



1500 WATT BIDIRECTIONAL TRANSIENT VOLTAGE SUPPESSOR

Qualified per MIL-PRF-19500/507

Qualified Levels: JAN, JANTX, and JANTXV

DESCRIPTION

This popular Transient Voltage Suppressor (TVS) series for 1N6036 thru 1N6072A are JEDEC registered selections for bidirectional devices. All have the same high Peak Pulse Power rating of 1500 W with extremely fast response times. They are also available in military qualified selections as described in the "Features" section herein. They are most often used for protecting against transients from inductive switching environments, induced RF effects, or induced secondary lightning effects as found in lower surge levels of IEC61000-4-5. They are also very successful in protecting airborne avionics and electrical systems. 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 latest information, visit our website http://www.microsemi.com.

FEATURES

- Bidirectional TVS series in axial packages for thru-hole mounting.
- Suppresses transients up to 1500 watts @ 10/1000 μs (see Figure 1).
- Clamps transients in less than 100 pico seconds.
- Working voltage (V_{WM}) range 5.5 V to 185 V.
- Hermetically sealed DO-13 metal package.
- JAN, JANTX, JANTXV military qualifications also available per MIL-PRF-19500/507 for the tighter tolerance "A" suffix types by adding the JAN, JANTX, or JANTXV prefix, e.g. JANTXV1N6036A, etc.
- RoHS compliant versions available (commercial grade only).

APPLICATIONS / BENEFITS

- Protection from switching transients and induced RF.
- Protection from ESD & 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: 1N6036 to 1N6072A

Class 2: 1N6036 to 1N6067A

Class 3: 1N6036 to 1N6061A

Class 4: 1N6036 to 1N6054A

Secondary lightning protection per IEC61000-4-5 with 12 Ohms source impedance:

Class 1: 1N6036 to 1N6064A

Class 2: 1N6036 to 1N6057A

Class 3: 1N6036 to 1N6049A

Class 4: 1N6036 to 1N6042A

Secondary lightning protection per IEC61000-4-5 with 2 Ohms source impedance:

Class 2: 1N6036 to 1N6048A

Class 3: 1N6036 to 1N6041A

Inherently radiation hard as described in Microsemi "MicroNote 050".



DO-13 (DO-202AA) Package

Also available in:

DO-13 package

(unidirectional)
1N5629 – 1N5665A

Case 1 package

(plastic equivalent)
1.5KE6.8C – 1.5KE220CA

DO-215AB package

(Gull-wing)
SMCG5.0 – SMCG170A

DO-214AB package

(J-bend)
SMCJ5.0 – SMCJ170A

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 Tel: +353 (0) 65 6840044 Fax: +353 (0) 65 6822298

Website:

www.microsemi.com



MAXIMUM RATINGS

Parameters/Test Conditions	Symbol	Value	Unit
Junction and Storage Temperature	T _J and T _{STG}	-55 to +175	Ô
Peak Pulse Power @ T _L = +25 °C (1)	P _{PP}	1500	W
Rated Average Power Dissipation @ T _L ≤ +125 °C (2)	P _{M(AV)}	1	W
Solder Temperature @ 10 s	T _{SP}	260	°C

Notes: 1. At 10/1000 us with repetition rate of 0.01% or less (see Figures 1, 2, & 4).

2. At 10 mm from body (see derating in Figure 3 and note below).

MECHANICAL and PACKAGING

- CASE: DO-13 (DO-202AA), welded, hermetically sealed metal and glass.
- TERMINALS: All external metal surfaces are tin-lead plated and solderable per MIL-STD-750 method 2026.
- · MARKING: Part number.
- POLARITY: Not applicable for bidirectional TVS.
- TAPE & REEL option: Standard per EIA-296 (add "TR" suffix to part number). Consult factory for quantities.
- WEIGHT: Approx 1.4 grams.
- See <u>Package Dimensions</u> on last page.

PART NOMENCLATURE **JAN** 1N6036 (e3)**RoHS Compliance Reliability Level** JAN = JAN level e3 = RoHS compliant (available JANTX = JANTX level on commercial grade only) JANTXV = JANTXV level Blank = non-RoHS compliant (All of the above require "A" suffix) Blank = Commercial **Voltage Tolerance** A = 5%JEDEC type number Blank = 10% (See Electrical Characteristics table)

	SYMBOLS & DEFINITIONS							
Symbol	Definition							
V_{WM}	Standoff Voltage: Applied Reverse Voltage to assure a nonconductive condition.							
V _(BR)	Breakdown Voltage: This is the Breakdown Voltage the device will exhibit at 25 °C.							
Vc	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)).							



ELECTRICAL CHARACTERISTICS @ 25 °C (Test Both Polarities)

Volts Volts Volts Volts mA Volts μA Amps March C C C C C C C C C C	JEDEC Type	Rated Standoff Voltage V _{WM}	Breakdown Voltage V _(BR)		Maximum Clamping Voltage V _C @ I _{PP}	Maximum Standby Current I _D @ V _{WM}	Maximum Peak Pulse Current	Maximum Temperature Coefficient of V _(BR)	
Note	No.		V _{(BR)min}	V _{(BR)max}	@ I _(BR)			(See <u>Fig. 2</u>)	
1N6036 5.5 6.75 8.25 10 11.7 1000 128 .061 **1N6036A 6.0 7.13 7.88 10 11.3 1000 132 .061 **1N6037 6.5 7.38 9.02 10 12.5 500 120 .065 **1N6037A 7.0 7.79 8.61 10 12.1 500 124 .065 **1N6038A 7.0 8.19 10.00 10 13.8 200 112 .068 **1N6038A 7.5 8.65 9.55 10 13.4 200 112 .068 **1N6039A 8.5 9.5 10.5 1 14.5 50 100 .073 **1N6039A 8.5 9.5 10.5 1 14.5 50 103 .073 **1N6040 8.5 9.9 12.1 1 16.2 10 93 .075 **1N6041 9.0 10.8 13.2 1 17.3 5 87 .078 **1N6041 9.0 10.8 13.2 1 17.3 5 87 .078 **1N6041 10.0 11.4 12.6 1 16.7 5 90 .078 **1N6042 11.0 12.4 13.7 1 18.2 5 82 .081 **1N6043 11.0 12.4 13.7 1 18.2 5 82 .081 **1N6043 11.0 12.4 13.7 1 18.2 5 68 .084 **1N6043 11.0 13.5 16.5 1 22.0 5 68 .084 **1N6044 12.0 14.3 15.8 1 22.1 5 71 .084 **1N6045 14.0 16.2 19.8 1 22.5 5 56.5 .088 **1N6046 15.0 17.1 18.9 1 25.2 5 59.5 .088 **1N6046 16.0 18.0 22.0 1 29.1 5 51.5 .090 **1N6048 19.0 21.6 26.4 1 34.7 5 34.5 .094 **1N6049 21.0 22.8 25.2 1 33.2 5 47 .092 **1N6048 19.0 21.6 26.4 1 34.7 5 34.5 .094 **N6049 21.0 22.8 25.2 1 33.2 5 47 .092 **1N6049 21.0 22.8 25.2 1 33.2 5 45 .094 **N6049 21.0 22.8 25.2 1 33.2 5 45 .094 **N6050 24.0 27.0 33.0 1 43.5 5 34.5 .095 **N6050 24.0 27.0 33.0 1 43.5 5 34.5 .097 **N6051 26.0 29.7 36.3 1 47.7 5 31.5 .098 **N6052 29.0 32.4 39.6 1 56.4 5 5 5 5 5 **N6053 33.0 37.1 41.0 1 50.9 5 5 5 5 5 **N6053 33.0 37.1 41.0 1 50.9 5 28 100		Volte	Volte	Volte	mΛ	Volte	4	Amne	α _{V(BR)}
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*1N6052A 30.0 34.2 37.8 1 49.9 5 30 .099 1N6053 31.0 35.1 42.9 1 56.4 5 26.5 .100 *1N6053A 33.0 37.1 41.0 1 53.9 5 28 .100									
1N6053 31.0 35.1 42.9 1 56.4 5 26.5 .100 *1N6053A 33.0 37.1 41.0 1 53.9 5 28 .100									
*1N6053A 33.0 37.1 41.0 1 53.9 5 28 .100									
1N6054 34.0 38.7 47.3 1 61.9 5 24 .101									
*1N6054A 36.0 40.9 45.2 1 59.3 5 25.3 .101									
1N6055 38.0 42.3 51.7 1 67.8 5 22.2 .101									
*1N6055A 40.0 44.7 49.4 1 64.8 5 23.2 .101	*1N6055A				1		5		
1N6056 41.0 45.9 56.1 1 73.5 5 20.4 .102	1N6056				1		5	20.4	
*1N6056A 43.0 48.5 53.6 1 70.1 5 21.4 .102					1				
1N6057 45.0 50.4 61.6 1 80.5 5 18.6 .103					1				
*1N6057A 47.0 53.2 58.8 1 77.0 5 19.5 .103									
1N6058 48.0 55.8 68.2 1 89.0 5 16.9 .104					1				
*1N6058A 53.0 58.9 65.1 1 85.0 5 17.7 .104					1				
1N6059 55.0 61.2 74.8 1 98.0 5 15.3 .104					-		5		
*1N6059A 58.0 64.6 71.4 1 92.0 5 16.3 .104									
1N6060 60.0 67.5 82.5 1 108.0 5 13.9 .105									
*1N6060A 64.0 71.3 78.8 1 103.0 5 14.6 .105 1N6061 66.0 73.8 90.2 1 118.0 5 12.7 .105									
1N6061 66.0 73.8 90.2 1 118.0 5 12.7 .105 1105 1									



ELECTRICAL CHARACTERISTICS @ 25 °C (Test Both Polarities)

JEDEC Type	Rated Standoff Voltage V _{WM}	E	Breakdown Voltage V _(BR)		Maximum Clamping Voltage V _C @ I _{PP}	Maximum Standby Current I _D @ V _{WM}	Maximum Peak Pulse Current I _{PP}	Maximum Temperature Coefficient of V _(BR)
No.		V _{(BR)min}	$V_{(BR)max}$	@ I _(BR)			(See <u>Fig. 2</u>)	
	Volts	Volts	Volts	mA	Volts	μА	Amps	α _{V(BR)} % /°C
1N6062	73.0	81.9	100.0	1	131.0	5	11.4	.106
*1N6062A	75.0	86.5	95.5	1	125.0	5	12.0	.106
1N6063	81.0	90.0	110.0	1	144.0	5	10.4	.106
*1N6063A	82.0	95.0	105.0	1	137.0	5	11.0	.106
1N6064	90.0	99.0	121.0	1	158.0	5	9.5	.107
*1N6064A	94.0	105.0	116.0	1	152.0	5 5	9.9	.107
1N6065	95.0	108.0	132.0	1	176.0	5	8.5	.107
*1N6065A	100.0	114.0	126.0	1	168.0	5	8.9	.107
1N6066	105.0	117.0	143.0	1	191.0	5	7.8	.107
*1N6066A	110.0	124.0	137.0	1	182.0	5	8.2	.107
1N6067	121.0	135.0	165.0	1	223.0	5	6.7	.108
*1N6067A	128.0	143.0	158.0	1	213.0	5	7.0	.108
1N6068	137.0	153.0	187.0	1	258.0	5	5.8	.108
*1N6068A	145.0	162.0	179.0	1	245.0	5	6.1	.108
1N6069	145.0	162.0	198.0	1	274.0	5	5.5	.108
*1N6069A	150.0	171.0	189.0	1	261.0	5	5.7	.108
1N6070	155.0	171.0	210.0	1	292.0	5	5.1	.108
*1N6070A	160.0	181.0	200.0	1	278.0	5 5	5.4	.108
1N6071	165.0	180.0	220.0	1	308.0		4.9	.108
*1N6071A	170.0	190.0	210.0	1	294.0	5	5.1	.108
1N6072	175.0	198.0	242.0	1	344.0	5	4.3	.108
*1N6072A	185.0	209.0	231.0	1	328.0	5	4.6	.108

^{*} Also available in military qualified types by adding the prefix JAN, JANTX or JANTXV per MIL-PRF-19500/507.



GRAPHS

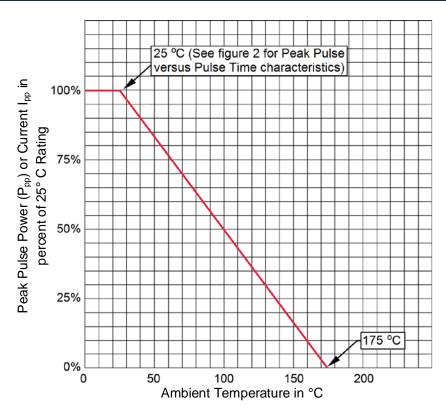


FIGURE 1
Derating Curve

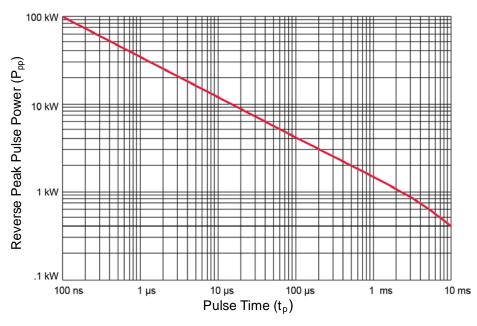


FIGURE 2
Peak Pulse Power versus Pulse Time



GRAPHS

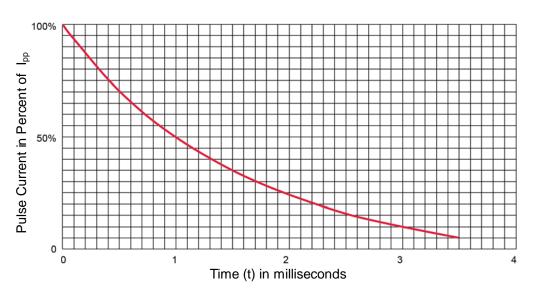


FIGURE 3
Current impulse waveform (I_{PP} = 10 μs)

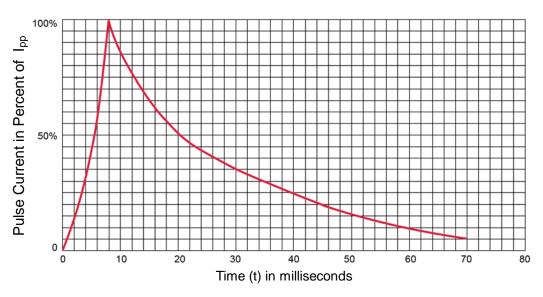
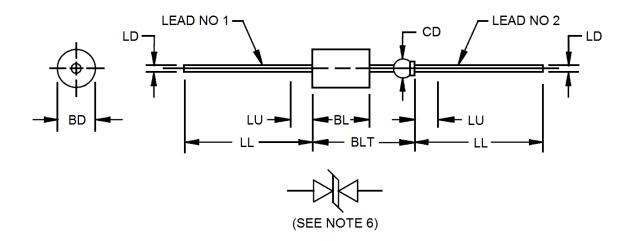


FIGURE 4
Current impulse waveform (I_{PP} = 8 µs).



PACKAGE DIMENSIONS



NOTES:

- 1 Dimensions are in inches.
- 2 Millimeter equivalents 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 Symbol for bidirectional transient suppressor.
- 7 Lead 1 shall be electrically connected to the case.
- 8 $\,$ In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

Symbol	Inc	hes	Millim	Notes	
	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	
LU		.188		4.78	4