



## Voidless Hermetically Sealed Unidirectional Transient Voltage Suppressors

Qualified per MIL-PRF-19500/434

Qualified Levels:  
JAN, JANTX, and JANTXV

### DESCRIPTION

This series of industry recognized voidless hermetically sealed unidirectional Transient Voltage Suppressor (TVS) designs is military qualified and are ideal for high-reliability applications where a failure cannot be tolerated. They provide a Working Peak “Standoff” Voltage selection from 30.5 to 175 volts with 1500 watt ratings. They are very robust in hard-glass construction and also use an internal metallurgical bond identified as “Category 1” for high reliability applications. These devices are also available in a surface mount MELF package configuration as a special order. Microsemi also offers numerous other TVS products to meet higher and lower peak pulse power and voltage ratings in both through-hole and surface-mount packages.

**Important:** For the latest information, visit our website <http://www.microsemi.com>.

### FEATURES

- High surge current and peak pulse power provides transient voltage protection for sensitive circuits.
- Triple-layer passivation.
- Internal “Category 1” metallurgical bonds.
- Voidless hermetically sealed glass package.
- JAN, JANTX, and JANTXV military qualifications available per MIL-PRF-19500/434.
- Further options for screening in accordance with MIL-PRF-19500 for JANS equivalent level by using a “SP” prefix.
- RoHS compliant versions available (commercial grade only).

### APPLICATIONS / BENEFITS

- Military and other high reliability transient protection.
- Extremely robust construction.
- Working Peak “Standoff” Voltage ( $V_{WM}$ ) from 30.5 to 175 V.
- Available as 1500 watt Peak Pulse Power ( $P_{PP}$ ).
- ESD and EFT protection per IEC61000-4-2 and IEC61000-4-4 respectively.
- Secondary lightning protection per select levels in IEC61000-4-5.
- Flexible axial-leaded mounting terminals.
- Non-sensitive to ESD per MIL-STD-750 method 1020.
- Inherently radiation hard as described in Microsemi “[MicroNote 050](#)”.

### MAXIMUM RATINGS @ $T_A = 25^\circ\text{C}$ unless otherwise noted.

Parameters/Test Conditions	Symbol	Value	Unit
Junction and Storage Temperature	$T_J$ and $T_{STG}$	-55 to +175	$^\circ\text{C}$
Peak Pulse Power @ $t_p = 1.0$ ms	$P_{PP}$	1500	W
Rated Forward Surge Current @ $t_p = 8.33$ ms	$I_{FSM}$	150	A (pk)
Impulse repetition rate (duty factor)	$I_{PP}$	0.01	%
Steady-State Power <sup>(1)</sup> ( <a href="#">Figure 4</a> )	$P_D$	3.0	W
Solder Temperature @ 10 s	$T_{SP}$	260	$^\circ\text{C}$

**Notes:** 1. Derate at 20 mW/ $^\circ\text{C}$  above  $T_A = +25^\circ\text{C}$ . Steady-state power ratings with reference to ambient are for PC boards where thermal resistance from mounting point to ambient is sufficiently controlled where  $T_{J(MAX)}$  is not exceeded.



“G” Package

**Also available by Special order:**

MELF Surface Mount

#### MSC – Lawrence

6 Lake Street,  
Lawrence, MA 01841  
Tel: 1-800-446-1158 or  
(978) 620-2600  
Fax: (978) 689-0803

#### MSC – Ireland

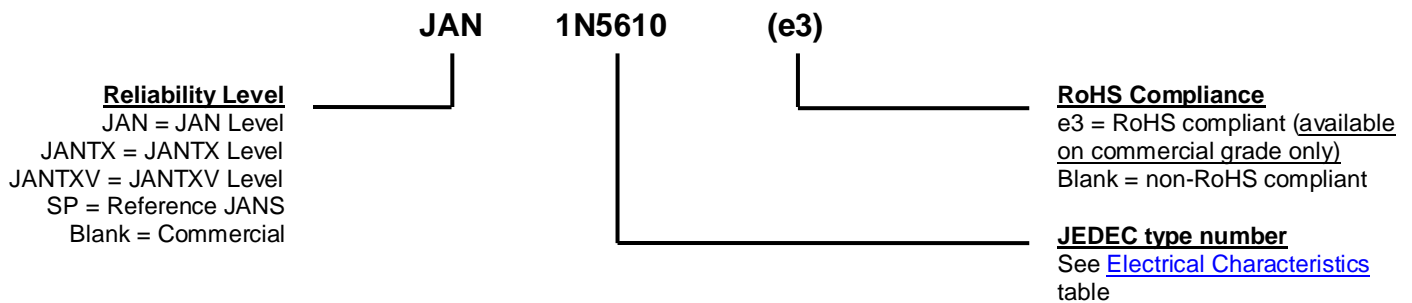
Gort Road Business Park,  
Ennis, Co. Clare, Ireland  
Tel: +353 (0) 65 6840044  
Fax: +353 (0) 65 6822298

**Website:**

[www.microsemi.com](http://www.microsemi.com)

**MECHANICAL and PACKAGING**

- CASE: Hermetically sealed voidless hard glass with tungsten slugs.
- TERMINATIONS: Axial-leads are tin/lead (Sn/Pb) over copper. RoHS compliant matte-tin available for commercial only.
- MARKING: Body painted and part number.
- POLARITY: Cathode band.
- Tape & Reel option: Standard per EIA-296. Consult factory for quantities.
- Weight: 1270 milligrams.
- See [Package Dimensions](#) on last page.

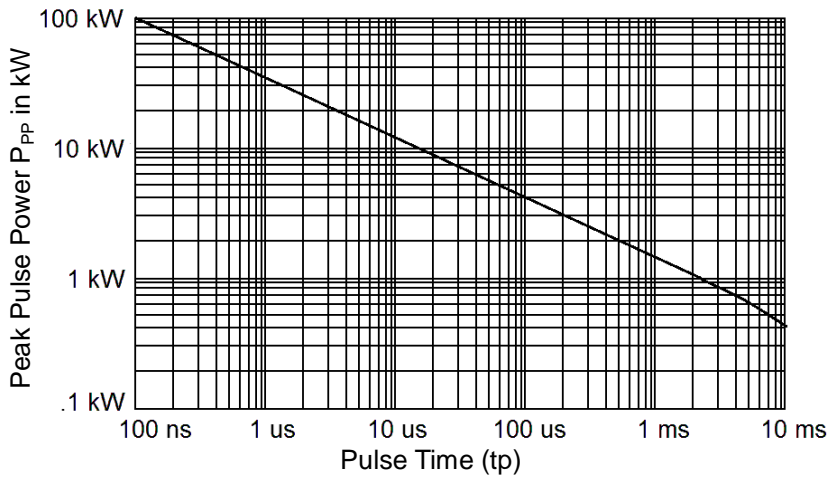
**PART NOMENCLATURE**

**SYMBOLS & DEFINITIONS**

Symbol	Definition
$I_{(BR)}$	Breakdown Current: The current used for measuring Breakdown Voltage $V_{(BR)}$ .
$I_D$	Maximum Standoff Current: The maximum current that will flow at the specified voltage and temperature.
$I_{PP}$	Peak Pulse Current: The peak current during the impulse.
$P_{PP}$	Peak Pulse Power: The peak power dissipation resulting from the peak impulse current $I_{PP}$ .
$T_{SP}$	Temperature Solder Pad: The maximum solder temperature that can be safely applied to the terminal.
$\alpha_{V(BR)}$	Temperature Coefficient of Minimum Breakdown Voltage: The minimum voltage the device will exhibit at a specified current temperature.
$V_{(BR)}$	Minimum Breakdown Voltage: The minimum voltage the device will exhibit at a specified current.
$V_C$	Maximum clamping voltage at specified $I_{PP}$ (Peak Pulse Current) at the specified pulse conditions.
$V_{WM}$	Working Peak Voltage: The maximum peak voltage that can be applied over the operating temperature range. This is also referred to as Standoff Voltage.

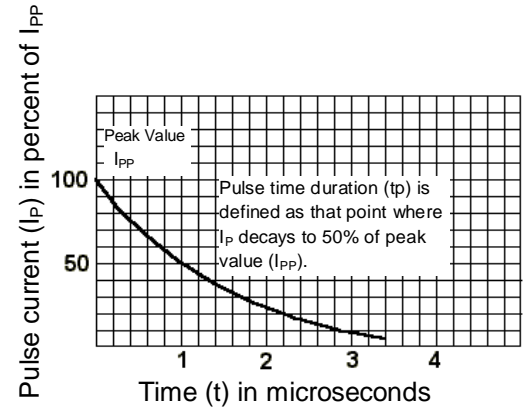
**ELECTRICAL CHARACTERISTICS**

TYPE	MINIMUM BREAK DOWN VOLTAGE	BREAKDOWN CURRENT	WORKING PEAK REVERSE VOLTAGE	MAX STANDOFF CURRENT	MAXIMUM CLAMPING VOLTAGE	MAXIMUM PEAK PULSE CURRENT		MAXIMUM TEMP. COEF. OF $V_{(BR)}$
	$V_{(BR)}$ @ 1.0 mA	MAXIMUM dc CURRENT $T_A = +25^\circ\text{C}$ $I_{(BR)}$	$V_{WM}$	$I_D$ @ $V_{WM}$	$V_C$ @ 10/1000 $\mu\text{s}$	$I_{PP}$ @ 8/20 $\mu\text{s}$	$I_{PP}$ @ 10/1000 $\mu\text{s}$	$\alpha_{V(BR)}$
	Volts	mA	V (pk)	$\mu\text{A}$	V (pk)	A (pk)	A (pk)	% / $^\circ\text{C}$
1N5610	33.0	75.0	30.5	5	47.6	193	32.0	.093
1N5611	43.7	53.0	40.3	5	63.5	136	24.0	.094
1N5612	54.0	43.0	49.0	5	78.5	116	19.0	.096
1N5613	191	12.5	175	5	265	33	5.7	.100

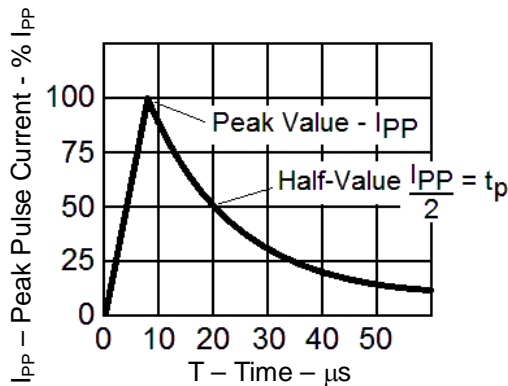
GRAPHS



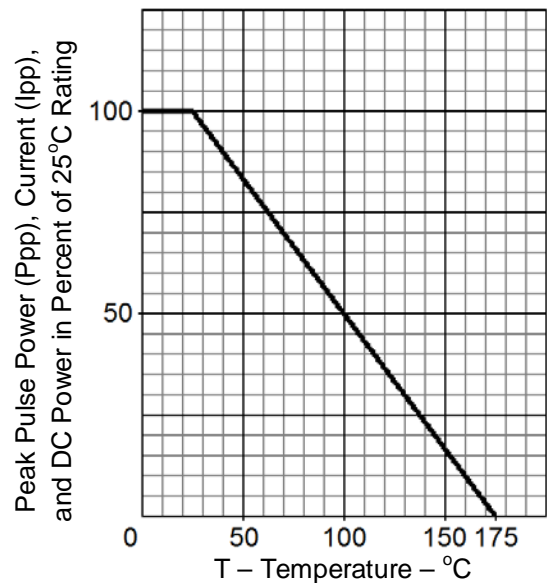
**FIG. 1 – Non-repetitive peak pulse power rating curve**  
 NOTE: Peak power defined as peak voltage times peak current.



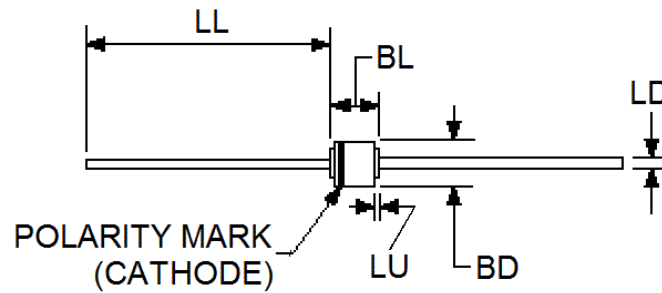
**FIG. 2 Pulse wave form for exponential surge for 10/1000  $\mu$ s**



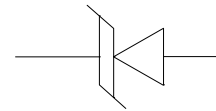
**FIGURE 3**  
**8/20  $\mu$ s CURRENT IMPULSE WAVEFORM**  
**TEST WAVEFORM PARAMETERS:**  $t_r = 8\mu\text{sec}$   
 $t_p = 20\mu\text{sec}$



**FIGURE 4**  
**DERATING CURVE**

**PACKAGE DIMENSIONS**


Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
<b>BD</b>	.150	.185	3.81	4.70	3
<b>BL</b>	.160	.375	4.06	9.53	3
<b>LD</b>	.037	.042	0.94	1.07	
<b>LL</b>	.900	1.300	22.86	33.02	
<b>LU</b>		.050		1.27	4



Schematic Symbol

**NOTES:**

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Package contour optional within BD and length BL.
4. Within this zone lead diameter may vary to allow for lead finishes and irregularities other than heat slugs.
5. In accordance with ASME Y14.5M, diameters are equivalent to  $\Phi$ x symbology.