Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Power (tp = 8/20µs)	P_{pk}	350	Watts
ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	V_{ESD}	25 20	kV
Operating Temperature	T_J	-55 to +125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

Electrical Characteristics

SMS05

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°C			20	µA
Clamping Voltage	V_C	I_{PP} = 5A, t_p = 8/20µs			9.8	V
Clamping Voltage	V_C	I_{PP} = 24A, t_p = 8/20µs			14.5	V
Peak Pulse Current	I_{PP}	t_p = 8/20µs			24	A
Junction Capacitance	C_j	Between I/O Pins and Ground V_R = 0V, f = 1MHz		325	400	pF

SMS12

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°C			1	µA
Clamping Voltage	V_C	I_{PP} = 5A, t_p = 8/20µs			19	V
Clamping Voltage	V_C	I_{PP} = 15A, t_p = 8/20µs			23	V
Peak Pulse Current	I_{PP}	t_p = 8/20µs			15	A
Junction Capacitance	C_j	Between I/O Pins and Ground V_R = 0V, f = 1MHz		135	150	pF

Electrical Characteristics *(Continued)*

SMS15

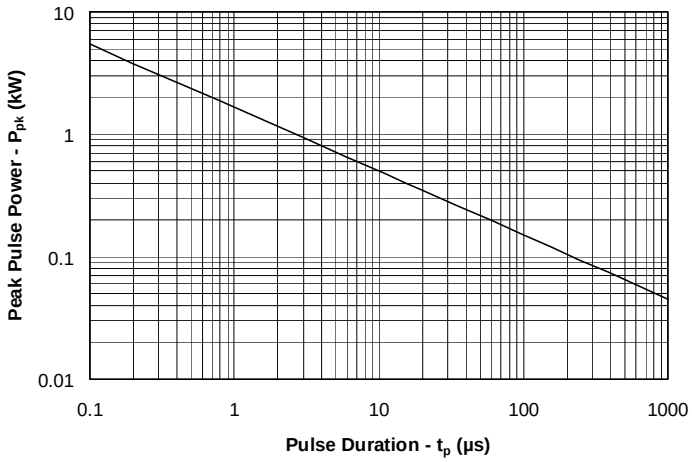
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}				15	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA	16.7			V
Reverse Leakage Current	I_R	V_{RWM} = 15V, T=25°C			1	µA
Clamping Voltage	V_C	I_{PP} = 5A, t_p = 8/20µs			24	V
Clamping Voltage	V_C	I_{PP} = 12A, t_p = 8/20µs			29	V
Peak Pulse Current	I_{PP}	t_p = 8/20µs			12	A
Junction Capacitance	C_j	Between I/O Pins and Ground V_R = 0V, f = 1MHz		100	125	pF

SMS24

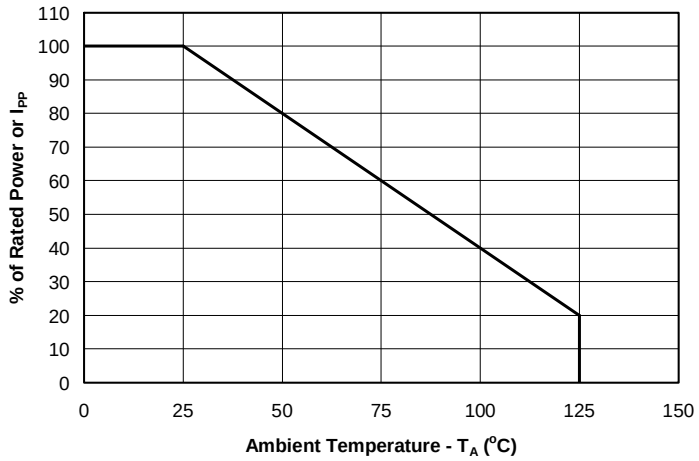
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}				24	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA	26.7			V
Reverse Leakage Current	I_R	V_{RWM} = 24V, T=25°C			1	µA
Clamping Voltage	V_C	I_{PP} = 5A, t_p = 8/20µs			40	V
Clamping Voltage	V_C	I_{PP} = 8A, t_p = 8/20µs			44	V
Peak Pulse Current	I_{PP}	t_p = 8/20µs			8	A
Junction Capacitance	C_j	Between I/O Pins and Ground V_R = 0V, f = 1MHz		60	75	pF

Typical Characteristics

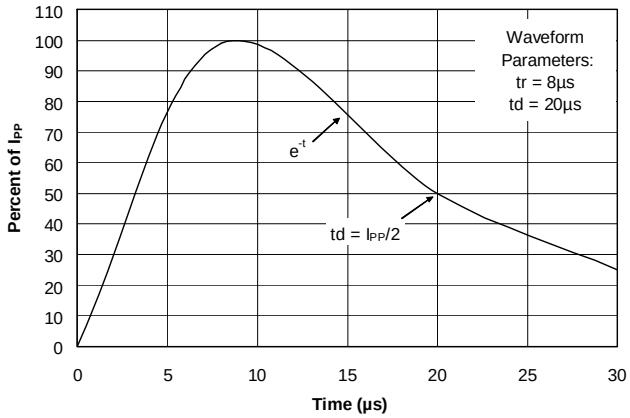
Non-Repetitive Peak Pulse Power vs. Pulse Time



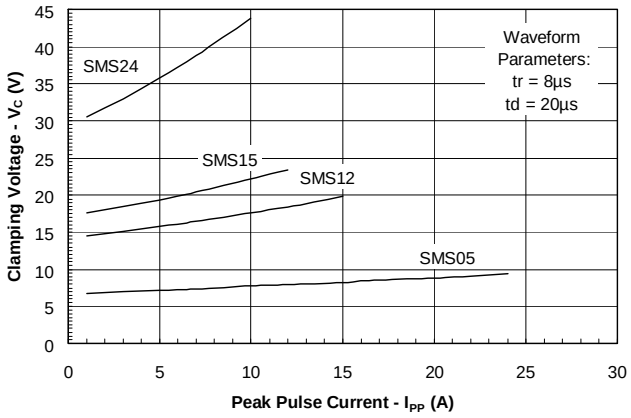
Power Derating Curve



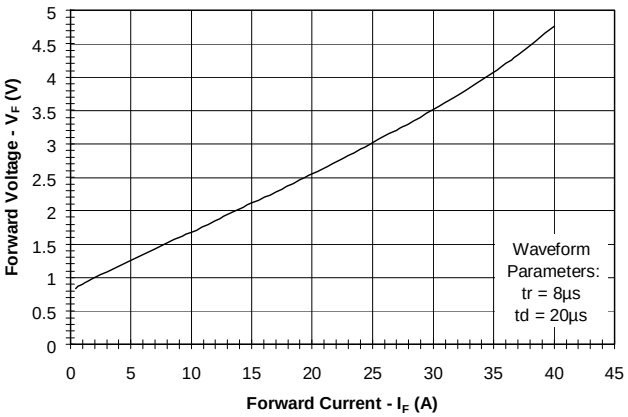
Pulse Waveform



Clamping Voltage vs. Peak Pulse Current



Forward Voltage vs. Forward Current



Applications Information

Device Connection for Protection of Four Data Lines

The SMSxx 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 6 to the data lines. Pin 2 and 5 are connected to ground. The ground connections 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

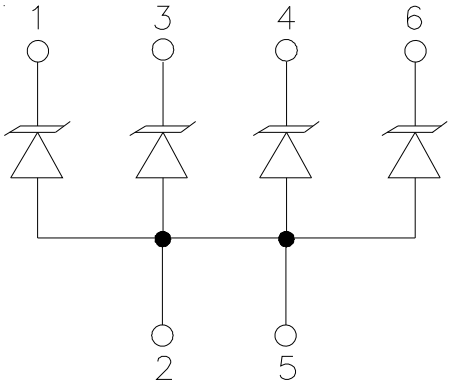
Good circuit board layout is critical for the suppression of ESD induced transients. The following guidelines are recommended:

- Place the SMSxx near the input terminals or connectors to restrict transient coupling.
- Minimize the path length between the SMSxx 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.

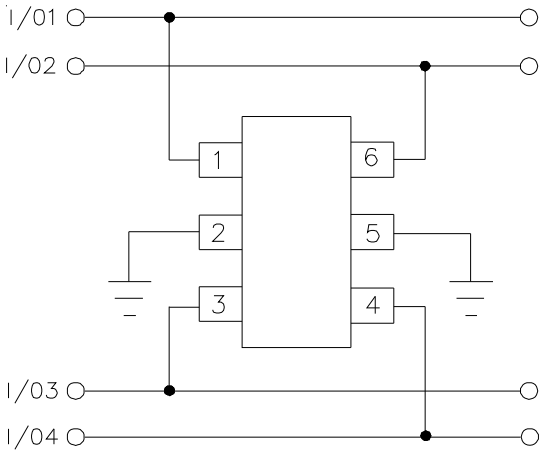
Matte Tin Lead Finish

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.

SMSxx Circuit Diagram



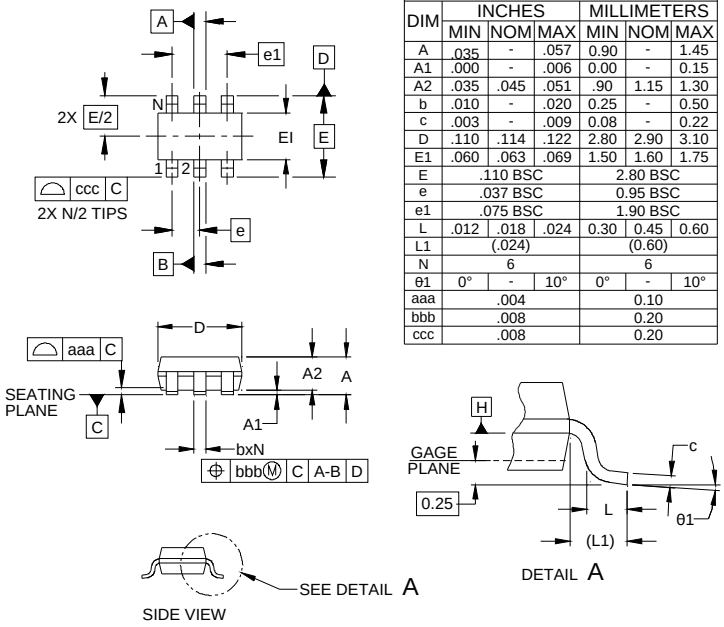
Protection of Four Unidirectional Lines



SEMTECH INTERNATIONAL AG

PROTECTION PRODUCTS

Outline Drawing -SOT23 6L

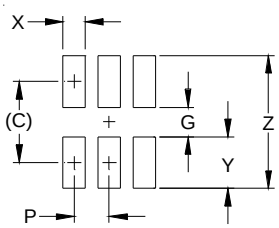


DIM	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	.035	-	.057	0.90	-	1.45
A1	.000	-	.006	0.00	-	0.15
A2	.035	.045	.051	.90	1.15	1.30
b	.010	-	.020	0.25	-	0.50
c	.003	-	.009	0.08	-	0.22
D	.110	.114	.122	2.80	2.90	3.10
E1	.060	.063	.069	1.50	1.60	1.75
E	.110 BSC			2.80 BSC		
e	.037 BSC			0.95 BSC		
e1	.075 BSC			1.90 BSC		
L	.012	.018	.024	0.30	0.45	0.60
L1	(.024)			(0.60)		
N	6			6		
θ1	0°	-	10°	0°	-	10°
aaa	.004			0.10		
bbb	.008			0.20		
ccc	.008			0.20		

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.

Land Pattern -SOT23 6L



DIM	INCHES	MILLIMETERS
C	(.098)	(2.50)
G	.055	1.40
P	.037	0.95
X	.024	0.60
Y	.043	1.10
Z	.141	3.60

NOTES:

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

SEMTECH INTERNATIONAL AG

PROTECTION PRODUCTS

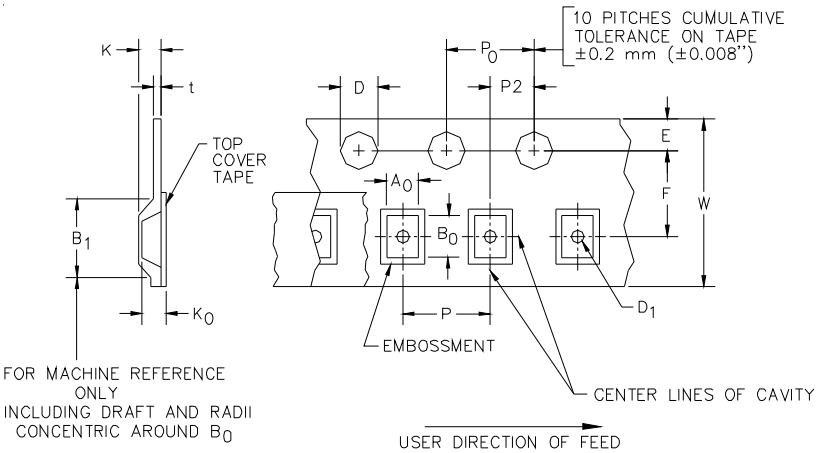
Marking Codes

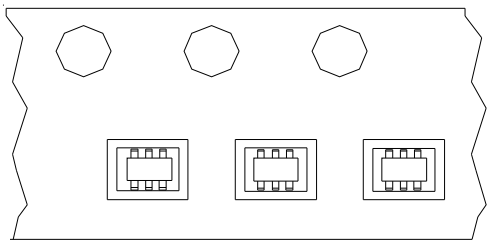
Part Number	Marking Code
SMS05	05\S0
SMS12	12\21
SMS15	15\SI
SMS24	24\24

Ordering Information

Part Number	Working Voltage	Qty per Reel	Reel Size
SMS05.TCT	5V	3,000	7 Inch
SMS12.TCT	12V	3,000	7 Inch
SMS15.TCT	15V	3,000	7 Inch
SMS24.TCT	24V	3,000	7 Inch

Tape and Reel Specification





A0	B0	K0
3.23 +/-0.05 mm	3.17 +/-0.05 mm	1.37 +/-0.05 mm

Tape Width	B, (Max)	D	D1	E	F	K (MAX)	P	P0	P2	T(MAX)	W
8 mm	4.2 mm (.165)	1.5 + 0.1 mm - 0.0 mm	1.0 mm ±0.05	1.750±.10 mm	3.5±0.05 mm	2.4 mm	4.0±0.1 mm	4.0±0.1 mm	2.0±0.05 mm	0.4 mm	8.0 mm + 0.3 mm - 0.1 mm

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