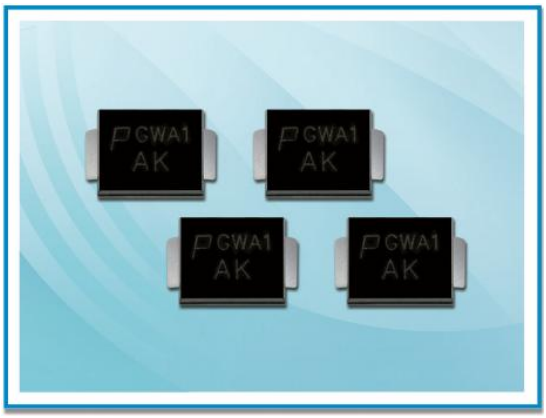
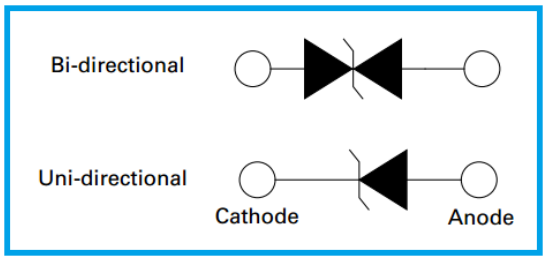
TVS Diode – SMBJ Series

Features

- Plastic package, excellent insulation strength.
- Glass passivated chip junction in SMB package.
- Excellent voltage clamping capability.
- 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
- Industrial and consumer electronic applications.
- Relay and electromagnetic valve surge absorption.

Agency Approval

- UL file no.: E474915

Mechanical and Physical Data

- Case: JEDEC SMB molded plastic.
- Axial leaded, 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.

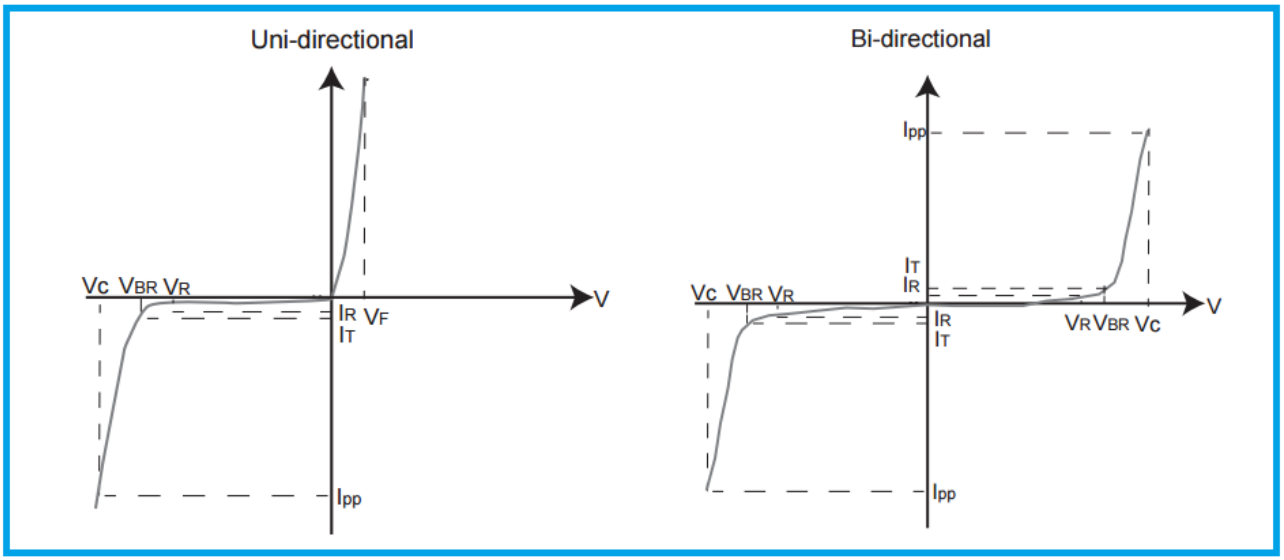
Part Number Code

SMBJ □□□ C A - □□□

- Packaging Code (T13: Tape with 13" Reel; T7: Tape with 7")
- V_{BR} Voltage tolerance (A: 5%; Blank: 10%)
- C: Bi-directional; Blank: Uni-directional
- Reverse Stand-Off Voltage or Typical Breakdown Voltage
- SMBJ Series (600W)

TVS Diode – SMBJ 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	Breakdown Voltage V_{BR} (V) @ I_T		Test Current I_T	Maximum Clamping Voltage	Maximum Peak Pulse Current	Maximum Reverse Leakage	UL
Uni	Bi	Uni	Bi	(V)	Min.	Max.	(mA)	V_C (V) @ I_{PP}	I_{PP} (A)	I_R (μA) @ V_R	
SMBJ5.0A	SMBJ5.0CA	KE	AE	5.0	6.40	7.00	10	9.2	65.3	800	✓
SMBJ6.0A	SMBJ6.0CA	KG	AG	6.0	6.67	7.37	10	10.3	58.3	800	✓
SMBJ6.5A	SMBJ6.5CA	KK	AK	6.5	7.22	7.98	10	11.2	53.6	500	✓
SMBJ7.0A	SMBJ7.0CA	KM	AM	7.0	7.78	8.60	10	12.0	50.0	200	✓
SMBJ7.5A	SMBJ7.5CA	KP	AP	7.5	8.33	9.21	1	12.9	46.6	100	✓
SMBJ8.0A	SMBJ8.0CA	KR	AR	8.0	8.89	9.83	1	13.6	44.2	50	✓
SMBJ8.5A	SMBJ8.5CA	KT	AT	8.5	9.44	10.4	1	14.4	41.7	20	✓
SMBJ9.0A	SMBJ9.0CA	KV	AV	9.0	10.0	11.1	1	15.4	39.0	10	✓
SMBJ10A	SMBJ10CA	KX	AX	10.0	11.1	12.3	1	17.0	35.3	5	✓
SMBJ11A	SMBJ11CA	KZ	AZ	11.0	12.2	13.5	1	18.2	33.0	1	✓
SMBJ12A	SMBJ12CA	LE	BE	12.0	13.3	14.7	1	19.9	30.2	1	✓
SMBJ13A	SMBJ13CA	LG	BG	13.0	14.4	15.9	1	21.5	28.0	1	✓
SMBJ14A	SMBJ14CA	LK	BK	14.0	15.6	17.2	1	23.2	25.9	1	✓
SMBJ15A	SMBJ15CA	LM	BM	15.0	16.7	18.5	1	24.4	24.6	1	✓
SMBJ16A	SMBJ16CA	LP	BP	16.0	17.8	19.7	1	26.0	23.1	1	✓
SMBJ17A	SMBJ17CA	LR	BR	17.0	18.9	20.9	1	27.6	21.8	1	✓
SMBJ18A	SMBJ18CA	LT	BT	18.0	20.0	22.1	1	29.2	20.6	1	✓

TVS Diode – SMBJ Series

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	UL
Uni	Bi	Uni	Bi		Min.	Max.					
SMBJ20A	SMBJ20CA	LV	BV	20.0	22.2	24.5	1	32.4	18.6	1	✓
SMBJ22A	SMBJ22CA	LX	BX	22.0	24.4	26.9	1	35.5	16.9	1	✓
SMBJ24A	SMBJ24CA	LZ	BZ	24.0	26.7	29.5	1	38.9	15.5	1	✓
SMBJ26A	SMBJ26CA	ME	CE	26.0	28.9	31.9	1	42.1	14.3	1	✓
SMBJ28A	SMBJ28CA	MG	CG	28.0	31.1	34.4	1	45.4	13.3	1	✓
SMBJ30A	SMBJ30CA	MK	CK	30.0	33.3	36.8	1	48.4	12.4	1	✓
SMBJ33A	SMBJ33CA	MM	CM	33.0	36.7	40.6	1	53.3	11.3	1	✓
SMBJ36A	SMBJ36CA	MP	CP	36.0	40.0	44.2	1	58.1	10.4	1	✓
SMBJ40A	SMBJ40CA	MR	CR	40.0	44.4	49.1	1	64.5	9.3	1	✓
SMBJ43A	SMBJ43CA	MT	CT	43.0	47.8	52.8	1	69.4	8.7	1	Pending
SMBJ45A	SMBJ45CA	MV	CV	45.0	50.0	55.3	1	72.7	8.3	1	Pending
SMBJ48A	SMBJ48CA	MX	CX	48.0	53.3	58.9	1	77.4	7.8	1	Pending
SMBJ51A	SMBJ51CA	MZ	CZ	51.0	56.7	62.7	1	82.4	7.3	1	Pending
SMBJ54A	SMBJ54CA	NE	DE	54.0	60.0	66.3	1	87.1	6.9	1	Pending
SMBJ58A	SMBJ58CA	NG	DG	58.0	64.4	71.2	1	93.6	6.5	1	Pending
SMBJ60A	SMBJ60CA	NK	DK	60.0	66.7	73.7	1	96.8	6.2	1	Pending
SMBJ64A	SMBJ64CA	NM	DM	64.0	71.1	78.6	1	103.0	5.9	1	Pending
SMBJ70A	SMBJ70CA	NP	DP	70.0	77.8	86.0	1	113.0	5.3	1	Pending
SMBJ75A	SMBJ75CA	NR	DR	75.0	83.3	92.1	1	121.0	5.0	1	Pending
SMBJ78A	SMBJ78CA	NT	DT	78.0	86.7	95.8	1	126.0	4.8	1	Pending
SMBJ85A	SMBJ85CA	NV	DV	85.0	94.4	104.0	1	137.0	4.4	1	Pending
SMBJ90A	SMBJ90CA	NX	DX	90.0	100.0	111.0	1	146.0	4.1	1	Pending
SMBJ100A	SMBJ100CA	NZ	DZ	100.0	111.0	123.0	1	162.0	3.7	1	Pending
SMBJ110A	SMBJ110CA	PE	EE	110.0	122.0	135.0	1	177.0	3.4	1	Pending
SMBJ120A	SMBJ120CA	PG	EG	120.0	133.0	147.0	1	193.0	3.1	1	Pending
SMBJ130A	SMBJ130CA	PK	EK	130.0	144.0	159.0	1	209.0	2.9	1	Pending
SMBJ150A	SMBJ150CA	PM	EM	150.0	167.0	185.0	1	243.0	2.5	1	Pending
SMBJ160A	SMBJ160CA	PP	EP	160.0	178.0	197.0	1	259.0	2.3	1	Pending
SMBJ170A	SMBJ170CA	PR	ER	170.0	189.0	209.0	1	275.0	2.2	1	Pending
SMBJ180A	SMBJ180CA	PT	ET	180.0	201.0	222.0	1	292.0	2.1	1	Pending
SMBJ190A	SMBJ190CA	PA	EC	190.0	209.0	243.0	1	308.0	2.0	1	Pending
SMBJ200A	SMBJ200CA	PV	EV	200.0	224.0	247.0	1	324.0	1.9	1	Pending
SMBJ220A	SMBJ220CA	PX	EX	220.0	246.0	272.0	1	356.0	1.7	1	Pending
SMBJ250A	SMBJ250CA	PZ	EZ	250.0	279.0	309.0	1	405.0	1.5	1	Pending
SMBJ300A	SMBJ300CA	QE	FE	300.0	335.0	371.0	1	486.0	1.3	1	Pending
SMBJ350A	SMBJ350CA	QG	FG	350.0	391.0	432.0	1	567.0	1.1	1	Pending
SMBJ400A	SMBJ400CA	QK	FK	400.0	447.0	494.0	1	648.0	0.9	1	Pending
SMBJ440A	SMBJ440CA	QM	FM	440.0	492.0	543.0	1	713.0	0.9	1	Pending

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

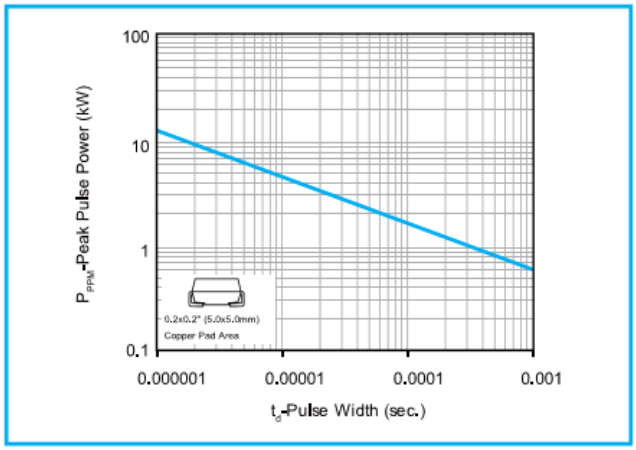


Fig 2 - Pulse Derating Curve

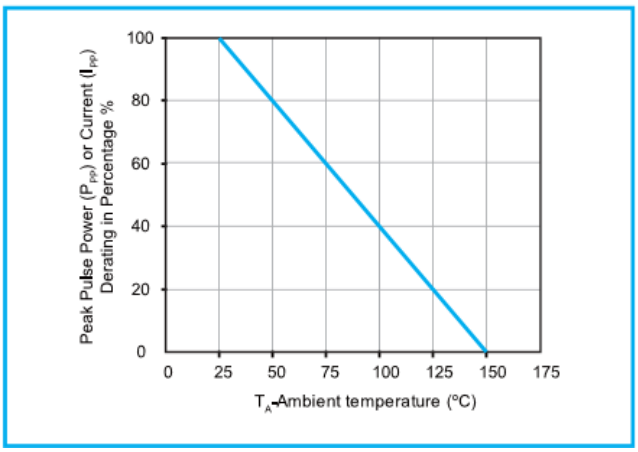


Fig 3 - Pulse Waveform

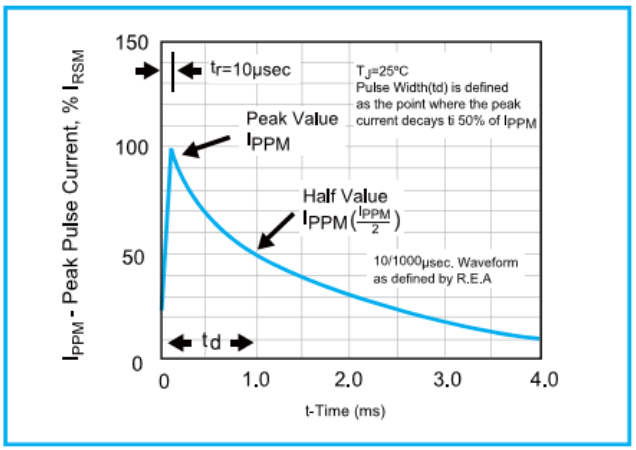


Fig 4 – Typical Junction Capacitance

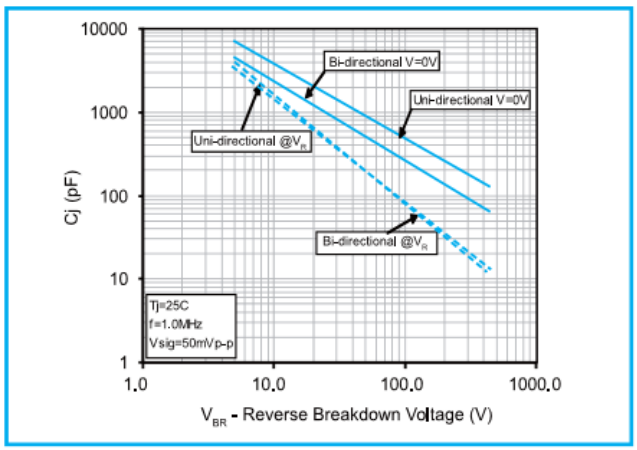


Fig 5 – Steady State Power Dissipation Derating Curve

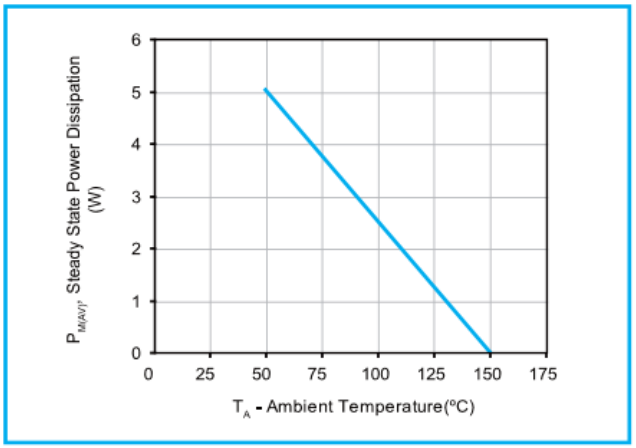
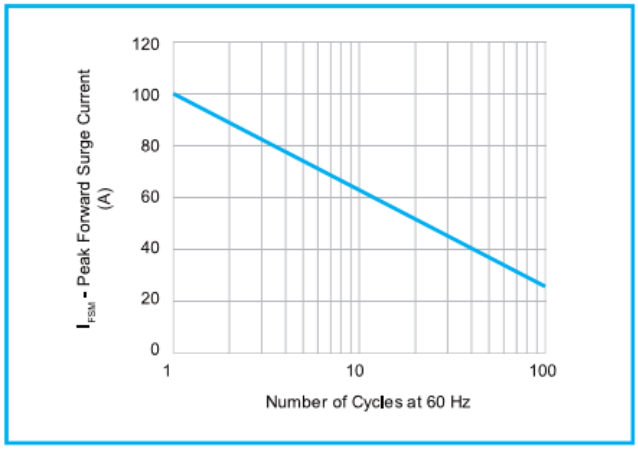
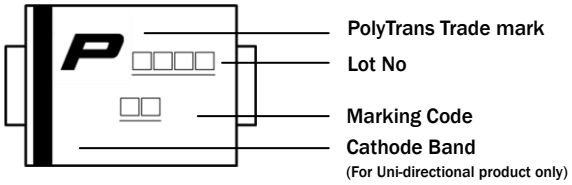


Fig 6 – Maximum Non-Repetitive Forward Surge Current (Uni-directional Only)

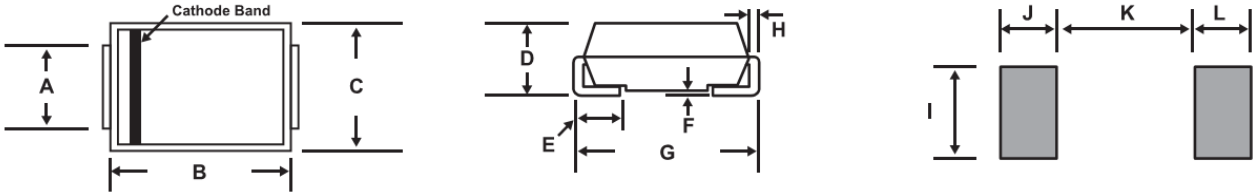


TVS Diode – SMBJ Series

Marking Definitions



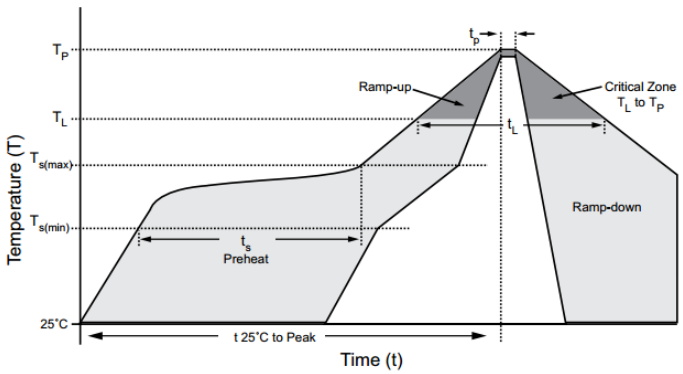
Physical Dimensions



Dimension	Millimeters		Inches	
	Min	Max	Min	Max
A	1.90	2.20	0.077	0.086
B	4.06	4.70	0.160	0.180
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.



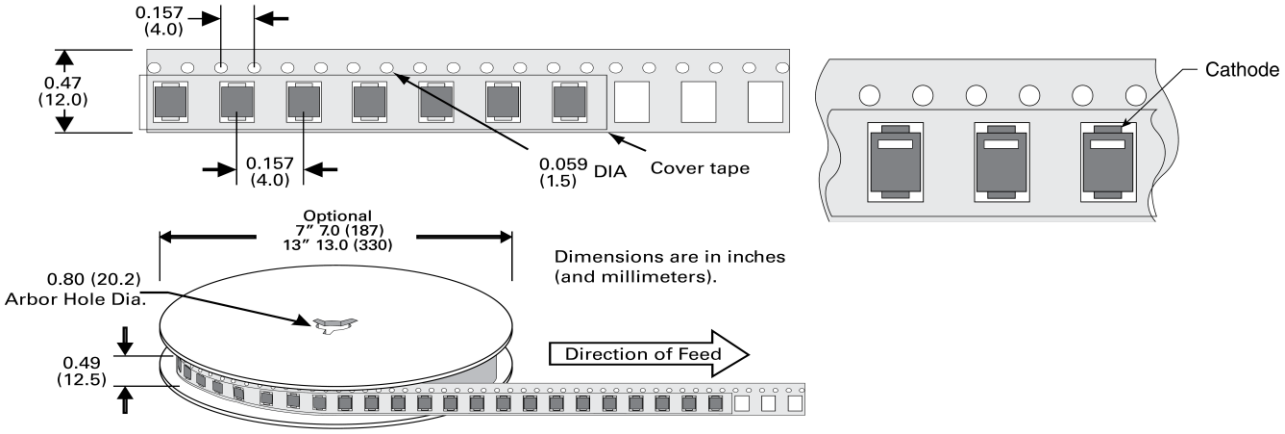
Note: If the soldering temperatures exceed the recommended profile, devices may not meet the performance requirements.

TVS Diode – SMBJ Series

Packaging Information

Part Number	Packaging Code	Component Package	Quantity	Packaging Option	Packaging Specification
SMBJ Series	T13	DO-214AA	3000	Tape & Reel – 12mm tape/13" reel	EIA STD RS-481
SMBJ Series	T7	DO-214AA	500	Tape & Reel – 12mm tape/7" reel	EIA STD RS-481

Tape and Reel Specifications



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