MMQA5V6T1 Series

24 Watt Peak Power Zener Transient Voltage Suppressors

SC−74 Quad Common Anode for Zeners ESD Protection

ON Semiconductor®

http://onsemi.com

These quad monolithic silicon voltage suppressors are designed for applications requiring transient voltage protection capability. They are intended for use in voltage and ESD sensitive equipment such as computers, printers, business machines, communication systems, medical equipment, and other applications. Their quad junction common anode design protects four separate lines using only one package. These devices are ideal for situations where board space is at a premium.

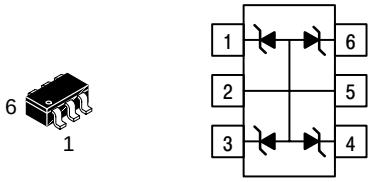
Features

- SC−74 Package Allows Four Separate Unidirectional Configurations
- Working Peak Reverse Voltage Range − 3.0 V to 2.5 V
- Standard Zener Breakdown Voltage Range − 5.6 V to 33 V
- Peak Power − Minimum 24 W @ 1 ms (Unidirectional), per Figure 5
- Peak Power − Minimum 150 W @ 20 μs (Unidirectional), per Figure 6
- ESD Rating of Class 3 (> 16 KV) per Human Body Model
- Maximum Clamp Voltage @ Peak Pulse Current
- Package Designed for Optimal Automated Board Assembly
- Small Package Size for High Density Applications
- Low Leakage < 2.0 μA
- Pb−Free Packages are Available

Mechanical Characteristics

CASE: Void-free, transfer-molded, thermosetting plastic
FINISH: All external surfaces are corrosion resistant and leads are readily solderable
MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES: 260°C for 10 Seconds

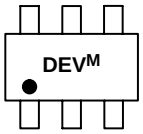
PIN ASSIGNMENT



SC−74
CASE 318F
STYLE 1

PIN 1. CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. ANODE
6. CATHODE

MARKING DIAGRAM



DEV = Device Code
(See Table Next Page)
M = Date Code

ORDERING INFORMATION

Device*	Package	Shipping†
MMQAxxxT1	SC−74	3000/Tape & Reel
MMQAxxxT3	SC−74	10,000/Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

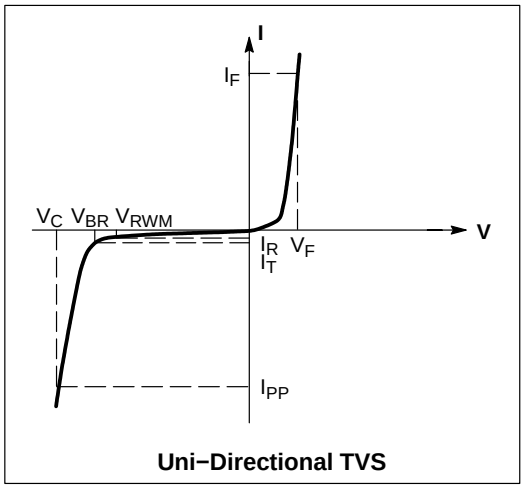
Individual devices are listed on page 3 of this data sheet.

*The “T1” suffix refers to an 8 mm, 7 inch reel.
The “T3” suffix refers to an 8 mm, 13 inch reel.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted, V_F = 0.9 V Max. @ I_F (Note 5) = 10 mA)

Unidirectional (Circuit tied to Pins 1, 2 and 5; Pins 2, 3 and 5; or 2, 4 and 6; or Pins 2, 5 and 6)

Symbol	Parameter
I_{PP}	Maximum Reverse Peak Pulse Current
V_C	Clamping Voltage @ I_{PP}
V_{RWM}	Working Peak Reverse Voltage
I_R	Maximum Reverse Leakage Current @ V_{RWM}
Z_{ZT}	Maximum Zener Impedance @ I_{ZT}
V_{BR}	Breakdown Voltage @ I_T
I_T	Test Current
ΘV_{BR}	Maximum Temperature Coefficient of V_{BR}
I_F	Forward Current
V_F	Forward Voltage @ I_F



Uni−Directional TVS

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Power Dissipation (Note 1) @ 1.0 ms @ $T_L \le 25°C$	P_{PK}	24	W
Peak Power Dissipation (Note 2) @ 20 μs @ $T_L \le 25°C$	P_{PK}	150	W
Total Power Dissipation (Note 3) @ T_A = 25°C Derate Above 25°C Thermal Resistance − Junction to Ambient	P_D $R_{\theta JA}$	225 1.8 556	mW mW/°C °C/W
Total Power Dissipation (Note 4) @ T_A = 25°C Derate Above 25°C Thermal Resistance − Junction to Ambient	P_D $R_{\theta JA}$	300 2.4 417	mW mW/°C °C/W
Junction and Storage Temperature Range	T_J, T_{stg}	−55 to +150	°C

1. Nonrepetitive current pulse per Figure 5 and derated above T_A = 25°C per Figure 4
2. Nonrepetitive current pulse per Figure 6 and derated above T_A = 25°C per Figure 4
3. FR−5 board = 1.0 X 0.75 X 0.62 in.
4. Alumina substrate = 0.4 X 0.3 X 0.024 in., 99.5% alumina

ELECTRICAL CHARACTERISTICS

Device	Device Marking	V_{RWM}	I_R @ V_{RWM}	Breakdown Voltage V_{BR} (Note 5) (Volts)			@ I_T	Z_{ZT} (Note 6) @ I_{ZT}		V_C @ I_{PP} (Note 7)		ΘV_{BR}
		Volts	nA	Min	Nom	Max	mA	Ω	mA	V_C Volts	I_{PP} Amps	mW/°C
MMQA5V6T1, G*	5A6	3.0	2000	5.32	5.6	5.88	1.0	400	1.0	8.0	3.0	1.26
MMQA6V2T1/T3, G*	6A2	4.0	700	5.89	6.2	6.51	1.0	300	1.0	9.0	2.66	10.6
MMQA6V8T1, G*	6A8	4.3	500	6.46	6.8	7.14	1.0	300	1.0	9.8	2.45	10.9
MMQA12VT1, G*	12A	9.1	75	11.4	12	12.6	1.0	80	1.0	17.3	1.39	14
MMQA13VT1/T3	13A	9.8	75	12.35	13	13.65	1.0	80	1.0	18.6	1.29	15
MMQA15VT1	15A	11	75	14.25	15	15.75	1.0	80	1.0	21.7	1.1	16
MMQA18VT1, G*	18A	14	75	17.1	18	18.9	1.0	80	1.0	26	0.923	19
MMQA20VT1/T3†, G*	20A	15	75	19.0	20	21.0	1.0	80	1.0	28.6	0.84	20.1
MMQA21VT1	21A	16	75	19.95	21	22.05	1.0	80	1.0	30.3	0.792	21
MMQA22VT1	22A	17	75	20.9	22	23.1	1.0	80	1.0	31.7	0.758	22
MMQA24VT1	24A	18	75	22.8	24	25.2	1.0	100	1.0	34.6	0.694	25
MMQA27VT1	27A	21	75	25.65	27	28.35	1.0	125	1.0	39.0	0.615	28
MMQA30VT1	30A	23	75	28.5	30	31.5	1.0	150	1.0	43.3	0.554	32
MMQA33VT1	33A	25	75	31.35	33	34.65	1.0	200	1.0	48.6	0.504	37

5. V_{BR} measured at pulse test current I_T at an ambient temperature of 25°C
6. Z_{ZT} is measured by dividing the AC voltage drop across the device by the AC current supplied. The specified limits are $I_Z(ac) = 0.1\ I_Z(dc)$ with the AC frequency = 1.0 kHz
7. Surge current waveform per Figure 5 and derate per Figure 4

* The “G” suffix indicates Pb−Free package available.
†Not Available in the 10,000/Tape & Reel.

TYPICAL CHARACTERISTICS

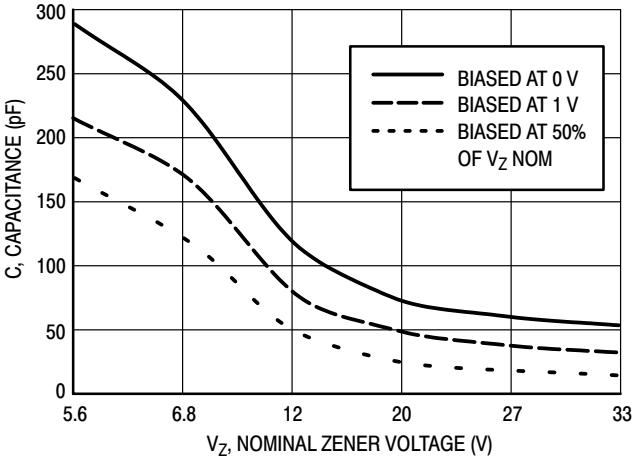


Figure 1. Typical Capacitance

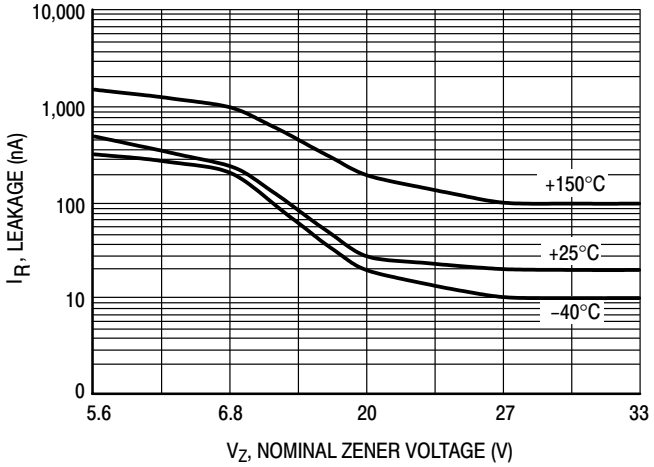


Figure 2. Typical Leakage Current

TYPICAL CHARACTERISTICS

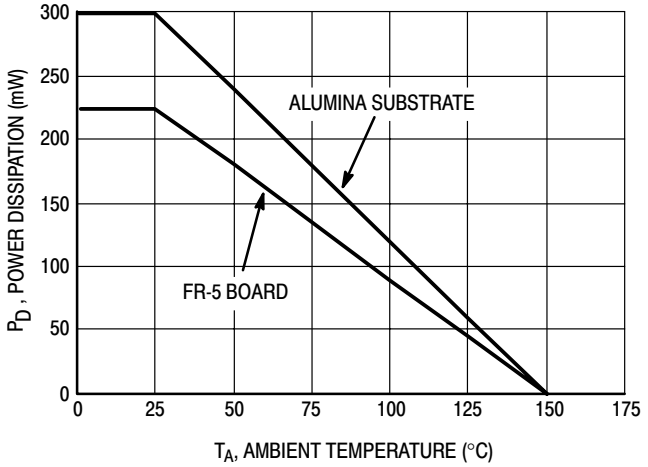


Figure 3. Steady State Power Derating Curve

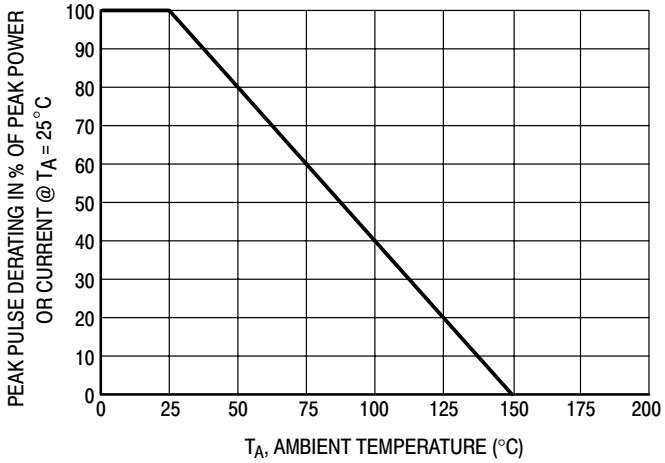


Figure 4. Pulse Derating Curve

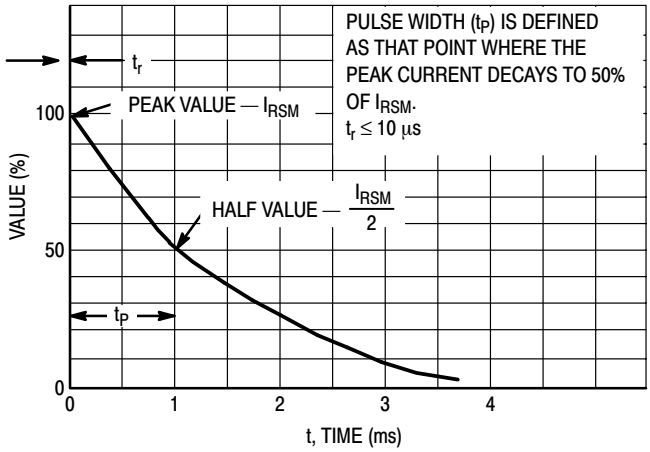


Figure 5. 10 × 1000 μs Pulse Waveform

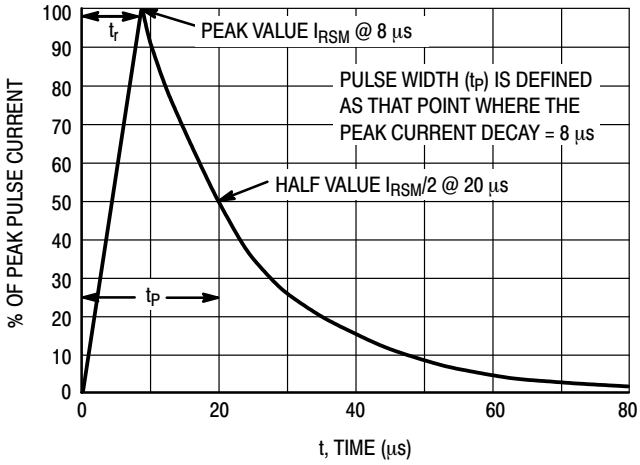


Figure 6. 8 × 20 μs Pulse Waveform

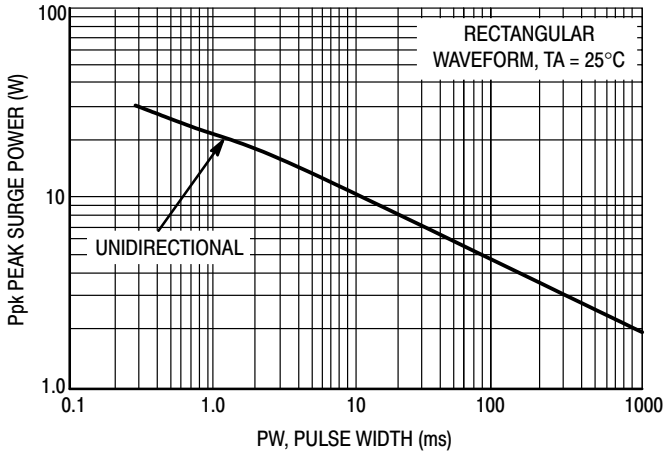


Figure 7. Maximum Non−Repetitive Surge Power, Ppk versus PW

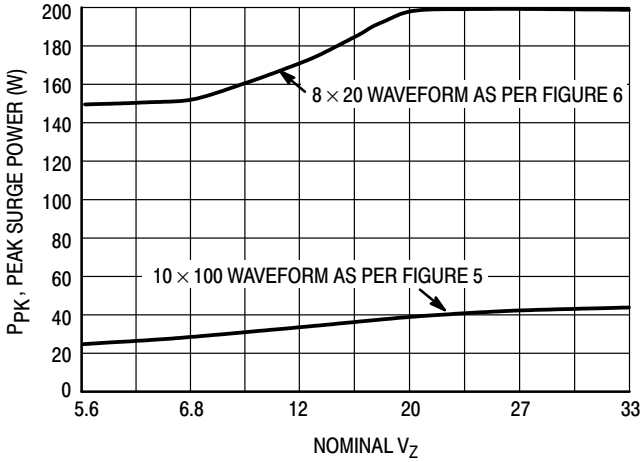


Figure 8. Typical Maximum Non−Repetitive Surge Power, Ppk versus V_{BR}

Power is defined as V_{RSM} x I_Z(pk) where V_{RSM} is the clamping voltage at I_Z(pk).

TYPICAL COMMON ANODE APPLICATIONS

A quad junction common anode design in a SC-74 package protects four separate lines using only one package. This adds flexibility and creativity to PCB design especially when board space is at a premium. A simplified example of MMQA Series Device applications is illustrated below.

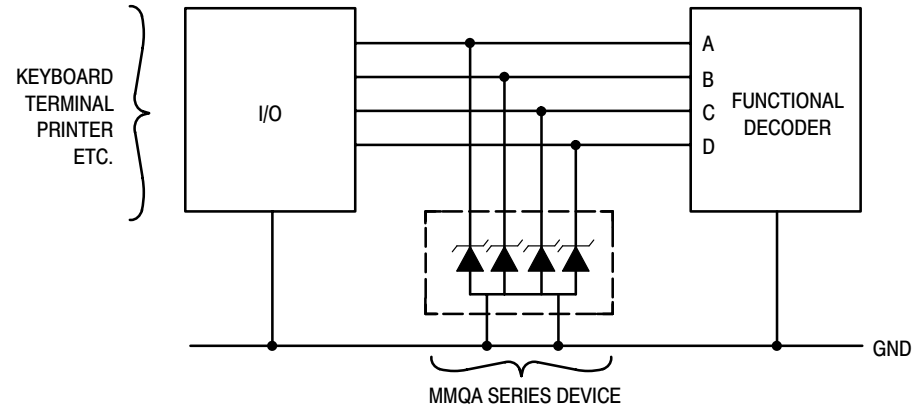


Figure 9. Computer Interface Protection

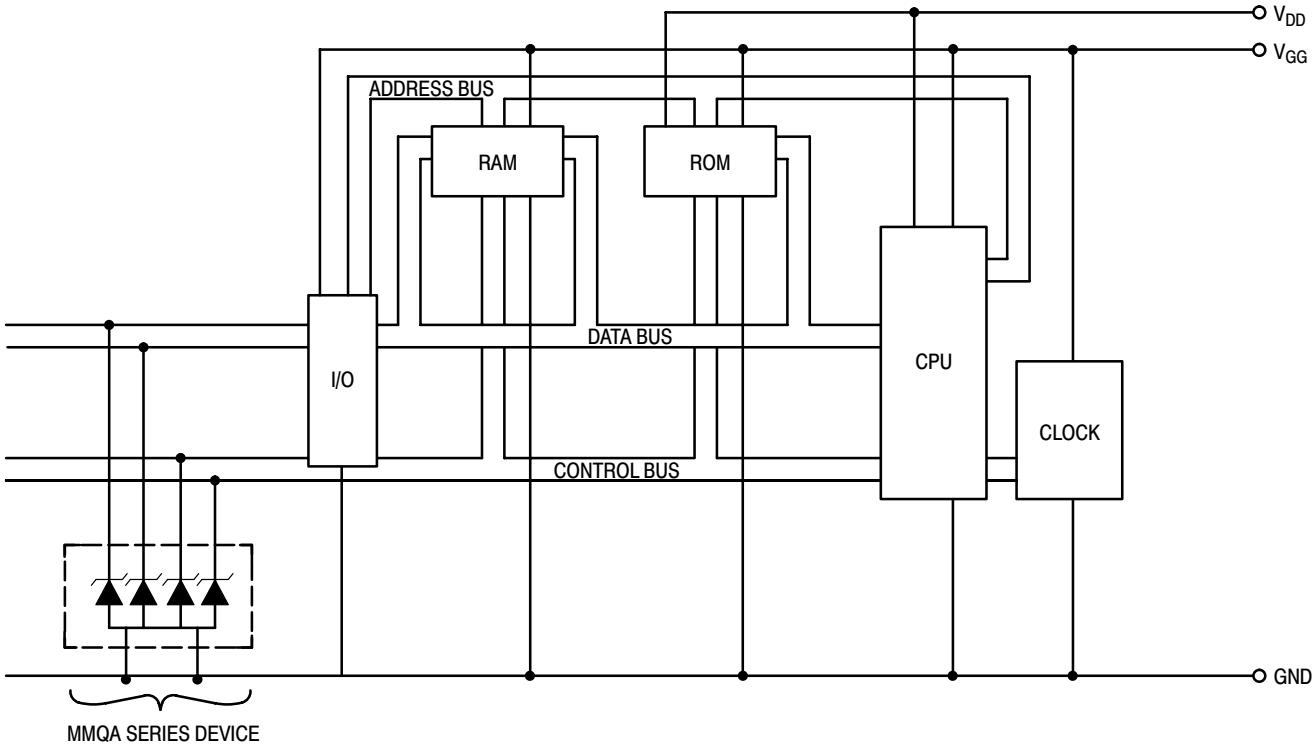
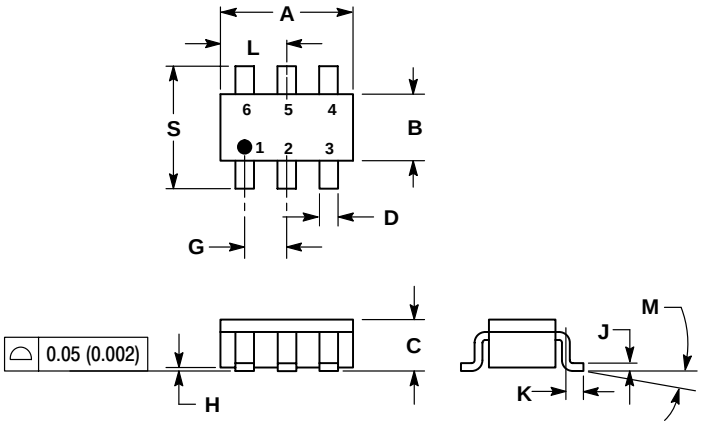


Figure 10. Microprocessor Protection

MMQA5V6T1 Series

PACKAGE DIMENSIONS

SC−74
CASE 318F−05
ISSUE K

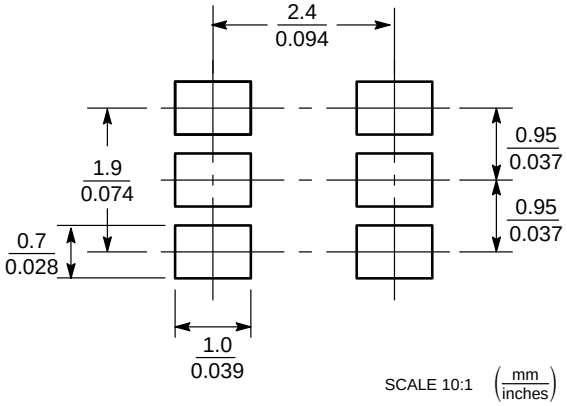


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318F−01, −02, −03 OBSOLETE. NEW STANDARD 318F−04.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.1142	0.1220	2.90	3.10
B	0.0512	0.0669	1.30	1.70
C	0.0354	0.0433	0.90	1.10
D	0.0098	0.0197	0.25	0.50
G	0.0335	0.0413	0.85	1.05
H	0.0005	0.0040	0.013	0.100
J	0.0040	0.0102	0.10	0.26
K	0.0079	0.0236	0.20	0.60
L	0.0493	0.0649	1.25	1.65
M	0 °	10 °	0 °	10 °
S	0.0985	0.1181	2.50	3.00

STYLE 1:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. ANODE
6. CATHODE

SOLDERING FOOTPRINT*



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

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 61312, Phoenix, Arizona 85082−1312 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

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