

# MMQA, SZMMQA Quad Common Anode Series

## SC-74 Quad Monolithic Common Anode

### Transient Voltage Suppressors for ESD Protection

This quad monolithic silicon voltage suppressor is designed for applications requiring transient overvoltage protection capability. It is intended for use in voltage and ESD sensitive equipment such as computers, printers, business machines, communication systems, medical equipment, and other applications. Its 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
- Peak Power – Min. 24 W @ 1.0 ms (Unidirectional), per Figure 5 Waveform
- Peak Power – Min. 150 W @ 20  $\mu$ s (Unidirectional), per Figure 6 Waveform
- Maximum Clamping Voltage @ Peak Pulse Current
- Low Leakage < 2.0  $\mu$ A
- ESD Rating of Class 3B (exceeding 16 kV) per the Human Body Model
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- Pb-Free Packages are Available\*



ON Semiconductor®

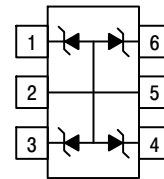
<http://onsemi.com>

**SC-74 QUAD TRANSIENT VOLTAGE SUPPRESSOR  
24 WATTS PEAK POWER  
5.6 – 33 VOLTS**



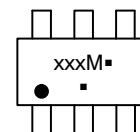
SC-74  
CASE 318F  
STYLE 1

#### PIN ASSIGNMENT



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

#### MARKING DIAGRAM



xxx = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

#### DEVICE MARKING & ORDERING INFORMATION

See specific marking and ordering information in the device marking and ordering information table on page 6 of this data sheet.

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

# MMQA, SZMMQA Quad Common Anode Series

## THERMAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Characteristic	Symbol	Value	Unit
Peak Power Dissipation @ 1.0 ms (Note 1) @ $T_A \leq 25^\circ\text{C}$	$P_{pk}$	24	W
Peak Power Dissipation @ 20 $\mu\text{s}$ (Note 2) @ $T_A \leq 25^\circ\text{C}$	$P_{pk}$	150	W
Total Power Dissipation on FR-5 Board (Note 3) @ $T_A = 25^\circ\text{C}$	$P_D$	225 1.8	MW mW/ $^\circ\text{C}$
Thermal Resistance from Junction-to-Ambient	$R_{\theta JA}$	556	$^\circ\text{C}/\text{W}$
Total Power Dissipation on Alumina Substrate (Note 4) @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	300 2.4	MW mW/ $^\circ\text{C}$
Thermal Resistance from Junction-to-Ambient	$R_{\theta JA}$	417	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$
Lead Solder Temperature – Maximum (10 Second Duration)	$T_L$	260	$^\circ\text{C}$

1. Non-repetitive current pulse per Figure 5 and derate above  $T_A = 25^\circ\text{C}$  per Figure 4.
2. Non-repetitive current pulse per Figure 6 and derate above  $T_A = 25^\circ\text{C}$  per Figure 4.
3. FR-5 = 1.0 x 0.75 x 0.62 in.
4. Alumina = 0.4 x 0.3 x 0.024 in., 99.5% alumina

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

### UNIDIRECTIONAL

(Circuit tied to pins 1, 2, and 5; Pins 2, 3, and 5; Pins 2, 4, and 5; or Pins 2, 5, and 6) ( $V_F = 0.9\text{ V Max @ } I_F = 10\text{ mA}$ )

Device (Note 8)	Breakdown Voltage				Max Reverse Leakage Current		Max Zener Impedance (Note 7)	Max Reverse Surge Current	Max Reverse Voltage @ $I_{RSM}$ (Note 6) (Clamping Voltage)	Maximum Temperature Coefficient of $V_Z$	Capacitance @ 0 Volt Bias, 1 MHz	
	V <sub>ZT</sub> (Note 5) (V)	@ $I_{ZT}$	$I_R$	$V_R$	Min	Max						
											Min	Nom
MMQA5V6T	5.32	5.6	5.88	1.0	2000	3.0	400	3.0	8.0	1.26	-	-
MMQA6V2T	5.89	6.2	6.51	1.0	700	4.0	300	2.66	9.0	10.6	-	-
MMQA6V8T	6.46	6.8	7.14	1.0	500	4.3	300	2.45	9.8	10.9	100	250
MMQA12VT	11.4	12	12.6	1.0	75	9.1	80	1.39	17.3	14	-	-
MMQA13VT	12.4	13	13.7	1.0	75	9.8	80	1.29	18.6	15	-	-
MMQA15VT	14.3	15	15.8	1.0	75	11	80	1.1	21.7	16	-	-
MMQA18VT	17.1	18	18.9	1.0	75	14	80	0.923	26	19	-	-
MMQA20VT	19	20	21	1.0	75	15	80	0.84	28.6	20.1	-	-
MMQA21VT	20	21	22.1	1.0	75	16	80	0.792	30.3	21	-	-
MMQA22VT	20.9	22	23.1	1.0	75	17	80	0.758	31.7	22	-	-
MMQA24VT	22.8	24	25.2	1.0	75	18	100	0.694	34.6	25	-	-
MMQA27VT	25.7	27	28.4	1.0	75	21	125	0.615	39	28	-	-
MMQA33VT	31.4	33	34.7	1.0	75	25	200	0.504	48.6	37	-	-

5.  $V_Z$  measured at pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .
6. Surge current waveform per Figure 5 and derate per Figure 4.
7.  $Z_{ZT}$  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 AC frequency = 1 kHz.
8. Include SZ-prefix devices where applicable.

# MMQA, SZMMQA Quad Common Anode Series

## TYPICAL CHARACTERISTICS

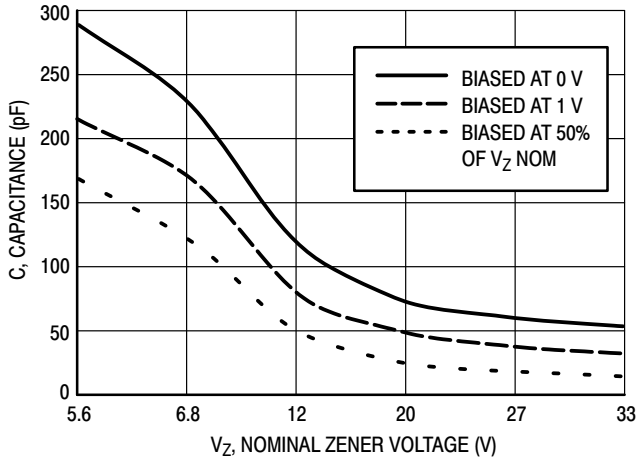


Figure 1. Typical Capacitance

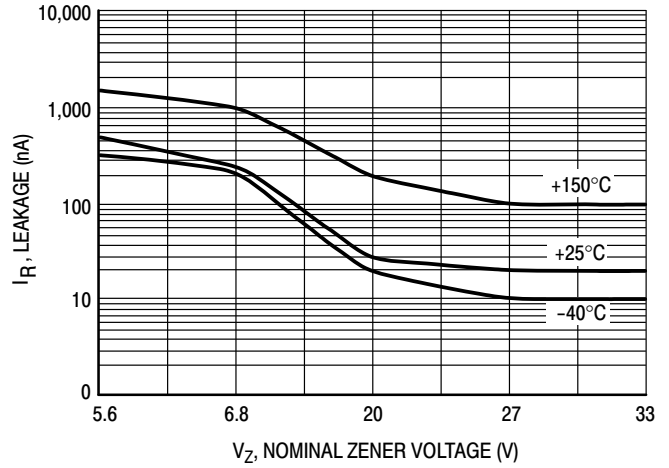


Figure 2. Typical Leakage Current

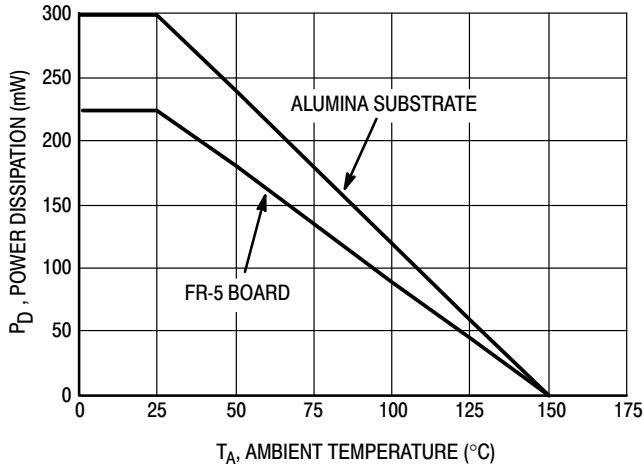


Figure 3. Steady State Power Derating Curve

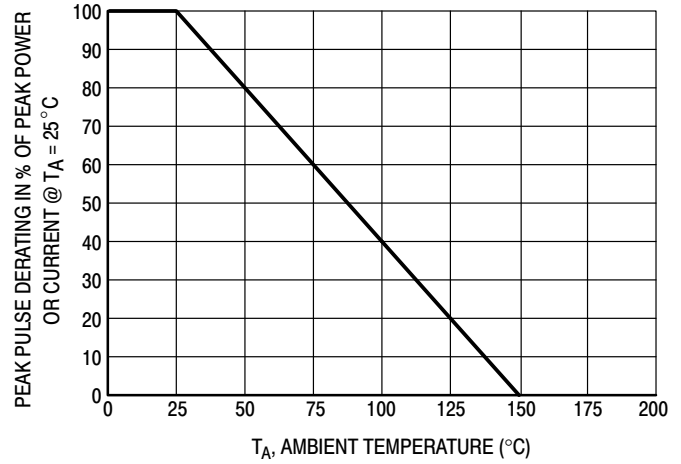


Figure 4. Pulse Derating Curve

# MMQA, SZMMQA Quad Common Anode Series

## TYPICAL CHARACTERISTICS

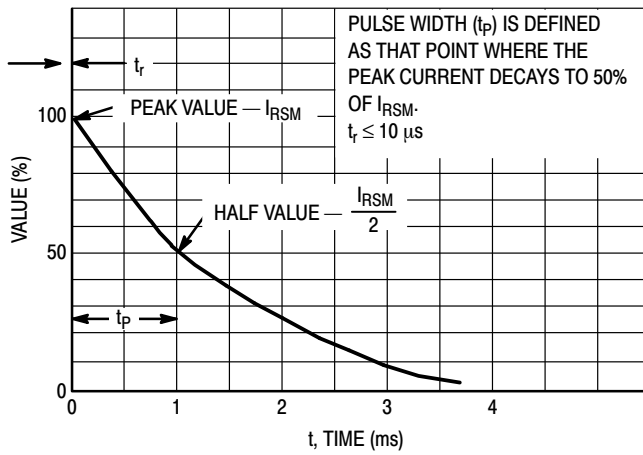


Figure 5.  $10 \times 1000 \mu\text{s}$  Pulse Waveform

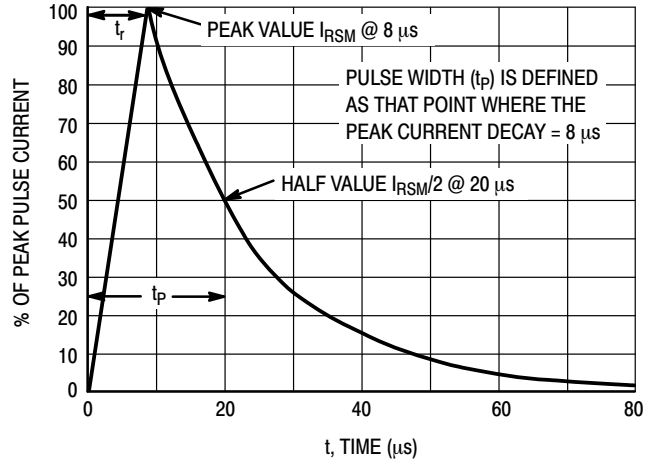


Figure 6.  $8 \times 20 \mu\text{s}$  Pulse Waveform

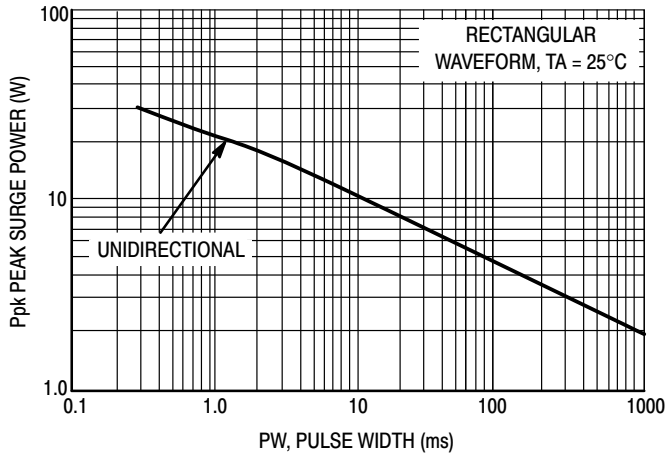


Figure 7. Maximum Non-Repetitive Surge Power,  $P_{pk}$  versus PW

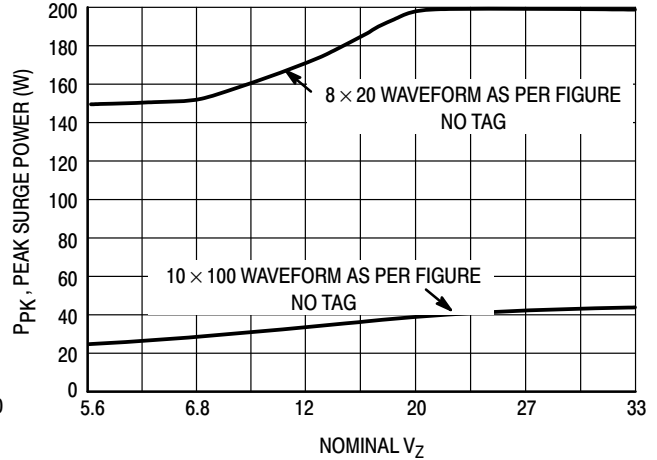


Figure 8. Typical Maximum Non-Repetitive Surge Power,  $P_{pk}$  versus  $V_Z$

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

# MMQA, SZMMQA Quad Common Anode Series

## 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/SZMMQA Series Device applications is illustrated below.

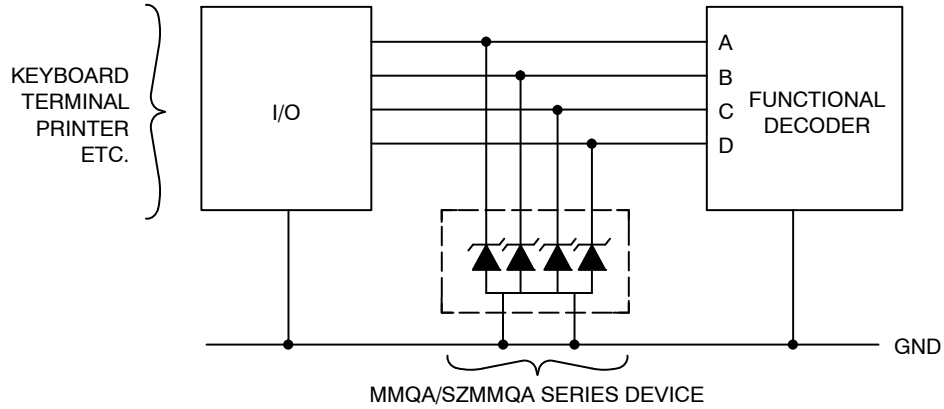


Figure 9. Computer Interface Protection

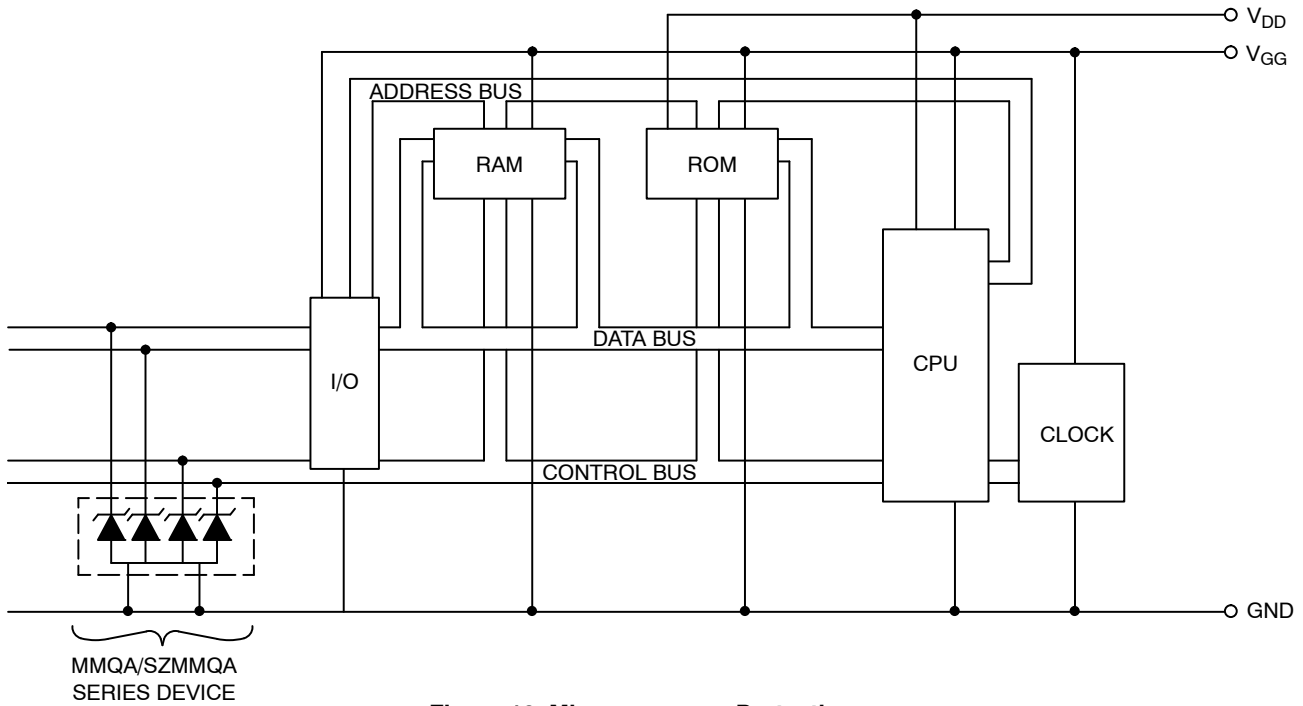


Figure 10. Microprocessor Protection

## MMQA, SZMMQA Quad Common Anode Series

### DEVICE MARKING AND ORDERING INFORMATION

Device*	Device Marking	Package	Shipping
MMQA5V6T1	5A6	SC-74	3,000/Tape & Reel
MMQA6V2T1	6A2	SC-74	3,000/Tape & Reel
MMQA6V2T3	6A2	SC-74	10,000/Tape & Reel
MMQA6V8T1	6A8	SC-74	3,000/Tape & Reel
MMQA12VT1	12A	SC-74	3,000/Tape & Reel
MMQA13VT1	13A	SC-74	3,000/Tape & Reel
MMQA15VT1	15A	SC-74	3,000/Tape & Reel
MMQA18VT1	18A	SC-74	3,000/Tape & Reel
MMQA20VT1	20A	SC-74	3,000/Tape & Reel
MMQA20VT3	20A	SC-74	10,000/Tape & Reel
MMQA21VT1	21A	SC-74	3,000/Tape & Reel
MMQA22VT1	22A	SC-74	3,000/Tape & Reel
MMQA24VT1	24A	SC-74	3,000/Tape & Reel
MMQA27VT1	27A	SC-74	3,000/Tape & Reel
MMQA27VT3	27A	SC-74	10,000/Tape & Reel
MMQA33VT1	33A	SC-74	3,000/Tape & Reel

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

\*Include SZ-prefix devices where applicable.

#### Mechanical Characteristics:

**CASE:** Void-free, Transfer-molded, Thermosetting Plastic Case.

**FINISH:** Corrosion resistant finish, easily solderable.

Package designed for optimal automated board assembly.

Small package size for high density applications.

Available in 8 mm Tape and Reel.

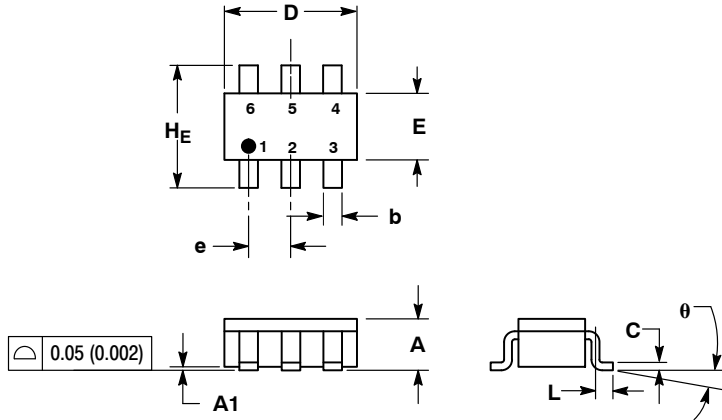
Use the Device Number to order the 7 inch/3,000 unit reel.

Replace the "T1" with "T3" in the Device Number to order the 13 inch/10,000 unit reel.

# MMQA, SZMMQA Quad Common Anode Series

## PACKAGE DIMENSIONS

SC-74  
CASE 318F-05  
ISSUE M

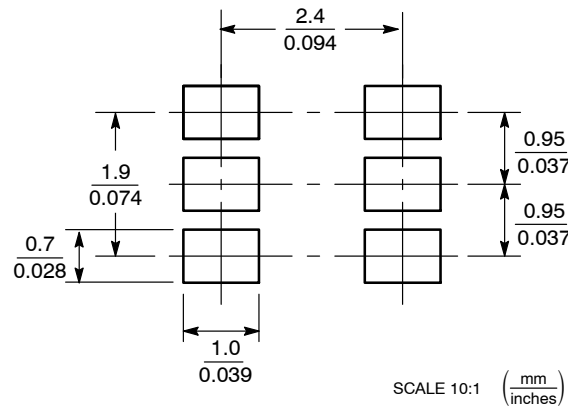


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
  4. 318F-01, -02, -03, -04 OBSOLETE. NEW STANDARD 318F-05.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.90	1.00	1.10	0.035	0.039	0.043
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.25	0.37	0.50	0.010	0.015	0.020
c	0.10	0.18	0.26	0.004	0.007	0.010
D	2.90	3.00	3.10	0.114	0.118	0.122
E	1.30	1.50	1.70	0.051	0.059	0.067
e	0.85	0.95	1.05	0.034	0.037	0.041
L	0.20	0.40	0.60	0.008	0.016	0.024
HE	2.50	2.75	3.00	0.099	0.108	0.118
θ	0°	-	10°	0°	-	10°

- 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.

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