

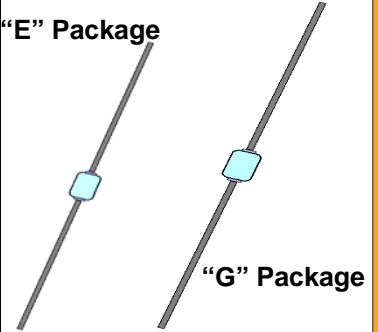
ALSO  
AVAILABLE IN  
SURFACE  
MOUNT

### DESCRIPTION

This series of industry recognized voidless-hermetically-sealed Bidirectional Transient Voltage Suppressor (TVS) designs is military qualified to MIL-PRF-19500/516 and are ideal for high-reliability applications where a failure cannot be tolerated. They provide a Working Peak "Standoff" Voltage selection from 5.2 to 152 Volts with two package sizes for 500 W and 1500 W ratings. They are very robust in hard-glass construction and also use an internal metallurgical bond identified as Category I for high reliability applications. Both of these are also military qualified to MIL-PRF-19500/516. These devices are available as both a non-suffix part and an "A" suffix part involving different voltage tolerances as further described in note 4 on page 2. These devices are also available in a surface mount MELF package configuration by adding a "US" suffix (see separate data sheet for 1N6103US thru 1N6173AUS). Microsemi also offers numerous other TVS products to meet higher and lower peak pulse power and voltage ratings in both through-hole and surface-mount packages.

### APPEARANCE

"E" Package



"G" Package

**IMPORTANT:** For the most current data, consult MICROSEMI's website: <http://www.microsemi.com>

### FEATURES

- High surge current and peak pulse power provides transient voltage protection for sensitive circuits
- Triple-layer passivation
- Internal "Category I" metallurgical bonds
- Voidless hermetically sealed glass package
- JAN/TX/TXV military qualifications available per MIL-PRF-19500/516 by adding JAN, JANTX, or JANTXV prefix (consult factory for 1N6103 and 1N6138)
- JANS available for 1N6103A thru 1N6118A per MIL-PRF-19500/516 as well as further options for screening in accordance with MIL-PRF-19500 for JANS on all others in this series by using a "SP" prefix, e.g. SP6119A, SP6143A, etc.
- Surface Mount equivalents are also available in a square-end-cap MELF configuration with a "US" suffix (see separate data sheet)

### APPLICATIONS / BENEFITS

- Military and other high reliability transient protection
- Extremely robust construction
- Extensive range in Working Peak "Standoff" Voltage ( $V_{WM}$ ) from 5.7 to 152 V
- Available as either 500 W or 1500 W Peak Pulse Power ( $P_{PP}$ ) using two different size packages
- ESD and EFT protection per IEC6100-4-2 and IEC61000-4-4 respectively
- Secondary lightning protection 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

- Operating & Storage Temperature:  $-55^{\circ}\text{C}$  to  $+175^{\circ}\text{C}$
- Peak Pulse Power at  $25^{\circ}\text{C}$ : 500 Watts for 1N6103 to 1N6137A and 1500 Watts for 1N6139 to 1N6173A @ 10/1000  $\mu\text{s}$  (also see Figures 1,2 and 3)
- Impulse repetition rate (duty factor): 0.01%
- Steady-State Power: 3.0 W for 1N6103 to 1N6137A and 5.0 W for 1N6139 to 1N6173A @  $T_L = 75^{\circ}\text{C}$  @ 3/8 inch lead length from body (see Figure 4)
- Steady-State Power: 2.0 W for 1N6103 to 1N6137A and 3.0 W for 1N6139 to 1N6173A @  $T_A = 25^{\circ}\text{C}$  (see note below and Figure 5)
- Thermal Resistance @ 3/8 inch lead length:  $33.5^{\circ}\text{C/W}$  for 1N6103 to 1N6137A and  $20.0^{\circ}\text{C/W}$  for 1N6139 thru 1N6173A
- Solder Temperatures:  $260^{\circ}\text{C}$  for 10 s (maximum)

### MECHANICAL AND PACKAGING

- CASE: Hermetically sealed voidless hard glass with Tungsten slugs
- TERMINATIONS: Axial-leads are Tin/Lead (Sn/Pb) over copper. Note: Previous JANS inventory had solid Silver (Ag) axial-leads and no finish
- MARKING: Body painted and part number, etc.
- POLARITY: No polarity marking for these bidirectional TVSs
- Tape & Reel option: Standard per EIA-296
- Weight: 750 mg for 500 Watt (E Package)  
1270 mg for 1500 Watt (G Package)
- See package dimensions on last page for both the "E" and "G" size packages

**NOTE:** Steady-state power ratings with reference to ambient are for PC boards where thermal resistance from mounting point to ambient is sufficiently controlled where  $T_{OP}$  or  $T_{J(MAX)}$  is not exceeded.

JANS  
1N6103 – 1N6137A  
1N6139 – 1N6173A

**ELECTRICAL CHARACTERISTICS**

| INDUSTRY TYPE NUMBER (Note 4) |         | MINIMUM BREAKDOWN VOLTAGE $V_{(BR)}$ @ $I_{(BR)}$ |          | RATED STANDOFF VOLTAGE $V_{WM}$ | MAXIMUM STANDBY CURRENT $I_D$ @ $V_{WM}$ |          | MAXIMUM CLAMPING VOLTAGE $V_C$ @ $I_{PP}$ | MAXIMUM PULSE PEAK CURRENT $I_{PP}$ |          | MAXIMUM TEMP. COEF. OF $V_{(BR)}$ |
|-------------------------------|---------|---------------------------------------------------|----------|---------------------------------|------------------------------------------|----------|-------------------------------------------|-------------------------------------|----------|-----------------------------------|
| PPR Rating                    |         |                                                   |          |                                 | 500W                                     | 1500W    |                                           | 500 W                               | 1500 W   |                                   |
| 500W                          | 1500W   | Volts                                             | mA       | V                               | uA                                       | uA       | Volts                                     | Amps                                | Amps     | %/°C                              |
| 1N6103A                       | 1N6139A | 7.13                                              | 175      | 5.7                             | 50                                       | 300      | 11.2                                      | 44.6                                | 133.9    | .06                               |
| 1N6104A                       | 1N6140A | 7.79                                              | 150      | 6.2                             | 20                                       | 100      | 12.1                                      | 41.3                                | 124.0    | .06                               |
| 1N6105A                       | 1N6141A | 8.65                                              | 150      | 6.9                             | 20                                       | 100      | 13.4                                      | 37.3                                | 111.9    | .06                               |
| 1N6106A                       | 1N6142A | 9.50                                              | 125      | 7.6                             | 20                                       | 100      | 14.5                                      | 34.5                                | 103.4    | .07                               |
| 1N6107A                       | 1N6143A | 10.45                                             | 125      | 8.4                             | 20                                       | 20       | 15.6                                      | 32.0                                | 96.2     | .07                               |
| 1N6108A                       | 1N6144A | 11.40                                             | 100      | 9.1                             | 20                                       | 20       | 16.9                                      | 29.6                                | 88.8     | .07                               |
| 1N6109A                       | 1N6145A | 12.35                                             | 100      | 9.9                             | 20                                       | 20       | 18.2                                      | 27.5                                | 82.4     | .08                               |
| 1N6110A                       | 1N6146A | 14.25                                             | 75       | 11.4                            | 20                                       | 20       | 21.0                                      | 23.8                                | 71.4     | .08                               |
| 1N6111A                       | 1N6147A | 15.20                                             | 75       | 12.2                            | 20                                       | 20       | 22.3                                      | 22.4                                | 67.3     | .08                               |
| 1N6112A                       | 1N6148A | 17.10                                             | 65       | 13.7                            | 1                                        | 10       | 25.1                                      | 19.9                                | 59.8     | .085                              |
| 1N6113A                       | 1N6149A | 19.0                                              | 65       | 15.2                            | 1                                        | 5        | 27.7                                      | 18.0                                | 54.2     | .085                              |
| 1N6114A                       | 1N6150A | 20.9                                              | 50       | 16.7                            | 1                                        | 5        | 30.5                                      | 16.4                                | 49.2     | .085                              |
| 1N6115A                       | 1N6151A | 22.8                                              | 50       | 18.2                            | 1                                        | 5        | 33.3                                      | 15.0                                | 45.0     | .09                               |
| 1N6116A                       | 1N6152A | 25.7                                              | 50       | 20.6                            | 1                                        | 5        | 37.4                                      | 13.4                                | 40.1     | .09                               |
| 1N6117A                       | 1N6153A | 28.5                                              | 40       | 22.8                            | 1                                        | 5        | 41.6                                      | 12.0                                | 36.0     | .09                               |
| 1N6118A                       | 1N6154A | 31.4                                              | 40       | 25.1                            | 1                                        | 5        | 45.7                                      | 10.9                                | 32.8     | .095                              |
| 1N6119A                       | 1N6155A | 34.2                                              | 30       | 27.4                            | 1                                        | 5        | 49.9                                      | 10.0                                | 30.1     | .095                              |
| 1N6120A                       | 1N6156A | 37.1                                              | 30       | 29.7                            | 1                                        | 5        | 53.6                                      | 9.3                                 | 28.0     | .095                              |
| 1N6121A                       | 1N6157A | 40.9                                              | 30       | 32.7                            | 1                                        | 5        | 59.1                                      | 8.5                                 | 25.4     | .095                              |
| 1N6122A                       | 1N6158A | 44.7                                              | 25       | 35.8                            | 1                                        | 5        | 64.6                                      | 7.7                                 | 23.2     | .095                              |
| 1N6123A                       | 1N6159A | 48.5                                              | 25       | 38.8                            | 1                                        | 5        | 70.1                                      | 7.1                                 | 21.4     | .095                              |
| 1N6124A                       | 1N6160A | 53.2                                              | 20       | 42.6                            | 1                                        | 5        | 77.0                                      | 6.5                                 | 19.5     | .095                              |
| 1N6125A                       | 1N6161A | 58.9                                              | 20       | 47.1                            | 1                                        | 5        | 85.3                                      | 5.9                                 | 17.6     | .100                              |
| 1N6126A                       | 1N6162A | 64.6                                              | 20       | 51.7                            | 1                                        | 5        | 97.1                                      | 5.1                                 | 15.4     | .100                              |
| 1N6127A                       | 1N6163A | 71.3                                              | 20       | 56.0                            | 1                                        | 5        | 103.1                                     | 4.8                                 | 14.5     | .100                              |
| 1N6128A                       | 1N6164A | 77.9                                              | 15       | 62.2                            | 1                                        | 5        | 112.8                                     | 4.4                                 | 13.3     | .100                              |
| 1N6129A                       | 1N6165A | 86.5                                              | 15       | 69.2                            | 1                                        | 5        | 125.1                                     | 4.0                                 | 12.0     | .100                              |
| 1N6130A                       | 1N6166A | 95.0                                              | 12       | 76.0                            | 1                                        | 5        | 137.6                                     | 3.6                                 | 10.9     | .100                              |
| 1N6131A                       | 1N6167A | 104.5                                             | 12       | 86.6                            | 1                                        | 5        | 151.3                                     | 3.3                                 | 9.9      | .100                              |
| 1N6132A                       | 1N6168A | 114.0                                             | 10       | 91.2                            | 1                                        | 5        | 165.1                                     | 3.0                                 | 9.1      | .100                              |
| 1N6133A                       | 1N6169A | 123.5                                             | 10       | 98.8                            | 1                                        | 5        | 178.8                                     | 2.8                                 | 8.4      | .105                              |
| 1N6134A                       | 1N6170A | 142.5                                             | 8        | 114.0                           | 1                                        | 5        | 206.3                                     | 2.4                                 | 7.3      | .105                              |
| 1N6135A                       | 1N6171A | 152.0                                             | 8        | 121.6                           | 1                                        | 5        | 218.4                                     | 2.3                                 | 6.9      | .105                              |
| 1N6136A                       | 1N6172A | 171.0                                             | 5        | 136.8                           | 1                                        | 5        | 245.7                                     | 2.0                                 | 6.1      | .110                              |
| 1N6137A                       | 1N6173A | 190.0                                             | 5        | 152.0                           | 1                                        | 5        | 273.0                                     | 1.8                                 | 5.5      | .110                              |
| <b>Note: 4</b>                |         | <b>1</b>                                          | <b>1</b> | <b>1</b>                        | <b>2</b>                                 | <b>3</b> | <b>1</b>                                  | <b>2</b>                            | <b>3</b> | <b>1</b>                          |

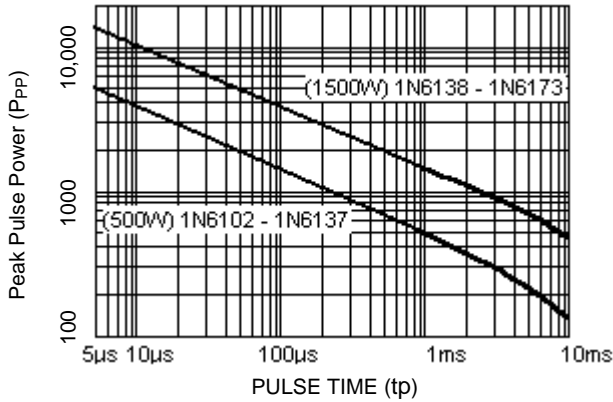
- Notes:**
1. Applies to both 500 W and 1500 W series for devices shown (see note 4)
  2. Applies only to 500 W series (1N6103 thru 1N6137A).
  3. Applies only to 1500 W series (1N6139 thru 1N6173A).
  4. Part number without the A suffix has 5% higher  $V_C$ , 5% lower minimum  $V_{(BR)}$ , and 5% lower  $I_{PP}$ .

**SYMBOLS & DEFINITIONS**

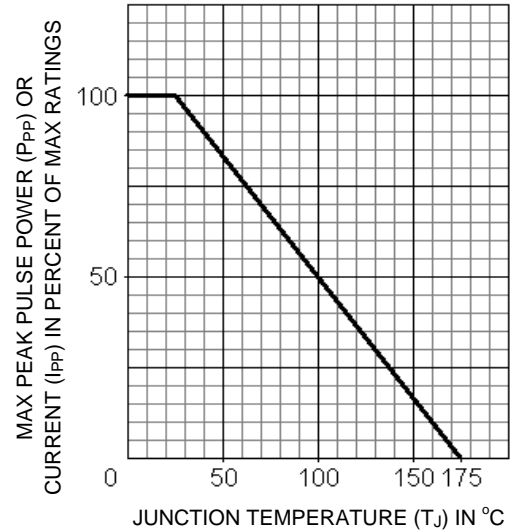
| Symbol   | Definition                                                                                                                                             |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| $V_{BR}$ | 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 $I_{PP}$ .                                                        |



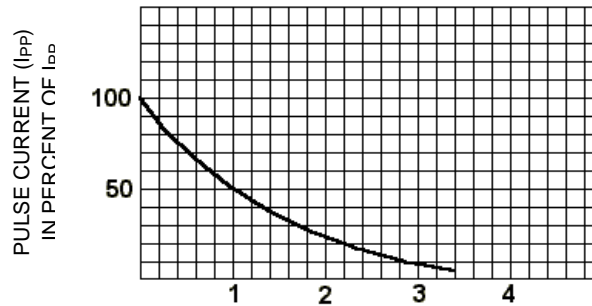
**GRAPHS**



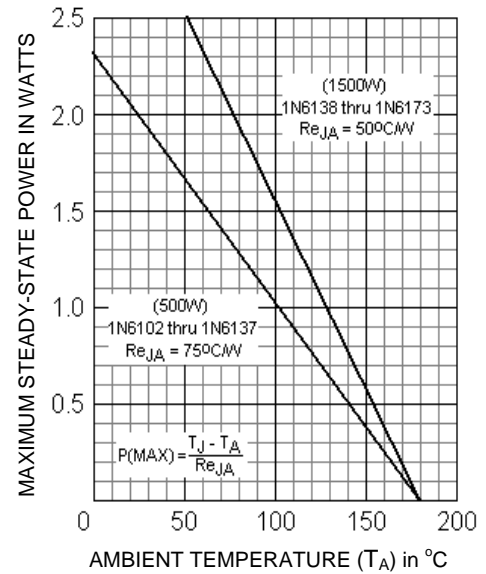
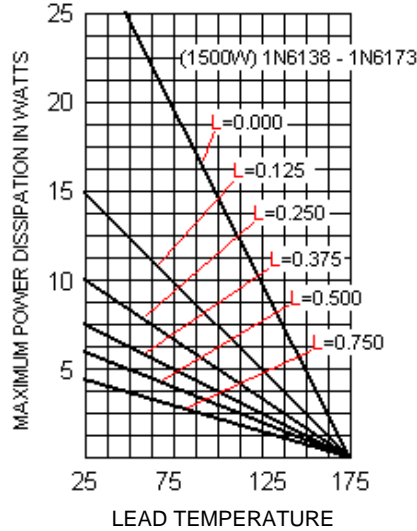
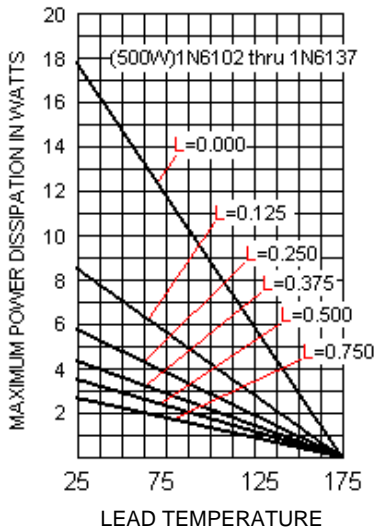
**FIGURE 1**  
PEAK PULSE POWER vs. PULSE TIME



**FIGURE 2**  
PEAK PULSE POWER vs.  $T_j$   
(prior to impulse)



**FIGURE 3**  
PULSE WAVE FORM

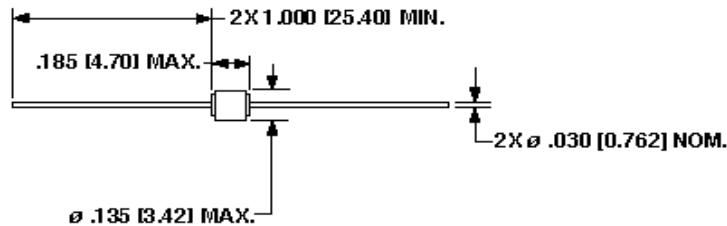


**FIGURE 4**  
MAXIMUM POWER vs. LEAD TEMPERATURE

Maximum lead temperature in °C ( $T_L$ ) at point "L" from body  
(for maximum operating junction temperature with equal two-lead conditions.)

**FIGURE 5**  
STEADY-STATE DERATING CURVE  
FOR FREE-AIR MOUNTING  
(For PC boards where thermal resistance from  
mounting point to ambient is sufficiently controlled  
where  $T_{OP}$  or  $T_{J(MAX)}$  rating is not exceeded)

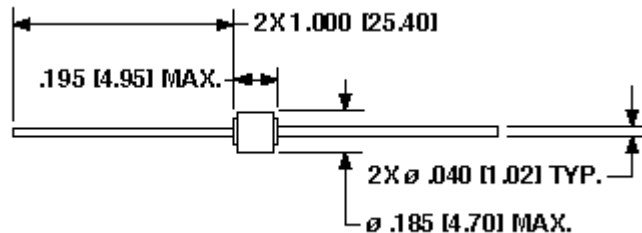
**PACKAGE DIMENSIONS Inches [mm]**



NOTE: DIMENSIONS IN INCHES [MM]

**PACKAGE E for 1N6103 thru 1N6137A (500 W)**

Note: Package E lead dimension diameter is 0.030 inch nominal with  $-.004 +.003$  inch tolerance



**PACKAGE G for 1N6139 thru 1N6173A (1500 W)**

Note: Package G lead dimension diameter is 0.040 inch nominal with  $-.004 +.002$  inch tolerance