Microsemi
SCOTTSDALE DIVISION

200KP295CVCL and 200KP295CA

AIRCRAFT AC POWER BUS PROTECTION

Replaced by RTCA130KP295CVCL, CA

DESCRIPTION

Microsemi's **200 kW** bidirectional Transient Voltage Suppressor (TVS) protects 120 volt ac airborne electronic equipment from harsh lightning environments per **RTCA/DO-160D** Section 22 and is compatible with Section 16 for 180 volt ac 100 ms highline surges. Microsemi also offers a broad spectrum of other TVS products to meet your needs.

APPEARANCE

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

FEATURES

- Symmetrical bidirectional TVS construction
- Available as either low clamp with "CVCL" suffix or normal clamping features with "CA" suffix.
- Suppresses transients up to **200 kW @ 10/40 us**
- 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

- Pin injection protection per RTCA/DO-160D up to Level 4 for Waveform 4 (6.4/69 µs) and Level 3 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 200KP295CVCL is designed for low clamping protection of 400V transistors, MOSFETs and IGBTs in off-line switching power supplies.
- The 200KP295CA normal clamp device is for use in less sensitive applications including RFI/EMI filters and general across-the-line protection.
- 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

OBSOLETE!

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: Inner Shell – Epoxy Encapsulated. Exterior Shell – Diallyl Phthallate, glass filled
- Meets UL 94V-0 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 Bi-directional

MICROSEMI PART NUMBER	Working Standoff Voltage V_{WM}	Maximum Standby Current I_D @ V_{WM}	Minimum Breakdown Voltage V_{BR} @ $I_{(BR)}$	Breakdown Current $I_{(BR)}$	Maximum Clamping Voltage V_C @ I_{PP}	Peak Pulse Current I_{PP} @ 10/40 µs
	V max	µA	Volts	mA	Volts	Amps
200KP295CVCL	295	5	300	5	**410**	300
200KP295CA	295	5	300	5	**460**	300

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GRAPHS

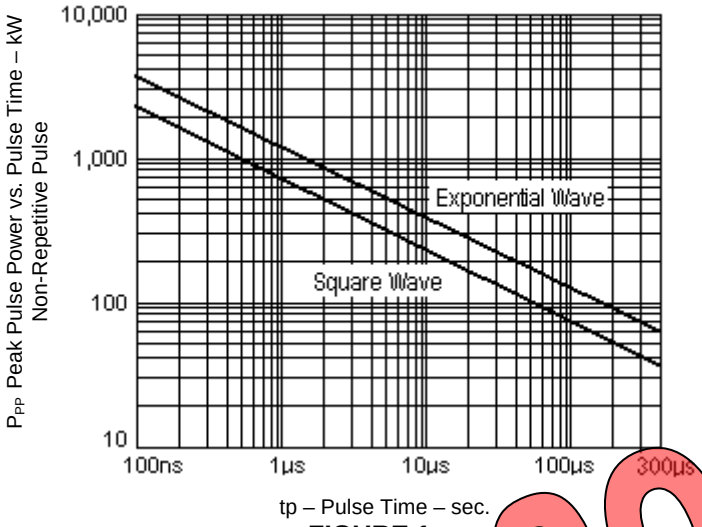

FIGURE 1
Peak Pulse Power vs. Pulse Time
To 50% of Exponentially Decaying Pulse

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.

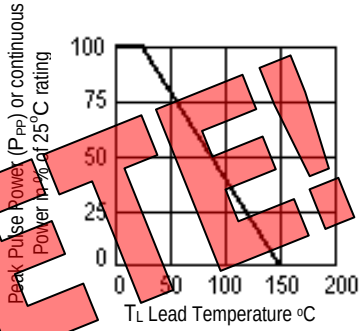

FIGURE 2
DERATING CURVE

Correct

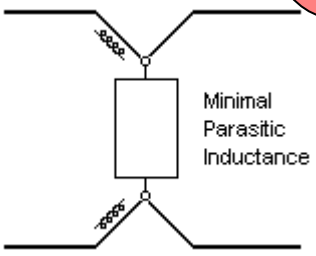

FIGURE 3

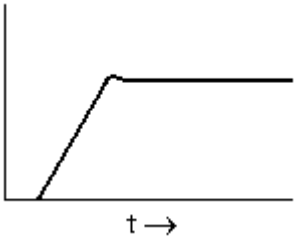

FIGURE 4

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

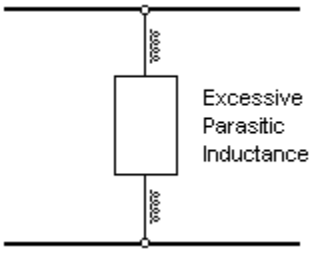

FIGURE 5

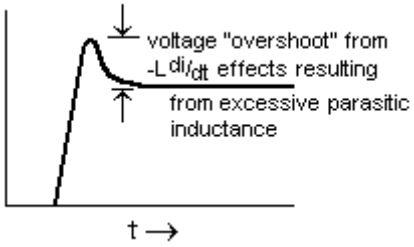

FIGURE 6

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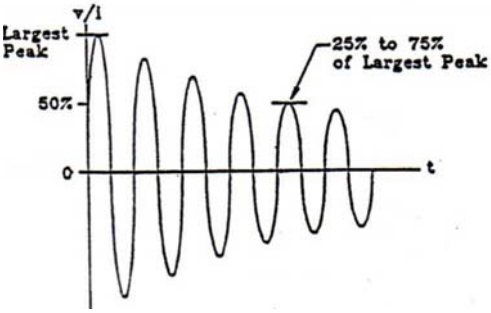
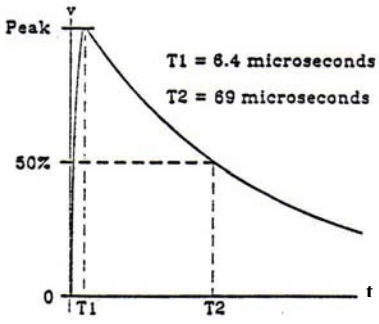


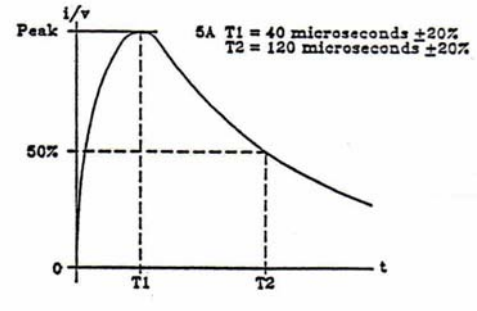
t – time
Note: frequency is 1MHz

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 200KP295CVCL and 200KP295CA at each of the pulse widths represented in RTCA/DO-160D for wave forms 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.

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WAVEFORM NUMBER	PULSE WIDTH μs	PEAK POWER kW
3	4	500
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