TEST REPORT

For

Cooper Industries Inc.

Bldg. 74 - 1833 Coast Meridian Road
Port Coquitlam, British Columbia
V3C 6G5, Canada

Date:	May 11, 2011
Report No.:	10211-1E
Revision No.:	1
Project No.:	10211
Equipment:	2400MHz Spread Spectrum Data Transceiver Module
Model No.:	LPT24RC

ONE STOP GLOBAL CERTIFICATION SOLUTIONS

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TABLE OF CONTENTS

TEST REPORT

FCC15.247:2009 / RSS-210, Issue 8

Report reference No.....:	10211-1E
Report Revision History:	✓ Rev. 0: May 11, 2011 ✓ Rev.1 – Corrected model designation from LPT-24 to **LPT24RC**
Tested by (printed name and signature) .....:	Jeremy Lee 
Approved by (printed name and signature) .....:	Kavinder Dhillon, Eng.L 
Date of issue .....:	May 11, 2011

Note: By signing this report, both the Testing Technician and the Reviewer hereby declare to abide by the applicable LabTest policies:
1.) Statement of Independence # 3014 (LabTest Employees),
2.) Independence, Impartiality, and Integrity #1039, clause 11 (Engineering Service Subcontractors), or
3.) Independence, Impartiality, and Integrity #1019, clause 3.5 (Testing Subcontractors).

Testing Laboratory Name .....:	LabTest Certification Inc.
Address .....:	3133 – 20800 Westminster Hwy, Richmond, B.C. V6V-2W3
FCC Site Registration No......:	444229
IC Site Registration No. .....:	5970B-1
OATS Test Location Name .....:	LabTest Certification Inc.
Address .....:	17325-48Ave., Surrey, BC, Canada
Applicant's Name .....:	Cooper Industries Inc.
Address .....:	Bldg. 74 - 1833 Coast Meridian Road, Port Coquitlam, B.C. V3C 6G5, Canada
Manufacturer's Name .....:	Same as Applicant
Address .....:	Same as Applicant
Test specification	
Standards .....:	FCC15.247:2009 / RSS-210, Issue 8, December 2010
Testing	
Date of receipt of test item .....:	April 29, 2011
Date(s) of performance of test .....:	May 02 to 10, 2011
Test item description .....:	
Trademark .....:	N/A
Model and/or type reference .....:	LPT24RC FCC ID: IA9LPT24RC, IC ID: 1338B-LPT24RC

Serial numbers ..... :	N/A
Electrical Rating(s) ..... :	4 to 10VDC, Typically 6VDC

Product descriptions	
Type of Emission ..... :	Frequency Hopping Spread Spectrum(FHSS)
No. of Hopping Channels ..... :	63 Channels
No. of Radio Channels ..... :	756 Channels
Modulation ..... :	FSK
Data Rates ..... :	4.8 kbps
Dwell time per channel ..... :	< 18.8 ms
Max. time between two instances of use of the same channel ..... :	≤ 1.575 sec
Operating Frequency Range:	2403.1 to 2478.5MHz
Application for ..... :	2400MHz Spread Spectrum Data Transceiver Module
Equipment mobility ..... :	Yes with attached host system
Nominal Voltages for ..... :	___ stand-alone equipment _X_ combined (or host) equipment __ test jig
Supply Voltage ..... :	_____ AC _____ Amps ____Hz ___6V___ DC ____Amps
If DC Power ..... :	____ Internal Power Supply _X__ Host system is supplied the DC power ____ Battery □ Nickel Cadmium □ Alkaline □ Nickel-Metal Hydride □ Lithium-Ion □ Lead Acid (Vehicle regulated) □ Other
Size of equipment(H X D X W, mm)..... :	
Mass of equipment (g)..... :	N/A
Operating Temperature Range ..... :	-30 °C to +70 °C
Test case verdicts	
Test case does not apply to the test object :	N/A
Test item does meet the requirement ..... :	Pass

Test item does not meet the requirement ..:	Fail

General remarks

"This report is not valid as a CB Test Report unless appended by an approved CB Testing Laboratory and appended to a CB Test Certificate.

The test result presented in this report relate only to the object(s) tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

☐ Throughout this report a comma is used as the decimal separator.

☒ Throughout this report a period is used as the decimal separator.

General product information:

The **LPT24RC** is a frequency hopped spread spectrum transceiver module designed to be compatible with US and Canadian regulations for license free use in the 2400 MHz ISM band.

Frequencies

Module	Description	Frequences
VCTCXO (X1)	TCXO	13 MHz
XTAL (X2)	Crystal	3.6864 MHz
CPU (U11)	SPI clock for the synthesizer	134 kHz
CPU (U11)	Clock for the microcontroller	3.6864 MHz

List of ancillary and/or support equipment provided by the applicant

Model No.	Description	Manufacturer	Approvals/Standards
None			

Description of Interface Cables for Testing

Description	Cable Type	Cable length	Ferrite
None			

ARRANGEMENT OF INTERFACE CABLES: All interface cables were positioned for worst-case maximum emissions within the manner assumed to be a typical operation condition (please reference photographs).

Software and Firmware

Description	Version
None	

Worst-case configuration and mode of operation during testing

The worst case was described at each test description.

Modifications Required for Compliance

None

Test Equipment Verified for function

Model #	Description	Checked Function	Results
E7405	Spectrum Analyzer	Frequency and Amplitude	Connected 50MHz and -20dBm Cal_siganl and checked OK.
PA-103	Pre-Amplifier, 1 to 1,000MHz	Gain at 30 and 1,000Mhz	Gains are normal.
8449B	Pre-Amplifier, 1 to 26.5GHz	Gain at 1 to 4GHz	Gains were normal.
SAS-542	Anatenna, 30 to 300MHz	Checked structure	Normal – no damage
SAS-510-2	Anatenna, 300 to 1000MHz	Checked structure	Normal – no damage
SAS-571	Anatenna, 1 to 18GHz	Checked structure	Normal – no damage
SAS-572	Anatenna, 18 to 26.5GHz	Checked structure	Normal – no damage
SAC-26G-0.5	RF Cable, up to 26.5GHz	Insertion Loss at 1 and 4GHz	Insertion Losses are normal
LCI-001	RF Cable, up to 1GHz	Insertion Losses from 30 to 1,000MHz	Saved data
OC-LMR195-2	RF Cable, SMA(m) to SMA(m)	Insertion Losses from 30MHz to 4GHz	Saved data

Measurement Uncertainty

Where relevant, the folllowing measurement uncertainty levels have been estimated for tests:

Parameter	Uncertainty(dB)
Radiated Emission, 30 to 300MHz	4.94
Radiated Emission, 300 to 1,000MHz	5.05

Radiated Emission, 1 to 26.5GHz	5.05

Uncertainty figures are valid to a confidence level of 95%.

Markings

You should refer to the clause of FCC Part 2 Section 2.295 & 2.296 and FCC Part 15 Section 15.19 for information to be contained on the label as well as information about the label. Any other statements or labelling requirements may appear on a separate label at the option of the applicant/grantee. The label has to be including FCC IC/IC ID, Product Number and Manufacturer Info.

According to FCC Section 2.925(a),
(a) Each equipment covered in an application for equipment authorization shall bear a nameplate or label listing the following:
(1) FCC Identifier consisting of the two elements in the exact order specified in §2.926. The FCC Identifier shall be preceded by the term *FCC ID* in capital letters on a single line, and shall be a type size large enough to be legible without the aid of magnification.
Example: FCC ID XXX123. XXX-Grantee Code 123-Equipment Product Code"

According to FCC Section 15.19(a)(3),
This device shall bear the following statement in a conspicuous location on the device:
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: **Some jurisdictions in Canada require Cautions and Warnings to also be in French. It is the responsibility of the Customer to provide bilingual marking, where applicable, in accordance with the requirements of the local regulatory authorities. It is the responsibility of the Customer to determine this requirement and have bilingual wording added to the "Markings".**

Test Summary

When configured and operated as specified in this report, the product was found to comply with the requirements as indicated below.

Test Type	Regulation	Measurement Method	Result
AC Power Line Conducted Emission	15.207(a) RSS-Gen	ANSI C63.4:2009 & ANSI C63.10:2009	N/A[1)]
Radiated Emissions-Unintentional radiators	15.109, Class B & RSS-210	ANSI C63.4:2009 & ANSI C63.10:2009, Clause 6.5	PASS
Radiated Emissions – Spurious and Harmonics	15.249, 15.205, 15.209 & RSS-210	ANSI C63.10:2009, Clause 6.5 & 6.6	PASS
Antenna-port Conducted Emissions	15.247(d) & RSS-210	ANSI C63.10:2009, Clause 6.7 & 7.7.10	PASS
Antenna Gain	15.247(b)(4) & RSS-210	N/A	PASS
Occupancy Bandwidth	15.247(a)(1) & (d) & RSS-210	ANSI C63.10:2009, Clause 6.9	PASS
Band Edge	15.247(d) & RSS-210	ANSI C63.10:2009, Clause 6.9 & 7.7.9	PASS
Conducted Output Power	15.247(b)(1) & RSS-210	ANSI C63.10:2009, Clause 6.10	PASS
FHSS			
Carrier Frequency Separation	15.247(a)(1) & RSS-210	ANSI C63.10:2009, Clause 7.7.2	PASS
Number of hopping frequencies	15.247(a)(1) & RSS-210	ANSI C63.10:2009, Clause 7.7.3	PASS
Time of occupancy(Dwell Time)	15.247(a)(1) & RSS-210	ANSI C63.10:2009, Clause 7.7.4	PASS
Pseudorandom frequency-hopping sequence	15.247(a)(1) & RSS-210	ANSI C63.10:2009, Clause 7.7.5	PASS
Equal hopping frequency usage	15.247(a)(1) & RSS-210	ANSI C63.10:2009, Clause 7.7.6	PASS
System receiver input bandwidth	15.247(a)(1) & RSS-210	ANSI C63.10:2009, Clause 7.7.7	PASS
RF Exposure	15.247(i) & RSS-102	FCC1.1310	PASS

Note1): The EUT connected to host power system. This test was exempted by no connection to AC Power Line.

Conducted Emission

Test Date	May 10, 2011
Sample Number	884753
Tested By	Jeremy Lee

Test Limits

FCC 15.207(a):
Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency.

Test Results

The test was exempted because there is no public utility (AC) power line connection.

Radiated Emission: Unintentional Radiators, Digital Part

Temperature	13.3 ℃
Relative Humidity	58 %
Barometric Pressure:	102.68 kPa
Test Date	May 04, 2011
Sample Number	884753
Calibrated Test Equipment (ID)	227-1, 228, 272
Reference Equipment (ID) (Calibration not required)	059, 112, 124, 233, 235
Tested By	Jeremy Lee

Use the barometric pressure reported at: http://www.theweathernetwork.com/weather/cabc0284

Test Limits

FCC 15.109 (a):
Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of emission (MHz)	Field strength (microvolts/ meter)
30–88	100
88–216	150
216–960	200
Above 960	500

Test Setup

The test was performed in accordance with **FCC 15.247:2009, FCC 15.31:2009, FCC 15.33:2009, FCC 15.35:2009, and ANSI C63.4:2009, and ANSI C63.10:2009.**

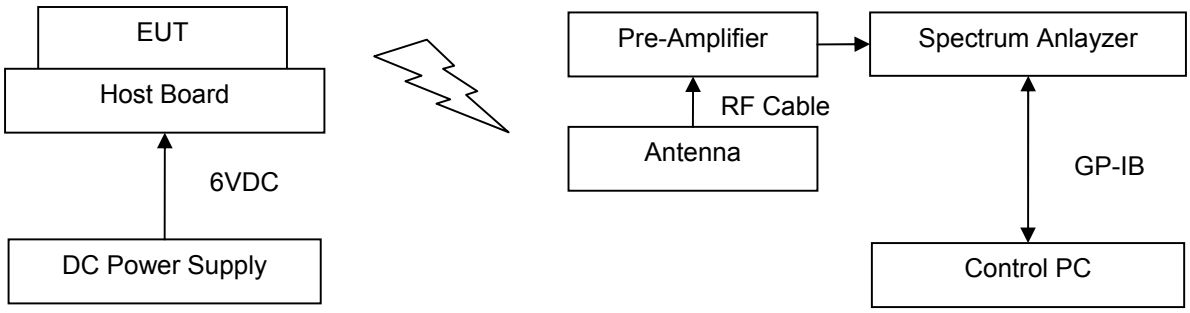
Test procedure is based on the FCC15.31(a)(3) – Other intentional and unintentional radiators are to be measured for compliance using the following procedure excluding sections 4.1.5.2, 5.7, 9 and 14: ANSI C63.4–2003: “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz” (incorporated by reference, see § 15.38). This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51.
NOTE to Paragraph (a)(3): Digital devices tested to show compliance with the provisions of §§ 15.107(e) and 15.109(g) must be tested following the ANSI C63.4 procedure described in paragraph (a)(3) of this section.[As stated in the adopting R&O, ANSI C63.4 is not used for measurements below 30 MHz.]

The EUT was placed on a 1 meter by 1.5 meters wide and 0.8-meter high nonconductive table that was placed directly onto a flush mounted turntable. The EUT was connected to its support equipment with any excess I/O cabling bundled to approximately 1 meter. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna supporter. It is measured with a receiver – the spectrum analyzer, was software controlled. The antennas were balanced dipoles. For frequencies of 80 MHz or above, the antennas were resonant in length, and for frequencies below 80 MHz it had a length equal to the 80 MHz resonant length.

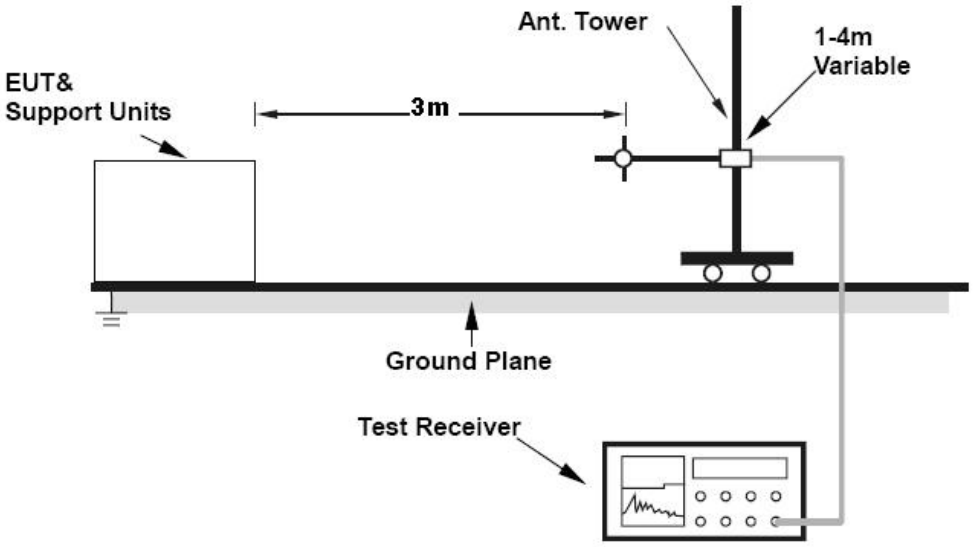
Tests were performed to determine the hopping of the EUT with terminated its Antenna port. The EUT was positioned three different orthogonals and the emissions from the unit were maximized by manipulating the cables, and by adjusting the polarization and height of the receive antenna and rotating the EUT on the turntable.

- The EUT was set-up in hopping mode.
- The following measurements were made with
  - Span = wide enough to fully capture the emission being measured.
  - RBW = 120kHz.
  - VBW ≥ RBW
  - Sweep = Auto
  - Detector Function = peak
  - Trace = Single trace up to capturing the whole range of signal
  - Detecting Method = Quasi peak.
  - Sweep Range = 30MHz to 1GHz

Setup Block Diagram



Test Setup at OATS



Test Result

Radiated Emission (dBuV/m) = Measured Emission (dBuV) + Antenna Factor(1/m) + Cable Loss(dB)– Pre-Amplifier Gain(dB)

Frequency (MHz)	Measured (dBuV)	AF (dB/m)	CL (dB)	Pre-Amp (dB)	Radiated Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	POL	Results
Horizontal									
36.85	37.48	13.18	2.42	33.59	19.49	40.00	20.51	H	PASS
228.55	29.73	14.49	6.10	33.06	17.26	46.02	28.76	H	PASS
Vertical									
36.87	32.02	12.33	2.42	33.59	13.17	40.00	26.83	V	PASS
228.50	32.41	15.08	6.10	33.06	20.54	46.02	25.48	V	PASS

X Pass Fail N/A

- Table of Unintentional Radiated Emissions: 30 to 300MHz, Quasi-peak Detecting, Antenna was used SAS-542.

LabTest Certification Inc.
Unintentional Radiated Emissions
FCC15.109, 3 meters, Horizontal

Operator: Jeremy Lee

02:45:18 PM, Wednesday, May 04, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency MHz	Measured dBuV	AntFactor dB/m	CableLoss dB	Preamp dB	Emission dBuV/m	Limit dBuV/m	Margin dB	T/T degree	Tower cm	Pol
36.85 MHz	37.48	13.18	2.42	-33.59	19.49	40.00	20.51	349.8	114.0	H
228.55 MHz	29.73	14.49	6.10	-33.06	17.26	46.02	28.76	230.1	100.2	H

Project # : 10211, Sample #: 884753
Temp.: 13.3 C, Hum.: 58 %
Barometer Pres.:102.68 kPa

LabTest Certification Inc.
Unintentional Radiated Emissions
FCC15.109, 3 meters, Vertical

Operator: Jeremy Lee

02:45:18 PM, Wednesday, May 04, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency MHz	Measured dBuV	AntFactor dB/m	CableLoss dB	Preamp dB	Emission dBuV/m	Limit dBuV/m	Margin dB	T/T degree	Tower cm	Pol
36.87 MHz	32.02	12.33	2.42	-33.59	13.17	40.00	26.83	134.5	132.2	V
228.50 MHz	32.41	15.08	6.10	-33.06	20.54	46.02	25.48	178.1	100.0	V

Project # : 10211, Sample #: 884753
Temp.: 13.3 C, Hum.: 58 %
Barometer Pres.:102.68 kPa

Radiated Emissions- Spurious and Harmonics

Temperature	11.2 to 12.0 ℃
Relative Humidity	68 to 72 %
Barometric Pressure:	102.81 to 102.96 kPa
Test Date	May 04, 2011
Sample Number	884753
Calibrated Test Equipment (ID)	227-3, 228, 272, 273
Reference Equipment (ID) (Calibration not required)	059, 112, 124, 233, 235
Tested By	Jeremy Lee

Use the barometric pressure reported at: http://www.theweathernetwork.com/weather/cabc0284

Test Limits

15.247(d)

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

15.205(a)

Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
[1] 0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	([2])
13.36–13.41.			

[1] Until February 1, 1999, this restricted band shall be 0.490–0.510 MHz.
[2] Above 38.6

15.209(a)

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100 **	3
88–216	150 **	3
216–960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 MHz, 76–88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permltted under other sections of this part, e.g., §§ 15.231 and 15.241.

Test Setup

The test was performed in accordance with **FCC 15.247:2009, FCC 15.31:2009, FCC 15.33:2009, FCC 15.35:2009, and ANSI C63.4:2009, and ANSI C63.10:2009.**

Test procedure is based on the FCC15.31(a)(3) – Other intentional and unintentional radiators are to be measured for compliance using the following procedure excluding sections 4.1.5.2, 5.7, 9 and 14: ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see § 15.38). This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51.
NOTE to Paragraph (a)(3): Digital devices tested to show compliance with the provisions of §§ 15.107(e) and 15.109(g) must be tested following the ANSI C63.4 procedure described in paragraph (a)(3) of this section.[As stated in the adopting R&O, ANSI C63.4 is not used for measurements below 30 MHz.]

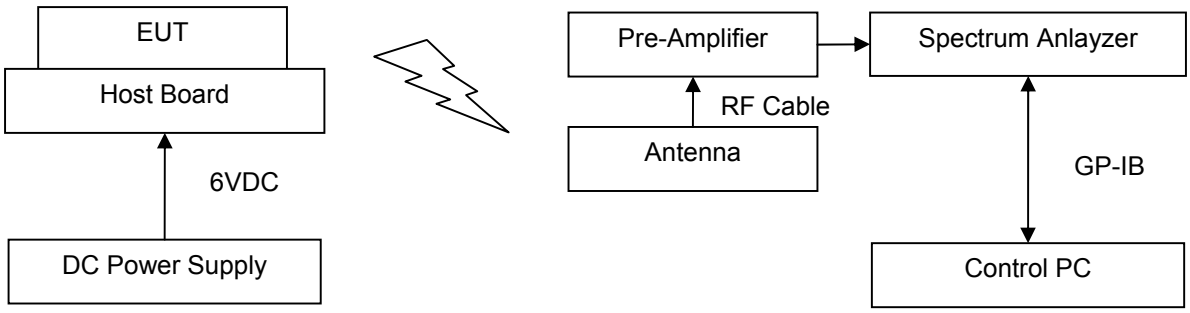
The EUT was placed on a 1 meter by 1.5 meters wide and 0.8-meter high nonconductive table that was placed directly onto a flush mounted turntable. The EUT was connected to its support equipment with any excess I/O cabling bundled to approximately 1 meter. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna supporter. It is measured with a receiver – spectrum analyzer, was software controlled. The antennas were balanced dipoles. For frequencies of 80 MHz or above, the antennas were resonant in length, and for frequencies below 80 MHz it had a length equal to the 80 MHz resonant length.

Pre-scan tests were performed to determine the "worst-case" orientation of the EUT. With the EUT positioned in the "worst case" orientation, emissions from the unit were maximized by manipulating the cables, and by adjusting the polarization and height of the receive antenna and rotating the EUT on the turntable.

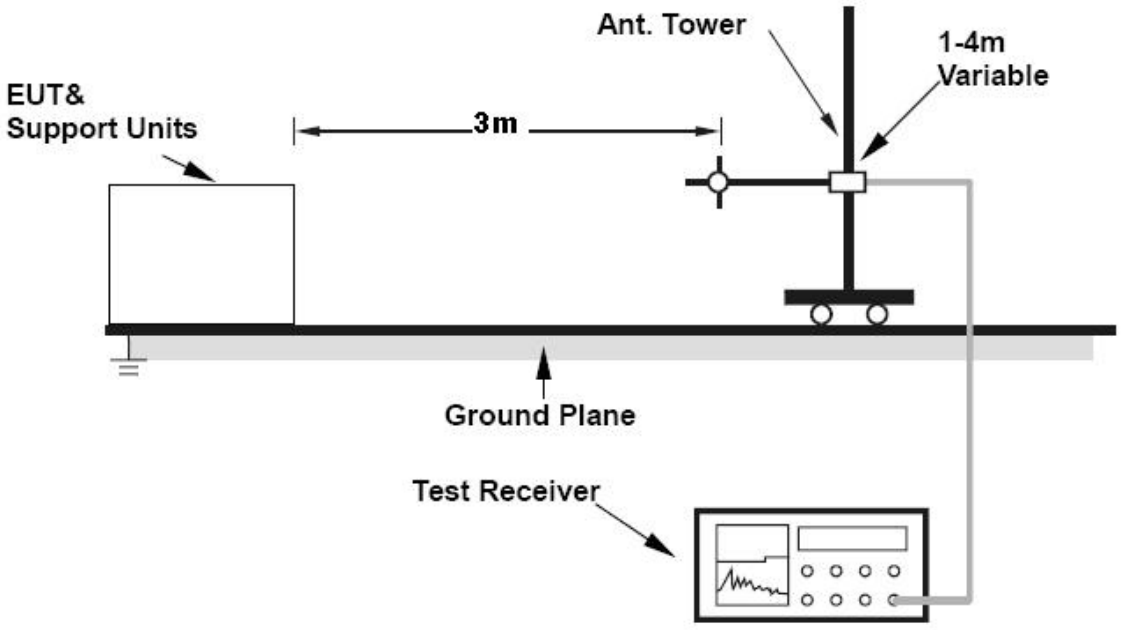
- The EUT was measured in three diferrent transmiting frequencies, low-end, middle, and high-end and each channel was performed three different orthogonals.
- The transmitter was set-up as its maximum power.
- The following measurements were made with
  - Span = wide enough to fully capture the emission being measured.
  - RBW = 100kHz for f < 1GHz, and 1MHz for f ≥ 1GHz
  - VBW ≥ RBW
  - Sweep = Auto

- Detector Function = peak
- Trace = Single trace up to capturing the whole range of signal
- Detecting Method = Peak Detecting

Setup Block Diagram



Test Setup at OATS



Test Result

Radiated Emission (dBuV/m) = Measured Emission (dBuV) + Antenna Factor(1/m) + Cable Loss(dB)– Pre-Amplifier Gain(dB)

Orthogonal	Description	Frequency (MHz)	Measured Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detecting Method	Polarity	Results
Low End; Carrier Frequency is 2403.1 MHz								
Y	Band-edge Spurious	2334.3	43.09	53.98	10.89	AVG	HOR	PASS
		2383.9	57.86	73.98	16.12	PEAK	HOR	PASS
		2388.2	63.88	73.98	10.10	PEAK	VERT	PASS
	Harmonics	4806.2	50.93	53.98	3.05	AVG	HOR	PASS
		12015.5	65.95	73.98	8.03	PEAK	HOR	PASS
Middle; Carrier Frequency is 2441.7 MHz								
Y	Band-edge Spurious	2329.9	61.11	73.98	12.87	PEAK	HOR	PASS
		2335.1	45.21	53.98	8.77	AVG	HOR	PASS
		2341.0	45.92	53.98	8.06	AVG	HOR	PASS
	Harmonics	4883.4	52.72	53.98	1.26	AVG	HOR	PASS
		7325.1	39.37	53.98	14.61	AVG	HOR	PASS
		12208.5	60.40	73.98	13.58	PEAK	VERT	PASS
High End; Carrier Frequency is 2478.5 MHz								
Y	Band-edge Spurious	2315.8	50.19	73.98	23.79	PEAK	VERT	PASS
		2333.9	43.48	53.98	10.50	AVG	VERT	PASS
		2339.0	48.37	53.98	5.61	AVG	HOR	PASS
	Harmonics	4957.0	53.62	53.98	0.36	AVG	HOR	PASS
		7435.5	42.30	53.98	11.68	AVG	VERT	PASS
		12392.5	41.09	53.98	12.89	AVG	HOR	PASS

X Pass Fail N/A

- Table of Radiated Spurious Emissions of Lowend: Peak Detecting, Antenna was used SAS-571.

LabTest Certification Inc.
Intentional Radiated Spurious_Peak Detector
FCC15.205 & 209, 3 meters, Low end, Horizontal

Operator: Jeremy Lee

03:42:53 PM, Wednesday, May 11, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_Peak	Margin_PK	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
2.33 GHz	59.26	27.97	1.37	-30.00	58.59	73.98	15.39	241.0	100.0	H
2.38 GHz	58.45	28.04	1.38	-30.00	57.86	73.98	16.12	220.1	100.0	H
2.39 GHz	58.07	28.04	1.38	-30.00	57.49	73.98	16.49	88.8	100.0	H

Project # : 10211, Sample #: 884753
Temp.: 11.7 C, Hum.: 72 %
Barometer Pres.:102.92kPa

LabTest Certification Inc.
Intentional Radiated Spurious_Peak Detector
FCC 15.205 & 209, 3 meters, Low end, Vertical

Operator: Jeremy Lee

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_Peak	Margin_PK	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
2.33 GHz	56.17	27.97	1.37	-30.00	55.50	73.98	18.48	169.3	100.0	V
2.38 GHz	57.87	28.04	1.38	-30.00	57.28	73.98	16.70	39.9	100.0	V
2.39 GHz	64.46	28.04	1.38	-30.00	63.88	73.98	10.10	15.4	100.0	V

Project # : 10211, Sample #: 884753
Temp.: 11.7 C, Hum.: 72 %
Barometer Pres.:102.92kPa

- Table of Radiated Spurious Emissions of Lowend: Average Detecting, Antenna was used SAS-571.

LabTest Certification Inc.
Intentional Radiated Spurious_AVG Detector
FCC15.205 & 209, 3 meters, Low end, Horizontal

Operator: Jeremy Lee

03:42:53 PM, Wednesday, May 11, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_AVG	Margin_AVG	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
2.33 GHz	43.76	27.97	1.37	-30.00	43.09	53.98	10.89	241.0	100.0	H
2.38 GHz	29.67	28.04	1.38	-30.00	29.08	53.98	24.90	220.1	100.0	H
2.39 GHz	30.14	28.04	1.38	-30.00	29.56	53.98	24.42	88.8	100.0	H

Project # : 10211, Sample #: 884753
Temp.: 11.7 C, Hum.: 72 %
Barometer Pres.:102.92kPa

LabTest Certification Inc.
Intentional Radiated Spurious_AVG Detector
FCC 15.205 & 209, 3 meters, Low end, Vertical

Operator: Jeremy Lee

03:42:53 PM, Wednesday, May 11, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_AVG	Margin_AVG	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
2.33 GHz	42.07	27.97	1.367	-30.00	41.40	53.98	12.58	169.3	100.0	V
2.38 GHz	29.57	28.04	1.377	-30.00	28.98	53.98	25.00	39.9	100.0	V
2.39 GHz	32.07	28.04	1.378	-30.00	31.49	53.98	22.49	15.4	100.0	V

Project # : 10211, Sample #: 884753
Temp.: 11.7 C, Hum.: 72 %
Barometer Pres.:102.92kPa

- Table of Radiated Spurious Emissions of Middle: Peak Detecting, Antenna was used SAS-571.

LabTest Certification Inc.
Intentional Radiated Spurious_Peak Detector
FCC15.205 & 209, 3 meters, Middle, Horizontal

Operator: Jeremy Lee

03:44:44 PM, Wednesday, May 11, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_Peak	Margin_PK	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
2.33 GHz	61.78	27.96	1.37	-30.00	61.11	73.98	12.87	126.4	100.0	H
2.34 GHz	62.99	27.97	1.37	-30.00	62.33	73.98	11.65	44.8	100.0	H
2.34 GHz	64.51	27.98	1.37	-30.00	63.86	73.98	10.12	226.3	100.0	H

Project # : 10211, Sample #: 884753
Temp.: 11.8 C, Hum.: 71 %
Barometer Pres.: 102.86kPa

LabTest Certification Inc.
Intentional Radiated Spurious_Peak Detector
FCC 15.205 & 209, 3 meters, Middle, Vertical

Operator: Jeremy Lee

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_Peak	Margin_PK	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
2.33 GHz	57.68	27.96	1.37	-30.00	57.01	73.98	16.97	101.2	100.0	V
2.33 GHz	57.60	27.97	1.37	-30.00	56.94	73.98	17.04	214.0	100.0	V
2.34 GHz	57.00	27.98	1.37	-30.00	56.35	73.98	17.63	91.2	100.0	V

Project # : 10211, Sample #: 884753
Temp.: 11.8 C, Hum.: 71 %
Barometer Pres.: 102.86kPa

- Table of Radiated Spurious Emissions of Middle: Average Detecting, Antenna was used SAS-571.

LabTest Certification Inc.
Intentional Radiated Spurious_AVG Detector
FCC15.205 & 209, 3 meters, Middle, Horizontal

Operator: Jeremy Lee

03:44:44 PM, Wednesday, May 11, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_AVG	Margin_AVG	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
2.33 GHz	33.45	27.96	1.37	-30.00	32.78	53.98	21.20	126.4	100.0	H
2.34 GHz	45.87	27.97	1.37	-30.00	45.21	53.98	8.77	44.8	100.0	H
2.34 GHz	46.57	27.98	1.37	-30.00	45.92	53.98	8.06	226.3	100.0	H

Project # : 10211, Sample #: 884753
Temp.: 11.8 C, Hum.: 71 %
Barometer Pres.: 102.86kPa

LabTest Certification Inc.
Intentional Radiated Spurious_AVG Detector
FCC 15.205 & 209, 3 meters, Middle, Vertical

Operator: Jeremy Lee

03:44:44 PM, Wednesday, May 11, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_AVG	Margin_AVG	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
2.33 GHz	33.15	27.96	1.366	-30.00	32.48	53.98	21.50	101.2	100.0	V
2.33 GHz	42.36	27.97	1.367	-30.00	41.70	53.98	12.28	214.0	100.0	V
2.34 GHz	42.52	27.98	1.368	-30.00	41.87	53.98	12.11	91.2	100.0	V

Project # : 10211, Sample #: 884753
Temp.: 11.8 C, Hum.: 71 %
Barometer Pres.: 102.86kPa

- Table of Radiated Spurious Emissions of Highend: Peak Detecting, Antenna was used SAS-571.

LabTest Certification Inc.
Intentional Radiated Spurious_Peak Detector
FCC15.205 & 209, 3 meters, High end, Horizontal

Operator: Jeremy Lee

03:45:54 PM, Wednesday, May 11, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_Peak	Margin_PK	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
2.32 GHz	49.91	27.94	1.36	-30.00	49.22	73.98	24.76	188.0	100.0	H
2.33 GHz	56.44	27.97	1.37	-30.00	55.77	73.98	18.21	288.0	100.0	H
2.34 GHz	68.44	27.97	1.37	-30.00	67.78	73.98	6.20	20.8	100.0	H

Project # : 10211, Sample #: 884753
Temp.: 12.0 C, Hum.: 69 %
Barometer Pres.: 102.81kPa

LabTest Certification Inc.
Intentional Radiated Spurious_Peak Detector
FCC 15.205 & 209, 3 meters, High end, Vertical

Operator: Jeremy Lee

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_Peak	Margin_PK	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
2.32 GHz	50.88	27.94	1.36	-30.00	50.19	73.98	23.79	301.0	100.0	V
2.33 GHz	56.79	27.97	1.37	-30.00	56.12	73.98	17.86	182.7	100.0	V
2.34 GHz	56.92	27.97	1.37	-30.00	56.26	73.98	17.72	273.6	100.0	V

Project # : 10211, Sample #: 884753
Temp.: 12.0 C, Hum.: 69 %
Barometer Pres.: 102.81kPa

- Table of Radiated Spurious Emissions of Highend: Average Detecting, Antenna was used SAS-571.

LabTest Certification Inc.
Intentional Radiated Spurious_AVG Detector
FCC15.205 & 209, 3 meters, High end, Horizontal

Operator: Jeremy Lee

03:45:54 PM, Wednesday, May 11, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_AVG	Margin_AVG	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
2.32 GHz	29.53	27.94	1.36	-30.00	28.84	53.98	25.14	188.0	100.0	H
2.33 GHz	40.59	27.97	1.37	-30.00	39.92	53.98	14.06	288.0	100.0	H
2.34 GHz	49.03	27.97	1.37	-30.00	48.37	53.98	5.61	20.8	100.0	H

Project # : 10211, Sample #: 884753
Temp.: 12.0 C, Hum.: 69 %
Barometer Pres.: 102.81kPa

LabTest Certification Inc.
Intentional Radiated Spurious_AVG Detector
FCC 15.205 & 209, 3 meters, High end, Vertical

Operator: Jeremy Lee

03:45:54 PM, Wednesday, May 11, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_AVG	Margin_AVG	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
2.32 GHz	29.61	27.94	1.363	-30.00	28.92	53.98	25.06	301.0	100.0	V
2.33 GHz	44.15	27.97	1.367	-30.00	43.48	53.98	10.50	182.7	100.0	V
2.34 GHz	43.86	27.97	1.368	-30.00	43.20	53.98	10.78	273.6	100.0	V

Project # : 10211, Sample #: 884753
Temp.: 12.0 C, Hum.: 69 %
Barometer Pres.: 102.81kPa

- Table of Radiated Harmonic Emissions of LowEnd: Peak Detecting, Antenna was used SAS-571.

LabTest Certification Inc.
Intentional Radiated Harmonics, Peak Detector
FCC15.205 & 209, 3 meters, Lowend, Horizontal

Operator: Jeremy Lee

09:20:25 AM, Wednesday, May 04, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_Peak	Margin_PK	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
4.81 GHz	57.92	33.68	1.86	-30.00	63.46	73.98	10.52	155.0	100.0	H
12.02 GHz	52.65	39.90	3.40	-30.00	65.95	73.98	8.03	155.0	100.0	H

Project # : 10211, Sample #: 884753
Temp.: 11.2 C, Hum.: 68 %
Barometer Pres.:102.96kPa

LabTest Certification Inc.
Intentional Radiated Harmonics, Peak Detector
FCC 15.205 & 209, 3 meters, Lowend, Vertical

Operator: Jeremy Lee

09:18:01 AM, Wednesday, May 04, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_Peak	Margin_PK	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
4.81 GHz	54.47	33.68	1.86	-30.00	60.01	73.98	13.97	243.0	100.0	V
12.02 GHz	47.16	39.90	3.40	-30.00	60.46	73.98	13.52	243.0	100.0	V

Project # : 10211, Sample #: 884753
Temp.: 11.2 C, Hum.: 68 %
Barometer Pres.:102.96kPa

- Table of Radiated Harmonic Emissions of LowEnd: Average Detecting, Antenna was used SAS-571.

LabTest Certification Inc.
Intentional Radiated Harmonics, AVG Detector
FCC15.205 & 209, 3 meters, Lowend, Horizontal

Operator: Jeremy Lee

09:20:25 AM, Wednesday, May 04, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_AVG	Margin_AVG	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
4.81 GHz	45.39	33.68	1.86	-30.00	50.93	53.98	3.05	155.0	100.0	H
12.02 GHz	27.32	39.90	3.40	-30.00	40.62	53.98	13.36	155.0	100.0	H

Project # : 10211, Sample #: 884753
Temp.: 11.2 C, Hum.: 68 %
Barometer Pres.:102.96kPa

LabTest Certification Inc.
Intentional Radiated Harmonics, AVG Detector
FCC 15.205 & 209, 3 meters, Lowend, Vertical

Operator: Jeremy Lee

09:18:01 AM, Wednesday, May 04, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_AVG	Margin_AVG	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
4.81 GHz	42.73	33.68	1.861	-30.00	48.27	53.98	5.71	243.0	100.0	V
12.02 GHz	28.11	39.90	3.403	-30.00	41.41	53.98	12.57	243.0	100.0	V

Project # : 10211, Sample #: 884753
Temp.: 11.2 C, Hum.: 68 %
Barometer Pres.:102.96kPa

- Table of Radiated Harmonic Emissions of Middle: Peak Detecting, Antenna was used SAS-571.

LabTest Certification Inc.
Intentional Radiated Harmonics, Peak Detector
FCC15.205 & 209, 3 meters, Middle, Horizontal

Operator: Jeremy Lee

09:27:10 AM, Wednesday, May 04, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_Peak	Margin_PK	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
4.88 GHz	52.20	33.93	1.88	-30.00	58.00	73.98	15.98	325.0	100.0	H
7.33 GHz	47.69	36.36	2.37	-30.00	56.42	73.98	17.56	325.0	100.0	H
12.21 GHz	46.90	39.90	3.44	-30.00	60.24	73.98	13.74	325.0	100.0	H

Project # : 10211, Sample #: 884753
Temp.: 11.2 C, Hum.: 68 %
Barometer Pres.: 102.96 kPa

LabTest Certification Inc.
Intentional Radiated Harmonics, Peak Detector
FCC 15.205 & 209, 3 meters, Middle, Vertical

Operator: Jeremy Lee

09:23:23 AM, Wednesday, May 04, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_Peak	Margin_PK	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
4.88 GHz	50.82	33.93	1.88	-30.00	56.62	73.98	17.36	0.0	100.0	V
7.33 GHz	47.27	36.36	2.37	-30.00	56.00	73.98	17.98	0.0	100.0	V
12.21 GHz	47.06	39.90	3.44	-30.00	60.40	73.98	13.58	0.0	100.0	V

Project # : 10211, Sample #: 884753
Temp.: 11.2 C, Hum.: 68 %
Barometer Pres.: 102.96 kPa

- Table of Radiated Harmonic Emissions of Middle: Average Detecting, Antenna was used SAS-571.

LabTest Certification Inc.
Intentional Radiated Harmonics, AVG Detector
FCC15.205 & 209, 3 meters, Middle, Horizontal

Operator: Jeremy Lee

09:27:10 AM, Wednesday, May 04, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_AVG	Margin_AVG	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
4.88 GHz	46.92	33.93	1.88	-30.00	52.72	53.98	1.26	325.0	100.0	H
7.33 GHz	30.64	36.36	2.37	-30.00	39.37	53.98	14.61	325.0	100.0	H
12.21 GHz	26.80	39.90	3.44	-30.00	40.14	53.98	13.84	325.0	100.0	H

Project # : 10211, Sample #: 884753
Temp.: 11.2 C, Hum.: 68 %
Barometer Pres.: 102.96 kPa

LabTest Certification Inc.
Intentional Radiated Harmonics, AVG Detector
FCC 15.205 & 209, 3 meters, Middle, Vertical

Operator: Jeremy Lee

09:23:23 AM, Wednesday, May 04, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_AVG	Margin_AVG	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
4.88 GHz	42.69	33.93	1.877	-30.00	48.49	53.98	5.49	0.0	100.0	V
7.33 GHz	30.44	36.36	2.365	-30.00	39.17	53.98	14.81	0.0	100.0	V
12.21 GHz	26.98	39.90	3.442	-30.00	40.32	53.98	13.66	0.0	100.0	V

Project # : 10211, Sample #: 884753
Temp.: 11.2 C, Hum.: 68 %
Barometer Pres.: 102.96 kPa

- Table of Radiated Harmonic Emissions of HighEnd: Peak Detecting, Antenna was used SAS-571.

LabTest Certification Inc.
Intentional Radiated Harmonics, Peak Detector
FCC15.205 & 209, 3 meters, Highend, Horizontal

Operator: Jeremy Lee

09:30:17 AM, Wednesday, May 04, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_Peak	Margin_PK	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
4.96 GHz	55.52	34.16	1.89	-30.00	61.57	73.98	12.41	180.0	100.0	H
7.44 GHz	47.71	36.45	2.39	-30.00	56.55	73.98	17.43	180.0	100.0	H
12.39 GHz	47.46	39.90	3.48	-30.00	60.84	73.98	13.14	180.0	100.0	H

Project # : 10211, Sample #: 884753
Temp.: 11.2 C, Hum.: 68 %
Barometer Pres.:102.96kPa

LabTest Certification Inc.
Intentional Radiated Harmonics, Peak Detector
FCC 15.205 & 209, 3 meters, Highend, Vertical

Operator: Jeremy Lee

09:29:25 AM, Wednesday, May 04, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_Peak	Margin_PK	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
4.96 GHz	52.18	34.16	1.89	-30.00	58.23	73.98	15.75	0.0	100.0	V
7.44 GHz	47.86	36.45	2.39	-30.00	56.70	73.98	17.28	0.0	100.0	V
12.39 GHz	46.55	39.90	3.48	-30.00	59.93	73.98	14.05	0.0	100.0	V

Project # : 10211, Sample #: 884753
Temp.: 11.2 C, Hum.: 68 %
Barometer Pres.:102.96kPa

- Table of Radiated Harmonic Emissions of HighEnd: Average Detecting, Antenna was used SAS-571.

LabTest Certification Inc.
Intentional Radiated Harmonics, AVG Detector
FCC15.205 & 209, 3 meters, Highend, Horizontal

Operator: Jeremy Lee

09:30:17 AM, Wednesday, May 04, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_AVG	Margin_AVG	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
4.96 GHz	47.57	34.16	1.89	-30.00	53.62	53.98	0.36	180.0	100.0	H
7.44 GHz	31.40	36.45	2.39	-30.00	40.24	53.98	13.74	180.0	100.0	H
12.39 GHz	27.71	39.90	3.48	-30.00	41.09	53.98	12.89	180.0	100.0	H

Project # : 10211, Sample #: 884753
Temp.: 11.2 C, Hum.: 68 %
Barometer Pres.:102.96kPa

LabTest Certification Inc.
Intentional Radiated Harmonics, AVG Detector
FCC 15.205 & 209, 3 meters, Highend, Vertical

Operator: Jeremy Lee

09:29:25 AM, Wednesday, May 04, 2011

Model #: LPT24RC
Contact: Radu Oprea
Company: Cooper Industries Inc.

Frequency	Measured	AntFactor	CableLoss	Preamp	Emission	Limit_AVG	Margin_AVG	T/T	Tower	Pol
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	degree	cm	
4.96 GHz	44.12	34.16	1.891	-30.00	50.17	53.98	3.81	0.0	100.0	V
7.44 GHz	33.46	36.45	2.387	-30.00	42.30	53.98	11.68	0.0	100.0	V
12.39 GHz	27.54	39.90	3.478	-30.00	40.92	53.98	13.06	0.0	100.0	V

Project # : 10211, Sample #: 884753
Temp.: 11.2 C, Hum.: 68 %
Barometer Pres.:102.96kPa

Antenna-port Conducted Emissions

Temperature	18.8 to 19.1 ℃
Relative Humidity	49.0 to 49.6 %
Barometric Pressure:	101.86 to 101.90 kPa
Test Date	May 10, 2011
Sample Number	884753
Calibrated Test Equipment (ID)	228, 272
Reference Equipment (ID) (Calibration not required)	059, N1
Tested By	Jeremy Lee

Use the barometric pressure reported at: http://www.theweathernetwork.com/weather/cabc0248

Test Limits

15.247(d)

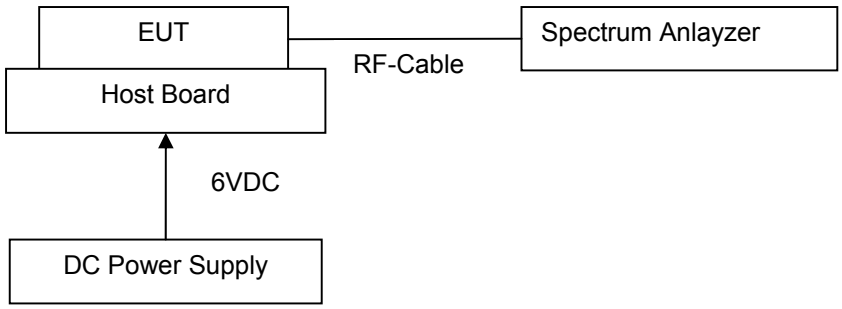
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Test Setup

The test was performed in accordance with **FCC 15.247:2009, FCC 15.31:2009 and ANSI C63.10:2009.**

- The RF output of the EUT was connected to the RF input port of the Spectrum Analyzer.
- The EUT was set-up in three different transmiting modes, low-end, middle, and high-end.
- The transmitter was set to output its maximum power.
- The following measurements were made with
  - Span = wide enough to capture the peak level of the in-band emission and all spurious emissions(e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic.
  - RBW = 100kHz up to 2.5GHz, 1MHz over 2.5GHz.
  - VBW ≥ RBW
  - Sweep = Auto
  - Detector Function = peak
  - Trace = Single trace up to capturing the whole range of signal
  - Allowed the trace to stabilize.
- Set the marker on the peak of any spurious emission recorded.

Setup Block Diagram



Test Results:

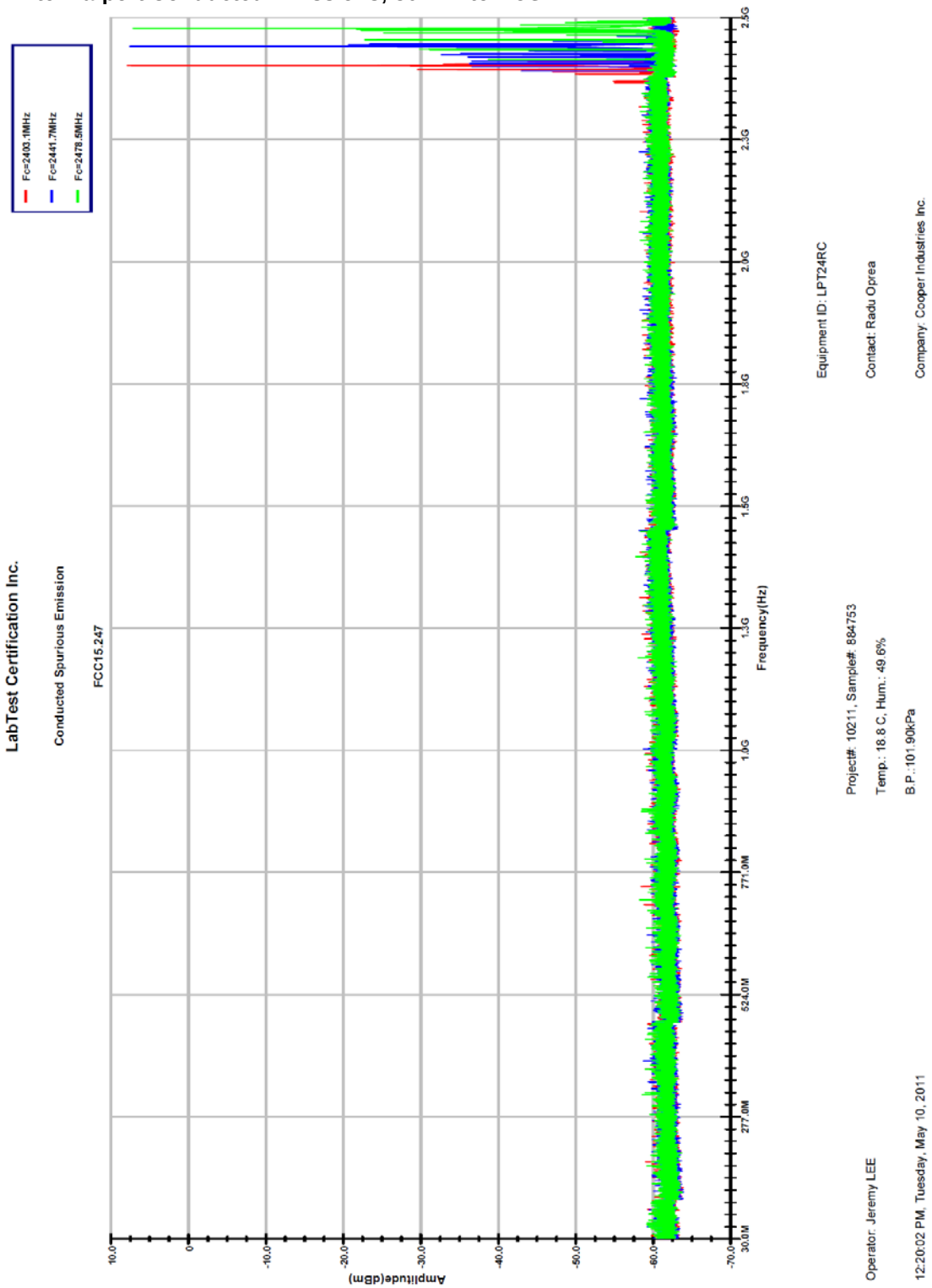
Difference(dB) = Measured Carrier Level(dBm) – Measured Spurious Level(dBm)

Description	Frequency (MHz)	Measured (dBm)	Difference (dB)	Limit (dB)	Pass/Fail
Carrier_Low End	2403.1	7.79	-	-	-
Spurious	2395.1	-29.66	37.45	> 20	Pass
	2405.4	-32.96	40.75	> 20	Pass
	2410.9	-43.90	51.69	> 20	Pass
2nd Harmonic	4806.2	-49.75	57.54	> 20	Pass
3rd Harmonic	7209.3	-48.23	56.02	> 20	Pass
4th Harmonic	9612.4	-50.11	57.90	> 20	Pass
5th Harmonic	12015.5	-49.22	57.01	> 20	Pass
6th Harmonic	14418.6	-47.26	55.05	> 20	Pass
7th Harmonic	16821.7	-45.15	52.94	> 20	Pass
8th Harmonic	19224.8	-44.16	51.95	> 20	Pass
9th Harmonic	21627.9	-42.55	50.34	> 20	Pass
10th Harmonic	24031.0	-42.13	49.92	> 20	Pass
Carrier_Middle	2441.7	7.50	-	-	-
Spurious	2391.9	-43.05	50.55	> 20	Pass
	2444.9	-20.74	28.24	> 20	Pass
	2447.3	-23.53	31.03	> 20	Pass
2nd Harmonic	4883.4	-49.80	57.30	> 20	Pass

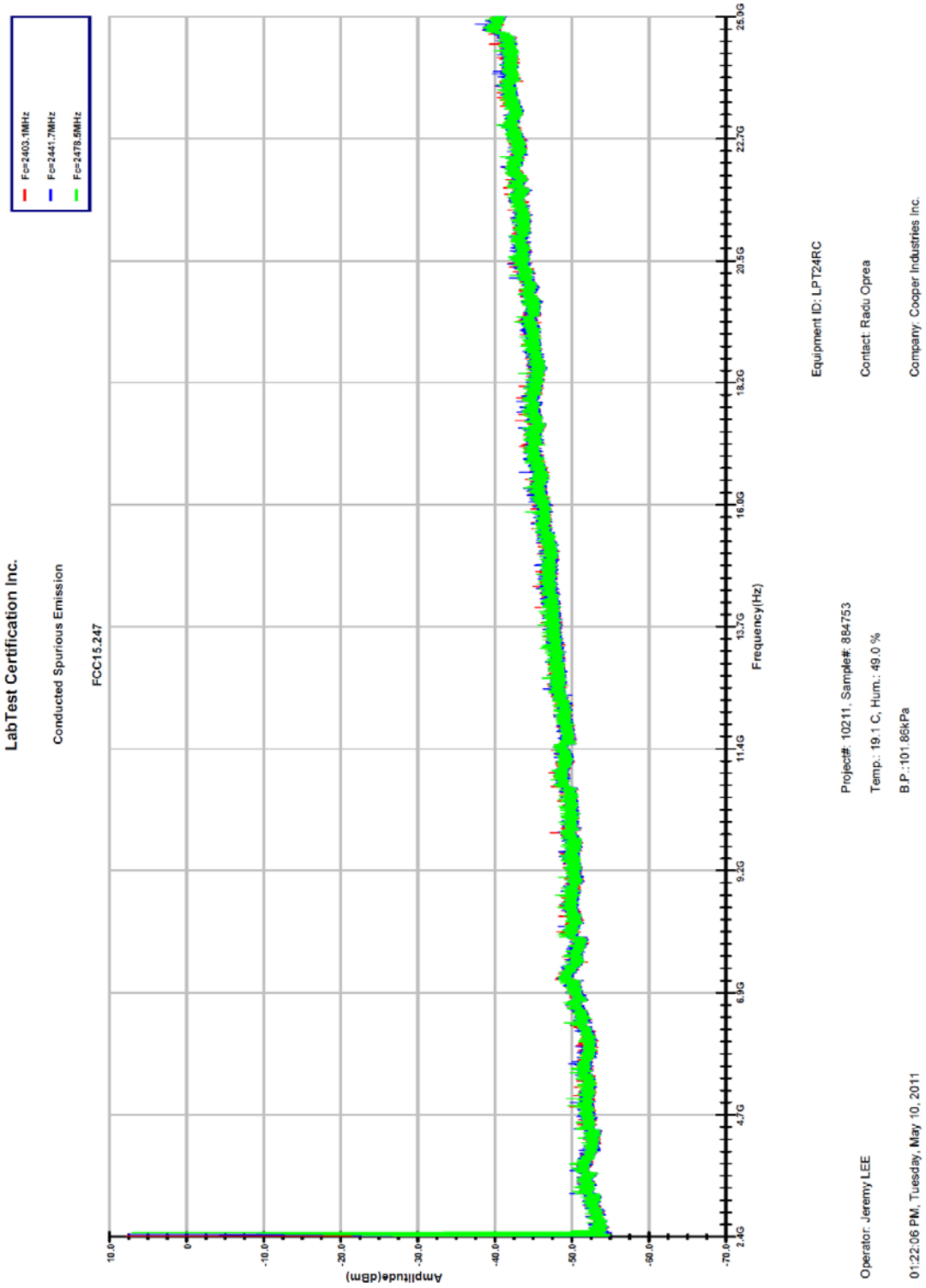
3rd Harmonic	7325.1	-49.87	57.37	> 20	Pass
4th Harmonic	9766.8	-51.02	58.52	> 20	Pass
5th Harmonic	12208.5	-49.45	56.95	> 20	Pass
6th Harmonic	14650.2	-47.62	55.12	> 20	Pass
7th Harmonic	17091.9	-45.84	53.34	> 20	Pass
8th Harmonic	19533.6	-44.95	52.45	> 20	Pass
9th Harmonic	21975.3	-43.12	50.62	> 20	Pass
10th Harmonic	24417.0	-42.13	49.63	> 20	Pass
Carrier_High End	2478.5	7.10	-	-	-
Spurious	2455.1	-22.85	29.95	> 20	Pass
	2476.4	-21.80	28.90	> 20	Pass
	2484.8	-42.95	50.05	> 20	Pass
2nd Harmonic	4957.0	-49.39	56.49	> 20	Pass
3rd Harmonic	7435.5	-50.38	57.48	> 20	Pass
4th Harmonic	9914.0	-49.91	57.01	> 20	Pass
5th Harmonic	13292.5	-47.90	55.00	> 20	Pass
6th Harmonic	14871.0	-46.71	53.81	> 20	Pass
7th Harmonic	17349.5	-45.63	52.73	> 20	Pass
8th Harmonic	19828.0	-44.95	52.05	> 20	Pass
9th Harmonic	22306.5	-42.67	49.77	> 20	Pass
10th Harmonic	24785.0	-40.46	47.56	> 20	Pass

X Pass **Fail** **N/A**

- Antenna-port Conducted Emissions; 30MHz to 2.5GHz.



- Antenna-port Conducted Emissions; 2.5 to 25GHz.



Occupied Bandwidth (OBW)

Temperature	18.7 to 19.2 ℃
Relative Humidity	51.6 to 51.8 %
Barometric Pressure:	102.03 to 102.05 kPa
Test Date	May 09, 2011
Sample Number	884753
Calibrated Test Equipment (ID)	228, 272
Reference Equipment (ID) (Calibration not required)	059, N1
Tested By	Jeremy Lee

Use the barometric pressure reported at: http://www.theweathernetwork.com/weather/cabc0248

Test Limits

15.247(a)(1)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Test Setup

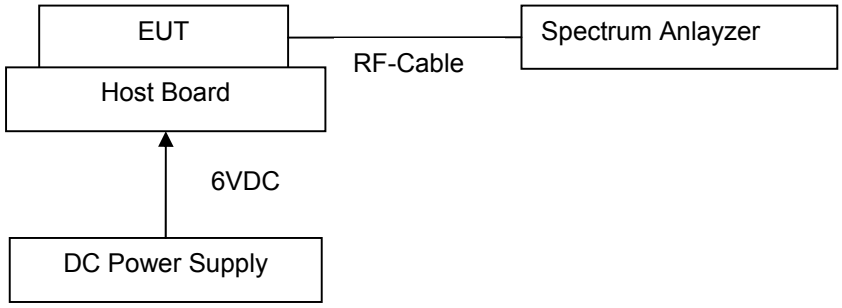
The test was performed in accordance with **FCC 15.247:2009, FCC 15.31:2009 and ANSI C63.10:2009.**

- The RF output of the EUT was connected to the RF input port of the Spectrum Analyzer.
- The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the unlicensed wireless device at either the fundamental frequency or the first-order modulation products in all typical modes of operation, including the un-modulated carrier, even if atypical. Once the reference level is established, the equipment is conditioned with typical modulating signals to produce the worst-case (i.e., the widest) bandwidth. Unless otherwise specified for an unlicensed wireless device, measure the bandwidth at the –20 dB levels with respect to the reference level.
- To measure the modulated signal properly, a resolution bandwidth that is small compared with the bandwidth required by the procuring or regulatory agency shall be used on the measuring instrument.
    1) The span range for the SA display shall be between two times and five times the OBW.
    2) The nominal IF filter bandwidth (3 dB RBW) should be approximately 1 % to 5 % of the OBW, unless otherwise specified, depending on the applicable requirement.
    3) The dynamic range of the SA at the selected RBW shall be more than 10 dB below the target “dB down” (attenuation) requirement, i.e., if the requirement calls for measuring the –20 dB OBW, the SA noise floor at the selected RBW shall be at least 30 dB below the largest measured value on the display
- Supply the EUT with nominal ac voltage, or install a new or fully charged battery in the EUT. Turn the EUT on, and set it to a frequency within its operating range and within regulatory requirements. Set a reference level on the measuring instrument at any level that will allow measuring the specified bandwidth (e.g., –20 dB below the un-modulated carrier).
- Supply the EUT with modulation. Devices modulated from internal sources shall be tested with typical modulation applied. If a device is equipped with input connectors for external modulation, typical modulating signals shall be applied at the maximum-rated input level for the device. Observe

and record with plotted graphs or photographs the worst-case (i.e., widest) occupied bandwidth produced by these different modulation sources.

- Set a reference level on the measuring instrument equal to the highest amplitude signal observed from the unlicensed wireless device at either the fundamental frequency or the first-order modulation products in all typical modes of operation, including the un-modulated carrier, even if atypical.
- Measure the frequencies of the modulated signal from the EUT, where it is the specified number of decibels below the reference level. The result is the occupied bandwidth.

Setup Block Diagram

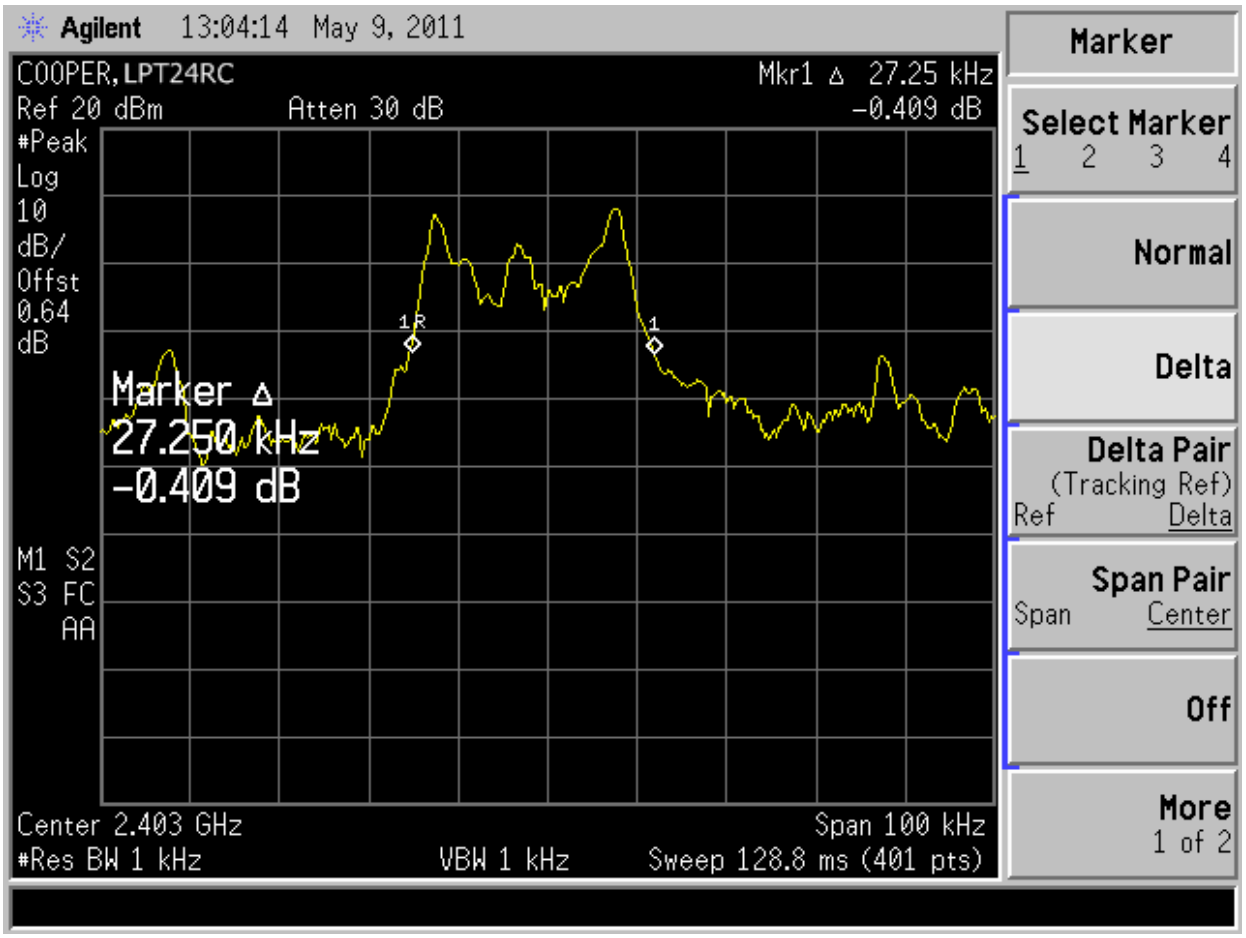


Test Results:

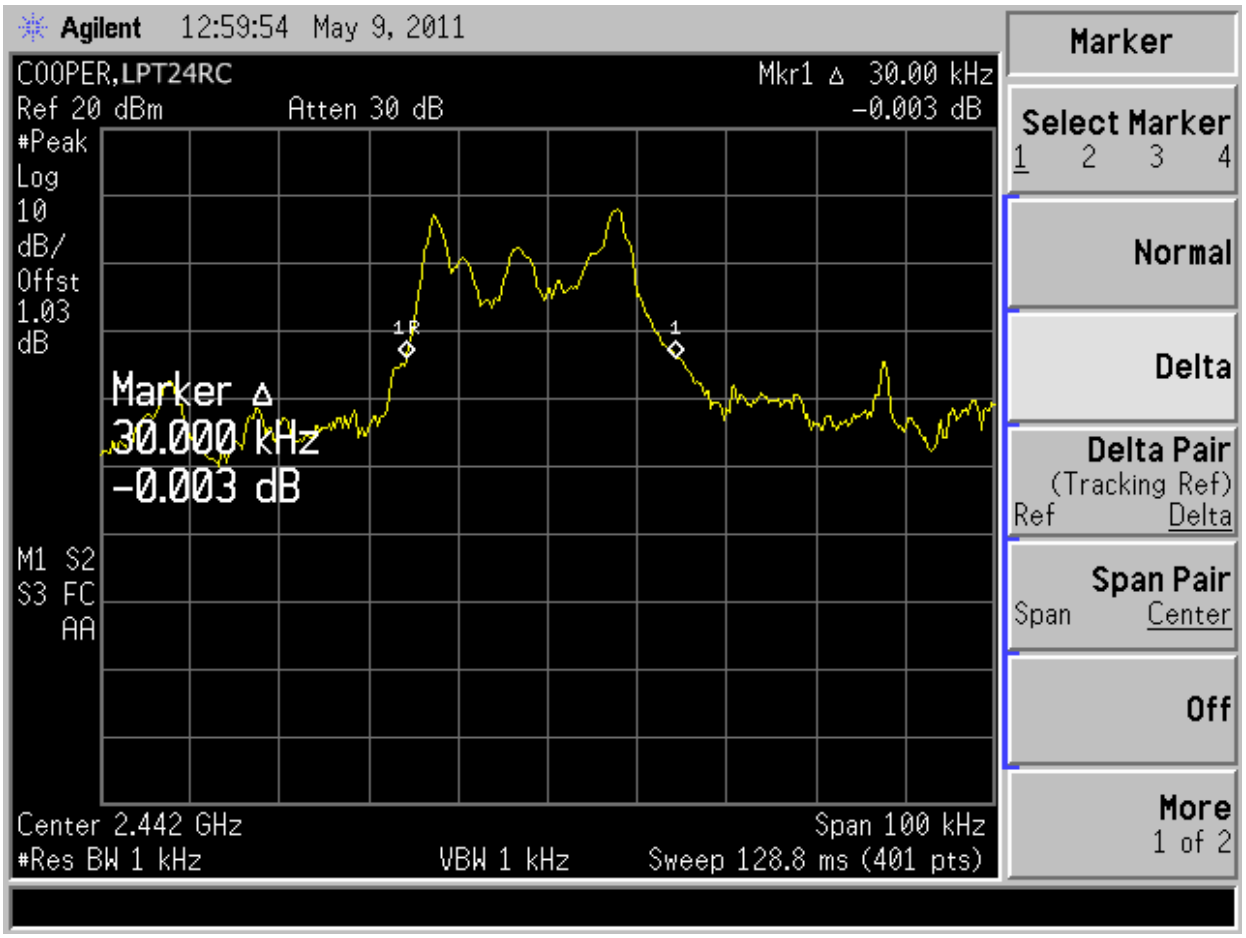
Carrier Frequency(MHz)	20dB BW(kHz)	Limit(kHz)	Pass/Fail
2403.1	27.25	N/A	N/A
2441.7	30.00	N/A	N/A
2478.5	32.50	N/A	N/A

X Pass Fail N/A

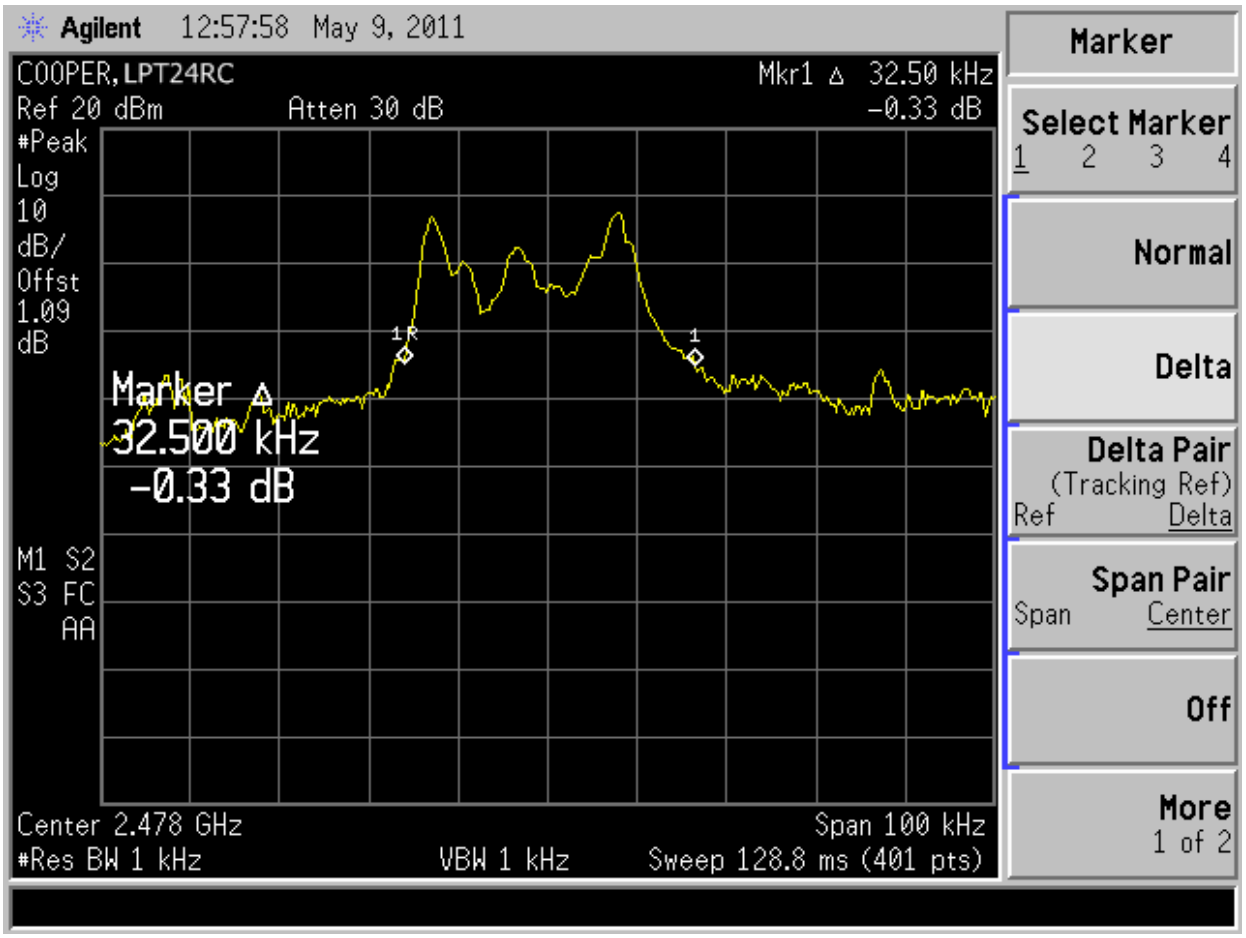
- OBW of Low End; centre frequency is 2403.1MHz



- OBW of middle, at centre frequency is 2441.7MHz



- OBW of High End, at centre frequency is 2478.5MHz



Band-edge Compliance

Temperature	18.7 to 19.2 ℃
Relative Humidity	51.6 to 51.8 %
Barometric Pressure:	102.03 to 102.05 kPa
Test Date	May 09, 2011
Sample Number	884753
Calibrated Test Equipment (ID)	228, 272
Reference Equipment (ID) (Calibration not required)	059, N1
Tested By	Jeremy Lee

Use the barometric pressure reported at: http://www.theweathernetwork.com/weather/cabc0284

Test Limits

15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

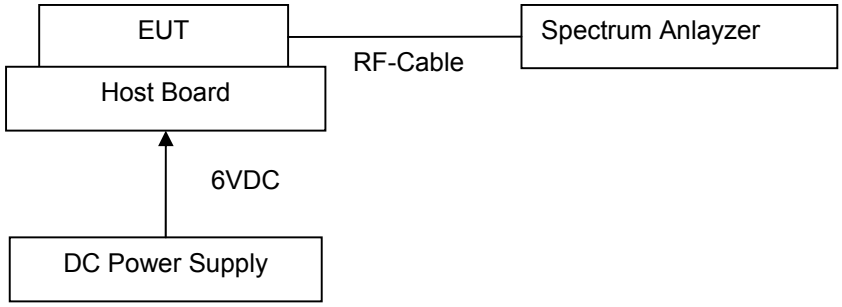
Test Setup

The test was performed in accordance with **FCC 15.247:2009, FCC 15.31:2009 and ANSI C63.10:2009.**

This procedure is applicable for determining compliance at authorized band edges, but not at restricted band edges.

- The RF output of the EUT was connected to the RF input port of the Spectrum Analyzer.
- The transmitter was transmitting at its maximum data rate and maximum power.
- The following measurements were made with
  - Span = wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.
  - RBW ≥ 1% of spectrum analyzer display span
  - VBW ≥ RBW
  - Sweep = Auto
  - Detector Function = peak
  - Trace = Max Hold
  - Allowed the trace to stabilize.
- Set the marker on the emission at the bandedge, or on the highest modulation product outside of band, if this level is greater than that at the band edge.
- Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission.
- Now, using the same instrumentation settings, enable the hopping function of the EUT. Allow the trace to stabilize. Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit.

Setup Block Diagram

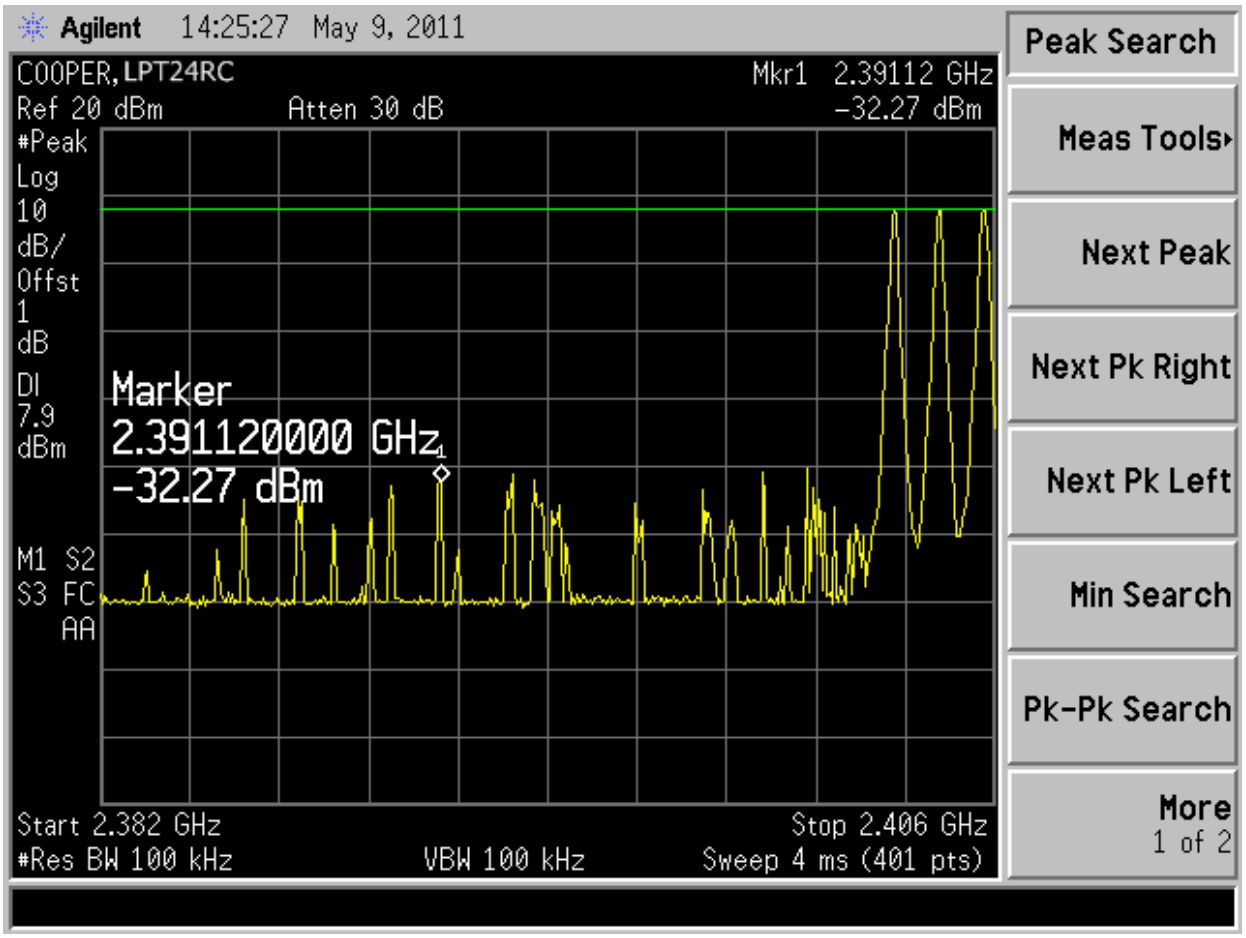


Test Results:

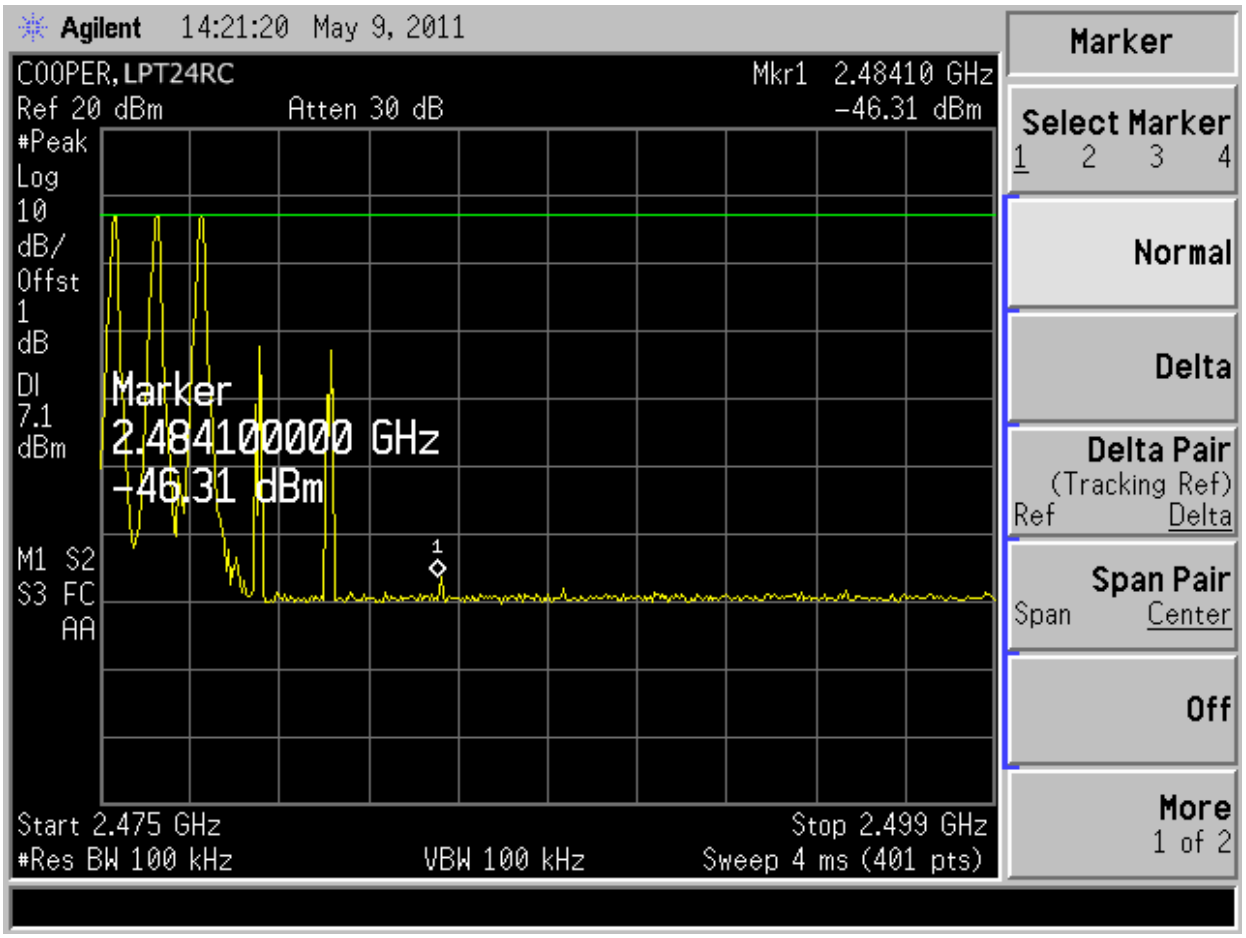
X Pass Fail N/A

Channel Frequency(MHz)	Hopping Mode	Band-edge(dB)	Limit(dB)	Pass/Fail
Low end	Yes	40.17	≥ 20	Pass
High end	Yes	53.41	≥ 20	Pass

- Band-edge compliance at low-end, hopping, the lowest centre frequency is 2403.1MHz



- Band-edge compliance at High-end, hopping, the highest centre frequency is 2478.5MHz



Conducted Output Power

Temperature	18.7 to 19.2 ℃
Relative Humidity	51.6 to 51.8 %
Barometric Pressure:	102.03 to 102.05 kPa
Test Date	May 09, 2011
Sample Number	884753
Calibrated Test Equipment (ID)	228, 272
Reference Equipment (ID) (Calibration not required)	059, N1
Tested By	Jeremy Lee

Use the barometric pressure reported at: http://www.theweathernetwork.com/weather/cabc0248

Test Limits

15.247(b)

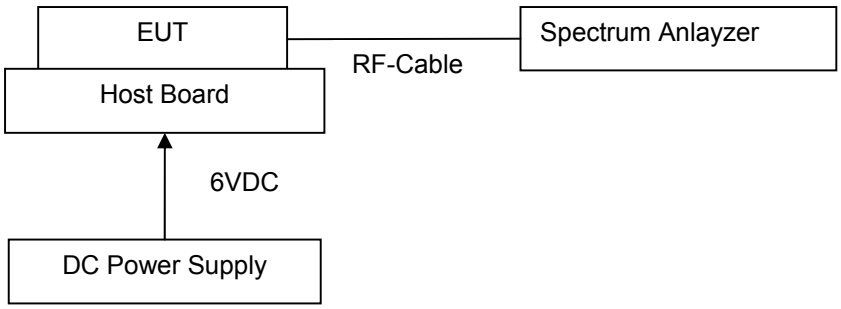
The maximum peak conducted output power of the intentional radiator shall not exceed the following:
(1) For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts..

Test Setup

The test was performed in accordance with **FCC 15.247:2009, FCC 15.31:2009 and ANSI C63.10:2009.**

- The RF output of the EUT was connected to the RF input port of the Spectrum Analyzer.
- The EUT was measured at three differrent transmitting frequencies, low-end, middle, and high-end.
- The transmitter was set-up as its maximum power.
- The following measurements were made with
  - Span = approximately five times the 20 dB BW, centered on a hopping channel
  - RBW > 20dB BW of the emission being measured
  - VBW ≥ RBW
  - Sweep = auto
  - Detector Function = peak
  - Trace = max hold
- Allowed the trace to stabilize.
- Use the marker-to-peak function to set the marker to the peak of the emission.
- The indicated level is the peak conductyed output power(with the addition of the cable loss).

Setup Block Diagram

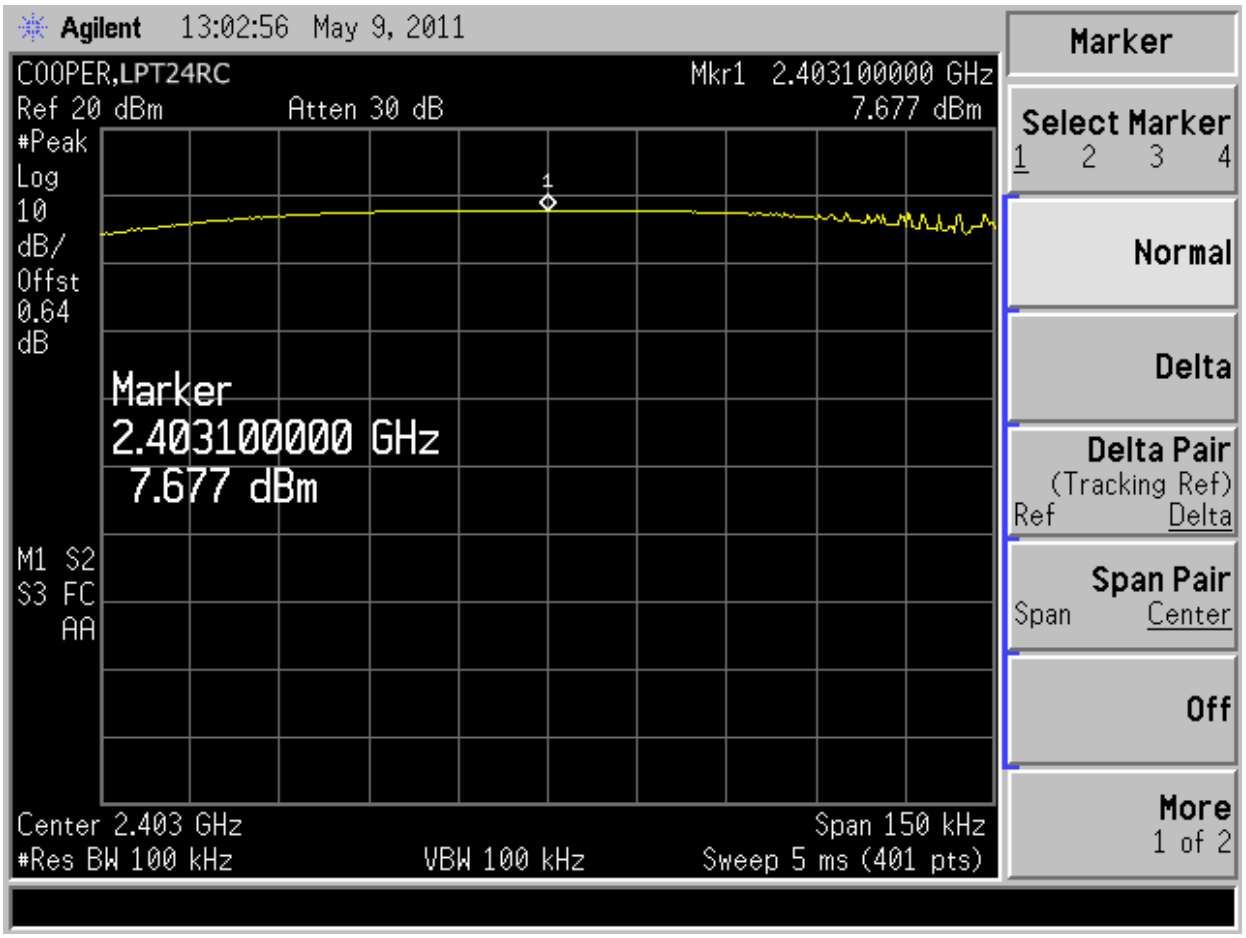


Test Results:

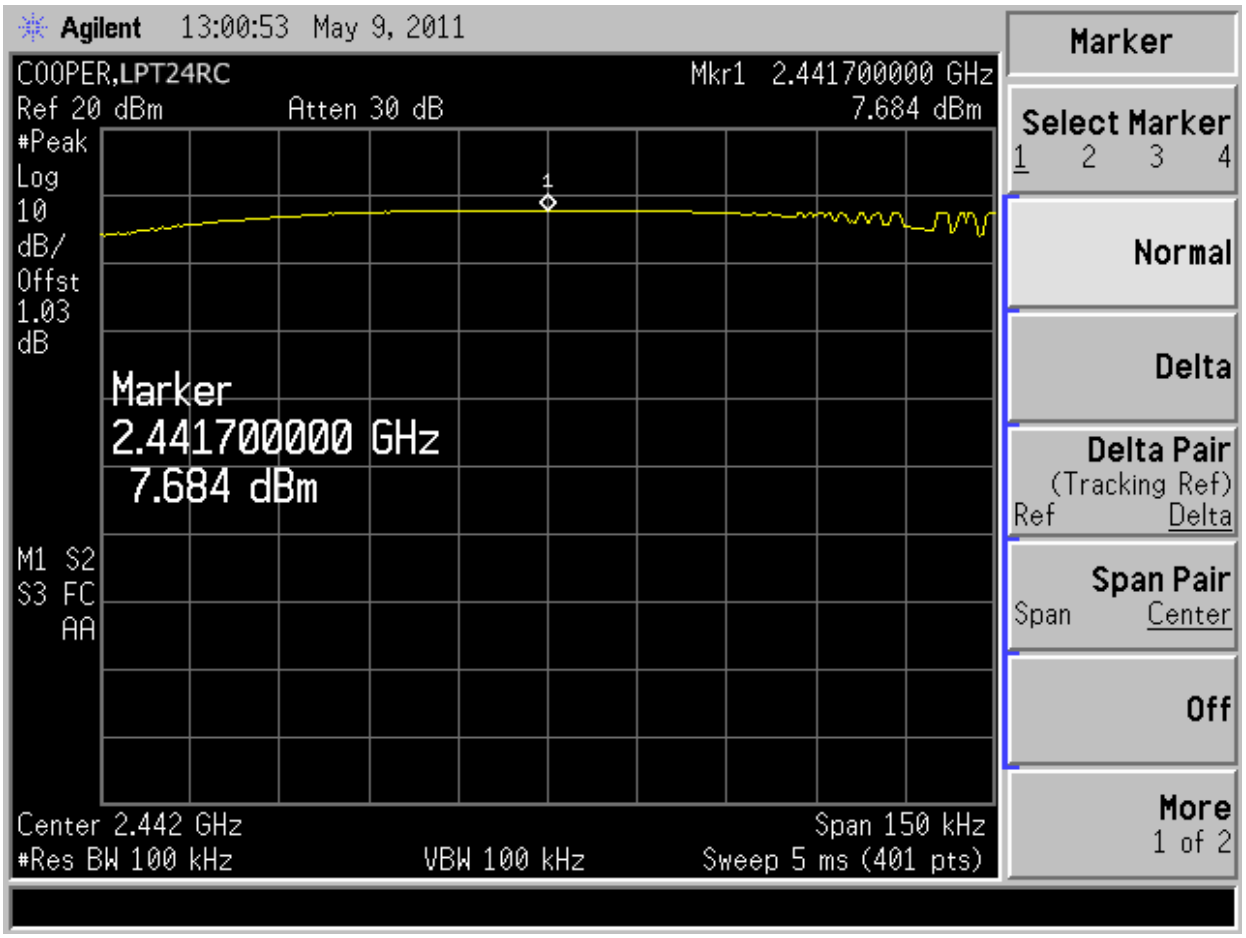
Channel Frequency(MHz)	Peak Power(dBm)	Limit(W/dBm)	Pass/Fail
2403.1	7.677	≤ 0.125 / + 20.97	Pass
2441.7	7.684	≤ 0.125 / + 20.97	Pass
2478.5	7.171	≤ 0.125 / + 20.97	Pass

X Pass Fail N/A

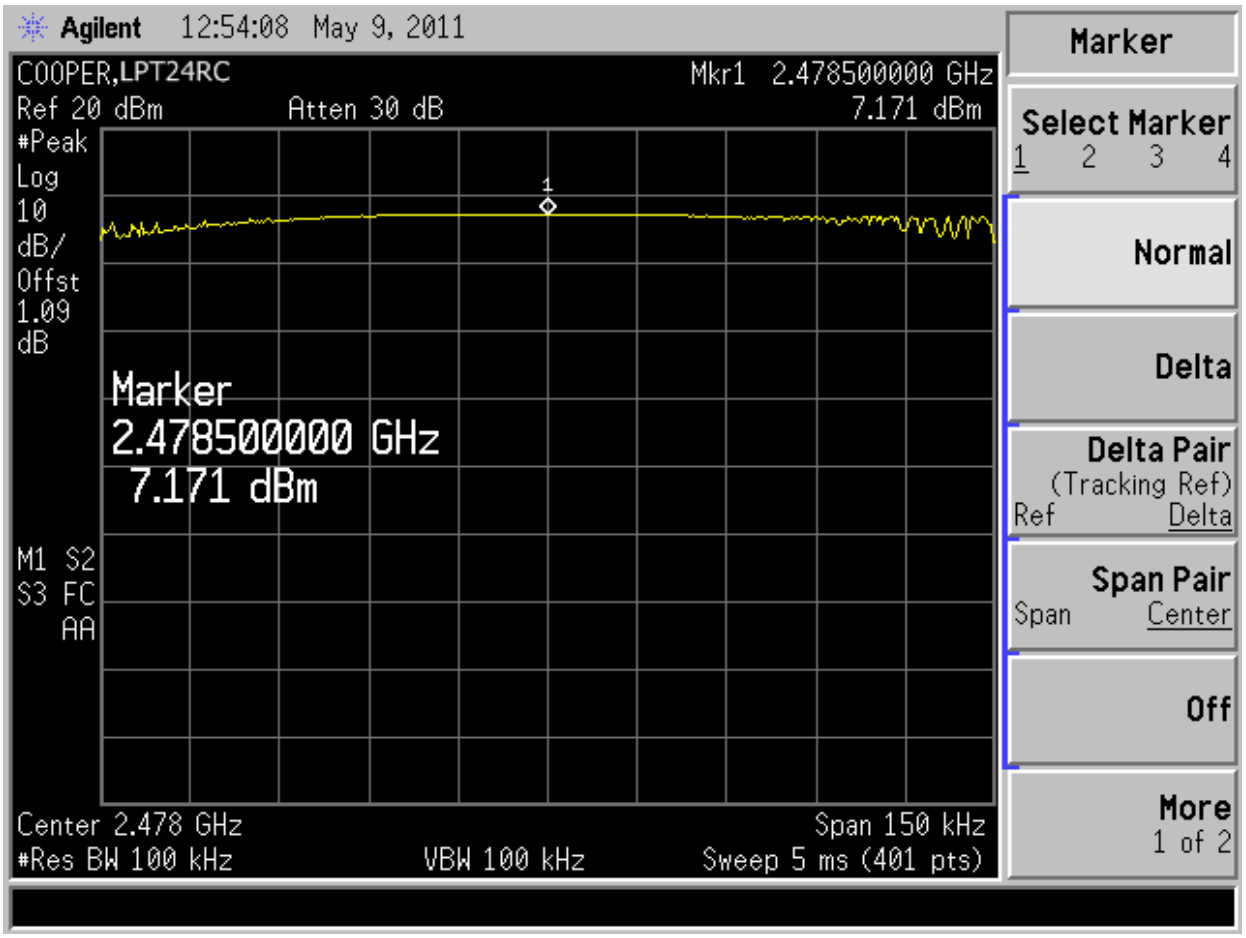
- Conducted maximum power at the Carrier Frequency is 2403.1MHz



- Conducted maximum power at the Carrier Frequency is 2441.7MHz



- Conducted maximum power at the Carrier Frequency is 2478.5MHz



Antenna Gain

Test Date	May 10, 2011
Sample Number	884753
Tested By	Jeremy Lee

Test Limits

15.247(b)
(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi.

Test Results:

Antenna description	Peak Antenna Gain(dBi)	Limit(dBi)	Pass/Fail
Internal Sleeved dipole	1.76	≤ 6	Pass

X Pass Fail N/A

Carrier Frequency Separation

Temperature	18.7 to 19.2 ℃
Relative Humidity	51.6 to 51.8 %
Barometric Pressure:	102.03 to 102.05 kPa
Test Date	May 09, 2011
Sample Number	884753
Calibrated Test Equipment (ID)	228, 272
Reference Equipment (ID) (Calibration not required)	059, N1
Tested By	Jeremy Lee

Use the barometric pressure reported at: http://www.theweathernetwork.com/weather/cabc0248

Test Limits

15.247(a)

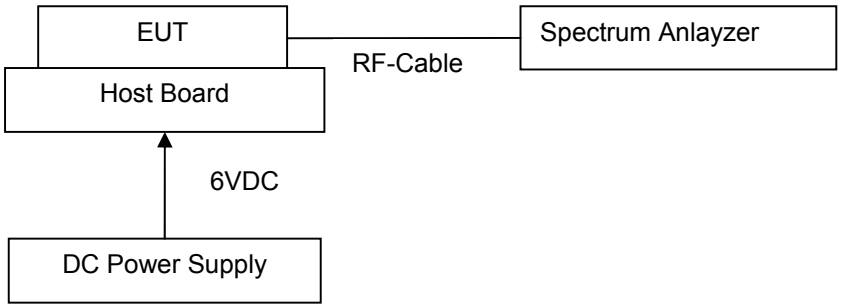
(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Test Setup

The test was performed in accordance with **FCC 15.247:2009, FCC 15.31:2009 and ANSI C63.10:2009.**

- The RF output of the EUT was connected to the RF input port of the Spectrum Analyzer.
- The EUT 's hopping function was enabled.
- The transmitter was transmitting at its maximum data rate and power.
- The following measurements were made with
  - Span = wide enough to capture the peaks of two adjacent channels.
  - RBW ≥ 1% of each span
  - VBW ≥ RBW
  - Sweep = auto
  - Detector Function = peak
  - Trace = max hold
  - Allowed the trace to stabilize.
- Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

Setup Block Diagram

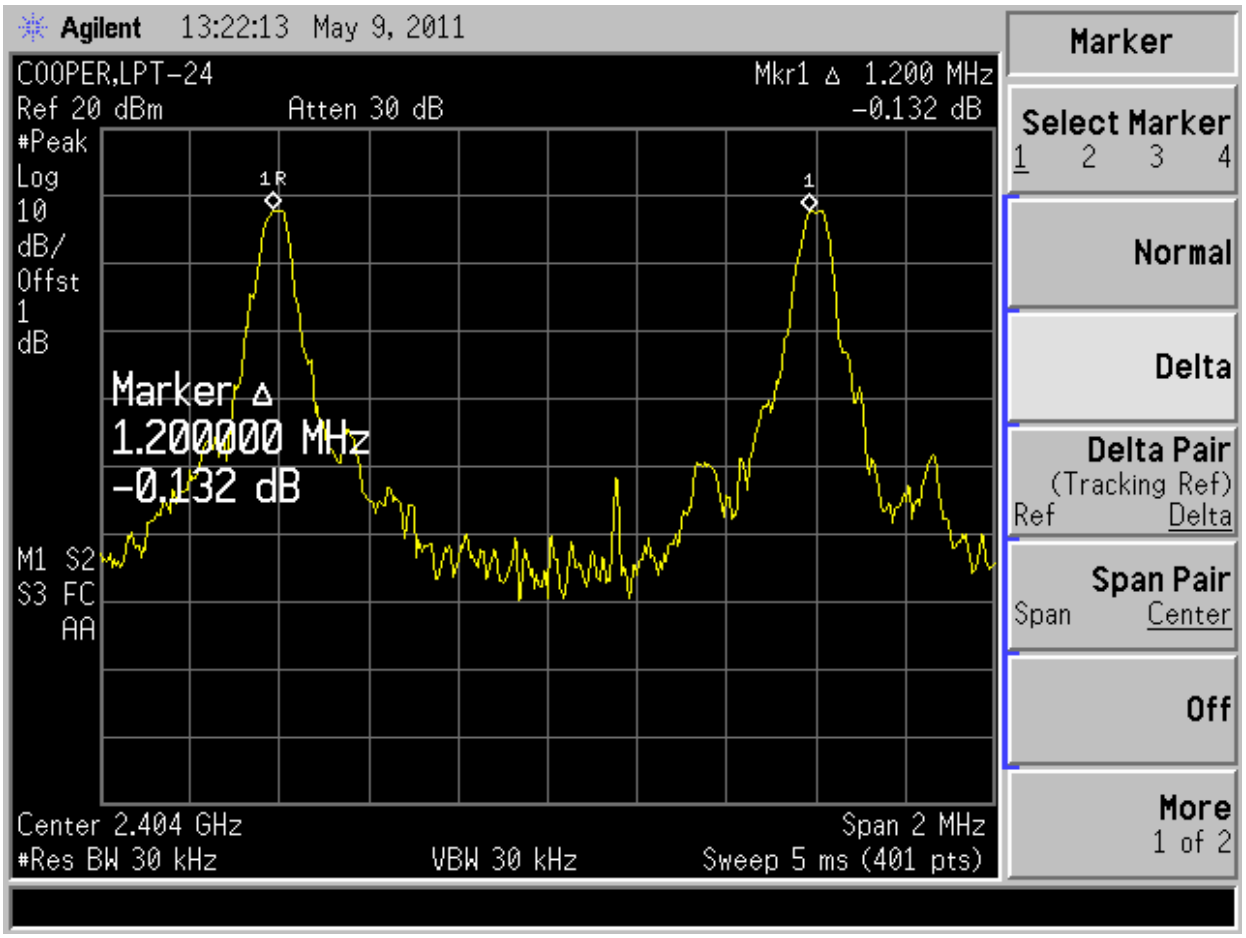


Test Results:

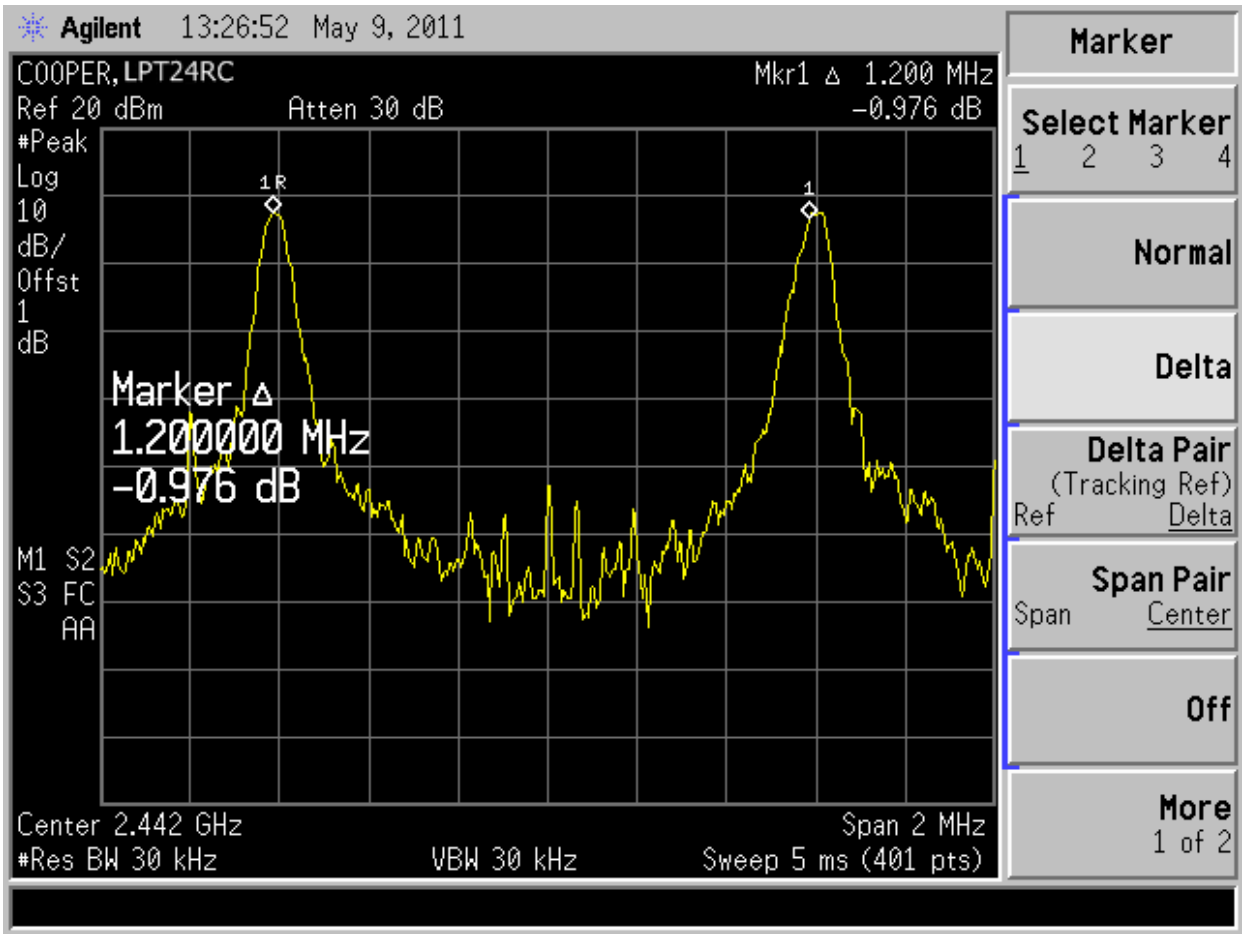
Centre Frequency(MHz)	Carrier Frequency Separation (kHz)	Limit(kHz)	Pass/Fail
2403.1	1200	≥ 25	Pass
2441.7	1200	≥ 25	Pass
2478.5	1200	≥ 25	Pass

X Pass Fail N/A

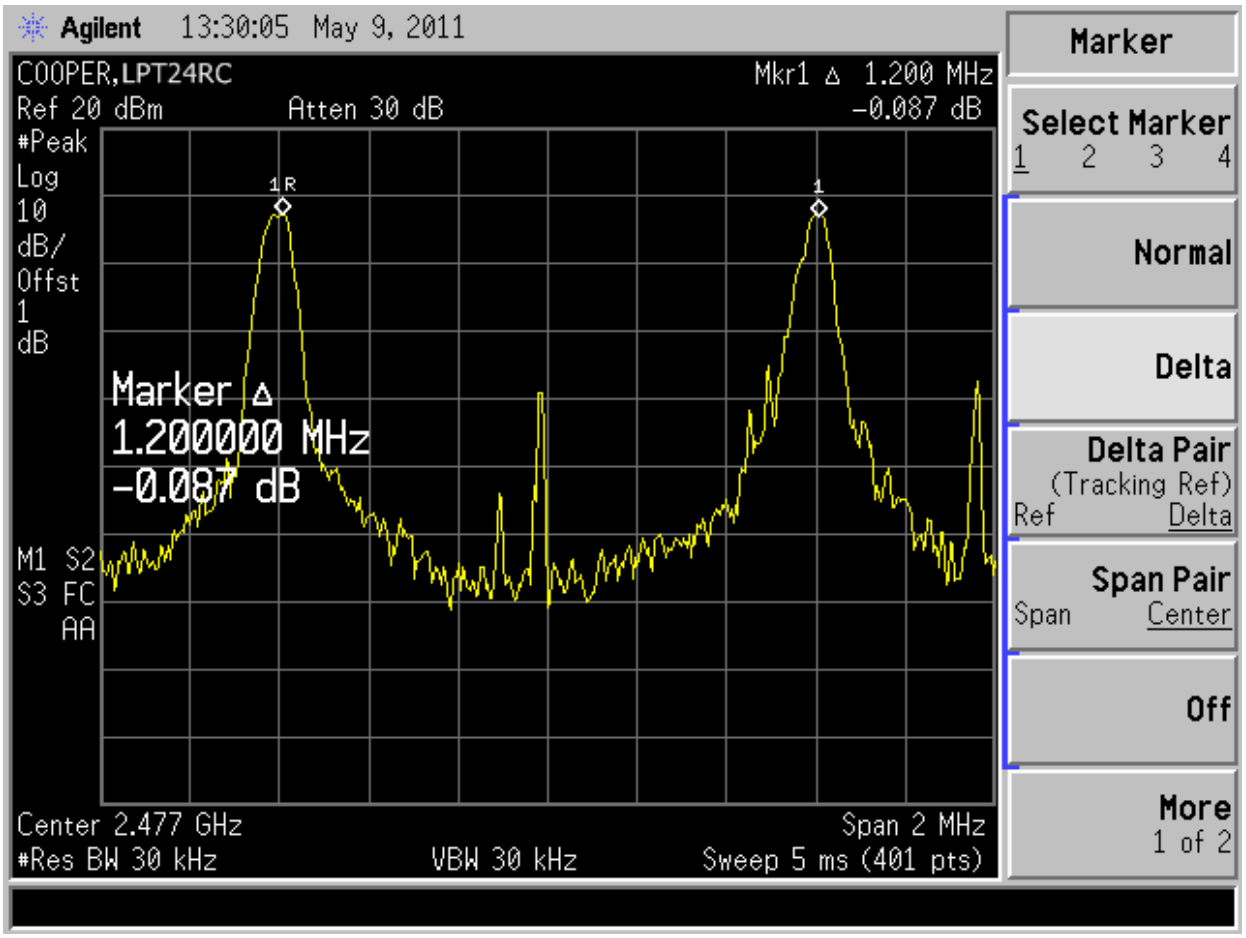
- Carrier Frequency Separation of Low End; centre frequency is 2403.1MHz.



- Carrier Frequency Separation of middle; centre frequency is 2441.7MHz.



- Carrier Frequency Separation of High End; centre frequency is 2478.5MHz.



Number of Hopping Frequencies

Temperature	18.7 to 19.2 ℃
Relative Humidity	51.6 to 51.8 %
Barometric Pressure:	102.03 to 102.05 kPa
Test Date	May 09, 2011
Sample Number	884753
Calibrated Test Equipment (ID)	228, 272
Reference Equipment (ID) (Calibration not required)	059, N1
Tested By	Jeremy Lee

Use the barometric pressure reported at: http://www.theweathernetwork.com/weather/cabc0248

Test Limits

15.247(a)(1)

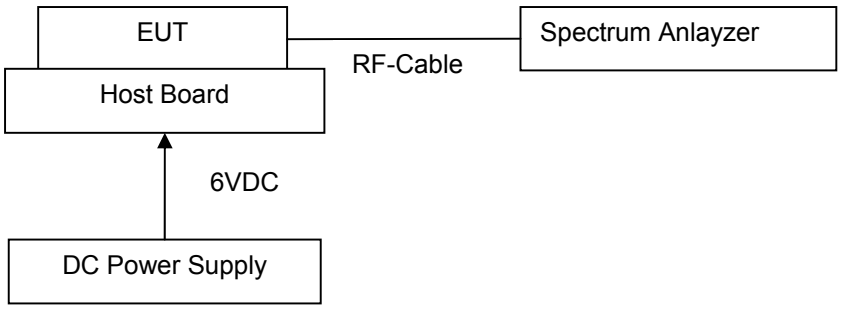
(iii) Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Setup

The test was performed in accordance with **FCC 15.247:2009, FCC 15.31:2009 and ANSI C63.10:2009.**

- The RF output of the EUT was connected to the RF input port of the Spectrum Analyzer.
- The EUT had its hopping function enabled.
- The transmitter was transmitting at its maximum data rate and maximum power.
- The following measurements were made with
  - Span = the frequency band of operation.
  - RBW ≥ 1% of the span
  - VBW ≥ RBW
  - Sweep = auto
  - Detector Function = peak
  - Trace = max hold
  - Allowed the trace to stabilize.
- Count to the peak detected signals.

Setup Block Diagram

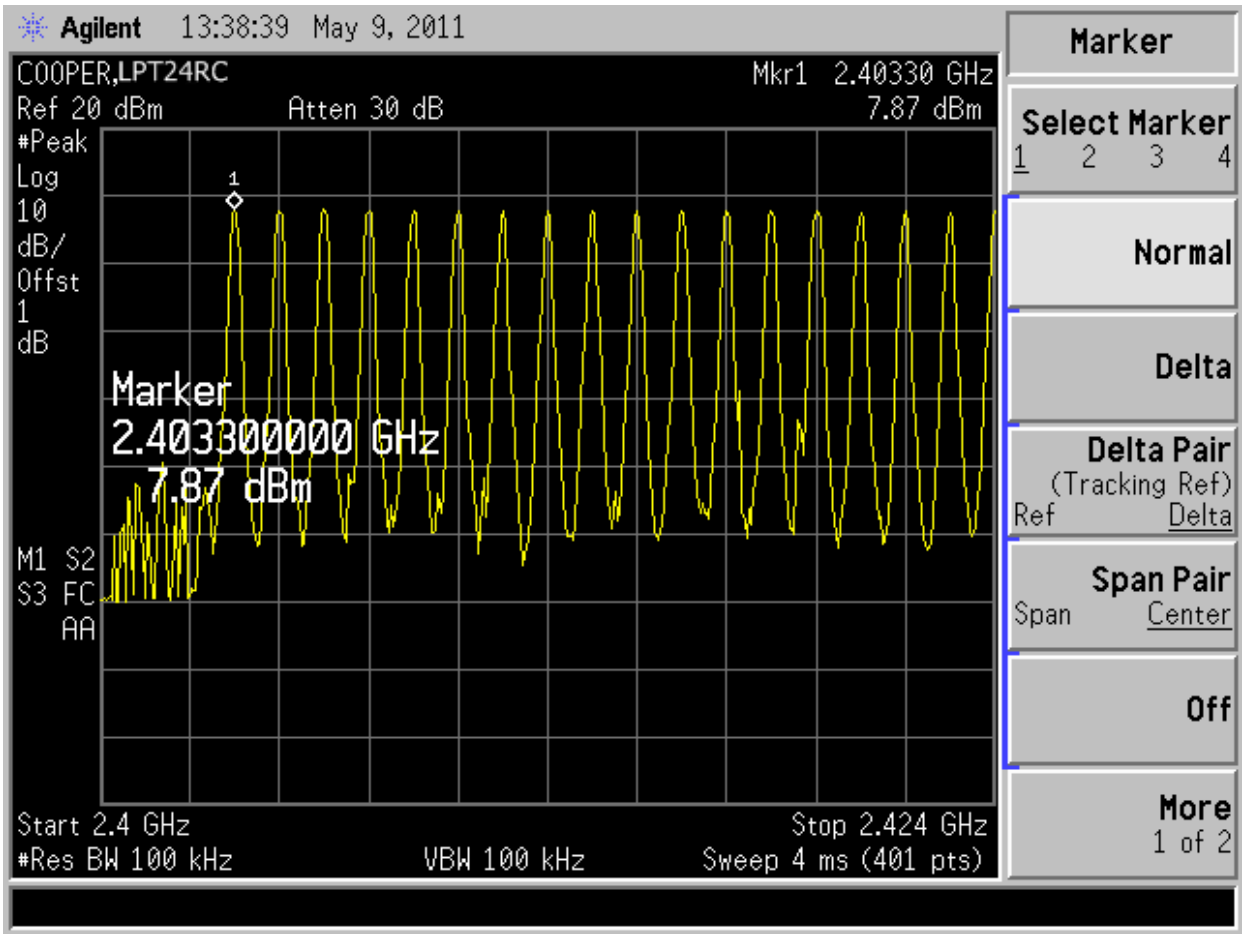


Test Results:

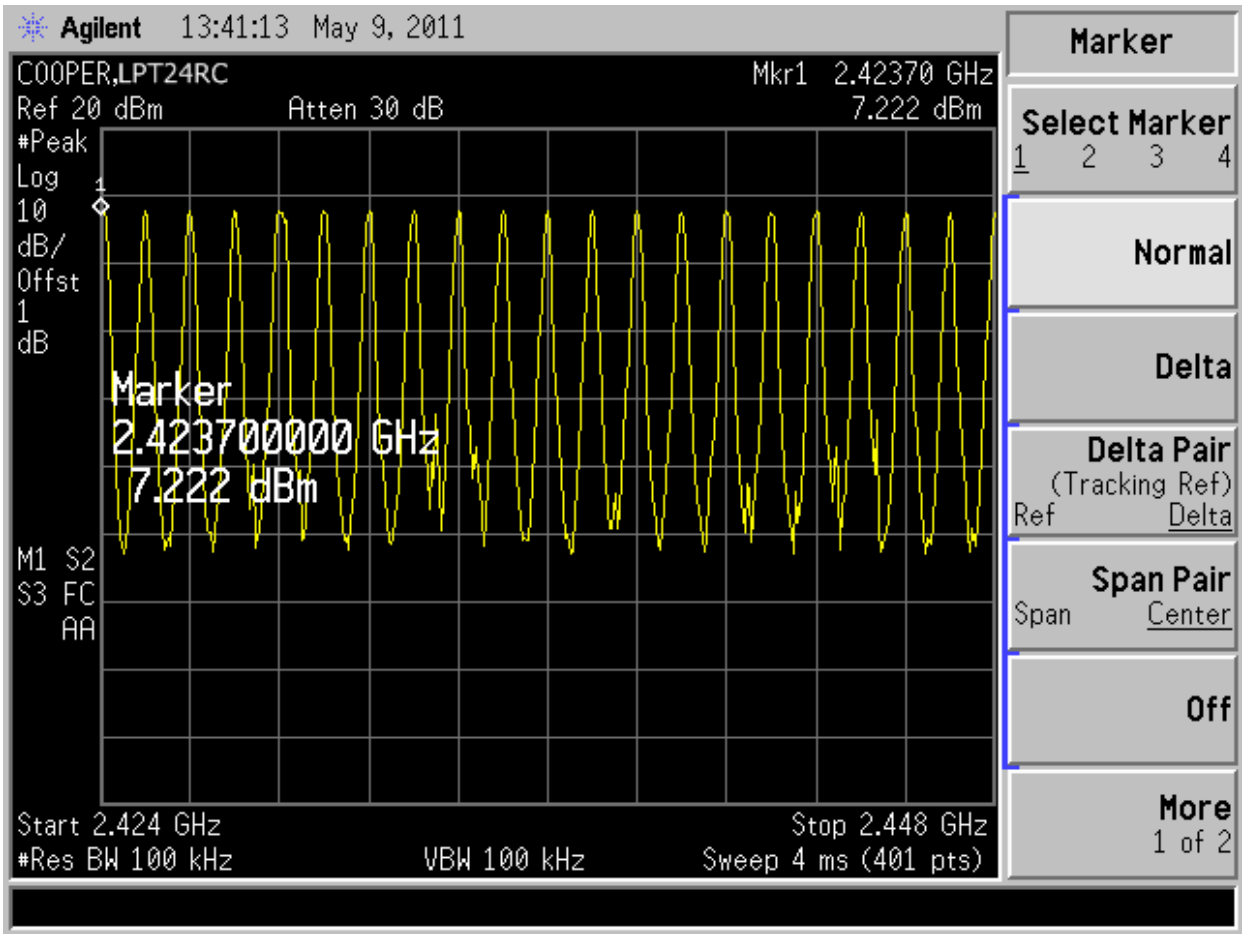
Frequency range (MHz)	Channel Number	Limit	Pass/Fail
2403.1 to 2478.5	63	≥ 15	Pass

X Pass Fail N/A

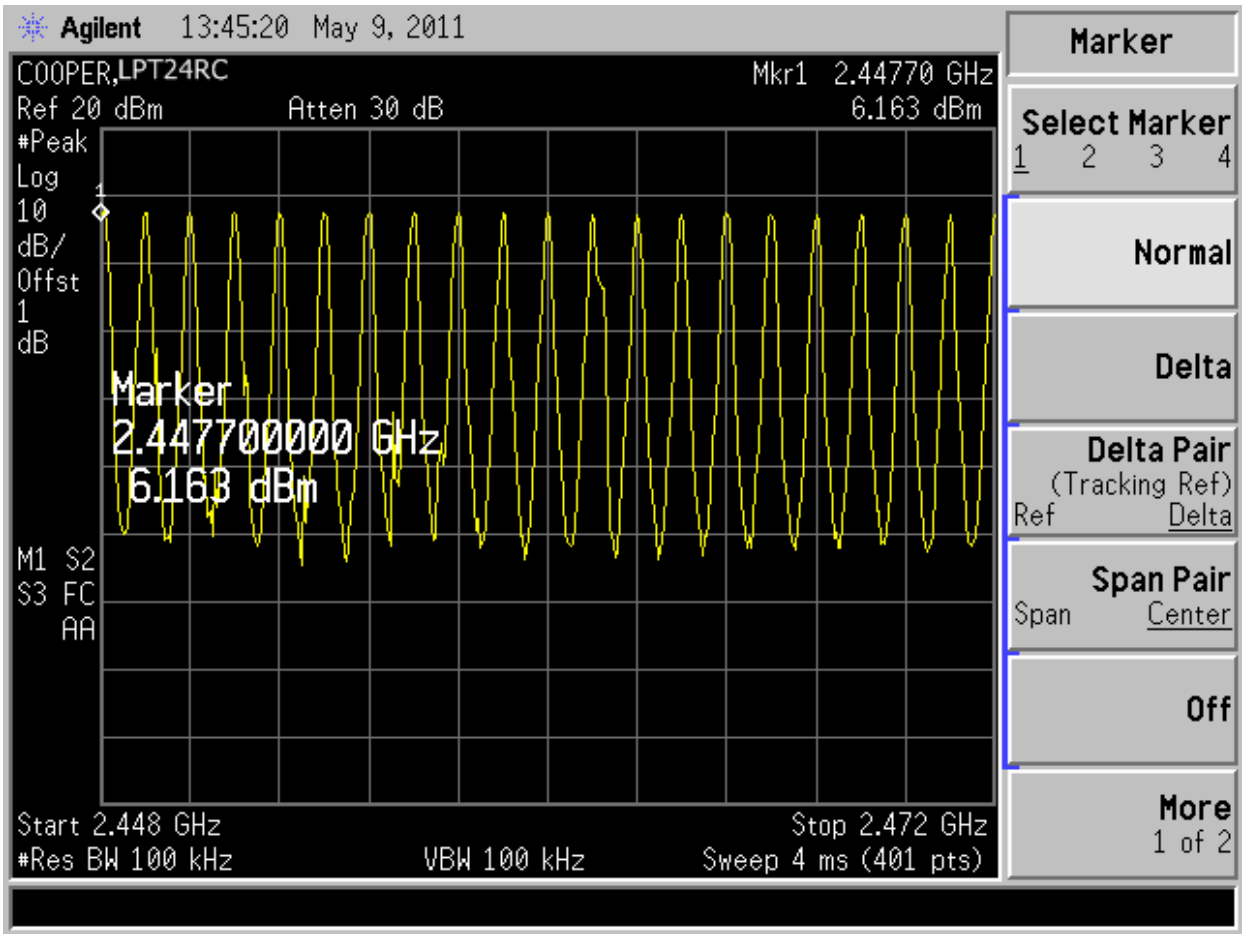
- Number of Channels, plot#1, 18 channels



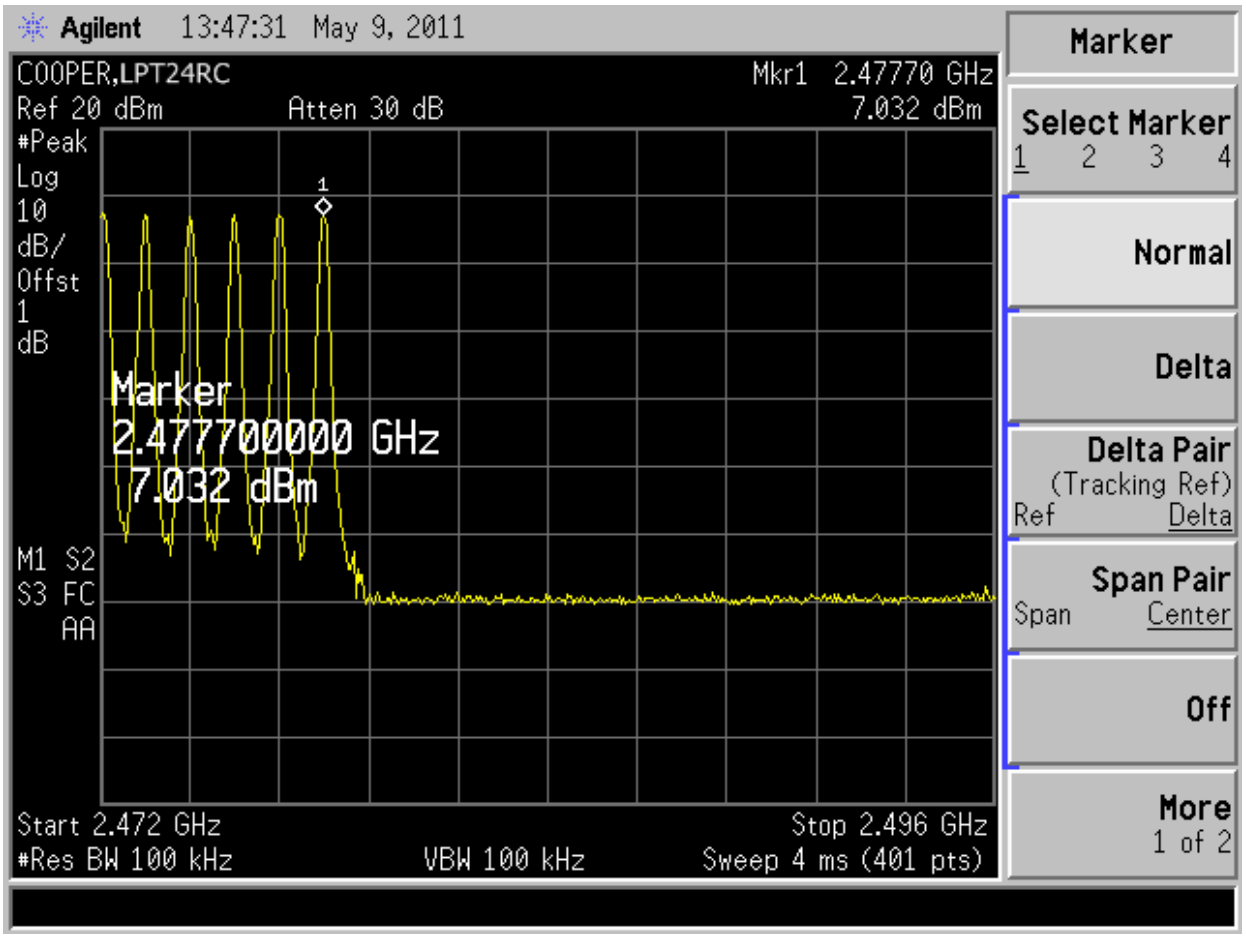
- Number of Channels, plot#2, 20channels



- Number of Channels, plot#3, 20 channels



- Number of Channels, plot#4, 5 channels



Time of Occupancy (Dwell Time)

Temperature	18.7 to 19.2 ℃
Relative Humidity	51.6 to 51.8 %
Barometric Pressure:	102.03 to 102.05 kPa
Test Date	May 09, 2011
Sample Number	884753
Calibrated Test Equipment (ID)	228, 272
Reference Equipment (ID) (Calibration not required)	059, N1
Tested By	Jeremy Lee

Use the barometric pressure reported at: http://www.theweathernetwork.com/weather/cabc0248

Test Limits

15.247(a)(1)

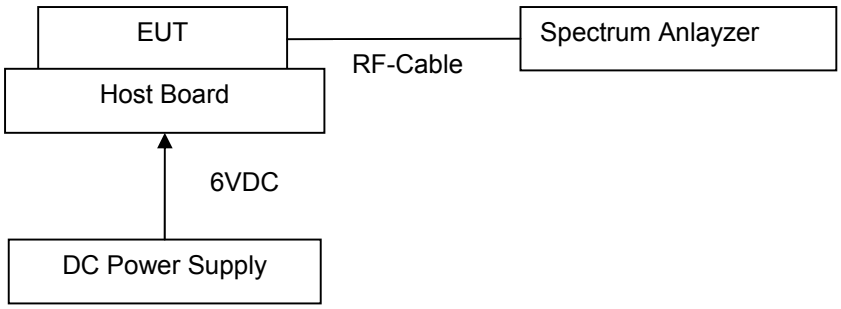
(iii) Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Setup

The test was performed in accordance with **FCC 15.247:2009, FCC 15.31:2009 and ANSI C63.10:2009.**

- The RF output of the EUT was connected to the RF input port of the Spectrum Analyzer.
- The EUT had its hopping function enabled.
- The transmitter was transmitting at its maximum data rate and maximum power.
- The following measurements were made with
  - Span = zero span, centered on a hopping channel.
  - RBW = 100kHz
  - VBW ≥ RBW
  - Sweep = as necessary to capture the entire dwell time per hopping channel
  - Detector Function = peak
  - Trace = max hold
- Use the marker function to determine the dwell time.
- Repeat this test for each different mode of operation (data rate, modulation format, etc.)
- The Dwell Time is the delta reading in time between two markers multiplied by the number of times they appearance in 25.2 sec (25.2 sec is 400ms times 63 channels).

Setup Block Diagram



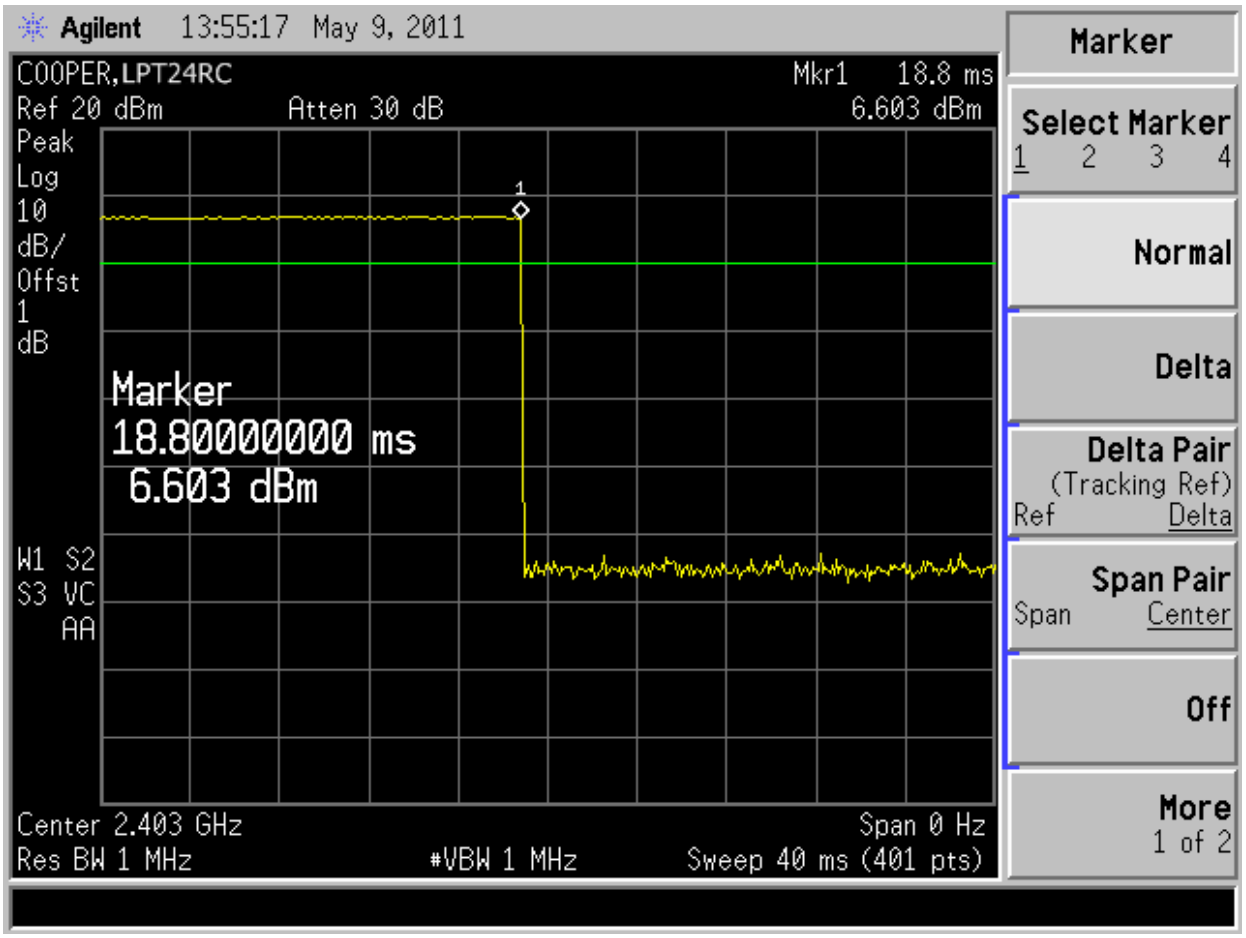
Test Results:

Channel Frequency(MHz)	Dwell Time (ms)	Limit(ms)	Pass/Fail
2403.1	37.6 [1)]	< 400	Pass
2441.7	37.6 [1)]	< 400	Pass
2478.5	37.6 [1)]	< 400	Pass

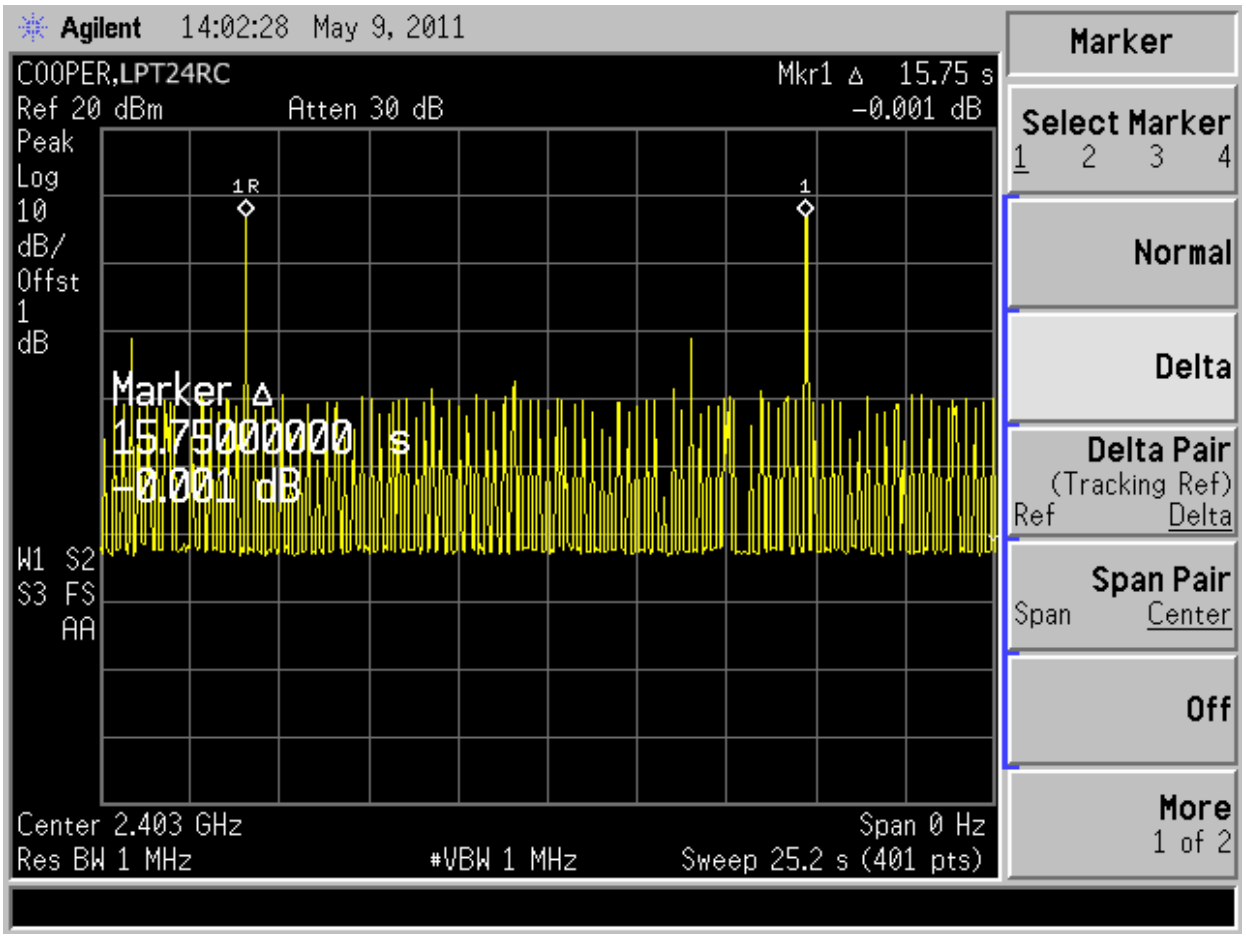
Note 1) Followed by user manual, the full hop cycle takes 15.75sec. So, in 25.2 second of monitoring time, it is able to detect maximum 2 times of hopping. The dwell time was detected by 2 times 18.8ms, on time of one single hopping channel.

X Pass **Fail** **N/A**

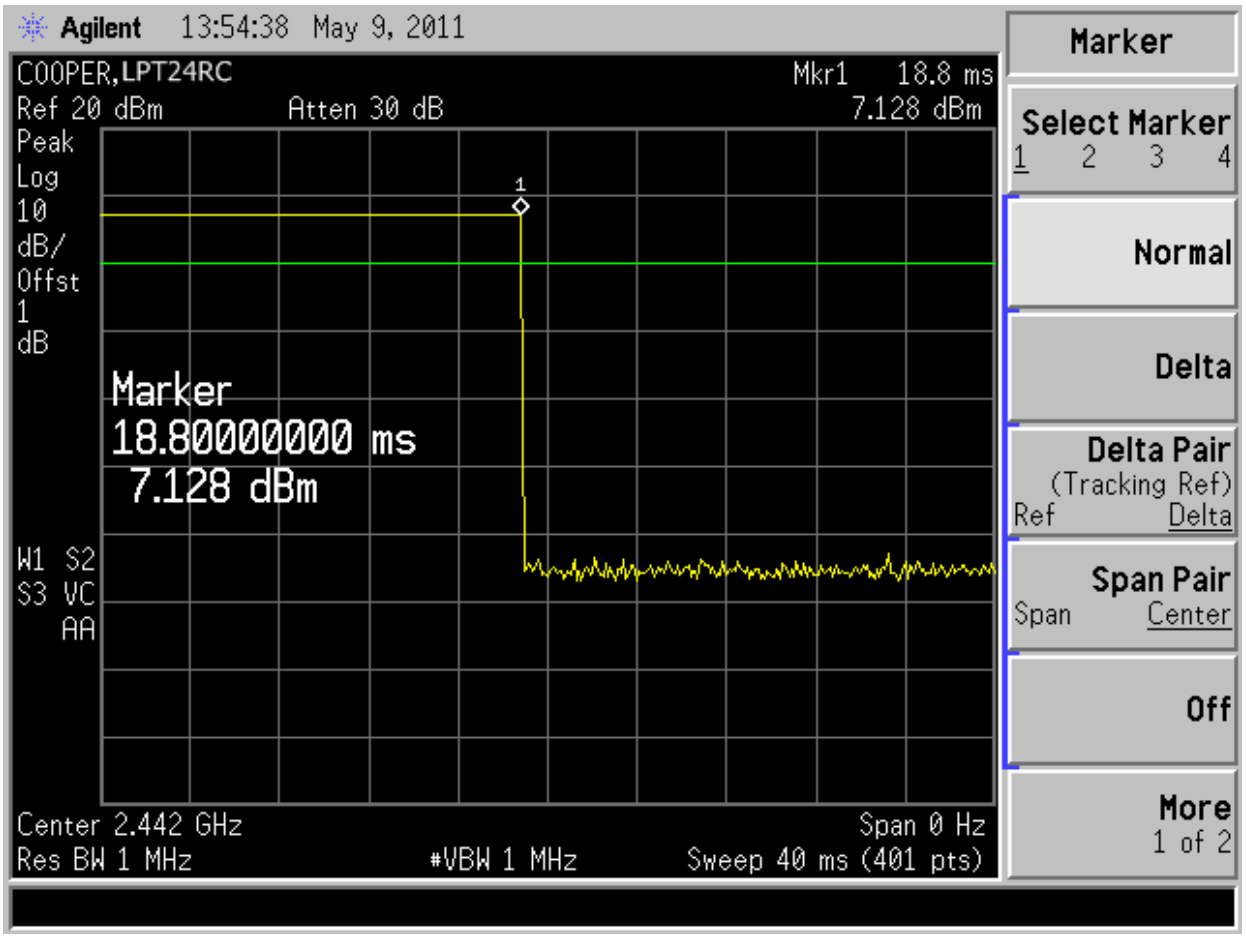
- Dwell time of low end; carrier frequency is 2403.1MHz.



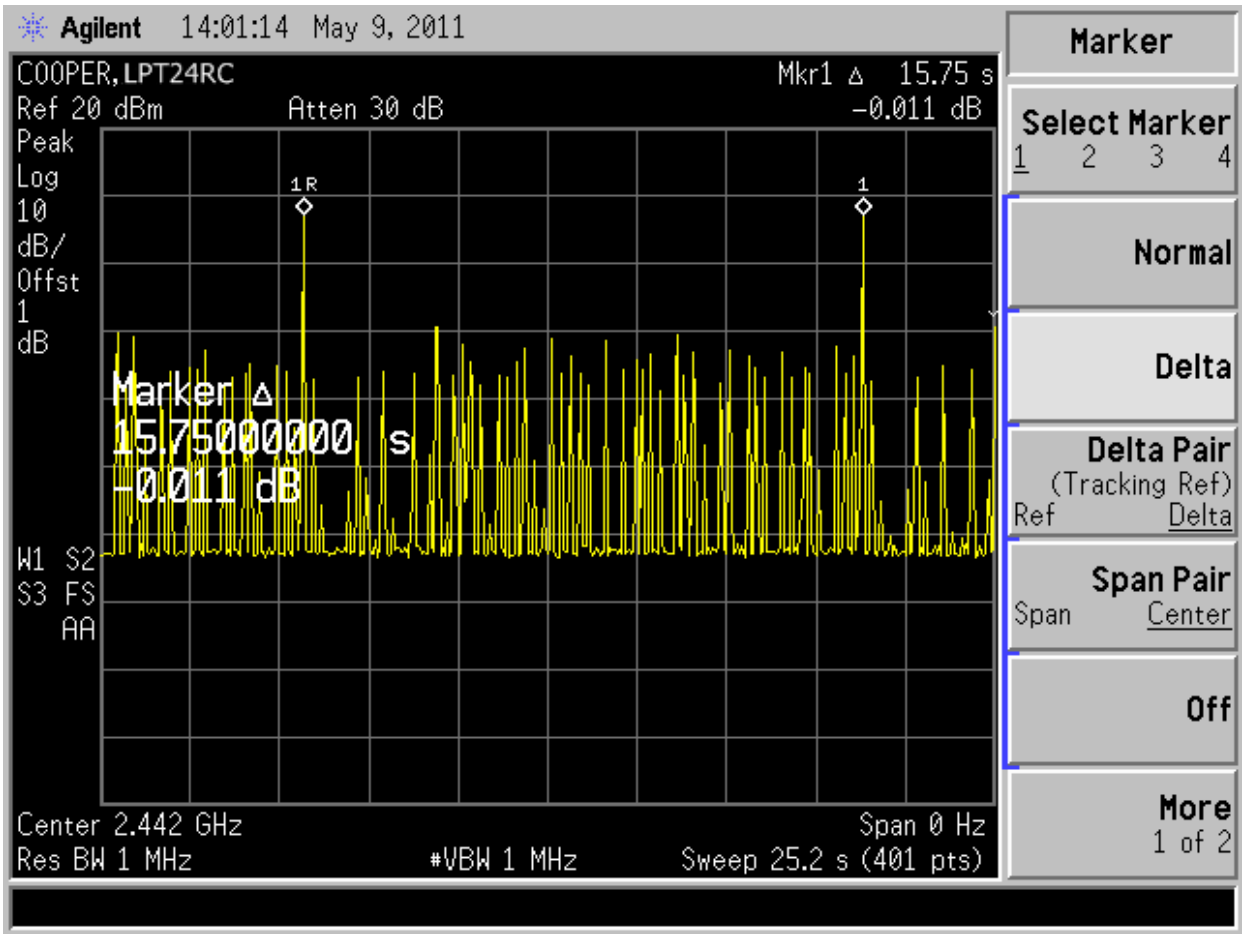
- Channel appearance of low end in 25.2 seconds; carrier frequency is 2403.1MHz.



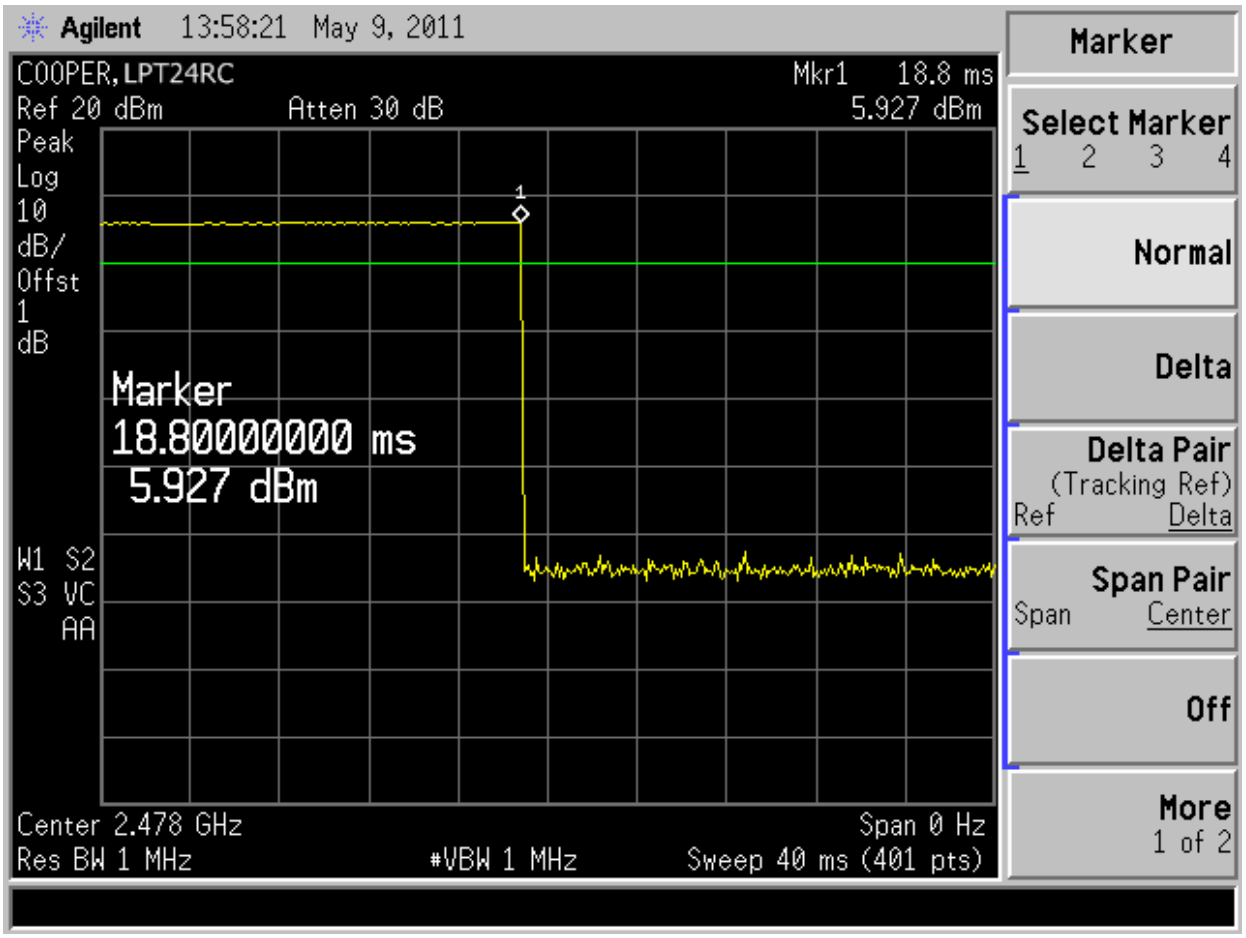
- Dwell time of middle; channel frequency is 2441.7MHz.



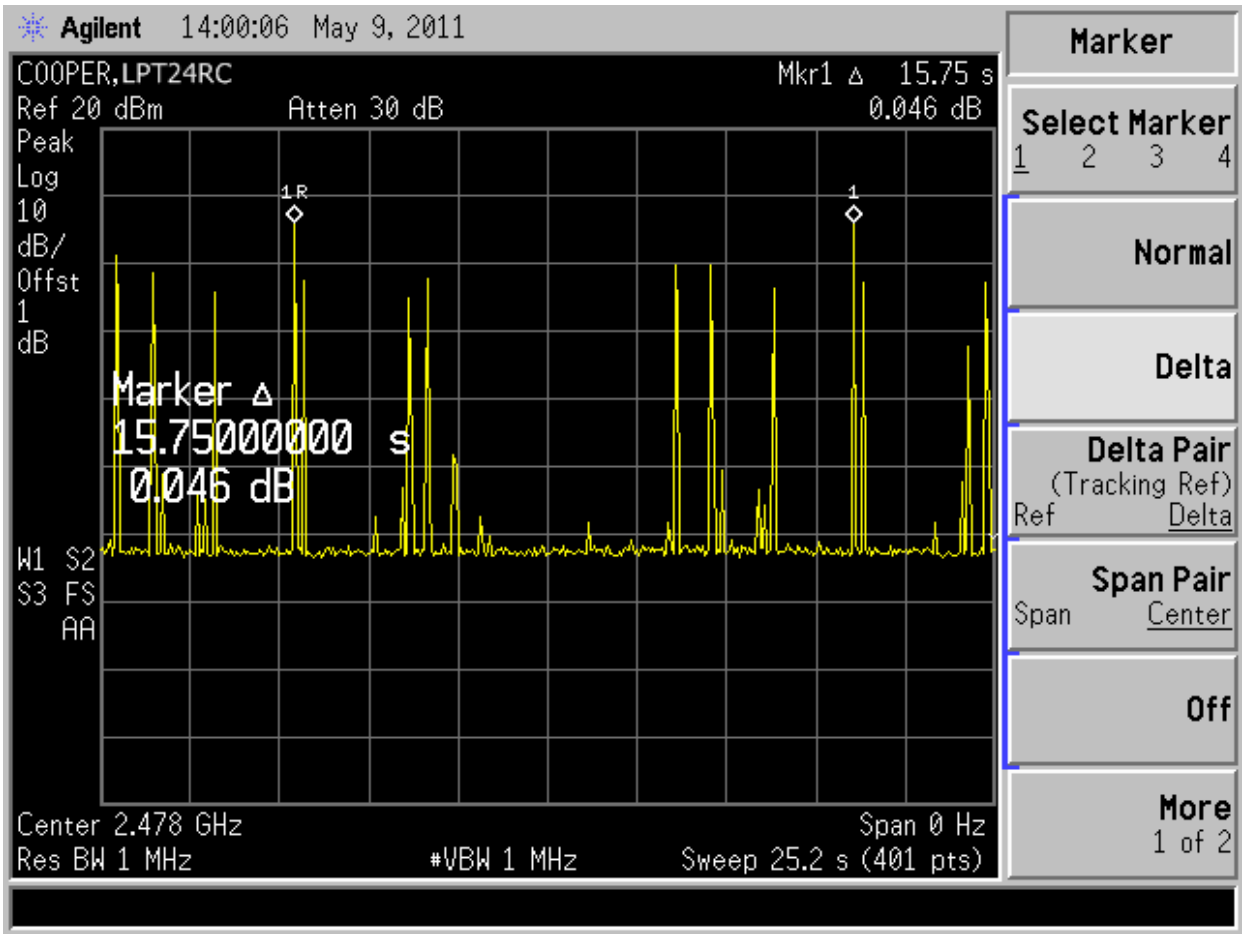
- Channel appearance of low end in 20 seconds; carrier frequency is 2441.7MHz.



- Dwell time of high end; channel frequency is 2478.5MHz.



- Channel appearance of low end in 20 seconds; carrier frequency is 2478.5MHz.



Pseudorandom frequency-hopping sequence

Test Date	May 10, 2011
Sample Number	884753
Tested By	Jeremy Lee

Test Limits

FCC15.247(a)
The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies.

Test Results

The **LPT24RC** is a frequency hopping spread spectrum (FHSS) transmitter designed to be compatible with FCC Part 15.247 (US) and RSS-210 (Canada) regulations for license free operation in the 2400MHz frequency band. The major elements include a frequency agile RF transmitter, a microcontroller that provides control and a power supply.

At each frequency hop one packet is sent by the transmitter which is received by a separate receiver unit. The transmitter generates the baseband waveforms. The microcontroller generates a pseudo random frequency hop sequence of length 256 based on a memorized table. The band is utilized in equally spaced 100 KHz channels.

X Pass **Fail** **N/A**

Equal Hopping Frequency Usage

Test Date	May 10, 2011
Sample Number	884753
Tested By	Jeremy Lee

Test Limits

FCC15.247(a)
Each frequency must be used equally on the average by each transmitter.

Test Results

The **LPT24RC** is a frequency hopping spread spectrum 2403.1-2478.5 MHz transmitter platform specifically designed for industrial remote control applications. The transmitter is capable of accepting a wide range of input voltages and is able to operate across a broad temperature range. This has been designed to withstand ISM band interference while ensuring the integrity of each data packet. This is accomplished via the OMNEX OmUD data protocol.

Frequency hopping spread spectrum technology was originally developed by the U.S. military to prevent interference or interception of radio transmissions on the battlefield. Frequency hopping devices concentrate their full power into a very narrow signal and randomly hop from one frequency to another within a designated frequency band. If they encounter interference on a particular frequency, the devices error checks the affected data, hops to another point on the spectrum, and resumes communications on subsequent hops.

The **LPT24RC** transmitter module operates on 756 channels with central frequencies between 2403.1 – 2478.5 MHz. These 756 channels are divided into 12 groups consisting of 64 frequencies. Each radio is configured to hop in one of these 12 groups. In order to link, radios must be configured to operate in the same group. The 64 frequencies are used to generate a pseudo random sequence of 63 frequencies which are equally used. The channels are spaced 100 KHz apart. The channel bandwidth is 31 KHz.

The hop sequence is a sequence of 63 numbers randomly generated with a proprietary algorithm. The unique serial number of the transmitter is used as a seed to the random number generator. The random number generator creates a list of 63 channels from the 64 available channels. This list of 63 channels is used to lookup in the frequency table to determine the next frequency.

X Pass **Fail** **N/A**

System Receiver Input Bandwidth

Test Date	May 10, 2011
Sample Number	884753
Tested By	Jeremy Lee

Test Limits

FCC15.247(a)
The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Test Results

The **LPT24RC** supports a serial interface and can send and receive a series of analogue and digital signal which are routed to the external world through test points (CN3 though CN29) .

The transmitter over the air data rate is 4.8 kbps.

X Pass **Fail** **N/A**

RF Exposure (SAR)

Test Date	May 10, 2011
Sample Number	884753
Tested By	Jeremy Lee

Test Limits

FCC15.247(i)

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. *See* § 1.1307(b)(1) of this chapter.

FCC1.1310

The criteria listed in table 1 shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in § 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of § 2.1093 of this chapter. Further information on evaluating compliance with these limits can be found in the FCC's OST/OET Bulletin Number 65, ''Evaluating Compliance with FCC-Specified Guidelines for Human Exposure to Radiofrequency Radiation.''

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*($900/f^2$)	6
30–300	61.4	0.163	1.0	6
300–1500	.....	.....	f/300	6
1500–100,000	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30
30–300	27.5	0.073	0.2	30
300–1500	.....	.....	f/1500	30
1500–100,000	.....	.....	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

Included are calculations that determine the minimum distance from the transmitter antenna that will ensure an exposure limit at or below the guidelines given in Table 1 of Section 1.1310 for the general population. The formula for these calculations are taken from OET Bulletin 65, edition 97-01, August 1997; "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields".

Calculations

Per Table 1 of Section 1.1310, the limit for General Population/Uncontrolled Exposure at 2400 to 2483.5MHz is 1 mW/cm^2.
Per OET Bulletin 65, Edition 97-01, the formula for calculating power density is: $S=P*G/4\pi d^2$ with:

Given

E=√(30*P*G)/d

and

S=E^2/3770

where

E=Field Strength in Volts/meter
P=Power in Watts
G=Numeric antenna gain
D=Distance in meters
S=Power Density in milliwatts/square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

d=√ ((30*P*G)/(3770*S)

Changing to units of Power to mW and Distance to cm, using:

P(mW)=P(W)/1000 and
D(cm)=100*d(m)

yields

d=100*√30*(P/1000)*G)/(3770*S))
d=0.282*√(P*G/S)

where

d=distance in cm
P=Power in mW
G=Numeric antenna gain
S=Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

P(mW)=10^(P(dBm)/10) and
G(numeric)=10^(G(dBi)/10)

yields

d=0.282*10^((P+G)/20)/ √S Equation(1)

where

d=MPE distance in cm
P=Power in dBm
G=Antenna Gain in dBi
S=Power Density Limit in mW/cm^2

Equation (1) and the measured peak power is used to calculate the MPE distance.

Limits

From §1.1310 Table 1 (B), S= 1 mW/cm^2

Results

No non-compliance noted:

Channel Frequency(MHz)	Power Density Limit (mW/cm^2)	Output Power (dBm)	Gain of Antenna (dBi)	MPE distance (cm)
2403.1	1	7.677	1.76	0.836
2441.7	1	7.684	1.76	0.836
2478.5	1	7.171	1.76	0.788

Conclusion

For mobile or fixed location transmitters, the minimum separation distance is 20cm, even if calculations indicate that the MPE distance would be less. Therefore, the minimum safe distance has to be inserted in the EUT's User Manual.

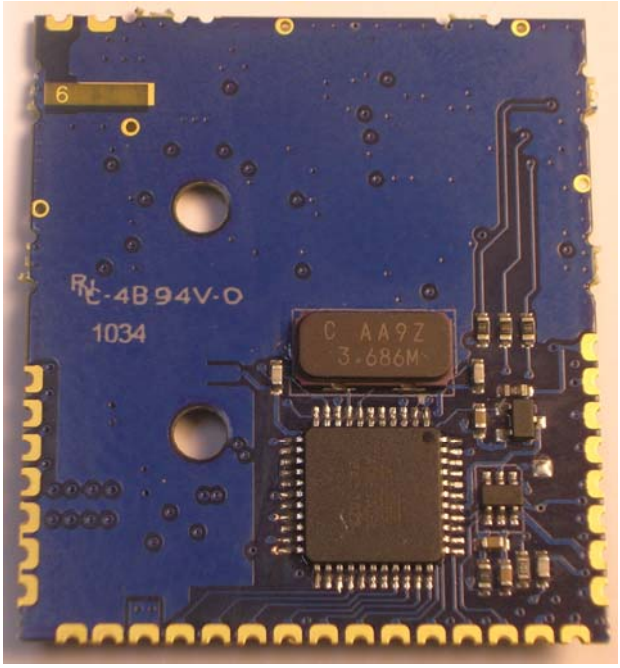
APPENDIX A: Test Equipment Used

ID No.	Description	Manufacturer	Model	Serial No.	Calibration Date	Calibration Due Date	Calibration Certificate No:	Calibration Laboratory
059	Power Supply	California Instruments	5000i	HK51870	N/A	N/A	N/A	N/A
112	GTEM EMC Chamber	Emco	5317	N/A	N/A	N/A	N/A	N/A
124	Pre-Amplifier	Com-Power	PA-103	161118	N/A	N/A	N/A	N/A
227-1	Biconical Antenna	A.H. Systems	SAS-542	716	18-May-2010	18-May-2011	11671EA	A.H. Systems
227-2	LP Antenna	A.H. Systems	SAS-510-2	1262	18-May-2010	18-May-2011	11668EA	A.H. Systems
227-3	Horn Antenna	A.H. Systems	SAS-571	936	18-May-2010	18-May-2011	11670EA	A.H. Systems
228	Humidity/ Temperature Logger	Veriteq	SP-2000-20R	07072157	21-Oct-2010	21-Oct-2011	0157252	Veriteq
233	Coaxial RF Cable	N/A	LCI-001	N/A	N/A	N/A	N/A	N/A
235	Turn table /Tower System	Sunol Sciences Co.	SC104V	031407-1	N/A	N/A	N/A	N/A
272	EMC Analyzer	Agilent	E7405A	US41110263	27-Apr-2011	26-Apr-2012	1-3312925125-1	Agilent
273	RF Preamplifier	Agilent	8449B	3008A02264	06-Jan-2010	06-Jan-2012	138311901068 042101 6	TRS-RenTelco
N1	Coaxial RF Cable	Belden	OC-LMR195-2	N/A	N/A	N/A	N/A	N/A

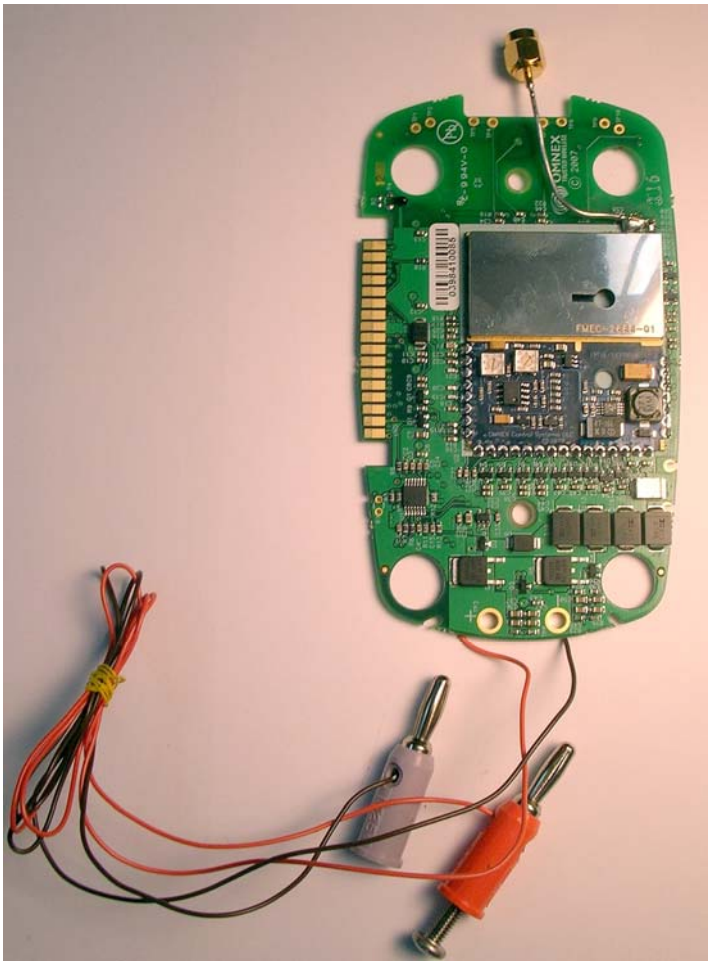
APPENDIX B: EUT photos

- EUT: Top View

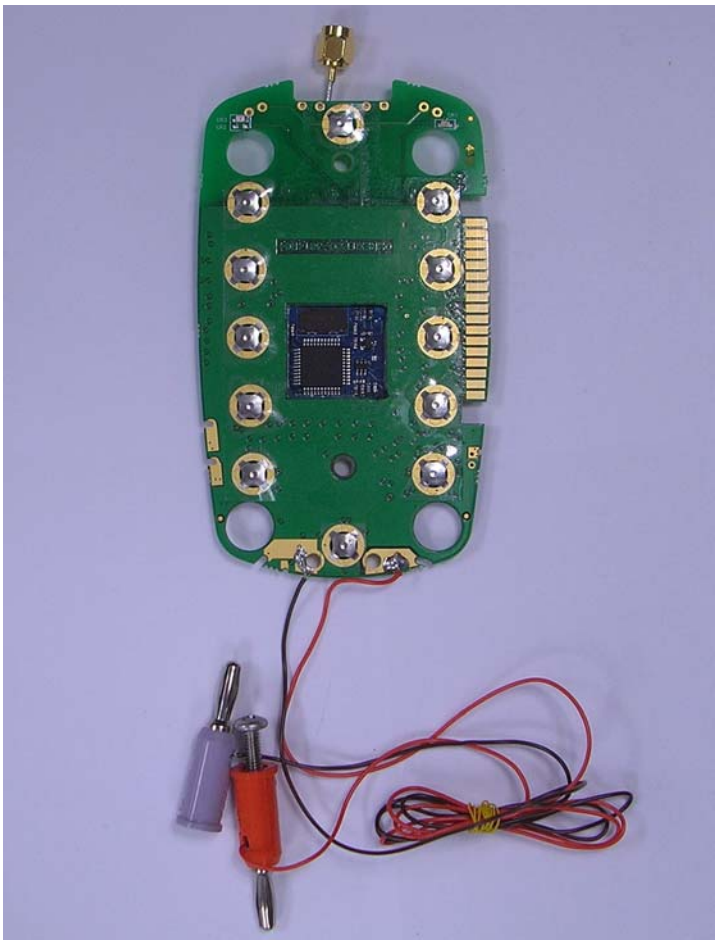
- EUT: Bottom View



- EUT: Top View with Carrier Board



- EUT: Botom View with Carrier Board



- EUT: View with attached Antenna

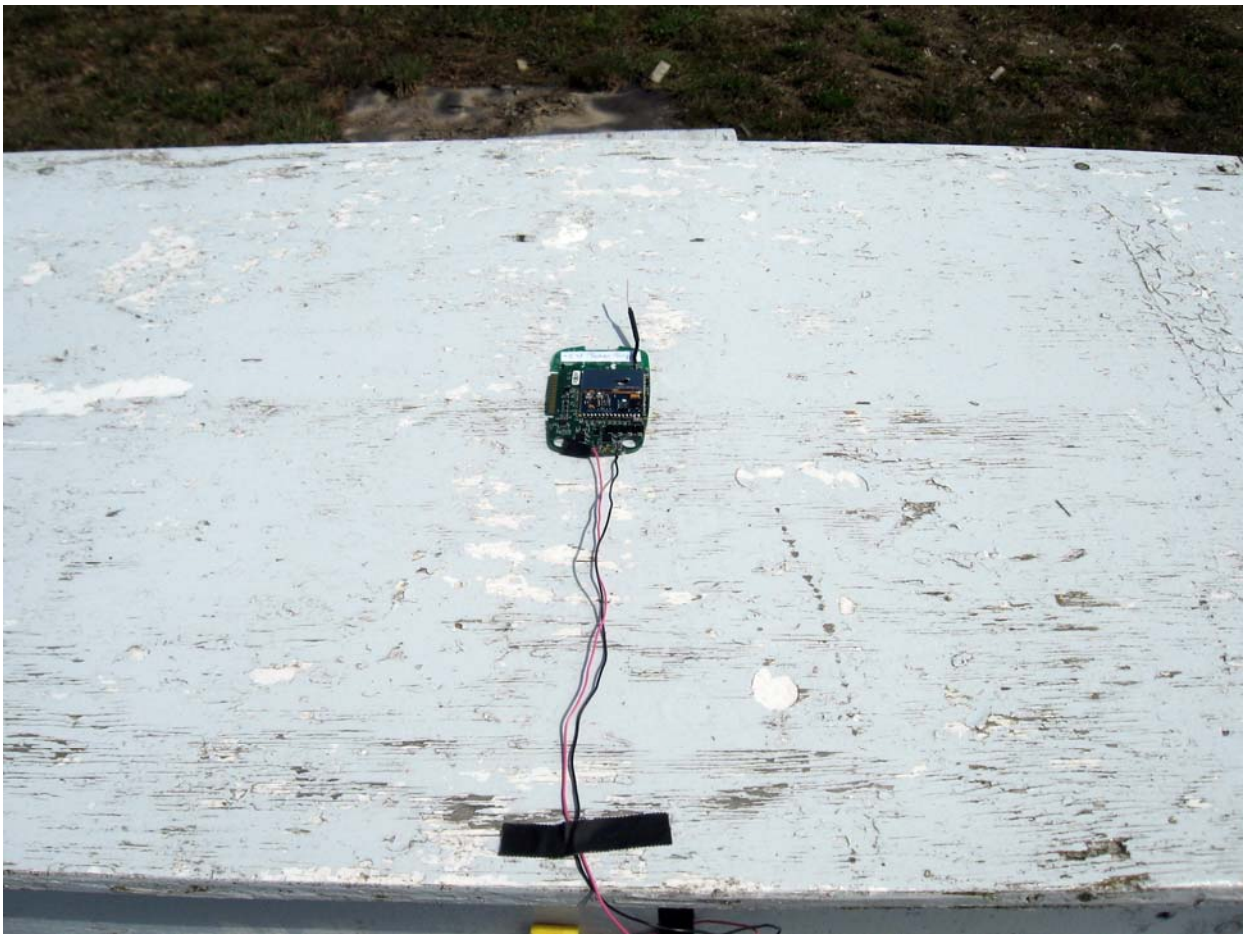
APPENDIX C: Test setup photos

- Test configuration for Conducted measurement

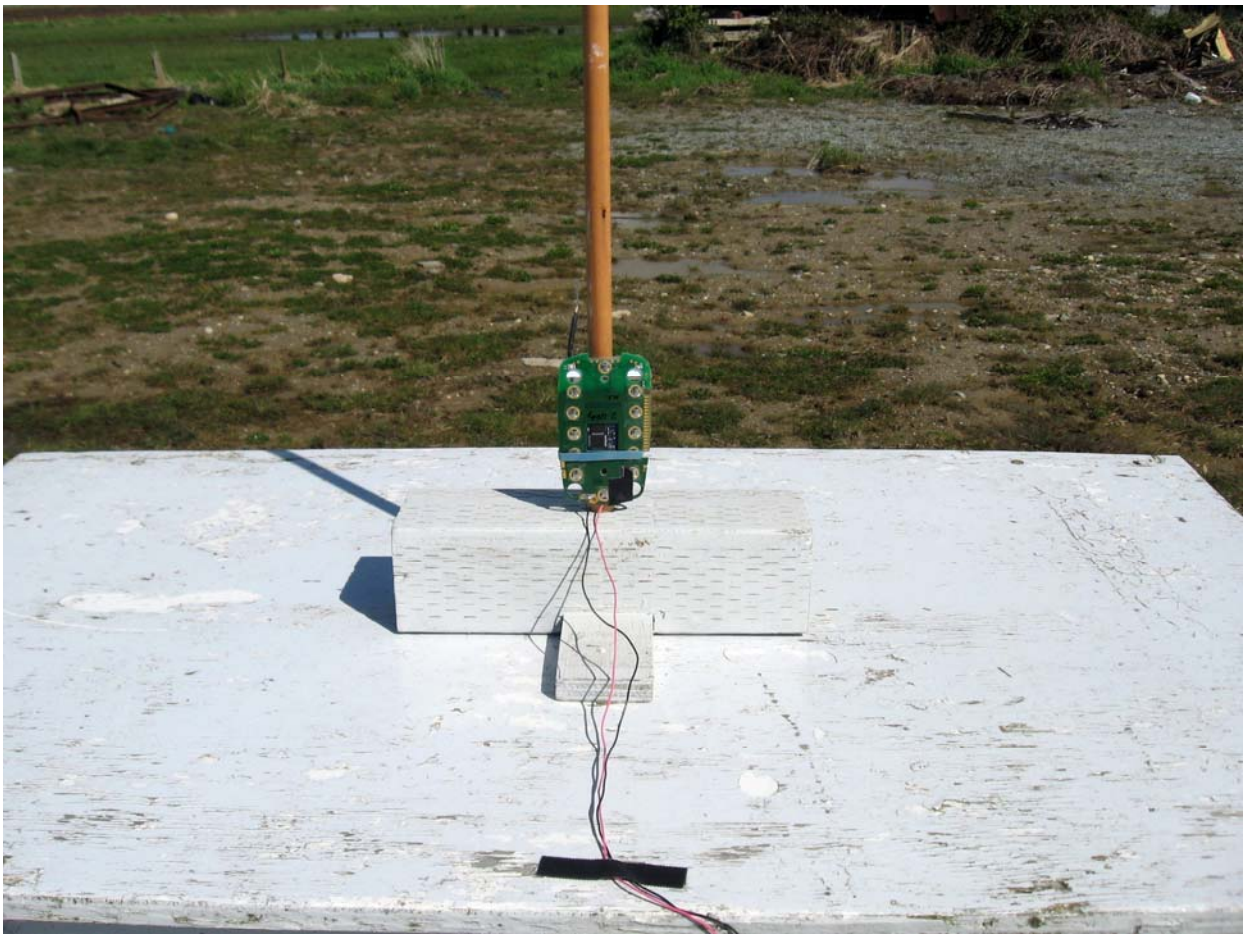
- Test configuration for Radiated Emission at OATS #1

- Test configuration for Radiated Emission at OATS #2

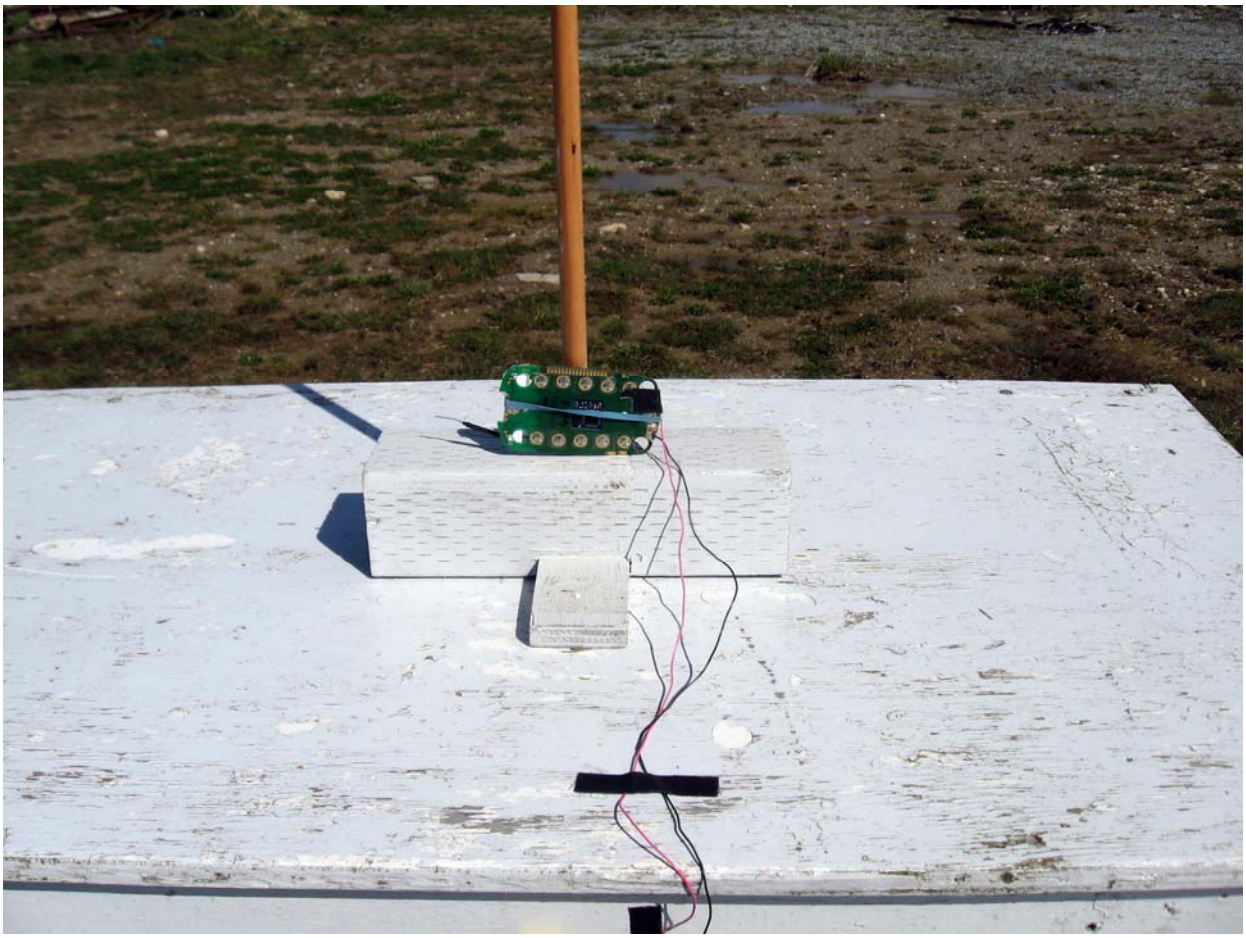
- Test configuration for Radiated Emission at OATS #3; Orthogonal X



- Test configuration for Radiated Emission at OATS #4; Orthogonal Y



- Test configuration for Radiated Emission at OATS #5; Orthogonal Z



APPENDIX D: ISO 17025:2005 Accreditation Certificate

International Accreditation Service

CERTIFICATE OF ACCREDITATION

This is to signify that

LABTEST CERTIFICATION, INC.
3133-20800 Westminster Highway
Richmond, British Columbia V6V 2W3
Canada

Testing Laboratory TL-367
(Revised February 11, 2010)

has met the requirements of the IAS Accreditation Criteria for Testing Laboratories (AC89), has demonstrated compliance with ANS/ISO/IEC Standard 17025:2005, *General criteria for the competence of testing and calibration laboratories*, and has been accredited, commencing August14, 2009, for the test methods listed in the approved scope of accreditation.

Patrick V. McCullen
Vice President

C. P. Ramani, P.E.
President

(see attached scope of accreditation for fields of testing and accredited test methods)

Print Date: 02/19/2010

Page 1 of 4

This accreditation certificate supersedes any IAS accreditation certificate bearing an earlier date. The certificate becomes invalid upon suspension, cancellation, revocation, or expiration of accreditation. See the IAS Accreditation Listings on the web at www.iasonline.org for current accreditation information, or contact IAS directly at (562) 699-0541.

International Accreditation Service

SCOPE OF ACCREDITATION

LabTest Certification, Inc. TL-367
(Revised February 11, 2010)

LabTest Certification, Inc.
3133-20800 Westminster Hwy
Richmond, British Columbia V6V 2W3
Canada

Kavinder Dhillon
President & CEO
(604) 247-0444

FIELDS OF TESTING	ACCREDITED TEST METHODS
Gas and plumbing	ANSI Z21.1; ANSI Z21.19/1.6; ANSI Z21 50, ANSI Z21.57; ANSI Z21.89/CGA1.18; B45 series; B125; B140.0; B140.1; B140.3; B140.4; B140.8; B140.9.3; CGA 1.16; AS 4551/Ag101; AS 4553/AG 103; AS 4563; AS 2658; EN 30-1-1; EN 30-1-2; EN 30-1-3; EN 30-1-4; EN 30-2-1; EN 30-2-2
Electrical, EMC, and electro-mechanical	AS 4268.1, 4268.2; AS/NZS 1044, 1053, 2064, 3548, 3862, 4051, 4251.1, 4251.2, 62040.2; CISPR 11 / EN55011; CISPR 14 / EN55014; CISPR 15 / EN55015; CISPR 22 / EN55022; CISPR 24 / EN55024; EN 12895, 301 489, 300 386, 50083-2, 50090-2-2, 50091-2, 50121-1, 50121-2, 50121-3-1, 50121-3-2, 50121-4, 50121-5, 50130-4, 50263, 50270, 50293, 50295, 50370-1, 50370-2, 50428, 50470-1, 55012, 55013, 55103-1, 55103-1, 55103-2, 55103-2, 60204-31, 60439-1, 60669-2-1, 60669-2-1, 60669-2-2, 60669-2-3, 60730-1, 60730-2-11, 60730-2-13, 60730-2-14, 60730-2-18, 60730-2-5, 60730-2-6, 60730-2-7, 60730-2-8, 60730-2-9, 60870-2-1, 60945, 61204-3, 61326, 61543, 61547, 61547, 617:2001, 618, 619, 620, 62040-2; FCC Part 15, 18; GB 13837 (CISPR 13); GB 4943, 9254, 7000.1, 7000.10, 7000.11, 7000.12, 2313, 8898, 15143, 14045, 17743, 13836, 13837; GB/T 9383; GB/T 17618; GB 17625.1, 2; GB/T 17626.2, 17626.4,

August 14, 2009
Commencement Date

C. P. Ramani, P.E.
President

Print Date: 02/19/2010

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(Revised February 11, 2010)

FIELDS OF TESTING	ACCREDITED TEST METHODS
Electrical, EMC, and electro-mechanical (cont)	17626.5; GB/T 17626.6, 17626.8, 17626.11; GB 4343.1 (CISPR 14.1), 4343.2 (CISPR 14.2); GB 4824; HKTA 1001, 1005, 1007, 1022; ICES-001, 003; JIS T 0601-1-2; IEC/EN/AS/KN: 60601-1-2; IEC/EN/AS/KN/JIS C: 61000-3-2, 61000-3-3, 61000-4-2, 61000-4-3, 61000-4-4, 61000-4-5, 61000-4-6, 61000-4-8, 61000-4-9, 61000-4-11, 61000-4-12, 61000-4-13, 61000-6-1, 61000-6-2, 61000-6-3, 61000-6-4; IEC/EN/AS/KN: 61326; RSS-130, 136, 138, 182, 187, 210, 213, 215, 243, 310; MIL-STD-461E; MIL-STD-462D; KN60601-1-2; KN301 489; KN22, 24; YD 1032; YD/T 965, 968, 993, 1103; C22.2 No. 0, .1, .17, .4, 6, 8, 9, 10, 12, 14, 15, 18, 24, 36, 37, 40, 43, 53, 61, 63, 64, 68, 71.1, 71.2, 72, 73, 81, 85, 89, 94, 99, 100, 101, 104, 107.1, 107.2, 108, 109, 110, 112, 113, 114, 117, 122, 125, 139, 141, 147, 149, 156, 157, 158, 164, 166, 167, 168, 169, 173, 177, 184, 187, 191, 195, 205, 207, 213, 217, 218.1, 218.2, 223, 224, 225, 231, 234, 236, 243, 247, 250, 60065; CSA-E60079-0, -6, -11, -15; CSA-E60335-1, -2; CSA-E60730-1, -2; CSA-E60745-1, -2; CSA-E61010-1, -2; CSA E742; IEC/EN 60335-1, -2; IEC/EN 60730-1, -2; IEC/EN 60745-1, -2; IEC/EN 61010-1, -2; IEC/EN 60601-1, -2; IEC/EN 60065; IEC/EN 60079-0, -6, -11, -15; IEC/EN 60950-1, -2; IEC/EN 60529; IEC/EN 60945; IEC/EN 60598-1, -2; IEC.EN 61347-1; UL 48, 50, 73, 197, 499, 507, 508, 508A, 745-1, 751, 763, 778, 858, 867, 875, 924, 935, 982, 987, 998, 1004, 1012, 1026, 1261, 1310, 1431, 1472, 1563,

August 14, 2009
Commencement Date

C. P. Ramani, P.E.
President

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SCOPE OF ACCREDITATION

LabTest Certification, Inc. TL-367
(Revised February 11, 2010)

FIELDS OF TESTING	ACCREDITED TEST METHODS
Electrical, EMC, and electro-mechanical (cont)	1564, 1585, 1598, 1647, 1795, 1993, 1995, 6500, 60079-0, 60079-6, 60079-11, 60079-15, 60335-1, 60335-2, 60601-1, 60601-2, 60730-1, 60730-2, 60745-1, 60745-2, 60950-1, 61010-1, 61010-2; ISO EN 61000-3-2 (Equipment input current less than or equal to 16 Amps/Phase), 61000-4-3
Environmental and Energy	IEC/EN 60068-2-1, 2-2, 2-6, 2-30; IEC/EN 60092-101; IEC/EN 60695-2-2; MIL-STD-810: Method 500.4, 501.4, 502.4, 503.4, 506.4, 507.4, 510.4, 512.4, 514.5; RTCA-DO-160E: Section 4, 5, 6, 7.2, 8, 10, 12, 16, 17, 25; CAN/CSA C-300; CAN/CSA C-814; Qualification Criteria for Bottled Water Cooler Version 1.1 - May 2004; Qualification Criteria for Compact Fluorescent Lamps Version 3.0 - October 2003; Qualification Criteria for Decorative Light Strings Version 1.3 - March 9, 2007; Qualification Criteria for Residential Light Fixtures Version 4.0; Qualification Criteria for Home Audio and DVD Equipment; ISO 9806-1, 9806-2, 9806-3; SRCC 100-08, SRCC TM-1, SRCC-150, CSA-F378, CSA-F379, EN 12975-1, EN 12975-2, ASHRAE-93
Maritime	ABYC Standards A-3, A-7, A-26, A-27, A-28, A-30 and A-31; E-2 and E-11; H-22; P-14, P-17, P-18, P-21, P-22, P-24 and P-27; EN 28846, 28848, 28849, 29775, 60092-507; EN ISO 10133, 12216, 13297, 13929, 14895, 15083, 8847, 8849, 10239, 10240, 10592: 1995/A1, 11105, 11192, 9097:1994/A1; IACS E1 – E21
Appliances	CSA B 140.0-3

August 14, 2009
Commencement Date

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President

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END OF REPORT