

The Transient Voltage Suppressor diode (T.V.S.) is specifically designed to protect electronic circuits against transients and over voltages. It is a silicon avalanche device available in both uni-directional or bi-directional configurations. With a uni-directional, the specified clamping characteristic is only apparent in one direction, the other direction exhibiting a V_F normally experienced with conventional rectifier diodes. All electrical characteristics are specified at 25 degrees C.

When selecting a T.V.S. device there are some important parameters to be considered, these are; Reverse Standoff Voltage (V_R), Peak Pulse Current (I_{PP}) and Maximum Clamping Voltage ($V_C \text{ max}$).

The most important is V_R , this is the parameter that is the key to selecting a T.V.S. diode. The V_R of the device should be equal to, or greater than, the peak operating level of the circuit (or part of the circuit) to be protected. This will ensure that the T.V.S. does not clip the circuit drive voltage.

The Peak Pulse Current (I_{PP}) is the maximum current the T.V.S. can withstand without damage. The required I_{PP} can only be determined by dividing the peak transient voltage by the source impedance. Of course, in many cases, the very nature of transient occurrence makes this parameter difficult to determine. The T.V.S. failure mechanism is a short circuit, therefore if the device fails due to a transient, the circuit will still be protected.

In secondary protection applications, any series impedances due to resistors, transformers and inductors will have a limiting effect on the peak pulse current. In some cases these may be due to long lengths of interconnecting wire.

The Maximum Clamping Voltage ($V_C \text{ max}$) is the peak voltage that will appear across the T.V.S. device when subjected to the Peak Pulse Current (I_{PP}), based on a 1ms exponential waveform. This waveform is a 10/1000 microsecond waveform as shown in Figure 1.

This pulse is a standard test waveform used for protection devices.

FIGURE 1

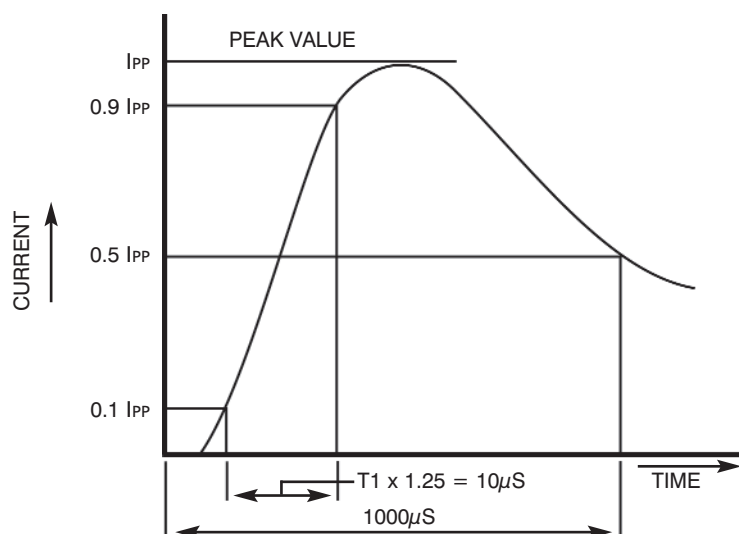


FIGURE 1
PROTECTING POWER SUPPLIES
USING BI-DIRECTIONAL CON
AVALANCHE DIODE

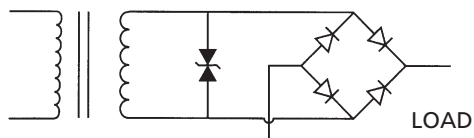


FIGURE 2
USING 2 UNI-DIRECTIONAL SILICON
AVALANCHE DIODES IN THE BRIDGE TO
PROVIDE RECTIFICATION & PROTECTION
OF BOTH LOAD & SUPPLY

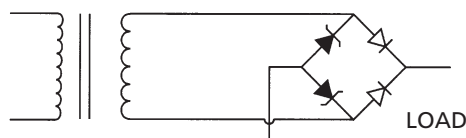


FIGURE 3
REDUCING EMI. DC MOTOR

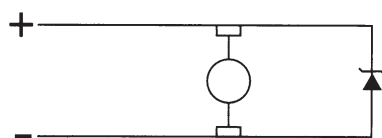


FIGURE 4
LIMITING TRANSIENTS DUE
TO BACK E.M.F. ON RELAY
& CONTRACTOR COILS

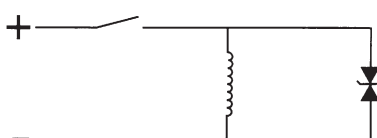
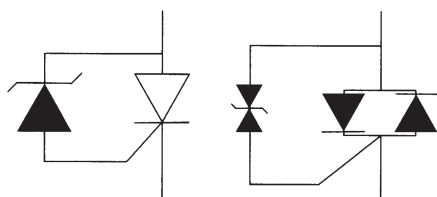
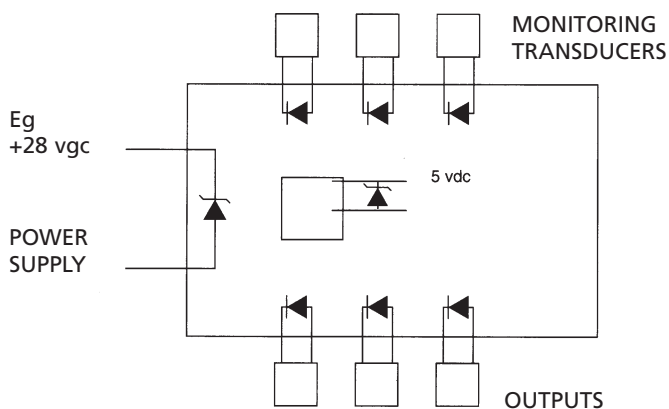


FIGURE 5
PREVENTING FALSE GATE
TRIGGERING ON THYRISTOR &
TRIACS DUE TO OVER VOLTAGES



The above are all examples of Centralised protection. On more complex circuits however, it is necessary to provide protection at several points in the circuit, this is especially true on systems with several I/O ports or internal communication.



SURFACE MOUNT TRANSIENT VOLTAGE SUPPRESSORS

Protect sensitive electronics against voltage transients induced by inductive load switching and lightning.

Ideal for the protection of I/O interfaces, Vcc bus and other integrated circuits.

FEATURES

- Stand-off Voltage Range 5.0 to 170 Volts
- Uni-directional and Bi-directional
- Glass passivated junction
- Jedec package designed to meet SM assembly needs
- Low head inductance
- 100% surge tested
- UL recognised

MAXIMUM RATING

- Peak Pulse Power (Ppk) 600 Watts (10 x 1000µs)@25°C
(see diagram on page 3 for wave form)
- 1.5 watt steady state
- Response time: 1 x 10⁻¹² secs (theoretical)
- Forward surge rating: 100A, 8.3 ms single half sine-wave
(Uni-directional only)
- Operating & storage temp.: -55°C to +150°C

MECHANICAL CHARACTERISTICS

- Case: D0214AA moulded plastic over glass passivated junction UL94V(O) (Thermoset) Epoxy
- Terminals: Solder plated solderable per MIL-STD-750 Method 2026
- Solderable leads: 230°C for 10 seconds.
- Marking: cathode band (positive terminal, uni-directional devices only), device code, logo
- Weight: 0.093 gram (approx).

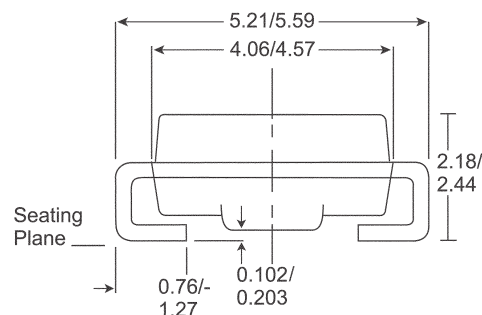
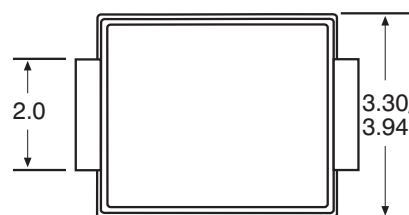
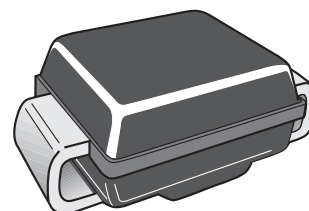
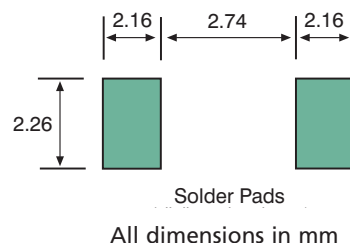


Figure 1 - Capacitance

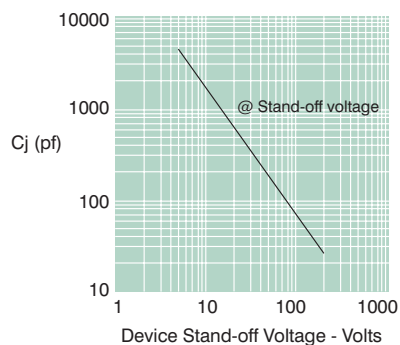
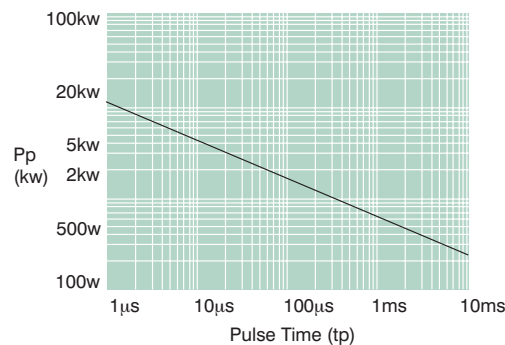


Figure 2 - Peak Pulse Power vs. Pulse Time



ORDERING INFORMATION

SMBJ [] [] [C] [A]
 Voltage ———
 Bi-Directional ———
 5% Voltage Tolerance ———

SMBJ5.0 - SMBJ188A series

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number Uni-Polar	Device Code Uni-Polar	Part Number Bi-Polar	Device Code Bi-Polar 'C' or 'CA' Version	Reverse Stand Off Voltage V _R (Volts)	Breakdown Voltage V _{BR} (Volts) @ I _T			Maximum Reverse Leakage I _R @ V _R (μA)	Maximum Clamping Voltage V _C @ I _{PP} (Volts)	Maximum Peak Pulse Current I _{PP} (A)
					MIN	MAX	(mA)			
SMBJ5.0*	KD	SMBJ5.0C*	AD	5.0	6.40	N/A	10	800.0	9.6	62.5
SMBJ5.0A*	KE	SMBJ5.0CA*	AE	5.0	6.40	N/A	10	800.0	9.2	65.2
SMBJ6.0*	KF	SMBJ6.0C*	AF	6.0	6.67	N/A	10	800.0	11.4	52.6
SMBJ6.0A*	KG	SMBJ6.0CA*	AG	6.0	6.67	N/A	10	800.0	10.3	58.3
SMBJ6.5	KH	SMBJ6.5C	AH	6.5	7.22	N/A	10	500.0	12.3	48.7
SMBJ6.5A	KK	SMBJ6.5CA	AK	6.5	7.22	N/A	10	500.0	11.2	53.6
SMBJ7.0	KL	SMBJ7.0C	AL	7.0	7.78	N/A	10	200.0	13.3	45.1
SMBJ7.0A	KM	SMBJ7.0CA	AM	7.0	7.78	N/A	10	200.0	12.0	50.0
SMBJ7.5	KN	SMBJ7.5C*	AN	7.5	8.33	N/A	1	100.0	14.3	42.0
SMBJ7.5A	KP	SMBJ7.5CA*	AP	7.5	8.33	N/A	1	100.0	12.9	46.5
SMBJ8.0	KQ	SMBJ8.0C	AQ	8.0	8.89	N/A	1	50.0	15.0	40.0
SMBJ8.0A	KR	SMBJ8.0CA	AR	8.0	8.89	N/A	1	50.0	13.6	44.1
SMBJ8.5*	KS	SMBJ8.5C*	AS	8.5	9.44	N/A	1	20.0	15.9	37.7
SMBJ8.5A*	KT	SMBJ8.5CA*	AT	8.5	9.44	N/A	1	20.0	14.4	41.7
SMBJ9.0	KU	SMBJ9.0C	AU	9.0	10.00	N/A	1	10.0	16.9	35.5
SMBJ9.0A	KV	SMBJ9.0CA	AV	9.0	10.00	N/A	1	10.0	15.4	39.0
SMBJ10	KW	SMBJ10C	AW	10.0	11.10	N/A	1	5.0	18.8	31.9
SMBJ10A	KX	SMBJ10CA	AX	10.0	11.10	N/A	1	5.0	17.0	35.3
SMBJ11	KY	SMBJ11C	AY	11.0	12.20	N/A	1	5.0	20.1	29.9
SMBJ11A	KZ	SMBJ11CA	AZ	11.0	12.20	N/A	1	5.0	18.2	33.0
SMBJ12*	LD	SMBJ12C*	BD	12.0	13.30	N/A	1	5.0	22.0	27.3
SMBJ12A*	LE	SMBJ12CA*	BE	12.0	13.30	N/A	1	5.0	19.9	30.2
SMBJ13	LF	SMBJ13C*	BF	13.0	14.40	N/A	1	5.0	23.8	25.2
SMBJ13A	LG	SMBJ13CA*	BG	13.0	14.40	N/A	1	5.0	21.5	27.9
SMBJ14	LH	SMBJ14C	BH	14.0	15.60	N/A	1	5.0	25.8	23.3
SMBJ14A	LK	SMBJ14CA	BK	14.0	15.60	N/A	1	5.0	23.2	25.8
SMBJ15*	LL	SMBJ15C*	BL	15.0	16.70	N/A	1	5.0	26.9	22.3
SMBJ15A*	LM	SMBJ15CA*	BM	15.0	16.70	N/A	1	5.0	24.4	24.0
SMBJ16	LN	SMBJ16C	BN	16.0	17.80	N/A	1	5.0	28.8	20.8
SMBJ16A	LP	SMBJ16CA	BP	16.0	17.80	N/A	1	5.0	26.0	23.1
SMBJ17	LQ	SMBJ17C	BQ	17.0	18.90	N/A	1	5.0	30.5	19.7
SMBJ17A	LR	SMBJ17CA	BR	17.0	18.90	N/A	1	5.0	27.6	21.0
SMBJ18*	LS	SMBJ18C	BS	18.0	20.00	N/A	1	5.0	32.2	18.6
SMBJ18A*	LT	SMBJ18CA	BT	18.0	20.00	N/A	1	5.0	29.2	20.5
SMBJ20	LU	SMBJ20C	BU	20.0	22.20	N/A	1	5.0	35.8	16.7
SMBJ20A	LV	SMBJ20CA	BV	20.0	22.20	N/A	1	5.0	32.4	18.5
SMBJ22	LW	SMBJ22C*	BW	22.0	24.40	N/A	1	5.0	39.4	15.2
SMBJ22A	LX	SMBJ22CA*	BX	22.0	24.40	N/A	1	5.0	35.5	16.9
SMBJ24	LY	SMBJ24C*	BY	24.0	26.70	N/A	1	5.0	43.0	14.0
SMBJ24A	LZ	SMBJ24CA*	BZ	24.0	26.70	N/A	1	5.0	38.9	15.4
SMBJ26*	MD	SMBJ26C	CD	26.0	28.90	N/A	1	5.0	46.6	12.4
SMBJ26A*	ME	SMBJ26CA	CE	26.0	28.90	N/A	1	5.0	42.1	14.2
SMBJ28	MF	SMBJ28C	CF	28.0	31.10	N/A	1	5.0	50.0	12.0
SMBJ28A	MG	SMBJ28CA	CG	28.0	31.10	N/A	1	5.0	45.4	13.2
SMBJ30	MH	SMBJ30C	CH	30.0	33.30	N/A	1	5.0	53.5	11.2
SMBJ30A	MK	SMBJ30CA	CK	30.0	33.30	N/A	1	5.0	46.6	12.4
SMBJ33*	ML	SMBJ33C	CL	33.0	36.70	N/A	1	5.0	59.0	10.2

Note: Non 'A' devices have higher clamping voltage. Add suffix 'C' to denote bi-polar devices. V_{BR} max not quoted.

1. For Bi-directional devices having V_R of 10 volts and below, the I_R limit is doubled.
2. For Uni-directional devices V_F = 3.5 Volts max at I_F = 50A, 300 μs square wave pulse. * Preferred voltages.

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number Uni-Polar	Device Code Uni-Polar	Part Number Bi-Polar	Device Code Bi-Polar 'C' or 'CA' Version	Reverse Stand Off Voltage V _R (Volts)	Breakdown Voltage V _{BR} (Volts) @ I _T			Maximum Reverse Leakage I _R @ V _R (μA)	Maximum Clamping Voltage V _C @ I _{PP} (Volts)	Maximum Peak Pulse Current I _{PP} (A)
					MIN	MAX	(mA)			
SMBJ33A*	MM	SMBJ33CA	CM	33.0	36.70	N/A	1.0	5.0	53.3	11.3
SMBJ36*	MN	SMBJ36C*	CN	36.0	40.00	N/A	1.0	5.0	64.3	9.3
SMBJ36A	MP	SMBJ36CA*	CP	36.0	40.00	N/A	1.0	5.0	58.1	10.3
SMBJ40	MQ	SMBJ40C	CQ	40.0	44.40	N/A	1.0	5.0	71.4	8.4
SMBJ40A	MR	SMBJ40CA	CR	40.0	44.40	N/A	1.0	5.0	64.5	9.3
SMBJ43	MS	SMBJ43C	CS	43.0	47.80	N/A	1.0	5.0	76.7	7.8
SMBJ43A	MT	SMBJ43CA	CT	43.0	47.80	N/A	1.0	5.0	69.4	8.6
SMBJ45	MU	SMBJ45C	CU	45.0	50.00	N/A	1.0	5.0	80.3	7.5
SMBJ45A	MV	SMBJ45CA	CV	45.0	50.00	N/A	1.0	5.0	72.7	8.3
SMBJ48	MW	SMBJ48C	CW	48.0	53.30	N/A	1.0	5.0	85.5	7.0
SMBJ48A	MX	SMBJ48CA	CX	48.0	53.30	N/A	1.0	5.0	77.4	7.7
SMBJ51	MY	SMBJ51C*	CY	51.0	56.70	N/A	1.0	5.0	91.1	6.6
SMBJ51A	MZ	SMBJ51CA*	CZ	51.0	56.70	N/A	1.0	5.0	82.4	7.3
SMBJ54	ND	SMBJ54C	DD	54.0	60.00	N/A	1.0	5.0	96.3	6.2
SMBJ54A	NE	SMBJ54CA	DE	54.0	60.00	N/A	1.0	5.0	87.1	6.9
SMBJ58	NF	SMBJ58C	DF	58.0	64.40	N/A	1.0	5.0	103.0	5.8
SMBJ58A	NG	SMBJ58CA	DG	58.0	64.40	N/A	1.0	5.0	93.6	6.4
SMBJ60	NH	SMBJ60C	DH	60.0	66.70	N/A	1.0	5.0	107.0	5.6
SMBJ60A	NK	SMBJ60CA	DK	60.0	66.70	N/A	1.0	5.0	96.8	6.2
SMBJ64	NL	SMBJ64C	DL	64.0	71.10	N/A	1.0	5.0	114.0	5.3
SMBJ64A	NM	SMBJ64CA	DM	64.0	71.10	N/A	1.0	5.0	103.0	5.8
SMBJ70	NN	SMBJ70C	DN	70.0	77.80	N/A	1.0	5.0	125.0	4.8
SMBJ70A	NP	SMBJ70CA	DP	70.0	77.80	N/A	1.0	5.0	113.0	5.3
SMBJ75	NQ	SMBJ75C	DQ	75.0	83.30	N/A	1.0	5.0	134.0	4.5
SMBJ75A	NR	SMBJ75CA	DR	75.0	83.30	N/A	1.0	5.0	121.0	4.9
SMBJ78	NS	SMBJ78C	DS	78.0	86.70	N/A	1.0	5.0	139.0	4.3
SMBJ78A	NT	SMBJ78CA	DT	78.0	86.70	N/A	1.0	5.0	126.0	4.7
SMBJ85	NU	SMBJ85C	DU	85.0	94.40	N/A	1.0	5.0	151.0	3.9
SMBJ85A	NV	SMBJ85CA	DV	85.0	94.40	N/A	1.0	5.0	137.0	4.4
SMBJ90	NW	SMBJ90C	DW	90.0	100.00	N/A	1.0	5.0	160.0	3.8
SMBJ90A	NX	SMBJ90CA	DX	90.0	100.00	N/A	1.0	5.0	146.0	4.1
SMBJ100	NY	SMBJ100C	DY	100.0	111.00	N/A	1.0	5.0	179.0	3.4
SMBJ100A	NZ	SMBJ100CA	DZ	100.0	111.00	N/A	1.0	5.0	162.0	3.7
SMBJ110	PD	SMBJ110C	ED	110.0	122.00	N/A	1.0	5.0	196.0	3.0
SMBJ110A	PE	SMBJ110CA	EE	110.0	122.00	N/A	1.0	5.0	177.0	3.4
SMBJ120	PF	SMBJ120C	EF	120.0	133.00	N/A	1.0	5.0	214.0	2.8
SMBJ120A	PG	SMBJ120CA	EG	120.0	133.00	N/A	1.0	5.0	193.0	3.1
SMBJ130	PH	SMBJ130C	EH	130.0	144.00	N/A	1.0	5.0	231.0	2.6
SMBJ130A	PK	SMBJ130CA	EK	130.0	144.00	N/A	1.0	5.0	209.0	2.9
SMBJ150*	PL	SMBJ150C	EL	150.0	167.00	N/A	1.0	5.0	268.0	2.2
SMBJ150A*	PM	SMBJ150CA	EM	150.0	167.00	N/A	1.0	5.0	243.0	2.5
SMBJ160	PN	SMBJ160C	EN	160.0	178.00	N/A	1.0	5.0	287.0	2.1
SMBJ160A	PP	SMBJ160CA	EP	160.0	178.00	N/A	1.0	5.0	259.0	2.3
SMBJ170	PQ	SMBJ170C*	EQ	170.0	189.00	N/A	1.0	5.0	304.0	2.0
SMBJ170A	PR	SMBJ170CA	ER	170.0	189.00	N/A	1.0	5.0	275.0	2.2
SMBJ188A	PS	SMBJ188A	ES	188.0	209.00	N/A	1.0	5.0	328.0	2.0

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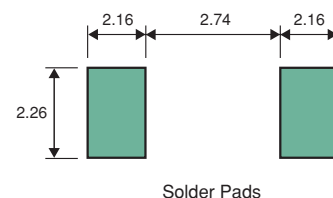
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SURFACE MOUNT TRANSIENT VOLTAGE SUPPRESSORS

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FEATURES

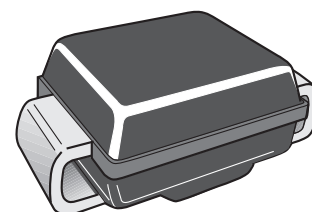
- Stand-off voltage range 5.5 to 185 Volts
- Uni-directional and Bi-directional
- Glass passivated junction
- Jedec package designed to meet SM assembly needs
- Low lead inductance
- 100% surge tested
- UL recognised



All dimensions in mm

MAXIMUM RATING

- Peak Pulse Power (Ppk) 600 Watts (10 x 1000μs)@25°C
(see diagram on page 3 for wave form)
- 1.5 watt steady state
- Response time: 1 x 10-12 secs (theoretical)
- Forward surge rating: 100A, 8.3 ms single half sine-wave
(uni-directional only)
- Operating & storage temp.: -55°C to +150°C



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- Solderable leads: 230°C for 10 seconds.
- Marking: cathode band (positive terminal, uni-directional devices only), device code, logo
- Weight: 0.093 gram (approx).

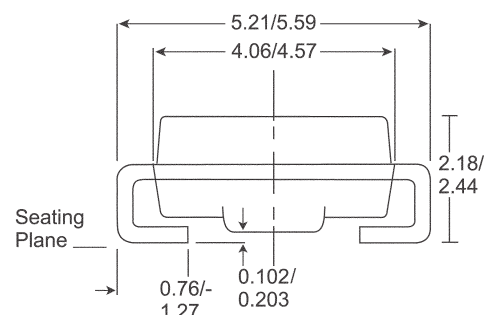
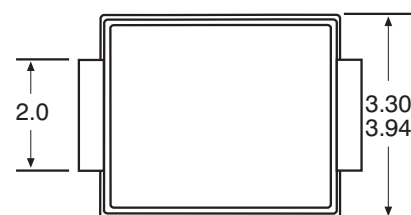


Figure 1 - Capacitance

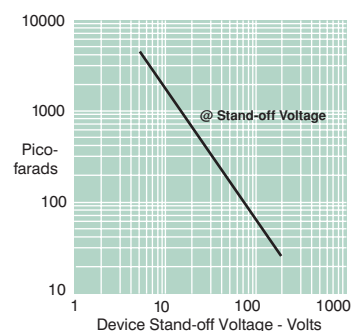
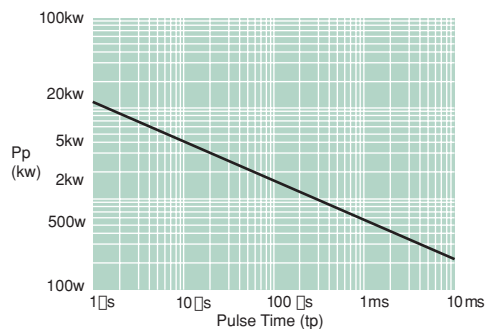


Figure 2 - Peak Pulse Power vs. Pulse Time



ORDERING INFORMATION

P6SMBJ

				C	A	
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Voltage —————

Bi-Directional —————

5% Voltage Tolerance —————

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number Uni-polar	Device Code	Reverse Standoff Voltage V _R (Volts)	Breakdown Voltage V _{BR} (Volts) @ I _T			Maximum Reverse Leakage I _R @ V _R (μA)	Maximum Clamping Voltage V _C @ I _{PP} (Volts)	Maximum Peak Pulse Current I _{PP} @ V _C (A)	Maximum Forward Voltage (V _F) @ I _T (Volts)
			Min	Max	(mA)				
P6SMBJ 6V8 / P6SMBJ 6V8C	6V8 / 6V8C	5.50	6.12	7.48	10.0	1000.0 (4)	10.8	56.0	3.5
P6SMBJ 6V8A / P6SMBJ 6V8CA	6V8A / 6V8CA	5.80	6.45	7.14	10.0	1000.0 (4)	10.5	57.0	3.5
P6SMBJ 7V5 / P6SMBJ 7V5C	7V5 / 7V5C	6.05	6.75	8.25	10.0	500.0 (4)	11.7	51.0	3.5
P6SMBJ 7V5A / P6SMBJ 7V5CA	7V5A / 7V5CA	6.40	7.13	7.88	10.0	500.0 (4)	11.3	53.0	3.5
P6SMBJ 8V2 / P6SMBJ 8V2C	8V2 / 8V2C	6.63	7.38	9.02	10.0	200.0 (4)	12.5	48.0	3.5
P6SMBJ 8V2A / P6SMBJ 8V2CA	8V2A / 8V2CA	7.02	7.79	8.61	10.0	200.0 (4)	12.1	50.0	3.5
P6SMBJ 9V1 / P6SMBJ 9V1C	9V1 / 9V1C	7.37	8.19	10.00	1.0	50.0 (4)	13.8	44.0	3.5
P6SMBJ 9V1A / P6SMBJ 9V1CA	9V1A / 9V1CA	7.78	8.65	9.55	1.0	50.0 (4)	13.4	45.0	3.5
P6SMBJ 10 / P6SMBJ 10C	10 / 10C	8.10	9.00	11.00	1.0	10.0 (4)	15.0	40.0	3.5
P6SMBJ 10A / P6SMBJ 10CA	10A / 10CA	8.55	9.50	10.50	1.0	10.0 (4)	14.5	41.0	3.5
P6SMBJ 11 / P6SMBJ 11C	11 / 11C	8.92	9.90	12.10	1.0	5.0 (4)	16.2	37.0	3.5
P6SMBJ 11A / P6SMBJ 11CA	11A / 11CA	9.40	10.50	11.60	1.0	5.0 (4)	15.6	38.0	3.5
P6SMBJ 12 / P6SMBJ 12C	12 / 12C	9.72	10.80	13.20	1.0	5.0 (4)	17.3	35.0	3.5
P6SMBJ 12A / P6SMBJ 12CA	12A / 12CA	10.20	11.40	12.60	1.0	5.0	16.7	36.0	3.5
P6SMBJ 13 / P6SMBJ 13C	13 / 13C	10.50	11.70	14.30	1.0	5.0	19.0	32.0	3.5
P6SMBJ 13A / P6SMBJ 13CA	13A / 13CA	11.10	12.40	13.70	1.0	5.0	18.2	33.0	3.5
P6SMBJ 15 / P6SMBJ 15C	15 / 15C	12.10	13.50	16.50	1.0	5.0	22.0	27.0	3.5
P6SMBJ 15A / P6SMBJ 15CA	15A / 15CA	12.80	14.30	15.80	1.0	5.0	21.2	28.0	3.5
P6SMBJ 16 / P6SMBJ 16C	16 / 16C	12.90	14.40	17.60	1.0	5.0	23.5	26.0	3.5
P6SMBJ 16A / P6SMBJ 16CA	16A / 16CA	13.60	15.20	16.80	1.0	5.0	22.5	27.0	3.5
P6SMBJ 18 / P6SMBJ 18C	18 / 18C	14.50	16.20	19.80	1.0	5.0	26.1	23.0	3.5
P6SMBJ 18A / P6SMBJ 18CA	18A / 18CA	15.30	17.10	18.90	1.0	5.0	25.2	24.0	3.5
P6SMBJ 20 / P6SMBJ 20C	20 / 20C	16.20	18.00	22.00	1.0	5.0	29.1	21.0	3.5
P6SMBJ 20A / P6SMBJ 20CA	20A / 20CA	17.10	19.00	21.00	1.0	5.0	27.7	22.0	3.5
P6SMBJ 22 / P6SMBJ 22C	22 / 22C	17.80	19.80	24.20	1.0	5.0	31.9	19.0	3.5
P6SMBJ 22A / P6SMBJ 22CA	22A / 22CA	18.80	20.90	23.10	1.0	5.0	30.6	20.0	3.5
P6SMBJ 24 / P6SMBJ 24C	24 / 24C	19.40	21.60	26.40	1.0	5.0	34.7	17.0	3.5
P6SMBJ 24A / P6SMBJ 24CA	24A / 24CA	20.50	22.80	25.20	1.0	5.0	33.2	18.0	3.5
P6SMBJ 27 / P6SMBJ 27C	27 / 27C	21.80	24.30	29.70	1.0	5.0	39.1	15.0	3.5
P6SMBJ 27A / P6SMBJ 27CA	27A / 27CA	23.10	25.70	28.40	1.0	5.0	37.5	16.0	3.5
P6SMBJ 30 / P6SMBJ 30C	30 / 30C	24.30	27.00	33.0	1.0	5.0	43.5	14.0	3.5
P6SMBJ 30A / P6SMBJ 30CA	30A / 30CA	25.60	28.50	31.50	1.0	5.0	41.4	14.4	3.5
P6SMBJ 33 / P6SMBJ 33C	30 / 33C	26.80	29.70	36.30	1.0	5.0	47.7	12.6	3.5
P6SMBJ 33A / P6SMBJ 33CA	33A / 33CA	28.20	31.40	34.70	1.0	5.0	45.7	13.2	3.5
P6SMBJ 36 / P6SMBJ 36C	36 / 36C	29.10	32.40	39.60	1.0	5.0	52.0	11.6	3.5
P6SMBJ 36A / P6SMBJ 36CA	36A / 36CA	30.80	34.20	37.80	1.0	5.0	49.9	12.0	3.5
P6SMBJ 39 / P6SMBJ 39C	39 / 39C	31.60	35.10	42.90	1.0	5.0	56.4	10.5	3.5
P6SMBJ 39A / P6SMBJ 39CA	39A / 39CA	33.30	37.10	41.00	1.0	5.0	53.9	11.2	3.5
P6SMBJ 43 / P6SMBJ 43C	43 / 43C	34.80	38.70	47.30	1.0	5.0	61.9	9.6	3.5
P6SMBJ 43A / P6SMBJ 43CA	43A / 43CA	36.80	40.90	45.20	1.0	5.0	59.3	10.1	3.5
P6SMBJ 47 / P6SMBJ 47C	47 / 47C	38.10	42.30	51.70	1.0	5.0	67.8	8.9	3.5
P6SMBJ 47A / P6SMBJ 47CA	47A / 47CA	40.20	44.70	49.40	1.0	5.0	64.8	9.3	3.5
P6SMBJ 51 / P6SMBJ 51C	51 / 51C	41.30	45.90	56.10	1.0	5.0	73.5	8.2	3.5
P6SMBJ 51A / P6SMBJ 51CA	51A / 51CA	43.60	48.50	53.60	1.0	5.0	70.1	8.6	3.5

Notes:

1. Bv is measured using a pulse of 20 milliseconds or less.
2. V_F, for Uni-directional devices, is measured using a 300 microsecond square wave pulse I_F = 50A
3. I_R is doubled for Bi-directional devices only with V_R equal or less than 10 volts.

P6SMBJ6.8 - 220CA series

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number	Device Code	Reverse Standoff Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T			Maximum Reverse Leakage I_R @ V_R (μA)	Maximum Clamping Voltage V_C @ I_{PP} (Volts)	Maximum Peak Pulse Current I_{PP} @ V_C (A)	Maximum Forward Voltage (V_F) @ I_T (Volts)
			Min	Max	(mA)				
P6SMBJ 56 / P6SMBJ 56C	56 / 56C	45.4	50.40	61.60	1.0	5.0	80.5	7.4	3.5
P6SMBJ 56A / P6SMBJ 56CA	56A / 56CA	47.8	53.20	58.80	1.0	5.0	77.0	7.8	3.5
P6SMBJ 62 / P6SMBJ 62C	62 / 62C	50.2	55.80	68.20	1.0	5.0	89.0	6.8	3.5
P6SMBJ 62A / P6SMBJ 62CA	62A / 62CA	53.0	58.90	65.10	1.0	5.0	85.0	7.1	3.5
P6SMBJ 68 / P6SMBJ 68C	68 / 68C	55.1	61.20	74.80	1.0	5.0	98.0	6.1	3.5
P6SMBJ 68A / P6SMBJ 68CA	68A / 68CA	58.1	64.60	71.40	1.0	5.0	92.0	6.5	3.5
P6SMBJ 75 / P6SMBJ 75C	75 / 75C	60.7	67.50	82.50	1.0	5.0	108.0	5.5	3.5
P6SMBJ 75A / P6SMBJ 75CA	75A / 75CA	64.1	71.30	78.80	1.0	5.0	103.0	5.8	3.5
P6SMBJ 82 / P6SMBJ 82C	82 / 82C	66.4	73.80	90.20	1.0	5.0	118.0	5.1	3.5
P6SMBJ 82A / P6SMBJ 82CA	82A / 82CA	70.1	77.90	86.10	1.0	5.0	113.0	5.3	3.5
P6SMBJ 91 / P6SMBJ 91C	91 / 91C	73.7	81.90	100.00	1.0	5.0	131.0	4.5	3.5
P6SMBJ 91A / P6SMBJ 91CA	91A / 91CA	77.8	86.50	95.50	1.0	5.0	125.0	4.8	3.5
P6SMBJ 100 / P6SMBJ 100C	100 / 100C	81.0	90.00	110.00	1.0	5.0	144.0	4.2	3.5
P6SMBJ 100A / P6SMBJ 100CA	100A / 100CA	85.5	95.00	105.00	1.0	5.0	137.0	4.4	3.5
P6SMBJ 110 / P6SMBJ 110C	110 / 110C	89.2	99.00	121.00	1.0	5.0	158.0	3.8	3.5
P6SMBJ 110A / P6SMBJ 110CA	110A / 110CA	94.0	105.00	116.00	1.0	5.0	152.0	4.0	3.5
P6SMBJ 120 / P6SMBJ 120C	120 / 120C	97.2	108.00	132.00	1.0	5.0	173.0	3.5	3.5
P6SMBJ 120A / P6SMBJ 120CA	120A / 120CA	102.0	114.00	126.00	1.0	5.0	165.0	3.6	3.5
P6SMBJ 130 / P6SMBJ 130C	130 / 130C	105.0	117.00	143.00	1.0	5.0	187.0	3.2	3.5
P6SMBJ 130A / P6SMBJ 130CA	130A / 130CA	111.0	124.00	137.00	1.0	5.0	179.0	3.3	3.5
P6SMBJ 150 / P6SMBJ 150C	150 / 150C	121.0	135.00	165.00	1.0	5.0	215.0	2.8	3.5
P6SMBJ 150A / P6SMBJ 150CA	150A / 150CA	128.0	143.00	158.00	1.0	5.0	207.0	2.9	3.5
P6SMBJ 160 / P6SMBJ 160C	160 / 160C	130.0	144.00	176.00	1.0	5.0	230.0	2.6	3.5
P6SMBJ 160A / P6SMBJ 160CA	160A / 160CA	136.0	152.00	168.00	1.0	5.0	219.0	2.7	3.5
P6SMBJ 170 / P6SMBJ 170C	170 / 170C	138.0	153.00	187.00	1.0	5.0	244.0	2.5	3.5
P6SMBJ 170A / P6SMBJ 170CA	170A / 170CA	145.0	162.00	179.00	1.0	5.0	234.0	2.6	3.5
P6SMBJ 180 / P6SMBJ 180C	180 / 180C	146.0	162.00	198.00	1.0	5.0	258.0	2.3	3.5
P6SMBJ 180A / P6SMBJ 180CA	180A / 180CA	154.0	171.00	189.00	1.0	5.0	246.0	2.4	3.5
P6SMBJ 200 / P6SMBJ 200C	200 / 200C	162.0	180.00	220.00	1.0	5.0	287.0	2.1	3.5
P6SMBJ 200A / P6SMBJ 200CA	200A / 200CA	171.0	190.00	210.00	1.0	5.0	274.0	2.2	3.5
P6SMBJ 220 / P6SMBJ 220C	220 / 220C	175.0	198.00	242.00	1.0	5.0	344.0	1.8	3.5
P6SMBJ 220A / P6SMBJ 220CA	220A / 220CA	185.0	209.00	231.00	1.0	5.0	328.0	1.8	3.5

Notes:

1. B_V is measured using a pulse of 20 milliseconds or less.
2. V_F , for Uni-directional devices, is measured using a 300 microsecond square wave pulse $I_F = 50A$.
3. I_R is doubled for Bi-directional devices only with V_R equal or less than 10 volts.

1000W SURFACE MOUNT TRANSIENT VOLTAGE SUPPRESSOR

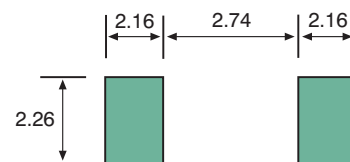
The 1KSMBJ range of surface mount protectors utilises the proven glass passivated technology used in many of Littelfuse products portfolio. Rated at 1000 watts (10 x 1000 μ s double exponential waveform), the 1KSMBJ bridges the gap left by traditional types rated at 600 watts and 1500 watts, suiting many applications where both power handling and size are paramount. The extremely fast turn-on time, (less than one pico second), coupled with the low clamping factor and low on-state impedance make this range ideal for the protection of today's circuits. Our specially selected range of voltages has been chosen to fulfill optimum protection for use in automotive and telecom applications.

FEATURES

- Available in breakdown voltages from 6.8v. to 43v; specially designed for automotive applications
- Response time: 1×10^{-12} secs (theoretical)
- Glass passivated junction
- Offers high-surge rating in compact package: bridges the gap between 600W and 1.5KW
- Forward surge rating:
100A 8.3ms single half sine wave
- 100% tested
- Operating temperature: -55°C to +150°C

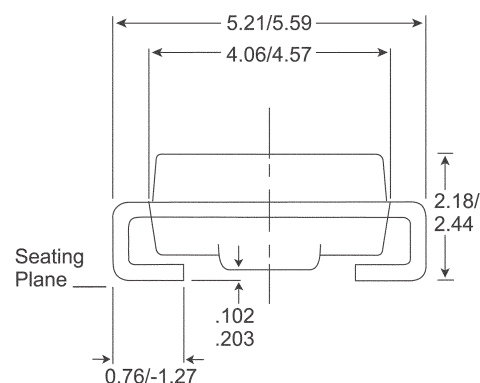
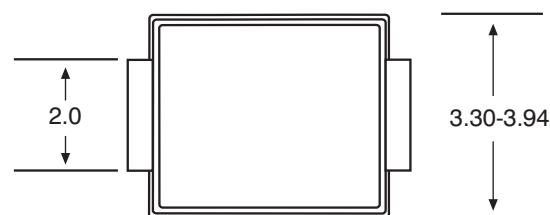
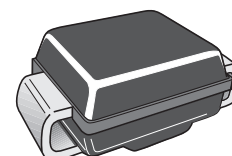
MECHANICAL CHARACTERISTICS

- Case: DO214AA Outline moulded plastic over glass passivated junction. UL 94 V-0 rated
 - Terminals: Solderable to MIL-STD-750 Method 2026
 - Solderable leads: 23°C for 10 seconds
 - Marking: Cathode band, device code logo
 - Weight: 0.093 grammes (approx)
 - Supplied on reels of 3000 pieces. Tape width 12mm
- Follows requirements of EIA 481-1



Solder Pads

All dimensions in mm



ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number	Reverse Stand Off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T			Maximum Reverse Leakage I_R @ V_R (μ A)	Maximum Clamping Voltage V_C @ I_{PP} (Volts)	Maximum Peak Pulse Current I_{PP} (A)
		MIN	MAX	(mA)			
1KSMB6.8	5.5	6.1	7.5	10.0	10000.0	10.8	92.5
1KSMB15	12.1	13.5	16.5	1.0	5.0	22.0	45.0
1KSMB18	15.3	16.2	19.8	1.0	5.0	26.5	38.0
1KSMB27	23.1	25.7	28.4	1.0	5.0	39.1	25.5
1KSMB30	25.6	27.0	33.0	1.0	5.0	43.5	22.9
1KSMB36	30.8	32.4	39.6	1.0	5.0	52.0	19.2

Note: Clamping voltage is measured using 10/1000 μ s waveshape.

500 WATT AXIAL TRANSIENT VOLTAGE SUPPRESSORS

Protect sensitive electronics against voltage transients induced by inductive load switching and lightning. Ideal for the protection of I/O interfaces, Vcc bus, and other integrated circuits used in computer or datacom equipment.

FEATURES

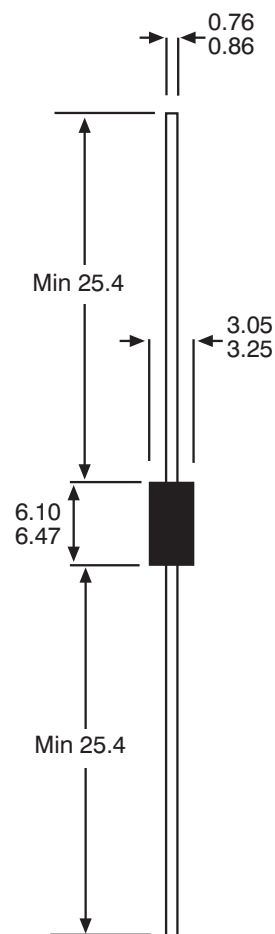
- Stand-off voltage range 5.0 to 170 Volts
- Uni-directional and Bi-directional
- Glass passivated junction
- Excellent clamping capability
- 100% surge tested

MAXIMUM RATING

- Peak Pulse Power (Ppk): 500 Watts (10 x 1000μs)@25°C
(see diagrams on page 3 for wave form)
- 1.0 watt steady state
- Response time: 1×10^{-12} seconds (theoretical)
- Forward surge rating: 70 Amps, 8.3ms half sine wave, (uni-directional devices only)
- Operating & storage temperature: -55°C to +150°C

MECHANICAL CHARACTERISTICS

- Case: DO15, Moulded plastic over glass passivated junction
- Terminals: Axial leads, solderable per MIL-STD-202 Method 208
- Solderable leads = 230°C for 10 seconds (1.59mm from case)
- Marking: cathode band, (positive terminal, uni-directional devices only), device code, logo
- Weight: 1 gram (approx)



All dimensions in mm

Figure 1 - Capacitance vs. Working Voltage

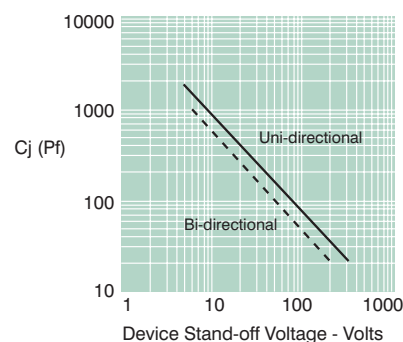
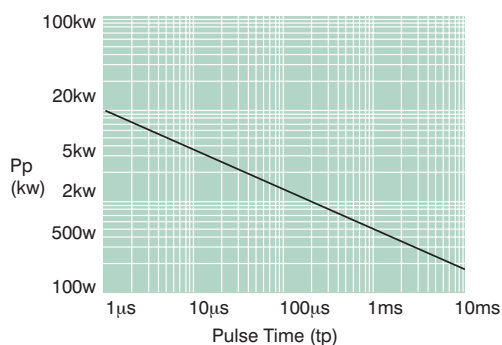


Figure 2 - Peak Pulse Power vs. Pulse Time



ORDERING INFORMATION

SA [] [] [] [] CIA []

Voltage _____

Bi-Directional

5% Voltage Tolerance

Packing Option

$B = Bulk (1000\ pcs)$

T = Tape and reeled (5000 pcs)

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number (Uni)	Part Number (Bi)	Reverse Stand Off Voltage VR (Volts)	Breakdown Voltage VBR (Volts) @ IT			Maximum Reverse Leakage IR @ VR (μA)	Maximum Clamping Voltage Vc @ IPP (Volts)	Maximum Peak Pulse Current IPP (A)	Max Voltage Temperature Variation of VBR (mV/°C)
			MIN	MAX	mA				
SA5.0*	SA5.0C	5.0	6.40	7.30	10.00	600.0	9.6	52.0	5.0
SA5.0A*	N/A	5.0	6.40	7.00	10.00	600.0	9.2	54.3	5.0
SA6.0*	SA6.0C*	6.0	6.67	8.15	10.00	600.0	11.4	43.9	5.0
SA6.0A*	SA6.0CA*	6.0	6.67	7.37	10.00	600.0	10.3	48.5	5.0
SA6.5	SA6.5C	6.5	7.22	8.82	10.00	400.0	12.3	40.7	5.0
SA6.5A	SA6.5CA	6.5	7.22	7.98	10.00	400.0	11.2	44.7	5.0
SA7.0	SA7.0A	7.0	7.78	9.51	10.00	150.0	13.3	37.8	6.0
SA7.0A	SA7.0CA	7.0	7.78	8.60	10.00	150.0	12.0	41.7	6.0
SA7.5	SA7.5A	7.5	8.33	10.20	1.00	50.0	14.3	35.0	7.0
SA7.5A	SA7.5CA	7.5	8.33	9.21	1.00	50.0	12.9	38.8	7.0
SA8.0	SA8.0C	8.0	8.89	10.90	1.00	25.0	15.0	33.3	7.0
SA8.0A	SA8.0CA	8.0	8.89	9.83	1.00	25.0	13.6	36.7	7.0
SA8.5	SA8.5C	8.5	9.44	11.50	1.00	10.0	15.9	31.4	8.0
SA8.5A	SA8.5CA	8.5	9.44	10.40	1.00	10.0	14.4	34.7	8.0
SA9.0	SA9.0C	9.0	10.00	12.20	1.00	5.0	16.9	29.5	9.0
SA9.0A	SA9.0CA	9.0	10.00	11.10	1.00	5.0	15.4	32.5	9.0
SA10*	SA10C	10.0	11.10	13.60	1.00	3.0	18.8	26.6	10.0
SA10A*	SA10CA	10.0	11.10	12.30	1.00	3.0	17.0	29.4	10.0
SA11	SA11C	11.0	12.20	14.90	1.00	3.0	20.1	24.9	11.0
SA11A	SA11CA	11.0	12.20	13.50	1.00	3.0	18.2	27.4	11.0
SA12	SA12C	12.0	13.30	16.30	1.00	3.0	22.0	22.7	12.0
SA12A	SA12CA	12.0	13.30	14.70	1.00	3.0	19.9	25.1	12.0
SA13	SA13C*	13.0	14.40	17.60	1.00	3.0	23.8	21.0	13.0
SA13A	SA13CA*	13.0	14.40	15.90	1.00	3.0	21.5	23.2	13.0
SA14	SA14C	14.0	15.60	19.10	1.00	3.0	25.8	19.4	14.0
SA14A	SA14CA	14.0	15.60	17.20	1.00	3.0	23.2	21.5	14.0
SA15	SA15C	15.0	16.70	20.40	1.00	3.0	26.9	18.8	16.0
SA15A	SA15CA	15.0	16.70	18.50	1.00	3.0	24.4	20.6	16.0
SA16	SA16C	16.0	17.80	21.80	1.00	3.0	28.8	17.6	19.0
SA16A	SA16CA	16.0	17.80	19.70	1.00	3.0	26.0	19.2	17.0
SA17	SA17C	17.0	18.90	23.10	1.00	3.0	30.5	16.4	20.0
SA17A	SA17CA	17.0	18.90	20.90	1.00	3.0	27.6	18.1	19.0
SA18	SA18	18.0	20.00	24.40	1.00	3.0	32.2	15.5	21.0
SA18A	SA18CA	18.0	20.00	22.10	1.00	3.0	29.2	17.2	20.0
SA20*	SA20C	20.0	22.20	27.10	1.00	3.0	35.8	13.9	25.0
SA20A*	SA20CA	20.0	22.20	24.50	1.00	3.0	32.4	15.4	23.0
SA22	SA22C	22.0	24.40	29.80	1.00	3.0	39.4	12.7	28.0
SA22A	SA22CA	22.0	24.40	26.90	1.00	3.0	35.5	14.1	25.0
SA24	SA24C	24.0	26.70	32.60	1.00	3.0	43.0	11.6	31.0
SA24A	SA24CA	24.0	26.70	29.50	1.00	3.0	38.9	12.8	28.0
SA26*	SA26C*	26.0	28.90	35.30	1.00	3.0	46.6	10.7	31.0
SA26A*	SA26CA*	26.0	28.90	31.90	1.00	3.0	42.1	11.9	30.0
SA28	SA28C*	28.0	31.10	38.00	1.00	3.0	50.0	9.9	35.0
SA28A	SA28CA*	28.0	31.10	34.40	1.00	3.0	45.4	11.0	31.0
SA30	SA30C	30.0	33.30	40.70	1.00	3.0	53.5	9.3	39.0
SA30A	SA30CA	30.0	33.30	36.80	1.00	3.0	48.4	10.3	36.0

Note: SA5.0A is not available in Bi-directional.

Suffix 'C' denotes Bi-directional device. Suffix 'A' denotes 5% tolerance device, no suffix denotes a 10% tolerance device.

1. For Bi-directional devices having VR of 10 volts and below, the IR limit is doubled.
2. For Uni-directional devices VF = 3.5 Volts max at IF = 35A, 300 μS square wave pulse. * Preferred voltages.

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number (Uni)	Part Number (Bi)	Reverse Stand off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T			Maximum Reverse Leakage I_R @ V_R (μA)	Maximum Clamping Voltage V_C @ I_{PP} (Volts)	Maximum Peak Pulse Current I_{PP} (A)	Max Voltage Temperature Variation of V_{BR} (mV/°C)
			MIN	MAX	(mA)				
SA33	SA33C	33.0	36.70	44.90	1.0	3.0	59.0	8.5	42.0
SA33A	SA33CA	33.0	36.70	40.60	1.0	3.0	53.3	9.4	39.0
SA36	SA36C	36.0	40.00	48.90	1.0	3.0	64.3	7.8	46.0
SA36A	SA36CA	36.0	40.00	44.20	1.0	3.0	58.1	8.6	41.0
SA40	SA40C	40.0	44.40	54.30	1.0	3.0	71.4	7.0	51.0
SA40A	SA40CA	40.0	44.40	49.10	1.0	3.0	64.5	7.8	46.0
SA43	SA43C	43.0	47.80	58.40	1.0	3.0	76.7	6.5	55.0
SA43A	SA43CA	43.0	47.80	52.80	1.0	3.0	69.4	7.2	50.0
SA45	SA45C	45.0	50.00	61.10	1.0	3.0	80.3	6.2	58.0
SA45A	SA45CA	45.0	50.00	55.30	1.0	3.0	72.7	6.9	52.0
SA48	SA48C	48.0	53.30	65.10	1.0	3.0	85.5	5.8	63.0
SA48A	SA48CA	48.0	53.30	58.90	1.0	3.0	77.4	6.5	56.0
SA51	SA51*	51.0	56.70	69.30	1.0	3.0	91.1	5.5	66.0
SA51A	SA51CA*	51.0	56.70	62.70	1.0	3.0	82.4	6.1	61.0
SA54	SA54C	54.0	60.00	73.30	1.0	3.0	96.3	5.2	71.0
SA54A	SA54CA	54.0	60.00	66.30	1.0	3.0	87.1	5.7	65.0
SA58	SA58C	58.0	64.40	78.70	1.0	3.0	103.0	4.9	78.0
SA58A	SA58CA	58.0	64.40	71.20	1.0	3.0	93.6	5.3	70.0
SA60	SA60C	60.0	66.70	81.50	1.0	3.0	107.0	4.7	80.0
SA60A	SA60CA	60.0	66.70	73.70	1.0	3.0	96.8	5.2	71.0
SA64	SA64C	64.0	71.00	86.90	1.0	3.0	114.0	4.4	86.0
SA64A	SA64CA	64.0	71.10	78.60	1.0	3.0	103.0	4.9	76.0
SA70	SA70C	70.0	77.80	95.10	1.0	3.0	125.0	4.0	94.0
SA70A	SA70CA	70.0	77.00	86.00	1.0	3.0	113.0	4.4	85.0
SA75	SA75C	75.0	83.00	102.00	1.0	3.0	134.0	3.7	101.0
SA75A	SA75CA	75.0	83.00	92.10	1.0	3.0	121.0	4.1	91.0
SA78	SA78C	78.0	86.00	106.00	1.0	3.0	139.0	3.6	105.0
SA78A	SA78CA	78.0	86.00	95.80	1.0	3.0	126.0	4.0	95.0
SA85	SA85C	85.0	94.00	115.00	1.0	3.0	151.0	3.3	114.0
SA85A	SA85CA	85.0	94.00	104.00	1.0	3.0	137.0	3.6	103.0
SA90	SA90C	90.0	100.00	122.00	1.0	3.0	160.0	3.1	121.0
SA90A	SA90CA	90.0	100.00	111.00	1.0	3.0	146.0	3.4	110.0
SA100	SA100CA	100.0	111.00	136.00	1.0	3.0	179.0	2.8	135.0
SA100A	SA100CA	100.0	111.00	123.00	1.0	3.0	162.0	3.1	123.0
SA110	SA110C	110.0	122.00	149.00	1.0	3.0	196.0	2.6	148.0
SA110A	SA110CA	110.0	122.00	135.00	1.0	3.0	177.0	2.8	133.0
SA120	SA120C	120.0	133.00	163.00	1.0	3.0	214.0	2.3	162.0
SA120A	SA120CA	120.0	133.00	147.00	1.0	3.0	193.0	2.0	146.0
SA130	SA130C	130.0	144.00	176.00	1.0	3.0	231.0	2.2	175.0
SA130A	SA130CA	130.0	144.00	159.00	1.0	3.0	209.0	2.4	158.0
SA150	SA150C	150.0	167.00	204.00	1.0	3.0	268.0	1.9	203.0
SA150A	SA150CA	150.0	167.00	185.00	1.0	3.0	243.0	2.1	184.0
SA160	SA160C	160.0	178.00	218.00	1.0	3.0	287.0	1.7	217.0
SA160A	SA160CA	160.0	178.00	197.00	1.0	3.0	259.0	1.9	196.0
SA170	SA170C	170.0	189.00	231.00	1.0	3.0	304.0	1.6	230.0
SA170A	SA170CA	170.0	189.00	209.00	1.0	3.0	275.0	1.8	208.0

Suffix 'C' denotes Bi-directional device. Suffix 'A' denotes 5% tolerance device, no suffix denotes a 10% tolerance device.

1. For Bi-directional devices having V_R of 10 volts and below, the I_R limit is doubled.
2. For Uni-directional devices $V_F = 3.5$ Volts max at $I_F = 35A$, 300 μs square wave pulse. * Preferred voltages.

600 WATT AXIAL TRANSIENT VOLTAGE SUPPRESSORS

Protect sensitive electronics against voltage transients induced by inductive load switching and lightning. Ideal for the protection of I/O interfaces, Vcc bus, and other integrated circuits.

FEATURES

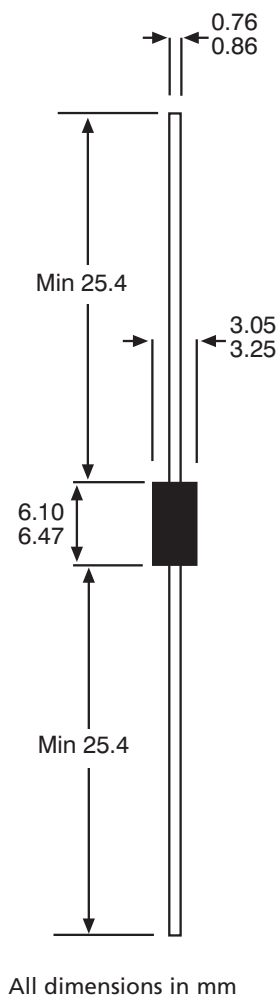
- Breakdown voltage range 6.8 to 440 Volts
- Uni-directional and Bi-directional
- Glass passivated junction
- Excellent clamping capability
- 100% surge tested
- UL recognised

MAXIMUM RATING

- Peak Pulse Power (Ppk): 600 Watts (10 x 1000µs)@25°C
(see diagram on page 3 for wave form)
- 1.5 watt steady state
- Response time: 1×10^{-12} seconds (theoretical)
- Forward surge rating: 100 Amps, 8.3ms half sine wave, (uni-directional devices only)
- Operating & storage temperature: -55°C to +150°C

MECHANICAL CHARACTERISTICS

- Case: DO15, Moulded plastic over glass passivated junction
- Terminals: Axial leads, solderable per MIL-STD-202" Method 208
- Solderable leads = 230°C for 10 seconds (1.59mm from case)
- Marking: cathode band, (positive terminal, uni-directional devices only), device code, logo
- Weight: 1.2 grammes (approx)



All dimensions in mm

Figure 1 - Capacitance vs. Stand-off Voltage

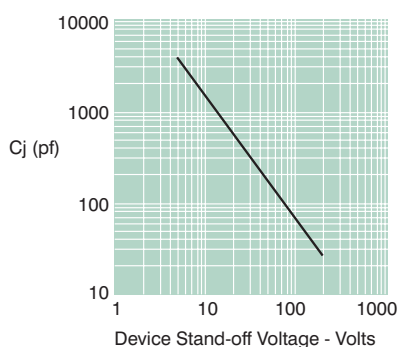
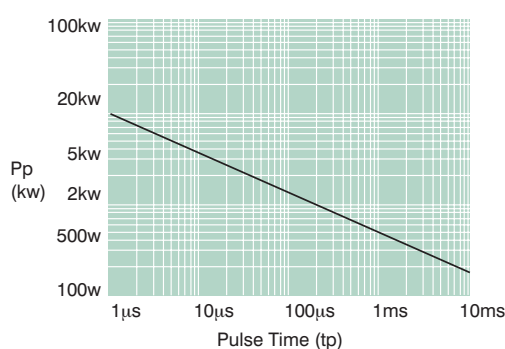


Figure 2 - Peak Pulse Power vs. Pulse Time



ORDERING INFORMATION

P6KE | | | | C | A | |

Voltage _____

Bi-Directional

5% Voltage Tolerance

Packaging Option —

$B = \text{Bulk (1000 pcs)}$

T = Tape and reeled (5000 pcs)

P6KE6.8 - P6KE440CA series

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number (Uni)	Part Number (Bi)	Reverse Stand off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T			Maximum Reverse Leakage I_R @ V_R (μA)	Maximum Clamping Voltage V_C @ I_{PP} (Volts)	Maximum Peak Pulse Current I_{PP} (A)	Max Voltage Temperature Variation of V_{BR} (%/°C)
			MIN	MAX	(mA)				
P6KE6.8*	P6KE6.8C*	5.50	6.12	7.48	10.0	1000.0	10.8	56.0	0.057
P6KE6.8A*	P6KE6.8CA*	5.80	6.45	7.14	10.0	1000.0	10.5	57.0	0.057
P6KE7.5*	P6KE7.5C*	6.05	6.75	8.25	10.0	500.0	11.7	51.0	0.061
P6KE7.5A*	P6KE7.5CA*	6.40	7.13	7.88	10.0	500.0	11.3	53.0	0.061
P6KE8.2	P6KE8.2C	6.63	7.38	9.02	10.0	200.0	12.5	48.0	0.065
P6KE8.2A	P6KE8.2CA	7.02	7.79	8.61	10.0	200.0	12.1	50.0	0.065
P6KE9.1	P6KE9.1C	7.37	8.19	10.00	1.0	50.0	13.8	44.0	0.068
P6KE9.1A	P6KE9.1CA	7.78	8.65	9.55	1.0	50.0	13.4	45.0	0.068
P6KE10	P6KE10C	8.10	9.00	11.00	1.0	10.0	15.0	40.0	0.073
P6KE10A	P6KE10CA	8.55	9.50	10.50	1.0	10.0	14.5	41.0	0.073
P6KE11	P6KE11C	8.92	9.90	12.10	1.0	5.0	16.2	37.0	0.075
P6KE11A	P6KE11CA	9.40	10.50	11.60	1.0	5.0	15.6	38.0	0.075
P6KE12*	P6KE12C*	9.72	10.80	13.20	1.0	5.0	17.3	35.0	0.078
P6KE12A*	P6KE12CA*	10.20	11.40	12.60	1.0	5.0	16.7	36.0	0.078
P6KE13	P6KE13C	10.50	11.70	14.30	1.0	5.0	19.0	32.0	0.081
P6KE13A	P6KE13CA	11.10	12.40	13.70	1.0	5.0	18.2	33.0	0.081
P6KE15	P6KE15C*	12.10	13.50	16.50	1.0	5.0	22.0	27.0	0.084
P6KE15A	P6KE15CA*	12.80	14.30	15.80	1.0	5.0	21.2	28.0	0.084
P6KE16	P6KE16C	12.90	14.40	17.60	1.0	5.0	23.5	26.0	0.086
P6KE16A	P6KE16CA	13.60	15.20	16.80	1.0	5.0	22.5	27.0	0.086
P6KE18*	P6KE18C*	14.50	16.20	19.80	1.0	5.0	26.5	23.0	0.088
P6KE18A*	P6KE18CA*	15.30	17.10	18.90	1.0	5.0	25.2	24.0	0.088
P6KE20	P6KE20C*	16.20	18.00	22.00	1.0	5.0	29.1	21.0	0.090
P6KE20A	P6KE20CA*	17.10	19.00	21.00	1.0	5.0	27.7	22.0	0.090
P6KE22	P6KE22C	17.80	19.80	24.20	1.0	5.0	31.9	19.0	0.092
P6KE22A	P6KE22CA	18.80	20.90	23.10	1.0	5.0	30.6	20.0	0.092
P6KE24	P6KE24C	19.40	21.60	26.40	1.0	5.0	34.7	17.0	0.094
P6KE24A	P6KE24CA	20.50	22.80	25.20	1.0	5.0	33.2	18.0	0.094
P6KE27*	P6KE27C	21.80	24.30	29.70	1.0	5.0	39.1	15.0	0.096
P6KE27A*	P6KE27CA	23.10	25.70	28.40	1.0	5.0	37.5	16.0	0.096
P6KE30*	P6KE30C*	24.30	27.00	33.00	1.0	5.0	43.5	14.0	0.097
P6KE30A*	P6KE30CA*	25.60	28.50	31.50	1.0	5.0	41.4	14.4	0.097
P6KE33*	P6KE33C	26.80	29.70	36.30	1.0	5.0	47.7	12.6	0.098
P6KE33A*	P6KE33CA	28.20	31.40	34.70	1.0	5.0	45.7	13.2	0.098
P6KE36*	P6KE36C	29.10	32.40	39.60	1.0	5.0	52.0	11.6	0.099
P6KE36A*	P6KE36CA	30.80	34.20	37.80	1.0	5.0	49.9	12.0	0.099
P6KE39	P6KE39C	31.60	35.10	42.90	1.0	5.0	56.4	10.5	0.100
P6KE39A	P6KE39CA	33.30	37.10	41.00	1.0	5.0	53.9	11.2	0.100
P6KE43	P6KE43C	34.80	38.70	47.30	1.0	5.0	61.9	9.6	0.101
P6KE43A	P6KE43CA	36.80	40.90	45.20	1.0	5.0	59.3	10.1	0.101
P6KE47	P6KE47C	38.10	42.30	51.70	1.0	5.0	67.8	8.9	0.101
P6KE47A	P6KE47CA	40.20	44.70	49.40	1.0	5.0	64.8	9.3	0.101
P6KE51	P6KE51C*	41.30	45.90	56.10	1.0	5.0	73.5	8.2	0.102
P6KE51A	P6KE51CA*	43.60	48.50	53.60	1.0	5.0	70.1	8.6	0.102

Suffix 'C' denotes Bi-directional device. Suffix 'A' denotes 5% tolerance device, no suffix denotes a 10% tolerance device.

- For Bi-directional devices having V_R of 10 volts and below, the I_R limit is doubled.
- $V_F = 3.5$ Volts max. for devices of $V_R < 100V$, and $V_F = 5.0$ Volts max for devices of $V_R > 100V$. $I_F = 50A$, 300 μs square wave.

* Preferred voltages.

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number (Uni)	Part Number (Bi)	Reverse Stand off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T			Maximum Reverse Leakage I_R @ V_R (μA)	Maximum Clamping Voltage V_C @ I_{PP} (Volts)	Maximum Peak Pulse Current I_{PP} (A)	Max Voltage Temperature Variation of V_{BR} (%/°C)
			MIN	MAX	(mA)				
P6KE56	P6KE56C	45.4	50.4	61.6	1.0	5.0	80.5	7.40	0.103
P6KE56A	P6KE56CA	47.8	53.2	58.8	1.0	5.0	77.0	7.80	0.103
P6KE62	P6KE62C	50.2	55.8	68.2	1.0	5.0	89.0	6.80	0.104
P6KE62A	P6KE62CA	53.0	58.9	65.1	1.0	5.0	85.0	7.10	0.104
P6KE68	P6KE68C*	55.1	61.2	74.8	1.0	5.0	98.0	6.10	0.104
P6KE68A	P6KE68CA*	58.1	64.6	71.4	1.0	5.0	92.0	6.50	0.104
P6KE75	P6KE75C	60.7	67.5	82.5	1.0	5.0	108.0	5.50	0.105
P6KE75A	P6KE75CA	64.1	71.3	78.8	1.0	5.0	103.0	5.80	0.105
P6KE82	P6KE82C	66.4	73.8	90.2	1.0	5.0	118.0	5.10	0.105
P6KE82A	P6KE82CA	70.1	77.9	86.1	1.0	5.0	113.0	5.30	0.105
P6KE91	P6KE91C	73.7	81.9	100.0	1.0	5.0	131.0	4.50	0.106
P6KE91A	P6KE91CA	77.8	86.5	95.5	1.0	5.0	125.0	4.80	0.106
P6KE100	P6KE100C	81.0	90.0	110.0	1.0	5.0	144.0	4.20	0.106
P6KE100A	P6KE100CA	85.5	95.0	105.0	1.0	5.0	137.0	4.40	0.106
P6KE110	P6KE110C	89.2	99.0	121.0	1.0	5.0	158.0	3.80	0.107
P6KE110A	P6KE110CA	94.0	105.0	116.0	1.0	5.0	152.0	4.00	0.107
P6KE120	P6KE120C	97.2	108.0	132.0	1.0	5.0	173.0	3.50	0.107
P6KE120A	P6KE120CA	102.0	114.0	126.0	1.0	5.0	165.0	3.60	0.107
P6KE130	P6KE130C	105.0	117.0	143.0	1.0	5.0	187.0	3.20	0.107
P6KE130A	P6KE130CA	111.0	124.0	137.0	1.0	5.0	179.0	3.30	0.107
P6KE150	P6KE150C	121.0	135.0	165.0	1.0	5.0	215.0	2.80	0.108
P6KE150A	P6KE150CA	128.0	143.0	158.0	1.0	5.0	207.0	2.90	0.108
P6KE160	P6KE160C	130.0	144.0	176.0	1.0	5.0	230.0	2.60	0.108
P6KE160A	P6KE160CA	136.0	152.0	168.0	1.0	5.0	219.0	2.70	0.108
P6KE170	P6KE170C	138.0	153.0	187.0	1.0	5.0	244.0	2.50	0.108
P6KE170A	P6KE170CA	145.0	162.0	179.0	1.0	5.0	234.0	2.60	0.108
P6KE180	P6KE180C	146.0	162.0	198.0	1.0	5.0	258.0	2.30	0.108
P6KE180A	P6KE180CA	154.0	171.0	189.0	1.0	5.0	246.0	2.40	0.108
P6KE200	P6KE200C	162.0	180.0	220.0	1.0	5.0	287.0	2.10	0.108
P6KE200A	P6KE200CA	171.0	190.0	210.0	1.0	5.0	274.0	2.20	0.108
P6KE220	P6KE220C*	175.0	198.0	242.0	1.0	5.0	344.0	1.75	0.108
P6KE220A	P6KE220CA*	185.0	209.0	231.0	1.0	5.0	328.0	1.83	0.108
P6KE250	P6KE250C	202.0	225.0	275.0	1.0	5.0	360.0	1.67	0.110
P6KE250A	P6KE250CA	214.0	237.0	263.0	1.0	5.0	344.0	1.75	0.110
P6KE300	P6KE300C	243.0	270.0	330.0	1.0	5.0	430.0	1.40	0.110
P6KE300A	P6KE300CA	256.0	285.0	315.0	1.0	5.0	414.0	1.45	0.110
P6KE350	P6KE350C	284.0	315.0	385.0	1.0	5.0	504.0	1.20	0.110
P6KE350A	P6KE350CA	300.0	332.0	368.0	1.0	5.0	482.0	1.25	0.110
P6KE400	P6KE400C	324.0	360.0	440.0	1.0	5.0	574.0	1.05	0.110
P6KE400A	P6KE400CA	342.0	380.0	420.0	1.0	5.0	548.0	1.10	0.110
P6KE440	P6KE440C	356.0	396.0	484.0	1.0	5.0	631.0	0.95	0.110
P6KE440A	P6KE440CA	376.0	418.0	462.0	1.0	5.0	602.0	1.00	0.110

Suffix 'C' denotes Bi-directional device. Suffix 'A' denotes 5% tolerance device, no suffix denotes a 10% tolerance device.

- For Bi-directional devices having V_R of 10 volts and below, the I_R limit is doubled.
 - $V_F = 3.5$ Volts max. for devices of $V_R < 100V$, and $V_F = 5.0$ Volts max for devices of $V_R > 100V$. $I_F = 50A$, 300 μs square wave.
- * Preferred voltages.

1.5KE6.8 - 1.5KE440CA series

1500 WATT AXIAL TRANSIENT VOLTAGE SUPPRESSORS

Protect sensitive electronics against voltage transients induced by inductive load switching and lightning. Ideal for the protection of I/O interfaces, Vcc bus, and other integrated circuits used in telecom, computer, datacom and industrial electronics.

FEATURES

- Breakdown voltage range 6.8 to 440 Volts
- Uni-directional and Bi-directional
- Glass passivated junction
- Low clamping factor
- 100% surge tested
- UL recognised

MAXIMUM RATING

- Peak Pulse Power (Ppk): 1500 Watts (10 x 1000μs)@25°C
(see diagram on page 6 for wave form)
- 5 watt steady state
- Response time: 1×10^{-12} seconds (theoretical)
- Forward surge rating: 200 Amps, 8.3ms half sine wave,
(uni-directional devices only)
- Operating & storage temperature: -55°C to +150°C

MECHANICAL CHARACTERISTICS

- Case: DO-201AD: Moulded plastic over glass passivated junction
- Terminals: Axial leads, solderable per MIL-STD-202 Method 208
- Solderable leads = 230°C for 10 seconds (1.59mm from case)
- Marking: cathode band, (positive terminal, uni-directional devices only), device code, logo
- Weight: 1.5 grammes (approx)

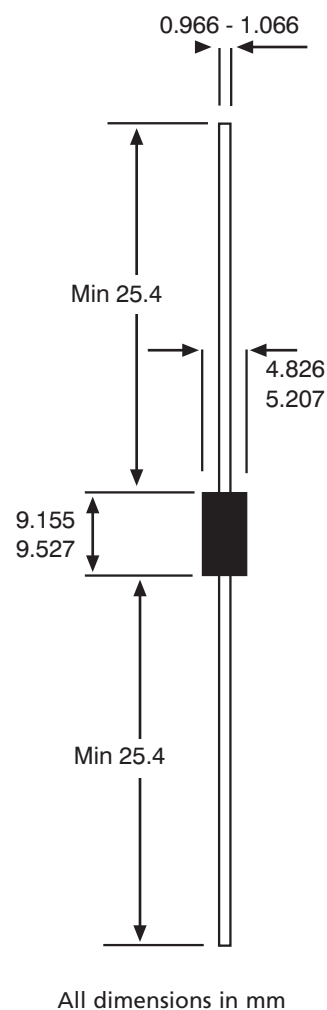


Figure 1 - Capacitance vs. Stand-off Voltage

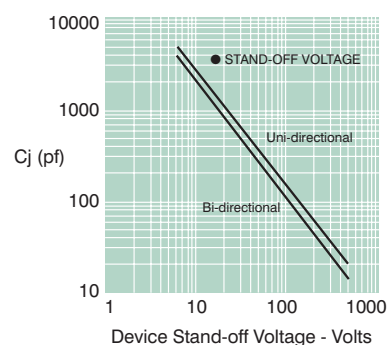
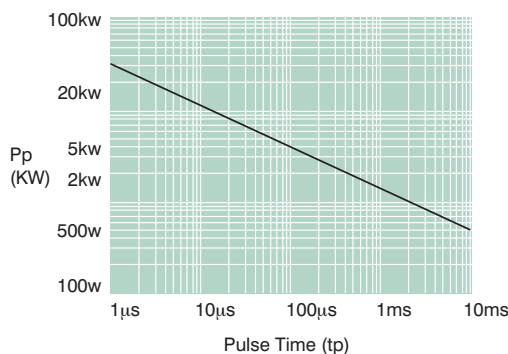


Figure 2 - Peak Pulse Power vs. Pulse Time



ORDERING INFORMATION

1.5KE [] [] [C] [A]

Voltage _____

Bi-Directional _____

5% Voltage Tolerance _____

Packaging Option _____

$B = \text{Bulk (500 pcs)}$
 $T = \text{Tape and reeled (1500 pcs)}$

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number (Uni)	Part Number (Bi)	Reverse Stand off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T			Maximum Reverse Leakage I_R @ V_R (μA)	Maximum Clamping Voltage V_C @ I_{PP} (Volts)	Maximum Peak Pulse Current I_{PP} (A)	Max Voltage Temperature Variation of V_{BR} (%/°C)
			MIN	MAX	mA				
1.5KE6.8*	1.5KE6.8C*	5.50	6.12	7.48	10.0	1000.0	10.8	139.0	0.057
1.5KE6.8A*	1.5KE6.8CA*	5.80	6.45	7.14	10.0	1000.0	10.5	143.0	0.057
1.5KE7.5	1.5KE7.5C	6.05	6.75	8.25	10.0	500.0	11.7	128.0	0.061
1.5KE7.5A	1.5KE7.5CA	6.40	7.13	7.88	10.0	500.0	11.3	132.0	0.061
1.5KE8.2	1.5KE8.2C	6.63	7.38	9.02	10.0	200.0	12.5	120.0	0.065
1.5KE8.2A	1.5KE8.2CA	7.02	7.79	8.61	10.0	200.0	12.1	124.0	0.065
1.5KE9.1	1.5KE9.1C	7.37	8.19	10.00	1.0	50.0	13.8	109.0	0.068
1.5KE9.1A	1.5KE9.1CA	7.78	8.60	9.55	1.0	50.0	13.4	112.0	0.068
1.5KE10	1.5KE10C	8.10	9.00	11.00	1.0	10.0	15.0	100.0	0.073
1.5KE10A	1.5KE10CA	8.55	9.50	10.50	1.0	10.0	14.5	103.0	0.073
1.5KE11	1.5KE11C	8.92	9.90	12.10	1.0	5.0	16.2	93.0	0.075
1.5KE11A	1.5KE11CA	9.40	10.50	11.60	1.0	5.0	15.6	96.0	0.075
1.5KE12	1.5KE12C	9.72	10.80	13.20	1.0	5.0	17.3	87.0	0.078
1.5KE12A	1.5KE12CA	10.20	11.40	12.60	1.0	5.0	16.7	90.0	0.078
1.5KE13	1.5KE13C	10.50	11.70	14.30	1.0	5.0	19.0	79.0	0.081
1.5KE13A	1.5KE13CA	11.10	12.40	13.70	1.0	5.0	18.2	82.0	0.081
1.5KE15	1.5KE15C*	12.10	13.50	16.50	1.0	5.0	22.0	68.0	0.084
1.5KE15A	1.5KE15CA*	12.80	14.30	15.80	1.0	5.0	21.2	71.0	0.084
1.5KE16	1.5KE16C	12.90	14.40	17.60	1.0	5.0	23.5	64.0	0.086
1.5KE16A	1.5KE16CA	13.60	15.20	16.80	1.0	5.0	22.5	67.0	0.086
1.5KE18*	1.5KE18C*	14.50	16.20	19.80	1.0	5.0	26.5	56.5	0.088
1.5KE18A*	1.5KE18CA*	15.30	17.10	18.90	1.0	5.0	25.2	59.5	0.088
1.5KE20*	1.5KE20C	16.20	18.00	22.00	1.0	5.0	29.1	51.5	0.090
1.5KE20A*	1.5KE20CA	17.10	19.00	21.00	1.0	5.0	27.7	54.0	0.090
1.5KE22	1.5KE22C	17.80	19.80	24.20	1.0	5.0	31.9	47.0	0.092
1.5KE22A	1.5KE22CA	18.80	20.90	23.10	1.0	5.0	30.6	49.0	0.092
1.5KE24*	1.5KE24C*	19.40	21.60	26.40	1.0	5.0	34.7	43.0	0.094
1.5KE24A*	1.5KE24CA*	20.50	22.80	25.20	1.0	5.0	33.2	45.0	0.094
1.5KE27*	1.5KE27C*	21.80	24.30	29.70	1.0	5.0	39.1	38.5	0.096
1.5KE27A*	1.5KE27CA*	23.10	25.70	28.40	1.0	5.0	37.5	40.0	0.096
1.5KE30	1.5KE30C	24.30	27.00	33.00	1.0	5.0	43.5	34.5	0.097
1.5KE30A	1.5KE30CA	25.60	28.50	31.50	1.0	5.0	41.4	36.0	0.097
1.5KE33*	1.5KE33C	26.80	29.70	36.30	1.0	5.0	47.7	31.5	0.098
1.5KE33A*	1.5KE33CA	28.20	31.40	34.70	1.0	5.0	45.7	33.0	0.098
1.5KE36	1.5KE36C	29.10	32.40	39.60	1.0	5.0	52.0	29.0	0.099
1.5KE36A	1.5KE36CA	30.80	34.20	37.80	1.0	5.0	49.9	30.0	0.099
1.5KE39*	1.5KE39C	31.60	35.10	42.90	1.0	5.0	56.4	26.5	0.100
1.5KE39A*	1.5KE39CA	33.30	37.10	41.00	1.0	5.0	53.9	28.0	0.100
1.5KE43	1.5KE43C	34.80	38.70	47.30	1.0	5.0	61.9	24.0	0.101
1.5KE43A	1.5KE43CA	36.80	40.90	45.20	1.0	5.0	59.3	25.3	0.101
1.5KE47	1.5KE47C	38.10	42.30	51.70	1.0	5.0	67.8	22.2	0.101
1.5KE47A	1.5KE47CA	40.20	44.70	49.40	1.0	5.0	64.8	23.2	0.101
1.5KE51*	1.5KE51C	41.30	45.90	56.10	1.0	5.0	73.5	20.4	0.102
1.5KE51A	1.5KE51CA	43.60	48.50	53.60	1.0	5.0	70.1	21.4	0.102

Suffix 'C' denotes Bi-directional device. Suffix 'A' denotes 5% tolerance device, no suffix denotes a 10% tolerance device.

1. For Bi-directional devices having V_R of 10 volts and below, the I_R limit is doubled.

2. $V_F = 3.5$ Volts max. for devices of $V_R < 100V$, and $V_F = 5.0$ Volts max for devices of $V_R > 100V$. $I_F = 100A$, 300 μS square wave.

* Preferred voltages.

1.5KE6.8 - 1.5KE440CA series

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number (Uni)	Part Number (Bi)	Reverse Stand off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T			Maximum Reverse Leakage I_R @ V_R (μA)	Maximum Clamping Voltage V_C @ I_{PP} (Volts)	Maximum Peak Pulse Current I_{PP} (A)	Max Voltage Temperature Variation of V_{BR} (%/°C)
			MIN	MAX	(mA)				
1.5KE56	1.5KE56C	45.4	50.40	61.60	1.0	5.0	80.5	18.6	0.103
1.5KE56A	1.5KE56CA	47.8	53.20	58.80	1.0	5.0	77.0	19.5	0.103
1.5KE62	1.5KE62C	50.2	55.80	68.20	1.0	5.0	89.0	16.9	0.104
1.5KE62A	1.5KE62CA	53.0	58.90	65.10	1.0	5.0	85.0	17.7	0.104
1.5KE68	1.5KE68C	55.1	61.20	74.80	1.0	5.0	98.0	15.3	0.104
1.5KE68A	1.5KE68CA	58.1	64.60	71.40	1.0	5.0	92.0	16.3	0.104
1.5KE75	1.5KE75C*	60.7	67.50	82.50	1.0	5.0	108.0	13.9	0.105
1.5KE75A	1.5KE75CA*	64.1	71.30	78.80	1.0	5.0	103.0	14.6	0.105
1.5KE82	1.5KE82C	66.4	73.80	90.20	1.0	5.0	118.0	12.7	0.105
1.5KE82A	1.5KE82CA	70.1	77.90	86.10	1.0	5.0	113.0	13.3	0.105
1.5KE91	1.5KE91C	73.7	81.90	100.00	1.0	5.0	131.0	11.4	0.106
1.5KE91A	1.5KE91CA	77.8	86.50	95.50	1.0	5.0	125.0	12.0	0.106
1.5KE100	1.5KE100C	81.0	90.00	110.00	1.0	5.0	144.0	10.4	0.106
1.5KE100A	1.5KE100CA	85.5	95.00	105.00	1.0	5.0	137.0	11.0	0.106
1.5KE110	1.5KE110C	89.2	99.00	121.00	1.0	5.0	158.0	9.5	0.107
1.5KE110A	1.5KE110CA	94.0	105.00	116.00	1.0	5.0	152.0	9.9	0.107
1.5KE120*	1.5KE120C*	97.2	108.00	132.00	1.0	5.0	173.0	8.7	0.107
1.5KE120A*	1.5KE120CA*	102.0	114.00	126.00	1.0	5.0	165.0	9.1	0.107
1.5KE130	1.5KE130C	105.0	117.00	143.00	1.0	5.0	187.0	8.0	0.107
1.5KE130A	1.5KE130CA	111.0	124.00	137.00	1.0	5.0	179.0	8.4	0.107
1.5KE150	1.5KE150C	121.0	135.00	165.00	1.0	5.0	215.0	7.0	0.108
1.5KE150A	1.5KE150CA	128.0	143.00	158.00	1.0	5.0	207.0	7.2	0.108
1.5KE160	1.5KE160CC	130.0	144.00	176.00	1.0	5.0	230.0	6.5	0.108
1.5KE160A	1.5KE160CA	136.0	152.00	168.00	1.0	5.0	219.0	6.8	0.108
1.5KE170	1.5KE170C	138.0	153.00	187.00	1.0	5.0	244.0	6.2	0.108
1.5KE170A	1.5KE170CA	145.0	162.00	179.00	1.0	5.0	234.0	6.4	0.108
1.5KE180	1.5KE180C	146.0	162.00	198.00	1.0	5.0	258.0	5.8	0.108
1.5KE180A	1.5KE180CA	154.0	171.00	189.00	1.0	5.0	246.0	6.1	0.108
1.5KE200*	1.5KE200C*	162.0	180.00	220.00	1.0	5.0	287.0	5.2	0.108
1.5KE200A*	1.5KE200CA*	171.0	190.00	210.00	1.0	5.0	274.0	5.5	0.108
1.5KE220	1.5KE220C	175.0	198.00	242.00	1.0	5.0	344.0	4.3	0.108
1.5KE220A	1.5KE220CA	185.0	209.00	231.00	1.0	5.0	328.0	4.6	0.108
1.5KE250	1.5KE250C	202.0	225.00	275.00	1.0	5.0	360.0	5.0	0.110
1.5KE250A	1.5KE250CA	214.0	237.00	263.00	1.0	5.0	344.0	4.4	0.110
1.5KE300	1.5KE300C*	243.0	270.00	330.00	1.0	5.0	430.0	3.5	0.110
1.5KE300A	1.5KE300CA*	256.0	285.00	315.00	1.0	5.0	414.0	3.6	0.110
1.5KE350*	1.5KE350C	284.0	315.00	385.00	1.0	5.0	504.0	3.0	0.110
1.5KE350A*	1.5KE350CA	300.0	332.00	368.00	1.0	5.0	482.0	3.1	0.110
1.5KE400	1.5KE400C*	324.0	360.00	440.00	1.0	5.0	574.0	2.6	0.110
1.5KE400A	1.5KE400CA*	342.0	380.00	420.00	1.0	5.0	548.0	2.8	0.110
1.5KE440	1.5KE440C	356.0	396.00	484.00	1.0	5.0	631.0	2.4	0.110
1.5KE440A	1.5KE440CA	376.0	418.00	462.00	1.0	5.0	602.0	2.5	0.110

Suffix 'C' denotes Bi-directional device. Suffix 'A' denotes 5% tolerance device, no suffix denotes a 10% tolerance device.

1. For Bi-directional devices having V_R of 10 volts and below, the I_R limit is doubled.

2. $V_F = 3.5$ Volts max. for devices of $V_R < 100V$, and $V_F = 5.0$ Volts max for devices of $V_R > 100V$. $I_F = 100A$, 300 μs square wave.

* Preferred voltages.

Designed specifically for the protection of sensitive electronics used in automotive, heavy industrial environments, and against voltage transients induced by lightning in other applications. Ideal for the protection of I/O interfaces, Vcc bus, and other integrated circuits.

FEATURES

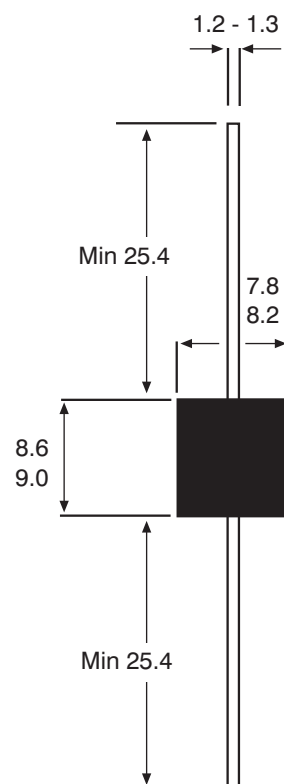
- Stand-off voltage range 5.0 to 180 Volts
- Uni-directional and Bi-directional
- Glass passivated junction
- Low clamping factor
- 100% surge tested
- UL recognised

MAXIMUM RATING

- Peak Pulse Power (Ppk): 5000 Watts (10 x 1000µs)@25°C
(see diagram on page 6 for wave form)
- 8 watt steady state
- Response time: 1×10^{-12} seconds (theoretical)
- Forward surge rating: 400 Amps, 8.3ms half sine wave,
(uni-directional devices only)
- Operating & storage temperature: -55°C to +150°C

MECHANICAL CHARACTERISTICS

- Case: JEDEC R6; Moulded plastic over glass passivated junction
- Terminals: Axial leads, solderable per MIL-STD-202 Method 208
- Solderable leads = 230°C for 10 seconds (1.59mm from case)
- Marking: cathode band, (positive terminal, uni-directional devices only), device code, logo
- Weight: 2.0 grammes (approx)



All dimensions in mm

Figure 1 - Capacitance vs. Stand-off Voltage

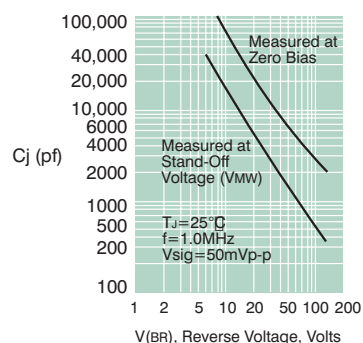
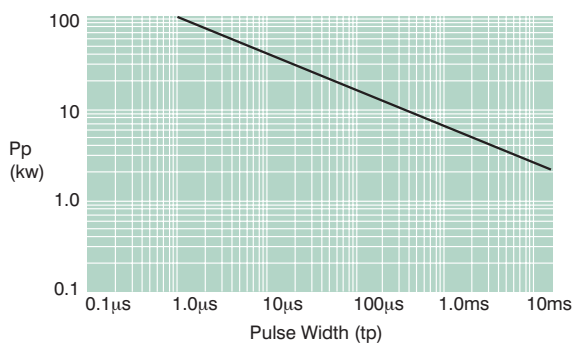


Figure 2 - Peak Pulse Power vs. Pulse Time



ORDERING INFORMATION

5KP [] [] [C] [A] []
 Voltage ———
 Bi-Directional ———
 5% Voltage Tolerance ———
 Packaging Option ———

B = Bulk (500 pcs)

T = Tape and reeled (1000 pcs)

5KP5.0 - 5KP180C series

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number (Uni)	Part Number (Bi)	Reverse Stand off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T			Maximum Reverse Leakage I_R @ V_R (μA)	Maximum Clamping Voltage V_C @ I_{PP} (Volts)	Maximum Peak Pulse Current I_{PP} (A)	Max Voltage Temperature Variation of V_{BR} (%/°C)
			MIN	MAX	(mA)				
5KP5.0	5KP5.0C*	5.0	6.40	7.30	50.0	5000.0	9.6	520.0	4.0
5KP5.0A	N/A	5.0	6.40	7.00	50.0	5000.0	9.2	543.0	4.0
5KP6.0	5KP6.0C	6.0	6.67	8.15	50.0	5000.0	11.4	439.0	4.0
5KP6.0A	5KP6.0CA	6.0	6.67	7.37	50.0	5000.0	10.3	485.0	4.0
5KP6.5	5KP6.5C	6.5	7.22	8.82	50.0	2000.0	12.3	407.0	4.0
5KP6.5A	5KP6.5CA	6.5	7.22	7.98	50.0	2000.0	11.2	447.0	4.0
5KP7.0	5KP7.0C	7.0	7.78	9.51	50.0	1000.0	13.3	378.0	5.0
5KP7.0A	5KP7.0CA	7.0	7.78	8.60	50.0	1000.0	12.0	417.0	5.0
5KP7.5	5KP7.5C	7.5	8.33	10.20	5.0	250.0	14.3	350.0	6.0
5KP7.5A	5KP7.5CA	7.5	8.33	9.21	5.0	250.0	12.9	388.0	6.0
5KP8.0	5KP8.0C	8.0	8.89	10.90	5.0	150.0	15.0	333.0	6.0
5KP8.0A	5KP8.0CA	8.0	8.89	9.83	5.0	150.0	13.6	367.0	6.0
5KP8.5	5KP8.5C	8.5	9.44	11.50	5.0	50.0	15.9	314.0	7.0
5KP8.5A	5KP8.5CA	8.5	9.44	10.40	5.0	50.0	14.4	347.0	7.0
5KP9.0	5KP9.0C	9.0	10.00	12.20	5.0	20.0	16.9	295.0	8.0
5KP9.0A	5KP9.0CA	9.0	10.00	11.10	5.0	20.0	15.4	325.0	8.0
5KP10*	5KP10C	10.0	11.10	13.60	5.0	15.0	18.8	266.0	9.0
5KP10A*	5KP10CA	10.0	11.10	12.30	5.0	15.0	17.0	294.0	9.0
5KP11	5KP11C	11.0	12.20	14.90	5.0	10.0	20.1	249.0	10.0
5KP11A	5KP11CA	11.0	12.20	13.50	5.0	10.0	18.2	274.0	10.0
5KP12*	5KP12C	12.0	13.30	16.30	5.0	10.0	22.0	227.0	11.0
5KP12A*	5KP12CA	12.0	13.30	14.70	5.0	10.0	19.9	251.0	11.0
5KP13	5KP13C	13.0	14.40	17.60	5.0	10.0	23.8	210.0	12.0
5KP13A	5KP13CA	13.0	14.40	15.90	5.0	10.0	21.5	232.0	12.0
5KP14	5KP14C	14.0	15.60	19.10	5.0	10.0	25.8	194.0	13.0
5KP14A	5KP14CA	14.0	15.60	17.20	5.0	10.0	23.2	215.0	13.0
5KP15	5KP15C	15.0	16.70	20.40	5.0	10.0	26.9	188.0	15.0
5KP15A	5KP15CA	15.0	16.70	18.50	5.0	10.0	24.4	206.0	15.0
5KP16	5KP16C	16.0	17.80	21.80	5.0	10.0	28.8	176.0	18.0
5KP16A	5KP16CA	16.0	17.80	19.70	5.0	10.0	26.0	192.0	16.0
5KP17	5KP17C	17.0	18.90	23.10	5.0	10.0	30.5	164.0	19.0
5KP17A	5KP17CA	17.0	18.90	20.90	5.0	10.0	27.6	181.0	18.0
5KP18	5KP18C	18.0	20.00	24.40	5.0	10.0	32.2	155.0	20.0
5KP18A	5KP18CA	18.0	20.00	22.10	5.0	10.0	29.2	172.0	19.0
5KP20	5KP20C	20.0	22.20	27.10	5.0	10.0	35.8	139.0	24.0
5KP20A	5KP20CA	20.0	22.20	24.50	5.0	10.0	32.4	154.0	22.0
5KP22	5KP22C*	22.0	24.40	29.80	5.0	10.0	39.4	127.0	27.0
5KP22A	5KP22CA*	22.0	24.40	26.90	5.0	10.0	35.5	141.0	24.0
5KP24*	5KP24C	24.0	26.70	32.60	5.0	10.0	43.0	116.0	30.0
5KP24A*	5KP24CA	24.0	26.70	29.50	5.0	10.0	38.9	128.0	27.0
5KP26*	5KP26C	26.0	28.90	35.30	5.0	10.0	46.6	107.0	33.0
5KP26A*	5KP26CA	26.0	28.90	31.90	5.0	10.0	42.1	119.0	29.0
5KP28	5KP28C	28.0	31.10	39.00	5.0	10.0	50.1	99.0	34.0

Suffix 'C' denotes Bi-directional device. Suffix 'A' denotes 5% tolerance device, no suffix denotes a 10% tolerance device.

1. For Bi-directional devices having V_R of 10 volts and below, the I_R limit is doubled.
2. $V_F = 3.5$ Volts max. for devices of $V_R < 100V$, and $V_F = 5.0$ Volts max for devices of $V_R > 100V$. $I_F = 100A$, 300 μs square wave.

* Preferred voltages.

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number (Uni)	Part Number (Bi)	Reverse Stand off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T			Maximum Reverse Leakage I_R @ V_R (μA)	Maximum Clamping Voltage V_C @ I_{PP} (Volts)	Maximum Peak Pulse Current I_{PP} (A)	Max Voltage Temperature Variation of V_{BR} (%/°C)
			MIN	MAX	(mA)				
5KP28A	5KP28CA	28.0	31.10	34.40	5.0	10.0	45.5	110.0	30.0
5KP30	5KP30C	30.0	33.30	40.70	5.0	10.0	53.5	93.0	38.0
5KP30A	5KP30CA	30.0	33.30	36.80	5.0	10.0	48.4	103.0	35.0
5KP33	5KP33C*	33.0	36.70	44.90	5.0	10.0	59.0	85.0	41.0
5KP33A	5KP33CA*	33.0	36.70	40.60	5.0	10.0	53.3	94.0	38.0
5KP36	5KP36C	36.0	40.00	48.90	5.0	10.0	64.3	78.0	45.0
5KP36A	5KP36CA	36.0	40.00	44.20	5.0	10.0	58.1	86.0	40.0
5KP40	5KP40C	40.0	44.40	54.30	5.0	10.0	71.4	70.0	50.0
5KP40A	5KP40CA	40.0	44.40	49.10	5.0	10.0	64.5	78.0	45.0
5KP43	5KP43C	43.0	47.80	58.40	5.0	10.0	76.7	65.0	54.0
5KP43A	5KP43CA	43.0	47.80	52.80	5.0	10.0	69.4	72.0	49.0
5KP45	5KP45C	45.0	50.00	61.10	5.0	10.0	80.3	62.0	57.0
5KP45A	5KP45CA	45.0	50.00	55.30	5.0	10.0	72.7	69.0	51.0
5KP48	5KP48C	48.0	53.30	65.20	5.0	10.0	85.5	58.0	62.0
5KP48A	5KP48CA	48.0	53.30	58.90	5.0	10.0	77.4	65.0	55.0
5KP51	5KP51C	51.0	56.70	69.30	5.0	10.0	91.1	55.0	65.0
5KP51A	5KP51CA	51.0	56.70	62.70	5.0	10.0	82.4	61.0	60.0
5KP54*	5KP54C	54.0	60.00	73.30	5.0	10.0	96.3	52.0	70.0
5KP54A*	5KP54CA	54.0	60.00	66.30	5.0	10.0	87.1	57.0	64.0
5KP58	5KP58C	58.0	64.40	78.70	5.0	10.0	103.0	49.0	77.0
5KP58A	5KP58CA	58.0	64.40	71.20	5.0	10.0	93.6	53.0	69.0
5KP60*	5KP60C	60.0	66.70	81.50	5.0	10.0	107.0	47.0	79.0
5KP60A*	5KP60CA	60.0	66.70	73.70	5.0	10.0	96.8	52.0	70.0
5KP64	5KP64C	64.0	71.00	86.90	5.0	10.0	114.0	44.0	85.0
5KP64A	5KP64CA	64.0	71.00	78.60	5.0	10.0	103.0	49.0	75.0
5KP70	5KP70C	70.0	77.00	95.10	5.0	10.0	125.0	40.0	93.0
5KP70A	5KP70CA	70.0	77.00	86.00	5.0	10.0	113.0	44.0	84.0
5KP75	5KP75C	75.0	83.30	102.00	5.0	10.0	134.0	37.0	100.0
5KP75A	5KP75CA	75.0	83.30	92.10	5.0	10.0	121.0	41.0	90.0
5KP78	5KP78C	78.0	86.70	106.00	5.0	10.0	139.0	36.0	104.0
5KP78A	5KP78CA	78.0	86.70	95.80	5.0	10.0	126.0	40.0	94.0
5KP85	5KP85C	85.0	94.40	115.00	5.0	10.0	151.0	33.0	113.0
5KP85A	5KP85CA	85.0	94.40	104.00	5.0	10.0	137.0	36.0	102.0
5KP90	5KP90C*	90.0	100.00	122.00	5.0	10.0	160.0	31.0	120.0
5KP90A	5KP90CA*	90.0	100.00	111.00	5.0	10.0	146.0	34.0	109.0
5KP100	5KP100C	100.0	111.00	136.00	5.0	10.0	179.0	28.0	134.0
5KP110	5KP110C*	110.0	122.00	149.00	5.0	10.0	196.0	26.0	147.0
5KP120	5KP120C	120.0	133.00	1603.0	5.0	10.0	215.0	23.0	158.0
5KP150*	5KP150C	150.0	166.00	204.00	5.0	10.0	268.0	18.5	200.0
5KP180	5KP180C	180.0	200.00	244.00	5.0	10.0	320.0	15.0	240.0

Suffix 'C' denotes Bi-directional device. Suffix 'A' denotes 5% tolerance device, no suffix denotes a 10% tolerance device.

1. For Bi-directional devices having V_R of 10 volts and below, the I_R limit is doubled.

2. $V_F = 3.5$ Volts max. for devices of $V_R < 100V$, and $V_F = 5.0$ Volts max for devices of $V_R > 100V$. $I_F = 100A$, 300 μs square wave.

* Preferred voltages.

**VOLTAGE RANGE 17 - 240 VOLTS 15000 WATT
PEAK PULSE POWER**

FEATURES

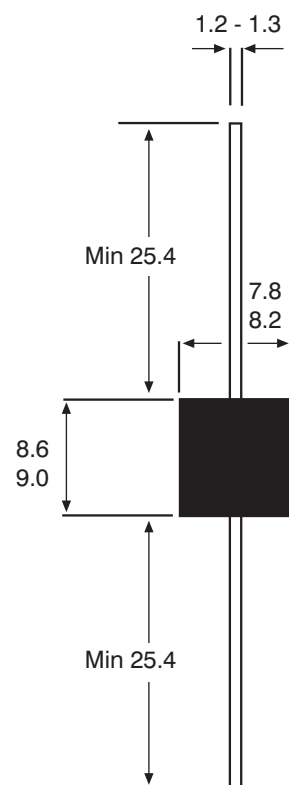
- Glass passivated junction
- Excellent clamping capability
- Fast response time
- Low zener impedance
- 100% surge tested
- UL recognised

MAXIMUM RATING

- Peak Pulse Power (Ppk): 15000 Watts (10 x 1000μs)@25°C
(see diagram on page 3 for wave form)
- 7 watt steady state
- Response time: 1×10^{-12} seconds (theoretical)
- Forward surge rating: 200 Amps, 8.3ms half sine wave,
(uni-directional devices only)
- Operating & storage temperature: -55°C to +150°C

MECHANICAL CHARACTERISTICS

- Case: JEDEC R6; Moulded plastic over glass passivated junction
- Terminals: Axial leads, solderable per MIL-STD-202 Method 208
- Solderable leads = 230°C for 10 seconds (1.59mm from case)
- Polarity: Cathode indicated by colour band
- Weight: 2.0 grammes (approx)



All dimensions in mm

Figure 1 - Typical capacitance vs. Breakdown Voltage

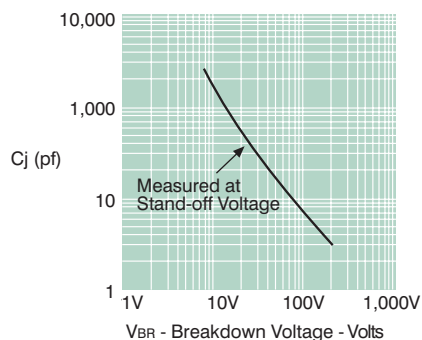
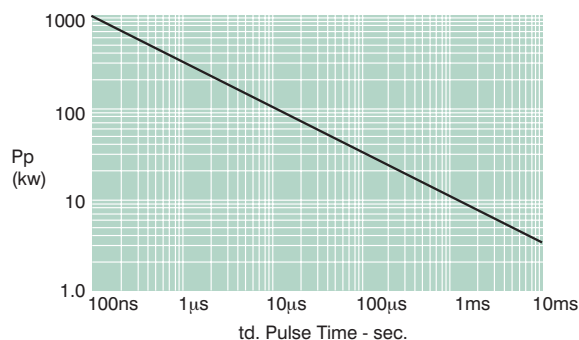


Figure 2 - Peak Pulse Power vs. Pulse Time



ORDERING INFORMATION

15KP

			C	A	
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Voltage

--	--	--	--	--	--

Bi-Directional

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5% Voltage Tolerance

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Packaging Option

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$B = \text{Bulk (500 pcs)}$
 $T = \text{Tape and reeled (1000 pcs)}$

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number (Uni)	Part Number (Bi)	Reverse Stand off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T		Maximum Reverse Leakage I_R @ V_R (μA)	Maximum Clamping Voltage V_C @ I_{PP} (Volts)	Maximum Peak Pulse Current I_{PP} (A)	Max Voltage Temperature Variation of V_{BR} (%/°C)
			MIN	(mA)				
15KP17	15KP17C	17.0	18.9	50.0	5000.0	32.2	464.0	19.0
15KP17A	15KP17CA	17.0	18.9	50.0	5000.0	29.3	512.0	17.0
15KP18	15KP18C	18.0	20.0	50.0	5000.0	34.2	439.0	20.0
15KP18A	15KP18CA	18.0	20.0	50.0	5000.0	30.9	485.0	18.0
15KP20	15KP20C	20.0	22.2	20.0	1500.0	37.9	396.0	24.0
15KP20A	15KP20CA	20.0	22.2	20.0	1500.0	34.3	437.0	21.0
15KP22	15KP22C	22.0	24.4	10.0	500.0	41.1	365.0	27.0
15KP22A	15KP22CA	22.0	24.4	10.0	500.0	37.1	404.0	24.0
15KP24	15KP24C	24.0	26.7	5.0	150.0	45.0	333.0	30.0
15KP24A	15KP24CA	24.0	26.7	5.0	150.0	40.7	369.0	27.0
15KP26	15KP26C	26.0	28.9	5.0	50.0	48.7	308.0	32.0
15KP26A	15KP26CA	26.0	28.9	5.0	50.0	44.0	341.0	29.0
15KP28	15KP28C	28.0	31.1	5.0	25.0	52.4	286.0	35.0
15KP28A	15KP28CA	28.0	31.1	5.0	25.0	47.5	316.0	31.0
15KP30	15KP30C	30.0	33.3	5.0	15.0	56.2	267.0	27.0
15KP30A	15KP30CA	30.0	33.3	5.0	15.0	50.7	296.0	34.0
15KP33*	15KP33C	33.0	36.7	5.0	10.0	60.6	248.0	42.0
15KP33A*	15KP33CA	33.0	36.7	5.0	10.0	54.8	274.0	38.0
15KP36*	15KP36C*	36.0	40.0	5.0	10.0	66.0	227.0	46.0
15KP36A*	15KP36CA*	36.0	40.0	5.0	10.0	59.7	251.0	41.0
15KP40*	15KP40C	40.0	44.4	5.0	10.0	72.8	206.0	51.0
15KP40A*	15KP40CA	40.0	44.4	5.0	10.0	65.8	228.0	46.0
15KP43	15KP43C	43.0	47.8	5.0	10.0	77.1	195.0	55.0
15KP43A	15KP43CA	43.0	47.8	5.0	10.0	69.7	215.0	50.0
15KP45	15KP45C	45.0	50.0	5.0	10.0	80.7	186.0	57.0
15KP45A	15KP45CA	45.0	50.0	5.0	10.0	73.0	205.0	52.0
15KP48*	15KP48C*	48.0	53.3	5.0	10.0	85.9	175.0	62.0
15KP48A*	15KP48CA*	48.0	53.3	5.0	10.0	77.7	193.0	56.0
15KP51	15KP51C	51.0	56.7	5.0	10.0	91.5	164.0	66.0
15KP51A	15KP51CA	51.0	56.7	5.0	10.0	82.8	181.0	60.0
15KP54	15KP54C*	54.0	60.0	5.0	10.0	96.8	155.0	70.0
15KP54A	15KP54CA*	54.0	60.0	5.0	10.0	87.5	171.0	63.0
15KP58	15KP58C	58.0	64.4	5.0	10.0	104.0	144.0	76.0
15KP58A	15KP58CA	58.0	64.4	5.0	10.0	94.0	160.0	68.0
15KP60	15KP60C	60.0	66.7	5.0	10.0	107.0	140.0	78.0
15KP60A	15KP60CA	60.0	66.7	5.0	10.0	97.3	154.0	71.0
15KP64	15KP64C	64.0	71.1	5.0	10.0	115.0	130.0	84.0
15KP64A	15KP64CA	64.0	71.1	5.0	10.0	104.0	144.0	76.0
15KP70	15KP70C*	70.0	77.8	5.0	10.0	126.0	119.0	92.0
15KP70A	15KP70CA*	70.0	77.8	5.0	10.0	114.0	132.0	83.0
15KP75	15KP75C	75.0	83.3	5.0	10.0	135.0	111.0	100.0
15KP75A	15KP75CA	75.0	83.3	5.0	10.0	122.0	123.0	89.0
15KP78	15KP78C	78.0	86.7	5.0	10.0	140.0	107.0	104.0
15KP78A	15KP78CA	78.0	86.7	5.0	10.0	126.0	119.0	93.0
15KP85	15KP85C	85.0	94.4	5.0	10.0	152.0	99.0	113.0
15KP85A	15KP85CA	85.0	94.4	5.0	10.0	137.0	109.0	102.0
15KP90	15KP90C	90.0	100.0	5.0	10.0	160.0	94.0	120.0
15KP100	15KP100C	100.0	111.0	5.0	10.0	179.0	84.0	134.0
15KP110	15KP110C	110.0	122.0	5.0	10.0	196.0	77.0	147.0
15KP110A	15KP110CA	110.0	122.0	5.0	10.0	178.0	84.0	133.0
15KP120	15KP120C	120.0	133.0	5.0	10.0	214.0	70.0	161.0
15KP130	15KP130C	130.0	144.0	5.0	10.0	231.0	65.0	174.0

Suffix 'C' denotes Bi-directional device. Suffix 'A' denotes 5% tolerance device, no suffix denotes a 10% tolerance device.

Maximum breakdown voltage is not specified.

* Preferred voltages.

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number (Uni)	Part Number (Bi)	Reverse Stand off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T		Maximum Reverse Leakage I_R @ V_R (μA)	Maximum Clamping Voltage V_C @ I_{PP} (Volts)	Maximum Peak Pulse Current I_{PP} (A)	Max Voltage Temperature Variation of V_{BR} (%/°C)
			MIN	(mA)				
15KP150	15KP150C	150.0	167.0	5.0	10.0	268.0	56.0	202.0
15KP160	15KP160C	160.0	178.0	5.0	10.0	287.0	52.0	216.0
15KP170	15KP170C	170.0	189.0	5.0	10.0	304.2	49.0	229.0
15KP180	15KP180C	180.0	200.0	5.0	10.0	321.0	47.0	242.0
15KP200	15KP200C	200.0	222.0	5.0	10.0	356.0	42.0	269.0
15KP220	15KP220C	220.0	245.0	5.0	10.0	393.0	38.0	297.0
15KP240	15KP240C	240.0	267.0	5.0	10.0	428.0	35.0	324.0

Suffix 'C' denotes Bi-directional device. Suffix 'A' denotes 5% tolerance device, no suffix denotes a 10% tolerance device.

Maximum breakdown voltage is not specified.

* Preferred voltages.

TELECOMMUNICATIONS TRANSIENT VOLTAGE SUPPRESSORS FOR PROTECTION AGAINST INDUCED LIGHTNING CONDITIONS

Designed to protect sensitive telecommunications electronics from transients which originate from induced lightning, power cross and inductive load switching etc., especially where breakover devices would cause nuisance latch-up.

Typical equipment would be: line cards, PABX, modems, multiplexers and NTDs.

FEATURES

- Foldback characteristics
- 2200 watts Peak Power rated with 10/1000µS pulse
- 30,000 watts Peak Pulse Power based on 8/20µS
- UL 94V-0 flammability classification

DESCRIPTION

The foldback characteristic of this device eliminates the clamping of the DC current, or the battery, used in telecom systems, so latch-up is eliminated. Latch-up can occur with breakover devices due to the conduction follow-on current supplied by the DC system, after the device has responded to a transient.

With breakover devices, latch-up will happen more readily as the ambient temperature rises because the holding current values will fall with rising temperature.

The Foldbak eliminates this problem whilst still providing high levels of protection.

ABSOLUTE MAXIMUM RATINGS @25°C case temp (unless otherwise noted)

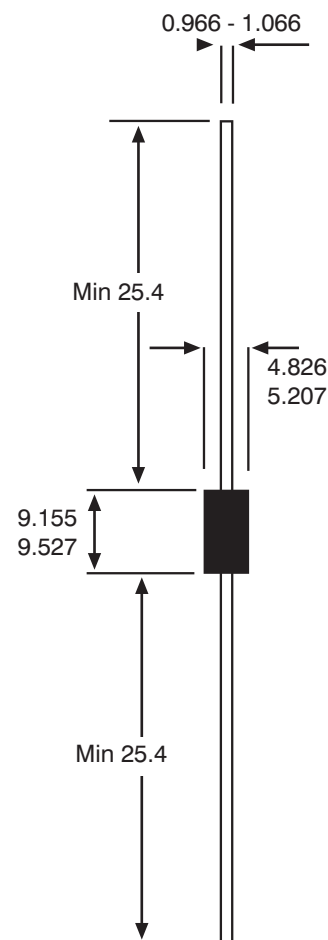
SYMBOL	PARAMETER	VALUE	Units
PPP	Peak Pulse Current	2,200	W
	10x1000µsec	20,000	W
PM (AV)	Steady state power dissipation, lead length 9.5mm, TL - 85°C (note 1)	5.0	W
T _j	Junction temperature	-55 to 150	°C
T _{stg}	Storage temperature	-55 to 150	°C

Note 1. Mounted on copper pad area 40mm square

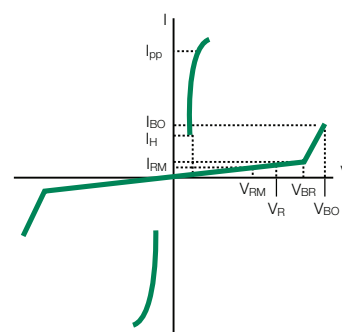
Characteristics @25°C case temp (unless otherwise noted)

DEVICE TYPE	Working voltage (V _r)	Maximum breakover Voltage (V _{bo})	Maximum leakage current (I _r) @ V _r	Minimum foldback voltage V _{fb}	Maximum Peak Pulse Current (I _{pp}) @ V _{cl} Note 2
	volts	volts	µA	volts	amps
FB120	120	170	1.0	55	170
FB160	160	220	1.0	110	220

Note 2. Using 10/1000µS pulse



All dimensions in mm



V-I Characteristic

HIGH POWER AUTOMOTIVE TRANSIENT VOLTAGE SUPPRESSORS FOR PROTECTION AGAINST LOAD DUMP CONDITIONS

FEATURES

- 2200 Watts Peak Power rated with 100µS/150mS pulse (applies to a single device)
- 50,000 Watts Peak Pulse Power based on 8/20µS (applies to a single device)
- UL 94V-0 Flammability classification

APPLICATION

- Designed to protect sensitive electronics which operate within an automotive system, such as: sound systems, satellite navigation, climate control, engine management, stability control, ABS etc.

DESCRIPTION

The SLD™ series is specifically designed for automotive applications, available in both unidirectional and bidirectional.

The SLD 10U is designed to be used in series, for example three 10Us in series for a 30 volt working; this configuration will provide a very high power (a multiple of 3) capability and is a far superior solution than using devices in parallel, which will require closely matched devices in order to prevent 'current hogging' and consequently, damage to the device.

ABSOLUTE MAXIMUM RATINGS @25°C case temp (unless otherwise noted)

SYMBOL	PARAMETER	VALUE	UNIT
PPP	Peak pulse power 100µ/150m sec. Pulse 8/20µ sec. Pulse	2,200 50,000	Watts Watts
PM (AV)	Steady state power dissipation, lead length 9.5mm, TL - 85 (note1)	6.3	Watts
Vf	Maximum instantaneous forward voltage @ 100amps (note 2)	3.5	Volts
Tj	Junction temperature	-55 to +150	°C
Tstg	Storage temperature	-55 to +150	°C

Note 1. Mounted on copper pad area 40mm square.

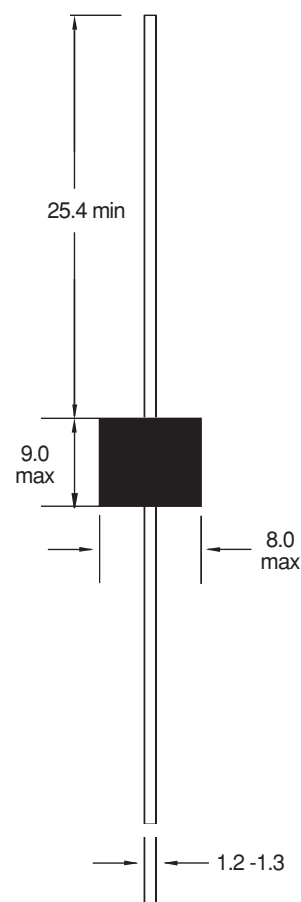
Note 2. Using 300 microsecond square pulse; applies to uni-directional only, and a single device only. For devices used in series, this value should be multiplied by the number of devices.

Characteristics @25°C case temp (unless otherwise noted)

Part Number	Working voltage (Vr)	Breakover Voltage (bv) @It			Maximum leakage current (Ir) @ Vr	Minimum clamping voltage (Vcl) @Ipp	Maximum Peak Pulse Current (Ipp) @ Vcl (Note 3)
		min	max	It			
	volts	volts		mA	µA	volts	amps
SLD 16U	16	18.0	22.0	1.0	10.0	28.6	76.0
SLD 10U	24	25.0	30.0	1.0	1.0	36.0	61.0
SLD 10U	10	11.8	13.0	5.0	10.0	19.0	115.0
3 x SLD 10U in series	30	35.4	39.0	5.0	10.0	45.0	100.0

Note 3. Using 100µS / 150mS pulse as defined by ISO7637/2 pulse #5.

Please note, U suffix denotes uni-directional.



All dimensions in mm

HIGH POWER TRANSIENT VOLTAGE SUPPRESSORS OPTIMISED FOR (8/20μS) INDUCED LIGHTNING CONDITIONS

Designed to protect sensitive electronics which operate within an environment of lightning induced, short duration, high current pulses.

FEATURES

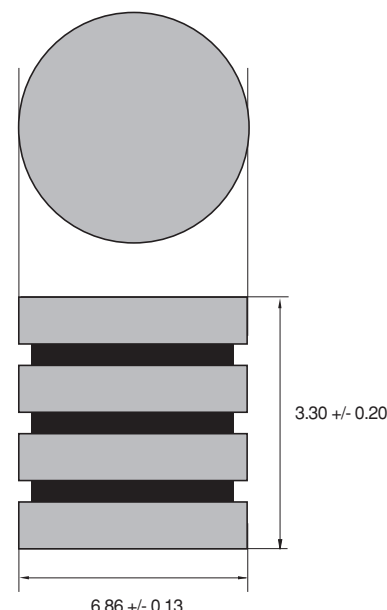
- 144,000 watts Peak Pulse Power based on 8/20μS (applies to a single device).
Devices can be arranged in series/parallel to increase surge handling capability.

DESCRIPTION

The 15KP cell series is specifically designed for high power, space limited applications. The cell construction provides three high power T.V.S. die connected in series via heat sinking electrodes.

Devices can be soldered to a substrate via one electrode; connection to the other electrode can then be made by soldering a suitable jumper.

These devices are designed so they can be used in series/parallel configuration in order to provide a very high power capability that is a far superior solution than using Metal Oxide Varistors. The low clamping voltage, high speed response and infinite life (if the maximum rating is not exceeded) make this ultimate protection for sensitive electronics.



All dimensions in mm unless otherwise stated

ABSOLUTE MAXIMUM RATINGS @25°C case temp (unless otherwise noted)

SYMBOL	PARAMETER	VALUE	Units
PPP	Peak Pulse Power 8-20μsec. Pulse	144,000	W
PM (AV)	Steady state power dissipation (note 1)	6.5	W
Vf	Maximum instantaneous forward voltage @100amps (note 2)	10.5	V
Tj	Junction Temperature	-55 to 150	°C
Tstg	Storage Temperature	-55 to 150	°C

Note 1. Mounted on copper pad area 40mm square.

Note 2. Using 300 microsecond square pulse; applies to uni-directional only, and a single device only. For devices used in series, this value should be multiplied by the number of devices.

Characteristics @25°C case temp (unless otherwise noted)

Part Number	Working voltage (Vr)	Breakover Voltage (bv) @It		Maximum leakage current (Ir) @ Vr	Minimum clamping voltage (Vcl) @Ipp	Maximum Peak Pulse Current (Ipp) @ Vcl (Note 3)
		min	It			
	volts	volts	mA	μA	volts	amps
15KP66CA	66	73.2	1.0	10.0	35.0	1500

Note 3. Using 8/@20μS pulse as defined by ITU.
Other voltages are available on request.

Individual 5KP cells also available, please contact sales for details.

ICTE/MPTE SERIES (1500 WATT) AXIAL TRANSIENT VOLTAGE SUPPRESSORS

The ICTE/MPTE series 1500 W transient suppressors are designed specifically for protection of CMOS, NMOS, BiMOS, and other integrated circuits available today for TTL, DTL, ECL, RTL, and linear functions. This series offers the lowest clamping voltages.

FEATURES

- Stand-off voltage range 5 to 45 Volts
- Uni-directional and Bi-directional
- Glass passivated junction
- Very low clamping voltages
- 100% surge tested

MAXIMUM RATING

- Peak Pulse Power (Ppk): 1500 Watts (10 x 1000µs)@25°C
(see diagram on page 3 for wave form)
- 5 watt steady state
- Response time: 1×10^{-12} seconds (theoretical)
- Forward surge rating 200 Amps, 8.3ms half sine wave, (uni-directional devices only)
- Operating & storage temperature: -55°C to +150°C

MECHANICAL CHARACTERISTICS

- Case: DO-201AD: Moulded plastic over glass passivated junction
- Terminals: Axial leads, solderable per MIL-STD-202 Method 208
- Solderable leads = 230°C for 10 seconds (1.59mm from case)
- Marking: cathode band, (positive terminal, uni-directional devices only), device code, logo
- Weight: 1.5 grammes (approx)

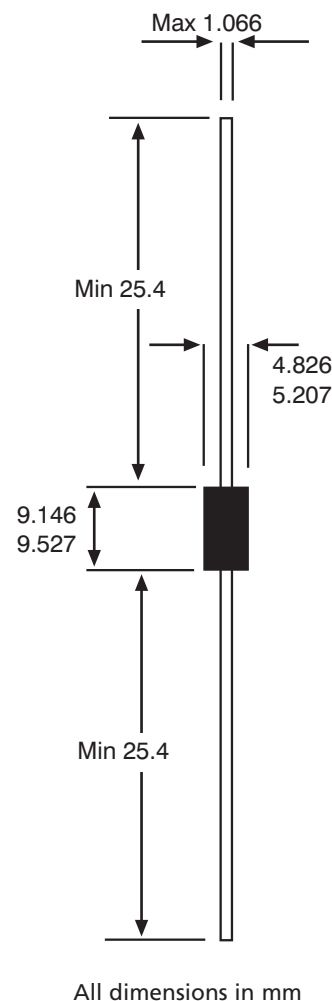


Figure 1 - Typical Junction Capacitance

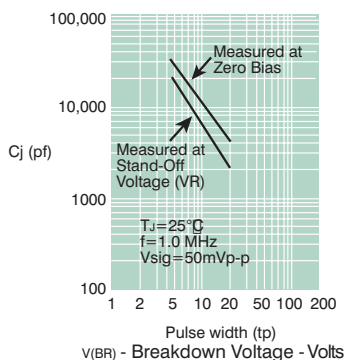
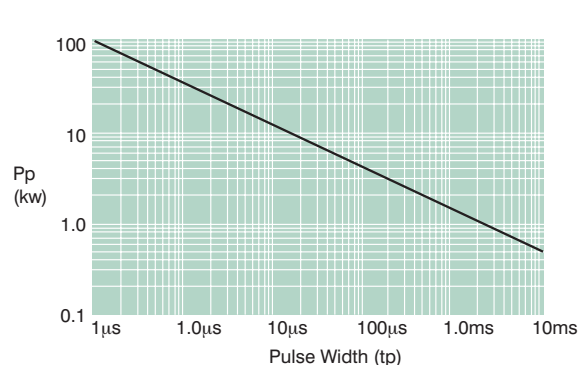


Figure 2 - Peak Pulse Power Rating Curve



ORDERING INFORMATION

ICTE or MPTE 
Voltage 
Bi-Directional 
Packaging Option 

B = Bulk (500 pcs)

T = Tape and reeled (1500 pcs)

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number	Reverse Standoff Voltage Vr (Volts)	Minimum Breakdown Voltage Vbr @1mA (Volts)	Maximum Reverse Leakage Ir @ Vr (μA)	Maximum Clamping Voltage Vc @ IPP 1=1A (Volts)	Maximum Clamping Voltage Vc @ IPP 2=10A (Volts)	Maximum Peak Pulse Current IPP (A)
ICTE-5/MPTE-5*	5.0	6.0	300.0	7.1	7.5	160.0
ICTE-8/MPTE-8*	8.0	9.4	25.0	11.3	11.5	100.0
ICTE-10/MPTE-10	10.0	11.7	2.0	13.7	14.1	90.0
ICTE-12/MPTE-12	12.0	14.1	2.0	16.1	16.5	70.0
ICTE-15/MPTE-15	15.0	17.6	2.0	20.1	20.6	60.0
ICTE-18/MPTE-18*	18.0	21.2	2.0	24.2	25.2	50.0
ICTE-22/MPTE-22	22.0	25.9	2.0	29.8	32.0	40.0
ICTE-36/MPTE-36	36.0	42.4	2.0	50.6	54.3	23.0
ICTE-45/MPTE-45	45.0	52.9	2.0	63.3	70.0	19.0

V_F max = 3.5 Volts max at I_F = 50A 300μS square wave pulse

ICTE-8C/MPTE-8C	8.0	9.4	50.0	11.4	11.6	100.0
ICTE-10C/MPTE-10C	10.0	11.7	2.0	14.1	14.5	90.0
ICTE-12C/MPTE-12C	12.0	14.1	2.0	16.7	17.1	70.0
ICTE-15C/MPTE-15C	15.0	17.6	2.0	20.8	21.4	60.0
ICTE-18C/MPTE-18C	18.0	21.2	2.0	24.8	25.5	50.0
ICTE-22C/MPTE-22C	22.0	25.9	2.0	30.8	32.0	40.0
ICTE-36C/MPTE-36C	36.0	42.4	2.0	50.6	54.3	23.0
ICTE-45C/MPTE-45C	45.0	52.9	2.0	63.3	70.0	19.0

ICTE-5 is not available in Bi-directional. Suffix 'C' denotes Bi-directional device. * Preferred voltages.

LCE SERIES (1500 WATT) AXIAL TRANSIENT VOLTAGE SUPPRESSORS (LOW CAPACITANCE DEVICE)

Device for data line interface circuit protection, the LCE series offers low shunt capacitance to prevent signal degradation. These devices can be used across transmission lines with signal levels up to 100MHz. For bi-directional applications, two LCE suppressors are required, connected anti-parallel with respect to each other, across the circuit to be protected.

FEATURES

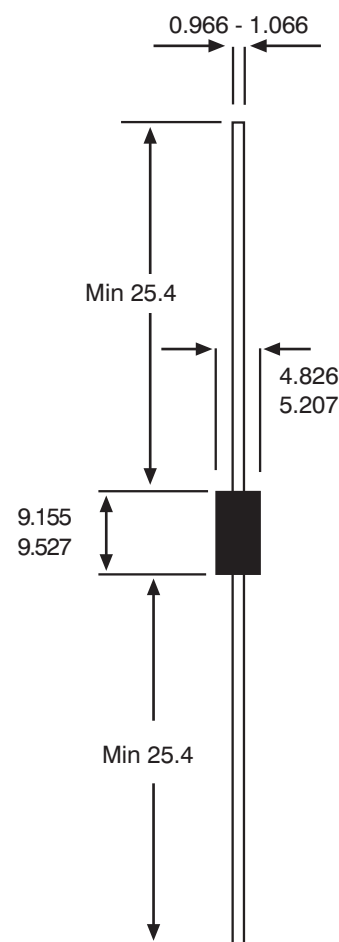
- Stand-off voltage range 6.5 to 90 Volts
- Uni-directional
- Glass passivated junction
- Low capacitance: 100pF (max)
- Low zener impedance
- 100% surge tested

MAXIMUM RATING

- Peak Pulse Power (Ppk): 1500 Watts (10 x 1000µs)@25°C
(see diagram on page 3 for wave form)
- 5 watt steady state
- Response time: 1×10^{-12} seconds (theoretical)
- Forward surge rating: 70 Amps, 8.3ms half sine wave, (uni-directional devices only)
- Operating & storage temperature: -55°C to +150°C

MECHANICAL CHARACTERISTICS

- Case: DO-201 AO; Moulded plastic over glass passivated junction
- Terminals: Axial leads, solderable per MIL-STD-202 Method 208
- Solderable leads = 230°C for 10 seconds (1.59mm from case)
- Marking: cathode band, device code, logo
- Weight: 1.5 grammes (approx)



All dimensions in mm

Figure 1 - Peak Pulse Power Rating Curve

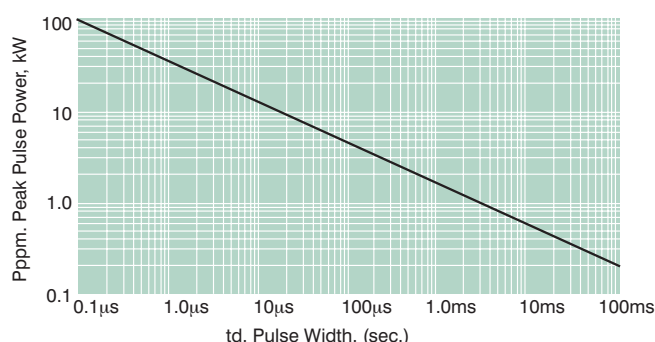
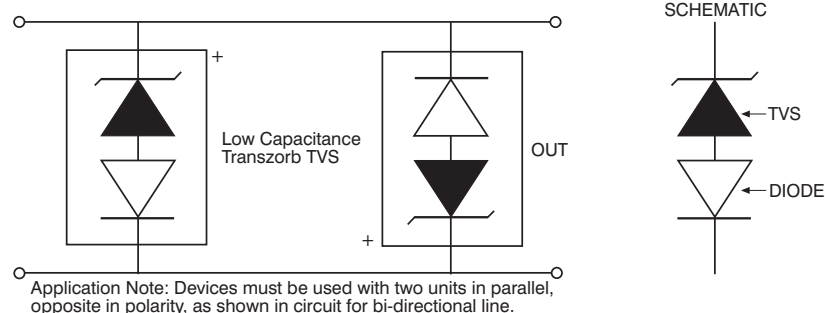
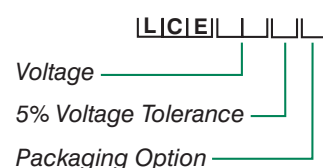


Figure 2 - AC Line Protection Application



ORDERING INFORMATION



B = Bulk (500 pcs)

T = Taped and reeled (1500 pcs)

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number	Reverse Stand off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T			Maximum Reverse Leakage I_R @ V_R (μA)	Maximum Clamping Voltage V_C @ I_{PP} (Volts)	Maximum Peak Pulse Current I_{PP} (A)	Capacitance @ 0 Volts pF	Working Inverse Blocking Voltage V_{WIB} (Volts)	Inverse Blocking Leakage Current @ I_{IB} @ V_{WIB} (μA)	Peak Inverse Blocking Voltage V_{PIB} (Volts)
		MIN	MAX	(mA)							
LCE6.5*	6.5	7.22	8.82	10.0	1000.0	12.3	100.0	100.0	75.0	1.0	100.0
LCE6.5A*	6.5	7.22	7.98	10.0	1000.0	11.2	100.0	100.0	75.0	1.0	100.0
LCE7.0	7.0	7.78	9.51	10.0	500.0	13.3	100.0	100.0	75.0	1.0	100.0
LCE7.0A	7.0	7.78	8.60	10.0	500.0	12.0	100.0	100.0	75.0	1.0	100.0
LCE7.5*	7.5	8.33	10.20	10.0	250.0	14.3	100.0	100.0	75.0	1.0	100.0
LCE7.5A*	7.5	8.33	9.21	10.0	250.0	12.9	100.0	100.0	75.0	1.0	100.0
LCE8.0	8.0	8.89	10.90	1.0	100.0	15.0	100.0	100.0	75.0	1.0	100.0
LCE8.0A	8.0	8.89	9.83	1.0	100.0	13.6	100.0	100.0	75.0	1.0	100.0
LCE8.5	8.5	9.44	11.50	1.0	50.0	15.9	94.0	100.0	75.0	1.0	100.0
LCE8.5A	8.5	9.44	10.40	1.0	50.0	14.4	100.0	100.0	75.0	1.0	100.0
LCE9.0	9.0	10.00	12.20	1.0	10.0	16.9	89.0	100.0	75.0	1.0	100.0
LCE9.0A	9.0	10.00	11.10	1.0	10.0	15.4	97.0	100.0	75.0	1.0	100.0
LCE10	10.0	11.10	13.60	1.0	5.0	18.8	80.0	100.0	75.0	1.0	100.0
LCE10A	10.0	11.10	12.30	1.0	5.0	17.0	88.0	100.0	75.0	1.0	100.0
LCE11	11.0	12.20	14.90	1.0	5.0	20.1	74.0	100.0	75.0	1.0	100.0
LCE11A	11.0	12.20	13.50	1.0	5.0	18.2	82.0	100.0	75.0	1.0	100.0
LCE12*	12.0	13.30	16.30	1.0	5.0	22.0	68.0	100.0	75.0	1.0	100.0
LCE12A*	12.0	13.30	14.70	1.0	5.0	19.9	75.0	100.0	75.0	1.0	100.0
LCE13*	13.0	14.40	17.60	1.0	5.0	23.8	63.0	100.0	75.0	1.0	100.0
LCE13A*	13.0	14.40	15.90	1.0	5.0	21.5	70.0	100.0	75.0	1.0	100.0
LCE14	14.0	15.60	19.10	1.0	5.0	25.8	58.0	100.0	75.0	1.0	100.0
LCE14A	14.0	15.60	17.20	1.0	5.0	23.2	65.0	100.0	75.0	1.0	100.0
LCE15	15.0	16.70	20.40	1.0	5.0	26.9	56.0	100.0	75.0	1.0	100.0
LCE15A	15.0	16.70	18.50	1.0	5.0	24.4	61.0	100.0	75.0	1.0	100.0
LCE16	16.0	17.80	21.80	1.0	5.0	28.8	52.0	100.0	75.0	1.0	100.0
LCE16A	16.0	17.80	19.70	1.0	5.0	26.0	57.0	100.0	75.0	1.0	100.0
LCE17	17.0	18.60	23.10	1.0	5.0	30.5	49.0	100.0	75.0	1.0	100.0
LCE17A	17.0	18.60	20.90	1.0	5.0	27.6	54.0	100.0	75.0	1.0	100.0
LCE18	18.0	20.00	24.40	1.0	5.0	32.2	46.0	100.0	75.0	1.0	100.0
LCE18A	18.0	20.00	22.10	1.0	5.0	29.2	51.0	100.0	75.0	1.0	100.0
LCE20	20.0	22.20	27.10	1.0	5.0	35.8	42.0	100.0	75.0	1.0	100.0
LCE20A	20.0	22.20	24.50	1.0	5.0	32.4	46.0	100.0	75.0	1.0	100.0
LCE22	22.0	24.40	29.80	1.0	5.0	39.4	38.0	100.0	75.0	1.0	100.0
LCE22A	22.0	24.40	26.90	1.0	5.0	35.5	42.0	100.0	75.0	1.0	100.0
LCE24	24.0	26.70	32.60	1.0	5.0	43.0	35.0	100.0	75.0	1.0	100.0
LCE24A	24.0	26.70	29.50	1.0	5.0	38.9	39.0	100.0	75.0	1.0	100.0
LCE26	26.0	28.90	35.30	1.0	5.0	46.6	32.0	100.0	75.0	1.0	100.0
LCE26A	26.0	28.90	31.90	1.0	5.0	42.1	36.0	100.0	75.0	1.0	100.0
LCE28	28.0	31.10	38.00	1.0	5.0	50.1	30.0	100.0	75.0	1.0	100.0
LCE28A	28.0	31.10	34.40	1.0	5.0	45.5	33.0	100.0	75.0	1.0	100.0
LCE30	30.0	33.30	40.70	1.0	5.0	53.5	28.0	100.0	75.0	1.0	100.0
LCE30A	30.0	33.30	36.80	1.0	5.0	48.4	31.0	100.0	75.0	1.0	100.0
LCE33	33.0	36.70	44.90	1.0	5.0	59.0	25.4	100.0	75.0	1.0	100.0
LCE33A	33.0	36.70	40.60	1.0	5.0	53.3	28.1	100.0	75.0	1.0	100.0
LCE36	36.0	40.00	48.90	1.0	5.0	64.3	23.3	100.0	75.0	1.0	100.0
LCE36A	36.0	40.00	44.20	1.0	5.0	58.1	25.8	100.0	75.0	1.0	100.0

Suffix 'A' denotes 5% tolerance device, no suffix denotes a 10% tolerance device.

* Preferred voltages.

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number	Reverse Stand off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T			Maximum Reverse Leakage I_R @ V_R (μA)	Maximum Clamping Voltage V_C @ I_{PP} (Volts)	Maximum Peak Pulse Current I_{PP} (A)	Capacitance @ 0 Volts pF	Working Inverse Blocking Voltage V_{WIB} (Volts)	Inverse Blocking Leakage Current @ I_{IB} @ V_{WIB} (μA)	Peak Inverse Blocking Voltage V_{PIB} (Volts)
		MIN	MAX	(mA)							
LCE40	40.0	44.4	54.3	1.0	5.0	71.4	21.0	100.0	75.0	1.0	100.0
LCE40A	40.0	44.4	49.1	1.0	5.0	64.5	23.3	100.0	75.0	1.0	100.0
LCE43	43.0	47.8	58.4	1.0	5.0	76.7	19.5	100.0	150.0	1.0	200.0
LCE43A	43.0	47.8	52.8	1.0	5.0	69.4	21.6	100.0	150.0	1.0	200.0
LCE45	45.0	50.0	61.1	1.0	5.0	80.3	18.7	100.0	150.0	1.0	200.0
LCE45A	45.0	50.0	55.3	1.0	5.0	72.7	20.6	100.0	150.0	1.0	200.0
LCE48	48.0	53.3	65.1	1.0	5.0	85.5	17.5	100.0	150.0	1.0	200.0
LCE48A	48.0	53.3	58.9	1.0	5.0	77.4	19.4	100.0	150.0	1.0	200.0
LCE51	51.0	56.7	69.3	1.0	5.0	91.1	16.5	100.0	150.0	1.0	200.0
LCE51A	51.0	56.7	62.7	1.0	5.0	82.4	18.2	100.0	150.0	1.0	200.0
LCE54	54.0	60.0	73.3	1.0	5.0	96.3	15.6	100.0	150.0	1.0	200.0
LCE54A	54.0	60.0	66.3	1.0	5.0	87.1	17.2	100.0	150.0	1.0	200.0
LCE58	58.0	64.4	78.7	1.0	5.0	103.0	14.6	100.0	150.0	1.0	200.0
LCE58A	58.0	64.4	71.2	1.0	5.0	93.6	16.0	100.0	150.0	1.0	200.0
LCE60	60.0	66.7	81.5	1.0	5.0	107.0	14.0	90.0	150.0	1.0	200.0
LCE60A	60.0	66.7	73.7	1.0	5.0	96.8	15.5	90.0	150.0	1.0	200.0
LCE64	64.0	71.1	86.9	1.0	5.0	114.0	13.2	90.0	150.0	1.0	200.0
LCE64A	64.0	71.1	78.6	1.0	5.0	103.0	14.6	90.0	150.0	1.0	200.0
LCE70	70.0	77.8	95.1	1.0	5.0	125.0	12.0	90.0	150.0	1.0	200.0
LCE70A	70.0	77.8	86.0	1.0	5.0	113.0	13.3	90.0	150.0	1.0	200.0
LCE75	75.0	83.3	102.0	1.0	5.0	134.0	11.2	90.0	150.0	1.0	200.0
LCE75A	75.0	83.3	91.1	1.0	5.0	121.0	12.4	90.0	150.0	1.0	200.0
LCE80	80.0	88.7	108.0	1.0	5.0	142.0	10.6	90.0	150.0	1.0	200.0
LCE80A	80.0	88.7	98.0	1.0	5.0	129.0	11.6	90.0	150.0	1.0	200.0
LCE90*	90.0	100.0	122.0	1.0	5.0	160.0	9.4	90.0	300.0	1.0	200.0
LCE90A*	90.0	100.0	111.0	1.0	5.0	146.0	10.3	90.0	300.0	1.0	200.0

Suffix 'A' denotes 5% tolerance device, no suffix denotes a 10% tolerance device.

Note: For Bi-directional protection two T.V.S. devices must be used when testing, Test T.V.S. in Avalanche direction, Do not pulse in forward direction. * Preferred voltages.

1N56 SERIES (1500 WATT) METAL AXIAL TRANSIENT VOLTAGE SUPPRESSORS (hermetically sealed package for harsh industrial environments)

FEATURES

- Breakdown voltage range 6.8 - 200 volts
- Glass passivated junction
- Excellent clamping capability
- Low zener impedance
- 100% surge tested
- -55°C to +150°C
- Hermetically sealed
- Uni-polar

MAXIMUM RATING

- Peak Pulse Power (Ppk): 1500 Watts (10 x 1000μs)@25°C
(see diagram on page 3 for wave form)
- 1 watt steady state
- Response time: 1×10^{-12} seconds (theoretical)
- Operating & storage temperature: -55°C to +150°C

MECHANICAL CHARACTERISTICS

- Case: Metal hermetically sealed DO-13 package
- Terminals: Axial leads, solderable per MIL-STD-202 Method 208
- Solderable leads = 230°C for 10 seconds (1.59mm from case)
- Polarity: cathode indicated by colour band
- Weight: 1.5 grammes (approx)

Figure 1 - Peak Power Derating Curve

Peak pulse power in percent of 25°C rating

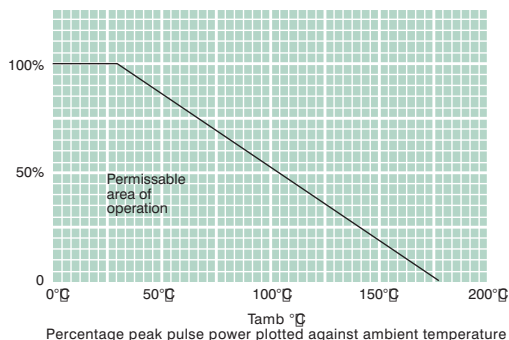


Figure 2 - Continuous D.C. Power Derating Curve

Continuous d.c. power dissipation

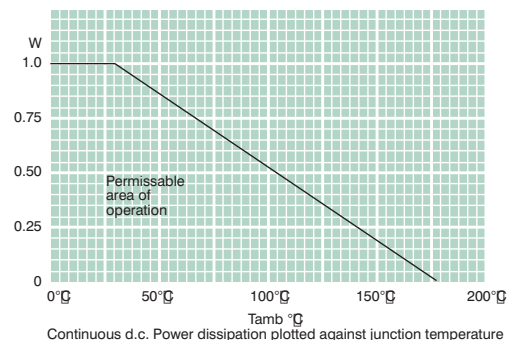
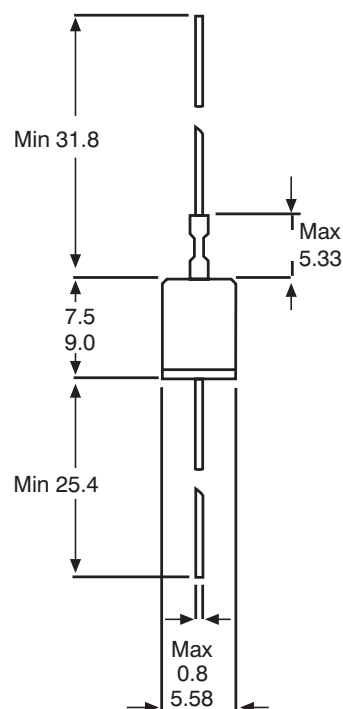
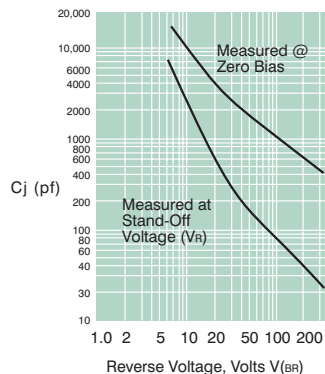


Figure 3 - Typical Junction Capacitance



All dimensions in mm

ORDERING INFORMATION

1 N 5 6 | X | X | A |

Voltage Reference

5% Voltage Tolerance

Packaging Option

B = Bulk (500 pcs)

1N5629 - 1N5665A series

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number	Reverse Stand Off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T			Maximum Reverse Leakage I_R @ V_R (μA)	Maximum Clamping Voltage V_C @ I_{PP} (Volts)	Maximum Peak Pulse Current I_{PP} (A)	Max Voltage Temperature Variation of V_{BR} (mV/°C)
		MIN	MAX	(mA)				
1N5629*	5.50	6.12	7.48	10	1000.0	10.8	139.0	5.0
1N5629A*	5.80	6.45	7.14	10	1000.0	10.5	143.0	5.0
1N5630	6.05	6.75	8.25	10	500.0	11.7	128.0	5.0
1N5630A	6.40	7.13	7.88	10	500.0	11.3	132.0	5.0
1N5631	6.63	7.38	9.02	10	200.0	12.5	120.0	6.0
1N5631A	7.02	7.79	8.61	10	200.0	12.1	124.0	6.0
1N5632	7.37	8.19	10.00	1.0	50.0	13.8	109.0	7.0
1N5632A	7.78	8.65	9.55	1.0	50.0	13.4	112.0	7.0
1N5633	8.10	9.00	11.00	1.0	10.0	15.0	100.0	8.0
1N5633A	8.55	9.50	10.50	1.0	10.0	14.5	103.0	8.0
1N5634	8.92	9.90	12.10	1.0	5.0	16.2	93.0	9.0
1N5634A	9.40	10.50	11.60	1.0	5.0	15.6	96.0	9.0
1N5635	9.72	10.80	13.20	1.0	5.0	17.3	87.0	10.0
1N5635A	10.20	11.40	12.60	1.0	5.0	16.7	90.0	10.0
1N5636	10.50	11.70	14.30	1.0	5.0	19.0	79.0	11.0
1N5636A	11.10	12.40	13.70	1.0	5.0	18.2	82.0	11.0
1N5637*	12.10	13.50	16.50	1.0	5.0	22.0	68.0	13.0
1N5637A*	12.80	14.30	15.80	1.0	5.0	21.2	71.0	12.0
1N5638*	12.90	14.40	17.60	1.0	5.0	23.5	64.0	16.0
1N5638A*	13.60	15.20	16.80	1.0	5.0	22.5	67.0	14.0
1N5639*	14.50	16.20	19.80	1.0	5.0	26.5	56.5	17.0
1N5639A*	15.30	17.10	18.90	1.0	5.0	25.2	59.5	19.0
1N5640	16.20	18.00	22.00	1.0	5.0	29.1	51.5	20.0
1N5640A	17.10	19.00	21.00	1.0	5.0	27.7	54.0	19.0
1N5641	17.80	19.80	24.20	1.0	5.0	31.9	47.0	21.0
1N5641A	18.80	20.90	23.10	1.0	5.0	30.6	49.0	20.0
1N5642	19.40	21.60	26.40	1.0	5.0	34.7	43.0	25.0
1N5642A	20.50	22.80	25.20	1.0	5.0	33.2	45.0	23.0
1N5643*	21.80	24.30	29.70	1.0	5.0	39.1	38.5	28.0
1N5643A*	23.10	25.70	28.40	1.0	5.0	37.5	40.0	25.0
1N5644*	24.30	27.00	33.00	1.0	5.0	43.5	34.5	31.0
1N5644A	25.60	28.50	31.50	1.0	5.0	41.4	36.0	28.0
1N5645	26.80	29.70	36.30	1.0	5.0	47.7	31.5	31.0
1N5645A	28.20	31.40	34.70	1.0	5.0	45.7	33.0	30.0
1N5646*	29.10	32.40	39.60	1.0	5.0	52.0	29.0	35.0
1N5646A*	30.80	34.20	37.80	1.0	5.0	49.9	30.0	31.0
1N5647	31.60	35.10	42.90	1.0	5.0	56.4	26.5	39.0
1N5647A	33.30	37.10	41.00	1.0	5.0	53.9	28.0	36.0
1N5648	34.80	38.70	47.30	1.0	5.0	61.9	24.0	46.0
1N5648A	36.80	40.90	45.20	1.0	5.0	59.3	25.3	44.0
1N5649*	38.10	42.30	51.70	1.0	5.0	67.8	22.2	50.0
1N5649A*	40.20	44.70	49.40	1.0	5.0	64.8	23.2	48.0
1N5650	41.30	45.90	56.10	1.0	5.0	73.5	20.4	55.0
1N5650A	43.60	48.50	53.60	1.0	5.0	70.1	21.4	51.0

Suffix 'A' denotes 5% tolerance device, no suffix denotes a 10% tolerance device.

1N5629 to 1N5647A V_F max = 3.5V at I_F = 50A 300 μ S square wave pulse.

1N5648 to 1N5665A V_F max = 5.0V at I_F = 50A 300 μ S square wave pulse.

* Preferred voltages.

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number	Reverse Stand Off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T			Maximum Reverse Leakage I_R @ V_R (μA)	Maximum Clamping Voltage V_C @ I_{PP} (Volts)	Maximum Peak Pulse Current I_{PP} (A)	Max Voltage Temperature Variation of V_{BR} (mV/°C)
		MIN	MAX	(mA)				
1N5651	45.4	50.4	61.6	1.0	5.0	80.5	18.6	58.0
1N5651A	47.8	53.2	58.8	1.0	5.0	77.0	19.5	56.0
1N5652	50.2	55.8	68.2	1.0	5.0	89.0	16.9	65.0
1N5652A	53.0	58.9	65.1	1.0	5.0	85.0	17.7	62.0
1N5653	55.1	61.2	74.8	1.0	5.0	98.0	15.3	71.0
1N5653A	58.1	64.6	71.4	1.0	5.0	92.0	16.3	69.0
1N5654	60.7	67.5	82.5	1.0	5.0	108.0	13.9	80.0
1N5654A	64.1	71.3	78.8	1.0	5.0	103.0	14.6	76.0
1N5655*	66.4	73.8	90.2	1.0	5.0	118.0	12.7	90.0
1N5655A*	70.1	77.9	86.1	1.0	5.0	113.0	13.3	86.0
1N5656*	73.7	81.9	100.0	1.0	5.0	131.0	11.4	99.0
1N5656A*	77.8	86.5	95.5	1.0	5.0	125.0	12.0	94.0
1N5657	81.0	90.0	110.0	1.0	5.0	144.0	10.4	109.0
1N5657A	85.5	95.0	105.0	1.0	5.0	137.0	11.0	104.0
1N5658	89.2	99.0	121.0	1.0	5.0	158.0	9.5	120.0
1N5658A	94.0	105.0	116.0	1.0	5.0	152.0	9.9	115.0
1N5659	97.2	108.0	132.0	1.0	5.0	173.0	8.7	131.0
1N5659A	102.0	114.0	126.0	1.0	5.0	165.0	9.1	125.0
1N5660*	105.0	117.0	143.0	1.0	5.0	187.0	8.0	142.0
1N5660A*	111.0	124.0	137.0	1.0	5.0	179.0	8.4	136.0
1N5661	121.0	135.0	165.0	1.0	5.0	215.0	7.0	164.0
1N5661A	128.0	143.0	158.0	1.0	5.0	207.0	7.2	157.0
1N5662	130.0	144.0	176.0	1.0	5.0	230.0	6.5	175.0
1N5662A	136.0	152.0	168.0	1.0	5.0	219.0	6.8	167.0
1N5663	138.0	153.0	187.0	1.0	5.0	244.0	6.2	186.0
1N5663A	145.0	162.0	179.0	1.0	5.0	234.0	6.4	188.0
1N5664	146.0	162.0	198.0	1.0	5.0	258.0	5.8	197.0
1N5664A	154.0	171.0	189.0	1.0	5.0	246.0	6.1	188.0
1N5665	162.0	180.0	220.0	1.0	5.0	287.0	5.2	219.0
1N5665A	171.0	190.0	210.0	1.0	5.0	274.0	5.5	209.0

Suffix 'A' denotes 5% tolerance device, no suffix denotes a 10% tolerance device.

1N5629 to 1N5647A V_F max = 3.5V at I_F = 50A 300 μ S square wave pulse.

1N5648 to 1N5665A V_F max = 5.0V at I_F = 50A 300 μ S square wave pulse.

* Preferred voltages.

1N6036 - 1N6072A series

1N60 SERIES (1500 WATT) METAL AXIAL TRANSIENT VOLTAGE SUPPRESSORS (hermetically sealed package for harsh industrial environments)

FEATURES

- Breakdown voltage range 6.8 - 200 volts
- Glass passivated junction
- Excellent clamping capability
- Low zener impedance
- 100% surge tested
- -55°C to +150°C
- Hermetically sealed
- Bi-directional

MAXIMUM RATING

- Peak Pulse Power (Ppk): 15000 Watts (10 x 1000µs)@25°C (see diagram on page 3 for wave form)
- 1 watt steady state
- Response time: 1×10^{-12} seconds (theoretical)
- Operating & storage temperature: -55°C to +150°C

MECHANICAL CHARACTERISTICS

- Case: Metal hermetically sealed DO-13 package
- Terminals: Axial leads, solderable per MIL-STD-202 Method 208
- Solderable leads = 230°C for 10 seconds (1.59mm from case)
- Weight: 1.5 grammes (approx)

Figure 1 - Peak Power Derating Curve

Peak pulse power in percent of 25°C rating

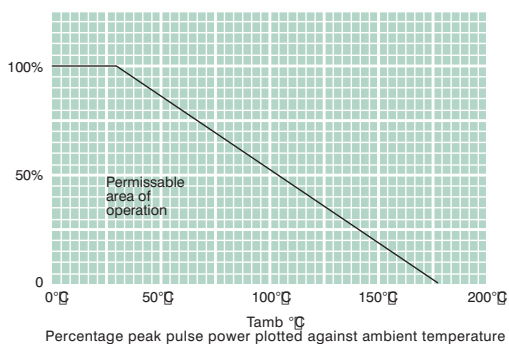
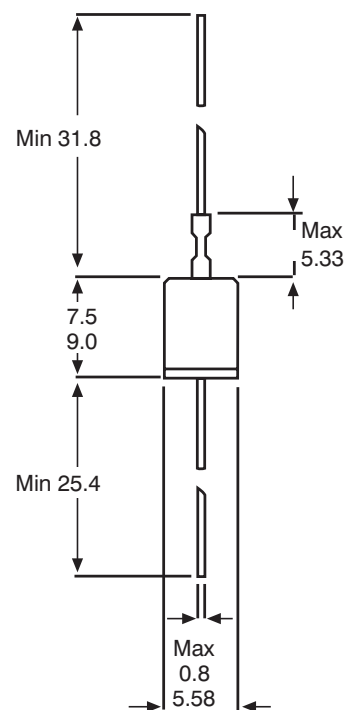
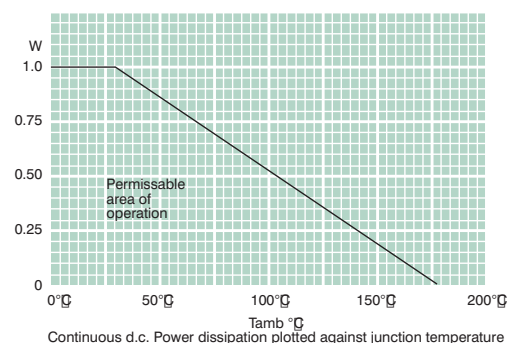


Figure 2 - Continuous D.C. Power Derating Curve

Continuous d.c. power dissipation



All dimensions in mm

ORDERING INFORMATION

1N60 [X][X][A][]

Voltage Reference

5% Voltage Tolerance

Packaging Option

B = Bulk (500 pcs)

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number	Reverse Stand Off Voltage V _R (Volts)	Breakdown Voltage V _{BR} (Volts) @ I _T			Maximum Reverse Leakage I _R @ V _R (μA)	Maximum Clamping Voltage V _C @ I _{PP} (Volts)	Maximum Peak Pulse Current I _{PP} (A)	Max Voltage Temperature Variation of V _{BR} (mV/°C)
		MIN	MAX	mA				
1N6036*	5.5	6.75	8.25	10	1000.0	11.7	128.0	5.0
1N6036A*	6.0	7.13	7.88	10	1000.0	11.3	132.0	5.0
1N6037*	6.5	7.38	9.02	10	500.0	12.5	120.0	5.0
1N6037A*	7.0	7.79	8.61	10	500.0	12.1	124.0	5.0
1N6038	7.0	8.19	10.00	1.0	200.0	13.8	109.0	7.0
1N6038A	7.5	8.65	9.55	1.0	200.0	13.4	112.0	7.0
1N6039	8.0	9.00	11.00	1.0	50.0	15.0	100.0	7.0
1N6039A	8.5	9.50	10.50	1.0	50.0	14.5	103.0	7.0
1N6040*	8.5	9.90	12.10	1.0	10.0	16.2	93.0	8.0
1N6040A*	9.0	10.50	11.60	1.0	10.0	15.6	96.0	8.0
1N6041*	9.0	10.80	13.20	1.0	5.0	17.3	87.0	9.0
1N6041A*	10.0	11.40	12.60	1.0	5.0	16.7	90.0	9.0
1N6042	10.0	11.70	14.30	1.0	5.0	19.0	79.0	10.0
1N6042A	11.0	12.40	13.70	1.0	5.0	18.2	82.0	10.0
1N6043	11.0	13.50	16.50	1.0	5.0	22.0	68.0	11.0
1N6043A	12.0	14.30	15.80	1.0	5.0	21.2	71.0	12.0
1N6044	12.0	14.40	17.60	1.0	5.0	23.5	64.0	12.0
1N6044A	13.0	15.20	16.80	1.0	5.0	22.5	67.0	13.0
1N6045*	14.0	16.20	19.80	1.0	5.0	26.5	56.5	14.0
1N6045A*	15.0	17.10	18.90	1.0	5.0	25.2	59.5	15.0
1N6046	16.0	18.00	22.00	1.0	5.0	29.1	51.5	17.0
1N6046A	17.0	19.00	21.00	1.0	5.0	27.7	54.0	18.0
1N6047	17.0	19.80	24.20	1.0	5.0	31.9	47.0	19.0
1N6047A	18.0	20.90	23.10	1.0	5.0	30.6	49.0	20.0
1N6048	19.0	21.60	26.40	1.0	5.0	34.7	43.0	24.0
1N6048A	20.0	22.80	25.20	1.0	5.0	33.2	45.0	24.0
1N6049*	21.0	24.30	29.70	1.0	5.0	39.1	38.5	27.0
1N6049A*	22.0	25.70	28.40	1.0	5.0	37.5	40.0	28.0
1N6050	24.0	27.00	33.00	1.0	5.0	43.5	34.5	36.0
1N6050A	25.0	28.50	31.50	1.0	5.0	41.4	36.0	31.0
1N6051*	26.0	29.70	36.30	1.0	5.0	47.7	31.5	32.0
1N6051A*	28.0	31.40	34.70	1.0	5.0	45.7	33.0	34.0
1N6052	29.0	32.40	39.60	1.0	5.0	52.0	29.0	36.0
1N6052A	30.0	34.20	37.80	1.0	5.0	49.9	30.0	37.0
1N6053*	31.0	35.10	42.90	1.0	5.0	56.4	26.5	39.0
1N6053A*	33.0	37.10	41.00	1.0	5.0	53.9	28.0	40.0
1N6054*	34.0	38.70	47.30	1.0	5.0	61.9	24.0	44.0
1N6054A*	36.0	40.90	45.20	1.0	5.0	59.3	25.3	43.0
1N6055*	38.0	42.30	51.70	1.0	5.0	67.8	22.2	49.0
1N6055A*	40.0	44.70	49.40	1.0	5.0	64.8	23.2	47.0
1N6056*	41.0	45.90	56.10	1.0	5.0	73.5	20.4	53.0
1N6056A*	43.0	48.50	53.60	1.0	5.0	70.1	21.4	51.0

Suffix 'A' denotes 5% tolerance device, no suffix denotes a 10% tolerance device.

* Preferred voltages.

1N6036 - 1N6072A series

ELECTRICAL SPECIFICATION @ Tamb 25°C

Part Number	Reverse Stand Off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T			Maximum Reverse Leakage I_R @ V_R (μA)	Maximum Clamping Voltage V_C @ I_{PP} (Volts)	Maximum Peak Pulse Current I_{PP} (A)	Max Voltage Temperature Variation of V_{BR} (mV/°C)
		MIN	MAX	mA				
1N6057	45.0	50.4	61.6	1.0	5.0	80.5	18.6	58.0
1N6057A	47.0	53.2	58.8	1.0	5.0	77.0	19.5	56.0
1N6058*	48.0	55.8	68.2	1.0	5.0	89.0	16.9	64.0
1N6058A*	53.0	58.9	65.1	1.0	5.0	85.0	17.7	62.0
1N6059*	55.0	61.2	74.8	1.0	5.0	98.0	15.3	70.0
1N6059A*	58.0	64.6	71.4	1.0	5.0	92.0	16.3	68.0
1N6060*	60.0	67.5	82.5	1.0	5.0	108.0	13.9	77.0
1N6060A*	64.0	71.3	78.8	1.0	5.0	103.0	14.6	75.0
1N6061*	66.0	73.8	90.2	1.0	5.0	118.0	12.7	84.0
1N6061A*	70.0	77.9	86.1	1.0	5.0	113.0	13.3	82.0
1N6062	73.0	81.9	100.0	1.0	5.0	131.0	11.4	90.0
1N6062A	75.0	86.5	95.5	1.0	5.0	125.0	12.0	86.0
1N6063*	81.0	90.0	110.0	1.0	5.0	144.0	10.4	99.0
1N6063A*	82.0	95.0	105.0	1.0	5.0	137.0	11.0	94.0
1N6064*	90.0	99.0	121.0	1.0	5.0	158.0	9.5	109.0
1N6064A*	94.0	105.0	116.0	1.0	5.0	152.0	9.9	104.0
1N6065	95.0	108.0	132.0	1.0	5.0	173.0	8.7	120.0
1N6065A	100.0	114.0	126.0	1.0	5.0	165.0	9.1	115.0
1N6066	105.0	117.0	143.0	1.0	5.0	187.0	8.0	131.0
1N6066A	110.0	124.0	137.0	1.0	5.0	179.0	8.4	125.0
1N6067	121.0	135.0	165.0	1.0	5.0	215.0	7.0	142.0
1N6067A	128.0	143.0	158.0	1.0	5.0	207.0	7.2	136.0
1N6068	137.0	153.0	187.0	1.0	5.0	258.0	5.8	164.0
1N6068A	145.0	162.0	179.0	1.0	5.0	245.0	6.1	157.0
1N6069*	145.0	162.0	198.0	1.0	5.0	274.0	5.5	175.0
1N6069A*	150.0	171.0	189.0	1.0	5.0	261.0	5.7	167.0
1N6070	155.0	171.0	210.0	1.0	5.0	292.0	5.1	186.0
1N6070A	160.0	181.0	200.0	1.0	5.0	278.0	5.4	188.0
1N6071*	165.0	180.0	220.0	1.0	5.0	308.0	4.9	197.0
1N6071A*	170.0	190.0	210.0	1.0	5.0	294.0	5.1	188.0
1N6072	175.0	198.0	242.0	1.0	5.0	344.0	4.3	219.0
1N6072A	185.0	209.0	231.0	1.0	5.0	328.0	4.6	209.0

Suffix 'A' denotes 5% tolerance device, no suffix denotes a 10% tolerance device.

* Preferred voltages.

Voltage range 7.5 - 75 Volts
 5000 Watt peak pulse power
 100 Watt steady state @ 25°C
 75 Watt steady state @ 65°C

FEATURES

- Glass passivated junction
- 5000 Watt surge capability at 1 ms
- Typically IR less than 1 μ A above 10V
- Excellent clamping capability
- Stud cathode & stud anode
- Operating temperature -55°C to +175°C
- 100% tested

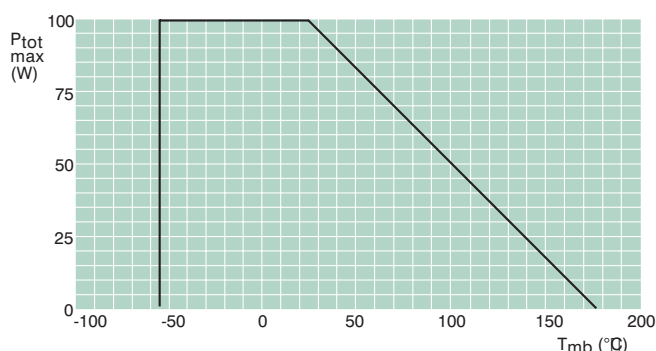
MECHANICAL CHARACTERISTICS

- Case: Hermetically sealed DO5 outline
- Finish: All external surfaces are corrosion resistant and terminal solderable
- Polarity: Indicated by direction of zener symbol
- Weight: 14 grammes excluding mounting kit (approx)
- Torque Setting 30inch/lb

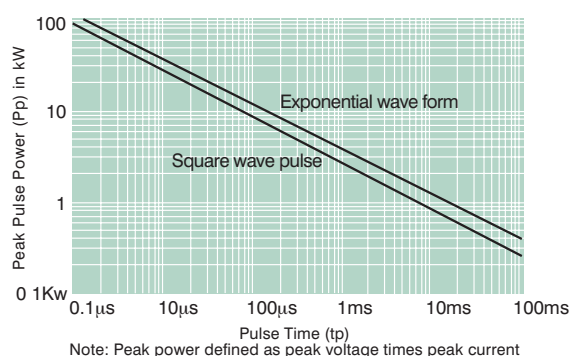
ELECTRICAL DATA

- Forward voltage V_f 1.5V max @ $I_f \leq 10A$ 300 μ S square wave pulse
- V_z measured with pulse $\leq 100\mu$ S and duty cycle ≤ 0.001
- R_z determined with DC plus 10% superimposed AC @ 1KHz

Maximum total dissipation plotted against mounting base temp



Non-repetitive peak pulse power rating curve



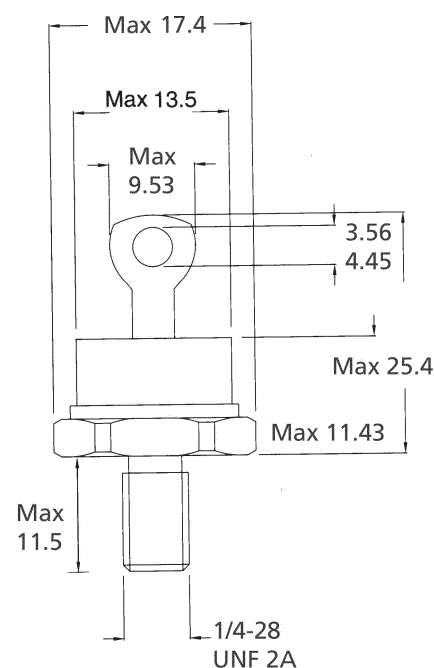
AVAILABLE IN THE
 FOLLOWING
 CONFIGURATIONS



STUD CATHODE NORMAL



STUD ANODE REVERSE



All dimensions in mm

ORDERING INFORMATION

BZY91C ☐ ☐ ☐ ☐ ☐
 Voltage ☐ ☐ ☐ ☐ ☐
 N = Stud Cathode Normal
 R = Stud Anode Reverse

ELECTRICAL SPECIFICATION @ Tamb 25°C

Stud Cathode Part Number	Stud Anode Part Number	Zener Voltage Vz (Volts) @ Iz		Iz (A)	Zener Resistance Rz (Ω) @ Iz Typ	Maximum Reverse Leakage IR @ VR		
		MIN	MAX			Max	(mA)	(Volts)
BZY91C7V5	BZY91C7V5R	7.0	7.9	5.0	0.04	0.2	5.0	5.1
BZY91C8V2	BZY91C8V2R	7.7	8.7	5.0	0.06	0.3	5.0	5.6
BZY91C9V1	BZY91C9V1R	8.5	9.6	2.0	0.08	0.4	5.0	6.2
BZY91C10*	BZY91C10R	9.4	10.6	2.0	0.08	0.4	1.0	6.8
BZY91C11	BZY91C11R	10.4	11.6	2.0	0.08	0.4	1.0	7.5
BZY91C12*	BZY91C12R	11.4	12.7	2.0	0.10	0.5	1.0	8.2
BZY91C13	BZY91C13R	12.4	14.1	2.0	0.10	0.5	1.0	9.1
BZY91C15*	BZY91C15R*	13.8	15.6	2.0	0.12	0.6	1.0	10.0
BZY91C16	BZY91C16R	15.3	17.1	2.0	0.12	0.6	1.0	11.0
BZY91C18	BZY91C18R	16.8	19.1	2.0	0.14	0.7	1.0	12.0
BZY91C20*	BZY91C20R	18.8	21.2	1.0	0.16	0.8	1.0	13.0
BZY91C22	BZY91C22R*	20.8	23.3	1.0	0.16	0.8	1.0	15.0
BZY91C24*	BZY91C24R	22.7	25.9	1.0	0.18	0.9	1.0	16.0
BZY91C27	BZY91C27R*	25.1	28.9	1.0	0.20	1.0	1.0	18.0
BZY91C30*	BZY91C30R	28.0	32.0	1.0	0.22	1.1	1.0	20.0
BZY91C33*	BZY91C33R	31.0	35.0	1.0	0.24	1.2	1.0	22.0
BZY91C36	BZY91C36R	34.0	38.0	1.0	0.26	1.3	1.0	24.0
BZY91C39*	BZY91C39R	37.0	41.0	0.5	0.28	1.4	1.0	27.0
BZY91C43*	BZY91C43R	40.0	46.0	0.5	0.30	1.5	1.0	30.0
BZY91C47	BZY91C47R	44.0	50.0	0.5	0.34	1.7	1.0	33.0
BZY91C51	BZY91C51R	48.0	54.0	0.5	0.36	1.8	1.0	36.0
BZY91C56*	BZY91C56R	52.0	60.0	0.5	0.4	2.0	1.0	39.0
BZY91C62	BZY91C62R*	58.0	66.0	0.5	0.44	2.2	1.0	43.0
BZY91C68	BZY91C68R	64.0	72.0	0.5	0.48	2.4	1.0	47.0
BZY91C75*	BZY91C75R	70.0	79.0	0.5	0.51	2.6	1.0	51.0

* Preferred voltages.

Voltage Range 7.5 -75 Volts
1500 Watt Peak Pulse Power
20 Watt Steady State @ 75°C
15 Watt Steady State @ 100°C

FEATURES

- Glass passivated junction
- 1500 Watt surge capability at 1 ms
- Typically IR less than 5 μ A above 10V
- Excellent clamping capability
- Stud cathode & stud anode
- Operating temperature -55°C to +175°C
- 100% tested

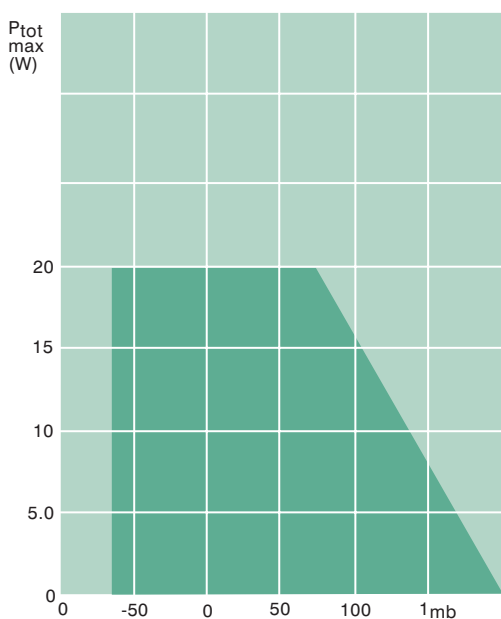
MECHANICAL CHARACTERISTICS

- Case: Hermetically sealed DO4 outline
- Finish: All external surfaces are corrosion resistant and terminal solderable
- Polarity: Indicated by direction of zener symbol
- Weight: 4.2 grammes excluding mounting kit (approx)
- Torque setting 13inch/lb

ELECTRICAL DATA

- Forward voltage V_F 1.5V max @ $I_F \leq 5A$ 300 μ S square wave pulse
- V_Z measured with pulse $\leq 100\mu$ S and duty cycle ≤ 0.001
- R_Z determined with DC plus 10% superimposed AC @ 1KHz

Maximum total dissipation plotted
 against mounting base temp



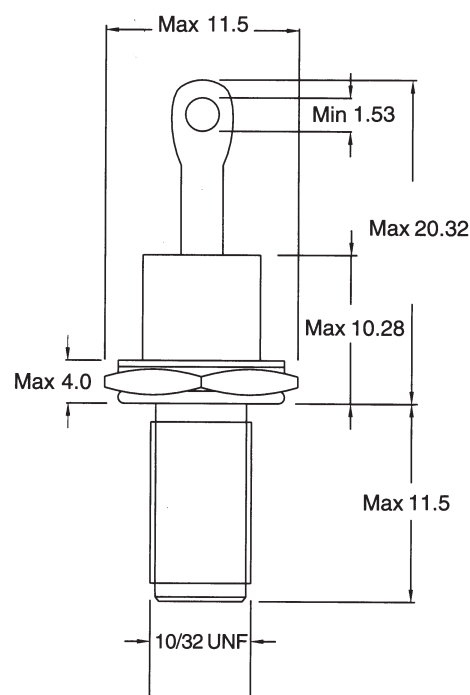
AVAILABLE IN THE
 FOLLOWING
 CONFIGURATIONS



STUD CATHODE NORMAL



STUD ANODE REVERSE



All dimensions in mm

ORDERING INFORMATION

BZY93C [] [] [] []
 Voltage []
 N = Stud Cathode Normal
 R = Stud Anode Reverse

ELECTRICAL SPECIFICATION @ Tamb 25°C

Stud Cathode Part Number	Stud Anode Part Number	Zener Voltage Vz (Volts) @ Iz		Iz (A)	Zener Resistance Rz (Ω) @ Iz		Maximum Reverse Leakage IR @ VR	
		MIN	MAX		Typ	Max	(mA)	(Volts)
BZY93C7V5*	BZY93C7V5R	7.0	7.9	2.0	0.04	0.3	0.10	5.1
BZY93C8V2	BZY93C8V2R	7.7	8.7	2.0	0.05	0.3	0.10	5.6
BZY93C9V1*	BZY93C9V1R	8.5	9.6	1.0	0.07	0.5	0.05	6.2
BZY93C10	BZY93C10R	9.4	10.6	1.0	0.09	0.5	0.05	6.8
BZY93C11	BZY93C11R	10.4	11.6	1.0	0.08	1.0	0.05	7.5
BZY93C12*	BZY93C12R*	11.4	12.7	1.0	0.08	1.0	0.05	8.2
BZY93C13*	BZY93C13R*	12.4	14.1	1.0	0.08	1.0	0.05	9.1
BZY93C15	BZY93C15R*	13.8	15.6	1.0	0.10	1.2	0.05	10
BZY93C16	BZY93C16R	15.3	17.1	0.5	0.18	1.2	0.05	11
BZY93C18*	BZY93C18R*	16.8	19.1	0.5	0.20	1.5	0.05	12
BZY93C20	BZY93C20R	18.8	21.2	0.5	0.20	1.5	0.05	13
BZY93C22	BZY93C22R	20.8	23.3	0.5	0.21	1.8	0.05	15
BZY93C24	BZY93C24R	22.7	25.9	0.5	0.22	2.0	0.05	16
BZY93C27	BZY93C27R*	25.1	28.9	0.5	0.25	2.0	0.05	18
BZY93C30*	BZY93C30R	28.0	32.0	0.5	0.30	2.5	0.05	20
BZY93C33	BZY93C33R	31.0	35.0	0.5	0.75	4.0	0.05	22
BZY93C36	BZY93C36R*	34.0	38.0	0.2	0.85	5.0	0.05	24
BZY93C39	BZY93C39R	37.0	41.0	0.2	0.90	6.5	0.05	27
BZY93C43	BZY93C43R	40.0	46.0	0.2	1.00	7.0	0.05	30
BZY93C47	BZY93C47R	44.0	50.0	0.2	1.00	7.5	0.05	33
BZY93C51	BZY93C51R	48.0	54.0	0.2	1.20	8.0	0.05	36
BZY93C56*	BZY93C56R	52.0	60.0	0.2	1.30	9.0	0.05	39
BZY93C62	BZY93C62R	58.0	66.0	0.2	1.50	10.0	0.05	43
BZY93C68	BZY93C68R*	64.0	72.0	0.2	1.80	11.0	0.05	47
BZY93C75*	BZY93C75R	70.0	79.0	0.2	2.00	15.0	0.05	51

* Preferred voltages.