Surface Mount Transient Voltage Suppressors (TVS)

SMDJ Series 5.0 To 440 V 3000W

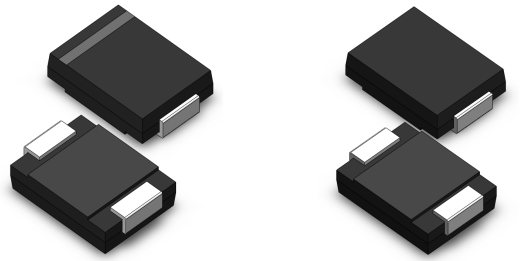
Description

The SMDJ 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
- 3000W 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 ΔV_{BR} = 0.1% × V_{BR}@25°C× ΔT
- 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)

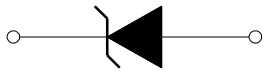
Uni-directional Bi-directional



Functional Diagram



Bi-directional

Cathode  Anode

Uni-direction

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℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation with a 10/1000μs waveform (Fig.1)(Note 1), (Note 2)	P_{PPM}	3000	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	$P_{M(AV)}$	6.0	Watt
Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)	I_{FSM}	300	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.

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Electrical Characteristics (T_A=25℃ unless otherwise noted)

Part Number		Marking		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	Uni	Bi		MIN	MAX				
SMDJ5.0	SMDJ5.0C	RDD	DDD	5.0	6.40	7.30	10	9.6	312.50	1000
SMDJ5.0A	SMDJ5.0CA	RDE	DDE	5.0	6.40	7.00	10	9.2	326.09	1000
SMDJ6.0	SMDJ6.0C	RDF	DDF	6.0	6.67	8.15	10	11.4	263.16	1000
SMDJ6.0A	SMDJ6.0CA	RDG	DDG	6.0	6.67	7.37	10	10.3	291.26	1000
SMDJ6.5	SMDJ6.5C	RDH	DDH	6.5	7.22	8.82	10	12.3	243.90	500
SMDJ6.5A	SMDJ6.5CA	RDK	DDK	6.5	7.22	7.98	10	11.2	267.86	500
SMDJ7.0	SMDJ7.0C	RDL	DDL	7.0	7.78	9.51	10	13.3	225.56	200
SMDJ7.0A	SMDJ7.0CA	PDM	DDM	7.0	7.78	8.60	10	12.0	250.00	200
SMDJ7.5	SMDJ7.5C	PDN	DDN	7.5	8.33	10.20	1	14.3	209.79	100
SMDJ7.5A	SMDJ7.5CA	PDP	DDP	7.5	8.33	9.21	1	12.9	232.56	100
SMDJ8.0	SMDJ8.0C	PDQ	DDQ	8.0	8.89	10.90	1	15.0	200.00	50
SMDJ8.0A	SMDJ8.0CA	PDR	DDR	8.0	8.89	9.83	1	13.6	220.59	50
SMDJ8.5	SMDJ8.5C	PDS	DDS	8.5	9.44	11.50	1	15.9	188.68	25
SMDJ8.5A	SMDJ8.5CA	PDT	DDT	8.5	9.44	10.40	1	14.4	208.33	25
SMDJ9.0	SMDJ9.0C	PDU	DDU	9.0	10.00	12.20	1	16.9	177.51	10
SMDJ9.0A	SMDJ9.0CA	PDV	DDV	9.0	10.00	11.10	1	15.4	194.81	10
SMDJ10	SMDJ10C	PDW	DDW	10.0	11.10	13.60	1	18.8	159.57	5
SMDJ10A	SMDJ10CA	PDX	DDX	10.0	11.10	12.30	1	17.0	176.47	5
SMDJ11	SMDJ11C	PDY	DDY	11.0	12.20	14.90	1	20.1	149.25	5
SMDJ11A	SMDJ11CA	PDZ	DDZ	11.0	12.20	13.50	1	18.2	164.84	5
SMDJ12	SMDJ12C	PED	DED	12.0	13.30	16.30	1	22.0	136.36	5
SMDJ12A	SMDJ12CA	PEE	DEE	12.0	13.30	14.70	1	19.9	150.75	5
SMDJ13	SMDJ13C	PEF	DEF	13.0	14.40	17.60	1	23.8	126.05	5
SMDJ13A	SMDJ13CA	PEG	DEG	13.0	14.40	15.90	1	21.5	139.53	5
SMDJ14	SMDJ14C	PEH	DEH	14.0	15.60	19.10	1	25.8	116.28	5
SMDJ14A	SMDJ14CA	PEK	DEK	14.0	15.60	17.20	1	23.2	129.31	5
SMDJ15	SMDJ15C	PEL	DEL	15.0	16.70	20.40	1	26.9	111.52	5
SMDJ15A	SMDJ15CA	PEM	DEM	15.0	16.70	18.50	1	24.4	122.95	5
SMDJ16	SMDJ16C	PEN	DEN	16.0	17.80	21.80	1	28.8	104.17	5
SMDJ16A	SMDJ16CA	PEP	DEP	16.0	17.80	19.70	1	26.0	115.38	5
SMDJ17	SMDJ17C	PEQ	DEQ	17.0	18.90	23.10	1	30.5	98.36	5
SMDJ17A	SMDJ17CA	PER	DER	17.0	18.90	20.90	1	27.6	108.70	5
SMDJ18	SMDJ18C	PES	DES	18.0	20.00	24.40	1	32.2	93.17	5
SMDJ18A	SMDJ18CA	PET	DET	18.0	20.00	22.10	1	29.2	102.74	5
SMDJ19	SMDJ19C	PEA	DEA	19.0	21.13	25.76	1	34.0	88.21	5
SMDJ19A	SMDJ19CA	PEB	DEB	19.0	21.10	23.30	1	30.8	97.47	5
SMDJ20	SMDJ20C	PEU	DEU	20.0	22.20	27.10	1	35.8	83.80	5
SMDJ20A	SMDJ20CA	PEV	DEV	20.0	22.20	24.50	1	32.4	92.59	5
SMDJ22	SMDJ22C	PEW	DEW	22.0	24.40	29.80	1	39.4	76.14	5
SMDJ22A	SMDJ22CA	PEX	DEX	22.0	24.40	26.90	1	35.5	84.51	5
SMDJ24	SMDJ24C	PEY	DEY	24.0	26.70	32.60	1	43.0	69.77	5
SMDJ24A	SMDJ24CA	PEZ	DEZ	24.0	26.70	29.50	1	38.9	77.12	5
SMDJ26	SMDJ26C	PFD	DFD	26.0	28.90	35.30	1	46.6	64.38	5
SMDJ26A	SMDJ26CA	PFE	DFE	26.0	28.90	31.90	1	42.1	71.26	5
SMDJ28	SMDJ28C	PFF	DFF	28.0	31.10	38.00	1	50.0	60.00	5
SMDJ28A	SMDJ28CA	PFG	DFG	28.0	31.10	34.40	1	45.4	66.08	5
SMDJ30	SMDJ30C	PFH	DFH	30.0	33.30	40.70	1	53.5	56.07	5
SMDJ30A	SMDJ30CA	PFK	DFK	30.0	33.30	36.80	1	48.4	61.98	5
SMDJ33	SMDJ33C	PFL	DFL	33.0	36.70	44.90	1	59.0	50.85	5
SMDJ33A	SMDJ33CA	PFM	DFM	33.0	36.70	40.60	1	53.3	56.29	5
SMDJ36	SMDJ36C	PFN	DFN	36.0	40.00	48.90	1	64.3	46.66	5
SMDJ36A	SMDJ36CA	PFP	DFP	36.0	40.00	44.20	1	58.1	51.64	5
SMDJ40	SMDJ40C	PFQ	DFQ	40.0	44.40	54.30	1	71.4	42.02	5
SMDJ40A	SMDJ40CA	PFR	DFR	40.0	44.40	49.10	1	64.5	46.51	5
SMDJ43	SMDJ43C	PFS	DFS	43.0	47.80	58.40	1	76.7	39.11	5
SMDJ43A	SMDJ43CA	PFT	DFT	43.0	47.80	52.80	1	69.4	43.23	5

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Electrical Characteristics (T_A=25℃ unless otherwise noted) (Continue)

Part Number		Marking		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	Uni	Bi		MIN	MAX				
SMDJ45	SMDJ45C	PFU	DFU	45.0	50.00	61.10	1	80.3	37.36	5
SMDJ45A	SMDJ45CA	PFV	DFV	45.0	50.00	55.30	1	72.7	41.27	5
SMDJ48	SMDJ48C	PFW	DFW	48.0	53.30	65.10	1	85.5	35.09	5
SMDJ48A	SMDJ48CA	PFX	DFX	48.0	53.30	58.90	1	77.4	38.76	5
SMDJ51	SMDJ51C	PFY	DFY	51.0	56.70	69.30	1	91.1	32.93	5
SMDJ51A	SMDJ51CA	PFZ	DFZ	51.0	56.70	62.70	1	82.4	36.41	5
SMDJ54	SMDJ54C	RGD	DGD	54.0	60.00	73.30	1	96.3	31.15	5
SMDJ54A	SMDJ54CA	RGE	DGE	54.0	60.00	66.30	1	87.1	34.44	5
SMDJ58	SMDJ58C	RGF	DGF	58.0	64.40	78.70	1	103.0	29.13	5
SMDJ58A	SMDJ58CA	PGG	DGG	58.0	64.40	71.20	1	93.6	32.05	5
SMDJ60	SMDJ60C	RGH	DGH	60.0	66.70	81.50	1	107.0	28.04	5
SMDJ60A	SMDJ60CA	PGK	DGK	60.0	66.70	73.70	1	96.8	30.99	5
SMDJ64	SMDJ64C	PGL	DGL	64.0	71.10	86.90	1	114.0	26.32	5
SMDJ64A	SMDJ64CA	PGM	DGM	64.0	71.10	78.60	1	103.0	29.13	5
SMDJ70	SMDJ70C	PGN	DGN	70.0	77.80	95.10	1	125.0	24.00	5
SMDJ70A	SMDJ70CA	PGP	DGP	70.0	77.80	86.00	1	113.0	26.55	5
SMDJ75	SMDJ75C	PGQ	DGQ	75.0	83.30	102.00	1	134.0	22.39	5
SMDJ75A	SMDJ75CA	PGR	DGR	75.0	83.30	92.10	1	121.0	24.79	5
SMDJ78	SMDJ78C	PGS	DGS	78.0	86.70	106.00	1	139.0	21.58	5
SMDJ78A	SMDJ78CA	PGT	DGT	78.0	86.70	95.80	1	126.0	23.81	5
SMDJ80	SMDJ80C	PGA	DGA	80.0	88.96	108.80	1	143.2	20.95	5
SMDJ80A	SMDJ80CA	PGB	DGB	80.0	88.80	97.60	1	129.6	23.15	5
SMDJ85	SMDJ85C	PGU	DGU	85.0	94.40	115.00	1	151.0	19.87	5
SMDJ85A	SMDJ85CA	PGV	DGV	85.0	94.40	104.00	1	137.0	21.90	5
SMDJ90	SMDJ90C	PGW	DGW	90.0	100.00	122.00	1	160.0	18.75	5
SMDJ90A	SMDJ90CA	PGX	DGX	90.0	100.00	111.00	1	146.0	20.55	5
SMDJ100	SMDJ100C	PGY	DGY	100.0	111.00	136.00	1	179.0	16.76	5
SMDJ100A	SMDJ100CA	PGZ	DGZ	100.0	111.00	123.00	1	162.0	18.52	5
SMDJ110	SMDJ110C	PHD	DHD	110.0	122.00	149.00	1	196.0	15.31	5
SMDJ110A	SMDJ110CA	PHE	DHE	110.0	122.00	135.00	1	177.0	16.95	5
SMDJ120	SMDJ120C	PHF	DHF	120.0	133.00	163.00	1	214.0	14.02	5
SMDJ120A	SMDJ120CA	PHG	DHG	120.0	133.00	147.00	1	193.0	15.54	5
SMDJ130	SMDJ130C	PHH	DHH	130.0	144.00	176.00	1	231.0	12.99	5
SMDJ130A	SMDJ130CA	PHK	DHK	130.0	144.00	159.00	1	209.0	14.35	5
SMDJ140	SMDJ140C	PHA	DHA	140.0	155.68	190.40	1	250.6	11.97	5
SMDJ140A	SMDJ140CA	PHB	DHB	140.0	155.00	171.00	1	226.8	13.23	5
SMDJ150	SMDJ150C	PHL	DHL	150.0	167.00	204.00	1	268.0	11.19	5
SMDJ150A	SMDJ150CA	PHM	DHM	150.0	167.00	185.00	1	243.0	12.35	5
SMDJ160	SMDJ160C	PHN	DHN	160.0	178.00	218.00	1	287.0	10.45	5
SMDJ160A	SMDJ160CA	PHP	DHP	160.0	178.00	197.00	1	259.0	11.58	5
SMDJ170	SMDJ170C	PHQ	DHQ	170.0	189.00	231.00	1	304.0	9.87	5
SMDJ170A	SMDJ170CA	PHR	DHR	170.0	189.00	209.00	1	275.0	10.91	5
SMDJ180	SMDJ180C	PHS	DHS	180.0	201.00	244.80	1	322.2	9.31	5
SMDJ180A	SMDJ180CA	PHT	DHT	180.0	201.00	220.00	1	291.6	10.29	5
SMDJ190	SMDJ190C	PHU	DHU	190.0	211.21	258.40	1	340.1	8.82	5
SMDJ190A	SMDJ190CA	PHV	DHV	190.0	211.00	232.00	1	307.8	9.75	5
SMDJ200A	SMDJ200CA	PHW	DHW	200.0	224.00	247.00	1	324.0	9.26	5
SMDJ220A	SMDJ220CA	PHX	DHX	220.0	246.00	272.00	1	356.0	8.43	5
SMDJ250A	SMDJ250CA	PHZ	DHZ	250.0	279.00	309.00	1	405.0	7.41	5
SMDJ300A	SMDJ300CA	PJE	DJE	300.0	335.00	371.00	1	486.0	6.17	5
SMDJ350A	SMDJ350CA	PJG	DJG	350.0	391.00	432.00	1	567.0	5.29	5
SMDJ400A	SMDJ400CA	PJK	DJK	400.0	447.00	494.00	1	648.0	4.63	5
SMDJ440A	SMDJ440CA	PJM	DJM	440.0	492.00	543.00	1	713.0	4.21	5

Note:

1. Suffix 'A ' denotes 5% tolerance device. Without 'A' denotes 10% tolerance device
2. Add suffix 'C 'or ' CA ' after part number to specify Bi-directional devices
3. For Bi-Directional devices having V_R of 10 volts and under, the I_R limit is double

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

Figure 1 - Peak Pulse Power Rating Curve

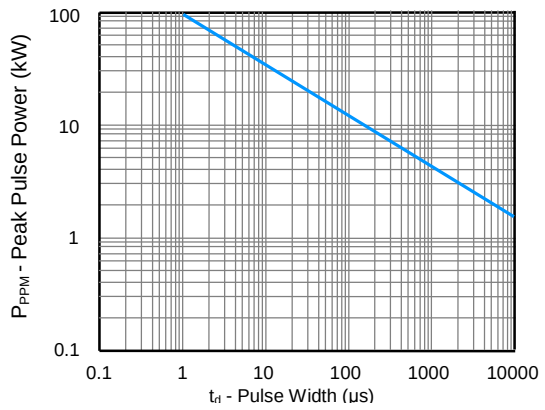


Figure 2 - Pulse Derating Curve

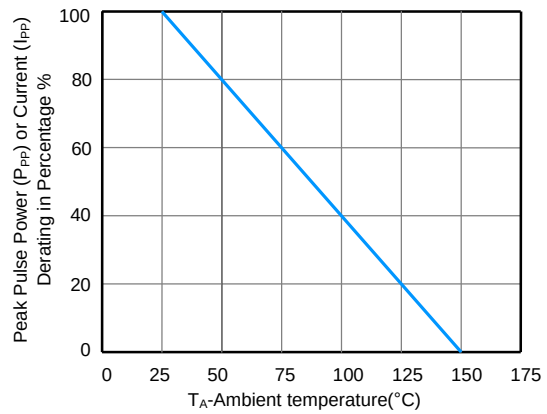


Figure 3 - Pulse Waveform

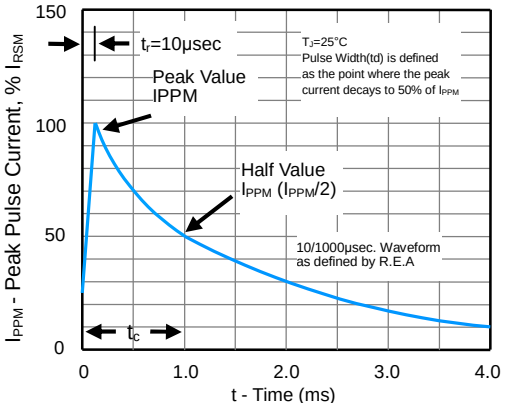


Figure 4 - Typical Junction Capacitance

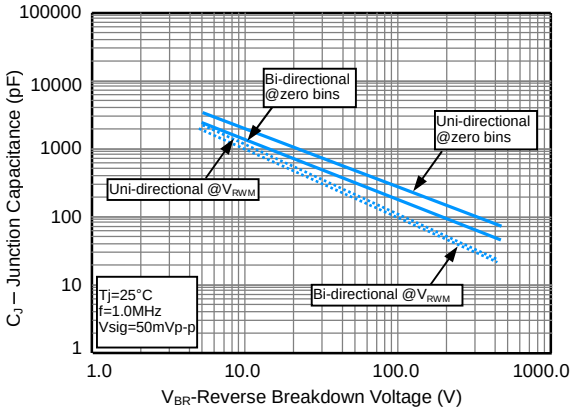


Figure 5 - Steady State Power Derating Curve

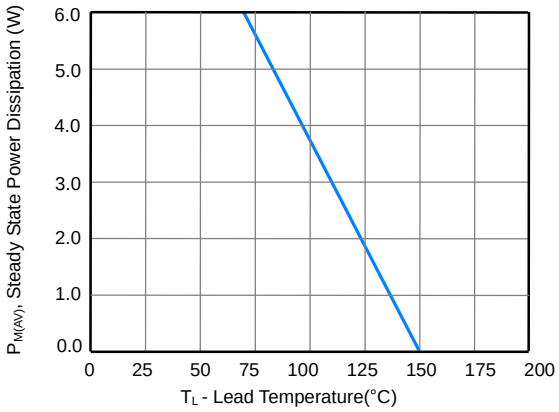
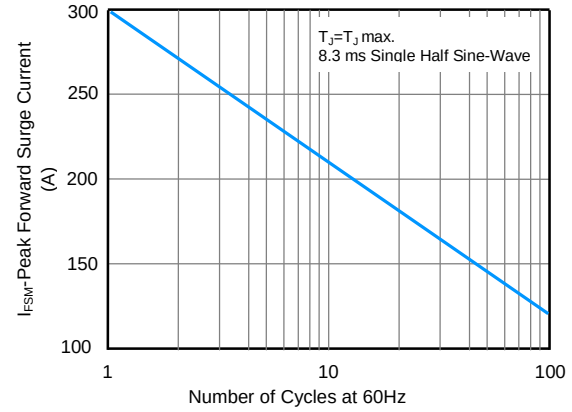


Figure 6 - Maximum Non-Repetitive Surge Current

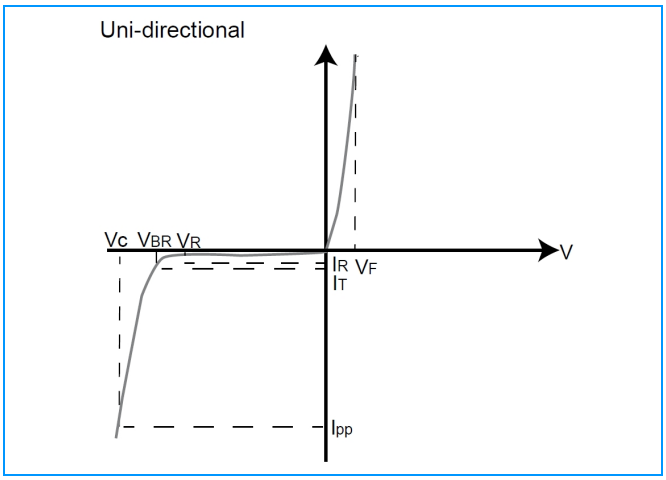


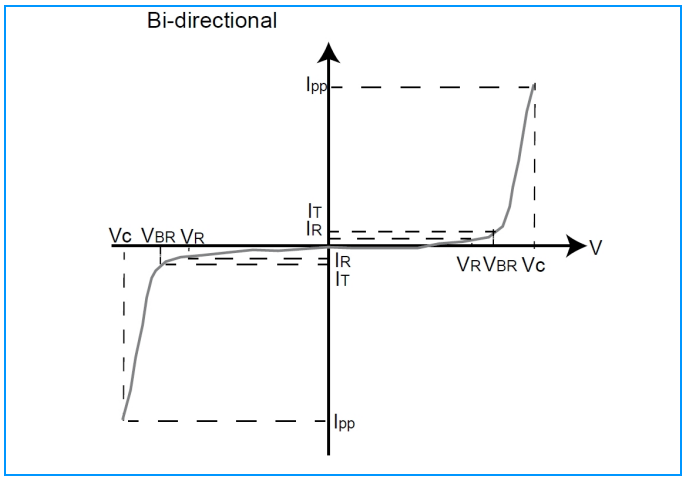
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I-V Curve Characteristics





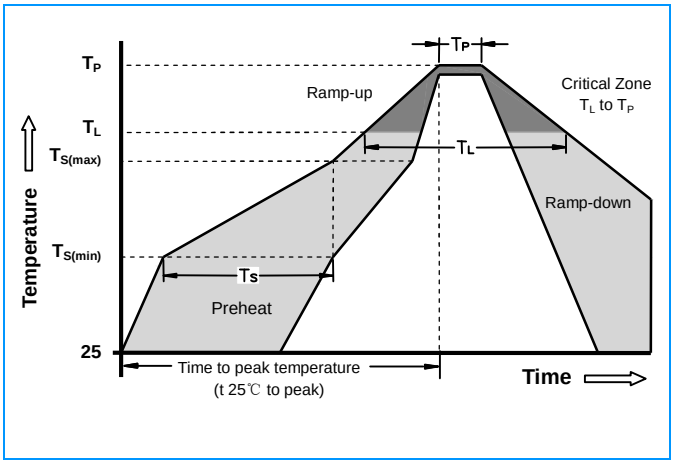
Physical Specifications

Weight	0.007 ounce, 0.21 gram
Case	JEDEC DO-214AB 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 TL - 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)		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

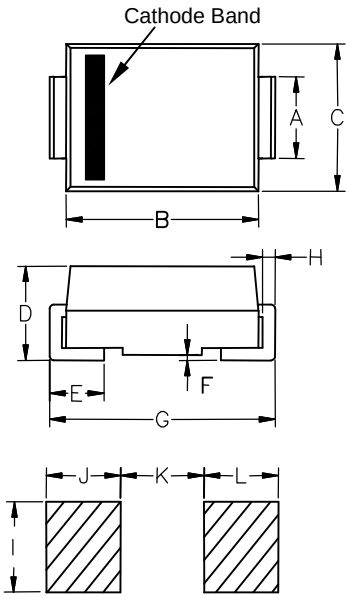
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SMDJ Series 5.0 To 440 V 3000W

Dimensions

DO-214AB (SMC)



Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.114	0.126	2.86	3.160
B	0.260	0.280	6.520	7.020
C	0.220	0.245	5.520	6.150
D	0.079	0.103	1.980	2.590
E	0.030	0.060	0.750	1.510
F	-	0.008	-	0.203
G	0.305	0.320	7.640	8.020
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	-

Part Numbering

S M D J × × × C A

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

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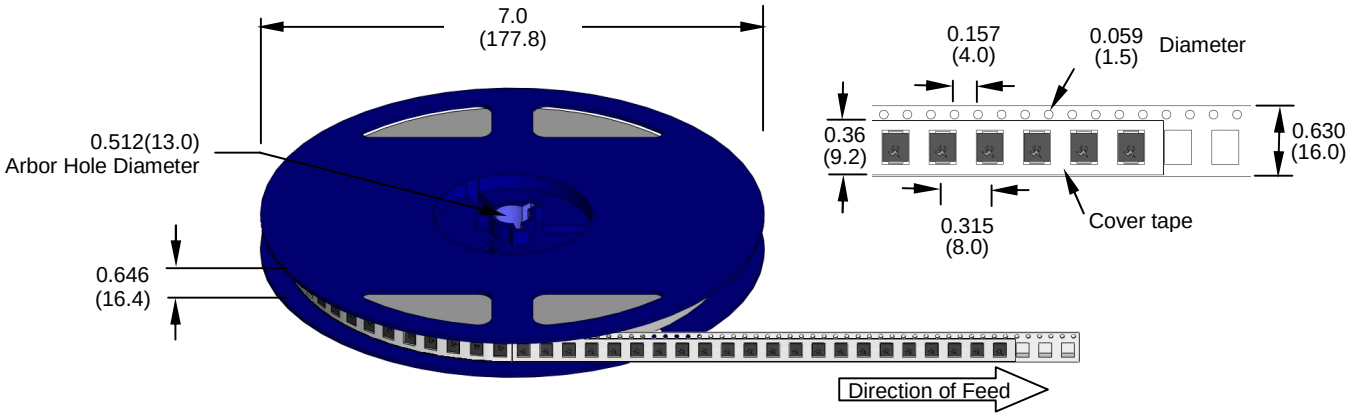
Surface Mount Transient Voltage Suppressors (TVS)

SMDJ Series 5.0 To 440 V 3000W

Packaging

Part Number	Component Package	Quantity	Packaging Option	Packaging Specification
SMDJXXXXX	DO-214AB	500	Tape & Reel -16mm/7"tape	EIA STD RS-481

Tape and Reel Specifications



Dimensions are in inches
(and millimeters)

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