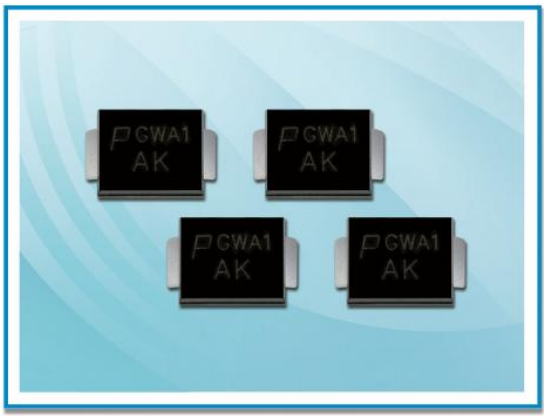
TVS Diode – TPSMBJ Series

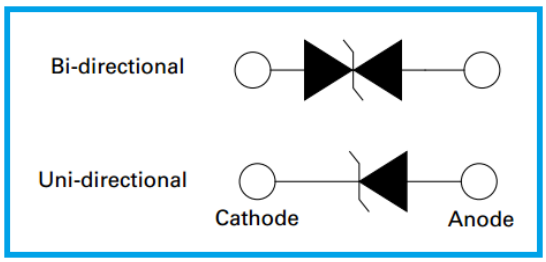
Features

- Plastic package, excellent insulation strength.
- Glass passivated chip junction in SMB package.
- Excellent voltage clamping capability.
- Automotive grade AEC–Q101 qualified.
- Low Zener impedance.
- 600W peak pulse power capability on 10/1000μs waveform.
- Typical leakage current less than 1μA above 13V.
- Very fast response time, typically less than 1.0ps from 0 volt to V_{BR} minimum.
- High temperature soldering guaranteed: 265°C/10 sec.
- MSL: JEDEC-J-STD-020, Level 1



Applications

- I/O interface, V_{CC} bus
- Telecom / Automotive
- Industrial and consumer electronic applications.
- Relay and electromagnetic valve surge absorption.



Mechanical and Physical Data

- Case: JEDEC SMB molded plastic.
- Surface mount device, solderable per MIL-STD-750, Method 2026
- Polarity: Color band denoted cathode except bidirectional.

Maximum Ratings and Thermal Characteristics

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation on 10/1000μs waveform (Note 1, Fig.1).	P_{PPM}	Min 600	Watt
Peak Pulse Current of 10/1000μs waveform (Note 1, Fig.3).	I_{PPM}	See Table	Amp
Steady State Power Dissipation at TL = 75°C, Lead lengths 0.375", (9.5mm) (Fig.5).	$P_{M(AV)}$	5.0	Watt
Peak Forward Surge Current, 8.3 ms Single Half Sine Wave Superimposed on Rated Load (Note 2, Fig.6).	I_{FSM}	100	Amp
Operating Junction and Storage Temperature Range.	T_J, T_{STG}	-55~150	°C

Note:

1. Non-repetitive current pulse, per Fig.3 and derated above T_A = 25°C per Fig.2.
2. 8.3ms single half sine wave, or equivalent square wave, Duty cycle = 4 pulses per minutes maximum.

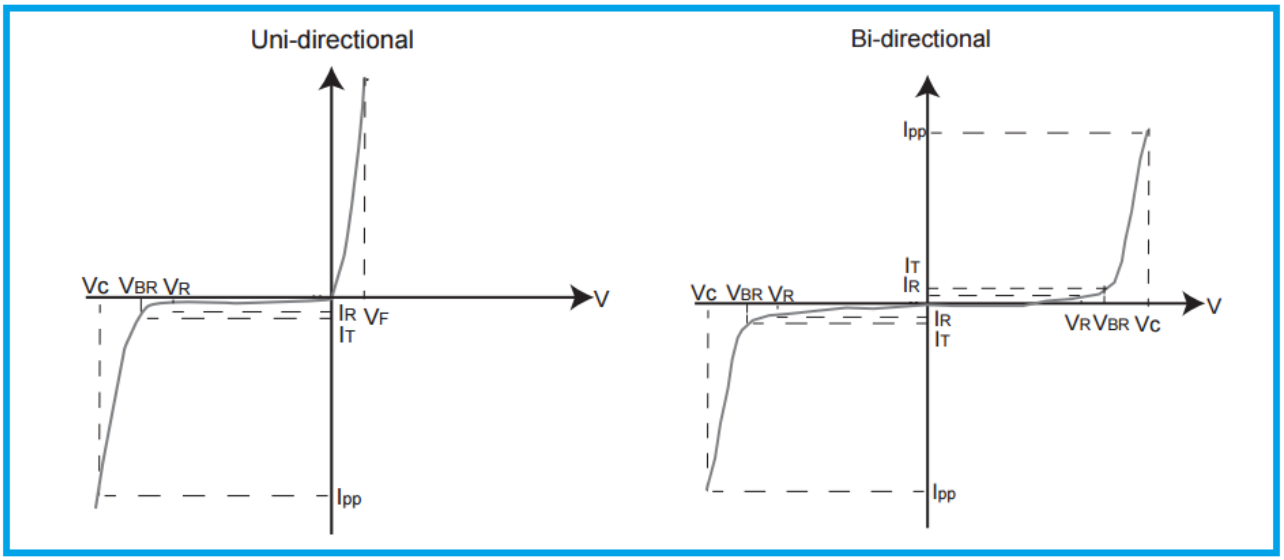
Part Number Code

TPSMBJ □□□ C A

- A: V_{BR} Voltage tolerance (A: 5%; Blank: 10%)
- C: Bi-directional; Blank: Uni-directional
- □□□: Reverse Stand-Off Voltage or Typical Breakdown Voltage
- TPSMBJ: Automotive TPSMBJ Series (600W)

TVS Diode – TPSMBJ Series

I-V Curve Characteristics



P_{PPM} Peak Pulse Power Dissipation – Maximum 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

Electrical Characteristics

Part Number		Marking		Reverse Stand Off Voltage V_R (V)	Breakdown Voltage V_{BR} (V) @ I_T		Test Current I_T (mA)	Maximum Clamping Voltage V_C (V) @ I_{PP}	Maximum Peak Pulse Current I_{PP} (A)	Maximum Reverse Leakage I_R (μA) @ V_R
Uni	Bi	Uni	Bi		Min.	Max.				
TPSMBJ5.0A	TPSMBJ5.0CA	KET	AET	5.0	6.40	7.00	10	9.2	65.22	800
TPSMBJ6.0A	TPSMBJ6.0CA	KGT	AGT	6.0	6.67	7.37	10	10.3	58.25	800
TPSMBJ6.5A	TPSMBJ6.5CA	KKT	AKT	6.5	7.22	7.98	10	11.2	53.57	500
TPSMBJ7.0A	TPSMBJ7.0CA	KMT	AMT	7.0	7.78	8.60	10	12.0	50.00	200
TPSMBJ7.5A	TPSMBJ7.5CA	KPT	APT	7.5	8.33	9.21	1	12.9	46.51	100
TPSMBJ8.0A	TPSMBJ8.0CA	KRT	ART	8.0	8.89	9.83	1	13.6	44.12	50
TPSMBJ8.5A	TPSMBJ8.5CA	KTT	ATT	8.5	9.44	10.40	1	14.4	41.67	10
TPSMBJ9.0A	TPSMBJ9.0CA	KVT	AVT	9.0	10.00	11.10	1	15.4	38.96	5
TPSMBJ10A	TPSMBJ10CA	KXT	AXT	10.0	11.10	12.30	1	17.0	35.29	5
TPSMBJ11A	TPSMBJ11CA	KZT	AZT	11.0	12.20	13.50	1	18.2	32.97	1
TPSMBJ12A	TPSMBJ12CA	LET	BET	12.0	13.30	14.70	1	19.9	30.15	1
TPSMBJ13A	TPSMBJ13CA	LGT	BGT	13.0	14.40	15.90	1	21.5	27.91	1
TPSMBJ14A	TPSMBJ14CA	LKT	BKT	14.0	15.60	17.20	1	23.2	25.86	1
TPSMBJ15A	TPSMBJ15CA	LMT	BMT	15.0	16.70	18.50	1	24.4	24.59	1
TPSMBJ16A	TPSMBJ16CA	LPT	BPT	16.0	17.80	19.70	1	26.0	23.08	1
TPSMBJ17A	TPSMBJ17CA	LRT	BRT	17.0	18.90	20.90	1	27.6	21.74	1
TPSMBJ18A	TPSMBJ18CA	LTT	BTT	18.0	20.00	22.10	1	29.2	20.55	1

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Part Number		Marking		Reverse Stand Off Voltage V_R (V)	Breakdown Voltage V_{BR} (V) @ I_T		Test Current I_T (mA)	Maximum Clamping Voltage V_C (V) @ I_{PP}	Maximum Peak Pulse Current I_{PP} (A)	Maximum Reverse Leakage I_R (μA) @ V_R
Uni	Bi	Uni	Bi		Min.	Max.				
TPSMBJ20A	TPSMBJ20CA	LVT	BVT	20.0	22.20	24.50	1	32.4	18.52	1
TPSMBJ22A	TPSMBJ22CA	LXT	BXT	22.0	24.40	26.90	1	35.5	16.90	1
TPSMBJ24A	TPSMBJ24CA	LZT	BZT	24.0	26.70	29.50	1	38.9	15.42	1
TPSMBJ26A	TPSMBJ26CA	MET	CET	26.0	28.90	31.90	1	42.1	14.25	1
TPSMBJ28A	TPSMBJ28CA	MGT	CGT	28.0	31.10	34.40	1	45.4	13.22	1
TPSMBJ30A	TPSMBJ30CA	MKT	CKT	30.0	33.30	36.80	1	48.4	12.40	1
TPSMBJ33A	TPSMBJ33CA	MMT	CMT	33.0	36.70	40.60	1	53.3	11.26	1
TPSMBJ36A	TPSMBJ36CA	MPT	CPT	36.0	40.00	44.20	1	58.1	10.33	1
TPSMBJ40A	TPSMBJ40CA	MRT	CRT	40.0	44.40	49.10	1	64.5	9.30	1
TPSMBJ43A	TPSMBJ43CA	MTT	CTT	43.0	47.80	52.80	1	69.4	8.65	1
TPSMBJ45A	TPSMBJ45CA	MVT	CVT	45.0	50.00	55.30	1	72.7	8.25	1
TPSMBJ48A	TPSMBJ48CA	MXT	CXT	48.0	53.30	58.90	1	77.4	7.75	1
TPSMBJ51A	TPSMBJ51CA	MZT	CZT	51.0	56.70	62.70	1	82.4	7.28	1
TPSMBJ54A	TPSMBJ54CA	NET	DET	54.0	60.00	66.30	1	87.1	6.89	1
TPSMBJ58A	TPSMBJ58CA	NGT	DGT	58.0	64.40	71.20	1	93.6	6.41	1
TPSMBJ60A	TPSMBJ60CA	NKT	DKT	60.0	66.70	73.70	1	96.8	6.20	1
TPSMBJ64A	TPSMBJ64CA	NMT	DMT	64.0	71.10	78.60	1	103.0	5.83	1
TPSMBJ70A	TPSMBJ70CA	NPT	DPT	70.0	77.80	86.00	1	113.0	5.31	1
TPSMBJ75A	TPSMBJ75CA	NRT	DRT	75.0	83.30	92.10	1	121.0	4.96	1
TPSMBJ78A	TPSMBJ78CA	NTT	DTT	78.0	86.70	95.80	1	126.0	4.76	1
TPSMBJ85A	TPSMBJ85CA	NVT	DVT	85.0	94.40	104.00	1	137.0	4.38	1
TPSMBJ90A	TPSMBJ90CA	NXT	DXT	90.0	100.00	111.00	1	146.0	4.11	1
TPSMBJ100A	TPSMBJ100CA	NZT	DZT	100.0	111.00	123.00	1	162.0	3.70	1
TPSMBJ110A	TPSMBJ110CA	PET	EET	110.0	122.0	135.0	1	177.0	3.39	1
TPSMBJ120A	TPSMBJ120CA	PGT	EGT	120.0	133.0	147.0	1	193.0	3.11	1
TPSMBJ130A	TPSMBJ130CA	PKT	EKT	130.0	144.0	159.0	1	209.0	2.87	1
TPSMBJ150A	TPSMBJ150CA	PMT	EMT	150.0	167.0	185.0	1	243.0	2.47	1
TPSMBJ160A	TPSMBJ160CA	PPT	EPT	160.0	178.0	197.0	1	259.0	2.32	1
TPSMBJ170A	TPSMBJ170CA	PRT	ERT	170.0	189.0	209.0	1	275.0	2.18	1
TPSMBJ180A	TPSMBJ180CA	PTT	ETT	180.0	201.0	222.0	1	292.0	2.06	1
TPSMBJ190A	TPSMBJ190CA	PAT	ECT	190.0	209.0	243.0	1	308.0	1.95	1
TPSMBJ200A	TPSMBJ200CA	PVT	EVT	200.0	224.0	247.0	1	324.0	1.85	1
TPSMBJ220A	TPSMBJ220CA	PXT	EXT	220.0	246.0	272.0	1	356.0	1.69	1
TPSMBJ250A	TPSMBJ250CA	PZT	EZT	250.0	279.0	309.0	1	405.0	1.48	1
TPSMBJ300A	TPSMBJ300CA	QET	FET	300.0	335.0	371.0	1	486.0	1.23	1
TPSMBJ350A	TPSMBJ350CA	QGT	FGT	350.0	391.0	432.0	1	567.0	1.06	1
TPSMBJ400A	TPSMBJ400CA	QKT	FKT	400.0	447.0	494.0	1	648.0	0.93	1
TPSMBJ440A	TPSMBJ440CA	QMT	FMT	440.0	492.0	543.0	1	713.0	0.84	1

Note:

1. For bi-directional type having V_R of 10 volts and less, the I_R limit is double.

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Ratings and Characteristic Curves

Fig 1 - Peak Pulse Power Rating Curve

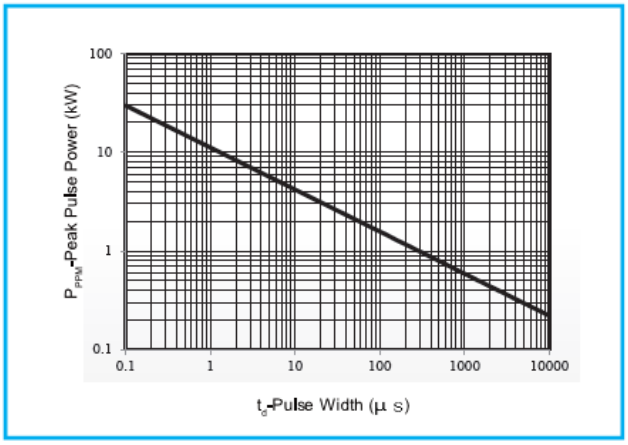


Fig 2 - Pulse Derating Curve

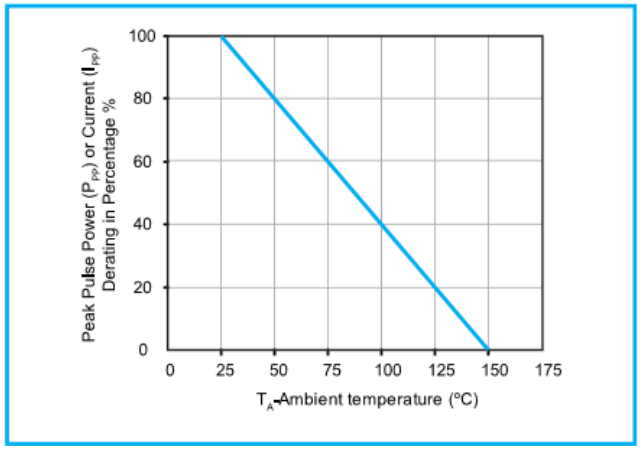


Fig 3 - Pulse Waveform

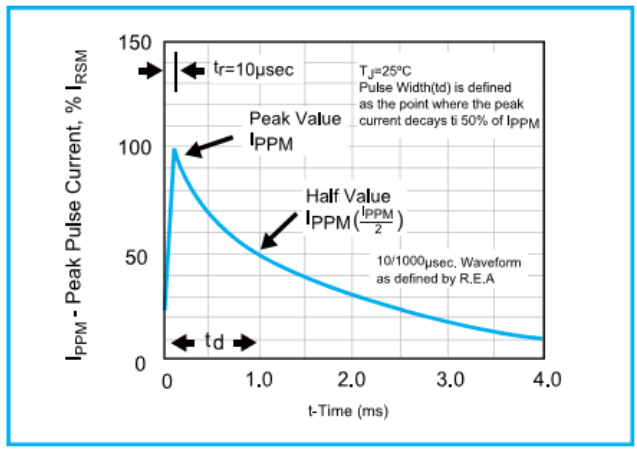


Fig 4 – Typical Junction Capacitance Uni-directional

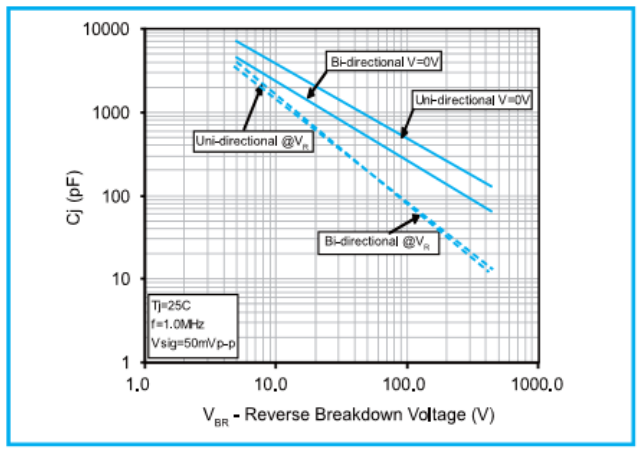


Fig 5 – Steady State Power Dissipation Derating Curve

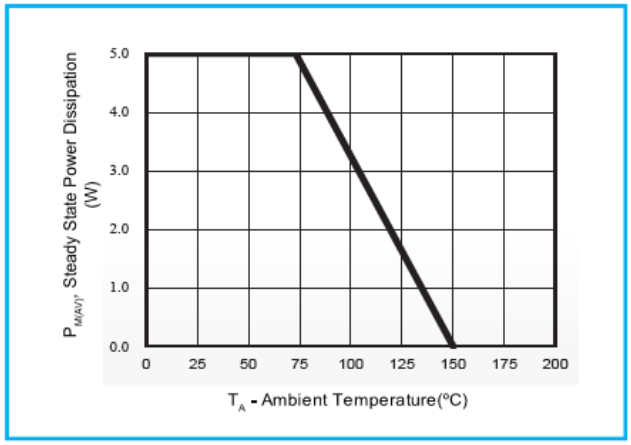
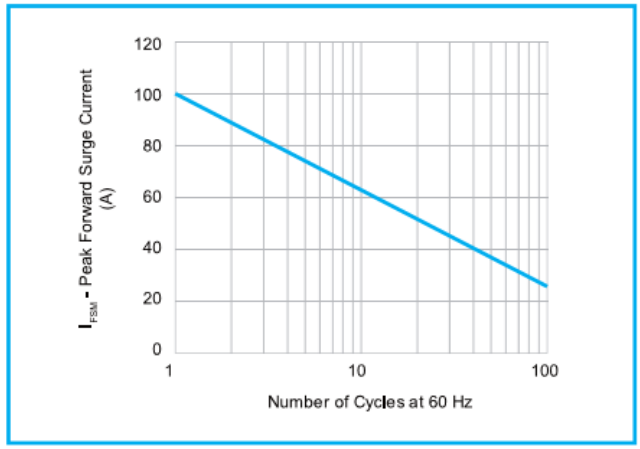
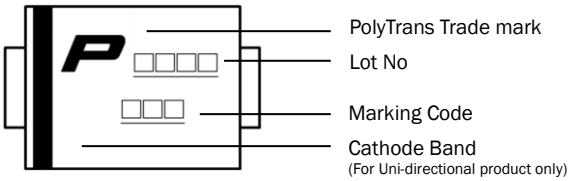


Fig 6 – Maximum Non-Repetitive Forward Surge Current (Uni-directional Only)

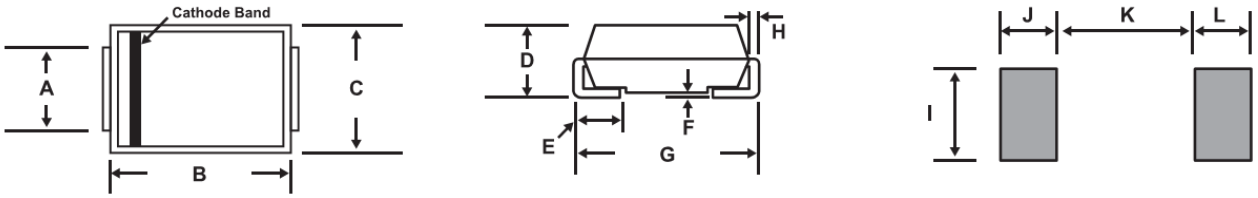


TVS Diode – TPSMBJ Series

Marking Definitions



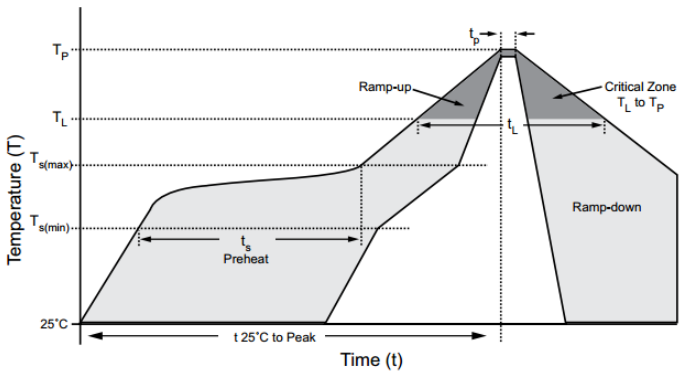
Physical Dimensions



Dimension	Millimeters		Inches	
	Min	Max	Min	Max
A	1.90	2.20	0.077	0.086
B	4.06	4.85	0.160	0.191
C	3.30	3.94	0.130	0.155
D	1.95	2.44	0.084	0.096
E	0.76	1.52	0.030	0.060
F	-	0.20	-	0.008
G	5.21	5.59	0.205	0.220
H	0.15	0.31	0.006	0.012
I	2.26	-	0.089	-
J	2.16	-	0.085	-
K	-	2.74	-	0.107
L	2.16	-	0.085	-

Lead Free Reflow Soldering Recommendations

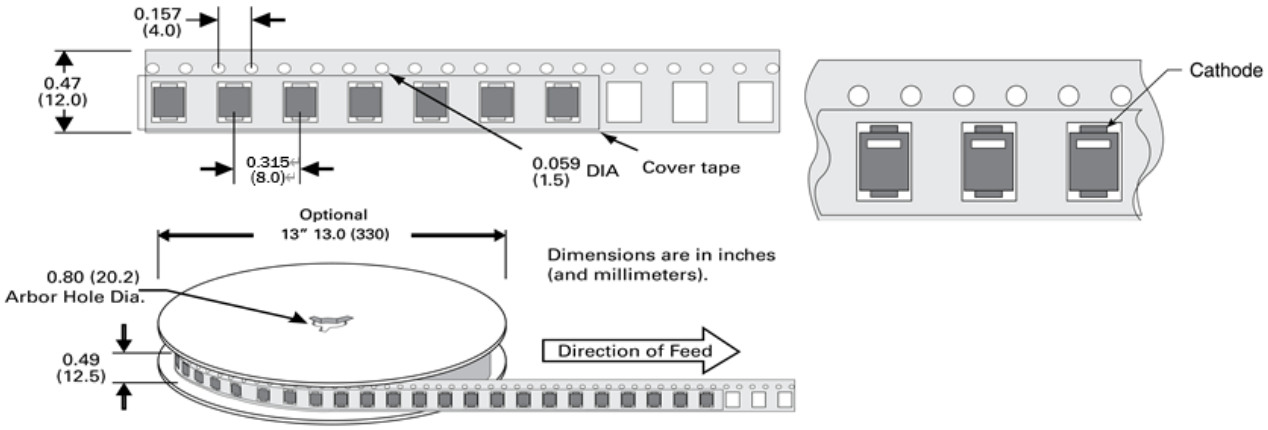
Preheat	
- Temperature Min (T_{s_min})	150°C
- Temperature Max (T_{s_max})	200°C
- Time (T_{s_min} to T_{s_max})	60-180 seconds
- Average Ramp-Up Rate	1~3°C/second
Peak Temperature	260°C max.
Time within 5°C of actual Peak Temperature (t_p)	40 seconds max.
Ramp-Down Rate	6 °C /second max.



Note: If the soldering temperatures exceed the recommended profile, devices may not meet the performance requirements.

TVS Diode – TPSMBJ Series

Packaging Information

Part Number	Component Package	Quantity	Packaging Option	Packaging Specification
TPSMBJ Series	DO-214AA	3000	Tape & Reel – 12mm tape/13" reel	EIA STD RS-481

Tape and Reel Specifications