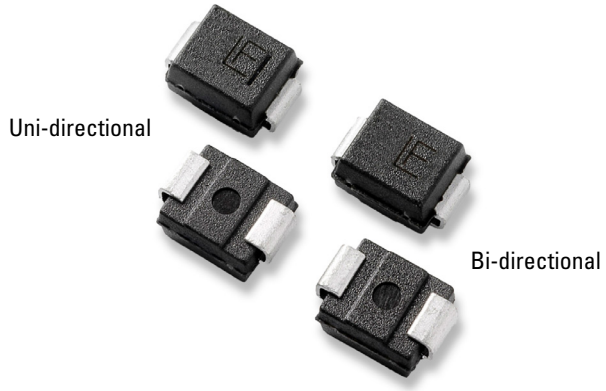
1.5SMB Series
Surface Mount – 1500 W



Web Resources

Download ECAD models, order samples, and find technical recources at www.littelfuse.com

Maximum Ratings and Thermal Characteristics (T_A=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation by 10/1000 µs Waveform (Fig.2) (Note 1), (Note 2)	P_{PPM}	1500	W
Power Dissipation on Infinite Heat Sink at T_L = 50 °C	P_D	5.0	W
Peak Forward Surge Current, 8.3 ms Single Half Sine Wave (Note 3)	I_{FSM}	120	A
Maximum Instantaneous Forward Voltage at 50 A for Unidirectional Only	V_F	5.0	V
Operating Temperature Range	T_J	-65 to 150	°C
Storage Temperature Range	T_{STG}	-65 to 175	°C
Typical Thermal Resistance Junction to Lead	$R_{\theta JL}$	20	°C/W
Typical Thermal Resistance Junction to Ambient	$R_{\theta JA}$	100	°C/W

Notes:
1. Non-repetitive current pulse, per Fig. 4 and derated above T_J (initial) =25°C per Fig. 3.
2. Mounted on copper pad area of 0.2x0.2" (5.0 x 5.0mm) to each terminal.
3. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional component only, duty cycle=4 per minute maximum.

Description

The 1.5SMB Series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

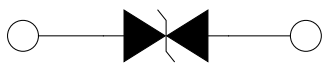
Features & Benefits

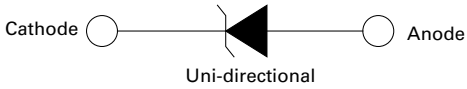
- For surface mounted applications to optimize board space
- Typical failure mode is short from over-specified voltage or current
- Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c pass Class 1 and Class 2
- ESD protection of data lines in accordance with IEC 61000-4-2, 30 kV(Air), 30 kV(Contact)
- Glass passivated chip junction
- 1500 W peak pulse power capability at 10/1000 µs waveform, repetition rate (duty cycles):0.01 %
- V_{BR} @ T_J= V_{BR}@25 °C x (1+αT x (T_J - 25))(αT:Temperature Coefficient, typical value is 0.1 %)
- Low dynamic resistance
- UL Recognized compound meeting flammability rating V-0
- Halogen free and RoHS compliant
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD-609A.01)
- Recognized to UL 497B as an Isolated Loop Circuit Protector
- Products manufactured in the Philippines are available.- Parts with an E suffix are manufactured outside China. (See Ordering and Packaging Options section for details)

Applications

TVS components are ideal for the protection of I/O Interfaces, V_{CC} bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

Functional Diagram





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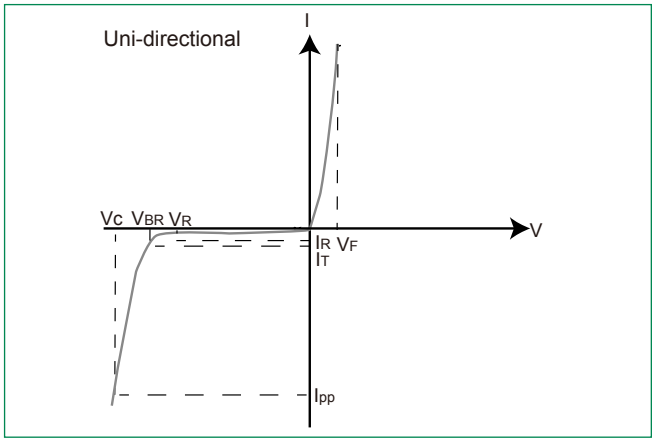
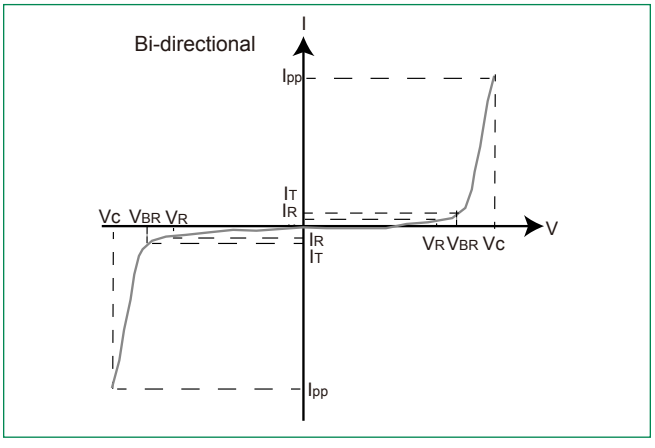
Electrical Characteristics (T_A = 25 °C unless otherwise noted)

Part Number (Uni)	Part Number (Bi)	Marking		Reverse Stand off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T		Test Current I_T (mA)	Maximum Clamping Voltage V_C @ I_{PP} (10/1000 µs) (V)	Maximum Peak Pulse Current I_{PP} (10/1000 µs) (A)	Maximum Clamping Voltage V_C @ I_{pp} (8/20 µs) (V)	Maximum Peak Pulse Current I_{PP} (8/20 µs) (A)	Maximum Reverse Leakage I_R @ V_R (µA)	Maximum Temperature coefficient of V_{BR} (%/C)
		UNI	BI		MIN	MAX							
1.5SMB20A	1.5SMB20CA	H15I	B15I	17.1	19.0	21.0	1	27.7	54.9	34.8	302.0	20	0.085
1.5SMB22A	1.5SMB22CA	H15K	B15K	18.8	20.9	23.1	1	30.6	49.7	35.0	273.4	10	0.088
1.5SMB23A	1.5SMB23CA	H10L	B10L	20.0	22.0	24.2	1	33.2	45.0	35.0	250.0	1	0.088
1.5SMB24A	1.5SMB24CA	H15N	B15N	20.5	22.8	25.2	1	33.2	45.0	42.9	249.0	1	0.091
1.5SMB27A	1.5SMB27CA	H15P	B15P	23.1	25.7	28.4	1	37.5	40.5	48.4	222.8	1	0.092
1.5SMB30A	1.5SMB30CA	H15S	B15S	25.6	28.5	31.5	1	41.4	36.7	53.5	201.9	1	0.093
1.5SMB33A	1.5SMB33CA	H15V	B15V	28.2	31.4	34.7	1	45.7	33.3	59.0	183.2	1	0.094
1.5SMB36A	1.5SMB36CA	H15Z	B15Z	30.8	34.2	37.8	1	49.9	30.5	64.5	167.8	1	0.096
1.5SMB39A	1.5SMB39CA	N15B	C15B	33.3	37.1	41.0	1	53.9	28.2	69.6	155.1	1	0.097
1.5SMB43A	1.5SMB43CA	N15D	C15D	36.8	40.9	45.2	1	59.3	25.6	76.6	140.8	1	0.098
1.5SMB47A	1.5SMB47CA	N15F	C15F	40.2	44.7	49.4	1	64.8	23.5	83.7	129.3	1	0.099
1.5SMB51A	1.5SMB51CA	N15G	C15G	43.6	48.5	53.6	1	70.1	21.7	90.6	119.4	1	0.100
1.5SMB56A	1.5SMB56CA	N15I	C15I	47.8	53.2	58.8	1	77.0	19.7	99.5	108.4	1	0.101
1.5SMB62A	1.5SMB62CA	N15K	C15K	53.0	58.9	65.1	1	85.0	17.9	109.8	98.5	1	0.102
1.5SMB68A	1.5SMB68CA	N15L	C15L	58.1	64.6	71.4	1	92.0	16.5	118.9	90.8	1	0.103
1.5SMB75A	1.5SMB75CA	N15N	C15N	64.1	71.3	78.8	1	103.0	14.8	133.1	81.4	1	0.104
1.5SMB82A	1.5SMB82CA	N15P	C15P	70.1	77.9	86.1	1	113.0	13.5	146.0	74.3	1	0.105
1.5SMB91A	1.5SMB91CA	N15S	C15S	77.8	86.5	95.5	1	125.0	12.2	161.5	67.1	1	0.106
1.5SMB100A	1.5SMB100CA	N15V	C15V	85.5	95.0	105.0	1	137.0	11.1	177.0	61.1	1	0.106

Add suffix "-E" to the part number for COO: Ex-China Site

I-V Curve Characteristics





P_{PPM} Peak Pulse Power Dissipation (I_{PP} x V_C) -Max power dissipation
V_R Stand-off Voltage - Maximum voltage that can be applied to the TVS without operation
V_{BR} Breakdown Voltage - Maximum voltage that flows though the TVS at a specified test current (I_T)
V_C Clamping Voltage - Peak voltage measured across the TVS at a specified I_{PPM} (peak impulse current)
I_R Reverse Leakage Current - Current measured at V_R
V_F Forward Voltage Drop for Uni-directional

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Ratings and Characteristic Curves (T_A=25 °C unless otherwise noted)

Figure 1 - TVS Transients Clamping Waveform

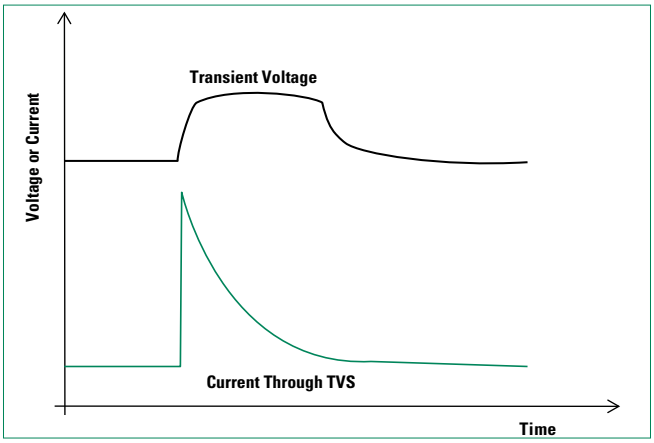

Figure 2 - Typical Peak Pulse Power Rating Curve

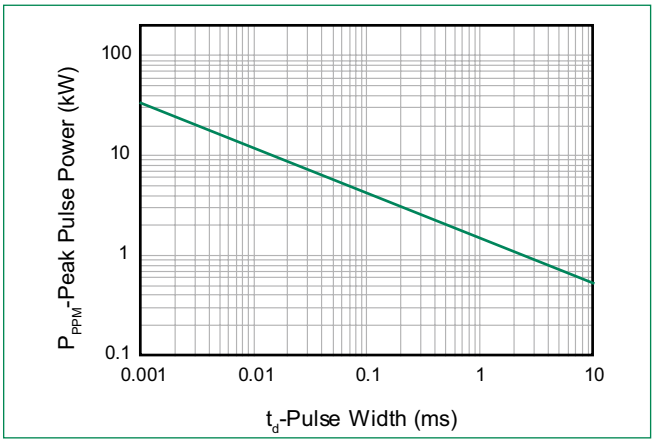

Figure 3 - Peak Pulse Power Derating Curve

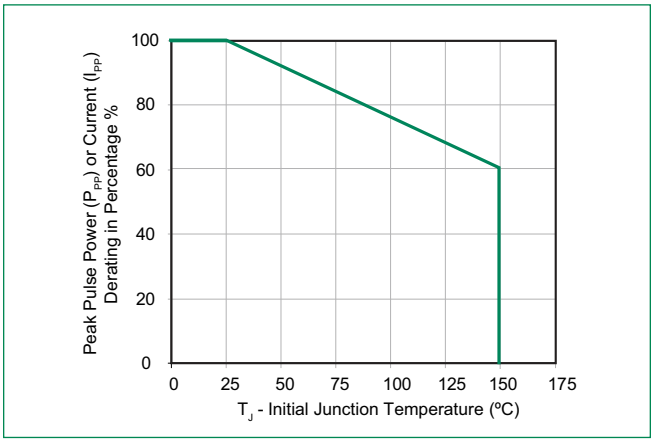

Figure 4 - Pulse Waveform

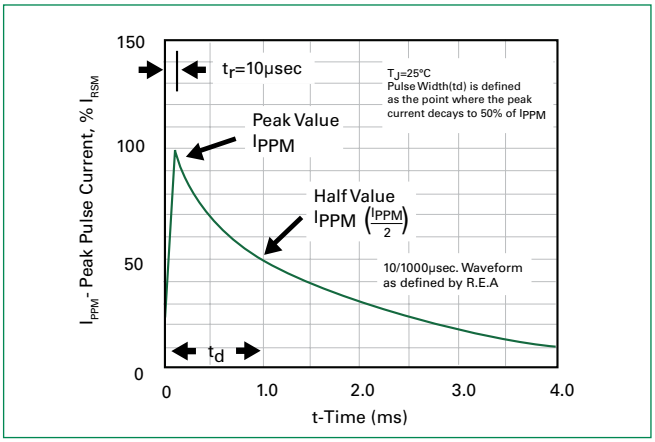

Figure 5 - Typical Junction Capacitance

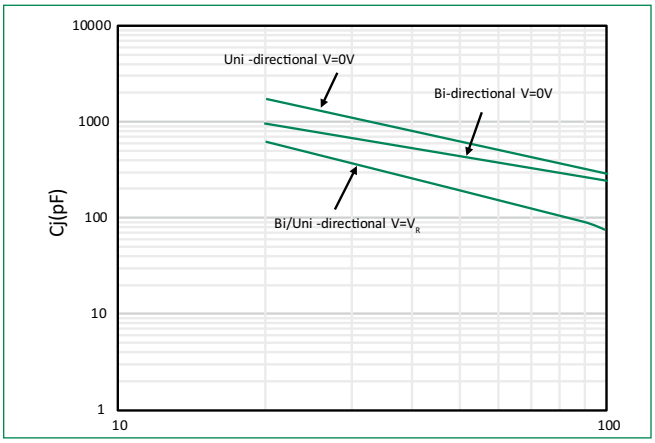

Figure 6 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only

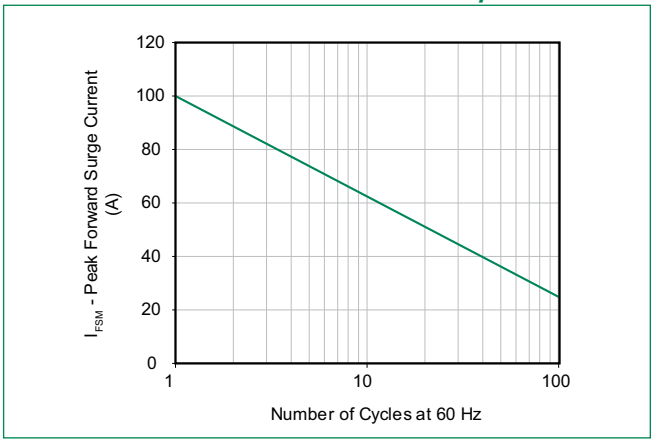

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Figure 7 - Typical Transient Thermal Impedance

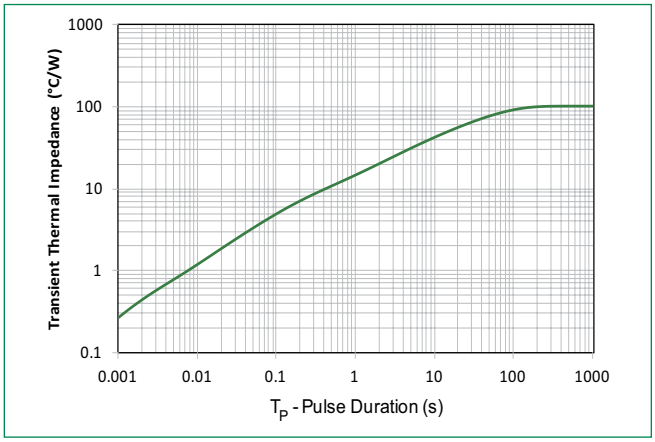
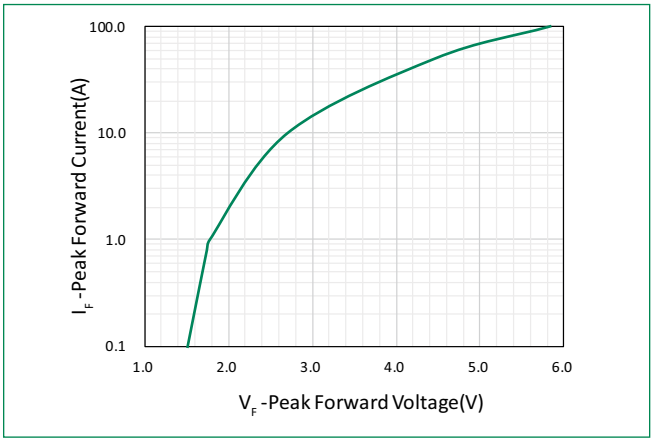
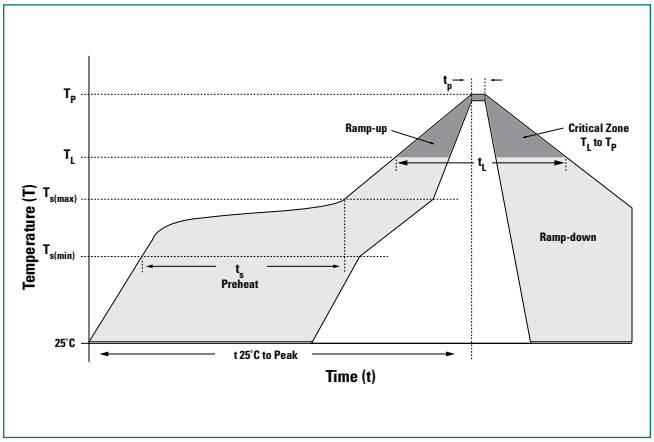


Figure 8 - Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)



Soldering Parameters

Reflow Condition		Lead–free assembly
Pre Heat	**- Temperature min ($T_{s(min)}$)**	150 °C
	- Temperature max ($T_{s(max)}$)	200 °C
	- Time (min to max) (t_s)	60 – 120 secs
Average ramp up rate (Liquidus Temp (T_A) to peak		3 °C/second max
$T_{S(max)}$ to T_A - Ramp-up rate		3 °C/second max
Reflow	**- Temperature (T_L) (Liquidus)**	217 °C
	- Time (min to max) (t_L)	60 – 150 seconds
Peak temperature (T_P)		$260^{+0/-5}$ °C
Time within 5 °C of actual peak temperature (t_p)		30 seconds
Ramp-down rate		6 °C/second max
Time 25 °C to peak temperature (T_P)		8 minutes Max.
Do not exceed		260 °C



Physical Specifications

Weight	0.003 ounce, 0.093 grams
Case	JEDEC DO214AA. Molded plastic body over glass passivated junction
Polarity	Uni-directional products are denoted with a cathode band
Terminal	Matte Tin-plated leads, Solderable per JESD22-B102

Environmental Specifications

High Temp Voltage Blocking (HTRB)	100 % DC reverse voltage rated 150 °C, 1008 hours JEDEC, JESD22-A-108
Biased Temp & Humidity (H3TRB)	80 % breakdown voltage (+85 °C) 85 %RH, 1008 hours JEDEC, JESD22-A-101
Unbiased Highly Accelerated Stress Test (UHAST)	96 hours at TA = 130 °C/85 %RH. JEDEC, JESD22-A-118
Temp Cycling (TC)	-55 °C to +150 °C, 15 min. dwell, 1000 cycles. JEDEC, JESD22-A104
Moisture Sensitivity Level (MSL)	85 %RH, +85 °C, 168 hours, 3 reflow cycles (+260 °C Peak). JEDEC, JEDEC-J-STD-020, Level 1
Resistance to Solder Heat (RSH)	+260 °C, 30 seconds JEDEC, JEDEC JESD22-A-111

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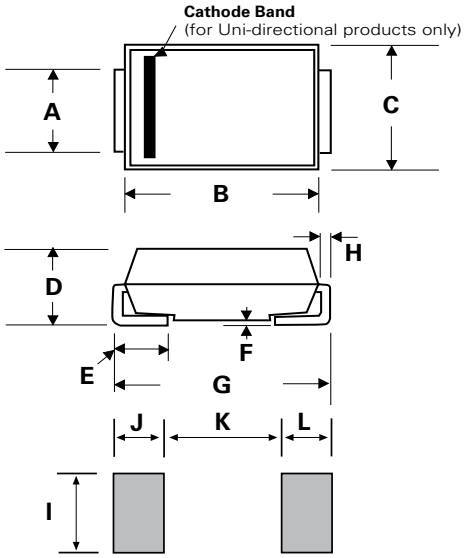
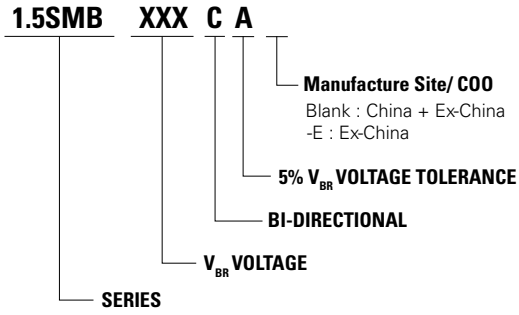
Dimensions

DO-214AA (SMB J-Bend)

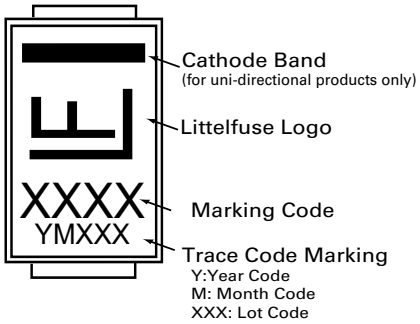


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.077	0.086	1.950	2.200
B	0.160	0.180	4.060	4.570
C	0.130	0.155	3.300	3.940
D	0.084	0.096	2.130	2.440
E	0.030	0.060	0.760	1.520
F	-	0.008	-	0.203
G	0.205	0.220	5.210	5.590
H	0.006	0.012	0.152	0.305
I	0.089	-	2.260	-
J	0.085	-	2.160	-
K	-	0.107	-	2.740
L	0.085	-	2.160	-

Part Numbering System



Part Marking System



Ordering and Packaging Options

Part number	Component Package	Quantity	Packaging Option	Packaging Specification	Manufacture Site/ COO
1.5SMBxxxXX	DO-214AA	3000	Tape & Reel - 12mm tape/13" reel	EIA STD RS-481	China + Ex-China
1.5SMBxxxXX-E	DO-214AA	3000	Tape & Reel - 12mm tape/13" reel	EIA STD RS-481	Ex-China

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Tape and Reel Specification