

3.0SMCJ Series

Surface Mount – 3000W – DO-214AB

PRELIMINARY & 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 μs 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	$R_{\theta\text{JL}}$	15	$^\circ\text{C}/\text{W}$
Typical Thermal Resistance Junction to Ambient	$R_{\theta\text{JA}}$	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.

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 μs 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 $^\circ\text{C}/40\text{sec}$
- $V_{\text{BR}} @ T_J = V_{\text{BR}} @ 25^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$ (αT : 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)

Functional Diagram



Bi-directional

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 μs) (V)	Maximum Peak Pulse Current I_{PP} (10/1000 μs) (A)	Maximum Clamping Voltage V_C @ I_{PP} (8/20 μs) (V)	Maximum Peak Pulse Current I_{PP} (8/20 μs) (A)	Maximum Reverse Leakage I_R @ V_R (μA)	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 μs , I_T = square wave pulse or equivalent.
- Surge current waveform per 10 μs /1000 μs exponential wave and derated per Fig. 2
- All terms and symbols are consistent with ANSI/IEEE C62.35

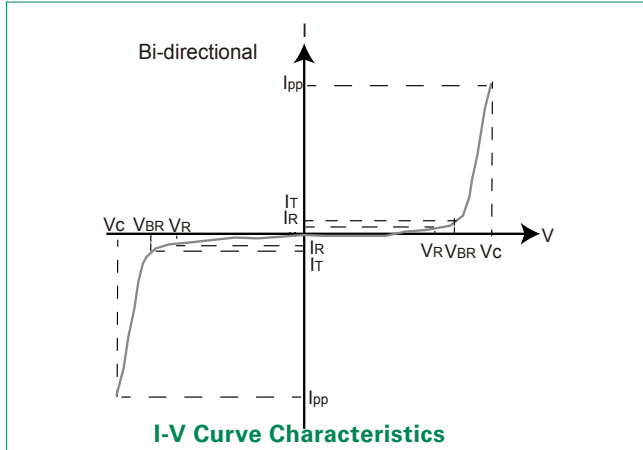
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I-V Curve Characteristics



- 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

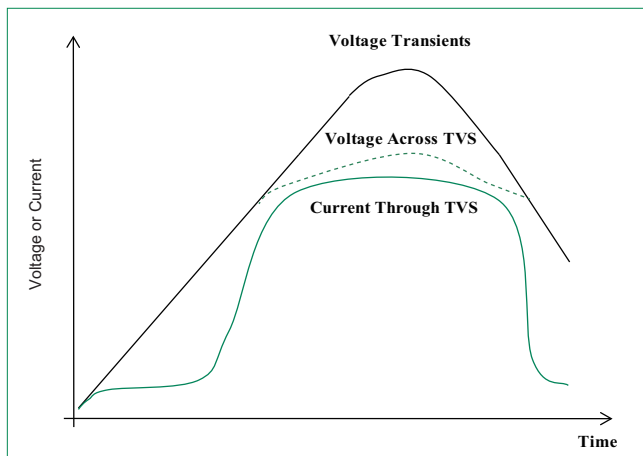
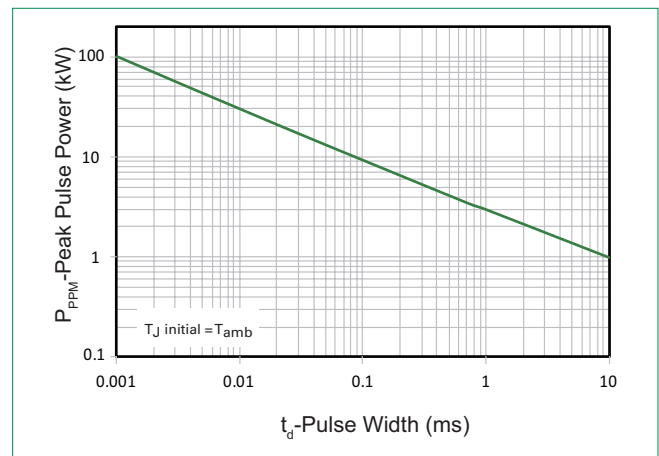


Figure 2 - Peak Pulse Power Rating



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Figure 3 - Peak Pulse Power Derating Curve

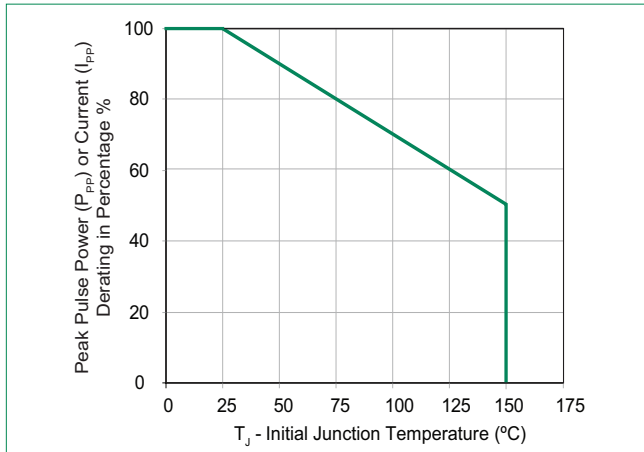


Figure 4 - Pulse Waveform

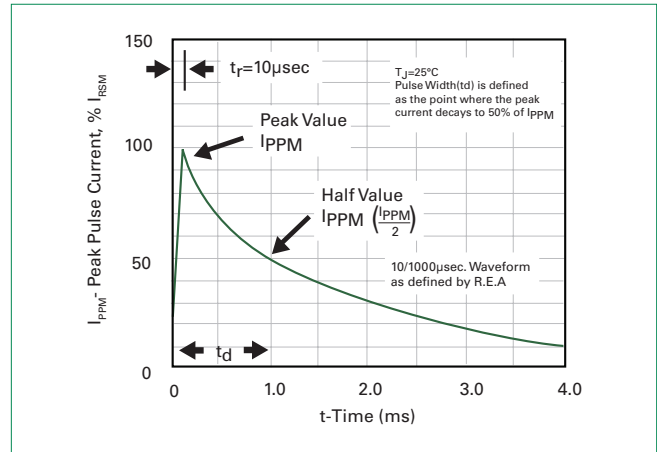


Figure 5 - Typical Junction Capacitance

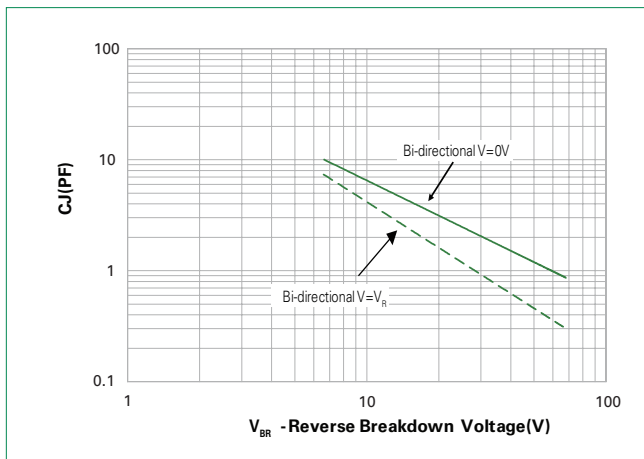
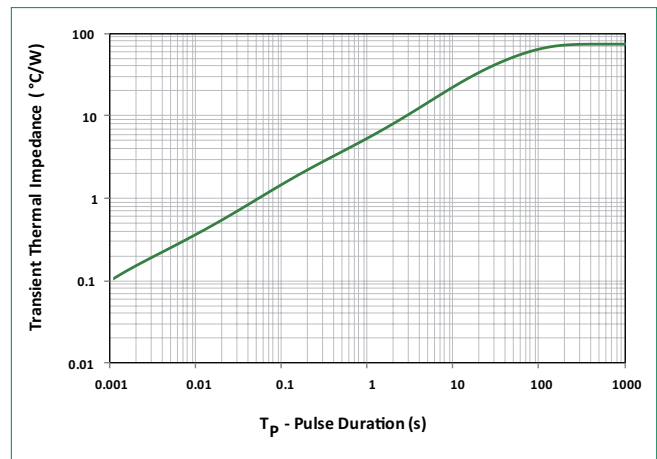


Figure 6 - Typical Transient Thermal Impedance



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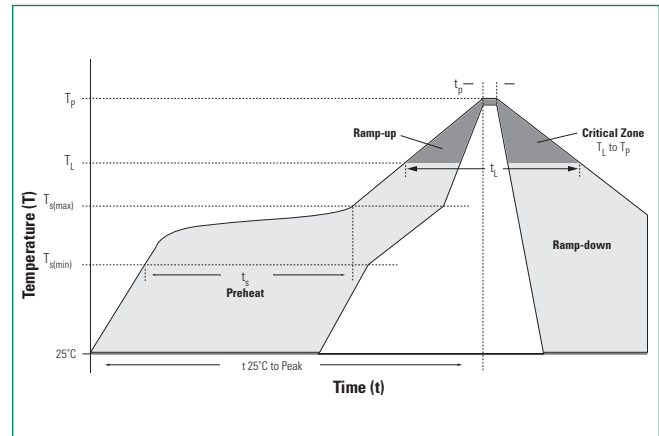
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Soldering Parameters

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 secs
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

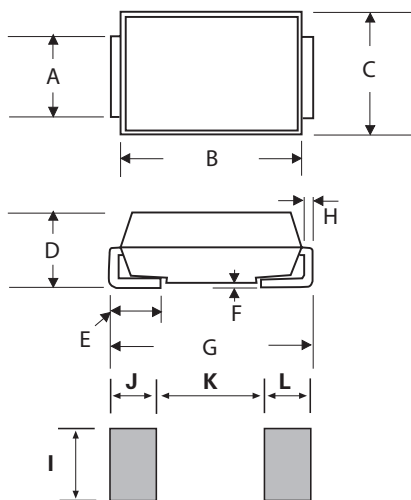
Weight	0.007 ounce, 0.21 grams
Case	JEDEC DO214AB. Molded plastic body over glass passivated junction
Terminal	Matte Tin-plated leads, Solderable per JESD22-B102

Environmental Specifications

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