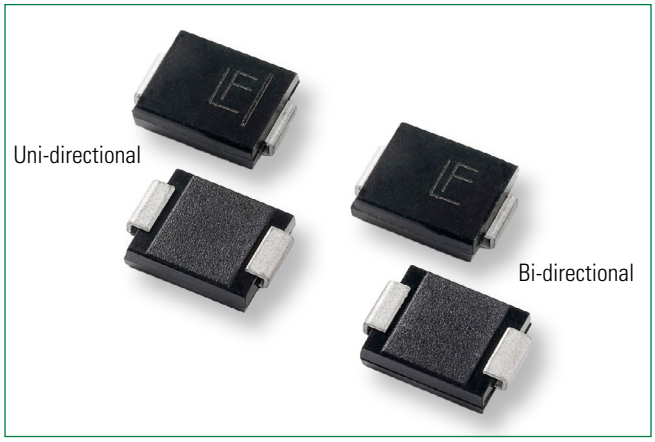
TP5.0SMDJ Series
Surface Mount - 5000W

AUTOMOTIVE GRADE HF RoHS Pb e3



Agency Approvals

Agency	Agency File Number
	E230531

Maximum Ratings & Thermal Characteristics
(T_A=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation at T_L=25°C by 10/1000µs Waveform (Fig.2)(Note 1), (Note 2)	P_{PPM}	5000	W
Power Dissipation on Infinite Heat Sink at T_L=50°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	°C
Storage Temperature Range	T_{STG}	-65 to 175	°C
Typical Thermal Resistance Junction to Lead	$R_{\theta JL}$	15	°C/W
Typical Thermal Resistance Junction to Ambient	$R_{\theta JA}$	75	°C/W

Notes:
1. Non-repetitive current pulse per Fig. 4 and derated above T_A = 25°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.

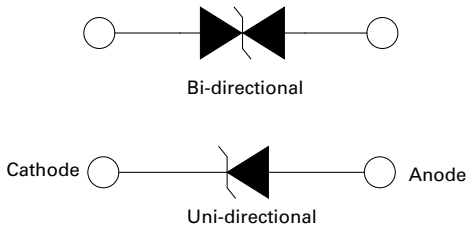
Features & Benefits

- High reliability application and automotive grade AEC-Q101 qualified
- 5000W peak pulse power capability at 10/1000µs 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 5µA when V_{BR} min>22V
- High temperature reflow soldering guaranteed: 260°C/40sec
- V_{BR} @ T_J= V_{BR}@25°C x (1+αT x (T_J - 25)) (αT:Temperature Coefficient)
- UL Recognized compound meeting flammability rating V-0
- Meet MSL level1, per J-STD-020, LF maximun 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)
- 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



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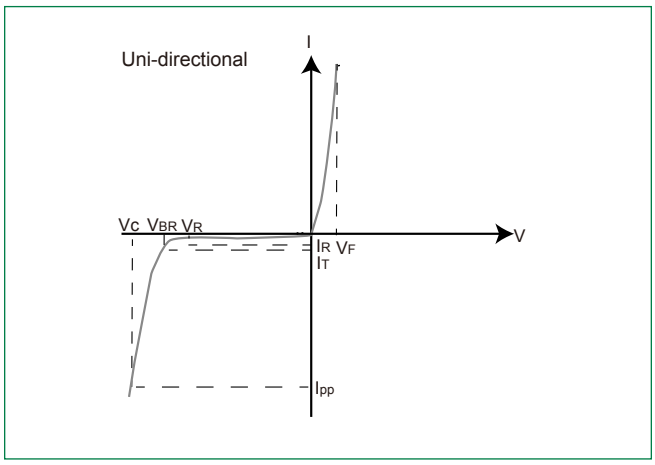
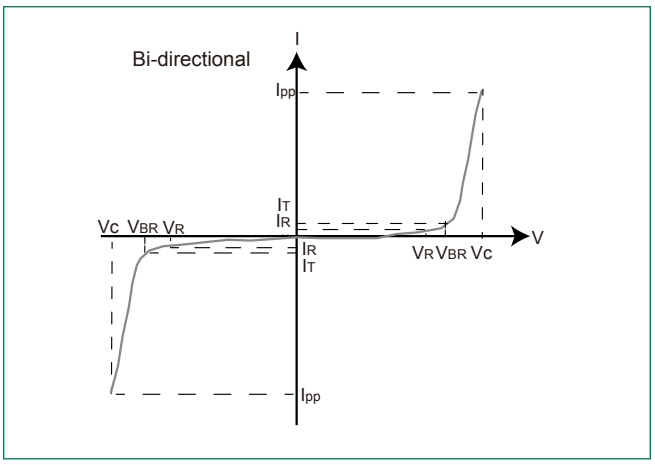
Electrical Characteristics

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} (10/1000µs) (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)	
		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 Ippm (peak impulse current)
I_R Reverse Leakage Current -- Current measured at V_R
V_F Forward Voltage Drop for Uni-directional

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Ratings and Characteristic Curves (T_A=25°C unless otherwise noted)

Figure 1 - TVS Transients Clamping Waveform

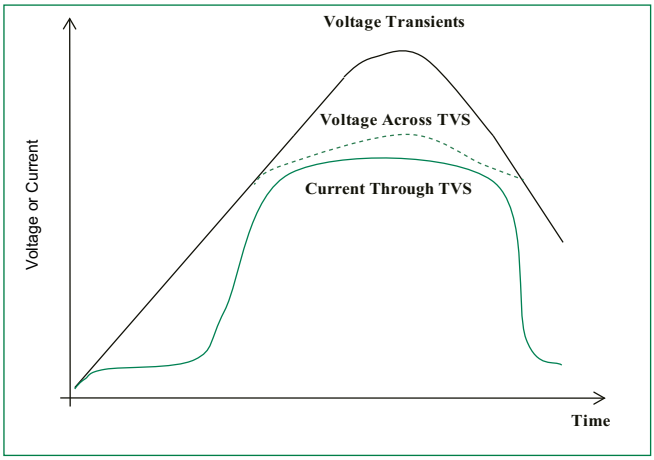

Figure 2 - Peak Pulse Power Rating

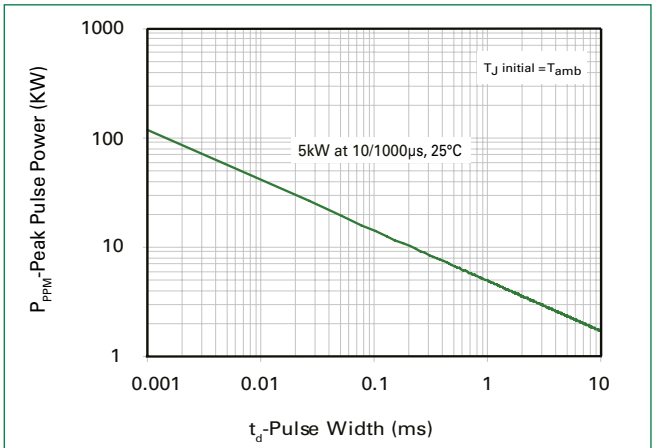

Figure 3 - Peak Pulse Power Derating Curve

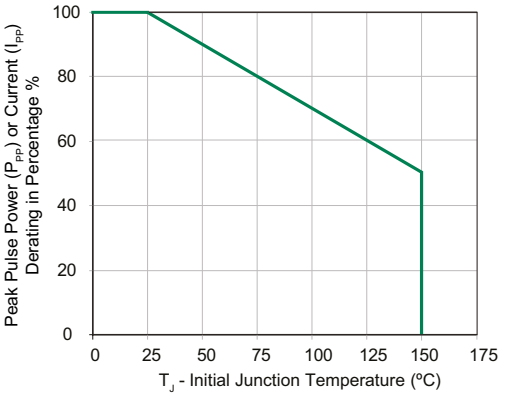

Figure 4 - Pulse Waveform

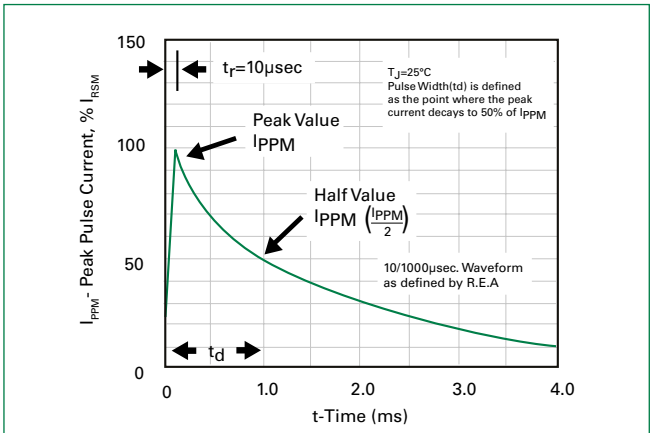

Figure 5 - Typical Junction Capacitance

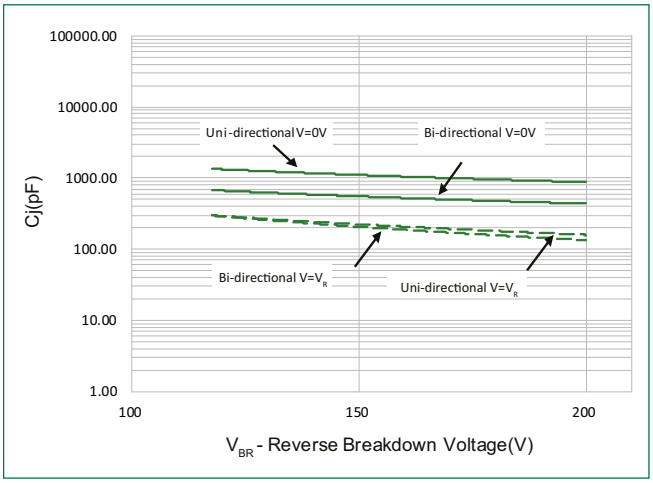

Figure 6 - Typical Transient Thermal Impedance

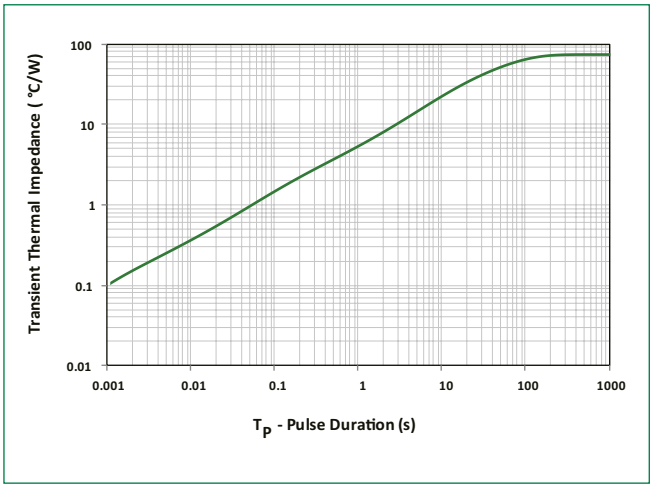

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Figure 7 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only

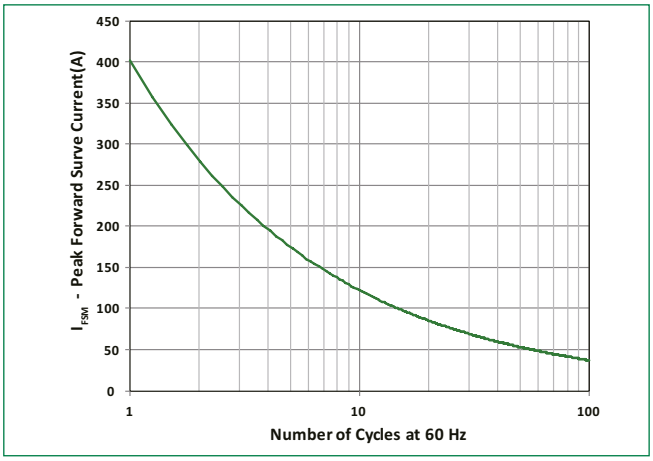
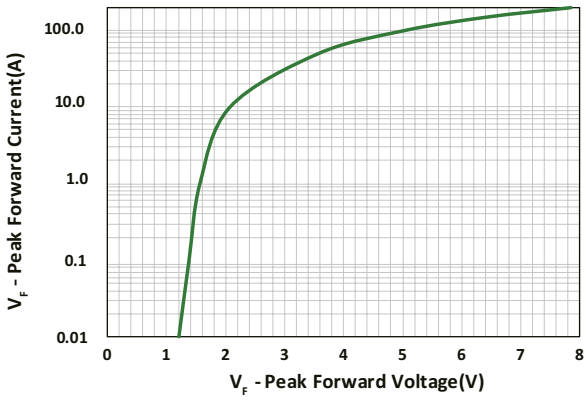
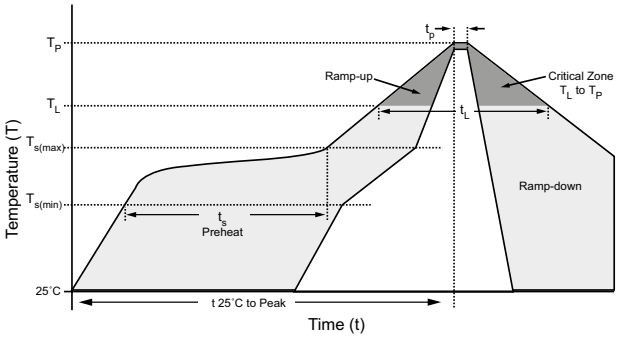


Figure 8 - Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)



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



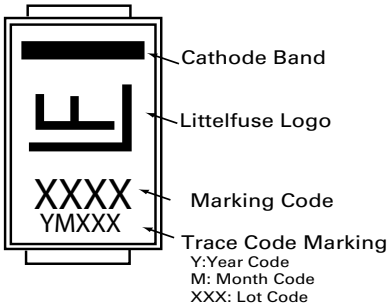
Physical Specifications

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

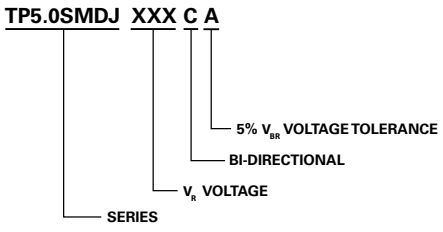
Environmental Specifications

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 Marking System



Part Numbering System



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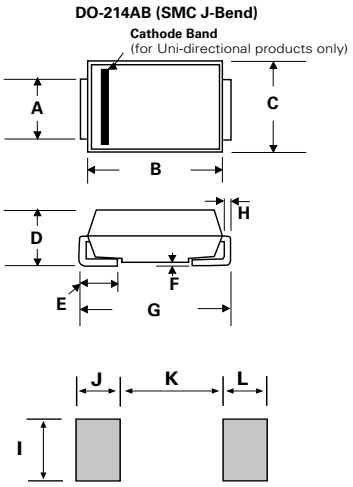
Dimensions

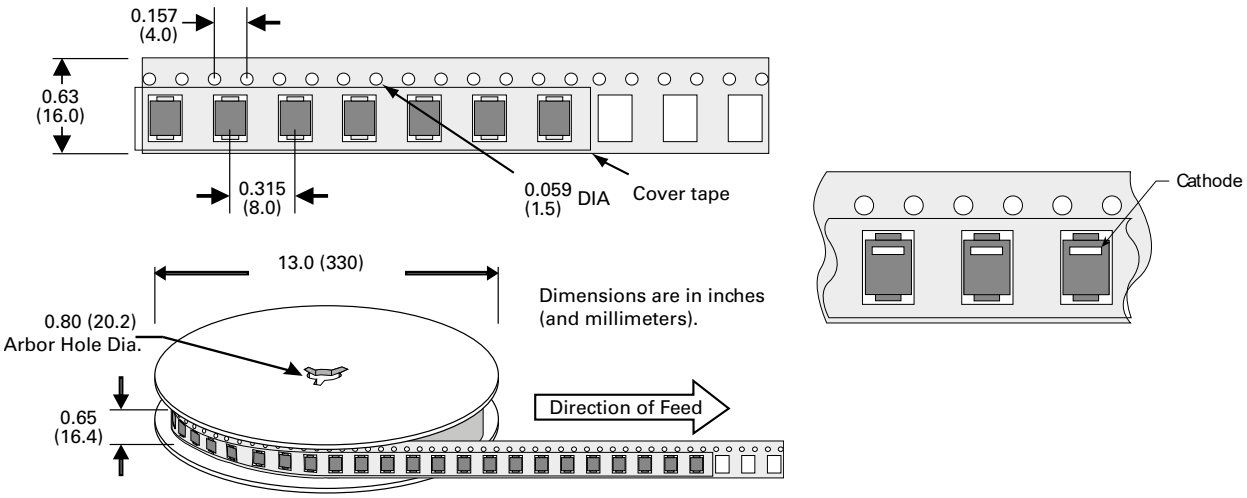


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.114	0.126	2.900	3.200
B	0.260	0.280	6.600	7.110
C	0.220	0.245	5.590	6.220
D	0.079	0.103	2.060	2.620
E	0.030	0.060	0.760	1.520
F	-	0.008	-	0.203
G	0.305	0.320	7.750	8.130
H	0.006	0.012	0.152	0.305
I	0.129	-	3.300	-
J	0.094	-	2.400	-
K	-	0.165	-	4.200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