Switch-mode Soft Recovery Power Rectifier

MSR1560G, MSRF1560G

These state−of−the−art devices are designed for boost converter or hard−switched converter applications, especially for Power Factor Correction application. It could also be used as a free wheeling diode in variable speed motor control applications and switching mode power supplies.

Features

- Soft Recovery with Low Reverse Recovery Charge (Q_{RR}) and Peak Reverse Recovery Current (I_{RRM})
- Epoxy meets UL 94 V−0 @ 0.125 in
- Low Forward Voltage
- Low Leakage Current
- High Temperature Glass Passivated Junction
- These are Pb−Free Devices

Mechanical Characteristics:

- Case: Epoxy, Molded
- Weight: 1.9 Grams (Approximately)
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads Readily Solderable
- Lead Temperature for Soldering Purposes: 260°C Max. for 10 Seconds

MAXIMUM RATINGS

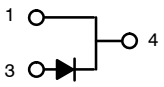
Rating	Symbol	Value	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	V_{RRM} V_{RWM} V_R	600	V
Average Rectified Forward Current (At Rated V_R, T_C = 125°C)	I_O	15	A
Peak Repetitive Forward Current (At Rated V_R, Square Wave, 20 kHz, T_C = 125°C)	I_{FRM}	30	A
Non−Repetitive Peak Surge Current (Surge applied at rated load conditions, halfwave, single phase, 60 Hz)	I_{FSM}	100	A
Operating Junction and Storage Temperature Range	T_J, T_{stg}	−65 to +150	°C

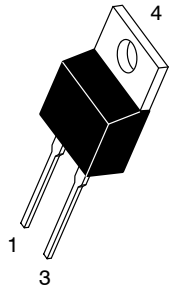
THERMAL CHARACTERISTICS

Parameter	Symbol	Value	Unit
MSR1560G: Thermal Resistance Junction−to−Case Junction−to−Ambient	 $R_{\theta JC}$ $R_{\theta JA}$	 1.6 72.8	°C/W
MSRF1560G: Thermal Resistance Junction−to−Case Junction−to−Ambient	 $R_{\theta JC}$ $R_{\theta JA}$	 4.25 75	°C/W

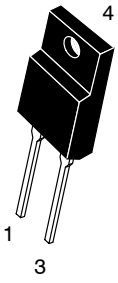
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

SOFT RECOVERY POWER RECTIFIER 15 AMPERES, 600 VOLTS



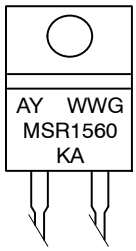


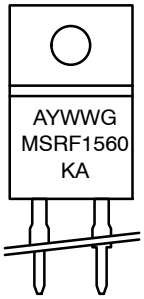
TO−220AC
CASE 221B
STYLE 1



TO−220 FULLPAK
CASE 221AG
STYLE 1

MARKING DIAGRAM





A	= Assembly Location
Y	= Year
WW	= Work Week
G	= Pb−Free Package
KA	= Diode Polarity

ORDERING INFORMATION

Device	Package	Shipping†
MSR1560G	TO−220AC (Pb−Free)	50 Units / Rail

DISCONTINUED (Note 1)

MSRF1560G	TO−220FP (Pb−Free)	50 Units / Rail

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

1. **DISCONTINUED:** This device is not recommended for new design. Please contact your **onsemi** representative for information. The most current information on this device may be available on www.onsemi.com.

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Value		Unit
Instantaneous Forward Voltage (Note 1) (I_F = 15 A) Maximum Typical	V_F	**T_J = 25°C** 1.8 1.5	**T_J = 150°C** 1.4 1.2	V
Instantaneous Reverse Current (V_R = 600 V) Maximum Typical	I_R	**T_J = 25°C** 15 0.4	**T_J = 150°C** 5000 100	μA
Reverse Recovery Time (Note 2) (V_R = 30 V, I_F = 1 A, di/dt = 100 A/μs) Maximum Typical	t_{rr}	**T_J = 25°C** 45 35	**T_J = 100°C** 65 54	ns
Typical Recovery Softness Factor (V_R = 30 V, I_F = 1 A, di/dt = 100 A/μs)	$s = t_b/t_a$	0.67	0.74	
Typical Peak Reverse Recovery Current (V_R = 30 V, I_F = 1 A, di/dt = 100 A/μs)	I_{RRM}	2.3	3.2	A
Typical Reverse Recovery Charge (V_R = 30 V, I_F = 1 A, di/dt = 100 A/μs)	Q_{RR}	31	78	nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. Pulse Test: Pulse Width ≤ 380 μs, Duty Cycle ≤ 2%
2. T_{RR} measured projecting from 25% of I_{RRM} to zero current

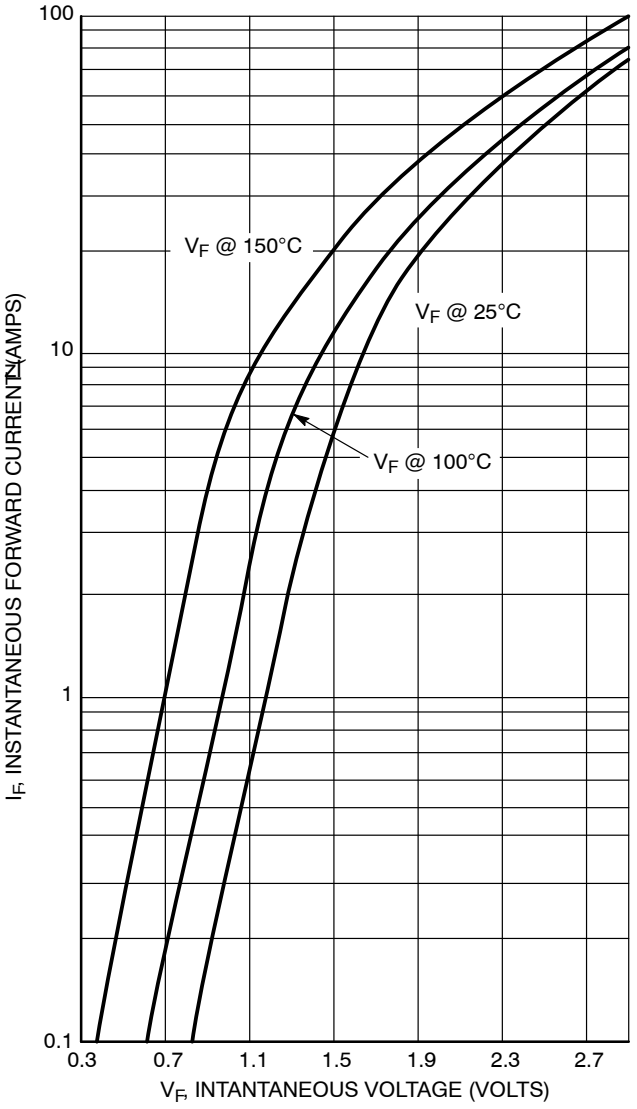


Figure 1. Maximum Forward Voltage

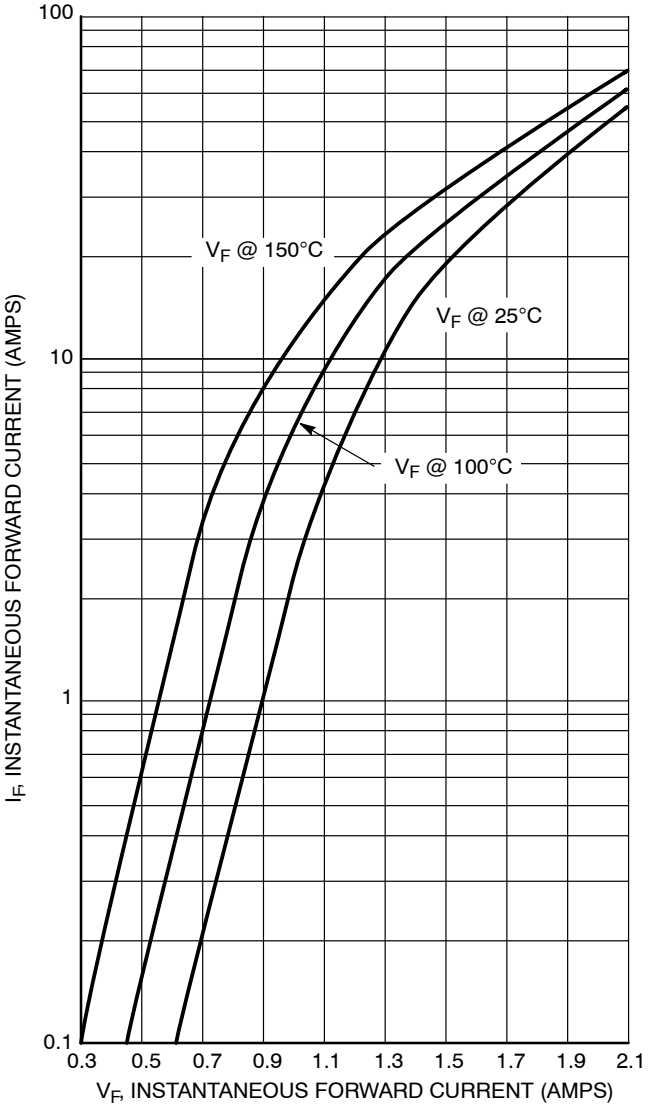


Figure 2. Typical Forward Voltage

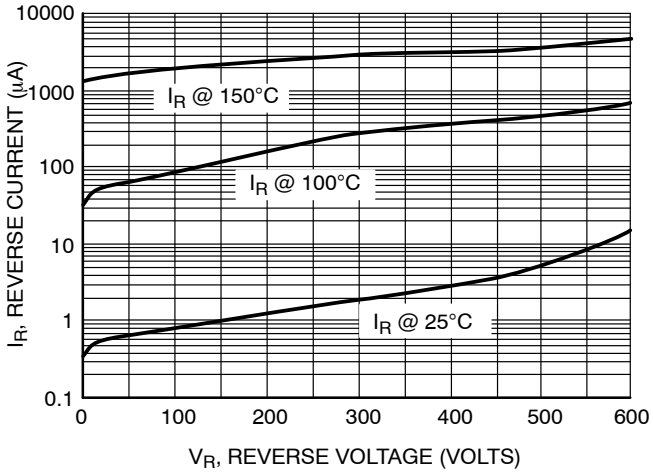


Figure 3. Maximum Reverse Current

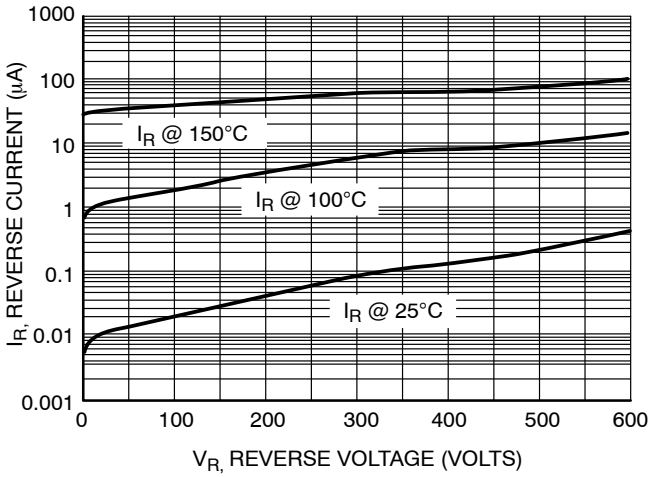


Figure 4. Typical Reverse Current

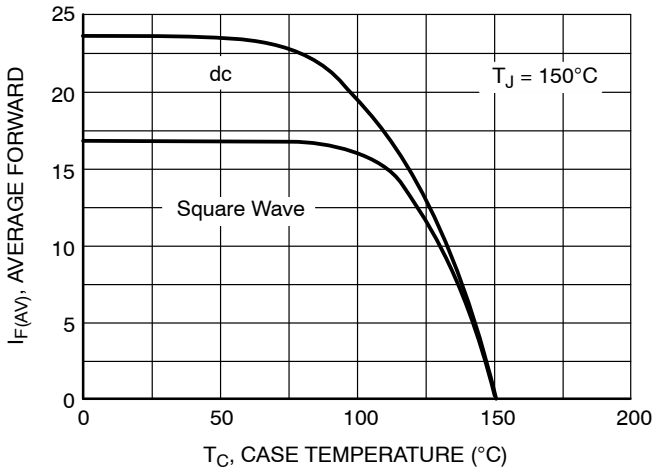


Figure 5. Current Derating

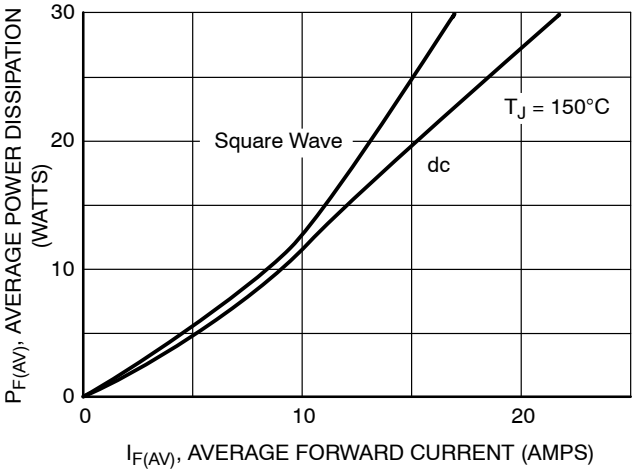


Figure 6. Power Dissipation

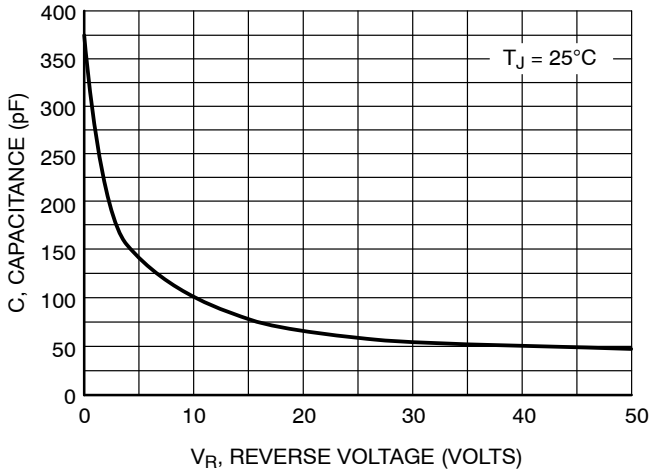


Figure 7. Maximum Capacitance

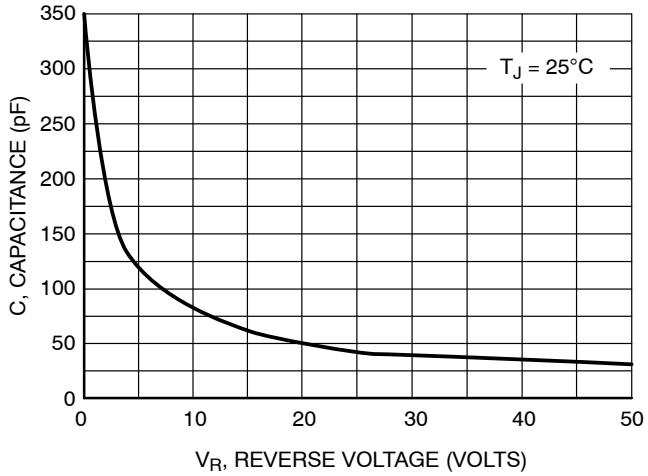


Figure 8. Typical Capacitance

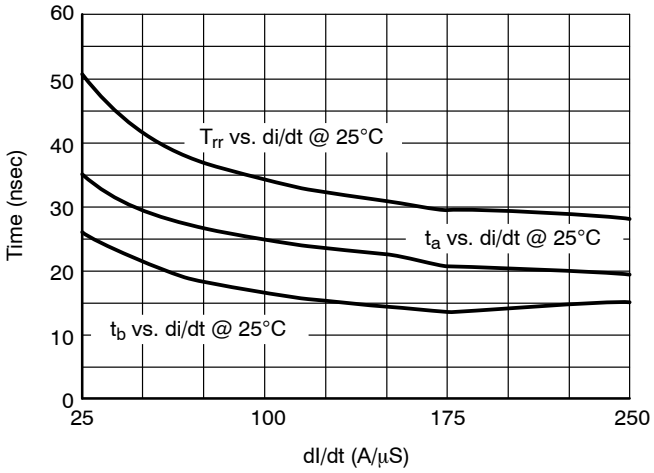


Figure 9. Typical Trr vs. di/dt

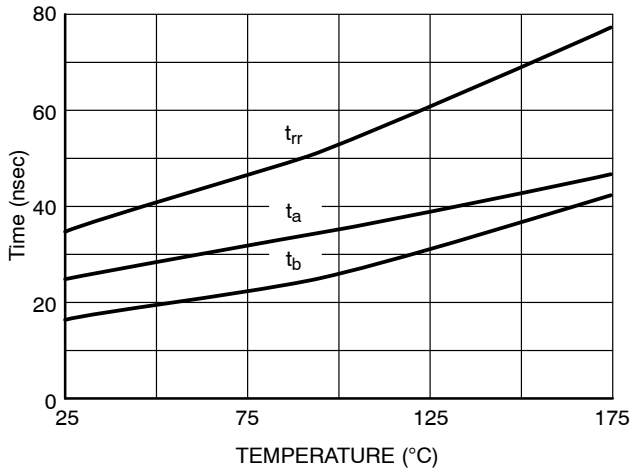


Figure 10. Typical Trr vs. Temperature

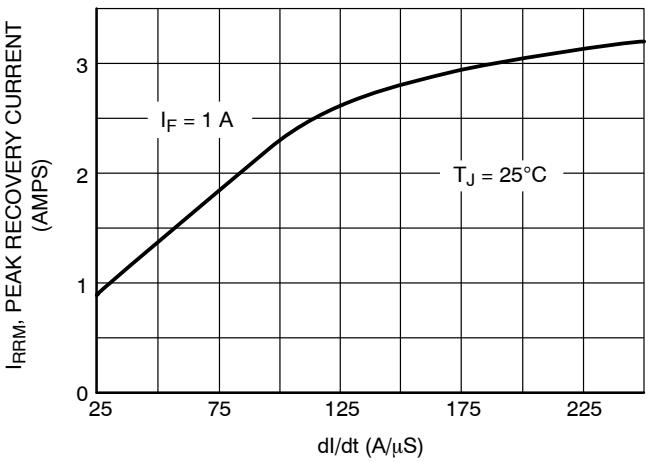


Figure 11. Typical Peak Reverse Recovery Current

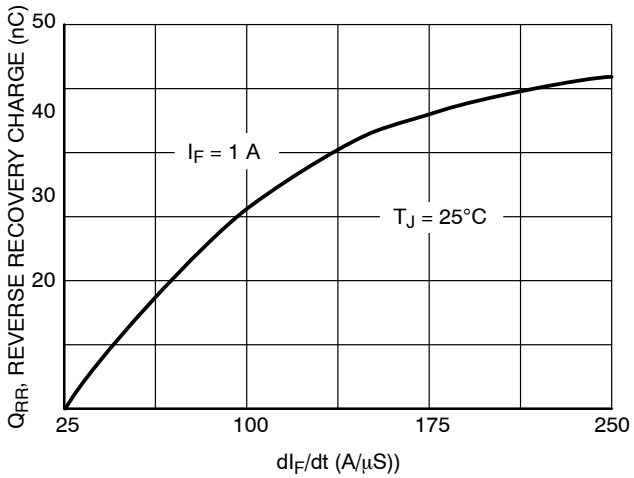


Figure 12. Typical Reverse Recovery Charge

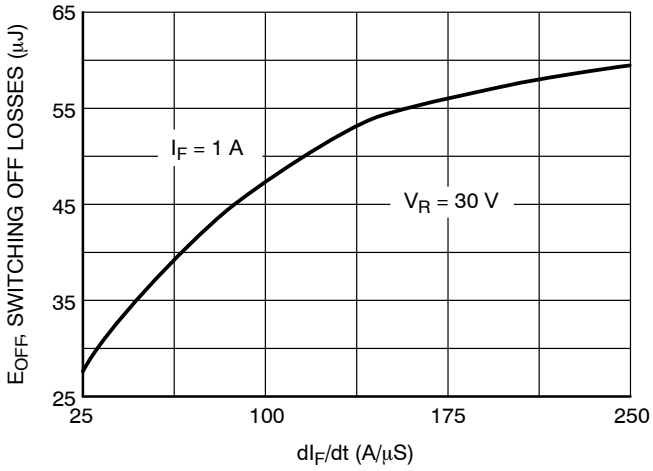


Figure 13. Typical Switching Off Losses

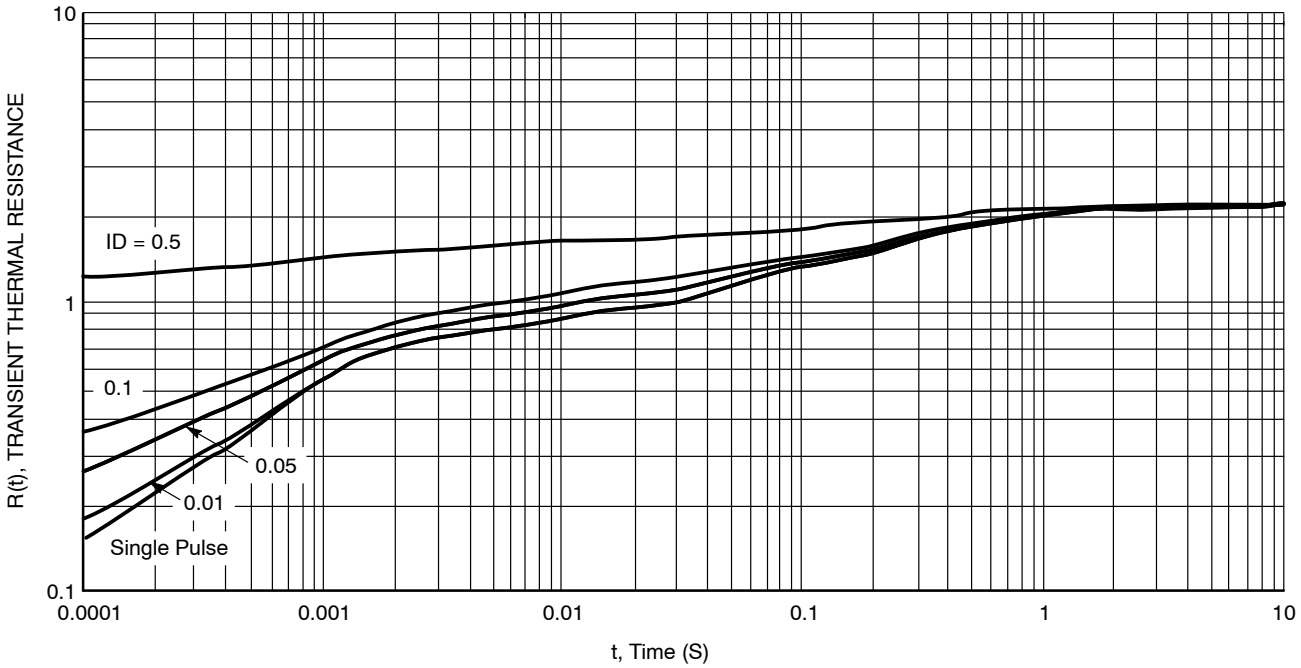


Figure 14. Transient Thermal Response

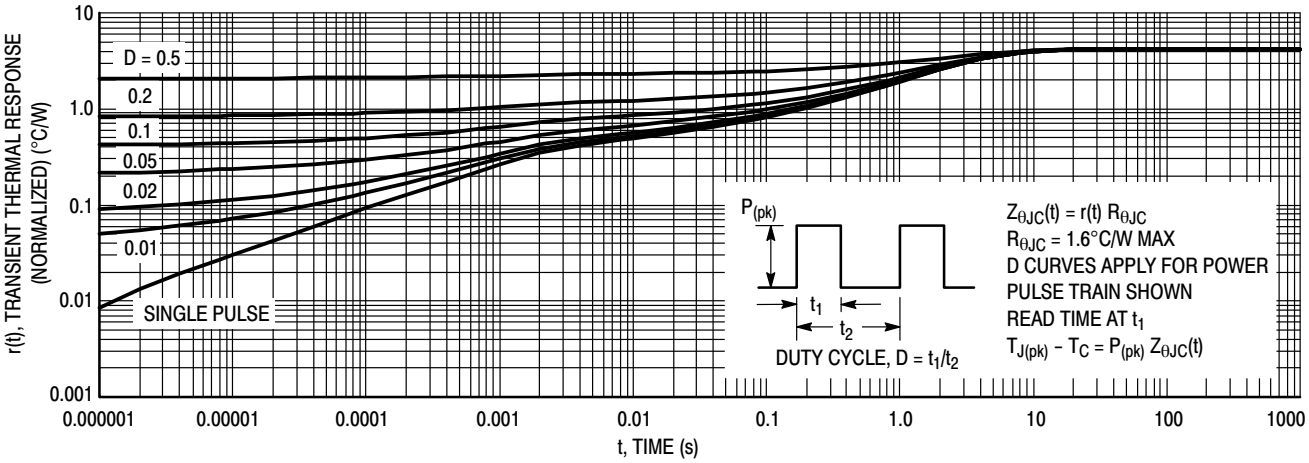


Figure 15. Thermal Response, (MSRF1560) Junction−to−Case ($R_{\theta JC}$)

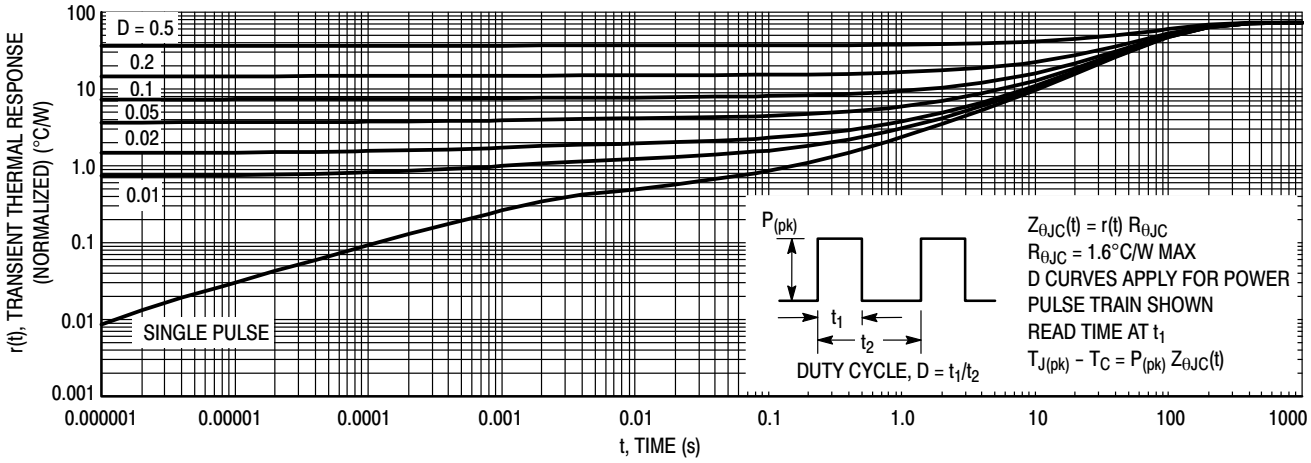
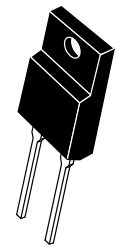


Figure 16. Thermal Response, (MSRF1560) Junction−to−Ambient ($R_{\theta JA}$)

TO−220 FULLPACK, 2−LEAD
CASE 221AG
ISSUE B

DATE 27 AUG 2015



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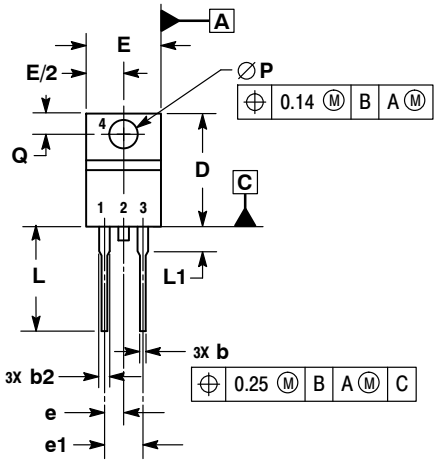
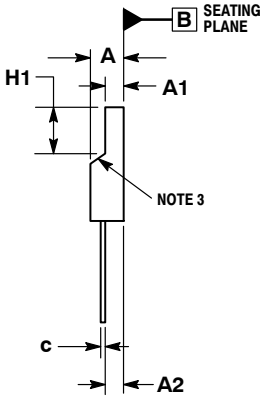


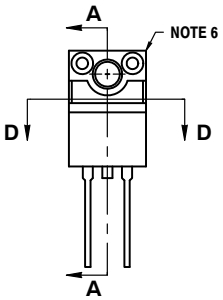
TOP VIEW



SIDE VIEW

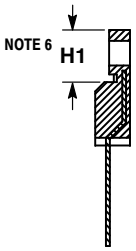
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. CONTOUR UNCONTROLLED IN THIS AREA.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH AND GATE PROTRUSIONS. MOLD FLASH AND GATE PROTRUSIONS NOT TO EXCEED 0.13 PER SIDE. THESE DIMENSIONS ARE TO BE MEASURED AT OUTERMOST EXTREME OF THE PLASTIC BODY.
5. DIMENSION b2 DOES NOT INCLUDE DAMBAR PROTRUSION. LEAD WIDTH INCLUDING PROTRUSION SHALL NOT EXCEED 2.00.

	MILLIMETERS	
DIM	MIN	MAX
A	4.30	4.70
A1	2.50	2.90
A2	2.50	2.90
b	0.54	0.84
b2	1.10	1.40
c	0.49	0.79
D	14.22	15.88
E	9.65	10.67
e	2.54 BSC	
e1	5.08 BSC	
H1	6.40	6.90
L	12.70	14.73
L1	---	2.80
P	3.00	3.40
Q	2.80	3.20



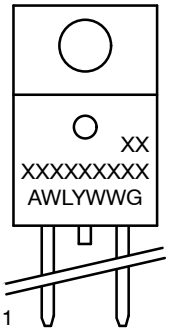
ALTERNATE CONSTRUCTION

SECTION D−D



SECTION A−A

GENERIC MARKING DIAGRAM*



A = Assembly Location
WL = Wafer Lot
Y = Year
WW = Work Week
G = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “ ▪”, may or may not be present.

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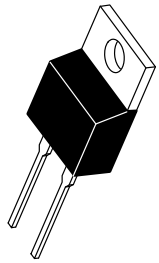
DESCRIPTION:	TO−220 FULLPACK, 2−LEAD	PAGE 1 OF 1

TO−220, 2−LEAD
CASE 221B−04
ISSUE F

DATE 12 APR 2013



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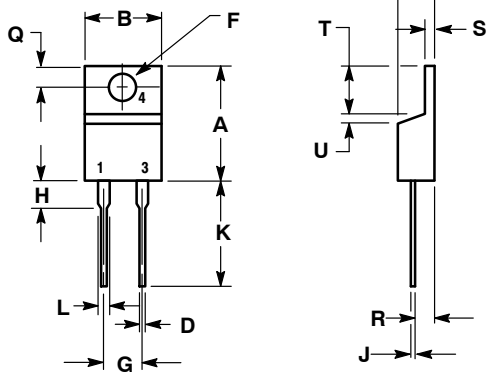

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.595	0.620	15.11	15.75
B	0.380	0.405	9.65	10.29
C	0.160	0.190	4.06	4.82
D	0.025	0.039	0.64	1.00
F	0.142	0.161	3.61	4.09
G	0.190	0.210	4.83	5.33
H	0.110	0.130	2.79	3.30
J	0.014	0.025	0.36	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.14	1.52
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.14	1.39
T	0.235	0.255	5.97	6.48
U	0.000	0.050	0.000	1.27

STYLE 1:
PIN 1. CATHODE
2. N/A
3. ANODE
4. CATHODE

STYLE 2:
PIN 1. ANODE
2. N/A
3. CATHODE
4. ANODE

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DESCRIPTION:	**TO−220, 2−LEAD**		**PAGE 1 OF 1**

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