



PROTEK DEVICES®

.....Engineered solutions for the transient environment

TVS Transient Voltage Suppressors 1N5629 thru 1N5665A

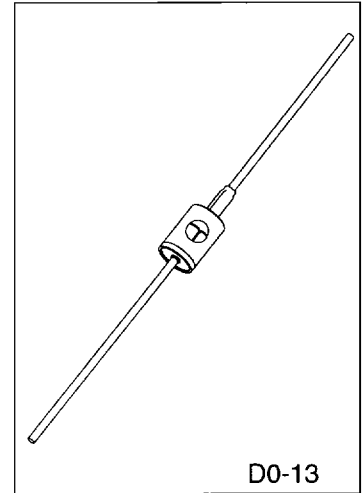
DESCRIPTION

This specification sheet defines a series of Silicon Transient Suppressor (TVS) diodes used in applications where large voltage transients can permanently damage voltage sensitive components. The TVS is packaged in a hermetically sealed, glass-to-metal package. Screened parts to JAN and JANTX requirements of MIL-S-19500/500 are also available.

TVS diodes 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 (V_{BR}) 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 a 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 presents a hazard to electronic circuitry (ref: REA specification PE 60). The response time of the 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.

This series of devices has proven to be very effective as NEMP Suppressors. For the actual test results and application, send for report number AD9092661. This specification sheet is only one of many series of Transient Voltage Suppressors available from ProTek Devices.



DO-13

FEATURES

- 1500 watts peak power dissipation
- Available in ranges from 6.8 V to 200V
- DO-13 hermetically sealed package

MECHANICAL CHARACTERISTICS

- Standard DO-13 package - glass-to-metal hermetically sealed
- Weight: 1.5 grams (approximate)
- Positive terminal marked with band
- Standard Polarity - Cathode to Case
- Body marked with logo and type number

MAXIMUM RATINGS

- 1500 watts of Peak Pulse Power dissipation at 25° C
- $t_{clamping}$ (0 volts to V_{BR} min): Less than 1×10^{-12} seconds
- Operating and Storage Temperatures: -65° to +175° C
- Forward surge rating: 200 amps, 1/120 second at 25° C
- Steady State (Average) power dissipation: 1 watt at T_L of 75° C
- Repetition rate (duty cycle): .01%

ELECTRICAL CHARACTERISTICS

- Clamping Factor: 1.33 @ Full rated power
1.20 @ 50% rated power

Clamping Factor: The ratio of the actual V_C (Clamping Voltage) to the V_{BR} (Breakdown Voltage) as measured on a specific device. (See Figure 3 for test pulse wave shape.)

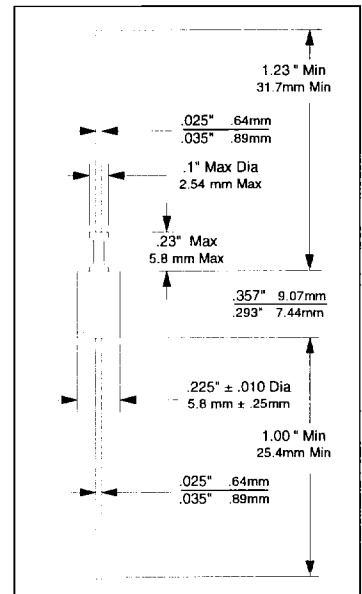


FIGURE 1
PEAK PULSE POWER vs PULSE TIME

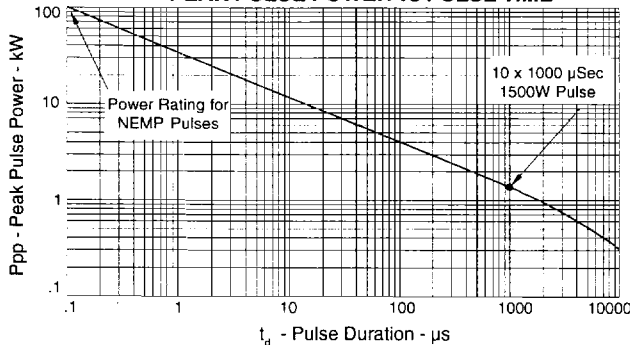


FIGURE 2
DERATING CURVE

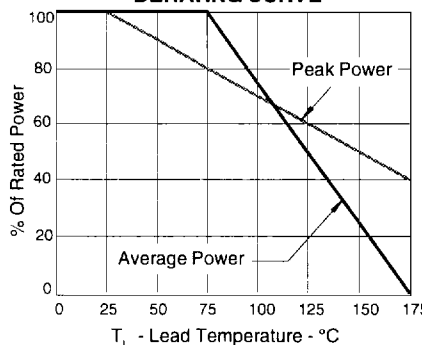
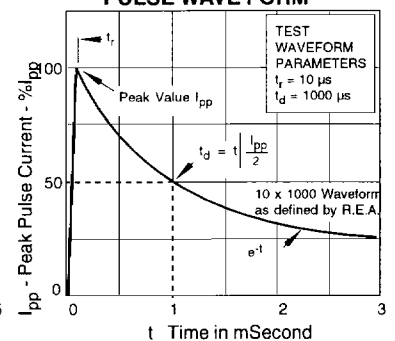


FIGURE 3
PULSE WAVE FORM

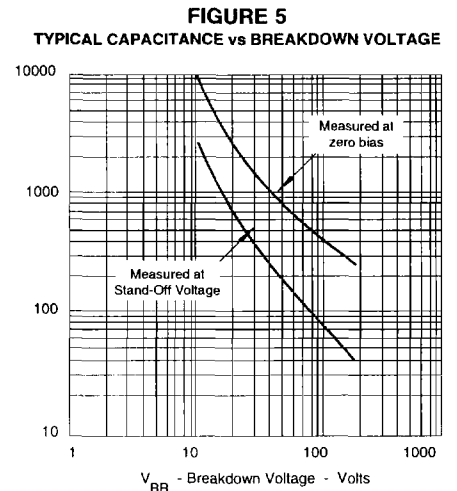
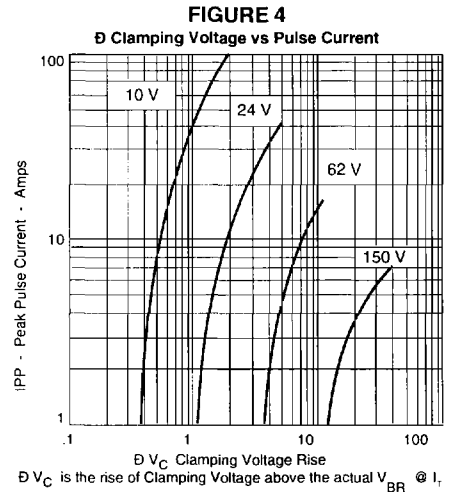


JEDEC TYPE NUMBER	RATED STAND-OFF VOLTAGE (See Note 1) V _{WM} VOLTS	BREAKDOWN VOLTAGE V _{BR} @ I _T		I _T mA	MAXIMUM CLAMPING VOLTAGE @ I _{pp} (See Fig. 3) V _C VOLTS	MAXIMUM STANDBY CURRENT @ V _{WM} I _D μA	MAXIMUM PEAK PULSE CURRENT (See Fig. 3) I _{pp} A	MAXIMUM TEMPERATURE COEFFICIENT OF V _{BR} mV/°C
		Min	Max					
1N5629	5.50	6.12	7.48	10	10.8	1000	139	5.0
1N5629A*	5.80	6.45	7.14	10	10.5	1000	143	5.0
1N5630	6.05	6.75	8.25	10	11.7	500	128	5.0
1N5630A*	6.40	7.13	7.88	10	11.3	500	132	5.0
1N5631	6.63	7.38	9.02	10	12.5	200	120	6.0
1N5631A*	7.02	7.79	8.61	10	12.1	200	124	6.0
1N5632	7.37	8.19	10.0	1	13.8	50	109	7.0
1N5632A*	7.78	8.65	9.55	1	13.4	50	112	7.0
1N5633	8.10	9.0	11.0	1	15.0	10	100	8.0
1N5633A*	8.55	9.5	10.5	1	14.5	10	103	8.0
1N5634	8.92	9.9	12.1	1	16.2	5	93	9.0
1N5634A*	9.40	10.5	11.6	1	15.6	5	96	9.0
1N5635	9.72	10.8	13.2	1	17.3	5	87	10
1N5635A*	10.2	11.4	12.6	1	16.7	5	90	10
1N5636	10.5	11.7	14.3	1	19.0	5	79	11
1N5636A*	11.1	12.4	13.7	1	18.2	5	82	11
1N5637	12.1	13.5	16.5	1	22.0	5	68	13
1N5637A*	12.8	14.3	15.8	1	21.2	5	71	12
1N5638	12.9	14.4	17.6	1	23.5	5	64	16
1N5638A*	13.6	15.2	16.8	1	22.5	5	67	14
1N5639	14.5	16.2	19.8	1	26.5	5	56.5	17
1N5639A*	15.3	17.1	18.9	1	25.2	5	59.5	19
1N5640	16.2	18.0	22.0	1	29.1	5	51.5	20
1N5640A*	17.1	19.0	21.0	1	27.7	5	54	19
1N5641	17.8	19.8	24.2	1	31.9	5	47	21
1N5641A*	18.8	20.9	23.1	1	30.6	5	49	20
1N5642	19.4	21.6	26.4	1	34.7	5	43	25
1N5642A*	20.5	22.8	25.2	1	33.2	5	45	23
1N5643	21.8	24.3	29.7	1	39.1	5	38.5	28
1N5643A*	23.1	25.7	28.4	1	37.5	5	40	25
1N5644	24.3	27.0	33.0	1	43.5	5	34.5	31
1N5644A*	25.6	28.5	31.5	1	41.4	5	36	28
1N5645	26.8	29.7	36.3	1	47.7	5	31.5	31
1N5645A*	28.2	31.4	34.7	1	45.7	5	33	30
1N5646	29.1	32.4	39.6	1	52.0	5	29	35
1N5646A*	30.8	34.2	37.8	1	49.9	5	30	31
1N5647	31.6	35.1	42.9	1	56.4	5	26.5	39
1N5647A*	33.3	37.1	41.0	1	53.9	5	28	36
1N5648	34.8	38.7	47.3	1	61.9	5	24	46
1N5648A*	36.8	40.9	45.2	1	59.3	5	25.3	44
1N5649	38.1	42.3	51.7	1	67.8	5	22.2	50
1N5649A*	40.2	44.7	49.4	1	64.8	5	23.2	48
1N5650	41.3	45.9	56.1	1	73.5	5	20.4	55
1N5650A*	43.6	48.5	53.6	1	70.1	5	21.4	51
1N5651	45.4	50.4	61.6	1	80.5	5	18.6	58
1N5651A*	47.8	53.2	58.8	1	77.0	5	19.5	56
1N5652	50.2	55.8	68.2	1	89.0	5	16.9	65
1N5652A*	53.0	58.9	65.1	1	85.0	5	17.7	62
1N5653	55.1	61.2	74.8	1	98.0	5	15.3	71
1N5653A*	58.1	64.6	71.4	1	92.0	5	16.3	69
1N5654	60.7	67.5	82.5	1	108.0	5	13.9	80
1N5654A*	64.1	71.3	78.8	1	103.0	5	14.6	76
1N5655	66.4	73.8	90.2	1	118.0	5	12.7	90
1N5655A*	70.1	77.9	86.1	1	113.0	5	13.3	86
1N5656	73.7	81.9	100.0	1	131.0	5	11.4	99
1N5656A*	77.8	86.5	95.0	1	125.0	5	12.0	94
1N5657	81.0	90.0	110.0	1	144.0	5	10.4	109
1N5657A*	85.5	95.0	105.0	1	137.0	5	11.0	104
1N5658	89.2	99.0	121.0	1	158.0	5	9.5	120
1N5658A*	94.0	105.0	116.0	1	152.0	5	9.9	115
1N5659	97.2	108.0	132.0	1	173.0	5	8.7	131
1N5659A*	102.0	114.0	126.0	1	165.0	5	9.1	125
1N5660	105.0	117.0	143.0	1	187.0	5	8.0	142
1N5660A*	111.0	124.0	137.0	1	179.0	5	8.4	136
1N5661	121.0	135.0	165.0	1	215.0	5	7.0	164
1N5661A*	128.0	143.0	158.0	1	207.0	5	7.2	157
1N5662	130.0	144.0	176.0	1	230.0	5	6.5	175
1N5662A*	136.0	152.0	168.0	1	219.0	5	6.8	167
1N5663	139.0	153.0	187.0	1	244.0	5	6.2	186
1N5663A*	145.0	162.0	179.0	1	234.0	5	6.4	188
1N5664	146.0	162.0	198.0	1	258.0	5	5.8	197
1N5664A*	154.0	171.0	189.0	1	246.0	5	6.1	188
1N5665	162.0	180.0	220.0	1	287.0	5	5.2	219
1N5665A*	171.0	190.0	210.0	1	274.0	5	5.5	209

V_F = 3.5V @ 100 A, 8.3 ms sine wave

This series of TVS diodes can be used in series or parallel to increase their power handling capability. No precautions are required when using TVS diodes in a series string, as power dissipation for two or more devices of the same type is equally shared. When using TVS diodes in parallel it is recommended that ProTek's Applications Department is contacted for specific instructions. Matched sets can be ordered from the factory for a small additional charge.

*Parts are available screened to the JANTX requirements of MIL-S-19500/500.



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 should 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 millisecond 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 3
- P_p** Peak Pulse Power - See Figure 1
- I_D** Standby-Current
- I_T** Test Current

Note 1: A TVS is normally selected according to its "Rated Stand-Off Voltage" V_{WM} which should be equal to or greater than the continuous peak operating voltage level.