

## 600W, 5V - 170V Surface Mount Transient Voltage Suppressor

### FEATURES

- Ideal for automated placement
- Glass passivated junction
- Excellent clamping capability
- Fast response time: Typically less than 1.0ps
- Typical  $I_R$  less than 1 $\mu$ A above 10V
- Meets ISO 7637-2 (Pulse 1/2a/2b/3a/3b)
- Moisture sensitivity level: level 1, per J-STD-020
- RoHS Compliant
- Halogen-free according to IEC 61249-2-21

### APPLICATIONS

- Protect sensitive circuit from damage by high voltage transients
- Lighting, ESD transient voltage protection of IC, system
- Inductive switching load protection of IC, system
- Electrical Fast Transient Immunity protection of IC, system

### MECHANICAL DATA

- Case: DO-214AA (SMB)
- Molding compound meets UL 94V-0 flammability rating
- Terminal: Matte tin plated leads, solderable per J-STD-002
- Meet JESD 201 class 2 whisker test
- Polarity: As marked
- Weight: 0.090g (approximately)

KEY PARAMETERS		
PARAMETER	VALUE	UNIT
$V_{WM}$	5 - 170	V
$V_{BR}$ (uni - directional)	6.4 - 231	V
$V_{BR}$ (bi - directional)	6.4 - 231	V
$P_{PK}$	600	W
$T_{JMAX}$	150	
Package	DO-214AA (SMB)	
Configuration	Single die	



**DO-214AA (SMB)**

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)			
PARAMETER	SYMBOL	VALUE	UNIT
Non-repetitive peak impulse power dissipation with 10/1000 $\mu$ s waveform <sup>(1)</sup>	$P_{PK}$	600	W
Steady state power dissipation at $T_A = 25^\circ\text{C}$	$P_D$	3	W
Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load for Uni-directional only	$I_{FSM}$	100	A
Forward Voltage @ $I_F = 50\text{A}$ for Uni-directional only <sup>(2)</sup>	$V_F$	3.5 / 5.0	V
Junction temperature	$T_J$	- 55 to +150	$^\circ\text{C}$
Storage temperature	$T_{STG}$	- 55 to +150	$^\circ\text{C}$

#### Notes:

1. Non-repetitive current pulse per Fig.3 and derated above  $T_A = 25^\circ\text{C}$  per Fig.2
2.  $V_F = 3.5\text{V}$  on SMBJ5.0 - SMBJ90 devices and  $V_F = 5.0\text{V}$  on SMBJ100 - SMBJ170 devices

#### Devices for Bipolar Applications

1. For bidirectional use C or CA suffix for types SMBJ5.0 - types SMBJ170
2. Electrical characteristics apply in both directions

<b>THERMAL PERFORMANCE</b>			
<b>PARAMETER</b>	<b>SYMBOL</b>	<b>TYP</b>	<b>UNIT</b>
Junction-to-case thermal resistance	$R_{\theta JC}$	10	°C/W
Junction-to-ambient thermal resistance	$R_{\theta JA}$	55	°C/W

<b>ELECTRICAL SPECIFICATIONS</b> ( $T_A = 25^\circ\text{C}$ unless otherwise noted)								
Part number	Marking code	Breakdown voltage $V_{BR}@I_T$ (V) (Note 1)		Test current $I_T$ (mA)	Working stand-off voltage $V_{WM}$ (V)	Maximum blocking leakage current $I_D@V_{WM}$ ( $\mu\text{A}$ )	Maximum peak impulse current $I_{PP}$ (A) (Note 2)	Maximum clamping voltage $V_C@I_{PP}$ (V)
		Min	Max					
SMBJ5.0	KD	6.40	7.30	10	5.0	800	65.0	9.6
SMBJ5.0A	KE	6.40	7.00	10	5.0	800	68.0	9.2
SMBJ5V0A								
SMBJ6.0	KF	6.67	8.15	10	6.0	800	55.0	11.4
SMBJ6.0A	KG	6.67	7.37	10	6.0	800	61.0	10.3
SMBJ6V0A								
SMBJ6.5	KH	7.22	8.82	10	6.5	500	51.0	12.3
SMBJ6.5A	KK	7.22	7.98	10	6.5	500	56.0	11.2
SMBJ6V5A								
SMBJ7.0	KL	7.78	9.51	10	7.0	200	47.0	13.3
SMBJ7.0A	KM	7.78	8.60	10	7.0	200	52.0	12.0
SMBJ7V0A								
SMBJ7.5	KN	8.33	10.3	1	7.5	100	44.0	14.3
SMBJ7.5A	KP	8.33	9.21	1	7.5	100	48.0	12.9
SMBJ7V5A								
SMBJ8.0	KQ	8.89	10.9	1	8.0	50	42.0	15.0
SMBJ8.0A	KR	8.89	9.83	1	8.0	50	46.0	13.6
SMBJ8V0A								
SMBJ8.5	KS	9.44	11.5	1	8.5	10	39.0	15.9
SMBJ8.5A	KT	9.44	10.4	1	8.5	10	43.0	14.4
SMBJ8V5A								
SMBJ9.0	KU	10.0	12.2	1	9.0	5	37.0	16.9
SMBJ9.0A	KV	10.0	11.1	1	9.0	5	40.0	15.4
SMBJ9V0A								
SMBJ10	KW	11.1	13.6	1	10	5	33.0	18.8
SMBJ10A	KX	11.1	12.3	1	10	5	37.0	17.0
SMBJ11	KY	12.2	14.9	1	11	1	31.0	20.1
SMBJ11A	KZ	12.2	13.5	1	11	1	34.0	18.2
SMBJ12	LD	13.3	16.3	1	12	1	28.0	22.0
SMBJ12A	LE	13.3	14.7	1	12	1	31.0	19.9
SMBJ13	LF	14.4	17.6	1	13	1	26.0	23.8
SMBJ13A	LG	14.4	15.9	1	13	1	29.0	21.5
SMBJ14	LH	15.6	19.1	1	14	1	24.4	25.8
SMBJ14A	LK	15.6	17.2	1	14	1	27.0	23.2
SMBJ15	LL	16.7	20.4	1	15	1	23.1	26.9
SMBJ15A	LM	16.7	18.5	1	15	1	25.1	24.4
SMBJ16	LN	17.8	21.8	1	16	1	21.8	28.8
SMBJ16A	LP	17.8	19.7	1	16	1	24.2	26.0
SMBJ17	LQ	18.9	23.1	1	17	1	20.0	30.5
SMBJ17A	LR	18.9	20.9	1	17	1	22.8	27.6
SMBJ18	LS	20.0	24.4	1	18	1	19.5	32.2
SMBJ18A	LT	20.0	22.1	1	18	1	21.5	29.2
SMBJ20	LU	22.2	27.1	1	20	1	17.6	35.8
SMBJ20A	LV	22.2	24.5	1	20	1	19.4	32.4
SMBJ22	LW	24.4	29.8	1	22	1	15.0	39.4
SMBJ22A	LX	24.4	26.9	1	22	1	17.7	35.5
SMBJ24	LY	26.7	32.6	1	24	1	14.6	43.0
SMBJ24A	LZ	26.7	29.5	1	24	1	16.0	38.9

**ELECTRICAL SPECIFICATIONS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Part number	Marking code	Breakdown voltage $V_{BR}@I_T$ (V) (Note 1)		Test current $I_T$ (mA)	Working stand-off voltage $V_{WM}$ (V)	Maximum blocking leakage current $I_D@V_{WM}$ ( $\mu\text{A}$ )	Maximum peak impulse current $I_{PP}$ (A) (Note 2)	Maximum clamping voltage $V_C@I_{PP}$ (V)
		Min	Max					
SMBJ26	MD	28.9	35.3	1	26	1	13.5	46.6
SMBJ26A	ME	28.9	31.9	1	26	1	14.9	42.1
SMBJ28	MF	31.1	38.0	1	28	1	12.6	50.0
SMBJ28A	MG	31.1	34.4	1	28	1	13.8	45.4
SMBJ30	MH	33.3	40.7	1	30	1	11.7	53.5
SMBJ30A	MK	33.3	36.8	1	30	1	13.0	48.4
SMBJ33	ML	36.7	44.9	1	33	1	10.6	59.0
SMBJ33A	MM	36.7	40.6	1	33	1	11.8	53.3
SMBJ36	MN	40.0	48.9	1	36	1	9.8	64.3
SMBJ36A	MP	40.0	44.2	1	36	1	10.8	58.1
SMBJ40	MQ	44.4	54.3	1	40	1	8.8	71.4
SMBJ40A	MR	44.4	49.1	1	40	1	9.7	64.5
SMBJ43	MS	47.8	58.4	1	43	1	8.2	76.7
SMBJ43A	MT	47.8	52.8	1	43	1	9.0	69.4
SMBJ45	MU	50.0	61.1	1	45	1	7.8	80.3
SMBJ45A	MV	50.0	55.3	1	45	1	8.6	72.7
SMBJ48	MW	53.3	65.1	1	48	1	7.3	85.5
SMBJ48A	MX	53.3	58.9	1	48	1	8.1	77.4
SMBJ51	MY	56.7	69.3	1	51	1	6.9	91.1
SMBJ51A	MZ	56.7	62.7	1	51	1	7.6	82.4
SMBJ54	ND	60.0	73.3	1	54	1	6.5	96.3
SMBJ54A	NE	60.0	66.3	1	54	1	7.2	87.1
SMBJ58	NF	64.4	78.7	1	58	1	6.1	103
SMBJ58A	NG	64.4	71.2	1	58	1	6.7	93.6
SMBJ60	NH	66.7	81.5	1	60	1	5.8	107
SMBJ60A	NK	66.7	73.7	1	60	1	6.5	96.8
SMBJ64	NL	71.1	86.9	1	64	1	5.5	114
SMBJ64A	NM	71.1	78.6	1	64	1	6.1	103
SMBJ70	NN	77.8	95.1	1	70	1	5.0	125
SMBJ70A	NP	77.8	86	1	70	1	5.5	113
SMBJ75	NQ	83.3	102	1	75	1	4.7	134
SMBJ75A	NR	83.3	92.1	1	75	1	5.2	121
SMBJ78	NS	86.7	106	1	78	1	4.5	139
SMBJ78A	NT	86.7	95.8	1	78	1	5.0	126
SMBJ85	NU	94.4	115	1	85	1	4.1	151
SMBJ85A	NV	94.4	104	1	85	1	4.6	137
SMBJ90	NW	100	122	1	90	1	3.9	160
SMBJ90A	NX	100	111	1	90	1	4.3	146
SMBJ100	NY	111	136	1	100	1	3.5	179
SMBJ100A	NZ	111	123	1	100	1	3.8	162
SMBJ110	PD	122	149	1	110	1	3.2	196
SMBJ110A	PE	122	135	1	110	1	3.5	177
SMBJ120	PF	133	163	1	120	1	2.9	214
SMBJ120A	PG	133	147	1	120	1	3.2	193
SMBJ130	PH	144	176	1	130	1	2.7	231
SMBJ130A	PK	144	159	1	130	1	3.0	209
SMBJ150	PL	167	204	1	150	1	2.3	266
SMBJ150A	PM	167	185	1	150	1	2.5	243
SMBJ160	PN	178	218	1	160	1	2.2	287
SMBJ160A	PP	178	197	1	160	1	2.4	259
SMBJ170	PQ	189	231	1	170	1	2.0	304

<b>ELECTRICAL SPECIFICATIONS</b> ( $T_A = 25^\circ\text{C}$ unless otherwise noted)								
Part number	Marking code	Breakdown voltage $V_{BR}@I_T$ (V) (Note 1)		Test current $I_T$ (mA)	Working stand-off voltage $V_{WM}$ (V)	Maximum blocking leakage current $I_D@V_{WM}$ ( $\mu\text{A}$ )	Maximum peak impulse current $I_{PP}$ (A) (Note 2)	Maximum clamping voltage $V_C@I_{PP}$ (V)
		Min	Max					
SMBJ170A	PR	189	209	1	170	1	2.2	275

**Notes:**

1.  $V_{BR}$  measure after  $I_T$  applied for 30ms,  $I_T =$  square wave pulse or equivalent.
2. Surge current waveform per Fig.3 and derate per Fig.2.
3. All terms and symbols are consistent with ANSI/IEEE C62.35.
4. For bidirectional use C or CA suffix for types SMBJ5.0 - SMBJ170
5. For bipolar types having  $V_{WM}$  of 10V (SMBJ10C) and under, the  $I_D$  limit is doubled.

<b>ORDERING INFORMATION</b>		
ORDERING CODE <sup>(1)</sup>	PACKAGE	PACKING
SMBJx	DO-214AA (SMB)	3,000 / Tape & Reel

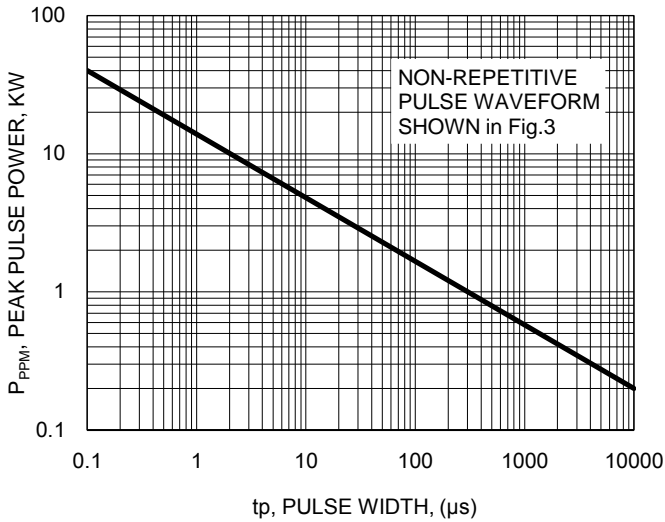
**Notes:**

1. "x" defines voltage from 5V(SMBJ5.0) to 170V(SMBJ170A)

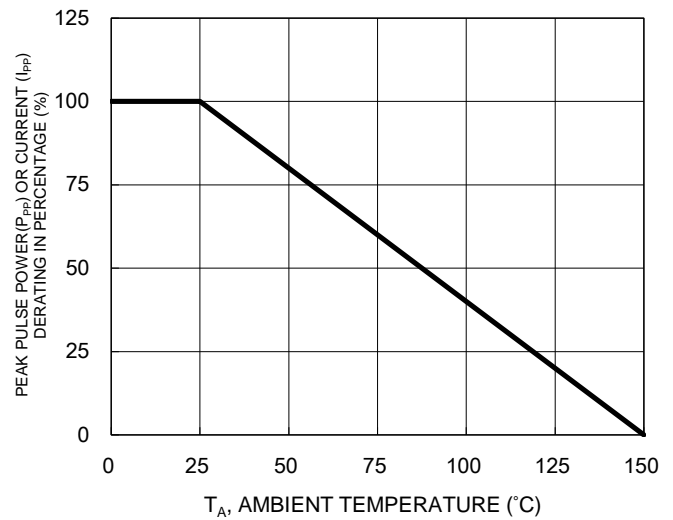
**CHARACTERISTICS CURVES**

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

**Fig.1 Peak Pulse Power Rating Curve**



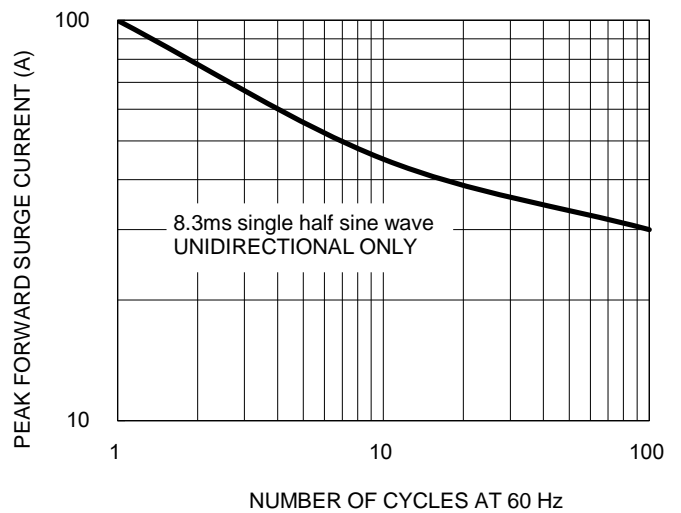
**Fig.2 Pulse Derating Curve**



**Fig.3 Clamping Power Pulse Waveform**



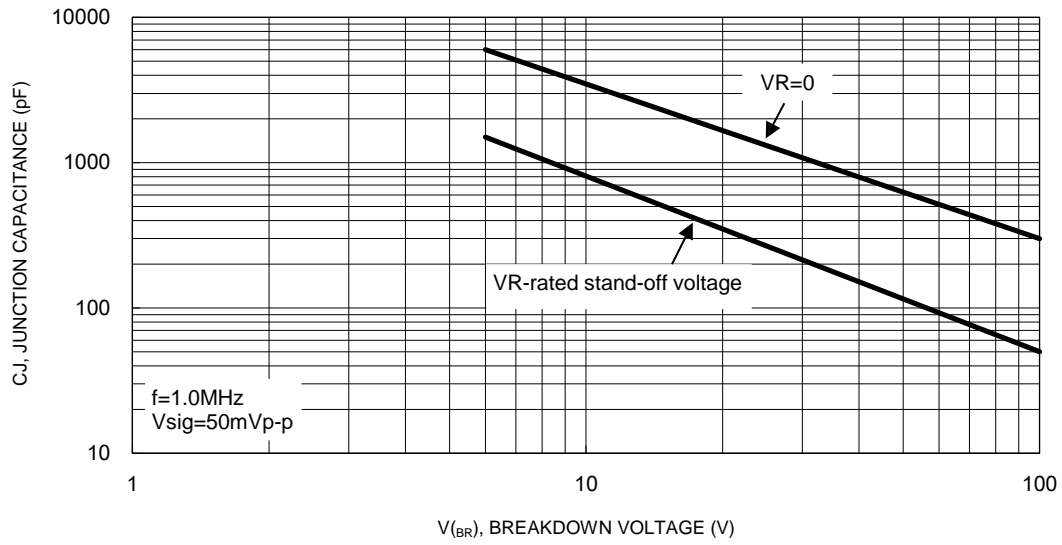
**Fig.4 Maximum Non-Repetitive Forward Surge Current**



**CHARACTERISTICS CURVES**

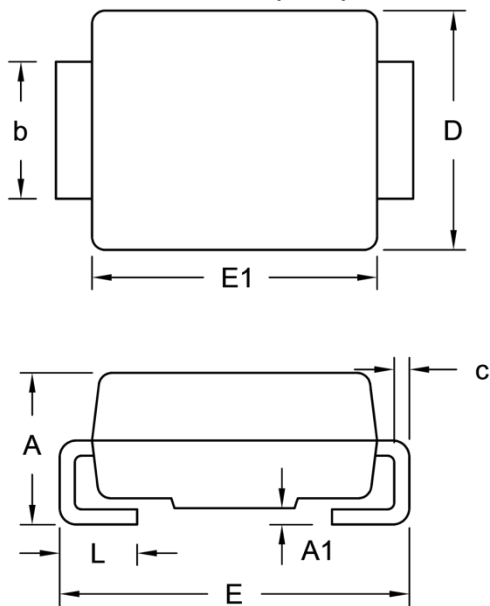
( $T_A = 25^\circ\text{C}$  unless otherwise noted)

**Fig.5 Typical Junction Capacitance**



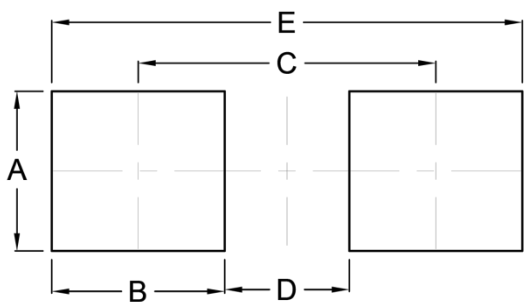
**PACKAGE OUTLINE DIMENSIONS**

DO-214AA (SMB)



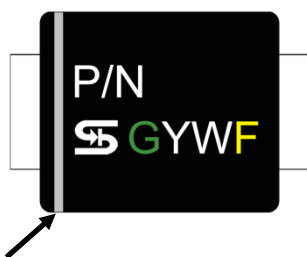
DIM.	Unit (mm)		Unit (inch)	
	Min.	Max.	Min.	Max.
A	1.95	2.65	0.077	0.104
A1	0.05	0.20	0.002	0.008
b	1.95	2.20	0.077	0.087
c	0.15	0.31	0.006	0.012
D	3.30	3.95	0.130	0.156
E	5.10	5.60	0.201	0.220
E1	4.05	4.60	0.159	0.181
L	0.75	1.60	0.030	0.063

**SUGGESTED PAD LAYOUT**



Symbol	Unit (mm)	Unit (inch)
A	2.30	0.091
B	2.50	0.098
C	4.30	0.169
D	1.80	0.071
E	6.80	0.268

**MARKING DIAGRAM**



- P/N = Marking Code
- G = Green Compound
- YW = Date Code
- F = Factory Code

Cathode band for uni-directional products only

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