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INNOVATOR IN SEMICONDUCTOR

SMBJ Series

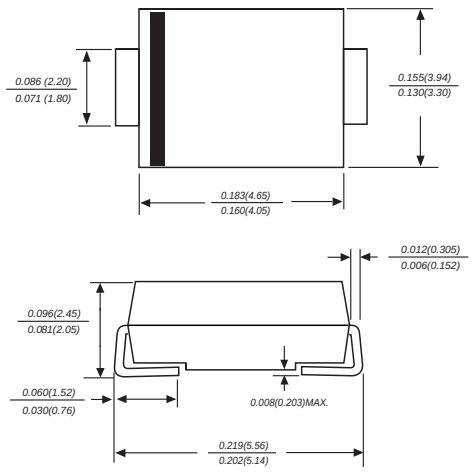
600W Surface Mount Transient Voltage Suppressors- 5.0V- 440V

Features

- 600W peak pulse power capability with a 10/1000 μs waveform, repetition rate (duty cycle): 0.01%.
- Low profile surface mounted application in order to optimize board space.
- Excellent clamping capability.
- Low incremental surge resistance.
- Fast response time from 0V to VBR, typically less than 1 ps for uni-directional & 5 ns for bi-directional types.
- Glass passivated chip junction.
- Lead-free parts meet RoHS requirments.
- Compliant to Halogen-free

Package outline

DO-214AA/SMB



Dimensions in inches and (millimeters)

Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, DO-214AA / SMB
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band
- Mounting Position : Any

Maximum ratings (AT T_A=25°C unless otherwise noted)

PARAMETER	CONDITIONS	Symbol	Value	UNIT
Peak Power Dissipation	with a 10/1000 μs waveform, Note 1, 2 & Fig. 1	P_{PPM}	600	W
Peak Pulse current	with a 10/1000 μs waveform	I_{PPM}	See Table 1	A
Steady State Power Dissipation	at T_L=75°C, Note 2	$P_{M(AV)}$	5.0	W
Peak Forward Surge Current	8.3ms Single Half Sine-Wave, Note 3	I_{FSM}	100	A
Maximum Instantaneours Forward Voltage	at 50A For Uni-Directional Types Only, Note 4	V_F	3.5/5.0	V
Typical Thermal resistance	Junction to case Junction to ambient	$R_{\theta JC}$ $R_{\theta JA}$	30 50	°C/W
Operating junction temperature range		T_J	-55 ~ +150	°C
Storage temperature range		T_{STG}	-55 ~ +150	°C

Note 1. Non-repetitive current pulse, per Fig. 3 and derated above T_A=25°C per Fig. 2
2. Mounted on copper pad area of 0.2"x0.2" (5.0x5.0 mm) per Fig 5
3. Measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle=4 pulses per minute maximum
4. V_F<3.5V for V_{BR}< 200V and V_F<5.0V for V_{BR} > 201V.

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Electrical characteristics (at T_A=25°C unless otherwise noted)

Part No. (Uni)	Part No. (Bi)	Reverse Stand-off Voltage	Breakdown Voltage @I_T		Test Current	Maximum Clamping Voltage @I_{PP}		Maximum Reverse Leakage Current	Marking Code	
		V_{RWM}	$V_{BR\ Min}$	$V_{BR\ Max}$	I_T	V_C	I_{PP}	I_R@V_{RWM}		
		Volts	Volts	Volts	mA	Volts	A	μA	UNI	BI
SMBJ5.0A	SMBJ5.0CA	5.0	6.40	7.00	10	9.2	65.2	800	KE	AE
SMBJ6.0A	SMBJ6.0CA	6.0	6.67	7.37	10	10.3	58.3	800	KG	AG
SMBJ6.5A	SMBJ6.5CA	6.5	7.22	7.98	10	11.2	53.6	500	KK	AK
SMBJ7.0A	SMBJ7.0CA	7.0	7.78	8.60	10	12.0	50.0	200	KM	AM
SMBJ7.5A	SMBJ7.5CA	7.5	8.33	9.21	1.0	12.9	46.5	100	KP	AP
SMBJ8.0A	SMBJ8.0CA	8.0	8.89	9.83	1.0	13.6	44.1	50	KR	AR
SMBJ8.5A	SMBJ8.5CA	8.5	9.44	10.4	1.0	14.4	41.7	20	KT	AT
SMBJ9.0A	SMBJ9.0CA	9.0	10.0	11.1	1.0	15.4	39.0	10	KV	AV
SMBJ10A	SMBJ10CA	10	11.1	12.3	1.0	17.0	35.3	5	KX	AX
SMBJ11A	SMBJ11CA	11	12.2	13.5	1.0	18.2	33.0	5	KZ	AZ
SMBJ12A	SMBJ12CA	12	13.3	14.7	1.0	19.9	30.2	5	LE	BE
SMBJ13A	SMBJ13CA	13	14.4	15.9	1.0	21.5	27.9	5	LG	BG
SMBJ14A	SMBJ14CA	14	15.6	17.2	1.0	23.2	25.9	5	LK	BK
SMBJ15A	SMBJ15CA	15	16.7	18.5	1.0	24.4	24.6	5	LM	BM
SMBJ16A	SMBJ16CA	16	17.8	19.7	1.0	26.0	23.0	5	LP	BP
SMBJ17A	SMBJ17CA	17	18.9	20.9	1.0	27.6	21.7	5	LR	BR
SMBJ18A	SMBJ18CA	18	20.0	22.1	1.0	29.2	20.5	5	LT	BT
SMBJ20A	SMBJ20CA	20	22.2	24.5	1.0	32.4	18.5	5	LV	BV
SMBJ22A	SMBJ22CA	22	24.4	26.9	1.0	35.5	16.9	5	LX	BX
SMBJ24A	SMBJ24CA	24	26.7	29.5	1.0	38.9	15.4	5	LZ	BZ
SMBJ26A	SMBJ26CA	26	28.9	31.9	1.0	42.1	14.3	5	ME	CE
SMBJ28A	SMBJ28CA	28	31.1	34.4	1.0	45.4	13.2	5	MG	CG
SMBJ30A	SMBJ30CA	30	33.3	36.8	1.0	48.4	12.4	5	MK	CK
SMBJ33A	SMBJ33CA	33	36.7	40.6	1.0	53.3	11.3	5	MM	CM
SMBJ36A	SMBJ36CA	36	40.0	44.2	1.0	58.1	10.3	5	MP	CP
SMBJ40A	SMBJ40CA	40	44.4	49.1	1.0	64.5	9.3	5	MR	CR
SMBJ43A	SMBJ43CA	43	47.8	52.8	1.0	69.4	8.6	5	MT	CT
SMBJ45A	SMBJ45CA	45	50.0	55.3	1.0	72.7	8.3	5	MV	CV
SMBJ48A	SMBJ48CA	48	53.3	58.9	1.0	77.4	7.8	5	MX	CX
SMBJ51A	SMBJ51CA	51	56.7	62.7	1.0	82.4	7.3	5	MZ	CZ
SMBJ54A	SMBJ54CA	54	60.0	66.3	1.0	87.1	6.9	5	NE	DE
SMBJ58A	SMBJ58CA	58	64.4	71.2	1.0	93.6	6.4	5	NG	DG
SMBJ60A	SMBJ60CA	60	66.7	73.7	1.0	96.8	6.2	5	NK	DK
SMBJ64A	SMBJ64CA	64	71.1	78.6	1.0	103.0	5.8	5	NM	DM
SMBJ70A	SMBJ70CA	70	77.8	86.0	1.0	113.0	5.3	5	NP	DP
SMBJ75A	SMBJ75CA	75	83.3	92.1	1.0	121.0	5.0	5	NR	DR
SMBJ78A	SMBJ78CA	78	86.7	95.8	1.0	126.0	4.8	5	NT	DT
SMBJ85A	SMBJ85CA	85	94.4	104	1.0	137.0	4.4	5	NV	DV

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		V_{RWM}	$V_{BR\ Min}$	$V_{BR\ Max}$	I_T	V_C	I_{PP}	I_R@V_{RWM}		
		Volts	Volts	Volts	mA	Volts	A	μA	UNI	BI
SMBJ 90A	SMBJ 90CA	90	100	111	1.0	146.0	4.1	5	NX	DX
SMBJ 100A	SMBJ 100CA	100	111	123	1.0	162.0	3.7	5	NZ	DZ
SMBJ 110A	SMBJ 110CA	110	122	135	1.0	177.0	3.4	5	PE	EE
SMBJ 120A	SMBJ 120CA	120	133	147	1.0	193.0	3.1	5	PG	EG
SMBJ 130A	SMBJ 130CA	130	144	159	1.0	209.0	2.9	5	PK	EK
SMBJ 150A	SMBJ 150CA	150	167	185	1.0	243.0	2.5	5	PM	EM
SMBJ 160A	SMBJ 160CA	160	178	197	1.0	259.0	2.3	5	PP	EP
SMBJ 170A	SMBJ 170CA	170	189	209	1.0	275.0	2.2	5	PR	ER
SMBJ 180A	SMBJ 180CA	180	201	222	1.0	292.0	2.1	5	PT	ET
SMBJ 200A	SMBJ 200CA	200	224	247	1.0	324.0	1.9	5	PX	EX
SMBJ 220A	SMBJ 220CA	220	246	272	1.0	356.0	1.7	5	PV	EV
SMBJ 250A	SMBJ 250CA	250	279	309	1.0	405.0	1.5	5	PZ	EZ
SMBJ 300A	SMBJ 300CA	300	335	371	1.0	486.0	1.3	5	QE	FE
SMBJ 350A	SMBJ 350CA	350	391	432	1.0	567.0	1.1	5	QG	FG
SMBJ 400A	SMBJ 400CA	400	447	494	1.0	648.0	0.9	5	QK	FK
SMBJ 440A	SMBJ 440CA	440	492	543	1.0	713.0	0.9	5	QM	FM

Note 1. V_{BR} measured after I_T applied for 300us, I_T=square wave pulse or equivalent
2. Surge current waveform per Fig. 3 and derated per Fig. 2
3. For bi-directional types having V_{RWM} of 10 volts and less, the I_R limit is doubled
4. Suffix 'C' denotes bi-directional devices. Suffix 'A' denotes 5% tolerance devices, no suffix denotes 10% tolerance devices.

Fig. a - Transients of several thousand volts can be clamped to a safe level by the TVS

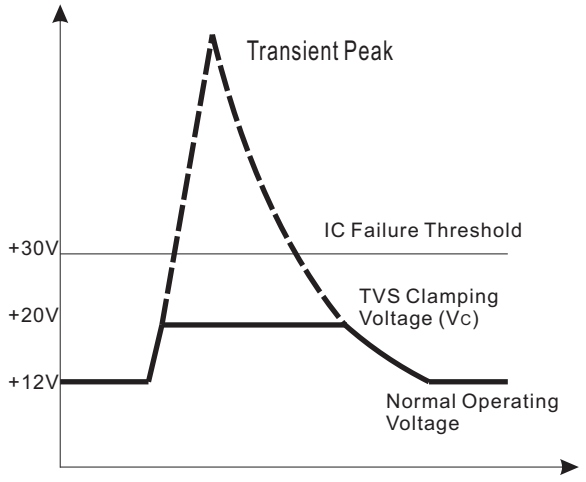
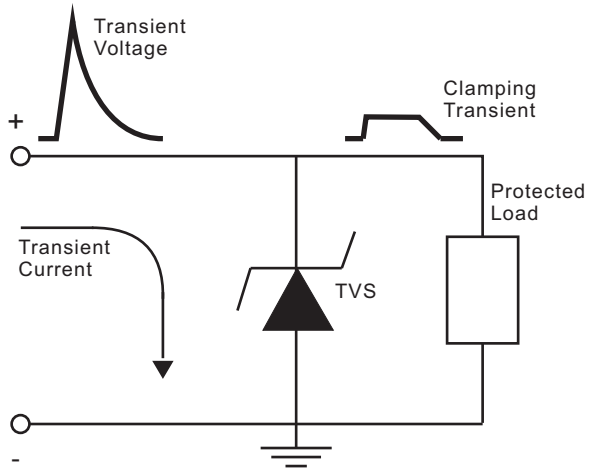


Fig. b - Transient current is divered to ground thru TVS; the voltage seen by the protected load is limited to the clamping voltage level



Rating and characteristic curves

Fig.1 - Pealk Pulse Power Rating Curve

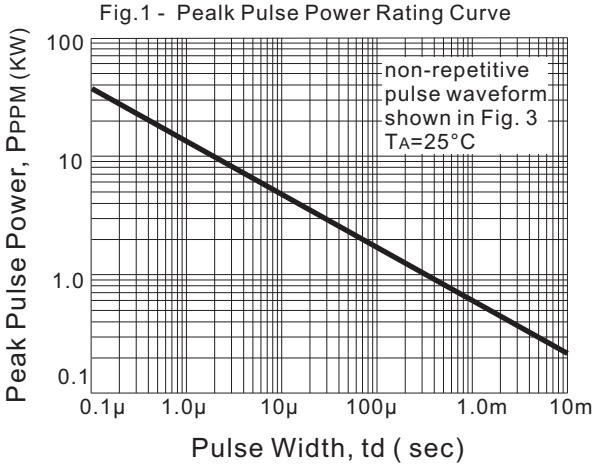


Fig.2 - Pulse Derating Curve

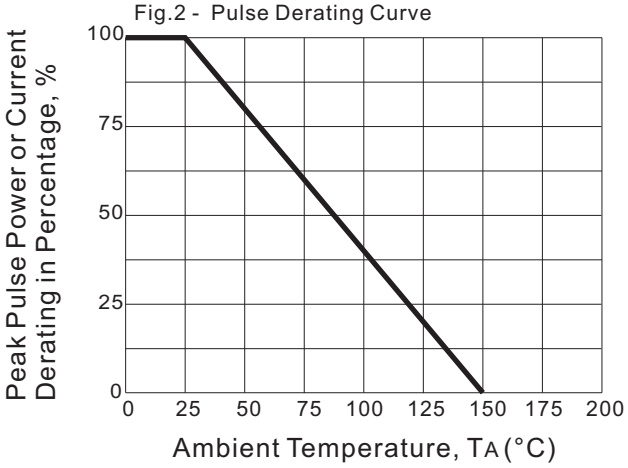


Fig.3 - Pulse Waveform

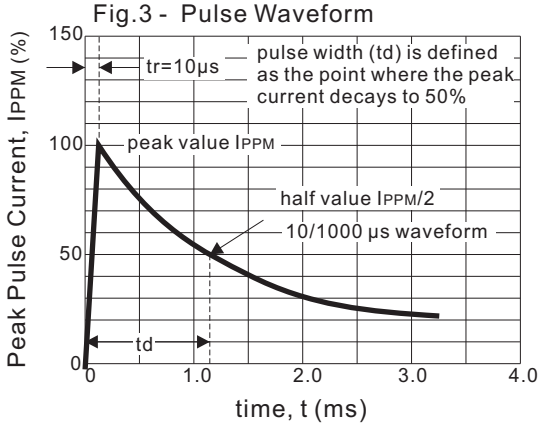


Fig.4 - Typical Junction Capacitance

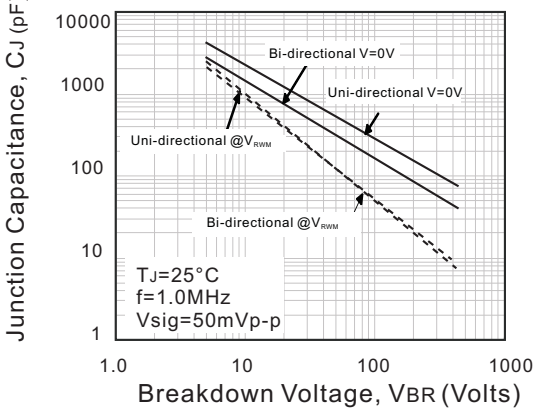


Fig.5 - Steady State Power Derating Curve

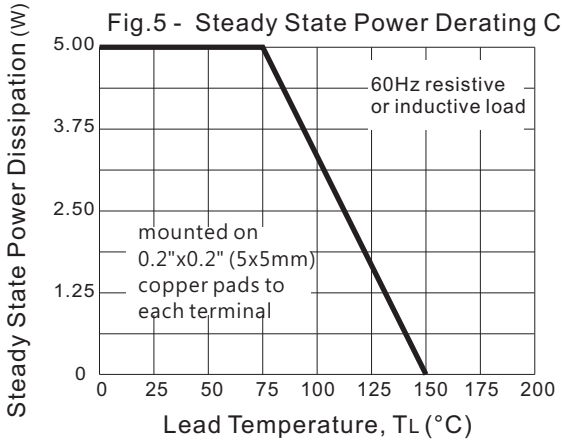
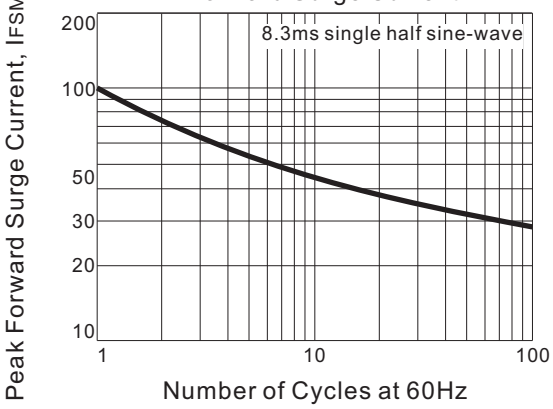


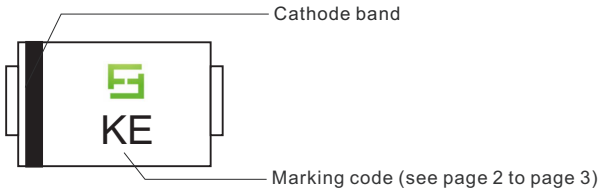
Fig.6 - Maximum Non-Repetitive Forward Surge Current



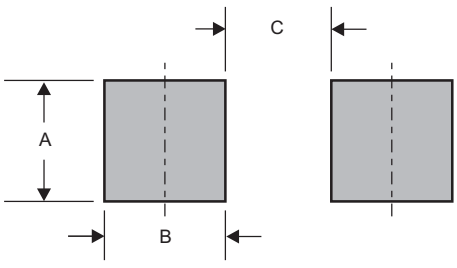
Pinning information

Pin	Simplified outline	Symbol
Uni-Directional Pin1 cathode Pin2 anode		
Bi-Directional		

Marking

Type number	Example
Uni-Directional	
Bi-Directional	

Suggested solder pad layout

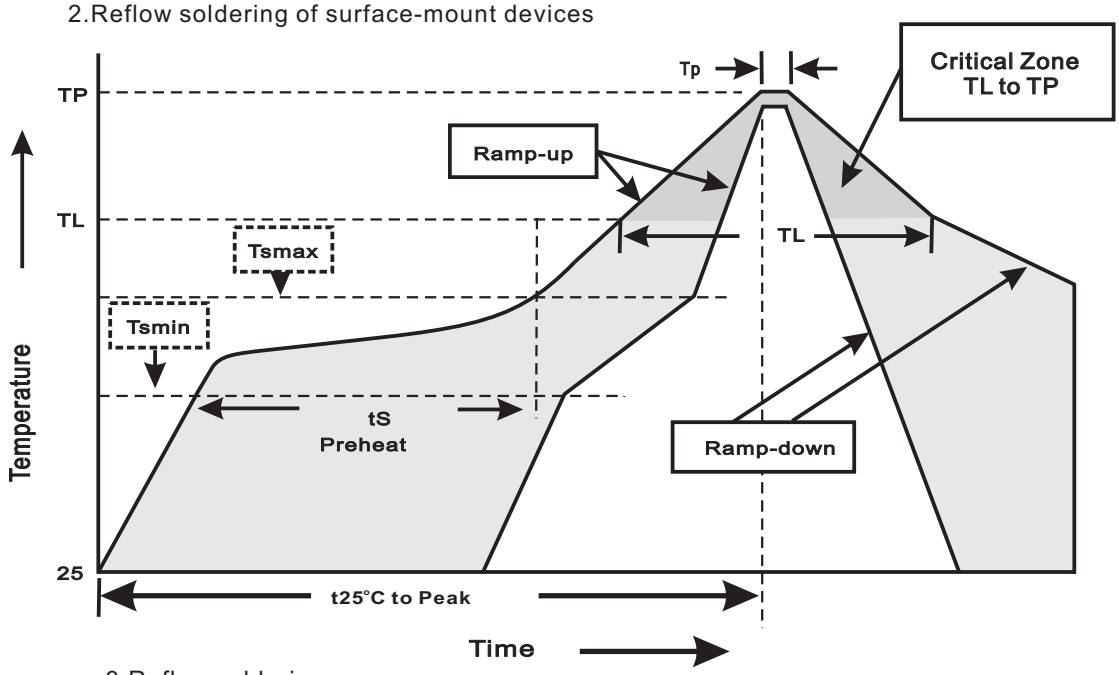


Dimensions in inches and (millimeters)

PACKAGE	A	B	C
SMB	0.078 (2.00)	0.059 (1.50)	0.110 (2.80)

Suggested thermal profiles for soldering processes

1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
2.Reflow soldering of surface-mount devices



3.Reflow soldering

Profile Feature	Soldering Condition
Average ramp-up rate(T_L to T_P)	<3°C/sec
Preheat -Temperature Min(Tsmin) -Temperature Max(Tsmax) -Time(min to max)(t_s)	 150°C 200°C 60~120sec
Tsmax to T_L -Ramp-upRate	 <3°C/sec
Time maintained above: -Temperature(T_L) -Time(t_L)	 217°C 60~260sec
Peak Temperature(T_P)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(t_P)	10~30sec
Ramp-down Rate	<6°C/sec
Time 25°C to Peak Temperature	<6minutes