



Engineering Solutions & Electromagnetic Compatibility Services

FCC Part 15.247 & RSS-210 Certification Application Test Report

Test Lab: Rhein Tech Laboratories, Inc. Tel: 703-689-0368 360 Herndon Parkway Fax: 703-689-2056 Suite 1400 Herndon, VA 20170 www.rheintech.com		Applicant: SmartThings, Inc. 1000 Potomac Street, NW Suite 120 Washington, DC 20007 (USA) Contact: Andrew Sterian	
FCC ID:	R3Y-STH-ETH011	Test Report Date	November 17, 2014
IC:	10734A-STHETH011		
Platform	N/A	RTL Work Order Number	2014175
Model #	PGC422-C	RTL Quote Number	QRTL14-175B
American National Standard Institute	ANSI C63.4-2003: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz; ANSI C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices		
FCC Classification	DTS – Part 15 Digital Transmission System		
FCC Rule Part(s)	FCC Rules Part 15.247: Operation within the bands 920-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz Direct Sequence System (10-01-13)		
Industry Canada Rule Part(s)	RSS-210 Issue 8: Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment RSS-Gen Issue 3: General Requirements and Information for the Certification of Radio Apparatus		
Digital Interface Information	Digital Interface was found to be compliant		
Frequency Range (MHz)	Power (W)	Frequency Tolerance	Emission Designator
2405-2470	0.107	N/A	1M62G1D

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. No modifications were made to the equipment during testing in order to achieve compliance with these standards. Furthermore, there was no deviation from, additions to, or exclusions from, the applicable parts of FCC Part 2, FCC Part 15, IC RSS-210, IC RSS-Gen, ANSI C63.4 and ANSI C63.10.

Signature: 

Date: November 17, 2014

Typed/Printed Name: Desmond A. Fraser

Position: President

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These tests are accredited and meet the requirements of ISO/IEC 17025 as verified by ANSI-ASQ National Accreditation Board/ACLASS. Refer to certificate and scope of accreditation AT-1445.

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1 General Information

1.1 Scope

This is an original certification application report for SmartThings, Inc. Model # PGC422-C.

Applicable Standards:

- FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz.
- RSS-210 Issue 8: Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment
- RSS-Gen Issue 3: General Requirements and Information for the Certification of Radio Apparatus

1.2 Description of EUT

Equipment Under Test	Hub V1.1; Model # PGC422-C
Power Supply	5 VAC Adapter
Modulation Type	OQPSK and DSSS
Frequency Range	2405 – 2470 MHz
Antenna Connector Type	N/A
Antenna Types	Internal inverted F trace

1.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 2003).

1.4 Related Submittals/Grant(s)

This is an original certification application for SmartThings, Inc., Model # PGC422-C, FCC ID: R3Y-STH-ETH011, IC: 10734A-STHETH011.

Requested grant notes: This module may be collocated with the following module: FCC ID: D87-ZM5304-U.

1.5 Modifications

No physical modifications were required for compliance. However, output power was reduced using a software setting of -6 to pass band edge and harmonic emissions tests.

2 Test Information

2.1 Description of Test Modes

In accordance with FCC 15.31(m), and because the EUT utilizes an operating band greater than 10 MHz, the following frequencies were tested:

Table 2-1: Frequencies Tested

Channel	Frequency
Low (Channel 11)	2405
Mid (Channel 18)	2440
High (Channel 24)	2470

2.2 Exercising the EUT

The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. The EUT was provided with software to continuously transmit during testing. The carrier was also checked to verify that information was being transmitted. There were no deviations from the test standard(s) and/or methods. The test results reported relate only to the item tested.

2.3 Test Result Summary

Table 2-2: Test Result Summary – FCC Part 15, Subpart C (Section 15.247), IC RSS-210/RSS-Gen

FCC Reference	IC Reference	Test	Pass/Fail or N/A
15.247(b)(2)	RSS-210 §A8.4(4)	Peak Output Power	Pass
15.247(d)	RSS-210 §A8.5	Antenna Conducted Spurious Emissions	Pass
15.247(e)	RSS-210 §A8.2(b)	Power Spectral Density	Pass
15.247(d)	RSS-Gen §7.2.2	Band Edge	Pass
15.247(a)(2)	RSS-210 §A8.2(a)	6 dB Bandwidth	Pass
15.207	RSS-Gen	Conducted AC Emissions	Pass
15.209	RSS-210 §A8.5; RSS-Gen	Radiated Emissions	Pass

2.4 Test System Details

The test samples were received on October 2, 2014. The FCC identifiers for all applicable equipment, plus descriptions of all cables used in the tested system, are identified in the following tables.

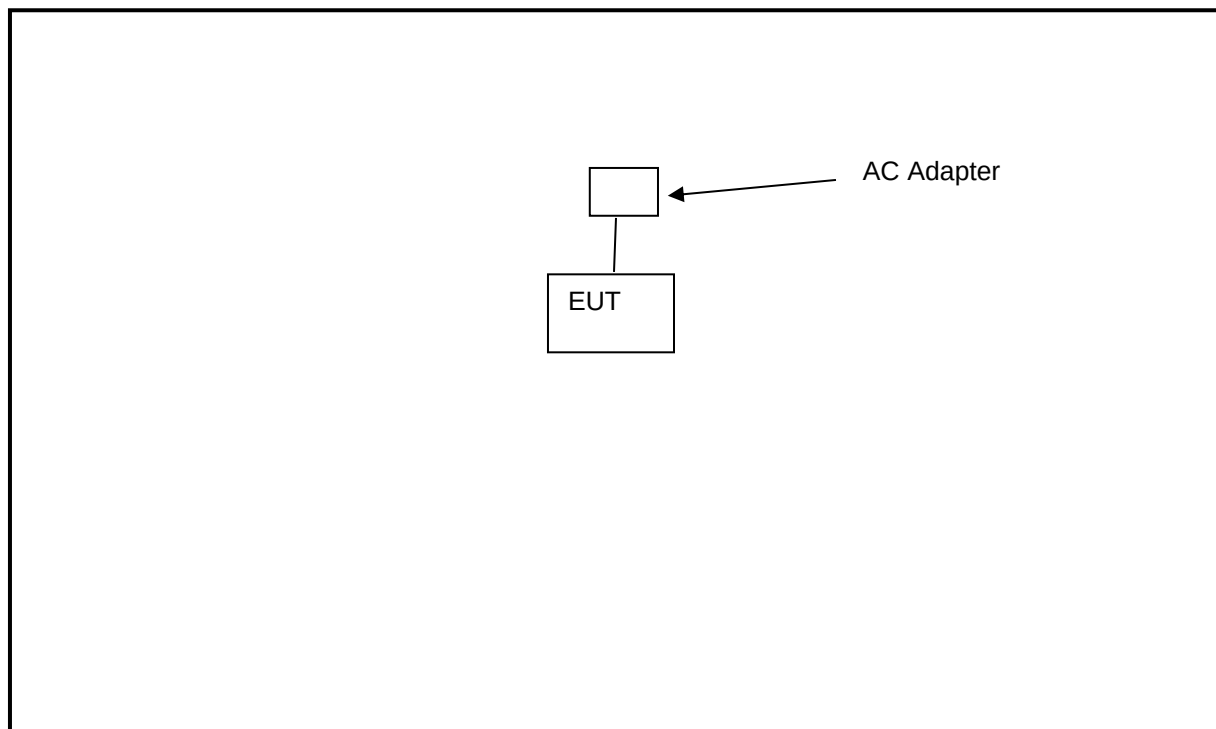
Table 2-3: Equipment Under Test

Part	Manufacturer	Model #	Serial Number	FCC ID	RTL Bar Code
RF Hub*	SmartThings, Inc.	PGC422-C	N/A	R3Y-STH-ETH011	21176
PCB**	SmartThings, Inc.	PGC422-C	N/A	R3Y-STH-ETH011	21177
5V AC Adapter	Phihong	PSM03A-050	N/A	N/A	21179
5V AC Adapter	Phihong	PSM03A-050	N/A	N/A	21180

* used for radiated tests

** used for conducted tests

Figure 2-1: Configuration of Tested System



3 Peak Output Power – FCC §15.247(b)(2); IC RSS-210 §A8.4(4)

3.1 Power Output Test Procedure

A conducted power measurement of the EUT was taken using a Rohde & Schwarz Analyzer.

Procedure: C63.10-2009 6.10

Table 3-1: Power Output Test Equipment

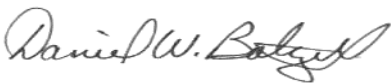
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	11/13/14
901523	MA/Com	2082-6174-20 DC-4GHz	Attenuator, 2W 20dB	N/A	9/5/15

3.2 Power Output Test Data

Table 3-2: Power Output Test Data

Frequency (MHz)	Peak Conducted High Power (dBm)
2405	20.1
2440	20.3
2470	20.2

Test Personnel:

Daniel W. Baltzell		October 9, 2014
EMC Test Engineer	Signature	Date of Test

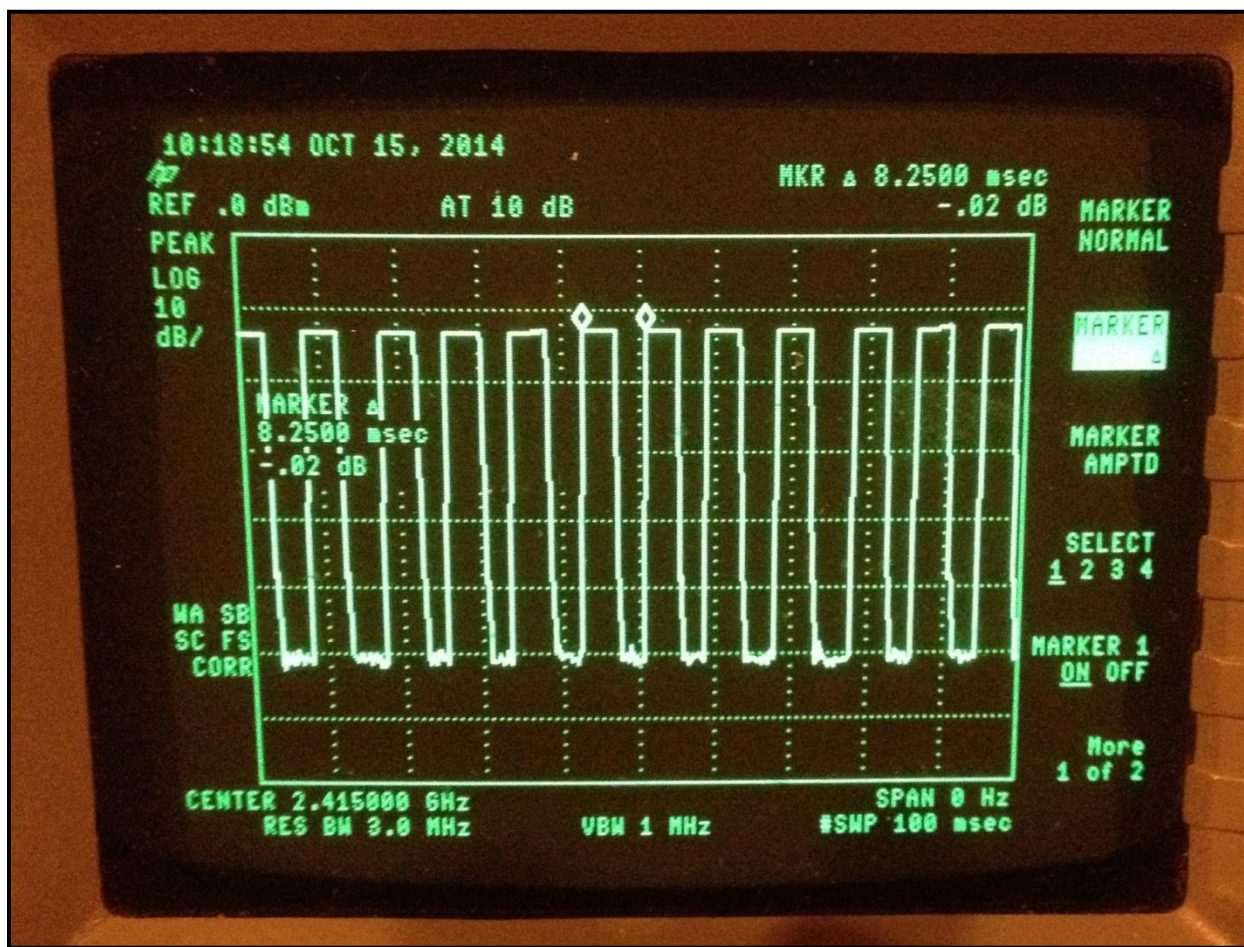
4 Duty Cycle Correction – FCC §15.35(c)

The theoretical worst-case duty cycle for the 802.15.4 system is 66% (-3.6 dB), and in the practical system the duty cycle is demonstrably lower as shown in the following plots. Though the plots below show a lower duty cycle, -3.6 dB was used for the calculated average emissions in section 10.3 as it gives the worst-case values.

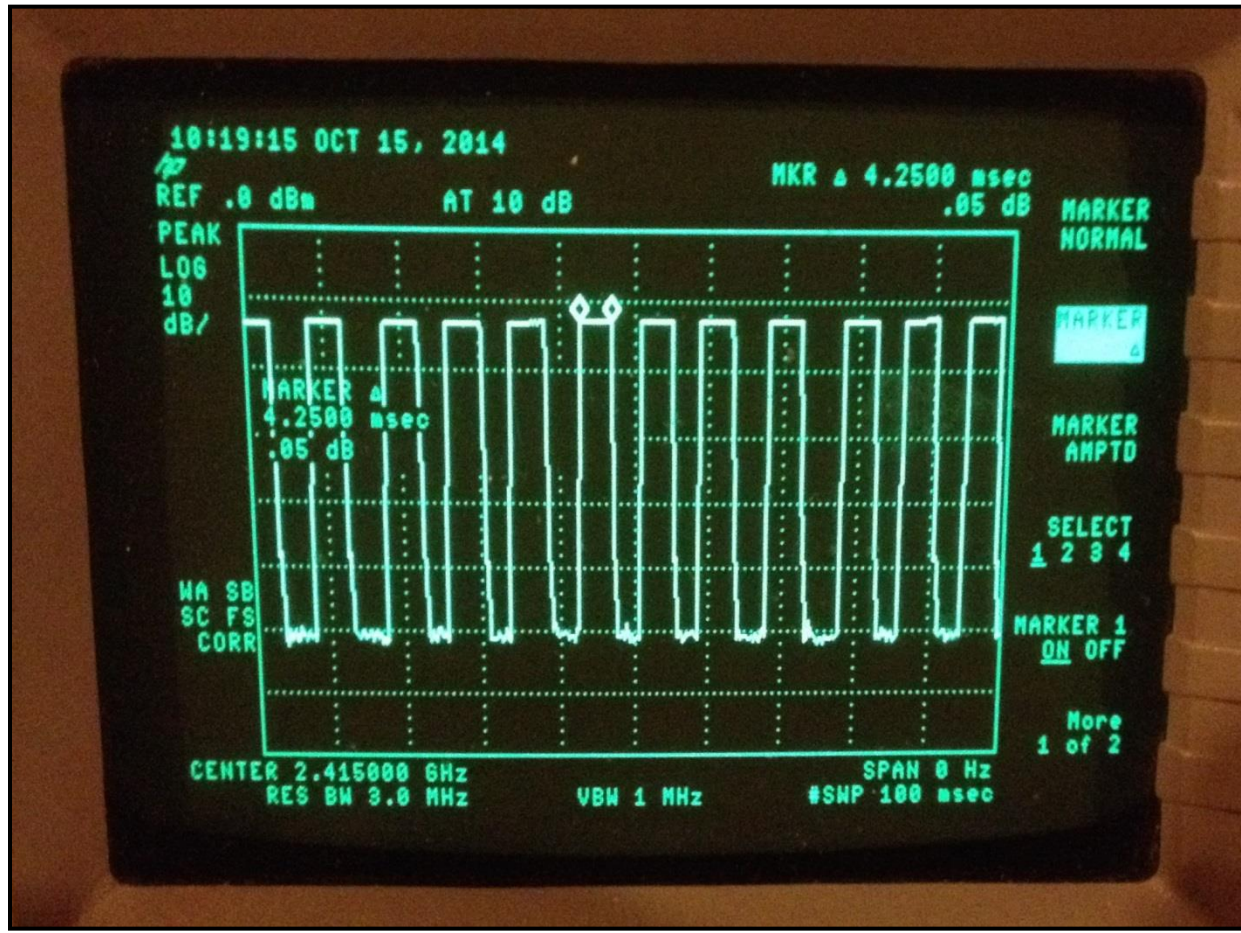
The following plots are for justification for the 66% duty cycle correction factor. This represents the maximum possible practical throughput of the system.

The following two plots show a transmission which occupies about 4.25 ms in a 8.25 ms period, or 51.5% duty cycle.

Plot 4-1: Transmit on/off Time (51.5% Duty Cycle)

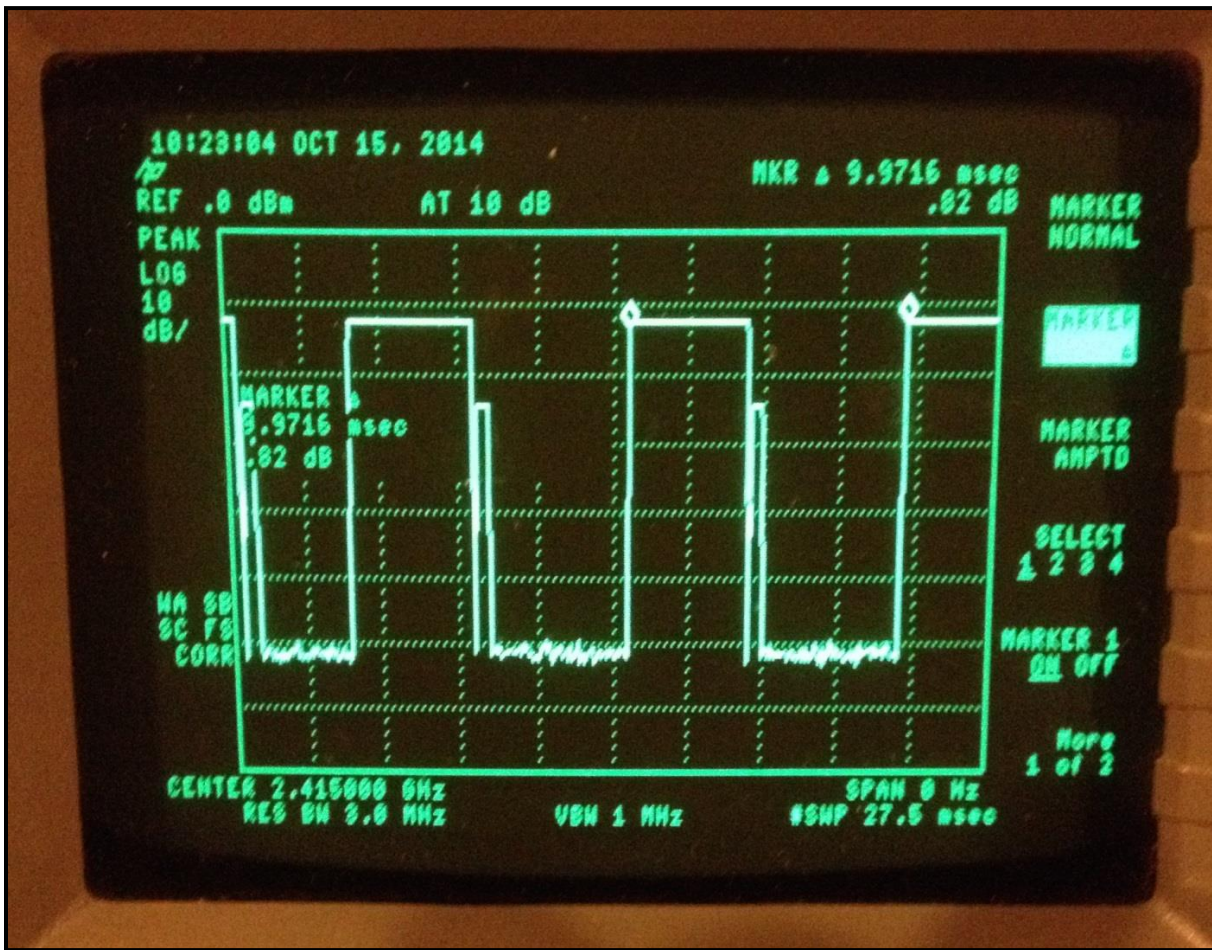


Plot 4-2: Pulse Width (51.5% Duty Cycle)

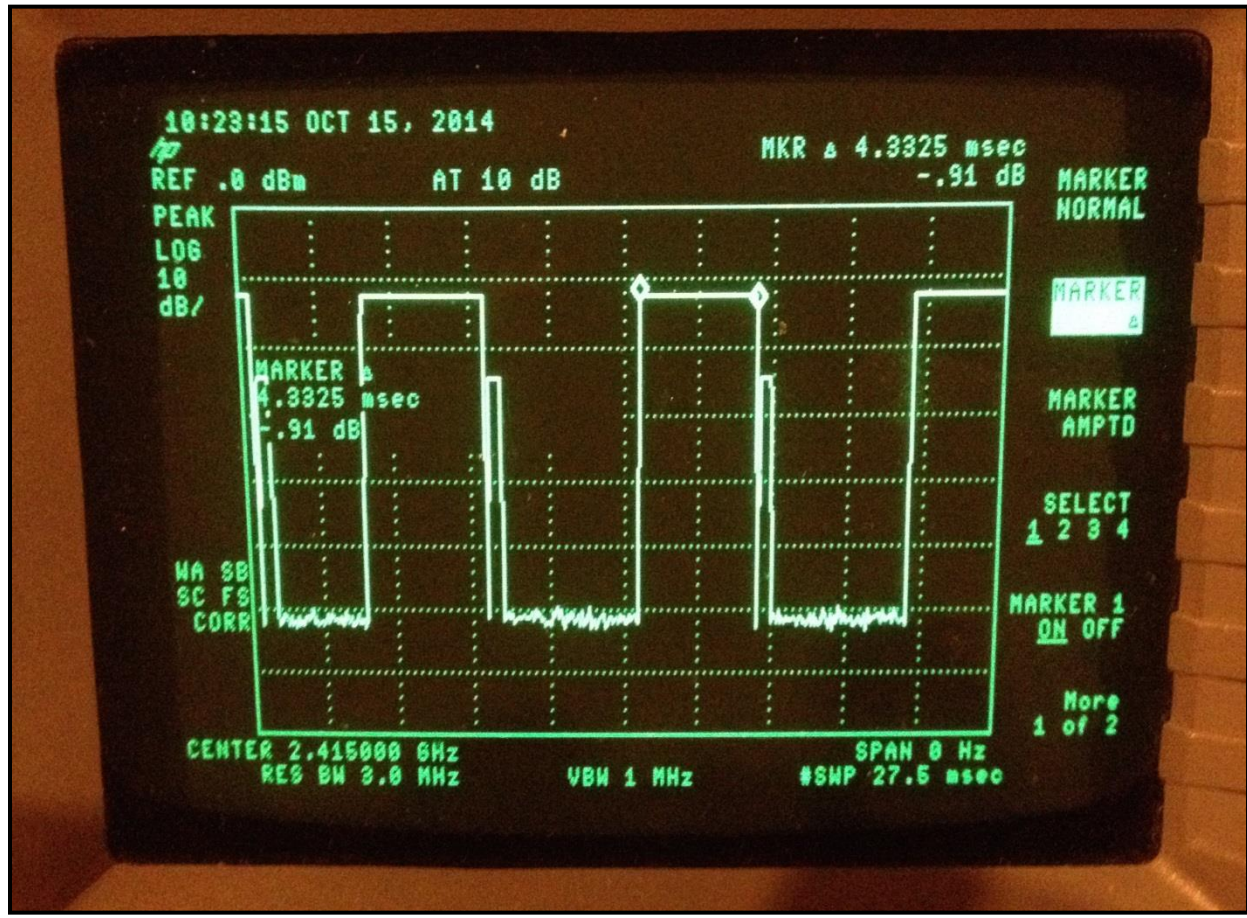


The following two images taken at 27.5 ms sweep time show a more detailed view. The period is 9.9716 ms and the transmit time is 4.3325 ms, or 43.4%. After the main 4.3325 ms transmission there is a much shorter and lower power transmission, representing the receiver's acknowledgment (farther from the analyzer's antenna than the transmitter).

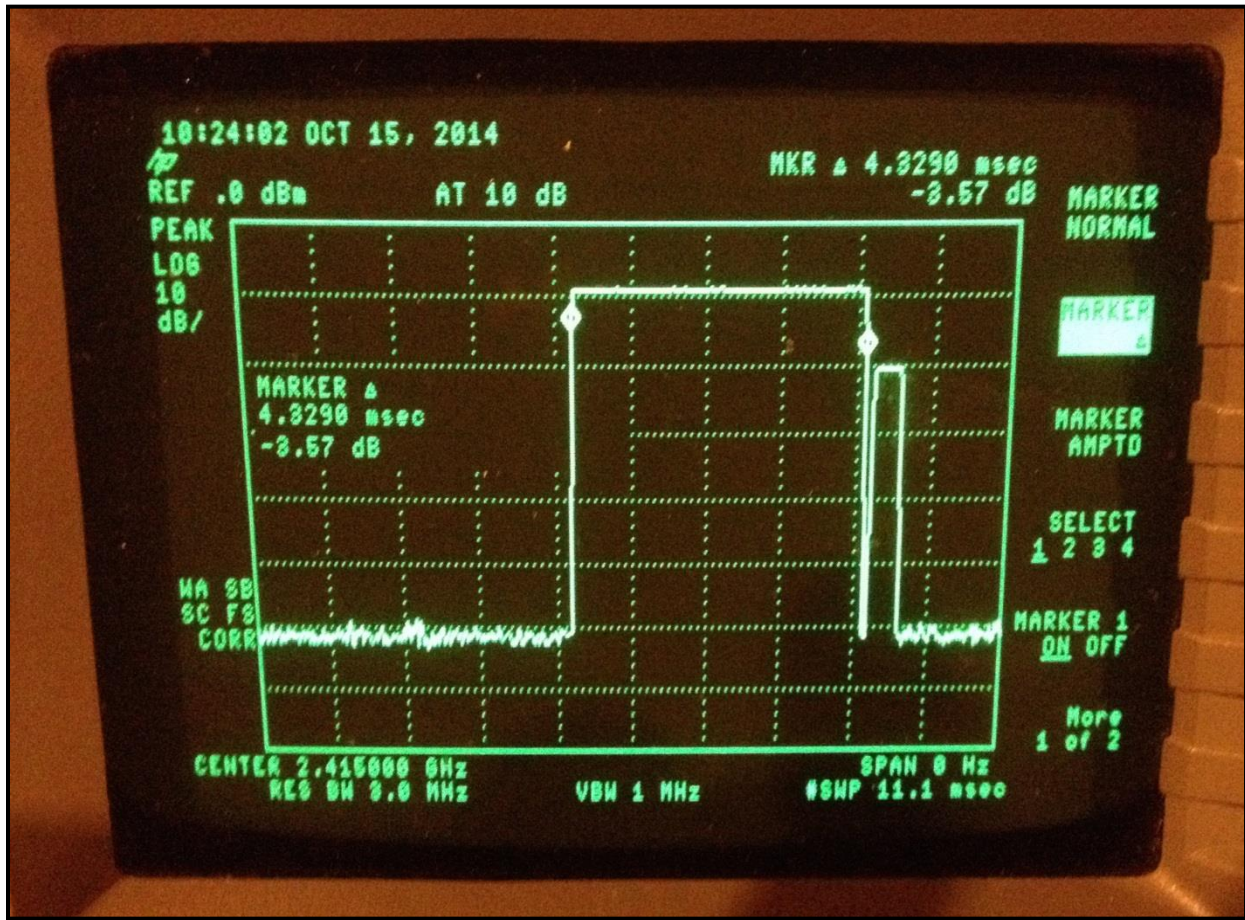
Plot 4-3: Transmit on/off Time (43.4% Duty Cycle)



Plot 4-4: Pulse Width (43.4% Duty Cycle)



Plot 4-5: Detail of Single Transmission



The above plot taken at 11.1 ms sweep time shows the most detailed view of a single transmission with a 4.329 ms transmission, a brief pause, and then the receiver's acknowledgment is shown distinctly.

5 Antenna Conducted Spurious Emissions – FCC §15.247(d); IC RSS-210 §A8.5

5.1 Antenna Conducted Spurious Emissions Test Procedures

Procedure: C63.10-2009 6.7

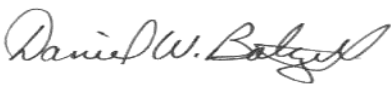
Antenna spurious emissions per FCC 15.247(d) were measured from the EUT antenna port using a 50-ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 100 kHz. The modulated carrier was identified at the following frequencies: 2405.0 MHz, 2440 MHz and 2470 MHz. The carrier to the 10th harmonic of the carrier frequency was investigated.

Table 5-1: Antenna Conducted Spurious Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	11/13/14
901523	MA/Com	2082-6174-20 DC-4GHz	Attenuator, 2W 20dB	N/A	9/5/15

No harmonics or spurs were found within 20 dB of the limit from the carrier to the 10th harmonic of the carrier frequency (note that we are reporting power as peak). Per FCC 15.31(o), no data is being reported.

Test Personnel:

Daniel W. Baltzell		October 7, 2014
EMC Test Engineer	Signature	Date of Test

6 Power Spectral Density – FCC §15.247(e); IC RSS-210 §A8.2(b)

6.1 Power Spectral Density Test Procedure

The power spectral density per FCC 15.247(e) was measured using a 50-ohm spectrum analyzer with the resolution bandwidth set at 3 kHz, the video bandwidth set at equal to or greater than 10 times the RBW, and the sweep time set at 500 seconds. The spectral lines were resolved for the modulated carriers at 2405 MHz, 2440 MHz, and 2470 MHz respectively. These levels are below the +8 dBm limit. See the power spectral density table and plots.

Table 6-1: Power Spectral Density Test Equipment

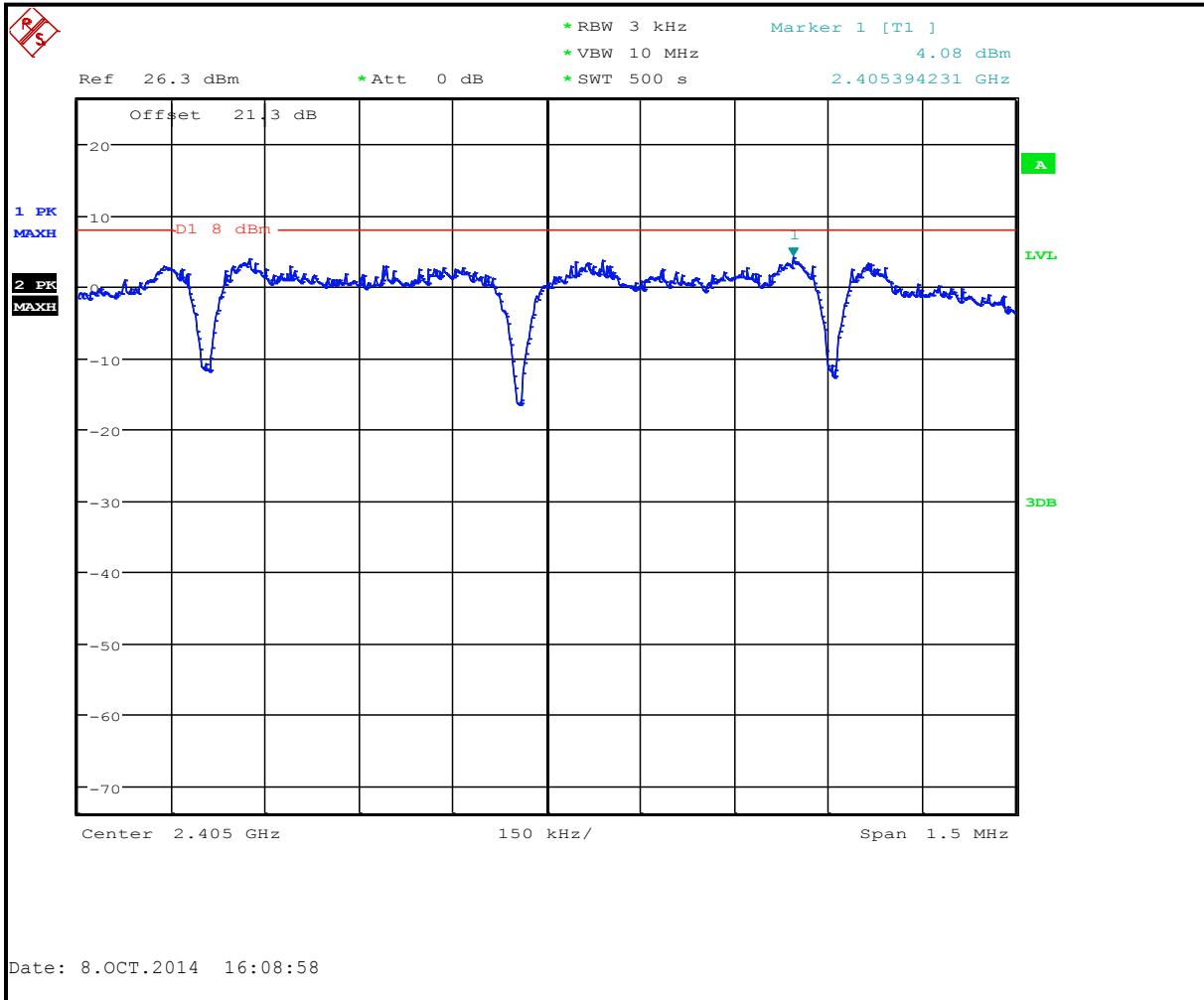
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	11/13/14
901523	M/A-Com	2082-6174-20 DC-4GHz	Attenuator, 2W 20dB	N/A	9/5/15

6.2 Power Spectral Density Test Data

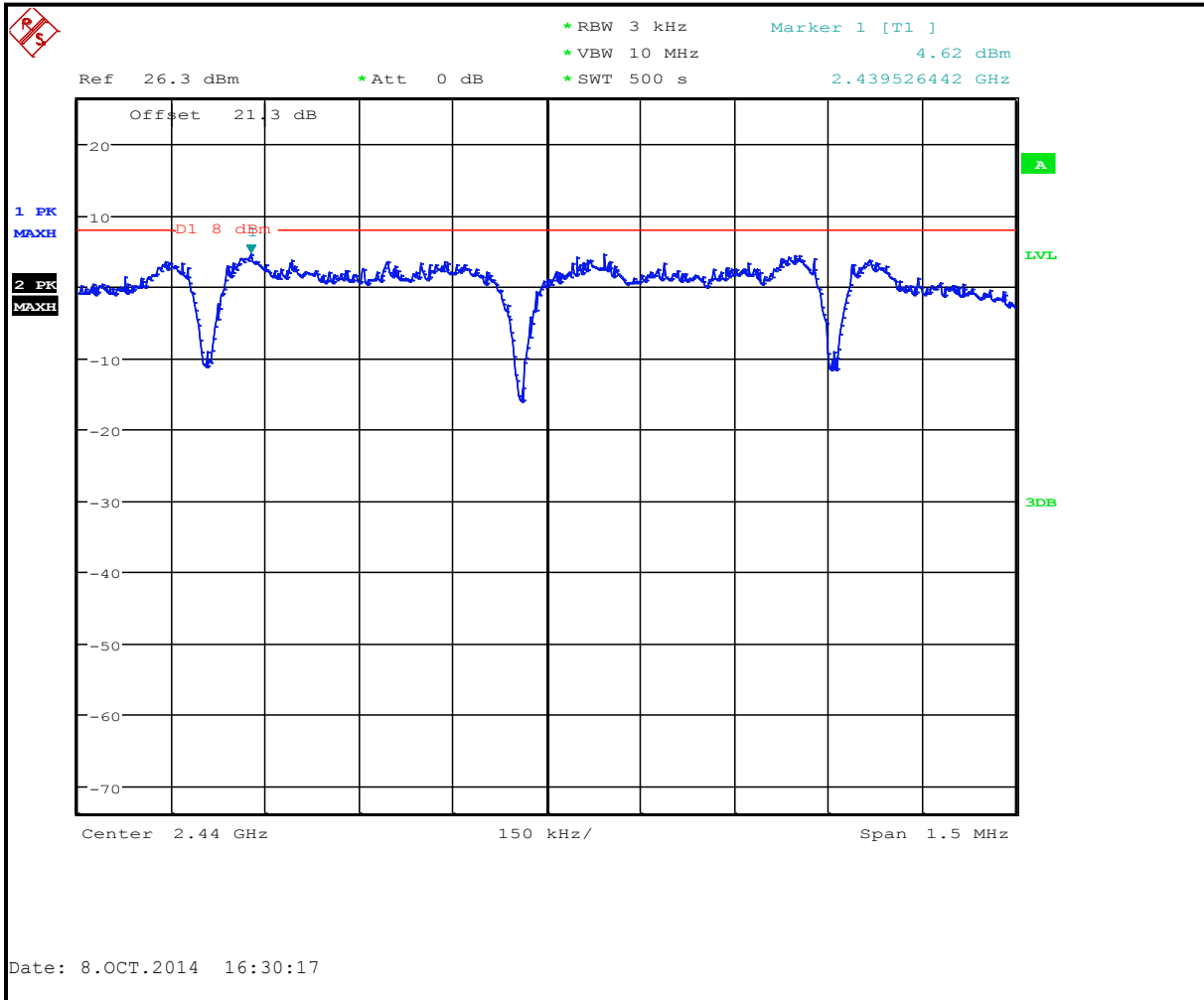
Table 6-2: Power Spectral Density Test Data

Channel	Frequency (MHz)	RF Power Level (dBm)	Maximum Limit +8dBm	Pass/Fail
11	2405	4.1	8	Pass
18	2440	4.6	8	Pass
24	2470	3.7	8	Pass

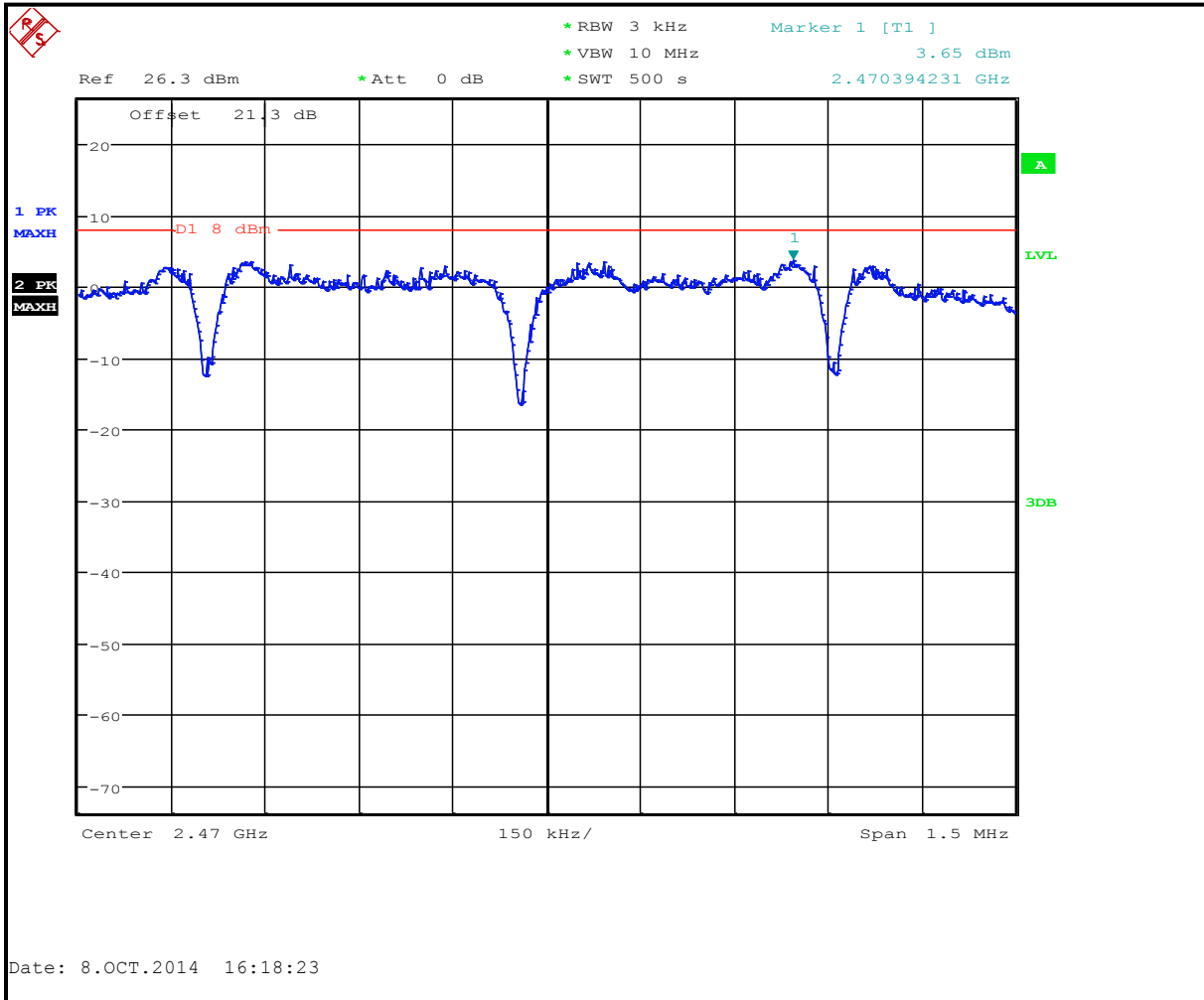
Plot 6-1: Power Spectral Density - 2405 MHz



Plot 6-2: Power Spectral Density - 2440 MHz



Plot 6-3: Power Spectral Density - 2470 MHz



Test Personnel:

Daniel W. Baltzell
EMC Test Engineer

Daniel W. Baltzell

Signature

October 8, 2014
Date of Test

7 Compliance with the Band Edge – FCC §15.247(d); IC RSS-Gen §7.2.2

7.1 Band Edge Test Procedure

The transmitter output was connected to its appropriate antenna. Peak (1 MHz RBW/3 MHz VBW) and average (1 MHz RBW/10 Hz VBW) corrected radiated measurements were taken within the restricted band to show compliance.

Table 7-1: Band Edge Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900878	Rhein Tech Laboratories, Inc.	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901592	Insulated Wire Inc.	KPS-1503-3600-KPR	SMK RF Cables 20'	NA	9/3/15
901242	Rhein Tech Laboratories, Inc.	WRT-000-0003	Wood rotating table	N/A	Not Required
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	4/20/15
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	11/13/14
901523	M/A-Com	2082-6174-20 DC-4GHz	Attenuator, 2W 20dB	N/A	9/5/15

7.2 Restricted Band Edge Test Results

7.2.1 Lower Band Edge

111.7 dBuV/m is the average field strength measurement, from which the delta measurement of 60.9 dB is subtracted (reference plots), resulting in a level 50.8 dBuV/m. This level has a margin of 3.2 dB below the limit of 54 dBuV/m.

Calculation: $111.7 \text{ dBuV/m} - 60.9 \text{ dB} - 54 \text{ dBuV/m} = -3.2 \text{ dB}$

Peak Field Strength of Lower Band Edge (1 MHz RBW/3 MHz VBW) = 114.1 dBuV/m

Average Field Strength of Lower Band Edge (1 MHz RBW/10 Hz VBW) = 111.7 dBuV/m

Delta measurement = 60.9 dB

Plot 7-1: In Band Emissions - Channel 11 (2405 MHz)



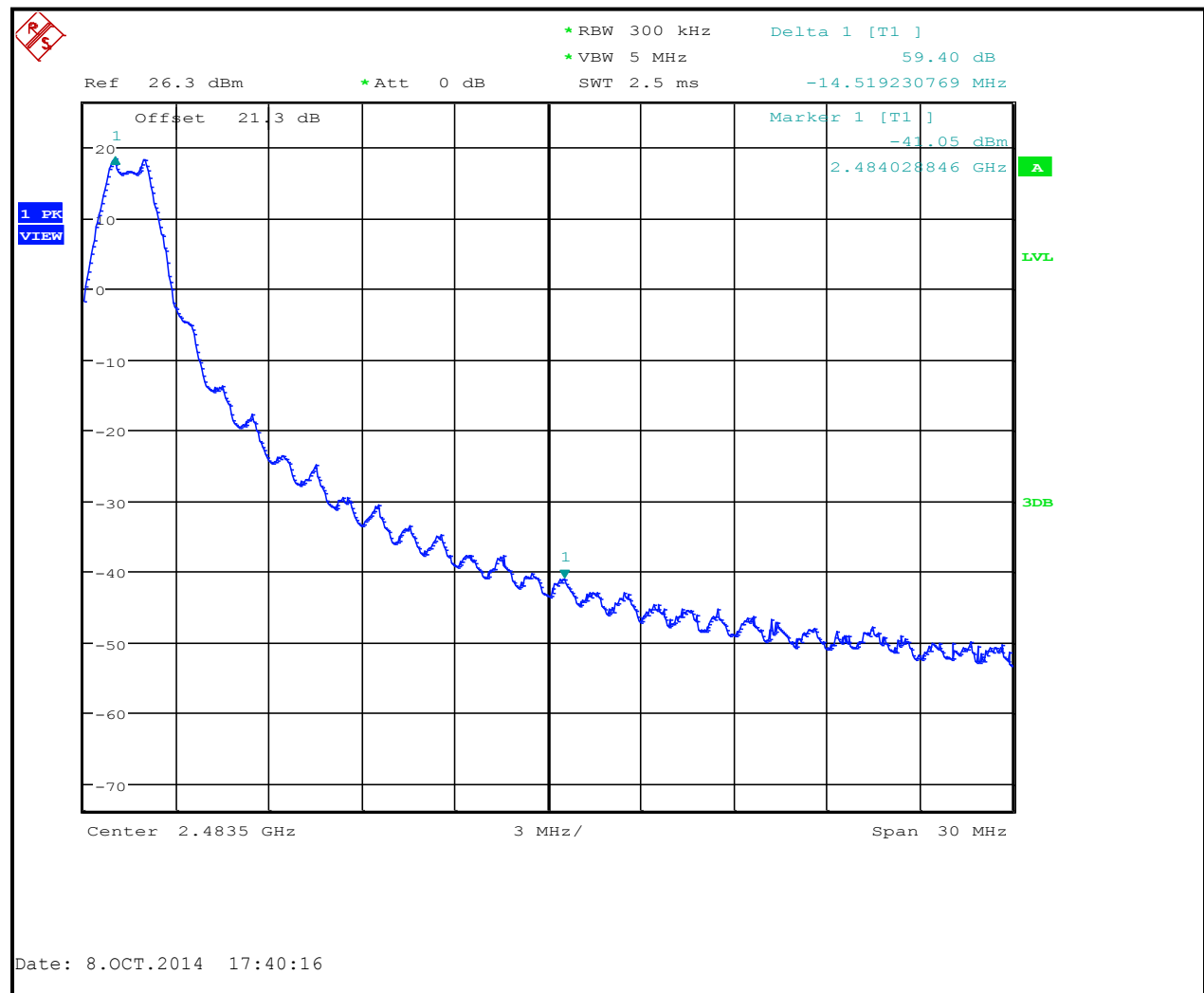
7.2.2 Upper Band Edge

111.9 dBuV/m is the average field strength measurement, from which the delta measurement of 59.4 dB is subtracted (reference plots), resulting in a level 52.5 dBuV/m. This level has a margin of 1.5 dB below the limit of 54 dBuV/m.

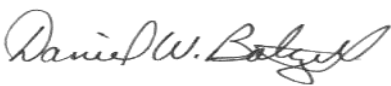
Calculation: $111.9 \text{ dBuV/m} - 59.4 \text{ dB} - 54 \text{ dBuV/m} = -1.5 \text{ dB}$

Peak Field Strength of Upper Band Edge (1 MHz RBW/1 MHz VBW) = 114.4 dBuV/m
 Average Field Strength of Upper Band Edge (1 MHz RBW/10 Hz VBW) = 111.9 dBuV/m
 Delta measurement = 59.4 dB

Plot 7-2: In Band Emissions - Channel 24 (2470 MHz)



Test Personnel:

Daniel W. Baltzell		October 8, 2014
EMC Test Engineer	Signature	Date of Test

8 6 dB Bandwidth – FCC §15.247(a)(2); IC RSS-210 §A8.2(a)

8.1 6 db Bandwidth Test Procedure – Minimum 6 dB Bandwidth

The minimum 6 dB bandwidths per FCC 15.247(a)(2) were measured using a 50-ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 1 MHz. The device was modulated. The minimum 6 dB bandwidths are presented below.

Table 8-1: 6 dB Bandwidth Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	11/13/14
901523	M/A-Com	2082-6174-20 DC-4GHz	Attenuator, 2W 20dB	N/A	9/5/15

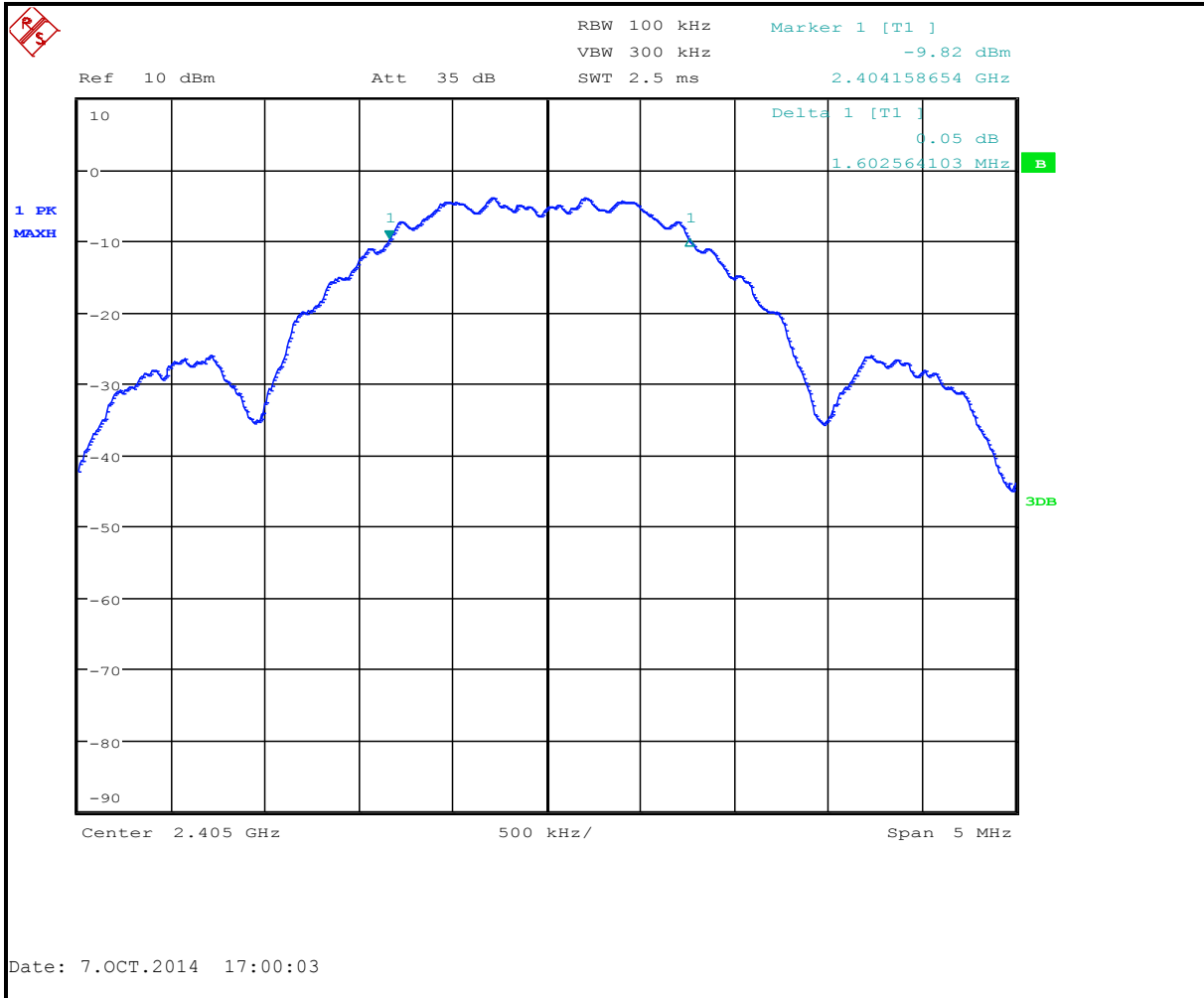
8.2 6 dB Modulated Bandwidth Test Data

Table 8-2: 6 dB Modulated Bandwidth Test Data

Frequency (MHz)	6 dB Bandwidth (MHz)
2405	1.603
2440	1.619
2470	1.619

8.3 6 dB Bandwidth Plots

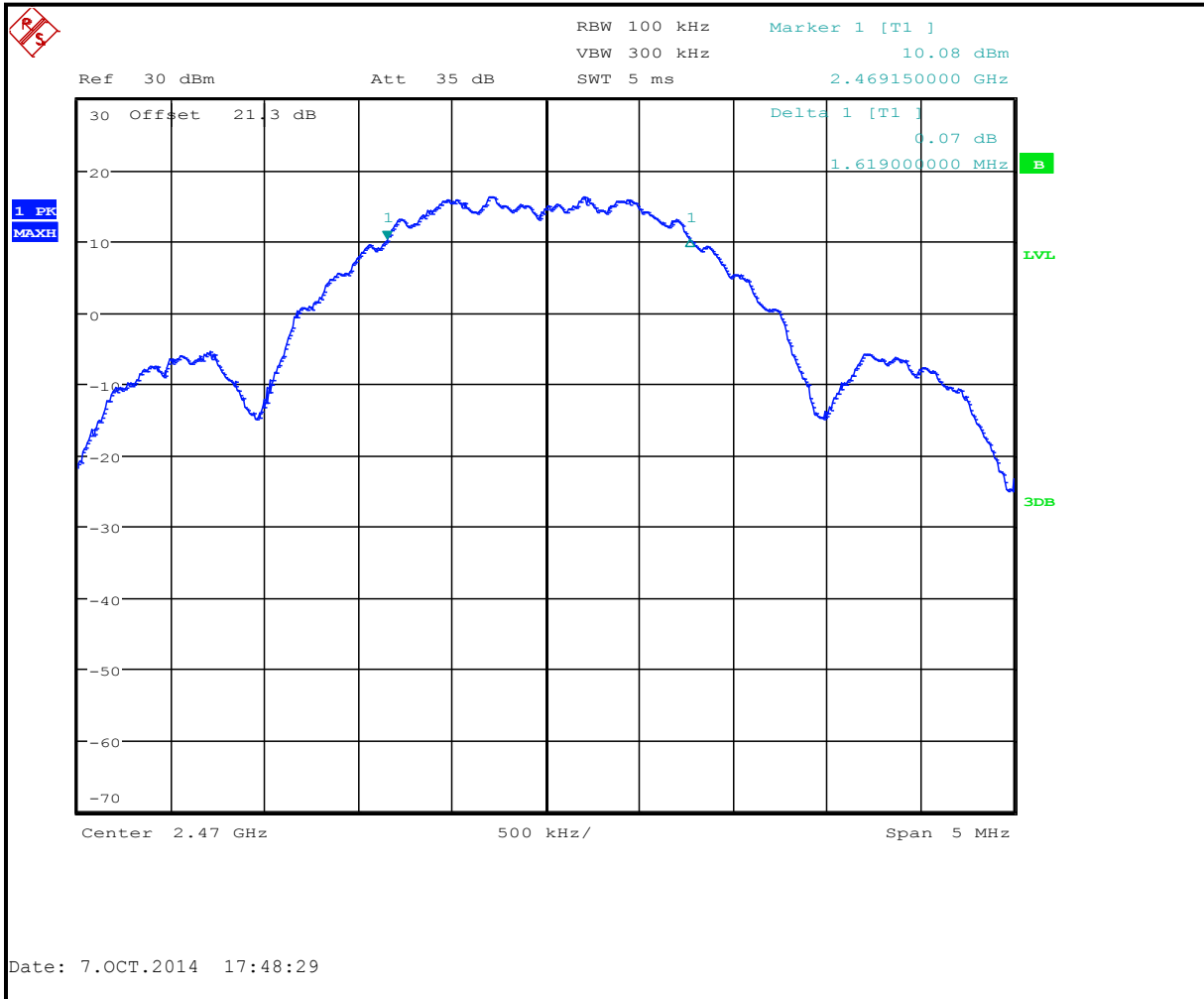
Plot 8-1: 6 dB Bandwidth - 2405 MHz



Plot 8-2: 6 dB Bandwidth - 2440 MHz



Plot 8-3: 6 dB Bandwidth - 2470 MHz



Test Personnel:

Daniel W. Baltzell
 EMC Test Engineer

Daniel W. Baltzell

Signature

October 7, 2014
 Date of Test

9 Conducted AC Emissions Measurement Limits – FCC §15.207; IC RSS-Gen

9.1 Limits of Conducted Emissions Measurement

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

9.2 Conducted Emissions Measurement Test Procedure

Procedure: C63.10-2009 6.2

The power line conducted emission measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50-ohm / 50 micro Henry Line Impedance Stabilization Network (EUT LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

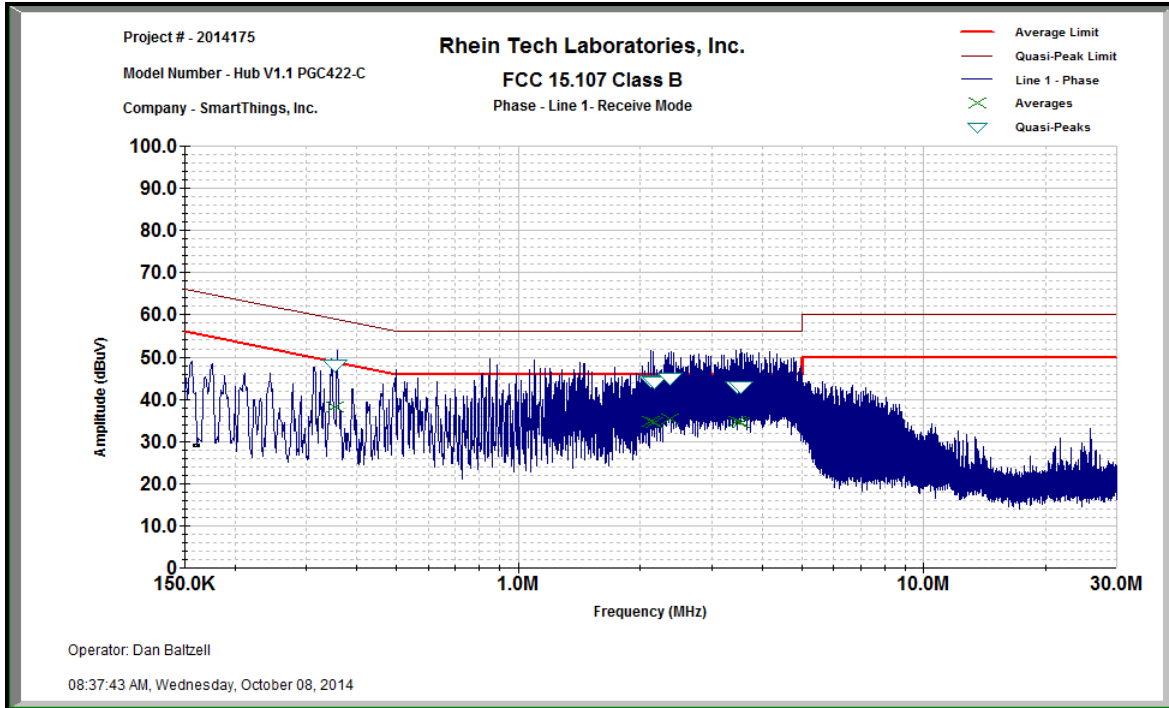
The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. No video filter less than 10 times the resolution bandwidth was used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from 150 kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in this report.

Table 9-1: Conducted Emissions Test Equipment

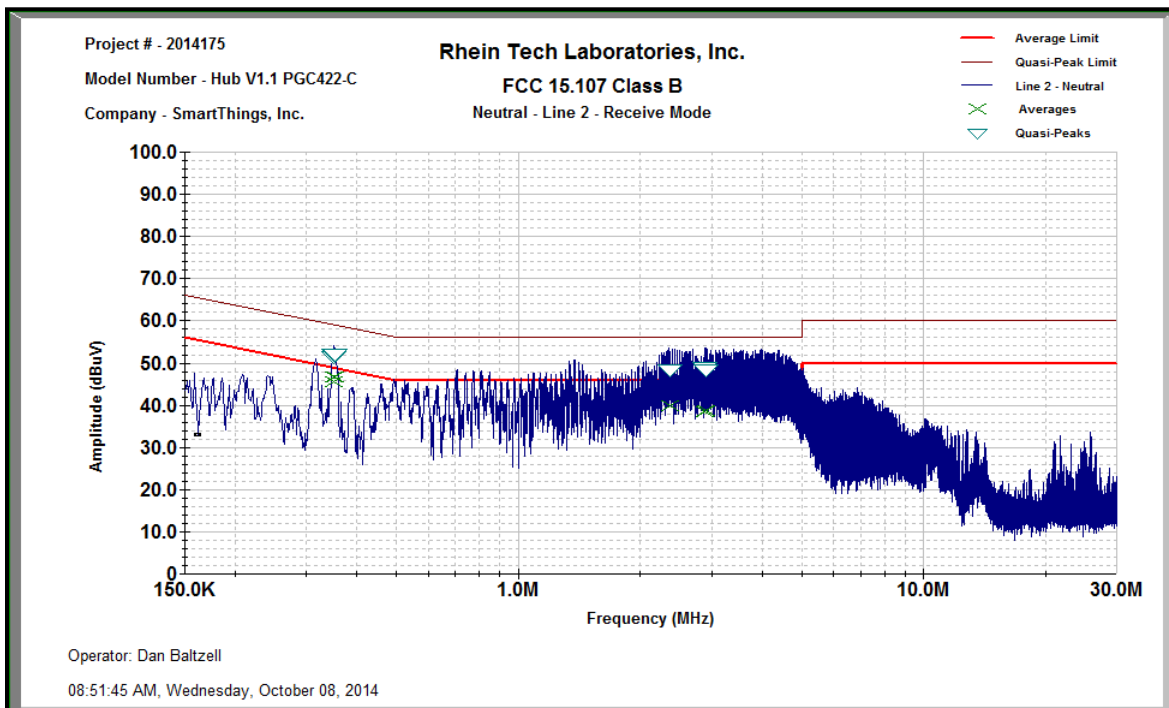
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	11/13/14
901083	AFJ International	LS16	16A LISN (110 V)	16010020080	8/27/15

9.3 Conducted Line Emissions Test Data

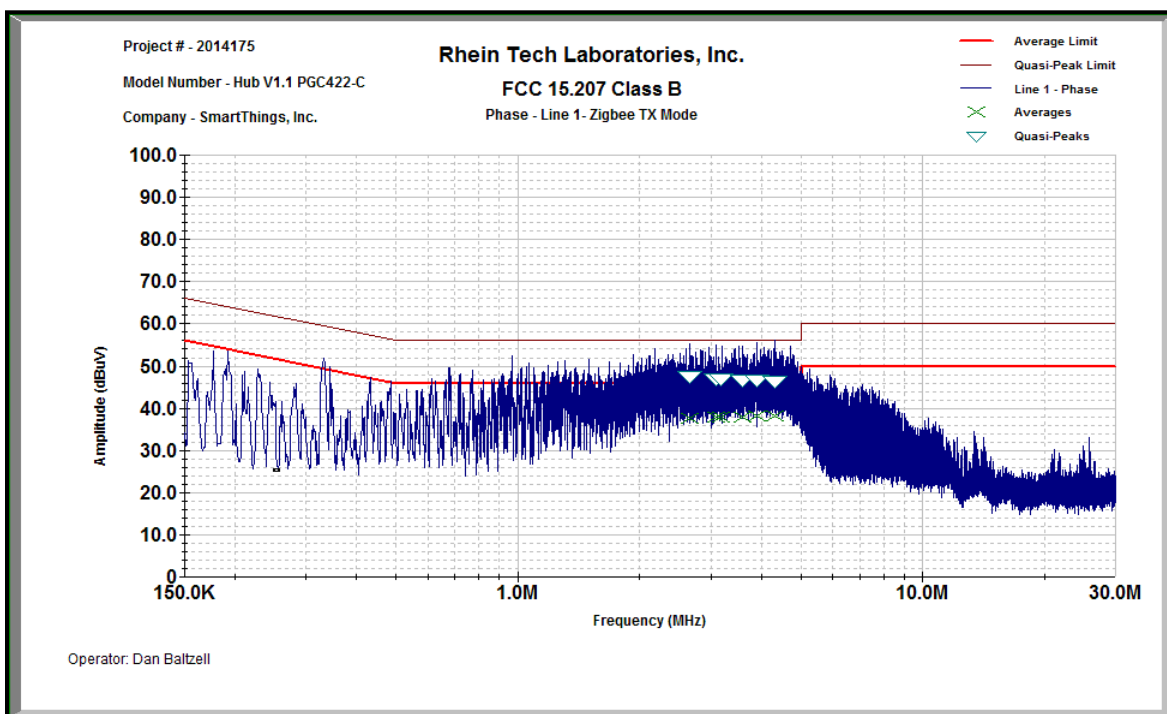
Plot 9-1: Conducted Emissions Test Data – Line - RX Mode



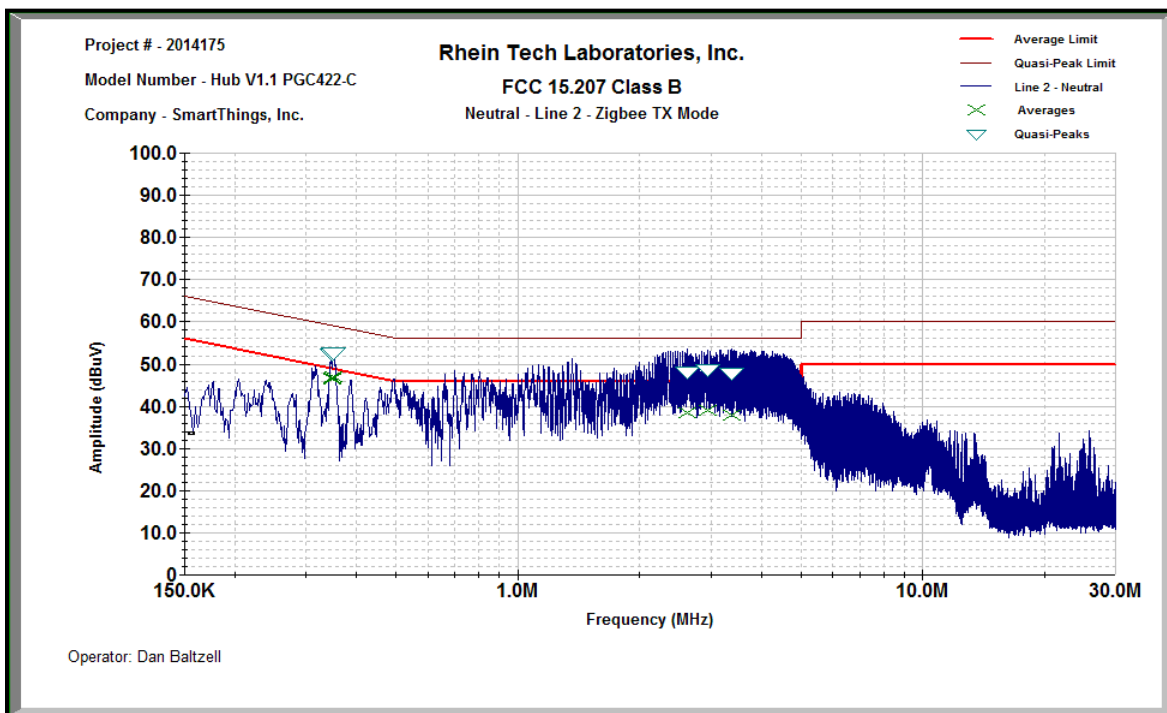
Plot 9-2: Conducted Emissions Test Data – Neutral – RX Mode



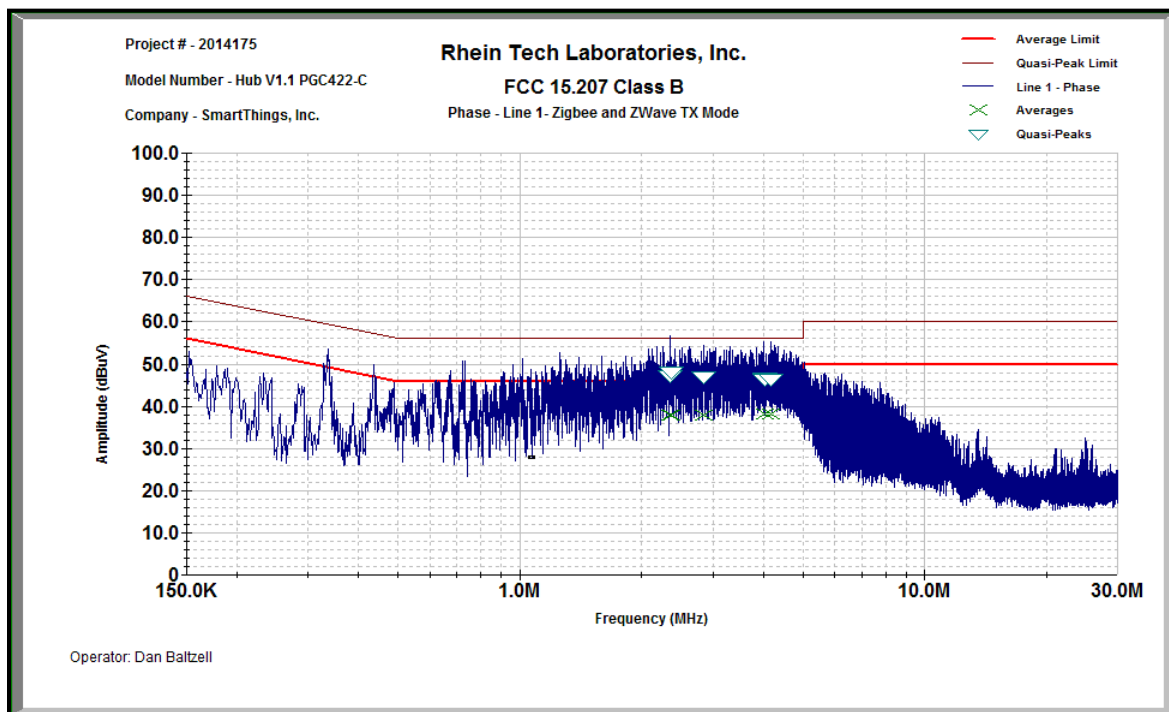
Plot 9-3: Conducted Emissions Test Data – Line – Zigbee TX Mode



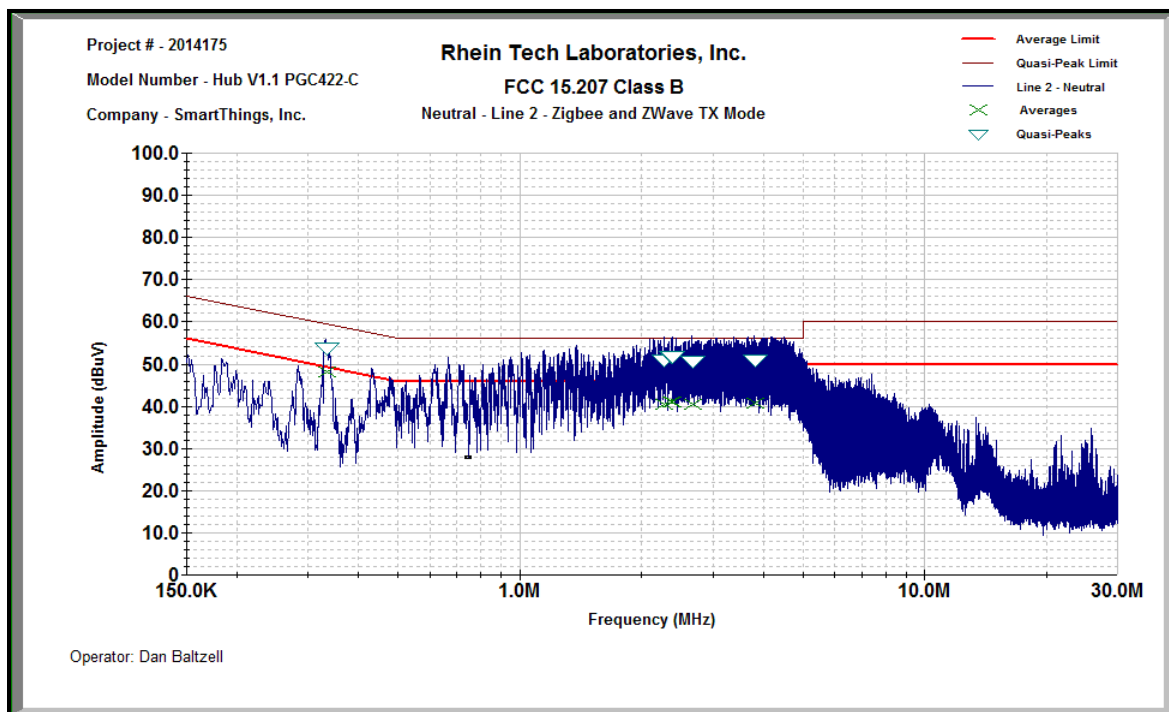
Plot 9-4: Conducted Emissions Test Data – Neutral – Zigbee TX Mode



Plot 9-5: Conducted Emissions Test Data – Line – Zigbee and ZWave TX Mode



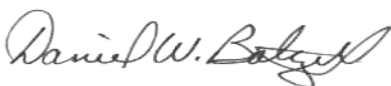
Plot 9-6: Conducted Emissions Test Data – Neutral – Zigbee and ZWave TX Mode



Rhein Tech Laboratories, Inc.
360 Herndon Parkway
Suite 1400
Herndon, VA 20170
<http://www.rheintech.com>

Client: SmartThings, Inc.
Model #: PGC422-C
IDs: R3Y-STH-ETH011/10734A-STHETH011
Standard: FCC 15.247/IC RSS-210
Report #: 2014175

Test Personnel:

Daniel W. Baltzell		October 8, 2014
EMC Test Engineer	Signature	Date of Test

10 Radiated Emissions – FCC §15.209; IC RSS-210 §A8.5; RSS-Gen

10.1 Limits of Radiated Emissions Measurement

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009-0.490	2400/f (kHz)	300
0.490-1.705	2400/f (kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

As shown in 15.35(b), for frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any circumstances of modulation.

10.2 Radiated Emissions Measurement Test Procedure

Procedure: C63.10-2009 6.5, 6.6

Before final measurements of radiated emissions were made on the open-field three/ten meter range, the EUT was scanned indoors at one and three meter distances. This was done in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to ensure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three/ten-meter, open-field test site. The EUT was placed on a nonconductive turntable 0.8 meters above the ground plane. The spectrum was examined from 9 kHz to the 10th harmonic of the highest fundamental transmitter frequency (24.8 GHz).

At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the emission's maximum level. Measurements were taken using both horizontal and vertical antenna polarizations. For frequencies between 30 and 1000 MHz, the spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. For emissions above 1,000 MHz, emissions are measured using the average detector function with a minimum resolution bandwidth of 1 MHz. No video filter less than 10 times the resolution bandwidth was used. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

Table 10-1: Radiated Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	9/5/15
900878	Rhein Tech Laboratories, Inc.	AM3-1197-0005	3 meter antenna mast, polarizing	OATS1	N/A
901592	Insulated Wire Inc.	KPS-1503-3600-KPR	SMK RF Cables 20'	NA	9/3/15
901593	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36"	NA	9/3/15
901242	Rhein Tech Laboratories, Inc.	WRT-000-0003	Wood rotating table	N/A	N/A
900724	Antenna Research Associates, Inc.	LPB-2520	BiLog Antenna (25 – 1000 MHz)	1037	4/19/15
901218	EMCO	3160-09	Horn Antenna (18 - 26.5 GHz)	960281-003	4/20/15
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	4/20/15
900321	EMCO	3161-03	Horn Antennas (4 – 8.2 GHz)	9508-1020	4/20/15
900323	EMCO	3160-07	Horn Antennas (8.2 – 12.4 GHz)	9605-1054	4/20/15
900356	EMCO	3160-08	Horn Antennas (12.4 – 18 GHz)	9607-1044	4/20/15
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	11/13/14
900724	Antenna Research Associates, Inc.	LPB-2520	BiLog Antenna (25 – 1000 MHz)	1037	4/19/15
901629	Teledyne Cougar	A4C2123	Amplifier	003-003	9/5/15

10.3 Radiated Emissions Test Results

10.3.1 Radiated Emissions Harmonics/Spurious

Table 10-2: 2405 MHz; Channel 11; Average Mode

Frequency (MHz)	Spectrum Analyzer Average Level (1 MHz RBW/10 Hz VBW) (dBuV)	Site Correction Factor (dB/m)	Corrected Average Level (with duty cycle correction -3.6 dB) (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4810.0	49.5	-1.1	44.8	54.0	-9.2
12025.0	31.8	12.0	40.2	54.0	-13.8
19240.0	24.6	23.7	44.7	54.0	-9.3

Table 10-3: 2440 MHz; Channel 18; Average Mode

Frequency (MHz)	Spectrum Analyzer Average Level (1 MHz RBW/10 Hz VBW) (dBuV)	Site Correction Factor (dB/m)	Corrected Average Level (with duty cycle correction -3.6 dB) (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4880.0	47.5	-1.0	42.9	54.0	-11.1
7320.0	52.0	0.9	49.3	54.0	-4.7
12200.0	32.2	12.1	40.7	54.0	-13.3
19520.0	23.6	23.9	43.9	54.0	-10.1

Table 10-4: 2470 MHz; Channel 24; Average Mode

Frequency (MHz)	Spectrum Analyzer Average Level (1 MHz RBW/10 Hz VBW) (dBuV)	Site Correction Factor (dB/m)	Corrected Average Level (with duty cycle correction -3.6 dB) (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4940.0	49.7	-1.0	45.1	54.0	-8.9
7410.0	51.9	1.0	49.3	54.0	-4.7
12350.0	35.4	12.1	43.9	54.0	-10.1
19760.0	23.7	24.1	44.2	54.0	-9.8
22230.0	20.0	26.8	43.2	54.0	-10.8

Table 10-5: 2405 MHz; Channel 11; Peak Mode

Frequency (MHz)	Spectrum Analyzer Peak Level (1 MHz RBW/3 MHz VBW) (dBuV)	Site Correction Factor (dB/m)	Corrected Peak Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4810.0	58.5	-1.1	57.4	74.0	-16.6
12025.0	46.3	12.0	58.3	74.0	-15.7
19240.0	37.0	23.7	60.7	74.0	-13.3

Table 10-6: 2440 MHz; Channel 18; Peak Mode

Frequency (MHz)	Spectrum Analyzer Peak Level (1 MHz RBW/3 MHz VBW) (dBuV)	Site Correction Factor (dB/m)	Corrected Peak Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4880.0	57.1	-1.0	56.1	74.0	-17.9
7320.0	63.4	0.9	64.3	74.0	-9.7
12200.0	45.6	12.1	57.7	74.0	-16.3
19520.0	36.0	23.9	59.9	74.0	-14.1

Table 10-7: 2470 MHz; Channel 24; Peak Mode

Frequency (MHz)	Spectrum Analyzer Peak Level (1 MHz RBW/3 MHz VBW) (dBuV)	Site Correction Factor (dB/m)	Corrected Peak Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4940.0	58.4	-1.0	57.4	74.0	-16.6
7410.0	63.5	1.0	64.5	74.0	-9.5
12350.0	48.0	12.1	60.1	74.0	-14.0
19760.0	36.0	24.1	60.1	74.0	-13.9
22230.0	34.3	26.8	61.1	74.0	-12.9

Table 10-8: Unintentional Radiated Emissions

Frequency (MHz)	Spectrum Analyzer Quasi-peak Level (dBuV)	Site Correction Factor (dB/m)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
32.0	38.0	-24.4	13.6	40.0	-26.4
50.0	38.3	-32.8	5.5	40.0	-34.5
72.0	38.7	-31.6	7.1	40.0	-32.9
96.0	30.4	-30.3	0.1	43.5	-43.4
100.0	33.2	-30.1	3.1	43.5	-40.4
120.0	37.1	-30.4	6.7	43.5	-36.8
144.0	37.5	-30.8	6.7	43.5	-36.8
150.0	37.9	-30.9	7.0	43.5	-36.5

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Note: radiated emissions were investigated with the module collocated and transmitting simultaneously with the following modularly approved device: FCC ID: D87-ZM5304-U.

No non-compliant emissions were found; per FCC guidance, no data is being reported.

Test Personnel:

Daniel W. Baltzell		October 8-9, 2014
EMC Test Engineer	Signature	Dates of Test

11 Conclusion

The data in this measurement report shows that the SmartThings, Inc. Model PGC422-C, FCC ID: R3Y-STH-ETH011, IC: 10734A-STHETH011, complies with the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations, and IC RSS-210 and RSS-Gen.