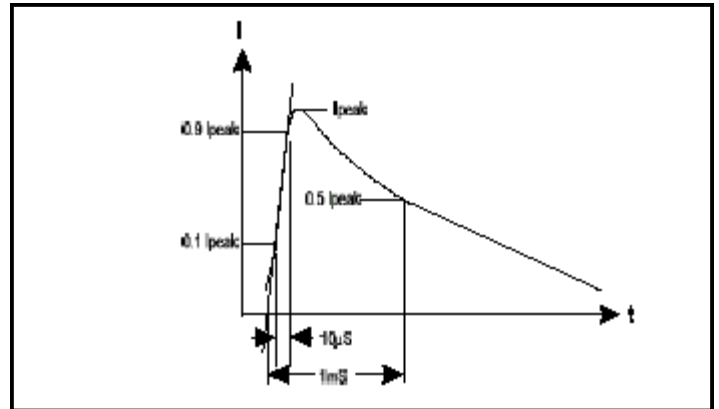
POWER DISCRETES

Electrical Characteristics

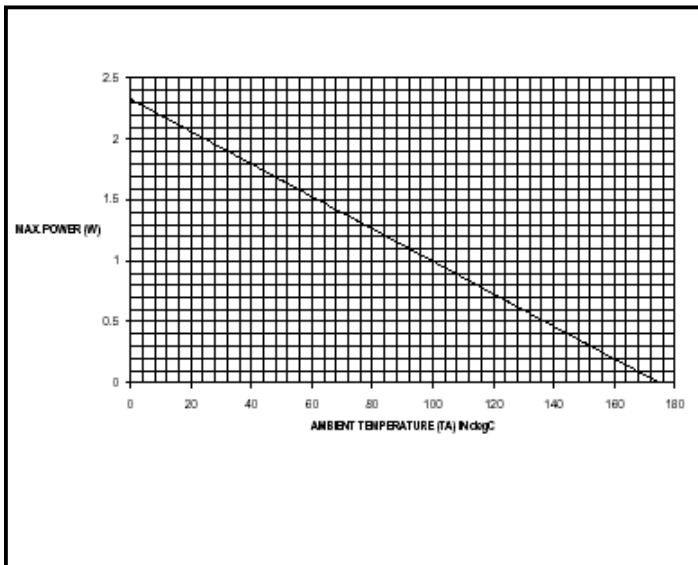
PEAK PULSE POWER vs. PULSE TIME



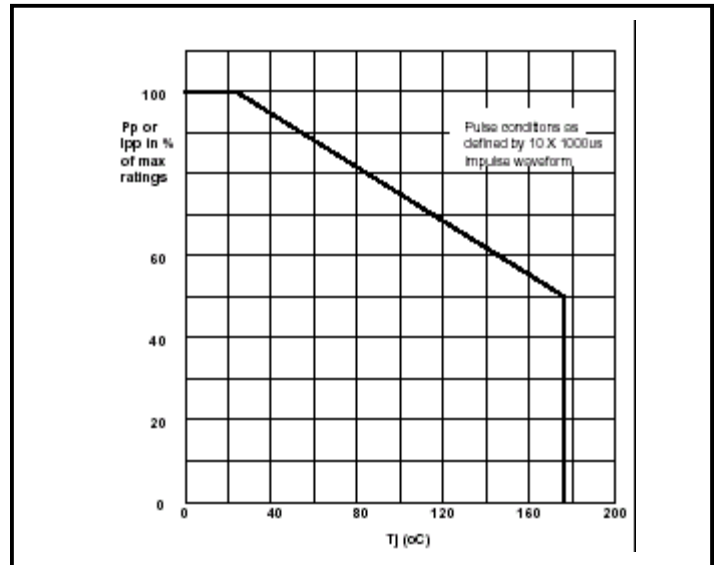
10 x 1000μs IMPULSE WAVEFORM



STEADY STATE DERATING CHARACTERISTICS
FOR FREE AIR MOUNTING



PULSE DERATING CURVE



POWER DISCRETES

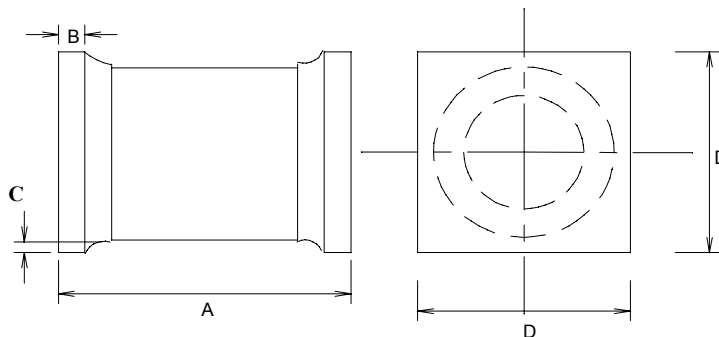
Ordering Information

Part Number	Description
1N6461US, 1N6462US, 1N6463US, 1N6464US, 1N6465US, 1N6466US, 1N6467US, 1N6468US	Surface Mount (US) ⁽¹⁾

Note:

(1) Available in trays and tape and reel packaging. Please consult factory for quantities.

Outline Drawing



	Dimensions			
	1N6461US - 1N6468US			
	Inches		Millimeters	
	MIN	MAX	MIN	MAX
A	0.200	0.225	5.08	5.72
B	0.019	0.028	0.48	0.71
C	0.003	-	0.08	-
D	0.137	0.148	3.48	3.76

Notes:

(1) Dimensions are in inches.

(2) Metric equivalents are given for general information only.

Contact Information

Semtech Corporation
Power Discretes Products Division
200 Flynn Road, Camarillo, CA 93012
Phone: (805)498-2111 FAX (805)498-3804



DESCRIPTION

The 1N64xx series of transient voltage suppressors are designed to protect military and commercial electronic equipment from overvoltages caused by lightning, ESD, EFT, inductive load switching, and EMP. These devices are constructed using a p-n junction TVS diode in a hermetically sealed, voidless glass package. The hermetically sealed package provides high reliability in harsh environmental conditions. TVS diodes are further characterized by their high surge capability, low operating and clamping voltages, and a theoretically instantaneous response time. This makes them ideal for use as board level protection for sensitive semiconductor components. These devices are DSCC QPL qualified to MIL-PRF-19500/552.

APPLICATIONS:

- Aerospace & Industrial Electronics
- Board Level Protection
- Airborne Systems
- Shipboard Systems
- Ground Systems

FEATURES:

- 1500 Watts Peak Pulse Power ($t_p = 10/1000\mu s$)
- Voidless hermetically sealed glass package
- Metallurgically bonded
- High surge capacity
- Unidirectional
- Available in **JAN**, **JTX**, and **JTXV** versions per MIL-PRF-19500/552

MECHANICAL CHARACTERISTICS:

- Hermetically sealed glass package
- Tinned copper leads
- Marking : P/N, date code, logo, & cathode band

MAXIMUM RATINGS

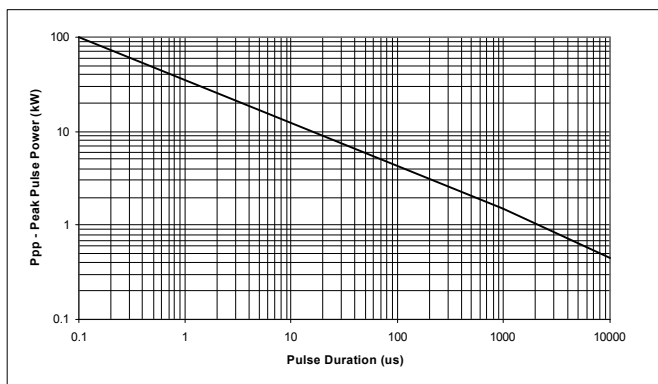
RATING	SYMBOL	VALUE	UNIT
Peak Pulse Power ($t_p = 10 \times 1000\mu s$)	Ppk	1500	Watts
Operating Temperature	Tj	-65 to +175	°C
Storage Temperature	Tstg	-65 to +175	°C
Steady-State Power Dissipation @ TL = 75°C (3/8")	PD	5	Watts

ELECTRICAL CHARACTERISTICS @ 25°C (unless otherwise specified)

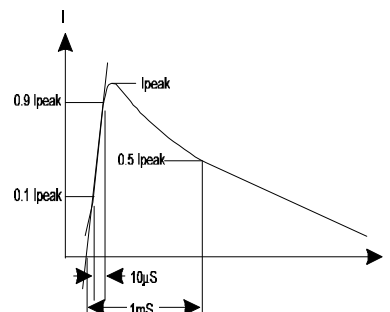
DEVICE TYPE	REVERSE STAND-OFF VOLTAGE V _{RWM}	REVERSE LEAKAGE CURRENT I _R	MINIMUM BREAKDOWN VOLTAGE V _{BR} @ I _T	TEST CURRENT I _T	MAXIMUM CLAMPING VOLTAGE V _c @ I _{pp}	PEAK PULSE CURRENT I _{pp} T _p = 1mS	PEAK PULSE CURRENT I _{pp} I _p = 20μS	TEMPERATURE COEFFICIENT OF V _{BR} αVZ
	(V)	(μA)	(V)	(mA)	(V)	(A)	(A)	% / °C
1N6469	5	1500	5.6	50	9.0	167	945	0.040
1N6470	6	1000	6.5	50	11.0	137	775	0.040
1N6471	12	20	13.6	10	22.6	66	374	0.050
1N6472	15	10	16.4	10	26.5	57	322	0.060
1N6473	24	5	27.0	5	41.4	36.5	206	0.084
1N6474	30.5	5	33.0	1	47.5	32	190	0.093
1N6475	40.3	5	43.7	1	63.5	24	136	0.094
1N6476	51.6	5	54.0	1	78.5	19	106	0.096



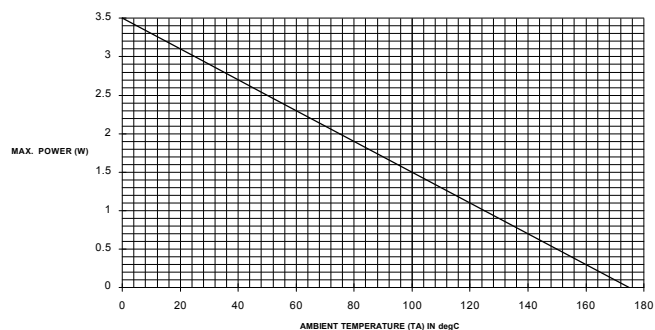
PEAK PULSE POWER vs. PULSE TIME



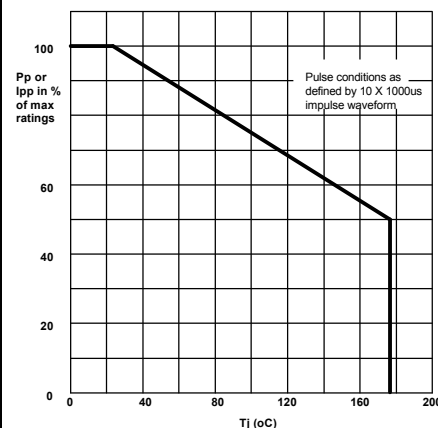
10x1000μs IMPULSE WAVEFORM



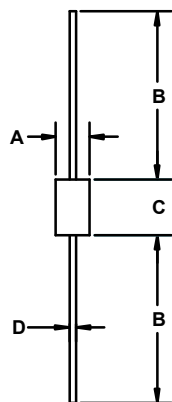
STEADY STATE DERATING CHARACTERISTICS FOR FREE AIR MOUNTING



PULSE DERATING CURVE



MECHANICAL OUTLINE



DIMENSIONS					
DIM ^N	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.150	0.185	3.81	4.70	
B	0.900	1.300	22.86	33.02	
C	0.160	0.375	4.06	9.53	2
D	0.037	0.042	0.94	1.07	2

NOTES :

1. Controlling dimension is inches.
2. Includes uncontrolled area of device leads.

SCHEMATIC



POWER DISCRETES

Description

The 1N64xx series of transient voltage suppressors are designed to protect military and commercial electronic equipment from overvoltages caused by lightning, ESD, EFT, inductive load switching, and EMP. These devices are constructed using a p-n junction TVS diode in a hermetically sealed, voidless glass package. The hermetically sealed package provides high reliability in harsh environmental conditions. TVS diodes are further characterized by their high surge capability, low operating and clamping voltages, and a theoretically instantaneous response time. This makes them ideal for use as board level protection for sensitive semiconductor components. These devices are DSCC QPL qualified to MIL-PRF-19500/552.

Features

- ◆ 1500 Watts peak pulse power ($t_p = 10/1000\mu s$)
- ◆ Voidless hermetically sealed glass package
- ◆ Metallurgically bonded
- ◆ High surge capacity
- ◆ Unidirectional
- ◆ Available in JAN, JTX, and JTXV versions per MIL-PRF-19500/552

Applications

- ◆ Aerospace and industrial electronics
- ◆ Board level protection
- ◆ Airborne systems
- ◆ Shipboard systems
- ◆ Ground systems

Mechanical Characteristics

- ◆ Hermetically sealed glass package

Absolute Maximum Ratings

Rating	Symbol	Value	Units
Peak Pulse Power ($t_p = 10 \times 1000\mu s$)	Ppk	1500	Watts
Operating Temperature Range	T _j	-65 to +175	°C
Storage Temperature Range	T _{STG}	-65 to +175	°C
Steady-State Power Dissipation @ TL = 75°C (3/8")	PD	5	Watts

Electrical Characteristics

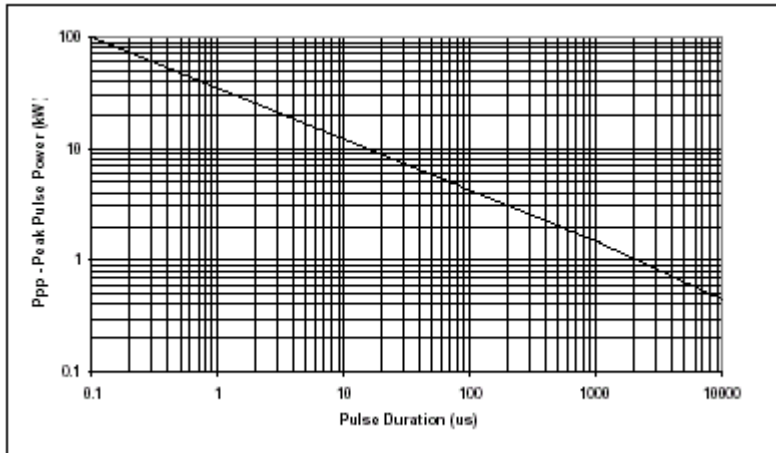
Electrical specifications @ T_A = 25°C unless otherwise specified.

Device Type	Reverse Standoff Voltage V _{RWM}	Reverse Leakage Current I _R	Minimum Breakdown Voltage V _{BR} @ I _T	Test Current I _T	Maximum Clamping Voltage V _C @ I _{PP}	Peak Pulse Current I _{PP} T _p = 1mS	Peak Pulse Current I _{PP} T _p = 20μS	Temp. Coef. of V _{BR} αV _Z
	V	μA	V	mA	V	A	A	%/°C
1N6469	5	1500	5.6	50	9	167	945	0.040
1N6470	6	1000	6.5	50	11.0	137	775	0.040
1N6471	12	20	13.6	10	22.6	66	374	0.050
1N6472	15	10	16.4	10	26.5	57	322	0.060
1N6473	24	5	27.0	5	41.4	36.5	206	0.084
1N6474	30.5	5	33.0	1	47.5	32	190	0.093
1N6475	40.3	5	43.7	1	63.5	24	136	0.094
1N6476	51.6	5	54.0	1	78.5	19	106	0.096

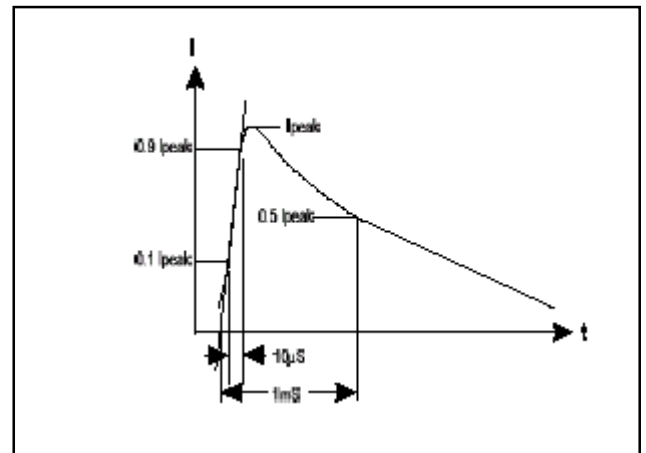
POWER DISCRETES

Electrical Characteristics

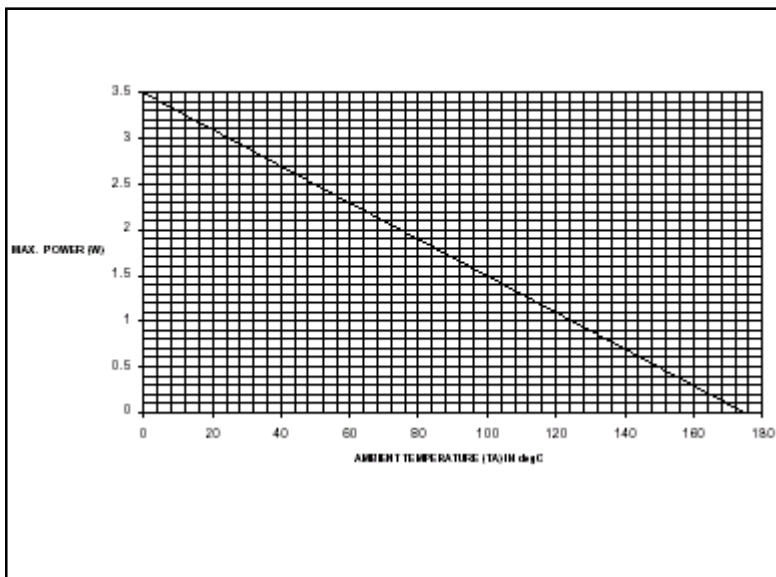
PEAK PULSE POWER vs. PULSE TIME



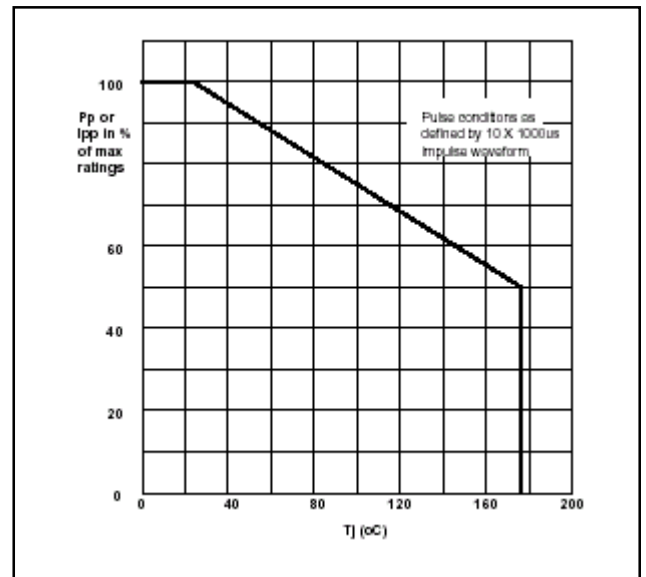
10 x 1000μs IMPLUSE WAVEFORM



STEADY STATE DERATING CHARACTERISTICS
FOR FREE AIR MOUNTING



PULSE DERATING CURVE



POWER DISCRETES

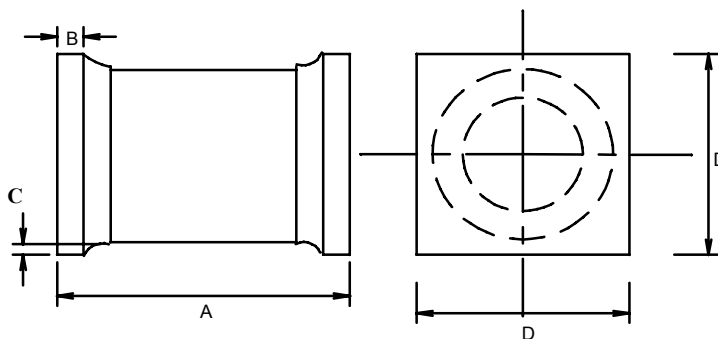
Ordering Information

Part Number	Description
1N6469US, 1N6470US, 1N6471US, 1N6472US, 1N6473US, 1N6474US, 1N6475US, 1N6476US	Surface Mount (US) ⁽¹⁾

Note:

(1) Available in trays and tape and reel packaging. Please consult factory for quantities.

Outline Drawing



	Dimensions	
	1N6469US - 1N6476US	
	Inches	
	MIN	MAX
A	0.205	0.245
B	0.019	0.028
C	0.003	-
D	0.183	0.202

8

Contact Information

Semtech Corporation
Power Discretes Products Division
200 Flynn Road, Camarillo, CA 93012
Phone: (805)498-2111 FAX (805)498-3804

**DESCRIPTION**

The 60KS200C & 90KS200C series of bidirectional transient voltage suppression modules are designed for use in shipboard equipment and other power servicing equipment. These modules protect sensitive semiconductor components from transients resulting from power interruptions and shore power switch-over. The sub-assemblies are metallurgically bonded and packaged in a hermetically sealed package. The hermetically sealed package provides high reliability in harsh environmental conditions. TVS modules are most often used in applications where discrete TVS diodes do not have high enough surge handling capability to suppress large power surges.

SCREENING:

100% Screening is available per MIL-S-19500/516. For ordering use the following suffix:

H1 - Submodule screening

H2 - Submodule & module screening

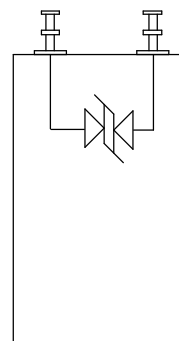
H3 - Submodule & module screening + Group B & C

FEATURES:

- 60,000 & 90,000 watts Peak Pulse Power ($t_p = 1.5 \times 40\mu s$)
- 200 Volts Bidirectional
- For use in shipboard power servicing equipment
- Bidirectional
- Custom voltages available from factory.

MECHANICAL CHARACTERISTICS:

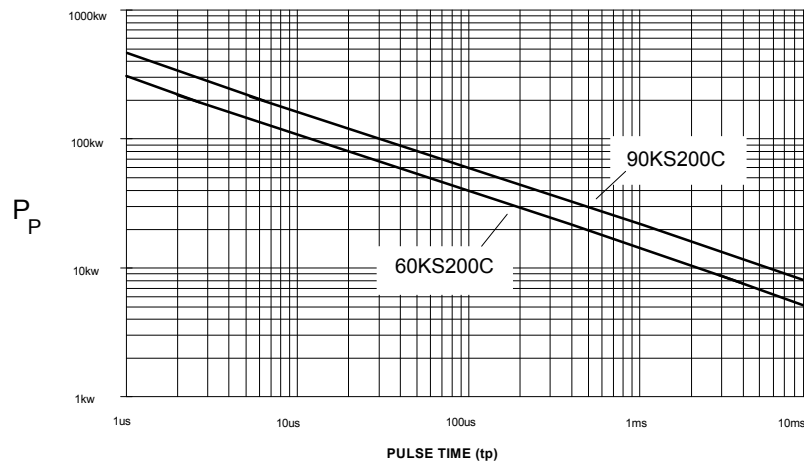
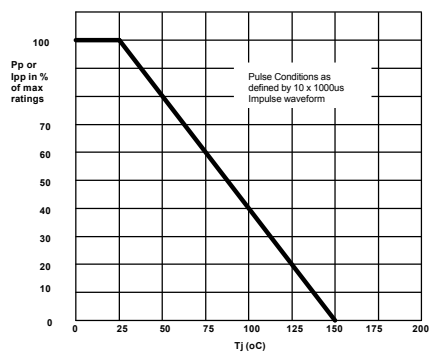
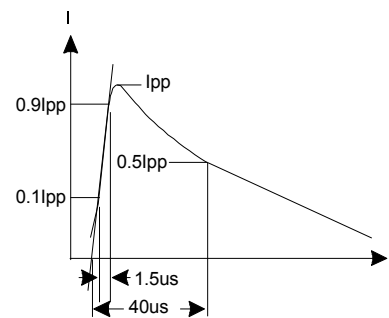
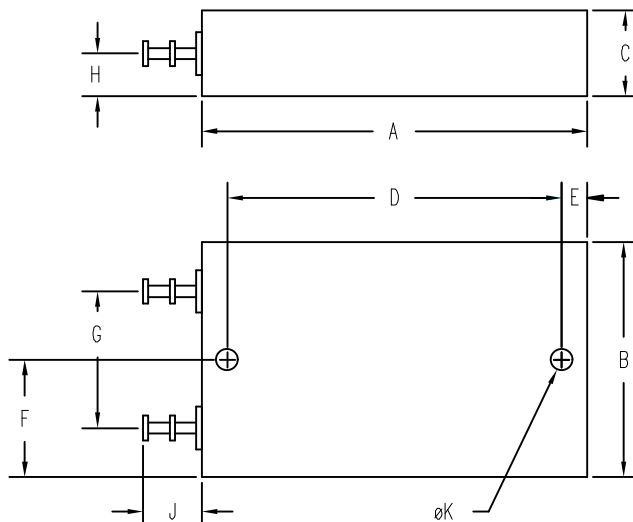
- Molded Case
- Readily solderable terminals
- Marking : Logo, part number, and date code

SCHEMATIC**8****MAXIMUM RATINGS**

RATING	SYMBOL	VALUE	UNIT
Peak Pulse Power ($t_p = 1.5 \times 40\mu s$)	Ppk	60,000 & 90,000	Watts
Operating Temperature	Tj	-65 to +150	°C
Storage Temperature	Tstg	-65 to +150	°C

ELECTRICAL CHARACTERISTICS @ 25°C (unless otherwise specified)

PART NUMBER	REVERSE STAND-OFF VOLTAGE V_{RWM} (V)	REVERSE LEAKAGE CURRENT I_R (μA)	BREAKDOWN VOLTAGE V_{BR} @ I_R Min. Max (V)	TEST CURRENT I_T (mA)	MAXIMUM CLAMPING VOLTAGE V_C @ I_{pp} (V)	PEAK PULSE CURRENT I_{pp} $t_p = 1.5 \times 40\mu s$ (A)	MAXIMUM PEAK PULSE POWER $t_p = 1.5 \times 40\mu s$ (kw)
60KS200C	180	10	200 - 225	1	335	180	60
90KS200C	180	0.5	200 - 225	1	280	180	90

**PEAK PULSE POWER vs. PULSE TIME****PULSE DERATING CURVE****1.5x40μs IMPULSE WAVEFORM****MECHANICAL OUTLINE****90KS200C**

DIMENSIONS					
DIM ^N	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	2.22	2.50	56.3	63.5	
B	1.35	1.90	34.2	48.3	
C	.47	0.55	11.9	13.9	
D	1.88	1.92	47.8	48.8	
E	.135	0.30	3.4	7.6	
F	.66	0.95	16.7	24.1	
G	.98	1.02	24.9	25.9	
H	.26	.29	6.5	7.5	
J	.325	.365	8.2	9.3	
K	.193	.205	5.35	5.65	DIA.

60KS200C

DIMENSIONS					
DIM ^N	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	2.22	2.28	56.3	58.0	
B	1.35	1.40	34.2	35.6	
C	.47	.53	11.9	13.5	
D	1.93	1.97	49.0	50.1	
E	.135	.165	3.4	4.2	
F	.66	.72	16.7	18.3	
G	.77	.83	19.5	21.1	
H	.22	.28	5.5	7.2	
J	.325	.365	8.2	9.3	
K	.120	.130	3.0	3.3	DIA

DESCRIPTION

The 704-15K36 & 704-15K36T series of transient voltage suppression modules are for use primarily in avionics equipment. This series meets all applicable environmental requirements of MIL-S-19500. The sub-assemblies are metallurgically bonded and packaged in a hermetically sealed package. The hermetically sealed package provides high reliability in harsh environmental conditions. In addition, the subassemblies can be 100% TX screened per MIL-S-19500/516 or /507. Although this series has been designed for 28 volt aircraft applications, different voltages may be special ordered for specific applications.

TVS modules are most often used in applications where discrete TVS diodes do not have high enough surge handling capability to suppress large power surges.

SCREENING:

100% Screening is available per MIL-S-19500/516. For ordering use the following suffix:

H1 - Submodule screening

H2 - Submodule & module screening

H3 - Submodule & module screening + Group B & C

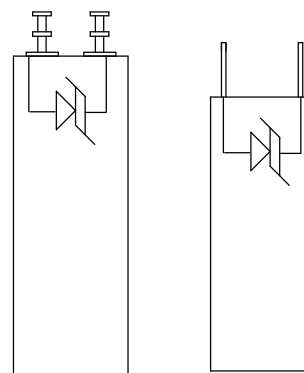
FEATURES:

- 15,000 watts Peak Pulse Power ($t_p = 10 \times 1000\mu s$)
- 28 Volt power supply protection
- For use in airborne equipment
- Unidirectional
- Custom voltages available from factory.

MECHANICAL CHARACTERISTICS:

- Molded Case
- Readily solderable terminals
- Marking : Logo, part number, and date code

SCHEMATIC



MAXIMUM RATINGS

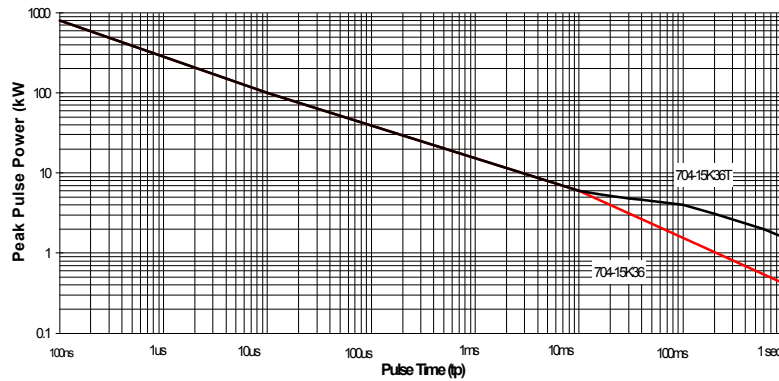
RATING	SYMBOL	VALUE	UNIT
Peak Pulse Power ($t_p = 10 \times 1000\mu s$)	Ppk	15,000	Watts
Operating Temperature	Tj	-65 to +150	°C
Storage Temperature	Tstg	-65 to +150	°C

ELECTRICAL CHARACTERISTICS @ 25°C (unless otherwise specified)

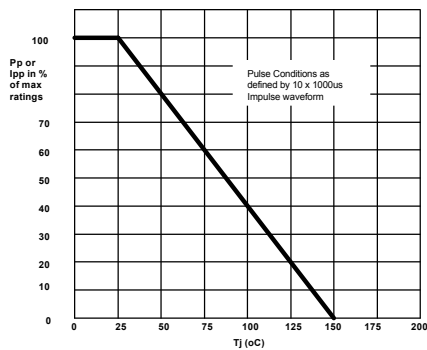
PART NUMBER	REVERSE STAND-OFF VOLTAGE V _{RWM}	REVERSE LEAKAGE CURRENT I _R	MINIMUM BREAKDOWN VOLTAGE V _{BR} @ I _T	TEST CURRENT I _T	MAXIMUM CLAMPING VOLTAGE V _C @ I _{pp}	PEAK PULSE CURRENT I _{pp} T _p = 1ms	MAXIMUM FORWARD VOLTAGE 8.3ms I _F = 100A
	(V)	(μA)	(V)	(mA)	(V)	(A)	(V)
704-15K36	31.5	100	36	10	51	300	3.0
704-15K36T	31.5	500	36	10	51	300	15.0



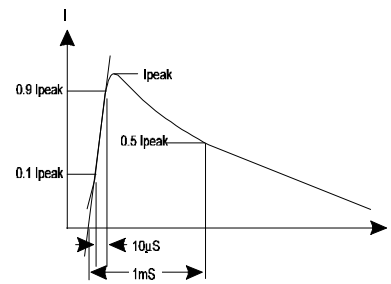
PEAK PULSE POWER vs. PULSE TIME



PULSE DERATING CURVE

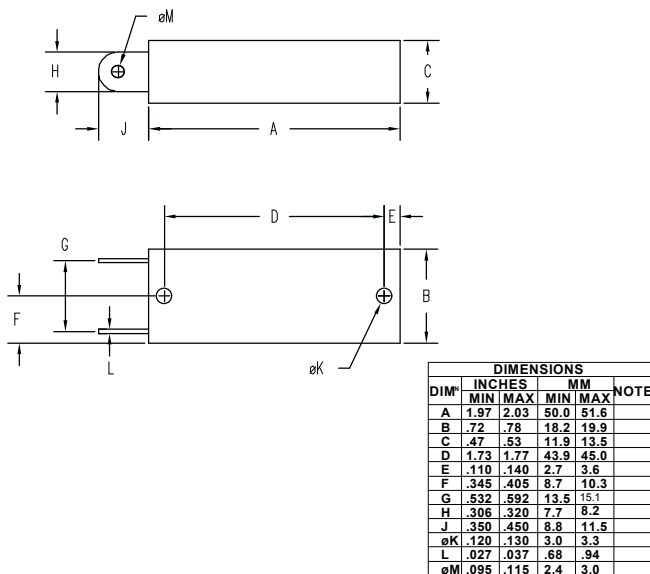


10/1000μs IMPULSE WAVEFORM

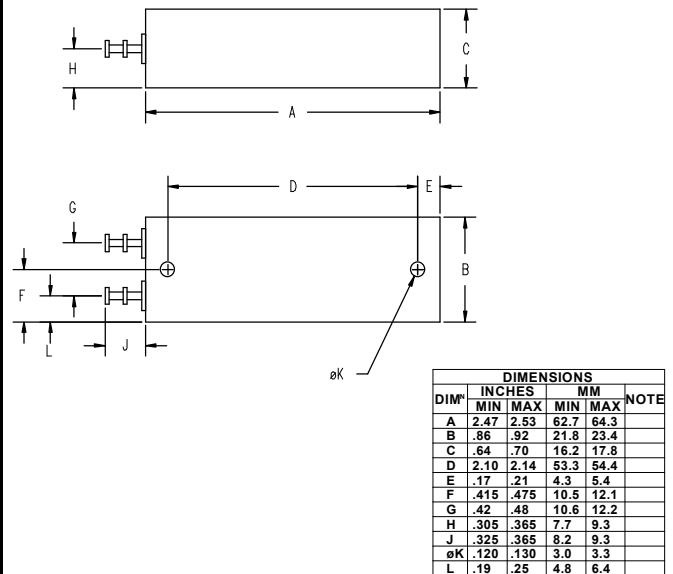


8

MECHANICAL OUTLINE - 704-15K36



MECHANICAL OUTLINE - 704-15K36T



Chapter 9

High Voltage Capacitors

Datasheet No.	Title:
180pF-.39uF	High Voltage Capacitors

POWER DISCRETES**Description**

**Semtech Premium Dielectric
High Voltage Capacitors
Monolithic Ceramic type**

Semtech's premium dielectric capacitors demonstrate minimum capacitance change over the operation voltage and temperature range, high current carrying capability and high volumetric efficiency. This X7R body has been designed into the most demanding applications: from the one extreme of satellite, missile, space shuttle, and avionics programs to the other extreme of "down hole" oil exploration equipment.

Features

- ◆ X7R dielectric
- ◆ 1kV to 5kV voltage range

General Specifications

- ◆ Operating temperature range -55°C to 125°C
- ◆ Aging rate <1.0% per decade hour
- ◆ Insulation resistance: 100k megΩ or 1000megΩ microfarads, whichever is less, at 500VDC, 25°C
- ◆ Dissipation factor: 2.5% max at 1kHz 1 VAC, 25°C
- ◆ Dielectric withstanding voltage: 1.2 x rated voltage at 25°C (Test conducted with charging current limited to 10mA and discharge current limited to 10A)
- ◆ Temperature coefficient: ± 15% over -55°C to 125°C range
- ◆ "S" size package type available

POWER DISCRETES
Capability Matrix

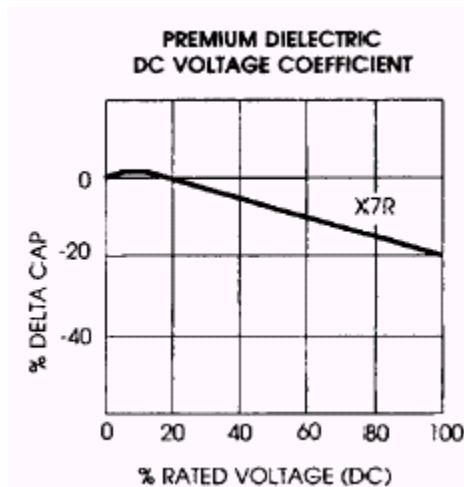
	1kV					2kV					3kV					4kV					5kV					EIA CODE
SIZE	2	3	4	5	6	2	3	4	5	6	2	3	4	5	6	2	3	4	5	6	2	3	4	5	6	
VALUE																										
180pF																										181
220pF																										221
270pF																										271
330pF																										331
390pF																										391
470pF																										471
560pF																										561
680pF																										681
820pF																										821
1000pF																										102
1200pF																										122
1500pF																										152
1800pF																										182
2200pF																										222
2700pF																										272
3300pF																										332
3900pF																										392
4700pF																										472
5600pF																										562
6800pF																										682
8200pF																										822
.010uF																										103
.012uF																										123
.015uF																										153
.018uF																										183
.022uF																										223
.027uF																										273
.033uF																										333
.039uF																										393
.047uF																										473
.056uF																										563
.068uF																										683
.082uF																										823
.10uF																										104
.12uF																										124
.15uF																										154
.18uF																										184
.22uF																										224
.27uF																										274
.33uF																										334
.39uF																										394

 = Standard range K tolerance available from stock.

 = Non standard capabilities

POWER DISCRETES

Typical Characteristic

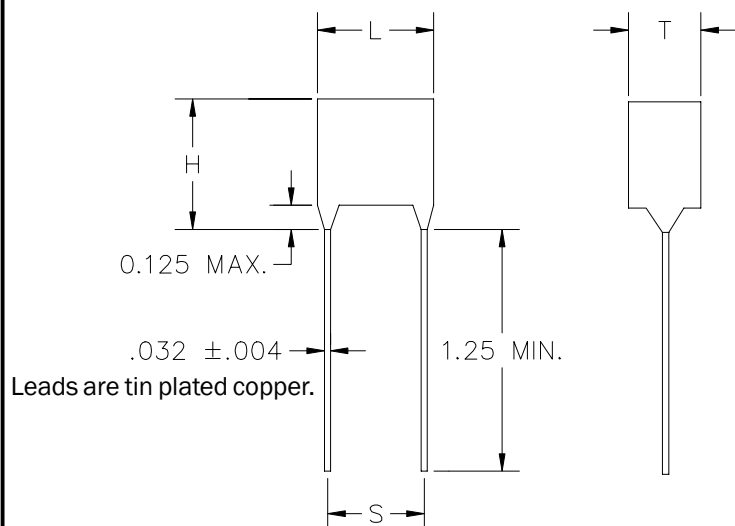


Ordering Information

3	A		X	103	K	2
PART SIZE CODE	FORM		DIELECTRIC MATERIAL	CAPACITANCE (EIA CODE)	CAPACITANCE TOLERANCE	VOLTAGE RATING
2	CHIP	LEADED	X = X7R	Last digit indicates number of zeroes following the first two digits Example: 103=10000pF	K = 10% M = 20% V = +100% - 0% Z = +80% - 20%	1 = 1kV 2 = 2kV 3 = 3kV 4 = 4kV 5 = 5kV
3	A = Silver Termination	E = Epoxy Encapsulated L = Leaded only				
4	D = Palladium Silver Termination					
5	H = Capable of handling temperature excursions of up to 200°C					
6						

Note:

- For "S" size package type, please order part as "SXXXXXXXX" e.g. S3AX103K2.

POWER DISCRETES
Outline Drawing - Encapsulated


Dimensions				
Size Code	L(Max) In. (mm)	S In.(mm)	T(Max) In.(mm)	H(Ref) ⁽¹⁾ In.(mm)
2	.400 (10.2)	.300 ± .032 (7.62 ± .82)	.275 (7.00)	.475 (12.1)
3	.500 (12.7)	.400 ± .032 (10.2 ± .82)	.300 (7.62)	.575 (14.6)
4	.600 (15.3)	.500 ± .032 (12.7 ± .82)	.375 (9.53)	.675 (17.1)
5	.700 (17.8)	.600 ± .032 (15.3 ± .82)	.375 (9.53)	.775 (19.7)
6	.800 (20.4)	.700 ± .032 (17.8 ± .82)	.375 (9.53)	.875 (22.2)

Notes:

1. Maximum mounting height. Leads shall be solderable beyond this point.
2. When ordering "S" size package type please see Dimension Table "S".

Dimensions for "S" Size ⁽²⁾				
Size Code	L(Max) In. (mm)	S In.(mm)	T(Max) In.(mm)	H(Ref) ⁽¹⁾ In.(mm)
S2	0.42 (10.7)	.275 ± .03 (6.96 ± .76)	0.35 (8.89)	0.3 (8.89)
S3	0.49 (12.4)	.375 ± .03 (9.52 ± .76)	0.35 (8.89)	0.4 (10.16)
S4	0.59 (14.9)	.475 ± .03 (12.06 ± .76)	0.35 (8.89)	0.5 (12.7)
S5	0.69 (17.5)	.575 ± .03 (14.6 ± .76)	0.35 (8.89)	0.6 (15.24)
S6	0.79 (20.0)	.675 ± .03 (17.14 ± .76)	0.35 (8.89)	0.72 (18.28)

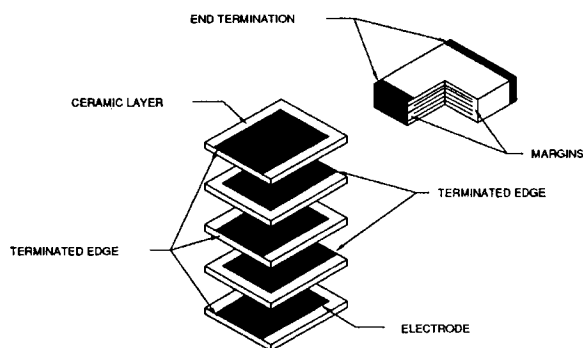
HIGH VOLTAGE CERAMIC CAPACITORS

I. FUNCTION

A Capacitor is a component that stores electrical charge. In its simplest form it consists of two conductive surfaces separated by an electrical insulator or dielectric. The stored charge is determined by the dielectric constant of the insulator material and the geometry of the construction.

Figure 1 shows the internal structure of a typical monolithic ceramic capacitor.

Fig.1 CAPACITOR CONSTRUCTION



II. BASIC PROPERTIES

(Electrical, sizes, configuration)

A. Electrical

1. **Capacitance.** Table 1 compares the dielectric constants of air, glass, mica, and paper with three of the commonly used ceramics. As can be seen the crystalline ceramics have extremely high K in comparison to the others. Barium Titanate is the basic material used in the manufacture of ceramic dielectric. It is produced by reacting barium oxide with titanium dioxide under controlled conditions. Barium Titanate has

ferroelectric properties. As a dielectric it exhibits strong hysteresis. Capacitance varies widely over a fairly narrow temperature range which limits use of Barium Titanate as a ceramic dielectric in its pure form. By adding other oxides the basic characteristics can be modified to make the dielectric more desirable electrically and flatten its response over the operating temperature range. These additives are variously referred to as shifters, depressors, fluxes, or stabilizers, depending on how they effect the Barium Titanate characteristics

Table 1 DIELECTRIC CONSTANTS

MATERIAL	" K "
AIR	1.0006
GLASS	7.0 - 10.0
MICA	5.0 - 7.0
PAPER	4.0 - 7.0
NPO (Class I-A)	25 - 100
X7R (Class II-A)	300 - 1800
Z5U (Class II-B)	2500 - 15000

As noted in Table 1, there are three basic ceramic formulations available in capacitors. They are NPO, X7R, and Z5U. Mathematically capacitance can be described as $C = \frac{n(0.224KA)}{t}$.

Where C is capacitance in picofarads
n is the number of capacitors in parallel,
K is the dielectric constant
A is the area of opposed conductors in inches squared
0.224 is the dimensional constant, and is the dielectric thickness in inches.



Capacitance then is directly proportional to dielectric constant, K.

2. **Dissipation Factor.** The dissipation factor is an overall measure of losses in the capacitor. It is related to dielectric type temperature and frequency. Figure 2 shows typical values for X7R. NPO is nearly unchanged with temperature.

B. TEMPERATURE EFFECTS

Barium Titanate is cubic above 120°C. As it is cooled through this temperature (the Curie temperature) the structure becomes tetragonal and distorted such that electric dipoles exist. Additional transformations occur at about 0°C and -85°C. The dipoles produce a large dielectric constant due to their ability to respond to an electric field and store energy. The transformation at 120°C produces an anomalously large dielectric constant (up to 160000). Commercial ceramics are made by adding chemicals which shift or suppress the Curie point to some degree (Z5U and X7R) or squash it entirely by eliminating the cubic to tetragonal transformation (NPO). Figure 3 shows the typical responses of commercial bodies to temperature.

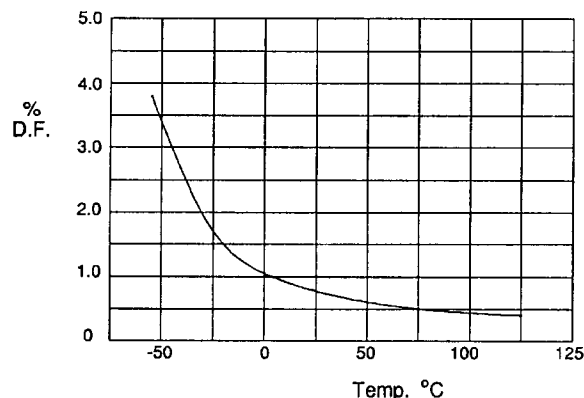


Fig 2. Typical Dissipation Factor vs Temperature

C. Voltage Effects

When voltage is applied the capacitance shifts considerably as shown in Figure 4 and Table 2. The overall volume efficiency of capacitors also change as shown in

Table 2. Here, dielectric constants are assumed to be 70, 1250, and 7000 for NPO, X7R, and Z5U respectively.

Figure 3. Temperature Coefficient

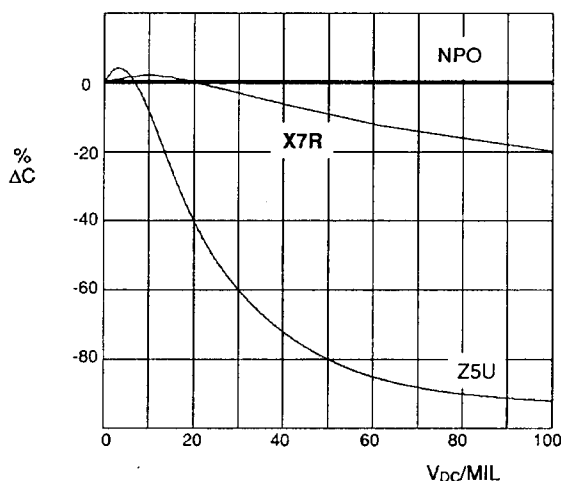
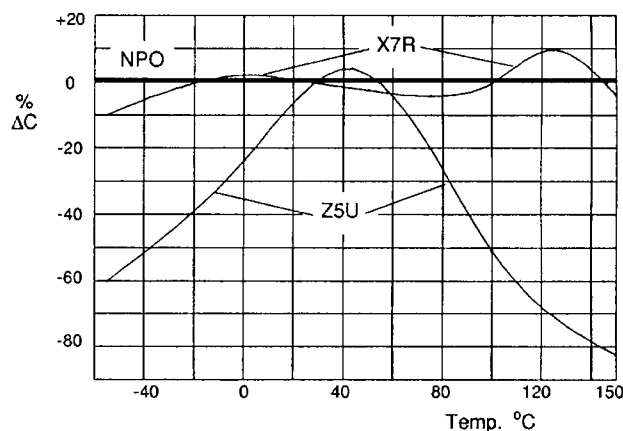


Figure 4. DC voltage Coefficient

Table 2. Volume Efficiency Comparison, Applied Working Voltage

DC Volts	0	2000	4000
DC/MIL	0	50	100
NPO	0.513/14.25	0.513/14.25	0.513/14.25
X7R	4.24/120	4.00/111	3.47/96
Z5U	5.26/156	1.12/31.1	0.592/16.4

Legend: (CAP/EFFICIENCY) nF/(nF/in³)



Fig 3 TEMPERATURE COEFFICIENT

For the same part size, say $0.45 \times 0.40 \times 0.20$, and voltage rating, say 5KV the required dielectric thickness would be about 25, 37, and 80 mils for the three materials. The capacitance for such parts is shown in Table 2 as a function of the applied voltage.

The efficiency of X7R for high voltage comes from a combination of good voltage withstanding properties, modest capacitance loss with voltage, and a relatively high basic dielectric constant. Another parameter to consider is break-down voltage or dielectric strength of a capacitor body. For any given thickness there is a maximum stress that can safely be applied to a dielectric before breakdown occurs (Figure 5). For example, a 6kV flash breakdown requirement for Z5U dielectric would result in a dielectric thickness of about 80 mils. An X7R dielectric of about 37 mils would easily meet the 6KV requirement. The Z5U part does not have adequate volumetric efficiency at high working voltages. The flash voltage, or over-rating as it is sometimes referred to, is a value which should be based on potential transient voltages that a capacitor may encounter. Instead the flash voltage is often determined by an arbitrary safety factor of 1.5 to 2 times the working voltage. Safety factors are mandatory for

reliable operation, however excessive over-rating creates problems for designer and user alike.

An X7R unit with a dielectric strength requirement of 4kV is 22 mils thick. If a traditional 50% safety margin is used, flash voltage increase to 6kV and the dielectric thickness increases to 40 mils. This in turn reduces capacitance and volume efficiency by 50%. Unnecessary over-rating similarly effects all type of dielectrics. When voltage is applied to a ceramic dielectric, the degree of polarization, and thus the capacitance, will vary as a function of voltage stress. (Figure 4). This property is known as the voltage coefficient of capacitance. The amount of variation is determined by the specific dielectric formulation, consequently each dielectric type has a distinct characteristic voltage coefficient curve. At 100 V/Mil, for example, NPO is virtually unaffected by the voltage, while Z5U has only 10% of its 1VDC biased capacitance. It is important to note that capacitors are normally specified at zero or 1V DC bias even though they do not operate at that bias level. The circuit designer should have access to data that reflects the true capacitance at operating voltage.

D. Frequency Effects

Frequency effects are like voltage effects in that NPO is less affected than X7R which is less affected than Z5U. NPO shows virtually no capacitance change up to 1MHz and although the DF may double between 1 KHz and 1 MHz the values are typically 0.02 to 0.04%.

E. Aging

When a ceramic capacitor is fired to a solid monolithic its internal grain structure is permanently set. When the ferroelectric types are cooled through the Curie point the grains divide into domains which reduces the strain energy of the body. With time these domains continue to divide until a balance is reached between stress relief and the energy required to form additional domain walls. The result is a decrease in

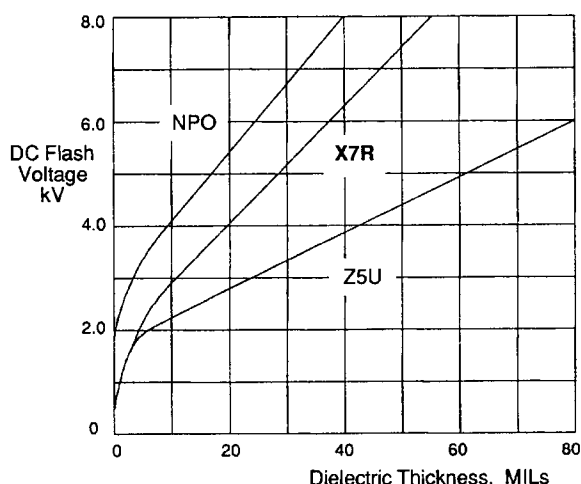


Figure 5. Relative Flash Test Voltage



capacitance with time. X7R bodies age at 2% per decade hour (depending upon type). Z5U ages at 3 to 4% per decade hour and NPO does not age as it is not ferroelectric. The aging cycle restarts every time the capacitor is heated above the Curie temperature such as during a soldering operation or a high temperature burn-in.

III. APPLICATION NOTES

A. Capacitor Mounting Techniques

Some Semtech High Voltage Ceramic Capacitors are supplied without leads. Because they are high voltage rated, connections should be solid and large in proportion to the termination area. Soldering is one of the strongest of the bonding methods and is the least electrically resistive. To prevent catastrophic thermal

shock, the chip should be slowly elevated in temperature to approximately 120°C prior to soldering. A good hot plate will provide an even temperature surface. Solder connections should be made quickly removing the soldering iron as soon as the connection is made to prevent leaching of the electrodes. Silver bearing solders are recommended to prevent leaching.

B. Surge Current

Charge and discharge currents are directly proportional to voltage. Excessive charging current can trigger a piezoelectric effect and result in destruction of the part. Excessive rate of discharge is not critical in terms of piezoelectric effect, but can result in loss of metallization during the discharge arc.

Chapter 10

TVS Application Notes

Datasheet No.	Title:
SI96-01	What are TVS Diodes?
SI96-02	TVS Diodes Selection
SI96-03	TVS Peak Pulse Power vs. Pulse Duration
SI96-04	TVS Power Derating vs. Temperature
SI96-09	Sources of Transients: Lightning
SI96-10	Sources of Transients: Electrostatic Discharge
SI97-02	Calculating Transient Energy
SI96-03	Calculating Clamping Voltage at Different Peak Pulse Currents

PROTECTION PRODUCTS

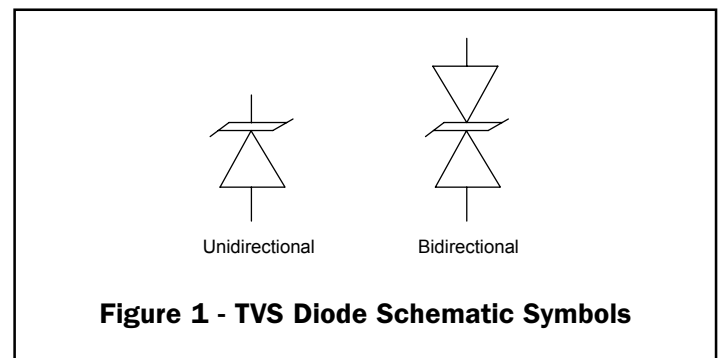
What Are TVS Diodes?

TVS diodes are solid state pn junction devices specifically designed to protect sensitive semiconductors from the damaging effects of transient voltages. TVS diode schematic symbols are shown in Figure 1. The electrical characteristics of the device are determined by factors such as junction area, doping concentration, and substrate resistivity. The surge power and surge current capability of the TVS diode are proportional to the junction area. TVS diodes are constructed with large cross sectional area junctions for absorbing high transient currents. While the VI characteristic curve of the TVS diode is similar to that of a zener diode, TVS diodes are specifically designed, characterized, and tested for transient voltage suppression. By contrast, zener diodes are designed and specified for voltage regulation.

TVS diodes serve as parallel protection elements (Figure 2). Under normal operating conditions, the TVS diode presents a high impedance to the protected circuit. Ideally, the device appears as an open circuit, although a small amount of leakage current is present. When the normal operating voltage of the protected circuit is exceeded, the TVS diode junction avalanches providing a low impedance path for the transient current. As a result, the transient current is diverted away from the protected components and shunted through the TVS diode. The voltage across the protected circuit is limited to the clamping voltage of the TVS diode. The device returns to a high impedance state after the transient threat passes. TVS diodes will not wear out nor will there be any degradation of the

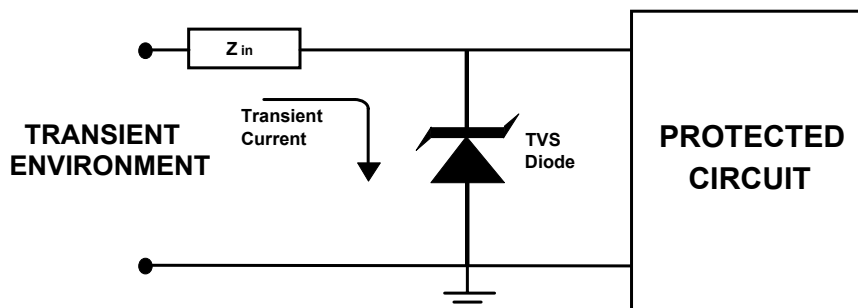
electrical parameters as long as the device is operated within specified limits.

A primary attribute of the TVS diode is its reaction time. Avalanche breakdown theoretically occurs in picoseconds. This is very difficult to measure however. Therefore, TVS diodes are often specified as responding “almost instantaneously”. The fast response time of the TVS diode means that any voltage overshoot is primarily due to lead inductance and PC board traces.



TVS diodes are available in a wide range of operating voltages. Traditional device voltages range from 5V to 440V for discrete devices. Recent innovations in TVS technology have yielded devices, such as Semtech's SLV series, which operate at 2.8 and 3.3V.

The TVS diodes fast response time and low clamping voltages make them ideal for use as board level protectors for semiconductors and other sensitive components. Applications include data and signal lines, microprocessors & MOS memory, AC power lines, and telecommunication equipment.



PROTECTION PRODUCTS

TVS Diode Selection

Selection of a suitable component will depend on the number of lines to be protected, the available board space, and the electrical characteristics of the circuit to be protected. TVS diodes are available in a variety of packages and configurations suitable for use today's advanced electronic systems. For high power applications, single device surface mount and axial leaded packages are used. TVS arrays available in standard JEDEC SO packages may be used to protect multiple lines. In situations where board space is at a premium, devices available in SOT23 packages are a low cost alternative.

No matter what the application however, certain device parameters and guidelines form the basis for device selection.

TVS Diode Terminology

A typical IV characteristic curve for a bidirectional TVS diode is shown in Figure 1. The key device parameters are:

Reverse Standoff Voltage (V_{RWM}) : This is the normal dc operating voltage of the device. At this point, the device will appear as a high impedance to the protected circuit. Discrete devices are available with standoff voltages ranging from 2.8V - 440V. This parameter is also referred to as working voltage.

Reverse Breakdown Voltage (V_{BR}) : This is the point where the device begins to conduct in avalanche mode and becomes a low impedance path for the transient. Breakdown voltage is measured at a test current (I_T), typically 1mA or 10mA.

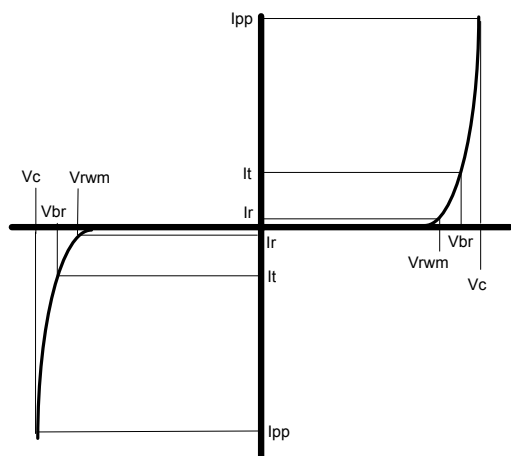


Figure 1 - Bidirectional IV Characteristic Curve

Peak Pulse Current (I_{PP}) : Maximum permissible surge current which the device can withstand without damage. TVS diode data sheets specify a peak pulse capability for a particular transient waveform. Most TVS diodes are rated using an 8/20μs or 10/1000μs impulse waveform.

TVS diodes can withstand higher peak pulse current for shorter duration pulses.

Clamping Voltage (V_C) : Maximum voltage drop across the TVS for a particular peak pulse current.

Selection Guidelines

TVS diode selection involves comparison of device parameters with circuit conditions. The following selection guidelines are recommended:

- 1 Select a device with a reverse standoff voltage greater than or equal to the normal operating voltage of the circuit.
- 2 Select a device which is capable of dissipating the expected transient peak pulse current.
- 3 The device clamping voltage should be less than the maximum voltage handling capability of the protected circuit for the same pulse waveform.
- 4 For systems using high speed data rates, device junction capacitance will have to be considered. Semtech manufactures special low capacitance devices for those applications.

There may be applications where the actual transient current cannot be defined. Often, the designer will have to meet the requirements of certain transient immunity specifications. At the very least, identification of the source of the threat is necessary; lightning, inductive switching, ESD, etc.

Device Parameter		Circuit Conditions
V_{RWM}	$\geq$	Normal circuit operating voltage
I_{PP}	$\geq$	Expected transient current
V_C	$\leq$	Maximum allowable voltage across the protected component
C_J	$<$	Maximum loading capacitance for signal integrity

Figure 2 - Selection Summary

PROTECTION PRODUCTS
TVS Peak Pulse Power vs. Pulse Duration

The peak pulse power (P_{pp}) rating of a TVS diode is defined as the instantaneous power dissipated by a device for a given pulse condition. The peak pulse power rating is calculated using the following relationship :

$$P_{pp} = V_c \times I_{pp}$$

Where

P_{pp} = Peak pulse power (W)

V_c = Clamping Voltage (V)

I_{pp} = Peak pulse current (A)

Common peak pulse power ratings are normally given for 8/20 μ s and 10/1000 μ s double exponential impulse waveforms (see SI96-09 for definition). Many applications specify different surge pulse widths which can range from a few nanoseconds to several milliseconds. To determine the power handling capability of a TVS device for different pulse widths, a peak pulse

power vs. pulse width curve is included on device data sheets. An example of a curve for a device rated at 1500W (10/1000 μ s) is shown in Figure 1. As the surge pulse width decreases, the peak pulse power capability of the device increases logarithmically. Additionally, for shorter pulse widths, the TVS can withstand higher peak pulse currents. For example, for a 1.2/50 μ s impulse waveform (per IEC 61000-4-5), the peak power handling capability is 6kW, 4x the rating at 1000 μ s. The peak current handling capability is also increased by approximately a factor of four. Conversely, as the surge pulse width is increases, the peak power and current handling capability of the device decreases.

The curve below is for a non-repetitive double exponential waveform. To determine the capability of the device for a square wave pulse, derate to 66% of the peak exponential value. For a half sine wave pulse, derate to 75%.



Figure 1 - Peak Pulse Power vs. Pulse Duration for a 1500W TVS Diode

PROTECTION PRODUCTS

TVS Power Derating vs. Temperature

Transient voltage suppressors are designed to work over a wide temperature range. If the application requires the TVS to operate at elevated temperatures, the characteristics of the device must be considered at the expected extremes.

Power Derating Curve

During surge conditions, the transient power is dissipated within the TVS diode and is limited by the maximum allowable junction temperature. If the ambient temperature is increased, the power dissipating capability of the device decreases. The peak pulse power capability of the device derates linearly from 25°C to $T_{(max)}$. To determine the power or current handling capability of the device at elevated temperatures, a power derating curve is used (Figure 1). For example, at an operating temperature of 100°C, the device is capable of dissipating 40% of the rated peak pulse current.

Clamping Voltage

Device clamping voltage is normally specified for a junction temperature of 25°C before surge. To extrapolate for other junction temperatures, the following formula may be used :

$$\Delta V_{BR} = \alpha T_{(VBR)} * (T_j - 25) * V_{BR}$$

Where :

ΔV_{BR} = Change in voltage (V)

$\alpha T_{(VBR)}$ = Temperature coefficient of breakdown voltage (V/°C)

V_{BR} = Breakdown (or clamping) voltage (V)

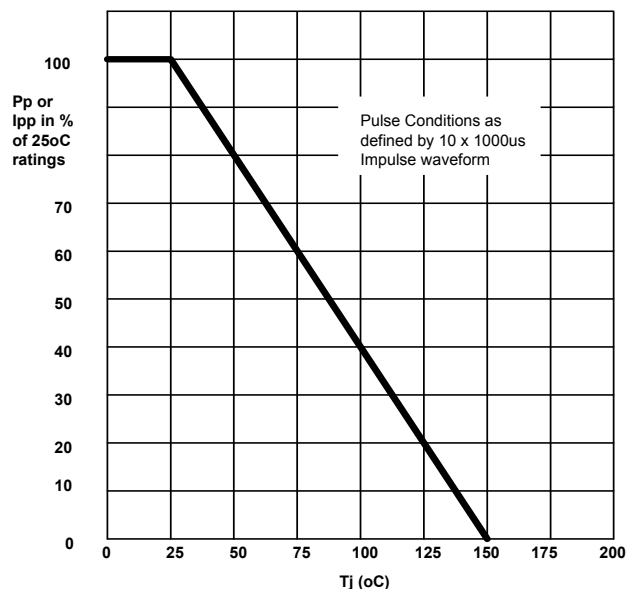


Figure 1 - Peak Pulse Power vs. Pulse Duration for a 1500W TVS Diode

PROTECTION PRODUCTS

Sources of Transients : Lightning

Lightning is an atmospheric discharge of electricity resulting from the accumulation of static charges, usually during a thunderstorm. Inside of a thundercloud, static charges are generated by the impact of water and ice particles and separated in strong air currents. Lightning occurs when enough charge has been separated inside the cloud to cause localized electric breakdown of the air.

Lightning is one of the most common causes of transients in electronic systems. Power and telecommunication systems being the most vulnerable. At any given time, there are approximately 1800 thunderstorms in progress around the world generating lightning strikes on the surface of the earth about 100 times every second. Each cloud-to-ground event generally contains 3-5 distinct strokes, but as many as twelve have been observed. Mean peak current for the first stroke is 20kA with subsequent strokes decreasing by 50% or more. While a direct lightning strike is dramatic, it is significant to note that lightning produces intense electric and magnetic fields which can couple into nearby power lines, communication lines, and circuit wiring causing catastrophic or latent damage to semiconductor equipment. The magnitude of the induced voltage varies with the distance from the strike (Figure 1).

Lightning Standards & Waveforms

Transient voltage waveforms representative of induced lightning transients are often described by a double exponential impulse waveform. A double exponential

surge waveform is defined as having an exponential rise to the peak and an exponential decay from that peak (Figure 2). The pulse is specified by a rise time from 10 to 90% of the peak value and a decay to 50% of the peak value. Industry standards such as **ANSI/IEEE C62.41** define a 1.2/50 μ s voltage waveform and 8/20 μ s current waveform for induced lightning on power lines. One of the most common double exponential waveforms for induced lightning in U.S. telecommunication systems is the 10/1000 μ s impulse waveform as defined by Bellcore **TR-NWT-001089** and Rural Electrification Administration **REA PE-60**. International telecommunication standards such as **ITU K17-K20** often specify the 10/700 μ s impulse for lightning induced transients. The telecommunication lightning waveform is different from the power line waveform because a lightning strike into a large telecommunication cable is distributed among several internal lines. This has the effect of slowing down the rise time and increasing the decay time of the waveform.

IEC 61000-4-5 was set forth by the European Community to define the lightning threat to both power and telecommunication lines. The standard specifies double exponential impulses of 1.2/50 μ s for power and 10/700 μ s for telecommunication lines to describe the threat.

References:

1. Stringfellow, Dr Michael F. "Lightning" Power Quality & Assurance, Sept/Oct 1995
2. Clark, O.M. "Lightning Protection for Computer Data Lines" EOS/ESD Symposium Proceedings, Sept., 1981

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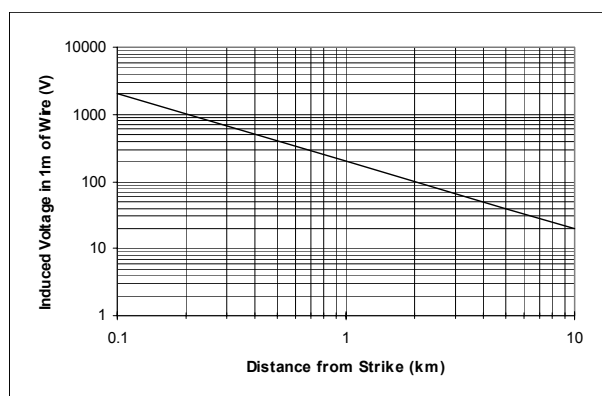


Figure 1 - Lightning Induced Voltages

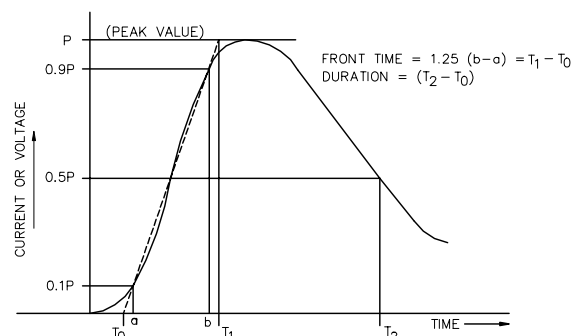


Figure 2 - Lightning Waveform

PROTECTION PRODUCTS

Sources of Transients : Electrostatic Discharge

Few pieces of electronic equipment today are void of semiconductors. With the focus on lowering the operating levels, the problem of malfunction caused by the environment is critical. Electrostatic discharge (ESD) is a major cause of failure in electronic systems. The products which are most prone are those with external connections to data and I/O lines.

ESD Generation

Electrostatic discharge is the result of a sudden and violent redistribution of electrons between two objects. The excess charge on an object usually results from the contact and separation of two non-conductive materials causing the transfer of electrons from one material to the other, thereby building up a triboelectric charge on the surface (Figure 1). If the discharge path includes semiconductor based equipment, catastrophic or latent damage may occur. The amplitude of the static discharge can exceed 30kV, with currents reaching 30A or more. The rate of the discharge is extremely fast, lasting less than 1ns. The human body is one of the most common generators of ESD. It stores charge capacitively with respect to ground. The voltage potential with respect to earth ground can exceed several thousand volts. It is very common in fact for a person to develop voltages as high as 15kV. Higher voltages such as 35kV are possible but rarer.

ESD Threat to Equipment

The ESD pulse contains little energy, but the extremely fast rise time and high power can cause semiconductor

devices to fail. Catastrophic destruction of semiconductor devices may occur as a result of the high static potential of ESD or from the discharge current in an ESD event.

One common misconception is that ESD is only a threat during equipment assembly. In reality, ESD is a threat to semiconductors throughout the life of the system. Operator control panels, indicators, and user accessible I/O pins are especially vulnerable to ESD. In a portable computer, for example, when attaching a mouse, printer, or modem, the user can inject a potentially hazardous ESD pulse of 2,000 volts and not even realize it. Component failure may be catastrophic or latent. The latter can be the worse since there is no known way to test for it. The product may simply be perceived as being of poor quality.

ESD Standards : IEC 61000-4-2

Industry standards are now in place which define the ESD immunity requirements of electronic equipment. The most widely accepted standard, set forth by the European Community, is IEC 61000-4-2. IEC 61000-4-2 defines requirements for human generated ESD transients. Test voltages range from 2kV to 15kV with peak currents as high as 30A. The ESD waveform as defined by IEC 61000-4-2 is extremely fast with a maximum rise time of 1ns and a total duration of only 60ns (Figure 2). The total energy contained within the pulse is a few hundred microjoules.

Several countries including the U.S. and Japan are using IEC 61000-4-2 as the model for developing their own ESD immunity standard.

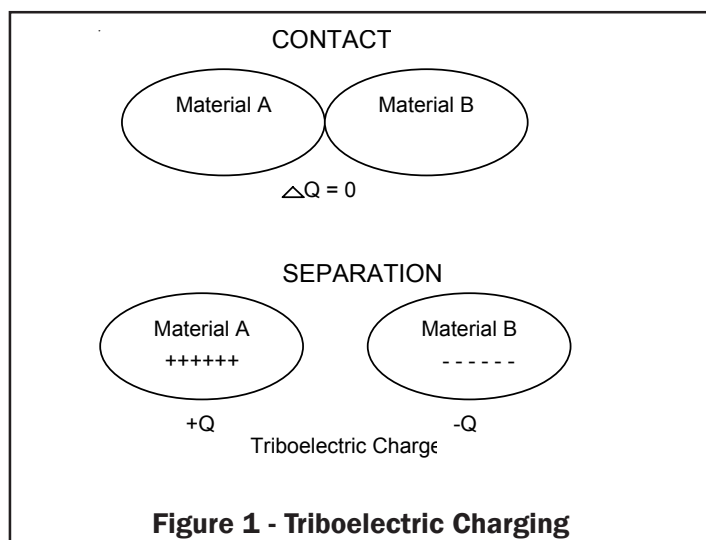


Figure 1 - Triboelectric Charging

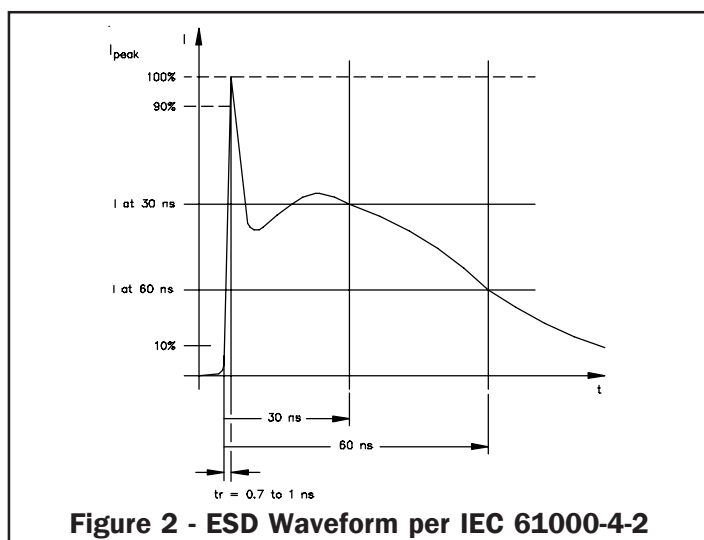


Figure 2 - ESD Waveform per IEC 61000-4-2

PROTECTION PRODUCTS

Calculating Transient Energy

This application note explains how to calculate the transient energy which is **absorbed** by a suppression element. An approximation technique is employed for transient current impulse waveforms, assuming the clamping voltage is almost constant during the surge impulse.

In the case of transients which are internal to the circuit, such as those created by inductive switching, the energy of the transient waveform may be readily calculated. Transients which are external to the circuit are more difficult to quantify. In this case an approximation technique may then be used to estimate the energy which is absorbed by the suppression element. The energy which is absorbed by the suppression device is given by:

$$E = \int_0^{t_p} V_c I_p dt = K V_c L_p t_p$$

Where

E = Energy (Joules)

V_c = Clamping Voltage (Volts)

I_p = Peak Pulse Surge Current (Amps)

t_p = Impulse Duration

K = Constant

K values for the most common surge current waveforms are given in Figure 1. For complex waveforms such as a double exponential impulse, the waveform may be divided into two parts to calculate the total energy.

10

Example Calculation

A typical waveform representative of lightning induced transients is shown in Figure 2. It is a 10/1000μs double exponential impulse as defined by Bellcore 1089. To calculate the energy absorbed by an LC01-6 first divide the waveform into two parts with part 1 being the section of the waveform from 0 to 10μs and part two the section from the peak to 1000μs (the 50% decay point). From the LC01-6 data sheet, the maximum clamping voltage at 100A is 15V.

Therefore:

Part 1 : E₁ = K V_c I_p t_p = 0.5 * 15 * 100 * 10 * 10⁻⁶ = 7.5mJ

Part 2 : E₂ = K V_c I_p t_p = 1.4 * 15 * 100 * 1 * 10⁻³ = 2.1J

E = E₁ + E₂ = .0075 + 2.1 = 2.11J

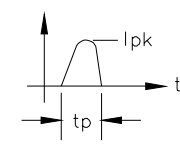
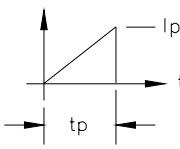
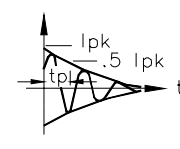
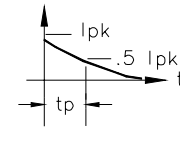
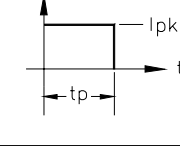
WAVESHAPE	EQUATION	K*
	$I_{pk} \sin\left(\frac{\pi}{t_p} t\right)$	0.637
	$I_{pk} \left(\frac{t}{t_p}\right)$	0.5
	$I_{pk} \sin(\pi t) e^{-t/t_p}$	0.86
	$I_{pk} e^{-t/1.44 t_p}$	1.4
	I_{pk}	1.0

Figure 1 - Energy Waveforms/Form Factor Constants

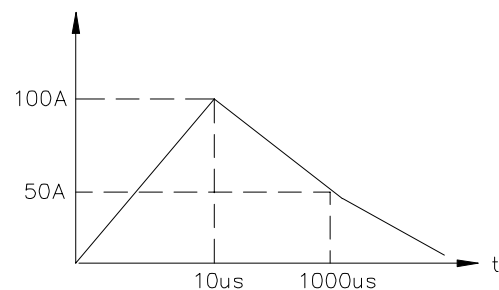


Figure 2 - Double Exponential Impulse Waveform

PROTECTION PRODUCTS

Calculating Clamping Voltage at Different Peak Pulse Currents

Transient voltage suppressor data sheets define clamping voltage at a specified maximum peak pulse current level. This application note describes how to interpolate the clamping voltage for transients currents other than the rated maximum.

This calculation assumes a worse case condition where the device is at the maximum breakdown voltage limit and is therefore a conservative estimate across most of the distribution. If the value for $V_{BR\ MAX}$ is not stated on the device data sheet, it may be approximated by multiplying the minimum value by 1.25.

Clamping Voltage Calculation

To determine the clamping voltage (V_C) of the TVS diode at an intermediate point between the breakdown voltage (V_{BR}) and the maximum clamping voltage ($V_{C\ MAX}$), a linear increase in V_C between V_{BR} and $V_{C\ MAX}$ is assumed. Therefore, the relationship between V_C and the test pulse current (I_P) is calculated using the following formula:

$$V_C = (I_P / I_{PP}) * (V_{C\ MAX} - V_{BR\ MAX}) + V_{BR\ MAX}$$

Where:

I_P = Test peak pulse current (Amps)

V_C = Intermediate clamping voltage at I_P (Volts)

I_{PP} = Rated maximum peak pulse current (Amps)

$V_{C\ MAX}$ = Maximum rated clamping voltage (Volts)

$V_{BR\ MAX}$ = Maximum rated breakdown voltage (Volts)

Example Calculation

An example of a calculated curve to one obtained through testing for an LC01-6 is shown in Figure 1. The LC01-6 data sheet specifies a minimum V_{BR} of 8 volts yielding a $V_{BR\ MAX}$ of 10 volts ($1.25 * 8$) for calculation purposes. Values are based on a maximum peak pulse current rating of 100A for a 10/1000µs impulse waveform. The experimental curve has a more shallow slope than the calculated curve, confirming the conservative rating of the device. Note that if I_P equals I_{PP} then V_C will equal $V_{C\ MAX}$.

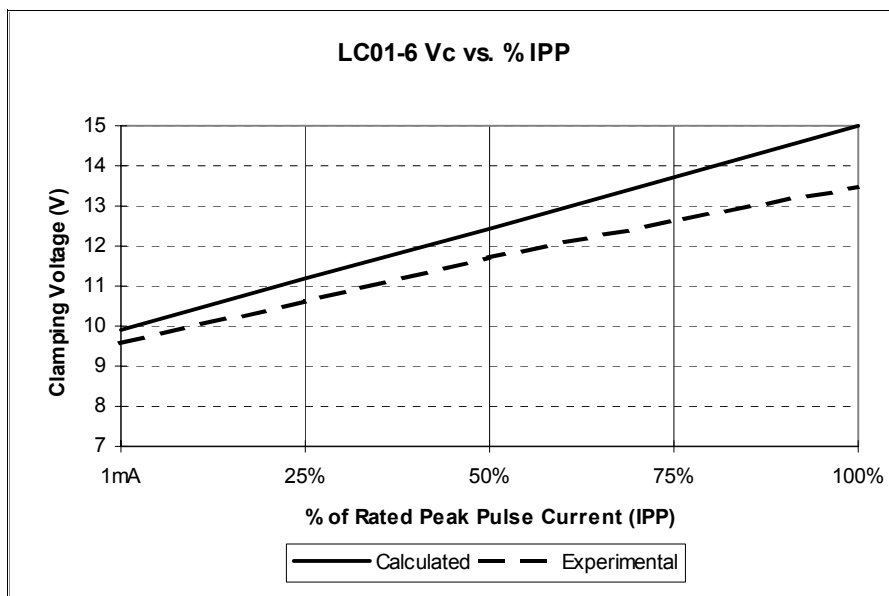


Figure 1 - LC01-6 Clamping Voltage vs. % Peak Pulse Current

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