



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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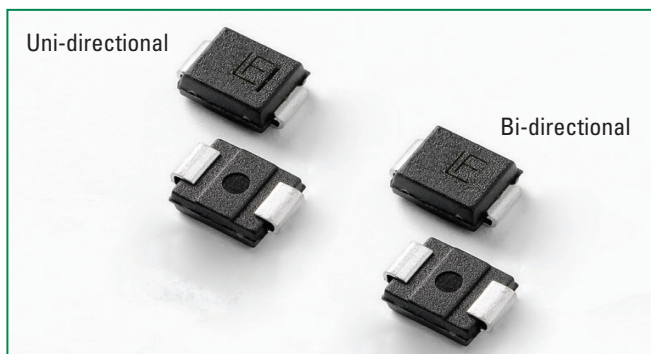
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SMBJ-HRA Series



Agency Approvals

AGENCY	AGENCY FILE NUMBER
	E230531

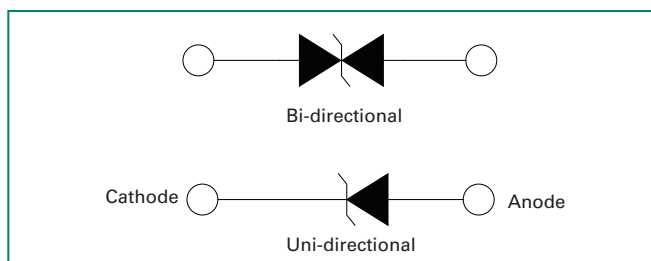
Maximum Ratings and Thermal Characteristics (T_A=25°C unless otherwise noted)

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 _A =50°C	P _{M(AV)}	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	3.5V	V
Operating Junction and Storage Temperature Range	T _J , T _{STG}	-65 to 150	°C
Typical Thermal Resistance Junction to Lead	R _{uJL}	20	°C/W
Typical Thermal Resistance Junction to Ambient	R _{uJA}	100	°C/W

Notes:

1. Non-repetitive current pulse, per Fig. 4 and derated above T_A = 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-HRA High Reliability series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.


Features

- 600W peak pulse power capability at 10/1000µs waveform, repetition rate (duty cycles):0.01%
- Excellent clamping capability
- Low incremental surge resistance
- Typical I_R less than 1µA above 12V
- 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 15kV(Air), 8kV (Contact)
- ESD protection of data lines in accordance with IEC 61000-4-2
- 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
- V_{BR} @ T_J = V_{BR} @ 25°C x (1 + α T x (T_J - 25)) (α T: Temperature Coefficient, typical value is 0.1%)
- Glass passivated chip junction
- High temperature soldering guaranteed: 260°C/40 seconds at terminals
- Plastic package is flammability rated V-0 per UL 94
- Meet MSL level1, per J-STD-020, 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)	Part Number (Bi)	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)	Agency Approval 
		UNI	BI		MIN	MAX					
SMBJ5.0A-HRA	SMBJ5.0CA-HRA	KEH	AEH	5.0	6.40	7.00	10	9.2	65.3	800	X
SMBJ6.0A-HRA	SMBJ6.0CA-HRA	KGH	AGH	6.0	6.67	7.37	10	10.3	58.3	800	X
SMBJ6.5A-HRA	SMBJ6.5CA-HRA	KKH	AKH	6.5	7.22	7.98	10	11.2	53.6	500	X
SMBJ7.0A-HRA	SMBJ7.0CA-HRA	KMH	AMH	7.0	7.78	8.60	10	12.0	50.0	200	X
SMBJ7.5A-HRA	SMBJ7.5CA-HRA	KPH	APH	7.5	8.33	9.21	1	12.9	46.6	100	X
SMBJ8.0A-HRA	SMBJ8.0CA-HRA	KRH	ARH	8.0	8.89	9.83	1	13.6	44.2	50	X
SMBJ8.5A-HRA	SMBJ8.5CA-HRA	KTH	ATH	8.5	9.44	10.40	1	14.4	41.7	20	X
SMBJ9.0A-HRA	SMBJ9.0CA-HRA	KVH	AVH	9.0	10.00	11.10	1	15.4	39.0	10	X
SMBJ10A-HRA	SMBJ10CA-HRA	KXH	AXH	10.0	11.10	12.30	1	17.0	35.3	5	X
SMBJ11A-HRA	SMBJ11CA-HRA	KZH	AZH	11.0	12.20	13.50	1	18.2	33.0	1	X
SMBJ12A-HRA	SMBJ12CA-HRA	LEH	BEH	12.0	13.30	14.70	1	19.9	30.2	1	X
SMBJ13A-HRA	SMBJ13CA-HRA	LGH	BGH	13.0	14.40	15.90	1	21.5	28.0	1	X
SMBJ14A-HRA	SMBJ14CA-HRA	LKH	BKH	14.0	15.60	17.20	1	23.2	25.9	1	X
SMBJ15A-HRA	SMBJ15CA-HRA	LMH	BMH	15.0	16.70	18.50	1	24.4	24.6	1	X
SMBJ16A-HRA	SMBJ16CA-HRA	LPH	BPH	16.0	17.80	19.70	1	26.0	23.1	1	X
SMBJ17A-HRA	SMBJ17CA-HRA	LRH	BRH	17.0	18.90	20.90	1	27.6	21.8	1	X
SMBJ18A-HRA	SMBJ18CA-HRA	LTH	BTH	18.0	20.00	22.10	1	29.2	20.6	1	X
SMBJ20A-HRA	SMBJ20CA-HRA	LVH	BVH	20.0	22.20	24.50	1	32.4	18.6	1	X
SMBJ22A-HRA	SMBJ22CA-HRA	LXH	BXH	22.0	24.40	26.90	1	35.5	16.9	1	X
SMBJ24A-HRA	SMBJ24CA-HRA	LZH	BZH	24.0	26.70	29.50	1	38.9	15.5	1	X
SMBJ26A-HRA	SMBJ26CA-HRA	MEH	CEH	26.0	28.90	31.90	1	42.1	14.3	1	X
SMBJ28A-HRA	SMBJ28CA-HRA	MGH	CGH	28.0	31.10	34.40	1	45.4	13.3	1	X
SMBJ30A-HRA	SMBJ30CA-HRA	MK H	CKH	30.0	33.30	36.80	1	48.4	12.4	1	X
SMBJ33A-HRA	SMBJ33CA-HRA	MMH	CMH	33.0	36.70	40.60	1	53.3	11.3	1	X
SMBJ36A-HRA	SMBJ36CA-HRA	MPH	CPH	36.0	40.00	44.20	1	58.1	10.4	1	X
SMBJ40A-HRA	SMBJ40CA-HRA	MRH	CRH	40.0	44.40	49.10	1	64.5	9.3	1	X
SMBJ43A-HRA	SMBJ43CA-HRA	MTH	CTH	43.0	47.80	52.80	1	69.4	8.7	1	X
SMBJ45A-HRA	SMBJ45CA-HRA	MVH	CVH	45.0	50.00	55.30	1	72.7	8.3	1	X
SMBJ48A-HRA	SMBJ48CA-HRA	MXH	CXH	48.0	53.30	58.90	1	77.4	7.8	1	X
SMBJ51A-HRA	SMBJ51CA-HRA	MZH	CZH	51.0	56.70	62.70	1	82.4	7.3	1	X
SMBJ54A-HRA	SMBJ54CA-HRA	NEH	DEH	54.0	60.00	66.30	1	87.1	6.9	1	X
SMBJ58A-HRA	SMBJ58CA-HRA	NGH	DGH	58.0	64.40	71.20	1	93.6	6.5	1	X
SMBJ60A-HRA	SMBJ60CA-HRA	NKH	DKH	60.0	66.70	73.70	1	96.8	6.2	1	X
SMBJ64A-HRA	SMBJ64CA-HRA	NMH	DMH	64.0	71.10	78.60	1	103.0	5.9	1	X
SMBJ70A-HRA	SMBJ70CA-HRA	NPH	DPH	70.0	77.80	86.00	1	113.0	5.3	1	X
SMBJ75A-HRA	SMBJ75CA-HRA	NRH	DRH	75.0	83.30	92.10	1	121.0	5.0	1	X
SMBJ78A-HRA	SMBJ78CA-HRA	NTH	DTH	78.0	86.70	95.80	1	126.0	4.8	1	X
SMBJ85A-HRA	SMBJ85CA-HRA	NVH	DVH	85.0	94.40	104.00	1	137.0	4.4	1	X
-	SMBJ90CA-HRA	-	DXH	90.0	100.00	111.00	1	146.0	4.1	1	X
-	SMBJ100CA-HRA	-	DZH	100.0	111.00	123.00	1	162.0	3.7	1	X
-	SMBJ110CA-HRA	-	EEH	110.0	122.00	135.00	1	177.0	3.4	1	X
-	SMBJ120CA-HRA	-	EGH	120.0	133.00	147.00	1	193.0	3.1	1	X
-	SMBJ130CA-HRA	-	EKH	130.0	144.00	159.00	1	209.0	2.9	1	X
-	SMBJ150CA-HRA	-	EMH	150.0	167.00	185.00	1	243.0	2.5	1	X
-	SMBJ160CA-HRA	-	EPH	160.0	178.00	197.00	1	259.0	2.3	1	X
-	SMBJ170CA-HRA	-	ER	170.0	189.00	209.00	1	275.0	2.2	1	X

Note:

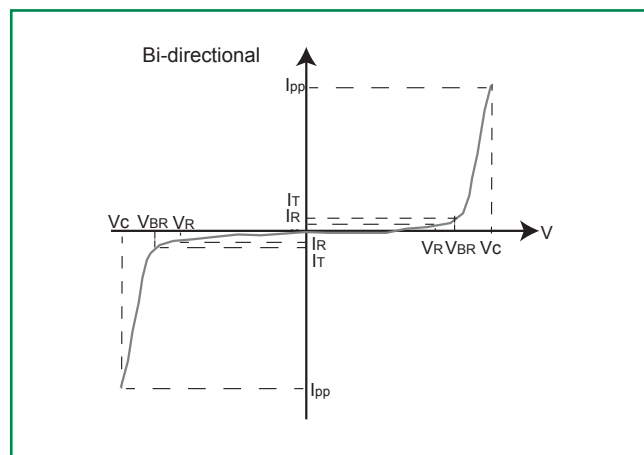
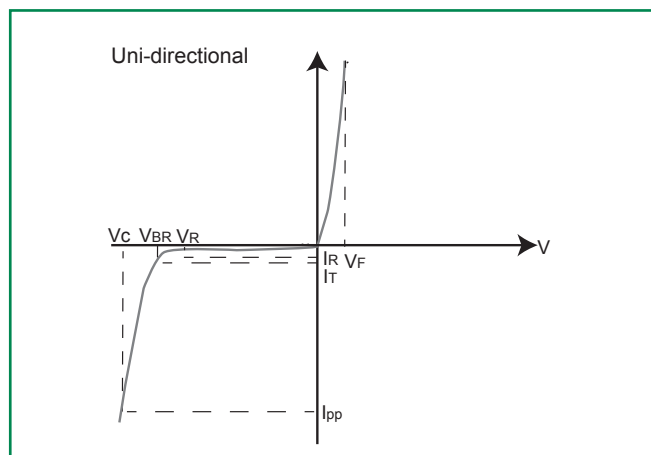
1. For bidirectional type having V_R of 10 volts and less, the I_R limit is double.

Screen Process

100% Vision Inspection	MIL-STD-750 method 2074
100% High Temperature Storage Life (168hrs,175°C)	MIL-STD-750 method 1031
100% X-RAY inspection	MIL-STD-750 method 2076
100% Temperature Cycle Test (-55 to150°C, 20 cycles, dwell time 15 min)	MIL-STD-750 method 1051
100% Reflow (2x)	JEDEC J-STD-020
100% Surge Test (2x)	MIL-STD-750 method 4066
100% HTRB 150°C Bias=VR(80% breakdown voltage, 96hrs, and each direction 96hrs for Bi-directional products)	MIL-STD-750 method 1038
Final Electrical Test(100% 3 sigma limit, 100% dynamic test and PAT limit)	MIL-STD-750 method 4016.4021.4011

Note: Up-screen program can be specified by customer's request via contacting Littelfuse service

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 though the TVS at a specified test current (I_R)

V_C Clamping Voltage – Peak voltage measured across the suppressor 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

continues on next page.

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

Figure 1 - TVS Transients Clamping Waveform

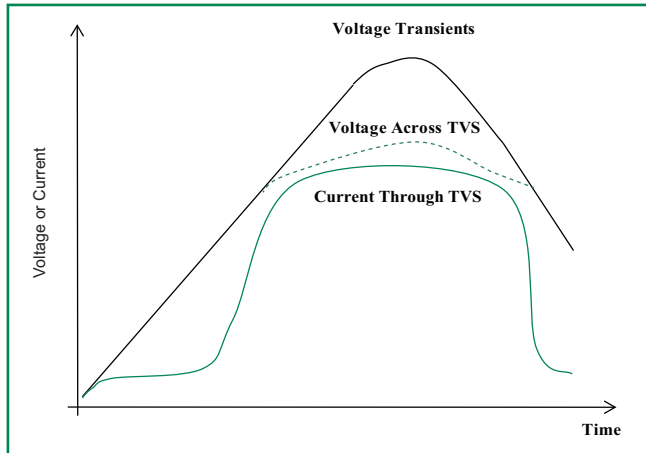


Figure 2 - Peak Pulse Power Rating

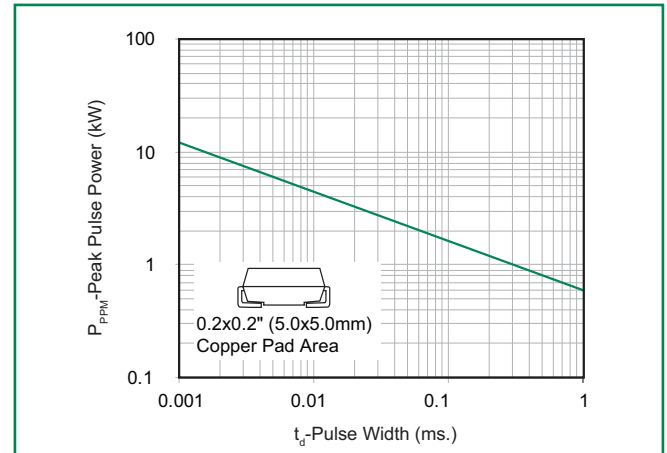


Figure 3 - Pulse Derating Curve

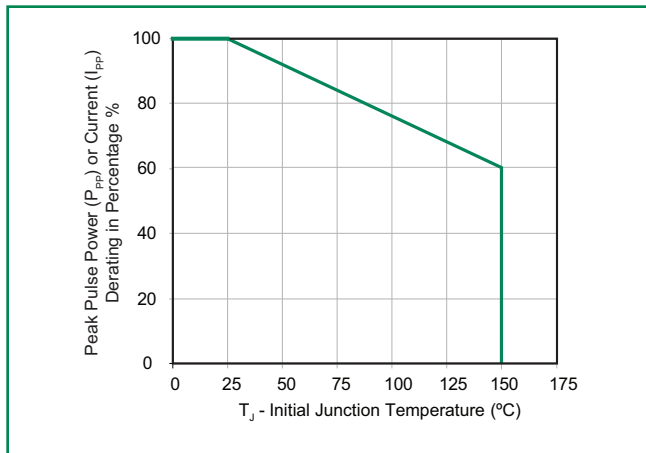


Figure 4 - Pulse Waveform

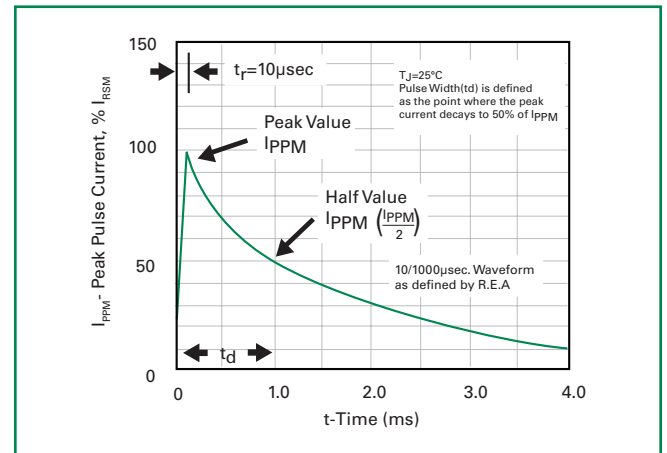


Figure 5 - Typical Junction Capacitance

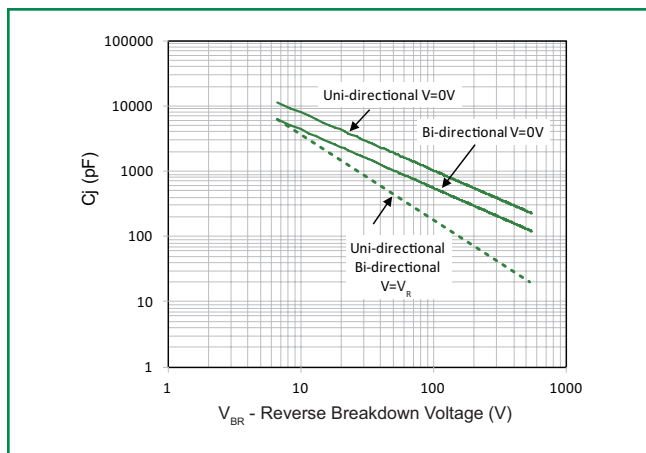
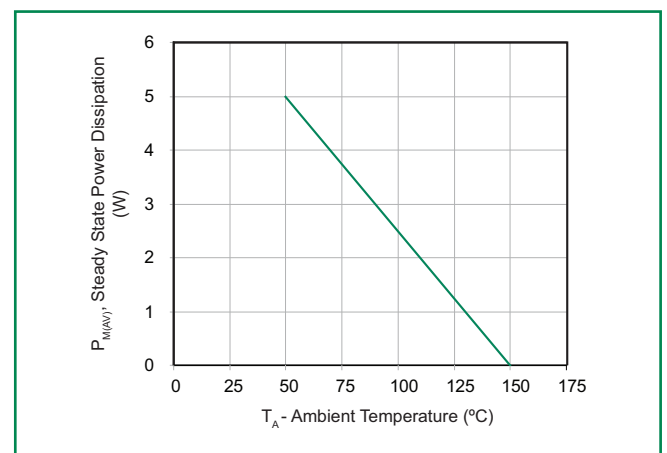
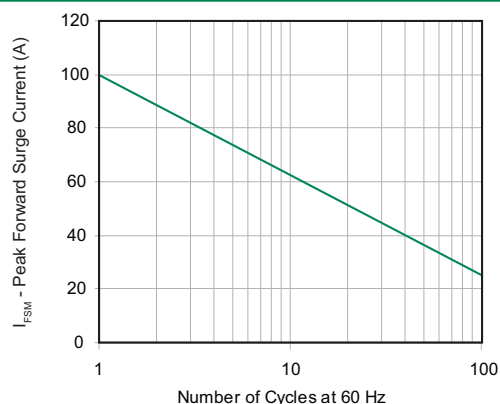


Figure 6 - Steady State Power Dissipation Derating Curve



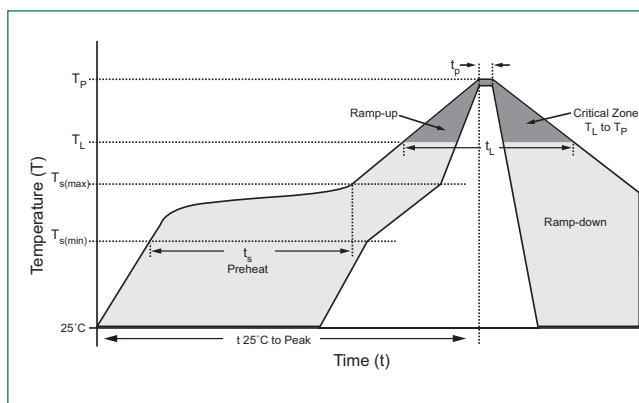
Ratings and Characteristic Curves ($T_A=25^\circ\text{C}$ unless otherwise noted) (Continued)

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



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_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		260°C



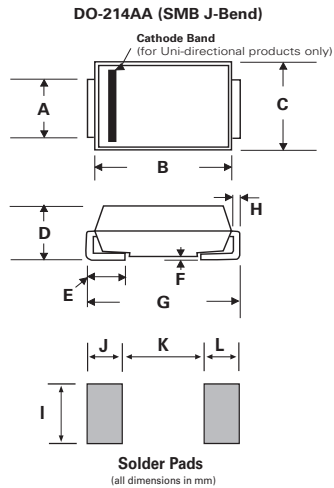
Physical Specifications

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

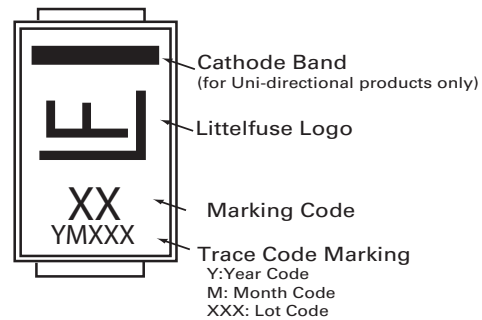
High Temp. Storage	JESD22-A103
HTRB	JESD22-A108
Temperature Cycling	JESD22-A104
MSL	JEDEC-J-STD-020, Level 1
H3TRB	JESD22-A101
RSH	JESD22-A111

Dimensions

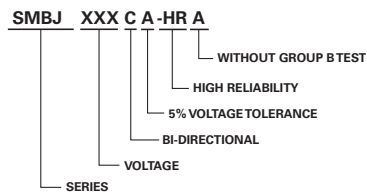


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.077	0.086	1.950	2.200
B	0.160	0.180	4.060	4.570
C	0.130	0.155	3.300	3.940
D	0.084	0.096	2.130	2.440
E	0.030	0.060	0.760	1.520
F	-	0.008	-	0.203
G	0.205	0.220	5.210	5.590
H	0.006	0.012	0.152	0.305
I	0.089	-	2.260	-
J	0.085	-	2.160	-
K	-	0.107	-	2.740
L	0.085	-	2.160	-

Part Marking System



Part Numbering System



Packaging

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

Tape and Reel Specification

