

DATE: 13 November 2003

I.T.L. (PRODUCT TESTING) LTD.

EMC Test
for
Bluesoft Inc.

Equipment under test:

AeroScout™ Location Receiver
(For Transmitter Section)

BWH1000-02

Approved by: _____

I. Raz, EMC Laboratory Manager

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This report relates only to items tested.

**Measurement/Technical Report for
Bluesoft Inc.**

AeroScout™ Location Receiver

(For Transmitter Section)

BWH1000-02

FCC ID: Q3H BS2020-0

13 November 2003

This report concerns: Original Grant x Class II change

Class B verification Class A verification Class I change

Equipment type: Radio Telemetry Transmitter

Request Issue of Grant:

 x Immediately upon completion of review

Limits used:

CISPR 22

Part 15 x

Measurement procedure used is ANSI C63.4-2001.

Application for Certification

prepared by:

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TABLE OF CONTENTS

1.	GENERAL INFORMATION -----	5
1.1	Administrative Information.....	5
1.2	List of Accreditations	6
1.3	Product Description	7
1.4	Test Methodology	8
1.5	Test Facility	8
1.6	Measurement Uncertainty	8
2.	PRODUCT LABELING -----	9
3.	SYSTEM TEST CONFIGURATION -----	10
3.1	Justification.....	10
3.2	EUT Exercise Software	10
3.3	Special Accessories	10
3.4	Equipment Modifications	11
3.5	Configuration of Tested System.....	12
4.	BLOCK DIAGRAM -----	12
4.1	Schematic Block/Connection Diagram.....	12
4.2	Theory of Operation	13
5.	CONDUCTED AND SPURIOUS RADIATED MEASUREMENT PHOTOS -----	14
6.	CONDUCTED EMISSION DATA -----	16
6.1	Test Specification	16
6.2	Test Procedure	16
6.3	Measured Data	16
6.4	Test Instrumentation Used, Conducted Measurement	21
7	SPURIOUS RADIATED EMISSION, BELOW 1 GHZ -----	22
7.1	Test Specification	22
7.2	Test Procedure	22
7.3	Measured Data	23
7.4	Test Instrumentation Used, Radiated Measurements	36
7.5	Field Strength Calculation	37
8	SPURIOUS RADIATED EMISSION ABOVE 1 GHZ -----	38
8.1	Radiated Emission Above 1 GHz.....	38
8.2	Test Data	39
8.3	Test Instrumentation Used, Radiated Measurements Above 1 GHz	64
9	MAXIMUM TRANSMITTED PEAK POWER OUTPUT -----	65
9.1	Test procedure	65
9.2	Results table.....	65
9.3	Test Equipment Used.....	66
10	PEAK POWER OUTPUT OUT OF 2400-2483.5 MHZ BAND -----	67
10.1	Test procedure	67
10.2	Results table.....	84
10.3	Test Equipment Used.....	84
11	6 DB MINIMUM BANDWIDTH -----	85
11.1	Test procedure	85
11.2	Results table.....	87
11.3	Test Equipment Used.....	87
12	BAND EDGE SPECTRUM -----	88
12.1	Test procedure	88
12.2	Results table.....	90
12.3	Test Equipment Used.....	91

13	TRANSMITTED POWER DENSITY -----	92
13.1	Test procedure	92
13.2	Results table.....	95
13.3	Test Equipment Used.....	96
14	ANTENNA GAIN -----	97
15	R.F EXPOSURE/SAFETY-----	98
16.	PHOTOGRAPHS OF TESTED E.U.T. -----	99

1. General Information

1.1 Administrative Information

Manufacturer:	Bluesoft Inc.
Manufacturer's Address:	10 Oppenheimer St. Park Tamar Rehovot 76701 Israel Tel: +972-8-9363136 Fax: +972-8-9365977
Manufacturer's Representative:	Reuven Amsalem
Equipment Under Test (E.U.T):	AeroScout™ Location Receiver
Equipment Model No.:	BWH1000-02
Equipment Serial No.:	130-1000-4190
Date of Receipt of E.U.T:	25.08.03
Start of Test:	25.08.03
End of Test:	26.10.03
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	See Section 2

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

The AeroScout™ Location Receiver is a component of the AeroScout™ wireless LAN location platform, which adds accurate location capabilities to a Wi-Fi™ wireless network. The AeroScout™ architecture stands out in several ways:

No modifications to mobile unit hardware or software. AeroScout™ works with standard laptops, PDAs, barcode scanners and other Wi-Fi™ wireless devices. This eliminates a major management challenge and enables simple implementation in public environments.

No dedicated backbone network. All communications between Location Receivers and the AeroScout™ Location Server use standard Ethernet connections and AeroScout™ achieves accurate measurement synchronization without the use of a dedicated network.

Locates equipment that is not Wi-Fi enabled. Small, battery-powered AeroScout™ Tags can be attached to a variety of equipment, such as medical devices, containers and shopping carts.

Open development platform. The AeroScout™ System includes a set of tools for designing, testing and implementing enterprise-class location-based applications.

The AeroScout™ Location Receiver (BWH1000-02) includes a Wi-Fi radio module and a powerful TOA processor, typically installed alongside standard access points and remotely configurable from the AeroScout™ Administration Console.

Approximately the size of a small access point, Location Receivers include an external antenna connector and a Power-over-Ethernet adapter. The Location Receivers can work over a wireless bridge to avoid the need for a wired Ethernet connection.

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 2001. 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 March 9, 2001).

I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01. The other tests in this report were performed at the Nexus Data facility, Rosh Ha'ayin, Israel.

1.6 Measurement Uncertainty

Radiated Emission

The Open Site complies with the ± 4 dB Normalized Site Attenuation requirements of ANSI C63.4-2001. 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

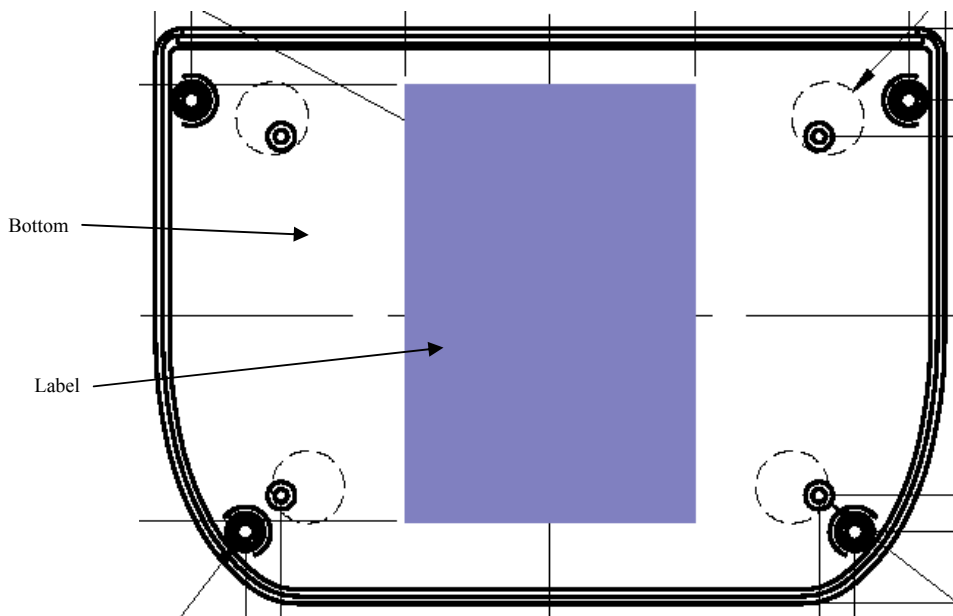


Figure 2. Location of Label on EUT

3. System Test Configuration

3.1 Justification

The product is a fixed installation type, either wall mounted or table mounted. The antennae direction may be re-oriented.

To determine the E.U.T. and transmission antenna orientation for the spurious radiated emissions tests, the product carrier field level was measured in both E.U.T. orientations and three orthogonal directions of the transmit antenna. The table mounted (placed) orientation with the transmission antenna in vertical position was selected as the worst case final orientation position.

The typical operation of the Location Receiver (as a customer would normally use) is that the unit is in continuous receive mode. It collects received data information and performs calculations on the received data. In a specific application, one Location Receiver unit in the system acts as transmitter and transmits a short message to a 802.11b client which triggers it to reply and all the other Location Receivers in the system receive its signal and calculate the location.

The product was tested in two test modes:

1. Continuous Receive mode in which All Receive path was activated.
2. Transmit mode. Due to the short period of transmission in a typical operation mode, the Location Receiver was configured to transmit continuously.

3.2 EUT Exercise Software

The Location Receiver SW uses two working modes in typical operation, a receive mode and then a transmit mode.

The testing configuration SW, allows the configuring of the Location Receiver to one of two programmable modes:

1. Continuous Receive Mode
2. Continuous Transmit Mode

The testing SW also allows configuring the channel of operation on those two modes. It can be done on three different channels.

3.3 Special Accessories

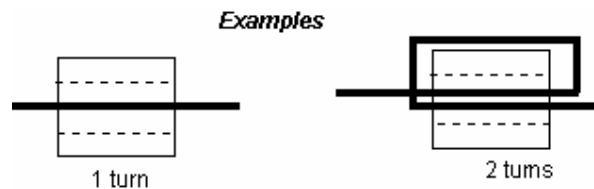
No special accessories were needed to achieve compliance.

3.4 Equipment Modifications

1. The power supply was changed to a power supply, model AD1605CF, manufactured by DEER Computer.
2. A ground strap was added between the PCB ground and Antenna #2.
3. A ferrite core, P/N 0443164251, manufactured by Fair-Rite was added on the LAN cable at the E.U.T. LAN connector. The core has two turns.
4. A ferrite core, P/N 2643665802, manufactured by Fair-Rite, was added on the DC cable at the E.U.T. connector. The core has two turns.

General Note:

The number of turns when using ferrite cores is determined by the times the cable/wire crosses the internal aperture of the core.



3.5 Configuration of Tested System

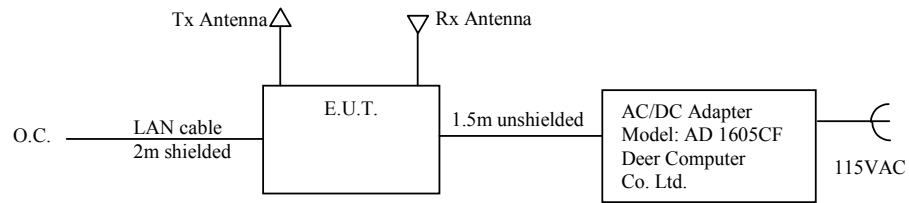


Figure 3. Configuration of Tested System

4. Block Diagram

4.1 Schematic Block/Connection Diagram

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Figure 4. E.U.T. Block Diagram

4.2 Theory of Operation

The Aeroscout Location Receiver (BWH1000-02) includes an 802.11b radio module and a powerful TOA processor, typically installed alongside standard 802.11b access points.

AeroScout™ Location Receiver size is approximately the size of a small access point.

AeroScout™ Location Receiver is remotely configurable from the AeroScout Administration Console to listen on a specific channel, the AeroScout™ Location Receiver samples the incoming signal, and upon receiving the MAC address of a specific 802.11b client or a TAG, it will perform calculations on the sampled data and transfer the results via Ethernet channel to the “master station”.

The AeroScout™ Location Receiver can be used as a transmitter, which transmits an RTS message to trigger an 802.11b client to reply using a CTS message to allow the location system to locate this unit.

5. Conducted and Spurious Radiated Measurement Photos



Figure 5. Conducted Emission Test Front



Figure 6. Conducted Emission Test Side



Figure 7. Spurious Radiated Emission Test Front



Figure 8. Spurious Radiated Emission Test Side

6. Conducted Emission Data

6.1 Test Specification

FCC, Part 15, Subpart B: Class B

6.2 Test Procedure

The E.U.T operation mode and test set-up are as described in Section 3.1. In order to minimize background noise interference, the conducted emission testing was performed inside a shielded room (see section 3), 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 μ 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 detector

6.3 Measured Data

JUDGEMENT: Passed by 14.4 dB

The EUT met the FCC Part 15, Subpart B, Class B specification requirements.

The details of the highest emissions at operating frequency 2442 MHz are given in *Figure 9* to *Figure 14*.

For the operating frequencies 2412 and 2462 MHz, the results were the same.

TEST PERSONNEL:

Tester Signature:  Date: 13.11.03

Typed/Printed Name: Y. Mordukhovitch

Conducted Emission

E.U.T Description AeroScout™ Location
Receiver
Type BWH1000-02
Serial Number: 130-1000-4190

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

Frequency (MHz)	Peak Amplitude (dBμV)	Quasi-peak Amplitude (dBμV)	Specification (dB μV)	Pass/Fail	Margin (dB)
0.26	43.4	42.0	61.5	Pass	-19.5
0.40	37.8	33.8	57.9	Pass	-24.1
0.92	38.8	36.8	56.0	Pass	-19.2
1.45	41.4	38.4	56.0	Pass	-17.6
1.85	40.2	37.8	56.0	Pass	-18.2
3.00	41.4	36.5	56.0	Pass	-19.5
4.10	40.2	35.1	56.0	Pass	-20.9

Figure 9. Conducted Emission: PHASE. Detectors: Peak, QUASI-PEAK

Frequency (MHz)	Peak Amplitude (dBμV)	Average Amplitude (dBμV)	Specification (dB μV)	Pass/Fail	Margin (dB)
0.26	43.4	38.6	51.4	Pass	-12.8
0.40	37.8	30.4	48.0	Pass	-17.6
0.92	38.8	20.3	46.0	Pass	-25.7
1.45	41.4	19.6	46.0	Pass	-26.4
1.85	40.2	14.0	46.0	Pass	-32.0
3.00	41.4	16.8	46.0	Pass	-29.2
4.10	40.2	15.6	46.0	Pass	-30.4

Figure 10. Detectors: Peak, AVERAGE .

Conducted Emission

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

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

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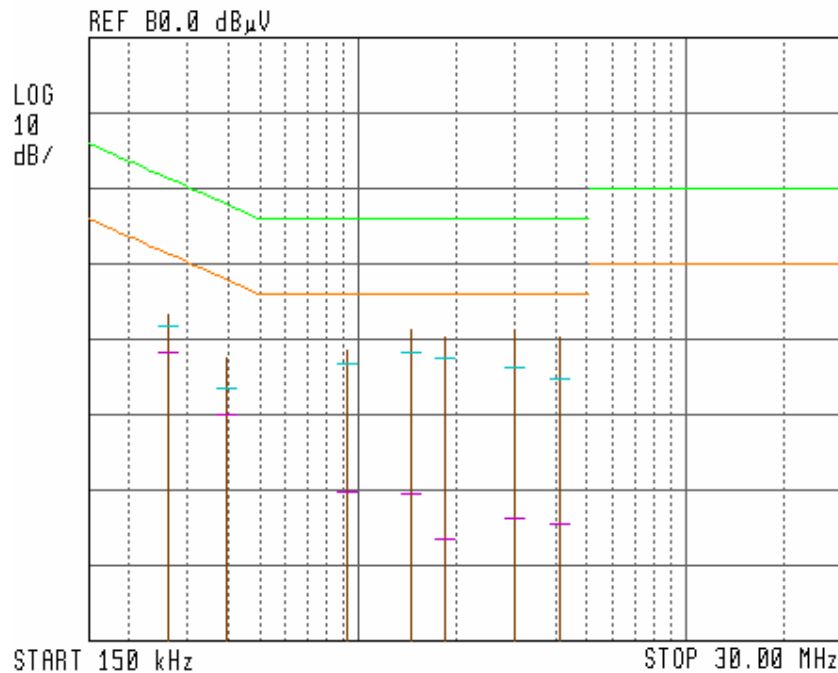


Figure 11. Detectors: Peak, Quasi-peak, Average

Notes:

1. Horizontal axis shows logarithmic frequency scale.
2. The vertical axis shows amplitude (in dB μ 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 AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

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

Frequency (MHz)	Peak Amplitude (dB μ V)	Quasi-peak Amplitude (dB μ V)	Specification (dB μ V)	Pass/Fail	Margin (dB)
0.97	42.9	41.5	56.0	Pass	-14.5
1.37	43.2	41.6	56.0	Pass	-14.4
2.74	41.6	35.9	56.0	Pass	-20.1
3.05	41.7	36.7	56.0	Pass	-19.3
4.08	41.4	37.7	56.0	Pass	-18.3
4.18	41.0	34.5	56.0	Pass	-21.5

Figure 12. Detectors: Peak, QUASI-PEAK

Frequency (MHz)	Peak Amplitude (dB μ V)	Average Amplitude (dB μ V)	Specification (dB μ V)	Pass/Fail	Margin (dB)
0.97	42.9	27.6	46.0	Pass	-18.4
1.37	43.2	26.0	46.0	Pass	-20.0
2.74	41.6	17.5	46.0	Pass	-28.5
3.05	41.7	18.1	46.0	Pass	-27.9
4.08	41.4	18.4	46.0	Pass	-27.6
4.18	41.0	15.3	46.0	Pass	-30.7

Figure 13. Detectors: Peak, AVERAGE

Conducted Emission

E.U.T Description	AeroScout™ Location Receiver
Type	BWH1000-02
Serial Number:	130-1000-4190

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

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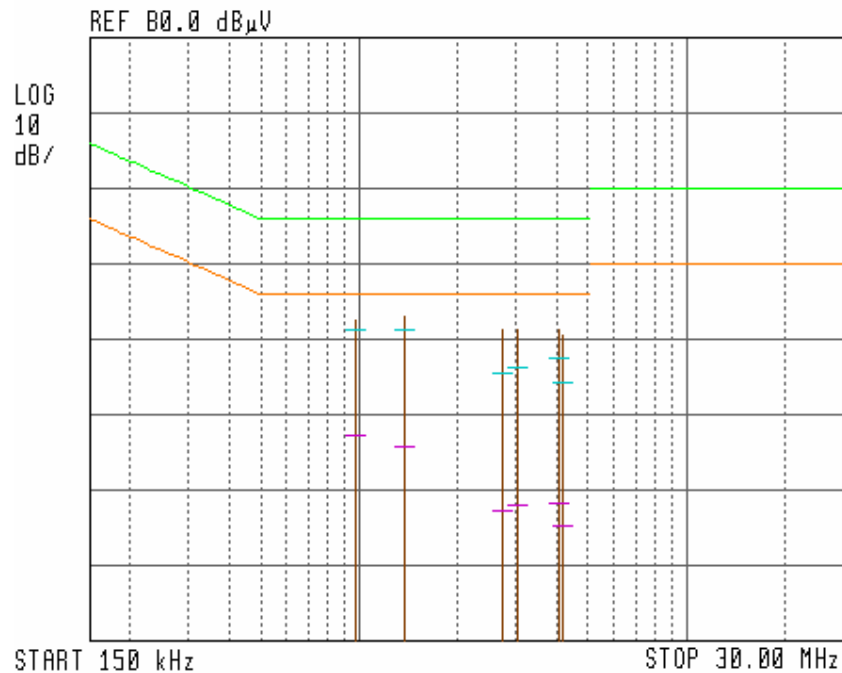


Figure 14 Conducted Emission: NEUTRAL
Detectors: Peak, Quasi-peak, Average

Notes:

1. Horizontal axis shows logarithmic frequency scale.
2. The vertical axis shows amplitude (in dB μV).
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.

6.4 Test Instrumentation Used, Conducted Measurement

Instrument	Manufacturer	Model	Serial No.	Calibration	Period
LISN	Fischer	FCC-LISN-2A	127	March 12, 2003	1 year
LISN	Fischer	FCC-LISN-2A	128	March 12, 2003	1 year
Receiver	HP	85420E/85422E	3427A00103/34	January 31, 2003	1 year
Printer	HP	ThinkJet2225	2738508357	N/A	N/A

7 Spurious Radiated Emission, Below 1 GHz

7.1 Test Specification

30-1000 MHz, F.C.C., Part 15, Subpart C

7.2 Test Procedure

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 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 3.1.

The frequency range 30-1000 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.

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.

7.3 Measured Data

JUDGEMENT: Passed by 2.6 dB

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

The worst cases were:

for 2412 MHz, 2.9 dB at 110.00 MHz frequency, horizontal polarization.

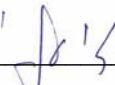
for 2442 MHz, 3.0 dB at 110. MHz frequency, horizontal polarization

for 2462 MHz, 2.6 dB at 110.00 MHz frequency, horizontal polarization

The details of the highest emissions are given in *Figure 15* to *Figure 26*.

In the tables in Figures 15-26, Peak Amp Quasi-peak Amp id the field strength including the correction factor.

TEST PERSONNEL:

Tester Signature: 

Date: 17.11.03

Typed/Printed Name: I. Raz

Radiated Emission

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Horizontal Frequency range: 30 MHz to 300 MHz
 Test Distance: 3 meters Detector: Quasi-peak
 Operating Frequency: 2412 MHz

Frequency	Peak Amp	QP Amp	Correction	Specification	Margin
(MHz)	(dBμV/m)	(dBμV/m)	(dB)	(dBμV/m)	(dB)
110.00	39.5	38.6	13.0	43.5	-4.9
132.00	31.7	29.8	14.0	43.5	-13.7
241.99	40.4	38.8	19.7	46.0	-7.2
263.99	36.3	33.2	21.4	46.0	-12.8

**Figure 15. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: 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 AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Horizontal Frequency range: 300 MHz to 1 GHz
 Test Distance: 3 meters Detector: Peak, Quasi-peak
 Operating Frequency: 2412 MHz

Frequency (MHz)	Peak Amp (dBμV/m)	QP Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB)
330.01	35.7	34.7	15.9	46.0	-11.3
967.98	35.8	32.5	28.3	54.0	-21.5

**Figure 16. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: 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 AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Vertical Frequency range: 30 MHz to 300 MHz
 Test Distance: 3 meters Detector: Quasi-peak
 Operating Frequency: 2412 MHz

Frequency (MHz)	Peak Amp (dBμV/m)	QP Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB)
110.00	41.4	40.6	13.0	43.5	-2.9
132.00	32.2	30.1	14.0	43.5	-13.4
241.99	35.0	32.6	19.7	46.0	-13.4

**Figure 17. Radiated Emission. Antenna Polarization: VERTICAL.
 Detector: 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 AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Vertical Frequency range: 300 MHz to 1 GHz
 Test Distance: 3 meters Detector: Peak, Quasi-peak
 Operating Frequency: 2142 MHz

Frequency (MHz)	Peak Amp (dBμV/m)	QP Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB)
330.01	30.4	27.9	15.9	46.0	-18.1
967.98	35.5	32.2	28.3	54.0	-21.8

**Figure 18. Radiated Emission. Antenna Polarization: VERTICAL.
 Detector: 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 AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Horizontal Frequency range: 30 MHz to 300 MHz
 Test Distance: 3 meters Detector: Quasi-peak
 Operating Frequency: 2442 MHz

Frequency	Peak Amp	QP Amp	Correction	Specification	Margin
(MHz)	(dBμV/m)	(dBμV/m)	(dB)	(dBμV/m)	(dB)
110.00	39.9	39.3	13.0	43.5	-4.2
132.02	25.0	22.7	14.0	43.5	-20.8
242.02	32.8	31.0	19.8	46.0	-15.0
263.98	30.6	28.2	21.4	46.0	-17.8

**Figure 19. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: 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 AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Horizontal Frequency range: 300 MHz to 1 GHz
 Test Distance: 3 meters Detector: Peak, Quasi-peak
 Operating Frequency: 2442 MHz

Frequency	Peak Amp	QP Amp	Correction	Specification	Margin
(MHz)	(dBμV/m)	(dBμV/m)	(dB)	(dBμV/m)	(dB)
329.99	31.2	29.8	15.9	46.0	-16.2
968.00	36.4	33.1	28.3	54.0	-20.9

**Figure 20. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: 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 AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Vertical Frequency range: 30 MHz to 300 MHz
 Test Distance: 3 meters Detector: Quasi-peak
 Operating Frequency: 2442 MHz

Frequency	Peak Amp	QP Amp	Correction	Specification	Margin
(MHz)	(dBμV/m)	(dBμV/m)	(dB)	(dBμV/m)	(dB)
110.00	41.3	40.5	13.0	43.5	-3.0
132.02	29.9	27.3	14.0	43.5	-16.2
242.02	30.5	27.0	19.8	46.0	-19.0
263.98	30.0	27.1	21.4	46.0	-18.9

**Figure 21. Radiated Emission. Antenna Polarization: VERTICAL.
 Detector: 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 AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Vertical Frequency range: 300 MHz to 1 GHz
 Test Distance: 3 meters Detector: Peak, Quasi-peak
 Operating Frequency: 2442 MHz

Frequency	Peak Amp	QP Amp	Correction	Specification	Margin
(MHz)	(dBμV/m)	(dBμV/m)	(dB)	(dBμV/m)	(dB)
329.99	26.3	23.8	15.9	46.0	-22.2
968.00	33.9	29.5	28.3	54.0	-24.5

**Figure 22. Radiated Emission. Antenna Polarization: VERTICAL.
 Detector: 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 AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Horizontal Frequency range: 30 MHz to 300 MHz
 Test Distance: 3 meters Detector: Quasi-peak
 Operating Frequency: 2462 MHz

Frequency	Peak Amp	QP Amp	Correction	Specification	Margin
(MHz)	(dBμV/m)	(dBμV/m)	(dB)	(dBμV/m)	(dB)
110.00	40.6	40.1	13.0	43.5	-3.4
132.02	24.9	22.5	14.0	43.5	-21.0
242.02	33.1	31.4	19.8	46.0	-14.6
263.98	33.0	30.6	21.4	46.0	-15.4

**Figure 23. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: 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 AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Horizontal Frequency range: 300 MHz to 1 GHz
 Test Distance: 3 meters Detector: Peak, Quasi-peak
 Operating Frequency: 2462 MHz

Frequency	Peak Amp	QP Amp	Correction	Specification	Margin
(MHz)	(dBμV/m)	(dBμV/m)	(dB)	(dBμV/m)	(dB)
329.99	32.3	30.9	15.9	46.0	-15.1
968.00	39.5	36.9	28.3	54.0	-17.1

**Figure 24. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: 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 AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Vertical Frequency range: 30 MHz to 300 MHz
 Test Distance: 3 meters Detector: Quasi-peak
 Operating Frequency: 2462 MHz

Frequency	Peak Amp	QP Amp	Correction	Specification	Margin
(MHz)	(dBμV/m)	(dBμV/m)	(dB)	(dBμV/m)	(dB)
110.00	41.7	40.9	13.0	43.5	-2.6
132.02	28.8	26.7	14.0	43.5	-16.8
242.02	27.8	24.8	19.8	46.0	-21.2
263.98	30.1	26.8	21.4	46.0	-19.2

**Figure 25. Radiated Emission. Antenna Polarization: VERTICAL.
 Detector: 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 AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Vertical Frequency range: 300 MHz to 1 GHz
 Test Distance: 3 meters Detector: Peak, Quasi-peak
 Operating Frequency: 2462 MHz

Frequency	Peak Amp	QP Amp	Correction	Specification	Margin
(MHz)	(dBμV/m)	(dBμV/m)	(dB)	(dBμV/m)	(dB)
329.99	26.0	23.1	15.9	46.0	-22.9
968.00	33.5	29.4	28.3	54.0	-24.6

**Figure 26. Radiated Emission. Antenna Polarization: VERTICAL.
 Detector: 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.

7.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3411A00102	January 31, 2003	1 year
RF Section	HP	85420E	3427A00103	January 31, 2003	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	April 20, 2003	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	N/A	N/A

7.5 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 μ V/m]
RA:	Receiver Amplitude [dB μ V]
AF:	Receiving Antenna Correction Factor [dB/m]
CF:	Cable Attenuation Factor [dB]

No external pre-amplifiers are used.

8 Spurious Radiated Emission Above 1 GHz

8.1 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 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 3.1.

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.

Above 12.0 GHz:

- a. The test distance was 1.5 meters. The reduced distance was used to increase the signal to noise ratio.
- b. For the average test, the IF bandwidth was reduced to 100kHz.

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.)

8.2 Test Data

JUDGEMENT: Passed by 1.9 dB

The EUT met the requirements of the F.C.C. Part 15, Subpart C, specification.
The worst cases were:

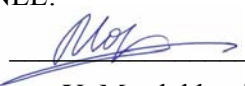
for 2412 MHz, 2.1 dB at 4824.00 MHz frequency, vertical polarization.

for 2442 MHz, 2.0 dB at 4884.00 MHz frequency, vertical polarization

for 2462 MHz, 1.9 dB at 4924.00 MHz frequency, vertical polarization

The details of the highest emissions are given in *Figure 27* to *Figure 50*.

TEST PERSONNEL:

Tester Signature: 

Date: 13.11.03

Typed/Printed Name: Y. Mordukhovitch

Radiated Emission Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Horizontal

Frequency range: 1 GHz to 2.9 GHz

Test Distance: 3 meters

Detector: Peak

Operating Frequency: 2412 MHz

Frequency (MHz)	Peak Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB)
1011.99	44.3	31.7	74.0	-29.7
1034.00	45.2	31.9	74.0	-28.8
1121.99	44.3	32.8	74.0	-29.7
1166.00	47.5	33.2	74.0	-26.5
1210.00	44.8	33.6	74.0	-29.2
1232.00	45.1	33.9	74.0	-28.9

**Figure 27. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: 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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Horizontal

Frequency range: 1 GHz to 2.9 GHz

Test Distance: 3 meters

Detector: Average

Operating Frequency: 2412 MHz

Frequency (MHz)	Avg. Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB)
1011.99	35.6	31.7	54.0	-18.4
1034.00	36.5	31.9	54.0	-17.5
1121.99	34.3	32.8	54.0	-19.7
1166.00	35.9	33.2	54.0	-18.1
1210.00	34.0	33.6	54.0	-20.0
1232.00	34.0	33.9	54.0	-20.0

**Figure 28. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: Average**

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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Horizontal Frequency range: 2.9 GHz to 25.0 GHz
 Test Distance: 3 meters Detector: Peak
 Operating Frequency: 2412 MHz

Freq.	PeakAmp	Correction	Peak Spec.	Peak
	(1)	Factor (2)		Margin
(MHz)	(dBμV/m)	(dB)	(dB μV/m)	(dB)
3740.00	40.7	5.0	74.0	-33.3
4076.00	47.7	6.6	74.0	-26.3
8152.00	51.7	16.0	74.0	-22.3

**Figure 29. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: Peak**

Notes:

1. Reading includes correction factor.
2. Correction Factor = Antenna Factor + Cable Factor – Gain amp.
3. 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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Horizontal Frequency range: 2.9 GHz to 25.0 GHz
 Test Distance: 3 meters Detector: Average
 Operating Frequency: 2412 MHz

Freq.	Average Amp	Correction Factor (1)	Average Spec.	Average Margin (2)
(MHz)	(dBμV/m)	(dB)	(dB μV/m)	(dB)
3740.00	31.1	5.0	54.0	-22.9
4076.00	43.6	6.6	54.0	-10.4
8152.00	43.1	16.0	54.0	-10.9

**Figure 30. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: Average**

Notes:

1. Reading includes correction factor.
2. Correction Factor = Antenna Factor + Cable Factor – Gain amp.
3. 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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Vertical Frequency range: 1 GHz to 2.9 GHz
 Test Distance: 3 meters Detector: Peak
 Operating Frequency: 2412 MHz

Frequency (MHz)	Peak Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB)
1144.00	48.1	33.0	74.0	-25.9
1166.00	43.6	33.2	74.0	-30.4
1188.00	45.2	33.4	74.0	-28.8
1663.98	49.2	37.7	74.0	-24.8
2367.98	56.6	42.1	74.0	-17.4
2490.13	53.3	42.7	74.0	-20.7

**Figure 31. Radiated Emission. Antenna Polarization: VERTICAL.
 Detector: 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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Vertical

Frequency range: 1 GHz to 2.9 GHz

Test Distance: 3 meters

Detector: Average

Operating Frequency: 2412 MHz

Frequency (MHz)	Avg. Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB)
1144.00	34.71	33.0	54.0	-19.3
1166.00	31.18	33.2	54.0	-22.8
1188.00	33.97	33.4	54.0	-20.0
1663.98	39.20	37.7	54.0	-14.8
2367.98	46.77	42.1	54.0	-7.2
2490.13	40.47	42.7	54.0	-13.5

**Figure 32. Radiated Emission. Antenna Polarization: VERTICAL.
 Detector: Average**

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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Vertical Frequency range: 2.9 GHz to 25.0 GHz
 Test Distance: 3 meters Detector: Peak
 Operating Frequency: 2412 MHz

Freq.	Peak Amp (1)	Correction Factor (2)	Peak Spec.	Peak Margin (3)
(MHz)	(dBμV/m)	(dB)	(dB μV/m)	(dB)
4824.00	64.0	28.7	74.0	-10.0

**Figure 33. Radiated Emission. Antenna Polarization: VERTICAL.
 Detector: Peak**

Notes:

1. Reading includes correction factor.
2. Correction Factor = Antenna Factor + Cable Factor – Gain amp. + ATT.
3. 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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Vertical Frequency range: 2.9 GHz to 25.0 GHz
 Test Distance: 3 meters Detector: Average
 Operating Frequency: 2412 MHz

Freq.	Average Amp (1)	Correction Factor (2)	Average Spec.	Average Margin (3)
(MHz)	(dBμV/m)	(dB)	(dB μV/m)	(dB)
4824.00	51.9	28.7	54.0	-2.1

**Figure 34. Radiated Emission. Antenna Polarization: VERTICAL
 Detector: Average**

Notes:

1. Reading includes correction factor.
2. Correction Factor = Antenna Factor + Cable Factor – Gain amp + ATT.
3. 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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Horizontal

Frequency range: 1 GHz to 2.9 GHz

Test Distance: 3 meters

Detector: Peak

Operating Frequency: 2442 MHz

Frequency (MHz)	Peak Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB)
1033.99	45.5	31.9	74.0	-28.5
1121.99	44.8	32.8	74.0	-29.2
1165.99	44.9	33.2	74.0	-29.1
1188.01	44.9	33.4	74.0	-29.1
1210.01	44.8	33.6	74.0	-29.2
1231.99	46.0	33.9	74.0	-28.0
1688.98	50.9	37.9	74.0	-23.1

**Figure 35. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: 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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C:
 Class B

Antenna Polarization: Horizontal Frequency range: 1 GHz to 2.9 GHz
 Test Distance: 3 meters Detector: Average
 Operating Frequency: 2442 MHz

Frequency (MHz)	Avg. Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB)
1033.99	37.4	31.9	54.0	-16.6
1121.99	34.5	32.8	54.0	-19.5
1165.99	34.7	33.2	54.0	-19.3
1188.01	33.5	33.4	54.0	-20.5
1210.01	33.4	33.6	54.0	-20.6
1231.99	33.8	33.9	54.0	-20.2
1688.98	41.5	37.9	54.0	-12.5

**Figure 36. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: Average**

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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Horizontal Frequency range: 2.9 GHz to 25.0 GHz
 Test Distance: 3 meters Detector: Peak
 Operating Frequency: 2442 MHz

Freq.	Peak Amp	Correction	Peak Spec.	Peak
	(1)	Factor (2)		Margin
(MHz)	(dBμV/m)	(dB)	(dB μV/m)	(dB)
4136.00	50.2	7.1	74.0	-23.8
8272.00	54.1	16.2	74.0	-19.9

**Figure 37. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: Peak**

Notes:

1. Reading includes correction factor.
2. Correction Factor = Antenna Factor + Cable Factor – Gain amp.
3. 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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Horizontal Frequency range: 2.9 GHz to 25.0 GHz
 Test Distance: 3 meters Detector: Average
 Operating Frequency: 2442 MHz

Freq.	Average Amp (1)	Correction Factor (2)	Average Spec.	Average Margin (3)
(MHz)	(dBμV/m)	(dB)	(dB μV/m)	(dB)
4136.00	44.6	7.1	54.0	-9.4
8272.00	42.8	16.2	54.0	-11.2

**Figure 38. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: Average**

Notes:

1. Reading includes correction factor.
2. Correction Factor = Antenna Factor + Cable Factor – Gain amp.
3. 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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Vertical Frequency range: 1 GHz to 2.9 GHz
 Test Distance: 3 meters Detector: Peak
 Operating Frequency: 2442 MHz

Frequency (MHz)	Peak Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB)
1121.99	43.6	32.8	74.0	-30.4
1144.00	44.6	33.0	74.0	-29.4
1165.98	44.7	33.2	74.0	-29.3
1210.00	45.1	33.6	74.0	-28.9
1688.98	51.0	37.9	74.0	-23.0
1719.00	50.4	38.1	74.0	-23.6

**Figure 39. Radiated Emission. Antenna Polarization: VERTICAL.
 Detector: 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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Vertical

Frequency range: 1 GHz to 2.9 GHz

Test Distance: 3 meters

Detector: Average

Operating Frequency: 2442 MHz

Frequency (MHz)	Avg. Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB)
1121.99	31.99	32.8	54.0	-22.0
1144.00	34.31	33.0	54.0	-19.7
1165.98	33.56	33.2	54.0	-20.4
1210.00	32.69	33.6	54.0	-21.3
1688.98	40.10	37.9	54.0	-13.9
1719.00	34.82	38.1	54.0	-19.2

**Figure 40. Radiated Emission. Antenna Polarization: VERTICAL.
 Detector: Average**

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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Vertical Frequency range: 2.9 GHz to 25.0 GHz
 Test Distance: 3 meters Detector: Peak
 Operating Frequency: 2442 MHz

Freq.	Peak Amp	Correction	Peak Spec.	Peak
	(1)	Factor (2)		Margin
(MHz)	(dBμV/m)	(dB)	(dB μV/m)	(dB)
4884.00	64.6	28.8	74.0	-9.4

**Figure 41. Radiated Emission. Antenna Polarization: VERTICAL.
 Detector: Peak**

Notes:

1. Reading includes correction factor.
2. Correction Factor = Antenna Factor + Cable Factor – Gain amp. + ATT.
3. 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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Vertical Frequency range: 2.9 GHz to 25.0 GHz
 Test Distance: 3 meters Detector: Average
 Operating Frequency: 2442 MHz

Freq.	Average Amp (1)	Correction Factor (2)	Average Spec.	Average Margin (3)
(MHz)	(dBμV/m)	(dB)	(dB μV/m)	(dB)
4884.00	52.0	28.8	54.0	-2.0

**Figure 42. Radiated Emission. Antenna Polarization: VERTICAL
 Detector: Average**

Notes:

1. Reading includes correction factor.
2. Correction Factor = Antenna Factor + Cable Factor – Gain amp. + ATT.
3. 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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Horizontal Frequency range: 1 GHz to 2.9 GHz
 Test Distance: 3 meters Detector: Peak
 Operating Frequency: 2462 MHz

Frequency	Peak Amp	Correction	Specification	Margin
(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dB)
1011.98	48.6	31.7	74.0	-25.4
1077.63	48.5	32.4	74.0	-25.5
1231.82	51.0	33.9	74.0	-23.0
1495.74	53.1	36.4	74.0	-20.9
1693.70	54.7	37.9	74.0	-19.3
2332.39	53.3	41.9	74.0	-20.7

**Figure 43. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: 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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Horizontal

Frequency range: 1 GHz to 2.9 GHz

Test Distance: 3 meters

Detector: Average

Operating Frequency: 2462 MHz

Frequency (MHz)	Avg. Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB)
1011.98	35.4	31.7	54.0	-18.6
1077.63	35.5	32.4	54.0	-18.5
1231.82	38.8	33.9	54.0	-15.2
1495.74	40.0	36.4	54.0	-14.0
1693.70	41.6	37.9	54.0	-12.4
2332.39	39.7	41.9	54.0	-14.3

**Figure 44. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: Average**

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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Horizontal Frequency range: 2.9 GHz to 25.0 GHz
 Test Distance: 3 meters Detector: Peak
 Operating Frequency: 2462 MHz

Freq.	Peak Amp (1)	Correction Factor (2)	Peak Spec.	Peak Margin (3)
(MHz)	(dBμV/m)	(dB)	(dB μV/m)	(dB)
4176.00	49.3	6.7	74.0	-24.7
8356.00	52.8	16.2	74.0	-21.2

**Figure 45. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: Peak**

Notes:

1. Reading includes correction factor.
2. Correction Factor = Antenna Factor + Cable Factor – Gain amp.
3. 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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Horizontal

Frequency range: 2.9 GHz to 25.0 GHz

Test Distance: 3 meters

Detector: Average

Operating Frequency: 2462 MHz

Freq.	Average Amp	Correction Factor (1)	Average Spec.	Average Margin (2)
(MHz)	(dBμV/m)	(dB)	(dB μV/m)	(dB)
4176.00	45.2	6.7	54.0	-8.8
8356.00	42.7	16.2	54.0	-11.3

**Figure 46. Radiated Emission. Antenna Polarization: AVERAGE.
 Detector: Average**

Notes:

1. Reading includes correction factor.
2. Correction Factor = Antenna Factor + Cable Factor – Gain amp.
3. 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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Vertical Frequency range: 1 GHz to 2.9 GHz
 Test Distance: 3 meters Detector: Peak
 Operating Frequency: 2462 MHz

Frequency (MHz)	Peak Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB)
1011.98	44.0	31.7	74.0	-30.0
1077.63	44.8	32.4	74.0	-29.2
1231.82	47.0	33.9	74.0	-27.0
1495.74	45.9	36.4	74.0	-28.1
1693.70	46.6	37.9	74.0	-27.4
2332.39	52.8	41.9	74.0	-21.2

**Figure 47. Radiated Emission. Antenna Polarization: VERTICAL.
 Detector: 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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Vertical Frequency range: 1 GHz to 2.9 GHz
 Test Distance: 3 meters Detector: Average
 Operating Frequency: 2462 MHz

Frequency	Avg Amp	Correction	Specification	Margin
(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dB)
1011.98	31.8	31.7	54.0	-22.2
1077.63	32.0	32.4	54.0	-22.0
1231.82	33.7	33.9	54.0	-20.3
1495.74	32.4	36.4	54.0	-21.6
1693.70	34.1	37.9	54.0	-19.9
2332.39	40.0	41.9	54.0	-14.0

**Figure 48. Radiated Emission. Antenna Polarization: VERTICAL.
 Detector: Average**

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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Vertical Frequency range: 2.9 GHz to 25.0 GHz
 Test Distance: 3 meters Detector: Peak
 Operating Frequency: 2462 MHz

Freq.	Peak Amp	Correction	Peak Spec.	Peak
	(1)	Factor (2)		Margin
(MHz)	(dBμV/m)	(dB)	(dB μV/m)	(dB)
4924.00	64.8	28.8	74.0	-9.2

**Figure 49. Radiated Emission. Antenna Polarization: VERTICAL.
 Detector: Peak**

Notes:

1. Reading includes correction factor.
2. Correction Factor = Antenna Factor + Cable Factor – Gain amp. + ATT.
3. 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 Above 1 GHz

E.U.T Description AeroScout™ Location Receiver
 Type BWH1000-02
 Serial Number: 130-1000-4190

Specification: F.C.C., Part 15, Subpart C

Antenna Polarization: Vertical Frequency range: 2.9 GHz to 25.0 GHz
 Test Distance: 3 meters Detector: Average
 Operating Frequency: 2462 MHz

Freq.	Average Amp (1)	Correction Factor (2)	Average Spec.	Average Margin (3)
(MHz)	(dBμV/m)	(dB)	(dB μV/m)	(dB)
4924.00	52.1	28.8	54.0	-1.9

**Figure 50. Radiated Emission. Antenna Polarization: VERTICAL
 Detector: Average**

Notes:

1. Reading includes correction factor.
2. Correction Factor = Antenna Factor + Cable Factor – Gain amp. + ATT.
3. 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.

8.3 Test Instrumentation Used, Radiated Measurements Above 1 GHz

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Receiver	HP	85422E	3411A00102	January 31, 2003	1 year
RF Section	HP	85420E	3427A00103	January 31, 2003	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001.0	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet2225	2738508357.0	N/A	N/A
Antenna-Log Periodic	A.H.System	SAS-200/511	253.0	January 31,2003	2 year
Double Ridged Waveguide Horn Antenna	EMCO	3102	2052	May 1, 2003	1 year
Band Pass Filter	SERNO	22102-0001	322	August 15, 2003	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	April 10, 2003	1 year
Spectrum Analyzer	HP	8592L	3926A01204	January 31,2003	1 year
Attenuator	MACOM	ATT-10	N/A	July 27, 2003	1 year
Attenuator	MACOM	ATT-20	N/A	July 27, 2003	1 year

9 Maximum Transmitted Peak Power Output

9.1 Test procedure

The E.U.T. antenna terminal was connected to the Power Meter through appropriate coaxial cable. Peak power level was measured at selected operation frequencies.

9.2 Results table

E.U.T. Description: AeroScout™ Location Receiver
 Model No.: BWH1000-02
 Serial Number: 130-1000-4190
 Specification: F.C.C. Part 15, Subpart C

Operation Frequency (MHz)	Reading Power Meter (dBm)	Cable Attenuation (dB)	Peak Output Power (dBm)	Specification (dBm)	Margin (dB)
2412	13.1	1.0	14.1	30.0	-15.9
2442	13.6	1.0	14.6	30.0	-15.4
2462	11.0	1.0	12.0	30.0	-18.0

Figure 51 Maximum Peak Power Output

JUDGEMENT: Passed by 15.4 dB

TEST PERSONNEL:

Tester Signature: 

Date: 13.11.03

Typed/Printed Name: E. Pitt

9.3 Test Equipment Used.

Peak Power Output

Instrument	Manufacture	Model	Serial Number	Calibration	
				Last Calibr.	Period
Power Meter	HP	436A	20312262	August 7, 2003	1.5 years
Cable	Avnet	MTS	N/A	September 9, 2003	1 year
Power Sensor	HP	8481A	2237A32152	August 6, 2003	1.5 years

Figure 52 Test Equipment Used

10 Peak Power Output Out of 2400-2483.5 MHz Band

10.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through appropriate coaxial cable. The spectrum analyzer was set to 100 kHz resolution BW except for the frequency range 9 kHz-1 MHz where the RBW was set to 3kHz. 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.

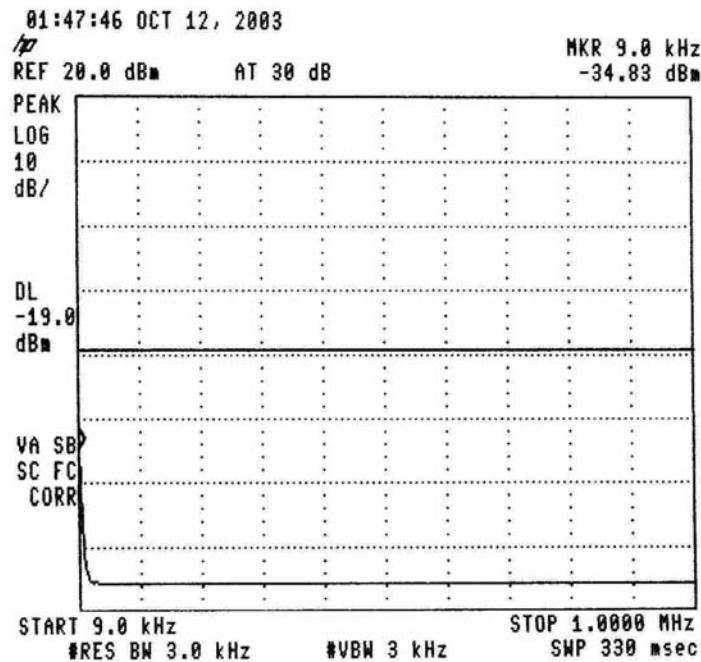


Figure 53 —2412 MHz

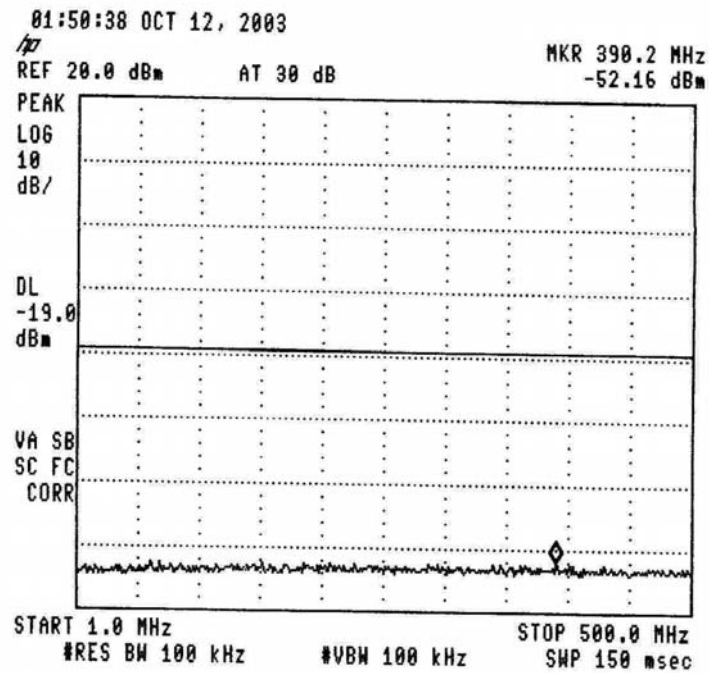


Figure 54 —2412 MHz

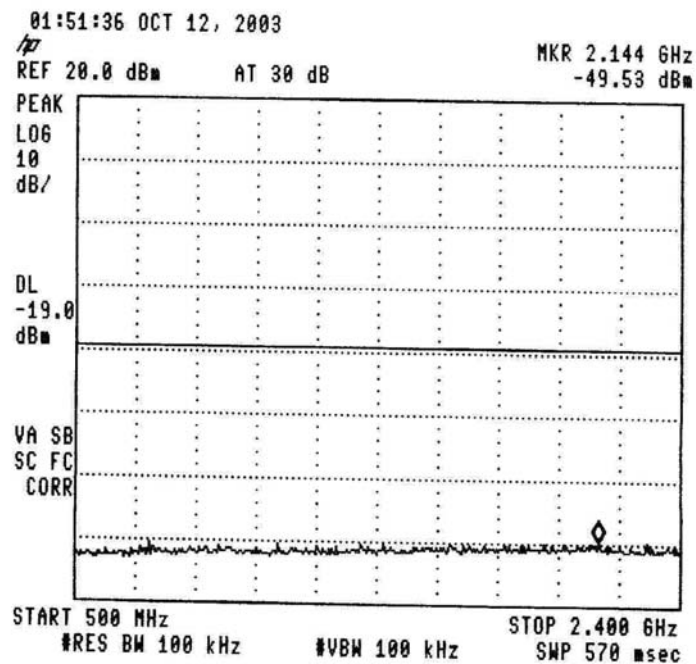


Figure 55 —2412 MHz

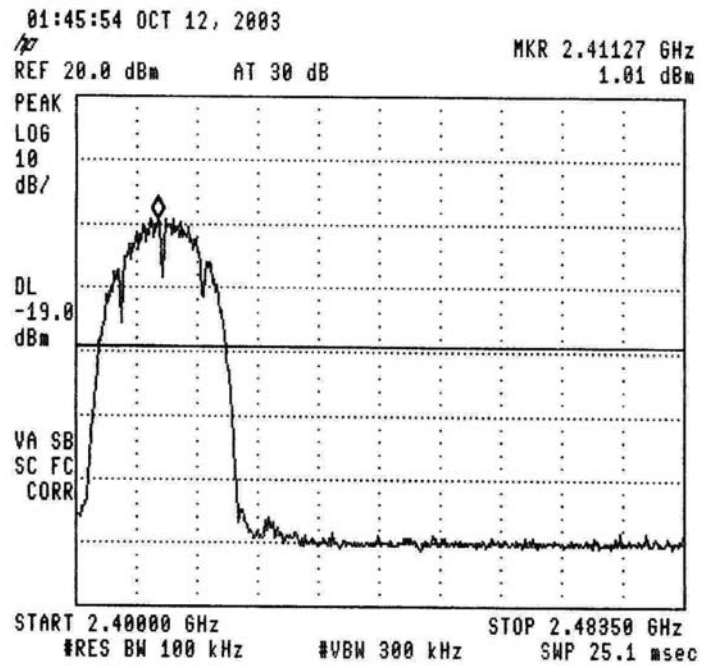


Figure 56 —2412 MHz

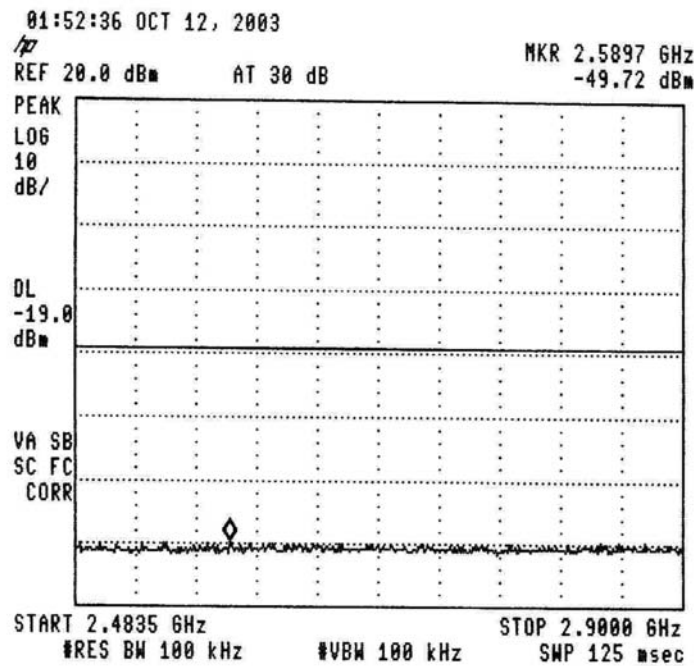


Figure 57 —2412 MHz

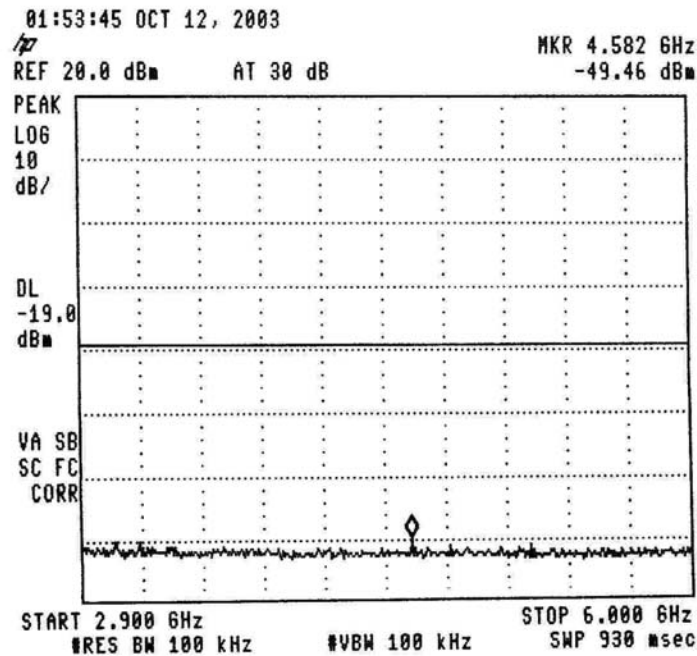


Figure 58 —2412 MHz

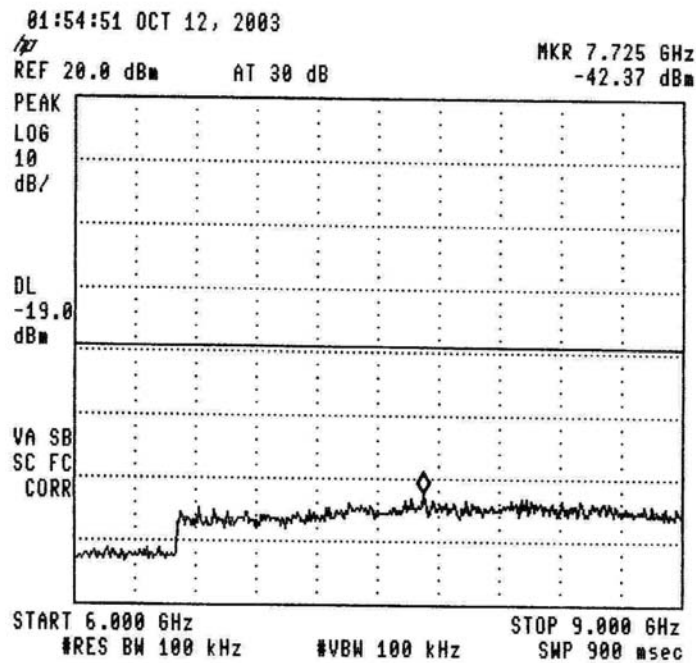


Figure 59 —2412 MHz

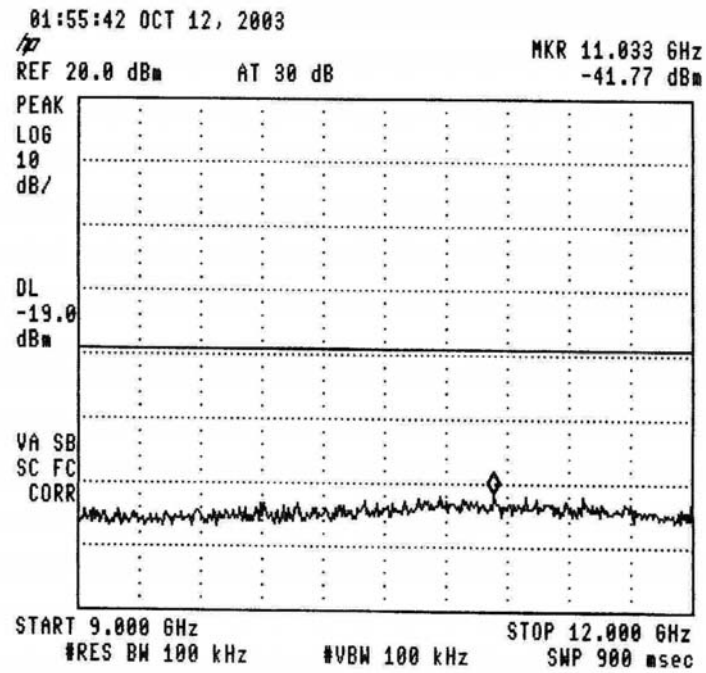


Figure 60 —2412 MHz

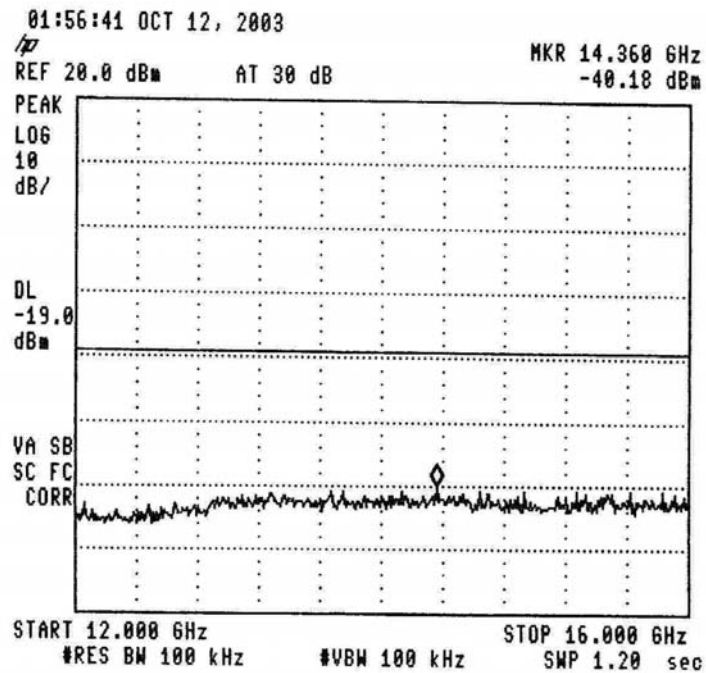


Figure 61 —2412 MHz

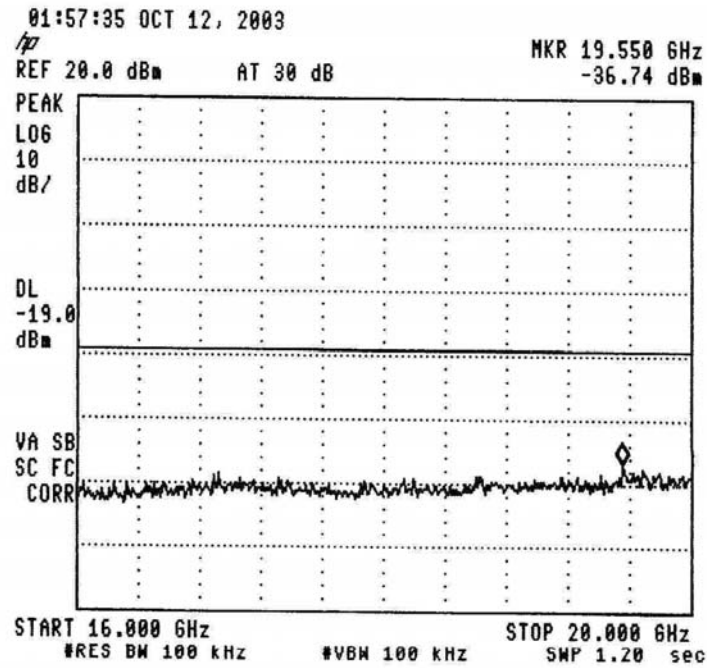


Figure 62 —2412 MHz

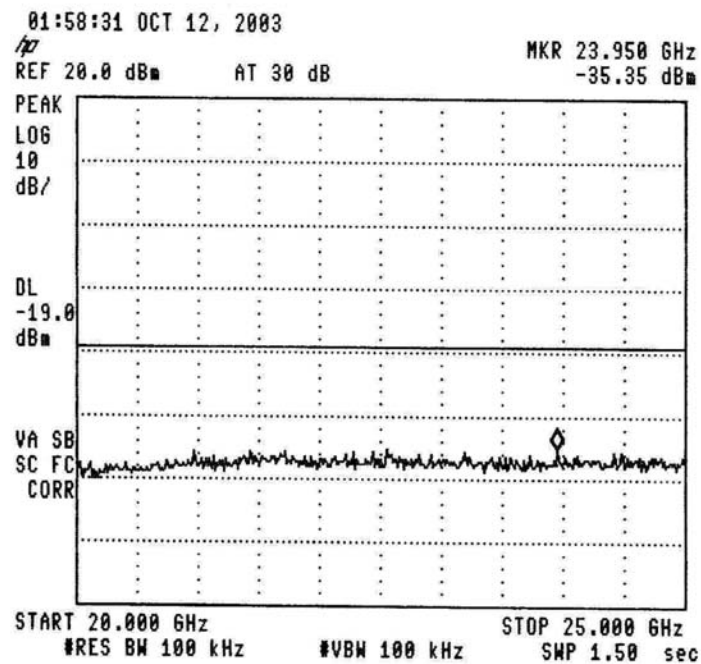


Figure 63 —2412 MHz

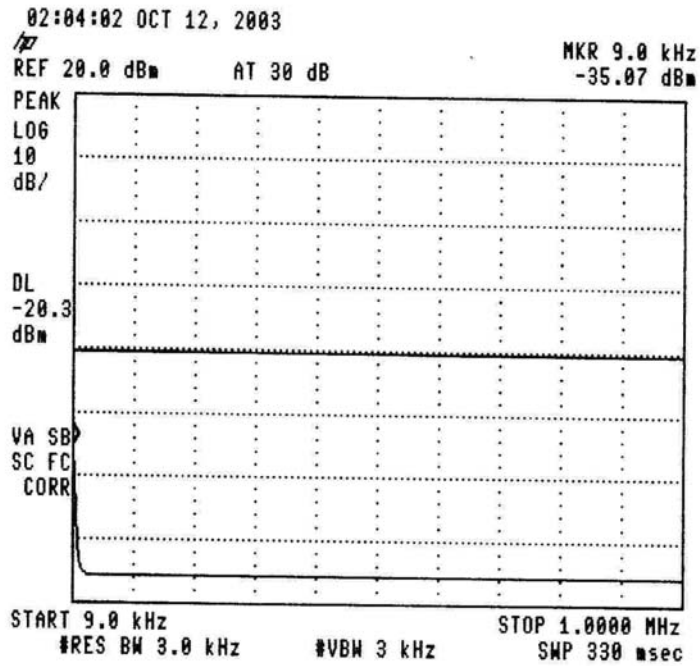


Figure 64 —2442 MHz

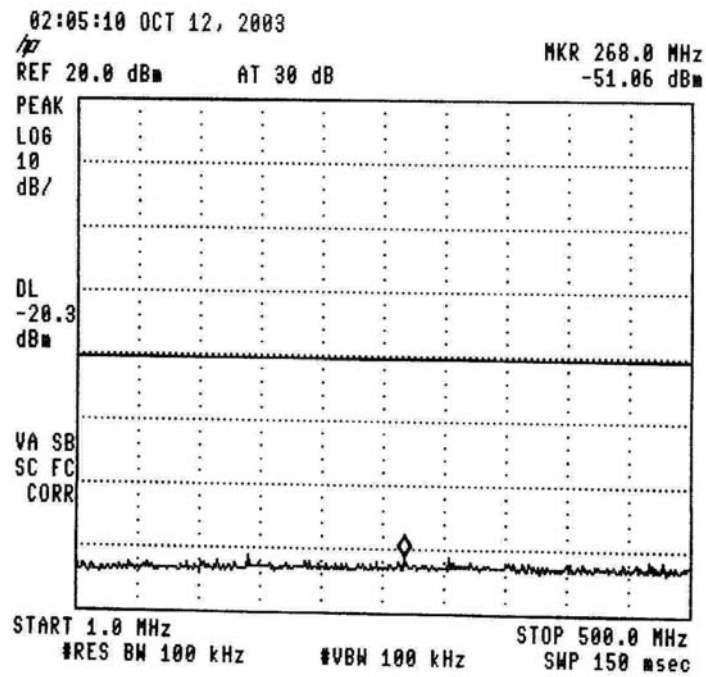


Figure 65 —2442 MHz

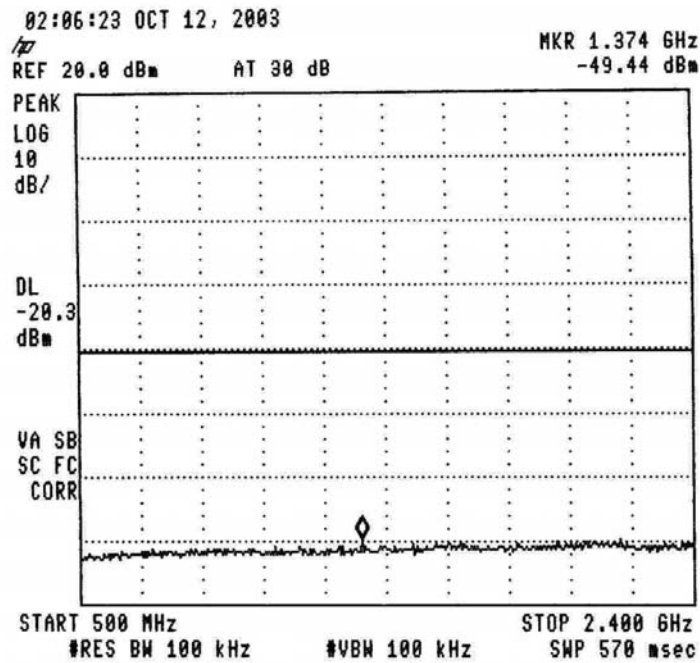


Figure 66 —2442 MHz

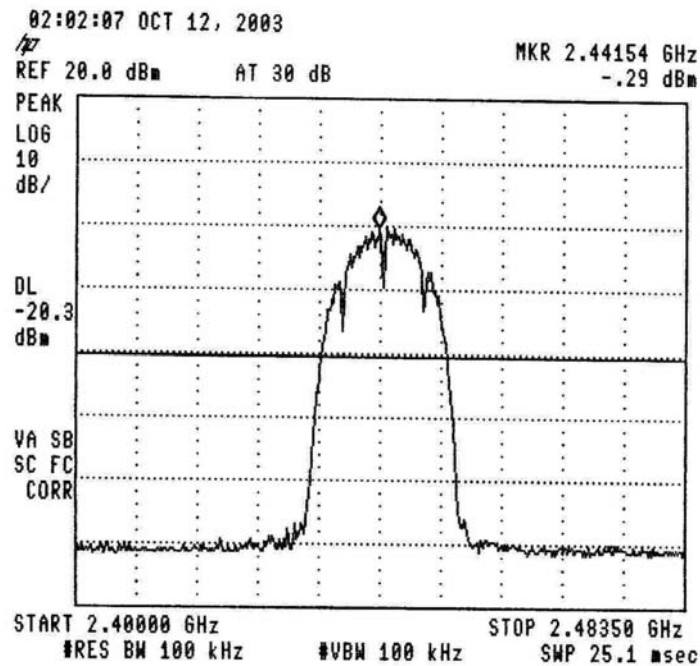


Figure 67 —2442 MHz

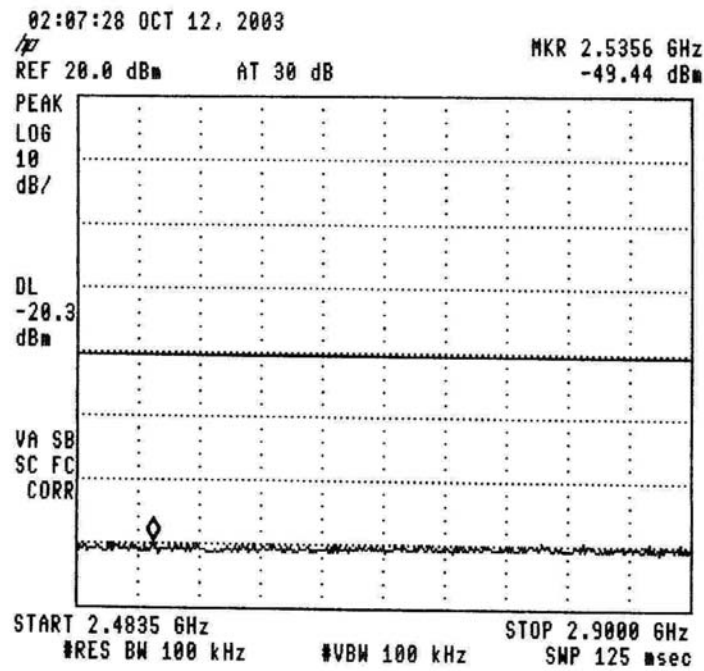


Figure 68 —2442 MHz

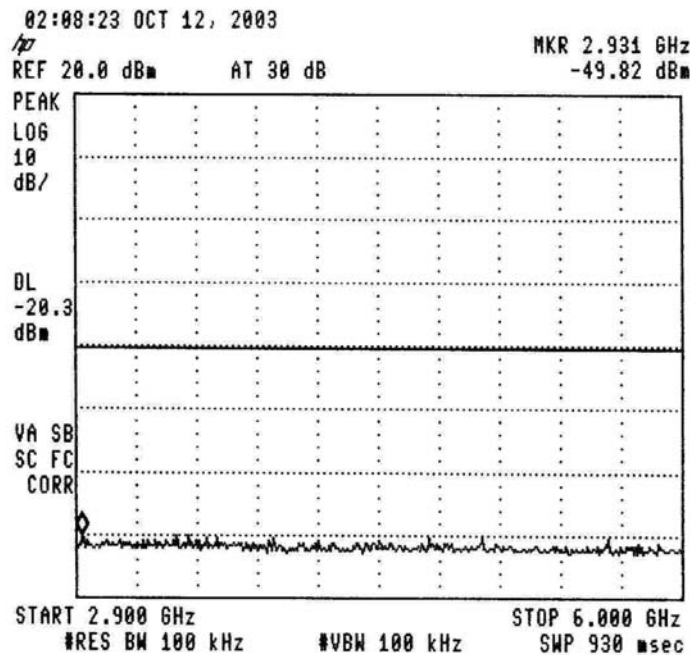


Figure 69 —2442 MHz

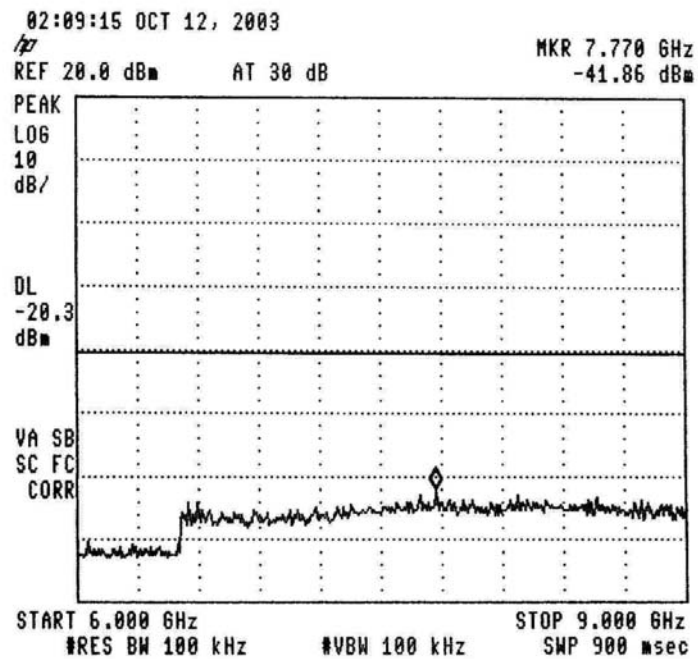


Figure 70 —2442 MHz

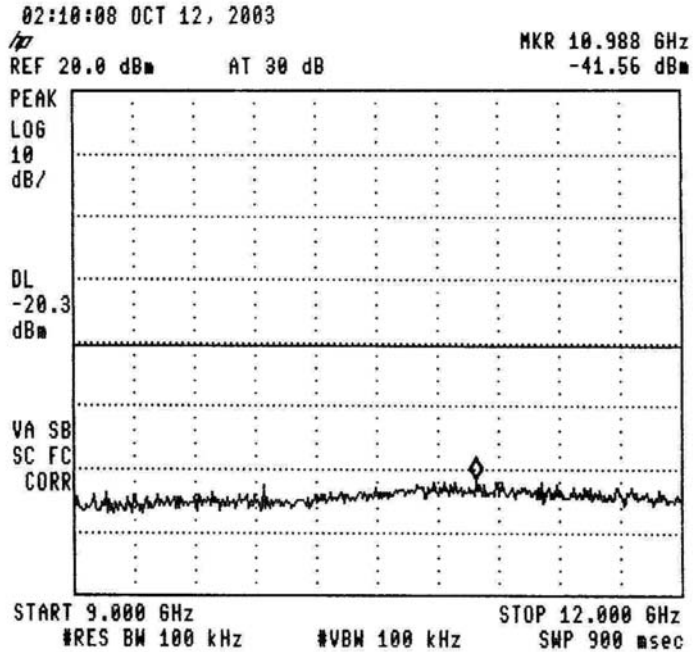


Figure 71 —2442 MHz

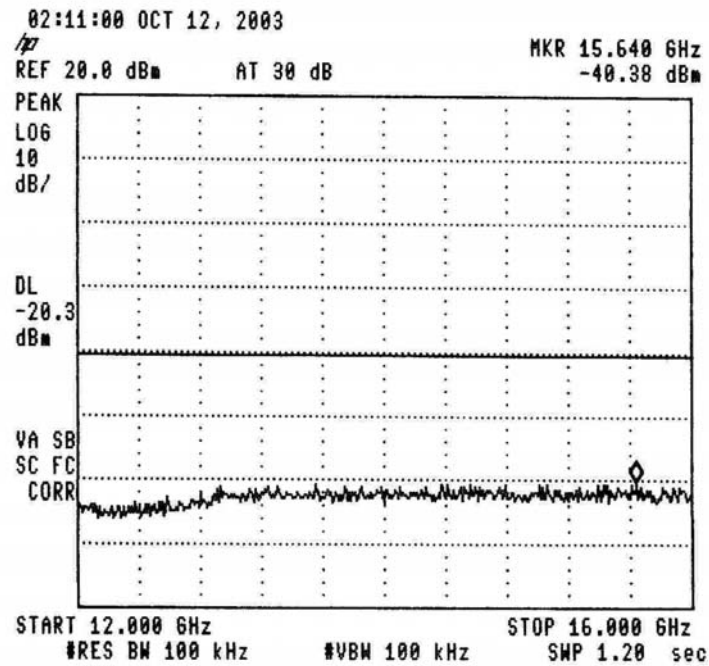


Figure 72 —2442 MHz

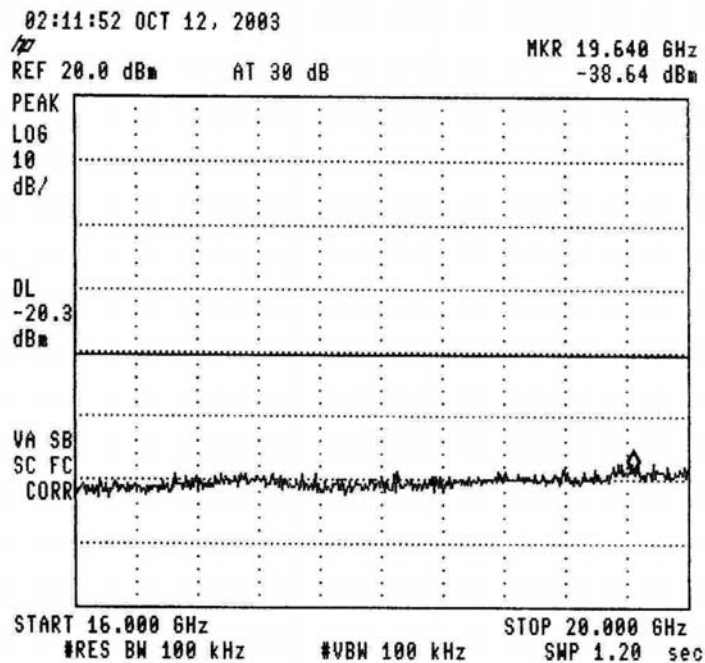


Figure 73 —2442 MHz

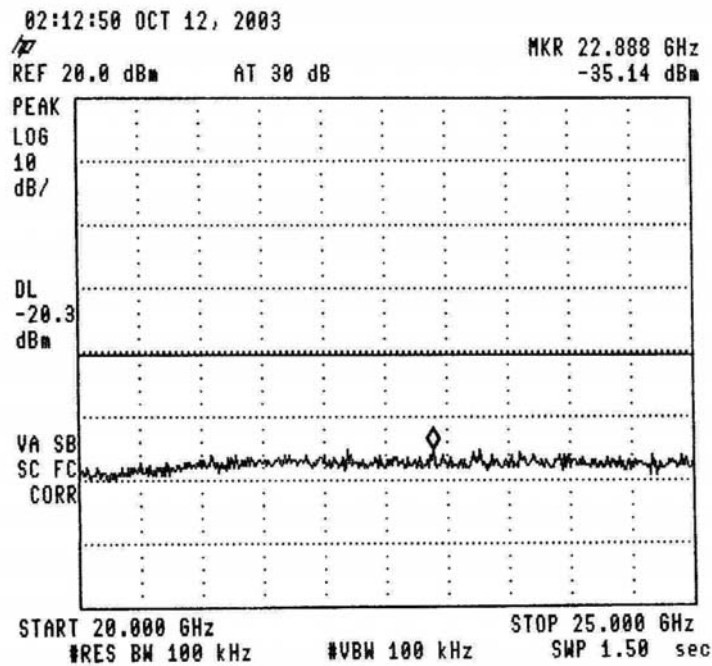


Figure 74 —2442 MHz

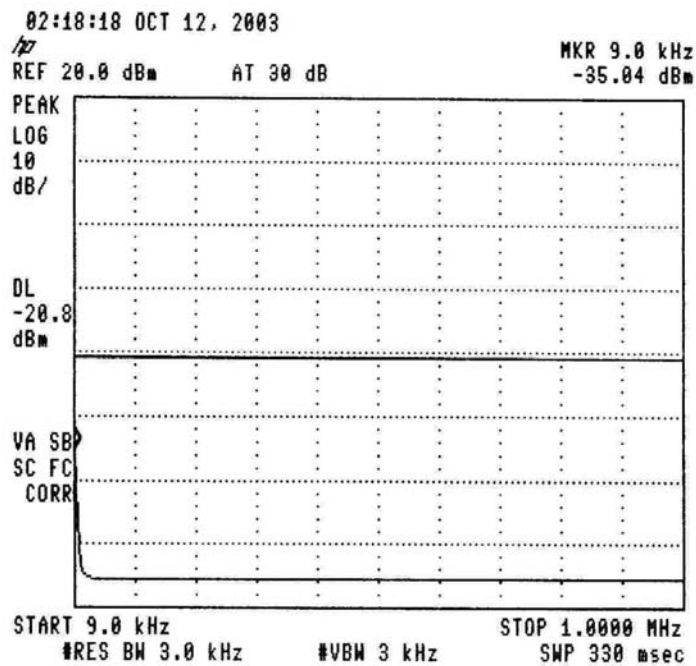


Figure 75 —2462 MHz

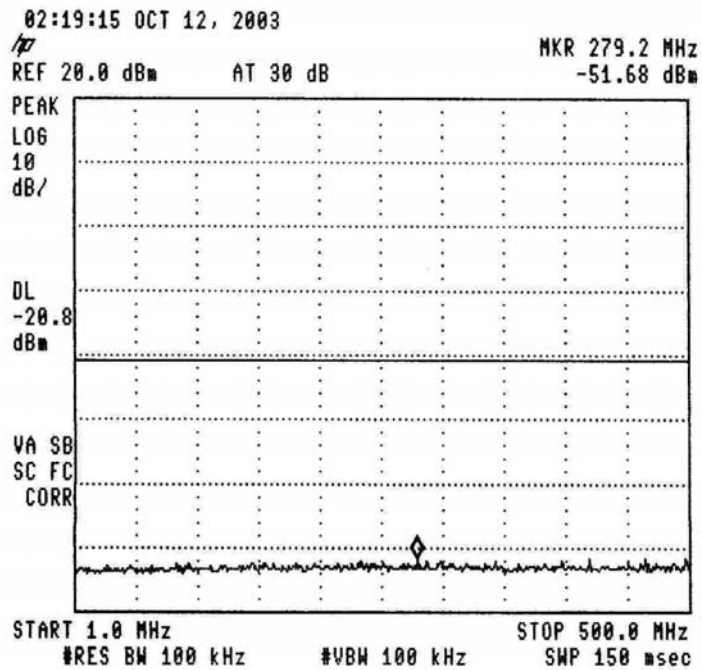


Figure 76 —2462 MHz

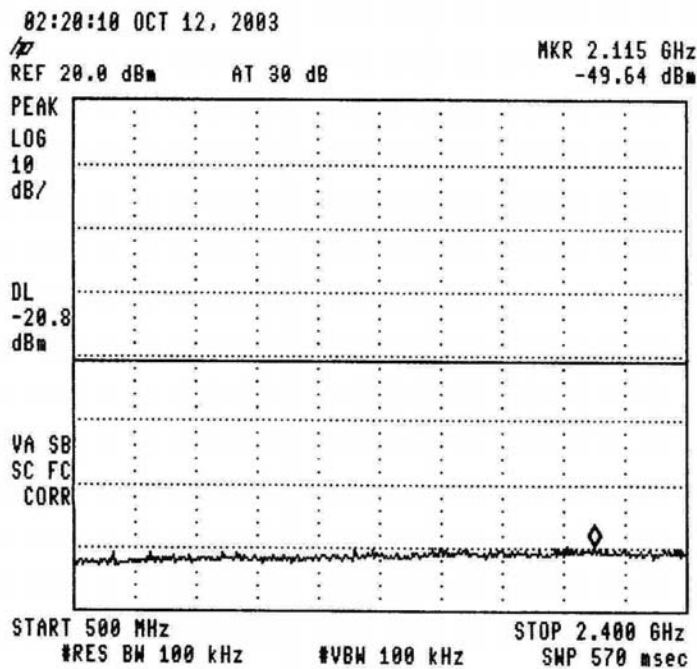


Figure 77 —2462 MHz

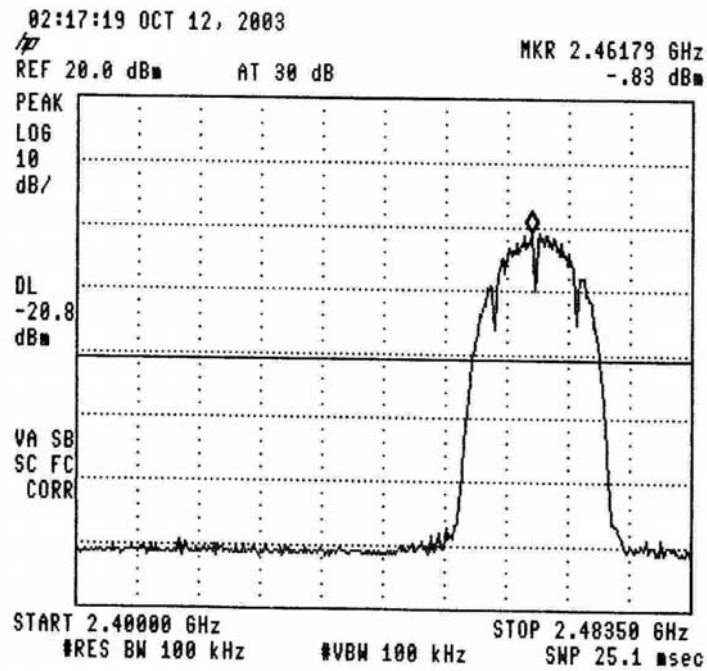


Figure 78 —2462 MHz

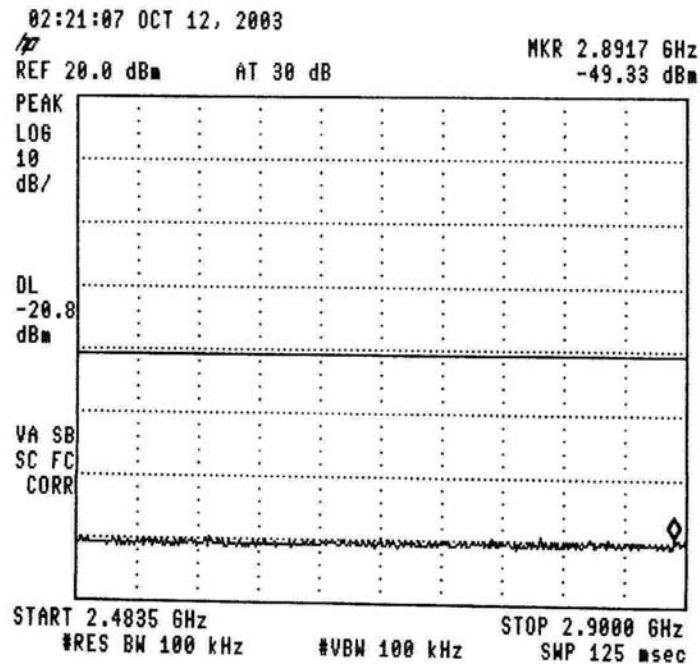


Figure 79 —2462 MHz

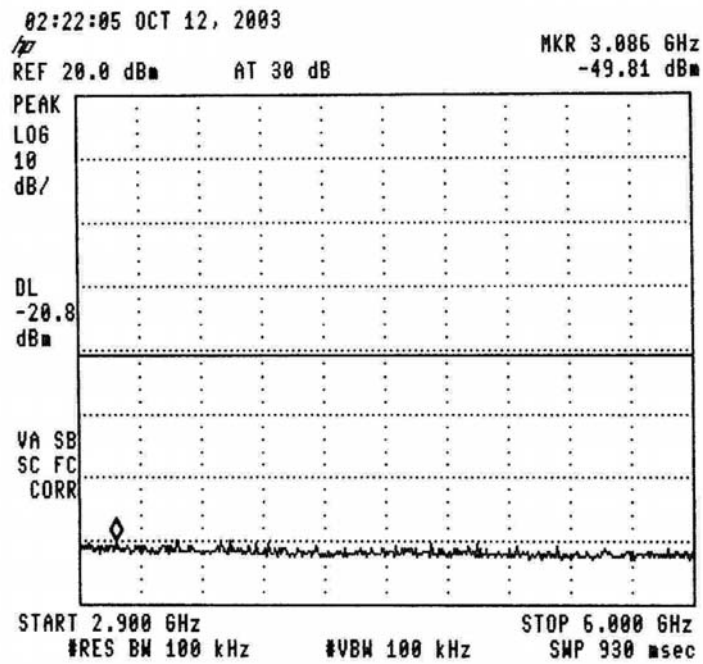


Figure 80 —2462 MHz

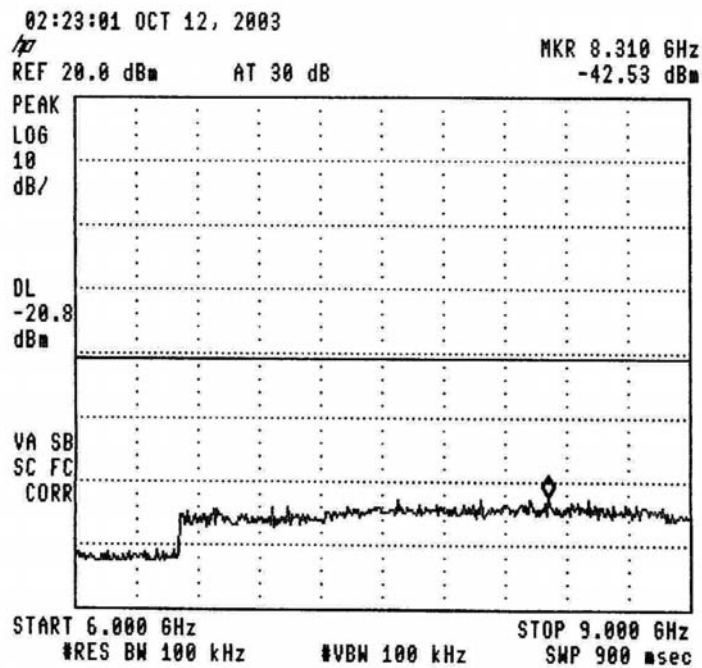


Figure 81 —2462 MHz

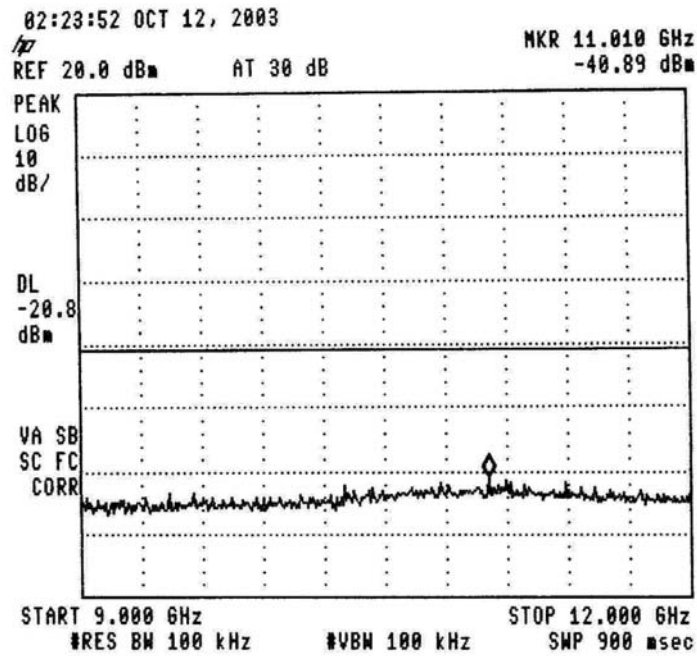


Figure 82 —2462 MHz

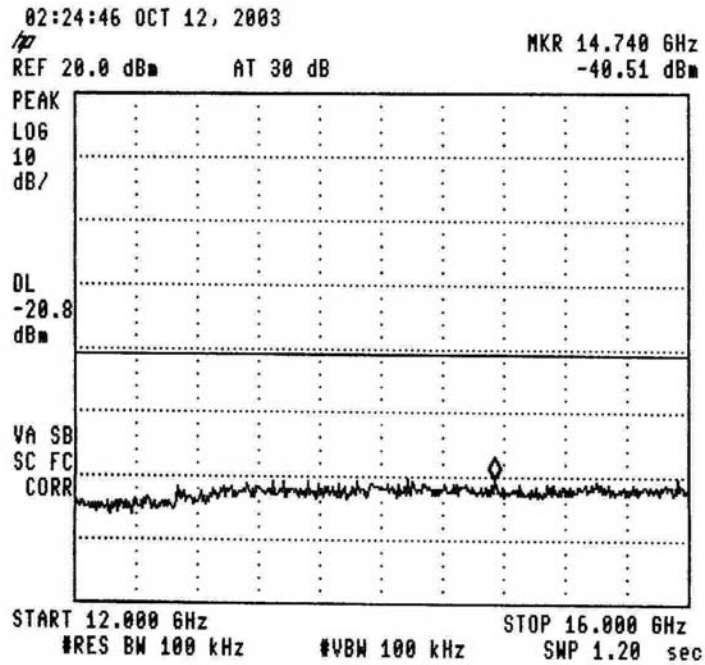


Figure 83 —2462 MHz

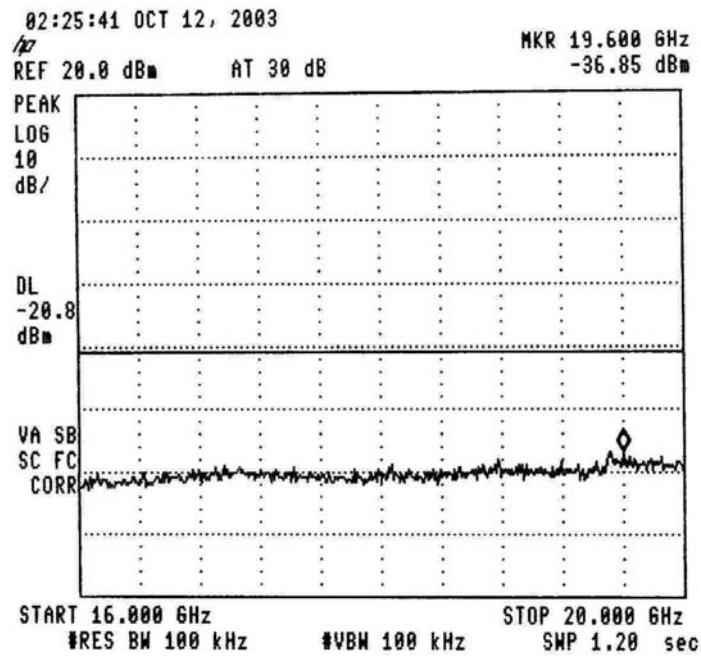


Figure 84 —2462 MHz

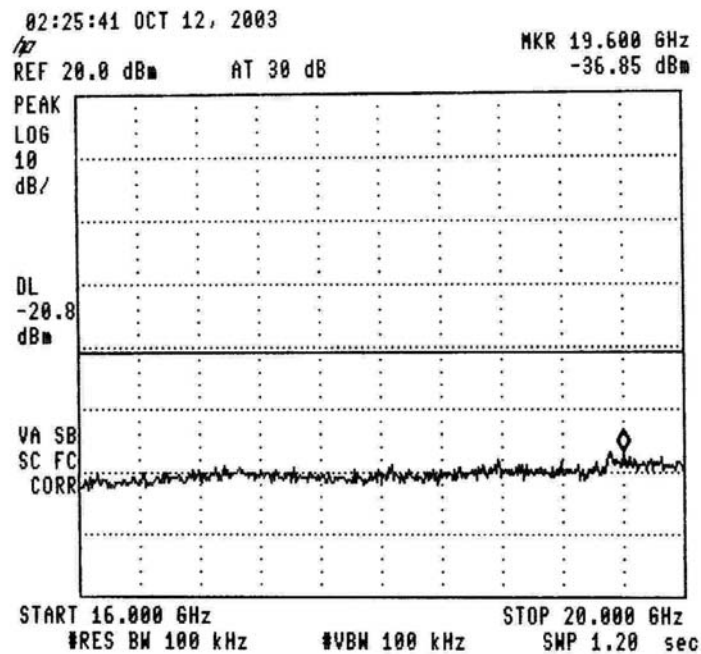


Figure 85 —2462 MHz

10.2 Results table

E.U.T Description: SALU AeroScout™ Location Receiver
 Model No.: BWH1000-02
 Serial Number: 130-1000-4190
 Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Reading (dBc)	Specification (dBc)	Margin (dB)
2412	36.36	20.0	16.36
2442	34.85	20.0	14.85
2462	34.36	20.0	14.36

Figure 86 Peak Power Output of 2400-2483.5 MHz Band

JUDGEMENT: Passed by 14.36 dB

TEST PERSONNEL:

Tester Signature: 

Date: 13.11.03

Typed/Printed Name: E. Pitt

10.3 Test Equipment Used.

Peak Power Output of 2400-2438.5 MHz Band

Instrument	Manufacture	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	January 31, 2003	1 year
Cable	Avnet	MTS	N/A	September 20, 2003	1 year

Figure 87 Test Equipment Used

11 6 dB Minimum Bandwidth

11.1 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 an appropriate coaxial cable section. 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.

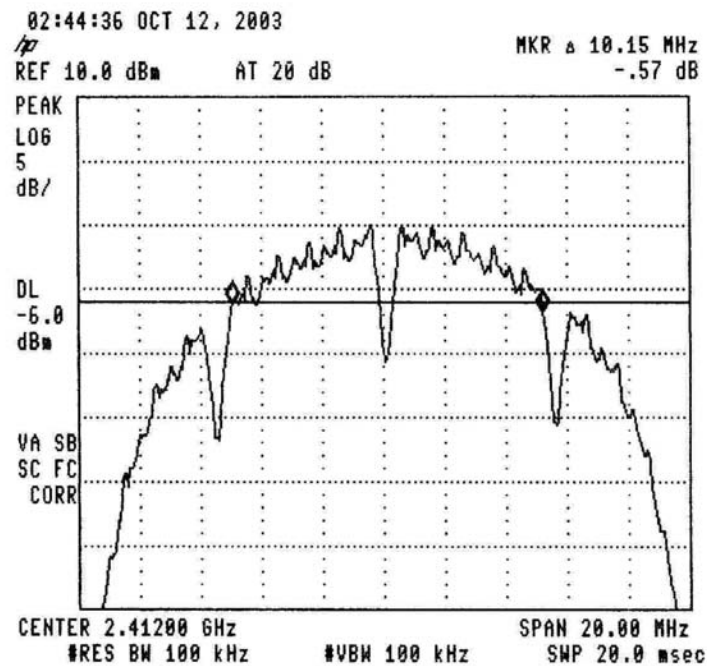


Figure 88 —2412 MHz

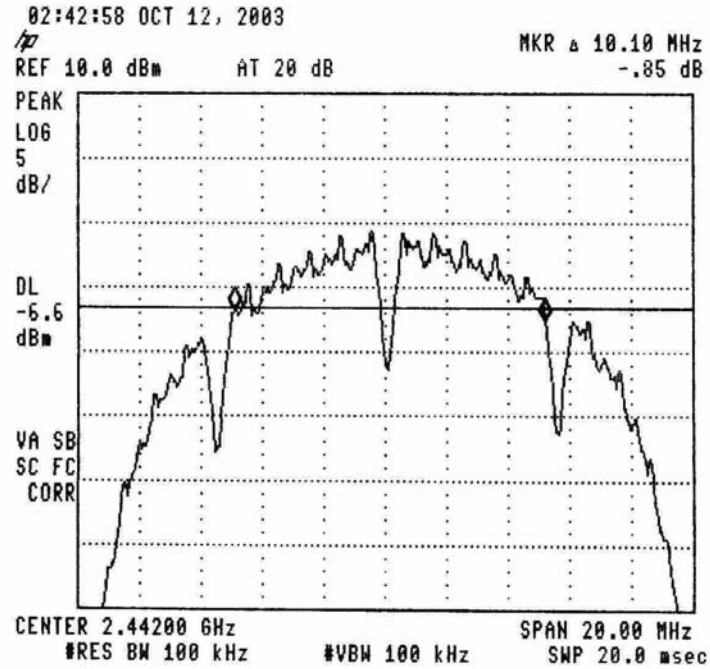


Figure 89 —2442 MHz

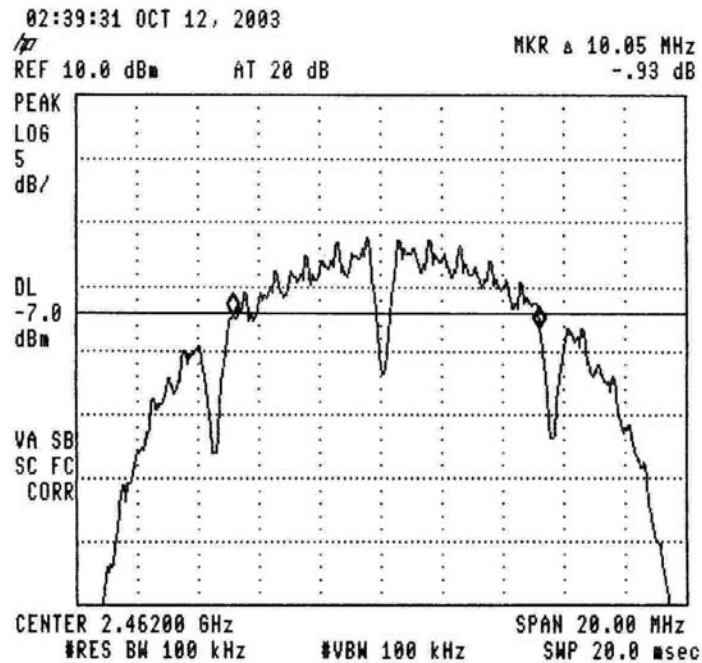


Figure 90 —2462 MHz

11.2 Results table

E.U.T Description: SALU AeroScout™ Location Receiver
 Model No.: BWH1000-02
 Serial Number: 130-1000-4190
 Specification: F.C.C. Part 15, Subpart C: (15.247-a2)

Operation Frequency (MHz)	Reading (MHz)	Specification (MHz)
2412	10.15	>0.5
2442	10.10	>0.5
2446	10.05	>0.5

Figure 91 6 dB Minimum Bandwidth

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: 

Date: 13.11.03

Typed/Printed Name: E. Pitt

11.3 Test Equipment Used.

6 dB Minimum Bandwidth

Instrument	Manufacture	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	January 31, 2003	1 year
Cable	Avnet	MTS	N/A	September 20, 2003	1 year

Figure 92 Test Equipment Used

12 Band Edge Spectrum

[In Accordance with section 15.247(c)]

12.1 Test procedure

Enclosed are spectrum analyzer plots for the lowest operation frequency (2412 MHz) and the highest operation frequency (2462 MHz) in which the E.U.T. is planned to be used.

The E.U.T. antenna terminal was connected to the spectrum analyzer through an appropriate coaxial cable. The spectrum analyzer was set to 100 kHz resolution BW. Maximum power level below 2400 MHz and above 2483.5 MHz was measured relative to power level at 2412 MHz and 2462 MHz correspondingly.

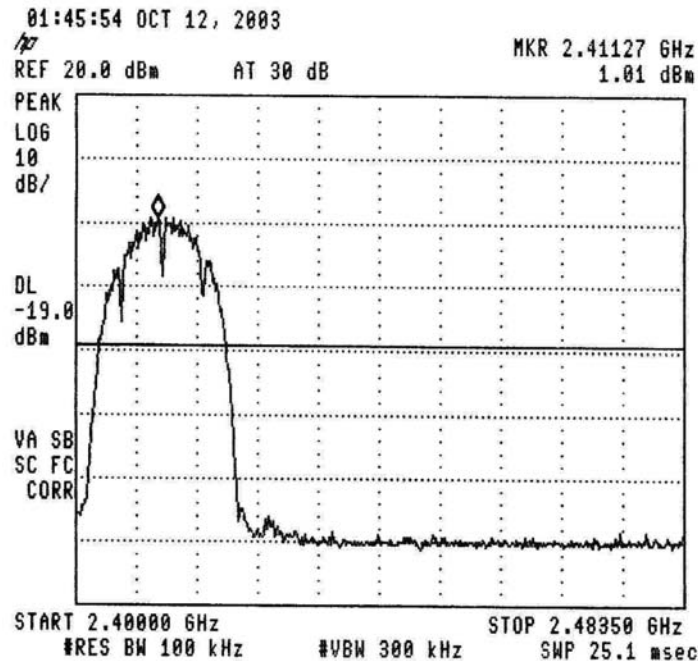


Figure 93 —2412 MHz

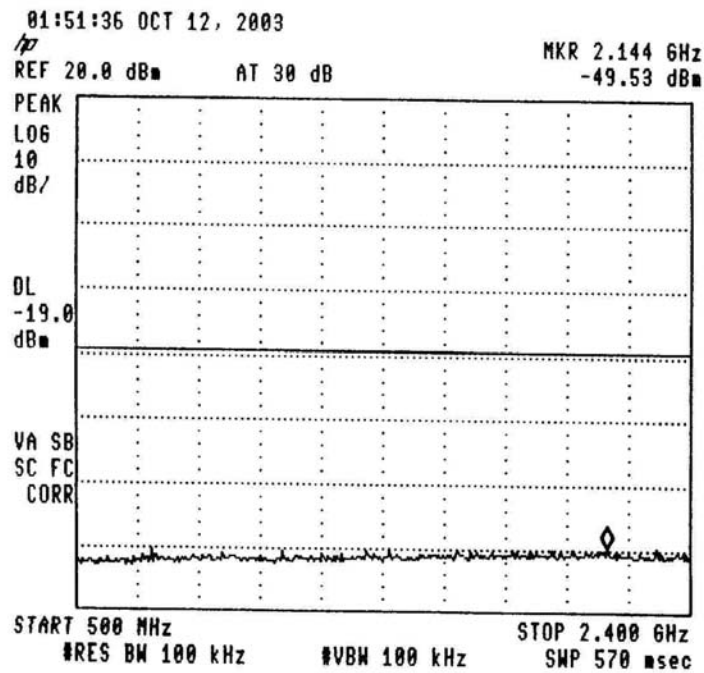


Figure 94 —2412 MHz

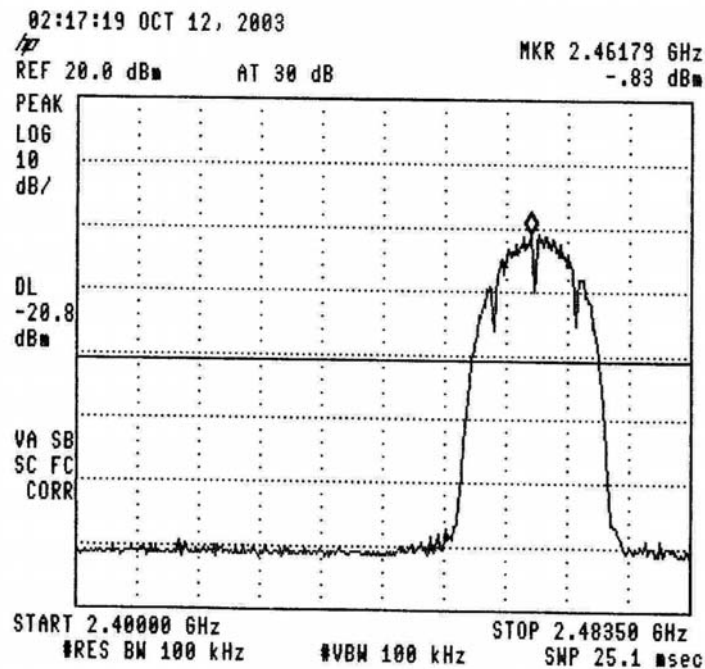


Figure 95 —2462 MHz

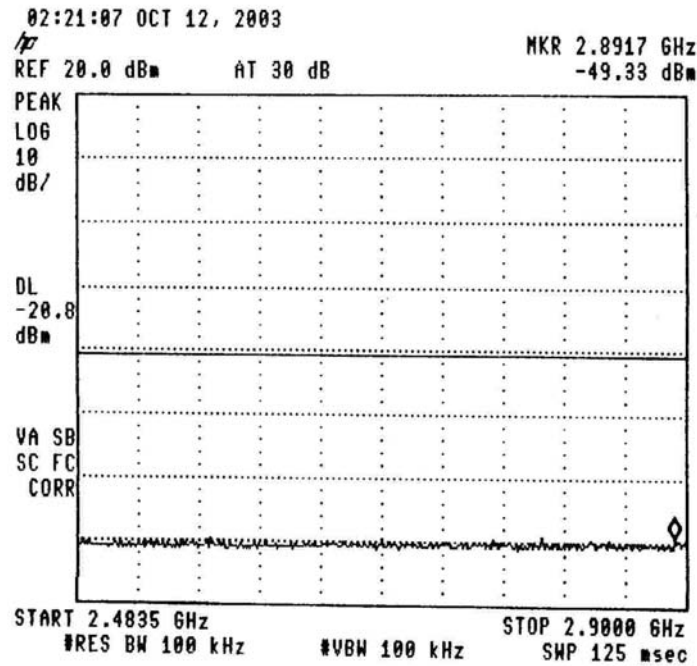


Figure 96 —2462 MHz

12.2 Results table

E.U.T. Description: SALU AeroScout™ Location Receiver
 Model No.: BWH1000-02
 Serial Number: 130-1000-4190
 Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Band Edge Frequency (MHz)	Spectrum Level (dBc)	Specification (dBc)	Margin (dB)
2412	2144.00	50.54	20.0	30.54
2462	2892.00	48.50	20.0	28.50

Figure 97 Band Edge Spectrum

JUDGEMENT: Passed by 28.50 dB

TEST PERSONNEL:

Tester Signature: E. Pitt

Date: 13.11.03

Typed/Printed Name: E. Pitt

12.3 Test Equipment Used.

Band edge Spectrum

Instrument	Manufacture	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	January 31, 2003	1 year
Cable	Avnet	MTS	N/A	September 20, 2003	1 year

Figure 98 Test Equipment Used

13 Transmitted Power Density

[In accordance with section 15.247(d)]

13.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an appropriate coaxial cable. 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.

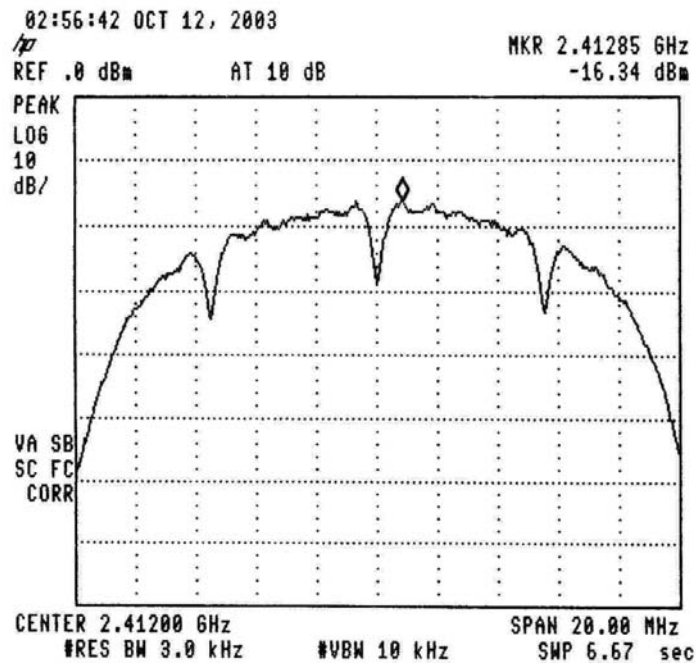


Figure 99 —2412 MHz

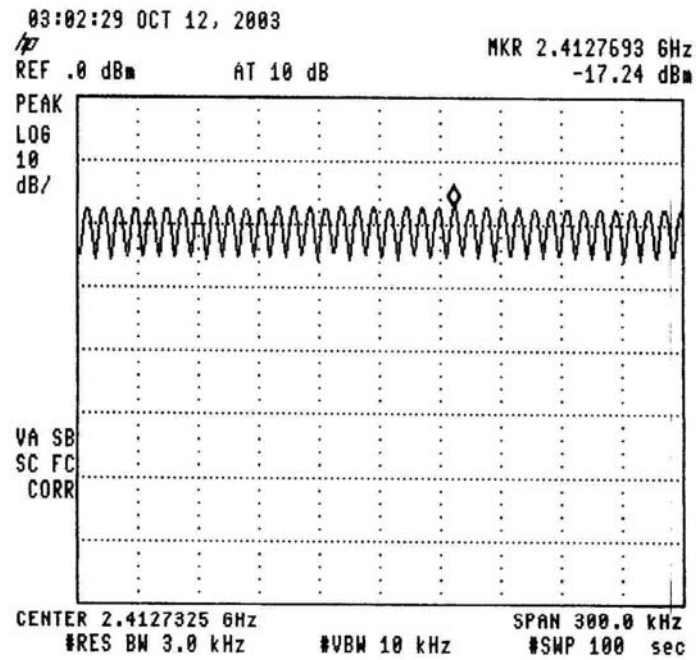


Figure 100 —2412 MHz

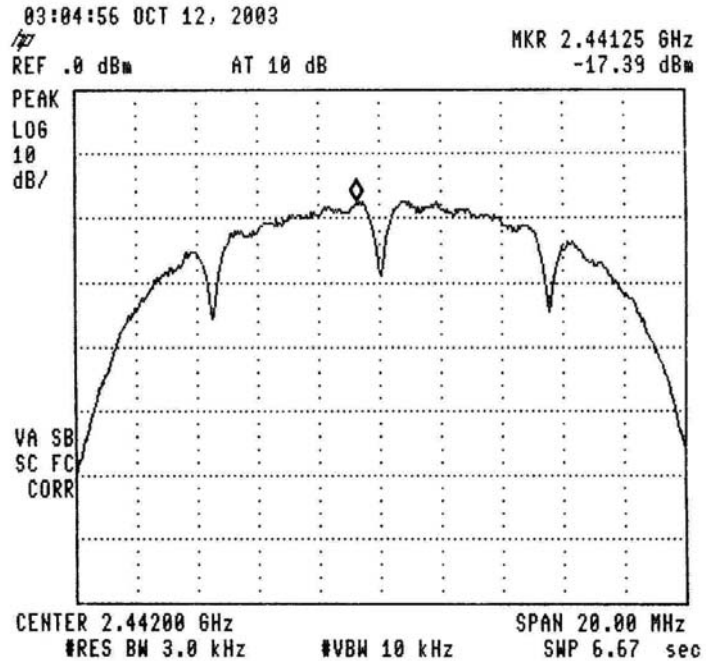


Figure 101 —2442 MHz

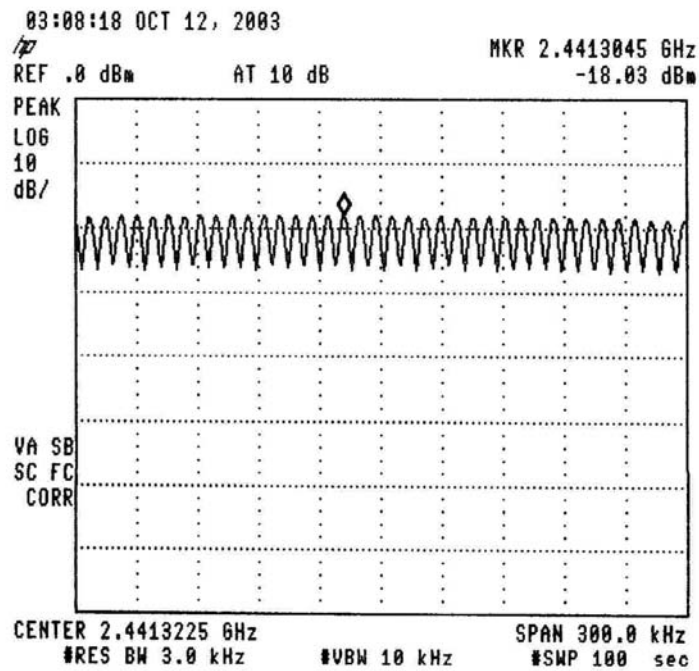


Figure 102 —2442 MHz

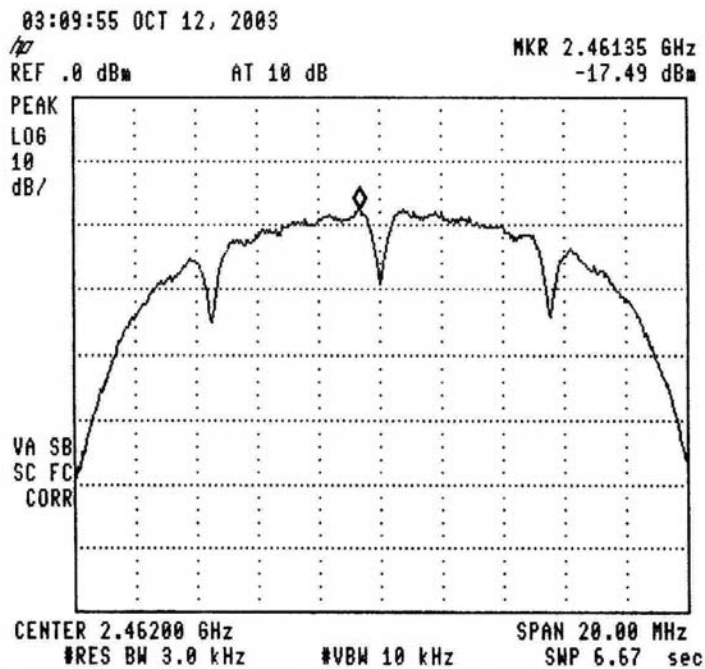


Figure 103 —2462 MHz

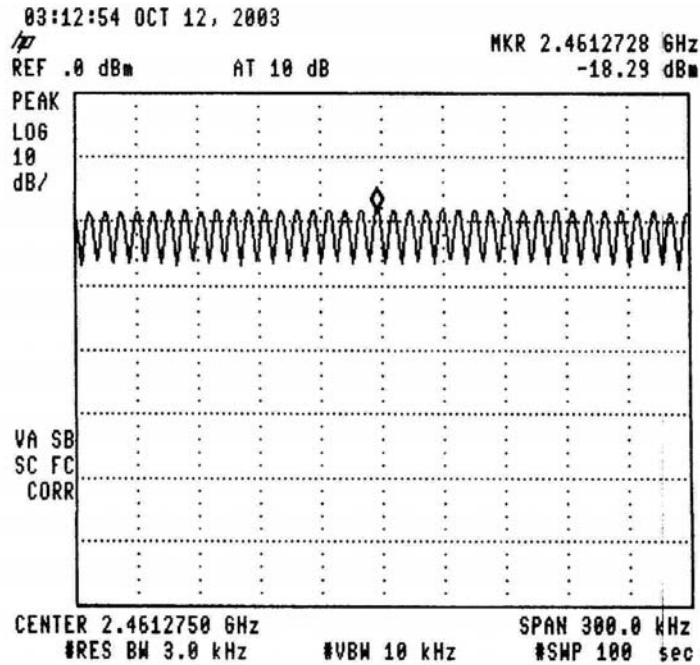


Figure 104 —2462 MHz

13.2 Results table

E.U.T. Description: SALU AeroScout™ Location Receiver
 Model No.: BWH1000-02
 Serial Number: 130-1000-4190
 Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Reading Signal Analyzer (dBm)	Cable Loss (dB)	Final Result (dBm)	Specification (dBm)	Margin (dB)
2412	-17.24	1.0	-16.24	8.0	24.24
2442	-18.03	1.0	-17.03	8.0	25.03
2462	-18.29	1.0	-17.29	8.0	25.29

Figure 105 Test Equipment Used

JUDGEMENT: Passed by 25.24 dB

TEST PERSONNEL:

Tester Signature: _____

Date:

Typed/Printed Name: E. Pitt

13.3 Test Equipment Used.

Transmitted Power Density

Instrument	Manufacture	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	January 31, 2003	1 year
Cable	Avnet	MTS	N/A	September 20, 2003	1 year

Figure 106 Test Equipment Used

14 Antenna Gain

The antenna gain is 0dBi.



YE EUN TECH CO., LTD

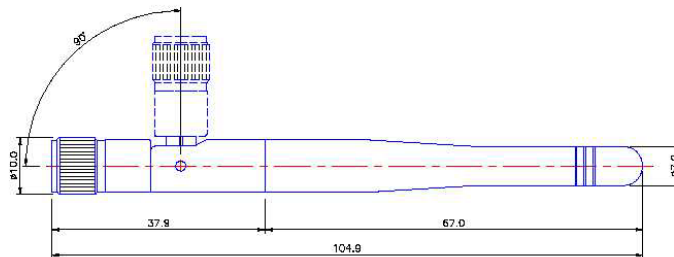
#604, GunpoJeil-Gongdan, 323-1, DangJeong-dong, Gunpo City,
Kyounggi, Korea Zip:435-832

TEL : 82-31-459-0960~1

FAX : 82-31-459-0962

MODEL : HPD-2400N/RP (Reverse Polarity)

■ **ANTENNA TYPE: SLEEVE DIPOLE**



■ ELECTRICAL SPECIFICATIONS

FREQUENCY BAND	2.4~2.5 GHz
V.S.W.R	LESS THAN 1.9:1
GAIN	0 dBi (Max.)
RADIATION PATTERN	OMNI - DIRECTIONAL
POLARIZATION	VERTICAL
POWER INPUT(Watts)	5 (MAX)
IMPEDANCE(Ω)	50

■ MECHANICAL SPECIFICATIONS

LENGTH	105mm $\pm$ 2.0
WEIGHT	17g
CONNECTOR TYPE	SMA-PLUG/ NICKEL PLATED/ SWIVLE
TEMPERATURE	-30℃~+70℃
COVER MATERIAL	URETHANE – IVORY COLOR

15 R.F Exposure/Safety

The E.U.T. is installed in fixed locations for application of collecting location data. Typical locations for the E.U.T. are offices and communication centers. The typical distance between the E.U.T. and the general population in normal use is at least 0.5 meters.

Calculation of Maximum Permissible Exposure (MPE)
Based on Section 1.1307(b)(1) Requirements

(a) FCC limits at 2442 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 30mw (Peak)

G_t - Antenna Gain, 0dBi

R - Distance from Transmitter using 20cm worst case

(c) The peak power density is :

$$S_p = \frac{30}{4\pi(20)^2} = 6 \times 10^{-3} \frac{mW}{cm^2}$$

(d) The duty cycle of transmission in actual worst case is 1 millisecond “on” and 50 microsecond “Off”.

The average power over 30 minutes is:

$$P_{AV} = \frac{30 \times 1}{1.05} = 28.6mW$$

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

$$S_{AV} = \frac{28.6}{4\pi(20)^2} = 5.7 \times 10^{-3} \frac{mW}{cm^2}$$

(f) This is 3 orders of magnitude below the FCC limit.

16 Photographs of Tested E.U.T.



Figure 107 Top View External



Figure 108 Bottom View External



Figure 109 Rear View



Figure 110 Front View

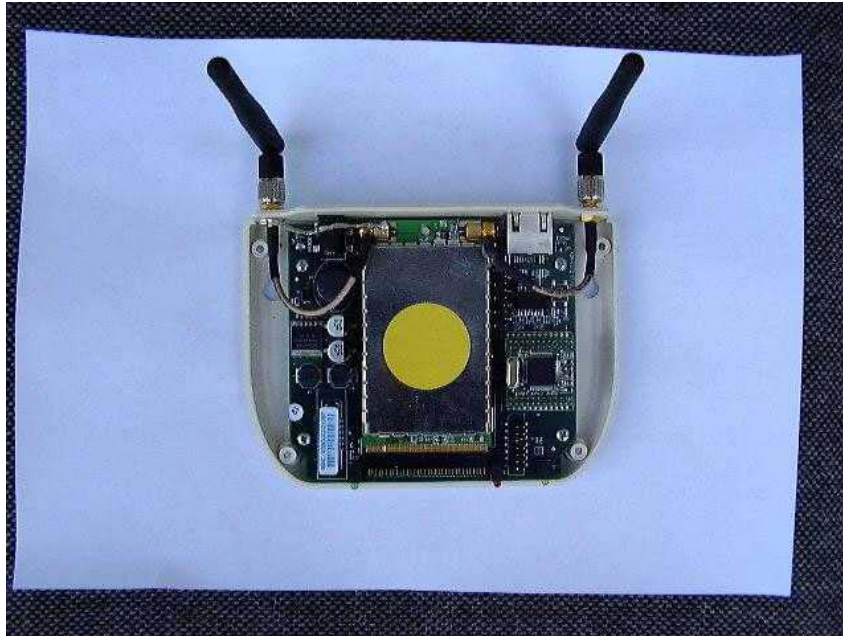


Figure 111 PCB in Case



Figure 112 PCB Side 1

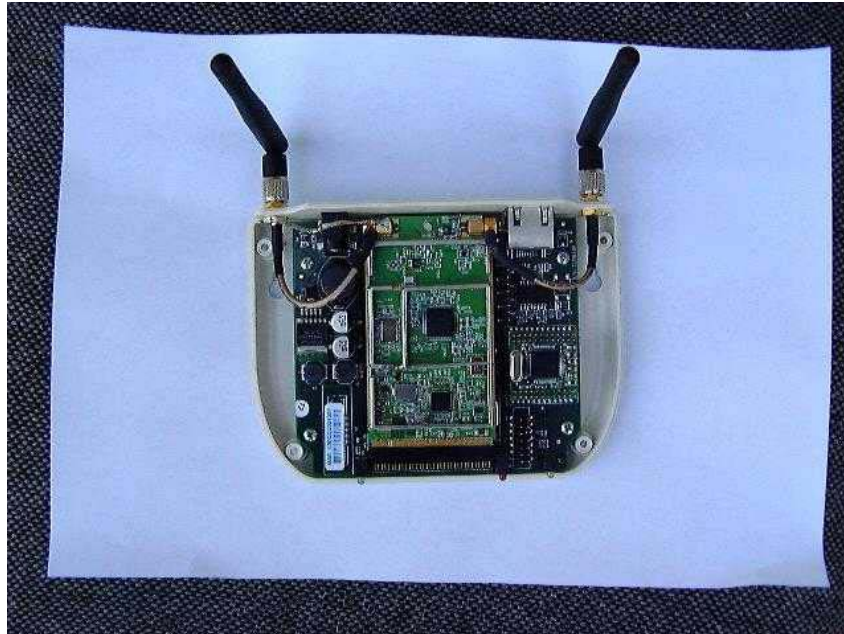


Figure 113 PCB Shield Removed



Figure 114 PCB Side 2