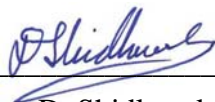



DATE: 27 June 2007

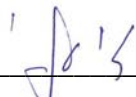
I.T.L. (PRODUCT TESTING) LTD.
FCC EMC/Radio Test Report
for
AeroScout Ltd.

Equipment under test:
AeroScout T3 Tag

TAG-3000

Written by: 
D. Shidlow, Documentation

Approved by: 
E. Pitt, Test Engineer

Approved by: 
I. Raz, EMC Laboratory Manager

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This report relates only to items tested.



**Measurement/Technical Report for
AeroScout Ltd.**

AeroScout T3 Tag

TAG-3000

FCC ID: Q3HTAG3000

27 June 2007

This report concerns: Original Grant Class II change

Class B verification Class A verification Class I change

Equipment type: Digital Transmission System

Request Issue of Grant:

Immediately upon completion of review

Limits used:

CISPR 22 Part 15

Measurement procedure used is ANSI C63.4-2003.

Application for Certification

prepared by:

Ishaishou Raz
ITL (Product Testing) Ltd.
Kfar Bin Nun
D.N. Shimshon 99780
Israel
e-mail Sraz@itl.co.il

Applicant for this device:

(different from "prepared by")

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1. General Information

1.1 Administrative Information

Manufacturer: AeroScout Ltd.

Manufacturer's Address: 10 Oppenheimer St. Park Tamar
Rehovot 76701
Israel
Tel: +972-8-9363136
Fax: +972-8-9365977

Manufacturer's Representative: Reuven Amsalem
Edward Morodin
Alex Garkin
Yuval Uziel

Equipment Under Test (E.U.T): AeroScout T3 Tag

Equipment Model No.: TAG-3000

Equipment Serial No.: 200-2044-1000

Date of Receipt of E.U.T: 09.05.07

Start of Test: 09.05.07

End of Test: 14.05.07

Test Laboratory Location: I.T.L (Product Testing) Ltd.
Kfar Bin Nun,
ISRAEL 99780

Test Specifications: FCC Part 15 Sub-parts B;C

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™ T3 Tag is a key component of the AeroScout™ Location System. These dedicated battery-powered Tags send Wi-Fi compatible messages at pre-defined intervals and can be attached to non-Wi-Fi assets in order to locate them. Tags send messages with their unique ID number that are detected by Location Receivers and used to estimate the Tag's location.

The AeroScout T3 Tag is used to be integrated to customer equipment and enables the wireless network infrastructure to locate people and assets otherwise not connected to a wireless network. The tag can be used to track people in many valuable applications - child tracking in amusement parks, security personnel in enterprises, hospital patients and many more. Various types of equipment can be tagged. These include vehicles in parking lots; inventory in a manufacturing line; containers, forklifts and other assets for efficient supply chain management; shopping carts in supermarkets; and medical equipment in hospitals.

1.4 Test Methodology

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

1.5 Test Facility

The radiated emissions tests were performed at I.T.L.'s testing facility at Kfar Bin-Nun, Israel. This site is a FCC listed test laboratory (FCC Registration No. 90715, date of listing August 22, 2006).

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

1.6 Measurement Uncertainty

Radiated Emission

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

2. Product Labeling



Figure 1. FCC Label and Location on the E.U.T.

3. System Test Configuration

3.1 *Justification*

The typical operation of the Tag (as a customer would normally use) is that the Tag wakes up every predefine interval (from 1 sec to 3.5 hours) and it is set to be in receive mode for a period of 100uSec to sniff the air traffic (RSSI detection) and in the case that the channel is free it will transmit a message for a period of max 500uS.

The Tag includes a low frequency receiver which is set to be in receiving mode continuously. Due to the short period in transmit and receive mode in a typical operation mode, the tag was configured to be in continuous receive mode and in continuous transmit mode to test the tag behavior on those modes as it was found to be the worst case operating mode.

Radiated emission screening was performed in 3 orthogonal orientations. The worst case orientation was the vertical position.

3.2 *EUT Exercise Software*

The Tag SW uses two working mode 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 be on one of the two programmable test modes

- 1) Continuous receive mode
- 2) Continuous transmit mode.

The Low frequency receiver is active in the two test mode above.

The testing of those two modes was done on three different channels.

3.3 *Special Accessories*

No special accessories were needed to achieve compliance.

3.4 *Equipment Modifications*

No modifications were needed to achieve compliance.

3.5 Configuration of Tested System

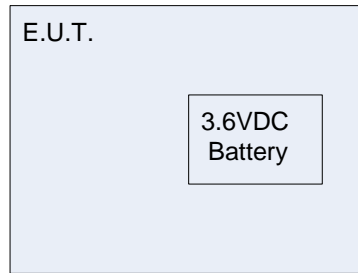


Figure 2. Configuration of Tested System

4. Block Diagram

4.1 Schematic Block/Connection Diagram

Intentionally Blank for Reasons of Confidentiality

4.2 Theory of Operation

The AeroScout™ T3 Tags are a component of the AeroScout™ Location System.

These dedicated battery-powered Tags send Wi-Fi compatible messages at pre-defined intervals and can be attached to non-Wi-Fi assets in order to locate them. Tags send messages with their unique ID number that are detected by Location Receivers and used to estimate the Tag's location.

In the typical operation the Tag wakes up every predefined interval and 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 Tag includes a low frequency magnetic receiver for remote control activation or detection by Exciter in programmable pre-defined range.

5. Radiated Measurement Test Set-up Photos



Figure 3. Radiated Emission Test



Figure 4. Radiated Emission Test

6 Spurious Radiated Emission in the Restricted Band, Below 1 GHz

6.1 Test Specification

9kHz-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.

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 configuration tested is shown in Figure 3.1.

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

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

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

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

In the frequency range 30-1000 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.

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



6.3 Test Data

JUDGEMENT: Passed by 12.7 dB

The signals in the band 9 kHz – 30 MHz were 20 dB below the specification limit.

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

The margin between the emission level and the specification limit is 12.7 dB in the worst case at the frequency of 264.01 MHz, vertical polarization.

TEST PERSONNEL:

Tester Signature: 

Date: 24.06.07

Typed/Printed Name: E. Pitt

Radiated Emission

E.U.T Description AeroScout T3 Tag
 Type TAG-3000
 Serial Number: 200-2044-1000

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal Frequency range: 30 MHz to 1000 MHz
 Antenna: 3 meters distance Detectors: Peak, Quasi-peak

Frequency (MHz)	Peak Amp (dB μ V/m)	QP Amp (dB μ V/m)	Correction (dB)	Specification (dB μ V/m)	Margin (dB)
132.00	30.1	23.6	14.0	43.5	-19.9
264.00	33.2	30.6	21.6	46.0	-15.4

**Figure 5. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detectors: Peak, Quasi-peak**

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

Radiated Emission

E.U.T Description AeroScout T3 Tag
 Type TAG-3000
 Serial Number: 200-2044-1000

Specification: FCC Part 15, Subpart C

Antenna Polarization: Vertical
 Antenna: 3 meters distance

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

Frequency	Peak Amp	QP Amp	Correction	Specification	Margin
(MHz)	(dB μ V/m)	(dB μ V/m)	(dB)	(dB μ V/m)	(dB)
132.00	34.8	24.7	14.0	43.5	-18.8
242.00	35.8	30.5	20.0	46.0	-15.5
264.01	38.8	33.3	21.6	46.0	-12.7

**Figure 6. Radiated Emission. Antenna Polarization: VERTICAL.
 Detectors: Peak, Quasi-peak**

Note: QP Delta 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.

6.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3411A00102	November 22, 2006	1 year
RF Section	HP	85420E	3427A00103	November 22, 2006	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	March 22, 2007	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 30, 2006	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 16, 2006	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKG19982	N/A	N/A

6.5 Field Strength Calculation

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

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

- 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 in the Restricted Band, Above 1 GHz

7.1 Radiated Emission Above 1 GHz

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

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

A preliminary measurement to characterize the E.U.T was performed inside the shielded room, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 3.1.

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.

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 2.3 dB


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

The margin between the emission level and the specification limit is 2.3 dB in the worst case at the frequency of 4874.00 MHz, vertical polarization, 2437.00 MHz operation frequency.

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

The details of the highest emissions are given in Figure 7 to Figure 10.

TEST PERSONNEL:

Tester Signature:  Date: 24.06.07

Typed/Printed Name: E. Pitt

Radiated Emission Above 1 GHz

E.U.T Description AeroScout T3 Tag
 Type TAG-3000
 Serial Number: 200-2044-1000

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal
 Test Distance: 3 meters

Frequency range: 1.0 GHz to 25.0 GHz
 Detector: Peak

Carrier Freq.	Measured Freq.	Peak Amp	Peak. Specification	Peak. Margin
(MHz)	(MHz)	(dB μ V/m)	(dB μ V/m)	(dB)
2412.00	4824.00	52.6*	74.0	-21.4
2437.00	4874.00	53.8*	74.0	-20.2
2462.00	2483.50	56.8**	74.0	-17.2
	4924.00	53.5*	74.0	-29.5

**Figure 7. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: Peak**

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

“Peak Amp” includes correction factor.

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

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

Radiated Emission Above 1 GHz

E.U.T Description AeroScout T3 Tag
 Type TAG-3000
 Serial Number: 200-2044-1000

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal
 Test Distance: 3 meters

Frequency range: 1.0 GHz to 25.0 GHz
 Detector: Average

Freq.	Measured Freq.	Average Amp	Average Specification	Peak Margin
(MHz)	(MHz)	(dBμV/m)	(dB μV/m)	(dB)
2412.00	4824.00	50.4*	54.0	-3.6
2437.00	4874.00	51.6*	54.0	-2.4
2462.00	2483.50	48.6**	54.0	-5.4
	4924.00	51.2*	54.0	-2.8

**Figure 8. 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.

“Average Amp” includes correction factor.

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

** Correction Factor = Antenna Factor + Cable Loss

Radiated Emission Above 1 GHz

E.U.T Description AeroScout T3 Tag
 Type TAG-3000
 Serial Number: 200-2044-1000

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Vertical
 Test Distance: 3 meters

Frequency range: 1.0 GHz to 25.0 GHz
 Detector: Peak

Carrier Freq.	Measured Freq.	Peak Amp	Peak. Specification	Peak. Margin
(MHz)	(MHz)	(dBμV/m)	(dB μV/m)	(dB)
2412.00	4824.00	54.7*	74.0	-19.3
2437.00	4874.00	54.1*	74.0	-19.9
2462.00	2483.50	56.2**	74.0	-17.8
	4924.00	53.8*	74.0	-20.2

**Figure 9. Radiated Emission. Antenna Polarization: VERTICAL.
 Detector: Peak**

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

“Peak Amp” includes correction factor.

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

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

Radiated Emission Above 1 GHz

E.U.T Description AeroScout T3 Tag
 Type TAG-3000
 Serial Number: 200-2044-1000

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Vertical
 Test Distance: 3 meters

Frequency range: 1.0 GHz to 25.0 GHz
 Detector: Average

Freq.	Measured Freq.	Average Amp	Average Specification	Peak Margin
(MHz)	(MHz)	(dB μ V/m)	(dB μ V/m)	(dB)
2412.00	4824.00	50.4*	54.0	-3.6
2437.00	4874.00	51.7*	54.0	-2.3
2462.00	2483.50	47.4**	54.0	-6.6
	4924.00	51.5*	54.0	-2.5

**Figure 10. 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.

“Average Amp” includes correction factor.

* Correction Factor = Antenna Factor + Cable Loss + Filter Loss -
 Pre-amplifier Gain

** Correction Factor = Antenna Factor + Cable Loss

7.3 Test Instrumentation Used, Radiated Measurements Above 1 GHz

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Receiver	HP	85422E	3411A00102	November 22, 2006	1 year
RF Section	HP	85420E	3427A00103	November 22, 2006	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet2225	2738508357	N/A	N/A
Antenna-Log Periodic	A.H.System	SAS-200/511	253	February 4, 2007	2 year
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 15, 2006	2 Years
Horn Antenna	ARA	SWH-28	1008	December 8, 2006	2 Years
Horn Antenna	Narda	V637	0410	December 8, 2006	2 Years
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 2, 2006	1 year
Band Pass Filter	Planar Filter Company	8CL6G-4G-CD-SFF	PF253/0439	September 9, 2006	1 year
Spectrum Analyzer	HP	8592L	3926A01204	November 21, 2006	1 year
Printer	HP	LaserJet 2200	JPKG19982	N/A	N/A

8 Maximum Transmitted Peak Power Output

8.1 Test procedure

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through a 20dB external attenuator and an appropriate coaxial cable (Cable Loss = 1.5 dB). Special attention was taken to prevent Spectrum Analyzer RF input overload. The Spectrum Analyzer was set to 1.0 MHz resolution BW. Peak power level was measured at selected operation frequencies.

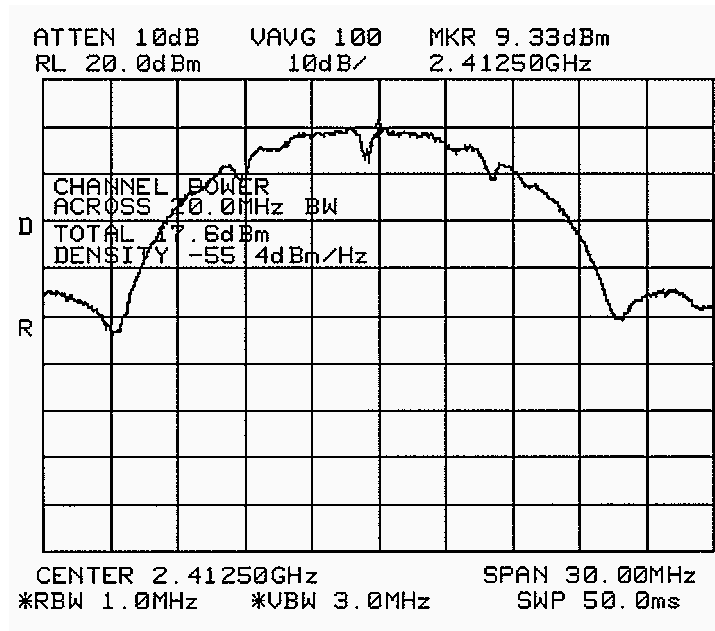


Figure 11 2412 MHz

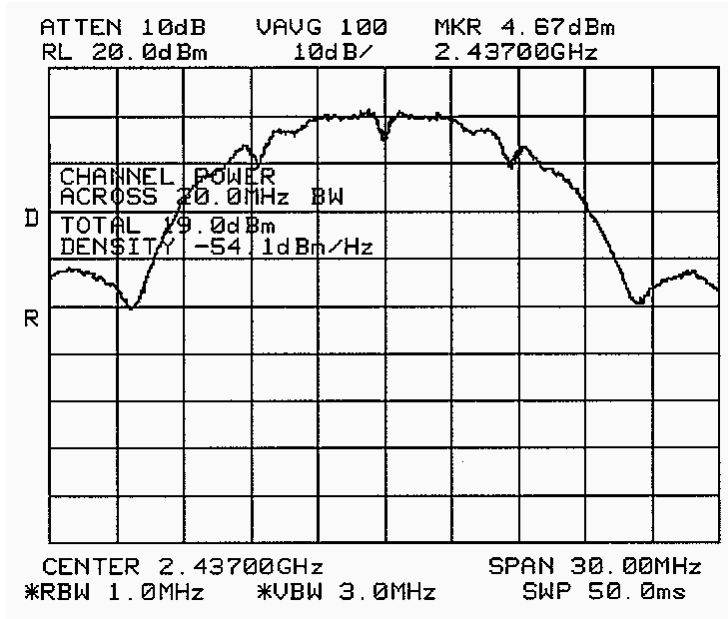


Figure 12 2437 MHz

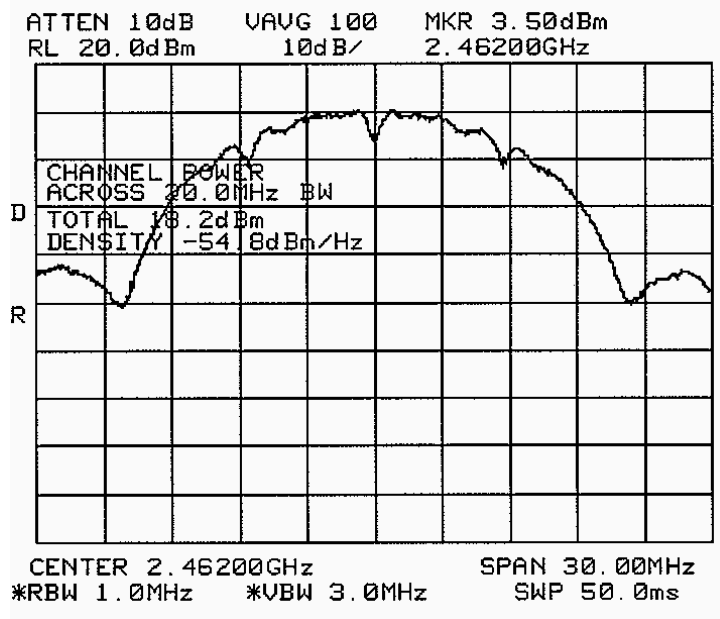


Figure 13 2462 MHz

8.2 Results table

E.U.T. Description: AeroScout T3 Tag
 Model No.: TAG-3000
 Serial Number: 200-2044-1000
 Specification: F.C.C. Part 15, Subpart C

Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
2412	17.6	30.0	-12.4
2437	19.0	30.0	-11.0
2462	18.2	30.0	-11.8

Figure 14 Maximum Peak Power Output

JUDGEMENT: Passed by 11.0 dB

TEST PERSONNEL:

Tester Signature: 

Date: 24.06.07

Typed/Printed Name: E. Pitt

8.3 Test Equipment Used.

Peak Power Output

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8564E	3442A00275	November 21, 2006	1 year
Cable	Rhophase	KPS-1501-1000	A1675	December 16, 2006	1 year
Attenuator	Jyebao	P/N FAT-AM5AF5G6G2W20	-	May 9, 2007	1 year

Figure 15 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 a 20dB external attenuator and an appropriate coaxial cable (Cable Loss = 1.5 dB). The spectrum analyzer was set to 100 kHz resolution BW except for the frequency range 9 kHz-5 MHz where the RBW was set to 3kHz. The frequency range from 30 kHz to 25 GHz was scanned. Level of spectrum components out of the 2400-2483.5 MHz was measured at the selected operation frequencies.

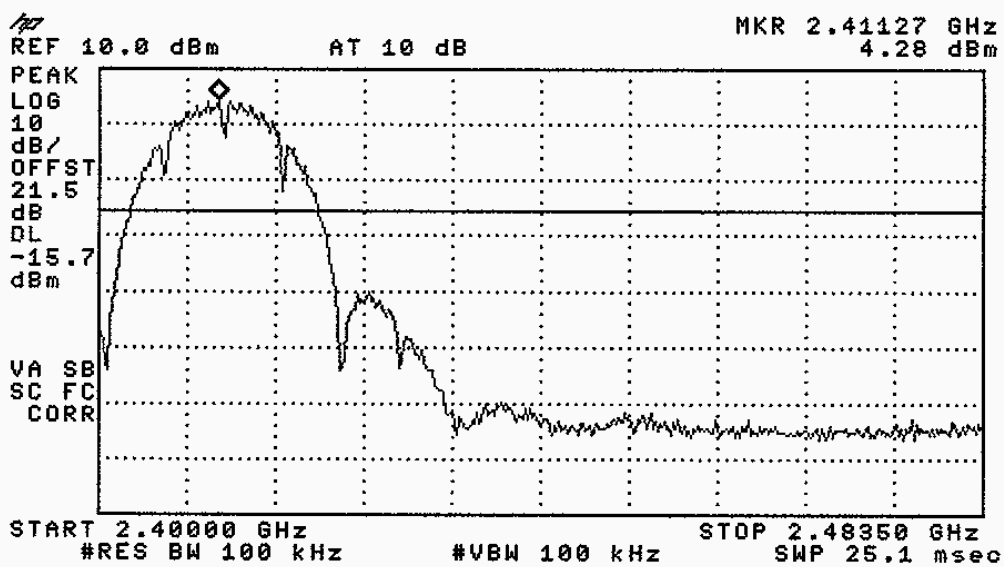


Figure 16 —2412 MHz

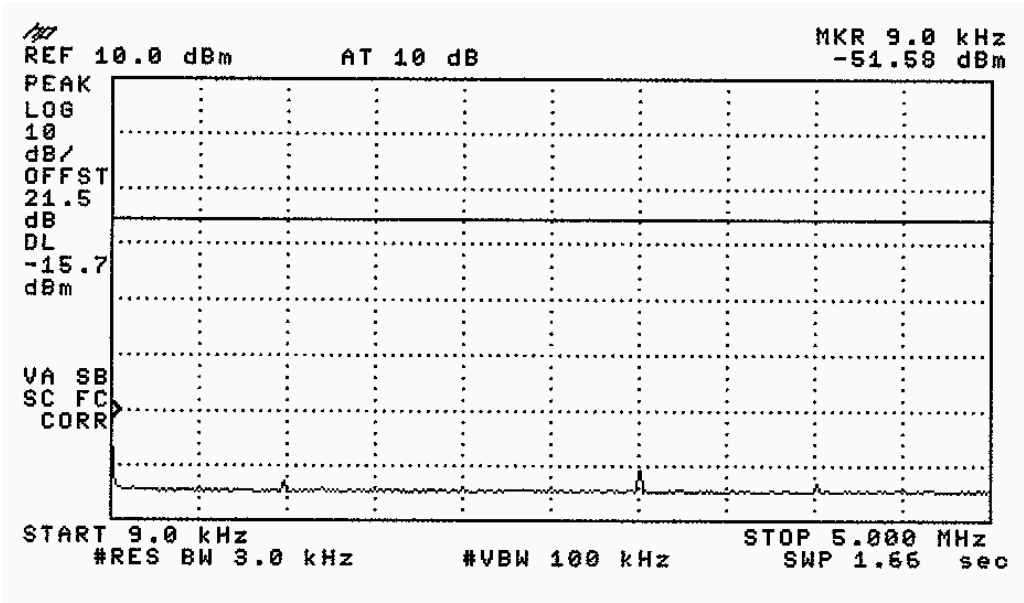


Figure 17 —2412 MHz

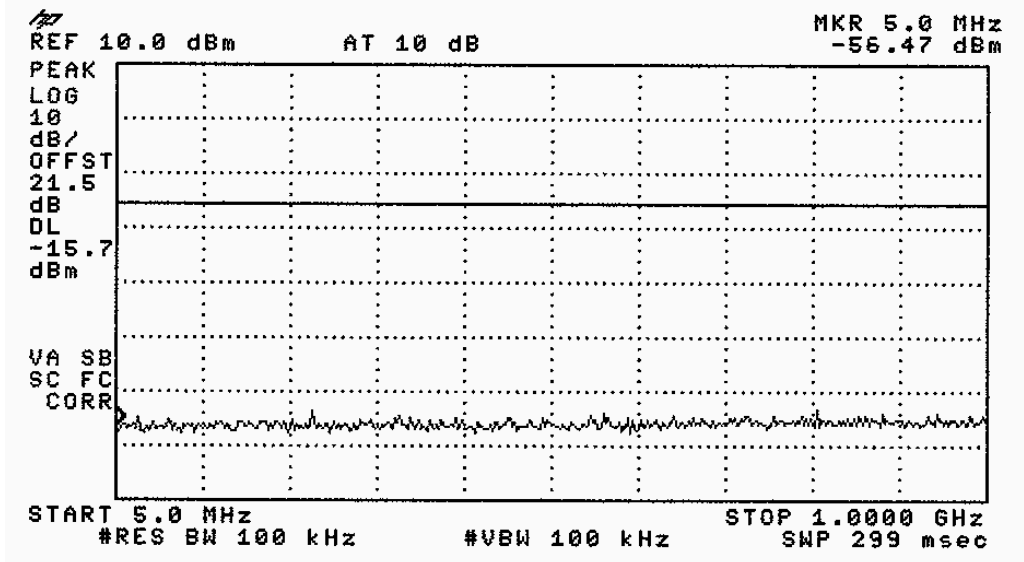


Figure 18 —2412 MHz

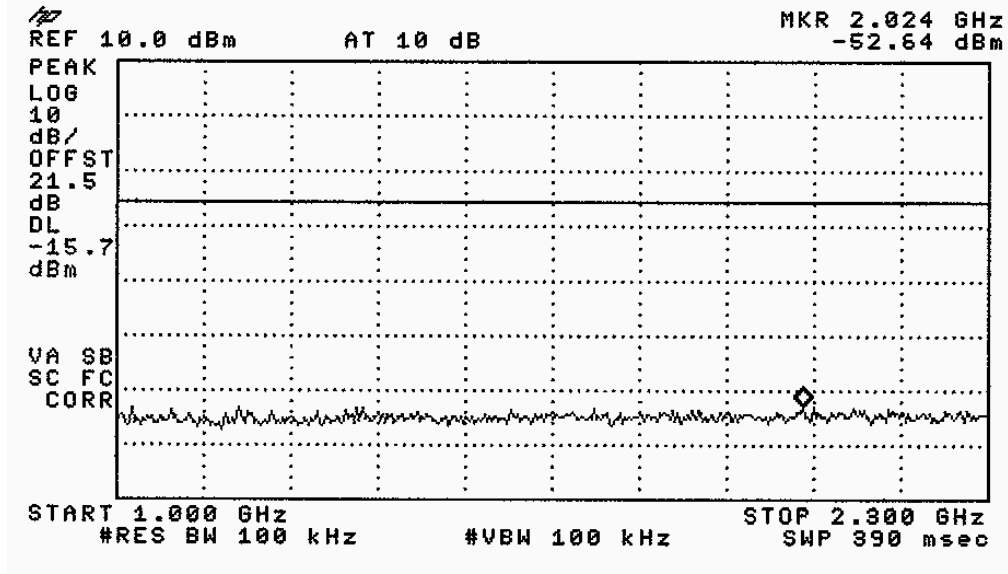


Figure 19 —2412 MHz

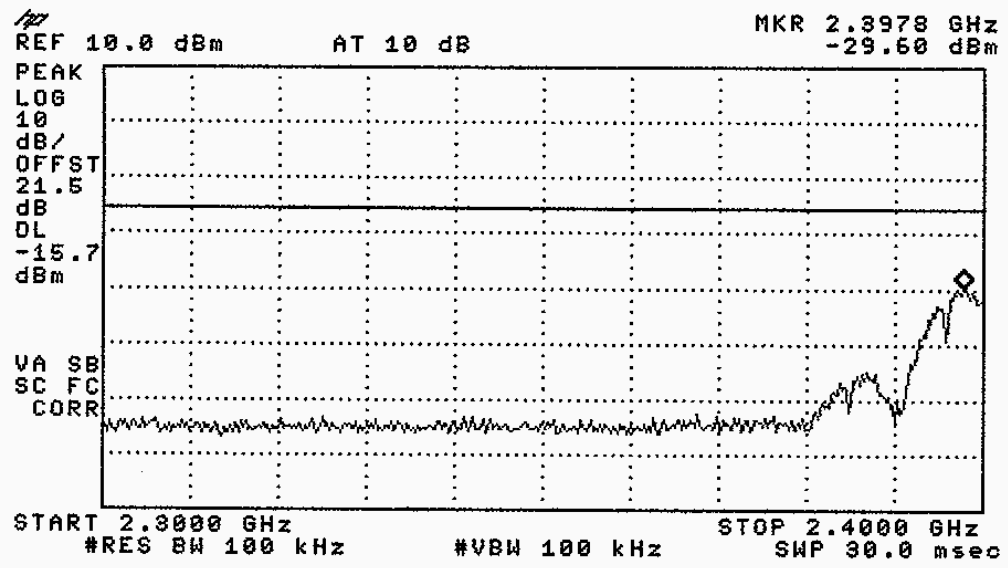


Figure 20 —2412 MHz

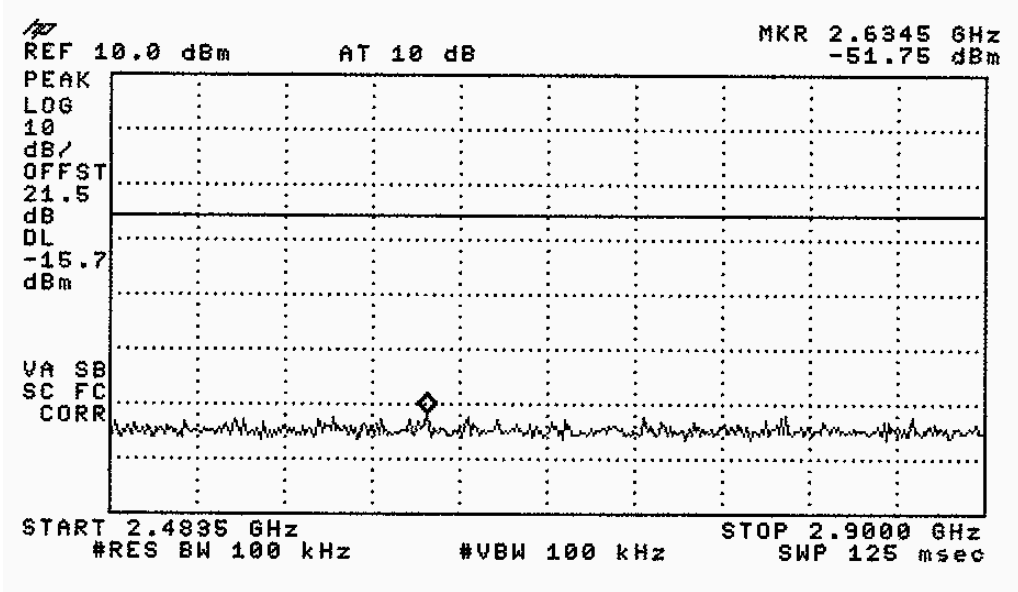


Figure 21 —2412 MHz

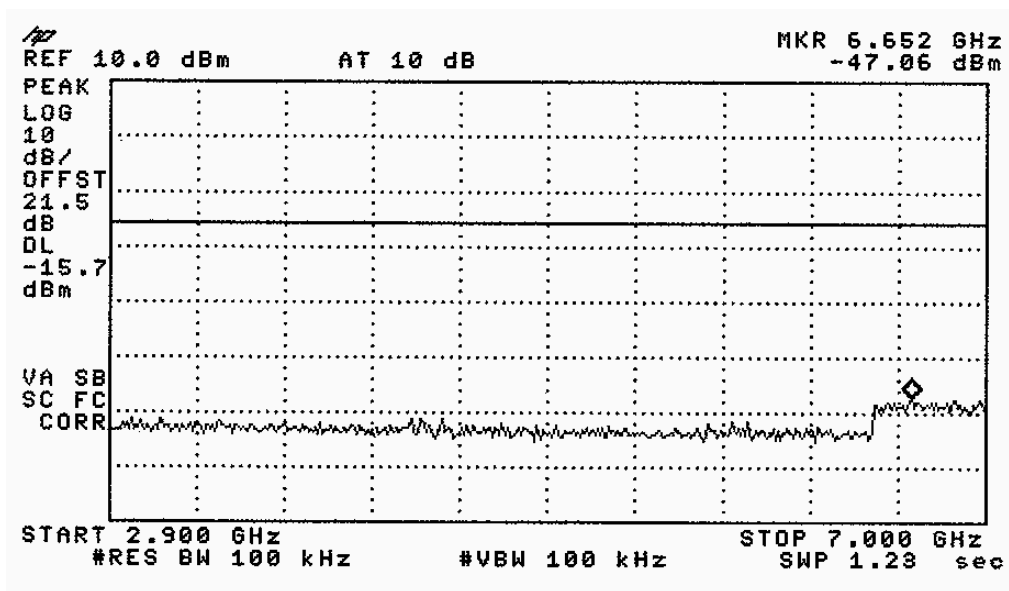


Figure 22 —2412 MHz

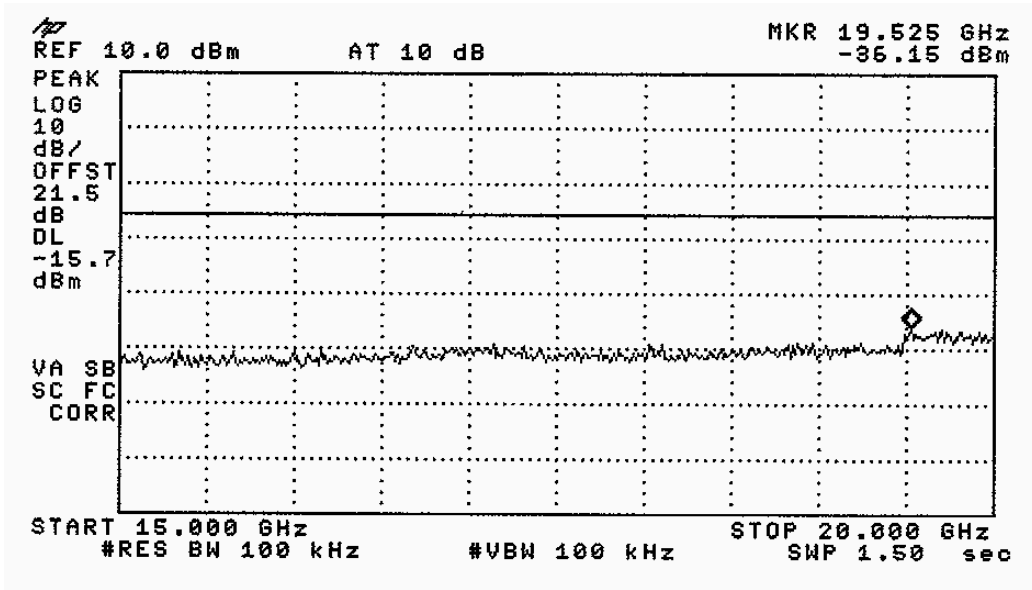


Figure 25 —2412 MHz

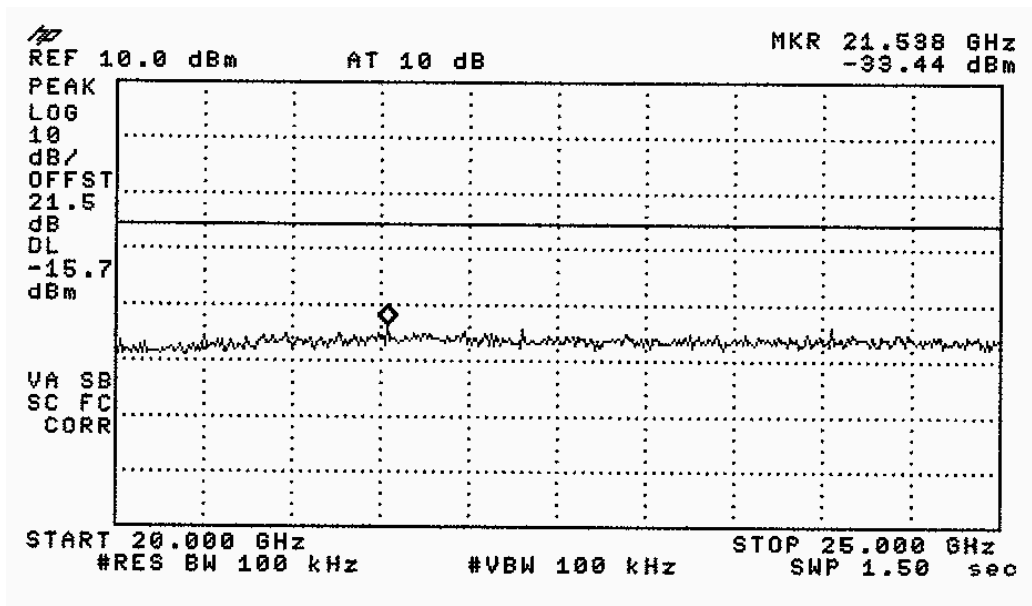


Figure 26 —2412 MHz

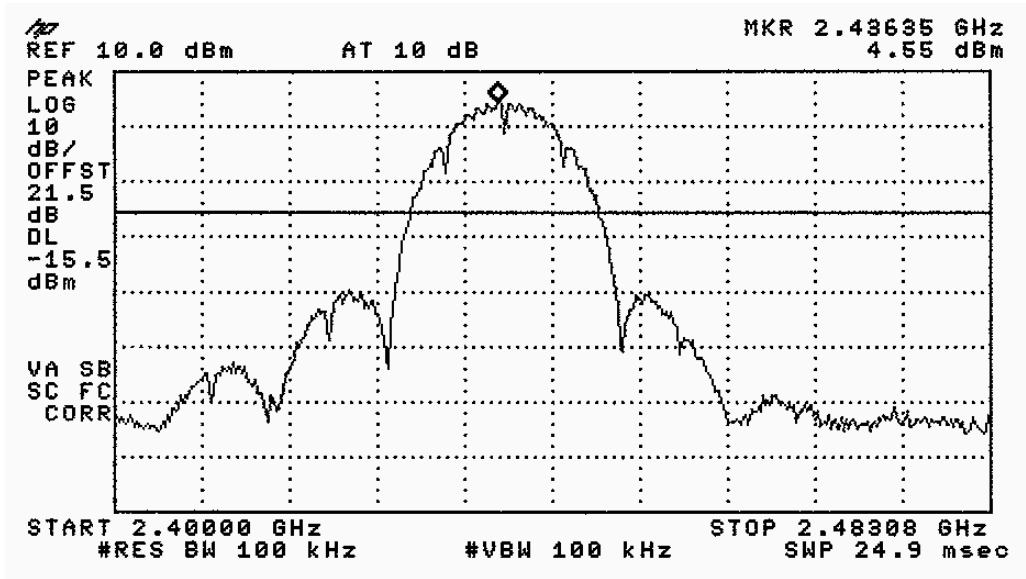


Figure 27 —2437 MHz

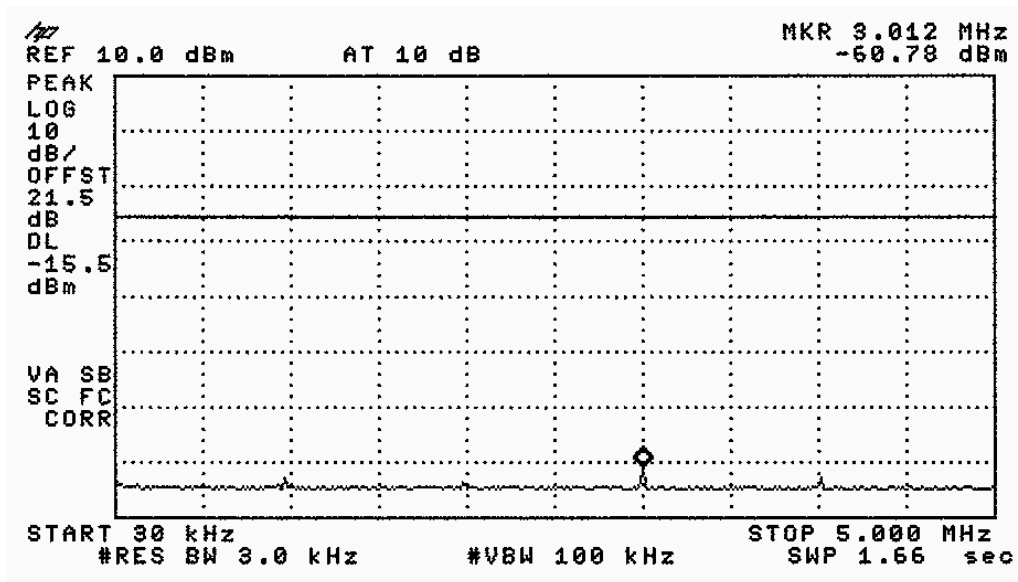


Figure 28 —2437 MHz

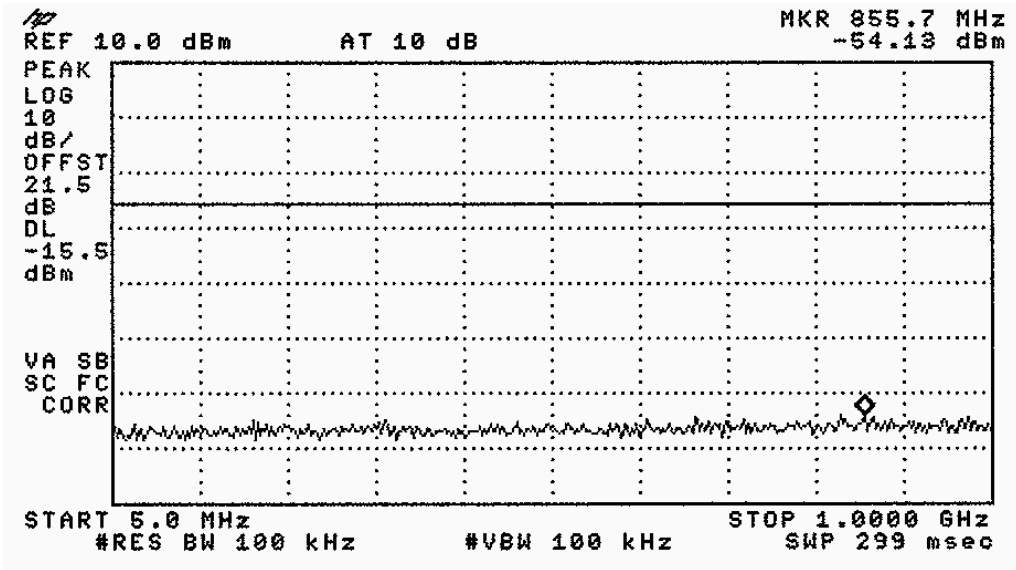


Figure 29 —2437 MHz

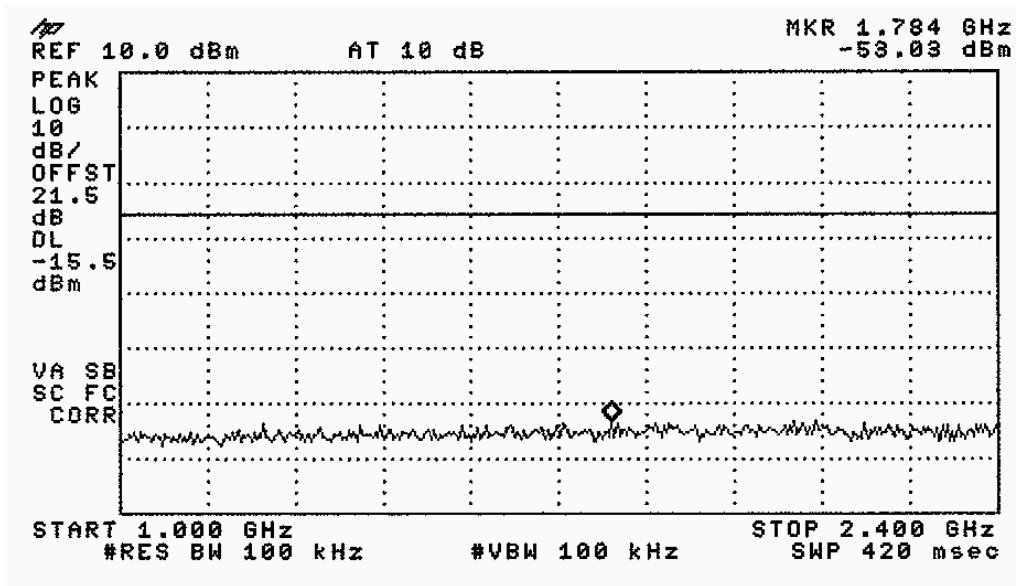


Figure 30 —2437 MHz

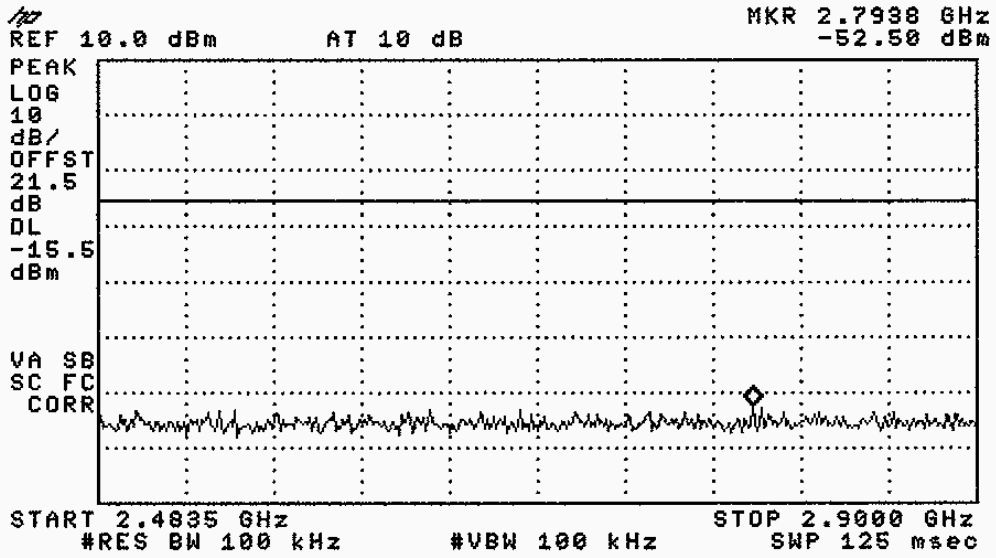


Figure 31 —2437 MHz

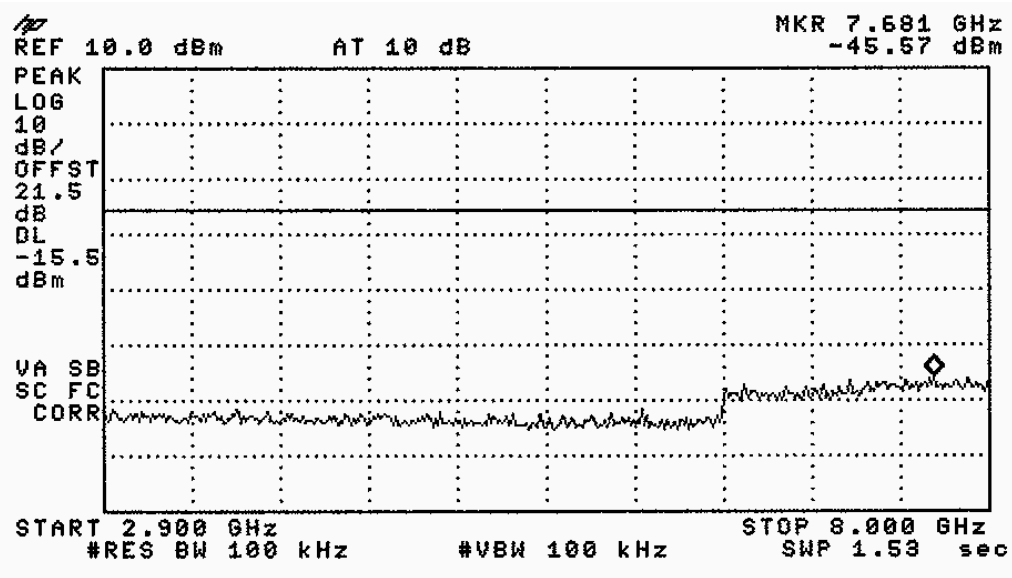


Figure 32 —2437 MHz

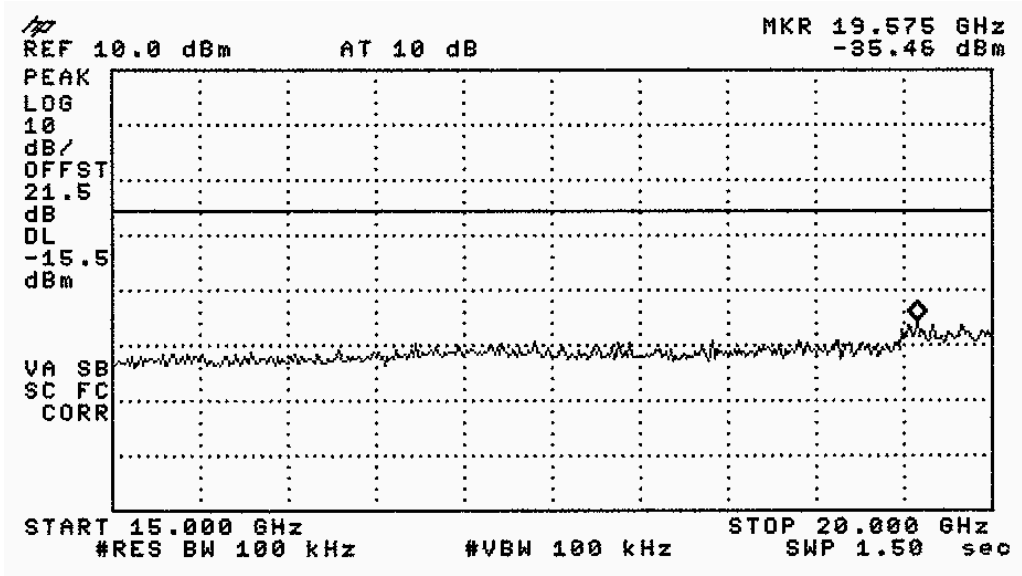


Figure 35 —2437 MHz

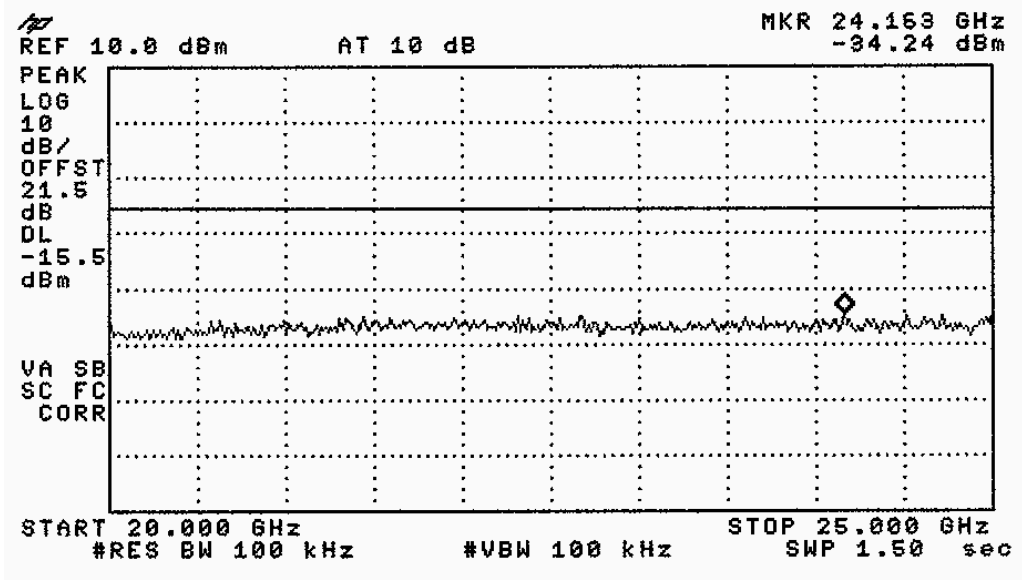


Figure 36 —2437 MHz

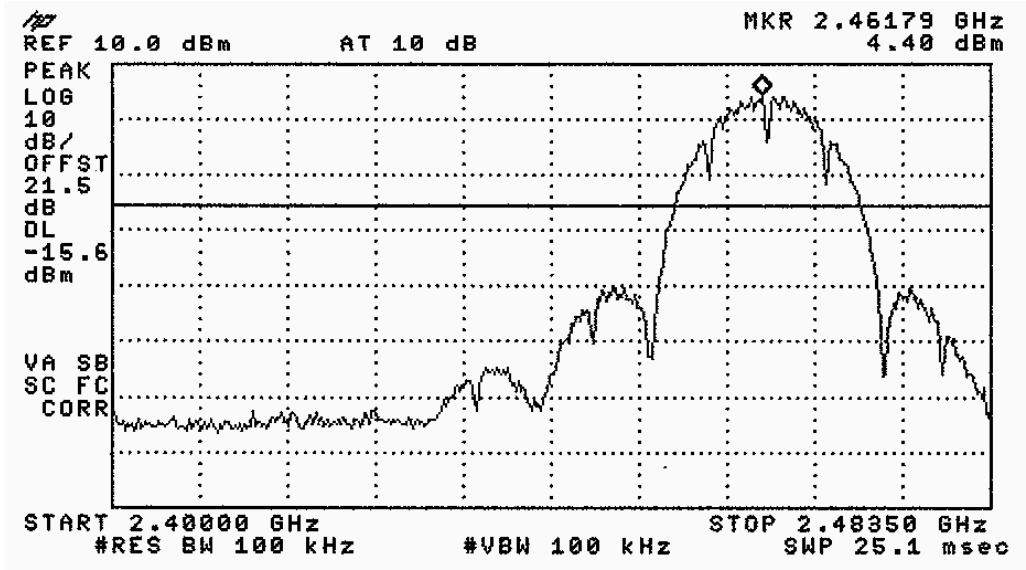


Figure 37 —2462 MHz

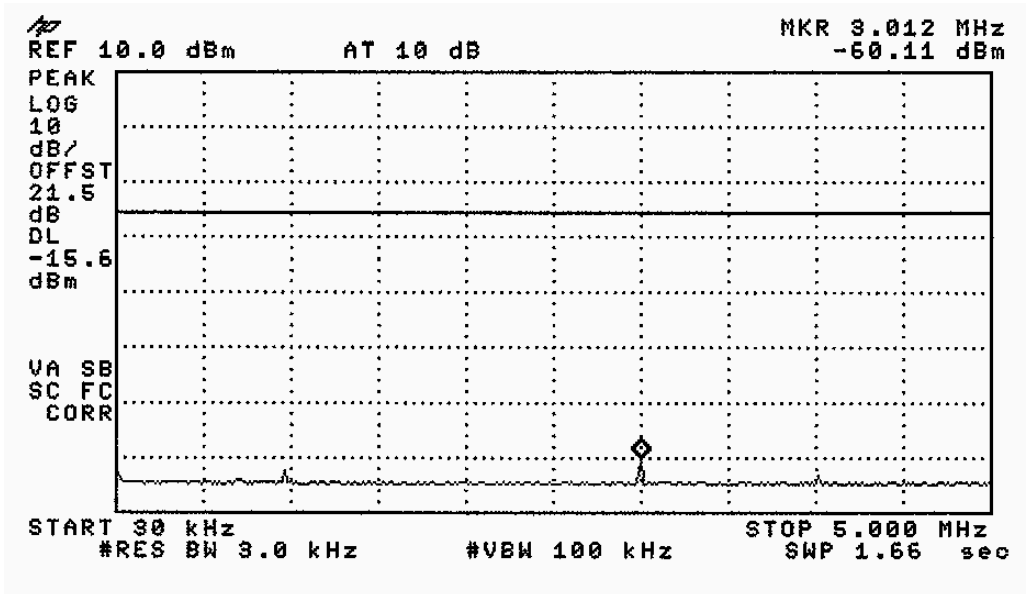


Figure 38 —2462 MHz

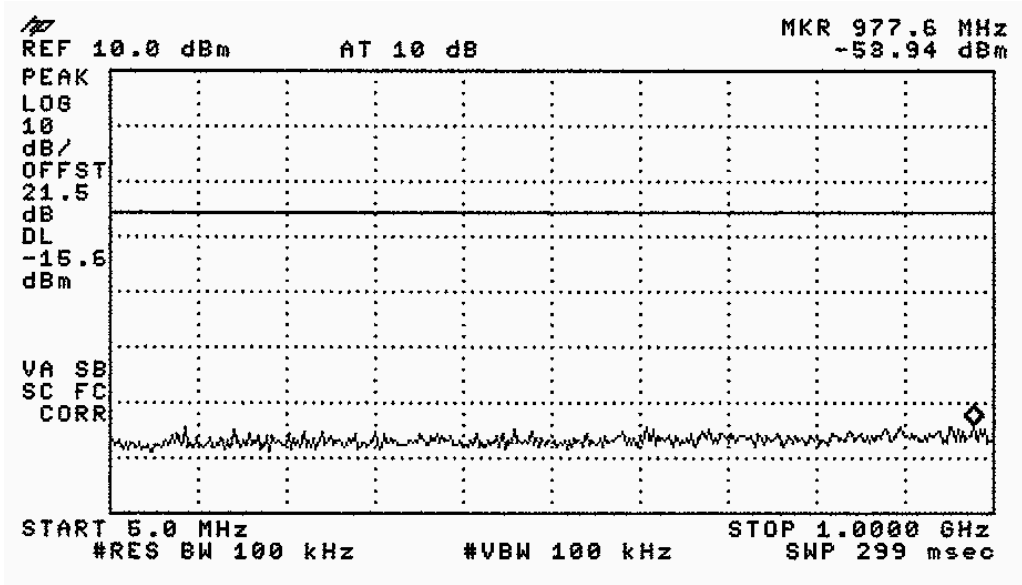


Figure 39 —2462 MHz

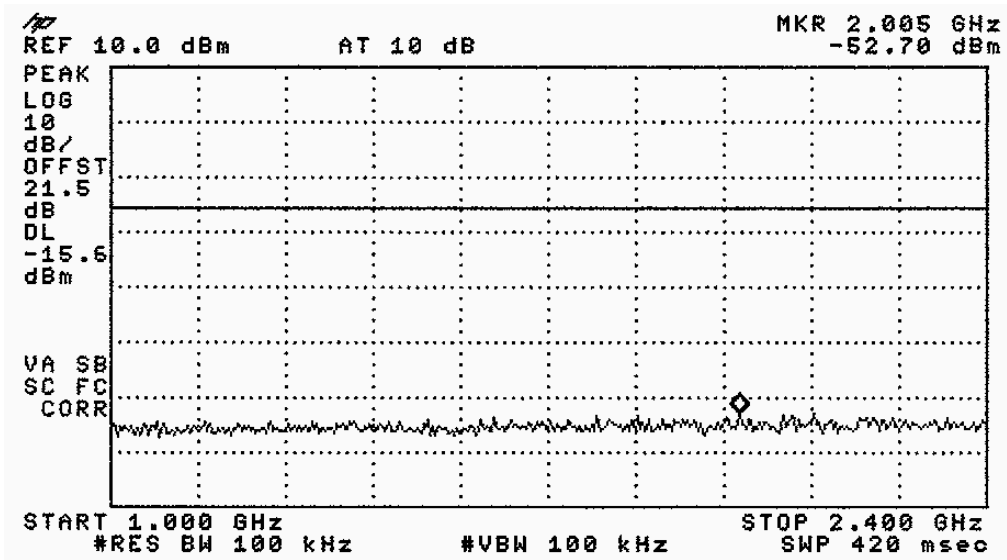


Figure 40 —2462 MHz

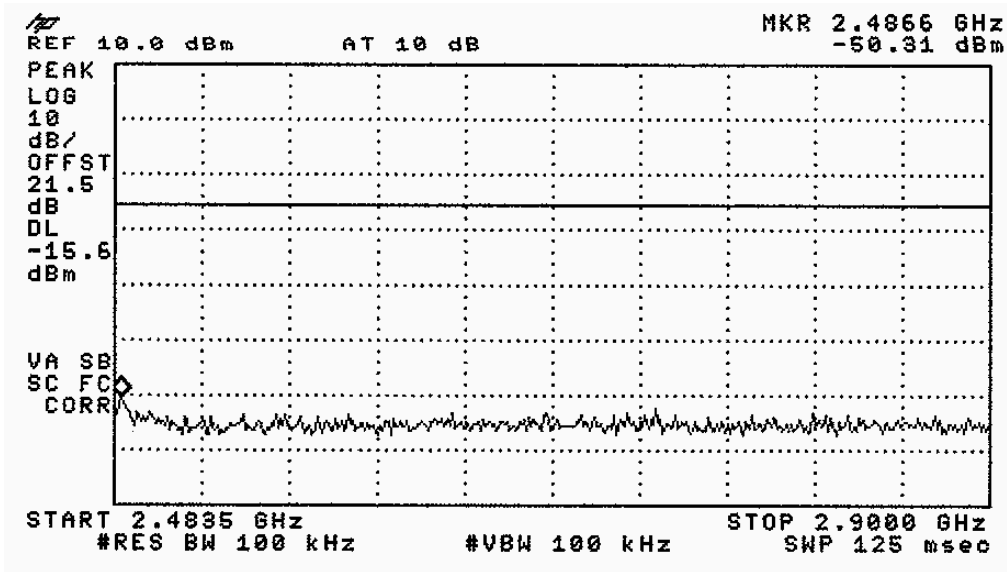


Figure 41 —2462 MHz

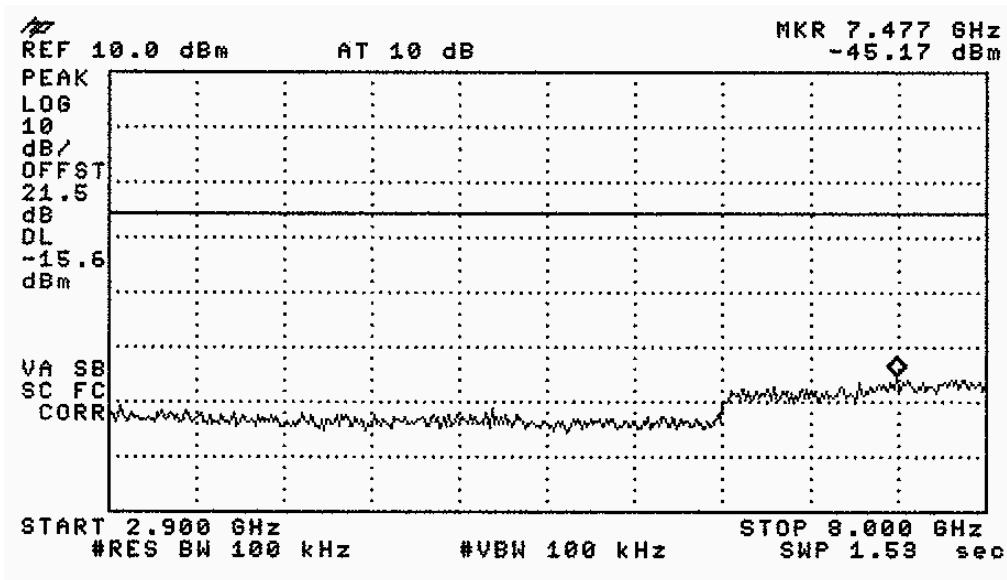


Figure 42 —2462 MHz

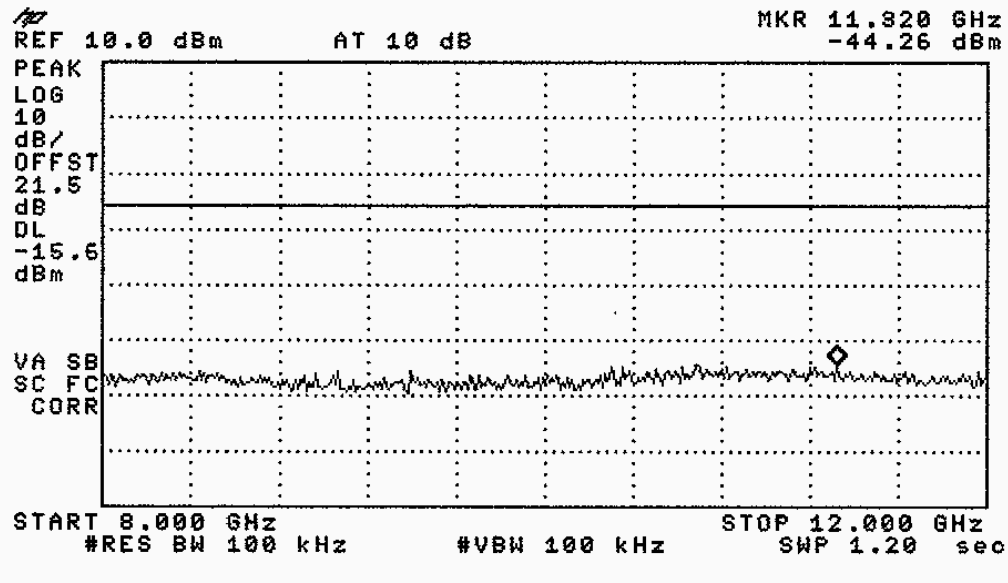


Figure 43 —2462 MHz

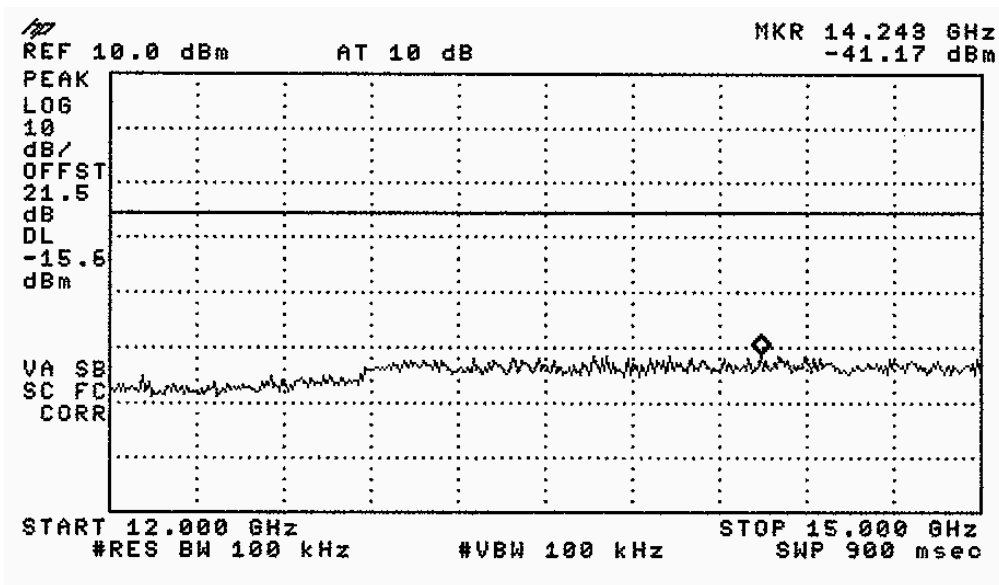


Figure 44 —2462 MHz

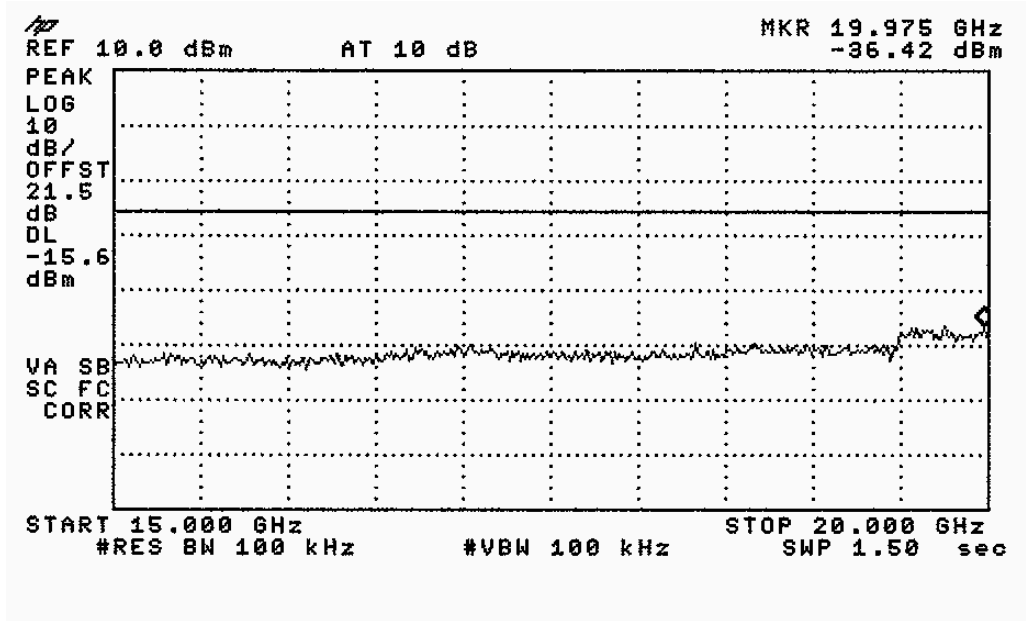


Figure 45 —2462 MHz

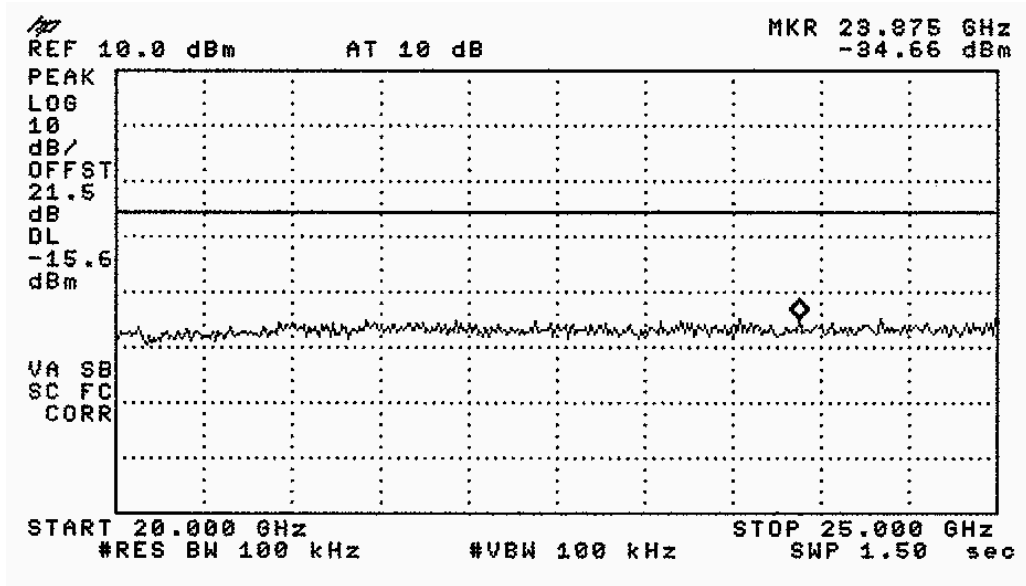


Figure 46 —2462 MHz

9.3 Test Equipment Used.

Peak Power Output of 2400-2438.5 MHz Band

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8564E	3442A00275	November 21, 2006	1 year
Cable	Rhophase	KPS-1501-1000	A1675	December 16, 2006	1 year
Attenuator	Jyebao	P/N FAT-AM5AF5G6G2W20	-	May 9, 2007	1 year

Figure 48 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 a 20dB external attenuator and 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.

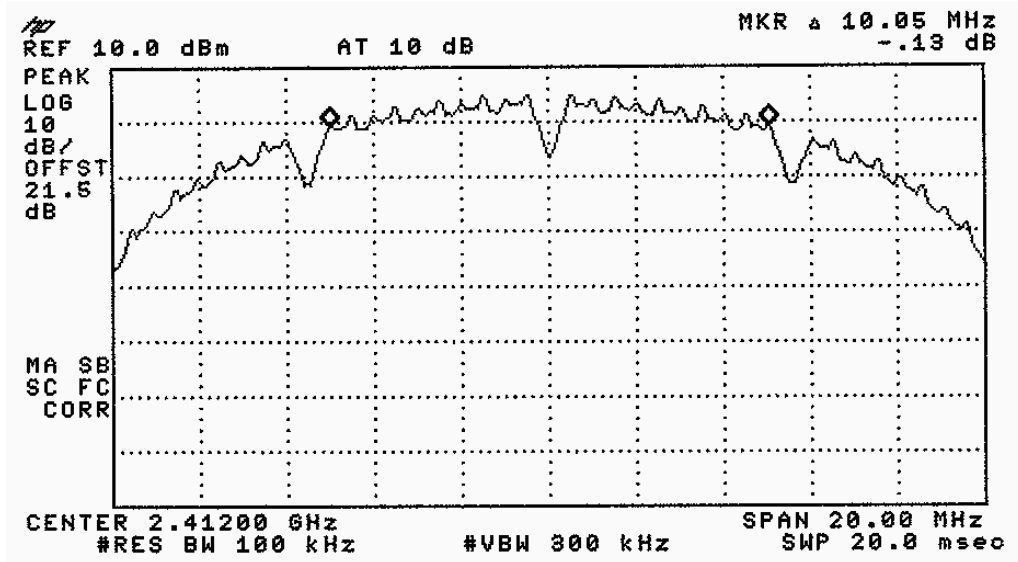


Figure 49 —2412 MHz

10.2 Results table


E.U.T Description: AeroScout T3 Tag
 Model No.: TAG-3000
 Serial Number: 200-2044-1000
 Specification: F.C.C. Part 15, Subpart C: (15.247-a2)

Operation Frequency (MHz)	Reading (MHz)	Specification (MHz)
2412	10.05	0.5
2437	10.20	0.5
2462	10.10	0.5

Figure 52 6 dB Minimum Bandwidth

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: 

Date: 24.06.07

Typed/Printed Name: E. Pitt

10.3 Test Equipment Used.

6 dB Minimum Bandwidth

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8564E	3442A00275	November 21, 2006	1 year
Cable	Rhophase	KPS-1501-1000	A1675	December 16, 2006	1 year
Attenuator	Jyebao	P/N FAT-AM5AF5G6G2W20	-	May 9, 2007	1 year

Figure 53 Test Equipment Used

11 Band Edge Spectrum

[In Accordance with section 15.247(c)]

11.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through a 20 dB external and an appropriate coaxial cable (Cable Loss = 1.5 dB). 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.

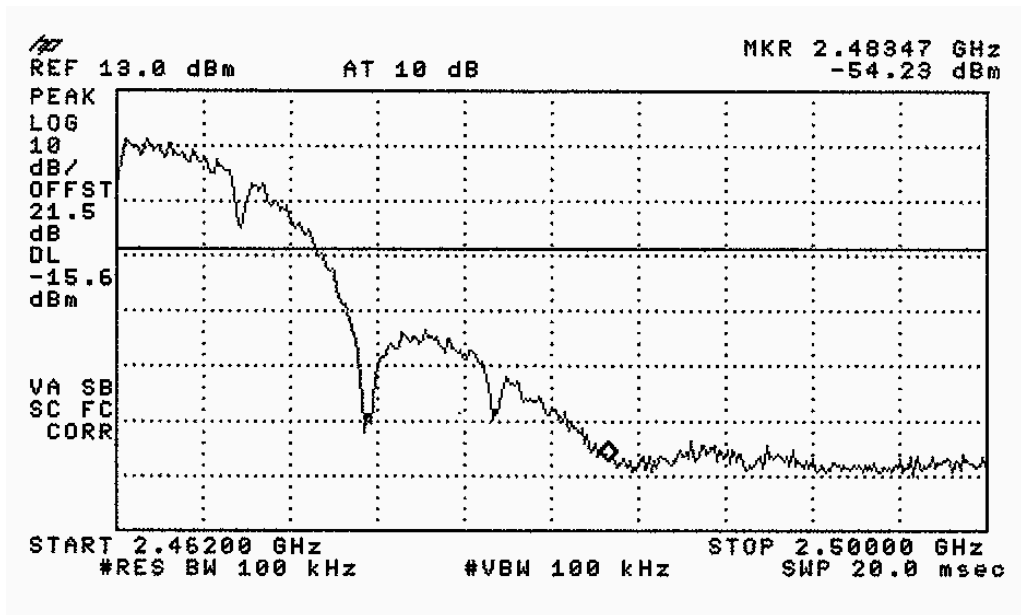


Figure 54 —2462 MHz

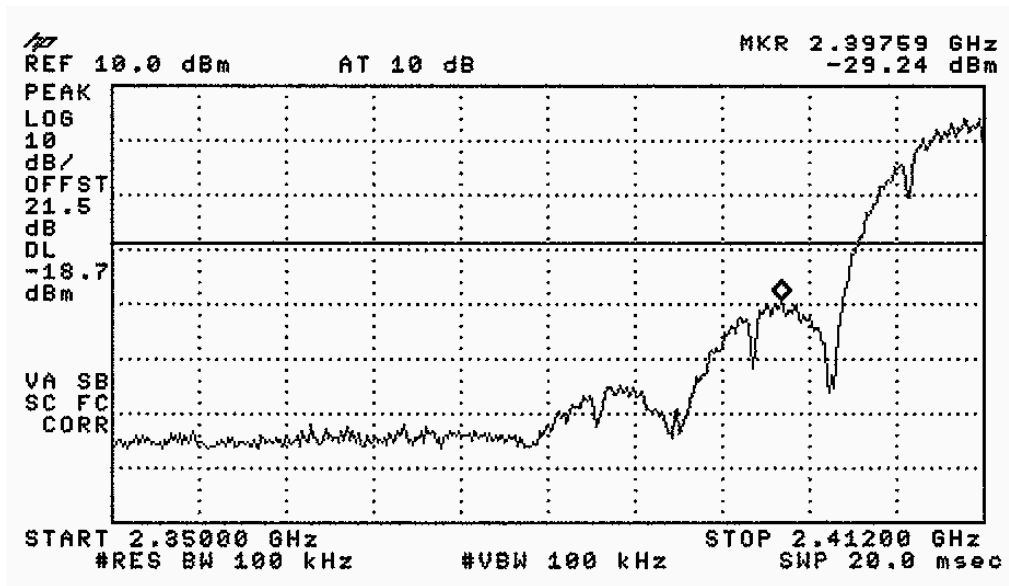


Figure 55 —2412 MHz

11.2 Results table

E.U.T. Description: AeroScout T3 Tag
 Model No.: TAG-3000
 Serial Number: 200-2044-1000
 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	2397.59	30.5	20.0	10.5
2462	2483.70	58.6	20.0	38.6

Figure 56 Band Edge Spectrum

JUDGEMENT: Passed by 10.5 dB

TEST PERSONNEL:

Tester Signature: *E. Pitt*

Date: 24.06.07

Typed/Printed Name: E. Pitt

11.3 Test Equipment Used.

Band edge Spectrum

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8564E	3442A00275	November 21, 2006	1 year
Cable	Rhophase	KPS-1501-1000	A1675	December 16, 2006	1 year
Attenuator	Jyebao	P/N FAT-AM5AF5G6G2W20	-	May 9, 2007	1 year

Figure 57 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 a 20 external attenuator and 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.

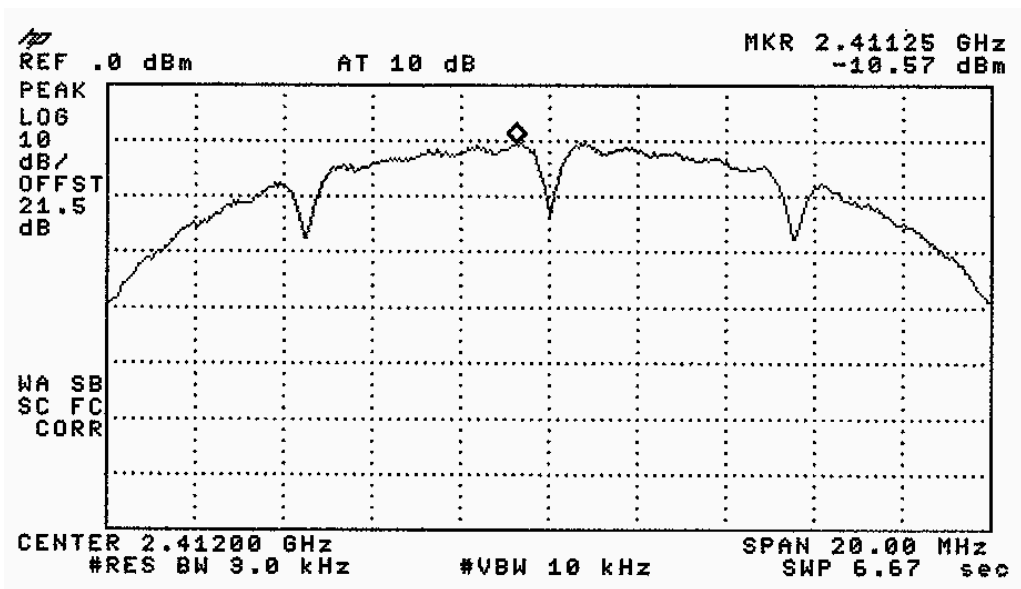


Figure 58 —2412 MHz

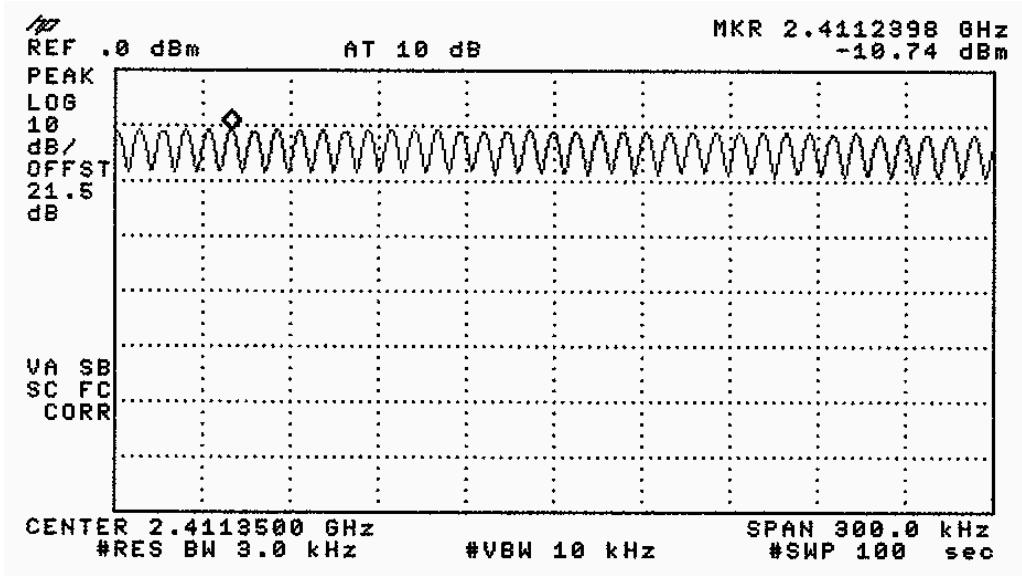


Figure 59 — 2412 MHz

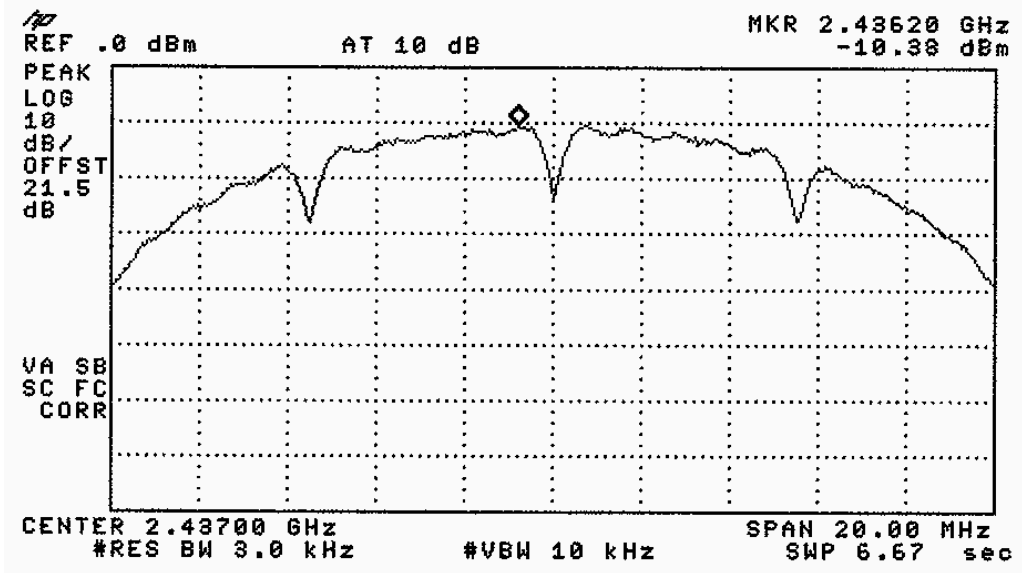


Figure 60 — 2437 MHz

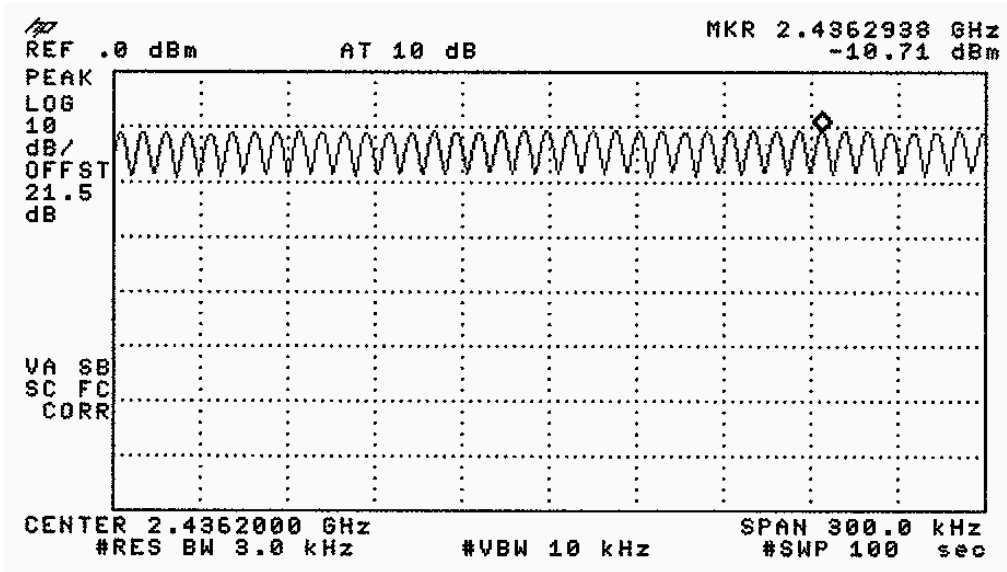


Figure 61 —2437 MHz

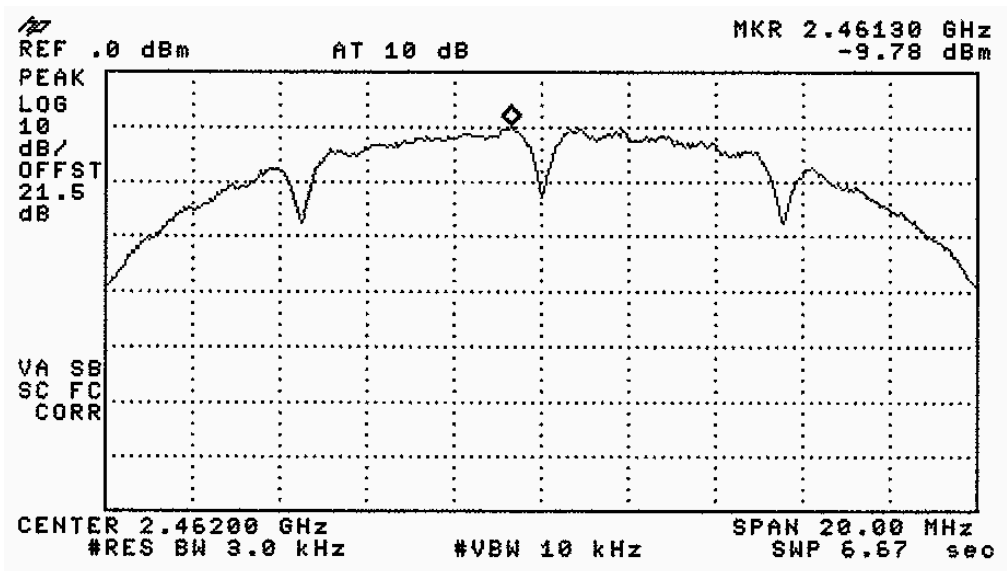


Figure 62 —2462 MHz

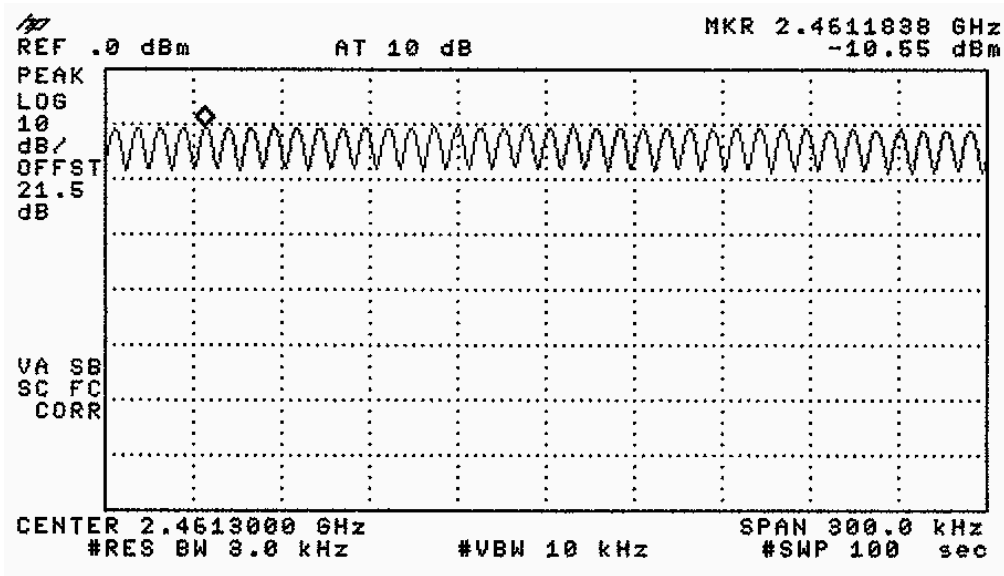


Figure 63 —2462 MHz

12.2 Results table

E.U.T. Description: AeroScout T3 Tag
 Model No.: TAG-3000
 Serial Number: 200-2044-1000
 Specification: F.C.C. Part 15, Subpart C (15.247)


Operation Frequency (MHz)	Reading Signal Analyzer (dBm)	Specification (dBm)	Margin (dB)
2412	-10.74	8.0	-18.74
2437	-10.71	8.0	-18.71
2462	-10.55	8.0	-18.55

Figure 64 Test Results



JUDGEMENT: Passed by 18.55 dB

TEST PERSONNEL:

Tester Signature: 

Date: 24.06.07

Typed/Printed Name: E. Pitt

12.3 Test Equipment Used.

Transmitted Power Density

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8564E	3442A00275	November 21, 2006	1 year
Cable	Rhophase	KPS-1501-1000	A1675	December 16, 2006	1 year
Attenuator	Jyebao	P/N FAT-AM5AF5G6G2W20	-	May 9, 2007	1 year

Figure 65 Test Equipment Used

13 Antenna Gain

The antenna gain is -0.5dBi.

14 R.F Exposure/Safety

Typical use of the E.U.T. is personnel tracking. The typical placement of the E.U.T. is the human chest, worn with a strap around the neck as a pendant. The typical distance between the E.U.T. and the user in the worst case application, is <2.5cm.

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

(a) FCC limits at 2437 MHz is: $1 \frac{mW}{cm^2}$

Using table 1 of Section 1.1310 limit for general population/uncontrolled exposures.

(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 79.4mw (Peak) = 19.0 dBm

G_T - Antenna Gain, -0.5 dBi

R - Distance from Transmitter using 1cm worst case

(c) The peak power density is :

$$S_p = \frac{79.4}{4\pi(1)^2} = 6.3 \frac{mW}{cm^2}$$

(d) The duty cycle of transmission in actual worst case is 500 microsecond “on” and 0.128 second “Off”.

The average power , source based time average , (100 msec. time window)is:

$$P_{AV} = \frac{79.4 \times 0.5}{100} = 0.397 mW$$

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

$$S_{AV} = \frac{0.397}{4\pi(1)^2} = 0.032 \frac{mW}{cm^2}$$

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

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

15.1 Test Specification

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

15.2 Test Procedure

The E.U.T operation mode and test configuration are as described in section 4.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The effect of varying the position of the cables was investigated to find the configuration that produces maximum emission. The configuration tested is shown in photographs *Figure 3. Radiated Emission Test* and *Figure 4. Radiated Emission Test*.

The E.U.T. highest frequency source or used frequency is 44.0 MHz.

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

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

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

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

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

- Using a frequency span less than 10 MHz.

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

The emissions were measured at a distance of 3 meters.

The E.U.T. was tested in both Rx and Tx modes.

15.3 Test Data


JUDGEMENT: Passed by 12.7 dB

The EUT met the requirements of the F.C.C. Part 15, Subpart C specification.
The margin between the emission level and the specification limit is 12.7 dB in the worst case at the frequency of 264.01 MHz, vertical polarization.

The results for both Rx and Tx modes were the same.

The details of the highest emissions are given in *Figure 66* to *Figure 69*.

TEST PERSONNEL:

Tester Signature: 

Date: 24.06.07

Typed/Printed Name: E. Pitt

Radiated Emission

E.U.T Description AeroScout T3 Tag
 Type TAG-3000
 Serial Number: 200-2044-1000

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
 Antenna: 3 meters distance

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

Signal Number	Frequency (MHz)	Peak dBuV/m	QP dBuV/m	QP Delta L 1 (dB)	Av Delta L 2 (dB)	Corr (dB)
1	131.998625	30.1	23.6	-19.9		14.0
2	176.000000	33.0	27.1	-16.4		15.9
3	219.997800	31.5	26.8	-19.2		18.8
4	263.997600	33.2	30.6	-15.4		21.6
5	307.997850	36.6	30.2	-15.8		23.5
6	351.997000	34.8	29.0	-17.0		17.9

**Figure 66. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detectors: Peak, Quasi-peak**

Note: QP Delta 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

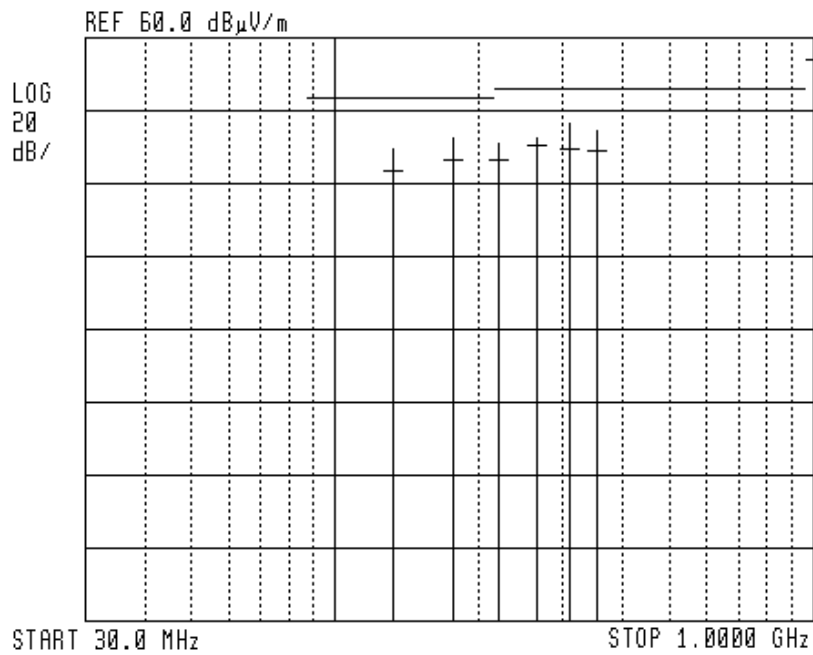
E.U.T Description AeroScout T3 Tag
 Type TAG-3000
 Serial Number: 200-2044-1000

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
 Antenna: 3 meters distance

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

15:55:14 MAY 09, 2007



**Figure 67. Radiated Emission. Antenna Polarization: HORIZONTAL
 Detectors: Peak, Quasi-peak**

Note:

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

Radiated Emission

E.U.T Description AeroScout T3 Tag
 Type TAG-3000
 Serial Number: 200-2044-1000

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
 Antenna: 3 meters distance

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

Signal Number	Frequency (MHz)	Peak dBuV/m	QP dBuV/m	QP Delta L 1 (dB)	Av Delta L 2 (dB)	Corr (dB)
1	132.000150	34.8	24.7	-18.8		14.0
2	176.000000	31.4	25.7	-17.8		15.9
3	220.000000	34.0	28.9	-17.1		18.8
4	241.999900	35.8	30.5	-15.5		20.0
5	264.006250	38.8	33.3	-12.7		21.6
6	308.000000	35.1	29.3	-16.7		23.5

**Figure 68. Radiated Emission. Antenna Polarization: VERTICAL.
 Detectors: Peak, Quasi-peak**

Note: QP Delta 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.

15.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial No.	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 22, 2006	1 Year
RF Filter Section	HP	85420E	3705A00248	November 22, 2006	1 Year
Antenna Bioconical	ARA	BCD 235/B	1041	March 19, 2006	1 Year
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 30, 2006	1 Year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKG19982	N/A	N/A

16. Photographs of Tested E.U.T.



Figure 70 Front Cover



Figure 71 Rear Cover



Figure 72 Rear Cover With Battery



Figure 73 Rear Cover Without Battery

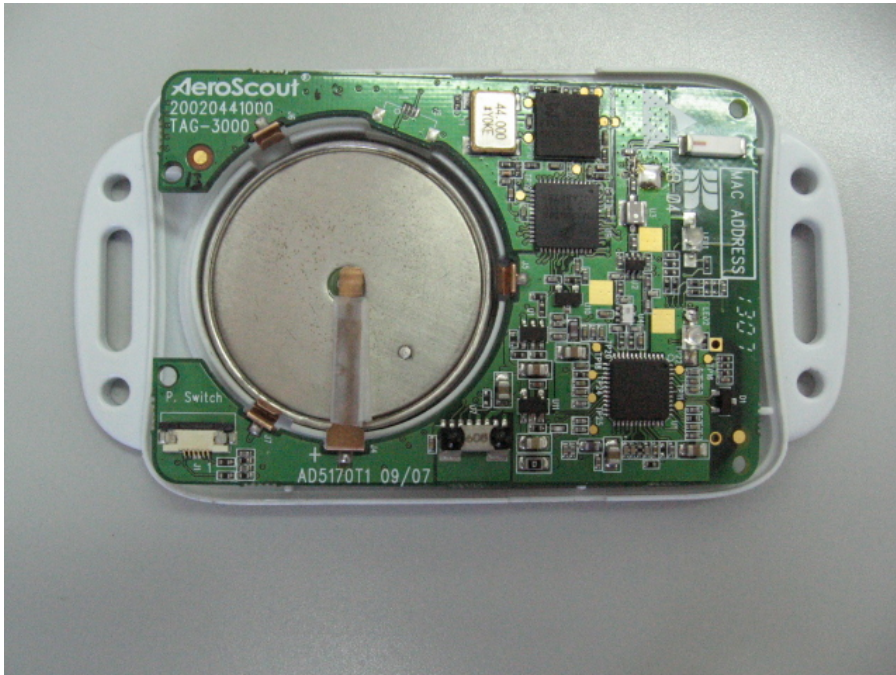


Figure 74 PCB In Cover

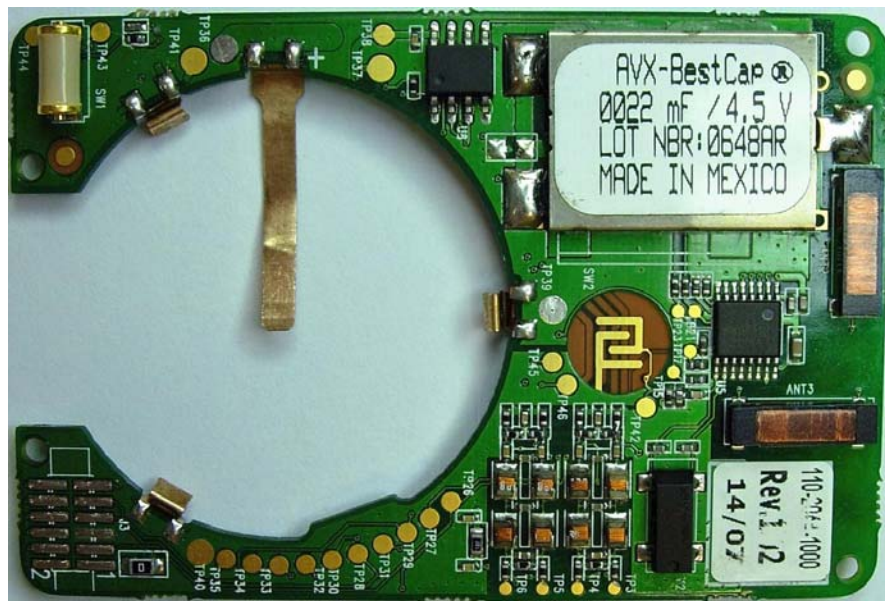


Figure 75 PCB Side 1



Figure 76 Side 2