

Application Note

Transmission Loss Measurements with the iVA Cable & Antenna Analyzer

Part 2: Antenna Isolation Measurements

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Introduction

Part 1 of this Application Note introduced the iVA's Transmission mode of operation, and illustrated how it could be used to perform accurate insertion loss measurements on RF cable assemblies. In Part 2 we shall explore the use of Transmission mode to perform antenna isolation measurements.

Antenna isolation is an important parameter in cellular base stations. Insufficient isolation between neighboring antennas can lead to a host of problems, including elevated noise floor, receiver blocking and loss of multipath immunity.

Isolation problems can be difficult to troubleshoot, as antennas with poor isolation can still have good return loss and low PIM. In fact, the only way to reliably determine the isolation between two antennas is to perform a two-port transmission measurement. The iVA's Transmission mode enables this task to be achieved quickly and accurately for isolations of up to 90 dB.

Equipment Setup

A typical equipment setup for an antenna isolation measurement in Transmission mode is depicted in Figure 1. Two iVAs are paired with the same user device, usually a tablet or laptop computer.¹ It is assumed that the iVAs have been calibrated according to the procedure described in Part 1 of this Application Note, and that a suitable sweep range has been specified. If desired, the user can place limit lines on the screen in order to obtain a pass/fail indication upon completion of a measurement sweep.

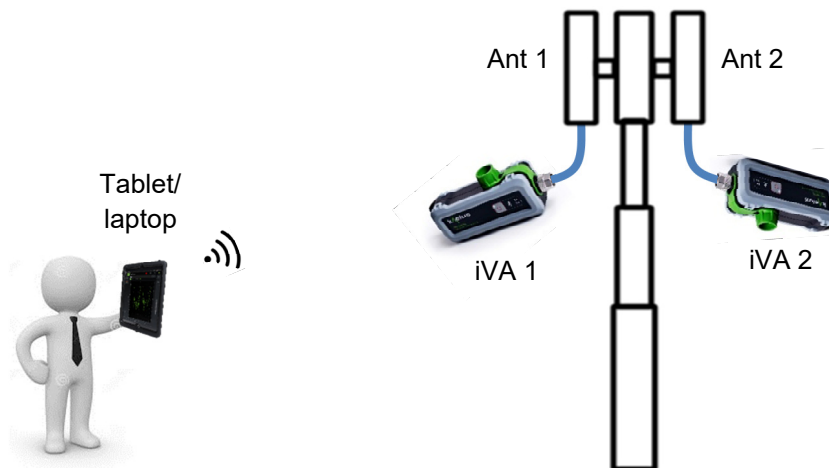


Figure 1. Typical equipment setup for an antenna isolation measurement.

Now connect the iVAs to a pair of antenna ports. The chosen ports can be located on physically separate antenna units, as shown in Figure 1, or they can be on the same antenna unit, as shown in Figure 2. If it is not possible to climb the tower and connect the iVAs directly to the antennas, the iVAs can be connected to the inputs to the antenna feeder cables at ground level.

You are now ready to perform an antenna isolation measurement.

¹ In some environments it may not be possible to maintain a continuous Bluetooth connection to both iVAs, in which case Transmission mode cannot be used. Instead, an alternative approach is recommended involving two tablets and two iVAs operating independently. Refer to Kaelus white paper "Branch Insertion Loss Measurements with the iVA" for details.



Figure 2. Equipment setup for an inter-band isolation test on a multiband sector antenna.

Measure Antenna Isolation

Trigger a measurement sweep in Transmission mode. At each point in the sweep, the iVA software controls the two iVAs in a coordinated fashion, post-processes the measured data, and plots the results on screen.

A typical set of results is presented in Figure 3 for a multiband sector antenna. In this example the inter-band isolation was measured between the antenna’s low-band and high-band ports. Limit lines (shown as shaded green regions on the plot) have been defined in each band, with the pass/fail limits set to 28 dB. The plot has been tagged with a descriptive label as shown, and can be saved as part of the final site report if desired.

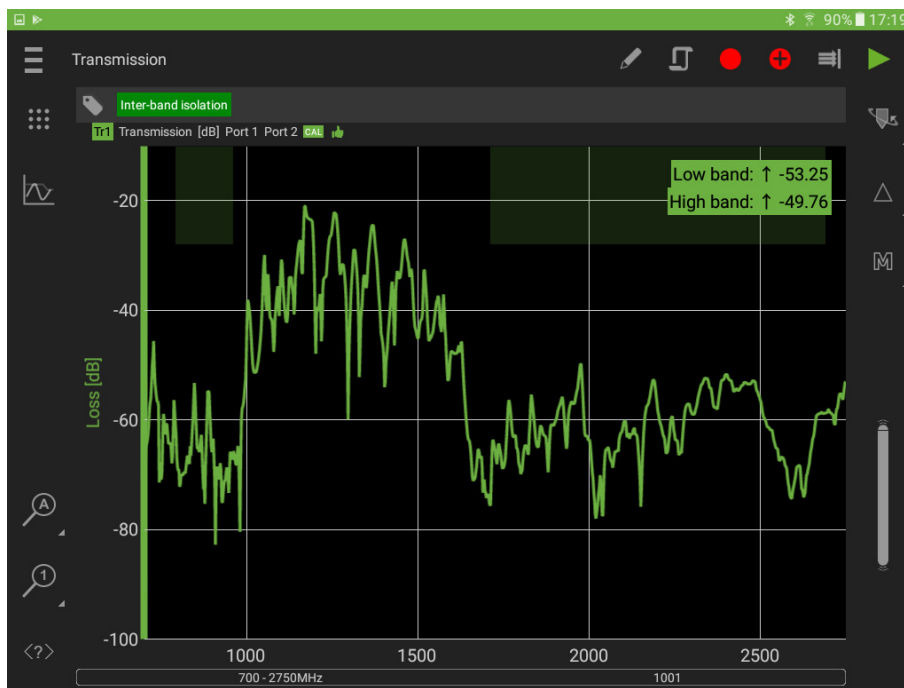


Figure 3. Results of an inter-band isolation measurement on a multiband sector antenna. Labels in top right-hand corner of plot denote worst-case isolation in each band.