

## Surface Mount Ceramic Chip Antennas for 2.4 GHz



**VJ5104W240GXCMT chip antenna**

The VJ5104W240 series are small form-factor, high-performance chip-antennas designed to be used in wireless, bluetooth and ISM band 2.4 GHz.

The VJ5104W240 series present an excellent performance (max. gain 2.1 dBi) with a low profile needed in most wireless applications.

### DESCRIPTION

The VJ5104W240GXCMT 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

- Small outline (5.2 mm x 2.0 mm x 1.1 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](http://www.vishay.com/doc?99912)

**RoHS**  
COMPLIANT

### APPLICATIONS

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

### 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

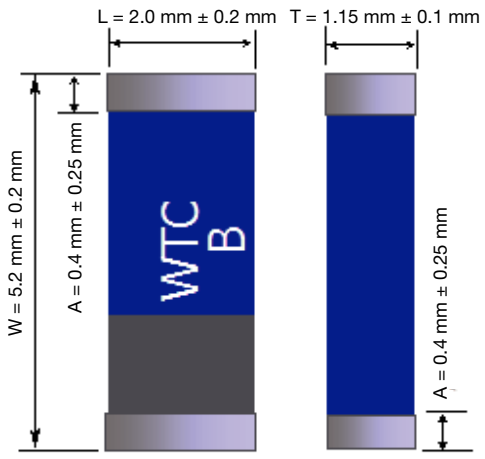
| SERIES          | FREQUENCY (MHz) | MAX. GAIN (dBi) | AVERAGE GAIN (dBi) | BANDWIDTH (- 10 dB) (MHz) | BANDWIDTH (- 3 dB) (MHz) |
|-----------------|-----------------|-----------------|--------------------|---------------------------|--------------------------|
| VJ5104W240GXCMT | 2450            | + 2.1           | - 0.80             | 180                       | 480                      |

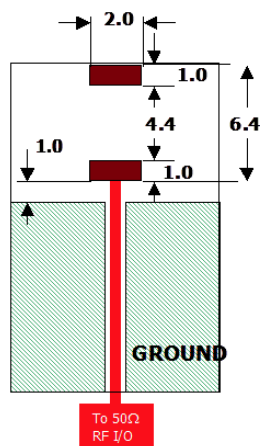
### CHIP ANTENNA PERFORMANCE

| NOMINAL FREQUENCY (MHz) | NOMINAL IMPEDANCE ( $\Omega$ ) | 2.45 GHz PEAK GAIN (dBi) | 2.45 GHz AVERAGE GAIN (dBi) | 2.45 GHz REFLECTED POWER LOSS | 2.45 GHz INSERTION POWER LOSS | - 3 dB BANDWIDTH 2.45 GHz | - 3 dB REFLECTED POWER LOSS | - 10 dB BANDWIDTH 2.45 GHz | - 10 dB REFLECTED POWER LOSS |
|-------------------------|--------------------------------|--------------------------|-----------------------------|-------------------------------|-------------------------------|---------------------------|-----------------------------|----------------------------|------------------------------|
| 2450                    | 50                             | - 0.80                   | + 2.1                       | < - 15 dB                     | < 4 %                         | 480                       | 50 %                        | 180                        | 10 %                         |
|                         |                                |                          |                             | < 3.2 %                       | < 0.14 dB                     |                           | 3 dB                        |                            | 0.46 dB                      |

# **FOOTPRINT, MECHANICAL, AND PCB DIMENSIONS**

The antenna footprint and mechanical dimensions are presented in figure 7. Optimal tuning is adjusted according to PCB layout.

| FIGURE                                                                            | SYMBOL | DIMENSION (mm)  |
|-----------------------------------------------------------------------------------|--------|-----------------|
|  | L      | $2.0 \pm 0.20$  |
|                                                                                   | W      | $5.2 \pm 0.20$  |
|                                                                                   | T      | $1.15 \pm 0.10$ |
|                                                                                   | A      | $0.40 \pm 0.25$ |



Unit : mm



Soldering Pad

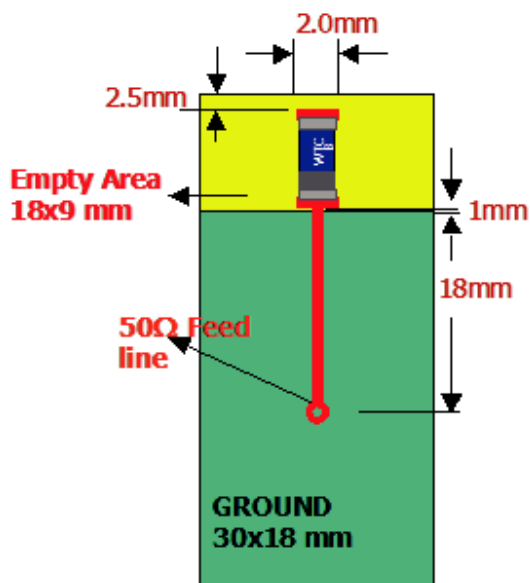


Ground

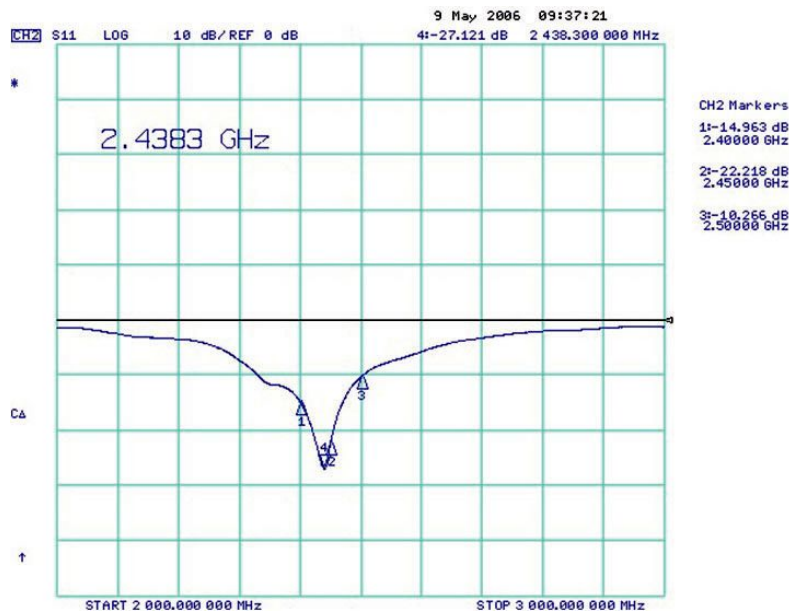


50 Ω Transmission Line

Top View



Antenna on Test Board (FRA4 thickness 0.8 mm)

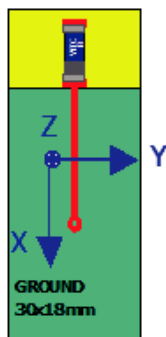


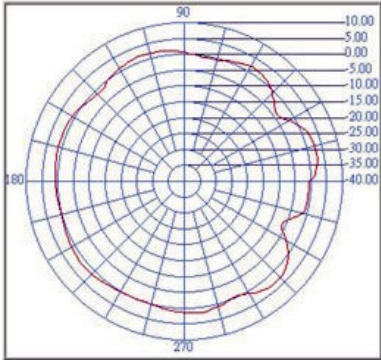
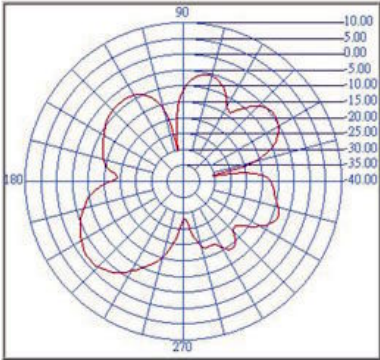
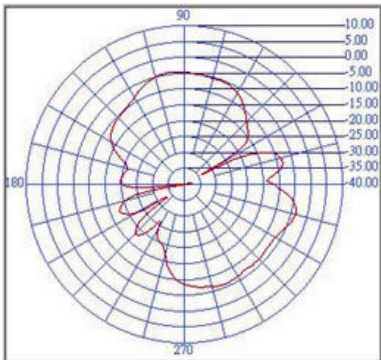
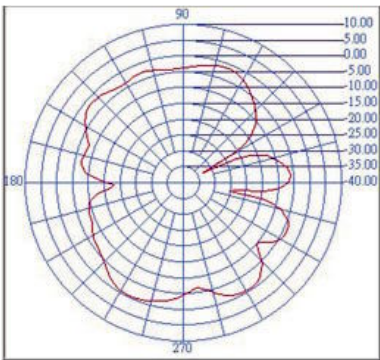
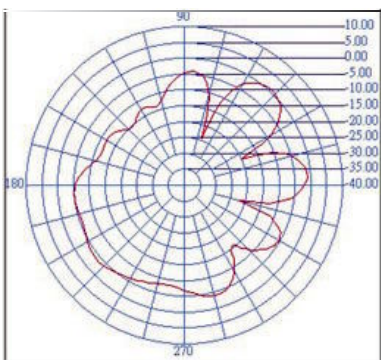
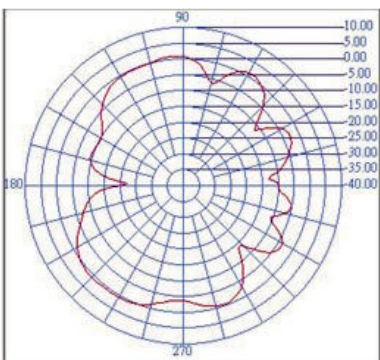
Antenna S11 on Test Board



## RADIATION PATTERN

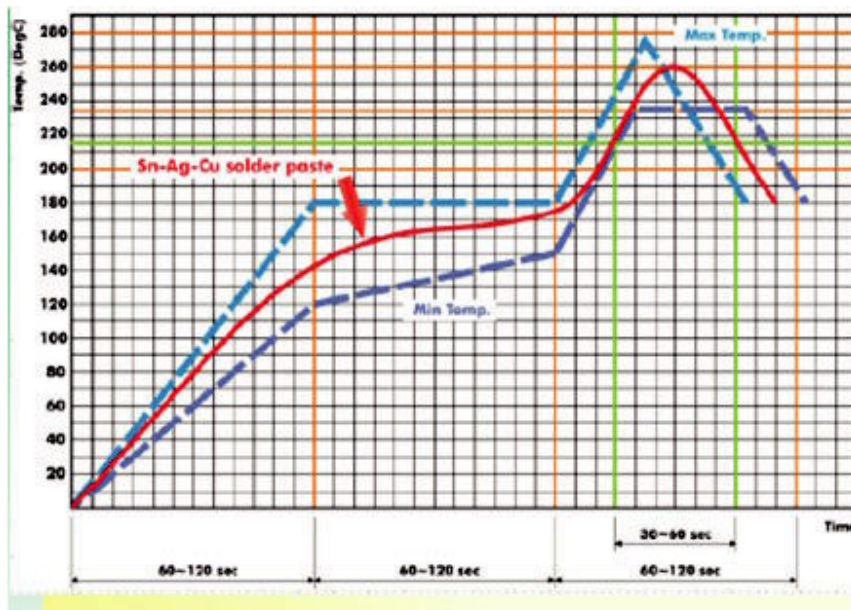
Radiation pattern and gain were dependent on measurement board design. The specification of VJ5104W240GXCMT antenna was measured based on the PCB size and installation position as shown in the below figure test board.



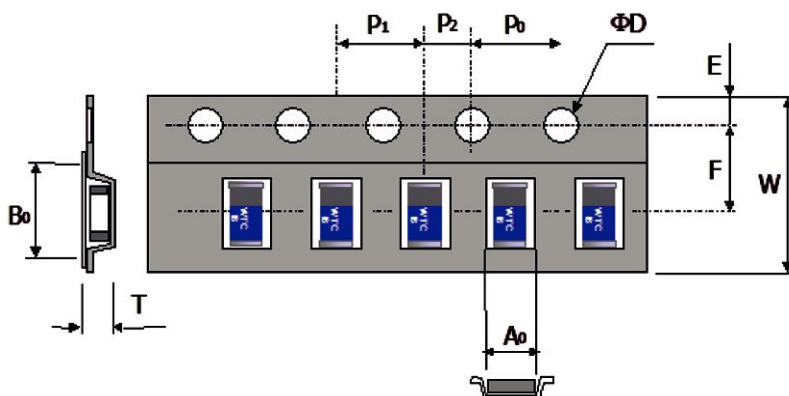
|                                                 | VERTICAL                                                                                                                                  | HORIZONTAL                                                                                                                               |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Y - Z<br>Plane<br><br>Average Gain = 1.19 dBi   | Peak Gain = 3.03 dBi, Average Gain = 0.71 dBi<br>       | Peak Gain = - 1.37 dBi, Average Gain = - 8.6 dBi<br> |
| X - Z<br>Plane<br><br>Average Gain = - 2.91 dBi | Peak Gain = - 3.76 dBi, Average Gain = - 11.97 dBi<br> | Peak Gain = 0.25 dBi, Average Gain = - 4.24 dBi<br> |
| X - Y<br>Plane<br><br>Average Gain = - 0.95 dBi | Peak Gain = - 0.76 dBi, Average Gain = - 5.81 dBi<br>  | Peak Gain = 1.37 dBi, Average Gain = - 2.67 dBi<br> |

## 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) |                |             |             |             |             |             |                |                |                |
|------------------------------------------------|----------------|-------------|-------------|-------------|-------------|-------------|----------------|----------------|----------------|
| A <sub>0</sub>                                 | B <sub>0</sub> | ØD          | T           | W           | E           | F           | P <sub>0</sub> | P <sub>1</sub> | P <sub>2</sub> |
| 1.20 ± 0.10                                    | 8.20 ± 0.10    | 1.50 ± 0.10 | 1.00 ± 0.10 | 16.0 ± 0.10 | 1.75 ± 0.10 | 7.50 ± 0.10 | 4.00 ± 0.05    | 4.00 ± 0.10    | 2.00 ± 0.05    |

| ORDERING INFORMATION    | VISHAY MATERIAL | PACKAGING QUANTITY |
|-------------------------|-----------------|--------------------|
| VJ5104W240 Chip Antenna | VJ5104W240GXCMT | 2000 pieces        |



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