

# SM05T1G Series, SZSM05T1G

## Transient Voltage Suppressor Diode Array

### SOT-23 Dual Common Anode Diodes for ESD Protection

These dual monolithic silicon TVS diodes are designed for applications requiring transient overvoltage 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 dual junction common anode design protects two separate lines using only one package. These devices are ideal for situations where board space is at a premium.

#### Specification Features:

- SOT-23 Package Allows Either Two Separate Unidirectional Configurations or a Single Bidirectional Configuration
- Working Peak Reverse Voltage Range – 5.0 V to 24 V
- Peak Power – 300 Watt (8 X 20  $\mu$ s)
- Low Leakage
- Flammability Rating UL 94 V-0
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These are Pb-Free Devices\*

#### Mechanical Characteristics:

**CASE:** Void-Free, Transfer-Molded, Thermosetting Plastic Case

**FINISH:** Corrosion Resistant Finish, Easily Solderable

#### MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES:

260°C for 10 Seconds

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

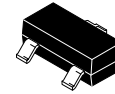
Replace the “T1” with “T3” in the Device Number to Order the 13 Inch/10,000 Unit Reel

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

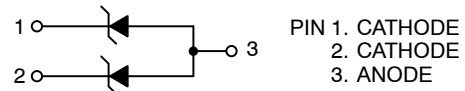


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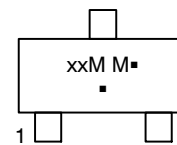
<http://onsemi.com>



SOT-23  
CASE 318  
STYLE 12



#### MARKING DIAGRAM



xxM = Device Code  
xx = 05, 12, 15, 24, 36  
M = Date Code\*  
■ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation and/or overbar may vary depending upon manufacturing location.

#### ORDERING INFORMATION

Device	Package	Shipping†
SM05T1G	SOT-23 (Pb-Free)	3,000/Tape & Reel
SZSM05T1G	SOT-23 (Pb-Free)	3,000/Tape & Reel
SM12T1G	SOT-23 (Pb-Free)	3,000/Tape & Reel
SM15T1G	SOT-23 (Pb-Free)	3,000/Tape & Reel
SM24T1G	SOT-23 (Pb-Free)	3,000/Tape & Reel
SM36T1G	SOT-23 (Pb-Free)	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 Specifications Brochure, BRD8011/D.

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## MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Power Dissipation @ 20 $\mu$ s (Note 1) @ $T_L \leq 25^\circ\text{C}$	$P_{pk}$	300	W
IEC 61000-4-2 (ESD) Air Contact		$\pm 15$ $\pm 8.0$	kV
IEC 61000-4-4 (EFT)		40	A
IEC 61000-4-5 (Lightening)		12	A
Total Power Dissipation on FR-5 Board (Note 2) @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$ Thermal Resistance, Junction-to-Ambient	$P_D$ $R_{\theta JA}$	225 1.8 556	mW mW/ $^\circ\text{C}$ $^\circ\text{C}/\text{W}$
Total Power Dissipation on Alumina Substrate (Note 3) @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$ Thermal Resistance, Junction-to-Ambient	$P_D$ $R_{\theta JA}$	300 2.4 417	mW mW/ $^\circ\text{C}$ $^\circ\text{C}/\text{W}$
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	$^\circ\text{C}$

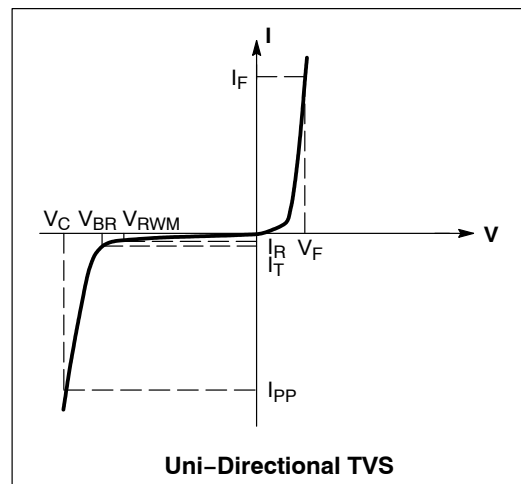
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Non-repetitive current pulse per Figure 3
  2. FR-5 = 1.0 x 0.75 x 0.62 in.
  3. Alumina = 0.4 x 0.3 x 0.024 in., 99.5% alumina
- NOTE: Other voltages may be available upon request

## ELECTRICAL CHARACTERISTICS

**UNIDIRECTIONAL** (Circuit tied to Pins 1 and 3 or 2 and 3)

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 @ $V_{RWM}$
$V_{BR}$	Breakdown Voltage @ $I_T$
$I_T$	Test Current
$\Theta V_{BR}$	Maximum Temperature Coefficient of $V_{BR}$
$I_F$	Forward Current
$V_F$	Forward Voltage @ $I_F$
$Z_{ZT}$	Maximum Zener Impedance @ $I_{ZT}$
$I_{ZK}$	Reverse Current
$Z_{ZK}$	Maximum Zener Impedance @ $I_{ZK}$



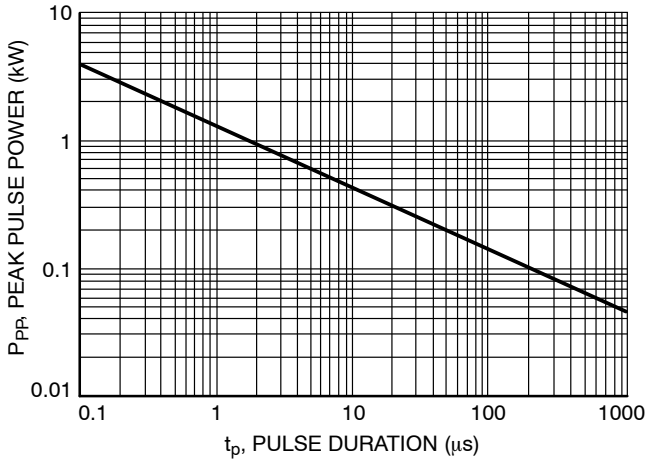
**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Device*	Device Marking	$V_{RWM}$ (Volts)	$I_R @ V_{RWM}$ ( $\mu\text{A}$ )	$V_{BR}$ , Breakdown Voltage		$I_T$ mA	$V_C @ I_{PP} = 1 \text{ Amp}$ (Volts)	Max $I_{PP}$ (Note 4) (Amps)	Typical Capacitance
				(Volts)					(pF)
				Min	Max				Pin 1 to 3 @ 0 Volts
SM05T1G	05M	5	10	6.2	7.3	1.0	9.8	17	225
SM12T1G	12M	12	1.0	13.3	15.75	1.0	19	12	95
SM15T1G	15M	15	1.0	16.7	19.6	1.0	24	10	100
SM24T1G	24M	24	1.0	26.7	31.35	1.0	43	5.0	60
SM36T1G	36M	36	1.0	40.0	46.95	1.0	60	4.0	45

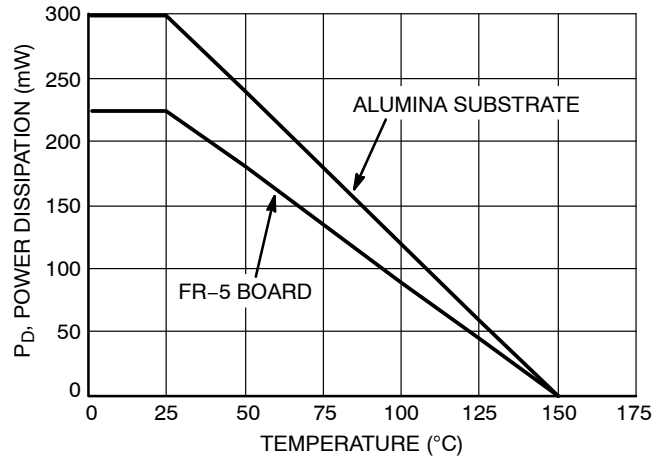
4.  $8 \times 20 \mu\text{s}$  pulse waveform per Figure 3
- \*Include SZ-prefix devices where applicable.

# SM05T1G Series, SZSM05T1G

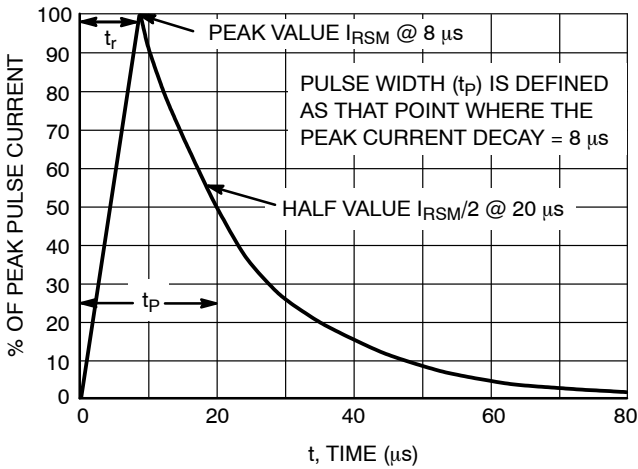
## TYPICAL CHARACTERISTICS



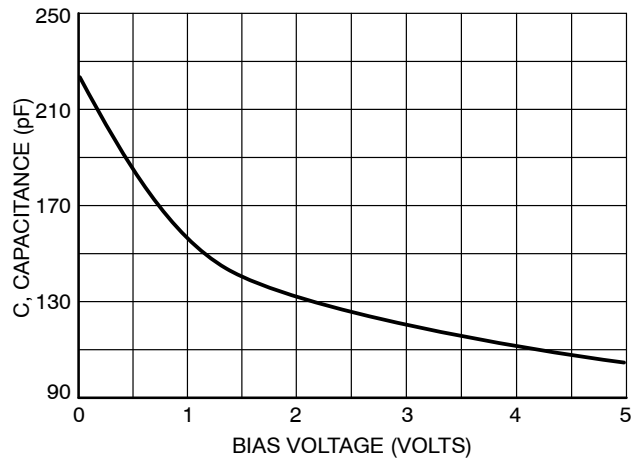
**Figure 1. Non-Repetitive Peak Pulse Power versus Pulse Time**



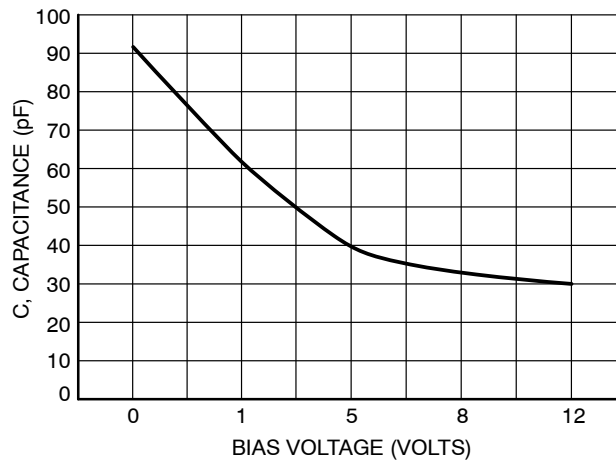
**Figure 2. Steady State Power Derating Curve**



**Figure 3. 8 x 20 μs Pulse Waveform**



**Figure 4. Typical Diode Capacitance (SM05)**



**Figure 5. Typical Diode Capacitance (SM12)**

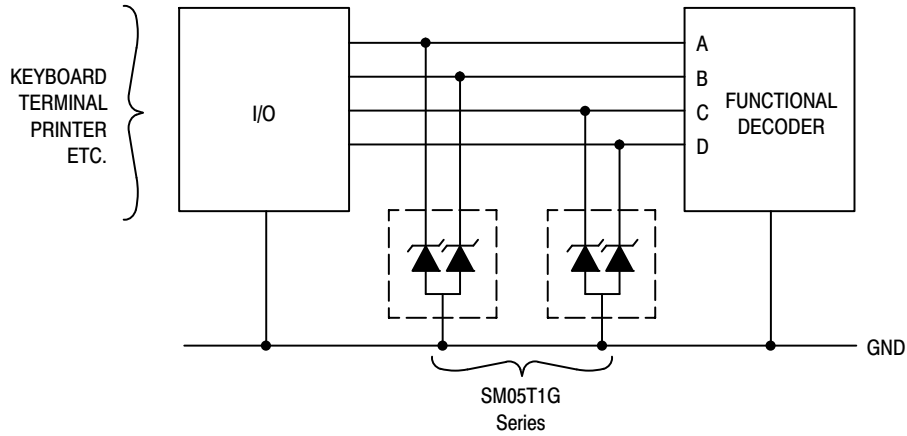
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## TYPICAL COMMON ANODE APPLICATIONS

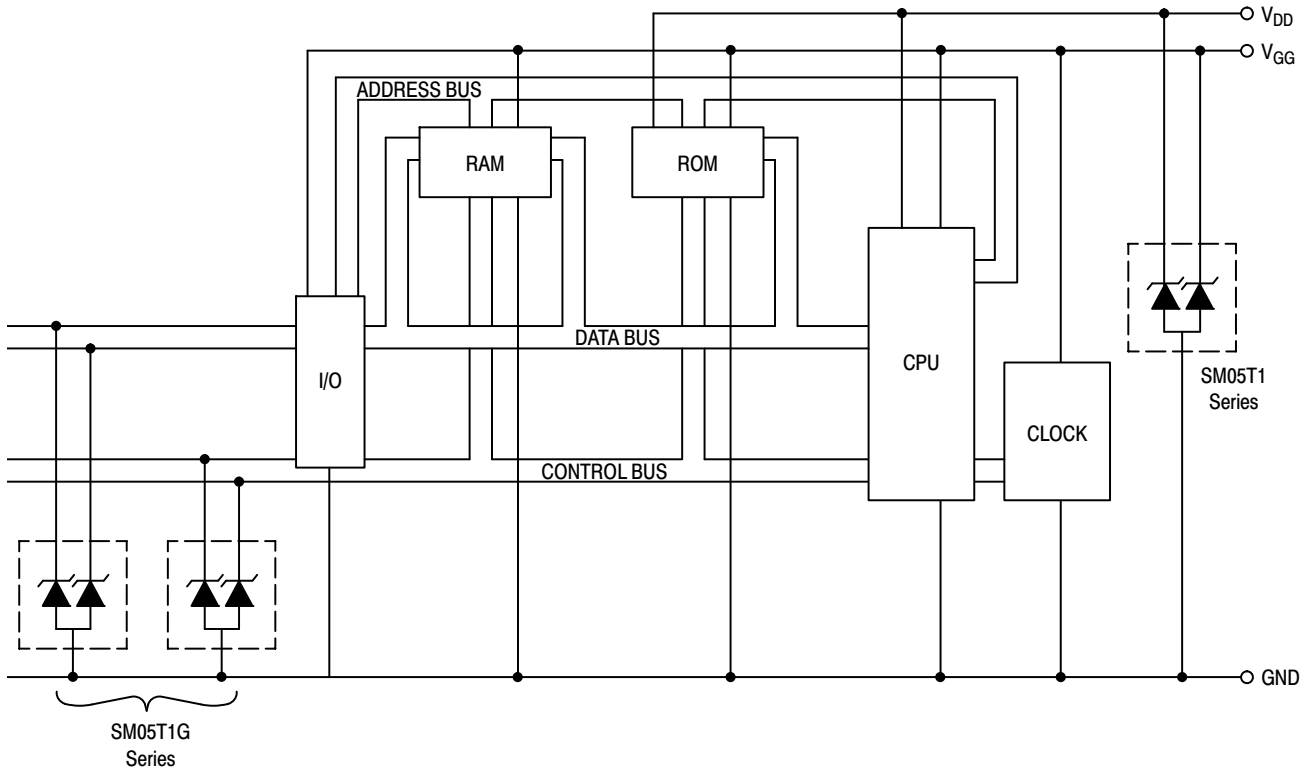
A quad junction common anode design in a SOT-23 package protects four separate lines using only one package. This adds flexibility and creativity to PCB design especially

when board space is at a premium. Two simplified examples of TVS applications are illustrated below.

### Computer Interface Protection



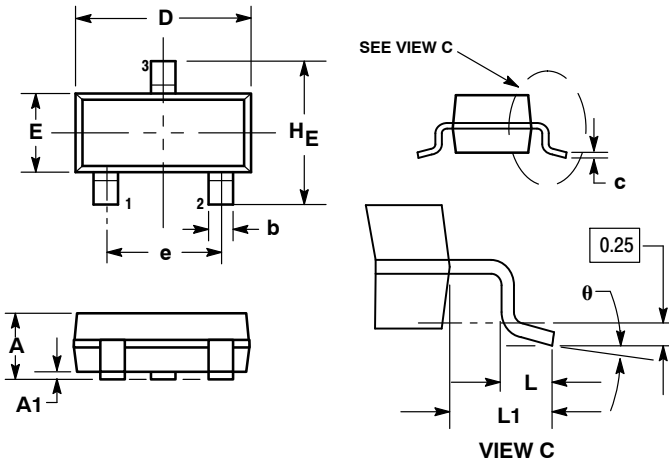
### Microprocessor Protection



# SM05T1G Series, SZSM05T1G

## PACKAGE DIMENSIONS

SOT-23 (TO-236)  
CASE 318-08  
ISSUE AP



NOTES:

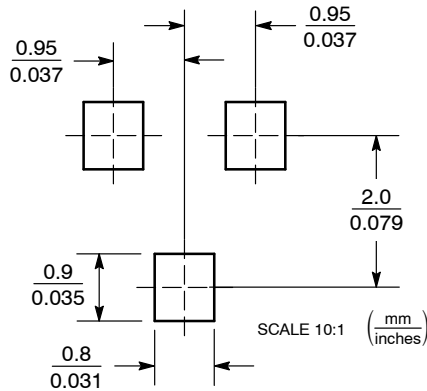
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.040	0.044
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.37	0.44	0.50	0.015	0.018	0.020
c	0.09	0.13	0.18	0.003	0.005	0.007
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.081
L	0.10	0.20	0.30	0.004	0.008	0.012
L1	0.35	0.54	0.69	0.014	0.021	0.029
HE	2.10	2.40	2.64	0.083	0.094	0.104
θ	0°	---	10°	0°	---	10°

STYLE 12:

1. CATHODE
2. CATHODE
3. ANODE

### SOLDERING FOOTPRINT



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