



## Voidless Hermetically Sealed Surface Mount Bidirectional Transient Voltage Suppressors

Qualified to MIL-PRF-19500/516

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

### DESCRIPTION

This surface mount series of industry recognized voidless, hermetically sealed, bidirectional Transient Voltage Suppressors (TVS) designs 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 W rating for a 10/1000  $\mu$ s pulse. They are very robust in hard-glass construction and internal “Category 1” metallurgical bonds. These are also 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 axial-leaded packages for thru-hole mounting.



“B” or SQ-MELF Package

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

Also available in:

### 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)US thru 1N6118(A)US 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).

“B” Package  
(axial-leaded)  
 [1N6103 – 1N6137](#)

### 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  $\mu$ 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.
- Square-end-cap terminals for easy placement.
- 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-End Cap                               | $R_{\theta JEC}$    | 8.3         | $^\circ\text{C/W}$ |
| Peak Pulse Power @ $25^\circ\text{C}$ (10/1000 $\mu$ s)              | $P_{PP}$            | 500         | W                  |
| Steady-State Power up to $T_{EC} = 150^\circ\text{C}$ <sup>(1)</sup> | $P_D$               | 3.0         | W                  |
| Steady-State Power @ $T_A = 25^\circ\text{C}$ <sup>(2)</sup>         | $P_D$               | 2.0         | W                  |
| Impulse Repetition Rate  | df                  | 0.01        | %                  |
| Solder Temperature @ 10 s  | $T_{SP}$            | 260         | $^\circ\text{C}$   |

- Notes:**
1. Linearly derate above  $T_{EC} = 150^\circ\text{C}$  to zero at  $T_{EC} = 175^\circ\text{C}$ .
  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](#)).

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**MECHANICAL and PACKAGING**

- CASE: Hermetically sealed voidless hard glass with tungsten slugs.
- TERMINALS: Tin/lead plate over copper. RoHS compliant matte-tin is available on commercial grade only.
- MARKING: None.
- POLARITY: No polarity marking for these bidirectional TVSs.
- TAPE & REEL option: Standard per EIA-481-B. Consult factory for quantities.
- WEIGHT: Approximately 539 milligrams.
- See [Package Dimensions](#) on last page.

**PART NOMENCLATURE**

Applicable to entire series:

**JAN 1N6103 A US (e3)**

**Reliability Level**

JAN = JAN Level  
 JANTX = JANTX Level  
 JANTXV = JANTXV Level  
 Blank = commercial

**JEDEC type number**

See [Electrical Characteristics](#) table

**RoHS Compliance**

e3 = RoHS compliant (available on commercial grade only)  
 Blank = non-RoHS compliant

**Surface Mount Package**

**Voltage Tolerance**

A = Standard  
 Blank = 5% higher  $V_C$ , 5% lower min.  $V_{(BR)}$  and 5% lower  $I_{PP}$

Applicable to 1N6103(A)US – 1N6118(A)US only:

**JANS 1N6103 A US**

**Reliability Level**

JANS = JANS Level

**JEDEC type number**

See [Electrical Characteristics](#) table

**Surface Mount Package**

**Voltage Tolerance**

A = Standard  
 Blank = 5% higher  $V_C$ , 5% lower min.  $V_{(BR)}$  and 5% lower  $I_{PP}$

Applicable to 1N6119(A)US – 1N6137(A)US only:

**MSP 1N6119 A US (e3)**

**Reliability Level**

MSP (reference JANS)

**JEDEC type number**

See [Electrical Characteristics](#) table

**RoHS Compliance**

e3 = RoHS compliant  
 Blank = non-RoHS compliant

**Surface Mount Package**

**Voltage Tolerance**

A = Standard  
 Blank = 5% higher  $V_C$ , 5% lower min.  $V_{(BR)}$  and 5% lower  $I_{PP}$

**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 $I_{PP}$ .  |

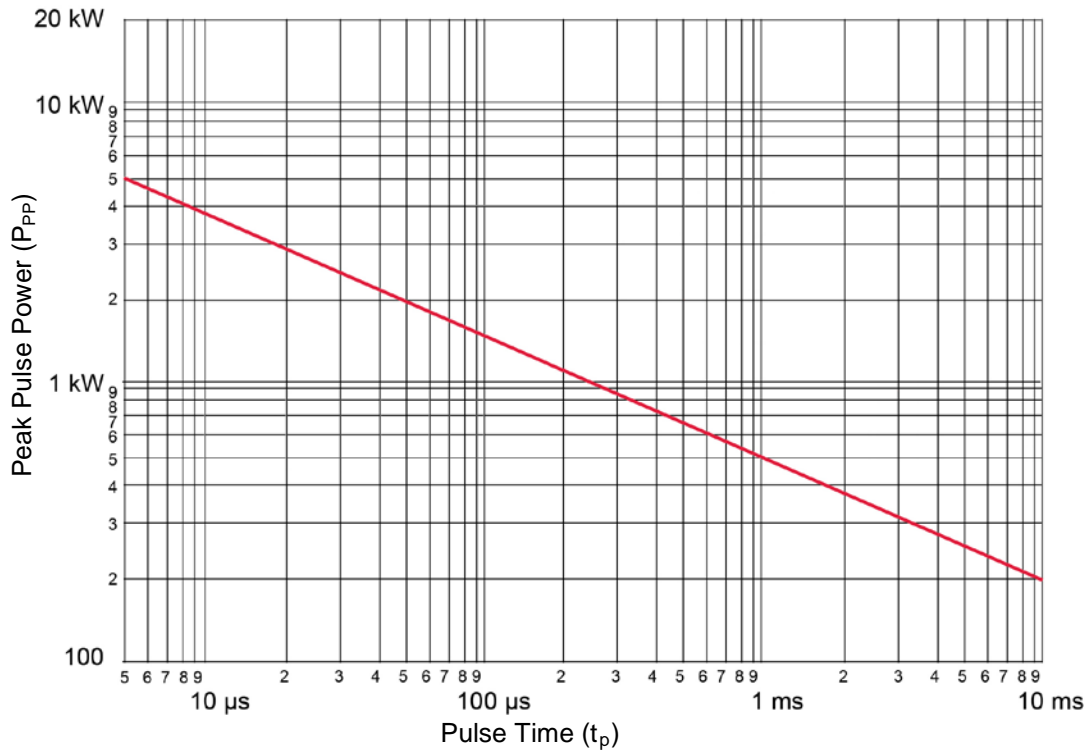
**ELECTRICAL CHARACTERISTICS**

| INDUSTRY TYPE NUMBER<br>(Note 1) | MINIMUM BREAKDOWN VOLTAGE<br>(Note 1) |              | RATED STANDOFF VOLTAGE | MAXIMUM STANDBY CURRENT | MAXIMUM CLAMPING VOLTAGE<br>(Note 1) | MAXIMUM PEAK PULSE CURRENT<br>(Note 1) | MAXIMUM TEMP. COEF. OF<br>$V_{(BR)}$ |
|----------------------------------|---------------------------------------|--------------|------------------------|-------------------------|--------------------------------------|--|--------------------------------------|
|                                  | $V_{(BR)}$                            | @ $I_{(BR)}$ | $V_{WM}$               | $I_D$ @ $V_{WM}$        | $V_C$ @ $I_{PP}$                     | $I_{PP}$                               | $\alpha_{V(BR)}$                     |
|                                  | Volts                                 | mA           | V                      | $\mu A$                 | Volts                                | Amps                                   | %/°C                                 |
| †1N6103AUS                       | 7.13                                  | 175          | 5.7                    | 50                      | 11.2                                 | 44.6                                   | .06                                  |
| †1N6104AUS                       | 7.79                                  | 150          | 6.2                    | 20                      | 12.1                                 | 41.3                                   | .06                                  |
| †1N6105AUS                       | 8.65                                  | 150          | 6.9                    | 20                      | 13.4                                 | 37.3                                   | .06                                  |
| †1N6106AUS                       | 9.50                                  | 125          | 7.6                    | 20                      | 14.5                                 | 34.5                                   | .07                                  |
| †1N6107AUS                       | 10.45                                 | 125          | 8.4                    | 20                      | 15.6                                 | 32.0                                   | .07                                  |
| †1N6108AUS                       | 11.40                                 | 100          | 9.1                    | 20                      | 16.9                                 | 29.6                                   | .07                                  |
| †1N6109AUS                       | 12.35                                 | 100          | 9.9                    | 20                      | 18.2                                 | 27.5                                   | .08                                  |
| †1N6110AUS                       | 14.25                                 | 75           | 11.4                   | 20                      | 21.0                                 | 23.8                                   | .08                                  |
| †1N6111AUS                       | 15.20                                 | 75           | 12.2                   | 20                      | 22.3                                 | 22.4                                   | .08                                  |
| †1N6112AUS                       | 17.10                                 | 65           | 13.7                   | 1                       | 25.1                                 | 19.9                                   | .085                                 |
| †1N6113AUS                       | 19.0                                  | 65           | 15.2                   | 1                       | 27.7                                 | 18.0                                   | .085                                 |
| †1N6114AUS                       | 20.9                                  | 50           | 16.7                   | 1                       | 30.5                                 | 16.4                                   | .085                                 |
| †1N6115AUS                       | 22.8                                  | 50           | 18.2                   | 1                       | 33.3                                 | 15.0                                   | .09                                  |
| †1N6116AUS                       | 25.7                                  | 50           | 20.6                   | 1                       | 37.4                                 | 13.4                                   | .09                                  |
| †1N6117AUS                       | 28.5                                  | 40           | 22.8                   | 1                       | 41.6                                 | 12.0                                   | .09                                  |
| †1N6118AUS                       | 31.4                                  | 40           | 25.1                   | 1                       | 45.7                                 | 10.9                                   | .095                                 |
| 1N6119AUS                        | 34.2                                  | 30           | 27.4                   | 1                       | 49.9                                 | 10.0                                   | .095                                 |
| 1N6120AUS                        | 37.1                                  | 30           | 29.7                   | 1                       | 53.6                                 | 9.3                                    | .095                                 |
| 1N6121AUS                        | 40.9                                  | 30           | 32.7                   | 1                       | 59.1                                 | 8.5                                    | .095                                 |
| 1N6122AUS                        | 44.7                                  | 25           | 35.8                   | 1                       | 64.6                                 | 7.7                                    | .095                                 |
| 1N6123AUS                        | 48.5                                  | 25           | 38.8                   | 1                       | 70.1                                 | 7.1                                    | .095                                 |
| 1N6124AUS                        | 53.2                                  | 20           | 42.6                   | 1                       | 77.0                                 | 6.5                                    | .095                                 |
| 1N6125AUS                        | 58.9                                  | 20           | 47.1                   | 1                       | 85.3                                 | 5.9                                    | .100                                 |
| 1N6126AUS                        | 64.6                                  | 20           | 51.7                   | 1                       | 97.1                                 | 5.1                                    | .100                                 |
| 1N6127AUS                        | 71.3                                  | 20           | 56.0                   | 1                       | 103.1                                | 4.8                                    | .100                                 |
| 1N6128AUS                        | 77.9                                  | 15           | 62.2                   | 1                       | 112.8                                | 4.4                                    | .100                                 |
| 1N6129AUS                        | 86.5                                  | 15           | 69.2                   | 1                       | 125.1                                | 4.0                                    | .100                                 |
| 1N6130AUS                        | 95.0                                  | 12           | 76.0                   | 1                       | 137.6                                | 3.6                                    | .100                                 |
| 1N6131AUS                        | 104.5                                 | 12           | 86.6                   | 1                       | 151.3                                | 3.3                                    | .100                                 |
| 1N6132AUS                        | 114.0                                 | 10           | 91.2                   | 1                       | 165.1                                | 3.0                                    | .100                                 |
| 1N6133AUS                        | 123.5                                 | 10           | 98.8                   | 1                       | 178.8                                | 2.8                                    | .105                                 |
| 1N6134AUS                        | 142.5                                 | 8            | 114.0                  | 1                       | 206.3                                | 2.4                                    | .105                                 |
| 1N6135AUS                        | 152.0                                 | 8            | 121.6                  | 1                       | 218.4                                | 2.3                                    | .105                                 |
| 1N6136AUS                        | 171.0                                 | 5            | 136.8                  | 1                       | 245.7                                | 2.0                                    | .110                                 |
| 1N6137AUS                        | 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 |
|------------|------------|-------|-------------|------|-------|
|            | Inch       |       | Millimeters |      |       |
|            | Min        | Max   | Min         | Max  |       |
| <b>BD</b>  | 0.137      | 0.148 | 3.48        | 3.76 |       |
| <b>BL</b>  | 0.200      | 0.225 | 5.08        | 5.72 |       |
| <b>ECT</b> | 0.019      | 0.028 | 0.48        | 0.71 |       |
| <b>S</b>   | 0.003      | -     | 0.08        | -    | 4     |

**NOTES:**

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Minimum clearance of glass body to mounting surface on all orientations.
4. In accordance with ASME Y14.5M, diameters are equivalent to  $\Phi$ x symbology.

**PAD LAYOUT**


| DIM       | INCH  | MILLIMETERS |
|-----------|-------|-------------|
| <b>A1</b> | 0.288 | 7.32        |
| <b>A2</b> | 0.144 | 3.66        |
| <b>B</b>  | 0.070 | 1.78        |
| <b>C</b>  | 0.155 | 3.94        |

**NOTE:** If mounting requires adhesive separate from the solder, an additional 0.080 inch (2.03 mm) diameter contact may be placed in the center between the pads as an optional spot for cement.