DATE: 10 October 2010

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

FCC Radio Test Report

for

AeroScout Ltd.

Equipment under test:

T2s Tag

TAG-2300-CUT*

* See customer's declaration on page 6 for additional models covered by this report.

Written by: _____
D. Shidlowsky, Documentation

Approved by: _____
E. Ever, Test Engineer

Approved by: _____
I. Raz, EMC Laboratory Manager

Measurement/Technical Report for

AeroScout Ltd.

T2s Tag

TAG-2300-CUT

FCC ID: Q3HTAG2300

IC: 5115A-TAG2300

This report concerns: Original Grant: x
Class I change:
Class II change:

Equipment type: Part 15 Digital Transmission System

47CFR15 Section 15.247

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")
Reuven Amsalem
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Rechovot 76702
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Tel: +972-8-936-3136
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TABLE OF CONTENTS

1. General Information

1.1 Administrative Information

Manufacturer:	AeroScout Ltd.
Manufacturer's Address:	3 Pekris St. Park Tamar Rehovot Israel, 76702 Tel: +972-8-936-9300 Fax: +972-8-936-5977
Manufacturer's Representative:	Dadi Matza
Equipment Under Test (E.U.T):	T2s Tag
Equipment Model No.:	TAG-2300-CUT (See customer's declaration on following page).
Equipment Serial No.:	Not designated
Date of Receipt of E.U.T:	30/06/2010
Start of Test:	30/06/2010
End of Test:	04/07/2010
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	FCC Part 15 Subpart C RSS-210 Issue 7, 2007

Israel Testing Laboratories

AeroScout®

Date: 16 September 2010

Declaration

I hereby declare that the name and model of the E.U.T. tested at the I.T.L. EMC/Radio laboratories between 27 June and 04 July 2010 is as follows:

E.U.T. Name: **T2s Tag**
Model Name: **TAG-2300-CUT**

Please use the above names and serial number in the test certificates and reports.

I hereby declare that TAG-2300-CUT is a full configuration model.
Other models which include:
TAG-2300; TAG-2300-C; TAG-2300-U; TAG-2300-CU; TAG-2300-T; TAG-2300-CT; TAG-2300-UT; TAG-5300; TAG-5300-C; TAG-5300-U; TAG-5300-CU; TAG-5300-T; TAG-5300-CT; TAG-5300-UT; TAG-5300-CUT

Differ from the TAG-2300-CUT only by software and/or extracted components/assemblies.

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

Thank you,
Signature:

Dadi Matza
Projects and Hardware Manager
AeroScout Ltd.

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™ T2 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 T2 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

Radiated testing was 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 September 3, 2009).
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. System Test Configuration

2.1 Justification

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

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.

2.2 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.

2.3 Special Accessories

No special accessories were needed to achieve compliance.

2.4 Equipment Modifications

No modifications were necessary in order o achieve compliance.

2.5 Configuration of Tested System

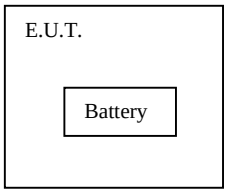


Figure 1. Configuration of Tested System

3. Test Set-up Photos

Figure 2. Radiated Emission Test

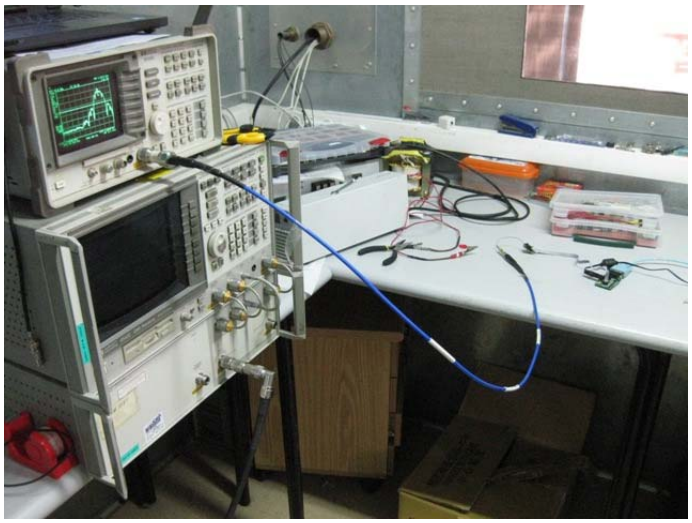


Figure 3. Conducted Emission from Antenna Port Tests

4. Duty Cycle

4.1 Test procedure

The E.U.T. was connected to a mixed signal oscilloscope.
Transmission “On” time and Transmission “On” and “OFF” time were measured.
Duty cycle was calculated.

Note: Transmission “On” ,and Transmission “On” and “OFF” time, and Duty Cycle calculation was performed by AeroScout.

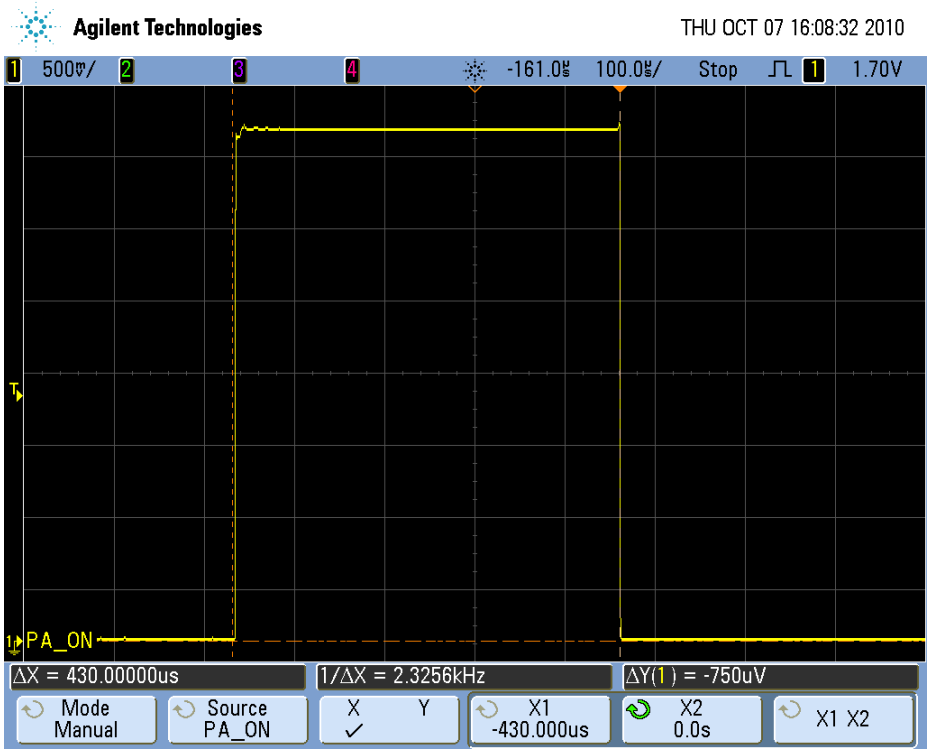


Figure 4. Transmission “On”

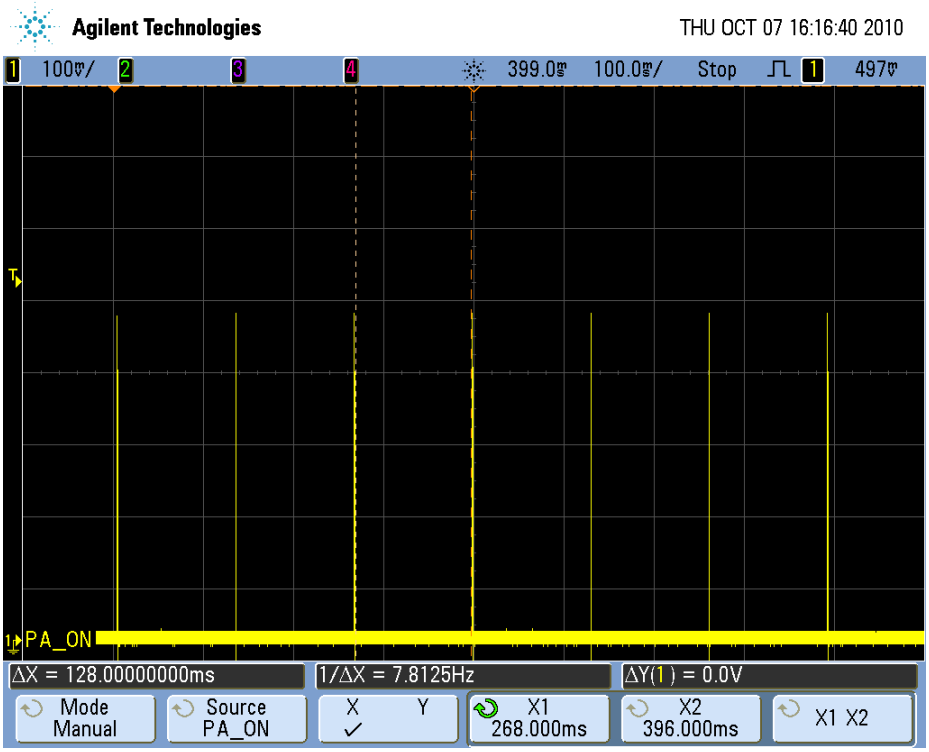


Figure 5. Transmission “On” and “OFF”

4.2 Duty Cycle Calculation

Duty cycle calculation 500e-6/128e-3 = 0.0039=0.39%

Worst case Transmit timing

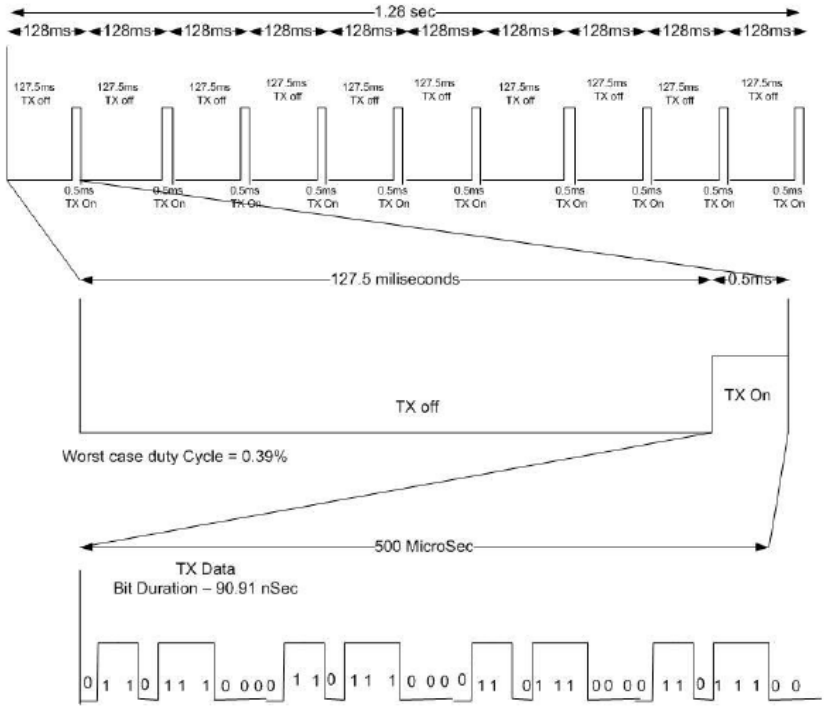


Figure 6. Duty Cycle Calculation

4.3 Test Equipment Used.

Duty Cycle

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Mixed Signal Oscilloscope	Agilent	MSO6054A	MY44000187	March 15, 2010	1 year

Figure 7 Test Equipment Used

5. 6 dB Minimum Bandwidth

5.1 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 external attenuator (20 dB) and an appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 100 kHz resolution BW and 300 kHz video BW. The spectrum bandwidth of the E.U.T. at the point of 6 dB below maximum peak power was measured and recorded.

The E.U.T. was tested at 2412, 2437, and 2462 MHz with the BPSK modulation.

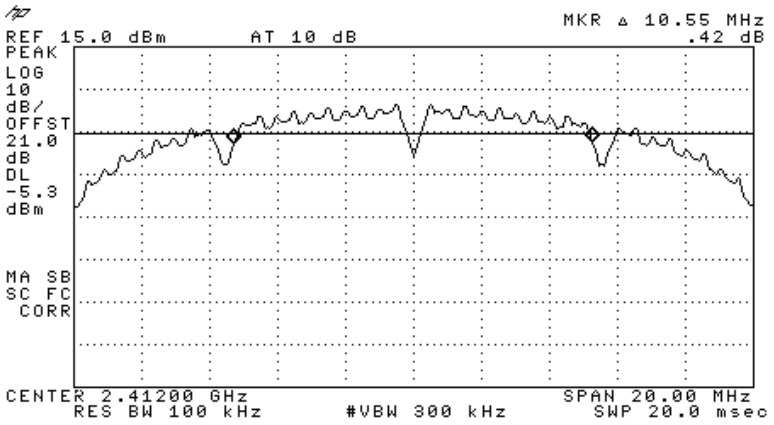


Figure 8 —2412 MHz BPSK

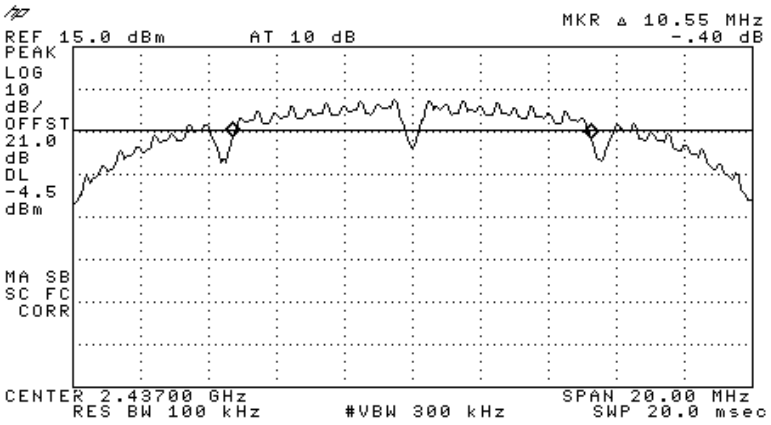


Figure 9 —2437 MHz BPSK

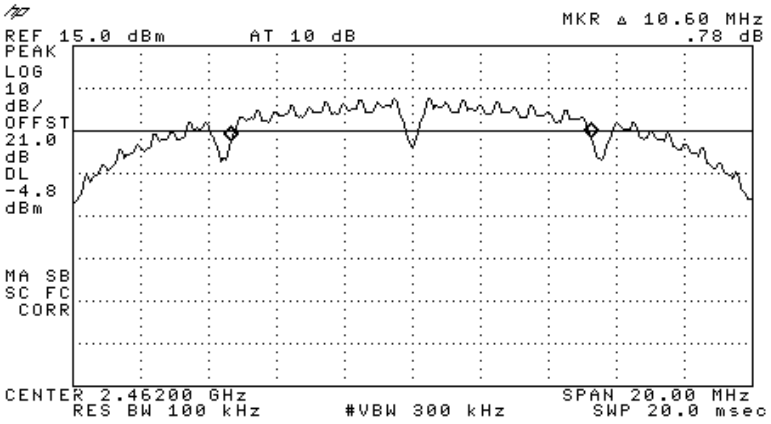


Figure 10 —2462 MHz BPSK

5.2 Results

E.U.T Description: T2s Tag
Model No.: TAG-2300-CUT
Serial Number: Not designated
Specification: F.C.C. Part 15, Subpart C: (15.247-a2)

Operation Frequency (MHz)	Modulation	Reading (MHz)	Specification (MHz)
2412	BPSK	10.55	0.5
2437	BPSK	10.55	0.5
2462	BPSK	10.60	0.5

Figure 11 6 dB Minimum Bandwidth

JUDGEMENT: Passed

TEST PERSONNEL:
Tester Signature: _____ Date: 19/09/2010
Typed/Printed Name: E. Ever

5.3 Test Equipment Used.

6 dB Minimum Bandwidth

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	March 14, 2010	1 year
Attenuator	Narda	771-10	63	March 14, 2010	2 year
Attenuator	Narda	771-10	56	March 14, 2010	2 year
Cable	Rhophase	KPS-5000-KPS	A1674	January 14, 2010	1 year

Figure 12 Test Equipment Used

6. Maximum Transmitted Peak Power Output

6.1 Test procedure

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (20 dB) and an appropriate coaxial cable (cable loss = 1 dB). The Spectrum Analyzer was set to 1.0 MHz resolution BW and 3 MHz video BW. Peak power level was measured at selected operation frequencies.

The E.U.T. was tested at 2412, 2437, and 2462 MHz with the BPSK modulation.

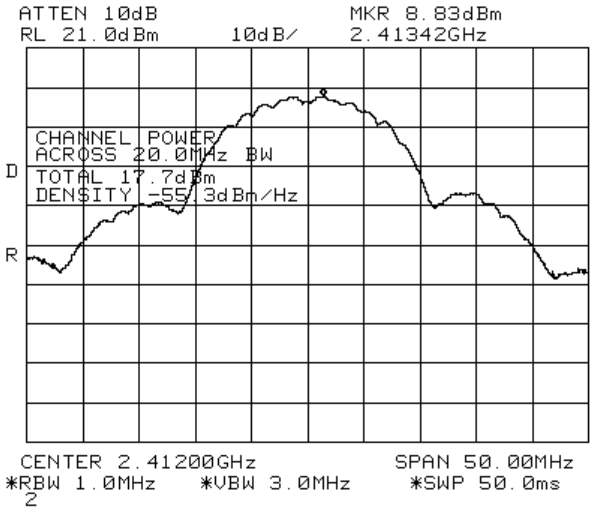


Figure 13 2412 BPSK

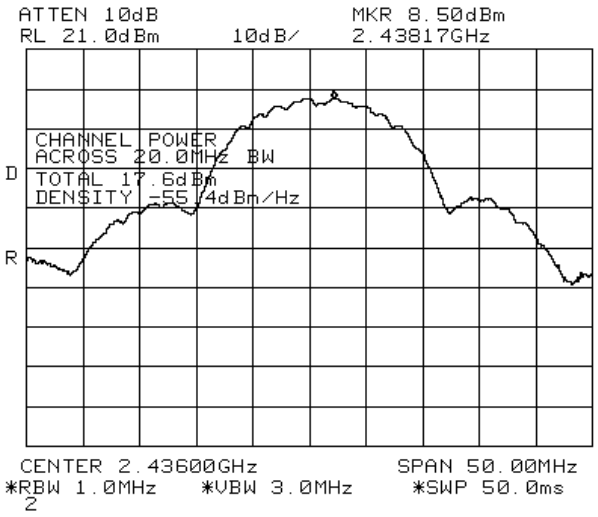


Figure 14 2437 MHz BPSK

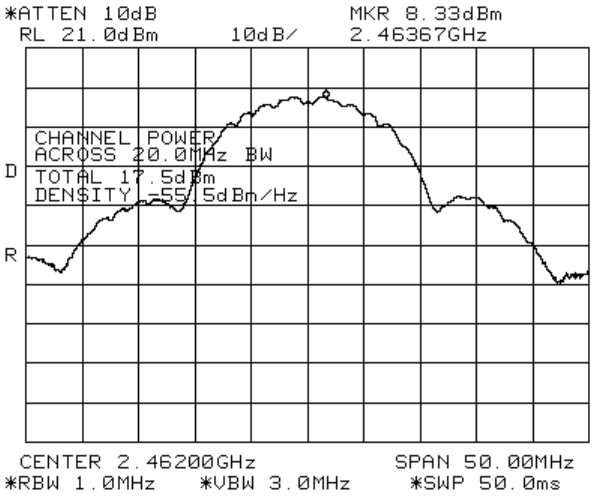


Figure 15 2462 MHz BPSK

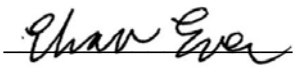
6.2 Results

E.U.T. Description: T2s Tag
Model No.: TAG-2300-CUT
Serial Number: Not designated
Specification: F.C.C. Part 15, Subpart C

Operation Frequency (MHz)	Modulation	Power (dBm)	Specification (dBm)	Margin (dB)
2412	BPSK	17.7	30.0	-12.3
2437	BPSK	17.6	30.0	-12.4
2462	BPSK	17.5	30.0	-12.5

Figure 16 Maximum Peak Power Output

JUDGEMENT: Passed by 12.3 dB

TEST PERSONNEL:
Tester Signature:  Date: 19/09/2010
Typed/Printed Name: E. Ever

6.3 Test Equipment Used.

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8564E	3442A00275	January 11, 2010	1 year
Attenuator	Narda	771-10	63	March 14, 2010	2 year
Attenuator	Narda	771-10	56	March 14, 2010	2 year
Cable	Rhophase	KPS-5000-KPS	A1674	January 14, 2010	1 year

Figure 17 Test Equipment Used

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

7.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and an appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 100 kHz resolution BW except for the frequency range 9 kHz-150 kHz where the RBW was set to 1 kHz and the frequency range 150 kHz-10 MHz where the RBW was set to 10 kHz. The frequency range from 9 kHz to 25 GHz was scanned. Level of spectrum components out of the 2400-2483.5 MHz was measured at the selected operation frequencies.

The E.U.T. was tested at 2412, 2437, and 2462 MHz with the BPSK modulation.

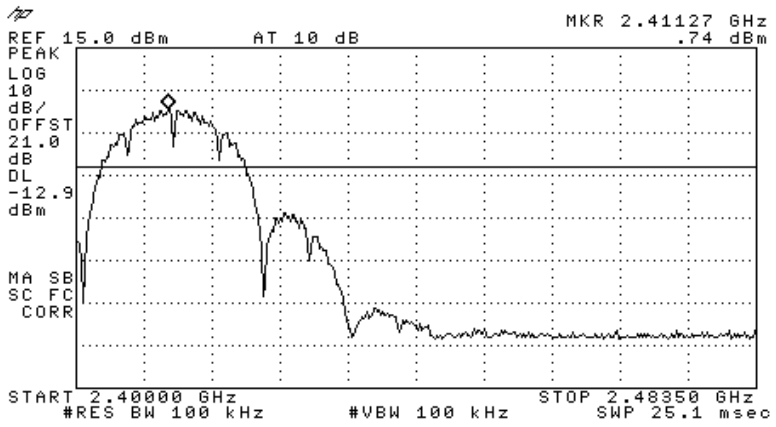


Figure 18 —2412 MHz BPSK

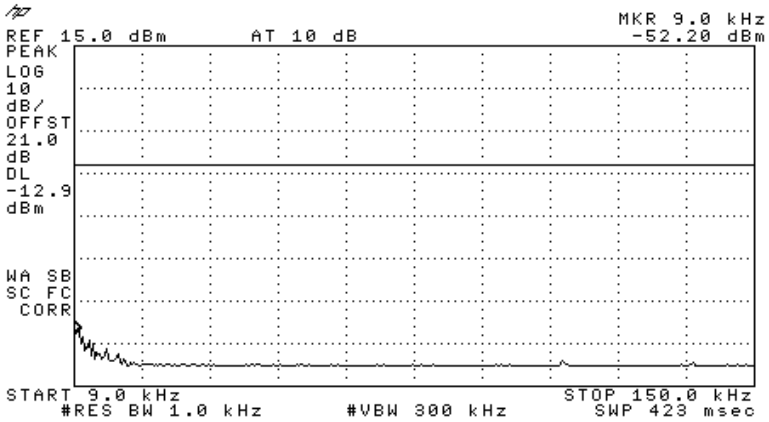


Figure 19 —2412 MHz BPSK

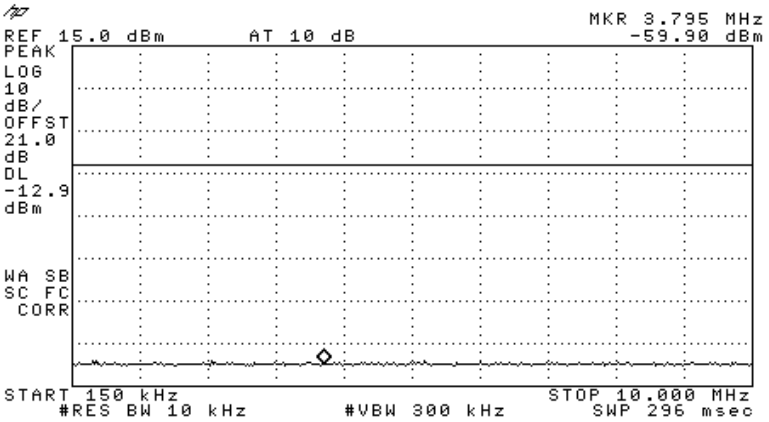


Figure 20 —2412 MHz BPSK

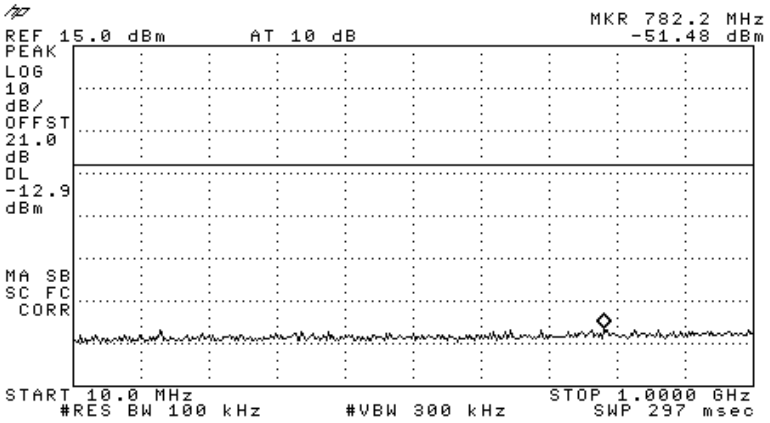


Figure 21 —2412 MHz BPSK

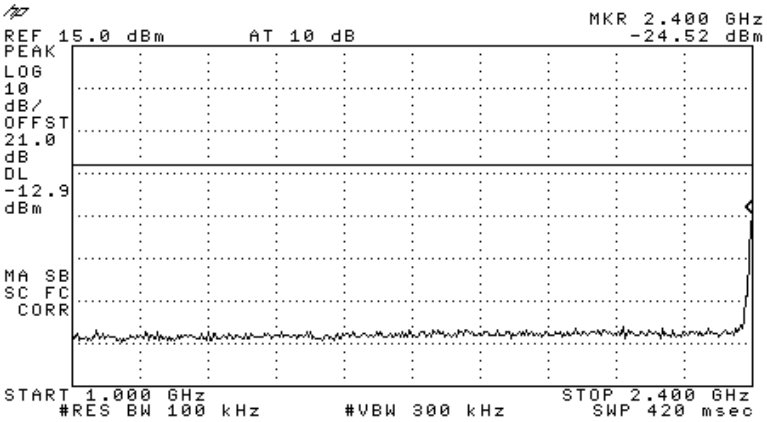


Figure 22 —2412 MHz BPSK

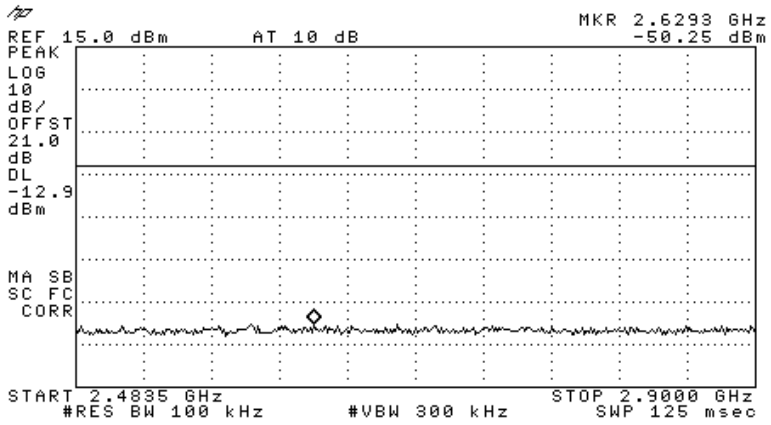


Figure 23 —2412 MHz BPSK

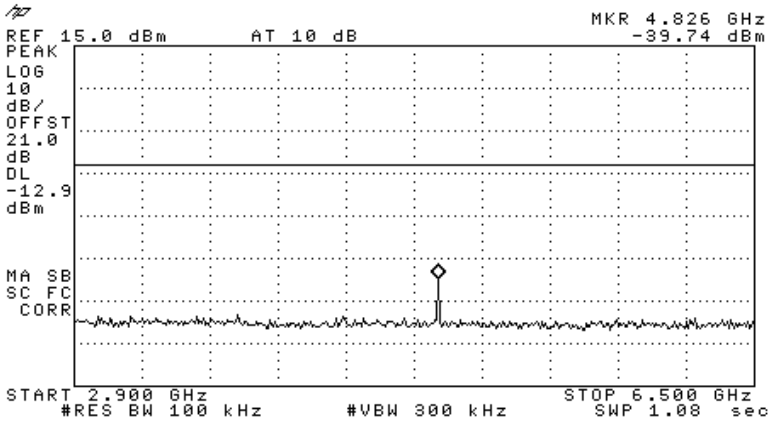


Figure 24 —2412 MHz BPSK

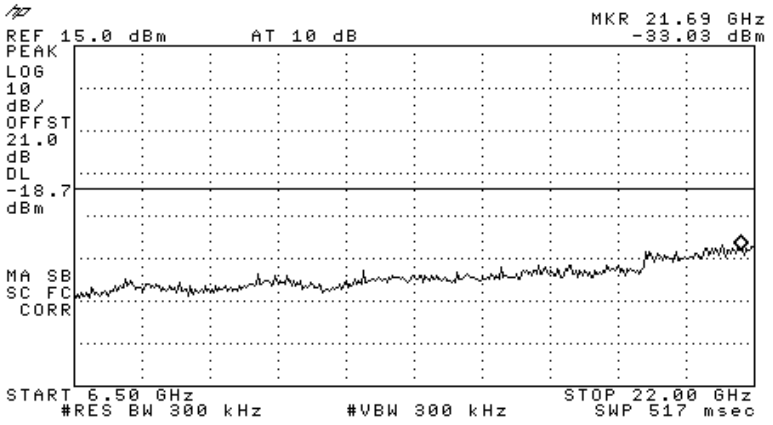


Figure 25 —2412 MHz BPSK

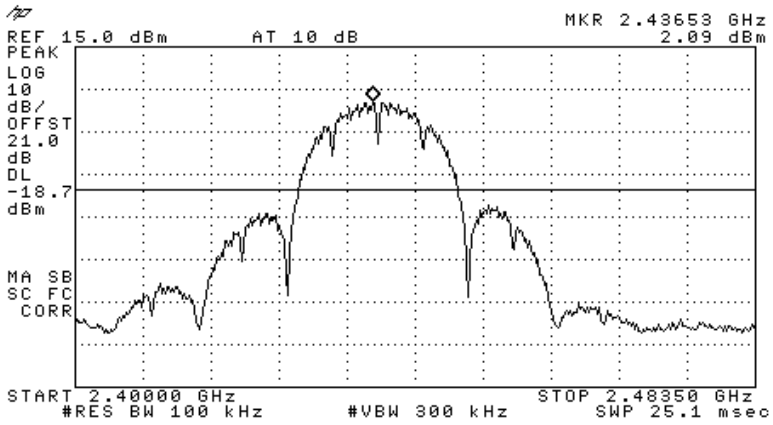


Figure 26 —2437 MHz BPSK

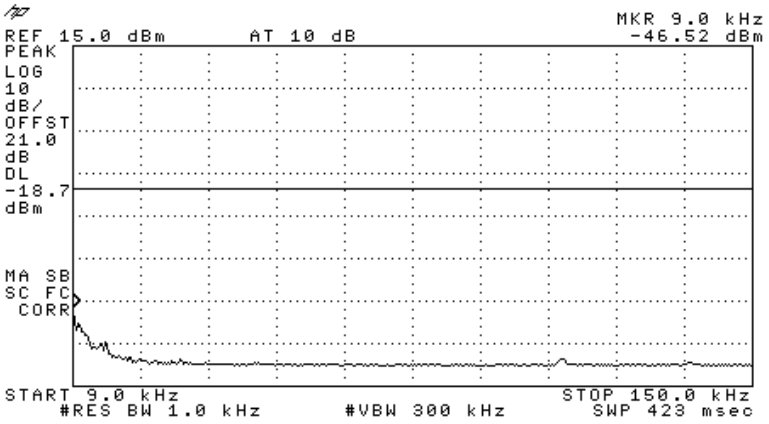


Figure 27 —2437 MHz BPSK

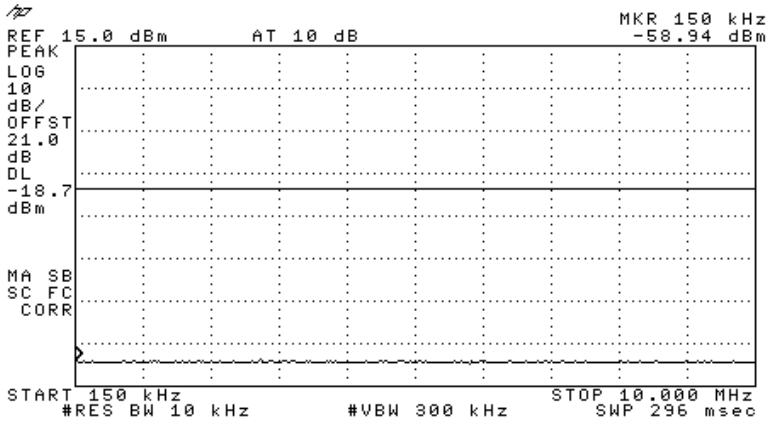


Figure 28 —2437 MHz BPSK

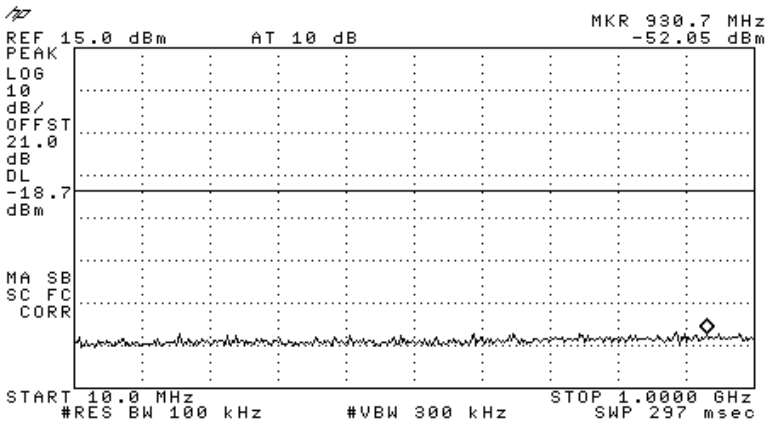


Figure 29 —2437 MHz BPSK

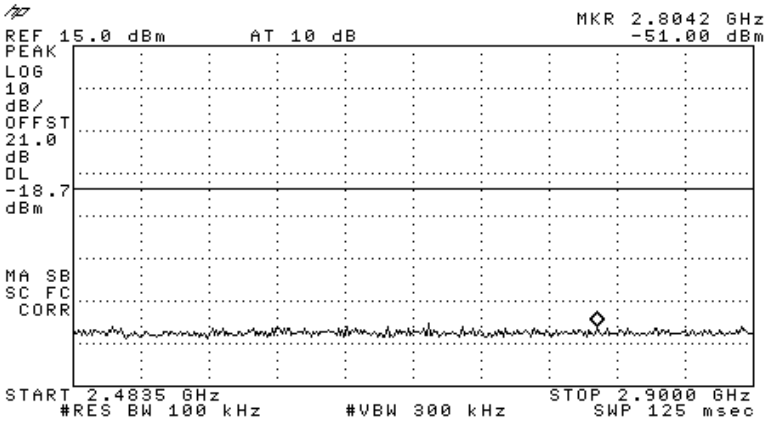


Figure 30 —2437 MHz BPSK

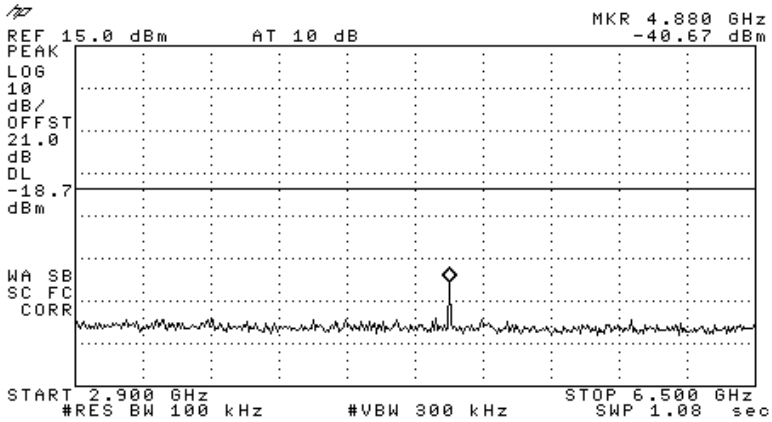


Figure 31 —2437 MHz BPSK

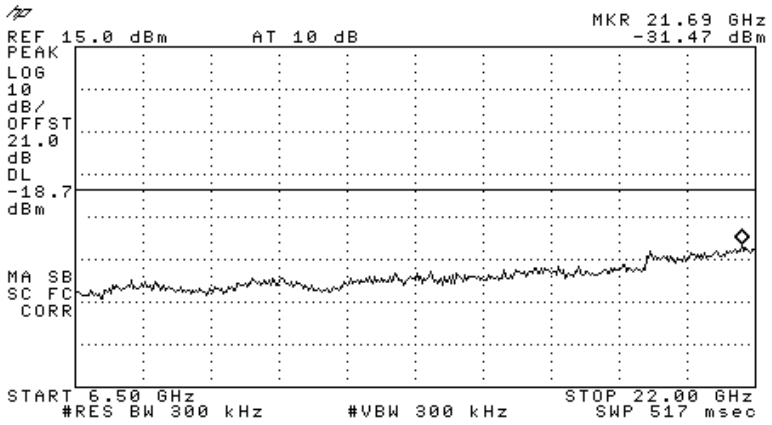


Figure 32 —2437 MHz CCK

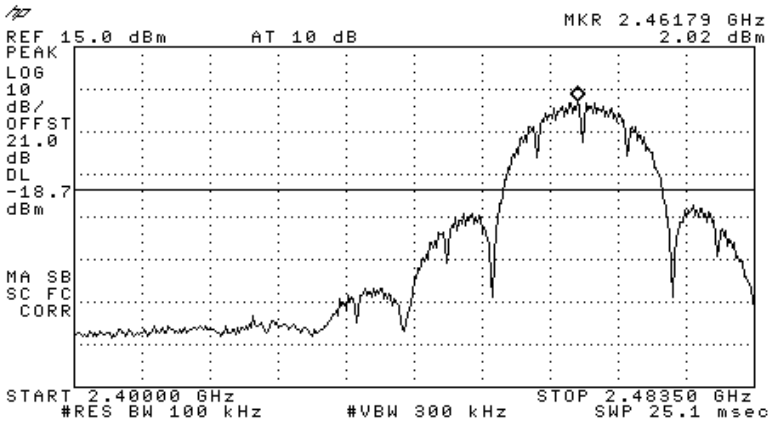


Figure 33 —2462 MHz BPSK

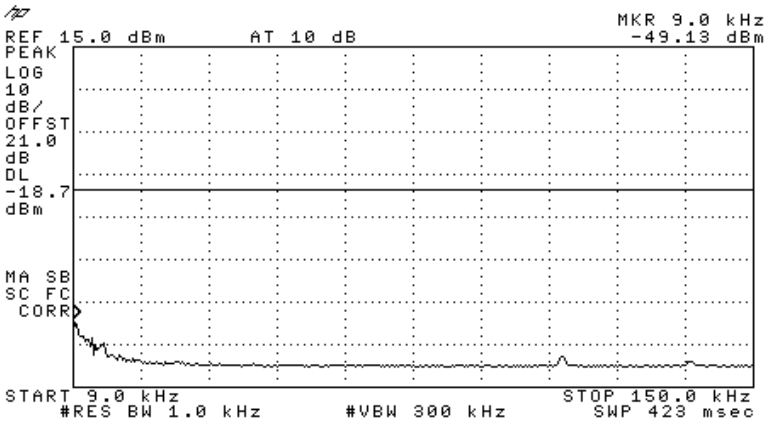


Figure 34 —2462 MHz BPSK

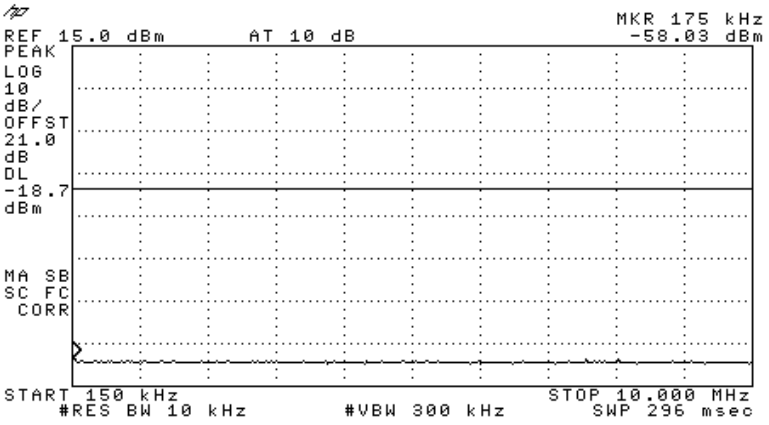


Figure 35 —2462 MHz BPSK

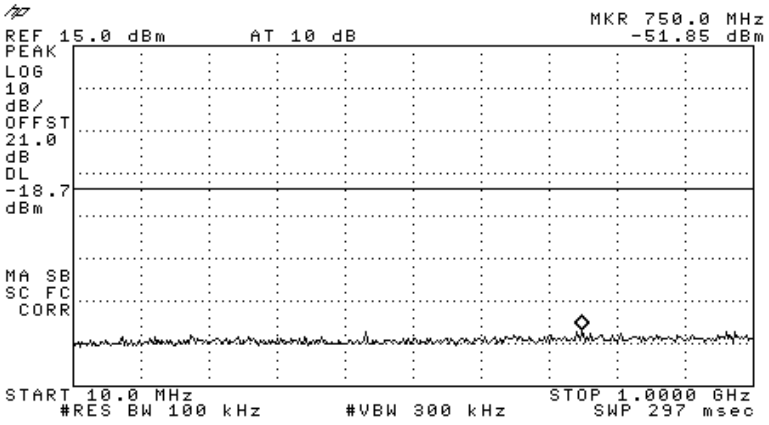


Figure 36 —2462 MHz BPSK

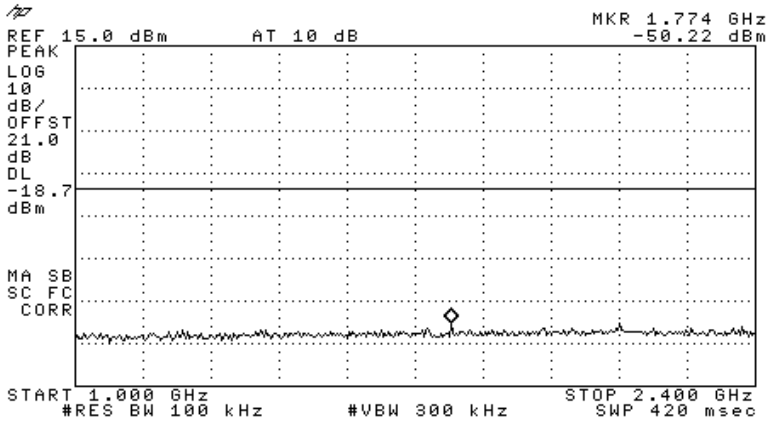


Figure 37 —2462 MHz BPSK

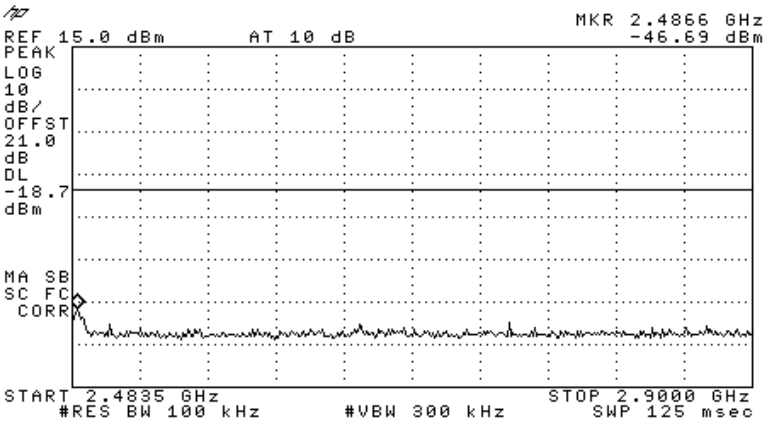


Figure 38 —2462 MHz BPSK

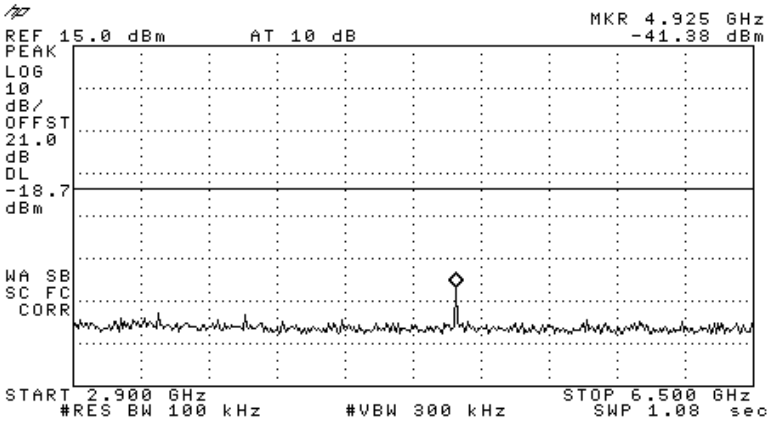


Figure 39 —2462 MHz BPSK

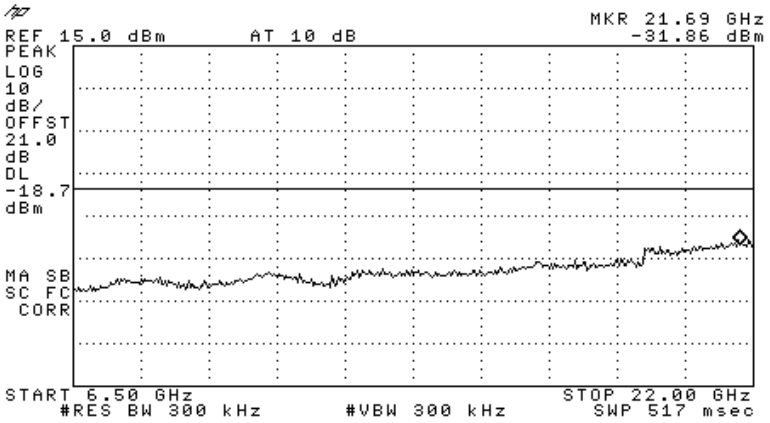


Figure 40 —2462 MHz BPSK

7.2 Results

E.U.T Description: T2s Tag
Model No.: TAG-2300-CUT
Serial Number: Not designated
Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Modulation	Reading (dBc)	Specification (dBc)	Margin (dB)
2412	BPSK	31.6*	20.0	-11.6
2437	BPSK	32.6*	20.0	-12.6
2462	BPSK	33.2*	20.0	-13.2

***Note:** Reading (dBc) = Peak - marker level + 20 db

Figure 41 Peak Power Output of 2400-2483.5 MHz Band

JUDGEMENT: Passed by 11.6 dB

TEST PERSONNEL:
Tester Signature: _____ Date: 19/09/2010
Typed/Printed Name: E. Ever

7.3 Test Equipment Used.

Peak Power Output of 2400-2438.5 MHz Band

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	March 14, 2010	1 year
Attenuator	Narda	771-10	63	March 14, 2010	2 year
Attenuator	Narda	771-10	56	March 14, 2010	2 year
Cable	Rhophase	KPS-5000-KPS	A1674	January 14, 2010	1 year

Figure 42 Test Equipment Used

8. Band Edge Spectrum

[In Accordance with section 15.247(c)]

8.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and an appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 100 kHz resolution BW and the video BW at 300 kHz. Maximum power level below 2400 MHz and above 2483.5 MHz was measured relative to power level at 2412 MHz, and 2462 MHz correspondingly.

The E.U.T. was tested using the BPSK modulation.

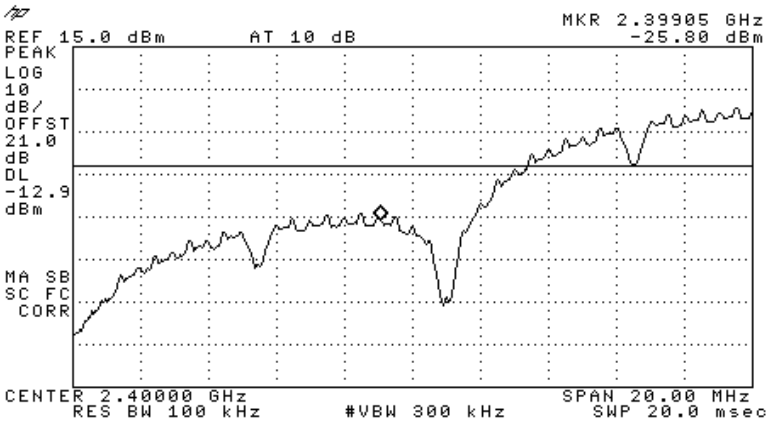


Figure 43 —2412 MHz BPSK

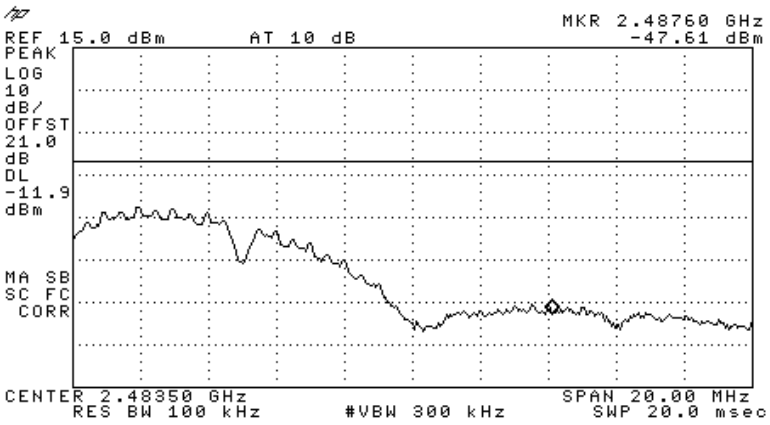


Figure 44 —2462 MHz BPSK

8.2 Results

E.U.T. Description: T2s Tag
Model No.: TAG-2300-CUT
Serial Number: Not designated
Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Modulation	Band Edge Frequency (MHz)	Spectrum Level (dBc)	Specification (dBc)	Margin (dB)
2412	BPSK	2399.05	25.80	20.0	-9.96
2462	BPSK	2487.60	47.61	20.0	-28.94

Figure 45 Band Edge Spectrum

JUDGEMENT: Passed by 9.96 dB

TEST PERSONNEL:
Tester Signature: Date: 19/09/2010
Typed/Printed Name: E. Ever

8.3 Test Equipment Used.

Band edge Spectrum

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	March 14, 2010	1 year
Attenuator	Narda	771-10	63	March 14, 2010	2 year
Attenuator	Narda	771-10	56	March 14, 2010	2 year
Cable	Rhophase	KPS-5000-KPS	A1674	January 14, 2010	1 year

Figure 46 Test Equipment Used

9. Radiated Emission, 9 kHz – 30 MHz

9.1 Test Specification

9 kHz-30 MHz, F.C.C., Part 15, Subpart C

9.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 2.

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 1.

The frequency range 9 kHz-30 MHz was scanned.

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

In the frequency range 9 kHz-30MHz, the loop antenna was rotated on its vertical axis. The antenna height (center of loop) was 1 meter at a distance of 3 meters.

The E.U.T. was tested in three operating frequencies 2.412, 2.437 and 2.462 GHz measured using peak detector and BPSK modulation.

9.3 Test Data

JUDGEMENT: Passed

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

The results for all three operating frequencies were the same.

No signals were detected in the frequency range of 9 kHz – 30 MHz.

TEST PERSONNEL:

Tester Signature:  Date: 19/09/2010

Typed/Printed Name: E. Ever

9.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 10, 2009	1 year
RF Section	HP	85420E	3705A00248	November 10, 2009	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 19, 2009	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

9.5 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.

10. Spurious Radiated Emission 30 MHz – 25 GHz

10.1 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 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 plane.

The frequency range 30 MHz-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.

In the frequency range 30 MHz - 2.9 GHz, 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 2.9-25.0 GHz, a spectrum analyzer including a low noise amplifier was used. During average measurements, the IF bandwidth was 1 MHz and the video bandwidth was 100Hz. During peak measurements, the IF bandwidth was 1 MHz and the video bandwidth was 3 MHz.
The test distance was 3 meters.
The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.
Verification of the E.U.T emissions was based on the following methods: turning the E.U.T on and off; using a frequency span less than 10 MHz; observation of the signal level during turntable rotation. (Background noise is not affected by the rotation of the E.U.T.)

The E.U.T. was tested at the operating frequencies of 2412, 2442, and 2462 MHz using BPSK modulation.

10.2 Test Data

JUDGEMENT: Passed by 8.9 dB

No signals were detected in the frequency range of 30 – 1000 MHz.

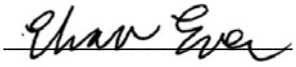
For the operation frequency of 2412 MHz, the margin between the emission level and the specification limit is 9.7 dB in the worst case at the frequency of 2390.00 MHz, horizontal polarization.

For the operation frequency of 2437 MHz, the margin between the emission level and the specification limit is 12.4 dB in the worst case at the frequency of 4874.00 MHz, horizontal polarization.

For the operation frequency of 2462 MHz, the margin between the emission level and the specification limit is 8.9 dB in the worst case at the frequency of 2483.50 MHz, vertical polarization.

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

TEST PERSONNEL:

Tester Signature:  Date: 19/09/2010

Typed/Printed Name: E. Ever

Radiated Emission Above 1 GHz

E.U.T Description	T2s Tag
Type	TAG-2300-CUT
Serial Number:	Not designated

Specification: FCC, Part 15, Subpart C

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

Freq. (MHz)	Polarity (H/V)	Peak Reading (dBµV/m)	Peak. Specification (dB µV/m)	Margin (dB)
2390.00	H	48.4	74.0	-25.6
2390.00	V	48.6	74.0	-25.4
4824.00	H	54.0*	74.0	-20.0
4824.00	V	58.3*	74.0	-15.7

Figure 47. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Peak

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

"Peak Reading" includes correction factor.

* "Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain + Band Pass Filter

Radiated Emission Above 1 GHz

E.U.T Description T2s Tag
Type TAG-2300-CUT
Serial Number: Not designated

Specification: FCC, Part 15, Subpart C

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

Freq. (MHz)	Polarity (H/V)	Average Reading (dBµV/m)	Average Specification (dB µV/m)	Margin (dB)
2390.00	H	44.3	54.0	-9.7
2390.00	V	44.1	54.0	-9.9
4824.00	H	36.6*	54.0	-17.4
4824.00	V	36.2*	54.0	-17.8

Figure 48. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

Notes:

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

"Average Reading" includes correction factor.

* "Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain + Band Pass Filter

Radiated Emission Above 1 GHz

E.U.T Description	T2s Tag
Type	TAG-2300-CUT
Serial Number:	Not designated

Specification: FCC, Part 15, Subpart C

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

Freq. (MHz)	Polarity (H/V)	Peak Reading (dBµV/m)	Peak Specification (dB µV/m)	Margin (dB)
4874.00	H	61.6	74.0	-12.4
4874.00	V	55.9	74.0	-18.1

Figure 49. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Peak

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

"Peak Margin" includes correction factor.

* "Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain + Band Pass Filter

Radiated Emission Above 1 GHz

E.U.T Description T2s Tag
Type TAG-2300-CUT
Serial Number: Not designated

Specification: FCC, Part 15, Subpart C

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

Freq. (MHz)	Polarity (H/V)	Average Reading (dBµV/m)	Average Specification (dB µV/m)	Margin (dB)
4875.00	H	32.0	54.0	-22.0
4875.00	V	36.5	54.0	-17.5

Figure 50. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

Notes:

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

"Average Reading" includes correction factor.

* "Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain + Band Pass Filter

Radiated Emission Above 1 GHz

E.U.T Description	T2s Tag
Type	TAG-2300-CUT
Serial Number:	Not designated

Specification: FCC, Part 15, Subpart C

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

Freq. (MHz)	Polarity (H/V)	Peak Reading (dBµV/m)	Peak Specification (dB µV/m)	Margin (dB)
2483.50	H	48.1	74.0	-25.9
2483.50	V	49.4	74.0	-24.6
4924.00	H	55.5*	74.0	-18.5
4924.00	V	58.4*	74.0	-15.6

Figure 51. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Peak

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

"Peak Readingp" includes correction factor.

"Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

* "Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain + Band Pass Filter

Radiated Emission Above 1 GHz

E.U.T Description T2s Tag
Type TAG-2300-CUT
Serial Number: Not designated

Specification: FCC, Part 15, Subpart C

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

Freq. (MHz)	Polarity (H/V)	Average Reading (dBµV/m)	Average Specification (dB µV/m)	Margin (dB)
2483.50	H	44.7	54.0	-9.3
2483.50	V	45.1	54.0	-8.9
4924.00	H	38.4*	54.0	-15.6
4924.00	V	36.9*	54.0	-17.1

Figure 52. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

Notes:

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

"Average Reading" includes correction factor.

Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

* "Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain + Band Pass Filter

10.3 Test Instrumentation Used, Radiated Measurements 30 MHz – 25 GHz

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	85422E	3906A00276	November 10, 2009	1 Year
RF Filter Section	HP	85420E	3705A00248	November 10, 2009	1 Year
Antenna Biconical	ARA	BCD 235/B	1041	August 3, 2009	1 Year
Antenna Log Periodic	ARA	LPD-2010/A	1038	March 24, 2010	1 Year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 29, 2009	2 Years
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 16, 2010	2 Years
Horn Antenna	ARA	SWH-28	1008	December 23, 2008	2 Years
Horn Antenna	Narda	V637	0410	December 23, 2008	2 Years
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	January 13, 2010	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	January 13, 2010	1 Year
Low Noise Amplifier	MK Milliwave	MKT6-3000 4000-30-13P	A0399	January 14, 2010	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	March 14, 2010	1 Year
Spectrum Analyzer	HP	8546E	3442A00275	January 11, 2010	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

11. Transmitted Power Density

[In accordance with section 15.247(d)]

11.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20dB) and an appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 3 kHz resolution BW and sweep time of 1 second for each 3 kHz "window". The spectrum peaks were located at each of the 3 operating frequencies.

11.2 Results

E.U.T. Description: T2s Tag
Model No.: TAG-2300-CUT
Serial Number: Not designated
Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Modulation	Reading Spectrum Analyzer (dBm)	Specification (dBm)	Margin (dB)
2412	BPSK	-16.0	8.0	-8.0
2437	BPSK	-15.7	8.0	-7.7
2462	BPSK	-15.3	8.0	-7.3

Figure 53 Test Results

JUDGEMENT: Passed by 7.3 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 19/09/2010

Typed/Printed Name: E. Ever

11.3 Test Equipment Used.

Transmitted Power Density

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8564E	3442A00275	January 11, 2010	1 year
Attenuator	Narda	771-10	63	March 14, 2010	2 year
Attenuator	Narda	771-10	56	March 14, 2010	2 year
Cable	Rhophase	KPS-5000-KPS	A1674	January 14, 2010	1 year

Figure 54 Test Equipment Used

12. Antenna Gain

The antenna gain is -4 dBi.

The antenna is a loop antenna.

13. APPENDIX A - CORRECTION FACTORS

13.1 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.3
20.0	0.6
30.0	0.8
40.0	0.9
50.0	1.1
60.0	1.2
70.0	1.3
80.0	1.4
90.0	1.6
100.0	1.7
150.0	2.0
200.0	2.3
250.0	2.7
300.0	3.1
350.0	3.4
400.0	3.7
450.0	4.0
500.0	4.3
600.0	4.7
700.0	5.3
800.0	5.9
900.0	6.3
1000.0	6.7

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
1200.0	7.3
1400.0	7.8
1600.0	8.4
1800.0	9.1
2000.0	9.9
2300.0	11.2
2600.0	12.2
2900.0	13.0

NOTES:

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

13.2 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

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

NOTES:

1. The cable type is RG-8.

2. The overall length of the cable is 10 meters.

13.3 Correction factors for CABLE

from spectrum analyzer to test antenna above 2.9 GHz

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

NOTES:

1. The cable type is SUCOFLEX 104 E manufactured by SUHNER.

2. The cable is used for measurements above 2.9 GHz.

3. The overall length of the cable is 10 meters.

12.6 Correction factors for LOG PERIODIC ANTENNA

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

Distance of 3 meters

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

Distance of 10 meters

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

NOTES:

1. *Antenna serial number is 1038.*
2. *The above lists are located in file number 38M3O.ANT for a 3 meter range, and file number 38M100.ANT for a 10 meter range.*
3. *The files mentioned above are located on the disk marked "Radiated Emission Test EMI Receiver".*

13.4 Correction factors for LOG PERIODIC ANTENNA

Type SAS-200/511
at 3 meter range.

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

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

NOTES:

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

13.5 Correction factors for BICONICAL ANTENNA

Type BCD-235/B,
at 3 meter range

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

NOTES:

1. Antenna serial number is 1041.

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

13.6 Correction factors for Double-Ridged Waveguide Horn

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

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

13.7 Correction factors for Horn Antenna

Model: SWH-28
at 1 meter range.

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

13.8 Correction factors for Horn Antenna

Model: V637

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

13.9 Correction factors for ACTIVE LOOP ANTENNA

Model 6502
S/N 9506-2950

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

14. Comparison Industry Canada Requirements With FCC

AeroScout T2s Tag
M/N : TAG-2300-CUT
IC: 5115A-TAG2300 FCC ID: Q3HTAG2300

Test	FCC	IC
❑ Max power / Peak power	15.247(b)(3)	RSS 210 Issue 7 A8.4(4)
❑ 6dB BW	15.247(a)2	RSS 210 Issue 7 A8.2a
❑ Power density	15.247(e)	RSS 210 Issue 7 A8.2b
❑ Spurious radiated emission in the restricted band	15.205(c)	RSS 210 Issue 7 2.7(Table2)
❑ Band edge spectrum	15.247(d)	RSS 210 Issue 7 A8.5
❑ RF Exposure Limits	1.1307(b)(1)	RSS 102 4.4