

**COMPLIANCE WORLDWIDE INC.  
TEST REPORT 105-17**

In Accordance with the Requirements of  
**Federal Communications Commission CFR Title 47 Part  
15.249, Subpart C  
Industry Canada RSS 210, Issue 9**

**Low Power License-Exempt Radio Communication Devices  
Intentional Radiators**

Issued to  
**Garmin International, Inc.  
1200 E. 151<sup>st</sup> Street  
Olathe, KS 66062-3426**

for the  
**Garmin  
Model Number A03086  
ANT+ Transmitter**

**FCC ID: IPH-03086  
IC: 1792A-03086**

**Report Issued on January 26, 2017**

Tested by

  
\_\_\_\_\_  
Brian F. Breault

Reviewed by

  
\_\_\_\_\_  
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**1. Scope**

This test report certifies that the Garmin Model A03086, as tested, meets the FCC Part 15, Subpart C and Industry Canada RSS 210, Issue 9 requirements. The scope of this test report is limited to the test sample provided by the client, only in as much as that sample represents other production units. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required.

**2. Product Details**

- 2.1. Manufacturer:** Garmin International
- 2.2. Model Number:** A03086
- 2.3 Serial Number:** N/A
- 2.4 Description of EUT:** High lumen light that can be mounted to helmets or handlebars.
- 2.5 Power Source:** Single 18650 lithium ion rechargeable cell with a nominal voltage of 3.7V
- 2.6 Hardware Revision:** Rev. 4
- 2.7 Software Revision:** Rev. 1.24
- 2.8. Modulation Type:** GFSK
- 2.9. Operating Frequency:** 2400-2483.5 MHz Frequency Band
- 2.10. EMC Modifications:** None

**3. Product Configuration**

**3.1. EUT Hardware**

Manufacturer	Model	Serial Number	Input Volts	Frq (Hz) Or DC	Description/Function
Garmin	A03086	N/A	3.7	DC	High lumen light

**3.2. Support Equipment**

Device	Manufacturer	Model	Serial No.	Comment
ANTUSB-M	Garmin	320-00559-(00/01)	N/A	RF Transceiver
Notebook Computer	Dell	PP18L	16925541373	Used as host for DUT conducted emissions via USB port
Notebook Computer AC Adapter	Dell	DA65NS3-00	ODK138-48661-79N-8YPC	RF Transceiver

**3.3. Cables**

Cable Type	Length	Shield	From	To
Micro USB Cable	500mm	Yes	EUT	Computer

### 3. Product Configuration (continued)

#### 3.4. Operational Characteristics & Software

**Software Name and Revision Level:** State Setter Application

The state setter application is a computer application. Use a computer to trigger the different modes. All control can be done through the button and the computer application.

**Instructions for Operating Software:**

The State Setter Application Instructions Unit needs to be on with the blue status LED flashing. When the blue status LED is flashing a connection to the ANT stick and the RF State Setter Application can be made. To turn the unit on press and hold the button for 1 second. The blue or pink status LED should flash. Cycle through the modes by pressing the button until the main LED shuts off and the blue status LED is flashing.

The unit will be labelled with a 5-digit device number. Enter the 5-digit Device Number into the correct field in the state setter application, select the Bike Lights device type from the drop down menu. See picture below.

RF mode allows the unit to be set in a CW (Constant Waveform) state, ANT\_CW Modulated (Constant Waveform with constant 100% ANT modulation) and ANT\_RX (Constant ANT receive). Note: BikeLight does not support BLE, although this is in the drop down menu, this selection will do nothing)

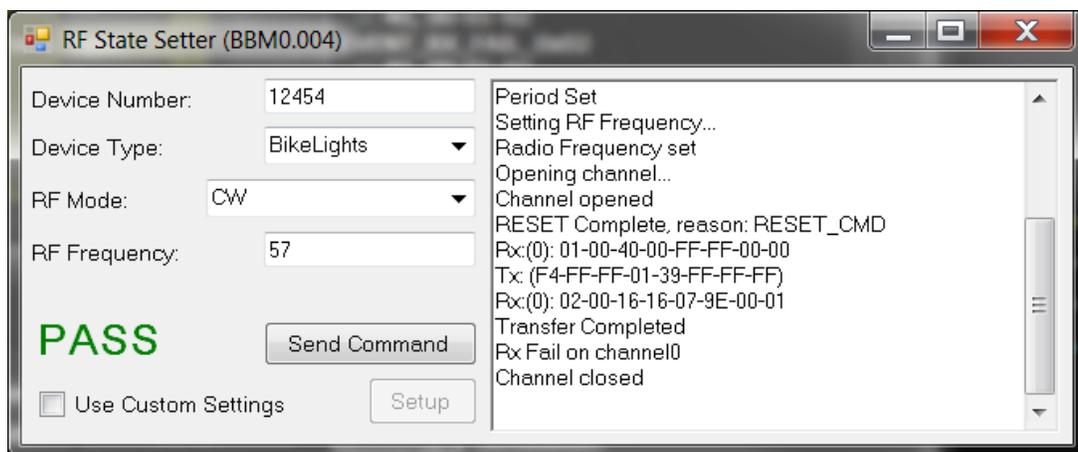
Set the RF Frequency by entering the channel in the RF Frequency block. Only the last two digits of the MHz frequency should be placed in the box, for instance if 2457 is the desired channel, 57 is entered in the box.

Once the test is complete the unit must be reset, this is accomplished by pressing and holding the button for 8 seconds. The unit will reset into deep sleep if the button is released at 8 seconds, if the button is held for 10 seconds the light will reset and then turn on with a pink status LED.

A 2 second press and hold will place the unit into deep sleep if the unit is not in a test state (ie: CW). If the unit is in a test state then the unit must be reset before a 2 second press and hold will place the unit into deep sleep.

**Troubleshooting:**

If the light does not turn on, recharge the battery by connecting it to a USB source. The green status LED should start flashing at the same 1/2Hz. If this does not occur, press and hold the button for 10 seconds, this will cause a hard reset of the device.



### 3. Product Configuration (continued)

#### 3.5. Block Diagram

Garmin  
A03086  
High Lumen  
Bike Light

### 4. Measurements Parameters

#### 4.1. Measurement Equipment Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due	Interval
EMI Test Receiver, 9kHz - 7GHz <sup>1</sup>	Rohde & Schwarz	ESR7	101156	7/23/2017	2 Years
Spectrum Analyzer 20 Hz – 40 GHz <sup>2</sup>	Rohde & Schwarz	FSV40	100899	7/23/2017	2 Years
Spectrum Analyzer, 9 kHz - 40 GHz <sup>3</sup>	Rohde & Schwarz	FSVR40	100909	7/23/2017	2 Years
EMI Receiver	Hewlett Packard	8546A	3330A00115	6/4/2017	3 Years
Passive Loop Antenna, 9 kHz to 30 MHz	EMCO	6512	9309-1139	10/26/2018	2 Years
Biconilog Antenna, 30 MHz to 2 GHz	Sunol Sciences	JB1	A050913	6/3/2019	3 Years
Horn Antenna, 960 MHz to 18 GHz	Electro-Metrics	EM-6961	6337	5/2/2018	1 Year
Horn Antenna, 18 GHz to 40 GHz	Com-Power	AH-840	101032	2/24/2018	2 Years
Preamplifier, 1 GHz to 26.5 GHz	Hewlett Packard	8449B	3008A00329	7/22/2017	2 Years
LISN 50 ohm 50 µH, 9 kHz to 30 MHz	EMCO	3825/2	9109-1860	11/17/2017	1 Year
2.4 GHz Band Reject Filter	Micro-Tronics	BRM50702	150	6/1/2017	1 Year
EMI Receiver, 9 kHz to 6.5 GHz	Hewlett Packard	8546A	3330A00115	12/4/2018	2 Years
Digital Barometer	Control Company	4195	ID236	10/8/2017	2 Years
Digital Multi-meter	Fluke	187	83030167	11/21/2017	1 Year
Temperature Chamber	Associated Research	E-0029	N/A	NR	---

<sup>1</sup> ESR7    Firmware revision: V2.28,SP1    Date installed: 9/2/2016    Previous V2.26, installed 8/15/2014.  
<sup>2</sup> FSV40    Firmware revision: V2.30 SP4,    Date installed: 5/4/2016    Previous V2.30 SP1, installed 10/22/2014.  
<sup>3</sup> FSVR40    Firmware revision: V2.23,    Date installed: 10/20/2014    Previous V1.63 SP1, installed 8/28/2013.

Manufacturer	Software Description	Title or Model #	Rev.	Report Sections
Compliance Worldwide	Test Report Generation Software	Test Report Generator	1.0	Used to process conducted emissions data

#### 4. Measurements Parameters (continued)

##### 4.2. Measurement & Equipment Setup

Test Dates:	1/10/2017 – 1/20/2017
Test Engineers:	Brian Breault, Cody Merry
Normal Site Temperature (15 - 35°C):	21.2
Relative Humidity (20 -75%RH):	35
Frequency Range:	32 kHz to 26.5 GHz
Measurement Distance:	3 Meters
EMI Receiver IF Bandwidth:	120 kHz - 30 MHz to 1 GHz 1 MHz - Above 1 GHz
EMI Receiver Average Bandwidth:	300 kHz - 30 MHz to 1 GHz 3 MHz - Above 1 GHz
Detector Function:	Peak, Quasi-Peak & Average

##### 4.3. Measurement Procedure

Test measurements were made in accordance FCC Part 15.249, IC RSS-210 B.10: Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz.

The test methods used to generate the data in this test report are in accordance with ANSI C63.10: 2013, American National Standard for Testing Unlicensed Wireless Devices.

##### 4.4. Choice of Operating Frequencies

Low Channel	2	2402 MHz
Middle Channel	41	2441 MHz
High Channel	80	2480 MHz

##### 4.5. EUT Positions for Emissions Measurements

In accordance with ANSI C63.10-2013, Section 5.10.1; a portable or small unlicensed wireless device shall be placed on a non-metallic test fixture or other non-metallic support during testing. The supporting fixture shall permit orientation of the EUT in each of three orthogonal positions such that emissions from the EUT are maximized.

X Axis	Light is facing left. Switch is facing up.	Bottom of the unit is facing the antenna at 0° azimuth.
Y Axis	Light is facing up. Switch is facing right.	Bottom of the unit is facing the antenna at 0° azimuth.
Z Axis	Bottom is down. Switch is facing right.	Light is facing the antenna at 0° azimuth.



X-Axis



Y-Axis



Z-Axis

**5. Measurement Summary**

Test Requirement	FCC Requirement	IC Requirement	Test Section	Result	Comment
Antenna Requirement	15.203	RSS-GEN 6.7	6.1	Compliant	
Radiated Field Strength of Fundamental	15.249 (a),(c)	RSS-210 B.10	6.2	Compliant	
Radiated Field Strength of Harmonics	15.249 (a),(c)	RSS-210 B.10	6.3	Compliant	
Fixed, Point-to-Point Operation	15.249 (b)	N/A	---	Not Required	
Band Edge Measurements	15.249 (d) 15.209	N/A	6.4	Compliant	
Spurious Radiated Emissions	15.249 (d), 15.209	RSS-210 B.10	6.5	Compliant	
Occupied Bandwidth 26 dB	ANSI C63.4 § 13.1.7	N/A	6.6	Compliant	
99% Bandwidth	N/A	RSS-GEN 6.6	6.7	Compliant	
AC Power Line Conducted Emissions	15.207	RSS-GEN 8.8	6.8	Compliant	
RF Safety	95.1125 2.1093 1.1307 (b)(1))	RSS-102 Issue 5	6.9	Compliant	

**6. Measurement Data**

**6.1. Antenna Requirement (Section 15.203, RSS-GEN, Issue 4)**

Requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section.

Result: The unit under test employs a permanent, non-user accessible chip antenna.

**6.2. Radiated Field Strength of Fundamental (15.249, Section (a), (c)), IC RSS-210 B.10**

Requirement: The 3 meter field strength of the fundamental emissions from intentional radiators operating within the 2400 – 2483.5 MHz frequency band shall comply with the following requirement: 50 millivolts/meter (94 dBµV/m) average mode measurement and 500 millivolts/meter (114 dBµV/m) peak mode measurement.

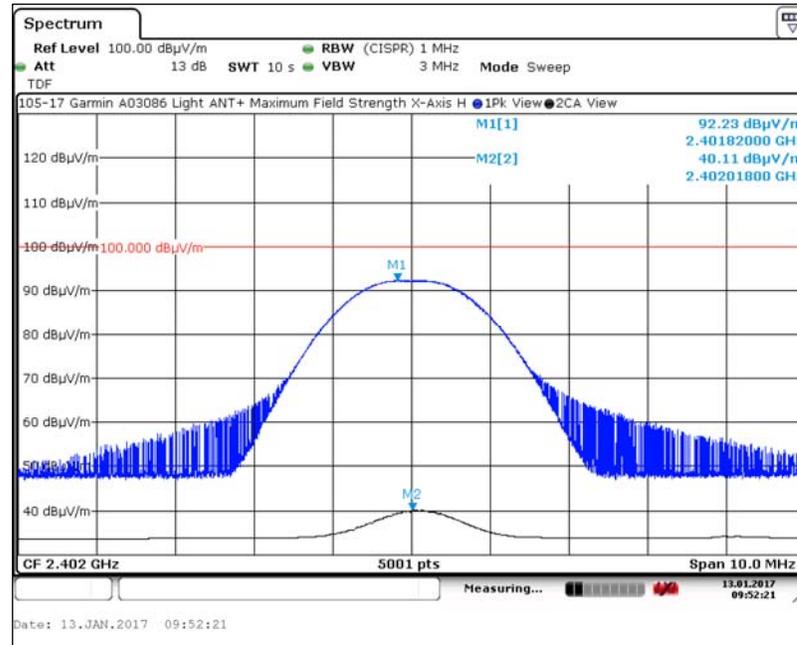
Frequency (MHz)	Amplitude <sup>1</sup> (dBµV/m) at 3 Meters		Limit (dBµV/m) at 3 Meters		Margin (dBµV/m) at 3 Meters		Ant Polarity	Ant Height	Turntable Azimuth	Result
	Peak	Average <sup>2</sup>	Peak	Average	Peak	Average	H/V	cm	Deg	
2402	92.23	40.11	114.00	94.00	-21.77	-53.89	H	114	211	Compliant
2441	92.28	40.25	114.00	94.00	-21.72	-53.75	H	228	52	Compliant
2480	91.21	39.54	114.00	94.00	-22.79	-54.46	H	237	44	Compliant

<sup>1</sup> All correction factors are included in measurement values.

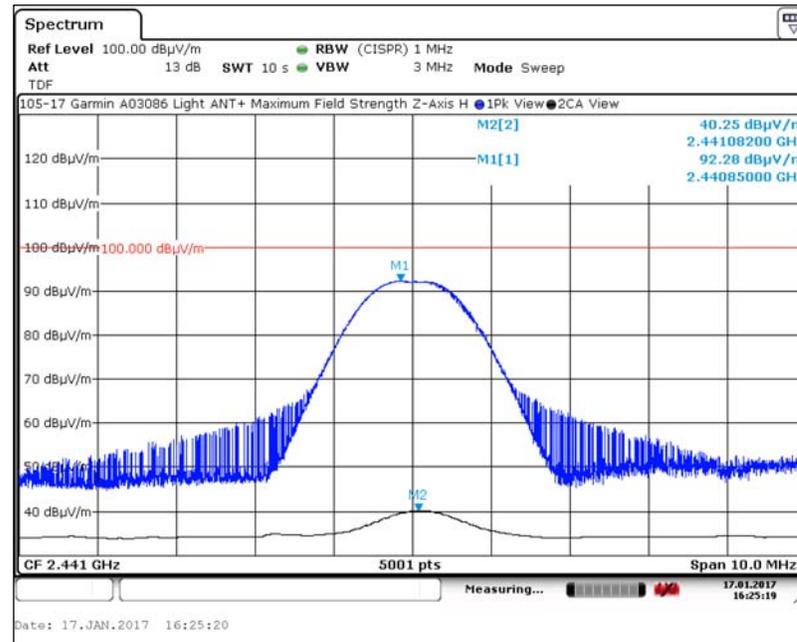
6. Measurement Data (continued)

6.2. Radiated Field Strength of Fundamental (15.249, Section (a), (c)), IC RSS-210 B.10

6.2.1. Radiated Field Strength of Fundamental – Channel 2



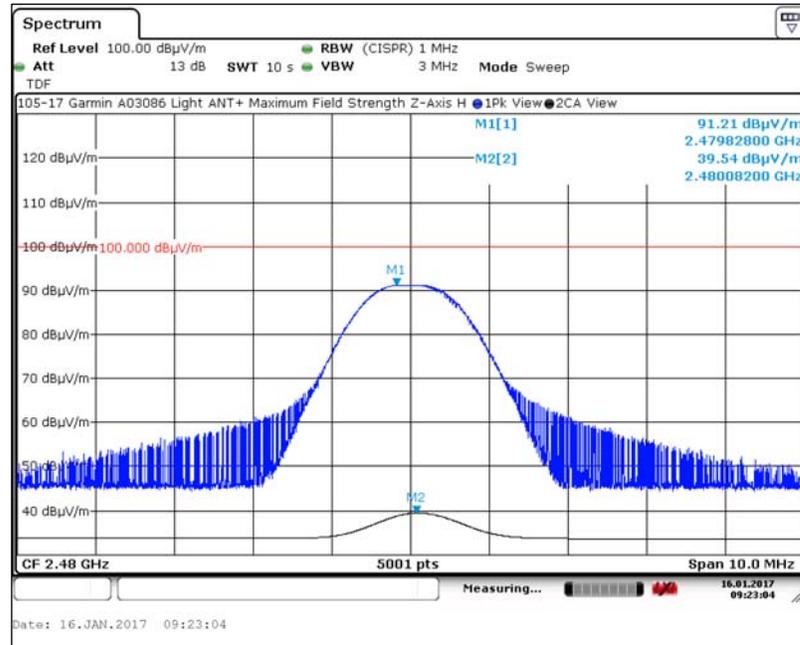
6.2.2. Radiated Field Strength of Fundamental – Channel 41



6. Measurement Data (continued)

6.2. Radiated Field Strength of Fundamental (15.249, Section (a), (c)), IC RSS-210 B.10

6.2.3. Radiated Field Strength of Fundamental – Channel 80



**6. Measurement Data (continued)**

**6.3. Radiated Field Strength of Harmonics (15.249, Section (a)), IC RSS-210 B.10**

Requirement: The 3 meter field strength of the harmonic emissions from intentional radiators operated within the 2400 to 2483.5 MHz frequency bands shall comply with the following: 500 microvolts/meter (54 dBµV/m), average mode measurement. Peak field strength may not be greater than 20 dB above the average limit (74 dBµV/m).

Test Results : Compliant

Notes: All correction factors are included in the field strength values. The tabled values represent the worst case antenna polarity and orthogonal position of the DUT.

Freq. (MHz)	Field Strength (dBµV/m)		Limit (dBµV/m)		Margin (dBµV/m)		Antenna Polarity (H/V)	Result
	Peak	Average	Peak	Average	Peak	Average		
4804	47.60	33.88	74.00	54.00	-26.40	-20.12	H	Compliant
4882	48.51	34.01	74.00	54.00	-25.49	-19.99	V	Compliant
4960	49.20	35.89	74.00	54.00	-24.80	-18.11	H	Compliant
7206	47.60	33.88	74.00	54.00	-26.40	-20.12	H	Compliant
7323	53.29	38.14	74.00	54.00	-20.71	-15.86	V	Compliant
7440	52.68	36.96	74.00	54.00	-21.32	-17.04	V	Compliant
9608	54.35	39.72	74.00	54.00	-19.65	-14.28	H	Compliant
9764	53.55	40.13	74.00	54.00	-20.45	-13.87	H	Compliant
9920	52.79	39.49	74.00	54.00	-21.21	-14.51	H	Compliant
12010	56.84	42.89	74.00	54.00	-17.16	-11.11	H	Compliant
12205	57.64	42.98	74.00	54.00	-16.36	-11.02	V	Compliant
12400	57.93	44.33	74.00	54.00	-16.07	-9.67	H	Compliant
14412	58.63	44.53	74.00	54.00	-15.37	-9.47	H	Compliant
14646	58.82	45.70	74.00	54.00	-15.18	-8.30	H	Compliant
14880	59.11	45.31	74.00	54.00	-14.89	-8.69	H	Compliant
16814	62.16	49.43	74.00	54.00	-11.84	-4.57	V	Compliant
17087	61.44	48.36	74.00	54.00	-12.56	-5.64	V	Compliant
17360	62.05	48.34	74.00	54.00	-11.95	-5.66	H	Compliant
19216	58.78	44.99	74.00	54.00	-15.22	-9.01	H	Compliant
19528	58.49	44.91	74.00	54.00	-15.51	-9.09	H	Compliant
19840	58.35	44.18	74.00	54.00	-15.65	-9.82	V	Compliant
21618	58.61	45.14	74.00	54.00	-15.39	-8.86	V	Compliant
21969	59.43	45.97	74.00	54.00	-14.57	-8.03	H	Compliant
22320	60.70	46.86	74.00	54.00	-13.30	-7.14	V	Compliant
24020	62.49	48.91	74.00	54.00	-11.51	-5.09	H	Compliant
24410	61.83	48.26	74.00	54.00	-12.17	-5.74	H	Compliant
24800	62.56	48.55	74.00	54.00	-11.44	-5.45	V	Compliant

## 6. Measurement Data (continued)

### 6.4. Band Edge Measurements

Requirement: Emissions radiated outside of the specified frequency band of 2400 to 2483.5 MHz, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Test Note: The upper band edge peak mode measurement meets the FCC Part 15, Section 15.209 peak and average (-54 dB $\mu$ V/m) requirement.

#### Band Edge Measurements - Lower and Upper Band Edge

##### Modulated

Frequency (MHz)	Band Edge (dB $\mu$ V/m)			Part 15.209 Limit (dB $\mu$ V/m)		Margin (dB $\mu$ V/m)		Result	
		Freq MHz	Peak	Average	Peak	Average	Peak <sup>1</sup>		Average
2402	Lower	2400	58.40	31.45	74	54	-15.60	-22.55	Compliant
2480	Upper	2483.5	53.12	31.50	74	54	-20.88	-22.50	Compliant

##### Unmodulated

Frequency (MHz)	Band Edge (dB $\mu$ V/m)			Part 15.209 Limit (dB $\mu$ V/m)		Margin (dB $\mu$ V/m)		Result	
		Freq MHz	Peak	Average	Peak	Average	Peak <sup>1</sup>		Average
2402	Lower	2400	49.86	37.84	74	54	-24.14	-16.16	Compliant
2480	Upper	2483.5	45.53	34.26	74	54	-28.47	-19.74	Compliant

#### Lower Restricted Band

Frequency (MHz)	Field Strength (dB $\mu$ V/m)		Part 15.209 Limit (dB $\mu$ V/m)		Margin (dB)		Result
	Peak	Average	Peak	Average	Peak	Average	
2323.5090	46.87	34.84	74.00	54.00	-27.13	-19.16	Compliant

#### Upper Restricted Band

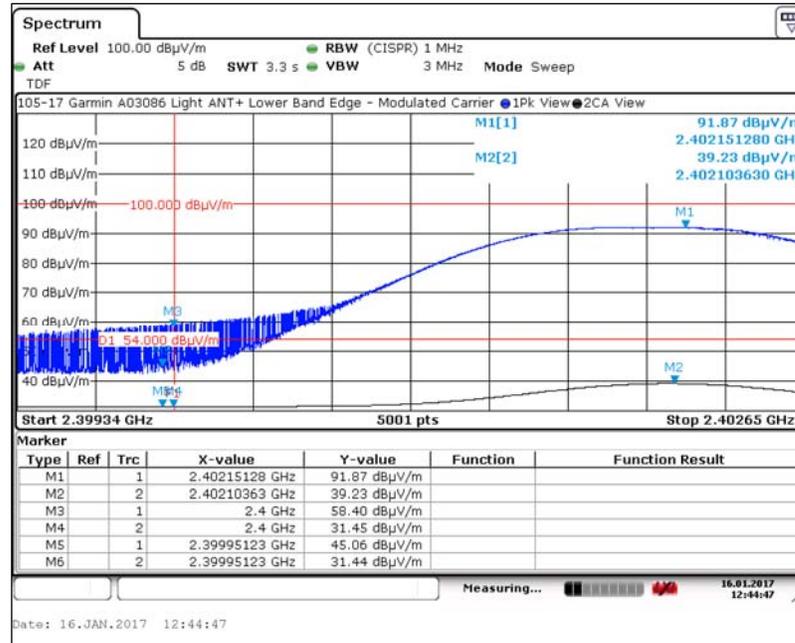
Frequency (MHz)	Field Strength (dB $\mu$ V/m)		Part 15.209 Limit (dB $\mu$ V/m)		Margin (dB)		Result
	Peak	Average	Peak	Average	Peak	Average	
2483.7854	53.14	31.36	74.00	54.00	-20.86	-22.64	Compliant

6. Measurement Data (continued)

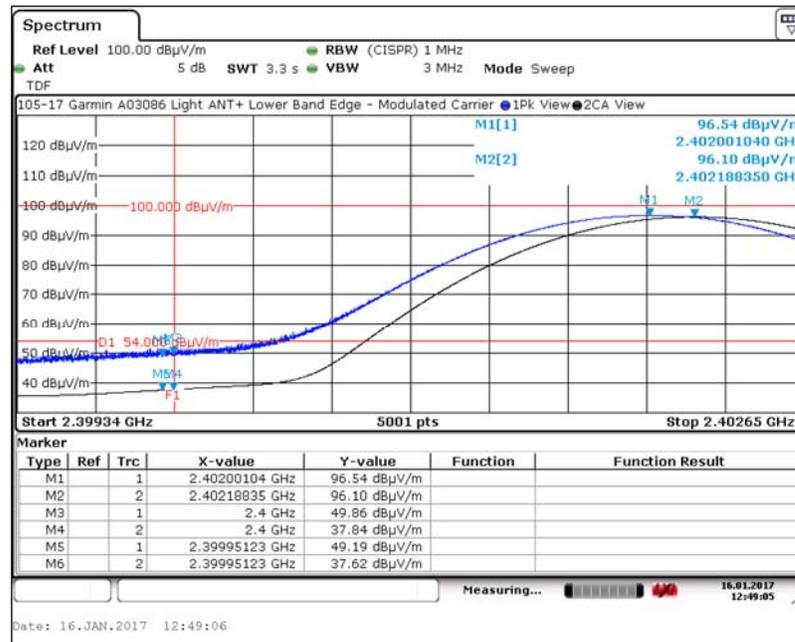
6.4. Band Edge Measurements (continued)

6.4.1. Band Edge Measurements - Lower Band Edge

6.4.1.1. Modulated



6.4.1.2. Unmodulated

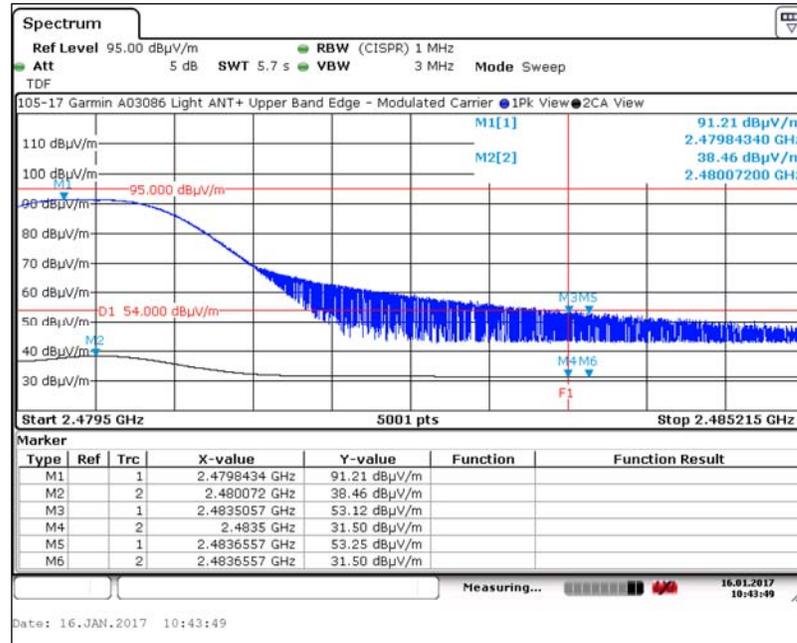


6. Measurement Data (continued)

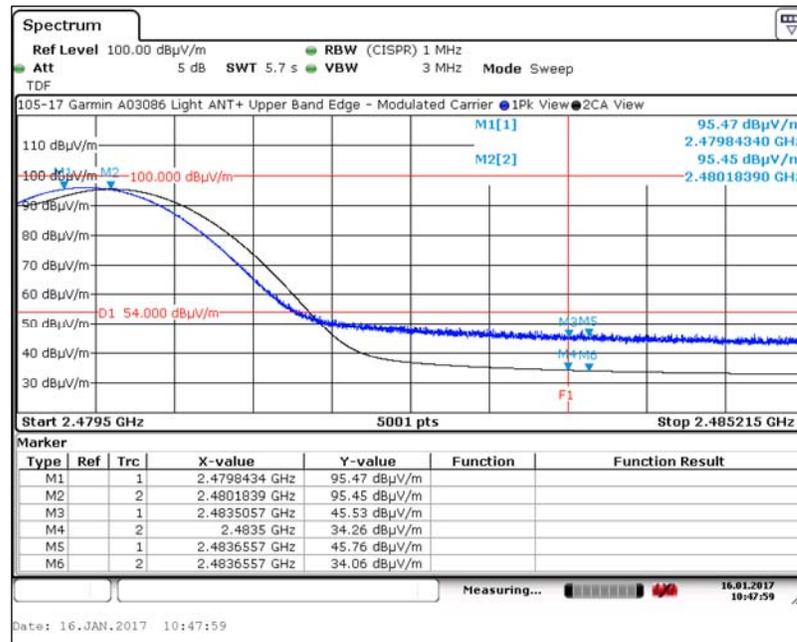
6.4. Band Edge Measurements (continued)

6.4.2. Band Edge Measurements - Upper Band Edge

6.4.2.1. Modulated



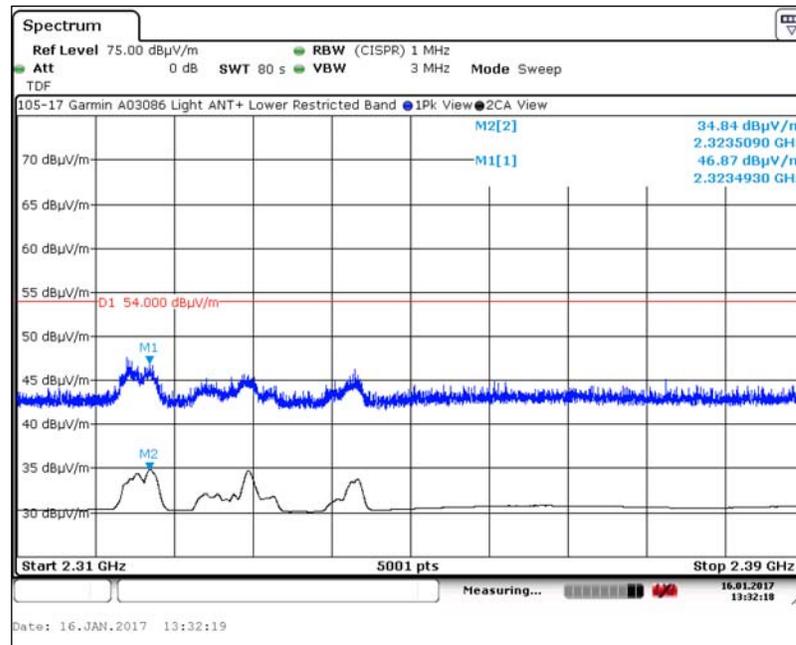
6.4.2.2. Unmodulated



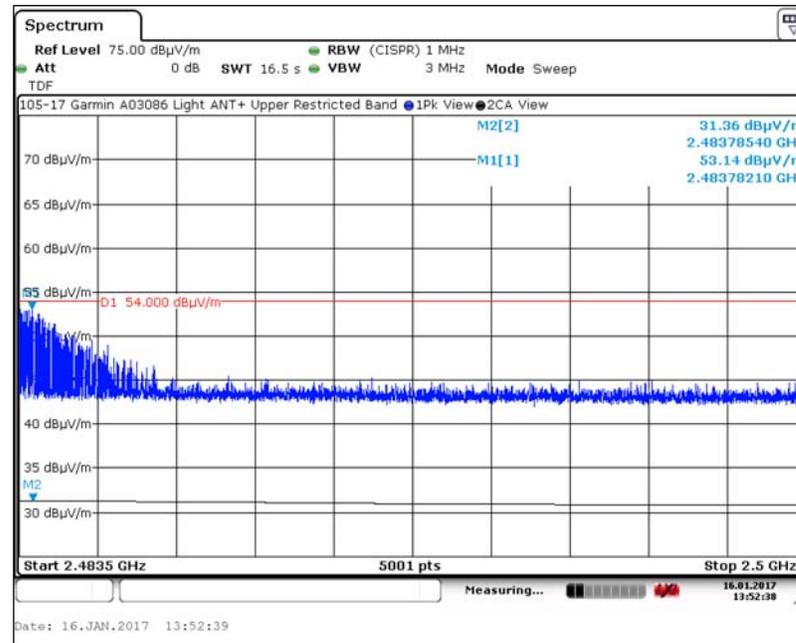
6. Measurement Data (continued)

6.4. Band Edge Measurements (continued)

6.4.3. Band Edge Measurements – Lower Restricted Band



6.4.4. Band Edge Measurements – Upper Restricted Band



**6. Measurement Data (continued)**

**6.5. Spurious Radiated Emissions, 32 kHz to EUT 10<sup>th</sup> Harmonic (15.249, Section (d)), IC RSS-GEN, Issue 4**

Requirement: Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Test Notes: Details of the spurious emissions measurements are located in Appendix A beginning on page 34.

The lowest frequency generated by the device under test is 32.768 kHz.

**6.5.1. Regulatory Limit: FCC Part 209, Quasi-Peak & Average**

Frequency Range (MHz)	Distance (Meters)	Limit (dBµV/m)
0.009 to 0.490	3	128.5 to 93.8
0.490 to 1.705	3	73.8 to 63
1.705 to 30	3	69.5
30 to 88	3	40.0
88 to 216	3	43.5
216 to 960	3	46.0
Above 960	3	54.0

**6.5.2. Measurement Summary**

Notes: Each of the tabled entries represent the worst case receive antenna polarity and DUT orthogonal position for the given frequency range.

All measurements were made with a peak detector.

Frequency Range (MHz)	Worst Case Emission Frequency (MHz)	Peak Amplitude (dBµV/m)	QP/Average Limit (dBµV/m)	Margin (dB)	Antenna Polarity (Orientation)
0.010 to 0.150	0.010	118.91	128.18	-9.27	Parallel
0.150 to 30.000	1.608	52.92	61.10	-8.18	Parallel
30 to 1000	935.820	39.42	46.00	-6.58	Vertical
1000 to 6000	5412.600	51.00	54.00	-3.00	Horizontal
6000 to 12000	11986.200	51.42	54.00	-2.58	Horizontal
12000 to 18000	16455.300	48.76	54.00	-5.24	Horizontal
18000 to 26500	25955.300	47.85	54.00	-6.15	Vertical

## 6. Measurement Data (continued)

### 6.6 Occupied Bandwidth (ANSI C63.10, Section 6.9.1 & IC RSS-GEN, Issue 4)

Requirement: The occupied bandwidth measurements on an intentional radiator shall be made in accordance with the requirements outlined in ANSI C63.10-2013, Section 6.9.1. If no bandwidth requirement is specified by the procuring or regulatory agency, the bandwidth will be measured at  $-20$  dB with respect to the reference level.

Test Notes: The span range for the SA display shall be between two times and five times the OBW. The nominal IF filter bandwidth (3 dB RBW) should be approximately 1% to 5% of the OBW, unless otherwise specified, depending on the applicable requirement. The dynamic range of the SA at the selected RBW shall be more than 10 dB below the target “dB down” (attenuation) requirement, i.e., if the requirement calls for measuring the  $-20$  dB OBW, the SA noise floor at the selected RBW shall be at least 30 dB below the largest measured value on the display.

Frequency (MHz)	-20 dB Bandwidth (kHz)
2402	898.220
2441	905.020
2480	907.020

#### 6.6.1. Occupied ( $-20$ dB) Bandwidth, Channel 2



6. Measurement Data (continued)

6.6 Occupied Bandwidth (ANSI C63.4, Section 13.1.7 & IC RSS-GEN, Issue 4) (continued)

6.6.2. Occupied (-20 dB) Bandwidth, Channel 41



6.6.3. Occupied (-20 dB) Bandwidth, Channel 80



**6. Measurement Data (continued)**

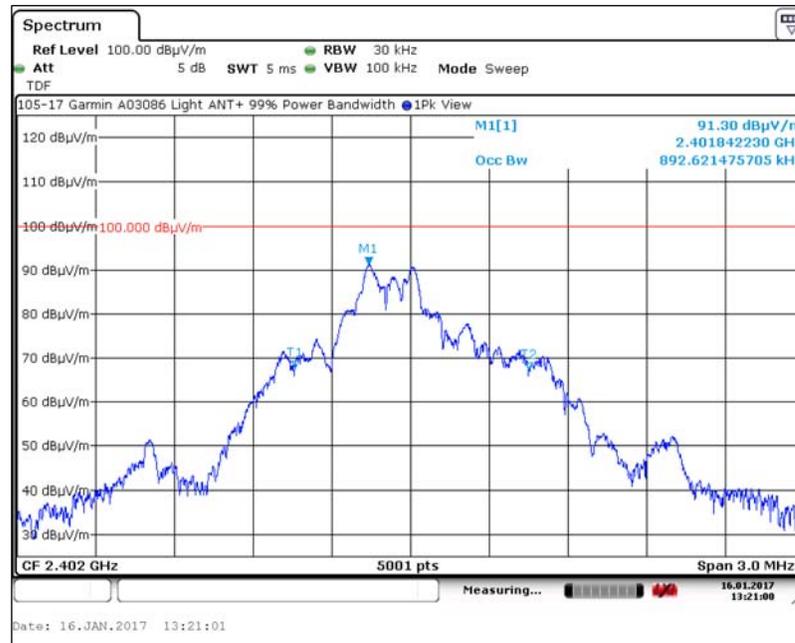
**6.7. 99% Emission Bandwidth (IC RSS-GEN, Issue 4, Section 4.6.1)**

Requirement: When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

Test Notes: The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.

Frequency (MHz)	Emission Bandwidth (kHz)
2402	892.621
2441	901.019
2480	886.622

**6.7.1. 99% Emission Bandwidth, Channel 0**



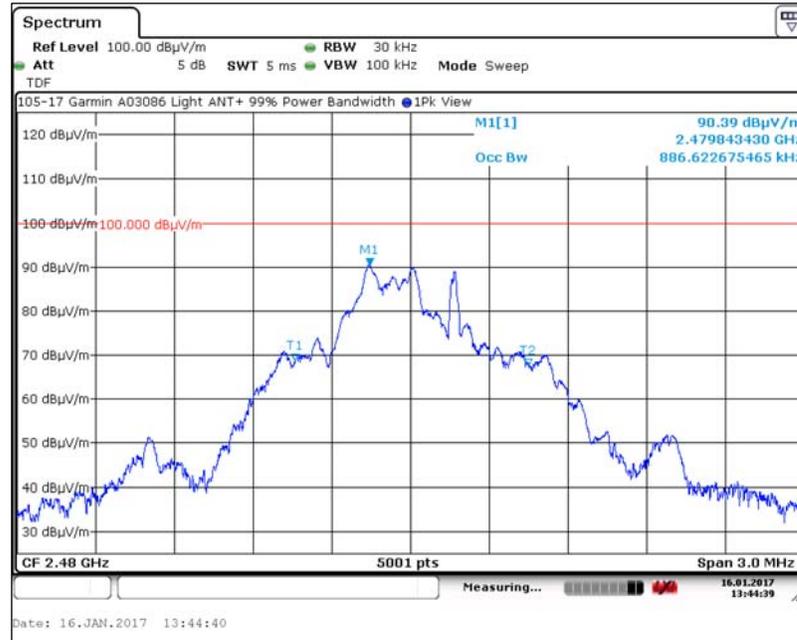
6. Measurement Data (continued)

6.7. 99% Emission Bandwidth (IC RSS-GEN, Issue 4, Section 4.6.1) (continued)

6.7.2. 99% Emission Bandwidth, Channel 41



6.7.3. 99% Emission Bandwidth, Channel 80



**6. Measurement Data (continued)**

**6.8. Conducted Emissions (FCC Part 15.207)**

**Regulatory Limits: FCC Part 15.207**

Frequency Range (MHz)	Limits (dBµV)	
	Quasi-Peak	Average
0.15 to 0.50	66 to 56 <sup>1</sup>	56 to 46 <sup>1</sup>
0.50 to 5.0	56	46
5.0 to 30	60	50

<sup>1</sup> The limit decreases linearly with the logarithm of the frequency.

**Measurement & Equipment Setup**

Test Date:	01/10/2017
Test Engineer:	Cody Merry
Site Temperature (°C):	27.2
Relative Humidity (%RH):	34
Frequency Range:	0.15 MHz to 30 MHz
EMI Receiver IF Bandwidth:	9 kHz
EMI Receiver Avg Bandwidth:	30 kHz
Detector Functions:	Peak, Quasi-Peak. & Average
Measurement Uncertainty	± 3.56 dB

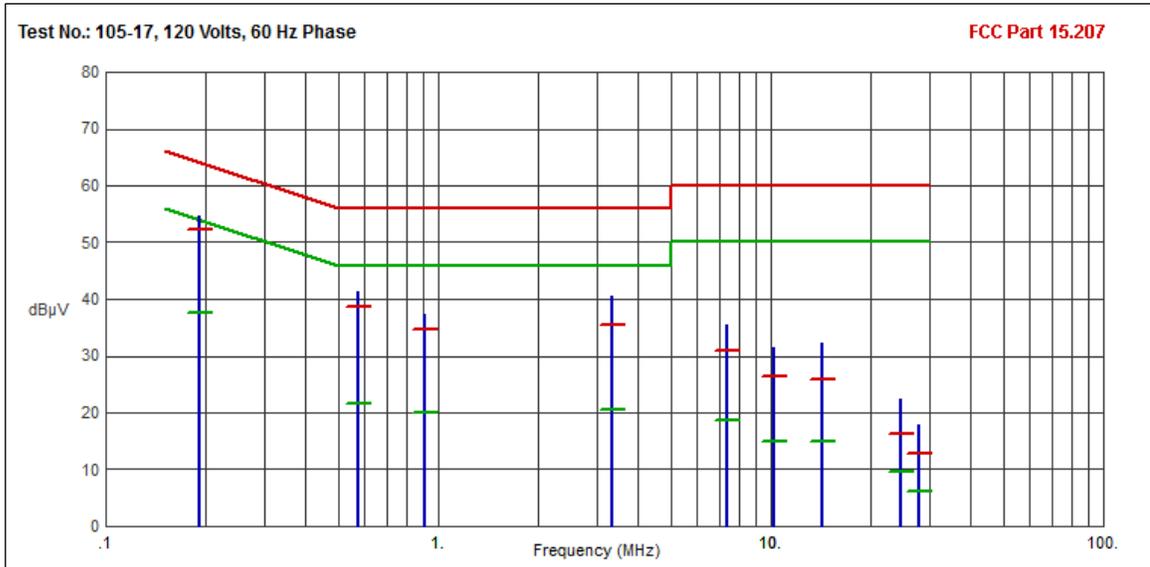
**Test Procedure**

Test measurements were made in accordance with ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices, Section 6.2: Standard test method for ac power-line conducted emissions from unlicensed wireless devices.

**6. Measurement Data (continued)**

**6.8. Conducted Emissions (FCC Part 15.207) (continued)**

6.8.1. 120 Volts, 60 Hz Phase

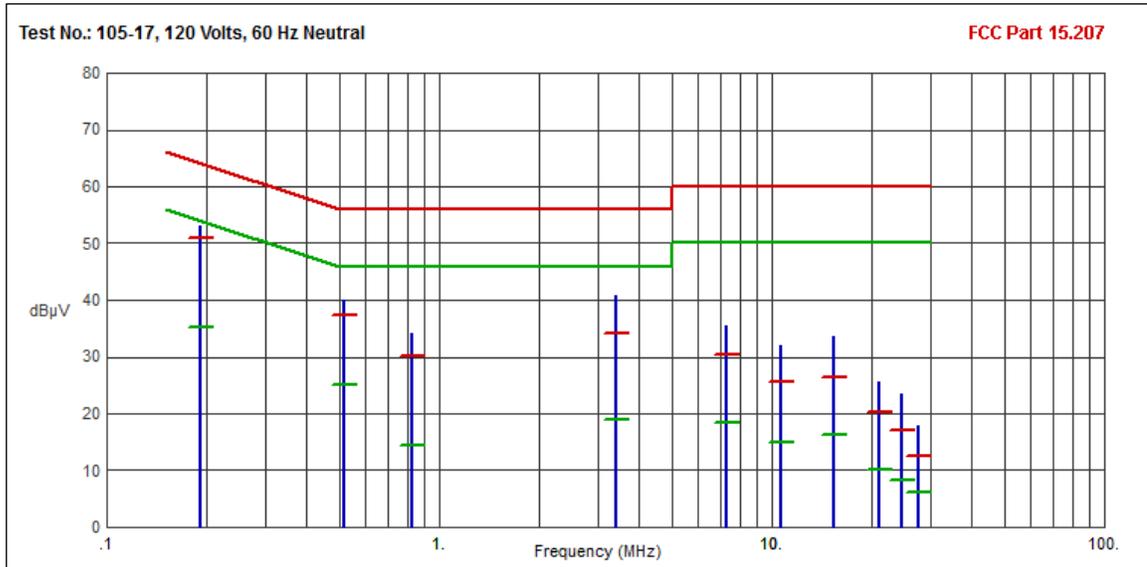


Frequency (MHz)	Pk Amp (dBµV)	QP Amp (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Avg Amp (dBµV)	Avg Limit (dBµV)	Avg Margin (dB)	Comments
.1920	54.73	52.19	63.95	-11.76	37.70	53.95	-16.25	
.5732	41.26	38.78	56.00	-17.22	21.63	46.00	-24.37	
.9104	37.34	34.54	56.00	-21.46	20.09	46.00	-25.91	
3.3426	40.50	35.46	56.00	-20.54	20.52	46.00	-25.48	
7.3492	35.58	30.91	60.00	-29.09	18.62	50.00	-31.38	
10.1823	31.41	26.27	60.00	-33.73	14.92	50.00	-35.08	
14.2872	32.26	25.75	60.00	-34.25	15.04	50.00	-34.96	
24.7045	22.44	16.31	60.00	-43.69	9.65	50.00	-40.35	
27.9546	17.87	12.69	60.00	-47.31	6.02	50.00	-43.98	

6. Measurement Data (continued)

6.8. Conducted Emissions (FCC Part 15.207) (continued)

6.8.2. 120 Volts, 60 Hz Neutral



Frequency (MHz)	Pk Amp (dBµV)	QP Amp (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Avg Amp (dBµV)	Avg Limit (dBµV)	Avg Margin (dB)	Comments
.1911	52.98	50.84	63.99	-13.15	35.09	53.99	-18.90	
.5185	40.00	37.44	56.00	-18.56	25.00	46.00	-21.00	
.8299	34.14	30.02	56.00	-25.98	14.27	46.00	-31.73	
3.3986	40.89	34.12	56.00	-21.88	18.85	46.00	-27.15	
7.2988	35.42	30.28	60.00	-29.72	18.38	50.00	-31.62	
10.6925	31.93	25.62	60.00	-34.38	14.85	50.00	-35.15	
15.2822	33.55	26.46	60.00	-33.54	16.26	50.00	-33.74	
21.0041	25.49	20.37	60.00	-39.63	10.01	50.00	-39.99	
24.6801	23.48	17.08	60.00	-42.92	8.36	50.00	-41.64	
27.7385	17.95	12.49	60.00	-47.51	6.13	50.00	-43.87	

**6. Measurement Data (continued)**

**6.9. Public Exposure to Radio Frequency Energy Levels ((1.1307 (b)(1)) RSS-GEN, ISSUE 4, RSS 102)**

6.9.1. FCC Requirements

Requirement: Portable devices are subject to radio frequency radiation exposure requirements.

For a 1-g SAR, the test exclusion result must be  $\leq 3.0$ .

Test Notes: The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq 50$  mm are determined by the following formula:

$$\text{SAR Test Exclusion} = \frac{P_{\text{MAX}}}{d_{\text{MIN}}} \times \sqrt{f_{(\text{GHz})}} \quad (1)$$

$P_{\text{MAX}}$  mW Maximum power of channel, including tune-up tolerance

$d_{\text{MIN}}$  mm Minimum test separation distance, mm ( $\leq 50$  mm)

$f_{(\text{GHz})}$  GHz  $f_{(\text{GHz})}$  is the RF channel transmit frequency in GHz ( $>100$  MHz and  $<6$  GHz)

(1) FCC OET 447498 - Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

Conclusion: The device under test meets the exclusion requirement detailed in FCC OET 447498.

<b>Input:</b>	$P_{\text{MAX}}^1$ (mW)	2.19	2.17	2.38
	$d_{\text{MIN}}$ (mm)	5.00	5.00	5.00
	$f_{(\text{GHz})}$	2.402	2.441	2.480
<b>Test Exclusion:</b>		<b>0.05514</b>	<b>0.05623</b>	<b>0.04430</b>
<b>Limit Exemption:</b>		<b>3.00</b>	<b>3.00</b>	<b>3.00</b>

<sup>1</sup> Taken from column 5 of the table in Section 7.4 of this test report.

7.10.2. RSS-102 Issue 5 Requirements

Requirement: SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1. Portable devices are subject to radio frequency radiation exposure requirements.

Test Notes: The limit was taken from Table 1 of RSS-102 Issue 5.

Frequency (MHz)	Separation Distance (mm)	Maximum Power (mW)	RSS-102 Limit (mW)	Result
2402.00	$\leq 5$	0.18	4.26	Compliant
2441.00	$\leq 5$	0.18	4.05	Compliant
2480.00	$\leq 5$	0.14	3.94	Compliant

## 7. Test Site Description

Compliance Worldwide is located at 357 Main Street in Sandown, New Hampshire. The test sites at Compliance Worldwide are used for conducted and radiated emissions testing in accordance with the Federal Communications Commission (FCC) and Industry Canada standards. Through our American Association for Laboratory Accreditation (A2LA) ISO Guide 17025:2005 Accreditation our test sites are designated with the FCC (designation number **US1091**), Industry Canada (file number **IC 3023A-1**) and VCCI (Member number 3168) under registration number A-0208.

Compliance Worldwide is also designated as a Phase 1 CAB under APEC-MRA (US0132) for Australia/New Zealand AS/NZS CISPR 22, Chinese-Taipei (Taiwan) BSMI CNS 13438 and Korea (RRA) KN 11, KN 13, KN 14-1, KN 22, KN 32, KN 61000-6-3, KN 61000-6-4.

The radiated emissions test site is a 3 and 10 meter enclosed open area test site (OATS). Personnel, support equipment and test equipment are located in the basement beneath the OATS ground plane.

The conducted emissions site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical ground plane required by EN 55022. A second conducted emissions site is also located in the basement of the OATS site with a 2.3 x 2.5 meter ground plane and a 2.4 x 2.4 meter vertical wall.

Both sites are designed to test products or systems 1.5 meters W x 1.5 meters L x 2.0 meters H, floor standing or table top.