

PROTECTION PRODUCTS
Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Power ($t_p = 8/20\mu s$)	P_{pk}	200	Watts
Peak Forward Voltage ($I_F = 1A$, $t_p = 8/20\mu s$)	V_{FP}	1.5	V
ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	V_{ESD}	20 15	kV
Lead Soldering Temperature	T_L	260 (10 seconds)	°C
Operating Temperature	T_J	-55 to +125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

Electrical Characteristics
SMF05

Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}				5	V
Reverse Breakdown Voltage	V_{BR}	$I_t = 1mA$	6			V
Reverse Leakage Current	I_R	$V_{RWM} = 5V$, $T = 25^\circ C$			10	μA
Clamping Voltage	V_C	$I_{PP} = 1A$, $t_p = 8/20\mu s$			9.5	V
Clamping Voltage	V_C	$I_{PP} = 12A$, $t_p = 8/20\mu s$			12.5	V
Peak Pulse Current	I_{PP}	$t_p = 8/20\mu s$			12	A
Junction Capacitance	C_J	Between I/O pins and Ground $V_R = 0V$, $f = 1MHz$		150	175	pF

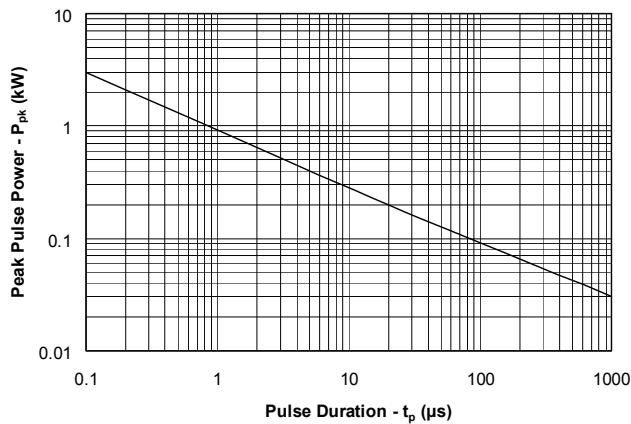
SMF12

Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}				12	V
Reverse Breakdown Voltage	V_{BR}	$I_t = 1mA$	13.3			V
Reverse Leakage Current	I_R	$V_{RWM} = 12V$, $T = 25^\circ C$			1	μA
Clamping Voltage	V_C	$I_{PP} = 1A$, $t_p = 8/20\mu s$			19	V
Clamping Voltage	V_C	$I_{PP} = 8A$, $t_p = 8/20\mu s$			25	V
Peak Pulse Current	I_{PP}	$t_p = 8/20\mu s$			8	A
Junction Capacitance	C_J	Between I/O pins and Ground $V_R = 0V$, $f = 1MHz$		60	75	pF

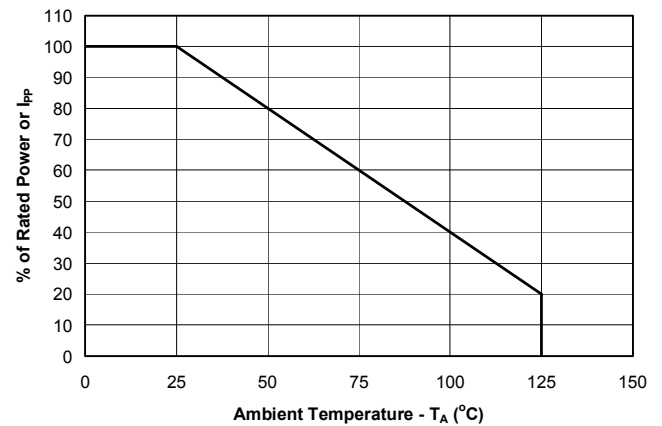
PROTECTION PRODUCTS

Typical Characteristics

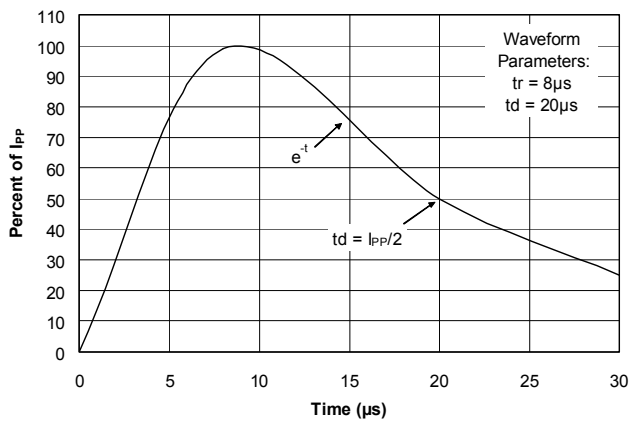
Non-Repetitive Peak Pulse Power vs. Pulse Time



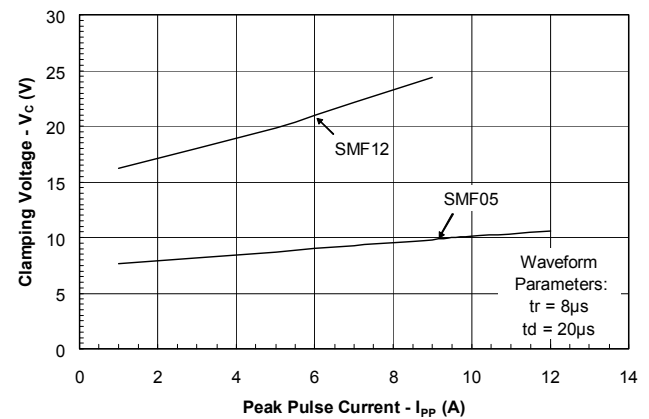
Power Derating Curve



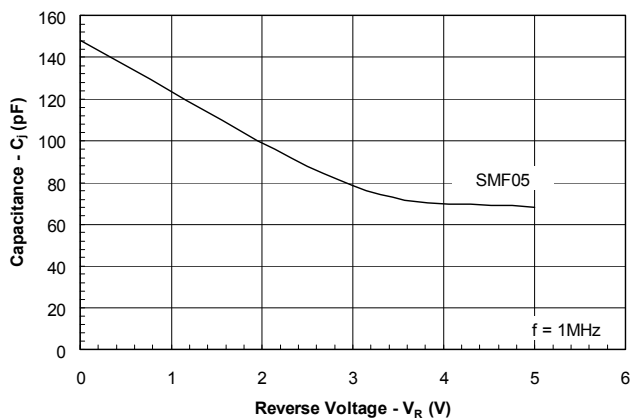
Pulse Waveform



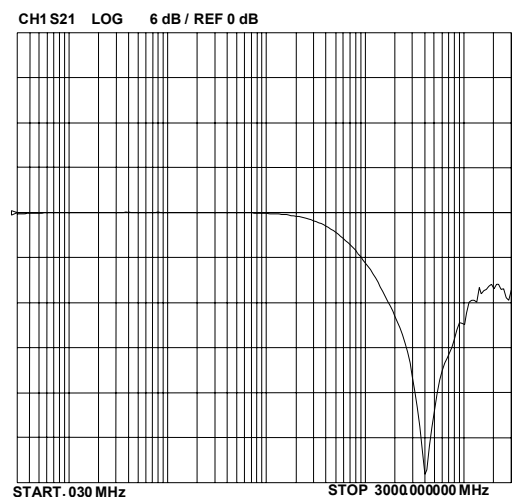
Clamping Voltage vs. Peak Pulse Current



Capacitance vs. Reverse Voltage

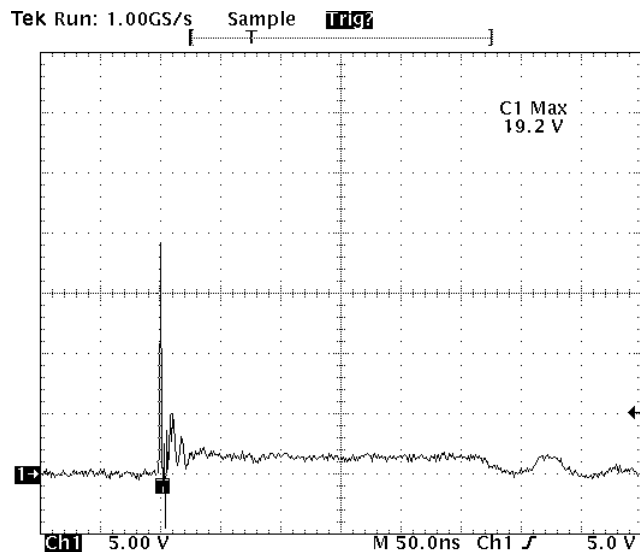


SMF05 Insertion Loss S21

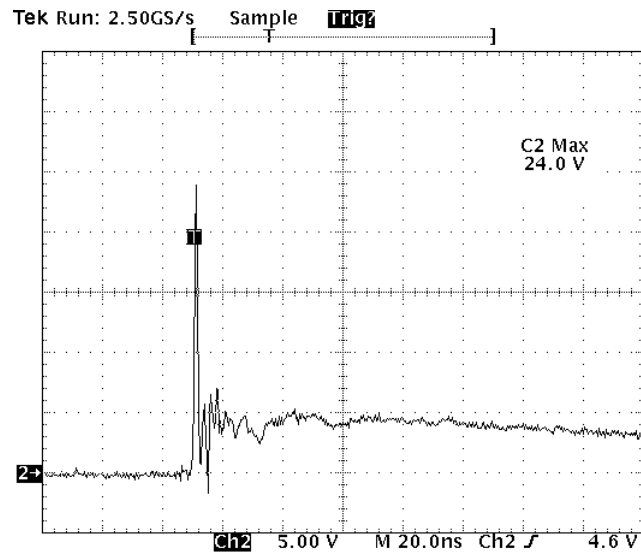


PROTECTION PRODUCTS
Typical Characteristics (Continued)

SMF05 ESD Clamping
(8kV Contact per IEC 61000-4-2)



SMF12 ESD Clamping
(8kV Contact per IEC 61000-4-2)



PROTECTION PRODUCTS

Applications Information

Device Connection for Protection of Four Data Lines

The SMFxx is designed to protect up to four unidirectional data lines. The device is connected as follows:

1. Unidirectional protection of four I/O lines is achieved by connecting pins 1, 3, 4, and 5 to the data lines. Pin 2 is connected to ground. The ground connection should be made directly to the ground plane for best results. The path length is kept as short as possible to reduce the effects of parasitic inductance in the board traces.

Circuit Board Layout Recommendations for Suppression of ESD.

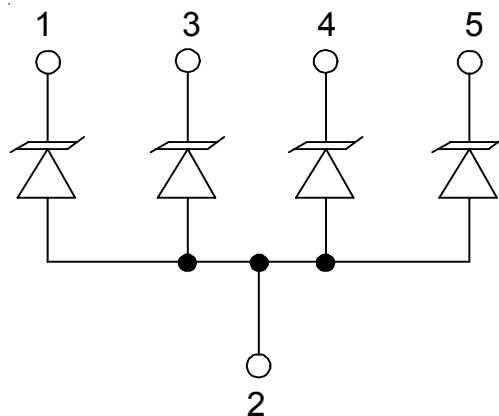
Good circuit board layout is critical for the suppression of ESD induced transients. The following guidelines are recommended:

- Place the SMFxx near the input terminals or connectors to restrict transient coupling.
- Minimize the path length between the SMFxx and the protected line.
- Minimize all conductive loops including power and ground loops.
- The ESD transient return path to ground should be kept as short as possible.
- Never run critical signals near board edges.
- Use ground planes whenever possible.

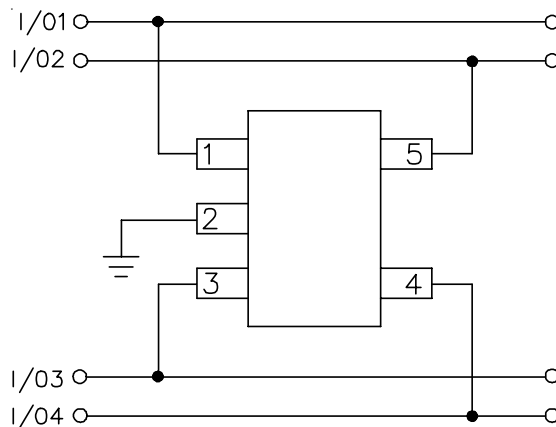
Matte Tin Lead Finish

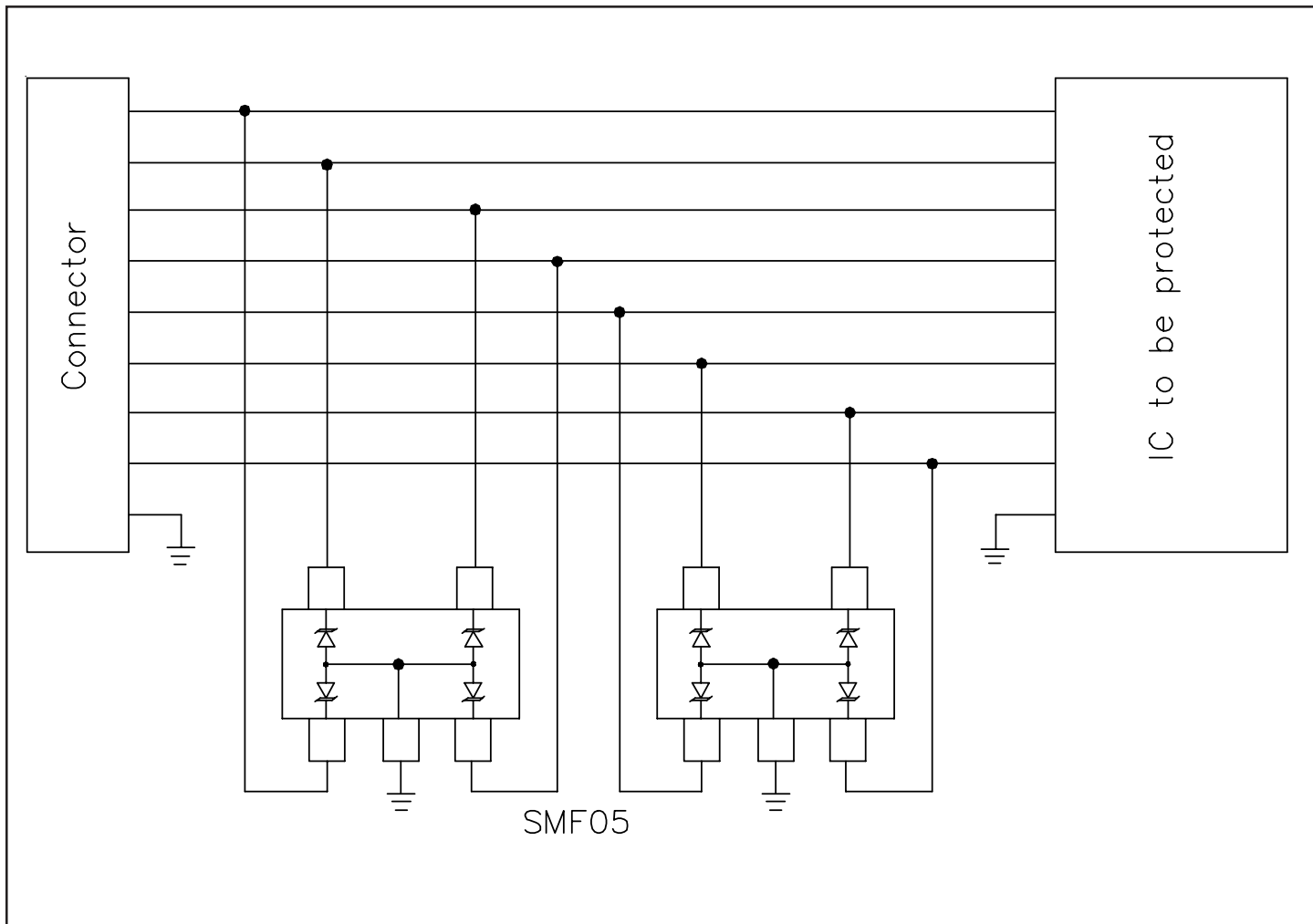
Matte tin has become the industry standard lead-free replacement for SnPb lead finishes. A matte tin finish is composed of 100% tin solder with large grains. Since the solder volume on the leads is small compared to the solder paste volume that is placed on the land pattern of the PCB, the reflow profile will be determined by the requirements of the solder paste. Therefore, these devices are compatible with both lead-free and SnPb assembly techniques. In addition, unlike other lead-free compositions, matte tin does not have any added alloys that can cause degradation of the solder joint.

SMF Circuit Diagram



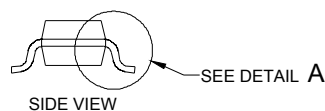
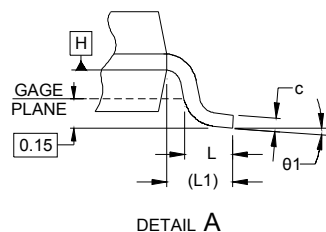
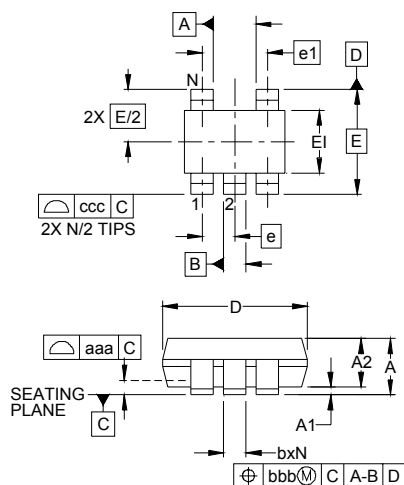
Protection of Four Unidirectional Lines



PROTECTION PRODUCTS**Typical Applications**

PROTECTION PRODUCTS

Outline Drawing - SC70 5L

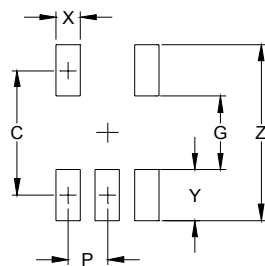


DIMENSIONS						
DIM	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	-	-	.043	-	-	1.10
A1	.000	-	.004	0.00	-	0.10
a	.028	.035	.039	0.70	0.90	1.00
b	.006	-	.012	0.15	-	0.30
c	.003	-	.009	0.08	-	0.22
D	.075	.079	.083	1.90	2.00	2.10
E1	.045	.049	.053	1.15	1.25	1.35
E	.083 BSC			2.10 BSC		
e	.026 BSC			0.65 BSC		
e1	.051			1.30 BSC		
L	.010	.014	.018	0.26	0.36	0.46
L1	(0.017)			(0.42)		
N	5			5		
00	0°	-	8°	0°	-	8°
aaa	.004			0.10		
bbb	.004			0.10		
ccc	.012			0.30		

NOTES:

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. DATUMS **-A-** AND **-B-** TO BE DETERMINED AT DATUM PLANE **-H-**.
3. DIMENSIONS "E1" AND "D" DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
4. REFERENCE JEDEC STD MO-203. VARIATION AA.

Land Pattern - SC70 5L



DIMENSIONS		
DIM	INCHES	MILLIMETERS
C	(.073)	(1.85)
G	.039	1.00
P	.026	0.65
X	.016	0.40
Y	.033	0.85
Z	.106	2.70

NOTES:

1. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY. CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.

PROTECTION PRODUCTS**Marking Codes**

Part Number	Marking Code
SMF05	F05
SMF12	F12

Ordering Information

Part Number	Lead Finish	Qty per Reel	Reel Size
SMF05.TC	SnPb	3,000	7 Inch
SMF12.TC	SnPb	3,000	7 Inch
SMF05.TCT	Pb free	3,000	7 Inch
SMF12.TCT	Pb free	3,000	7 Inch

Contact Information

Semtech Corporation
Protection Products Division
200 Flynn Road, Camarillo, CA 93012
Phone: (805)498-2111 FAX (805)498-3804