



PROTEK DEVICES®

.....Engineered solutions for the transient environment

TVS
Transient Voltage
Suppressors
SMBJ5.0
 thru
SMBJ170CA

DESCRIPTION

The SMBJ series device types are designed in a surface mount package size where power and space is a consideration. They are characterized by their high surge capability, extremely fast response time, and low impedance, (R_{on}). Because of the unpredictable nature of transients and the variation of the impedance with respect to these transients, impedance, per se, is not specified as a parametric value. However, a minimum voltage at low current conditions (BV) and a maximum clamping voltage (V_C) at a maximum peak pulse current is specified.

In some instances, the thermal effect (see V_C Clamping Voltage) may be responsible for 50 to 70 percent of the observed voltage differential when subjected to high current pulses or several duty cycles, thus making a maximum impedance specification insignificant. In case of severe current overload or abnormal transient beyond the maximum ratings, the TVS will initially fail "short", thus tripping the system's circuit breaker or fuse while protecting the entire circuit. Curves depicting clamping voltage vs. various current pulses are available from the factory. Extended power curves vs. pulse time are also available.

APPLICATION

This TVS series is a low cost commercial product for use in applications where large voltage transients can permanently damage voltage-sensitive components. It has a peak pulse power rating of 600 watts for one millisecond. The response time of TVS's clamping action is theoretically instantaneous (1×10^{-12} sec.); therefore, they can protect integrated circuits, MOS devices, Hybrids, and other voltage-sensitive components. TVSs can also be used in series or parallel to increase the peak pulse power ratings. This is only one of many series of Transient Voltage Suppressors available from ProTek Devices.

FEATURES

- 600 watts Peak Pulse Power
- Available in ranges from 5.0 to 170 V_{WM}
- Unidirectional and Bidirectional Device Types
- Low Inductance
- UL 94V-0 Flammability Classification

MAXIMUM RATINGS

- 600 Watts of Peak Power dissipation at 25°C (see derating curve)
- Operating and Storage temperatures: -55° to +150°C
- $t_{clamping}$ (0 volts to BV min): Less than 1×10^{-12} second (theoretical)
- Forward surge rating: half cycle 100A, 1/120 sec @ 25 °C (Unidirectional)
- Steady State power dissipation: 3.0 watt @ $T_L = 75^\circ C$
- Repetition rate (duty cycle): .01%

MECHANICAL CHARACTERISTICS

- Molded Surface Mountable case
- Standard Packaging: 12 mm tape (see EIA Std. RS-481)
- Positive terminal marked with polarity band (except Bidirectional) or notch (Top Surface)
- Body marked with Logo and type code (see part list)

FIGURE 1
Peak Pulse Power vs. Pulse Time

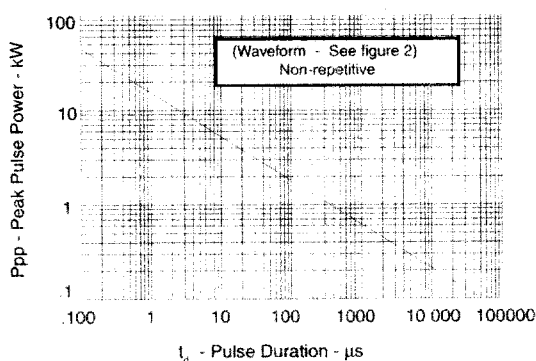


FIGURE 2
Pulse Wave Form

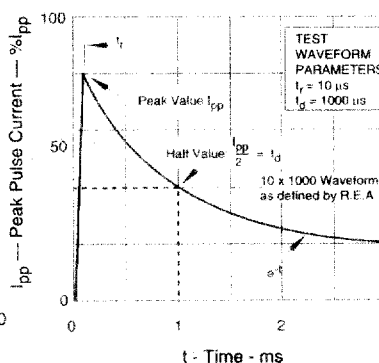
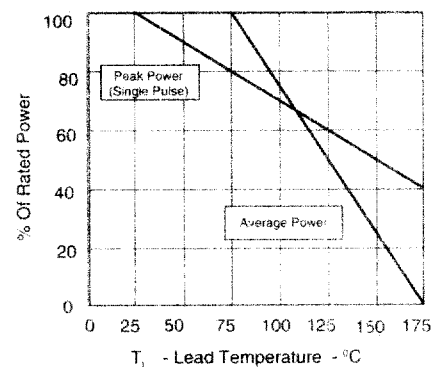
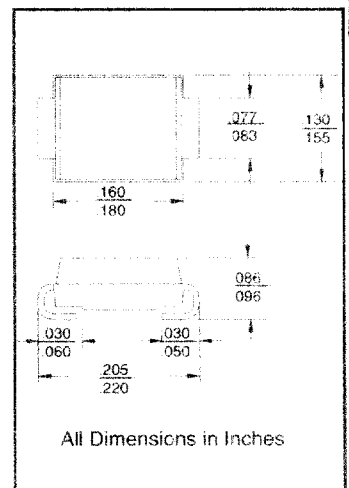


FIGURE 3
Power Derating Curve



DO-214AA

Discrete TVS
Diodes



All Dimensions in Inches



PROTEK DEVICES

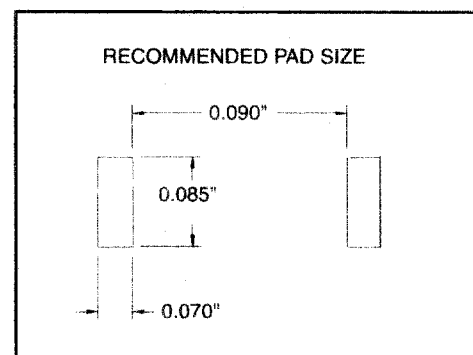
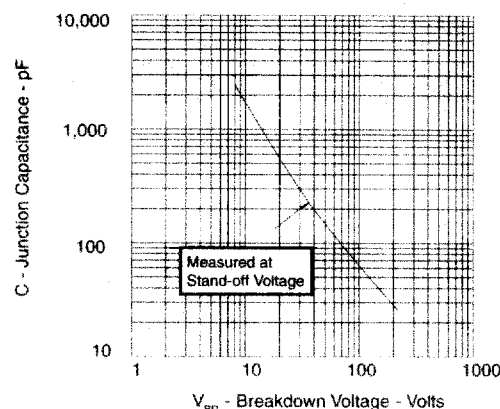
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ELECTRICAL CHARACTERISTICS @ 25°C

PROTEK TYPE NUMBER	DEVICE MARKING CODE	DEVICE MARKING CODE	RATED STAND-OFF VOLTAGE (See Note 1) V _{WM} VOLTS	BREAKDOWN VOLTAGE V _{BR} VOLTS	MAXIMUM STANDBY CURRENT @ I _T mA	MAXIMUM CLAMPING VOLTAGE @ I _{PP} (See Fig. 2) V _C VOLTS	MAXIMUM PEAK PULSE CURRENT (See Fig. 2) I _{PP} A	MAXIMUM TEMPERATURE COEFFICIENT OF V _{BR} mV/°C
	(Note 4)	(Note 5)						
P SMBJ5.0	KD		5.0	6.40	10	800	9.6	5.0
P SMBJ5.0A	KE		5.0	6.40	10	800	9.2	5.0
P SMBJ6.0	KF	AF	6.0	6.67	10	800	11.4	5.0
P SMBJ6.0A	KG	AG	6.0	6.67	10	800	10.3	5.0
SMBJ6.5	KH	AH	6.5	7.22	10	500	12.3	5.0
SMBJ6.5A	KK	AK	6.5	7.22	10	500	11.2	5.0
SMBJ7.0	KL	AL	7.0	7.78	10	200	13.3	6.0
SMBJ7.0A	KM	AM	7.0	7.78	10	200	12.0	6.0
SMBJ7.5	KN	AN	7.5	8.33	1	100	14.3	7.0
SMBJ7.5A	KP	AN	7.5	8.33	1	100	12.9	7.0
P SMBJ8.0	KQ	AQ	8.0	8.89	1	50	15.0	7.0
P SMBJ8.0A	KR	AR	8.0	8.89	1	50	13.6	7.0
SMBJ8.5	KS	AS	8.5	9.44	1	10	15.9	8.0
SMBJ8.5A	KT	AT	8.5	9.44	1	10	14.4	8.0
SMBJ9.0	KU	AU	9.0	10.0	1	5	16.9	9.0
SMBJ9.0A	KV	AV	9.0	10.0	1	5	15.4	9.0
P SMBJ10	KW	AW	10	11.1	1	5	18.8	10
P SMBJ10A	KX	AX	10	11.1	1	5	17.0	10
SMBJ11	KY	AY	11	12.2	1	5	20.1	11
SMBJ11A	KZ	AZ	11	12.2	1	5	18.2	11
P SMBJ12	LD	BD	12	13.3	1	5	22.0	12
P SMBJ12A	LE	BE	12	13.3	1	5	19.9	12
SMBJ13	LF	BF	13	14.4	1	5	23.8	13
SMBJ13A	LG	BG	13	14.4	1	5	21.5	13
SMBJ14	LH	BH	14	15.6	1	5	25.8	14
SMBJ14A	LK	BK	14	15.6	1	5	23.2	14
P SMBJ15	LL	BL	15	16.7	1	5	26.9	16
P SMBJ15A	LM	BM	15	16.7	1	5	24.4	16
SMBJ16	LN	BN	16	17.8	1	5	28.8	19
SMBJ16A	LP	BP	16	17.8	1	5	26.0	17
SMBJ18	LS	BS	18	20.0	1	5	32.2	21
SMBJ18A	LT	BT	18	20.0	1	5	29.2	20
P SMBJ20	LU	BU	20	22.2	1	5	35.8	25
P SMBJ20A	LV	BV	20	22.2	1	5	32.4	23
P SMBJ24	LY	BY	24	26.7	1	5	43.0	31
P SMBJ24A	LZ	BZ	24	26.7	1	5	38.9	28
P SMBJ26	MD	CD	26	28.9	1	5	46.6	31
P SMBJ26A	ME	CE	26	28.9	1	5	42.1	30
P SMBJ28	MF	CF	28	31.1	1	5	50.0	35
P SMBJ28A	MG	CG	28	31.1	1	5	45.4	31
SMBJ30	MH	CH	30	33.3	1	5	53.5	39
SMBJ30A	MK	CK	30	33.3	1	5	48.4	36
SMBJ33	ML	CL	33	36.7	1	5	59.0	42
SMBJ33A	MM	CM	33	36.7	1	5	53.3	39
P SMBJ36	MN	CN	36	40.0	1	5	64.3	46
P SMBJ36A	MP	CP	36	40.0	1	5	58.1	41
SMBJ40	MQ	CQ	40	44.4	1	5	71.4	51
SMBJ40A	MR	CR	40	44.4	1	5	64.5	46
SMBJ43	MS	CS	43	47.8	1	5	76.7	55
SMBJ43A	MT	CT	43	47.8	1	5	69.4	50
SMBJ45	MU	CU	45	50.0	1	5	80.3	58
SMBJ45A	MV	CV	45	50.0	1	5	72.7	52
SMBJ48	MW	CW	48	53.3	1	5	85.5	63
SMBJ48A	MX	CX	48	53.3	1	5	77.4	56
SMBJ54	ND	DD	54	60.0	1	5	96.3	71
SMBJ54A	NE	DE	54	60.0	1	5	87.1	65
P SMBJ58	NF	DF	58	64.4	1	5	103.0	78
P SMBJ58A	NG	DG	58	64.4	1	5	93.6	70
SMBJ60	NH	DH	60	66.7	1	5	107.0	80
SMBJ60A	NK	DK	60	66.7	1	5	96.8	71
SMBJ64	NL	DL	64	71.1	1	5	114.0	86
SMBJ64A	NM	DM	64	71.1	1	5	103.0	76
SMBJ70	NN	DN	70	77.8	1	5	125.0	94
SMBJ70A	NP	DP	70	77.8	1	5	113.0	85
SMBJ78	NS	DS	78	86.7	1	5	139	105
SMBJ78A	NT	DT	78	86.7	1	5	126	95
SMBJ85	NU	DU	85	94.4	1	5	151	114
SMBJ85A	NV	DV	85	94.4	1	5	137	103
P SMBJ90	NW	DW	90	100	1	5	160	121
P SMBJ90A	NX	DX	90	100	1	5	146	110
SMBJ100	NY	DY	100	111	1	5	179	135
SMBJ100A	NZ	DZ	100	111	1	5	162	123
SMBJ110	PD	ED	110	122	1	5	196	148
SMBJ110A	PE	EE	110	122	1	5	177	133
SMBJ120	PF	EF	120	133	1	5	214	162
SMBJ120A	PG	EG	120	133	1	5	193	146
P SMBJ130	PH	EH	130	144	1	5	231	175
P SMBJ130A	PK	EK	130	144	1	5	209	158
SMBJ150	PL	EL	150	167	1	5	268	203
SMBJ150A	PM	EM	150	167	1	5	243	184
P SMBJ160	PN	EN	160	178	1	5	287	217
P SMBJ160A	PP	EP	160	178	1	5	259	196
P SMBJ170	PQ	EQ	170	189	1	5	304	230
P SMBJ170A	PR	ER	170	189	1	5	275	208

FIGURE 4
TYPICAL CAPACITANCE vs BREAKDOWN VOLTAGE
(Unidirectional Only)



NOTES:

1. A TVS is normally selected according to the reverse "Stand Off Voltage" (V_r) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. For Bidirectional types, 10 volts and under, the I_D limit is doubled
3. Part numbers shown are for unidirectional devices. Add C or CA suffix to specify bidirectional devices, such as SMBJ7.5C or SMBJ7.5CA
4. Unidirectional Marking Code
5. Bidirectional Marking Code

ABBREVIATIONS & SYMBOLS

V _{WM}	Rated Stand-Off Voltage: Maximum working (continuous) DC or peak voltage which may be applied over the standard operating temperature range. (Note: V _{WM} is a selected device parameter and must be equal to or greater than the maximum operating voltage of the line to be protected.)
V _{BR} (min)	Minimum Breakdown Voltage: This is the minimum voltage the device will exhibit and is used to assure that conduction does not occur prior to that voltage at 25°C.
V _C	Maximum Clamping Voltage: The maximum peak voltage that appears across the TVS when subjected to the peak pulse current in a 1 ms time interval. The peak pulse voltages are the combination of voltage rise due to both the series resistance and the thermal rise
I _{PP}	Peak Pulse Current - See Figure 2
P _P	Peak Pulse Power - See Figure 1
I _D	Standby-Current
I _T	Test Current

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V_r at 50 amps peak, 8.3 ms sine wave = 3.5 volts maximum (Unidirectional Only) For Bidirectional Device Types: See Notes 2 and 3
Note: P = Standard Part, for non-designated parts, contact the factory for minimum order quantity and delivery.

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