

Electromagnetic Compatibility
INTENTIONAL RADIATOR
TEST REPORT
IC RSS-210; FCC 47 CFR Part 15/C 15.247

Report Reference No.: E10494-1401 Rev 2.0
Date of issue: July 08, 2014
Total number of pages.....: 27

Testing Laboratory: Quality Auditing Institute
Address.....: 16 – 211 Schoolhouse Street, Coquitlam, BC, V3K 4X9, Canada

Accreditations (ISO 17025):



Standard Council of Canada: Accredited Laboratory No. 743

International Accreditation Service Inc: Accredited Laboratory: No. TL-239

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Applicant's name: Axxess Industries Inc.
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Contact.....: Joerg Wagner, jwagner@axxind.com
Phone.....: (250)469-9375 Fax: (250) 491-4715

Test Standard.....: RSS-210 Issue 8, FCC 47 CFR Part15 Subpart C 15.247

Test item description.....: Zigbee Wireless Module (for use in Axxess products)

Model.....: HPZM2

Trade Mark



Manufacturer.....: Axxess Industries Inc.

Registrations: : FCC ID: WP4HPZM2
IC: 9709A-HPZM2



HPZM2 Module

Revision History

Date	Report Number	Rev #	Details	Authors Initials
May 07, 2014	E10494-1401	0.0	Draft Test Report	DJ
June 02, 2014	E10494-1401	1.0	Release version with client requested changes	DJ
July 08, 2014	E10494-1401	2.0	Revised version additional setup photos and equipment list	DJ
<p><i>Note: All previous versions of this report have been superseded by the latest dated revision as listed in the above table. Please dispose of all previous electronic and paper printed revisions accordingly.</i></p>				

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Statement of Compliance

The following tests demonstrate testimony for the FCC & IC Marks for Transceivers / electromagnetic compatibility testing for this EUT as required by FCC Part 15 Section 15.247 and IC RSS-210 Appendix8.

Test / Requirement Description	Applicable FCC Rule Parts	Applicable Industry Canada Rule Parts	Results		Pass / Fail
			Limit	Measured	
Antenna Requirement	15.203	RSS-Gen (7.1.2)	Approved Antenna	PCB Antenna	Pass
Maximum Peak Conducted Output Power Level	15.247 (b)(3)	RSS-210 A8.4(4)	Max Peak: 1W Max Peak EIRP 4W	18.7dBm 74mW	Pass
Emission Bandwidth (EBW)	15.247(a)(2);	RSS-210 A8.2(a)	Min. 500kHz	1.59MHz	Pass
RF Exposure Compliance	15.247 (b)(5)	RSS-Gen (5.6) and RSS-102 (2.5)	Exempt if greater than 20cm and less than 5 W	Exempt SAR and RF Exposure	Pass
Spurious Emissions at antenna terminals	15.247 (d)	RSS-210 A8.5	Min 20dBc	46dBc	Pass
Spurious Emissions Radiated Field Strength	15.247 (d) 15.205 (c)	RSS-210 A8.5 RSS-Gen	Min 20dBc and 54dBuV	2.0dB Margin	Pass
Maximum Power Spectral Density Level in Fundamental Emission	15.247 (e)	RSS-210 A8.2(b)	8dBm	3.35dBm	
Frequency Stability	15.215 (c)	RSS-Gen	+/- 5.0ppm	+/-0.01ppm	Pass
Duty Cycle Correction	15.247(a)(1) (iii)	RSS-Gen.		20dB	Pass

Tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with CFR 47 FCC Part 15 and Industry Canada RSS-210. The manufacturer is responsible for the tested product configuration, continued product compliance with these standards listed, and for the appropriate auditing of subsequent products as required.

X

Tested By & Report Written By David Johanson,
RF/EMC Test Engineer

X

Reviewed By Amandeep Jathaul
RF/EMC Test Engineer

Testing Location and Procedures

Testing Laboratory:	Quality Auditing Institute
Testing location/ address	16 – 211 Schoolhouse Street, Coquitlam, BC, 3K 4X9, Canada
Associated Laboratory:	Quality Auditing Institute (Remote location)
Testing location/ address	19473 Fraser Way, Pitt Meadows, BC, V3Y 2V4, Canada
FCC Test Site Registration Number (OATS 10m and SAC-3m):	226383
Industry Canada Site Registration Number (SAC-3m).....	9543B-1
Industry Canada Test Site Registration Number (OATS-10m)...	9543C-1
Tested by	David Johanson
Reviewed by.....	Aman Jathaul
Sample Information:	
Product Name.....	HPZM module
Part Number.....	
Company:.....	Axxess Industries
Received Date:.....	14Feb2014
Received By.....	Aman Jathaul
Sample Log.....	QAI Product Control Log (QM 1301 - Sample Inventory)
Environmental Conditions:	
Indoor:	Temperature: 22°C R.H.: 40.0%

Measurement Uncertainty	
Radio Frequency	$\pm 1,5 \times 10^{-5}$ MHz
Total RF power, conducted.....	± 1 dB
RF power density, conducted.....	± 2.75 dB
Spurious emissions, conducted.....	± 3 dB
All emissions, radiated.....	± 3.5 dB
Temperature.....	$\pm 1^\circ\text{C}$
Humidity.....	± 5 %
DC and low frequency voltages.....	± 3 %

Test Bench Equipment List

Manufacturer	Model	Description	Serial No.	Last Cal	Cal Due Date
Tektronix	TDS754C	Oscilloscope	B012403	10-Oct-2013	10-Oct-2016
HP	8648C	Signal Generator	3623A03622	30-Oct-2012	30-Oct-2015
Boonton	4200-S/17	RF MicroWattmeter	430519 BG	13-Mar-2013	13-Mar-2016
Boonton	51033-6E	Power Sensor 100kHz-18GHz +33dBm	15779	18-Mar-2013	18-Mar-2016
Rohde & Schwarz	ESCI	EMI Receiver	1000123	29-Mar-2012	29-Mar-2015

Semi-Anechoic Chamber Equipment List

Manufacturer	Model	Description	Serial No.	Last Cal	Cal Due Date
ETS Lindgren	2165	Turntable	00043677	N/A	N/A
ETS Lindgren	2125	Mast	00077487	N/A	N/A
Rohde & Schwarz	ESU40	EMI Receiver	100011	26-June-2012	26-Jun-2015
FCC	FCC-LISN-50-25-2	LISN	9927	30-Nov-2012	30-Nov-2015
EMCO	6502	60cm Active Loop Antenna 9kHz to 30MHz	2178	14-Jun-2013	10-Jun-2015
Sunol Sciences	JB3	Biconilog Antenna 30MHz – 3GHz	A042004	31-Oct-2012	31-Oct-2015
AILTECH/Eaton	94455-1	Biconical Antenna 20-200MHz	0931	14-Jun-2013	14-Jun-2016
EMCO	93146	Log Periodical Antenna 200-1000MHz	9811-5136	14-Jun-2013	10-Jun-2016
COM-POWER	AHA-118	Dual Ridge Horn Antenna 1-18GHz	711040	14-Jun-2013	14-Jun-2016
EMCO	3160-09	Pyramidal Horn Antenna 18-26GHz	9701-1071	30-Aug-2013	30-Aug-2016
EMCO	3160-10	Pyramidal Horn Antenna 26-40GHz	9708-1055	30-Aug-2013	30-Aug-2016
ETS Lindgren	S201	3 meter Semi-Anechoic Chamber	1030	N/A	N/A

Product Description

Introduction:

The HPZM2 is a ZigBee wireless communications module employed primarily in a number of Axxess Industries Inc.'s sensor and control devices supplied to the hospitality and residential controls and automation market. It plugs onto the application PCB, which varies with each application.

The HPZM2 is a ZigBee compliant wireless communications module employed primarily in a number of Axxess Industries Inc.'s sensor and control devices supplied to the hospitality and residential controls and automation market. It plugs onto the application PCB, which varies with each application.

The HPZM2 requires +3.3VDC to operate, which it receives from a regulated power supply on the application board.

The HPZM2 is internally regulated to 1.8VDC

The HPZM2 mounts on to 2 12-pin 2x6 1.27mm pitch male headers.

EUT Test Configuration:

The HPZM2 (EUT) was provided preprogrammed with custom firmware for EMC compliance testing. It was provided with 2 modules. One module was with a semi-rigid cable for the conducted emissions measurements and the other was in it's normal configuration using the on-board PCB antenna for the radiated emissions. Both modules were tested using the Axxess Industries Zigbee Repeater PCB to provide the programming and Power supply interface.

The EUT was programmed using a combination of button presses to set the frequency and turn on the appropriate feature of the radio transmitter.

The EUT was verified in various orientations for the radiated emissions to find the worst case orientation. All radiated emissions were done with the EUT in the vertical orientation.

Equipment Under Test Information

Manufacturer	Axxess Industries Ltd.
Product Name	Zigbee Radio Module
Model Name	HPZM2
Serial No.	PROTO-001 (Radiated) and PROTO-002 (conducted)

Zigbee Repeater PCB

Manufacturer	Axxess Industries Ltd.
Product Name	Zigbee Repeater Module

AC-DC Power Adapter with USB Cable and Clamp-on Ferrite

Manufacturer	SHENZHEN SHENGJI MAINS CO LTD
Product Name	Switching power supply 3.6Vdc
Model	SJ-0302-U
Input	AC100-240V, 50/60Hz, 0.1A
Output	DC 3.6V 200mA

Controller Cabling Configuration

Description	Number of Lines	Connection Type	Load or Termination	Shielded	Ferrites
DC Power Cord from -AC Power	2	2.5mm barrel DC plug	No	No	No

Test Results

Antenna Requirements

DATE: March 19, 2014

TEST STANDARD: FCC 15.203; IC RSS-Gen (7.1.2)

APPLICABLE REGULATIONS : - "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. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited." ... "the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded."

RESULT : This unit meets this requirement. The antenna is a permanent PCB trace antenna pattern.

Maximum Peak Conducted Output Power Level

DATE(s): March 19, 2014

TEST STANDARD: FCC Part 15.247 (b)(3); IC RSS-210 (A8.2(a))

TEST PROCEDURE: ANSI c63.10

TEST VOLTAGE: 120Vac 60Hz AC to DC Power Adapter

MINIMUM STANDARD: 1 Watt (30dBm)

TEST SETUP: The EUT was programmed for maximum output. The antenna port of EUT was directly connected to an RF Power Meter through a 10dB Attenuator.

MEASUREMENT METHOD: As called by the standards above.

DEVICE DESCRIPTIONS: As described in the above EUT description and set up section.

EMISSIONS DATA:

Frequency (GHz)	Measured (dBm)
2.405692	17.2
2.440674	18.1
2.479723	18.7

OBSERVATIONS: The EUT performed as expected.

PERFORMANCE: Complies.

Occupied Bandwidth

DATE(s): March 31, 2014

TEST STANDARD: FCC Part 15.247(a)(2) RSS-210 (A8.2(a))

TEST VOLTAGE: 120Vac 60Hz

MINIMUM STANDARD: the 6dB bandwidth must be greater than 500kHz

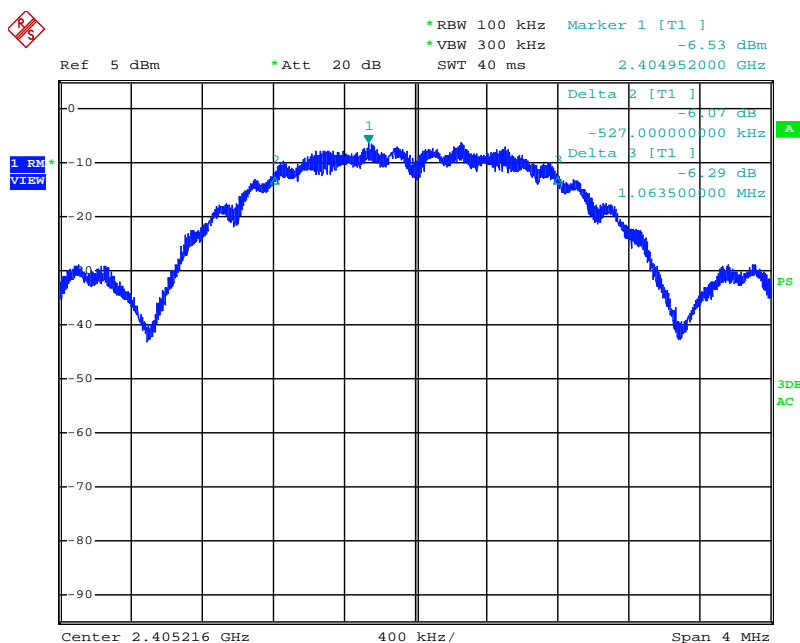
TEST SETUP: The antenna port of EUT was directly connected to a Spectrum Analyzer through a 30dB Attenuator.

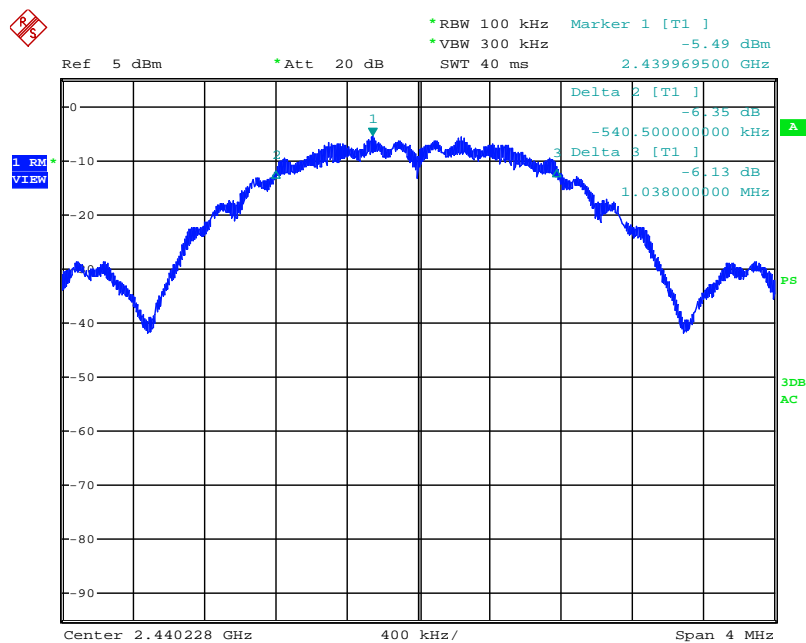
MEASUREMENT METHOD: As called by the standards above.

DEVICE DESCRIPTIONS: As described in the above EUT description and set up section.

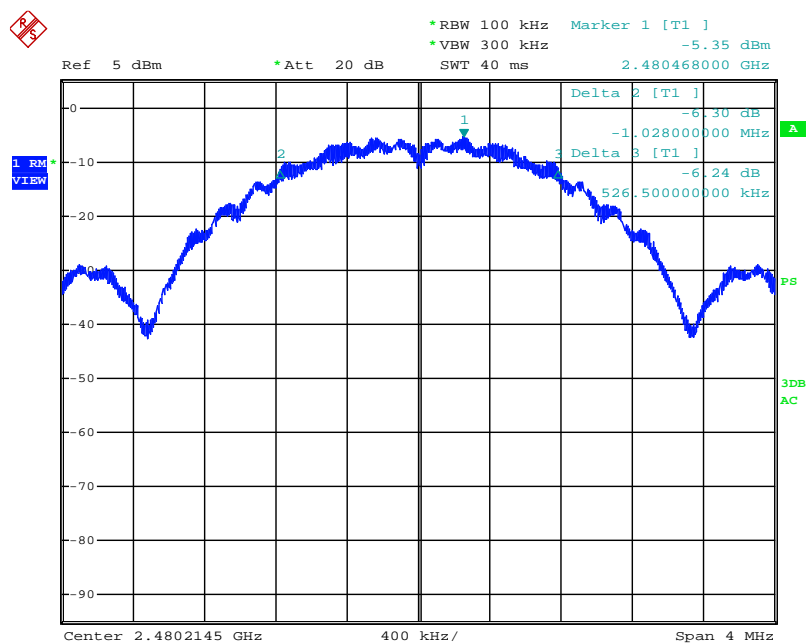
EMISSIONS DATA:

Frequency (GHz)	Measured 6dB (MHz)	Measured 99% (MHz)
2.405692	1.590	2.46
2.440674	1.578	2.40
2.479723	1.554	2.38

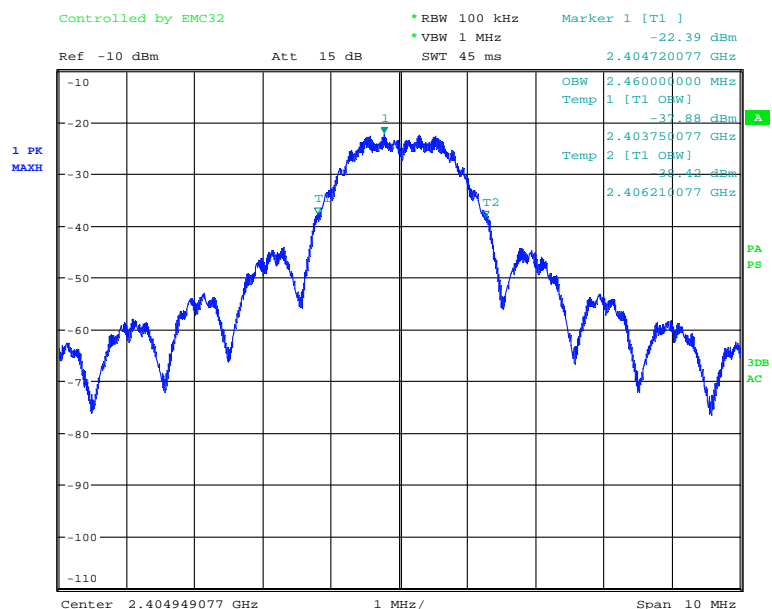




Date: 31.MAR.2014 10:23:56

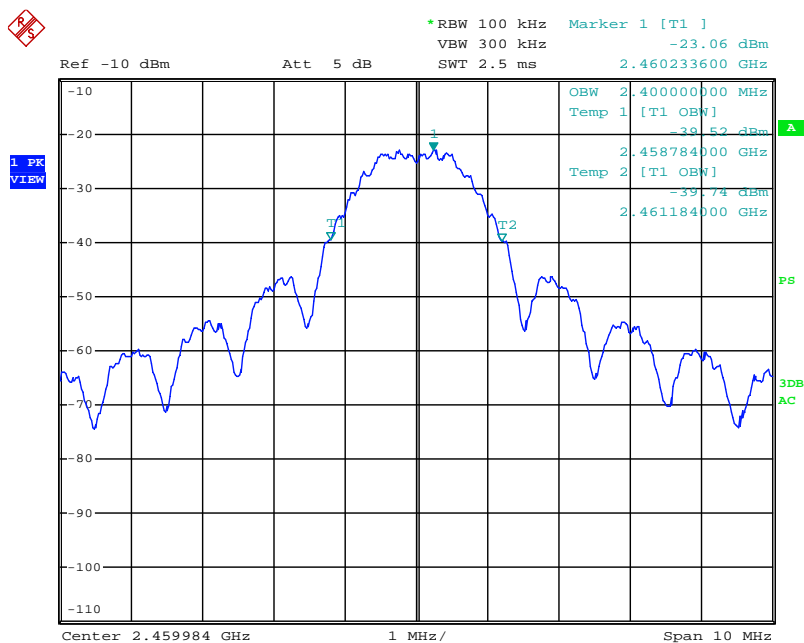


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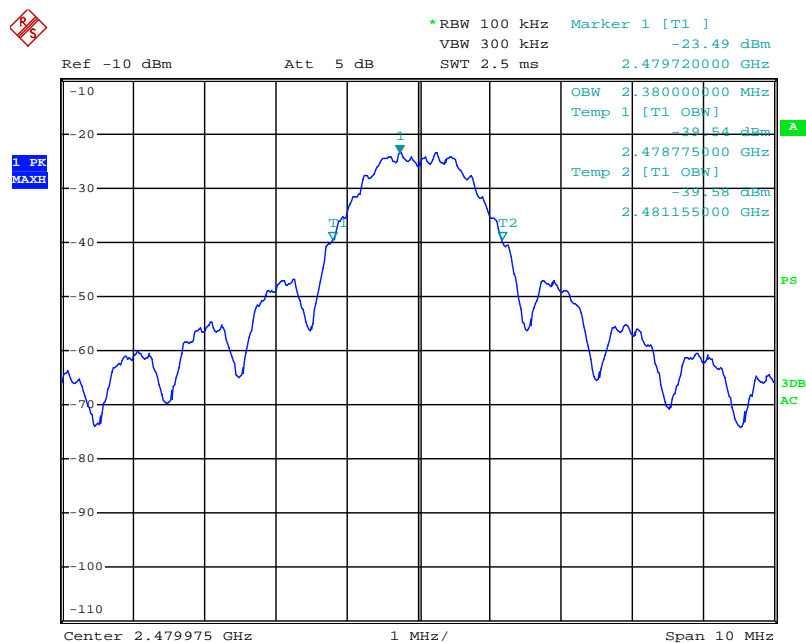


TTTTTT

Date: 21.FEB.2014 19:31:19



Date: 14.FEB.2014 13:41:23



Date: 14.FEB.2014 14:33:36

OBSERVATIONS: The EUT performed as expected.
PERFORMANCE: Complies.

Out Of Band Spurious Emissions Conducted

DATE: March 31, 2014

TEST STANDARD: FCC Part 15.247(d) RSS-210(A8.5)

TEST VOLTAGE: 120Vac 60Hz

MINIMUM STANDARD: Emissions must be at least 20dB down from the highest emission level within the authorized band as measured with a 100kHz RBW

TEST SETUP: The antenna port of EUT was directly connected to a Spectrum Analyzer through a 20dB Attenuator and appropriated RF Filters.

Conversion Formulas used: For the frequency measurement:
 $E(\text{dBm}) = \text{Meas}(\text{dBm}) + \text{Cable Loss}(\text{dB}) + \text{Attenuator/Filter Loss}(\text{dB})$

MEASUREMENT METHOD: Measurements were made using spectrum analyser and receiver using the appropriate attenuators and filters to optimize the reading. The settings used were:

200Hz RBW average detector for the frequency range 9kHz-150kHz
 9kHz RBW average detector for the Frequency range 150kHz to 30MHz
 120kHz RBW quasi-peak detector for the frequency range 30MHz to 1GHz
 1MHz RBW Average detector for the frequency range 1GHz to 20GHz

DEVICE DESCRIPTIONS: As described in the above EUT description and setup section.

EMISSIONS DATA: No transmitter Conducted Spurious Emissions were detected 9kHz to 2.4GHz.

Low Channel

Frequency	Uncorr-Avg	Uncorr-Peak	Bandwidth	Correction Factors	Corr. Avg	Corr. Peak
GHz	dBm	dBm	kHz		dBm	dBm
2.405692	-9.90	-4.30	1000.00	20.70	10.80	16.40
4.811424	-59.30	-51.50	1000.00	22.00	-37.30	-29.50
7.217286	-64.20	-54.60	1000.00	22.20	-42.00	-32.40
9.622907	-73.90	-60.80	1000.00	22.10	-51.80	-38.70
12.028696	-69.90	-58.30	1000.00	21.00	-48.90	-37.30
14.434272	-74.10	-60.50	1000.00	24.20	-49.90	-36.30
16.840007	-75.20	-62.00	1000.00	24.20	-51.00	-37.80

Mid Channel

Frequency	Uncorr-Avg	Uncorr-Peak	Bandwidth	Correction Factors	Corr. Avg	Corr. Peak
GHz	dBm	dBm	kHz		dBm	dBm
2.440674	-9.30	-3.90	1000.00	20.70	11.40	16.80
4.879513	-58.90	-50.90	1000.00	22.00	-36.90	-28.90
7.322078	-65.20	-55.40	1000.00	22.20	-43.00	-33.20
9.762830	-73.90	-60.80	1000.00	22.10	-51.80	-38.70
12.198522	-68.30	-56.50	1000.00	21.00	-47.30	-35.50
14.644268	-74.40	-61.20	1000.00	24.20	-50.20	-37.00
17.083738*	-75.50	-61.80	1000.00	24.20	-51.30	-37.60

High Channel

Frequency	Uncorr-Avg	Uncorr-Peak	Bandwidth	Correction Factors	Corr. Avg	Corr. Peak
GHz	dBm	dBm	kHz		dBm	dBm
2.479723	-9.60	-4.00	1000.00	20.70	11.10	16.70
4.959527	-57.00	-49.30	1000.00	22.00	-35.00	-27.30
7.442004	-65.30	-55.80	1000.00	22.20	-43.10	-33.60
9.922784	-71.90	-59.90	1000.00	22.10	-49.80	-37.80
12.403521	-68.50	-56.60	1000.00	21.00	-47.50	-35.60
14.884326	-72.20	-59.30	1000.00	24.20	-48.00	-35.10
17.366369*	-75.20	-60.90	1000.00	24.20	-51.00	-36.70

Out Of Band Spurious Emissions Radiated

DATE: March 31, 2014

TEST STANDARD: FCC Part 15.247(d) RSS-210(A8.5)

TEST VOLTAGE: 120Vac 60Hz

MINIMUM STANDARD: All emissions that fall in the restricted bands (15.205 or RSS-Gen (7.2.2)) must comply with the limits as listed in 15.209 and RSS-Gen (7.2.5). All other emissions must be at least 20dB down from the highest emission level within the authorized band as measured with a 100kHz RBW

TEST SETUP: The EUT was tested in our 3 m SAC and was positioned on the center of the turntable and powered up. The Transmitter Output was connected to its on-board fixed antenna. The transmitter was set for continuous transmission. The lowest, middle and highest channels were measured for all radiated emissions 10kHz to 2 GHz. The EUT was verified in 3 orthogonal orientations and the worst orientation was used for the final measurements. The EUT was tested and placed in the Vertical orientation on the table top as indicated in the test photos.

MEASUREMENT METHOD: Measurements were made using spectrum analyser and receiver using the appropriate antennas, amplifiers, attenuators and filters as per ANSI c63.10 and FCC KDB 558074 D01 DTS Meas Guidance v03r01

Because the EUT is using a pulsed train transmission a Duty Cycle correction of 20dB was used for the spurious emissions. Refer to Duty Cycle Section contained in this document for details.

DEVICE DESCRIPTIONS: As described in the above EUT description and setup section.

EMISSIONS DATA: No transmitter Radiated Spurious Emissions were detected 9kHz to 2.4GHz and above 17.5GHz.

Low Channel -Streaming Mode

Frequency	Uncorr. Peak	Antenna height	Pol	Turntable position	Corr. Peak	Duty Cycle Corrected Average based on Peak	Margin Avg	Limit
(GHz)	(dBμV/m)	(cm)		(deg)	(dBμV/m)	(dB)	(dB)	(dBμV/m)
2.405406	94.20	108.30	V	192.10	115.20			
2.405342	93.30	193.00	H	344.50	114.30			
4.808958	53.70	136.30	V	298.50	56.10	36.10	59.10	95.20
4.808959	59.30	150.30	H	305.00	61.70	41.70	53.50	95.20
7.213519	54.30	100.00	V	204.90	63.40	43.40	10.60	54.00
7.213504	52.20	110.60	H	9.50	61.30	41.30	12.70	54.00
9.621853	42.90	153.00	V	197.50	59.00	39.00	56.20	95.20
9.621919	46.20	123.90	H	72.80	62.30	42.30	52.90	95.20
12.027353	40.20	164.40	V	33.20	62.30	42.30	11.70	54.00
12.027447	40.60	160.30	H	222.20	62.70	42.70	11.3	54.00
14.426877	37.80	100.00	V	240.20	65.90	45.90	49.30	95.20

14.426875	39.60	150.40	H	35.60	67.70	47.70	47.50	95.20
16.835023	37.00	100.00	V	360.00	64.90	44.90	9.1	54.00
16.835023	37.00	150.00	H	180.00	64.90	44.90	9.1	54.00

Mid Channel -Streaming Mode

Frequency	Uncorr-Peak	Antenna height	Pol	Turntable position	Corr. Peak	Duty Cycle Corrected Average based on Peak	Margin Avg	Limit
(GHz)	(dBμV/m)	(cm)		(deg)	(dBμV/m)	(dB)	(dB)	(dBμV/m)
2.440489	96.80	132.20	V	161.40	116.00			
2.440425	94.90	189.60	H	340.30	114.10			
4.880994	59.70	107.40	V	143.20	61.20	41.20	54.80	96.00
4.880857	59.20	144.00	H	306.30	60.70	40.70	55.30	96.00
7.321501	58.40	126.40	V	221.80	67.80	47.80	6.20	54.00
7.321464	58.00	120.30	H	25.40	67.40	47.40	6.60	54.00
9.761916	40.10	108.30	V	188.10	56.30	36.30	59.70	96.00
9.761928	41.60	126.90	H	70.60	57.80	37.80	58.20	96.00
12.197428	44.40	130.60	V	326.50	67.30	47.30	6.70	54.00
12.197453	46.10	164.30	H	221.00	69.00	49.00	5.00	54.00
14.642899	37.70	143.70	V	59.70	66.20	46.20	49.80	96.00
14.642900	39.20	148.90	H	46.30	67.70	47.70	48.30	96.00
17.083422	36.50	110.30	V	87.30	63.60	43.60	10.40	54.00
17.082893	36.00	105.80	H	100.00	63.10	43.10	10.90	54.00

High Channel -Streaming Mode

Frequency	Uncorr-Peak	Antenna height	Pol	Turntable position	Corr. Peak	Duty Cycle Corrected Average based on Peak	Margin Avg	Limit
(GHz)	(dBμV/m)	(cm)		(deg)	(dBμV/m)	(dB)	(dB)	(dBμV/m)
2.480219	101.80	130.10	V	198.70	110.10			
2.479708	101.00	188.10	H	339.40	109.30			
4.960942	67.40	130.50	V	181.40	68.60	48.60	41.50	90.10
4.960907	65.20	157.10	H	337.90	66.40	46.40	43.70	90.10
7.441243	62.50	129.50	V	23.00	72.00	52.00	2.00	54.00
7.441335	61.70	110.50	H	0.00	71.20	51.20	2.80	54.00
9.921917	36.40	134.40	V	69.10	53.00	33.00	57.10	90.10
9.922429	36.70	149.50	H	0.00	53.30	33.30	56.80	90.10
12.402143	46.60	105.50	V	42.10	70.40	50.40	3.60	54.00
12.402309	46.90	100.10	H	225.20	70.70	50.70	3.30	54.00
14.882875	40.10	106.60	V	72.90	69.80	49.80	40.30	90.10
14.882915	39.70	100.00	H	234.50	69.40	49.40	40.70	90.10
17.363284	36.50	100.00	V	360.00	61.20	41.20	12.80	54.00
17.363284	36.90	112.00	H	360.00	61.60	41.60	12.40	54.00

Power Spectral Density

DATE(s): March 31, 2014

TEST STANDARD: FCC Part 15.247(e) RSS-210 (A8.2(b))

TEST VOLTAGE: 120Vac 60Hz

MINIMUM STANDARD: Maximum of 8dBm in any 3kHz band

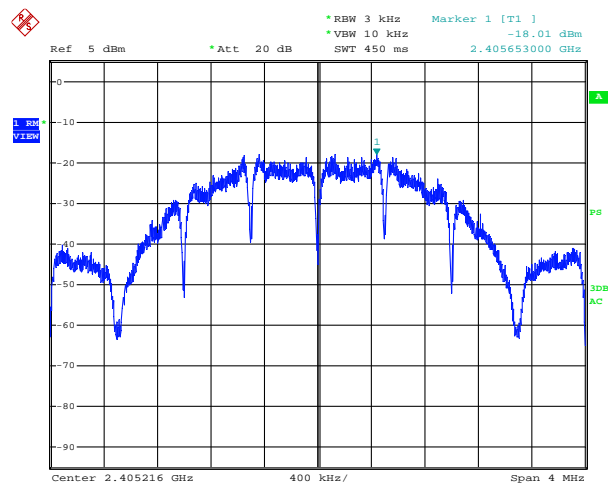
TEST SETUP: The antenna port of EUT was directly connected to a Spectrum Analyzer through a 20dB Attenuator.

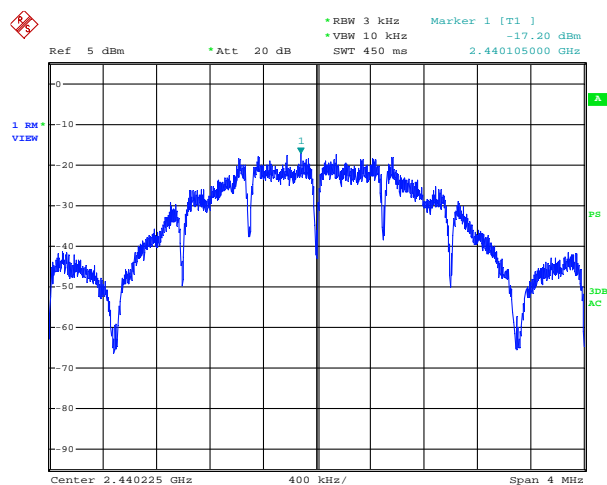
MEASUREMENT METHOD: As called by the standards above.

DEVICE DESCRIPTIONS: As described in the above EUT description and set up section.

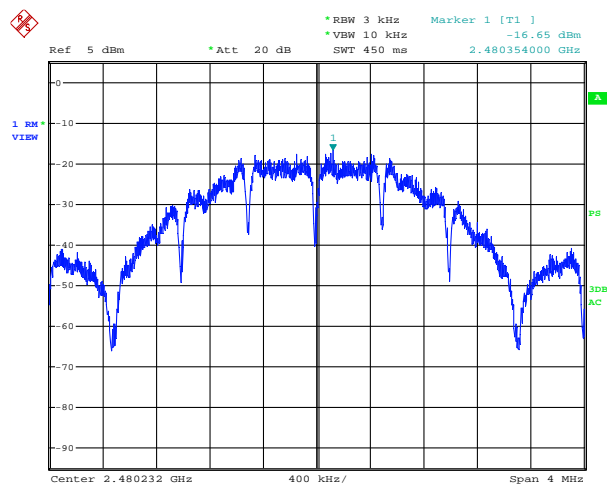
EMISSIONS DATA:

Frequency (GHz)	Measured (dBm)
2.405692	1.99
2.440674	2.80
2.479723	3.35





Date: 31.MAR.2014 09:24:46



Date: 31.MAR.2014 09:32:03

Frequency Stability

DATE:	April 02, 2014
TEST STANDARD:	FCC Part 15.215(c) and RSS-Gen Section (4.7) and (7.2.6)
TEST VOLTAGE:	100-240Vac to power adapter
MINIMUM STANDARD:	<p>Not specified.</p> <p>(4.7)With the transmitter installed in an environment test chamber, the unmodulated carrier frequency shall be measured under the conditions specified below:</p> <p>(a) at temperatures of -30°C, +20°C and +55°C, at the manufacturer's rated supply voltage of the battery.</p> <p>(b) at a temperature of +20°C and at ±15 percent of the manufacturer's rated supply voltage.</p> <p>(7.2.6) Transmitter frequency stability for licence-exempt radio apparatus shall be measured in accordance with Section 4.7. Also, for licence-exempt radio apparatus, the frequency stability shall be measured at temperatures of -20°C, +20°C and +55°C instead of at the temperatures specified in Section 4.7(a). If the frequency stability of the licence-exempt radio apparatus is not specified in the applicable standards, measurement of the frequency stability is not required provided that the occupied bandwidth of the licence-exempt radio apparatus lies entirely outside the restricted bands and the prohibited TV bands of 54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz and 614-806 MHz.</p> <p>(15.215(c))</p> <p>The 20dB bandwidth must remain within the designated frequency band over the expected variations in temperature and voltage range</p>
TEST SETUP:	<p>The EUT was bench tested and in our temperature chamber. The temperature was varied at +55, +20, and -30° Celsius. The transmitter was set for Carrier Wave (CW) mode and the lowest and highest channel Frequency was measured at each Temperature setting, after the Transmitter stabilized at the temperature. After the CW mode was measured the Modulated Mode was also measured.</p>
MEASUREMENT METHOD:	Measurements were made using a Spectrum Analyzer with 120kHz RBW Average detector using the appropriate Antennas, amplifiers and filters.
DEVICE DESCRIPTIONS:	As described in the above EUT description and setup section.

DATA:
Low Channel

Temp (C)	Power Level at 120Vac 60Hz (dBm)	Change (%)	Frequency Measured at 120Vac 60Hz (GHz)	Drift (Hz)	Drift (ppm)
20	20.65	Ref	2.405218	Ref	
-30	21.20	3	2.405243	25	0.01
55	20.45	1	2.405211	-7	0.003
Voltage (AC)	Power Level at 20° Cel (dBm)	Change (%)	Frequency Measured at 20° Cel (GHz)	Drift (Hz)	Drift (ppm)
120	20.65	Ref	2.405218	Ref	
100	21.14	2	2.405216	2	0.0008
240	20.57	1	2.405218	0	0

Mid Channel

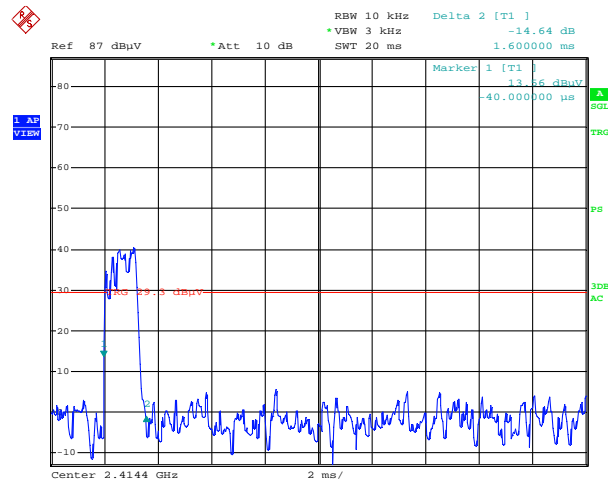
Temp (C)	Power Level at 120Vac 60Hz (dBm)	Change (%)	Frequency Measured at 120Vac 60Hz (GHz)	Drift (Hz)	Drift (ppm)
20	20.79	Ref	2.440225	Ref	
-30	22.72	9	2.440250	25	0.01
55	21.82	5	2.440218	7	0.003
Voltage (AC)	Power Level at 20° Cel (dBm)	Change (%)	Frequency Measured at 20° Cel (GHz)	Drift (Hz)	Drift (ppm)
120	20.79	Ref	2.440225	Ref	
100	22.02	6	2.440225	0	0
240	21.91	5	2.440225	0	0

High Channel

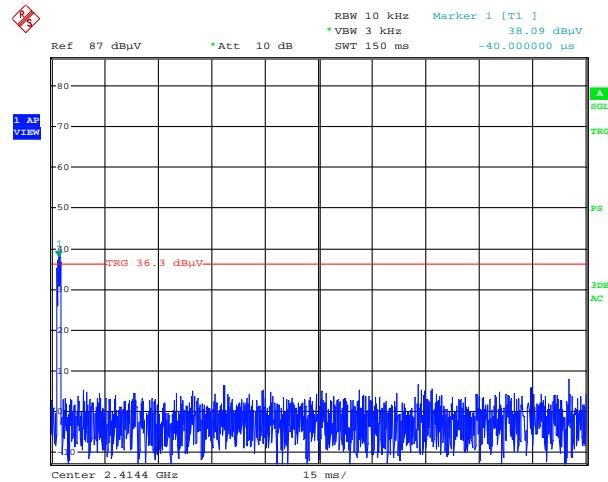
Temp (C)	Power Level at 120Vac 60Hz (dBm)	Change (%)	Frequency Measured at 120Vac 60Hz (GHz)	Drift (Hz)	Drift (ppm)
20	20.16	Ref	2.480225	Ref	
-30	21.31	6	2.480249	24	.009
55	19.96	1	2.480216	9	.003
Voltage (AC)	Power Level at 20° Cel (dBm)	Change (%)	Frequency Measured at 20° Cel (GHz)	Drift (Hz)	Drift (ppm)
120	20.16	Ref	2.480225	Ref	
100	20.50	2	2.480224	1	.0004
240	20.34	1	2.480223	2	.0008

Duty Cycle Correction - Pulsed Train Average Time of Occupancy

DATE:	April 02, 2014
TEST STANDARD:	FCC Part 15.35(c) and RSS-Gen Section 4.5
TEST VOLTAGE:	120Vac 60Hz to power adapter
MINIMUM STANDARD:	<p>Not specified.</p> <p>(4.5) Pulsed Operation</p> <p>When the field strength (or envelope power) is not constant or it is in pulses, and an average detector is specified to be used, the value of field strength or power shall be determined by averaging over one complete pulse train, including blanking intervals within the pulse train, as long as the pulse train does not exceed 0.1 seconds. In cases where the pulse train exceeds 0.1 second, the average value of field strength or output power shall be determined during a 0.1 second interval during which the field strength or power is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.</p>
TEST SETUP:	The antenna port of EUT was directly connected to a Spectrum Analyzer through a 20dB Attenuator
MEASUREMENT METHOD:	Measurements were made using a Spectrum Analyzer with 10kHz RBW Peak detector using Zero Span mode.
DEVICE DESCRIPTIONS:	<p>As described in the above EUT description and setup section.</p> <p>As per the manufacturer, the transmitter only sends 1 byte data status indications when requested. The requests for data is greater than once per second.</p>
EMISSIONS DATA:	<p>Worst case Pulse On Time: 1.6ms</p> <p>Pulse Off Time: Greater than 100ms</p> <p>Radiated emission Relaxation Correction for dBuV: $(20\log (1.6/100)) = 36\text{dB}$</p> <p>Maximum allowed Correction for Spurious emissions: 20dB (peak measurement)</p>



Date: 31.MAR.2014 17:13:37



Date: 31.MAR.2014 17:10:25

EUT photos during the testing



