



## Voidless Hermetically Sealed Unidirectional Transient Voltage Suppressors

*Qualified per MIL-PRF-19500/551*

Qualified Levels:  
JAN, JANTX, and  
JANTXV

### DESCRIPTION

This series of 500 watt voidless hermetically sealed unidirectional Transient Voltage Suppressors (TVS) are military qualified to MIL-PRF-19500/551 and are ideal for high-reliability applications where a failure cannot be tolerated. Working peak “standoff” voltages are available from 5.0 to 51.6 volts. They are very robust, using a hard glass casing and internal Category 1 metallurgical bonds. These devices are also available in a surface mount MELF package configuration.

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

### FEATURES

- Popular JEDEC registered 1N6461 thru 1N6468 series.
- Available as 500 W peak pulse power ( $P_{PP}$ ).
- Working peak “standoff” voltage ( $V_{WM}$ ) from 5.0 to 51.6 V.
- 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 qualifications available per MIL-PRF-19500/551. Other screening in reference to MIL-PRF-19500 is also available.  
(See [part nomenclature](#) for all available options.)
- RoHS compliant versions available (commercial grade only).

### APPLICATIONS / BENEFITS

- Military and other high-reliability transient protection.
- Extremely robust construction.
- ESD and EFT protection per IEC61000-4-2 and IEC61000-4-4 respectively.
- Protection from secondary effects of lightning per select levels in IEC61000-4-5.
- Flexible axial-leaded mounting terminals.
- Nonsensitive to ESD per MIL-STD-750 method 1020.
- Inherently radiation hard as described in Microsemi “[MicroNote 050](#)”.

### MAXIMUM RATINGS @ 25 °C

| Parameters/Test Conditions                          | Symbol              | Value       | Unit |
|-----------------------------------------------------|---------------------|-------------|------|
| Junction and Storage Temperature                    | $T_J$ and $T_{STG}$ | -55 to +175 | °C   |
| Thermal Resistance, Junction to Lead <sup>(1)</sup> | $R_{\theta JL}$     | 60          | °C/W |
| Forward Surge Current @ 8.3 ms half-sine            | $I_{FSM}$           | 80          | A    |
| Forward Voltage @ 1 Amp                             | $V_F$               | 1.5         | V    |
| Peak Pulse Power @ 10/1000 $\mu$ s                  | $P_{PP}$            | 500         | W    |
| Reverse Power Dissipation <sup>(2)</sup>            | $P_R$               | 2.5         | W    |
| Solder Temperature @ 10 s                           |                     | 260         | °C   |

- Notes:**
1. At  $L = 0.375$  inch (9.53 mm) from body.
  2. Derate at  $16.7 \text{ mW}/^\circ\text{C}$  (see [figure 4](#)).



### “B” Package

Also available in:

#### “B” SQ-MELF Package

(surface mount)



[1N6461US - 1N6468US](#)

#### MSC – Lawrence

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

#### MSC – Ireland

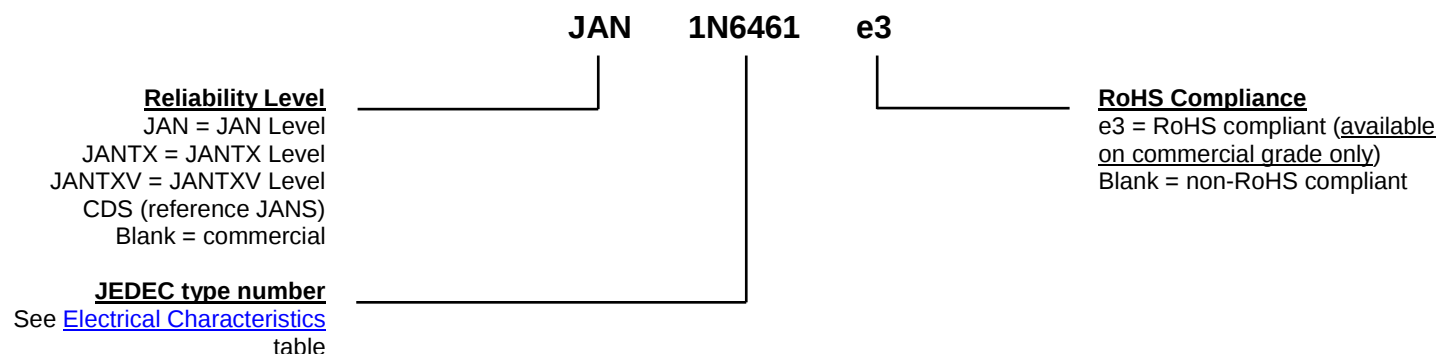
Gort Road Business Park,  
Ennis, Co. Clare, Ireland  
Tel: +353 (0) 65 6840044  
Fax: +353 (0) 65 6822298

#### Website:

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

**MECHANICAL and PACKAGING**

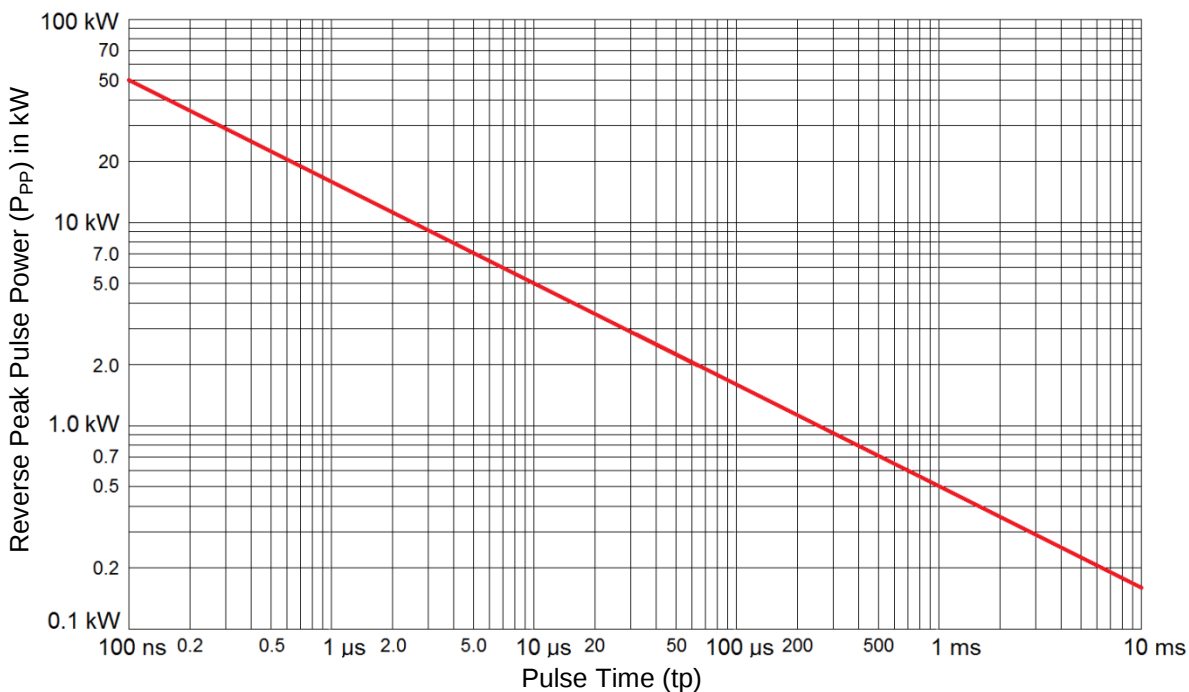
- CASE: Hermetically sealed voidless hard glass with tungsten slugs.
- TERMINALS: Axial-leads are tin/lead over copper. RoHS compliant matte-tin is available for commercial grade only.
- MARKING: Body paint and part number.
- POLARITY: Cathode band.
- TAPE & REEL option: Standard per EIA-296. Contact factory for quantities.
- WEIGHT: Approximately 750 milligrams.
- See [Package Dimensions](#) on last page.

**PART NOMENCLATURE**

**SYMBOLS & DEFINITIONS**

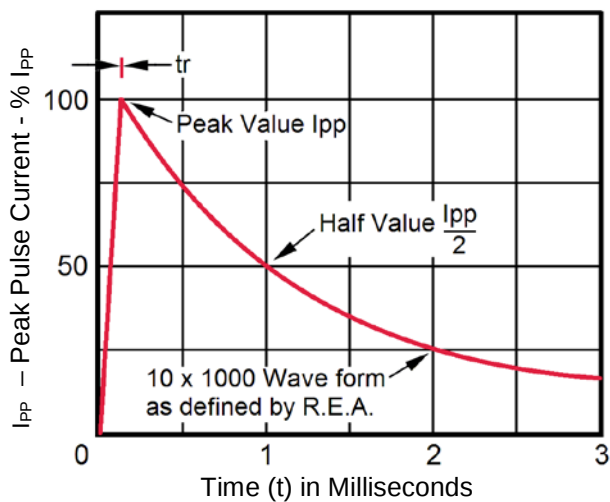
| Symbol           | Definition                                                                                                                                                                                                                                                                                                                                            |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $\alpha_{V(BR)}$ | Temperature Coefficient of Breakdown Voltage: The change in breakdown voltage divided by the change in temperature expressed in $\%/^{\circ}\text{C}$ or $\text{mV}/^{\circ}\text{C}$ .                                                                                                                                                               |
| $V_{(BR)}$       | Breakdown Voltage: The voltage across the device at a specified current $I_{(BR)}$ in the breakdown region.                                                                                                                                                                                                                                           |
| $V_{WM}$         | Rated working standoff voltage: The maximum-rated value of dc or repetitive peak positive cathode-to-anode voltage that may be continuously applied over the standard operating temperature.                                                                                                                                                          |
| $I_D$            | Standby Current: The current through the device at rated stand-off voltage.                                                                                                                                                                                                                                                                           |
| $I_{PP}$         | Peak Impulse Current: The maximum rated random recurring peak impulse current or nonrepetitive peak impulse current that may be applied to a device. A random recurring or nonrepetitive transient current is usually due to an external cause, and it is assumed that its effect will have completely disappeared before the next transient arrives. |
| $V_C$            | Clamping Voltage: The voltage across the device in a region of low differential resistance during the application of an impulse current ( $I_{PP}$ ) for a specified waveform.                                                                                                                                                                        |
| $P_{PP}$         | Peak Pulse Power. The rated random recurring peak impulse power or rated nonrepetitive peak impulse power. The impulse power is the maximum-rated value of the product of $I_{PP}$ and $V_C$ .                                                                                                                                                        |

**ELECTRICAL CHARACTERISTICS**

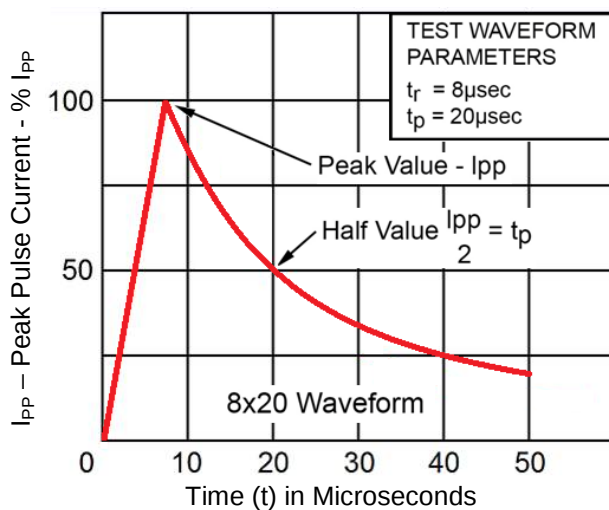
| TYPE   | MINIMUM<br>BREAK<br>DOWN<br>VOLTAGE<br>$V_{(BR)}$<br>@ $I_{(BR)}$ | BREAKDOWN<br>CURRENT<br>$I_{(BR)}$ | RATED<br>WORKING<br>STANDOFF<br>VOLTAGE<br>$V_{WM}$ | MAXIMUM<br>STANDBY<br>CURRENT<br>$I_D$<br>@ $V_{WM}$ | MAXIMUM<br>CLAMPING<br>VOLTAGE<br>$V_C$<br>@ 10/1000 $\mu s$ | MAXIMUM<br>PEAK IMPULSE<br>CURRENT<br>$I_{PP}$ |                      | MAXIMUM<br>TEMP. COEF.<br>OF<br>$\alpha V_{(BR)}$ |
|--------|-------------------------------------------------------------------|------------------------------------|-----------------------------------------------------|------------------------------------------------------|--------------------------------------------------------------|------------------------------------------------|----------------------|---------------------------------------------------|
|        |                                                                   |                                    |                                                     |                                                      |                                                              | @ 8/20<br>$\mu s$                              | @ 10/1000<br>$\mu s$ |                                                   |
|        | Volts                                                             | mA                                 | V (pk)                                              | $\mu A$                                              | V (pk)                                                       | A (pk)                                         | A (pk)               | %/°C                                              |
| 1N6461 | 5.6                                                               | 25                                 | 5                                                   | 3000                                                 | 9.0                                                          | 315                                            | 56                   | -0.03, +0.045                                     |
| 1N6462 | 6.5                                                               | 20                                 | 6                                                   | 2500                                                 | 11.0                                                         | 258                                            | 46                   | +0.060                                            |
| 1N6463 | 13.6                                                              | 5                                  | 12                                                  | 500                                                  | 22.6                                                         | 125                                            | 22                   | +0.085                                            |
| 1N6464 | 16.4                                                              | 5                                  | 15                                                  | 500                                                  | 26.5                                                         | 107                                            | 19                   | +0.085                                            |
| 1N6465 | 27.0                                                              | 2                                  | 24                                                  | 50                                                   | 41.4                                                         | 69                                             | 12                   | +0.096                                            |
| 1N6466 | 33.0                                                              | 1                                  | 30.5                                                | 3                                                    | 47.5                                                         | 63                                             | 11                   | +0.098                                            |
| 1N6467 | 43.7                                                              | 1                                  | 40.3                                                | 2                                                    | 63.5                                                         | 45                                             | 8                    | +0.101                                            |
| 1N6468 | 54.0                                                              | 1                                  | 51.6                                                | 2                                                    | 78.5                                                         | 35                                             | 6                    | +0.103                                            |

**GRAPHS**


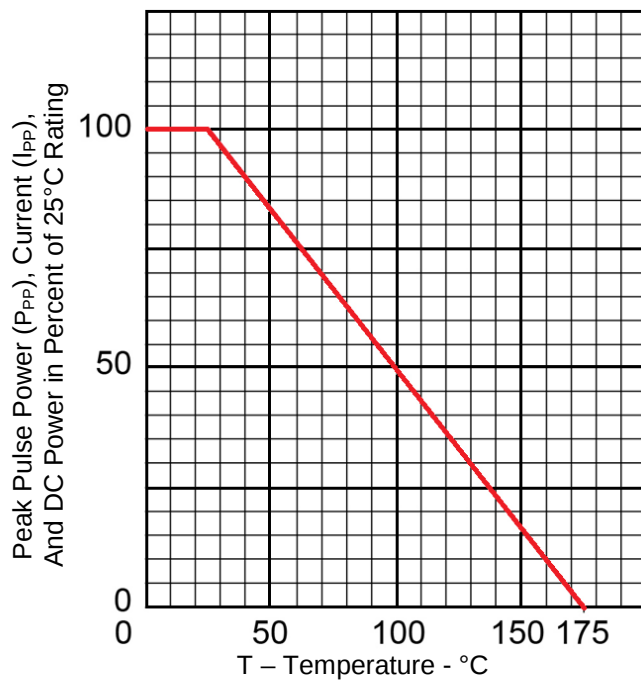
**FIGURE 1**  
Peak Pulse Power vs Pulse Time



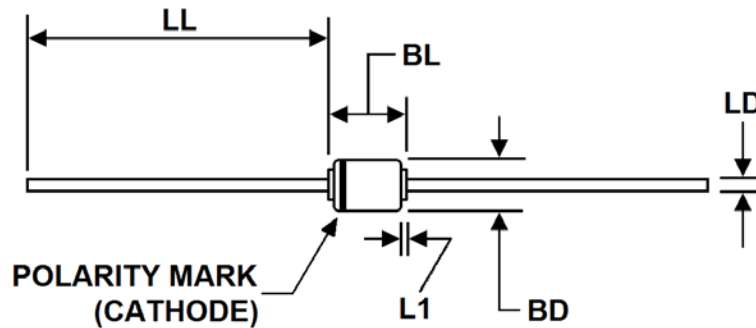
**FIGURE 2**  
10/1000  $\mu$ s Current Impulse Waveform

**GRAPHS**


**FIGURE 3**  
8/20  $\mu\text{s}$  Current Impulse Waveform



**FIGURE 4**  
Derating Curve

**PACKAGE DIMENSIONS**


| Symbol | Dimensions |       |             |       | Notes |
|--------|------------|-------|-------------|-------|-------|
|        | Inches     |       | Millimeters |       |       |
|        | Min        | Max   | Min         | Max   |       |
| BD     | 0.115      | 0.145 | 2.92        | 3.68  | 3,4   |
| BL     | 0.150      | 0.300 | 3.81        | 7.62  | 4     |
| LD     | 0.037      | 0.042 | 0.94        | 1.07  | 4     |
| LL     | 0.900      | 1.30  | 22.86       | 33.02 |       |
| L1     |            | 0.050 |             | 1.27  | 4     |

**NOTES:**

1. Dimensions are in inches.
2. Millimeter equivalents are given for information only.
3. Dimension BD shall be measured at the largest diameter.
4. Dimension BL includes dimension L1 region in which the diameter may vary from BD maximum to LD minimum.
5. In accordance with ASME Y14.5M, diameters are equivalent to  $\Phi$ x symbology.