

## Surface Mount Transient Voltage Suppressors (TVS)

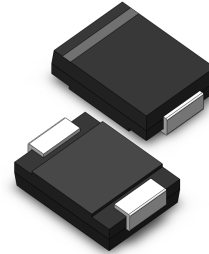
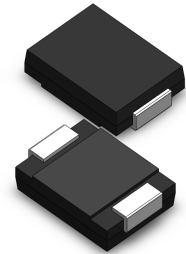
**5.0SMDJ Series 11 To 440 V 5000W**

### Description

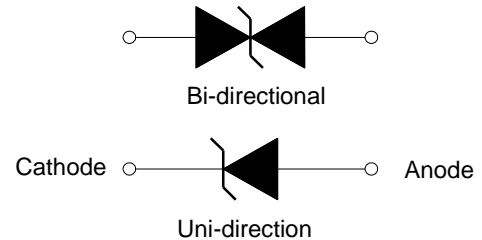
The 5.0SMDJ series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

### Features

- u For surface mounted applications in order to optimize board space
- u Low leakage
- u Uni and Bidirectional unit
- u Glass passivated junction
- u Low inductance
- u Excellent clamping capability
- u 5000W Peak power capability at 10 × 1000μs waveform Repetition rate (duty cycle):0.01%
- u Fast response time: typically less than 1.0ps from 0 Volts to  $V_{BR}$  min
- u Typical  $I_R$  less than 5μA above 25V.
- u High Temperature soldering: 260°C/40 seconds at terminals
- u Typical maximum temperature coefficient  $\Delta V_{BR} = 0.1\% \times V_{BR}@25^\circ\text{C} \times \Delta T$
- u Plastic package has Underwriters Laboratory Flammability 94V-0
- u Matte tin lead-free Plated
- u Halogen free and RoHS compliant
- u Typical failure mode is short from over-specified voltage or current
- u Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c
- u IEC-61000-4-2 ESD 15kV(Air), 8kV (Contact)
- u ESD protection of data lines in accordance with IEC 61000-4-2 (IEC801-2)
- u 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 ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation with a 10/1000μs waveform (Fig.1)(Note 1), (Note 2)	$P_{PPM}$	5000	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 $T_L=75^\circ\text{C}$	$P_{M(AV)}$	6.5	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	$^\circ\text{C}$

### Notes:

1. Non-repetitive current pulse, per Fig. 3 and derated above  $T_A = 25^\circ\text{C}$  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.  $V_F < 3.5\text{V}$  for  $V_{BR} < 200\text{V}$  and  $V_F < 6.5\text{V}$  for  $V_{BR} > 201\text{V}$ .

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

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**5.0SMDJ Series 11 To 440 V 5000W**

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 $I_R$ @ $V_{RWM}$ ( $\mu$ A)
Uni	Bi	Uni	Bi		MIN	MAX				
5.0SMDJ11	5.0SMDJ11C	5PDW	5BDW	11.0	12.20	14.90	1	20.1	251.24	800
5.0SMDJ11A	5.0SMDJ11CA	5PDX	5BDX	11.0	12.20	13.50	1	18.2	277.47	800
5.0SMDJ12	5.0SMDJ12C	5PDY	5BDY	12.0	13.30	16.30	1	22.0	229.55	800
5.0SMDJ12A	5.0SMDJ12CA	5PDZ	5BDZ	12.0	13.30	14.70	1	19.9	253.77	800
5.0SMDJ13	5.0SMDJ13C	5PED	5BED	13.0	14.40	17.60	1	23.8	212.18	500
5.0SMDJ13A	5.0SMDJ13CA	5PEE	5BEE	13.0	14.40	15.90	1	21.5	234.88	500
5.0SMDJ14	5.0SMDJ14C	5PEF	5BEF	14.0	15.60	19.10	1	25.8	195.74	200
5.0SMDJ14A	5.0SMDJ14CA	5PEG	5BEG	14.0	15.60	17.20	1	23.2	217.67	200
5.0SMDJ15	5.0SMDJ15C	5PEH	5BEH	15.0	16.70	20.40	1	26.9	187.73	100
5.0SMDJ15A	5.0SMDJ15CA	5PEK	5BEK	15.0	16.70	18.50	1	24.4	206.97	100
5.0SMDJ16	5.0SMDJ16C	5PEL	5BEL	16.0	17.80	21.80	1	28.8	175.35	50
5.0SMDJ16A	5.0SMDJ16CA	5PEM	5BEM	16.0	17.80	19.70	1	26.0	194.23	50
5.0SMDJ17	5.0SMDJ17C	5PEN	5BEN	17.0	18.90	23.10	1	30.5	165.57	20
5.0SMDJ17A	5.0SMDJ17CA	5PEP	5BEP	17.0	18.90	20.90	1	27.6	182.97	20
5.0SMDJ18	5.0SMDJ18C	5PEQ	5BEQ	18.0	20.00	24.40	1	32.2	156.83	10
5.0SMDJ18A	5.0SMDJ18CA	5PER	5BER	18.0	20.00	22.10	1	29.2	172.95	10
5.0SMDJ19	5.0SMDJ19C	5PES	5BES	19.0	21.13	25.76	1	34.0	148.49	10
5.0SMDJ19A	5.0SMDJ19CA	5PET	5BET	19.0	21.10	23.30	1	30.8	164.07	10
5.0SMDJ20	5.0SMDJ20C	5PEU	5BEU	20.0	22.20	27.10	1	35.8	141.06	5
5.0SMDJ20A	5.0SMDJ20CA	5PEV	5BEV	20.0	22.20	24.50	1	32.4	155.86	5
5.0SMDJ22	5.0SMDJ22C	5PEW	5BEW	22.0	24.40	29.80	1	39.4	128.17	5
5.0SMDJ22A	5.0SMDJ22CA	5PEX	5BEX	22.0	24.40	26.90	1	35.5	142.25	5
5.0SMDJ24	5.0SMDJ24C	5PEY	5BEY	24.0	26.70	32.60	1	43.0	117.44	5
5.0SMDJ24A	5.0SMDJ24CA	5PEZ	5BEZ	24.0	26.70	29.50	1	38.9	129.82	5
5.0SMDJ26	5.0SMDJ26C	5PFD	5BFD	26.0	28.90	35.30	1	46.6	108.37	5
5.0SMDJ26A	5.0SMDJ26CA	5PFE	5BFE	26.0	28.90	31.90	1	42.1	119.95	5
5.0SMDJ28	5.0SMDJ28C	5PFF	5BFF	28.0	31.10	38.00	1	50.0	101.00	5
5.0SMDJ28A	5.0SMDJ28CA	5PFG	5BFG	28.0	31.10	34.40	1	45.4	111.23	5
5.0SMDJ30	5.0SMDJ30C	5PFH	5BFH	30.0	33.30	40.70	1	53.5	94.39	5
5.0SMDJ30A	5.0SMDJ30CA	5PFK	5BFK	30.0	33.30	36.80	1	48.4	104.34	5
5.0SMDJ33	5.0SMDJ33C	5PFL	5BFL	33.0	36.70	44.90	1	59.0	85.59	5
5.0SMDJ33A	5.0SMDJ33CA	5PFM	5BFM	33.0	36.70	40.60	1	53.3	94.75	5
5.0SMDJ36	5.0SMDJ36C	5PFN	5BFN	36.0	40.00	48.90	1	64.3	78.54	5
5.0SMDJ36A	5.0SMDJ36CA	5PFP	5BFP	36.0	40.00	44.20	1	58.1	86.92	5
5.0SMDJ40	5.0SMDJ40C	5PFQ	5BFQ	40.0	44.40	54.30	1	71.4	70.73	5
5.0SMDJ40A	5.0SMDJ40CA	5PFR	5BFR	40.0	44.40	49.10	1	64.5	78.29	5
5.0SMDJ43	5.0SMDJ43C	5PFS	5BFS	43.0	47.80	58.40	1	76.7	65.84	5
5.0SMDJ43A	5.0SMDJ43CA	5PFT	5BFT	43.0	47.80	52.80	1	69.4	72.77	5
5.0SMDJ45	5.0SMDJ45C	5PFU	5BFU	45.0	50.00	61.10	1	80.3	62.89	5
5.0SMDJ45A	5.0SMDJ45CA	5PFV	5BFV	45.0	50.00	55.30	1	72.7	69.46	5
5.0SMDJ48	5.0SMDJ48C	5PFW	5BFW	48.0	53.30	65.10	1	85.5	59.06	5
5.0SMDJ48A	5.0SMDJ48CA	5PFX	5BFX	48.0	53.30	58.90	1	77.4	65.25	5
5.0SMDJ51	5.0SMDJ51C	5PFY	5BFY	51.0	56.70	69.30	1	91.1	55.43	5
5.0SMDJ51A	5.0SMDJ51CA	5PFZ	5BFZ	51.0	56.70	62.70	1	82.4	61.29	5
5.0SMDJ54	5.0SMDJ54C	5PGD	5BGD	54.0	60.00	73.30	1	96.3	52.44	5
5.0SMDJ54A	5.0SMDJ54CA	5PGE	5BGE	54.0	60.00	66.30	1	87.1	57.98	5
5.0SMDJ58	5.0SMDJ58C	5PGF	5BGF	58.0	64.40	78.70	1	103.0	49.03	5
5.0SMDJ58A	5.0SMDJ58CA	5PGG	5BGG	58.0	64.40	71.20	1	93.6	53.95	5

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

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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 $I_R$ @ $V_{RWM}$ ( $\mu$ A)
Uni	Bi	Uni	Bi		MIN	MAX				
5.0SMDJ60	SMAJ60C	5PGH	5BGH	60.0	66.70	81.50	1	107.0	47.20	5
5.0SMDJ60A	SMAJ60CA	5PGK	5BGK	60.0	66.70	73.70	1	96.8	52.17	5
5.0SMDJ64	SMAJ64C	5PGL	5BGL	64.0	71.10	86.90	1	114.0	44.30	5
5.0SMDJ64A	SMAJ64CA	5PGM	5BGM	64.0	71.10	78.60	1	103.0	49.03	5
5.0SMDJ70	SMAJ70C	5PGN	5BGN	70.0	77.80	95.10	1	125.0	40.40	5
5.0SMDJ70A	SMAJ70CA	5PGP	5BGP	70.0	77.80	86.00	1	113.0	44.69	5
5.0SMDJ75	SMAJ75C	5PGQ	5BGQ	75.0	83.30	102.00	1	134.0	37.69	5
5.0SMDJ75A	SMAJ75CA	5PGR	5BGR	75.0	83.30	92.10	1	121.0	41.74	5
5.0SMDJ78	SMAJ78C	5PGS	5BGS	78.0	86.70	106.00	1	139.0	36.33	5
5.0SMDJ78A	SMAJ78CA	5PGT	5BGT	78.0	86.70	95.80	1	126.0	40.08	5
5.0SMDJ80	SMAJ80C	5PGA	5BGA	80.0	88.96	108.80	1	143.2	35.27	5
5.0SMDJ80A	SMAJ80CA	5PGB	5BGB	80.0	88.80	97.60	1	129.6	38.97	5
5.0SMDJ85	SMAJ85C	5PGU	5BGU	85.0	94.40	115.00	1	151.0	33.44	5
5.0SMDJ85A	SMAJ85CA	5PGV	5BGV	85.0	94.40	104.00	1	137.0	36.86	5
5.0SMDJ90	SMAJ90C	5PGW	5BGW	90.0	100.00	122.00	1	160.0	31.56	5
5.0SMDJ90A	SMAJ90CA	5PGX	5BGX	90.0	100.00	111.00	1	146.0	34.59	5
5.0SMDJ100	SMAJ100C	5PGY	5BGY	100.0	111.00	136.00	1	179.0	28.21	5
5.0SMDJ100A	SMAJ100CA	5PGZ	5BGZ	100.0	111.00	123.00	1	162.0	31.17	5
5.0SMDJ110	SMAJ110C	5PHD	5BHD	110.0	122.00	149.00	1	196.0	25.77	5
5.0SMDJ110A	SMAJ110CA	5PHE	5BHE	110.0	122.00	135.00	1	177.0	28.53	5
5.0SMDJ120	SMAJ120C	5PHF	5BHF	120.0	133.00	163.00	1	214.0	23.60	5
5.0SMDJ120A	SMAJ120CA	5PHG	5BHG	120.0	133.00	147.00	1	193.0	26.17	5
5.0SMDJ130	SMAJ130C	5PHH	5BHH	130.0	144.00	176.00	1	231.0	21.86	5
5.0SMDJ130A	SMAJ130CA	5PHK	5BHK	130.0	144.00	159.00	1	209.0	24.16	5
5.0SMDJ140	SMAJ140C	5PHA	5BHA	140.0	155.68	190.40	1	250.6	20.15	5
5.0SMDJ140A	SMAJ140CA	5PHB	5BHB	140.0	155.00	171.00	1	226.8	22.27	5
5.0SMDJ150	SMAJ150C	5PHL	5BHL	150.0	167.00	204.00	1	268.0	18.84	5
5.0SMDJ150A	SMAJ150CA	5PHM	5BHM	150.0	167.00	185.00	1	243.0	20.78	5
5.0SMDJ160	SMAJ160C	5PHN	5BHN	160.0	178.00	218.00	1	287.0	17.60	5
5.0SMDJ160A	SMAJ160CA	5PHP	5BHP	160.0	178.00	197.00	1	259.0	19.50	5
5.0SMDJ170	SMAJ170C	5PHQ	5BHQ	170.0	189.00	231.00	1	304.0	16.61	5
5.0SMDJ170A	SMAJ170CA	5PHR	5BHR	170.0	189.00	209.00	1	275.0	18.36	5
5.0SMDJ180	SMAJ180C	5PHS	5BHS	180.0	201.00	244.80	1	322.2	15.67	5
5.0SMDJ180A	SMAJ180CA	5PHT	5BHT	180.0	201.00	220.00	1	291.6	17.32	5
5.0SMDJ190	SMAJ190C	5PHU	5BHU	190.0	211.21	258.40	1	340.1	14.85	5
5.0SMDJ190A	SMAJ190CA	5PHV	5BHV	190.0	211.00	232.00	1	307.8	16.41	5
5.0SMDJ200A	SMAJ200CA	5PHW	5BHW	200.0	224.00	247.00	1	324.0	9.26	5
5.0SMDJ220A	SMAJ220CA	5PHX	5BHX	220.0	246.00	272.00	1	356.0	8.43	5
5.0SMDJ250A	SMAJ250CA	5PHZ	5BHZ	250.0	279.00	309.00	1	405.0	7.41	5
5.0SMDJ300A	SMAJ300CA	5PJE	5BJE	300.0	335.00	371.00	1	486.0	6.17	5
5.0SMDJ350A	SMAJ350CA	5PJG	5BJG	350.0	391.00	432.00	1	567.0	5.29	5
5.0SMDJ400A	SMAJ400CA	5PJK	5BJK	400.0	447.00	494.00	1	648.0	4.63	5
5.0SMDJ440A	SMAJ440CA	5PJM	5BJM	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

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

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Figure 1 - Peak Pulse Power Rating Curve

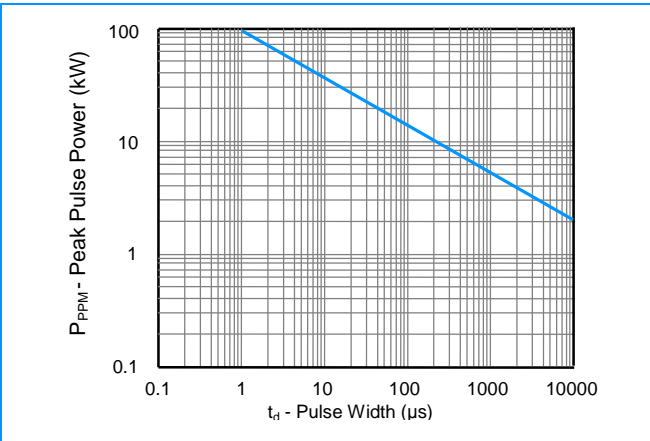


Figure 2 - Pulse Derating Curve

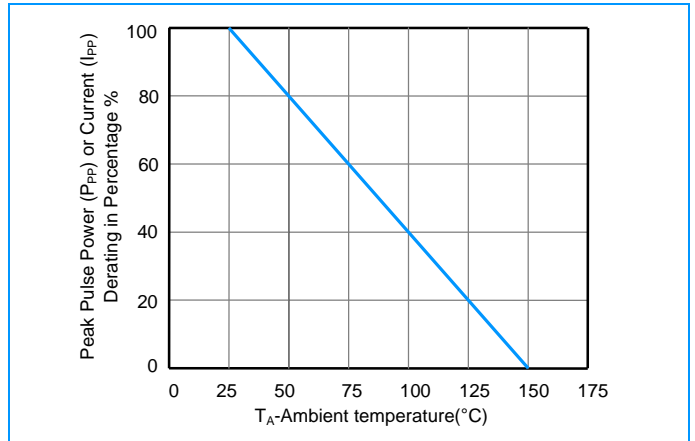


Figure 3 - Pulse Waveform

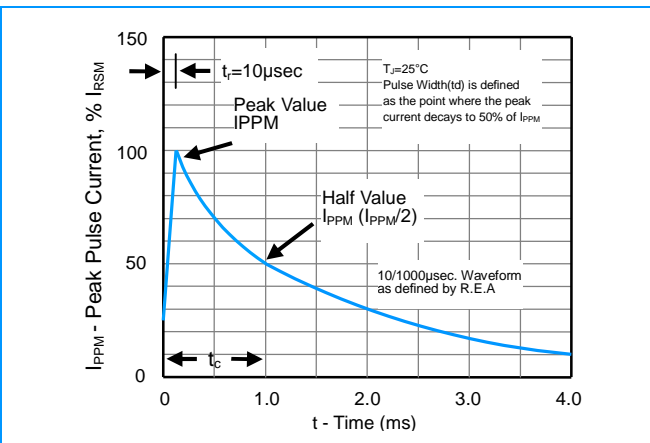


Figure 4 - Typical Junction Capacitance

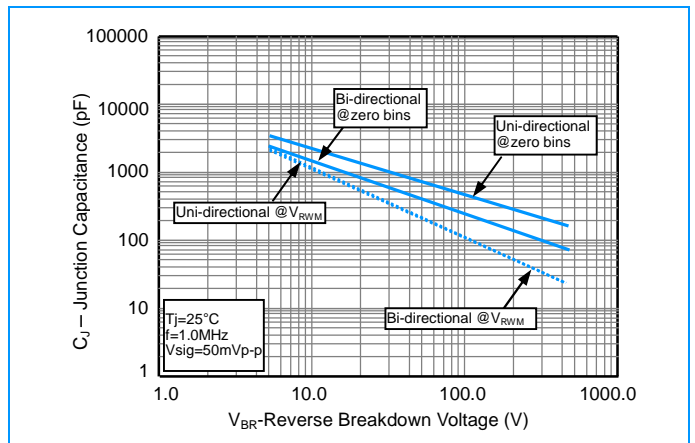


Figure 5 - Steady State Power Derating Curve

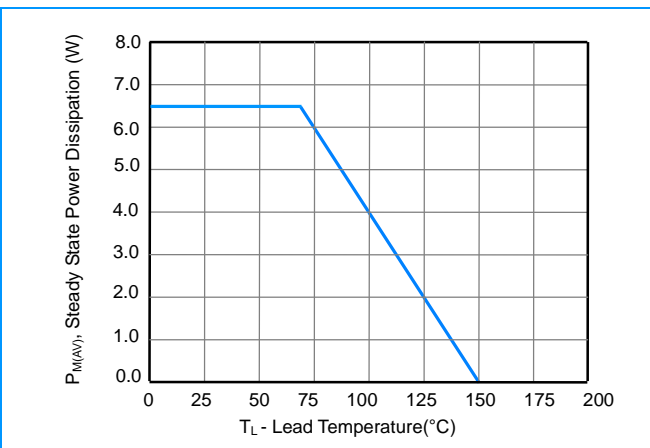
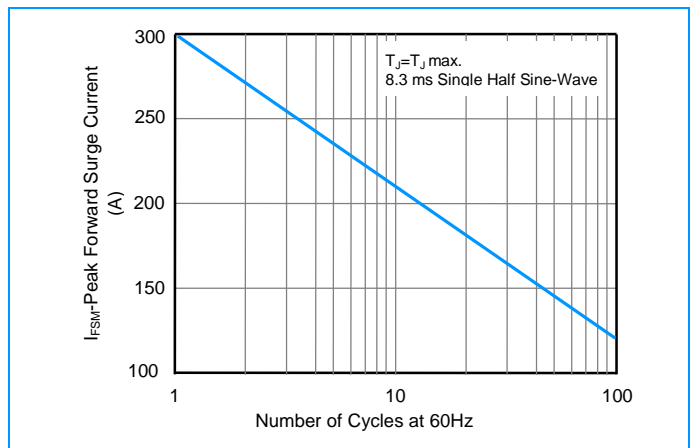


Figure 6 - Maximum Non-Repetitive Surge Current

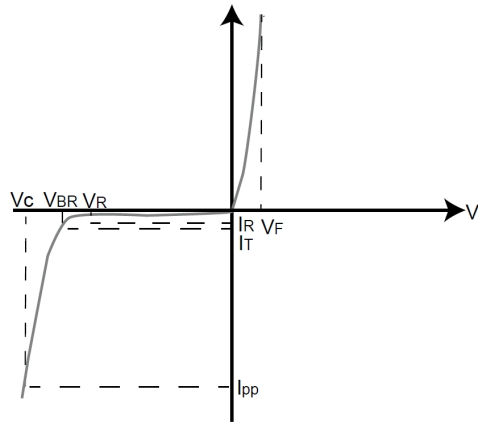


## I-V Curve Characteristics

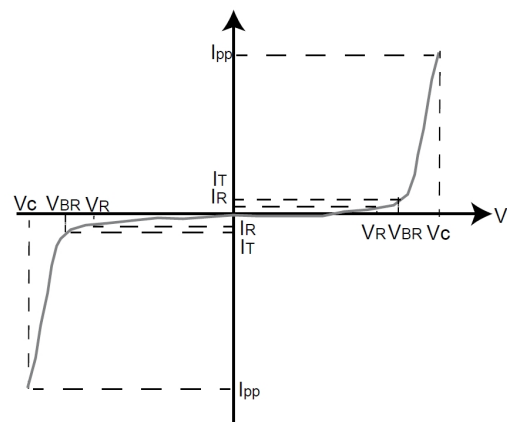
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**5.0SMDJ Series 11 To 440 V 5000W**

Uni-directional



Bi-directional



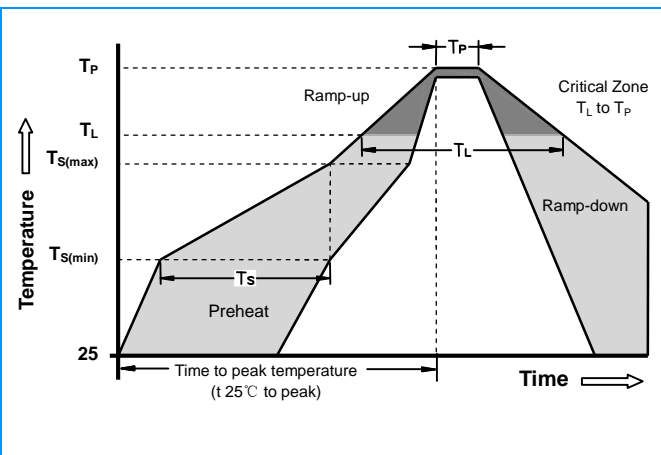
### Physical Specifications

<b>Weight</b>	0.007 ounce, 0.21 gram
<b>Case</b>	JEDEC DO-214AB Molded Plastic over glass passivated junction
<b>Polarity</b>	Color band denotes cathode except Bipolar
<b>Terminal</b>	Matte Tin-plated leads, Solderable per JESD22-B102D

### Environmental Specifications

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

### Soldering Parameters

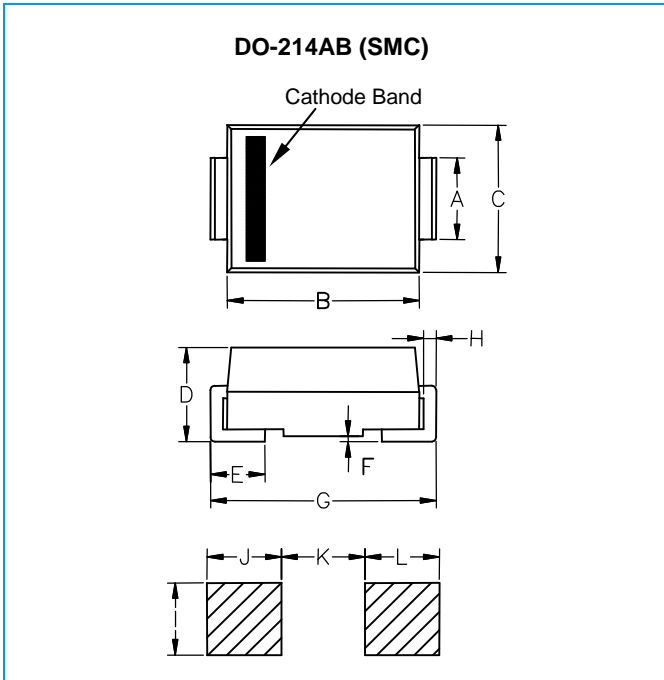


Reflow Condition		Lead-free assembly
Pre Heat	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 - 180 Seconds
Average ramp up rate ( Liquidus Temp $T_L$ ) to peak		3°C/second max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/second max
Reflow	- Temperature ( $T_L$ ) (Liquidus)	217°C
	- Time (min to max) ( $t_s$ )	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

### Dimensions

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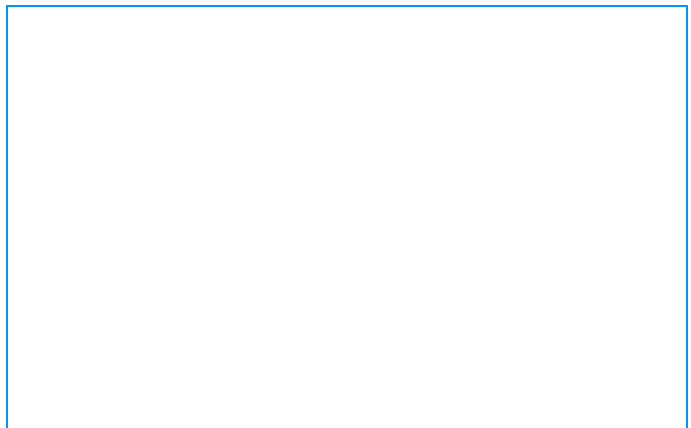
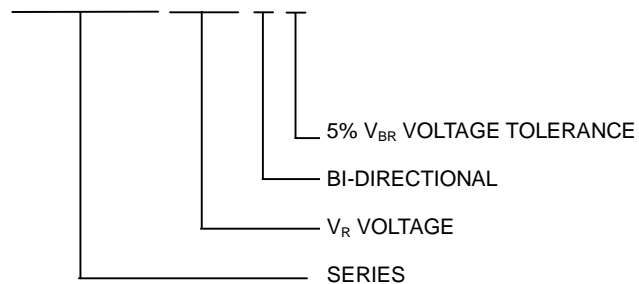
5.0SMDJ Series 11 To 440 V 5000W



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

**5.0SMDJ × × × CA**



### Packaging

Part Number	Component	Quantity	Packaging	Option	Packaging
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UN Semiconductor Co., Ltd.

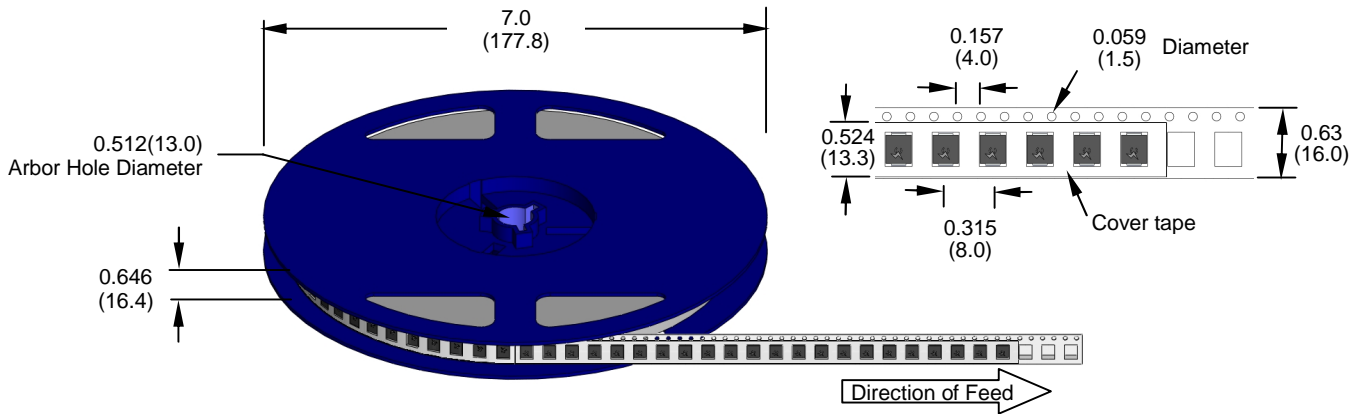
[www.unsemi.com.tw](http://www.unsemi.com.tw)

## Surface Mount Transient Voltage Suppressors (TVS)

5.0SMDJ Series 11 To 440 V 5000W

	Package			Specification
15.0SMDJXXXXX	DO-214AB	500	Tape & Reel -16mm/7"tape	EIA STD RS-481

### Tape and Reel Specifications



Dimensions are in inches  
(and millimeters)