

# SMF05

## ESD Protection Diode Array

### Quad, Low Clamping Voltage

This quad monolithic silicon overvoltage suppressor is designed for applications requiring transient voltage protection capability. It is intended for use in ESD sensitive equipment such as computers, printers, cell phones, 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

- SC-88A Package Allows Four Separate Unidirectional Configurations
- Low Leakage < 5  $\mu\text{A}$  @ 5 V
- Breakdown Voltage: 6.1 V – 7.2 V @ 1 mA
- Low Capacitance (90 pF TYP)
- Provides Protection for 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

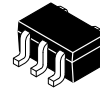
#### Applications

- Computers
- Printers
- Cell Phones
- Medical Equipment



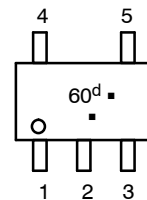
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SC-88A/SOT-353  
CASE 419A-02  
STYLE 5  
SCALE 2:1

#### MARKING DIAGRAM

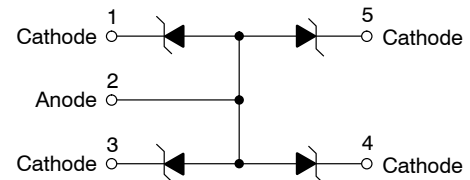


60 = Specific Device Code

<sup>d</sup> = 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 (Pb-Free)	3000 Tape & Reel
SMF05T2G	SC-88A (Pb-Free)	3000 Tape & Reel
SMF05CT1	SC-88A	3000 Tape & Reel
SMF05CT1G	SC-88A (Pb-Free)	3000 Tape & Reel
SMF05CT2	SC-88A	3000 Tape & Reel
SMF05CT2G	SC-88A (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 Specification 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.

# SMF05

## 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
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 IEC61000-4-2, Contact Discharge	$V_{pp}$	16 9	kV
Lead Solder Temperature (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 per Figure 2. Derate per Figure 3.

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

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

## TYPICAL PERFORMANCE CURVES

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

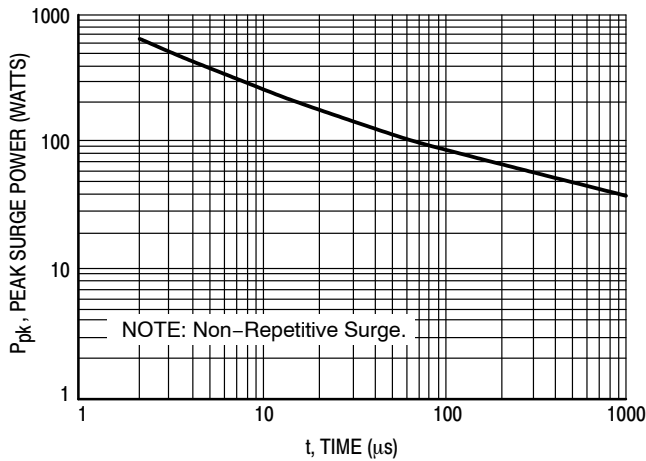


Figure 1. Peak Power Dissipation versus Pulse Width

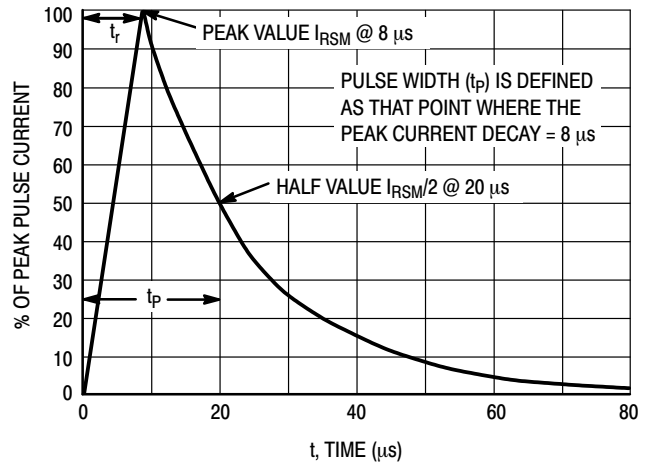
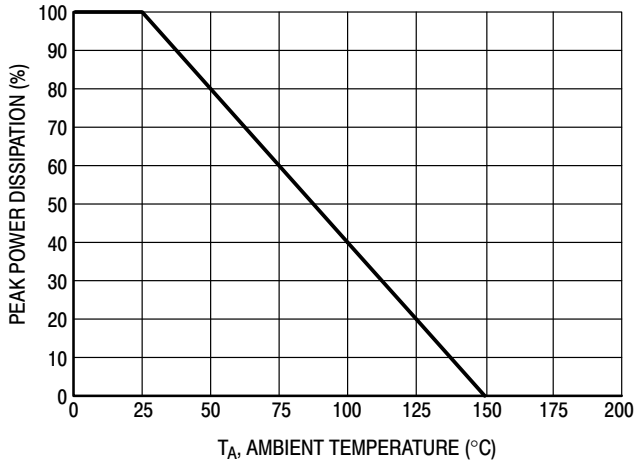


Figure 2. Pulse Waveform  $8 \times 20 \mu\text{s}$

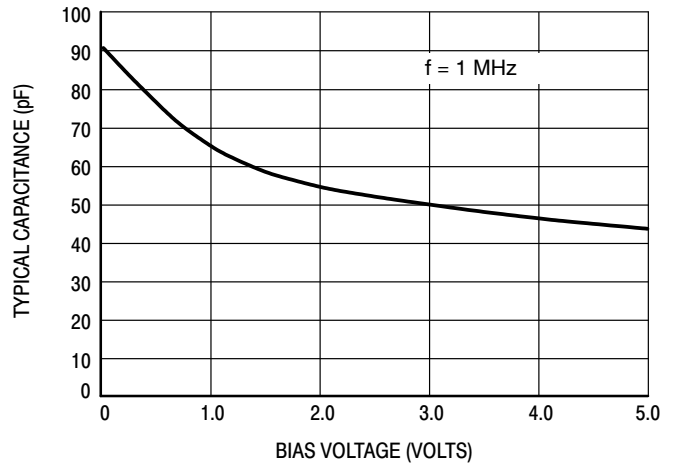
# SMF05

## TYPICAL PERFORMANCE CURVES

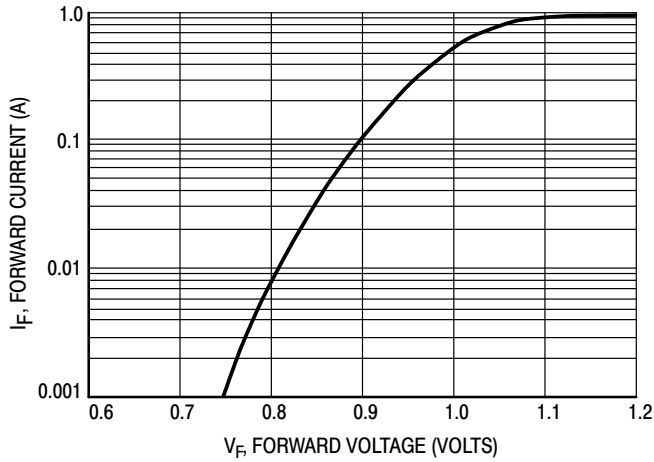
( $T_A = 25^\circ\text{C}$  unless otherwise noted)



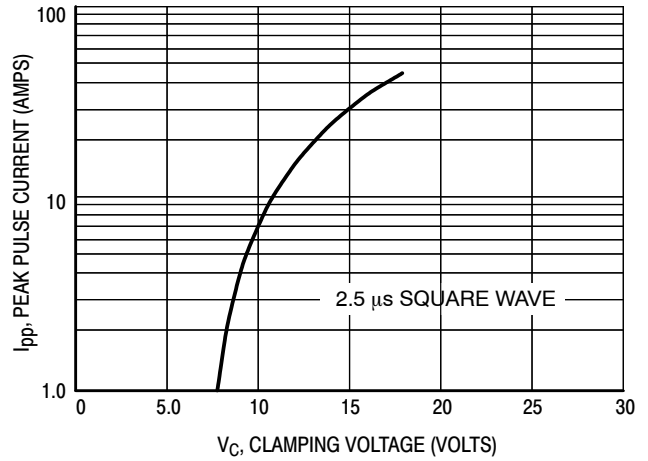
**Figure 3. Power Derating Curve**



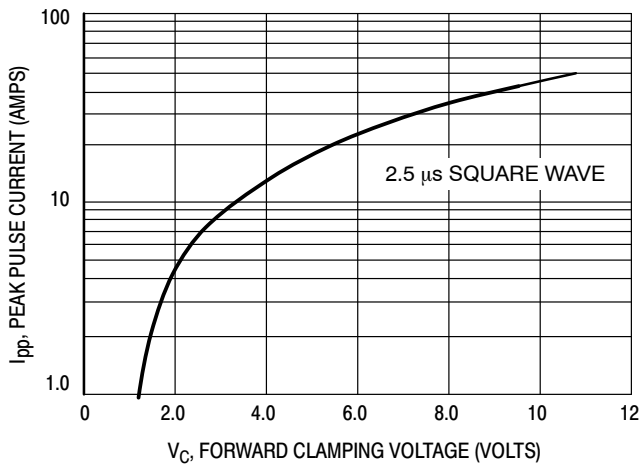
**Figure 4. Junction Capacitance versus Reverse Voltage**



**Figure 5. Forward Voltage Curve**



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



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

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

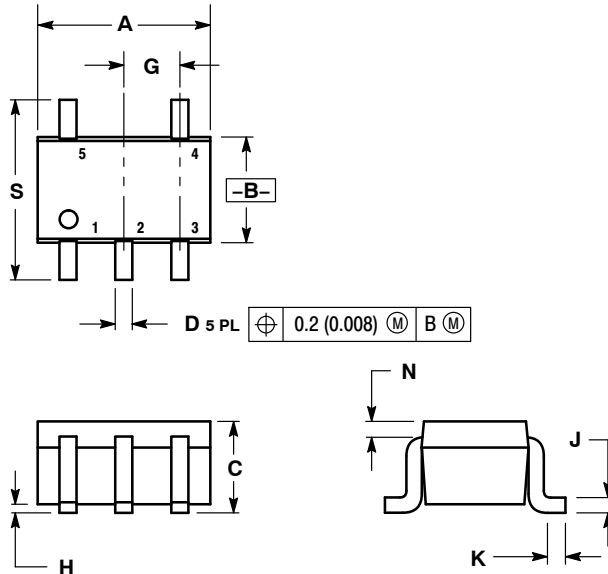
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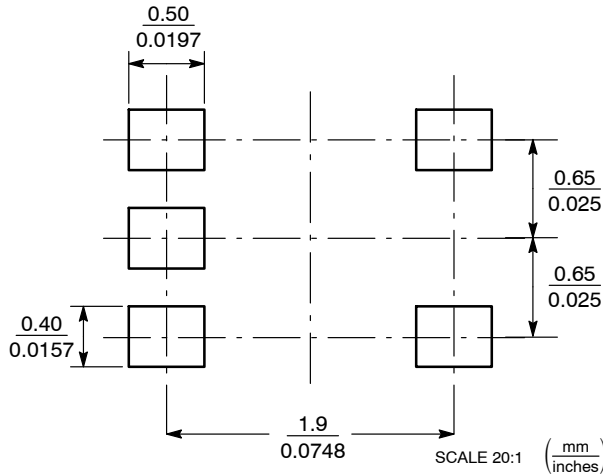
SCALE 2:1

SC-88A (SC-70-5/SOT-353)  
CASE 419A-02  
ISSUE L

DATE 17 JAN 2013



### SOLDER FOOTPRINT

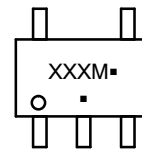


NOTES:

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

### 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.

- |  |  |  |  |  |
|--|--|--|--|--|
| <p>STYLE 1:<br/>PIN 1. BASE<br/>2. EMITTER<br/>3. BASE<br/>4. COLLECTOR<br/>5. COLLECTOR</p>                   | <p>STYLE 2:<br/>PIN 1. ANODE<br/>2. EMITTER<br/>3. BASE<br/>4. COLLECTOR<br/>5. CATHODE</p>  | <p>STYLE 3:<br/>PIN 1. ANODE 1<br/>2. N/C<br/>3. ANODE 2<br/>4. CATHODE 2<br/>5. CATHODE 1</p> | <p>STYLE 4:<br/>PIN 1. SOURCE 1<br/>2. DRAIN 1/2<br/>3. SOURCE 1<br/>4. GATE 1<br/>5. GATE 2</p> | <p>STYLE 5:<br/>PIN 1. CATHODE<br/>2. COMMON ANODE<br/>3. CATHODE 2<br/>4. CATHODE 3<br/>5. CATHODE 4</p>  |
| <p>STYLE 6:<br/>PIN 1. EMITTER 2<br/>2. BASE 2<br/>3. EMITTER 1<br/>4. COLLECTOR<br/>5. COLLECTOR 2/BASE 1</p> | <p>STYLE 7:<br/>PIN 1. BASE<br/>2. EMITTER<br/>3. BASE<br/>4. COLLECTOR<br/>5. COLLECTOR</p> | <p>STYLE 8:<br/>PIN 1. CATHODE<br/>2. COLLECTOR<br/>3. N/C<br/>4. BASE<br/>5. EMITTER</p>      | <p>STYLE 9:<br/>PIN 1. ANODE<br/>2. CATHODE<br/>3. ANODE<br/>4. ANODE<br/>5. ANODE</p>           | <p>Note: Please refer to datasheet for style callout. If style type is not called out in the datasheet refer to the device datasheet pinout or pin assignment.</p> |

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DESCRIPTION:	SC-88A (SC-70-5/SOT-353)	PAGE 1 OF 1

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