

Voidless Hermetically Sealed Unidirectional Transient Suppressors Data Sheet

1N6469-1N6476



Product Overview

This series of industry-recognized voidless hermetically sealed unidirectional Transient Voltage Suppressor (TVS) designs is military qualified per MIL-PRF19500/552 and are ideal for high-reliability applications where a failure cannot be tolerated. They provide a working peak “standoff” voltage selection from 5.0 V to 51.6 V with 1500 W ratings. They are very robust in hard-glass construction and also use an internal metallurgical bond identified as “Category 1” for high reliability applications. The 1500 W series is military qualified to MIL-PRF-19500/552. These devices are also available in a surface mount MELF package configuration by adding a “US” suffix (see separate data sheet for *1N6469US through 1N6476AUS*). Microchip 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.

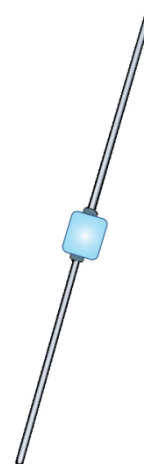
Features

- High surge current and peak pulse power provides transient voltage protection for sensitive circuits.
- Double-layer passivation
- Internal “Category I” metallurgical bonds
- Voidless hermetically sealed glass package
- JAN/TX/TXV military qualifications available per MILPRF-19500/552 by adding JAN, JANTX, or JANTXV prefix.
 - Further options for screening in accordance with MIL-PRF-19500 for JANS equivalent level by using a “MS” prefix.
 - Surface-mount equivalents are also available in a square-end-cap MELF configuration with a “US” suffix (see separate data sheet).

Applications

- Military and other high reliability transient protection
- Extremely robust construction
- Working peak “standoff” voltage (V_{WM}) from 5.0 V to 51.6 V
- Available as 1500 W peak pulse power (P_{PP})
- ESD and EFT protection per IEC61000-4-2 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 [MicroNote 050](#)

Figure 1. “C” Package



1. Maximum Ratings

Maximum ratings 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	$^\circ\text{C}$
Peak pulse power at $t_p = 1.0\text{ ms}$ (also see Figure 3-1 , Figure 3-2 , and Figure 3-4)	P_{PP}	1500	W
Rated forward surge current at $t_p = 8.33\text{ ms}$	I_{FSM}	130	A (pk)
Impulse repetition rate (duty factor)	I_{PP}	0.01	%
Steady-state power ¹ (see Figure 3-4)	P_D	3.0	W
Solder temperature at 10 s	T_{SP}	260	$^\circ\text{C}$
Thermal resistance at 3/8-inch lead length	θ	50.0	$^\circ\text{C/W}$

Notes:

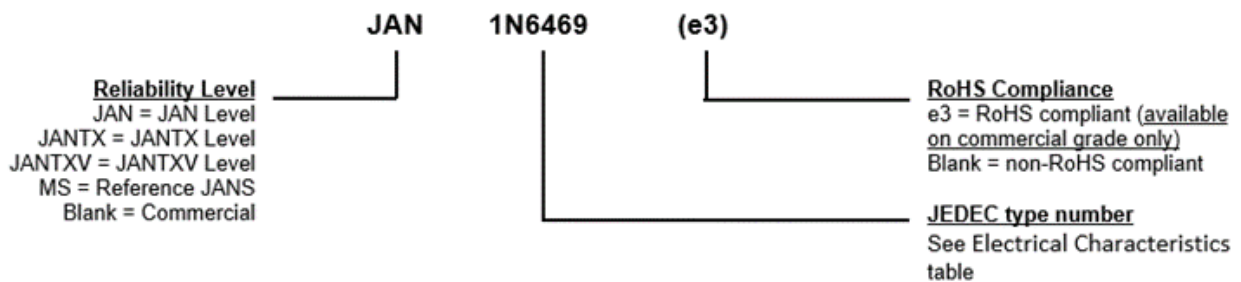
- Steady-state power ratings with reference to ambient are for PC boards where thermal resistance from mounting point to ambient is sufficiently controlled where T_J (MAX) is not exceeded.

Forward voltage is 1.5 V at 4 amps dc and 4.8 V at 100 amps (pulsed).

1.1 Mechanical and Packaging

- Case: Hermetically sealed voidless hard glass with tungsten slugs
- Terminations: Axial-leads are tin/lead (Sn/Pb) over copper.
- Marking: Body painted and part number
- Polarity: Cathode band
- Tape & reel option: Standard per EIA-296
- Weight: 1270 mg
- See [Package Dimensions](#).

1.2 Part Nomenclature



2. Symbols and Definitions

Symbol	Definition
$I_{(BR)}$	Breakdown current: The current used for measuring breakdown voltage $V_{(BR)}$.
I_D	Maximum standby current: The maximum current that will flow at the specified voltage and temperature.
I_{PP}	Peak pulse current: The peak current during the impulse.
P_{PP}	Peak pulse power: The peak power dissipation resulting from the peak impulse current I_{PP} .
T_{SP}	Temperature solder pad: The maximum solder temperature that can be safely applied to the terminal.
$\alpha_{V(BR)}$	Temperature coefficient of minimum breakdown voltage: The change in breakdown voltage divided by the change in temperature that caused it expressed in $\%/^{\circ}\text{C}$ or $\text{mV}/^{\circ}\text{C}$.
$V_{(BR)}$	Minimum breakdown voltage: The minimum voltage the device will exhibit at a specified current.
V_C	Maximum clamping voltage at specified I_{PP} (peak pulse current) at the specified pulse conditions.
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.

2.1 Electrical Characteristics

Type	Minimum Breakdown Voltage ¹ $V_{(BR)}$ at $I_{(BR)}$	Breakdown Current $I_{(BR)}$	Working Peak Voltage V_{WM}	Maximum Standby Current I_D	Maximum Clamping Voltage V_C at 10/1000 μs	Maximum Peak Pulse Current I_{PP}		Maximum Temp. Coef. of $V_{(BR)}$ $\alpha_{V(BR)}$
						at 8/20 μs	at 10/1000 μs	
	V	mAdc	Vdc	μAdc	V (pk)	A (pk)	A (pk)	$\%/^{\circ}\text{C}$
1N6469	5.6	50	5	1500	9	945	167	-0.03, +0.04
1N6470	6.5	50	6	1000	11	775	137	0.06
1N6471	13.6	10	12	20	22.6	374	66	0.085
1N6472	16.4	10	15	10	26.5	322	57	0.085
1N6473	27	5	24	5	41.4	207	36.5	0.096
1N6474	33	1	30.5	5	47.5	181	32	0.098
1N6475	43.7	1	40.3	5	63.5	135	24	0.101
1N6476	54	1	51.6	5	78.5	107	-25.97	0.103

3. Performance Curves

Figure 3-1. Non-Repetitive Peak Pulse Power Rating Curve

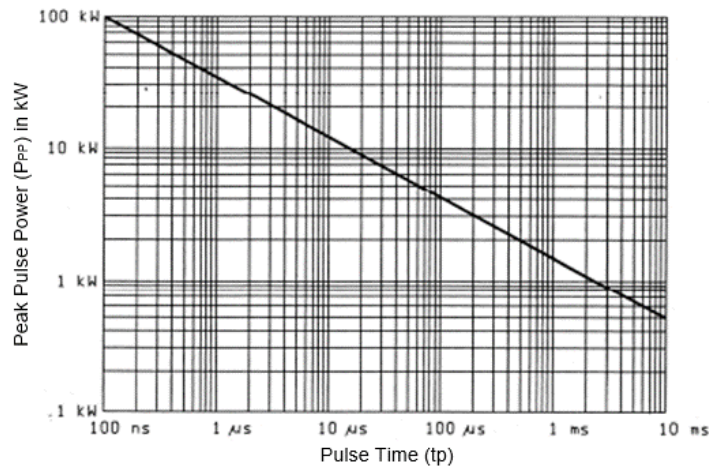


Figure 3-2. Pulse Wave Form for Exponential Surge for 10/1000 μ s

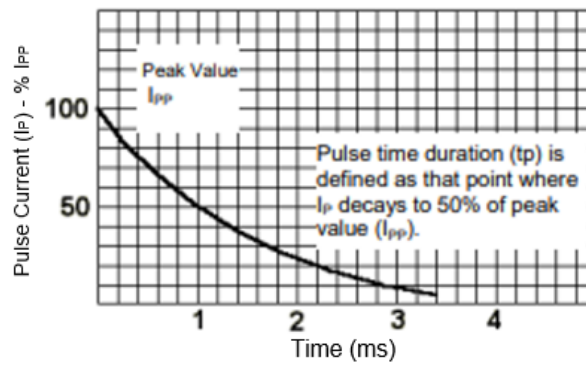


Figure 3-3. 8/20 μ s Current Impulse Waveform

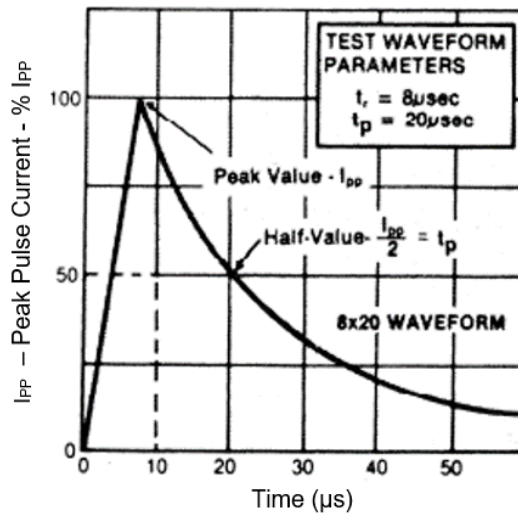
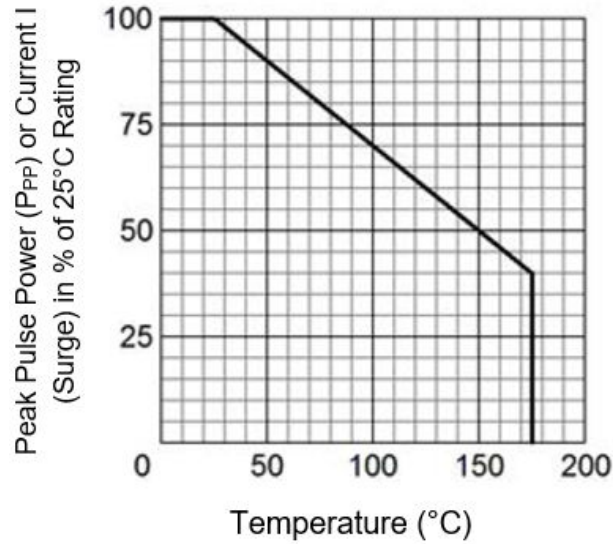
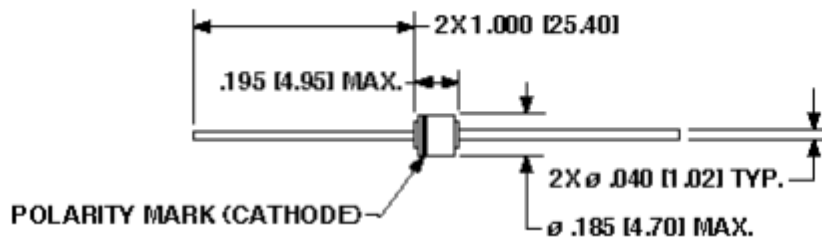


Figure 3-4. Derating Curve



3.1 Package Dimensions

Dimensions are in inches. Package C lead dimension diameter is 0.040-inch nominal with $-.003$ $+.002$ -inch tolerance. Within this zone lead diameter may vary to allow for lead finishes and irregularities other than heat slugs. In accordance with ASME Y14.5M, diameters are equivalent to Φ x symbology.



4. 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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