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TECHNICAL DATA SHEET

500 W Low Capacitance
Transient Voltage Suppressor

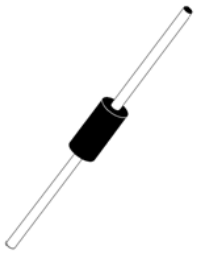
- **High Reliability controlled devices**
- **Thru hole mounting**
- **Unidirectional construction**
- **Selections for 5 V to 50 V standoff voltages (V_{WM})**

DEVICES **MSAC5.0 thru MSAC50, e3**

LEVELS
M, MA, MX, MXL

FEATURES

- High reliability controlled devices with wafer fabrication and assembly lot traceability
- 100 % surge tested devices
- Suppresses transients up to 500 W @ 10/1000 µs
- Low capacitance rating of 30 pF
- Unidirectional low-capacitance device (for bidirectional see Figure 6)
- Optional upscreening available by replacing the M prefix with MA, MX or MXL. These prefixes specify various screening and conformance inspection options based on MIL-PRF-19500. Refer to MicroNote 129 for more details on the screening options.
- Moisture classification is Level 1 with no dry pack required per IPC/JEDEC J-STD-020B
- RoHS Compliant devices available by adding “e3” suffix
- 3σ lot norm screening performed on Standby Current I_D



DO-41

APPLICATIONS / BENEFITS

- Low Capacitance for data-line protection to 10 MHz
- Protection for aircraft fast data rate lines up to Level 3 Waveform 4 and Level 1 Waveform 5A in RTCA/DO-160F (also see MicroNote 130) & ARINC 429 with bit rates of 100 kb/s (per ARINC 429, Part 1, par 2.4.1.1)
- ESD and EFT protection per IEC61000-4-2 and IEC61000-4-4 respectively
- Secondary lightning protection per IEC61000-4-5 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 IEC61000-4-5 with 12 Ohms source impedance
  Class 1: MSAC5.0 to MSAC26
  Class 2: MSAC5.0 to MSAC15
  Class 3: MSAC5.0 to MSAC7.0

MAXIMUM RATINGS

- Peak Pulse Power dissipation at 25 °C: 500 W at @ 10/1000 µs with impulse repetition rate (duty factor) of 0.01 % max*
- Operating and Storage temperature: -65 ºC to +150 °C
- Steady-state power dissipation: 2.5 W @ TL = 75 °C (lead Length = 3/8”)
- Clamping Speed (0 volts to V_{BR} min.) less than 5 nanoseconds.
- Solder temperatures: 260 °C for 10 s (maximum)

* 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

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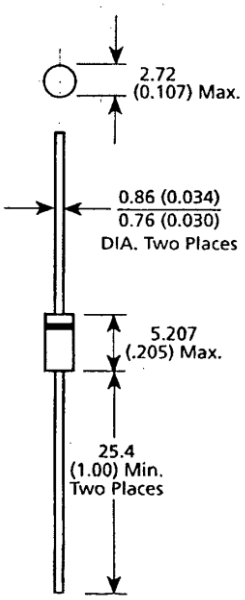
MECHANICAL AND PACKAGING

- Void-free transfer molded thermosetting epoxy body meeting UL94V-0 requirements
- Tin-Lead (90 % Sn, 10 % Pb) or RoHS (100% Sn) Compliant annealed matte-Tin plating readily solderable per MIL-STD-750, method 2026
- Body marked with part number
- Cathode indicated by band.
- Available in bulk or custom tape-and-reel packaging
- TAPE-AND-REEL standard per EIA-296 (add “TR” suffix to part number)
- Weight: 0.7 grams (approximate)

PACKAGE DIMENSIONS



DO-41

SYMBOLS & DEFINITIONS

Symbol	Definition	Symbol	Definition
V_{WM}	Working Peak (Standoff) Voltage	I_{PP}	Peak Pulse Current
P_{PP}	Peak Pulse Power	V_C	Clamping Voltage
V_{BR}	Breakdown Voltage	I_{BR}	Breakdown Current for V_{BR}
I_D	Standby Current		

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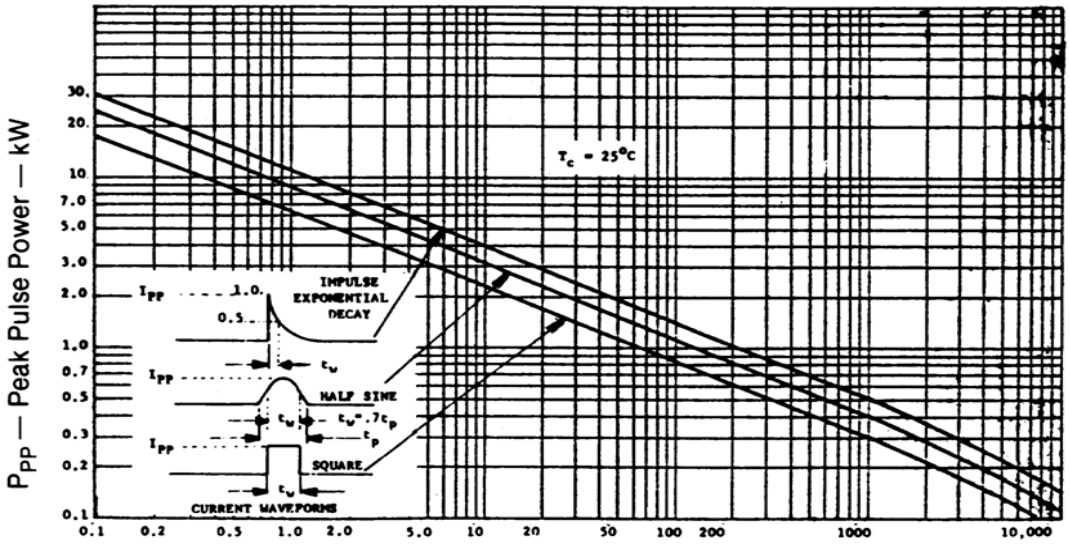
TECHNICAL DATA SHEET

ELECTRICAL CHARACTERISTICS @ 25°C

MICROSEMI PART NUMBER	REVERSE STAND-OFF VOLTAGE (Note 1) V_{WM} Volts	BREAKDOWN VOLTAGE V_{BR} @ I_{BR} 1.0mA $V_{(BR)}$ Volts Min.	MAXIMUM STANDBY CURRENT I_D @V_{WM} µA	MAXIMUM CLAMPING VOLTAGE V_C @ I_P = 5.0A Volts	MAXIMUM PEAK PULSE CURRENT RATING (Note 2) I_{PP} Amps	MAXIMUM CAPACITANCE @ O Volts pF	WORKING INVERSE BLOCKING VOLTAGE V_{WIB} Volts	INVERSE BLOCKING LEAKAGE CURRENT @ V_{WIB} I_{IB} µA	PEAK INVERSE BLOCKING VOLTAGE V_{PIB} 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 "Schematic Applications" herein.

GRAPHS



t_w – Pulse width
Figure 1

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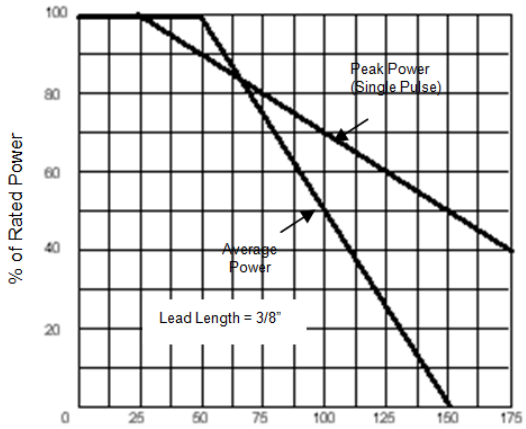
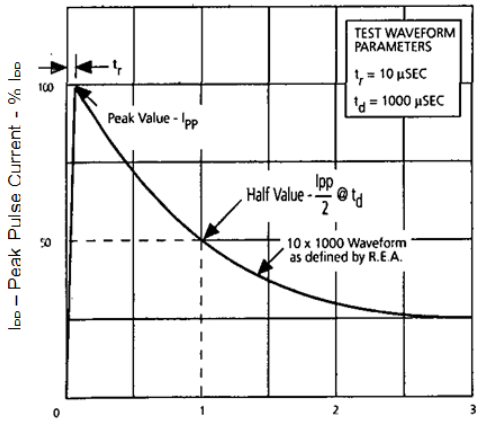
GRAPHS Contd.



TL – Lead Temperature - °C

Figure 2



t –time – msec

Figure 3

SCHEMATIC APPLICATIONS

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 V_C. 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.

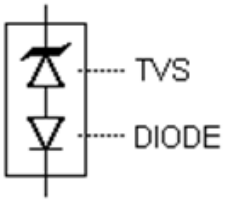


Figure 4

TVS with internal Low Capacitance Diode

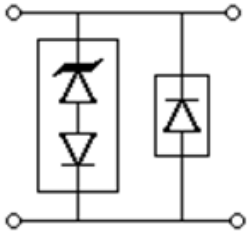


Figure 5

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

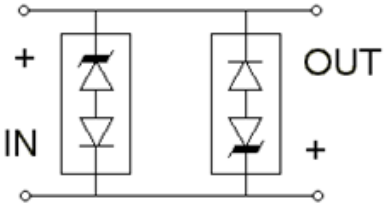


Figure 6

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