

Surface Mount Transient Voltage Suppressors (TVS)

SMBJ Series 5.0 To 440 V 600W

Description

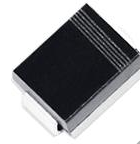
The SMBJ series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

Features

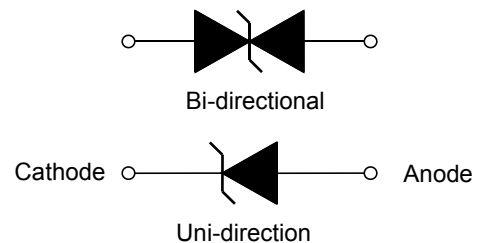
- ◆ For surface mounted applications in order to optimize board space
- ◆ Low leakage
- ◆ Uni and Bidirectional unit
- ◆ Glass passivated junction
- ◆ Low inductance
- ◆ Excellent clamping capability
- ◆ 600W Peak power capability at 10 × 1000μs waveform Repetition rate (duty cycle):0.01%
- ◆ Fast response time: typically less than 1.0ps from 0 Volts to V_{BR} min
- ◆ Typical I_R less than 5μA above 12V.
- ◆ High Temperature soldering: 260°C/40 seconds at terminals
- ◆ Typical maximum temperature coefficient $\Delta V_{BR} = 0.1\% \times V_{BR@25^{\circ}\text{C}} \times \Delta T$
- ◆ Plastic package has Underwriters Laboratory Flammability 94V-0
- ◆ Matte tin lead-free Plated
- ◆ Halogen free and RoHS compliant
- ◆ 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
- ◆ IEC-61000-4-2 ESD 15kV(Air), 8kV (Contact)
- ◆ ESD protection of data lines in accordance with IEC 61000-4-2 (IEC801-2)
- ◆ EFT protection of data lines in accordance with IEC 61000-4-4 (IEC801-4)

Uni-directional

Bi-directional



Functional Diagram



Applications

TVS devices 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.

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

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation with a 10/1000μs waveform (Fig.1)(Note 1), (Note 2)	P _{PPM}	600	Watts
Peak Pulse Current with a 10/1000μs waveform.(Note1, Fig.3)	I _{PP}	See Next Table	Amps
Power Dissipation on Infinite Heat Sink at T _L =75°C	P _{M(AV)}	5.0	Watt
Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)	I _{FSM}	100	Amps
Maximum Instantaneous Forward Voltage at 25A for Unidirectional Only (Note 4)	V _F	3.5/5.0	Voltage
Operating junction and Storage Temperature Range.	T _J , T _{STG}	-55 to +150	°C

Notes:

1. Non-repetitive current pulse, per Fig. 3 and derated above T_A = 25°C per Fig. 2.
2. Mounted on 5.0mm x 5.0mm (0.03mm thick) Copper Pads to each terminal.
3. 8.3ms single half sine-wave, or equivalent square wave, Duty cycle = 4 pulses per minutes maximum.
4. V_F < 3.5V for V_{BR} < 200V and V_F < 6.5V for V_{BR} > 201V.

Surface Mount Transient Voltage Suppressors (TVS)

SMBJ Series 5.0 To 440 V 600W

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

Part Number		Reverse Stand-Off Voltage V_{RWM} (V)	Breakdown Voltage V_{BR} (V) @ I_T		Test Current I_T (mA)	Maximum Clamping Voltage V_C @ I_{PP} (V)	Maximum Peak Pulse Current I_{PP} (A)	Maximum Reverse Leakage I_R @ V_{RWM} (μA)
Uni	Bi		MIN	MAX				
SMBJ3.3A	—	3.3	5.20	6.00	10	8.0	75.00	600
SMBJ5.0A	SMBJ5.0CA	5.0	6.40	7.00	10	9.2	65.22	800
SMBJ6.0A	SMBJ6.0CA	6.0	6.67	7.37	10	10.3	58.25	800
SMBJ6.5A	SMBJ6.5CA	6.5	7.22	7.98	10	11.2	53.57	500
SMBJ7.0A	SMBJ7.0CA	7.0	7.78	8.60	10	12.0	50.00	200
SMBJ7.5A	SMBJ7.5CA	7.5	8.33	9.21	1	12.9	46.51	100
SMBJ8.0A	SMBJ8.0CA	8.0	8.89	9.83	1	13.6	44.12	50
SMBJ8.5A	SMBJ8.5CA	8.5	9.44	10.40	1	14.4	41.67	10
SMBJ9.0A	SMBJ9.0CA	9.0	10.00	11.10	1	15.4	38.96	5
SMBJ10A	SMBJ10CA	10.0	11.10	12.30	1	17.0	35.29	5
SMBJ11A	SMBJ11CA	11.0	12.20	13.50	1	18.2	32.97	5
SMBJ12A	SMBJ12CA	12.0	13.30	14.70	1	19.9	30.15	5
SMBJ13A	SMBJ13CA	13.0	14.40	15.90	1	21.5	27.91	5
SMBJ14A	SMBJ14CA	14.0	15.60	17.20	1	23.2	25.86	5
SMBJ15A	SMBJ15CA	15.0	16.70	18.50	1	24.4	24.59	5
SMBJ16A	SMBJ16CA	16.0	17.80	19.70	1	26.0	23.08	5
SMBJ17A	SMBJ17CA	17.0	18.90	20.90	1	27.6	21.74	5
SMBJ18A	SMBJ18CA	18.0	20.00	22.10	1	29.2	20.55	5
SMBJ19A	SMBJ19CA	19.0	21.10	23.30	1	30.8	19.49	5
SMBJ20A	SMBJ20CA	20.0	22.20	24.50	1	32.4	18.52	5
SMBJ22A	SMBJ22CA	22.0	24.40	26.90	1	35.5	16.90	5
SMBJ24A	SMBJ24CA	24.0	26.70	29.50	1	38.9	15.42	5
SMBJ26A	SMBJ26CA	26.0	28.90	31.90	1	42.1	14.25	5
SMBJ28A	SMBJ28CA	28.0	31.10	34.40	1	45.4	13.22	5
SMBJ30A	SMBJ30CA	30.0	33.30	36.80	1	48.4	12.40	5
SMBJ33A	SMBJ33CA	33.0	36.70	40.60	1	53.3	11.26	5
SMBJ36A	SMBJ36CA	36.0	40.00	44.20	1	58.1	10.33	5
SMBJ40A	SMBJ40CA	40.0	44.40	49.10	1	64.5	9.30	5
SMBJ43A	SMBJ43CA	43.0	47.80	52.80	1	69.4	8.65	5

Surface Mount Transient Voltage Suppressors (TVS)

SMBJ Series 5.0 To 440 V 600W

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

Part Number		Reverse Stand-Off Voltage V_{RWM} (V)	Breakdown Voltage V_{BR} (V) @ I_{T}		Test Current I_{T} (mA)	Maximum Clamping Voltage V_{C} @ I_{PP} (V)	Maximum Peak Pulse Current I_{PP} (A)	Maximum Reverse Leakage I_{R} @ V_{RWM} (μA)
Uni	Bi		MIN	MAX				
SMBJ45A	SMBJ45CA	45.0	50.00	55.30	1	72.7	8.25	5
SMBJ48A	SMBJ48CA	48.0	53.30	58.90	1	77.4	7.75	5
SMBJ51A	SMBJ51CA	51.0	56.70	62.70	1	82.4	7.28	5
SMBJ54A	SMBJ54CA	54.0	60.00	66.30	1	87.1	6.89	5
SMBJ58A	SMBJ58CA	58.0	64.40	71.20	1	93.6	6.41	5
SMBJ60A	SMBJ60CA	60.0	66.70	73.70	1	96.8	6.20	5
SMBJ64A	SMBJ64CA	64.0	71.10	78.60	1	103.0	5.83	5
SMBJ70A	SMBJ70CA	70.0	77.80	86.00	1	113.0	5.31	5
SMBJ75A	SMBJ75CA	75.0	83.30	92.10	1	121.0	4.96	5
SMBJ78A	SMBJ78CA	78.0	86.70	95.80	1	126.0	4.76	5
SMBJ80A	SMBJ80CA	80.0	88.80	97.60	1	129.6	4.63	5
SMBJ85A	SMBJ85CA	85.0	94.40	104.00	1	137.0	4.38	5
SMBJ90A	SMBJ90CA	90.0	100.00	111.00	1	146.0	4.11	5
SMBJ100A	SMBJ100CA	100.0	111.00	123.00	1	162.0	3.70	5
SMBJ110A	SMBJ110CA	110.0	122.00	135.00	1	177.0	3.39	5
SMBJ120A	SMBJ120CA	120.0	133.00	147.00	1	193.0	3.11	5
SMBJ130A	SMBJ130CA	130.0	144.00	159.00	1	209.0	2.87	5
SMBJ140A	SMBJ140CA	140.0	155.00	171.00	1	226.8	2.65	5
SMBJ150A	SMBJ150CA	150.0	167.00	185.00	1	243.0	2.47	5
SMBJ160A	SMBJ160CA	160.0	178.00	197.00	1	259.0	2.32	5
SMBJ170A	SMBJ170CA	170.0	189.00	209.00	1	275.0	2.18	5
SMBJ180A	SMBJ180CA	180.0	201.00	220.00	1	291.6	2.06	5
SMBJ190A	SMBJ190CA	190.0	211.00	232.00	1	307.8	1.95	5
SMBJ200A	SMBJ200CA	200.0	224.00	247.00	1	324.0	1.85	5
SMBJ220A	SMBJ220CA	220.0	246.00	272.00	1	356.0	1.69	5
SMBJ250A	SMBJ250CA	250.0	279.00	309.00	1	405.0	1.48	5
SMBJ300A	SMBJ300CA	300.0	335.00	371.00	1	486.0	1.23	5
SMBJ350A	SMBJ350CA	350.0	391.00	432.00	1	567.0	1.06	5
SMBJ400A	SMBJ400CA	400.0	447.00	494.00	1	648.0	0.93	5
SMBJ440A	SMBJ440CA	440.0	492.00	543.00	1	713.0	0.84	5

Note:

- Suffix 'A' denotes 5% tolerance device.
- Add suffix 'CA' after part number to specify Bi-directional devices.
- For Bi-Directional devices having V_{R} of 10 volts and under, the I_{R} limit is double.

Surface Mount Transient Voltage Suppressors (TVS)

SMBJ Series 5.0 To 440 V 600W

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

Figure 1 - Peak Pulse Power Rating Curve

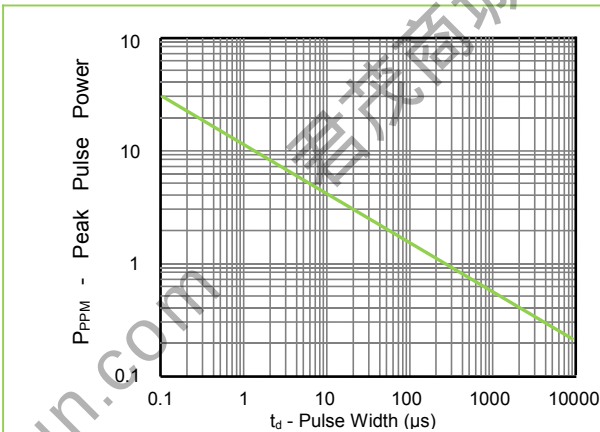


Figure 2 - Pulse Derating Curve

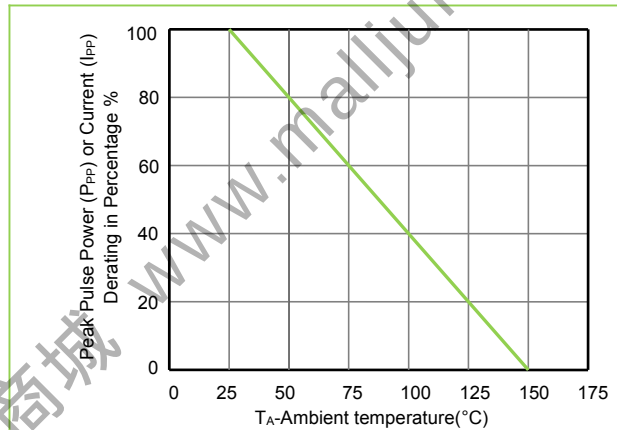


Figure 3 - Pulse Waveform

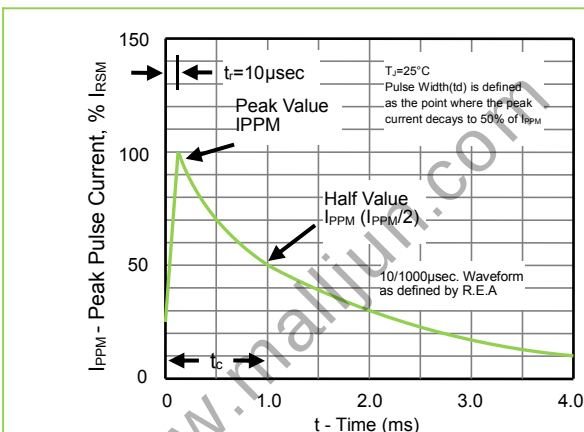


Figure 4 - Typical Junction Capacitance

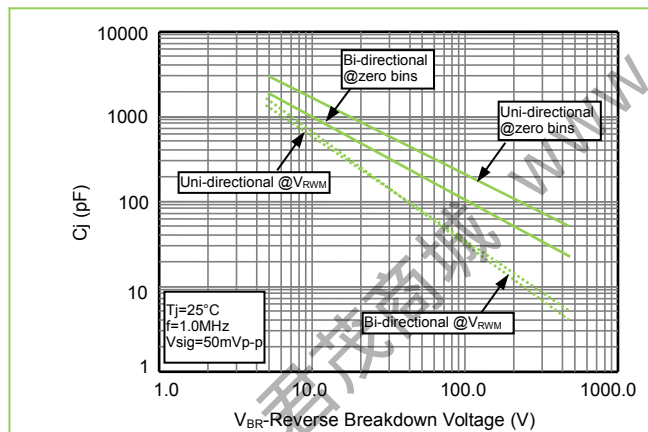


Figure 5 - Steady State Power Derating Curve

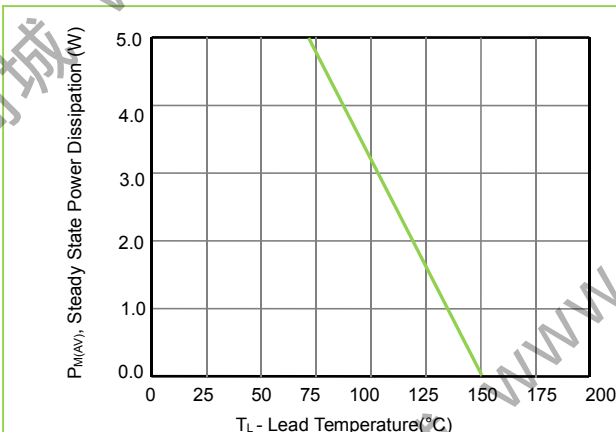
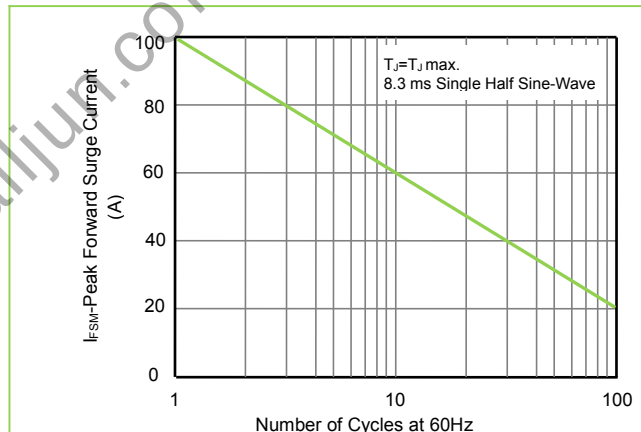


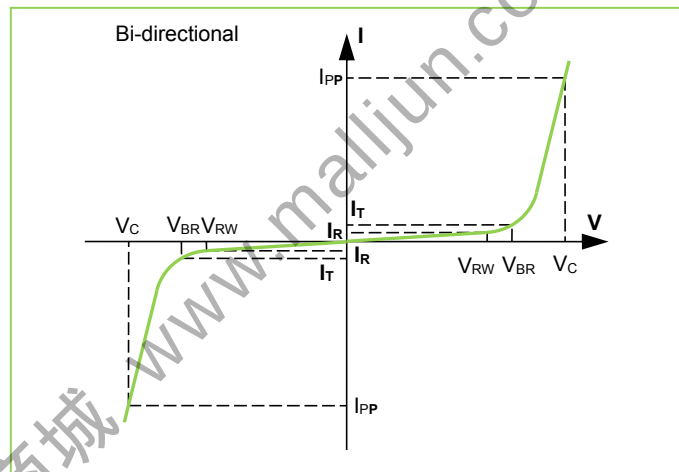
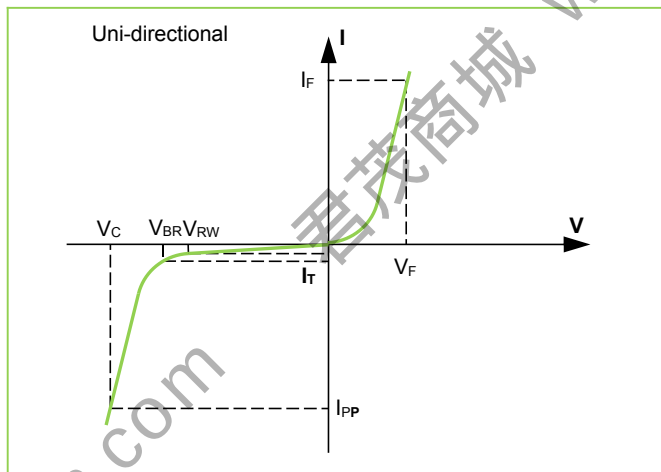
Figure 6 - Maximum Non-Repetitive Surge Current



Surface Mount Transient Voltage Suppressors (TVS)

SMBJ Series 5.0 To 440 V 600W

I-V Curve Characteristics



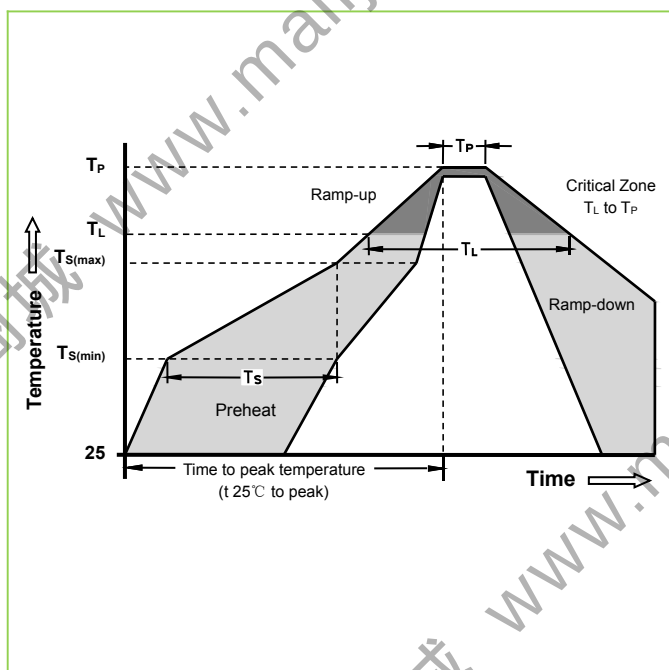
Physical Specifications

Weight	0.003 ounce, 0.093 gram
Case	JEDEC DO-214AA Molded Plastic over glass passivated junction
Polarity	Color band denotes cathode except Bipolar
Terminal	Matte Tin-plated leads, Solderable per JESD22-B102D

Environmental Specifications

Temperature Cycle	JESD22-A104
Pressure Cooker	JESD22-A102
High Temp. Storage	JESD22-A103
HTRB	JESD22-A108
Thermal Shock	JESD22-A106

Soldering Parameters

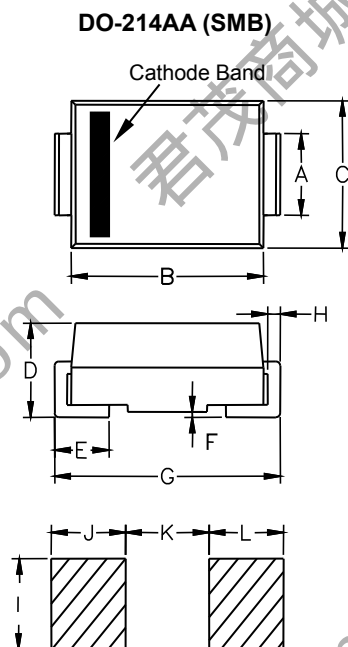


Reflow Condition		Lead-free assembly
Pre Heat	-Temperature Min (T _{S(min)})	150°C
	-Temperature Max (T _{S(max)})	200°C
	- Time (min to max) (T _S)	60 -180 Seconds
Average ramp up rate (Liquidus Temp T _L) to peak		3°C/second max
T _{S(max)} to T _L - Ramp-up Rate		3°C/second max
Reflow	- Temperature (T _L) (Liquidus)	217°C
	- Time (min to max) (T _L)	60 -150 Seconds
Peak Temperature (T _P)		260 +0/-5°C
Time within 5°C of actual peak Temperature (t _p)		20 -40 Seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature (T _P)		8 minutes Max
Do not exceed		280°C

Surface Mount Transient Voltage Suppressors (TVS)

SMBJ Series 5.0 To 440 V 600W

Dimensions



Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.073	0.087	1.85	2.21
B	0.167	0.187	4.25	4.75
C	0.130	0.155	3.30	3.94
D	0.083	0.096	2.11	2.44
E	0.030	0.060	0.76	1.52
F	0.002	0.008	0.051	0.203
G	0.200	0.220	5.08	5.59
H	0.006	0.012	0.15	0.31
I	0.090	-	2.40	-
J	0.085	-	2.10	-
K	-	0.100	-	2.60
L	0.085	-	2.10	-

Part Numbering

SMBJ × × × CA

5% V_{BR} VOLTAGE TOLERANCE
BI-DIRECTIONAL
 V_R VOLTAGE
SERIES

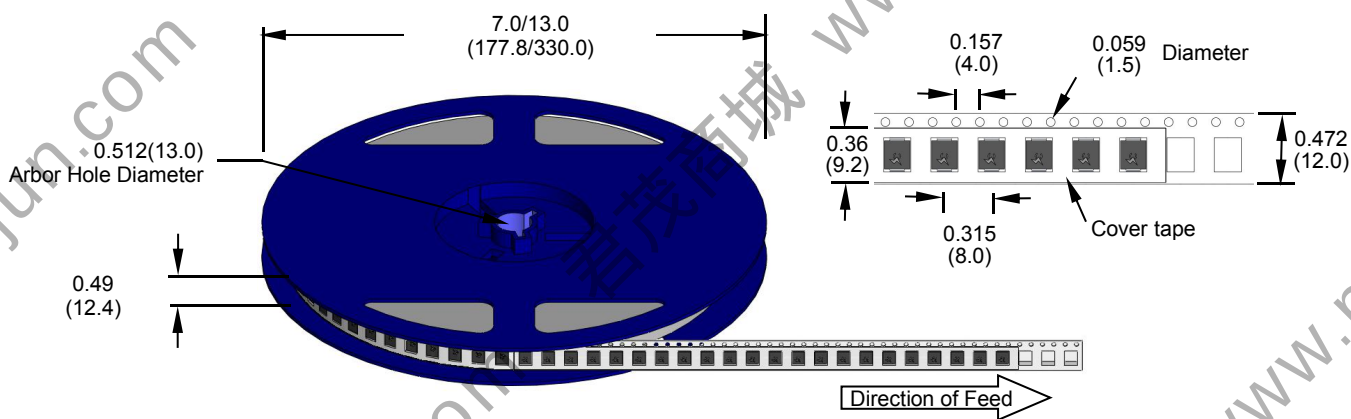
Surface Mount Transient Voltage Suppressors (TVS)

SMBJ Series 5.0 To 440 V 600W

Packaging

Part Number	Component Package	Quantity	Packaging Option	Reel Diameters (mm)
SMBJXXXXX	DO-214AA (SMB)	500 pcs	Tape & Reel -12mm/7"tape	177.8
SMBJXXXXX	DO-214AA (SMB)	3000 pcs	Tape & Reel -12mm/13"tape	330.0

Tape and Reel Specifications



Dimensions are in inches
(and millimeters)