

# SMF05C, SMF12C, SMF15C, SMF24C

## 5-Line Transient Voltage Suppressor Array

This 5-line voltage transient suppressor array is designed for application requiring transient voltage protection capability. It is intended for use in over-transient voltage and ESD sensitive equipment such as computers, printers, automotive electronics, networking communication and other applications. This device features a monolithic common anode design which protects five independent lines in a single SC-88 package.

### Features

- Protects up to 5-Line in a Single SC-88 Package
- Peak Power Dissipation – 100 W (8 x 20  $\mu$ s Waveform)
- ESD Rating of Class 3B (Exceeding 8 kV) per Human Body Model and Class C (Exceeding 400 V) per Machine Model.
- Compliance with IEC 61000-4-2 (ESD) 15 kV (Air), 8 kV (Contact)
- Flammability Rating of UL 94 V-0
- Pb-Free Packages are Available

### Applications

- Hand-Held Portable Applications
- Networking and Telecom
- Automotive Electronics
- Serial and Parallel Ports
- Notebooks, Desktops, Servers

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

Symbol	Rating	Value	Unit
$P_{PK}$ 1	Peak Power Dissipation 8 x 20 $\mu$ s Double Exponential Waveform (Note 1)	100	W
$T_J$	Operating Junction Temperature Range	-40 to 125	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_L$	Lead Solder Temperature (10 s)	260	$^\circ\text{C}$
ESD	Human Body Model (HBM) Machine Model (MM) IEC 61000-4-2 Air (ESD) IEC 61000-4-2 Contact (ESD)	16000 400 15000 15000	V

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.

1. Nonrepetitive current pulse per Figure 3.

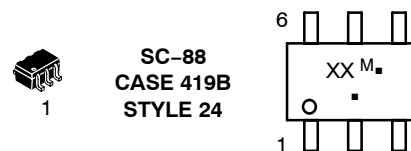


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## SC-88 FIVE TRANSIENT VOLTAGE SUPPRESSOR 100 W PEAK POWER

### MARKING DIAGRAM



XX = Specific Device Code

6J = SMF05C

6K = SMF12C

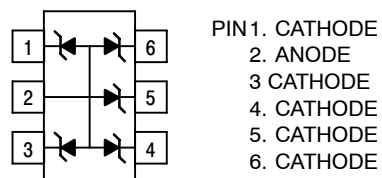
6L = SMF15C

6M = SMF24C

M = Date Code

■ = Pb-Free Package

### PIN ASSIGNMENT



### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

## SMF05C, SMF12C, SMF15C, SMF24C

### SMF05C ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	$V_{RWM}$	(Note 2)			5.0	V
Breakdown Voltage	$V_{BR}$	$I_T = 1\text{ mA}$ , (Note 3)	6.2		7.2	V
Reverse Leakage Current	$I_R$	$V_{RWM} = 5\text{ V}$		0.07	5.0	$\mu\text{A}$
Clamping Voltage	$V_C$	$I_{PP} = 5\text{ A}$ (8 x 20 $\mu\text{s}$ Waveform)			9.8	V
Clamping Voltage	$V_C$	$I_{PP} = 8\text{ A}$ (8 x 20 $\mu\text{s}$ Waveform)			12.5	V
Maximum Peak Pulse Current	$I_{PP}$	8 x 20 $\mu\text{s}$ Waveform			8.0	A
Capacitance	$C_J$	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ (Line to GND)		80	130	pF

### SMF12C ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	$V_{RWM}$	(Note 2)			12	V
Breakdown Voltage	$V_{BR}$	$I_T = 1\text{ mA}$ , (Note 3)	13.3		15	V
Reverse Leakage Current	$I_R$	$V_{RWM} = 12\text{ V}$		0.01	0.1	$\mu\text{A}$
Clamping Voltage	$V_C$	$I_{PP} = 3\text{ A}$ (8 x 20 $\mu\text{s}$ Waveform)			21	V
Clamping Voltage	$V_C$	$I_{PP} = 6\text{ A}$ (8 x 20 $\mu\text{s}$ Waveform)			23	V
Maximum Peak Pulse Current	$I_{PP}$	8 x 20 $\mu\text{s}$ Waveform			6.0	A
Capacitance	$C_J$	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ (Line to GND)		40	60	pF

### SMF15C ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	$V_{RWM}$	(Note 2)			15	V
Breakdown Voltage	$V_{BR}$	$I_T = 1\text{ mA}$ , (Note 3)	17		19	V
Reverse Leakage Current	$I_R$	$V_{RWM} = 15\text{ V}$		0.01	1.0	$\mu\text{A}$
Clamping Voltage	$V_C$	$I_{PP} = 1\text{ A}$ (8 x 20 $\mu\text{s}$ Waveform)			23	V
Clamping Voltage	$V_C$	$I_{PP} = 5\text{ A}$ (8 x 20 $\mu\text{s}$ Waveform)			29	V
Maximum Peak Pulse Current	$I_{PP}$	8 x 20 $\mu\text{s}$ Waveform			5.0	A
Capacitance	$C_J$	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ (Line to GND)		33	45	pF

### SMF24C ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	$V_{RWM}$	(Note 2)			24	V
Breakdown Voltage	$V_{BR}$	$I_T = 1\text{ mA}$ , (Note 3)	26.7		32	V
Reverse Leakage Current	$I_R$	$V_{RWM} = 24\text{ V}$		0.01	1.0	$\mu\text{A}$
Clamping Voltage	$V_C$	$I_{PP} = 1\text{ A}$ (8 x 20 $\mu\text{s}$ Waveform)			40	V
Clamping Voltage	$V_C$	$I_{PP} = 2.5\text{ A}$ (8 x 20 $\mu\text{s}$ Waveform)			44	V
Maximum Peak Pulse Current	$I_{PP}$	8 x 20 $\mu\text{s}$ Waveform			2.5	A
Capacitance	$C_J$	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ (Line to GND)		21	25	pF

- TVS devices are normally selected according to the working peak reverse voltage ( $V_{RWM}$ ), which should be equal or greater than the DC or continuous peak operating voltage level.
- $V_{BR}$  is measured at pulse test current  $I_T$ .

# SMF05C, SMF12C, SMF15C, SMF24C

## TYPICAL PERFORMANCE CURVES

( $T_J = 25^\circ\text{C}$  unless otherwise specified)

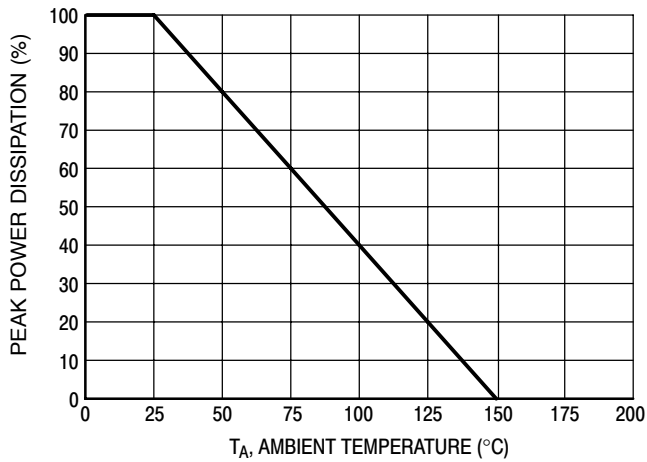


Figure 1. Pulse Derating Curve

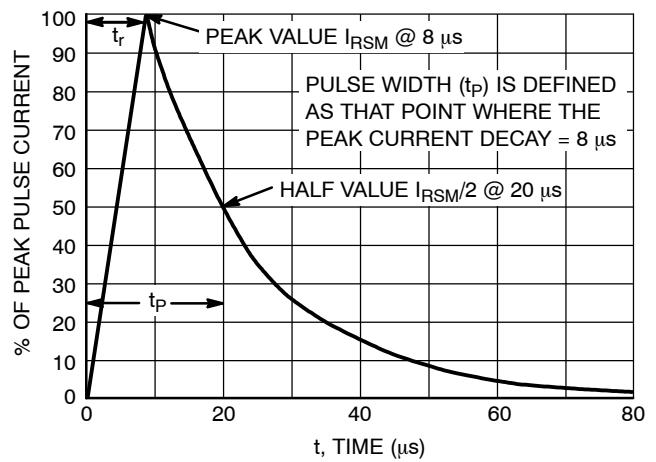


Figure 2.  $8 \times 20 \mu\text{s}$  Pulse Waveform

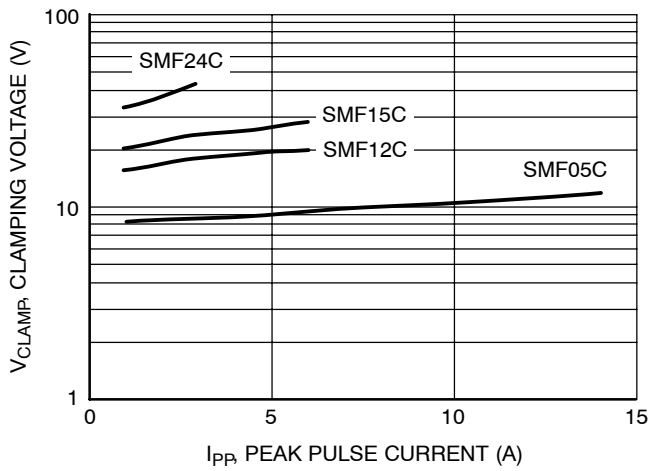


Figure 3. Clamping Voltage vs Peak Pulse Current

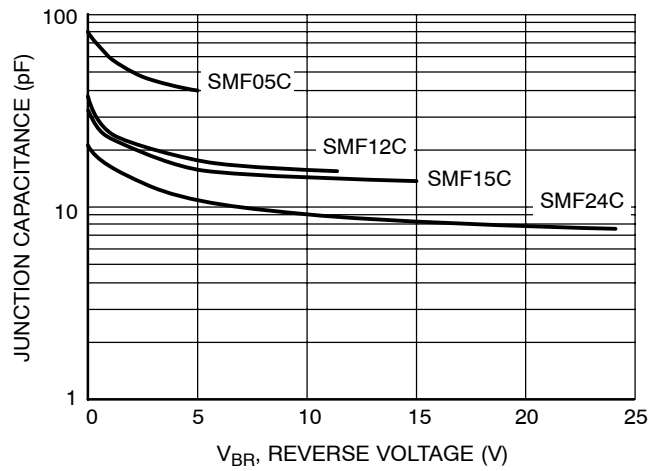


Figure 4. Junction Capacitance vs Reverse Voltage

## SMF05C, SMF12C, SMF15C, SMF24C

### ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
SMF05CT1	SC-88	3000 / Tape & Reel
SMF05CT1G	SC-88 (Pb-Free)	3000 / Tape & Reel
SMF05CT2*	SC-88	3000 / Tape & Reel
SMF05CT2G*	SC-88 (Pb-Free)	3000 / Tape & Reel
SMF12CT1	SC-88	3000 / Tape & Reel
SMF12CT1G	SC-88 (Pb-Free)	3000 / Tape & Reel
SMF15CT1	SC-88	3000 / Tape & Reel
SMF15CT1G	SC-88 (Pb-Free)	3000 / Tape & Reel
SMF24CT1	SC-88	3000 / Tape & Reel
SMF24CT1G	SC-88 (Pb-Free)	3000 / Tape & Reel

<sup>†</sup>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.

\*The "T2" suffix refers to an alternate tape & reel orientation.

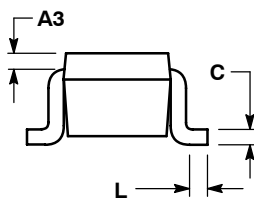
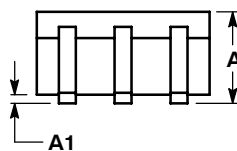
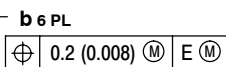
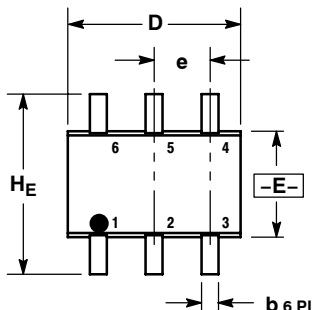
# SMF05C, SMF12C, SMF15C, SMF24C

## PACKAGE DIMENSIONS

SC-88/SC70-6/SOT-363

CASE 419B-02

ISSUE V



### NOTES:

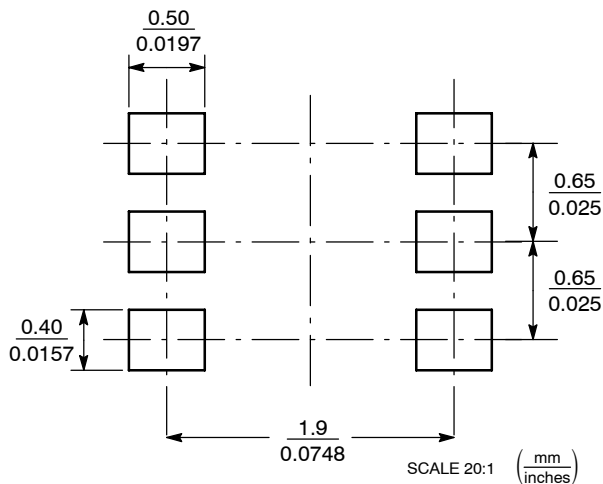
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.95	1.10	0.031	0.037	0.043
A1	0.00	0.05	0.10	0.000	0.002	0.004
A3	0.20 REF			0.008 REF		
b	0.10	0.21	0.30	0.004	0.008	0.012
C	0.10	0.14	0.25	0.004	0.005	0.010
D	1.80	2.00	2.20	0.070	0.078	0.086
E	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65 BSC			0.026 BSC		
L	0.10	0.20	0.30	0.004	0.008	0.012
H_E	2.00	2.10	2.20	0.078	0.082	0.086

### STYLE 24:


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

## SOLDERING FOOTPRINT\*



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

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