



Voidless Hermetically Sealed Bidirectional Transient Voltage Suppressors

Qualified to MIL-PRF-19500/516

*Qualified Levels:
JAN, JANTX, JANTXV
and JANS**

DESCRIPTION

This series of industry recognized voidless, hermetically sealed bidirectional Transient Voltage Suppressors (TVS) is military qualified to 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 to 152 volts with a 500 watt rating for a 10/1000 μ 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.

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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 qualified versions are available per MIL-PRF-19500/516.
- *JANS available for 1N6103(A) thru 1N6118(A) per MIL-PRF-19500/516 as well as further options for screening in reference to MIL-PRF-19500 for all others in this series. (See [part nomenclature](#) for all available options.)
- RoHS compliant versions available (commercial grade only).

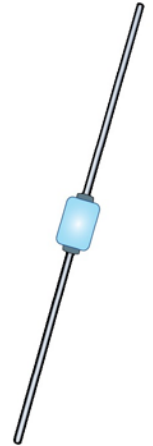
APPLICATIONS / BENEFITS

- Military and other high-reliability applications.
- Extremely robust construction.
- Extensive range in working peak “standoff” voltage (V_{WM}) from 5.7 to 152 volts.
- 500 watt peak pulse power (P_{PP}) for a 10/1000 μ 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 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 | $^\circ\text{C}$ |
| Thermal Resistance Junction-to-Lead ⁽¹⁾ | $R_{\theta JL}$ | 33.5 | $^\circ\text{C/W}$ |
| Peak Pulse Power @ 25°C (10/1000 μ s) | P_{PP} | 500 | W |
| Steady-State Power @ $T_L = 75^\circ\text{C}$ ⁽¹⁾ | P_D | 3.0 | W |
| Steady-State Power @ $T_A = 25^\circ\text{C}$ ⁽²⁾ | P_D | 2.0 | W |
| Impulse Repetition Rate | df | 0.01 | % |
| Solder Temperature @ 10 s | T_{SP} | 260 | $^\circ\text{C}$ |


- Notes:**
1. At 3/8 inch lead length from body.
 2. 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 4](#)).



“B” Package

Also available in:

“B” SQ-MELF Package (surface mount)

 [1N6103US – 1N6137US](#)

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
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Website:

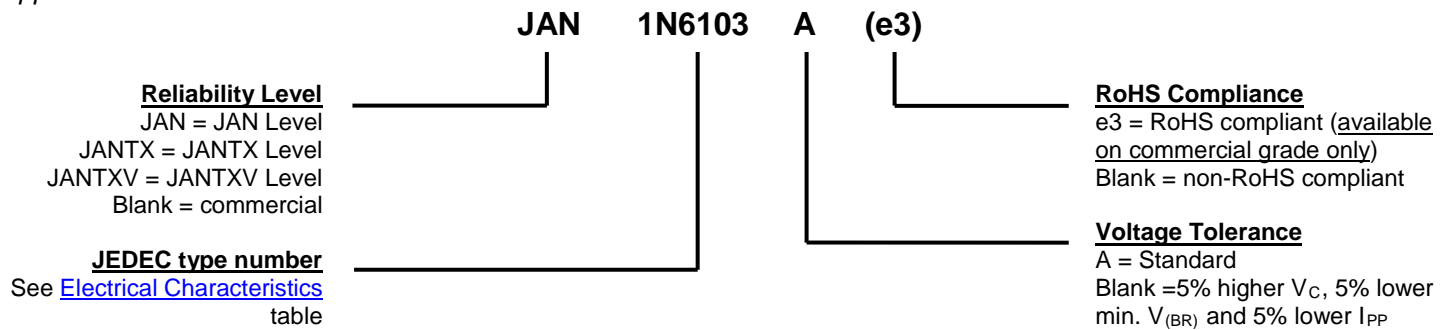
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MECHANICAL and PACKAGING

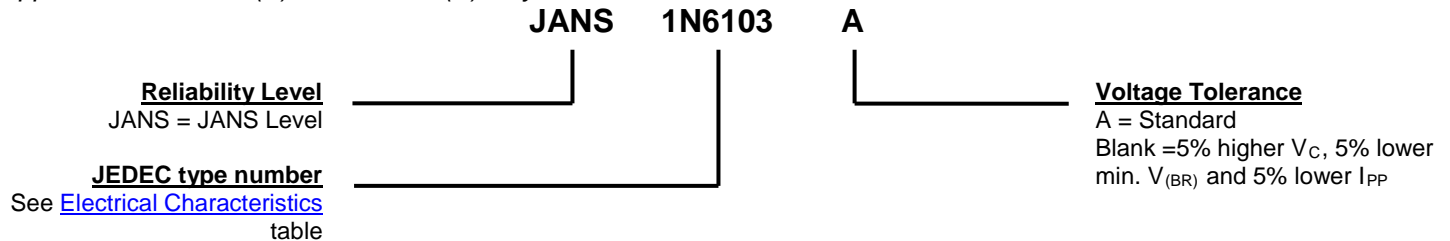
- CASE: Hermetically sealed voidless hard glass with tungsten slugs.
- TERMINALS: Axial-leads are tin/lead over copper. RoHS compliant matte-tin is available on commercial grade only.
- MARKING: Body paint and part number.
- POLARITY: No polarity marking for these bidirectional TVSs.
- TAPE & REEL option: Standard per EIA-296. Consult factory for quantities.
- WEIGHT: Approximately 750 milligrams.
- See [Package Dimensions](#) on last page.

PART NOMENCLATURE

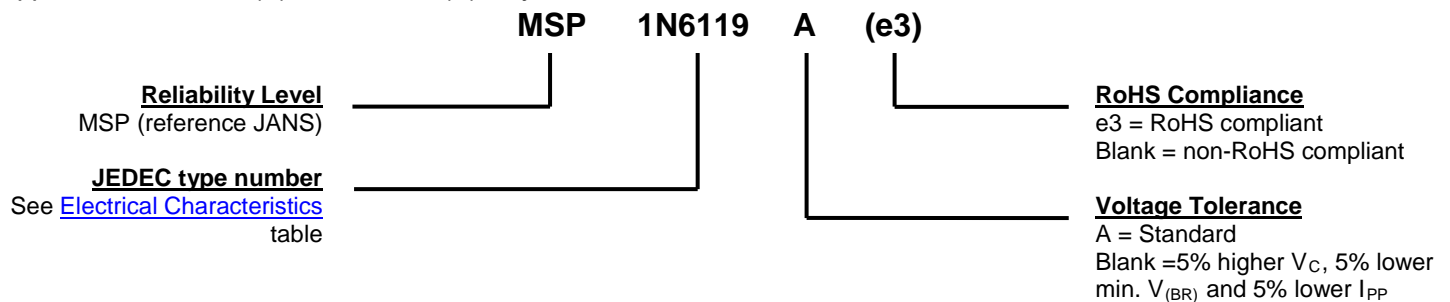
Applicable to entire series:



Applicable to 1N6103(A) thru 1N6118(A) only:



Applicable to 1N6119(A) thru 1N6137(A) only:



SYMBOLS & DEFINITIONS

| Symbol | Definition |
|------------|--|
| $V_{(BR)}$ | 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 Standoff 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} . |

ELECTRICAL CHARACTERISTICS

| INDUSTRY TYPE NUMBER (Note 1) | MINIMUM BREAKDOWN VOLTAGE (Note 1) | | RATED STANDOFF VOLTAGE | MAXIMUM STANDBY CURRENT | MAXIMUM CLAMPING VOLTAGE (Note 1) | MAXIMUM PEAK PULSE CURRENT (Note 1) | MAXIMUM TEMP. COEF. OF $V_{(BR)}$ $\alpha_{V(BR)}$ |
|--|---|--------------|------------------------------|-------------------------------|--|--|--|
| | $V_{(BR)}$ | @ $I_{(BR)}$ | | | | | |
| | Volts | mA | V | μA | Volts | Amps | %/°C |
| †1N6103A | 7.13 | 175 | 5.7 | 50 | 11.2 | 44.6 | .06 |
| †1N6104A | 7.79 | 150 | 6.2 | 20 | 12.1 | 41.3 | .06 |
| †1N6105A | 8.65 | 150 | 6.9 | 20 | 13.4 | 37.3 | .06 |
| †1N6106A | 9.50 | 125 | 7.6 | 20 | 14.5 | 34.5 | .07 |
| †1N6107A | 10.45 | 125 | 8.4 | 20 | 15.6 | 32.0 | .07 |
| †1N6108A | 11.40 | 100 | 9.1 | 20 | 16.9 | 29.6 | .07 |
| †1N6109A | 12.35 | 100 | 9.9 | 20 | 18.2 | 27.5 | .08 |
| †1N6110A | 14.25 | 75 | 11.4 | 20 | 21.0 | 23.8 | .08 |
| †1N6111A | 15.20 | 75 | 12.2 | 20 | 22.3 | 22.4 | .08 |
| †1N6112A | 17.10 | 65 | 13.7 | 1 | 25.1 | 19.9 | .085 |
| †1N6113A | 19.0 | 65 | 15.2 | 1 | 27.7 | 18.0 | .085 |
| †1N6114A | 20.9 | 50 | 16.7 | 1 | 30.5 | 16.4 | .085 |
| †1N6115A | 22.8 | 50 | 18.2 | 1 | 33.3 | 15.0 | .09 |
| †1N6116A | 25.7 | 50 | 20.6 | 1 | 37.4 | 13.4 | .09 |
| †1N6117A | 28.5 | 40 | 22.8 | 1 | 41.6 | 12.0 | .09 |
| †1N6118A | 31.4 | 40 | 25.1 | 1 | 45.7 | 10.9 | .095 |
| 1N6119A | 34.2 | 30 | 27.4 | 1 | 49.9 | 10.0 | .095 |
| 1N6120A | 37.1 | 30 | 29.7 | 1 | 53.6 | 9.3 | .095 |
| 1N6121A | 40.9 | 30 | 32.7 | 1 | 59.1 | 8.5 | .095 |
| 1N6122A | 44.7 | 25 | 35.8 | 1 | 64.6 | 7.7 | .095 |
| 1N6123A | 48.5 | 25 | 38.8 | 1 | 70.1 | 7.1 | .095 |
| 1N6124A | 53.2 | 20 | 42.6 | 1 | 77.0 | 6.5 | .095 |
| 1N6125A | 58.9 | 20 | 47.1 | 1 | 85.3 | 5.9 | .100 |
| 1N6126A | 64.6 | 20 | 51.7 | 1 | 97.1 | 5.1 | .100 |
| 1N6127A | 71.3 | 20 | 56.0 | 1 | 103.1 | 4.8 | .100 |
| 1N6128A | 77.9 | 15 | 62.2 | 1 | 112.8 | 4.4 | .100 |
| 1N6129A | 86.5 | 15 | 69.2 | 1 | 125.1 | 4.0 | .100 |
| 1N6130A | 95.0 | 12 | 76.0 | 1 | 137.6 | 3.6 | .100 |
| 1N6131A | 104.5 | 12 | 86.6 | 1 | 151.3 | 3.3 | .100 |
| 1N6132A | 114.0 | 10 | 91.2 | 1 | 165.1 | 3.0 | .100 |
| 1N6133A | 123.5 | 10 | 98.8 | 1 | 178.8 | 2.8 | .105 |
| 1N6134A | 142.5 | 8 | 114.0 | 1 | 206.3 | 2.4 | .105 |
| 1N6135A | 152.0 | 8 | 121.6 | 1 | 218.4 | 2.3 | .105 |
| 1N6136A | 171.0 | 5 | 136.8 | 1 | 245.7 | 2.0 | .110 |
| 1N6137A | 190.0 | 5 | 152.0 | 1 | 273.0 | 1.8 | .110 |

† Also available in JANS qualification per MIL-PRF-19500/516.

Notes: 1. Part number without the A suffix has 5% higher V_C , 5% lower minimum $V_{(BR)}$, and 5% lower I_{PP} .

GRAPHS

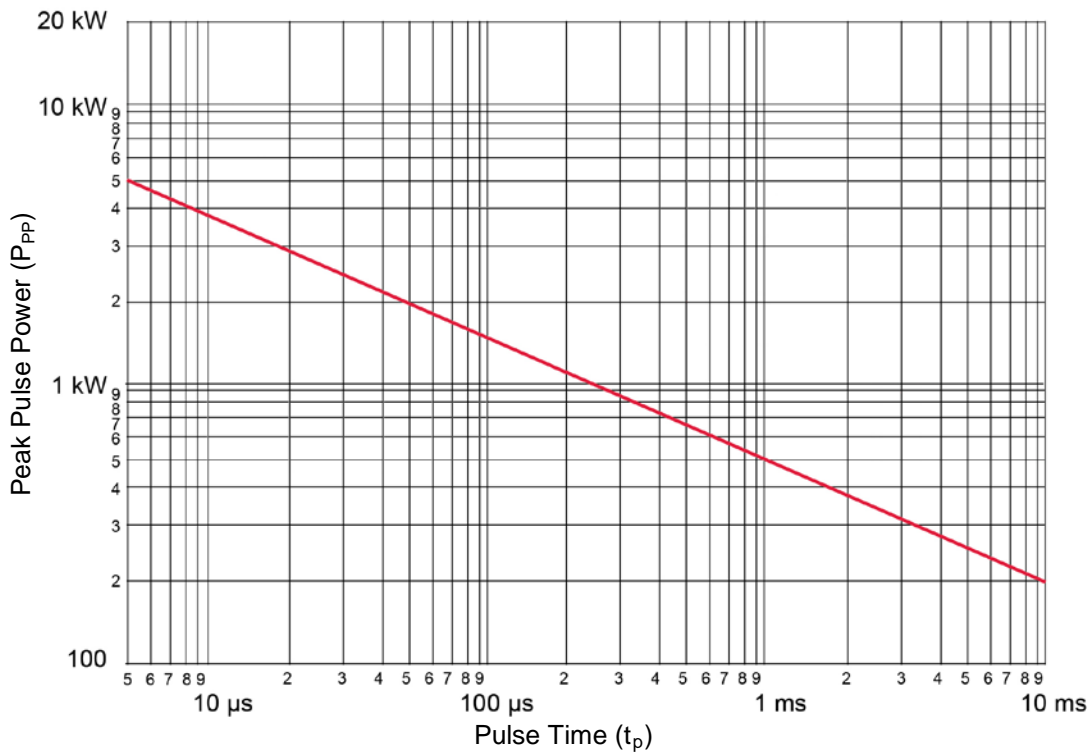


FIGURE 1
Peak Pulse Power vs. Pulse Time

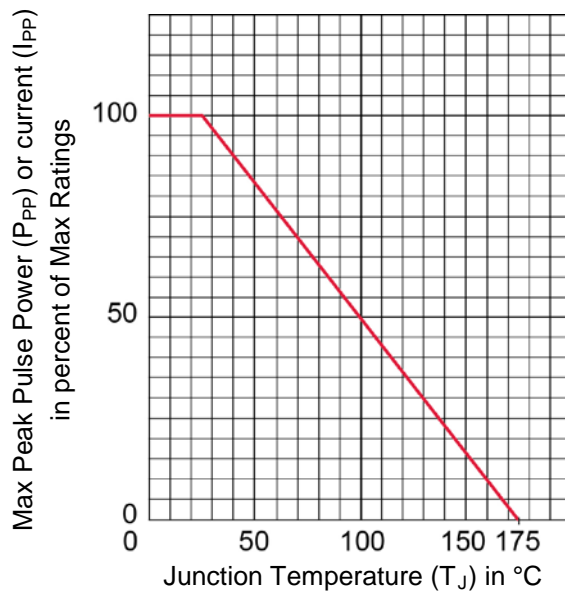


FIGURE 2
Peak Pulse Power vs T_J (prior to impulse)

GRAPHS

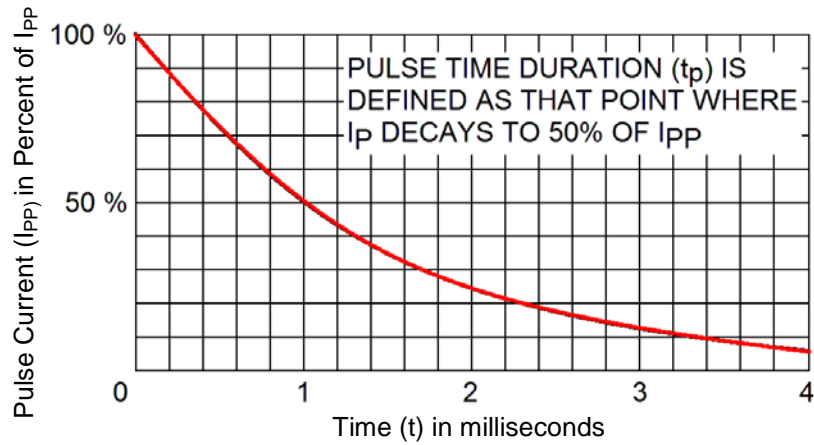


FIGURE 3
Pulse Wave Form

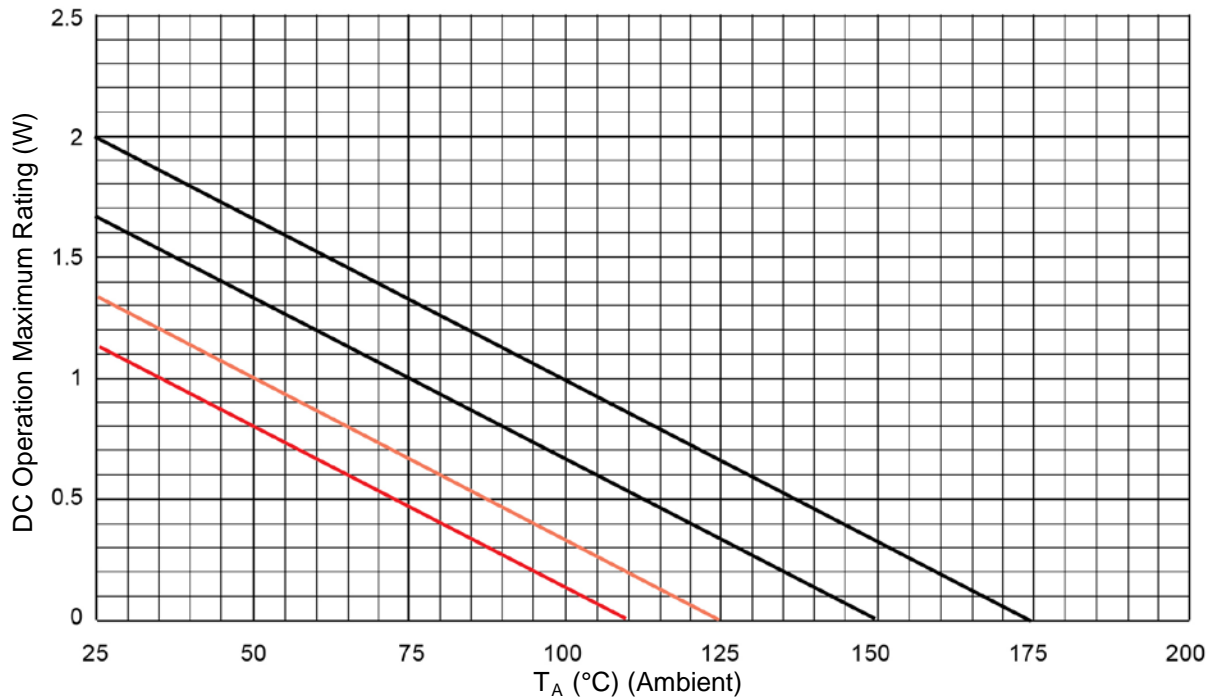
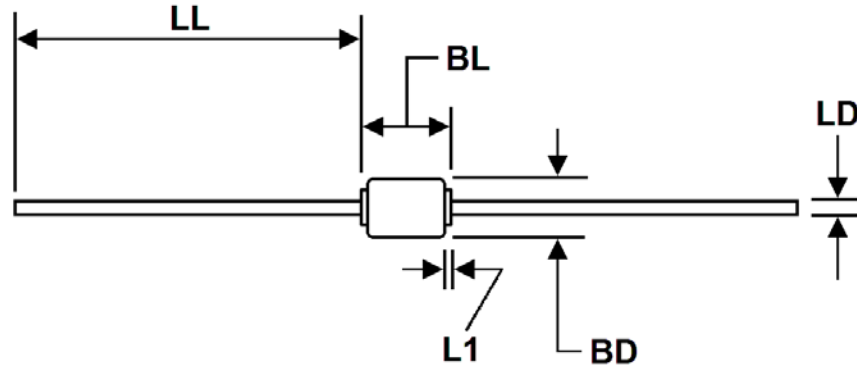
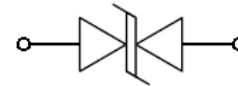


FIGURE 4
Temperature-Power Derating Curve

PACKAGE DIMENSIONS


| Ltr | Dimensions | | | | Notes |
|-----------|------------|-------|-------------|-------|-------|
| | Inches | | Millimeters | | |
| | Min | Max | Min | Max | |
| BD | 0.085 | 0.140 | 2.16 | 3.56 | 3 |
| 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 | 4 |



Schematic Symbol

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Dimension BD shall be measured at the largest diameter.
4. Dimension L1 lead diameter uncontrolled in this area.
5. In accordance with ASME Y14.5M, diameters are equivalent to Φ x symbology.

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