

5.0SMDJxxS-HR

Surface Mount – 5000 W – DO-214AB



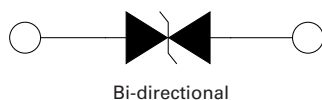
Maximum Ratings and Thermal Characteristics ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Dissipation by 10/1000 μs Waveform (Fig.1)(Note 1), (Note 2)	P_{PPM}	5000	W
Power dissipation on infinite heatsink at $T_L = 50\text{ }^\circ\text{C}$	P_D	6.5	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-65 to 150	$^\circ\text{C}$
Typical Thermal Resistance Junction to Lead	$R_{\theta JL}$	15	$^\circ\text{C/W}$
Typical Thermal Resistance Junction to Ambient	$R_{\theta JA}$	75	$^\circ\text{C/W}$

Notes:

1. Non-repetitive current pulse, per Fig. 3 and derated above $T_A = 25\text{ }^\circ\text{C}$ per Fig. 2.
2. Mounted on copper pad area of 0.31x0.31" (8.0 x 8.0 mm) to each terminal.

Functional Diagram



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
- $V_{BR} @ T_J = V_{BR} @ 25\text{ }^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$ (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 $^\circ\text{C}$ /40 seconds at terminals
- Plastic package has underwriters laboratory flammability 94V-0
- Meet MSL level1, per J-STD-020, LF maximum peak of 260 $^\circ\text{C}$
- 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

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 ($T_A = 25\text{ }^\circ\text{C}$ 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	\checkmark

Notes:

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

5.0SMDJxxS-HR

Surface Mount – 5000 W – DO-214AB

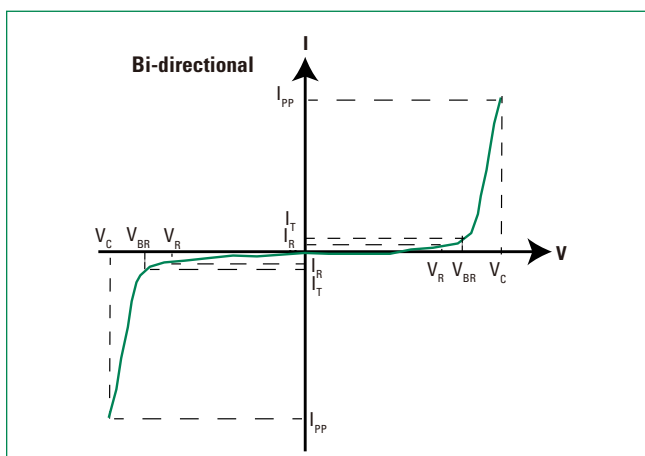
Screen Process

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 to 150 °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 Littelfuse service

Group B Test Requirement

Screen	Method	Condition	Requirement
Surge Test	10/1000 μ s 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 ($I_{PP} \times V_C$)** – 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

5.0SMDJxxS-HR

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Ratings and Characteristic Curves ($T_A=25^\circ\text{C}$ unless otherwise noted)

Figure 1: TVS Transients Clamping Waveform

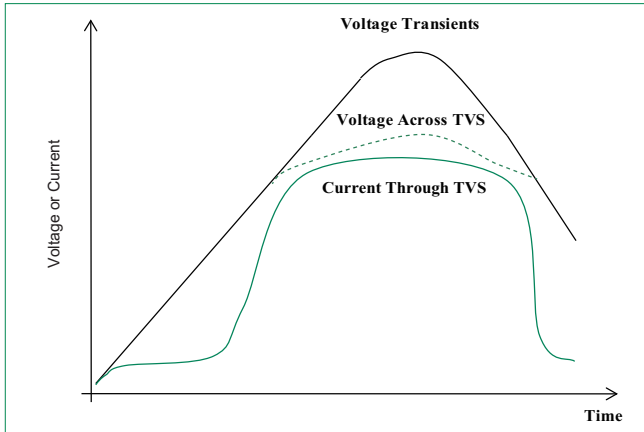


Figure 2: Peak Pulse Power Rating

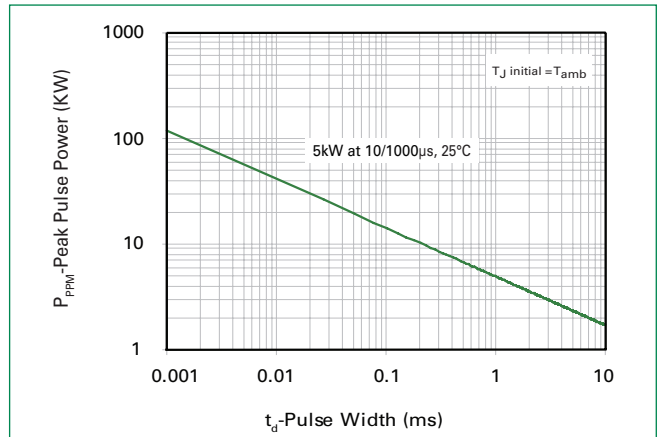


Figure 3: Peak Pulse Power Derating Curve

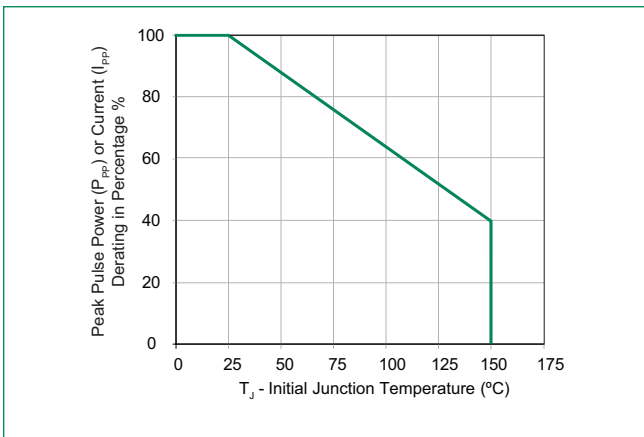


Figure 4: Pulse Waveform

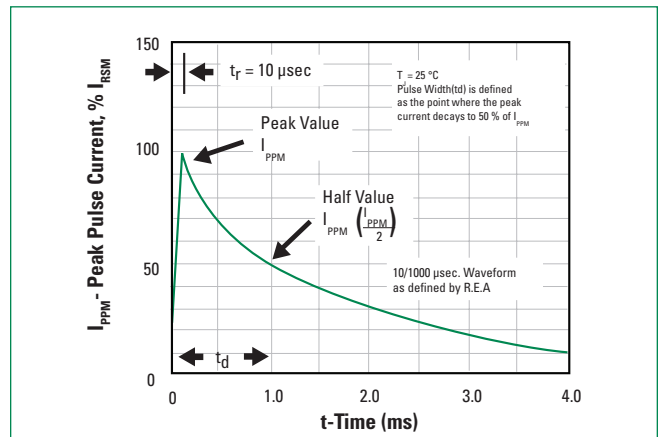


Figure 5: Typical Junction Capacitance

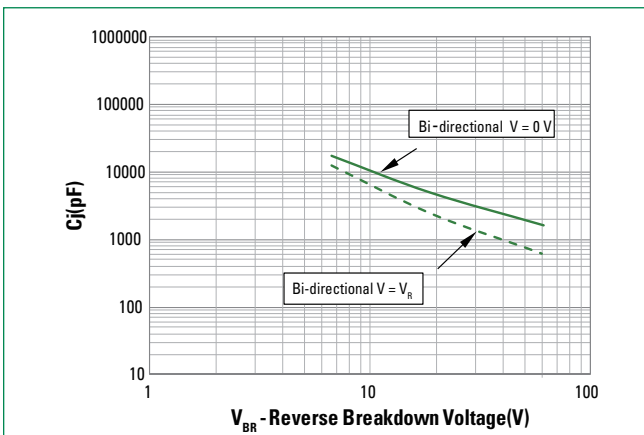
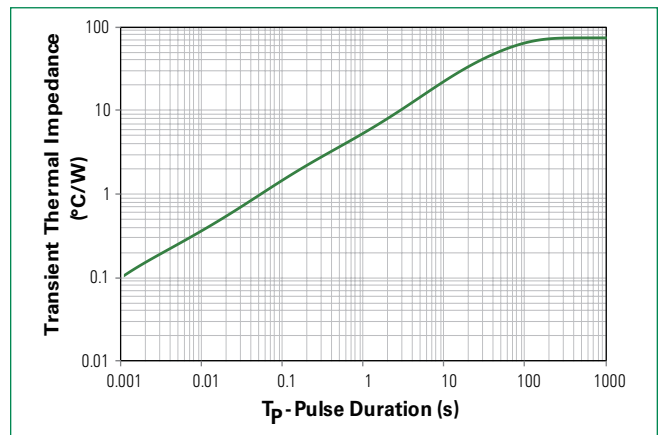


Figure 6: Typical Transient Thermal Impedance

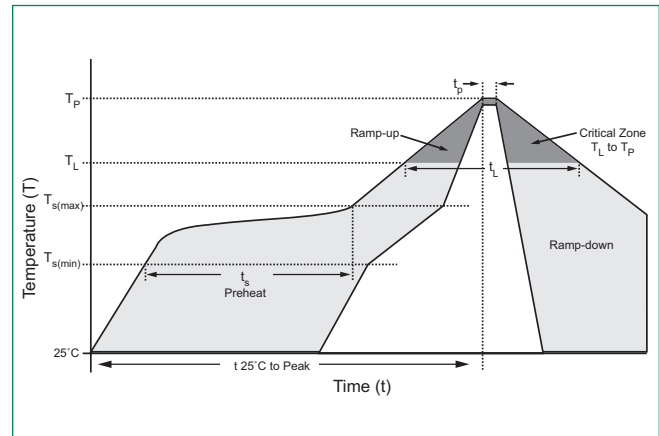


5.0SMDJxxS-HR

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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_p)	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

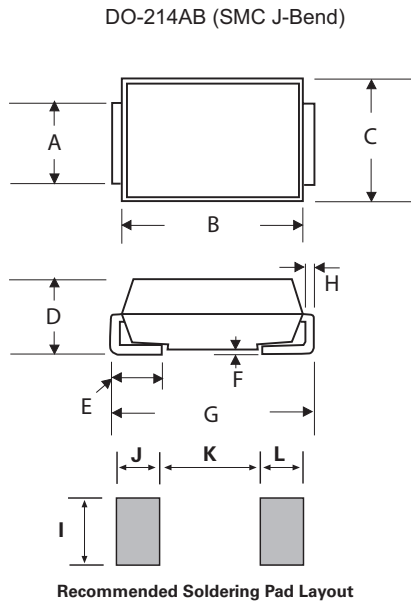
High Temperature Storage	JESD22-A103
HTRB	JESD22-A108
Temperature Cycling	JESD22-A104
MSL	JEDEC-J-STD-020, Level 1
H3TRB	JESD22-A101
RSH	JESD22-A111

Packing Options

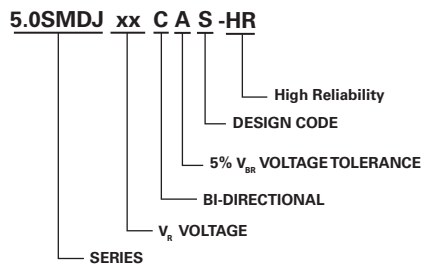
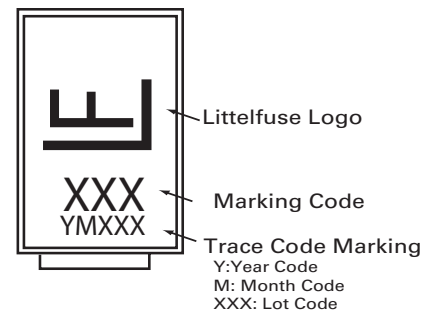
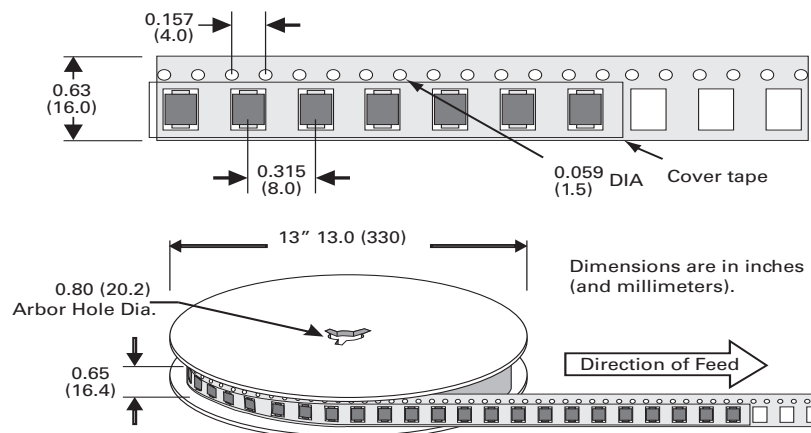
Part Number	Component Package	Quantity	Packaging Option	Packaging Specification
5.0SMDJxxS-HR	DO-214AB	3000	Tape & Reel - 16 mm tape/13" reel	EIA STD RS-481

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Dimensions

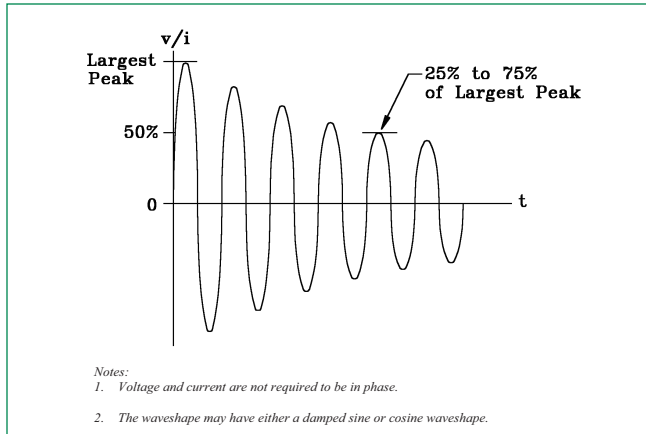
Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.114	0.126	2.900	3.200
B	0.260	0.280	6.600	7.110
C	0.220	0.245	5.590	6.220
D	0.079	0.103	2.060	2.620
E	0.030	0.060	0.760	1.520
F	-	0.008	-	0.203
G	0.305	0.320	7.750	8.130
H	0.006	0.012	0.152	0.305
I	0.129	-	3.300	-
J	0.094	-	2.400	-
K	-	0.165	-	4.200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

Part Marking System**Part Marking System****Tape and Reel Specification**

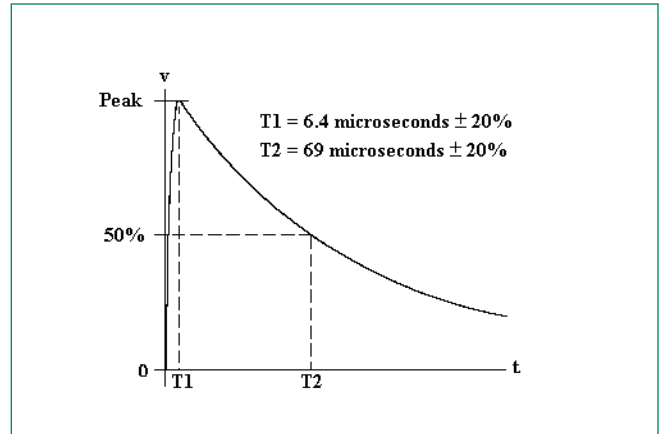
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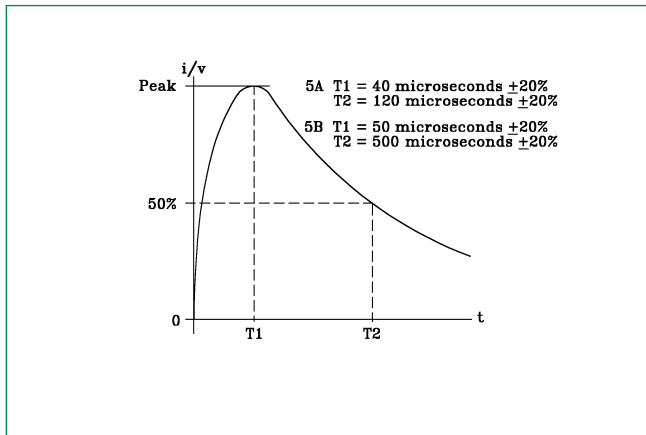
RTCA/DO-160G Wave 3



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	L5	L3	L4			
5.0SMDJ13CAS-HR	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	-	-	-	-	-			

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

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