

# Voidless Hermetically Sealed Unidirectional Transient Voltage Suppressors Data Sheet

## 1N6461-1N6468



## Product Overview

This series of 500 W voidless hermetically sealed unidirectional Transient Voltage Suppressors (TVS) are military qualified per 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 V to 51.6 V. 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.

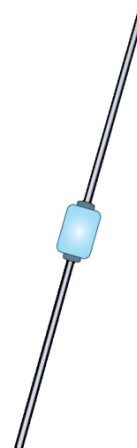
### Features

- Popular JEDEC registered 1N6461 through 1N6468 series
- Available as 500 W peak pulse power ( $P_{PP}$ )
- Working peak “standoff” voltage ( $V_{WM}$ ) from 5.0 V to 51.6 V
- High surge current and peak pulse power provides transient voltage protection for sensitive circuits.
- Double-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

- 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 [MicroNote 050](#)

Figure 1. “B” Package



## 1. Maximum Ratings at 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 at 8.3 ms half-sine	$I_{FSM}$	80	A
Forward voltage at 1 A	$V_F$	1.5	V
Peak pulse power at 10/1000 $\mu$ s	$P_{PP}$	500	W
Reverse power dissipation <sup>2</sup>	$P_R$	2.5	W
Solder temperature at 10 seconds	$T_{SP}$	260	°C

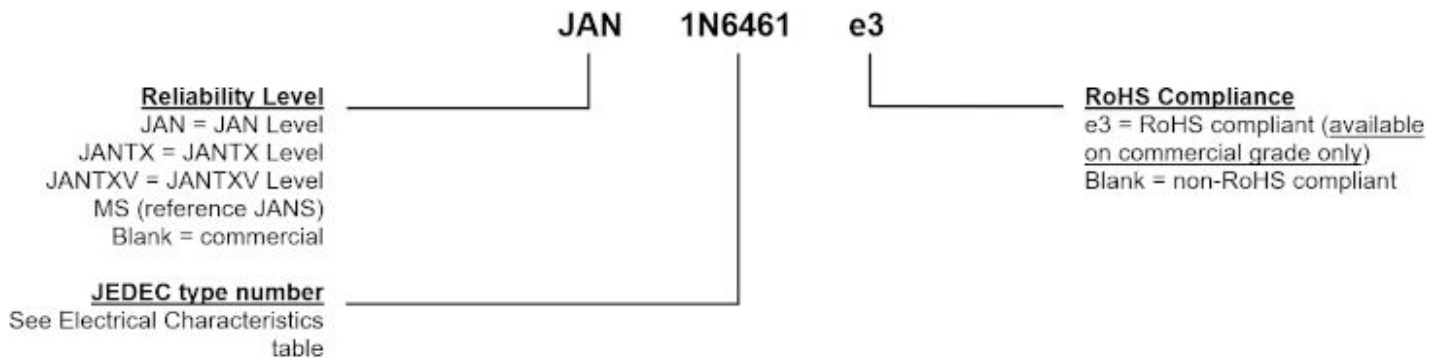
### Notes:

- At  $L = 0.375$  inch (9.53 mm) from body.
- Derate at 16.7 mW/°C (see [Figure 3-4](#)).

### 1.1 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 mg
- See [Package Dimensions](#).

### 1.2 Part Nomenclature



## 2. Symbols and Definitions

Symbol	Definition
$\alpha_{V(BR)}$	Temperature coefficient of minimum 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 $V_C$ .

### 2.1 Electrical Characteristics

Type	Minimum Breakdown Voltage <sup>1</sup> $V_{(BR)}$ at $I_{(BR)}$	Breakdown Current $I_{(BR)}$	Rated Standoff Voltage $V_{WM}$	Maximum Standby Current $I_D$ at $V_{RWM}$	Maximum Clamping Voltage <sup>1</sup> $V_C$ at $I_{PP}$	Maximum Peak Pulse Current <sup>1</sup> $I_{PP}$		Maximum Temp. Coef. of $V_{(BR)}$ $\alpha_{V(BR)}$
						at 8/20 $\mu\text{s}$	at 10/1000 $\mu\text{s}$	
	V	mA	V (pk)	$\mu\text{A}$	V (pk)	A (pk)	A (pk)	$\%/^{\circ}\text{C}$
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

### 3. Performance Curves

Figure 3-1. Peak Pulse Power vs. Pulse Time

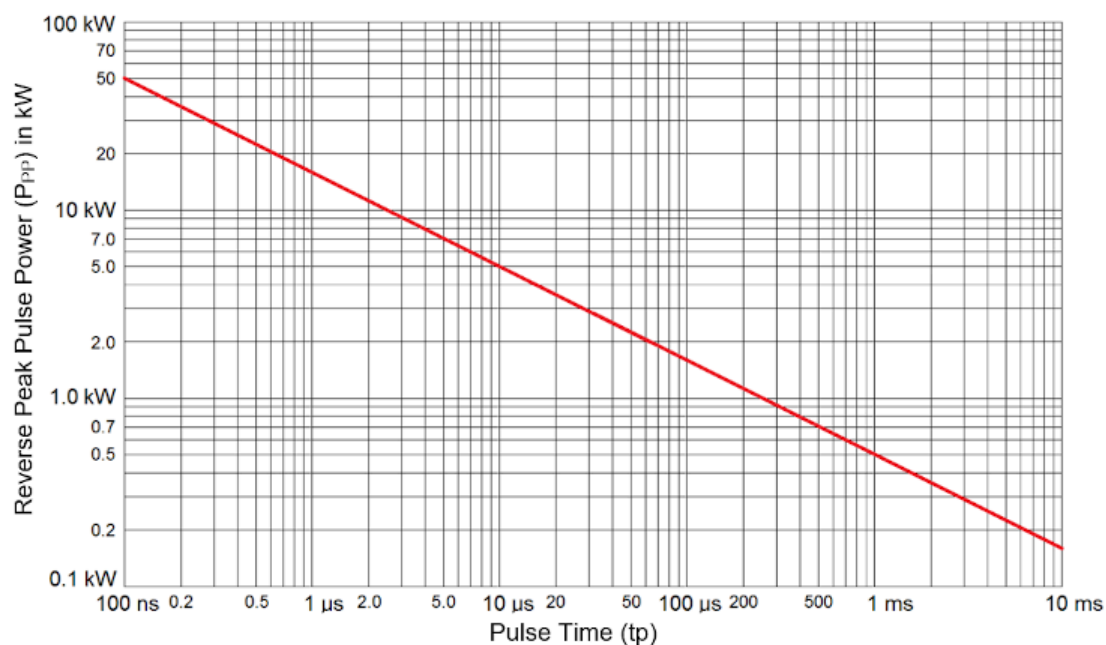


Figure 3-2. 10/1000  $\mu$ s Current Impulse Waveform

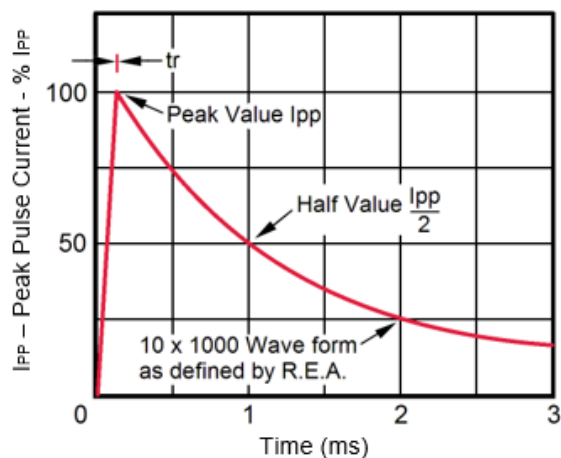


Figure 3-3. 8/20  $\mu$ s Current Impulse Waveform

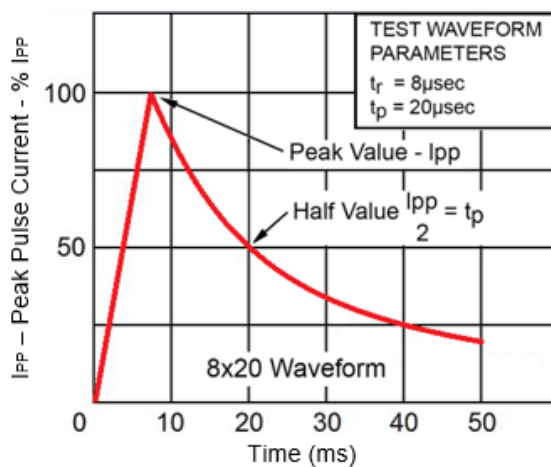
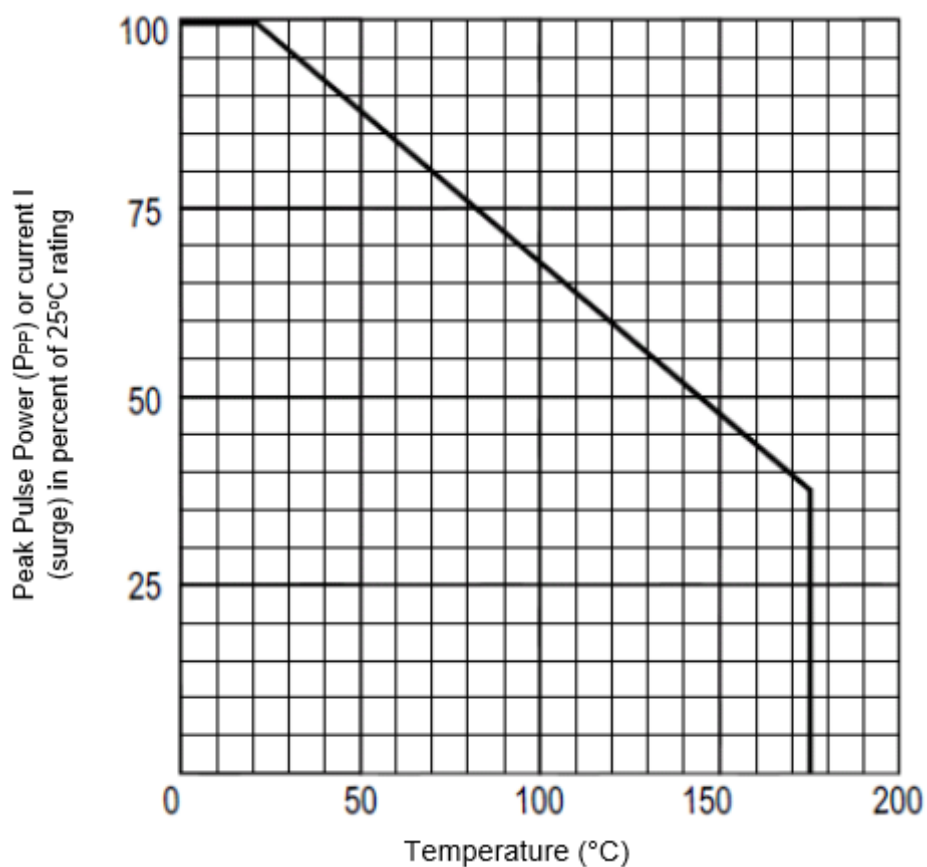
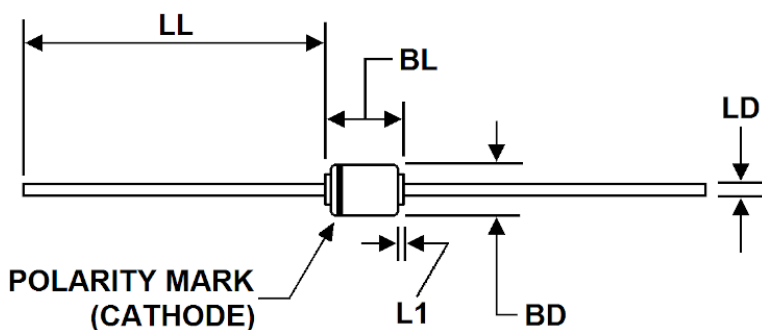


Figure 3-4. Derating Curve



## 4. Package Dimensions

Dimensions are in inches. Millimeter equivalents are given for information only. In accordance with ASME Y14.5M, diameters are equivalent to  $\Phi$ x symbology.



	Inch		Millimeters		Notes
	Min	Max	Min	Max	
BD	0.115	0.145	2.92	3.68	1,2
BL	0.150	0.300	3.81	7.62	2
LD	0.037	0.042	0.94	1.07	2
LL	0.900	1.30	22.86	33.02	
L1		0.050		1.27	2

### Note:

1. Dimension BD shall be measured at the largest diameter.
2. Dimension BL includes dimension L1 region in which the diameter may vary from BD maximum to LD minimum.

## 5. Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

Revision	Date	Description
A	06/2023	Converted document to Microchip template.

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