

3.0SMCJ Series

Surface Mount – 3000W – DO-214AB



Additional Information



Resources



Accessories



Samples

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 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
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 $0.31 \times 0.31"$ ($8.0 \times 8.0\text{mm}$) 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.

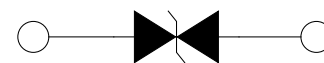
Features & Benefits

- 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: $260^\circ\text{C}/40\text{sec}$
- $V_{BR} @ T_J = V_{BR} @ 25^\circ\text{C} \times (1 + \alpha T) \times (T_J - 25)$ (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°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°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} (10/1000μs) (V)	Maximum Peak Pulse Current I _{pp} (10/1000μs) (A)	Maximum Clamping Voltage V _c @ I _{pp} (8/20μs) (V)	Maximum Peak Pulse Current I _{pp} (8/20μs) (A)	Maximum Reverse Leakage I _R @ V _R (μA)	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

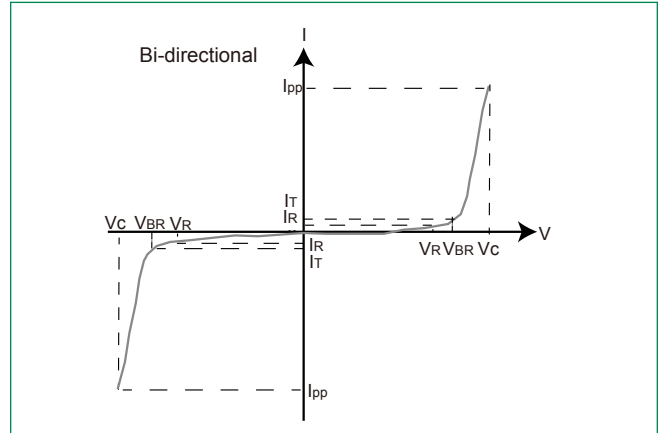
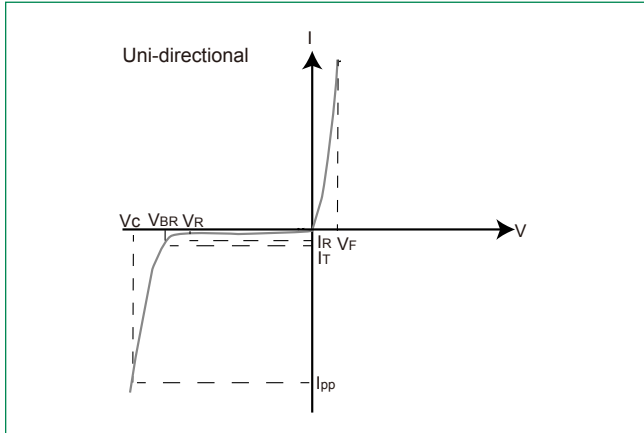
Notes:

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

3.0SMCJ Series

Surface Mount – 3000W – DO-214AB

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_{pp} (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

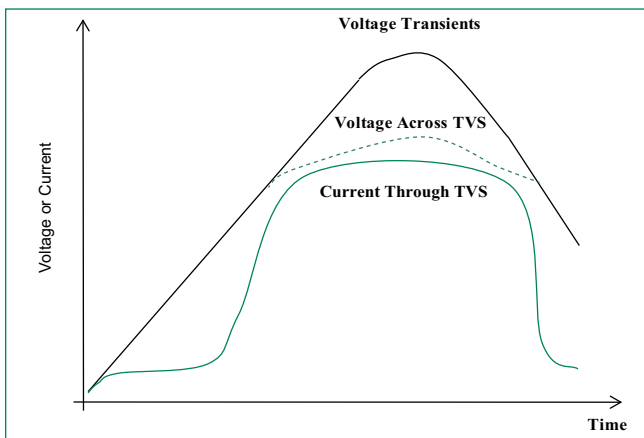
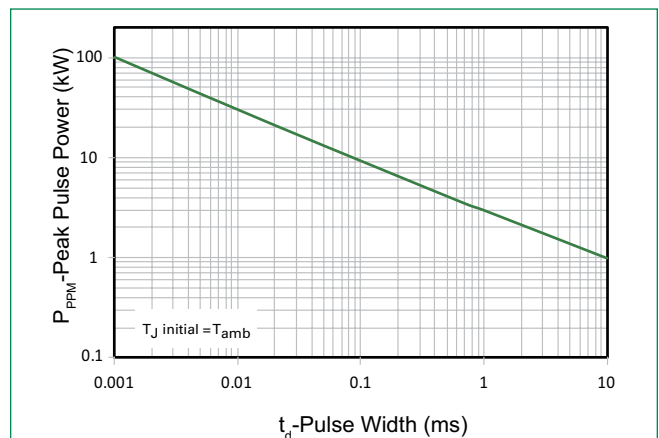


Figure 2:
Peak Pulse Power Rating



3.0SMCJ Series

Surface Mount – 3000W – DO-214AB

Figure 3:
Peak Pulse Power Derating Curve

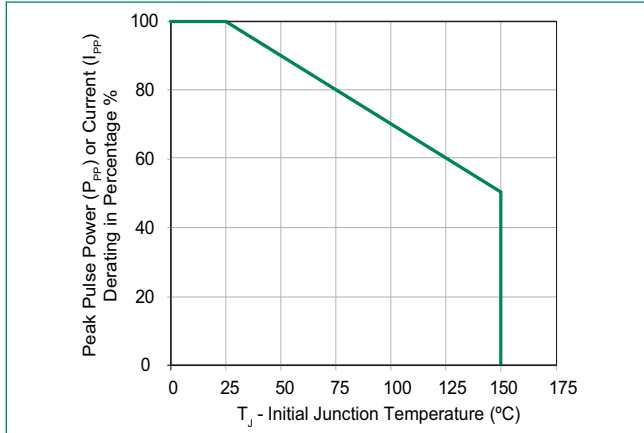


Figure 4:
Pulse Waveform

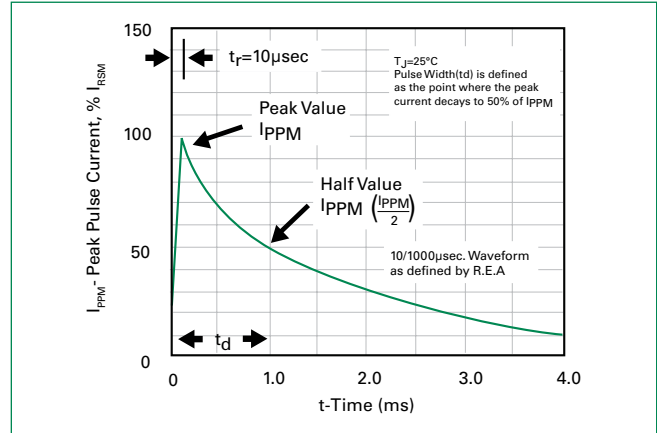


Figure 5:
Typical Junction Capacitance

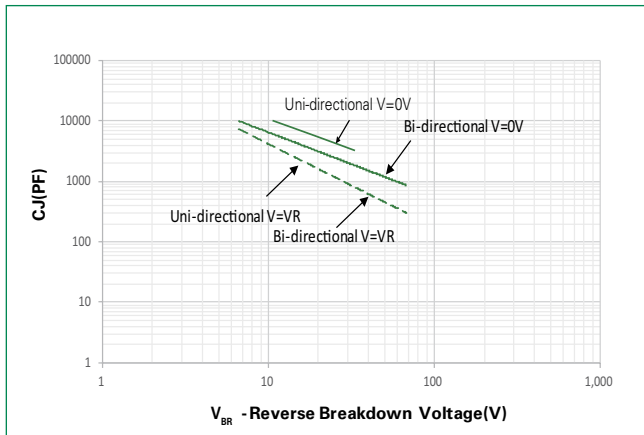


Figure 6:
Typical Transient Thermal Impedance

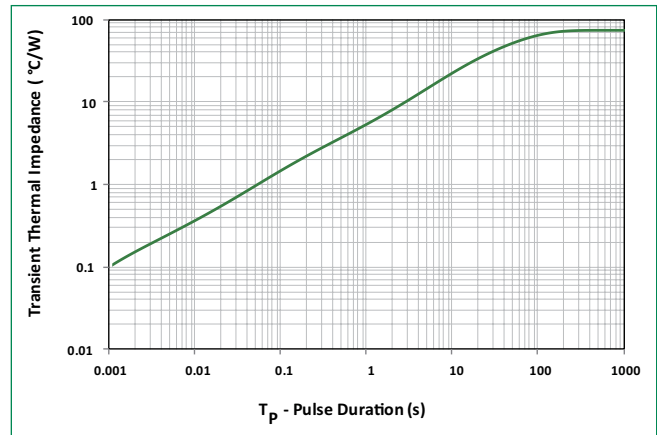


Figure 7:
Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only

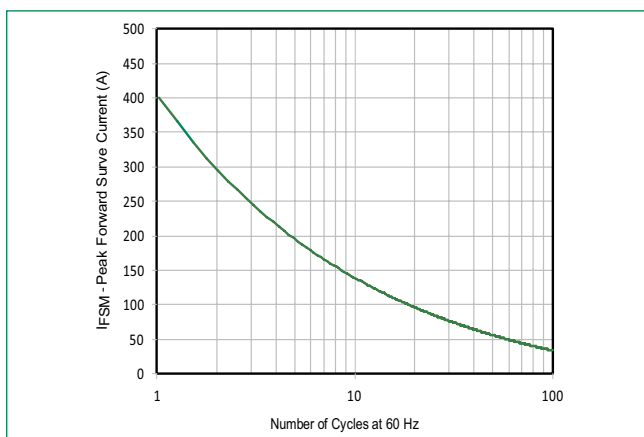
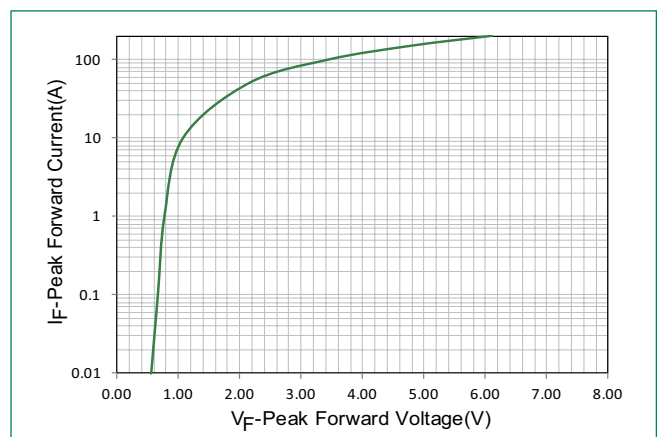


Figure 8:
Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)

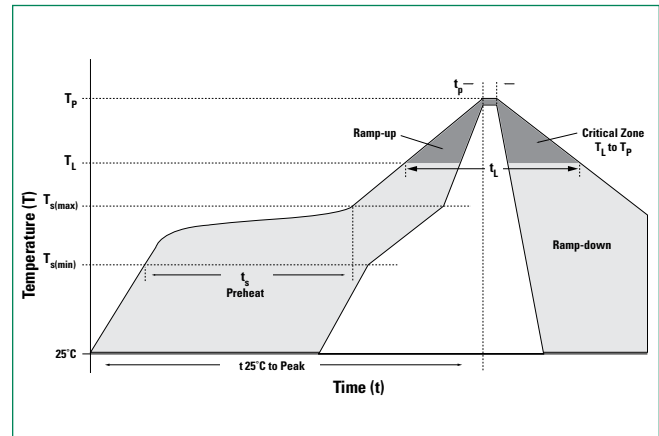


3.0SMCJ Series

Surface Mount – 3000W – DO-214AB

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)	60-120 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)		30 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

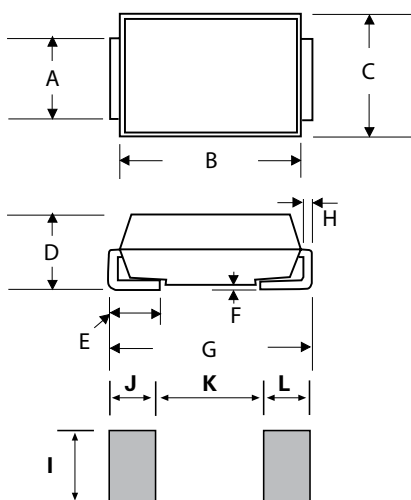
Weight	0.007 ounce, 0.21 grams
Case	JEDEC DO214AB. Molded plastic body over glass passivated junction
Terminal	Matte Tin-plated leads, Solderable per JESD22-B102

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)

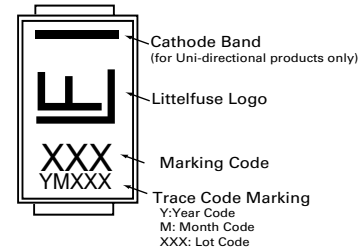
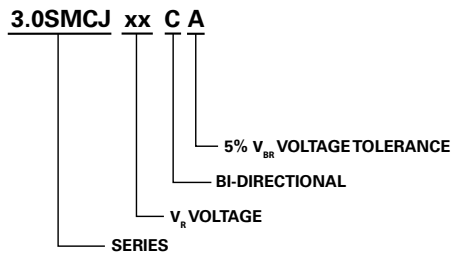


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.114	0.126	2.900	3.200
B	0.260	0.280	6.600	7.110
C	0.220	0.245	5.590	6.220
D	0.079	0.103	2.060	2.620
E	0.030	0.060	0.760	1.520
F	-	0.008	-	0.203
G	0.305	0.320	7.750	8.130
H	0.006	0.012	0.152	0.305
I	0.129	-	3.300	-
J	0.094	-	2.400	-
K	-	0.165	-	4.200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

3.0SMCJ Series

Surface Mount – 3000W – DO-214AB

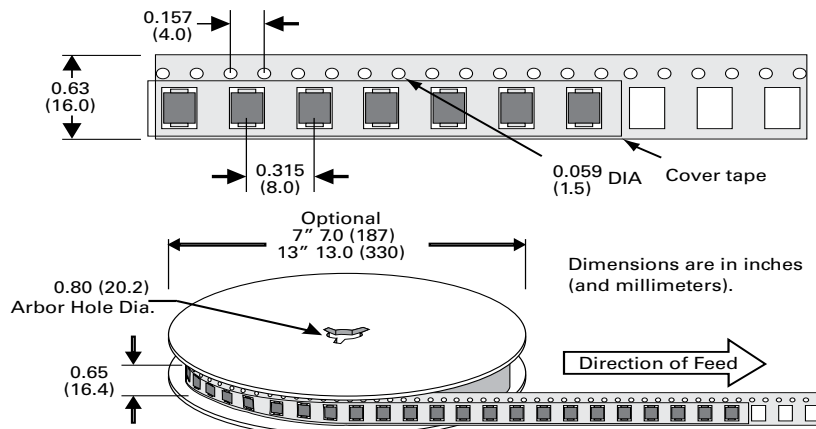
Part Marking System



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



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 <http://www.littelfuse.com/disclaimer-electronics>.