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# TEST REPORT

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

FOR:

**Visonic Ltd.**

**Supervised Wireless PowerG Smoke  
Detector, model SMD-426 PG2**

**Supervised Wireless PowerG Heat and  
Smoke Detector, model SMD-427 PG2**

**FCC ID: WP3SMD426-SMD427N**

**IC:1467C- SMD426427N**

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## 1 Applicant information

**Client name:** Visonic Ltd.  
**Address:** 24 Habarzel street, Tel Aviv 69710, Israel  
**Telephone:** +972 3 645 6714  
**Fax:** +972 3645 6788  
**E-mail:** aelshtein@tycoint.com  
**Contact name:** Mr. Arik Elshtein

## 2 Equipment under test attributes

**Product name:** Supervised wireless PowerG smoke detector  
**Product type:** Transceiver  
**Model(s):** SMD-427 PG2  
**Catalogue number:** 0-500125  
**Hardware version:** 90-203714  
**Software release:** JS-701760  
**Receipt date:** 17-Oct-13

## 3 Manufacturer information

**Manufacturer name:** Visonic Ltd.  
**Address:** 24 Habarzel street, Tel Aviv 69710, Israel  
**Telephone:** +972 3 645 6714  
**Fax:** +972 3645 6788  
**E-Mail:** aelshtein@tycoint.com  
**Contact name:** Mr. Arik Elshtein

## 4 Test details

**Project ID:** 24997  
**Location:** Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel  
**Test started:** 17-Oct-13  
**Test completed:** 18-Dec-13  
**Test specification(s):** FCC 47CFR part 15, subpart C, §15.247 (FHSS);  
RSS-210 issue 8 Annex 8





## 5 Tests summary

Test	Status
<b>Transmitter characteristics</b>	
FCC Section 15.247(a)1, RSS-210 section A8.1(a), The 20 dB bandwidth	Pass
FCC Section 15.247(a)1, RSS-210 section A8.1(b), Frequency separation	Pass
FCC Section 15.247(a)1, RSS-210 section A8.1(c), Number of hopping frequencies	Pass
FCC Section 15.247(a)1, RSS-210 section A8.1(c), Average time of occupancy	Pass
FCC Section 15.247(b), RSS-210 section A8.4(1), Peak output power	Pass
FCC Section 15.247(d), RSS-210 section A8.5, Emissions at band edges	Pass
FCC Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions	Pass
FCC Section 15.203, RSS-Gen section 7.1.2, Antenna requirements	Pass
FCC Section 15.207(a), RSS-Gen section 7.2.4, Conducted emission	Not required
FCC Section 15.247(i), RSS-Gen, section 5.5, RF exposure	Pass, the exhibit to the application of certification is provided

Testing was completed against all relevant requirements of the test standard. The results obtained indicate that the product under test complies in full with the requirements tested.

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

This test report supersedes the previously issued test report identified by Doc ID:VISRAD\_FCC\_IC.24997.

	Name and Title	Date	Signature
<b>Tested by:</b>	Mrs. E. Pitt, test engineer Mr. A. Chaplik, test engineer	December 18, 2013	 
<b>Reviewed by:</b>	Mrs. M. Cherniavsky, certification engineer	July 23, 2014	
<b>Approved by:</b>	Mr. M. Nikishin, EMC and radio group manager	July 23, 2014	

## 6 EUT description

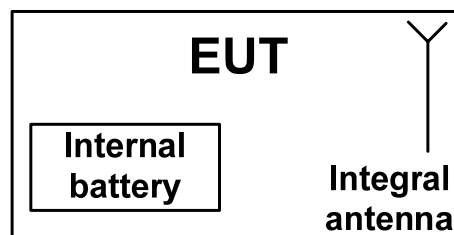
### 6.1 General information

The EUT is a heat and smoke automatic fire detector with integral audible signal for open area protection, designed to sense smoke or heat (not flame) and fitted with a PowerG type transceiver.

The EUT, model name SMD-426 PG2, is a smoke detector and the EUT, model name SMD-427 PG2, is a heat and smoke detector. They provide early warning of developing fire by sounding an alarm with its built-in alarm horn, and by transmitting a coded alarm signal to a PowerG receiver or to a compatible wireless alarm control panel.

According to manufacturer's Declaration of Identity the SMD-426 PG2 and SMD-427 PG2 have the same RF part. Each EUT utilizes an integral antenna and is powered by 3 V lithium battery. The only difference is an additional temperature sensor based on the same PCB in SMD-427 PG2. Therefore only the most populated product version SMD-427 PG2 was tested.

### 6.2 Test configuration



### 6.3 Changes made in the EUT

No changes were implemented in the EUT during testing.



### 6.4 Transmitter characteristics

<b>Type of equipment</b>					
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)				
<b>Intended use</b>		<b>Condition of use</b>			
	fixed	Always at a distance more than 2 m from all people			
X	mobile	Always at a distance more than 20 cm from all people			
	portable	May operate at a distance closer than 20 cm to human body			
<b>Assigned frequency ranges</b>		902 – 928 MHz			
<b>Operating frequencies</b>		912.750 – 919.106 MHz			
<b>Maximum rated output power</b>		At transmitter 50 Ω RF output connector			dBm
		Peak output power			17 dBm
<b>Is transmitter output power variable?</b>		X	No		
			Yes		
			continuous variable		
			stepped variable with stepsize		
		minimum RF power			dBm
		maximum RF power			dBm
<b>Antenna connection</b>					
unique coupling		standard connector		X	integral
				X	with temporary RF connector
				X	without temporary RF connector
<b>Antenna/s technical characteristics</b>					
Type	Manufacturer		Model number		Gain
Internal	Visonic		Wire antenna		-3 dBi
<b>Transmitter aggregate data rate/s</b>			50 kbps		
<b>Type of modulation</b>			GFSK		
<b>Modulating test signal (baseband)</b>			PRBS		
<b>Maximum transmitter duty cycle in normal use</b>			0.1%		
<b>Transmitter power source</b>					
X	Battery	<b>Nominal rated voltage</b>	3.0 VDC	Battery type	Lithium
	DC	<b>Nominal rated voltage</b>	VDC		
	AC mains	<b>Nominal rated voltage</b>	VAC	Frequency	
<b>Common power source for transmitter and receiver</b>				X	yes
					no
<b>Spread spectrum technique used</b>		X	Frequency hopping (FHSS)		
			Digital transmission system (DTS)		
			Hybrid		
<b>Spread spectrum parameters for transmitters tested per FCC 15.247 only</b>					
FHSS	Total number of hops		50		
	Bandwidth per hop		106 kHz		
	Max. separation of hops		125 kHz		



<b>Test specification:</b> Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth	
<b>Test procedure:</b> Public notice DA 00-705	
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS
<b>Date &amp; Time:</b> 28-Oct-13	
<b>Temperature:</b> 24.1 °C	<b>Air Pressure:</b> 1015 hPa
<b>Relative Humidity:</b> 44 %	
<b>Power Supply:</b> Battery	
<b>Remarks:</b>	

## 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 the 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	250	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 associated plots.

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

Figure 7.1.1 The 20 dB bandwidth test setup





<b>Test specification:</b>		<b>Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth</b>	
<b>Test procedure:</b>		Public notice DA 00-705	
<b>Test mode:</b>		Compliance	
<b>Date &amp; Time:</b>		28-Oct-13	
<b>Temperature:</b> 24.1 °C		<b>Air Pressure:</b> 1015 hPa	
		<b>Relative Humidity:</b> 44 %	
		<b>Power Supply:</b> Battery	
<b>Remarks:</b>			

Table 7.1.2 The 20 dB bandwidth test results

ASSIGNED FREQUENCY BAND: 902-928 MHz  
DETECTOR USED: Peak  
SWEEP TIME: Auto  
VIDEO BANDWIDTH: ≥ RBW  
MODULATION ENVELOPE REFERENCE POINTS: 20.0 dBc  
FREQUENCY HOPPING: Disabled

Carrier frequency, MHz	Type of modulation	Data rate, kbps	99% OBW kHz	20 dB bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
<b>Low frequency</b>							
912.750	GFSK	50	86.5	106.0	250	-144.0	Pass
<b>Mid frequency</b>							
915.863	GFSK	50	86.3	105.6	250	-144.4	Pass
<b>High frequency</b>							
919.106	GFSK	50	85.7	105.2	250	-144.8	Pass

Reference numbers of test equipment used

HL 3818	HL 4135	HL 4274					
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Full description is given in Appendix A.

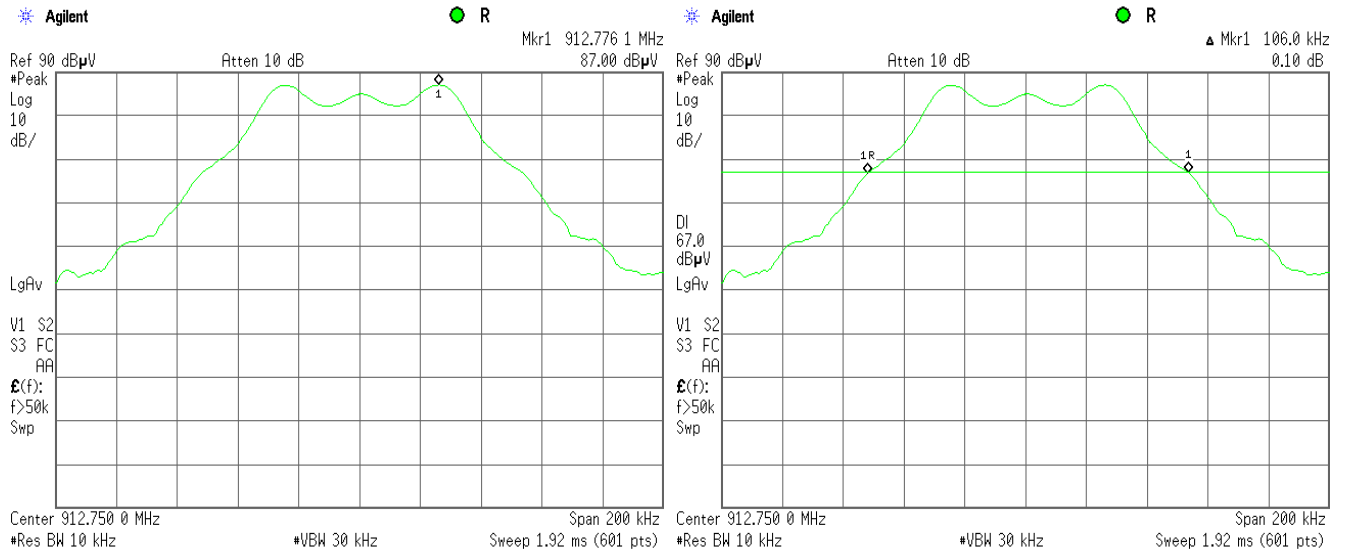




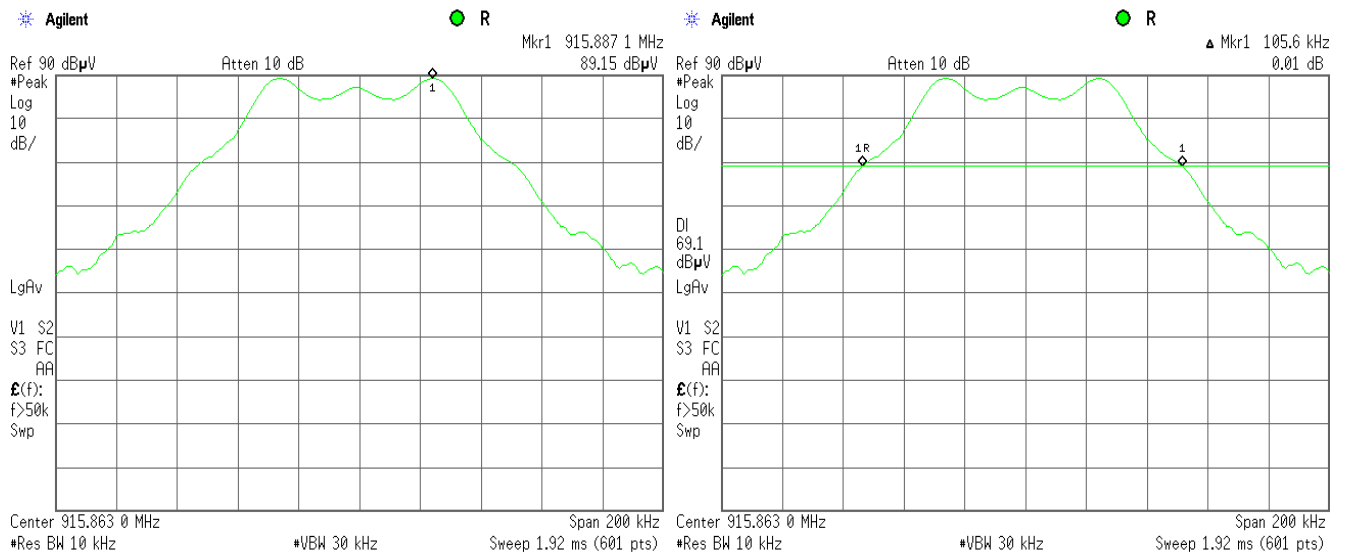
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<b>Test specification:</b> Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth			
<b>Test procedure:</b> Public notice DA 00-705			
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS		
<b>Date &amp; Time:</b> 28-Oct-13			
<b>Temperature:</b> 24.1 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

Plot 7.1.1 The 20 dB bandwidth test result at low frequency



Plot 7.1.2 The 20 dB bandwidth test result at mid frequency

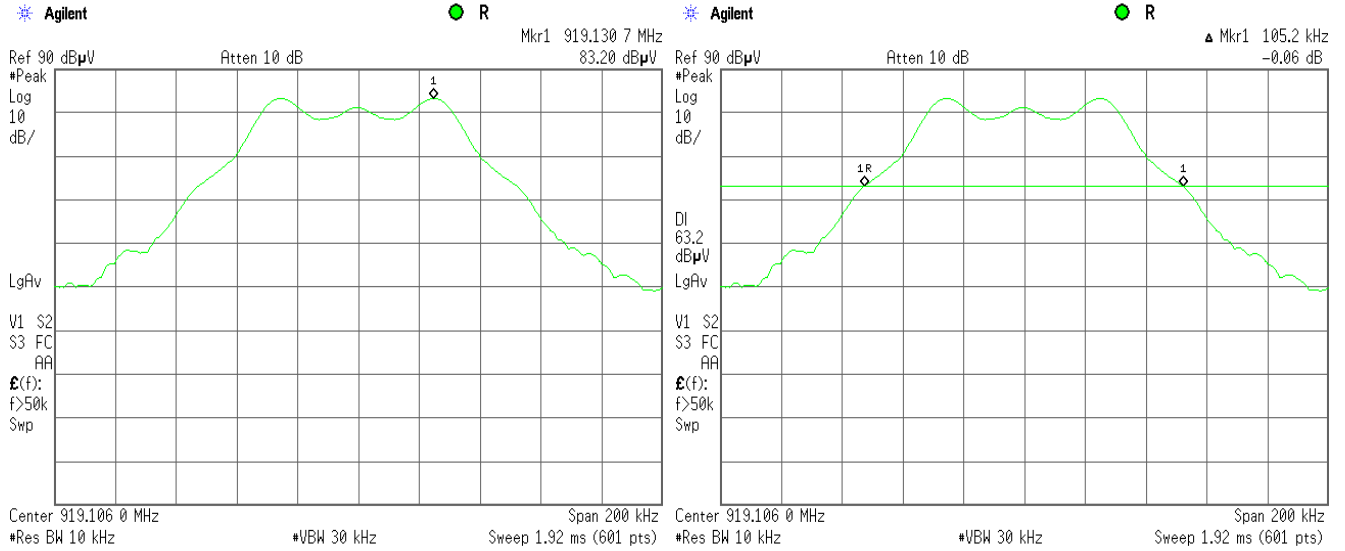




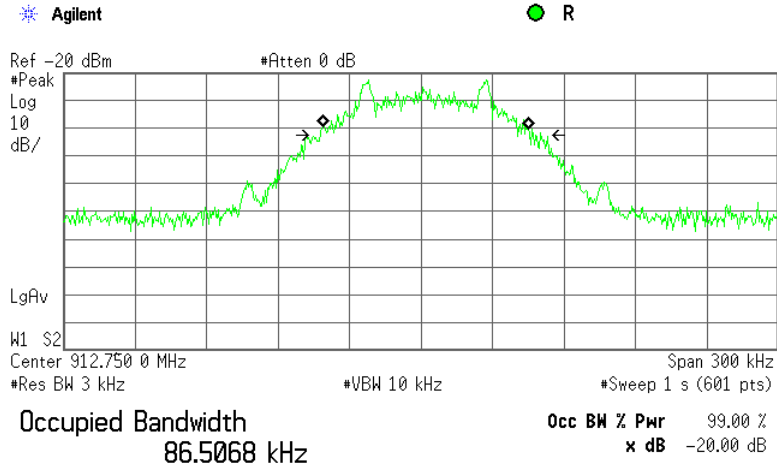
HERMON LABORATORIES

<b>Test specification:</b> Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth			
<b>Test procedure:</b> Public notice DA 00-705			
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS		
<b>Date &amp; Time:</b> 28-Oct-13			
<b>Temperature:</b> 24.1 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

Plot 7.1.3 The 20 dB bandwidth test result at high frequency



Plot 7.1.4 The 99% occupied bandwidth at low frequency

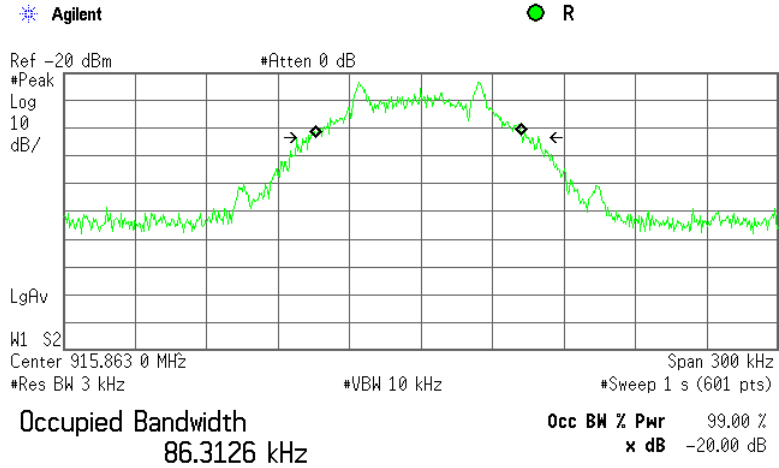


Transmit Freq Error 1.888 kHz  
x dB Bandwidth 92.836 kHz\*



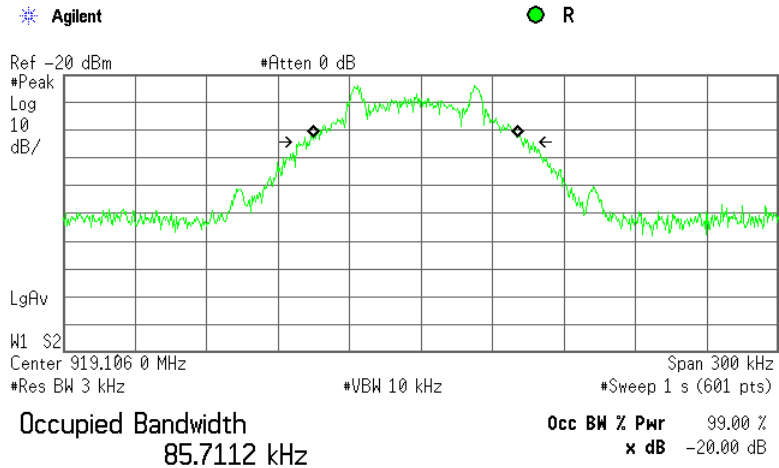
<b>Test specification:</b> Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth			
<b>Test procedure:</b> Public notice DA 00-705			
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS		
<b>Date &amp; Time:</b> 28-Oct-13			
<b>Temperature:</b> 24.1 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

Plot 7.1.5 The 99% occupied bandwidth at mid frequency



Transmit Freq Error -819.918 Hz  
 x dB Bandwidth 96.578 kHz\*

Plot 7.1.6 The 99% occupied bandwidth at high frequency



Transmit Freq Error -2.074 kHz  
 x dB Bandwidth 93.864 kHz\*



<b>Test specification:</b> Section 15.247(a)1, RSS-210 section A8.1(b), Frequency separation	
<b>Test procedure:</b>	Public notice DA 00-705
<b>Test mode:</b>	Compliance
<b>Date &amp; Time:</b>	28-Oct-13
<b>Temperature:</b> 23.9 °C	<b>Air Pressure:</b> 1015 hPa
<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>	
<b>Verdict: PASS</b>	

## 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 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 associated plots.

Figure 7.2.1 Carrier frequency separation test setup





<b>Test specification:</b>		<b>Section 15.247(a)1, RSS-210 section A8.1(b), Frequency separation</b>	
<b>Test procedure:</b>		Public notice DA 00-705	
<b>Test mode:</b>		Compliance	
<b>Date &amp; Time:</b>		28-Oct-13	
<b>Temperature:</b> 23.9 °C		<b>Air Pressure:</b> 1015 hPa	
		<b>Relative Humidity:</b> 45 %	
		<b>Power Supply:</b> Battery	
<b>Remarks:</b>			

Table 7.2.2 Carrier frequency separation test results

ASSIGNED FREQUENCY BAND: 902 - 928 MHz  
 MODULATION: GFSK  
 MODULATING SIGNAL: PRBS  
 BIT RATE: 50 kbps  
 DETECTOR USED: Peak  
 RESOLUTION BANDWIDTH: ≥ 1% of the span  
 VIDEO BANDWIDTH: ≥ RBW  
 FREQUENCY HOPPING: Enabled  
 20 dB BANDWIDTH: 106.0 kHz

Carrier frequency separation, kHz	Limit, kHz	Margin*	Verdict
125.0	106.0	19.0	Pass

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

Reference numbers of test equipment used

HL 3818	HL 4135	HL 4274				
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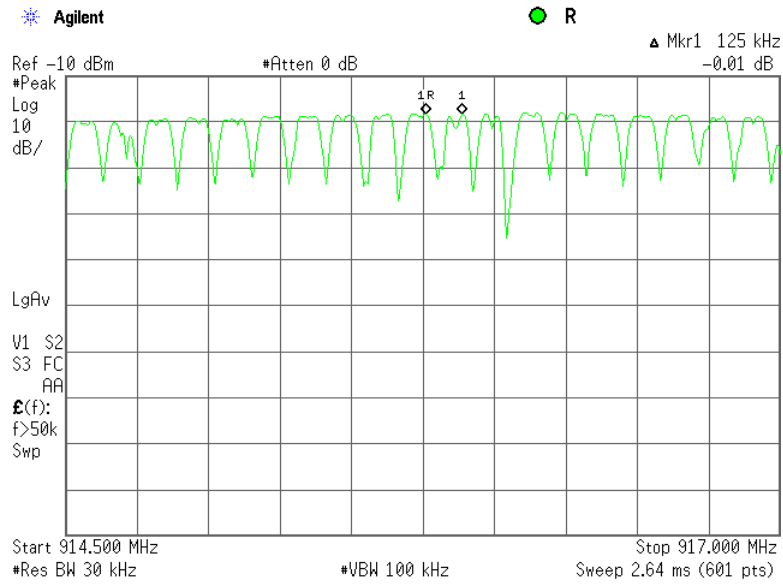
Full description is given in Appendix A.



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<b>Test specification:</b>		<b>Section 15.247(a)1, RSS-210 section A8.1(b), Frequency separation</b>	
<b>Test procedure:</b>		Public notice DA 00-705	
<b>Test mode:</b>		Compliance	
<b>Date &amp; Time:</b>		28-Oct-13	
<b>Temperature:</b> 23.9 °C		<b>Air Pressure:</b> 1015 hPa	
		<b>Relative Humidity:</b> 45 %	
		<b>Power Supply:</b> Battery	
<b>Remarks:</b>			

Plot 7.2.1 Carrier frequency separation





<b>Test specification:</b>	<b>Section 15.247(a)1, RSS-210 section A8.1(c), Number of hopping frequencies</b>		
<b>Test procedure:</b>	Public notice DA 00-705		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	17-Oct-13		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 40 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

### 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
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





<b>Test specification:</b>	<b>Section 15.247(a)1, RSS-210 section A8.1(c), Number of hopping frequencies</b>		
<b>Test procedure:</b>	Public notice DA 00-705		
<b>Test mode:</b>	Compliance	<b>Verdict: PASS</b>	
<b>Date &amp; Time:</b>	17-Oct-13		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 40 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

**Table 7.3.2 Hopping frequencies test results**

ASSIGNED FREQUENCY BAND: 902-928 MHz  
 MODULATION: GFSK  
 BIT RATE: 50 kbps  
 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
50	50	0	Pass

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

**Reference numbers of test equipment used**

HL 1424	HL 4273					
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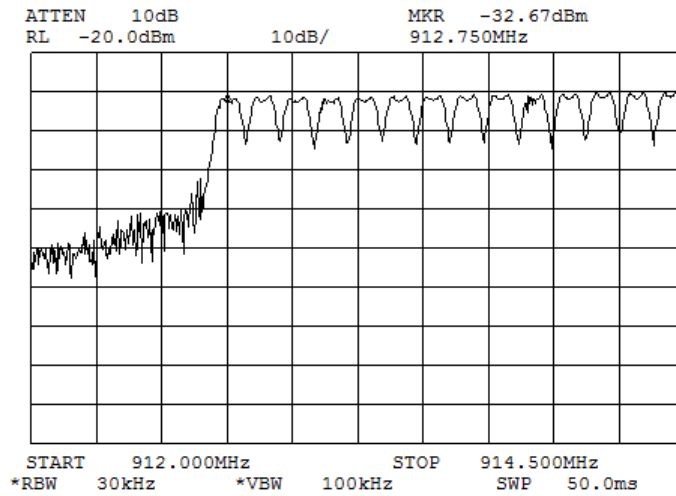
Full description is given in Appendix A.



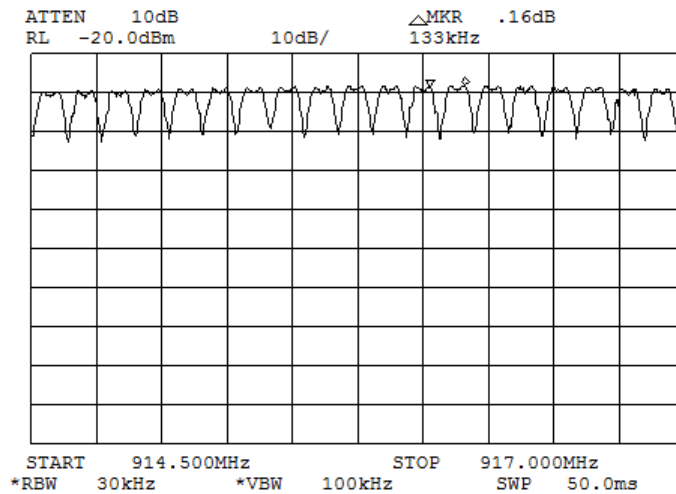


<b>Test specification:</b>	<b>Section 15.247(a)1, RSS-210 section A8.1(c), Number of hopping frequencies</b>		
<b>Test procedure:</b>	Public notice DA 00-705		
<b>Test mode:</b>	Compliance	<b>Verdict: PASS</b>	
<b>Date &amp; Time:</b>	17-Oct-13		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 40 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

Plot 7.3.1 Number of hopping frequencies in the frequency range 912 –914.5 MHz (fourteen)



Plot 7.3.2 Number of hopping frequencies in the frequency range 914.5 –917.0 MHz (nineteen)







<b>Test specification:</b> Section 15.247(a)1, RSS-210 section A8.1(c), Average time of occupancy	
<b>Test procedure:</b>	Public notice DA 00-705
<b>Test mode:</b>	Compliance
<b>Date &amp; Time:</b>	28-Oct-13
<b>Temperature:</b> 23.9 °C	<b>Air Pressure:</b> 1015 hPa
<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>	
<b>Verdict: PASS</b>	

## 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.

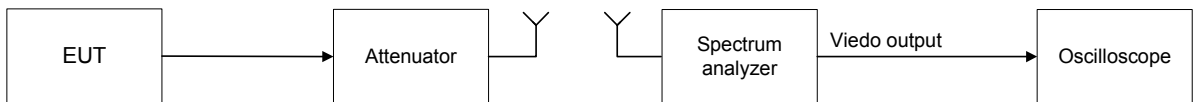
Table 7.4.1 Average time of occupancy limits

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





<b>Test specification:</b> Section 15.247(a)1, RSS-210 section A8.1(c), Average time of occupancy	
<b>Test procedure:</b>	Public notice DA 00-705
<b>Test mode:</b>	Compliance
<b>Date &amp; Time:</b>	28-Oct-13
<b>Temperature:</b> 23.9 °C	<b>Air Pressure:</b> 1015 hPa
<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>	

Table 7.4.2 Average time of occupancy test results

ASSIGNED FREQUENCY BAND: 902 - 928 MHz  
 MODULATION: GFSK  
 MODULATING SIGNAL: PRBS  
 DETECTOR USED: Peak  
 RESOLUTION BANDWIDTH: 1 MHz  
 VIDEO BANDWIDTH: 3 MHz  
 NUMBER OF HOPPING FREQUENCIES: 50  
 INVESTIGATED PERIOD: 20s  
 FREQUENCY HOPPING: Enabled

Carrier frequency, MHz	Single pulse duration, s	Number of pulses during 20 s	Average time of occupancy*, s	Bit rate, Mbps	Limit, s	Margin, s**	Verdict
917.8	0.004662	7	0.0326	50	0.4	-0.367	Pass

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

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

Reference numbers of test equipment used

HL 3818	HL 4135	HL 4274					
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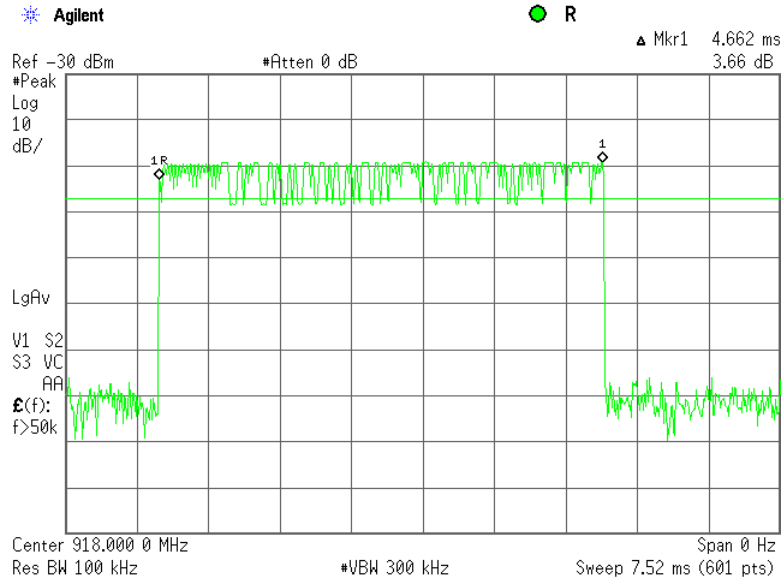
Full description is given in Appendix A.



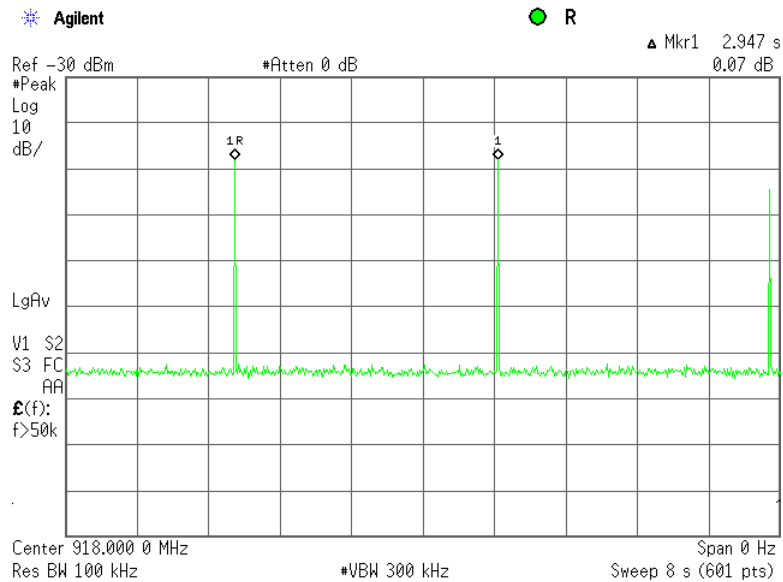
HERMON LABORATORIES

<b>Test specification:</b>		<b>Section 15.247(a)1, RSS-210 section A8.1(c), Average time of occupancy</b>	
<b>Test procedure:</b>		Public notice DA 00-705	
<b>Test mode:</b>		Compliance	
<b>Date &amp; Time:</b>		28-Oct-13	
<b>Temperature:</b> 23.9 °C		<b>Air Pressure:</b> 1015 hPa	
		<b>Relative Humidity:</b> 45 %	
		<b>Power Supply:</b> Battery	
<b>Remarks:</b>			
		<b>Verdict: PASS</b>	

Plot 7.4.1 Single pulse duration



Plot 7.4.2 Single transmission period

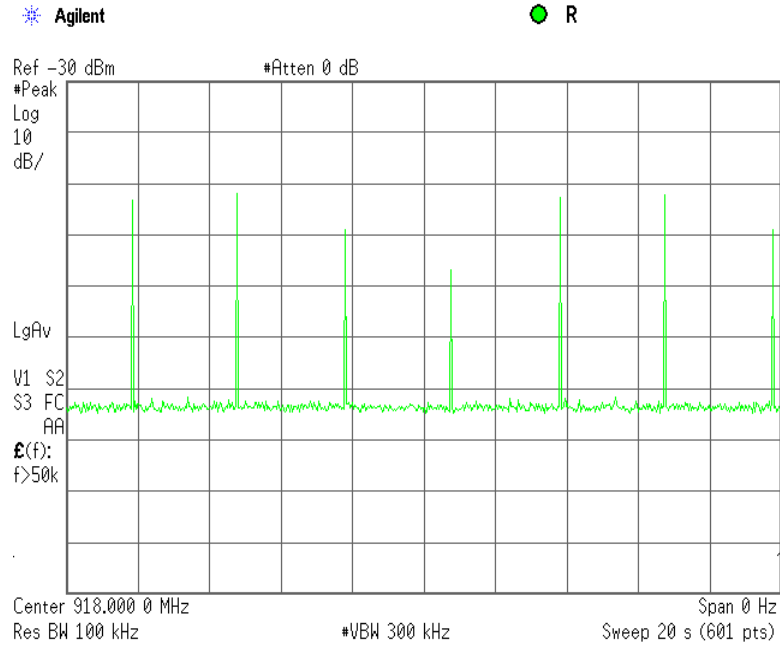




HERMON LABORATORIES

<b>Test specification:</b>		<b>Section 15.247(a)1, RSS-210 section A8.1(c), Average time of occupancy</b>	
<b>Test procedure:</b>		Public notice DA 00-705	
<b>Test mode:</b>		Compliance	
<b>Date &amp; Time:</b>		28-Oct-13	
<b>Temperature:</b> 23.9 °C		<b>Air Pressure:</b> 1015 hPa	
		<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			
		<b>Verdict: PASS</b>	

Plot 7.4.3 Transmission train, pulse period





<b>Test specification:</b>		<b>Section 15.247(b), RSS-210 section A8.4(1), Peak output power</b>	
<b>Test procedure:</b>		Public notice DA 00-705	
<b>Test mode:</b>		Compliance	
<b>Date &amp; Time:</b>		18-Dec-13	
<b>Temperature:</b> 22 °C		<b>Air Pressure:</b> 1011 hPa	
<b>Remarks:</b>		<b>Relative Humidity:</b> 42%	
		<b>Power Supply:</b> Battery	
		<b>Verdict:</b> PASS	

## 7.5 Peak output power

### 7.5.1 General

This test was performed to measure the maximum peak output power radiated by transmitter. 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*		Equivalent field strength limit @ 3m, dB(μV/m)*	Maximum antenna gain, dBi
	W	dBm		
902.0 – 928.0	0.25 (<50 hopping channels)	24.0(<50 hopping channels)	125.2 (<50 hopping channels)	6.0*
	1.0 (≥50 hopping channels)	30.0 (≥50 hopping channels)	131.2 (≥50 hopping channels)	
2400.0 – 2483.5	0.125 (<75 hopping channels)	21.0(<75 hopping channels)	122.2 (<75 hopping channels)	
	1.0 (≥75 hopping channels)	30.0 (≥75 hopping channels)	131.2 (≥75 hopping channels)	
5725.0 – 5850.0	1.0	30.0	131.2	

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

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

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

### 7.5.2 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 to 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. To find maximum radiation the turntable was rotated 360° and the measuring antenna height was swept in both vertical and horizontal polarizations.

**7.5.2.4** The maximum field strength of the EUT carrier frequency was measured as provided in Table 7.5.2 and associated plots.

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

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

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

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

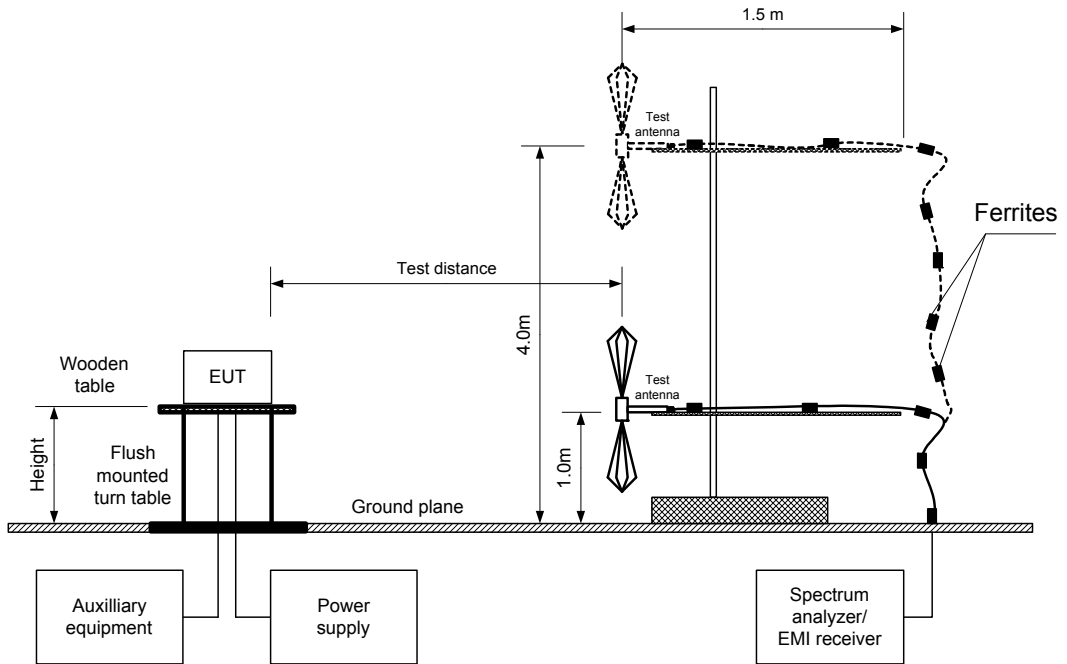
$$\text{Peak output power in dBm} = \text{Field strength in dB}(\mu\text{V/m}) - \text{Transmitter antenna gain in dBi} - 95.2 \text{ dB}$$

**7.5.2.6** The worst test results (the lowest margins) were recorded in Table 7.5.2.



<b>Test specification:</b>	<b>Section 15.247(b), RSS-210 section A8.4(1), Peak output power</b>		
<b>Test procedure:</b>	Public notice DA 00-705		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	18-Dec-13		
<b>Temperature:</b> 22 °C	<b>Air Pressure:</b> 1011 hPa	<b>Relative Humidity:</b> 42%	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

Figure 7.5.1 Setup for carrier field strength measurements







<b>Test specification:</b>		<b>Section 15.247(b), RSS-210 section A8.4(1), Peak output power</b>	
<b>Test procedure:</b>		Public notice DA 00-705	
<b>Test mode:</b>		Compliance	
<b>Date &amp; Time:</b>		18-Dec-13	
<b>Temperature:</b> 22 °C		<b>Air Pressure:</b> 1011 hPa	
		<b>Relative Humidity:</b> 42%	
		<b>Power Supply:</b> Battery	
<b>Remarks:</b>			

Table 7.5.2 Peak output power test results

ASSIGNED FREQUENCY BAND: 902-928 MHz  
TEST DISTANCE: 3 m  
TEST SITE: Semi anechoic chamber  
EUT HEIGHT: 0.8 m  
DETECTOR USED: Peak  
TEST ANTENNA TYPE: Biconilog (30 MHz – 1000 MHz)  
MODULATION: GFSK  
MODULATING SIGNAL: PRBS  
BIT RATE: 50 kbps  
TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
DETECTOR USED: Peak  
RESOLUTION BANDWIDTH: 120 kHz  
VIDEO BANDWIDTH: 300 kHz  
FREQUENCY HOPPING: Disabled

Frequency, MHz	Field strength, dB(μV/m)	Antenna polarization	Antenna height, m	Azimuth, degrees*	EUT antenna gain, dBi	Peak output power, dBm**	Limit, dBm	Margin, dB***	Verdict
912.773	108.02	Horizontal	1.2	70	-3	15.82	30.00	-14.18	Pass
915.834	109.20	Horizontal	1.4	60	-3	17.00	30.00	-13.00	Pass
919.079	108.31	Horizontal	1.5	60	-3	16.11	30.00	-13.89	Pass

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

\*\* - Peak output power was calculated from the field strength of carrier as follows:  $P = (E \times d)^2 / (30 \times G)$ , where P is the peak output power in W, E is the field strength in V/m, d is the test distance in meters and G is the transmitter numeric antenna gain over an isotropic radiator. The above equation was converted in logarithmic units for 3 m test distance: *Peak output power in dBm = Field strength in dB(μV/m) - Transmitter antenna gain in dBi - 95.2 dB*

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

#### Reference numbers of test equipment used

HL 4535	HL 4541	HL 4542	HL 4549	HL 4575	HL 4604		
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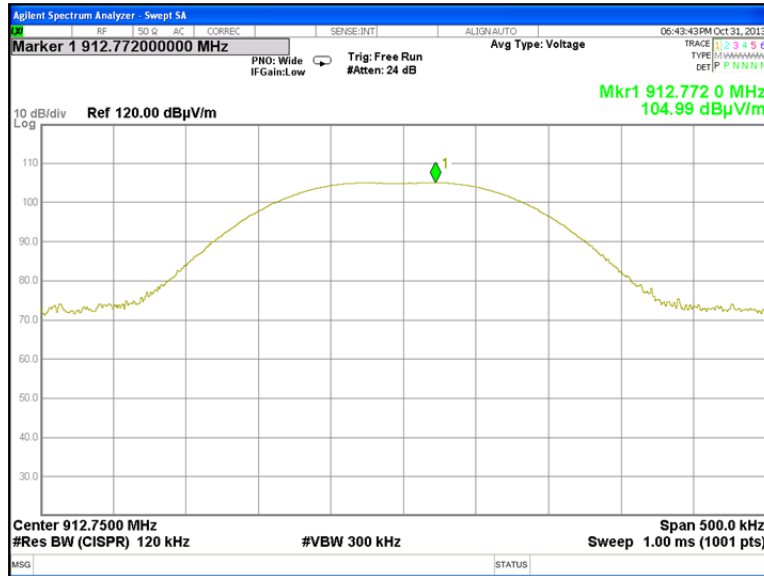
Full description is given in Appendix A.



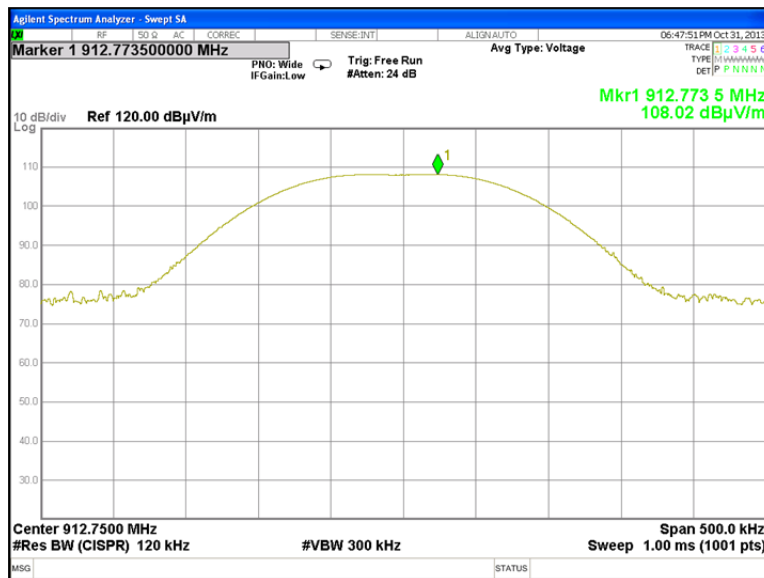
HERMON LABORATORIES

<b>Test specification:</b>		<b>Section 15.247(b), RSS-210 section A8.4(1), Peak output power</b>	
<b>Test procedure:</b>		Public notice DA 00-705	
<b>Test mode:</b>		Compliance	
<b>Date &amp; Time:</b>		18-Dec-13	
<b>Temperature: 22 °C</b>		<b>Air Pressure: 1011 hPa</b>	
<b>Relative Humidity: 42%</b>		<b>Power Supply: Battery</b>	
<b>Remarks:</b>			

Plot 7.5.1 Field strength of carrier at low frequency in vertical antenna polarization



Plot 7.5.2 Field strength of carrier at low frequency in horizontal antenna polarization

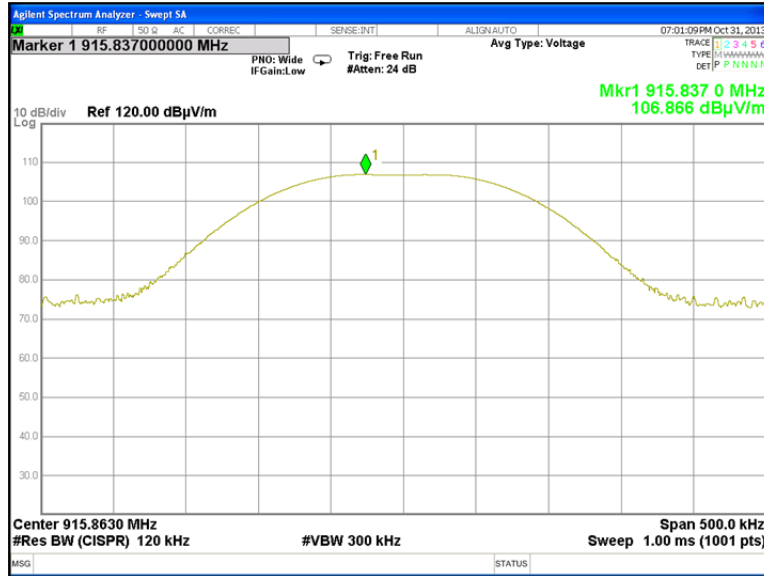




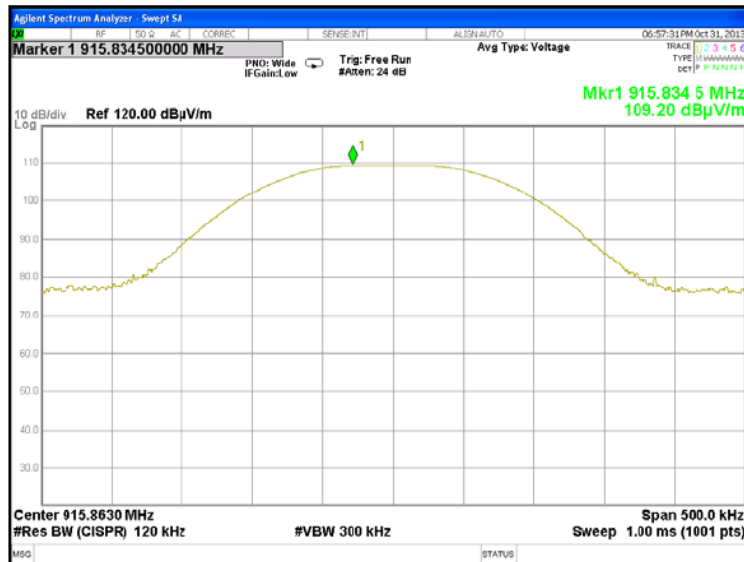
HERMON LABORATORIES

<b>Test specification:</b>		<b>Section 15.247(b), RSS-210 section A8.4(1), Peak output power</b>	
<b>Test procedure:</b>		Public notice DA 00-705	
<b>Test mode:</b>		Compliance	
<b>Date &amp; Time:</b>		18-Dec-13	
<b>Temperature: 22 °C</b>		<b>Air Pressure: 1011 hPa</b>	
<b>Relative Humidity: 42%</b>		<b>Power Supply: Battery</b>	
<b>Remarks:</b>			
		<b>Verdict: PASS</b>	

Plot 7.5.3 Field strength of carrier at mid frequency in vertical antenna polarization



Plot 7.5.4 Field strength of carrier at mid frequency in horizontal antenna polarization

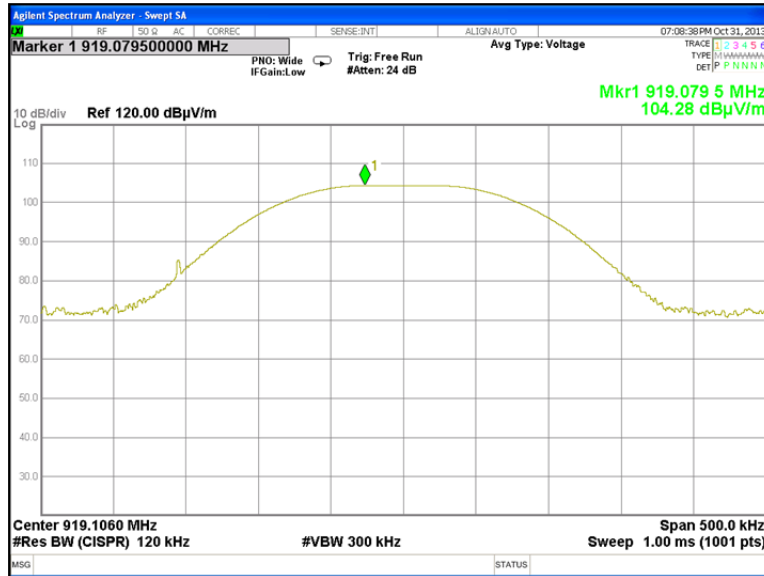




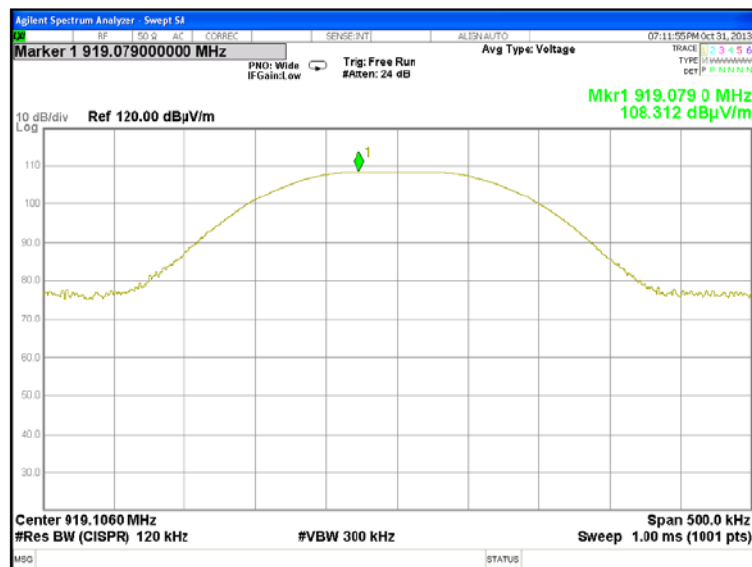
HERMON LABORATORIES

<b>Test specification:</b>		<b>Section 15.247(b), RSS-210 section A8.4(1), Peak output power</b>	
<b>Test procedure:</b>		Public notice DA 00-705	
<b>Test mode:</b>		Compliance	
<b>Date &amp; Time:</b>		18-Dec-13	
<b>Temperature: 22 °C</b>		<b>Air Pressure: 1011 hPa</b>	
<b>Relative Humidity: 42%</b>		<b>Power Supply: Battery</b>	
<b>Remarks:</b>			
		<b>Verdict: PASS</b>	

Plot 7.5.5 Field strength of carrier at high frequency in vertical antenna polarization



Plot 7.5.6 Field strength of carrier at high frequency in horizontal antenna polarization





<b>Test specification:</b> Section 15.247(d), RSS-210 section A8.5, Emissions at band edges	
<b>Test procedure:</b>	Public notice DA 00-705
<b>Test mode:</b>	Compliance
<b>Date &amp; Time:</b>	28-Oct-13
<b>Temperature:</b> 23.9 °C	<b>Air Pressure:</b> 1015 hPa
<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>	
<b>Verdict: PASS</b>	

## 7.6 Band edge radiated emissions

### 7.6.1 General

This test was performed to measure emissions, radiated from the EUT at the assigned frequency band edges. Specification test limits are given in Table 7.6.1.

Table 7.6.1 Band edge emission limits

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

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

### 7.6.2 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





<b>Test specification:</b> Section 15.247(d), RSS-210 section A8.5, Emissions at band edges	
<b>Test procedure:</b> Public notice DA 00-705	
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS
<b>Date &amp; Time:</b> 28-Oct-13	
<b>Temperature:</b> 23.9 °C	<b>Air Pressure:</b> 1015 hPa
<b>Relative Humidity:</b> 46 %	
<b>Power Supply:</b> Battery	
<b>Remarks:</b>	

Table 7.6.2 Band edge emission test results

ASSIGNED FREQUENCY RANGE: 902 – 928 MHz  
DETECTOR USED: Peak  
MODULATION: GFSK  
MODULATING SIGNAL: PRBS  
BIT RATE: 50 kbps  
TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
RESOLUTION BANDWIDTH: ≥ 1% of the span  
VIDEO BANDWIDTH: ≥ RBW

Frequency, MHz	Band edge emission, dBμV	Emission at carrier, dBμV	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
<b>Frequency hopping disabled</b>						
902.018	26.97	92.22	65.25	20.0	45.25	Pass
927.992	27.21	91.32	64.11		44.11	
<b>Frequency hopping enabled</b>						
902.018	27.90	92.22	64.32	20.0	44.32	Pass
927.992	28.39	91.32	62.93		42.93	

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

Reference numbers of test equipment used

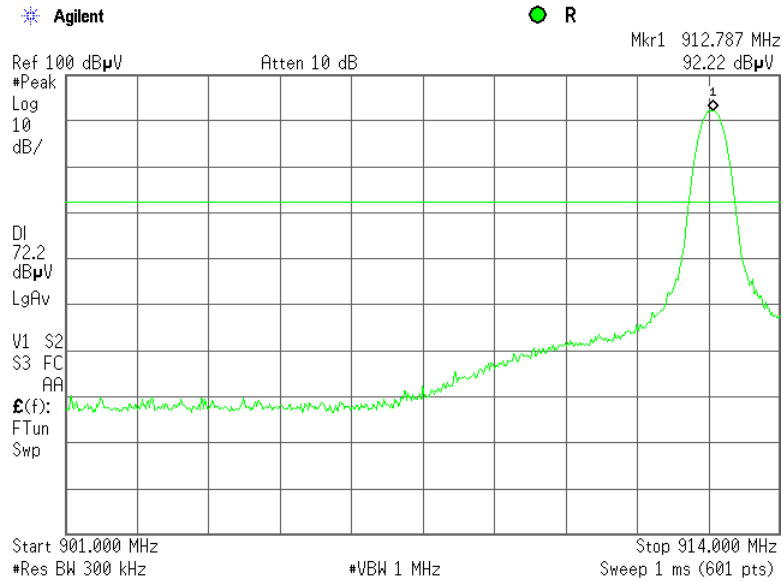
HL 3818	HL 4135	HL 4274				
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Full description is given in Appendix A.

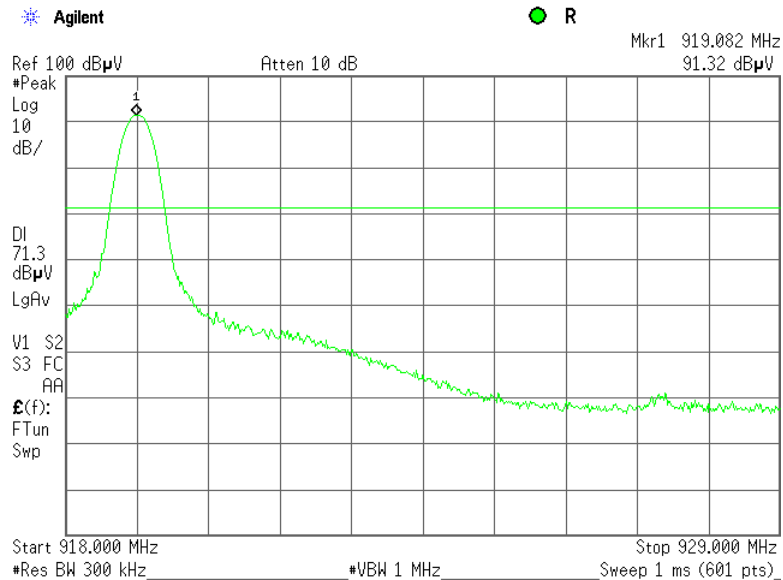


<b>Test specification:</b>		<b>Section 15.247(d), RSS-210 section A8.5, Emissions at band edges</b>	
<b>Test procedure:</b>		Public notice DA 00-705	
<b>Test mode:</b>		Compliance	
<b>Date &amp; Time:</b>		28-Oct-13	
<b>Temperature:</b> 23.9 °C		<b>Air Pressure:</b> 1015 hPa	
		<b>Relative Humidity:</b> 46 %	
		<b>Power Supply:</b> Battery	
<b>Remarks:</b>			
		<b>Verdict: PASS</b>	

Plot 7.6.1 The highest emission level within the assigned band at low carrier frequency



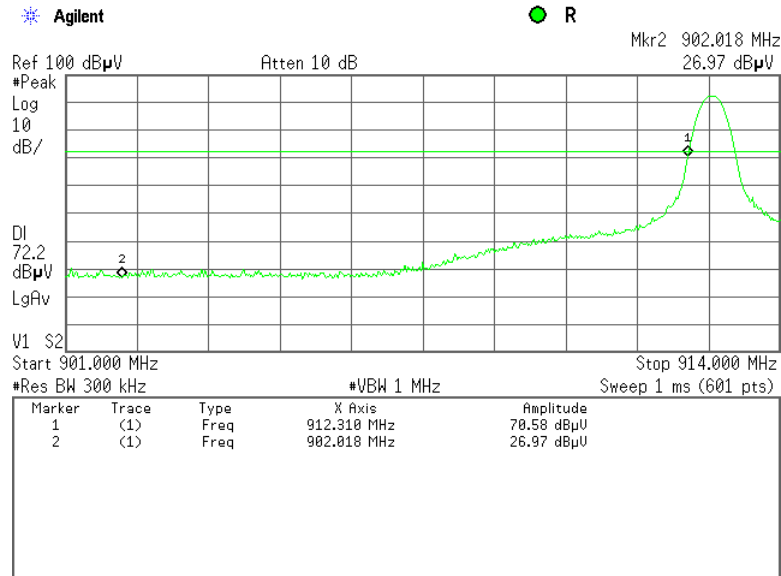
Plot 7.6.2 The highest emission level within the assigned band at high carrier frequency



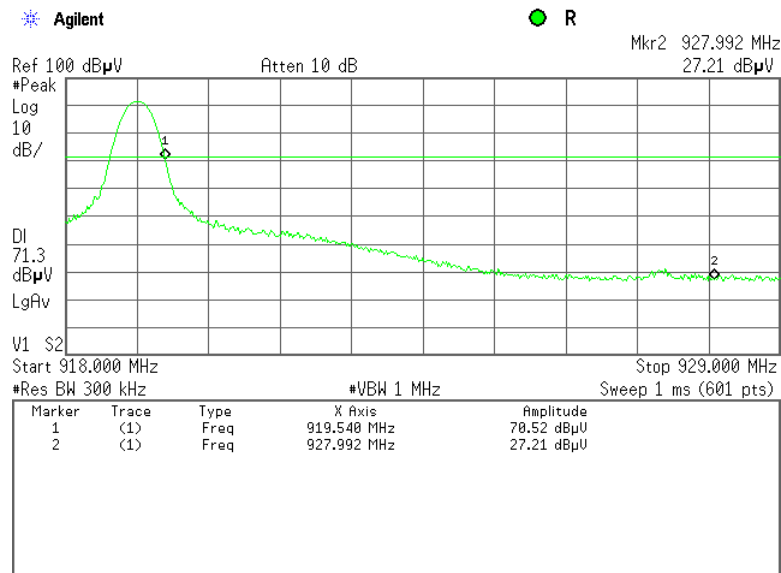


<b>Test specification:</b>		<b>Section 15.247(d), RSS-210 section A8.5, Emissions at band edges</b>	
<b>Test procedure:</b>		Public notice DA 00-705	
<b>Test mode:</b>		Compliance	
<b>Date &amp; Time:</b>		28-Oct-13	
<b>Temperature:</b> 23.9 °C		<b>Air Pressure:</b> 1015 hPa	
		<b>Relative Humidity:</b> 46 %	
		<b>Power Supply:</b> Battery	
<b>Remarks:</b>			
		<b>Verdict: PASS</b>	

Plot 7.6.3 The highest band edge emission at low carrier frequency with hopping function disabled



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

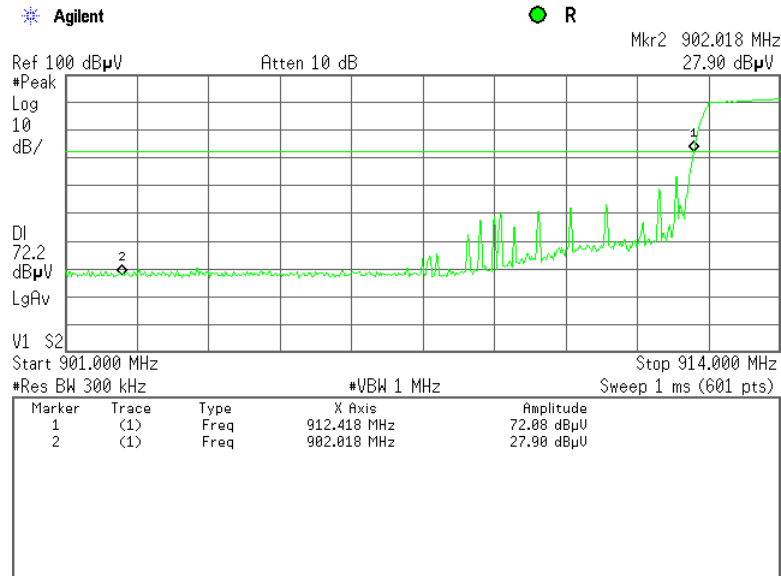




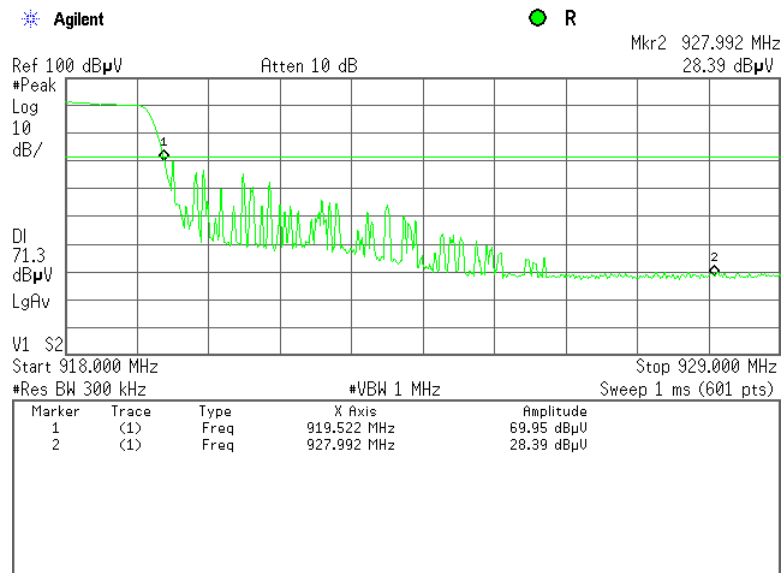


<b>Test specification:</b> Section 15.247(d), RSS-210 section A8.5, Emissions at band edges			
<b>Test procedure:</b> Public notice DA 00-705			
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS		
<b>Date &amp; Time:</b> 28-Oct-13			
<b>Temperature:</b> 23.9 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

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





<b>Test specification:</b>		<b>Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b>	
<b>Test procedure:</b>		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
<b>Test mode:</b>		Compliance	
<b>Date &amp; Time:</b>		12-Nov-13	
<b>Temperature:</b> 23 °C		<b>Air Pressure:</b> 1015 hPa	
<b>Remarks:</b>		<b>Verdict:</b> PASS	
		<b>Relative Humidity:</b> 44 %	
		<b>Power Supply:</b> Battery	

## 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 7.7.1.

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 <sup>th</sup> 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<sub>1</sub> and S<sub>2</sub> – 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.



<b>Test specification:</b>	<b>Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b>		
<b>Test procedure:</b>	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	12-Nov-13		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

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

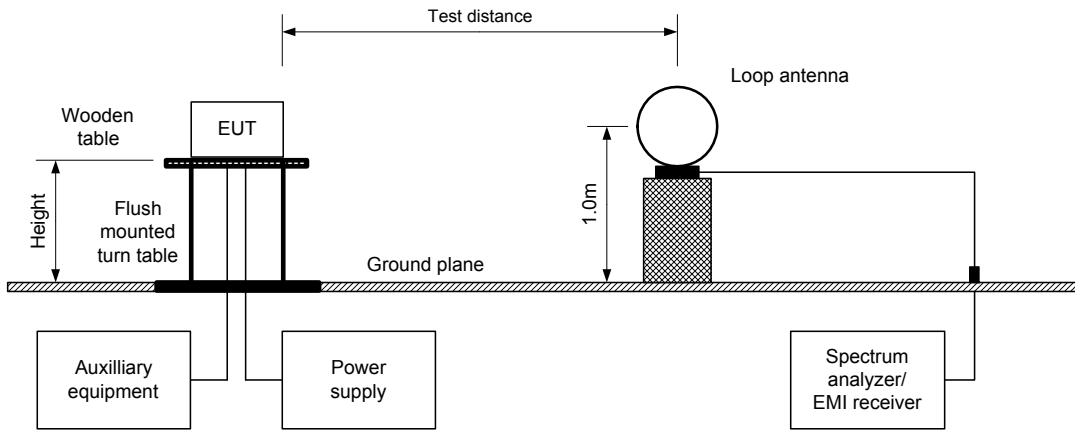
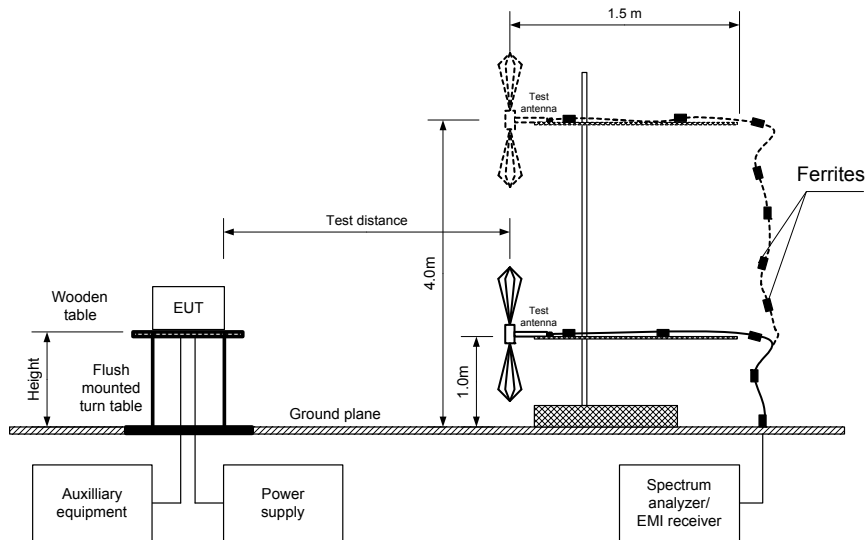


Figure 7.7.2 Setup for spurious emission field strength measurements above 30 MHz





<b>Test specification:</b>		<b>Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b>	
<b>Test procedure:</b>		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
<b>Test mode:</b>		Compliance	
<b>Date &amp; Time:</b>		12-Nov-13	
<b>Temperature:</b> 23 °C		<b>Air Pressure:</b> 1015 hPa	
<b>Remarks:</b>		<b>Relative Humidity:</b> 44 %	
		<b>Power Supply:</b> Battery	
<b>Verdict: PASS</b>			

**Table 7.7.2 Field strength of emissions outside restricted bands**

ASSIGNED FREQUENCY BAND: 902-928MHz  
 INVESTIGATED FREQUENCY RANGE: 0.009 –9300 MHz  
 TEST DISTANCE: 3 m  
 MODULATION: GFSK  
 BIT RATE: 50kbps  
 DUTY CYCLE: 100 %  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
 DETECTOR USED: Peak  
 RESOLUTION BANDWIDTH: 100 kHz  
 VIDEO BANDWIDTH: 300 kHz  
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)  
 Biconilog (30 MHz – 1000 MHz)  
 Double ridged guide (above 1000 MHz)

Frequency, MHz	Field strength of spurious, dB(μV/m)	Antenna polarization	Antenna height, m	Azimuth, degrees*	Field strength of carrier, dB(μV/m)	Attenuation below carrier, dBc	Limit, dBc	Margin, dB**	Verdict
<b>Low carrier frequency</b>									
1825.448	80.91	H	1.0	75	106.43	-24.92	20.0	-4.92	Pass
3651.089	64.61	H	1.0	72		-41.22		-21.22	
5476.639	57.70	V	1.7	360	105.83	-48.73		-28.73	
6389.398	54.17	V	1.7	360		-52.26		-32.26	
<b>Mid carrier frequency</b>									
1831.670	83.18	H	1.1	75	107.23	-24.05	20.0	-4.05	Pass
3663.332	67.89	H	1.0	58		-39.34		-19.34	
5494.007	55.21	H	1.1	60		-52.02		-32.02	
6410.845	58.14	H	1.1	70		-49.09		-29.09	
<b>High carrier frequency</b>									
1838.160	78.45	H	1.1	70.0	105.18	-26.73	20.0	-6.73	Pass
3676.318	59.95	H	1.1	74.0		-45.23		-25.23	
5514.768	55.77	H	1.2	285		-49.41		-29.41	
6433.899	50.63	H	1.8	0		-54.55		-34.55	

\*- EUT front panel refers to 0 degrees position of turntable.  
 \*\*- Margin = Attenuation below carrier – specification limit.



<b>Test specification:</b>		<b>Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b>			
<b>Test procedure:</b>		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
<b>Test mode:</b>		Compliance		<b>Verdict: PASS</b>	
<b>Date &amp; Time:</b>		12-Nov-13			
<b>Temperature:</b> 23 °C		<b>Air Pressure:</b> 1015 hPa		<b>Relative Humidity:</b> 44 %	
<b>Power Supply:</b> Battery					
<b>Remarks:</b>					

**Table 7.7.3 Field strength of spurious emissions above 1 GHz within restricted bands**

ASSIGNED FREQUENCY BAND: 902-928 MHz  
 INVESTIGATED FREQUENCY RANGE: 1000 - 10000 MHz  
 TEST DISTANCE: 3 m  
 MODULATION: GFSK  
 BIT RATE: 50 kbps  
 DUTY CYCLE: 100 %  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
 DETECTOR USED: Peak  
 RESOLUTION BANDWIDTH: 1000 kHz  
 TEST ANTENNA TYPE: Double ridged guide

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength(VBW=3 MHz)			Average field strength(VBW=10 kHz)				Verdict
	Polarization	Height, m		Measured, dB(µV/m)	Limit, dB(µV/m)	Margin, dB**	Measured, dB(µV/m)	Calculated, dB(µV/m)	Limit, dB(µV/m)	Margin, dB***	
<b>Low carrier frequency</b>											
2738.295	H	1.0	75	65.29	74.0	-8.71	64.73	37.73	54.0	-16.27	Pass
4563.760	H	1.1	80	60.13	74.0	-13.87	58.70	31.70	54.0	-22.30	
7302.020	H	1.0	70	52.40	74.0	-21.60	48.15	21.15	54.0	-32.85	
8214.775	H	1.0	75	52.85	74.0	-21.15	48.59	21.59	54.0	-32.41	
9127.505	H	1.0	80	49.74	74.0	-24.26	42.63	15.63	54.0	-38.37	
<b>Mid carrier frequency</b>											
2747.619	H	1.0	68	71.06	74.0	-2.94	70.15	43.15	54.0	-10.85	Pass
4579.320	H	1.1	60	59.92	74.0	-14.08	59.08	32.08	54.0	-21.92	
7326.634	H	1.2	70	49.71	74.0	-24.29	53.04	26.04	54.0	-27.96	
8242.757	H	1.2	65	51.88	74.0	-22.12	47.12	20.12	54.0	-33.88	
9158.630	H	1.0	60	51.53	74.0	-22.47	45.75	18.75	54.0	-35.25	
<b>High carrier frequency</b>											
2757.368	H	1.1	80	53.00	74.0	-21.00	51.75	24.75	54.0	-29.25	Pass
4595.575	H	2.0	230	57.48	74.0	-16.52	56.58	29.58	54.0	-24.42	
7352.868	H	1.0	65	47.95	74.0	-26.05	38.48	11.48	54.0	-42.52	
8271.974	H	1.0	70	47.84	74.0	-26.16	39.84	12.84	54.0	-41.16	
9191.095	H	1.7	340	47.66	74.0	-26.34	34.49	7.49	54.0	-46.51	

\*- 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 7.7.4 Average factor calculation**

Transmission pulse		Transmission burst		Transmission train duration, ms	Average factor, dB
Duration, ms	Period, s	Duration, ms	Period, ms		
4.475	2.947	NA	NA	NA	-27

\*- Average factor was calculated as follows

for pulse train shorter than 100 ms:

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

for pulse train longer than 100 ms:

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



<b>Test specification:</b>		<b>Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b>	
<b>Test procedure:</b>		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
<b>Test mode:</b>		Compliance	
<b>Date &amp; Time:</b>		12-Nov-13	
<b>Temperature:</b> 23 °C		<b>Air Pressure:</b> 1015 hPa	
<b>Remarks:</b>		<b>Verdict:</b> PASS	
		<b>Relative Humidity:</b> 44 %	
		<b>Power Supply:</b> Battery	

Table 7.7.5 Field strength of spurious emissions below 1 GHz within restricted bands

ASSIGNED FREQUENCY BAND: 902-928 MHz  
 INVESTIGATED FREQUENCY RANGE: 0.009 – 1000 MHz  
 TEST DISTANCE: 3 m  
 MODULATION: GFSK  
 BIT RATE: 50kbps  
 DUTY CYCLE: 100 %  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
 RESOLUTION BANDWIDTH: 0.2 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, MHz	Peak emission, dB(µV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*				
No emission were found								

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

Reference numbers of test equipment used

HL 0446	HL 0583	HL 4295	HL 4535	HL 4541	HL 4542	HL 4543	HL 4549
HL 4551	HL 4575	HL 4603	HL 4604				

Full description is given in Appendix A.



<b>Test specification:</b>		<b>Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b>			
<b>Test procedure:</b>		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
<b>Test mode:</b>		Compliance		<b>Verdict:</b> PASS	
<b>Date &amp; Time:</b>		12-Nov-13			
<b>Temperature:</b> 23 °C		<b>Air Pressure:</b> 1015 hPa		<b>Relative Humidity:</b> 44 %	
<b>Remarks:</b>		<b>Power Supply:</b> Battery			

Table 7.7.6 Restricted bands according to FCC section 15.205

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	

Table 7.7.7 Restricted bands according to RSS-Gen

MHz	MHz	MHz	MHz	MHz	GHz
0.09 - 0.11	8.291 - 8.294	16.80425 - 16.80475	399.9 - 410	3260 - 3267	10.6 - 12.7
2.1735 - 2.1905	8.362 - 8.366	25.5 - 25.67	608 - 614	3332 - 3339	13.25 - 13.4
3.020 - 3.026	8.37625 - 8.38675	37.5 - 38.25	960 - 1427	3345.8 - 3358	14.47 - 14.5
4.125 - 4.128	8.41425 - 8.41475	73 - 74.6	1435 - 1626.5	3500 - 4400	15.35 - 16.2
4.17725 - 4.17775	12.29 - 12.293	74.8 - 75.2	1645.5 - 1646.5	4500 - 5150	17.7 - 21.4
4.20725 - 4.20775	12.51975 - 12.52025	108 - 138	1660 - 1710	5350 - 5460	22.01 - 23.12
5.677 - 5.683	12.57675 - 12.57725	156.52475 - 156.52525	1718.8 - 1722.2	7250 - 7750	23.6 - 24
6.215 - 6.218	13.36 - 13.41	156.7 - 156.9	2200 - 2300	8025 - 8500	31.2 - 31.8
6.26775 - 6.26825	16.42 - 16.423	240 - 285	2310 - 2390	9000 - 9200	36.43 - 36.5
6.31175 - 6.31225	16.69475 - 16.69525	322 - 335.4	2655 - 2900	9300 - 9500	Above 38.6

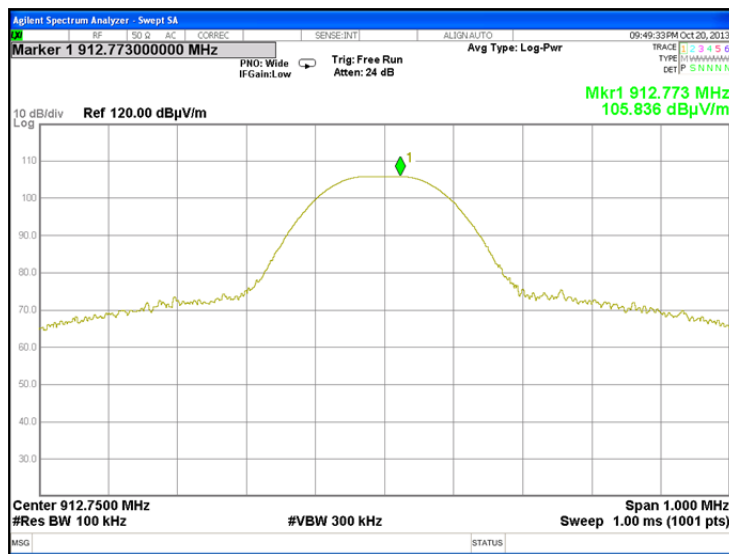


HERMON LABORATORIES

<b>Test specification:</b>	<b>Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b>		
<b>Test procedure:</b>	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	12-Nov-13		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

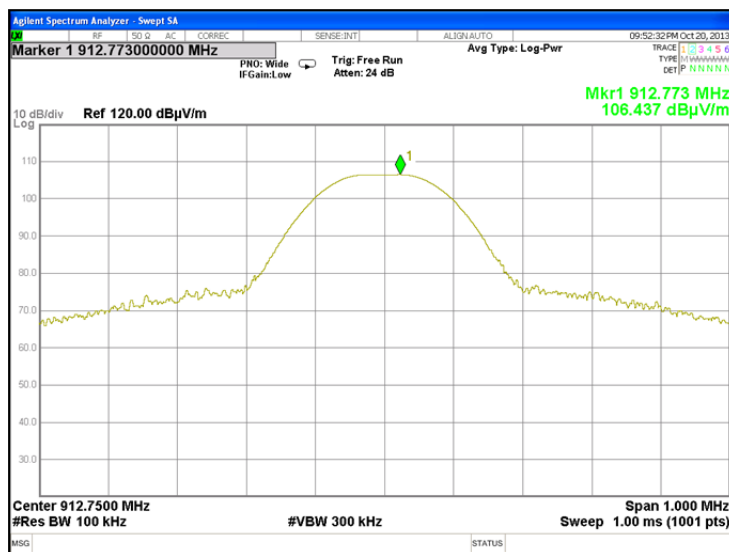
Plot 7.7.1 Radiated emission measurements at the low carrier frequency

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



Plot 7.7.2 Radiated emission measurements at the low carrier frequency

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





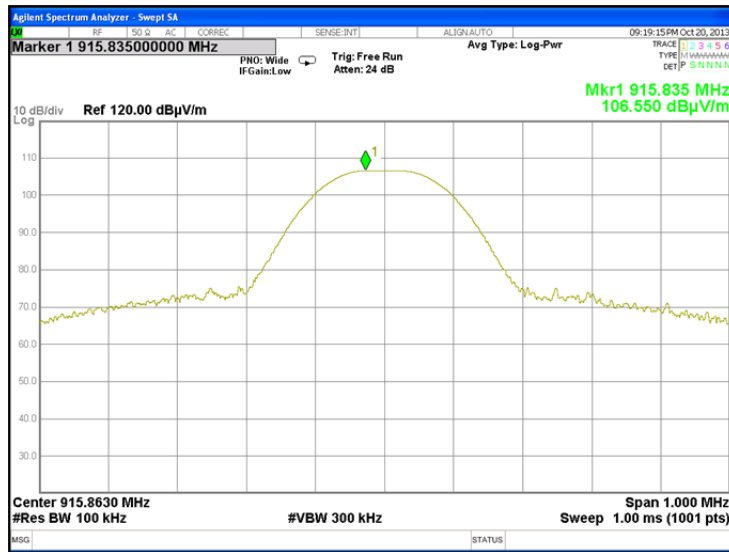


HERMON LABORATORIES

<b>Test specification:</b>	<b>Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b>		
<b>Test procedure:</b>	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	12-Nov-13		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

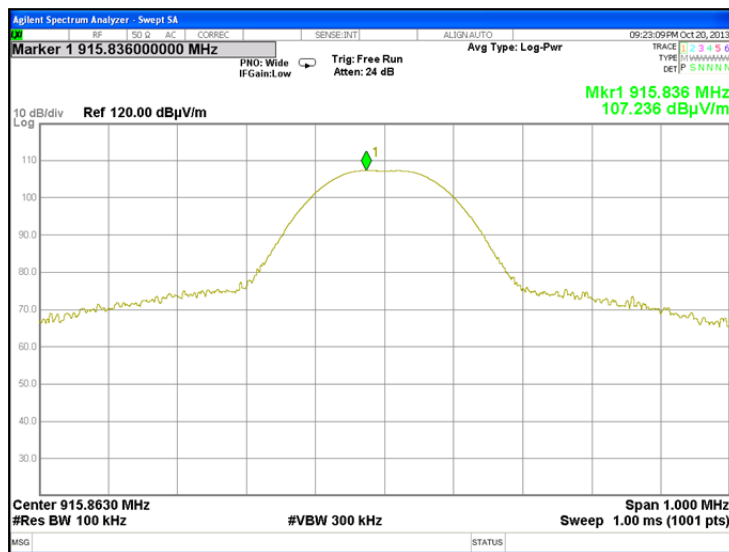
Plot 7.7.3 Radiated emission measurements at the mid carrier frequency

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



Plot 7.7.4 Radiated emission measurements at the mid carrier frequency

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



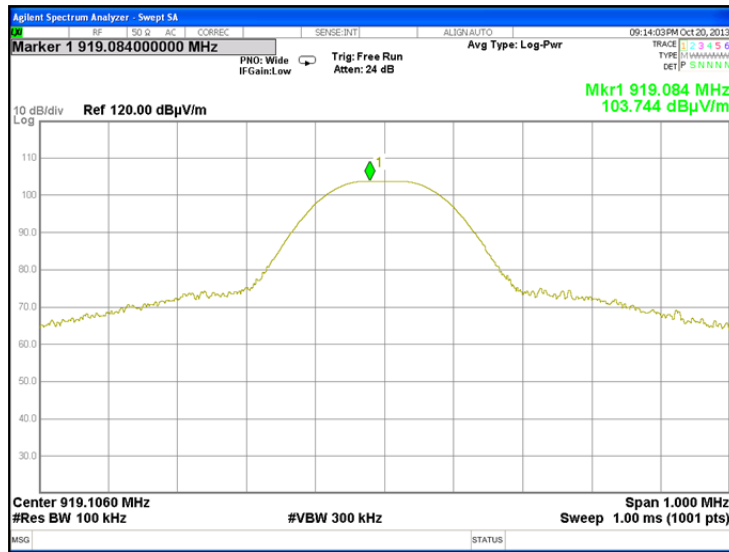


HERMON LABORATORIES

<b>Test specification:</b> Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions	
<b>Test procedure:</b> Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS
<b>Date &amp; Time:</b> 12-Nov-13	
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa
	<b>Relative Humidity:</b> 44 %
<b>Power Supply:</b> Battery	
<b>Remarks:</b>	

Plot 7.7.5 Radiated emission measurements at the high carrier frequency

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



Plot 7.7.6 Radiated emission measurements at the high carrier frequency

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



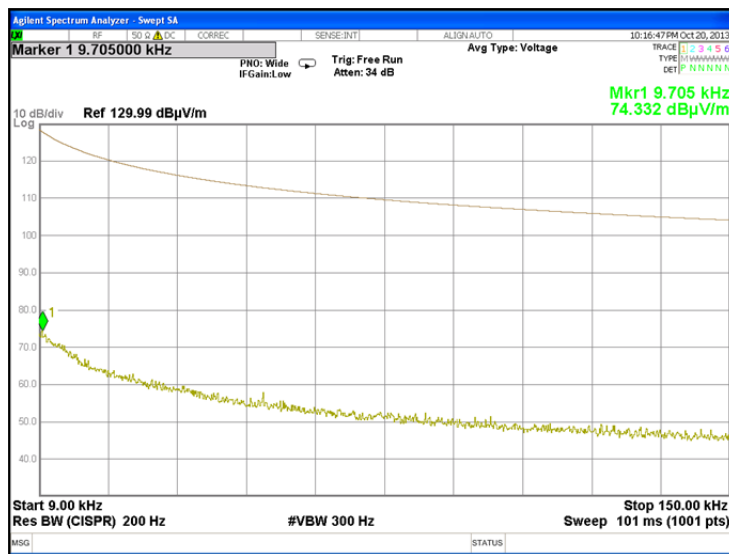


HERMON LABORATORIES

<b>Test specification:</b> Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions	
<b>Test procedure:</b> Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS
<b>Date &amp; Time:</b> 12-Nov-13	
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa
	<b>Relative Humidity:</b> 44 %
<b>Power Supply:</b> Battery	
<b>Remarks:</b>	

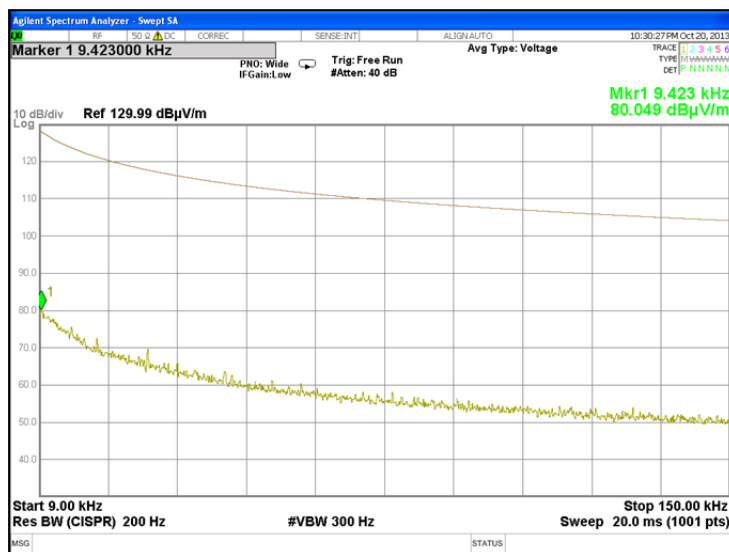
Plot 7.7.7 Radiated emission measurements from 9 to 150 kHz at the low carrier frequency

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



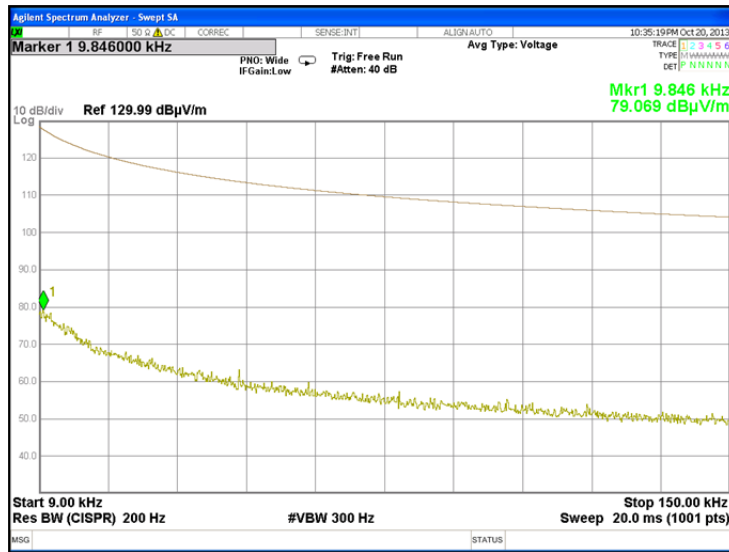


HERMON LABORATORIES

<b>Test specification:</b>	<b>Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b>		
<b>Test procedure:</b>	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	12-Nov-13		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

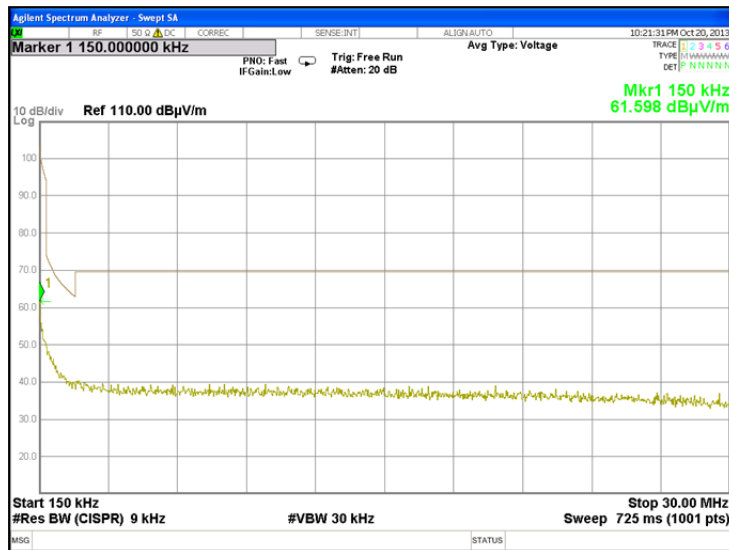
Plot 7.7.9 Radiated emission measurements from 9 to 150 kHz at the high carrier frequency

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



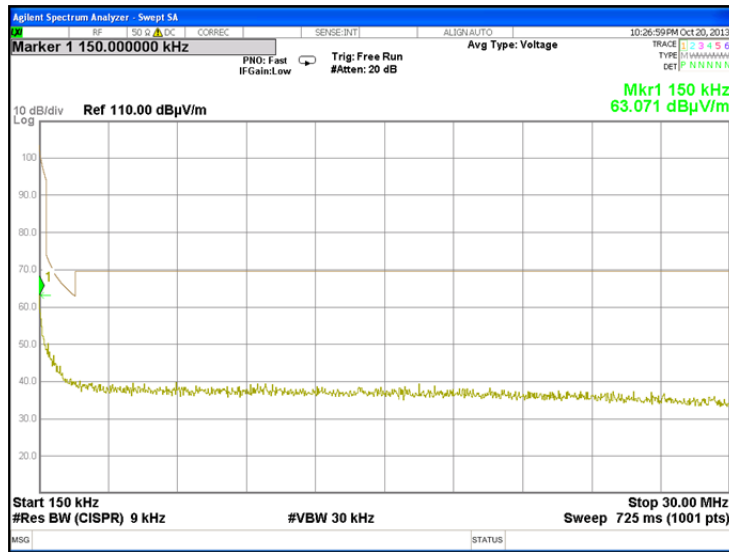


HERMON LABORATORIES

<b>Test specification:</b>	<b>Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b>		
<b>Test procedure:</b>	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	12-Nov-13		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

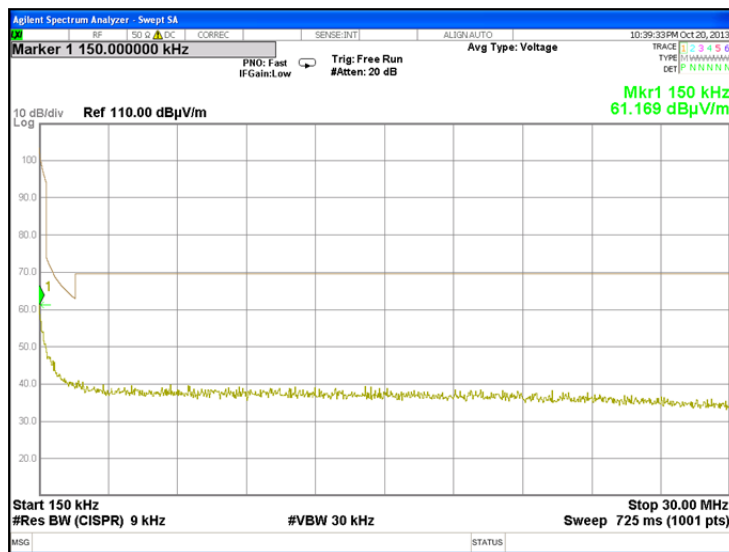
Plot 7.7.11 Radiated emission measurements from 0.15 to 30 MHz at the mid carrier frequency

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



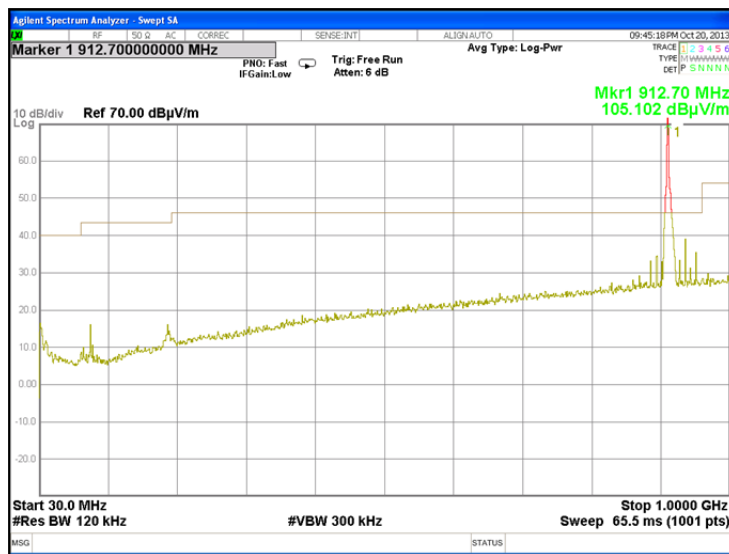


HERMON LABORATORIES

<b>Test specification:</b>	<b>Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b>		
<b>Test procedure:</b>	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	12-Nov-13		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

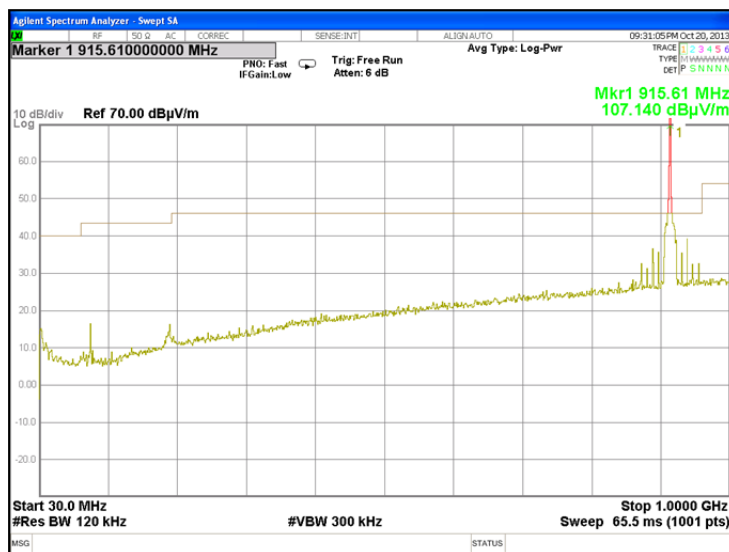
Plot 7.7.13 Radiated emission measurements from 30 to 1000 MHz at the low carrier frequency

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



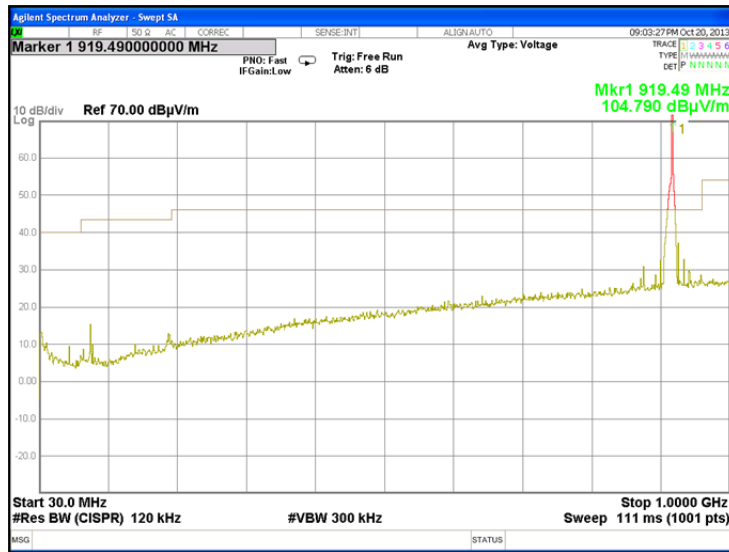


HERMON LABORATORIES

<b>Test specification:</b> Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions	
<b>Test procedure:</b> Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS
<b>Date &amp; Time:</b> 12-Nov-13	
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa
	<b>Relative Humidity:</b> 44 %
<b>Power Supply:</b> Battery	
<b>Remarks:</b>	

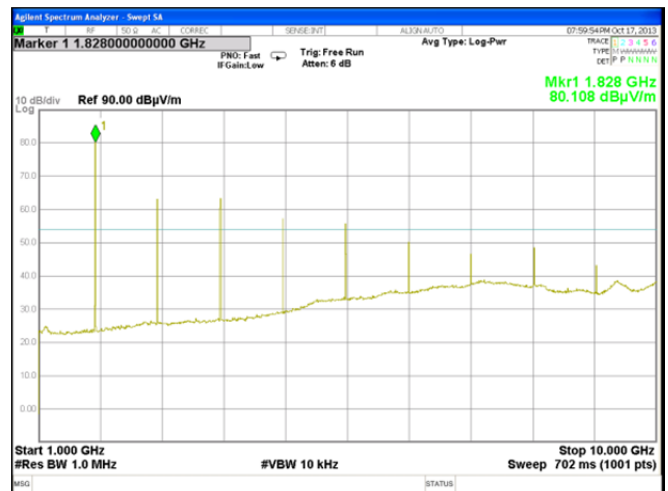
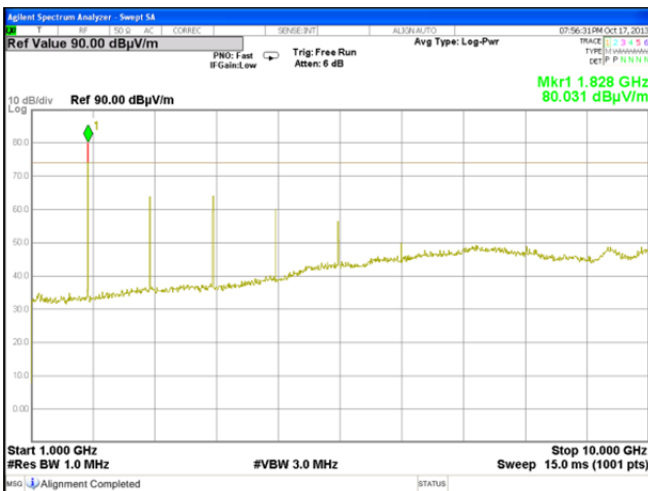
Plot 7.7.15 Radiated emission measurements from 30 to 1000 MHz at the high carrier frequency

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



Plot 7.7.16 Radiated emission measurements from 1000 to 10000 MHz at the low carrier frequency

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



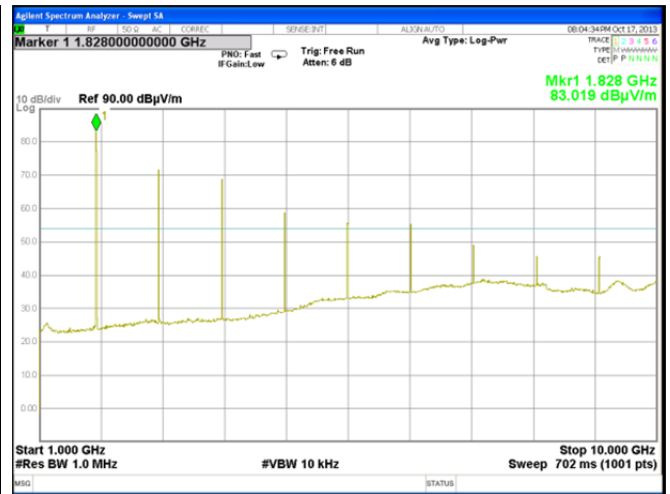
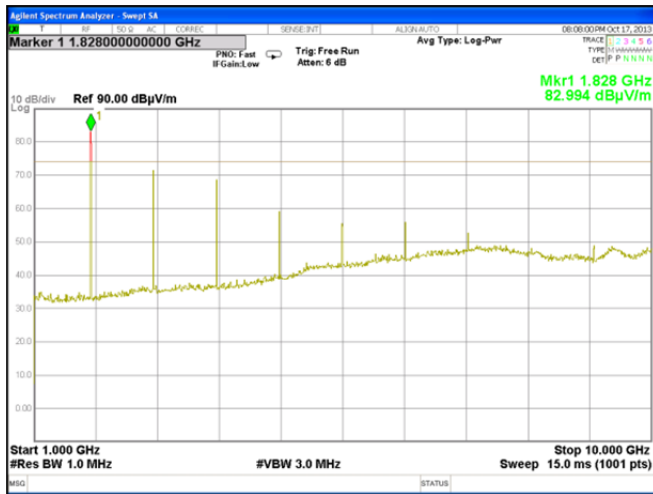


HERMON LABORATORIES

<b>Test specification:</b> Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions	
<b>Test procedure:</b> Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS
<b>Date &amp; Time:</b> 12-Nov-13	
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa
<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>	

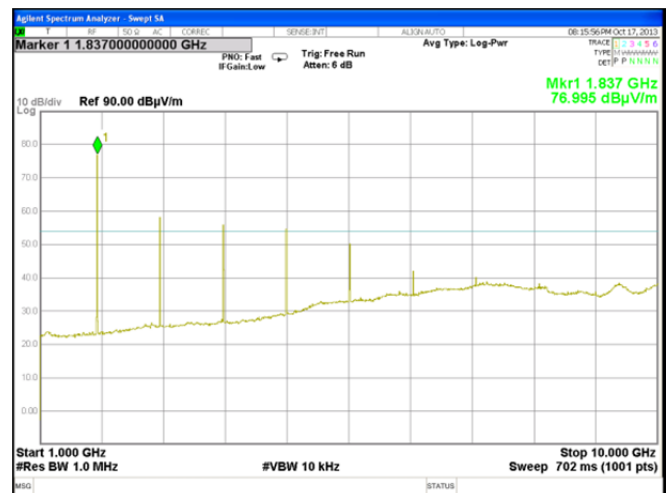
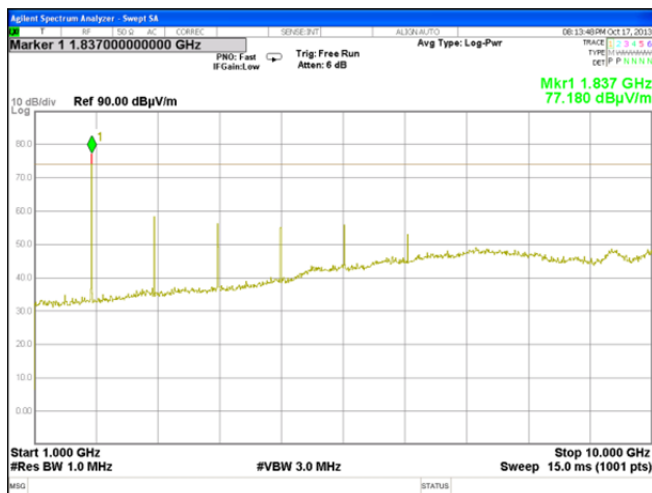
Plot 7.7.17 Radiated emission measurements from 1000 to 10000 MHz at the mid carrier frequency

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



Plot 7.7.18 Radiated emission measurements from 1000 to 10000 MHz at the high carrier frequency

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





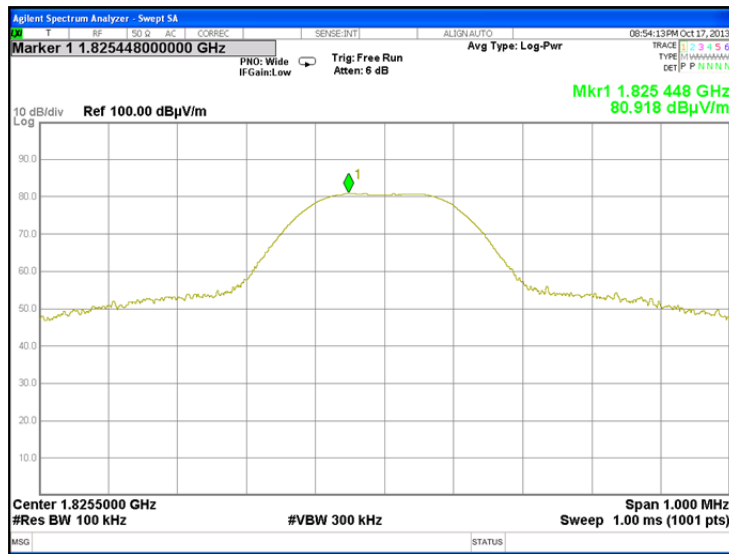


HERMON LABORATORIES

<b>Test specification:</b>	<b>Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b>		
<b>Test procedure:</b>	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	12-Nov-13		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

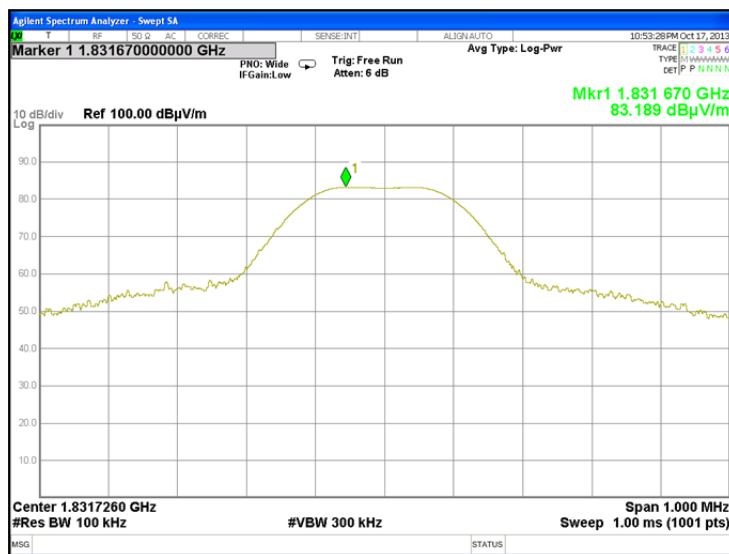
Plot 7.7.19 Radiated emission measurements at the second harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



Plot 7.7.20 Radiated emission measurements at the second harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



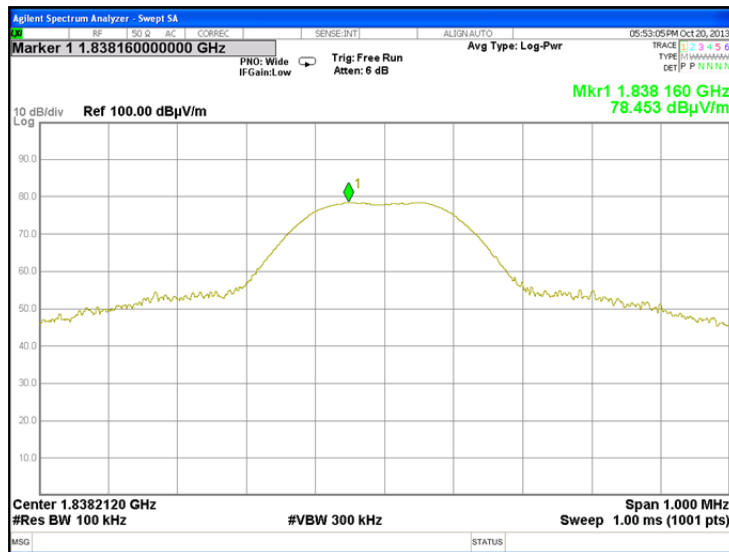


HERMON LABORATORIES

<b>Test specification:</b> Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions	
<b>Test procedure:</b> Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS
<b>Date &amp; Time:</b> 12-Nov-13	
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa
<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>	

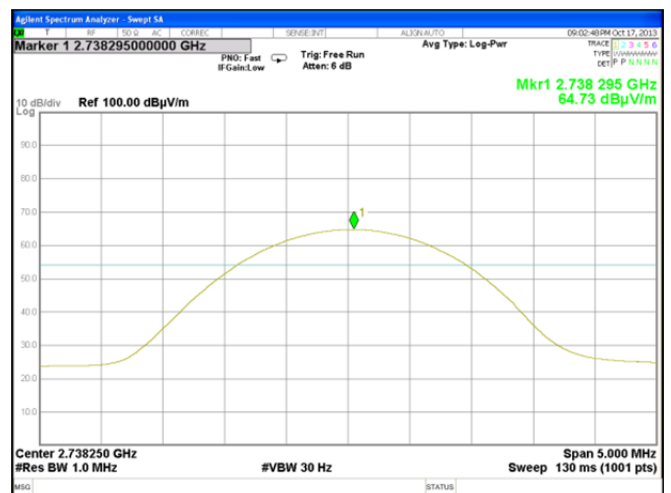
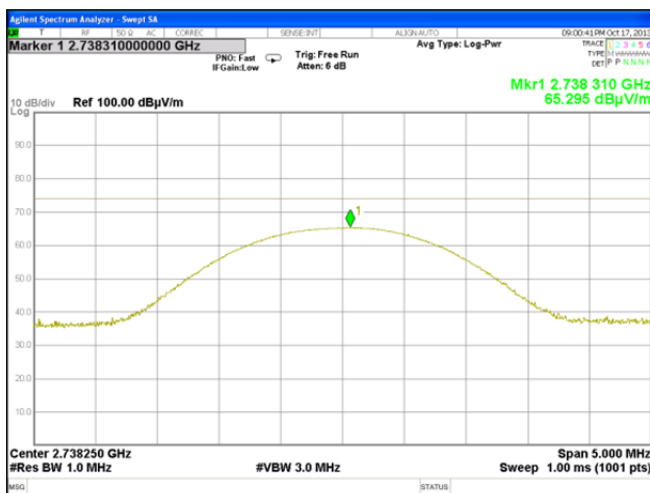
Plot 7.7.21 Radiated emission measurements at the second harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



Plot 7.7.22 Radiated emission measurements at the third harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



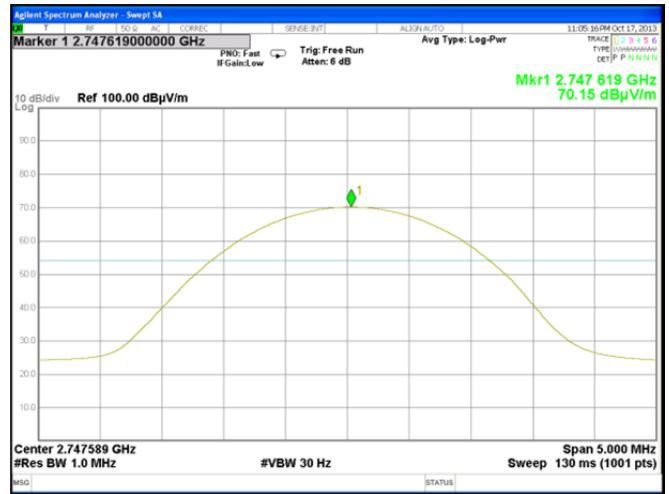
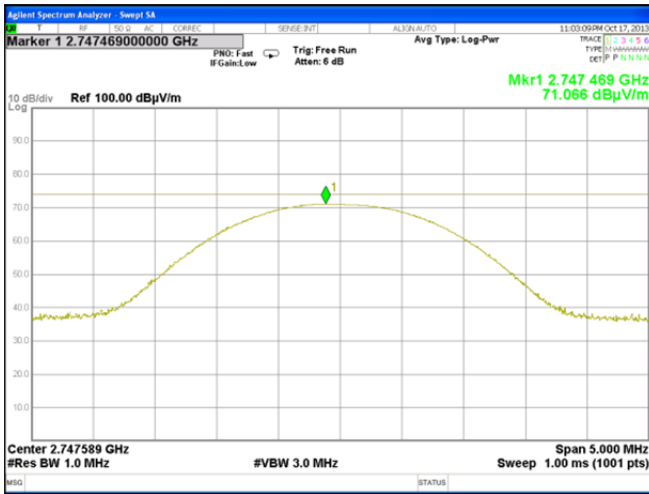


HERMON LABORATORIES

<b>Test specification:</b> Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions	
<b>Test procedure:</b> Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS
<b>Date &amp; Time:</b> 12-Nov-13	
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa
<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>	

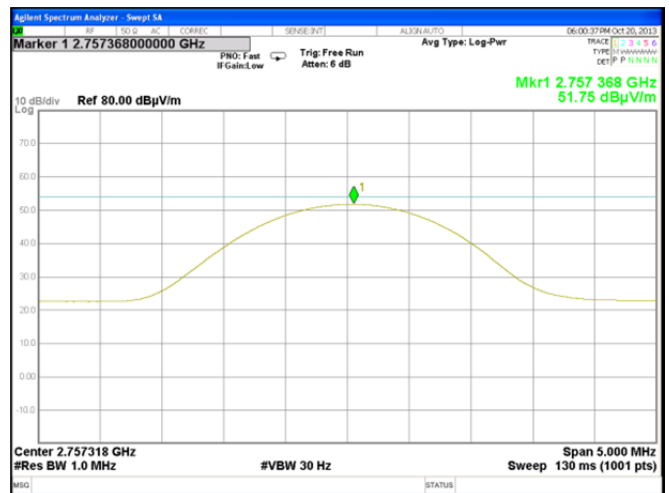
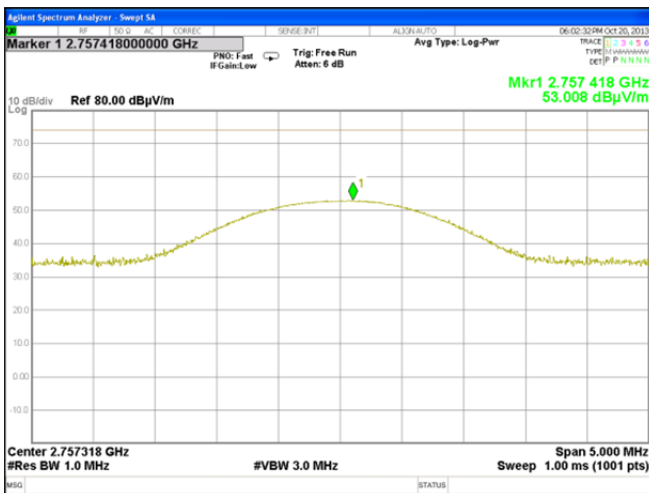
Plot 7.7.23 Radiated emission measurements at the third harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



Plot 7.7.24 Radiated emission measurements at the third harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



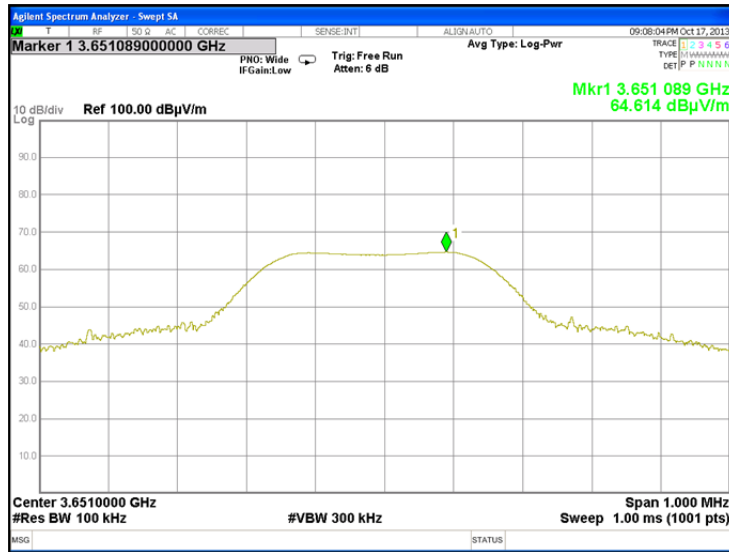


HERMON LABORATORIES

<b>Test specification:</b> Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions	
<b>Test procedure:</b> Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS
<b>Date &amp; Time:</b> 12-Nov-13	
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa
	<b>Relative Humidity:</b> 44 %
<b>Power Supply:</b> Battery	
<b>Remarks:</b>	

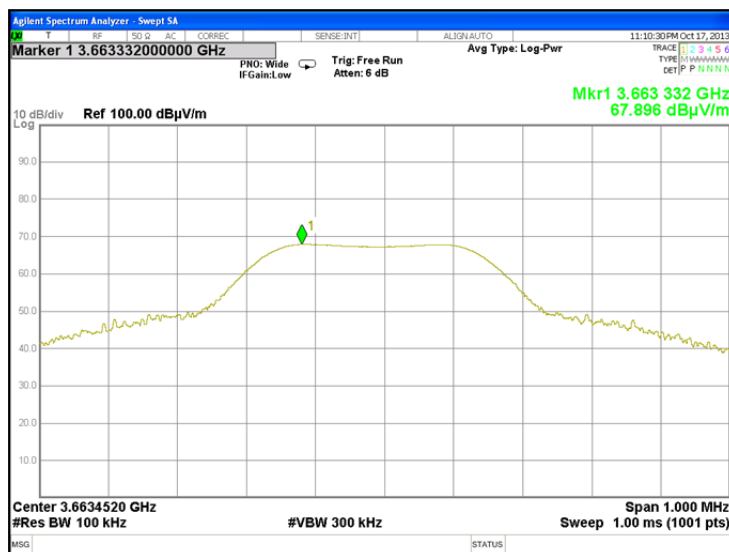
Plot 7.7.25 Radiated emission measurements at the fourth harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



Plot 7.7.26 Radiated emission measurements at the fourth harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



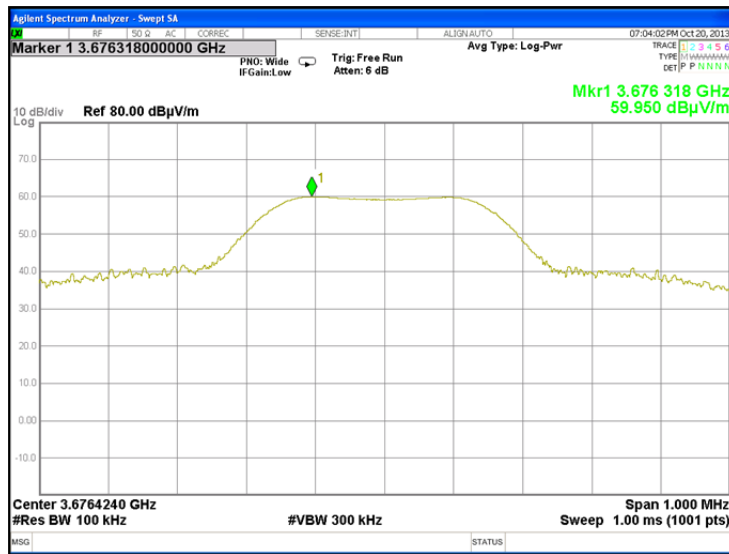


HERMON LABORATORIES

<b>Test specification:</b>	<b>Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b>		
<b>Test procedure:</b>	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	12-Nov-13		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

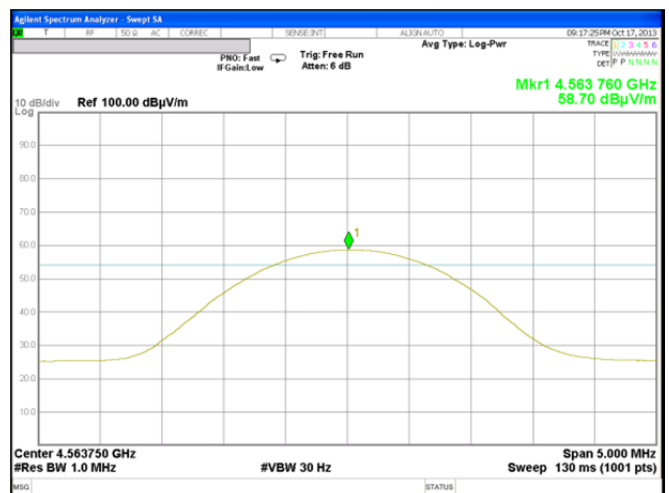
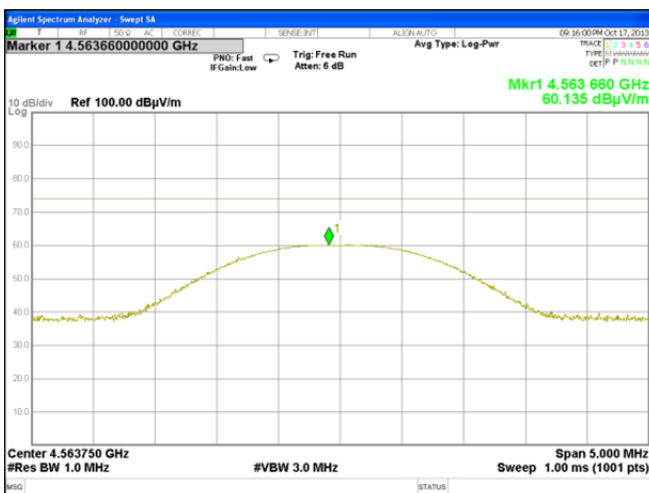
Plot 7.7.27 Radiated emission measurements at the fourth harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



Plot 7.7.28 Radiated emission measurements at the fifth harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



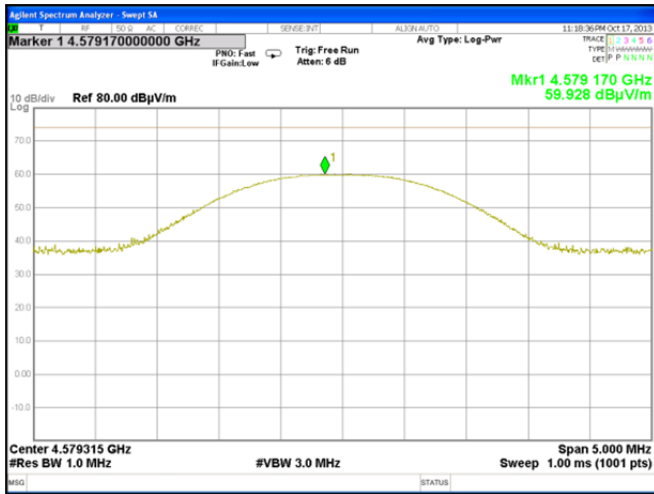


HERMON LABORATORIES

<b>Test specification:</b>	<b>Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b>		
<b>Test procedure:</b>	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict: PASS</b>	
<b>Date &amp; Time:</b>	12-Nov-13		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

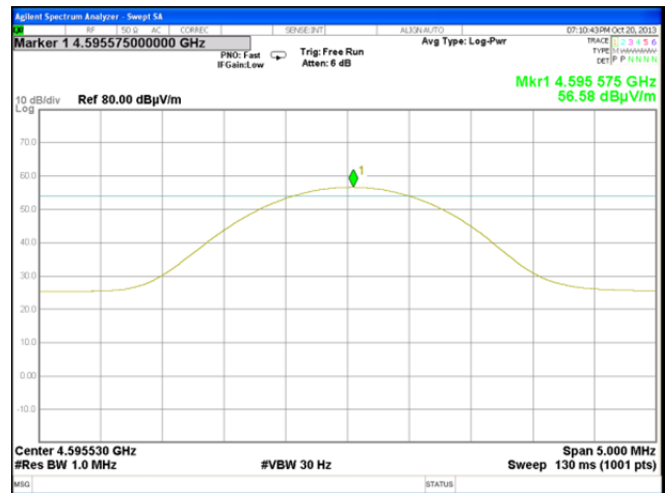
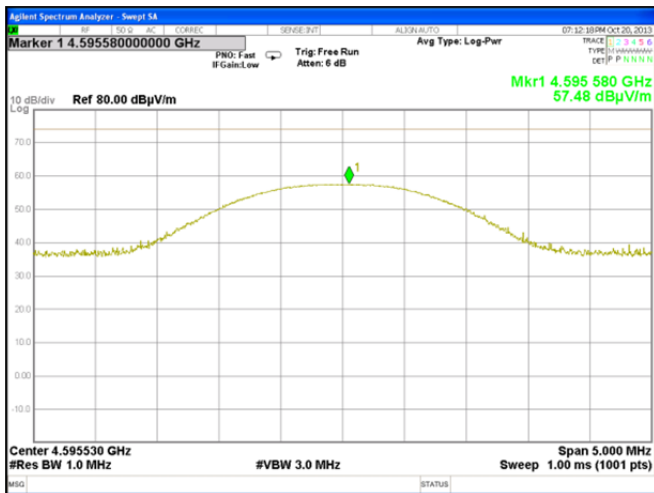
Plot 7.7.29 Radiated emission measurements at the fifth harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



Plot 7.7.30 Radiated emission measurements at the fifth harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



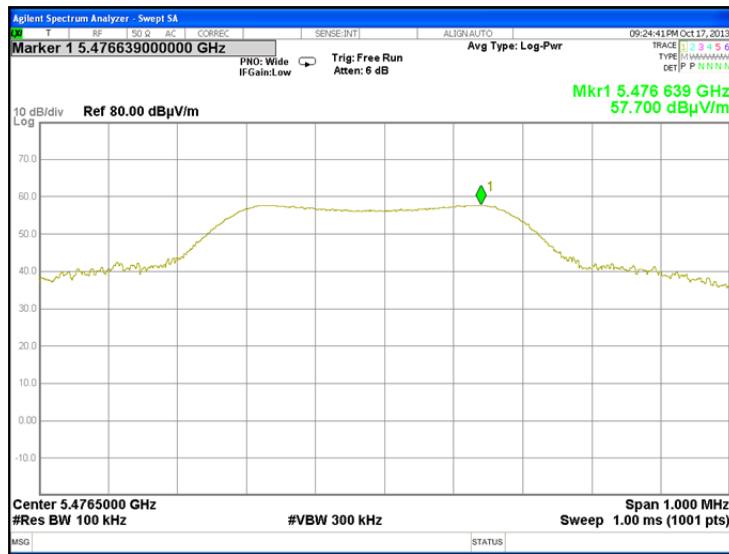


HERMON LABORATORIES

<b>Test specification:</b>	<b>Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b>		
<b>Test procedure:</b>	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	12-Nov-13		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

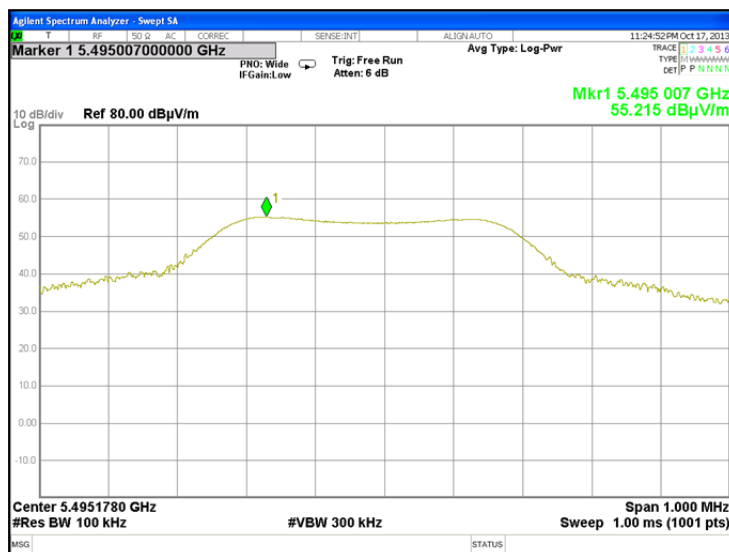
Plot 7.7.31 Radiated emission measurements at the sixth harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



Plot 7.7.32 Radiated emission measurements at the sixth harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



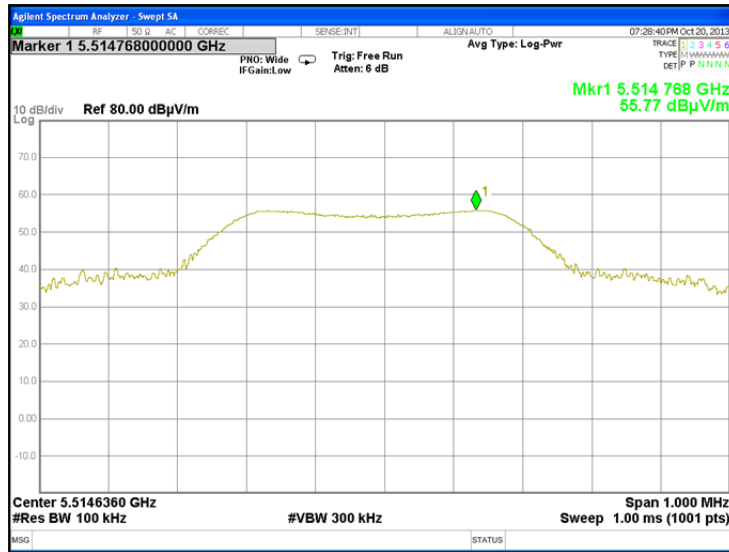


HERMON LABORATORIES

<b>Test specification:</b> Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions	
<b>Test procedure:</b> Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS
<b>Date &amp; Time:</b> 12-Nov-13	
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa
	<b>Relative Humidity:</b> 44 %
<b>Power Supply:</b> Battery	
<b>Remarks:</b>	

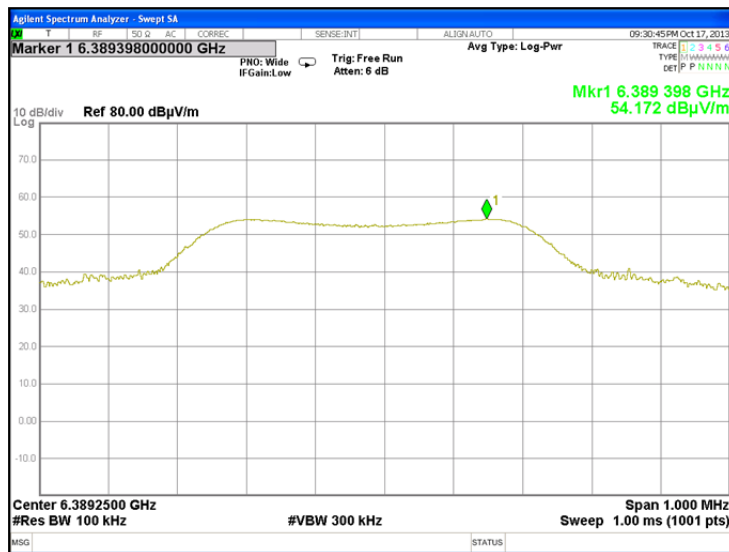
Plot 7.7.33 Radiated emission measurements at the sixth harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



Plot 7.7.34 Radiated emission measurements at the seventh harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m





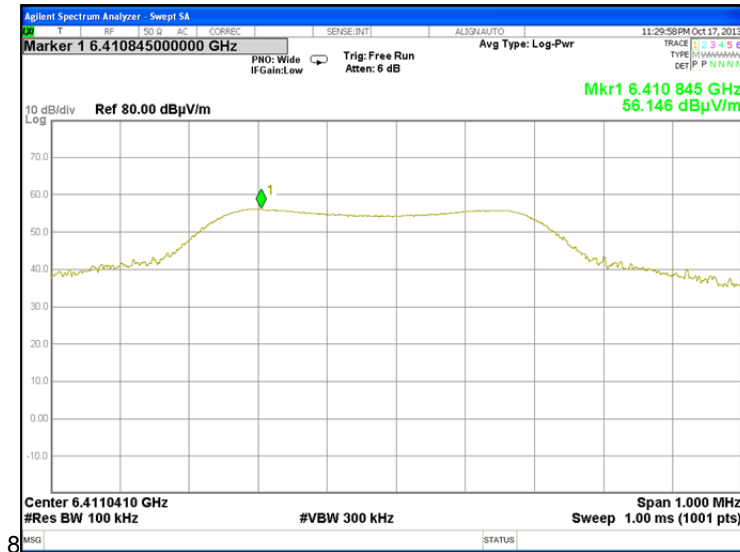


HERMON LABORATORIES

<b>Test specification:</b>	<b>Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b>		
<b>Test procedure:</b>	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	12-Nov-13		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

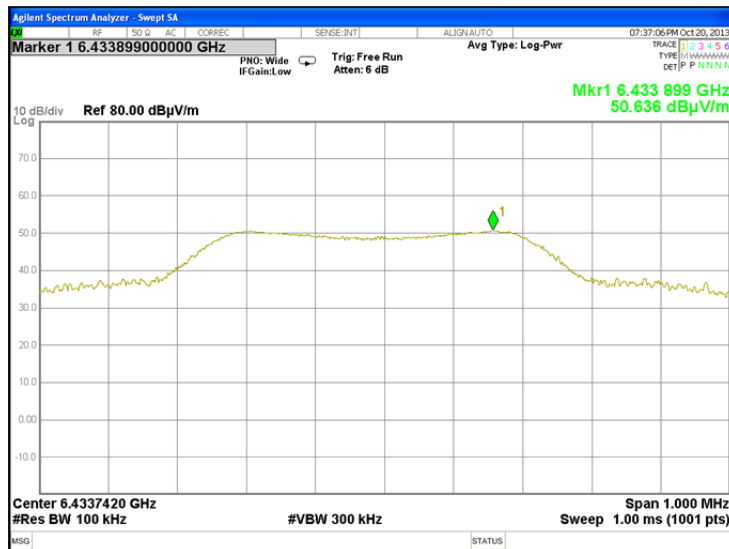
Plot 7.7.35 Radiated emission measurements at the seventh harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



Plot 7.7.36 Radiated emission measurements at the seventh harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



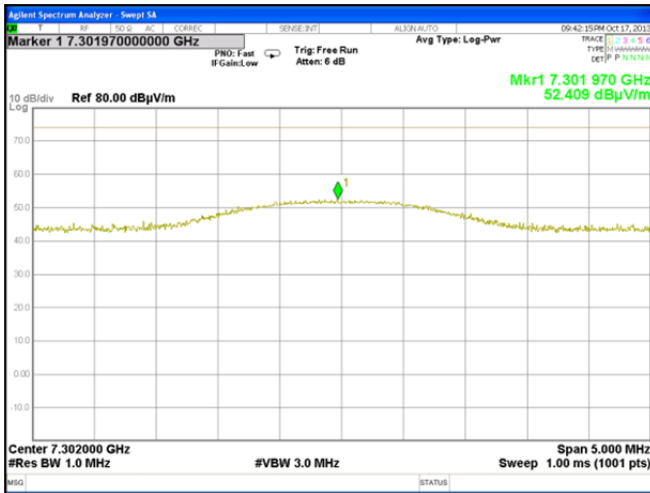


HERMON LABORATORIES

<b>Test specification:</b> Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions	
<b>Test procedure:</b> Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS
<b>Date &amp; Time:</b> 12-Nov-13	
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa
<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>	

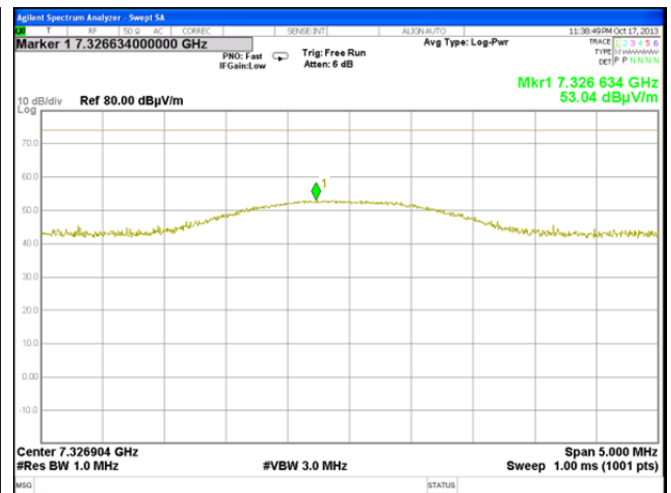
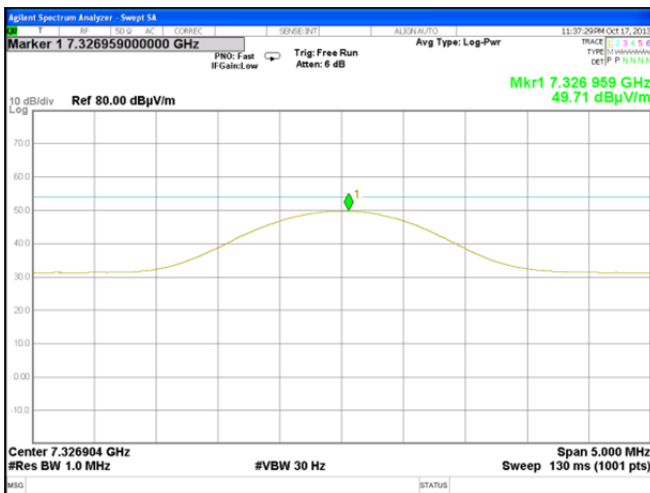
Plot 7.7.37 Radiated emission measurements at the eighth harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



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

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



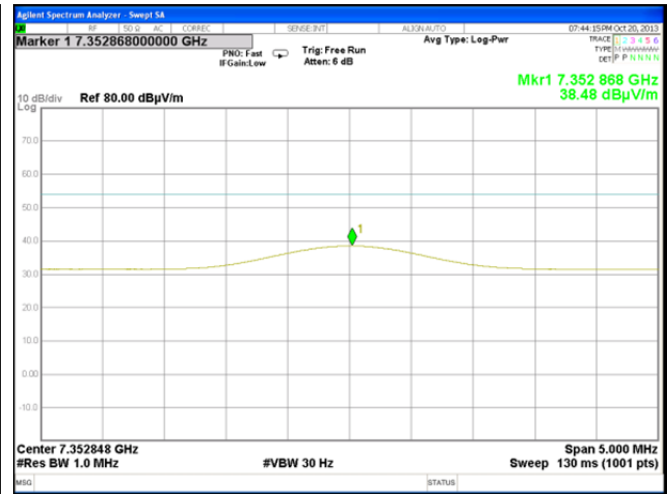
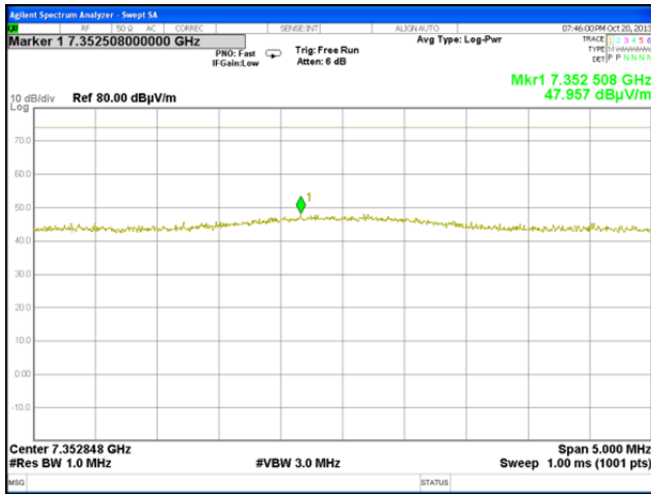


HERMON LABORATORIES

<b>Test specification:</b>		<b>Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b>	
<b>Test procedure:</b>		Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
<b>Test mode:</b>		<b>Verdict: PASS</b>	
<b>Date &amp; Time:</b>		12-Nov-13	
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

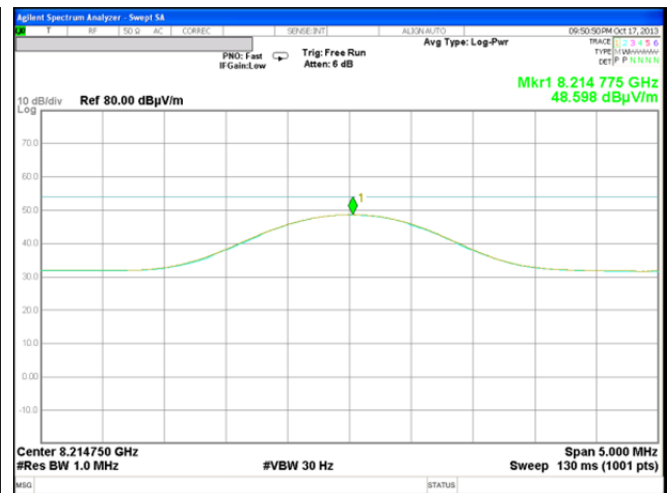
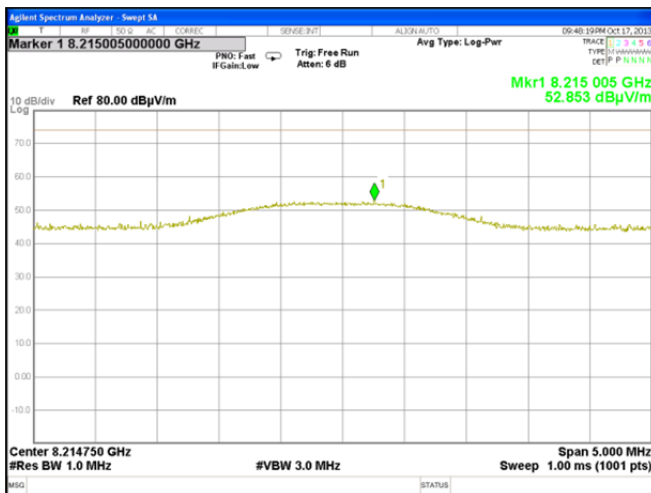
Plot 7.7.39 Radiated emission measurements at the eighth harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



Plot 7.7.40 Radiated emission measurements at the ninth harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



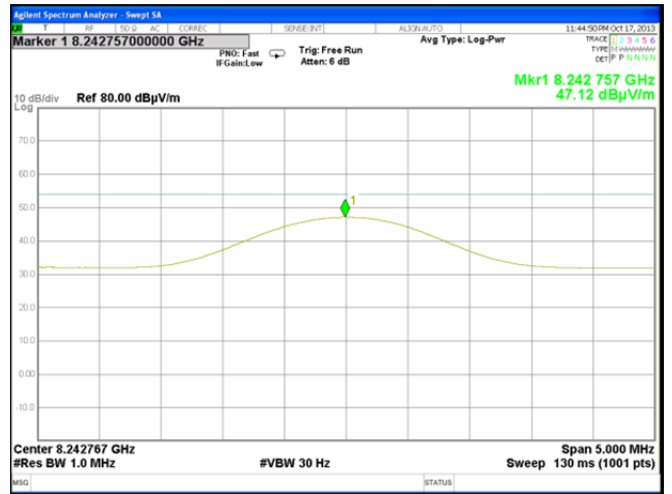
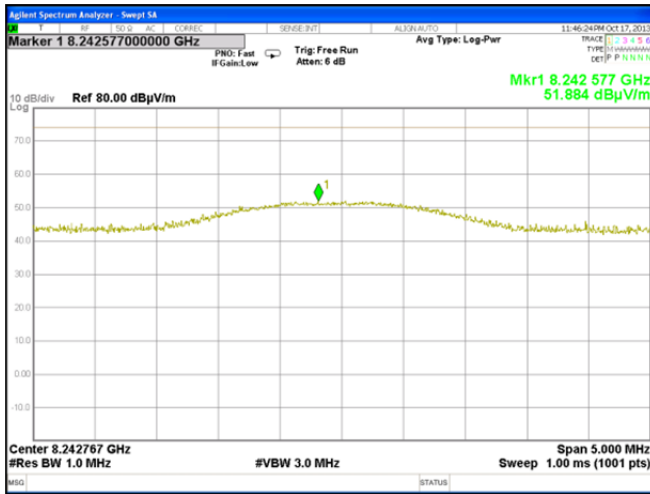


HERMON LABORATORIES

<b>Test specification:</b>	<b>Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b>		
<b>Test procedure:</b>	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	12-Nov-13		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

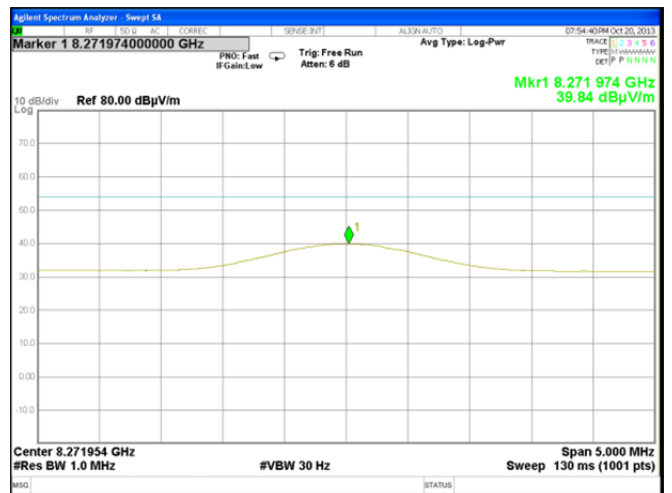
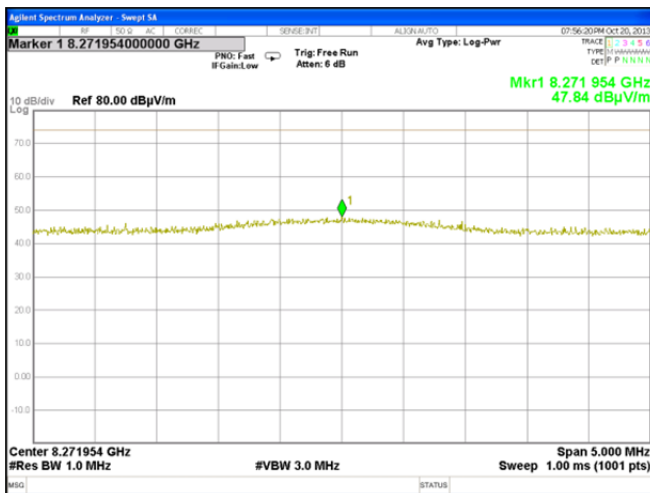
Plot 7.7.41 Radiated emission measurements at the ninth harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



Plot 7.7.42 Radiated emission measurements at the ninth harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



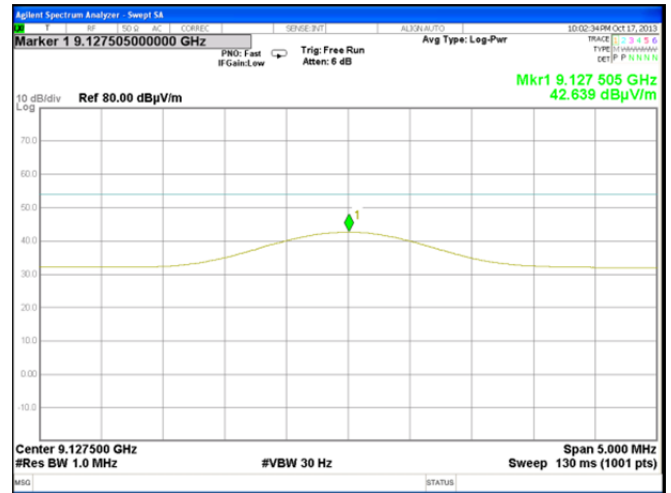
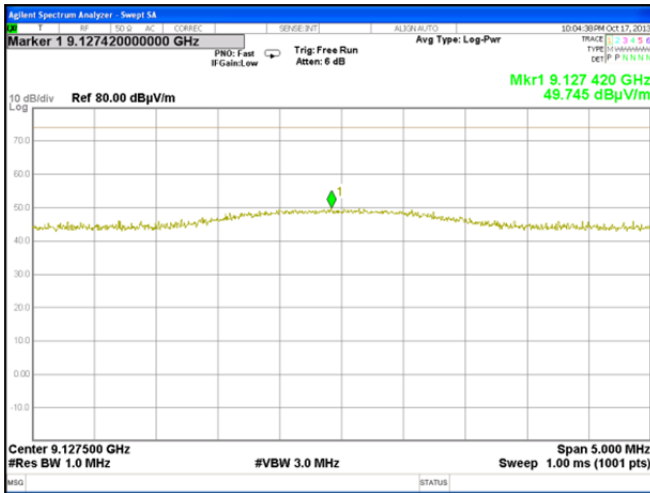


HERMON LABORATORIES

<b>Test specification:</b>	<b>Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b>		
<b>Test procedure:</b>	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	12-Nov-13		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

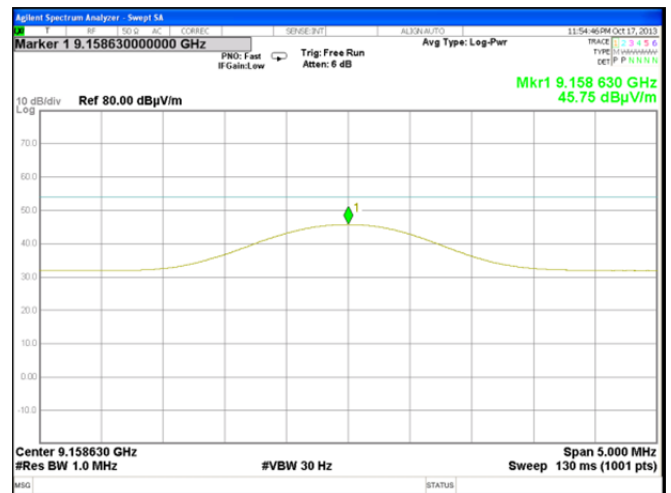
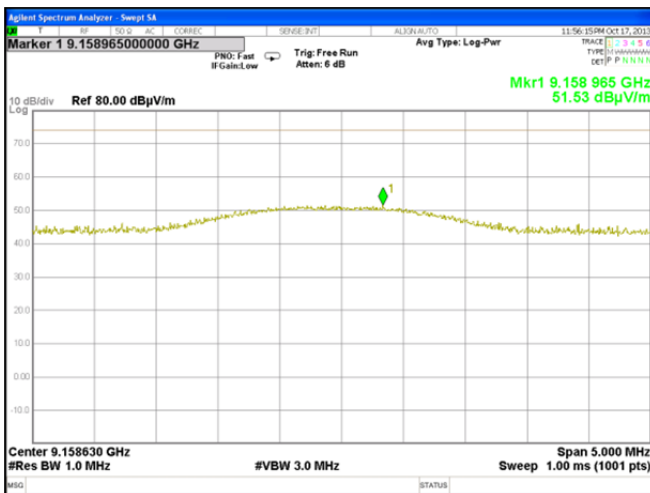
Plot 7.7.43 Radiated emission measurements at the tenth harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



Plot 7.7.44 Radiated emission measurements at the tenth harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



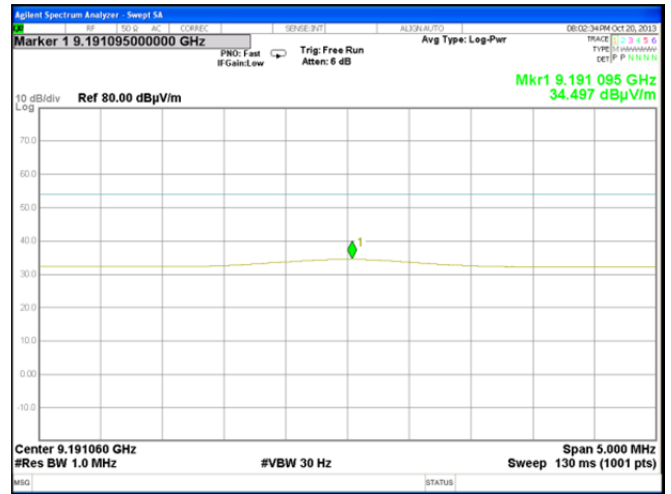
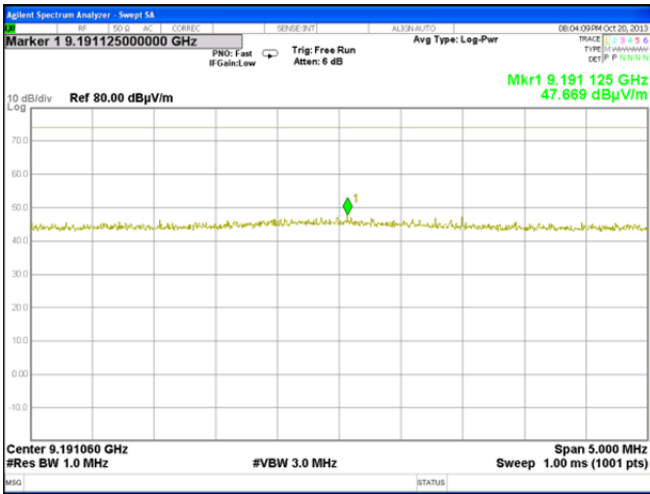


HERMON LABORATORIES

<b>Test specification:</b> Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions	
<b>Test procedure:</b> Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS
<b>Date &amp; Time:</b> 12-Nov-13	
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa
	<b>Relative Humidity:</b> 44 %
	<b>Power Supply:</b> Battery
<b>Remarks:</b>	

Plot 7.7.45 Radiated emission measurements at the tenth harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m

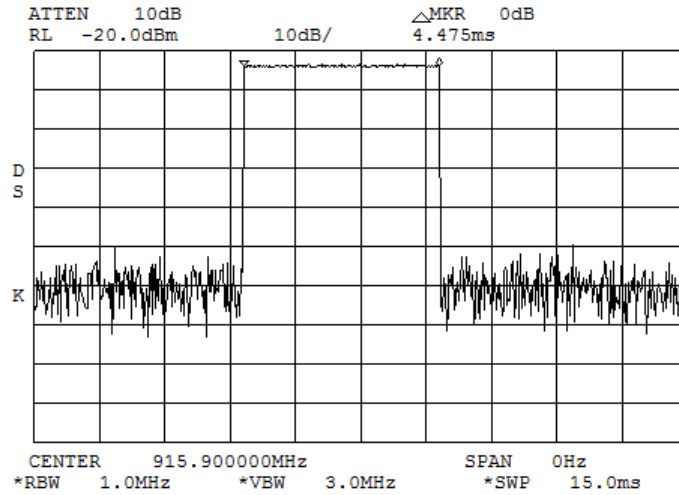




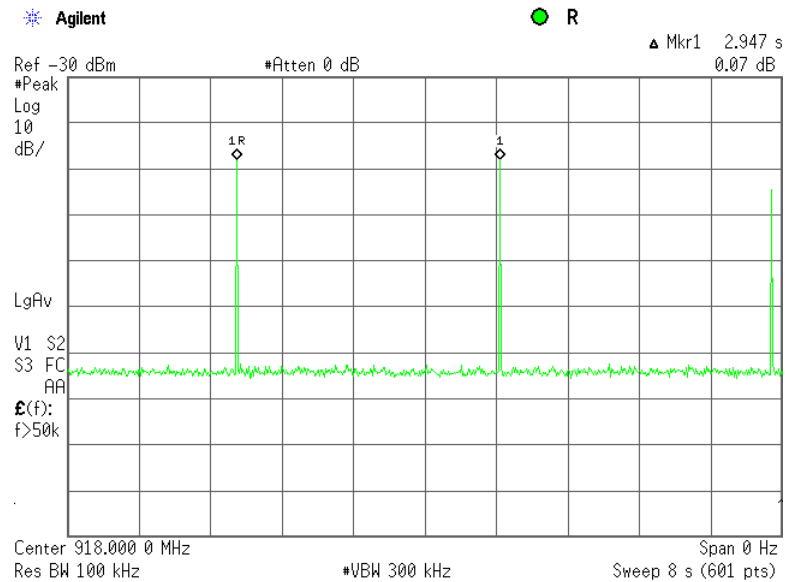
HERMON LABORATORIES

<b>Test specification:</b>	<b>Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b>		
<b>Test procedure:</b>	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict: PASS</b>	
<b>Date &amp; Time:</b>	12-Nov-13		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

Plot 7.7.46 Transmission pulse duration



Plot 7.7.47 Single transmission period





<b>Test specification:</b>	<b>Section 15.203, RSS-Gen section 7.1.2, Antenna requirements</b>		
<b>Test procedure:</b>	Public notice DA 00-705		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	09-Dec-13		
<b>Temperature:</b> 25 °C	<b>Air Pressure:</b> 1020 hPa	<b>Relative Humidity:</b> 43 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

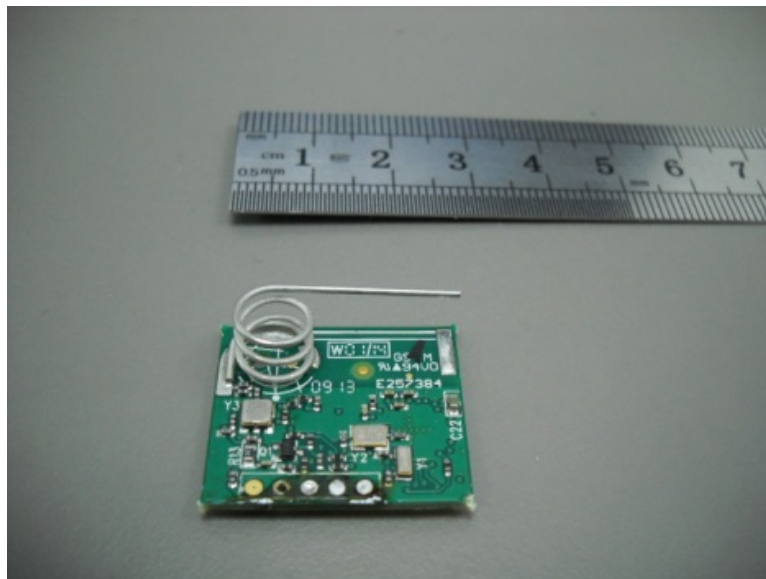
### 7.8 Antenna requirements

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 7.8.1.

Table 7.8.1 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	

Photograph 7.8.1 Antenna assembly





**8 APPENDIX A Test equipment and ancillaries used for tests**

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check*	Due Cal./ Check*
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	03-Jul-12	03-Jul-14
0583	Antenna, Log Periodic, 200 - 1000 MHz	Hermon Laboratories	LP 200/1000	035	11-Jul-13	11-Jul-14
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies	8564EC	3946A002 19	10-Oct-13	10-Oct-14
3818	PSA Series Spectrum Analyzer, 3 Hz- 44 GHz	Agilent Technologies	E4446A	MY482502 88	24-Apr-13	24-Apr-14
4135	Shield Box	TESCOM CO., LTD	TC-5916A	5916A000 136	09-Apr-13	09-Apr-14
4273	Test Cable , DC-18 GHz, 1.8 m, SMA/M - N/M	Mini-Circuits	CBL-6FT-SMNM+	70045	27-Nov-13	27-Nov-14
4274	Test Cable , DC-18 GHz, 1.8 m, SMA/M - N/M	Mini-Circuits	CBL-6FT-SMNM+	70047	27-Nov-13	27-Nov-14
4295	Microwave Cable Assembly, 18.0 GHz, 3.4 m, SMA/SMA	Huber-Suhner	Sucoflex P103	NA	04-Dec-13	04-Dec-14
4535	Microwave Cable Assembly, 6.5 GHz, 5.0 m, N/M type-N/M type	Suhner Switzerland	214-U	NA	01-Jan-14	01-Jan-15
4541	Microwave Cable Assembly, 4.0 GHz, 1.0 m, N/M type-N/M type	Suhner Switzerland	214-U	NA	01-Jan-14	01-Jan-15
4542	Amplifier, 9 kHz to 1 GHz, 32 dB gain	Sonoma Instrument	310	0002A056 39	31-Dec-13	31-Dec-14
4543	Broadband preamplifier, 0.5 to 18 GHz, 35 dB gain	Schwarzbeck mess-elektronik	BBV 9718	9718-134	29-Dec-13	29-Dec-14
4549	Cable RF, 6.8 m, N/N - type, up to 3 GHz	Suhner Switzerland	NA	07262	29-Dec-13	29-Dec-14
4551	Cable RF, 6.6 m, N/N - type, up to 18 GHz	Suhner Switzerland	Sucoflex 104E	22200/4E	29-Dec-13	29-Dec-14
4575	EXA Signal Analyzer, 9 kHz - 26.5 GHz	Agilent Technologies	N9010A	MY480301 10	17-Apr-13	17-Apr-14
4603	Horn Antenna, 1 - 18 GHz	Schwarzbeck mess-elektronik	BBHA 9120 D	9120D-611	04-Jun-13	04-Jun-14
4604	Biconilog Antenna, 26 - 2000 MHz	EMCO	3142B	9909-1421	04-Jun-13	04-Jun-14

\*- the calibration was valid at the testing time

## 9 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: $\pm 1.7$ dB 12.4 GHz to 40 GHz: $\pm 2.3$ dB
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: $\pm 2.6$ dB 2.9 GHz to 6.46 GHz: $\pm 3.5$ dB 6.46 GHz to 13.2 GHz: $\pm 4.3$ dB 13.2 GHz to 22.0 GHz: $\pm 5.0$ dB 22.0 GHz to 26.8 GHz: $\pm 5.5$ dB 26.8 GHz to 40.0 GHz: $\pm 4.8$ dB
Occupied bandwidth	$\pm 8.0$ %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	$\pm 1.0$ %
Radiated emissions at 3 m measuring distance	
Horizontal polarization	Biconilog antenna: $\pm 5.3$ dB Biconical antenna: $\pm 5.0$ dB Log periodic antenna: $\pm 5.3$ dB Double ridged horn antenna: $\pm 5.3$ dB
Vertical polarization	Biconilog antenna: $\pm 6.0$ dB Biconical antenna: $\pm 5.7$ dB Log periodic antenna: $\pm 6.0$ dB Double ridged horn antenna: $\pm 6.0$ 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.



## 10 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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Person for contact: Mr. Alex Usoskin, CEO.

## 11 APPENDIX D Specification references

FCC 47CFR part 15: 2013	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 8: 2010	Low Power Licence- Exempt Radiocommunication Devices
RSS-Gen Issue 3: 2010	General Requirements and Information for the Certification of Radiocommunication Equipment



## 12 APPENDIX E Test equipment correction factors

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

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

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



**Antenna factor**  
**Log periodic antenna**  
**Hermon Laboratories, model LP 200/1000**  
**Ser.No.035, HL 0583**

Frequency, MHz	Antenna factor, dB(1/m)
200	12.0
250	12.5
300	14.5
350	15.7
400	16.0
450	16.7
500	18.1
550	18.2
600	18.8
650	20.1
700	21.8
750	21.4
800	21.4
850	22.4
900	22.8
950	23.4
1000	24.6

The antenna factor shall be added to receiver reading in dB $\mu$ V to obtain field strength in dB $\mu$ V/m.



**Antenna factor**  
**Horn antenna**  
Schwarzbeck mess-elektronik, Model BBHA 9120 D, serial number: 9120D-611, HL 4603

Frequency, MHz	Measured antenna factor, dB/m
1000	25.2
1500	25.7
2000	26.1
2500	27.5
3000	28.3
3500	29.0
4000	30.0
4500	30.8
5000	31.9
5500	32.2
6000	33.1
6500	34.6
7000	35.9
7500	36.6
8000	37.2
8500	36.6
9000	36.9
9500	37.5
10000	38.4
10500	39.5
11000	40.3
11500	40.0
12000	39.2
12500	38.7
13000	39.6
13500	40.8
14000	41.6
14500	42.1
15000	41.2
15500	39.1
16000	38.5
16500	39.9
17000	41.0
17500	44.1
18000	55.6

The antenna factor shall be added to receiver reading in dB $\mu$ V to obtain field strength in dB $\mu$ V/m.



**Antenna factor**  
**Biconilog Antenna, 26 - 2000 MHz**  
**EMCO, Model 3142B, serial number: 9909-1421, HL 4604**

Frequency, MHz	Measured, dB/m
30	17.9
35	14.8
40	12.1
45	10.0
50	8.7
60	8.1
70	7.3
80	6.6
90	7.6
100	7.9
120	7.0
140	7.7
160	9.6
180	10.0
200	10.2
250	12.7
300	13.4
400	16.7
500	18.2
600	20.2
700	22.0
800	22.7
900	24.1
1000	25.0

The antenna factor shall be added to receiver reading in dB $\mu$ V to obtain field strength in dB $\mu$ V/m



**Cable loss**  
**Test cable, Mini-Circuits, S/N 70045, 18 GHz, 1.8 m, SMA/M - N/M**  
**CBL-6FT-SMNM+, HL 4273**

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.09	4800	1.76	9800	2.70	14800	3.59
30	0.11	4900	1.78	9900	2.71	14900	3.59
50	0.14	5000	1.81	10000	2.73	15000	3.60
100	0.20	5100	1.82	10100	2.75	15100	3.63
200	0.30	5200	1.86	10200	2.76	15200	3.67
300	0.38	5300	1.89	10300	2.79	15300	3.70
400	0.45	5400	1.92	10400	2.81	15400	3.68
500	0.50	5500	1.96	10500	2.82	15500	3.70
600	0.55	5600	2.00	10600	2.83	15600	3.71
700	0.60	5700	2.03	10700	2.87	15700	3.77
800	0.65	5800	2.04	10800	2.87	15800	3.75
900	0.69	5900	2.07	10900	2.88	15900	3.77
1000	0.73	6000	2.10	11000	2.89	16000	3.79
1100	0.77	6100	2.10	11100	2.91	16100	3.85
1200	0.80	6200	2.11	11200	2.92	16200	3.82
1300	0.84	6300	2.11	11300	2.94	16300	3.83
1400	0.88	6400	2.14	11400	2.95	16400	3.88
1500	0.92	6500	2.15	11500	2.98	16500	3.89
1600	0.95	6600	2.15	11600	3.00	16600	3.92
1700	0.98	6700	2.16	11700	3.02	16700	3.88
1800	1.01	6800	2.19	11800	3.04	16800	3.95
1900	1.04	6900	2.22	11900	3.08	16900	3.91
2000	1.07	7000	2.24	12000	3.09	17000	3.97
2100	1.09	7100	2.26	12100	3.12	17100	3.92
2200	1.13	7200	2.29	12200	3.13	17200	3.94
2300	1.15	7300	2.32	12300	3.16	17300	3.94
2400	1.18	7400	2.36	12400	3.17	17400	3.98
2500	1.21	7500	2.39	12500	3.19	17500	3.93
2600	1.24	7600	2.41	12600	3.20	17600	3.95
2700	1.27	7700	2.43	12700	3.21	17700	3.96
2800	1.30	7800	2.46	12800	3.21	17800	3.97
2900	1.34	7900	2.49	12900	3.22	17900	3.96
3000	1.36	8000	2.52	13000	3.22	18000	3.97
3100	1.38	8100	2.52	13100	3.24		
3200	1.41	8200	2.54	13200	3.24		
3300	1.45	8300	2.59	13300	3.27		
3400	1.46	8400	2.61	13400	3.28		
3500	1.49	8500	2.60	13500	3.31		
3600	1.51	8600	2.63	13600	3.31		
3700	1.55	8700	2.65	13700	3.35		
3800	1.34	8800	2.65	13800	3.37		
3900	1.36	8900	2.65	13900	3.40		
4000	1.38	9000	2.66	14000	3.43		
4100	1.41	9100	2.66	14100	3.45		
4200	1.45	9200	2.67	14200	3.46		
4300	1.46	9300	2.67	14300	3.46		
4400	1.49	9400	2.67	14400	3.49		
4500	1.51	9500	2.68	14500	3.50		
4600	1.55	9600	2.69	14600	3.50		
4700	1.34	9700	2.69	14700	3.52		





**Cable loss**  
**Test cable, Mini-Circuits, S/N 70047, 18 GHz, 1.8 m, SMA/M - N/M**  
**CBL-6FT-SMNM+, HL 4274**

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.07	4800	1.69	9800	2.62	14800	3.42
30	0.11	4900	1.70	9900	2.63	14900	3.39
50	0.14	5000	1.72	10000	2.64	15000	3.38
100	0.21	5100	1.75	10100	2.64	15100	3.40
200	0.26	5200	1.76	10200	2.66	15200	3.41
300	0.30	5300	1.77	10300	2.67	15300	3.40
400	0.37	5400	1.79	10400	2.68	15400	3.39
500	0.44	5500	1.82	10500	2.68	15500	3.41
600	0.49	5600	1.85	10600	2.70	15600	3.44
700	0.54	5700	1.86	10700	2.71	15700	3.46
800	0.58	5800	1.87	10800	2.73	15800	3.45
900	0.63	5900	1.91	10900	2.74	15900	3.47
1000	0.67	6000	1.94	11000	2.76	16000	3.51
1100	0.71	6100	1.97	11100	2.77	16100	3.56
1200	0.75	6200	1.98	11200	2.78	16200	3.55
1300	0.78	6300	1.99	11300	2.79	16300	3.54
1400	0.81	6400	2.02	11400	2.80	16400	3.57
1500	0.85	6500	2.05	11500	2.82	16500	3.62
1600	0.88	6600	2.06	11600	2.83	16600	3.61
1700	0.91	6700	2.06	11700	2.84	16700	3.60
1800	0.94	6800	2.08	11800	2.85	16800	3.62
1900	0.97	6900	2.10	11900	2.87	16900	3.68
2000	1.00	7000	2.12	12000	2.88	17000	3.70
2100	1.03	7100	2.12	12100	2.89	17100	3.68
2200	1.06	7200	2.13	12200	2.90	17200	3.70
2300	1.08	7300	2.16	12300	2.92	17300	3.80
2400	1.11	7400	2.19	12400	2.94	17400	3.84
2500	1.14	7500	2.22	12500	2.95	17500	3.83
2600	1.16	7600	2.23	12600	2.96	17600	3.83
2700	1.19	7700	2.26	12700	2.98	17700	3.86
2800	1.21	7800	2.30	12800	3.00	17800	3.86
2900	1.27	7900	2.33	12900	3.02	17900	3.80
3000	1.29	8000	2.35	13000	3.03	18000	3.79
3100	1.32	8100	2.37	13100	3.06		
3200	1.35	8200	2.41	13200	3.08		
3300	1.37	8300	2.44	13300	3.09		
3400	1.38	8400	2.47	13400	3.10		
3500	1.41	8500	2.48	13500	3.13		
3600	1.43	8600	2.51	13600	3.17		
3700	1.46	8700	2.53	13700	3.17		
3800	1.47	8800	2.55	13800	3.18		
3900	1.49	8900	2.56	13900	3.22		
4000	1.52	9000	2.57	14000	3.26		
4100	1.55	9100	2.58	14100	3.28		
4200	1.56	9200	2.59	14200	3.30		
4300	1.58	9300	2.59	14300	3.35		
4400	1.60	9400	2.60	14400	3.39		
4500	1.63	9500	2.60	14500	3.39		
4600	1.65	9600	2.61	14600	3.39		
4700	1.67	9700	2.61	14700	3.41		



**Cable loss**  
**Microwave Cable Assembly, 18.0 GHz, 3.4 m, SMA/SMA, Huber-Suhner, S/N 4295,**  
**Sucoflex P103, HL 4295**

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.11	5000	2.09	10200	2.97	15400	3.63
30	0.18	5100	2.12	10300	3.01	15500	3.65
50	0.23	5200	2.13	10400	3.00	15600	3.63
100	0.31	5300	2.16	10500	3.05	15700	3.64
200	0.38	5400	2.19	10600	3.09	15800	3.64
300	0.43	5500	2.21	10700	3.05	15900	3.66
400	0.52	5600	2.21	10800	3.09	16000	3.71
500	0.60	5700	2.24	10900	3.10	16100	3.67
600	0.67	5800	2.24	11000	3.08	16200	3.71
700	0.72	5900	2.25	11100	3.11	16300	3.70
800	0.78	6000	2.27	11200	3.12	16400	3.71
900	0.83	6100	2.25	11300	3.12	16500	3.72
1000	0.89	6200	2.29	11400	3.20	16600	3.84
1100	0.94	6300	2.34	11500	3.16	16700	3.78
1200	0.98	6400	2.37	11600	3.16	16800	3.85
1300	1.03	6500	2.33	11700	3.20	16900	3.88
1400	1.06	6600	2.34	11800	3.19	17000	3.85
1500	1.11	6700	2.39	11900	3.21	17100	3.88
1600	1.14	6800	2.46	12000	3.28	17200	3.92
1700	1.19	6900	2.45	12100	3.23	17300	3.90
1800	1.22	7000	2.44	12200	3.26	17400	4.00
1900	1.26	7100	2.43	12300	3.30	17500	4.02
2000	1.30	7200	2.44	12400	3.25	17600	4.00
2100	1.34	7300	2.51	12500	3.26	17700	3.96
2200	1.37	7400	2.54	12600	3.30	17800	4.01
2300	1.40	7500	2.49	12700	3.26	17900	4.02
2400	1.44	7600	2.52	12800	3.34	18000	4.08
2500	1.47	7700	2.59	12900	3.37		
2600	1.50	7800	2.57	13000	3.30		
2700	1.55	7900	2.55	13100	3.35		
2800	1.58	8000	2.57	13200	3.31		
2900	1.60	8100	2.58	13300	3.33		
3000	1.63	8200	2.64	13400	3.42		
3100	1.64	8300	2.70	13500	3.43		
3200	1.67	8400	2.65	13600	3.40		
3300	1.69	8500	2.66	13700	3.47		
3400	1.73	8600	2.68	13800	3.45		
3500	1.74	8700	2.70	13900	3.43		
3600	1.76	8800	2.74	14000	3.52		
3700	1.79	8900	2.74	14100	3.51		
3800	1.82	9000	2.76	14200	3.54		
3900	1.85	9100	2.82	14300	3.55		
4000	1.87	9200	2.79	14400	3.52		
4100	1.90	9300	2.82	14500	3.52		
4200	1.92	9400	2.83	14600	3.56		
4300	1.93	9500	2.83	14700	3.55		
4400	1.94	9600	2.86	14800	3.55		
4500	1.97	9700	2.93	14900	3.59		
4600	1.99	9800	2.89	15000	3.56		
4700	2.01	9900	2.91	15100	3.59		
4800	2.02	10000	2.94	15200	3.59		
4900	2.04	10100	2.94	15300	3.59		



**Cable loss**  
**Microwave Cable Assembly, 6.5 GHz, 5.0 m, N/M type-N/M type**  
**Suhner Switzerland, HL 4535**

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.10	1700	1.79	4400	3.53
15	0.13	1800	1.86	4500	3.60
20	0.15	1900	1.93	4600	3.72
30	0.18	2000	2.00	4700	3.80
40	0.21	2100	2.06	4800	3.87
50	0.24	2200	2.13	4900	3.94
60	0.26	2300	2.19	5000	3.99
70	0.29	2400	2.25	5100	4.06
80	0.31	2500	2.32	5200	4.12
90	0.33	2600	2.38	5300	4.17
100	0.35	2700	2.45	5400	4.25
150	0.43	2800	2.51	5500	4.31
200	0.50	2900	2.57	5600	4.40
300	0.63	3000	2.64	5700	4.47
400	0.74	3100	2.73	5800	4.54
500	0.85	3200	2.79	5900	4.64
600	0.94	3300	2.86	6000	4.73
700	1.03	3400	2.91	6100	4.79
800	1.12	3500	2.97	6200	4.89
900	1.20	3600	3.02	6300	5.00
1000	1.28	3700	3.07	6400	5.06
1100	1.35	3800	3.14	6500	5.13
1200	1.43	3900	3.20		
1300	1.50	4000	3.25		
1400	1.58	4100	3.32		
1500	1.65	4200	3.38		
1600	1.72	4300	3.46		



**Cable loss**  
**Microwave Cable Assembly, 4.0 GHz, 1.0 m, N/M type-N/M type**  
**Suhner Switzerland, HL 4541**

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.02	1700	0.45
15	0.03	1800	0.46
20	0.03	1900	0.48
30	0.04	2000	0.49
40	0.04	2100	0.52
50	0.05	2200	0.54
60	0.06	2300	0.55
70	0.06	2400	0.56
80	0.07	2500	0.58
90	0.07	2600	0.59
100	0.08	2700	0.61
150	0.10	2800	0.63
200	0.12	2900	0.64
300	0.15	3000	0.67
400	0.18	3100	0.70
500	0.20	3200	0.74
600	0.23	3300	0.77
700	0.25	3400	0.80
800	0.28	3500	0.82
900	0.30	3600	0.86
1000	0.31	3700	0.88
1100	0.33	3800	0.94
1200	0.35	3900	0.95
1300	0.37	4000	0.99
1400	0.39		
1500	0.41		
1600	0.43		



### 13 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( $\mu$ V)	decibel referred to one microvolt
dB( $\mu$ V/m)	decibel referred to one microvolt per meter
dB( $\mu$ 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
$\mu$ s	microsecond
NA	not applicable
NB	narrow band
OATS	open area test site
$\Omega$	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