

DATE: 05 November 2003

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

EMC Test

for

Bluesoft Inc.

Equipment under test:

AeroScout™ Tag

(For Transmitter Section)

BWH2000-02

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™ Tag

(For Transmitter Section)

BWH2000-02

FCC ID: Q3H BS2030-0

05 November 2003

This report concerns: Original Grant Class II change

Class B verification Class A verification Class I change

Equipment type: Radio Telemetry Transmitter

Request Issue of Grant:

Immediately upon completion of review

Limits used:

CISPR 22

Part 15

Measurement procedure used is ANSI C63.4-2001.

Application for Certification

prepared by:

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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™ Tag

Equipment Model No.: BWH2000-02

Equipment Serial No.: 63,66,68

Date of Receipt of E.U.T: 30.06.03

Start of Test: 30.06.03

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 Tag is a component of the AeroScout Wireless LAN Location System.

The Tag is a stand-alone unit battery powered, 3.6 AA Lithium Thionyl Chloride cell, and uses DSSS in the 2.4GHz ISM frequency band.

The Tag includes an internal SMD antenna (0 dBi gain) and has no external interfaces.

Each Tag has its own MAC address. Before any transmission the Tag sniffs the air interface in order to detect 802.11b transmissions (RSSI detection). If the air is free, the Tag transmits its preprogrammed 802.11b message (1 Mbps, DBPSK modulation).

The interval between two consecutive transmissions can be programmed from 1 second to 8 hours; in between that interval the Tag is in power down.

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

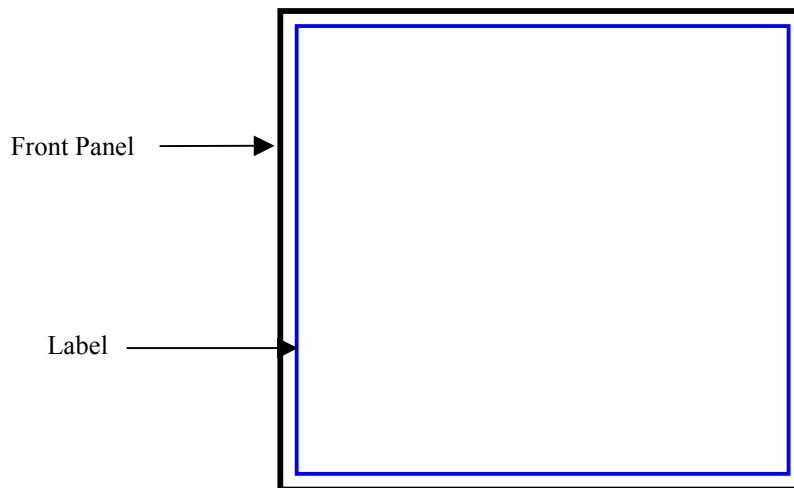


Figure 2. Location of Label on EUT

3. System Test Configuration

3.1 *Justification*

The typical operation of the Tag (as a customer would normally use) is in receive mode for a period of 100uSec to sniff the air traffic (RSSI detection) and then to transmit a message for a period of max 500uS.

Due to the short period in transmit and receive mode in a typical operation mode, the tag was configured in this test mode to be in continuous receive mode and in continuous transmit mode as it was found to be the worst case operating mode.

3.2 *EUT Exercise Software*

The Tag SW uses two working modes in typical operation, a receive mode for the RSSI detection and then the transmit mode.

In the testing SW configuration, the Tag was configured to operate on two programmable modes 1) continuous receive mode 2) continuous transmit mode. The testing on those two modes where done on three different channels.

3.3 *Special Accessories*

No special accessories were needed to achieve compliance.

3.4 *Equipment Modifications*

The value of C72 was changed from not connected to 1pF.

3.5 Configuration of Tested System

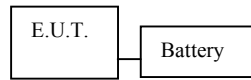


Figure 3. Configuration of Tested System

Notes:

1. The P.C.B. of the E.U.T. was tested out of the case using a larger battery, that does not fit into the E.U.T. case, in order to enable a higher duty cycle.
2. Three units were tested, each operating at a different frequency:
S/N 63 at 2412 MHz
S/N 66 at 2442 MHz
S/N 68 at 2462 MHz

4. Block Diagram

4.1 *Schematic Block/Connection Diagram*

Intentionally Blank for Reasons of Confidentiality

Figure 4. E.U.T. Block Diagram

4.2 *Theory of Operation*

Each Tag has its own MAC address. Before any transmission the Tag sniffs the air interface in order to detect 802.11b transmissions (RSSI detection). If the air is free, the Tag transmits its preprogrammed 802.11b message (1 Mbps, DBPSK modulation).

5. Spurious Radiated Measurement Photos



Figure 5. Spurious Radiated Emission Test. Front



Figure 6. Spurious Radiated Emission Test. Side

6. Spurious Radiated Emission, Below 1 GHz

6.1 Test Specification

30-1000 MHz, F.C.C., 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 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 emission levels for other frequencies were compared to the fundamental carrier level and the requirement of Section 15.249 (c).

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.



Measured Data

JUDGEMENT: Passed by 8.1 dB μ V/m

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

The worst cases were:

for 2412 MHz, 8.1 dB at 264.00 MHz frequency, horizontal polarization.

for 2442 MHz, 8.5 dB at 264.00 MHz frequency, horizontal polarization

for 2462 MHz, 8.6 dB at 264.00 MHz frequency, horizontal polarization

The details of the highest emissions are given in Figure 7 to Figure 18.

TEST PERSONNEL:

Tester Signature: 

Date: 06.11.03

Typed/Printed Name: Y. Mordukhovitch

Radiated Emission

E.U.T Description AeroScout™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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 μV/m)
73.71	16.1	11.1	10.3	40.0	-28.9
111.06	18.7	13.7	13.1	43.5	-29.8
149.95	20.5	15.6	15.0	43.5	-27.9
156.80	20.7	15.6	15.2	43.5	-27.9
164.11	20.8	16.0	15.4	43.5	-27.5
264.00	41.5	37.9	21.0	46.0	-8.1

**Figure 7. 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™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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 μV/m)
332.22	22.3	16.7	15.9	46.0	-29.3
407.73	25.5	19.8	18.6	46.0	-26.2
612.99	29.0	24.0	22.5	46.0	-22.0
968.00	45.7	41.5	28.3	54.0	-12.5

**Figure 8. 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™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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)
37.93	19.2	14.1	13.7	40.0	-25.9
113.54	20.0	14.0	13.2	43.5	-29.5
132.08	20.8	14.8	14.0	43.5	-28.7
164.50	24.4	16.1	15.4	43.5	-27.4
264.00	40.4	37.8	21.4	46.0	-8.2
283.91	27.9	22.9	22.1	46.0	-23.1

**Figure 9. 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™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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 μV/m)
327.17	22.5	16.7	15.8	46.0	-29.3
399.86	24.5	19.7	18.5	46.0	-26.3
611.18	29.3	24.0	22.4	46.0	-22.0
968.01	44.6	39.8	28.3	54.0	-14.2

**Figure 10. 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™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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 (MHz)	Peak Amp (dBμV/m)	QP Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB)
73.71	16.1	11.1	10.3	40.0	-28.9
111.06	18.7	13.7	13.1	43.5	-29.8
149.95	20.5	15.6	15.0	43.5	-27.9
156.80	20.7	15.6	15.2	43.5	-27.9
164.11	20.8	16.0	15.4	43.5	-27.5
264.00	39.2	37.5	21.4	46.0	-8.5

**Figure 11. 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™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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 (MHz)	Peak Amp (dBμV/m)	QP Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB μV/m)
332.22	22.3	16.7	15.9	46.0	-29.3
407.73	25.3	19.8	18.6	46.0	-26.2
612.99	29.0	24.0	22.6	46.0	-22.0
968.00	43.4	40.1	28.3	54.0	-13.9

**Figure 12. 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™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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 (MHz)	Peak Amp (dBμV/m)	QP Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB)
37.93	19.2	14.1	13.7	40.0	-25.9
113.54	20.0	14.0	13.2	43.5	-29.5
132.08	20.8	14.8	14.0	43.5	-28.7
164.50	24.4	16.1	15.4	43.5	-27.4
264.00	38.5	36.6	21.4	46.0	-9.4
283.91	27.9	22.9	22.1	46.0	-23.1

**Figure 13. 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™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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 (MHz)	Peak Amp (dBμV/m)	QP Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB μV/m)
327.17	22.5	16.7	15.8	46.0	-29.3
399.86	24.5	19.7	18.5	46.0	-26.3
611.18	29.3	24.0	22.4	46.0	-22.0
968.01	45.1	38.7	28.3	54.0	-15.3

**Figure 14. 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™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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 (MHz)	Peak Amp (dBμV/m)	QP Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB)
73.71	16.1	11.1	10.3	40.0	-28.9
111.06	18.7	13.7	13.1	43.5	-29.8
149.95	20.5	15.6	15.0	43.5	-27.9
156.80	20.7	15.6	15.2	43.5	-27.9
164.11	20.8	16.0	15.4	43.5	-27.5
264.00	41.5	37.4	21.0	46.0	-8.6

**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™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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 (MHz)	Peak Amp (dBμV/m)	QP Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB μV/m)
332.22	22.3	16.7	15.9	46.0	-29.3
407.73	25.5	19.8	18.6	46.0	-26.2
612.99	29.0	24.0	22.5	46.0	-22.0
968.00	45.6	39.3	28.3	54.0	-14.7

**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™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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 (MHz)	Peak Amp (dBμV/m)	QP Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB)
37.93	19.2	14.1	13.7	40.0	-25.9
113.54	20.0	14.0	13.2	43.5	-29.5
132.08	20.8	14.8	14.0	43.5	-28.7
164.50	24.4	16.1	15.4	43.5	-27.4
264.00	38.8	35.8	21.4	46.0	-10.2
283.91	27.9	22.9	22.1	46.0	-23.1

**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™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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 (MHz)	Peak Amp (dBμV/m)	QP Amp (dBμV/m)	Correction (dB)	Specification (dBμV/m)	Margin (dB μV/m)
327.17	22.5	16.7	15.8	46.0	-29.3
399.86	24.5	19.7	18.5	46.0	-26.3
611.18	29.3	24.0	22.4	46.0	-22.0
968.01	43.3	37.3	28.3	54.0	-16.7

**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.

6.3 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	2738508357.0	N/A	N/A

6.4 Field Strength Calculation

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

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

- 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.

7. Spurious Radiated Emission 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.

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.

The emission levels for other frequencies were compared to the fundamental carrier level and the requirement of Section 15.249 (c).

In the frequency range 1-2.9 GHz, a computerized EMI receiver complying to CISPR 16 requirements and a High Pass Filter were used. The test distance was 3 meters.

In the frequency range 2.9-25.0 GHz, a spectrum analyzer including a low noise amplifier was used. The test distance was 3 meters for frequencies up to 9.6 GHz and 1.5 meters for frequencies above 9.6 GHz. The reduced distance was used to increase the signal to noise ratio. During average measurements, the IF bandwidth was 1 MHz and the video bandwidth was 100Hz. Above 12.5 GHz, 100kHz IF bandwidth was used. During peak measurements, the IF bandwidth was 1 MHz and the video bandwidth was 3 MHz.

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.)

7.2 Test Data

JUDGEMENT: Passed by 1.2 dB μ V/m

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

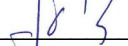
for 2412 MHz, 3.7 dB at 7236.00 MHz frequency, horizontal polarization.

for 2442 MHz, 2.3 dB at 4884.00 MHz frequency, horizontal polarization

for 2462 MHz, 1.2 dB at 4924.00 MHz frequency, horizontal polarization

The details of the highest emissions are given in Figure 19 to Figure 30.

TEST PERSONNEL:

Tester Signature:  _____

Date: 06.11.03

Typed/Printed Name: I. Raz

Radiated Emission Above 1 GHz

E.U.T Description AeroScout™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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

Antenna Polarization: Horizontal Frequency range: 1.0 GHz to 25.0 GHz
 Test Distance: See Table Detector: Peak
 Operating Frequency: 2412 MHz

Freq. (MHz)	Peak Amp (dBμV)	Correction Factors				Peak Spec. (dB μV/m)	Peak Final Result FR (P)* (dB μV/m)	Peak Margin (dB)	Test Distance (meters)
		Antenna AF (dB)	Cable CF (dB)	Preamp PF (dB)	Atten ATF (dB)				
4824.00	37.4	35.7	2.5	29.9	20.0	74.0	65.7	-8.3	3
7236.00	36.9	38.8	3.0	28.5	20.0	74.0	70.2	-3.8	3
9648.00	39.8	41.2	4.0	27.8	0.0	80.0	57.2	-22.8	1.5
12060.00	40.0	43.4	6.5	27.1	0.0	80.0	62.8	-17.2	1.5
14471.00	41.1	40.0	7.8	23.8	0.0	80.0	65.1	-14.9	1.5

**Figure 19. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: Peak**

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.

* In the frequency range above 2.9 GHz, the field strength was manually calculated by using the following equation:

$$FR(P) = \text{Peak} + AF + CF - PF + ATF$$

Where: FR (P) is final peak detector result,
 Peak is peak detector measurement,
 AF is antenna factor,
 CF is cable factor,
 PF is preamplifier factor.
 ATF is Attenuator Factor

Radiated Emission Above 1 GHz

E.U.T Description AeroScout™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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

Antenna Polarization: Horizontal Frequency range: 1.0 GHz to 25.0 GHz
 Test Distance: See Table Detector: Average
 Operating Frequency: 2412 MHz

Freq. (MHz)	Avg. Amp (dBμV)	Correction Factors				Avg. Spec. (dB μV/m)	Avg. Final Result FR (A)* (dB μV/m)	Avg. Margin (dB)	Test Distance (meters)
		Antenna AF (dB)	Cable CF (dB)	Preamp PF (dB)	Atten ATF (dB)				
4824.00	19.4	35.7	2.5	29.9	20.0	54.0	47.7	-6.3	3
7236.00	17.0	38.8	3.0	28.5	20.0	54.0	50.3	-3.7	3
9648.00	27.1	41.2	4.0	27.8	0.0	60.0	44.5	-15.5	1.5
12060.00	26.0	43.4	6.5	27.1	0.0	60.0	48.8	-11.2	1.5
14471.00	23.2	40.0	7.8	23.8	0.0	60.0	47.3	-12.7	1.5

**Figure 20. Radiated Emission. Antenna Polarization: HORIZONTAL.
 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.

* In the frequency range above 2.9 GHz, the field strength was manually calculated by using the following equation:

$$FR(A) = AVG + AF + CF - PF + ATF$$

Where: FR(A) is average detector result,
 AVG is average detector measurement,
 AF is antenna factor,
 CF is cable factor,
 PF is preamplifier factor.
 ATF is Attenuator Factor

Radiated Emission Above 1 GHz

E.U.T Description AeroScout™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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

Antenna Polarization: Vertical Frequency range: 1.0 GHz to 25.0 GHz
 Test Distance: See Table Detector: Peak
 Operating Frequency: 2412 MHz

Freq. (MHz)	Peak Amp (dBμV)	Correction Factors				Peak Spec. (dB μV/m)	Peak Final Result FR (P)* (dB μV/m)	Peak Margin (dB)	Test Distance (meters)
		Antenna AF (dB)	Cable CF (dB)	Preamp PF (dB)	Atten ATF (dB)				
4824.00	38.0	35.7	2.5	29.9	20.0	74.0	66.3	-7.3	3
7236.00	36.5	38.8	3.0	28.5	20.0	74.0	69.8	-4.2	3
9648.00	39.3	41.2	4.0	27.8	0.0	80.0	56.7	-23.3	1.5
12060.00	39.5	43.4	6.5	27.1	0.0	80.0	62.3	-17.7	1.5
14471.00	40.6	40.0	7.8	23.8	0.0	80.0	64.6	-15.4	1.5

**Figure 21. Radiated Emission. Antenna Polarization: VERTICAL.
 Detector: Peak**

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.

* In the frequency range above 2.9 GHz, the field strength was manually calculated by using the following equation:

$$FR(P) = \text{Peak} + AF + CF - PF + ATF$$

Where: FR (P) is final peak detector result,
 Peak is peak detector measurement,
 AF is antenna factor,
 CF is cable factor,
 PF is preamplifier factor.
 ATF is Attenuator Factor

Radiated Emission Above 1 GHz

E.U.T Description AeroScout™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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

Antenna Polarization: Vertical Frequency range: 1.0 GHz to 25.0 GHz
 Test Distance: See Table Detector: Average
 Operating Frequency: 2412 MHz

Freq. (MHz)	Avg. Amp (dBμV)	Correction Factors				Avg. Spec. (dB μV/m)	Avg. Final Result FR (A)* (dB μV/m)	Avg. Margin (dB)	Test Distance (meters)
		Antenna AF (dB)	Cable CF (dB)	Preamp PF (dB)	Atten ATF (dB)				
4824.00	20.4	35.7	2.5	29.9	20.0	54.0	48.7	-5.3	3
7236.00	14.9	38.8	3.0	28.5	20.0	54.0	48.2	-5.8	3
9648.00	26.7	41.2	4.0	27.8	0.0	60.0	44.1	-15.9	1.5
12060.00	27.0	43.4	6.5	27.1	0.0	60.0	49.8	-10.2	1.5
14471.00	22.9	40.0	7.8	23.7	0.0	60.0	47.0	-13.0	1.5

**Figure 22. Radiated Emission. Antenna Polarization: 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.

* In the frequency range above 2.9 GHz, the field strength was manually calculated by using the following equation:

$$FR(A) = AVG + AF + CF - PF + ATF$$

Where: FR(A) is average detector result,
 AVG is average detector measurement,
 AF is antenna factor,
 CF is cable factor,
 PF is preamplifier factor.
 ATF is Attenuator Factor

Radiated Emission Above 1 GHz

E.U.T Description AeroScout™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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

Antenna Polarization: Horizontal Frequency range: 1.0 GHz to 25.0 GHz
 Test Distance: See Table Detector: Peak
 Operating Frequency: 2442 MHz

Freq. (MHz)	Peak Amp (dBμV)	Correction Factors				Peak Spec. (dB μV/m)	Peak Final Result FR (P)* (dB μV/m)	Peak Margin (dB)	Test Distance (meters)
		Antenna AF (dB)	Cable CF (dB)	Preamp PF (dB)	Atten ATF (dB)				
4884.00	40.6	35.7	2.5	29.9	20.0	74.0	68.9	-5.1	3
7326.00	37.3	38.9	3.1	28.5	20.0	74.0	70.8	-3.2	3
9768.00	38.7	41.2	4.1	28.2	0.0	80.0	55.8	-24.2	1.5
12210.00	38.4	43.4	6.6	27.0	0.0	80.0	61.4	-18.6	1.5

**Figure 23. 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.

Note*: In the frequency range above 2.9 GHz, the field strength was manually calculated by using the following equation:

$$FR(P) = Peak + AF + CF - PF + ATF$$

Where: FR (P) is final peak detector result,
 Peak is peak detector measurement,
 AF is antenna factor,
 CF is cable factor,
 PF is preamplifier factor.
 ATF is Attenuator Factor

Radiated Emission Above 1 GHz

E.U.T Description AeroScout™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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

Antenna Polarization: Horizontal Frequency range: 1.0 GHz to 25.0 GHz
 Test Distance: See Table Detector: Average
 Operating Frequency: 2442 MHz

Freq. (MHz)	Avg. Amp (dBμV)	Correction Factors				Avg. Spec. (dB μV/m)	Avg. Final Result FR (A)* (dB μV/m)	Avg. Margin (dB)	Test Distance (meters)
		Antenna AF (dB)	Cable CF (dB)	Preamp PF (dB)	Atten ATF (dB)				
4884.00	23.4	35.7	2.5	29.9	20.0	54.0	51.7	-2.3	3
7326.00	18.0	38.9	3.1	28.5	20.0	54.0	51.3	-2.7	3
9768.00	27.5	41.2	4.1	28.2	0.0	60.0	44.6	-15.4	1.5
12210.00	26.3	43.4	6.6	27.0	0.0	60.0	49.3	-10.7	1.5

**Figure 24. 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.

Note*: In the frequency range above 2.9 GHz, the field strength was manually calculated by using the following equation:

$$FR(A) = AVG + AF + CF - PF + ATF$$

Where: FR(A) is final average detector result,
 AVG is average detector measurement,
 AF is antenna factor,
 CF is cable factor,
 PF is preamplifier factor.
 ATF is Attenuator Factor

Radiated Emission Above 1 GHz

E.U.T Description AeroScout™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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

Antenna Polarization: Vertical Frequency range: 1.0 GHz to 25.0 GHz
 Test Distance: See Table Detector: Peak
 Operating Frequency: 2442 MHz

Freq. (MHz)	Peak Amp (dBμV)	Correction Factors				Peak Spec. (dB μV/m)	Peak Final Result FR (P)* (dB μV/m)	Peak Margin (dB)	Test Distance (meters)
		Antenna AF (dB)	Cable CF (dB)	Preamp PF (dB)	Atten ATF (dB)				
4884.00	36.1	35.7	2.5	29.9	20.0	74.0	64.4	-9.6	3
7326.00	34.2	38.9	3.1	28.5	20.0	74.0	67.7	-6.3	3
9768.00	37.1	41.2	4.1	28.2	0.0	80.0	54.2	-25.8	1.5
12210.00	39.7	43.4	6.6	27.0	0.0	80.0	62.7	-17.3	1.5

**Figure 25. 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.

Note*: In the frequency range above 2.9 GHz, the field strength is manually calculated by using the following equation:

$$FR(P) = \text{Peak} + AF + CF - PF + ATF$$

Where: FR (P) is final peak detector result,
 Peak is peak detector measurement,
 AF is antenna factor,
 CF is cable factor,
 PF is preamplifier factor.
 ATF is Attenuator Factor

Radiated Emission Above 1 GHz

E.U.T Description AeroScout™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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

Antenna Polarization: Vertical Frequency range: 1.0 GHz to 25.0 GHz
 Test Distance: See Table Detector: Average
 Operating Frequency: 2442 MHz

Freq. (MHz)	Avg. Amp (dBμV)	Correction Factors				Avg. Spec. (dB μV/m)	Avg. Final Result FR (A)* (dB μV/m)	Avg. Margin (dB)	Test Distance (meters)
		Antenna AF (dB)	Cable CF (dB)	Preamp PF (dB)	Atten ATF (dB)				
4884.00	18.3	35.7	2.5	29.9	20.0	54.0	46.6	-7.4	3
7326.00	11.5	38.9	3.1	28.5	20.0	54.0	44.8	-9.2	3
9768.00	25.7	41.2	4.1	28.2	0.0	60.0	42.8	-17.2	1.5
12210.00	24.2	43.4	6.6	27.0	0.0	60.0	47.2	-12.8	1.5

**Figure 26. 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.

Note*: In the frequency range above 2.9 GHz, the field strength was manually calculated by using the following equation:

$$FR(A) = AVG + AF + CF - PF + ATF$$

Where: FR(A) is average detector result,
 AVG is average detector measurement,
 AF is antenna factor,
 CF is cable factor,
 PF is preamplifier factor.
 ATF is Attenuator Factor

Radiated Emission Above 1 GHz

E.U.T Description AeroScout™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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

Antenna Polarization: Horizontal Frequency range: 1.0 GHz to 25.0 GHz
 Test Distance: See Table Detector: Peak
 Operating Frequency: 2462 MHz

Freq. (MHz)	Peak Amp (dBμV)	Correction Factors				Peak Spec. (dB μV/m)	Peak Final Result FR (P)* (dB μV/m)	Peak Margin (dB)	Test Distance (meters)
		Antenna AF (dB)	Cable CF (dB)	Preamp PF (dB)	Atten ATF (dB)				
4924.00	39.5	36.0	2.5	29.9	20.0	74.0	68.1	-5.9	3
7386.00	37.2	39.0	3.2	28.5	20.0	74.0	70.9	-3.1	3
9848.00	37.7	41.5	4.2	28.2	0.0	80.0	55.2	-24.8	1.5
12310.00	40.0	43.7	6.8	26.7	0.0	80.0	63.8	-16.2	1.5

**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.

Note*: In the frequency range above 2.9 GHz, the field strength was manually calculated by using the following equation:

$$FR(P) = \text{Peak} + AF + CF - PF + ATF$$

Where: FR (P) is final peak detector result,
 Peak is peak detector measurement,
 AF is antenna factor,
 CF is cable factor,
 PF is preamplifier factor.
 ATF is Attenuator Factor

Radiated Emission Above 1 GHz

E.U.T Description AeroScout™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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

Antenna Polarization: Horizontal Frequency range: 1.0 GHz to 25.0 GHz
 Test Distance: See Table Detector: Average
 Operating Frequency: 2462 MHz

Freq. (MHz)	Avg. Amp (dBμV)	Correction Factors				Avg. Spec. (dB μV/m)	Avg. Final Result FR (A)* (dB μV/m)	Avg. Margin (dB)	Test Distance (meters)
		Antenna AF (dB)	Cable CF (dB)	Preamp PF (dB)	Atten ATF (dB)				
4924.00	24.2	36.0	2.5	29.9	20.0	54.0	52.8	-1.2	3
7386.00	14.5	39.0	3.2	28.5	20.0	54.0	48.2	-5.8	3
9848.00	28.1	41.5	4.2	28.2	0.0	60.0	45.6	-14.4	1.5
12310.00	27.9	43.7	6.8	26.7	0.0	60.0	51.7	-8.3	1.5

**Figure 28. Radiated Emission. Antenna Polarization: AVERAGE.
 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.

Note*: In the frequency range above 2.9 GHz, the field strength was manually calculated by using the following equation:

$$FR(A) = AVG + AF + CF - PF + ATF$$

Where: FR(A) is final average detector result,
 AVG is average detector measurement,
 AF is antenna factor,
 CF is cable factor.
 PF is preamplifier factor.
 ATF is Attenuator Factor

Radiated Emission Above 1 GHz

E.U.T Description AeroScout™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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

Antenna Polarization: Vertical Frequency range: 1.0 GHz to 25.0 GHz
 Test Distance: See Table Detector: Peak
 Operating Frequency: 2462 MHz

Freq. (MHz)	Peak Amp (dBμV)	Correction Factors				Peak Spec. (dB μV/m)	Peak Final Result FR (P)* (dB μV/m)	Peak Margin (dB)	Test Distance (meters)
		Antenna AF (dB)	Cable CF (dB)	Preamp PF (dB)	Atten ATF (dB)				
4924.00	38.2	36.0	2.5	29.9	20.0	74.0	66.8	-7.2	3
7386.00	36.8	39.0	3.2	28.5	20.0	74.0	70.5	-3.5	3
9848.00	37.4	41.5	4.2	28.2	0.0	80.0	54.9	-25.1	1.5
12310.00	39.5	43.7	6.8	26.7	0.0	80.0	63.3	-16.7	1.5

**Figure 29. 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.

Note*: In the frequency range above 2.9 GHz, the field strength was manually calculated by using the following equation:

$$FR(P) = \text{Peak} + AF + CF - PF + ATF$$

Where: FR (P) is final peak detector result,
 Peak is peak detector measurement,
 AF is antenna factor,
 CF is cable factor,
 PF is preamplifier factor.
 ATF is Attenuator Factor

Radiated Emission Above 1 GHz

E.U.T Description AeroScout™ Tag
 Type BWH2000-02
 Serial Number: 63,66,68

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

Antenna Polarization: Vertical Frequency range: 1.0 GHz to 25.0 GHz
 Test Distance: See Table Detector: Average
 Operating Frequency: 2462 MHz

Freq. (MHz)	Avg. Amp (dBμV)	Correction Factors				Avg. Spec. (dB μV/m)	Avg. Final Result FR (A)* (dB μV/m)	Avg. Margin (dB)	Test Distance (meters)
		Antenna AF (dB)	Cable CF (dB)	Preamp PF (dB)	Atten ATF (dB)				
4924.00	18.4	36.0	2.5	29.9	20.0	54.0	47.0	-7.0	3
7386.00	10.9	39.0	3.2	28.5	20.0	54.0	44.6	-9.4	3
9848.00	26.2	41.5	4.2	28.2	0.0	60.0	43.7	-16.3	1.5
12310.00	26.8	43.7	6.8	26.7	0.0	60.0	50.6	-9.4	1.5

**Figure 30. 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.

Note*: In the frequency range above 2.9 GHz, the field strength was manually calculated by using the following equation:

$$FR(A) = AVG + AF + CF - PF + ATF$$

Where: FR(A) is average detector result,
 AVG is average detector measurement,
 AF is antenna factor,
 CF is cable factor,
 PF is preamplifier factor.
 ATF is Attenuator Factor

7.3 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	3745A08184	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

8. Maximum Transmitted Peak Power Output

8.1 Test procedure

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through appropriate coaxial cable. Special attention was taken to prevent Spectrum Analyzer RF input overload. The Spectrum Analyzer was set to 3 MHz resolution BW. Peak power level was measured at selected operation frequencies.

15:21:18 JUL 03, 2003

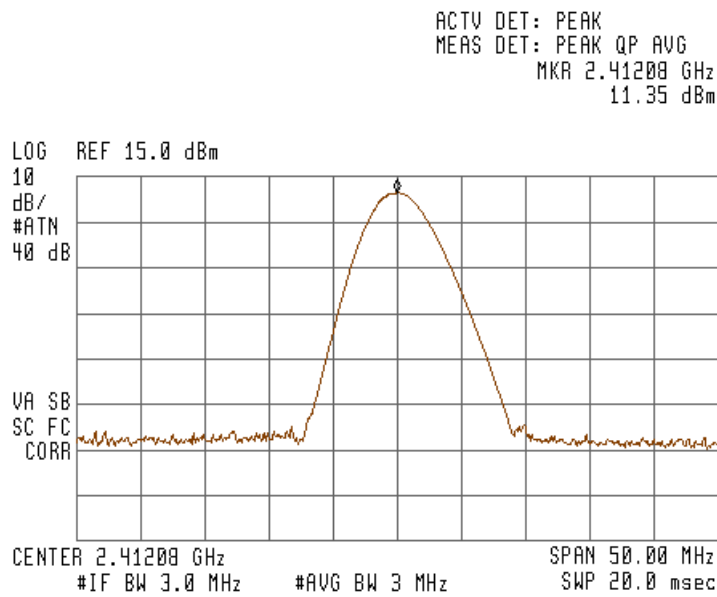


Figure 31 —2412 MHz

15:12:00 JUL 03, 2003

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR 2.44200 GHz
 11.70 dBm

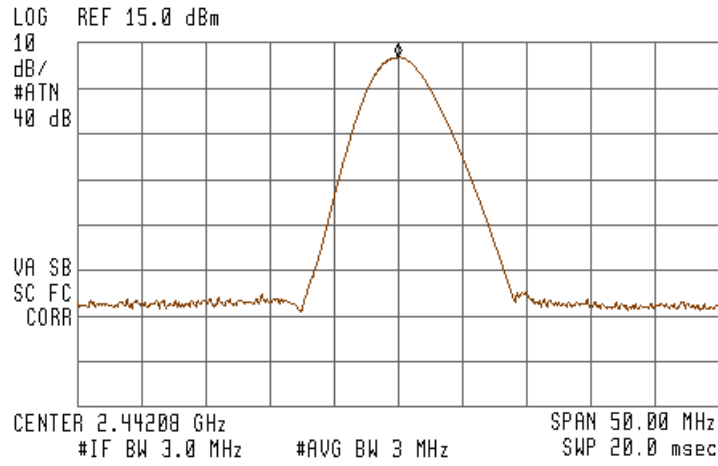


Figure 32 —2442 MHz

15:03:46 JUL 03, 2003

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR 2.46200 GHz
 10.91 dBm

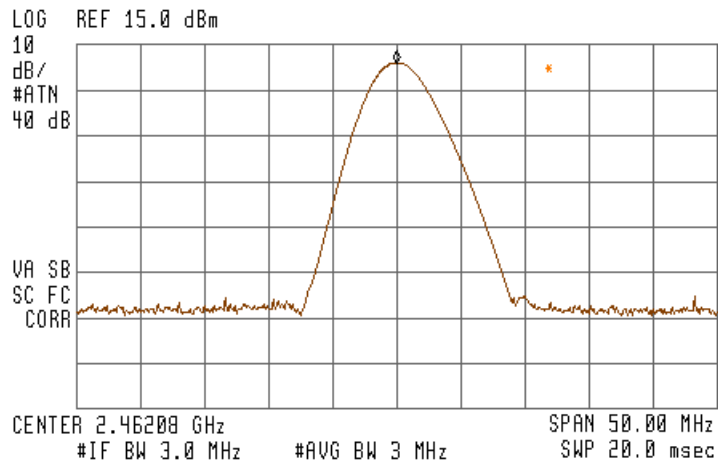


Figure 33.—2462 MHz

8.2 Results table

E.U.T. Description: AeroScout™ TAG
 Model No.: BWH2000-02
 Serial Number: 63, 66, 68
 Specification: F.C.C. Part 15, Subpart C

Operation Frequency (MHz)	Reading (dBm)	Final Result (dBm)	Specification (dBm)	Margin (dB)	Cable Attenuation (dB)
2412	11.35	14.75	30.0	-15.25	3.4
2442	11.70	15.10	30.0	-14.90	3.4
2462	10.91	14.31	30.0	-15.69	3.4

Figure 34 Maximum Power Output

JUDGEMENT: Passed by 14.90 dB

TEST PERSONNEL:

Tester Signature: 

Date: 06.11.03

Typed/Printed Name: Y. Mordukhovitch

8.3 Test Equipment Used.

Peak Power Output

Instrument	Manufacture	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8542E	3411A00102	31.01.03	1 year

Figure 35 Test Equipment Used

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

9.1 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. Frequency range from 10 kHz to 24.8 GHz was scanned. Level of spectrum components out of the 2400-2483.5 MHz was measured at the selected operation frequencies.

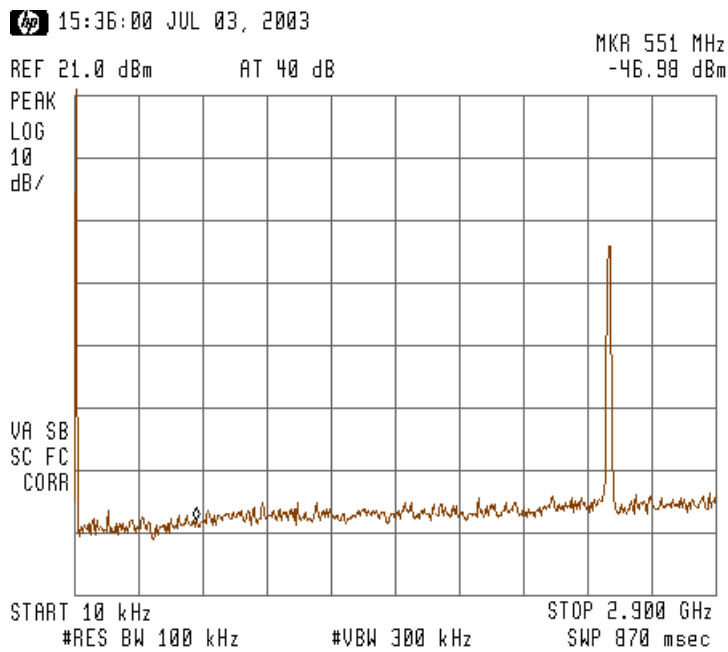


Figure 36 —2412 MHz

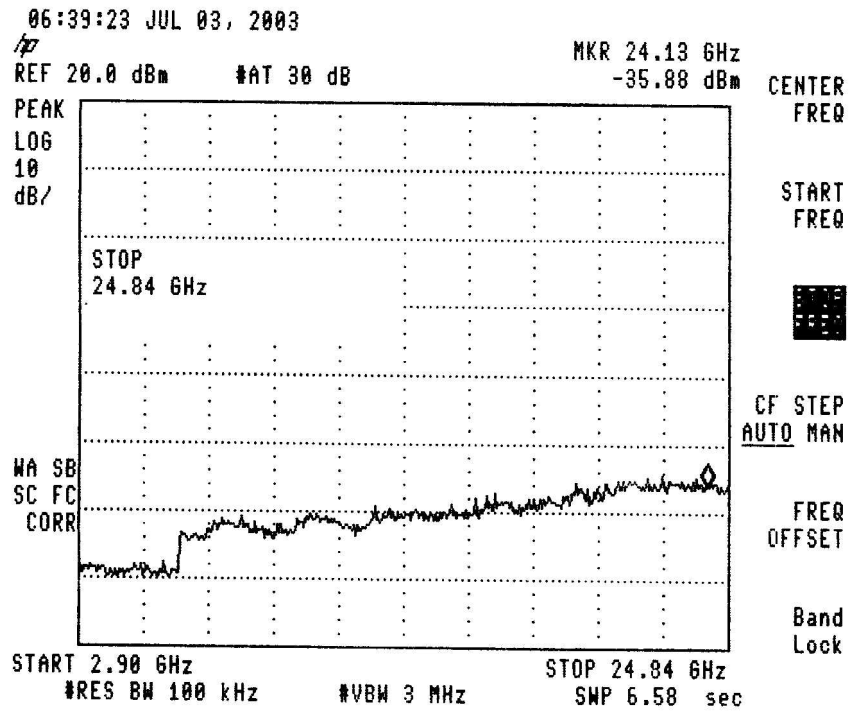


Figure 37 —2412 MHz

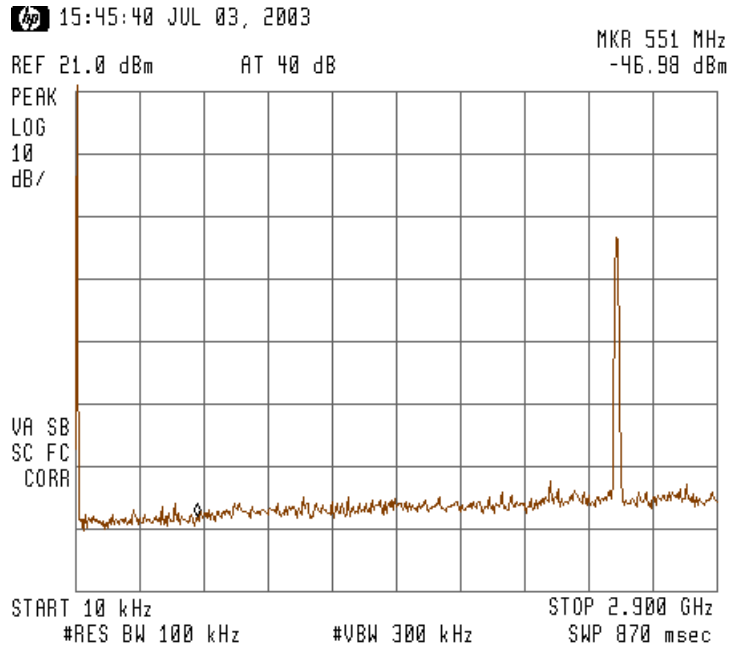


Figure 38 —2442 MHz

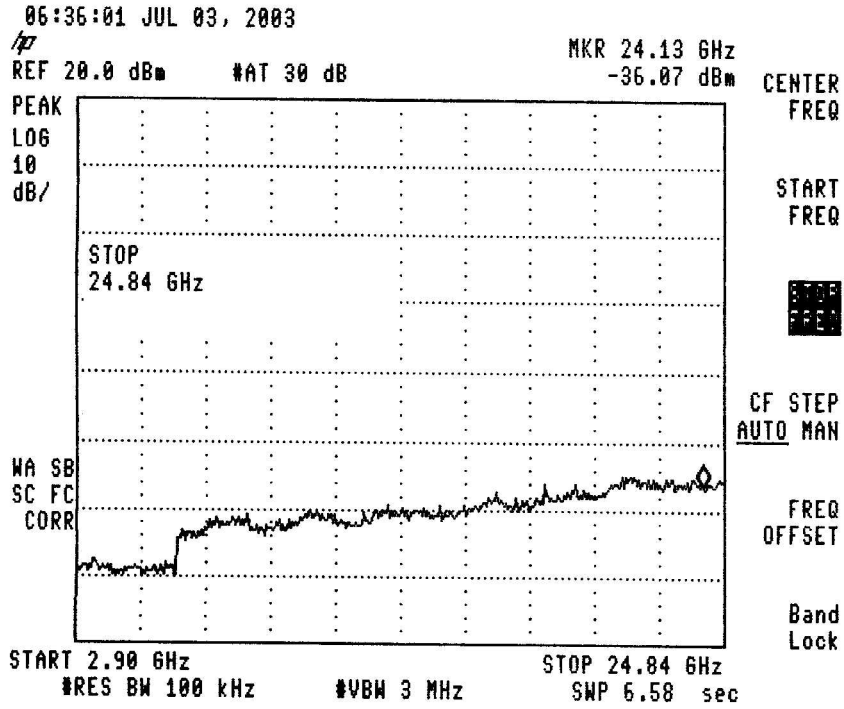


Figure 39 —2442 MHz

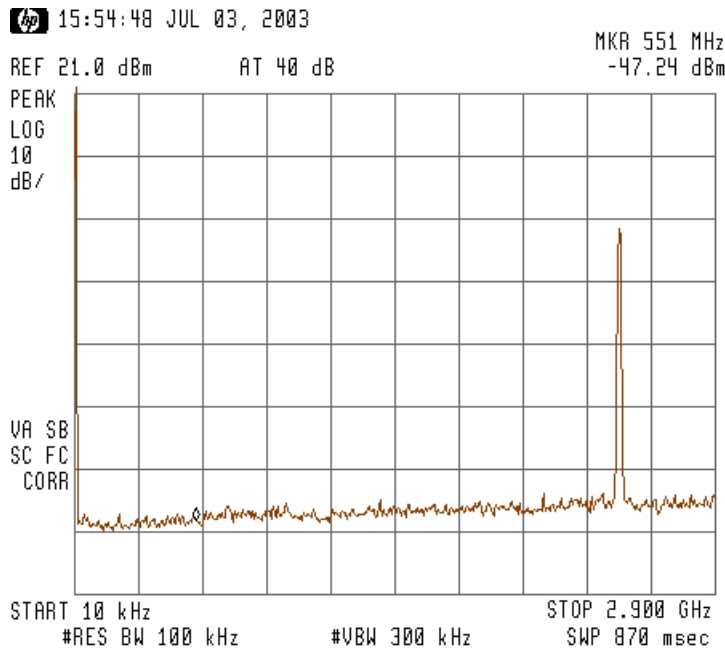


Figure 40 —2462 MHz

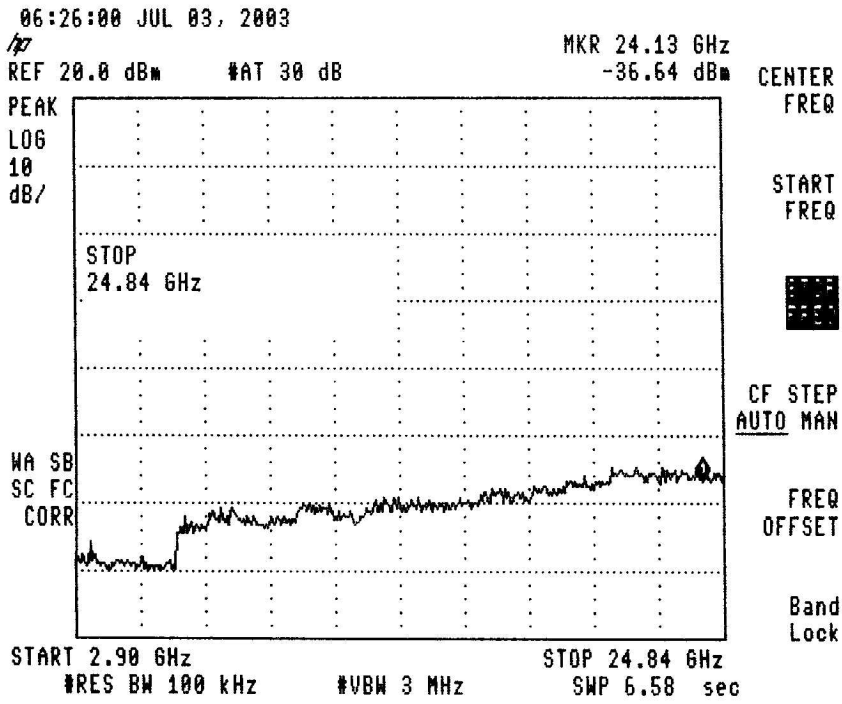


Figure 41—2462 MHz

9.2 Results table

E.U.T Description: AeroScout™ TAG
 Model No.: BWH2000-02
 Serial Number: 63, 66, 68
 Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Reading (dBc)	Specification (dBc)	Margin (dB)
2412	33.0	20.0	13.0
2442	33.0	20.0	13.0
2462	35.0	20.0	15.0

Figure 42 Peak Power Output of 2400-2483.5 MHz Band

JUDGEMENT: Passed by 13.0 dB

TEST PERSONNEL:

Tester Signature: 

Date: 06.11.03

Typed/Printed Name: Y. Mordukhovich

9.3 Test Equipment Used.

Peak Power Output of 902-928 MHz Band

Instrument	Manufacture	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8542E	3411A00102	31.01.03	1 year

Figure 43 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 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.

10:56:49 JUL 03, 2003

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR Δ 4.10 MHz
 -5.40 dB

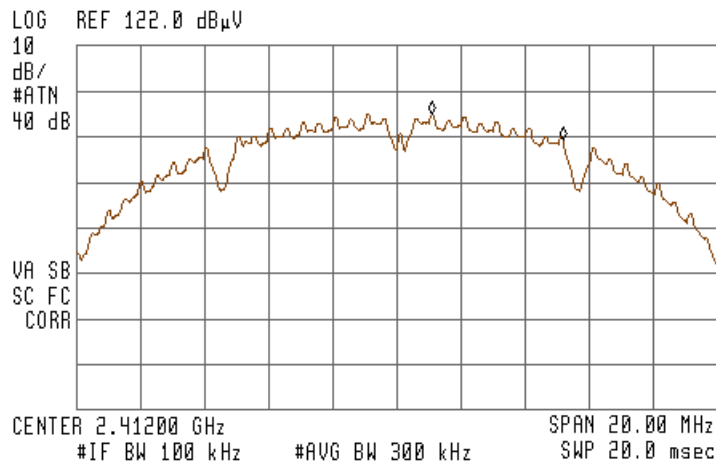


Figure 44 —2412 MHz

11:10:44 JUL 03, 2003

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR Δ -5.15 MHz
 -5.81 dB

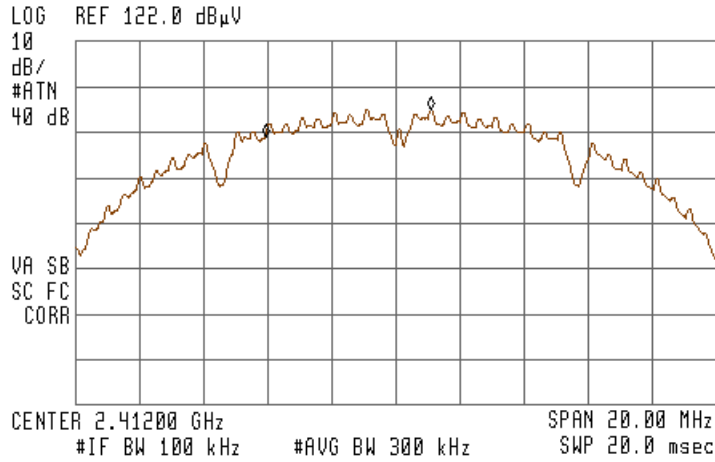


Figure 45 —2412 MHz

12:39:30 JUL 03, 2003

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR Δ 3.60 MHz
 -5.45 dB

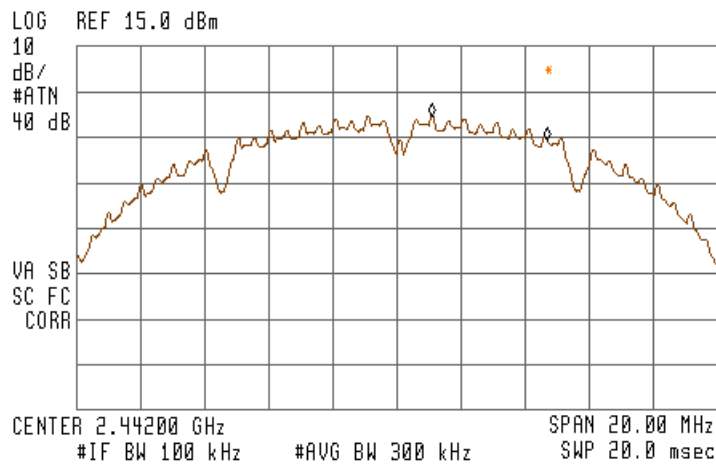


Figure 46 —2442 MHz

12:46:16 JUL 03, 2003

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR Δ -5.15 MHz
 -5.99 dB

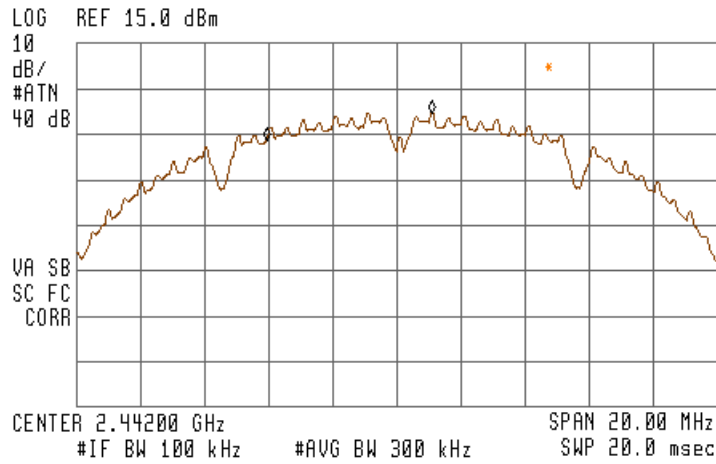


Figure 47 —2442 MHz

12:12:04 JUL 03, 2003

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR Δ 3.15 MHz
 -6.04 dB

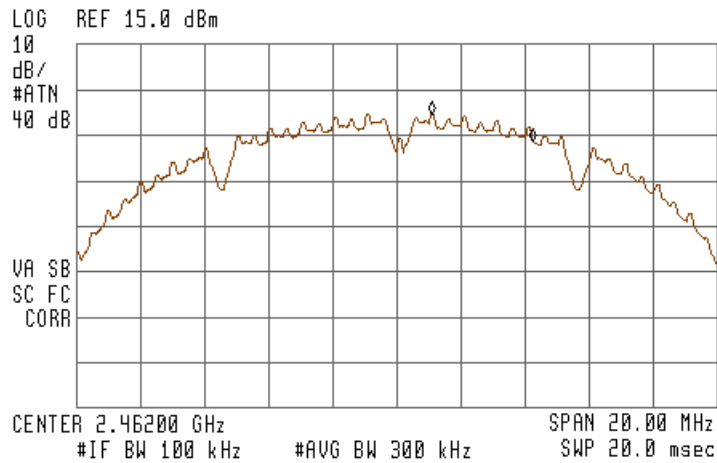


Figure 48 —2462 MHz

12:31:32 JUL 03, 2003

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKRΔ -5.15 MHz
 -5.87 dB

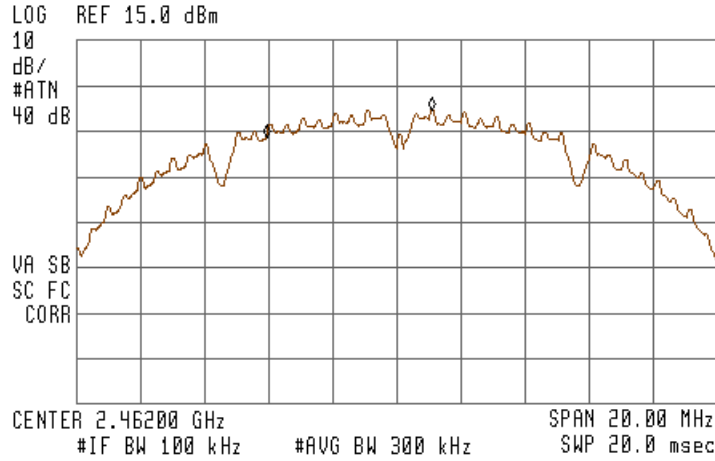


Figure 49 —2462 MHz

10.2 Results table

E.U.T Description: AeroScout™ TAG
 Model No.: BWH2000-02
 Serial Number: 63, 66, 68
 Specification: F.C.C. Part 15, Subpart C: (15.247-a2)

Operation Frequency (MHz)	Reading (MHz)	Specification (MHz)	Margin (MHz)
2412	4.1	0.5	3.6
2442	3.6	0.5	3.1
2446	3.15	0.5	2.65

Figure 50 6 dB Minimum Bandwidth

JUDGEMENT: Passed by 2.65 MHz

TEST PERSONNEL:

Tester Signature:

Date: 06.11.03

Typed/Printed Name: Y. Mordukhovitch



10.3 Test Equipment Used.

6 dB Minimum Bandwidth

Instrument	Manufacture	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8542E	3411A00102	31.01.03	1 year

Figure 51 Test Equipment Used

11. Band Edge Spectrum

[In Accordance with section 15.247(c)]

11.1 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.

13:11:18 JUL 03, 2003

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR 2.39994 GHz
 -40.37 dBm

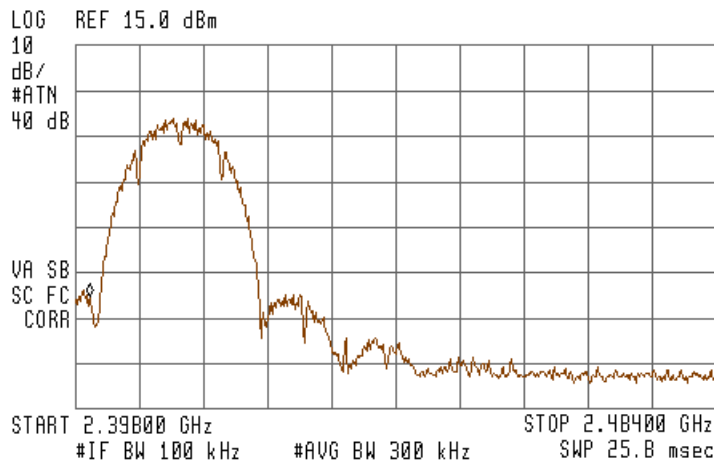


Figure 52 —2412 MHz

13:20:22 JUL 03, 2003

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR 2.40357 GHz
 -58.59 dBm

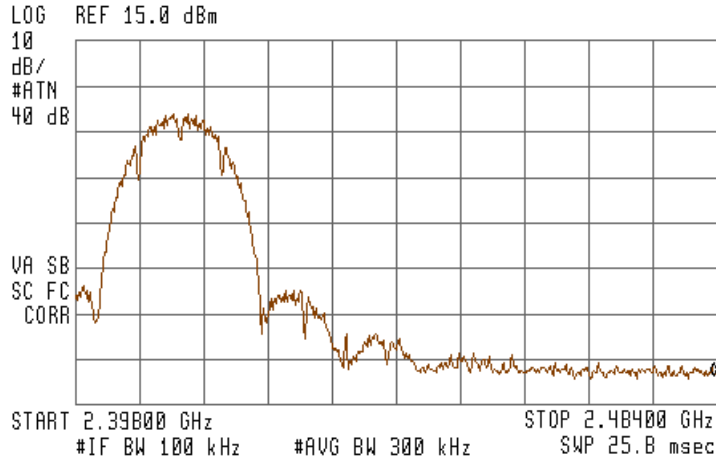


Figure 53 —2412 MHz

13:48:31 JUL 03, 2003

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR 2.40015 GHz
 -56.27 dBm

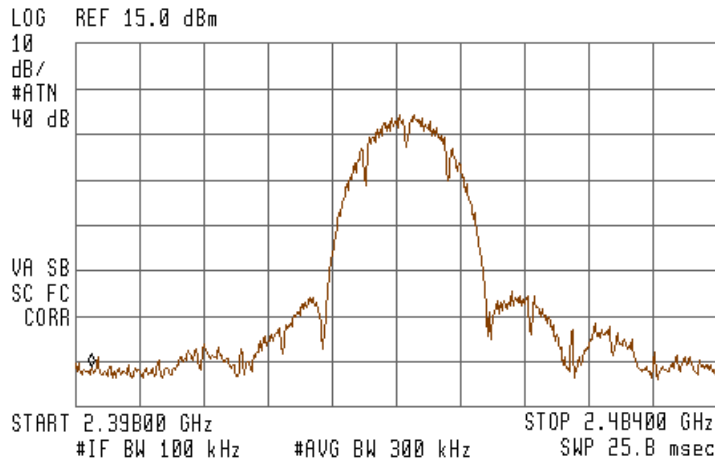


Figure 54 —2442 MHz

13:55:38 JUL 03, 2003

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR 2.40357 GHz
 -57.04 dBm

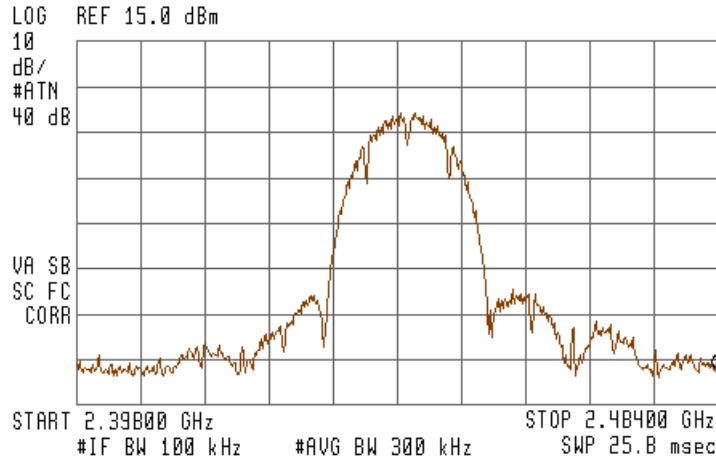


Figure 55 —2442 MHz

14:18:53 JUL 03, 2003

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR 2.39994 GHz
 50.96 dBμV

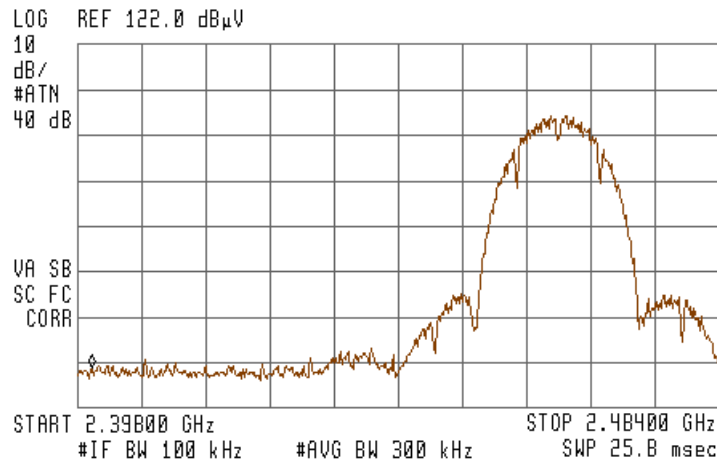


Figure 56 —2462 MHz

14:34:28 JUL 03, 2003

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR Δ -20.00 MHz
 53.04 dB

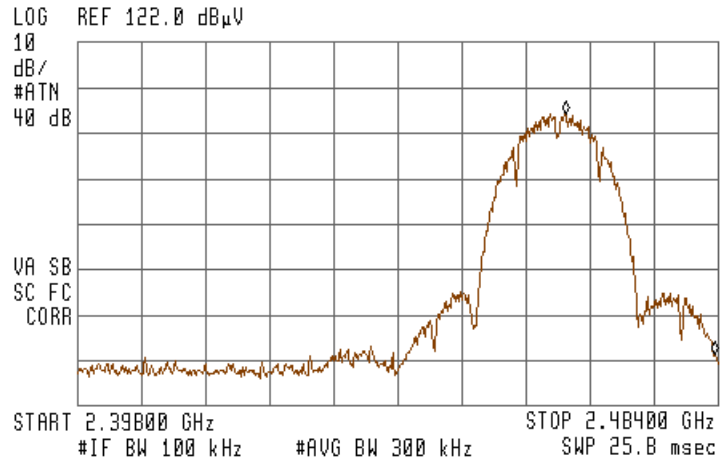


Figure 57 —2462 MHz

11.2 Results table

E.U.T. Description: AeroScout™ TAG
 Model No.: BWH2000-02
 Serial Number: 63, 66, 68
 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	2400	39.2	20.0	-19.2
2442	2400	55.4	20.0	-35.4
2462	2483.5	53.0	20.0	-33.0

Figure 58 Band Edge Spectrum

JUDGEMENT: Passed by 19.2 dB

TEST PERSONNEL:

Tester Signature: 

Date: 06.11.03

Typed/Printed Name: Y. Mordukhovitch

11.3 Test Equipment Used.

Band edge Spectrum

Instrument	Manufacture	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8542E	3411A00102	31.01.03	1 year

Figure 59 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 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.

11:48:12 JUL 03, 2003

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR 2.41204 GHz
 -13.15 dBm

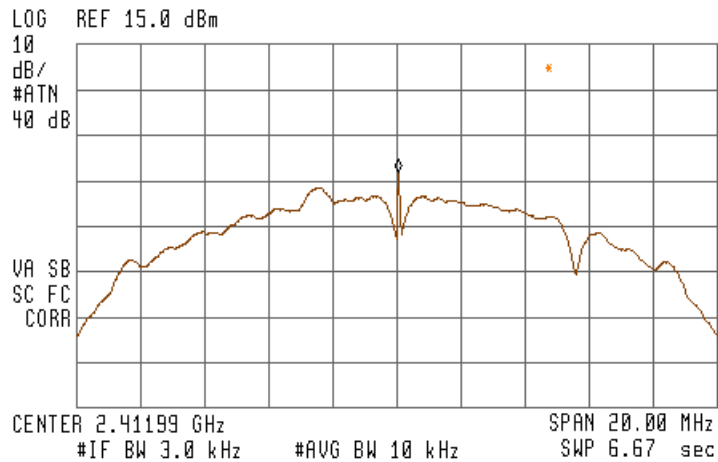


Figure 60 —2412 MHz

11:56:44 JUL 03, 2003

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR 2.44205 GHz
 -12.64 dBm

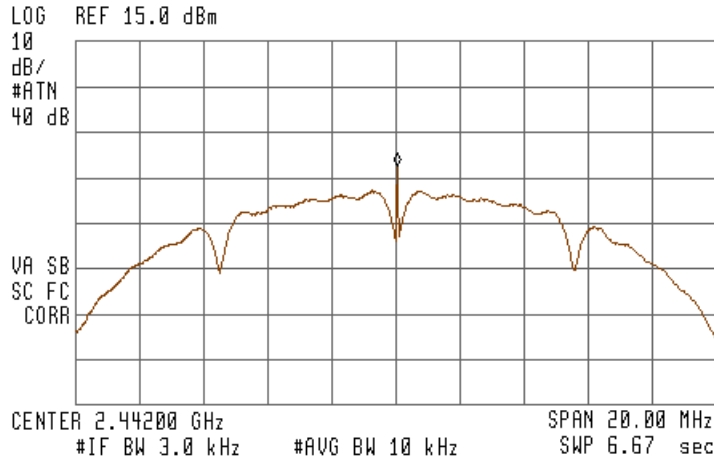


Figure 61 —2442 MHz

12:04:21 JUL 03, 2003

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR 2.46205 GHz
 -12.51 dBm

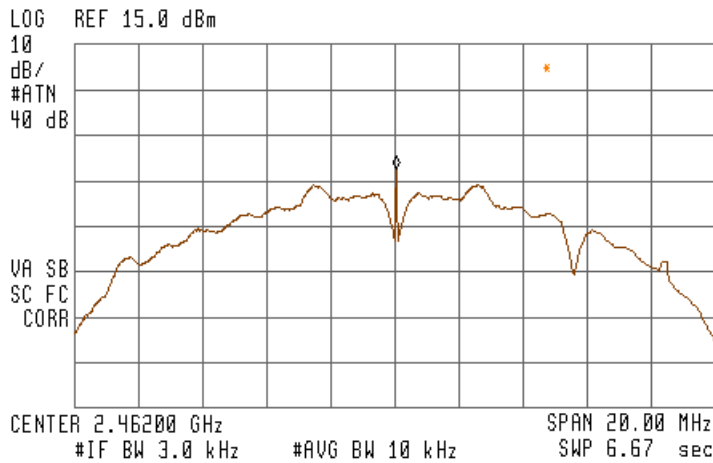


Figure 62 —2462 MHz

12.2 Results table

E.U.T. Description: AeroScout™ TAG
 Model No.: BWH2000-02
 Serial Number: 63, 66, 68
 Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Reading (dBm)	Final Result (dBm)	Specification (dBm)	Margin (dB)	Cable Attenuation (dB)
2412	-13.1	-9.7	8.0	-17.2	3.4
2442	-12.6	-9.2	8.0	-17.2	3.4
2462	-12.5	-9.1	8.0	-17.1	3.4

Figure 63 Test Equipment Used

JUDGEMENT: Passed by 17.1 dB

TEST PERSONNEL:

Tester Signature:  Date: 06.11.03
 Typed/Printed Name: Y. Mordukhovitch

12.3 Test Equipment Used.

Transmitted Power Density

Instrument	Manufacture	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8542E	3411A00102	31.01.03	1 year

Figure 64 Test Equipment Used

13. Antenna Gain

The antenna gain as stated by the manufacturer is 0dBi.

14. R.F Exposure/Safety

The E.U.T. is installed in fixed and mobile locations for application of transmitting location data. Typical locations for the tag are containers, trucks, merchandise in storage warehouses. 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 100mw (Peak)

G_t - Antenna Gain, 0dBi

R - Distance from Transmitter using 20cm worst case

(c) The peak power density is :

$$S_p = \frac{100}{4\pi(20)^2} = 0.02 \frac{mW}{cm^2}$$

(d) The duty cycle of transmission in actual worst case is 200 microsecond “on” and 20 millisecond “Off”.

The average power over 30 minutes is:

$$P_{AV} = \frac{100 \times 0.2}{20.2} = 1mW$$

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

$$S_{AV} = \frac{1}{4\pi(20)^2} = 2 \times 10^{-4} \frac{mW}{cm^2}$$

(f) This is 4 orders of magnitude below the FCC limit.

15. Photographs of Tested E.U.T.



Figure 65 Top View External

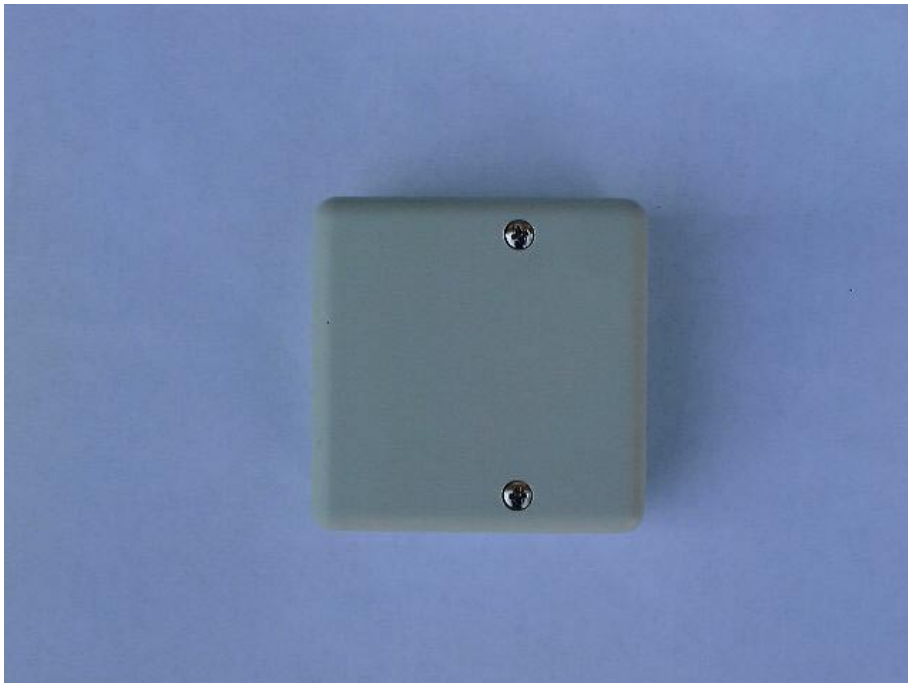


Figure 66 Bottom View



Figure 67 PCB in Case



Figure 68 PCB in Case Without Battery



Figure 69 PCB Side 1

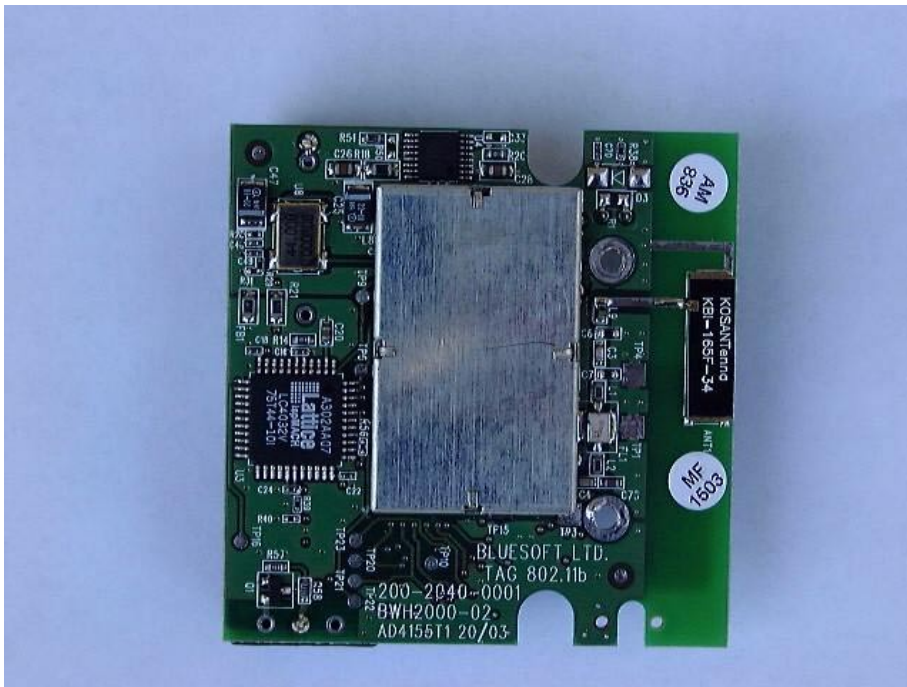


Figure 70 PCB Side 2

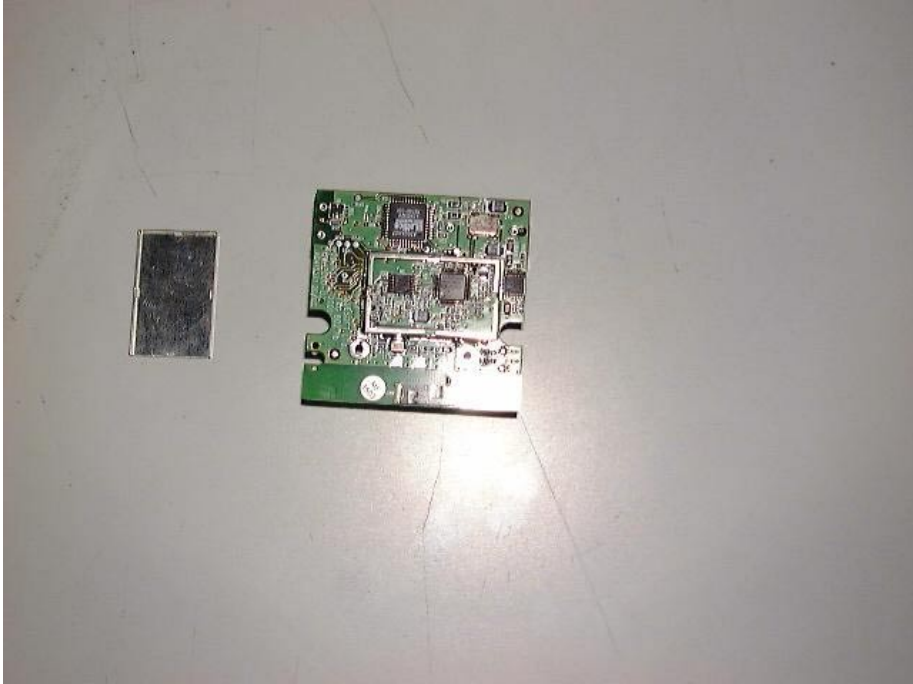


Figure 71 PCB Shield Removed