

**SMBJ-E Series**



**OBSOLETE** DATE: 08/21/2020 PCN/ECN# 41356  
REPLACED BY: SMBJ Series

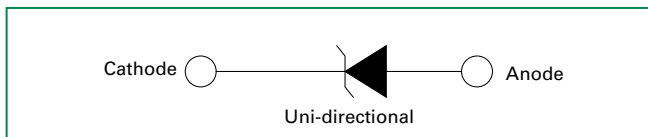


**Maximum Ratings and Thermal Characteristics (T<sub>A</sub>=25°C unless otherwise noted)**

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation at T <sub>A</sub> =25°C by 10/1000µs Waveform (Fig.2)(Note 1), (Note 2)	P <sub>PPM</sub>	600	W
Power Dissipation on Infinite Heat Sink at T <sub>L</sub> =50°C	P <sub>D</sub>	5.0	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)	I <sub>FSM</sub>	100	A
Maximum Instantaneous Forward Voltage at 50A for Unidirectional Only	V <sub>F</sub>	3.5	V
Operating Temperature Range	T <sub>J</sub>	-65 to 150	°C
Storage Temperature Range	T <sub>STG</sub>	-65 to 175	°C
Typical Thermal Resistance Junction to Lead	R <sub>θJL</sub>	20	°C/W
Typical Thermal Resistance Junction to Ambient	R <sub>θJA</sub>	100	°C/W

- Notes:**
1. Non-repetitive current pulse, per Fig. 4 and derated above T<sub>J</sub> (initial) =25°C per Fig. 3.
  2. Mounted on copper pad area of 0.2x0.2" (5.0 x 5.0mm) to each terminal.
  3. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle=4 per minute maximum.

**Functional Diagram**



**Description**

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

**Features**

- Excellent clamping capability
- Low incremental surge resistance
- For surface mounted applications to optimize board space
- Low profile package
- 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 30kV(Air), 30kV (Contact)
- EFT protection of data lines in accordance with IEC 61000-4-4
- Built-in strain relief
- Fast response time: typically less than 1.0ps from 0V to BV min
- 600W peak pulse power capability at 10/1000µs waveform, repetition rate (duty cycles):0.01%
- High temperature to reflow soldering guaranteed: 260°C/40sec
- V<sub>BR</sub> @T<sub>J</sub> = V<sub>BR</sub> @25°C × (1+αT × (T<sub>J</sub> - 25)) (αT: Temperature Coefficient, typical value is 0.1%)
- EPI silicon technology
- Meet MSL level1, per J-STD-020C, LF maximum peak of 260°C
- Matte tin lead-free plated
- Halogen free and RoHS compliant
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD-609A.01)

**Applications**

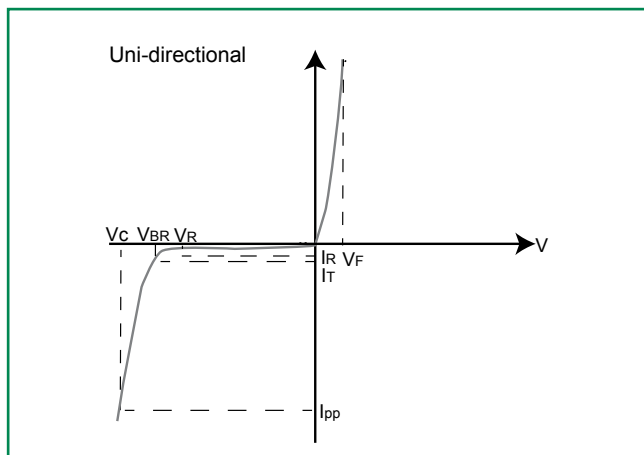
TVS devices are ideal for the protection of I/O Interfaces, V<sub>CC</sub> bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

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

Part Number (Uni)	Marking	Reverse Stand off Voltage $V_R$ (Volts)	Breakdown Voltage $V_{BR}$ (Volts) @ $I_T$		Test Current $I_T$ (mA)	Maximum Clamping Voltage $V_C$ @ $I_{pp}$ (V)	Maximum Peak Pulse Current $I_{pp}$ (A)	Maximum Reverse Leakage $I_R$ @ $V_R$ ( $\mu\text{A}$ )
			MIN	MAX				
SMBJ300A-E	YE	300	335.0	371.0	1	486.0	1.30	1
SMBJ350A-E	YG	350	391.0	432.0	1	567.0	1.10	1
SMBJ400A-E*	YK	400	447.0	494.0	1	648.0	0.93	1
SMBJ440A-E*	YM	440	492.0	543.0	1	713.0	0.85	1
SMBJ500A-E*	YN	500	558.0	618.0	1	810.0	0.75	1
SMBJ550A-E*	YP	550	614.0	680.0	1	891.0	0.67	1
SMBJ600A-E*	YR	600	670.0	741.0	1	971.0	0.62	1
SMBJ650A-E*	YS	650	726.0	803.0	1	1052.0	0.57	1
SMBJ700A-E*	YT	700	782.0	865.0	1	1133.0	0.53	1
SMBJ750A-E*	YU	750	837.0	927.0	1	1213.0	0.50	1
SMBJ850A-E*	YV	850	950.0	1050.0	1	1365.0	0.44	1

Note: for parts with \* are still under development

### I-V Curve Characteristics



**$P_{ppm}$  Peak Pulse Power Dissipation** – Max 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 ( $I_T$ )

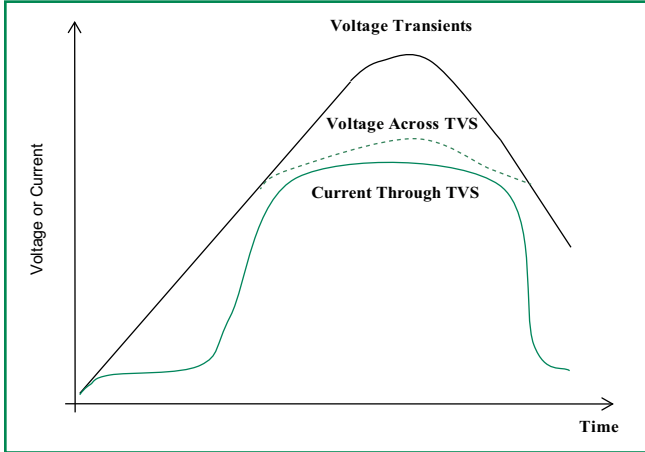
**$V_C$  Clamping Voltage** – Peak voltage measured across the TVS at a specified  $I_{ppm}$  (peak impulse current)

**$I_R$  Reverse Leakage Current** – Current measured at  $V_R$

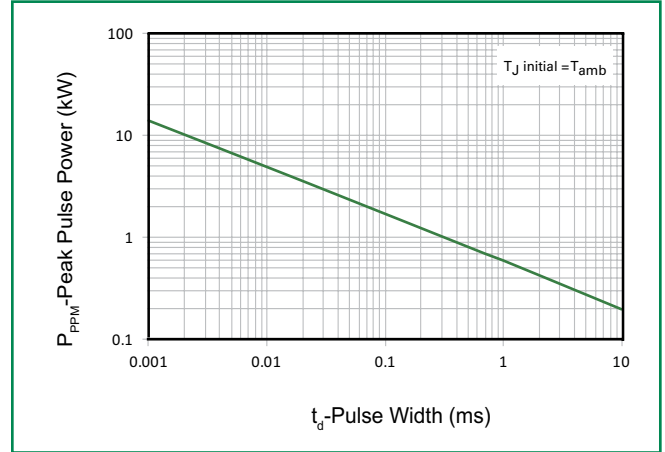
**$V_F$  Forward Voltage Drop for Uni-directional**

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

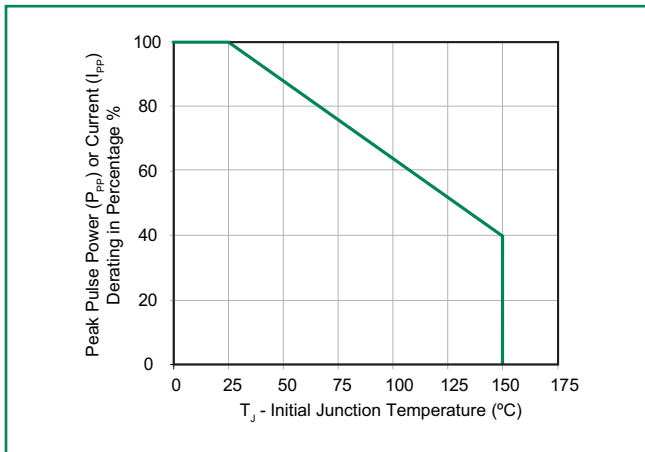
**Figure 1 - TVS Transients Clamping Waveform**



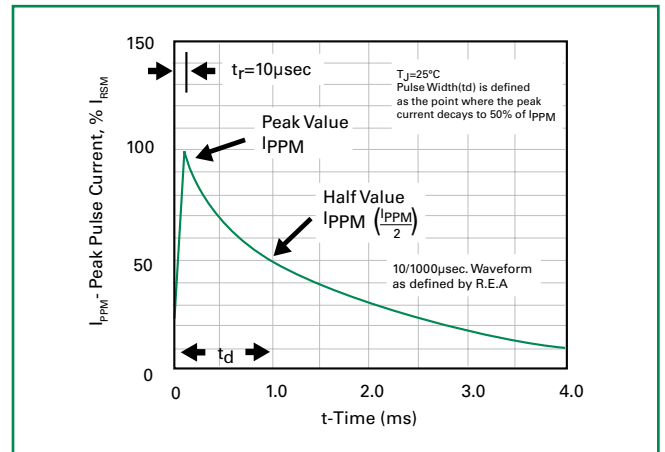
**Figure 2 - Peak Pulse Power Rating**



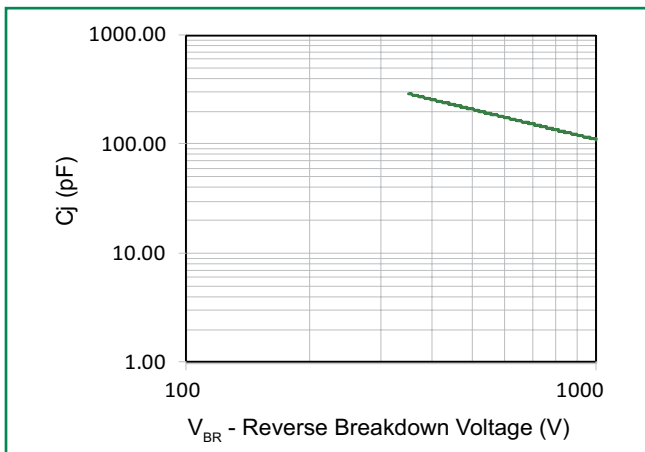
**Figure 3 - Peak Pulse Power Derating Curve**



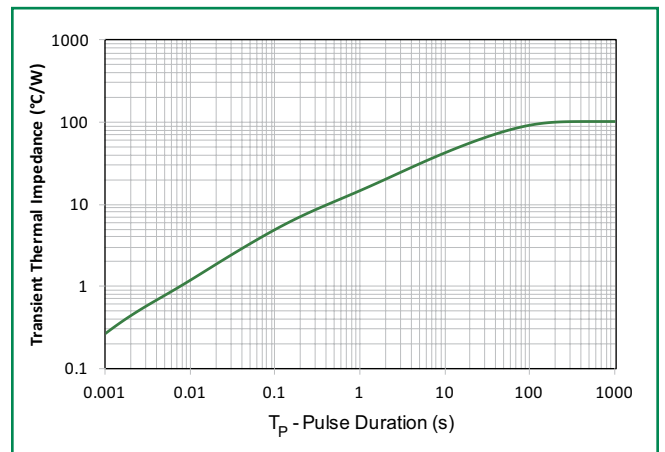
**Figure 4 - Pulse Waveform**



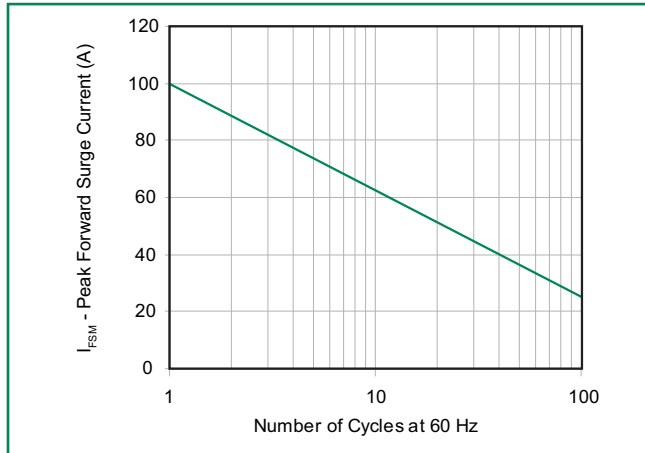
**Figure 5 - Typical Junction Capacitance**



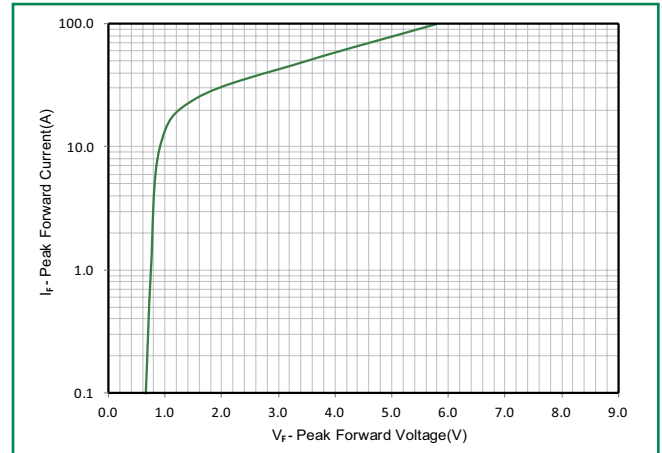
**Figure 6 - Typical Transient Thermal Impedance**



**Figure 7 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only**

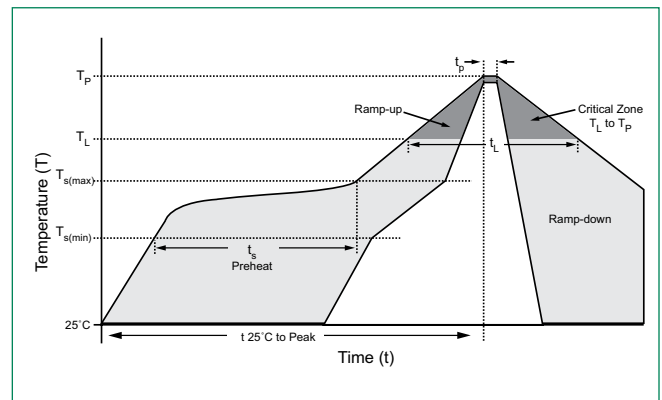


**Figure 8 - Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)**



**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 secs
Average ramp up rate (Liquidus Temp ( $T_A$ ) to peak)		3°C/second max
$T_{s(max)}$ to $T_A$ - Ramp-up Rate		3°C/second max
Reflow	- Temperature ( $T_A$ ) (Liquidus)	217°C
	- Time (min to max) ( $t_s$ )	60 – 150 seconds
Peak Temperature ( $T_p$ )		260 <sup>+0/-5</sup> °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		260°C



**Physical Specifications**

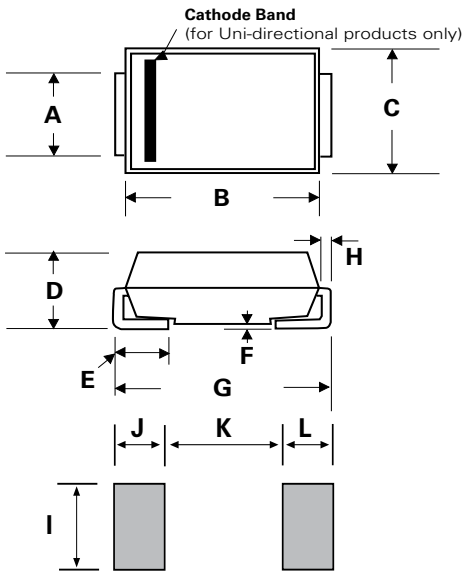
<b>Weight</b>	0.003 ounce, 0.093 grams
<b>Case</b>	JEDEC DO214AA. Molded plastic body over glass passivated junction
<b>Polarity</b>	Color band denotes cathode except Bidirectional
<b>Terminal</b>	Matte Tin-plated leads, Solderable per JESD22-B102

**Environmental Specifications**

<b>High Temp. Storage</b>	JESD22-A103
<b>HTRB</b>	JESD22-A108
<b>Temperature Cycling</b>	JESD22-A104
<b>MSL</b>	JEDEC-J-STD-020, Level 1
<b>H3TRB</b>	JESD22-A101
<b>RSH</b>	JESD22-A111

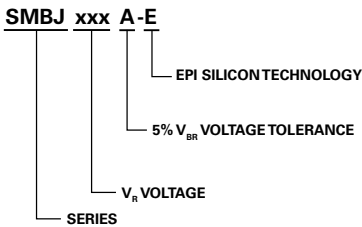
**Dimensions**

**DO-214AA (SMB J-Bend)**

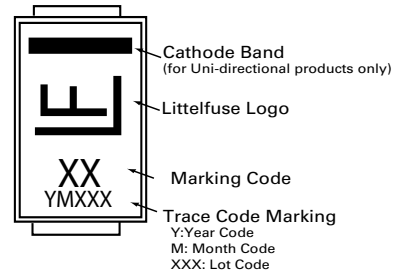


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.076	0.086	1.930	2.200
B	0.160	0.187	4.060	4.750
C	0.130	0.155	3.300	3.940
D	0.078	0.103	1.990	2.610
E	0.030	0.060	0.760	1.520
F	-	0.008	-	0.203
G	0.205	0.220	5.210	5.590
H	0.006	0.012	0.152	0.305
I	0.089	-	2.260	-
J	0.085	-	2.160	-
K	-	0.107	-	2.740
L	0.085	-	2.160	-

**Part Numbering System**



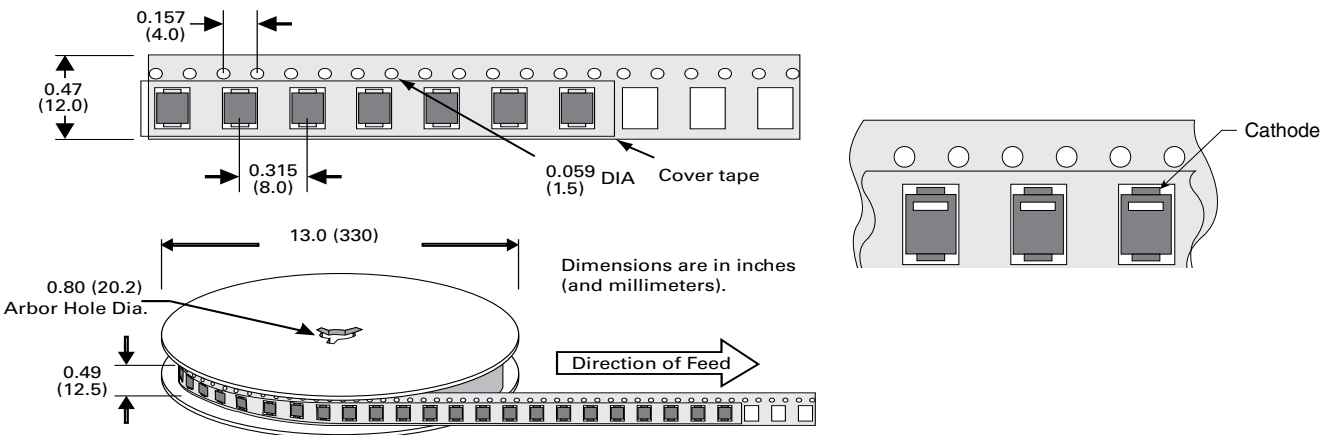
**Part Marking System**



**Packaging**

Part number	Component Package	Quantity	Packaging Option	Packaging Specification
SMBJxxx A-E	DO-214AA	3000	Tape & Reel - 12mm tape/13" reel	EIA STD RS-481

**Tape and Reel Specification**



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