MSR860G, MSRF860G

Switch-mode Soft Recovery Power Rectifiers

Plastic TO−220 Package

ON Semiconductor®

http://onsemi.com

These state−of−the−art devices are designed for use as free wheeling diodes in variable speed motor control applications and switching power supplies.

Features

- Soft Recovery with Guaranteed Low Reverse Recovery Charge (Q_{RR}) and Peak Reverse Recovery Current (I_{RRM})
- 150°C Operating Junction Temperature
- Epoxy meets UL 94 V−0 @ 0.125 in
- Low Forward Voltage
- Low Leakage Current
- 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

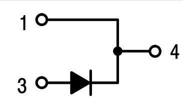
Rating	Symbol	Value	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	V_{RRM} V_{RWM} V_R	600	V
Average Rectified Forward Current (Rated V_R, T_C = 125°C)	I_O	8.0	A
Peak Repetitive Forward Current (Rated V_R, Square Wave, 20 kHz, T_C = 125°C)	I_{FRM}	16	A
Non−Repetitive 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

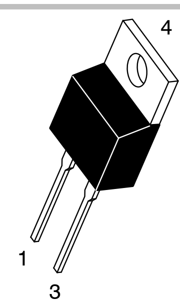
THERMAL CHARACTERISTICS

Parameter	Symbol	Value	Unit
MSR860G Thermal Resistance, Junction−to−Case Thermal Resistance, Junction−to−Ambient	 $R_{\theta JC}$ $R_{\theta JA}$	 1.6 72.8	°C/W
MSRF860G Thermal Resistance, Junction−to−Case Thermal Resistance, Junction−to−Ambient	 $R_{\theta JC}$ $R_{\theta JA}$	 4.75 75	°C/W

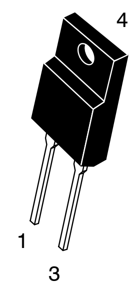
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

SOFT RECOVERY POWER RECTIFIER
8.0 AMPERES, 600 VOLTS



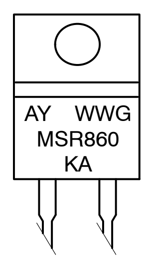


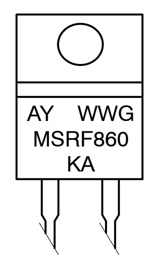
TO−220AC
CASE 221B
STYLE 1



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
MSR860G	TO−220AC (Pb−Free)	50 Units / Rail
MSRF860G	TO−220FP (Pb−Free)	50 Units / Rail

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Value		Unit
Maximum Instantaneous Forward Voltage (I_F = 8.0 A) (Note 1)	V_F	**T_J = 25°C**	**T_J = 150°C**	V
Maximum		1.7	1.3	
Typical		1.4	1.1	
Maximum Instantaneous Reverse Current (V_R = 600 V)	I_R	**T_J = 25°C**	**T_J = 150°C**	μA
Maximum		10	1000	
Typical		2.0	80	
Maximum Reverse Recovery Time (Note 2) (V_R = 400 V, I_F = 8.0 A, di/dt = 200 A/μs)	t_{rr}	**T_J = 25°C**	**T_J = 125°C**	ns
Maximum		120	190	
Typical		95	125	
Typical Recovery Softness Factor (V_R = 400 V, I_F = 8.0 A, di/dt = 200 A/μs)	$s = t_b/t_a$	2.5	3.0	
Maximum Peak Reverse Recovery Current (V_R = 400 V, I_F = 8.0 A, di/dt = 200 A/μs)	I_{RRM}	5.8	8.3	A
Maximum Reverse Recovery Charge (V_R = 400 V, I_F = 8.0 A, di/dt = 200 A/μs)	Q_{RR}	350	700	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

TYPICAL ELECTRICAL CHARACTERISTICS

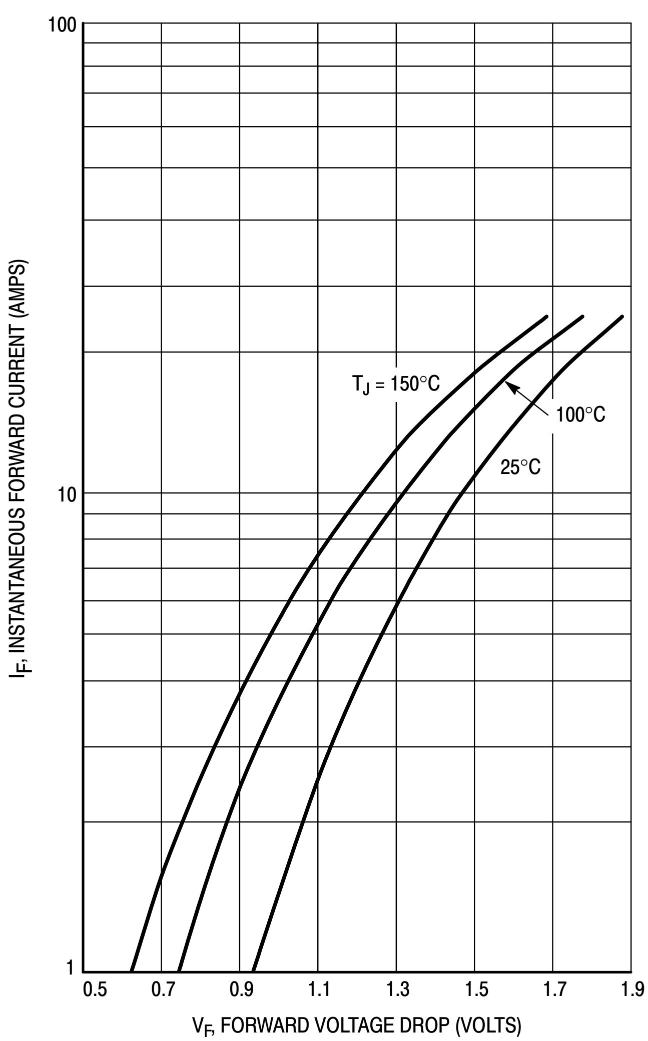


Figure 1. Typical Forward Voltage

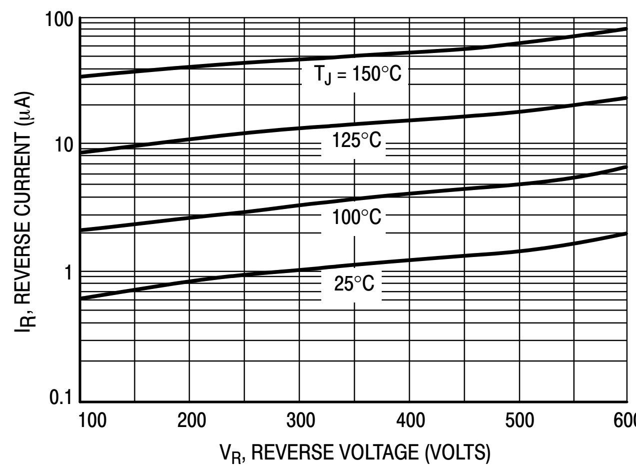


Figure 2. Typical Reverse Current

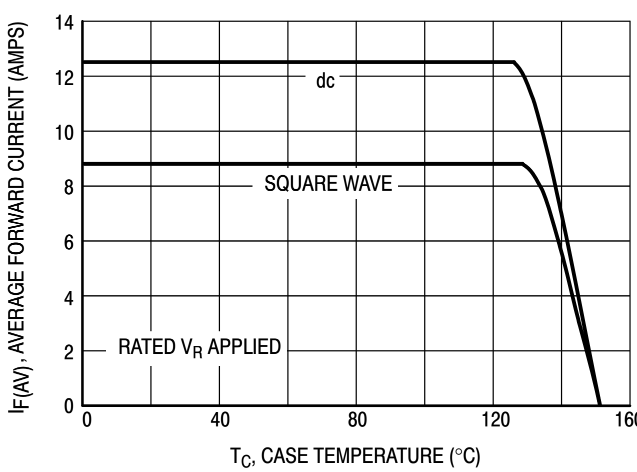


Figure 3. Current Derating, Case

TYPICAL ELECTRICAL CHARACTERISTICS

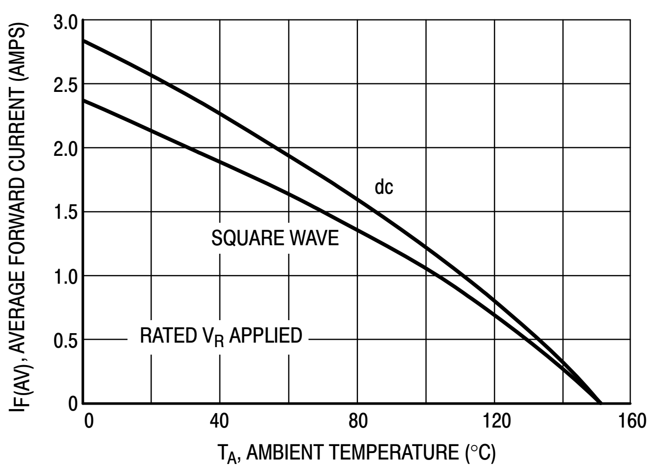


Figure 4. Current Derating, Ambient

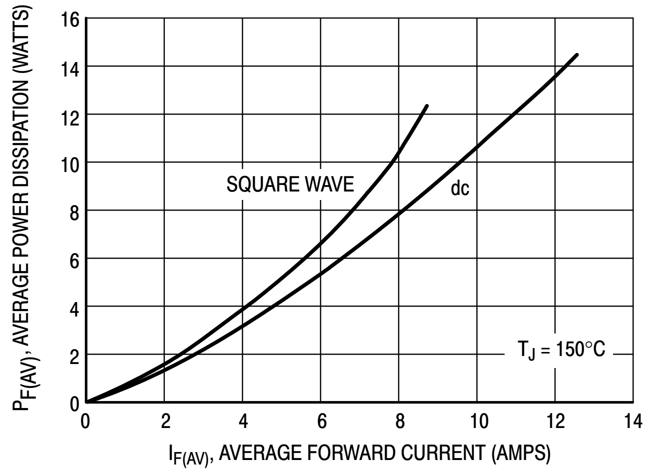


Figure 5. Power Dissipation

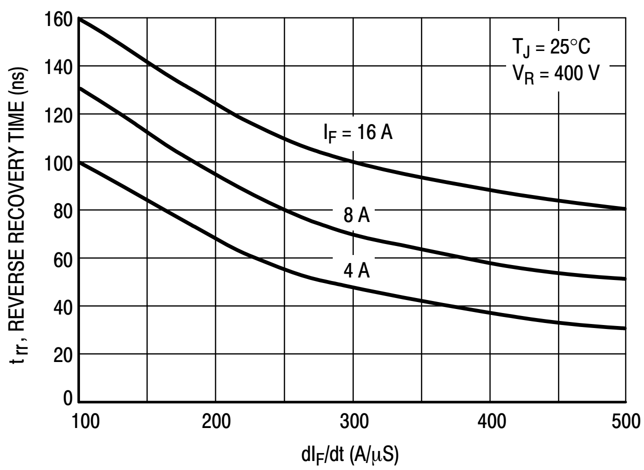


Figure 6. Typical Reverse Recovery Time

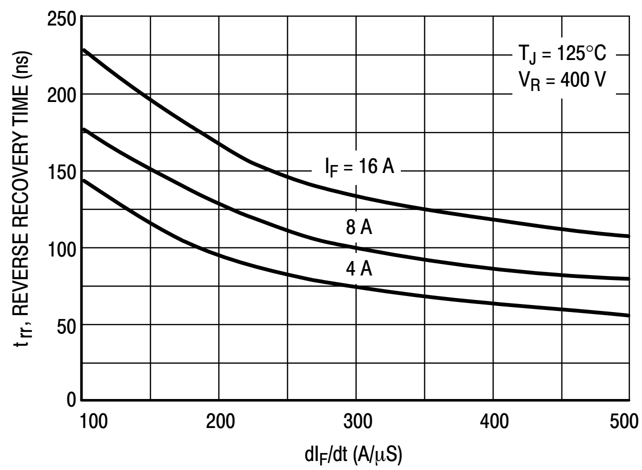


Figure 7. Typical Reverse Recovery Time

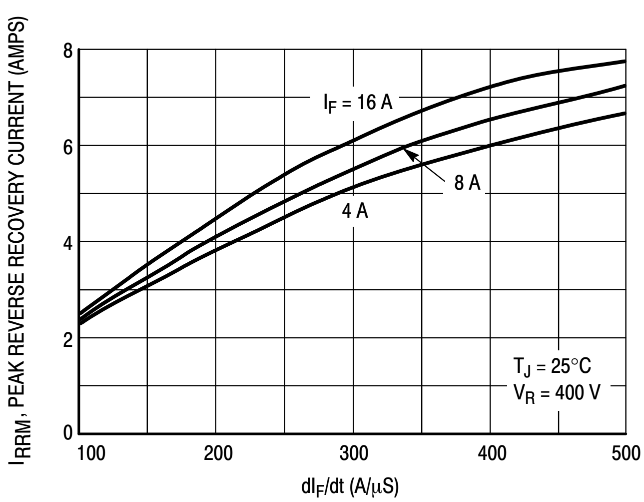


Figure 8. Typical Peak Reverse Recovery Current

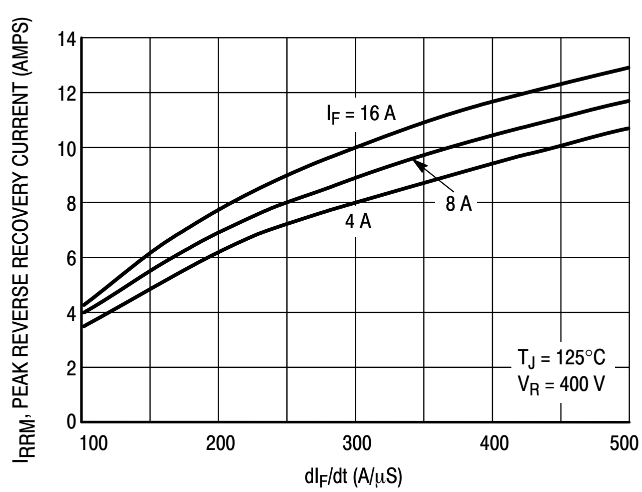


Figure 9. Typical Peak Reverse Recovery Current

TYPICAL ELECTRICAL CHARACTERISTICS

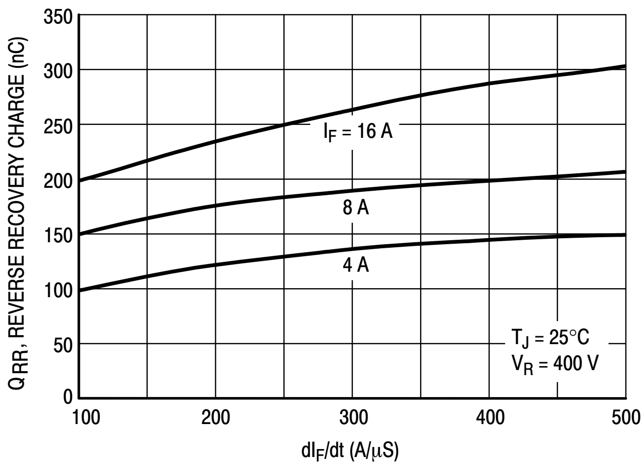


Figure 10. Typical Reverse Recovery Charge

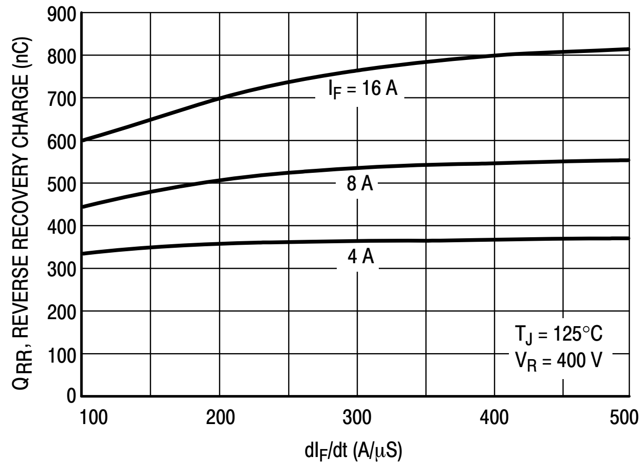


Figure 11. Typical Reverse Recovery Charge

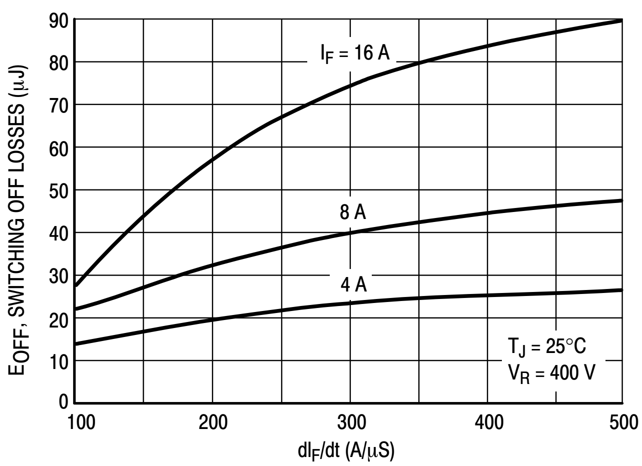


Figure 12. Typical Switching Off Losses

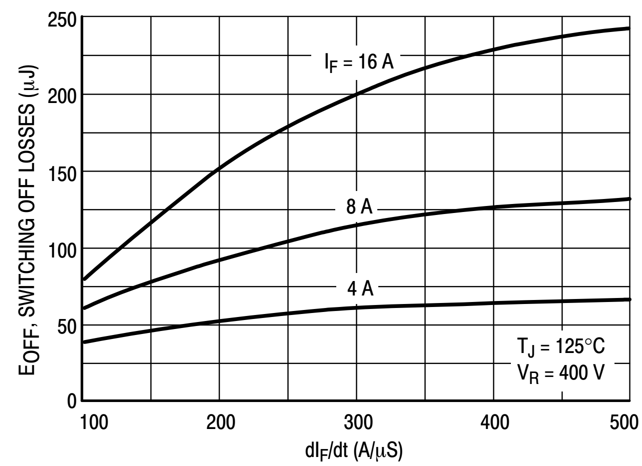


Figure 13. Typical Switching Off Losses

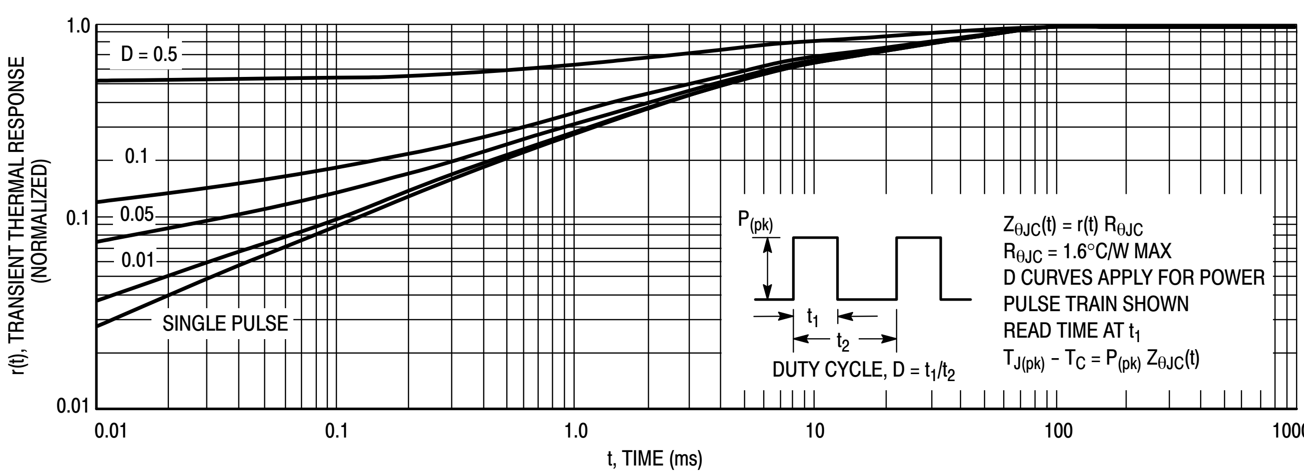


Figure 14. Thermal Response (MSR860)

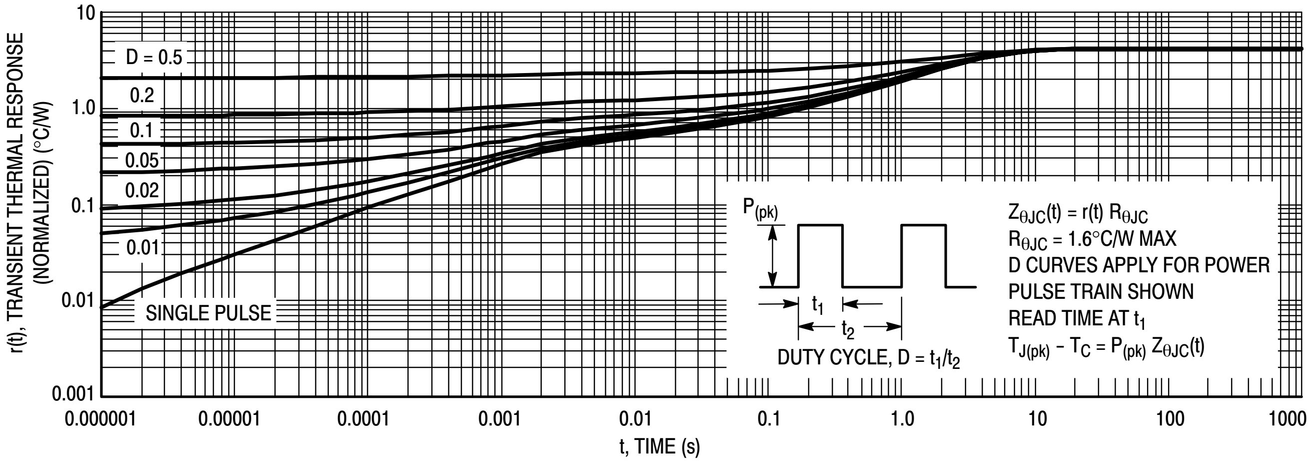


Figure 15. Thermal Response, (MSRF860) Junction−to−Case ($R_{\theta JC}$)

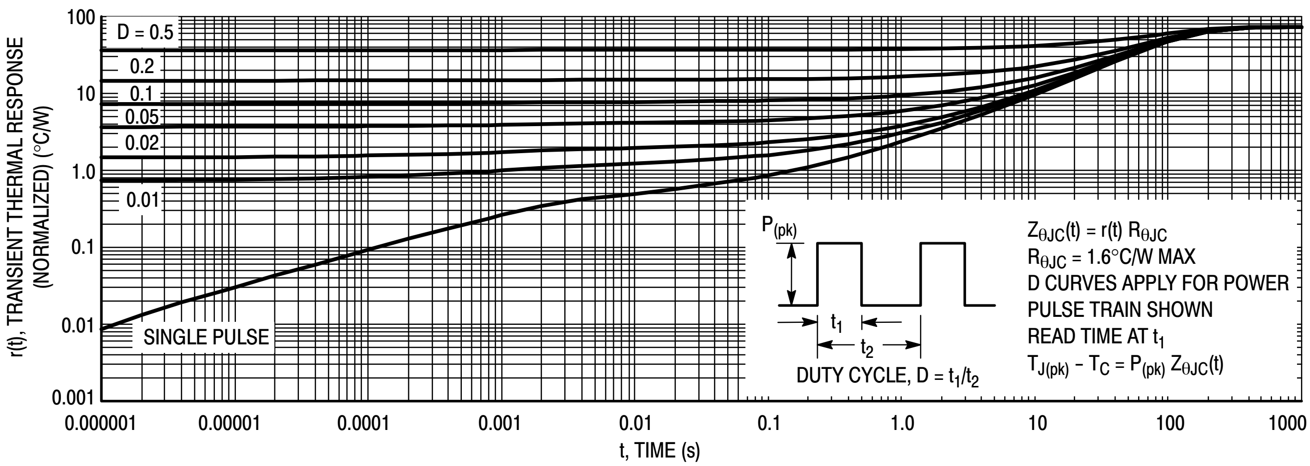
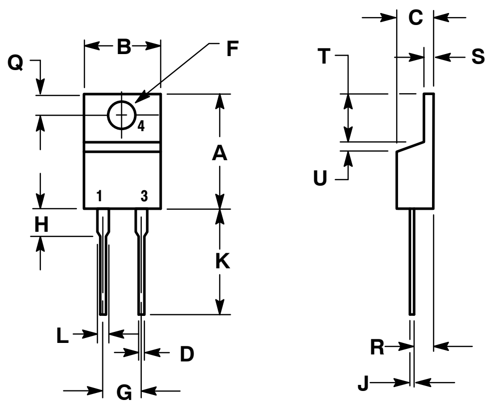


Figure 16. Thermal Response, (MSRF860) Junction−to−Ambient ($R_{\theta JA}$)

PACKAGE DIMENSIONS

TO−220 TWO−LEAD
CASE 221B−04
ISSUE F

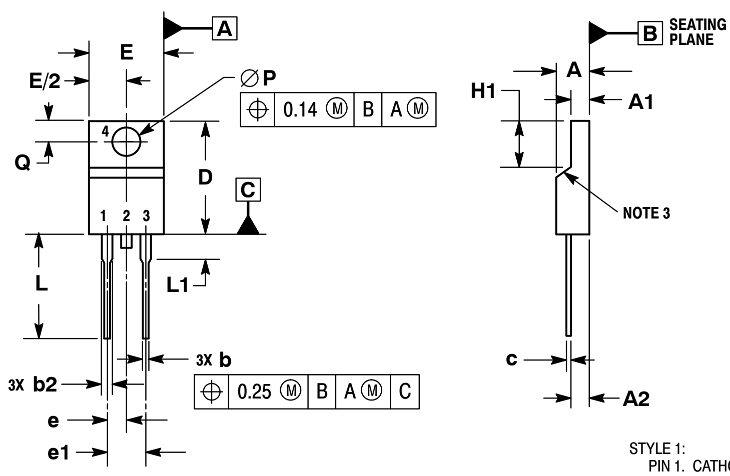


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS 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



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

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.

DIM	MILLIMETERS MIN	MILLIMETERS 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

PUBLICATION ORDERING INFORMATION

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