Surface Mount Ceramic Chip Antennas for 2.4 GHz

**FEATURES**
- Small outline (8.0 mm x 1.05 mm x 0.8 mm)
- 50 Ω unbalanced tuning interface
- Omnidirectional
- Assembled onto a PCB in the standard reflow process
- Low profile for thin type terminal
- High stability in temperature / humidity changes
- High mechanical strength
- Wide operating temperature range (-40 °C to +85 °C)
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

**APPLICATIONS**
- Bluetooth
- Wireless LAN
- ISM band 2.4 GHz wireless applications

**DESCRIPTION**
The VJ5103W240GXCMT ceramic chip antenna is a small form-factor, high-performance, chip-antenna designed for operation at 2.4 GHz. It allows manufacturers to design high quality products that do not bear the penalty of a large external antenna, and is designed to be assembled onto a PC board using a standard reflow process.

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**APPLICATIONS**
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**DESCRIPTION**
The VJ5103W240 series are small form-factor, high-performance chip-antennas designed to be used in wireless, bluetooth and ISM band 2.4 GHz.
The VJ5103W240 series present an excellent performance (max. gain 3 dBi) with a low profile needed in most wireless applications.

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**QUICK REFERENCE DATA**

<table>
<thead>
<tr>
<th>SERIES</th>
<th>FREQUENCY (MHz)</th>
<th>MAX. GAIN (dBi)</th>
<th>AVERAGE GAIN (dBi)</th>
<th>BANDWIDTH (-10 dB) (MHz)</th>
<th>BANDWIDTH (-3 dB) (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VJ5103W240GXCMT</td>
<td>2450</td>
<td>+ 3.0</td>
<td>- 0.60</td>
<td>250</td>
<td>570</td>
</tr>
</tbody>
</table>

**CHIP ANTENNA PERFORMANCE**

<table>
<thead>
<tr>
<th>NOMINAL FREQUENCY (MHz)</th>
<th>NOMINAL IMPEDANCE (Ω)</th>
<th>2.45 GHz PEAK GAIN (dBi)</th>
<th>2.45 GHz AVERAGE GAIN (dBi)</th>
<th>2.45 GHz REFLECTED POWER LOSS</th>
<th>2.45 GHz INSERTION POWER LOSS</th>
<th>-3 dB BANDWIDTH 2.45 GHz</th>
<th>-3 dB REFLECTED POWER LOSS</th>
<th>-10 dB BANDWIDTH 2.45 GHz</th>
<th>-10 dB REFLECTED POWER LOSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2450</td>
<td>50</td>
<td>- 0.60</td>
<td>+ 3.0</td>
<td>&lt; -15 dB</td>
<td>&lt; 4 %</td>
<td>570</td>
<td>50 %</td>
<td>250</td>
<td>10 %</td>
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</tbody>
</table>
FOOTPRINT, MECHANICAL, AND PCB DIMENSIONS
The antenna footprint and mechanical dimensions are presented in figure 7. Optimal tuning is adjusted according to PCB layout.

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>SYMBOL</th>
<th>DIMENSION (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L</td>
<td>8.0 ± 0.20</td>
</tr>
<tr>
<td></td>
<td>W</td>
<td>1.05 ± 0.20</td>
</tr>
<tr>
<td></td>
<td>T</td>
<td>0.80 ± 0.10</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>0.30 ± 0.10</td>
</tr>
</tbody>
</table>

Top View
Antenna on Test Board (FRA thickness 0.8 mm)

Antenna S11 on Test Board
**RADIATION PATTERN**

Radiation pattern and gain were dependent on measurement board design. The specification of VJ5103W240GXCMT antenna was measured based on the PCB size and installation position as shown in the below figure test board.

<table>
<thead>
<tr>
<th>Plane</th>
<th>VERTICAL</th>
<th>HORIZONTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y - Z</td>
<td>Peak Gain = 3.03 dBi, Average Gain = 0.71 dBi</td>
<td>Peak Gain = -1.37 dBi, Average Gain = -8.6 dBi</td>
</tr>
<tr>
<td></td>
<td>Average Gain = 1.19 dBi</td>
<td></td>
</tr>
<tr>
<td>X - Z</td>
<td>Peak Gain = -3.76 dBi, Average Gain = -8.72 dBi</td>
<td>Peak Gain = 0.25 dBi, Average Gain = -4.24 dBi</td>
</tr>
<tr>
<td></td>
<td>Average Gain = -2.91 dBi</td>
<td></td>
</tr>
<tr>
<td>X - Y</td>
<td>Peak Gain = -0.76 dBi, Average Gain = -5.81 dBi</td>
<td>Peak Gain = 1.37 dBi, Average Gain = -2.67 dBi</td>
</tr>
<tr>
<td></td>
<td>Average Gain = -0.95 dBi</td>
<td></td>
</tr>
</tbody>
</table>
SOLDERING CONDITION

Typical examples of soldering processes that provide reliable joints without any damage are given in figure 2.
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