



500 Watt Low Capacitance Transient Voltage Suppressors

Screened in reference to MIL-PRF-19500

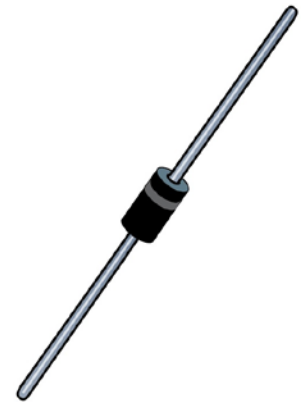
DESCRIPTION

This family of MSAC5.0 through MSAC50A Transient Voltage Suppressors are high-reliability controlled devices that offer thru-hole mounting. They feature unidirectional construction and working standoff voltage (V_{WM}) selections from 5 to 50 volts. Microsemi also offers a great variety of other Transient Voltage Suppressors to meet higher and lower power demands and special applications.

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

FEATURES

- High reliability controlled devices with wafer fabrication and assembly lot traceability.
- 100% surge testing of all devices.
- Suppresses transients up to 500 W @ 10/1000 μ s.
- Working standoff voltage (V_{WM}) values from 5 to 50 V.
- 5% and 10% voltage tolerance options.
- Unidirectional low-capacitance device (30 pF). For bidirectional applications, see [Figure 6](#).
- Various screening levels in reference to MIL-PRF-19500.
(Refer to [High Reliability Non-Hermetic Products portfolio](#) for more details on the screening options.)
- Moisture classification is Level 1 with no dry pack required per IPC/JEDEC J-STD-020B.
- 3σ lot norm screening performed on standby current I_D .
- RoHS compliant versions available.



DO-41 (DO-204AL) Package

APPLICATIONS / BENEFITS

- Low Capacitance for data-line protection to 10 MHz.
- Protection for fast data rate lines in aircraft up to:
 - RTCA/DO-160G - Level 3 Waveform 4 and Level 1 Waveform 5A (also see [MicroNote 130](#))
 - ARINC 429, Part 1, paragraph 2.4.1.1 up to bit rates of 100 kb/s
- ESD and EFT protection per IEC61000-4-2 and IEC61000-4-4 respectively.
- Secondary lightning protection per IEC 61000-4-5 with 42 ohms source impedance:
 - Class 1: MSAC5.0 to MSAC50
 - Class 2: MSAC5.0 to MSAC45
 - Class 3: MSAC5.0 to MSAC22
 - Class 4: MSAC5.0 to MSAC10
- Secondary lightning protection per IEC 61000-4-5 with 12 ohms source impedance:
 - Class 1: MSAC5.0 to MSAC26
 - Class 2: MSAC5.0 to MSAC15
 - Class 3: MSAC5.0 to MSAC7.0

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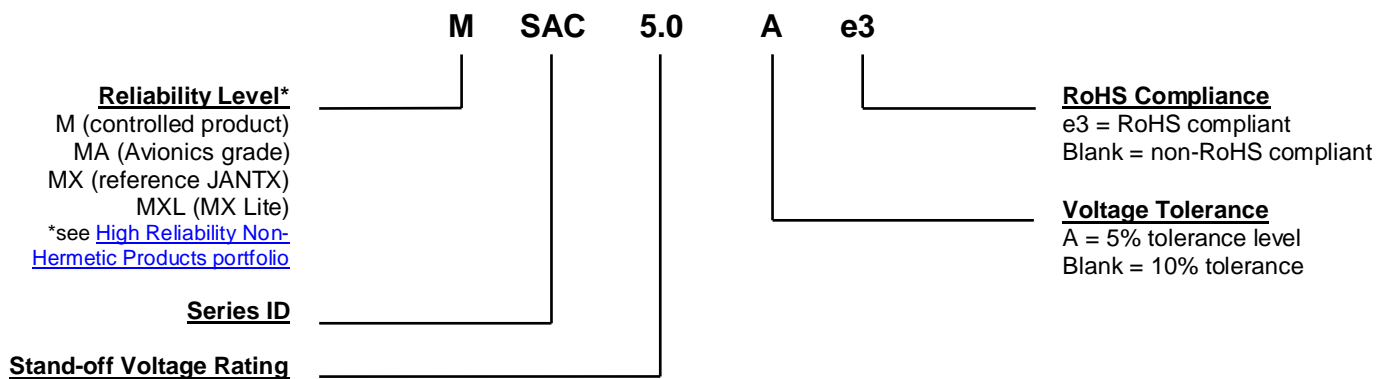
MAXIMUM RATINGS @ 25 °C unless otherwise stated

Parameters/Test Conditions	Symbol	Value	Unit
Junction and Storage Temperature	T _J and T _{STG}	-65 to +150	°C
Peak Pulse Power Dissipation @ 10/1000 μs ⁽¹⁾	P _{PP}	500	W
Average Power Dissipation @ T _L = +75 °C ⁽²⁾	P _{M(AV)}	2.5	W
Clamping Speed (0 volts to V _(BR) min.)		< 5	ns
Solder Temperature @ 10 s		260	°C

- Notes:**
- With impulse repetition rate (duty factor) of 0.01 % max. TVS devices are not typically used for dc power dissipation and are instead operated $\leq V_{WM}$ (rated standoff voltage) except for transients that briefly drive the device into avalanche breakdown (V_(BR) to V_C region) of the TVS element. Also see [Figures 5 and 6](#) for further protection details in rated peak pulse power for unidirectional and bidirectional configurations respectively.
 - At 3/8 (10 mm) lead length from body.

MECHANICAL and PACKAGING

- CASE: Void-free transfer molded thermosetting epoxy body meeting UL94V-0.
- TERMINALS: Tin-lead or RoHS compliant annealed matte-tin plating. Solderable per MIL-STD-750, method 2026.
- MARKING: Part number.
- POLARITY: Cathode indicated by band.
- TAPE & REEL option: Standard per EIA-296 (add "TR" suffix to part number). Consult factory for quantities.
- WEIGHT: Approximately 0.7 grams.
- See [Package Dimensions](#) on last page.

PART NOMENCLATURE


SYMBOLS & DEFINITIONS

Symbol	Definition
$I_{(BR)}$	Breakdown Current: The current used for measuring Breakdown Voltage $V_{(BR)}$.
I_D	Standby Current: The current through the device at rated stand-off voltage.
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.
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 .
$V_{(BR)}$	Breakdown Voltage: The voltage across the device at a specified current $I_{(BR)}$ in the breakdown region.
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.
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.

ELECTRICAL CHARACTERISTICS @ 25 °C unless otherwise stated

PART NUMBER	WORKING STAND-OFF VOLTAGE (Note 1) V_{WM}	BREAKDOWN VOLTAGE V_{BR} @ I_{BR} 1.0mA $V_{(BR)}$	MAXIMUM STANDBY CURRENT I_D @ V_{WM}	MAXIMUM CLAMPING VOLTAGE V_C @ $I_P = 5.0A$	MAXIMUM PEAK PULSE CURRENT RATING (Note 2) I_{PP}	MAXIMUM CAPACITANCE @ 0 Volts	WORKING INVERSE BLOCKING VOLTAGE V_{WIB}	INVERSE BLOCKING LEAKAGE CURRENT @ V_{WIB} I_{IB}	PEAK INVERSE BLOCKING VOLTAGE V_{PIB}
	Volts	Volts (min)	A	Volts	Amps	pF	Volts	μA	Volts
MSAC5.0	5.0	7.60	300	10.0	44	30	75	10	100
MSAC6.0	6.0	7.90	300	11.2	41	30	75	10	100
MSAC7.0	7.0	8.33	300	12.6	38	30	75	10	100
MSAC8.0	8.0	8.89	100	13.4	36	30	75	10	100
MSAC8.5	8.5	9.44	50	14.0	34	30	75	10	100
MSAC10	10	11.10	5.0	16.3	29	30	75	10	100
MSAC12	12	13.30	5.0	19.0	25	30	75	10	100
MSAC15	15	16.70	5.0	23.6	20	30	75	10	100
MSAC18	18	20.00	5.0	28.8	15	30	75	10	100
MSAC22	22	24.40	5.0	35.4	14	30	75	10	100
MSAC26	26	28.90	5.0	42.3	11.1	30	75	10	100
MSAC36	36	40.0	5.0	60.0	8.6	30	75	10	100
MSAC45	45	50.00	5.0	77.0	6.8	30	150	10	200
MSAC50	50	55.50	5.0	88.0	5.8	30	150	10	200

Note 1: A Transient Voltage Suppressor is normally selected according to voltage (V_{WM}), which should be equal to or greater than the dc or continuous peak operating voltage level.

Note 2: Test in TVS avalanche direction. Do not pulse in "forward" direction. See section for [Application Schematics](#) herein.

GRAPHS

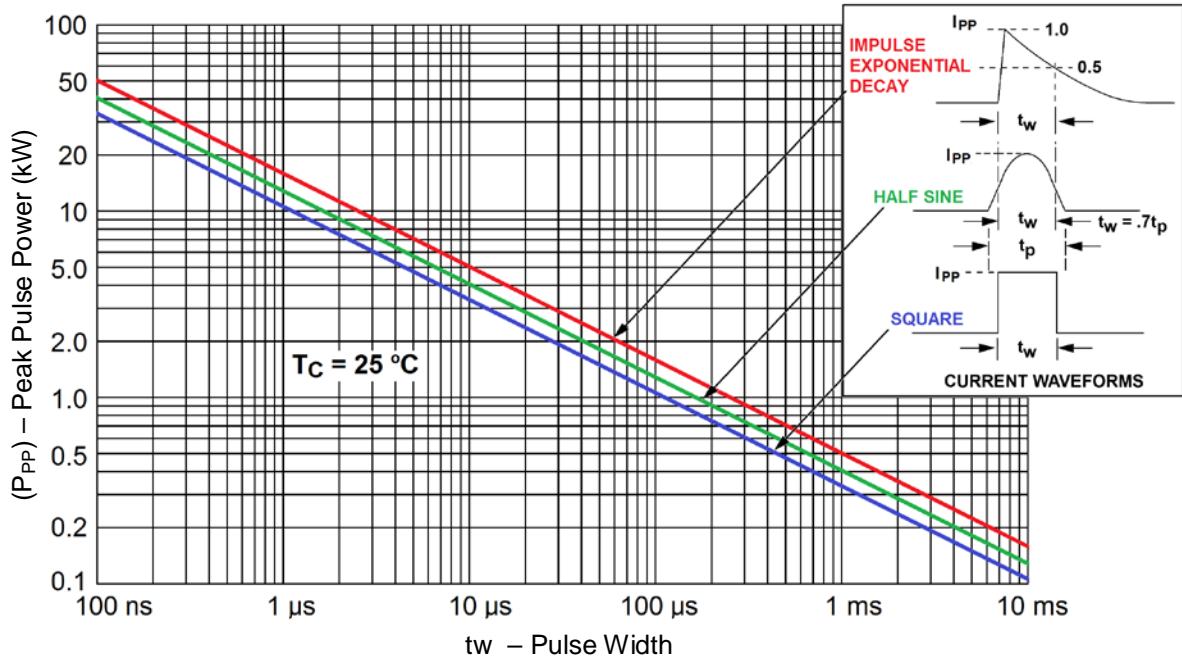


FIGURE 1
Peak Pulse Power vs Pulse Time

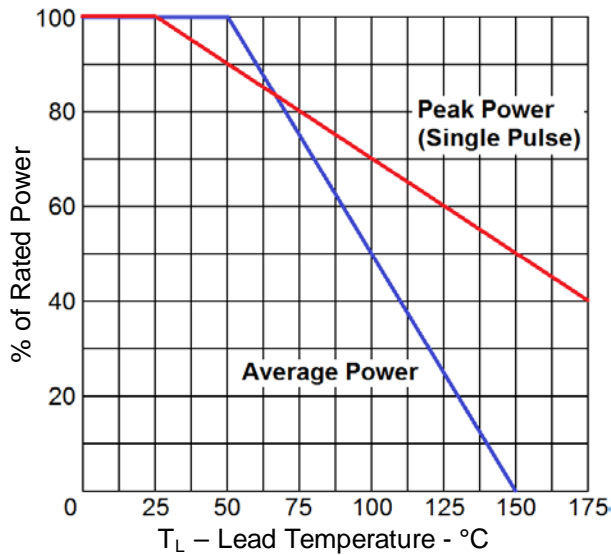


Figure 2
Rated Power vs Lead Temperature
(At Lead Length = 3/8")

GRAPHS (continued)

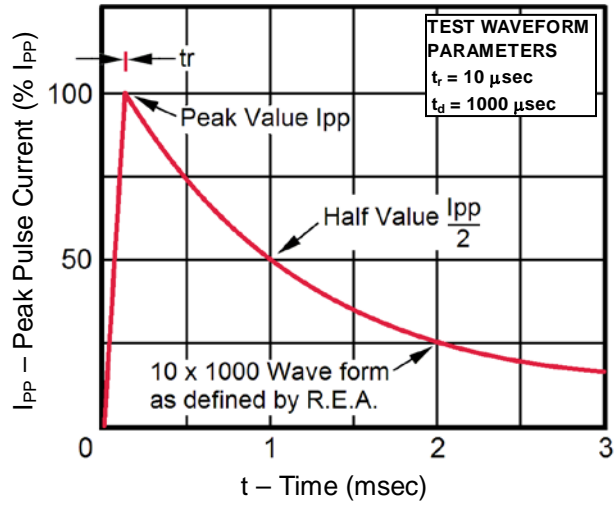
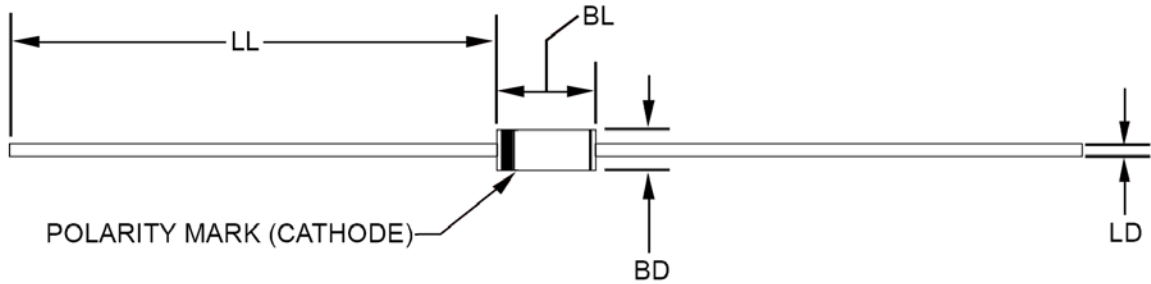


Figure 3
Peak Pulse Current vs Time

PACKAGE DIMENSIONS



NOTES: Cathode indicated by band.

Dim	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
LL	1.00	-	25.4	-
BL	-	0.205	-	5.207
BD	-	0.107	-	2.72
LD	0.030	0.034	0.76	0.86

APPLICATION SCHEMATICS

The TVS low capacitance device configuration is shown in Figure 4. As a further option for unidirectional applications, an additional low capacitance rectifier diode may be used in parallel in the same polarity direction as the TVS as shown in Figure 5. In applications where random high voltage transients occur, this will prevent reverse transients from damaging the internal low capacitance rectifier diode and also provide a low voltage conducting direction. The added rectifier diode should be of similar low capacitance and also have a higher reverse voltage rating than the TVS clamping voltage VC. The Microsemi recommended rectifier part number is the "LCR60" for the application in Figure 5. If using two (2) low capacitance TVS devices in anti-parallel for bidirectional applications, this added protective feature for both directions (including the reverse of each rectifier diode) is also provided. The unidirectional and bidirectional configurations in Figure 5 and 6 will both result in twice the capacitance of Figure 4.

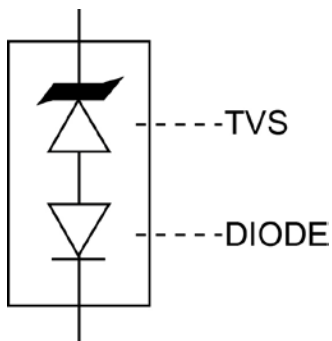


Figure 4
TVS with internal
Low capacitance diode

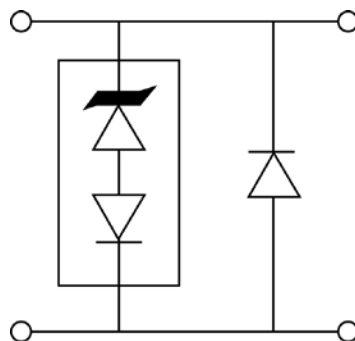


Figure 5
Optional Unidirectional
configuration (TVS and
separate rectifier diode
in parallel)

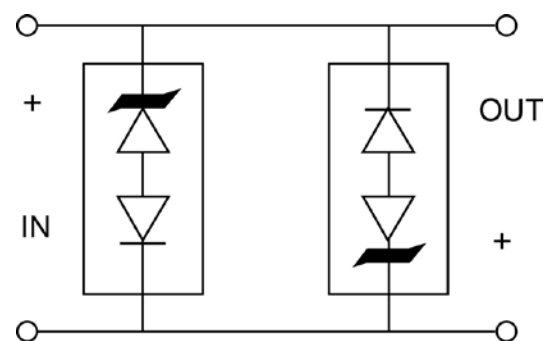


Figure 6
Optional Bidirectional
configuration (two TVS
devices in anti-parallel)