T-11-23

General Semiconductor Industries, Inc.

TRANSZORB® TRANSIENT VOLTAGE SUPPRESSORS

1N5629 THRU 1N5665A

FEATURES

- **1500 watts Peak Pulse Power dissipation**
- **Available in ranges from 5.5 to 171 volts**
- **MIL qualified per MIL-S-19500/500**
- **Hermetically sealed package**
- **Each device 100% tested**

MAXIMUM RATINGS

- 1500 watts of Peak Pulse Power dissipation at 25°C (see derating curve)
- $t_{clamping}$ (0 volts to BV min): Less than 1 x 10^{-9} second
- Operating and Storage temperatures: -65°C to +175°C
- Forward Surge Rating: half cycle 200 amps, 1/120 second at 25°C
- Steady State power dissipation: 1.0 watt
- Repetition rate (duty cycle): .01%

MECHANICAL CHARACTERISTICS

- Standard DO-13 package, glass and 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

ELECTRICAL CHARACTERISTICS

Clamping Factor 1 33 at full rated power
1 20 at 50% rated power

Clamping Factor The ratio of the actual V_C (Clamping Voltage) to the BV (Breakdown Voltage) as measured on a specific device

APPLICATION

This specification sheet defines a series of Silicon Transient Suppressors used in applications in which

APPLICATION CONT'D

large voltage transients can permanently damage voltage-sensitive components.

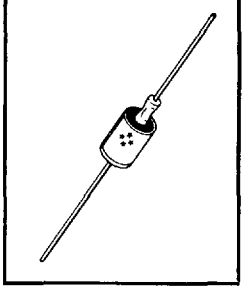
The TransZorb® TVS is used in applications in which induced lightning on remote transmission lines presents a hazard to electronic circuitry. Clamping action is theoretically instantaneous (1 x 10^{-9} sec); therefore, they can protect integrated circuits, MOS devices, hybrids, and other voltage-sensitive semiconductors and components. TransZorb devices can also be used in series or parallel to increase the peak power ratings.

This series of devices has proven effective as EMP suppressors.

DESCRIPTION

TransZorbs are characterized by their high surge capability, extremely fast response time, and low shunt resistance (R_{on}). The shunt resistance is less than 1 ohm and therefore, is not specified as a parameter value During a high current pulse, as much as 50% to 70% of the observed clamping voltage can be due to thermal effects. A clamping factor is provided to determine the maximum clamping voltage (V_C) at a specified breakdown voltage (BV) In case of a severe current overload or abnormal transient beyond the maximum ratings, the TransZorb 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

CASE DO-13



CASE OUTLINE

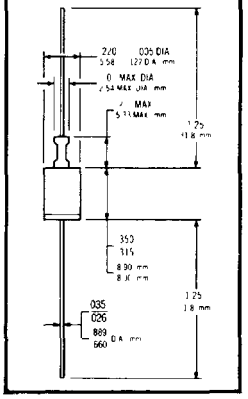


FIGURE 1—Peak Pulse Power vs Pulse Time

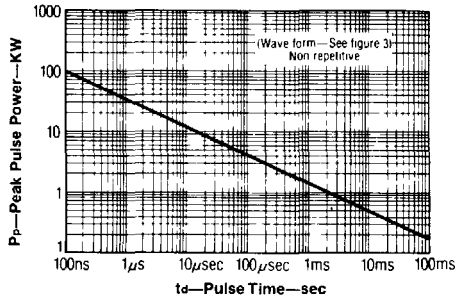
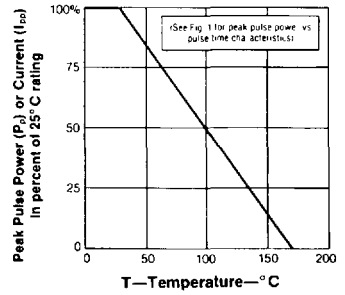


FIGURE 2—Derating Curve



ELECTRICAL CHARACTERISTICS @ 25 C (JEDEC Registered Data)

JEDEC TYPE NUMBER	REVERSE STAND-OFF VOLTAGE (NOTE 1) V_R VOLTS	BREAKDOWN VOLTAGE BV VOLTS @ I_T mA MIN.	MAX.		MAXIMUM CLAMPING VOLTAGE @I_{PP} (FIG. 3) V_C VOLTS	MAXIMUM REVERSE LEAKAGE @V_R I_R uA	MAXIMUM PEAK PULSE CURRENT (FIG. 3) I_{PP} A	MAXIMUM VOLTAGE TEMPERATURE VARIATION OF BV mV/°C
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	9.00	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	95.5	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	138.0	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 at 100 amps peak, 8.3 msec sine wave = 3.5 volts maximum.

Available in JAN, JTX & JTXV per MIL-S-19500/500.

TRANSZORB® UNIDIRECTIONAL 1N5629 THRU 1N5665A

TRANSIENT VOLTAGE SUPPRESSORS

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FIGURE 3—Pulse Waveform

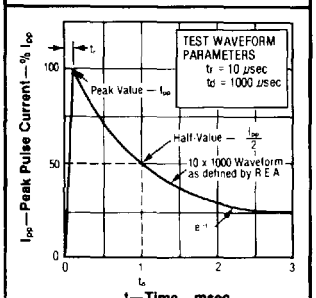
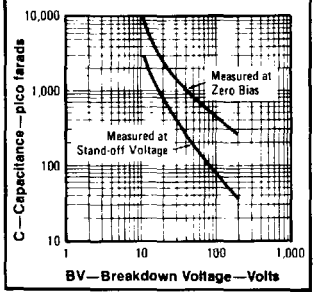


FIGURE 4—Typical Capacitance vs Breakdown Voltage



NOTES

Note 1: A TransZorb 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.

ABBREVIATIONS & SYMBOLS

- V_R — Stand-Off Voltage Applied Reverse Voltage to assure a nonconductive condition (See Note 1)
- BV(min) This is the minimum Breakdown Voltage the device will exhibit and is used to assure that conduction does not occur prior to this voltage level at 25° C
- V_C(max) Maximum Clamping Voltage The maximum peak voltage appearing across the TransZorb when subjected to the peak pulse current in a one millisecond time interval The peak pulse voltages are the combination of voltage rise due to both the series resistance and thermal rise
- I_{pp} Peak Pulse Current — See Figure 3
- P_p Peak Pulse Power
- I_R Reverse Leakage