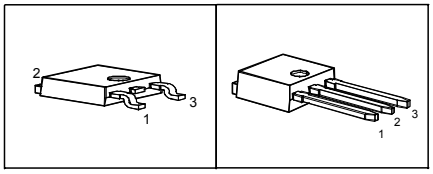
Cool MOS™ Power Transistor

V_{DS}	600	V
$R_{DS(on)}$	3	Ω
I_D	1.8	A

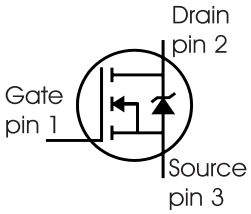
PG-TO252 PG-TO251



Feature

- New revolutionary high voltage technology
- Ultra low gate charge
- Periodic avalanche rated
- Extreme d*v*/d*t* rated
- Ultra low effective capacitances
- Improved transconductance
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC[0)] for target applications

Type	Package	Ordering Code	Marking
SPU02N60S5	PG-TO251	Q67040-S4226	02N60S5
SPD02N60S5	PG-TO252	Q67040-S4213	02N60S5



Maximum Ratings

Parameter	Symbol	Value	Unit
Continuous drain current T_C = 25 °C T_C = 100 °C	I_D	 1.8 1.1	A
Pulsed drain current, t_p limited by T_{jmax}	$I_{D\ puls}$	3.2	
Avalanche energy, single pulse I_D = 1.35 A, V_{DD} = 50 V	E_{AS}	50	mJ
Avalanche energy, repetitive t_{AR} limited by T_{jmax}[1] I_D = 1.8 A, V_{DD} = 50 V	E_{AR}	0.07	
Avalanche current, repetitive t_{AR} limited by T_{jmax}	I_{AR}	1.8	A
Gate source voltage	V_{GS}	±20	V
Gate source voltage AC (f >1Hz)	V_{GS}	±30	
Power dissipation, T_C = 25°C	P_{tot}	25	W
Operating and storage temperature	T_j, T_{stg}	-55... +150	°C

Downloaded from Arrow.com.

Maximum Ratings

Parameter	Symbol	Value	Unit
Drain Source voltage slope V_{DS} = 480 V, I_D = 1.8 A, T_j = 125 °C	dv/dt	20	V/ns

Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Thermal resistance, junction - case	R_{thJC}	-	-	5	K/W
Thermal resistance, junction - ambient, leaded	R_{thJA}	-	-	75	
SMD version, device on PCB: @ min. footprint @ 6 cm^2 cooling area [2)]	R_{thJA}	 - -	 - -	 75 50	
Soldering temperature, *) 1.6 mm (0.063 in.) from case for 10s	T_{sold}	-	-	260	°C

Electrical Characteristics, at T_j=25°C unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=0.25mA	600	-	-	V
Drain-Source avalanche breakdown voltage	$V_{(BR)DS}$	V_{GS}=0V, I_D=1.8A	-	700	-	
Gate threshold voltage	$V_{GS(th)}$	I_D=80µA, V_{GS}=V_{DS}	3.5	4.5	5.5	
Zero gate voltage drain current	I_{DSS}	V_{DS}=600V, V_{GS}=0V, T_j=25°C, T_j=150°C	 - -	 0.5 -	 1 50	µA
Gate-source leakage current	I_{GSS}	V_{GS}=20V, V_{DS}=0V	-	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=1.1A, T_j=25°C T_j=150°C	 - -	 2.7 7.3	 3 -	Ω

*) TO252: reflow soldering, MSL3; TO251: wavesoldering

Downloaded from Arrow.com.

Electrical Characteristics , at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Characteristics						
Transconductance	g_{fs}	$V_{DS}\geq 2*I_D*R_{DS(on)max}$, I_D=1.1A	-	1.4	-	S
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=25V, f=1MHz	-	240	-	pF
Output capacitance	C_{oss}		-	77	-	
Reverse transfer capacitance	C_{rss}		-	4.4	-	
Turn-on delay time	$t_{d(on)}$	V_{DD}=350V, V_{GS}=0/10V, I_D=1.8A, R_G=50Ω	-	35	-	ns
Rise time	t_r		-	35	-	
Turn-off delay time	$t_{d(off)}$		-	35	42	
Fall time	t_f		-	20	30	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DD}=350V, I_D=1.8A	-	2.3	-	nC
Gate to drain charge	Q_{gd}		-	4.5	-	
Gate charge total	Q_g	V_{DD}=350V, I_D=1.8A, V_{GS}=0 to 10V	-	7.3	9.5	
Gate plateau voltage	$V_{(plateau)}$	V_{DD}=350V, I_D=1.8A	-	8	-	V

[0]J-STD20 and JESD22

[1]Repetitve avalanche causes additional power losses that can be calculated as $P_{AV}=E_{AR}*f$.

[2]Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 µm thick) copper area for drain connection. PCB is vertical without blown air.

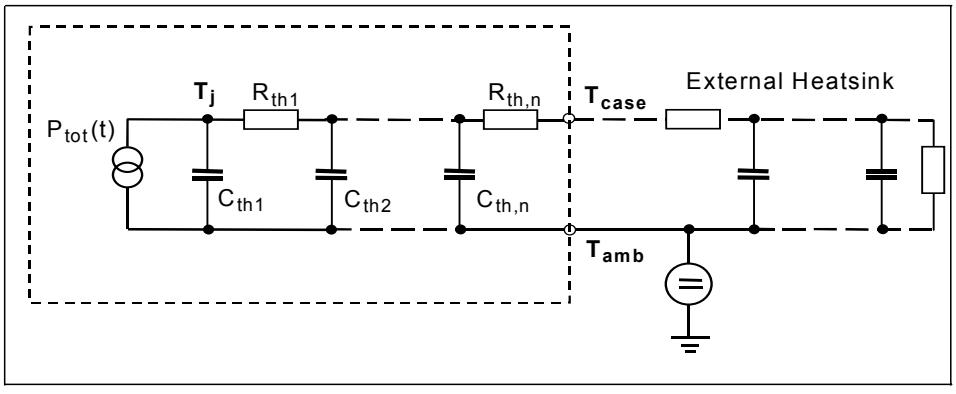
Downloaded from Arrow.com.

Electrical Characteristics, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Inverse diode continuous forward current	I_S	T_C=25°C	-	-	1.8	A
Inverse diode direct current, pulsed	I_{SM}		-	-	3.2	
Inverse diode forward voltage	V_{SD}	V_{GS}=0V, I_F=I_S	-	1	1.2	V
Reverse recovery time	t_{rr}	V_R=350V, I_F=I_S ,	-	860	1460	ns
Reverse recovery charge	Q_{rr}	di_F/dt=100A/µs	-	1.6	-	µC

Typical Transient Thermal Characteristics

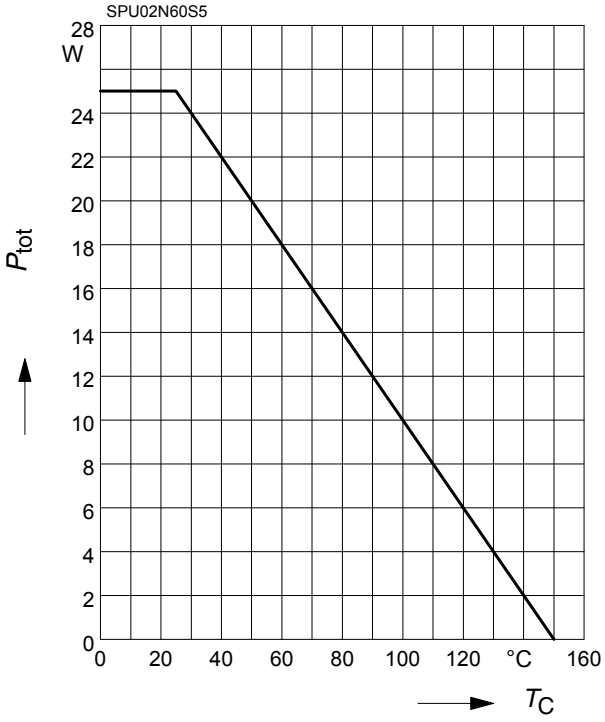
Symbol	Value	Unit	Symbol	Value	Unit
	typ.			typ.	
Thermal resistance			Thermal capacitance		
R_{th1}	0.1	K/W	C_{th1}	0.00002806	Ws/K
R_{th2}	0.184		C_{th2}	0.0001113	
R_{th3}	0.306		C_{th3}	0.0001679	
R_{th4}	1.207		C_{th4}	0.000547	
R_{th5}	0.974		C_{th5}	0.001388	
R_{th6}	0.251		C_{th6}	0.019	



Downloaded from Arrow.com.

1 Power dissipation

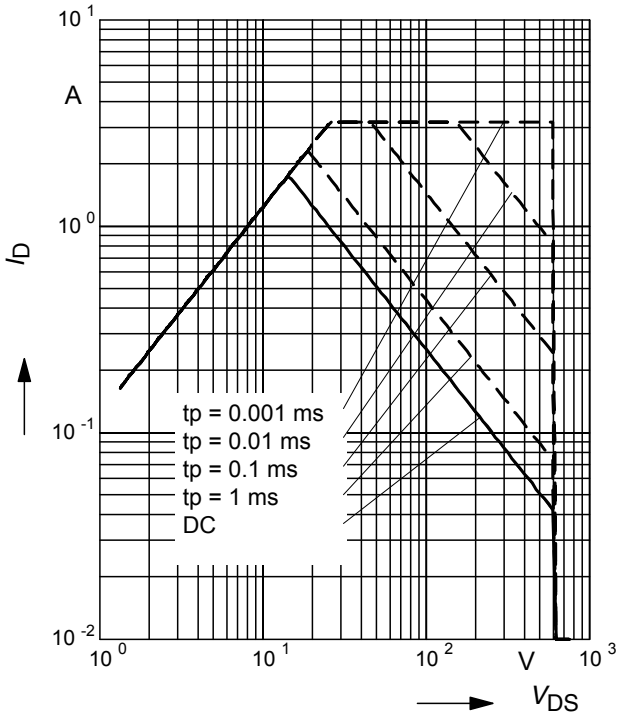
$P_{tot} = f(T_C)$



2 Safe operating area

$I_D = f(V_{DS})$

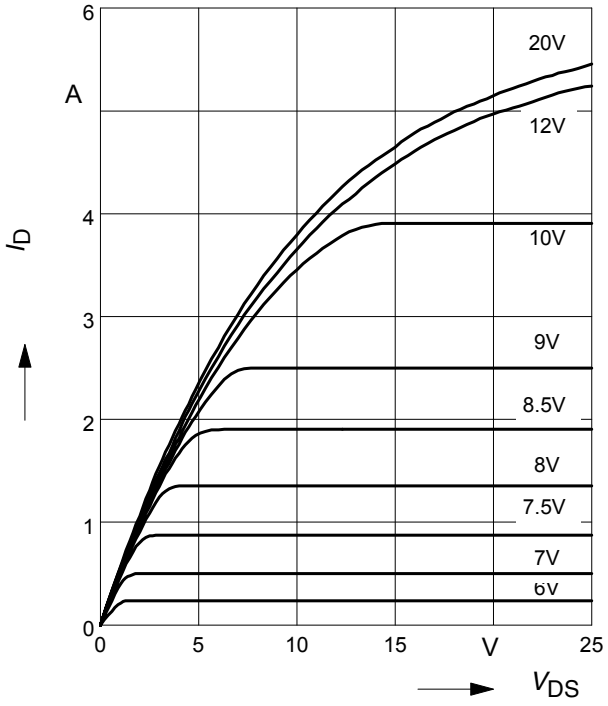
parameter : $D = 0$, $T_C = 25°C$



3 Typ. output characteristic

$I_D = f(V_{DS})$; $T_j = 25°C$

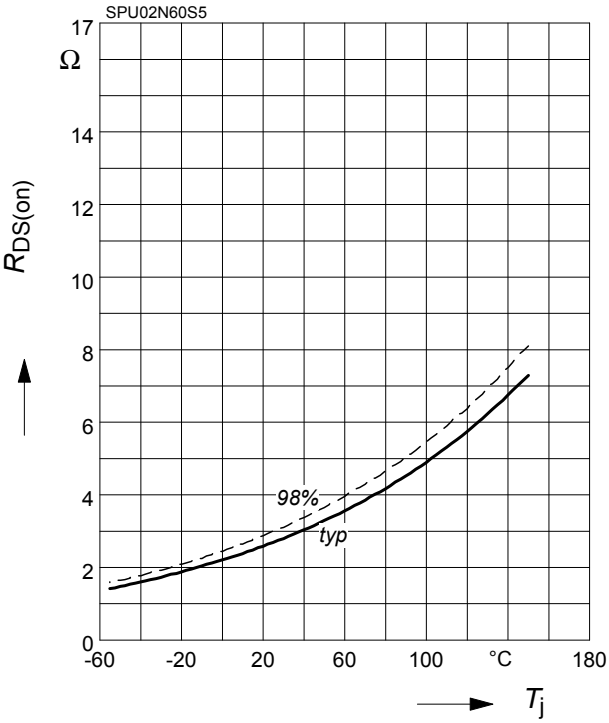
parameter: $t_p = 10$ µs, V_{GS}



4 Drain-source on-state resistance

$R_{DS(on)} = f(T_j)$

parameter : $I_D = 1.1$ A, $V_{GS} = 10$ V

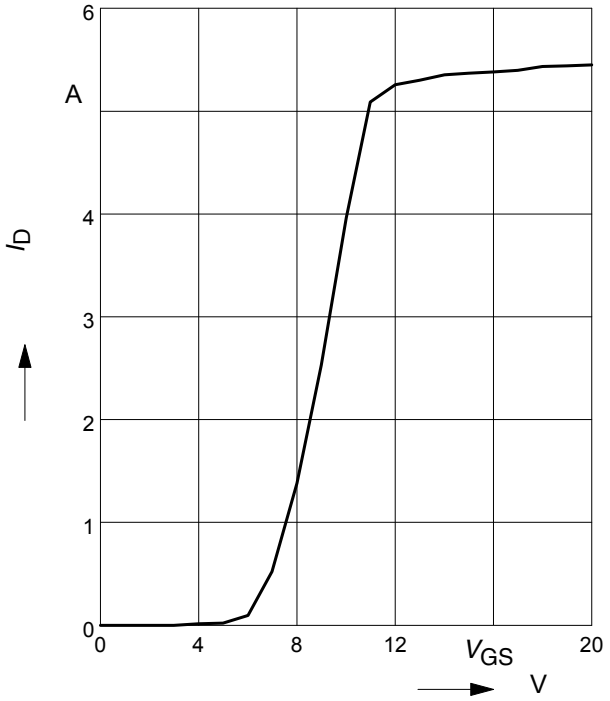


Downloaded from Arrow.com.

5 Typ. transfer characteristics

$I_D = f(V_{GS})$; $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$

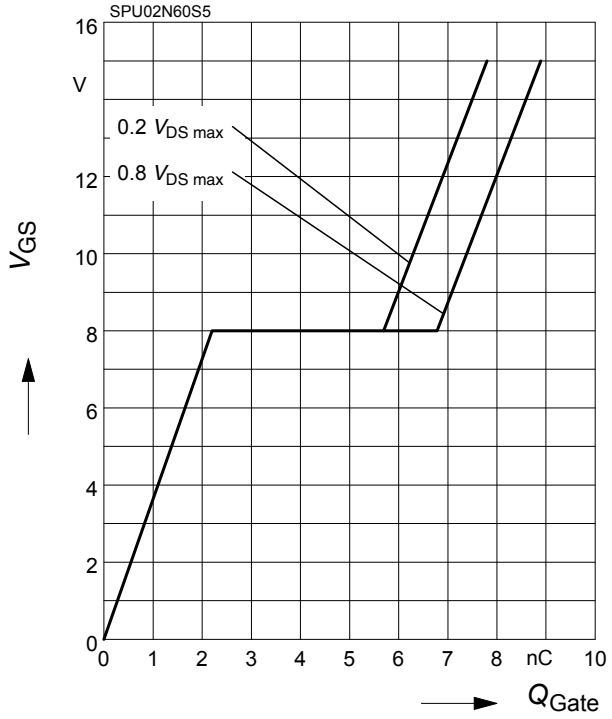
parameter: t_p = 10 µs



6 Typ. gate charge

$V_{GS} = f(Q_{Gate})$

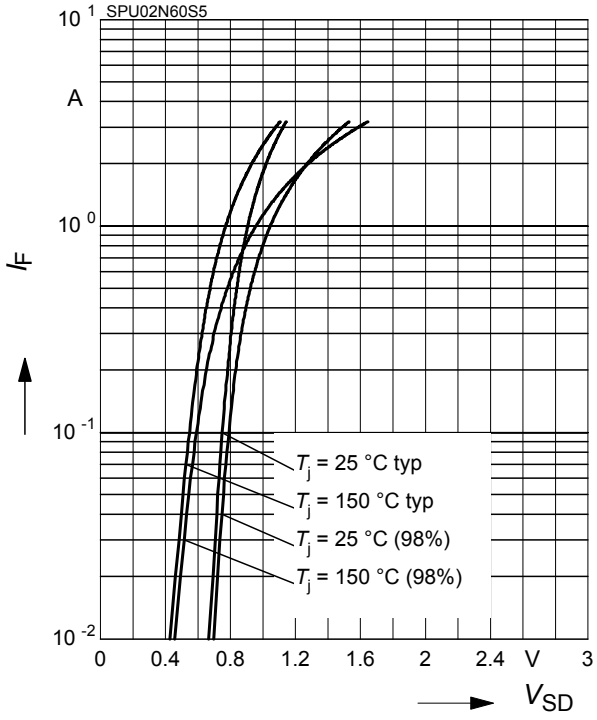
parameter: I_D = 1.8 A pulsed



7 Forward characteristics of body diode

$I_F = f(V_{SD})$

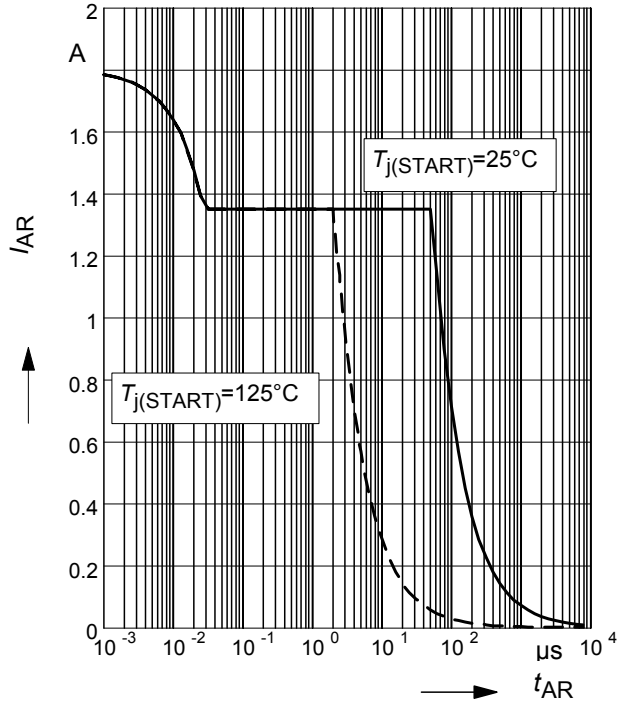
parameter: T_j , tp = 10 µs



8 Avalanche SOA

$I_{AR} = f(t_{AR})$

par.: $T_j \leq$ 150 °C

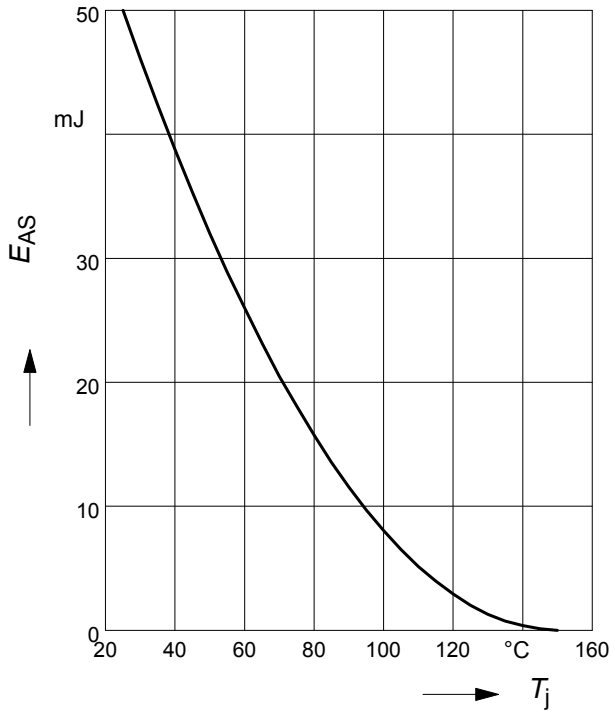


Downloaded from Arrow.com.

9 Avalanche energy

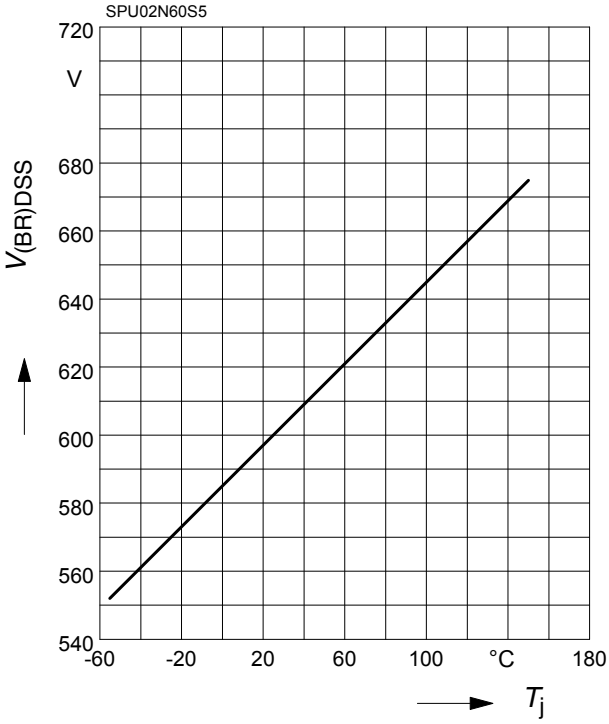
$E_{AS} = f(T_j)$

par.: I_D = 1.35 A, V_{DD} = 50 V



10 Drain-source breakdown voltage

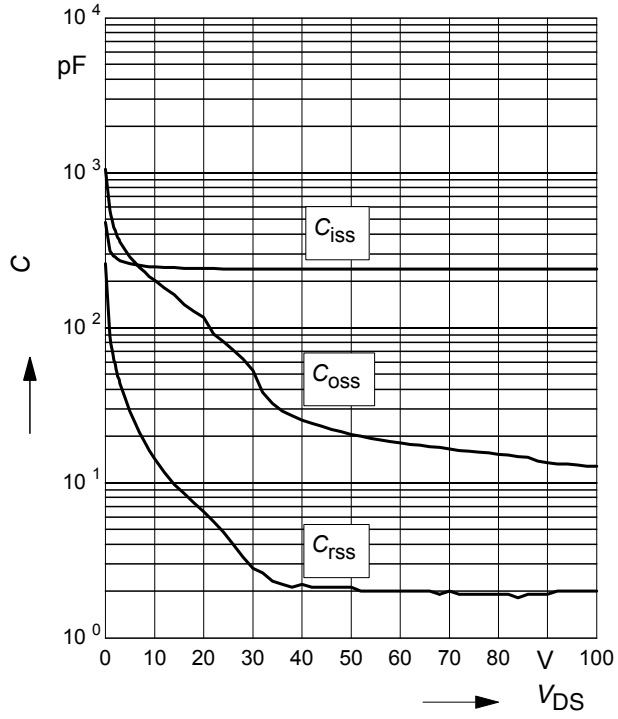
$V_{(BR)DSS} = f(T_j)$



11 Typ. capacitances

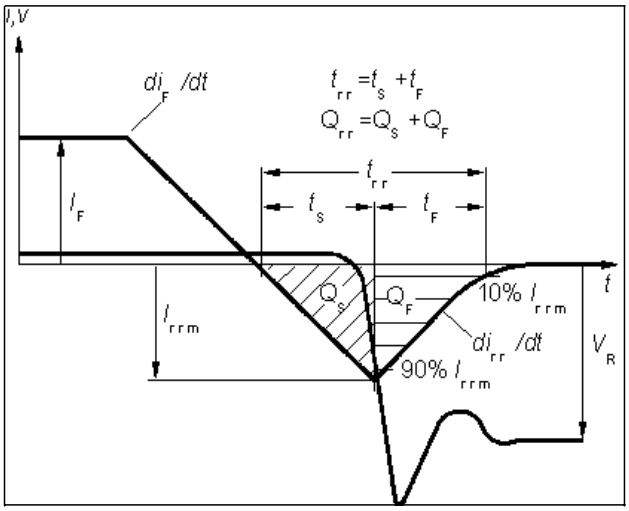
$C = f(V_{DS})$

parameter: V_{GS}=0V, f=1 MHz



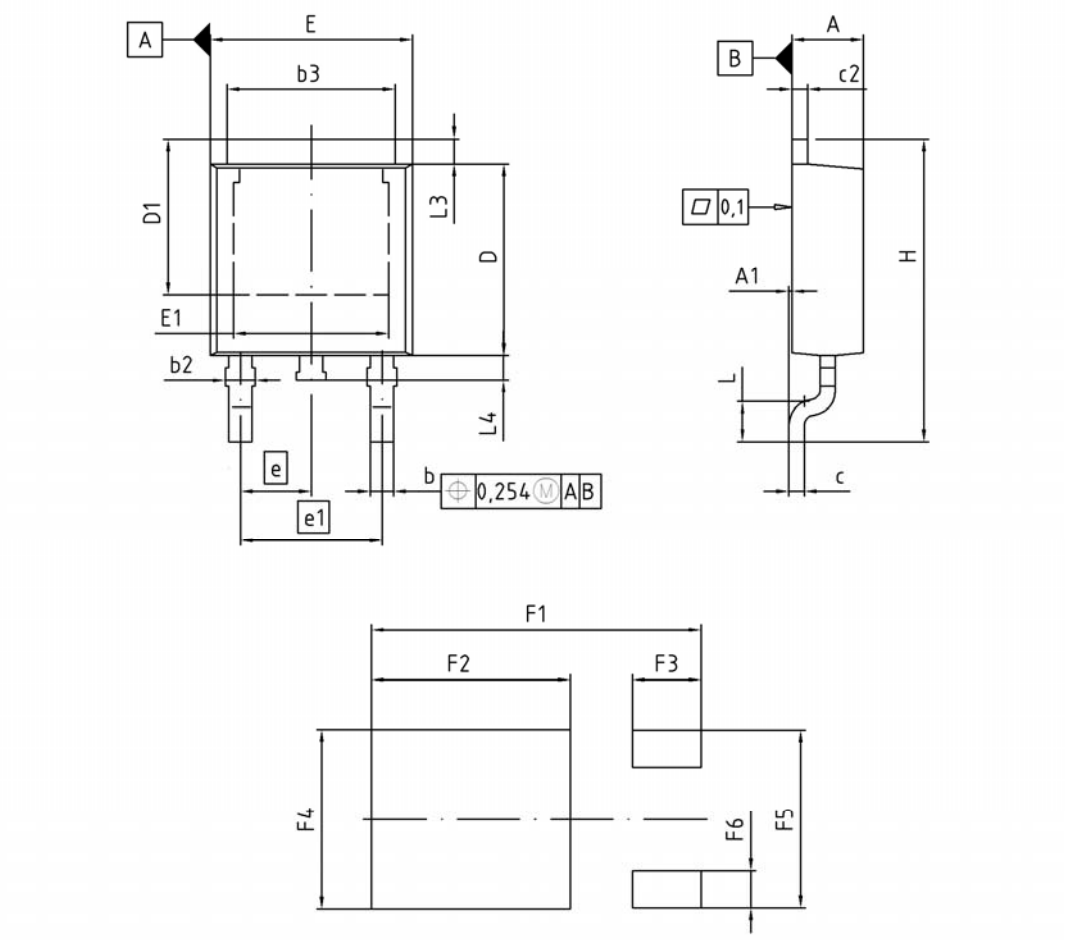
Downloaded from Arrow.com.

Definition of diodes switching characteristics

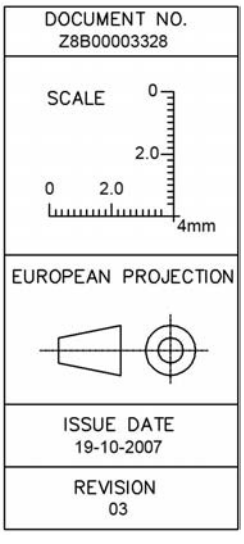


Downloaded from Arrow.com.

PG-TO252-3-1, PG-TO252-3-11, PG-TO252-3-21 (D-PAK)

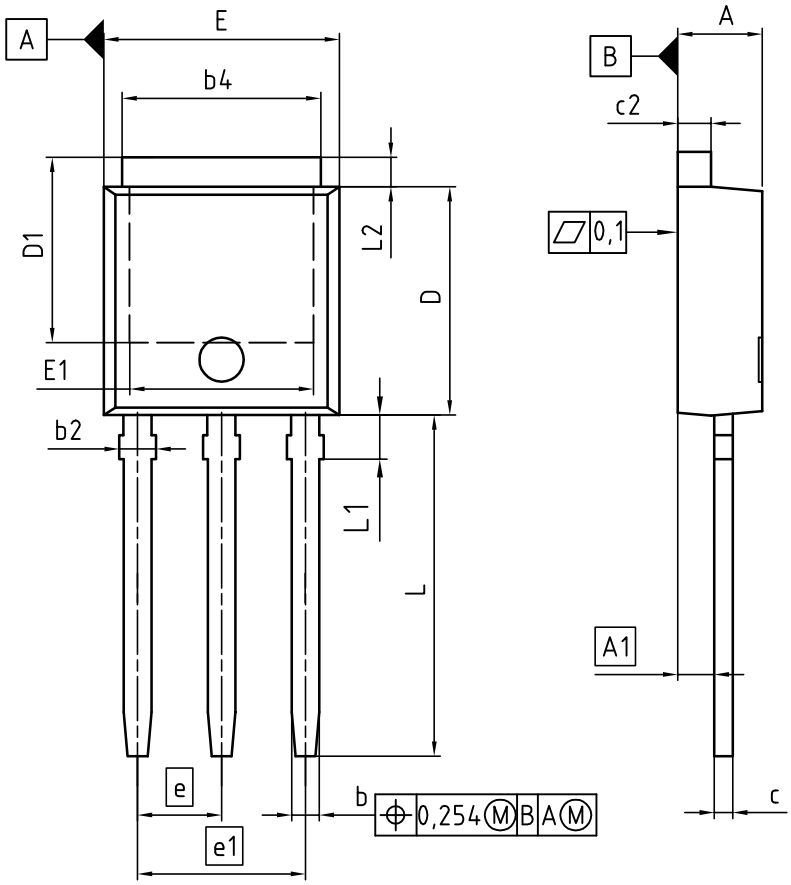


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.16	2.41	0.085	0.095
A1	0.00	0.15	0.000	0.006
b	0.64	0.89	0.025	0.035
b2	0.65	1.15	0.026	0.045
b3	5.00	5.50	0.197	0.217
c	0.46	0.60	0.018	0.024
c2	0.46	0.98	0.018	0.039
D	5.97	6.22	0.235	0.245
D1	5.02	5.84	0.198	0.230
E	6.40	6.73	0.252	0.265
E1	4.70	5.21	0.185	0.205
e	2.29		0.090	
e1	4.57		0.180	
N	3		3	
H	9.40	10.48	0.370	0.413
L	1.18	1.70	0.046	0.067
L3	0.90	1.25	0.035	0.049
L4	0.51	1.00	0.020	0.039
F1	10.50	10.70	0.413	0.421
F2	6.30	6.50	0.248	0.256
F3	2.10	2.30	0.083	0.091
F4	5.70	5.90	0.224	0.232
F5	5.66	5.86	0.223	0.231
F6	1.10	1.30	0.043	0.051

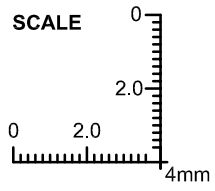
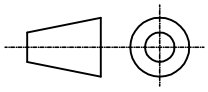


Downloaded from Arrow.com.

PG-TO251-3-1, PG-TO251-3-21 (I-PAK)



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.16	2.41	0.085	0.095
A1	0.90	1.14	0.035	0.045
b	0.64	0.89	0.025	0.035
b2	0.65	1.15	0.026	0.045
b4	4.95	5.50	0.195	0.217
c	0.46	0.60	0.018	0.024
c2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	5.04	5.77	0.198	0.227
E	6.35	6.73	0.250	0.265
E1	4.70	5.21	0.185	0.205
e	2.29		0.090	
e1	4.57		0.180	
N	3		3	
L	8.89	9.65	0.350	0.380
L1	1.90	2.29	0.075	0.090
L2	0.89	1.37	0.035	0.054

DOCUMENT NO.	Z8B00003330
SCALE	
EUROPEAN PROJECTION	
ISSUE DATE	19-03-2008
REVISION	03

Downloaded from Arrow.com.

Published by
Infineon Technologies AG
81726 Munich, Germany
© 2008 Infineon Technologies AG
All Rights Reserved.

Legal Disclaimer
The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.

Information
For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office (www.infineon.com).

Warnings
Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office.
Infineon Technologies components may be used in life-support devices or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

Downloaded from Arrow.com.