



Voidless-Hermetically-Sealed Unidirectional 150 W Low-Capacitance Transient Voltage Suppressors

DESCRIPTION

This series of voidless-hermetically-sealed unidirectional low-capacitance Transient Voltage Suppressor (TVS) designs are ideal for protecting higher frequency applications in high-reliability applications where a failure cannot be tolerated. They include a unique rectifier diode in series and opposite direction from the TVS to achieve a very low capacitance of 4 pF. This product series provides a working peak “standoff” voltage selection from 6.8 to 170 volts with 150 watt ratings. They are very robust in hard-glass construction and also use an internal metallurgical bond identified as Category 1 for high reliability applications. These devices are also available in axial leaded packages for thru-hole mounting.

Important: For the latest information, visit our website <http://www.microsemi.com>.

FEATURES

- High surge current and peak pulse power unidirectional protection for sensitive circuits.
- Very low capacitance for high frequency or high baud rate applications.
- Bidirectional capability with two devices in anti-parallel (see Figure 5).
- Triple-layer passivation.
- Internal “Category 1” metallurgical bonds.
- Voidless hermetically sealed glass package.
- RoHS compliant versions are available.

APPLICATIONS / BENEFITS

- High reliability transient protection.
- Extremely robust construction.
- Working peak “standoff” voltage (V_{WM}) from 6.8 to 170 volts.
- Available as 150 W peak pulse power (P_{PP}) at 10/1000 μ s.
- Lowest available capacitance for 150 W rated TVS.
- 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 Microsemi [MicroNote 050](#).

MAXIMUM RATINGS

Parameters/Test Conditions	Symbol	Value	Unit
Junction and Storage Temperature	T_J and T_{STG}	-55 to +175	$^{\circ}C$
Capacitance at zero volts	C	4	pF
Thermal Resistance junction to ambient	$R_{\theta JA}$	150	$^{\circ}C/W$
Peak Pulse Power at 25 $^{\circ}C$ (10 μ s/1000 μ s)	P_{PP}	150	W
Impulse repetition rate (duty factor)	d.f	0.01	%
Steady State (Average) Power @ $T_A = 25^{\circ}C$	$P_{M(AV)}$	1.0	W
Solder Temperature (10 s maximum)		260	$^{\circ}C$


Note: 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.



“A” Package

Also available in:

“A” MELF package
(surface mount)

 1N8149US – 1N8182US

MSC – Lawrence

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Lawrence, MA 01841
1-800-446-1158
(978) 620-2600
Fax: (978) 689-0803

MSC – Ireland

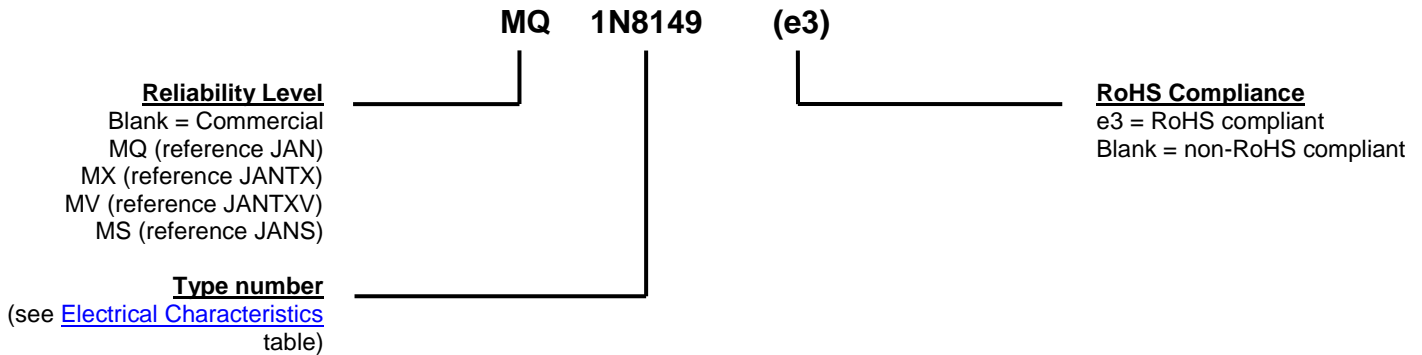
Gort Road Business Park,
Ennis, Co. Clare, Ireland
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Website:

www.microsemi.com

MECHANICAL and PACKAGING

- CASE: Hermetically sealed voidless hard glass with tungsten slugs.
- TERMINALS: Axial-leads are tin/lead or RoHS compliant matte/tin plating over copper.
- MARKING: Body paint and part number
- POLARITY: Cathode band
- MOUNTING: Any position
- TAPE & REEL option: Standard per EIA-296.
- WEIGHT: Approximately 340 milligrams.
- See [Package Dimensions](#) on last page.

PART NOMENCLATURE

SYMBOLS & DEFINITIONS

Symbol	Definition
$\alpha_{V(BR)}$	Temperature Coefficient of Breakdown Voltage: The change in breakdown voltage divided by the change in temperature that caused it expressed in %/°C or mV/°C.
$V_{(BR)}$	Breakdown Voltage: The voltage across the device at a specified current $I_{(BR)}$ in the breakdown region.
V_{WM}	Working Standoff Voltage: The maximum-rated value of dc or repetitive peak positive cathode-to-anode voltage that may be continuously applied over the standard operating temperature.
I_D	Standby Current: The current through the device at rated stand-off voltage.
$I_{(BR)}$	Breakdown Current: The current used for measuring Breakdown Voltage $V_{(BR)}$
I_{PP}	Peak Impulse Current: The maximum rated random recurring peak impulse current or nonrepetitive peak impulse current that may be applied to a device. A random recurring or nonrepetitive transient current is usually due to an external cause, and it is assumed that its effect will have completely disappeared before the next transient arrives.
V_C	Clamping Voltage: The voltage across the device in a region of low differential resistance during the application of an impulse current (I_{PP}) for a specified waveform.
P_{PP}	Peak Pulse Power. The rated random recurring peak impulse power or rated nonrepetitive peak impulse power. The impulse power is the maximum-rated value of the product of I_{PP} and V_C .
C_T	Total Capacitance: The total small signal capacitance between the diode terminals of a complete device.
V_{WIB}	Inverse Blocking Voltage: The maximum-rated value of dc or peak blocking voltage in the inverse direction.
I_{IB}	Blocking Leakage Current: The current through the device at the rated inverse blocking voltage (V_{WIB}).

ELECTRICAL CHARACTERISTICS @ $T_A = 25^\circ\text{C}$ unless otherwise noted.

Type Number	Minimum Breakdown Voltage (V_{BR})	Breakdown Current (I_{BR})	Working Standoff Voltage (V_{WM})	Maximum Standby Current (I_D)	Maximum Peak Clamping Voltage (V_C)	Maximum Surge Current (I_{PP})	Maximum $V_{(BR)}$ Temperature Coefficient ($\alpha_{V(BR)}$)	Capacitance (C_T)	Inverse Blocking Voltage (V_{WIB})	Blocking Leakage Current (I_{IB})
	V	mA	V	μA	V	A	$\%/^\circ\text{C}$	pF	V	μA
1N8149	7.79	10	6.8	20	12.8	11.7	.065	4	300	1
1N8150	8.65	1	7.5	10	13.5	11.1	.068	4	300	1
1N8151	9.50	1	8.5	10	14.5	10.3	.073	4	300	1
1N8152	10.4	1	9.0	5	15.6	9.62	.075	4	300	1
1N8153	11.4	1	10.0	1	16.9	8.88	.078	4	300	1
1N8154	12.4	1	11.0	1	18.2	8.24	.081	4	300	1
1N8155	13.8	1	12.0	1	20.2	7.42	.084	4	300	1
1N8156	15.2	1	13.0	1	22.3	6.73	.086	4	300	1
1N8157	17.1	1	15.0	1	25.1	5.98	.088	4	300	1
1N8158	19.0	1	17.0	0.5	27.7	5.42	.090	4	300	1
1N8159	20.9	1	18.0	0.5	30.5	4.92	.092	4	300	1
1N8160	22.8	1	20.0	0.5	33.3	4.50	.094	4	300	1
1N8161	25.7	1	22.0	0.5	37.4	4.01	.096	4	300	1
1N8162	28.5	1	25.0	0.5	41.6	3.60	.097	4	300	1
1N8163	31.4	1	28.0	0.5	45.7	3.28	.098	4	300	1
1N8164	34.2	1	30.0	0.5	49.9	3.01	.099	4	300	1
1N8165	37.1	1	33.0	0.5	53.6	2.80	.100	4	300	1
1N8166	40.9	1	36.0	0.5	59.1	2.54	.101	4	300	1
1N8167	44.7	1	40.0	0.5	64.6	2.32	.101	4	300	1
1N8168	48.5	1	43.0	0.5	70.1	2.14	.102	4	300	1
1N8169	53.2	1	47.0	0.5	77.0	1.95	.103	4	300	1
1N8170	58.9	1	53.0	0.5	85.3	1.76	.104	4	300	1
1N8171	64.6	1	58.0	0.5	93.7	1.60	.104	4	300	1
1N8172	71.3	1	64.0	0.5	103.0	1.45	.105	4	300	1
1N8173	77.9	1	70.0	0.5	113.0	1.32	.105	4	300	1
1N8174	86.5	1	75.0	0.5	125.0	1.20	.105	4	300	1
1N8175	95.0	1	82.0	0.5	137.0	1.09	.106	4	300	1
1N8176	104.0	1	94.0	0.5	152.0	0.98	.107	4	300	1
1N8177	114.0	1	100.0	0.5	168.0	0.89	.107	4	300	1
1N8178	124.0	1	110.0	0.5	183.0	0.82	.107	4	300	1
1N8179	138.0	1	120.0	0.5	208.0	0.72	.108	4	300	1
1N8180	152.0	1	130.0	0.5	225.0	0.67	.108	4	300	1
1N8181	171.0	1	150.0	0.5	261.0	0.57	.108	4	300	1
1N8182	190.0	1	170.0	0.5	294.0	0.51	.108	4	300	1

GRAPHS

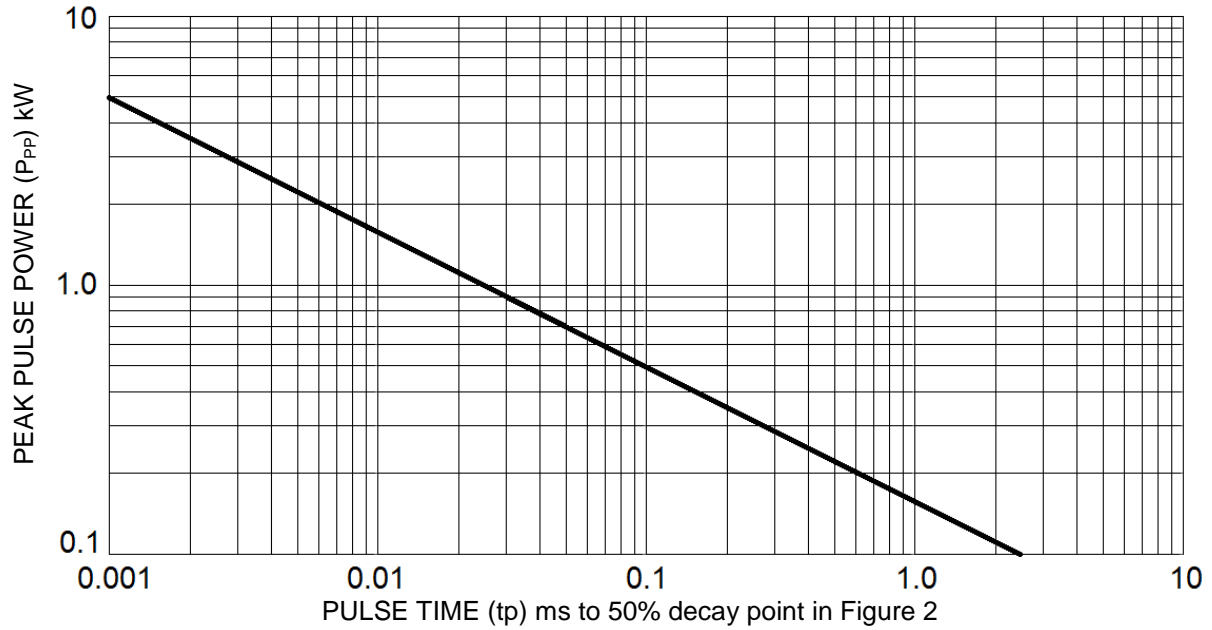


FIGURE 1
PEAK PULSE POWER VS. PULSE TIME

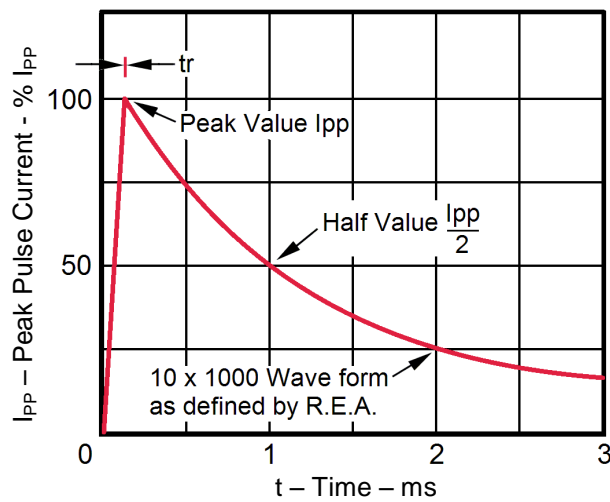


FIGURE 2
10/1000µs CURRENT IMPULSE WAVEFORM

GRAPHS

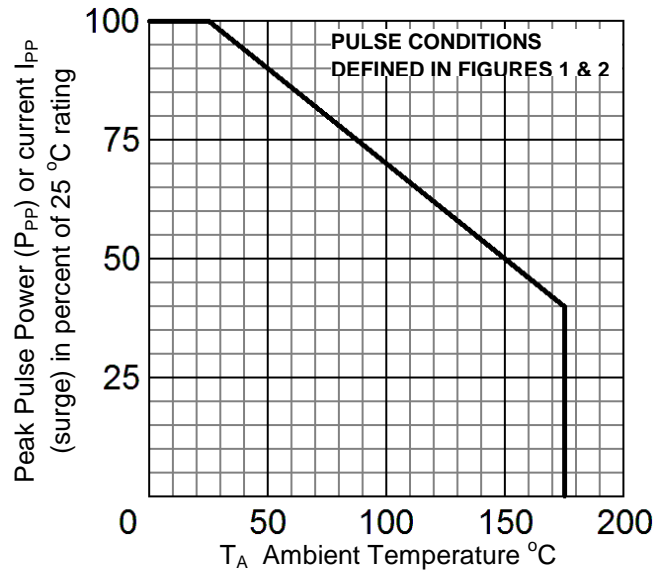


FIGURE 3
DERATING CURVE

SCHEMATIC APPLICATIONS

The TVS low capacitance device configuration described in this data sheet is shown in Figure 4 involving a TVS and a unique diode in series and opposite direction. For bidirectional low capacitance TVS applications, use two (2) low capacitance TVS devices as described in this data sheet in anti-parallel as shown in Figure 5. This will result in twice the capacitance of Figure 4 specified in this data sheet.

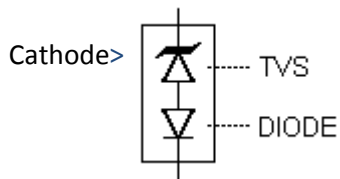


FIGURE 4
Low Capacitance TVS

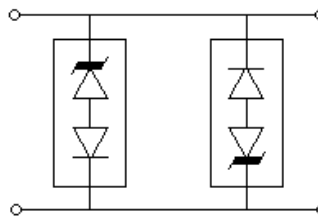


FIGURE 5
Bidirectional configuration
(2 Low Capacitance TVS
devices in anti-parallel)