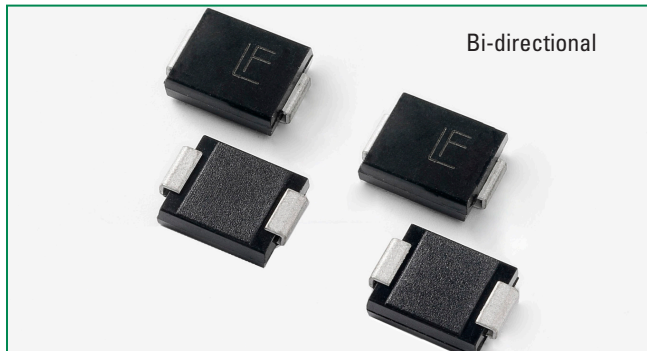


# 5.0SMDJxxS-HR

## Surface Mount – 5000 W – DO-214AB



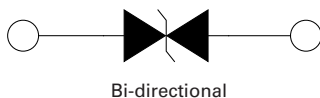
### Maximum Ratings and Thermal Characteristics ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation by 10/1000 $\mu\text{s}$ Waveform (Fig.1)(Note 1), (Note 2)	$P_{PPM}$	5000	W
Power dissipation on infinite heatsink at $T_L = 50^\circ\text{C}$	$P_D$	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  $T_A = 25^\circ\text{C}$  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
- $V_{BR} @ T_J = V_{BR} @ 25^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$  ( $\alpha T$ : Temperature Coefficient)
- Glass passivated chip junction
- 5000 W peak pulse power capability at 10/1000  $\mu\text{s}$  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 ( $T_A = 25^\circ\text{C}$ 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 $I_R$ @ $V_R$ ( $\mu\text{A}$ )	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

# 5.0SMDJxxS-HR

## Surface Mount – 5000 W – DO-214AB

### Screen Process

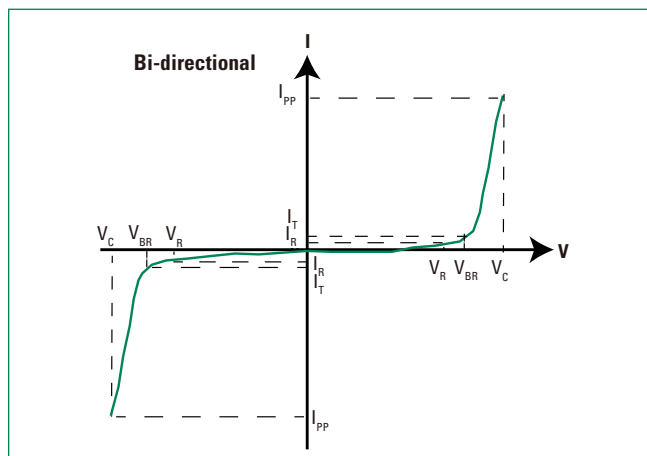
100 % Vision Inspection	MIL-STD-750 method 2074
100 % High Temperature Storage Life (168 hrs, 175 °C)	MIL-STD-750 method 1031
100 % X-RAY inspection	MIL-STD-750 method 2076
100 % Temperature Cycle Test (-55 to 150 °C, 20 cycles, dwell time 15 min)	MIL-STD-750 method 1051
100 % Reflow (2X)	JEDEC J-STD-020
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 $\mu$ 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, each direction 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

Surface Mount – 5000 W – DO-214AB

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

Figure 1: TVS Transients Clamping Waveform

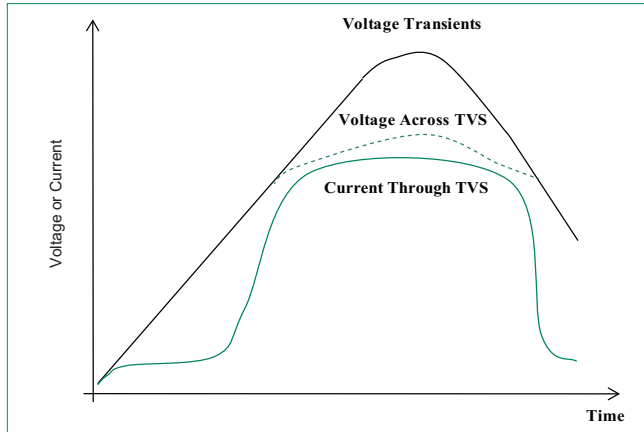


Figure 2: Peak Pulse Power Rating

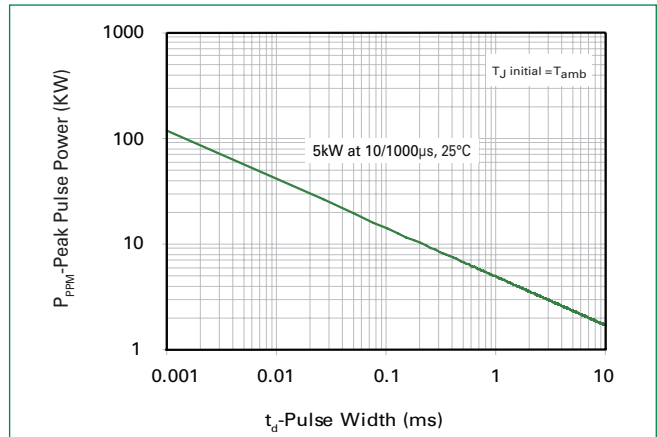


Figure 3: Peak Pulse Power Derating Curve

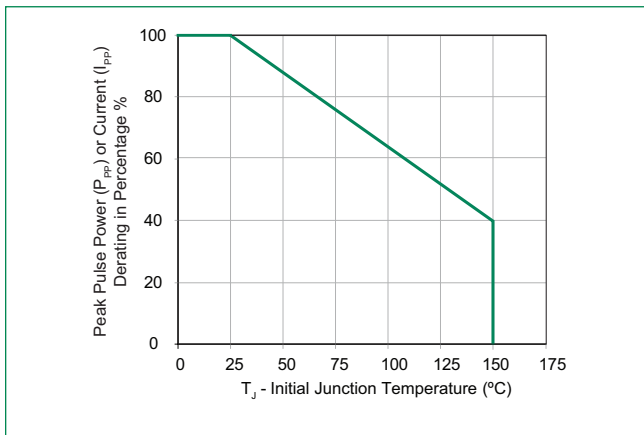


Figure 4: Pulse Waveform

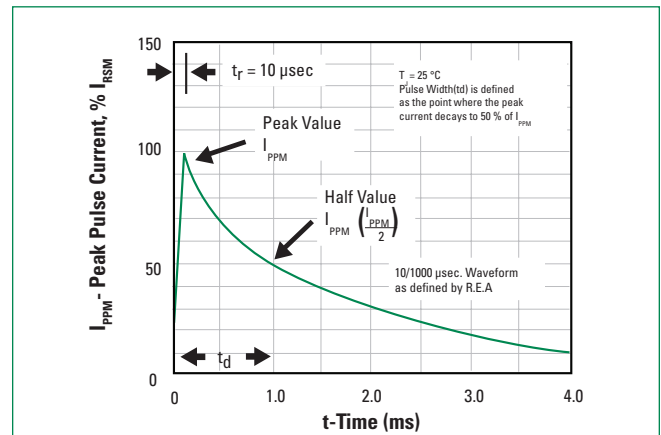


Figure 5: Typical Junction Capacitance

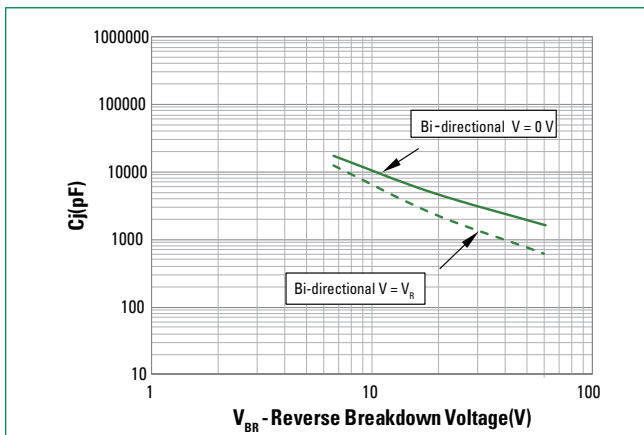
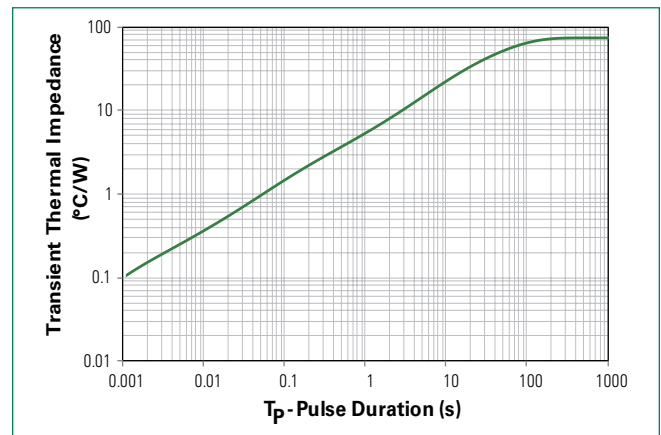


Figure 6: Typical Transient Thermal Impedance

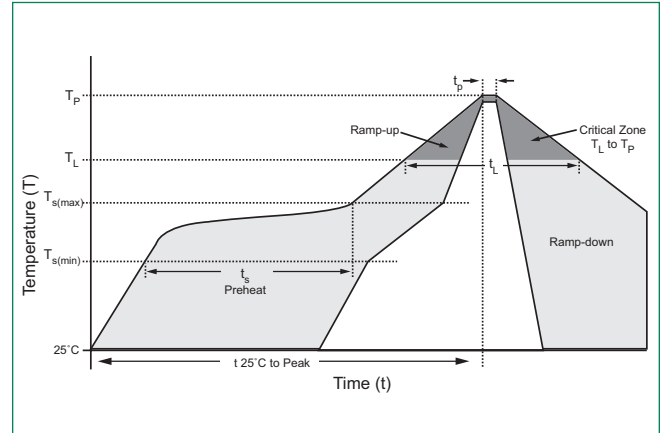


# 5.0SMDJxxS-HR

Surface Mount – 5000 W – DO-214AB

## Soldering Parameters

<b>Reflow Condition</b>		Lead-free assembly
<b>Pre Heat</b>	- Temperature Min ( $T_{s(min)}$ )	150 °C
	- Temperature Max ( $T_{s(max)}$ )	200 °C
	- Time (min to max) ( $t_s$ )	60 – 180 seconds
<b>Average Ramp Up Rate (Liquidus Temp (<math>T_L</math>) to Peak</b>		3 °C/second max
<b><math>T_{s(max)}</math> to <math>T_A</math> - Ramp-up Rate</b>		3 °C/second max
<b>Reflow</b>	- Temperature ( $T_L$ ) (Liquidus)	217 °C
	- Time (min to max) ( $T_s$ )	60 – 150 seconds
<b>Peak Temperature (<math>T_p</math>)</b>		260 <sup>+0/-5</sup> °C
<b>Time Within 5°C of Actual Peak Temperature (<math>t_p</math>)</b>		20 – 40 seconds
<b>Ramp-down Rate</b>		6 °C/second max
<b>Time 25°C to Peak Temperature (<math>T_p</math>)</b>		8 minutes max
<b>Do Not Exceed</b>		260 °C



## Physical Specifications

<b>Weight</b>	0.007 ounce, 0.21 grams
<b>Case</b>	JEDEC DO214AB. Molded plastic body over glass passivated junction
<b>Terminal</b>	Matte tin-plated leads, solderable per JESD22-B102

## Environmental Specifications

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

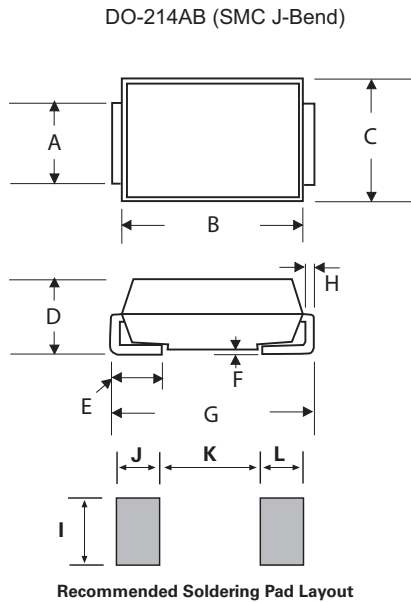
## Packing Options

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

# 5.0SMDJxxS-HR

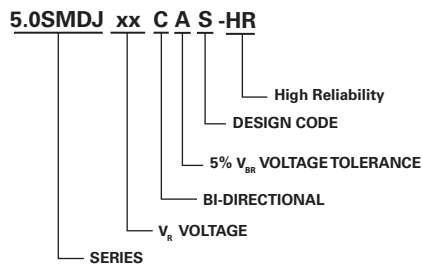
## Surface Mount – 5000 W – DO-214AB

### Dimensions

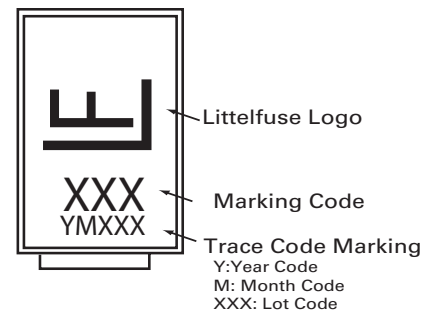


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.114	0.126	2.900	3.200
B	0.260	0.280	6.600	7.110
C	0.220	0.245	5.590	6.220
D	0.079	0.103	2.060	2.620
E	0.030	0.060	0.760	1.520
F	-	0.008	-	0.203
G	0.305	0.320	7.750	8.130
H	0.006	0.012	0.152	0.305
I	0.129	-	3.300	-
J	0.094	-	2.400	-
K	-	0.165	-	4.200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

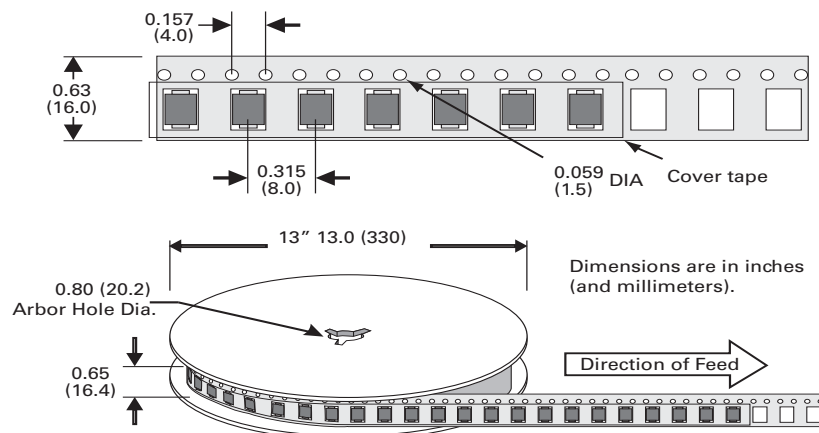
### Part Marking System



### Part Marking System



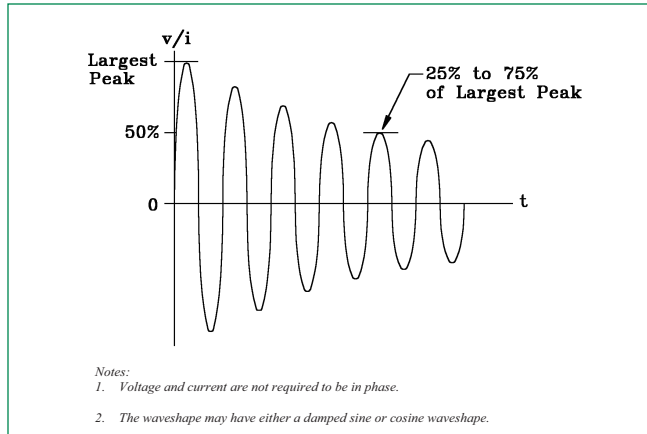
### Tape and Reel Specification



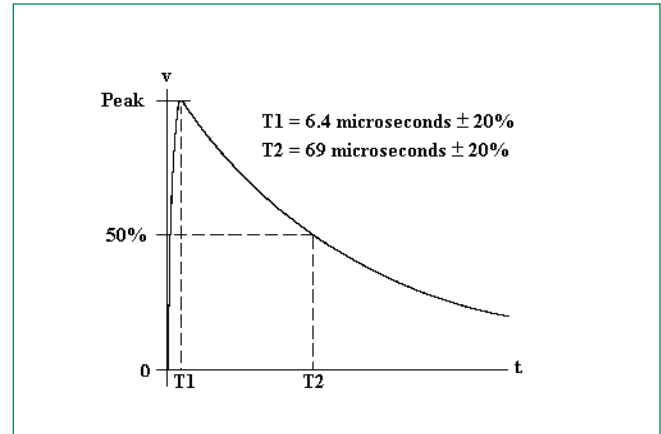
# 5.0SMDJxxS-HR

## Surface Mount – 5000 W – DO-214AB

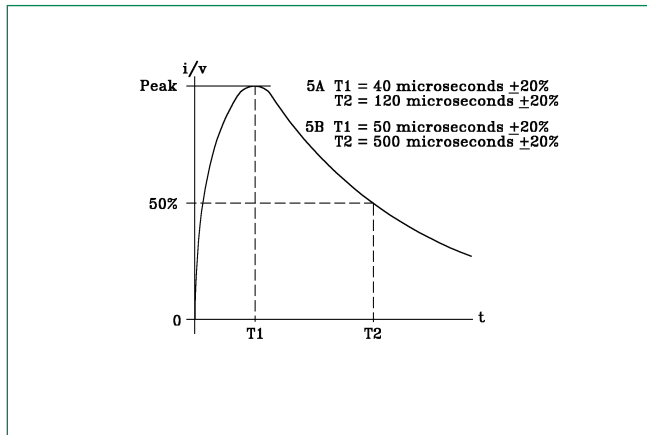
RTCA/DO-160G Wave 3



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
	128A	60A	150A	320A	300A	750A	128A	60A	150A	320A	300A	750A	128A	60A	150A	320A	300A	750A	128A	60A	750A
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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