

**DATE: 04 February 2007**

**I.T.L. (PRODUCT TESTING) LTD.**  
**FCC EMC/Radio Test Report**  
**for**  
**SercoNet Ltd.**

**Equipment under test:**

**WirePlus XTN v1.3**

**WPG54X0 v1.3**

Written by:



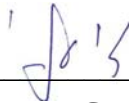
D. Shidlowsky, Documentation

Approved by:



E. Pitt, Test Engineer

Approved by:



I. Raz, EMC Laboratory Manager

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This report relates only to items tested.

## Measurement/Technical Report for SercoNet Ltd.

WirePlus XTN v1.3

WPG54X0 v1.3

FCC ID: QXFWirePlus

04 February 2007

This report concerns: Original Grant ☒ Class II change

Class B verification ☐ Class A verification ☐ Class I change

Equipment type: Radio Transmitter

Request Issue of Grant:

☒ Immediately upon completion of review

Limits used:

CISPR 22 ☐

Part 15 ☒

Measurement procedure used is ANSI C63.4-2003.

Application for Certification

prepared by:

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Applicant for this device:

(different from "prepared by")

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# 1. General Information

## 1.1 Administrative Information

|                                |                                                                                                              |
|--------------------------------|--------------------------------------------------------------------------------------------------------------|
| Manufacturer:                  | SercoNet Ltd.                                                                                                |
| Manufacturer's Address:        | 16 Ha'Haroshet St.<br>P.O.B. 2009<br>Ra'anana, 43657<br>Israel<br>Tel: 972-9-741-1833<br>Fax: 972-9-748-1333 |
| Manufacturer's Representative: | Eli Deri<br>Slomo Butbul                                                                                     |
| Equipment Under Test (E.U.T):  | WirePlus XTN v1.3 *                                                                                          |
| Equipment Model No.:           | WPG54X0 v1.3 *                                                                                               |
| Equipment Serial No.:          | PCP5092028                                                                                                   |
| Date of Receipt of E.U.T:      | 10.07.06                                                                                                     |
| Start of Test:                 | 10.07.06                                                                                                     |
| End of Test:                   | 17.07.06                                                                                                     |
| Test Laboratory Location:      | I.T.L (Product Testing) Ltd.<br>Kfar Bin Nun,<br>ISRAEL 99780                                                |
| Test Specifications:           | See Section 2                                                                                                |

\* See customer's declaration on following page.



October 30, 2006

## DECLARATION

I HEREBY DECLARE THAT THE FOLLOWING PRODUCT:

E.U.T.: WirePlus XTN v1.3

M/N: M/N WPG54X0 v1.3

IS IDENTICAL ELECTRONICALLY, PHYSICALLY, AND  
MECHANICALLY TO:

WirePlus XTN  
M/N WPG54X0

Please relate to them all (from an EMC point of view)  
as the same product.

Thank you,

Signature.....

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## **1.2 List of Accreditations**

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), Registration No. 90715.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) (Japan), Registration Numbers: C-1350, R-1285.
5. Industry Canada (Canada), File No. IC 4025.
6. TUV Product Services, England, ASLLAS No. 97201.
7. Nemko (Norway), Authorization No. ELA 207.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

### **1.3 Product Description**

WirePlus takes you beyond the world of cords and cables, providing you with a non-invasive, wireless, broadband home network. The WirePlus system consists of two outlets. The WirePlus INT serves as the basis of your home wireless network, while WirePlus XTNs extend that network to every corner of your home.

WirePlus outlets are IEEE 802.11g compliant wireless network solutions, combining standards based wireless technology with existing telephone wires already in the home. By combining these features, Wi-Fi signals can be extended easily, providing you with an easy to install, affordable, high-speed, home network.

WirePlus outlets leave your existing phone system intact, allowing the full range of telephony features, such as call forwarding and caller ID, and telephony hardware such as fax and answering machines. Additionally, the WirePlus system coexists seamlessly with cable and DSL services, such as ADSL2++.

In the event of a power outage, WirePlus outlets allow direct access to the Public Switched Telephone Network (PSTN) via a standard RJ-11 phone connector, supporting lifeline services, and allowing you to place emergency calls.

The WirePlus XTN

By plugging WirePlus XTN outlets into telephone jacks throughout your home you can benefit from full wireless coverage at the highest possible Wi-Fi speeds. Normally, as distance from the transmitting antenna of the WAP increases, walls and interference cause signal levels to decrease, or result in dead spots.

The XTN outlet overcomes these issues and provides robust performance wherever needed by boosting signal strength. By cutting the transmission distance from workstation to access point, the XTN ensures that your broadband services operate near the maximum 802.11g throughput all the time.

### **1.4 Test Methodology**

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at an antenna to EUT distance of 3 meters.

### **1.5 Test Facility**

The radiated emissions tests were performed at I.T.L.'s testing facility at Kfar Bin-Nun, Israel. This site is a FCC listed test laboratory (FCC Registration No. 90715, date of listing December 12, 2003).

I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

## **1.6      *Measurement Uncertainty***

### Radiated Emission

The Open Site complies with the  $\pm 4$  dB Normalized Site Attenuation requirements of ANSI C63.4-2003. In accordance with Paragraph 5.4.6.1 of this standard, this tolerance includes instrumentation calibration errors, measurement technique errors, and errors due to site anomalies.

## 2. Product Labeling



Figure 1. FCC Label (15mm X 55mm)



Figure 2. Location of Label on EUT

### **3. System Test Configuration**

#### **3.1 Justification**

The E.U.T is a vertical, mounted fixed installation unit. The E.U.T. was placed in a “jig” holding it in a way that simulates a wall, and it was held in a vertical position simulating the real installation.

This setup gives the maximum radiation that is radiated from the E.U.T.

#### **3.2 EUT Exercise Software**

The (B2B) WirePlus XTN operate as RF Transceiver transfers from IF 20MHz on 2W signals to 802.11b/g RF transmission and vice versa.

The module detects RF 802.11b/g (2.4GHz) signals from the air and convert them to IF 20MHz, and transmit them on twisted 2w and vice versa.

It includes FPGA that it works like microprocessor, it programmed by Serconet WirePlus Software program.

The E.U.T no needs any interface to a computer, it start working by itself, when 5V DC is plugged in.

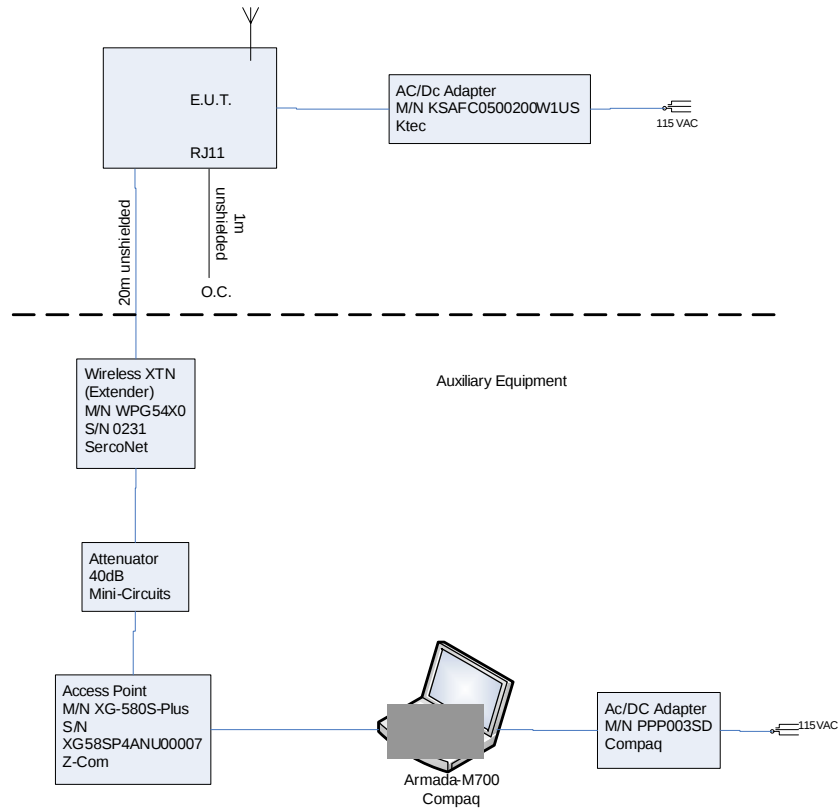
#### **3.3 Special Accessories**

No special accessories were needed to achieve compliance.

#### **3.4 Equipment Modifications**

A screen plate was added on the synthesizer area.

### 3.5 Configuration of Tested System



**Figure 3. Configuration of Tested System**

## 4. Block Diagram

### 4.1 Schematic Block/Connection Diagram

Intentionally Blank for Reasons of Confidentiality

### 4.2 Theory of Operation

The WirePlus system has three modes of operation:

Idle:

This mode is a 'listening' mode: Both directions: up (TX) and down (RX) are active. In this mode the system is waiting for a signal to come.

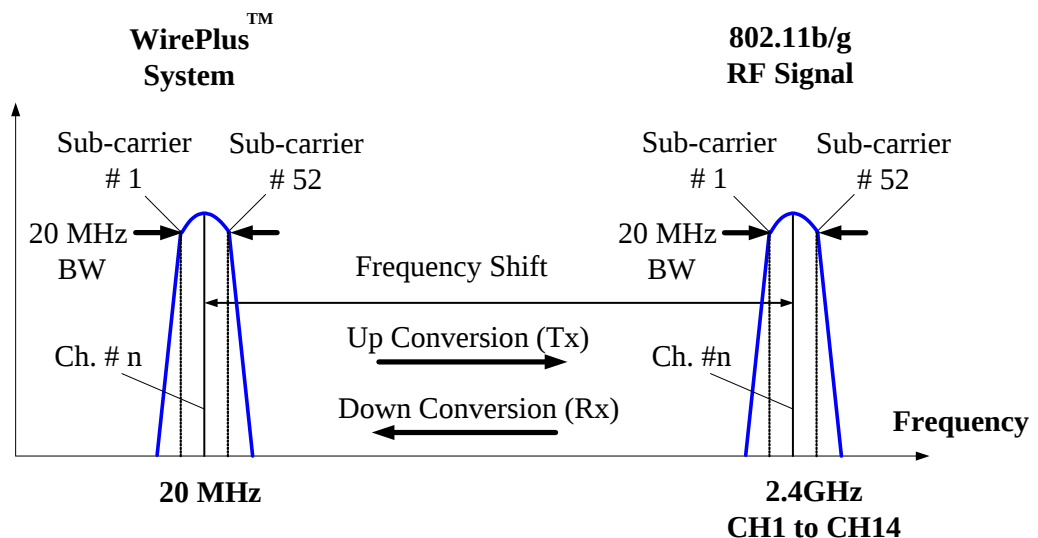
TX:

A signal comes from the two wires direction is detected by the TX detector (TxTH), the control circuitry located out of the XTN is sending a command to switch to TX mode.

RX:

A signal comes from the antenna direction (RF) is detected by the RX detector (RxTH). The control circuitry located out of the XTN is sending a command to switch to RX mode.

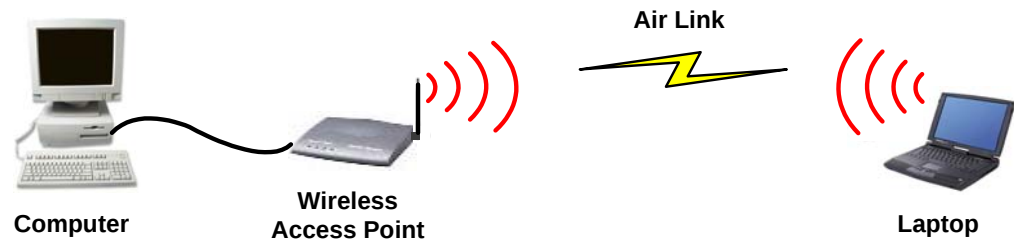
Basic WirePlus operation



## WirePlus method and applications

### WiFi system without WirePlus add-on:

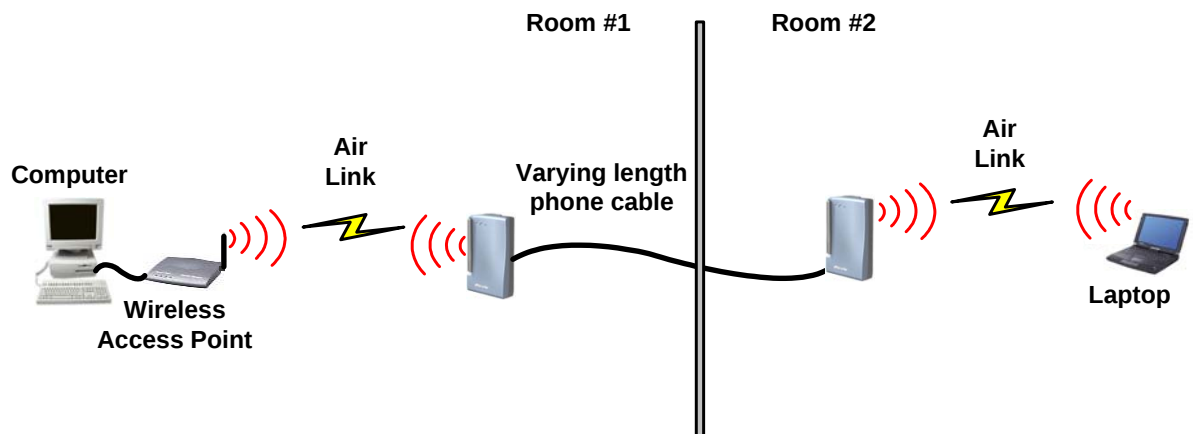
Result: → Limited coverage wireless communication

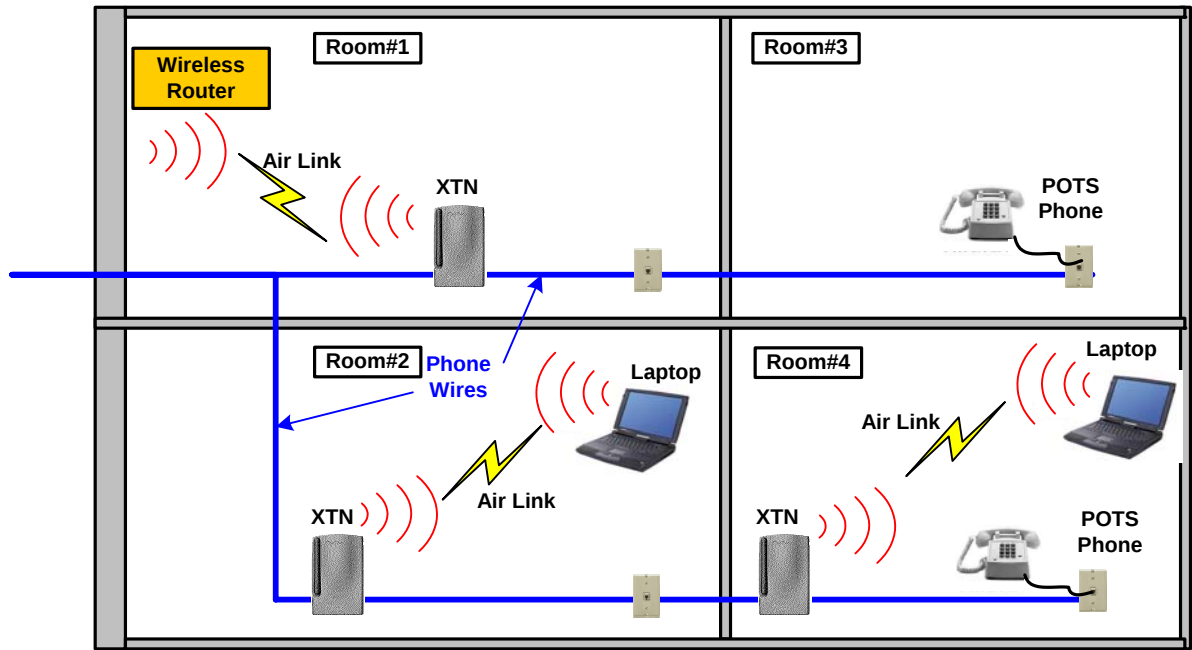


### WirePlus Extender (XTN) application:

### WiFi system with WirePlus add-on (Two XTN up/down converters units):

Result: → Extended coverage wireless communication (Remote rooms)





## 5. Conducted and Radiated Measurement Photos



Figure 4. Conducted Emission From AC Mains Test Front



Figure 5. Conducted Emission From AC Mains Test Side



**Figure 6. Radiated Emission Test Front**



**Figure 7. Radiated Emission Test Front**

## 6. Spurious Radiated Emission in the Restricted Bands Below 1 GHz

### 6.1 Test Specification

9 kHz-1000 MHz, FCC Part 15, Subpart C

### 6.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 3.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in *Figure 3*.

The frequency range 9 kHz-1000 MHz was scanned, and the list of the highest emissions was verified and updated accordingly.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.

The emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 9 kHz-30MHz, the loop antenna was rotated on its vertical axis. The antenna height (center of loop) was 1 meter.

In the frequency range 30-1000MHz, the readings were maximized by adjusting the antenna height between 1-4 meters. The turntable azimuth between 0-360°, and the antenna polarization.

Verification of the E.U.T emissions was based on the following methods:

- Turning the E.U.T on and off.

- Using a frequency span less than 10 MHz.

- Observation of the signal level during turntable rotation. Background noise is not affected by the rotation of the E.U.T.

The E.U.T. was operated in the frequencies of 2412, 2437, and 2462 MHz.

### 6.3 Test Results

The E.U.T met the requirements of the FCC Part 15, Subpart C specification.

The results for all three operating frequencies were the same.

The signals in the frequency range 9 kHz – 1000 MHz in the restricted bands were 20 dB below the specification limit.

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: 

Date: 31.01.07

Typed/Printed Name: E. Pitt

#### 6.4 Test Instrumentation Used, Radiated Measurements

| Instrument              | Manufacturer | Model         | Serial Number | Calibration       | Period |
|-------------------------|--------------|---------------|---------------|-------------------|--------|
| EMI Receiver            | HP           | 85422E        | 3411A00102    | March 22, 2006    | 1 year |
| RF Section              | HP           | 85420E        | 3427A00103    | March 22, 2006    | 1 year |
| Antenna Bioconical      | ARA          | BCD 235/B     | 1041          | March 19, 2006    | 1 year |
| Antenna Log Periodic    | ARA          | LPD-2010/A    | 1038          | November 17, 2005 | 1 year |
| Active Loop Antenna     | EMCO         | 6502          | 9506-2950     | October 17, 2005  | 1 year |
| Antenna Mast            | ARA          | AAM-4A        | 1001          | N/A               | N/A    |
| Turntable               | ARA          | ART-1001/4    | 1001          | N/A               | N/A    |
| Mast & Table Controller | ARA          | ACU-2/5       | 1001          | N/A               | N/A    |
| Printer                 | HP           | ThinkJet 2225 | 2738508357.0  | N/A               | N/A    |

## 6.5 *Field Strength Calculation*

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$[\text{dB}\mu\text{v/m}] \text{ FS} = \text{RA} + \text{AF} + \text{CF}$$

|     |                                            |
|-----|--------------------------------------------|
| FS: | Field Strength [dB $\mu$ v/m]              |
| RA: | Receiver Amplitude [dB $\mu$ v]            |
| AF: | Receiving Antenna Correction Factor [dB/m] |
| CF: | Cable Attenuation Factor [dB]              |

No external pre-amplifiers are used.

## **7. Spurious Radiated Emission in the Restricted Band, Above 1 GHz**

### **7.1 Radiated Emission Above 1 GHz**

The E.U.T operation mode and test set-up are as described in Section 3.

See Section 3.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in *Figure 3*.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.

In the frequency range 1-2.9 GHz, a computerized EMI receiver complying to CISPR 16 requirements was used.

In the frequency range 2.9-25.0 GHz, a spectrum analyzer including a low noise amplifier was used. During average measurements, the IF bandwidth was 1 MHz and the video bandwidth was 100Hz. During peak measurements, the IF bandwidth was 1 MHz and the video bandwidth was 3 MHz.

The test distance was 3 meters.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.

Verification of the E.U.T emissions was based on the following methods:

- Turning the E.U.T on and off.

- Using a frequency span less than 10 MHz.

- Observation of the signal level during turntable rotation. Background noise is not affected by the rotation of the E.U.T.

The E.U.T. was operated at the frequencies of 2412, 2437, and 2462 MHz.

## 7.2 Test Data

JUDGEMENT: Passed by 1.0 dB

The EUT met the requirements of the F.C.C. Part 15, Subpart C, specification.

All other signals not included in the result tables are at least 20dB below the specification limit.

The margin between the emission level and the specification limit is 2.3 dB in the worst case at the frequency of 4824.00 MHz, horizontal polarization for the operation frequency of 2412 MHz.

The margin between the emission level and the specification limit is 1.0 dB in the worst case at the frequency of 4874.00 MHz, horizontal polarization for the operation frequency of 2437 MHz.

The margin between the emission level and the specification limit is 3.0 dB in the worst case at the frequency of 4924.00 MHz, horizontal polarization for the operation frequency of 2462 MHz.

The details of the highest emissions are given in *Figure 8* to *Figure 13*.

TEST PERSONNEL:

Tester Signature:  \_\_\_\_\_

Date: 31.01.07

Typed/Printed Name: E. Pitt

## Radiated Emission Above 1 GHz

E.U.T Description WirePlus XTN v1.3  
 Type WPG54X0 v1.3  
 Serial Number: PCP5092028

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/ Vertical Frequency range: 1.0 GHz to 25.0 GHz  
 Test Distance: 3 meters Detector: Peak  
 Operation Frequency: 2412 MHz

| Freq.   | Polarity | Peak<br>Amp    | Peak.<br>Specification | Peak.<br>Margin |
|---------|----------|----------------|------------------------|-----------------|
| (MHz)   |          | (dB $\mu$ V/m) | (dB $\mu$ V/m)         | (dB)            |
| 2390.00 | V        | 59.6**         | 74.0                   | -14.4           |
| 4824.00 | H        | 60.3*          | 74.0                   | -13.7           |

**Figure 8. Radiated Emission. Antenna Polarization: HORIZONTAL/VERTICAL.  
 Detector: Peak**

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Peak Amp” includes correction factor.

\* “Correction Factor” = Antenna Factor + Cable Loss- Preamplifier Gain

\*\* “Correction Factor” = Antenna Factor + Cable Loss

## Radiated Emission Above 1 GHz

E.U.T Description WirePlus XTN v1.3  
 Type WPG54X0 v1.3  
 Serial Number: PCP5092028

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 25.0 GHz  
 Test Distance: 3 meters Detector: Average  
 Operation Frequency: 2412 MHz

| Freq.   | Polarity | Average<br>Amp | Average<br>Specification | Peak.<br>Margin |
|---------|----------|----------------|--------------------------|-----------------|
| (MHz)   |          | (dBμV/m)       | (dB μV/m)                | (dB)            |
| 2390.00 | V        | 49.0**         | 54.0                     | -5.0            |
| 4824.00 | H        | 51.7*          | 54.0                     | -2.3            |

**Figure 9. Radiated Emission. Antenna Polarization: HORIZONTAL/VERTICAL.  
 Detector: Average**

### Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Average Amp” includes correction factor.

\* Correction Factor = Antenna Factor + Cable Loss- Preamplifier Gain

\*\* Correction Factor = Antenna Factor + Cable Loss

## Radiated Emission Above 1 GHz

E.U.T Description WirePlus XTN v1.3  
 Type WPG54X0 v1.3  
 Serial Number: PCP5092028

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/ Vertical Frequency range: 1.0 GHz to 25.0 GHz  
 Test Distance: 3 meters Detector: Peak  
 Operation Frequency: 2437 MHz

| Freq.   | Polarity | Peak<br>Amp    | Peak.<br>Specification | Peak.<br>Margin |
|---------|----------|----------------|------------------------|-----------------|
| (MHz)   |          | (dB $\mu$ V/m) | (dB $\mu$ V/m)         | (dB)            |
| 4874.00 | H        | 60.1*          | 74.0                   | -13.9           |

**Figure 10. Radiated Emission. Antenna Polarization: HORIZONTAL/VERTICAL.  
 Detector: Peak**

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Peak Amp” includes correction factor.

\* “Correction Factor” = Antenna Factor + Cable Loss- Preamplifier Gain

## Radiated Emission Above 1 GHz

E.U.T Description WirePlus XTN v1.3  
 Type WPG54X0 v1.3  
 Serial Number: PCP5092028

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 25.0 GHz  
 Test Distance: 3 meters Detector: Average  
 Operation Frequency: 2437 MHz

| Freq.   | Polarity | Average<br>Amp | Average<br>Specification | Peak.<br>Margin |
|---------|----------|----------------|--------------------------|-----------------|
| (MHz)   |          | (dB $\mu$ V/m) | (dB $\mu$ V/m)           | (dB)            |
| 4874.00 | H        | 53.0*          | 54.0                     | -1.0            |

**Figure 11. Radiated Emission. Antenna Polarization: HORIZONTAL/VERTICAL.  
 Detector: Average**

### Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Average Amp” includes correction factor.

\* Correction Factor = Antenna Factor + Cable Loss- Preamplifier Gain

## Radiated Emission Above 1 GHz

E.U.T Description WirePlus XTN v1.3  
 Type WPG54X0 v1.3  
 Serial Number: PCP5092028

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/ Vertical Frequency range: 1.0 GHz to 25.0 GHz  
 Test Distance: 3 meters Detector: Peak  
 Operation Frequency: 2462 MHz

| Freq.   | Polarity | Peak<br>Amp    | Peak.<br>Specification | Peak.<br>Margin |
|---------|----------|----------------|------------------------|-----------------|
| (MHz)   |          | (dB $\mu$ V/m) | (dB $\mu$ V/m)         | (dB)            |
| 2383.50 | V        | 60.4**         | 74.0                   | -13.6           |
| 4924.00 | H        | 60.3*          | 74.0                   | -13.7           |

**Figure 12. Radiated Emission. Antenna Polarization: HORIZONTAL/VERTICAL.  
 Detector: Peak**

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Peak Amp” includes correction factor.

\* “Correction Factor” = Antenna Factor + Cable Loss- Preamplifier Gain

\*\* “Correction Factor” = Antenna Factor + Cable Loss

## Radiated Emission Above 1 GHz

E.U.T Description WirePlus XTN v1.3  
 Type WPG54X0 v1.3  
 Serial Number: PCP5092028

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 25.0 GHz  
 Test Distance: 3 meters Detector: Average  
 Operation Frequency: 2462 MHz

| Freq.   | Polarity | Average<br>Amp | Average<br>Specification | Peak.<br>Margin |
|---------|----------|----------------|--------------------------|-----------------|
| (MHz)   |          | (dBμV/m)       | (dB μV/m)                | (dB)            |
| 2383.50 | V        | 49.6**         | 54.0                     | -4.4            |
| 4924.00 | H        | 51.0*          | 54.0                     | -3.0            |

**Figure 13. Radiated Emission. Antenna Polarization: HORIZONTAL/VERTICAL.  
 Detector: Average**

### Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Average Amp” includes correction factor.

\* Correction Factor = Antenna Factor + Cable Loss- Preamplifier Gain

\*\* Correction Factor = Antenna Factor + Cable Loss

### 7.3 Test Instrumentation Used, Radiated Measurements Above 1 GHz

|                         |                 |                  |            |                  |        |
|-------------------------|-----------------|------------------|------------|------------------|--------|
| Receiver                | HP              | 85422E           | 3411A00102 | March 22, 2006   | 1 year |
| RF Section              | HP              | 85420E           | 3427A00103 | March 22, 2006   | 1 year |
| Antenna Mast            | ARA             | AAM-4A           | 1001       | N/A              | N/A    |
| Turntable               | ARA             | ART-1001/4       | 1001       | N/A              | N/A    |
| Mast & Table Controller | ARA             | ACU-2/5          | 1001       | N/A              | N/A    |
| Printer                 | HP              | ThinkJet2225     | 2738508357 | N/A              | N/A    |
| Antenna-Log Periodic    | A.H.System      | SAS-200/511      | 253        | January 24,2005  | 2 year |
| Horn Antenna            | EMCO            | 3115             | 29845      | March 15, 2006   | 2 year |
| Horn Antenna            | ARA             | SWH-28           | 1007       | October 28, 2005 | 2 year |
| Low Noise Amplifier     | DBS MICROWAVE   | LNA-DBS-0411N313 | 013        | October 16, 2005 | 1 year |
| Low Noise Amplifier     | Sophia Wireless | LNA28-B          | 232        | February 8, 2006 | 1 year |
| Spectrum Analyzer       | HP              | 8592L            | 3926A01204 | February 6, 2006 | 1 year |
| Spectrum Analyzer       | HP              | 8564E            | 3442A00275 | February 1, 2006 | 1 year |

## 8. Maximum Transmitted Peak Power Output

### 8.1 Test procedure

The E.U.T. antenna terminal was connected to the power meter.

### 8.2 Results table

E.U.T. Description: WirePlus XTN v1.3  
Model No.: WPG54X0 v1.3  
Serial Number: PCP5092028  
Specification: F.C.C. Part 15, Sub-part C, 15.247

| Operation<br>Frequency<br>(MHz) | Peak Power<br>(dBm) | Specification<br>(dBm) | Margin<br>(dB) |
|---------------------------------|---------------------|------------------------|----------------|
| 2412.00                         | 19.4                | 30                     | -10.6          |
| 2437.00                         | 19.1                | 30                     | -10.9          |
| 2462.00                         | 20.0                | 30                     | -10.0          |

Figure 14 Maximum Peak Power Output

JUDGEMENT: Passed by 10.0 dB

TEST PERSONNEL:

Tester Signature: 

Date: 31.01.07

Typed/Printed Name: E. Pitt

### 8.3 Test Equipment Used.

#### Peak Power Output

| Instrument   | Manufacturer | Model | Serial Number | Calibration  |        |
|--------------|--------------|-------|---------------|--------------|--------|
|              |              |       |               | Last Calibr. | Period |
| Power Meter  | HP           | 437B  | 3043004017    | 31.07.05     | 1 year |
| Power Sensor | HP           | 8482A | 2652A19986    | 31.07.05     | 1 year |

**Figure 15 Test Equipment Used**

## 9. Peak Power Out of 2400-2483.5 MHz Band

### 9.1 Test procedure

The test was performed for OFDM modulation.

The E.U.T. antenna terminal was connected to the spectrum analyzer through an appropriate coaxial cable=1dB. The spectrum analyzer was set to 1 kHz resolution BW for the frequency range 9 kHz-150 kHz, 30 kHz resolution BW for the frequency range 150 kHz-10.0 MHz, and 100 kHz resolution BW for the frequency range 10.0 MHz-25.0 GHz. The frequency range from 9 kHz to 25 GHz was scanned. Level of spectrum components out of the 2400-2483.5 MHz was measured at the selected operation frequencies.

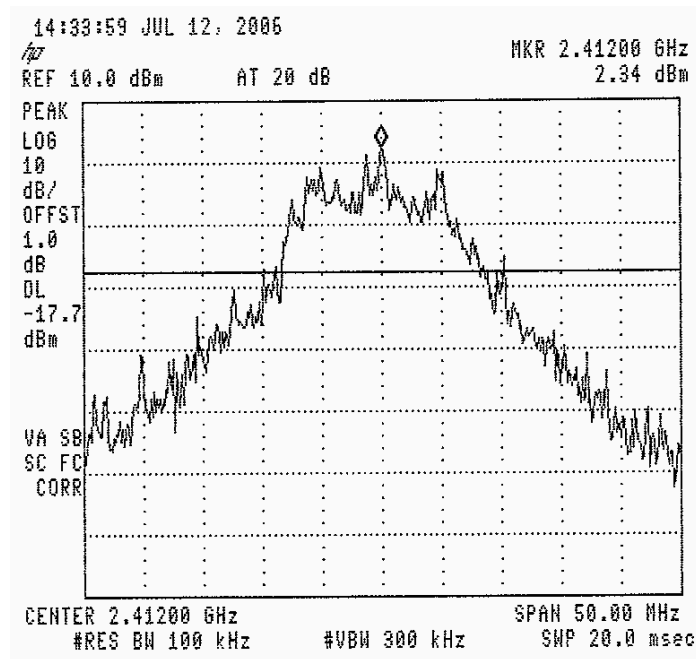


Figure 16 —2412 MHz

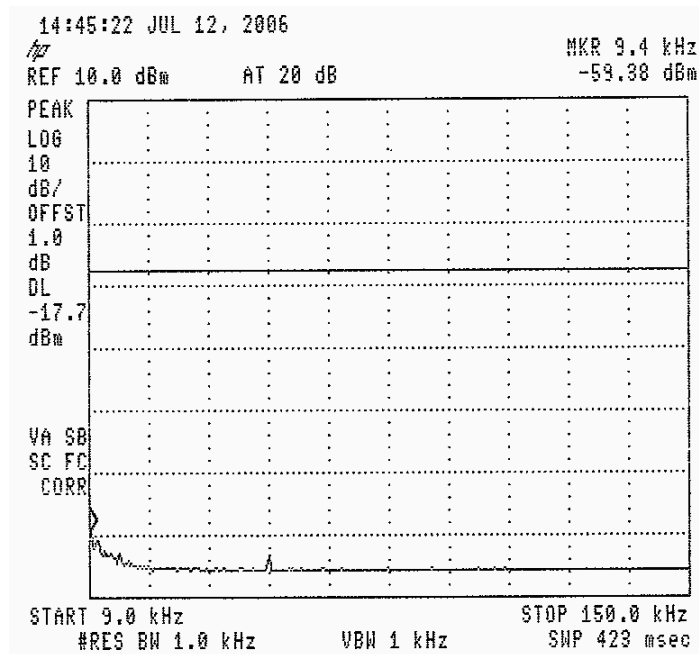


Figure 17 —2412 MHz

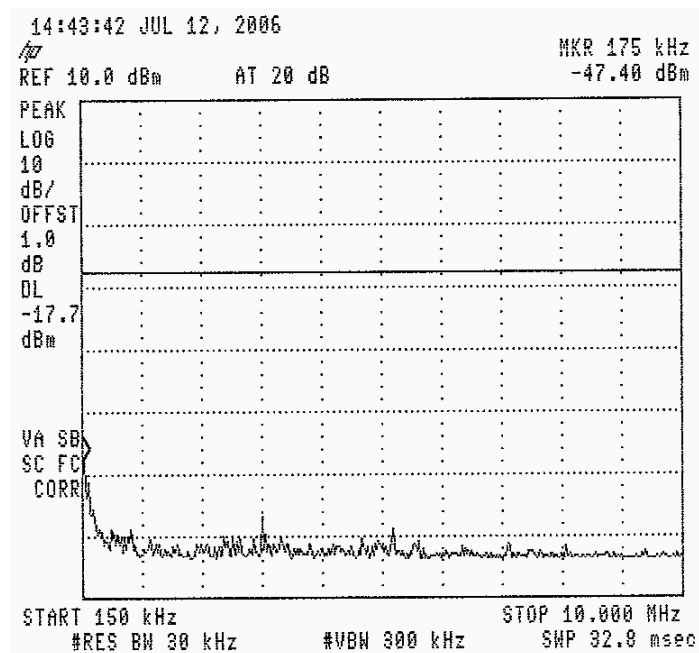


Figure 18 —2412 MHz

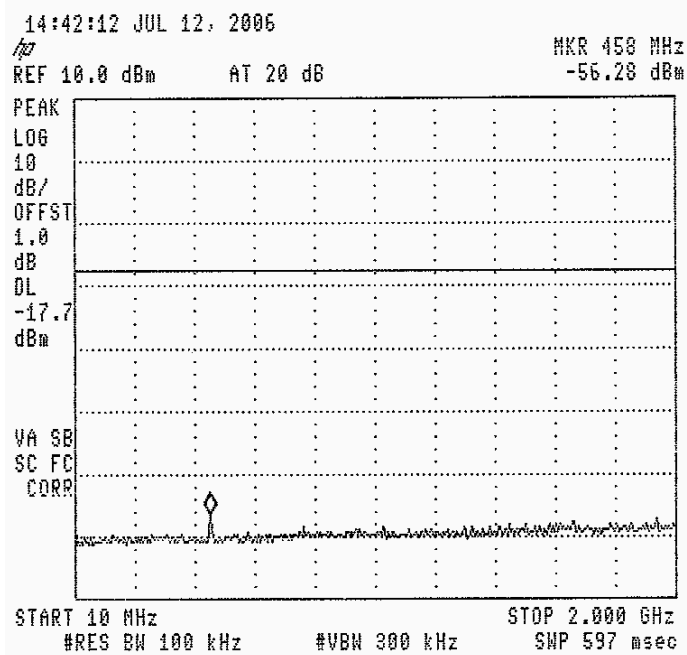


Figure 19 —2412 MHz

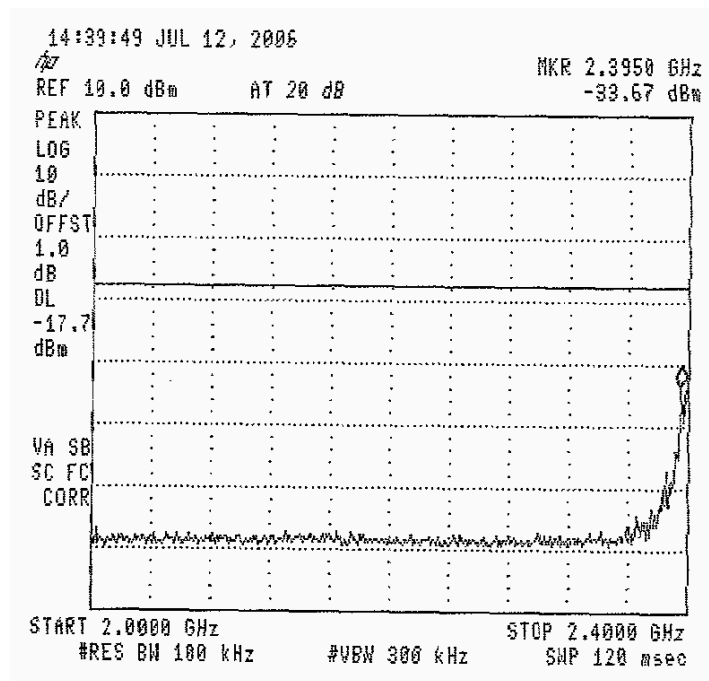


Figure 20 —2412 MHz

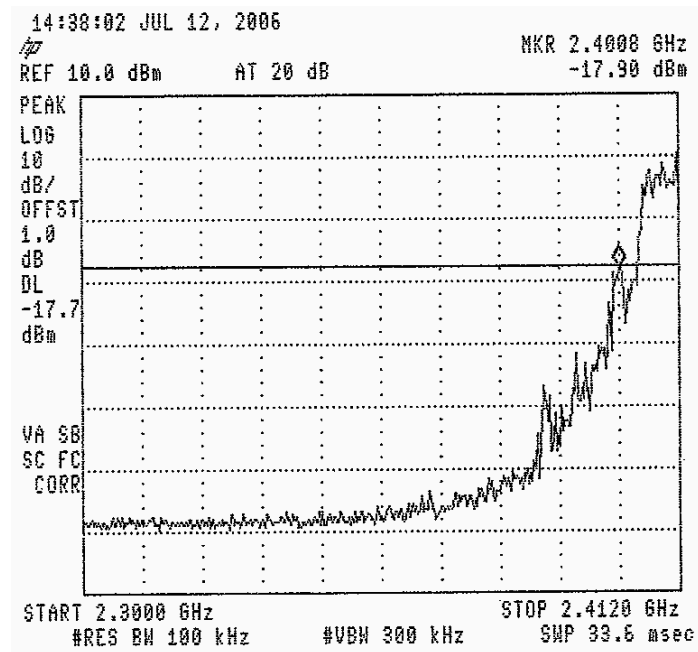


Figure 21 —2412 MHz

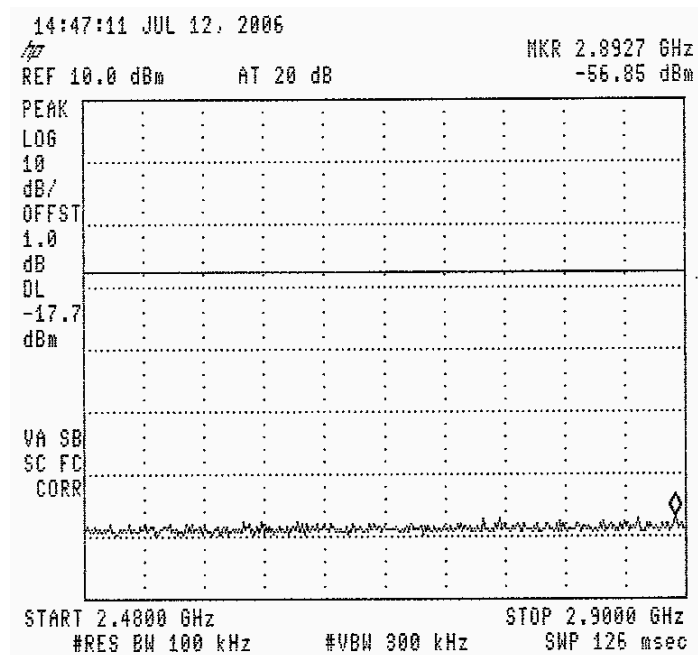


Figure 22 —2412 MHz

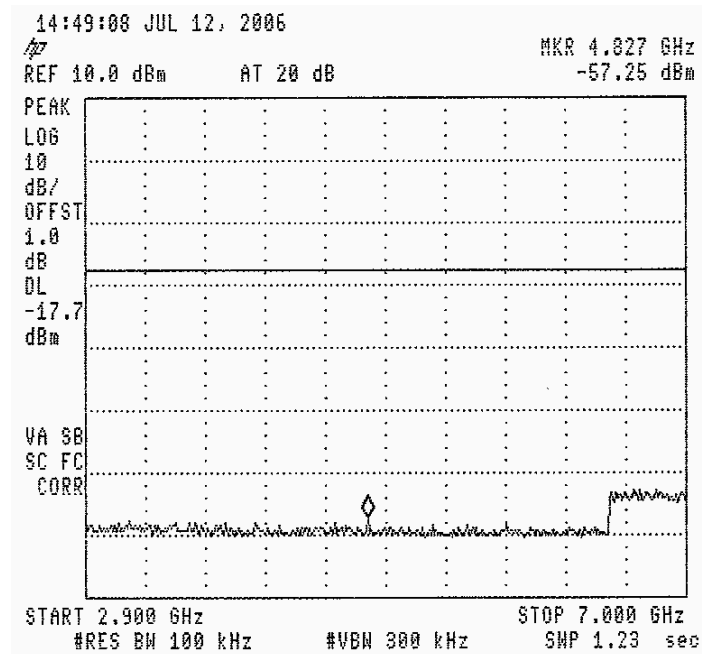


Figure 23 —2412 MHz

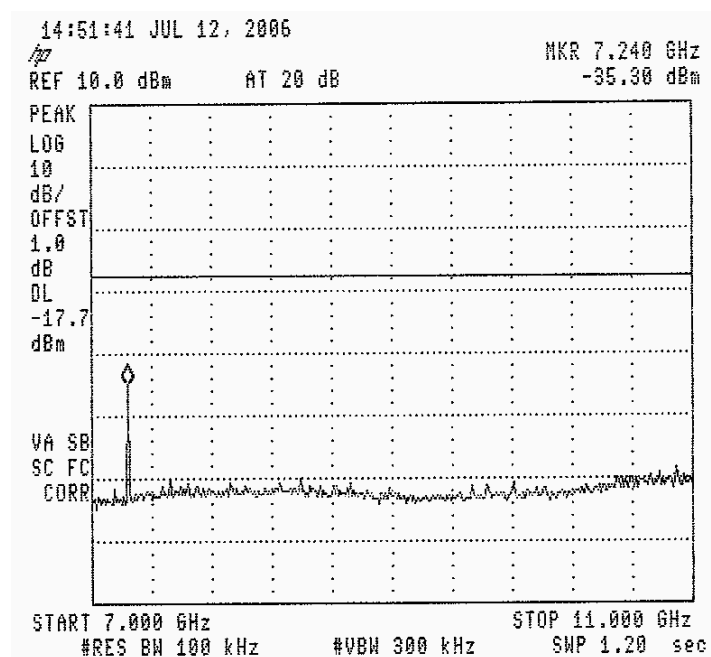


Figure 24 —2412 MHz

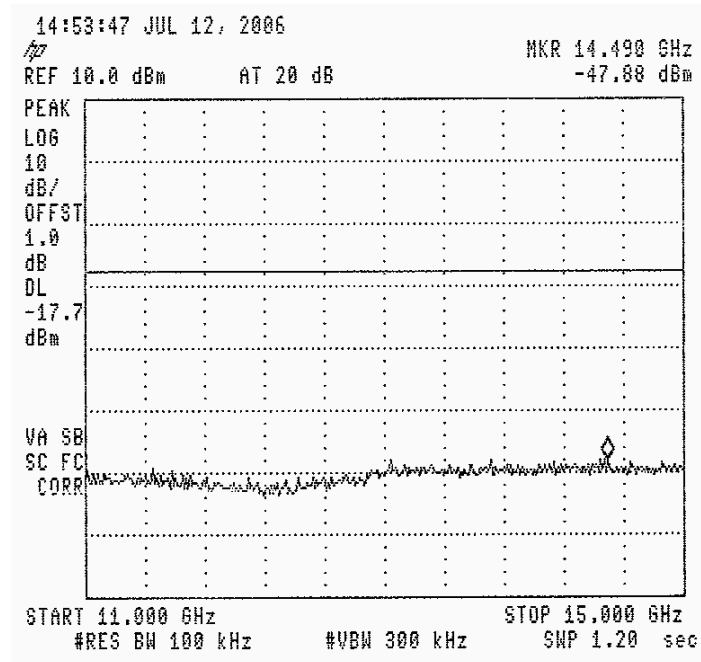


Figure 25 —2412 MHz

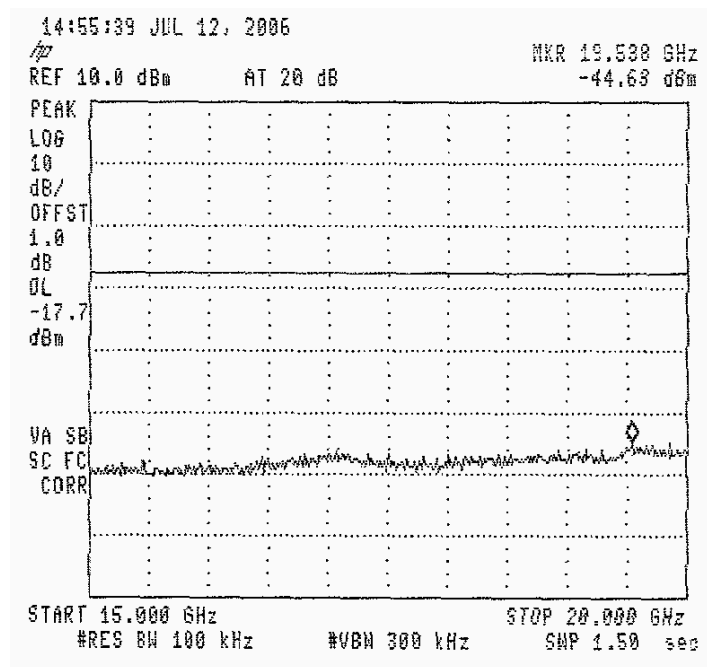


Figure 26 —2412 MHz

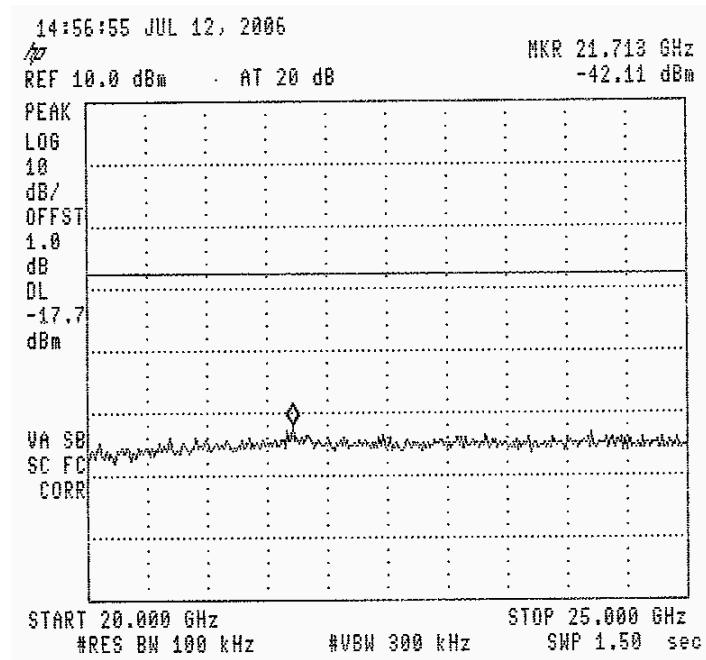


Figure 27 —2412 MHz

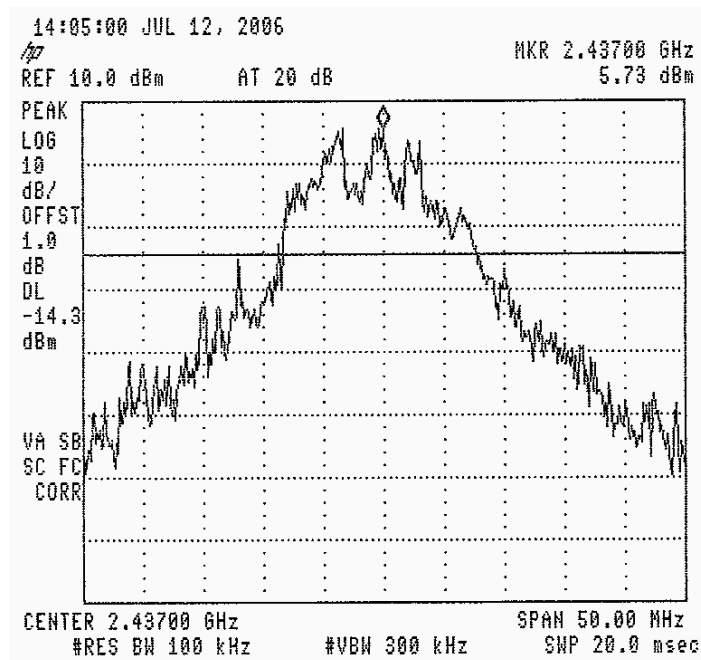


Figure 28 —2437 MHz

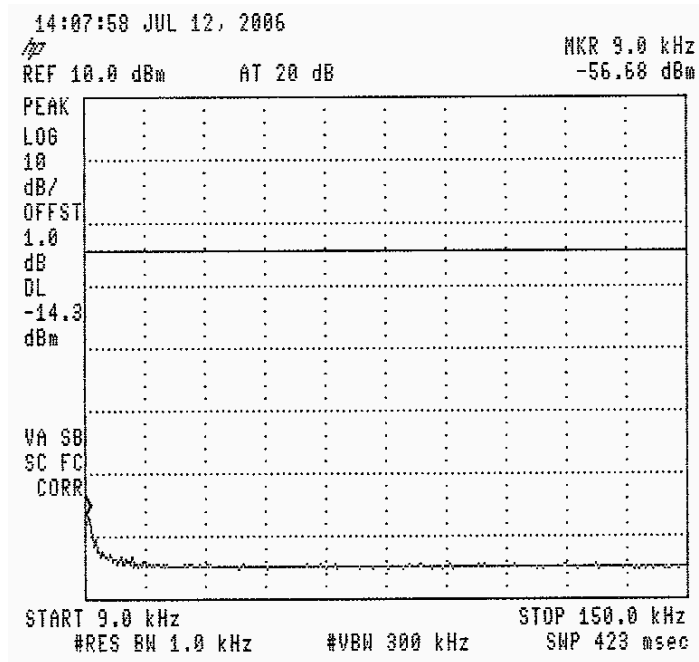


Figure 29 —2437 MHz

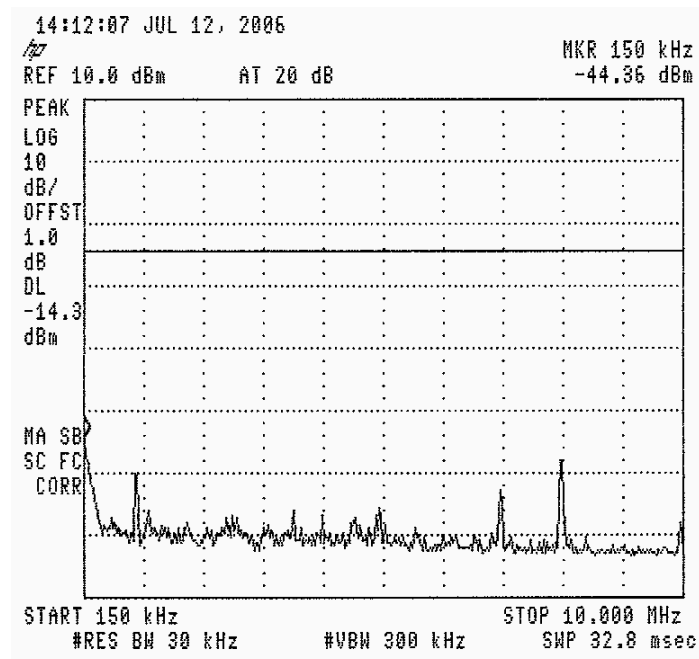


Figure 30 —2437 MHz

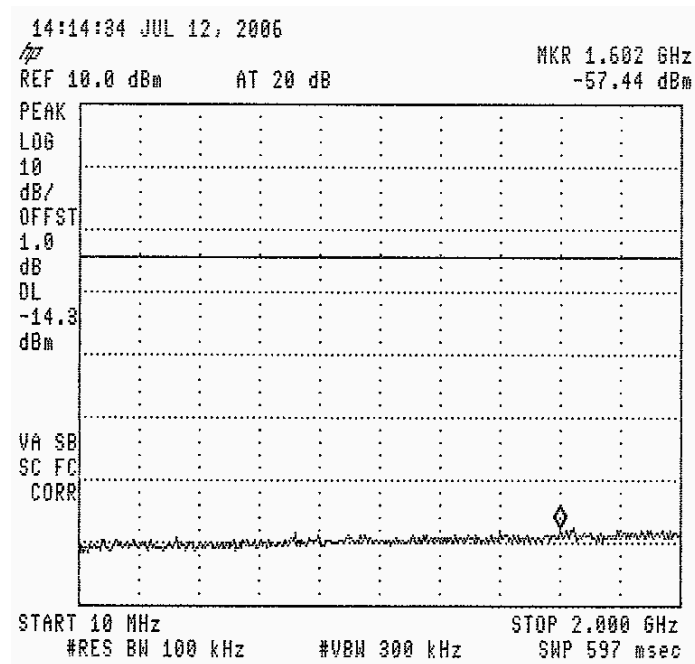


Figure 31 —2437 MHz

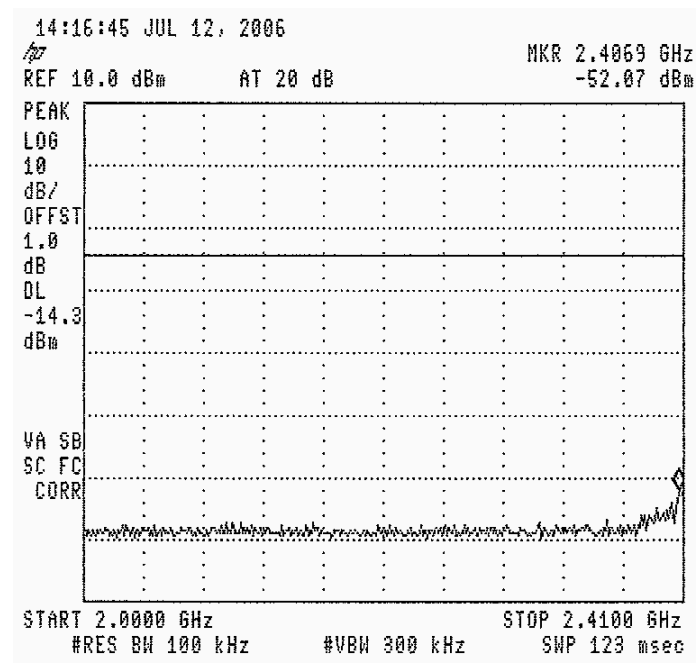


Figure 32 —2437 MHz

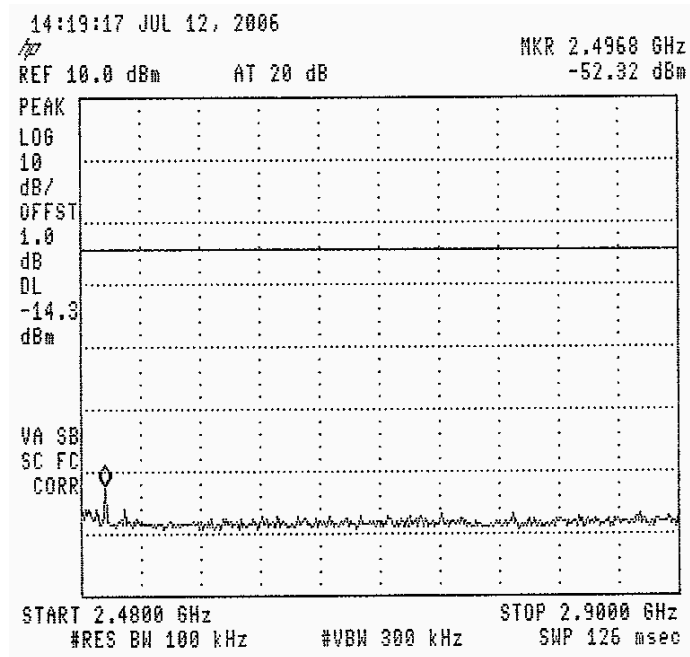


Figure 33 —2437 MHz

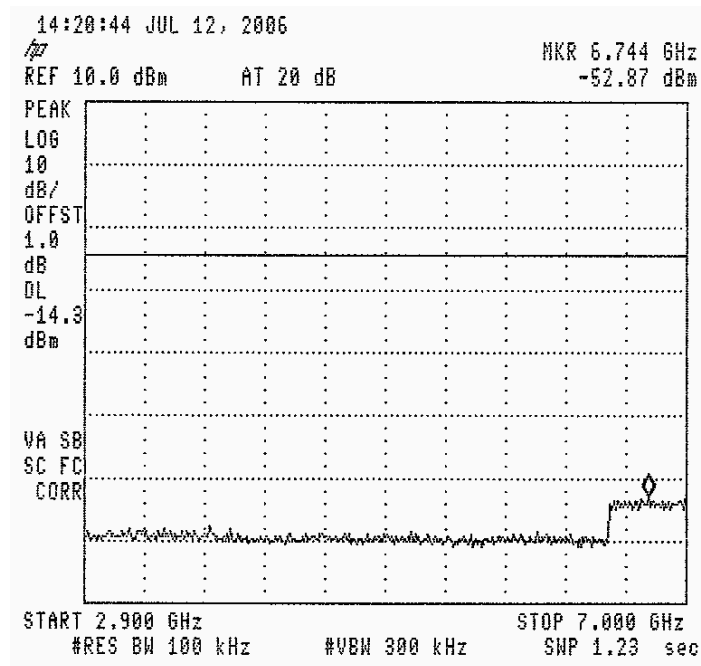


Figure 34 —2437 MHz

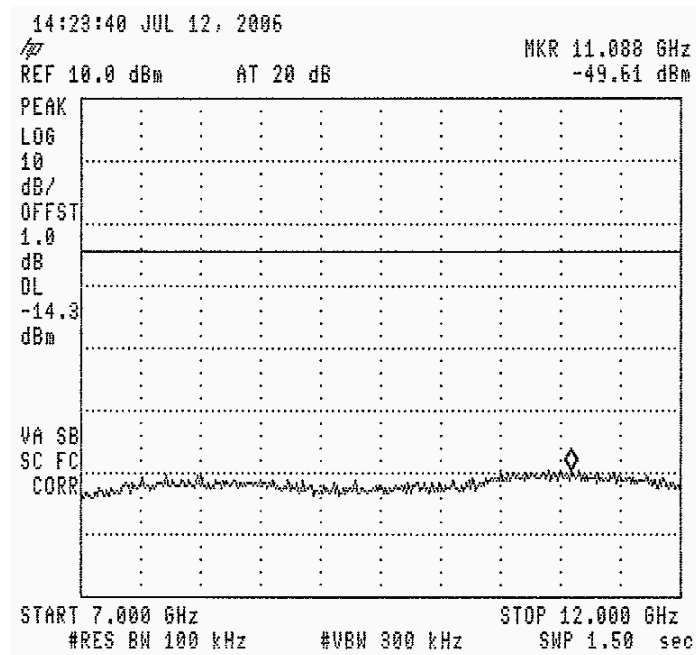


Figure 35 —2437 MHz

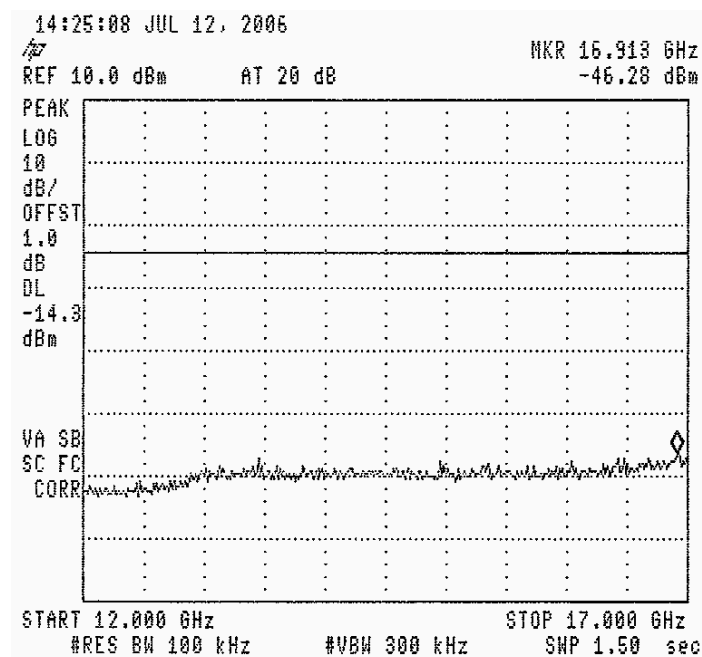


Figure 36 —2437 MHz

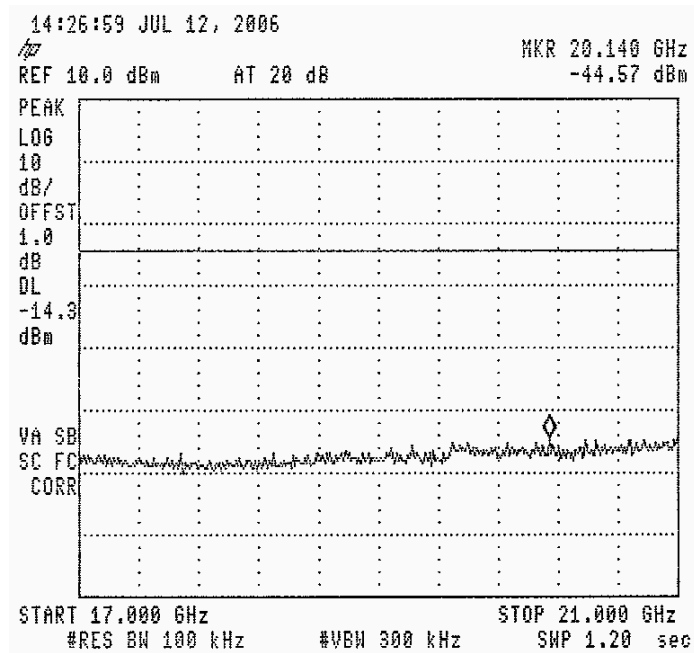


Figure 37 —2437 MHz

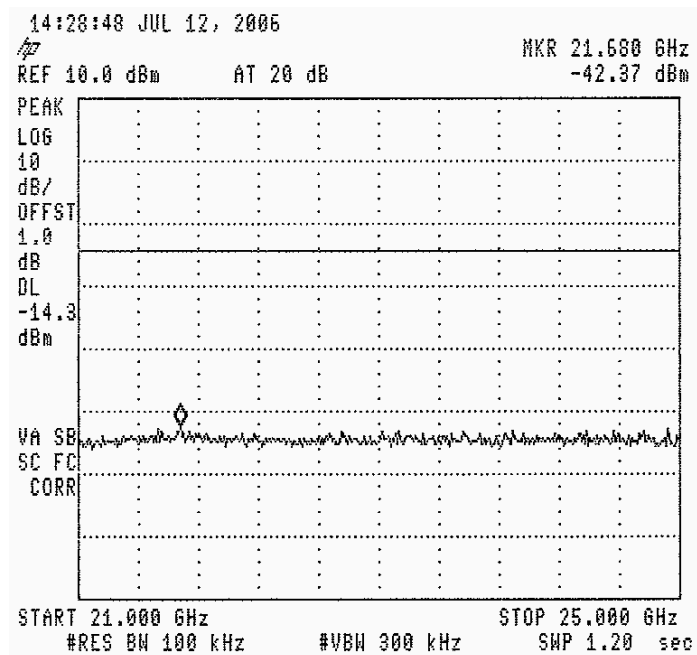


Figure 38 —2437 MHz

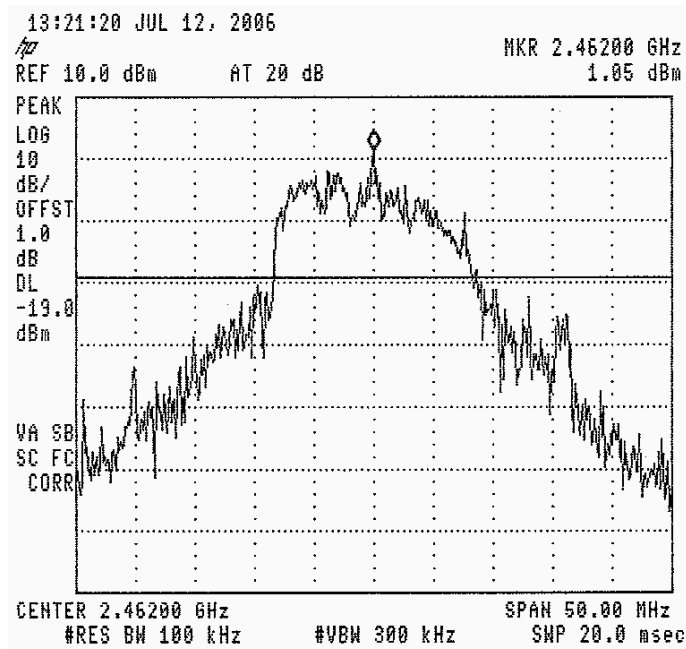


Figure 39 —2462 MHz

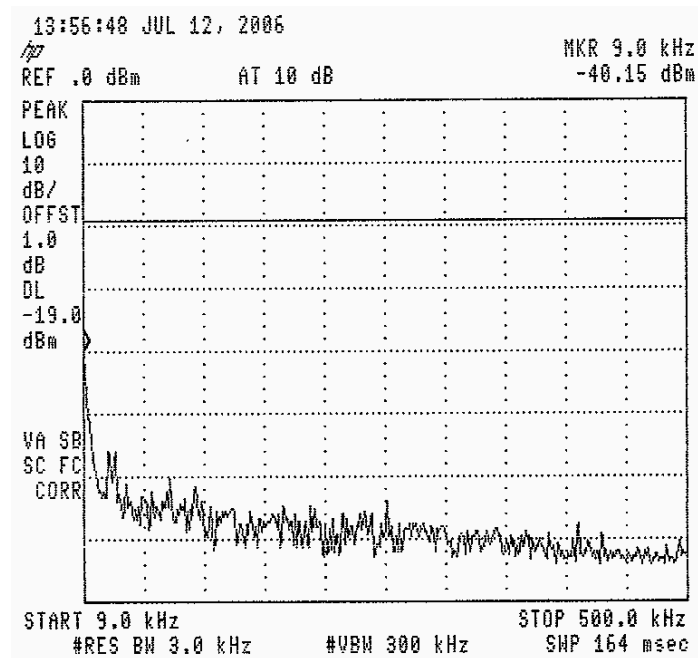


Figure 40 —2462 MHz

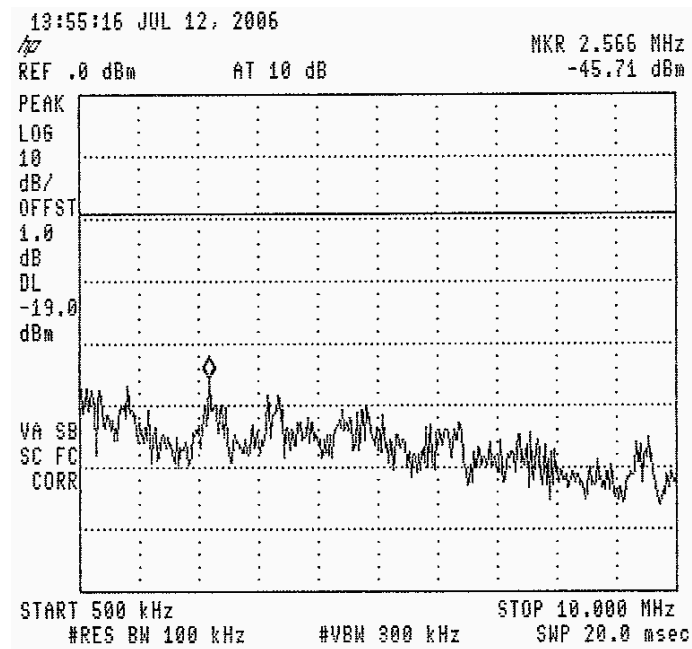


Figure 41 —2462 MHz

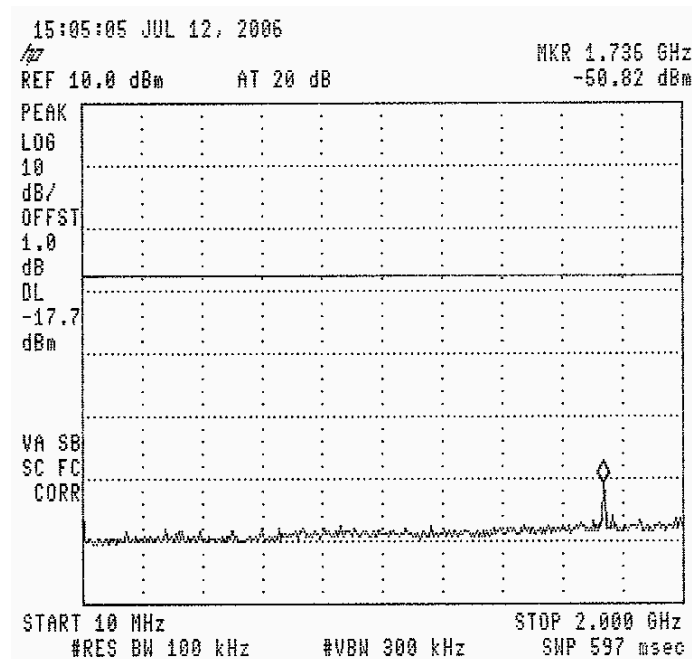


Figure 42 —2462 MHz

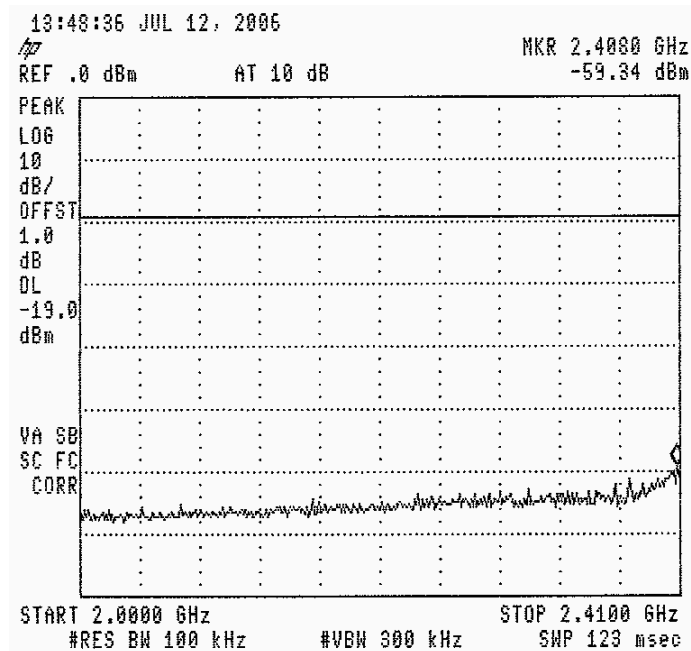


Figure 43 —2462 MHz

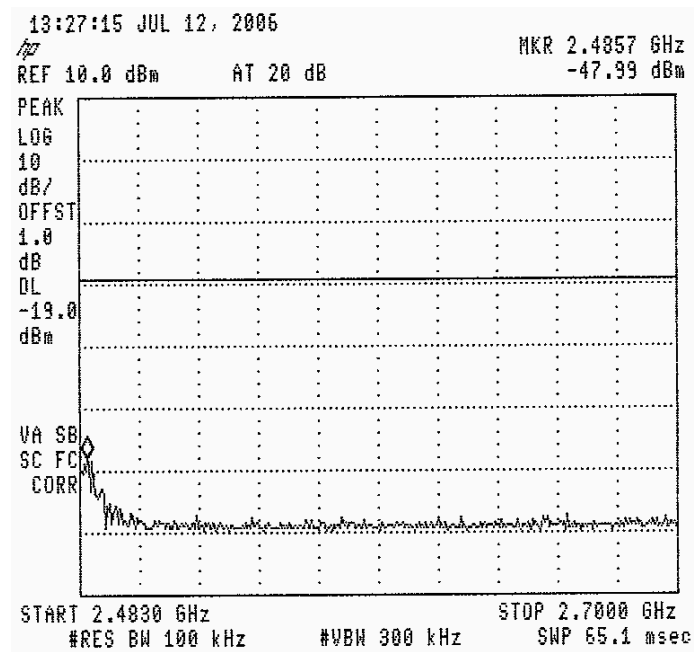


Figure 44 —2462 MHz

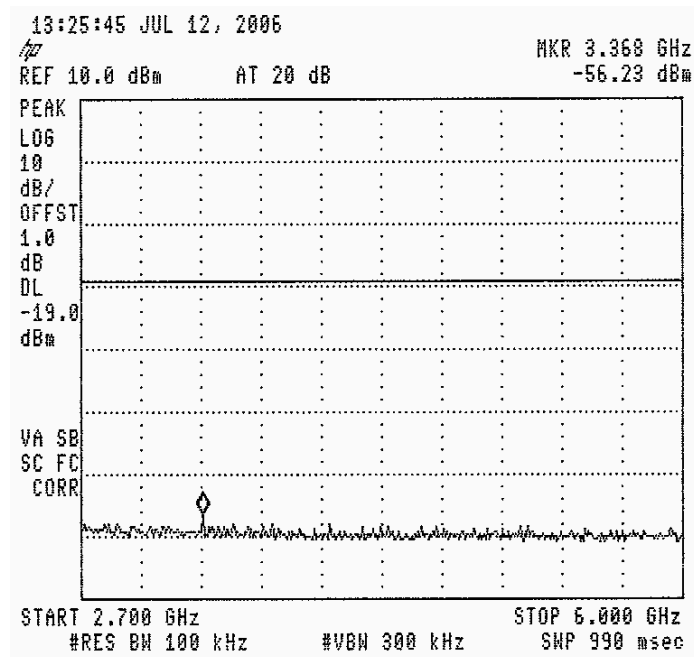


Figure 45 —2462 MHz

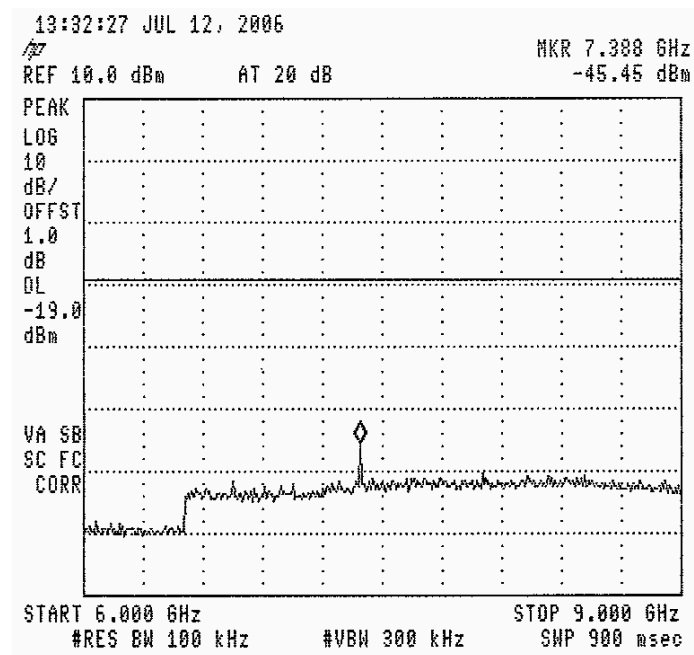


Figure 46 —2462 MHz

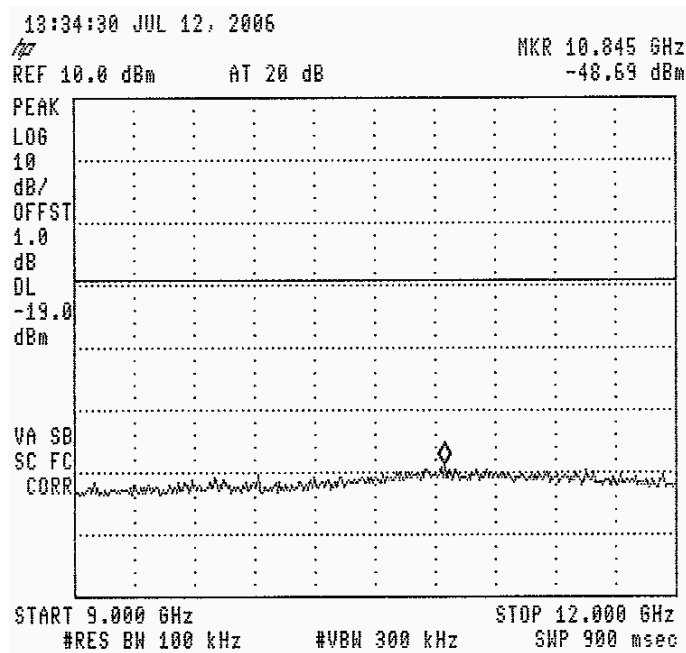


Figure 47 —2462 MHz

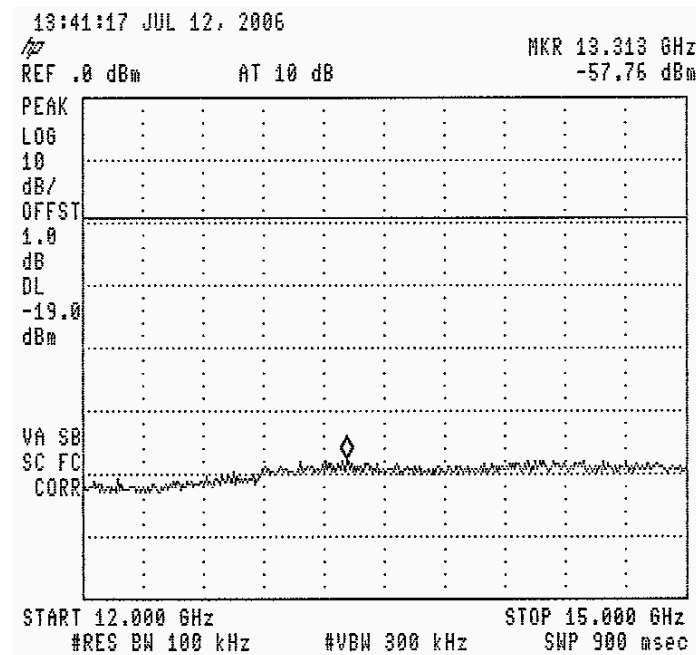


Figure 48 —2462 MHz

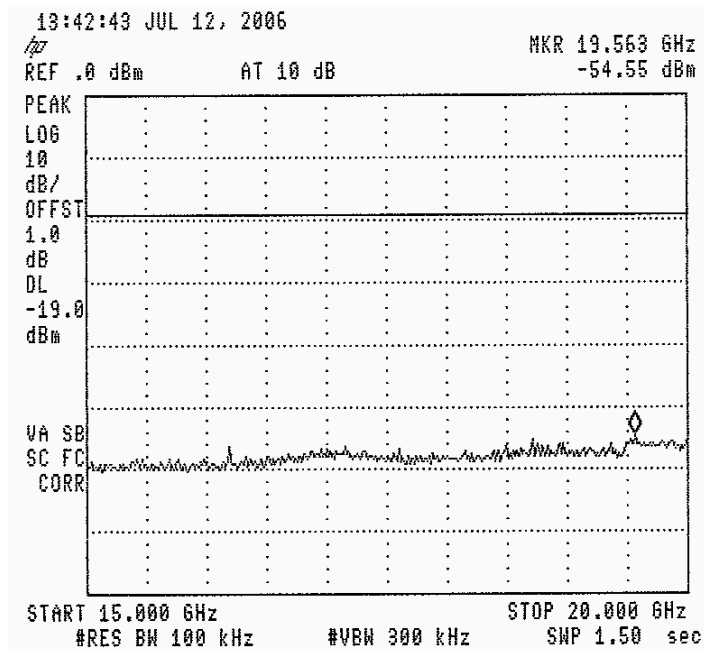


Figure 49 —2462 MHz

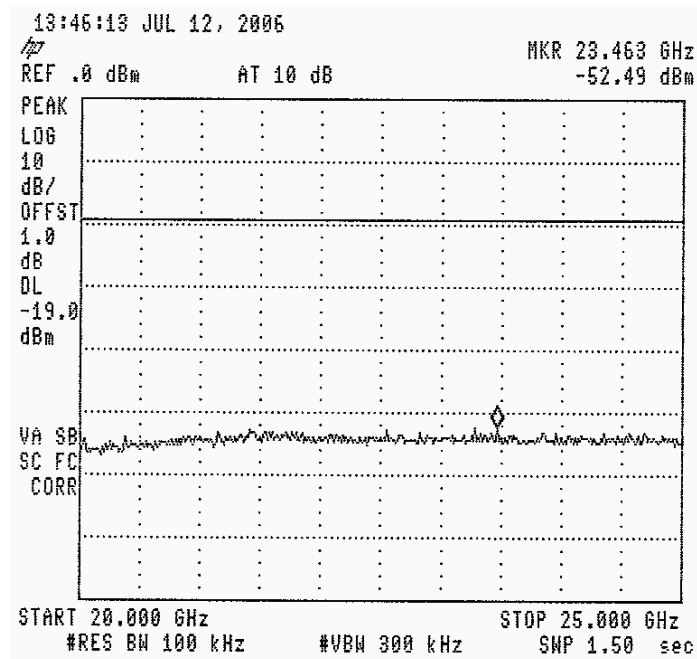


Figure 50 —2462 MHz

## 9.2 Results table

E.U.T. Description: WirePlus XTN v1.3  
 Model No.: WPG54X0 v1.3  
 Serial Number: PCP5092028  
 Specification: F.C.C. Part 15, Subpart C (15.247)

| Operation Frequency (MHz) | Reading (dBc) | Specification (dBc) | Margin (dB) |
|---------------------------|---------------|---------------------|-------------|
| 2412                      | 20.2          | 20                  | 0.2         |
| 2437                      | 48.1          | 20                  | 28.1        |
| 2462                      | 41.2          | 20                  | 21.2        |

**Figure 51 Peak Power Output of 2400-2483.5 MHz Band**

JUDGEMENT: Passed by 0.2 dB

TEST PERSONNEL:

Tester Signature: 

Date: 31.01.07

Typed/Printed Name: E. Pitt

## 9.3 Test Equipment Used.

Peak Power Output of 2400-2438.5 MHz Band

| Instrument        | Manufacturer | Model | Serial Number | Calibration      |        |
|-------------------|--------------|-------|---------------|------------------|--------|
|                   |              |       |               | Last Calibr.     | Period |
| Spectrum Analyzer | HP           | 8592L | 3826A01204    | February 6, 2006 | 1 year |
| Cable             | Avnet        | MTS   | N/A           | February 8, 2006 | 1 year |

**Figure 52 Test Equipment Used**

## 10. 6 dB Minimum Bandwidth

### 10.1 Test procedure

The E.U.T. was set to the applicable test frequency. The E.U.T. antenna terminal was connected to the spectrum analyzer through EXT ATT=16dB ( $2 \times 8\text{dB}$ ) and an appropriate coaxial cable=1dB. The spectrum analyzer was set to 100 kHz resolution BW. The spectrum bandwidth of the E.U.T. at the point of 6 dB below maximum peak power was measured and recorded.

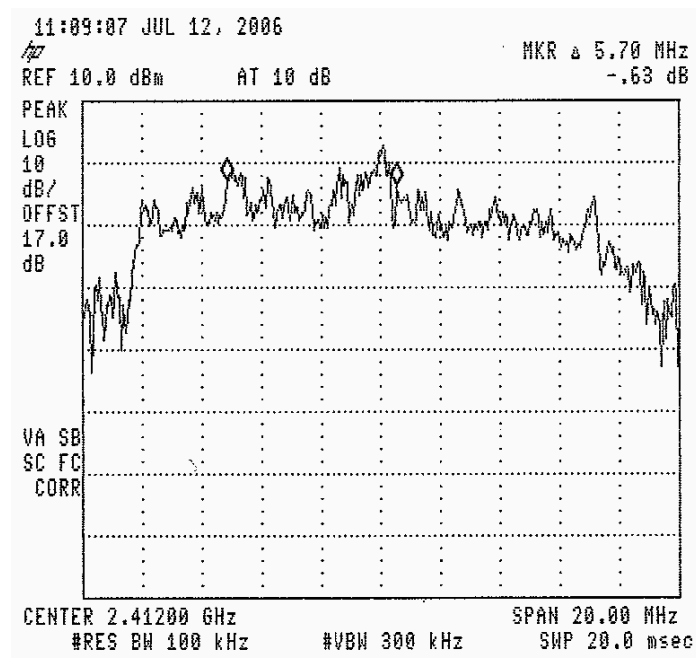


Figure 53 —2412 MHz

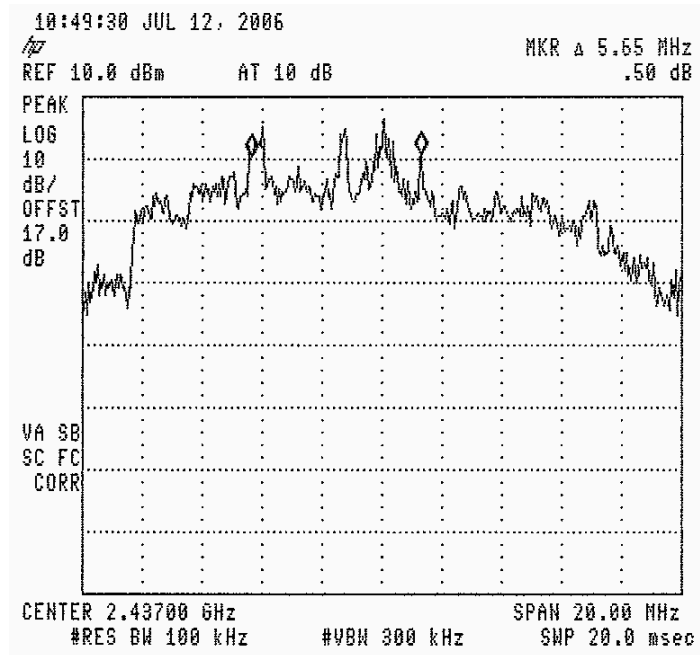


Figure 54 —2437 MHz

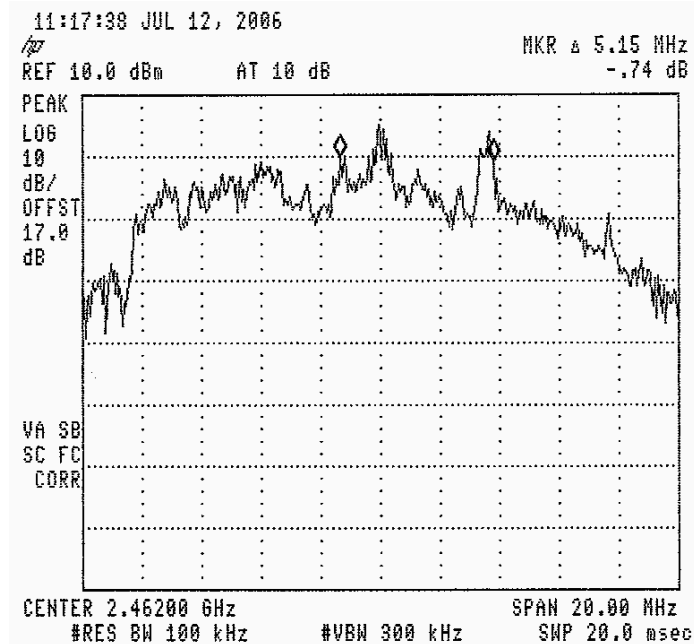


Figure 55 —2462 MHz

## 10.2 Results table

E.U.T. Description: WirePlus XTN v1.3

Model No.: WPG54X0 v1.3

Serial Number: PCP5092028

Specification: F.C.C. Part 15, Subpart C: (15.247-a2)

| Operation Frequency (MHz) | 6dB Bandwidth (MHz) | Specification (MHz) | Margin (MHz) |
|---------------------------|---------------------|---------------------|--------------|
| 2412.00                   | 5.70                | At Least 0.500      | 5.20         |
| 2437.00                   | 5.65                | At Least 0.500      | 5.15         |
| 2462.00                   | 5.15                | At Least 0.500      | 4.65         |

**Figure 56 6 dB Minimum Bandwidth**

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: 

Date: 31.01.07

Typed/Printed Name: E. Pitt

### 10.3 Test Equipment Used.

6 dB Minimum Bandwidth

| Instrument        | Manufacturer | Model       | Serial Number | Calibration      |        |
|-------------------|--------------|-------------|---------------|------------------|--------|
|                   |              |             |               | Last Calibr.     | Period |
| Spectrum Analyzer | HP           | 8592L       | 3826A01204    | February 6, 2006 | 1 year |
| Cable             | Avnet        | MTS         | N/A           | February 8, 2006 | 1 year |
| Attenuator        | MACOM        | M3933/25-74 | 0056          | October 10, 2005 | 1 year |
| Attenuator        | MACOM        | M3933/25-74 | 0202          | October 10, 2005 | 1 year |

**Figure 57 Test Equipment Used**

## 11. Band Edge Spectrum

[In Accordance with section 15.247(c)]

### 11.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an appropriate coaxial cable=1dB. The spectrum analyzer was set to 100 kHz resolution BW. Maximum power level below 2400 MHz and above 2483.5 MHz was measured.

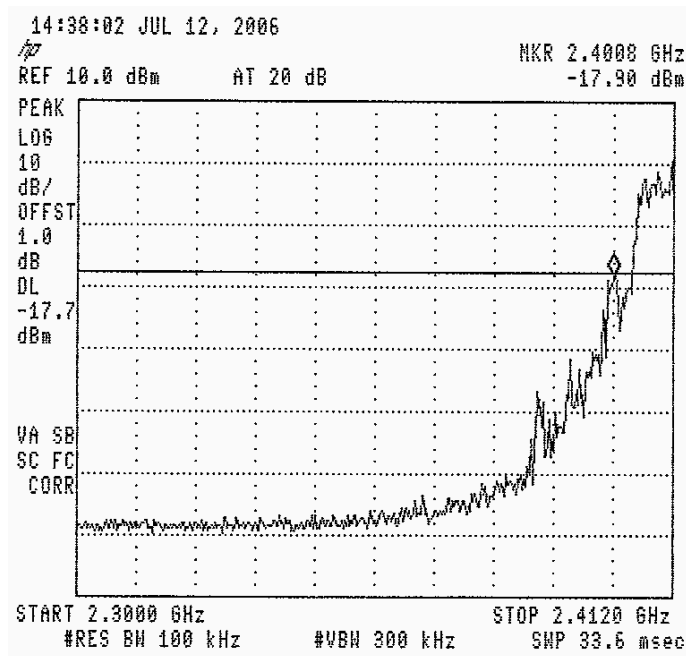


Figure 58 —2412 MHz

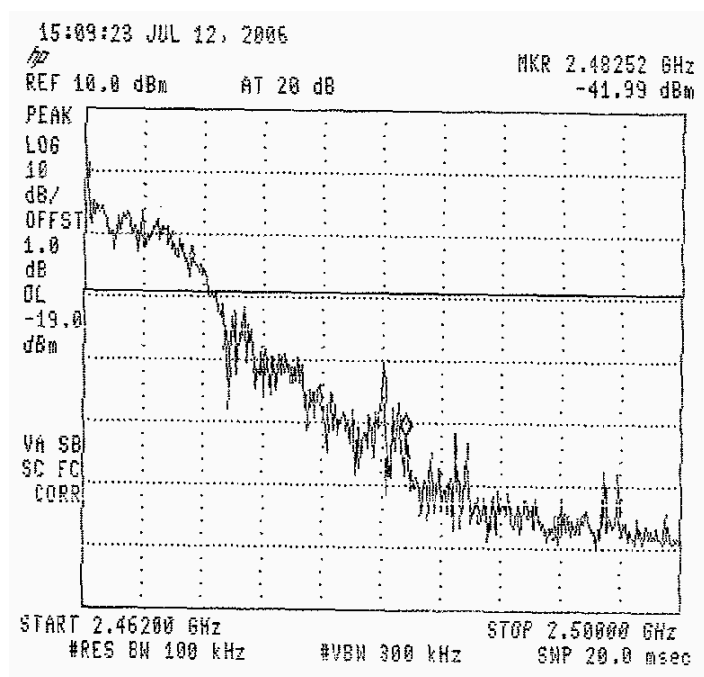


Figure 59 —2462 MHz

## 11.2 Results table

E.U.T. Description: WirePlus XTN v1.3  
 Model No.: WPG54X0 v1.3  
 Serial Number: PCP5092028  
 Specification: F.C.C. Part 15, Subpart C (15.247)

| Operation Frequency (MHz) | Band Edge (dBc) | Specification (dBc) | Margin (dBc) |
|---------------------------|-----------------|---------------------|--------------|
| 2412.00                   | 20.2            | 20                  | -0.2         |
| 2462.00                   | 43.0            | 20                  | -23.0        |

Figure 60 Band Edge Spectrum

JUDGEMENT: Passed by 0.2 dB

TEST PERSONNEL:

Tester Signature: E. Pitt

Date: 31.01.07

Typed/Printed Name: E. Pitt

### 11.3 Test Equipment Used.

Band edge Spectrum

| Instrument        | Manufacturer | Model | Serial Number | Calibration      |        |
|-------------------|--------------|-------|---------------|------------------|--------|
|                   |              |       |               | Last Calibr.     | Period |
| Spectrum Analyzer | HP           | 8592L | 3826A01204    | February 6, 2006 | 1 year |
| Cable             | Avnet        | MTS   | N/A           | February 8, 2006 | 1 year |

**Figure 61 Test Equipment Used**

## 12. Transmitted Power Density [In accordance with section 15.247(d)]

### 12.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through EXT ATT=16dB ( $2 \times 8$ dB) and an appropriate coaxial cable=1dB. The spectrum analyzer was set to 3 kHz resolution BW. 10 kHz video BW and sweep time of 1 second for each 3 kHz “window”. The spectrum peaks were located at each of the 3 operating frequencies.

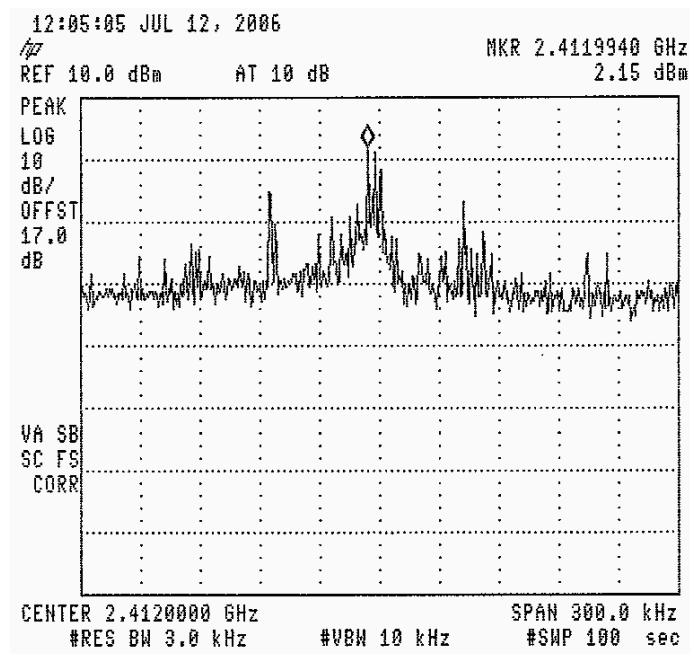


Figure 62 —2412 MHz

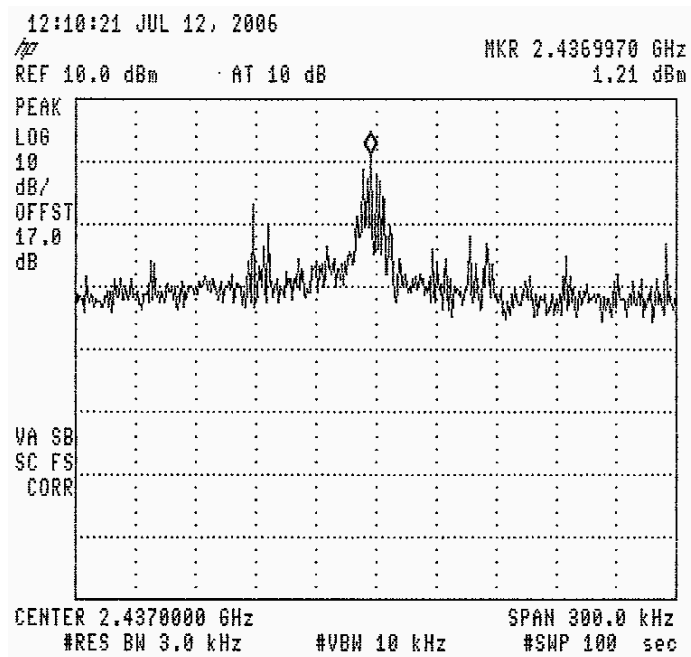


Figure 63 —2437 MHz

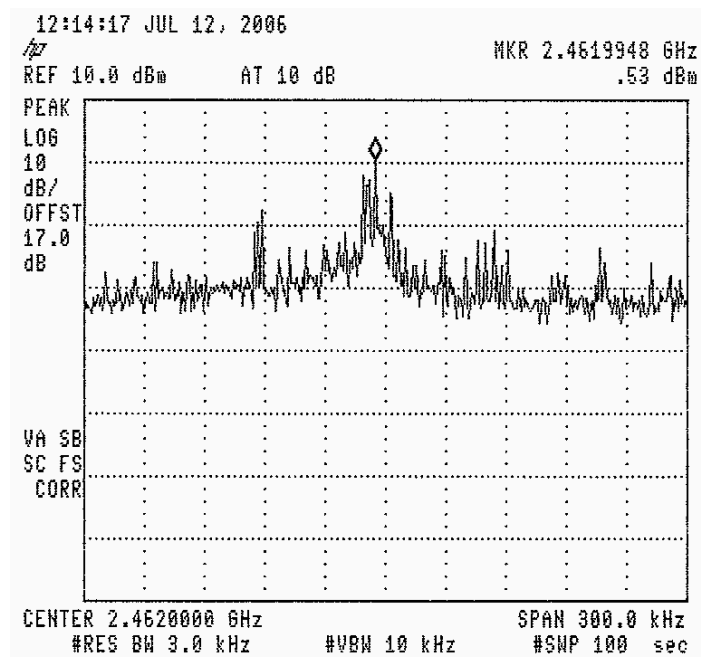


Figure 64 —2462 MHz

## 12.2 Results table

E.U.T. Description: WirePlus XTN v1.3  
 Model No.: WPG54X0 v1.3  
 Serial Number: PCP5092028  
 Specification: F.C.C. Part 15, Subpart C

| Frequency | Peak Power Density | Specification | Margin     |
|-----------|--------------------|---------------|------------|
| (MHz)     | (dBm/3kHz)         | (dBm/3kHz)    | (dBm/3kHz) |
| 2412.00   | 2.15               | 8             | -5.85      |
| 2437.00   | 1.21               | 8             | -6.79      |
| 2462.00   | 0.53               | 8             | -7.47      |

Figure 65 Test Results

JUDGEMENT: Passed by 5.85 dBm

TEST PERSONNEL:

Tester Signature: 

Date: 31.01.07

Typed/Printed Name: E. Pitt

## 12.3 Test Equipment Used.

Transmitted Power Density

| Instrument        | Manufacturer | Model       | Serial Number | Calibration      |        |
|-------------------|--------------|-------------|---------------|------------------|--------|
|                   |              |             |               | Last Calibr.     | Period |
| Spectrum Analyzer | HP           | 8592L       | 3826A01204    | February 6, 2006 | 1 year |
| Cable             | Avnet        | MTS         | N/A           | February 8, 2006 | 1 year |
| Attenuator        | MACOM        | M3933/25-74 | 0056          | October 10, 2005 | 1 year |
| Attenuator        | MACOM        | M3933/25-74 | 0202          | October 10, 2005 | 1 year |

Figure 66 Test Equipment Used

## 13. Antenna Gain

The antenna gain is  $\leq 2.0$  dBi.

### ELECTRICAL SPECIFICATION

- |                              |                                                                            |
|------------------------------|----------------------------------------------------------------------------|
| 1. ANTENNA TYPE              | : Dipole Antenna                                                           |
| 2. FREQUENCY RANGE           | : $2.45\text{GHz} \pm 50\text{MHz}$<br>( $\varnothing 1.13$ 100mm + I-PEX) |
| 3. IMPEDANCE                 | : 50 Ohms                                                                  |
| 4. GAIN                      | : $\leq 2.0$ dBi                                                           |
| 5. VSWR                      | : $\leq 2.0$                                                               |
| 6. ADMITTED POWER RADIATION: | 3W                                                                         |
| 7. TYPE OF RADIATION         | : Toroidal                                                                 |
| 8. POLARIZATION              | : Vertical                                                                 |
| 9. ELECTRICAL LENGTH         | : $1/4 \lambda$ Dipole                                                     |

## 14. R.F Exposure/Safety

The E.U.T. is a fixed installation transmitter. The typical distance between the E.U.T. and the general population is 0.5 meters.

Calculation of Maximum Permissible Exposure (MPE)

Based on Section 1.1307(b)(1) Requirements

(a) FCC limits at 2462 MHz is:  $1 \frac{mW}{cm^2}$

Using table 1 of Section 1.1310 limit for general population/uncontrolled exposures, the above level is an average over 30 minutes.

(b) The power density produced by the E.U.T. is

$$S = \frac{P_t G_t}{4\pi R^2}$$

$P_t$ - Transmitted Power 100mW (Peak)

$G_t$ - Antenna Gain, 2 dBi= 1.58

$R$ - Distance from Transmitter using 20cm worst case

(c) The peak power density is :

$$S_p = \frac{100 \times 1.58}{4\pi(20)^2} = 0.031 \frac{mW}{cm^2}$$

(d) The E.U.T. transmission in actual worst case is 100%.

The average power over 30 minutes is:

$$P_{AV} = 100mW$$

(e) The averaged power density of the E.U.T. is:

$$S_{AV} = 0.031 \frac{mW}{cm^2}$$

(f) This is 2 orders of magnitude below the FCC limit.

## 15. Conducted Emission From AC Mains Test Data Per FCC Part 15 Sub-part B

### 15.1 Test Specification

FCC, Part 15, Subpart B: Class B

### 15.2 Test Procedure

The E.U.T operation mode and test set-up are as described in Section 4. In order to minimize background noise interference, the conducted emission testing was performed inside a shielded room, with the E.U.T placed on an 0.8 meter high wooden table, 0.4 meter from the room's vertical wall.

The E.U.T was powered from 115 V AC / 60 Hz via 50 Ohm / 50  $\mu$ Hn Line Impedance Stabilization Network (LISN) on the phase and neutral lines. The LISN's were grounded to the shielded room ground plane (floor), and were kept at least 0.8 meters from the nearest boundary of the E.U.T

The center of the E.U.T AC cable was folded back and forth, in order to form a bundle less than 0.40 meters and a total cable length of 1 meter.

The effect of varying the position of the cables was investigated to find the configuration that produces maximum emission.

The emission voltages at the LISN's outputs were measured using a computerized receiver, complying with CISPR 16 requirements. The specification limits are loaded to the receiver via a 3.5" floppy disk and are displayed on the receiver's spectrum display.

A frequency scan between 0.15 and 30 MHz was performed at 9 kHz I.F. band width, and using peak detection.

The spectral components having the highest level on each line were measured using a quasi-peak and average detector.

### 15.3 Test Data

JUDGEMENT: Passed by 12.0 dB

The margin between the emission levels and the specification limit is, in the worst case, 12.0 dB for the phase line at 20.00 MHz and 13.6 dB at 20.00 MHz for the neutral line.

The EUT met the FCC Part 15, Subpart B, Class B specification requirements. The details of the highest emissions are given in *Figure 67* to *Figure 72*.

TEST PERSONNEL:

Tester Signature: 

Date: 31.01.07

Typed/Printed Name: E. Pitt

## Conducted Emission

E.U.T Description WirePlus XTN v1.3  
 Type WPG54X0 v1.3  
 Serial Number: PCP5092028

Specification: FCC Part 15, Subpart B, Class **B**  
 Lead: Phase  
 Detectors: Peak, Quasi-peak, Average

| Frequency<br>(MHz) | Peak<br>Amplitude<br>(dB $\mu$ V) | Quasi-peak<br>Amplitude<br>(dB $\mu$ V) | Specification<br>(dB $\mu$ V) | Pass/Fail | Margin<br>(dB) |
|--------------------|-----------------------------------|-----------------------------------------|-------------------------------|-----------|----------------|
| 0.17               | 50.2                              | 49.2                                    | 64.8                          | Pass      | -15.6          |
| 0.23               | 43.9                              | 42.7                                    | 62.4                          | Pass      | -19.7          |
| 0.29               | 38.1                              | 36.8                                    | 60.6                          | Pass      | -23.8          |
| 0.35               | 35.1                              | 33.8                                    | 59.0                          | Pass      | -25.2          |
| 14.00              | 39.6                              | 34.0                                    | 60.0                          | Pass      | -26.0          |
| 20.00              | 43.1                              | 41.3                                    | 60.0                          | Pass      | -18.7          |

**Figure 67. Conducted Emission: PHASE. Detectors: Peak, QUASI-PEAK**

| Frequency<br>(MHz) | Peak<br>Amplitude<br>(dB $\mu$ V) | Average<br>Amplitude<br>(dB $\mu$ V) | Specification<br>(dB $\mu$ V) | Pass/Fail | Margin<br>(dB) |
|--------------------|-----------------------------------|--------------------------------------|-------------------------------|-----------|----------------|
| 0.17               | 50.2                              | 36.3                                 | 54.8                          | Pass      | -18.5          |
| 0.23               | 43.9                              | 32.2                                 | 52.4                          | Pass      | -20.2          |
| 0.29               | 38.1                              | 28.9                                 | 50.6                          | Pass      | -21.7          |
| 0.35               | 35.1                              | 28.3                                 | 49.1                          | Pass      | -20.8          |
| 14.00              | 39.6                              | 26.7                                 | 50.0                          | Pass      | -23.3          |
| 20.00              | 43.1                              | 38.0                                 | 50.0                          | Pass      | -12.0          |

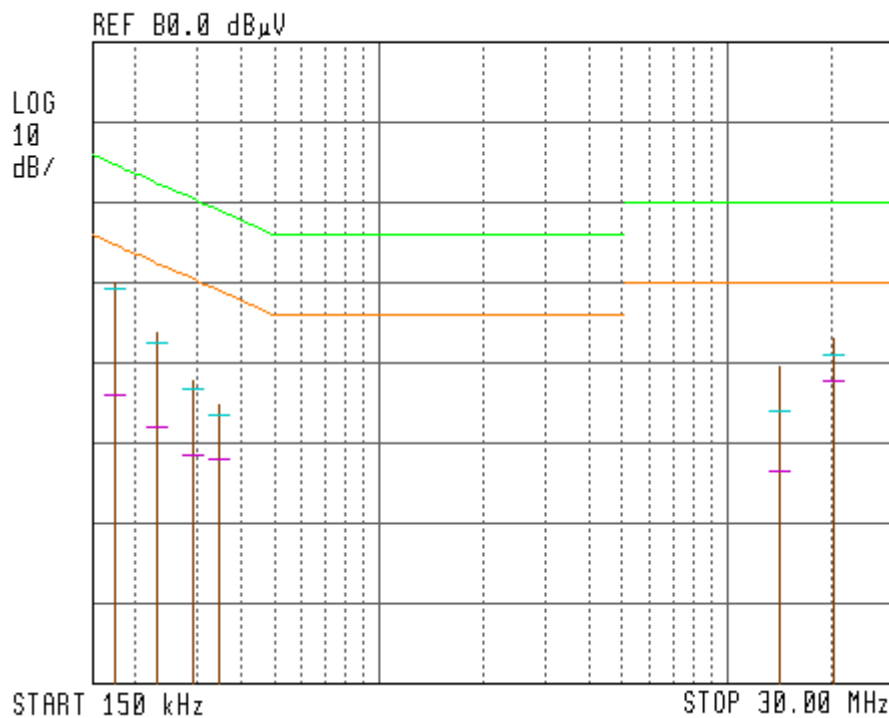
**Figure 68. Detectors: Peak, AVERAGE .**

# Conducted Emission

E.U.T Description WirePlus XTN v1.3  
 Type WPG54X0 v1.3  
 Serial Number: PCP5092028

Specification: FCC Part 15, Subpart B, Class B  
 Lead: Phase  
 Detectors: Peak, Quasi-peak, Average

18:56:08 JUL 17, 2006



**Figure 69. Detectors: Peak, Quasi-peak, Average**

**Notes:**

1. Horizontal axis shows logarithmic frequency scale.
2. The vertical axis shows amplitude (in dB  $\mu$ V).
3. Peak detection is designated by the top of each vertical line.
4. Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.
5. Average detection is designated by the second dash mark (from the top) of each vertical line.

## Conducted Emission

E.U.T Description WirePlus XTN v1.3  
 Type WPG54X0 v1.3  
 Serial Number: PCP5092028

Specification: FCC Part 15, Subpart B, Class **B**  
 Lead: Neutral  
 Detectors: Peak, Quasi-peak, Average

| Frequency<br>(MHz) | Peak<br>Amplitude<br>(dB $\mu$ V) | Quasi-peak<br>Amplitude<br>(dB $\mu$ V) | Specification<br>(dB $\mu$ V) | Pass/Fail | Margin<br>(dB) |
|--------------------|-----------------------------------|-----------------------------------------|-------------------------------|-----------|----------------|
| 0.17               | 51.4                              | 50.3                                    | 64.8                          | Pass      | -14.5          |
| 0.23               | 45.1                              | 43.8                                    | 62.3                          | Pass      | -18.5          |
| 0.29               | 38.8                              | 37.5                                    | 60.5                          | Pass      | -23.0          |
| 0.35               | 36.1                              | 34.6                                    | 59.0                          | Pass      | -24.4          |
| 13.90              | 37.8                              | 32.3                                    | 60.0                          | Pass      | -27.7          |
| 20.00              | 41.9                              | 40.1                                    | 60.0                          | Pass      | -19.9          |

**Figure 70. Detectors: Peak, QUASI-PEAK**

| Frequency<br>(MHz) | Peak<br>Amplitude<br>(dB $\mu$ V) | Average<br>Amplitude<br>(dB $\mu$ V) | Specification<br>(dB $\mu$ V) | Pass/Fail | Margin<br>(dB) |
|--------------------|-----------------------------------|--------------------------------------|-------------------------------|-----------|----------------|
| 0.17               | 51.4                              | 37.0                                 | 54.8                          | Pass      | -17.8          |
| 0.23               | 45.1                              | 30.9                                 | 52.4                          | Pass      | -21.5          |
| 0.29               | 38.8                              | 28.3                                 | 50.5                          | Pass      | -22.2          |
| 0.35               | 36.1                              | 26.4                                 | 49.1                          | Pass      | -22.7          |
| 13.90              | 37.8                              | 26.1                                 | 50.0                          | Pass      | -23.9          |
| 20.00              | 41.9                              | 36.4                                 | 50.0                          | Pass      | -13.6          |

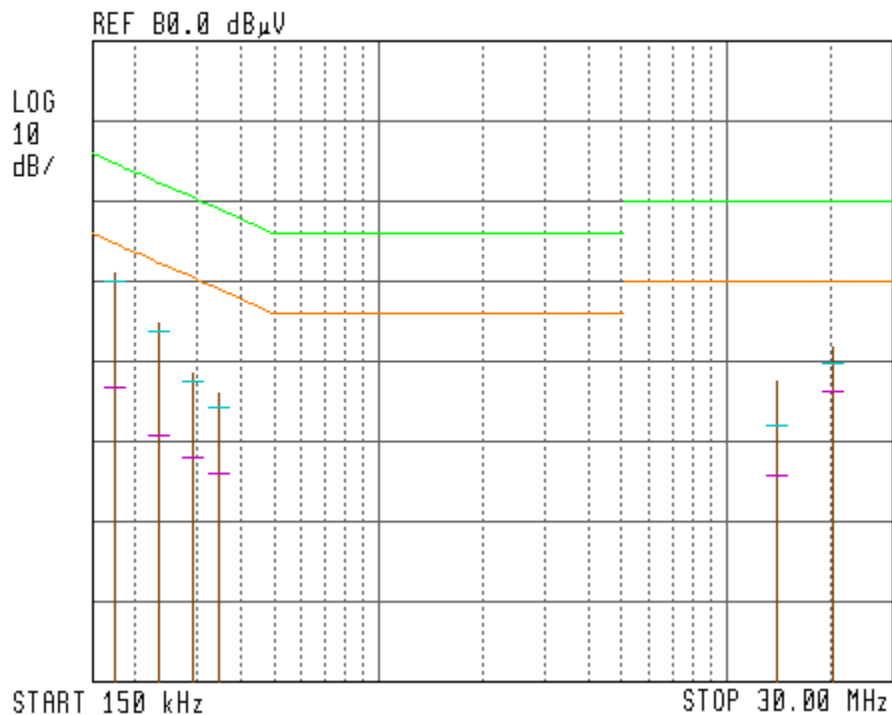
**Figure 71. Detectors: Peak, AVERAGE**

# Conducted Emission

E.U.T Description WirePlus XTN v1.3  
 Type WPG54X0 v1.3  
 Serial Number: PCP5092028

Specification: FCC Part 15, Subpart B, Class **B**  
 Lead: Neutral  
 Detectors: Peak, Quasi-peak, Average

 19:07:06 JUL 17, 2006



**Figure 72 Conducted Emission: NEUTRAL**  
**Detectors: Peak, Quasi-peak, Average**

## Notes:

1. Horizontal axis shows logarithmic frequency scale.
2. The vertical axis shows amplitude (in dB  $\mu$ V).
3. Peak detection is designated by the top of each vertical line.
4. Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.
5. Average detection is designated by the second dash mark (from the top) of each vertical line.

#### 15.4 Test Instrumentation Used, Conducted Measurement

| Instrument | Manufacturer | Model         | Serial No.    | Calibration    | Period |
|------------|--------------|---------------|---------------|----------------|--------|
| LISN       | Fischer      | FCC-LISN-2A   | 127           | March 20, 2006 | 1 year |
| LISN       | Fischer      | FCC-LISN-2A   | 128           | March 20, 2006 | 1 year |
| Receiver   | HP           | 85420E/85422E | 3427A00103/34 | March 22, 2006 | 1 year |
| Printer    | HP           | ThinkJet2225  | 2738508357    | N/A            | N/A    |

## 16. Radiated Emission Test Data Per FCC Part 15 Sub-part B

### 16.1 Test Specification

30-1000 MHz, FCC Part 15, Subpart B, CLASS B

### 16.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 4.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The effect of varying the position of the cables was investigated to find the configuration that produces maximum emission. The configuration tested is shown in *Figure 3*.

The E.U.T. highest frequency source or used frequency is 20 MHz.

The frequency range 30-1000 MHz was scanned, and the list of the highest emissions was verified and updated accordingly.

The emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.

Verification of the E.U.T emissions was based on the following methods:

- Turning the E.U.T on and off.

- Using a frequency span less than 10 MHz.

- Observation of the signal level during turntable rotation. Background noise is not affected by the rotation of the E.U.T.

The emissions were measured at a distance of 3 meters.

### 16.3 Test Data

JUDGEMENT: Passed by 10.6 dB

The EUT met the requirements of the F.C.C. Part 15, Subpart B, specification.

The margin between the emission level and the specification limit is 10.6 dB in the worst case at the frequency of 40.00 MHz, vertical polarization.

The details of the highest emissions are given in Figure 73 to Figure 76.

TEST PERSONNEL:

Tester Signature: 

Date: 31.01.07

Typed/Printed Name: E. Pitt

## Radiated Emission

E.U.T Description WirePlus XTN v1.3  
 Type WPG54X0 v1.3  
 Serial Number: PCP5092028

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal  
 Antenna: 3 meters distance

Frequency range: 30 MHz to 1000 MHz  
 Detectors: Peak, Quasi-peak

| Frequency | Peak Amp       | QP Amp         | Correction | Specification  | Margin |
|-----------|----------------|----------------|------------|----------------|--------|
| (MHz)     | (dB $\mu$ V/m) | (dB $\mu$ V/m) | (dB)       | (dB $\mu$ V/m) | (dB)   |
| 40.00     | 31.4           | 28.5           | 12.8       | 40.0           | -11.5  |
| 200.00    | 38.9           | 29.0           | 17.1       | 43.5           | -14.5  |
| 360.00    | 35.4           | 30.5           | 17.7       | 46.0           | -15.5  |
| 440.00    | 36.8           | 32.0           | 19.6       | 46.0           | -14.0  |
| 520.00    | 37.5           | 32.1           | 21.1       | 46.0           | -13.9  |
| 600.00    | 34.2           | 29.7           | 23.9       | 46.0           | -16.3  |

**Figure 73. Radiated Emission. Antenna Polarization: HORIZONTAL.  
 Detectors: Peak, Quasi-peak**

*Note: Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.*

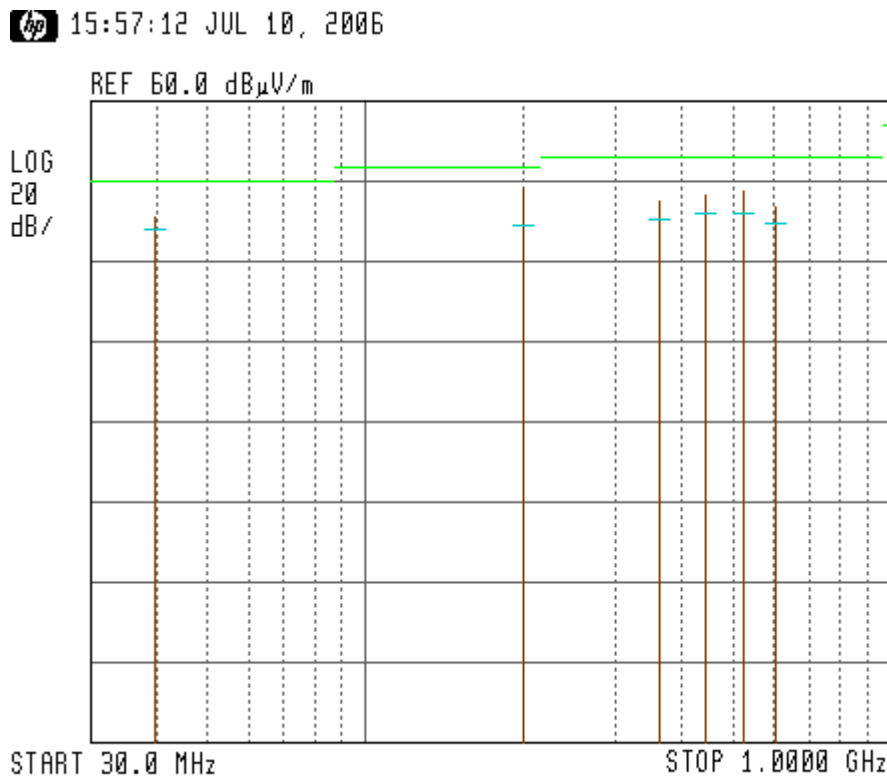
# Radiated Emission

E.U.T Description WirePlus XTN v1.3  
Type WPG54X0 v1.3  
Serial Number: PCP5092028

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal  
Antenna: 3 meters distance

Frequency range: 30 MHz to 1000 MHz  
Detectors: Peak, Quasi-peak



**Figure 74. Radiated Emission. Antenna Polarization: HORIZONTAL  
Detectors: Peak, Quasi-peak**

*Note:*

1. Horizontal axis shows logarithmic frequency scale.
2. The vertical axis shows amplitude (in dB  $\mu$ V/m).
3. Peak detection is designated by the top of each vertical line.
4. Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.

## Radiated Emission

E.U.T Description WirePlus XTN v1.3  
 Type WPG54X0 v1.3  
 Serial Number: PCP5092028

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical  
 Antenna: 3 meters distance

Frequency range: 30 MHz to 1000 MHz  
 Detectors: Peak, Quasi-peak

| Frequency | Peak Amp       | QP Amp         | Correction | Specification  | Margin |
|-----------|----------------|----------------|------------|----------------|--------|
| (MHz)     | (dB $\mu$ V/m) | (dB $\mu$ V/m) | (dB)       | (dB $\mu$ V/m) | (dB)   |
| 40.00     | 32.2           | 29.4           | 12.8       | 40.0           | -10.6  |
| 120.01    | 30.5           | 25.4           | 13.3       | 43.5           | -18.1  |
| 200.00    | 35.8           | 28.5           | 17.1       | 43.5           | -15.0  |
| 280.00    | 39.6           | 32.9           | 21.6       | 46.0           | -13.1  |
| 520.00    | 38.5           | 32.6           | 21.1       | 46.0           | -13.4  |
| 600.00    | 34.8           | 30.7           | 23.9       | 46.0           | -15.3  |

**Figure 75. Radiated Emission. Antenna Polarization: VERTICAL.  
 Detectors: Peak, Quasi-peak**

*Note: Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.*

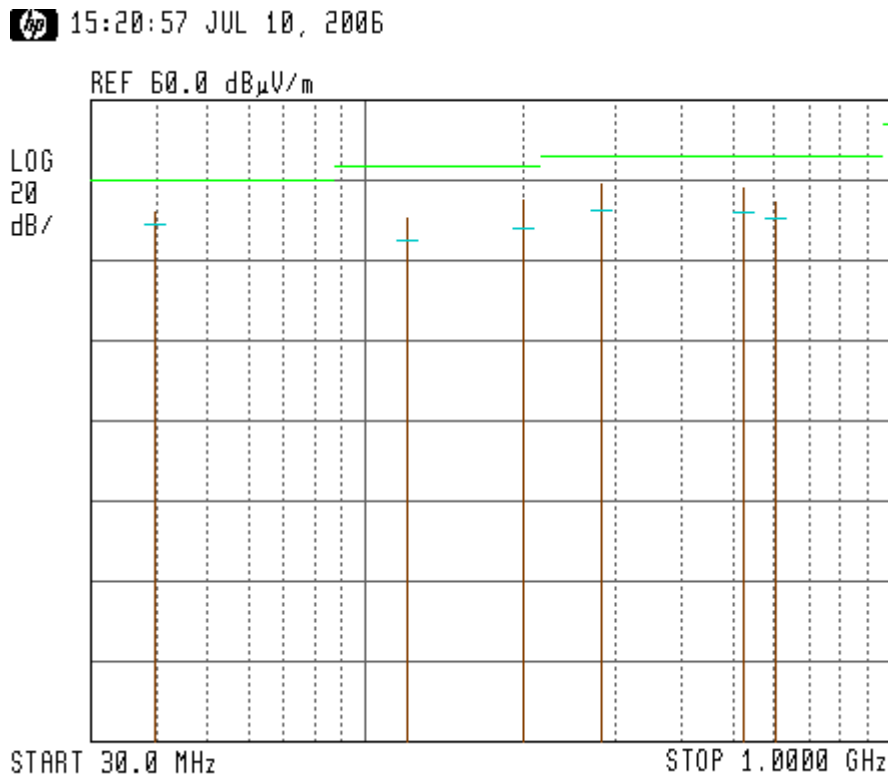
# Radiated Emission

E.U.T Description WirePlus XTN v1.3  
 Type WPG54X0 v1.3  
 Serial Number: PCP5092028

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical  
 Antenna: 3 meters distance

Frequency range: 30 MHz to 1000 MHz  
 Detectors: Peak, Quasi-peak



**Figure 76. Radiated Emission. Antenna Polarization: VERTICAL.  
 Detectors: Peak, Quasi-peak**

*Note:*

1. Horizontal axis shows logarithmic frequency scale.
2. The vertical axis shows amplitude (in dB  $\mu$ V/m).
3. Peak detection is designated by the top of each vertical line.
4. Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.

#### 16.4 Test Instrumentation Used, Radiated Measurements

| Instrument                           | Manufacturer    | Model            | Serial Number | Calibration       | Period |
|--------------------------------------|-----------------|------------------|---------------|-------------------|--------|
| EMI Receiver                         | HP              | 85422E           | 3411A00102    | March 22, 2006    | 1 year |
| RF Section                           | HP              | 85420E           | 3427A00103    | March 22, 2006    | 1 year |
| Antenna Bioconical                   | ARA             | BCD 235/B        | 1041          | March 19, 2006    | 1 year |
| Antenna Log Periodic                 | ARA             | LPD-2010/A       | 1038          | November 17, 2005 | 1 year |
| Antenna-Log Periodic                 | A.H.System      | SAS-200/511      | 253           | January 24, 2005  | 2 year |
| Double Ridged Waveguide Horn Antenna | EMCO            | 3115             | 29845         | March 15, 2006    | 2 year |
| Horn Antenna                         | ARA             | SWH-28           | 1007          | October 28, 2005  | 2 year |
| Horn Antenna                         | Narda           | V637             | 0410          | November 19, 2004 | 2 year |
| Low Noise Amplifier                  | DBS MICROWAVE   | LNA-DBS-0411N313 | 013           | October 16, 2005  | 1 year |
| Low Noise Amplifier                  | Sophia Wireless | LNA28-B          | 232           | February 8, 2006  | 1 year |
| Spectrum Analyzer                    | HP              | 8592L            | 3926A01204    | February 6, 2006  | 1 year |
| Spectrum Analyzer                    | HP              | 8564E            | 3442A00275    | February 1, 2006  | 1 year |
| Antenna Mast                         | ARA             | AAM-4A           | 1001          | N/A               | N/A    |
| Turntable                            | ARA             | ART-1001/4       | 1001          | N/A               | N/A    |
| Mast & Table Controller              | ARA             | ACU-2/5          | 1001          | N/A               | N/A    |
| Printer                              | HP              | ThinkJet 2225    | 2738508357.0  | N/A               | N/A    |

## **16.5 Field Strength Calculation**

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$FS = RA + AF + CF$$

|     |                                            |
|-----|--------------------------------------------|
| FS: | Field Strength [dB $\mu$ v/m]              |
| RA: | Receiver Amplitude [dB $\mu$ v]            |
| AF: | Receiving Antenna Correction Factor [dB/m] |
| CF: | Cable Attenuation Factor [dB]              |

No external pre-amplifiers are used.

## 17. Photographs of Tested E.U.T.



Figure 77 Front View



Figure 78 Front View



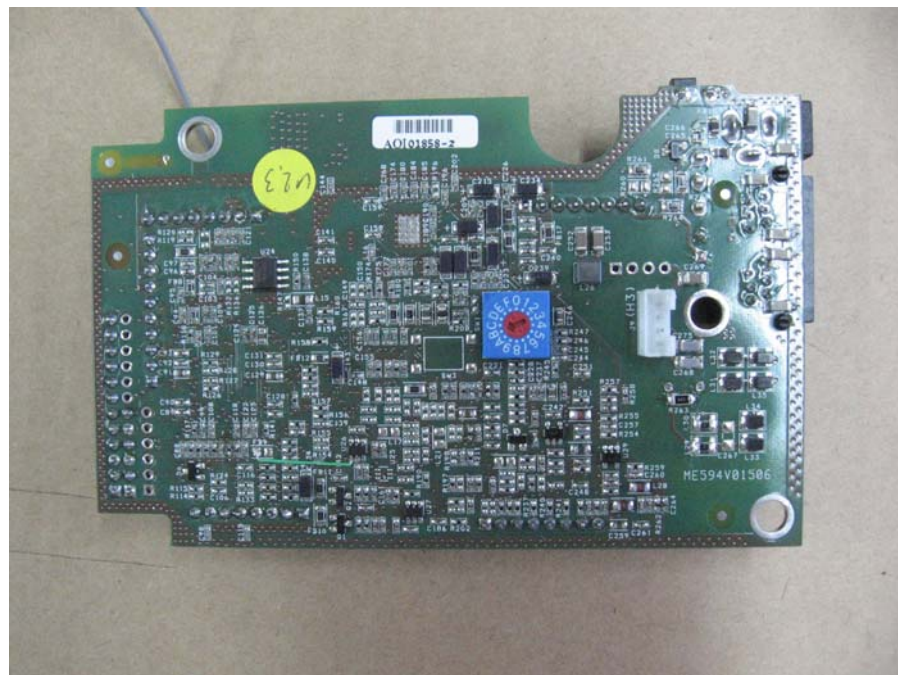
**Figure 79 Rear View**



**Figure 80 Top Cover Internal**



**Figure 81 PCB in Cover**



**Figure 82 PCB Print Side**

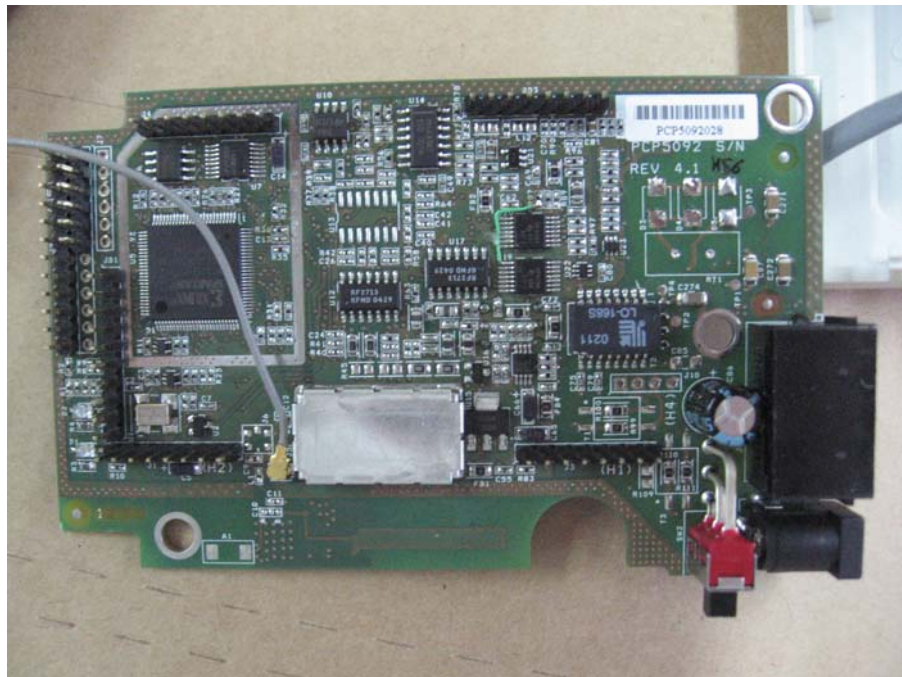


Figure 83 PCB Component Side

## 18. APPENDIX A - CORRECTION FACTORS

### 18.1 Correction factors for CABLE

from EMI receiver  
to test antenna  
at 3 meter range.

| FREQUENCY<br>(MHz) | CORRECTION<br>FACTOR<br>(dB) | FREQUENCY<br>(MHz) | CORRECTION<br>FACTOR<br>(dB) |
|--------------------|------------------------------|--------------------|------------------------------|
| 10.0               | 0.3                          | 1200.0             | 7.3                          |
| 20.0               | 0.6                          | 1400.0             | 7.8                          |
| 30.0               | 0.8                          | 1600.0             | 8.4                          |
| 40.0               | 0.9                          | 1800.0             | 9.1                          |
| 50.0               | 1.1                          | 2000.0             | 9.9                          |
| 60.0               | 1.2                          | 2300.0             | 11.2                         |
| 70.0               | 1.3                          | 2600.0             | 12.2                         |
| 80.0               | 1.4                          | 2900.0             | 13.0                         |
| 90.0               | 1.6                          |                    |                              |
| 100.0              | 1.7                          |                    |                              |
| 150.0              | 2.0                          |                    |                              |
| 200.0              | 2.3                          |                    |                              |
| 250.0              | 2.7                          |                    |                              |
| 300.0              | 3.1                          |                    |                              |
| 350.0              | 3.4                          |                    |                              |
| 400.0              | 3.7                          |                    |                              |
| 450.0              | 4.0                          |                    |                              |
| 500.0              | 4.3                          |                    |                              |
| 600.0              | 4.7                          |                    |                              |
| 700.0              | 5.3                          |                    |                              |
| 800.0              | 5.9                          |                    |                              |
| 900.0              | 6.3                          |                    |                              |
| 1000.0             | 6.7                          |                    |                              |

#### NOTES:

1. The cable type is RG-214.
2. The overall length of the cable is 27 meters.
3. The above data is located in file 27MO3MO.CBL on the disk marked "Radiated Emission Tests EMI Receiver".

## 18.2 Correction factors for

## CABLE

from EMI receiver  
to test antenna  
at 3 meter range.

| FREQUENCY<br>(GHz) | CORRECTION<br>FACTOR<br>(dB) |
|--------------------|------------------------------|
| 1.0                | 1.2                          |
| 2.0                | 1.6                          |
| 3.0                | 2.0                          |
| 4.0                | 2.4                          |
| 5.0                | 3.0                          |
| 6.0                | 3.4                          |
| 7.0                | 3.8                          |
| 8.0                | 4.2                          |
| 9.0                | 4.6                          |
| 10.0               | 5.0                          |
| 12.0               | 5.8                          |

### NOTES:

1. The cable type is RG-8.
2. The overall length of the cable is 10 meters.

### 18.3 Correction factors for

### CABLE

from spectrum analyzer  
to test antenna above 2.9 GHz

| FREQUENCY<br>(GHz) | CORRECTION<br>FACTOR<br>(dB) | FREQUENCY<br>(GHz) | CORRECTION<br>FACTOR<br>(dB) |
|--------------------|------------------------------|--------------------|------------------------------|
| 1.0                | 1.9                          | 14.0               | 9.1                          |
| 2.0                | 2.7                          | 15.0               | 9.5                          |
| 3.0                | 3.5                          | 16.0               | 9.9                          |
| 4.0                | 4.2                          | 17.0               | 10.2                         |
| 5.0                | 4.9                          | 18.0               | 10.4                         |
| 6.0                | 5.5                          | 19.0               | 10.7                         |
| 7.0                | 6.0                          | 20.0               | 10.9                         |
| 8.0                | 6.5                          | 21.0               | 11.2                         |
| 9.0                | 7.0                          | 22.0               | 11.6                         |
| 10.0               | 7.5                          | 23.0               | 11.9                         |
| 11.0               | 7.9                          | 24.0               | 12.3                         |
| 12.0               | 8.3                          | 25.0               | 12.6                         |
| 13.0               | 8.7                          | 26.0               | 13.0                         |

#### NOTES:

1. The cable type is SUCOFLEX 104 E manufactured by SUHNER.
2. The cable is used for measurements above 2.9 GHz.
3. The overall length of the cable is 10 meters.

## 12.6 Correction factors for LOG PERIODIC ANTENNA

**Type LPD 2010/A  
at 3 and 10 meter ranges.**

**Distance of 3 meters**

| <b>FREQUENCY</b><br>(MHz) | <b>AFE</b><br>(dB/m) |
|---------------------------|----------------------|
| 200.0                     | 9.1                  |
| 250.0                     | 10.2                 |
| 300.0                     | 12.5                 |
| 400.0                     | 15.4                 |
| 500.0                     | 16.1                 |
| 600.0                     | 19.2                 |
| 700.0                     | 19.4                 |
| 800.0                     | 19.9                 |
| 900.0                     | 21.2                 |
| 1000.0                    | 23.5                 |

**Distance of 10 meters**

| <b>FREQUENCY</b><br>(MHz) | <b>AFE</b><br>(dB/m) |
|---------------------------|----------------------|
| 200.0                     | 9.0                  |
| 250.0                     | 10.1                 |
| 300.0                     | 11.8                 |
| 400.0                     | 15.3                 |
| 500.0                     | 15.6                 |
| 600.0                     | 18.7                 |
| 700.0                     | 19.1                 |
| 800.0                     | 20.2                 |
| 900.0                     | 21.1                 |
| 1000.0                    | 23.2                 |

### NOTES:

1. Antenna serial number is 1038.
2. The above lists are located in file number 38M30.ANT for a 3 meter range,  
and file number 38M100.ANT for a 10 meter range.
3. The files mentioned above are located on the disk marked "Radiated Emission  
Test EMI Receiver".

**12.7 Correction factors for LOG PERIODIC ANTENNA**  
**Type SAS-200/511**  
**at 3 meter range.**

| FREQUENCY<br>(GHz) | ANTENNA<br>FACTOR<br>(dB) |
|--------------------|---------------------------|
| 1.0                | 24.9                      |
| 1.5                | 27.8                      |
| 2.0                | 29.9                      |
| 2.5                | 31.2                      |
| 3.0                | 32.8                      |
| 3.5                | 33.6                      |
| 4.0                | 34.3                      |
| 4.5                | 35.2                      |
| 5.0                | 36.2                      |
| 5.5                | 36.7                      |
| 6.0                | 37.2                      |
| 6.5                | 38.1                      |

| FREQUENCY<br>(GHz) | ANTENNA<br>FACTOR<br>(dB) |
|--------------------|---------------------------|
| 7.0                | 38.6                      |
| 7.5                | 39.2                      |
| 8.0                | 39.9                      |
| 8.5                | 40.4                      |
| 9.0                | 40.8                      |
| 9.5                | 41.1                      |
| 10.0               | 41.7                      |
| 10.5               | 42.4                      |
| 11.0               | 42.5                      |
| 11.5               | 43.1                      |
| 12.0               | 43.4                      |
| 12.5               | 44.4                      |
| 13.0               | 44.6                      |

**NOTES:**

1. Antenna serial number is 253.
2. The above lists are located in file number SAS3M0.ANT for a 3 meter range.
3. The files mentioned above are located on the disk marked "Antenna Factors".

**18.8 Correction factors for BICONICAL ANTENNA**  
**Type BCD-235/B,**  
**at 3 meter range**

| FREQUENCY<br>(MHz) | AFE<br>(dB/m) |
|--------------------|---------------|
| 20.0               | 19.4          |
| 30.0               | 14.8          |
| 40.0               | 11.9          |
| 50.0               | 10.2          |
| 60.0               | 9.1           |
| 70.0               | 8.5           |
| 80.0               | 8.9           |
| 90.0               | 9.6           |
| 100.0              | 10.3          |
| 110.0              | 11.0          |
| 120.0              | 11.5          |
| 130.0              | 11.7          |
| 140.0              | 12.1          |
| 150.0              | 12.6          |
| 160.0              | 12.8          |
| 170.0              | 13.0          |
| 180.0              | 13.5          |
| 190.0              | 14.0          |
| 200.0              | 14.8          |
| 210.0              | 15.3          |
| 220.0              | 15.8          |
| 230.0              | 16.2          |
| 240.0              | 16.6          |
| 250.0              | 17.6          |
| 260.0              | 18.2          |
| 270.0              | 18.4          |
| 280.0              | 18.7          |
| 290.0              | 19.2          |
| 300.0              | 19.9          |
| 310                | 20.7          |
| 320                | 21.9          |
| 330                | 23.4          |
| 340                | 25.1          |
| 350                | 27.0          |

**NOTES:**

1. Antenna serial number is 1041.
2. The above list is located in file 19BC10M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver".

### 18.9 Correction factors for Double-Ridged Waveguide Horn

**Model: 3115, S/N 29845  
at 3 meter range.**

| FREQUENCY<br>(GHz) | ANTENNA<br>FACTOR<br>(dB 1/m) | ANTENNA<br>Gain<br>(dBi) | FREQUENCY<br>(GHz) | ANTENNA<br>FACTOR<br>(dB 1/m) | ANTENNA<br>Gain<br>(dBi) |
|--------------------|-------------------------------|--------------------------|--------------------|-------------------------------|--------------------------|
| 1.0                | 24.8                          | 5.4                      | 10.0               | 38.8                          | 11.4                     |
| 1.5                | 26.1                          | 7.6                      | 10.5               | 38.9                          | 11.8                     |
| 2.0                | 28.6                          | 7.7                      | 11.0               | 39.0                          | 12.1                     |
| 2.5                | 29.8                          | 8.4                      | 11.5               | 39.6                          | 11.8                     |
| 3.0                | 31.4                          | 8.4                      | 12.0               | 39.8                          | 12.0                     |
| 3.5                | 32.4                          | 8.7                      | 12.5               | 39.6                          | 12.5                     |
| 4.0                | 33.7                          | 8.6                      | 13.0               | 40.0                          | 12.5                     |
| 4.5                | 33.4                          | 9.9                      | 13.5               | 39.8                          | 13.0                     |
| 5.0                | 34.5                          | 9.7                      | 14.0               | 40.2                          | 13.0                     |
| 5.5                | 35.1                          | 9.9                      | 14.5               | 40.6                          | 12.9                     |
| 6.0                | 35.4                          | 10.4                     | 15.0               | 41.3                          | 12.4                     |
| 6.5                | 35.6                          | 10.8                     | 15.5               | 39.5                          | 14.6                     |
| 7.0                | 36.2                          | 10.9                     | 16.0               | 38.8                          | 15.5                     |
| 7.5                | 37.3                          | 10.4                     | 16.5               | 40.0                          | 14.6                     |
| 8.0                | 37.7                          | 10.6                     | 17.0               | 41.4                          | 13.4                     |
| 8.5                | 38.3                          | 10.5                     | 17.5               | 44.8                          | 10.3                     |
| 9.0                | 38.5                          | 10.8                     | 18.0               | 47.2                          | 8.1                      |
| 9.5                | 38.7                          | 11.1                     |                    |                               |                          |

### 18.10 Correction factors for

**Horn Antenna**  
**Model: SWH-28**  
**at 1 meter range.**

| <b>FREQUENCY</b><br>(GHz) | <b>AFE</b><br>(dB /m) | <b>Gain</b><br>(dB1) |
|---------------------------|-----------------------|----------------------|
| 18.0                      | 40.3                  | 16.1                 |
| 19.0                      | 40.3                  | 16.3                 |
| 20.0                      | 40.3                  | 16.1                 |
| 21.0                      | 40.3                  | 16.3                 |
| 22.0                      | 40.4                  | 16.8                 |
| 23.0                      | 40.5                  | 16.4                 |
| 24.0                      | 40.5                  | 16.6                 |
| 25.0                      | 40.5                  | 16.7                 |
| 26.0                      | 40.6                  | 16.4                 |

### 18.11 Correction factors for

### Horn Antenna Model: V637

| FREQUENCY<br>(GHz) | AFE<br>(dB /m) | Gain<br>(dB1) |
|--------------------|----------------|---------------|
| 26.0               | 43.6           | 14.9          |
| 27.0               | 43.7           | 15.1          |
| 28.0               | 43.8           | 15.3          |
| 29.0               | 43.9           | 15.5          |
| 30.0               | 43.9           | 15.8          |
| 31.0               | 44.0           | 16.0          |
| 32.0               | 44.1           | 16.2          |
| 33.0               | 44.1           | 16.4          |
| 34.0               | 44.1           | 16.7          |
| 35.0               | 44.2           | 16.9          |
| 36.0               | 44.2           | 17.1          |
| 37.0               | 44.2           | 17.4          |
| 38.0               | 44.2           | 17.6          |
| 39.0               | 44.2           | 17.8          |
| 40.0               | 44.2           | 18.0          |

## 18.12 Correction factors for ACTIVE LOOP ANTENNA

**Model 6502**

**S/N 9506-2950**

| FREQUENCY | Magnetic<br>Antenna<br>Factor | Electric<br>Antenna<br>Factor |
|-----------|-------------------------------|-------------------------------|
| (MHz)     | (dB)                          | (dB)                          |
| .009      | -35.1                         | 16.4                          |
| .010      | -35.7                         | 15.8                          |
| .020      | -38.5                         | 13.0                          |
| .050      | -39.6                         | 11.9                          |
| .075      | -39.8                         | 11.8                          |
| .100      | -40.0                         | 11.6                          |
| .150      | -40.0                         | 11.5                          |
| .250      | -40.0                         | 11.6                          |
| .500      | -40.0                         | 11.5                          |
| .750      | -40.1                         | 11.5                          |
| 1.000     | -39.9                         | 11.7                          |
| 2.000     | -39.5                         | 12.0                          |
| 3.000     | -39.4                         | 12.1                          |
| 4.000     | -39.7                         | 11.9                          |
| 5.000     | -39.7                         | 11.8                          |
| 10.000    | 40.2                          | 11.3                          |
| 15.000    | -40.7                         | 10.8                          |
| 20.000    | -40.5                         | 11.0                          |
| 25.000    | -41.3                         | 10.2                          |
| 30.000    | 42.3                          | 9.2                           |