

MSR1560

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.

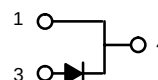
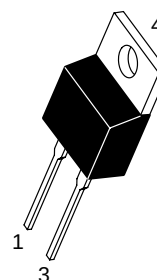
*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



ON Semiconductor®

<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	$T_J = 25^\circ\text{C}$	$T_J = 150^\circ\text{C}$	μA
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

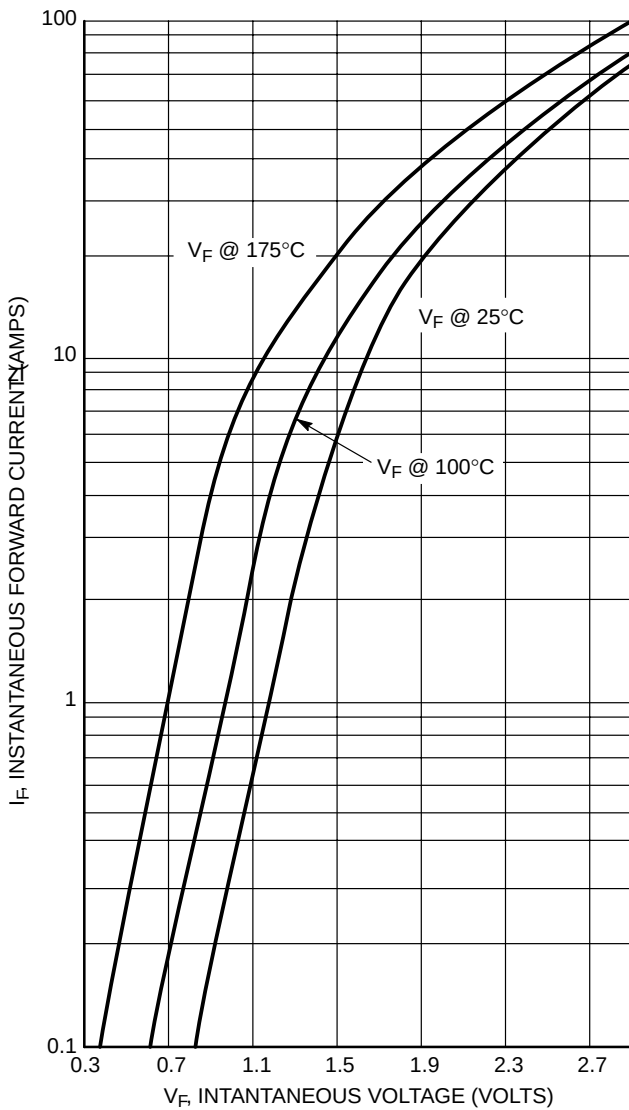


Figure 1. Maximum Forward Voltage

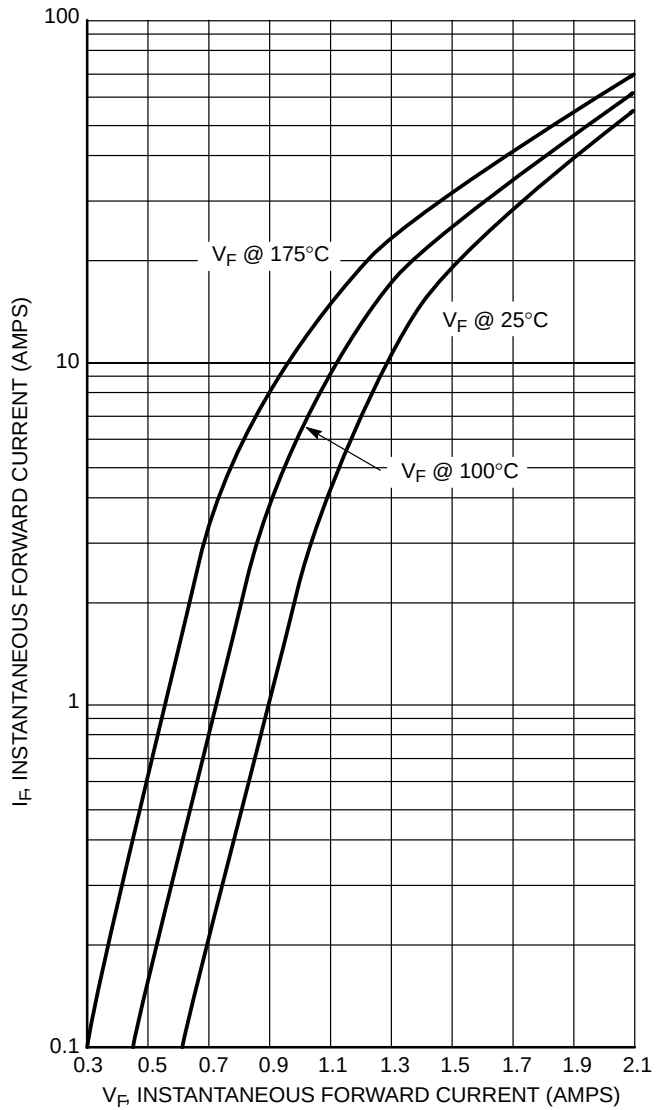


Figure 2. Typical Forward Voltage

MSR1560

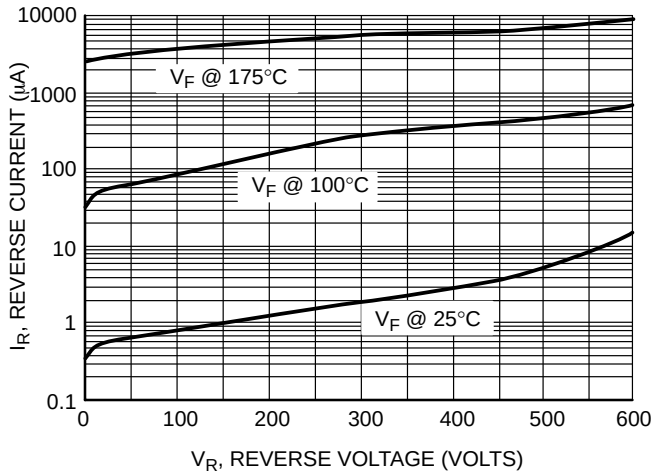


Figure 3. Maximum Reverse Current

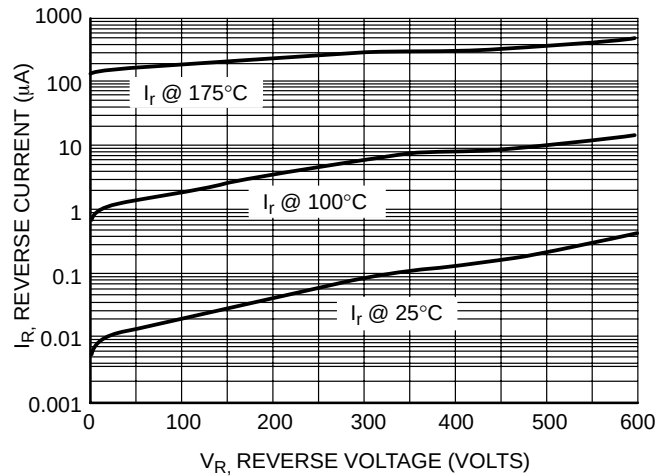


Figure 4. Typical Reverse Current

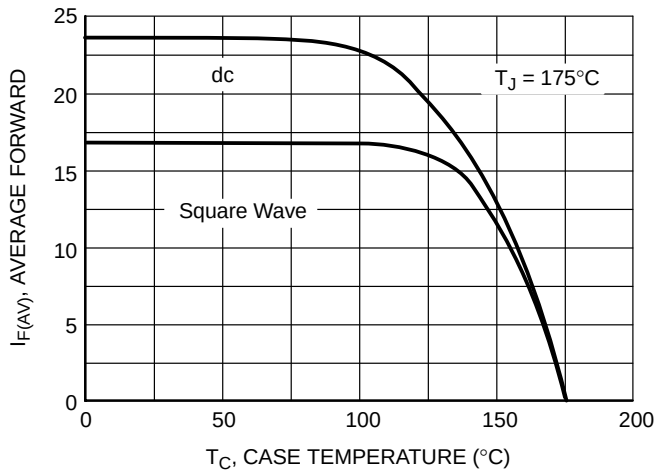


Figure 5. Current Derating

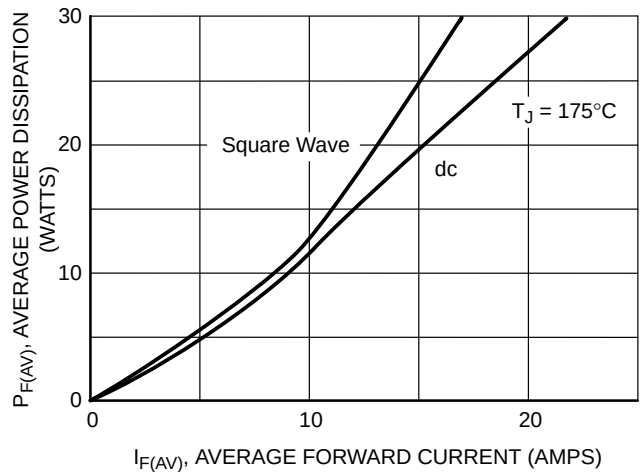


Figure 6. Power Dissipation

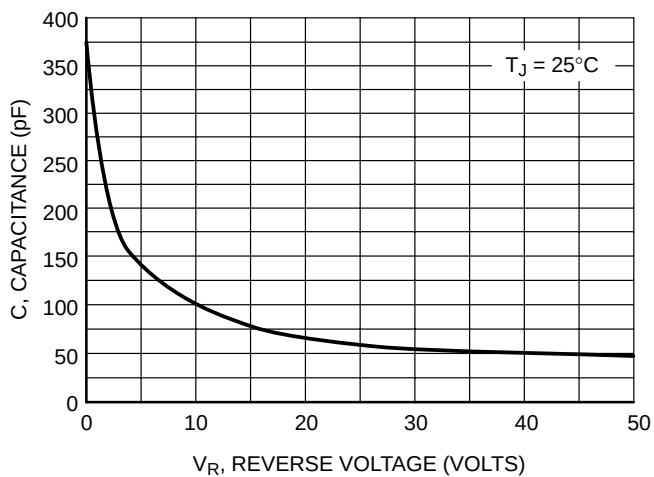


Figure 7. Maximum Capacitance

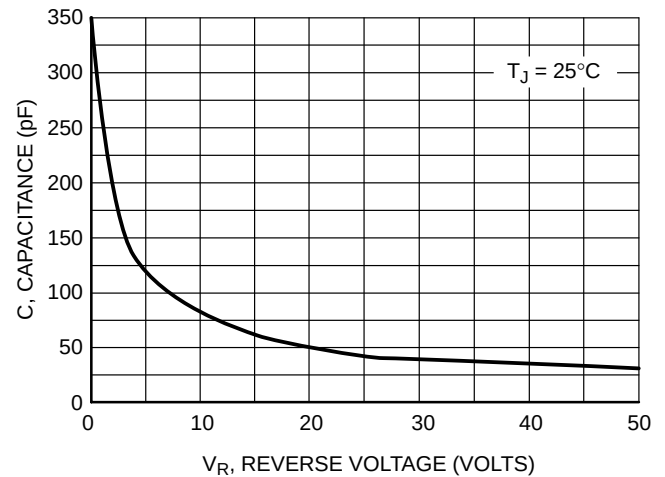


Figure 8. Typical Capacitance

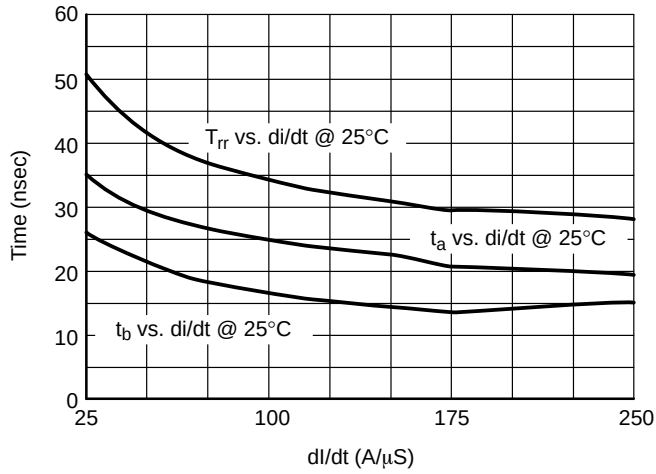


Figure 9. Typical Trr vs. di/dt

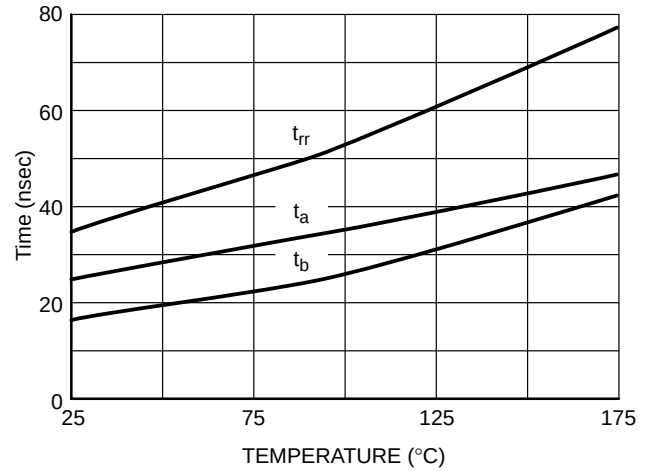


Figure 10. Typical Trr vs. Temperature

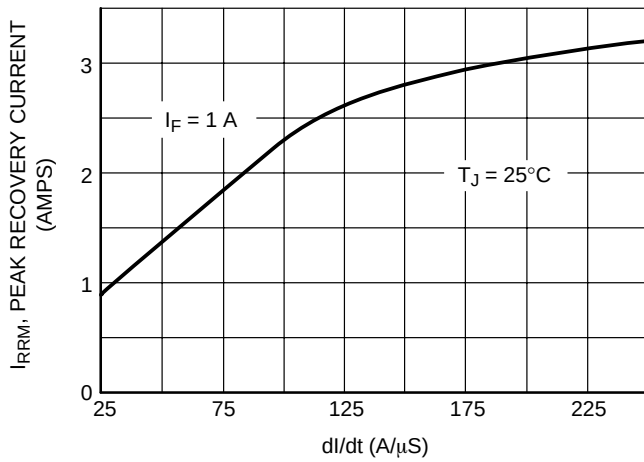


Figure 11. Typical Peak Reverse Recovery Current

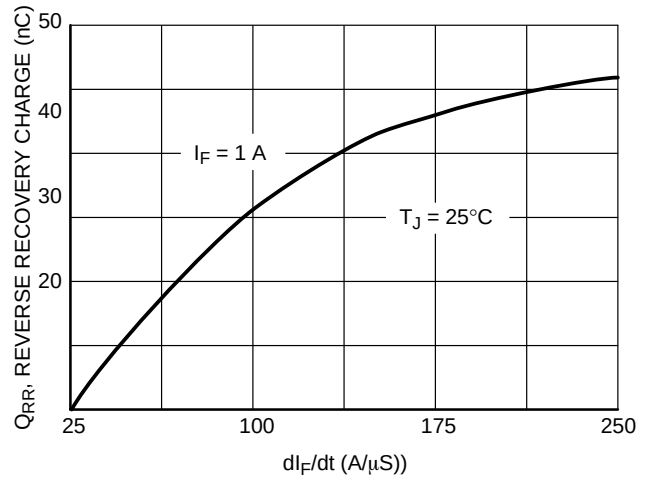


Figure 12. Typical Reverse Recovery Charge

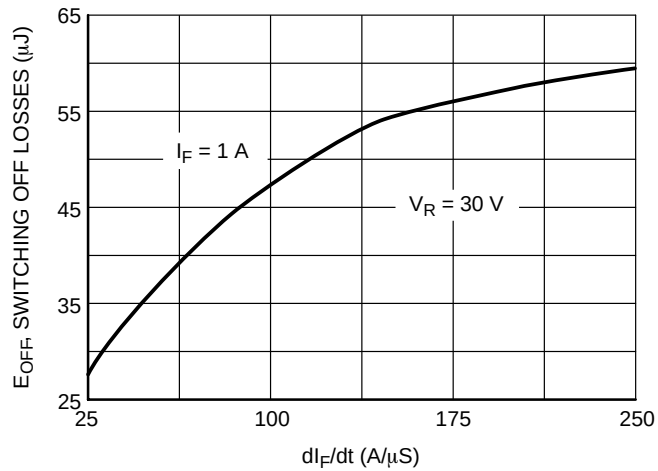
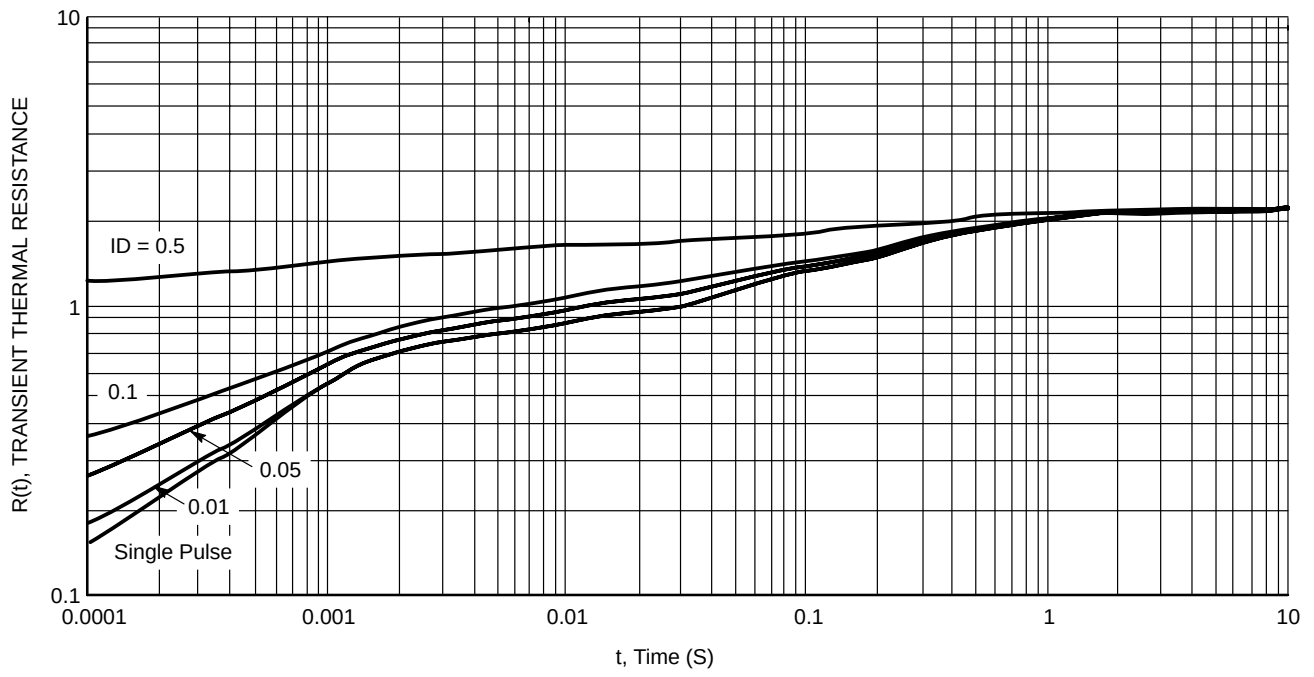


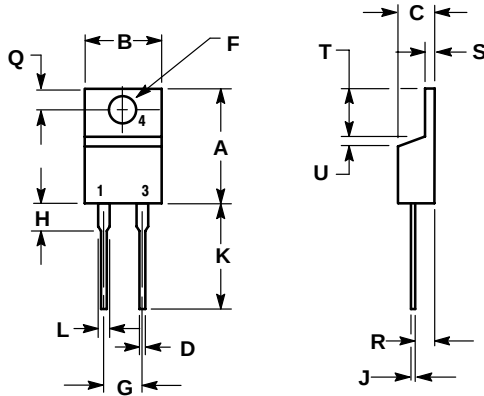
Figure 13. Typical Switching Off Losses

**Figure 14. Transient Thermal Response**

MSR1560

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
E	0.142	0.147	3.61	3.73
F	0.190	0.210	4.83	5.33
G	0.110	0.130	2.79	3.30
H	0.018	0.025	0.46	0.64
I	0.500	0.562	12.70	14.27
J	0.045	0.060	1.14	1.52
K	0.100	0.120	2.54	3.04
L	0.080	0.110	2.04	2.79
M	0.045	0.055	1.14	1.39
N	0.235	0.255	5.97	6.48
O	0.000	0.050	0.000	1.27

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

SWITCHMODE is a trademark of Semiconductor Components Industries, LLC.

ON Semiconductor and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 61312, Phoenix, Arizona 85062-1312 USA
Phone: 480-829-7710 or 800-344-3860 Toll Free USA/Canada
Fax: 480-829-7709 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada

Japan: ON Semiconductor, Japan Customer Focus Center
2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051
Phone: 81-3-5773-3850

ON Semiconductor Website: <http://onsemi.com>

Order Literature: <http://www.onsemi.com/litorder>

For additional information, please contact your
local Sales Representative.