



**THE DATASHEET OF  
3.0SMC24A**

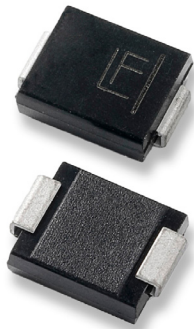


# 3.0SMC Series

## Surface Mount



Uni-directional



### Additional Information



Resources



Accessories



Samples

### Maximum Ratings and Thermal Characteristics ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
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 1)	$I_{FSM}$	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	$^\circ\text{C}/\text{W}$
Typical Thermal Resistance Junction to Ambient	$R_{\theta JA}$	75	$^\circ\text{C}/\text{W}$

#### Notes:

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

### Description

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

### Features & Benefits

- 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
- IEC-61000-4-2 ESD 30kV(Air), 30kV (Contact)
- $I_{pp}$  is specified @ 8/20 $\mu\text{s}$  surge waveform
- Built-in strain relief
- $V_{BR} @ T_J = V_{BR} @ 25^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$  ( $\alpha$ : Temperature Coefficient, typical value is 0.1%)
- 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 $^\circ\text{C}/40\text{sec}$
- 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 devices 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



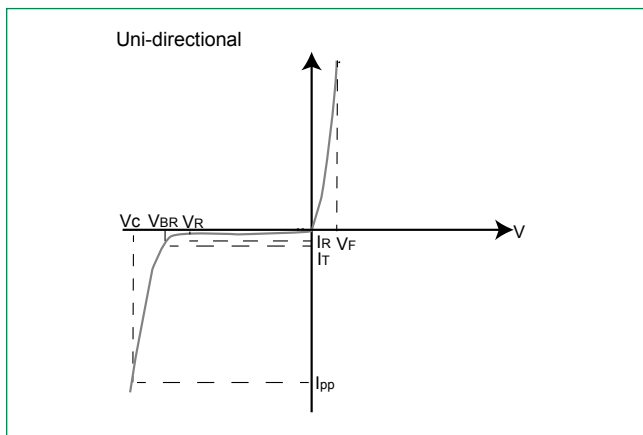
# 3.0SMC Series

## Surface Mount

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

Part Number (Uni)	Marking	Reverse Stand off Voltage $V_R$ (Volts)	Breakdown Voltage $V_{BR}$ (Volts) @ $I_T$		Test Current $I_T$ (mA)	Maximum Clamping Voltage $V_C$ @ $8/20\mu\text{S}$ $I_{pp}$ (V)	Maximum Peak Pulse Current $I_{pp}$ @ $8/20\mu\text{S}$ (A)	Maximum Reverse Leakage $I_R$ @ $V_R$ ( $\mu\text{A}$ )
			MIN	MAX				
3.0SMC20A	YLA	20.0	22.20	24.50	1	42	570	1
3.0SMC24A	YLC	24.0	26.70	29.50	1	51	520	1
3.0SMC28A	YLE	28.0	31.10	34.40	1	59	470	1
3.0SMC30A	YLF	30.0	33.30	36.80	1	62	420	1
3.0SMC33A	YLG	33.0	36.70	40.60	1	70	365	1

### 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  $V_R$   
 $V_F$  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

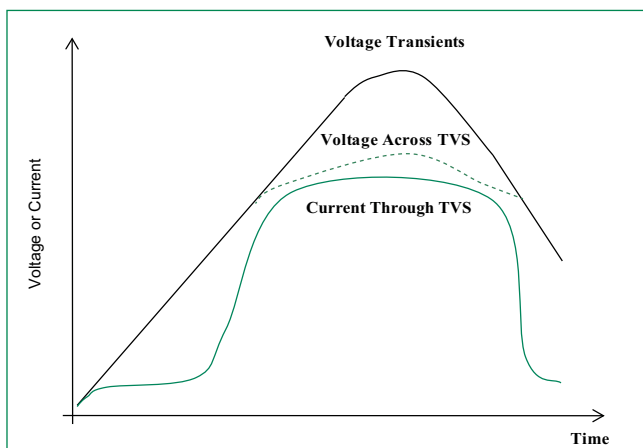
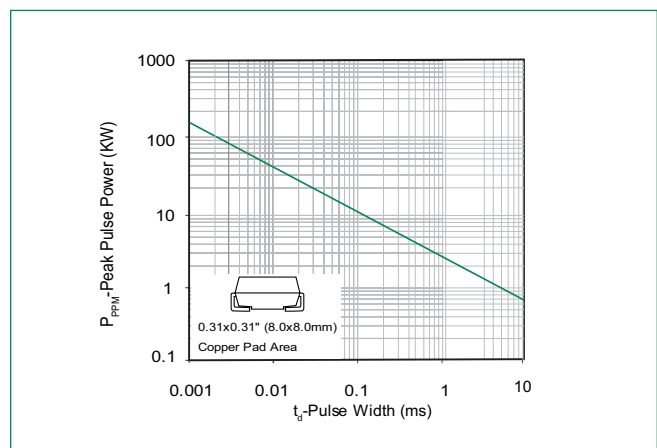


Figure 2 - Peak Pulse Power Rating

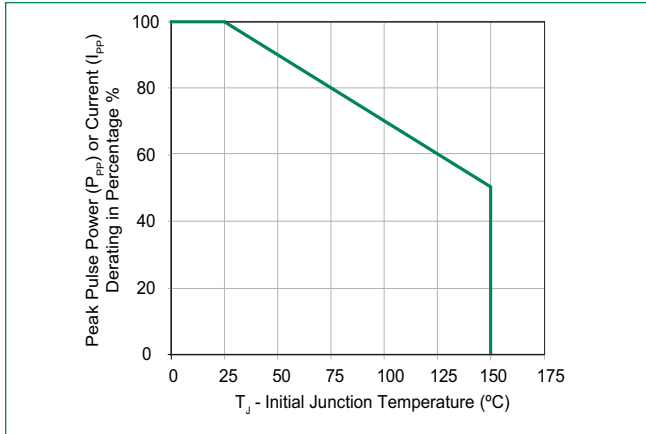


# 3.0SMC Series

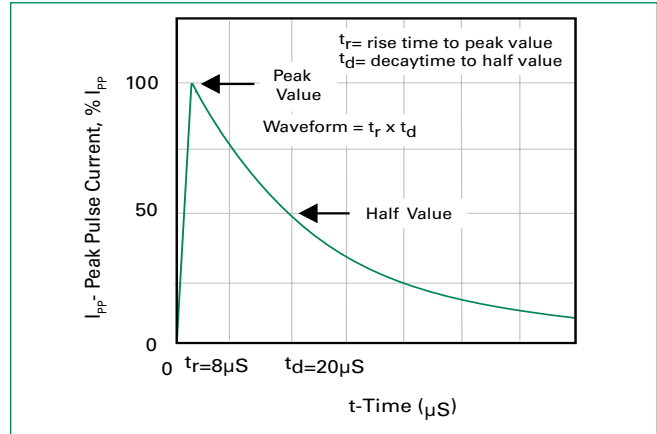
## Surface Mount

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

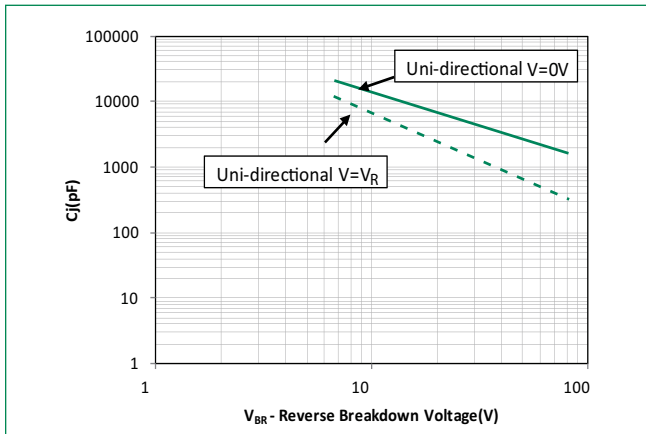
**Figure 3 - Peak Pulse Power Derating Curve**



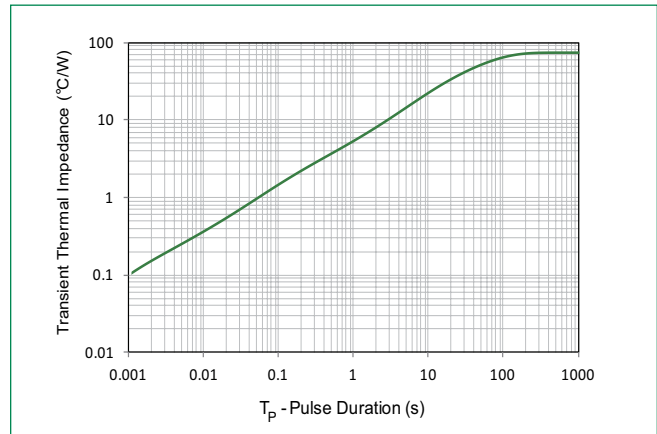
**Figure 4 - Pulse Waveform**



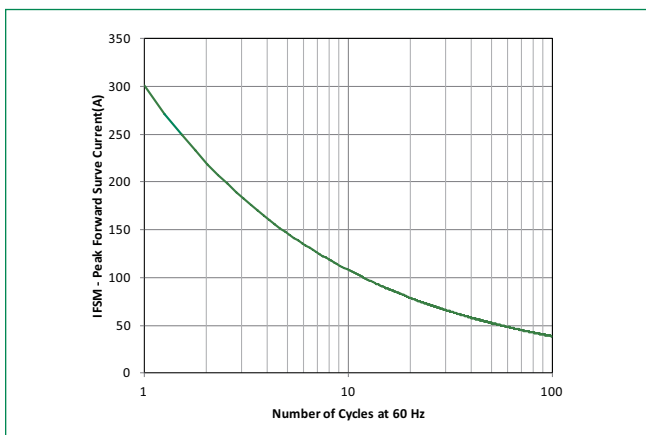
**Figure 5 - Typical Junction Capacitance**



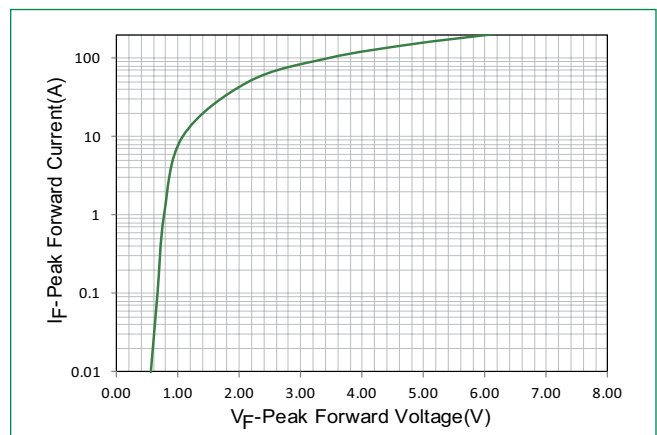
**Figure 6 - Typical Transient Thermal Impedance**



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



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

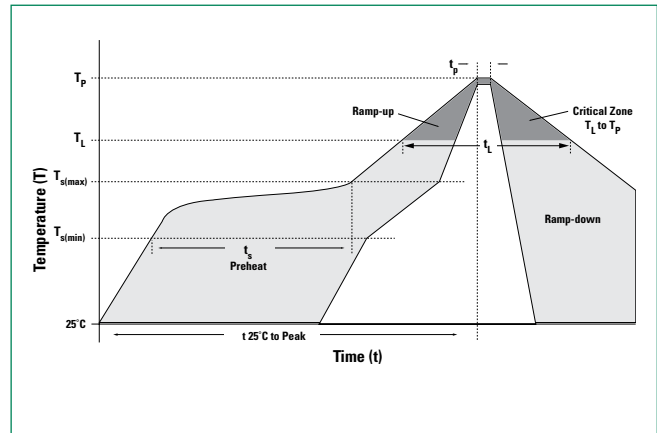


# 3.0SMC Series

## Surface Mount

### 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 – 180 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 ( $T_A$ ) (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



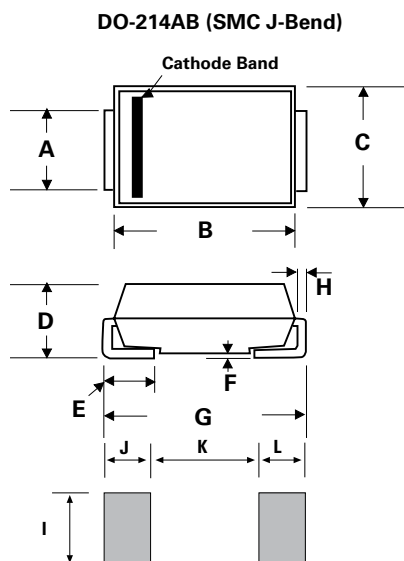
### Physical Specifications

<b>Weight</b>	0.007 ounce, 0.21 grams
<b>Case</b>	JEDEC DO214AB. Molded plastic body over glass passivated junction
<b>Polarity</b>	Color band denotes positive end (cathode) except Bidirectional.
<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

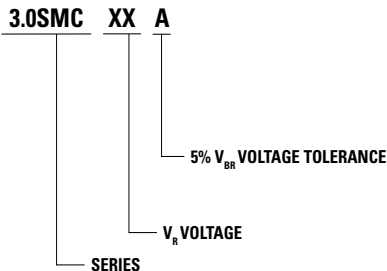


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.114	0.126	2.900	3.200
B	0.260	0.280	6.600	7.110
C	0.220	0.245	5.590	6.220
D	0.079	0.103	2.060	2.620
E	0.030	0.060	0.760	1.520
F	-	0.008	-	0.203
G	0.305	0.320	7.750	8.130
H	0.006	0.012	0.152	0.305
I	0.129	-	3.300	-
J	0.094	-	2.400	-
K	-	0.165	-	4.200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

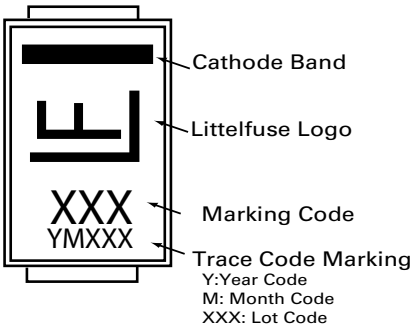
# 3.0SMC Series

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### Part Numbering System



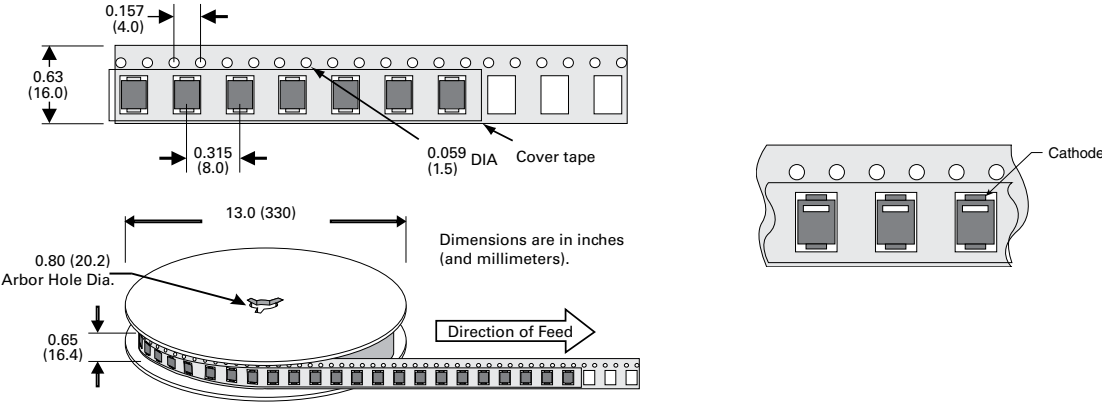
### Part Marking System



### Packaging Options

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

### Tape and Reel Specification



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