MSR1560G, MSRF1560G

Switch-mode Soft Recovery Power Rectifier

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.

ON Semiconductor®

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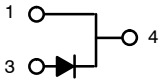
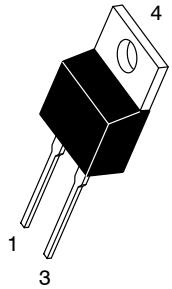
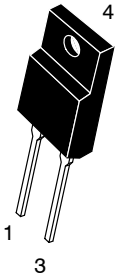
SOFT RECOVERY POWER RECTIFIER 15 AMPERES, 600 VOLTS



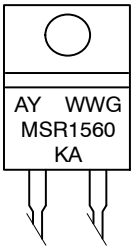


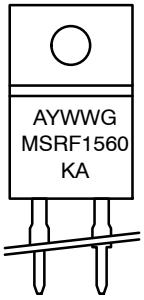
TO−220AC
CASE 221B
STYLE 1



TO−220 FULLPAK
CASE 221AG
STYLE 1

MARKING DIAGRAMS





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

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Value		Unit
Instantaneous Forward Voltage (Note 1) (I_F = 15 A)	V_F	**T_J = 25°C**	**T_J = 150°C**	V
Maximum		1.8	1.4	
Typical		1.5	1.2	
Instantaneous Reverse Current (V_R = 600 V)	I_R	**T_J = 25°C**	**T_J = 150°C**	μA
Maximum		15	5000	
Typical		0.4	100	
Reverse Recovery Time (Note 2) (V_R = 30 V, I_F = 1 A, di/dt = 100 A/μs)	t_{rr}	**T_J = 25°C**	**T_J = 100°C**	ns
Maximum		45	65	
Typical		35	54	
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

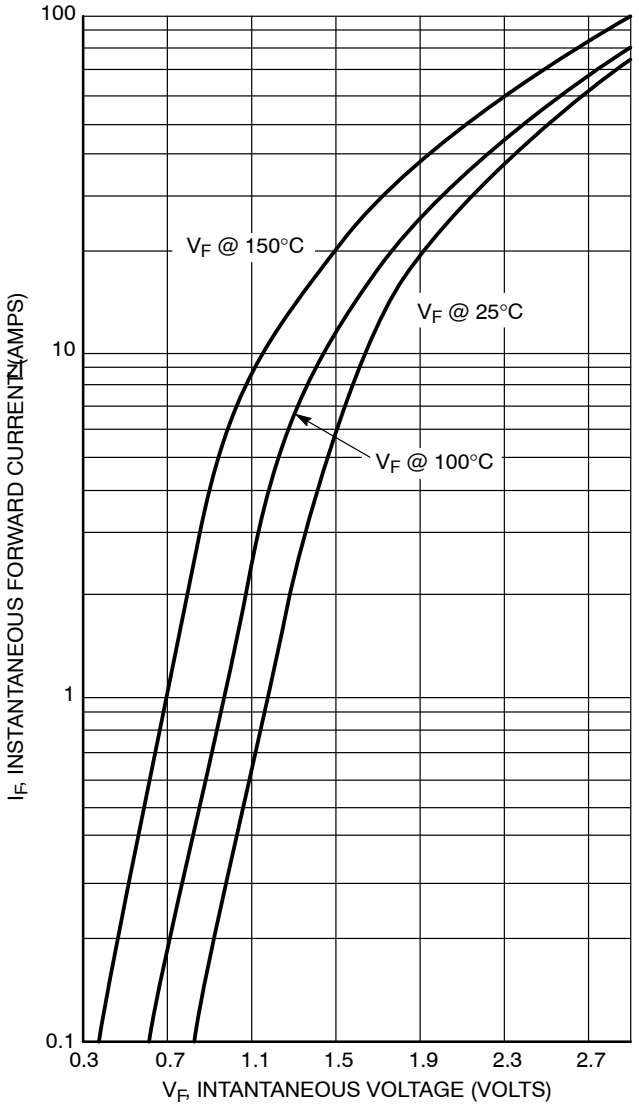


Figure 1. Maximum Forward Voltage

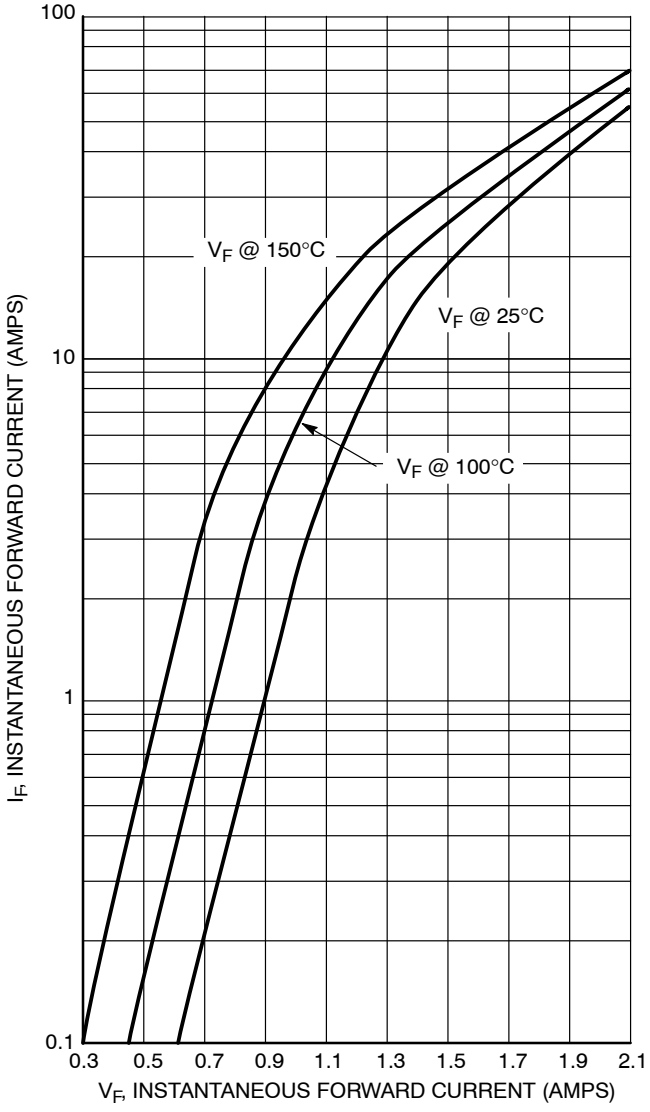


Figure 2. Typical Forward Voltage

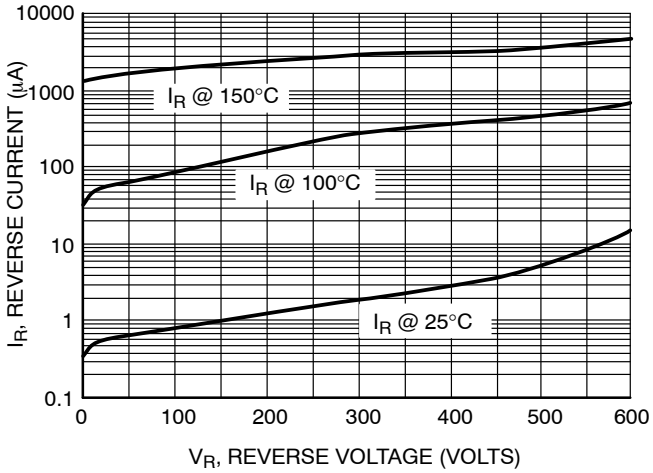


Figure 3. Maximum Reverse Current

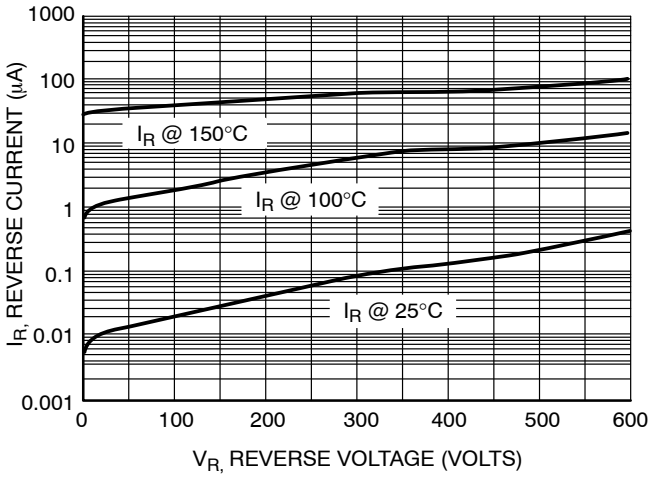


Figure 4. Typical Reverse Current

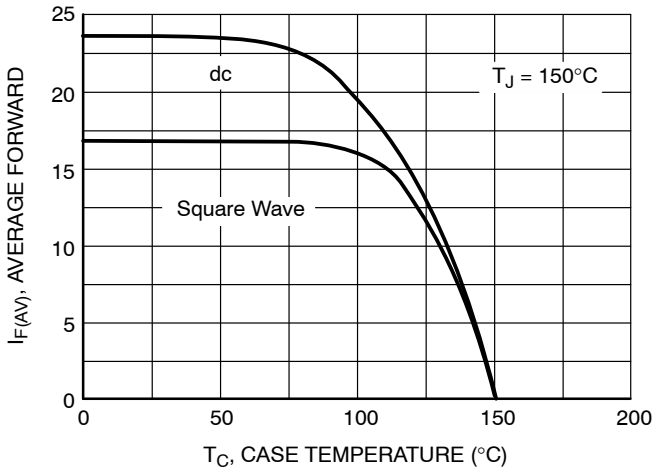


Figure 5. Current Derating

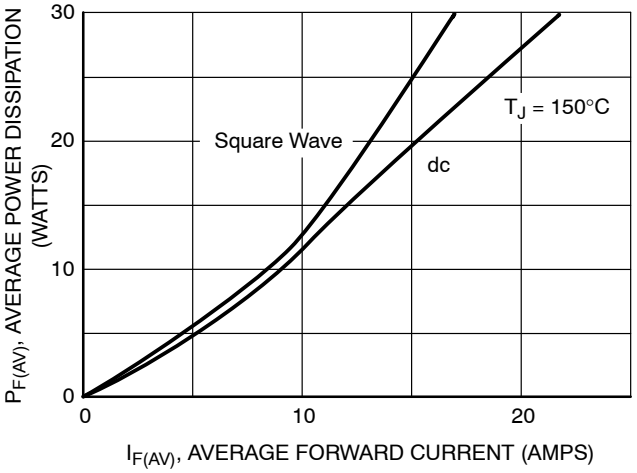


Figure 6. Power Dissipation

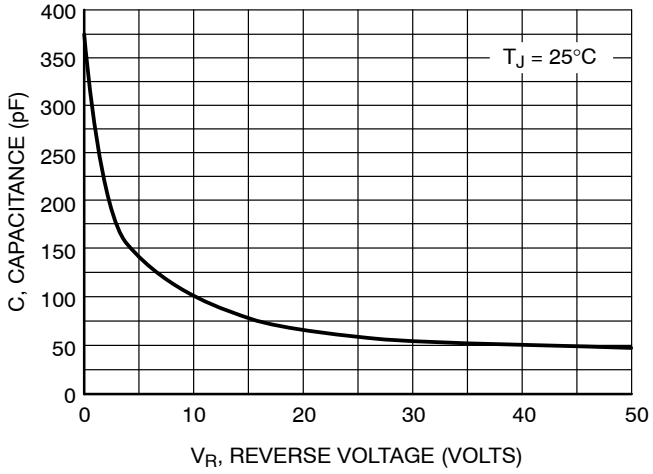


Figure 7. Maximum Capacitance

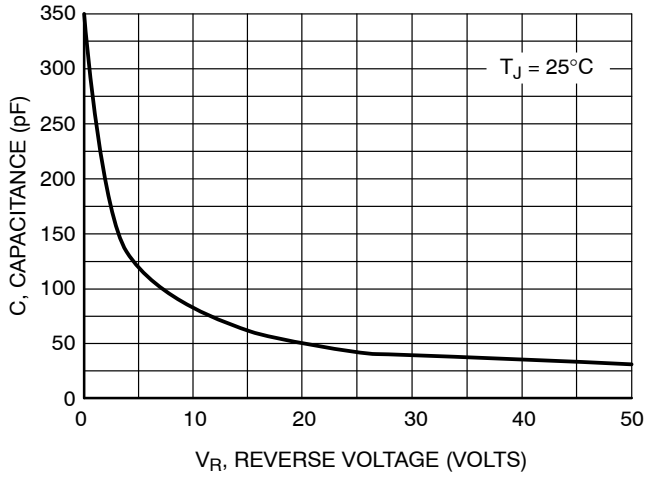


Figure 8. Typical Capacitance

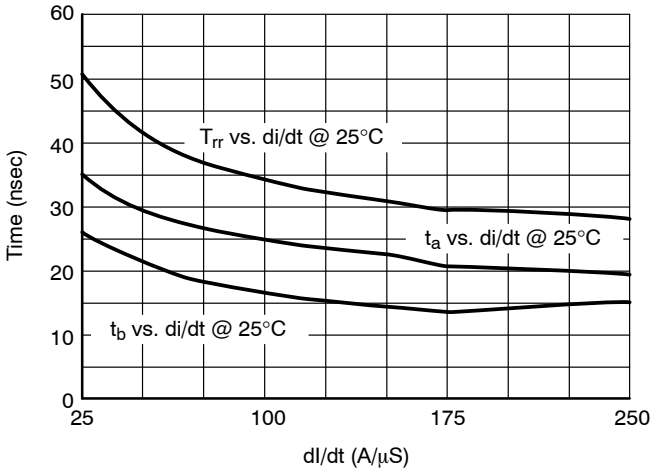


Figure 9. Typical Trr vs. di/dt

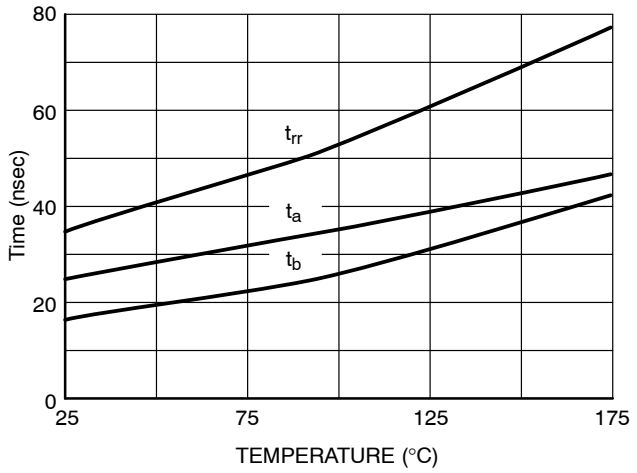


Figure 10. Typical Trr vs. Temperature

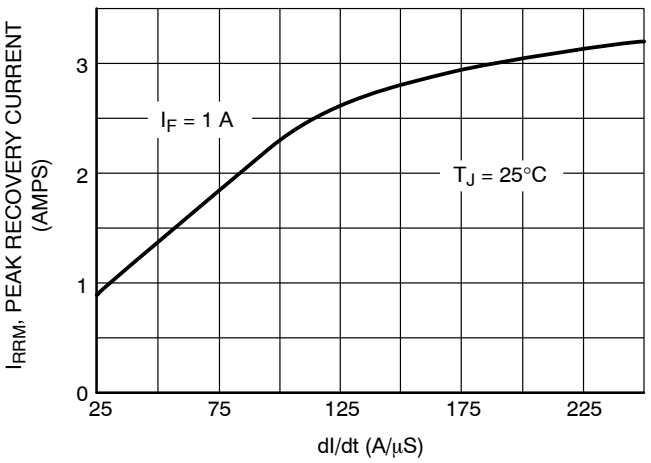


Figure 11. Typical Peak Reverse Recovery Current

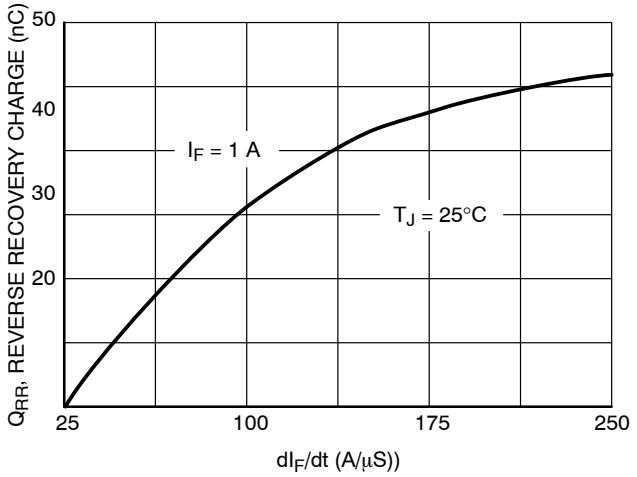


Figure 12. Typical Reverse Recovery Charge

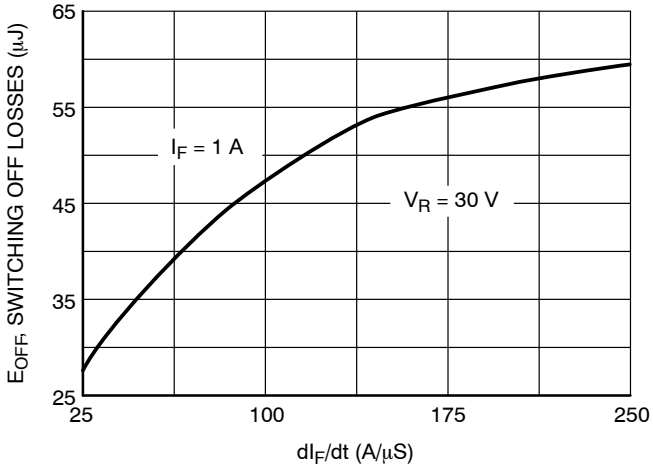


Figure 13. Typical Switching Off Losses

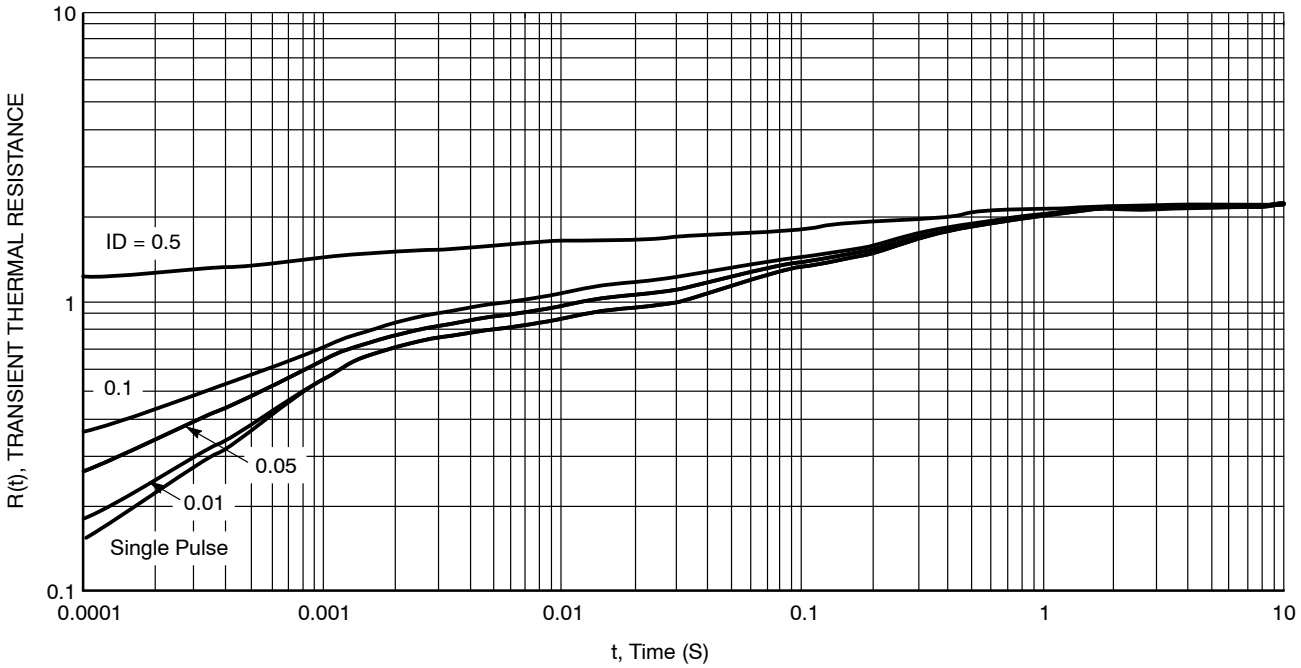


Figure 14. Transient Thermal Response

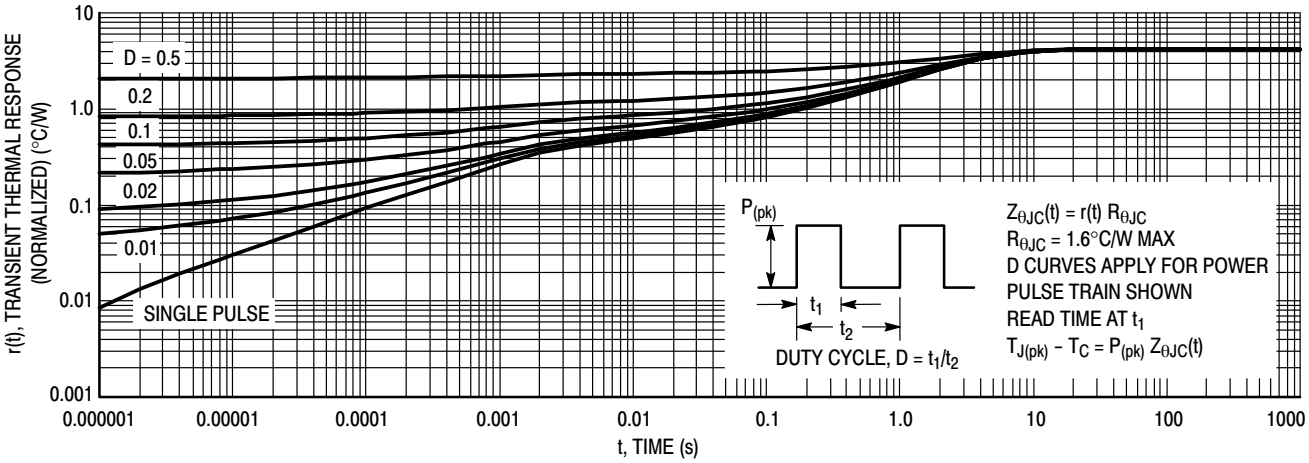


Figure 15. Thermal Response, (MSRF1560) Junction−to−Case ($R_{\theta JC}$)

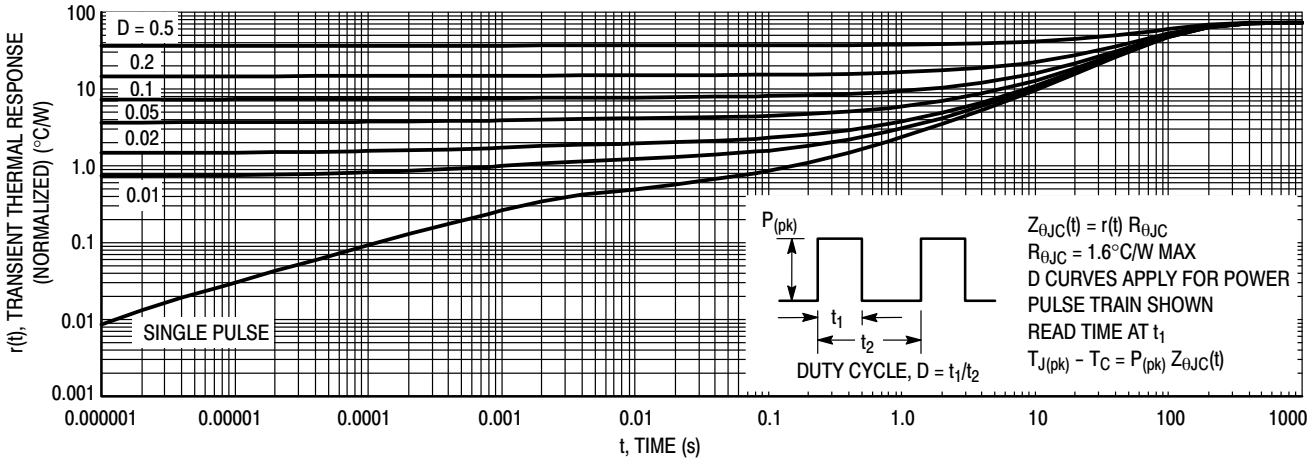
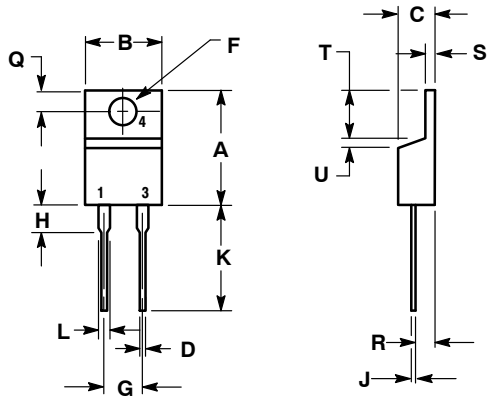


Figure 16. Thermal Response, (MSRF1560) Junction−to−Ambient ($R_{\theta JA}$)

PACKAGE DIMENSIONS

TO−220 TWO−LEAD
CASE 221B−04
ISSUE F

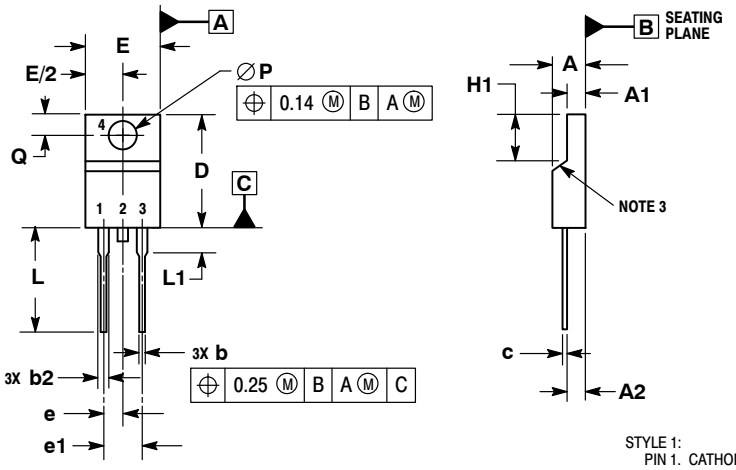


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	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

TO−220 FULLPAK, 2−LEAD
CASE 221AG
ISSUE A



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.

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

	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	5.97	6.48
L	12.70	14.73
L1	---	2.80
P	3.00	3.40
Q	2.80	3.20

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