



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) are 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 5.7 to 152 Volts with a 1500 W rating for a 10/1000 μ s pulse. They are very robust in hard-glass construction and use internal Category 1 metallurgical bonds for high reliability. These devices are available as both a non-suffix part and an “A” version part involving different voltage tolerances as described in the [nomenclature](#) section. These devices are also available in a surface mount MELF package configuration.

Important: For the latest information, visit our 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 1” metallurgical bonds.
- Voidless hermetically sealed glass package.
- JAN, JANTX, and JANTXV qualified versions are available per MIL-PRF-19500/516.
- *JANS available for 1N6143(A) thru 1N6173(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).

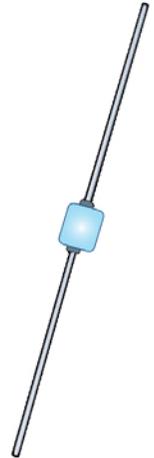
APPLICATIONS / BENEFITS

- Military and other high-reliability applications.
- Extremely robust construction.
- Extensive range in working peak “standoff” voltage (V_{WM}) from 5.7 to 152 volts.
- 1500 watt peak pulse power (P_{PP}) for a 10/1000 μ s test 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⁾	$R_{\theta JL}$	20	$^\circ\text{C/W}$
Peak Pulse Power @ 25°C	P_{PP}	1500	W
Off-State Power @ $T_L = 75^\circ\text{C}$ ⁽¹⁾	P_D	5.0	W
Off-State Power @ $T_A = 25^\circ\text{C}$ ⁽²⁾	P_D	3.0	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 (see [figure 4](#)).
 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 T_{OP} or $T_{J(MAX)}$ is not exceeded (also see [figure 6](#)).



“C” Package

Also available in:

**“C” SQ-MELF
Package**
(surface mount)

 [1N6139US – 1N6173US](#)

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
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Website:

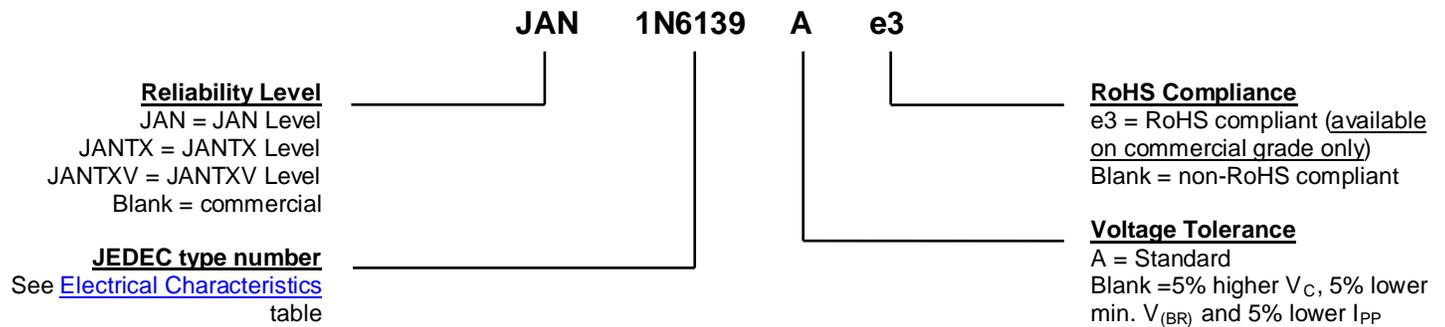
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MECHANICAL and PACKAGING

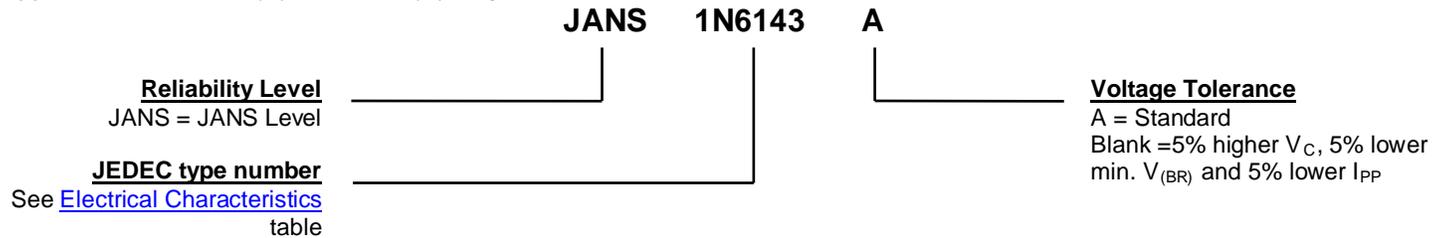
- CASE: Hermetically sealed voidless hard glass with tungsten slugs.
- TERMINALS: Axial-leads are tin/lead over copper. RoHS compliant matte-tin is available on commercial grade only.
- MARKING: Body paint and part number.
- POLARITY: No polarity marking for these bidirectional TVSs.
- TAPE & REEL option: Standard per EIA-296. Consult factory for quantities.
- WEIGHT: Approximately 1270 milligrams.
- See [package dimensions](#) on last page.

PART NOMENCLATURE

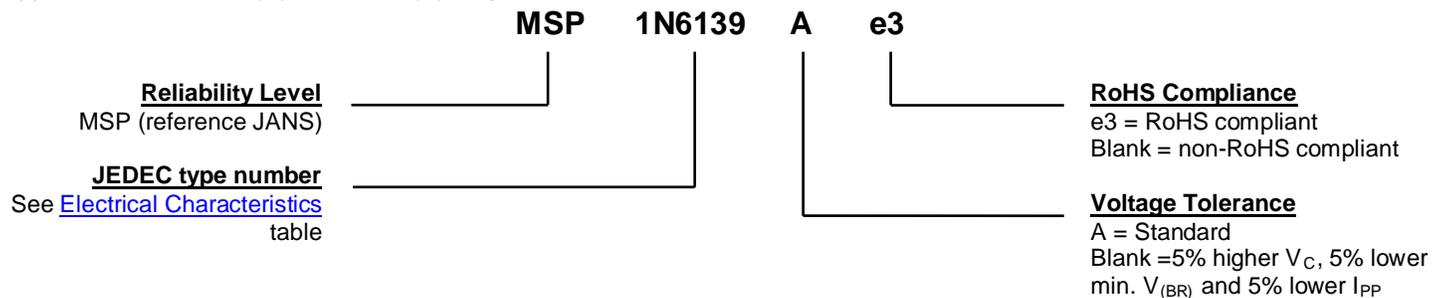
Applicable to entire series:



Applicable to 1N6143(A) – 1N6173(A) only:



Applicable to 1N6139(A) – 1N6142(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	Clamping Voltage: The 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 V_{WM}	MAXIMUM STANDBY CURRENT $I_D @ V_{WM}$	MAXIMUM CLAMPING VOLTAGE (Note 1) $V_C @ I_{PP}$	MAXIMUM PEAK PULSE CURRENT (Note 1) I_{PP}	MAXIMUM TEMP. COEF. OF $V_{(BR)}$ $\alpha_{V(BR)}$
	$V_{(BR)}$	@ $I_{(BR)}$					
	Volts	mA	V	μA	Volts	Amps	%°C
1N6139A	7.13	175	5.7	300	11.2	133.9	.06
1N6140A	7.79	150	6.2	100	12.1	124.0	.06
1N6141A	8.65	150	6.9	100	13.4	111.9	.06
1N6142A	9.50	125	7.6	100	14.5	103.4	.07
†1N6143A	10.45	125	8.4	20	15.6	96.2	.07
†1N6144A	11.40	100	9.1	20	16.9	88.8	.07
†1N6145A	12.35	100	9.9	20	18.2	82.4	.08
†1N6146A	14.25	75	11.4	20	21.0	71.4	.08
†1N6147A	15.20	75	12.2	20	22.3	67.3	.08
†1N6148A	17.10	65	13.7	10	25.1	59.8	.085
†1N6149A	19.0	65	15.2	5	27.7	54.2	.085
†1N6150A	20.9	50	16.7	5	30.5	49.2	.085
†1N6151A	22.8	50	18.2	5	33.3	45.0	.09
†1N6152A	25.7	50	20.6	5	37.4	40.1	.09
†1N6153A	28.5	40	22.8	5	41.6	36.0	.09
†1N6154A	31.4	40	25.1	5	45.7	32.8	.095
†1N6155A	34.2	30	27.4	5	49.9	30.1	.095
†1N6156A	37.1	30	29.7	5	53.6	28.0	.095
†1N6157A	40.9	30	32.7	5	59.1	25.4	.095
†1N6158A	44.7	25	35.8	5	64.6	23.2	.095
†1N6159A	48.5	25	38.8	5	70.1	21.4	.095
†1N6160A	53.2	20	42.6	5	77.0	19.5	.095
†1N6161A	58.9	20	47.1	5	85.3	17.6	.100
†1N6162A	64.6	20	51.7	5	97.1	15.4	.100
†1N6163A	71.3	20	56.0	5	103.1	14.5	.100
†1N6164A	77.9	15	62.2	5	112.8	13.3	.100
†1N6165A	86.5	15	69.2	5	125.1	12.0	.100
†1N6166A	95.0	12	76.0	5	137.6	10.9	.100
†1N6167A	104.5	12	86.6	5	151.3	9.9	.100
†1N6168A	114.0	10	91.2	5	165.1	9.1	.100
†1N6169A	123.5	10	98.8	5	178.8	8.4	.105
†1N6170A	142.5	8	114.0	5	206.3	7.3	.105
†1N6171A	152.0	8	121.6	5	218.4	6.9	.105
†1N6172A	171.0	5	136.8	5	245.7	6.1	.110
†1N6173A	190.0	5	152.0	5	273.0	5.5	.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

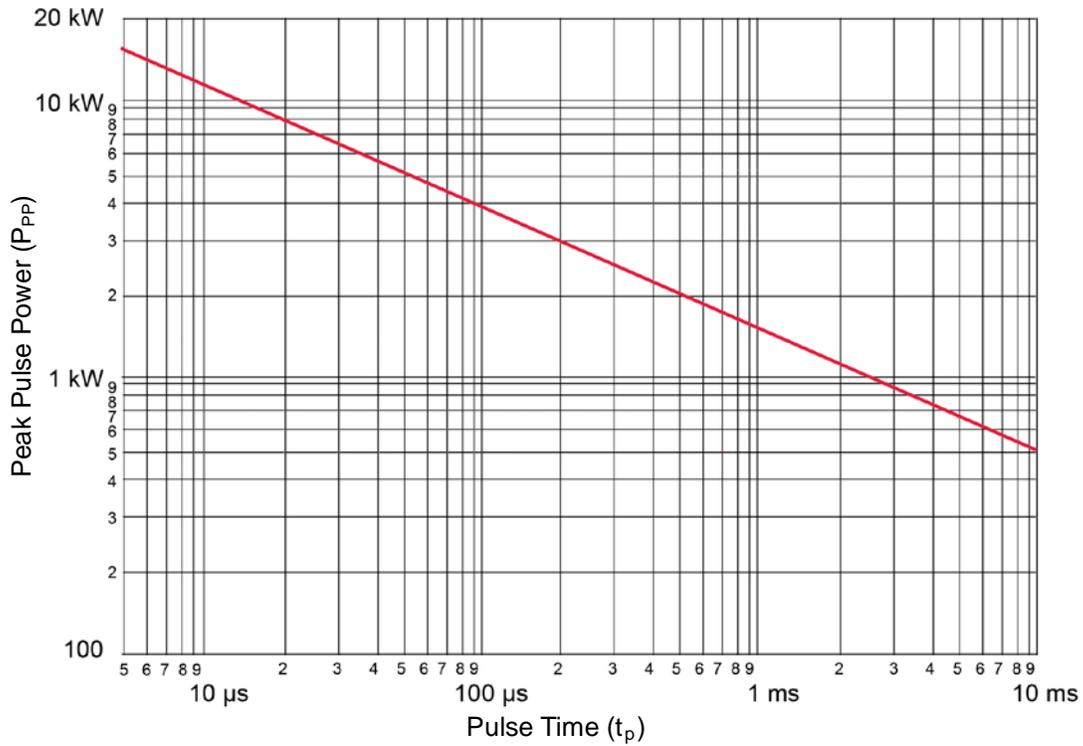


FIGURE 1
Peak Pulse Power vs. Pulse Time

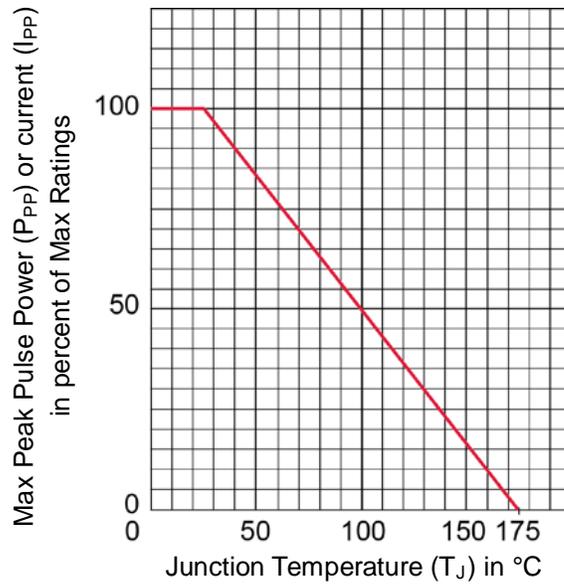


FIGURE 2
Peak Pulse Power vs T_J (prior to impulse)

GRAPHS

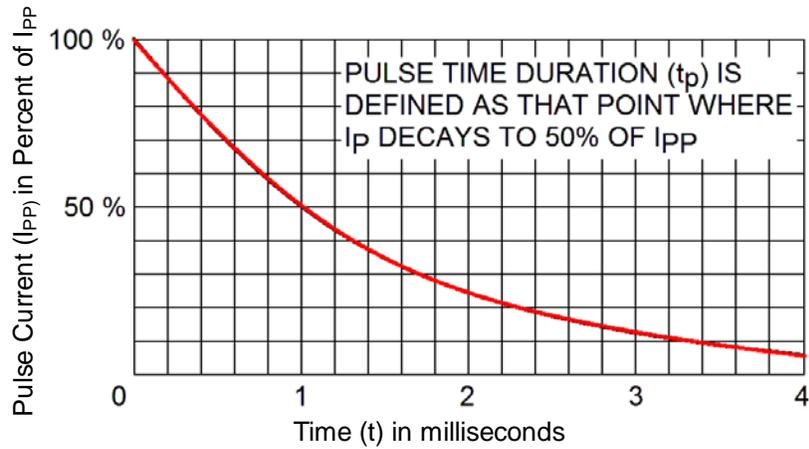


FIGURE 3
Pulse Wave Form

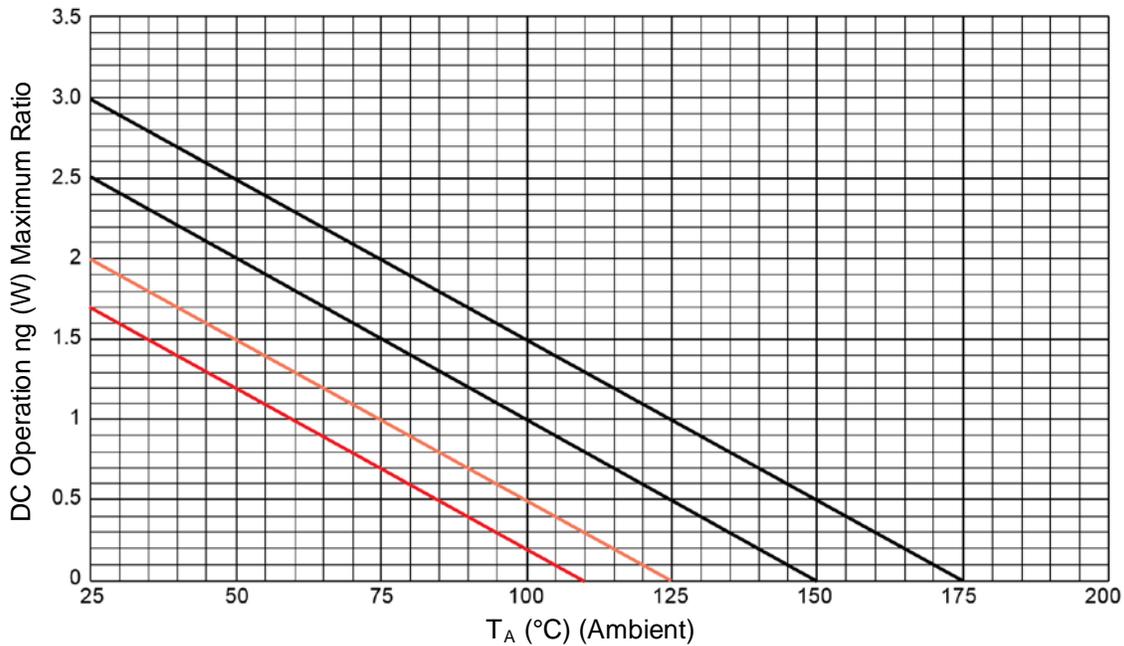


FIGURE 4
Temperature-Power Derating Curve

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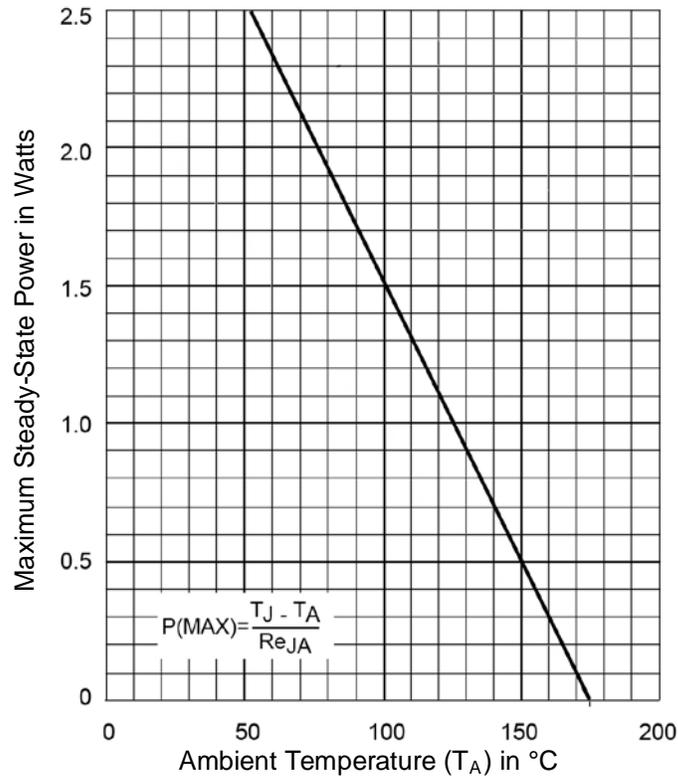
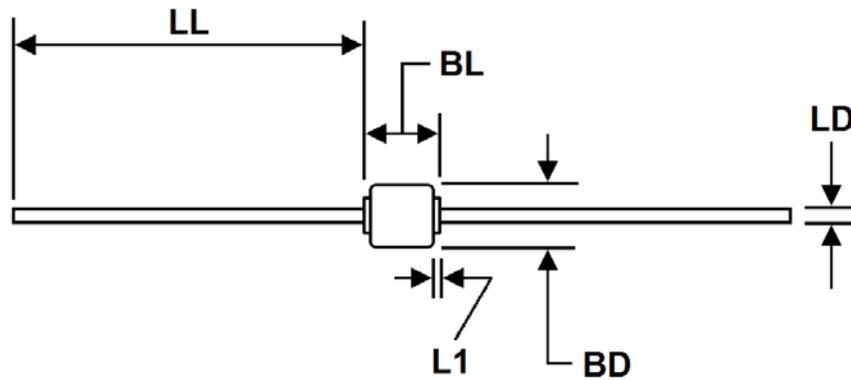
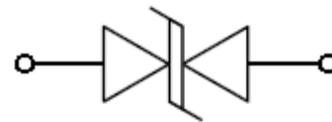


FIGURE 5
Steady-State Derating Curve for Free-Air Mounting (R_{θJA} = 50 °C/W)

PACKAGE DIMENSIONS


Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
BD	0.135	0.185	3.43	4.70	3
BL	0.140	0.195	3.56	4.95	
LD	0.036	0.042	0.91	1.07	
LL	1.00	1.30	25.4	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.