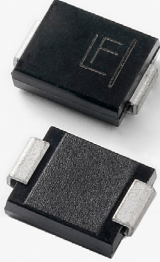


# 4.0SMDJ

## Surface Mount – 4000W



Uni-directional



### 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 at $T_A=25^{\circ}\text{C}$ by 10/1000 $\mu\text{s}$ Waveform (Fig.2)(Note 1), (Note 2)	$P_{PPM}$	4000	W
Power Dissipation on Infinite Heat Sink at $T_A=50^{\circ}\text{C}$	$P_D$	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	$^{\circ}\text{C}/\text{W}$
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  $T_A = 25^{\circ}\text{C}$  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 device only, duty cycle=4 per minute maximum.

## Description

The 4.0SMDJ is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

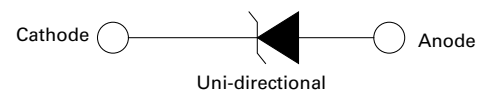
## Features and Benefits

- 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 15kV(Air), 8kV (Contact)
- ESD protection of data lines in accordance with IEC 61000-4-2 (IEC801-2)
- EFT protection of data lines in accordance with IEC 61000-4-4 (IEC801-4)
- Built-in strain relief
- Glass passivated chip junction
- 4000W peak pulse power capability at 10/1000 $\mu\text{s}$  waveform, repetition rate (duty cycles):0.01%
- Fast response time: typically less than 1.0ps from 0V to BV min
- Excellent clamping capability
- Low incremental surge resistance
- Meet MSL level 1 per J-STD-020, and high temperature soldering guaranteed: 260 $^{\circ}\text{C}/10\text{sec}$
- Matte tin lead-free plated
- Halogen free and RoHS compliant
- Plastic package is flammability rated V-0 per UL 94

## 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



# 4.0SMDJ

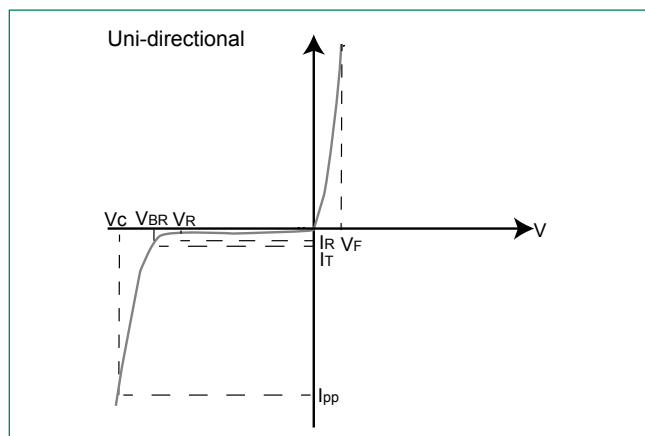
## Surface Mount – 4000W

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

Part Number	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 Clamping Voltage $V_C$ @ $I_{PP}$ (8/20 $\mu\text{S}$ ) (V)	Maximum Peak Pulse Current $I_{PP}$ (10/1000 $\mu\text{S}$ ) (A)	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 
			MIN	MAX								
4.0SMDJ10A	4PDX	10.0	11.10	12.30	1	17.0	29.0	235.5	1480.0	5	0.071	x
4.0SMDJ11A	4PDZ	11.0	12.20	13.50	1	18.2	31.0	220.0	1385.0	2	0.074	x
4.0SMDJ12A	4PEE	12.0	13.30	14.70	1	19.9	32.0	201.5	1270.0	2	0.075	x
4.0SMDJ13A	4PEG	13.0	14.40	15.90	1	21.5	34.0	186.5	1175.0	2	0.076	x
4.0SMDJ14A	4PEK	14.0	15.60	17.20	1	23.2	35.0	172.5	1085.0	2	0.080	x
4.0SMDJ15A	4PEM	15.0	16.70	18.50	1	24.4	37.0	164.0	1033.0	2	0.083	x
4.0SMDJ18A	4PET	18.0	20.00	22.10	1	29.2	42.0	137.0	860.0	2	0.088	x
4.0SMDJ20A	4PEV	20.0	22.20	24.50	1	32.4	45.0	123.5	780.0	2	0.091	x
4.0SMDJ24A	4PEZ	24.0	26.70	29.50	1	38.9	51.0	103.0	650.0	2	0.092	x

$V_{BR} @ T_J = V_{BR} @ 25^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$  ( $\alpha$ : Temperature Coefficient)

### 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 suppressor at a specified  $I_{PPM}$  (peak impulse current)

**$I_R$  Reverse Leakage Current** – Current measured at  $V_R$

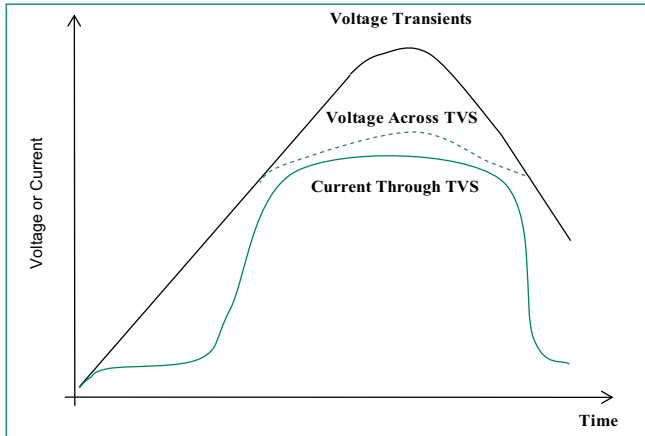
**$V_F$  Forward Voltage Drop for Uni-directional**

# 4.0SMDJ

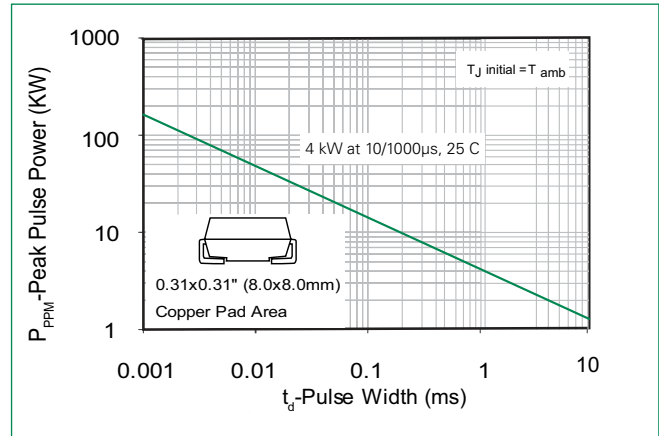
Surface Mount – 4000W

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

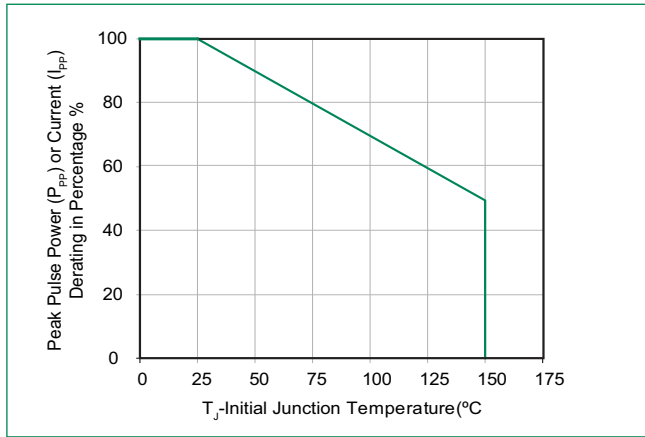
**Figure 1 - TVS Transients Clamping Waveform**



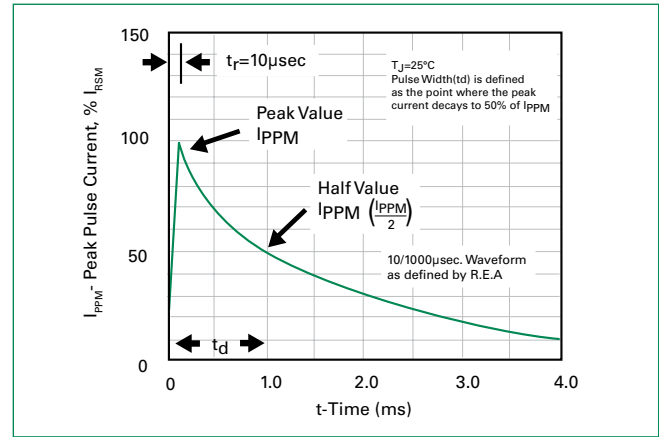
**Figure 2 - Peak Pulse Power Rating**



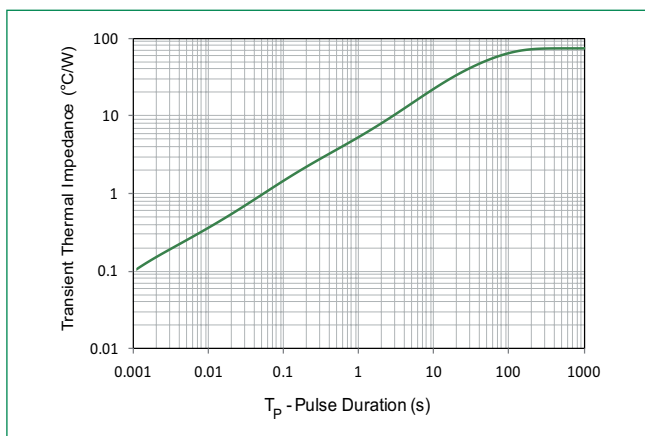
**Figure 3 - Peak Pulse Power Derating Curve**



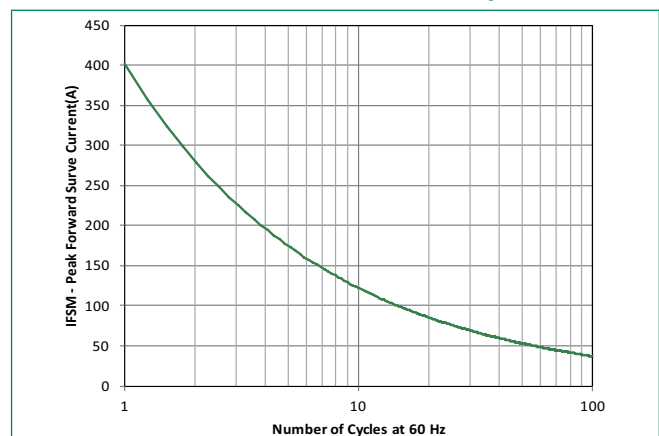
**Figure 4 - Pulse Waveform**



**Figure 5 - Typical Transient Thermal Impedance**



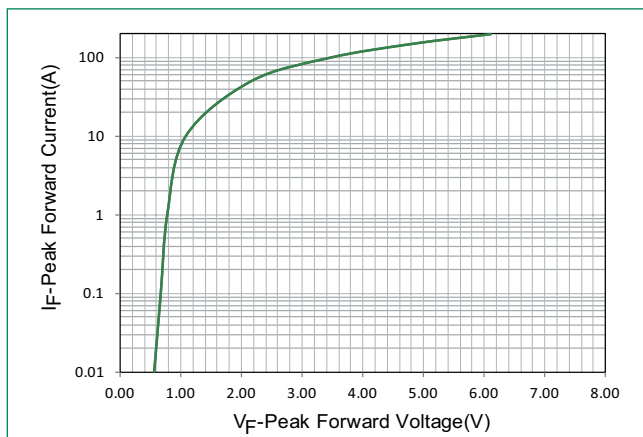
**Figure 6 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only**



# 4.0SMDJ

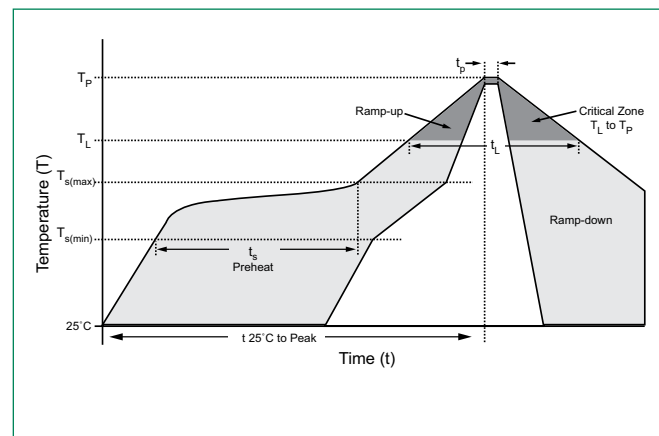
Surface Mount – 4000W

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

**Figure 7 - Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)**

## 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 – 120 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_L</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 $^{+0/-5}$ °C
<b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>		30 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

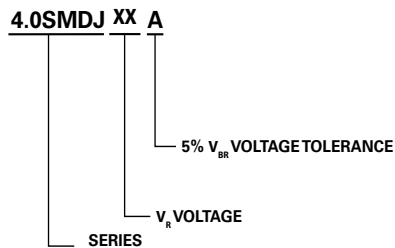
## Environmental Specifications

<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

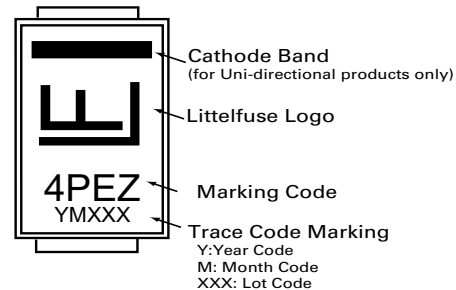
# 4.0SMDJ

## Surface Mount – 4000W

### Part Numbering System



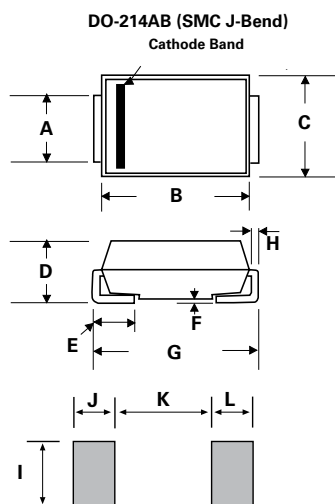
### Part Marking System



### Packaging Options

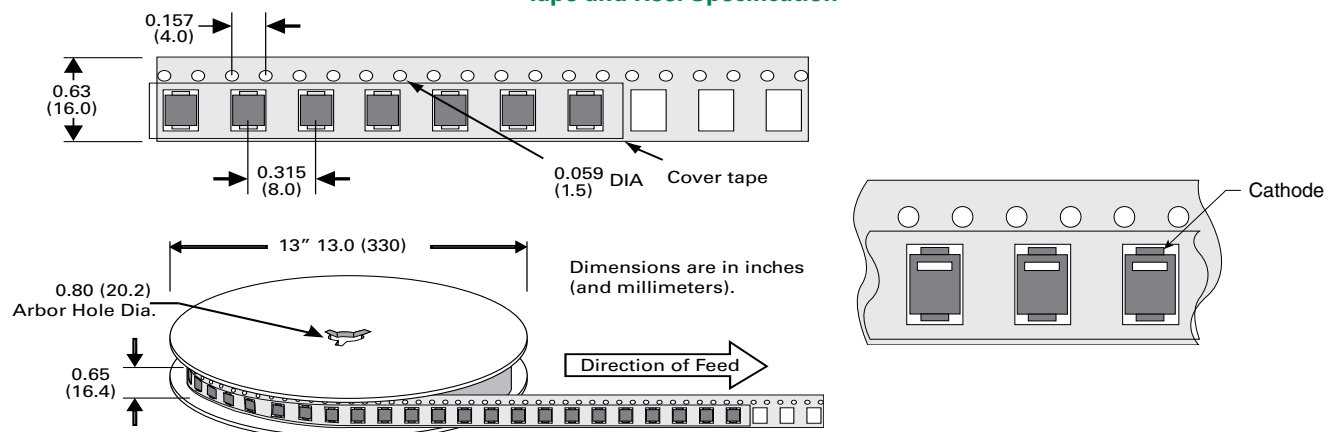
Part number	Component Package	Quantity	Packaging Option	Packaging Specification
4.0SMDJxxA	DO-214AB	3000	Tape & Reel - 16mm tape/13" reel	EIA STD RS-481

### 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	-

### Tape and Reel Specification



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