SC-74 Quad ESD and Surge Protector

Surge Protection Up to 350 W Peak Power

SMS05T1 Series

This quad monolithic silicon ESD and Surge Protector is designed for applications requiring ESD protection. It is intended for use in voltage and ESD sensitive equipment such as computers, printers, business machines, communication systems and other applications. This quad device provides superior surge protection over current quad Zener MMQA series by providing up to 350 watts peak power.

Features

- SC−74 Package Allows Four Separate Unidirectional Configurations
- Peak Power − 350 W, 8 x 20 μs
- ESD Rating of Class N (Exceeding 25 kV) per the Human Body Model
- ESD Rating:
  IEC 61000−4−2 (ESD) 15 kV (Air) 8 kV (Contact)
  IEC 61000−4−4 (EFT) 40 A (5/5 ns)
  IEC 61000−4−5 (Surge) 23 A (8/20 μs)
- UL Flammability Rating of 94 V−0
- These Devices are Pb−Free and are RoHS Compliant
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable

Typical Applications

- Hand Held Portable Applications such as Cell Phones, Pagers, Notebooks and Notebook Computers

MAXIMUM RATINGS

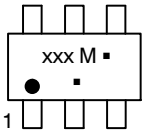
Rating	Symbol	Value	Unit
Peak Power Dissipation 8 x 20 μS @ T_A = 25°C (Note 1)	P_{pk}	350	W
Total Power Dissipation on FR−5 Board @ T_A = 25°C (Note 2) Derate Above 25°C	P_D	225 1.8	mW mW/°C
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	556	°C/W
Junction and Storage Temperature Range	T_J, T_{stg}	−55 to +150	°C
Lead Solder Temperature Maximum 10 Seconds Duration	T_L	260	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.
1. Non−repetitive current pulse 8 x 20 μs exponential decay waveform.
2. FR−5 = 1.0 x 0.75 x 0.62 in.

SC−74 QUAD ESD AND SURGE PROTECTOR 350 WATTS PEAK POWER 5 VOLTS

SC−74
CASE 318F
STYLE 1

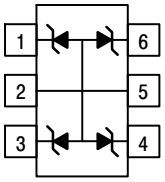
MARKING DIAGRAM



xxx = Specific Device Code
M = Date Code*
▪ = Pb−Free Package

(Note: Microdot may be in either location)
*Date Code orientation and/or position may vary depending upon manufacturing location.

PIN ASSIGNMENT



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

DEVICE MARKING INFORMATION

See specific marking information in the device marking column of the Electrical Characteristics table on page 2 of this data sheet.

ORDERING INFORMATION

See detailed ordering, marking and shipping information on page 2 of this data sheet.

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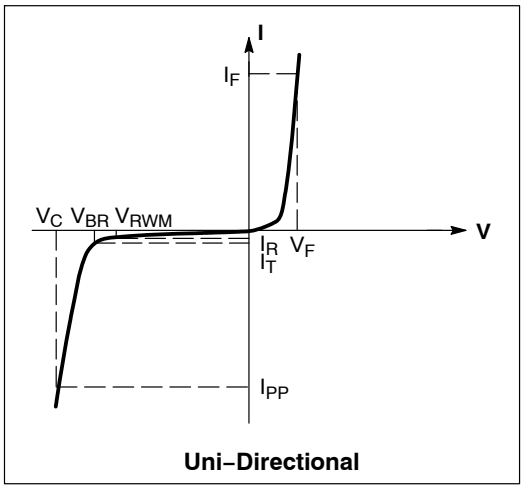
ELECTRICAL CHARACTERISTICS

(T_A = 25°C unless otherwise noted)

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

ELECTRICAL CHARACTERISTICS − UNIDIRECTIONAL

Device*	Device Marking	Breakdown Voltage V_{BR}(V) Min	Nom	Max	I_T (mA)	Max Reverse Leakage Current I_R (μA)	V_R (V)	Max Reverse Voltage (Clamping Voltage) At Specified Reverse Surge Current (I_{RSM}) I_{RSM} (8x20 μs) (A)	V_{RSM} (8x20 μs) (V)	Max Reverse Voltage (Clamping Voltage) At Specified Reverse Surge Current (I_{RSM}) I_{RSM} (8x20 μs) (A)	V_{RSM} (8x20 μs) (V)	Capacitance @ 0 Volt Bias, 1 MHz (pF) Min	Max
SMS05T1G	5V0	6.0	–	7.2	1.0	20	5.0	5.0	9.8	23	15.5	250	400
SMS12T1G	12V	13.3	–	15	1.0	1.0	12	5.0	19.0	15	23.0	80	150
SMS15T1G	15V	16.7	–	18.5	1.0	1.0	15	5.0	24.0	12	29.0	60	125
SMS24T1G	24V	26.7	–	32	1.0	1.0	24	5.0	40.0	8	44.0	40	75

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.
*Includes SZ−prefix devices where applicable.

ORDERING INFORMATION

Device	Package	Shipping†
SMS05T1G, SZSMS05T1G**	SC−74 (Pb−Free)	3000 / Tape & Reel
SMS12T1G	SC−74 (Pb−Free)	3000 / Tape & Reel
SMS15T1G, SZSMS15T1G**	SC−74 (Pb−Free)	3000 / Tape & Reel
SMS24T1G, SZSMS24T1G**	SC−74 (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.
**SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable.

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TYPICAL CHARACTERISTICS

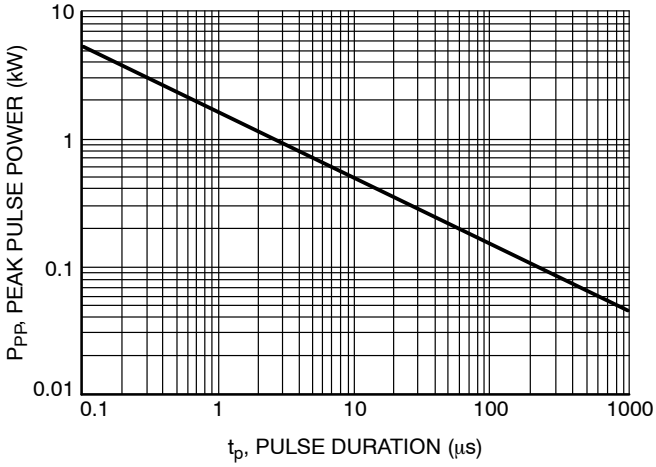

Figure 1. Non−Repetitive Peak Pulse Power versus Pulse Time

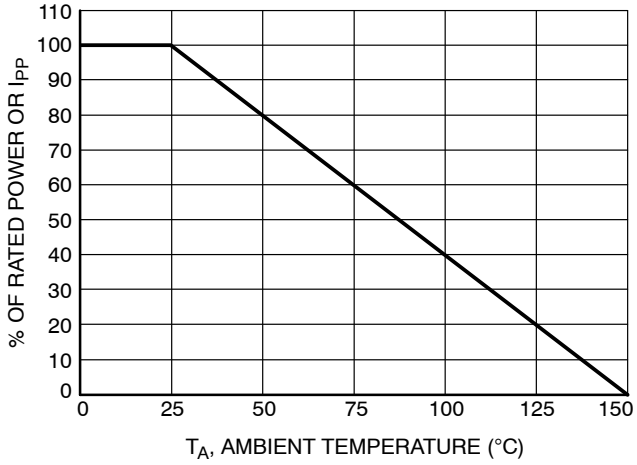

Figure 2. Power Derating Curve

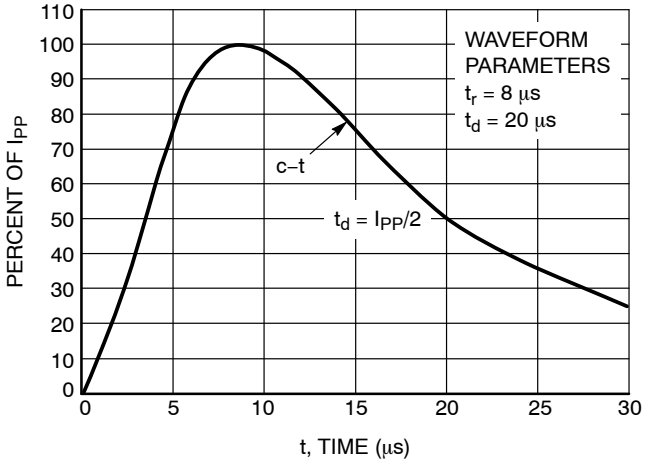

Figure 3. Pulse Waveform

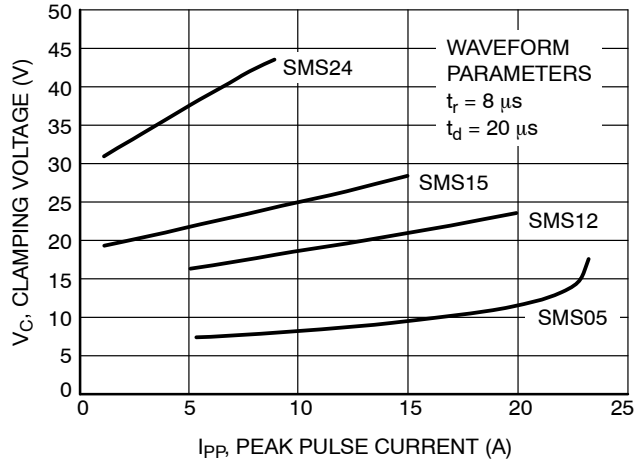

Figure 4. Clamping Voltage versus Peak Pulse Current

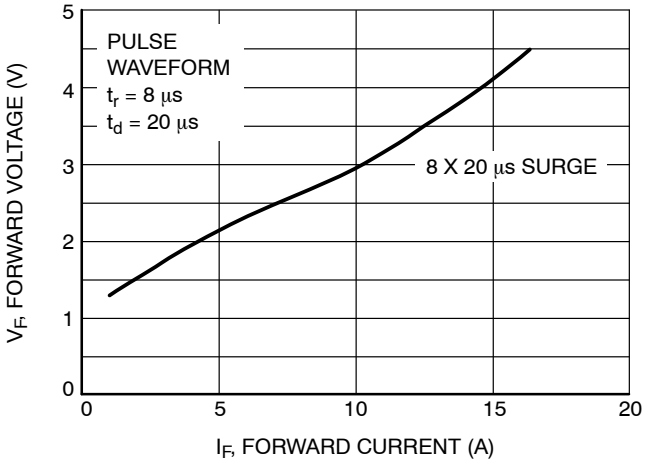

Figure 5. 8 x 20 μs V_F

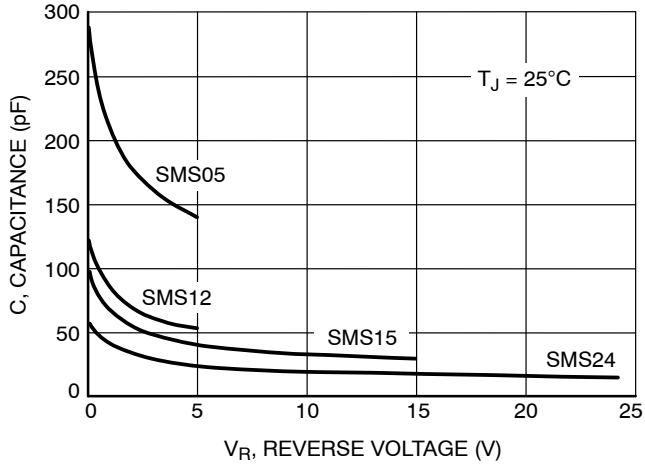

Figure 6. Typical Capacitance (SMS05 Series)

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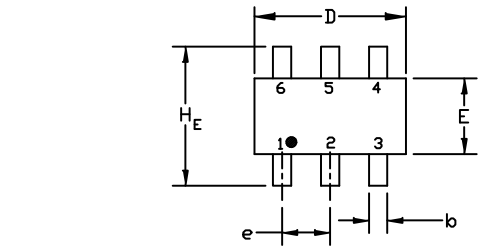
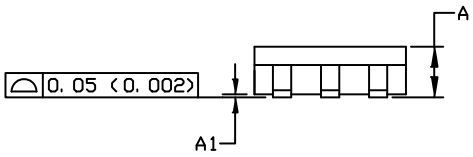
SCALE 2:1

SC−74
CASE 318F
ISSUE P

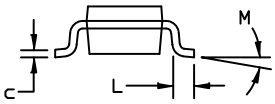
DATE 07 OCT 2021



TOP VIEW



SIDE VIEW

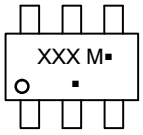


END VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994
2. CONTROLLING DIMENSION: INCHES
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.

	MILLIMETERS			INCHES		
DIM	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
H_E	2.50	2.75	3.00	0.099	0.108	0.118
L	0.20	0.40	0.60	0.008	0.016	0.024
M	0°	---	10°	0°	---	10°

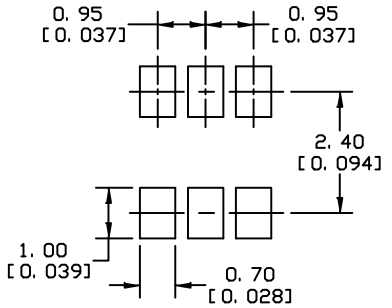
GENERIC MARKING DIAGRAM*



XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.



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

SOLDERING FOOTPRINT

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

STYLE 2:
PIN 1. NO CONNECTION
2. COLLECTOR
3. EMITTER
4. NO CONNECTION
5. COLLECTOR
6. BASE

STYLE 3:
PIN 1. EMITTER 1
2. BASE 1
3. COLLECTOR 2
4. EMITTER 2
5. BASE 2
6. COLLECTOR 1

STYLE 4:
PIN 1. COLLECTOR 2
2. EMITTER 1/EMITTER 2
3. COLLECTOR 1
4. EMITTER 3
5. BASE 1/BASE 2/COLLECTOR 3
6. BASE 3

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

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

STYLE 7:
PIN 1. SOURCE 1
2. GATE 1
3. DRAIN 2
4. SOURCE 2
5. GATE 2
6. DRAIN 1

STYLE 8:
PIN 1. EMITTER 1
2. BASE 2
3. COLLECTOR 2
4. EMITTER 2
5. BASE 1
6. COLLECTOR 1

STYLE 9:
PIN 1. EMITTER 2
2. BASE 2
3. COLLECTOR 1
4. EMITTER 1
5. BASE 1
6. COLLECTOR 2

STYLE 10:
PIN 1. ANODE/CATHODE
2. BASE
3. EMITTER
4. COLLECTOR
5. ANODE
6. CATHODE

STYLE 11:
PIN 1. EMITTER
2. BASE
3. ANODE/CATHODE
4. ANODE
5. CATHODE
6. COLLECTOR

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