SM05T1 Series

Preferred Device

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 12 V
- Peak Power − 300 Watt (8 X 20 μs)
- Low Leakage
- Flammability Rating UL 94 V−0
- Pb−Free Packages are Available

Mechanical Characteristics:

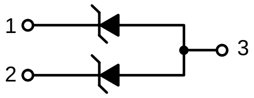
CASE: Void-free, transfer-molded, thermosetting plastic case
FINISH: Corrosion resistant finish, easily solderable
MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES:
260°C for 10 Seconds
Package designed for optimal automated board assembly
Small package size for high density applications
Available in 8 mm Tape and Reel

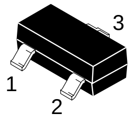
Use the Device Number to order the 7 inch/3,000 unit reel.
Replace the “T1” with “T3” in the Device Number to order the 13 inch/10,000 unit reel.

ON Semiconductor®

http://onsemi.com

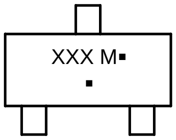
PIN 1. CATHODE
2. CATHODE
3. ANODE





SOT−23
CASE 318
STYLE 12

MARKING DIAGRAM



XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package
(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
SM05T1	SOT−23	3000/Tape & Reel
SM05T1G	SOT−23 (Pb−Free)	3000/Tape & Reel
SM12T1	SOT−23	3000/Tape & Reel
SM12T1G	SOT−23 (Pb−Free)	3000/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.

Preferred devices are recommended choices for future use and best overall value.

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Power Dissipation @ 20 μs (Note 1) @ T_L ≤ 25°C	P_{pk}	300	Watts
IEC 61000−4−2 (ESD) Air Contact		±15 ±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°C Derate above 25°C	P_D	225 1.8	mW mW/°C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	556	°C/W
Total Power Dissipation on Alumina Substrate (Note 3) @ T_A = 25°C Derate above 25°C	P_D	300 2.4	mW mW/°C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	417	°C/W
Junction and Storage Temperature Range	T_J, T_{stg}	− 55 to +150	°C
Lead Solder Temperature − Maximum (10 Second Duration)	T_L	260	°C

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

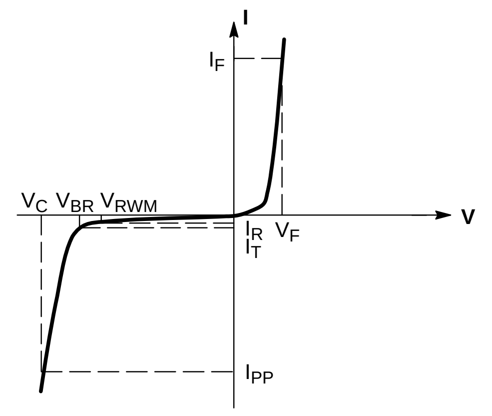
*Other voltages may be available upon request

ELECTRICAL CHARACTERISTICS

(T_A = 25°C unless otherwise noted)

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
ΘV_{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}



Uni−Directional TVS

ELECTRICAL CHARACTERISTICS

				V_{BR}, Breakdown Voltage					Typical Capacitance
		V_{RWM}	I_R @ V_{RWM}	(Volts)		I_T	V_C @ I_{PP} = 1 Amp	Max I_{PP} (Note 4)	(pF)
Device	Device Marking	(Volts)	(μA)	Min	Max	mA	(Volts)	(Amps)	Pin 1 to 3 @ 0 Volts
SM05T1, G	05M	5	10	6.2	7.3	1.0	9.8	17	225
SM12T1, G	12M	12	1.0	13.3	15.75	1.0	19	12	95

4. 8 × 20 μs pulse waveform per Figure 3

TYPICAL CHARACTERISTICS

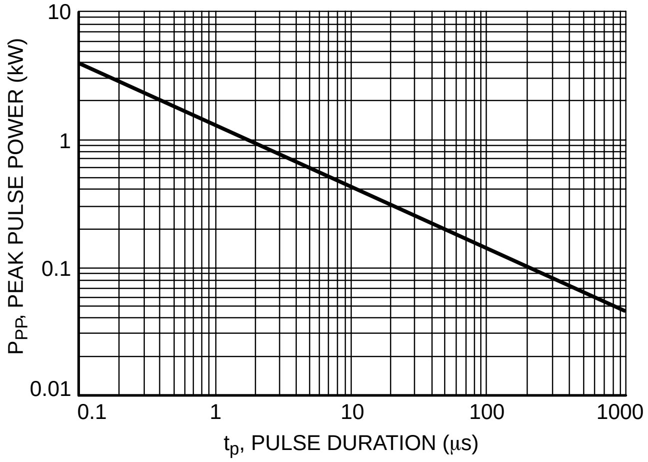


Figure 1. Non−Repetitive Peak Pulse Power versus Pulse Time

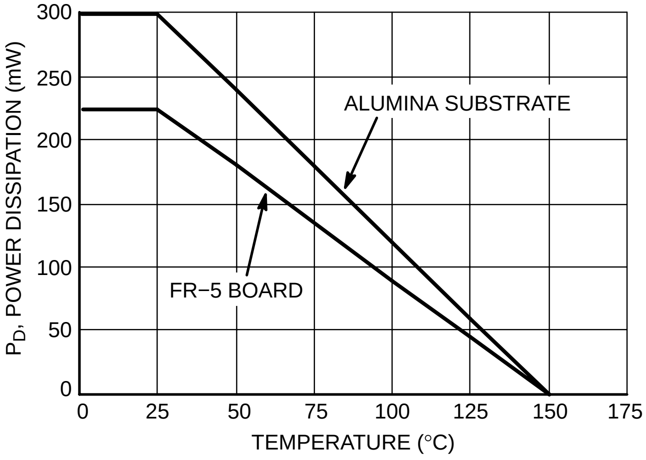


Figure 2. Steady State Power Derating Curve

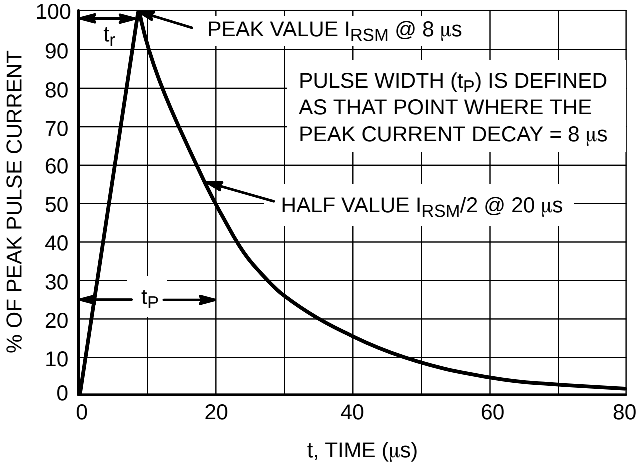


Figure 3. 8 × 20 μs Pulse Waveform

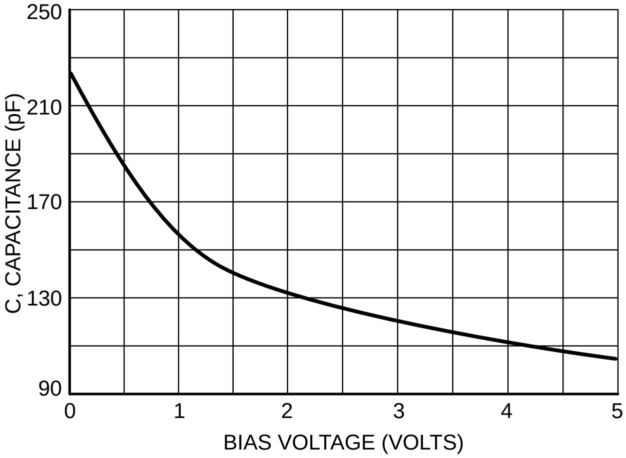


Figure 4. Typical Diode Capacitance (SM05)

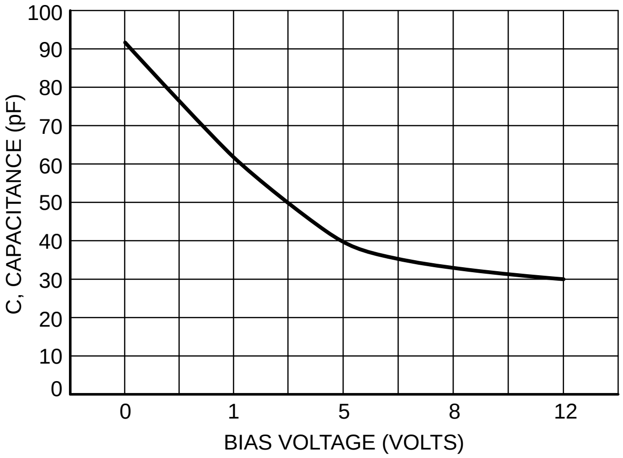
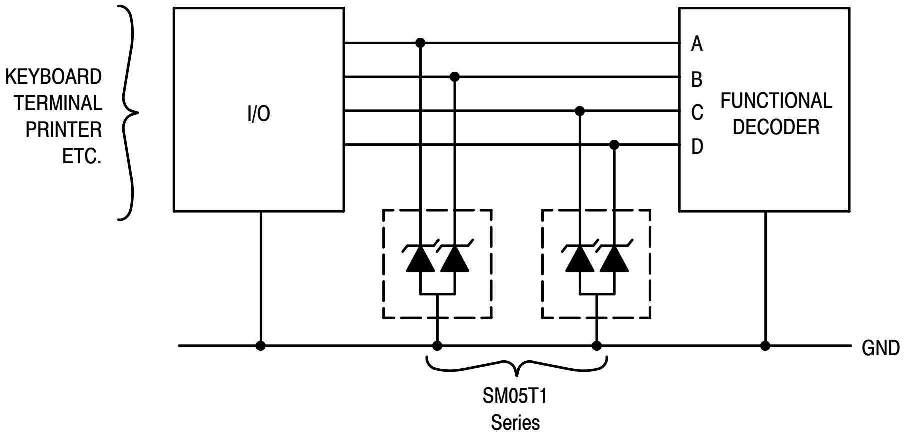


Figure 5. Typical Diode Capacitance (SM12)

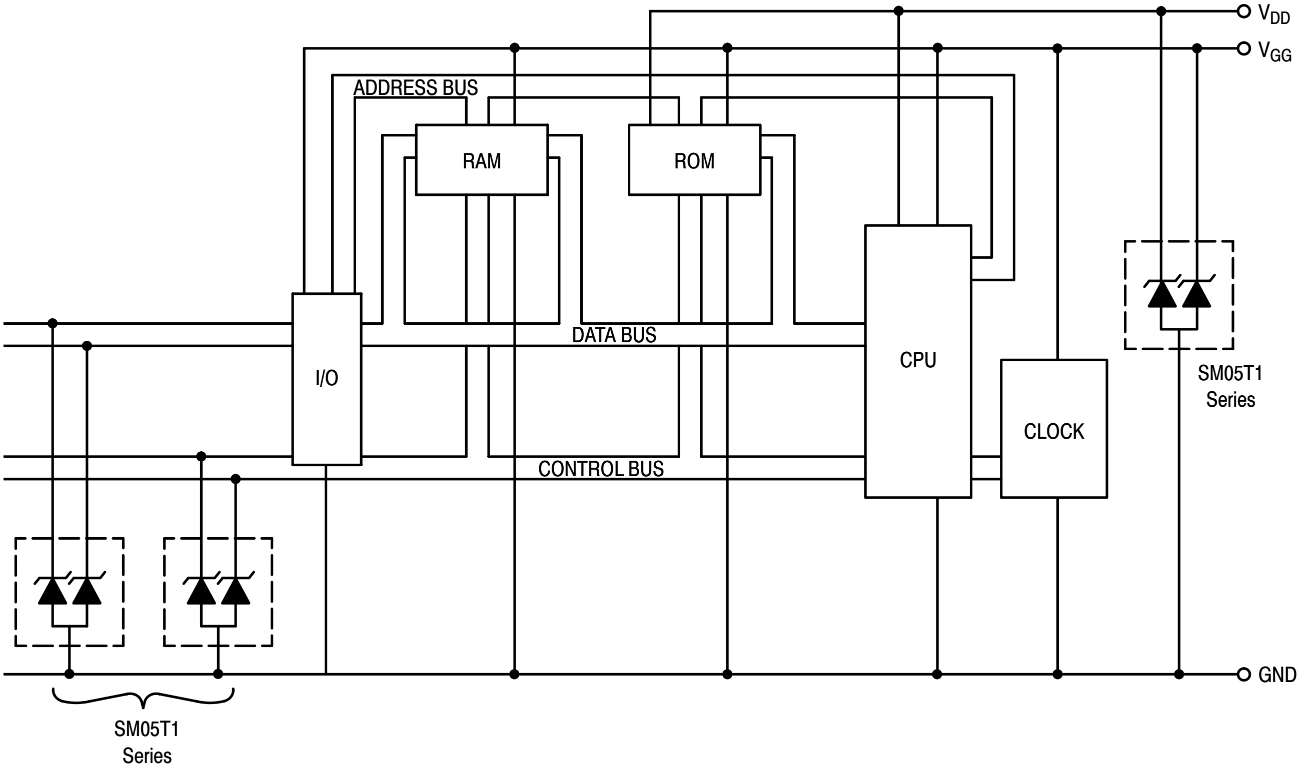
TYPICAL COMMON ANODE APPLICATIONS

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

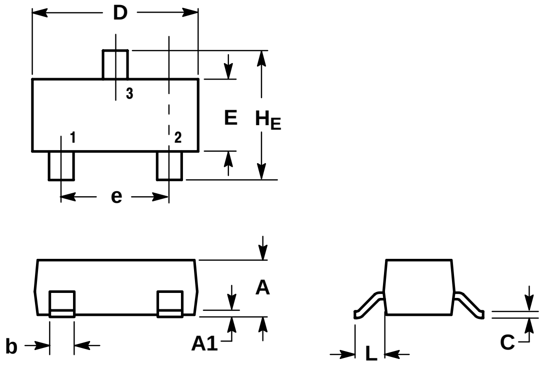


Microprocessor Protection



PACKAGE DIMENSIONS

SOT−23 (TO−236)
CASE 318−08
ISSUE AL

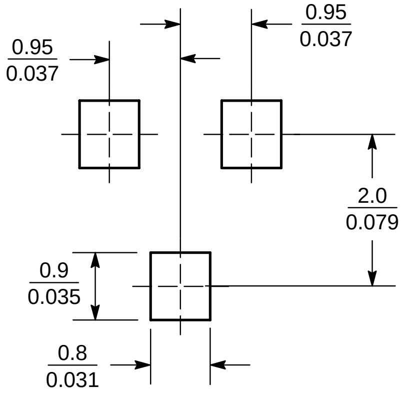


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318−01 THRU −07 AND −09 OBSOLETE, NEW STANDARD 318−08.

	MILLIMETERS			INCHES		
DIM	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	0.35	0.54	0.69	0.014	0.021	0.029
H_E	2.10	2.40	2.64	0.083	0.094	0.104

STYLE 12:
PIN 1. CATHODE
2. CATHODE
3. ANODE

SOLDERING FOOTPRINT*



SCALE 10:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

*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 and ON 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 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

For additional information, please contact your local Sales Representative.