Surface Mount Ceramic Chip Antennas for 915 MHz

RoHS COMPLIANT

VJ5601M915MXBSR chip antenna product

Vishay™ VJ5601M915MXBSR chip antennas are covered by one or more of the following patents:

WO2008250262 (A1), US2008303720 (A1), US2008305750 (A1), WO2008154173 (A1).

Other patents are pending.

ELECTRICAL SPECIFICATIONS[2]

Operating Temperature: -40 °C to + 85 °C
Frequency Range (Transmission/Reception): 835 to 995 MHz

DESCRIPTION

The VJ5601M915MXBSR ceramic chip antenna is a small form-factor, high-performance, chip-antenna designed for operation at 915 MHz. 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.

The VJ5601M915 is the latest in a family of products developed by Vishay™, a world leader in manufacturing of discrete and passive components.

The VJ5601M915 series are small form-factor, high-performance chip-antennas optimized for medical, remote sensing, industrial, security, and RFID applications.

Utilizing unique Vishay™ materials and manufacturing technologies, these products when properly tuned also comply with the MBRAI standard for portable communication.

Features

- Small outline (15.5 mm x 10.5 mm x 1.2 mm)
- 50Ω unbalanced tuning interface (max. 1.73 dBi gain[1])
- Assembled onto a PCB in the standard reflow process
- 160 MHz half-power tuned bandwidth (835 to 995 MHz)
- High-reliability ceramic-oxide body construction
- Low-RF-loss, high-Q ceramic
- Lead (Pb)-free / wet build process
- Reliable Noble Metal Electrode (NME) system
- Compliant to RoHS Directive 2002/95/EC
- Halogen-free per IEC 61249-2-21
- Wide operating temperature range (-40 °C to + 85 °C)

Applications

- Medical telemetry (internal / external)
- Remote sensing and control
- Industrial automation and telemetry
- Security systems, home automation
- Long range RFID

QUICK REFERENCE DATA

SERIES	FREQUENCY (MHz)	MAX. GAIN (dBi)	AVERAGE GAIN (dBi)	BANDWIDTH (- 10 dB) (MHz)	BANDWIDTH (- 3 dB) (MHz)
VJ5601M915MXBSR	915	1.73	-2.73	41	160

CHIP ANTENNA PERFORMANCE

NOMINAL FREQUENCY (MHz)	NOMINAL IMPEDANCE (Ω)	916 MHZ AVERAGE GAIN (dBi)	915 MHZ PEAK GAIN (dBi)	REFLECTED POWER COEFFICIENT S11	915 MHZ REFLECTED POWER LOSS	- 3 dB BANDWIDTH 835 MHz to 995 MHz	- 3 dB REFLECTED POWER LOSS	- 10 dB BANDWIDTH 894 MHz to 937 MHz	- 10 dB REFLECTED POWER LOSS
915	50	-2.73	1.73	< -32 dB	0.6 %	160	50 %	41	10 %
				0.6 %	< 0.003 dB		3 dB		0.46 dB

Table 1 of quick reference data and chip antenna performance

[1] See Figures 1 through 6 for more details on the radiation pattern (antenna gain) at 915 MHz; the PCB board ground is shorted to earth ground for tuning.
[2] Electrical characteristics at +25 °C unless otherwise specified. Antenna performance is measured at 915 MHz and 50 Ohm impedance unless otherwise specified. The best results are obtained by mounting the chip following the layout guidelines application note for the evaluation kit.

VJ5601M915MXBSR Tuning

Final tuning configuration and component values for L_1, L_2, and C_1 depend on customer PCB layout. Optimal tuning is possible with just a few standard components. **The nominal values shown are for a tuned VJ5601M915MXBEK kit.**

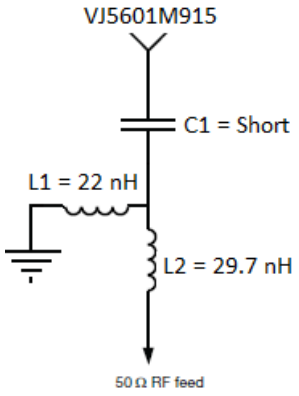


Figure 1 Tuning example with inductors L_1 , L_2 and capacitor C_1

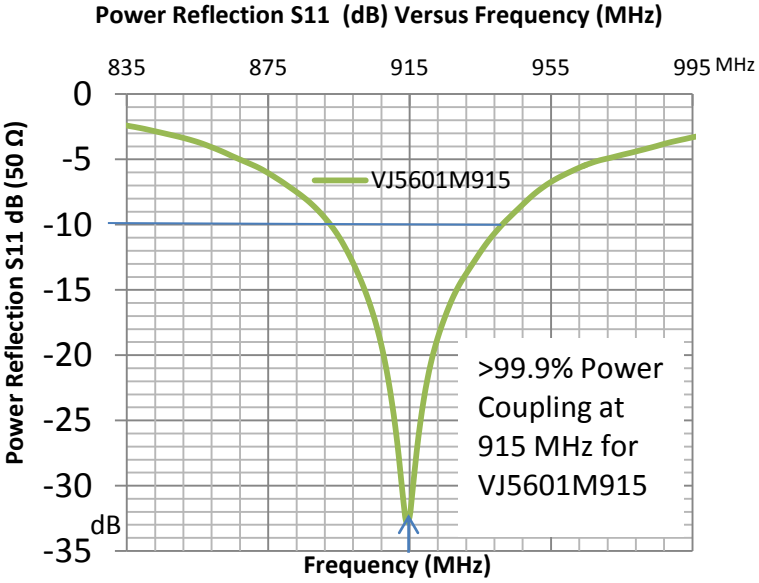
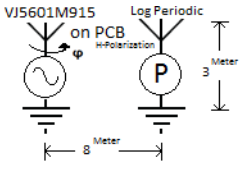


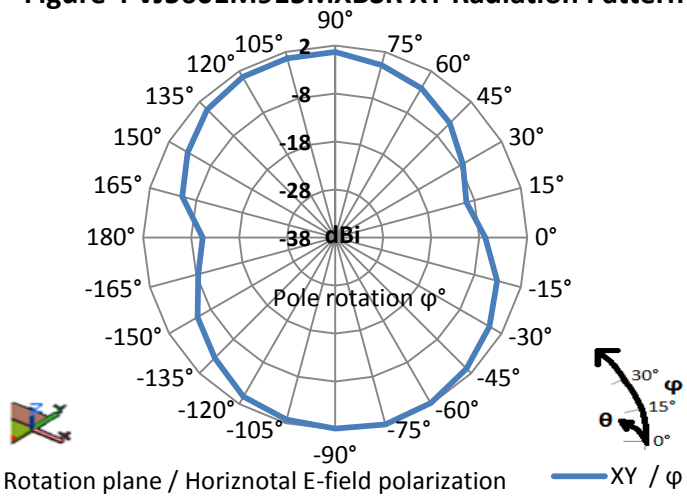
Figure 2 VJ5601M915 tuned to 915 MHz with >99.9% power coupled



Rotation Plane	φ = 0° Receiver Direction
XY	Y-axis
YZ	Z-axis
XZ	Z-axis
The radiation patterns reference the elevation θ that is perpendicular to the azimuth pole rotation in φ.	

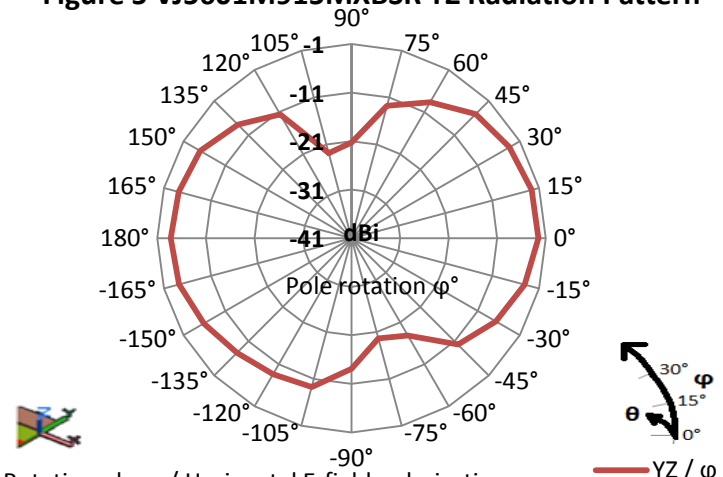
Figure 3 VJ5601M915 PCB mounting and coordinate directions

Figure 4 VJ5601M915MXBSR XY Radiation Pattern



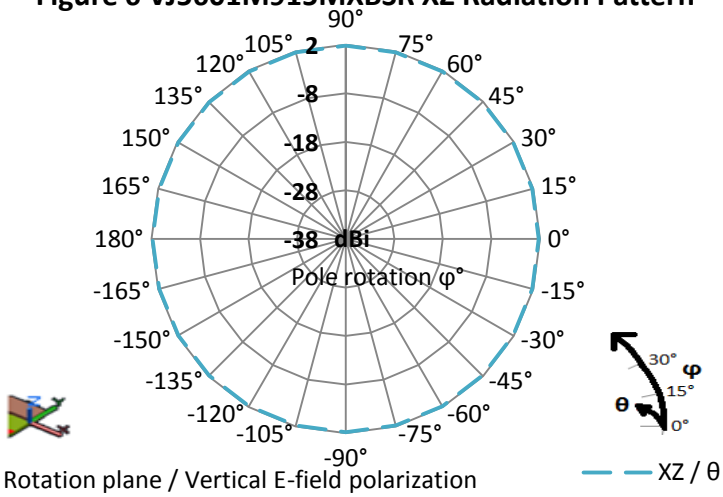
Rotation plane / Horiznotal E-field polarization

Figure 5 VJ5601M915MXBSR YZ Radiation Pattern



Rotation plane / Horizontal E-field polarization

Figure 6 VJ5601M915MXBSR XZ Radiation Pattern



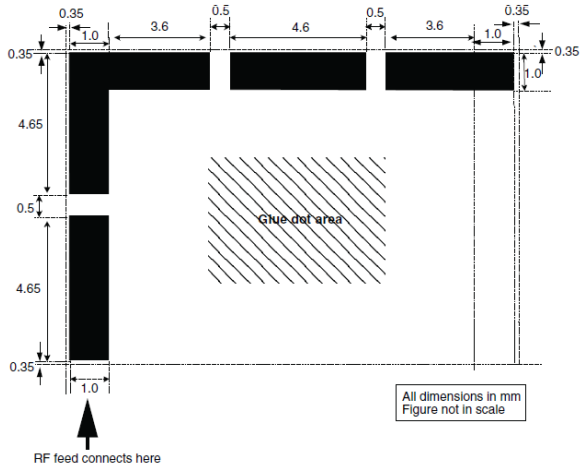
Rotation plane / Vertical E-field polarization

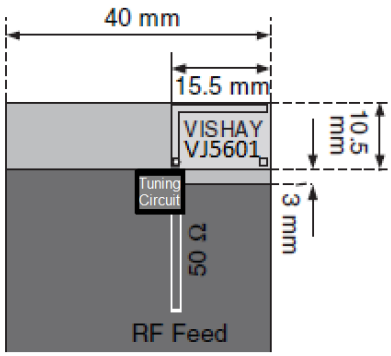
FOOTPRINT, MECHANICAL AND PCB DIMENSIONS

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

For additional mechanical support, it is recommended to add one drop of heat curing epoxy glue.

- The glue dot should not overlap with any of the soldering pads.
- Apply the glue dot at the center of the antenna.
- The glue dot area secures the chip firmly to the PCB.





DIMENSIONS	(mm)
Length	15.5 +/- 0.5
Width	10.5 +/- 0.5
Height	1.2 +/- 0.1

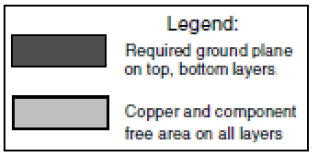


Figure 7 of VJ5601M915 footprint, chip antenna mechanical dimensions, and PCB layout dimensions

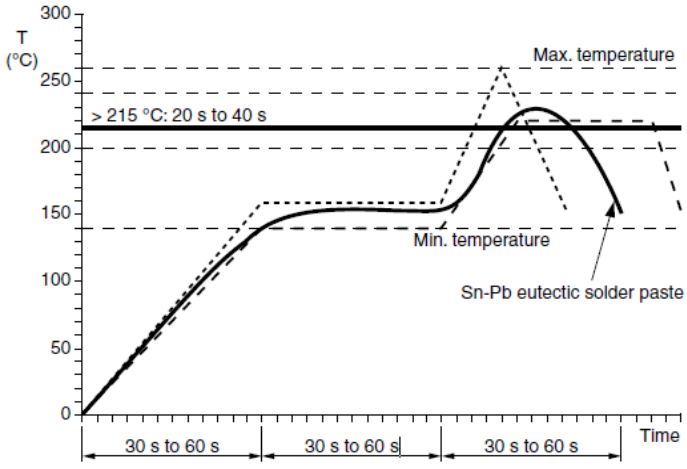


Figure 8 Soldering IR Reflow with SnPb Solder

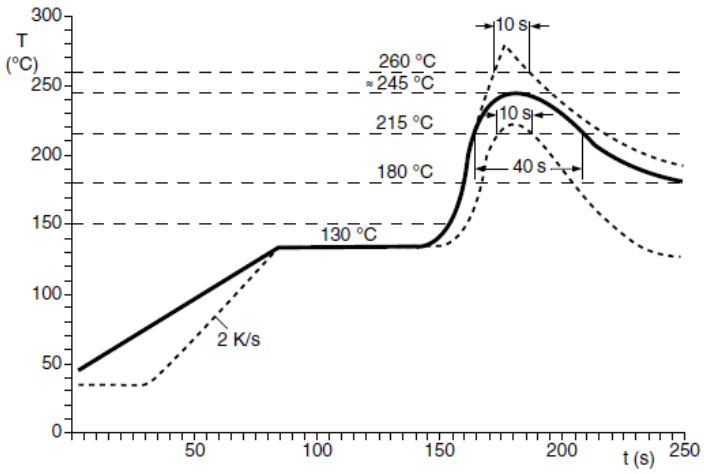


Figure 9 Soldering Reflow with Sn Solder

VJ5601M915 ASSEMBLY GUIDELINES

1. Mounting of antennas on a printed circuit board should be done by reflow soldering using the profiles shown (Figures 8, 9, and 10).

2. In order to provide the adequate strength between the antenna and the PCB apply of a dot of heat cured epoxy glue in the center of the footprint of the antenna prior to soldering the antenna to the board. An example for such glue is Heraeus PD 860002 SA. The weight of the dot should be 5 mg to10 mg.

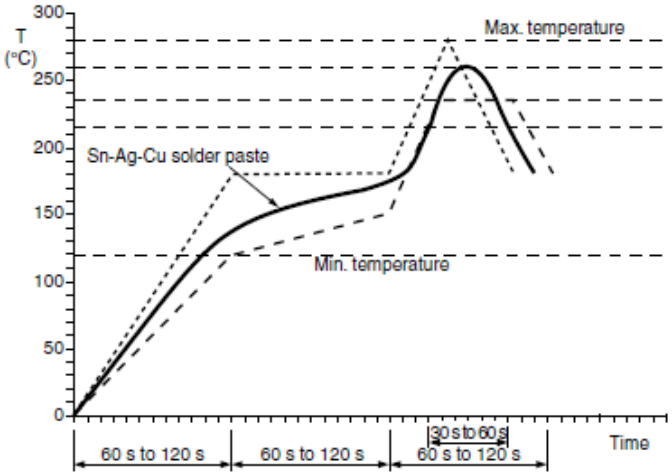


Figure 10 Soldering IR Reflow with SnAgCu Solder

ORDERING INFORMATION	VISHAY MATERIAL	PACKAGING QUANTITY
VJ5601M915 Chip Antenna	VJ5601M915MXBSR	1000 pieces
VJ5601M915 Evaluation Kit[3]	VJ5601M915MXBEK	1 kit

[3] The VJ5601M915 Kit is available for evaluation. For samples, please contact mlcc-samples@vishay.com .

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