**TECHNICAL DATA SHEET**

Gort Road Business Park, Ennis, Co. Clare, Ireland.
Tel: +353 (0) 65 6840044, Fax: +353 (0) 65 6822298

Website: http://www.microsemi.com

65 kW Transient Voltage Suppressor

### FEATURES
- High Reliability controlled devices
- Thru hole mounting
- Unidirectional (A) and Bidirectional (CA) construction
- Selections for 48 V to 75 V standoff voltages (V_{WM})

### DEVICES
MRT65KP48A thru MRT65KP75CA, e3

### LEVELS
M, MA, MX, MXL

### APPLICATIONS / BENEFITS
- Pin injection protection per RTCA/DO-160F up to Level 5 for Waveform 4 (6.4/69 μs) and up to Level 3 for Waveform 5A (40/120 μs) at 70 °C
- Compatible with “abnormal surge voltage (dc)” in 16.6.2.4 (Category A, B, and Z) of RTCA/DO-160F
- The MRT65KP48A is designed for Category A in protecting 80 V components**
- The MRT65KP54A or 60A is designed for Category B in protecting 90 V or 100 V components**
- The MRT65KP75A is designed for Category Z in protecting 125 V components**

** including switching transistors, MOSFETS & IGBTs in offline switching power supplies

### MAXIMUM RATINGS
- Peak Pulse Power dissipation at 25 °C: 65 kW at @ 6.4/69 μs per waveform in Figure 8 (derate per Figure 2) with impulse repetition rate (duty factor) of 0.01 % max
- Operating and Storage temperature: -55 °C to +150 °C
- Steady-state power dissipation: 7 W @ TL = 25 °C
- Temperature coefficient of voltage: +0.100 ‰/°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
- Cathode indicated by band. No cathode band on bi-directional devices
- Available in bulk or custom tape-and-reel packaging
- TAPE-AND-REEL standard per EIA-296 (add "TR" suffix to part number)
- Weight: 1.6 grams (approximate)

PACKAGE DIMENSIONS

Case 5A

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

NOTE: Cathode indicated by band
All dimensions in inches, millimeters
### ELECTRICAL CHARACTERISTICS @ 25°C

<table>
<thead>
<tr>
<th>MICROSEMI PART NUMBER</th>
<th>Working Standoff Voltage $V_{WM}$</th>
<th>Maximum Standby Current $I_{D} @ V_{WM}$</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>MRT65KP48A</td>
<td>48 V max</td>
<td>5 µA</td>
<td>53.3 V</td>
<td>5 mA</td>
<td>77.7 V</td>
<td>836 A</td>
</tr>
<tr>
<td>MRT65KP54A</td>
<td>54 V max</td>
<td>5 µA</td>
<td>60.0 V</td>
<td>5 mA</td>
<td>87.5 V</td>
<td>742 A</td>
</tr>
<tr>
<td>MRT65KP60A</td>
<td>60 V max</td>
<td>5 µA</td>
<td>66.7 V</td>
<td>5 mA</td>
<td>97.3 V</td>
<td>668 A</td>
</tr>
<tr>
<td>MRT65KP75A</td>
<td>75 V max</td>
<td>5 µA</td>
<td>83.3 V</td>
<td>5 mA</td>
<td>122 V</td>
<td>533 A</td>
</tr>
</tbody>
</table>

### GRAPHS

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

**FIGURE 2**
Power Derating

NOTE: This $P_{PP}$ versus 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-wave impulses, derate power and current to 66% of that for exponential decay as shown in Figure 1.
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 \( V = -L \frac{di}{dt} \) 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”.

NOTE: The 1MHz damped oscillatory waveform (3) has an effective pulse width of 4 \( \mu \text{s} \). Equivalent peak pulse power at each of the pulse widths represented in RTCA/DO-160E 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.
### GRAPHS Contd.

<table>
<thead>
<tr>
<th>WAVEFORM NUMBER</th>
<th>PULSE WIDTH (μS)</th>
<th>PEAK PULSE POWER (kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4</td>
<td>290</td>
</tr>
<tr>
<td>4</td>
<td>6.4/69</td>
<td>65</td>
</tr>
<tr>
<td>5A</td>
<td>40/120</td>
<td>49</td>
</tr>
</tbody>
</table>

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