VJ 3505 Layout Design Principles

LAYOUT DESIGN PRINCIPLES FOR VJ 3505 UHF ANTENNA

VJ 3505 is a multilayer ceramic chip antenna designed for receiving mobile digital TV transmissions in the UHF band.

The most challenging target application for the VJ 3505 antenna is the cellular phone. For this reason the following document offers design principles that will allow best performance of the VJ 3505 antenna, while maintaining a form factor suitable for most cellular phone designs.

To help in the design-in process, Vishay offers an antenna evaluation kit designed according to the principles described hereafter. The evaluation kit allows designers to test the antenna performance. The evaluation kit measures 40 mm by 100 mm and includes the following:

- VJ 3505 antenna mounted against a 40 mm by 85 mm ground plane
- Active digital tuning circuit controlled by two input lines allowing full coverage of the UHF band 470 MHz to 860 MHz
- 50 W SMA termination

Applications that allow larger ground planes can enjoy improved antenna efficiency.

We encourage our consumers to take advantage of the technical support offered by Vishay Vitramon division.
For any technical support please contact: mlcc@vishay.com

ANTENNA ENVIRONMENT

General

VJ 3505, like any other antenna, will be affected by any nearby conducting element.

This effect can be helpful, as in the case of the ground plane. However, it can also be harmful.

When the application is being designed, it is crucial to maximize the benefits offered by correct implementation of the ground plane and minimize the potentially harmful effects of other conduction components.

All cellular applications include at least a single antenna designed for the cellular network itself. Because VJ 3505 is similar to most of these antennas, the same design considerations can be applied to both antennas. For this reason we recommend positioning VJ 3505 close to the cellular antenna. By doing so we can achieve the following goals:

- Both antennas will benefit from the same ground plane
- No additional real estate will be required. Both antennas will use the same ground clearance
- Both antennas will enjoy favorable positioning away from the user's hand and other potentially harmful elements such as battery, connectors, buttons etc.
- The cellular antenna can be easily customized to perform well in the presence of VJ 3505
- VJ 3505 will not be significantly affected by the presence of the cellular antenna, provided a minimal gap between it and the neighboring antenna will be kept.

APPLICATION NOTE

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GROUND PLANE CONFIGURATION

VJ 3505 evaluation kit demonstrates exceptional antenna performance achieved with a 40 mm by 80 mm ground plane. Applications that allow an increase in the overall dimensions of the ground plane will enjoy improved efficiency.

Figure 1 describes two recommended reference ground plane configurations.

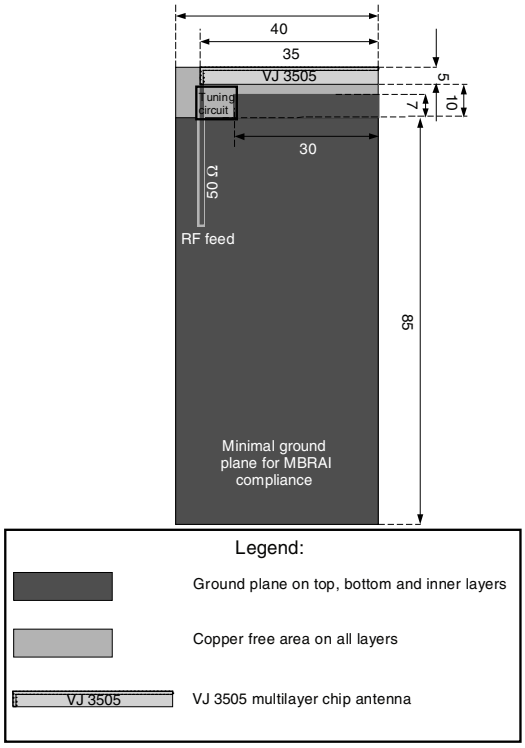

Fig. 1 - Recommended Ground Plane Configurations
all Dimensions in mm

The recommended design describes the minimal area required to allow VJ 3505 to comply with the MBRAI standard. This configuration is used by the VJ 3505 evaluation kit.

Applications that can support ground planes larger than 80 mm will also benefit from improved antenna parameters.

Improved antenna performance can be obtained by increasing the ground clearance. A clearance of 10 mm from the antenna will result in optimal performance.

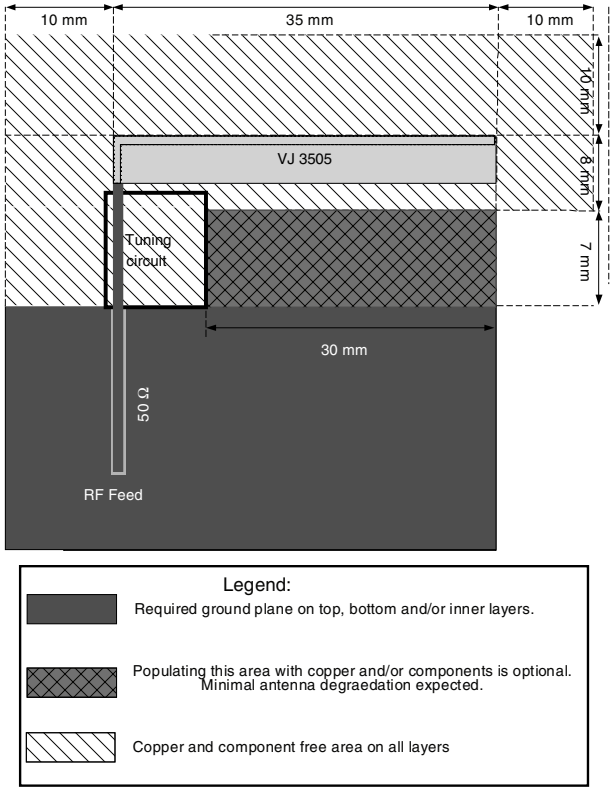

Fig. 2 - Component Free Area Description

The area marked by the crisscross pattern is less sensitive to the presence of conducting bodies than the areas marked by the diagonal pattern. In cases where the ground clearance must be utilized, it is recommended to populate this area with small discrete components. The discrete components should be connected using the thinnest wires possible. Large conducting components such as batteries, connectors or buttons should be avoided.

The areas closest to the antenna, marked by the diagonal pattern, are sensitive to the presence of any conducting body. Violating this clearance might result in antenna detuning or loss of radiation efficiency.

In cases where the antenna clearance is shared by both VJ 3505 and an additional antenna, it is recommended to maintain maximum distance between the antennas. Most cellular antennas are mounted on a plastic carrier and are not soldered directly to the main PCB. In these cases, the plastic carrier can be designed to meet the recommended clearance as described above.

Technical support for antenna integration is provided by Vishay Vitramon division.

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Z AXIS DESIGN PRINCIPLES

The following section deals with the recommended clearance required by VJ 3505 in the Z axis. As in the case of the PCB clearance, the area closest to the antenna is sensitive to the presence of any conducting materials. The following figure provides recommendations for the clearance required in elevation:

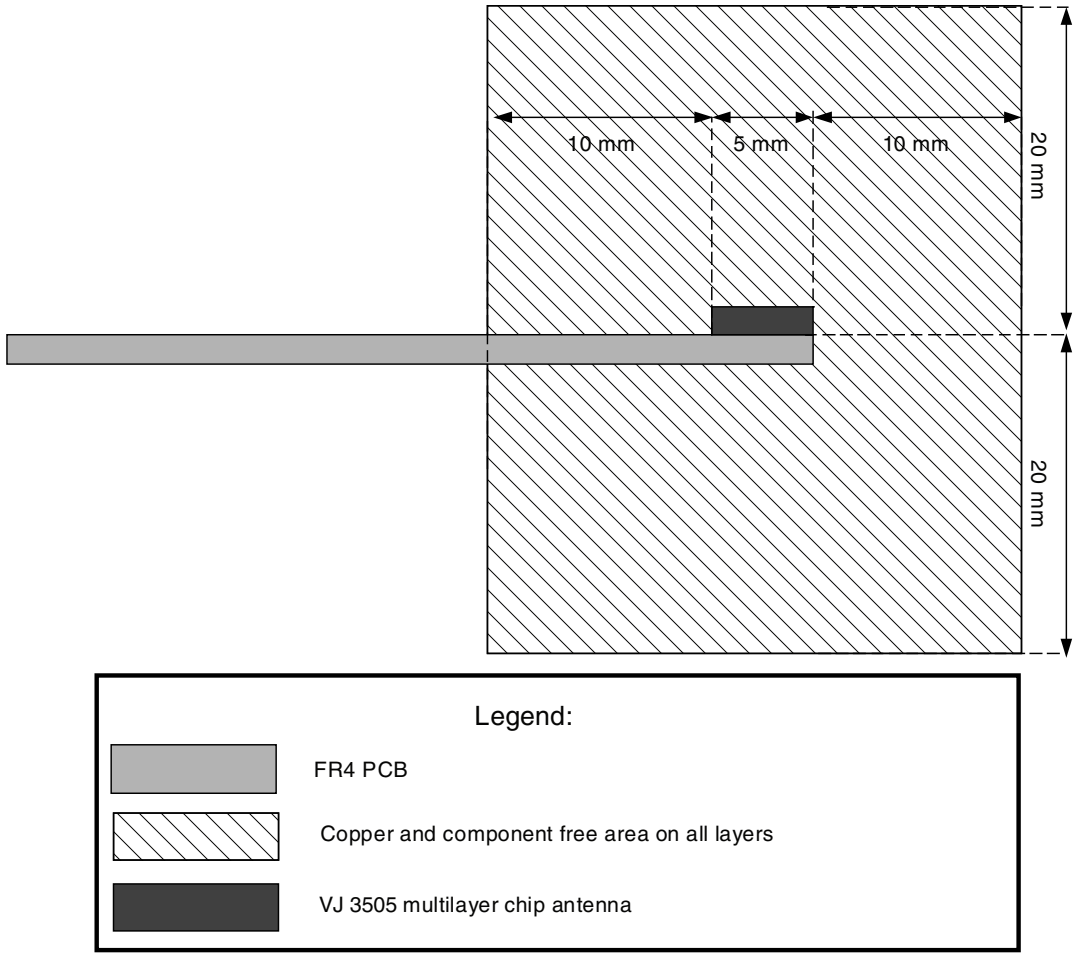

Fig. 3 - Side View of Antenna Assembled on PCB

The company's products are covered by one or more of the following:
WO2008250262 (A1), US2008303720 (A1), US2008305750 (A1), WO2008154173 (A1). Other patents pending.

ORDERING INFORMATION	VISHAY MATERIAL	PACKAGING QUANTITY
VJ 3505	VJ3505M011SXMSRA0	1000 pieces