

# SMF05T1

## Quad Array 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.

### Specification Features

- SC88A Package Allows Four Separate Unidirectional Configurations
- Low Leakage < 5  $\mu$ A @ 5 Volt
- Breakdown Voltage: 6.1 Volt - 7.2 Volt @ 1 mA
- Low Capacitance (90 pF typical)
- ESD Protection Meeting IEC61000-4-2
- Pb-Free Packages are Available

### Mechanical Characteristics

- Void Free, Transfer-Molded, Thermosetting Plastic Case
- Corrosion Resistant Finish, Easily Solderable
- Package Designed for Optimal Automated Board Assembly
- Small Package Size for High Density Applications



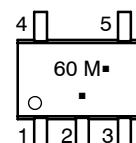
ON Semiconductor®

<http://onsemi.com>

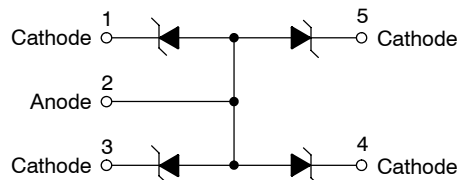


SC-88A/SOT-323  
CASE 419A  
STYLE 5

### MARKING DIAGRAM



60 = Device Marking  
M = One Digit Date Code  
▪ = Pb-Free Package  
(Note: Microdot may be in either location)



### ORDERING INFORMATION

| Device   | Package             | Shipping†        |
|----------|---------------------|------------------|
| SMF05T1  | SC-88A              | 3000/Tape & Reel |
| SMF05T1G | SC-88A<br>(Pb-Free) | 3000/Tape & Reel |
| SMF05T2G | SC-88A<br>(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.

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

# SMF05T1

## MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic  | Symbol          | Value       | Unit  |
|---|-----------------|-------------|---|
| Peak Power Dissipation @ $8 \times 20 \mu\text{s}$ @ $T_A \leq 25^\circ\text{C}$ (Note 1) | $P_{pk}$        | 200         | W   |
| Steady State Power - 1 Diode (Note 2)   | $P_D$           | 385         | mW  |
| Thermal Resistance Junction to Ambient<br>Above $25^\circ\text{C}$ , Derate               | $R_{\theta JA}$ | 325<br>3.1  | $^\circ\text{C}/\text{W}$<br>mW/ $^\circ\text{C}$ |
| Maximum Junction Temperature  | $T_{Jmax}$      | 150         | $^\circ\text{C}$                                  |
| Operating Junction and Storage Temperature Range  | $T_J T_{stg}$   | -55 to +150 | $^\circ\text{C}$                                  |
| ESD Discharge IEC61000-4-2, Air Discharge   |                 | 30          | kV  |
| IEC61000-4-2, Contact Discharge   |                 | 30          |   |
| Lead Solder Temperature (10 seconds duration)   | $T_L$           | 260         | $^\circ\text{C}$                                  |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

## ELECTRICAL CHARACTERISTICS

| Device | Breakdown Voltage $V_{BR}$ @ 1 mA (Volts) |     | Leakage Current $I_R$ @ $V_{RWM} = 5 \text{ V}$ ( $\mu\text{A}$ ) | Capacitance @ 0 V Bias ( $\text{pF}$ ) | Max $V_F$ @ $I_F = 200 \text{ mA}$ (V) | Max Clamping Voltage ( $V_C$ ) @ $I_{PP}$ |           | Max Clamping Voltage ( $V_C$ ) @ $I_{PP}$ |           |
|--------|---|-----|---|--|--|---|-----------|---|-----------|
|        | Min                                       | Max |   |  |  | $I_{PP}$ (A)                              | $V_C$ (V) | $I_{PP}$ (A)                              | $V_C$ (V) |
| SMF05  | 6.0                                       | 7.2 | 5.0   | 90                                     | 1.25                                   | 1.0                                       | 9.5       | 12  | 12.5      |

- Non-repetitive current per Figure 1. Derate per Figure 2.
- Only 1 diode under power. For all 4 diodes under power,  $P_D$  will be 25%. Mounted on FR-4 board with min pad.

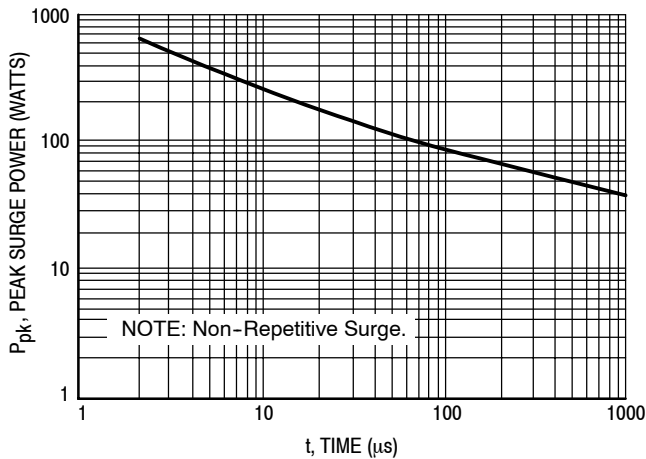


Figure 1. Pulse Width

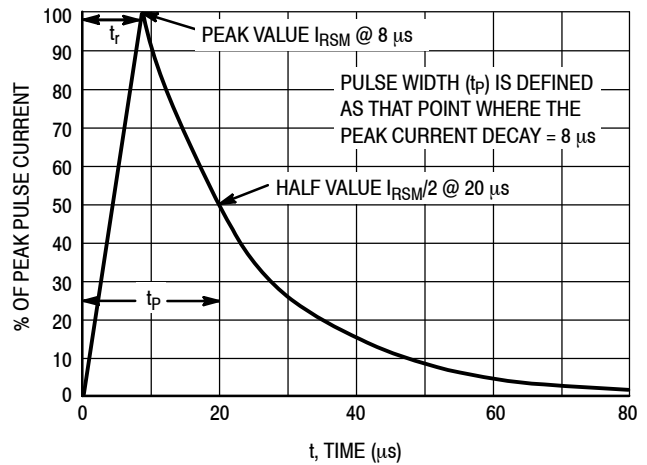
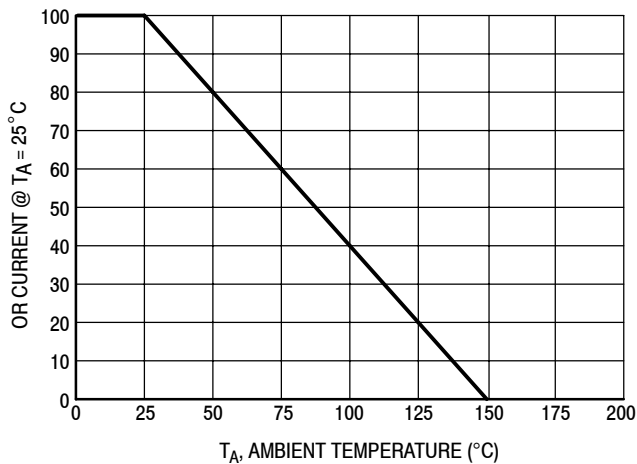
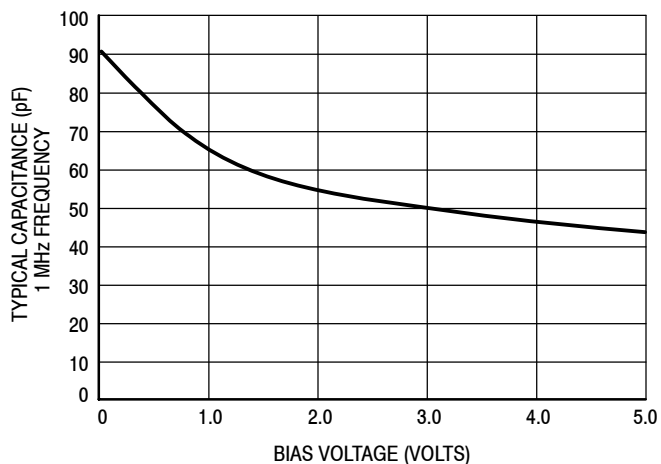


Figure 2.  $8 \times 20 \mu\text{s}$  Pulse Waveform

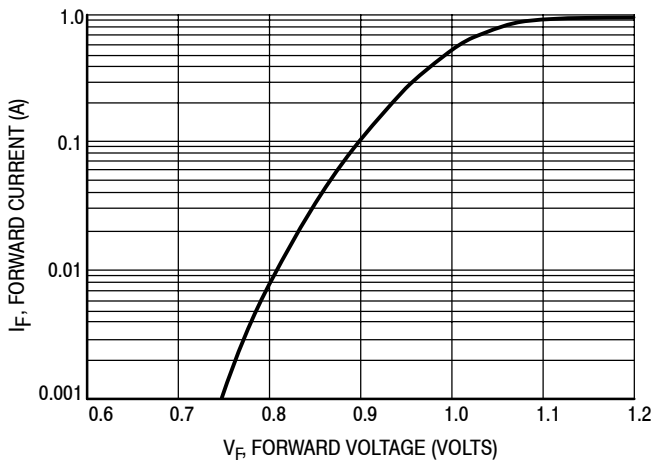
# SMF05T1



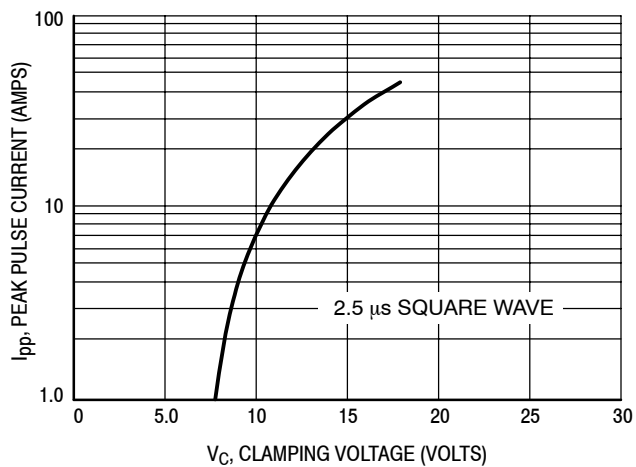
**Figure 3. Pulse Derating Curve**



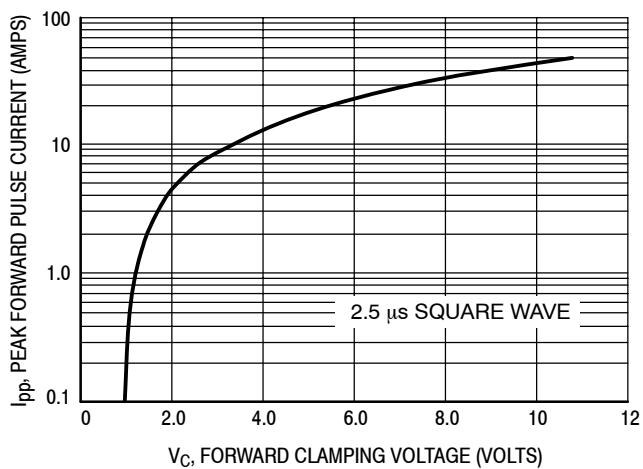
**Figure 4. Capacitance**



**Figure 5. Forward Voltage**



**Figure 6. Clamping Voltage versus Peak Pulse Current (Reverse Direction)**

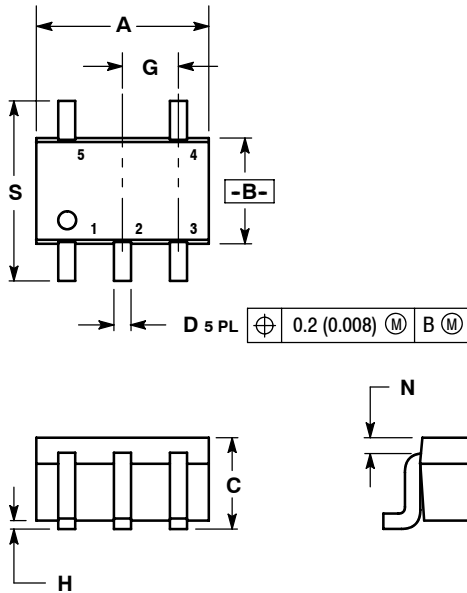


**Figure 7. Clamping Voltage versus Peak Pulse Current (Forward Direction)**

# SMF05T1

## PACKAGE DIMENSIONS

SC-88A/SOT-353/SC-70  
5-LEAD PACKAGE  
CASE 419A-02  
ISSUE J



**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419A-01 OBSOLETE. NEW STANDARD 419A-02.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| DIM | INCHES    |       | MILLIMETERS |      |
|-----|-----------|-------|-------------|------|
|     | MIN       | MAX   | MIN         | MAX  |
| A   | 0.071     | 0.087 | 1.80        | 2.20 |
| B   | 0.045     | 0.053 | 1.15        | 1.35 |
| C   | 0.031     | 0.043 | 0.80        | 1.10 |
| D   | 0.004     | 0.012 | 0.10        | 0.30 |
| G   | 0.026 BSC |       | 0.65 BSC    |      |
| H   | ---       | 0.004 | ---         | 0.10 |
| J   | 0.004     | 0.010 | 0.10        | 0.25 |
| K   | 0.004     | 0.012 | 0.10        | 0.30 |
| N   | 0.008 REF |       | 0.20 REF    |      |
| S   | 0.079     | 0.087 | 2.00        | 2.20 |

**STYLE 5:**

1. CATHODE
2. COMMON ANODE
3. CATHODE 2
4. CATHODE 3
5. CATHODE 4

ON Semiconductor and 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.