

# 3.0SMCJ Series

## Surface Mount – 3000W – DO-214AB

PRELIMINARY &amp; CONFIDENTIAL

Littelfuse, Inc. has characterized initial samples of this device and is currently conducting reliability testing. Parts numbers and specifications are subject to change until the datasheet is made final.



### 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.4)(Note 1), (Note 2)	$P_{PPM}$	3000	W
Power dissipation on infinite heatsink at $T_C = 25^\circ\text{C}$	$P_D$	6.5	W
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	$^\circ\text{C}/\text{W}$
Typical Thermal Resistance Junction to Ambient	$R_{\theta JA}$	75	$^\circ\text{C}/\text{W}$

#### Notes:

- Non-repetitive current pulse, per Fig. 4 and derated above  $T_J$  (initial)  $= 25^\circ\text{C}$  per Fig. 3.
- Mounted on copper pad area of 0.31x0.31" (8.0 x 8.0mm) to each terminal.

### Functional Diagram



Bi-directional

### Description

The 3.0SMCJ Series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

### Features

- 3000W  $P_{PPM}$  peak pulse power capability at 10/1000 $\mu\text{s}$  waveform, repetition rate (duty cycles):0.01 %
- For surface mounted applications in order to optimize board space
- Low profile package
- 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
- ESD protection of data lines in accordance with IEC 61000-4-2,30kV(Air), 30kV (Contact)
- EFT protection of data lines in accordance with IEC 61000-4-4
- Built-in strain relief
- Glass passivated chip junction
- Fast response time: typically less than 1.0ps
- from 0V to BV min
- Excellent clamping capability
- Low incremental surge resistance
- High temperature to reflow soldering guaranteed: 260 $^\circ\text{C}/40\text{sec}$
- $V_{BR} @ T_J = V_{BR} @ 25^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$  ( $\alpha T$ : Temperature Coefficient, typical value is 0.1 %)
- UL Recognized compound meeting flammability rating V-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
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/ JEDEC J-STD- 609A.01)

### 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.

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

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 $\mu\text{s}$ ) (V)	Maximum Peak Pulse Current $I_{PP}$ (10/1000 $\mu\text{s}$ ) (A)	Maximum Clamping Voltage $V_C$ @ $I_{PP}$ (8/20 $\mu\text{s}$ ) (V)	Maximum Peak Pulse Current $I_{PP}$ (8/20 $\mu\text{s}$ ) (A)	Maximum Reverse Leakage $I_R$ @ $V_R$ ( $\mu\text{A}$ )	Maximum Temperature coefficient of $V_{BR}$ (%/C)
			MIN	MAX							
3.0SMCJ5.0CA	3DDE	5.0	6.40	7.00	10	9.2	326.1	11.89	1630.5	800	0.041
3.0SMCJ6.0CA	3DDG	6.0	6.67	7.37	10	10.3	291.3	13.31	1456.5	800	0.046
3.0SMCJ6.5CA	3DDK	6.5	7.22	7.98	10	11.2	267.9	14.47	1339.5	500	0.052
3.0SMCJ7.0CA	3DDM	7.0	7.78	8.60	10	12.0	250.0	15.50	1250.0	200	0.058
3.0SMCJ7.5CA	3DDP	7.5	8.33	9.21	1	12.9	232.6	16.67	1163.0	100	0.061
3.0SMCJ8.0CA	3DDR	8.0	8.89	9.83	1	13.6	220.6	17.57	1103.0	50	0.064
3.0SMCJ8.5CA	3DDT	8.5	9.44	10.40	1	14.4	208.3	18.60	1041.5	20	0.066
3.0SMCJ9.0CA	3DDV	9.0	10.00	11.10	1	15.4	194.8	19.90	974.0	10	0.069
3.0SMCJ10CA	3DDX	10.0	11.10	12.30	1	17.0	176.5	21.96	882.5	5	0.071
3.0SMCJ11CA	3DDZ	11.0	12.20	13.50	1	18.2	164.8	23.51	824.0	2	0.074
3.0SMCJ12CA	3DEE	12.0	13.30	14.70	1	19.9	150.8	25.71	754.0	2	0.075
3.0SMCJ13CA	3DEG	13.0	14.40	15.90	1	21.5	139.5	27.78	697.5	2	0.076
3.0SMCJ14CA	3DEK	14.0	15.60	17.20	1	23.2	129.3	29.97	646.5	2	0.08
3.0SMCJ15CA	3DEM	15.0	16.70	18.50	1	24.4	123.0	31.52	615.0	2	0.083
3.0SMCJ16CA	3DEP	16.0	17.80	19.70	1	26.0	115.4	33.59	577.0	2	0.084
3.0SMCJ17CA	3DER	17.0	18.90	20.90	1	27.6	108.7	35.66	543.5	2	0.085
3.0SMCJ18CA	3DET	18.0	20.00	22.10	1	29.2	102.7	37.73	513.5	2	0.088
3.0SMCJ20CA	3DEV	20.0	22.20	24.50	1	32.4	92.6	41.86	463.0	2	0.091
3.0SMCJ22CA	3DEX	22.0	24.40	26.90	1	35.5	84.5	45.87	422.5	2	0.092
3.0SMCJ24CA	3DEZ	24.0	26.70	29.50	1	38.9	77.1	50.26	385.5	2	0.092
3.0SMCJ26CA	3DFE	26.0	28.90	31.90	1	42.1	71.3	54.39	356.5	2	0.093
3.0SMCJ28CA	3DFG	28.0	31.10	34.40	1	45.4	66.1	58.66	330.5	2	0.094
3.0SMCJ30CA	3DFK	30.0	33.30	36.80	1	48.4	62.0	62.53	310.0	2	0.096
3.0SMCJ33CA	3DFM	33.0	36.70	40.60	1	53.3	56.3	68.86	281.5	2	0.097
3.0SMCJ36CA	3DFP	36.0	40.00	44.20	1	58.1	51.6	75.06	258.0	2	0.098
3.0SMCJ40CA	3DFR	40.0	44.40	49.10	1	64.5	46.5	83.33	232.5	2	0.099
3.0SMCJ43CA	3DFT	43.0	47.80	52.80	1	69.4	43.2	89.66	216.0	2	0.100
3.0SMCJ45CA	3DFV	45.0	50.00	55.30	1	72.7	41.3	93.93	206.5	2	0.101
3.0SMCJ48CA	3DFX	48.0	53.30	58.90	1	77.4	38.8	100.00	194.0	2	0.101
3.0SMCJ51CA	3DFZ	51.0	56.70	62.70	1	82.4	36.4	106.46	182.0	2	0.101
3.0SMCJ54CA	3DGE	54.0	60.00	66.30	1	87.1	34.4	112.53	172.0	2	0.102
3.0SMCJ58CA	3DGG	58.0	64.40	71.20	1	93.6	32.1	120.93	160.5	2	0.103

## Notes:

- $V_{BR}$  measured after  $I_T$  applied for 300 $\mu\text{s}$ ,  $I_T$  = square wave pulse or equivalent.
- Surge current waveform per 10 $\mu\text{s}$ /1000 $\mu\text{s}$  exponential wave and derated per Fig. 2
- All terms and symbols are consistent with ANSI/IEEE C62.35

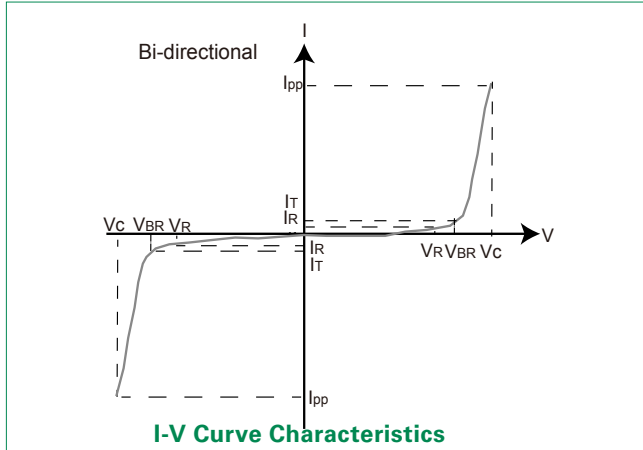
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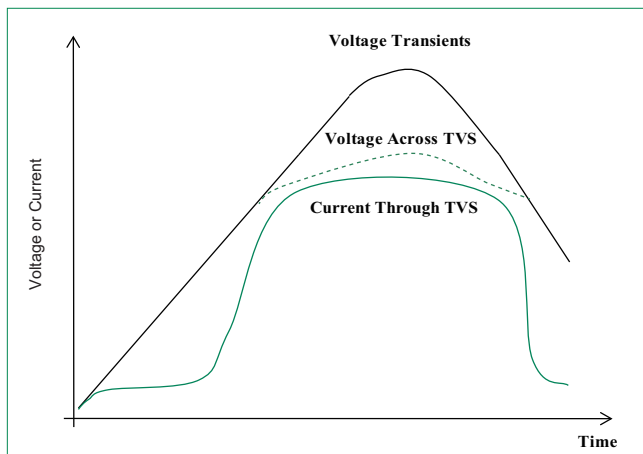
### I-V Curve Characteristics



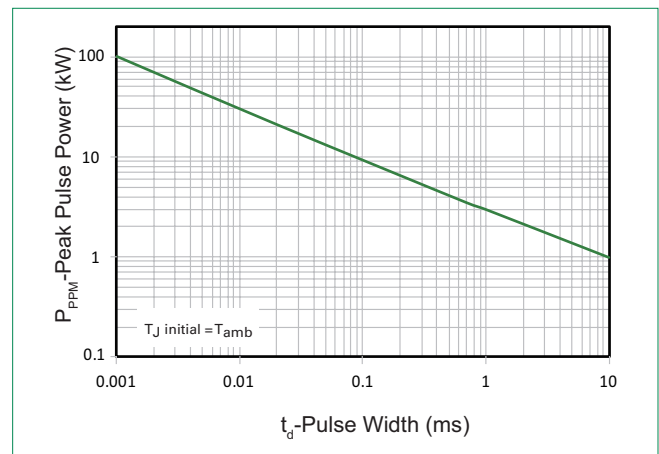
- $P_{PPM}$  Peak Pulse Power Dissipation** – Max power dissipation
- $V_R$  Stand-off Voltage** – Maximum voltage that can be applied to the TVS without operation
- $V_{BR}$  Breakdown Voltage** – Maximum voltage that flows through the TVS at a specified test current ( $I_T$ )
- $V_C$  Clamping Voltage** – Peak voltage measured across the TVS at a specified  $I_{PPM}$  (peak impulse current)
- $I_R$  Reverse Leakage Current** – Current measured at  $V_R$

### 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**



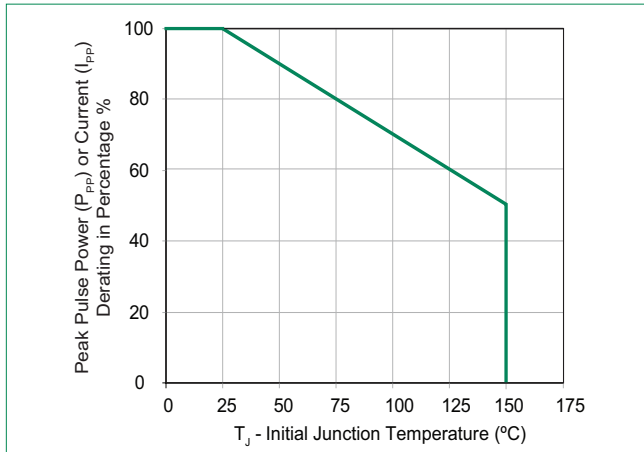
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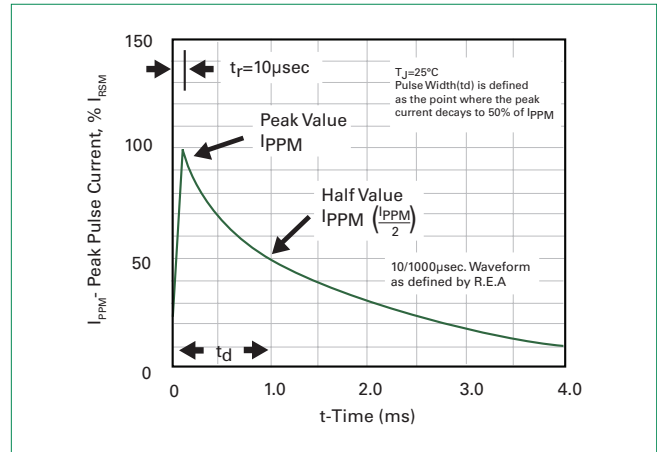
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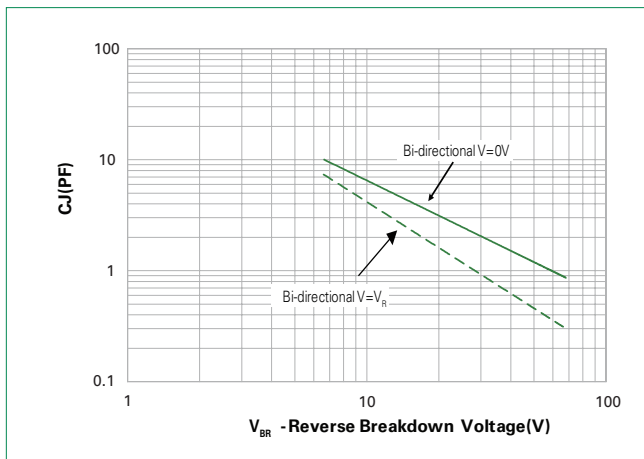
**Figure 3 - Peak Pulse Power Derating Curve**



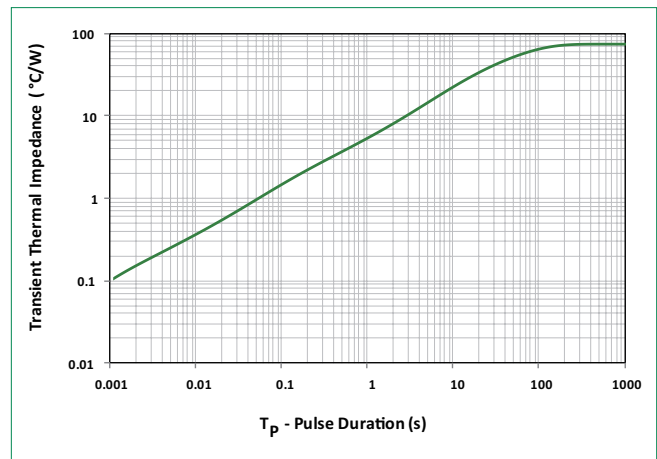
**Figure 4 - Pulse Waveform**



**Figure 5 - Typical Junction Capacitance**



**Figure 6 - Typical Transient Thermal Impedance**



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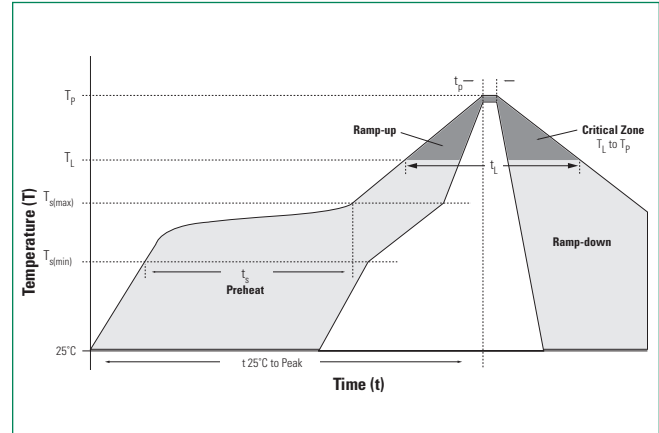
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### Soldering Parameters

<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) ( $t_p$ )	60 – 180 secs
<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

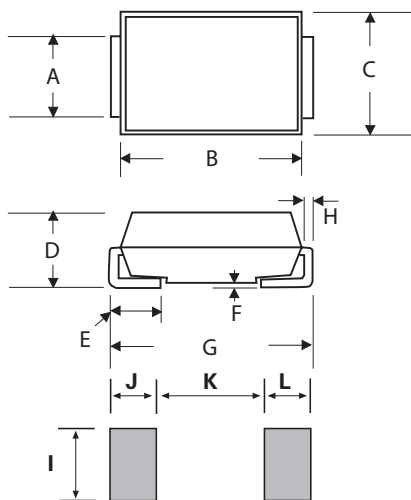
<b>Weight</b>	0.007 ounce, 0.21 grams
<b>Case</b>	JEDEC DO214AB. Molded plastic body over glass passivated junction
<b>Terminal</b>	Matte Tin-plated leads, Solderable per JESD22-B102

### Environmental Specifications

<b>High Temp. 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

### Dimensions

DO-214AB (SMC J-Bend)



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	-