

# Voidless Hermetically Sealed Bidirectional Transient Voltage Suppressors Data Sheet

## 1N6103A-1N6137A



## Product Overview

This series of industry-recognized, voidless, hermetically sealed bidirectional Transient Voltage Suppressors (TVS) is military qualified per MIL-PRF-19500/516 and is ideal for high-reliability applications where a failure cannot be tolerated. They provide a working peak standoff voltage selection from 5.7 V to 152 V with a 500 W rating for a 10/1000  $\mu$ s pulse. They are very robust in hard-glass construction and use internal "Category 1" metallurgical bonds. These devices are available as both a non-suffix part and an "A" version providing different voltage tolerances as described in the nomenclature section. These devices are also available in a surface-mount MELF package configuration.

### Features

- 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, JANS qualified versions are available per MIL-PRF-19500/516. (See [Part Nomenclature](#) for all available options).
- RoHS compliant versions available (commercial grade only).

### Applications

- Military and other high-reliability applications
- Extremely robust construction
- Extensive range in working peak "standoff" voltage ( $V_{WM}$ ) from 5.7 V to 152 V
- 500 W peak pulse power ( $P_{PP}$ ) for a 10/1000  $\mu$ s pulse
- ESD and EFT protection per IEC6100-4-2 and IEC61000-4-4 respectively
- Protection from the secondary effects of lightning 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 [MicroNote 050](#).

Figure 1. "B" Package



## 1. Maximum Ratings

Maximum ratings are taken at  $T_A = 25\text{ }^\circ\text{C}$  unless otherwise noted.

Parameters/Test Conditions	Symbol	Value	Unit
Junction and storage temperature	$T_J$ and $T_{STG}$	-55 to +175	$^\circ\text{C}$
Thermal resistance junction-to-lead <sup>1</sup>	$R_{\theta JL}$	33.5	$^\circ\text{C}/\text{W}$
Peak pulse power at $25\text{ }^\circ\text{C}$ (10/1000 $\mu\text{s}$ )	$P_{PP}$	500	W
Steady-state power at $T_L = 75\text{ }^\circ\text{C}$ <sup>1</sup>	$P_D$	3.0	W
Steady-state power at $T_A = 25\text{ }^\circ\text{C}$ <sup>2</sup>	$P_D$	2.0	W
Impulse repetition rate	df	0.01	%
Solder temperature at 10 seconds	$T_{SP}$	260	$^\circ\text{C}$

### Notes:

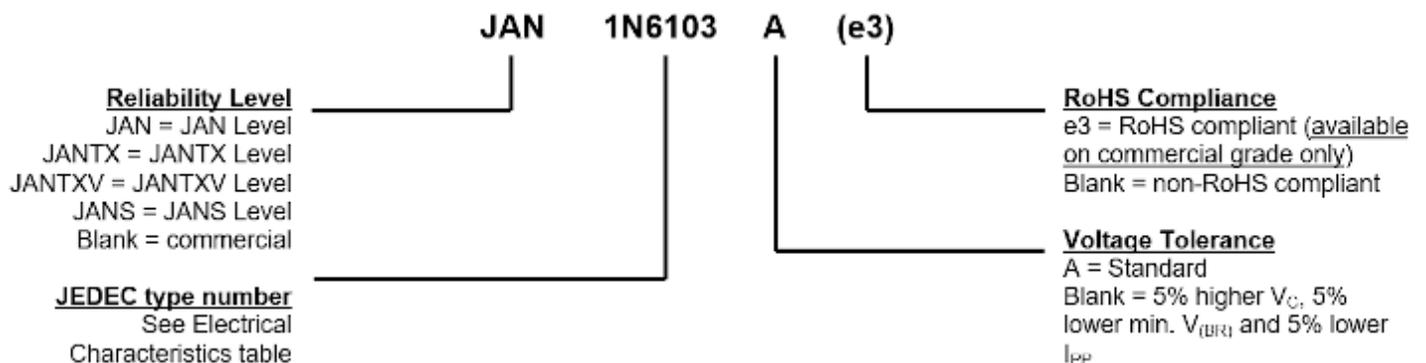
- At 3/8 inch lead length from body.
- Steady-state power ratings with reference to ambient are for PC boards where thermal resistance from mounting point to ambient is sufficiently controlled where maximum rated  $T_J$  is not exceeded (also see [Figure 3-4](#)).

### 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 on commercial grade only.
- Marking: Body paint and part number
- Polarity: No polarity marking for these bidirectional TVSs
- Tape and reel option: Standard per EIA-296. Consult factory for quantities.
- Weight: Approximately 750 milligrams
- See [Package Dimensions](#).

### 1.2 Part Nomenclature

Applicable to entire series:



## 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 that caused it expressed in %/°C or mV/°C.
$V_{(BR)}$	Minimum breakdown voltage: The minimum voltage the device will exhibit at a specified current.
$V_{WM}$	Working peak voltage: The maximum peak voltage that can be applied over the operating temperature range. This is also referred to as standoff voltage.
$I_D$	Maximum standby current: The maximum current that will flow at the specified voltage and temperature.
$V_C$	Maximum clamping voltage at specified $I_{PP}$ (Peak Pulse Current) at the specified pulse conditions.
$P_{PP}$	Peak pulse power: The peak power dissipation resulting from the peak impulse current $I_{PP}$ .

### 2.1 Electrical Characteristics

Industry Type Number <sup>1</sup>	Minimum Breakdown Voltage <sup>1</sup> $V_{(BR)}$ at $I_{(BR)}$		Rated Standoff Voltage $V_{WM}$	Maximum Standby Current $I_D$ at $V_{WM}$	Maximum Clamping Voltage <sup>1</sup> $V_C$ at $I_{PP}$	Maximum Peak Pulse Current <sup>1</sup> $I_{PP}$	Maximum Temp. Coef. of $V_{(BR)}$ $\alpha_{V(BR)}$
	V	mA	V	$\mu$ A	V	A	%/°C
1N6103A <sup>2</sup>	7.13	175	5.7	50	11.2	44.6	0.06
1N6104A <sup>2</sup>	7.79	150	6.2	20	12.1	41.3	0.06
1N6105A <sup>2</sup>	8.65	150	6.9	20	13.4	37.3	0.06
1N6106A <sup>2</sup>	9.50	125	7.6	20	14.5	34.5	0.07
1N6107A <sup>2</sup>	10.45	125	8.4	20	15.6	32.0	0.07
1N6108A <sup>2</sup>	11.40	100	9.1	20	16.9	29.6	0.07
1N6109A <sup>2</sup>	12.35	100	9.9	20	18.2	27.5	0.08
1N6110A <sup>2</sup>	14.25	75	11.4	20	21.0	23.8	0.08
1N6111A <sup>2</sup>	15.20	75	12.2	20	22.3	22.4	0.08
1N6112A <sup>2</sup>	17.10	65	13.7	1	25.1	19.9	0.085
1N6113A <sup>2</sup>	19.0	65	15.2	1	27.7	18.0	0.085
1N6114A <sup>2</sup>	20.9	50	16.7	1	30.5	16.4	0.085
1N6115A <sup>2</sup>	22.8	50	18.2	1	33.3	15.0	0.09
1N6116A <sup>2</sup>	25.7	50	20.6	1	37.4	13.4	0.09
1N6117A <sup>2</sup>	28.5	40	22.8	1	41.6	12.0	0.09
1N6118A <sup>2</sup>	31.4	40	25.1	1	45.7	10.9	0.095
1N6119A	34.2	30	27.4	1	49.9	10.0	0.095
1N6120A	37.1	30	29.7	1	53.6	9.3	0.095
1N6121A	40.9	30	32.7	1	59.1	8.5	0.095
1N6122A	44.7	25	35.8	1	64.6	7.7	0.095
1N6123A	48.5	25	38.8	1	70.1	7.1	0.095
1N6124A	53.2	20	42.6	1	77.0	6.5	0.095
1N6125A	58.9	20	47.1	1	85.3	5.9	0.100

.....continued

Industry Type Number <sup>1</sup>	Minimum Breakdown Voltage <sup>1</sup> $V_{(BR)}$ at $I_{(BR)}$		Rated Standoff Voltage $V_{WM}$	Maximum Standby Current $I_D$ at $V_{WM}$	Maximum Clamping Voltage <sup>1</sup> $V_C$ at $I_{PP}$	Maximum Peak Pulse Current <sup>1</sup> $I_{PP}$	Maximum Temp. Coef. of $V_{(BR)}$ $\alpha_{V(BR)}$
	V	mA	V	$\mu A$	V	A	%/ $^{\circ}C$
1N6126A	64.6	20	51.7	1	97.1	5.1	0.100
1N6127A	71.3	20	56.0	1	103.1	4.8	0.100
1N6128A	77.9	15	62.2	1	112.8	4.4	0.100
1N6129A	86.5	15	69.2	1	125.1	4.0	0.100
1N6130A	95.0	12	76.0	1	137.6	3.6	0.100
1N6131A	104.5	12	86.6	1	151.3	3.3	0.100
1N6132A	114.0	10	91.2	1	165.1	3.0	0.100
1N6133A	123.5	10	98.8	1	178.8	2.8	0.105
1N6134A	142.5	8	114.0	1	206.3	2.4	0.105
1N6135A	152.0	8	121.6	1	218.4	2.3	0.105
1N6136A	171.0	5	136.8	1	245.7	2.0	0.110
1N6137A	190.0	5	152.0	1	273.0	1.8	0.110

**Notes:**

1. Part number without the "A" suffix has 5% higher  $V_C$ , 5% lower minimum  $V_{(BR)}$ , and 5% lower  $I_{PP}$ .
2. Also available in JANS qualification per MIL-PRF-19500/516.

### 3. Performance Curves

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

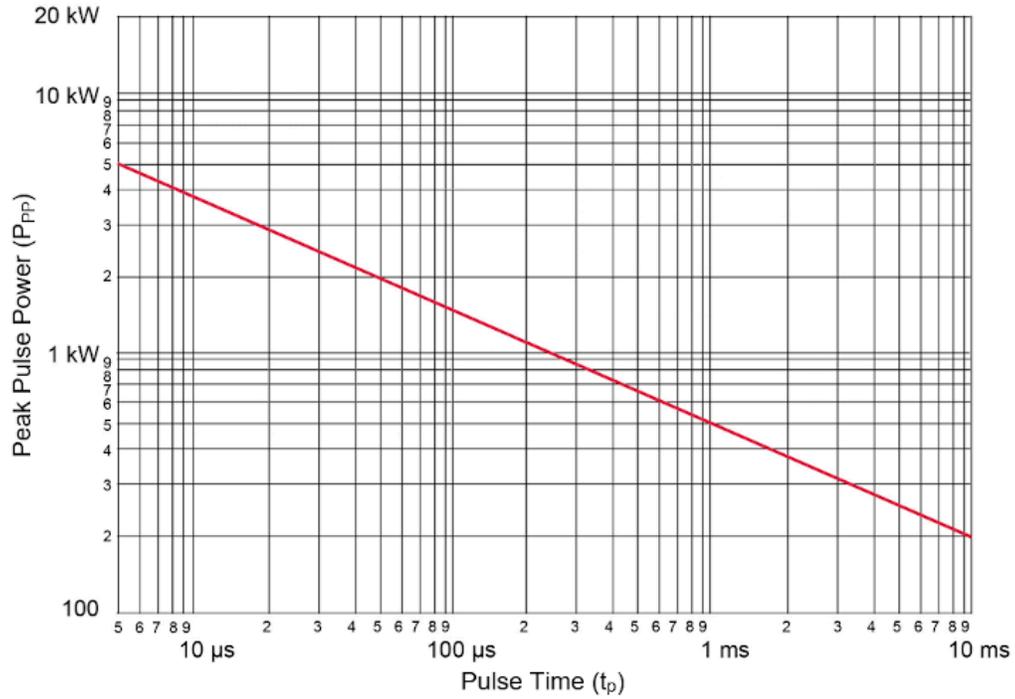


Figure 3-2. Pulse Derating curve (Not Applicable to JANHC/JANKC Die)

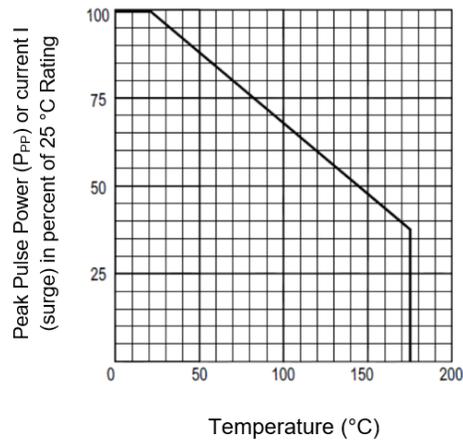


Figure 3-3. Pulse Wave Form

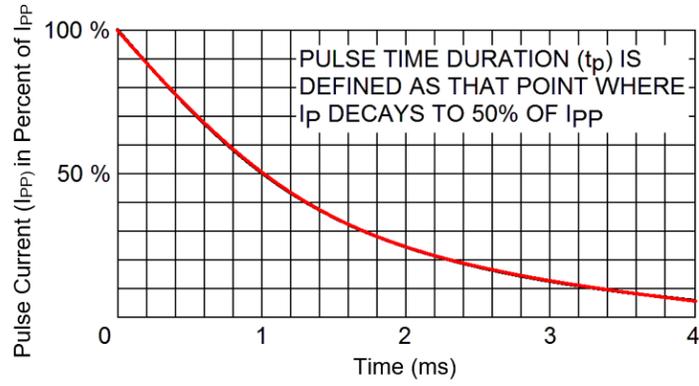
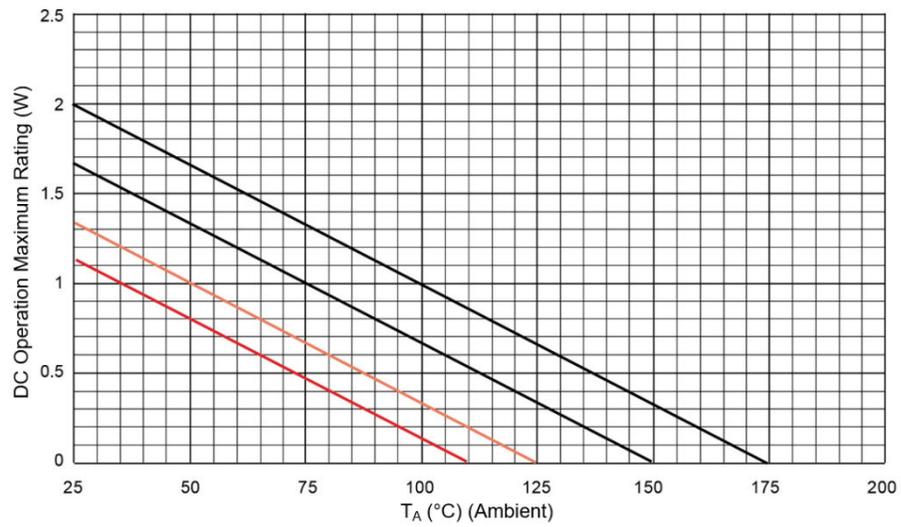
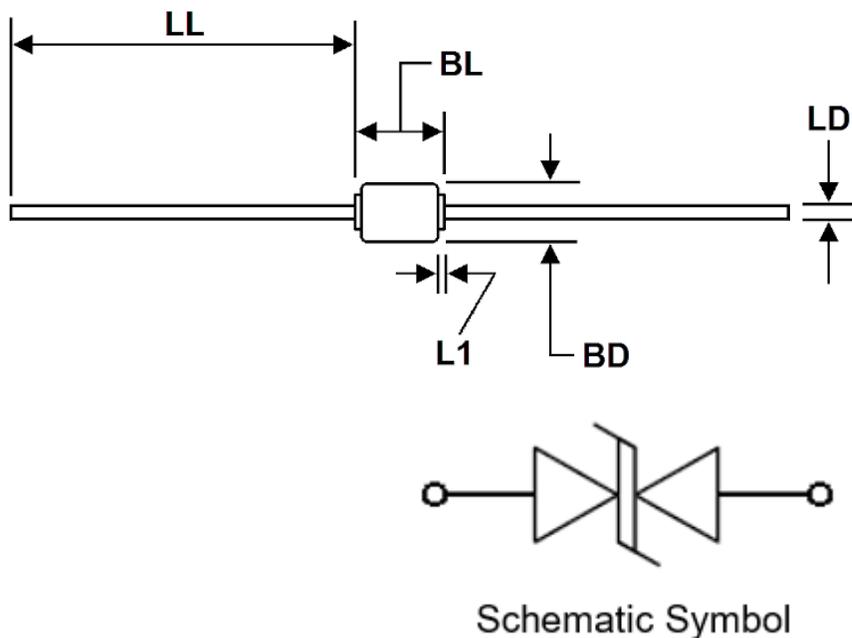


Figure 3-4. Temperature-Power Derating Curve



## 4. Package Dimensions

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



Ltr	Inches		Millimeters		Notes
	Min	Max	Min	Max	
BD	0.085	0.140	2.16	3.56	1
BL	0.140	0.185	3.56	4.70	
LD	0.026	0.033	0.66	0.84	
LL	1.00	1.30	25.40	33.02	
L1	-	0.030	-	0.76	2

### Notes:

1. Dimension BD shall be measured at the largest diameter.
2. Dimension L1 lead diameter uncontrolled in this area.

## 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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