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TECHNICAL DATA SHEET

1500 WATT LOW VOLTAGE TRANSIENT VOLTAGE SUPPRESSOR

Qualified per MIL-PRF-19500/500

DEVICES

1N5907

LEVELS

JAN
JANTX
JANTXV

DESCRIPTION

This unidirectional low voltage Transient Voltage Suppressor (TVS) device for the 1N5907 JEDEC registration has a high Peak Pulse Power rating of 1500 W with extremely fast response times. The 1N5907 is available in a military qualified version as described in the Features section herein. It's most often used for protecting against transients from inductive switching environments, induced RF effects, or induced secondary lightning effects as found in surge levels of IEC61000-4-5 described herein. It's also very successful in protecting airborne avionics and electrical systems when low voltage is required. Since their response time is virtually instantaneous, they can also protect from ESD and EFT per IEC61000-4-2 and IEC61000-4-4.

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

DO-13 (DO-202A)

FEATURES

- Unidirectional TVS for thru-hole mounting
- Suppresses transients up to 1500 watts @ 10/1000 µs (Figure 1) in less than 100 pico seconds
- Low working voltage (V_{WM}) of 5 V
- Hermetic sealed DO-13 metal package for 1N5907
- JAN/TX/TXV military qualification available for 1N5907 per MIL-PRF-19500/500 by adding JAN, JANTX, or JANTXV prefix, e.g. JANTXV1N5907
- Surface mount equivalent packages also available as SMCJ5.0 or SMCG5.0 in separate data sheet (consult factory for other surface mount options)

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APPLICATIONS / BENEFITS

- Protection from switching transients and induced RF
- Protects TTL, ECL, DTL, MOS, MSI, and other integrated circuits requiring 5.0 V or lower power supplies
- Protection from ESD and EFT per IEC 61000-4-2 and IEC 61000-4-4
- Secondary lightning protection per IEC61000-4-5 with 42 Ohms source impedance: Class 1 thru 4
- Secondary lightning protection per IEC61000-4-5 with 12 Ohms source impedance: Class 1 thru 4
- Secondary lightning protection per IEC61000-4-5 with 2 Ohms source impedance: Class 2 & 3
- 1N5907 Inherently radiation hard as described in Microsemi MicroNote 050

MAXIMUM RATINGS

- 1500 Watts for 10/1000 µs at lead temperature (T_L) 25°C (See Figs. 1, 2, and 4) with repetition rate of 0.01% or less*
- Operating & Storage Temperatures: -65° to +175°C for 1N5907
- THERMAL RESISTANCE (junction to lead): 50°C/W for 1N5907
- THERMAL RESISTANCE (junction to ambient): 110 °C/W for 1N5907
- DC Power Dissipation* (1N5907): 1 Watt at $T_L \leq$125°C 3/8" (10 mm) from body, or 1 Watt at $T_A \leq$+65°C when mounted on FR4 PC board as described for thermal resistance junction to ambient
- Forward surge current: 200 A for 8.3ms half-sine wave at T_A = +25°C
- Solder Temperatures: 260 ° C for 10 s (maximum)

MECHANICAL AND PACKAGING

- CASE (1N5907): DO-13 (DO-202AA) welded hermetically sealed metal and glass
- FINISH: External metal surfaces are Tin-Lead (Sn-Pb) plated and solderable per MIL-STD-750 method 2026
- POLARITY: Polarity indicated by diode symbol or cathode band (cathode connected to case for 1N5907)
- MARKING: Part number and polarity symbol
- WEIGHT: 1.4 grams. (Approx)
- TAPE & REEL option: Standard per EIA-296 (add "TR" suffix to part number)
- See package dimension on last page

* TVS devices are not typically used for dc power dissipation and are instead operated at or less than their rated standoff voltage (V_{WM}) except for transients that briefly drive the device into avalanche breakdown (V_{BR} to V_C region).

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ELECTRICAL CHARACTERISTICS @ 25°C

JEDEC Type No.	Reverse Standoff Voltage V_{WM} (NOTE 1) Volts	Minimum Breakdown Voltage $V_{(BR)}$ @ 1 mA Volts	Maximum Standby Current I_D @ V_{WM} µA	Maximum Clamping Voltage V_C @ I_{PP1} (FIG. 3) Volts	Peak Pulse Current I_{PP1} (FIG. 3) Amps	Maximum Clamping Voltage V_C @ I_{PP2} (FIG. 3) Volts	Peak Pulse Current I_{PP2} (FIG. 3) Amps	Maximum Clamping Voltage V_C @ I_{PP3} (FIG. 3) Volts	Peak Pulse Current I_{PP3} (FIG. 3) Amps
1N5907 *	5.0	6.0	300	7.6	30	8.0	60	8.5	120

* Also available in military qualified types with a JAN, JANTX, or JANTXV prefix per MIL-PRF-19500/500.

NOTE 1: A TVS is normally selected according to the reverse "Standoff Voltage" V_{WM} which should be equal to or greater than the dc or continuous peak operating voltage level.

SYMBOLS & DEFINITIONS

Symbol	Definition
V_{WM}	Standoff Voltage: Applied Reverse Voltage to assure a nonconductive condition. (See Note 1 above)
$V_{(BR)}$	Breakdown Voltage: This is the Breakdown Voltage the device will exhibit at 25°C
V_C	Maximum Clamping Voltage: The maximum peak voltage appearing across the TVS when subjected to the peak pulse current in a one millisecond time interval. The peak pulse voltage is the combination of voltage rise due to both the series resistance and thermal rise and positive temperature coefficient ($\alpha_{V(BR)}$)
I_{PP}	Peak Pulse Current: The peak current during the impulse (See Figure 2)
P_{PP}	Peak Pulse Power: The pulse power as determined by the product of V_C and I_{PP}
I_D	Standby Current: The current at the standoff voltage (V_{WM})
$I_{(BR)}$	Breakdown Current: The current used for measuring Breakdown Voltage ($V_{(BR)}$)

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GRAPHS

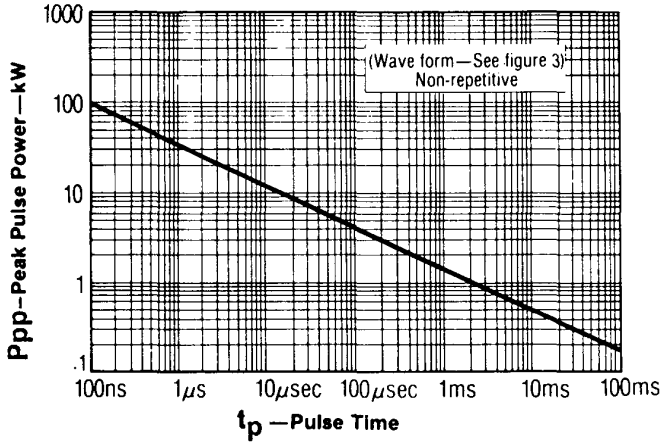

FIGURE 1
PEAK PULSE POWER VS. PULSE TIME

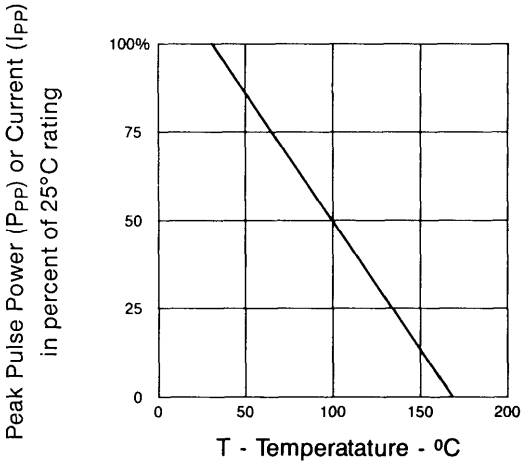

FIGURE 2
DERATING CURVE

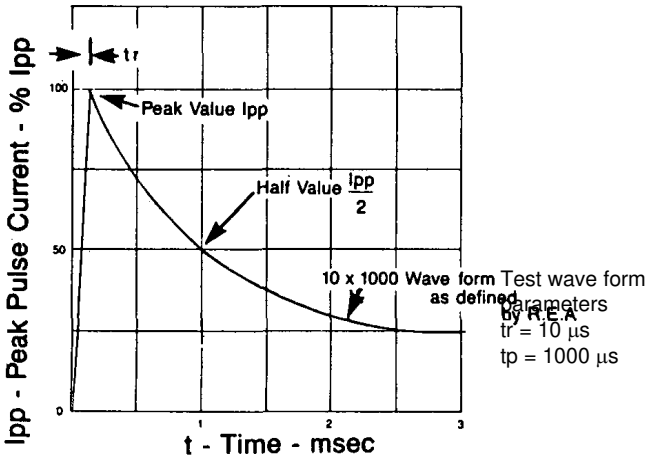

FIGURE 3
PULSE WAVEFORM

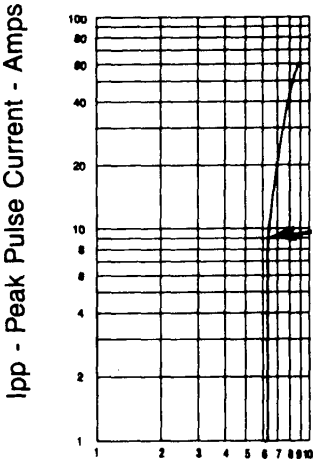

FIGURE 4 TYPICAL CLAMPING VOLTAGE (V_C) VS. PEAK PULSE CURRENT (I_{PP})

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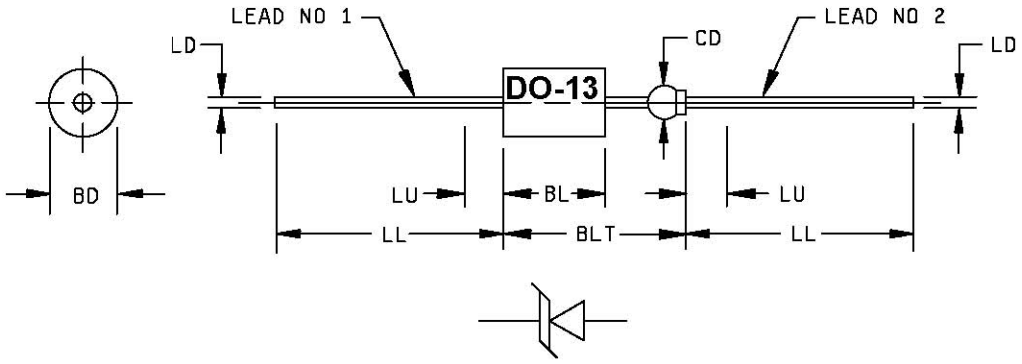
PACKAGE DIMENSIONS



NOTES:
1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. The major diameter is essentially constant along its length.
4. Within this zone, diameter may vary to allow for lead finishes and irregularities.
5. Dimension to allow for pinch or seal deformation anywhere along tubulation.
6. Lead 1 (cathode) shall be electrically connected to the case.
7. In accordance with ASME Y14.5M, diameters are equivalent to ϕx symbology.

Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
BD	.215	.235	5.46	5.97	
BL	.293	.357	7.44	9.07	3
BLT		.570		14.48	
CD	.045	.100	1.14	2.54	5
LD	.025	.035	0.64	0.89	
LL	1.000	1.625	25.40	41.28	4
LU		.188		4.78	4

FIGURE 1. Physical dimensions (DO-13).