Nemko Test Report:	23109RUS1
Applicant:	Aerocomm 11160 Thompson Avenue Lenexa, KS 66219 USA
Equipment Under Test: (E.U.T.)	LT2510
In Accordance With:	**FCC Part 15, Subpart C, 15.247 and IC RSS 210, Issue 7** Frequency Hopping Transmitters
Tested By:	Nemko USA Inc. 802 N. Kealy Lewisville, Texas 75057-3136

TESTED BY: _____ **DATE:** **23 January 2009**

David Light, Senior Wireless Engineer

APPROVED BY: _____ **DATE:** **19 November, 2009**

Tom Tidwell, Telecom Direct

Total Number of Pages: 66

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Section 1. Summary of Test Results

Manufacturer: Aerocomm

Model No.: LT2510

Serial No.: None

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C, Paragraph 15.247 and RSS 210, Issue 7 for Frequency Hopping Transmitters. Radiated tests were conducted is accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

☒ New Submission ☐ Production Unit

☐ Class II Permissive Change ☒ Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.
See " Summary of Test Data".

NVLAP®
LAB CODE: 100426-0

Summary Of Test Data

NAME OF TEST	PARA. NO.	RESULT
Powerline Conducted Emissions	15.207(a), RSS-Gen 7.2.2	Complies
Channel Separation	15.247(a)(1) and A8.1(b)	Complies
Time of Occupancy	15.247(a)(1) and A8.1(d)	Complies
20 dB Occupied Bandwidth	15.247(a)(1) and A8.1(a)	Complies
Peak Power Output	15.247(b) and A8.4(2)	Complies*
Spurious Emissions(Antenna Conducted)	15.247(d) and A8.5	Complies
Spurious Emissions (Radiated)	15.247(d) and A8.5	Complies
Receiver Spurious Emissions	RSS-Gen. 6(b)	Complies

Footnotes:

*The radio comes with options for the following antennas:

1) 2 dBi chip
2) 5 dBi dipole
3) 6 dBi omni
4) 9 dBi panel

To comply with the power requirements of 15.247(b)(1) and 15.247(b)(4), the device will not be marketed with the 9 dBi antenna if using the 43 channel hop sequence.

Section 2. Equipment Under Test (E.U.T.)

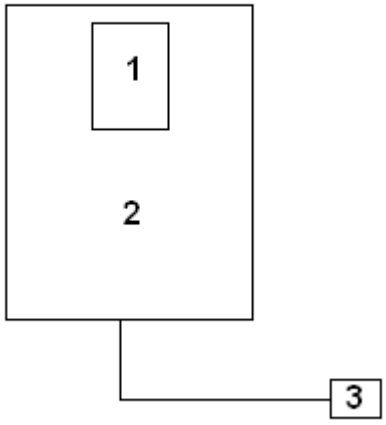
General Equipment Information

Frequency Band:	☐ 902 – 928 MHz ☒ 2400 – 2483.5 MHz ☐ 5725 – 5850 MHz
Operating Frequency Range:	2404.0 to 2467.0 MHz (43) 2400.75 to 2471.0 MHz (79)
Number of Channels:	43 or 79
Channel Spacing:	1.5 MHz (43) or 900 kHz (79)
User Frequency Adjustment:	Software controlled

Description of EUT

The LT2510 is a surface mount module built around Texas Instruments 2510 soc. The LT2510 utilizes a front-end module to amplify the receive and transmit signals of the 2510. Aerocomm's firmware controls the RF parameters and allows the OEM customer access to customize the data being sent for their application.

System Diagram



1) EUT
2) Serial interface board
3) AC adapter

Section 3. Channel Separation

NAME OF TEST: Channel Separation	PARA. NO.: FCC 15.247(a)(1) RSS-210 A8.1(b)
TESTED BY: David Light	DATE: 20 January 2009

Test Results: Complies.

Measurement Data: See 20 dB BW plot

Measured 20 dB bandwidth:	1.36 MHz (43) and 845 kHz (79)
Channel Separation:	1.5 MHz (43 and 900 kHz (79)

Equipment Used: 1464-1472-1469-1082

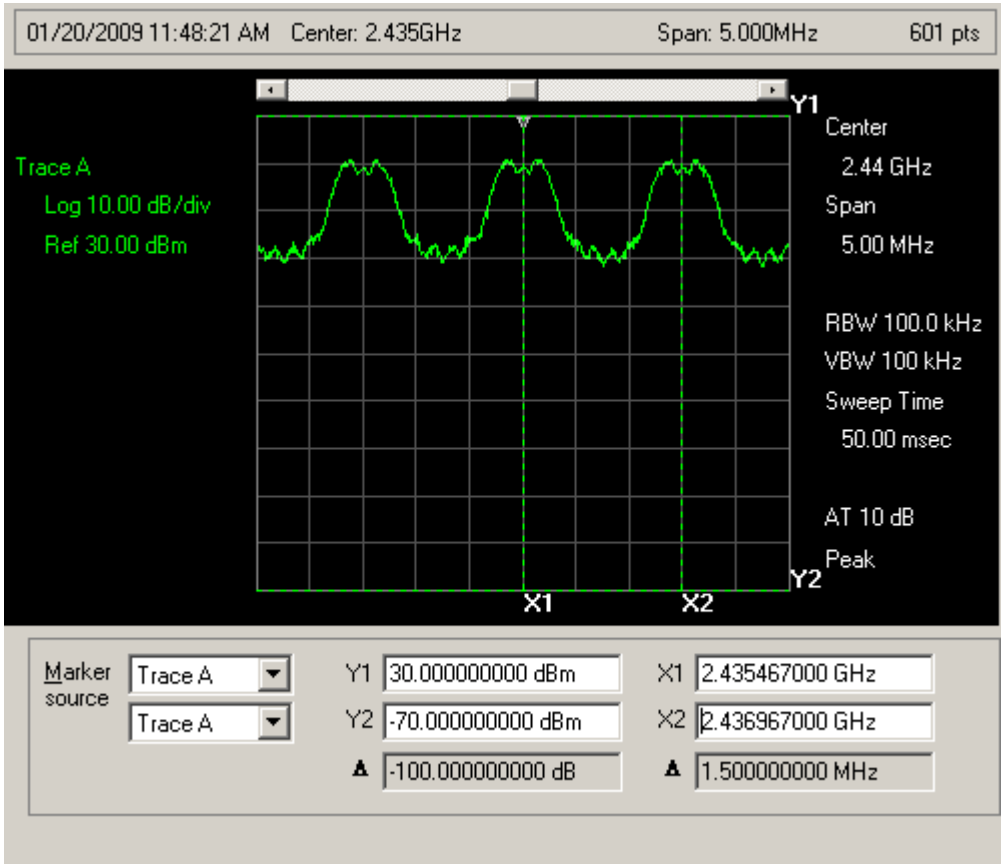
Measurement Uncertainty: $1X10^{-7}$ppm

Temperature: 22 °C

Relative Humidity: 35 %

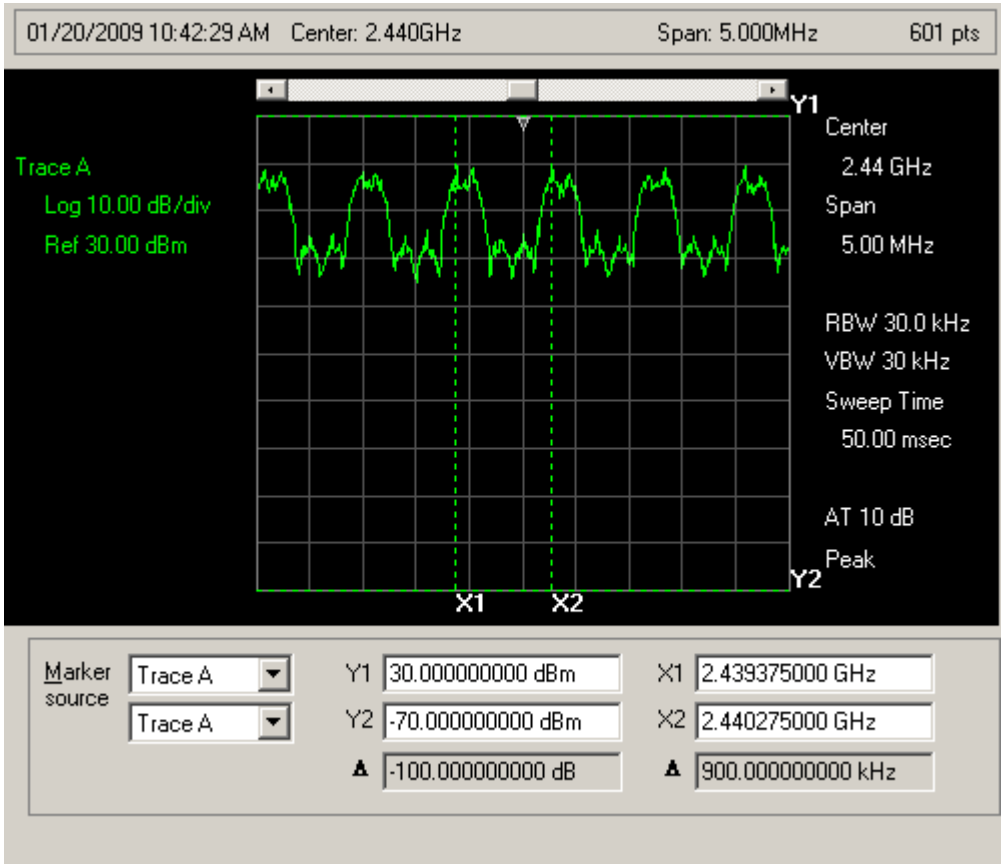
Test Data – Channel Separation

43 Channels



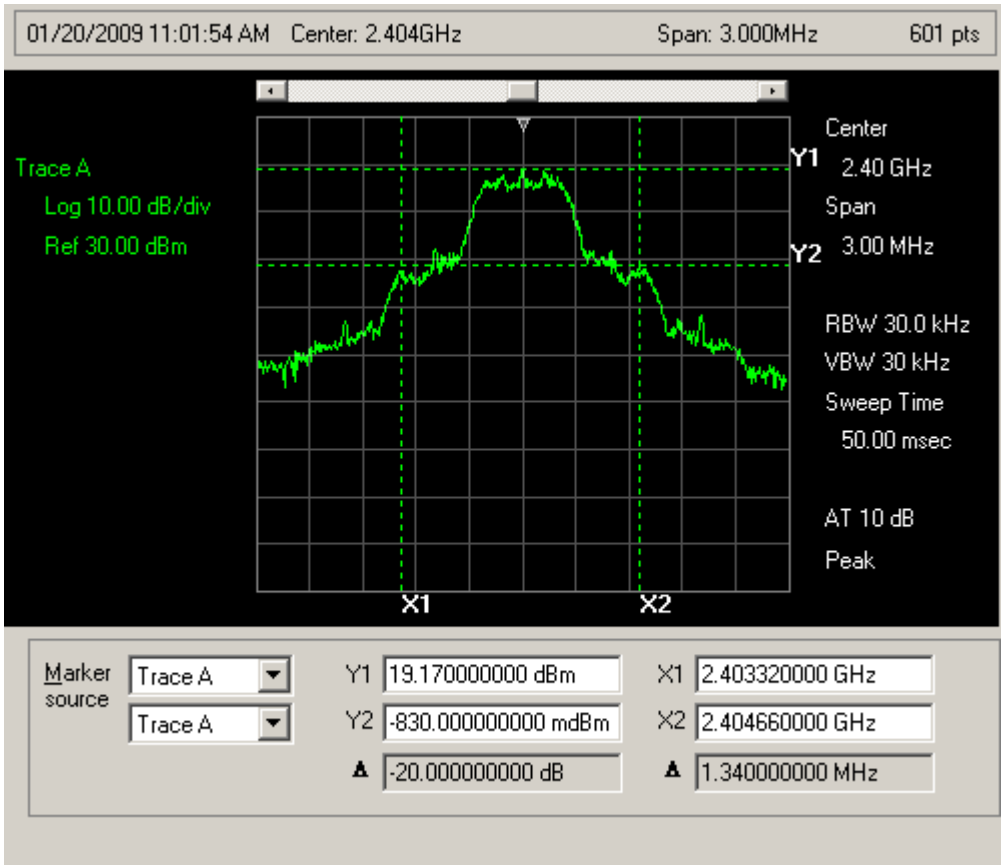
Test Data – Channel Separation

79 Channels



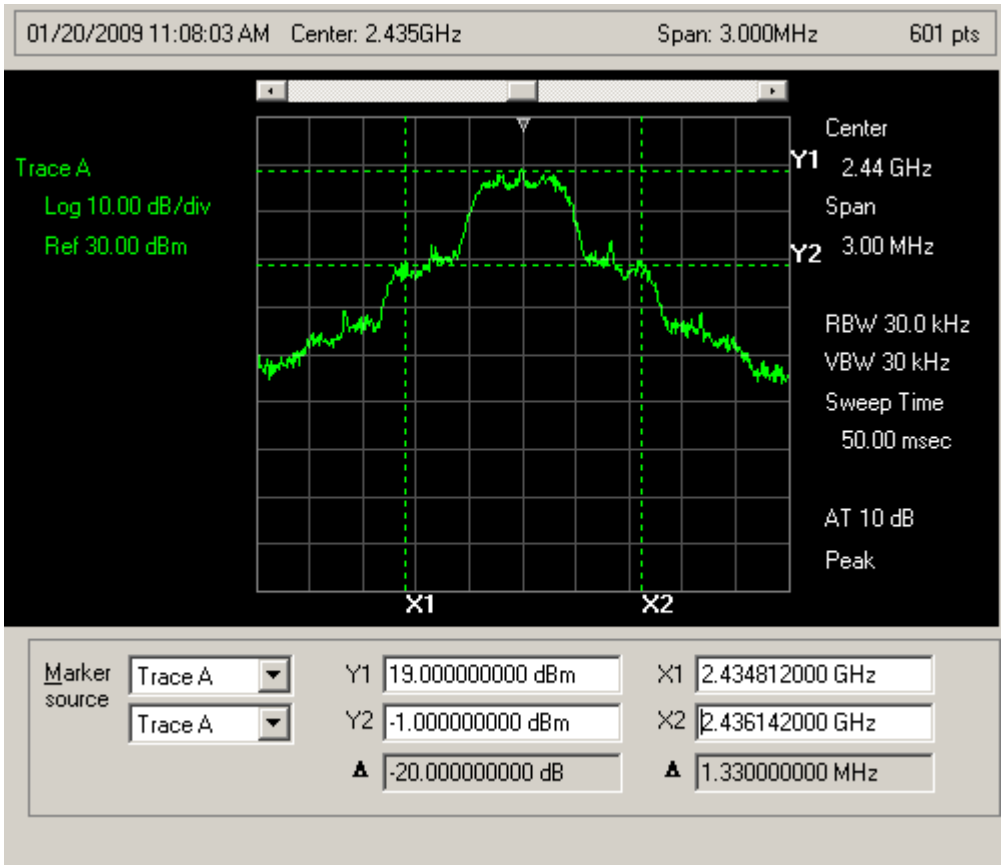
Test Data – 20 dB Bandwidth

43 Channel
Low Channel – 2404.0 MHz



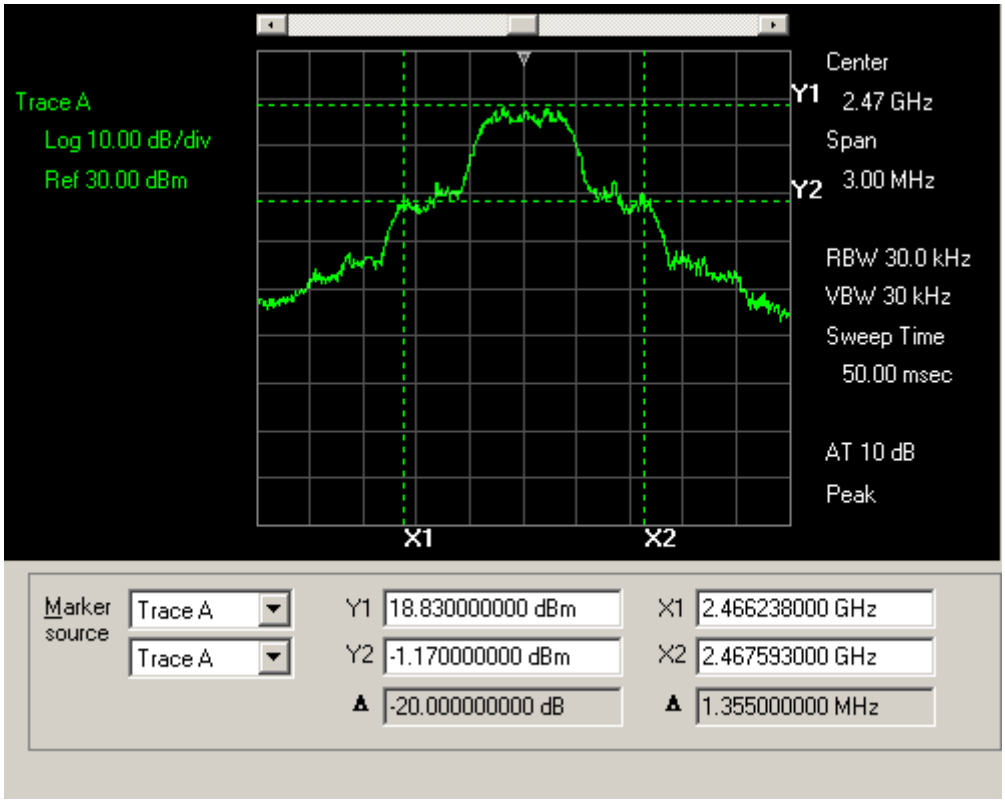
Test Data – 20 dB Bandwidth

43 Channel
Mid Channel – 2435 MHz



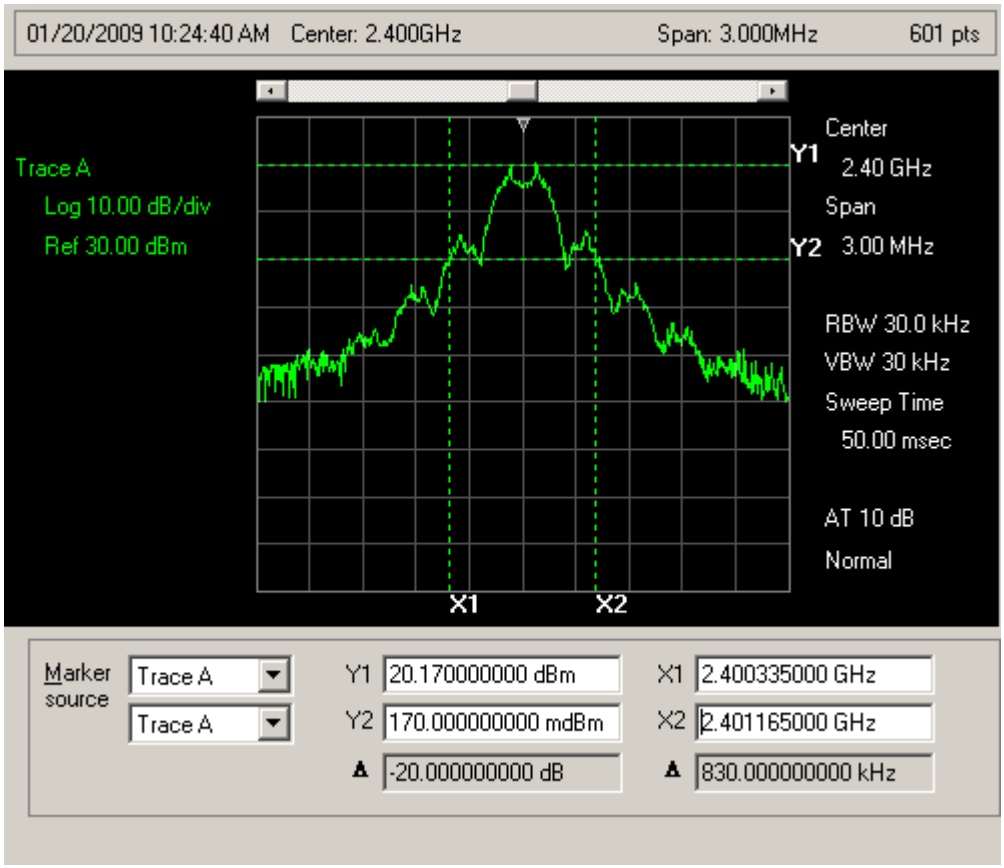
Test Data – 20 dB Bandwidth

43 Channel
High Channel – 2467 MHz



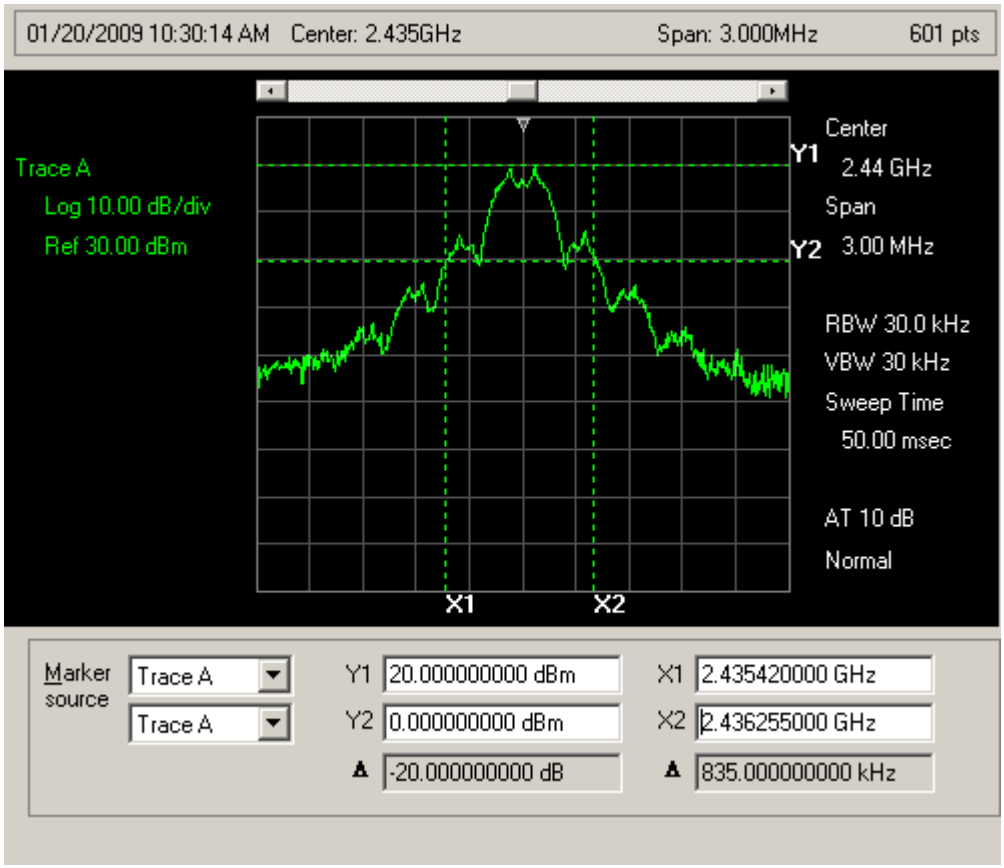
Test Data – 20 dB Bandwidth

79 Channel
Low Channel – 2400.75 MHz



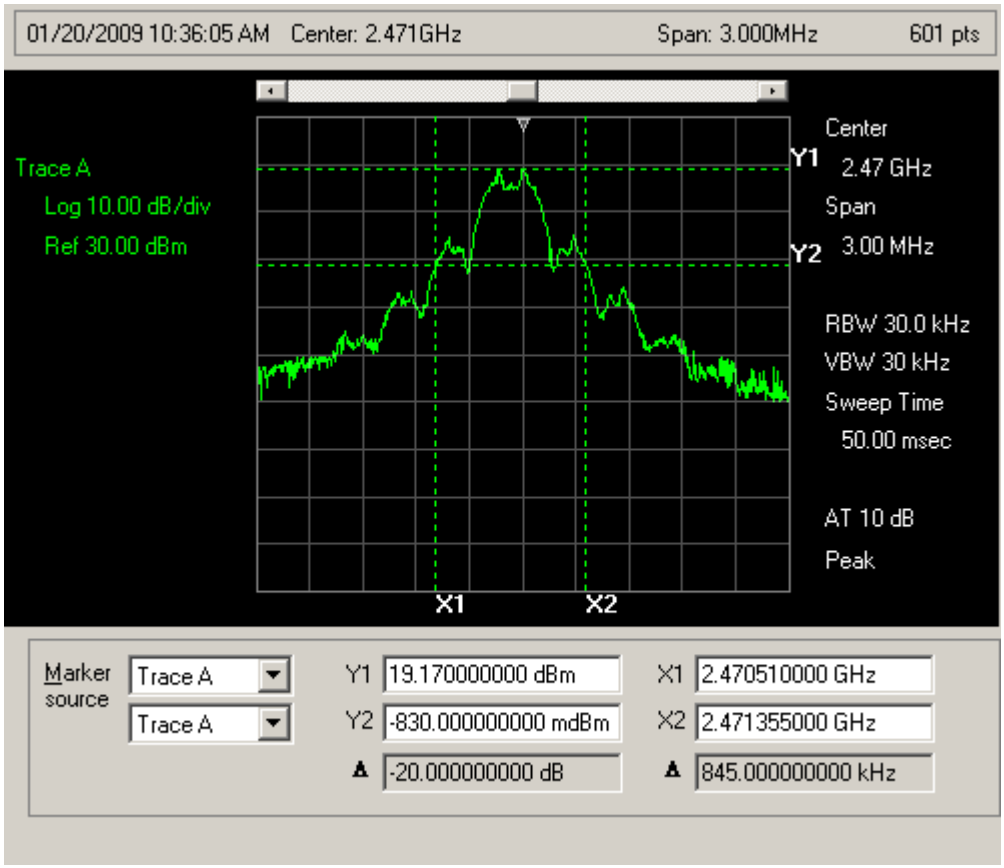
Test Data – 20 dB Bandwidth

79 Channel
Mid Channel – 2435 MHz



Test Data – 20 dB Bandwidth

79 Channel
High Channel – 2471 MHz



Section 4. Time of Occupancy

NAME OF TEST: Time of Occupancy	PARA. NO.: 15.247(a)(1) RSS-210 A8(d)
TESTED BY: David Light	DATE: 20 January 2009

Test Results: Complies.

Measurement Data:

Maximum Dwell Time On Any Channel: 333 mS (49)
297 mS (79)

Equipment Used: 1464-1082-1472-1469

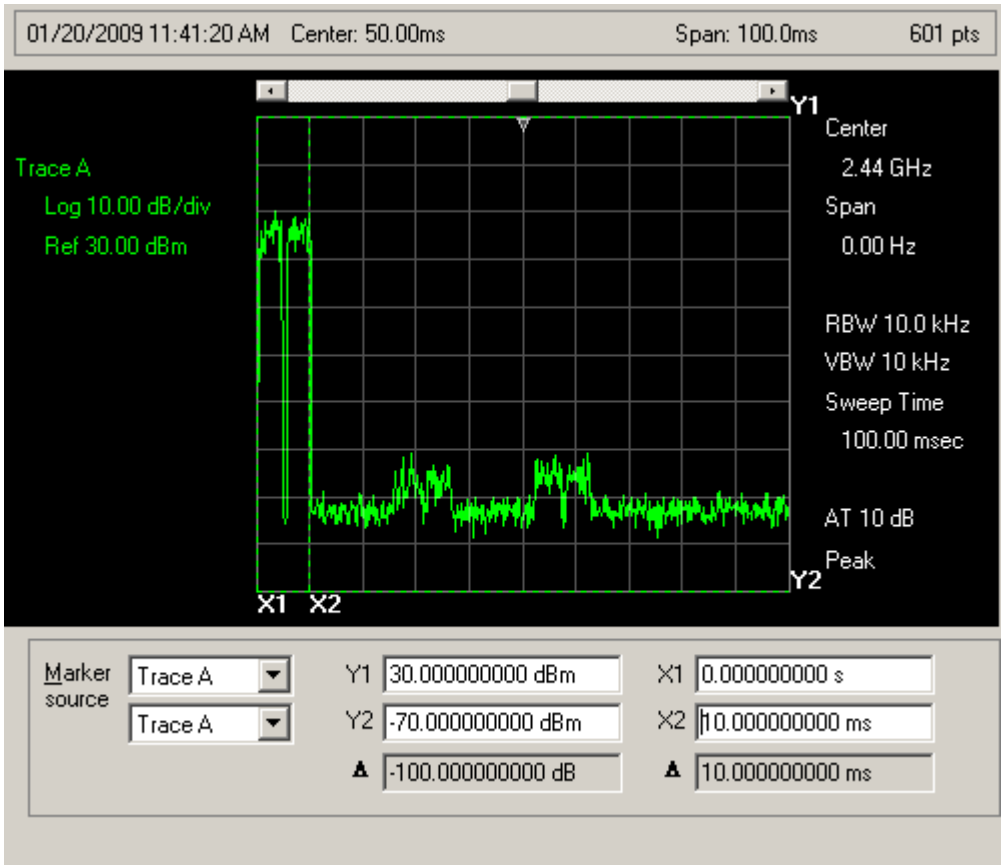
Measurement Uncertainty: $1X10^{-7}$ppm

Temperature: 22 °C

Relative Humidity: 35 %

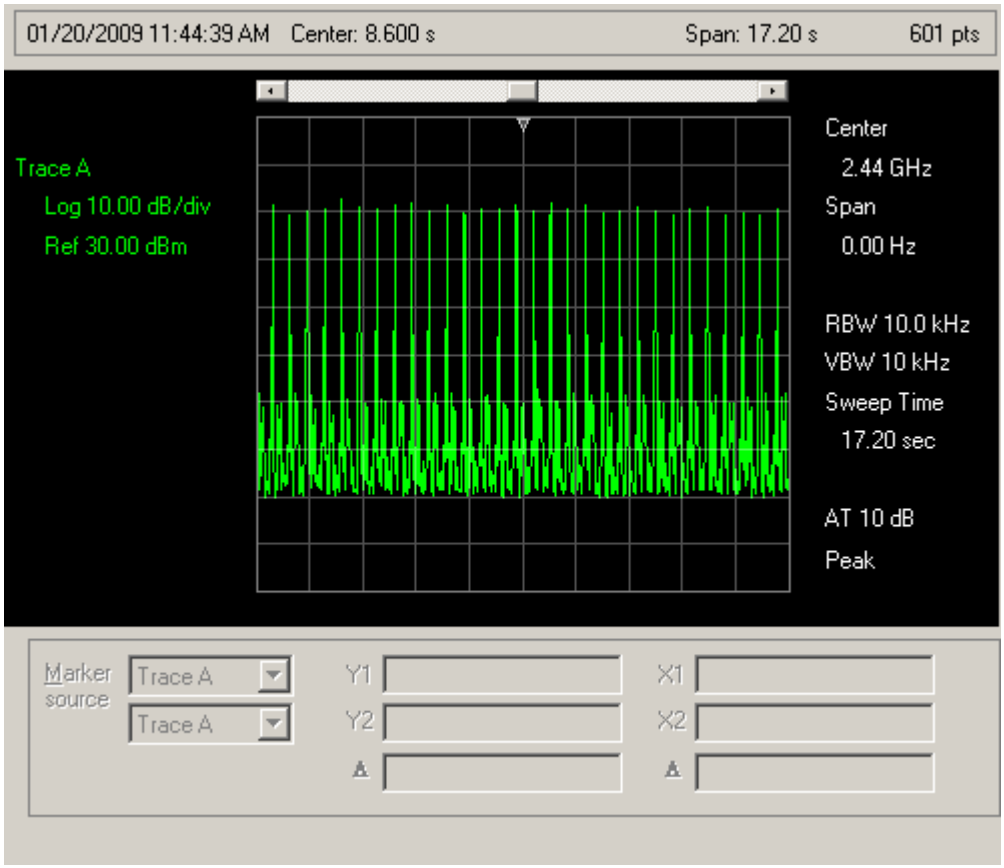
Test Data – Time of Occupancy

43 Channels
Pulse Width



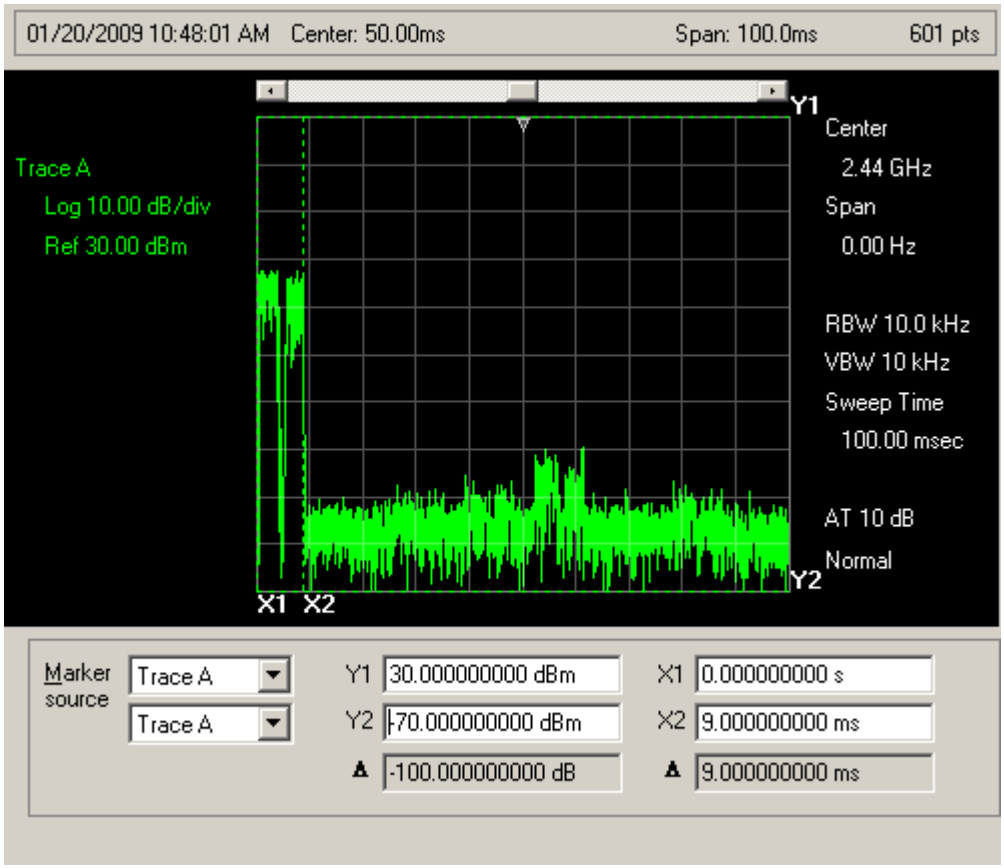
20 log (10/100) = -20.0 dB (Duty cycle correction)

Test Data – Time of Occupancy



33 hops in 17.2 seconds
33 x 10 mS = 333 mS (0.333 seconds)

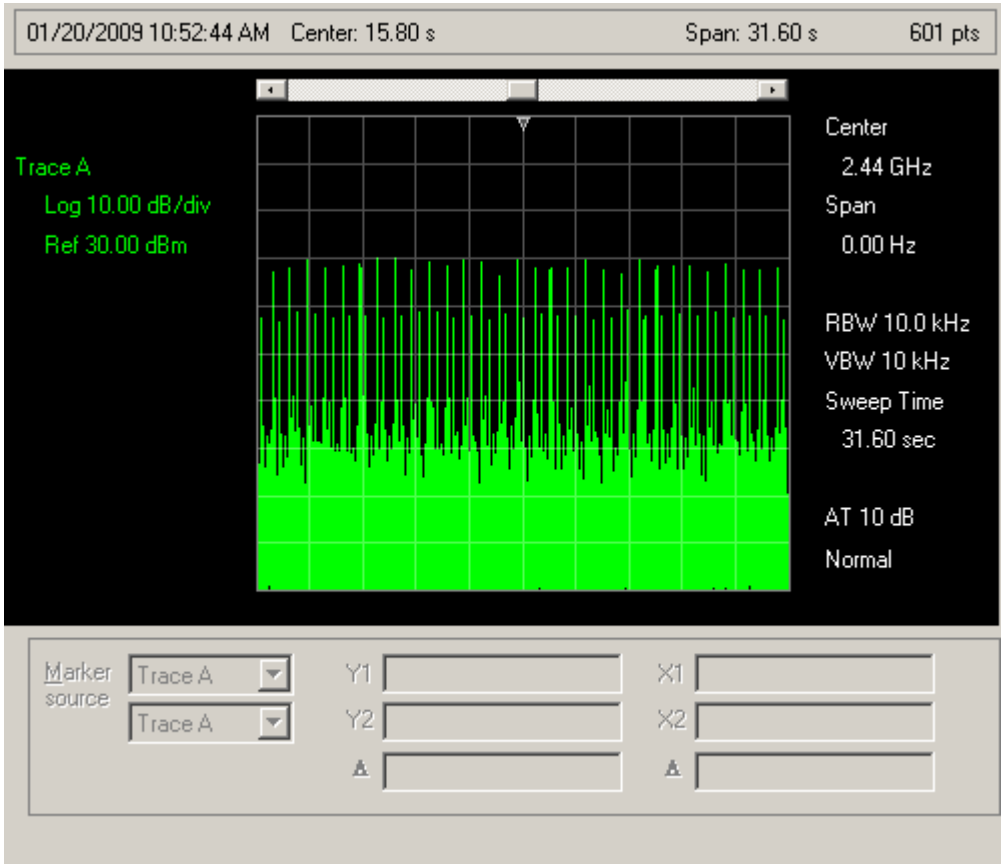
Test Data – Time of Occupancy



20 log (9/100) = -20.9 dB (Duty cycle correction)

Test Data – Time of Occupancy

79 Channels

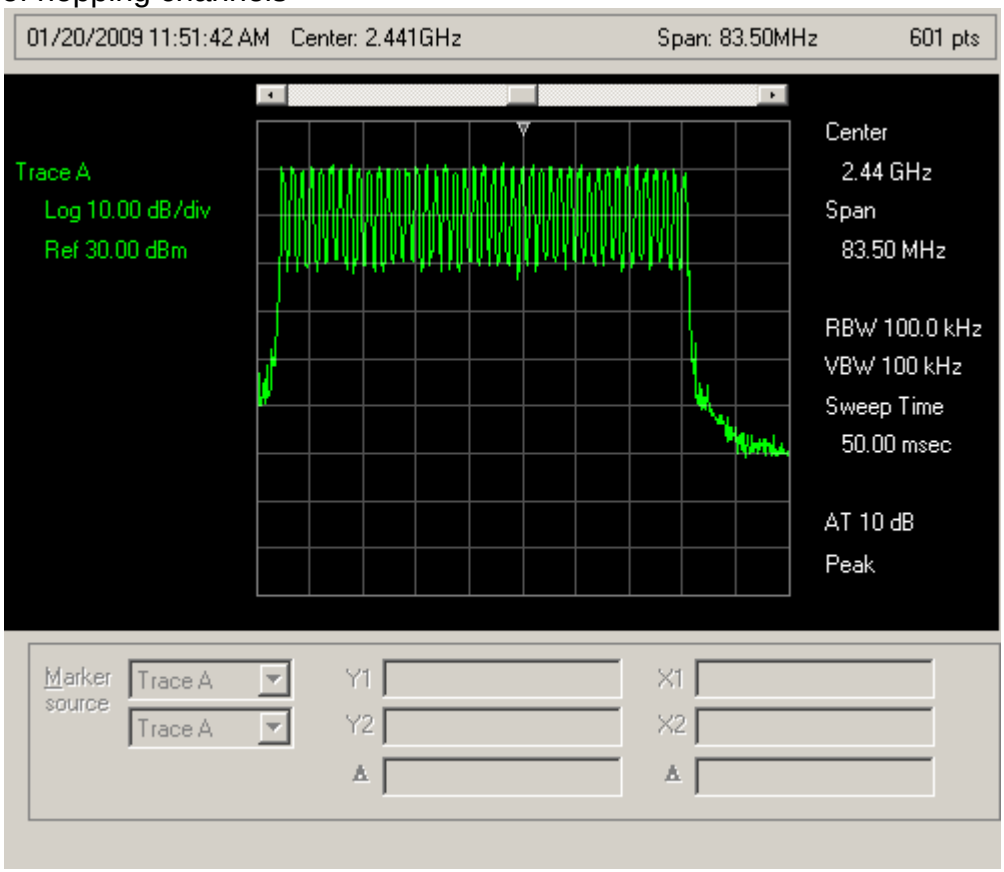


33 hops in 31.6 seconds
33 x 9 mS = 297 mS (0.297 seconds)

Test Data – Time of Occupancy

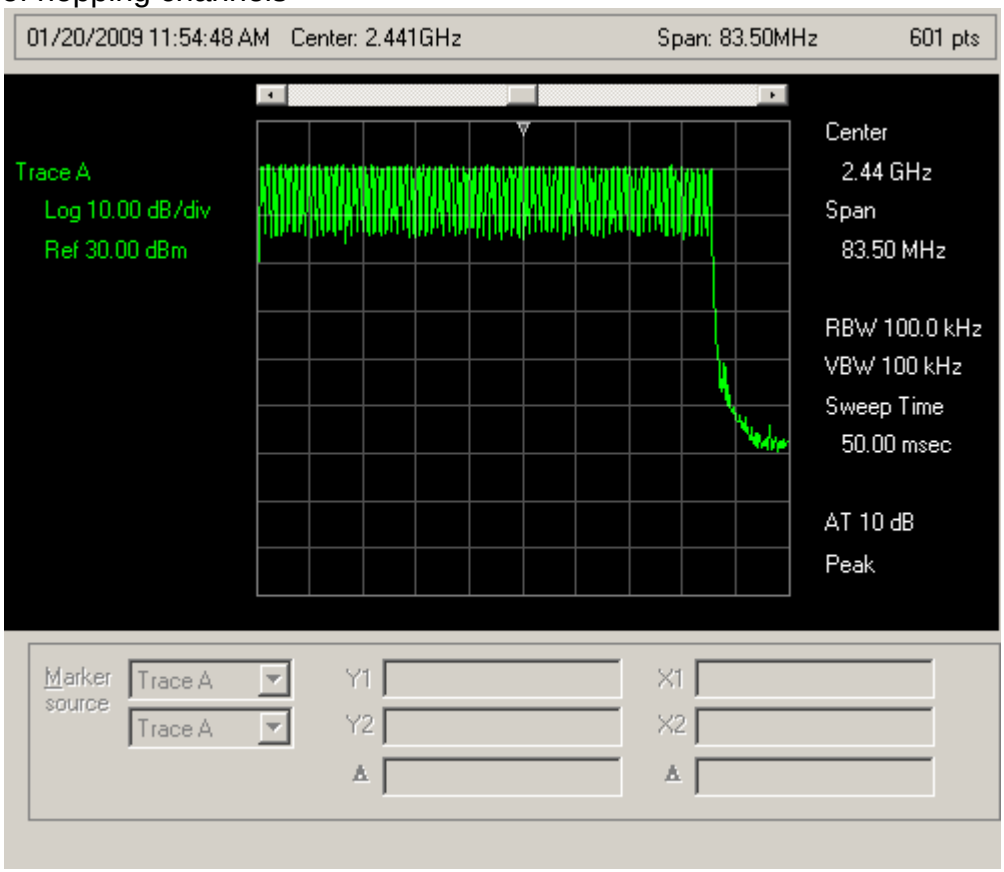
43 Channels

Number of hopping channels



Test Data – Time of Occupancy

79 Channels
Number of hopping channels



Section 5. Peak Power Output

NAME OF TEST: Peak Power Output	PARA. NO.: 15.247 (b) RSS-210 A8.4(2)
TESTED BY: David Light	DATE: 20 January 2009

Test Results: Complies.

Measurement Data: See attached plots.

Detachable antenna? ☒ Yes ☐ No

Frequency (MHz)	Peak Power (dBm)	Peak Power (mW)	Antenna Type	Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (mW)
2404	21.0	125	Omni	6	27.0	500
2435	20.7	117	Omni	6	26.7	468
2467	20.5	112	Omni	6	26.5	447
2400.75	20.8	120	Panel	9	29.8	955
2434	20.7	117	Panel	9	29.7	933
2471	20.3	107	Panel	9	29.3	851
Maximum EIRP (mW): 955 (79 channel mode) / 500 (43 channel mode)						

☒ This device was tested at +/- 15% input power per 15.31(e), with no variation in output power.

☒ The device was tested on three channels per 15.31(l).

Equipment Used: 1464-1472-1469-1082

Measurement Uncertainty: 1.7 dB

Temperature: 22 °C

Relative Humidity: 35 %

Section 6. Spurious Emissions (Antenna Conducted)

NAME OF TEST: Spurious Emissions (Antenna Conducted)	PARA. NO.: 15.247(d) RSS-210 A8.5
TESTED BY: David Light	DATE: 20 January 2009

Test Results: Complies.

Measurement Data: See attached plots.

Equipment Used: 1464-1472-1469-1082

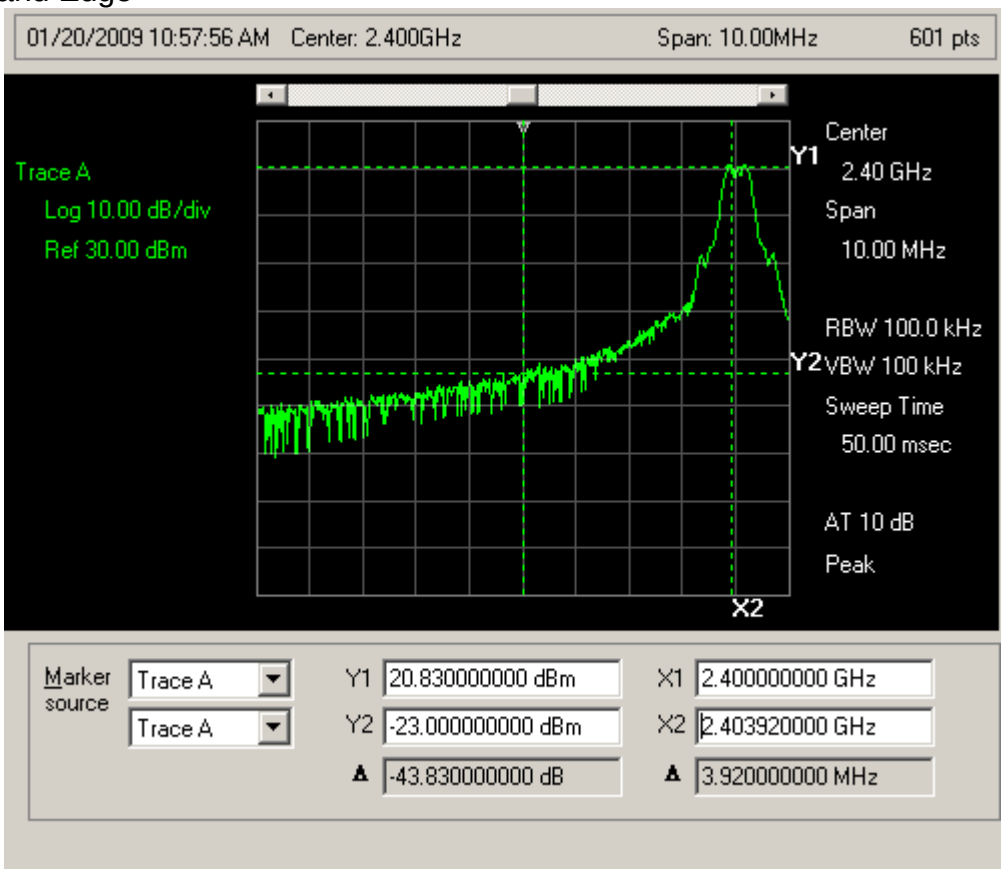
Measurement Uncertainty: $1X10^{-7}$ppm

Temperature: 22 °C

Relative Humidity: 35 %

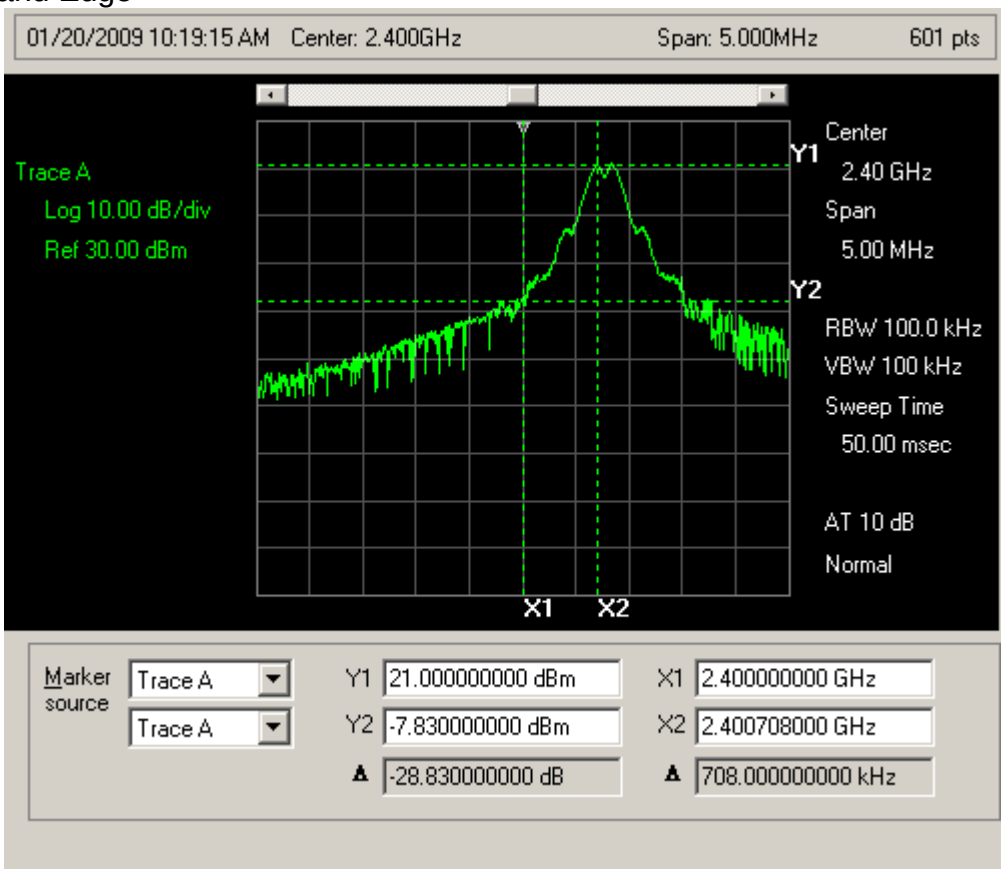
Test Data – Spurious Emissions at Antenna Terminals

43 Channel
Lower Band Edge



Test Data – Spurious Emissions at Antenna Terminals

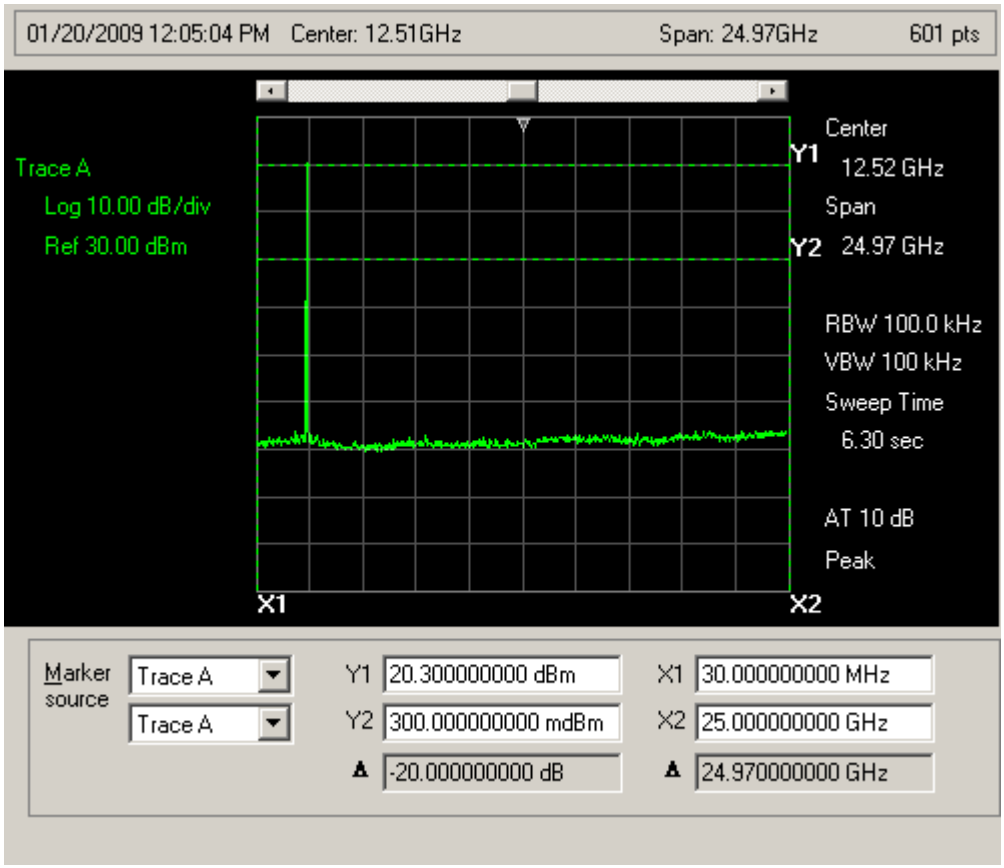
79 Channel
Lower Band Edge



Test Data – Spurious Emissions at Antenna Terminals

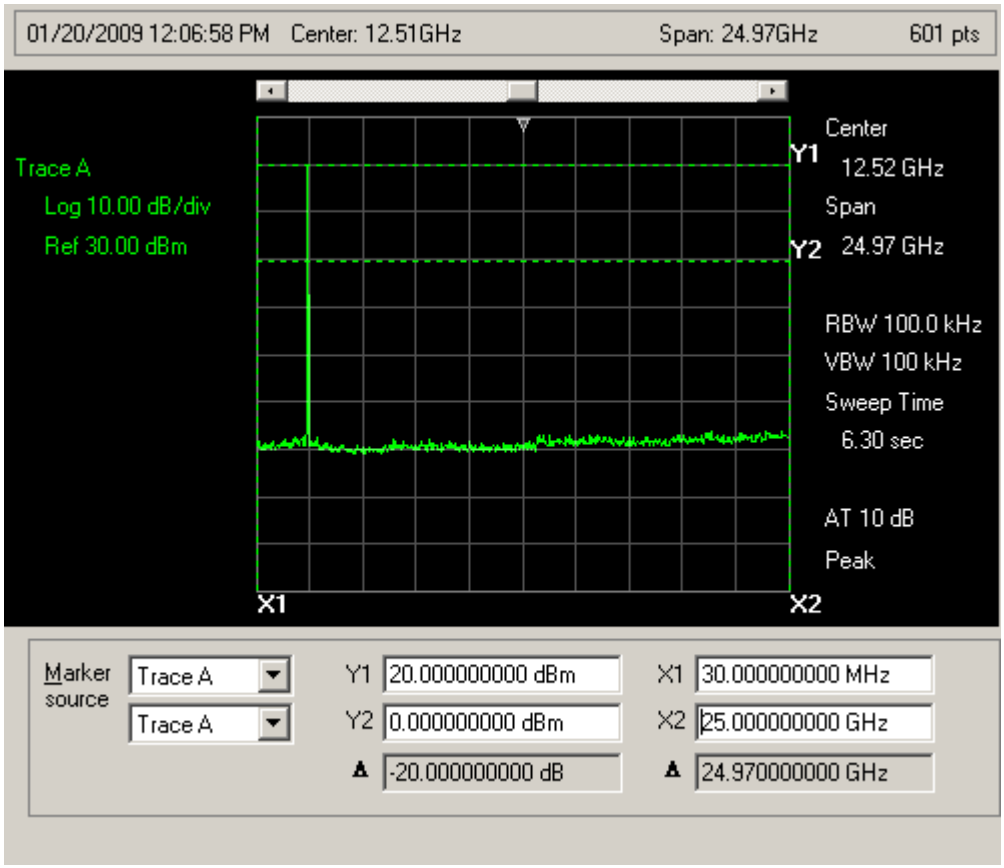
43 Channel

Spurs – Low Channel



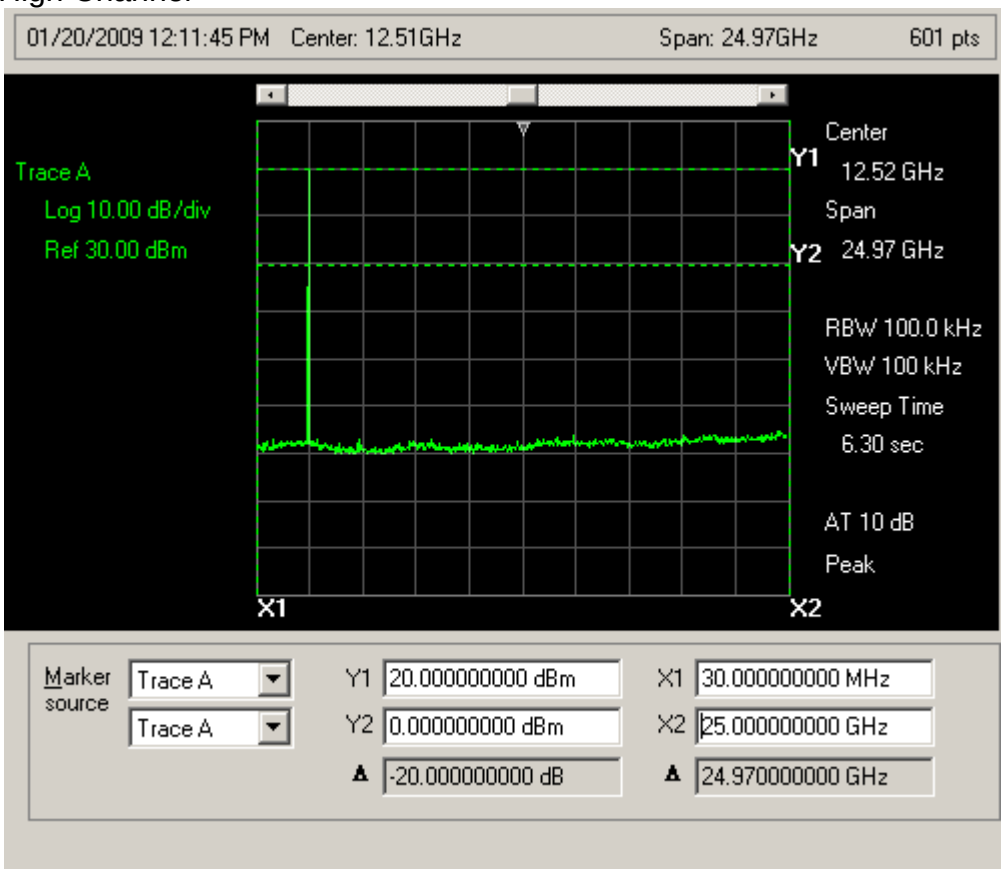
Test Data – Spurious Emissions at Antenna Terminals

43 Channel
Spurs – Mid Channel



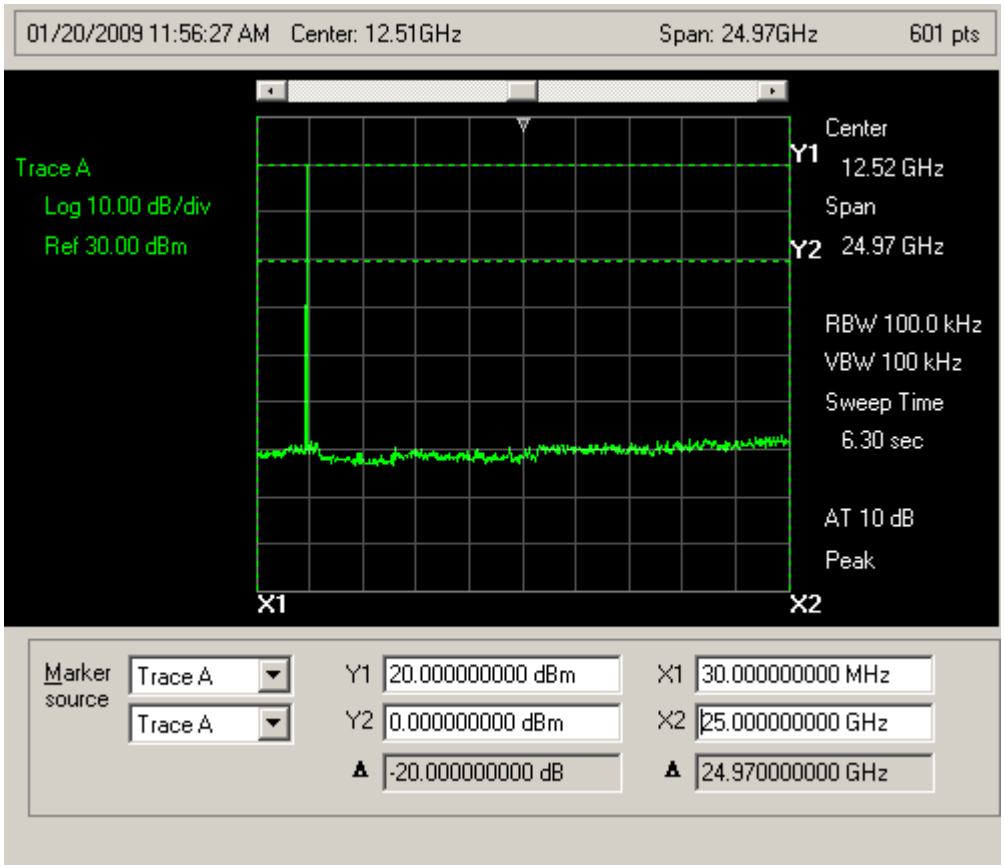
Test Data – Spurious Emissions at Antenna Terminals

43 Channel
Spurs – High Channel



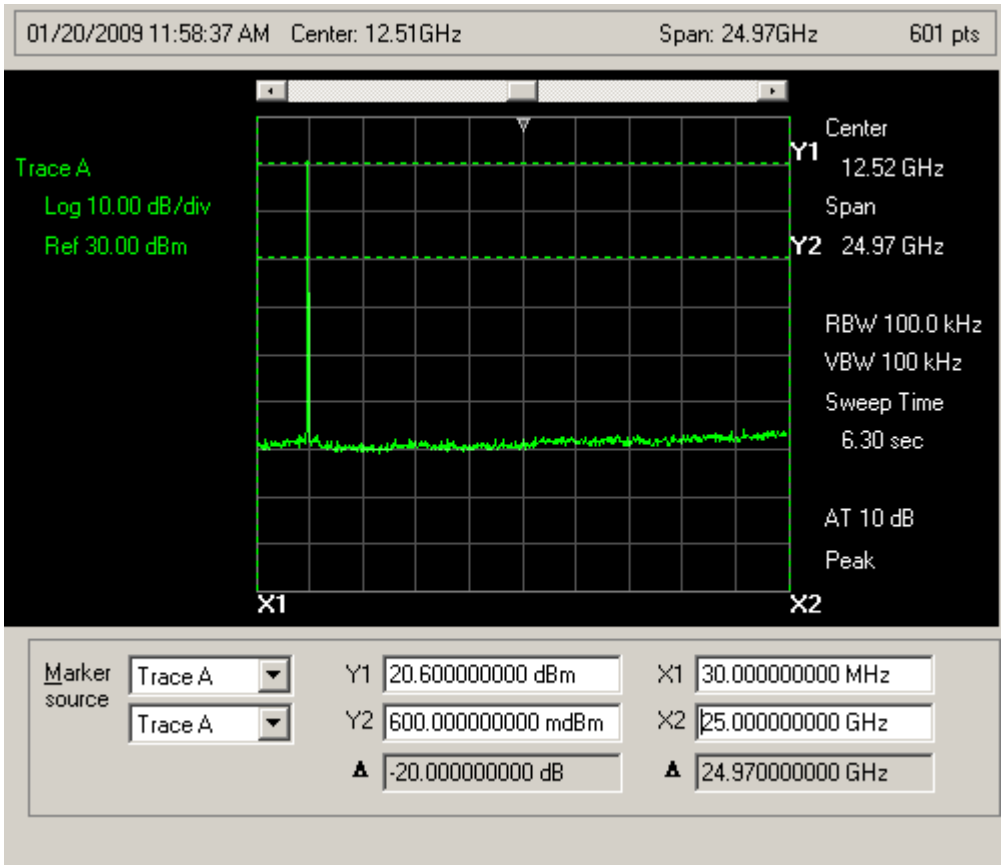
Test Data – Spurious Emissions at Antenna Terminals

79 Channel
Spurs – Low Channel



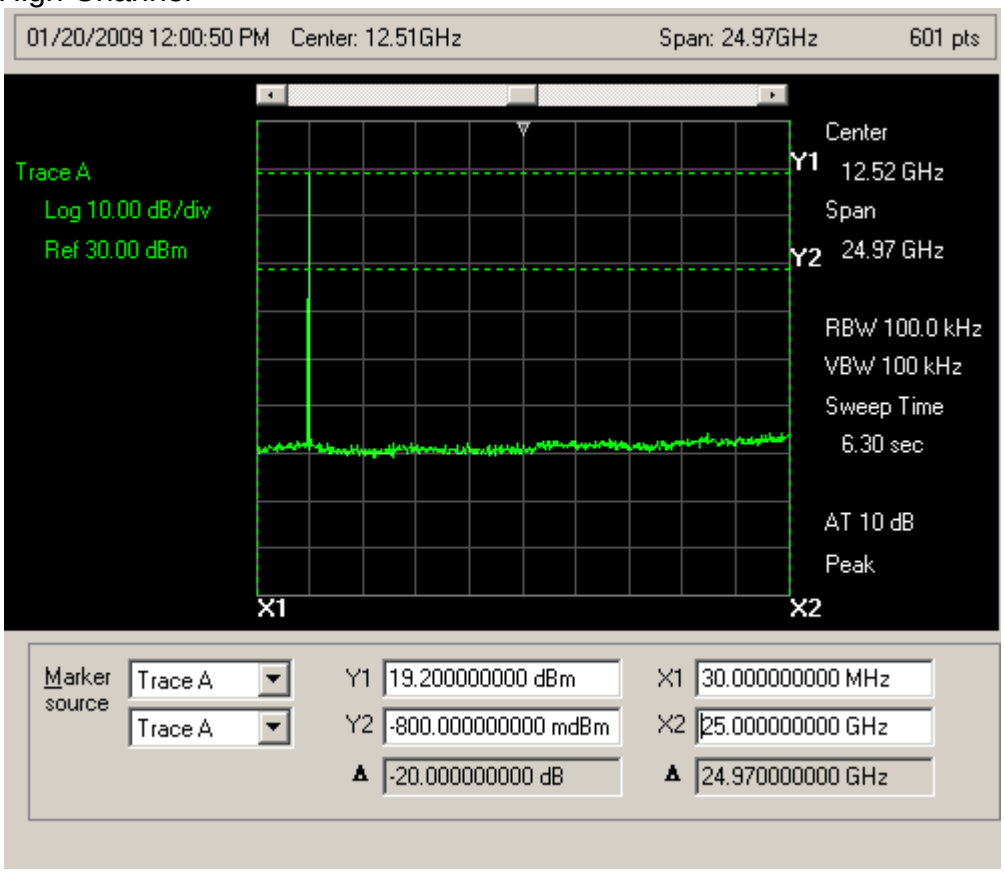
Test Data – Spurious Emissions at Antenna Terminals

79 Channel
Spurs – Mid Channel



Test Data – Spurious Emissions at Antenna Terminals

79 Channel
Spurs – High Channel



Section 7. Spurious Emissions (Radiated)

NAME OF TEST: Spurious Emissions (Radiated)	PARA. NO.: 15.247(d) RSS-210 A8.5
TESTED BY: David Light	DATE: 22 January 2009

Test Results: Complies. The worst case emission was 73.6 dBµV/m at 2483.5 MHz. This is 0.4 dB below the specification limit of 74 dBµV/m.

Measurement Data: See attached table(s).

Notes:

☐ For handheld devices, the EUT was tested on three orthogonal axis'

☒ The device was tested from 30 MHz to the tenth harmonic of the highest fundamental frequency per 15.33

☒ The device was tested on three channels per 15.31(l).

Equipment Used: 1464-1484-1485-1016-993-1763-791

Measurement Uncertainty: +/-3.6 dB

Temperature: 25 °C

Relative Humidity: 40 %

Analyzer Settings:

<1000 MHz: RBW=VBW=100 kHz, Peak detector
>1000 MHz: RBW=VBW=1 MHz, Peak detector

Duty cycle correction:

-20.9 dB for 43 channel configuration
-20.0 dB for 79 channel configuration

Test Data - Radiated Emissions

Laird Technologies WIC2450-A 2dBi Chip Antenna

43 Channel

Freq MHz	Rdng dBµV	Pre-A Duty dB	Horn dB	Cable dB	Cable dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
2483.500	36.2	+0.0	+29.0	+0.8	+2.3	+0.0	68.3	74.0	-5.7	Horiz
		+0.0						High channel		
2483.500	36.2	+0.0	+29.0	+0.8	+2.3	+0.0	47.4	54.0	-6.6	Horiz
Ave		-20.9						High channel		
7400.757	50.5	-32.4	+35.9	+1.2	+4.0	+0.0	59.2	74.0	-14.8	Horiz
		+0.0						High channel		
7400.757	50.5	-32.4	+35.9	+1.2	+4.0	+0.0	38.3	54.0	-15.7	Horiz
Ave		-20.9						High channel		
2483.500	34.3	+0.0	+29.0	+0.8	+2.3	+0.0	66.4	74.0	-7.6	Vert
		+0.0						High channel		
2483.500	34.3	+0.0	+29.0	+0.8	+2.3	+0.0	45.5	54.0	-8.5	Vert
Ave		-20.9						High channel		
7400.760	54.3	-32.4	+35.9	+1.2	+4.0	+0.0	63.0	74.0	-11.0	Vert
		+0.0						High channel		
7400.760	54.3	-32.4	+35.9	+1.2	+4.0	+0.0	42.1	54.0	-11.9	Vert
Ave		-20.9						High channel		
7306.425	53.0	-32.3	+35.8	+1.2	+4.0	+0.0	61.7	74.0	-12.3	Vert
		+0.0						Mid channel		
7306.425	53.0	-32.3	+35.8	+1.2	+4.0	+0.0	40.8	54.0	-13.2	Vert
Ave		-20.9						Mid channel		
7306.425	48.3	-32.3	+35.8	+1.2	+4.0	+0.0	57.0	74.0	-17.0	Horiz
		+0.0						Mid channel		
7306.425	48.3	-32.3	+35.8	+1.2	+4.0	+0.0	36.1	54.0	-17.9	Horiz
Ave		-20.9						Mid channel		
7211.973	45.7	-32.1	+35.8	+1.2	+3.9	+0.0	54.5	74.0	-19.5	Horiz
		+0.0						Low channel		
7211.973	45.7	-32.1	+35.8	+1.2	+3.9	+0.0	33.6	54.0	-20.4	Horiz
Ave		-20.9						Low channel		
7211.973	48.2	-32.1	+35.8	+1.2	+3.9	+0.0	57.0	74.0	-17.0	Vert
		+0.0						Low channel		
7211.973	48.2	-32.1	+35.8	+1.2	+3.9	+0.0	36.1	54.0	-17.9	Vert
Ave		-20.9						Low channel		

Test Data - Radiated Emissions

Nearson S151FC-L-(132)PX-2450S 5dBi Dipole Antenna
43 Channel

Freq MHz	Rdng dBµV	Pre-A Duty dB	Horn dB	Cable dB	Cable dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
2483.500	37.2	+0.0 +0.0	+29.0	+0.8	+2.3	+0.0	69.3	74.0 High Channel	-4.7	Vert
2483.500 Ave	37.2	+0.0 -20.9	+29.0	+0.8	+2.3	+0.0	48.4	54.0 High Channel	-5.6	Vert
7401.000	57.5	-32.4 +0.0	+35.9	+1.2	+4.0	+0.0	66.2	74.0 High Channel	-7.8	Vert
7401.000 Ave	57.5	-32.4 -20.9	+35.9	+1.2	+4.0	+0.0	45.3	54.0 High Channel	-8.7	Vert
2483.000	33.7	+0.0 +0.0	+29.0	+0.8	+2.3	+0.0	65.8	74.0 High Channel	-8.2	Horiz
2483.000 Ave	33.7	+0.0 -20.9	+29.0	+0.8	+2.3	+0.0	44.9	54.0 High Channel	-9.1	Horiz
7401.000	52.5	-32.4 +0.0	+35.9	+1.2	+4.0	+0.0	61.2	74.0 High Channel	-12.8	Horiz
7401.000 Ave	52.5	-32.4 -20.9	+35.9	+1.2	+4.0	+0.0	40.3	54.0 High Channel	-13.7	Horiz
7306.350	49.8	-32.3 +0.0	+35.8	+1.2	+4.0	+0.0	58.5	74.0 Mid Channel	-15.5	Horiz
7306.350 Ave	49.8	-32.3 -20.9	+35.8	+1.2	+4.0	+0.0	37.6	54.0 Mid Channel	-16.4	Horiz
7306.350	55.5	-32.3 +0.0	+35.8	+1.2	+4.0	+0.0	64.2	74.0 Mid Channel	-9.8	Vert
7306.350 Ave	55.5	-32.3 -20.9	+35.8	+1.2	+4.0	+0.0	43.3	54.0 Mid Channel	-10.7	Vert
7212.000	53.2	-32.1 +0.0	+35.8	+1.2	+3.9	+0.0	62.0	74.0 Low Channel	-12.0	Vert
7212.000 Ave	53.2	-32.1 -20.9	+35.8	+1.2	+3.9	+0.0	41.1	54.0 Low Channel	-12.9	Vert
7212.000	47.7	-32.1 +0.0	+35.8	+1.2	+3.9	+0.0	56.5	74.0 Low Channel	-17.5	Horiz
7212.000 Ave	47.7	-32.1 -20.9	+35.8	+1.2	+3.9	+0.0	35.6	54.0 Low Channel	-18.4	Horiz

Test Data - Radiated Emissions

Laird Technologies IG2450-RS36 6dBi Omni Antenna
43 Channel

Freq MHz	Rdng dBµV	Pre-A Duty dB	Horn dB	Cable dB	Cable dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
2483.500	32.8	+0.0	+29.0	+0.8	+2.3	+0.0	64.9	74.0	-9.1	Vert
		+0.0						High Channel		
2483.500	32.8	+0.0	+29.0	+0.8	+2.3	+0.0	44.0	54.0	-10.0	Vert
Ave		-20.9						High Channel		
4934.000	49.8	-32.6	+33.6	+1.0	+3.3	+0.0	55.1	74.0	-18.9	Vert
		+0.0						High Channel		
4934.000	49.8	-32.6	+33.6	+1.0	+3.3	+0.0	34.2	54.0	-19.8	Vert
Ave		-20.9						High Channel		
7401.000	57.7	-32.4	+35.9	+1.2	+4.0	+0.0	66.4	74.0	-7.6	Vert
		+0.0						High Channel		
7401.000	57.7	-32.4	+35.9	+1.2	+4.0	+0.0	45.5	54.0	-8.5	Vert
Ave		-20.9						High Channel		
2483.500	32.7	+0.0	+29.0	+0.8	+2.3	+0.0	64.8	74.0	-9.2	Horiz
		+0.0						High Channel		
2483.500	32.7	+0.0	+29.0	+0.8	+2.3	+0.0	43.9	54.0	-10.1	Horiz
Ave		-20.9						High Channel		
7401.000	54.2	-32.4	+35.9	+1.2	+4.0	+0.0	62.9	74.0	-11.1	Horiz
		+0.0						High Channel		
7401.000	54.2	-32.4	+35.9	+1.2	+4.0	+0.0	42.0	54.0	-12.0	Horiz
Ave		-20.9						High Channel		
7306.339	50.2	-32.3	+35.8	+1.2	+4.0	+0.0	58.9	74.0	-15.1	Horiz
		+0.0						Mid Channel		
7306.339	50.2	-32.3	+35.8	+1.2	+4.0	+0.0	38.0	54.0	-16.0	Horiz
Ave		-20.9						Mid Channel		
7306.339	55.2	-32.3	+35.8	+1.2	+4.0	+0.0	63.9	74.0	-10.1	Vert
		+0.0						Mid Channel		
7306.339	55.2	-32.3	+35.8	+1.2	+4.0	+0.0	43.0	54.0	-11.0	Vert
Ave		-20.9						Mid Channel		
7211.964	54.7	-32.1	+35.8	+1.2	+3.9	+0.0	63.5	74.0	-10.5	Vert
		+0.0						Low Channel		
7211.964	54.7	-32.1	+35.8	+1.2	+3.9	+0.0	42.6	54.0	-11.4	Vert
Ave		-20.9						Low Channel		
7211.964	50.7	-32.1	+35.8	+1.2	+3.9	+0.0	59.5	74.0	-14.5	Horiz
		+0.0						Low Channel		
7211.964	50.7	-32.1	+35.8	+1.2	+3.9	+0.0	38.6	54.0	-15.4	Horiz
Ave		-20.9						Low Channel		

Test Data - Radiated Emissions

Laird Technologies ID2450-RS36 9dBi Panel Antenna
43 Channel

Freq MHz	Rdng dBµV	Pre-A Duty dB	Horn dB	Cable dB	Cable dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
2483.500	26.2	+0.0	+29.0	+0.8	+2.3	+0.0	58.3	74.0	-15.7	Vert
		+0.0						High Channel		
2483.500	26.3	+0.0	+29.0	+0.8	+2.3	+0.0	37.5	54.0	-16.5	Vert
Ave		-20.9						High Channel		
7401.000	59.5	-32.4	+35.9	+1.2	+4.0	+0.0	68.2	74.0	-5.8	Vert
		+0.0						High Channel		
7401.000	59.5	-32.4	+35.9	+1.2	+4.0	+0.0	47.3	54.0	-6.7	Vert
Ave		-20.9						High Channel		
2483.500	27.0	+0.0	+29.0	+0.8	+2.3	+0.0	59.1	74.0	-14.9	Horiz
		+0.0						High Channel		
2483.500	27.0	+0.0	+29.0	+0.8	+2.3	+0.0	38.2	54.0	-15.8	Horiz
Ave		-20.9						High Channel		
7401.000	49.8	-32.4	+35.9	+1.2	+4.0	+0.0	58.5	74.0	-15.5	Horiz
		+0.0						High Channel		
7401.000	49.8	-32.4	+35.9	+1.2	+4.0	+0.0	37.6	54.0	-16.4	Horiz
Ave		-20.9						High Channel		
7306.350	50.7	-32.3	+35.8	+1.2	+4.0	+0.0	59.4	74.0	-14.6	Horiz
		+0.0						Mid Channel		
7306.350	50.7	-32.3	+35.8	+1.2	+4.0	+0.0	38.5	54.0	-15.5	Horiz
Ave		-20.9						Mid Channel		
7306.350	56.3	-32.3	+35.8	+1.2	+4.0	+0.0	65.0	74.0	-9.0	Vert
		+0.0						Mid Channel		
7306.350	56.3	-32.3	+35.8	+1.2	+4.0	+0.0	44.1	54.0	-9.9	Vert
Ave		-20.9						Mid Channel		
7212.000	53.8	-32.1	+35.8	+1.2	+3.9	+0.0	62.6	74.0	-11.4	Vert
		+0.0						Low Channel		
7212.000	53.8	-32.1	+35.8	+1.2	+3.9	+0.0	41.7	54.0	-12.3	Vert
Ave		-20.9						Low Channel		
7212.000	48.5	-32.1	+35.8	+1.2	+3.9	+0.0	57.3	74.0	-16.7	Horiz
		+0.0						Low Channel		
7212.000	48.5	-32.1	+35.8	+1.2	+3.9	+0.0	36.4	54.0	-17.6	Horiz
Ave		-20.9						Low Channel		

Test Data - Radiated Emissions

Laird Technologies WIC2450-A 2dBi Chip Antenna

79 Channel

Freq MHz	Rdng dBµV	Pre-A Duty dB	Horn dB	Cable dB	Cable dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
2483.500	34.5	+0.0	+29.0	+0.8	+2.3	+0.0	66.6	74.0 High channel	-7.4	Vert
2483.500 Ave	34.5	-20.9	+29.0	+0.8	+2.3	+0.0	45.7	54.0 High channel	-8.3	Vert
7412.781	53.3	-32.5 +0.0	+35.9	+1.2	+4.0	+0.0	61.9	74.0 High channel	-12.1	Vert
7412.781 Ave	53.3	-32.5 -20.9	+35.9	+1.2	+4.0	+0.0	41.0	54.0 High channel	-13.0	Vert
2483.500	33.3	+0.0	+29.0	+0.8	+2.3	+0.0	65.4	74.0 High channel	-8.6	Horiz
2483.500 Ave	33.3	-20.9	+29.0	+0.8	+2.3	+0.0	44.5	54.0 High channel	-9.5	Horiz
7412.781	47.7	-32.5 +0.0	+35.9	+1.2	+4.0	+0.0	56.3	74.0 High channel	-17.7	Horiz
7412.781 Ave	47.7	-32.5 -20.9	+35.9	+1.2	+4.0	+0.0	35.4	54.0 High channel	-18.6	Horiz
7307.493	50.3	-32.3 +0.0	+35.8	+1.2	+4.0	+0.0	59.0	74.0 Mid channel	-15.0	Vert
7307.493 Ave	50.3	-32.3 -20.9	+35.8	+1.2	+4.0	+0.0	38.1	54.0 Mid channel	-15.9	Vert
7307.493	49.8	-32.3 +0.0	+35.8	+1.2	+4.0	+0.0	58.5	74.0 Mid channel	-15.5	Horiz
7307.493 Ave	49.8	-32.3 -20.9	+35.8	+1.2	+4.0	+0.0	37.6	54.0 Mid channel	-16.4	Horiz
7202.400	44.7	-32.1 +0.0	+35.8	+1.2	+3.9	+0.0	53.5	74.0 Low channel	-20.5	Horiz
7202.400 Ave	44.7	-32.1 -20.9	+35.8	+1.2	+3.9	+0.0	32.6	54.0 Low channel	-21.4	Horiz
7202.400	47.5	-32.1 +0.0	+35.8	+1.2	+3.9	+0.0	56.3	74.0 Low channel	-17.7	Vert
7202.400 Ave	47.5	-32.1 -20.9	+35.8	+1.2	+3.9	+0.0	35.4	54.0 Low channel	-18.6	Vert

Test Data - Radiated Emissions

Nearson S151FC-L-(132)PX-2450S 5dBi Dipole Antenna
79 Channel

Freq MHz	Rdng dBµV	Pre-A Duty dB	Horn dB	Cable dB	Cable dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
2483.500	33.5	+0.0	+29.0	+0.8	+2.3	+0.0	65.6	74.0 5 dBi	-8.4	Horiz
2483.500 Ave	33.5	-20.9	+29.0	+0.8	+2.3	+0.0	44.7	54.0 5 dBi	-9.3	Horiz
7412.850	54.8	-32.5 +0.0	+35.9	+1.2	+4.0	+0.0	63.4	74.0 High channel	-10.6	Horiz
7412.850 Ave	54.8	-32.5 -20.9	+35.9	+1.2	+4.0	+0.0	42.5	54.0 High channel	-11.5	Horiz
2483.500	41.5	+0.0	+29.0	+0.8	+2.3	+0.0	73.6	74.0 5 dBi	-0.4	Vert
2483.500 Ave	41.5	-20.9	+29.0	+0.8	+2.3	+0.0	52.7	54.0 5 dBi	-1.3	Vert
7412.850	60.8	-32.5 +0.0	+35.9	+1.2	+4.0	+0.0	69.4	74.0 High channel	-4.6	Vert
7412.850 Ave	60.8	-32.5 -20.9	+35.9	+1.2	+4.0	+0.0	48.5	54.0 High channel	-5.5	Vert
7307.475	61.3	-32.3 +0.0	+35.8	+1.2	+4.0	+0.0	70.0	74.0 Mid channel	-4.0	Horiz
7307.475 Ave	61.3	-32.3 -20.9	+35.8	+1.2	+4.0	+0.0	49.1	54.0 Mid channel	-4.9	Horiz
4871.650	43.7	-32.5	+33.4	+1.0	+3.3	+0.0	48.9	74.0	-25.1	Vert
7307.475	56.0	-32.3 +0.0	+35.8	+1.2	+4.0	+0.0	64.7	74.0 Mid channel	-9.3	Vert
7307.475 Ave	56.0	-32.3 -20.9	+35.8	+1.2	+4.0	+0.0	43.8	54.0 Mid channel	-10.2	Vert
7202.400	55.8	-32.1 +0.0	+35.8	+1.2	+3.9	+0.0	64.6	74.0 Low channel	-9.4	Horiz
7202.400 Ave	55.8	-32.1 -20.9	+35.8	+1.2	+3.9	+0.0	43.7	54.0 Low channel	-10.3	Horiz
7202.400	59.8	-32.1 +0.0	+35.8	+1.2	+3.9	+0.0	68.6	74.0 Low channel	-5.4	Vert
7202.400 Ave	59.8	-32.1 -20.9	+35.8	+1.2	+3.9	+0.0	47.7	54.0 Low channel	-6.3	Vert

Test Data - Radiated Emissions

Laird Technologies IG2450-RS36 6dBi Omni Antenna
79 Channel

Freq MHz	Rdng dBµV	Pre-A Duty dB	Horn dB	Cable dB	Cable dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
2483.500	33.5	+0.0	+29.0	+0.8	+2.3	+0.0	65.6	74.0 6 dBi	-8.4	Horiz
2483.500 Ave	33.5	-20.9	+29.0	+0.8	+2.3	+0.0	44.7	54.0 6 dBi	-9.3	Horiz
7412.760	54.0	-32.5 +0.0	+35.9	+1.2	+4.0	+0.0	62.6	74.0 High channel	-11.4	Horiz
7412.760 Ave	54.0	-32.5 -20.9	+35.9	+1.2	+4.0	+0.0	41.7	54.0 High channel	-12.3	Horiz
2483.500	39.8	+0.0	+29.0	+0.8	+2.3	+0.0	71.9	74.0 6 dBi	-2.1	Vert
2483.500 Ave	39.8	-20.9	+29.0	+0.8	+2.3	+0.0	51.0	54.0 6 dBi	-3.0	Vert
7412.760	58.0	-32.5 +0.0	+35.9	+1.2	+4.0	+0.0	66.6	74.0 High channel	-7.4	Vert
7412.760 Ave	58.0	-32.5 -20.9	+35.9	+1.2	+4.0	+0.0	45.7	54.0 High channel	-8.3	Vert
7307.232	54.2	-32.3 +0.0	+35.8	+1.2	+4.0	+0.0	62.9	74.0 Mid channel	-11.1	Vert
7307.232 Ave	54.2	-32.3 -20.9	+35.8	+1.2	+4.0	+0.0	42.0	54.0 Mid channel	-12.0	Vert
7307.232	51.0	-32.3 +0.0	+35.8	+1.2	+4.0	+0.0	59.7	74.0 Mid channel	-14.3	Horiz
7307.232 Ave	51.0	-32.3 -20.9	+35.8	+1.2	+4.0	+0.0	38.8	54.0 Mid channel	-15.2	Horiz
7202.400	53.8	-32.1 +0.0	+35.8	+1.2	+3.9	+0.0	62.6	74.0 Low channel	-11.4	Vert
7202.400 Ave	53.8	-32.1 -20.9	+35.8	+1.2	+3.9	+0.0	41.7	54.0 Low channel	-12.3	Vert
7202.400	51.0	-32.1 +0.0	+35.8	+1.2	+3.9	+0.0	59.8	74.0 Low channel	-14.2	Horiz
7202.400 Ave	51.0	-32.1 -20.9	+35.8	+1.2	+3.9	+0.0	38.9	54.0 Low channel	-15.1	Horiz

Test Data - Radiated Emissions

Laird Technologies ID2450-RS36 9dBi Panel Antenna
79 Channel

Freq MHz	Rdng dBµV	Pre-A Duty dB	Horn dB	Cable dB	Cable dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
2483.500	41.2	+0.0	+29.0	+0.8	+2.3	+0.0	73.3	74.0 Panel	-0.7	Vert
2483.500 Ave	41.2	-20.9	+29.0	+0.8	+2.3	+0.0	52.4	54.0 Panel	-1.6	Vert
7412.775	59.2	-32.5 +0.0	+35.9	+1.2	+4.0	+0.0	67.8	74.0 High channel	-6.2	Vert
7412.775 Ave	59.2	-32.5 -20.9	+35.9	+1.2	+4.0	+0.0	46.9	54.0 High channel	-7.1	Vert
2483.500	33.3	+0.0	+29.0	+0.8	+2.3	+0.0	65.4	74.0 Panel	-8.6	Horiz
2483.500 Ave	33.3	-20.9	+29.0	+0.8	+2.3	+0.0	44.5	54.0 Panel	-9.5	Horiz
7412.775	56.8	-32.5 +0.0	+35.9	+1.2	+4.0	+0.0	65.4	74.0 High channel	-8.6	Horiz
7412.775 Ave	56.8	-32.5 -20.9	+35.9	+1.2	+4.0	+0.0	44.5	54.0 High channel	-9.5	Horiz
7307.482	52.7	-32.3 +0.0	+35.8	+1.2	+4.0	+0.0	61.4	74.0 Mid channel	-12.6	Horiz
7307.482 Ave	52.7	-32.3 -20.9	+35.8	+1.2	+4.0	+0.0	40.5	54.0 Mid channel	-13.5	Horiz
7307.482	53.5	-32.3 +0.0	+35.8	+1.2	+4.0	+0.0	62.2	74.0 Mid channel	-11.8	Vert
7307.482 Ave	53.5	-32.3 -20.9	+35.8	+1.2	+4.0	+0.0	41.3	54.0 Mid channel	-12.7	Vert
7202.250	47.0	-32.1 +0.0	+35.8	+1.2	+3.9	+0.0	55.8	74.0 Low channel	-18.2	Horiz
7202.250 Ave	47.0	-32.1 -20.9	+35.8	+1.2	+3.9	+0.0	34.9	54.0 Low channel	-19.1	Horiz
7202.250	50.5	-32.1 +0.0	+35.8	+1.2	+3.9	+0.0	59.3	74.0 Low channel	-14.7	Vert
7202.250 Ave	50.5	-32.1 -20.9	+35.8	+1.2	+3.9	+0.0	38.4	54.0 Low channel	-15.6	Vert

Radiated Emission Test Setup Photo

Laird Technologies WIC2450-A 2dBi Chip Antenna

Laird Technologies ID2450-RS36 9dBi Panel Antenna

Laird Technologies IG2450-RS36 6dBi Omni Antenna

Nearson S151FC-L-(132)PX-2450S 5dBi Dipole Antenna

Section 8. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207(a) RSS-Gen 7.2.2
TESTED BY: David Light	DATE: 25 January 2009

Test Results: Complies.

Measurement Data: See attached graphs..

Test Conditions: 41 %RH
24 °C

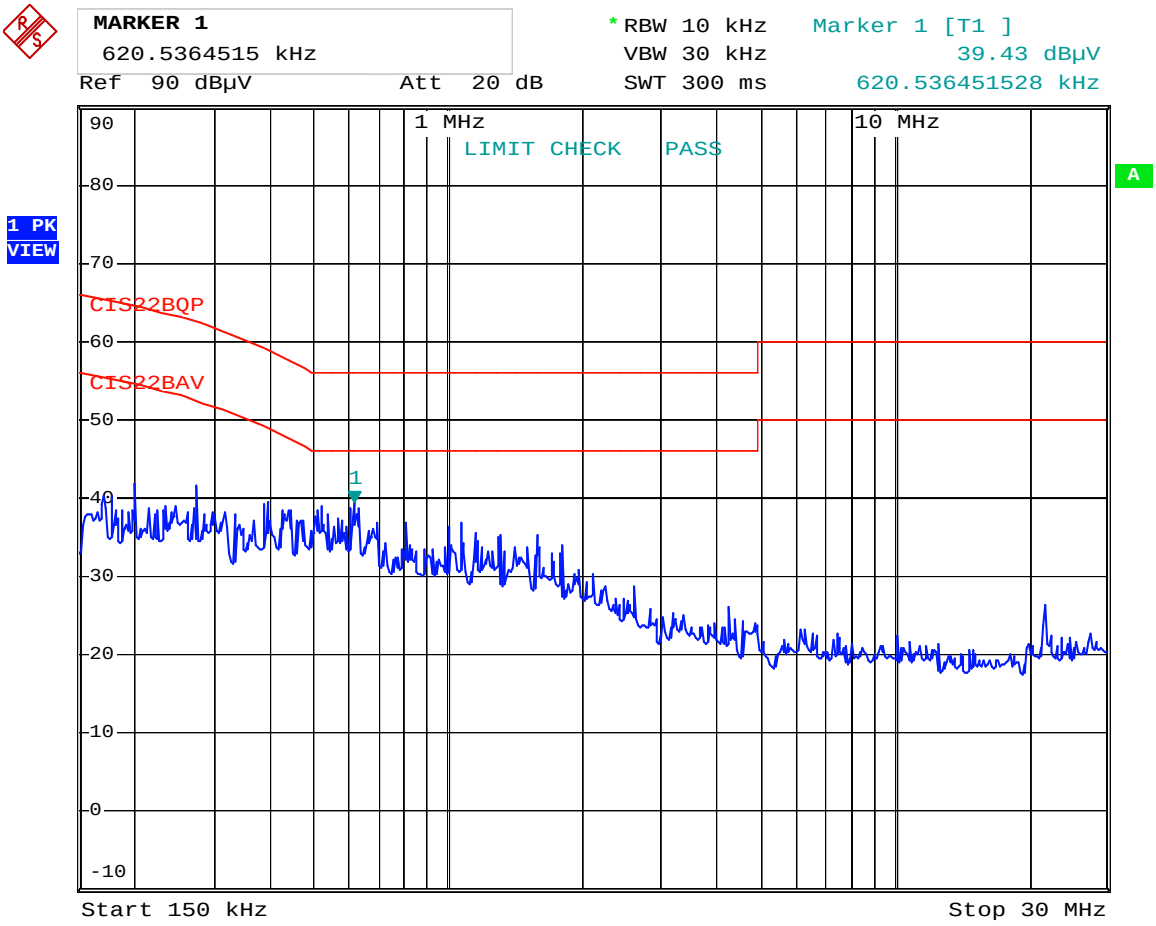
Measurement Uncertainty: +/-1.7 dB

Test Equipment Used: 1663-1484-545

Power was supplied with a GlobTek power adapter p/n WR90C2000LCP-N-NA.

Test Data – Powerline Conducted Emissions

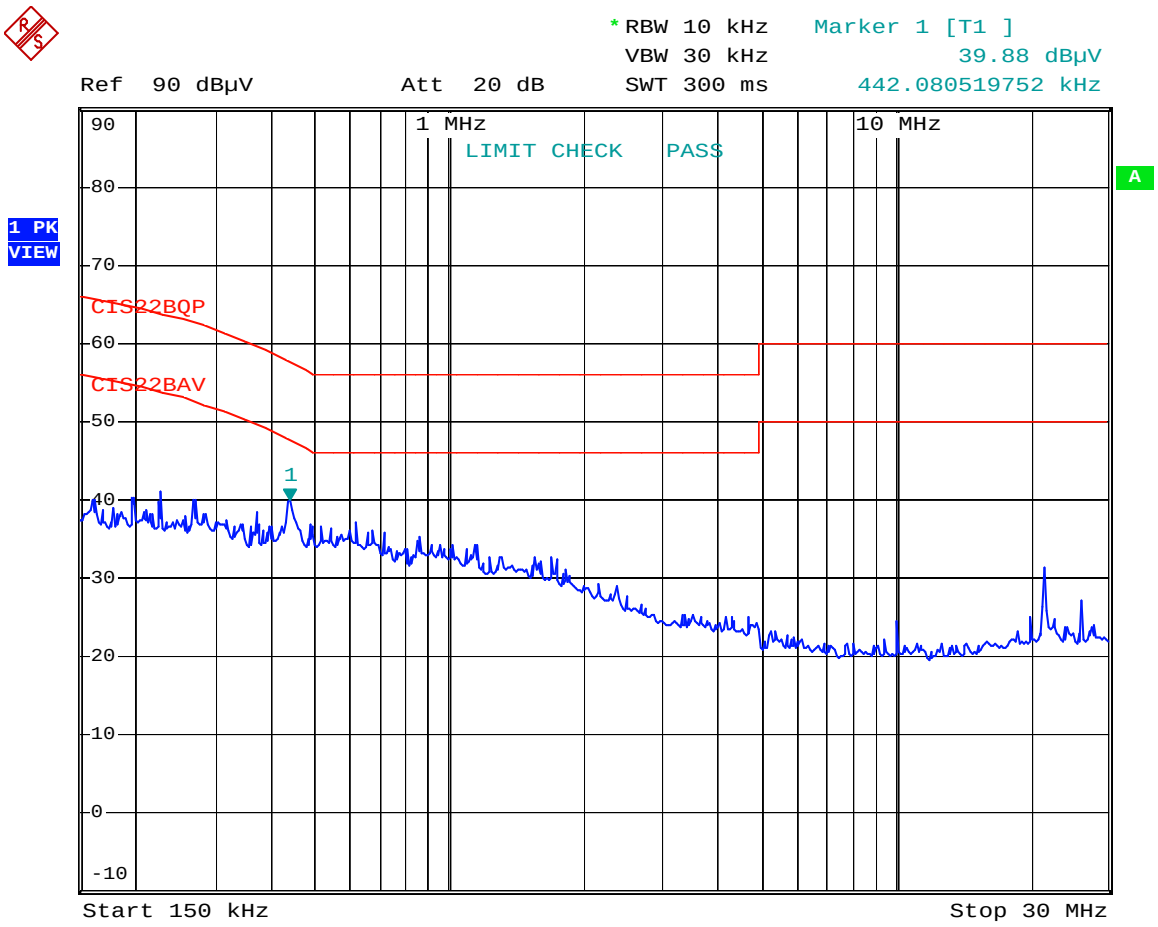
L1 Peak



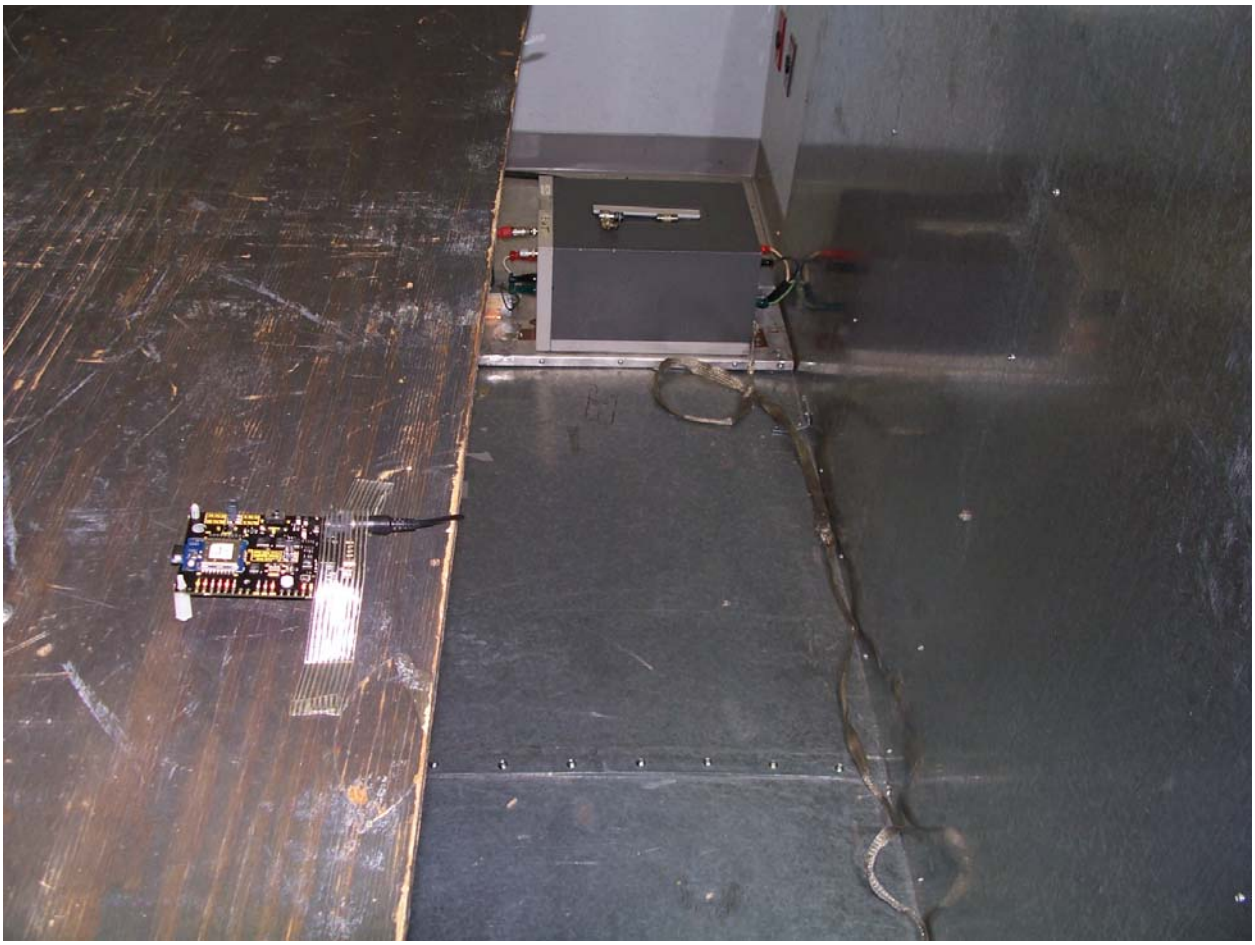
Date: 26.JAN.2009 09:55:38

Test Data – Powerline Conducted Emissions

L2 Peak



Conducted Emissions



Section 9. Receiver Spurious Emissions

NAME OF TEST: Receiver Spurious Emissions	PARA. NO.: RSS-Gen 6(b)
TESTED BY: David Light	DATE: 20 January 2009

Test Results: Complies.

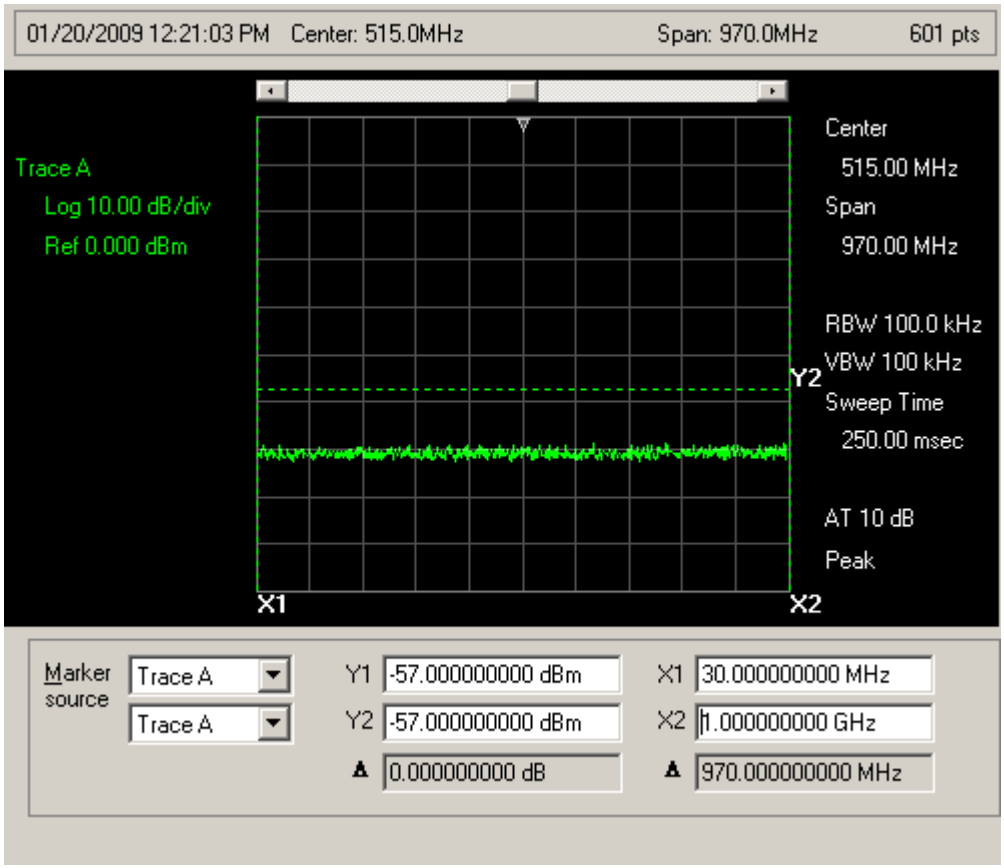
Measurement Data: See attached data..

Test Conditions: 48 %RH
22 °C

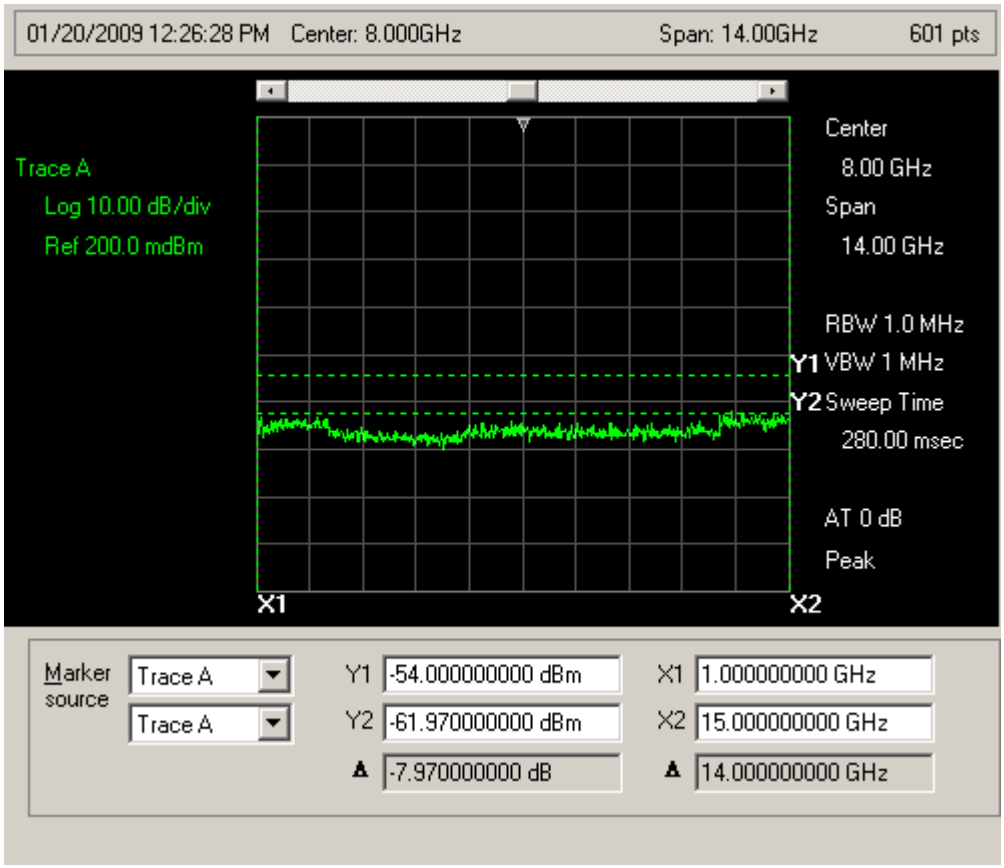
Measurement Uncertainty: +/-1.7 dB

Test Equipment Used: 1464-1082

Test Data – Receiver Spurious Emissions



Test Data – Receiver Spurious Emissions



Section 10. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/24/07	01/24/09
1484	Cable	Storm PR90-010-072	N/A	05/07/08	05/07/09
1485	Cable	Storm PR90-010-216	N/A	05/07/08	05/07/09
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	05/07/08	05/07/09
791	PREAMP, 25dB	Nemko USA, Inc. LNA25	398	05/07/08	05/07/09
1763	Bilog Antenna	Schaffner CBL 6111D	22926	11/04/08	11/04/09
993	Horn antenna	A.H. Systems SAS-200/571	XXX	08/31/07	08/30/08
1082	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	CBU	N/A
1472	20db Attenuator DC 18 Ghz	Omni Spectra 20600-20db	NONE	CBU	N/A
1469	10 db Attenuator DC 18 Ghz	MCL Inc. BW-S10W2 10db-2WDC	NONE	CBU	N/A
1663	Spectrum Analyzer	Rhode & Schwarz FSP3	100073	06/03/08	06/03/09
1484	Cable	Storm PR90-010-072	N/A	05/07/08	05/07/09
545	LISN	Schwarz Beck 8120	8120350	08/05/08	08/05/09

ANNEX A - TEST DETAILS

NAME OF TEST: Powerline Conducted Emissions PARA. NO.: 15.207(a)

Minimum Standard: §15.207 Conducted limits.

(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 mH/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 frequency ranges.

Frequency of Conducted Emission (MHz)	Limit (dBmV) 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.

(b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

(1) For carrier current systems containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000 mV within the frequency band 535-1705 kHz, as measured using a 50 mH/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits as provided in §15.205 and §§15.209, 15.221, 15.223, 15.225 or 15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provision for, the use of battery chargers which permit operating while charging, AC adaptors or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

NAME OF TEST: Channel Separation	PARA. NO.: 15.247(a)(1)

Minimum Standard:

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. 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.

NAME OF TEST: Time of Occupancy	PARA. NO.: 15.247(a)(1)

Minimum Standard:

Frequency Band (MHz)	20 dB Bandwidth	No. of Hopping Channels	Average Time of Occupancy
902 - 928	<250 kHz	50	=<0.4 sec. in 20 sec.
902 – 928	=>250 kHz	25	=<0.4 sec. in 10 sec.
2400 – 2483.5	-----	75	=<0.4 sec. in 0.4 seconds multiplied by the number of hopping channels employed.
5725 – 5850	-----	75	=<0.4 sec. in 30 sec.

Method Of Measurement:

The spectrum analyzer is set as follows:

RBW: 1 MHz
VBW: = RBW
Span: 0 Hz
LOG dB/div.: 10 dB
Sweep: Sufficient to see one hop time sequence.
Trigger: Video

The occupancy time of one hop is measured as above. The average time of occupancy is calculated over the appropriate period of time from above table

Avg. time of occupancy = (period from table/duration of one hop)/no. of channels multiplied by the duration of one hop.

For instance:

If a 2.4 GHz system has a measured hop duration time of 1 msec. and uses 75 channels, then the average time of occupancy would be:

(30 sec./.001 sec.)/75 chan. = 400 x 1 msec. = 400 msec. or 0.4 sec. in 30 sec.

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.247(a)(1)

Minimum Standard:

Frequency Band (MHz)	Maximum 20 dB Bandwidth
902 - 928	500 kHz
2400 – 2483.5	Not defined
5725 – 5850	1 MHz

Method Of Measurement:

The spectrum analyzer is set as follows:

RBW: At least 1% of span/div.
VBW: >RBW
Span: Sufficient to display 20 dB bandwidth
LOG dB/div.: 10 dB
Sweep: Auto

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

NAME OF TEST: Peak Power Output	PARA. NO.: 15.247(b)

Minimum Standard:

Frequency Band (MHz)	No. of Hopping Channels	Maximum Peak Power Output at Antenna Port
902 - 928	at least 50	1 watt
902 – 928	25 - 49	0.25 watts
2400 – 2483.5	75	1 watt
5725 – 5850	75	1 watt

If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point to point operation may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceed 6 dBi.

Systems operating in the 5725 – 5850 MHz band that are used exclusively for fixed, point-to-point operation may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

Direct Measurement Method For Detachable Antennas:
If the antenna is detachable, a peak power meter is used to measure the power output with the transmitter operating into a 50 ohm load. The dBi gain of the antenna(s) employed shall be reported.

Calculation Of EIRP For Integral Antenna:
If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation $GP/4\pi R^2 = E^2/120\pi$ and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

P = the equivalent isotropic radiated power in watts
E = the maximum measured field strength in V/m
R = the measurement range (3 meters)
G = the numeric gain of the transmit antenna in relation to an isotropic radiator

The RBW of the spectrum analyzer shall be set to a value greater than the measured 20 dB occupied bandwidth of the E.U.T.

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

NAME OF TEST: Spurious Emissions at Antenna Terminals PARA. NO.: 15.247(d)

Minimum Standard: In any 100kHz bandwidth outside the frequency band in which the transmitter is operating, emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits. Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

Frequency (MHz)	Field Strength (μV/m @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

THE SPECTRUM WAS SEARCHED TO THE 10th HARMONIC

Method Of Measurement:

30 MHz - 10th harmonic plot
RBW: 100 kHz
VBW: 300 kHz
Sweep: Auto
Display line: -20 dBc

Lower Band Edge
RBW: At least 1% of span/div.
VBW: >RBW
Span: As necessary to display any spurious at band edge.
Sweep: Auto
Center Frequency: 902 MHz, 2400 MHz, or 5725 MHz
Marker: Peak of fundamental emission
Marker Δ: Peak of highest spurious level below center frequency.

Upper Band Edge
RBW: At least 1% of span/div.
VBW: >RBW
Span: As necessary to display any spurious at band edge.
Sweep: Auto
Center Frequency: 928 MHz, 2483.5 MHz, or 5850 MHz
Marker: Peak of fundamental emission
Marker Δ: Peak of highest spurious level above center frequency.

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

NAME OF TEST: Radiated Spurious Emissions PARA. NO.: 15.247(d)

Minimum Standard: In any 100kHz bandwidth outside the frequency band in which the transmitter is operating, emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits:

Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

Frequency (MHz)	Field Strength (μV/m @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

THE SPECTRUM WAS SEARCHED TO THE 10th HARMONIC

15.205 Restricted Bands

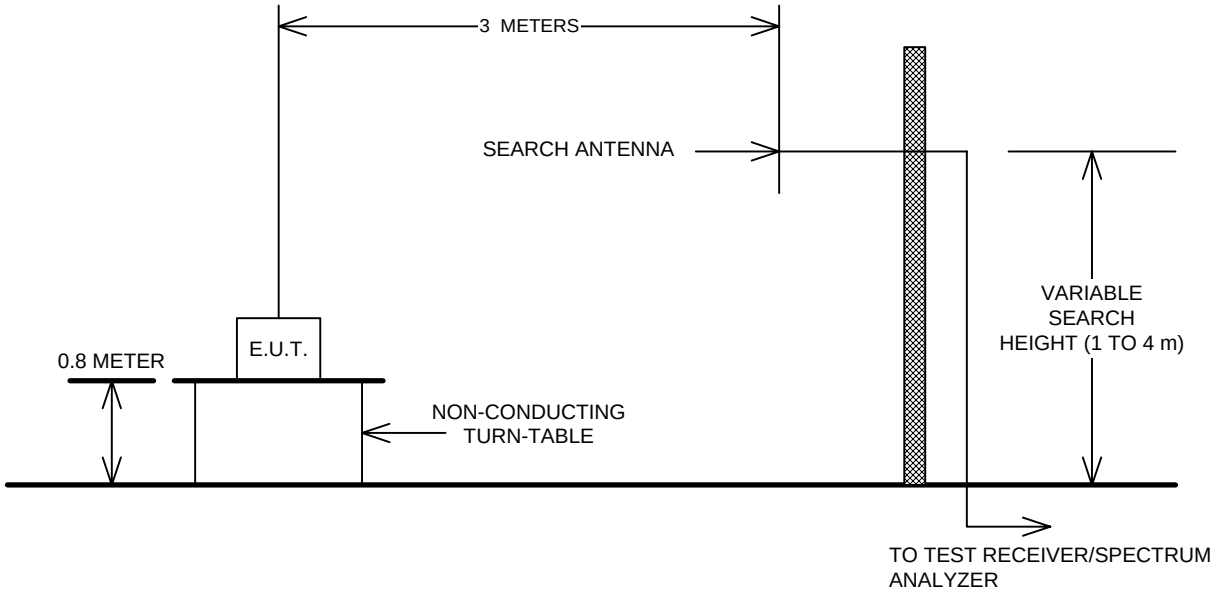
MHz	MHz	MHz	GHz
0.09-0.11	16.42-16.423	399.9-410	4.5-5.25
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.125-6.218	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	2655-2900	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	Above 38.6
13.36-13.41	1718		

Number of channels tested:

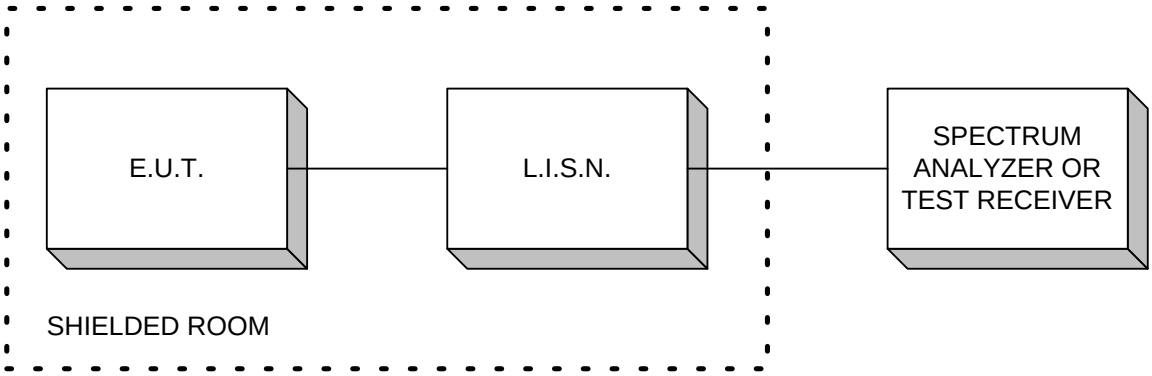
Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

ANNEX B - TEST DIAGRAMS

Test Site For Radiated Emissions



Conducted Emissions



Peak Power at Antenna Terminals