Microsemi
SCOTTSDALE DIVISION

200KP48CA

AIRCRAFT DC POWER BUS PROTECTION

DESCRIPTION

Microsemi's **200 kW** bidirectional Transient Voltage Suppressor (TVS) protects 28 volt dc airborne electronic equipment from harsh lightning environments per **RTCA/DO-160D** Section 22 and is compatible with Section 16 for 53 volt highline surges. Microsemi also offers a broad spectrum of additional TVS to meet your needs.

APPEARANCE

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

FEATURES

- Symmetrical bidirectional TVS construction (unidirectional devices available on request.)
- Suppresses transients up to **200 kW @ 10/40 µs**
- Fast response with less than 5 ns turn-on time.
- Optional 100% **screening for avionics grade** is available by adding MA prefix to part number for added 100% temperature cycle -55°C to +125°C (10X), surge (3X) in each direction, 24 hours HTRB in each direction, and post test (V_Z and I_R)
- Options for **screening** in accordance with MIL-PRF-19500 **for JAN, JANTX, JANTXV, and JANS** are also available by adding MQ, MX, MV, or MSP prefixes respectively to part numbers.
- Moisture classification is Level 1 with no dry pack required per IPC/JEDEC J-STD-020B.

APPLICATIONS / BENEFITS

- Supplied in bidirectional configuration in the event of reverse polarity connection.
- Pin injection protection per RTCA/DO-160D up to Level 5 for Waveform 4 (6.4/69 µs) and up to Level 4 for Waveform 5A (40/120 µs)
- Compatible with "abnormal surge and variation from a controlled steady-state level" as described in 16.5.3.3 of RTCA/DO-160D.
- The 200KP48CA is designed for protecting 80V components including switching transistors, MOSFETs & IGBTs in off-line switching power supplies.
- Secondary lightning protection per IEC61000-4-5 with 12 Ohms source impedance for Class 1,2, 3 and 4.
- Secondary lightning protection per IEC61000-4-5 with 2 Ohms source impedance for Class 2 and 3.

MAXIMUM RATINGS

- Steady-state power dissipation: 7 W @ T_A = 25°C
- Peak Pulse Power at 25°C: 200 kW at 10/40 µs (linear derate to zero @ 150°C)
- Repetition rate: 0.01% max.
- Operating & storage temperatures: -55°C to +150°C
- Temperature coefficient of voltage: +0.100%/°C max
- Solder Temperatures: 260°C for 10 s maximum

MECHANICAL & PACKAGING

- CASE: Molded Epoxy
- Meets UL 94V-O flammability requirements
- FINISH: Tin-Lead plated readily solderable per MIL-STD-750, method 2026
- Polarity: No band required for bidirectional
- MARKING: Manufacturers logo and part number. Add prefix MA, MQ, MX, etc., for screened parts.
- Package dimensions: See last page

ELECTRICAL PARAMETERS @ 25°C Devices are Bidirectional

Working Standoff Voltage V_{WM}	Maximum Standby Current I_D @ V_{WM}	Minimum Breakdown Voltage V_{BR}	Breakdown Current $I_{(BR)}$	Maximum Clamping Voltage V_C	Peak Pulse Current I_{PP} @ 10/40 µs
V max	µA	V	mA	V	A
48	5	53.3	5	77	400

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GRAPHS

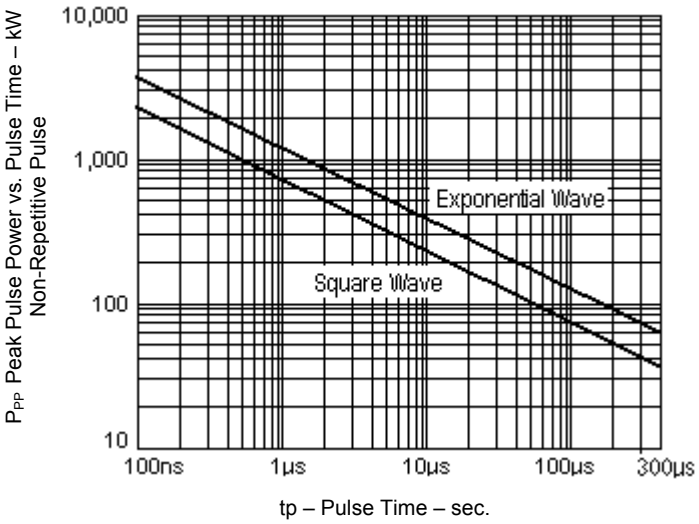


FIGURE 1
Peak Pulse Power vs. Pulse Time
To 50% of Exponentially Decaying Pulse

NOTE: This P_{PP} vs. Time graph allows the designer to use these parts over a broad power spectrum using the guidelines illustrated in App Note 104 on Microsemi's website. Aircraft transients are described with exponential decaying waveforms. For suppression of square waveforms, derate power and current to 66% of that for exponential decay.

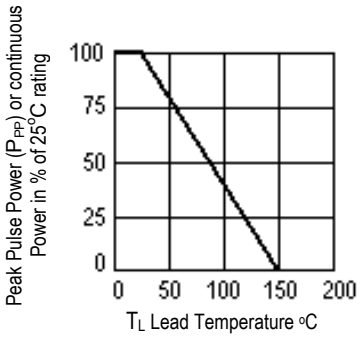


FIGURE 2
DERATING CURVE

Correct

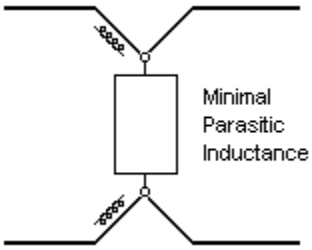


FIGURE 3

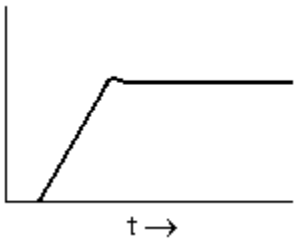


FIGURE 4

INSTALLATION

TVS devices used across power lines are subject to relatively high magnitude surge currents and are more prone to adverse parasitic inductance effects in the mounting leads. Minimizing the shunt path of the lead inductance and their V= -Ldi/dt effects will optimize the TVS effectiveness. Examples of optimum installation and poor installation are illustrated in figures 3 through figure 6. Figure 3 illustrates minimal parasitic inductance with attachment at end of device. Inductive voltage drop is across input leads. Virtually no "overshoot" voltage results as illustrated with figure 4. The loss of effectiveness in protection caused by excessive parasitic inductance is illustrated in figures 5 and 6. Also see MicroNote 111 for further information on "Parasitic Lead Inductance in TVS".

Wrong

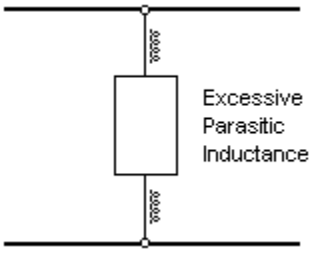


FIGURE 5

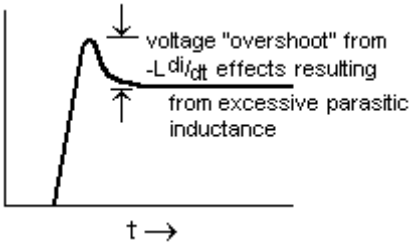
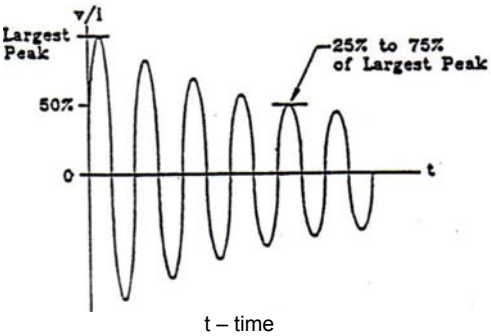
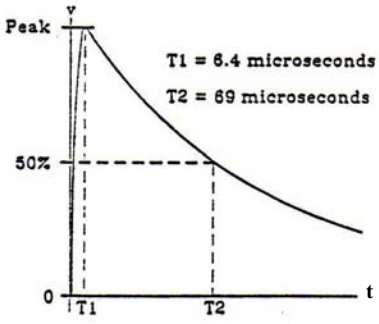


FIGURE 6



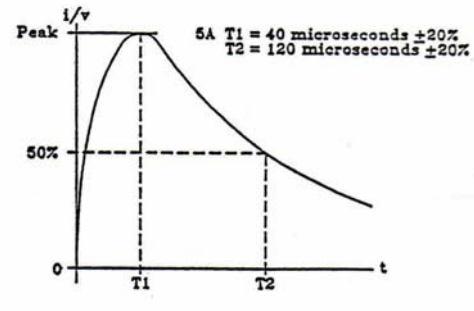
t – time
Note: frequency is 1MHz

FIGURE 7 – Waveform 3



t – time

FIGURE 8 – Waveform 4



t - Time

FIGURE 9 – Waveform 5a

NOTE: The 1MHz damped oscillatory waveform (3) has an effective pulse width of 4 μs. Equivalent peak pulse power for the 200KP48CA at each of the pulse widths represented in RTCA/DO-160D for waveforms 3, 4 and 5a (above) have been determined referencing Figure 1 herein as well as Application Notes 104 and 120 (found on Microsemi's website) and are listed below.

WAVEFORM NUMBER	PULSE WIDTH μs	PEAK POWER kW
3	4	550
4	6.4/69	150
5a	40/120	120

Note: High current fast rise-time transients of 250 ns or less can more than triple the V_C from parasitic inductance effects (V= -Ldi/dt) compared to the clamping voltage shown in the initial Electrical Characteristics on page 1 as also described in Figures 5 and 6 herein.

DIMENSIONS