

# TEST REPORT

**ACCORDING TO: FCC 47 CFR PART 15 subpart C, section 15.249 and subpart B;  
RSS-210 issue 8 Annex 2, ICES-003 Issue 5:2012**

**FOR:**

**Israel Weapon Industries (IWI) Ltd.  
Light weapons inventory control  
and maintenance tool  
Model: eLog  
FCC ID:2AG7D810**

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

**Client name:** Israel Weapon Industries (IWI) Ltd.  
**Address:** 64 Bialik avenue, P.O.Box 63, Ramat Hasharon 4710001, Israel  
**Telephone:** +972 3760 6195  
**Fax:** +972 3760 6001  
**E-mail:** avirams@iwi.net  
**Contact name:** Mr. Aviram Sobol

## 2 Equipment under test attributes

**Product name:** Light weapons inventory control and maintenance tool  
**Product type:** Transceiver  
**Model(s):** eLog  
**Serial number:** 4315.0003  
**Hardware version:** 2.1  
**Software release:** 2.1  
**Receipt date** 20-Dec-15

## 3 Manufacturer information

**Manufacturer name:** Israel Weapon Industries (IWI) Ltd.  
**Address:** 64 Bialik avenue, P.O.Box 63, Ramat Hasharon 4710001, Israel  
**Telephone:** +972 3760 6195  
**Fax:** +972 3760 6001  
**E-Mail:** avirams@iwi.net  
**Contact name:** Mr. Aviram Sobol

## 4 Test details




**Project ID:** 27623  
**Location:** Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel  
**Test started:** 20-Dec-15  
**Test completed:** 29-Dec-15  
**Test specification(s):** FCC 47 CFR Part 15, subpart C, §15.249; subpart B §15.109;  
RSS-210 issue 8, RSS-Gen issue 4, ICES-003 issue 5

## 5 Tests summary

Test	Status
<b>Transmitter characteristics</b>	
Section 15.249(a)(d) / RSS-210, section A2.9, Field strength of emissions	Pass
Section 15.215(c) / RSS-Gen, section 6.6, Occupied bandwidth	Pass
Section 15.249(d) / RSS-210, section A2.9, Band edge emissions	Pass
Section 15.207(a) / RSS-Gen, section 8.8, Conducted emission	Not required
Section 15.203 / RSS-Gen, section 8.3, Antenna requirement	Pass
<b>Unintentional emissions</b>	
Section 15.107 / ICES-003, Section 6.1 class B, Conducted emission at AC power port	Not required
Section 15.109 / RSS-Gen, section 7.1.2, ICES-003, Section 6.2 class B, Radiated emission	Pass

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.

	Name and Title	Date	Signature
<b>Tested by:</b>	Mrs. E. Pitt, test engineer	December 29, 2015	
<b>Reviewed by:</b>	Mrs. M. Cherniavsky, certification engineer	January 24, 2016	
<b>Approved by:</b>	Mr. M. Nikishin, EMC and Radio group manager	February 22, 2016	

## 6 EUT description

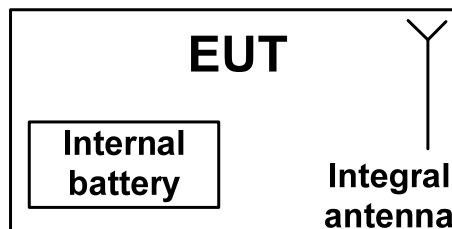
### 6.1 General information

The EUT, model name eLog (Electronic LOG), is an innovative computer based, light weapons inventory control and maintenance tool for field armorer level.

The eLog enables real preventive maintenance for small arms weapons, based on real counting of shot, and a database of life expectancy of each component in the weapon.

The EUT is a small PCB in the plastic case containing transceiver operating in the 902-928 MHz range and stand-alone coin battery.

### 6.2 Test configuration



### 6.3 Changes made in EUT

No changes were implemented in the EUT during the testing.

## 6.4 Transmitter characteristics

<b>Type of equipment</b>						
<b>V</b>	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>Assigned frequency range</b>		902-908 MHz				
<b>Operating frequency</b>		916 MHz				
<b>Maximum field strength of carrier at 3 m distance</b>		83.6 dBµV/m				
<b>Is transmitter output power variable?</b>		<b>V</b>	No			
			Yes	continuous variable		
				stepped variable with stepsize		
				dB		
				minimum RF power		
			dBm			
			maximum RF power			
			dBm			
<b>Antenna connection</b>						
unique coupling		standard connector		<b>V</b>	Integral	
				<b>V</b>	with temporary RF connector	
				<b>V</b>	without temporary RF connector	
<b>Antenna/s technical characteristics</b>						
<b>Type</b>		<b>Manufacturer</b>		<b>Model number</b>		
Integral		IWI Ltd.		Printed		
				Gain		
				NA		
<b>Transmitter aggregate data rate/s</b>				50 kbps		
<b>Type of modulation</b>				FSK		
<b>Modulating test signal (baseband)</b>				PRBS		
<b>Transmitter power source</b>						
<b>V</b>	Battery	<b>Nominal rated voltage</b>	3.0 V	<b>Battery type</b>	Renata CR2032 MFR	
	DC	<b>Nominal rated voltage</b>				
	AC mains	<b>Nominal rated voltage</b>		<b>Frequency</b>	Hz	



<b>Test specification:</b>	<b>FCC Part 15, Section 15.249(a)(d)/RSS-210, section A2.9, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date(s):</b>	20-Dec-15 - 23-Dec-15		
<b>Temperature:</b> 22 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 55 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

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

### 7.1 Field strength of emissions

#### 7.1.1 General

This test was performed to measure field strength of fundamental and spurious emissions from the EUT. Specification test limits are given in Table 7.1.1, Table 7.1.2 and Table 7.1.3.

**Table 7.1.1 Radiated fundamental emission limits**

Fundamental frequency, MHz	Field strength at 3 m, dB(μV/m)		
	Peak	Average	Quasi-Peak
902 – 928	NA	NA	94

**Table 7.1.2 Harmonics limits**

Fundamental frequency, MHz	Field strength at 3 m, dB(μV/m)	
	Peak	Average
902 – 928	74.0	54.0

**Table 7.1.3 Radiated spurious emissions limits (other than harmonics)**

Frequency, MHz	Field strength at 3 m, dB(μV/m)*			
	Peak	Quasi Peak	Average	Attenuation below carrier
0.009 – 0.090	148.5 – 128.5	NA	128.5 – 108.5**	50 dBc (whichever is the less stringent)
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		
Above 1000	74.0	NA	54.0	

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

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

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

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

**Note:** The above 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 but not exceeding 40 GHz for intentional radiators operated below 10 GHz and up to the fifth harmonic of the highest fundamental frequency but not exceeding 100 GHz for intentional radiators operated above 10 GHz.



<b>Test specification:</b>	<b>FCC Part 15, Section 15.249(a)(d)/RSS-210, section A2.9, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date(s):</b>	20-Dec-15 - 23-Dec-15		
<b>Temperature:</b> 22 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 55 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

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

**7.1.2.1** The EUT was set up as shown in Figure 7.1.1, energized and the performance check was conducted.

**7.1.2.2** 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.

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

**7.1.3 Test procedure for spurious emission field strength measurements above 30 MHz**

**7.1.3.1** The EUT was set up as shown in Figure 7.1.2, energized and the performance check was conducted.

**7.1.3.2** 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.

**7.1.3.3** The worst test results (the lowest margins) were recorded in the associated tables and shown in the associated plots



<b>Test specification:</b>		<b>FCC Part 15, Section 15.249(a)(d)/RSS-210, section A2.9, Field strength of emissions</b>	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		20-Dec-15 - 23-Dec-15	
<b>Temperature:</b> 22 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 55 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

Figure 7.1.1 Setup for spurious emission field strength measurements below 30 MHz

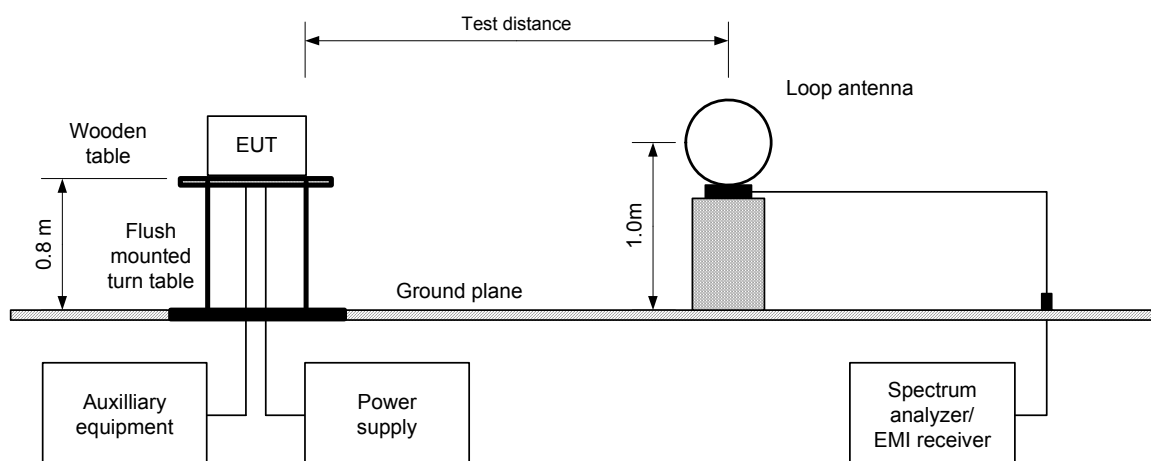
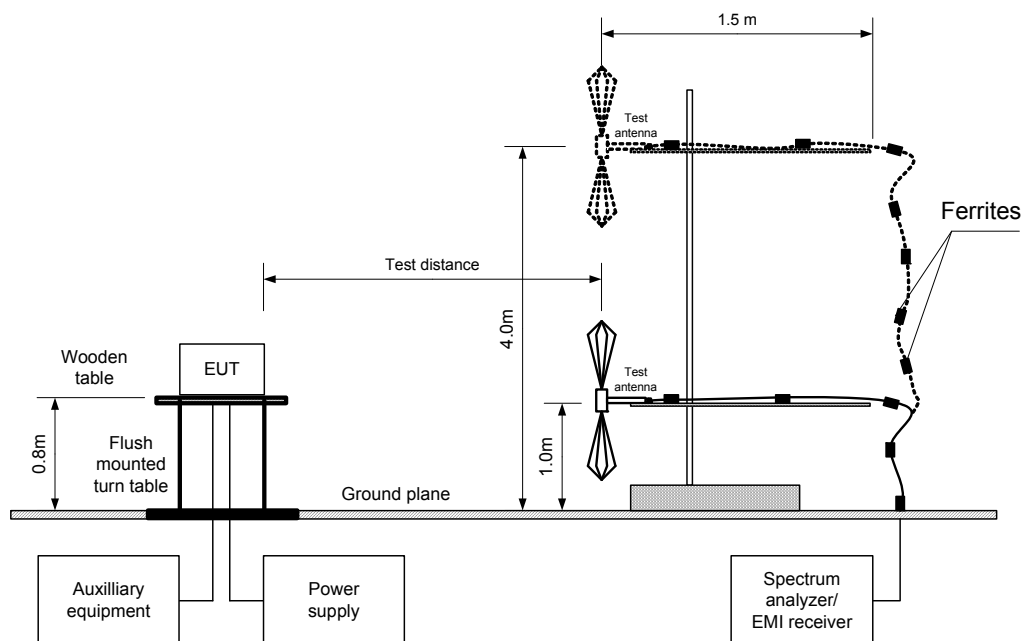


Figure 7.1.2 Setup for spurious emission field strength measurements above 30 MHz



<b>Test specification:</b>		FCC Part 15, Section 15.249(a)(d)/RSS-210, section A2.9, Field strength of emissions	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		20-Dec-15 - 23-Dec-15	
<b>Temperature:</b> 22 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 55 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

**Table 7.1.4 Field strength of fundamental emission and spurious emissions**

TEST DISTANCE:	3 m
EUT POSITION:	Vertical & Horizontal
MODULATION:	FSK
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
INVESTIGATED FREQUENCY RANGE:	0.009 –9200 MHz
DETECTOR USED:	Peak
RESOLUTION BANDWIDTH:	1.0 kHz (9 kHz – 150 kHz) 9.0 kHz (150 kHz – 30 MHz) 120 kHz (30 MHz – 1000 MHz) 1.0 MHz (above 1000 MHz)
VIDEO BANDWIDTH:	≥ Resolution bandwidth
TEST ANTENNA TYPE:	Active loop (9 kHz – 30 MHz) Biconilog (30 MHz – 1000 MHz) Double ridged guide (above 1000 MHz)

**Fundamental emission**

Frequency, MHz	Antenna		Azimuth, degrees*	Peak emission, dB(μV/m)	Quasi-peak			Verdict
	Pol.	Height, m			Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	
915.645	Vertical	1.1	60	84.57	83.6	94	-10.4	Pass

**Spurious emissions**

F, MHz	Antenna		Azimuth, degrees*	Peak field strength			Avr factor, dB	Average field strength			Verdict
	Pol.	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	
1831.5	Vertical	1.3	90	49.28	74	-24.72	-26	23.28	54	-30.72	Pass
2746.9	Horizontal	1.4	10	50.52	74	-23.48	-26	24.52	54	-29.48	
3662.6	Vertical	1.2	65	50.72	74	-23.48	-26	24.72	54	-29.28	
4578.3	Vertical	1.2	70	51.49	74	-22.51	-26	25.49	54	-28.51	
5494.3	Vertical	1.2	70	50.76	74	-23.24	-26	24.76	54	-29.24	

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

\*\* - Margin, dB = Measured (calculated) value, dB(μV/m) - Limit, dB(μV/m).

**Table 7.1.5 Average factor calculation**

Transmission pulse		Transmission burst		Transmission train duration, ms	Average factor, dB
Duration, ms	Period, ms	Duration, ms	Period, ms		
5	125	NA	NA	NA	-26

\*- Average factor was calculated as follows

for pulse train shorter than 100 ms:

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

for pulse train longer than 100 ms:

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

**Reference numbers of test equipment used**

HL 0446	HL 0521	HL 0604	HL 1984	HL 4353	HL 4722	HL 4916	HL 4932
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Full description is given in Appendix A.

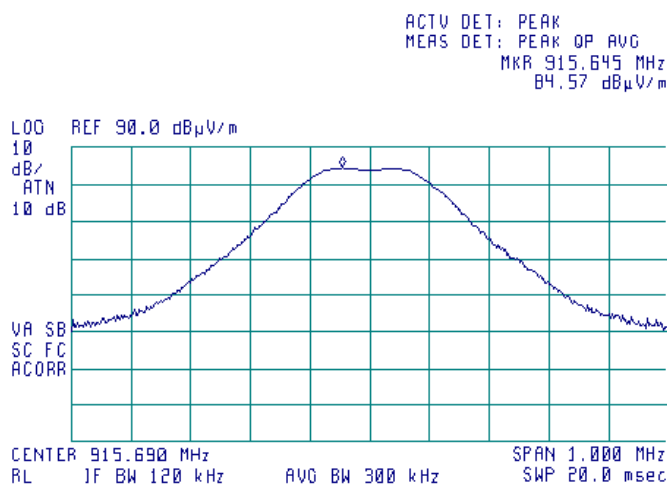


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<b>Test specification:</b>		<b>FCC Part 15, Section 15.249(a)(d)/RSS-210, section A2.9, Field strength of emissions</b>	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		20-Dec-15 - 23-Dec-15	
<b>Temperature:</b> 22 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 55 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

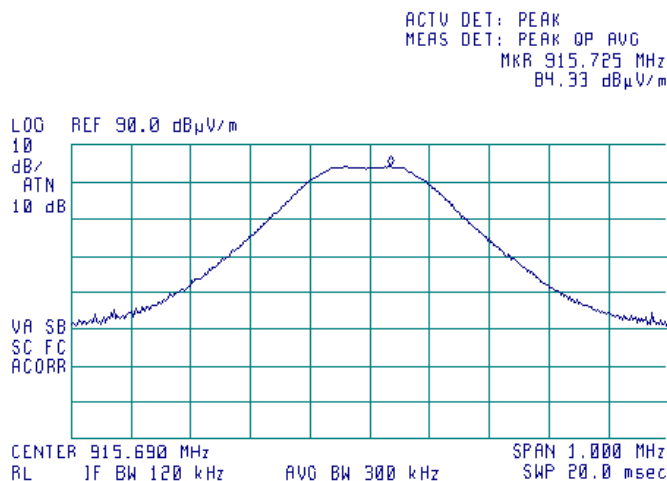
#### Plot 7.1.1 Radiated emission measurements at the fundamental frequency

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



#### Plot 7.1.2 Radiated emission measurements at the fundamental frequency

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



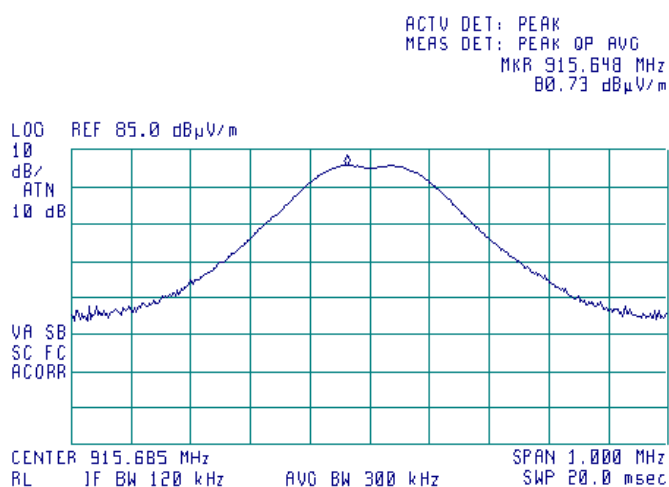


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Test specification:	FCC Part 15, Section 15.249(a)(d)/RSS-210, section A2.9, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	20-Dec-15 - 23-Dec-15		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 55 %	Power Supply: Battery
Remarks:			

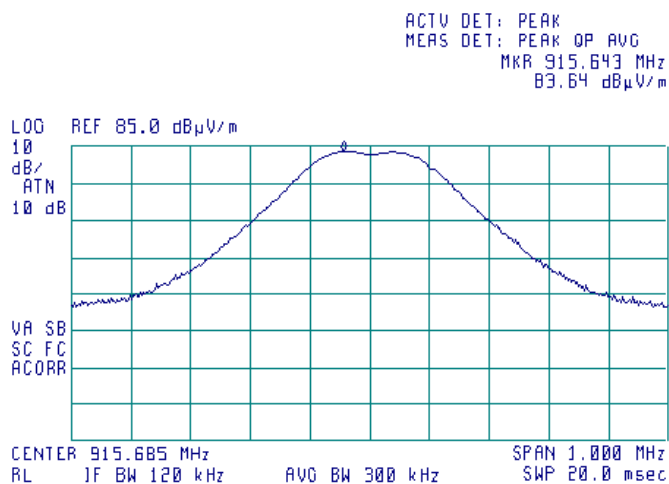
#### Plot 7.1.3 Radiated emission measurements at the fundamental frequency

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



#### Plot 7.1.4 Radiated emission measurements at the fundamental frequency

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





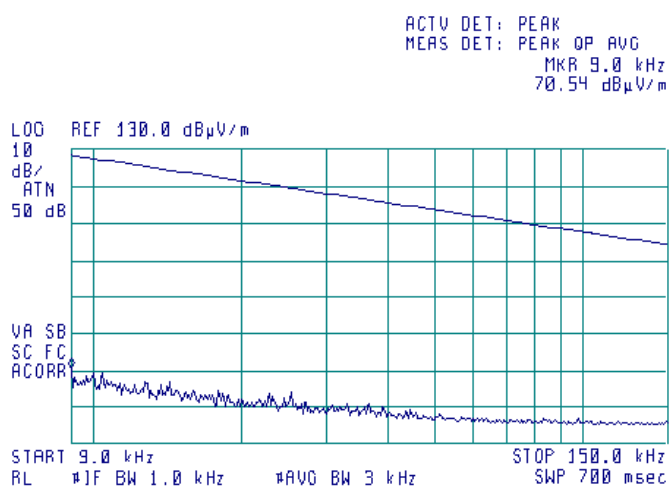
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Report ID: IWIRAD\_FCC.27623.docx  
Date of Issue: 22-Feb-16

Test specification:	FCC Part 15, Section 15.249(a)(d)/RSS-210, section A2.9, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	20-Dec-15 - 23-Dec-15		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 55 %	Power Supply: Battery
Remarks:			

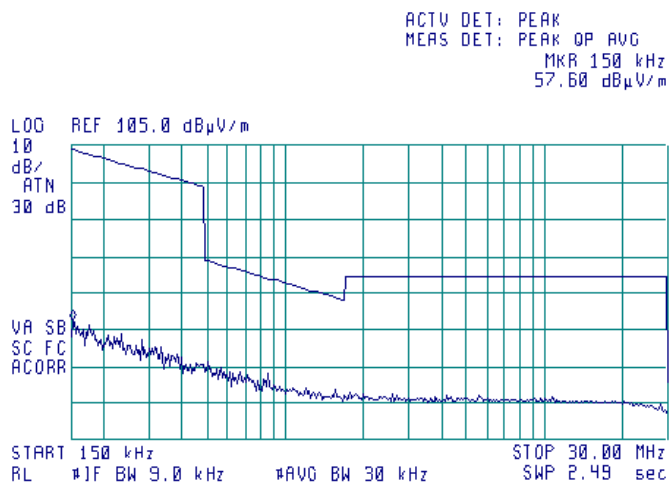
Plot 7.1.5 Radiated emission measurements from 9 to 150 kHz

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
EUT POSITION: Typical (Vertical/ Horizontal) /



Plot 7.1.6 Radiated emission measurements from 0.15 to 30 MHz

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
EUT POSITION: Typical (Vertical/ Horizontal)





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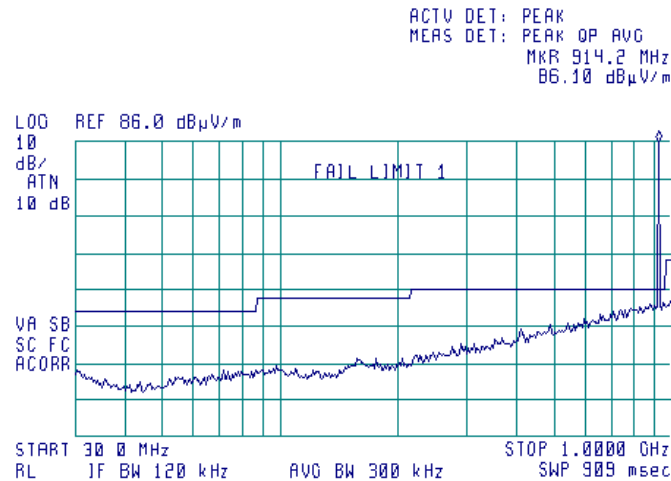
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Date of Issue: 22-Feb-16

<b>Test specification:</b>		<b>FCC Part 15, Section 15.249(a)(d)/RSS-210, section A2.9, Field strength of emissions</b>	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		20-Dec-15 - 23-Dec-15	
<b>Temperature:</b> 22 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 55 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

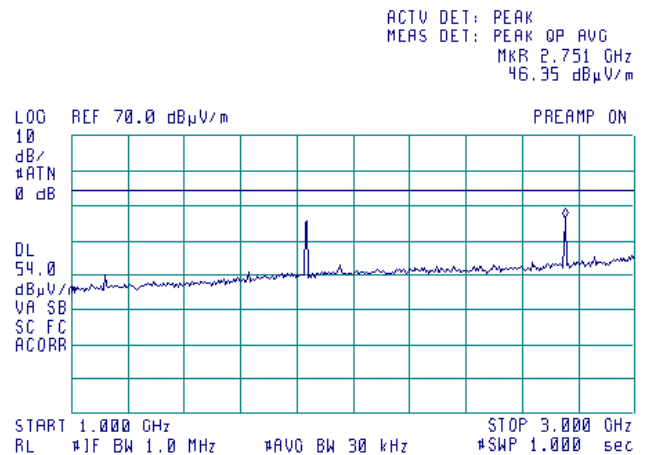
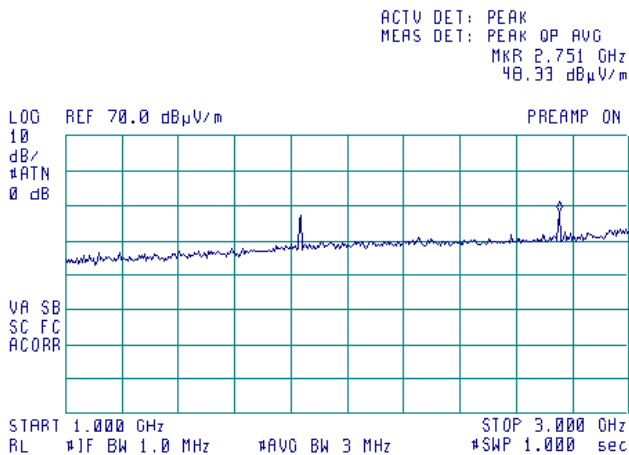
#### Plot 7.1.7 Radiated emission measurements from 30 to 1000 MHz

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



#### Plot 7.1.8 Radiated emission measurements from 1.0 to 3 GHz

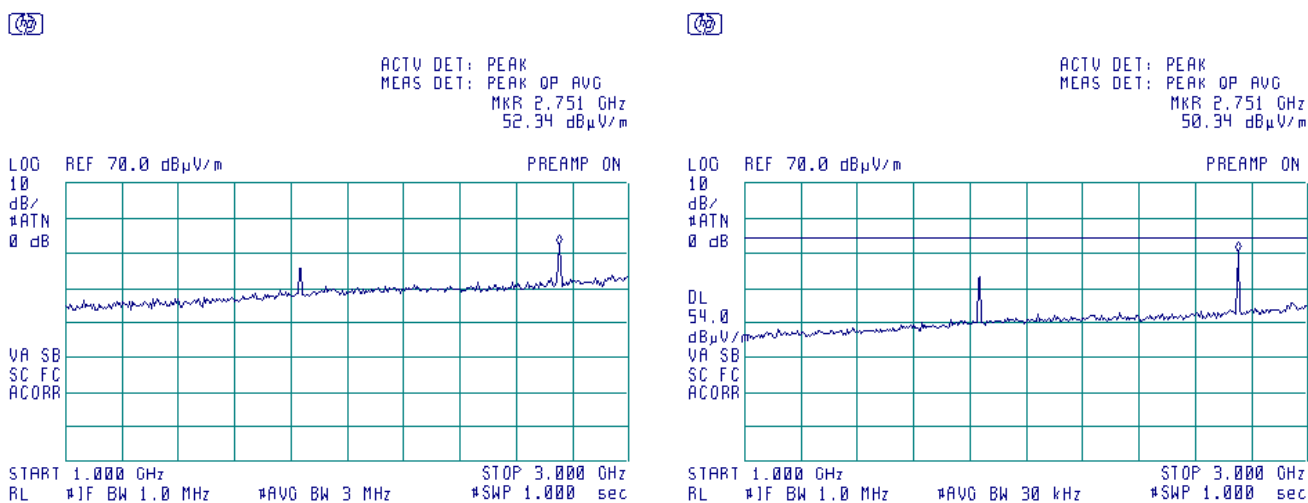
TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical/ Horizontal)



<b>Test specification:</b>		<b>FCC Part 15, Section 15.249(a)(d)/RSS-210, section A2.9, Field strength of emissions</b>	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		20-Dec-15 - 23-Dec-15	
<b>Temperature:</b> 22 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 55 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

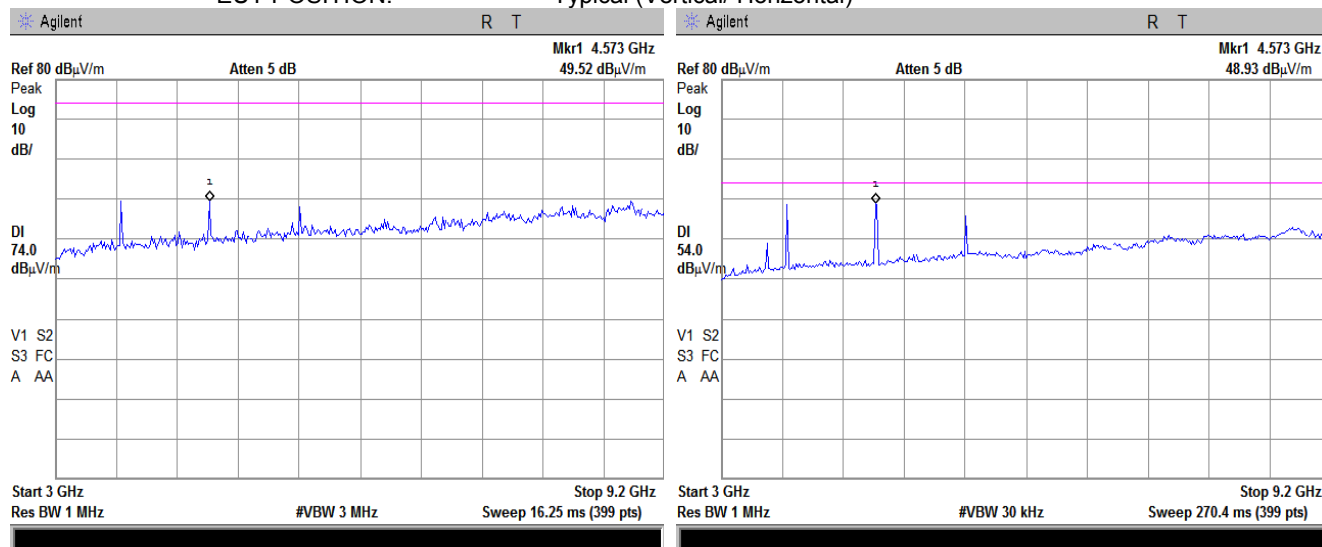
**Plot 7.1.9 Radiated emission measurements from 1 to 3.0 GHz**

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Horizontal  
EUT POSITION: Typical (Vertical/ Horizontal)



**Plot 7.1.10 Radiated emission measurements from 3.0 to 9.2 GHz**

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical and Horizontal  
EUT POSITION: Typical (Vertical/ Horizontal)





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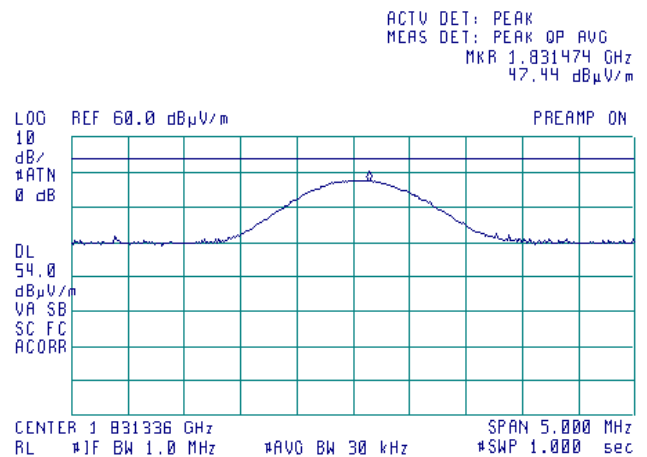
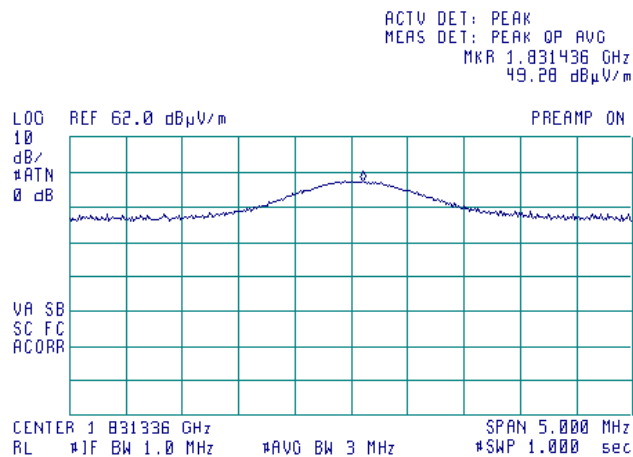
Report ID: IWIRAD\_FCC.27623.docx

Date of Issue: 22-Feb-16

Test specification:	FCC Part 15, Section 15.249(a)(d)/RSS-210, section A2.9, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	20-Dec-15 - 23-Dec-15		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 55 %	Power Supply: Battery
Remarks:			

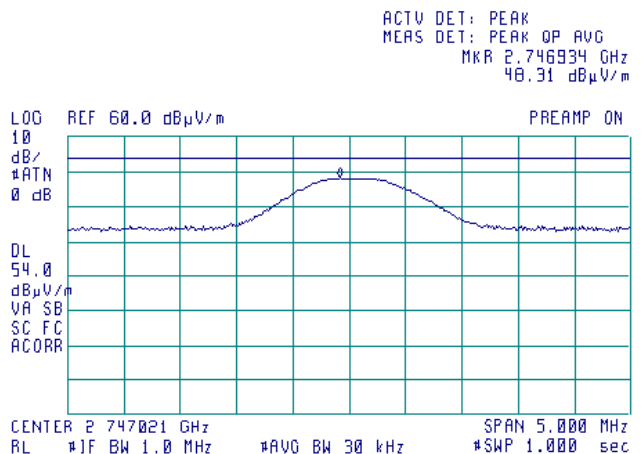
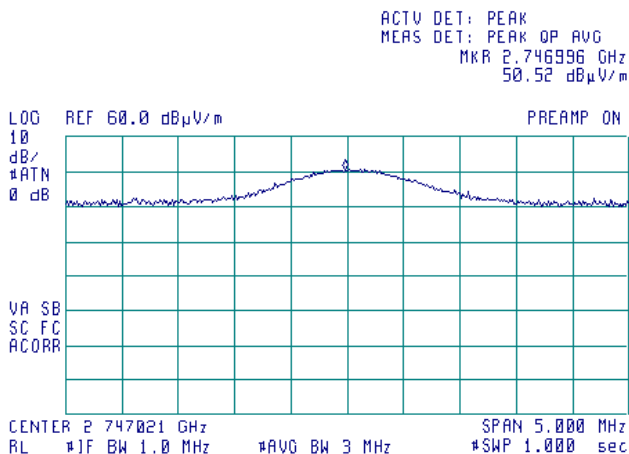
#### Plot 7.1.11 Radiated emission measurements at the second harmonic frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical & Horizontal  
EUT POSITION: Typical (Vertical/ Horizontal)



#### Plot 7.1.12 Radiated emission measurements at the third harmonic frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical & Horizontal  
EUT POSITION: Typical (Vertical/ Horizontal)

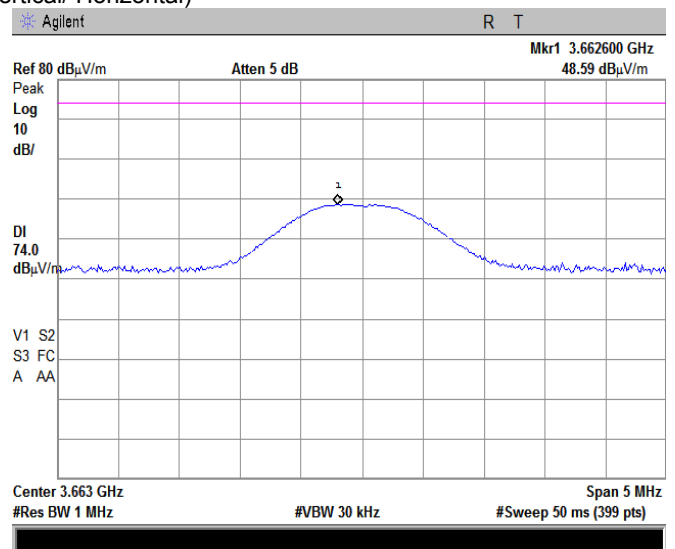
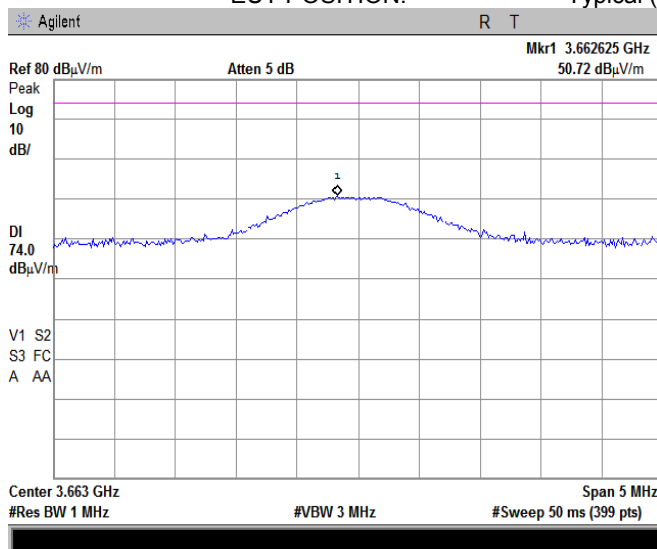




<b>Test specification:</b>		<b>FCC Part 15, Section 15.249(a)(d)/RSS-210, section A2.9, Field strength of emissions</b>	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		20-Dec-15 - 23-Dec-15	
<b>Temperature:</b> 22 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 55 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

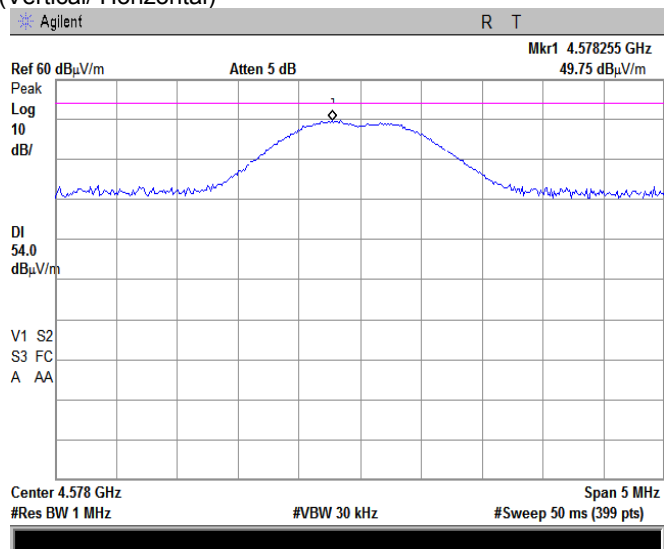
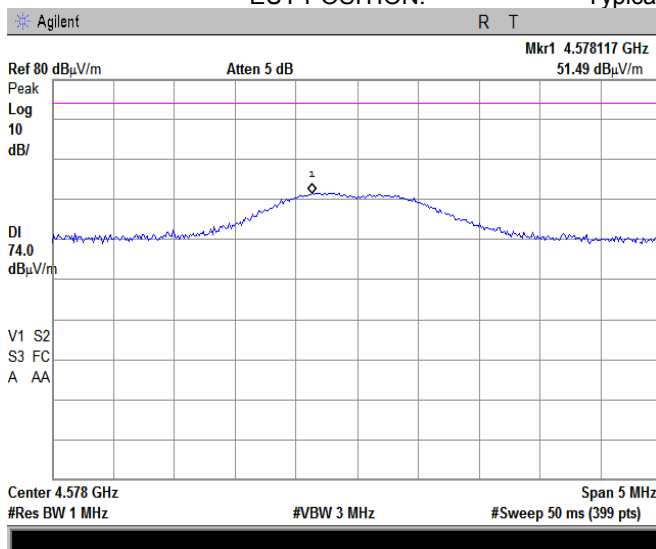
**Plot 7.1.13 Radiated emission measurements at the 4 harmonic frequency**

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical & Horizontal  
EUT POSITION: Typical (Vertical/ Horizontal)



**Plot 7.1.14 Radiated emission measurements at the 5 harmonic frequency**

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical & Horizontal  
EUT POSITION: Typical (Vertical/ Horizontal)



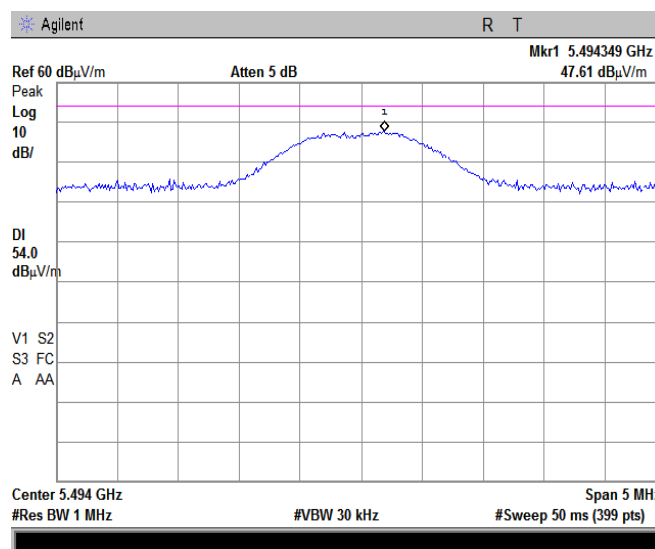
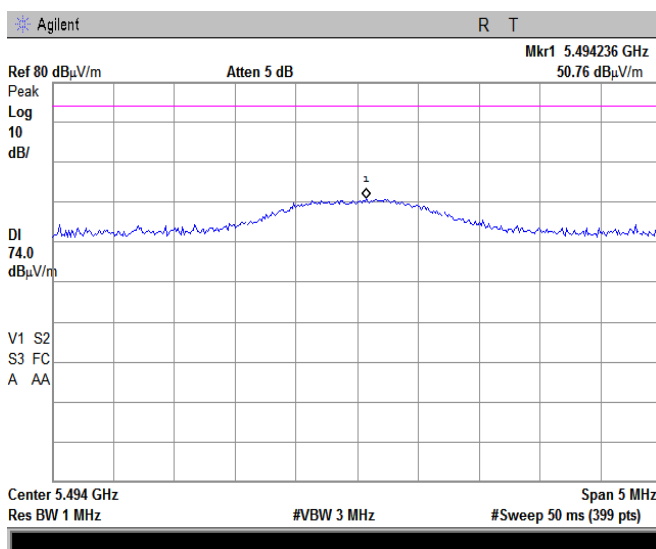


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Test specification:	FCC Part 15, Section 15.249(a)(d)/RSS-210, section A2.9, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	20-Dec-15 - 23-Dec-15		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 55 %	Power Supply: Battery
Remarks:			

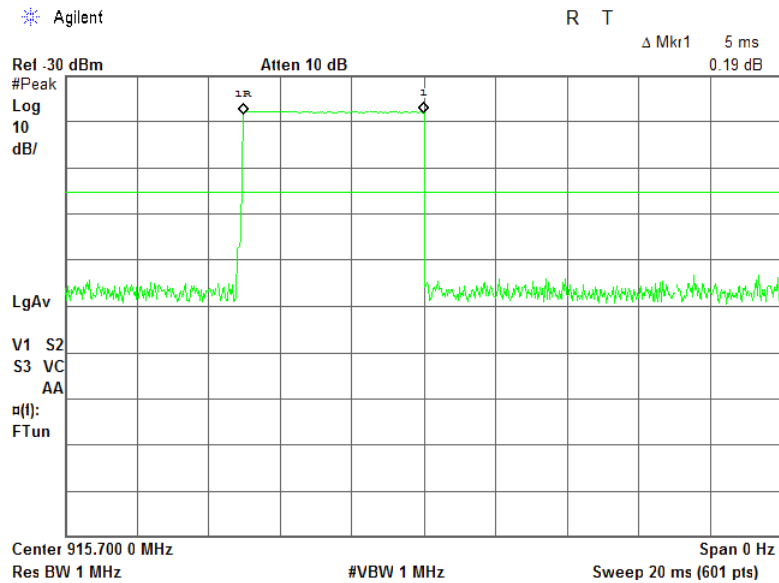
Plot 7.1.15 Radiated emission measurements at the 6 harmonic frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical & Horizontal  
EUT POSITION: Typical (Vertical/ Horizontal)

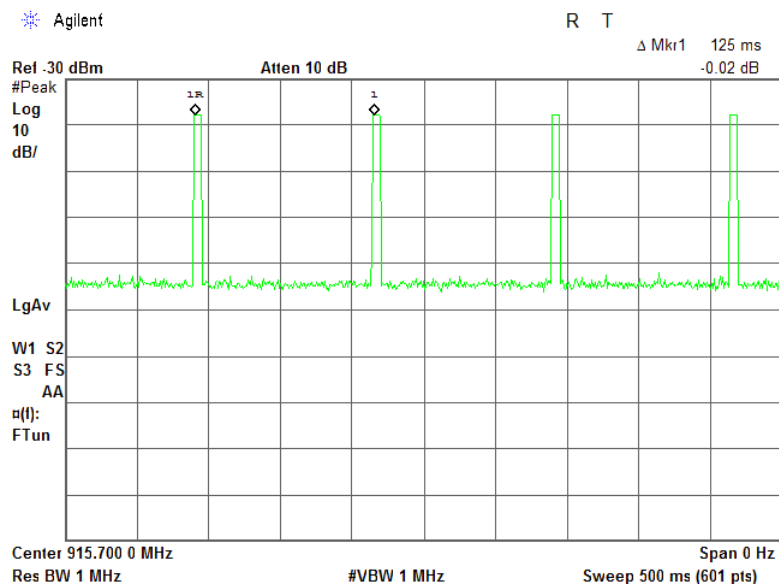


<b>Test specification:</b>		<b>FCC Part 15, Section 15.249(a)(d)/RSS-210, section A2.9, Field strength of emissions</b>	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		20-Dec-15 - 23-Dec-15	
<b>Temperature:</b> 22 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 55 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

Plot 7.1.16 Transmission pulse duration



Plot 7.1.17 Transmission pulse period



<b>Test specification:</b>		<b>FCC Part 15, Section 15.215(c) / RSS-Gen, section 6.6, Occupied bandwidth</b>	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.7	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		23-Dec-15	
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1018 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

## 7.2 Occupied bandwidth test

### 7.2.1 General

This test was performed to verify that the 20 dB bandwidth of the emissions was contained within the standard specified frequency band according to FCC §15.215 requirements. Specification test limits are given in Table 7.2.1.

Table 7.2.1 Occupied bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, dBc
902 - 928	20.0

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

### 7.2.2 Test procedure

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

7.2.2.2 The spectrum analyzer sweep time and bandwidth were set to capture all major modulation sidebands of emission and sweep time was set sufficiently slow to ensure peak measurements. Spectrum analyzer was set in peak hold mode and time sufficient for trace stabilization was allowed.

7.2.2.3 The peak of emission was measured. The transmitter occupied bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope and provided in Table 7.2.2 and associated plot.

7.2.2.4 Modulation bandwidth was calculated by adding of the negative frequency drift to the lower measured frequency and the positive frequency drift to the higher measured frequency. The obtained modulation bandwidth was verified to be within the allowed frequency range.

Figure 7.2.1 Occupied bandwidth test setup





HERMON LABORATORIES

<b>Test specification:</b>		<b>FCC Part 15, Section 15.215(c) / RSS-Gen, section 6.6, Occupied bandwidth</b>	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.7	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		23-Dec-15	
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1018 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

Table 7.2.2 Occupied bandwidth test results

ASSIGNED FREQUENCY BAND: 902-928 MHz  
 DETECTOR USED: Peak hold  
 RESOLUTION BANDWIDTH: 10  
 VIDEO BANDWIDTH: 30 kHz  
 MODULATION ENVELOPE REFERENCE POINTS: 20 dBc  
 MODULATION: FSK

Band edge	Cross point frequency, MHz	Frequency drift, kHz		Modulation band edge, MHz	Assigned band edge, MHz	Verdict
		Negative	Positive			
Low	915.5980	NA	NA	915.5980	902	Pass
High	915.7764	NA	NA	915.7764	928	Pass

## Reference numbers of test equipment used

HL 3818								
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Full description is given in Appendix A.



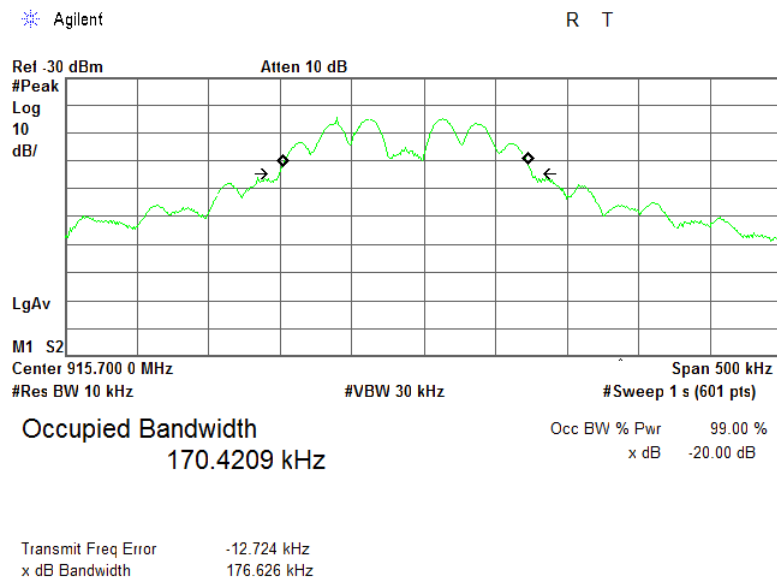
HERMON LABORATORIES

Report ID: IWIRAD\_FCC.27623.docx

Date of Issue: 22-Feb-16

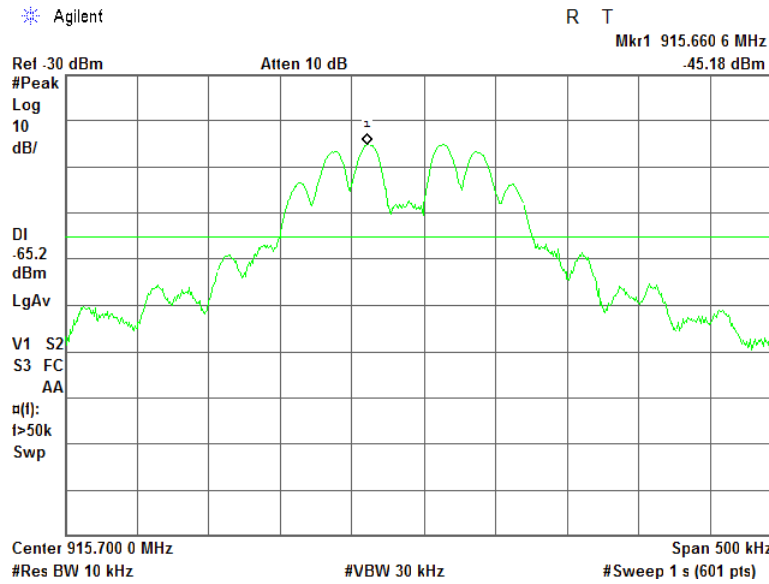
Test specification:		FCC Part 15, Section 15.215(c) / RSS-Gen, section 6.6, Occupied bandwidth	
Test procedure:		ANSI C63.4, Section 13.1.7	
Test mode:		Compliance	Verdict: PASS
Date(s):		23-Dec-15	
Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 44 %	Power Supply: Battery
Remarks:			

Plot 7.2.1 Occupied bandwidth test result

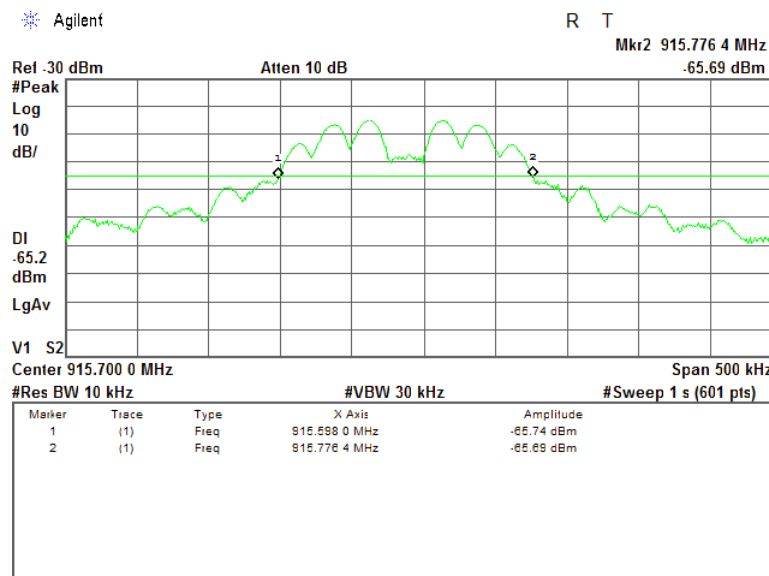


<b>Test specification:</b>		<b>FCC Part 15, Section 15.215(c) / RSS-Gen, section 6.6, Occupied bandwidth</b>	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.7	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		23-Dec-15	
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1018 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

Plot 7.2.2 Occupied bandwidth test result



Plot 7.2.3 Low and high band edge frequencies





<b>Test specification:</b>		<b>FCC Part 15, Section 15.249(d)/RSS-210, section A2.9, Band edge emissions</b>	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		20-Dec-15	
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 55 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

## 7.3 Band edge emission

### 7.3.1 General

This test was performed to verify the EUT band edge emission including all associated side bands was attenuated at least 50 dB below the unmodulated carrier level or below the general spurious emission limit. Specification test limits are given in Table 7.3.1.

**Table 7.3.1 Band edge emission limits**

Frequency band, MHz	Field strength limit at 3 m, dB $\mu$ V/m		Attenuation below carrier, dBc
	Peak	QP	
902.000 - 928.000	NA	46.0	50

### 7.3.2 Test procedure

**7.3.2.1** The EUT was set up as shown in Figure 7.3.1, energized and the performance check was conducted.

**7.3.2.2** The spectrum analyzer frequency span was set to capture all major modulation sidebands of emission and sweep time was set sufficiently slow to ensure peak measurements. Spectrum analyzer was set in peak hold mode and time sufficient for trace stabilization was allowed.

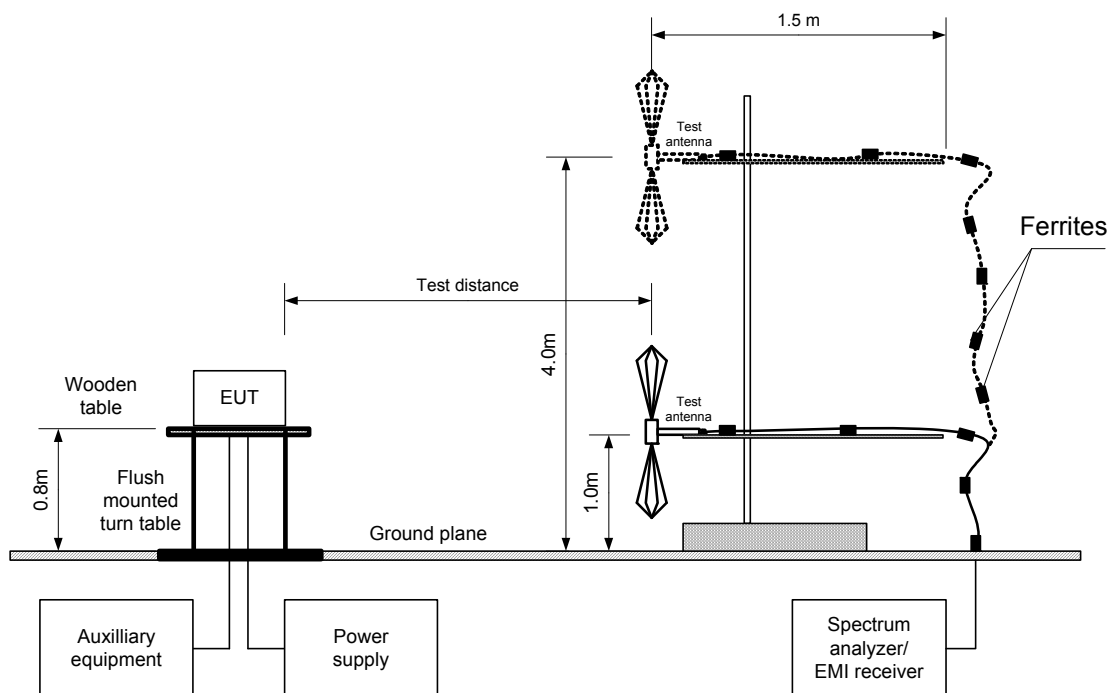
**7.3.2.3** The frequency of modulation envelope points beyond which power level drops below the band edge emission limit was measured.

**7.3.2.4** The test results were recorded in Table 7.3.2 and shown in the associated plots.



<b>Test specification:</b>		<b>FCC Part 15, Section 15.249(d)/RSS-210, section A2.9, Band edge emissions</b>	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.4	
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date(s):</b>	20-Dec-15		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 55 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

Figure 7.3.1 Band edge emission measurement set up





<b>Test specification:</b>		<b>FCC Part 15, Section 15.249(d)/RSS-210, section A2.9, Band edge emissions</b>	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		20-Dec-15	
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 55 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

Table 7.3.2 Band edge emission test results

OPERATING FREQUENCY RANGE: 902-928 MHz  
 DETECTOR USED: Peak hold  
 RESOLUTION BANDWIDTH: 120 kHz  
 VIDEO BANDWIDTH: 300 kHz  
 MODULATION: FSK  
 BIT RATE: 50 kbps  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Modulation envelope		Measured peak emission, dBµV/m	Measured QP emission, dBµV/m	QP limit, dBµV/m	Margin, dB *	Verdict
Edge	Frequency, MHz					
Low	902	30.61	NA	46	-15.39	Pass
High	928	28.65	NA	46	-17.35	Pass

\* - Margin = measured value– limit

## Reference numbers of test equipment used

HL 0521	HL 0604	HL 4353					
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Full description is given in Appendix A.

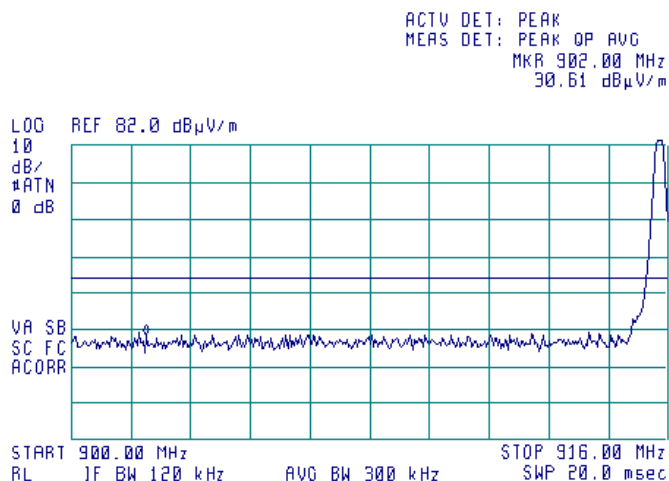


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Test specification:	FCC Part 15, Section 15.249(d)/RSS-210, section A2.9, Band edge emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	20-Dec-15		
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 55 %	Power Supply: Battery
Remarks:			

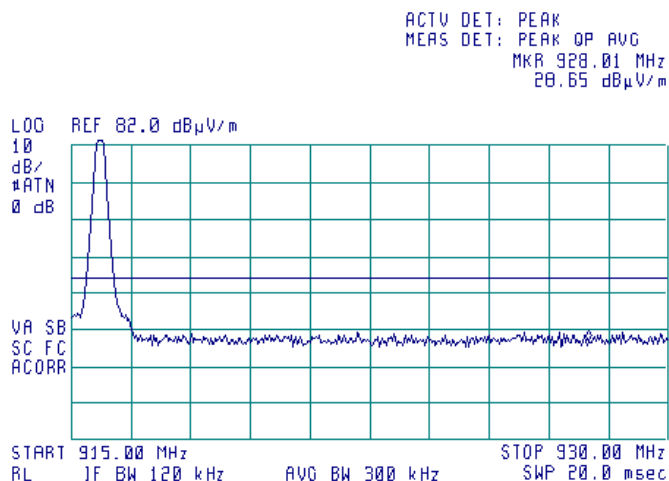
#### Plot 7.3.1 Low band edge emission test result

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



#### Plot 7.3.2 High band edge emission test result

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



<b>Test specification:</b>		<b>FCC Part 15, Section 15.203 / RSS-Gen, Section 8.3 Antenna requirement</b>	
<b>Test procedure:</b>		Visual inspection / supplier declaration	
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date(s):</b>	29-Dec-15		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1016 hPa	<b>Relative Humidity:</b> 55 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

## 7.4 Antenna requirements

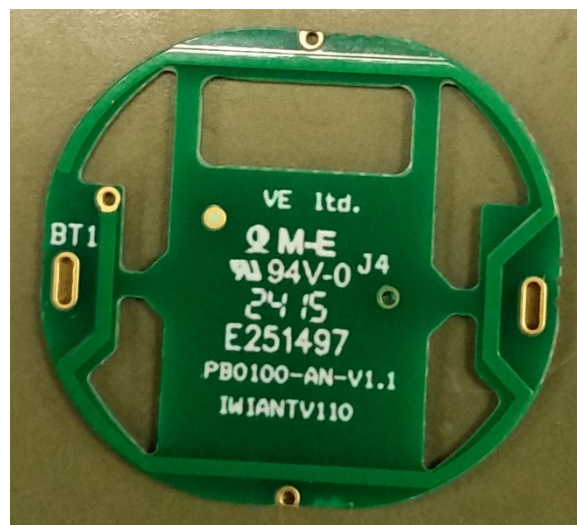
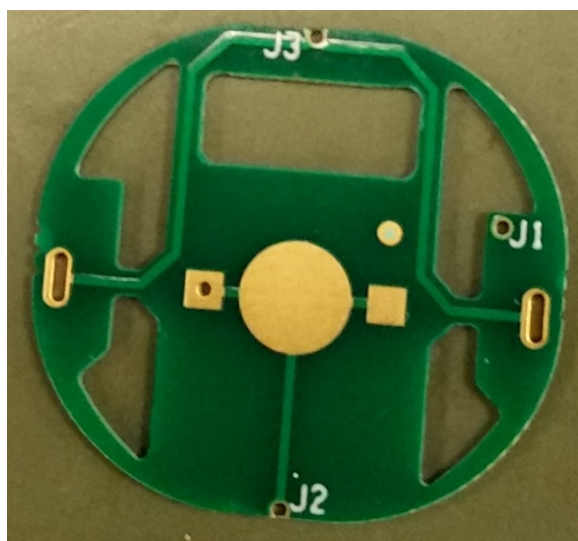
The EUT was verified for compliance with antenna requirements. A transmitter shall be designed to ensure that no antenna other than that furnished by the responsible party will be used with the device. It may be either permanently attached or employs a unique antenna connector for every antenna proposed 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 7.4.1.

**Table 7.4.1 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 7.4.1 Antenna assembly**



<b>Test specification:</b>	<b>FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Section 6.2, Class B, Radiated emission</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.9 and 12.2		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date(s):</b>	20-Dec-15		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 55 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

## 8 Unintentional emission tests

### 8.1 Radiated emission measurements

#### 8.1.1 General

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

**Table 8.1.1 Radiated emission test limits according to FCC Part 15, Section 109 and ICES-003, Section 6.2**

Frequency, MHz	Class B limit, dB(μV/m)		Class A limit, dB(μV/m)	
	10 m distance	3 m distance	10 m distance	3 m distance
30 - 88	29.5*	40.0	39.0	49.5*
88 - 216	33.0*	43.5	43.5	54.0*
216 - 960	35.5*	46.0	46.4	56.9*
Above 960	43.5*	54.0	49.5	60.0*

\* The limit for test distance other than specified was calculated using the inverse linear distance extrapolation factor as follows:  $\text{Lim}_{S2} = \text{Lim}_{S1} + 20 \log(S1/S2)$ , where  $S1$  and  $S2$  – standard defined and test distance respectively in meters.

**Table 8.1.2 Radiated emission limits according to RSS-Gen, Section 7.1.2**

Frequency, MHz	Field strength limit at 3 m test distance, dB(μV/m)
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
960 - 5 <sup>th</sup> harmonic**	54.0

\*\* - harmonic of the highest frequency the EUT generates, uses, operates or tunes to.

#### 8.1.2 Test procedure for measurements

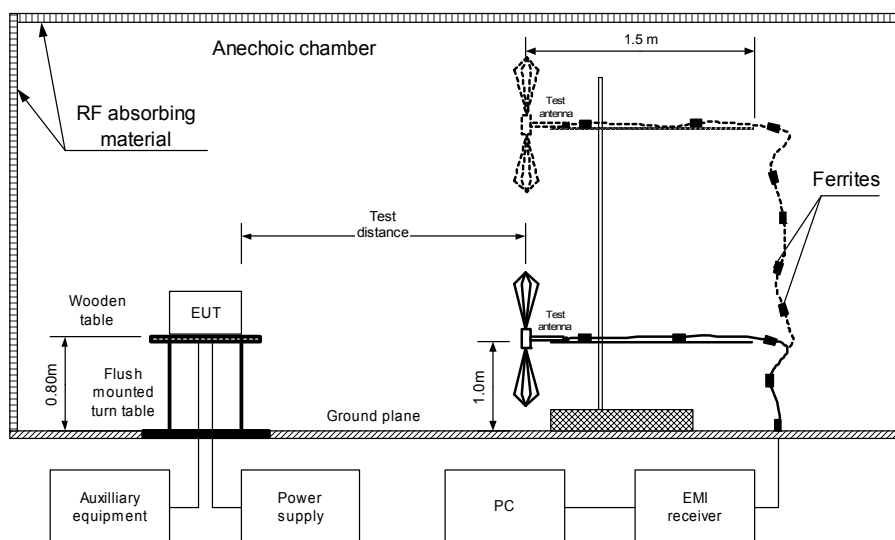
**8.1.2.1** The EUT was set up as shown in Figure 8.1.1 and associated photograph/s, energized and the performance check was conducted.

**8.1.2.2** The specified frequency range was investigated with biconilog antenna connected to EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal and the EUT cables position was varied.

**8.1.2.3** The worst test results (the lowest margins) were recorded in Table 8.1.3 and shown in the associated plots.

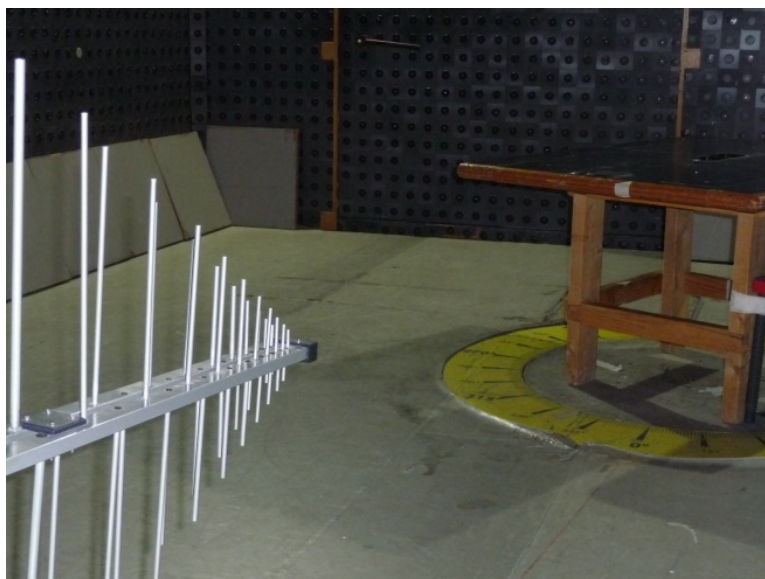
<b>Test specification:</b>		<b>FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Section 6.2, Class B, Radiated emission</b>	
<b>Test procedure:</b>		ANSI C63.4, Sections 11.9 and 12.2	
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date(s):</b>	20-Dec-15		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 55 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

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



<b>Test specification:</b>		<b>FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Section 6.2, Class B, Radiated emission</b>	
<b>Test procedure:</b>		ANSI C63.4, Sections 11.9 and 12.2	
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date(s):</b>	20-Dec-15		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 55 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

Photograph 8.1.1 Setup for radiated emission measurements in 30-1000 MHz



Photograph 8.1.2 Setup for radiated emission measurements, EUT in horizontal position



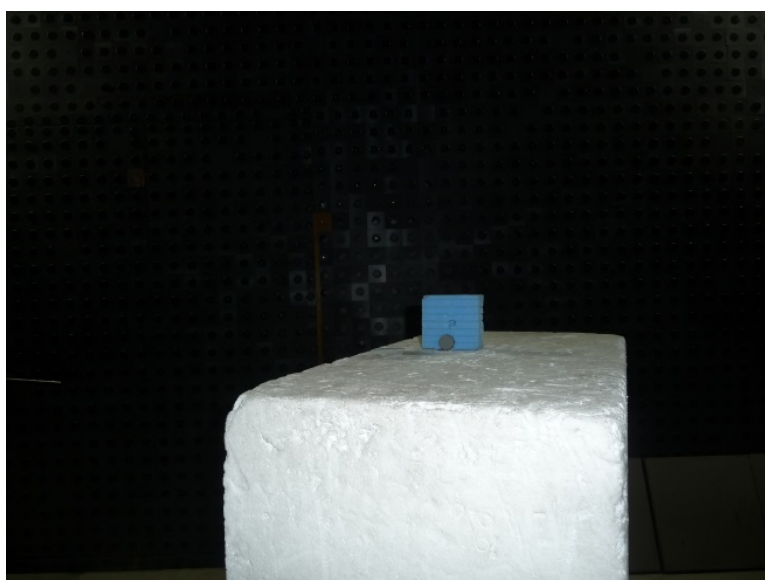


<b>Test specification:</b>	<b>FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Section 6.2, Class B, Radiated emission</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.9 and 12.2		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date(s):</b>	20-Dec-15		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 55 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

Photograph 8.1.3 Setup for radiated emission measurements above 1000 MHz



Photograph 8.1.4 Setup for radiated emission measurements above 1000 MHz, EUT in vertical position







HERMON LABORATORIES

<b>Test specification:</b>	<b>FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Section 6.2, Class B, Radiated emission</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.9 and 12.2		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date(s):</b>	20-Dec-15		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 55 %	<b>Power Supply:</b> Battery
<b>Remarks:</b>			

**Table 8.1.3 Radiated emission test results**

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

Resolution Bandwidth 111:					120 kHz			
Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
No signals were found								Pass

TEST SITE: SEMI ANECHOIC CHAMBER  
TEST DISTANCE: 3 m  
DETECTORS USED: PEAK / AVERAGE  
FREQUENCY RANGE: 1000 MHz – 5000 MHz  
RESOLUTION BANDWIDTH: 1000 kHz

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

\*- Margin = Measured emission - specification limit.

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

**Reference numbers of test equipment used**

HL 0521	HL 0604	HL 1984	HL 4353	HL 4722			
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Full description is given in Appendix A.

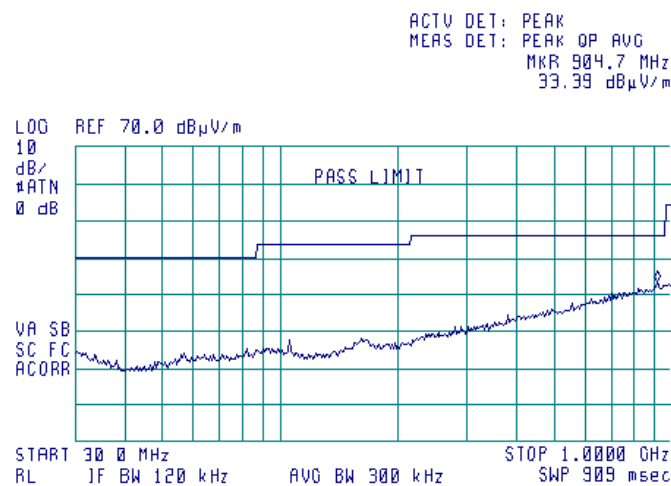


HERMON LABORATORIES

Test specification:	FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Section 6.2, Class B, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.9 and 12.2		
Test mode:	Compliance	Verdict:	PASS
Date(s):	20-Dec-15		
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 55 %	Power Supply: Battery
Remarks:			

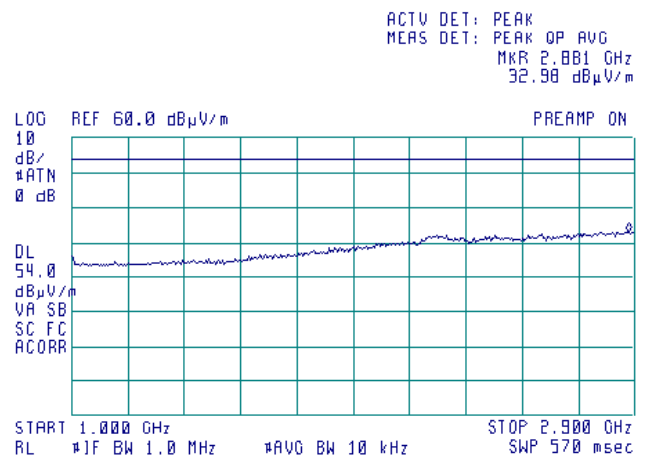
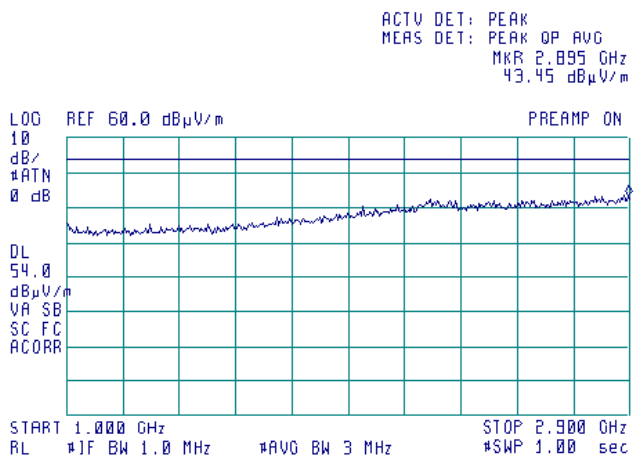
Plot 8.1.1 Radiated emission measurements in 30 - 1000 MHz range, vertical & horizontal antenna polarization

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



Plot 8.1.2 Radiated emission measurements in 1- 2.9 GHz range, vertical & horizontal antenna polarization

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



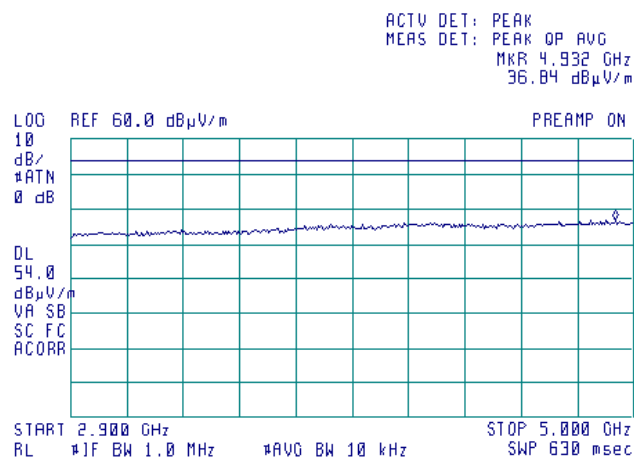
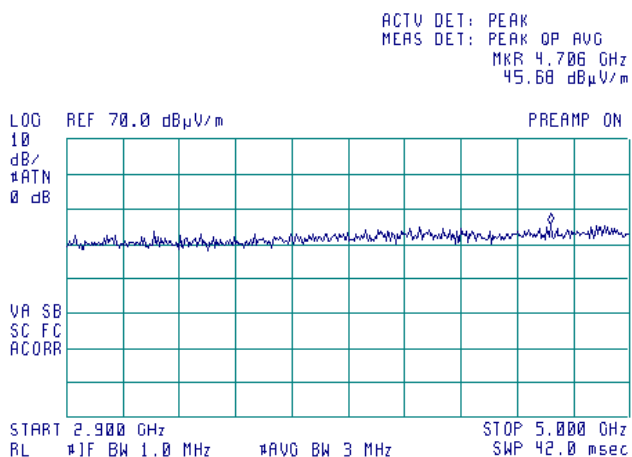


HERMON LABORATORIES

Test specification:	FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Section 6.2, Class B, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.9 and 12.2		
Test mode:	Compliance	Verdict:	PASS
Date(s):	20-Dec-15		
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 55 %	Power Supply: Battery
Remarks:			

Plot 8.1.3 Radiated emission measurements in 2.9 - 5 GHz range, vertical & horizontal antenna polarization

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



## 9 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	13-Jan-15	13-Jan-16
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	27-Oct-15	27-Oct-16
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	15-May-15	15-May-16
1984	Antenna, Double-Ridged Waveguide Horn, 1 to 18 GHz, 300 W	EMC Test Systems	3115	9911-5964	17-Apr-15	17-Apr-16
3818	PSA Series Spectrum Analyzer, 3 Hz- 44 GHz	Agilent Technologies	E4446A	MY482502 88	29-Apr-15	29-Apr-16
4353	Low Loss Armored Test Cable, DC - 18 GHz, 6.2 m, N type-M/N type-M	MegaPhase	NC29-N1N1-244	12025101 003	15-Mar-15	15-Mar-16
4722	Low Loss Armored Test Cable, DC - 18 GHz, 6.2 m, N type-M/N type-M	MegaPhase	NC29-N1N1-244	51228701 001	30-Dec-15	30-Dec-16
4916	High Pass Filter, 50 Ohm, 3150 to 6500 MHz, SMA-FM / SMA-M	Mini-Circuits	VHF-2700+	NA	01-Oct-15	01-Oct-17
4932	Microwave preamplifier, 500 MHz to 18 GHz, 40 dB Gain	Com-Power Corporation	PAM-118A	551029	19-Nov-15	19-Nov-16

## 10 APPENDIX B Measurement uncertainties

### Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
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
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
Duty cycle, timing (Tx ON / OFF) and average factor measurements	$\pm 1.0$ %
Occupied bandwidth	$\pm 8.0$ %

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

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

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

## 11 APPENDIX C Test laboratory description

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

Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47), Registration Numbers 90624 for OATS and 90623 for the anechoic chamber; by Industry Canada for electromagnetic emissions (file numbers IC 2186A-1 for OATS), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, C-845 for conducted emissions site), 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 IL1001.

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## 12 APPENDIX D Specification references

FCC 47CFR part 15: 2014	Radio Frequency Devices
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications
ANSI C63.4: 2009	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 4: 2014	General Requirements and Information for the Certification of Radiocommunication Equipment
ICES-003 issue 5:2012	Information Technology Equipment (ITE) – Limits and methods of measurement

## 13 APPENDIX E Test equipment correction factors

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

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

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

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

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

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



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

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

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

**Cable loss**  
**Low Loss Armored Test Cable, MegaPhase, 18 GHz, 6.2 m, N type-M/N type-M,**  
**NC29-N1N1-244S/N 12025101 003,**  
**HL 4353**

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
50	0.20	9000	2.71
100	0.27	9500	2.81
300	0.47	10000	2.90
500	0.61	10500	2.97
1000	0.87	11000	3.06
1500	1.07	11500	3.13
2000	1.24	12000	3.20
2500	1.39	12500	3.26
3000	1.53	13000	3.34
3500	1.65	13500	3.39
4000	1.77	14000	3.47
4500	1.89	14500	3.54
5000	1.99	15000	3.62
5500	2.07	15500	3.69
6000	2.20	16000	3.76
6500	2.30	16500	3.83
7000	2.39	17000	3.86
7500	2.51	17500	3.94
8000	2.58	18000	4.02
8500	2.65		

**Cable loss**  
**Low Loss Armored Test Cable, MegaPhase, 18 GHz, 6.2 m, N type-M/N type-M,**  
**NC29-N1N1-244, S/N 51228701 001**  
**HL 4722**

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
50	0.22	9000	2.93
100	0.30	9500	3.06
300	0.52	10000	3.16
500	0.66	10500	3.20
1000	0.93	11000	3.34
1500	1.15	11500	3.39
2000	1.33	12000	3.48
2500	1.49	12500	3.55
3000	1.64	13000	3.66
3500	1.77	13500	3.75
4000	1.90	14000	3.76
4500	2.03	14500	3.87
5000	2.17	15000	3.98
5500	2.30	15500	4.01
6000	2.39	16000	4.14
6500	2.51	16500	4.15
7000	2.59	17000	4.32
7500	2.67	17500	4.36
8000	2.76	18000	4.38
8500	2.84		

## 14 APPENDIX F Abbreviations and acronyms

A	ampere
AC	alternating current
A/m	ampere per meter
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
OATS	open area test site
$\Omega$	Ohm
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

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