

# SWITCHMODE™ 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 ( $I_{RRM}$ )
- 150°C Operating Junction Temperature
- Popular TO-220 Package
- Epoxy meets UL 94 V-0 @ 0.125 in
- Low Forward Voltage
- Low Leakage Current
- High Temperature Glass Passivated Junction
- Pb-Free Package is Available\*

## 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 $V_R$ , $T_C = 125^\circ\text{C}$ )	$I_O$	15	A
Peak Repetitive Forward Current (At Rated $V_R$ , Square Wave, 20 kHz, $T_C = 125^\circ\text{C}$ )	$I_{FRM}$	30	A
Non-Repetitive Peak Surge Current (Surge applied at rated load conditions, halfwave, single phase, 60 Hz)	$I_{FSM}$	100	A
Storage/Operating Case Temperature	$T_{stg}, T_C$	-65 to +150	°C
Operating Junction Temperature	$T_J$	-65 to +150	°C

## THERMAL CHARACTERISTICS

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.6	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	72.8	

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

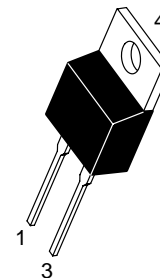
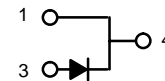
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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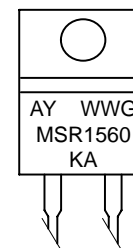
<http://onsemi.com>

## SOFT RECOVERY POWER RECTIFIER 15 AMPERES, 600 VOLTS



TO-220AC  
CASE 221B  
STYLE 2

## MARKING DIAGRAM



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

## ORDERING INFORMATION

Device	Package	Shipping
MSR1560	TO-220	50 Units/Rail
MSR1560G	TO-220 (Pb-Free)	50 Units/Rail

## ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Value		Unit
Maximum Instantaneous Forward Voltage (Note 1) ( $I_F = 15\text{ A}$ )	$V_F$	$T_J = 25^\circ\text{C}$	$T_J = 150^\circ\text{C}$	V
Typical		1.8 1.5	1.4 1.2	
Maximum Instantaneous Reverse Current ( $V_R = 600\text{ V}$ )	$I_R$	$T_J = 25^\circ\text{C}$	$T_J = 150^\circ\text{C}$	$\mu\text{A}$
Typical		15 0.4	5000 100	
Maximum Reverse Recovery Time (Note 2) ( $V_R = 30\text{ V}$ , $I_F = 1\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ )	$t_{rr}$	$T_J = 25^\circ\text{C}$	$T_J = 100^\circ\text{C}$	ns
Typical		45 35	65 54	
Typical Recovery Softness Factor ( $V_R = 30\text{ V}$ , $I_F = 1\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ )	$s = t_b/t_a$	.67	.74	
Typical Peak Reverse Recovery Current ( $V_R = 30\text{ V}$ , $I_F = 1\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ )	$I_{RRM}$	2.3	3.2	A
Typical Reverse Recovery Charge ( $V_R = 30\text{ V}$ , $I_F = 1\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ )	$Q_{RR}$	31	78	nC

1. Pulse Test: Pulse Width  $\leq 380\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2\%$
2.  $T_{RR}$  measured projecting from 25% of  $I_{RRM}$  to zero current

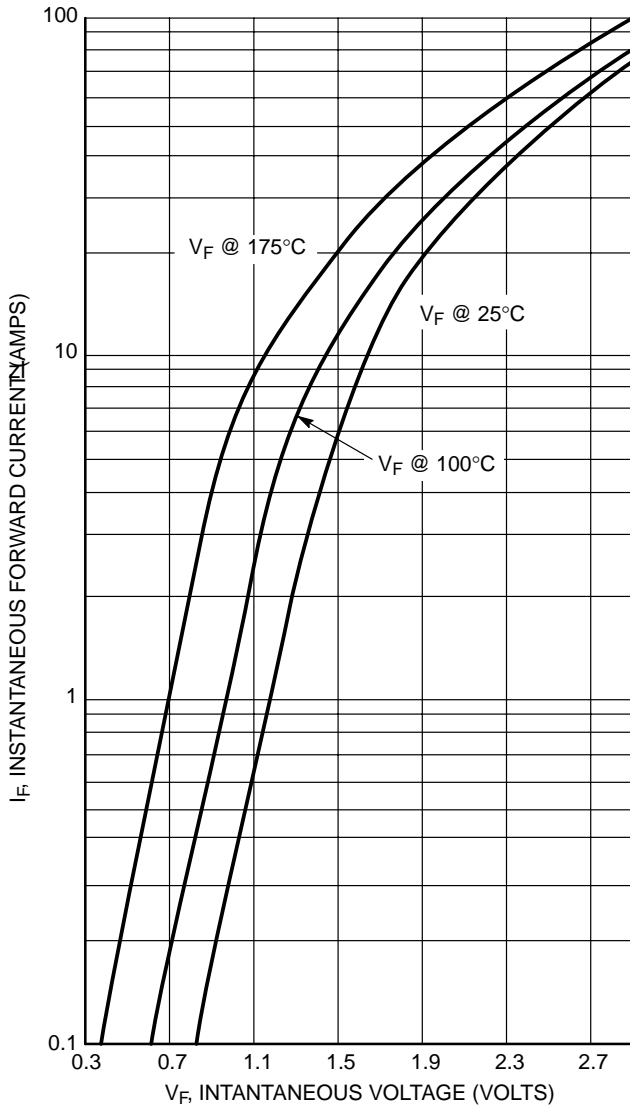


Figure 1. Maximum Forward Voltage

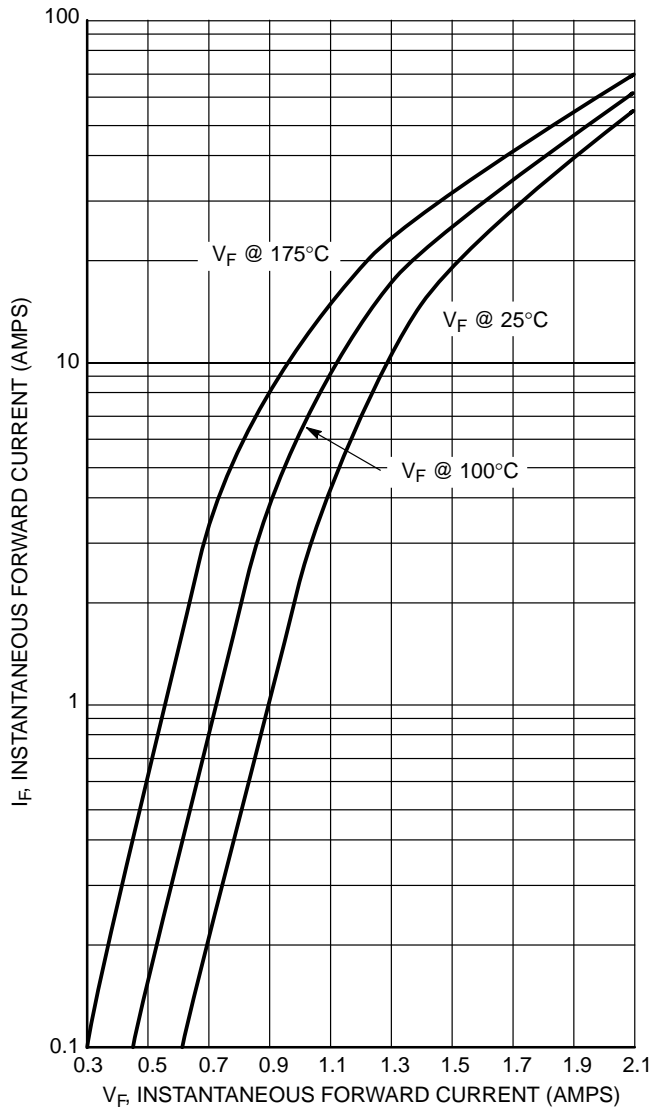


Figure 2. Typical Forward Voltage

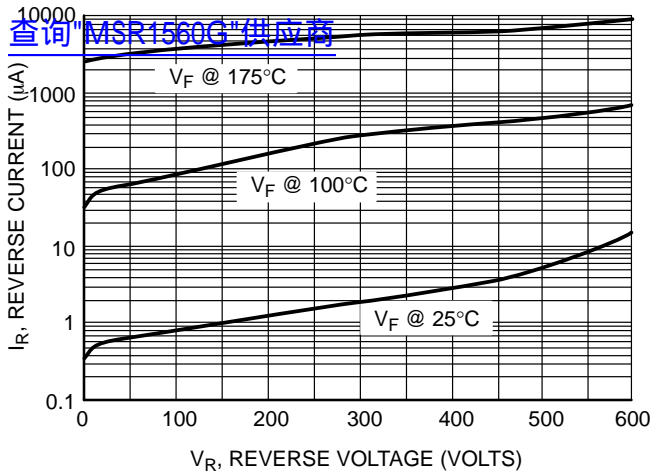


Figure 3. Maximum Reverse Current

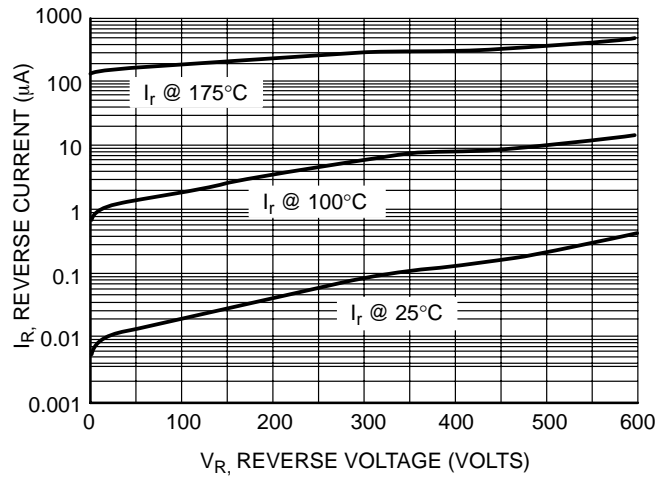


Figure 4. Typical Reverse Current

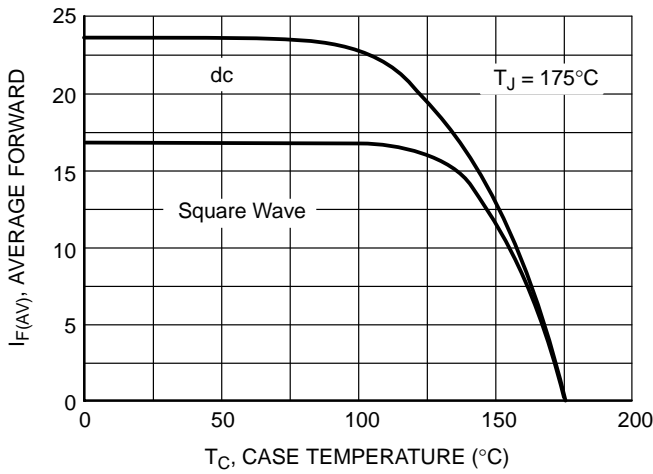


Figure 5. Current Derating

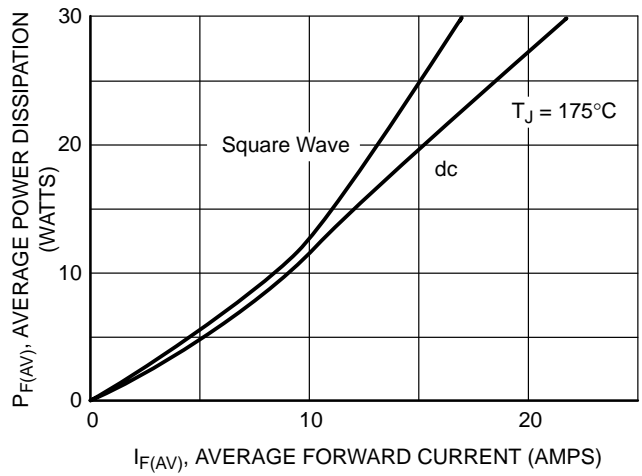


Figure 6. Power Dissipation

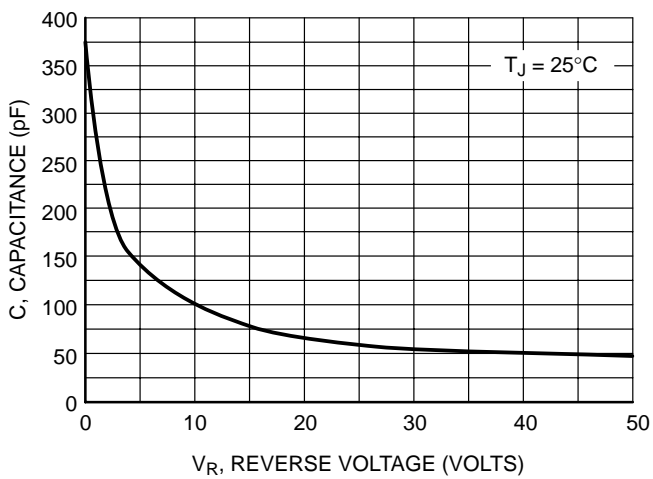


Figure 7. Maximum Capacitance

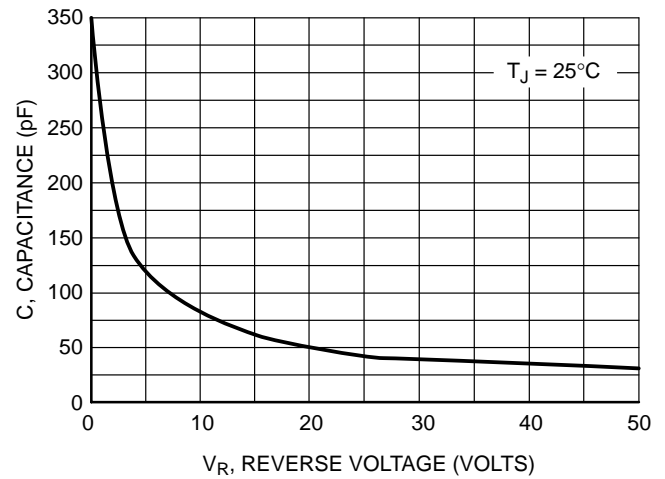


Figure 8. Typical Capacitance

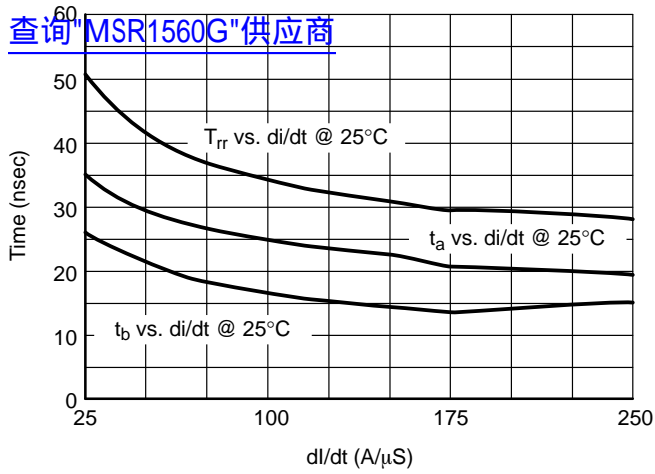


Figure 9. Typical Trr vs. di/dt

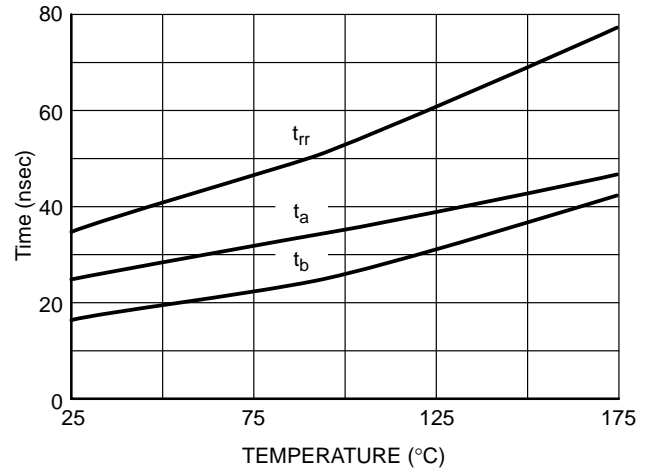


Figure 10. Typical Trr vs. Temperature

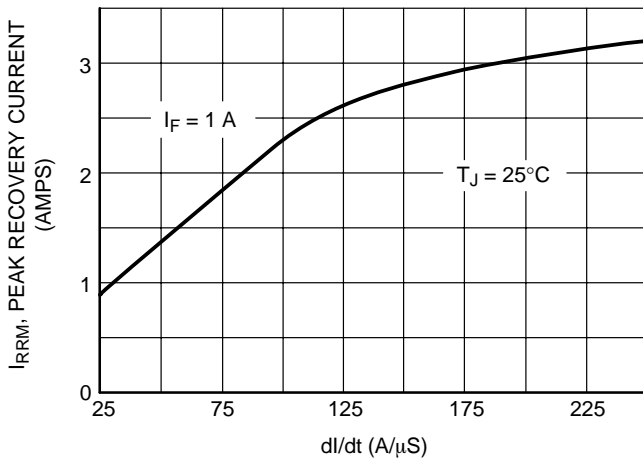


Figure 11. Typical Peak Reverse Recovery Current

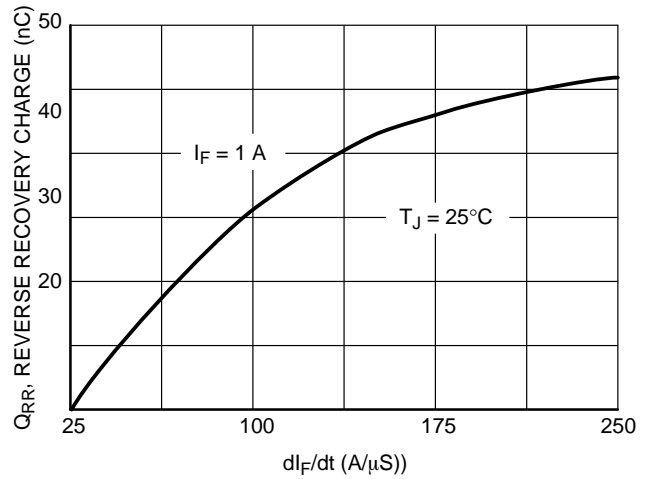


Figure 12. Typical Reverse Recovery Charge

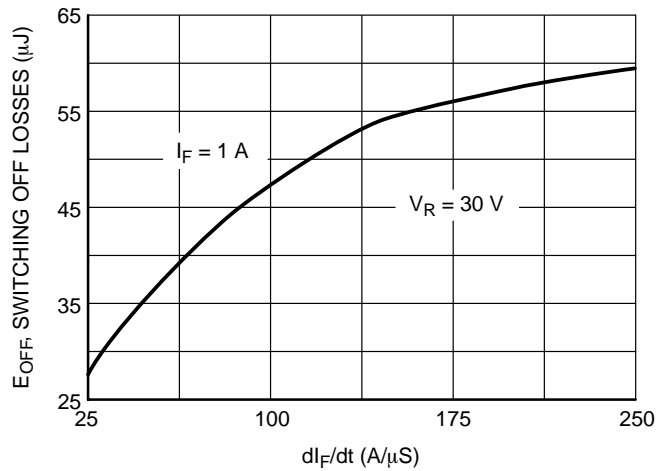


Figure 13. Typical Switching Off Losses

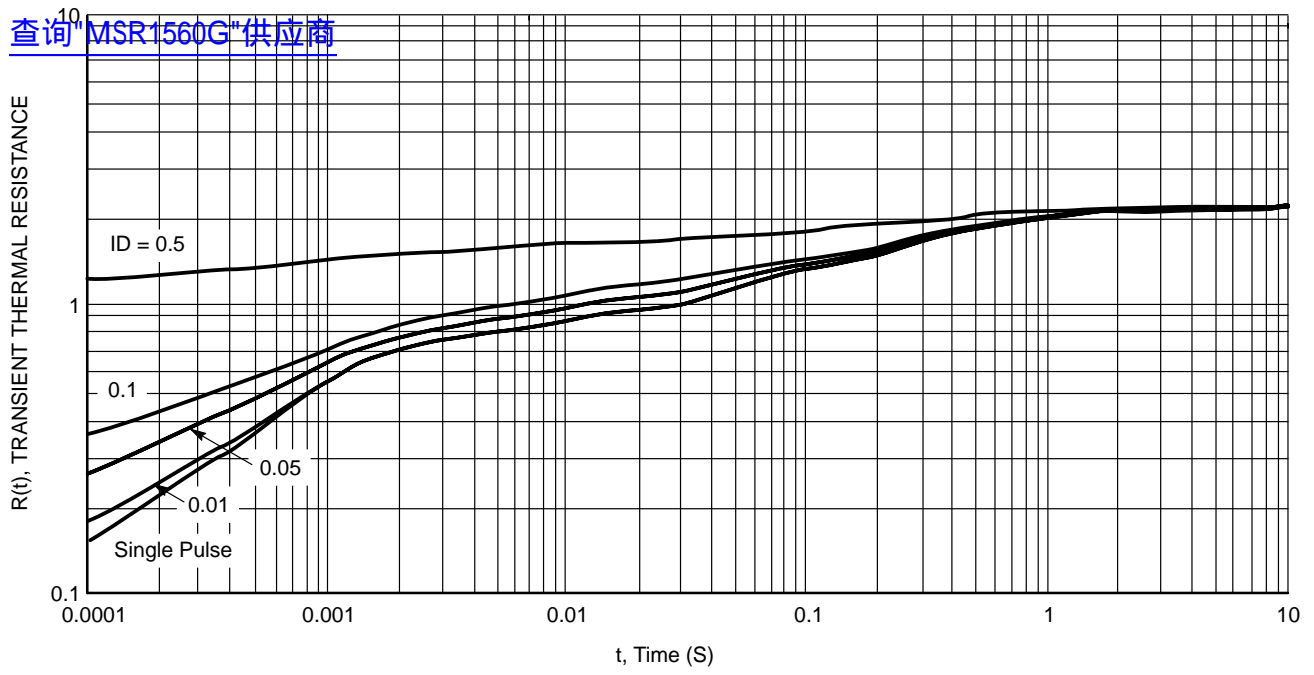
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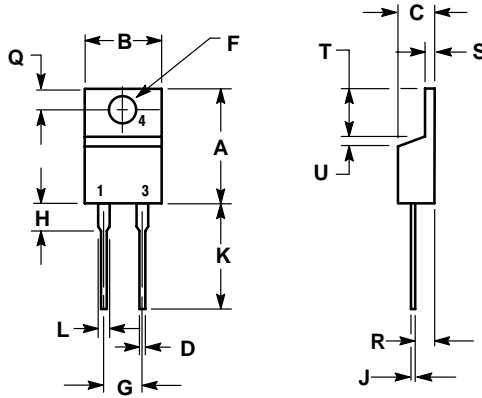
Figure 14. Transient Thermal Response

# MSR1560

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## PACKAGE DIMENSIONS

### TO-220 TWO-LEAD CASE 221B-04 ISSUE D




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

DIM	INCHES		MILLIMETERS	
	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	0.035	0.64	0.89
F	0.142	0.147	3.61	3.73
G	0.190	0.210	4.83	5.33
H	0.110	0.130	2.79	3.30
J	0.018	0.025	0.46	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 2:
- PIN 1. ANODE
  - N/A
  - CATHODE
  - ANODE

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