

# 5.0SMDJ Series

## Surface Mount – 5000W



### Web Resources



Download ECAD models, order samples, and find technical resources at [www.littelfuse.com](http://www.littelfuse.com)

### Agency Approvals

Agency	Agency File Number
	E230531

### Maximum Ratings and Thermal Characteristics

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

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation at $T_L=25^{\circ}\text{C}$ by 10/1000 $\mu\text{s}$ Waveform (Fig.2)(Note 1), (Note 2)	$P_{PPM}$	5000	W
Power Dissipation on Infinite Heat Sink at $T_L=50^{\circ}\text{C}$	$P_D$	6.5	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)	$I_{FSM}$	300	A
Maximum Instantaneous Forward Voltage at 100A for Unidirectional Only	$V_F$	5.0	V
Operating Temperature Range	$T_J$	-65 to 150	$^{\circ}\text{C}$
Storage Temperature Range	$T_{STG}$	-65 to 175	$^{\circ}\text{C}$
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. 4 and derated above  $T_J$  (initial)  $=25^{\circ}\text{C}$  per Fig. 3.
2. Mounted on copper pad area of 0.31x0.31" (8.0 x 8.0mm) 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 5.0SMDJ series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

### Features & Benefits

- 5000W peak pulse power capability at 10/1000 $\mu\text{s}$  waveform, repetition rate (duty cycles):0.01 %
- SMD low profile surface mount package minimizing PCB footprint
- 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 1/2
- IEC 61000-4-2 ESD 30kV(Air), 30kV (Contact)
- Built-in strain relief
- Glass passivated chip junction
- Fast response time: typically less than 1.0ps from 0V to BV min
- Low dynamic resistance
- $V_{BR} @ T_J = V_{BR} @ 25^{\circ}\text{C} \times (1 + \alpha T \times (T_J - 25))$  ( $\alpha$ : Temperature Coefficient,)
- 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 outside China are available. (parts with an E suffix and see Ordering and Packaging Options section for the details)

### Applications

TVS devices are ideal for the protection of I/O Interfaces, VCC bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

#### Functional Diagram



Bi-directional




Uni-directional

# 5.0SMDJ Series

## Surface Mount – 5000W

### Electrical Characteristics ( $T_A=25^\circ\text{C}$ 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 $\mu$ s) (V)	Maximum Peak Pulse Current $I_{PP}$ (10/1000 $\mu$ s) (A)	Maximum Reverse Leakage $I_R$ @ $V_R$ ( $\mu$ A)	Maximum Temperature Coefficient of $V_{BR}$ (%/C)	Agency Approval 
		Uni	Bi		Min.	Max.						
5.0SMDJ12A	5.0SMDJ12CA	5PEP	5BEP	12.0	13.3	14.7	10	19.9	252.0	5	0.075	X
5.0SMDJ13A	5.0SMDJ13CA	5PEQ	5BEQ	13.0	14.4	15.9	10	21.5	233.0	5	0.076	X
5.0SMDJ14A	5.0SMDJ14CA	5PER	5BER	14.0	15.6	17.2	10	23.2	216.0	5	0.08	X
5.0SMDJ15A	5.0SMDJ15CA	5PES	5BES	15.0	16.7	18.5	1	24.4	205.0	5	0.083	X
5.0SMDJ16A	5.0SMDJ16CA	5PET	5BET	16.0	17.8	19.7	1	26.0	193.0	5	0.084	X
5.0SMDJ17A	5.0SMDJ17CA	5PEU	5BEU	17.0	18.9	20.9	1	27.6	181.0	5	0.085	X
5.0SMDJ18A	5.0SMDJ18CA	5PEV	5BEV	18.0	20.0	22.1	1	29.2	172.0	5	0.088	X
5.0SMDJ20A	5.0SMDJ20CA	5PEW	5BEW	20.0	22.2	24.5	1	32.4	155.0	5	0.091	X
5.0SMDJ22A	5.0SMDJ22CA	5PEX	5BEX	22.0	24.4	26.9	1	35.5	141.0	5	0.092	X
5.0SMDJ24A	5.0SMDJ24CA	5PEZ	5BEZ	24.0	26.7	29.5	1	38.9	129.0	5	0.092	X
5.0SMDJ26A	5.0SMDJ26CA	5PFE	5BFE	26.0	28.9	31.9	1	42.1	119.0	5	0.093	X
5.0SMDJ28A	5.0SMDJ28CA	5PFG	5BFG	28.0	31.1	34.4	1	45.4	110.0	5	0.094	X
5.0SMDJ30A	5.0SMDJ30CA	5PFK	5BFK	30.0	33.3	36.8	1	48.4	103.0	5	0.096	X
5.0SMDJ33A	5.0SMDJ33CA	5PFM	5BFM	33.0	36.7	40.6	1	53.3	93.9	5	0.097	X
5.0SMDJ36A	5.0SMDJ36CA	5PFP	5BFP	36.0	40.0	44.2	1	58.1	86.1	5	0.098	X
5.0SMDJ40A	5.0SMDJ40CA	5PFR	5BFR	40.0	44.4	49.1	1	64.5	77.6	5	0.099	X
5.0SMDJ43A	5.0SMDJ43CA	5PFT	5BFT	43.0	47.8	52.8	1	69.4	72.1	5	0.1	X
5.0SMDJ45A	5.0SMDJ45CA	5PFV	5BFV	45.0	50.0	55.3	1	72.7	68.8	5	0.101	X
5.0SMDJ48A	5.0SMDJ48CA	5PFX	5BFX	48.0	53.3	58.9	1	77.4	64.7	5	0.101	X
5.0SMDJ51A	5.0SMDJ51CA	5PFZ	5BFZ	51.0	56.7	62.7	1	82.4	60.7	5	0.101	X
5.0SMDJ54A	5.0SMDJ54CA	5PGE	5BGE	54.0	60.0	66.3	1	87.1	57.5	5	0.102	X
5.0SMDJ58A	5.0SMDJ58CA	5PGG	5BGG	58.0	64.4	71.2	1	93.6	53.5	5	0.103	X
5.0SMDJ60A	5.0SMDJ60CA	5PGK	5BGK	60.0	66.7	73.7	1	96.8	51.7	5	0.103	X
5.0SMDJ64A	5.0SMDJ64CA	5PGM	5BGM	64.0	71.1	78.6	1	103.0	48.6	5	0.104	X
5.0SMDJ70A	5.0SMDJ70CA	5PGP	5BGP	70.0	77.8	86.0	1	113.0	44.3	5	0.105	X
5.0SMDJ75A	5.0SMDJ75CA	5PGR	5BGR	75.0	83.3	92.1	1	121.0	41.4	5	0.106	X
5.0SMDJ78A	5.0SMDJ78CA	5PGT	5BGT	78.0	86.7	95.8	1	126.0	39.7	5	0.106	X
5.0SMDJ85A	5.0SMDJ85CA	5PGV	5BGV	85.0	94.4	104.0	1	137.0	36.5	5	0.106	X
5.0SMDJ90A	5.0SMDJ90CA	5PGX	5BGX	90.0	100.0	111.0	1	146.0	34.3	5	0.107	X
5.0SMDJ100A	5.0SMDJ100CA	5PGZ	5BGZ	100.0	111.0	123.0	1	162.0	30.9	5	0.107	X
5.0SMDJ110A	5.0SMDJ110CA	5PHE	5BHE	110.0	122.0	135.0	1	177.0	28.3	5	0.107	X
5.0SMDJ120A	5.0SMDJ120CA	5PHG	5BHG	120.0	133.0	147.0	1	193.0	26.0	5	0.108	X
5.0SMDJ130A	5.0SMDJ130CA	5PHK	5BHK	130.0	144.0	159.0	1	209.0	24.0	5	0.108	X
5.0SMDJ140A	5.0SMDJ140CA	5PHL	5BHL	140.0	156.0	172.0	1	226.1	22.2	5	0.108	X
5.0SMDJ150A	5.0SMDJ150CA	5PHM	5BHM	150.0	167.0	185.0	1	243.0	20.6	5	0.108	X
5.0SMDJ160A	5.0SMDJ160CA	5PHP	5BHB	160.0	178.0	197.0	1	259.0	19.3	5	0.108	X
5.0SMDJ170A	5.0SMDJ170CA	5PHR	5BHR	170.0	189.0	209.0	1	275.0	18.2	5	0.108	X
5.0SMDJ180A	5.0SMDJ180CA	5PHT	5BHT	180	200	221	1	292.0	17.5	5	0.108	-
5.0SMDJ200A	5.0SMDJ200CA	5PHV	5BHV	200	224	247	1	325.0	15.4	5	0.11	-
5.0SMDJ220A	5.0SMDJ220CA	5PHX	5BHX	220	244	270	1	357.0	14.1	5	0.11	-
5.0SMDJ250A	5.0SMDJ250CA	5PHZ	5BHZ	250	279	309	1	406.0	12.4	5	0.11	-
5.0SMDJ300A	5.0SMDJ300CA	5PIE	5BIE	300	335	371	1	487.0	10.3	5	0.112	-
5.0SMDJ350A	5.0SMDJ350CA	5PIG	5BIG	350	391	432	1	568.0	8.9	5	0.112	-
5.0SMDJ400A	5.0SMDJ400CA	5PIK	5BIK	400	447	494	1	649.0	7.8	5	0.112	-
5.0SMDJ440A	5.0SMDJ440CA	5PIM	5BIM	440	492	544	1	714.0	7.1	5	0.112	-

Footnote:

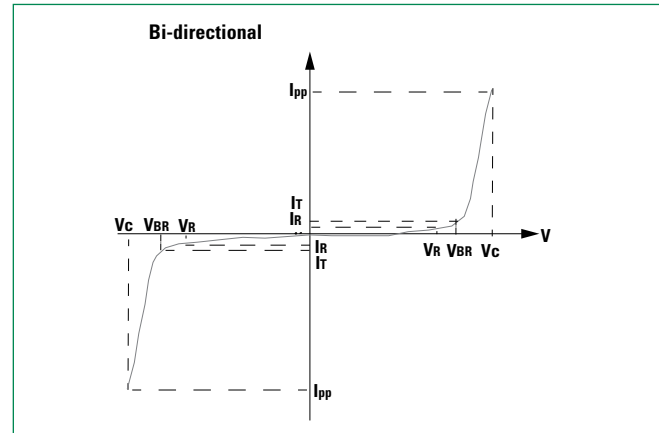
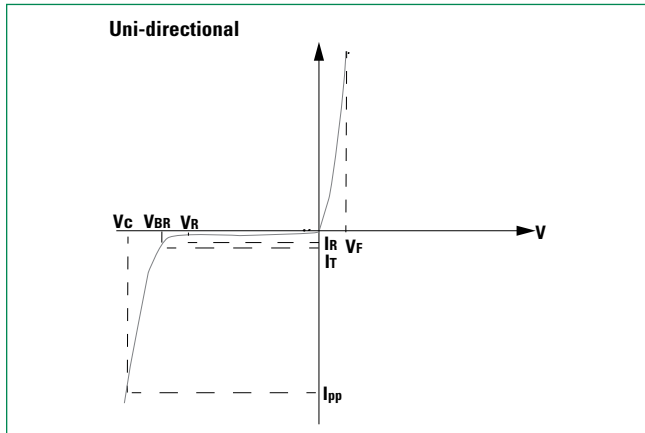
 $V_R$  12–30V bi & uni direction and 33–60V uni is single die and the rest is stack die.

For uni-directional 12V to 60V and bi-directional 12V to 30V, add suffix -E to the part number for C00 Ex-China Site.

# 5.0SMDJ Series

## Surface Mount – 5000W

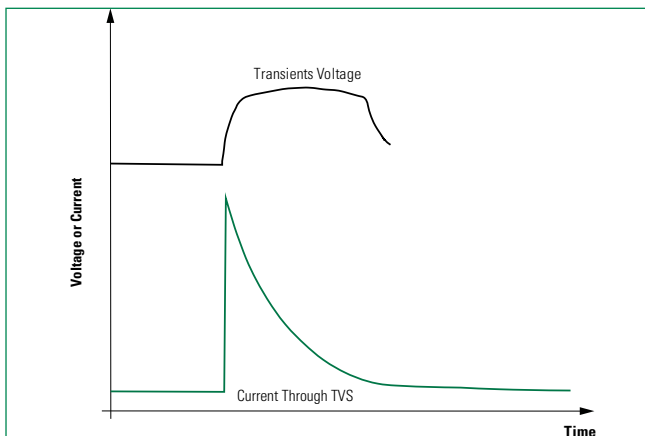
### I-V Curve Characteristics



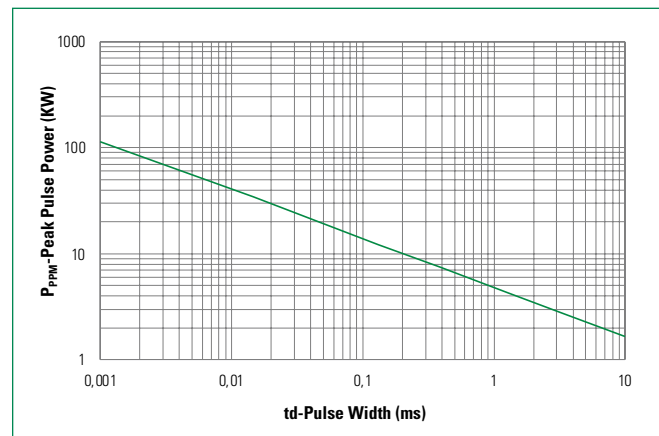
**$P_{PPM}$**  Peak Pulse Power Dissipation  $I_{PP} \times V_C$  – Max power dissipation  
 **$V_R$**  Stand-off Voltage – Maximum voltage that can be applied to the TVS without operation  
 **$V_{BR}$**  Breakdown Voltage – Maximum voltage that flows through the TVS at a specified test current ( $I_R$ )  
 **$V_C$**  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

### 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

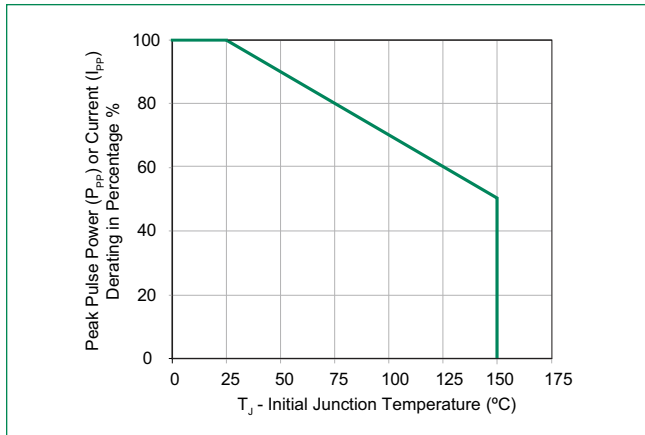


# 5.0SMDJ Series

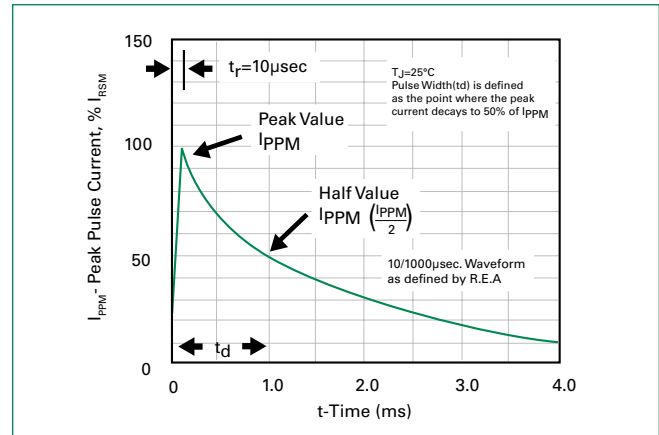
## Surface Mount – 5000W

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

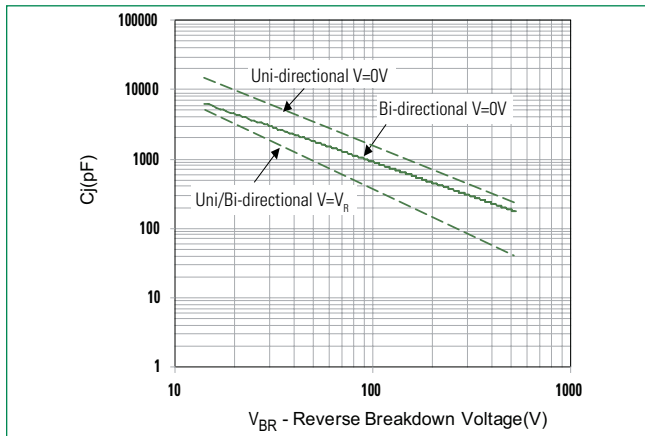
**Figure 3:**  
Peak Pulse Power Derating Curve



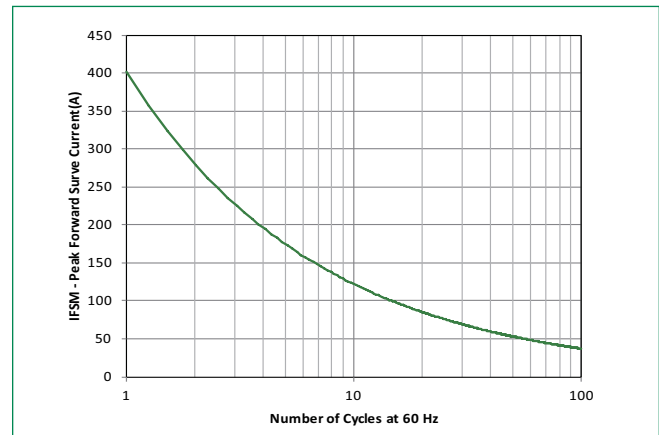
**Figure 4:**  
Pulse Waveform



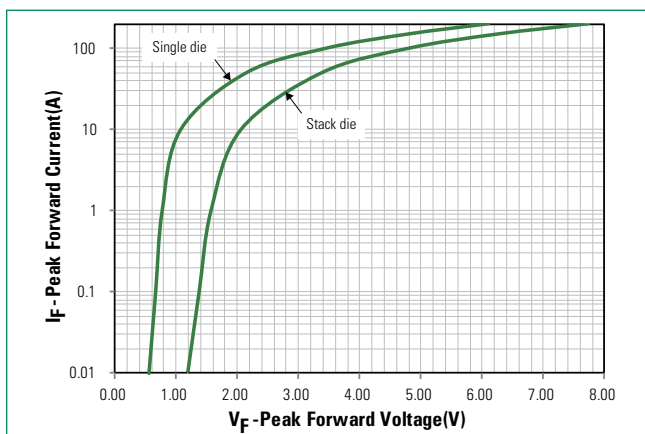
**Figure 5:**  
Typical Junction Capacitance



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



**Figure 7:**  
Peak Forward Voltage Drop  
vs Peak Forward Current (Typical Values)

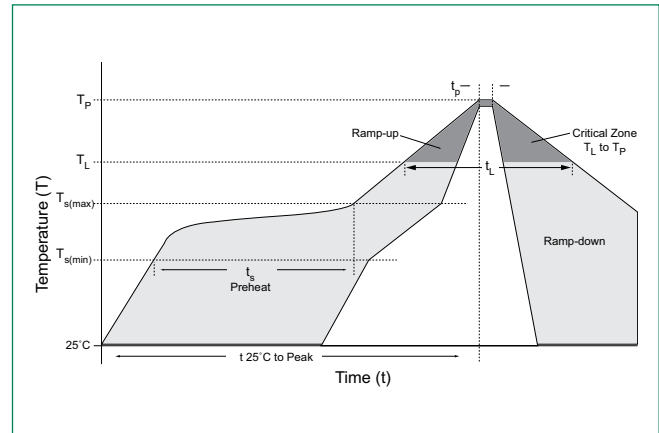


# 5.0SMDJ Series

## Surface Mount – 5000W

### 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 – 120 secs
<b>Average ramp up rate (Liquidus Temp (<math>T_A</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) ( $t_L$ )	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>		30 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



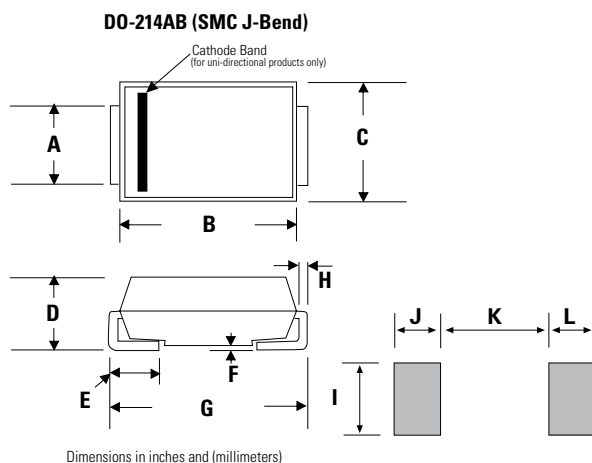
### Physical Specifications

<b>Weight</b>	0.007 ounce, 0.21 grams
<b>Case</b>	JEDEC DO214AB. Molded component over glass passivated junction
<b>Polarity</b>	Uni-directional products are denoted with a cathode band
<b>Terminal</b>	Matte Tin-plated leads, Solderable per JESD22-B102

### Environmental Specifications

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

### Dimensions

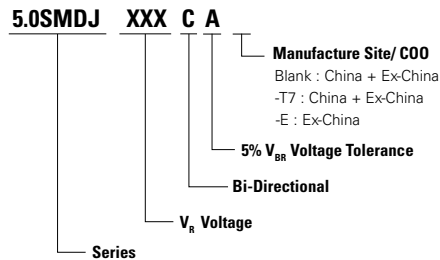


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
<b>A</b>	0.114	0.126	2.900	3.200
<b>B</b>	0.260	0.280	6.600	7.110
<b>C</b>	0.220	0.245	5.590	6.220
<b>D</b>	0.079	0.103	2.060	2.620
<b>E</b>	0.030	0.060	0.760	1.520
<b>F</b>	-	0.008	-	0.203
<b>G</b>	0.305	0.320	7.750	8.130
<b>H</b>	0.006	0.012	0.152	0.305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

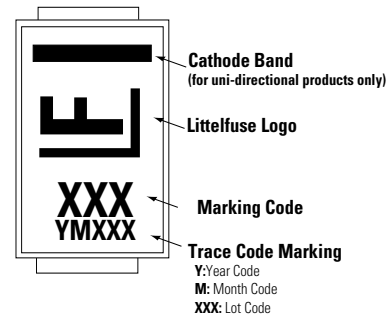
# 5.0SMDJ Series

## Surface Mount – 5000W

### Part Numbering System



### Part Marking System



### Ordering and Packaging Options

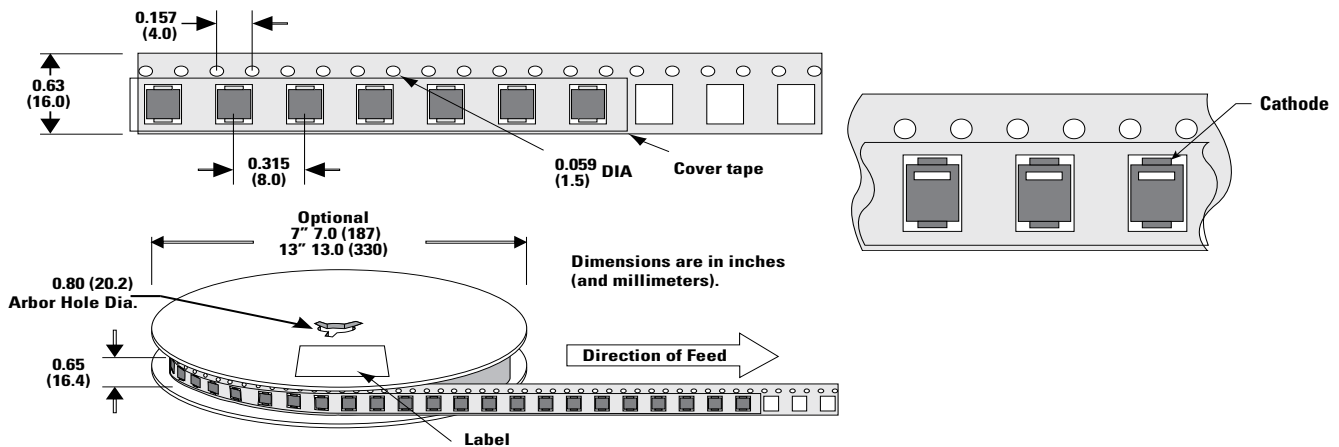
Part number	Component Package	Quantity	Packaging Option	Packaging Specification	Manufacture Site/ COO
5.0SMDJxxxXX	DO-214AB	3000	Tape & Reel - 16mm tape/13" reel	EIA STD RS-481	China + Ex-China
5.0SMDJxxxXX-T7	DO-214AB	500	Tape & Reel - 16mm tape/7" reel	EIA STD RS-481	China + Ex-China
5.0SMDJxxxXX-E <sup>(1) (2)</sup>	DO-214AB	3000	Tape & Reel - 16mm tape/13" reel	EIA STD RS-481	Ex-China

Footnote:

1. Available for Uni-directional product with voltage range of 12 V to 60 V

2. Available for Bi-directional product with voltage range of 12 V to 30 V

### Tape and Reel Specification



**Disclaimer Notice** - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).