

TEST REPORT

**ACCORDING TO: FCC CFR 47 PART 15 Subpart C, section 15.247 (FHSS) and
subpart B; RSS-210, Issue 7, Annex 8; ICES-003 Issue 4:2004**

FOR:

Cardo Systems Inc.

Bluetooth headset

Model: scala rider Q2 Pro

This report is in conformity with ISO/ IEC 17025. The "A2LA Accredited" symbol endorsement applies only to the tests and calibrations that are listed in the scope of Hermon Laboratories accreditation. The test results relate only to the items tested.
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Table of contents

1	Applicant information	3
2	Equipment under test attributes	3
3	Manufacturer information	3
4	Test details	3
5	Tests summary	4
6	EUT description	5
6.1	General information	5
6.2	EUT options/configurations	5
6.3	Ports and lines	5
6.4	Operating frequencies	5
6.5	Changes made in the EUT	5
6.6	Test configuration	6
6.7	Transmitter characteristics	7
7	Transmitter tests according to 47CFR part 15 subpart C §15.247 (FHSS) and RSS-210 Annex 8 requirements	8
7.1	Frequency hopping requirements	8
7.2	The 20 dB bandwidth	10
7.3	The 99% bandwidth	14
7.4	Carrier frequency separation	18
7.5	Number of hopping frequencies	21
7.6	Average time of occupancy	24
7.7	Peak output power	27
7.8	Band edge radiated emissions	35
7.9	Field strength of spurious emissions	40
7.10	Antenna requirements	78
8	Unintentional emissions tests	79
8.1	Radiated emission measurements	79
9	APPENDIX A Test equipment and ancillaries used for tests	88
10	APPENDIX B Measurement uncertainties	89
11	APPENDIX C Test laboratory description	90
12	APPENDIX D Specification references	90
13	APPENDIX E Test equipment correction factors	91
14	APPENDIX F Abbreviations and acronyms	97

1 Applicant information

Client name: Cardo Systems Inc.
Address: 100 High Tower Blvd, Pittsburgh, PA 15205, USA
Telephone: 001 412-788-4533
Fax: 001 412-788-0270
E-mail: yosi@cardosystems.com
Contact name: Mr. Yosi Twina

2 Equipment under test attributes

Product name: Bluetooth headset
Product type: Transceiver
Model(s): scala rider Q2 Pro
Serial number: W092609885 (Audio set), R092501000 (Driver)
Hardware version: 1.0 (Driver), 1.0 (Audio set)
Software release: 1.0 (Driver)
Receipt date: 3/7/2010

3 Manufacturer information

Manufacturer name: Cardo Systems Inc.
Address: 100 High Tower Blvd, Pittsburgh, PA 15205, USA
Telephone: 001 412-788-4533
Fax: 001 412-788-0270
E-Mail: yosi@cardosystems.com
Contact name: Mr. Yosi Twina

4 Test details

Project ID: 20594
Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 3/7/2010
Test completed: 4/14/2010
Test specification(s): FCC Part 15, subpart C, §15.247 (FHSS); subpart B, §15.109
RSS-210 Issue 7:2007, Annex 8; ICES-003 issue 4:2004

5 Tests summary

Test	Status
Transmitter characteristics	
FCC section 15.247(a)1, (g), (h) / RSS-210 section A8.1, Frequency hopping requirements	Pass
FCC section 15.247(a)1 / RSS-210 section A8.1(a), The 20 dB bandwidth	Pass
FCC section 15.247(a)1 / RSS-210 section A8.1(b), Frequency separation	Pass
FCC section 15.247(a)1 / RSS-210 section A8.1(d), Number of hopping frequencies	Pass
FCC section 15.247(a)1 / RSS-210 section A8.1(d), Average time of occupancy	Pass
FCC section 15.247(b) / RSS-210 section A8.4(2), Peak output power	Pass
FCC section 15.247(i) / RSS-Gen, section 5.5, RF exposure	Exhibit provided in documentation for Application
FCC section 15.247(d) / RSS-210 section A8.5, Emissions at band edges	Pass
FCC section 15.247(d) / RSS-210 section A8.5, Radiated spurious emissions	Pass
FCC section 15.203 / RSS-Gen, section 7.1.4, Antenna requirements	Pass
FCC section 15.207(a) / RSS-Gen, section 7.2.2, Conducted emission	Not required
RSS-Gen, Section 4.6.1, 99% emission occupied bandwidth	Measured
Unintentional emissions	
FCC section 15.107 / ICES-003 section 5.3, Class B, Conducted emission at AC power port	Not required
FCC section 15.109 / RSS-Gen, Section 7.2.3.2 / ICES-003 section 5.5, Class B, Radiated emission	Pass

Testing was not completed against all relevant requirements of the test standard. However, results obtained indicate that the product under test complies in full with the requirements tested.

The test results relate only to the items tested. Pass/ fail decision was based on nominal values.

	Name and Title	Date	Signature
Tested by:	Mr. E. Plotnichenko, test engineer	April 14, 2010	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	April 25, 2010	
Approved by:	Mr. M. Nikishin, EMC and Radio group leader	May 10, 2010	

6 EUT description

6.1 General information

The EUT is a Bluetooth headset, technology compliant with Bluetooth™ Ver 2.1 class 1.

6.2 EUT options/configurations

Number	Operating mode description
1	BT headset - paired with other headset
2	FM receive

6.3 Ports and lines

Port type	Port description	Connected from	Connected to	Qty.	Cable type	Cable length
Signal	Audio	Audio set	Audio set (headphones)	2	Shielded	0.3 m

6.4 Operating frequencies

Source	Frequency, MHz		
LO	26		
Blue Tooth	2402	2440	2480

6.5 Changes made in the EUT

No changes were implemented.

6.6 Test configuration

Photograph 6.6.1 EUT located on the table (Y-axis position)



Photograph 6.6.2 EUT located on the plastic plate in vertical position (X-axis position)





6.7 Transmitter characteristics

Type of equipment					
X	Stand-alone (Equipment with or without its own control provisions)				
	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)				
	Plug-in card (Equipment intended for a variety of host systems)				
Intended use		Condition of use			
	fixed	Always at a distance more than 2 m from all people			
	mobile	Always at a distance more than 20 cm from all people			
X	portable	May operate at a distance closer than 20 cm to human body			
Assigned frequency range		2400 - 2483.5 MHz			
Operating frequency range		2402 - 2480 MHz			
RF channel spacing		1 MHz			
Maximum rated output power		At transmitter 50 Ω RF output connector			NA
		Effective radiated power (for equipment with no RF connector)			10.57 dBm
Is transmitter output power variable?	X	No			
		Yes	continuous variable		
			stepped variable with stepsize		
			minimum RF power		
			maximum RF power		
Antenna connection					
unique coupling		standard connector		X	integral
				X	with temporary RF connector
					without temporary RF connector
Antenna/s technical characteristics					
Type		Manufacturer		Model number	
Printed		Cardo Peripheral Systems		NA	
Transmitter aggregate data rate/s		1 Mbps			
Modulation		GFSK			
Modulating test signal (baseband)		PRBS			
Transmitter power source					
X	Battery	Nominal rated voltage	3.7 VDC	Battery type	Lead acid
	DC	Nominal rated voltage	VDC		
	AC mains	Nominal rated voltage	VAC	Frequency	

Test specification:	Section 15.247(a)1, (g), (h)/ RSS-210, Section A8.1(a), Frequency hopping requirements		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	
Date & Time:	3/17/2010 5:16:40 PM		
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

7 Transmitter tests according to 47CFR part 15 subpart C §15.247 (FHSS) and RSS-210 Annex 8 requirements

7.1 Frequency hopping requirements

The EUT was verified for compliance with frequency hopping requirements listed below:

- The EUT shall hop to channel frequencies that are selected from a pseudorandomly ordered list;
- Each hopping frequency shall be used equally on the average;
- The EUT receiver shall have input bandwidth that match the hopping channel bandwidth of the corresponding transmitter and shall shift frequencies in synchronization with the transmitted signals;
- The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

The rationale for compliance with the above requirements was either test results or supplier declaration. The summary of results is provided in Table 7.1.1.

Table 7.1.1 Frequency hopping requirements

Requirement	Rationale	Verdict
The EUT shall hop to channel frequencies that are selected from a pseudorandomly ordered list	Supplier declaration (refer to Table 7.1.2)	Comply
Each hopping frequency shall be used equally on the average	Supplier declaration	Comply
The EUT receiver shall have input bandwidth that match the hopping channel bandwidth of the corresponding transmitter	Supplier declaration	Comply
The EUT receiver shall shift frequencies in synchronization with the transmitted signals	Supplier declaration	Comply
Each transmitter operates independently and there is no synchronization with other transmitters for purposes other than to avoid simultaneous channel occupancy	Supplier declaration	Comply

Table 7.1.2 Frequency hopping assignment

Frequency [MHz]	Frequency Assignment	Frequency [MHz]	Frequency Assignment	Frequency [MHz]	Frequency Assignment	Frequency [MHz]	Frequency Assignment
2402.00	F1	2422.00	F21	2442.00	F41	2462.00	F61
2403.00	F2	2423.00	F22	2443.00	F42	2463.00	F62
2404.00	F3	2424.00	F23	2444.00	F43	2464.00	F63
2405.00	F4	2425.00	F24	2445.00	F44	2465.00	F64
2406.00	F5	2426.00	F25	2446.00	F45	2466.00	F65
2407.00	F6	2427.00	F26	2447.00	F46	2467.00	F66
2408.00	F7	2428.00	F27	2448.00	F47	2468.00	F67
2409.00	F8	2429.00	F28	2449.00	F48	2469.00	F68
2410.00	F9	2430.00	F29	2450.00	F49	2470.00	F69
2411.00	F10	2431.00	F30	2451.00	F50	2471.00	F70
2412.00	F11	2432.00	F31	2452.00	F51	2472.00	F71
2413.00	F12	2433.00	F32	2453.00	F52	2473.00	F72
2414.00	F13	2434.00	F33	2454.00	F53	2474.00	F73
2415.00	F14	2435.00	F34	2455.00	F54	2475.00	F74
2416.00	F15	2436.00	F35	2456.00	F55	2476.00	F75
2417.00	F16	2437.00	F36	2457.00	F56	2477.00	F76
2418.00	F17	2438.00	F37	2458.00	F57	2478.00	F77
2419.00	F18	2439.00	F38	2459.00	F58	2479.00	F78
2420.00	F19	2440.00	F39	2460.00	F59	2480.00	F79
2421.00	F20	2441.00	F40	2461.00	F60		F80

Test specification:	Section 15.247(a)1, (g), (h)/ RSS-210, Section A8.1(a), Frequency hopping requirements		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	
Date & Time:	3/17/2010 5:16:40 PM		
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

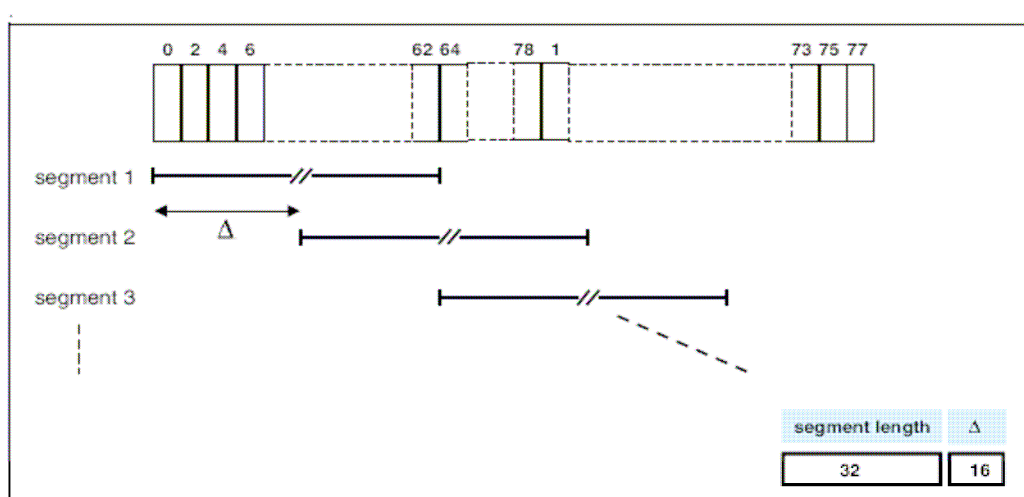
NOTE: According to BLUETOOTH Specifications the selection scheme chooses a segment of 32 hop frequencies spanning about 64 MHz and visits these hops in pseudo-random order. Next, a different 32-hop segment is chosen, etc. In the page, master page response, slave page response, page scan, inquiry, inquiry response and inquiry scan hopping sequences, the same 32-hop segment is used all the time (the segment is selected by the address; different devices will have different paging segments).

When the basic channel hopping sequence is selected, the output constitutes a pseudo-random sequence that slides through the 79 hops.

On the basic piconet channel the master controls access to the channel. The master starts its transmission in even-numbered time slots only. Packets transmitted by the master are aligned with the slot start and define the piconet timing. Packets transmitted by the master may occupy up to five time slots depending on the packet type.

Each master transmission is a packet carrying information on one of the logical transports. Slave devices may transmit on the physical channel in response. The characteristics of the response are defined by the logical transport that is addressed. For example, on the asynchronous connection-oriented logical transport the addressed slave device responds by transmitting a packet containing information for the same logical transport that is nominally aligned with the next (odd numbered) slot start. Such a packet may occupy up to five time slots, depending on the packet type. On a broadcast logical transport no slaves are allowed to respond.

Figure 7.1.1 Hop selection scheme





Test specification:		Section 15.247(a)1/ RSS-210, Section A8.1(a), 20 dB bandwidth	
Test procedure:		Public notice DA 00-705	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/17/2010 4:44:10 PM	
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

7.2 The 20 dB bandwidth

7.2.1 General

This test was performed to measure 20 dB bandwidth of the transmitter hopping channel. Specification test limits are given in Table 7.2.1.

Table 7.2.1 The 20 dB bandwidth limits

Assigned frequency, MHz	Maximum bandwidth, kHz	Modulation envelope reference points*, dBc
902.0 – 928.0	500	20
2400.0 – 2483.5	NA	
5725.0 – 5850.0	1000	

* - Modulation envelope reference points provided in terms of attenuation below the peak of modulated carrier.

7.2.2 Test procedure

7.2.2.1 The EUT was set up as shown in Figure 7.2.1, energized and its proper operation was checked.

7.2.2.2 The EUT was set to transmit modulated carrier at maximum data rate.

7.2.2.3 The transmitter bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope and provided in Table 7.2.2 and the associated plots.

7.2.2.4 The test was repeated for each data rate and each modulation format.

Figure 7.2.1 The 20 dB bandwidth test setup





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Test specification:		Section 15.247(a)1/ RSS-210, Section A8.1(a), 20 dB bandwidth	
Test procedure:		Public notice DA 00-705	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/17/2010 4:44:10 PM	
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

Table 7.2.2 The 20 dB bandwidth test results

ASSIGNED FREQUENCY BAND: 2400.0 – 2483.5 MHz
 DETECTOR USED: Peak
 SWEEP TIME: Auto
 RESOLUTION BANDWIDTH: $\geq 1\%$ of the 20 dB bandwidth
 VIDEO BANDWIDTH: $\geq$ RBW
 MODULATION ENVELOPE REFERENCE POINTS: 20.0 dBc
 MODULATING SIGNAL: PRBS
 FREQUENCY HOPPING: Disabled

Carrier frequency, MHz	Type of modulation	Data rate, Mbps	20 dB bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
2402.00	GFSK	1	251.6	NA	NA	Pass
2437.00	GFSK	1	251.7	NA	NA	Pass
2480.00	GFSK	1	250.9	NA	NA	Pass

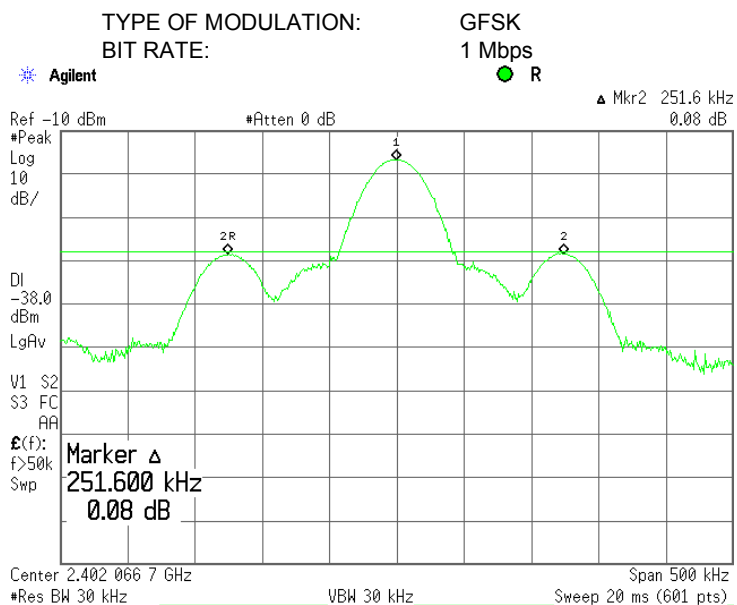
Reference numbers of test equipment used

HL 2952	HL 3818						
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Full description is given in Appendix A.

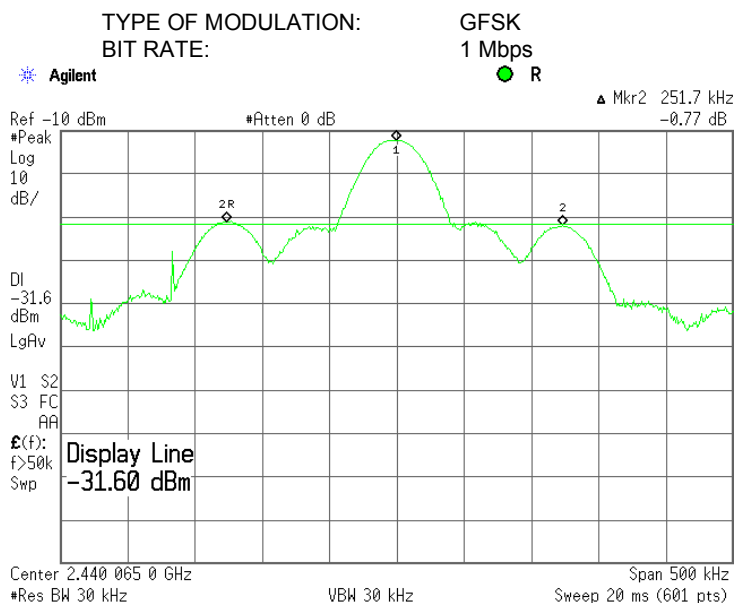
Test specification:		Section 15.247(a)1/ RSS-210, Section A8.1(a), 20 dB bandwidth	
Test procedure:		Public notice DA 00-705	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/17/2010 4:44:10 PM	
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

Plot 7.2.1 The 20 dB bandwidth test result at low frequency with GFSK modulation @ 1 Mbps

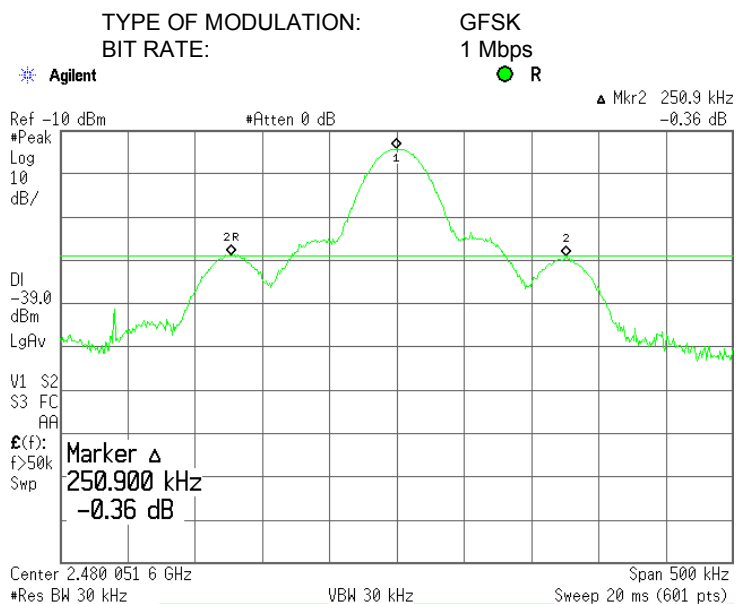


Test specification: Section 15.247(a)1/ RSS-210, Section A8.1(a), 20 dB bandwidth			
Test procedure: Public notice DA 00-705			
Test mode: Compliance		Verdict: PASS	
Date & Time: 3/17/2010 4:44:10 PM			
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

Plot 7.2.2 The 20 dB bandwidth test result at mid frequency with GFSK modulation @ 1 Mbps



Plot 7.2.3 The 20 dB bandwidth test result at high frequency with GFSK modulation @ 1 Mbps





Test specification:		RSS-Gen, Section 4.6.1, 99% bandwidth	
Test procedure:		Public notice DA 00-705	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/17/2010 6:25:57 PM	
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

7.3 The 99% bandwidth

7.3.1 General

This test was performed to measure 99% bandwidth of the transmitter channel.

7.3.2 Test procedure

7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and its proper operation was checked.

7.3.2.2 The EUT was set to transmit modulated carrier at maximum data rate.

7.3.2.3 The transmitter bandwidth was measured with spectrum analyzer and provided in Table 7.3.1 and the associated plot.

Figure 7.3.1 99% bandwidth test setup





Test specification:		RSS-Gen, Section 4.6.1, 99% bandwidth	
Test procedure:		Public notice DA 00-705	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/17/2010 6:25:57 PM	
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

Table 7.3.1 The 99% bandwidth test results

ASSIGNED FREQUENCY BAND: 2400 – 2483.5 MHz
 DETECTOR USED: Peak
 SWEEP TIME: Auto
 RESOLUTION BANDWIDTH: $\geq 1\%$ of the 99% bandwidth
 VIDEO BANDWIDTH: 3 RBW
 MODULATING SIGNAL: PRBS
 FREQUENCY HOPPING: Disabled

Carrier frequency, MHz	Type of modulation	Data rate, Mbps	Symbol rate, Msymbols/s	99% bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
2402	GFSK	1	NA	237.10	NA	NA	NA
2440				235.26			
2480				225.37			

Reference numbers of test equipment used

HL 1451	HL 2909	HL 3323						
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Full description is given in Appendix A.



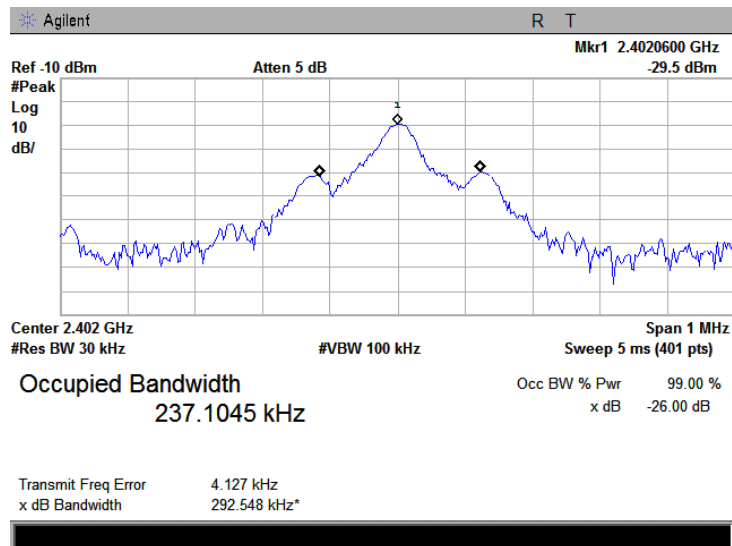
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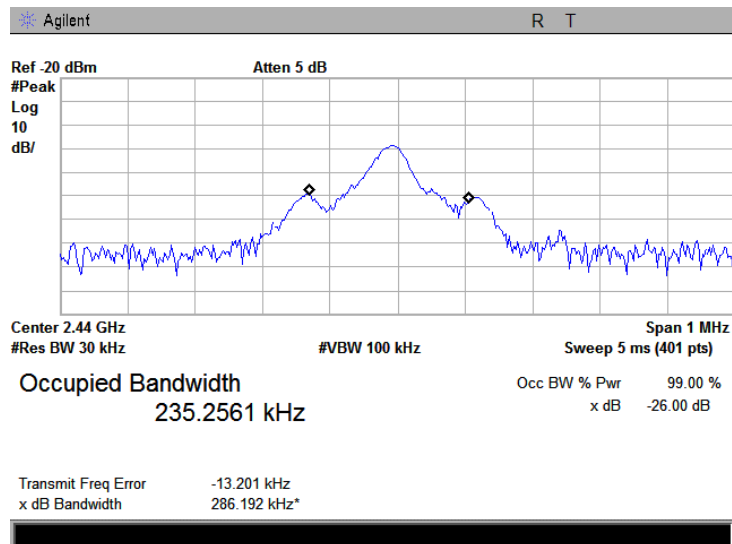
Date of Issue: 4/21/2010

Test specification: RSS-Gen, Section 4.6.1, 99% bandwidth			
Test procedure: Public notice DA 00-705			
Test mode: Compliance		Verdict: PASS	
Date & Time: 3/17/2010 6:25:57 PM			
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

Plot 7.3.1 The 99% bandwidth test result at low frequency



Plot 7.3.2 The 99% bandwidth test result at mid frequency





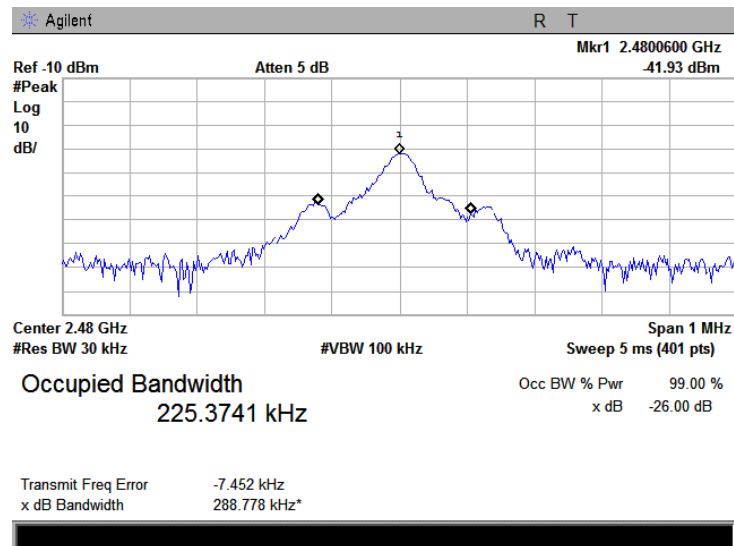
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Date of Issue: 4/21/2010

Test specification:		RSS-Gen, Section 4.6.1, 99% bandwidth	
Test procedure:		Public notice DA 00-705	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/17/2010 6:25:57 PM	
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

Plot 7.3.3 The 99% bandwidth test result at high frequency



Test specification:		Section 15.247(a)1/ RSS-210, Section A8.1(b), Frequency separation	
Test procedure:		Public notice DA 00-705	
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/17/2010 4:46:26 PM		
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

7.4 Carrier frequency separation

7.4.1 General

This test was performed to measure frequency separation between the peaks of adjacent channels. Specification test limits are given in Table 7.4.1.

Table 7.4.1 Carrier frequency separation limits

Assigned frequency range, MHz	Carrier frequency separation
902.0 – 928.0	25 kHz or 20 dB bandwidth of the hopping channel, whichever is greater
2400.0 – 2483.5	
5725.0 – 5850.0	

7.4.2 Test procedure

- 7.4.2.1** The EUT was set up as shown in Figure 7.4.1, energized with frequency hopping function enabled and its proper operation was checked.
- 7.4.2.2** The spectrum analyzer span was set to capture the carrier frequency and both of adjacent channels, the lower and the higher. The resolution bandwidth was set wider than 1 % of the frequency span.
- 7.4.2.3** The spectrum analyzer was set in max hold mode and allowed trace to stabilize.
- 7.4.2.4** The frequency separation between the peaks of adjacent channels was measured as provided in Table 7.4.2 and the associated plots.

Figure 7.4.1 Carrier frequency separation test setup





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Date of Issue: 4/21/2010

Test specification:		Section 15.247(a)1/ RSS-210, Section A8.1(b), Frequency separation	
Test procedure:		Public notice DA 00-705	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/17/2010 4:46:26 PM		
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

Table 7.4.2 Carrier frequency separation test results

ASSIGNED FREQUENCY BAND: 2400.0 – 2483.5 MHz
 MODULATION: GFSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 1 Mbps
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: $\geq 1\%$ of the span
 VIDEO BANDWIDTH: $\geq$ RBW
 FREQUENCY HOPPING: Disabled*
 20 dB BANDWIDTH: 251 kHz

Carrier frequency separation, kHz	Limit, kHz	Margin**	Verdict
1000	250	-750	Pass

*NOTE: Each channel was set manually.

** - Margin = Carrier frequency separation – specification limit.

Reference numbers of test equipment used

HL 2952	HL 3818						
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Full description is given in Appendix A.

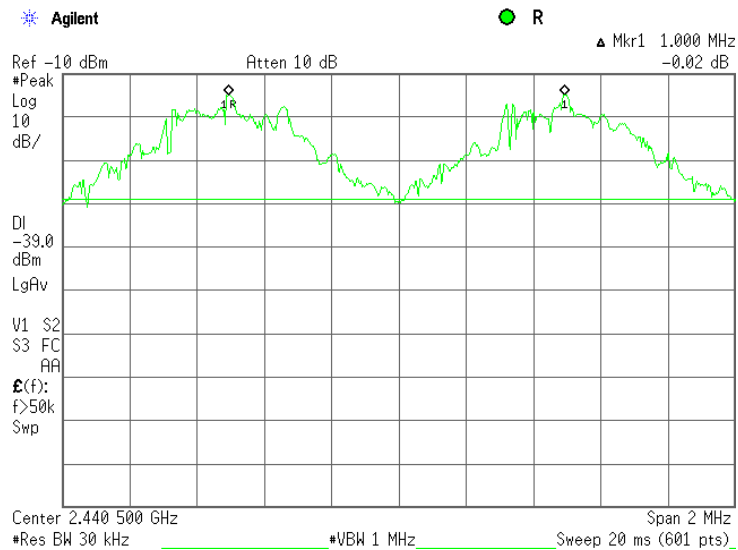


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Date of Issue: 4/21/2010

Test specification:		Section 15.247(a)1/ RSS-210, Section A8.1(b), Frequency separation	
Test procedure:		Public notice DA 00-705	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/17/2010 4:46:26 PM	
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

Plot 7.4.1 Carrier frequency separation



Test specification:	Section 15.247(a)1/ RSS-210, Section A8.1(d), Number of hopping frequencies		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/17/2010 4:50:35 PM		
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

7.5 Number of hopping frequencies

7.5.1 General

This test was performed to calculate the number of hopping frequencies used by the EUT. Specification test limits are given in Table 7.5.1.

Table 7.5.1 Minimum number of hopping frequencies

Assigned frequency range, MHz	Number of hopping frequencies
902.0 – 928.0	50 (if the 20 dB bandwidth is less than 250 kHz) 25 (if the 20 dB bandwidth is 250 kHz or greater)
2400.0 – 2483.5	15
5725.0 – 5850.0	75

7.5.2 Test procedure

- 7.5.2.1** The EUT was set up as shown in Figure 7.5.1, energized with frequency hopping function enabled and its proper operation was checked.
- 7.5.2.2** Initially the spectrum analyzer span was set equal to frequency band of operation and the resolution bandwidth was set wider than 1 % of the frequency span. If the separate hopping channels were not clearly resolved the frequency band of operation was broken to sections and the resolution bandwidth was set wider than 1 % of the frequency span of each section.
- 7.5.2.3** The spectrum analyzer was set in max hold mode and allowed trace to stabilize.
- 7.5.2.4** The number of frequency hopping channels was calculated as provided in Table 7.5.2 and the associated plots.

Figure 7.5.1 Hopping frequencies test setup





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Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:	Section 15.247(a)1/ RSS-210, Section A8.1(d), Number of hopping frequencies		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/17/2010 4:50:35 PM		
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

Table 7.5.2 Hopping frequencies test results

ASSIGNED FREQUENCY BAND: 2400.0 – 2483.5 MHz
 MODULATION: GFSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 1 Mbps
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: $\geq 1\%$ of the span
 VIDEO BANDWIDTH: $\geq$ RBW
 FREQUENCY HOPPING: Disabled

Number of hopping frequencies	Minimum number of hopping frequencies	Margin*	Verdict
79	15	64	Pass

* - Margin = Number of hopping frequencies – Minimum number of hopping frequencies.

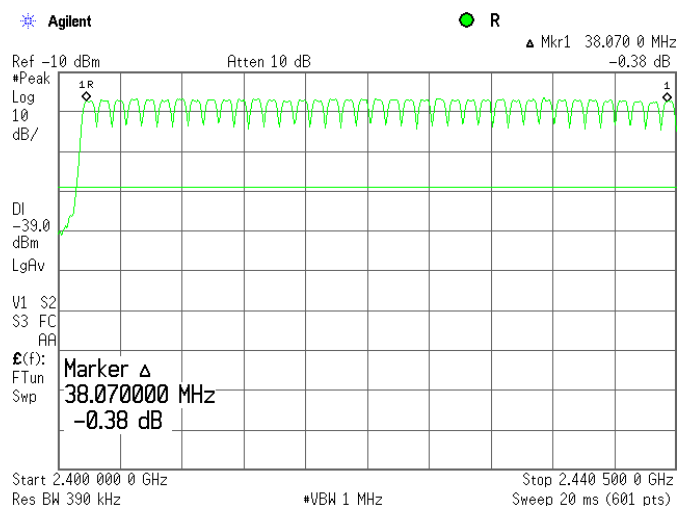
Reference numbers of test equipment used

HL 2952	HL 3818						
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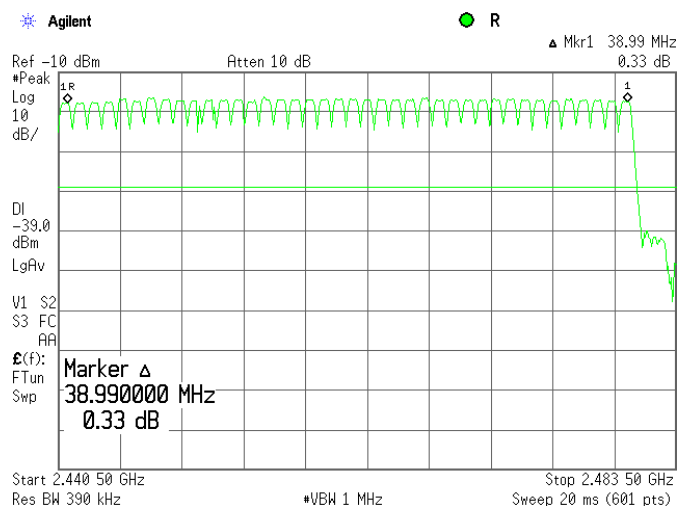
Full description is given in Appendix A.

Test specification:	Section 15.247(a)1/ RSS-210, Section A8.1(d), Number of hopping frequencies		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/17/2010 4:50:35 PM		
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

Plot 7.5.1 Number of hopping frequencies, channels from 1 to 39



Plot 7.5.2 Number of hopping frequencies, channels from 39 to 79



Test specification:		Section 15.247(a)1/RSS-210, Section A8.1(d), Average time of occupancy	
Test procedure:		Public notice DA 00-705	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/29/2010 12:38:48 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

7.6 Average time of occupancy

7.6.1 General

This test was performed to calculate the average time of occupancy (dwell time) on any frequency channel of the EUT. Specification test limits are given in Table 7.6.1.

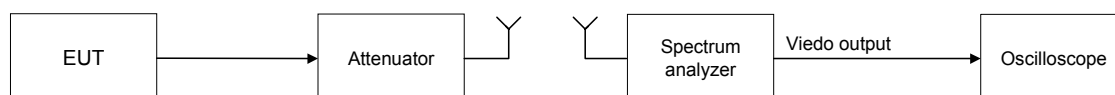
Table 7.6.1 Average time of occupancy limits

Assigned frequency range, MHz	Maximum average time of occupancy, s	Investigated period, s	Number of hopping frequencies
902.0 – 928.0	0.4	20.0	≥ 50
902.0 – 928.0	0.4	10.0	< 50
2400.0 – 2483.5	0.4	$0.4 \times N$	$N (\geq 15)$
5725.0 – 5850.0	0.4	30.0	≥ 75

7.6.2 Test procedure

- 7.6.2.1** The EUT was set up as shown in Figure 7.6.1, energized with frequency hopping function enabled and its proper operation was checked.
- 7.6.2.2** The spectrum analyzer span was set to zero centered on a hopping channel.
- 7.6.2.3** The single transmission duration and period were measured with oscilloscope.
- 7.6.2.4** The average time of occupancy was calculated as the single transmission time multiplied by the investigated period and divided by the single transmission period as provided in Table 7.6.2 and the associated plots.

Figure 7.6.1 Average time of occupancy test setup





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Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:		Section 15.247(a)1/RSS-210, Section A8.1(d), Average time of occupancy	
Test procedure:		Public notice DA 00-705	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/29/2010 12:38:48 PM	
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

Table 7.6.2 Average time of occupancy test results

ASSIGNED FREQUENCY BAND: 2400.00 – 2483.50 MHz
 MODULATION: GFSK
 MODULATING SIGNAL: PRBS
 DETECTOR USED: Peak
 NUMBER OF HOPPING FREQUENCIES: 79
 INVESTIGATED PERIOD: 31.6 s
 FREQUENCY HOPPING: Enabled

Carrier frequency, MHz	Single transmission duration, ms	Single transmission period, ms	Average time of occupancy*, ms	Bit rate, Mbps	Symbol rate, Msymbol/s	Limit, ms	Margin, ms**	Verdict
Frequency hopping	3.005	3.752	320.5	1	NA	400	-79.5	Pass

* - Average time of occupancy = (Single transmission duration × Investigated period) / (Single transmission period × number of channels).

** - Margin = Average time of occupancy – specification limit.

Reference numbers of test equipment used

HL 2952	HL 3818						
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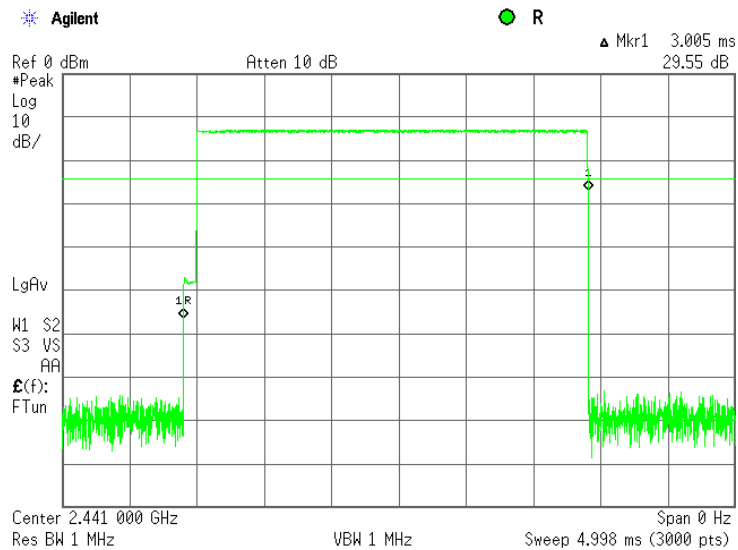
Full description is given in Appendix A.



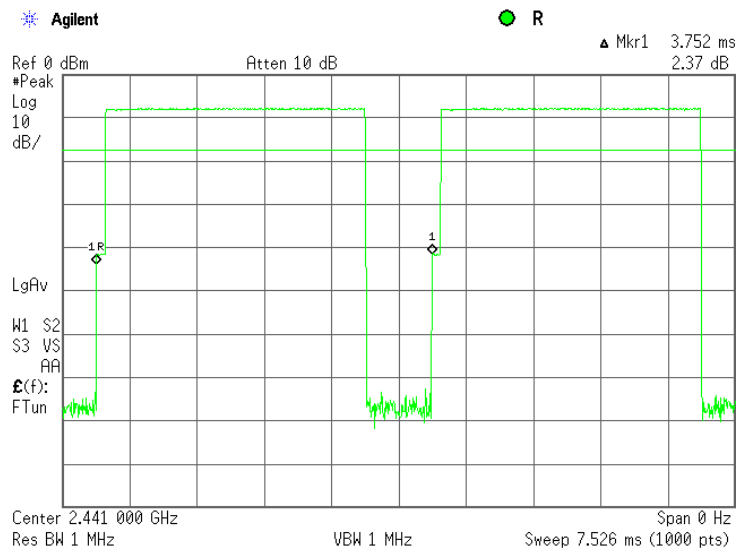
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Test specification:		Section 15.247(a)1/RSS-210, Section A8.1(d), Average time of occupancy	
Test procedure:		Public notice DA 00-705	
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/29/2010 12:38:48 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

Plot 7.6.1 Single transmission duration



Plot 7.6.2 Single transmission period





Test specification:		Section 15.247(b)/RSS-210, Section A8.4(2), Peak output power	
Test procedure:		Public notice DA 00-705	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/17/2010 4:27:20 PM		
Temperature: 25 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

7.7 Peak output power

7.7.1 General

This test was performed to measure the maximum peak output power radiated by transmitter. Specification test limits are given in Table 7.7.1.

Table 7.7.1 Peak output power limits

Assigned frequency range, MHz	Peak output power*		Equivalent field strength limit @ 3m, dB(μV/m)*	Maximum antenna gain dBi
	W	dBm		
902.0 – 928.0	0.125	21.0	122.2	6.0*
2400.0 – 2483.5	0.125 (<75 hopping channels)	21.0(<75 hopping channels)	122.2 (<75 hopping channels)	
	1.0 (≥75 hopping channels)	30.0 (≥75 hopping channels)	131.2 (≥75 hopping channels)	
5725.0 – 5850.0	1.0	30.0	131.2	

*- Equivalent field strength limit was calculated from the peak output power as follows: $E = \sqrt{30 \times P \times G} / r$, where P is peak output power in Watts, r is antenna to EUT distance in meters and G is transmitter antenna gain in dBi.

** - The limit is provided in terms of conducted RF power at the antenna connector. If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power limit shall be reduced below the stated value as follows:

- by 1 dB for every 3 dB that the directional gain of antenna exceeds 6 dBi for fixed point-to-point transmitters operate in 2400-2483.5 MHz band;
- without any corresponding reduction for fixed point-to-point transmitters operate in 5725-5850 MHz band;
- by the amount in dB that the directional gain of antenna exceeds 6 dBi for the rest of transmitters.

7.7.2 Test procedure

7.7.2.1 The EUT was set up as shown in Figure 7.7.1, energized and its proper operation was checked.

7.7.2.2 The EUT was adjusted to produce maximum available to end user RF output power.

7.7.2.3 The frequency span of spectrum analyzer was set approximately 5 times wider than 20 dB bandwidth of the EUT and the resolution bandwidth was set wider than 20 dB bandwidth of the EUT. To find maximum radiation the turntable was rotated 360° and the measuring antenna height was swept in both vertical and horizontal polarizations.

7.7.2.4 The maximum field strength of the EUT carrier frequency was measured as provided in Table 7.7.2 and the associated plots in 3 orthogonal positions.

7.7.2.5 The maximum peak output power was calculated from the field strength of carrier as follows:

$$P = (E \times d)^2 / (30 \times G),$$

where P is the peak output power in W, E is the field strength in V/m, d is the test distance and G is the transmitter numeric antenna gain over an isotropic radiator.

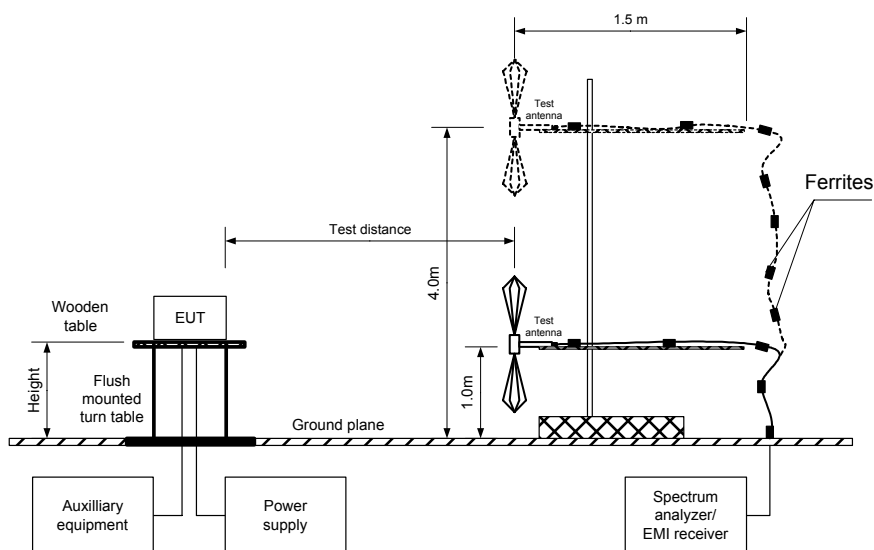
The above equation was converted in logarithmic units for 3 m test distance:

$$\text{Peak output power in dBm} = \text{Field strength in dB}(\mu\text{V/m}) - \text{Transmitter antenna gain in dBi} - 95.2 \text{ dB}$$

7.7.2.6 The worst test results (the lowest margins) were recorded in Table 7.7.2.

Test specification:		Section 15.247(b)/RSS-210, Section A8.4(2), Peak output power	
Test procedure:		Public notice DA 00-705	
Test mode:		Verdict: PASS	
Date & Time:			
3/17/2010 4:27:20 PM			
Temperature: 25 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

Figure 7.7.1 Setup for carrier field strength measurements





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Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:		Section 15.247(b)/RSS-210, Section A8.4(2), Peak output power	
Test procedure:		Public notice DA 00-705	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/17/2010 4:27:20 PM		
Temperature: 25 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

Table 7.7.2 Peak output power test results

ASSIGNED FREQUENCY BAND: 2400.00 – 2483.50 MHz
 TEST DISTANCE: 3 m
 TEST SITE: OATS
 EUT HEIGHT: 0.8 m
 DETECTOR USED: Peak
 TEST ANTENNA TYPE: Double ridged guide
 MODULATION: GFSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 1 Mbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 DETECTOR USED: Peak
 EUT 20 dB BANDWIDTH: 0.25 MHz
 RESOLUTION BANDWIDTH: 1 MHz
 VIDEO BANDWIDTH: 3 MHz
 FREQUENCY HOPPING: Disabled
 NUMBER OF FREQUENCY HOPPING CHANNELS: 79

Frequency, MHz	Field strength, dB(μV/m)	Antenna polarization	Antenna height, m	Azimuth, degrees*	EUT antenna gain, dBi	Peak output power, dBm**	Limit, dBm	Margin, dB***	Verdict
2402.04	104.60	Vertical	1.0	0	0	9.37	30.0	-20.63	Pass
2440.09	105.80	Horizontal	1.0	0	0	10.57	30.0	-19.43	Pass
2480.05	104.50	Horizontal	1.0	0	0	9.27	30.0	-20.73	Pass

*- EUT front panel refer to 0 degrees position of turntable.

** - Peak output power was calculated from the field strength of carrier as follows: $P = (E \times d)^2 / (30 \times G)$, where P is the peak output power in W, E is the field strength in V/m, d is the test distance in meters and G is the transmitter numeric antenna gain over an isotropic radiator. The above equation was converted in logarithmic units for 3 m test distance: *Peak output power in dBm = Field strength in dB(μV/m) - Transmitter antenna gain in dBi - 95.23 dB*

*** - Margin = Peak output power – specification limit.

Note: Maximum peak output power was obtained at Unom input power voltage.

Reference numbers of test equipment used

HL 1334	HL 1984	HL 2871	HL 2909	HL 3323			
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Full description is given in Appendix A.



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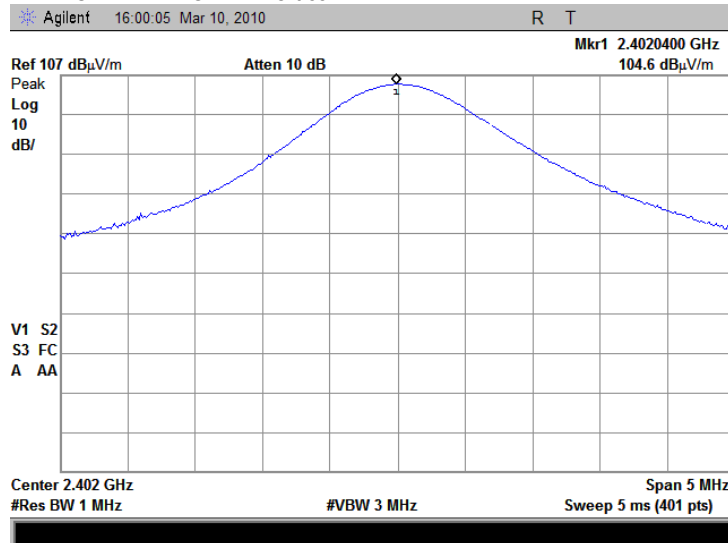
Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:		Section 15.247(b)/RSS-210, Section A8.4(2), Peak output power	
Test procedure:		Public notice DA 00-705	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/17/2010 4:27:20 PM	
Temperature: 25 °C		Air Pressure: 1017 hPa	Relative Humidity: 40 %
			Power Supply: battery 3.7V
Remarks:			

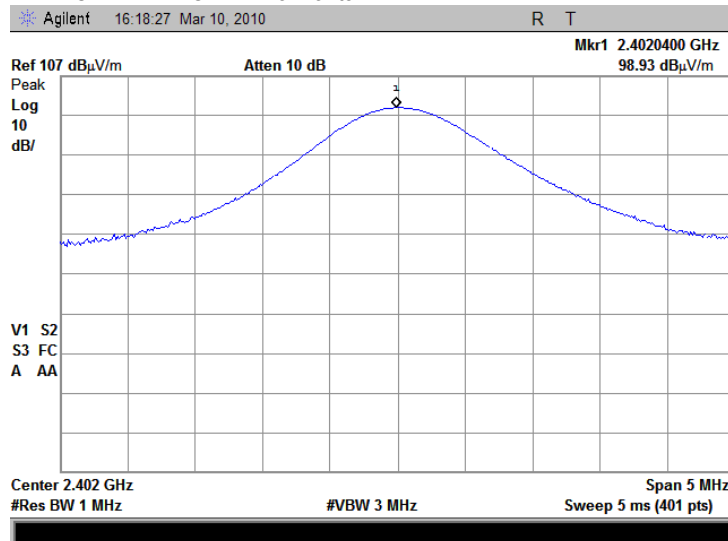
Plot 7.7.1 Field strength of carrier at low frequency

EUT POSITION: X-axis
ANTENNA POLARIZATION: Vertical



Plot 7.7.2 Field strength of carrier at low frequency

EUT POSITION: X-axis
ANTENNA POLARIZATION: Horizontal



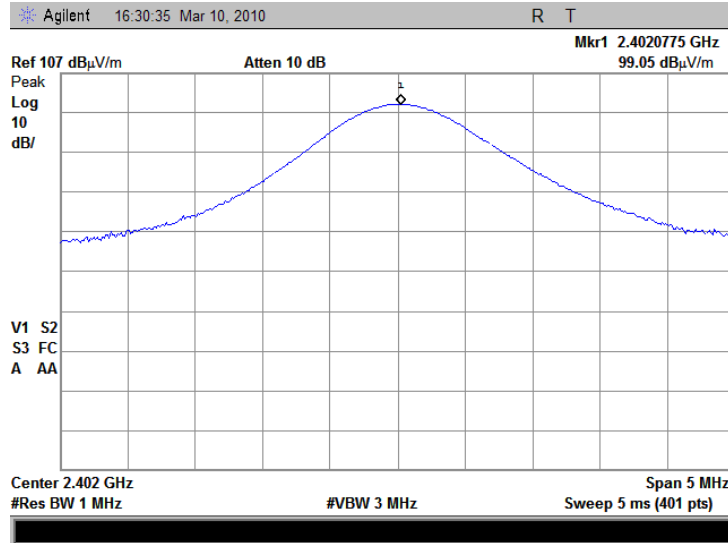


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Test specification:		Section 15.247(b)/RSS-210, Section A8.4(2), Peak output power	
Test procedure:		Public notice DA 00-705	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/17/2010 4:27:20 PM	
Temperature: 25 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

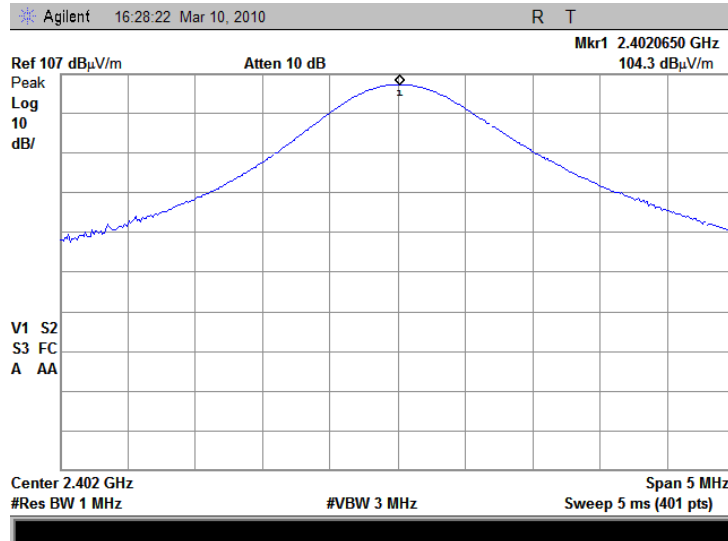
Plot 7.7.3 Field strength of carrier at low frequency

EUT POSITION: Y-axis
ANTENNA POLARIZATION: Vertical



Plot 7.7.4 Field strength of carrier at low frequency

EUT POSITION: Y-axis
ANTENNA POLARIZATION: Horizontal





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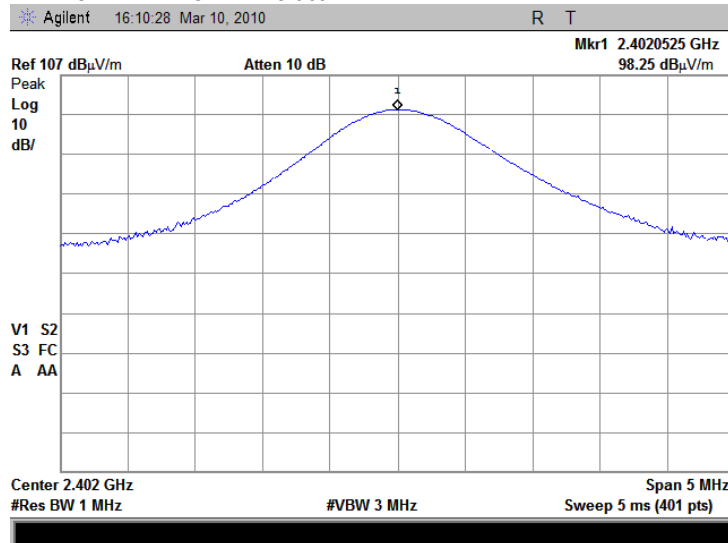
Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:		Section 15.247(b)/RSS-210, Section A8.4(2), Peak output power	
Test procedure:		Public notice DA 00-705	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/17/2010 4:27:20 PM	
Temperature: 25 °C		Air Pressure: 1017 hPa	Relative Humidity: 40 %
			Power Supply: battery 3.7V
Remarks:			

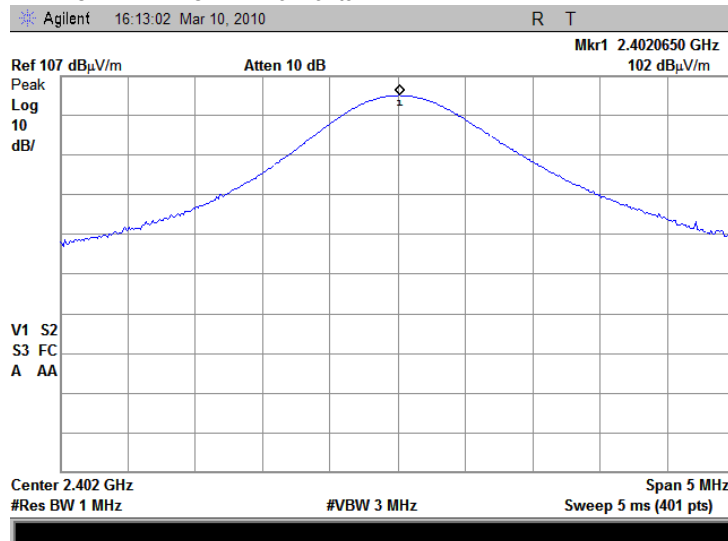
Plot 7.7.5 Field strength of carrier at low frequency

EUT POSITION: Z-axis
ANTENNA POLARIZATION: Vertical



Plot 7.7.6 Field strength of carrier at low frequency

EUT POSITION: Z-axis
ANTENNA POLARIZATION: Horizontal





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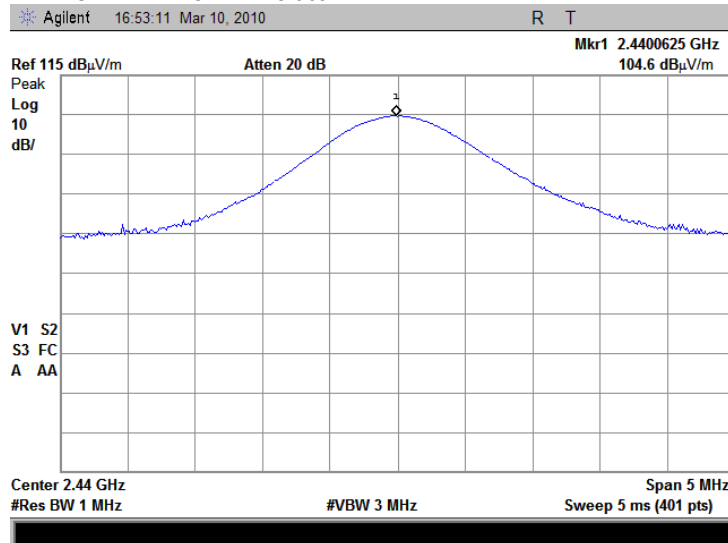
Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:		Section 15.247(b)/RSS-210, Section A8.4(2), Peak output power	
Test procedure:		Public notice DA 00-705	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/17/2010 4:27:20 PM	
Temperature: 25 °C		Air Pressure: 1017 hPa	Relative Humidity: 40 %
			Power Supply: battery 3.7V
Remarks:			

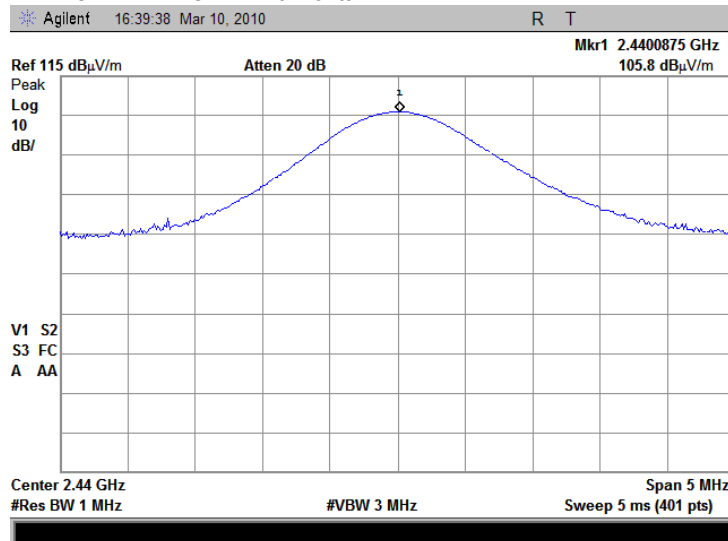
Plot 7.7.7 Field strength of carrier at mid frequency

EUT POSITION: X-axis
ANTENNA POLARIZATION: Vertical



Plot 7.7.8 Field strength of carrier at mid frequency

EUT POSITION: Y-axis
ANTENNA POLARIZATION: Horizontal





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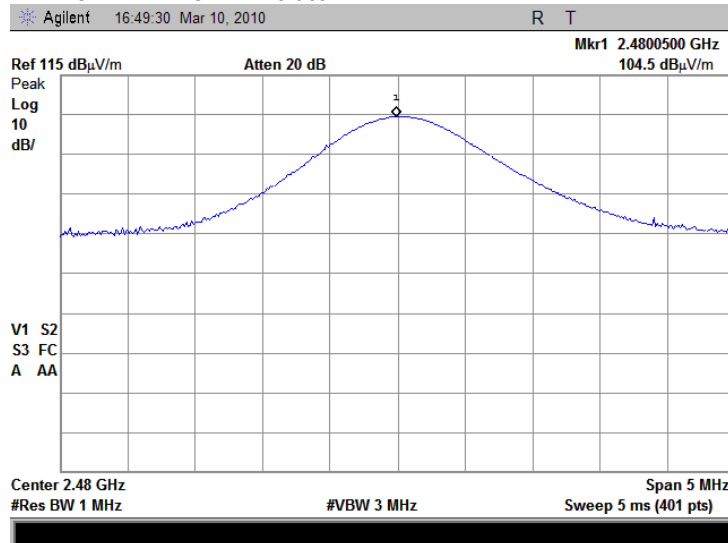
Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:		Section 15.247(b)/RSS-210, Section A8.4(2), Peak output power	
Test procedure:		Public notice DA 00-705	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/17/2010 4:27:20 PM	
Temperature: 25 °C		Air Pressure: 1017 hPa	Relative Humidity: 40 %
			Power Supply: battery 3.7V
Remarks:			

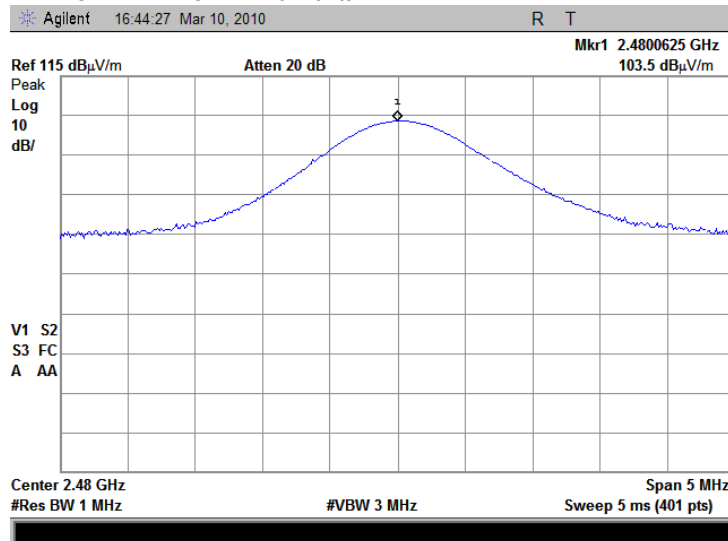
Plot 7.7.9 Field strength of carrier at high frequency

EUT POSITION: X-axis
ANTENNA POLARIZATION: Vertical



Plot 7.7.10 Field strength of carrier at high frequency

EUT POSITION: Y-axis
ANTENNA POLARIZATION: Horizontal



Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Emissions at band edges	
Test procedure:		Public notice DA 00-705	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/29/2010 12:13:23 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

7.8 Band edge radiated emissions

7.8.1 General

This test was performed to measure emissions, radiated from the EUT at the assigned frequency band edges. Specification test limits are given in Table 7.8.1.

Table 7.8.1 Band edge emission limits

Assigned frequency, MHz	Attenuation below carrier*, dBc	Field strength at 3 m within restricted bands, dB(μV/m)	
		Peak	Average
902.0 – 928.0	20.0	74.0	54.0
2400.0 – 2483.5			
5725.0 – 5850.0			

* - Band edge emission limit is provided in terms of attenuation below the peak of modulated carrier measured with the same resolution bandwidth.

7.8.2 Test procedure

- 7.8.2.1 The EUT was set up as shown in Figure 7.8.1, energized normally modulated at the maximum data rate with its hopping function disabled and its proper operation was checked.
- 7.8.2.2 The EUT was adjusted to produce maximum available to end user RF output power at the lowest carrier frequency.
- 7.8.2.3 The spectrum analyzer span was set to capture the carrier frequency and associated modulation products. The resolution bandwidth was set wider than 1 % of the frequency span.
- 7.8.2.4 The spectrum analyzer was set in max hold mode and allowed trace to stabilize. The highest emission level within the authorized band was measured.
- 7.8.2.5 The maximum band edge emission and modulation product outside of the band were measured as provided in Table 7.8.2 and associated plots and referenced to the highest emission level measured within the authorized band.
- 7.8.2.6 The above procedure was repeated with the EUT adjusted to produce maximum RF output power at the highest carrier frequency.
- 7.8.2.7 The above procedure was repeated with the frequency hopping function enabled.

Figure 7.8.1 Band edge emission test setup





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Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Emissions at band edges	
Test procedure:		Public notice DA 00-705	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/29/2010 12:13:23 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

Table 7.8.2 Band edge emission test results

ASSIGNED FREQUENCY RANGE: 2400 – 2483.5 MHz
 DETECTOR USED: Peak
 MODULATION: GFSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 1 Mbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 TRANSMITTER OUTPUT POWER: 9.37 dBm at low carrier frequency
 RESOLUTION BANDWIDTH: $\geq 1\%$ of the span
 VIDEO BANDWIDTH: $\geq$ RBW

Frequency, MHz	Band edge emission, dBm	Emission at carrier, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
Frequency hopping disabled						
Maximum emission at the band edge meets 20 dBc limit at 2401.860 MHz						Pass
Frequency hopping enabled						
Maximum emission at the band edge meets 20 dBc limit at 2401.440 MHz						Pass

*- Margin = Attenuation below carrier – specification limit.

Reference numbers of test equipment used

HL 1984	HL 2871	HL 2909					
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Full description is given in Appendix A.



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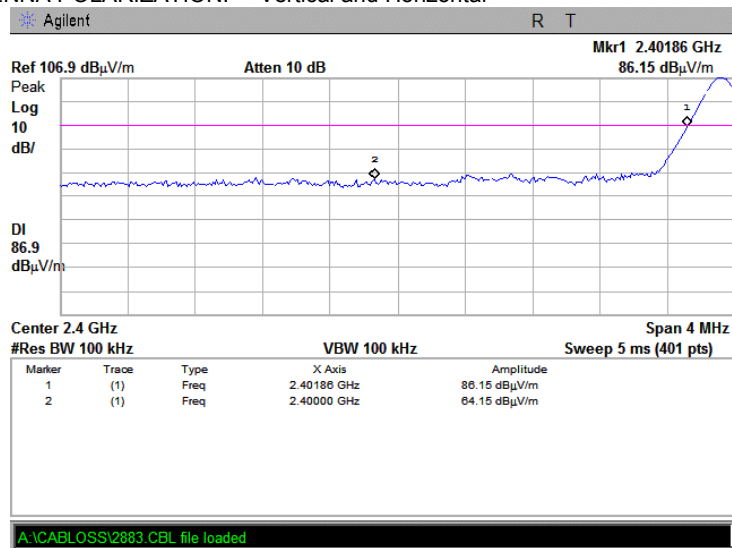
Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Emissions at band edges	
Test procedure:		Public notice DA 00-705	
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/29/2010 12:13:23 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

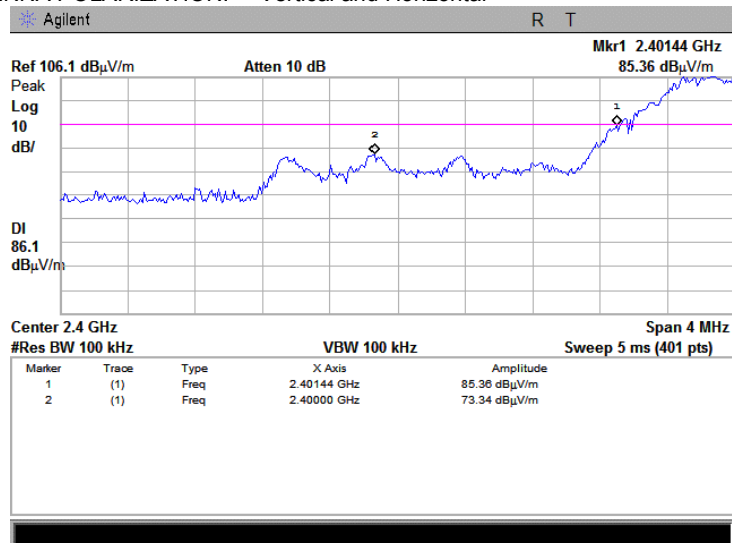
Plot 7.8.1 The highest band edge emission at low carrier frequency with hopping function disabled

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.8.2 The highest band edge emission at low carrier frequency with hopping function enabled

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal





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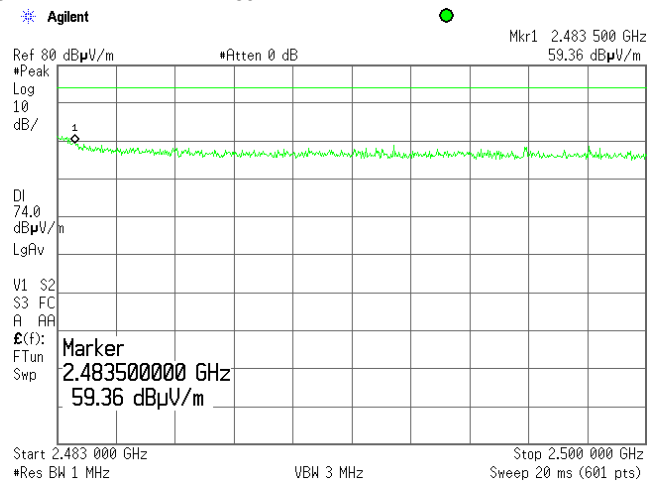
Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Emissions at band edges	
Test procedure:		Public notice DA 00-705	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/29/2010 12:13:23 PM	
Temperature: 22 °C		Air Pressure: 1020 hPa	Relative Humidity: 48 %
			Power Supply: battery 3.7V
Remarks:			

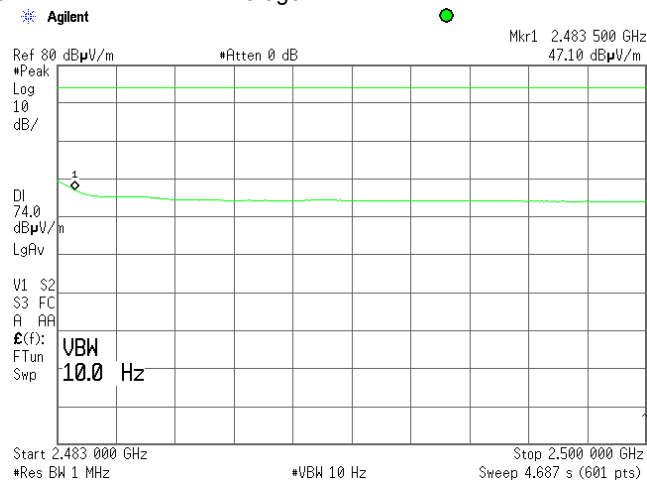
Plot 7.8.3 The highest band edge emission at high carrier frequency with hopping function disabled

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak



Plot 7.8.4 The highest band edge emission at high carrier frequency with hopping function disabled

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Average





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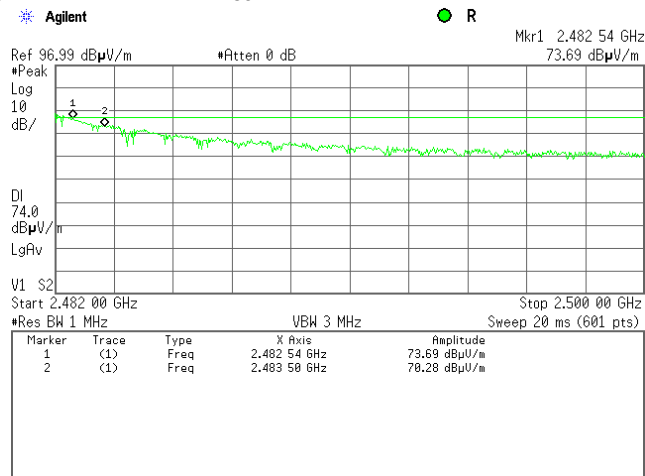
Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Emissions at band edges	
Test procedure:		Public notice DA 00-705	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/29/2010 12:13:23 PM	
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

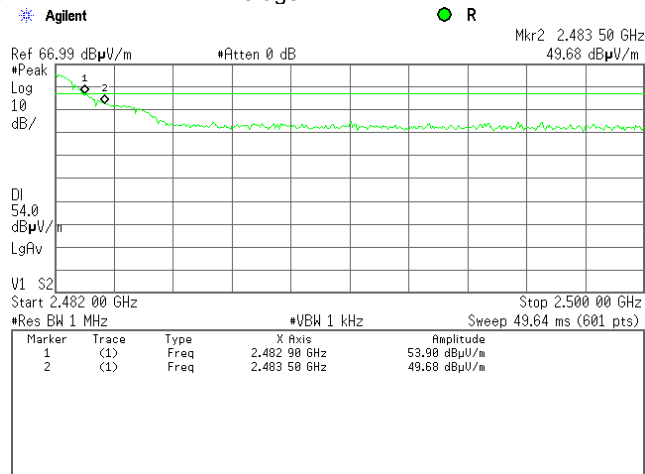
Plot 7.8.5 The highest band edge emission at high carrier frequency with hopping function enabled

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak



Plot 7.8.6 The highest band edge emission at high carrier frequency with hopping function enabled

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Average





Test specification:	Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

7.9 Field strength of spurious emissions

7.9.1 General

This test was performed to measure field strength of spurious emissions from the EUT. Specification test limits are given in Table 7.9.1.

Table 7.9.1 Radiated spurious emissions limits

Frequency, MHz	Field strength at 3 m within restricted bands, dB(μV/m)***			Attenuation of field strength of spurious versus carrier outside restricted bands, dBc***
	Peak	Quasi Peak	Average	
0.009 – 0.090	148.5 – 128.5	NA	128.5 – 108.5**	20.0
0.090 – 0.110	NA	108.5 – 106.8**	NA	
0.110 – 0.490	126.8 – 113.8	NA	106.8 – 93.8**	
0.490 – 1.705	NA	73.8 – 63.0**	NA	
1.705 – 30.0*		69.5		
30 – 88		40.0		
88 – 216		43.5		
216 – 960		46.0		
960 - 1000		54.0		
1000 – 10 th harmonic	74.0	NA	54.0	

* - The limit for 3 m test distance was calculated using the inverse square distance extrapolation factor as follows:

$$\text{Lim}_{S2} = \text{Lim}_{S1} + 40 \log (S_1/S_2),$$

where S_1 and S_2 – standard defined and test distance respectively in meters.

** - The limit decreases linearly with the logarithm of frequency.

*** - The field strength limits applied from the lowest radio frequency generated in the device, without going below 9 kHz up to the tenth harmonic of the highest fundamental frequency.

7.9.2 Test procedure for spurious emission field strength measurements in 9 kHz to 30 MHz band

7.9.2.1 The EUT was set up as shown in Figure 7.9.1, energized and the performance check was conducted.

7.9.2.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360° and the measuring antenna was rotated around its vertical axis.

7.9.2.3 The worst test results (the lowest margins) were recorded and shown in the associated plots.

7.9.3 Test procedure for spurious emission field strength measurements above 30 MHz

7.9.3.1 The EUT was set up as shown in Figure 7.9.2, energized and the performance check was conducted.

7.9.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal.

7.9.3.3 The worst test results (the lowest margins) were recorded and shown in the associated plots.

Test specification: Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions			
Test procedure: Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode: Compliance		Verdict: PASS	
Date & Time: 3/29/2010 12:45:24 PM			
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

Figure 7.9.1 Setup for spurious emission field strength measurements below 30 MHz

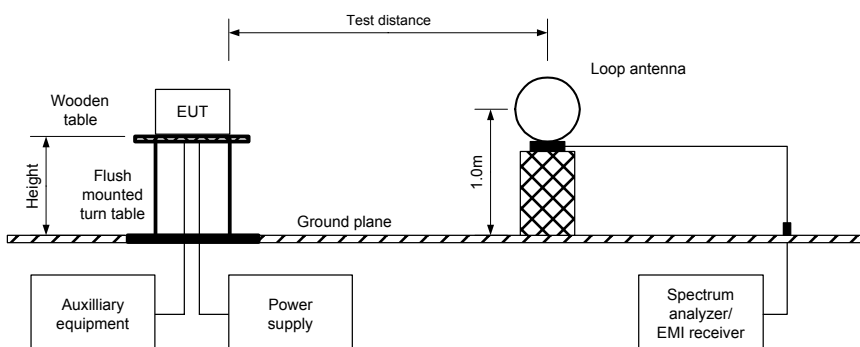
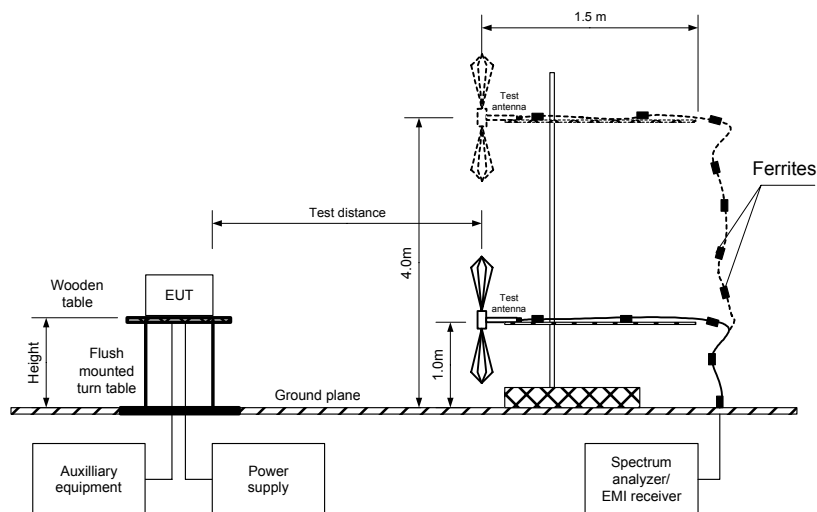


Figure 7.9.2 Setup for spurious emission field strength measurements above 30 MHz





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Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:	Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

Table 7.9.2 Field strength of spurious emissions above 1 GHz within restricted bands

ASSIGNED FREQUENCY BAND: 2400 – 2483.5 MHz
 INVESTIGATED FREQUENCY RANGE: 1000 – 25000 MHz
 TEST DISTANCE: 3 m
 MODULATION: GFSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 1 Mbps
 DUTY CYCLE: 100 %
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 1000 kHz
 TEST ANTENNA TYPE: Double ridged guide

FREQUENCY HOPPING: Disabled

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength(VBW=3 MHz)			Average field strength(VBW=10 Hz)				Verdict
	Polarization	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	Measured, dB(μV/m)	Calculated, dB(μV/m)	Limit, dB(μV/m)	Margin, dB***	
Low carrier frequency											
4804.21	Horizontal	1.2	210	71.95	74.00	-2.05	67.74	37.30	54.00	-16.70	Pass
7206.18	Horizontal	1.2	210	56.28	74.00	-17.22	52.48	22.04	54.00	-31.96	
9608.18	Horizontal	1.2	210	54.66	74.00	-19.34	49.77	19.33	54.00	-34.67	
12010.26	Horizontal	1.2	210	54.45	74.00	-19.55	46.55	16.11	54.00	-38.99	
Mid carrier frequency											
4880.14	Horizontal	1.3	210	71.50	74.00	-2.5	67.50	37.06	54.00	-16.94	Pass
7320.18	Horizontal	1.3	0	58.72	74.00	-15.28	55.90	25.46	54.00	-28.54	
99760.27	Horizontal	1.7	0	58.49	74.00	-15.51	55.43	24.99	54.00	-29.01	
12200.36	Horizontal	1.5	0	54.17	74.00	-19.83	44.02	13.58	54.00	-40.42	
High carrier frequency											
2483.50	Vertical	1.0	45	59.36	74.00	-14.64	47.10	16.66	54.00	-37.34	Pass
4960.14	Horizontal	1.2	210	70.31	74.00	-3.69	66.03	35.59	54.00	-18.41	
7440.17	Horizontal	1.2	210	56.20	74.00	-17.80	52.62	22.18	54.00	-31.82	
9920.24	Horizontal	1.5	0	57.03	74.00	-17.97	52.80	22.36	54.00	-31.64	
12400.33	Horizontal	1.5	0	53.37	74.00	-20.63	41.15	10.71	54.00	-43.29	

FREQUENCY HOPPING: Enabled

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength(VBW=3 MHz)			Average field strength(VBW=10 Hz)				Verdict
	Polarization	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	Measured, dB(μV/m)	Calculated, dB(μV/m)	Limit, dB(μV/m)	Margin, dB***	
High carrier frequency											
2483.50	Vertical	1.2	90	70.28	74.00	-3.72	49.68	19.24	54.00	-34.76	Pass

*- EUT front panel refers to 0 degrees position of turntable.

**- Margin = Measured field strength - specification limit.

 ***- Margin = Calculated field strength - specification limit,
 where Calculated field strength = Measured field strength + Average factor.



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Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/29/2010 12:45:24 PM	
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

Table 7.9.3 Average factor calculation

Transmission pulse		Transmission burst		Transmission train duration, ms	Average factor, dB
Duration, ms	Period, ms	Duration, ms	Period, ms		
3.005	Longer than 100 ms	NA	NA	NA	-30.44

*- Average factor was calculated as follows

For pulse train shorter than 100 ms:

$$\text{Average factor} = 20 \times \log_{10} \left(\frac{\text{Pulse duration}}{\text{Pulse period}} \times \frac{\text{Burst duration}}{\text{Train duration}} \times \text{Number of bursts within pulse train} \right)$$

For pulse train longer than 100 ms:

$$\text{Average factor} = 20 \times \log_{10} \left(\frac{\text{Pulse duration}}{\text{Pulse period}} \times \frac{\text{Burst duration}}{100 \text{ ms}} \times \text{Number of bursts within 100 ms} \right)$$

Test specification:	Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

Table 7.9.4 Field strength of emissions outside restricted bands and below 1 GHz within restricted bands

ASSIGNED FREQUENCY BAND: 2400 – 2483.5 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 25000 MHz
 TEST DISTANCE: 3 m
 MODULATION: GFSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 1 Mbps
 DUTY CYCLE: 100 %
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 100 kHz
 VIDEO BANDWIDTH: 300 kHz
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
 Biconilog (30 MHz – 1000 MHz)
 Double ridged guide (above 1000 MHz)
 FREQUENCY HOPPING: Disabled

Outside restricted bands

Frequency MHz	Field strength of spurious, dB(μV/m)	Antenna polarization	Antenna height, m	Azimuth degrees	Field strength of carrier, dB(μV/m)	Attenuation below carrier dBc	Limit, dBc	Margin, dB**	Verdict
No emissions were found									

Below 1 GHz within restricted bands

Frequency MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission dB(μV/m)	Limit, dB(μV/m)	Margin, dB				
No emissions were found								

*- EUT front panel refers to 0 degrees position of turntable.

**- Margin = Attenuation below carrier – specification limit.

Table 7.9.5 Restricted bands

MHz	MHz	MHz	MHz	MHz	GHz
0.09 - 0.11	8.37625 - 8.38675	73 - 74.6	399.9 - 410	2690 - 2900	10.6 - 12.7
0.495 - 0.505	8.41425 - 8.41475	74.8 - 75.2	608 - 614	3260 - 3267	13.25 - 13.4
2.1735 - 2.1905	12.29 - 12.293	108 - 121.94	960 - 1240	3332 - 3339	14.47 - 14.5
4.125 - 4.128	12.51975 - 12.52025	123 - 138	1300 - 1427	3345.8 - 3358	15.35 - 16.2
4.17725 - 4.17775	12.57675 - 12.57725	149.9 - 150.05	1435 - 1626.5	3600 - 4400	17.7 - 21.4
4.20725 - 4.20775	13.36 - 13.41	156.52475 - 156.52525	1645.5 - 1646.5	4500 - 5150	22.01 - 23.12
6.215 - 6.218	16.42 - 16.423	156.7 - 156.9	1660 - 1710	5350 - 5460	23.6 - 24
6.26775 - 6.26825	16.69475 - 16.69525	162.0125 - 167.17	1718.8 - 1722.2	7250 - 7750	31.2 - 31.8
6.31175 - 6.31225	16.80425 - 16.80475	167.72 - 173.2	2200 - 2300	8025 - 8500	36.43 - 36.5
8.291 - 8.294	25.5 - 25.67	240 - 285	2310 - 2390	9000 - 9200	Above 38.6
8.362 - 8.366	37.5 - 38.25	322 - 335.4	2483.5 - 2500	9300 - 9500	

Reference numbers of test equipment used

HL 0446	HL 0604	HL 1430	HL 1984	HL 2883	HL 3119		
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Full description is given in Appendix A.



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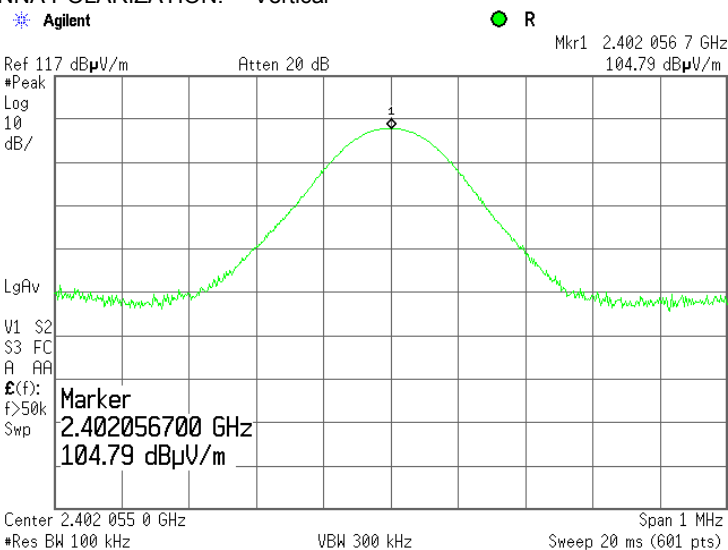
Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:	Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

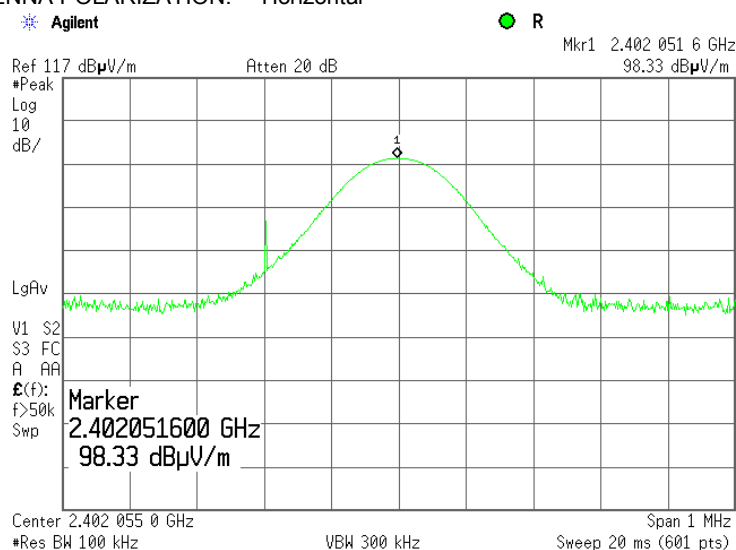
Plot 7.9.1 Radiated emission measurements at the low carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Plot 7.9.2 Radiated emission measurements at the low carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal





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Report ID: CARRAD_FCC.20594.doc

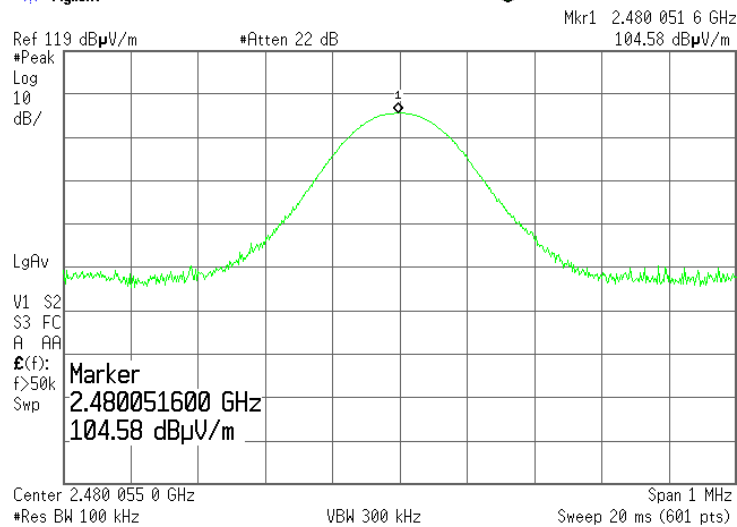
Date of Issue: 4/21/2010

Test specification:	Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

Plot 7.9.3 Radiated emission measurements at the high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical

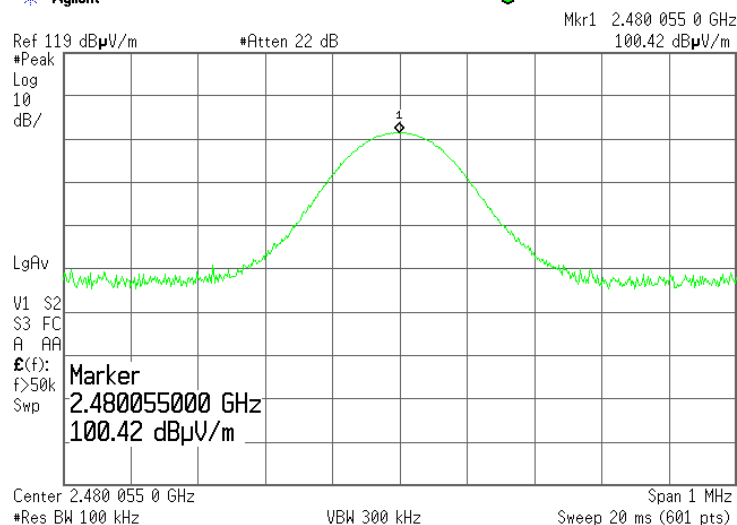
Agilent



Plot 7.9.4 Radiated emission measurements at the high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal

Agilent

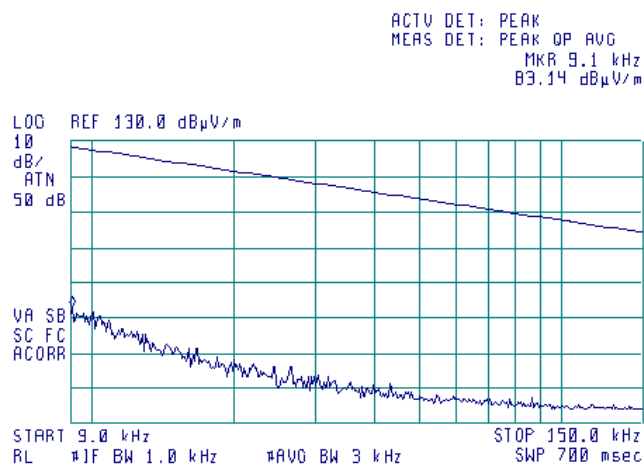


Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/29/2010 12:45:24 PM	
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

Plot 7.9.5 Radiated emission measurements from 9 to 150 kHz at the low carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical

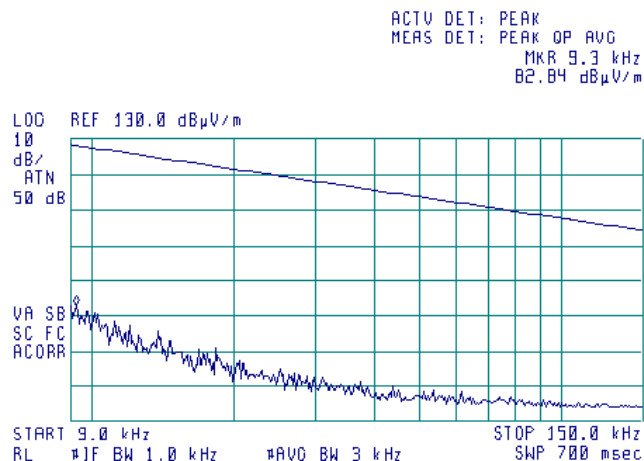
12:23:57 MAR 14, 2010



Plot 7.9.6 Radiated emission measurements from 9 to 150 kHz at the mid carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical

12:28:21 MAR 14, 2010





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Report ID: CARRAD_FCC.20594.doc

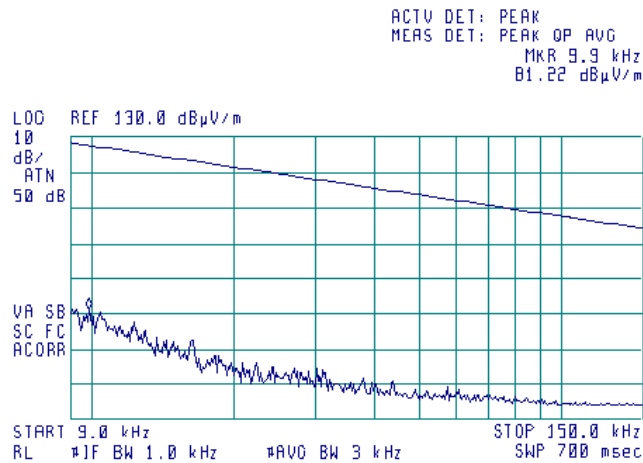
Date of Issue: 4/21/2010

Test specification:	Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

Plot 7.9.7 Radiated emission measurements from 9 to 150 kHz at the high carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical

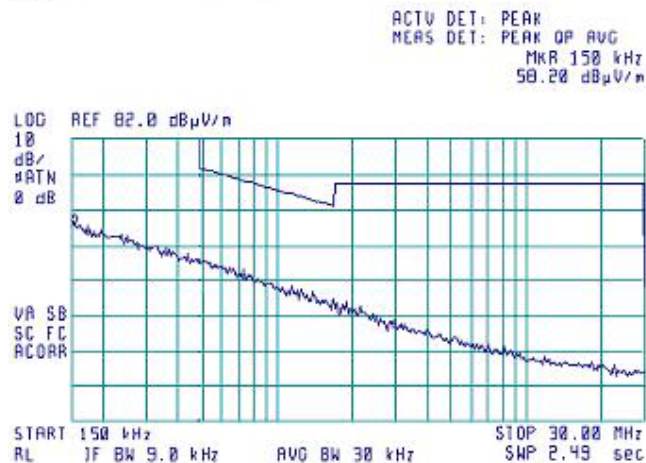
12:29:04 MAR 14, 2010



Plot 7.9.8 Radiated emission measurements from 0.15 to 30 MHz at the low carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical

12:48:03 MAR 14, 2010





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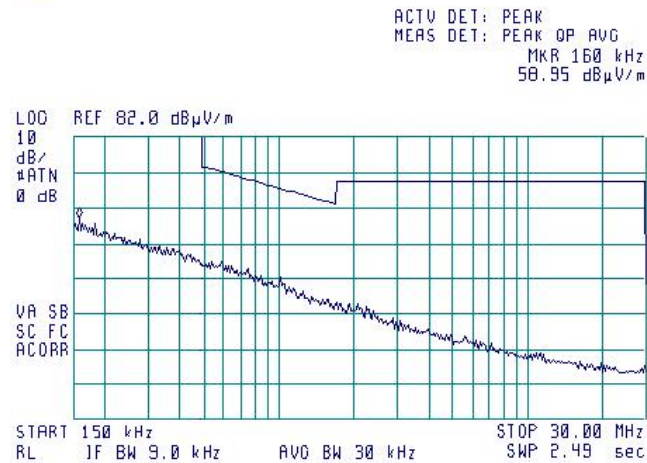
Date of Issue: 4/21/2010

Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/29/2010 12:45:24 PM	
Temperature: 22 °C		Air Pressure: 1020 hPa	Relative Humidity: 48 %
			Power Supply: battery 3.7V
Remarks:			

Plot 7.9.9 Radiated emission measurements from 0.15 to 30 MHz at the mid carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical

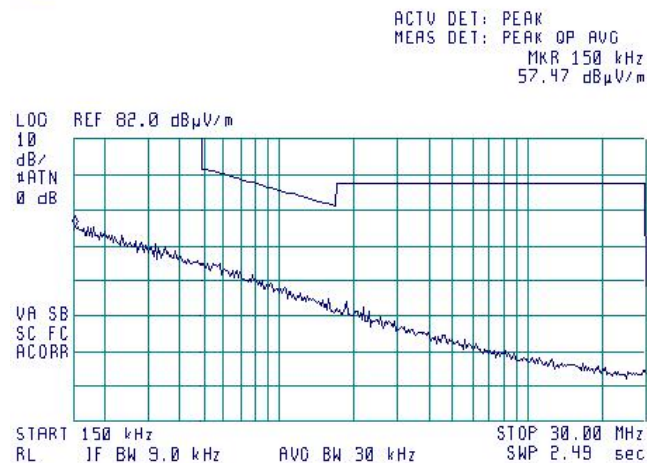
12:50:35 MAR 14, 2010



Plot 7.9.10 Radiated emission measurements from 0.15 to 30 MHz at the high carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical

12:53:52 MAR 14, 2010

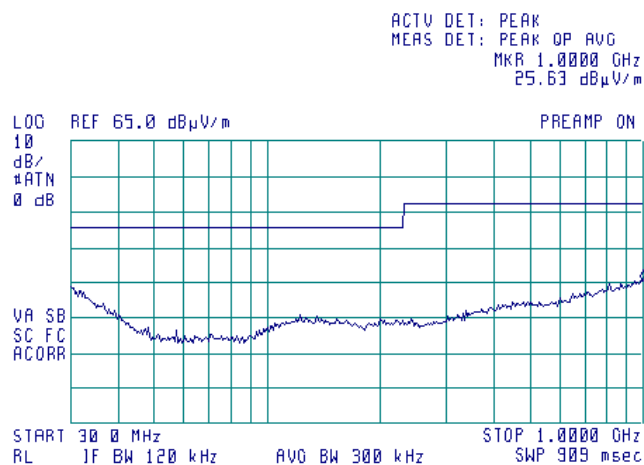


Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/29/2010 12:45:24 PM	
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

Plot 7.9.11 Radiated emission measurements from 30 to 1000 MHz at the low carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal

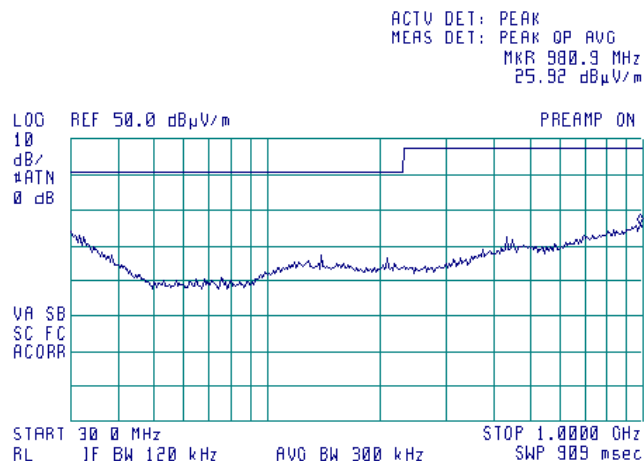
10:08:00 MAR 14, 2010



Plot 7.9.12 Radiated emission measurements from 30 to 1000 MHz at the mid carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal

09:32:51 MAR 14, 2010





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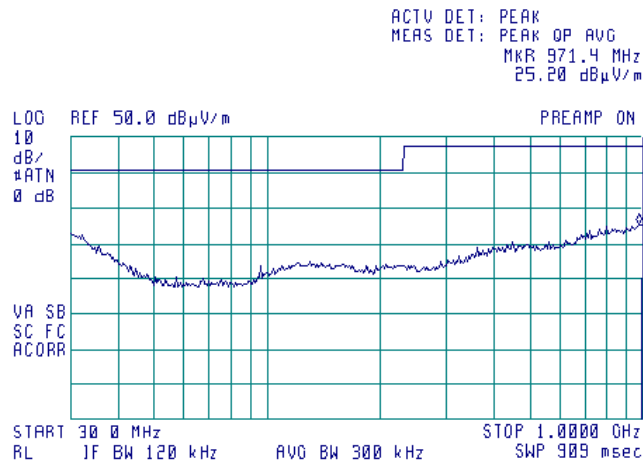
Date of Issue: 4/21/2010

Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/29/2010 12:45:24 PM	
Temperature: 22 °C		Air Pressure: 1020 hPa	Relative Humidity: 48 %
			Power Supply: battery 3.7V
Remarks:			

Plot 7.9.13 Radiated emission measurements from 30 to 1000 MHz at the high carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal

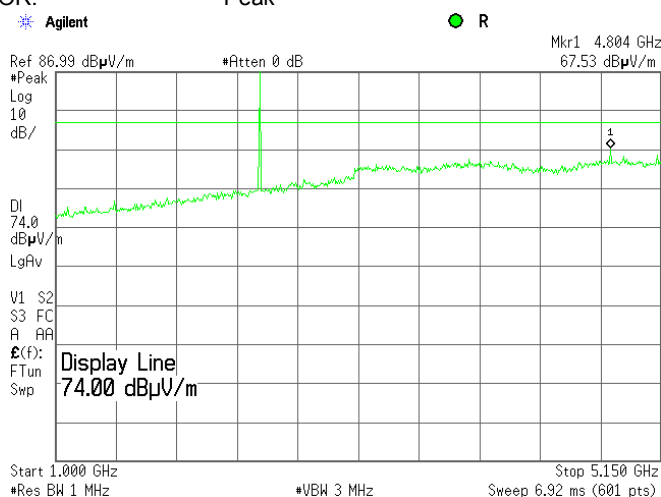
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Test specification:	Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

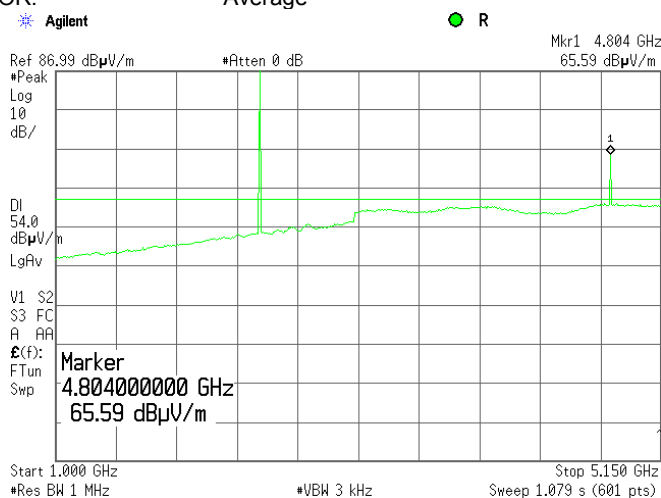
Plot 7.9.14 Radiated emission measurements from 1000 to 5150 MHz at the low carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak



Plot 7.9.15 Radiated emission measurements from 1000 to 5150 MHz at the low carrier frequency

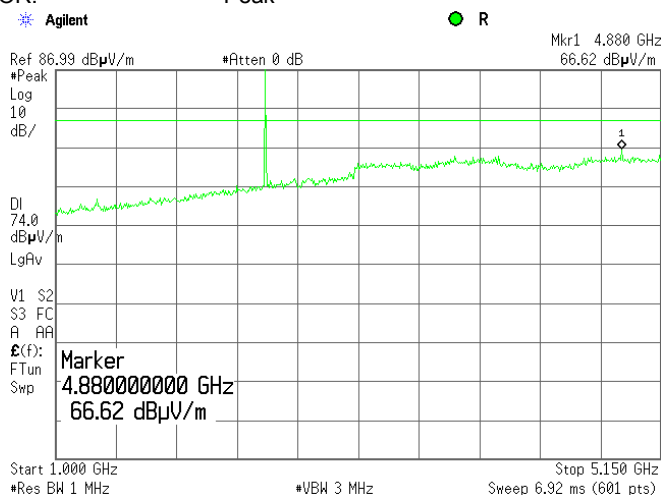
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Average



Test specification:	Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

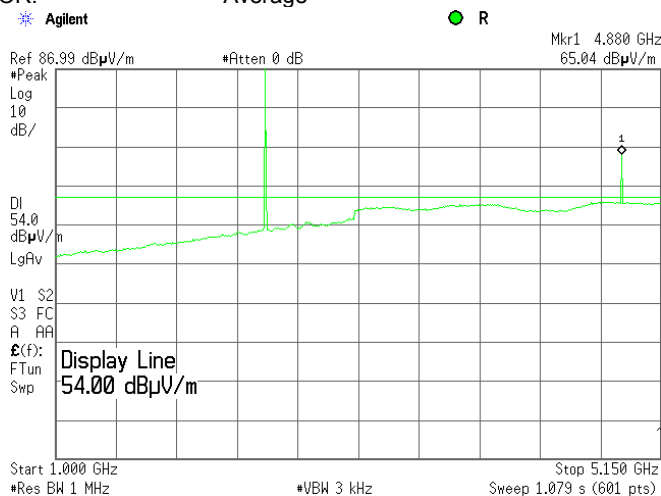
Plot 7.9.16 Radiated emission measurements from 1000 to 5150 MHz at the mid carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak



Plot 7.9.17 Radiated emission measurements from 1000 to 5150 MHz at the mid carrier frequency

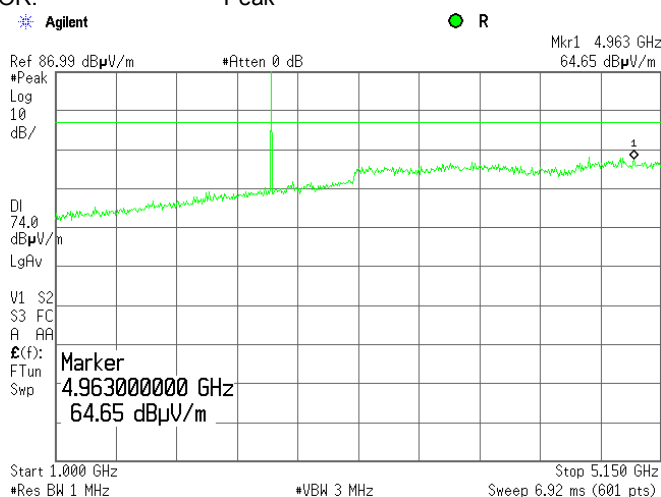
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Average



Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

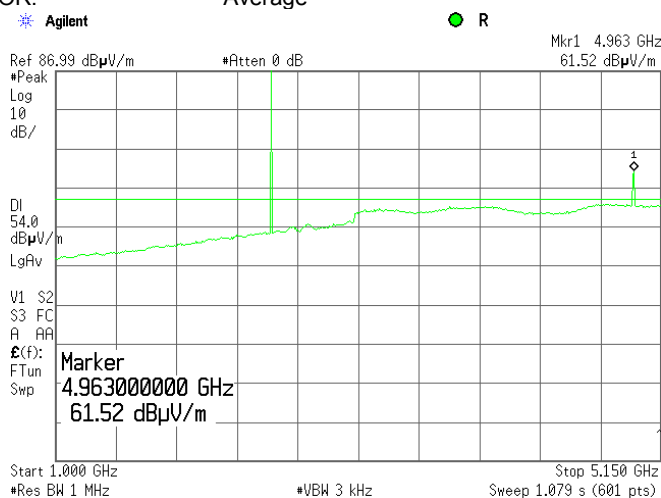
Plot 7.9.18 Radiated emission measurements from 1000 to 5150 MHz at the high carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak



Plot 7.9.19 Radiated emission measurements from 1000 to 5150 MHz at the high carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Average





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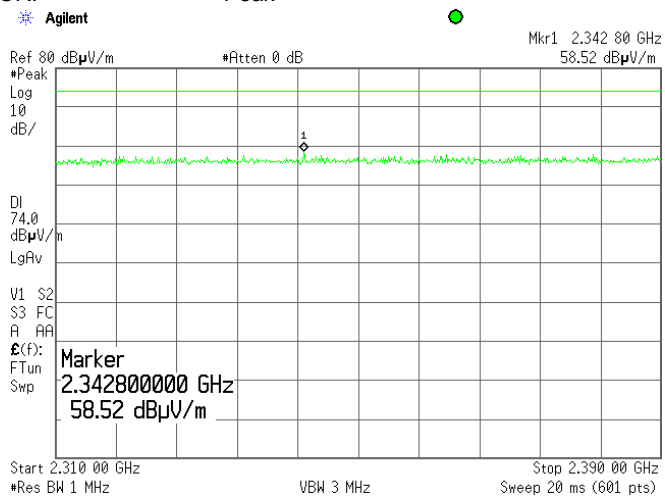
Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:	Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

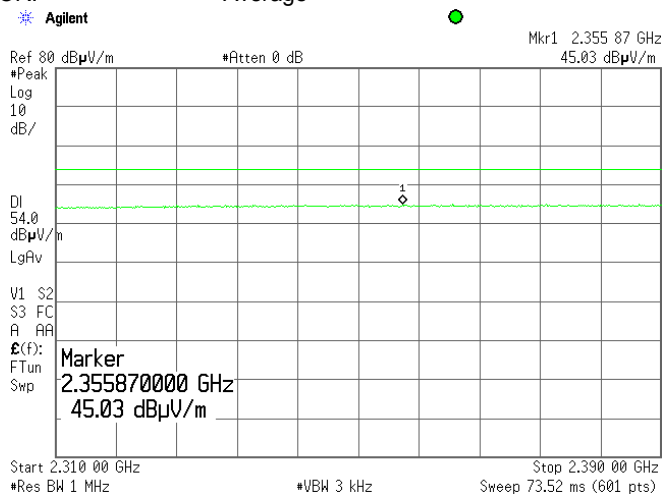
Plot 7.9.20 Radiated band emission measurements near the low edge, within restricted band

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
FREQUENCY HOPPING: Enabled
DETECTOR: Peak



Plot 7.9.21 Radiated band emission measurements near the low edge, within restricted band

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
FREQUENCY HOPPING: Enabled
DETECTOR: Average





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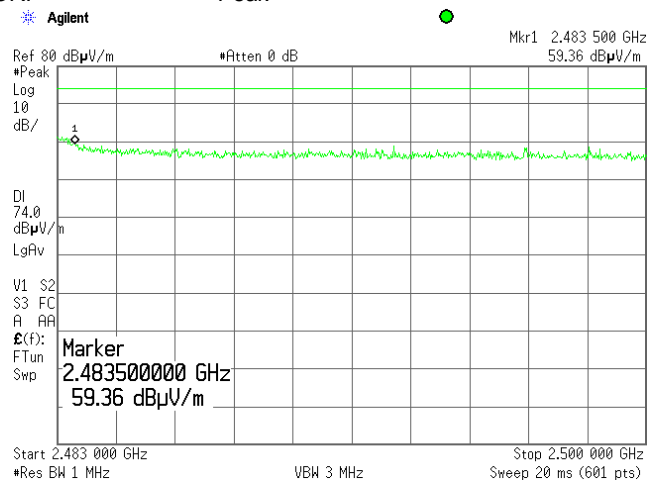
Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/29/2010 12:45:24 PM	
Temperature: 22 °C		Air Pressure: 1020 hPa	Relative Humidity: 48 %
			Power Supply: battery 3.7V
Remarks:			

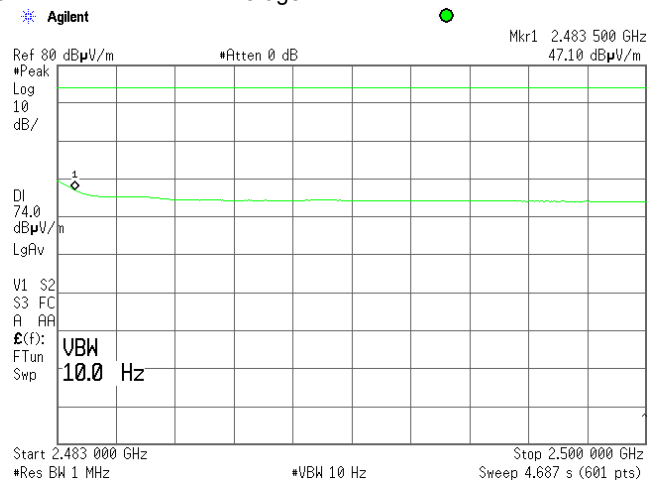
Plot 7.9.22 Radiated band emission measurements near the high edge, within restricted band

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
HOPPING FUNCTION: Disabled
TRANSMITTER CHANNEL: High (2480 MHz)
DETECTOR: Peak



Plot 7.9.23 Radiated band emission measurements near the high edge, within restricted band

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
HOPPING FUNCTION: Disabled
TRANSMITTER CHANNEL: High (2480 MHz)
DETECTOR: Average





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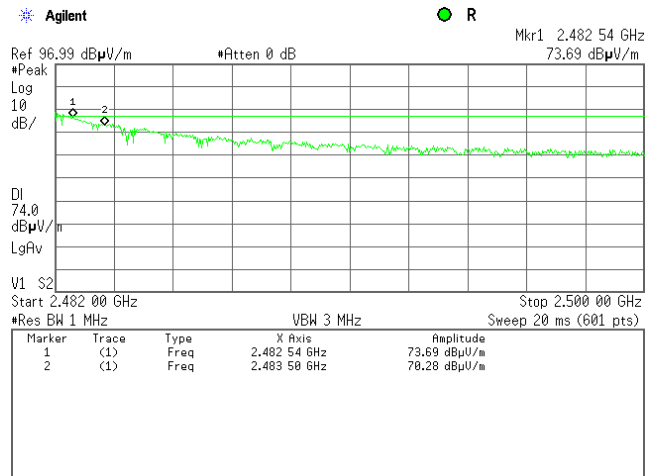
Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/29/2010 12:45:24 PM	
Temperature: 22 °C		Air Pressure: 1020 hPa	Relative Humidity: 48 %
			Power Supply: battery 3.7V
Remarks:			

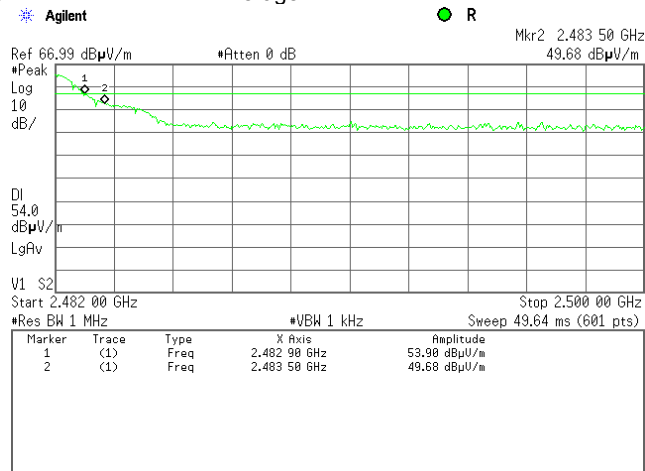
Plot 7.9.24 Radiated band emission measurements near the high edge, within restricted band

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
HOPPING FUNCTION: Enabled
TRANSMITTER CHANNEL: High (2480 MHz)
DETECTOR: Peak



Plot 7.9.25 Radiated band emission measurements near the high edge, within restricted band

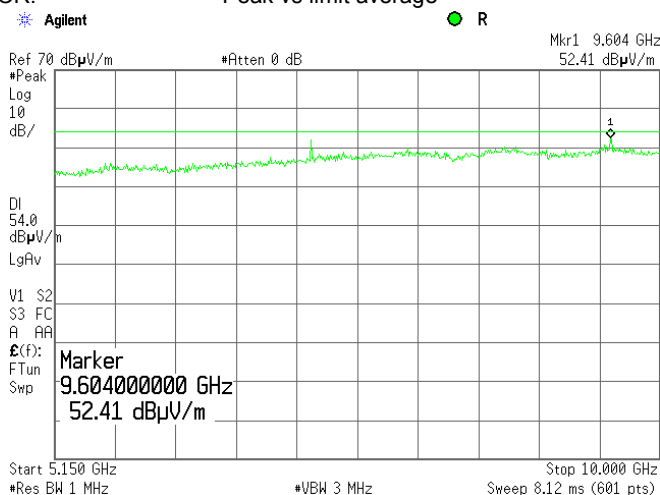
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
HOPPING FUNCTION: Enabled
TRANSMITTER CHANNEL: High (2480 MHz)
DETECTOR: Average



Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

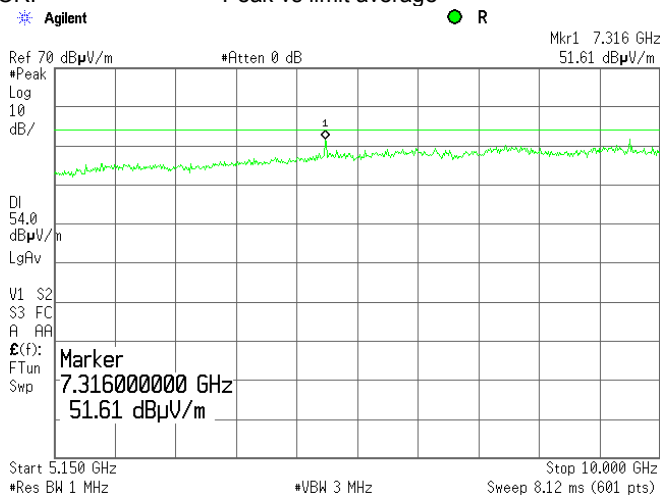
Plot 7.9.26 Radiated emission measurements from 5.150 to 10.0 GHz at the low carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak vs limit average



Plot 7.9.27 Radiated emission measurements from 5.150 to 10.0 GHz at the mid carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak vs limit average





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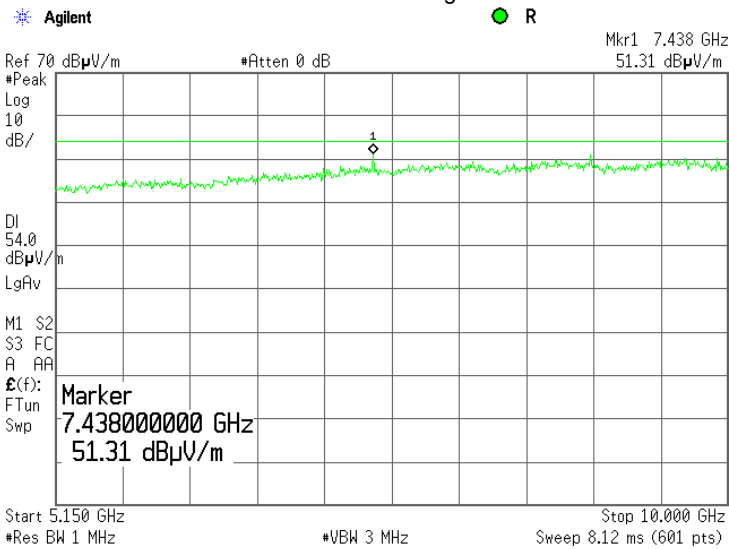
Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/29/2010 12:45:24 PM	
Temperature: 22 °C		Air Pressure: 1020 hPa	Relative Humidity: 48 %
			Power Supply: battery 3.7V
Remarks:			

Plot 7.9.28 Radiated emission measurements from 5.150 to 10.0 GHz at the high carrier frequency

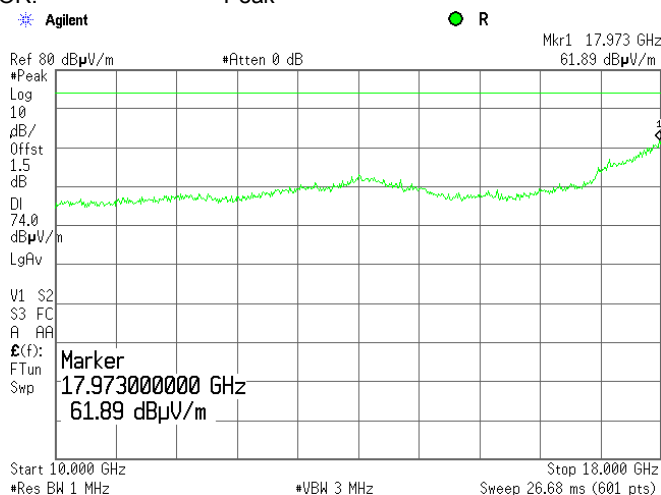
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak vs limit average



Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/29/2010 12:45:24 PM	
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

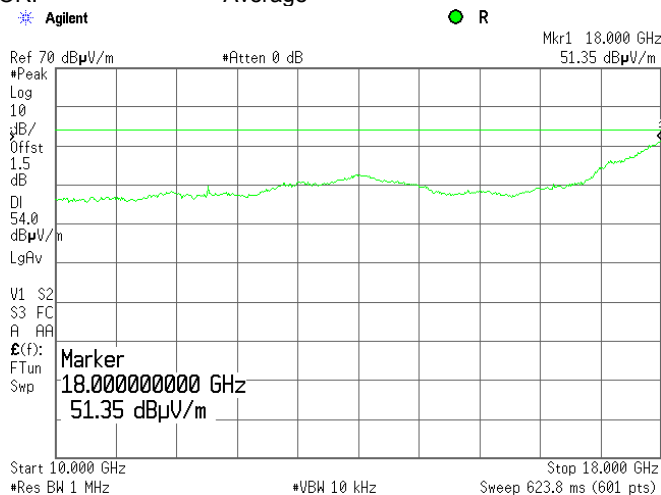
Plot 7.9.29 Radiated emission measurements from 10 to 18 GHz at the low carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak



Plot 7.9.30 Radiated emission measurements from 10 to 18 GHz at the low carrier frequency

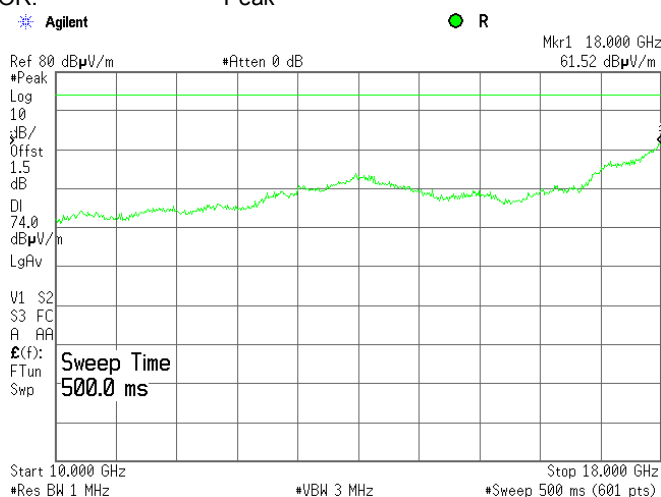
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Average



Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

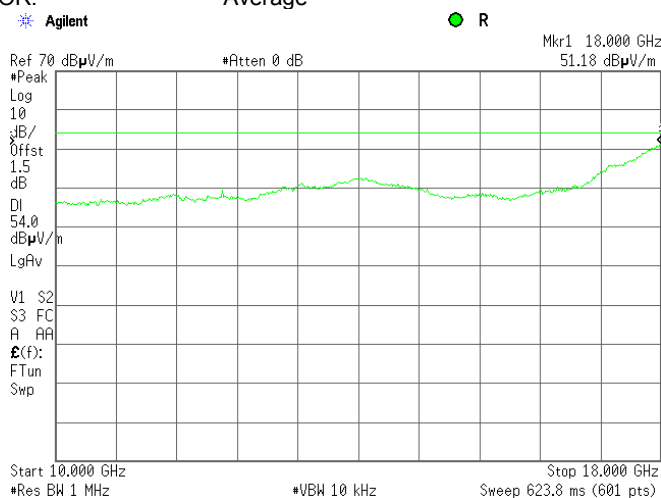
Plot 7.9.31 Radiated emission measurements from 10 to 18 GHz at the mid carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak



Plot 7.9.32 Radiated emission measurements from 10 to 18 GHz at the mid carrier frequency

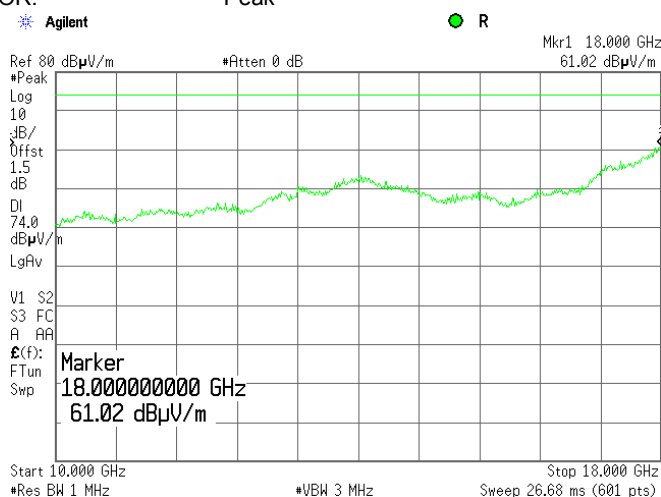
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Average



Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/29/2010 12:45:24 PM	
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

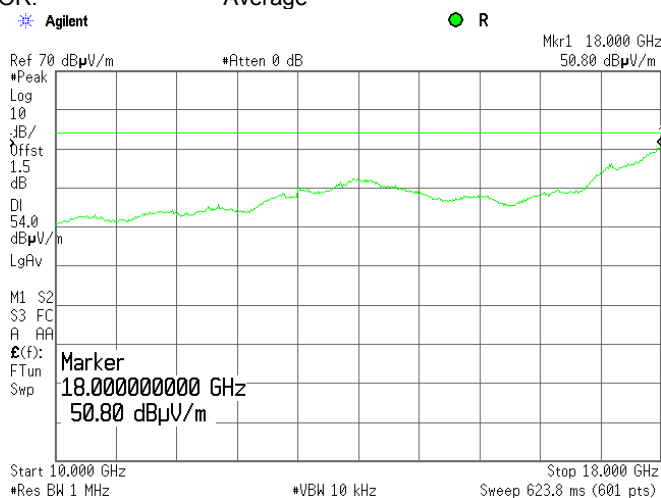
Plot 7.9.33 Radiated emission measurements from 10 to 18G Hz at the high carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak



Plot 7.9.34 Radiated emission measurements from 10 to 18G Hz at the high carrier frequency

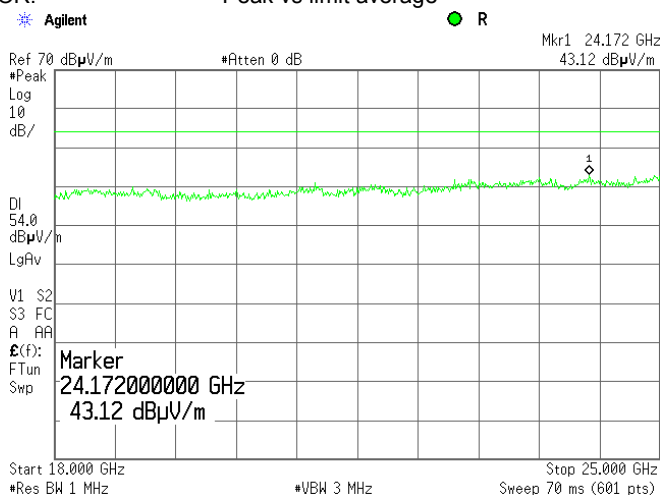
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Average



Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/29/2010 12:45:24 PM	
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

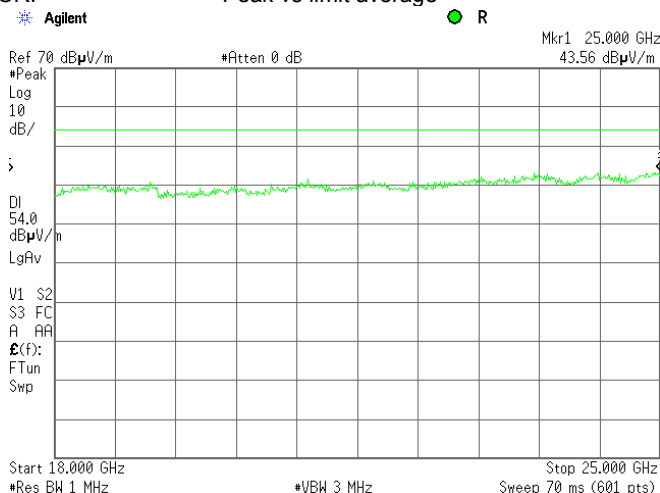
Plot 7.9.35 Radiated emission measurements from 18 to 25 GHz at the low carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak vs limit average



Plot 7.9.36 Radiated emission measurements from 18 to 25 GHz at the mid carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak vs limit average





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Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

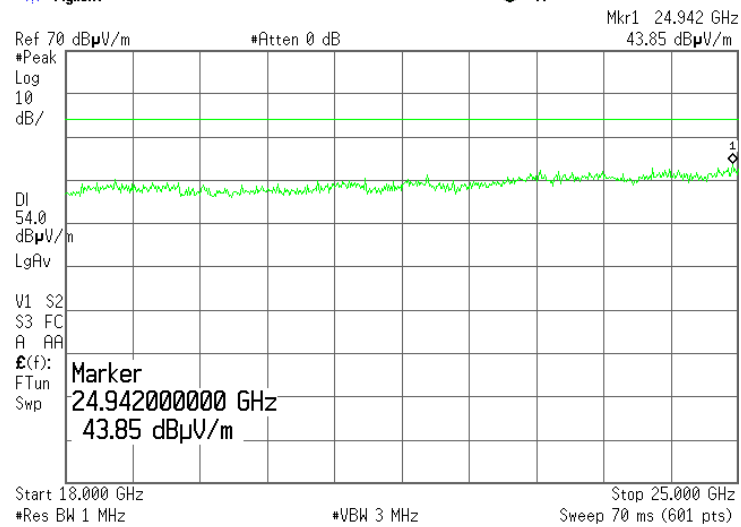
Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/29/2010 12:45:24 PM	
Temperature: 22 °C		Air Pressure: 1020 hPa	Relative Humidity: 48 %
			Power Supply: battery 3.7V
Remarks:			

Plot 7.9.37 Radiated emission measurements from 18 to 25 GHz at the high carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak vs limit average

Agilent

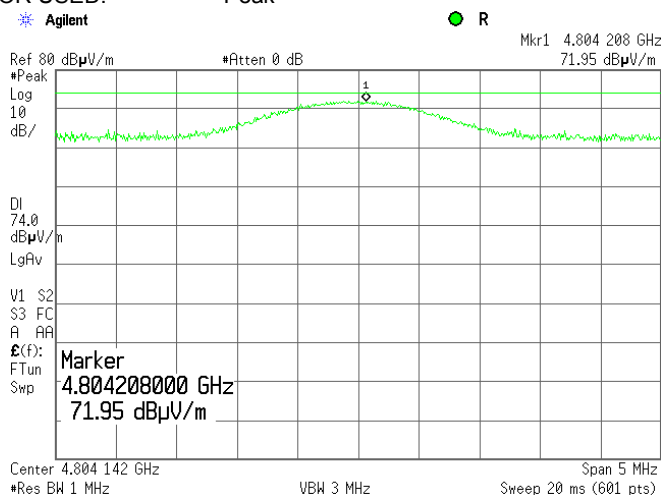
R



Test specification:	Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

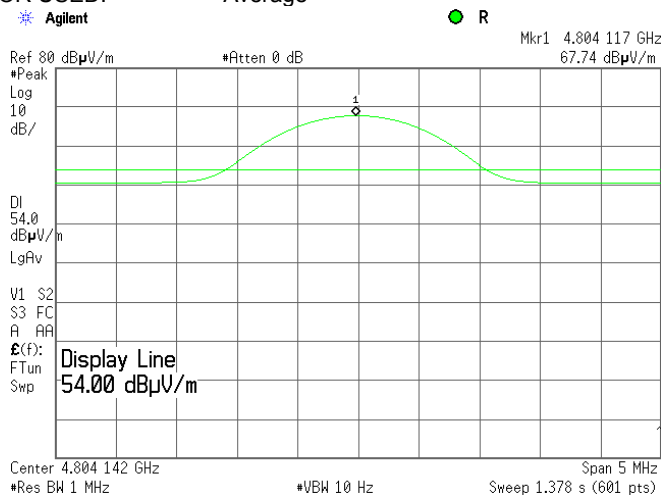
Plot 7.9.38 Radiated emission measurements at the second harmonic of low carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARISATION: Vertical and Horizontal
DETECTOR USED: Peak



Plot 7.9.39 Radiated emission measurements at the second harmonic of low carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARISATION: Vertical and Horizontal
DETECTOR USED: Average





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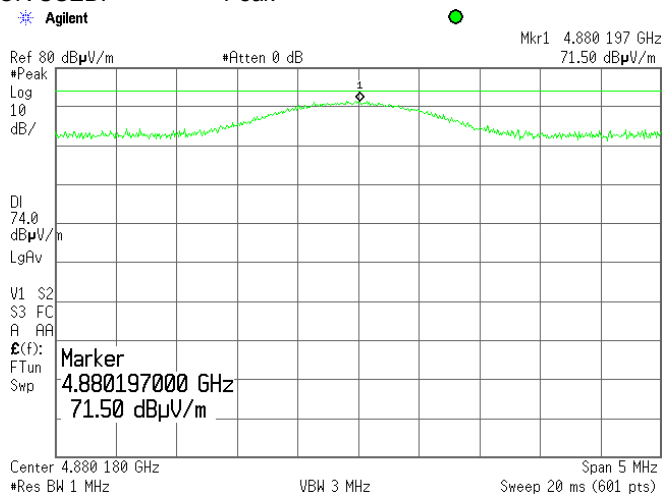
Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/29/2010 12:45:24 PM	
Temperature: 22 °C		Air Pressure: 1020 hPa	Relative Humidity: 48 %
			Power Supply: battery 3.7V
Remarks:			

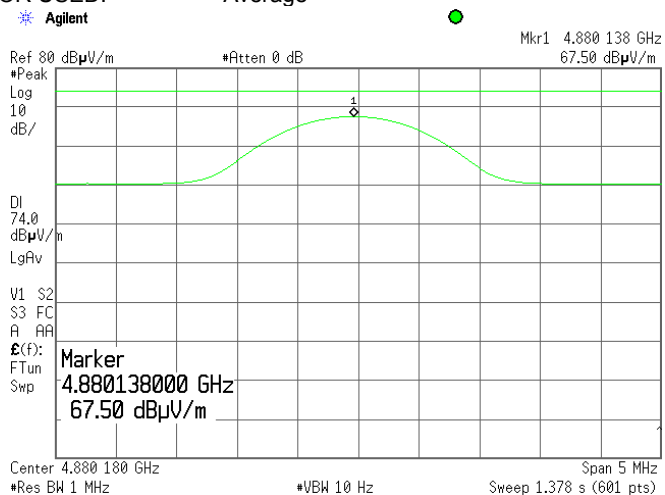
Plot 7.9.40 Radiated emission measurements at the second harmonic of mid carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARISATION: Vertical and Horizontal
DETECTOR USED: Peak



Plot 7.9.41 Radiated emission measurements at the second harmonic of mid carrier frequency

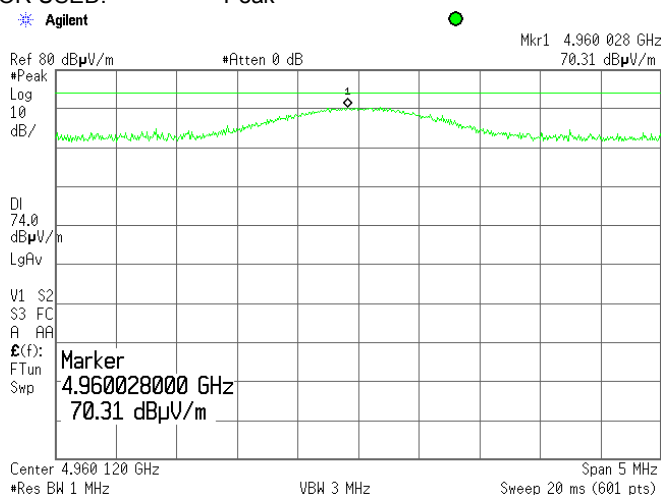
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARISATION: Vertical and Horizontal
DETECTOR USED: Average



Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/29/2010 12:45:24 PM	
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

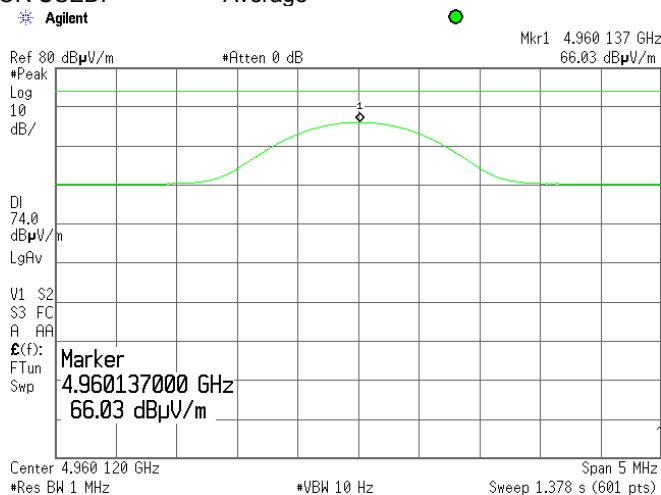
Plot 7.9.42 Radiated emission measurements at the second harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARISATION: Vertical and Horizontal
DETECTOR USED: Peak



Plot 7.9.43 Radiated emission measurements at the second harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARISATION: Vertical and Horizontal
DETECTOR USED: Average





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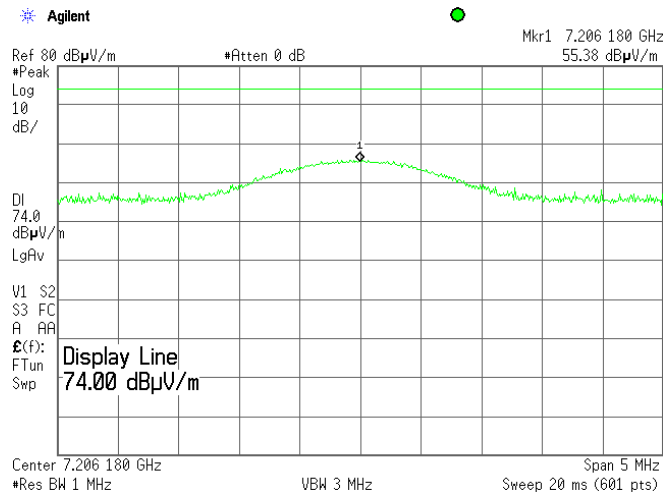
Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

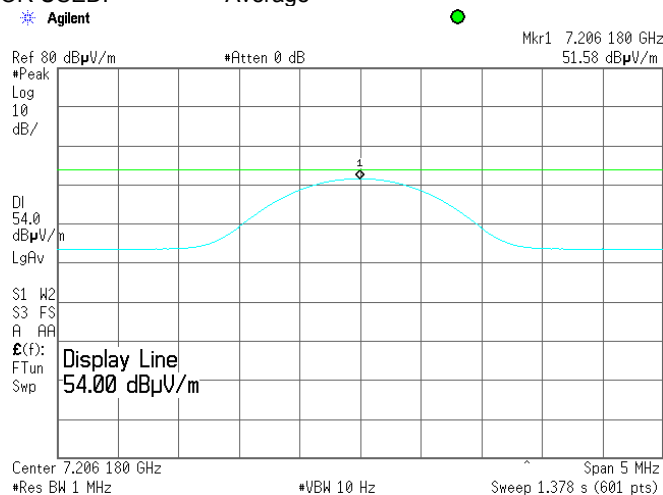
Plot 7.9.44 Radiated emission measurements at the third harmonic of low carrier frequency

TEST SITE: OATS
 TEST DISTANCE: 3 m
 ANTENNA POLARISATION: Vertical and Horizontal
 DETECTOR USED: Peak



Plot 7.9.45 Radiated emission measurements at the third harmonic of low carrier frequency

TEST SITE: OATS
 TEST DISTANCE: 3 m
 ANTENNA POLARISATION: Vertical and Horizontal
 DETECTOR USED: Average

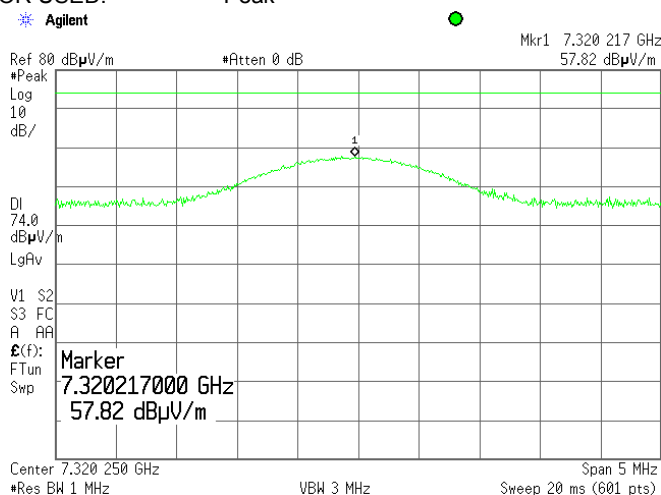


NOTE: Additional cable loss 0.9 dB

Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/29/2010 12:45:24 PM	
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

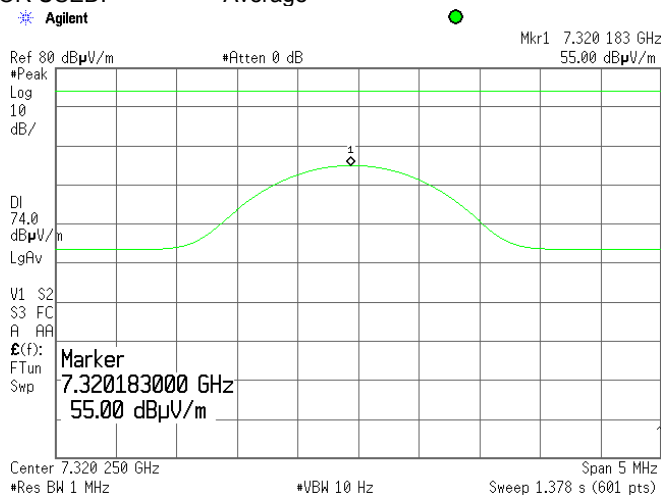
Plot 7.9.46 Radiated emission measurements at the third harmonic of mid carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARISATION: Vertical and Horizontal
DETECTOR USED: Peak



Plot 7.9.47 Radiated emission measurements at the third harmonic of mid carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARISATION: Vertical and Horizontal
DETECTOR USED: Average

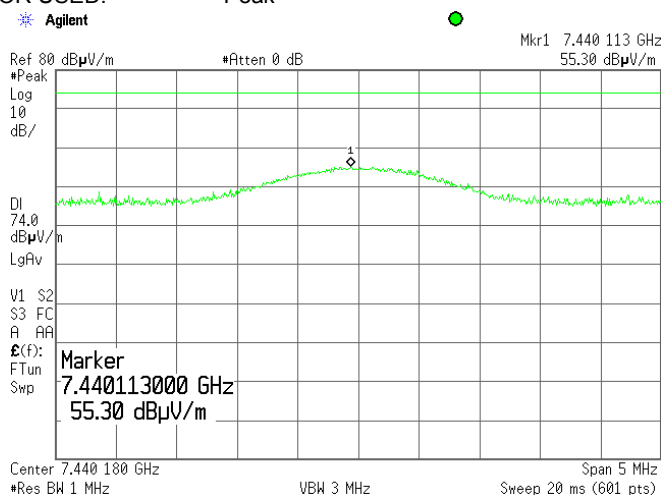


NOTE: Additional cable loss 0.9 dB

Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

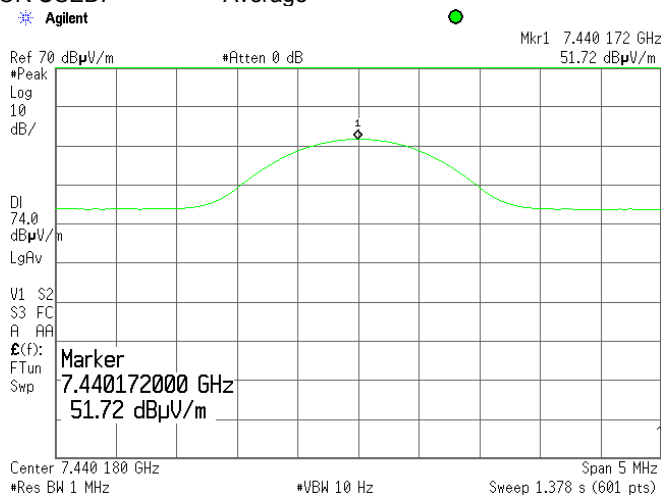
Plot 7.9.48 Radiated emission measurements at the third harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARISATION: Vertical and Horizontal
DETECTOR USED: Peak



Plot 7.9.49 Radiated emission measurements at the third harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARISATION: Vertical and Horizontal
DETECTOR USED: Average

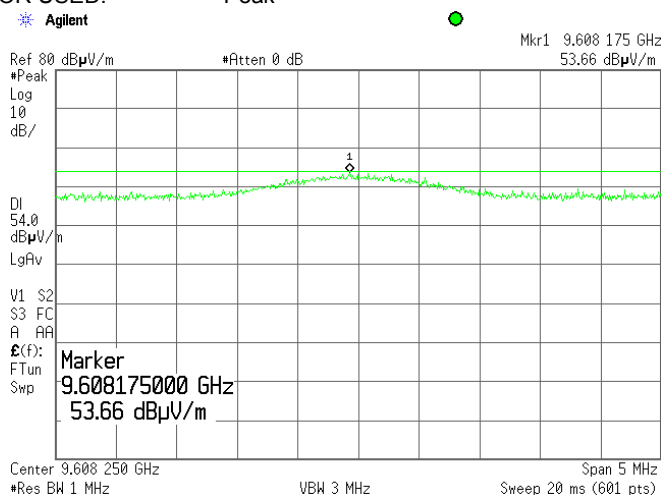


NOTE: Additional cable loss 0.9 dB

Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

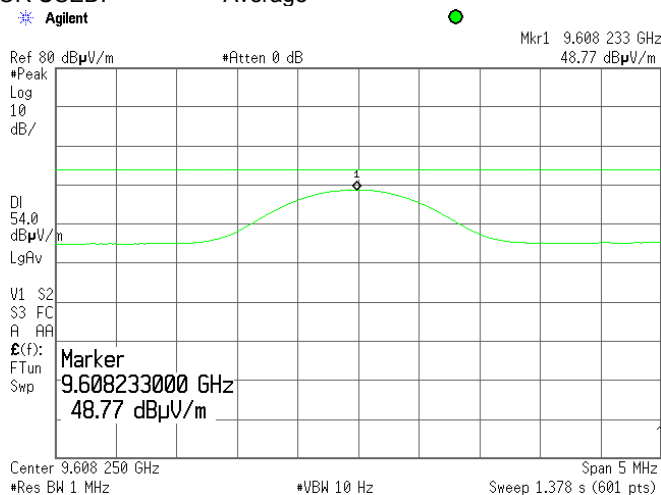
Plot 7.9.50 Radiated emission measurements at the fourth harmonic of low carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARISATION: Vertical and Horizontal
DETECTOR USED: Peak



Plot 7.9.51 Radiated emission measurements at the fourth harmonic of low carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARISATION: Vertical and Horizontal
DETECTOR USED: Average

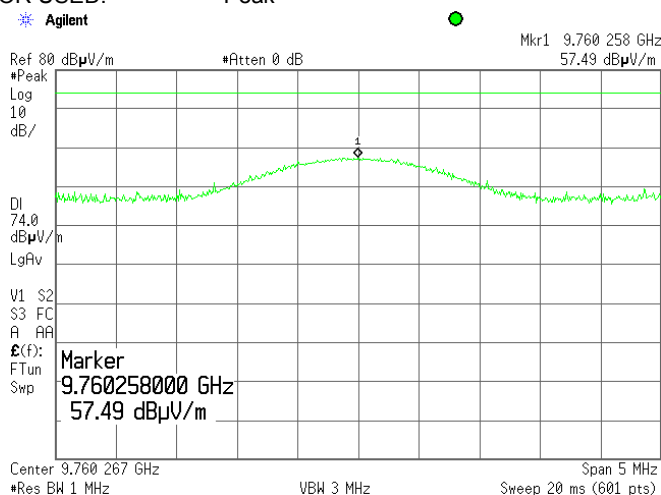


NOTE: Additional cable loss 1.0 dB

Test specification:	Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

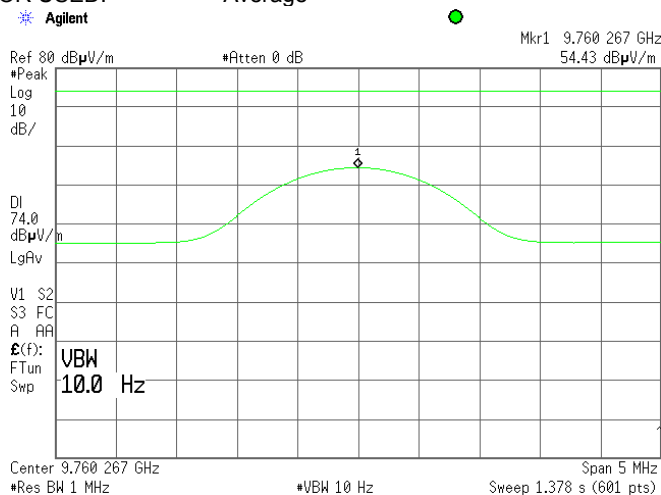
Plot 7.9.52 Radiated emission measurements at the fourth harmonic of mid carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARISATION: Vertical and Horizontal
DETECTOR USED: Peak



Plot 7.9.53 Radiated emission measurements at the fourth harmonic of mid carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARISATION: Vertical and Horizontal
DETECTOR USED: Average



NOTE: Additional cable loss 1.0 dB



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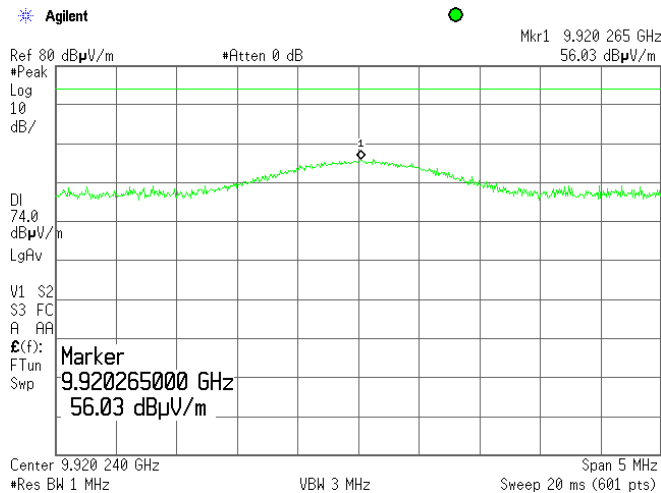
Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:	Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

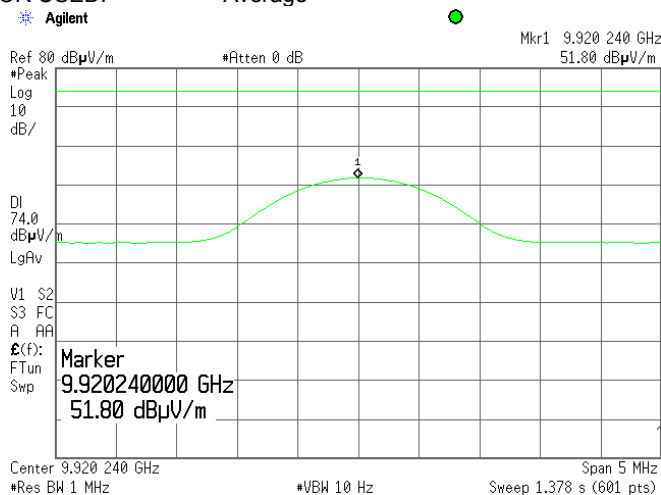
Plot 7.9.54 Radiated emission measurements at the fourth harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARISATION: Vertical and Horizontal
DETECTOR USED: Peak



Plot 7.9.55 Radiated emission measurements at the fourth harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARISATION: Vertical and Horizontal
DETECTOR USED: Average



NOTE: Additional cable loss 1.0 dB



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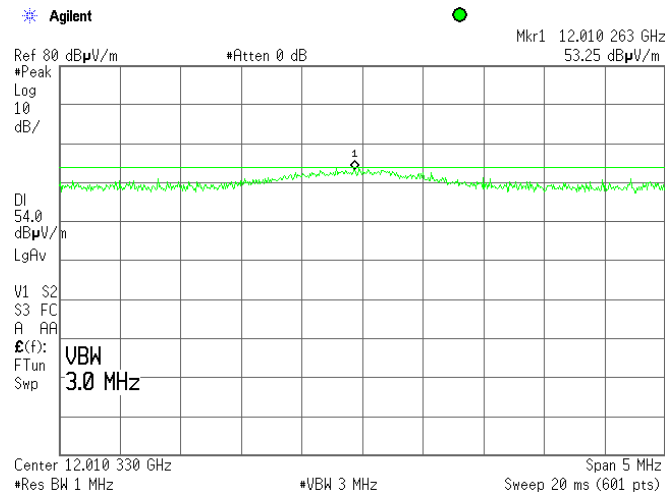
Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

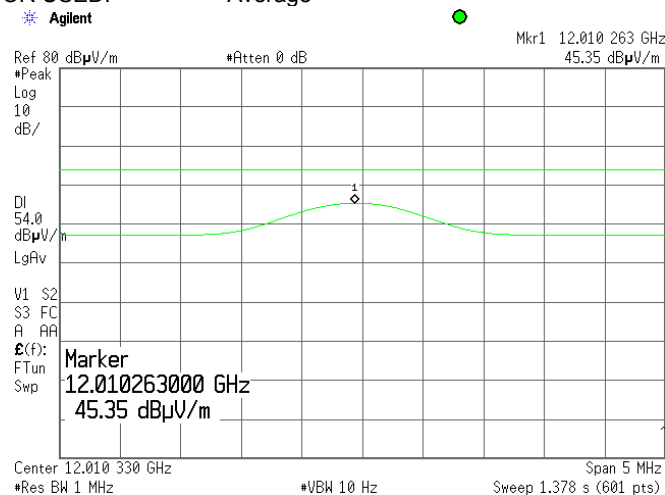
Plot 7.9.56 Radiated emission measurements at the fifth harmonic of low carrier frequency

TEST SITE: OATS
 TEST DISTANCE: 3 m
 ANTENNA POLARISATION: Vertical and Horizontal
 DETECTOR USED: Peak



Plot 7.9.57 Radiated emission measurements at the fifth harmonic of low carrier frequency

TEST SITE: OATS
 TEST DISTANCE: 3 m
 ANTENNA POLARISATION: Vertical and Horizontal
 DETECTOR USED: Average

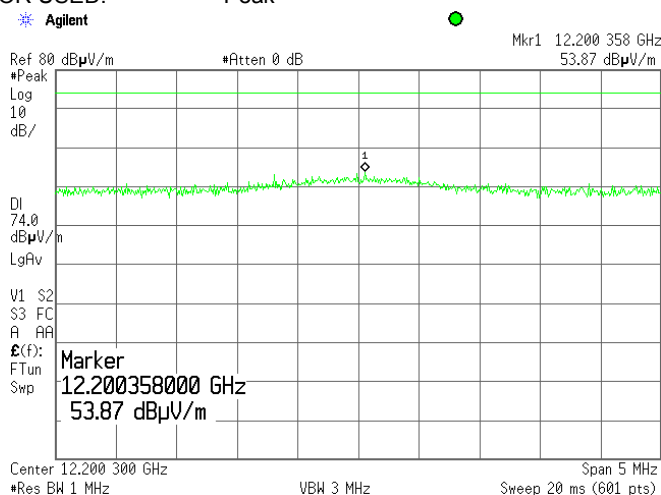


NOTE: Additional cable loss 1.2 dB

Test specification:	Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

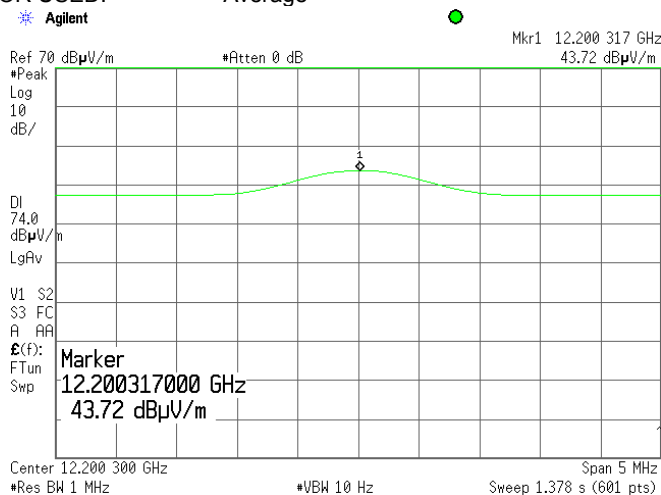
Plot 7.9.58 Radiated emission measurements at the fifth harmonic of mid carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARISATION: Vertical and Horizontal
DETECTOR USED: Peak



Plot 7.9.59 Radiated emission measurements at the fifth harmonic of mid carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARISATION: Vertical and Horizontal
DETECTOR USED: Average



NOTE: Additional cable loss 1.3 dB



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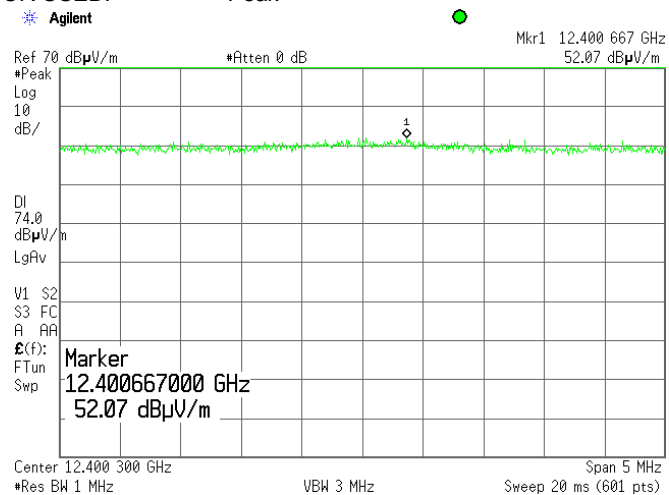
Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:	Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/29/2010 12:45:24 PM		
Temperature: 22 °C	Air Pressure: 1020 hPa	Relative Humidity: 48 %	Power Supply: battery 3.7V
Remarks:			

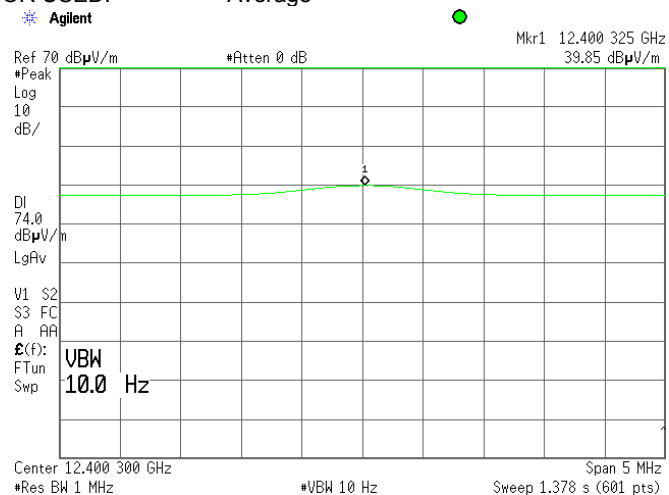
Plot 7.9.60 Radiated emission measurements at the fifth harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARISATION: Vertical and Horizontal
DETECTOR USED: Peak



Plot 7.9.61 Radiated emission measurements at the fifth harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARISATION: Vertical and Horizontal
DETECTOR USED: Average



NOTE: Additional cable loss 1.2 dB

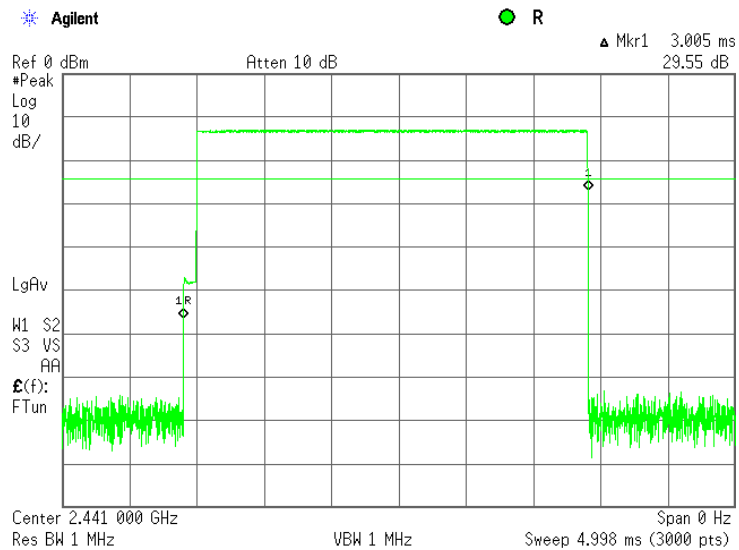


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Report ID: CARRAD_FCC.20594.doc
Date of Issue: 4/21/2010

Test specification:		Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/29/2010 12:45:24 PM	
Temperature: 22 °C		Air Pressure: 1020 hPa	Relative Humidity: 48 %
			Power Supply: battery 3.7V
Remarks:			

Plot 7.9.62 Transmission pulse duration



Test specification:		Section 15.203 / RSS-Gen, section 7.1.4, Antenna requirements	
Test procedure:		Public notice DA 00-705	
Test mode:		Compliance	
Date & Time:		3/17/2010 5:09:03 PM	
Temperature: 24.2 °C		Air Pressure: 1017 hPa	
		Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

7.10 Antenna requirements

The EUT was verified for compliance with antenna requirements. A transmitter shall be designed to ensure that no antenna other than that furnished by the responsible party will be used with the device. It may be either permanently attached or employs a unique antenna connector for every antenna proposed for use with the EUT. This requirement does not apply to professionally installed transmitters.

The rationale for compliance with the above requirements was either visual inspection results or supplier declaration. The summary of results is provided in Table 7.10.1.

Table 7.10.1 Antenna requirements

Requirement	Rationale	Verdict
The transmitter antenna is permanently attached (printed)	Visual inspection	Comply
The transmitter employs a unique antenna connector	NA	
The transmitter requires professional installation	NA	

Photograph 7.10.1 Antenna assembly



Test specification:	FCC section 15.109/ RSS-Gen section 7.2.3.2/ICES-003 Section 5.5 Class B, Radiated emission		
Test procedure:	ANSI C63.4, Section 8.3		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/17/2010 7:53:39 PM		
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

8 Unintentional emissions tests

8.1 Radiated emission measurements

8.1.1 General

This test was performed to measure radiated emissions from the EUT enclosure. The specification test limits are given in Table 8.1.1, Table 8.1.2.

Table 8.1.1 Radiated emission test limits according to FCC part 15 section 15.109 class B and RSS-Gen section 7.2.3.2

Frequency, MHz	Class B limit, dB(μV/m)	
	10 m distance	3 m distance
30 - 88	29.5*	40.0
88 - 216	33.0*	43.5
216 - 960	35.5*	46.0
Above 960	43.5*	54.0

Table 8.1.2 Radiated disturbance test limits according to ICES-003 section 5.5

Frequency, MHz	Class B limit, dB(μV/m)		Class A limit, dB(μV/m)	
	10 m distance	3 m distance	10 m distance	3 m distance
30 - 230	30.0	40.5*	40.0	50.5*
230 - 1000	37.0	47.5*	47.0	57.5*

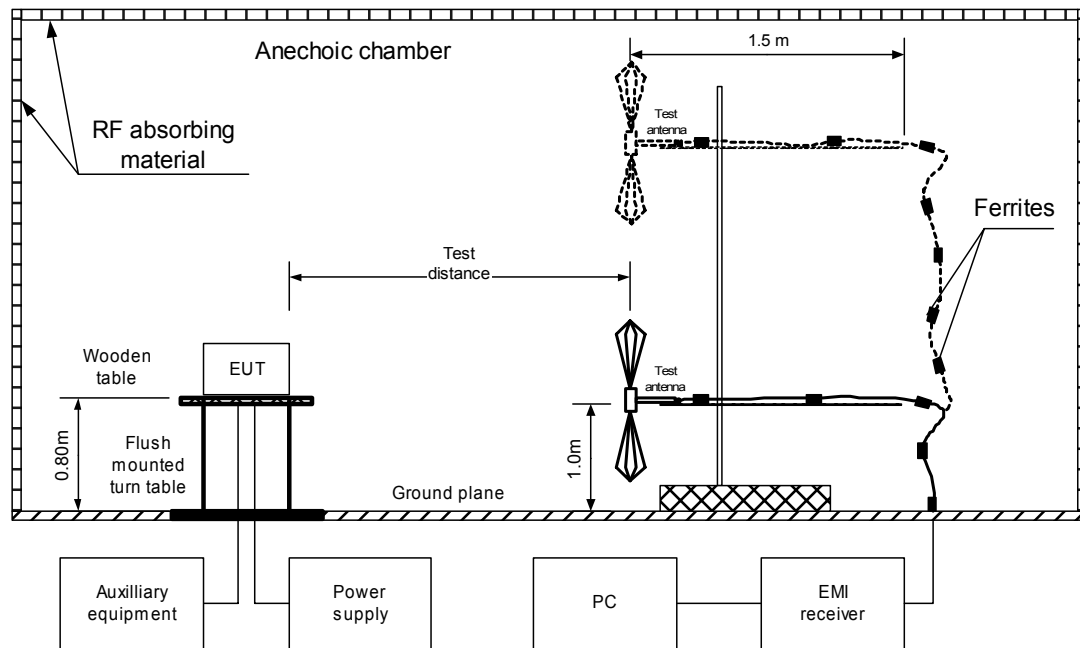
* The limit for test distance other than specified was calculated using the inverse linear distance extrapolation factor as follows: $\text{Lim}_{S_2} = \text{Lim}_{S_1} + 20 \log(S_1/S_2)$, where S_1 and S_2 – standard defined and test distance respectively in meters.

8.1.2 Test procedure

- 8.1.2.1 The EUT was set up as shown in Figure 8.1.1 and the associated photographs, energized and the EUT performance was checked.
- 8.1.2.2 The specified frequency range was investigated with the antenna connected to the EMI receiver. To find the highest emission the turntable was rotated 360° and the measuring antenna height was swept from 1 to 4 m in both, vertical and horizontal polarizations. The EUT cables position was varied to maximize emission.
- 8.1.2.3 The worst test results with respect to the limits were recorded in Table 8.1.3, Table 8.1.4 and shown in the associated plots.

Test specification:	FCC section 15.109/ RSS-Gen section 7.2.3.2/ICES-003 Section 5.5 Class B, Radiated emission		
Test procedure:	ANSI C63.4, Section 8.3		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/17/2010 7:53:39 PM		
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

Figure 8.1.1 Setup for radiated emission measurements in anechoic chamber, table-top EUT



Test specification:	FCC section 15.109/ RSS-Gen section 7.2.3.2/ICES-003 Section 5.5 Class B, Radiated emission		
Test procedure:	ANSI C63.4, Section 8.3		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/17/2010 7:53:39 PM		
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

Photograph 8.1.1 Setup for radiated emission measurements



Photograph 8.1.2 Setup for radiated emission measurements, EUT close view





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Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:	FCC section 15.109/ RSS-Gen section 7.2.3.2/ICES-003 Section 5.5 Class B, Radiated emission		
Test procedure:	ANSI C63.4, Section 8.3		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/17/2010 7:53:39 PM		
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

Table 8.1.3 Radiated emission test results for Bluetooth mode

EUT SET UP: TABLE-TOP
 TEST SITE: SEMI ANECHOIC CHAMBER
 TEST DISTANCE: 3 m
 DETECTORS USED: PEAK / QUASI-PEAK
 FREQUENCY RANGE: 30 MHz – 1000 MHz (refer to Note)
 RESOLUTION BANDWIDTH: 120 kHz
 EUT OPERATING MODE: Bluetooth in receive/standby mode

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
No emissions were found								Pass

Note: the receiver spurious emissions were checked during transmitter spurious emissions test under 54 dB(μV/m) limit, section 7.9 of this test report

Reference numbers of test equipment used

HL 0521	HL 0614	HL 3121	HL 3616				
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Full description is given in Appendix A.



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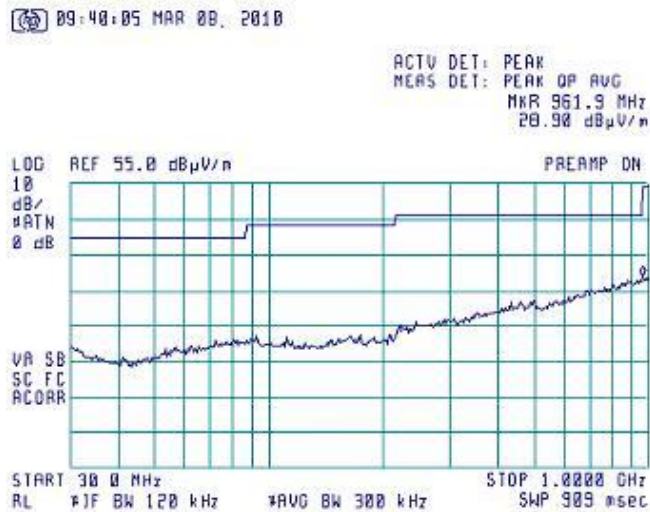
Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:		FCC section 15.109/ RSS-Gen section 7.2.3.2/ICES-003 Section 5.5 Class B, Radiated emission	
Test procedure:		ANSI C63.4, Section 8.3	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/17/2010 7:53:39 PM	
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

Plot 8.1.1 Radiated emission measurements in 30 - 1000 MHz range, vertical and horizontal antenna polarization, according to FCC part 15 section 15.109 class B and RSS-Gen section 7.2.3.2 limits

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
EUT POSITION: Vertical (Typical)
EUT OPERATING MODE: BT standby





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Report ID: CARRAD_FCC.20594.doc

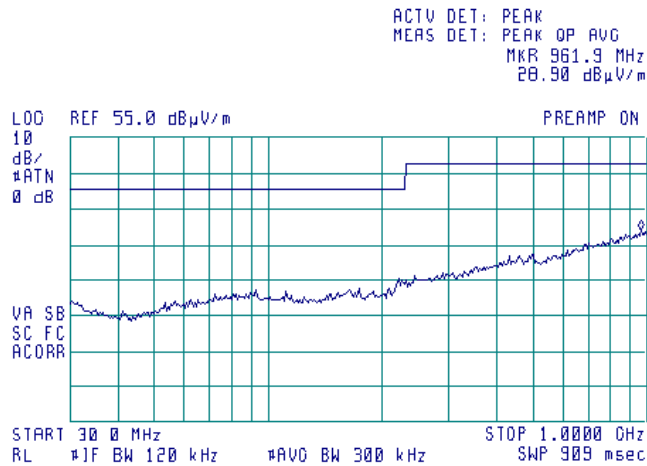
Date of Issue: 4/21/2010

Test specification:		FCC section 15.109/ RSS-Gen section 7.2.3.2/ICES-003 Section 5.5 Class B, Radiated emission	
Test procedure:		ANSI C63.4, Section 8.3	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/17/2010 7:53:39 PM	
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

Plot 8.1.2 Radiated emission measurements in 30 - 1000 MHz range, vertical and horizontal antenna polarization, according to ICES-003 section 5.5 class B limit

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
EUT POSITION: Vertical (Typical)
EUT OPERATING MODE: BT standby

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Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:		FCC section 15.109/ RSS-Gen section 7.2.3.2/ICES-003 Section 5.5 Class B, Radiated emission	
Test procedure:		ANSI C63.4, Section 8.3	
Test mode:		Verdict: PASS	
Date & Time:			
Temperature: 24.2 °C		Air Pressure: 1017 hPa	Relative Humidity: 40 %
			Power Supply: battery 3.7V
Remarks:			

Table 8.1.4 Radiated emission test results for FM receiver operating mode

EUT SET UP: TABLE-TOP
TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / QUASI-PEAK
FREQUENCY RANGE: 30 MHz – 1000 MHz
RESOLUTION BANDWIDTH: 120 kHz
EUT OPERATING MODE: FM receiver @ 108 MHz (as the worst case between 88, 98 and 108 MHz)

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
320.00	24.9	19.8	46.0	-26.2	Horizontal	1.0	345	Pass

Reference numbers of test equipment used

HL 0521	HL 0614	HL 3121	HL 3616				
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Full description is given in Appendix A.

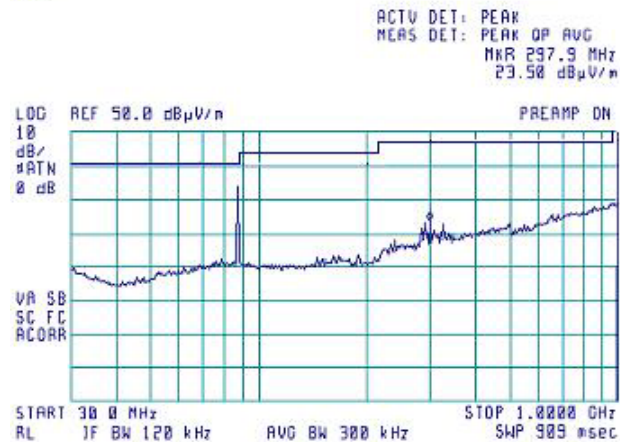


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Test specification:		FCC section 15.109/ RSS-Gen section 7.2.3.2/ICES-003 Section 5.5 Class B, Radiated emission	
Test procedure:		ANSI C63.4, Section 8.3	
Test mode:		Compliance	
Date & Time:		3/17/2010 7:53:39 PM	
Temperature: 24.2 °C		Air Pressure: 1017 hPa	
		Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

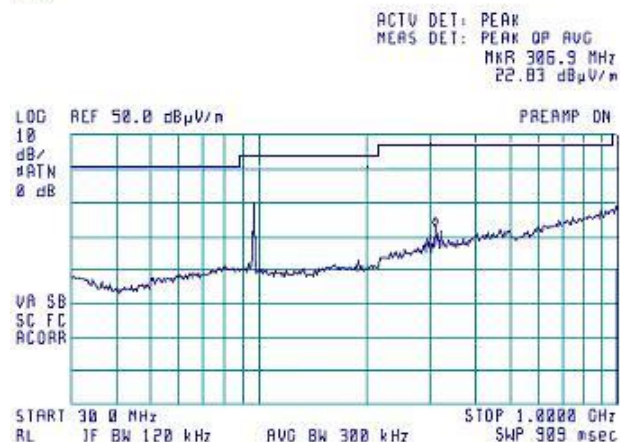
Plot 8.1.3 Radiated emission measurements in 30 - 1000 MHz range, vertical and horizontal antenna polarization

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
EUT POSITION: Vertical (Typical)
EUT OPERATING MODE: 88 MHz FM



Plot 8.1.4 Radiated emission measurements in 30 - 1000 MHz range, vertical and horizontal antenna polarization

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
EUT POSITION: Vertical (Typical)
EUT OPERATING MODE: 98 MHz FM





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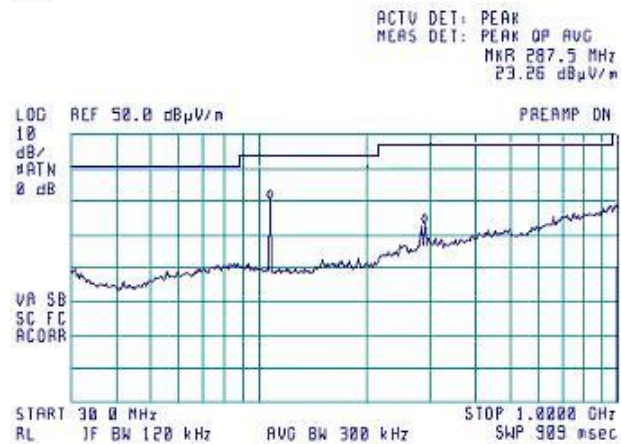
Report ID: CARRAD_FCC.20594.doc

Date of Issue: 4/21/2010

Test specification:		FCC section 15.109/ RSS-Gen section 7.2.3.2/ICES-003 Section 5.5 Class B, Radiated emission	
Test procedure:		ANSI C63.4, Section 8.3	
Test mode:		Compliance	Verdict: PASS
Date & Time:		3/17/2010 7:53:39 PM	
Temperature: 24.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 40 %	Power Supply: battery 3.7V
Remarks:			

Plot 8.1.5 Radiated emission measurements in 30 - 1000 MHz range, vertical and horizontal antenna polarization

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
EUT POSITION: Vertical (Typical)
EUT OPERATING MODE: 108 MHz FM



9 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	29-Jun-09	29-Jun-10
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	11-Jan-10	11-Jan-11
1334	Power supply programmable dual 0-150 VDC, 0.25 A	Lip Electrical Engineering	LPS-150D	627	21-Dec-09	21-Dec-10
1430	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL1432	Agilent Technologies	8542E	3807A002 62,3705A0 0217	31-Aug-09	31-Aug-10
1451	Cable, 1.5 m, N/N-Type	Harbour Industries	MIL 17/60-RG142	1451	01-Sep-09	01-Sep-10
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W	EMC Test Systems	3115	9911-5964	29-Jan-10	29-Jan-11
2871	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-8155-00	2871	16-Sep-09	16-Sep-10
2883	Cable, 18 GHz N-type, M-F, 3 m	Bird	TC-MNFN-3.0	211539 003	01-Dec-09	01-Dec-10
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY414447 62	07-May-09	07-May-10
2952	Cable, RF, 18 GHz, 1.2 m, SMA-SMA	Gore	10020014	NA	05-Oct-09	05-Oct-10
3119	Cable, 18 GHz N-type, M-F, 3 m	Bird	TC-MNFN-3.0	211539004	29-Nov-09	29-Nov-10
3323	UHF TEM CELL, 100 MHz to 3000 MHz	TESCOM CO., LTD	TC-5060B	506039018 8	27-Aug-08	27-Aug-10
3818	PSA Series Spectrum Analyzer, 3 Hz- 44 GHz	Agilent Technologies	E4446A	MY482502 88	25-Sep-09	25-Sep-10

10 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Conducted carrier power at RF antenna connector	Below 12.4 GHz: ± 1.7 dB 12.4 GHz to 40 GHz: ± 2.3 dB
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Occupied bandwidth	± 8.0 %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %
Conducted emissions with LISN	9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 3 m measuring distance Horizontal polarization Vertical polarization	Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB

Hermon Laboratories is accredited by A2LA for calibration according to present requirements of ISO/IEC 17025 and NCSL Z540-1. The accreditation is granted to perform calibration of parameters that are listed in the Scope of Hermon Laboratories Accreditation.

Hermon Laboratories calibrates its reference and transfer standards by calibration laboratories accredited to ISO/IEC 17025 by a mutually recognized Accreditation Body or by a recognized national metrology institute. All reference and transfer standards used in the calibration system are traceable to national or international standards.

In-house calibration of all test and measurement equipment is performed on a regular basis according to Hermon Laboratories calibration procedures, manufacturer calibration/verification procedures or procedures defined in the relevant standards. The Hermon Laboratories test and measurement equipment is calibrated within the tolerances specified by the manufacturers and/or by the relevant standards.

11 APPENDIX C Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental and telecommunication testing facility.

Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47), Registration Numbers 90624 for OATS and 90623 for the anechoic chamber; by Industry Canada for electromagnetic emissions (file numbers IC 2186A-1 for OATS, IC 2186A-2 for anechoic chamber, IC 2186A-3 for full-anechoic chamber for RE measurements above 1 GHz), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, G-27 for full-anechoic chamber for RE measurements above 1 GHz, C-845 for conducted emissions site, T-1606 for conducted emissions at telecommunication ports), has a status of a Telefication - Listed Testing Laboratory, Certificate No. L138/00. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing and environmental simulation (for exact scope please refer to Certificate No. 839.01).

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Person for contact: Mr. Alex Usoskin, CEO.

12 APPENDIX D Specification references

FCC 47CFR part 15: 2009	Radio Frequency Devices.
Public notice DA 00- 705: 2000	Filing and measurement guidelines for frequency hopping spread spectrum systems.
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
RSS-210 Issue 7: 2007	Low Power Licence- Exempt Radiocommunication Devices
ICES-003 Issue 4: 2004	Digital Apparatus
CAN/CSA-CEI/IEC CISPR 22: 2002	Information Technology Equipment- Radio Disturbance Characteristics- Limits and Methods of measurement

13 APPENDIX E Test equipment correction factors

Antenna factor
Active loop antenna
Model 6502, S/N 2857, HL 0446

Frequency, MHz	Magnetic antenna factor, dB	Electric antenna factor, dB
0.009	-32.8	18.7
0.010	-33.8	17.7
0.020	-38.3	13.2
0.050	-41.1	10.4
0.075	-41.3	10.2
0.100	-41.6	9.9
0.150	-41.7	9.8
0.250	-41.6	9.9
0.500	-41.8	9.8
0.750	-41.9	9.7
1.000	-41.4	10.1
2.000	-41.5	10.0
3.000	-41.4	10.2
4.000	-41.4	10.1
5.000	-41.5	10.1
10.000	-41.9	9.6
15.000	-41.9	9.6
20.000	-42.2	9.3
25.000	-42.8	8.7
30.000	-44.0	7.5

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μ V) to convert it into field intensity in dB(μ V/m).

Antenna factor
Biconilog antenna EMCO Model 3141
Ser.No.1011, HL 0604

Frequency, MHz	Antenna Factor, dB(1/m)	Frequency, MHz	Antenna Factor, dB(1/m)
26	7.8	940	24.0
28	7.8	960	24.1
30	7.8	980	24.5
40	7.2	1000	24.9
60	7.1	1020	25.0
70	8.5	1040	25.2
80	9.4	1060	25.4
90	9.8	1080	25.6
100	9.7	1100	25.7
110	9.3	1120	26.0
120	8.8	1140	26.4
130	8.7	1160	27.0
140	9.2	1180	27.0
150	9.8	1200	26.7
160	10.2	1220	26.5
170	10.4	1240	26.5
180	10.4	1260	26.5
190	10.3	1280	26.6
200	10.6	1300	27.0
220	11.6	1320	27.8
240	12.4	1340	28.3
260	12.8	1360	28.2
280	13.7	1380	27.9
300	14.7	1400	27.9
320	15.2	1420	27.9
340	15.4	1440	27.8
360	16.1	1460	27.8
380	16.4	1480	28.0
400	16.6	1500	28.5
420	16.7	1520	28.9
440	17.0	1540	29.6
460	17.7	1560	29.8
480	18.1	1580	29.6
500	18.5	1600	29.5
520	19.1	1620	29.3
540	19.5	1640	29.2
560	19.8	1660	29.4
580	20.6	1680	29.6
600	21.3	1700	29.8
620	21.5	1720	30.3
640	21.2	1740	30.8
660	21.4	1760	31.1
680	21.9	1780	31.0
700	22.2	1800	30.9
720	22.2	1820	30.7
740	22.1	1840	30.6
760	22.3	1860	30.6
780	22.6	1880	30.6
800	22.7	1900	30.6
820	22.9	1920	30.7
840	23.1	1940	30.9
860	23.4	1960	31.2
880	23.8	1980	31.6
900	24.1	2000	32.0
920	24.1		

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μ V) to convert it into field intensity in dB(μ V/m).

Antenna factor
Double-ridged wave guide horn antenna
Model 3115, S/N 9911-5964, HL1984

Frequency, MHz	Antenna factor, dB(1/m)
1000.0	24.7
1500.0	25.7
2000.0	27.6
2500.0	28.9
3000.0	31.2
3500.0	32.0
4000.0	32.5
4500.0	32.7
5000.0	33.6
5500.0	35.1
6000.0	35.4
6500.0	34.9
7000.0	36.1
7500.0	37.8
8000.0	38.0
8500.0	38.1
9000.0	39.1
9500.0	38.3
10000.0	38.6
10500.0	38.2
11000.0	38.7
11500.0	39.5
12000.0	40.0
12500.0	40.4
13000.0	40.5
13500.0	41.1
14000.0	41.6
14500.0	41.7
15000.0	38.7
15500.0	38.2
16000.0	38.8
16500.0	40.5
17000.0	42.5
17500.0	45.9
18000.0	49.4

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μ V) to convert it into field intensity in dB(μ V/m).

Cable loss
Cable coaxial, Huber-Suhner, 18 GHz, 6.4 m, SMA - SMA, model 198-8155-00,
HL 2871

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.12	5750	2.34	12000	3.55
30	0.14	6000	2.39	12250	3.61
100	0.27	6250	2.46	12500	3.67
250	0.45	6500	2.52	12750	3.74
500	0.63	6750	2.58	13000	3.79
750	0.76	7000	2.64	13250	3.82
1000	0.89	7250	2.68	13500	3.83
1250	1.01	7500	2.73	13750	3.83
1500	1.12	7750	2.78	14000	3.88
1750	1.23	8000	2.83	14250	3.93
2000	1.32	8250	2.88	14500	3.96
2250	1.41	8500	2.94	14750	4.01
2500	1.49	8750	2.97	15000	4.00
2750	1.58	9000	3.02	15250	4.01
3000	1.66	9250	3.07	15500	4.00
3250	1.73	9500	3.13	15750	4.13
3500	1.80	9750	3.18	16000	4.22
3750	1.87	10000	3.21	16250	4.29
4000	1.93	10250	3.26	16500	4.29
4250	2.01	10500	3.30	16750	4.32
4500	2.06	10750	3.36	17000	4.37
4750	2.12	11000	3.39	17250	4.45
5000	2.17	11250	3.44	17500	4.49
5250	2.24	11500	3.48	17750	4.53
5500	2.29	11750	3.52	18000	4.55

Cable loss
Cable coaxial, Bird, 18 GHz, N-type, M-F, model TC-MNFN-3.0, S/N 211539 003
HL 2883

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.06	5750	1.70	12000	2.46
30	0.12	6000	1.75	12250	2.48
100	0.21	6250	1.80	12500	2.52
250	0.34	6500	1.81	12750	2.50
500	0.47	6750	1.86	13000	2.54
750	0.59	7000	1.86	13250	2.48
1000	0.67	7250	1.92	13500	2.63
1250	0.76	7500	1.96	13750	2.65
1500	0.84	7750	1.98	14000	2.72
1750	0.92	8000	2.02	14250	2.67
2000	0.98	8250	2.03	14500	2.70
2250	1.05	8500	2.05	14750	2.72
2500	1.12	8750	2.11	15000	2.79
2750	1.17	9000	2.17	15250	2.80
3000	1.22	9250	2.17	15500	2.83
3250	1.27	9500	2.20	15750	2.75
3500	1.33	9750	2.19	16000	2.82
3750	1.38	10000	2.22	16250	2.85
4000	1.42	10250	2.25	16500	2.90
4250	1.46	10500	2.30	16750	2.89
4500	1.51	10750	2.28	17000	2.88
4750	1.54	11000	2.32	17250	2.85
5000	1.59	11250	2.34	17500	2.96
5250	1.62	11500	2.39	17750	3.04
5500	1.65	11750	2.42	18000	3.04

Cable loss
Cable coaxial, Gore, 18 GHz, 1.2 m, SMA-SMA, S/N 10020014
HL 2952

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.03	5750	0.97	12000	1.50
30	0.05	6000	1.01	12250	1.45
100	0.11	6250	1.03	12500	1.48
250	0.19	6500	1.06	12750	1.57
500	0.26	6750	1.08	13000	1.51
750	0.32	7000	1.10	13250	1.64
1000	0.38	7250	1.13	13500	1.60
1250	0.43	7500	1.13	13750	1.63
1500	0.47	7750	1.21	14000	1.59
1750	0.53	8000	1.20	14250	1.66
2000	0.55	8250	1.24	14500	1.60
2250	0.59	8500	1.29	14750	1.65
2500	0.63	8750	1.23	15000	1.72
2750	0.66	9000	1.27	15250	1.68
3000	0.69	9250	1.27	15500	1.73
3250	0.72	9500	1.29	15750	1.70
3500	0.75	9750	1.30	16000	1.82
3750	0.78	10000	1.38	16250	1.79
4000	0.82	10250	1.44	16500	1.81
4250	0.84	10500	1.47	16750	1.91
4500	0.86	10750	1.45	17000	1.92
4750	0.90	11000	1.50	17250	1.98
5000	0.91	11250	1.46	17500	2.05
5250	0.94	11500	1.47	17750	2.04
5500	0.96	11750	1.44	18000	2.05

14 APPENDIX F Abbreviations and acronyms

A	ampere
AC	alternating current
AM	amplitude modulation
AVRG	average (detector)
BB	broad band
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μV)	decibel referred to one microvolt
dB(μV/m)	decibel referred to one microvolt per meter
dB(μA)	decibel referred to one microampere
DC	direct current
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
k	kilo
kHz	kilohertz
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μs	microsecond
NA	not applicable
NB	narrow band
OATS	open area test site
Ω	Ohm
PM	pulse modulation
ppm	part per million (10 ⁻⁶)
QP	quasi-peak
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt
VA	volt-ampere
WB	wideband

END OF DOCUMENT