| Title | Department | Reg No |
|---|---|---|
| LP902 WLAN check | 331-RF | 0453-0035 |

| Established By | Approved By | Approved Date | Issue |
|---|---|---|---|
| Daniel Skaufel | Daniel Skaufel | 2008-10-17 | 1 |

# 1. Introduction

The functionality of the LP902 antenna at WLAN frequencies has been tested, and is presented in this short report.

# 2. Measurements

## *2.1. General*

Antennas are used to receive signals from distant sources by converting the arriving power density to a current on a transmission line, which connects to a receiver. It works of course the other way around for transmitting.

To entirely evaluate the characteristics of an antenna, there are a numerous amount of measurements needed. Two of the most important measurements are *Radiation Pattern* and Voltage Standing Wave measurements.

### 2.1.1. VSWR

VSWR, Voltage Standing Wave Ratio displays the ratio of reflected versus transformed power. This measurement is conducted to determine that the antenna operates in the correct frequency band and is matched to 50Ω. This test is carried out with a network analyzer.

### 2.1.2. Radiation Pattern measurement

An antenna pattern is a graphical representation of the field magnitude at a fixed distance from an antenna as a function of direction i.e. angular variation of the test antenna's radiation.

## *2.2. Measurement range system description*

The entire measurement range facility consists of the space for the source and test antennas, antenna positioner, transmitting/receiving system and data display/recording equipment. A rotation positioner (turntable) is required to turn the AUT (Antenna Under Test) in the azimuth plane.

| Title | | Department | Reg No |
|---|---|---|---|
| LP902 WLAN check | | 331-RF | 0453-0035 |
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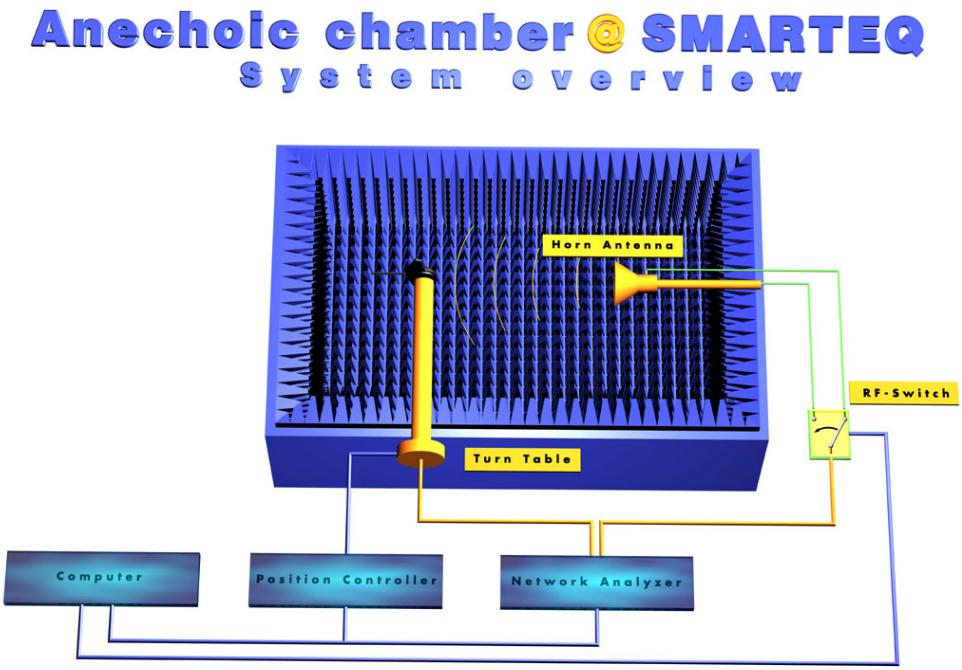
| Daniel Skaufel | Daniel Skaufel | 2008-10-17 | 1 |




## *2.3. Technical description of measurement range*

| | |
|---|---|
| Turntable: | Orbit AL-360-1P15 |
| Position controller: | Orbit AL-4802-3A |
| Network analyzer: | Rohde & Schwarz ZVRE, 9kHz-4GHz |
| Measurement antenna: | Condor AS48410 Quad-ridged Horn antenna |
| Antenna Switch: | Orbit Cased; Mini-Circuit ZASWA-2-50DR |
| Controller software: | MiDAS |
| GPIB-CARD | National Instruments 777073 |
| Digital I/O | National Instruments 777387 |

## *2.4. Measurement set-up*

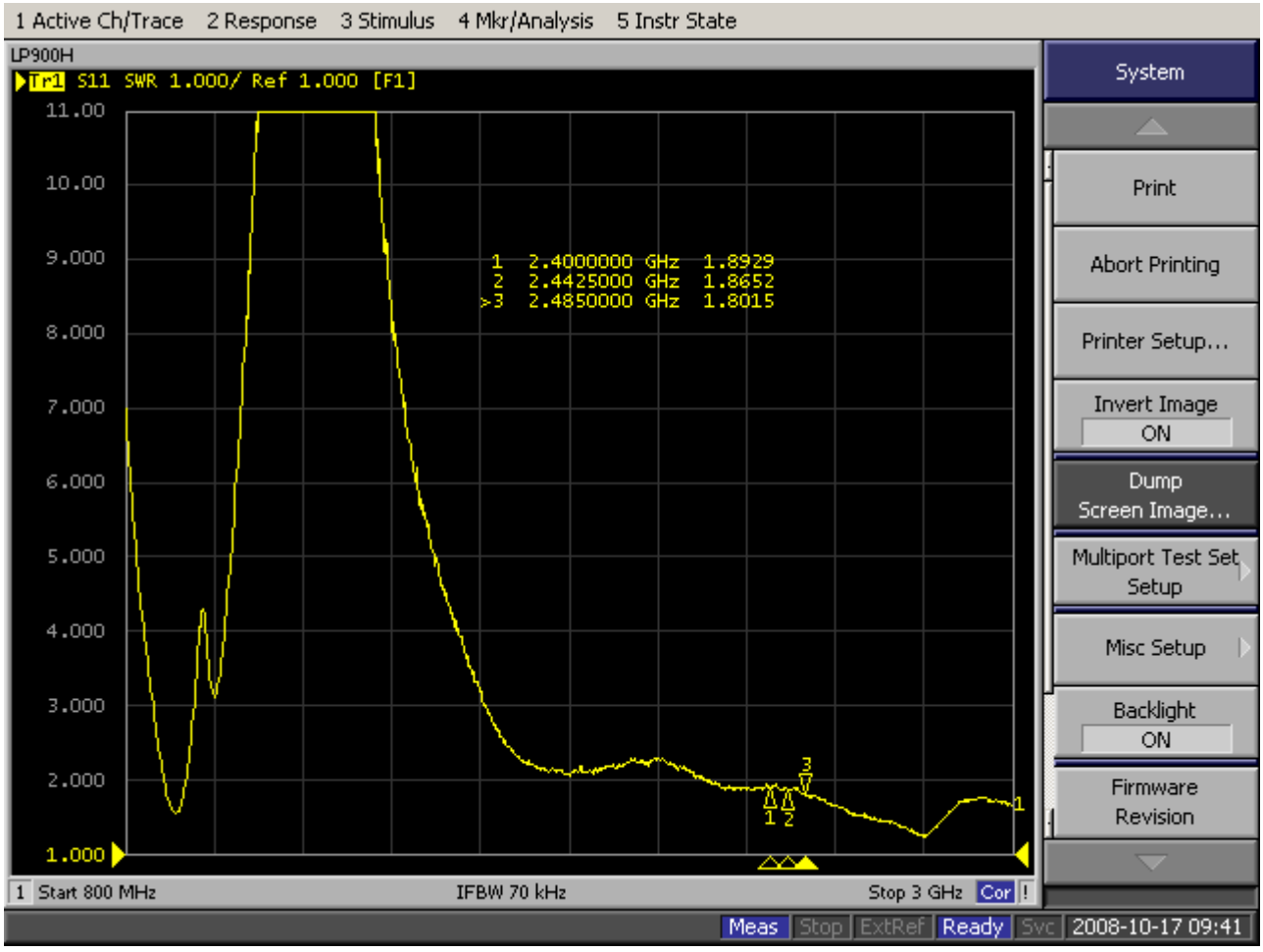
For both VSWR and radiation pattern measurements, the antenna under test is mounted on a 1m ground plane. For radiation measurements, the original cable length of 1m is used, but when measuring VSWR the cable is shortened to approximately 100mm to get a more accurate result.

| Title | Department | Reg No |
|---|---|---|
| LP902 WLAN check | 331-RF | 0453-0035 |

| Established By | Approved By | Approved Date | Issue |
|---|---|---|---|
| Daniel Skaufel | Daniel Skaufel | 2008-10-17 | 1 |

# 3. Results

## *3.1. VSWR*

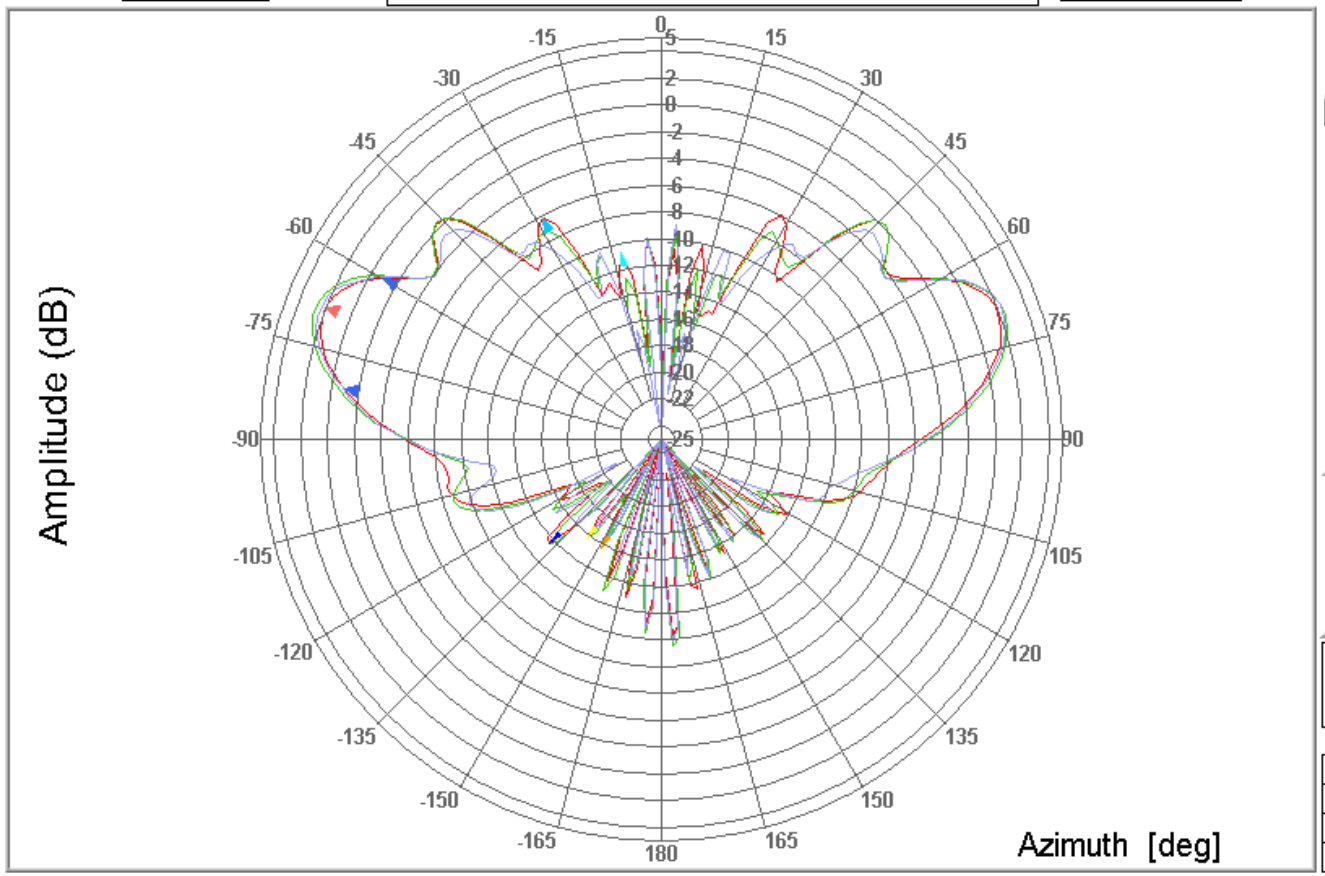


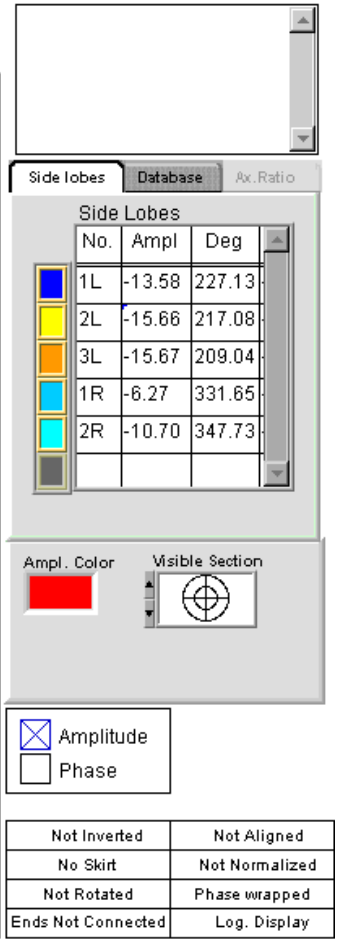

## *3.2. Radiation measurements*

The antenna is measured in two perpendicular elevation cuts. The results are displayed on the following pages.

| Title | Department | Reg No |
|---|---|---|
| LP902 WLAN check | 331-RF | 0453-0035 |

| Established By | Approved By | Approved Date | Issue |
|---|---|---|---|
| Daniel Skaufel | Daniel Skaufel | 2008-10-17 | 1 |




| File Name | [mm] | | Freq. MHz | [mm] | Ch. | Beam | Switch | Beam Peak [dB] Value | [deg] | | Beam Width [deg] Value | At dB | | Null Depth [dB] Value | [deg] | | Avg. | Dir. | Gain | Norm. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| lp900h-wlan-sts-CAL.nff | | | 2400.00 M | 0.00 | CH1 | | HP | 2.02 | 291.45 | P | 21.08 | 3.00 | P | | | | -7.79 | 0.00 | 0.00 | -44.43 |
| lp900h-wlan-sts-CAL.nff | | | 2442.50 M | 0.00 | CH1 | | HP | 2.69 | 291.45 | P | 20.18 | 3.00 | P | | | | -7.58 | 0.00 | 0.00 | -44.70 |
| lp900h-wlan-sts-CAL.nff | | | 2485.00 M | 0.00 | CH1 | | HP | 2.34 | 291.45 | P | 20.40 | 3.00 | P | | | | -8.06 | 0.00 | 0.00 | -44.97 |

| Title | Department | Reg No |
|---|---|---|
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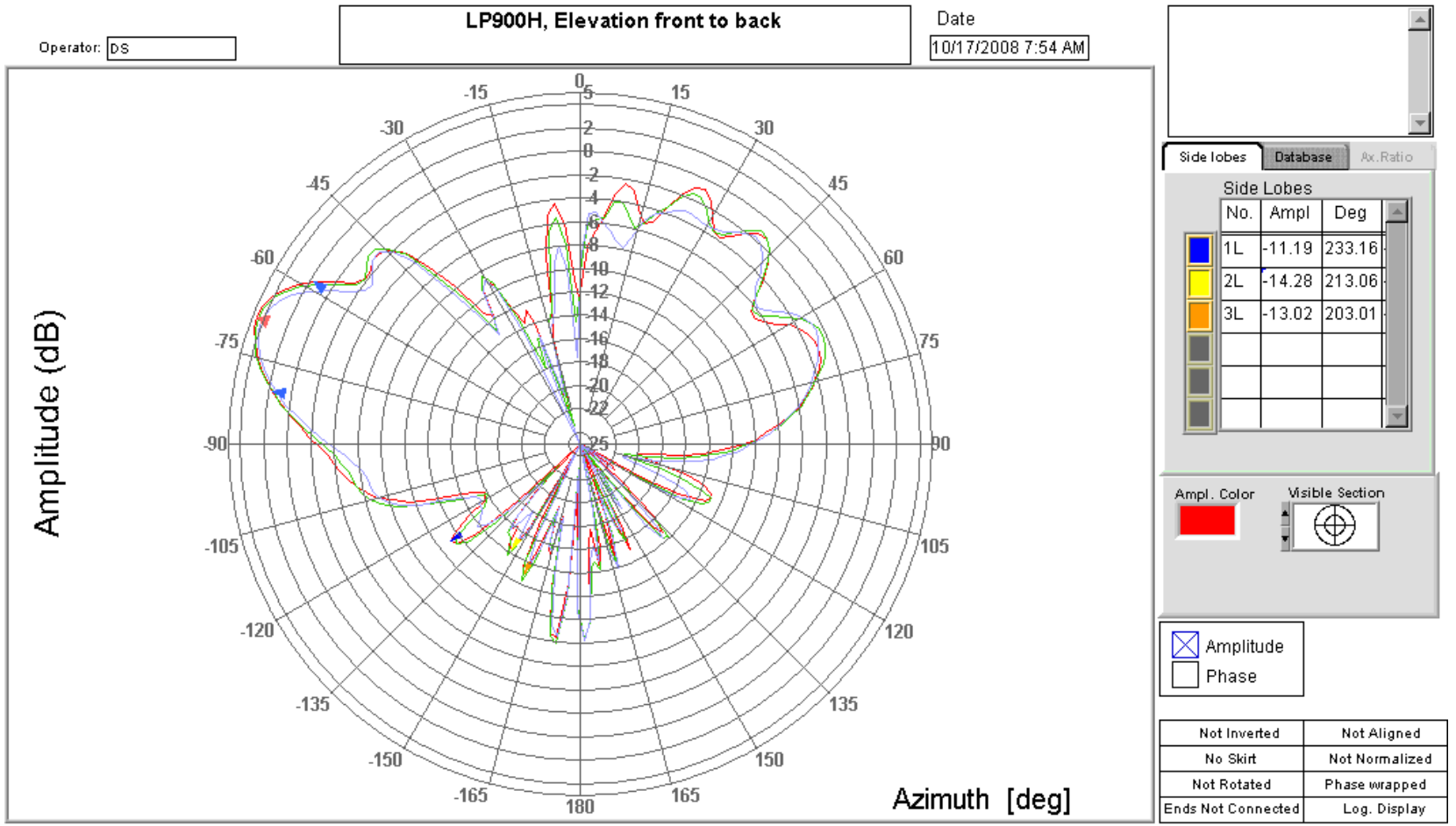
|---|---|---|---|
| Daniel Skaufel | Daniel Skaufel | 2008-10-17 | 1 |




| File Name | [mm] | | Freq. MHz | [mm] | Ch. | Beam | Switch | Beam Peak [dB] Value | [deg] | | Beam Width [deg] Value | At dB | | Null Depth [dB] Value | [deg] | | Avg. | Dir. | Gain | Norm. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| lp900h-wlan-ftb-CAL.nff | | | 2400.00 M | 0.00 | CH1 | | HP | 4.59 | 291.45 | P | 21.46 | 3.00 | P | | | | -6.98 | 0.00 | 0.00 | -44.43 |
| lp900h-wlan-ftb-CAL.nff | | | 2442.50 M | 0.00 | CH1 | | HP | 4.46 | 291.45 | P | 21.60 | 3.00 | P | | | | -7.00 | 0.00 | 0.00 | -44.70 |
| lp900h-wlan-ftb-CAL.nff | | | 2485.00 M | 0.00 | CH1 | | HP | 4.12 | 291.45 | P | 20.60 | 3.00 | P | | | | -7.55 | 0.00 | 0.00 | -44.97 |

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|---|---|---|
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# 4. Conclusion

The measurements show that the antenna performs very well at WLAN frequencies. The VSWR is <2:1 and the gain is approximately 3dBi. Hence, the LP902 antenna could successfully be used in applications using WLAN communication and in need of a robust antenna.