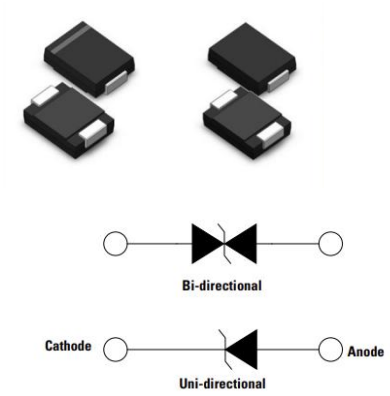
SMBJ Series

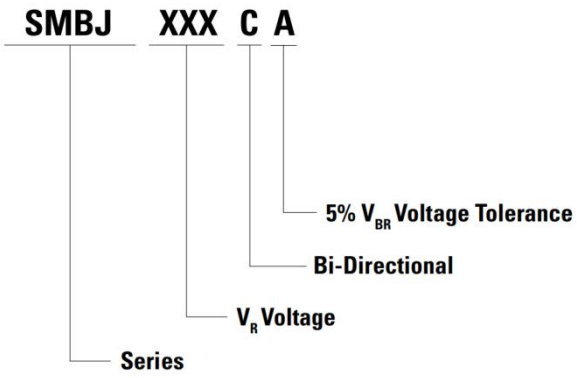
Transient Voltage Suppressors

Features

- 600W peak pulse power capability at 10/1000μs Waveform,repetition rate (duty cycle): 0.01%
- For surface mounted applications to optimize board space
- Low incremental surge impedance
- Excellent clamping capability
- Fast response time
- Typical I_R less than 1μA when V_{BR} min>12V
- High Temperature soldering guaranteed: 260℃/30 seconds at terminals
- Plastic package has underwriters laboratory flammability 94V-0
- Meets MSL level 1, per J-STD-020
- Meet RoHS compliant



Part Number Coding System



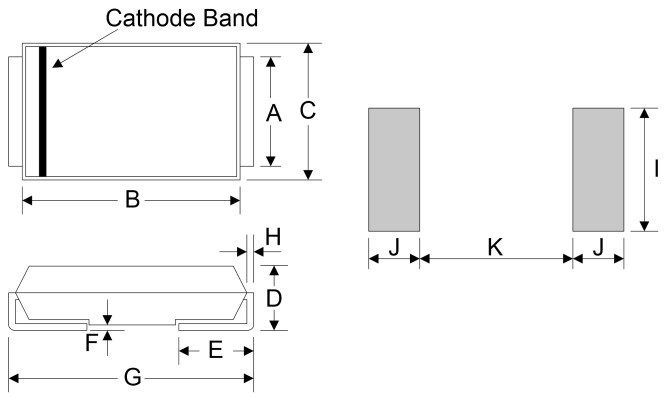
Applications

- I/O interface
- AC/DC power supply.
- Low frequency signal transmission line (RS485, RS232 etc.)

Mechanical Data

- Case: JEDEC DO-214AA
- Polarity: Color band denotes positive end(cathode) except bi-directional models

Dimensions (SMB)



Ref.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.850	2.200	0.073	0.087
B	4.060	4.900	0.160	0.193
C	3.300	3.940	0.130	0.155
D	1.950	2.650	0.077	0.104
E	0.760	1.520	0.030	0.060
F	-	0.400	-	0.016
G	4.950	5.700	0.195	0.224
H	0.150	0.305	0.006	0.012
I	1.9	-	0.075	-
J	0.800	-	0.031	-
K	-	2.740	-	0.108

Maximum Rating and Characteristics(T_A=25℃, unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse power Dissipation at 10/1000μs Waveform (Note1, Note2,)	P_{PPM}	Minimum 600	W
Peak pulse current of at 10/1000μs waveform(Note 1, Fig.2)	I_{PPM}	See Table	A
Steady state power dissipation @T_A=50℃	$P_{M(AV)}$	5.0	W
Maximum Instantaneous Forward Voltage at 25A for Unidirectional only(Note 4)	V_F	3.5/5.0	V
Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load(Note 4)	I_{FSM}	100	A
Operating Temperature Range	T_J	-65 to +150	℃
Storage Temperature Range	T_{STG}	-65 to +175	℃

Notes:

1.Non-repetitive current pulse, per Fig.2 and derated above T_A=25℃ per Fig.1.

2. Mounted on 5.0mm×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_{RWM}≤200V and V_F<5.0V for V_{RWM}≥ 201V.

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

Part Number		Device Marking Code		Reverse Stand-Off Voltage	Breakdown Voltage @I_T	Test Current	Maximum Clamping Voltage @I_{PP}	Peak Pulse Current	Reverse Leakage @V_{RWM}
UNI	BI	UNI	BI	V_{RWM}(V)	V_{BR}(V)	I_T(mA)	V_C(V)	I_{PP}(A)	I_R(μA)
SMBJ5.0A	SMBJ5.0CA	KE	AE	5.0	6.40~7.00	10	9.2	65.3	800
SMBJ6.0A	SMBJ6.0CA	KG	AG	6.0	6.67~7.37	10	10.3	58.3	800
SMBJ6.5A	SMBJ6.5CA	KK	AK	6.5	7.22~7.98	10	11.2	53.6	500
SMBJ7.0A	SMBJ7.0CA	KM	AM	7.0	7.78~8.60	10	12.0	50.0	200
SMBJ7.5A	SMBJ7.5CA	KP	AP	7.5	8.33~9.21	1	12.9	46.6	100
SMBJ8.0A	SMBJ8.0CA	KR	AR	8.0	8.89~9.83	1	13.6	44.2	50
SMBJ8.5A	SMBJ8.5CA	KT	AT	8.5	9.44~10.40	1	14.4	41.7	20
SMBJ9.0A	SMBJ9.0CA	KV	AV	9.0	10.00~11.10	1	15.4	39.0	10
SMBJ10A	SMBJ10CA	KX	AX	10.0	11.10~12.30	1	17.0	35.3	5
SMBJ11A	SMBJ11CA	KZ	AZ	11.0	12.20~13.50	1	18.2	33.0	1
SMBJ12A	SMBJ12CA	LE	BE	12.0	13.30~14.70	1	19.9	30.2	1
SMBJ13A	SMBJ13CA	LG	BG	13.0	14.40~15.90	1	21.5	28.0	1
SMBJ14A	SMBJ14CA	LK	BK	14.0	15.60~17.20	1	23.2	25.9	1
SMBJ15A	SMBJ15CA	LM	BM	15.0	16.70~18.50	1	24.4	24.6	1
SMBJ16A	SMBJ16CA	LP	BP	16.0	17.80~19.70	1	26.0	23.1	1
SMBJ17A	SMBJ17CA	LR	BR	17.0	18.90~20.90	1	27.6	21.8	1
SMBJ18A	SMBJ18CA	LT	BT	18.0	20.00~22.10	1	29.2	20.6	1
SMBJ20A	SMBJ20CA	LV	BV	20.0	22.20~24.50	1	32.4	18.6	1
SMBJ22A	SMBJ22CA	LX	BX	22.0	24.40~26.90	1	35.5	16.9	1
SMBJ24A	SMBJ24CA	LZ	BZ	24.0	26.70~29.50	1	38.9	15.5	1
SMBJ26A	SMBJ26CA	ME	CE	26.0	28.90~31.90	1	42.1	14.3	1
SMBJ28A	SMBJ28CA	MG	CG	28.0	31.10~34.40	1	45.4	13.3	1
SMBJ30A	SMBJ30CA	MK	CK	30.0	33.30~36.80	1	48.4	12.4	1
SMBJ33A	SMBJ33CA	MM	CM	33.0	36.70~40.60	1	53.3	11.3	1
SMBJ36A	SMBJ36CA	MP	CP	36.0	40.00~44.20	1	58.1	10.4	1
SMBJ40A	SMBJ40CA	MR	CR	40.0	44.40~49.10	1	64.5	9.3	1
SMBJ43A	SMBJ43CA	MT	CT	43.0	47.80~52.80	1	69.4	8.7	1
SMBJ45A	SMBJ45CA	MV	CV	45.0	50.00~55.30	1	72.7	8.3	1
SMBJ48A	SMBJ48CA	MX	CX	48.0	53.30~58.90	1	77.4	7.8	1
SMBJ51A	SMBJ51CA	MZ	CZ	51.0	56.70~62.70	1	82.4	7.3	1
SMBJ85A	SMBJ85CA	NV	DV	85.0	94.40~104.00	1	137.0	4.4	1
SMBJ90A	SMBJ90CA	NX	DX	90.0	100.00~111.00	1	146.0	4.1	1
SMBJ100A	SMBJ100CA	NZ	DZ	100.0	111.00~123.00	1	162.0	3.7	1
SMBJ110A	SMBJ110CA	PE	EE	110.0	122.00~135.00	1	177.0	3.4	1
SMBJ120A	SMBJ120CA	PG	EG	120.0	133.00~147.00	1	193.0	3.1	1
SMBJ130A	SMBJ130CA	PK	EK	130.0	144.00~159.00	1	209.0	2.9	1
SMBJ150A	SMBJ150CA	PM	EM	150.0	167.00~185.00	1	243.0	2.5	1
SMBJ160A	SMBJ160CA	PP	EP	160.0	178.00~197.00	1	259.0	2.3	1
SMBJ170A	SMBJ170CA	PR	ER	170.0	189.00~209.00	1	275.0	2.2	1

Part Number		Device Marking Code		Reverse Stand-Off Voltage	Breakdown Voltage @I_T	Test Current	Maximum Clamping Voltage @I_{PP}	Peak Pulse Current	Reverse Leakage @V_{RWM}
Unidirectional	Bidirectional	UNI	BI	V_{RWM}(V)	V_{BR}(V)	I_T(mA)	V_C(V)	I_{PP}(A)	I_R(μA)
SMBJ180A	SMBJ180CA	PT	ET	180.0	201.00~222.00	1	292.0	2.1	1
SMBJ188A	SMBJ188CA	PB	EB	188.0	209.00~231.00	1	304.0	2.0	1
SMBJ190A	SMBJ190CA	PA	EC	190.0	211.00~233.00	1	308.0	2.0	1
SMBJ200A	SMBJ200CA	PV	EV	200.0	224.00~247.00	1	324.0	1.9	1
SMBJ210A	SMBJ210CA	PB	ED	210.0	237.00~263.00	1	340.0	1.8	1
SMBJ220A	SMBJ220CA	PX	EX	220.0	246.00~272.00	1	356.0	1.7	1
SMBJ250A	SMBJ250CA	PZ	EZ	250.0	279.00~309.00	1	405.0	1.5	1
SMBJ300A	SMBJ300CA	QE	FE	300.0	335.00~371.00	1	486.0	1.7	1
SMBJ350A	SMBJ350CA	QG	FG	350.0	391.00~432.00	1	567.0	1.5	1
SMBJ400A	SMBJ400CA	QK	FK	400.0	447.00~494.00	1	648.0	1.3	1
SMBJ440A	SMBJ440CA	QM	FM	440.0	492.00~543.00	1	713.0	1.1	1

Notes:

1.For bidirectional type having V_{RWM} of 10V and less, the IR limit is double.

Ratings and Characteristic Curves (T_A=25℃,unless otherwise noted)

Figure 1.Peak Pulse Power Derating Curve

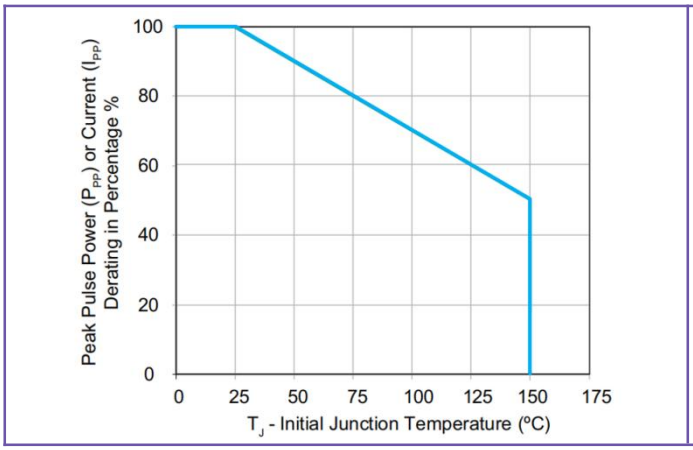


Figure 2. Pulse Waveform

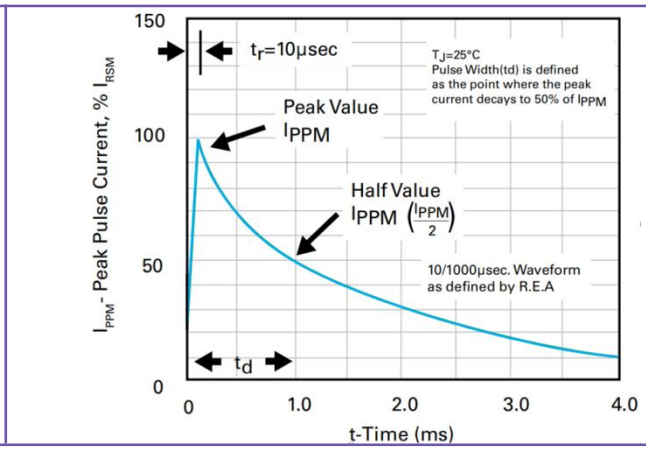


Figure 3. Typical Junction Capacitance

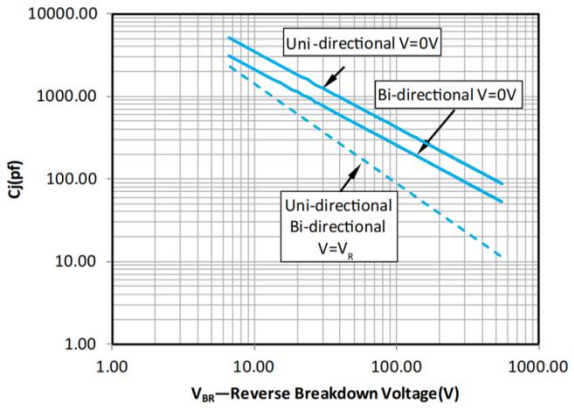


Figure 4. Typical Transient Thermal Impedance

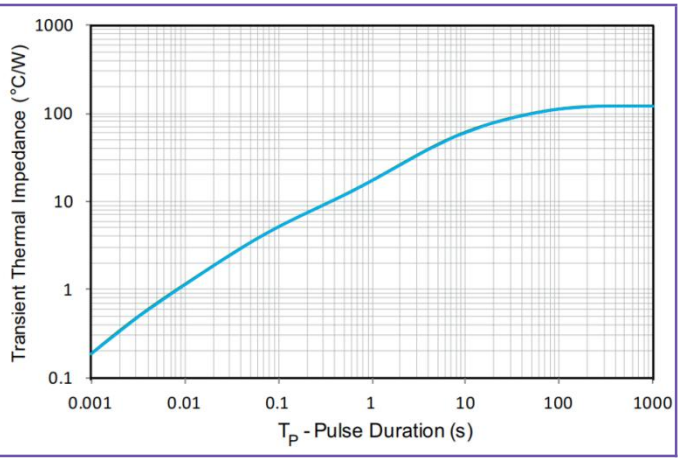


Figure 5. Maximum Non-Repetitive Forward Surge Current Uni-Directional Only

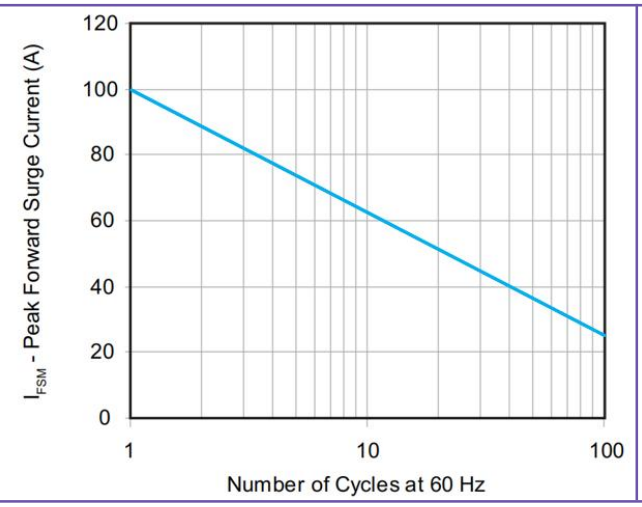
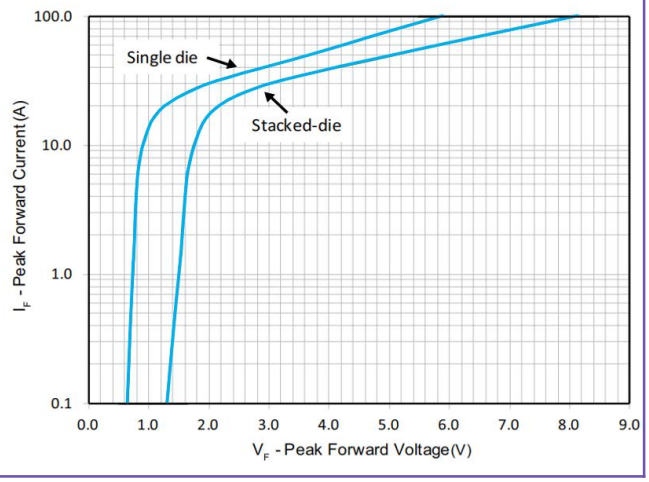
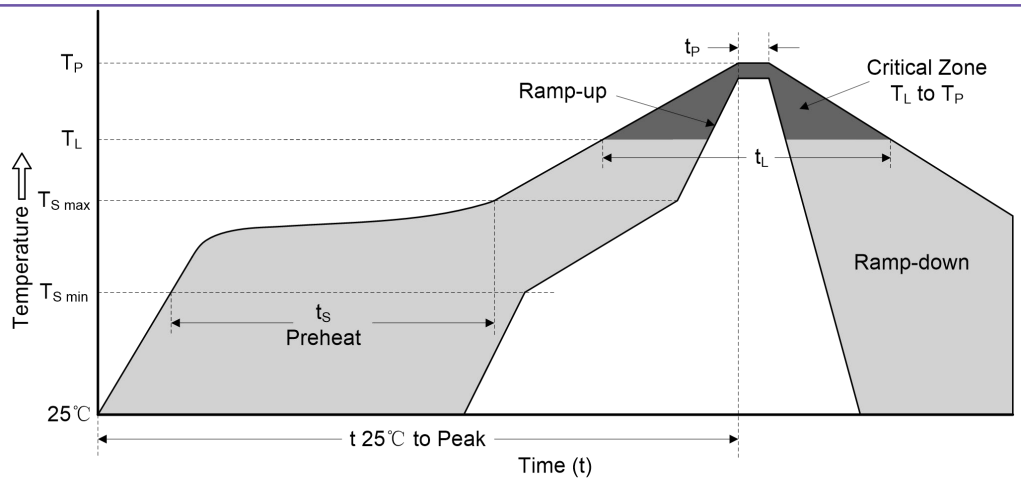


Figure 6. Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)



Reflow Soldering Parameters



Reflow Condition		Lead-free Assembly
Preheat	-Temperature Min ($T_{S\ min}$)	150℃
	-Temperature Max ($T_{S\ max}$)	200℃
	-Time (min to max) (t_S)	60-120 seconds
Average ramp-up rate (T_L to T_P)		3℃/second max.
$T_{S\ max}$ to T_L -Ramp-up Rate		3℃/second max.
Reflow	-Temperature (T_L) (Liquidus)	217℃
	-Time (min to max) (t_S)	60-150 seconds
Peak Temperature (T_P)		260(+0/-5)℃
Time within 5℃ of actual Peak Temperature (t_P)		30 seconds
Ramp-down Rate		6℃/second max.
Time 25℃ to Peak Temperature(T_p)		8 minutes max.
Do not exceed		260℃

Reliability

Items	Standards
Terminal strength	MIL-STD-750 Method 2036
Mechanical shock	JESD22-B104
Vibration	JESD22-B103
High Temp Storage	JESD22-A103
High Temp Reverse Bias	JESD22-A108
Temperature Cycling	JESD22-A104
High Temp High Humidity Reverse Bias	JESD22-A101
Resistance to solder heat	JESD22-A111

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