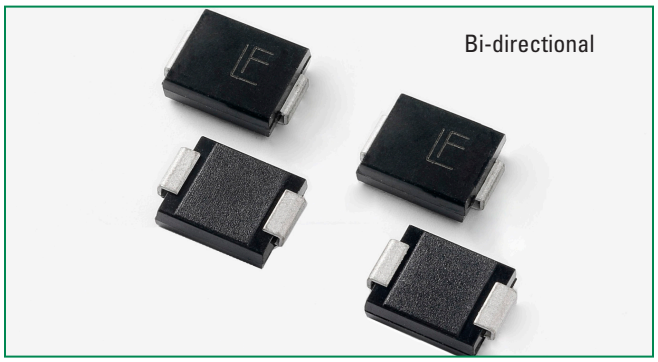
5.0SMDJxxS-HR

Surface Mount – 5000 W – DO-214AB



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.1)(Note 1), (Note 2)	P_{PPM}	5000	W
Power dissipation on infinite heatsink at T_L = 50 °C	P_D	6.5	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-65 to 150	°C
Typical Thermal Resistance Junction to Lead	$R_{\theta JL}$	15	°C/W
Typical Thermal Resistance Junction to Ambient	$R_{\theta JA}$	75	°C/W

Notes:
1. Non-repetitive current pulse , per Fig. 3 and derated above T_A = 25 °C per Fig. 2.
2. Mounted on copper pad area of 0.31x0.31" (8.0 x 8.0 mm) to each terminal.

Description

The 5.0SMDJxxS-HR high reliability series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events. These are available with a variety of upscreening options for enhanced reliability.

Features & Benefits

- High reliability devices with fabrication and assembly lots traceability
- Enhanced reliability screening options are available in reference to MIL-PRF-19500. Refer to screen process table for more detail on screening options
- For surface mounted applications in order to optimize board space
- Low profile package
- Built-in strain relief
- V_{BR} @T_J = V_{BR}@25 °C x (1+αT x (T_J - 25)) (αT:Temperature Coefficient)
- Glass passivated chip junction
- 5000 W peak pulse power capability at 10/1000 µs waveform, repetition rate (duty cycles):0.01 %
- Fast response time: typically less than 1.0 ps from 0 V to BV min
- Excellent clamping capability
- Low incremental surge resistance
- High temperature soldering guaranteed: 260 °C/40 seconds at terminals
- Plastic package has underwriters laboratory flammability 94V-O
- Meet MSL level1, per J-STD-020, LF maximum peak of 260 °C
- Matte tin lead–free plated
- Halogen free and RoHS compliant
- 2nd level interconnect is Pb-free per IPC/JEDEC J-STD-609A.01
- Recognized to UL 497B as an isolated loop circuit protector

Functional Diagram

Bi-directional

Applications

TVS components are ideal for the high reliability protection of I/O Interfaces, VCC bus and other vulnerable circuits used in telecom, computer, industrial and consumer electronic applications.

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

Part Number (Bi)	Marking	Reverse Stand off Voltage V_R (V)	Breakdown Voltage V_{BR} (V) @ I_T		Test Current I_T (mA)	Maximum Clamping Voltage V_C @ I_{PP} (V)	Maximum Peak Pulse Current I_{PP} (A)	Maximum Reverse Leakage I_R @ V_R (µA)	Agency Approval
			Min	Max					
5.0SMDJ13CAS-HR	5BAX	13.0	14.4	15.9	1	21.5	232.6	2.0	√

Notes:
1. 5.0SMDJxxS-HR voltage binning can be specified by customer's request via contacting Littelfuse service

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Surface Mount – 5000 W – DO-214AB

Screen Process

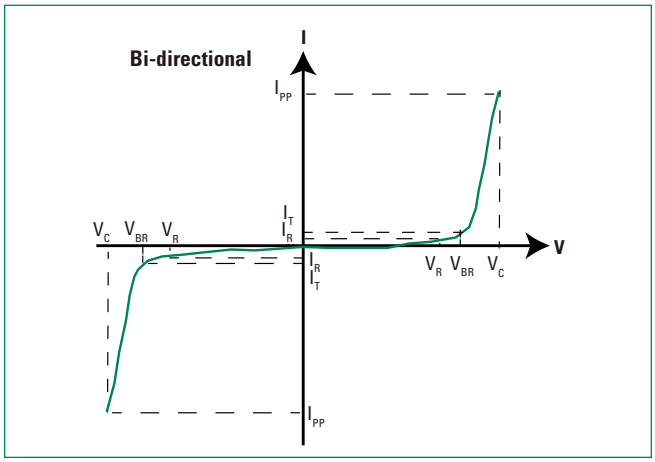
100 % Vision Inspection	MIL-STD-750 method 2074
100 % High Temperature Storage Life (168 hrs,175 °C)	MIL-STD-750 method 1031
100 % X-RAY inspection	MIL-STD-750 method 2076
100 % Temperature Cycle Test (-55 to150 °C, 20 cycles, dwell time 15 min)	MIL-STD-750 method 1051
100 % Reflow (2X)	JEDEC J-STD-020
100 % Surge Test (2x)	MIL-STD-750 method 4066
100 % HTRB 150 °C Bias = V_R(80 % breakdown voltage, 96 hrs, and each direction 96 hrs for bi-directional products)	MIL–STD–750 method 1038
Final Electrical Test(100 % 3 sigma limit, 100 % dynamic test and PAT limit)	MIL-STD-750 method 4016.4021.4011

Note: Up-screen program can be specified by customer's request via contacting Littlefuse service

Group B Test Requirement

Screen	Method	Condition	Requirement
Surge Test	10/1000 µs Peak Pulse Waveform	Maximum Clamping Voltage (V_C) @ Peak Pulse Current (I_{PP})	Sample Size 45 Perform 10x Accept 0 Failures
Burn - In (HTRB)	MIL -STD-750, Method 1038.5	Applied Voltage 100 % V_R@150 °C	Sample Size 45 340 hours (680 hours for bi-direction products, eachdirection 340 hours) Accept 0 Failures
Electrical Test	-	I_R@V_R, V_{BR}@ I_T	Sample Size 45 Accept 0 Failures

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

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Surface Mount – 5000 W – DO-214AB

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

Figure 1: TVS Transients Clamping Waveform

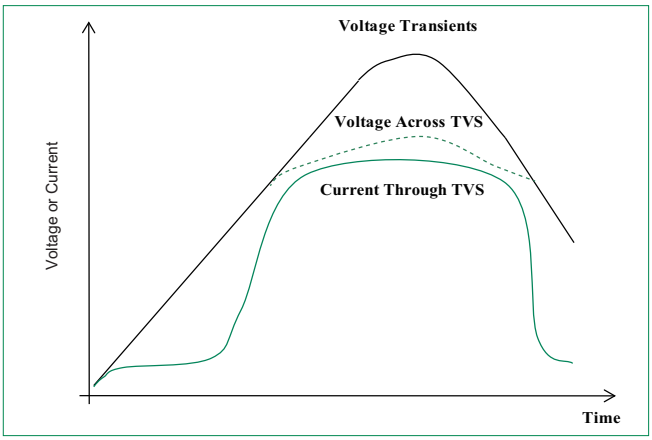


Figure 2: Peak Pulse Power Rating

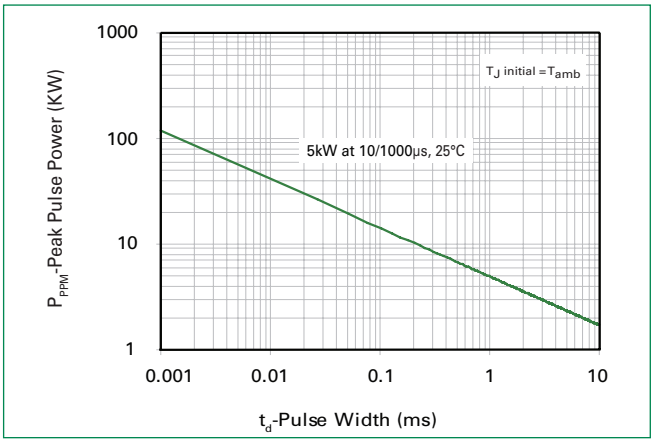


Figure 3: Peak Pulse Power Derating Curve

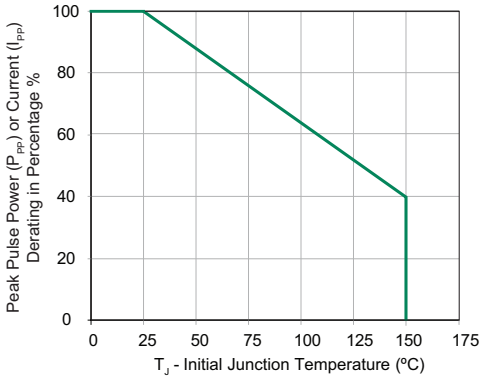


Figure 4: Pulse Waveform

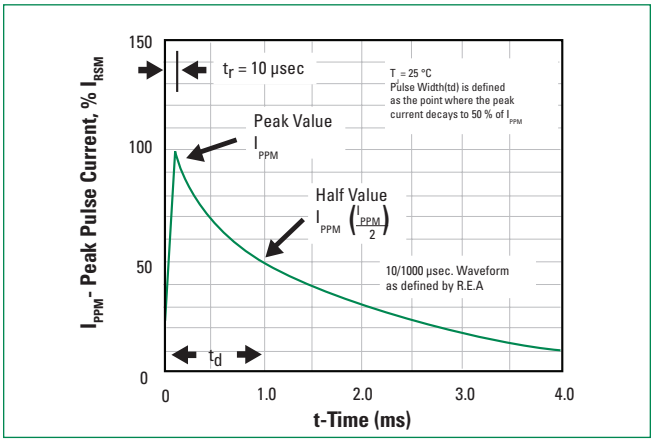


Figure 5: Typical Junction Capacitance

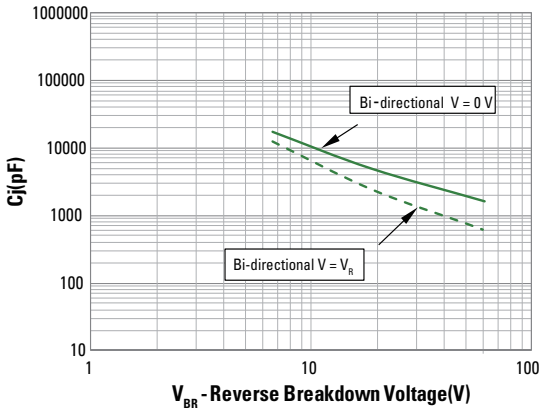
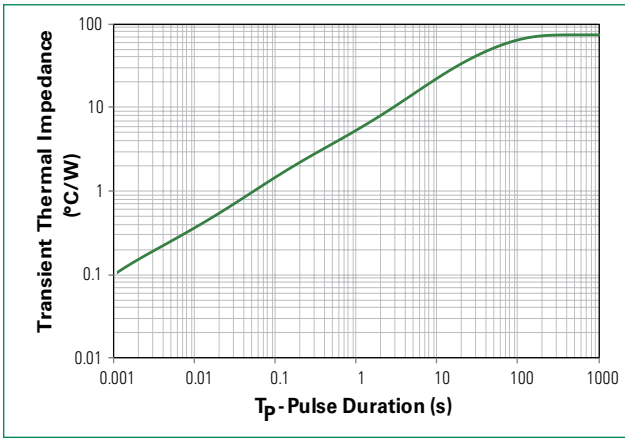


Figure 6: Typical Transient Thermal Impedance



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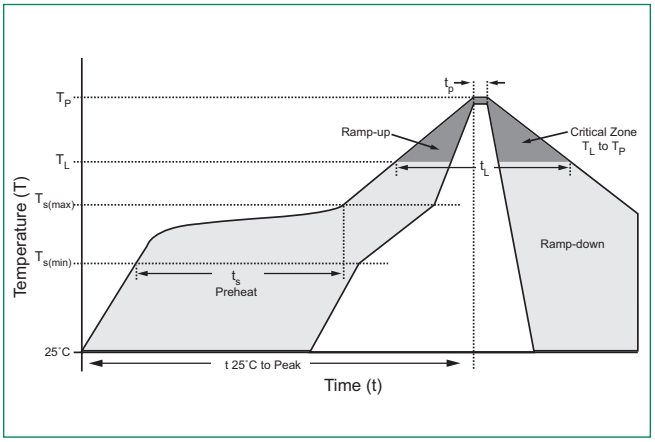
Surface Mount – 5000 W – DO-214AB

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 – 180 seconds
Average Ramp Up Rate (Liquidus Temp (T_L) 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_S)	60 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °C
Time Within 5°C of Actual Peak Temperature (t_p)		20 – 40 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	0.007 ounce, 0.21 grams
Case	JEDEC DO214AB. Molded plastic body over glass passivated junction
Terminal	Matte tin-plated leads, solderable per JESD22-B102

Environmental Specifications

High Temperature Storage	JESD22-A103
HTRB	JESD22-A108
Temperature Cycling	JESD22-A104
MSL	JEDEC-J-STD-020, Level 1
H3TRB	JESD22-A101
RSH	JESD22-A111

Packing Options

Part Number	Component Package	Quantity	Packaging Option	Packaging Specification
5.0SMDJxxS-HR	DO-214AB	3000	Tape & Reel - 16 mm tape/13" reel	EIA STD RS-481

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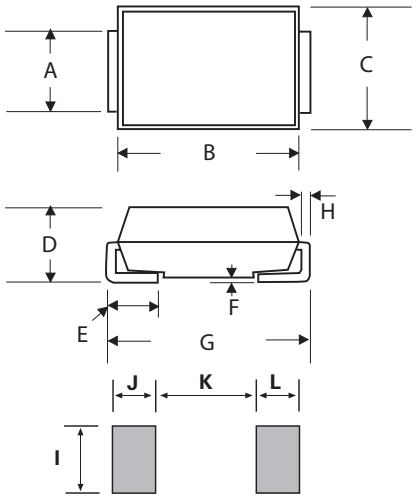
5.0SMDJxxS-HR

Surface Mount – 5000 W – DO-214AB

Dimensions

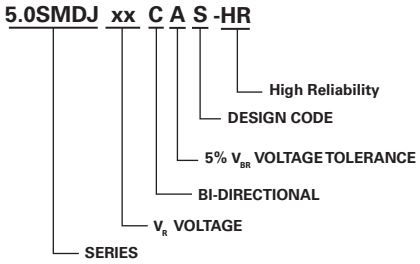
DO-214AB (SMC J-Bend)



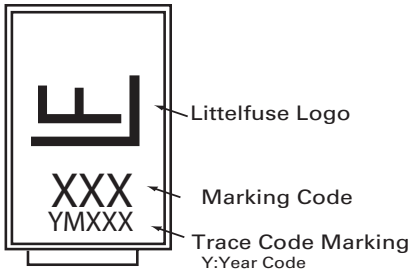
Recommended Soldering Pad Layout

Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.114	0.126	2.900	3.200
B	0.260	0.280	6.600	7.110
C	0.220	0.245	5.590	6.220
D	0.079	0.103	2.060	2.620
E	0.030	0.060	0.760	1.520
F	-	0.008	-	0.203
G	0.305	0.320	7.750	8.130
H	0.006	0.012	0.152	0.305
I	0.129	-	3.300	-
J	0.094	-	2.400	-
K	-	0.165	-	4.200
L	0.094	-	2.400	-

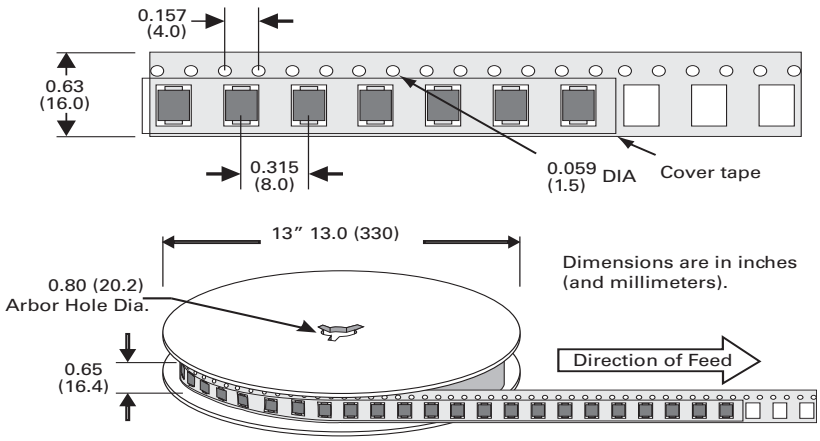
Part Marking System



Part Marking System



Tape and Reel Specification



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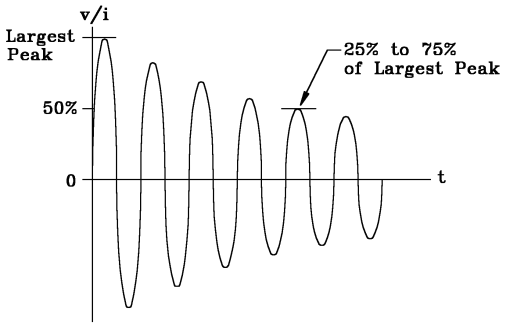
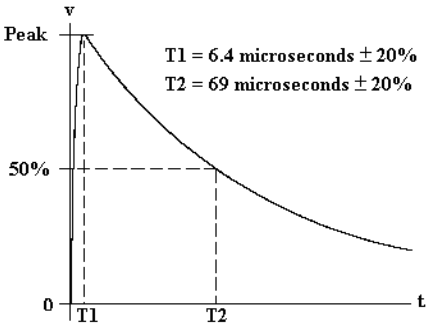
Surface Mount – 5000 W – DO-214AB

RTCA/DO-160G Wave 3

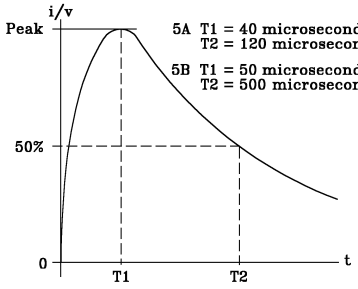


Notes:
1. Voltage and current are not required to be in phase.
2. The waveshape may have either a damped sine or cosine waveshape.

RTCA/DO-160G Wave 4



RTCA/DO-160G Wave 5



Pin Injection Protection Per RTCA/DO-160G

Part Number	25 °C						70 °C						120 °C					
	Wave 3	Wave 4 (6.4/69 µs)			Wave 5a (40/120 µs)		Wave 3	Wave 4 (6.4/69 µs)			Wave 5a (40/120 µs)		Wave 3	Wave 4 (6.4/69 µs)			Wave 5a (40/120 µs)	
	L5	L3	L4	L5	L3	L4	L5	L3	L4	L5	L3	L4	L5	L3	L4	L5	L3	L4
	128A	60A	150A	320A	300A	750A	128A	60A	150A	320A	300A	750A	128A	60A	150A	320A	300A	750A
5.0SMDJ13CAS-HR	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	-	-

Note:
1. L1 = Level1, L2 = Level 2, L3 = Level 3, L4 = Level 4, L5 = Level 5

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