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DEVICES

* 1N5629 thru 1N5665 1N5629A thru 1N5665A

JAN
JANTX
JANTXV

* Commercial only

DESCRIPTION

This popular Transient Voltage Suppressor (TVS) series for 1N5629 thru 1N5665A are JEDEC registered selections for unidirectional devices. All have the same high Peak Pulse Power rating of 1500 W with extremely fast response times. They are also available in military qualified selections as described in the Features section herein. They are most often used for protecting against transients from inductive switching environments, induced RF effects, or induced secondary lightning effects as found in lower surge levels of IEC61000-4-5. They are also very successful in protecting airborne avionics and electrical systems. Since their response time is virtually instantaneous, they can also protect from ESD and EFT per IEC61000-4-2 and IEC61000-4-4.

IMPORTANT: For the most current data, consult *MICROSEMI's* website:

http://www.microsemi.com

FEATURES

- Unidirectional TVS series for thru-hole mounting
- > Suppresses transients up to 1500 watts @ 10/1000 μs (see Figure 1)
- ➤ Clamps transient in less than 100 pico seconds
- ➤ Working voltage (V_{WM}) range 5 V to 171 V
- ➤ Hermetic sealed DO-13 metal package
- ➤ JAN/TX/TXV military qualifications also available for the tighter tolerance "A" suffix devices per MIL-PRF-19500/500 by adding the JAN, JANTX, or JANTXV prefix, e.g. JANTXV1N5629A, etc.
- ➤ For bidirectional TVS in the same DO-13 package, see separate data sheet for the 1N6036 1N6072A series (also military qualified)
- Surface mount equivalent packages also available as SMCJ5.0 SMCJ170CA or SMCG5.0 - SMCG170CA in separate data sheet (consult factory for other surface mount options)
- ➤ Plastic axial-leaded equivalents available in the 1N6267 1N6303A series in separate data sheet



DO-13 (DO-202AA)

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APPLICATIONS / BENEFITS

- > Protection from switching transients and induced RF
- > ESD & EFT protection per IEC 61000-4-2 and -4-4
- ➤ Secondary lightning protection per IEC61000-4-5 with 42 Ohms source impedance:

Class 1: 1N5629 to 1N5665A

Class 2: 1N5629 to 1N5663A

Class 3: 1N5629 to 1N5655A

Class 4: 1N5629 to 1N5648A

Secondary lightning protection per IEC61000-4-5 with 12 Ohms source impedance:

Class 1: 1N5629 to 1N5658A

Class 2: 1N5629 to 1N5651A

Class 3: 1N5629 to 1N5643A

Class 4: 1N5629 to 1N5636A

➤ Secondary lightning protection per IEC61000-4-5 with 2 Ohms source impedance:

Class 2: 1N5629 to 1N5642A

Class 3: 1N5629 to 1N5635A

➤ Inherently radiation hard per Microsemi MicroNote 050

MAXIMUM RATINGS

- > 1500 Watts for 10/1000 μs with repetition rate of 0.01% or less* at lead temperature (T_L) 25°C (see Figs 1, 2, & 4)
- ➤ Operating & Storage Temperatures: -55° to +175°C
- ➤ THERMAL RESISTANCE: 50°C/W junction to lead at 0.375 inches (10 mm) from body or 110°C/W junction to ambient when mounted on FR4 PC board with 4 mm² copper pads (1oz) and track width 1 mm, length 25 mm
- ▶ DC Power Dissipation*: 1 Watt at $T_L \le +125^{\circ}\text{C}$ 3/8" (10 mm) from body (see derating in Fig 3 and note below)
- Forward surge current: 200 Amps for 8.3ms half-sine wave at $T_A = +25^{\circ}C$
- Solder Temperatures: 260 ° C for 10 s (maximum)

MECHANICAL AND PACKAGING

- CASE: DO-13 (DO-202AA), welded, hermetically sealed metal and glass
- FINISH: All external metal surfaces are Tin-Lead plated and solderable per MIL-STD-750 method 2026
- ➤ POLARITY: Cathode connected to case and polarity indicated by diode symbol
- MARKING: Part number and polarity diode symbol
- ➤ WEIGHT: 1.4 grams. (Approx)
- > TAPE & REEL option: Standard per EIA-296 (add "TR" suffix to part number)
- > See package dimension on last page
- * TVS devices are not typically used for dc power dissipation and are instead operated at or less than their rated standoff voltage

(V_{WM}) except for transients that briefly drive the device into avalanche breakdown (V_{BR} to V_C region).

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JEDEC Voltage Current Standoff Standby Clamping Peak Pulse Current Voltage Current Voltage Current Coefficient	
No. Min. Max. V	Maximum Temperature Coefficient of V(BR) αV(BR)
INS629	
INS629A 6.45 7.14 10 5.80 1000 10.5 143 .055 118630A 7.13 7.88 10 6.65 500 11.7 128 .066 1185630A 7.13 7.88 10 6.40 500 11.3 132 .066 1185631 7.79 8.61 10 7.02 200 12.5 120 .065 185632 8.65 9.55 1 7.78 50 13.8 109 .068 118632 8.65 9.55 1 7.78 50 13.8 109 .068 118633 9.00 11.0 1 8.10 10 15.0 100 .072 186633 9.00 11.0 1 8.10 10 15.0 100 .073 186634 9.9 12.1 1 8.92 5 16.2 93 .073 186634 9.9 12.1 1 8.92 5 16.2 93 .073 186635 10.8 13.2 1 9.72 5 17.3 87 .078 186636 11.7 14.3 1 10.5 5 19.0 79 .081 186636 11.7 14.3 1 10.5 5 19.0 79 .081 186636 11.7 14.3 1 10.5 5 19.0 79 .081 186637 13.5 16.5 1 12.1 5 22.0 68 .084 186638 14.4 17.6 1 12.8 5 21.2 71 .084 186638 14.4 17.6 1 12.9 5 23.5 64 .084 186639 16.2 19.8 1 15.3 5 22.5 67 .084 186639 16.2 19.8 1 15.3 5 22.5 22.5 64 .084 186639 16.2 19.8 1 15.3 5 22.5 22.5 67 .084 186640 19.0 22.0 1 16.2 5 33.2 45 .094 186640 19.0 22.0 1 16.2 5 33.2 45 .094 186640 22.8 22.5 1 18.8 5 30.6 49 .092 18.6640 19.0 22.0 1 16.2 5 33.2 45 .094 18.6640 22.4 21 17.8 5 31.5 31.5 30.6 49 .092 18.6640 32.4 39.6 1 22.8 23.1 18.8 5 30.6 49 .092 18.6640 32.4 39.6 1 23.1 18.8 5 30.6 49 .092 18.6640 32.4 39.6 1 22.8 23.1 18.8 5 30.6 49 .092 18.6640 32.4 39.6 1 23.1 18.8 5 30.6 49 .092 18.6640 32.4 39.6 1 23.1 33.3 5 33.2 45 .094 18.6640 32.4 39.6 1 23.1 33.3 5 33.2 45 .094 18.6640 32.4 39.6 1 23.1 33.3 5 33.2 34.5 .094 18.6640 32.4 39.6 1 23.1 33.3 5 33.9 28 .100 18.6640 32.4 39.6 1 29.	
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INS640	38
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1N5657A 95 105 1 85.5 5 137 11.0 .106	
1N5658 99 121 1 89.2 5 158 9.5 .107	
1N5658A 105 116 1 94.0 5 152 9.9 .107	
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1N5660A 124 137 1 111 5 179 8.4 .107	

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JEDEC Type	Breakdown Voltage V(BR) @ I(BR)		Breakdown Current I _(BR)	Rated Standoff Voltage V _{WM}	Maximum Standby Current I _D @ V _{WM}	Maximum Clamping Voltage V _C @ I _{PP}	Maximum Peak Pulse Current Ipp	Maximum Temperature Coefficient of V(BR) αV(BR)
No.*	Min.	Max.		* *************************************	-B @ * W.M	70 @ 71	-11	V (BR) WV(BR)
	V	V	mA	V	μA	\mathbf{V}	A	%/°C
1N5661	135	165	1	121	5	215	7.0	.108
1N5661A	143	158	1	128	5	207	7.2	.108
1N5662	144	176	1	130	5	230	6.5	.108
1N5662A	152	168	1	136	5	219	6.8	.108
1N5663	153	187	1	138	5	244	6.2	.108
1N5663A	162	179	1	145	5	234	6.4	.108
1N5664	162	198	1	146	5	258	5.8	.108
1N5664A	171	189	1	154	5	246	6.1	.108
1N5665	180	220	1	162	5	287	5.2	.108
1N5665A	190	210	1	171	5	274	5.5	.108

NOTE 1: A TVS is normally selected according to the rated "Standoff Voltage" V_{WM} that should be equal to or greater than the dc or continuous peak operating voltage level.

NOTE 2: Also available in military qualified types with a JAN, JANTX, or JANTXV prefix.

	SYMBOLS & DEFINITIONS							
Symbol	Definition							
V_{WM}	Standoff Voltage: Applied Reverse Voltage to assure a nonconductive condition. (See Note 1 above.)							
$V_{\left(BR\right)}$	Breakdown Voltage: This is the Breakdown Voltage the device will exhibit at 25°C							
$V_{\rm C}$	Maximum Clamping Voltage: The maximum peak voltage appearing across the TVS when subjected to the peak pulse current in a one millisecond time interval. The peak pulse voltage is the combination of voltage rise due to both the series resistance and thermal rise and positive temperature coefficient $(\alpha_{V(BR)})$							
I_{PP}	Peak Pulse Current: The peak current during the impulse (See Figure 2)							
P_{PP}	Peak Pulse Power: The pulse power as determined by the product of V_{C} and I_{PP}							
I_D	Standby Current: The current at the standoff voltage (V_{WM})							
$I_{\left(\mathrm{BR}\right) }$	Breakdown Current: The current used for measuring Breakdown Voltage (V _(BR))							

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GRAPHS

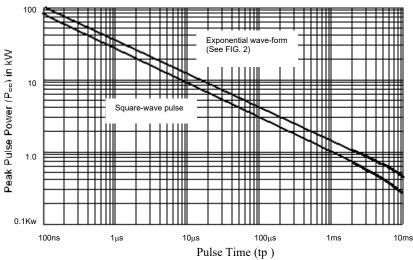
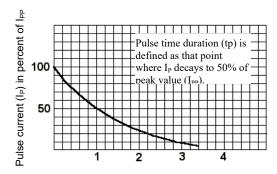


FIG. 1 – Non-repetitive peak pulse power rating curve NOTE: Peak power defined as peak voltage times peak current



Time (t) in milliseconds

FIG. 2 Pulse wave form for exponential surge

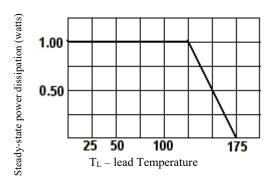
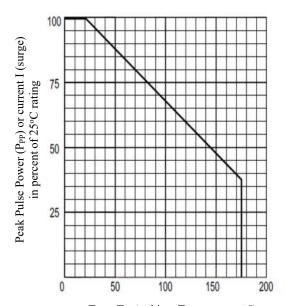


FIG. 3 Steady-state power derating curve



 T_L or T_A Ambient Temperature ${}^{\rm o}C$

FIG. 4 Derating Curve

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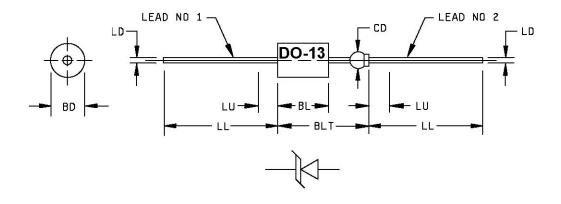
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PACKAGE DIMENSIONS



NOTES:

- 1. Dimensions are in inches.
- 2. Millimeters are given for general information only.
- 3. The major diameter is essentially constant along its length.
- 4. Within this zone, diameter may vary to allow for lead finishes and irregularities.
- 5. Dimension to allow for pinch or seal deformation anywhere along tubulation.
- 6. Lead 1 (cathode) shall be electrically connected to the case.
- 7. In accordance with ASME Y14.5M, diameters are equivalent to ϕx symbology.

Symbol	Inc	hes	Millir	Notes	
	Min	Max	Min	Max	
BD	.215	.235	5.46	5.97	
BL	.293	.357	7.44	9.07	3
BLT		.570		14.48	
CD	.045	.100	1.14	2.54	5
LD	.025	.035	0.64	0.89	
LL	1.000	1.625	25.40	41.28	4
LU		.188		4.78	4

FIGURE 1. Physical dimensions (DO-13).

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