



PROTEK DEVICES®

.....Engineered solutions for the transient environment

TVS Transient Voltage Suppressors P6KE6.8 thru P6KE400A

DESCRIPTION

The P6KE series device types are designed in a small package size where power and space is a consideration. They are characterized by their high surge capability, extremely fast response time, and low impedance, (R_{on}). Because of the unpredictable nature of transients and the variation of the impedance with respect to these transients, impedance, per se, is not specified as a parametric value. However, a minimum voltage at low current conditions (BV) and a maximum clamping voltage (V_c) at a maximum peak pulse current is specified.

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

APPLICATION

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

FEATURES

- 600 watts Peak Pulse Power
- Available in ranges from 6.8 to 400 V_{BR}
- Bidirectional types available
- Each device 100% tested

MAXIMUM RATINGS

- 600 Watts of Peak Power dissipation at 25°C (see derating curve)
- Operating and Storage temperatures: -65° to +175°C
- $t_{clamping}$ (0 volts to BV min): Less than 5×10^{-12} second (theoretical)
- Forward surge rating: half cycle 100A, 1/120 sec @ 25 °C (Unidirectional)
- Steady State power dissipation: 5.0 watt @ $T_L = 75^\circ\text{C}$, Lead Length = 3/8"
- Repetition rate (duty cycle): .01%

MECHANICAL CHARACTERISTICS

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

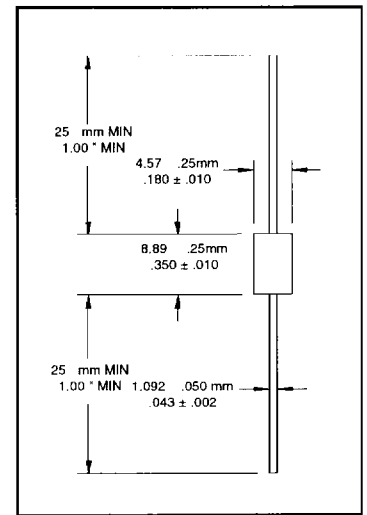
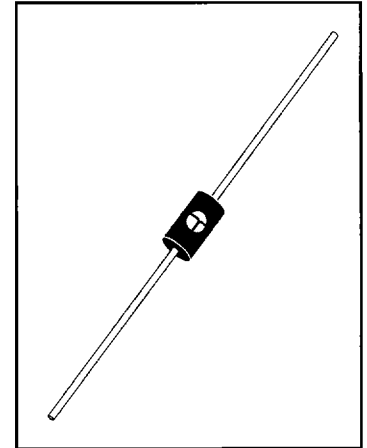


FIGURE 1
Peak Pulse Power vs. Pulse Time

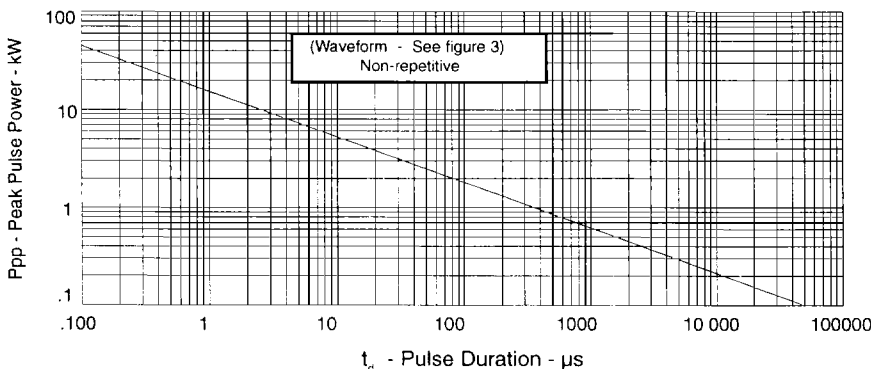
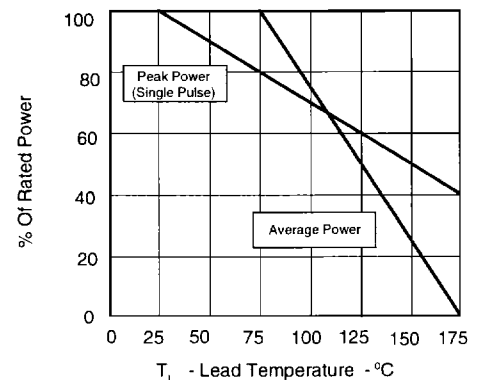


FIGURE 2
Power Derating Curve



ELECTRICAL CHARACTERISTICS @ 25 °C

PROTEK TYPE NUMBER	RATED STAND-OFF VOLTAGE (See Note 1) V_{WM} VOLTS	BREAKDOWN VOLTAGE @ I_T		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	
		V_{BR} Min VOLTS	V_{BR} Max VOLTS					
P P6KE6.8	5.60	6.12	7.48	10	1000	10.8	56	5.0
P P6KE6.8A	5.80	6.45	7.14	10	1000	10.5	57	5.0
P P6KE7.5	6.05	6.75	8.25	10	500	11.7	51	5.0
P P6KE7.5A	6.40	7.13	7.88	10	500	11.3	53	5.0
P6KE8.2	6.63	7.38	9.02	10	200	12.5	48	6.0
P6KE8.2A	7.02	7.79	8.61	10	200	12.1	50	6.0
P6KE9.1	7.37	8.19	10.0	1	50	13.8	44	7.0
P6KE9.1A	7.78	8.65	9.55	1	50	13.4	45	7.0
P6KE10	8.10	9.0	11.0	1	10	15.0	40	8.0
P6KE10A	8.55	9.5	10.5	1	10	14.5	41	8.0
P6KE11	8.92	9.9	12.1	1	5	16.2	37	9.0
P6KE11A	9.40	10.5	11.6	1	5	15.6	38	9.0
P P6KE12	9.72	10.8	13.2	1	5	17.3	35	10
P P6KE12A	10.2	11.4	12.6	1	5	16.7	36	10
P6KE13	10.5	11.7	14.3	1	5	19.0	32	11
P6KE13A	11.1	12.4	13.7	1	5	18.2	33	11
P6KE15	12.1	13.5	16.5	1	5	22.0	27	13
P6KE15A	12.8	14.3	15.8	1	5	21.2	28	12
P6KE16	12.9	14.4	17.6	1	5	23.5	26	16
P6KE16A	13.6	15.2	16.8	1	5	22.5	27	14
P P6KE18	14.5	16.2	19.8	1	5	26.5	23	17
P P6KE18A	15.3	17.1	18.9	1	5	25.2	24	19
P6KE20	16.2	18.0	22.0	1	5	29.1	21	20
P6KE20A	17.1	19.0	21.0	1	5	27.7	22	19
P6KE22	17.8	19.8	24.2	1	5	31.9	19	21
P6KE22A	18.8	20.9	23.1	1	5	30.6	20	20
P6KE24	19.4	21.6	26.4	1	5	34.7	17	25
P6KE24A	20.5	22.8	25.2	1	5	33.2	18	23
P6KE27	21.8	24.3	29.7	1	5	39.1	15	28
P6KE27A	23.1	25.7	28.4	1	5	37.5	16	25
P6KE30	24.3	27.0	33.0	1	5	43.5	14	31
P6KE30A	25.6	28.5	31.5	1	5	41.4	14.4	28
P6KE33	26.8	29.7	36.3	1	5	47.7	12.6	31
P6KE33A	28.2	31.4	34.7	1	5	45.7	13.2	20
P6KE36	29.1	32.4	39.6	1	5	52.0	11.6	35
P6KE36A	30.8	34.2	37.8	1	5	49.9	12.0	31
P6KE39	31.6	35.1	42.9	1	5	56.4	10.6	39
P6KE39A	33.3	37.1	41.0	1	5	53.9	11.2	36
P6KE43	34.8	38.7	47.3	1	5	61.9	9.6	46
P6KE43A	36.8	40.9	45.2	1	5	59.3	10.1	44
P6KE47	38.1	42.3	51.7	1	5	67.8	8.9	50
P6KE47A	40.2	44.7	49.4	1	5	64.8	9.3	48
P6KE51	41.3	45.9	56.1	1	5	73.5	8.2	55
P6KE51A	43.6	48.5	53.6	1	5	70.1	8.6	51
P P6KE56	45.4	50.4	61.6	1	5	80.5	7.4	58
P P6KE56A	47.8	53.2	58.8	1	5	77.0	7.8	56
P P6AKE62	50.2	55.8	68.2	1	5	89.0	6.8	65
P P6KE62A	53.0	58.9	65.1	1	5	85.0	7.1	62
P6KE68	55.1	61.2	74.8	1	5	98.0	6.1	71
P6KE68A	58.1	64.6	71.4	1	5	92.0	6.5	69
P6KE75	60.7	67.5	82.5	1	5	108.0	5.5	80
P6KE75A	64.1	71.3	78.8	1	5	103.0	5.8	76
P6KE82	66.4	73.8	90.2	1	5	118.0	5.1	90
P6KE82A	70.1	77.9	86.1	1	5	113.0	5.3	86
P6KE91	73.7	81.9	100.0	1	5	131.0	4.5	99
P6KE91A	77.8	86.5	95.0	1	5	125.0	4.8	94
P6KE100	81.0	90.0	110.0	1	5	144.0	4.2	109
P6KE100A	85.5	95.0	105.0	1	5	137.0	4.4	104
P P6KE110	89.2	99.0	121.0	1	5	158.0	3.8	120
P P6KE110A	94.0	105.0	116.0	1	5	152.0	4.0	115
P6KE120	97.2	108.0	132.0	1	5	173.0	3.5	131
P6KE120A	102.0	114.0	126.0	1	5	165.0	3.6	125
P6KE130	105.0	117.0	143.0	1	5	187.0	3.2	142
P6KE130A	111.0	124.0	137.0	1	5	179.0	3.3	136
P6KE150	121.0	135.0	165.0	1	5	215.0	2.8	164
P6KE150A	128.0	143.0	158.0	1	5	207.0	2.9	157
P6KE160	130.0	144.0	176.0	1	5	230.0	2.6	175
P6KE160A	136.0	152.0	168.0	1	5	219.0	2.7	167
P6KE170	138.0	153.0	187.0	1	5	244.0	2.5	186
P6KE170A	145.0	162.0	179.0	1	5	234.0	2.6	188
P6KE180	146.0	162.0	198.0	1	5	258.0	2.3	197
P6KE180A	154.0	171.0	189.0	1	5	246.0	2.4	188
F P6KE200	162.0	180.0	220.0	1	5	287.0	2.1	219
F P6KE200A	171.0	190.0	210.0	1	5	274.0	2.2	209
F P6KE220	175.0	198.0	242.0	1	5	344.0	2.0	240
F P6KE220A	185.0	209.0	231.0	1	5	328.0	2.0	230
P6KE250	202.0	225.0	275.0	1	5	360.0	2.0	270
P6KE250A	214.0	237.0	263.0	1	5	344.0	2.0	260
P6KE300	243.0	270.0	330.0	1	5	430.0	2.0	330
P6KE300A	256.0	285.0	315.0	1	5	414.0	2.0	315
P6KE350	284.0	315.0	385.0	1	5	504.0	2.0	385
P6KE350A	300.0	333.0	368.0	1	5	482.0	2.0	368
P P6KE400	324.0	360.0	440.0	1	5	574.0	2.0	440
P P6KE400A	342.0	380.0	420.0	1	5	548.0	2.0	420

Note: P = Preferred Device

For Bidirectional Device Types: See Notes 2 & 3

Pulse Waveform

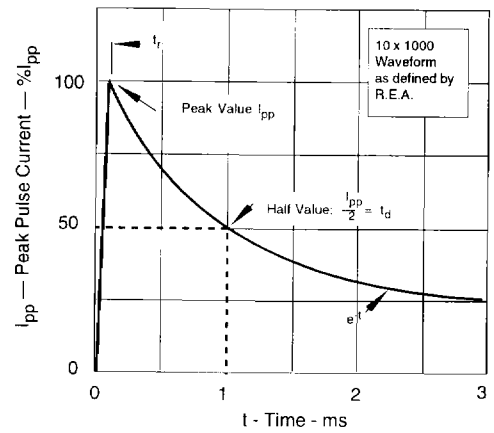
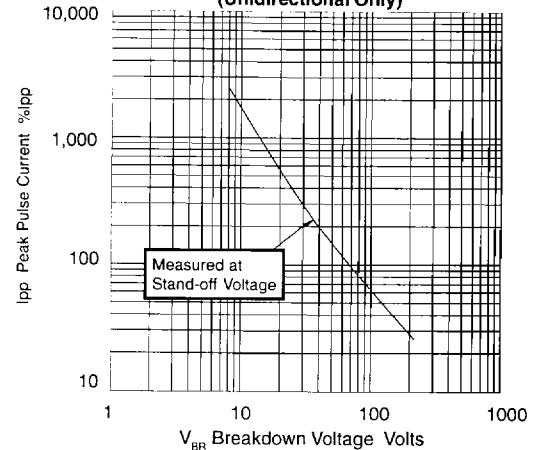


FIGURE 4

Typical Capacitance vs V_{BR} (Unidirectional Only)



NOTES

1. A TVS is normally selected according to the reverse "Stand Off Voltage" (V_R) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. For Bidirectional types, 10 volts and under, the I_D limit is doubled.
3. Part numbers shown are for unidirectional devices. Add C or CA suffix to specify bidirectional devices, such as P6KE7.5C or P6KE7.5CA

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 and is used to assure that conduction does not occur prior to that voltage at 25°C.
- V_C Maximum Clamping Voltage: The maximum peak voltage that appears across the TVS when subjected to the peak pulse current in a 1 ms time interval. The peak pulse voltages are the combination of voltage rise due to both the series resistance and the thermal rise.
- I_{pp} Peak Pulse Current - See Figure 2
- P_p Peak Pulse Power - See Figure 1
- I_D Standby-Current
- I_T Test Current
- V_F Forward Voltage Drop: $V_F < 3.5 V @ I_F = 50$ amps, 8.3 ms sine wave. (Unidirectional Devices Only)

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