TECHNICAL DATA SHEET

130 kW Transient Voltage Suppressor

- High Reliability controlled devices
- Thru hole mounting
- Bidirectional (CA) construction
- Selections for 275 V and 295 V standoff voltages (V_{WM})

**DEVICES**

<table>
<thead>
<tr>
<th>MRT130KP275CV and MRT130KP275CA, e3</th>
<th>MRT130KP295CV and MRT130KP295CA, e3</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEVELS</td>
<td>M, MA, MX, MXL</td>
</tr>
</tbody>
</table>

**FEATURES**

- High reliability controlled devices with wafer fabrication and assembly lot traceability
- 100% surge tested devices
- Suppresses transients up to 130 kW @ 6.4/69 µs
- Fast response with less than 5ns turn-on time
- Available as either low clamp with "CV" suffix or normal clamping features with "CA" suffix
- 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}

**APPLICATIONS / BENEFITS**

- Pin injection protection per RTCA/DO-160F Table 22-2 up to Level 5 for Waveform 4 (6.4/69 µs) and Level 3 for Waveform 5A (40/120 µs) at 70 °C
- 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
- Compatible with "abnormal surge voltage" as described in 16.5.2.3.1b of RTCA/DO-160F
- The very low clamping with "CV" suffix is designed for low clamping protection of 400V transistors, IGBTs and MOSFETs in off-line switching power supplies.
- The normal clamp device with "CA" suffix is for use in less-sensitive applications including RFI/EMI filters and general across-the-line protection

**MAXIMUM RATINGS**

- Peak Pulse Power dissipation at 25 °C: 130 kW at @ 6.4/69 µs per waveform in Figure 8 (derate as per Figure 2) with Impulse repetition rate (duty factor) of 0.001 % max for T_A = 25 °C
- Steady-state power dissipation: 7 Watts @ T_L = 25 °C or 1.61 Watts at T_A = 25 °C when mounted on FR4 PC board with recommended footprint
- Operating and Storage temperatures: -55 °C to +150 °C
- Temperature coefficient of voltage: 0.1 %/°C max
- Solder temperatures: 260 °C for 10 s (maximum)
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
- No cathode band on bi-directional devices
- Weight: 2.3 grams (approximate)
- Available in bulk or custom tape-and-reel packaging
- TAPE-AND-REEL standard per EIA-296 (add "TR" suffix to part number)

PACKAGE DIMENSIONS

![Package Dimensions Diagram]

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Definition</th>
<th>Symbol</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_{WM}</td>
<td>Working Peak (Standoff) Voltage</td>
<td>I_{PP}</td>
<td>Peak Pulse Current</td>
</tr>
<tr>
<td>P_{PP}</td>
<td>Peak Pulse Power</td>
<td>V_{C}</td>
<td>Clamping Voltage</td>
</tr>
<tr>
<td>V_{BR}</td>
<td>Breakdown Voltage</td>
<td>I_{BR}</td>
<td>Breakdown Current for V_{BR}</td>
</tr>
<tr>
<td>I_{D}</td>
<td>Standby Current</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: All dimensions in inches +/- 0.010 and millimeters +/- 0.025
**ELECTRICAL CHARACTERISTICS @ 25°C**

<table>
<thead>
<tr>
<th>MICROSEMI PART NUMBER</th>
<th>Working Standoff Voltage $V_{WM}$</th>
<th>Maximum Standby Current $I_0 @ V_{WM}$</th>
<th>Minimum Breakdown Voltage $V_{BR} @ I_{BR}$</th>
<th>Breakdown Current $I_{BR}$</th>
<th>Maximum Clamping Voltage $V_C @ I_{PP}$ (Note 1)</th>
<th>Peak Pulse Current $I_{PP} @ 6.4/69 \mu s$ (Note 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRT130KP275CV</td>
<td>275 V</td>
<td>5 ( \mu )A</td>
<td>300 Volts</td>
<td>5 mA</td>
<td>400 Volts</td>
<td>292 Amps</td>
</tr>
<tr>
<td>MRT130KP275CA</td>
<td>275 V</td>
<td>5 ( \mu )A</td>
<td>300 Volts</td>
<td>5 mA</td>
<td>445 Volts</td>
<td>292 Amps</td>
</tr>
<tr>
<td>MRT130KP295CV</td>
<td>295 V</td>
<td>5 ( \mu )A</td>
<td>300 Volts</td>
<td>5 mA</td>
<td>410 Volts</td>
<td>282 Amps</td>
</tr>
<tr>
<td>MRT130KP295CA</td>
<td>295 V</td>
<td>5 ( \mu )A</td>
<td>300 Volts</td>
<td>5 mA</td>
<td>460 Volts</td>
<td>282 Amps</td>
</tr>
</tbody>
</table>

**Note 1:** See MicroNote 108 for lower Clamping Voltage performance at reduced $I_p$ values relative to $I_{PP}$ and $P_{PP}$ ratings and Figure 1.

**Note 2:** Also equivalent to 90 and 87 Amps (40 kW) respectively at a longer impulse of 10/1000 \( \mu s \) (see Figure 1) with clamping voltages shown. Also see other equivalent peak pulse power performance levels for aircraft waveforms on page 3 for this device.

**GRAPHS**

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

**FIGURE 2**
Power Derating
Peak Pulse Power ($P_{PP}$) or continuous Average Power ($P_{avg}$) at $25^\circ C$ rating
Note: The 1MHz damped oscillatory waveform (3) has an effective pulse width of 4 μs. Equivalent peak pulse power for the RT130KP275CA and RT130KP295CA at each of the pulse widths represented in RTCA/DO-160E 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.

<table>
<thead>
<tr>
<th>WAVEFORM NUMBER</th>
<th>PULSE WIDTH</th>
<th>PEAK PULSE POWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4</td>
<td>580</td>
</tr>
<tr>
<td>4</td>
<td>6.4/69</td>
<td>130</td>
</tr>
<tr>
<td>5A</td>
<td>40/120</td>
<td>98</td>
</tr>
</tbody>
</table>

Note: High current fast rise-time transients of 250 ns or less can more than triple the Vc 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.