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.

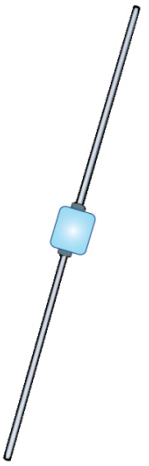
Features

- 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 °C unless otherwise noted.

Parameters/Test Conditions	Symbol	Value	Unit
Junction and storage temperature	T_J and T_{STG}	-55 to +175	°C
Peak pulse power at t_p = 1.0 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 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	°C
Thermal resistance at 3/8-inch lead length	θ	50.0	°C/W

Notes:

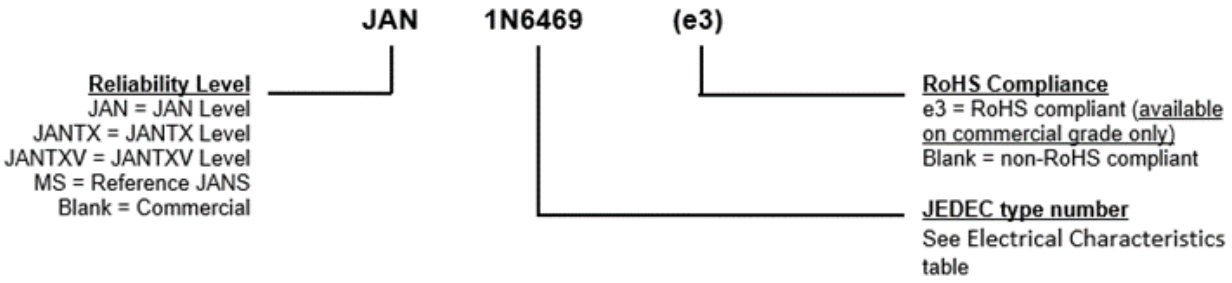
1. Steady-state power ratings with reference to ambient are for PC boards where thermal resistance from mounting point to ambient is sufficiently controlled where T_J (MAX) is not exceeded.

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 %/°C or mV/°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)	%/°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

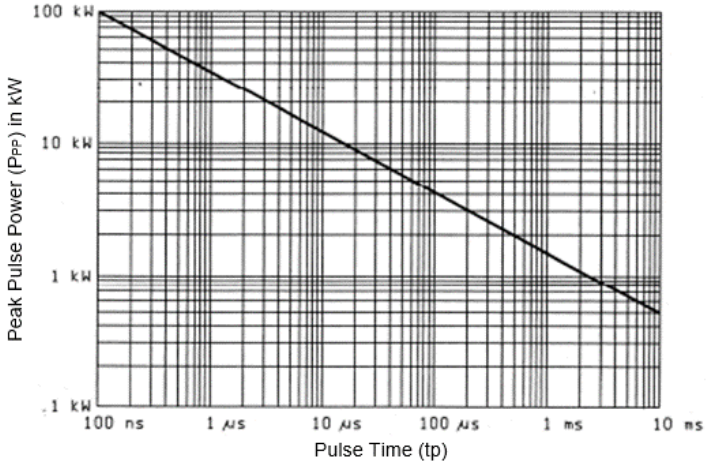


Figure 3-2. Pulse Wave Form for Exponential Surge for 10/1000 µs

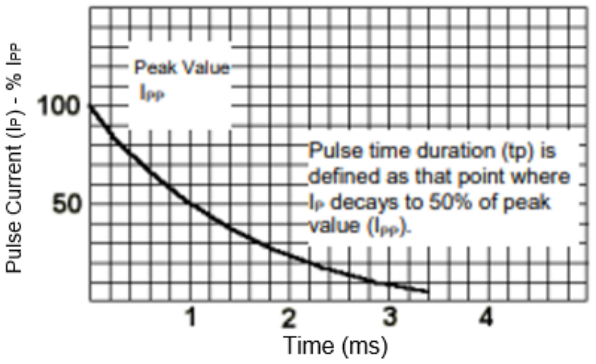


Figure 3-3. 8/20 µs Current Impulse Waveform

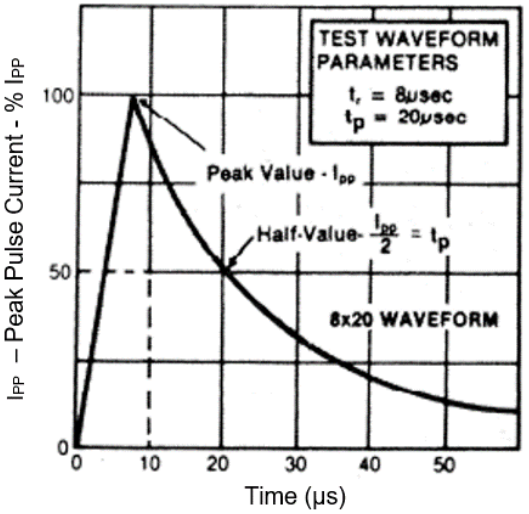
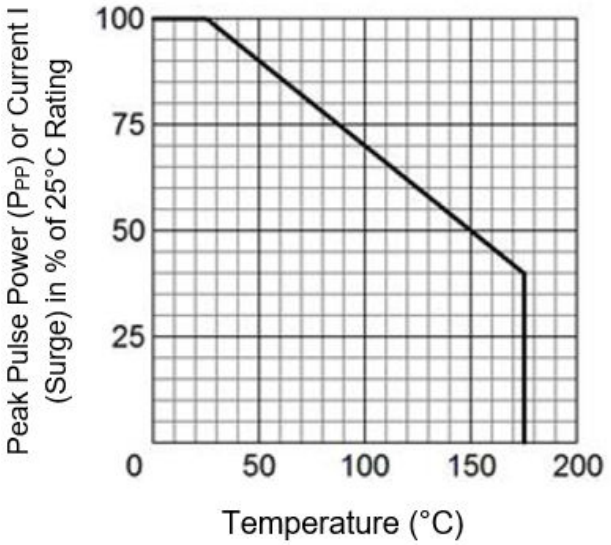
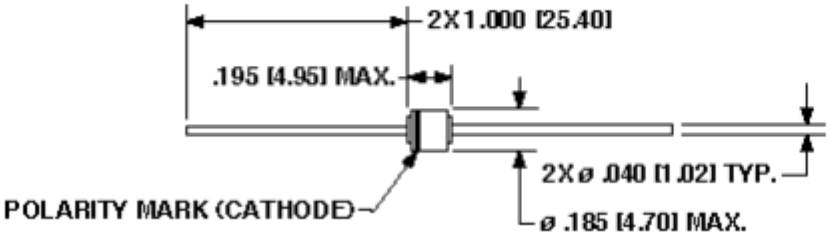


Figure 3-4. Derating Curve



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 Φx 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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