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TEST REPORT

ACCORDING TO: FCC 47CFR part 15 subpart C § 15.247 (FHSS), subpart B and
RSS-210, Issue 7, Annex 8

FOR:

Motorola Israel Ltd.

APX6000 Rugged two way radio

Models: H98QDH9PW7AN,

H98QDF9PW6AN,

H98QDD9PW5AN

FCC ID:AZ489FT4892

IC:109U-89FT4892

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1 Applicant information

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Contact name: Mr. Babeladze Alex

2 Equipment under test attributes

Product name: APX6000 Rugged two way radio
Product type: Transceiver
Model(s): H98QDH9PW7AN
Serial number: CAI10078KK (radiated emission test), CAI1007BLL (conducted tests)
Hardware version: P2
Software release: R2
Receipt date: 10/14/2010

3 Manufacturer information

Manufacturer name: Motorola Israel Ltd.
Address: 3 Kremenetski street, P.O.B. 25016, Tel Aviv 67899, Israel
Telephone: +972 3565 9674
Fax: +972 3565 9968
E-Mail: eli.borokh@motorola.com
Contact name: Mr. Eli Borokhovich

4 Test details

Project ID: 21300
Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 10/18/2010
Test completed: 10/28/2010
Test specification(s): FCC 47CFR part 15, subpart C, §15.247 (FHSS) and subpart B class B
RSS-210 Issue 7:2007, Annex 8

5 Tests summary

Test	Status
Transmitter characteristics	
FCC section 15.247(a)1 / RSS-210 section A8.1(a), 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	Pass, done by Motorola lab.
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 15.247(d) / RSS-210 section A8.5, Conducted 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	Pass
RSS-Gen, Section 4.6.1, 99% emission occupied bandwidth	Measured
Unintentional emissions	
FCC section 15.107 / RSS-Gen, Section 7.2.2, Class B, Conducted emission at AC power port	Pass
FCC section 15.109 / RSS-Gen, Section 7.2.3.2, Class B, Radiated emission	Pass
RSS-Gen, Section 7.2.3.1, Conducted emission at receiver antenna port	Pass

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

This test report replaces the previously issued test report identified by Doc ID:MOTRAD_FCC.21300.

	Name and Title	Date	Signature
Tested by:	Mr. E. Plotnichenko, test engineer	October 28, 2010	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	October 31, 2010	
Approved by:	Mr. M. Nikishin, EMC and radio group manager	November 25, 2010	



6 EUT description

6.1 General information

The EUT is a rugged two way radio with C4FM module operating in 380-470 MHz and bluetooth transceiver operating in 2.4 GHz band.

6.2 EUT modules and sub-assemblies

Description	Manufacturer	Model or P/N	Hardware rev.	Serial number
Rugged radio	Motorola	APX-6000	P2	CAI10078KK, CAI1007BLL
Lithium battery	Motorola	NNTN7038A	NA	50000053E7EF
Battery charger	Motorola	Impress adaptive charger	V3.90	9138MTO02
Charger's AC/DC power supply	Motorola	NU20-C140150-I3	NA	2571886T01

6.3 Ports and lines

Port type	Port description	Connected from	Connected to	Qty.	Cable type	Cable length, m
Power	AC Power	AC mains	AC/DC adaptor	1	Unshielded	1.5
Power	DC Power	AC/DC adaptor	Charger	1	Unshielded	2.5
Control	USB interface	Radio	Laptop	1	Shielded	1.2
Power	AC Power	AC mains	Laptop's AC/DC adaptor	1	Unshielded	0.9
Power	DC Power	Laptop	Laptop's AC/DC adaptor	1	Unshielded	2.0

6.4 Support and test equipment

Description	Manufacturer	Model number	Serial number
Laptop	Dell	Inspiron 6400	nf208 a01
AC/DC adaptor for laptop	Dell	LA65NS0-00	CN-ODF263-71615-79F-E85D

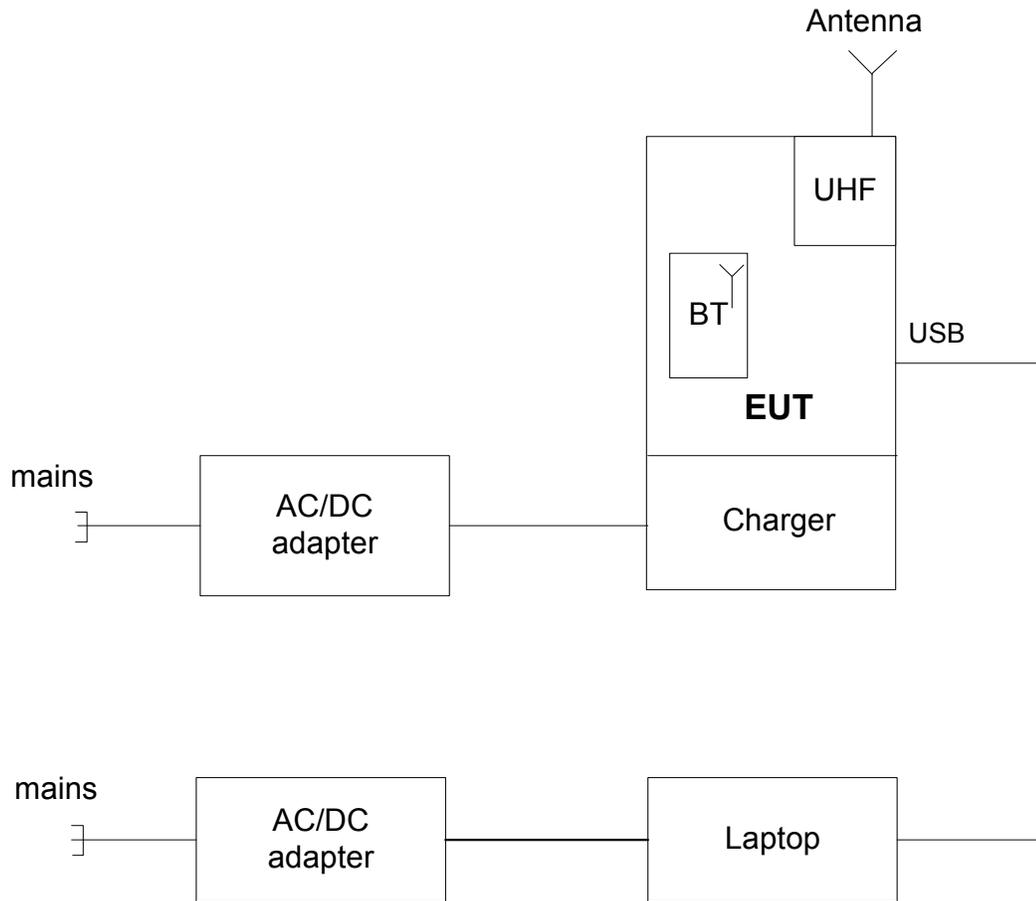
6.5 Operating frequencies

Source	Frequency, MHz		
Tx BT	2402	2440	2479, 2480
Tx UHF	380	436	470

6.6 Changes made in the EUT

No changes were implemented in the EUT.

6.7 Test configuration



6.8 Transmitter characteristics of Bluetooth transceiver

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	
Maximum rated output power		At transmitter 50 Ω RF output connector	7.25 dBm
		Effective radiated power (for equipment with no RF connector)	NA
Is transmitter output power variable?		X	No
			Yes
			continuous variable
			stepped variable with stepsize
	minimum RF power	dBm	
	maximum RF power	dBm	
Antenna connection			
	unique coupling	standard connector	X integral
			X with temporary RF connector
			without temporary RF connector
Transmitter aggregate data rate/s		The BT device is compliant with the Bluetooth Specification 1.1, 1.2, 2.0, and 2.1 (including EDR 2 or 3 Mbps)	
Transmitter aggregate symbol (baud) rate/s		As above	
Type of modulation		DPSK, GFSK	
Modulating test signal (baseband)		PRBS	
Transmitter duty cycle supplied for test		100%	
Transmitter power source			
X	Battery	Nominal rated voltage	7.5 V internal battery, model NNTN7038A
	DC	Nominal rated voltage	VDC
	AC mains	Nominal rated voltage	VAC Frequency
Common power source for transmitter and receiver		X	yes no
Spread spectrum technique used		X	Frequency hopping (FHSS)
			Digital transmission system (DTS)
			Hybrid
Spread spectrum parameters for transmitters tested per FCC 15.247 only			
FHSS	Total number of hops	79	
	Bandwidth per hop	1337 kHz	
	Max. separation of hops	1005 kHz	

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:	10/28/2010		
Temperature: 24°C	Air Pressure: 1013 hPa	Relative Humidity: 44 %	Power Supply: 120 VAC
Remarks:			

7 Transmitter tests according to 47CFR part 15 subpart C and RSS-210 Annex 8 requirements

7.1 20 dB bandwidth

7.1.1 General

This test was performed to measure 20 dB bandwidth of the transmitter hopping channel. Specification test limits are given in Table 7.1.1.

Table 7.1.1 The 20 dB bandwidth limits

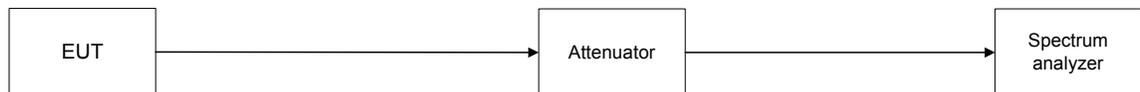
Assigned frequency, MHz	Maximum bandwidth, kHz	Modulation envelope reference points*, dBc
902.0 – 928.0	500	20
2400.0 – 2483.5	NA	
5725.0 – 5850.0	1000	

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

7.1.2 Test procedure

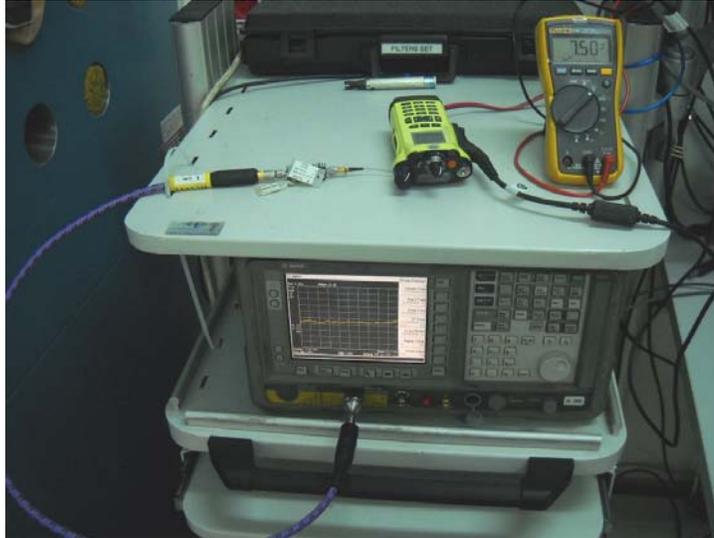
- 7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.
- 7.1.2.2 The EUT was set to transmit modulated carrier at maximum data rate.
- 7.1.2.3 The transmitter bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope and provided in Table 7.1.2 and the associated plots.
- 7.1.2.4 The test was repeated for each data rate and each modulation format.

Figure 7.1.1 The occupied bandwidth test setup



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:	10/28/2010		
Temperature: 24°C	Air Pressure: 1013 hPa	Relative Humidity: 44 %	Power Supply: 120 VAC
Remarks:			

Photograph 7.1.1 The occupied bandwidth test setup





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:	10/28/2010		
Temperature: 24°C	Air Pressure: 1013 hPa	Relative Humidity: 44 %	Power Supply: 120 VAC
Remarks:			

Table 7.1.2 The 20 dB bandwidth test results

OPERATING FREQUENCY RANGE: 2402.0 – 2480.0 MHz
 DETECTOR USED: Peak
 SWEEP TIME: Auto
 RESOLUTION BANDWIDTH: ≥ 1% of the 20 dB bandwidth
 VIDEO BANDWIDTH: ≥ RBW
 MODULATION ENVELOPE REFERENCE POINTS: 20.0 dBc
 MODULATING SIGNAL: PRBS
 FREQUENCY HOPPING: Disabled

Carrier frequency, MHz	Type of modulation	Data rate, Mbps*	Symbol rate, Msymbols/s*	20 dBc bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
Low frequency							
2402.0	DPSK	See Note		1335.0	NA	NA	NA
	GFSK			915.6	NA	NA	NA
Mid frequency							
2440.0	DPSK	See Note		1337	NA	NA	NA
	GFSK			914.8	NA	NA	NA
High frequency							
2480.0	DPSK	See Note		1336	NA	NA	NA
	GFSK			907.0	NA	NA	NA

* Note: according to the manufacturer statement the BT device is compliant with the Bluetooth Specification 1.1, 1.2, 2.0, and 2.1 (including EDR 2 or 3 Mbps).

Reference numbers of test equipment used

HL 2909	HL 2951	HL 3440	HL 3784				
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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:	10/28/2010		
Temperature: 24°C	Air Pressure: 1013 hPa	Relative Humidity: 44 %	Power Supply: 120 VAC
Remarks:			

Table 7.1.3 The 99% power bandwidth test results

OPERATING FREQUENCY RANGE: 2402.0 – 2480.0 MHz
 DETECTOR USED: Peak
 SWEEP TIME: Auto
 RESOLUTION BANDWIDTH: ≥ 1% of the 99 dB bandwidth
 VIDEO BANDWIDTH: ≥ RBW
 MODULATION ENVELOPE REFERENCE POINTS: 99% power
 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
Low frequency							
2402.0	DPSK	See Note		1206.0	NA	NA	NA
	GFSK			873.2	NA	NA	NA
Mid frequency							
2440.0	DPSK	See Note		1209.6	NA	NA	NA
	GFSK			876.8	NA	NA	NA
High frequency							
2480.0	DPSK	See Note		1200.2	NA	NA	NA
	GFSK			881.0	NA	NA	NA

* Note: according to the manufacturer statement the BT device is compliant with the Bluetooth Specification 1.1, 1.2, 2.0, and 2.1 (including EDR 2 or 3 Mbps).

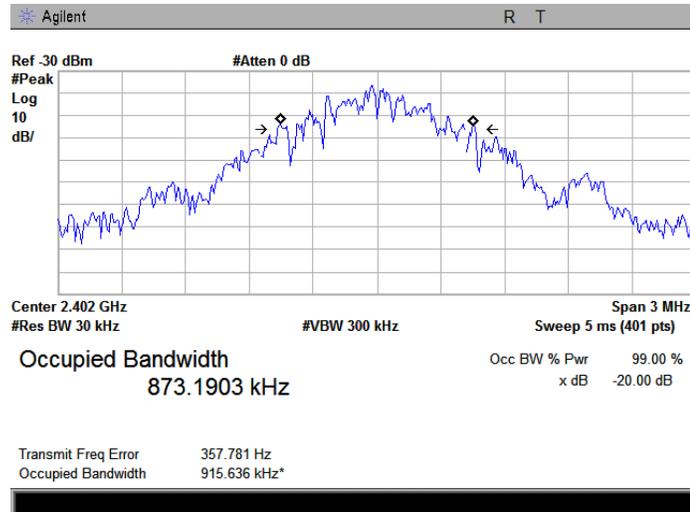
Reference numbers of test equipment used

HL 2909	HL 2951	HL 3440	HL 3784				
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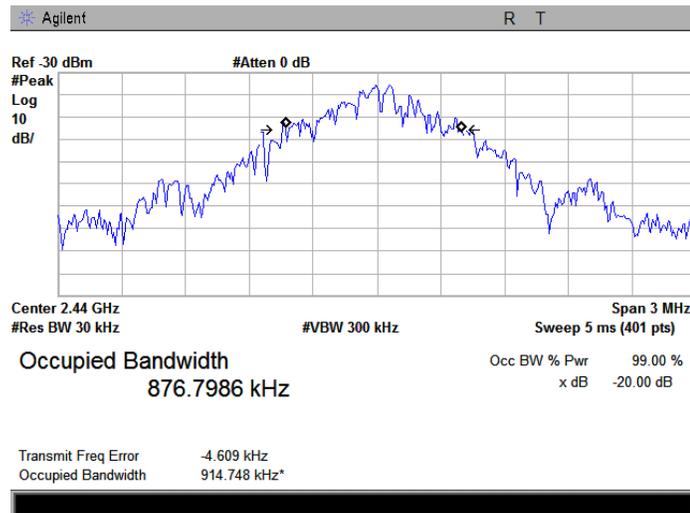
Full description is given in Appendix A.

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: 10/28/2010			
Temperature: 24°C	Air Pressure: 1013 hPa	Relative Humidity: 44 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.1 The 20 dB bandwidth test result at low frequency, GFSK

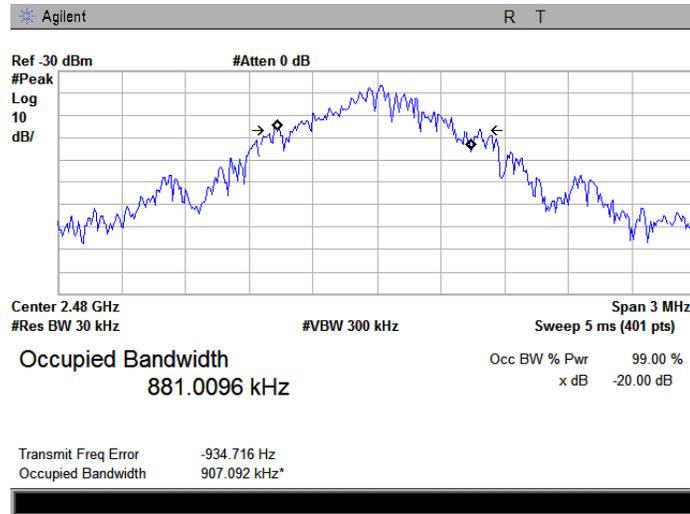


Plot 7.1.2 The 20 dB bandwidth test result at mid frequency, GFSK

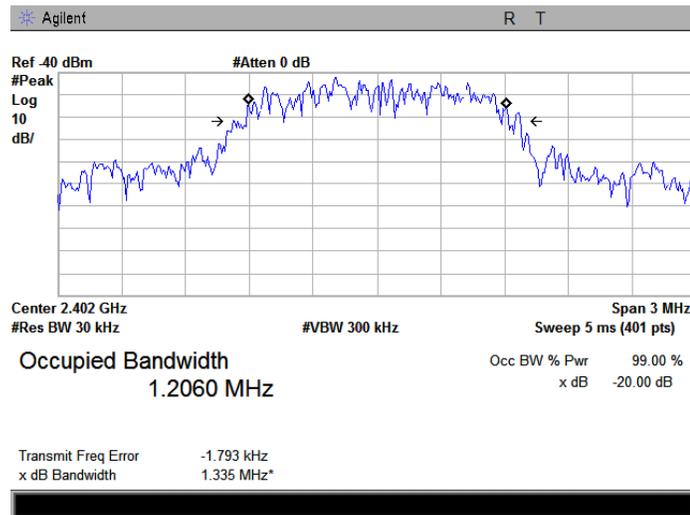


Test specification: Section 15.247(a)1/RSS-210, Section A8.1(a), 20 dB bandwidth			
Test procedure: Public notice DA 00-705			
Test mode: Compliance	Verdict: PASS		
Date: 10/28/2010			
Temperature: 24°C	Air Pressure: 1013 hPa	Relative Humidity: 44 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.3 The 20 dB bandwidth test result at high frequency, GFSK

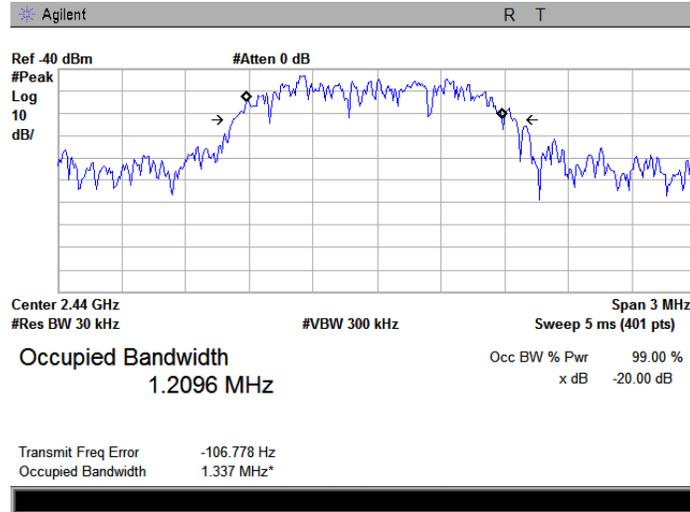


Plot 7.1.4 The 20 dB bandwidth test result at low frequency, DPSK

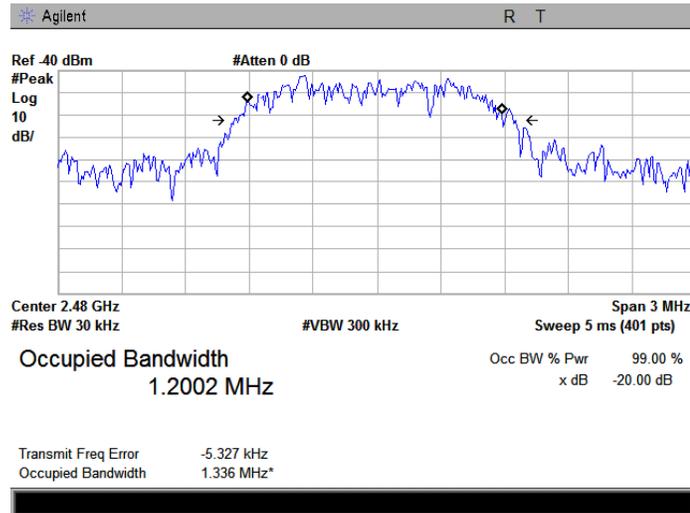


Test specification: Section 15.247(a)1/RSS-210, Section A8.1(a), 20 dB bandwidth			
Test procedure: Public notice DA 00-705			
Test mode: Compliance	Verdict: PASS		
Date: 10/28/2010			
Temperature: 24°C	Air Pressure: 1013 hPa	Relative Humidity: 44 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.5 The 20 dB bandwidth test result at mid frequency, DPSK



Plot 7.1.6 The 20 dB bandwidth test result at high frequency, DPSK



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:	10/21/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

7.2 Carrier frequency separation

7.2.1 General

This test was performed to measure frequency separation between the peaks of adjacent channels. Specification test limits are given in Table 7.2.1.

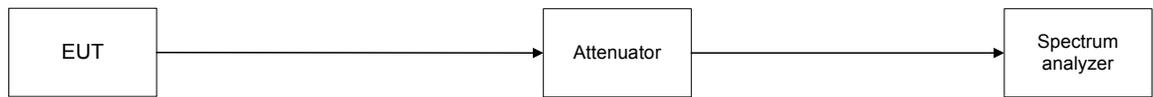
Table 7.2.1 Carrier frequency separation limits

Assigned frequency range, MHz	Carrier frequency separation
902.0 – 928.0	25 kHz or $\frac{2}{3}$ of 20 dB bandwidth of the hopping channel, whichever is greater
2400.0 – 2483.5	
5725.0 – 5850.0	

7.2.2 Test procedure

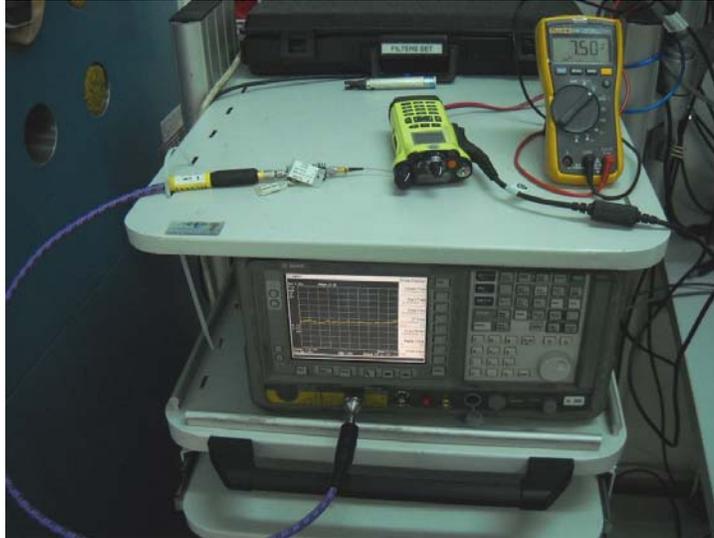
- 7.2.2.1 The EUT was set up as shown in Figure 7.2.1, energized with frequency hopping function enabled and its proper operation was checked.
- 7.2.2.2 The spectrum analyzer span was set to capture the carrier frequency and both of adjacent channels, the lower and the higher. The resolution bandwidth was set wider than 1 % of the frequency span.
- 7.2.2.3 The spectrum analyzer was set in max hold mode and allowed trace to stabilize.
- 7.2.2.4 The frequency separation between the peaks of adjacent channels was measured as provided in Table 7.2.2 and the associated plots.

Figure 7.2.1 Carrier frequency separation test setup



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:	10/21/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Photograph 7.2.1 Carrier frequency separation test setup



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:	10/21/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Table 7.2.2 Carrier frequency separation test results

OPERATING FREQUENCY RANGE: 2402.0 – 2480.0 MHz
 MODULATION: See Note
 MODULATING SIGNAL: PRBS
 BIT RATE: Mbps
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: ≥ 1% of the span
 VIDEO BANDWIDTH: ≥ RBW
 FREQUENCY HOPPING: Enabled
 20 dB BANDWIDTH: 914.8 kHz

Carrier frequency separation, kHz	Limit, kHz	Margin*	Verdict
1005.0	≥609.9	395.1	Pass

Note: according to the manufacturer statement the DH5 packet type with PN9 packet pattern modulation was used for the hopping test

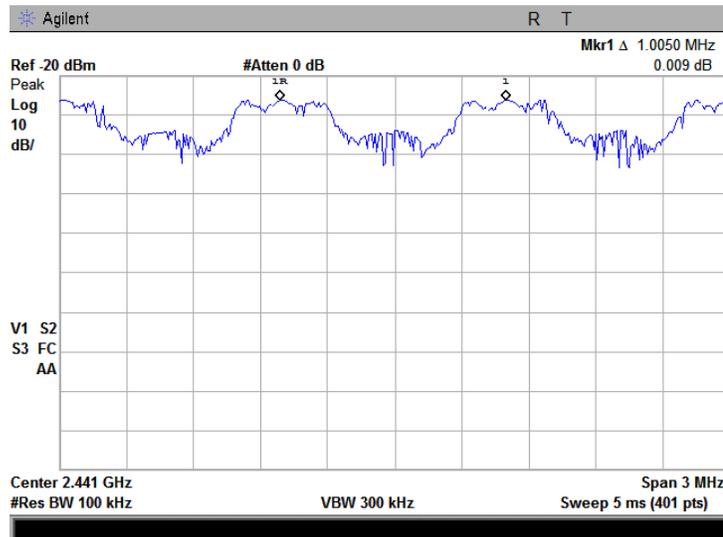
* - Margin = Carrier frequency separation – specification limit.

Reference numbers of test equipment used

HL 2909	HL 2951	HL 3440	HL 3784			
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Full description is given in Appendix A.

Plot 7.2.1 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:	10/21/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

7.3 Number of hopping frequencies

7.3.1 General

This test was performed to calculate the number of hopping frequencies used by the EUT. Specification test limits are given in Table 7.3.1.

Table 7.3.1 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 (minimum)
5725.0 – 5850.0	75

7.3.2 Test procedure

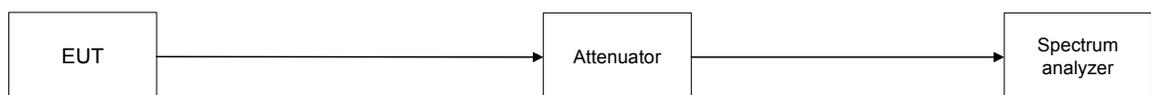
7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized with frequency hopping function enabled and its proper operation was checked.

7.3.2.2 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.

7.3.2.3 The spectrum analyzer was set in max hold mode and allowed trace to stabilize.

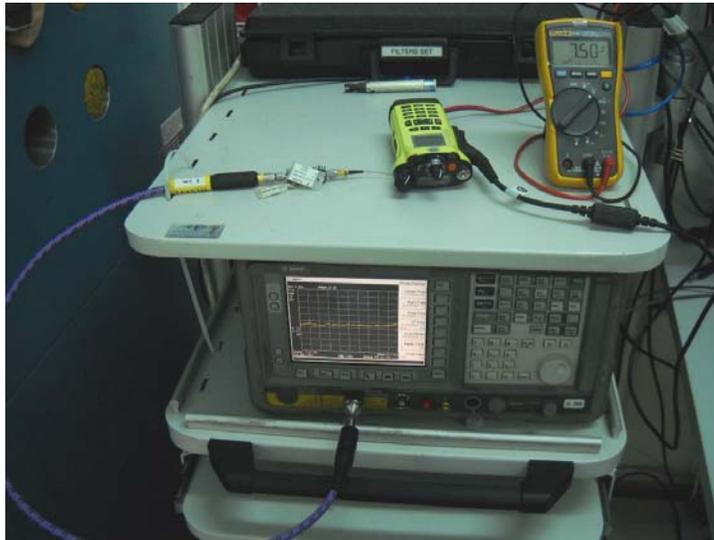
7.3.2.4 The number of frequency hopping channels was calculated as provided in Table 7.3.2 and the associated plots.

Figure 7.3.1 Hopping frequencies test setup



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:	10/21/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Photograph 7.3.1 Hopping frequencies test setup



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:	10/21/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Table 7.3.2 Hopping frequencies test results

OPERATING FREQUENCY RANGE: 2402.0 – 2480.0 MHz
 MODULATION: See Note
 MODULATING SIGNAL: PRBS
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: ≥ 1% of the span
 VIDEO BANDWIDTH: ≥ RBW
 FREQUENCY HOPPING: Enabled

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

Note: according to the manufacturer statement the DH5 packet type with PN9 packet pattern modulation was used for the hopping test

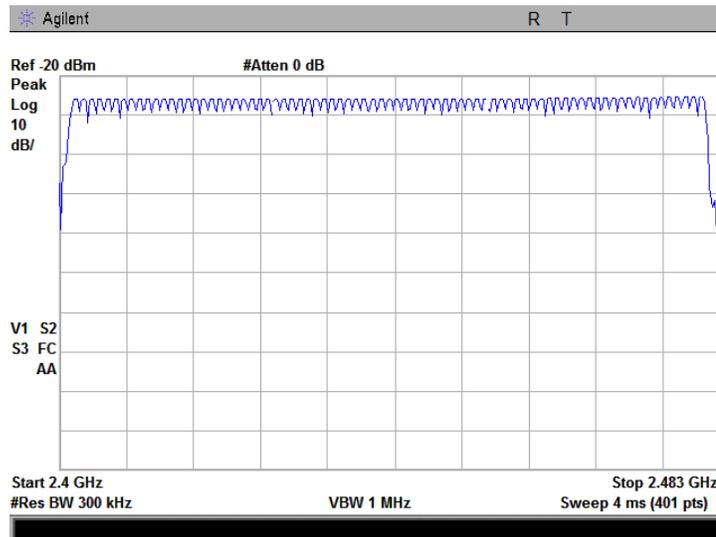
* - Margin = Number of hopping frequencies – Minimum number of hopping frequencies.

Reference numbers of test equipment used

HL 2909	HL 2951	HL 3440	HL 3874			
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Full description is given in Appendix A.

Plot 7.3.1 Number of hopping frequencies



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:	10/21/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

7.4 Average time of occupancy

7.4.1 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 7.4.1.

Table 7.4.1 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 × N	N (≥ 15)
5725.0 – 5850.0	0.4	30.0	≥ 75

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.

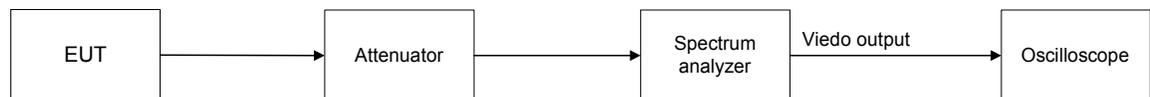
7.4.2.2 The spectrum analyzer span was set to zero centered on a hopping channel.

7.4.2.3 The single transmission duration and period were measured with oscilloscope.

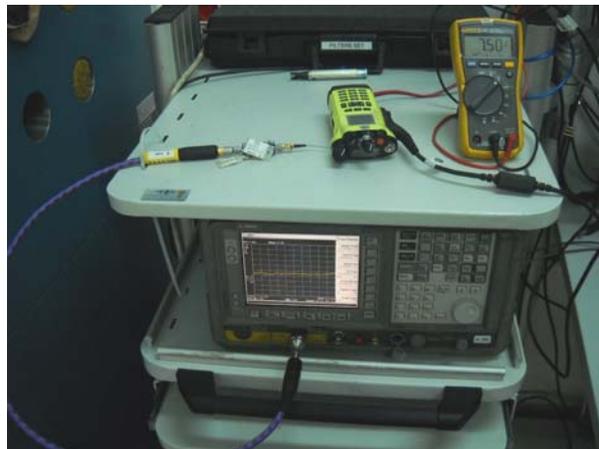
7.4.2.4 The average time of occupancy was calculated as the single transmission time multiplied by the investigated period and divided by the single transmission period.

7.4.2.5 The test was repeated at each data rate and modulation type as provided in Table 7.4.2 and the associated plots.

Figure 7.4.1 Average time of occupancy test setup



Photograph 7.4.1 Average time of occupancy test setup





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:	10/21/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Table 7.4.2 Average time of occupancy test results

OPERATING FREQUENCY RANGE: 2402.0 – 2480.0 MHz
 MODULATION: See Note
 MODULATING SIGNAL: PRBS
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 1 MHz
 VIDEO BANDWIDTH: 3 MHz
 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
2440.00	0.18075	8.75	8.26	See Note	See Note	400	-391.74	Pass

Note: according to the manufacturer statement the DH5 packet type with PN9 packet pattern modulation was used for the hopping test

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

** - Margin = Average time of occupancy – specification limit.
(0.18075 * 31600) / (17.5 * 79)

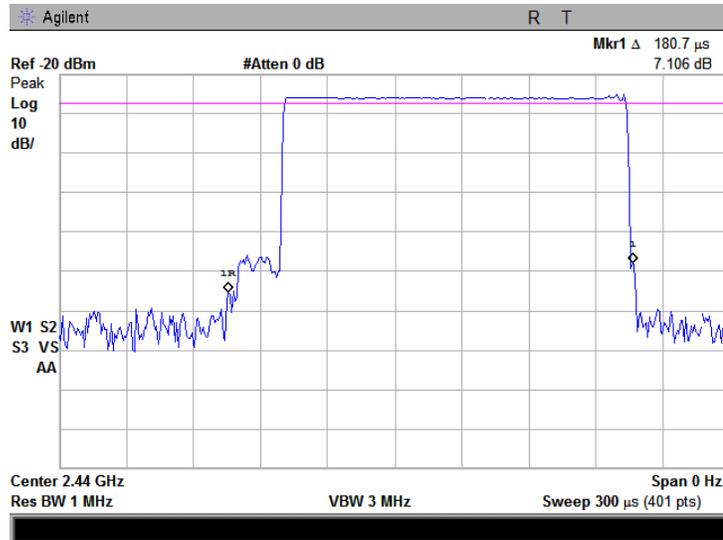
Reference numbers of test equipment used

HL 2909	HL 2951	HL 3440	HL 3874				
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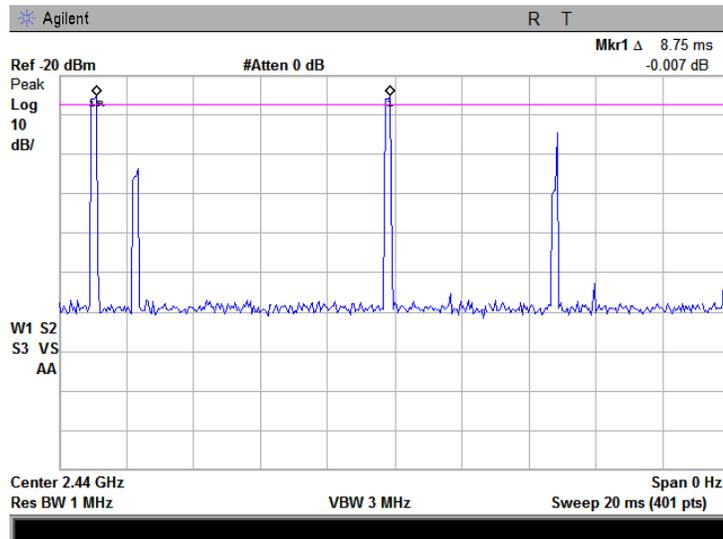
Full description is given in Appendix A.

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:	10/21/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.1 Single transmission duration



Plot 7.4.2 Single transmission period



NOTE: Low-amplitude signals relate to the adjacent channels

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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

7.5 Peak output power

7.5.1 General

This test was performed to measure the maximum peak output power at the transmitter RF antenna connector. Specification test limits are given in Table 7.5.1.

Table 7.5.1 Peak output power limits

Assigned frequency range, MHz	Peak output power*		Maximum antenna gain, dBi
	W	dBm	
902.0 – 928.0	0.125	21.0	6.0*
2400.0 – 2483.5	0.125 (<75 hopping channels)	21.0 (<75 hopping channels)	
	1.0 (≥75 hopping channels)	30.0 (≥75 hopping channels)	
5725.0 – 5850.0	1.0	30.0	

*- 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.

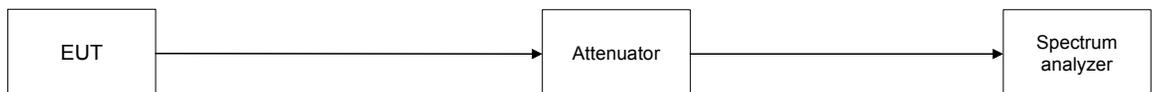
7.5.2 Test procedure

7.5.2.1 The EUT was set up as shown in Figure 7.5.1, energized and its proper operation was checked.

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

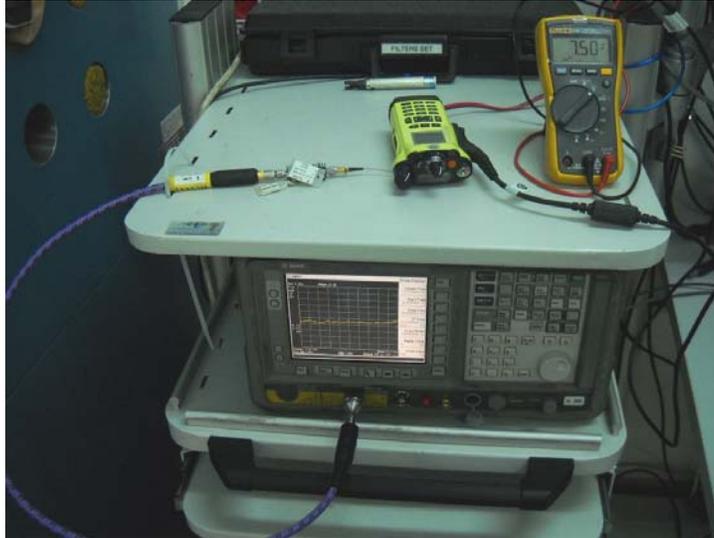
7.5.2.3 The frequency span of spectrum analyzer was set approximately 5 times wider than 20 dB bandwidth of the EUT and the resolution bandwidth was set wider than 20 dB bandwidth of the EUT. The spectrum analyzer trace was allowed to stabilize and the maximum peak output power was measured as provided in Table 7.5.2 and the associated plots.

Figure 7.5.1 Peak output power test setup



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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Photograph 7.5.1 Peak output power test setup





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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Table 7.5.2 Peak output power test results

OPERATING FREQUENCY RANGE: 2402.0 – 2480.0 MHz
 MODULATION: DPSK/GFSK
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 DETECTOR USED: Peak
 EUT 20 dB BANDWIDTH: 930 kHz (maximum)
 RESOLUTION BANDWIDTH: 1 MHz
 VIDEO BANDWIDTH: 3 MHz
 FREQUENCY HOPPING: Disabled
 NUMBER OF FREQUENCY HOPPING CHANNELS: 79

Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation, dB	Cable loss, dB	Peak output power, dBm	Limit, dBm	Margin*, dB	Verdict
GFSK modulation							
2402.0	6.615	Included	Included	6.615	30.0	-23.385	Pass
2440.0	6.381	Included	Included	6.381	30.0	-23.619	
2480.0	7.245	Included	Included	7.245	30.0	-22.755	
DPSK modulation							
2402.0	6.020	Included	Included	6.020	30.0	-23.980	Pass
2440.0	5.860	Included	Included	5.860	30.0	-24.140	
2480.0	6.789	Included	Included	6.789	30.0	-23.211	

* - Margin = Peak output power – specification limit.

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

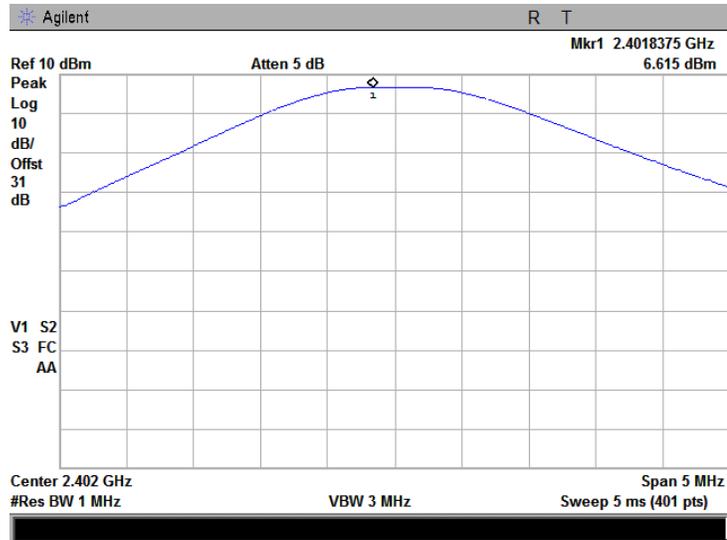
Reference numbers of test equipment used

HL 2909	HL 2951	HL 3440	HL 3874				
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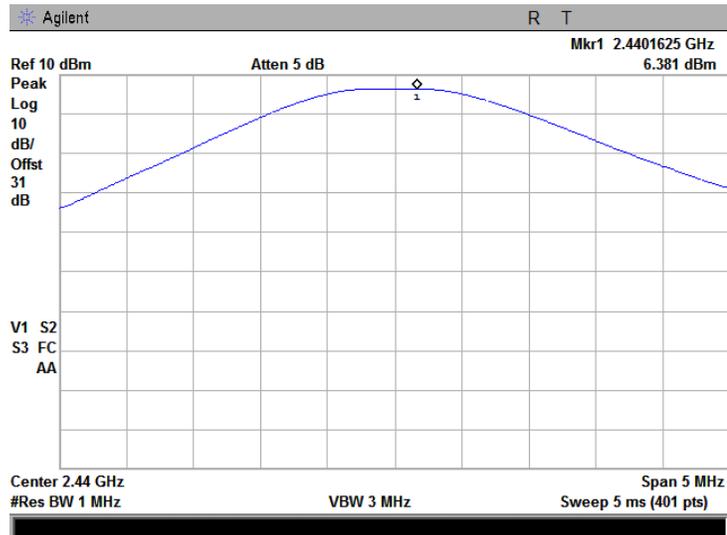
Full description is given in Appendix A.

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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.5.1 Peak output power at low frequency and Unom, GFSK

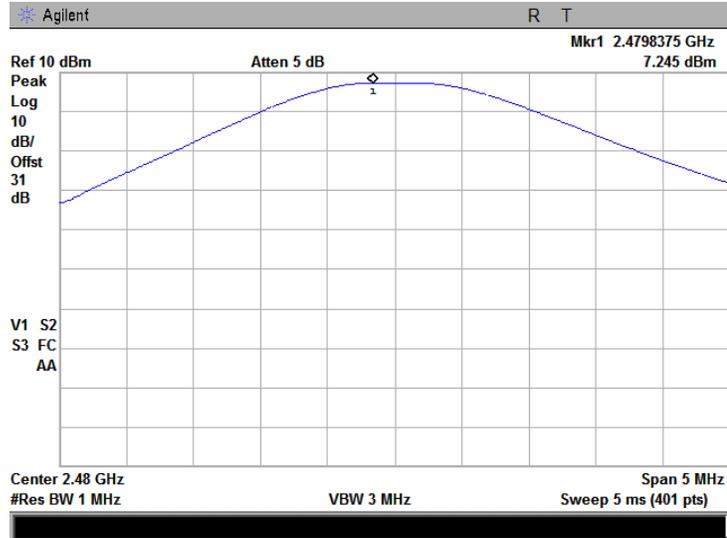


Plot 7.5.2 Peak output power at mid frequency and Unom, GFSK

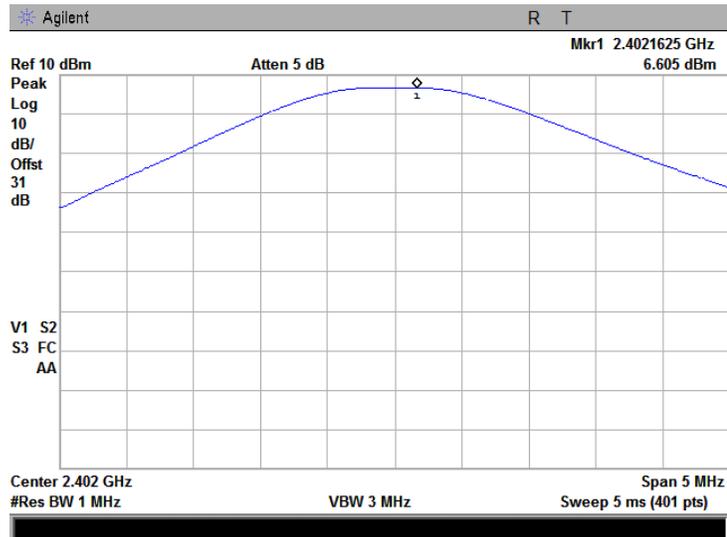


Test specification:	Section 15.247(b)/RSS-210, Section A8.4(2), Peak output power		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.5.3 Peak output power at high frequency and Unom, GFSK

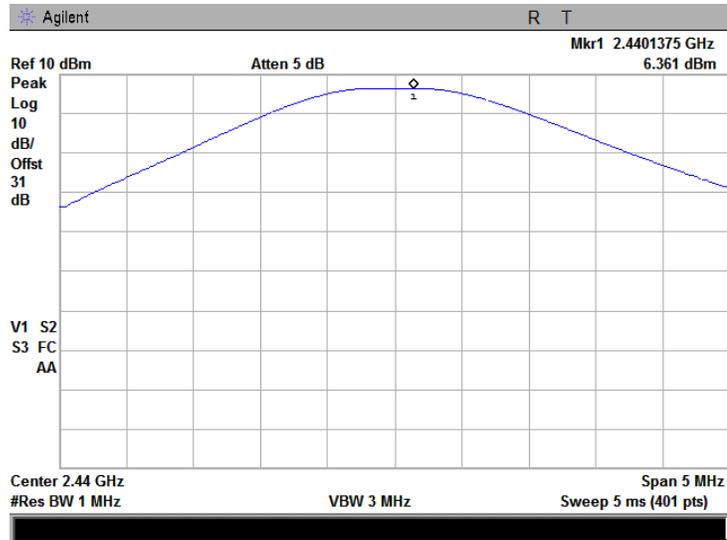


Plot 7.5.4 Peak output power at low frequency and 115%Unom, GFSK

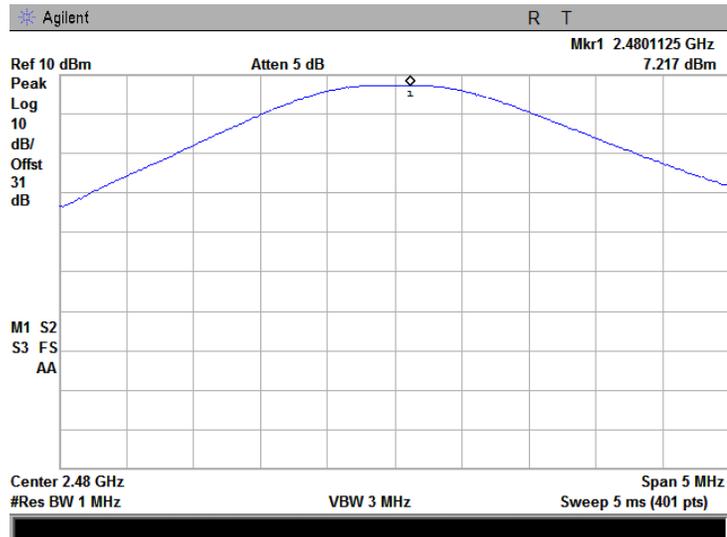


Test specification:	Section 15.247(b)/RSS-210, Section A8.4(2), Peak output power		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.5.5 Peak output power at mid frequency and 115%Unom, GFSK

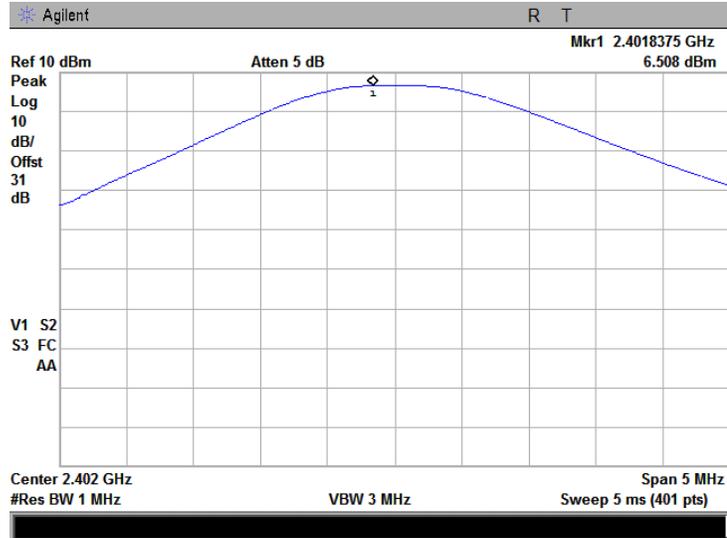


Plot 7.5.6 Peak output power at high frequency and 115%Unom

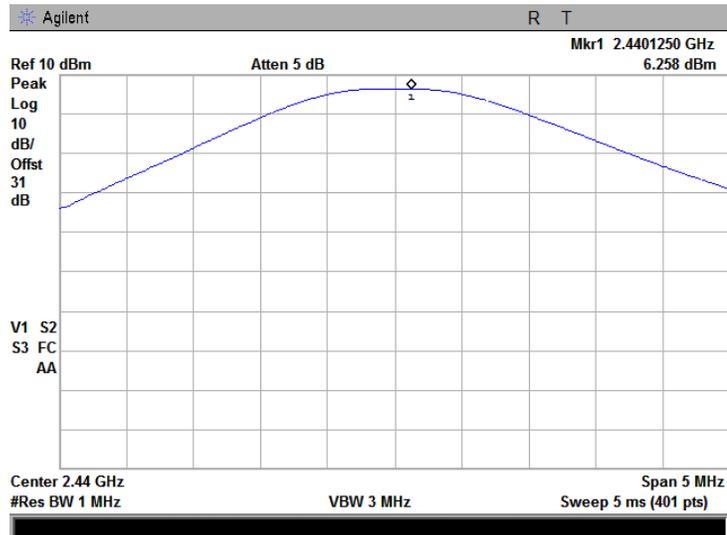


Test specification:	Section 15.247(b)/RSS-210, Section A8.4(2), Peak output power		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.5.7 Peak output power at low frequency and 85%Unom

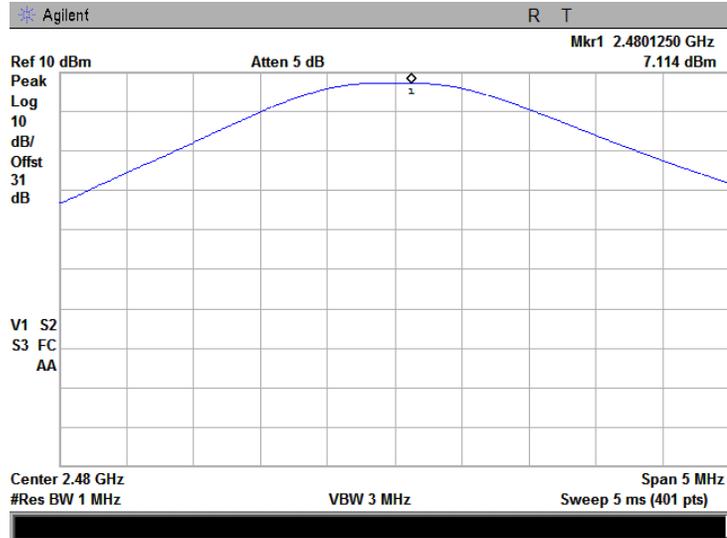


Plot 7.5.8 Peak output power at mid frequency and 85%Unom

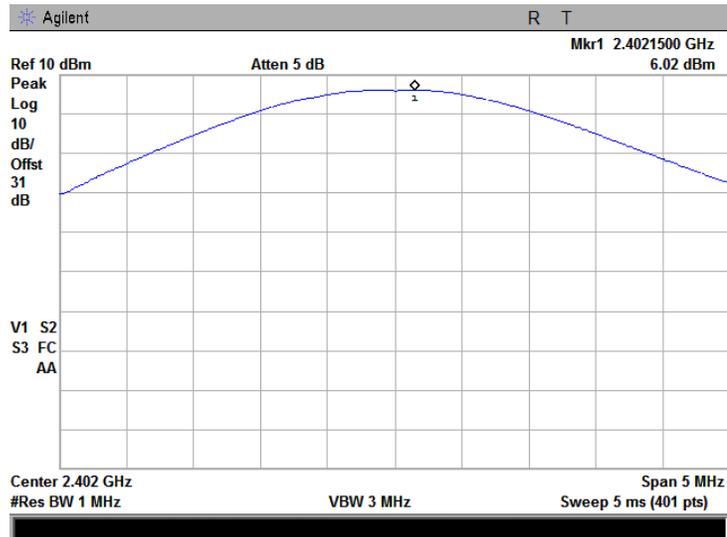


Test specification:	Section 15.247(b)/RSS-210, Section A8.4(2), Peak output power		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.5.9 Peak output power at high frequency and 85%Unom

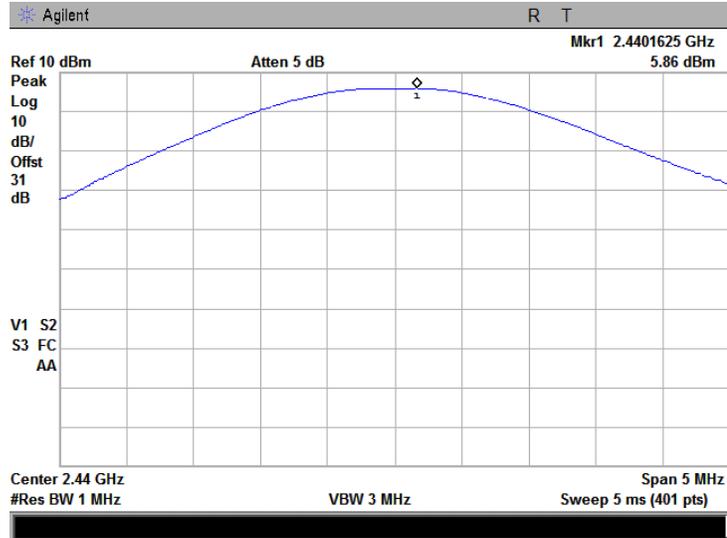


Plot 7.5.10 Peak output power at low frequency and Unom, DPSK

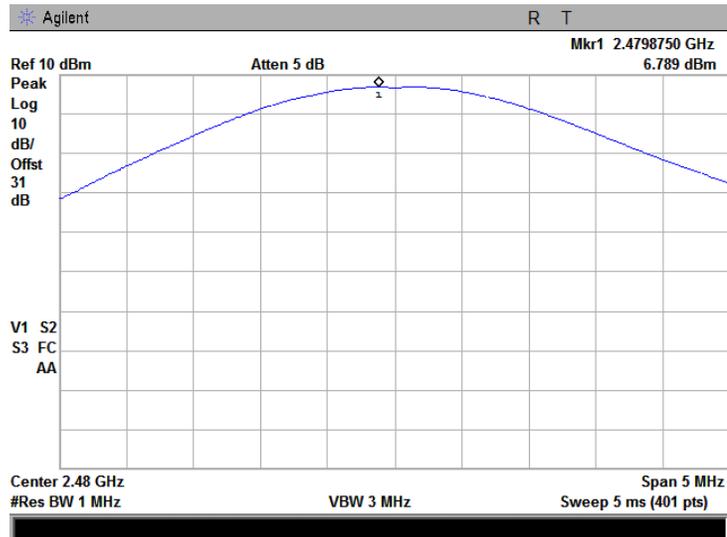


Test specification:	Section 15.247(b)/RSS-210, Section A8.4(2), Peak output power		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.5.11 Peak output power at mid frequency and Unom, DPSK

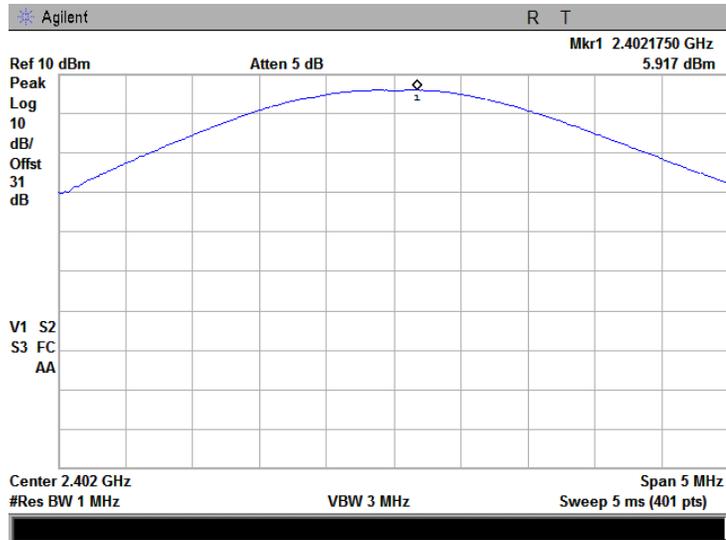


Plot 7.5.12 Peak output power at high frequency and Unom, DPSK

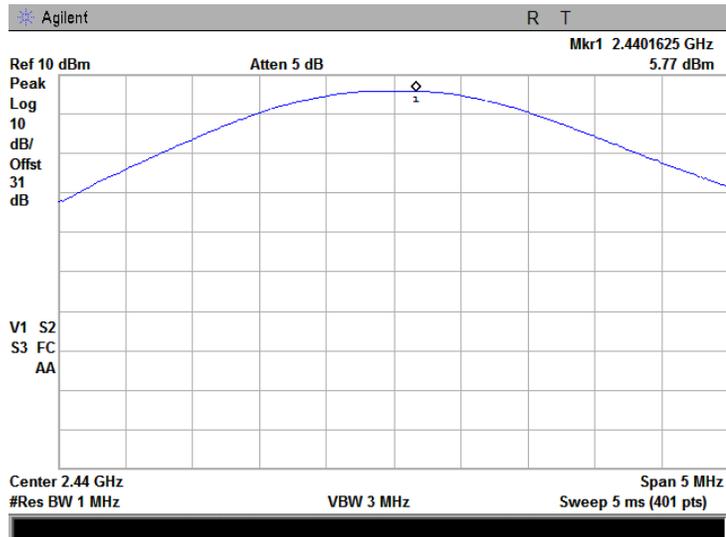


Test specification:	Section 15.247(b)/RSS-210, Section A8.4(2), Peak output power		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.5.13 Peak output power at low frequency and 115%Unom

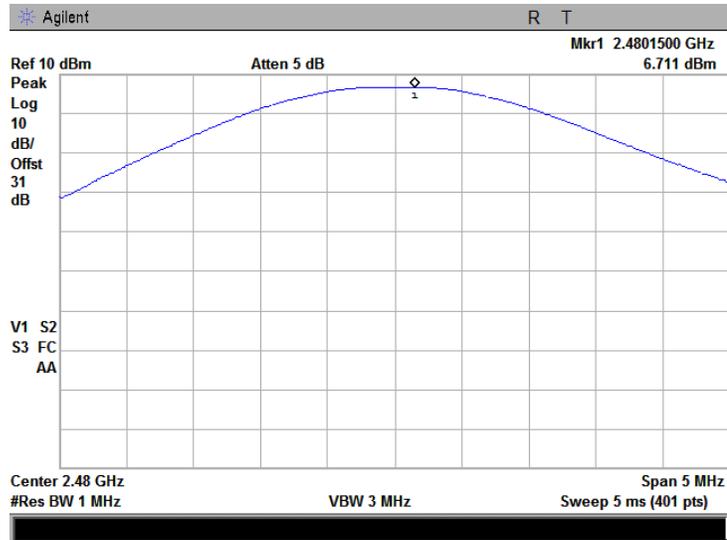


Plot 7.5.14 Peak output power at mid frequency and 115%Unom

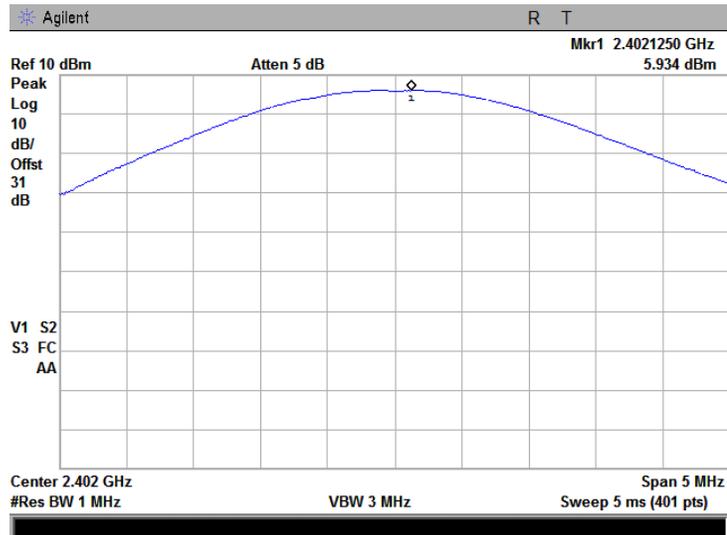


Test specification:	Section 15.247(b)/RSS-210, Section A8.4(2), Peak output power		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.5.15 Peak output power at high frequency and 115%Unom

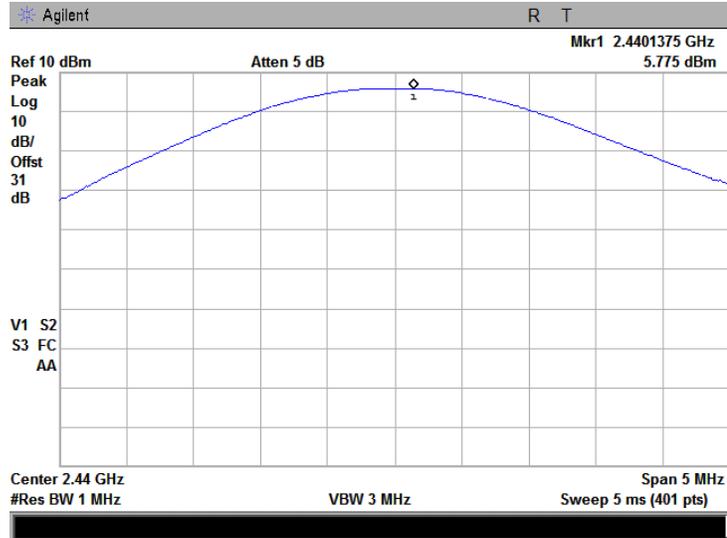


Plot 7.5.16 Peak output power at low frequency and 85%Unom

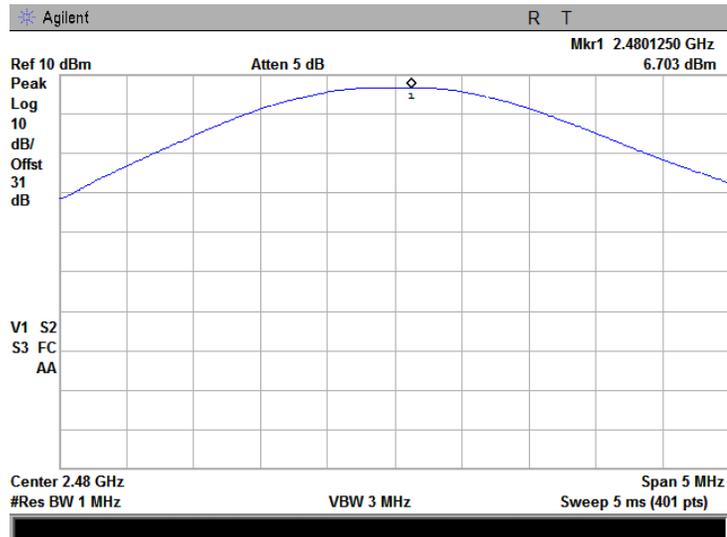


Test specification:	Section 15.247(b)/RSS-210, Section A8.4(2), Peak output power		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.5.17 Peak output power at mid frequency and 85%Unom



Plot 7.5.18 Peak output power at high frequency and 85%Unom



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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

7.6 Band edge emissions at RF antenna connector

7.6.1 General

This test was performed to measure band edge emissions at RF antenna connector. Specification test limits are given in Table 7.6.1.

Table 7.6.1 Band edge emission limits

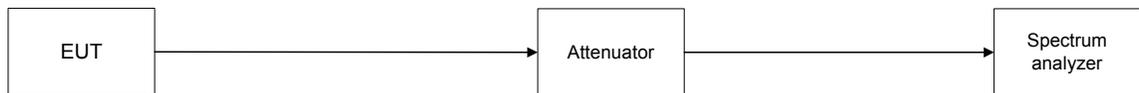
Assigned frequency, MHz	Attenuation below carrier*, dBc
902.0 – 928.0	20.0
2400.0 – 2483.5	
5725.0 – 5850.0	

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

7.6.2 Test procedure

- 7.6.2.1 The EUT was set up as shown in Figure 7.6.1, energized normally modulated at the maximum data rate with its hopping function disabled and its proper operation was checked.
- 7.6.2.2 The EUT was adjusted to produce maximum available to end user RF output power at the lowest carrier frequency.
- 7.6.2.3 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.
- 7.6.2.4 The spectrum analyzer was set in max hold mode and allowed trace to stabilize. The highest emission level within the authorized band was measured.
- 7.6.2.5 The maximum band edge emission and modulation product outside of the band were measured as provided in Table 7.6.2 and associated plots and referenced to the highest emission level measured within the authorized band.
- 7.6.2.6 The above procedure was repeated with the EUT adjusted to produce maximum RF output power at the highest carrier frequency.
- 7.6.2.7 The above procedure was repeated with the frequency hopping function enabled.

Figure 7.6.1 Band edge emission test setup

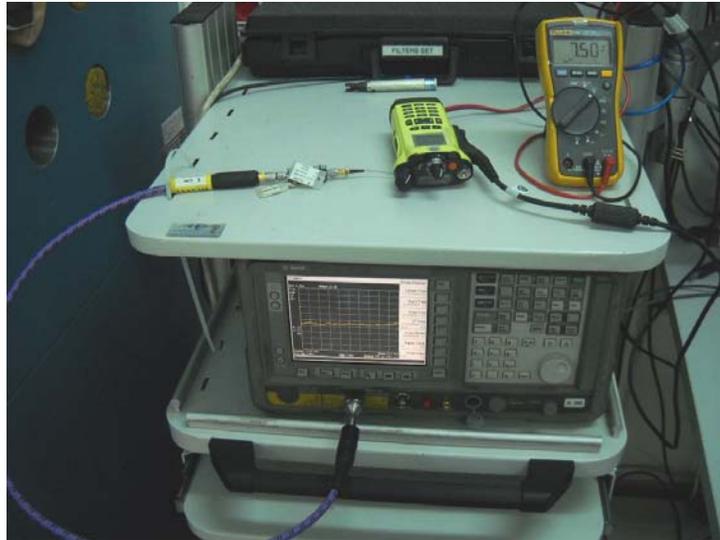




HERMON LABORATORIES

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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Photograph 7.6.1 Band edge emission test setup





HERMON LABORATORIES

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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Table 7.6.2 Band edge emission test results

OPERATING FREQUENCY RANGE: 2402.0 – 2480.0 MHz
DETECTOR USED: Peak
MODULATION: DPSK/GFSK
MODULATING SIGNAL: PRBS
BIT RATE: Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
TRANSMITTER OUTPUT POWER: 7.342 dBm at low carrier frequency
8.018 dBm at high carrier frequency
RESOLUTION BANDWIDTH: ≥ 1% of the span
VIDEO BANDWIDTH: ≥ RBW

Frequency, MHz	Band edge emission, dBm	Emission at carrier, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
Frequency hopping disabled						
GFSK modulation						
2400.0	-50.97	5.29	56.26	20.0	36.26	Pass
2483.5	-49.96	6.66	56.62		36.62	
DPSK modulation						
2400.0	-44.81	3.12	47.93	20.0	27.93	Pass
2483.5	-48.73	3.61	52.34		32.34	
Frequency hopping enabled**						
2400.0	-26.37	4.60	30.97	20.0	10.97	Pass
2483.5	-46.14	5.20	51.34		31.34	

*- Margin = Attenuation below carrier – specification limit.

**Note: according to the manufacturer statement the DH5 packet type with PN9 packet pattern modulation was used for the hopping test

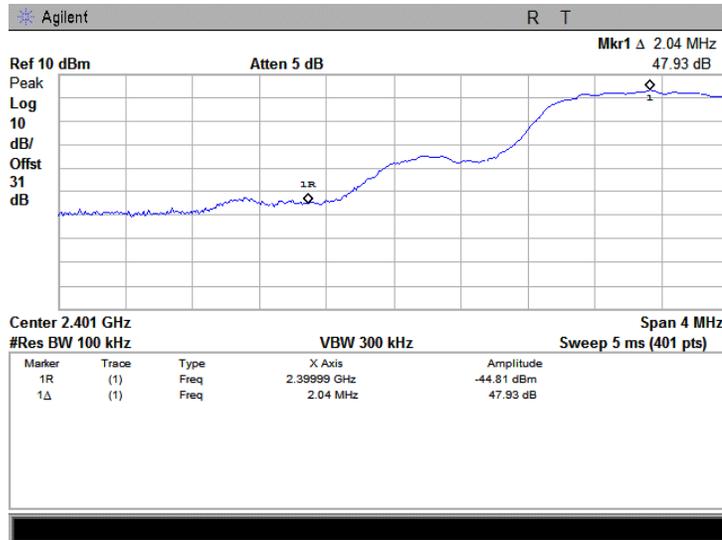
Reference numbers of test equipment used

HL 2909	HL 2951	HL 3440	HL 3874			
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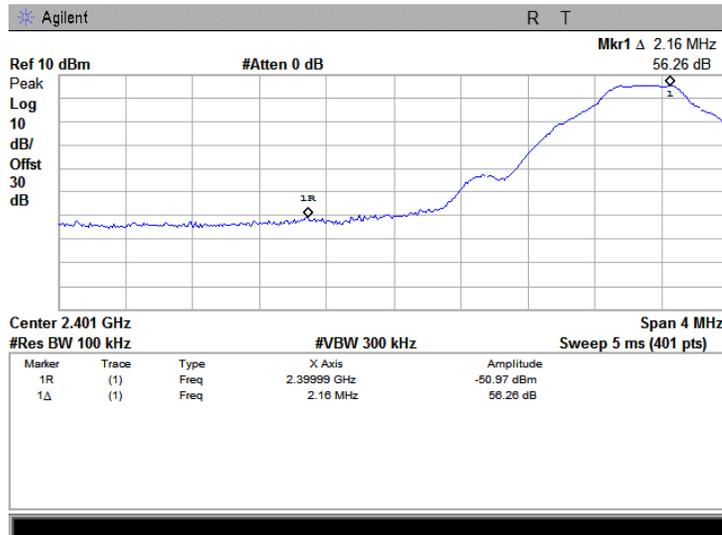
Full description is given in Appendix A.

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: 10/26/2010			
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.6.1 The highest band edge emission at low carrier frequency with hopping function disabled, DPSK

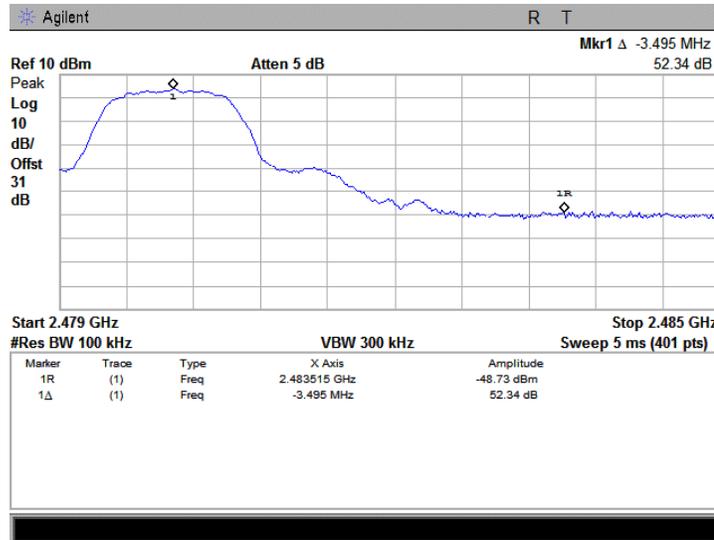


Plot 7.6.2 The highest band edge emission at low carrier frequency with hopping function disabled, GFSK

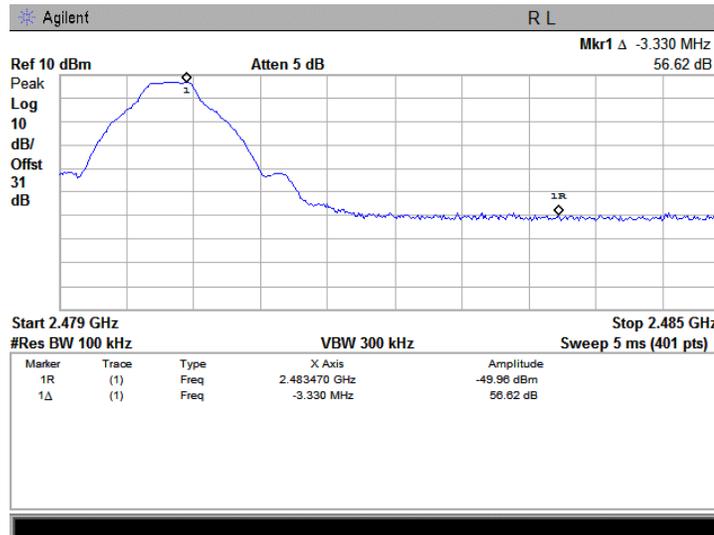


Test specification: Section 15.247(d)/RSS-210, Section A8.5, Emissions at band edges			
Test procedure: Public notice DA 00-705			
Test mode: Compliance	Verdict: PASS		
Date: 10/26/2010			
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.6.3 The highest band edge emission at high carrier frequency with hopping function disabled, DPSK

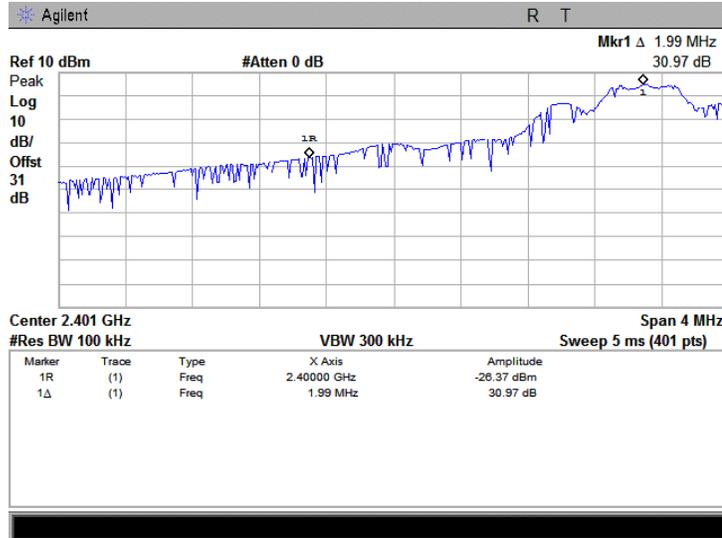


Plot 7.6.4 The highest band edge emission at high carrier frequency with hopping function disabled, GFSK

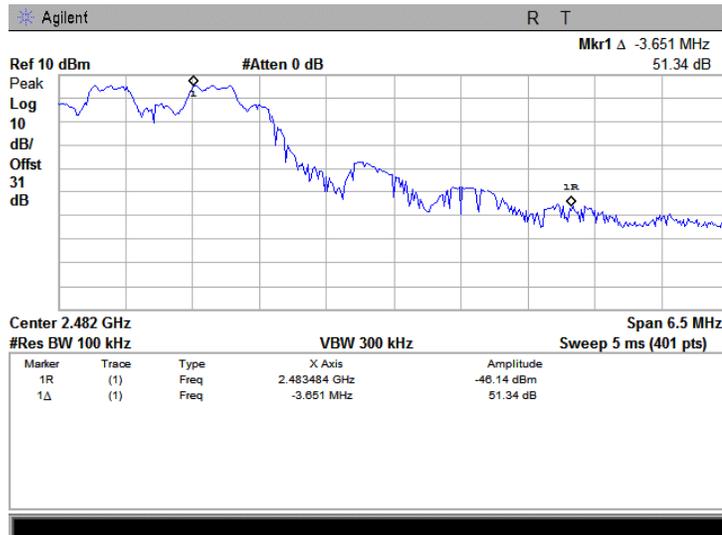


Test specification: Section 15.247(d)/RSS-210, Section A8.5, Emissions at band edges			
Test procedure: Public notice DA 00-705			
Test mode: Compliance	Verdict: PASS		
Date: 10/26/2010			
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.6.5 The highest band edge emission at low carrier frequency with hopping function enabled



Plot 7.6.6 The highest band edge emission at high carrier frequency with hopping function enabled



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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

7.7 Field strength of spurious emissions

7.7.1 General

This test was performed to measure field strength of spurious emissions from the EUT. Specification test limits are given in Table 7.8.1.

Table 7.7.1 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:

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

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.

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

7.7.2.1 The EUT was set up as shown in Figure 7.7.1, energized and the performance check was conducted.

7.7.2.2 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.

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

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

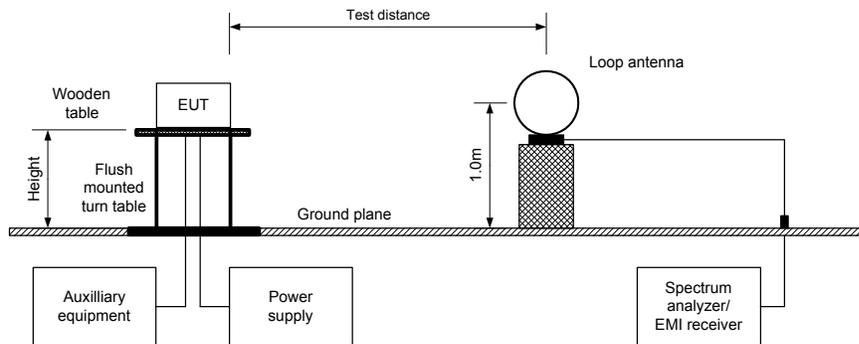
7.7.3.1 The EUT was set up as shown in Figure 7.7.2, energized and the performance check was conducted.

7.7.3.2 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.

7.7.3.3 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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

Figure 7.7.1 Setup for spurious emission field strength measurements below 30 MHz

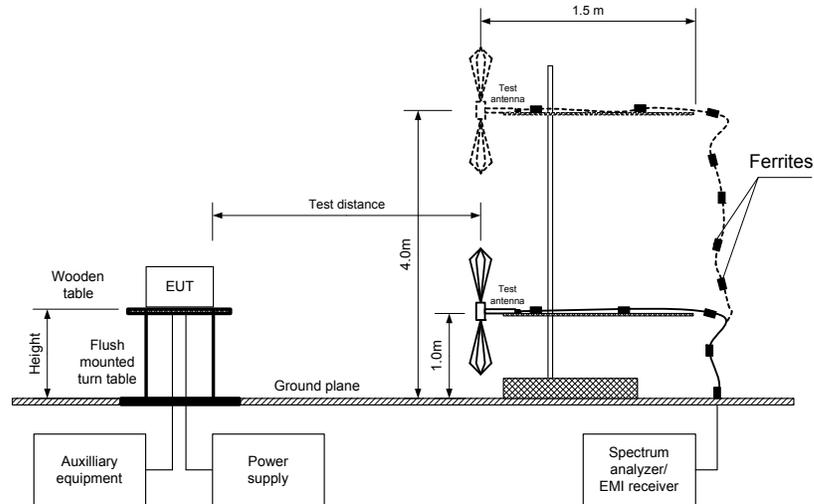


Photograph 7.7.1 Setup for spurious emission field strength measurements below 30 MHz



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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

Figure 7.7.2 Setup for spurious emission field strength measurements above 30 MHz



Photograph 7.7.2 Setup for spurious emission field strength measurements from 30 to 1000 MHz

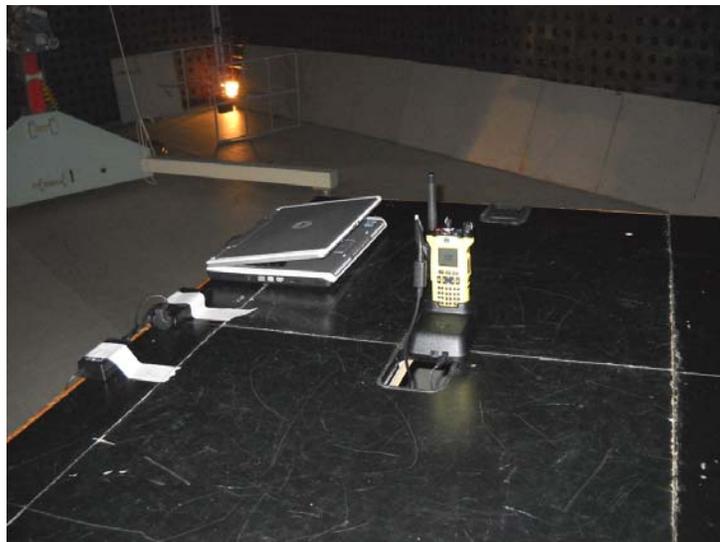


Test specification:	Section 15.247(d)/RSS-210, Section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

Photograph 7.7.3 Setup for spurious emission field strength measurements above 1000 MHz



Photograph 7.7.4 Setup for spurious emission field strength measurements, EUT close view





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:		10/26/2010			
Temperature: 23 °C		Air Pressure: 1018 hPa		Relative Humidity: 46 %	
Power Supply: 120VAC					
Remarks:					

Table 7.7.2 Field strength of spurious emissions above 1 GHz within restricted bands

OPERATING FREQUENCY RANGE: 2402.0 – 2480.0 MHz
 INVESTIGATED FREQUENCY RANGE: 1000 - 25000 MHz
 TEST DISTANCE: 3 m
 MODULATION: DPSK
 MODULATING SIGNAL: PRBS
 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			Peak field strength(VBW=3 MHz)			Average field strength(VBW=10 Hz)				Verdict
	Polarization	Height, m	Azimuth, degrees*	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											
19216.0	Vertical	1.2	90	58.12	74.00	-15.88	47.45	27.45	54.00	-26.55	Pass
Mid carrier frequency											
19520.0	Vertical	1.2	90	58.21	74.00	-15.79	46.76	26.76	54.00	-27.24	Pass
Mid carrier frequency, simultaneously operated BT and UHF transmitters											
19520.0	Vertical	1.2	90	59.18	74.00	-14.82	47.19	27.19	54.00	-26.81	Pass
High carrier frequency											
19832.0	Vertical	1.2	90	57.37	74.00	-16.63	46.15	26.15	54.00	-27.85	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.

Table 7.7.3 Average factor calculation

Transmission pulse		Transmission burst		Transmission train duration, ms	Average factor, dB
Duration, ms	Period, ms	Duration, ms	Period, ms		
0.1807	8.75	NA	NA	NA	-20

*- Average factor was calculated as follows

$$AF = 20\log (\Sigma Tx ON \text{ within } 100\text{ms window} / 100 \text{ ms}) = 20\log(12 \times 0.1807 / 100) = -33.27$$

Average factor value used -20dB as the maximum possible according to 47CFR part 15 section 15.35.

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:	10/26/2010				
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC		
Remarks:					

Table 7.7.4 Field strength of spurious emissions below 1 GHz within restricted bands

OPERATING FREQUENCY RANGE: 2402.0 – 2480.0 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 1000 MHz
 TEST DISTANCE: 3 m
 MODULATION: DPSK
 MODULATING SIGNAL: PRBS
 DUTY CYCLE: 100 %
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 RESOLUTION BANDWIDTH: 1 kHz (9 kHz – 150 kHz)
 9.0 kHz (150 kHz – 30 MHz)
 120 kHz (30 MHz – 1000 MHz)
 VIDEO BANDWIDTH: > Resolution bandwidth
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
 Biconilog (30 MHz – 1000 MHz)
 FREQUENCY HOPPING: Disabled

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*				
Does not depend on the BT transmission								
50.42	28.80	21.10	40.00	-18.90	Vertical	1.0	180	Pass

*- Margin = Measured emission - specification limit.

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

Table 7.7.5 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

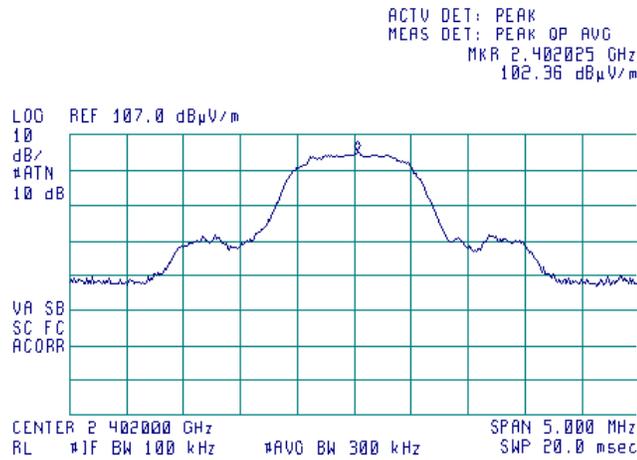
HL 0446	HL 0521	HL 0604	HL 0768	HL 1984	HL 2870	HL 2871	HL 3535
HL 3622	HL 3883	HL 3901					

Full description is given in Appendix A.

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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

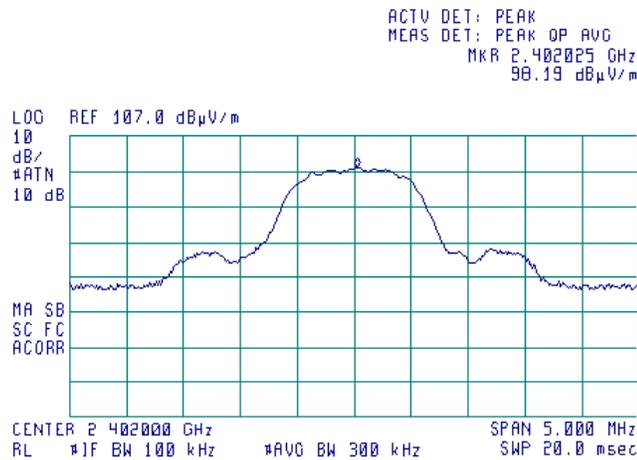
Plot 7.7.1 Radiated emission measurements at the low carrier frequency (2402 MHz)

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Plot 7.7.2 Radiated emission measurements at the low carrier frequency (2402 MHz)

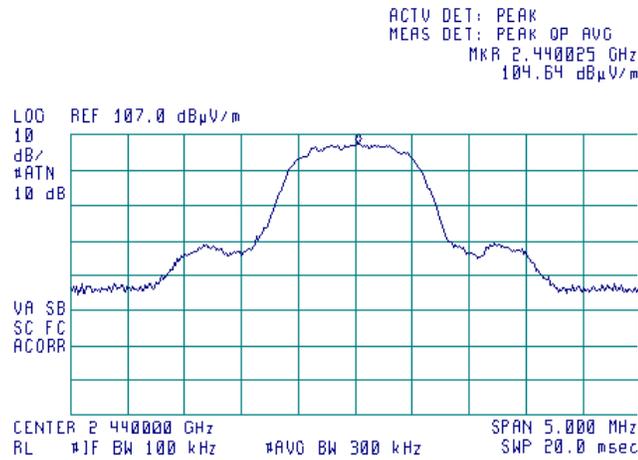
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal



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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

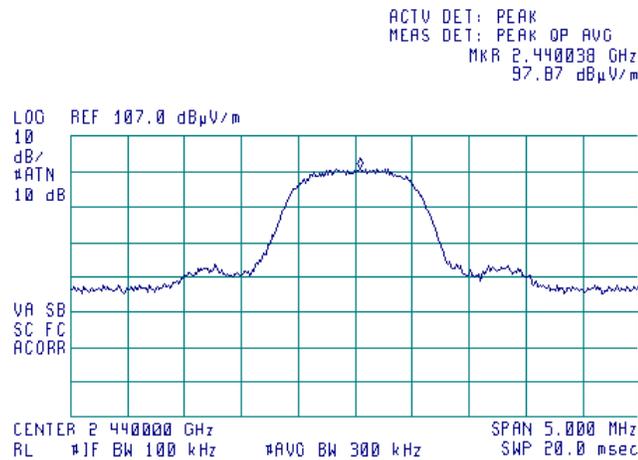
Plot 7.7.3 Radiated emission measurements at the mid carrier frequency (2440 MHz)

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Plot 7.7.4 Radiated emission measurements at the mid carrier frequency (2440 MHz)

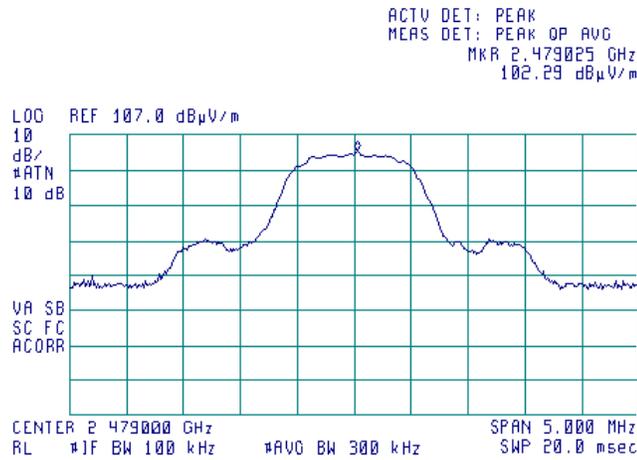
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal



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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

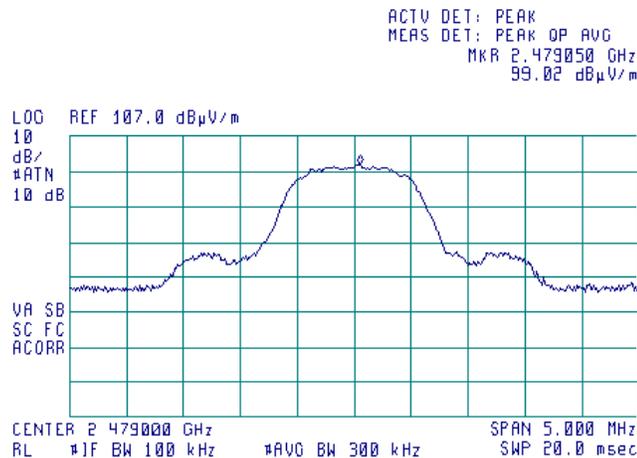
Plot 7.7.5 Radiated emission measurements at the high carrier frequency (2479 MHz)

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Plot 7.7.6 Radiated emission measurements at the high carrier frequency (2479 MHz)

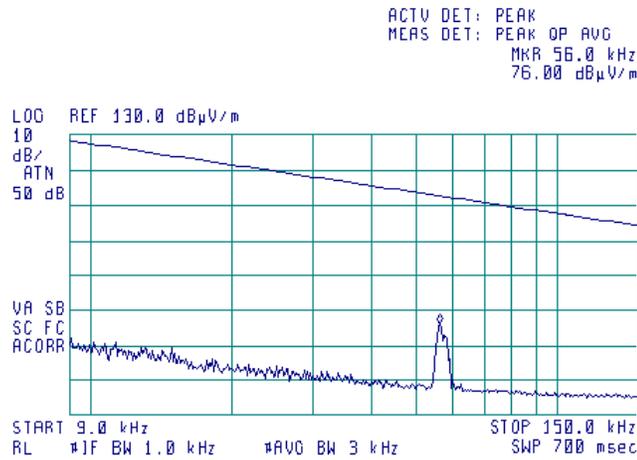
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal



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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

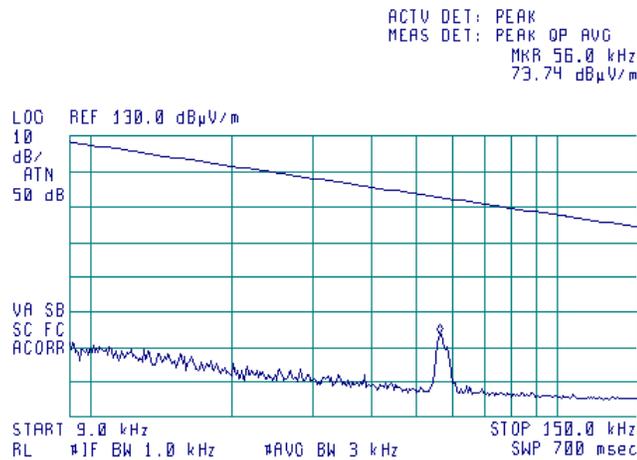
Plot 7.7.7 Radiated emission measurements from 9 to 150 kHz at the low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Plot 7.7.8 Radiated emission measurements from 9 to 150 kHz at the mid carrier frequency

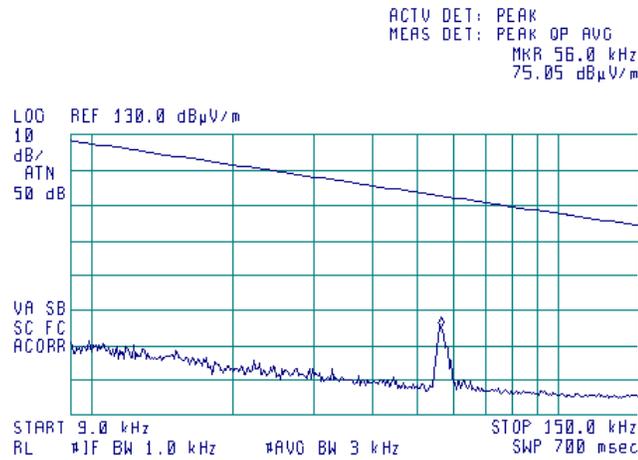
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

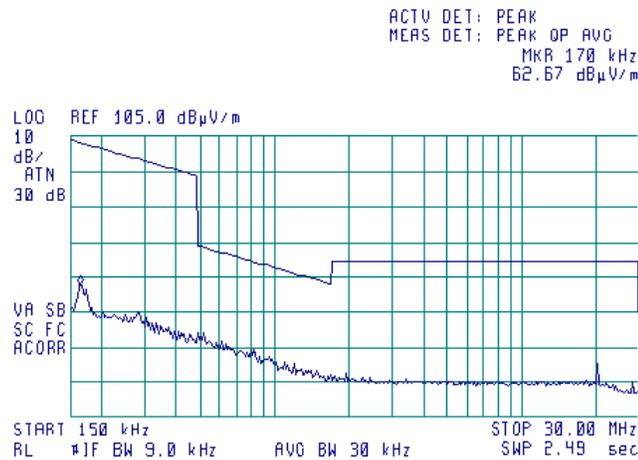
Plot 7.7.9 Radiated emission measurements from 9 to 150 kHz at the high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Plot 7.7.10 Radiated emission measurements from 0.15 to 30 MHz at the low carrier frequency

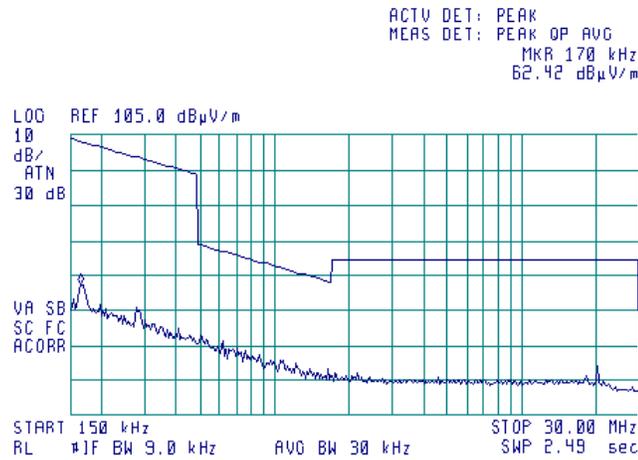
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

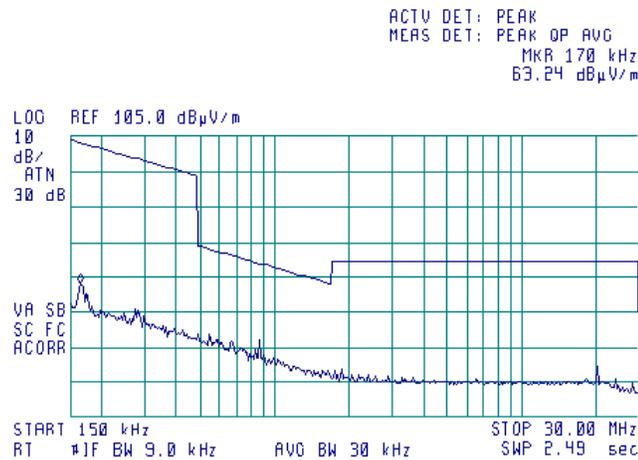
Plot 7.7.11 Radiated emission measurements from 0.15 to 30 MHz at the mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Plot 7.7.12 Radiated emission measurements from 0.15 to 30 MHz at the high carrier frequency

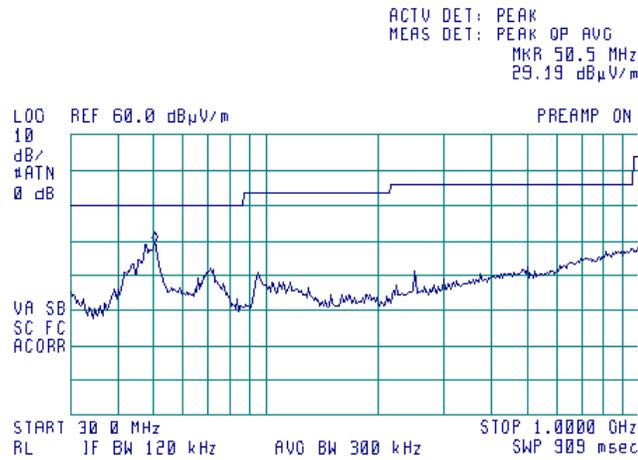
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

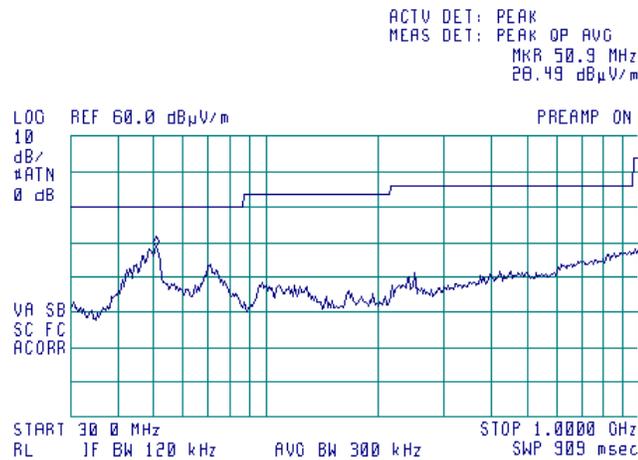
Plot 7.7.13 Radiated emission measurements from 30 to 1000 MHz at the low carrier frequency

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



Plot 7.7.14 Radiated emission measurements from 30 to 1000 MHz at the mid carrier frequency

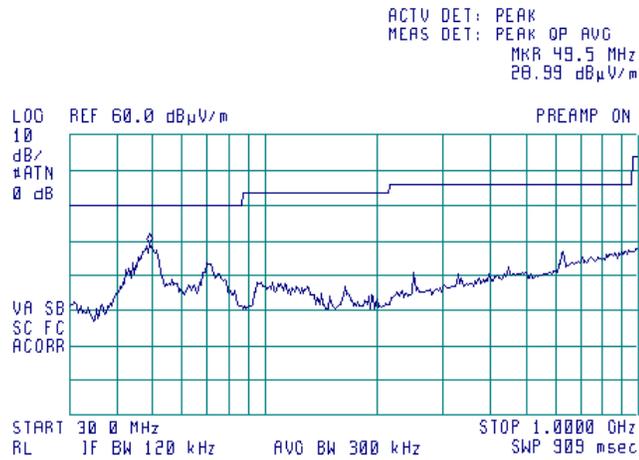
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

Plot 7.7.15 Radiated emission measurements from 30 to 1000 MHz at the high carrier frequency

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

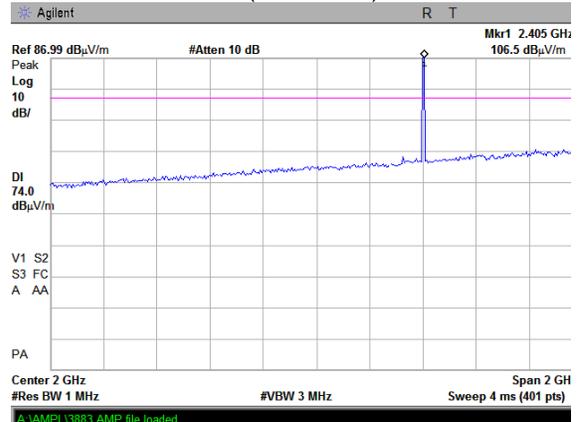
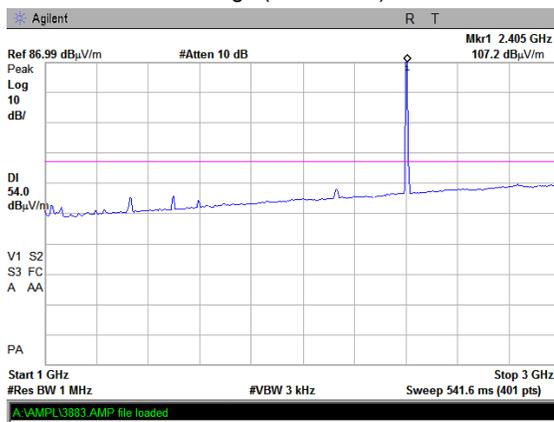


Test specification:	Section 15.247(d)/RSS-210, Section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict: PASS	
Date:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

Plot 7.7.16 Radiated emission measurements from 1000 to 3000 MHz at the low carrier frequency

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
Average (VBW 3kHz)

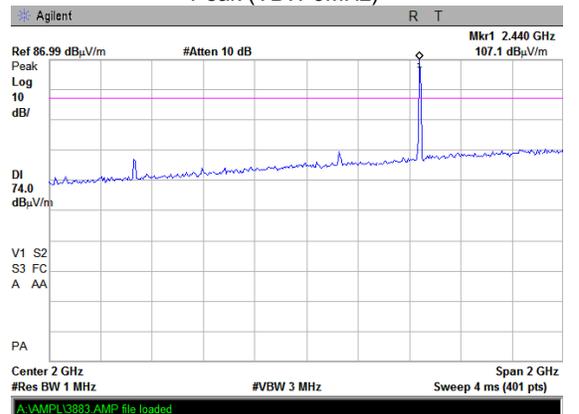
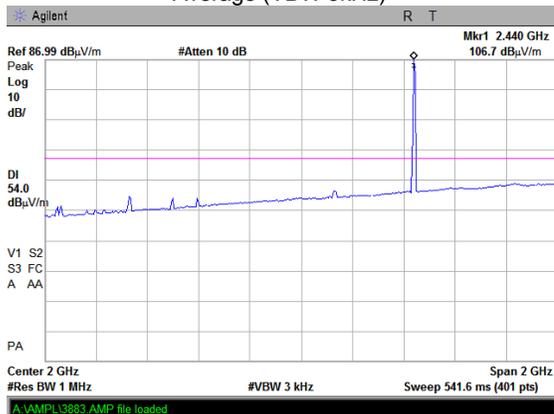
Semi anechoic chamber
3 m
Vertical and Horizontal
Peak (VBW 3MHz)



Plot 7.7.17 Radiated emission measurements from 1000 to 3000 MHz at the mid carrier frequency

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
Average (VBW 3kHz)

Semi anechoic chamber
3 m
Vertical and Horizontal
Peak (VBW 3MHz)

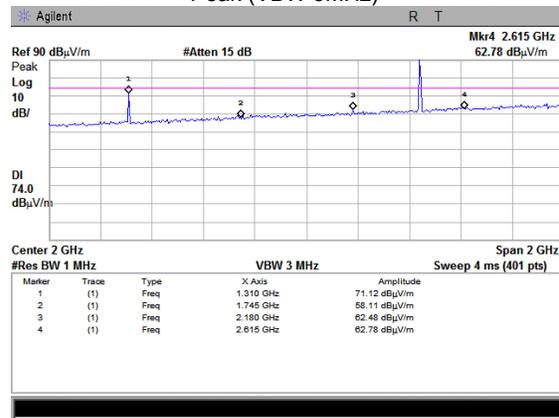
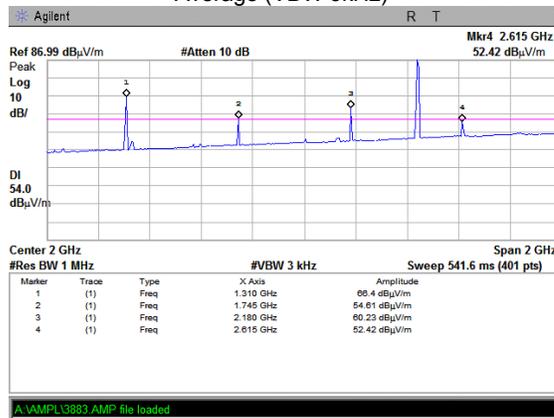


Test specification: Section 15.247(d)/RSS-210, Section A8.5, Radiated spurious emissions			
Test procedure: Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode: Compliance	Verdict: PASS		
Date: 10/26/2010			
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

Plot 7.7.18 Radiated emission measurements from 1000 to 3000 MHz at the mid carrier frequency, simultaneously operated BT and UHF transmitters

TEST SITE:
UHF TRANSMITTER FREQUENCY:
TEST DISTANCE:
ANTENNA POLARIZATION:
Average (VBW 3kHz)

Semi anechoic chamber
436MHz
3 m
Vertical and Horizontal
Peak (VBW 3MHz)

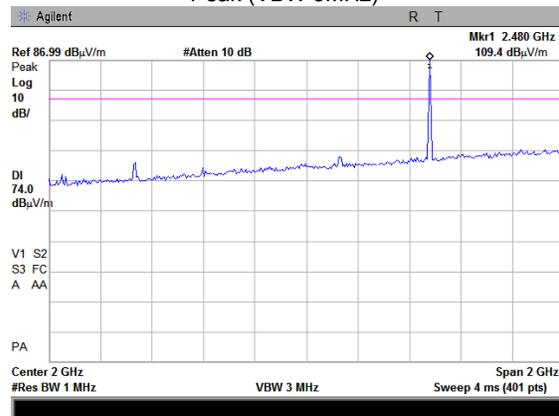
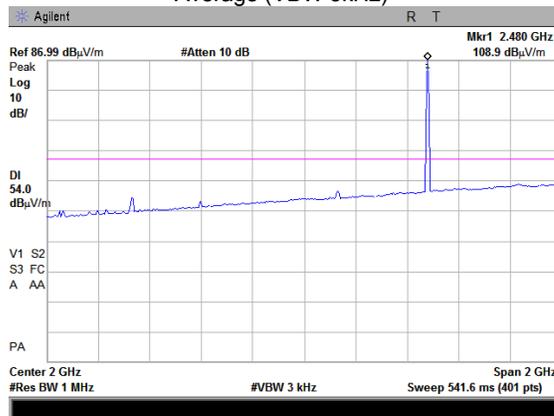


NOTE1: the highest frequency on the plot is the BT transmission (106.5 dBuV/m in average detector view)
NOTE2: four markers points are the 3-rd, 4-th, 5-th and 6-th harmonics of the UHF transmitter.

Plot 7.7.19 Radiated emission measurements from 1000 to 3000 MHz at the high carrier frequency

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
Average (VBW 3kHz)

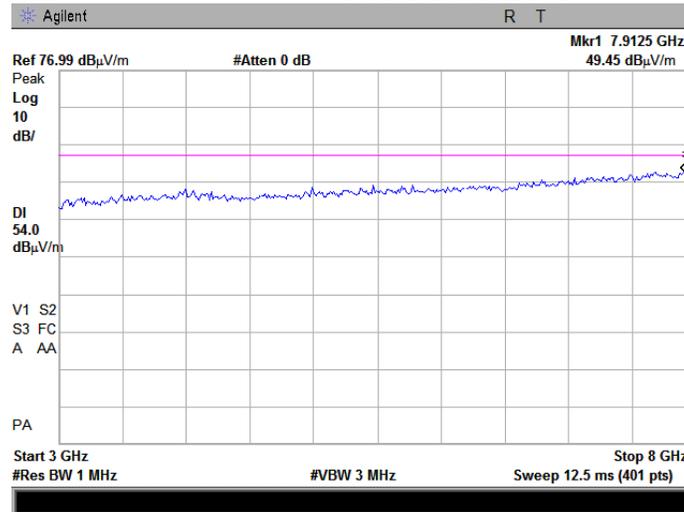
Semi anechoic chamber
3 m
Vertical and Horizontal
Peak (VBW 3MHz)



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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

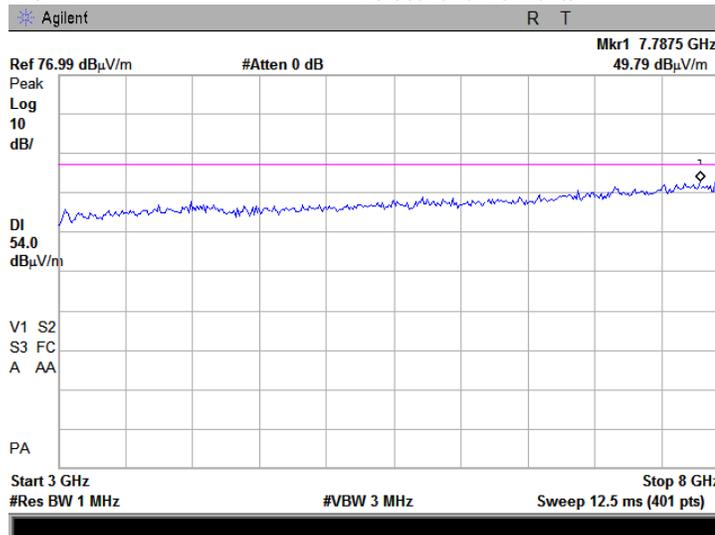
Plot 7.7.20 Radiated emission measurements from 3000 to 8000 MHz at the low carrier frequency

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



Plot 7.7.21 Radiated emission measurements from 3000 to 8000 MHz at the mid carrier frequency

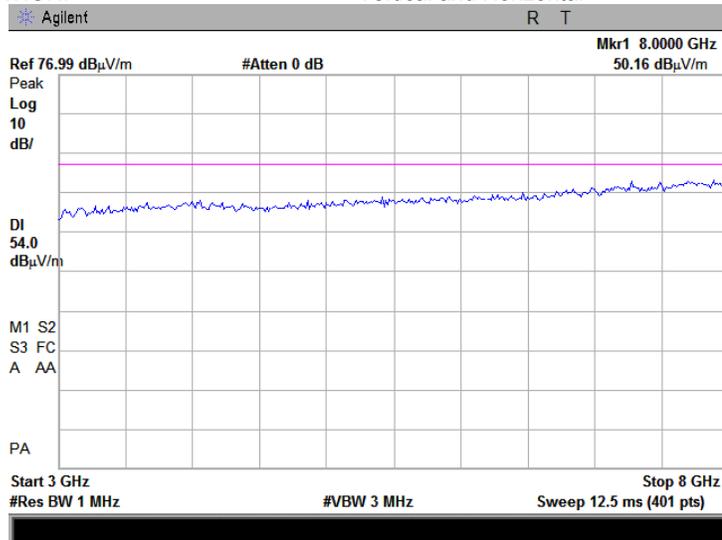
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

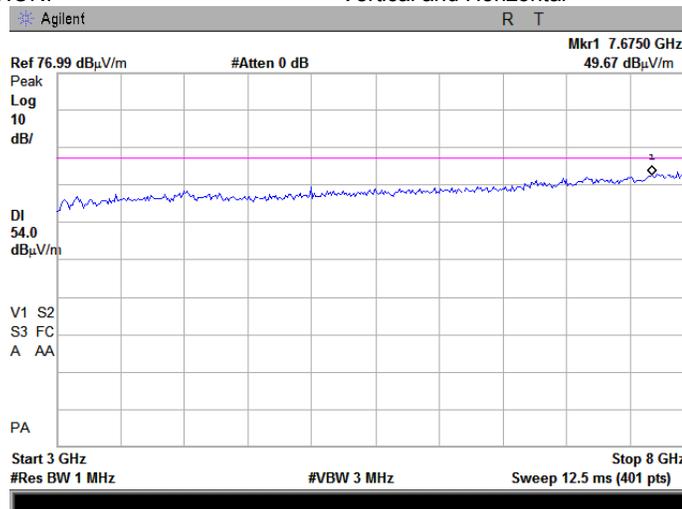
Plot 7.7.22 Radiated emission measurements from 3000 to 8000 MHz at the mid carrier frequency, simultaneously operated BT and UHF transmitters

TEST SITE: Semi anechoic chamber
 UHF TRANSMITTER FREQUENCY: 436MHz
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.7.23 Radiated emission measurements from 3000 to 8000 MHz at the high carrier frequency

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

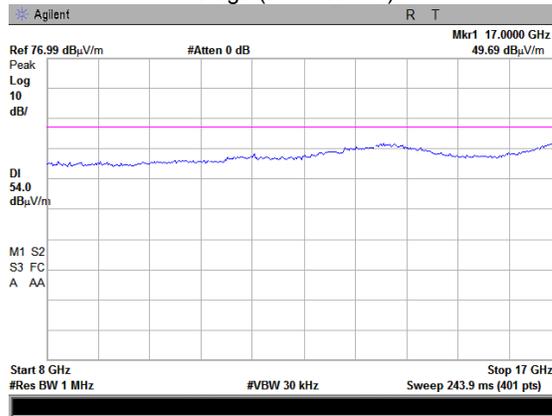


Test specification:	Section 15.247(d)/RSS-210, Section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict: PASS	
Date:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

Plot 7.7.24 Radiated emission measurements from 8000 to 17000 MHz at the low carrier frequency

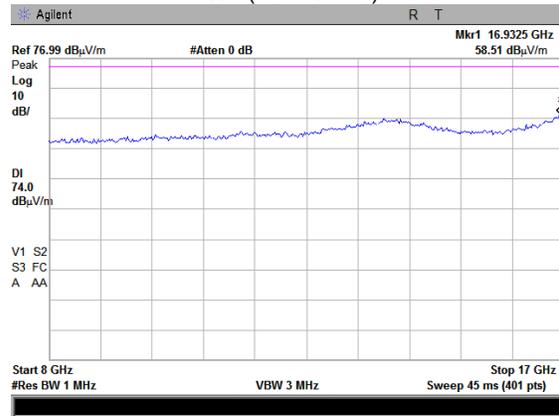
TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:

Average (VBW 30kHz)



Semi anechoic chamber
3 m
Vertical and Horizontal

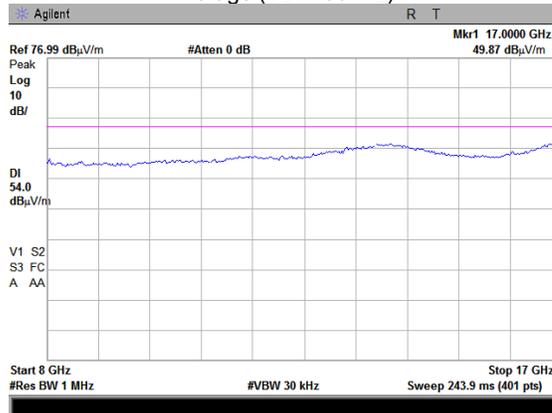
Peak (VBW 3MHz)



Plot 7.7.25 Radiated emission measurements from 8000 to 17000 MHz at the mid carrier frequency

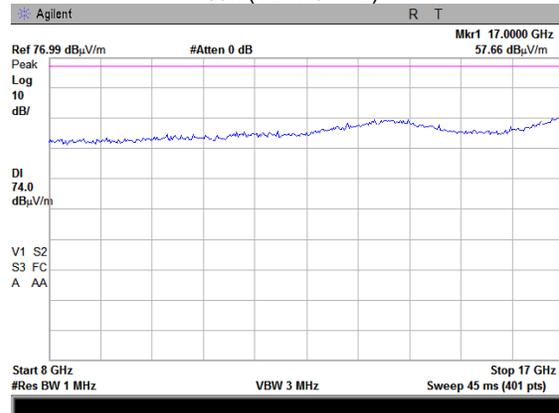
TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:

Average (VBW 30kHz)



Semi anechoic chamber
3 m
Vertical and Horizontal

Peak (VBW 3MHz)

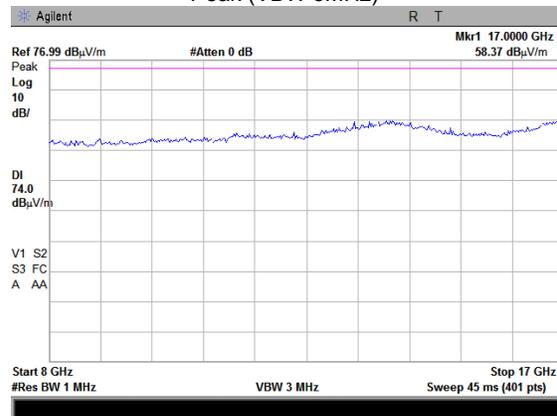
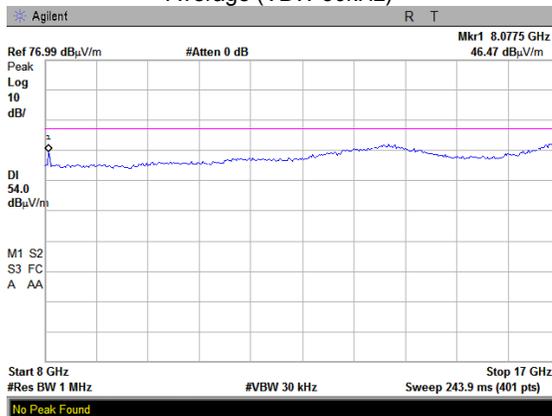


Test specification: Section 15.247(d)/RSS-210, Section A8.5, Radiated spurious emissions			
Test procedure: Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode: Compliance	Verdict: PASS		
Date: 10/26/2010			
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

Plot 7.7.26 Radiated emission measurements from 8000 to 17000 MHz at the mid carrier frequency, simultaneously operated BT and UHF transmitters

TEST SITE:
UHF TRANSMITTER FREQUENCY:
TEST DISTANCE:
ANTENNA POLARIZATION:
Average (VBW 30kHz)

Semi anechoic chamber
436MHz
3 m
Vertical and Horizontal
Peak (VBW 3MHz)

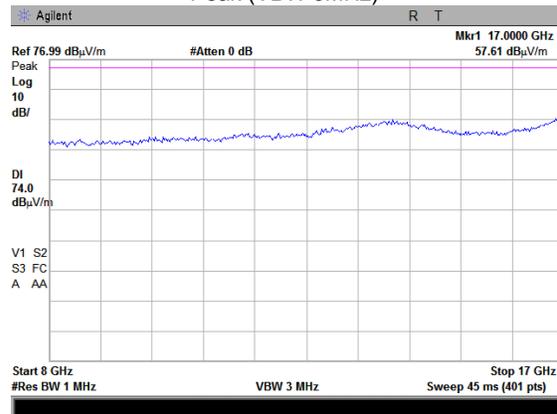
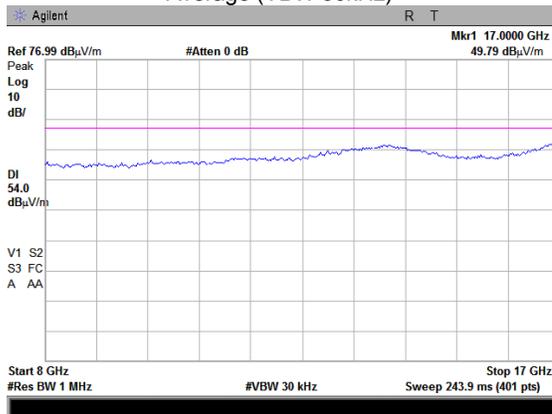


NOTE: 8.0775GHz emission does not depend on BT transmission (exists when BT does not operate)

Plot 7.7.27 Radiated emission measurements from 8000 to 17000 MHz at the high carrier frequency

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
Average (VBW 30kHz)

Semi anechoic chamber
3 m
Vertical and Horizontal
Peak (VBW 3MHz)

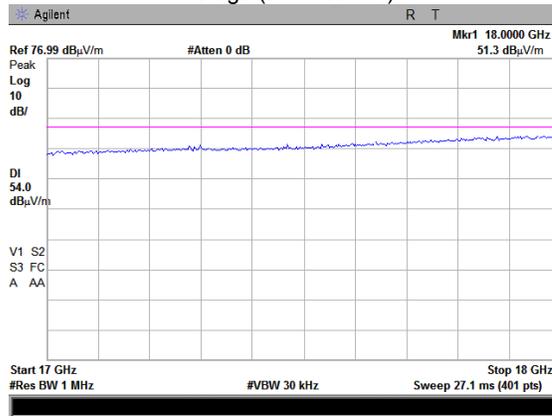


Test specification:	Section 15.247(d)/RSS-210, Section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict: PASS	
Date:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

Plot 7.7.28 Radiated emission measurements from 17000 to 18000 MHz at the low carrier frequency

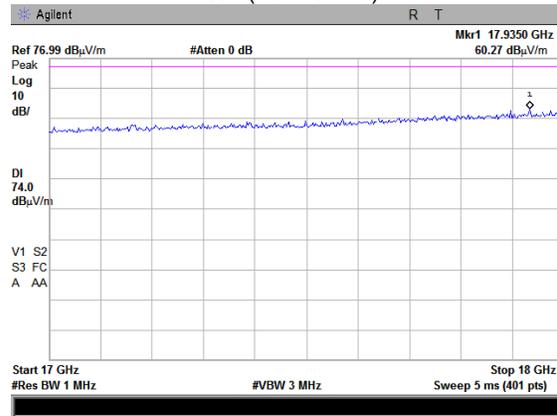
TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:

Average (VBW 30kHz)



Semi anechoic chamber
3 m
Vertical and Horizontal

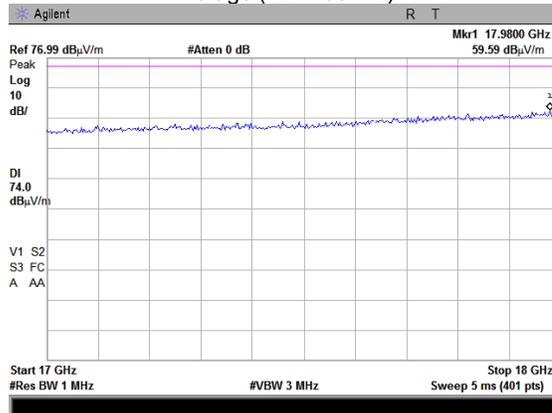
Peak (VBW 3MHz)



Plot 7.7.29 Radiated emission measurements from 17000 to 18000 MHz at the mid carrier frequency

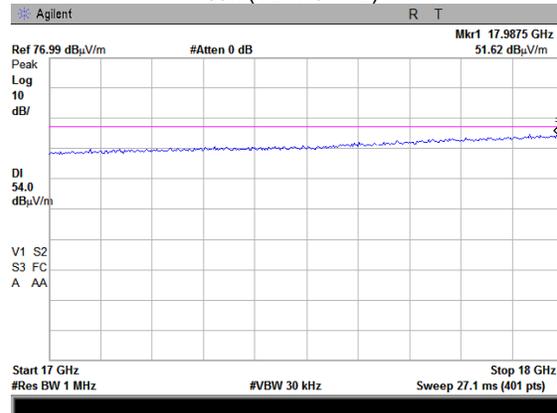
TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:

Average (VBW 30kHz)



Semi anechoic chamber
3 m
Vertical and Horizontal

Peak (VBW 3MHz)

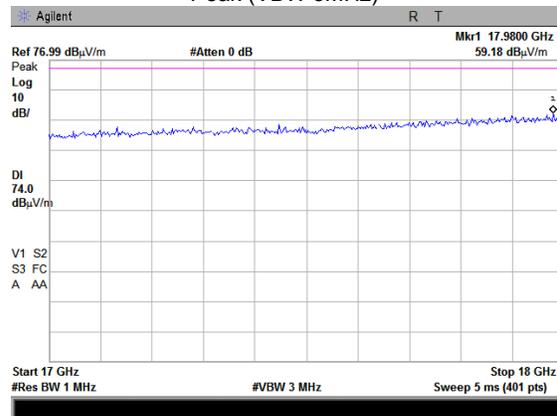
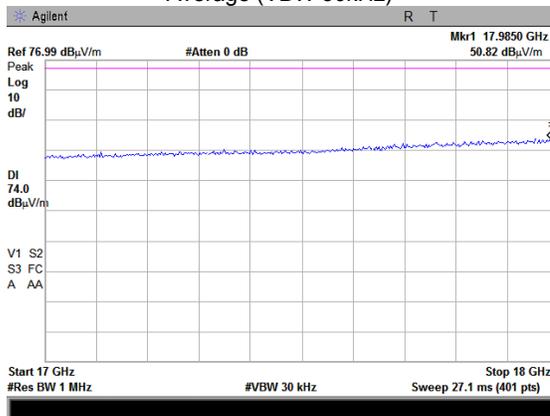


Test specification: Section 15.247(d)/RSS-210, Section A8.5, Radiated spurious emissions			
Test procedure: Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode: Compliance	Verdict: PASS		
Date: 10/26/2010			
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

Plot 7.7.30 Radiated emission measurements from 17000 to 18000 MHz at the mid carrier frequency, simultaneously operated BT and UHF transmitters

TEST SITE:
UHF TRANSMITTER FREQUENCY:
TEST DISTANCE:
ANTENNA POLARIZATION:
Average (VBW 30kHz)

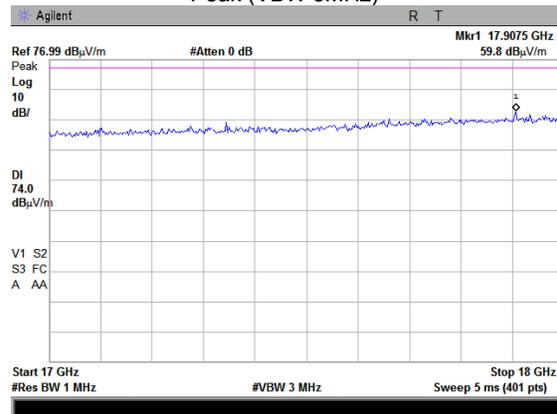
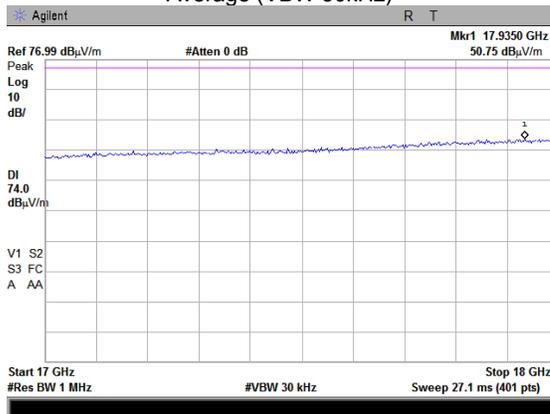
Semi anechoic chamber
436MHz
3 m
Vertical and Horizontal
Peak (VBW 3MHz)



Plot 7.7.31 Radiated emission measurements from 17000 to 18000 MHz at the high carrier frequency

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
Average (VBW 30kHz)

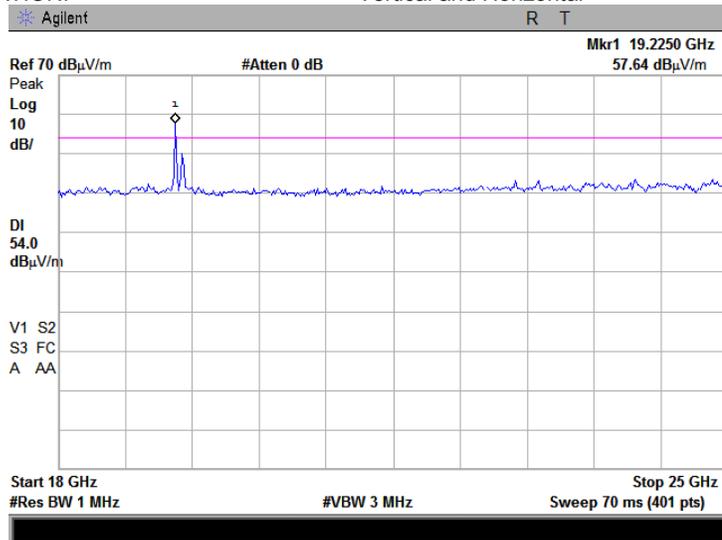
Semi anechoic chamber
3 m
Vertical and Horizontal
Peak (VBW 3MHz)



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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

Plot 7.7.32 Radiated emission measurements from 18000 to 25000 MHz at the low carrier frequency

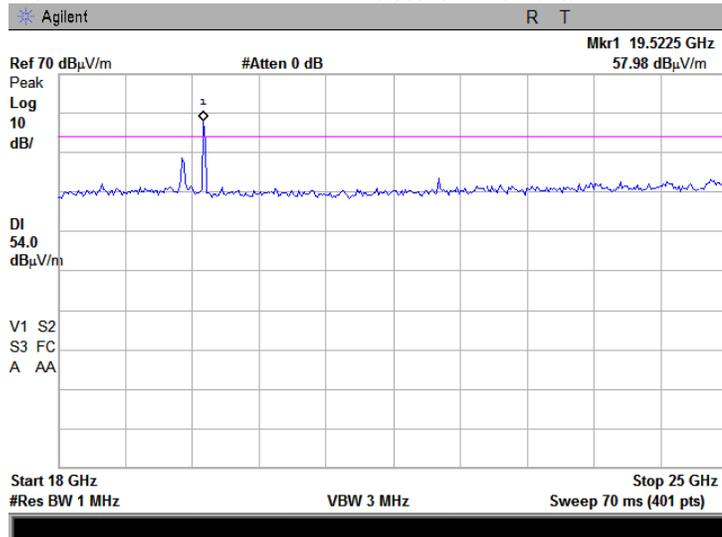
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



NOTE: the nearby emission peak is the ambient noise @ 19295 MHz, see the additional Plot 7.7.36

Plot 7.7.33 Radiated emission measurements from 18000 to 25000 MHz at the mid carrier frequency

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

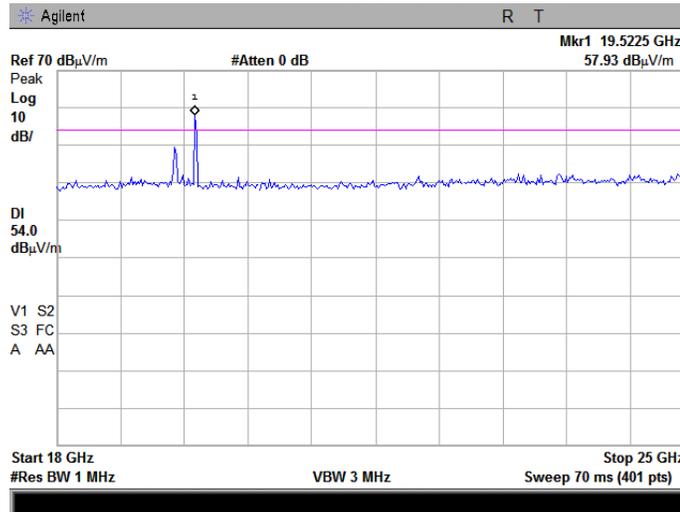


NOTE: the nearby emission peak is the ambient noise @ 19295 MHz, see the additional Plot 7.7.36

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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

Plot 7.7.34 Radiated emission measurements from 18000 to 25000 MHz at the mid carrier frequency, simultaneously operated BT and UHF transmitters

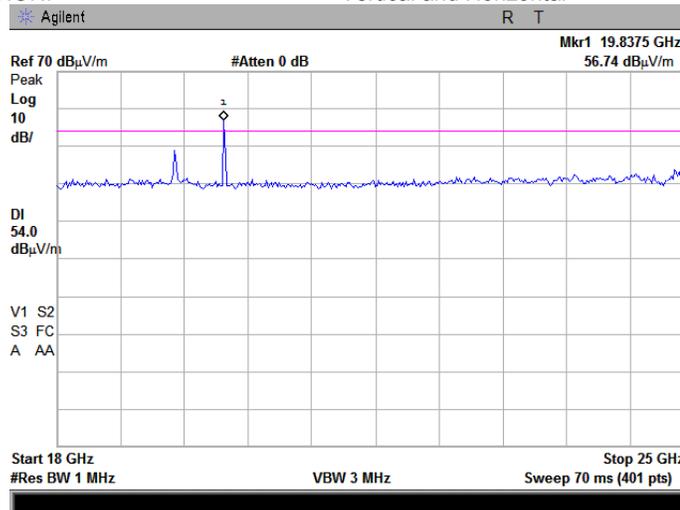
TEST SITE: Semi anechoic chamber
 UHF TRANSMITTER FREQUENCY: 436MHz
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal



NOTE: the nearby emission peak is the ambient noise @ 19295 MHz, see the additional Plot 7.7.36

Plot 7.7.35 Radiated emission measurements from 18000 to 25000 MHz at the high carrier frequency

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



NOTE: the nearby emission peak is the ambient noise @ 19295 MHz, see the additional Plot 7.7.36

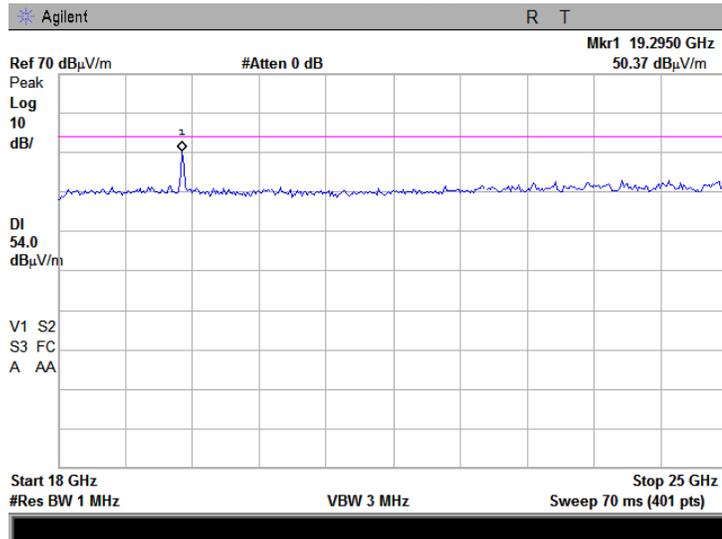


HERMON LABORATORIES

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:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

Plot 7.7.36 Ambient noise in the frequency range 18000 – 25000MHz

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

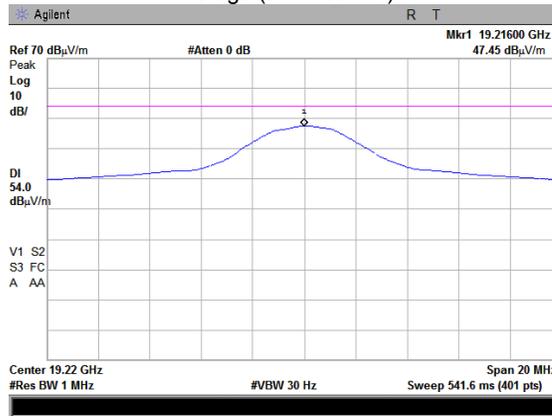


Test specification:	Section 15.247(d)/RSS-210, Section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

Plot 7.7.37 Radiated emission measurements at the eight harmonic of low carrier frequency

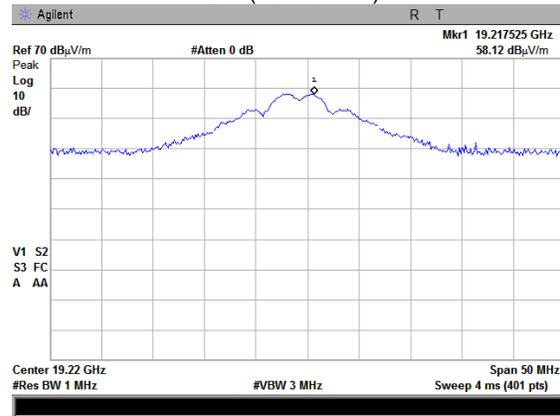
TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:

Average (VBW 30kHz)



Semi anechoic chamber
3 m
Vertical and Horizontal

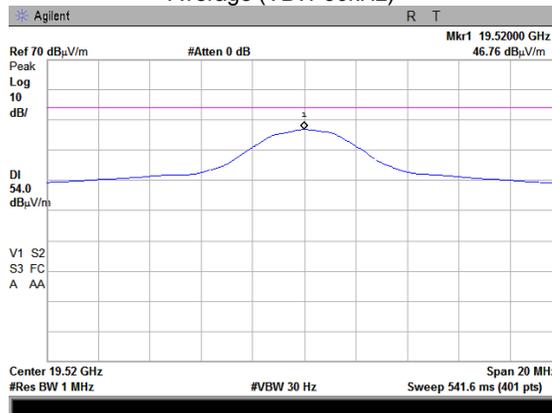
Peak (VBW 3MHz)



Plot 7.7.38 Radiated emission measurements at the eight harmonic of mid carrier frequency

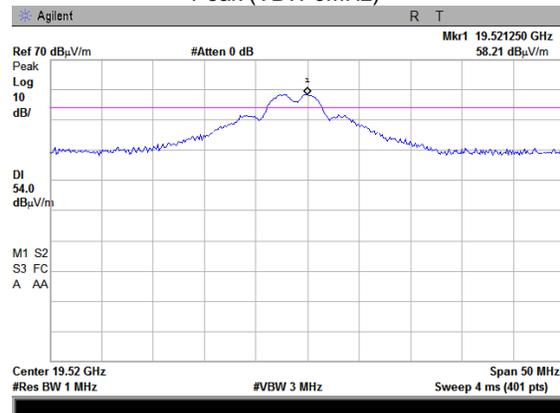
TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:

Average (VBW 30kHz)



Semi anechoic chamber
3 m
Vertical and Horizontal

Peak (VBW 3MHz)

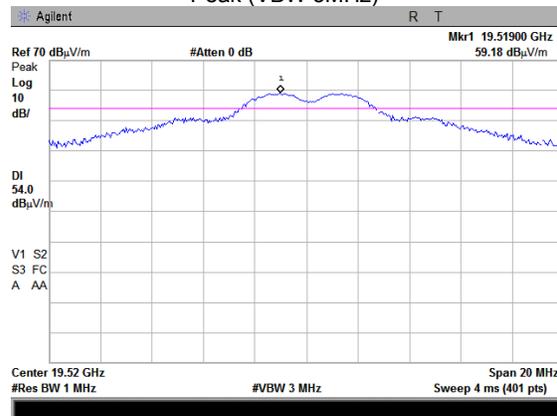
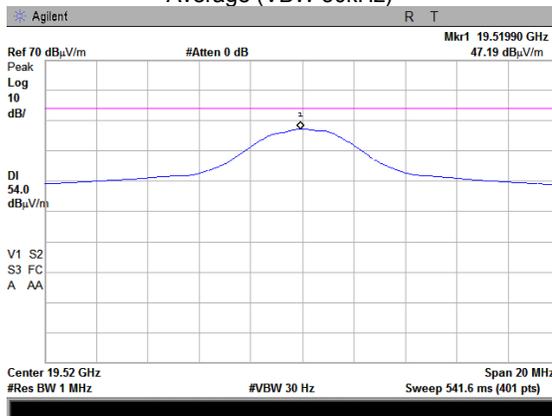


Test specification: Section 15.247(d)/RSS-210, Section A8.5, Radiated spurious emissions			
Test procedure: Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode: Compliance	Verdict: PASS		
Date: 10/26/2010			
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

Plot 7.7.39 Radiated emission measurements at the eight harmonic of mid carrier frequency, simultaneously operated BT and UHF transmitters

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
Average (VBW 30kHz)

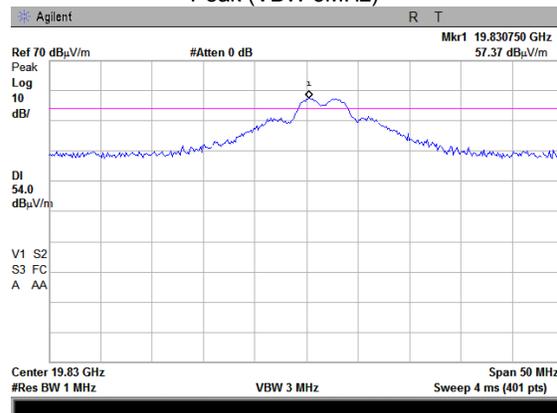
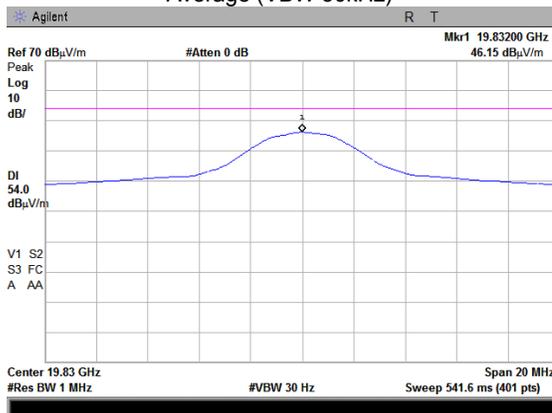
Semi anechoic chamber
3 m
Vertical and Horizontal
Peak (VBW 3MHz)



Plot 7.7.40 Radiated emission measurements at the eight harmonic of high carrier frequency

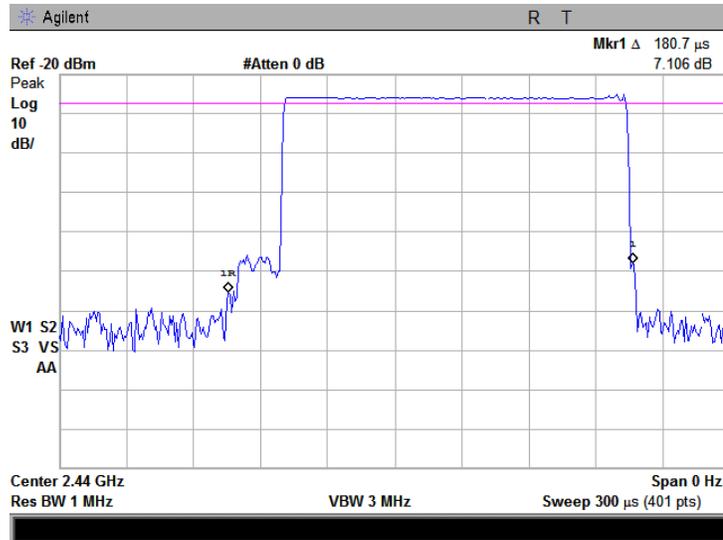
TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
Average (VBW 30kHz)

Semi anechoic chamber
3 m
Vertical and Horizontal
Peak (VBW 3MHz)

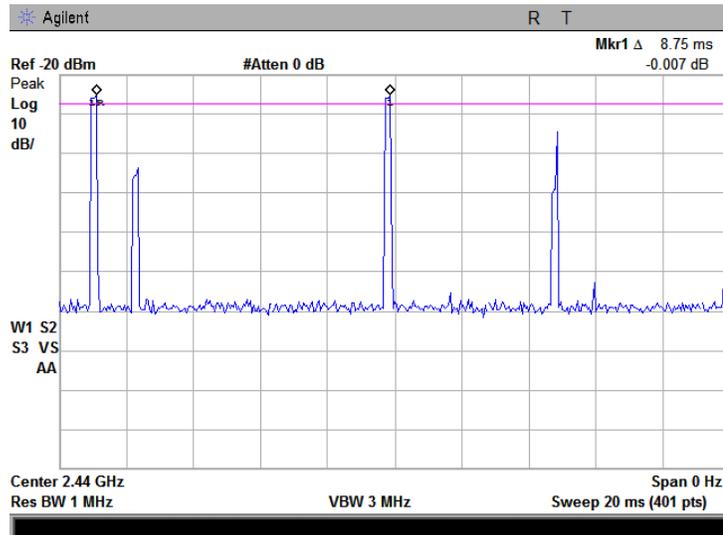


Test specification:	Section 15.247(d)/RSS-210, Section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

Plot 7.7.41 Transmission pulse duration



Plot 7.7.42 Transmission pulse period

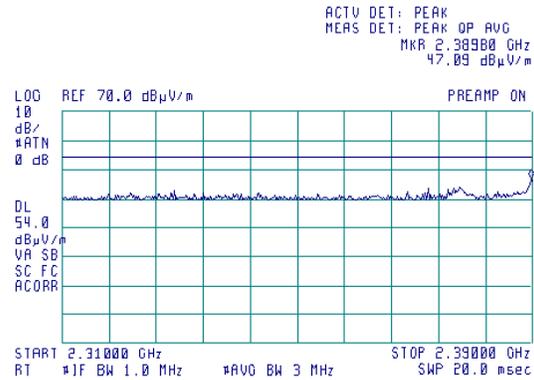
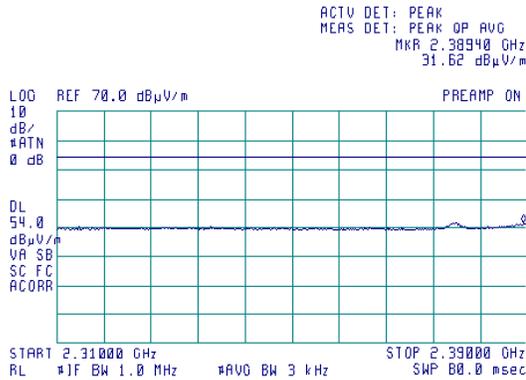


Test specification: Section 15.247(d)/RSS-210, Section A8.5, Radiated spurious emissions			
Test procedure: Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode: Compliance	Verdict: PASS		
Date: 10/26/2010			
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

Plot 7.7.43 Radiated emission measurements near the low band edge at the low carrier frequency (2402 MHz)

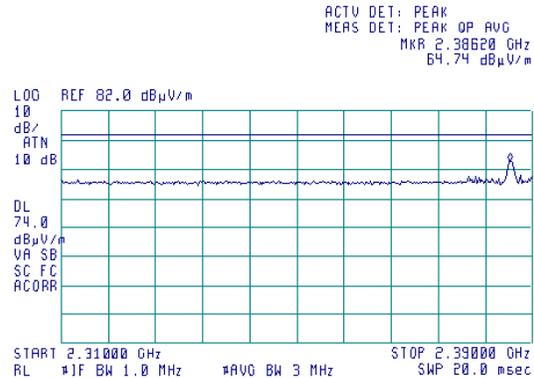
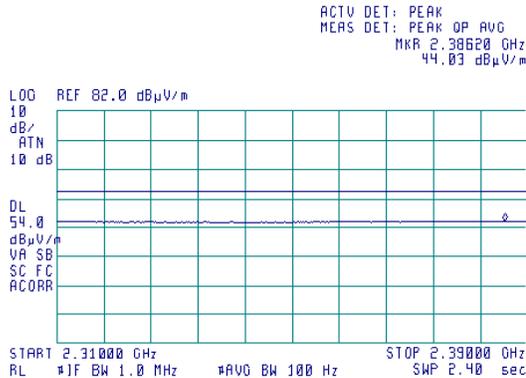
TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
MODULATION:
Average (VBW 3kHz)
FREQUENCY HOPPING:

Semi anechoic chamber
3 m
Vertical and Horizontal
DPSK
Peak (VBW 3MHz)
Disabled



FREQUENCY HOPPING:

Enabled

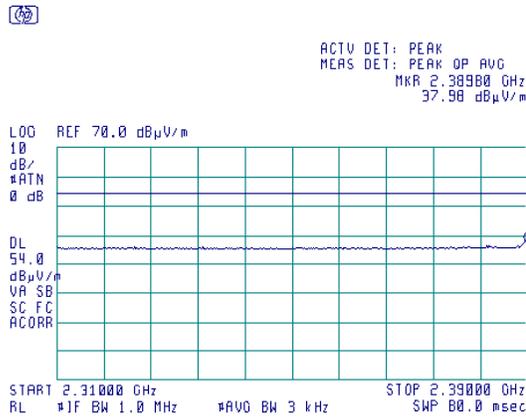


Test specification:		Section 15.247(d)/RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

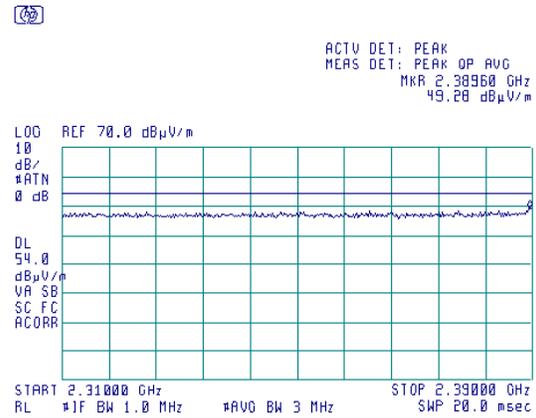
Plot 7.7.44 Radiated emission measurements near the low band edge at the low carrier frequency (2402 MHz)

TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Vertical and Horizontal
MODULATION:	GFSK
FREQUENCY HOPPING:	Disabled

Average (VBW 3kHz)



Peak (VBW 3MHz)

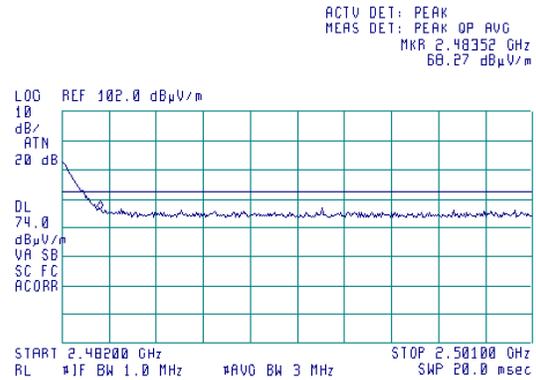
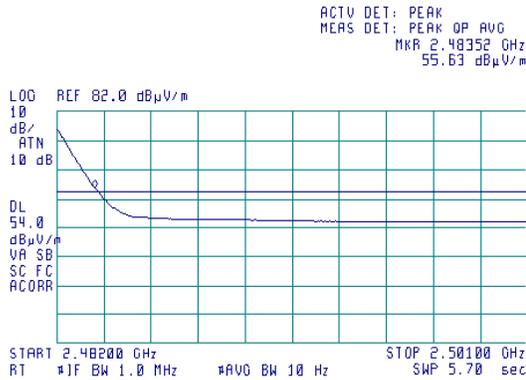


Test specification:		Section 15.247(d)/RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

Plot 7.7.45 Radiated emission measurements near the high band edge at the high carrier frequency (2480 MHz)

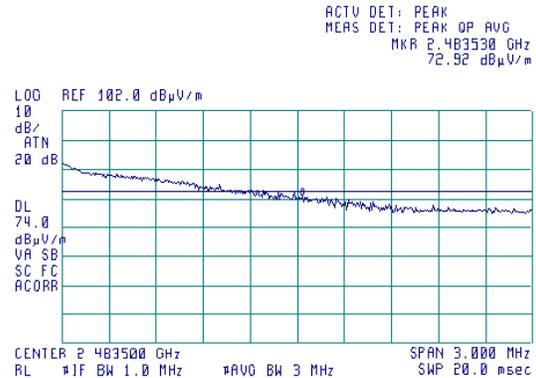
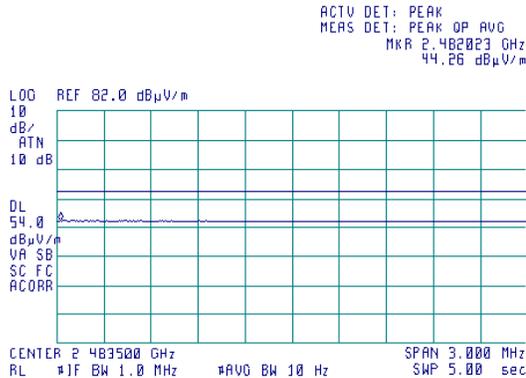
TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
MODULATION:
Average (VBW 3kHz)
FREQUENCY HOPPING:

Semi anechoic chamber
3 m
Vertical and Horizontal
DPSK
Peak (VBW 3MHz)
Disabled



FREQUENCY HOPPING:

Enabled

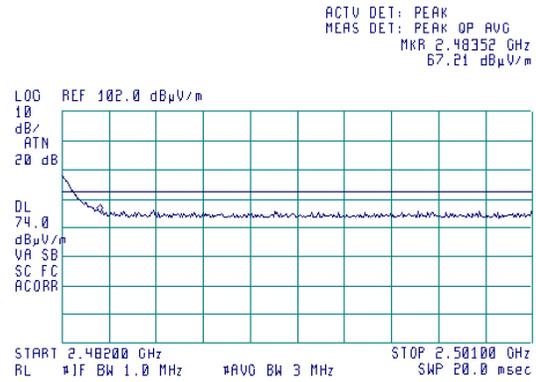
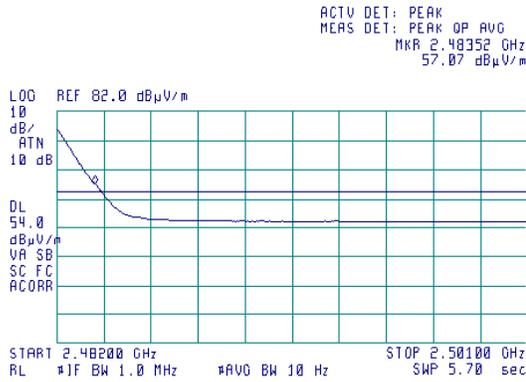


Test specification:		Section 15.247(d)/RSS-210, Section A8.5, Radiated spurious emissions	
Test procedure:		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date:	10/26/2010		
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 46 %	Power Supply: 120VAC
Remarks:			

Plot 7.7.46 Radiated emission measurements near the high band edge at the high carrier frequency (2480 MHz)

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
MODULATION:
Average (VBW 3kHz)
FREQUENCY HOPPING:

Semi anechoic chamber
3 m
Vertical and Horizontal
GFSK
Peak (VBW 3MHz)
Disabled



Test specification:	Section 15.247(d)/RSS-210, Section A8.5, Conducted spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date:	10/27/2010		
Temperature: 24 °C	Air Pressure: 1019 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

7.8 Spurious emissions at RF antenna connector

7.8.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.8.1.

Table 7.8.1 Spurious emission limits

Frequency*, MHz	Attenuation below carrier*, dBc
0.009 – 10 th harmonic	20.0

* - The above 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.

** - Spurious 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 and its proper operation was checked.

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

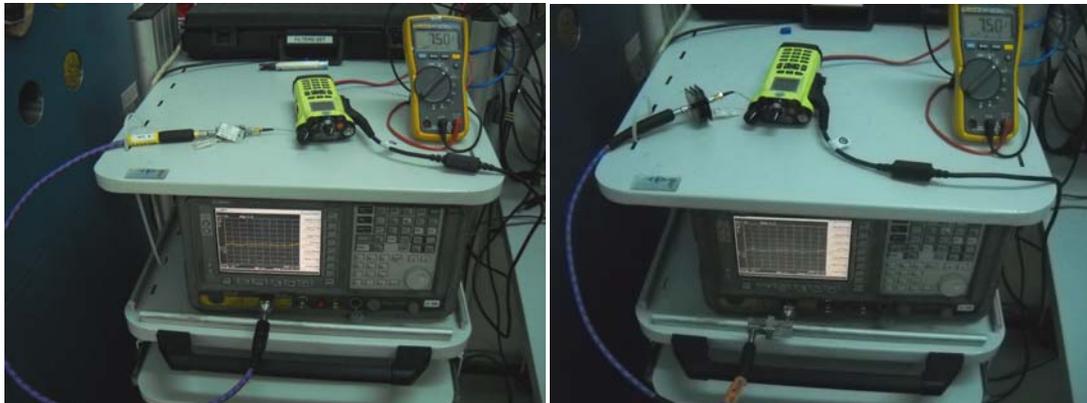
7.8.2.3 The highest emission level within the authorized band was measured.

7.8.2.4 The spurious emission was measured with spectrum analyzer as provided in Table 7.8.2 and the associated plots and referenced to the highest emission level measured within the authorized band.

Figure 7.8.1 Spurious emission test setup



Photograph 7.8.1 Spurious emission test setup





Test specification:	Section 15.247(d)/RSS-210, Section A8.5, Conducted spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date:	10/27/2010		
Temperature: 24 °C	Air Pressure: 1019 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Table 7.8.2 Spurious emission test results

OPERATING FREQUENCY RANGE: 2402.0 – 2480.0 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 25000 MHz
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 100 kHz
 VIDEO BANDWIDTH: 300 kHz
 MODULATION: GFSK
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 FREQUENCY HOPPING: Disabled

Frequency, MHz	Spurious emission, dBm	Emission at carrier, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
Low carrier frequency						
19217.275	-37.84	2.566	40.41	20.0	20.41	Pass
Mid carrier frequency						
19521.275	-39.16	2.334	41.49	20.0	21.49	Pass
High carrier frequency						
19833.275	-41.69	3.110	44.80	20.0	24.80	Pass

*- Margin = Attenuation below carrier – specification limit.

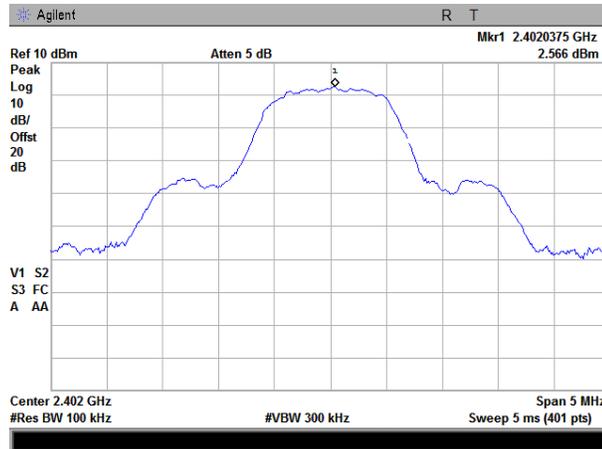
Reference numbers of test equipment used

HL 2780						
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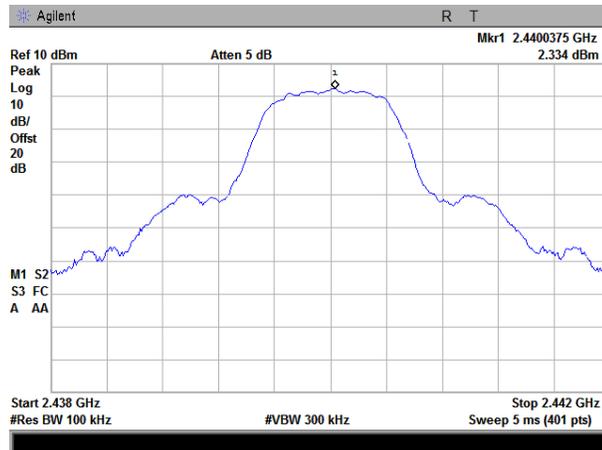
Full description is given in Appendix A.

Test specification:	Section 15.247(d)/RSS-210, Section A8.5, Conducted spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date:	10/27/2010		
Temperature: 24 °C	Air Pressure: 1019 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 7.8.1 The highest emission level within the assigned band at low carrier frequency (2402 MHz)

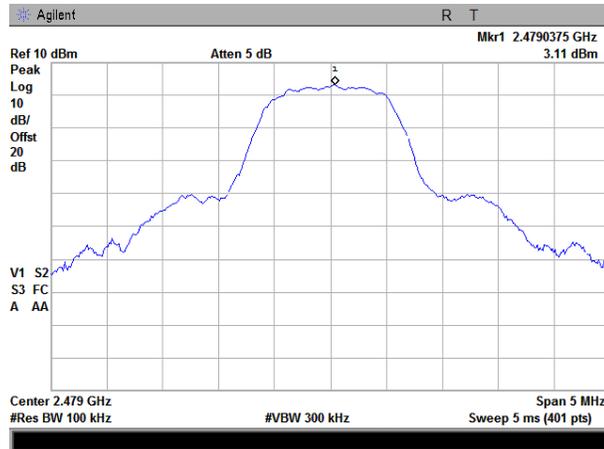


Plot 7.8.2 The highest emission level within the assigned band at mid carrier frequency (2440 MHz)



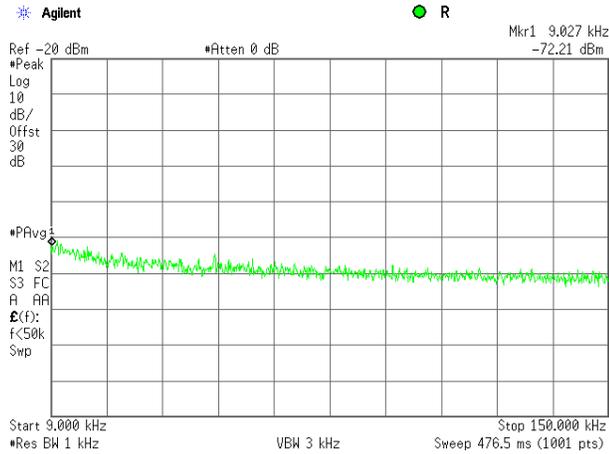
Test specification:	Section 15.247(d)/RSS-210, Section A8.5, Conducted spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date:	10/27/2010		
Temperature: 24 °C	Air Pressure: 1019 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 7.8.3 The highest emission level within the assigned band at high carrier frequency (2479 MHz)

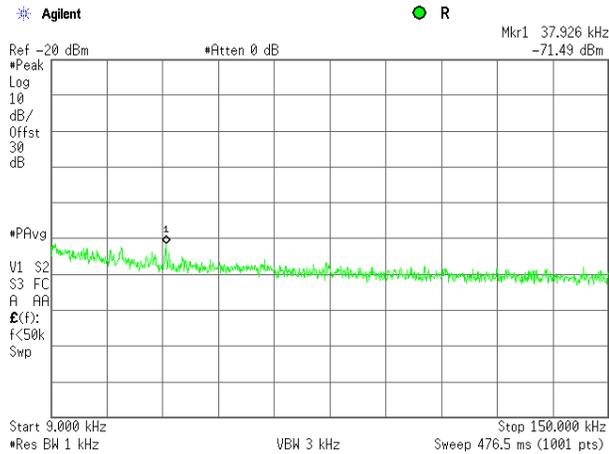


Test specification:	Section 15.247(d)/RSS-210, Section A8.5, Conducted spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date:	10/27/2010		
Temperature: 24 °C	Air Pressure: 1019 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 7.8.4 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency

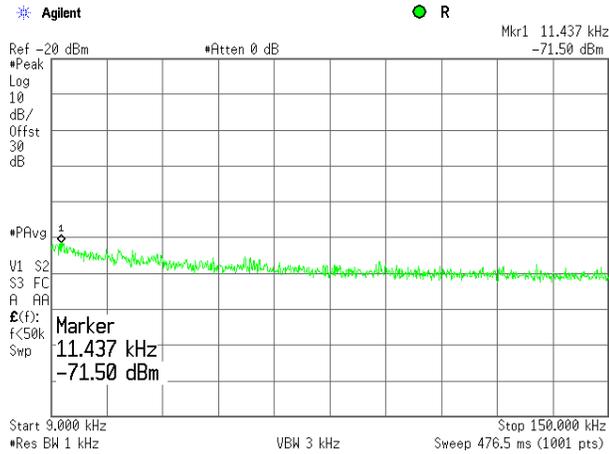


Plot 7.8.5 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency

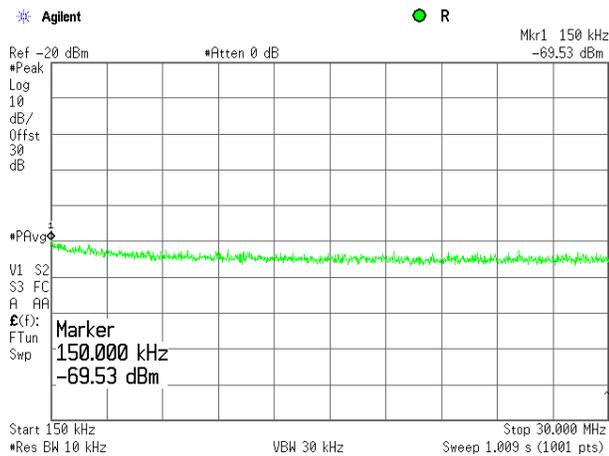


Test specification:	Section 15.247(d)/RSS-210, Section A8.5, Conducted spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date:	10/27/2010		
Temperature: 24 °C	Air Pressure: 1019 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 7.8.6 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency

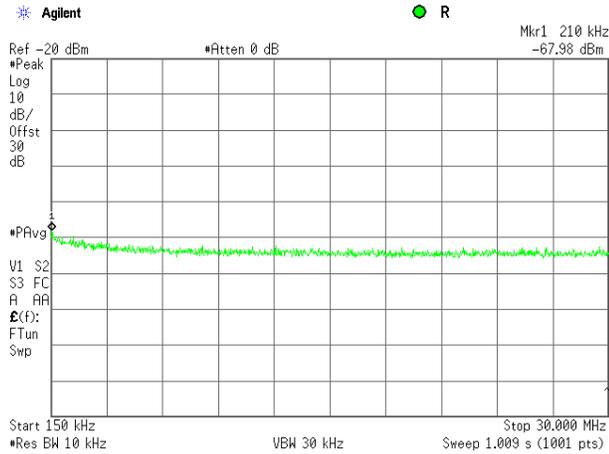


Plot 7.8.7 Spurious emission measurements in 0.15 - 30 MHz range at low carrier frequency

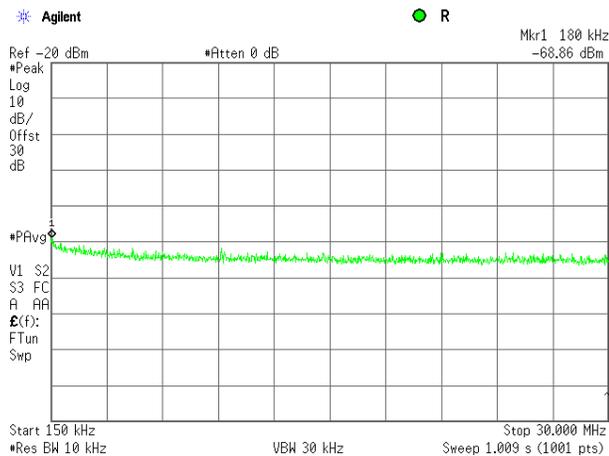


Test specification:	Section 15.247(d)/RSS-210, Section A8.5, Conducted spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date:	10/27/2010		
Temperature: 24 °C	Air Pressure: 1019 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 7.8.8 Spurious emission measurements in 0.15 - 30 MHz range at mid carrier frequency

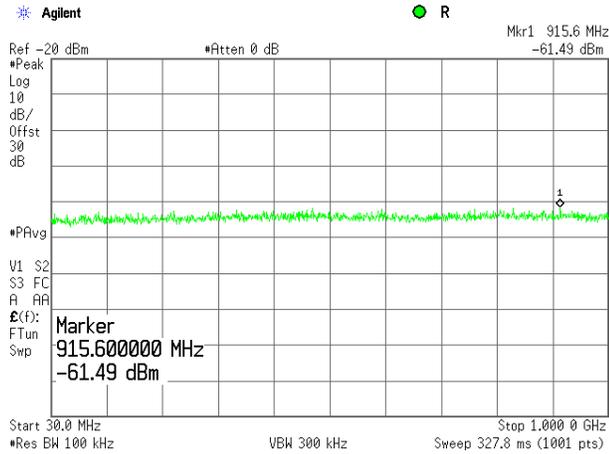


Plot 7.8.9 Spurious emission measurements in 0.15 - 30 MHz range at high carrier frequency

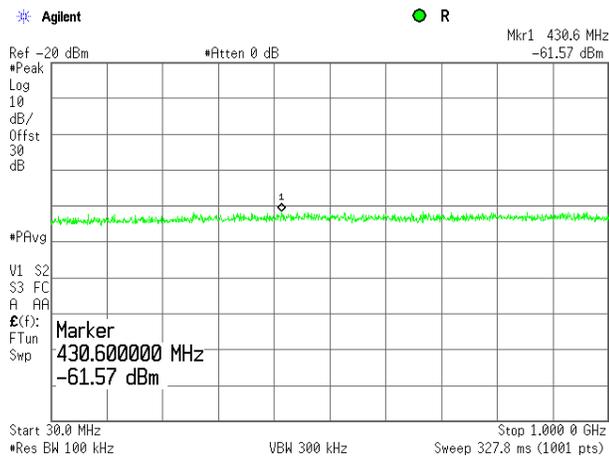


Test specification:	Section 15.247(d)/RSS-210, Section A8.5, Conducted spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date:	10/27/2010		
Temperature: 24 °C	Air Pressure: 1019 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 7.8.10 Spurious emission measurements in 30 - 1000 MHz range at low carrier frequency

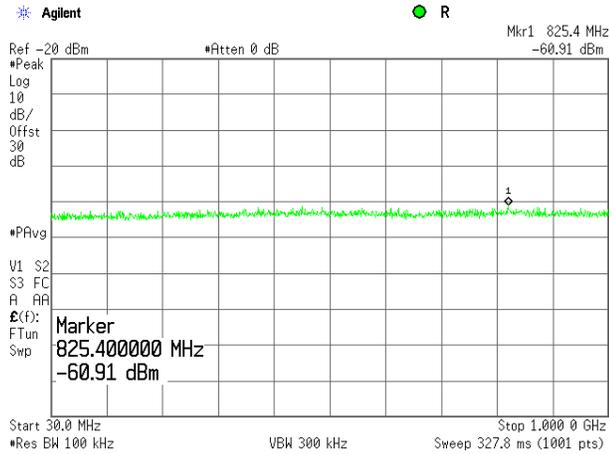


Plot 7.8.11 Spurious emission measurements in 30 - 1000 MHz range at mid carrier frequency

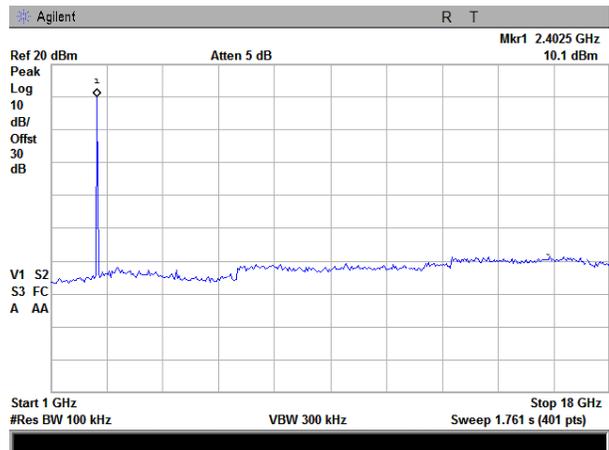


Test specification:	Section 15.247(d)/RSS-210, Section A8.5, Conducted spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date:	10/27/2010		
Temperature: 24 °C	Air Pressure: 1019 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 7.8.12 Spurious emission measurements in 30 - 1000 MHz range at high carrier frequency

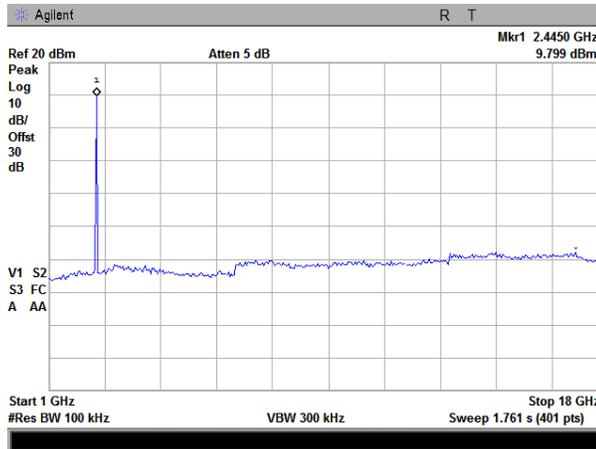


Plot 7.8.13 Spurious emission measurements in 1000 - 18000 MHz range at low carrier frequency

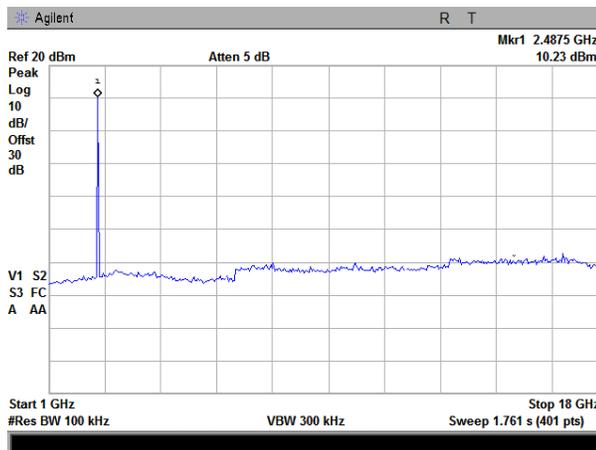


Test specification:	Section 15.247(d)/RSS-210, Section A8.5, Conducted spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date:	10/27/2010		
Temperature: 24 °C	Air Pressure: 1019 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 7.8.14 Spurious emission measurements in 1000 - 18000 MHz range at mid carrier frequency

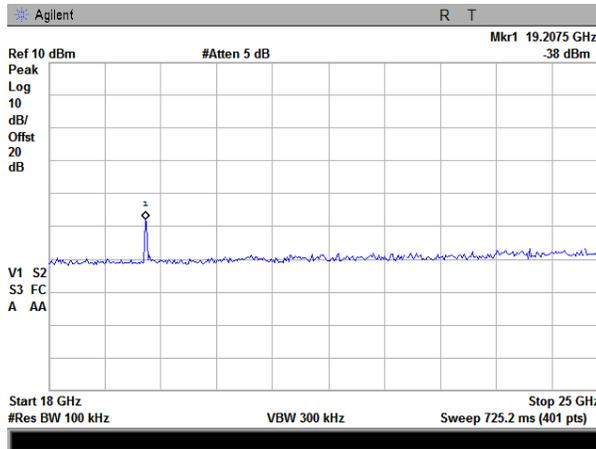


Plot 7.8.15 Spurious emission measurements in 1000 - 18000 MHz range at high carrier frequency

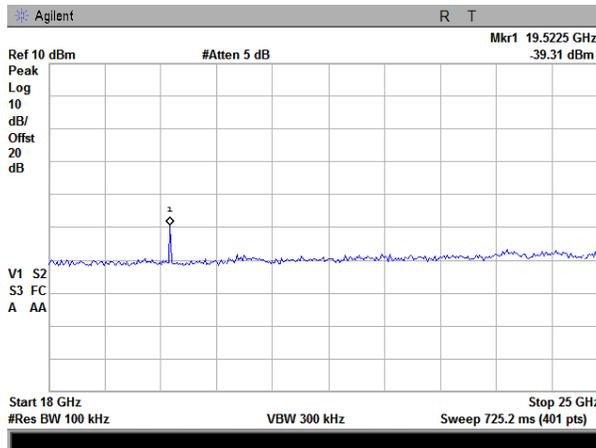


Test specification:	Section 15.247(d)/RSS-210, Section A8.5, Conducted spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date:	10/27/2010		
Temperature: 24 °C	Air Pressure: 1019 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 7.8.16 Spurious emission measurements in 18000 - 25000 MHz range at low carrier frequency

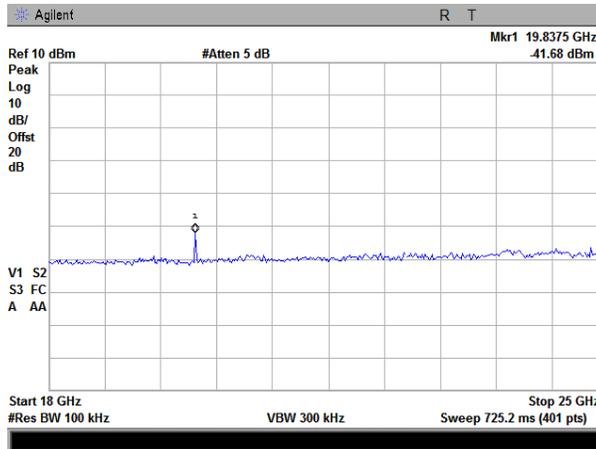


Plot 7.8.17 Spurious emission measurements in 18000 - 25000 MHz range at mid carrier frequency

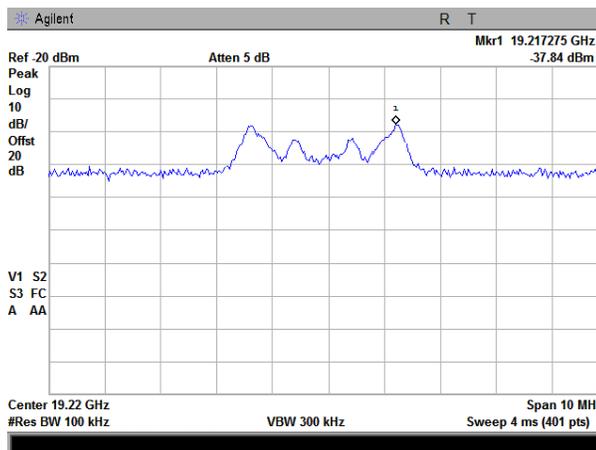


Test specification:	Section 15.247(d)/RSS-210, Section A8.5, Conducted spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date:	10/27/2010		
Temperature: 24 °C	Air Pressure: 1019 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 7.8.18 Spurious emission measurements in 18000 - 25000 MHz range at high carrier frequency

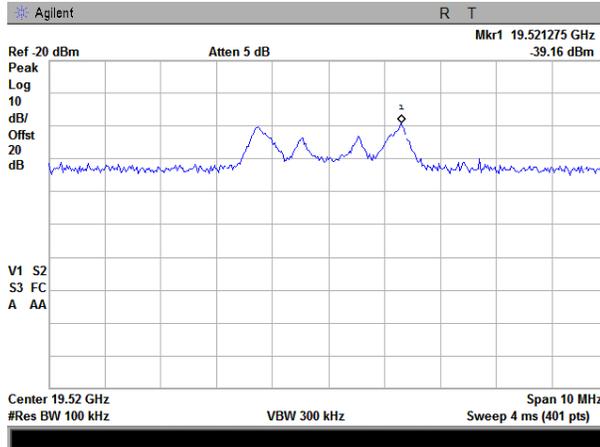


Plot 7.8.19 Conducted spurious emission measurements at the 8th harmonic of low carrier frequency

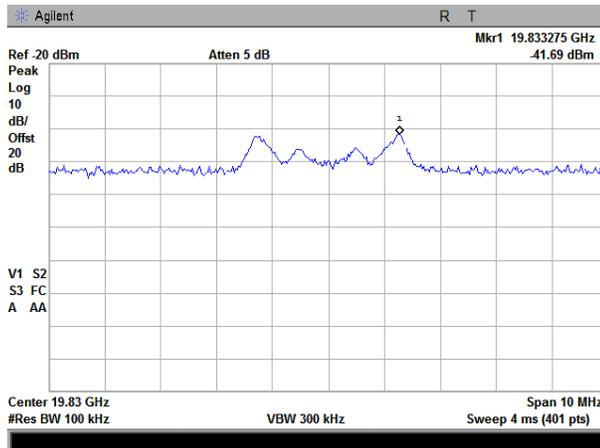


Test specification:	Section 15.247(d)/RSS-210, Section A8.5, Conducted spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date:	10/27/2010		
Temperature: 24 °C	Air Pressure: 1019 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 7.8.20 Conducted spurious emission measurements at the 8th harmonic of mid carrier frequency



Plot 7.8.21 Conducted spurious emission measurements at the 8th harmonic of high carrier frequency



Test specification:	Section 15.203/RSS-Gen, section 7.1.4, Antenna requirement		
Test procedure:	Visual inspection / supplier declaration		
Test mode:	Compliance	Verdict:	PASS
Date:	10/20/2010		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 50 %	Power Supply: 120 VAC
Remarks:			

7.9 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 7.9.1.

Table 7.9.1 Antenna requirements

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

Test specification:		Section 15.207(a)/ RSS-Gen section 7.2.2, Conducted emission	
Test procedure:		ANSI C63.4, Section 13.1.3	
Test mode:	Compliance	Verdict:	PASS
Date:	10/20/2010		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 50 %	Power Supply: 120 VAC
Remarks:			

7.10 Conducted emissions

7.10.1 General

This test was performed to measure common mode conducted emissions at the power port. Specification test limits are given in Table 7.10.1.

Table 7.10.1 Limits for conducted emissions

Frequency, MHz	Class B limit, dB(μV)	
	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5.0	56	46
5.0 - 30	60	50

* The limit decreases linearly with the logarithm of frequency.

7.10.2 Test procedure

7.10.2.1 The EUT was set up as shown in Figure 7.10.1 and associated photographs, energized and the performance check was conducted.

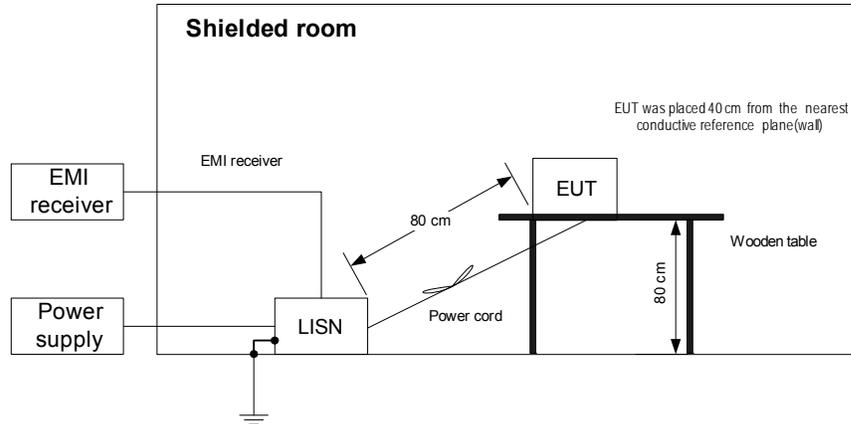
7.10.2.2 The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer in the frequency range referred to in Table 7.10.2. Unused coaxial connector of the LISN was terminated with 50 Ohm. Quasi-peak and average detectors were used throughout the testing.

7.10.2.3 The position of the device cables was varied to determine maximum emission level.

7.10.2.4 The worst test results (the lowest margins) were recorded in Table 7.10.2 and shown in the associated plots.

Test specification:	Section 15.207(a)/ RSS-Gen section 7.2.2, Conducted emission		
Test procedure:	ANSI C63.4, Section 13.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	10/20/2010		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 50 %	Power Supply: 120 VAC
Remarks:			

Figure 7.10.1 Setup for conducted emission measurements, table-top equipment



Photograph 7.10.1 Setup for conducted emission measurements

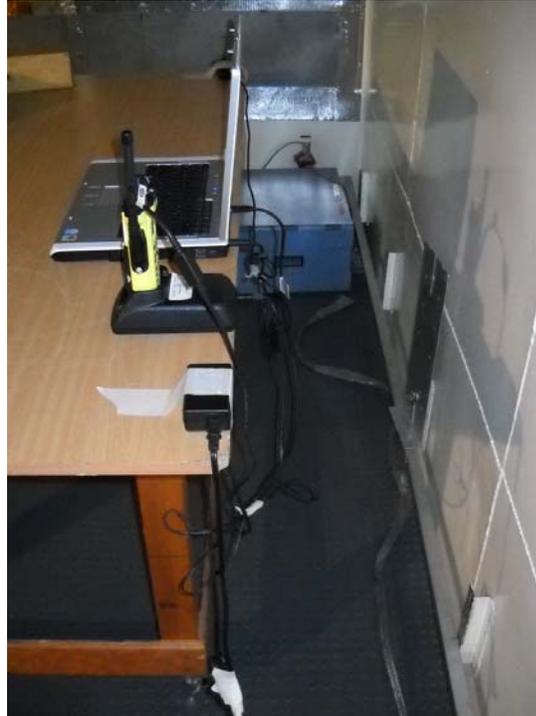




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Test specification:	Section 15.207(a)/ RSS-Gen section 7.2.2, Conducted emission		
Test procedure:	ANSI C63.4, Section 13.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	10/20/2010		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 50 %	Power Supply: 120 VAC
Remarks:			

Photograph 7.10.2 Setup for conducted emission measurements





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Test specification: Section 15.207(a)/ RSS-Gen section 7.2.2, Conducted emission			
Test procedure: ANSI C63.4, Section 13.1.3			
Test mode: Compliance	Verdict: PASS		
Date: 10/20/2010			
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 50 %	Power Supply: 120 VAC
Remarks:			

Table 7.10.2 Conducted emission test results

LINE: AC mains
 EUT OPERATING MODE: Transmit
 EUT SET UP: TABLE-TOP
 TEST SITE: SHIELDED ROOM
 DETECTORS USED: PEAK / QUASI-PEAK / AVERAGE
 FREQUENCY RANGE: 150 kHz - 30 MHz
 RESOLUTION BANDWIDTH: 9 kHz

Frequency, MHz	Peak emission, dB(μV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*	Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*		
0.180445	47.03	45.77	64.51	-18.74	40.07	54.51	-14.44	L1	Pass
0.283860	42.65	40.18	60.76	-20.58	32.95	50.76	-17.81		
3.637990	45.33	37.71	56.00	-18.29	23.40	46.00	-22.60		
3.857045	44.58	37.63	56.00	-18.37	22.89	46.00	-23.11		
23.998995	48.46	47.65	60.00	-12.35	46.56	50.00	-3.44		
26.419770	49.96	46.84	60.00	-13.16	38.24	50.00	-11.76		
0.175695	48.07	46.01	64.75	-18.74	40.48	54.75	-14.27	L2	Pass
0.278235	44.25	42.65	60.93	-18.28	35.51	50.93	-15.42		
3.655310	47.16	39.14	56.00	-16.86	22.12	46.00	-23.88		
3.863820	46.65	38.72	56.00	-17.28	22.08	46.00	-23.92		
23.998970	48.12	47.47	60.00	-12.53	46.42	50.00	-3.58		
26.417365	49.18	46.71	60.00	-13.29	38.19	50.00	-11.81		

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

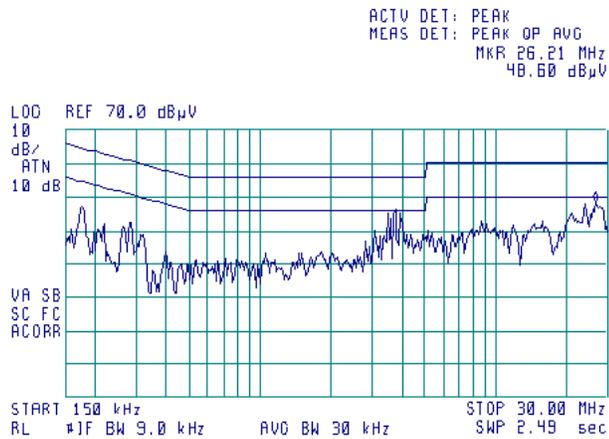
HL 0787	HL 1425	HL 1513	HL 2888	HL 3612			
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Full description is given in Appendix A.

Test specification: Section 15.207(a)/ RSS-Gen section 7.2.2, Conducted emission			
Test procedure: ANSI C63.4, Section 13.1.3			
Test mode: Compliance	Verdict: PASS		
Date: 10/20/2010			
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 50 %	Power Supply: 120 VAC
Remarks:			

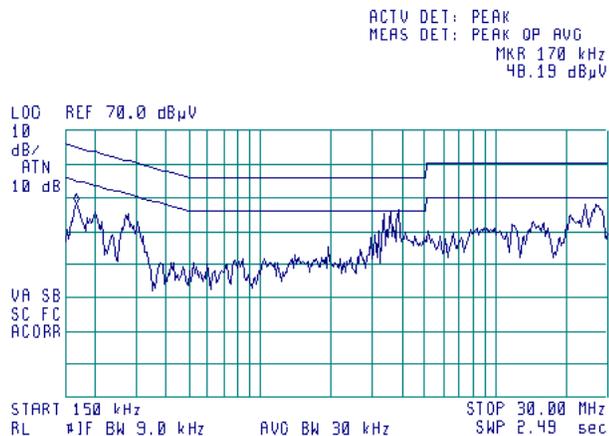
Plot 7.10.1 Conducted emission measurements

LINE: L1
EUT OPERATING MODE: Transmit
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Plot 7.10.2 Conducted emission measurements

LINE: L2
EUT OPERATING MODE: Transmit
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Test specification:	Section 15.107/ RSS-Gen section 7.2.2, Class B, Conducted emission at AC power port		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	10/20/2010		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 50 %	Power Supply: 120 VAC
Remarks:			

8 Emission tests according to 47CFR part 15 subpart B and RSS-Gen requirements

8.1 Conducted emissions

8.1.1 General

This test was performed to measure common mode conducted emissions at the mains power port. Specification test limits are given in Table 8.1.1. The worst test results (the lowest margins) were recorded in Table 8.1.2 and shown in the associated plots.

Table 8.1.1 Limits for conducted emissions

Frequency, MHz	Class B limit, dB(μV)		Class A limit, dB(μV)	
	QP	AVRG	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*	79	66
0.5 - 5.0	56	46	73	60
5.0 - 30	60	50	73	60

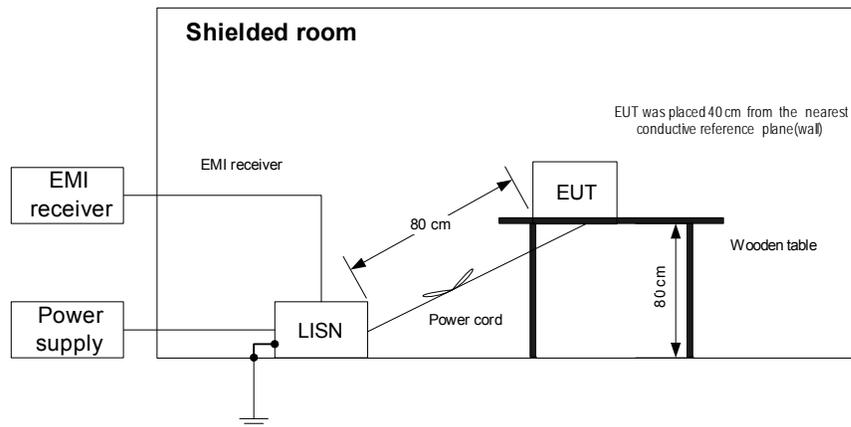
* The limit decreases linearly with the logarithm of frequency.

8.1.2 Test procedure

- 8.1.2.1 The EUT was set up as shown in Figure 8.1.1 and associated photographs, energized and the performance check was conducted.
- 8.1.2.2 The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer in the frequency range referred to in Table 8.1.2. Unused coaxial connector of the LISN was terminated with 50 Ohm. Quasi-peak and average detectors were used throughout the testing.
- 8.1.2.3 The position of the device cables was varied to determine maximum emission level.

Test specification:	Section 15.107/ RSS-Gen section 7.2.2, Class B, Conducted emission at AC power port		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	10/20/2010		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 50 %	Power Supply: 120 VAC
Remarks:			

Figure 8.1.1 Setup for conducted emission measurements, table-top equipment



Photograph 8.1.1 Setup for conducted emission measurements

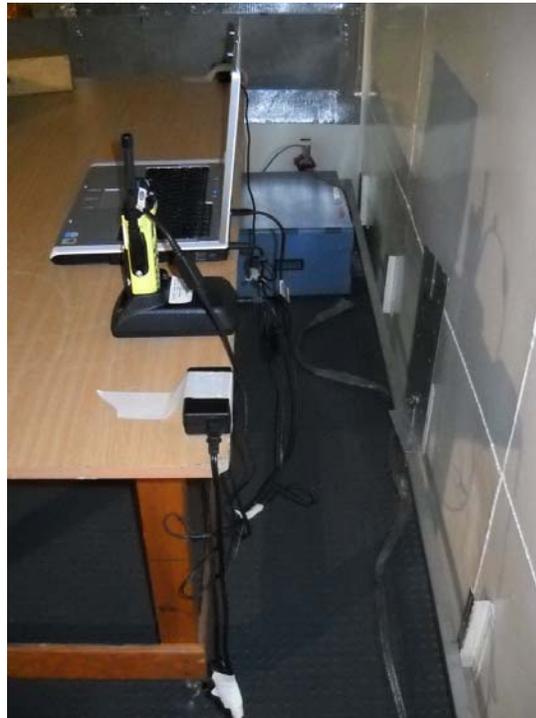




HERMON LABORATORIES

Test specification:	Section 15.107/ RSS-Gen section 7.2.2, Class B, Conducted emission at AC power port		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	10/20/2010		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 50 %	Power Supply: 120 VAC
Remarks:			

Photograph 8.1.2 Setup for conducted emission measurements



Test specification:	Section 15.107/ RSS-Gen section 7.2.2, Class B, Conducted emission at AC power port		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict: PASS	
Date:	10/20/2010		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 50 %	Power Supply: 120 VAC
Remarks:			

Table 8.1.2 Conducted emission test results

LINE: AC mains
LIMIT: Class B
EUT OPERATING MODE: Receive and battery charging
EUT SET UP: TABLE-TOP
TEST SITE: SHIELDED ROOM
DETECTORS USED: PEAK / QUASI-PEAK / AVERAGE
FREQUENCY RANGE: 150 kHz - 30 MHz
RESOLUTION BANDWIDTH: 9 kHz

Frequency, MHz	Peak emission, dB(µV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*	Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*		
0.178965	47.03	45.50	64.59	-19.09	40.02	54.59	-14.57	L1	Pass
3.809110	45.05	38.72	56.00	-17.28	24.61	46.00	-21.39		
5.003670	40.00	34.50	60.00	-25.50	26.83	50.00	-23.17		
20.873766	46.76	43.44	60.00	-16.56	34.71	50.00	-15.29		
23.998338	48.54	47.70	60.00	-12.30	46.63	50.00	-3.37		
26.418733	49.91	46.79	60.00	-13.21	38.45	50.00	-11.55		
0.179785	47.67	46.36	64.55	-18.19	40.84	54.55	-13.71	L2	Pass
0.287115	43.14	41.74	60.66	-18.92	35.28	50.66	-15.38		
3.803555	47.91	39.39	56.00	-16.61	25.48	46.00	-20.52		
20.800475	45.78	42.36	60.00	-17.64	32.14	50.00	-17.86		
23.998835	48.28	47.58	60.00	-12.42	46.45	50.00	-3.55		
26.599528	49.44	46.19	60.00	-13.81	35.00	50.00	-15.00		

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

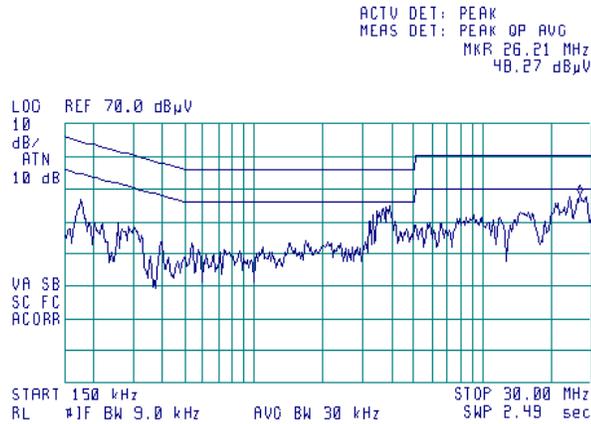
HL 0787	HL 1425	HL 1513	HL 2888	HL 3612			
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Full description is given in Appendix A.

Test specification:	Section 15.107/ RSS-Gen section 7.2.2, Class B, Conducted emission at AC power port		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	10/20/2010		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 50 %	Power Supply: 120 VAC
Remarks:			

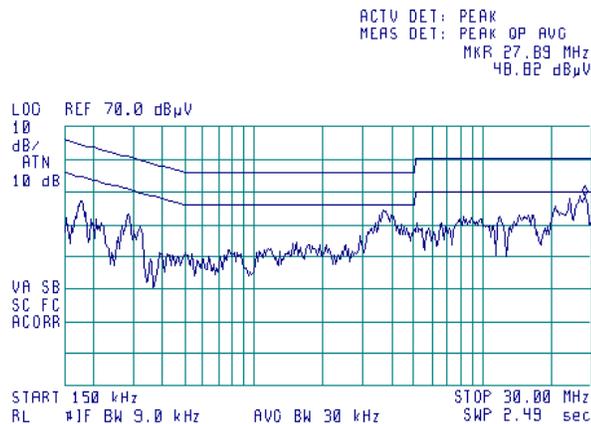
Plot 8.1.1 Conducted emission measurements

LINE: L1
LIMIT: Class B
EUT OPERATING MODE: Receive and battery charging
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Plot 8.1.2 Conducted emission measurements

LINE: L2
LIMIT: Class B
EUT OPERATING MODE: Receive and battery charging
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Test specification:		Section 15.109/ RSS-Gen section 7.2.3.2, Radiated emission	
Test procedure:		ANSI C63.4, Sections 11.6 and 12.1.4	
Test mode:	Compliance	Verdict:	PASS
Date:	10/18/2010		
Temperature: 21 °C	Air Pressure: 1012 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks:			

8.2 Radiated emission measurements

8.2.1 General

This test was performed to measure radiated emissions from the EUT enclosure. Specification test limits are given in Table 8.2.1.

Table 8.2.1 Radiated emission test limits

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 - 88	29.5*	40.0	39.0	49.5*
88 - 216	33.0*	43.5	43.5	54.0*
216 - 960	35.5*	46.0	46.4	56.9*
Above 960	43.5*	54.0	49.5	60.0*

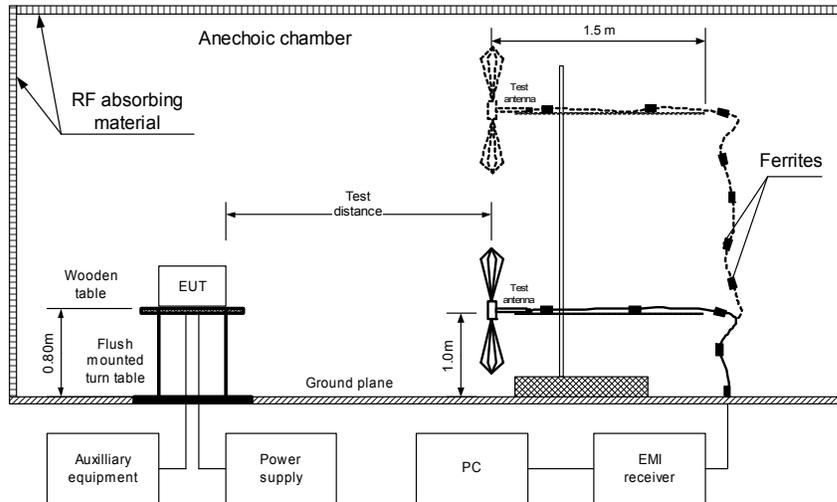
* The limit for test distance other than specified was calculated using the inverse linear distance extrapolation factor as follows: $Lim_{S_2} = Lim_{S_1} + 20 \log(S_1/S_2)$, where S_1 and S_2 – standard defined and test distance respectively in meters.

8.2.2 Test procedure

- 8.2.2.1 The EUT was set up as shown in Figure 8.2.1 and associated photograph/s, energized and the performance check was conducted.
- 8.2.2.2 The specified frequency range was investigated with biconilog antenna connected to 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 and the EUT cables position was varied.
- 8.2.2.3 The worst test results (the lowest margins) were recorded in Table 8.2.2 and shown in the associated plots.

Test specification:	Section 15.109/ RSS-Gen section 7.2.3.2, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	10/18/2010		
Temperature: 21 °C	Air Pressure: 1012 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks:			

Figure 8.2.1 Setup for radiated emission measurements in anechoic chamber, table-top equipment



Photograph 8.2.1 Setup for radiated emission measurements, general view





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Test specification:	Section 15.109/ RSS-Gen section 7.2.3.2, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	10/18/2010		
Temperature: 21 °C	Air Pressure: 1012 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks:			

Photograph 8.2.2 Setup for final radiated emission measurements, EUT cabling





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Test specification:		Section 15.109/ RSS-Gen section 7.2.3.2, Radiated emission	
Test procedure:		ANSI C63.4, Sections 11.6 and 12.1.4	
Test mode:	Compliance	Verdict:	PASS
Date:	10/18/2010		
Temperature: 21 °C	Air Pressure: 1012 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks:			

Table 8.2.2 Radiated emission test results

EUT SET UP: TABLE-TOP
LIMIT: Class B
EUT OPERATING MODE: Receive
TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / QUASI-PEAK
FREQUENCY RANGE: 30 MHz – 1000 MHz
RESOLUTION BANDWIDTH: 120 kHz

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*				
42.600000	37.39	31.62	40.00	-8.38	Vertical	1.0	225	Pass
216.000000	42.11	39.06	43.50	-4.44	Horizontal	1.2	180	
240.000000	43.46	40.94	46.00	-5.06	Horizontal	1.2	135	
432.007500	42.93	40.05	46.00	-5.95	Vertical	1.0	180	
528.007500	43.57	42.52	46.00	-3.48	Vertical	1.0	180	
829.576250	39.20	36.37	46.00	-9.63	Vertical	1.1	90	

TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / AVERAGE
FREQUENCY RANGE: 1000 MHz -
RESOLUTION BANDWIDTH: 1000 kHz

Frequency, MHz	Peak			Average			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
	Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
1333.00	56.90	74.00	-18.10	52.00	54.00	-2.00	Vertical	1.0	45	Pass
1595.00	53.90	74.00	-20.10	41.30	54.00	-12.70	Vertical	1.1	90	
1861.00	53.40	74.00	-20.60	35.70	54.00	-18.30	Vertical	1.0	180	
2130.00	54.60	74.00	-19.40	44.80	54.00	-9.20	Vertical	1.0	160	

*- Margin = Measured emission - specification limit.
**- EUT front panel refer to 0 degrees position of turntable.

Reference numbers of test equipment used

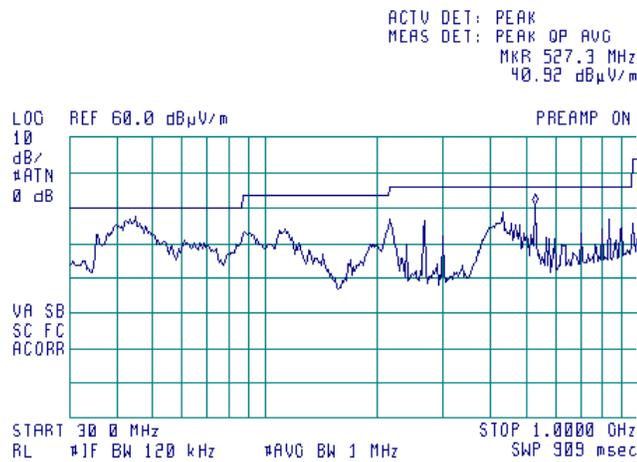
HL 0521	HL 0604	HL 2432	HL 2871	HL 2909	HL 3121	HL 3883	
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Full description is given in Appendix A.

Test specification:		Section 15.109/ RSS-Gen section 7.2.3.2, Radiated emission	
Test procedure:		ANSI C63.4, Sections 11.6 and 12.1.4	
Test mode:	Compliance	Verdict:	PASS
Date:	10/18/2010		
Temperature: 21 °C	Air Pressure: 1012 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks:			

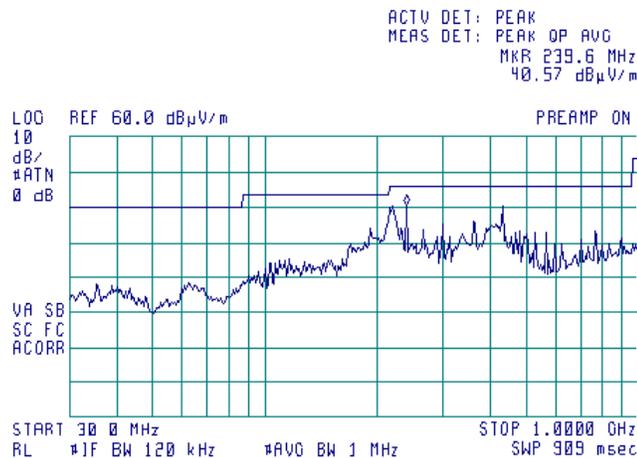
Plot 8.2.1 Radiated emission measurements in 30 - 1000 MHz range, vertical antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive



Plot 8.2.2 Radiated emission measurements in 30 - 1000 MHz range, horizontal antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive



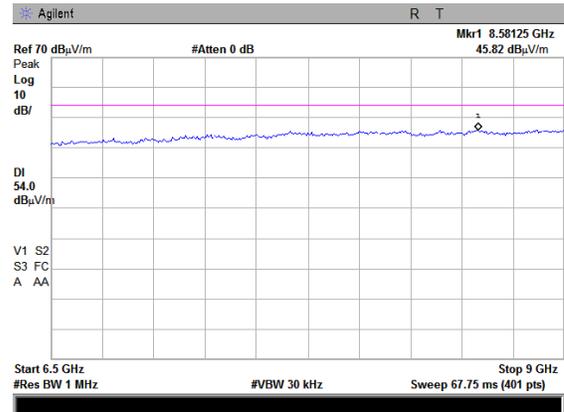
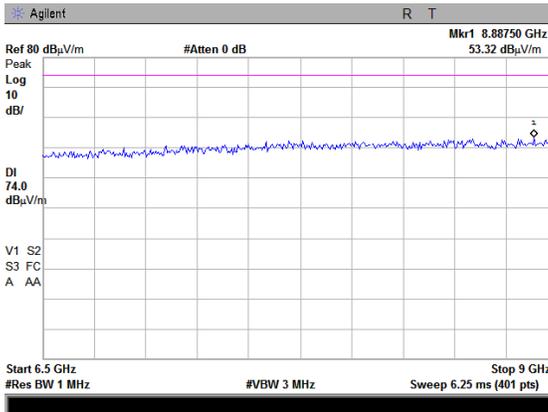
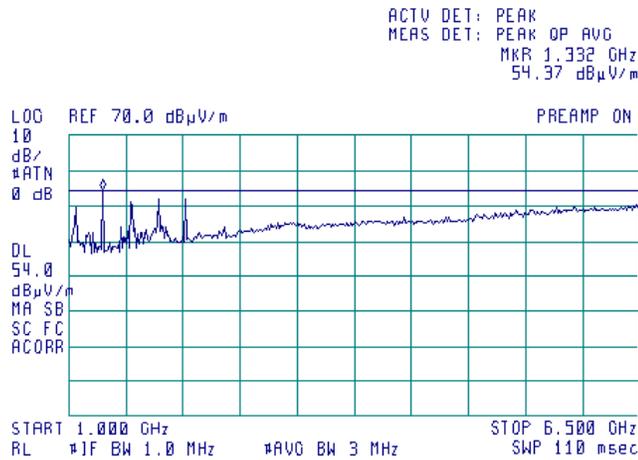


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Test specification: Section 15.109/ RSS-Gen section 7.2.3.2, Radiated emission			
Test procedure: ANSI C63.4, Sections 11.6 and 12.1.4			
Test mode: Compliance	Verdict: PASS		
Date: 10/18/2010			
Temperature: 21 °C	Air Pressure: 1012 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks:			

Plot 8.2.3 Radiated emission measurements above 1000 MHz, vertical antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive





HERMON LABORATORIES

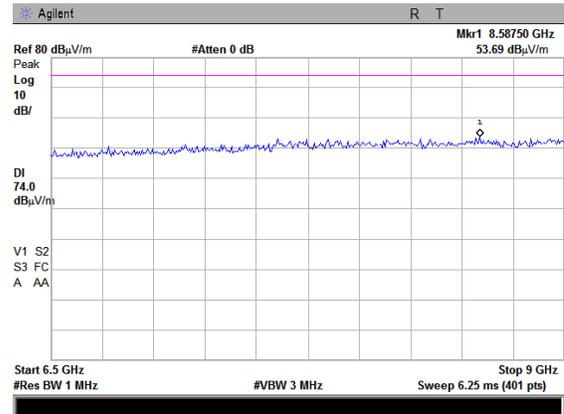
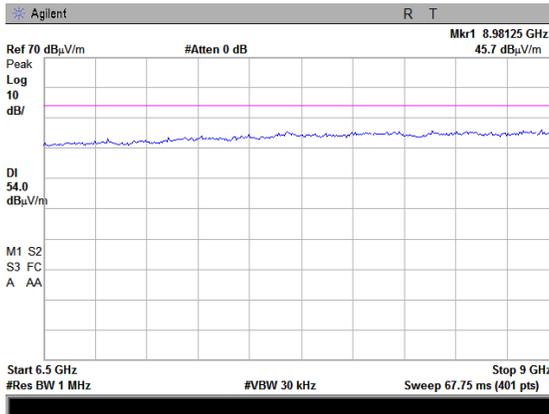
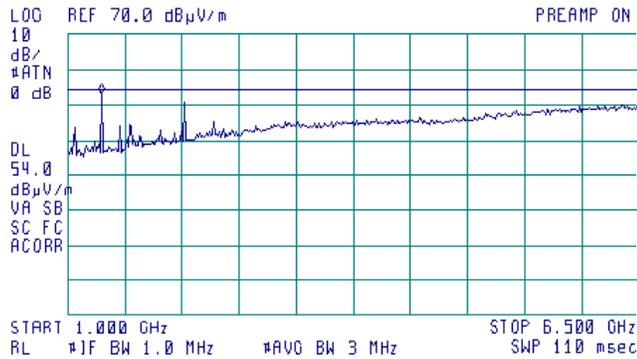
Test specification: Section 15.109/ RSS-Gen section 7.2.3.2, Radiated emission			
Test procedure: ANSI C63.4, Sections 11.6 and 12.1.4			
Test mode: Compliance	Verdict: PASS		
Date: 10/18/2010			
Temperature: 21 °C	Air Pressure: 1012 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks:			

Plot 8.2.4 Radiated emission measurements above 1000 MHz, horizontal antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive



ACTV DET: PEAK
MERS DET: PEAK OP AVG
MKR 1.332 GHz
53.06 dBμV/m



Test specification: RSS-Gen section 7.2.3.1, Conducted emission at receiver antenna port			
Test procedure: ANSI C63.4, Section 12.1.5			
Test mode:	Compliance	Verdict: PASS	
Date:	10/27/2010		
Temperature: 24 °C	Air Pressure: 1019 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

8.3 Receiver spurious emissions

8.3.1 General

This test was performed to measure spurious emissions at RF antenna connector of receiver. Specification test limits are given in Table 8.3.1.

Table 8.3.1 Antenna conducted measurement spurious emission limits

Frequency range, MHz	Resolution bandwidth, kHz	Power of spurious	
		nW	dBm
30 – 1000	100	2	-57
1000 – 3 rd harmonic*	1000	5	-53

* - harmonic of the highest frequency the EUT generates, uses, operates or tunes to (without exceeding 40 GHz).

8.3.2 Test procedure

8.3.2.1 The EUT was set up as shown in Figure 8.3.1, energized and its proper operation was checked.

8.3.2.2 The spurious emission was measured with spectrum analyzer as provided in Table 8.3.2 and the associated plots.

Figure 8.3.1 Spurious emission test setup for single antenna mode





Test specification: RSS-Gen section 7.2.3.1, Conducted emission at receiver antenna port	
Test procedure: ANSI C63.4, Section 12.1.5	
Test mode: Compliance	Verdict: PASS
Date: 10/27/2010	
Temperature: 24 °C	Air Pressure: 1019 hPa
Relative Humidity: 45 %	
Power Supply: 120 VAC	
Remarks:	

Table 8.3.2 Spurious emission test results

INVESTIGATED FREQUENCY RANGE: 30 – 7500 MHz
 RECEIVER OPERATING FREQUENCY: 2402 - 2480 MHz
 EUT OPERATING MODE: Receive at 3545.0 MHz (mid frequency)
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 100 kHz (below 1000 MHz)
 1000 kHz (above 1000 MHz)
 VIDEO BANDWIDTH: 300 kHz (below 1000 MHz)
 3000 kHz (above 1000 MHz)

Frequency, MHz	Spurious emission, dBm	Limit, dBm	Margin, dB	Verdict
No emissions were found				Pass

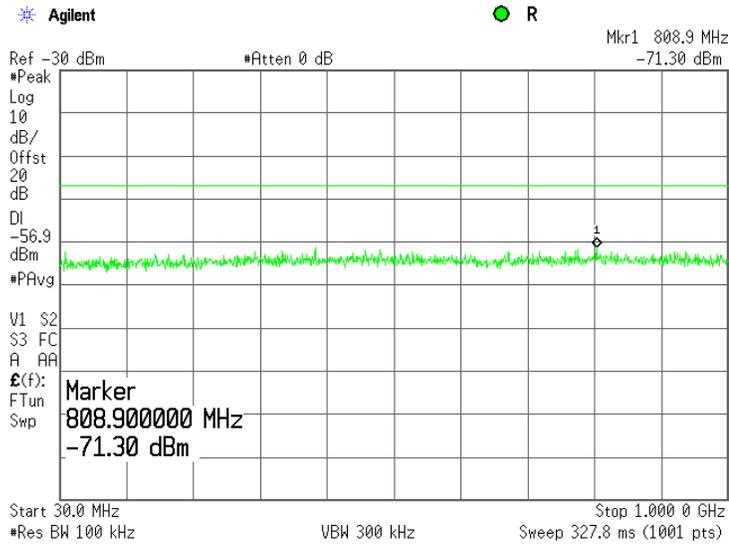
Reference numbers of test equipment used

HL 3440	HL 3472	HL 3784	HL 3818				
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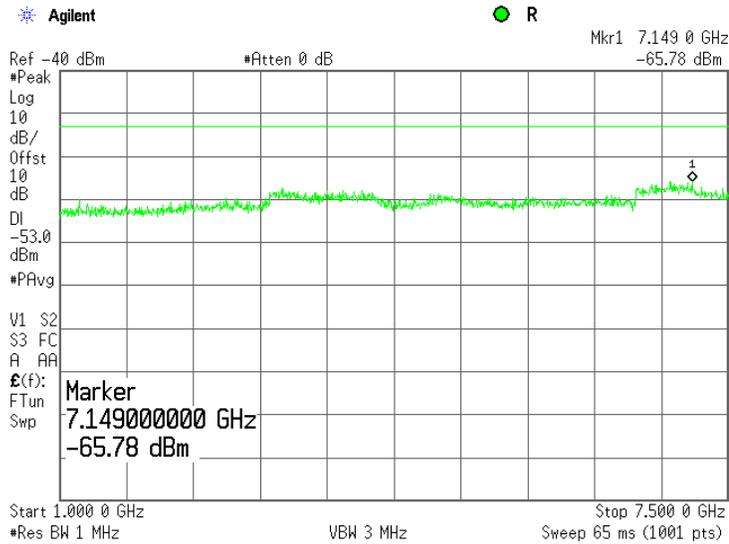
Full description is given in Appendix A.

Test specification:		RSS-Gen section 7.2.3.1, Conducted emission at receiver antenna port	
Test procedure:		ANSI C63.4, Section 12.1.5	
Test mode:	Compliance	Verdict:	PASS
Date:	10/27/2010		
Temperature: 24 °C	Air Pressure: 1019 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.1 Spurious emission test results in 30 – 1000MHz frequency range



Plot 8.3.2 Spurious emission test results in 1000 – 7500MHz frequency range



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-10	29-Jun-11
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	25-Aug-10	25-Aug-11
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	11-Jan-10	11-Jan-11
0768	Antenna Standard Gain Horn, 18-26.5 GHz, WR-42, 25 dB gain	Quinstar Technology	QWH-4200-BA	110	23-Dec-08	23-Dec-11
0787	Transient Limiter 9 kHz-200 MHz	Hewlett Packard	11947A	3107A018 77	18-Oct-10	18-Oct-11
1425	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1426, HL1427	Agilent Technologies	8542E	3710A002 22, 3705A002 04	24-Aug-10	24-Aug-11
1513	Cable RF, 8 m, BNC/BNC	Belden	M17/167 MIL-C-17	1513	01-Sep-10	01-Sep-11
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W	EMC Test Systems	3115	9911-5964	11-Jun-10	11-Jun-11
2432	Antenna, Double-Ridged Waveguide Horn 1-18 GHz	EMC Test Systems	3115	00027177	11-Jun-10	11-Jun-11
2780	EMC analyzer, 100 Hz to 26.5 GHz	Agilent Technologies	E7405A	MY451024 62	07-Jul-10	07-Jul-11
2870	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155-00	2870	04-Aug-10	04-Aug-11
2871	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-8155-00	2871	14-Sep-10	14-Sep-11
2888	LISN Two-line V-Network 50 Ohm / 50 uH + 5 Ohm, 16A, MIL STD 461E, CISPR 16-1	Rolf Heine	NNB-2/16Z	02/10018	07-Jul-10	07-Jul-11
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY414447 62	07-May-10	07-May-11
2951	Cable, RF, 18 GHz, 0.9 m, SMA-SMA	Gore	10020014	NA	04-Oct-10	04-Oct-11
3121	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155-00	3121	30-Dec-09	30-Dec-10
3440	Precision Fixed Attenuator, 50 Ohm, 5 W, 20 dB, DC to 18 GHz	Mini-Circuits	BW-S20W5+	NA	07-Mar-10	07-Mar-11
3472	Cable, Coax, Microwave, DC-18 GHz, SMA-SMA, 1.0 m	Gore	GORE 65474	1003478	09-May-10	09-May-11
3535	Amplifier, low noise, 18 to 40 GHz	Quinstar Technology	QLJ-18404537-J0	111590030 01	06-Dec-09	06-Dec-10
3612	Cable RF, 17.5 m, N type-N type	Teldor	RG-214/U	NA	02-Dec-09	02-Dec-10
3622	Cable RF, 6.0 m, N type-N type, DC-6.5 GHz	Alpha Wire	RG 214/U	NA	27-May-10	27-May-11



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HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
3784	Precision Fixed Attenuator, 50 Ohm, 5 W, 10 dB, DC to 18 GHz	Mini-Circuits	BW-S10W5+	NA	07-Dec-09	07-Dec-10
3818	PSA Series Spectrum Analyzer, 3 Hz- 44 GHz	Agilent Technologies	E4446A	MY48250288	26-Sep-10	26-Sep-11
3874	Pressure Transducer, (0-30) PSI, (0-5) V	OMEGA	PX419-030A5V	413906	20-Jan-10	20-Jan-12
3883	Preamplifier, 0.1 to 18 GHz, Gain 25 dB, N-type (f) in, N-type (m) out.	Agilent Technologies	87405C	MY47010406	13-Jan-10	13-Jan-11
3901	Microwave Cable Assembly, 40.0 GHz, 3.5 m, SMA/SMA	Huber-Suhner	SUCOFLEX 102A	1225/2A	07-Feb-10	07-Feb-11

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). The FCC Designation Number is US1003.

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website: www.hermonlabs.com

Person for contact: Mr. Alex Usoskin, CEO.

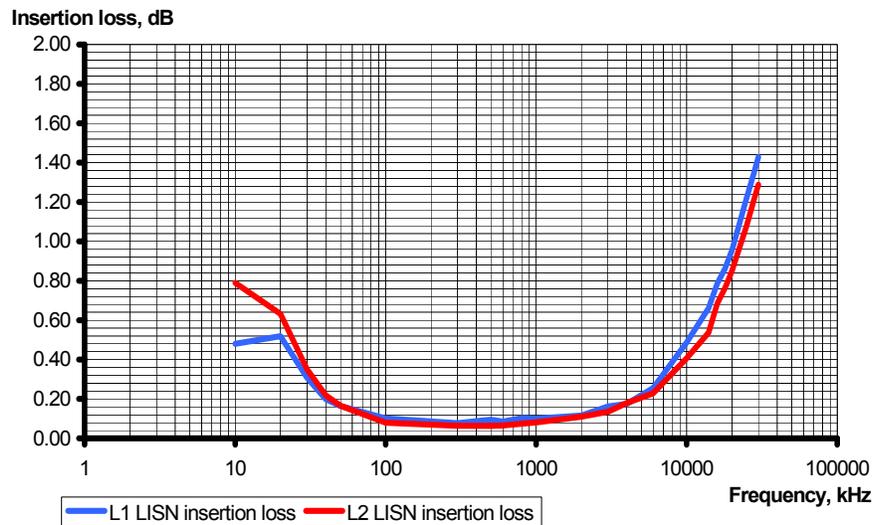
12 APPENDIX D Specification references

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
RSS-Gen Issue 2:2007	General Requirements and Information for the Certification of Radiocommunication Equipment

13 APPENDIX E Test equipment correction factors

Correction factor
Line impedance stabilization network
Model NNB-2/16Z, Rolf Heine, HL 2888

Frequency, kHz	Insertion loss, dB		Measurement Uncertainty, dB
	L1	N	
10	0.48	0.79	±0.6
20	0.52	0.63	
30	0.31	0.35	
40	0.20	0.22	
50	0.16	0.17	
100	0.10	0.08	
300	0.08	0.06	
500	0.10	0.06	
600	0.09	0.07	
800	0.10	0.07	
1000	0.10	0.08	
2000	0.12	0.11	
3000	0.16	0.14	
4000	0.17	0.18	
6000	0.26	0.23	
10000	0.49	0.41	
14000	0.66	0.54	
16000	0.79	0.69	
18000	0.86	0.76	
20000	0.96	0.85	
25000	1.22	1.08	
28000	1.35	1.21	
30000	1.43	1.29	



**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
Standard gain horn antenna
Quinstar Technology
Model QWH
Ser.No.110, HL 0768**

Frequency min, GHz	Frequency max, GHz	Antenna factor, dB(1/m)
18.000	26.500	32.01
26.500	40.000	35.48
40.000	60.000	39.03
60.000	90.000	42.55
90.000	140.000	46.23
140.000	220.000	50.11

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).

**Antenna factor
Double-ridged guide horn antenna
Model 3115, serial number: 00027177, HL 2432**

Frequency, MHz	Antenna factor. dB(1/m)
1000.0	24.7
1500.0	25.7
2000.0	27.8
2500.0	28.9
3000.0	30.7
3500.0	31.8
4000.0	33.0
4500.0	32.8
5000.0	34.2
5500.0	34.9
6000.0	35.2
6500.0	35.4
7000.0	36.3
7500.0	37.3
8000.0	37.5
8500.0	38.0
9000.0	38.3
9500.0	38.3
10000.0	38.7
10500.0	38.7
11000.0	38.9
11500.0	39.5
12000.0	39.5
12500.0	39.4
13000.0	40.5
13500.0	40.8
14000.0	41.5
14500.0	41.3
15000.0	40.2
15500.0	38.7
16000.0	38.5
16500.0	39.8
17000.0	41.9
17500.0	45.8
18000.0	49.1

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).

Cable loss
Cable coaxial, Huber-Suhner, 18 GHz, 6.4 m, SMA - SMA, model 198-9155-00,
HL 2870

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.09	5750	2.49	12000	3.71
30	0.17	6000	2.53	12250	3.81
100	0.32	6250	2.58	12500	3.84
250	0.49	6500	2.64	12750	3.88
500	0.70	6750	2.69	13000	3.92
750	0.86	7000	2.75	13250	3.96
1000	1.00	7250	2.80	13500	3.98
1250	1.11	7500	2.87	13750	4.01
1500	1.23	7750	2.93	14000	4.03
1750	1.34	8000	2.94	14250	4.09
2000	1.41	8250	3.00	14500	4.08
2250	1.51	8500	3.04	14750	4.10
2500	1.59	8750	3.08	15000	4.15
2750	1.68	9000	3.14	15250	4.22
3000	1.76	9250	3.16	15500	4.31
3250	1.83	9500	3.22	15750	4.42
3500	1.91	9750	3.26	16000	4.48
3750	1.97	10000	3.36	16250	4.54
4000	2.05	10250	3.41	16500	4.56
4250	2.11	10500	3.46	16750	4.57
4500	2.18	10750	3.50	17000	4.59
4750	2.24	11000	3.54	17250	4.66
5000	2.30	11250	3.58	17500	4.70
5250	2.36	11500	3.63	17750	4.76
5500	2.43	11750	3.66	18000	4.72

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, Gore, 18 GHz, 0.9 m, SMA-SMA, S/N 10020014
HL 2951

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.07	5750	0.77	12000	1.23
30	0.06	6000	0.78	12250	1.25
100	0.09	6250	0.81	12500	1.26
250	0.15	6500	0.83	12750	1.26
500	0.21	6750	0.84	13000	1.30
750	0.27	7000	0.85	13250	1.30
1000	0.31	7250	0.88	13500	1.30
1250	0.36	7500	0.88	13750	1.29
1500	0.38	7750	0.93	14000	1.23
1750	0.42	8000	0.92	14250	1.32
2000	0.44	8250	0.94	14500	1.27
2250	0.47	8500	0.99	14750	1.27
2500	0.50	8750	0.97	15000	1.34
2750	0.52	9000	1.01	15250	1.36
3000	0.54	9250	1.05	15500	1.35
3250	0.57	9500	1.08	15750	1.36
3500	0.58	9750	1.10	16000	1.43
3750	0.61	10000	1.09	16250	1.38
4000	0.63	10250	1.09	16500	1.42
4250	0.66	10500	1.07	16750	1.49
4500	0.68	10750	1.10	17000	1.53
4750	0.70	11000	1.09	17250	1.59
5000	0.71	11250	1.09	17500	1.65
5250	0.74	11500	1.13	17750	1.82
5500	0.77	11750	1.12	18000	2.09

Cable loss
Microwave Cable Assembly, 18 GHz, 6.4 m, SMA – SMA, Huber-Suhner, model 198-9155-00
HL 3121

Frequency, MHz	Cable loss, dB								
10	0.08	3600	2.10	7400	3.08	11200	3.85	15100	4.58
30	0.18	3700	2.14	7500	3.11	11300	3.85	15200	4.60
50	0.26	3800	2.18	7600	3.14	11400	3.86	15300	4.63
100	0.34	3900	2.19	7700	3.16	11500	3.86	15400	4.65
200	0.47	4000	2.25	7800	3.18	11600	3.87	15500	4.71
300	0.59	4100	2.25	7900	3.20	11700	3.85	15600	4.70
400	0.66	4200	2.28	8000	3.22	11800	3.96	15700	4.69
500	0.75	4300	2.35	8100	3.26	11900	3.92	15800	4.71
600	0.83	4400	2.35	8200	3.27	12000	3.92	15900	4.74
700	0.90	4500	2.38	8300	3.29	12100	3.94	16000	4.69
800	0.96	4600	2.43	8400	3.30	12200	3.94	16100	4.72
900	1.02	4700	2.43	8500	3.31	12300	3.99	16200	4.71
1000	1.07	4800	2.45	8600	3.33	12400	4.02	16300	4.74
1100	1.12	4900	2.48	8700	3.35	12500	4.10	16400	4.74
1200	1.15	5000	2.55	8800	3.36	12600	4.09	16500	4.75
1300	1.22	5100	2.54	8900	3.38	12700	4.15	16600	4.78
1400	1.28	5200	2.56	9000	3.40	12800	4.15	16700	4.86
1500	1.29	5300	2.58	9100	3.41	12900	4.08	16800	4.84
1600	1.36	5400	2.61	9200	3.45	13000	4.21	16900	4.83
1700	1.40	5500	2.64	9300	3.48	13100	4.19	17000	4.86
1800	1.45	5600	2.69	9400	3.52	13200	4.29	17100	4.83
1900	1.51	5700	2.67	9500	3.54	13300	4.24	17200	4.90
2000	1.50	5800	2.71	9600	3.59	13400	4.26	17300	4.91
2100	1.56	5900	2.73	9700	3.59	13500	4.26	17400	4.94
2200	1.59	6000	2.75	9800	3.62	13600	4.29	17500	4.93
2300	1.63	6100	2.81	9900	3.70	13700	4.35	17600	4.93
2400	1.73	6200	2.80	10000	3.70	13800	4.31	17700	5.00
2500	1.73	6300	2.82	10100	3.72	13900	4.29	17800	5.01
2600	1.78	6400	2.85	10200	3.73	14000	4.32	17900	5.00
2700	1.84	6500	2.87	10300	3.75	14100	4.33	18000	5.00
2800	1.84	6600	2.90	10400	3.76	14200	4.34		
2900	1.91	6700	2.91	10500	3.77	14300	4.36		
3000	1.91	6800	2.94	10600	3.79	14400	4.38		
3100	1.97	6900	2.96	10700	3.80	14600	4.42		
3200	1.98	7000	2.98	10800	3.81	14700	4.42		
3300	2.04	7100	3.01	10900	3.81	14800	4.55		
3400	2.04	7200	3.02	11000	3.83	14900	4.55		
3500	2.10	7300	3.04	11100	3.84	15000	4.55		

Cable loss
Cable coaxial, Microwave, SMA-SMA, 18 GHz, 1.0 m
Gore, HL 3472

Frequency, MHz	Cable loss, dB						
10	0.01	5000	0.47	10200	0.72	15500	0.75
30	0.03	5100	0.47	10300	0.67	15600	0.89
50	0.04	5200	0.47	10400	0.77	15700	0.82
100	0.04	5300	0.47	10500	0.67	15800	0.89
200	0.08	5400	0.49	10600	0.74	15900	0.89
300	0.11	5500	0.48	10700	0.81	16000	0.93
400	0.11	5600	0.49	10800	0.77	16100	0.90
500	0.12	5700	0.49	10900	0.82	16200	0.92
600	0.14	5800	0.51	11000	0.86	16300	0.90
700	0.15	5900	0.50	11100	0.78	16400	0.94
800	0.16	6000	0.51	11200	0.82	16500	0.93
900	0.18	6100	0.53	11300	0.77	16600	0.95
1000	0.17	6200	0.52	11400	0.84	16700	0.98
1100	0.19	6300	0.53	11500	0.74	16800	1.00
1200	0.22	6400	0.54	11600	0.81	16900	0.94
1300	0.21	6500	0.55	11700	0.73	17000	1.00
1400	0.22	6600	0.54	11800	0.75	17100	0.93
1500	0.23	6700	0.57	11900	0.73	17200	1.00
1600	0.24	6800	0.54	12000	0.75	17300	0.93
1700	0.24	6900	0.58	12100	0.66	17400	0.93
1800	0.25	7000	0.58	12200	0.66	17500	0.96
1900	0.26	7100	0.58	12300	0.72	17600	0.94
2000	0.28	7200	0.61	12400	0.64	17700	0.99
2100	0.27	7300	0.59	12500	0.75	17800	0.97
2200	0.29	7400	0.55	12600	0.67	17900	0.90
2300	0.29	7500	0.63	12700	0.75	18000	0.78
2400	0.30	7600	0.60	12800	0.66		
2500	0.30	7700	0.61	12900	0.81		
2600	0.32	7800	0.64	13000	0.75		
2700	0.32	7900	0.60	13100	0.80		
2800	0.33	8000	0.58	13200	0.80		
2900	0.34	8100	0.61	13300	0.81		
3000	0.34	8200	0.62	13400	0.88		
3100	0.35	8300	0.62	13500	0.82		
3200	0.35	8400	0.68	13600	1.00		
3300	0.36	8500	0.63	13700	0.93		
3400	0.37	8600	0.61	13800	0.86		
3500	0.38	8700	0.63	13900	0.84		
3600	0.38	8800	0.62	14000	1.00		
3700	0.40	8900	0.64	14100	0.86		
3800	0.40	9000	0.62	14200	0.98		
3900	0.40	9100	0.64	14300	0.99		
4000	0.40	9200	0.62	14400	0.82		
4100	0.43	9300	0.62	14600	0.89		
4200	0.43	9400	0.62	14700	0.84		
4300	0.43	9500	0.63	14800	0.90		
4400	0.44	9600	0.64	14900	0.89		
4500	0.45	9700	0.60	15000	0.89		
4600	0.45	9800	0.65	15100	0.86		
4700	0.46	9900	0.60	15200	0.87		
4800	0.46	10000	0.67	15300	0.86		
4900	0.46	10100	0.69	15400	0.87		

Cable loss
Cable coaxial, RG-214/U, N type-N type, 17 m
Teldor, HL 3612

Frequency, GHz	Cable loss, dB
0.1	0.05
0.5	0.07
1	0.10
3	0.22
5	0.29
10	0.39
30	0.68
50	0.90
100	1.27
150	1.58
200	1.80
250	2.12
300	2.36
350	2.60
400	2.82
450	2.99
500	3.23
550	3.40
600	3.56
650	3.71
700	3.90
750	4.04
800	4.23
850	4.39
900	4.55
950	4.65
1000	4.79

Cable loss
Cable coaxial, RG-214/U, N type-N type, 6 m
Alpha Wire, HL 3622

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.13	2100	2.95	4400	4.99
30	0.24	2200	2.99	4500	5.00
50	0.32	2300	3.11	4600	5.17
100	0.47	2400	3.16	4700	5.18
200	0.70	2500	3.31	4800	5.33
300	0.88	2600	3.36	4900	5.34
400	1.05	2700	3.46	5000	5.50
500	1.21	2800	3.52	5100	5.56
600	1.36	2900	3.65	5200	5.76
700	1.49	3000	3.70	5300	5.76
800	1.63	3100	3.82	5400	5.85
900	1.72	3200	3.88	5500	5.88
1000	1.84	3300	3.99	5600	5.96
1100	1.96	3400	4.08	5700	6.02
1200	2.06	3500	4.19	5800	6.06
1300	2.15	3600	4.28	5900	6.14
1400	2.28	3700	4.42	6000	6.17
1500	2.35	3800	4.40	6100	6.28
1600	2.43	3900	4.51	6200	6.36
1700	2.57	4000	4.62	6300	6.47
1800	2.62	4100	4.70	6400	6.51
1900	2.75	4200	4.78	6500	6.65
2000	2.80	4300	4.83		

Cable loss
Microwave Cable Assembly, Huber-Suhner, 40 GHz, 3.5 m, SMA-SMA, S/N 1225/2A
HL 3901

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.09	9500	4.29	21000	6.67
100	0.41	10000	4.40	22000	6.92
500	0.93	10500	4.52	23000	7.00
1000	1.33	11000	4.64	24000	7.18
1500	1.63	11500	4.76	25000	7.29
2000	1.90	12000	4.87	26000	7.55
2500	2.12	12500	4.99	27000	7.70
3000	2.33	13000	5.11	28000	7.88
3500	2.50	13500	5.20	29000	8.02
4000	2.67	14000	5.31	30000	8.15
4500	2.82	14500	5.42	31000	8.35
5000	2.99	15000	5.51	32000	8.40
5500	3.16	15500	5.58	33000	8.62
6000	3.32	16000	5.68	34000	8.73
6500	3.51	16500	5.78	35000	8.78
7000	3.65	17000	5.91	36000	8.94
7500	3.79	17500	5.99	37000	9.21
8000	3.92	18000	6.07	38000	9.37
8500	4.04	19000	6.36	39000	9.45
9000	4.18	20000	6.49	40000	9.52

14 APPENDIX F Abbreviations and acronyms

A	ampere
AC	alternating current
A/m	ampere per meter
AM	amplitude modulation
AVRG	average (detector)
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μ V)	decibel referred to one microvolt
dB(μ V/m)	decibel referred to one microvolt per meter
dB(μ A)	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
μ s	microsecond
NA	not applicable
NB	narrow band
OATS	open area test site
Ω	Ohm
PM	pulse modulation
PS	power supply
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
WB	wideband

END OF DOCUMENT