Surface Mount Ceramic Chip Antennas for 2.4 GHz

VJ5106W240GXCMT chip antenna
The VJ5106W240 series are small form-factor, high-performance chip-antennas designed to be used in wireless, bluetooth and ISM band 2.4 GHz. The VJ5106W240 series present an excellent performance (max. gain 2 dBi) with a low profile needed in most Wireless applications.

DESCRIPTION
The VJ5106W240GXCMT 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.

FEATURES
- Ultra small outline (3.1 mm x 1.6 mm x 0.6 mm)
- 50 \( \Omega \) 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

APPLICATIONS
- Bluetooth
- Wireless LAN
- ISM band 2.4 GHz wireless applications
- Home WF wireless

ELECTRICAL SPECIFICATIONS
Operating temperature: -40 °C to +85 °C
Frequency range (transmission / reception): 2450 MHz \( \pm 50 \) MHz

Note
- Electrical characteristics at +25 °C unless otherwise specified.

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>VJ5106W240GXCMT</td>
<td>2450</td>
<td>+ 3.1</td>
<td>- 0.50</td>
<td>100</td>
<td>240</td>
</tr>
</tbody>
</table>

CHIP ANTENNA PERFORMANCE

<table>
<thead>
<tr>
<th>NOMINAL FREQUENCY (MHz)</th>
<th>NOMINAL IMPEDANCE (( \Omega ))</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 REFLECTED POWER LOSS</th>
<th>-3 dB BANDWIDTH 2.45 GHz</th>
<th>-10 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>- 0.50</td>
<td>+ 3.1</td>
<td>&lt; - 15 dB</td>
<td>&lt; - 4 %</td>
<td>&lt; - 3 dB</td>
<td>&lt; 0.14 dB</td>
<td>240</td>
<td>50 %</td>
<td>100</td>
</tr>
</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><img src="image" alt="Figure" /></td>
<td>L</td>
<td>3.10 ± 0.20</td>
</tr>
<tr>
<td></td>
<td>W</td>
<td>1.60 ± 0.20</td>
</tr>
<tr>
<td></td>
<td>T</td>
<td>0.60 ± 0.10</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>0.25 ± 0.10</td>
</tr>
</tbody>
</table>

The minimum size for VJ5106W240 is L > 30 mm and D > 6 mm.
Antenna on Test Board (thickness 0.8 mm)

Antenna S11 on Test Board

Antenna VSWR on Test Board
**RADIATION PATTERN**

Radiation pattern and gain were dependent on measurement board design. The specification of VJ5106W240GXCMT 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>Peak Gain</th>
<th>Average Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Y - Z</strong></td>
<td>3.14 dBi</td>
<td>0.05 dBi</td>
</tr>
<tr>
<td><strong>X - Z</strong></td>
<td>-2.29 dBi</td>
<td>-7.03 dBi</td>
</tr>
<tr>
<td><strong>X - Y</strong></td>
<td>-7.02 dBi</td>
<td>-11.95 dBi</td>
</tr>
</tbody>
</table>

**VERTICAL**

![Y-Z Plane Radiation Pattern](image)

**HORIZONTAL**

![X-Z Plane Radiation Pattern](image)

![X-Y Plane Radiation Pattern](image)

Average Gain = 0.795 dBi

Peak Gain = 3.14 dBi, Average Gain = 0.05 dBi

Peak Gain = -0.35 dBi, Average Gain = -7.23 dBi

Average Gain = -1.51 dBi

Peak Gain = -2.29 dBi, Average Gain = -7.03 dBi

Peak Gain = 1.08 dBi, Average Gain = -2.94 dBi

Average Gain = -1.05 dBi

Peak Gain = -7.02 dBi, Average Gain = -11.95 dBi

Peak Gain = 3.32 dBi, Average Gain = -1.42 dBi
SOLDERING CONDITION

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

PACKAGING

PLASTIC TAPE SPECIFICATIONS (Dimensions in mm)

<table>
<thead>
<tr>
<th>Ao</th>
<th>Bo</th>
<th>ØD</th>
<th>T</th>
<th>W</th>
<th>E</th>
<th>F</th>
<th>P₀</th>
<th>P₁</th>
<th>P₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.95 ± 0.10</td>
<td>3.45 ± 0.10</td>
<td>1.55 ± 0.05</td>
<td>1.30 ± 0.10</td>
<td>8.20 ± 0.10 - 0.30</td>
<td>1.75 ± 0.10</td>
<td>3.50 ± 0.05</td>
<td>4.00 ± 0.10</td>
<td>4.00 ± 0.10</td>
<td>2.00 ± 0.10</td>
</tr>
</tbody>
</table>

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>VISHAY MATERIAL</th>
<th>PACKAGING QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>VJ5106W240GXCMT</td>
<td>2000 pieces</td>
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</tbody>
</table>
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