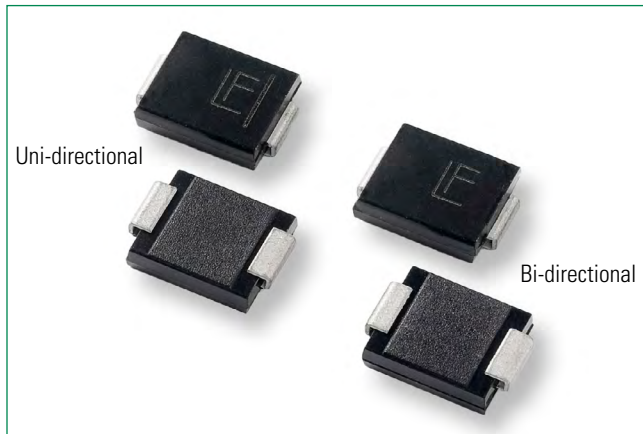


TP5.0SMDJ Series

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 μs 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:

1. Non-repetitive current pulse per Fig. 4 and derated above $T_A = 25^\circ\text{C}$ per Fig. 3.
2. Mounted on copper pad area of 0.31x0.31" (8.0 x 8.0mm) to each terminal.
3. 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.

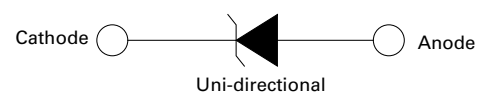
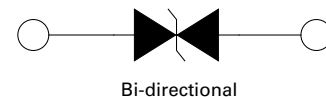
Features & Benefits

- High reliability application and automotive grade AEC-Q101 qualified
- 5000W peak pulse power capability at 10/1000 μs 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 μA when $V_{BR \min} > 22\text{V}$
- High temperature reflow soldering guaranteed: 260 $^\circ\text{C}$ /40sec
- $V_{BR} @ T_J = V_{BR} @ 25^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$ (αT : 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 automotive applications.

Functional Diagram



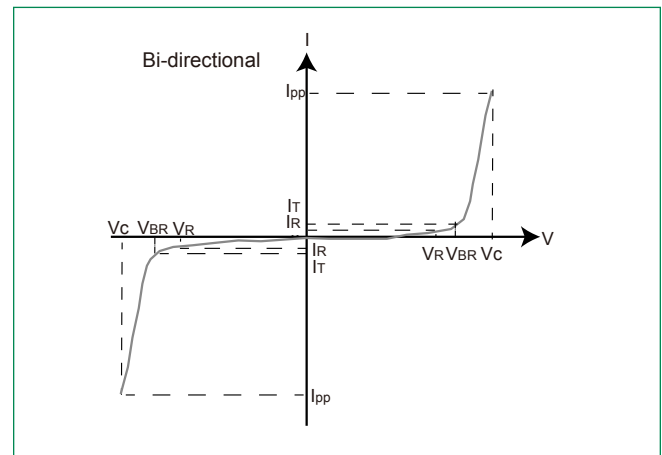
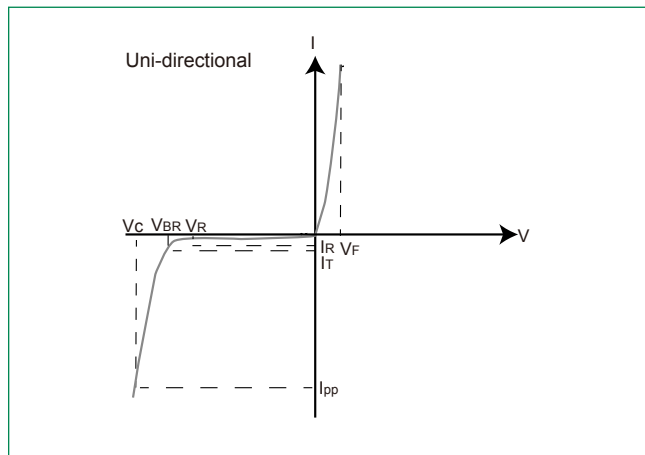
TP5.0SMDJ Series

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 μ s) (V)	Maximum Peak Pulse Current I_{PP} (10/1000 μ s) (A)	Maximum Clamping Voltage V_C @ I_{PP} (8/20 μ s) (V)	Maximum Peak Pulse Current I_{PP} (8/20 μ s) (A)	Maximum Reverse Leakage I_R @ V_R (μ A)	Maximum Temperature coefficient of V_{BR} (%/°C)	
		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
TP5.0SMDJ180A	TP5.0SMDJ180CA	T5PHT	T5BHT	180	200.0	221.0	1	292.0	17.5	392.0	131.3	5	0.108	-
TP5.0SMDJ200A	TP5.0SMDJ200CA	T5PHV	T5BHV	200	224.0	247.0	1	325.0	15.4	425.0	115.5	5	0.110	-
TP5.0SMDJ220A	TP5.0SMDJ220CA	T5PHX	T5BHX	220	244.0	270.0	1	357.0	14.1	457.0	105.8	5	0.110	-
TP5.0SMDJ250A	TP5.0SMDJ250CA	T5PHZ	T5BHZ	250	279.0	309.0	1	406.0	12.4	506.0	93.0	5	0.112	-
TP5.0SMDJ300A	TP5.0SMDJ300CA	T5PIE	T5BIE	300	335.0	371.0	1	487.0	10.3	587.0	77.3	5	0.112	-
TP5.0SMDJ350A	TP5.0SMDJ350CA	T5PIG	T5BIG	350	391.0	432.0	1	568.0	8.9	668.0	66.8	5	0.112	-
TP5.0SMDJ400A	TP5.0SMDJ400CA	T5PIK	T5BIK	400	447.0	494.0	1	649.0	7.8	749.0	58.5	5	0.112	-

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

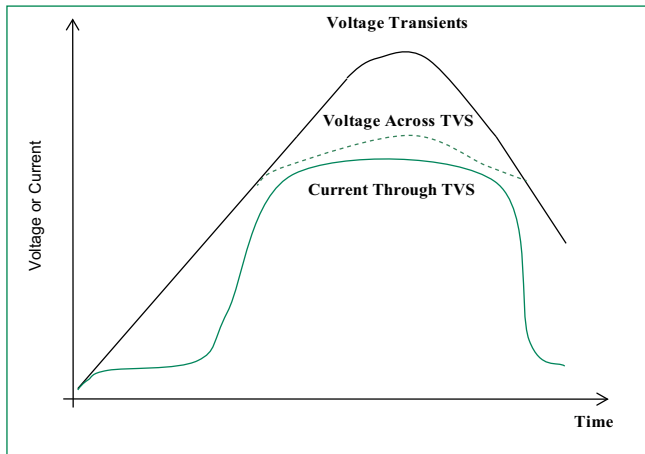


Figure 2 - Peak Pulse Power Rating

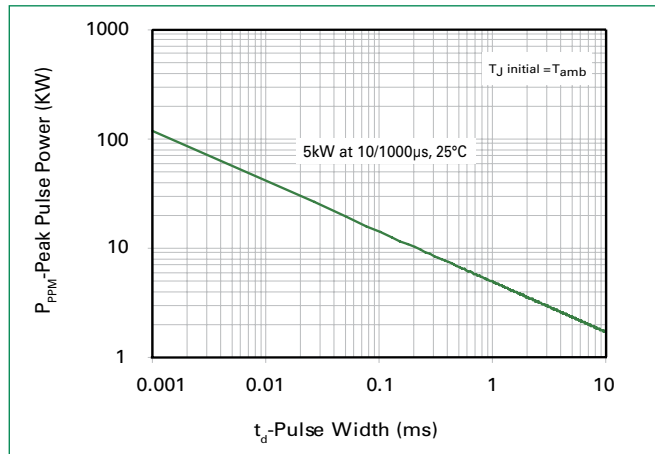


Figure 3 - Peak Pulse Power Derating Curve

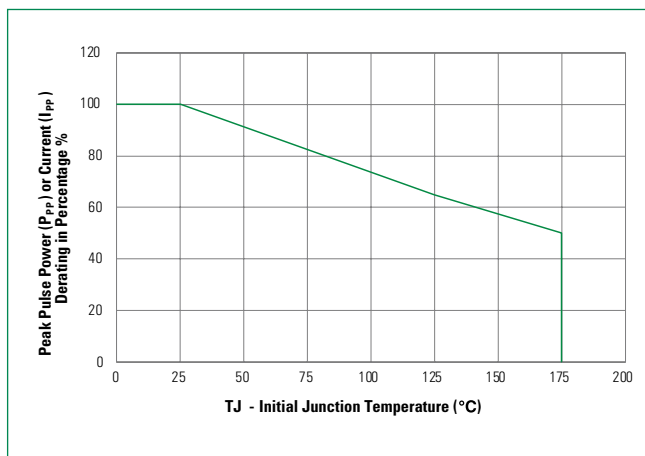


Figure 4 - Pulse Waveform

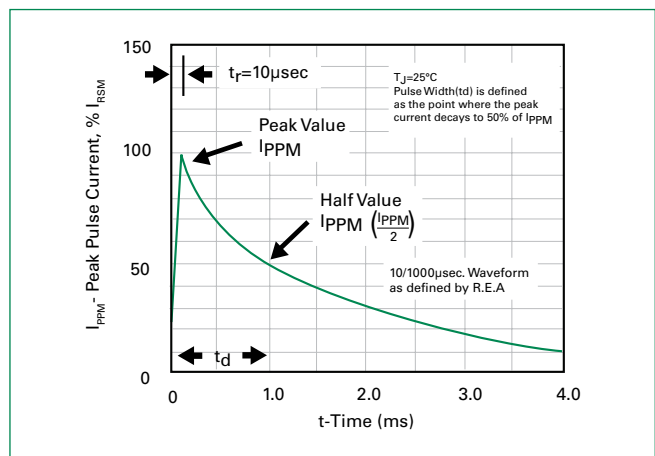


Figure 5 - Typical Junction Capacitance

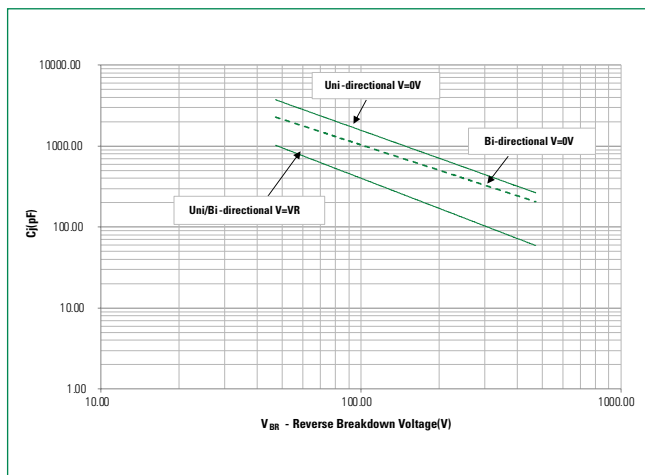
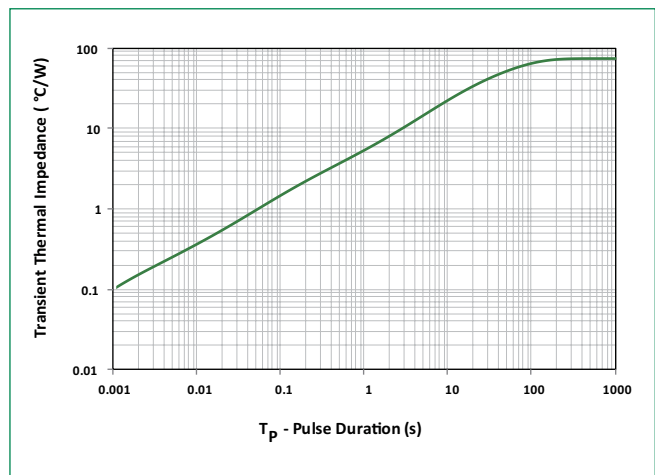


Figure 6 - Typical Transient Thermal Impedance



TP5.0SMDJ Series

Surface Mount - 5000W

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

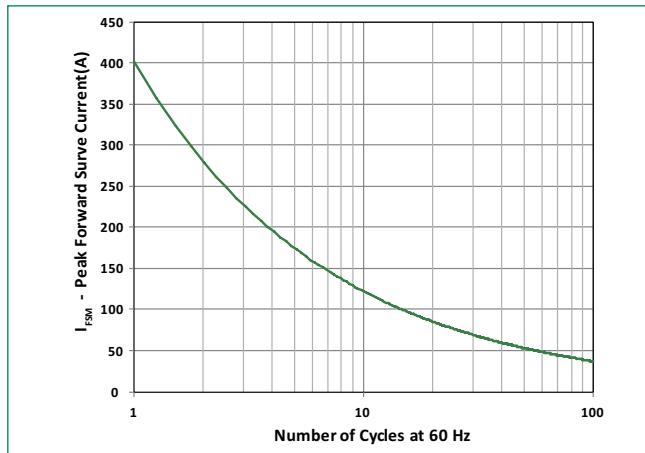
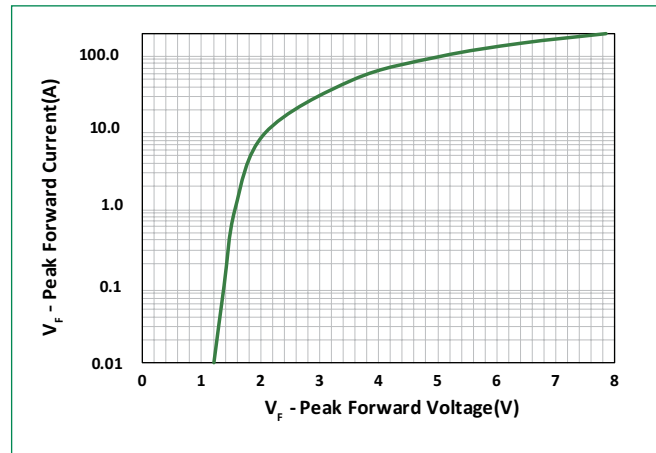
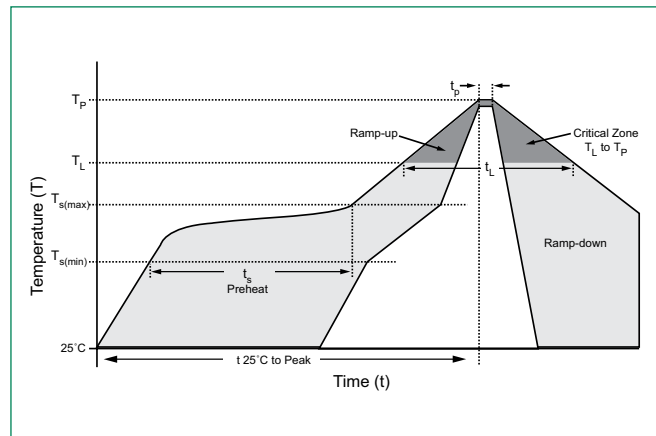


Figure 8 - Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)



Soldering Parameters

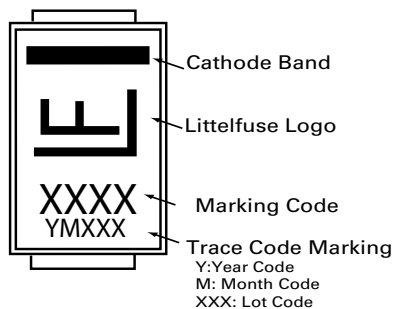
Reflow Condition		Lead-free assembly
Pre Heat	- Temperature Min ($T_{s(min)}$)	150°C
	- Temperature Max ($T_{s(max)}$)	200°C
	- Time (min to max) (t_s)	60 – 120 secs
Average ramp up rate (Liquidus Temp (T_L) to peak)		3°C/second max
$T_{s(max)}$ to T_L - Ramp-up Rate		3°C/second max
Reflow	- Temperature (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
Polarity	Color band denotes positive end (cathode) except Bidirectional.
Terminal	Matte Tin-plated leads, Solderable per JESD22-B102

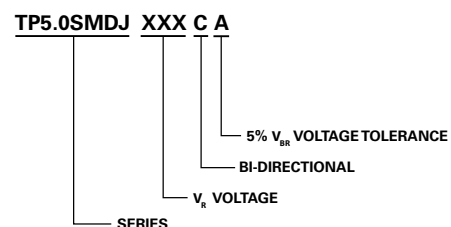
Part Marking System



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

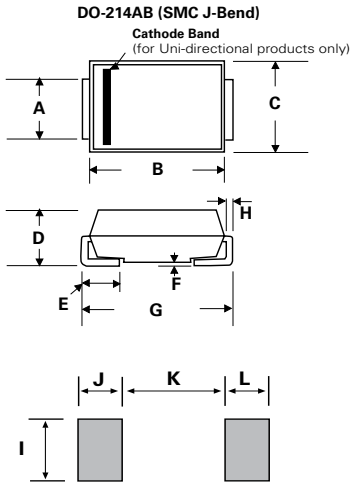
Part Numbering System



TP5.0SMDJ Series

Surface Mount - 5000W

Dimensions

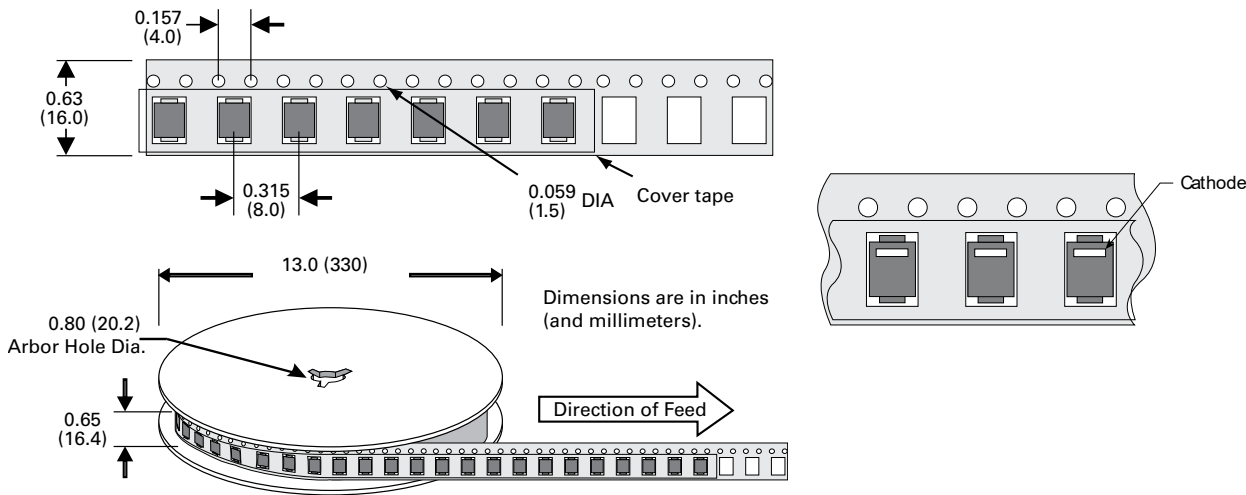


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.114	0.126	2.900	3.200
B	0.260	0.280	6.600	7.110
C	0.220	0.245	5.590	6.220
D	0.079	0.103	2.060	2.620
E	0.030	0.060	0.760	1.520
F	-	0.008	-	0.203
G	0.305	0.320	7.750	8.130
H	0.006	0.012	0.152	0.305
I	0.129	-	3.300	-
J	0.094	-	2.400	-
K	-	0.165	-	4.200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



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