

SMBJ-E Series



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

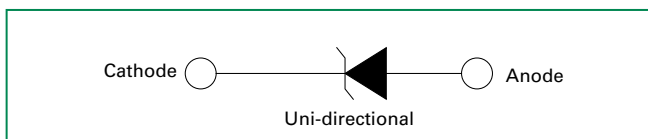


Maximum Ratings and Thermal Characteristics (T_A=25°C unless otherwise noted)

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

- Notes:**
1. Non-repetitive current pulse, per Fig. 4 and derated above T_J (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_{BR} @T_J = V_{BR} @25°C x (1+αT x (T_J - 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

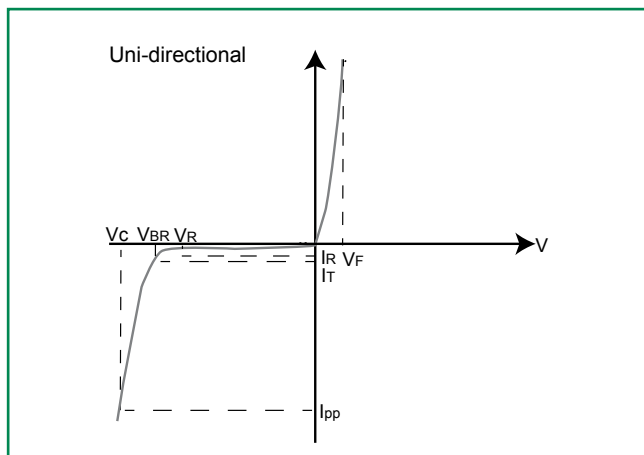
TVS devices are ideal for the protection of I/O Interfaces, V_{CC} bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

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 (μA)
			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

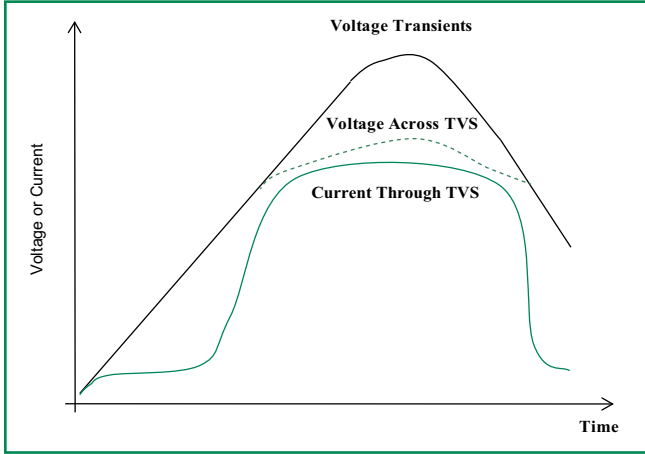


Figure 2 - Peak Pulse Power Rating

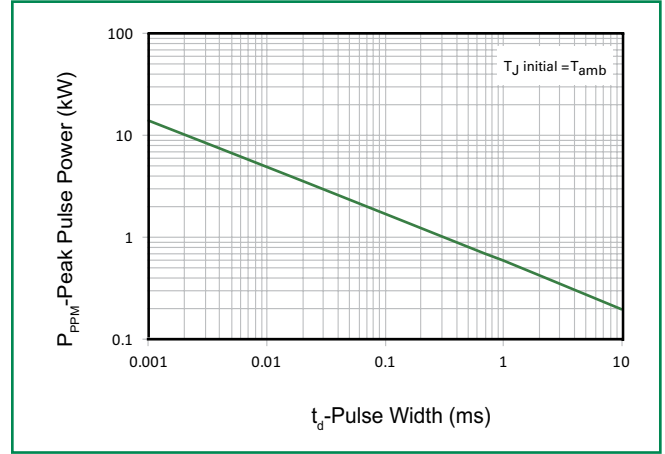


Figure 3 - Peak Pulse Power Derating Curve

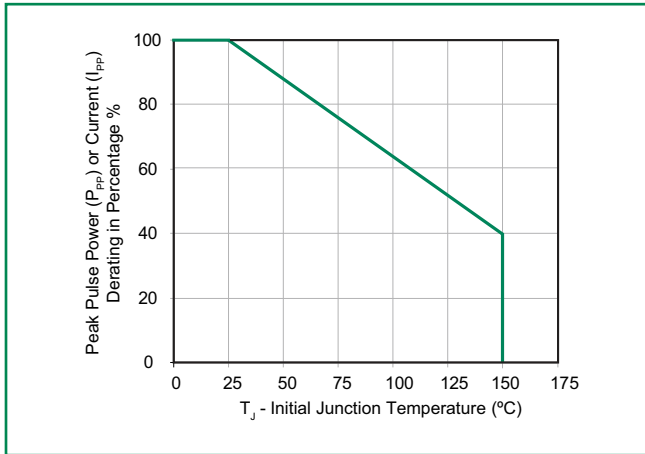


Figure 4 - Pulse Waveform

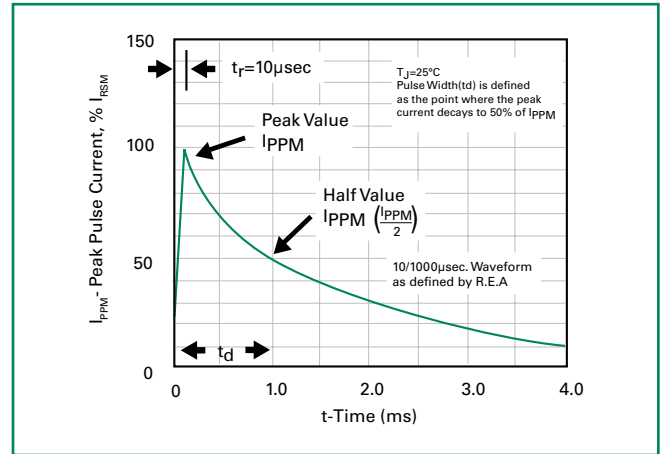


Figure 5 - Typical Junction Capacitance

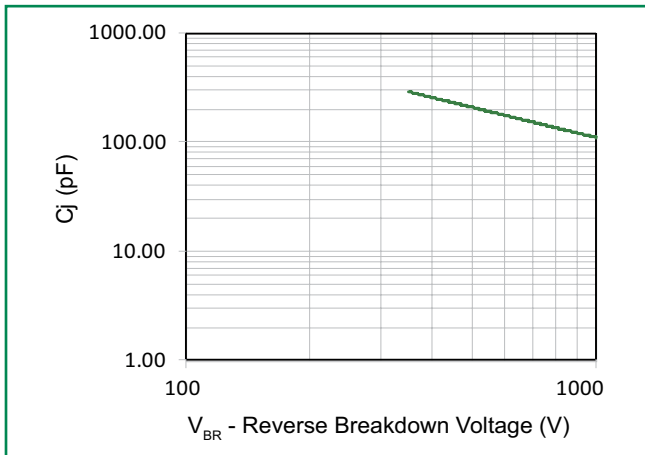


Figure 6 - Typical Transient Thermal Impedance

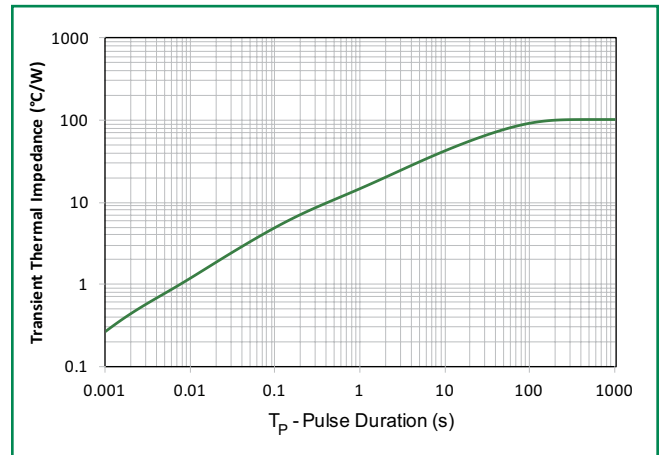


Figure 7 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only

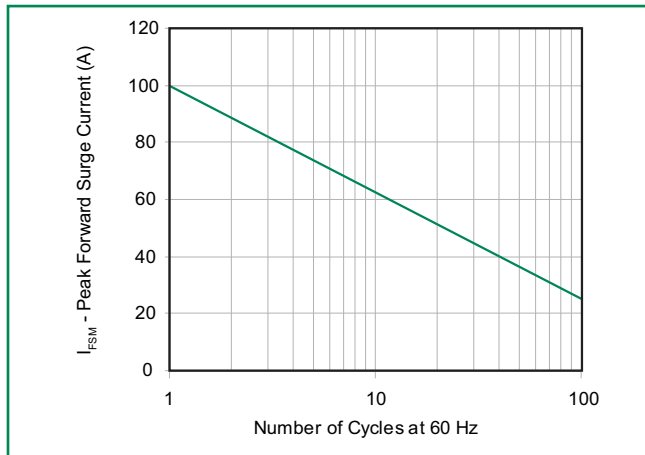
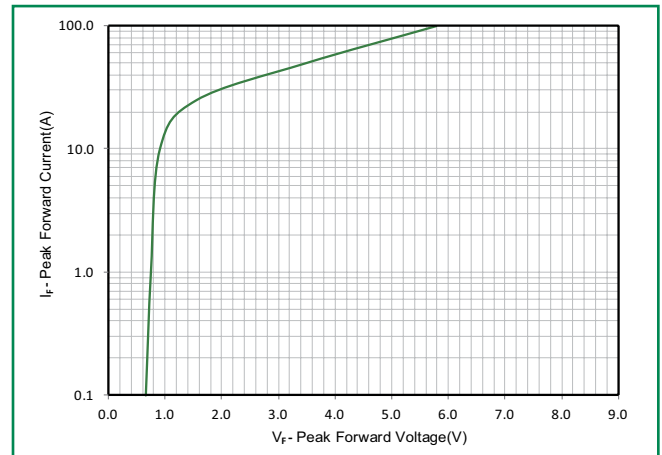
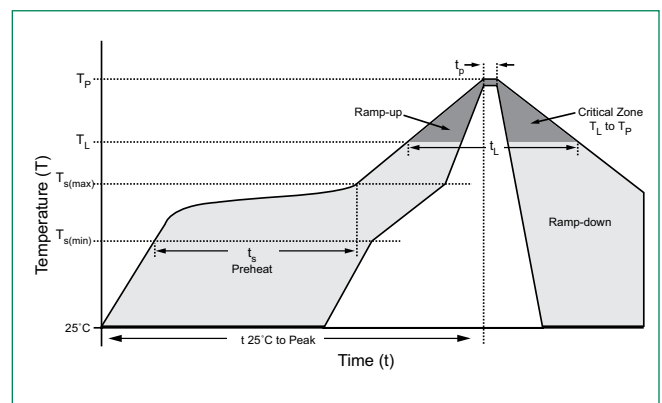


Figure 8 - Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)



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 ^{+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		260°C



Physical Specifications

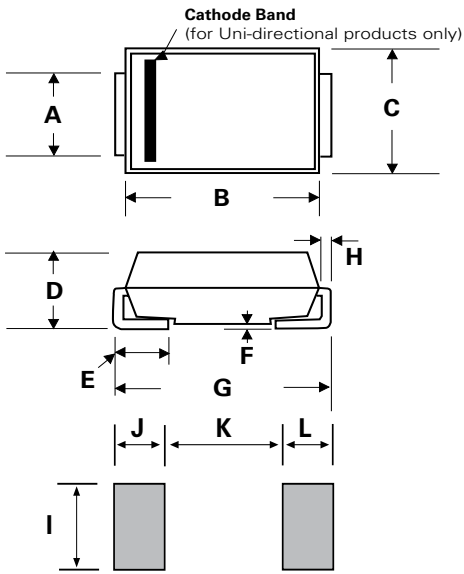
Weight	0.003 ounce, 0.093 grams
Case	JEDEC DO214AA. Molded plastic body over glass passivated junction
Polarity	Color band denotes cathode except Bidirectional
Terminal	Matte Tin-plated leads, Solderable per JESD22-B102

Environmental Specifications

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

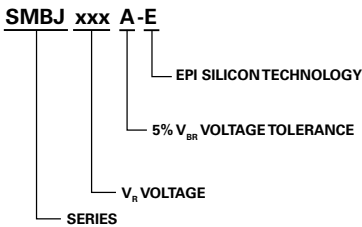
Dimensions

DO-214AA (SMB J-Bend)

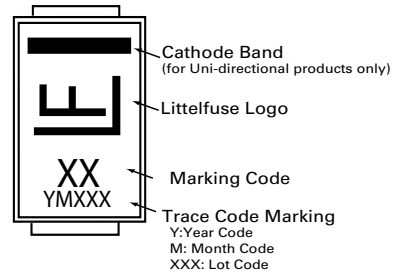


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.076	0.086	1.930	2.200
B	0.160	0.187	4.060	4.750
C	0.130	0.155	3.300	3.940
D	0.078	0.103	1.990	2.610
E	0.030	0.060	0.760	1.520
F	-	0.008	-	0.203
G	0.205	0.220	5.210	5.590
H	0.006	0.012	0.152	0.305
I	0.089	-	2.260	-
J	0.085	-	2.160	-
K	-	0.107	-	2.740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

Part Numbering System



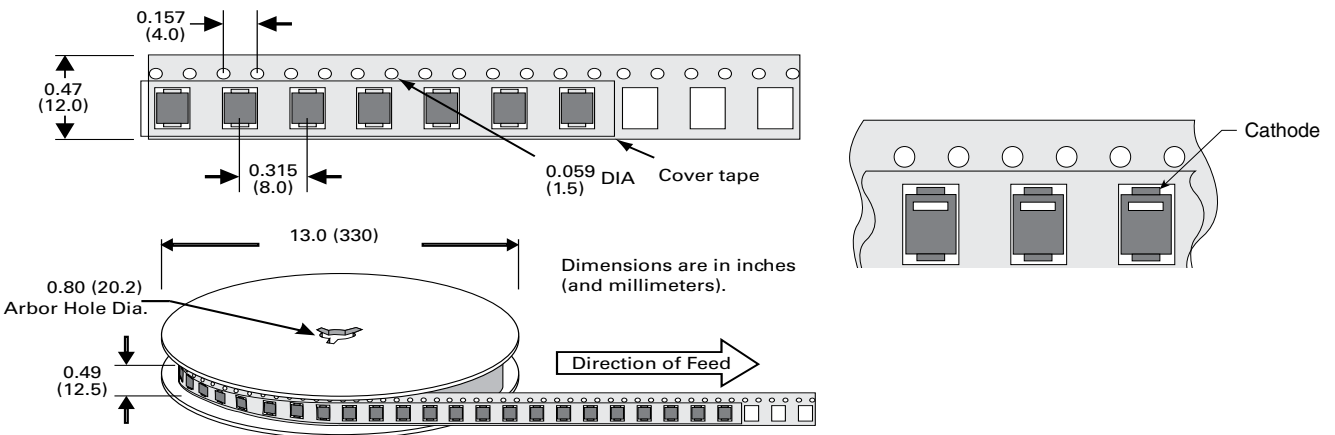
Part Marking System



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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