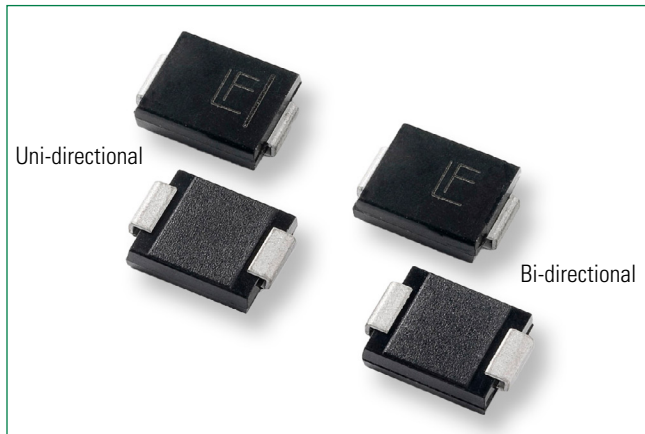


# TP5.0SMDJ Series

## Surface Mount - 5000W



### Agency Approvals

Agency	Agency File Number
	E230531

### Maximum Ratings & Thermal Characteristics

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

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation at $T_L = 25^\circ\text{C}$ by 10/1000 $\mu\text{s}$ Waveform (Fig.2)(Note 1), (Note 2)	$P_{PPM}$	5000	W
Power Dissipation on Infinite Heat Sink at $T_L = 50^\circ\text{C}$	$P_{M(AV)}$	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	$V_F$	5.0	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  $T_A = 25^\circ\text{C}$  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 TP5.0SMDJ series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

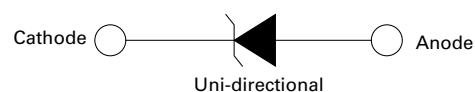
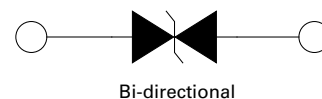
### Features & Benefits

- High reliability application and automotive grade AEC-Q101 qualified
- 5000W peak pulse power capability at 10/1000 $\mu\text{s}$  waveform, repetition rate (duty cycles):0.01%
- SMD low profile surface mount package minimizing PCB footprint
- 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  $V_{BR}$  min
- Excellent clamping capability
- Low incremental surge resistance
- Typical  $I_R$  less than 5 $\mu\text{A}$  when  $V_{BR\ min} > 22\text{V}$
- High temperature 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)
- 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)
- Recognized to UL 497B as an Isolated Loop Circuit Protector

### 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



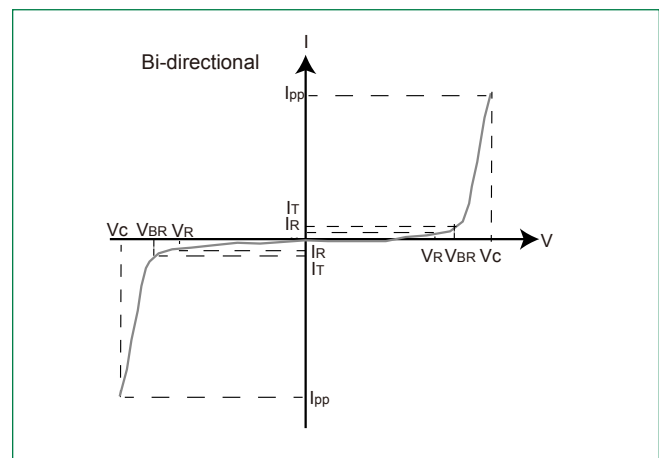
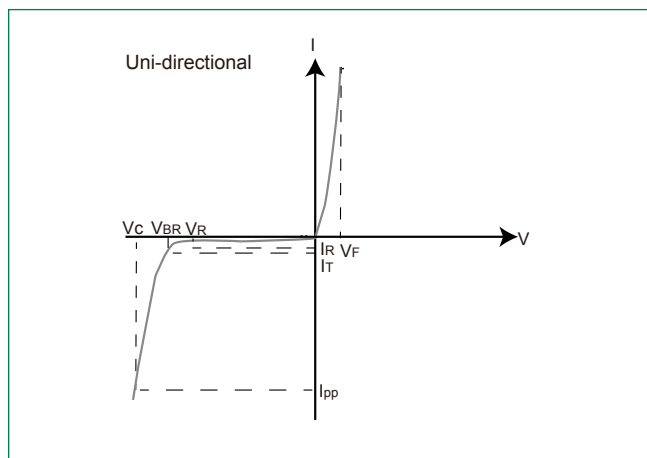
# TP5.0SMDJ Series

## Surface Mount - 5000W

### Electrical Characteristics

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 $\mu$ s) (V)	Maximum Peak Pulse Current $I_{PP}$ (10/1000 $\mu$ s) (A)	Maximum Clamping Voltage $V_C$ @ $I_{PP}$ (8/20 $\mu$ s) (V)	Maximum Peak Pulse Current $I_{PP}$ (8/20 $\mu$ s) (A)	Maximum Reverse Leakage $I_R$ @ $V_R$ ( $\mu$ A)	Maximum Temperature coefficient of $V_{BR}$ (%/C)	RL
		UNI	BI		MIN	MAX								
TP5.0SMDJ40A	TP5.0SMDJ40CA	T5PFR	T5BFR	40	44.4	49.1	1	64.5	77.6	83.3	582.0	5	0.099	X
TP5.0SMDJ43A	TP5.0SMDJ43CA	T5PFT	T5BFT	43	47.8	52.8	1	69.4	72.1	89.7	540.0	5	0.100	X
TP5.0SMDJ45A	TP5.0SMDJ45CA	T5PFV	T5BFV	45	50.0	55.3	1	72.7	68.8	93.9	516.0	5	0.101	X
TP5.0SMDJ48A	TP5.0SMDJ48CA	T5PFX	T5BFX	48	53.3	58.9	1	77.4	64.7	100.0	485.3	5	0.101	X
TP5.0SMDJ51A	TP5.0SMDJ51CA	T5PFZ	T5BFZ	51	56.0	62.7	1	82.4	60.7	106.5	455.3	5	0.101	X
TP5.0SMDJ54A	TP5.0SMDJ54CA	T5PGE	T5BGE	54	60.0	66.3	1	87.1	57.5	112.5	431.3	5	0.102	X
TP5.0SMDJ58A	TP5.0SMDJ58CA	T5PGG	T5BGG	58	64.4	71.2	1	93.6	53.5	120.9	401.3	5	0.103	X
TP5.0SMDJ60A	TP5.0SMDJ60CA	T5PGK	T5BGK	60	66.7	73.7	1	96.8	51.7	125.1	387.8	5	0.103	X
TP5.0SMDJ64A	TP5.0SMDJ64CA	T5PGM	T5BGM	64	71.1	78.6	1	103.0	48.6	133.1	364.5	5	0.104	X
TP5.0SMDJ70A	TP5.0SMDJ70CA	T5PGP	T5BGP	70	77.8	86.0	1	113.0	44.3	146.0	332.2	5	0.105	X
TP5.0SMDJ75A	TP5.0SMDJ75CA	T5PGR	T5BGR	75	83.3	92.1	1	121.0	41.4	156.3	310.5	5	0.106	X
TP5.0SMDJ78A	TP5.0SMDJ78CA	T5PGT	T5BGT	78	86.7	95.8	1	126.0	39.7	162.8	297.8	5	0.106	X
TP5.0SMDJ85A	TP5.0SMDJ85CA	T5PGV	T5BGV	85	94.4	104.0	1	137.0	36.5	177.0	273.8	5	0.106	X
TP5.0SMDJ90A	TP5.0SMDJ90CA	T5PGX	T5BGX	90	100.0	111.0	1	146.0	34.3	188.6	257.3	5	0.107	X
TP5.0SMDJ100A	TP5.0SMDJ100CA	T5PGZ	T5BGZ	100	111	123	1	162	30.9	209.3	231.8	5	0.107	X
TP5.0SMDJ110A	TP5.0SMDJ110CA	T5PHE	T5BHE	110	122	135	1	177	28.3	228.7	212.3	5	0.107	X
TP5.0SMDJ120A	TP5.0SMDJ120CA	T5PHG	T5BHG	120	133	147	1	193	26	249.4	195	5	0.108	X
TP5.0SMDJ130A	TP5.0SMDJ130CA	T5PHK	T5BHK	130	144	159	1	209	24	270	180	5	0.108	X
TP5.0SMDJ140A	TP5.0SMDJ140CA	T5PHL	T5BHL	140	156	172	1	226.1	22.2	292.1	166.5	5	0.108	X
TP5.0SMDJ150A	TP5.0SMDJ150CA	T5PHM	T5BHM	150	167	185	1	243	20.6	314	154.5	5	0.108	X
TP5.0SMDJ160A	TP5.0SMDJ160CA	T5PHP	T5BHB	160	178	197	1	259	19.3	334.6	144.8	5	0.108	X
TP5.0SMDJ170A	TP5.0SMDJ170CA	T5PHR	T5BHR	170	189	209	1	275	18.2	355.3	136.5	5	0.108	X

### I-V Curve Characteristics



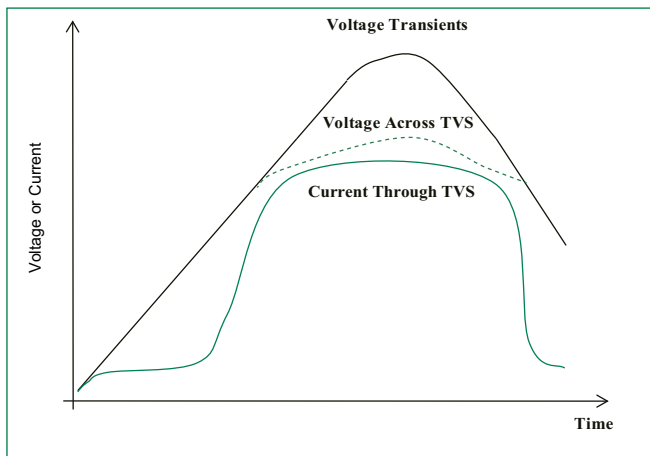
- $P_{PPM}$  **Peak Pulse Power Dissipation** -- Max power dissipation  
 $V_R$  **Stand-off Voltage** -- Maximum voltage that can be applied to the TVS without operation  
 $V_{BR}$  **Breakdown Voltage** -- Maximum voltage that flows though the TVS at a specified test current ( $I_T$ )  
 $V_C$  **Clamping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

# TP5.0SMDJ Series

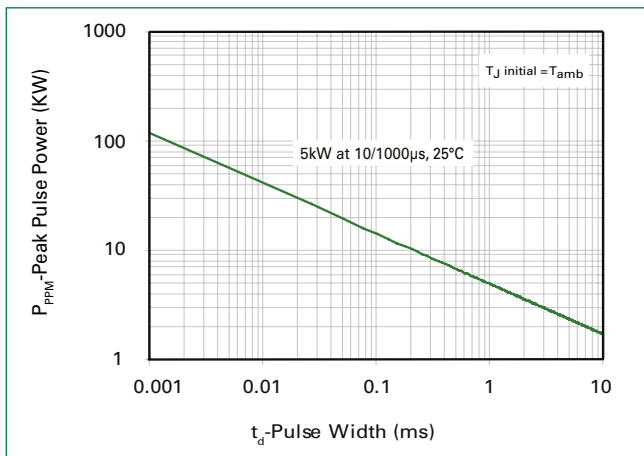
## Surface Mount - 5000W

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

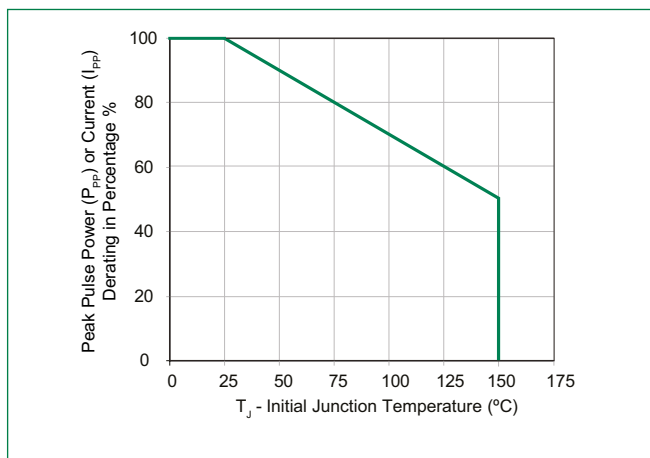
**Figure 1 - TVS Transients Clamping Waveform**



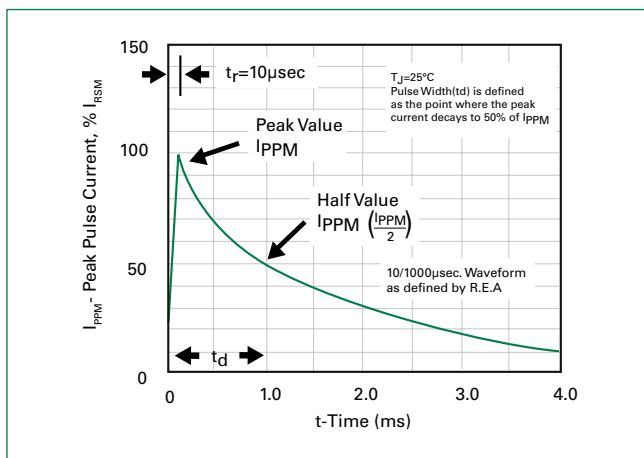
**Figure 2 - Peak Pulse Power Rating**



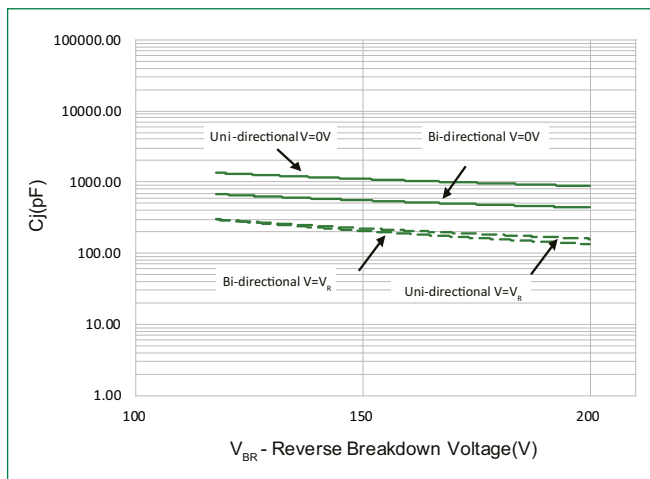
**Figure 3 - Peak Pulse Power Derating Curve**



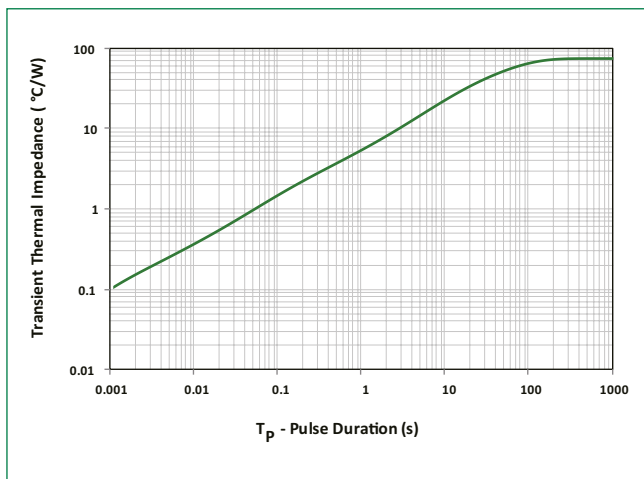
**Figure 4 - Pulse Waveform**



**Figure 5 - Typical Junction Capacitance**



**Figure 6 - Typical Transient Thermal Impedance**



# TP5.0SMDJ Series

## Surface Mount - 5000W

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

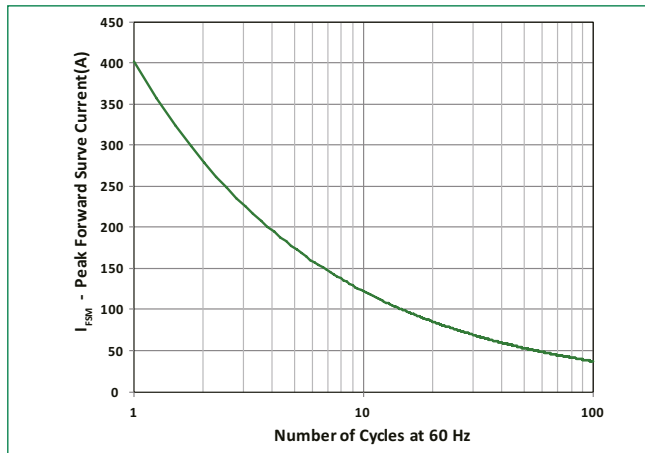
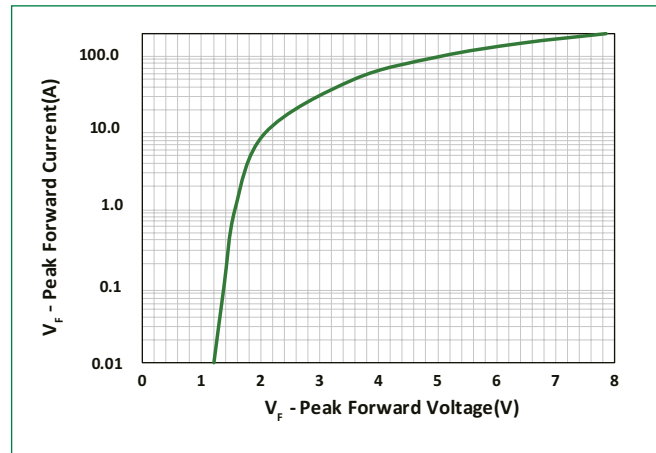
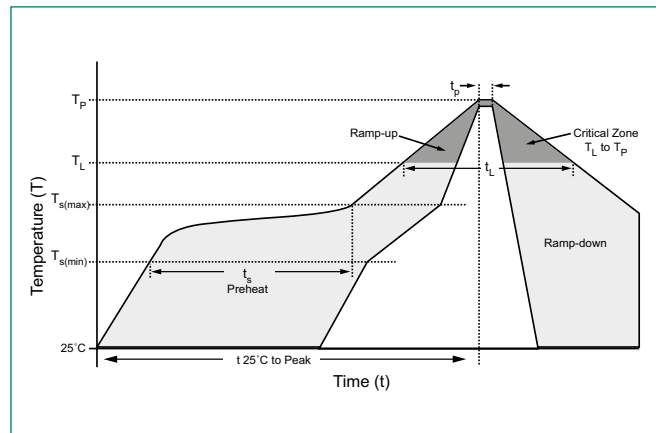


Figure 8 - Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)



### Soldering Parameters

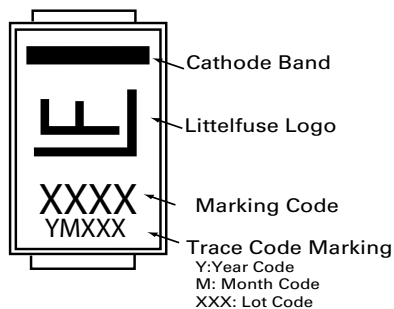
<b>Reflow Condition</b>	Lead-free assembly	
<b>Pre Heat</b>	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 – 120 secs
<b>Average ramp up rate (Liquidus Temp (<math>T_L</math>) to peak)</b>	3°C/second max	
<b><math>T_{s(max)}</math> 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 <sup>+0/-5</sup> °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

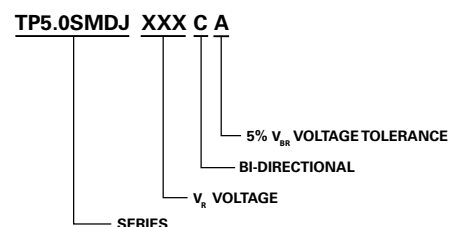
### Part Marking System



### 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

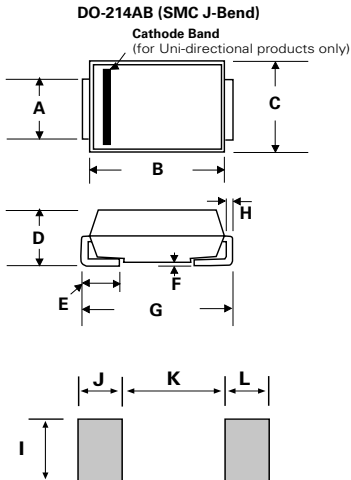
### Part Numbering System



# TP5.0SMDJ Series

## Surface Mount - 5000W

### Dimensions

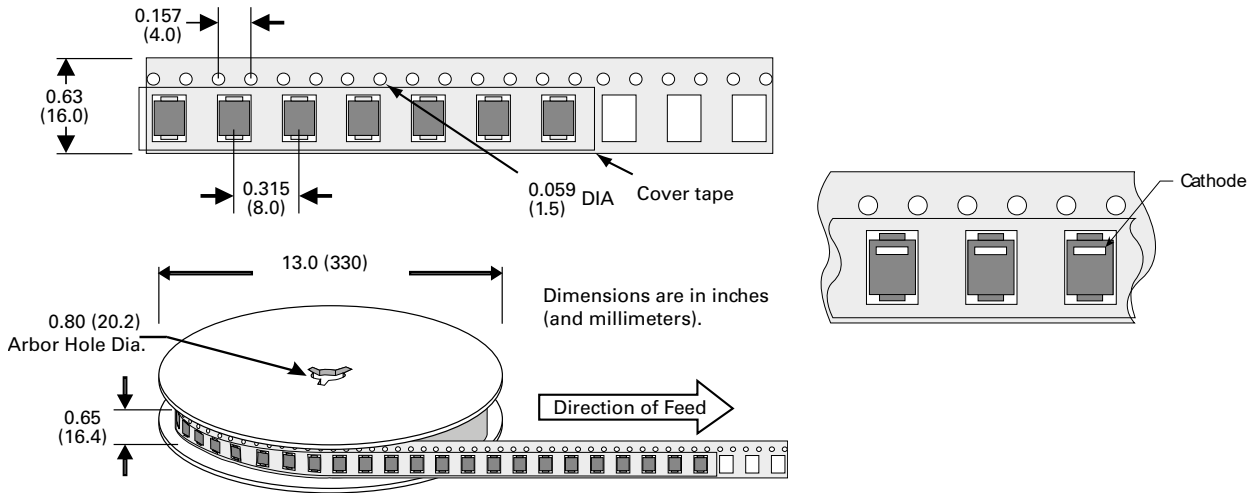


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.114	0.126	2.900	3.200
B	0.260	0.280	6.600	7.110
C	0.220	0.245	5.590	6.220
D	0.079	0.103	2.060	2.620
E	0.030	0.060	0.760	1.520
F	-	0.008	-	0.203
G	0.305	0.320	7.750	8.130
H	0.006	0.012	0.152	0.305
I	0.129	-	3.300	-
J	0.094	-	2.400	-
K	-	0.165	-	4.200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

### Packaging

Part number	Component Package	Quantity	Packaging Option	Packaging Specification
TP5.0SMDJxxxXX	DO-214AB	3000	Tape & Reel - 16mm tape/13" reel	EIA STD RS-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>.