

# MSR1560

## SWITCHMODE™ Soft Recovery Power Rectifier

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. These state-of-the-art devices have the following 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 UL94,  $V_O @ 1/8''$
- Low Forward Voltage
- Low Leakage Current
- High Temperature Glass Passivated Junction

### Mechanical Characteristics:

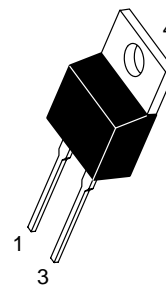
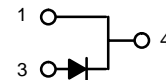
- Case: Molded Epoxy
- Weight: 1.9 Grams (approximately)
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads Readily Solderable
- Lead Temperature for Soldering Purposes: 260°C Max. for 10 Seconds
- Shipped in 50 Units per Plastic Tube
- Marking: MSR1560



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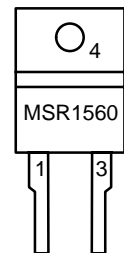
<http://onsemi.com>

### SOFT RECOVERY POWER RECTIFIER 15 AMPERES 600 VOLTS



CASE 221B  
TO-220  
PLASTIC

### MARKING DIAGRAM



### ORDERING INFORMATION

Device	Package	Shipping
MSR1560	TO-220	50 Units/Rail

# MSR1560

## 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	$^\circ\text{C}$
Operating Junction Temperature	$T_J$	- 65 to 150	$^\circ\text{C}$

## THERMAL CHARACTERISTICS

Thermal Resistance — Junction-to-Case	$R_{\theta JC}$	1.6	$^\circ\text{C/W}$
Thermal Resistance — Junction-to-Ambient	$R_{\theta JA}$	72.8	

## ELECTRICAL CHARACTERISTICS

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
<i>Typical</i>		1.8 1.5	1.4 1.2	
Maximum Instantaneous Reverse Current ( $V_R = 600\text{ V}$ )	$I_R$	$T_J = 25^\circ\text{C}$	$T_J = 150^\circ\text{C}$	$\mu\text{A}$
<i>Typical</i>		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
<i>Typical</i>		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  $\leq 380\ \mu\text{s}$ , Duty Cycle  $\leq 2\%$
2.  $T_{RR}$  measured projecting from 25% of  $I_{RRM}$  to zero current

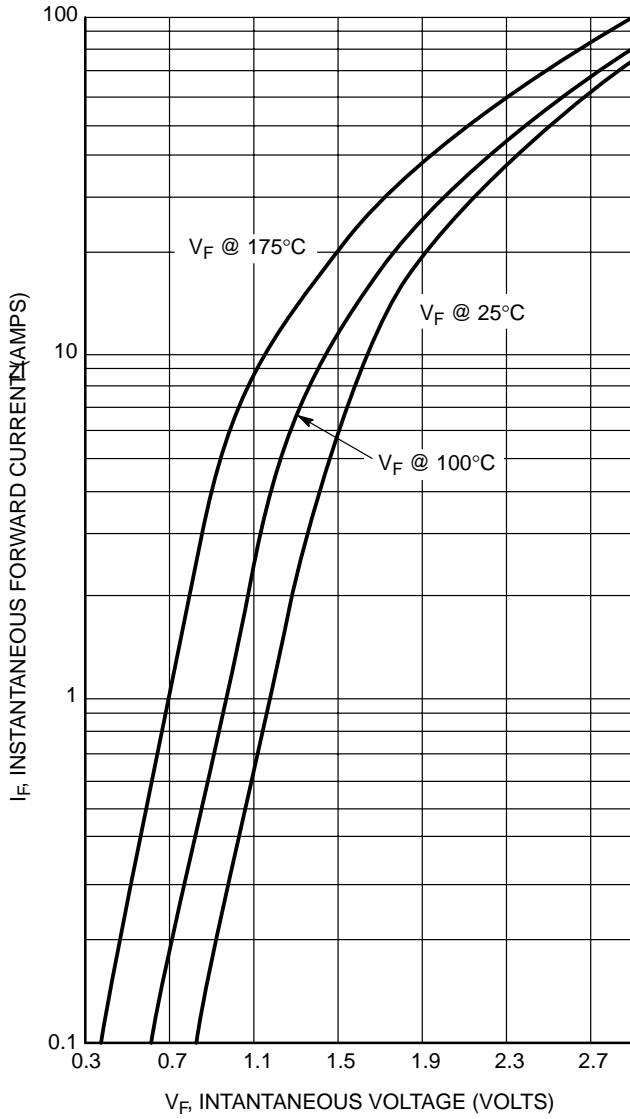


Figure 1. Maximum Forward Voltage

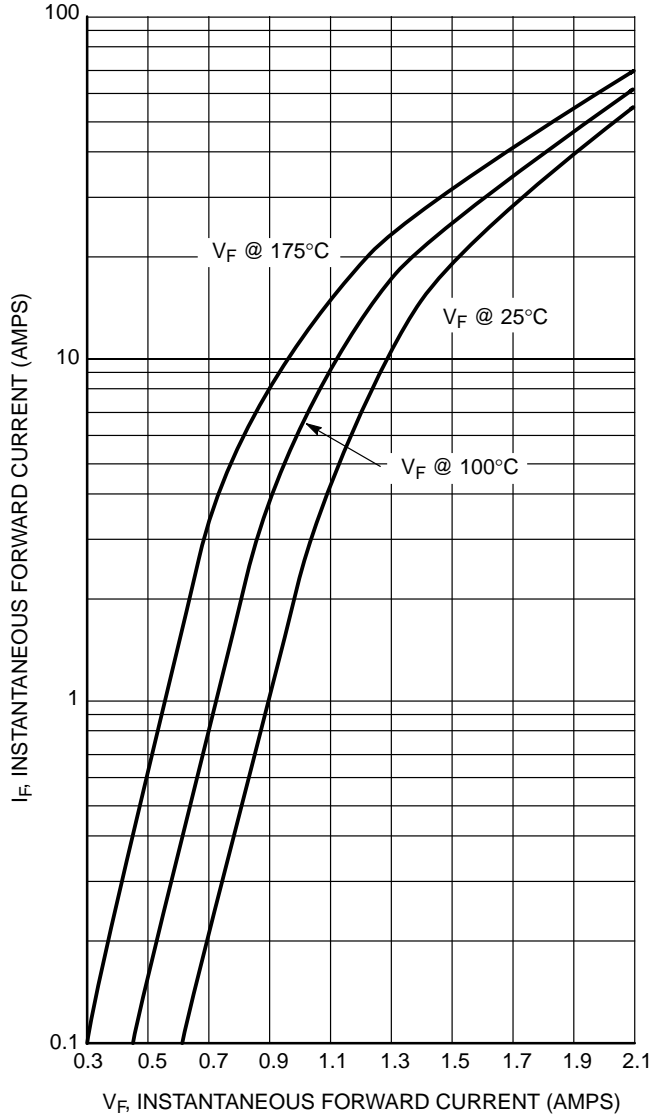


Figure 2. Typical Forward Voltage

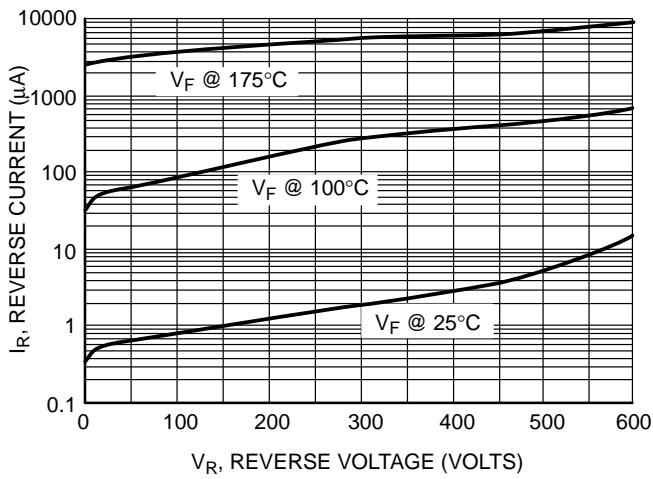


Figure 3. Maximum Reverse Current

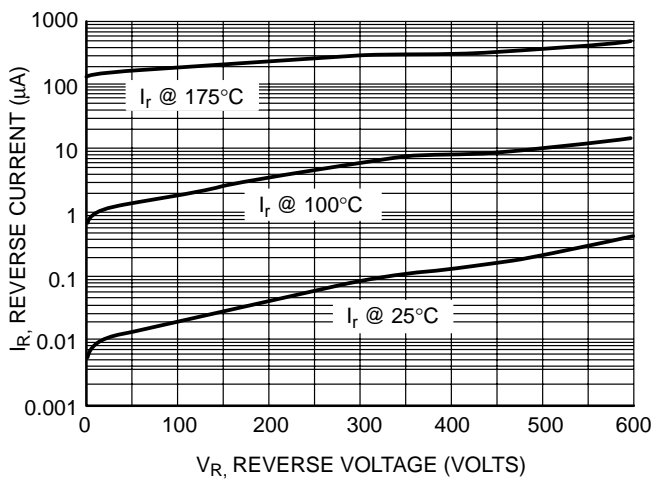


Figure 4. Typical Reverse Current

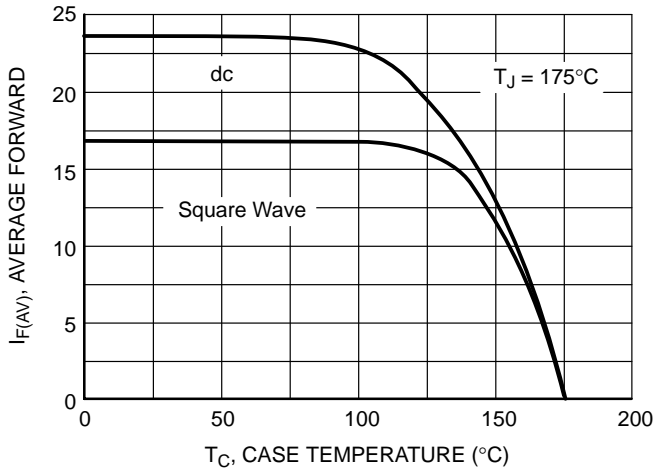


Figure 5. Current Derating

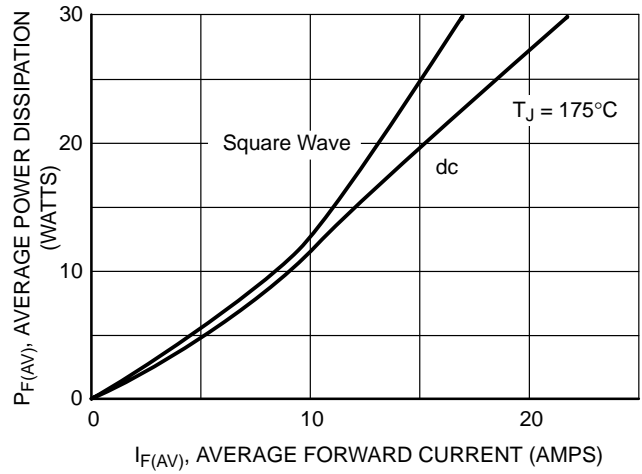


Figure 6. Power Dissipation

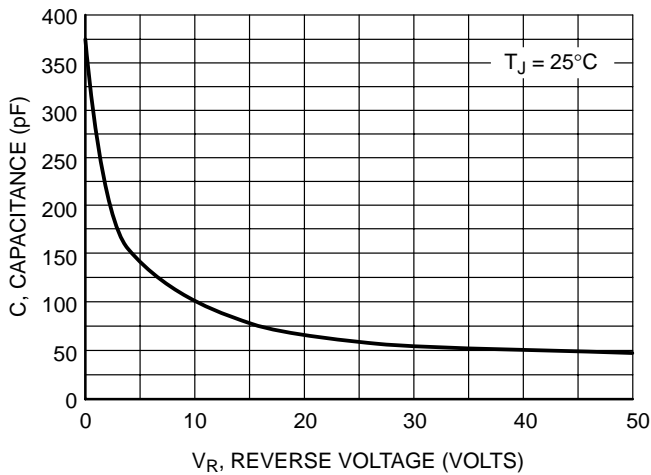


Figure 7. Maximum Capacitance

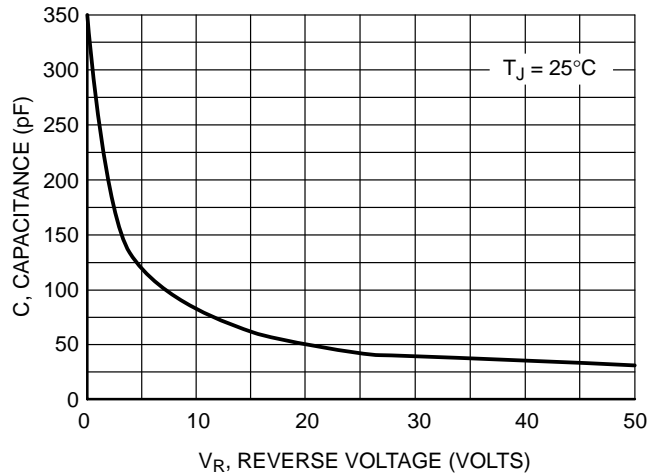


Figure 8. Typical Capacitance

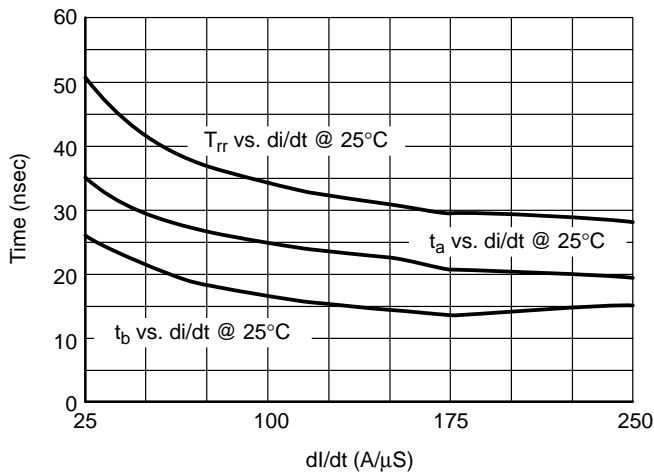


Figure 9. Typical  $T_{rr}$  vs.  $di/dt$

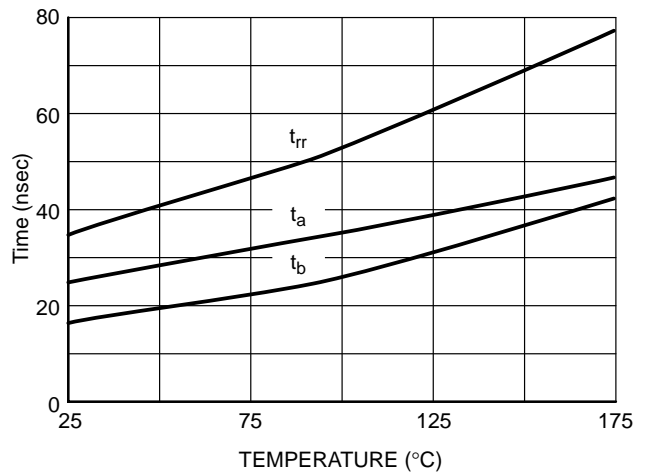


Figure 10. Typical  $T_{rr}$  vs. Temperature

# MSR1560

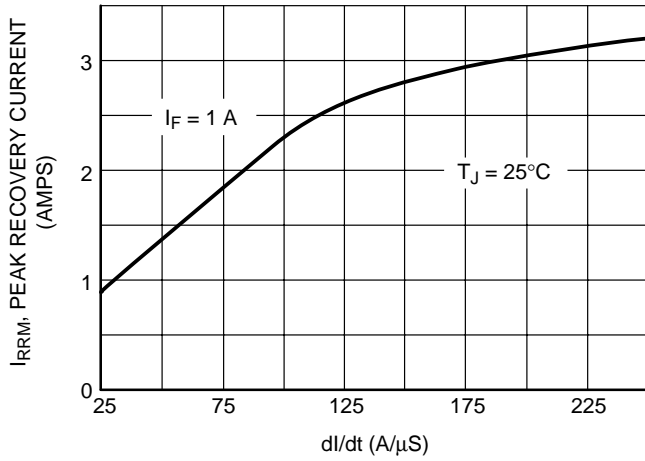


Figure 11. Typical Peak Reverse Recovery Current

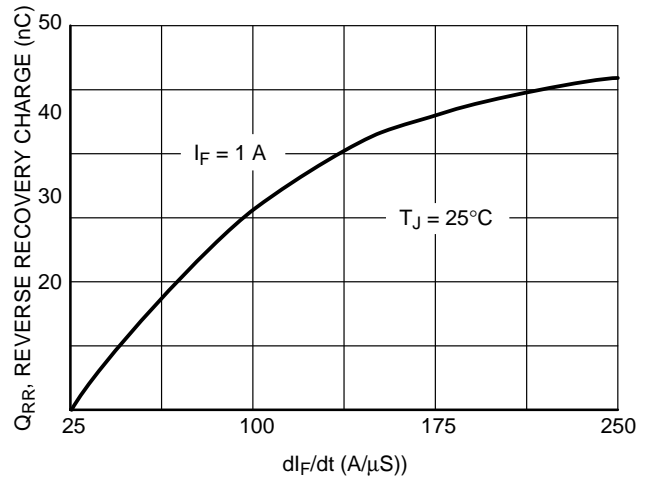


Figure 12. Typical Reverse Recovery Charge

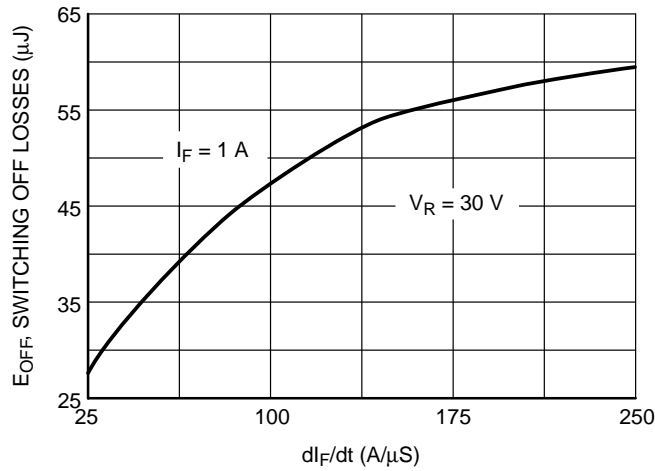


Figure 13. Typical Switching Off Losses

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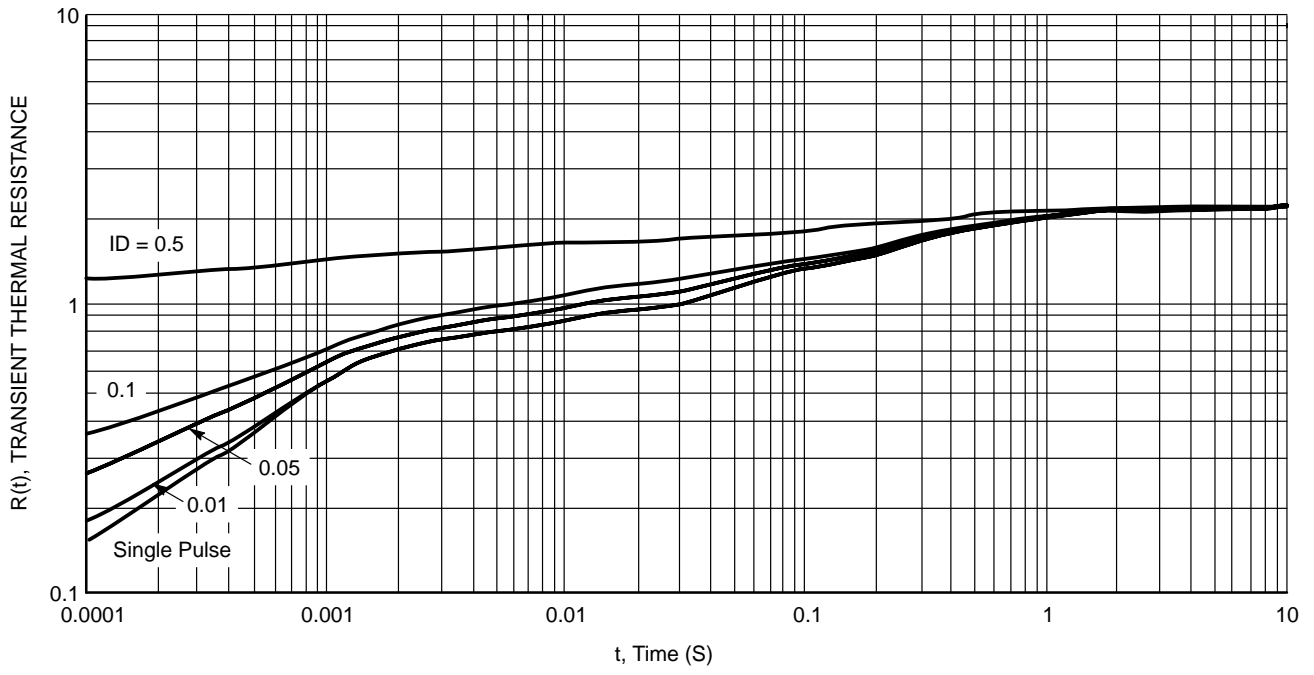
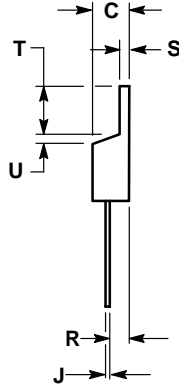
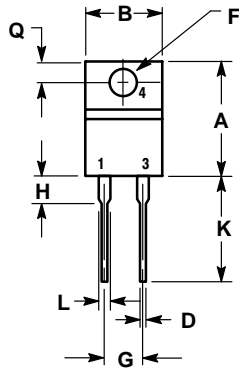


Figure 14. Transient Thermal Response

# MSR1560

## PACKAGE DIMENSIONS

TO-220  
 PLASTIC  
 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 1:  
 PIN 1. CATHODE  
 2. N/A  
 3. ANODE  
 4. CATHODE

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