

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 μ s
- 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 μ s)
- 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 μ s @ $T_A = 25^\circ\text{C}$ (Note 1) | P_{pk} | 350 | W |
| Total Power Dissipation on FR-5 Board @ $T_A = 25^\circ\text{C}$ (Note 2) Derate Above 25°C | P_D | 225 | mW |
| | | 1.8 | mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 556 | $^\circ\text{C}/\text{W}$ |
| Junction and Storage Temperature Range | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |
| Lead Solder Temperature Maximum 10 Seconds Duration | T_L | 260 | $^\circ\text{C}$ |

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.

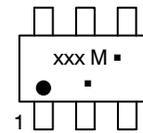
1. Non-repetitive current pulse 8 x 20 μ s exponential decay waveform.
2. FR-5 = 1.0 x 0.75 x 0.62 in.

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



SC-74
CASE 318F
STYLE 1

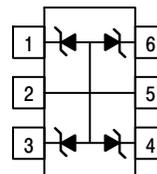
MARKING DIAGRAM



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

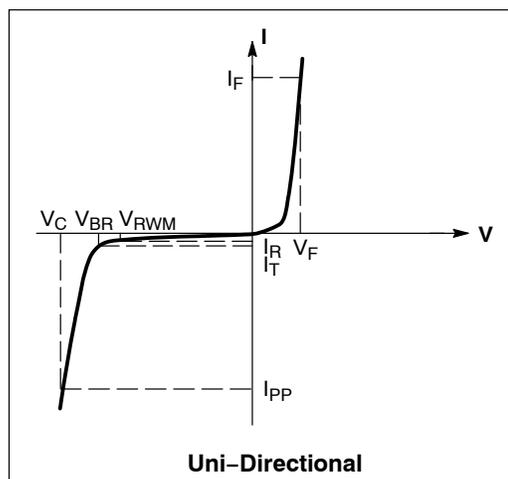
See detailed ordering, marking and shipping information on page 2 of this data sheet.

SMS05T1 Series

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 |
| ∅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 - UNIDIRECTIONAL

| Device* | Device Marking | Breakdown Voltage | | | Max Reverse Leakage Current | | Max Reverse Voltage (Clamping Voltage) At Specified Reverse Surge Current (I _{RSM}) | | Max Reverse Voltage (Clamping Voltage) At Specified Reverse Surge Current (I _{RSM}) | | Capacitance @ 0 Volt Bias, 1 MHz | | |
|----------|----------------|---------------------|-----|------|-----------------------------|----------------|---|-------------------------------|---|-------------------------------|----------------------------------|------|-----|
| | | V _{BR} (V) | | | I _T | I _R | V _R | I _{RSM} (8x20 μs) | V _{RSM} (8x20 μs) | I _{RSM} (8x20 μs) | V _{RSM} (8x20 μs) | (pF) | |
| | | Min | Nom | Max | (mA) | (μA) | (V) | (A) | (V) | (A) | (V) | 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.

SMS05T1 Series

TYPICAL CHARACTERISTICS

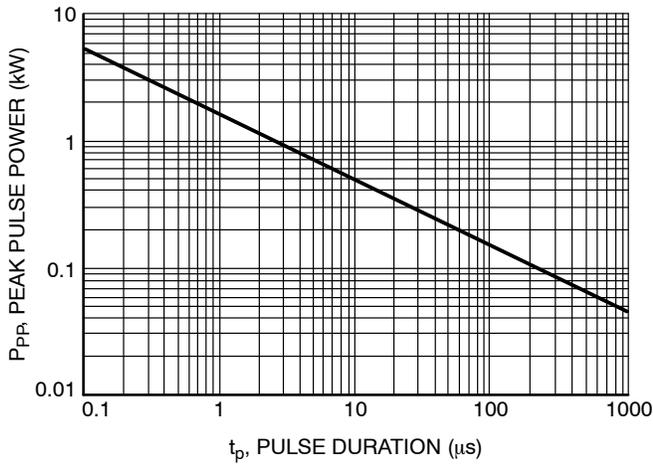


Figure 1. Non-Repetitive Peak Pulse Power versus Pulse Time

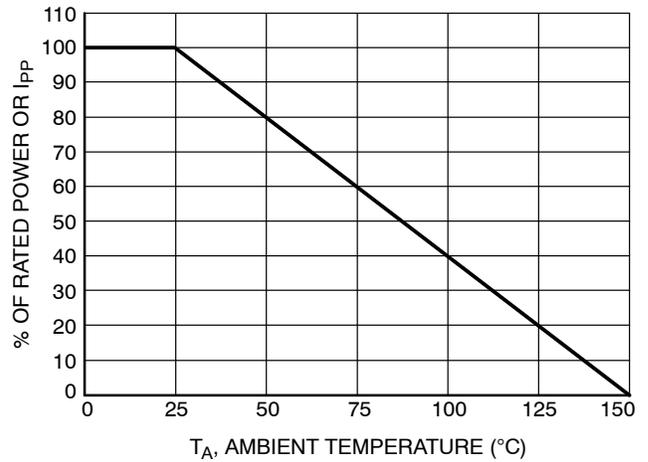


Figure 2. Power Derating Curve

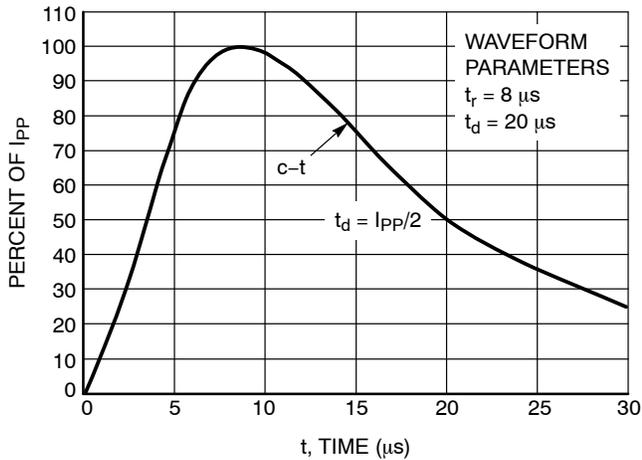


Figure 3. Pulse Waveform

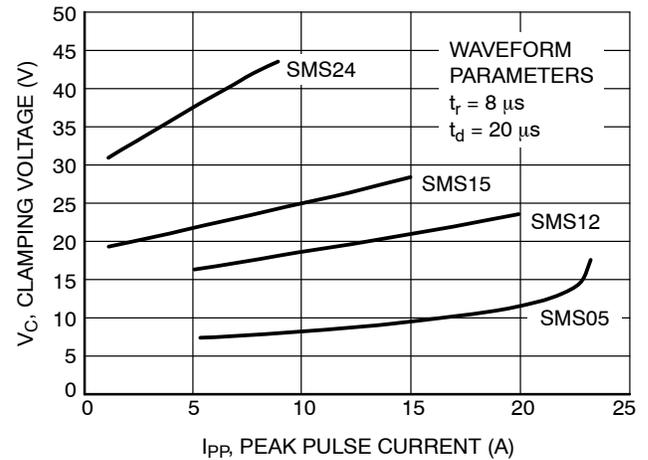


Figure 4. Clamping Voltage versus Peak Pulse Current

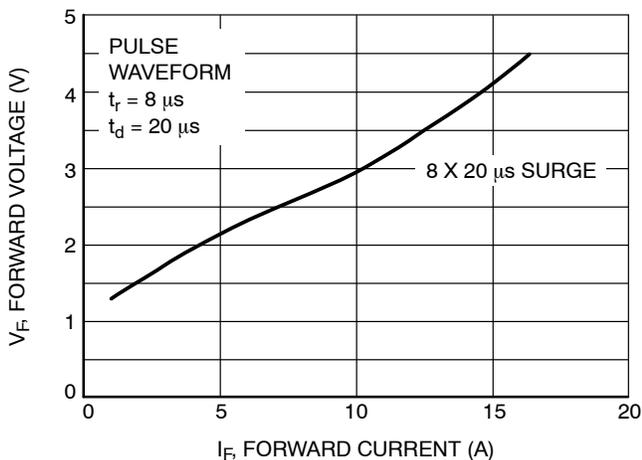


Figure 5. 8 x 20 μs V_F

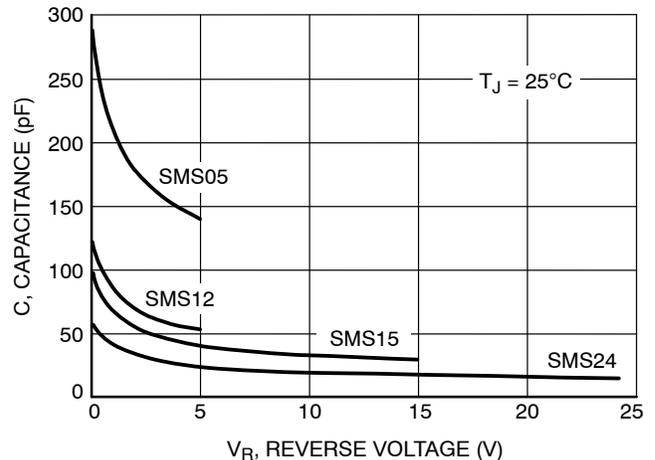


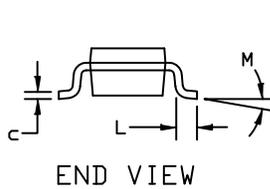
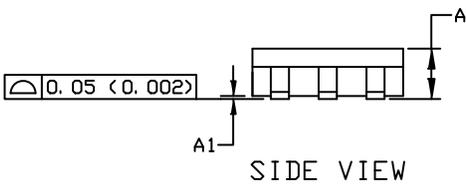
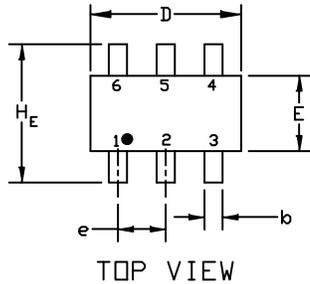
Figure 6. Typical Capacitance (SMS05 Series)



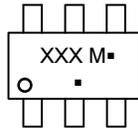
SCALE 2:1

SC-74
CASE 318F
ISSUE P

DATE 07 OCT 2021



GENERIC
MARKING DIAGRAM*



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

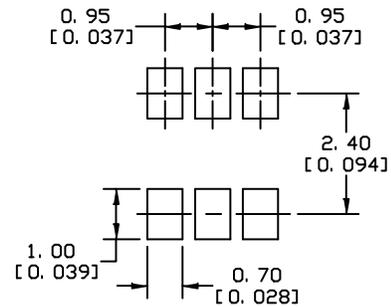
(Note: Microdot may be in either location)

*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.

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.

| 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 |
| 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* |



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

SOLDERING FOOTPRINT

| | | | | | |
|---|--|---|--|---|---|
| <p>STYLE 1: PIN 1. CATHODE 2. ANODE 3. CATHODE 4. CATHODE 5. ANODE 6. CATHODE</p> | <p>STYLE 2: PIN 1. NO CONNECTION 2. COLLECTOR 3. EMITTER 4. NO CONNECTION 5. COLLECTOR 6. BASE</p> | <p>STYLE 3: PIN 1. EMITTER 1 2. BASE 1 3. COLLECTOR 2 4. EMITTER 2 5. BASE 2 6. COLLECTOR 1</p> | <p>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</p> | <p>STYLE 5: PIN 1. CHANNEL 1 2. ANODE 3. CHANNEL 2 4. CHANNEL 3 5. CATHODE 6. CHANNEL 4</p> | <p>STYLE 6: PIN 1. CATHODE 2. ANODE 3. CATHODE 4. CATHODE 5. CATHODE 6. CATHODE</p> |
| <p>STYLE 7: PIN 1. SOURCE 1 2. GATE 1 3. DRAIN 2 4. SOURCE 2 5. GATE 2 6. DRAIN 1</p> | <p>STYLE 8: PIN 1. EMITTER 1 2. BASE 2 3. COLLECTOR 2 4. EMITTER 2 5. BASE 1 6. COLLECTOR 1</p> | <p>STYLE 9: PIN 1. EMITTER 2 2. BASE 2 3. COLLECTOR 1 4. EMITTER 1 5. BASE 1 6. COLLECTOR 2</p> | <p>STYLE 10: PIN 1. ANODE/CATHODE 2. BASE 3. EMITTER 4. COLLECTOR 5. ANODE 6. CATHODE</p> | <p>STYLE 11: PIN 1. EMITTER 2. BASE 3. ANODE/CATHODE 4. ANODE 5. CATHODE 6. COLLECTOR</p> | |

| | | |
|------------------|-------------|--|
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