



**THE DATASHEET OF  
3.0SMCJ20CA**



# 3.0SMCJ Series

## Surface Mount – 3000W – DO-214AB



### 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 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
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	$V_F$	3.5	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:

- 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.
- Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional component only, duty cycle=4 per minute maximum.

### Description

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

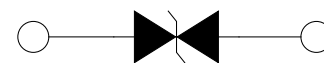
### Features

- 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.

### Functional Diagram



Bi-directional




Uni-directional

# 3.0SMCJ Series

## Surface Mount – 3000W – DO-214AB

### 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 $\mu\text{s}$ ) (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)	Agency Approval 
		UNI	BI		MIN	MAX								
-	3.0SMCJ5.0CA	-	3DDE	5.00	6.40	7.00	10	9.2	326.1	11.89	1630.5	800	0.041	X
-	3.0SMCJ6.0CA	-	3DDG	6.00	6.67	7.37	10	10.3	291.3	13.31	1456.5	800	0.046	X
-	3.0SMCJ6.5CA	-	3DDK	6.50	7.22	7.98	10	11.2	267.9	14.47	1339.5	500	0.052	X
-	3.0SMCJ7.0CA	-	3DDM	7.00	7.78	8.60	10	12.0	250.0	15.50	1250.0	200	0.058	X
-	3.0SMCJ7.5CA	-	3DDP	7.50	8.33	9.21	1	12.9	232.6	16.67	1163.0	100	0.061	X
-	3.0SMCJ8.0CA	-	3DDR	8.00	8.89	9.83	1	13.6	220.6	17.57	1103.0	50	0.064	X
-	3.0SMCJ8.5CA	-	3DDT	8.50	9.44	10.40	1	14.4	208.3	18.60	1041.5	20	0.066	X
3.0SMCJ9.0A	3.0SMCJ9.0CA	3PDV	3DDV	9.00	10.00	11.10	1	15.4	194.8	19.90	974.0	10	0.069	X
3.0SMCJ10A	3.0SMCJ10CA	3PDX	3DDX	10.00	11.10	12.30	1	17.0	176.5	21.96	882.5	5	0.071	X
3.0SMCJ11A	3.0SMCJ11CA	3PDZ	3DDZ	11.00	12.20	13.50	1	18.2	164.8	23.51	824.0	2	0.074	X
3.0SMCJ12A	3.0SMCJ12CA	3PEE	3DEE	12.00	13.30	14.70	1	19.9	150.8	25.71	754.0	2	0.075	X
3.0SMCJ13A	3.0SMCJ13CA	3PEG	3DEG	13.00	14.40	15.90	1	21.5	139.5	27.78	697.5	2	0.076	X
3.0SMCJ14A	3.0SMCJ14CA	3PEK	3DEK	14.00	15.60	17.20	1	23.2	129.3	29.97	646.5	2	0.080	X
3.0SMCJ15A	3.0SMCJ15CA	3PEM	3DEM	15.00	16.70	18.50	1	24.4	123.0	31.52	615.0	2	0.083	X
3.0SMCJ16A	3.0SMCJ16CA	3PEP	3DEP	16.00	17.80	19.70	1	26.0	115.4	33.59	577.0	2	0.084	X
3.0SMCJ17A	3.0SMCJ17CA	3PER	3DER	17.00	18.90	20.90	1	27.6	108.7	35.66	543.5	2	0.085	X
3.0SMCJ18A	3.0SMCJ18CA	3PET	3DET	18.00	20.00	22.10	1	29.2	102.7	37.73	513.5	2	0.088	X
3.0SMCJ20A	3.0SMCJ20CA	3PEV	3DEV	20.00	22.20	24.50	1	32.4	92.6	41.86	463.0	2	0.091	X
3.0SMCJ22A	3.0SMCJ22CA	3PEX	3DEX	22.00	24.40	26.90	1	35.5	84.5	45.87	422.5	2	0.092	X
3.0SMCJ24A	3.0SMCJ24CA	3PEZ	3DEZ	24.00	26.70	29.50	1	38.9	77.1	50.26	385.5	2	0.092	X
3.0SMCJ26A	3.0SMCJ26CA	3PFE	3DFE	26.00	28.90	31.90	1	42.1	71.3	54.39	356.5	2	0.093	X
3.0SMCJ28A	3.0SMCJ28CA	3PFG	3DFG	28.00	31.10	34.40	1	45.4	66.1	58.66	330.5	2	0.094	X
3.0SMCJ30A	3.0SMCJ30CA	3PFK	3DFK	30.00	33.30	36.80	1	48.4	62.0	62.53	310.0	2	0.096	X
3.0SMCJ33A	3.0SMCJ33CA	3PFM	3DFM	33.00	36.70	40.60	1	53.3	56.3	68.86	281.5	2	0.097	X
3.0SMCJ36A	3.0SMCJ36CA	3PFP	3DFP	36.00	40.00	44.20	1	58.1	51.6	75.06	258.0	2	0.098	X
3.0SMCJ40A	3.0SMCJ40CA	3PFR	3DFR	40.00	44.40	49.10	1	64.5	46.5	83.33	232.5	2	0.099	X
-	3.0SMCJ43CA	-	3DFT	43.00	47.80	52.80	1	69.4	43.2	89.66	216.0	2	0.100	X
-	3.0SMCJ45CA	-	3DFV	45.00	50.00	55.30	1	72.7	41.3	93.93	206.5	2	0.101	X
-	3.0SMCJ48CA	-	3DFX	48.00	53.30	58.90	1	77.4	38.8	100.00	194.0	2	0.101	X
-	3.0SMCJ51CA	-	3DFZ	51.00	56.70	62.70	1	82.4	36.4	106.46	182.0	2	0.101	X
-	3.0SMCJ54CA	-	3DGE	54.00	60.00	66.30	1	87.1	34.4	112.53	172.0	2	0.102	X
-	3.0SMCJ58CA	-	3DGG	58.00	64.40	71.20	1	93.6	32.1	120.93	160.5	2	0.103	X

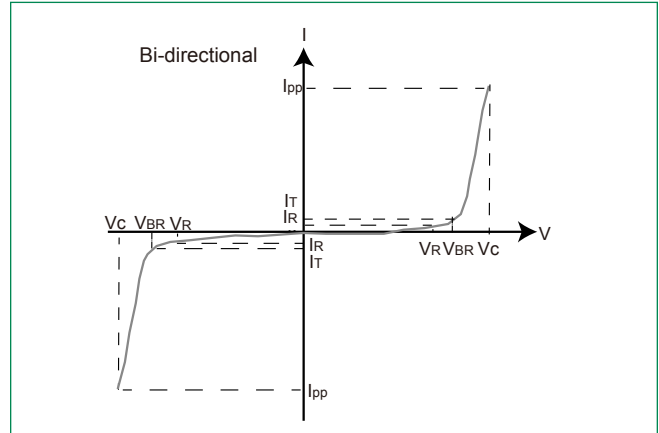
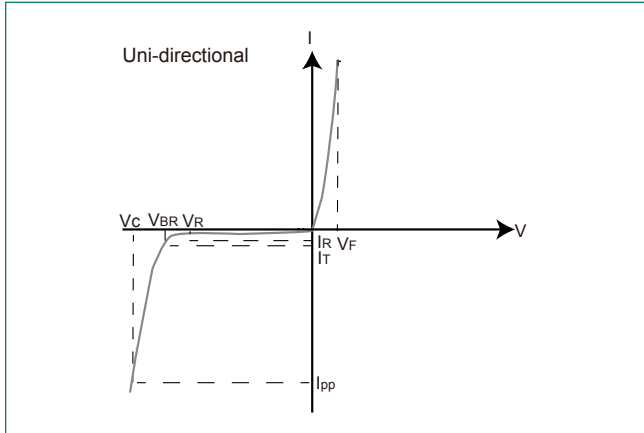
## Notes:

- $V_{BR}$  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

# 3.0SMCJ Series

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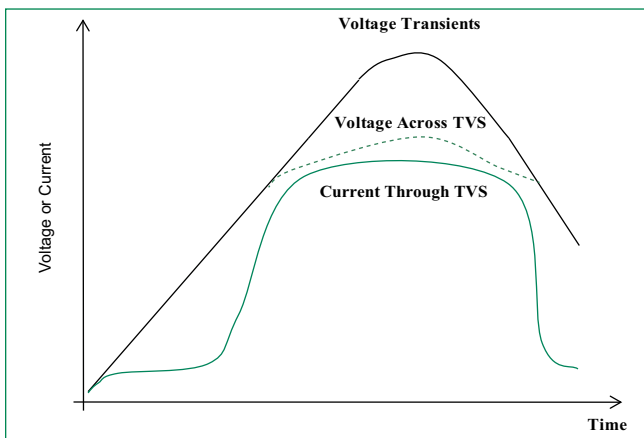
### I-V Curve Characteristics



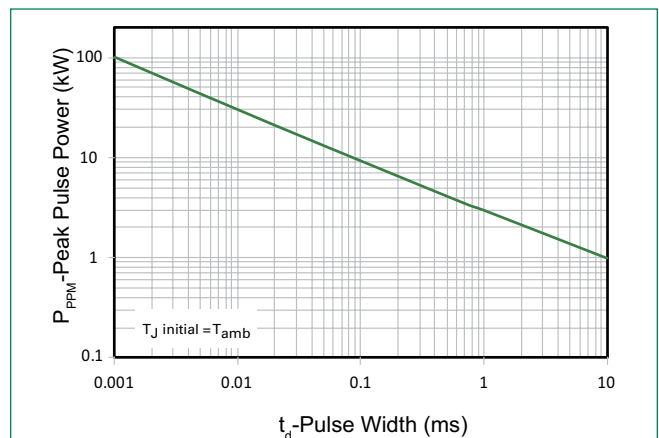
- $P_{PPM}$  **Peak Pulse Power Dissipation** -- Max power dissipation
- $V_R$  **Stand-off Voltage** -- Maximum voltage that can be applied to the TVS without operation
- $V_{BR}$  **Breakdown Voltage** -- Maximum voltage that flows though the TVS at a specified test current ( $I_T$ )
- $V_C$  **Clamping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



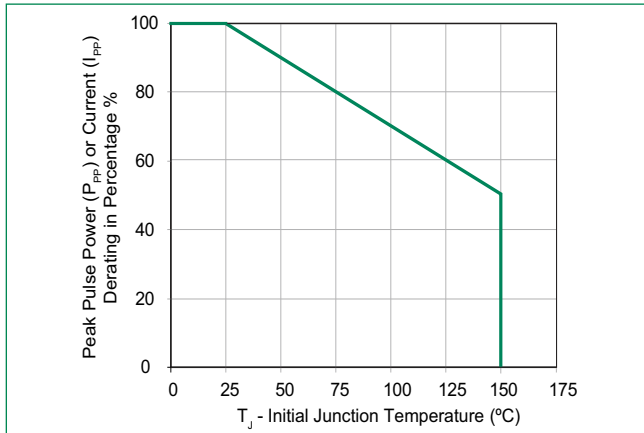
**Figure 2:**  
Peak Pulse Power Rating



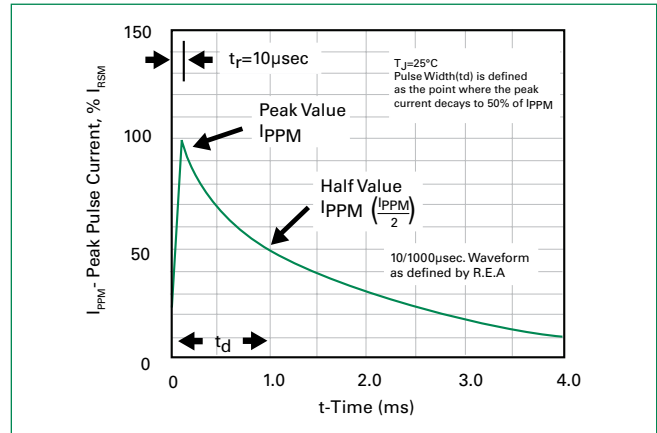
# 3.0SMCJ Series

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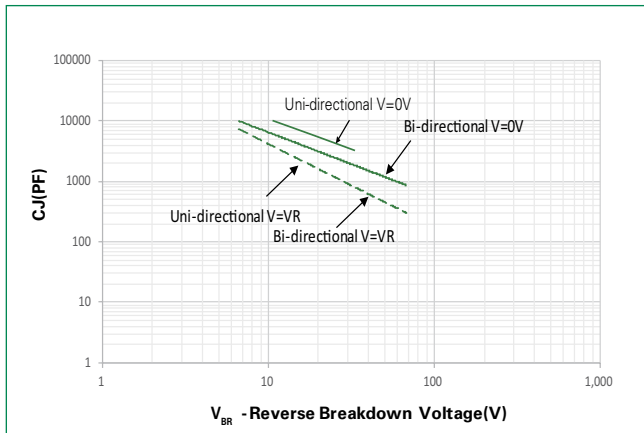
**Figure 3:**  
Peak Pulse Power Derating Curve



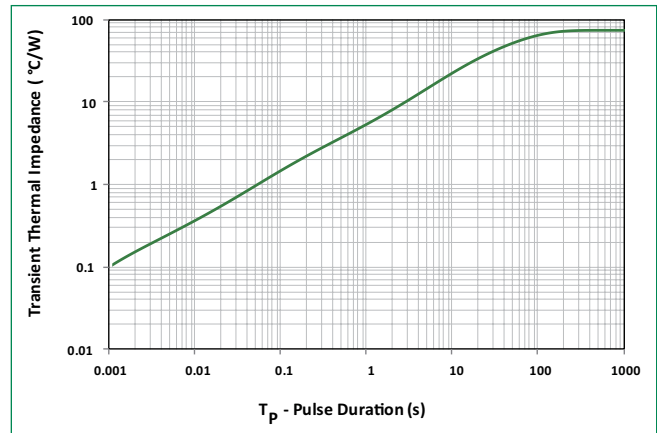
**Figure 4:**  
Pulse Waveform



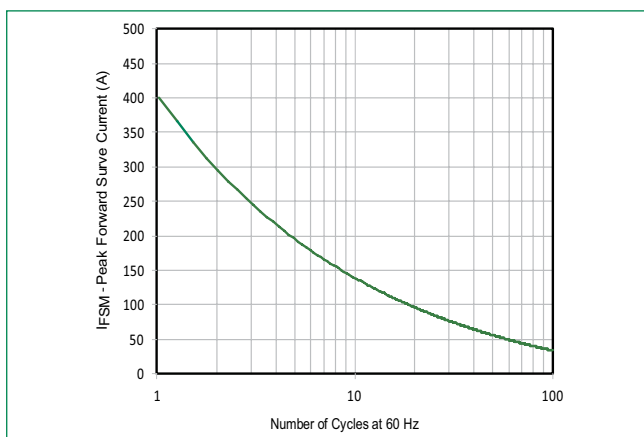
**Figure 5:**  
Typical Junction Capacitance



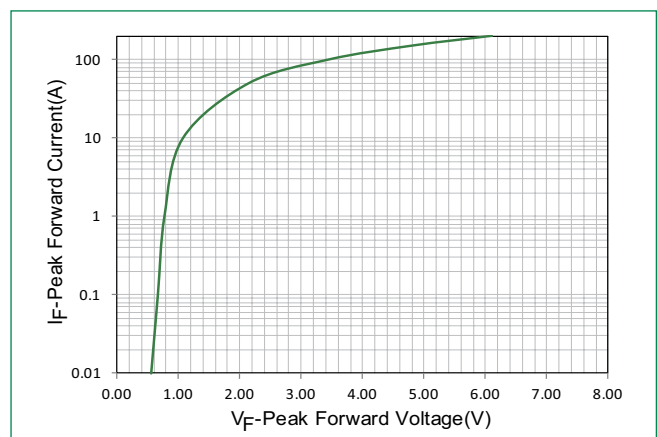
**Figure 6:**  
Typical Transient Thermal Impedance



**Figure 7:**  
Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only



**Figure 8:**  
Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)

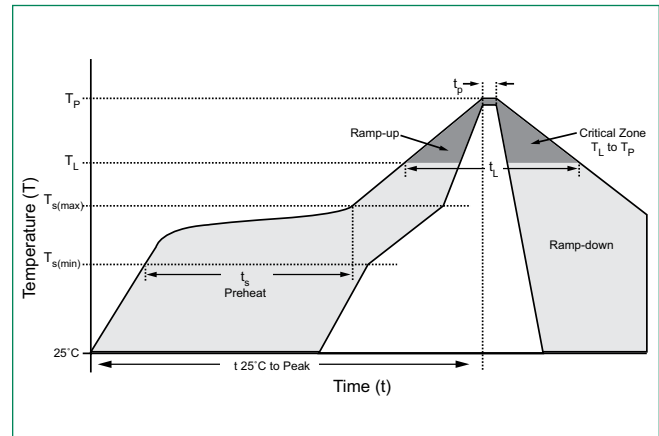


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## Surface Mount – 3000W – DO-214AB

### 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) ( $t_p$ )	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

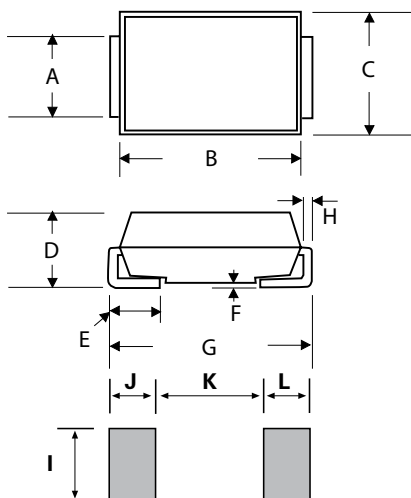
<b>Weight</b>	0.007 ounce, 0.21 grams
<b>Case</b>	JEDEC DO214AB. Molded plastic body over glass passivated junction
<b>Terminal</b>	Matte Tin-plated leads, Solderable per JESD22-B102

### 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)

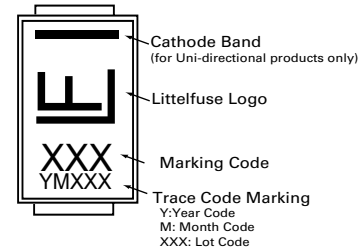
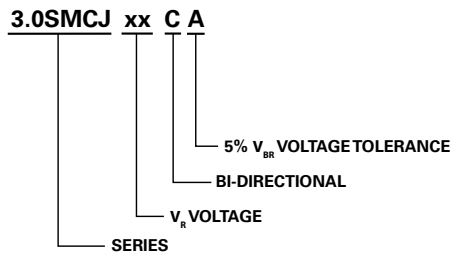


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.114	0.126	2.900	3.200
B	0.260	0.280	6.600	7.110
C	0.220	0.245	5.590	6.220
D	0.079	0.103	2.060	2.620
E	0.030	0.060	0.760	1.520
F	-	0.008	-	0.203
G	0.305	0.320	7.750	8.130
H	0.006	0.012	0.152	0.305
I	0.129	-	3.300	-
J	0.094	-	2.400	-
K	-	0.165	-	4.200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

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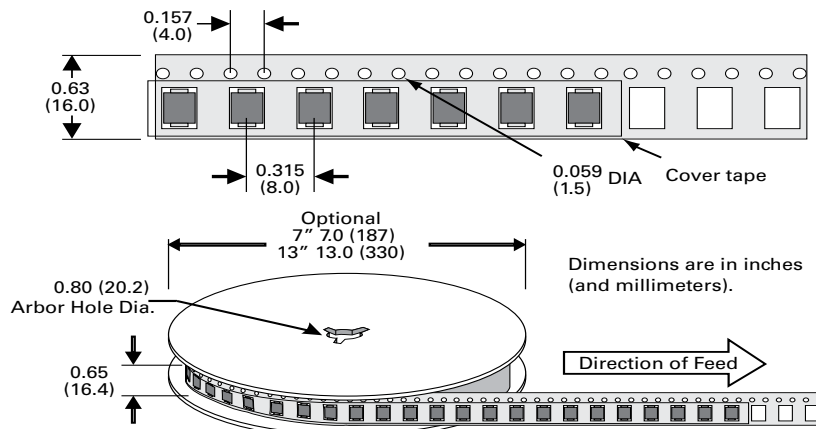
### Part Marking System



### Packing Options

Part Number	Component Package	Quantity	Packaging Option	Packaging Specification
3.0SMCJxxXX	DO-214AB	3000	Tape & Reel - 16mm tape/13" reel	EIA-481

### Tape and Reel Specification



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