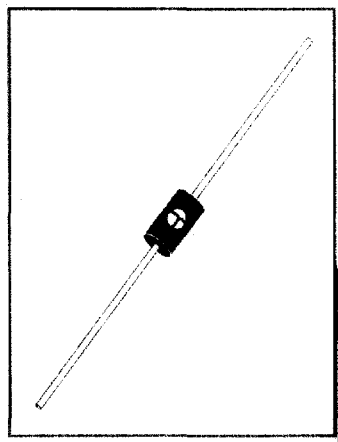
PROTEK DEVICES®

.....Engineered solutions for the transient environment

TVS
Transient Voltage Suppressors
1.5KE6.8 thru 1.5KE400A

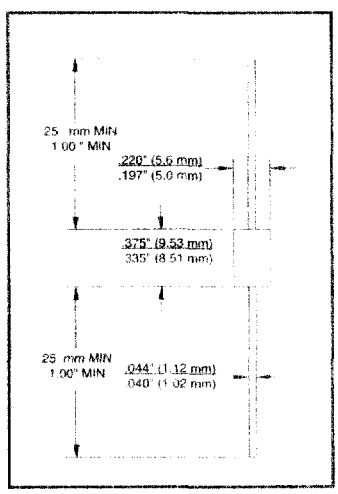


DESCRIPTION

This TVS family is a series of silicon transient voltage suppressors for use in applications where large voltage transients can permanently damage voltage sensitive components.

TVS diodes are characterized by their high surge capability, extremely fast response time, and low impedance, (Ron). Because of the unpredictable nature of transients, and the variation of the impedance with respect to these transients, impedance, per se, is not a specified parametric value. However, a minimum voltage (V_{BR}) at low current conditions and a maximum clamping voltage (V_C) at a maximum peak pulse current is specified. In addition, a maximum clamping ratio is indicated. In some instances, the thermal effect (see V_C Clamping Voltage) may be responsible for 50 to 70 percent of the observed voltage differential when subjected to high current pulses or severe duty cycles, thus making maximum impedance specification insignificant. Curves depicting clamping voltage vs. various current pulses are available from the factory. Extended power curves vs. pulse time are also available.

This TVS series has a peak pulse power rating of 1500 watts for one millisecond and therefore can be used in applications where induced lightning on rural or remote transmission lines present a hazard to electronic circuitry. The response time of TVS clamping action is theoretically instantaneous (1×10^{-12} sec); therefore, they can protect Integrated Circuits, MOS devices, Hybrids, and other voltage-sensitive semiconductors and components. TVSs can also be used in series or parallel to increase the peak power ratings (contact the factory for details). This is only one of many series of Transient Voltage Suppressors available from ProTek Devices.



FEATURES

- **1500 watts peak power dissipation**
- **Available in ranges from 6.8 to 400 Volts**
- **Unidirectional and Bidirectional Device Types**
- **UL 94V-0 Flammability Classification**

MAXIMUM RATINGS

- 1500 Watts of Peak Pulse Power dissipation at 25°C (see Figure 1)
- Operating and Storage temperatures: -65° to +175°C
- Forward surge rating: 200 amps, 1/120 second at 25°C
- Steady State power dissipation: 5.0 watts T_A = 25°C, Lead Length = 3/8"
- Repetition rate (duty cycle): .01%
- $t_{clamping}$ (0 volts V_{BR} min): Less than 1×10^{-12} seconds (10×10^{-9} for bidirectional)

MECHANICAL CHARACTERISTICS

- Molded case
- Weight: 1.5 grams (approximate)
- Positive terminal marked with band (unidirectional only)
- Body marked with Logo and type number

FIGURE 1
PEAK PULSE POWER vs PULSE TIME

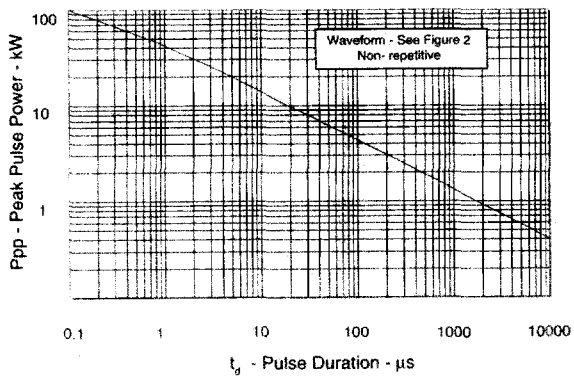


FIGURE 2
PULSE WAVE FORM

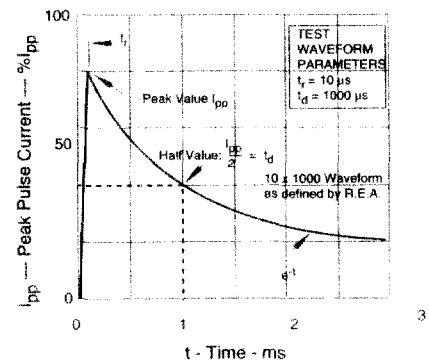
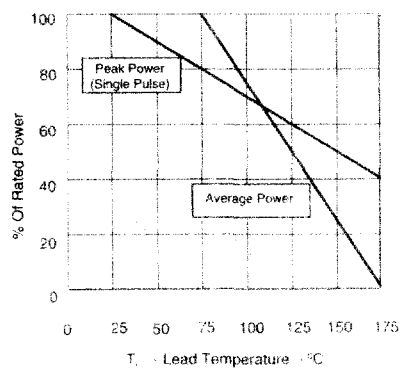


FIGURE 3
DERATING CURVE

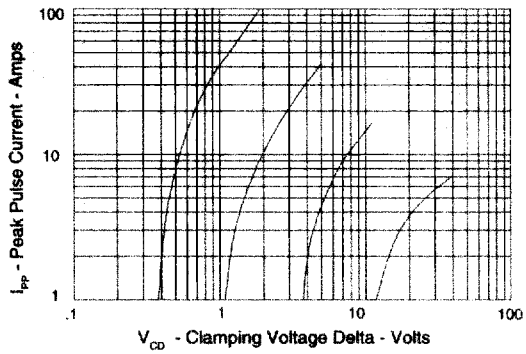


ELECTRICAL CHARACTERISTICS @ 25° C

	PROTEK Part Number	RATED STAND-OFF VOLTAGE (See Note 1) V_{WM} VOLTS	BREAKDOWN VOLTAGE V_{BR} @ I_T VOLTS Min	Max	mA	MAXIMUM STANDBY CURRENT @V_{WM} I_D µA	MAXIMUM CLAMPING VOLTAGE @I_{PP} (See Fig. 2) V_C VOLTS	MAXIMUM PEAK PULSE CURRENT (See Fig. 2) I_{PP} A	MAXIMUM TEMPERATURE COEFFICIENT OF V_{BR} mV/°C
P	1.5KE6.8	5.50	6.12	7.48	10	1000	10.8	139	5.0
P	1.5KE6.8A	5.80	6.45	7.14	10	1000	10.5	143	5.0
P	1.5KE7.5	6.05	6.75	8.25	10	500	11.7	128	5.0
P	1.5KE7.5A	6.40	7.13	7.88	10	500	11.3	132	5.0
	1.5KE8.2	6.83	7.38	9.02	10	200	12.5	120	6.0
	1.5KE8.2A	7.02	7.79	8.61	10	200	12.1	124	6.0
	1.5KE9.1	7.37	8.19	10.0	1	50	13.8	109	7.0
	1.5KE9.1A	7.78	8.65	9.55	1	50	13.4	112	7.0
	1.5KE10	8.10	9.0	11.0	1	10	15.0	100	8.0
	1.5KE10A	8.55	9.5	10.5	1	10	14.5	103	8.0
	1.5KE11	8.92	9.9	12.1	1	5	16.2	93	9.0
	1.5KE11A	9.40	10.5	11.6	1	5	15.6	96	9.0
P	1.5KE12	9.72	10.8	13.2	1	5	17.3	87	10
P	1.5KE12A	10.2	11.4	12.6	1	5	16.7	90	10
	1.5KE13	10.5	11.7	14.3	1	5	19.0	79	11
	1.5KE13A	11.1	12.4	13.7	1	5	18.2	82	11
	1.5KE15	12.1	13.5	16.5	1	5	22.0	68	13
	1.5KE15A	12.8	14.3	15.8	1	5	21.2	71	12
	1.5KE16	12.9	14.4	17.6	1	5	23.5	64	16
	1.5KE16A	13.6	15.2	16.8	1	5	22.5	67	14
P	1.5KE18	14.5	16.2	19.8	1	5	26.5	56.5	17
P	1.5KE18A	15.3	17.1	18.9	1	5	25.2	59.5	19
	1.5KE20	16.2	18.0	22.0	1	5	29.1	51.5	20
	1.5KE20A	17.1	19.0	21.0	1	5	27.7	54	19
	1.5KE22	17.8	19.8	24.2	1	5	31.9	47	21
	1.5KE22A	18.8	20.9	23.1	1	5	30.6	49	20
P	1.4KE24	19.4	21.6	26.4	1	5	34.7	43	25
P	1.5KE24A	20.5	22.8	25.2	1	5	33.2	45	23
	1.5KE27	21.8	24.3	29.7	1	5	39.1	38.5	28
	1.5KE27A	23.1	25.7	28.4	1	5	37.5	40	25
P	1.5KE30	24.3	27.0	33.0	1	5	43.5	34.5	31
P	1.5KE30A	25.6	28.5	31.5	1	5	41.5	36	28
P	1.5KE33	26.8	29.7	36.3	1	5	47.7	31.5	31
P	1.5KE33A	28.2	31.4	34.7	1	5	45.7	33	30
P	1.5KE36	29.1	32.4	39.6	1	5	52.0	29	35
P	1.5KE36A	30.8	34.2	37.8	1	5	49.9	30	31
P	1.5KE39	31.6	35.1	42.9	1	5	56.4	26.5	39
P	1.5KE39A	33.3	37.1	41.0	1	5	53.9	28	36
P	1.5KE43	34.8	38.7	47.3	1	5	61.9	24	46
P	1.5KE43A	36.8	40.9	45.2	1	5	59.3	25.3	44
	1.5KE47	38.1	42.3	51.7	1	5	67.8	22.2	50
	1.5KE47A	40.2	44.7	49.4	1	5	64.8	23.2	48
	1.5KE51	41.3	45.9	56.1	1	5	73.5	20.4	55
	1.5KE51A	43.6	48.5	53.6	1	5	70.1	21.4	51
P	1.5KE56	45.6	50.4	61.6	1	5	80.5	18.6	58
P	1.5KE56A	47.8	53.2	58.8	1	5	77.0	19.5	56
P	1.5KE62	50.2	55.8	68.2	1	5	89.0	16.9	65
P	1.5KE62A	53.0	58.9	65.1	1	5	85.0	17.7	62
	1.5KE68	55.1	61.2	74.8	1	5	98.0	15.3	71
	1.5KE68A	58.1	64.6	71.4	1	5	92.0	16.3	69
	1.5KE75	60.7	67.5	82.5	1	5	108.0	13.9	80
	1.5KE75A	64.1	71.3	78.8	1	5	103.0	14.6	76
	1.5KE82	66.4	73.8	90.2	1	5	118.0	12.7	90
	1.5KE82A	70.1	77.9	86.1	1	5	113.0	13.3	86
	1.5KE91	73.7	81.9	100.0	1	5	131.0	11.4	99
	1.5KE91A	77.8	86.5	95.5	1	5	125.0	12.0	94
	1.5KE100	81.0	90.0	110.0	1	5	144.0	10.4	109
	1.5KE100A	85.5	95.0	105.0	1	5	137.0	11.0	104
P	1.5KE110	89.2	99.0	121.0	1	5	158.0	9.5	120
P	1.5KE110A	94.0	105.0	116.0	1	5	152.0	9.9	115
	1.5KE120	97.2	108.0	132.0	1	5	173.0	8.7	131
	1.5KE120A	102.0	114.0	126.0	1	5	165.0	9.1	125
	1.5KE130	105.0	117.0	143.0	1	5	187.0	8.0	142
	1.5KE130A	111.0	124.0	137.0	1	5	179.0	8.4	136
	1.5KE150	121.0	135.0	165.0	1	5	215.0	7.0	164
	1.5KE150A	128.0	143.0	158.0	1	5	207.0	7.2	157
	1.5KE160	130.0	144.0	176.0	1	5	230.0	6.5	175
	1.5KE160A	136.0	152.0	168.0	1	5	219.0	6.8	167
	1.5KE170	138.0	153.0	187.0	1	5	244.0	6.2	186
	1.5KE170A	145.0	162.0	179.0	1	5	234.0	6.4	188
	1.5KE180	146.0	162.0	198.0	1	5	258.0	5.8	197
	1.5KE180A	154.0	171.0	189.0	1	5	246.0	6.1	188
P	1.5KE200	162.0	180.0	220.0	1	5	287.0	5.2	219
P	1.5KE200A	171.0	190.0	210.0	1	5	274.0	5.5	209
P	1.5KE220	175.0	198.0	242.0	1	5	344.0	4.3	240
P	1.5KE220A	185.0	209.0	231.0	1	5	328.0	4.6	230
	1.5KE250	202.0	225.0	275.0	1	5	360.0	5.0	270
	1.5KE250A	214.0	237.0	263.0	1	5	344.0	5.0	260
	1.5KE300	243.0	270.0	330.0	1	5	430.0	5.0	330
	1.5KE300A	256.0	285.0	315.0	1	5	414.0	5.0	315
	1.5KE350	284.0	315.0	385.0	1	5	504.0	4.0	385
	1.5KE350A	300.0	332.0	368.0	1	5	482.0	4.0	368
P	1.5KE400	324.0	360.0	440.0	1	5	574.0	4.0	440
P	1.5KE400A	342.0	380.0	420.0	1	5	548.0	4.0	420

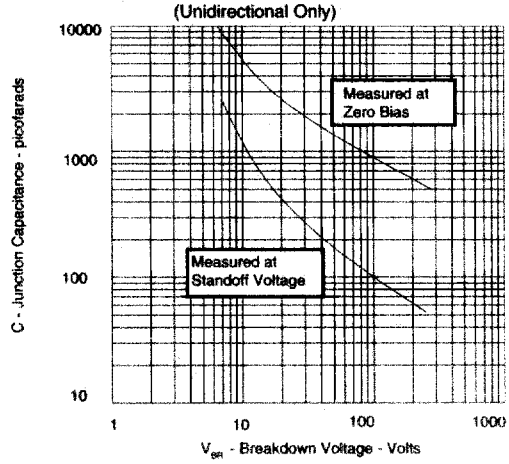
Note: P = Standard Part, for non-designated parts, contact the factory for minimum order quantity and delivery.
For Bidirectional Device Types: See Notes 2 & 3

FIGURE 4
CLAMPING VOLTAGE vs PULSE CURRENT



V_{CD} is the rise in Clamping Voltage above the actual V_{BR} @ I_T

FIGURE 5
TYPICAL CAPACITANCE vs BREAKDOWN VOLTAGE
(Unidirectional Only)



NOTES

1. A TVS is normally selected according to the reverse "Stand off Voltage" (V_{WM}) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. For Bidirectional types, 10 volts and under, the I_D limit is doubled.
3. Part numbers shown are for unidirectional devices. Add C or CA suffix to specify birdirectional devices, such as 1.5KE 7.5C or 1.5KE7.5CA

ABBREVIATIONS & SYMBOLS

V_{WM} Rated Stand-Off Voltage: Maximum working (continuous) DC or peak voltage which may be applied over the standard operating temperature range. (Note: V_{WM} is a selected device parameter and must be equal to or greater than the maximum operating voltage of the line to be protected.)

V_{BR} (min) Minimum Breakdown Voltage: This is the minimum voltage the device will exhibit at I_T and is used to assure that conduction does not occur prior to that voltage at 25°C.

V_C Maximum Clamping Voltage: Maximum peak voltage that appears across the TVS when subjected to the peak pulse current in a 1 ms time interval. The peak pulse voltage is the combination of voltage rise due to both the series resistance and the thermal rise.

I_{PP} Peak Pulse Current - See Figure 2

P_P Peak Pulse Power - See Figure 1

I_D Standby-Current

I_T Test Current

V_F Forward Voltage Drop: $V_F < 3.5$ V @ $I_F = 100$ A, 1/2 sine wave of 8.33 ms sine wave. (Unidirectional Devices Only)