Surface Mount Ceramic Chip Antennas for 868 MHz

VJ5601M868MXBSR chip antenna product

Vishay VJ5601M868MXBSR chip antennas are covered by one or more of the following patents:

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

Other patents are pending.

DESCRIPTION

The VJ5601M868MXBSR ceramic chip antenna is a small form-factor, high-performance, chip-antenna designed for operation at 868 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 VJ5601M868 is the latest in a family of products developed by Vishay, a world leader in manufacturing of discrete and passive components.

The VJ5601M868 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

Pb-free

RoHS COMPLIANT

HALOGEN FREE

- Small outline (15.5 mm x 10.5 mm x 1.2 mm)
- 50 Ω unbalanced tuning interface (max. 1.73 dBi gain [1])
- Assembled onto a PCB in the standard reflow process
- 140 MHz half-power tuned bandwidth (800 to 940 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
- Wide operating temperature range (- 40 °C to + 85 °C)
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Note

(1) See figures 1 through 6 for more details on the radiation pattern (antenna gain) at 868 MHz; the PCB board ground is shorted to earth ground for tuning.

APPLICATIONS

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

ELECTRICAL SPECIFICATIONS

Operating temperature: - 40 °C to + 85 °C

Frequency range (transmission/reception): 800 MHz to 940 MHz

Note

- Electrical characteristics at + 25 °C unless otherwise specified. Antenna performance is measured at 868 MHz and 50 Ω impedance unless otherwise specified. The best results are obtained by mounting the chip following the layout guidelines application note for the evaluation kit.

QUICK REFERENCE DATA

SERIES	FREQUENCY (MHz)	MAX. GAIN (dBi)	AVERAGE GAIN (dBi)	BANDWIDTH (- 10 dB) (MHz)	BANDWIDTH (- 3 dB) (MHz)
VJ5601M868MXBSR	868	3.2	0.2	38	140

CHIP ANTENNA PERFORMANCE

NOMINAL FREQUENCY (MHz)	NOMINAL IMPEDANCE (Ω)	868 MHz AVERAGE GAIN (dBi)	868 MHz PEAK GAIN (dBi)	REFLECTED POWER COEFFICIENT S11	868 MHZ REFLECTED POWER LOSS	- 3 dB BANDWIDTH 800 MHz to 940 MHz (MHz)	- 3 dB REFLECTED POWER LOSS	- 10 dB BANDWIDTH 849 MHz to 887 MHz (MHz)	- 10 dB REFLECTED POWER LOSS
868	50	0.2	3.2	< - 22 dB	0.6 %	140	50 %	38	10 %
				0.6 %	< 0.03 dB		3 dB		0.46 dB

VJ5601M868MXBSR TUNING

Final tuning configuration and component values for L1, L2, and C1 depend on customer PCB layout. Optimal tuning is possible with just a few standard components. The nominal values shown are for a tuned VJ5601M868MXBEK kit.

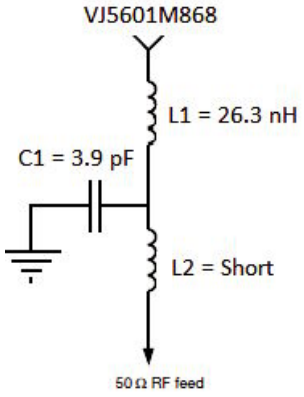


Fig. 1 - Tuning Example with Inductors L1, L2 and Capacitor C1

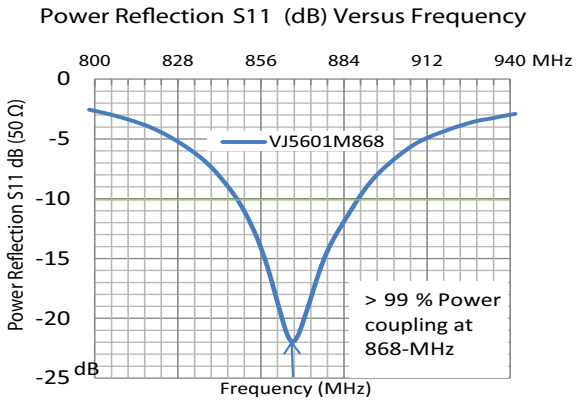
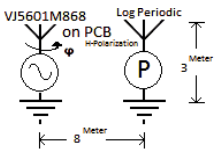


Fig. 2 - VJ5601M868 Tuned to 868 MHz with > 99 % Power Coupled



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.	

Fig. 3 - VJ5601M868 PCB Mounting and Coordinate Directions

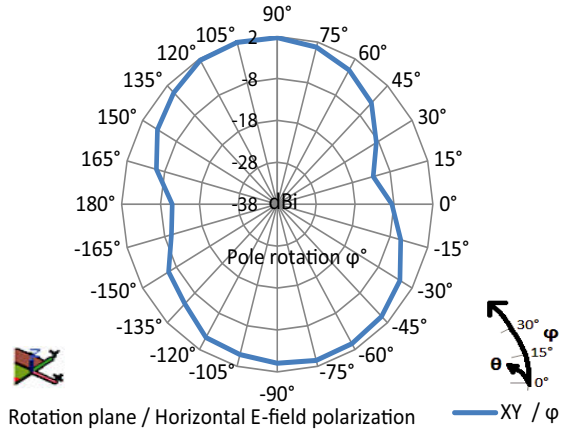


Fig. 4 - VJ5601M868MXBSR XY Radiation Pattern

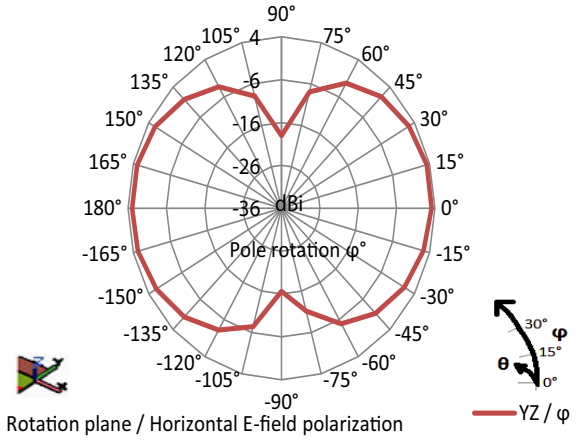


Fig. 5 - VJ5601M868MXBSR YZ Radiation Pattern

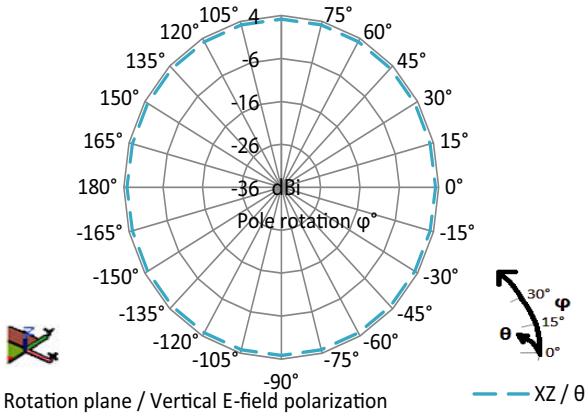


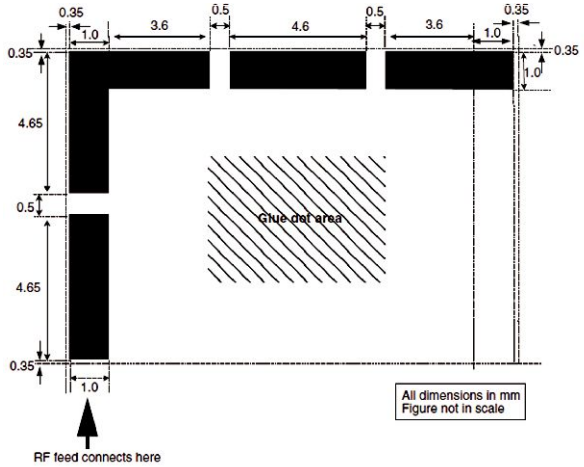
Fig. 6 - VJ5601M868MXBSR XZ Radiation Pattern

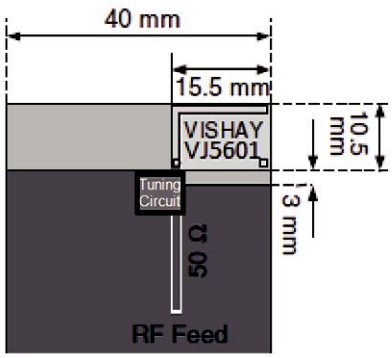
FOOTPRINT, MECHANICAL AND PCB DIMENSIONS

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

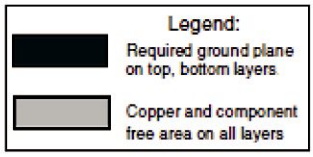


Fig. 7 - Footprint, Chip Antenna Mechanical Dimensions, and PCB Layout Dimensions of VJ5601M868

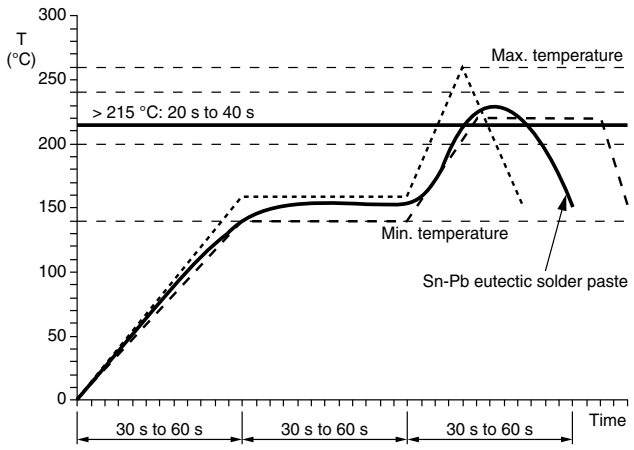


Fig. 8 - Soldering IR Reflow with SnPb Solder

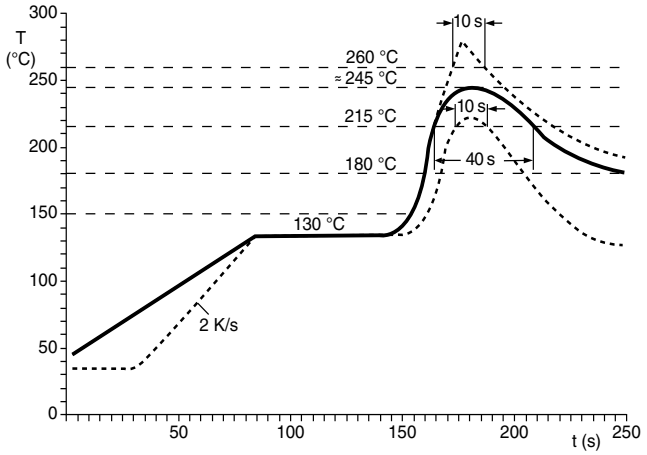


Fig. 9 - Soldering Reflow with Sn Solder

VJ5601M868 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 to 10 mg.

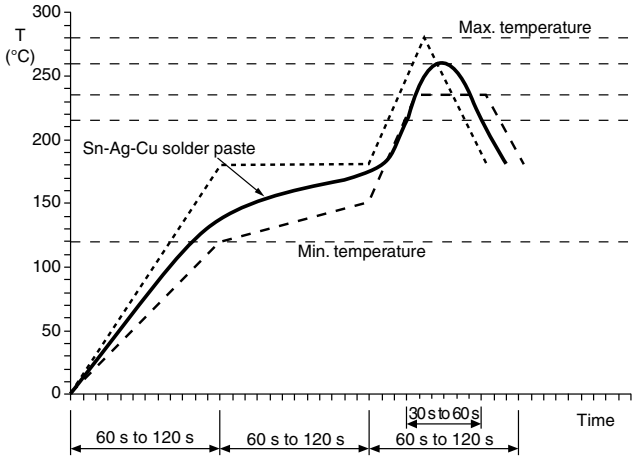


Fig. 10 - Soldering IR Reflow with SnAgCu Solder

ORDERING INFORMATION	VISHAY MATERIAL	PACKAGING QUANTITY
VJ5601M868 Chip Antenna	VJ5601M868MXBSR	1000 pieces
VJ5601M868 Evaluation Kit (1)	VJ5601M868MXBEK	1 kit

Note

(1) The VJ5601M868 kit is available for evaluation. For samples, please contact mlcc-samples@vishay.com.

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