Cert. No. 1152.01
Electrical (EMC)

DATE: 27 March 2007

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

FCC EMC/Radio Test Report

for

AeroScout Ltd.

Equipment under test:

AeroScout T3i Tag

TAG-3100

Written by: _____
D. Shidlowsky, Documentation

Approved by: _____
E. Pitt, Test Engineer

Approved by: _____
I. Raz, EMC Laboratory Manager

Cert. No. 1152.01
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Measurement/Technical Report for

AeroScout Ltd.

AeroScout T3i Tag

TAG-3100

FCC ID: Q3H TAG3100

27 March 2007

This report concerns: Original Grant x Class II change

Class B verification ___ Class A verification_____Class I change

Equipment type: Radio Telemetry Transmitter

Request Issue of Grant:

__**x**__Immediately upon completion of review

Limits used:

CISPR 22 _____ Part 15 __x

Measurement procedure used is ANSI C63.4-2003.

Application for Certification
prepared by:
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Applicant for this device:
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1. General Information

1.1 Administrative Information

Manufacturer:	AeroScout Ltd.
Manufacturer's Address:	10 Oppenheimer St. Park Tamar Rechovot 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 T3i Tag
Equipment Model No.:	TAG-3100
Equipment Serial No.:	5D4304
Date of Receipt of E.U.T:	04.01.07
Start of Test:	04.01.07
End of Test:	19.02.07
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™ T3i Tag is a key component of the AeroScout™ Location System. These dedicated battery-powered Tags send Wi-Fi (2.4 GHz ISM Band) compatible messages at predefined 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 addition, the product uses a 125 kHz receiver to improve location accuracy.

The AeroScout T3i 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

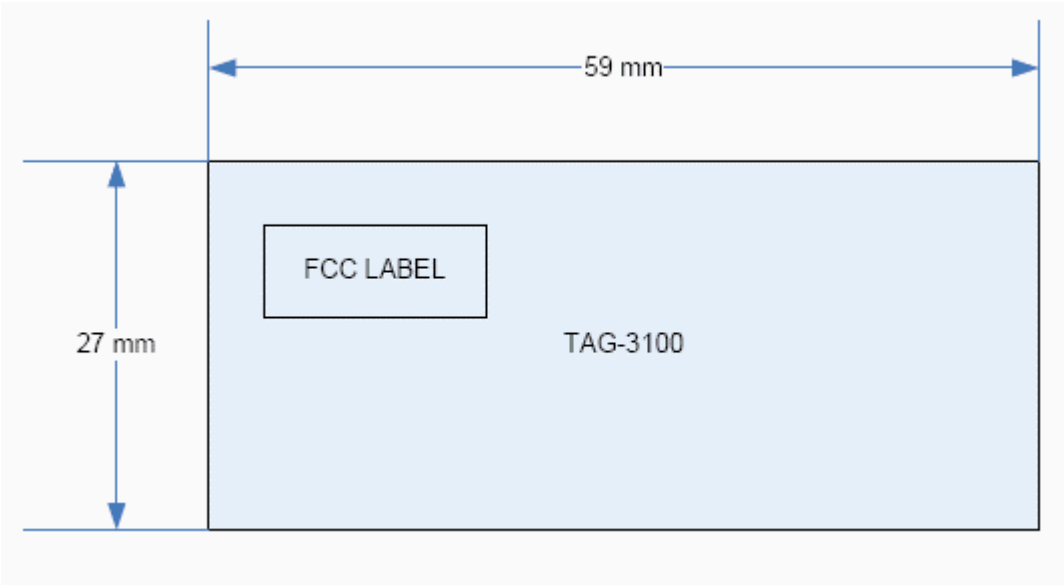

Figure 2. Location of Label on EUT

3. System Test Configuration

3.1 Justification

The typical operation of the Tag (as a customer would normally use) is that the Tag wake 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.

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 modes 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

DC line filtering was performed by changing the values of capacitors and inductors:

C24 was Not in Use, now 15pF,

C25was Not in Use, now 15pF,

C5 was Not in Use, now 15pF,

C29 was Not in Use, now 15pF,

C34 was Not in Use, now 15pF,

C13 was Not in Use, now 15pF,

L10 was 0 Ohm, now 27nH,

L12 was 0 Ohm, now 27nH

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.
2. The E.U.T. was tested at 2412, 2442, and 2462 MHz

4. Block Diagram

4.1 Schematic Block/Connection Diagram

Intentionally Blank for Reasons of Confidentiality

4.2 Theory of Operation

The AeroScout™ T3i 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 4. Radiated Emission Test

Figure 5. 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, 2442, and 2462 MHz.

6.3 Test Data

JUDGEMENT: Passed by 13.1 dB

The signals in the band 9 kHz – 30 MHz were –20dB 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 13.1 dB in the worst case at the frequency of 396.00 MHz, horizontal polarization.

TEST PERSONNEL:

Tester Signature: _____ Date: 26.03.07

Typed/Printed Name: E. Pitt

Radiated Emission

E.U.T Description	AeroScout T3i Tag
Type	TAG-3100
Serial Number:	5D4304

Specification: FCC Part 15, Subpart C

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)	Avg dBuV/m	Av Delta L 2 (dB)	Corr (dB)
1	131.999000	32.2	28.0	-15.5			14.5
2	175.999000	33.3	27.2	-16.3			16.6
3	307.998500	31.8	28.0	-18.0			15.9
4	395.998500	36.5	32.9	-13.1			18.9
5	439.998500	32.5	29.7	-16.3			19.6
6	791.996750	33.7	28.2	-17.8			25.7

Figure 6. 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 T3i Tag
Type	TAG-3100
Serial Number:	5D4304

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal
Antenna: 3 meters distance

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

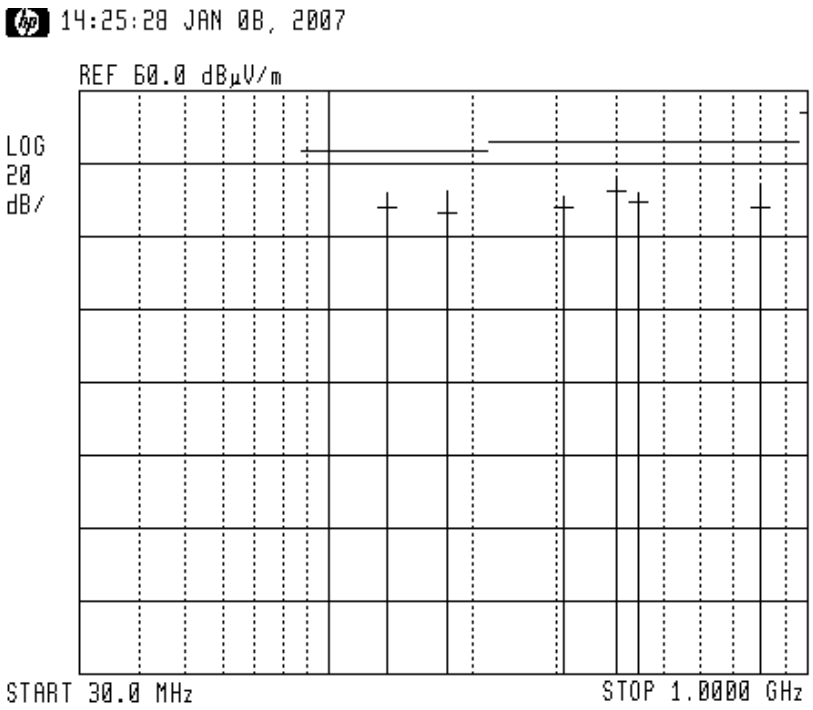

Figure 7. Radiated Emission. Antenna Polarization: HORIZONTAL Detectors: Peak, Quasi-peak

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 T3i Tag
Type TAG-3100
Serial Number: 5D4304

Specification: FCC Part 15, Subpart C

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)	Avg dBuV/m	Av Delta L 2 (dB)	Corr (dB)
1	62.002550	26.2	20.4	-19.6			10.2
2	131.999425	30.5	25.1	-18.4			13.7
3	175.999300	31.3	25.5	-18.0			15.4
4	263.998700	36.9	31.6	-14.4			21.1
5	439.998700	33.8	28.9	-17.1			19.6
6	527.998700	38.0	30.5	-15.4			21.4
7	615.998700	32.6	28.3	-17.7			24.0

Figure 8. 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.

Radiated Emission

E.U.T Description	AeroScout T3i Tag
Type	TAG-3100
Serial Number:	5D4304

Specification: FCC Part 15, Subpart C

Antenna Polarization: Vertical
Antenna: 3 meters distance

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

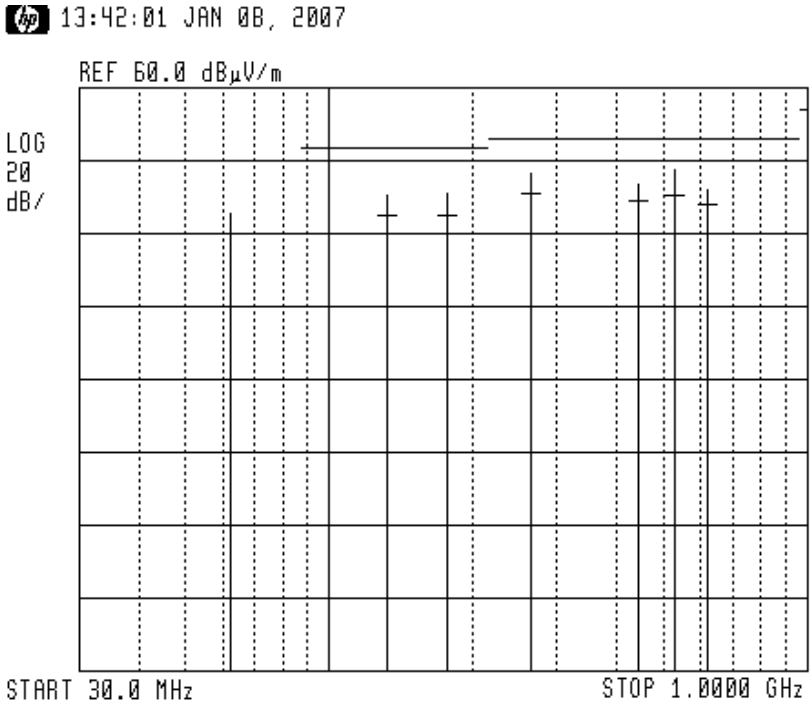

Figure 9. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

Note:

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

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 19, 2006	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	JPKGC19982	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:

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

FS:	Field Strength [dBμv/m]
RA:	Receiver Amplitude [dBμv]
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 7.8 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 7.8 dB in the worst case at the frequency of 4824.00 MHz, horizontal polarization.

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 10 to Figure 13.

TEST PERSONNEL:

Tester Signature: _____ Date: 26.03.07

Typed/Printed Name: E. Pitt

Radiated Emission Above 1 GHz

E.U.T Description	AeroScout T3i Tag
Type	TAG-3100
Serial Number:	5D4304

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal
Test Distance: 3 meters
Frequency range: 1.0 GHz to 25.0 GHz
Detector: Peak

Freq. (MHz)	Peak Amp (dBµV/m)	Peak. Specification (dB µV/m)	Peak. Margin (dB)
2483.50	45.7**	74.0	-28.3
4824.00	53.9*	74.0	-20.1
4884.00	48.4*	74.0	-25.6
4924.00	50.0*	74.0	-24.0

Figure 10. 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 + FilterLoss- Preamplifier Gain

** "Correction Factor" = Antenna Factor + Cable Loss + Filter Loss

Radiated Emission Above 1 GHz

E.U.T Description AeroScout T3i Tag
Type TAG-3100
Serial Number: 5D4304

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. (MHz)	Average Amp (dBµV/m)	Average Specification (dB µV/m)	Peak. Margin (dB)
2483.50	36.7**	54.0	-17.3
4824.00	46.2*	54.0	-7.8
4884.00	42.5*	54.0	-11.5
4924.00	43.6*	54.0	-10.4

Figure 11. 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 + Filter Loss

Radiated Emission Above 1 GHz

E.U.T Description	AeroScout T3i Tag
Type	TAG-3100
Serial Number:	5D4304

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Peak

Freq. (MHz)	Peak Amp (dBµV/m)	Peak. Specification (dB µV/m)	Peak. Margin (dB)
2483.50	45.7**	74.0	-28.3
4824.00	50.2*	74.0	-23.8
4884.00	46.9*	74.0	-27.1
4924.00	47.8*	74.0	-26.2

Figure 12. 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 + Filter Loss

Radiated Emission Above 1 GHz

E.U.T Description AeroScout T3i Tag
Type TAG-3100
Serial Number: 5D4304

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Average

Freq. (MHz)	Average Amp (dBµV/m)	Average Specification (dB µV/m)	Peak. Margin (dB)
2483.50	36.7**	54.0	-17.3
4824.00	41.5*	54.0	-12.5
4884.00	40.4*	54.0	-13.6
4924.00	42.3*	54.0	-11.7

Figure 13. 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 - Preamplifier Gain

** Correction Factor = Antenna Factor + Cable Loss + Filter 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	January 24, 2005	2 year
Double Ridged Waveguide Horn Antenna	EMCO	3115	9702-5111	March 15, 2006	1 year
Horn Antenna	ARA	SWH-28	1008	December 8, 2006	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 2, 2006	1 year
Spectrum Analyzer	HP	8592L	3926A01204	November 21, 2006	1 year
Printer	HP	LaserJet 2200	JPKGC19982	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 24dB external attenuator (3 X 8 dB = 24 dB) and an appropriate coaxial cable (Cable Loss = 05 dB). Special attention was taken to prevent Spectrum Analyzer RF input overload. The Spectrum Analyzer was set to 2.0 MHz resolution BW. Peak power level was measured at selected operation frequencies.

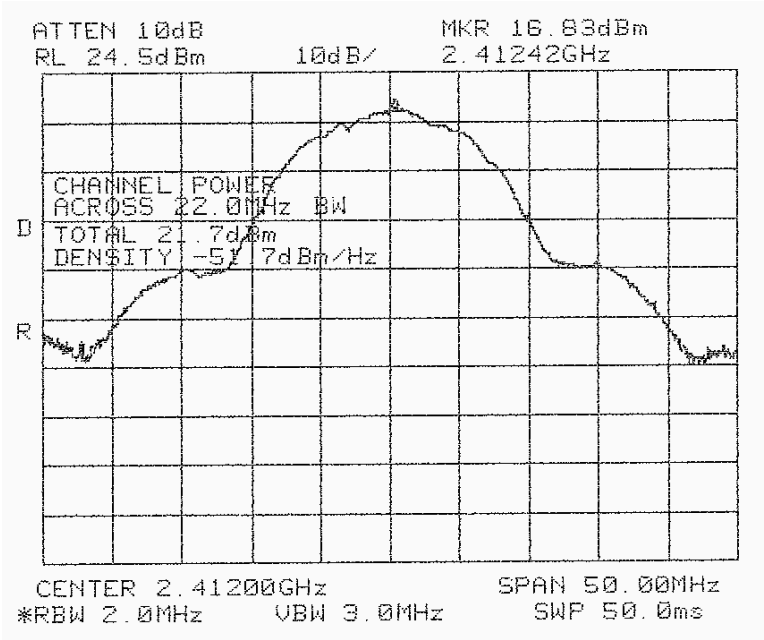

Figure 14 2412 MHz

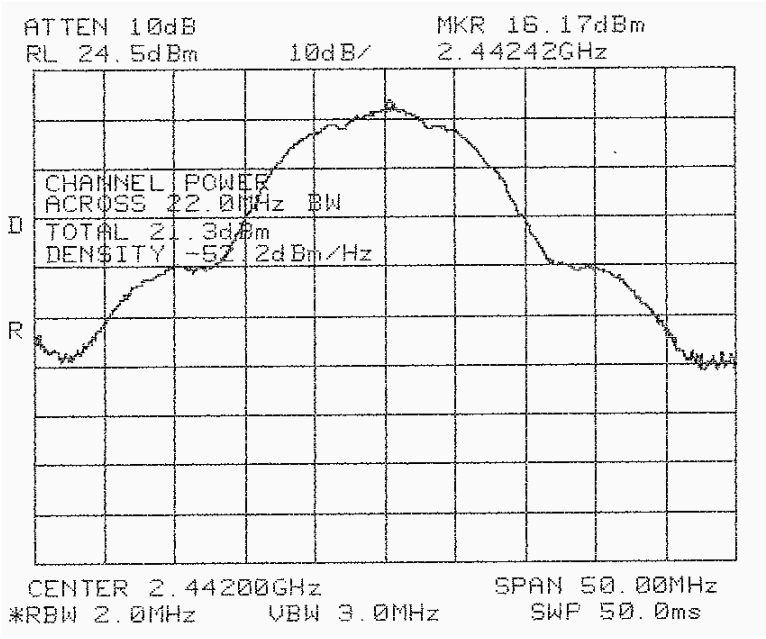

Figure 15 2442 MHz

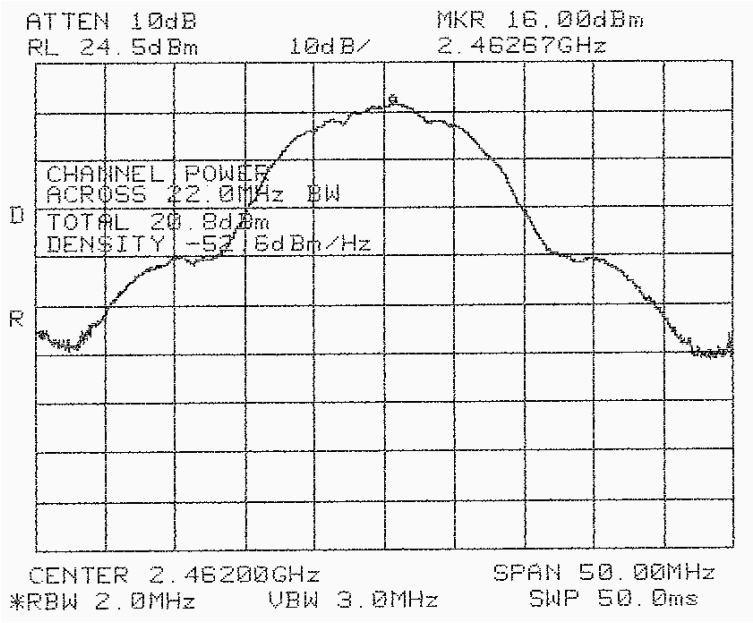

Figure 16 2462 MHz

8.2 Results table

E.U.T. Description: AeroScout T3i Tag
Model No.: TAG-3100
Serial Number: 5D4304
Specification: F.C.C. Part 15, Subpart C

Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
2412	21.7	30.0	-8.3
2442	21.3	30.0	-8.7
2462	20.8	30.0	-9.2

Figure 17 Maximum Peak Power Output

JUDGEMENT: Passed by 8.3 dB

TEST PERSONNEL:
Tester Signature: _____ Date: 26.03.07
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	Macom	M3933/25-74	050	November 26, 2006	1 year
Attenuator	Macom	M3933/25-74	211	November 26, 2006	1 year
Attenuator	Macom	M3933/25-74	056	November 26, 2006	1 year

Figure 18 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 24dB external attenuator (3 X 8 dB = 24 dB) and an appropriate coaxial cable (Cable Loss = 0.5 dB). The spectrum analyzer was set to 100 kHz resolution BW except for the frequency range 30 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.

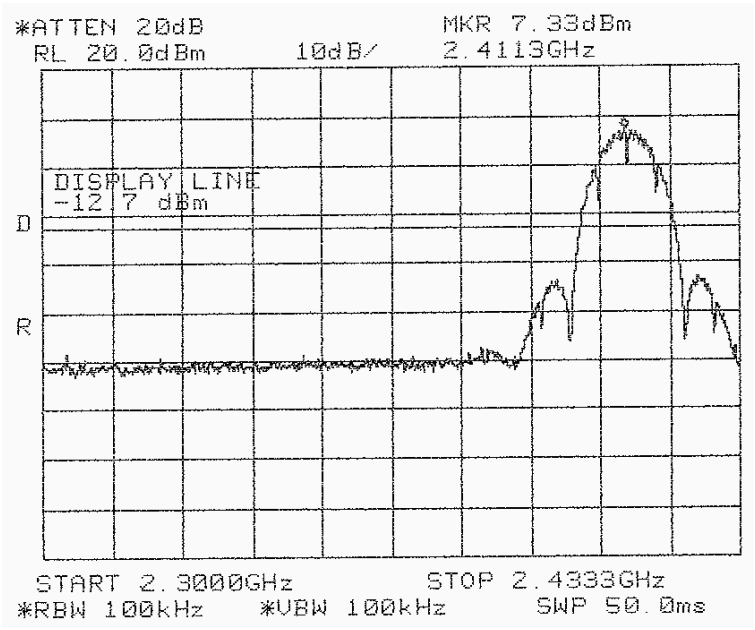

Figure 19 —2412 MHz

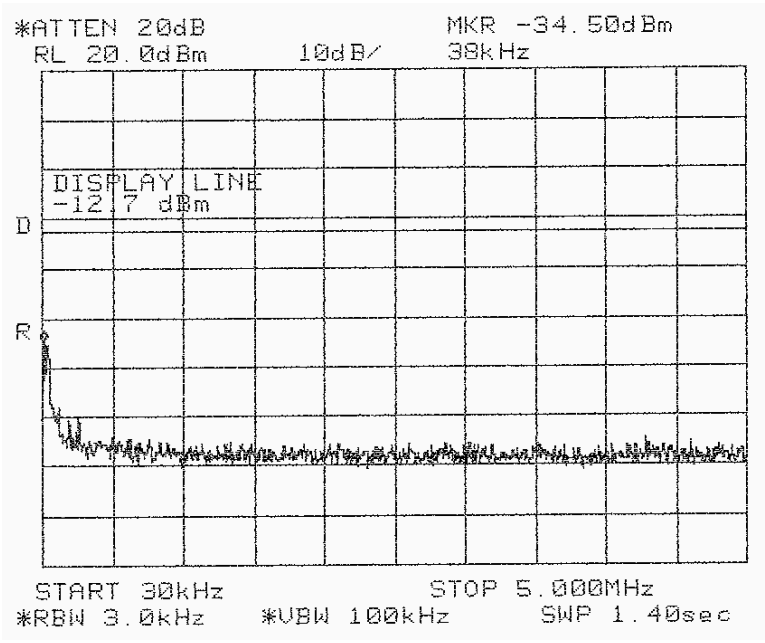

Figure 20 —2412 MHz

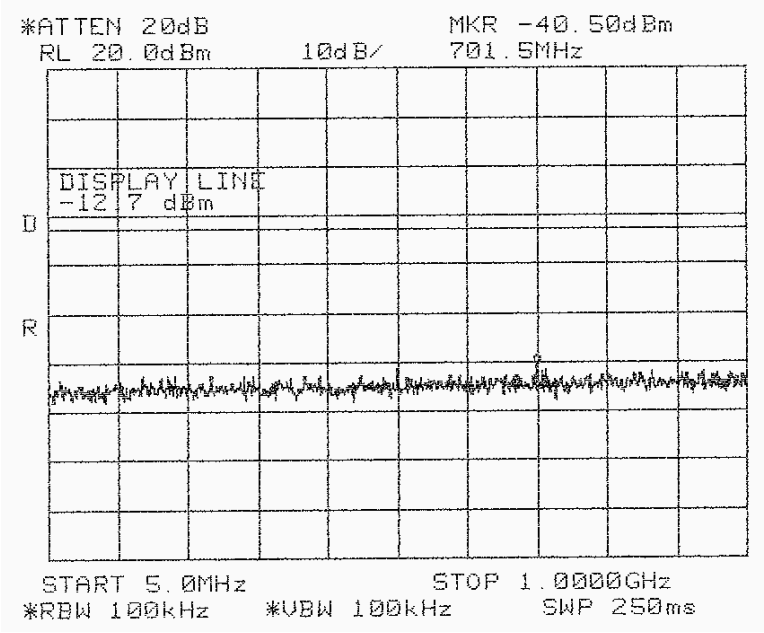

Figure 21 —2412 MHz

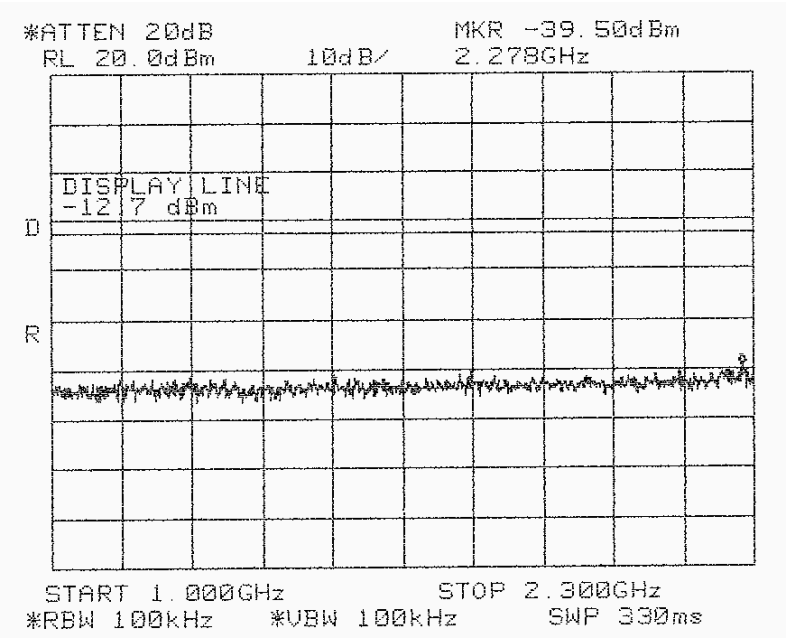

Figure 22 —2412 MHz

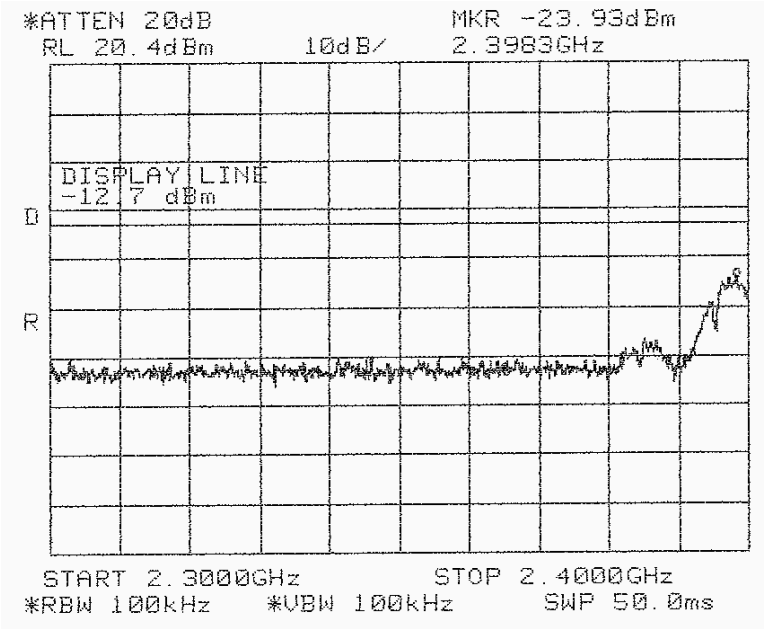

Figure 23 —2412 MHz

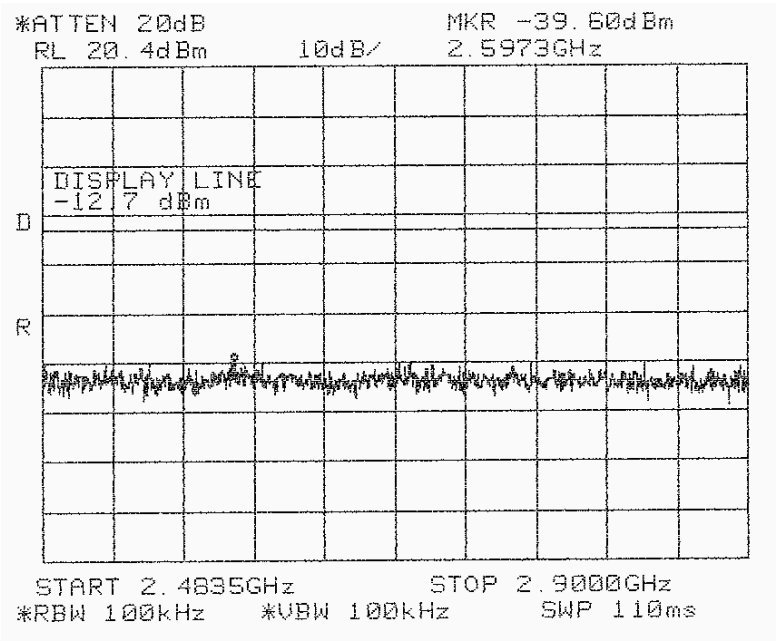

Figure 24 —2412 MHz

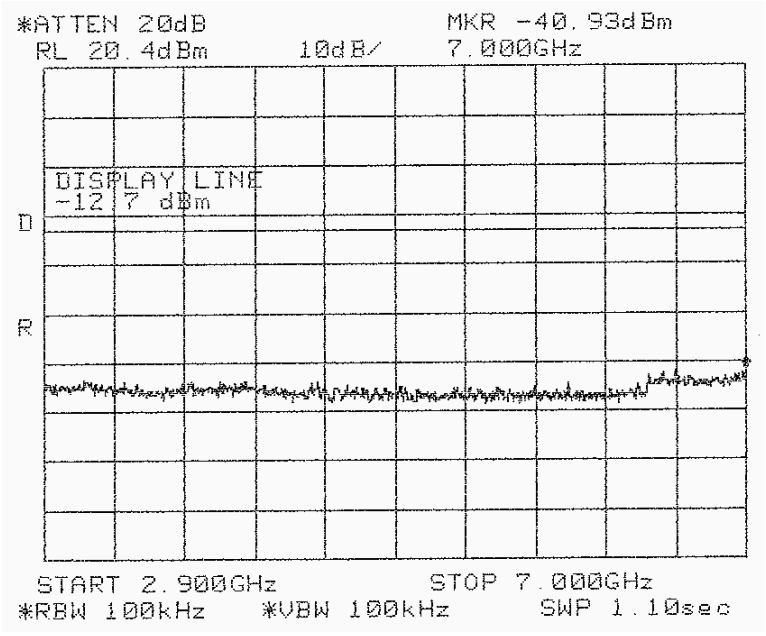

Figure 25 —2412 MHz

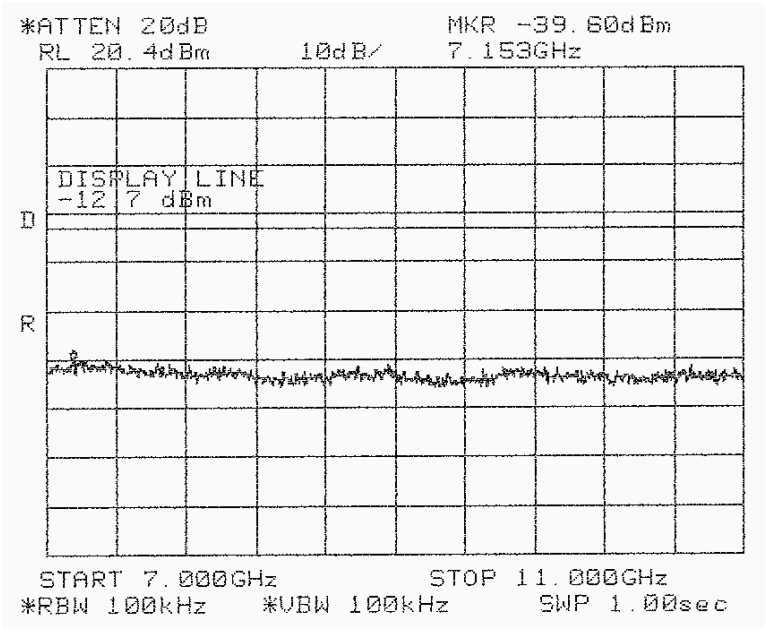

Figure 26 —2412 MHz

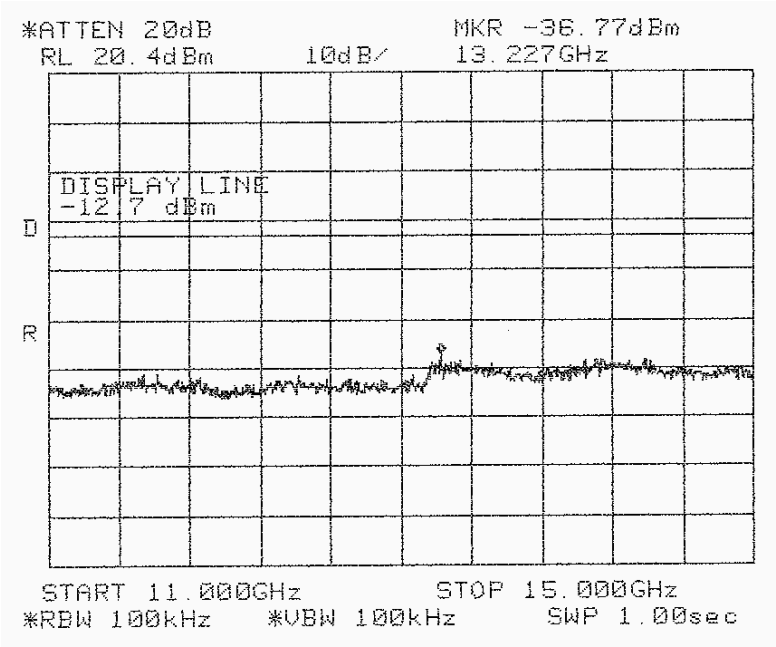

Figure 27 —2412 MHz

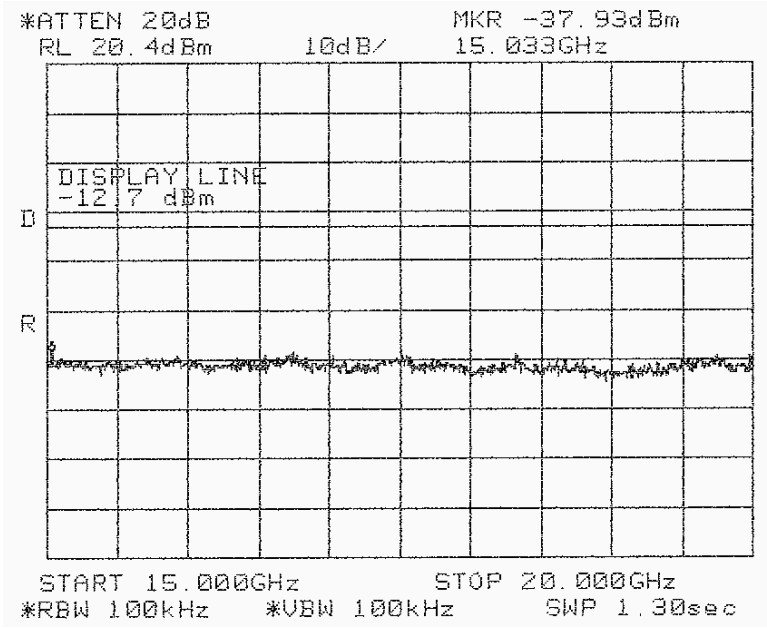

Figure 28 —2412 MHz

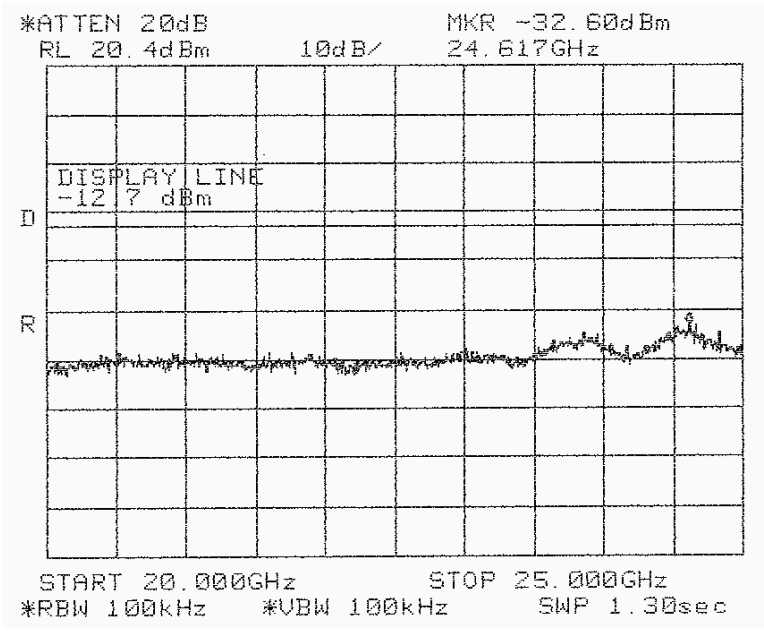

Figure 29 —2412 MHz

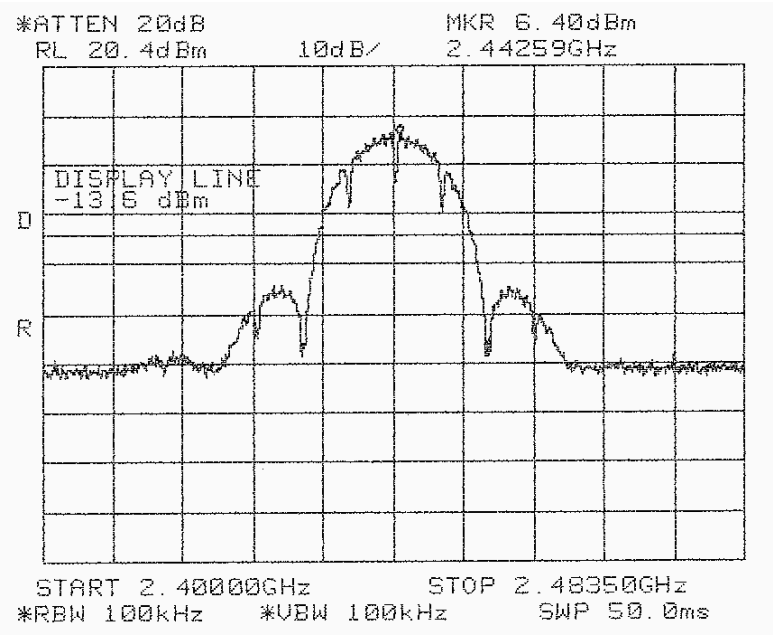

Figure 30 —2442 MHz

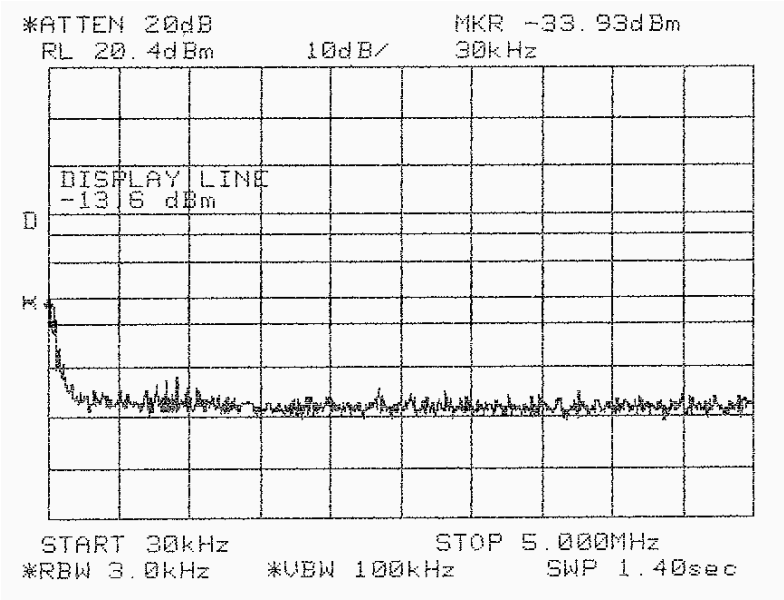

Figure 31 —2442 MHz

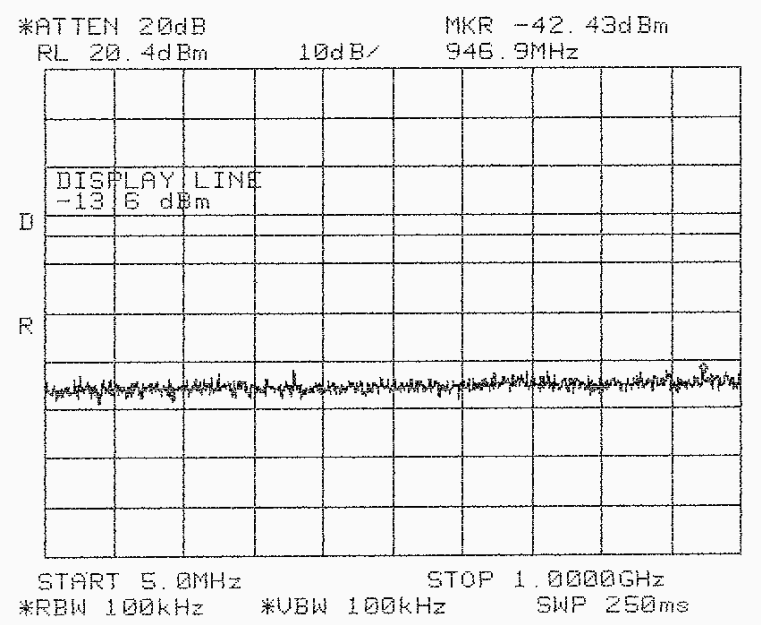

Figure 32 —2442 MHz

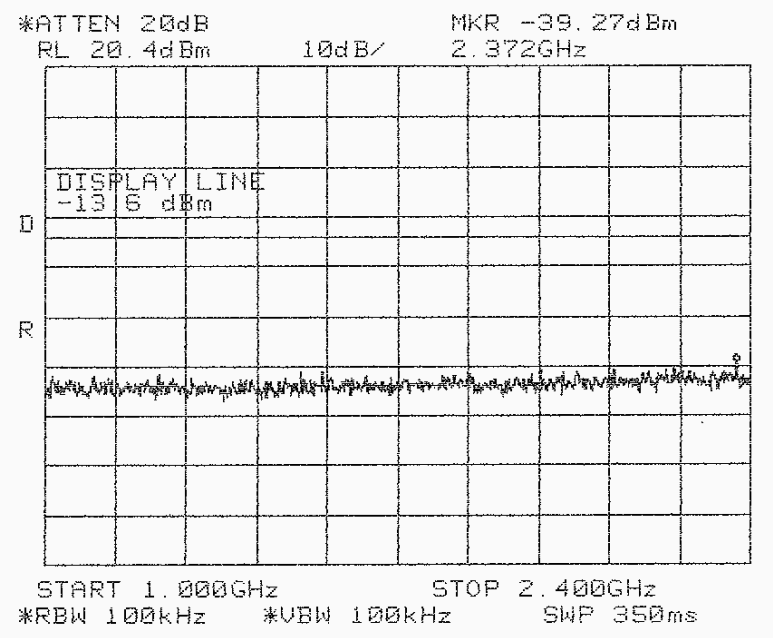

Figure 33 —2442 MHz

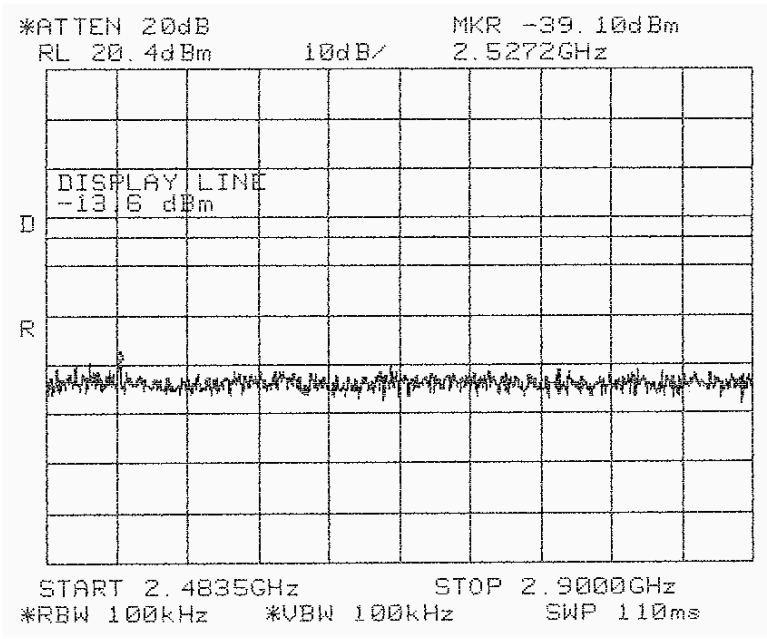

Figure 34 —2442 MHz

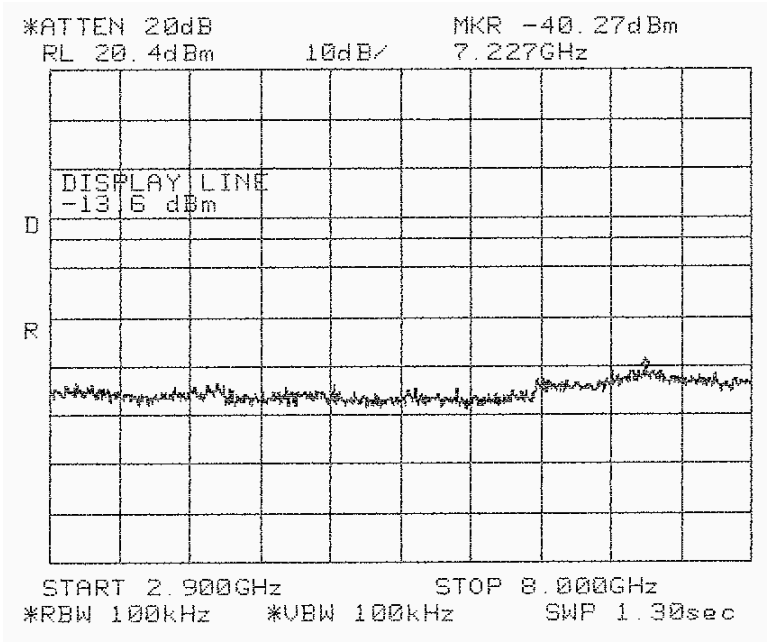

Figure 35 —2442 MHz

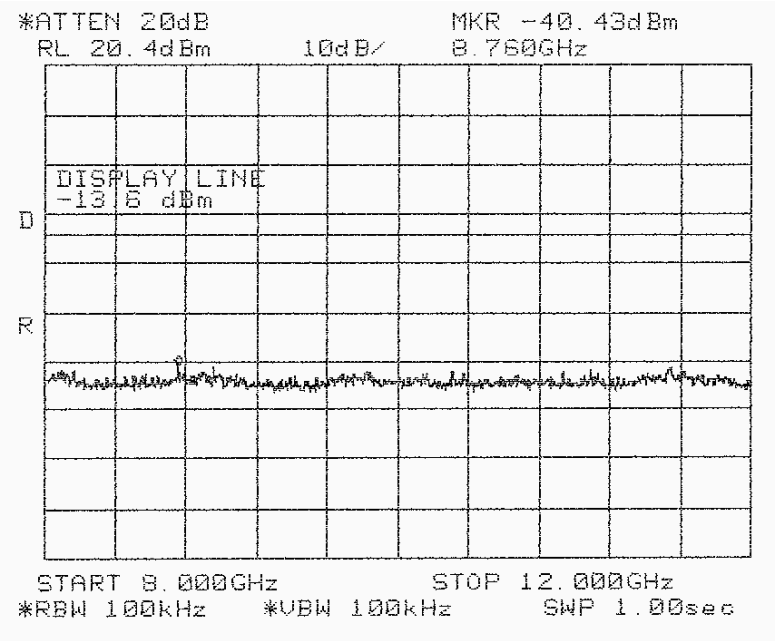

Figure 36 —2442 MHz

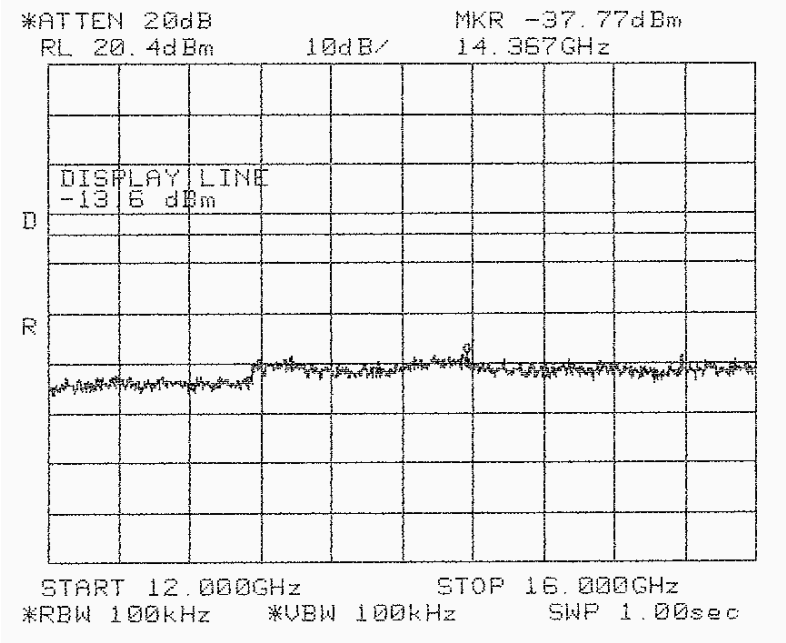

Figure 37 —2442 MHz

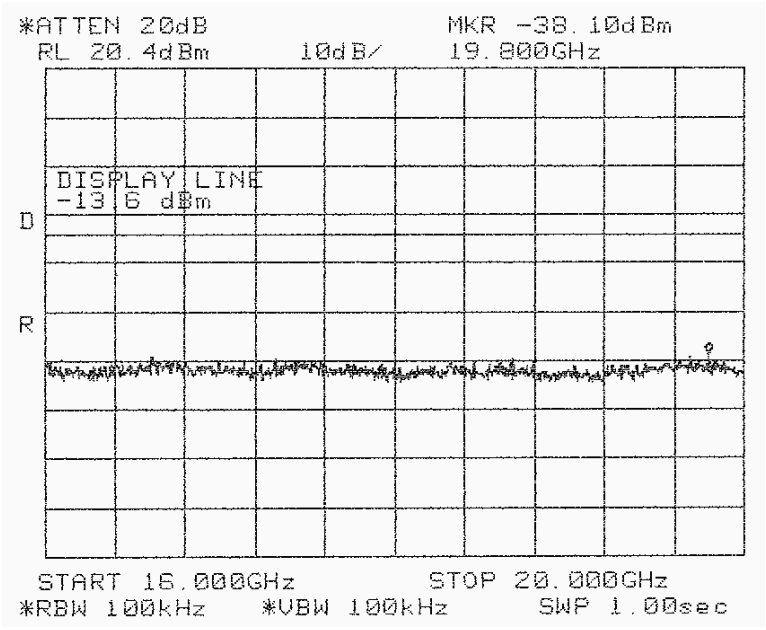

Figure 38 —2442 MHz

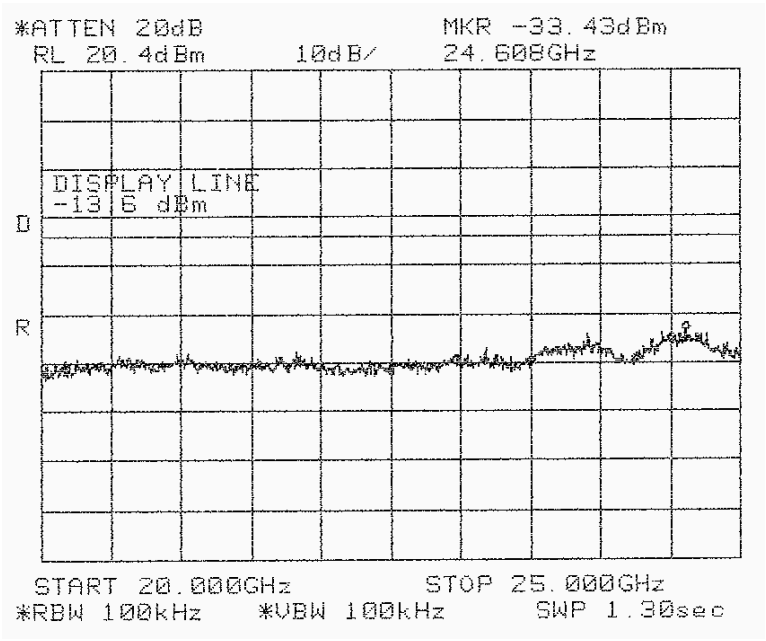

Figure 39 —2442 MHz

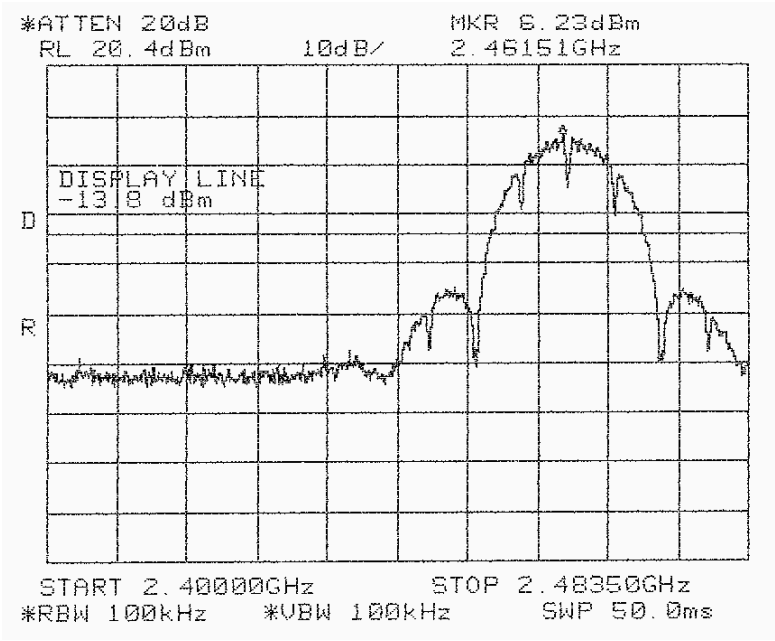

Figure 40 —2462 MHz

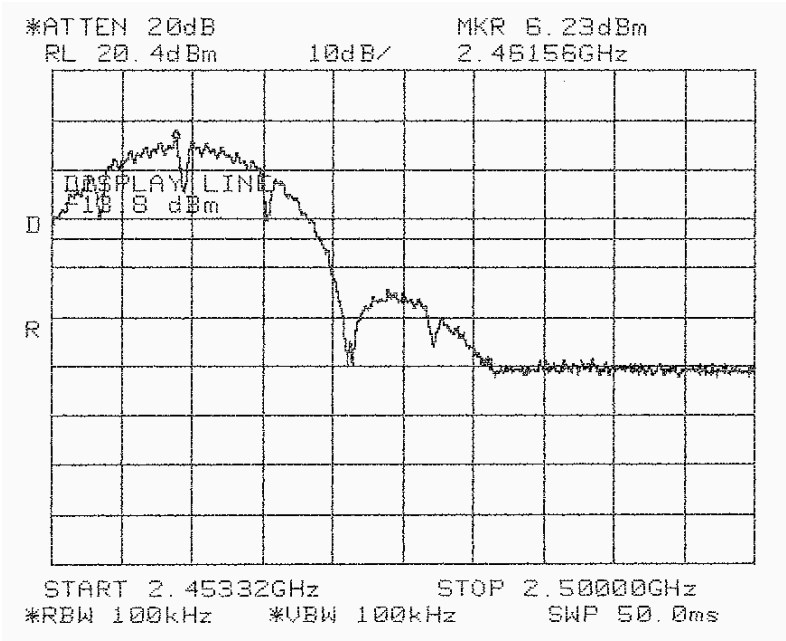

Figure 41 —2462 MHz

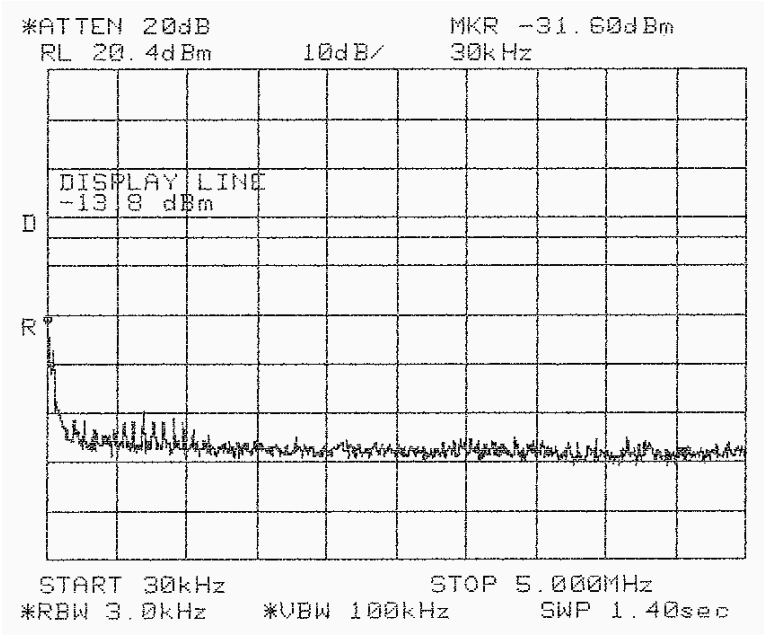

Figure 42 —2462 MHz

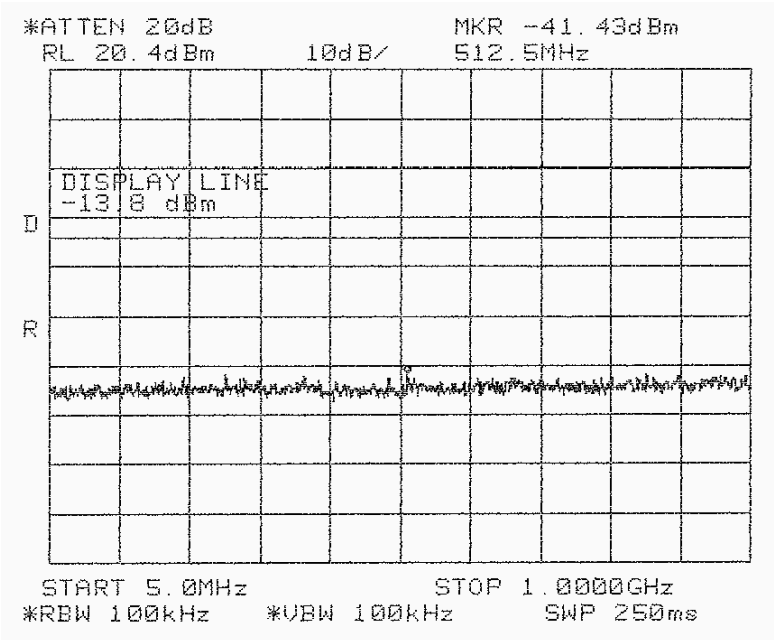

Figure 43 —2462 MHz

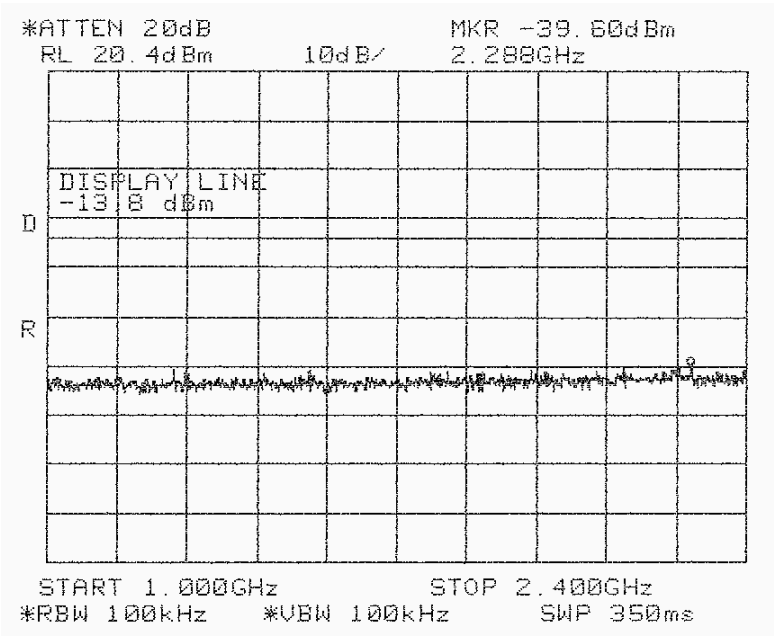

Figure 44 —2462 MHz

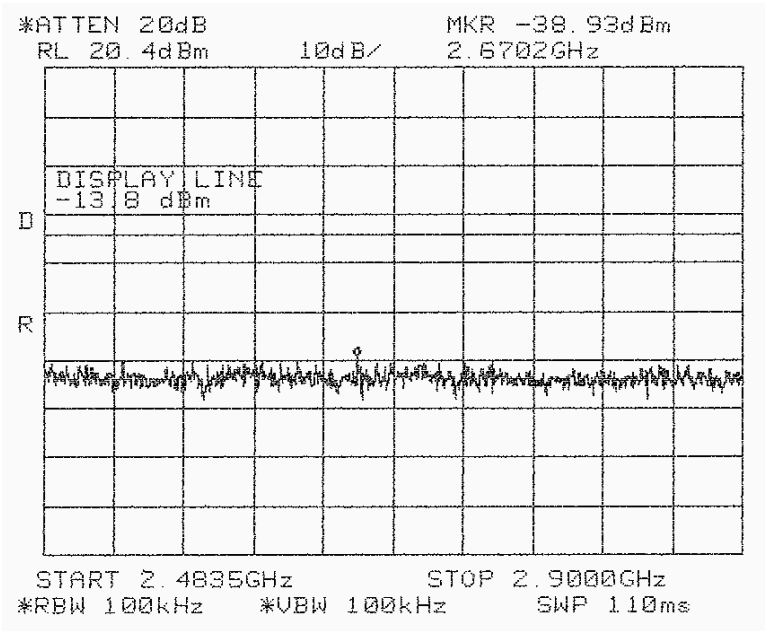

Figure 45 —2462 MHz

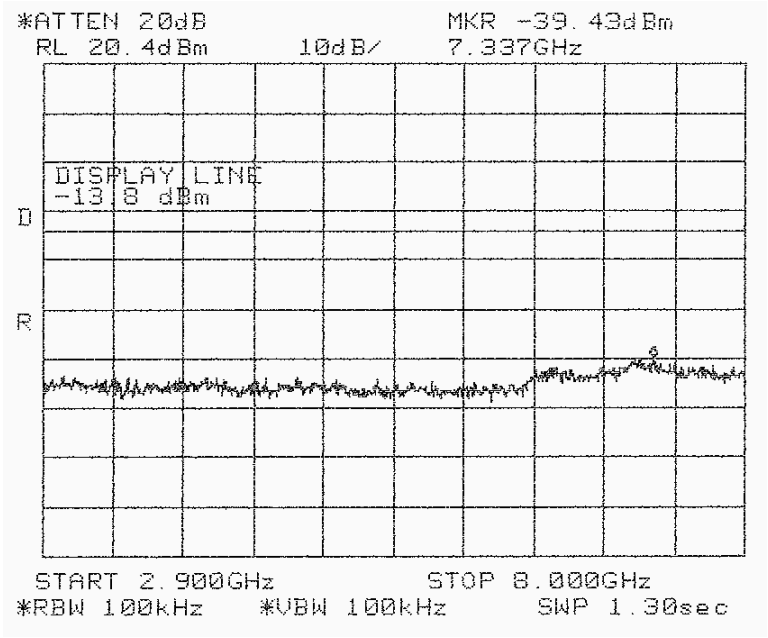

Figure 46 —2462 MHz

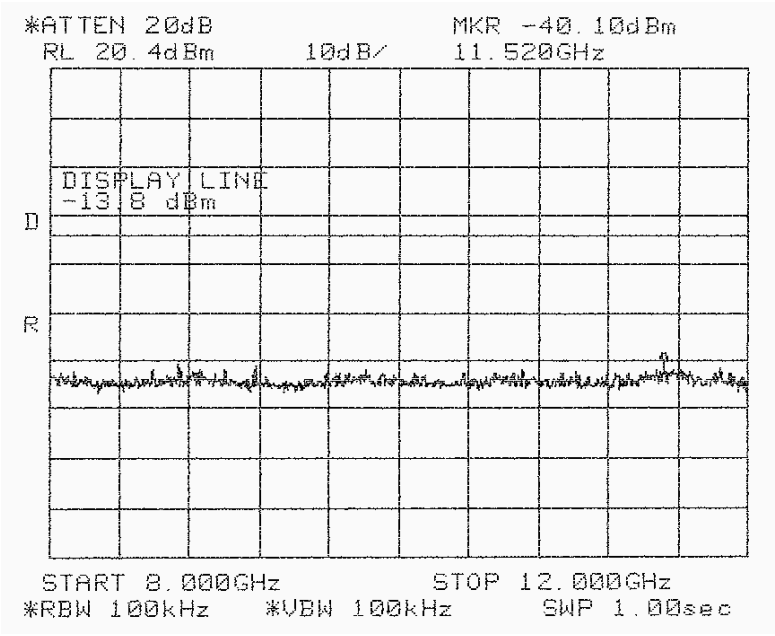

Figure 47 —2462 MHz

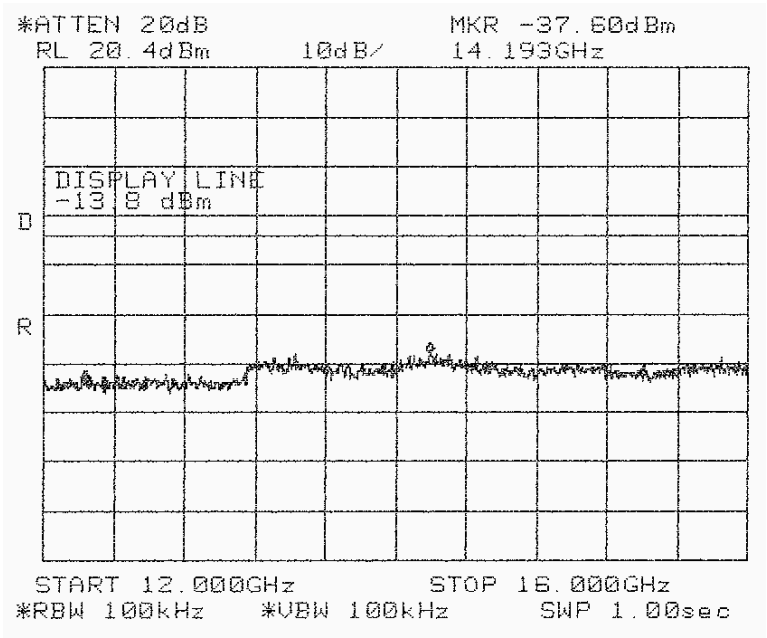

Figure 48 —2462 MHz

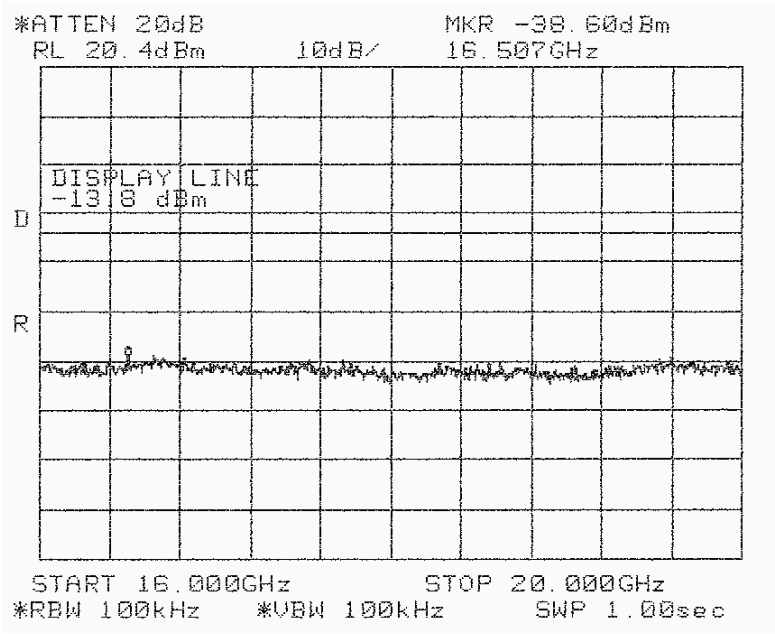

Figure 49 —2462 MHz

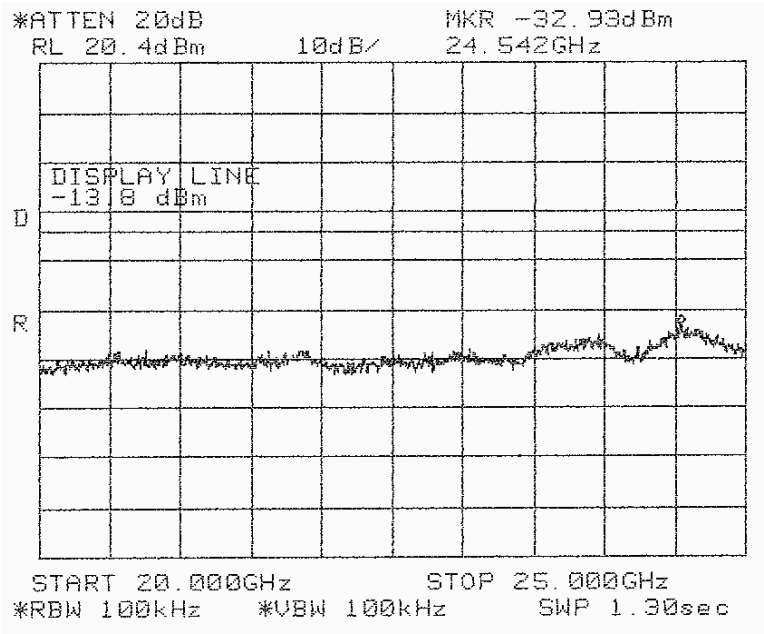

Figure 50 —2462 MHz

9.2 Results table

E.U.T Description: AeroScout T3i Tag
Model No.: TAG-3100
Serial Number: 5D4304
Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Reading (dBc)	Specification (dBc)	Margin (dB)
2412	31.2	20.0	11.2
2442	39.8	20.0	19.8
2462	37.8	20.0	17.8

Figure 51 Peak Power Output of 2400-2483.5 MHz Band

JUDGEMENT: Passed by 11.2 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 26.03.07

Typed/Printed Name: E. Pitt

9.3 Test Equipment Used.

Peak Power Output of 2400-2438.5 MHz Band

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8564E	3442A00275	November 21, 2006	1 year
Cable	Rhophase	KPS-1501-1000	A1675	December 16, 2006	1 year
Attenuator	Macom	M3933/25-74	050	November 26, 2006	1 year
Attenuator	Macom	M3933/25-74	211	November 26, 2006	1 year
Attenuator	Macom	M3933/25-74	056	November 26, 2006	1 year

Figure 52 Test Equipment Used

10 6 dB Minimum Bandwidth

10.1 Test procedure

The E.U.T. was set to the applicable test frequency. The E.U.T. antenna terminal was connected to the spectrum analyzer through a 20dB external attenuator (2 X 10 dB = 20 dB) 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.

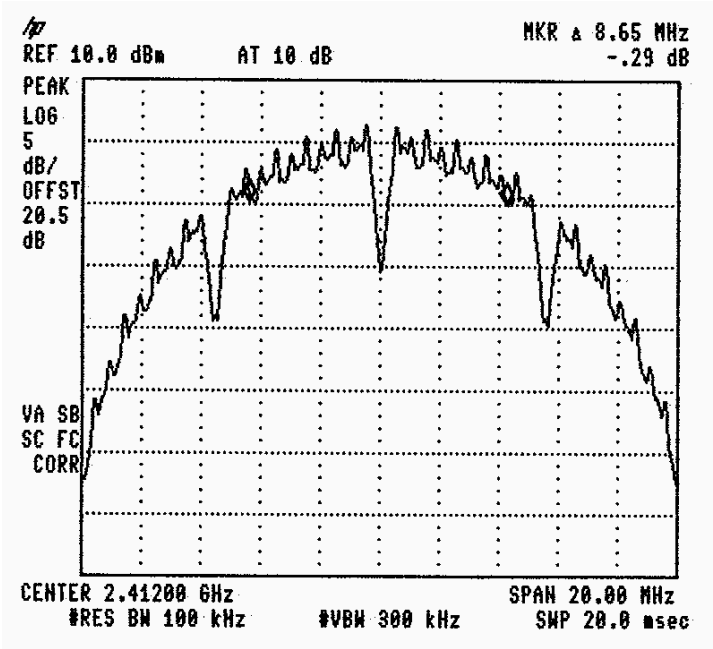

Figure 53 —2412 MHz

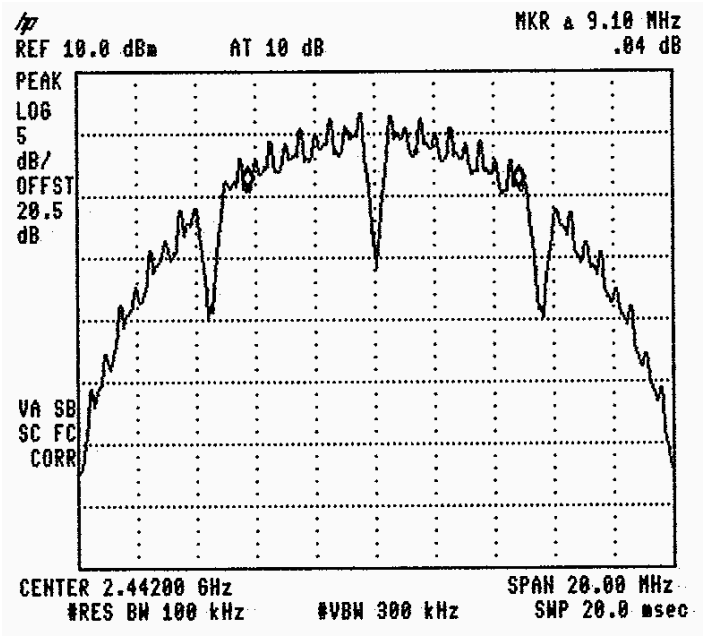

Figure 54 —2442 MHZ

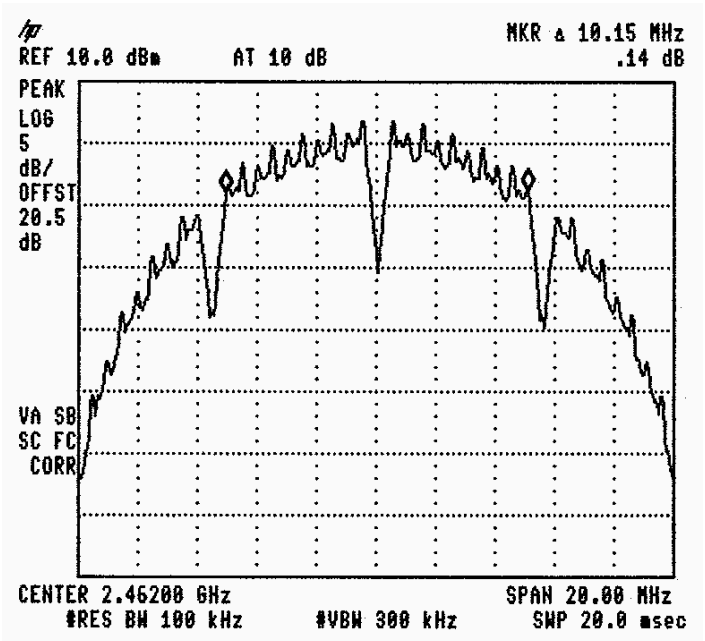

Figure 55 —2462 MHz

10.2 Results table

E.U.T Description: AeroScout T3i Tag
Model No.: TAG-3100
Serial Number: 5D4304
Specification: F.C.C. Part 15, Subpart C: (15.247-a2)

Operation Frequency (MHz)	Reading (MHz)	Specification (MHz)
2412	8.65	0.5
2442	9.10	0.5
2462	10.15	0.5

Figure 56 6 dB Minimum Bandwidth

JUDGEMENT: Passed

TEST PERSONNEL:
Tester Signature: _____ Date: 26.03.07
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	Narda	771-10	N/A	November 26, 2006	1 year
Attenuator	Narda	771-10	N/A	November 26, 2006	1 year

Figure 57 Test Equipment Used

11 Band Edge Spectrum

[In Accordance with section 15.247(c)]

11.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through a 24 dB external attenuator (3 X 8 dB = 24 dB) and an appropriate coaxial cable (Cable Loss = 05 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.

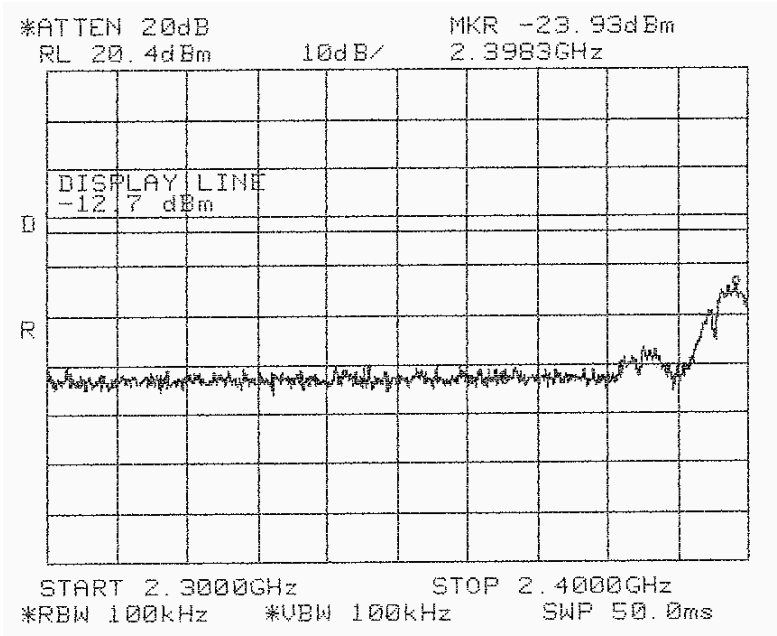

Figure 58 —2412 MHz

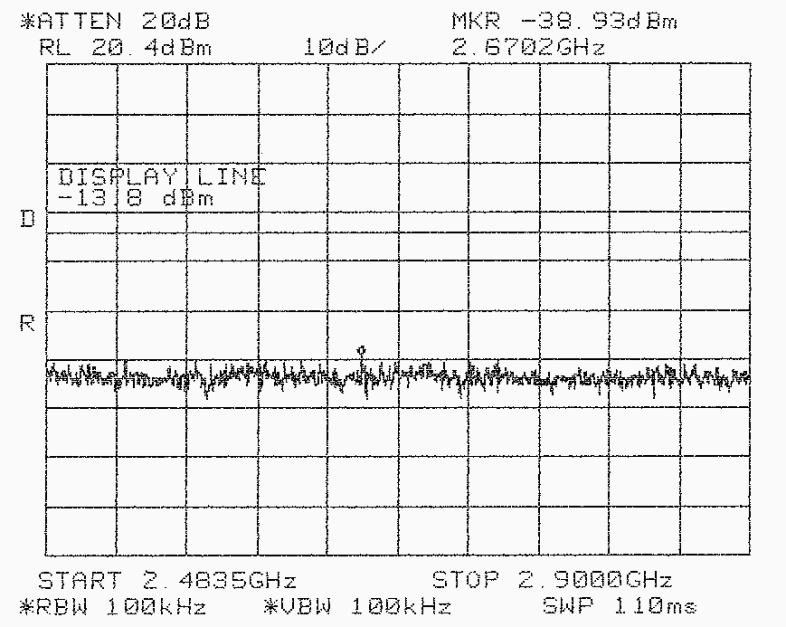

Figure 59 —2462 MHz

11.2 Results table

E.U.T. Description: AeroScout T3i Tag
Model No.: TAG-3100
Serial Number: 5D4304
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	23983.0	31.2	20.0	11.2
2462	24835.0	45.1	20.0	25.1

Figure 60 Band Edge Spectrum

JUDGEMENT: Passed by 11.2 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 26.03.07

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	Macom	M3933/25-74	050	November 26, 2006	1 year
Attenuator	Macom	M3933/25-74	211	November 26, 2006	1 year
Attenuator	Macom	M3933/25-74	056	November 26, 2006	1 year

Figure 61 Test Equipment Used

12 Transmitted Power Density

[In accordance with section 15.247(d)]

12.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through a 20 (2 X 10dB = 20 dB) 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.

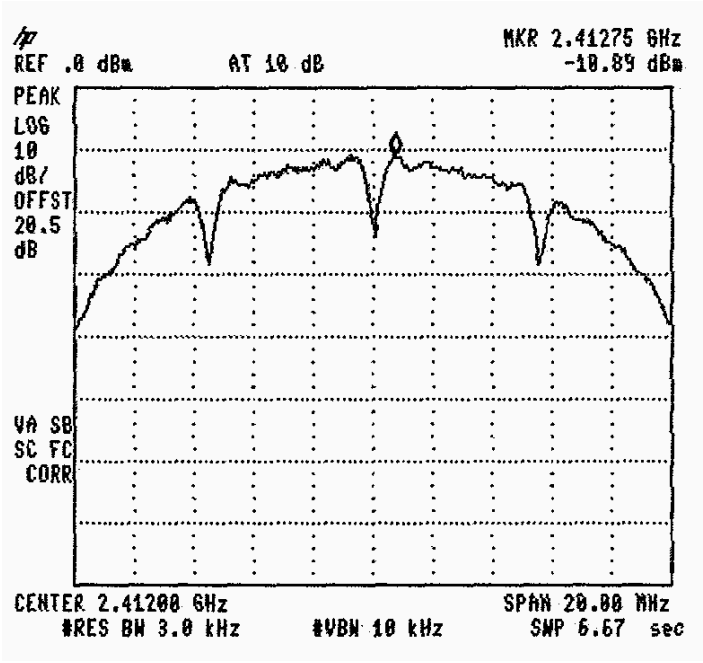

Figure 62 —2412 MHz

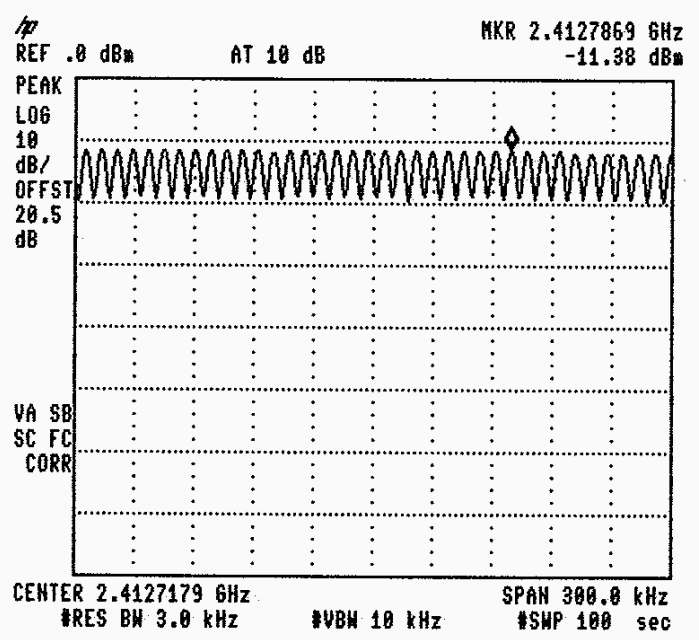

Figure 63 —2412 MHz

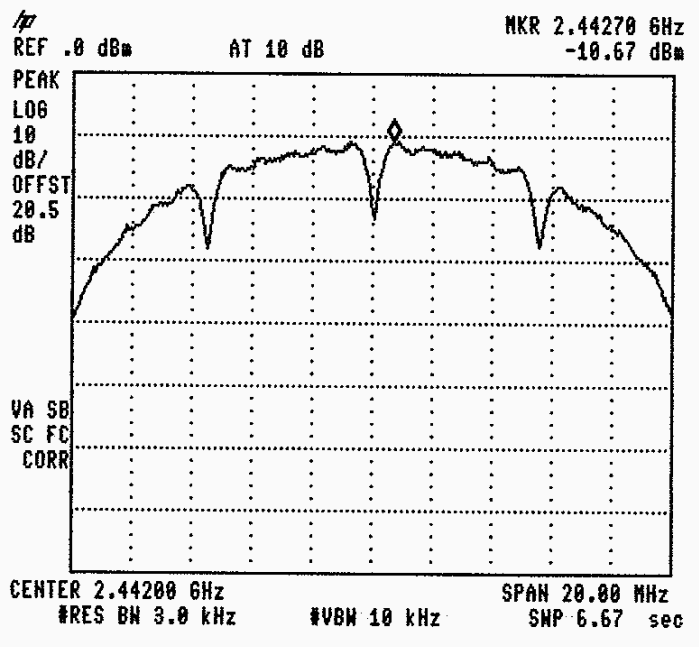

Figure 64 —2442 MHz

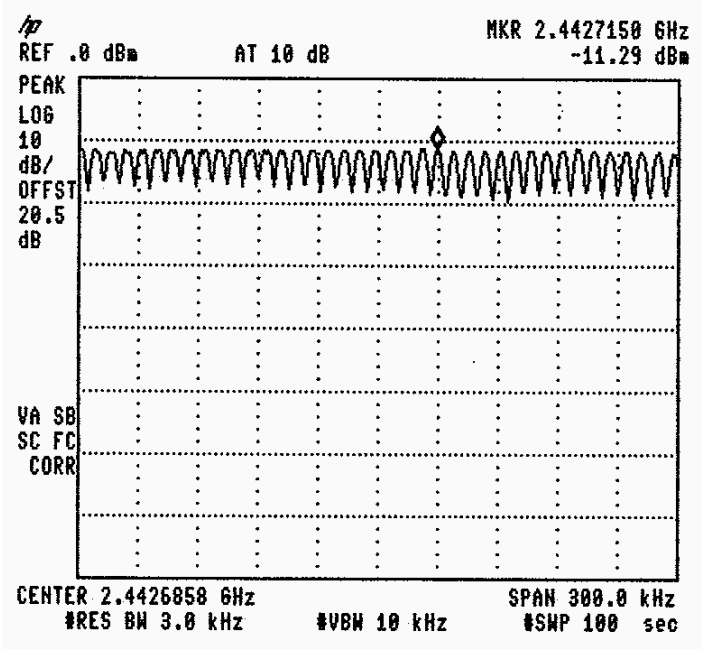

Figure 65 —2442 MHz

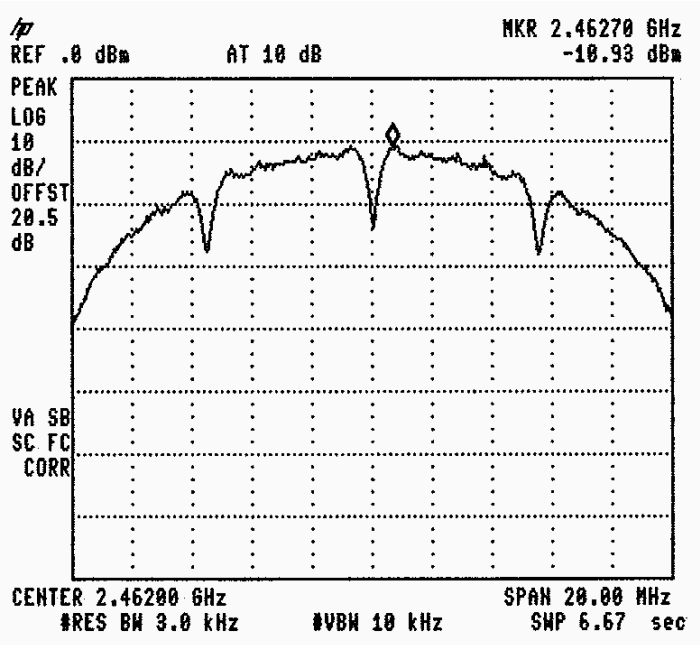

Figure 66 —2462 MHz

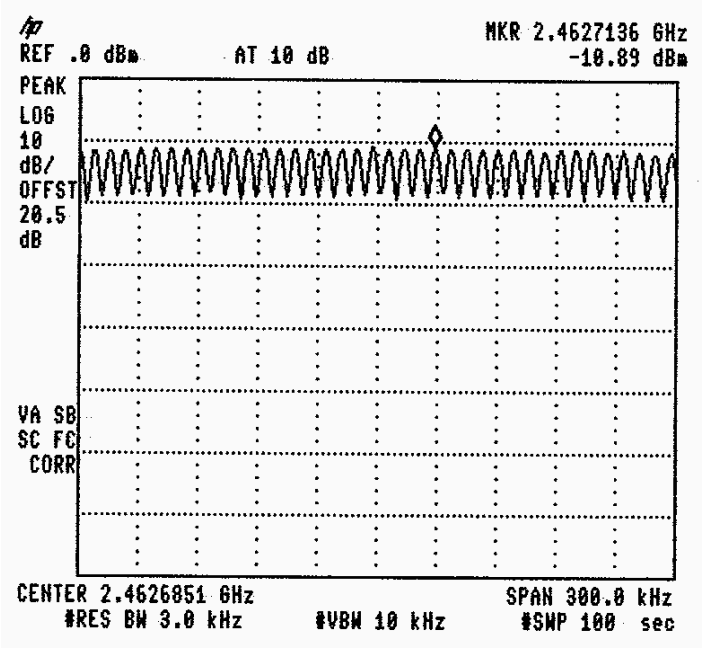

Figure 67 —2462 MHz

12.2 Results table

E.U.T. Description: AeroScout T3i Tag
Model No.: TAG-3100
Serial Number: 5D4304
Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Reading Signal Analyzer (dBm)	Specification (dBm)	Margin (dB)
2412	-10.89	8.0	-18.89
2442	-10.67	8.0	-18.67
2462	-10.93	8.0	-18.93

Figure 68 Test Results

JUDGEMENT: Passed by 18.93 dB

TEST PERSONNEL:

Tester Signature: _____ Date:

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	Narda	771-10	N/A	November 26, 2006	1 year
Attenuator	Narda	771-10	N/A	November 26, 2006	1 year

Figure 69 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 on the user's belt. 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 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 148mw (Peak) = 21.7 dBm

G_T- Antenna Gain, -0.5 dBi

R- Distance from Transmitter using 1cm worst case

(c) The peak power density is :

$$S_p = \frac{148}{4\pi(1)^2} = 11.8\frac{mW}{cm^2}$$

(d) The duty cycle of transmission in actual worst case is 500 microsecond "on" and 1 second "Off".

The average power over 30 minutes is:

$$P_{AV} = \frac{148 \times 0.5}{1000} = 0.074mW$$

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

$$S_{AV} = \frac{0.074}{4\pi(1)^2} = 5.9\times10^{-3}\frac{mW}{cm^2}$$

(f) This is 3 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 4. Radiated Emission Test* and *Figure 5. 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 13.1 dB

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

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

The details of the highest emissions are given in *Figure 70* to *Figure 73*.

Radiated Emission

E.U.T Description	AeroScout T3i Tag
Type	TAG-3100
Serial Number:	5D4304

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)	Avg dBuV/m	Av Delta L 2 (dB)	Corr (dB)
1	131.999000	32.2	28.0	-15.5			14.5
2	175.999000	33.3	27.2	-16.3			16.6
3	307.998500	31.8	28.0	-18.0			15.9
4	395.998500	36.5	32.9	-13.1			18.9
5	439.998500	32.5	29.7	-16.3			19.6
6	791.996750	33.7	28.2	-17.8			25.7

Figure 70. 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 T3i Tag
Type	TAG-3100
Serial Number:	5D4304

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
Antenna: 3 meters distance

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

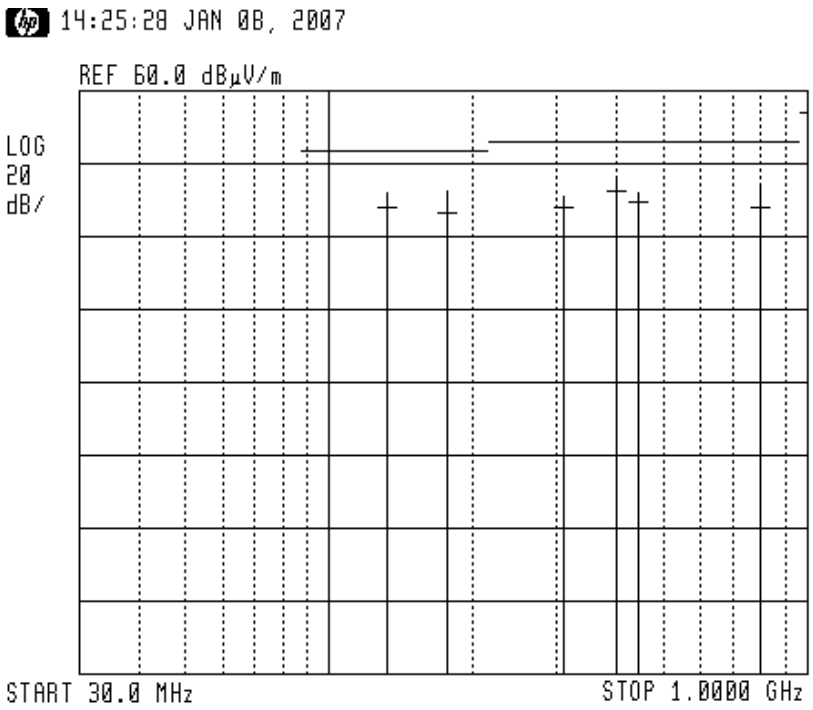

Figure 71. Radiated Emission. Antenna Polarization: HORIZONTAL Detectors: Peak, Quasi-peak

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 T3i Tag
Type TAG-3100
Serial Number: 5D4304

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)	Avg dBuV/m	Av Delta L 2 (dB)	Corr (dB)
1	62.002550	26.2	20.4	-19.6			10.2
2	131.999425	30.5	25.1	-18.4			13.7
3	175.999300	31.3	25.5	-18.0			15.4
4	263.998700	36.9	31.6	-14.4			21.1
5	439.998700	33.8	28.9	-17.1			19.6
6	527.998700	38.0	30.5	-15.4			21.4
7	615.998700	32.6	28.3	-17.7			24.0

Figure 72. 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.

Radiated Emission

E.U.T Description	AeroScout T3i Tag
Type	TAG-3100
Serial Number:	5D4304

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
Antenna: 3 meters distance

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

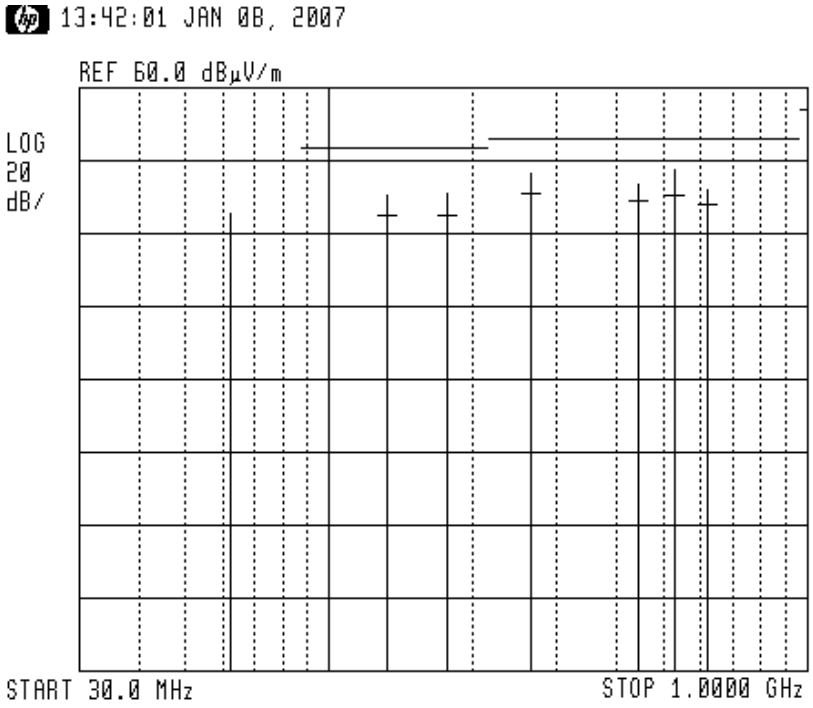

Figure 73. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

Note:

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

15.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial No.	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 22, 2006	1Year
RF Filter Section	HP	85420E	3705A00248	November 22, 2006	1Year
Antenna Bioconical	ARA	BCD 235/B	1041	March 19, 2006	1Year
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 30, 2006	1 Year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 24, 2005	2 Years
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
Spectrum Analyzer	HP	8592L	3926A01204	November 21, 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	JPKGC19982	N/A	N/A

16. Photographs of Tested E.U.T.

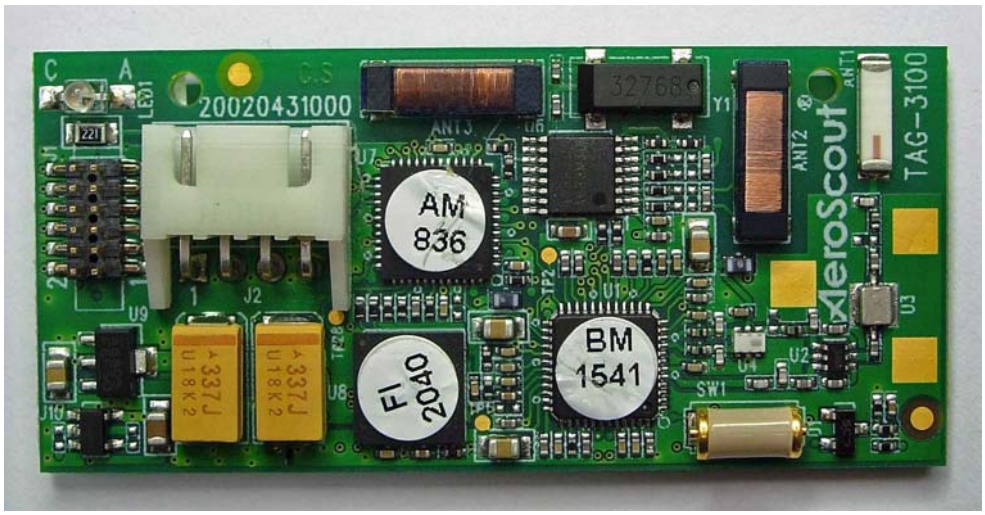

Figure 74 PCB Component Side

Figure 75 PCB Print Side