

Test Report

FCC Part15 Subpart C

Product Name : Cassia Hub
Model No. : C1000
FCC ID : 2AGF9C1000
IC : 20842-C1000

Applicant : BEIJING CASSIA NETWORKS TECHNOLOGY
CO.,LTD
Address : Room 206,District B,2/F,No.12,Xinxi Road,Haidian
District,Beijing

Date of Receipt : Oct. 27, 2015
Test Date : Oct. 27, 2015~ Nov. 26, 2015
Issued Date : Nov. 27, 2015
Report No. : 15A0076R-RF-US-P06V01
Report Version : V1.0

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

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Test Report Certification

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District,Beijing
Manufacturer : BEIJING CASSIA NETWORKS TECHNOLOGY CO.,LTD
Address : Room 206,Distrit B,2/F,No.12,Xinxi Road,Haidian
District,Beijing
Model No. : C1000
FCC ID : 2AGF9C1000
IC : 20842-C1000
EUT Voltage : DC 12V
Brand Name : Cassia
Applicable Standard : FCC CFR Title 47 Part 15 Subpart C: 2014
ANSI C63.4:2014;
ANSI C63.10:2013;
KDB 558074 D01v03r03
KDB 662911 D01 Multiple Transmitter Output v02r01
Industry Canada RSS-Gen Issue 4/RSS-247 Issue 1
Test Result : Complied
Performed Location : Suzhou EMC Laboratory
No.99 Hongye Rd., Suzhou Industrial Park, Suzhou,215006,
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TEL: +86-512-6251-5088 / FAX: +86-512-6251-5098
FCC Registration Number: 800392; IC Lab Code: 4075B

Documented By : Elaine neng
Reviewed By : Jack Zhang
Approved By : Harry Zhou

Laboratory Information

We, **Quietek Corporation**, are an independent EMC and safety consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted(audited or listed) by the following related bodies in compliance with ISO 17025, EN 45001 and specified testing scope:

Taiwan R.O.C.	:	BSMI, NCC, TAF
USA	:	FCC
Japan	:	VCCI
China	:	CNAS

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation's Web Site :<http://www.quietek.com/tw/ctg/cts/accreditations.htm>

The address and introduction of Quietek Corporation's laboratories can be founded in our Web site :
<http://www.quietek.com/>

If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

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TABLE OF CONTENTS

Description	Page
1. General Information	7
1.1. EUT Description	7
1.2. Mode of Operation	11
1.3. Tested System Details	12
1.4. Configuration of Tested System	13
1.5. EUT Exercise Software	14
2. Technical Test	15
2.1. Summary of Test Result	15
2.2. Test Environment	17
3. Conducted Emission	18
3.1. Test Equipment	18
3.2. Test Setup	18
3.3. Limit	19
3.4. Test Procedure	19
3.5. Uncertainty	19
3.6. Test Result	20
4. Radiated Emission	22
4.1. Test Equipment	22
4.2. Test Setup	23
4.3. Limit	24
4.4. Test Procedure	24
4.5. Uncertainty	25
4.6. Test Result	26
5. RF Antenna Conducted Spurious	31
5.1. Test Equipment	31
5.2. Test Setup	31
5.3. Limit	31
5.4. Test Procedure	32
5.5. Uncertainty	32
5.6. Test Result	33
6. Radiated Emission Band Edge	45
6.1. Test Equipment	45
6.2. Test Setup	46
6.3. Limit	46
6.4. Test Procedure	46
6.5. Uncertainty	47
6.6. Test Result	48

7.	Occupied Bandwidth.....	72
7.1.	Test Equipment.....	72
7.2.	Test Setup.....	72
7.3.	Limit.....	72
7.4.	Test Procedure	72
7.5.	Uncertainty	73
7.6.	Test Result.....	74
8.	Power Output.....	80
8.1.	Test Equipment.....	80
8.2.	Test Setup.....	80
8.3.	Limit.....	80
8.4.	Test Procedure	81
8.5.	Uncertainty	81
8.6.	Test Result.....	82
9.	Power Spectral Density	85
9.1.	Test Equipment.....	85
9.2.	Test Setup.....	85
9.3.	Limit.....	85
9.4.	Test Procedure	86
9.5.	Uncertainty	86
9.6.	Test Result.....	87

History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
15A0076R-RF-US-P06V01	V1.0	Initial Issued Report	Nov. 27, 2015

1. General Information

1.1. EUT Description

Product Name	Cassia Hub
Brand Name	Cassia
Model No.	C1000
EUT Voltage	DC 12V
Frequency Range	For 2.4GHz Band 802.11b/g/n(20MHz): 2412~2462MHz
Channel Number	For 2.4GHz Band 802.11b/g/n(20MHz): 11
Type of Modulation	802.11b: DSSS 802.11g/n: OFDM
Data Rate	802.11g: 6/9/12/18/24/36/48/54 Mbps 802.11b: 1/2/5.5/11 Mbps 802.11n: up to 72.2 Mbps
Channel Control	Auto
Antenna Delivery	1*Tx + 1*Rx for 802.11b/g/n
Antenna Type	Reference to Antenna List
Peak Antenna Gain	Reference to Antenna List

For 2.4GHz Band

802.11b/g/n(20MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz	04	2427 MHz
05	2432 MHz	06	2437 MHz	07	2442 MHz	08	2447 MHz
09	2452 MHz	10	2457 MHz	11	2462 MHz	N/A	N/A

Antenna List

Antenna	Type	Model No.	Peak Gain
Antenna	Omni antenna	SPQ-2400-2T	1.5dBi

Power Parameter Value of the test software

Test Mode	Test Channel	Ant1
802.11b	2412	✓
	2437	✓
	2462	✓
802.11g	2412	✓
	2437	✓
	2462	✓
802.11n(20MHz)	2412	✓
	2437	✓
	2462	✓

Power Parameter Value of the test software

Test Mode	Test Channel	Ant1
802.11b	2412	11
	2437	11
	2462	11
802.11g	2412	11
	2437	11
	2462	11
802.11n(20MHz)	2412	11
	2437	11
	2462	11

Note: the power parameter cannot be configured, use the default value.

Duty Cycle

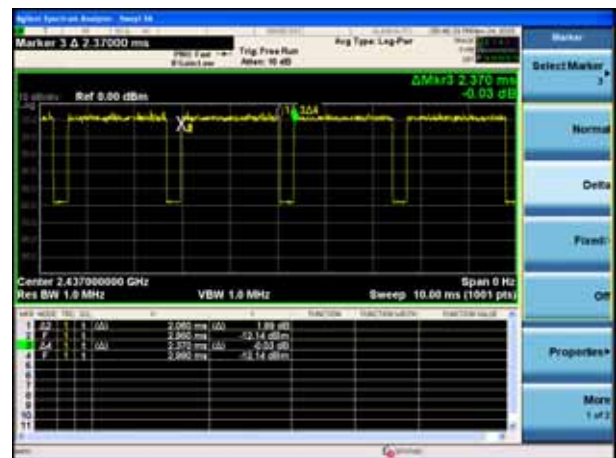
2.4GHz Band

Test Mode	Tx On (ms)	T (ms)	VBW	Tx Off (ms)	Duty Cycle
802.11b	12.42	12.42	100Hz	0.300	97.6%
802.11g	2.06	2.06	510Hz	0.310	86.9%
802.11n(20MHz)	1.92	1.92	560Hz	0.304	86.3%

802.11b



802.11g



802.11n(20MHz)



Note: 1. T means the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

2. According to KDB 558074, when test for Radiated Emission Band Edge and Radiated Emission, $VBW \geq 1/T$ will be used.

1.2. Mode of Operation

QuieTek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: Transmit by 802.11b
Mode 2: Transmit by 802.11g
Mode 3: Transmit by 802.11n(20MHz)

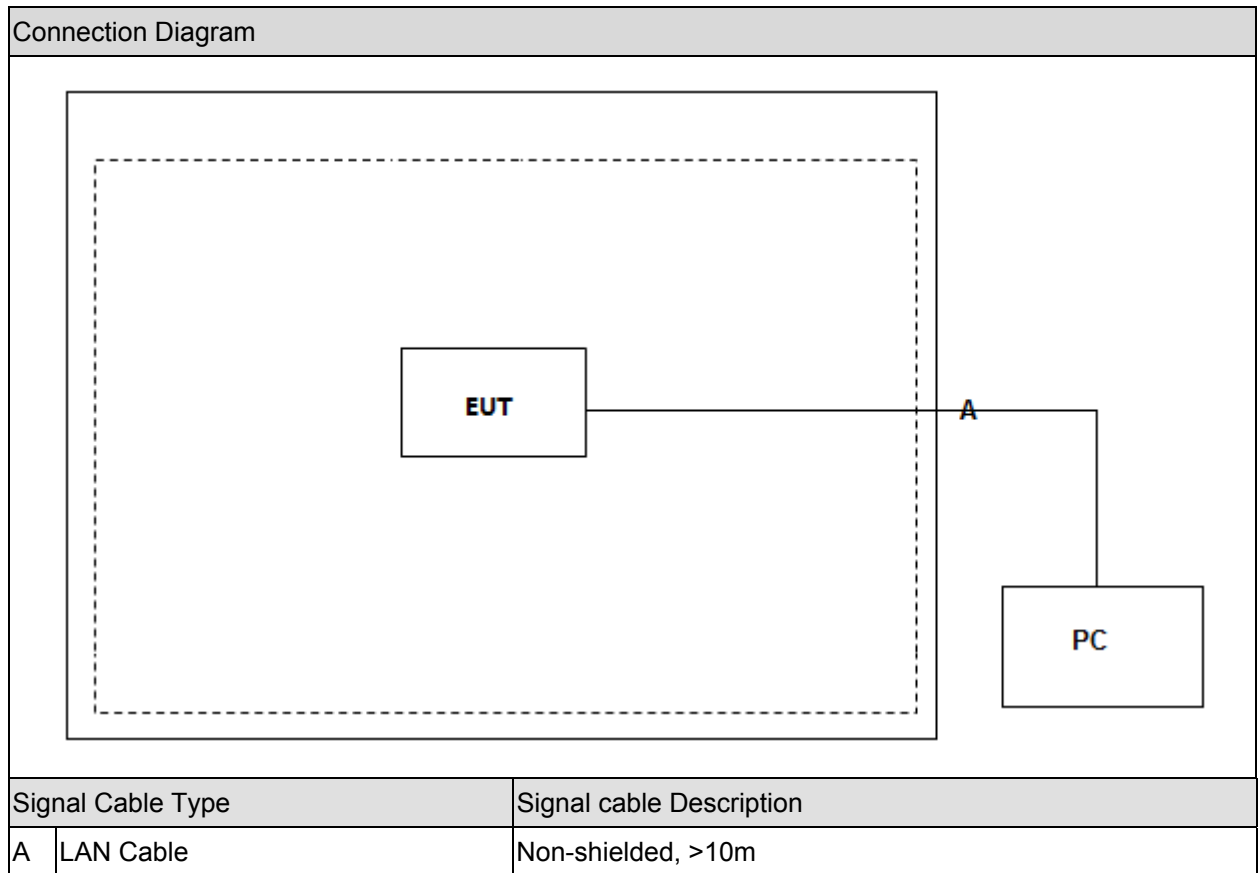
Note: Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, and be shown on this report.

1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook	Lenovo	Think pad x220	SUA0600195	Non-shielded

1.4. Configuration of Tested System



1.5. EUT Exercise Software

1	Setup the EUT and simulators as shown on above.
2	Turn on the power of equipment.
3	Input launch command, and set the test mode and channel, then press OK to start continue Transmit or receive.

2. Technical Test

2.1. Summary of Test Result

- ☒ No deviations from the test standards
☐ Deviations from the test standards as below description:

For FCC

Performed Test Item	Normative References	Test Performed	Deviation
Conducted Emission	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.207	Yes	No
Radiated Emission	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.209	Yes	No
RF Antenna Conducted Spurious	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.247(d)	Yes	No
Radiated Emission Band Edge	FCC CFR Title 47 Part 15 Subpart C: 2014 15.247(d)	Yes	No
Operation Frequency Range of 20dB Bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2014 15.215(c)	Yes	No
Occupied Bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.247(a)(2)	Yes	No
Power Output	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.247(b)(3)	Yes	No
Power Spectral Density	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.247(e)	Yes	No

For IC

Performed Test Item	Normative References	Test Performed	Deviation
Conducted Emission	RSS-Gen Issue 4 November 2014 Section 8.8	Yes	No
Radiated Emission	RSS-247 Issue 1 May 2015 Section 5.5	Yes	No
RF Antenna Conducted Spurious	RSS-247 Issue 1 May 2015 Section 5.5	Yes	No
Radiated Emission Band Edge	RSS-Gen Issue 4 November 2014 Section 8.10	Yes	No
Occupied Bandwidth	RSS-Gen Issue 4 November 2014 Section 6.6 RSS-247 Issue 1 May 2015 Section 5.2	Yes	No
Power Output	RSS-247 Issue 1 May 2015 Section 5.4	Yes	No
Power Spectral Density	RSS-247 Issue 1 May 2015 Section 5.2	Yes	No

2.2. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	21
Humidity (%RH)	25-75	50
Barometric pressure (mbar)	860-1060	950-1000

3. Conducted Emission

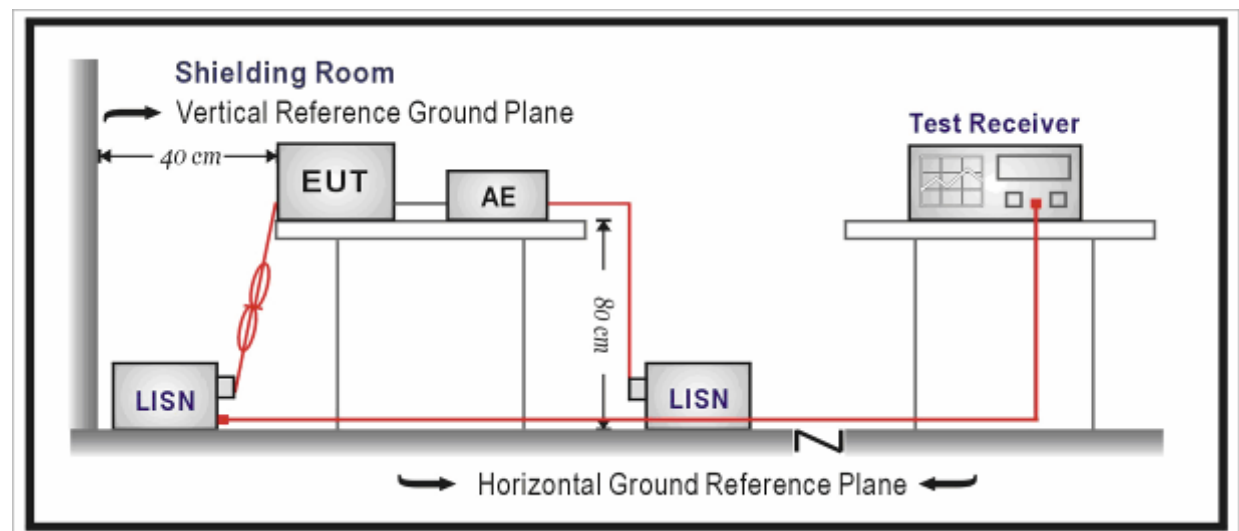
3.1. Test Equipment

Conducted Emission / TR-1

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100726	2016.03.28
Two-Line V-Network	R&S	ENV216	100043	2016.03.28
Two-Line V-Network	R&S	ENV216	100044	2016.09.16
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	2016.03.01
50ohm Termination	SHX	TF2	07081401	2016.09.16
Temperature/Humidity Meter	zhichen	ZC1-2	TR1-TH	2016.01.08

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

3.2. Test Setup



3.3. Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 – 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

3.4. Test Procedure

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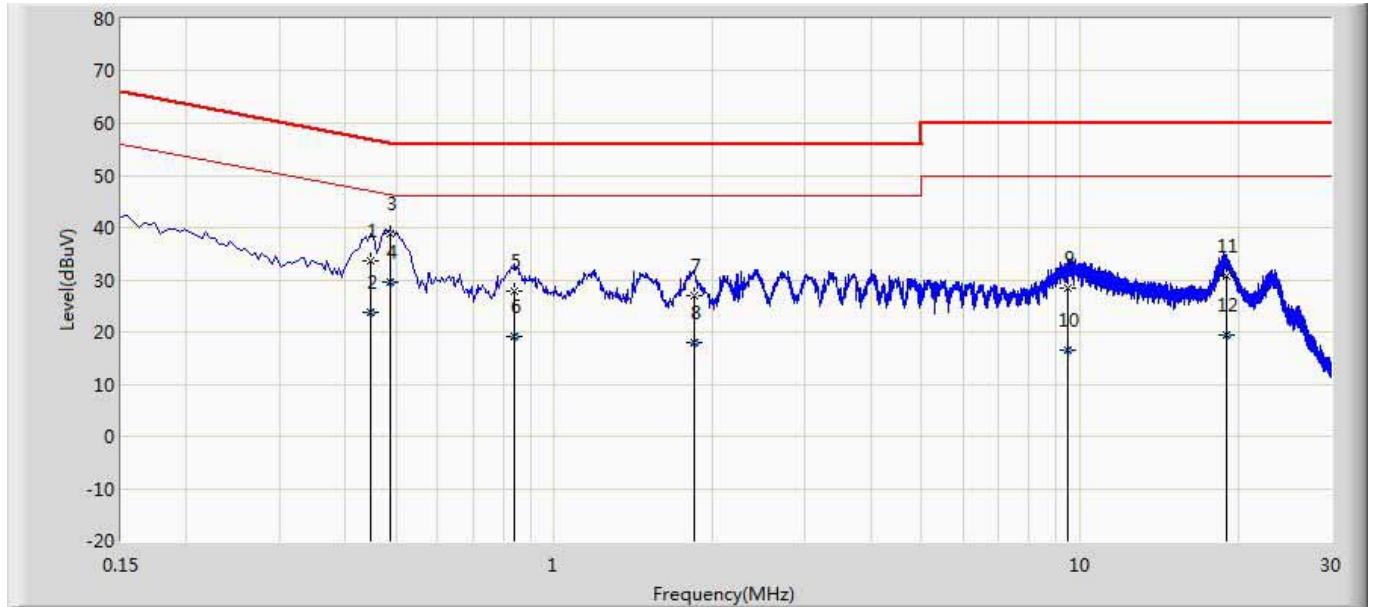
The EUT was setup according to ANSI C63.4, 2014 for compliance to FCC 47CFR 15.247 requirements. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

3.5. Uncertainty

The measurement uncertainty is defined as ± 2.02 dB

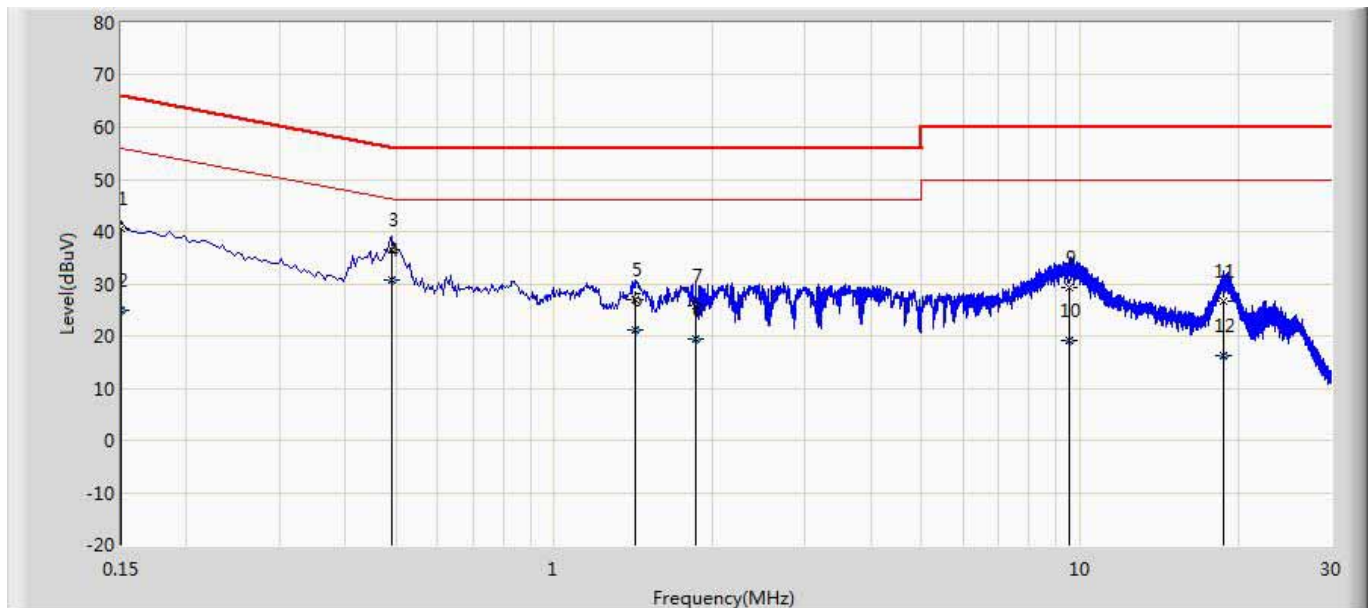
3.6. Test Result

Site: SR8	Time: 2015/10/30
Limit: FCC_Part15.107_CE_AC Power_ClassC	Margin: 0
Probe: ENV216-L1	Polarity: Line
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 1 Transmit at CH2412 by 802.11b	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1		0.446	33.578	23.878	-23.371	56.949	9.630	0.070	0.000	QP
2		0.446	23.873	14.173	-23.076	46.949	9.630	0.070	0.000	AV
3		0.486	38.920	29.220	-17.316	56.236	9.630	0.070	0.000	QP
4	*	0.486	29.561	19.861	-16.675	46.236	9.630	0.070	0.000	AV
5		0.842	27.872	18.182	-28.128	56.000	9.620	0.070	0.000	QP
6		0.842	19.195	9.505	-26.805	46.000	9.620	0.070	0.000	AV
7		1.842	27.080	17.343	-28.920	56.000	9.640	0.097	0.000	QP
8		1.842	17.966	8.229	-28.034	46.000	9.640	0.097	0.000	AV
9		9.498	28.418	18.444	-31.582	60.000	9.724	0.250	0.000	QP
10		9.498	16.480	6.506	-33.520	50.000	9.724	0.250	0.000	AV
11		18.978	30.807	20.597	-29.193	60.000	9.760	0.450	0.000	QP
12		18.978	19.432	9.222	-30.568	50.000	9.760	0.450	0.000	AV

Site: SR8	Time: 2015/10/30
Limit: FCC_Part15.107_CE_AC Power_ClassC	Margin: 0
Probe: ENV216-N	Polarity: Neutral
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 1 Transmit at CH2412 by 802.11b	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1		0.150	40.454	30.718	-25.546	66.000	9.676	0.060	0.000	QP
2		0.150	24.935	15.199	-31.065	56.000	9.676	0.060	0.000	AV
3		0.490	36.555	26.855	-19.613	56.168	9.630	0.070	0.000	QP
4	*	0.490	30.749	21.049	-15.419	46.168	9.630	0.070	0.000	AV
5		1.426	27.054	17.334	-28.946	56.000	9.630	0.090	0.000	QP
6		1.426	21.103	11.383	-24.897	46.000	9.630	0.090	0.000	AV
7		1.862	25.918	16.178	-30.082	56.000	9.640	0.100	0.000	QP
8		1.862	19.452	9.712	-26.548	46.000	9.640	0.100	0.000	AV
9		9.554	29.249	19.259	-30.751	60.000	9.730	0.260	0.000	QP
10		9.554	19.034	9.044	-30.966	50.000	9.730	0.260	0.000	AV
11		18.718	26.770	16.480	-33.230	60.000	9.840	0.450	0.000	QP
12		18.718	16.346	6.056	-33.654	50.000	9.840	0.450	0.000	AV

Note: All the test modes are pretested and mode 1 802.11b mode was found to be the worst mode, so the data of this test mode was recorded.

4. Radiated Emission

4.1. Test Equipment

Radiated Emission / AC-2

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100573	2016.03.28
Loop Antenna	R&S	HFH2-Z2	833799/003	2016.11.17
Bilog Chainenna	Teseq GmbH	CBL6112D	27611	2016.10.15
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC2-C	2016.03.01
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC2-TH	2016.01.08

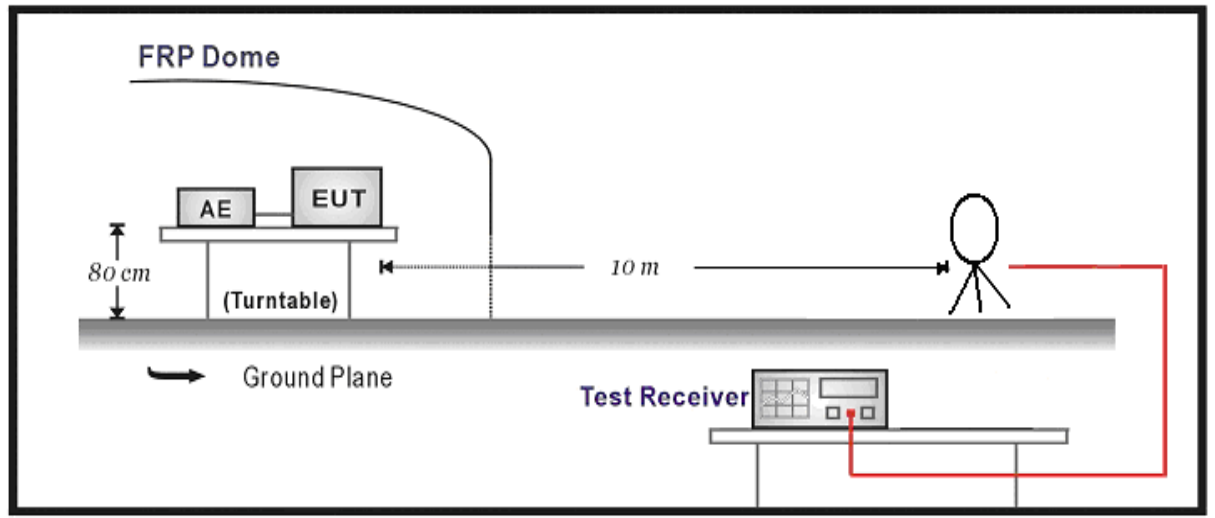
Radiated Emission / AC-5

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	N9020A	MY49100159	2016.03.28
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016.01.07
Preamplifier	Miteq	NSP1800-25	1364185	2016.05.05
Preamplifier	QuieTek	AP-040G	CHM-0906001	2016.05.05
DRG Horn	ETS-Lindgren	3117	00123988	2016.01.21
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2016.11.24
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2016.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2016.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2016.03.01
EMI Receiver	Agilent	N9038A	MY51210196	2016.06.09
Temperature/Humidity Meter	Zhichen	ZC1-2	AC5-TH	2016.01.08

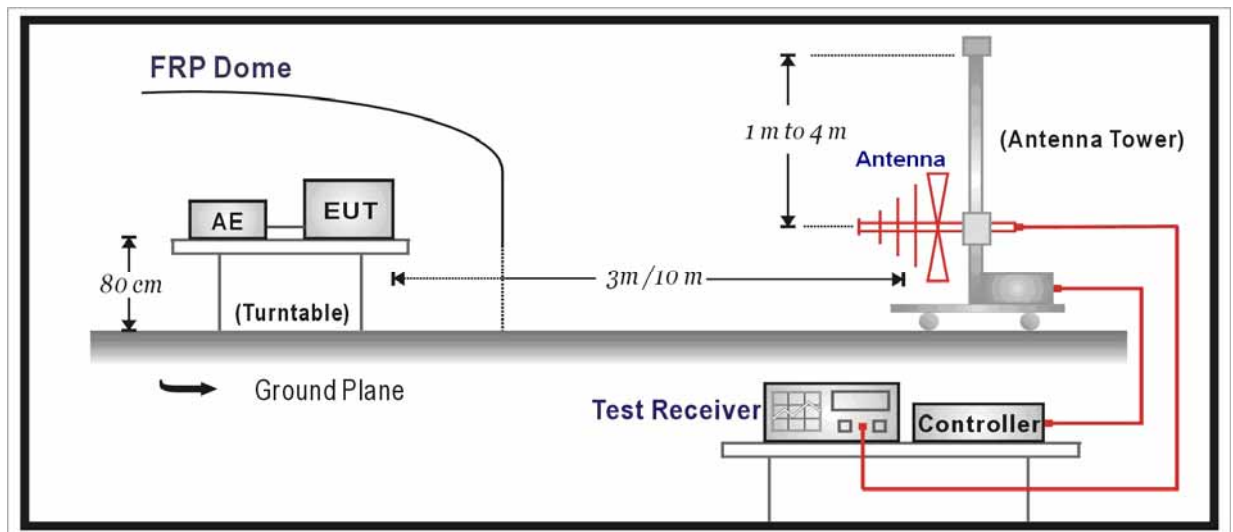
Note 1: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

4.2. Test Setup

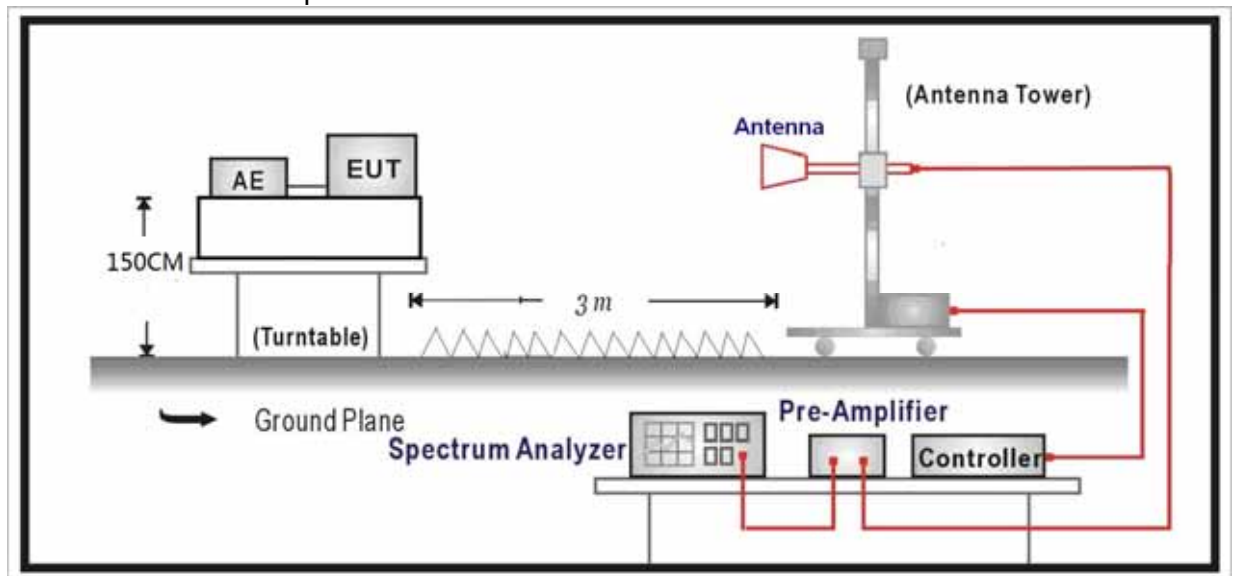
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



4.3. Limit

FCC Part 15 Subpart C Paragraph 15.209		
Frequency (MHz)	Distance (m)	Level (dBuV/m)
30 - 88	3	40
88 - 216	3	43.5
216 - 960	3	46
Above 960	3	54

Note 1: The lower limit shall apply at the transition frequency.

Note 2: Distance refers to the distance in meters between the measuring instrument Antenna and the closed point of any part of the device or system.

Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m)

4.4. Test Procedure

According to FCC ANSI C63.4: 2014 & ANSI C63.10: 2013& FCC 47CFR 15.247& KDB 558074 D01v03r03& ndustry Canada RSS-Gen Issue 4& RSS-247 Issue 1

FCC&IC

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from Antenna to the EUT was 3 meters.

The Antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the Antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2014 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

The frequency range from 30MHz to 10th harmonic is checked.

Note: When doing emission measurement above 1GHz, the horn Antenna will be bended down a little (as horn Antenna has the narrow beamwidth) in order to keeping the Antenna in the “cone of radiation” of EUT. The 3dB beamwidth is 10~60 degrees for H-plane and 10~90 degrees for E-plane.

If continuous transmission of the EUT (i.e., duty cycle ≥ 98 percent) cannot be achieved and the duty cycle is not constant (i.e., duty cycle variations exceed ± 2 percent), then the following procedure shall be used:

a) Set RBW = 1 MHz.

b) Set VBW $\geq 1/T$.

c) Video bandwidth mode or display mode

1) The instrument shall be set to ensure that video filtering is applied in the power domain.

Typically, this requires setting the detector mode to RMS and setting the Average-VBW Type to Power (RMS).

2) As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to “Voltage” regardless of the display mode.

d) Detector = Peak.

e) Sweep time = auto.

f) Trace mode = max hold.

g) Allow max hold to run for at least 50 times (1/duty cycle) traces.

4.5. Uncertainty

The measurement uncertainty above 1G is defined as ± 3.9 dB
below 1G is defined as ± 3.8 dB

4.6. Test Result

Mode1: Transmit by 802.11b

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	H	4824.4	54.1	-6.7	47.4	54(note3)	-6.6	PK
	H	7236.0	53.7	-2.6	51.1	54(note3)	-2.9	PK
	H	9648.0	48.8	1.0	49.8	54(note3)	-4.2	PK
	V	4825.0	53.2	-6.7	46.5	54(note3)	-7.5	PK
	V	7236.0	52.9	-2.6	50.3	54(note3)	-3.7	PK
	V	9648.0	48.0	1.0	49.0	54(note3)	-5.0	PK
6	H	4876.0	53.1	-6.6	46.5	54(note3)	-7.5	PK
	H	7311.0	52.4	-2.9	49.5	54(note3)	-4.5	PK
	H	9748.0	50.4	1.0	51.4	54(note3)	-2.6	PK
	V	4876.0	52.8	-6.6	46.2	54(note3)	-7.8	PK
	V	7311.0	52.4	-3.0	49.4	54(note3)	-4.6	PK
	V	9748.0	51.0	1.0	52.0	54(note3)	-2.0	PK
11	H	4927.0	52.9	-6.7	46.2	54(note3)	-7.8	PK
	H	7383.5	50.5	-2.4	48.1	54(note3)	-5.9	PK
	H	9848.0	50.9	1.2	52.1	54(note3)	-1.9	PK
	V	4927.0	53.4	-6.7	46.7	54(note3)	-7.3	PK
	V	7386.0	50.4	-2.4	48.0	54(note3)	-6.0	PK
	V	9848.0	50.3	1.2	51.5	54(note3)	-2.5	PK

Note: 1. Measure Level = Reading Level + Factor.

- The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 6dB below the limits, therefore no data appear in the report.
- This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Mode2: Transmit by 802.11g

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	H	4824.4	54.7	-6.7	48.0	54(note3)	-6.0	PK
	H	7236.0	52.5	-2.6	49.9	54(note3)	-4.1	PK
	H	9648.0	49.8	1.0	50.8	54(note3)	-3.2	PK
	V	4825.0	53.3	-6.6	46.7	54(note3)	-7.3	PK
	V	7236.0	53.1	-2.6	50.5	54(note3)	-3.5	PK
	V	9648.0	49.1	0.9	50.0	54(note3)	-4.0	PK
6	H	4876.0	53.3	-6.6	46.7	54(note3)	-7.3	PK
	H	7311.0	52.1	-3.0	49.1	54(note3)	-4.9	PK
	H	9748.0	50.8	1.1	51.9	54(note3)	-2.1	PK
	V	4876.0	53.8	-6.6	47.2	54(note3)	-6.8	PK
	V	7311.0	52.6	-2.9	49.7	54(note3)	-4.3	PK
	V	9748.0	50.7	1.0	51.7	54(note3)	-2.3	PK
11	H	4927.0	52.6	-6.7	45.9	54(note3)	-8.1	PK
	H	7383.5	50.5	-2.5	48.0	54(note3)	-6.0	PK
	H	9848.0	50.5	1.1	51.6	54(note3)	-2.4	PK
	V	4927.0	52.6	-6.7	45.9	54(note3)	-8.1	PK
	V	7386.0	50.9	-2.4	48.5	54(note3)	-5.5	PK
	V	9848.0	51.2	1.2	52.4	54(note3)	-1.6	PK

Note: 1. Measure Level = Reading Level + Factor.

2. The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 6dB below the limits, therefore no data appear in the report.
3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Mode3: Transmit by 802.11n(20MHz)

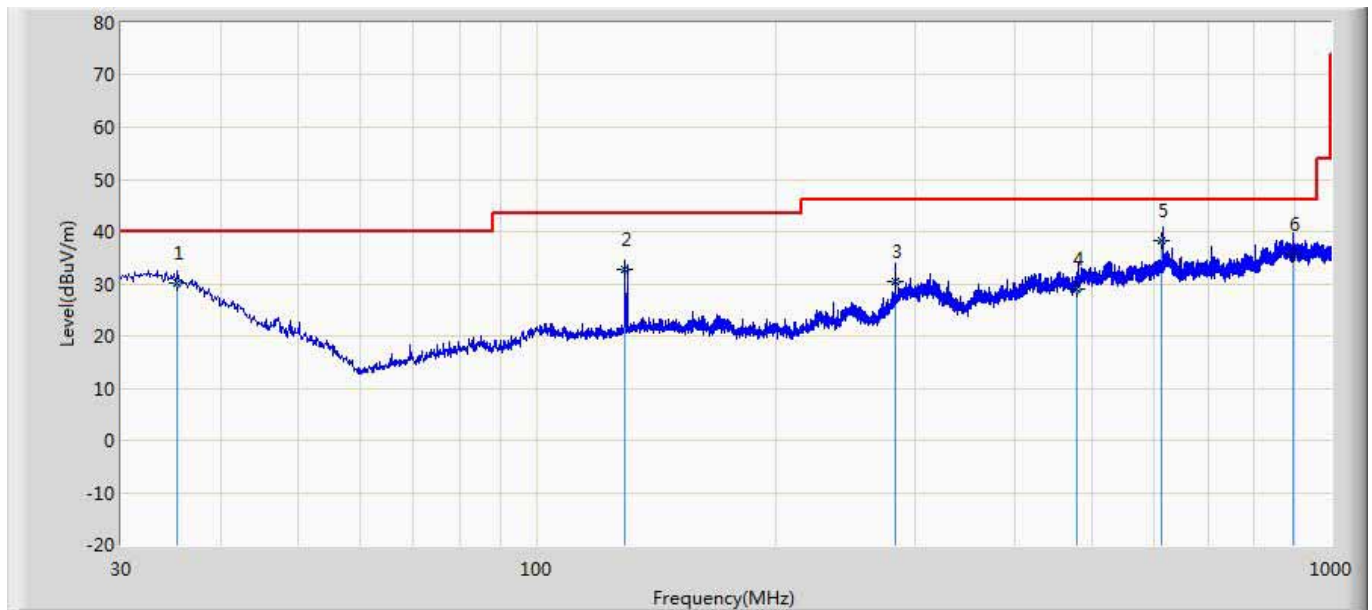
Chain	CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
Ant 1+2	1	H	4824.4	54.4	-6.7	47.7	54(note3)	-6.3	PK
		H	7236.0	52.7	-2.6	50.1	54(note3)	-3.9	PK
		H	9648.0	49.6	1.0	50.6	54(note3)	-3.4	PK
		V	4825.0	53.2	-6.7	46.5	54(note3)	-7.5	PK
		V	7236.0	52.8	-2.6	50.2	54(note3)	-3.8	PK
		V	9648.0	48.7	1.0	49.7	54(note3)	-4.3	PK
	6	H	4876.0	52.8	-6.7	46.1	54(note3)	-7.9	PK
		H	7311.0	52.3	-3.0	49.3	54(note3)	-4.7	PK
		H	9748.0	50.8	1.0	51.8	54(note3)	-2.2	PK
		V	4876.0	52.3	-6.7	45.6	54(note3)	-8.4	PK
		V	7311.0	52.7	-3.0	49.7	54(note3)	-4.3	PK
		V	9748.0	50.8	1.0	51.8	54(note3)	-2.2	PK
	11	H	4927.0	52.6	-6.7	45.9	54(note3)	-8.1	PK
		H	7383.5	50.7	-2.4	48.3	54(note3)	-5.7	PK
		H	9848.0	50.8	1.2	52.0	54(note3)	-2.0	PK
		V	4927.0	53.4	-6.7	46.7	54(note3)	-7.3	PK
		V	7386.0	50.1	-2.4	47.7	54(note3)	-6.3	PK
		V	9848.0	50.0	1.2	51.2	54(note3)	-2.8	PK

Note: 1. Measure Level = Reading Level + Factor.

2. The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 6dB below the limits, therefore no data appear in the report.
3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

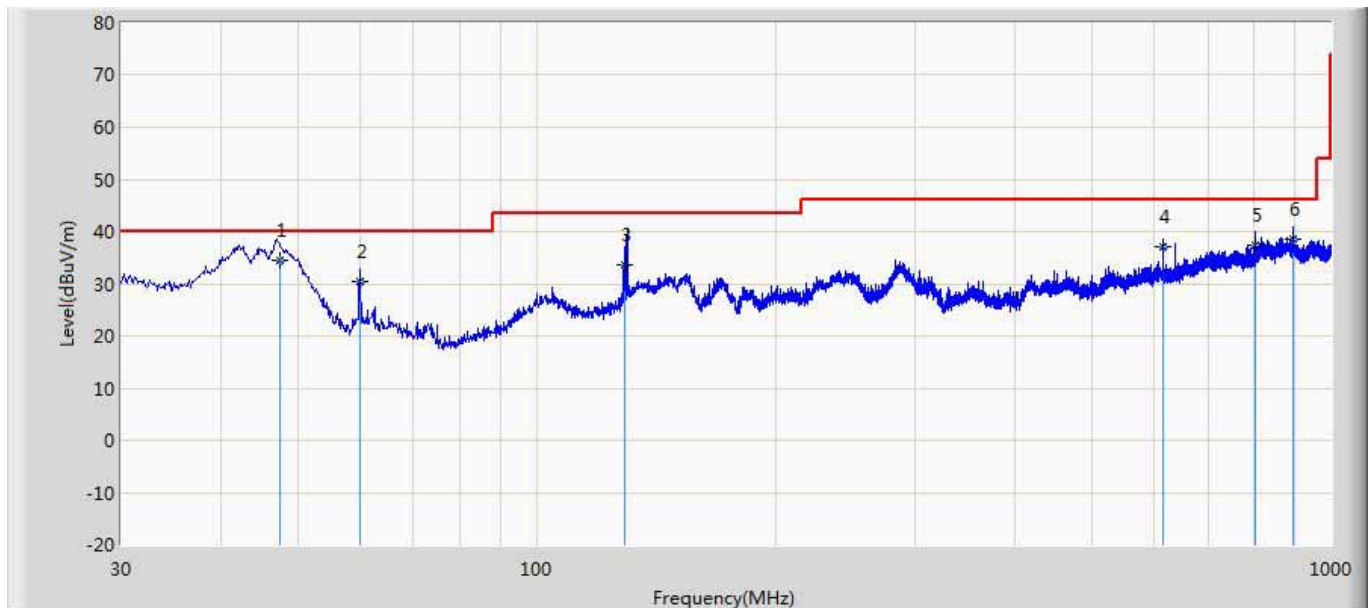
The worst case of Radiated Emission below 1GHz:

Site: CB7	Time: 2015/10/30
Limit: FCC_Part15.109_RE(3m)_ClassC	Margin: 0
Probe: CB7_CBL6112_0726	Polarity: Horizontal
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 1 Transmit at CH2412 by 802.11b	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1		35.218	30.055	36.812	-9.945	40.000	15.773	0.644	23.174	136	360	QP
2		129.252	32.632	42.527	-10.868	43.500	11.945	1.230	23.070	200	194	QP
3		283.520	30.501	38.797	-15.499	46.000	12.970	1.810	23.076	100	154	QP
4		479.218	29.127	32.039	-16.873	46.000	17.468	2.380	22.760	100	151	QP
5	*	613.218	38.267	39.224	-7.733	46.000	19.000	2.710	22.667	200	102	QP
6		897.101	35.693	34.679	-10.307	46.000	20.494	3.300	22.780	100	259	QP

Site: CB7	Time: 2015/10/30
Limit: FCC_Part15.109_RE(3m)_ClassC	Margin: 0
Probe: CB7_CBL6112_0726	Polarity: Vertical
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 1 Transmit at CH2412 by 802.11b	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1	*	47.521	34.407	47.603	-5.593	40.000	9.192	0.751	23.138	100	141	QP
2		59.871	30.449	46.118	-9.551	40.000	6.531	0.838	23.038	100	3	QP
3		128.961	33.713	43.590	-9.787	43.500	11.963	1.230	23.070	100	306	QP
4		613.875	37.109	38.060	-8.891	46.000	19.000	2.710	22.661	100	38	QP
5		802.218	37.516	36.689	-8.484	46.000	20.018	3.120	22.311	200	14	QP
6		897.180	38.469	37.455	-7.531	46.000	20.494	3.300	22.780	100	343	QP

Note: All the test modes are pretested and mode 1 802.11b mode was found to be the worst mode, so the data of this test mode was recorded.

5. RF Antenna Conducted Spurious

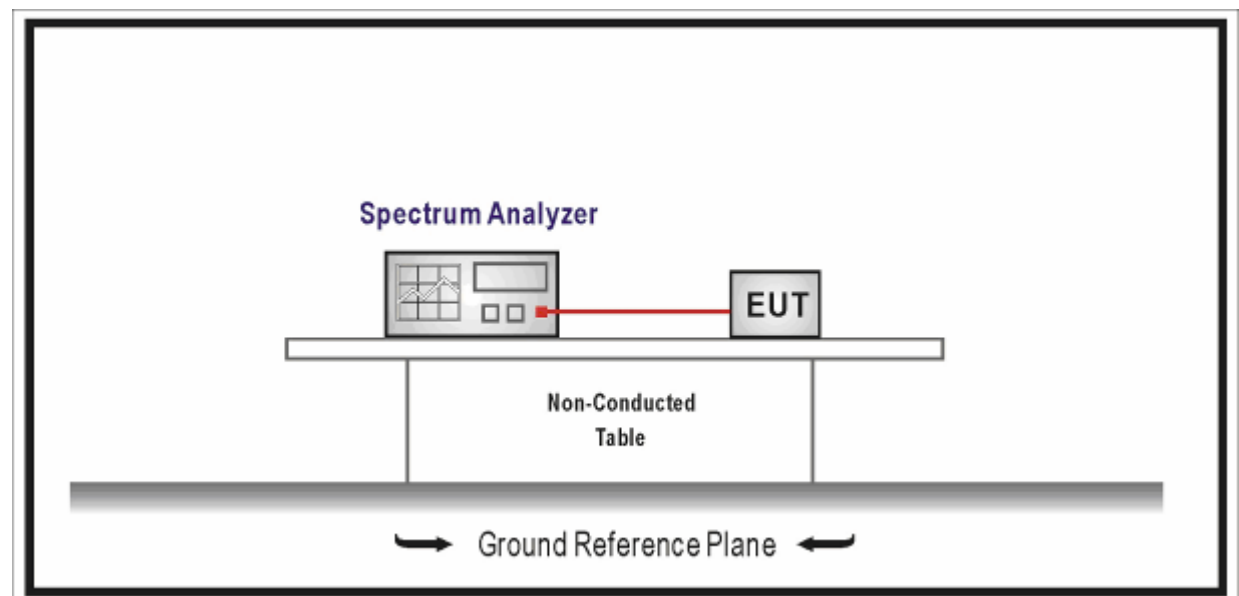
5.1. Test Equipment

RF Antenna Conducted Spurious / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016.01.07
Temperature/Humidity Meter	zhichen	ZC1-2	TR8-TH	2016.04.09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

5.2. Test Setup



5.3. Limit

FCC&IC

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

5.4. Test Procedure

According to FCC ANSI C63.4: 2014 & ANSI C63.10: 2013& FCC 47CFR 15.247& KDB
558074 D01v03r03& Industry Canada RSS-Gen Issue 4& RSS-247 Issue 1
Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

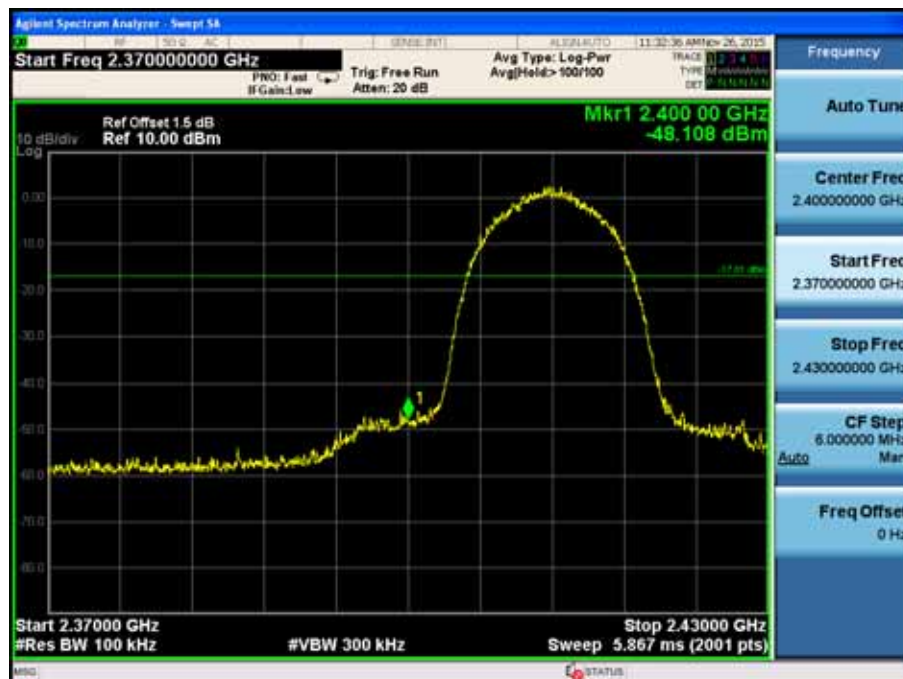
5.5. Uncertainty

The measurement uncertainty is defined as ± 1.27 dB

5.6. Test Result

Product	:	Cassia Hub
Test Item	:	RF Antenna Conducted Spurious
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit by 802.11b

Channel 01 (2412MHz)





Channel 06 (2437MHz)





Channel 11 (2462MHz)





Product	:	Cassia Hub
Test Item	:	RF Antenna Conducted Spurious
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmit by 802.11g

Channel 01 (2412MHz)



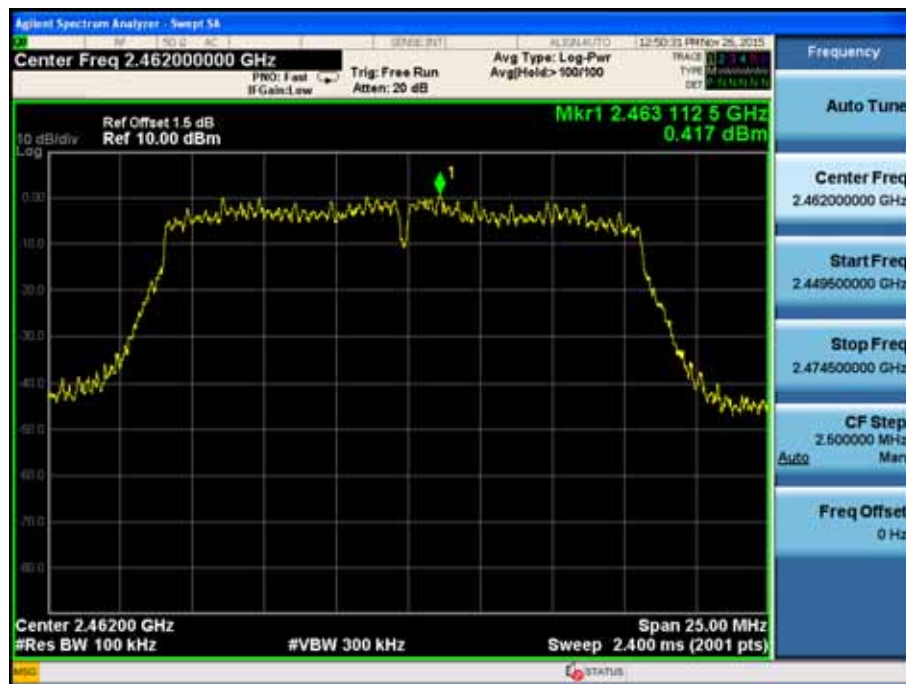


Channel 06 (2437MHz)





Channel 11 (2462MHz)





Product	:	Cassia Hub
Test Item	:	RF Antenna Conducted Spurious
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmit by 802.11n(20MHz)

Channel 01 (2412MHz)



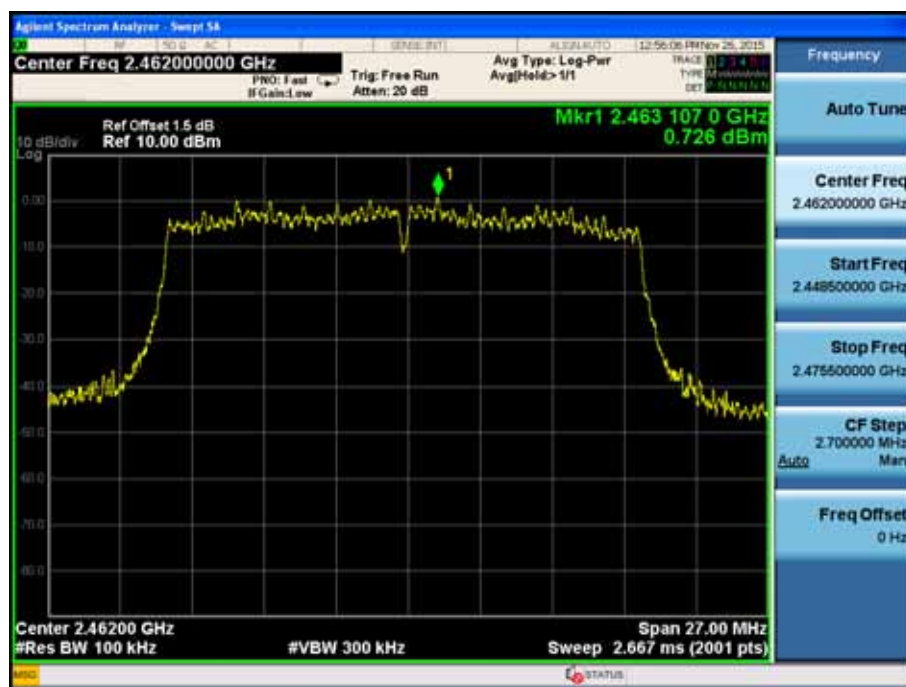


Channel 06 (2437MHz)





Channel 11 (2462MHz)





6. Radiated Emission Band Edge

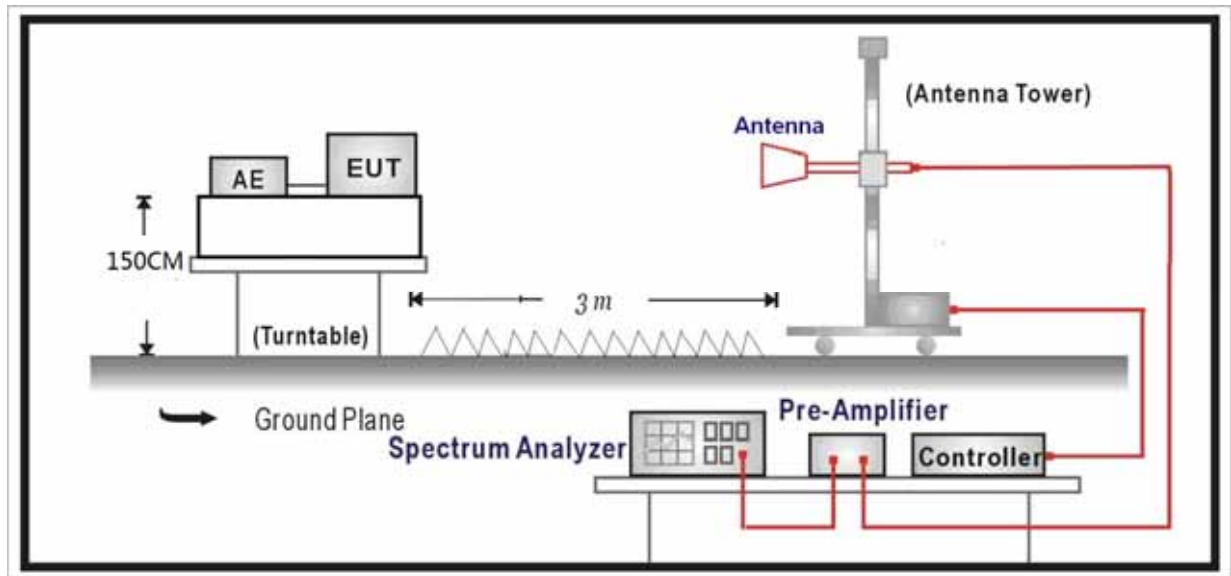
6.1. Test Equipment

☒ Radiated Emission Band Edge / AC-5

Instrument	Manufacturer	Type No.	Serial No.	Cali. Due Date
Preamplifier	Miteq	NSP1800-25	1364185	2016.05.03
Preamplifier	QuieTek	AP-040G	CHM-0906001	2016.05.03
Bilog Antenna	Teseq GmbH	CBL6112D	27612	2016.10.15
DRG Horn	ETS-Lindgren	3117	00123988	2016.01.07
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2016.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2016.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2016.03.01
EMI Receiver	Agilent	N9038A	MY51210196	2016.06.09
Temperature/Humidity Meter	Zhichen	ZC1-2	AC5-TH	2016.01.08

Note 1: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

6.2. Test Setup



6.3. Limit

FCC&IC

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

6.4. Test Procedure

According to FCC ANSI C63.4: 2014 & ANSI C63.10: 2013& FCC 47CFR 15.247& KDB 558074 D01v03r03& Industry Canada RSS-Gen Issue 4& RSS-247 Issue 1

This test is required for any spurious emission or modulation product that falls in a Restricted Band, as defined in Section 15.205 of FCC part 15. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.4 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a

high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b) of FCC part 15.

Now set the VBW $\geq 1 / T$ (the minimum transmission duration), while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209 of FCC Part 15.

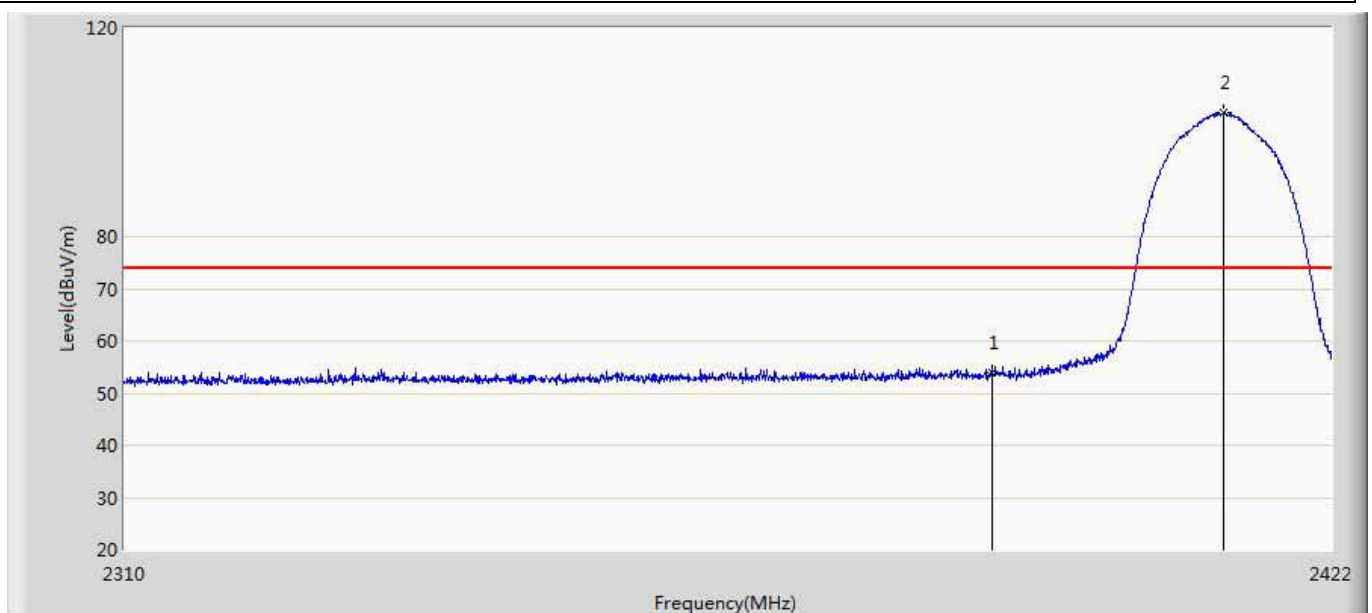
If the emission on which a radiated measurement must be made is located at the edge of the authorized band of operation, then the alternative “marker-delta” method may be employed.

6.5. Uncertainty

The measurement uncertainty above 1G is defined as ± 3.9 dB

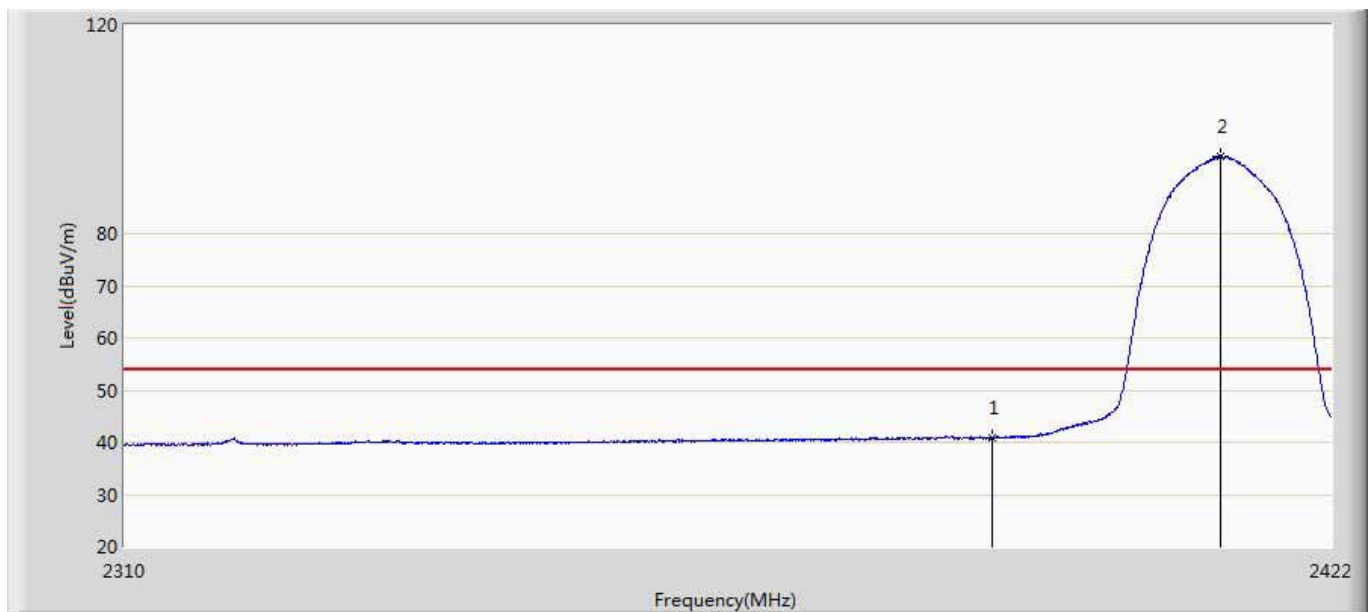
6.6. Test Result

Profile: 15.247	Page No.: 1
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 19:03
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 1 Transmit at 802.11b CH2412	



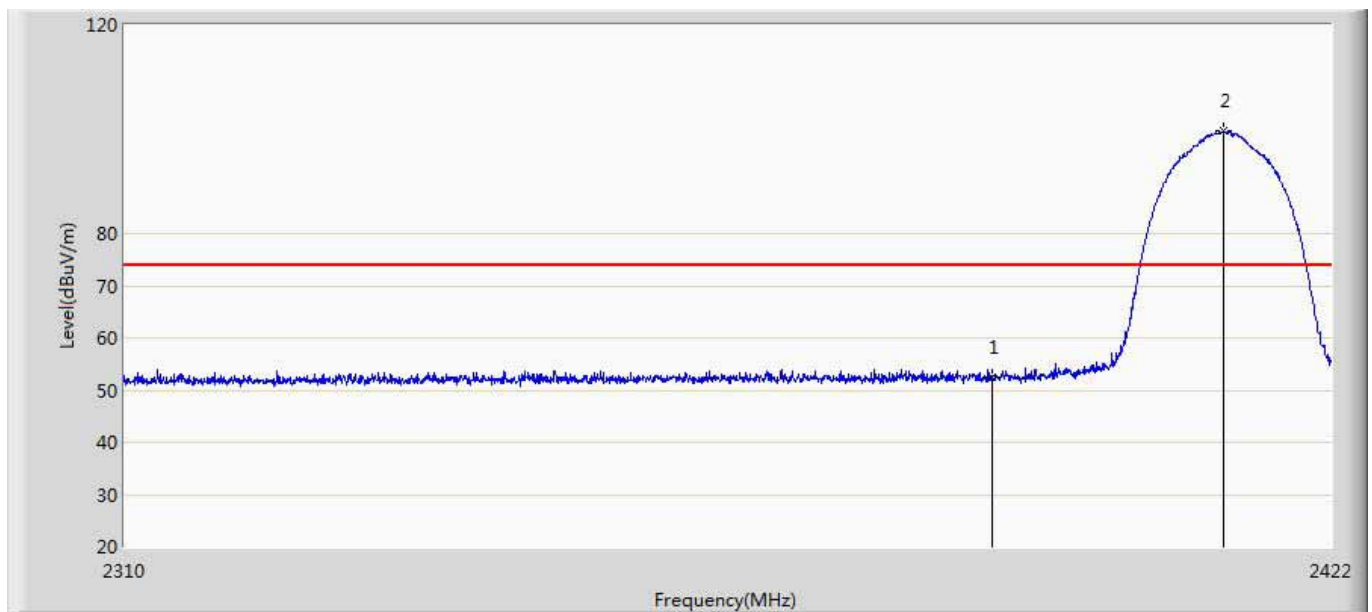
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	53.915	16.052	-20.085	74.000	37.863	PK
2	*	2411.864	103.717	65.881	N/A	N/A	37.836	PK

Profile: 15.247	Page No.: 2
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 19:06
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 1 Transmit at 802.11b CH2412	



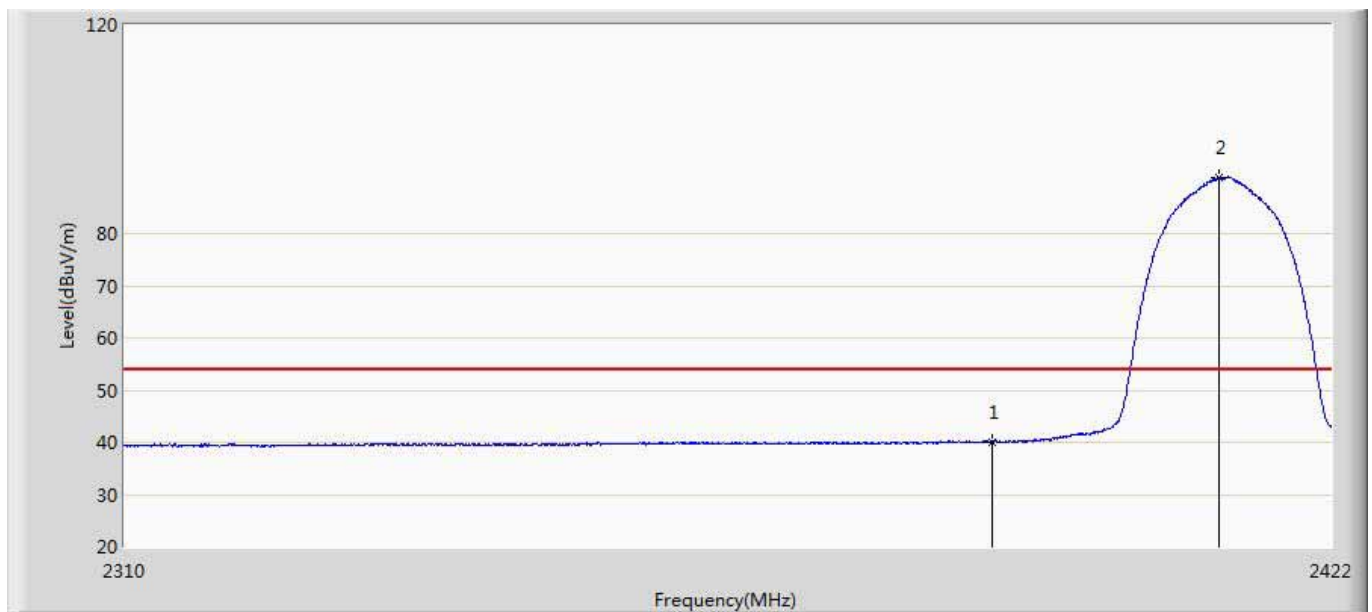
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	40.836	2.973	-13.164	54.000	37.863	AV
2	*	2411.584	94.817	56.982	N/A	N/A	37.835	AV

Profile: 15.247	Page No.: 3
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 19:08
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 1 Transmit at 802.11b CH2412	



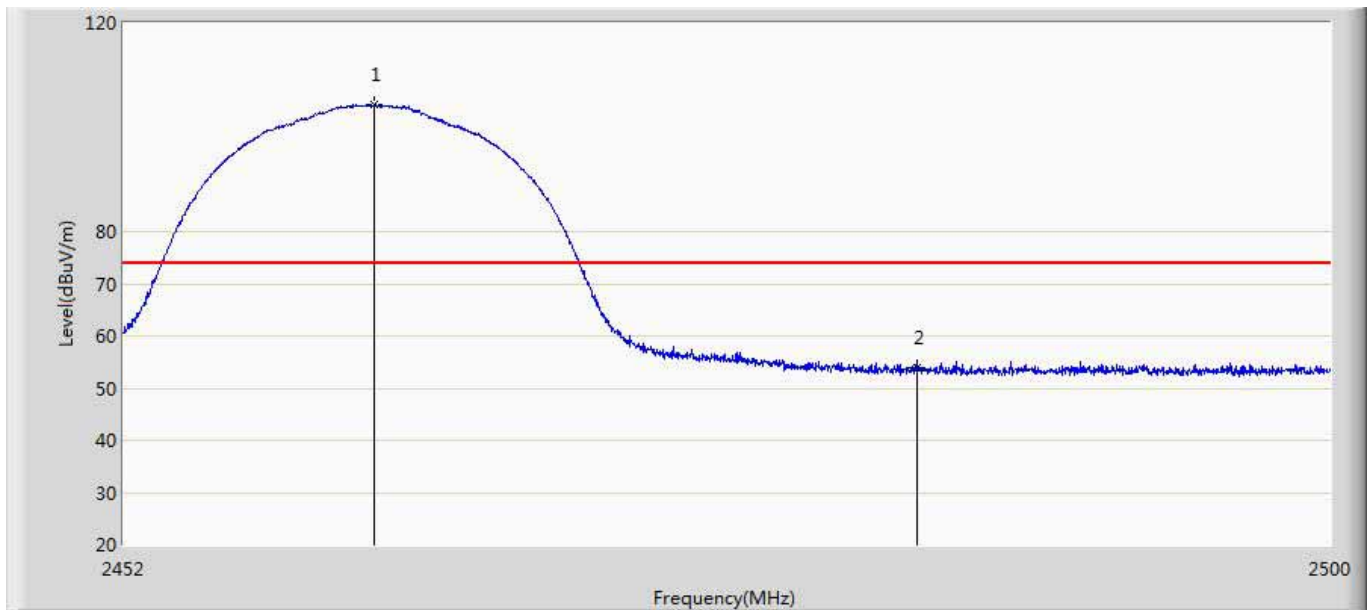
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	52.568	14.705	-21.432	74.000	37.863	PK
2	*	2411.808	99.596	61.760	N/A	N/A	37.836	PK

Profile: 15.247	Page No.: 4
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 19:09
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 1 Transmit at 802.11b CH2412	



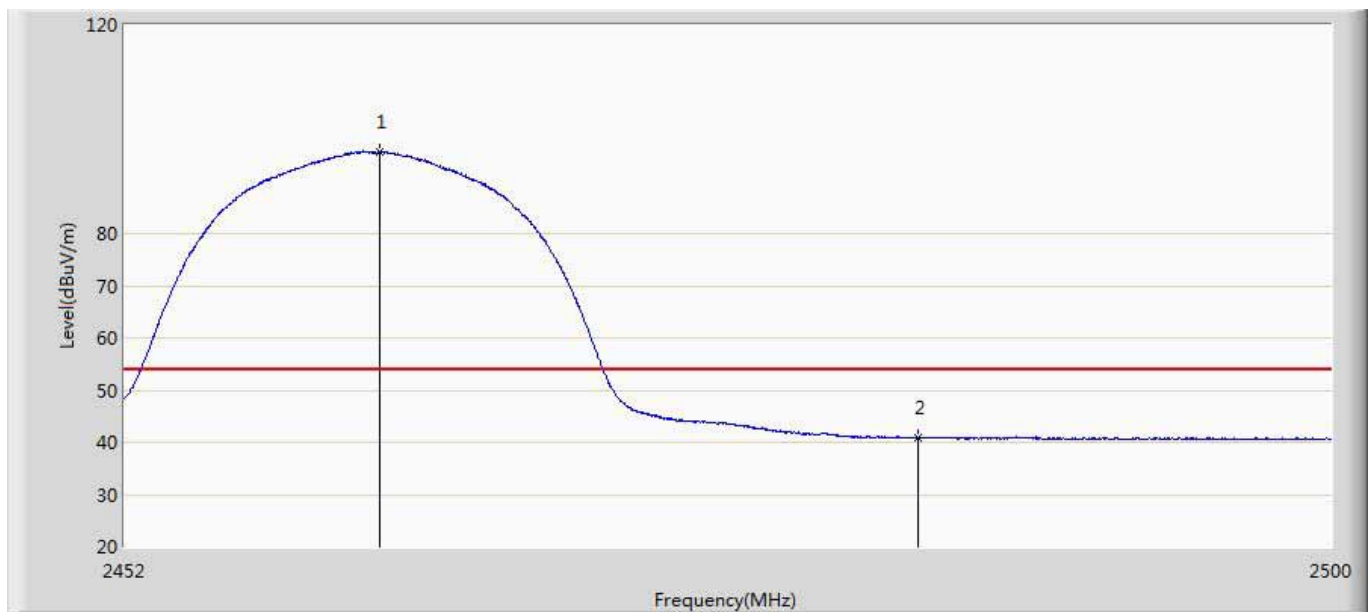
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	40.135	2.272	-13.865	54.000	37.863	AV
2	*	2411.360	90.664	52.831	N/A	N/A	37.833	AV

Profile: 15.247	Page No.: 5
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 19:12
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 1 Transmit at 802.11b CH2462	



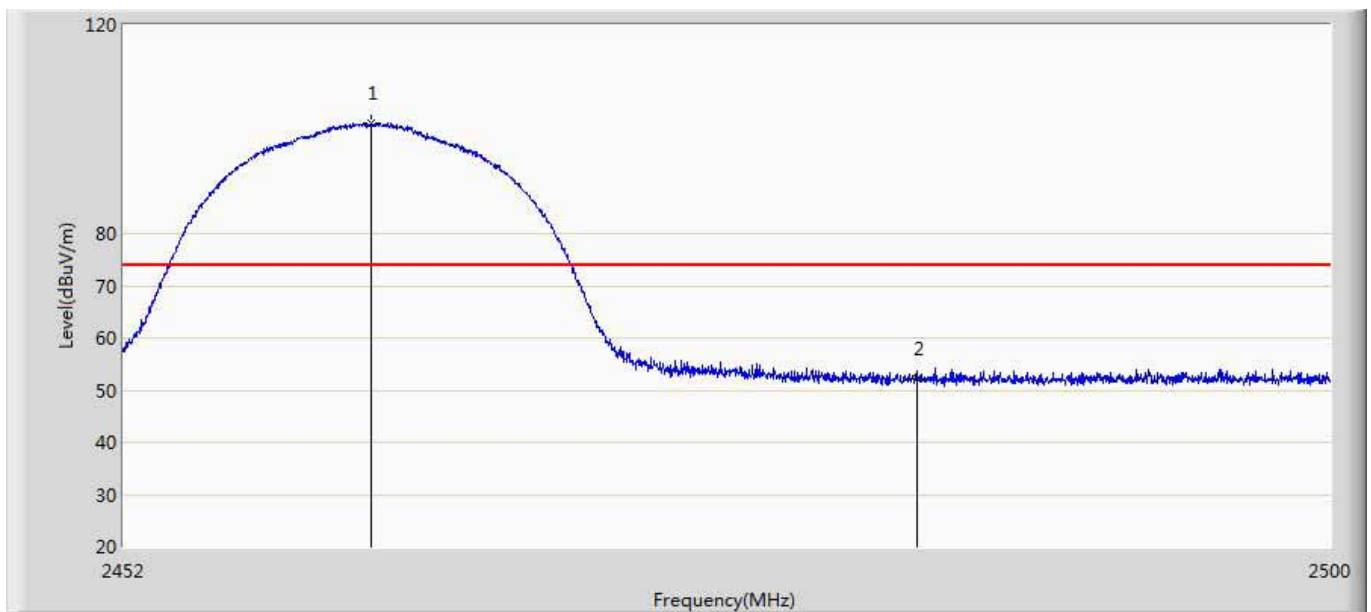
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2461.888	104.321	66.314	N/A	N/A	38.007	PK
2		2483.500	53.858	15.820	-20.142	74.000	38.038	PK

Profile: 15.247	Page No.: 6
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 19:14
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 1 Transmit at 802.11b CH2462	



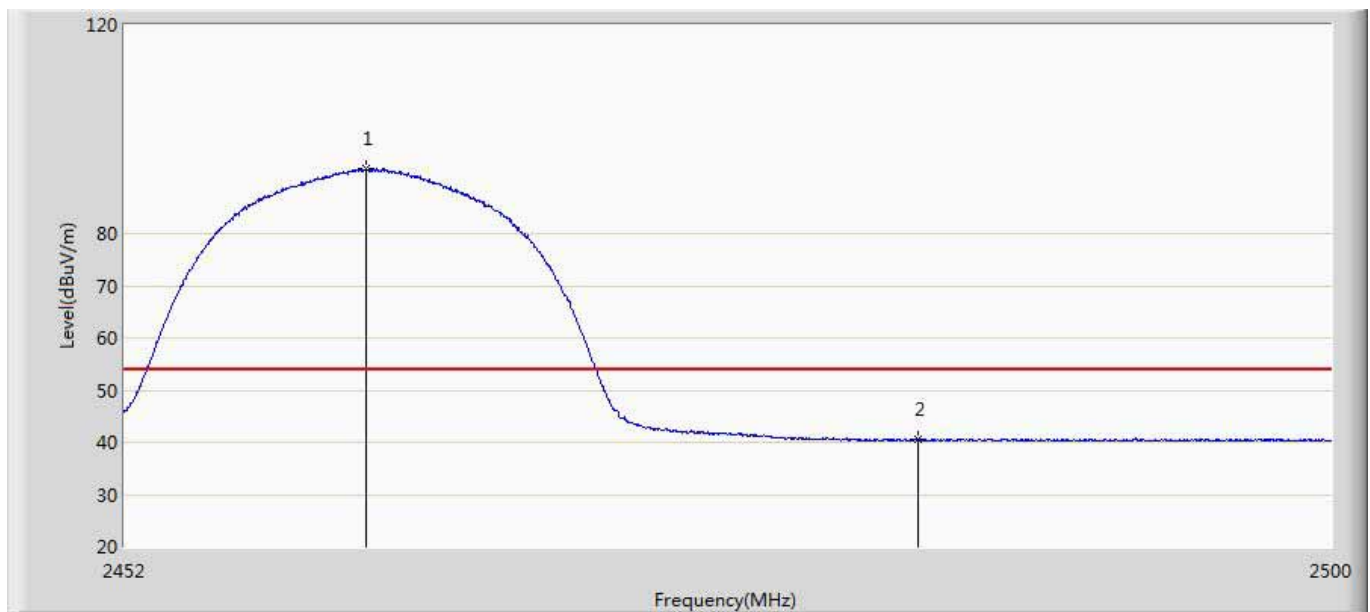
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2462.080	95.648	57.641	N/A	N/A	38.007	AV
2		2483.500	40.812	2.774	-13.188	54.000	38.038	AV

Profile: 15.247	Page No.: 7
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 19:20
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 1 Transmit at 802.11b CH2462	



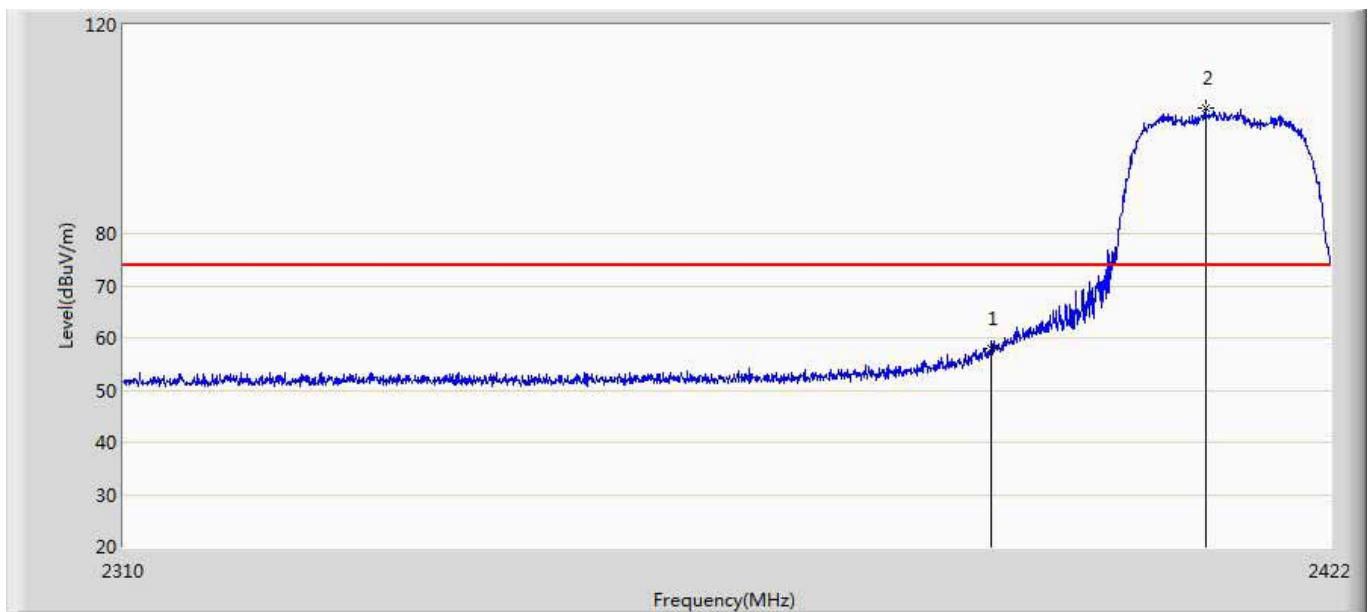
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2461.792	101.224	63.217	N/A	N/A	38.007	PK
2		2483.500	52.075	14.037	-21.925	74.000	38.038	PK

Profile: 15.247	Page No.: 8
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 19:21
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 1 Transmit at 802.11b CH2462	



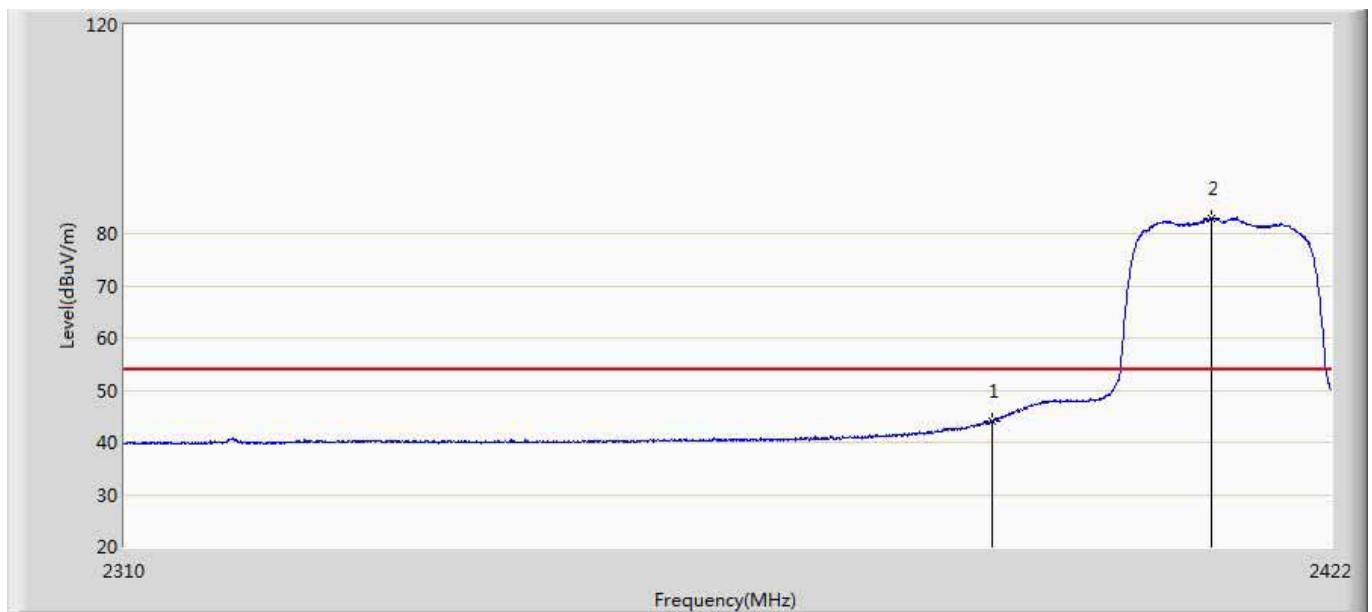
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2461.552	92.548	54.542	N/A	N/A	38.005	AV
2		2483.500	40.501	2.463	-13.499	54.000	38.038	AV

Profile: 15.247	Page No.: 9
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 19:27
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 2 Transmit at 802.11g CH2412	



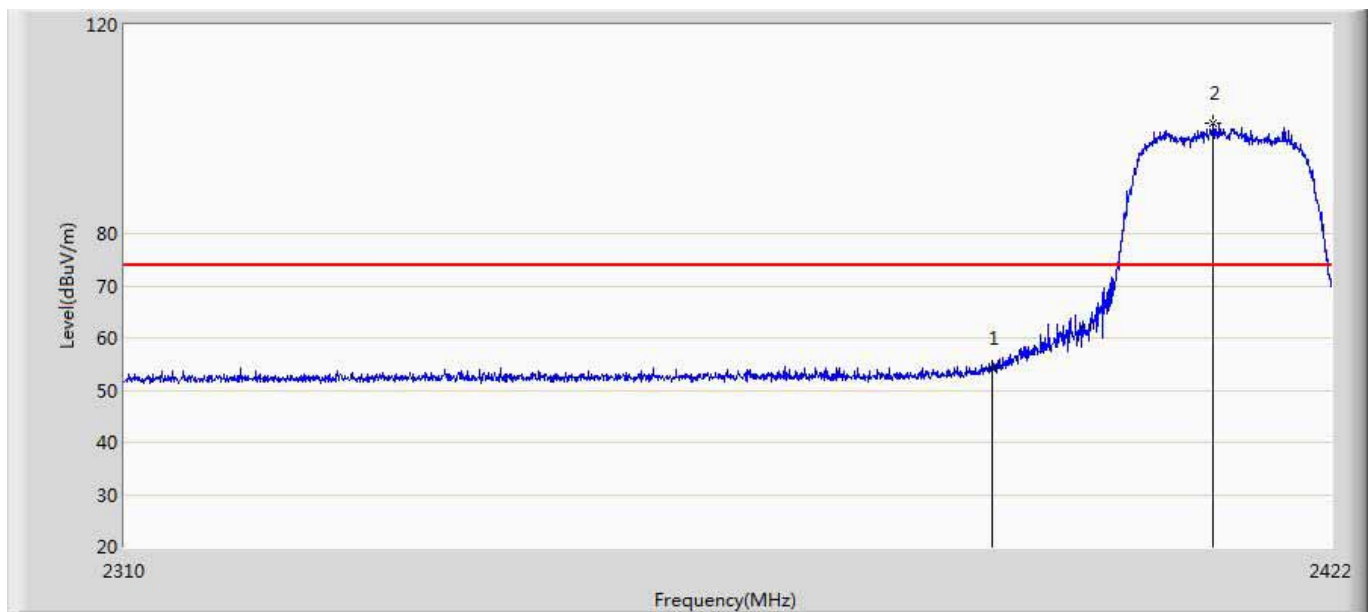
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	57.939	20.076	-16.061	74.000	37.863	PK
2	*	2410.184	104.003	66.171	N/A	N/A	37.832	PK

Profile: 15.247	Page No.: 10
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 19:30
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 2 Transmit at 802.11g CH2412	



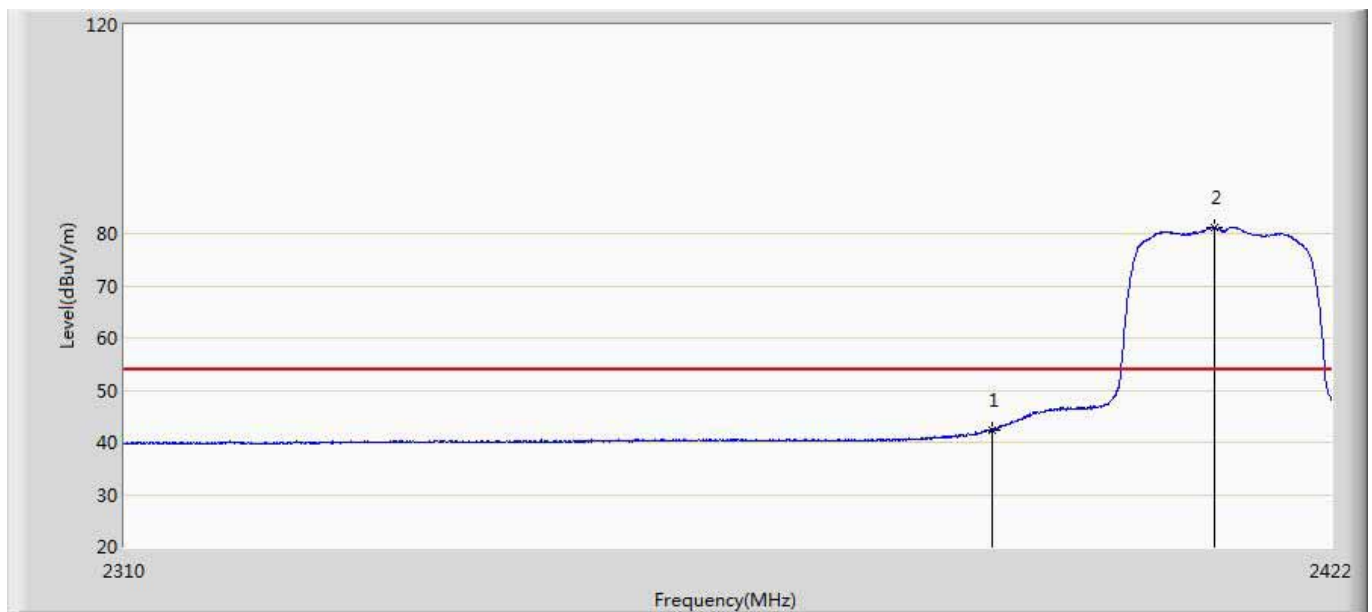
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	43.998	6.135	-10.002	54.000	37.863	AV
2	*	2410.744	83.041	45.209	N/A	N/A	37.832	AV

Profile: 15.247	Page No.: 11
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 19:33
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 2 Transmit at 802.11g CH2412	



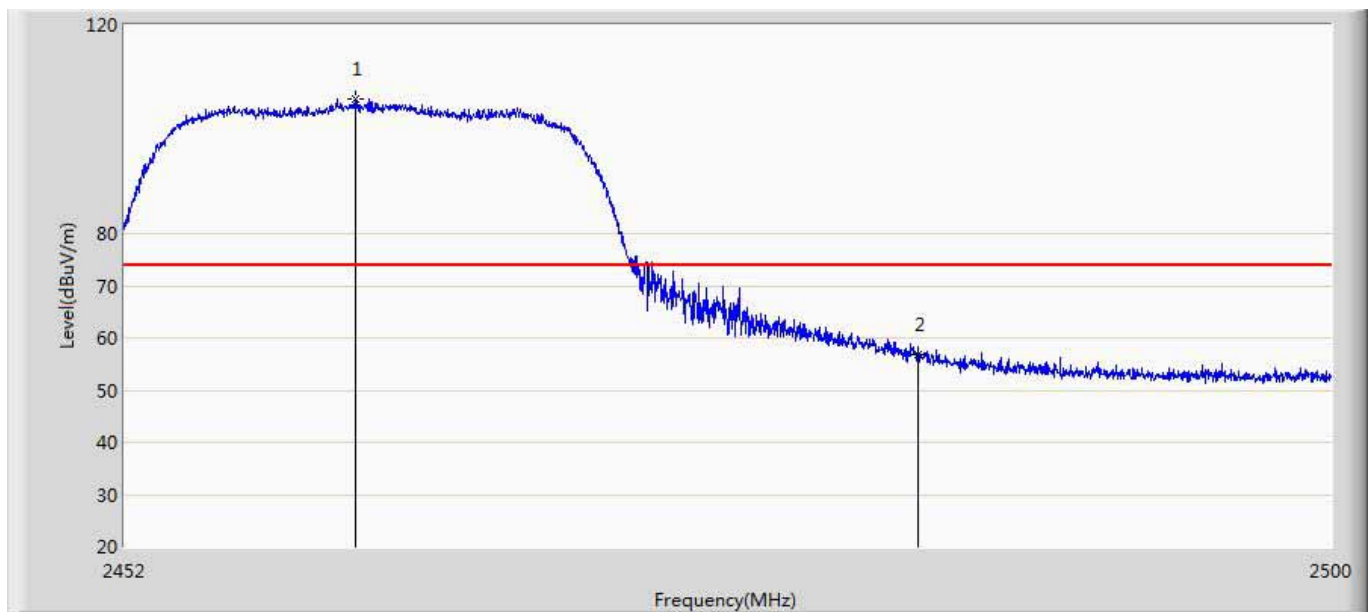
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	54.312	16.449	-19.688	74.000	37.863	PK
2	*	2410.856	101.127	63.296	N/A	N/A	37.832	PK

Profile: 15.247	Page No.: 12
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 19:35
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 2 Transmit at 802.11g CH2412	



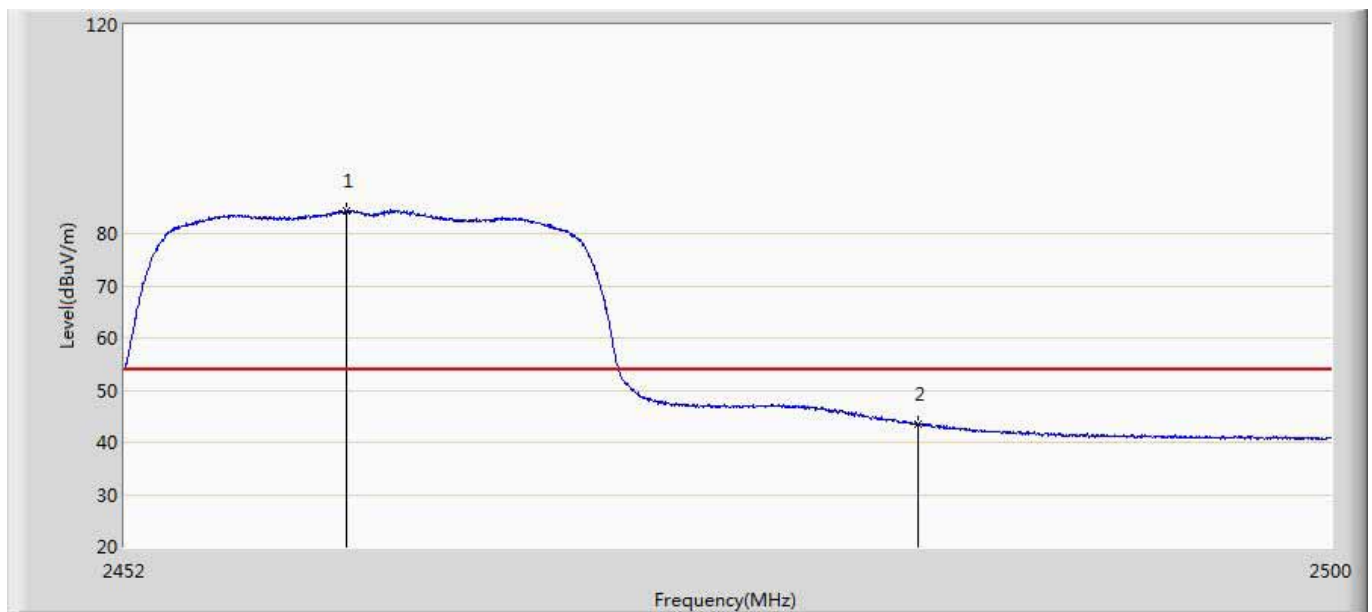
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	42.387	4.524	-11.613	54.000	37.863	AV
2	*	2411.024	81.099	43.268	N/A	N/A	37.831	AV

Profile: 15.247	Page No.: 13
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 19:39
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 2 Transmit at 802.11g CH2462	



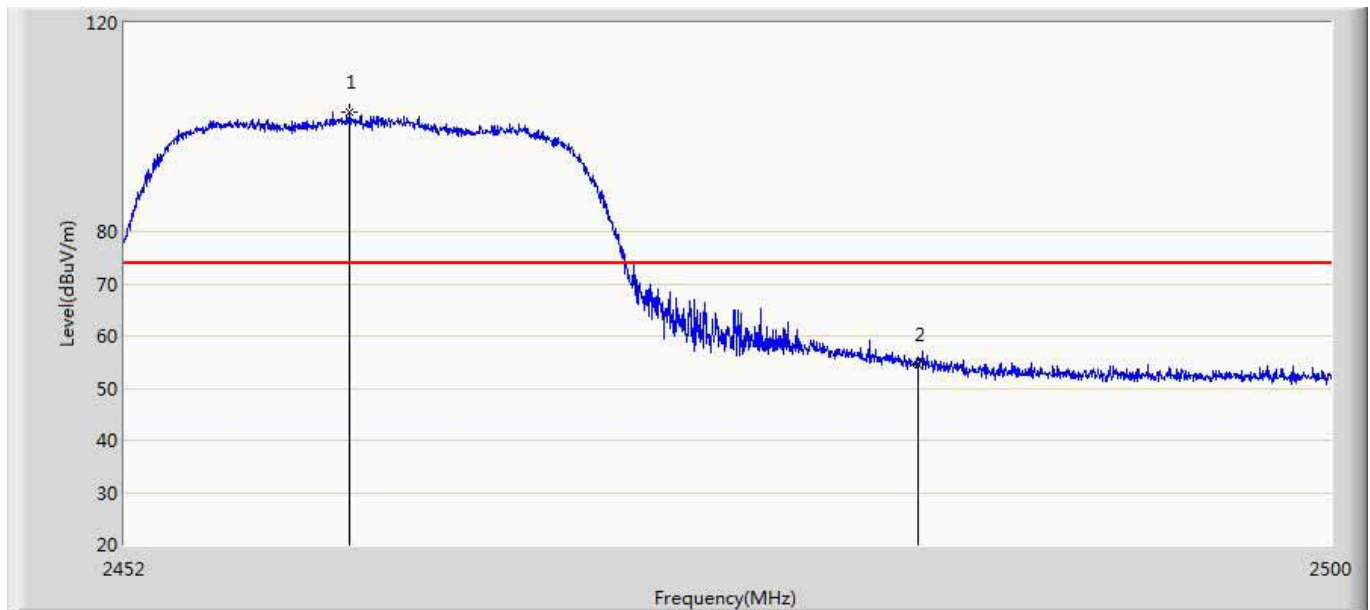
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2461.120	105.845	67.841	N/A	N/A	38.004	PK
2		2483.500	56.885	18.847	-17.115	74.000	38.038	PK

Profile: 15.247	Page No.: 14
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 19:41
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 2 Transmit at 802.11g CH2462	



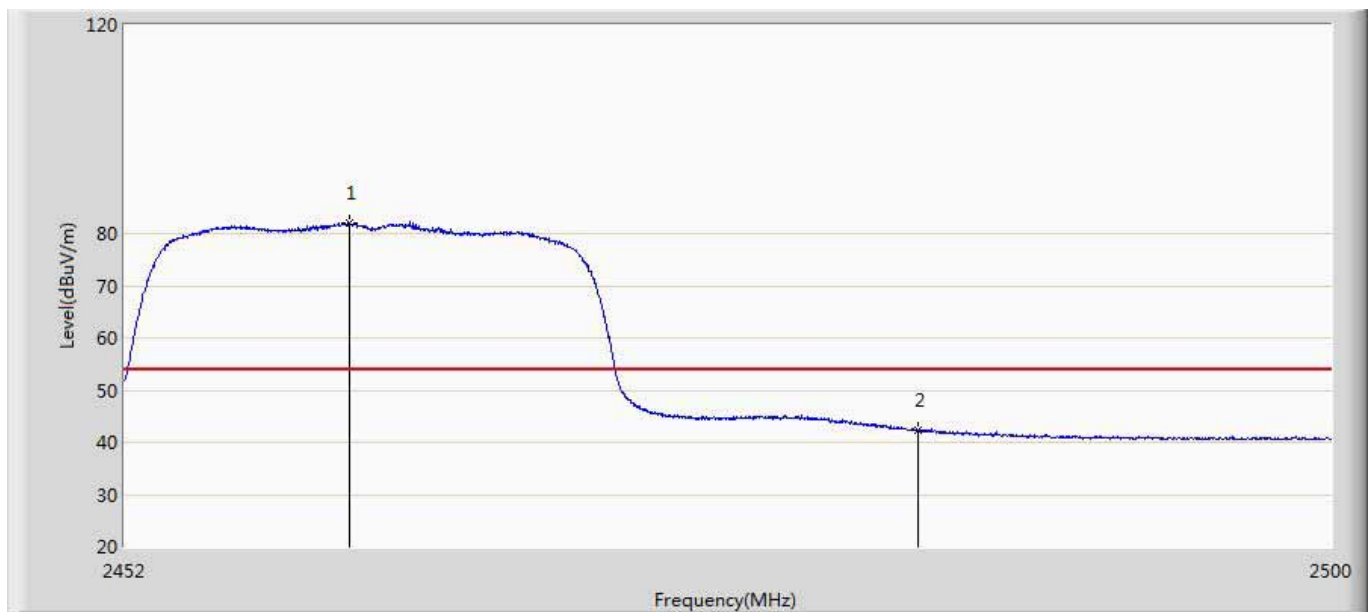
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2460.784	84.443	46.440	N/A	N/A	38.003	AV
2		2483.500	43.586	5.548	-10.414	54.000	38.038	AV

Profile: 15.247	Page No.: 15
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 19:43
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 2 Transmit at 802.11g CH2462	



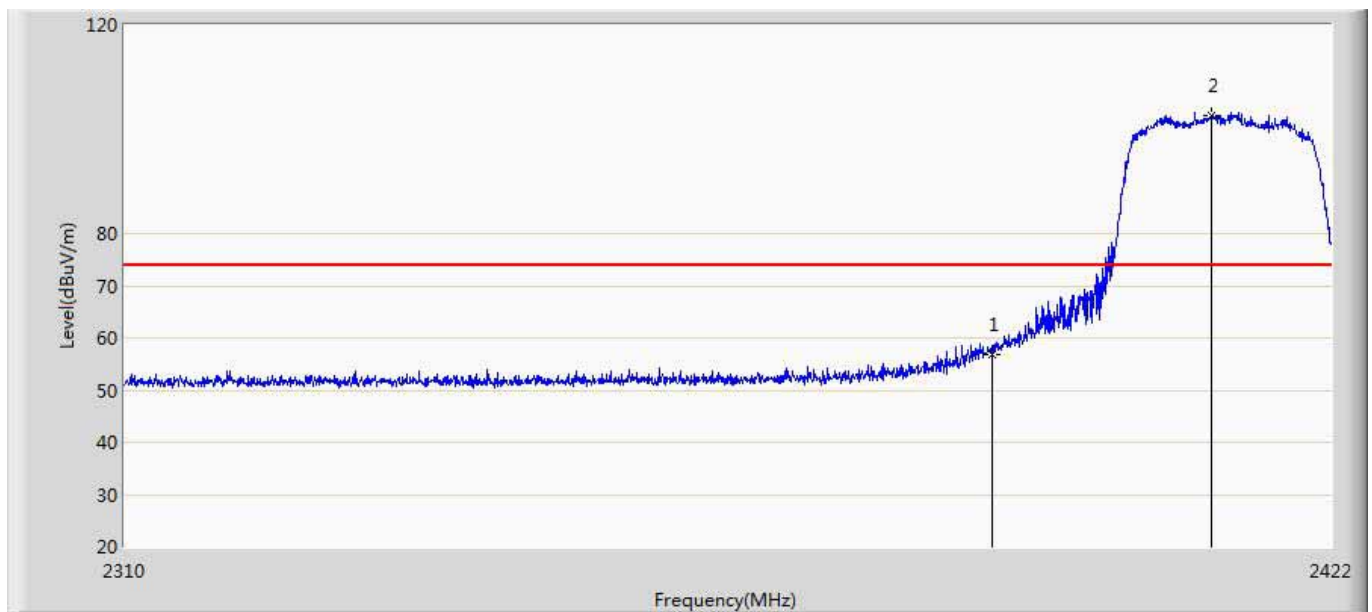
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2460.880	102.894	64.891	N/A	N/A	38.003	PK
2		2483.500	54.595	16.557	-19.405	74.000	38.038	PK

Profile: 15.247	Page No.: 16
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 19:45
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 2 Transmit at 802.11g CH2462	



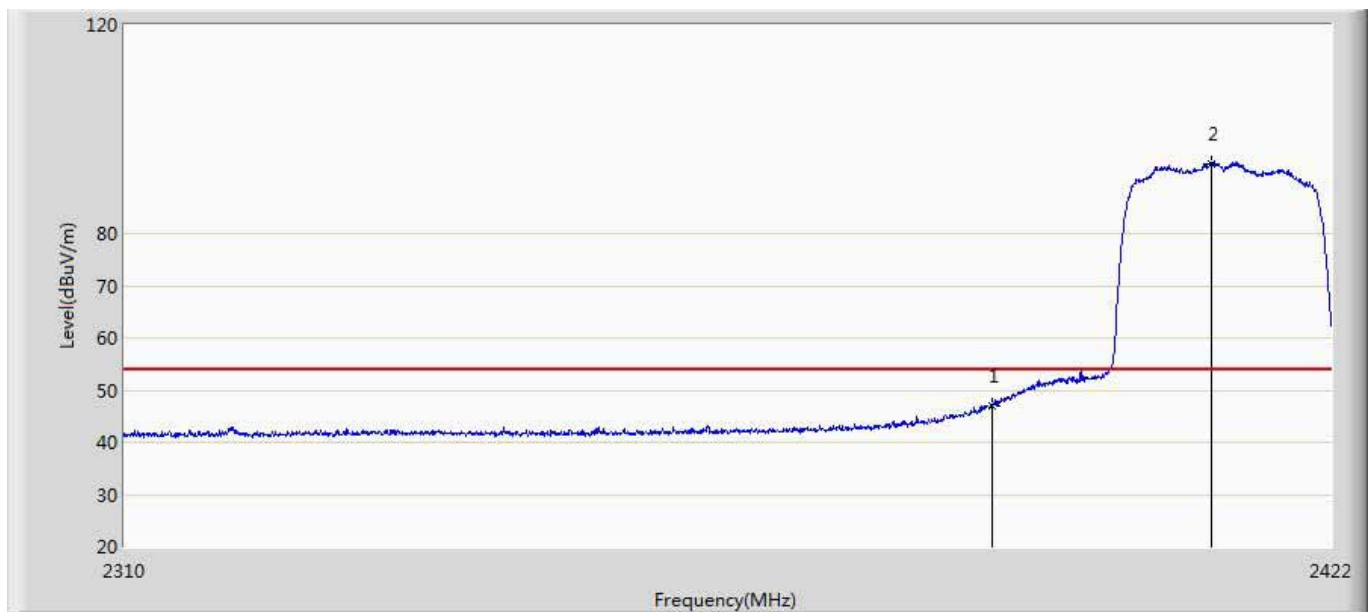
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2460.904	82.122	44.119	N/A	N/A	38.003	AV
2		2483.500	42.377	4.339	-11.623	54.000	38.038	AV

Profile: 15.247	Page No.: 17
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 19:47
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 3 Transmit at 802.11n20 CH2412	



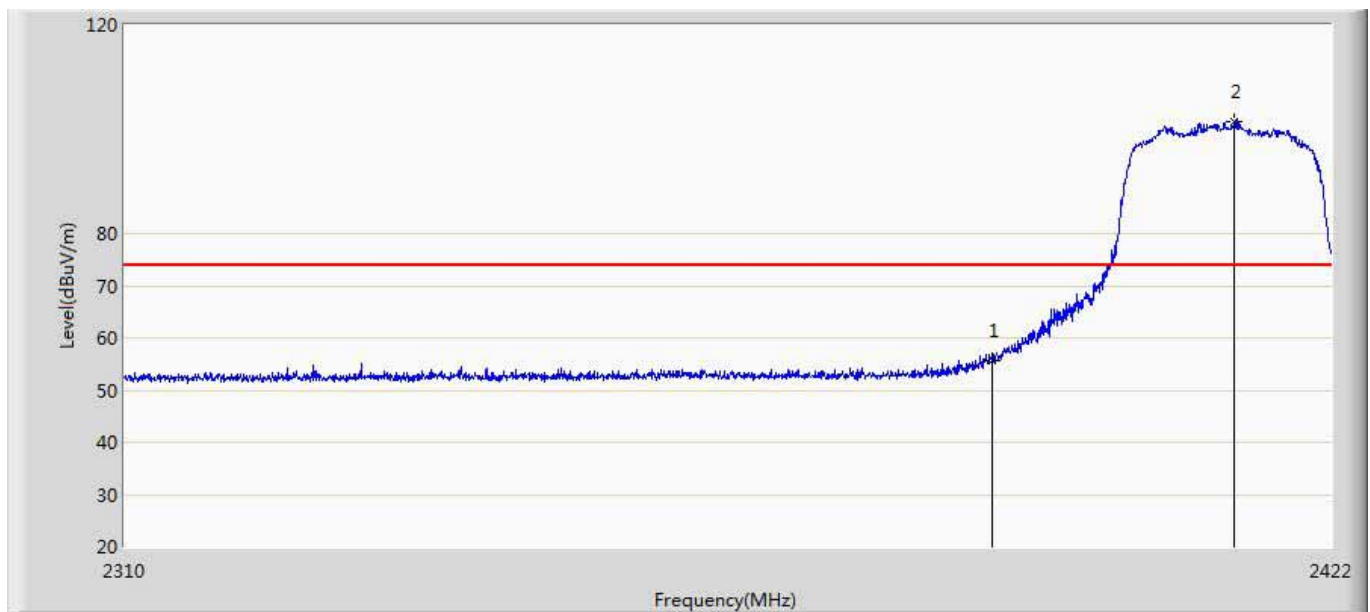
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	56.948	19.085	-17.052	74.000	37.863	PK
2	*	2410.688	102.477	64.645	N/A	N/A	37.832	PK

Profile: 15.247	Page No.: 18
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 19:50
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 3 Transmit at 802.11n20 CH2412	



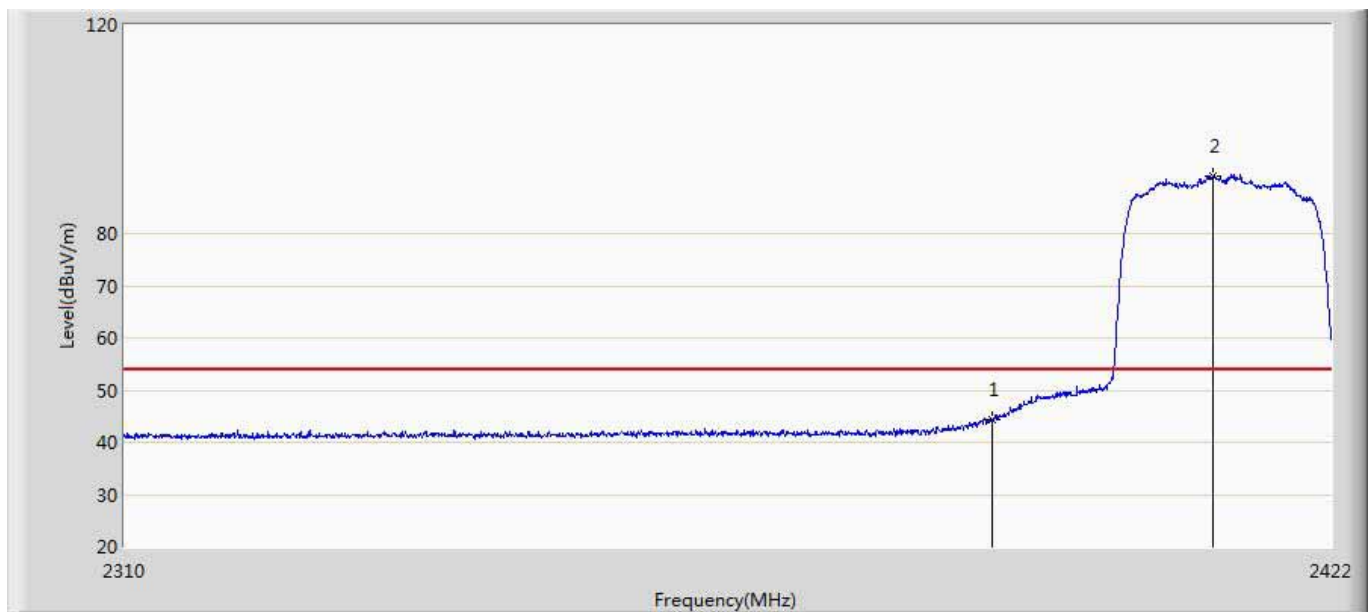
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	46.932	9.069	-7.068	54.000	37.863	AV
2	*	2410.688	93.465	55.633	N/A	N/A	37.832	AV

Profile: 15.247	Page No.: 19
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 19:52
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 3 Transmit at 802.11n20 CH2412	



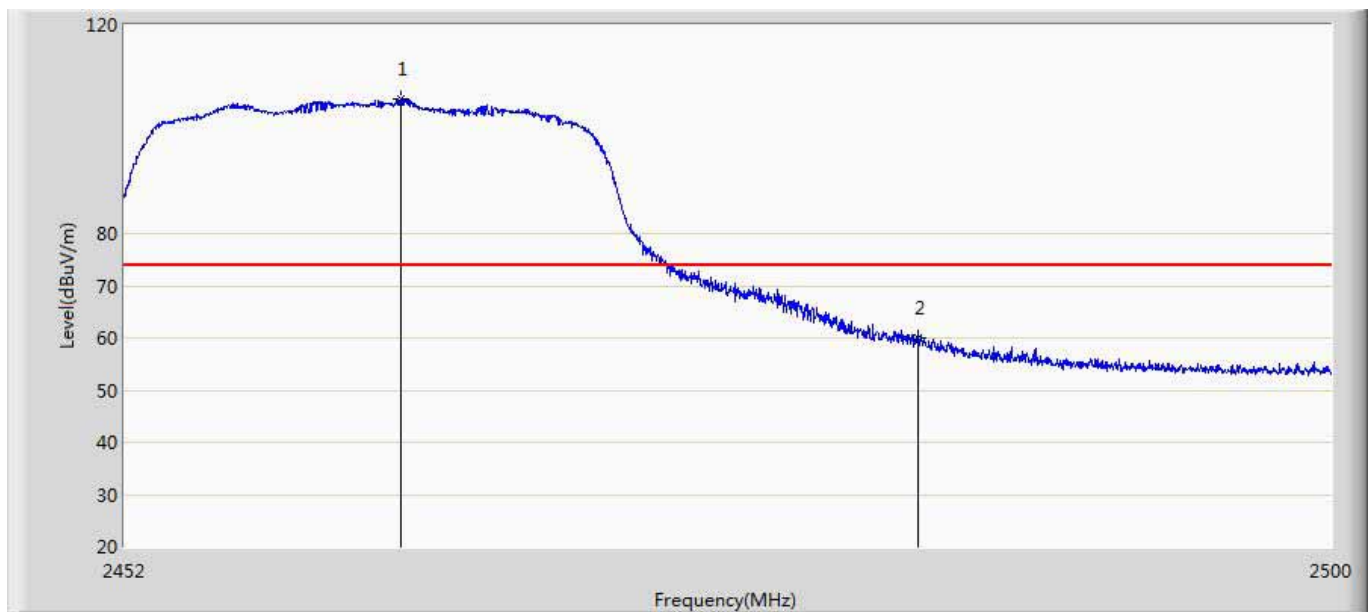
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	55.662	17.799	-18.338	74.000	37.863	PK
2	*	2412.816	101.564	63.722	N/A	N/A	37.842	PK

Profile: 15.247	Page No.: 20
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 19:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 3 Transmit at 802.11n20 CH2412	



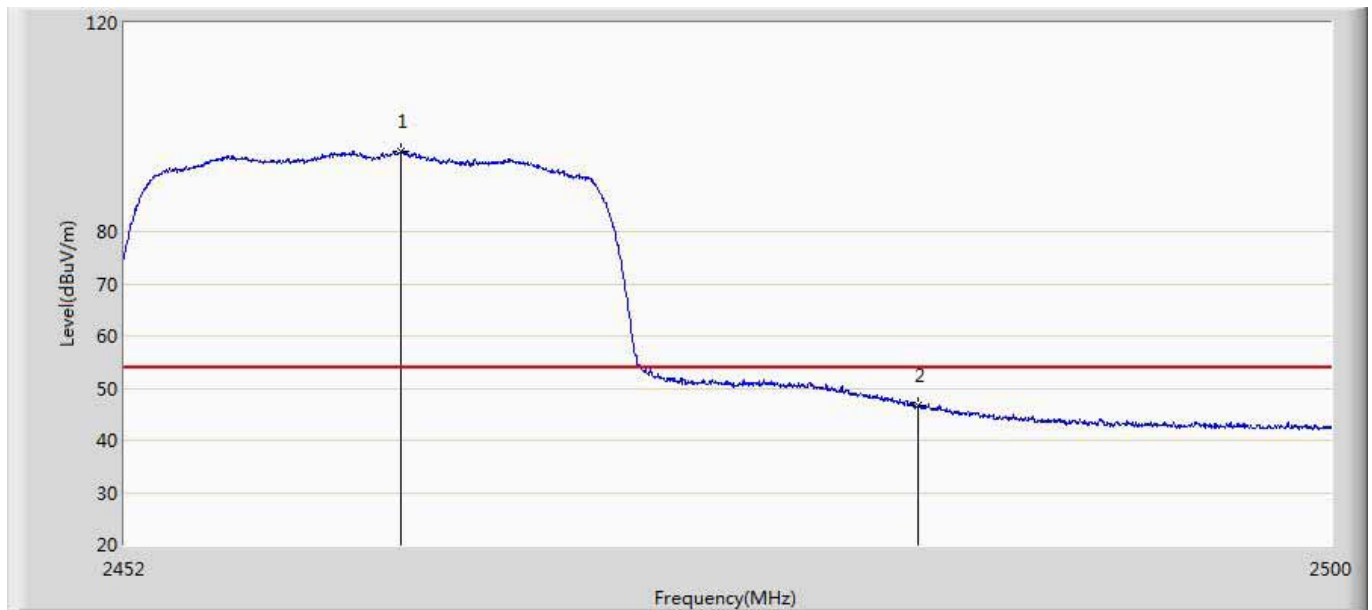
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	44.217	6.354	-9.783	54.000	37.863	AV
2	*	2410.800	91.051	53.219	N/A	N/A	37.832	AV

Profile: 15.247	Page No.: 21
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 20:01
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 3 Transmit at 802.11n20 CH2462	



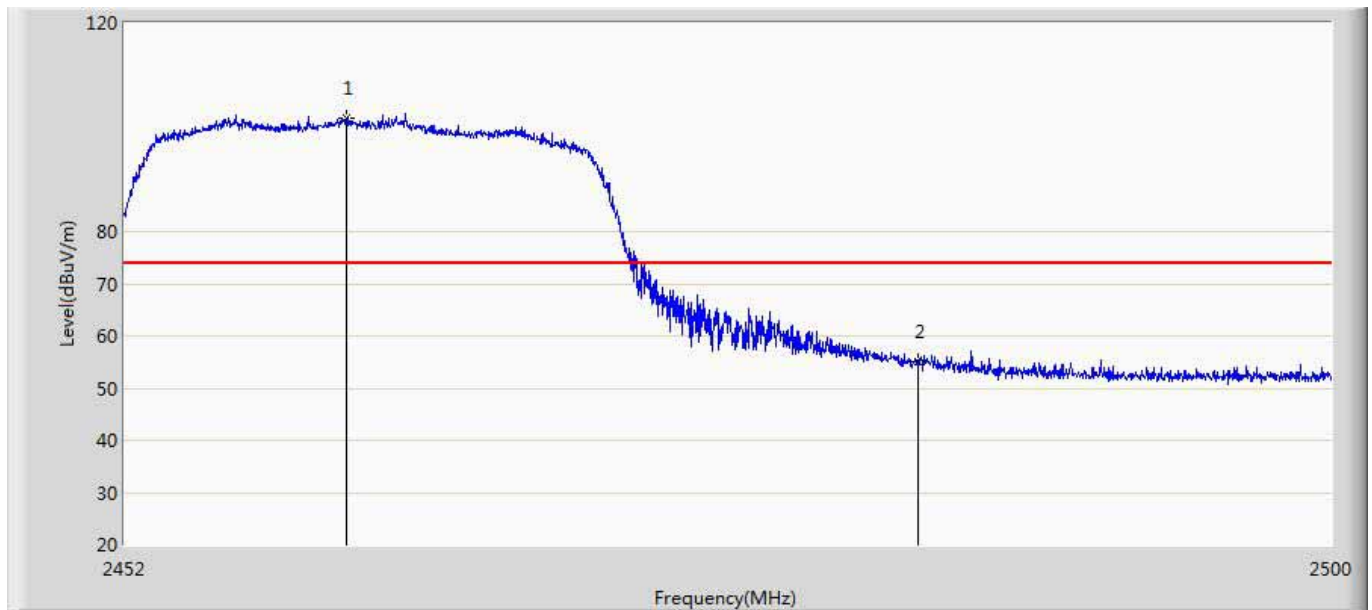
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2462.896	105.912	67.905	N/A	N/A	38.007	PK
2		2483.500	59.882	21.844	-14.118	74.000	38.038	PK

Profile: 15.247	Page No.: 22
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 20:02
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 3 Transmit at 802.11n20 CH2462	



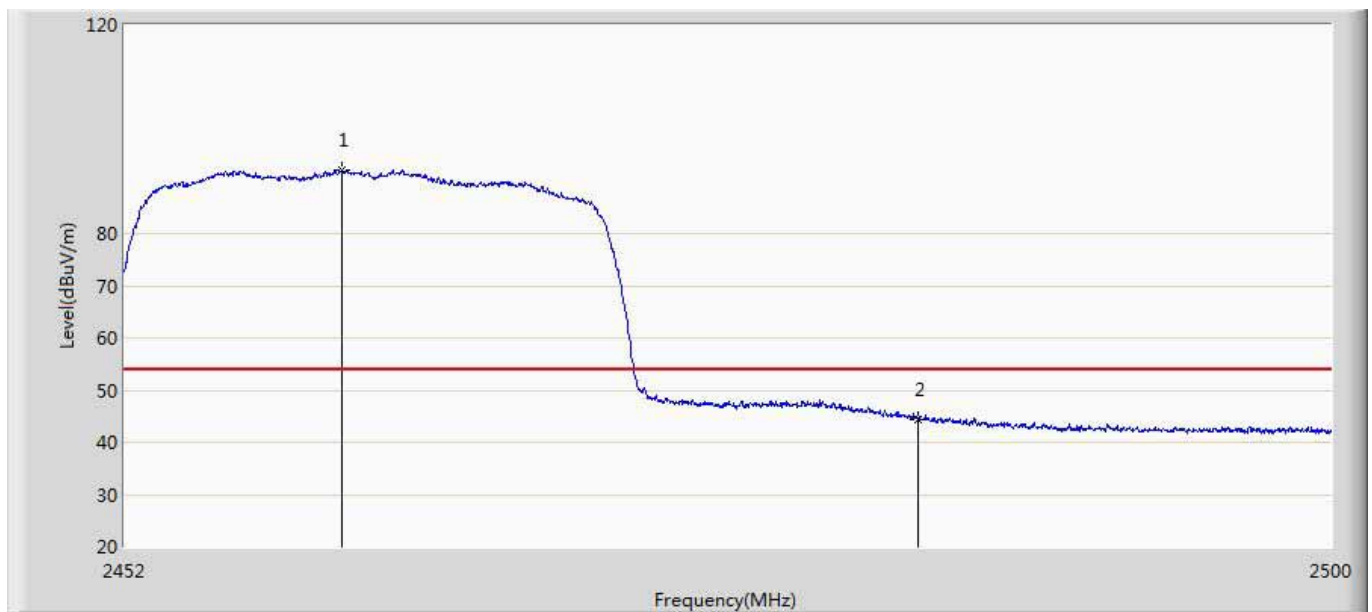
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2462.920	95.388	57.381	N/A	N/A	38.007	AV
2		2483.500	46.527	8.489	-7.473	54.000	38.038	AV

Profile: 15.247	Page No.: 23
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 20:04
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 3 Transmit at 802.11n20 CH2462	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2460.760	101.845	63.842	N/A	N/A	38.003	PK
2		2483.500	54.960	16.922	-19.040	74.000	38.038	PK

Profile: 15.247	Page No.: 24
Engineer: Cloud	
Site: AC5	Time: 2015/11/26 - 20:06
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Cassia Hub	Power: AC 120V/60Hz
Note: Mode 3 Transmit at 802.11n20 CH2462	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2460.568	92.308	54.306	N/A	N/A	38.001	AV
2		2483.500	44.468	6.430	-9.532	54.000	38.038	AV

7. Occupied Bandwidth

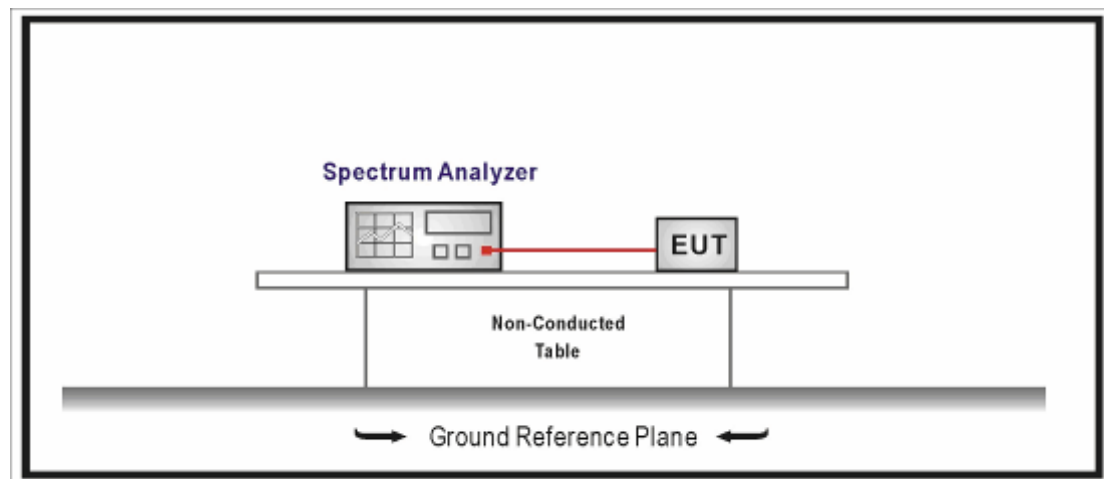
7.1. Test Equipment

Occupied Bandwidth / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016.01.07
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2016.04.09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

7.2. Test Setup



7.3. Limit

For FCC

99% occupied bandwidth should be less than the nominal bandwidth.

For IC

The minimum 6dB bandwidth shall be at least 500 kHz.

7.4. Test Procedure

The EUT was setup according to ANSI C63.4: 2014; tested according to DTS test procedure of ANSI C63.10 requirements.

When the average power is exercised, the measured power is to be referenced to the OBW (99% occupied bandwidth) rather than to the DTS bandwidth according to Clause 11.9.2.1 of ANSI C63.10.

The 99% bandwidth test is using ANSI C63.10 Section 6.9.3 method.

- a) Set RBW = in the range of 1% to 5% of the OBW.
- b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

7.5. Uncertainty

The measurement uncertainty is defined as ± 1 kHz

7.6. Test Result

Product	:	Cassia Hub
Test Item	:	99% Occupied Bandwidth
Test Mode	:	Mode 1: Transmit by 802.11b

Channel No.	Frequency (MHz)	99%Occupied Bandwidth (kHz)	6dB Occupied Bandwidth (kHz)	Limit (kHz)	Result
01	2412	12193	7559	500	Pass
06	2437	12307	7585	500	Pass
11	2462	12312	7594	500	Pass

Channel 01 (2412MHz)



Channel 06 (2437MHz)



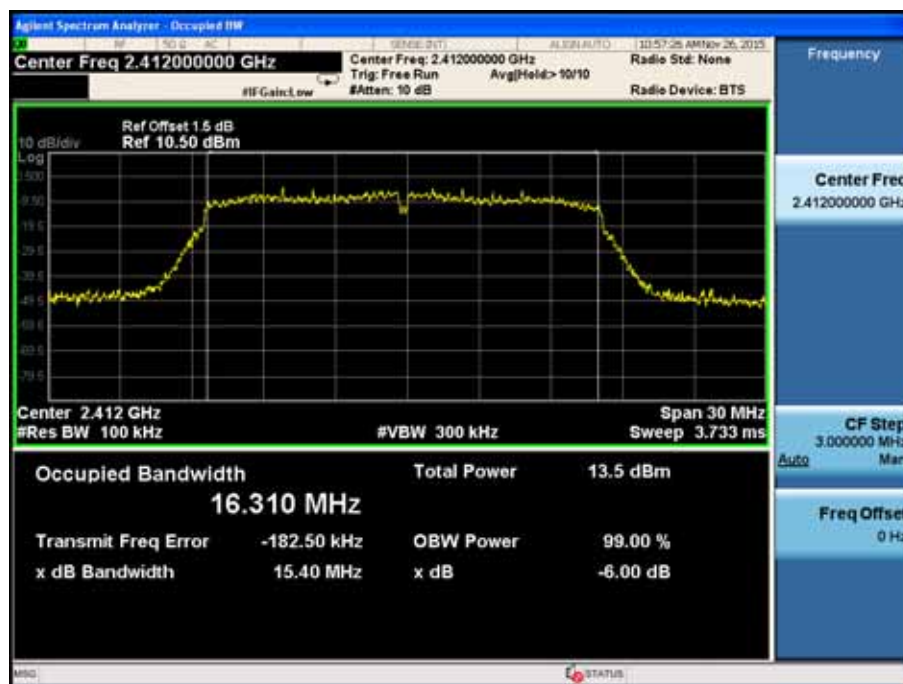
Channel 11 (2462MHz)



Product	:	Cassia Hub
Test Item	:	99% Occupied Bandwidth
Test Mode	:	Mode 2: Transmit by 802.11g

Channel No.	Frequency (MHz)	99%Occupied Bandwidth (kHz)	6dB Occupied Bandwidth (kHz)	Limit (kHz)	Result
01	2412	16310	15400	500	Pass
06	2437	16329	15340	500	Pass
11	2462	16312	15120	500	Pass

Channel 01 (2412MHz)(Ant 2)



Channel 06 (2437MHz) (Ant 2)



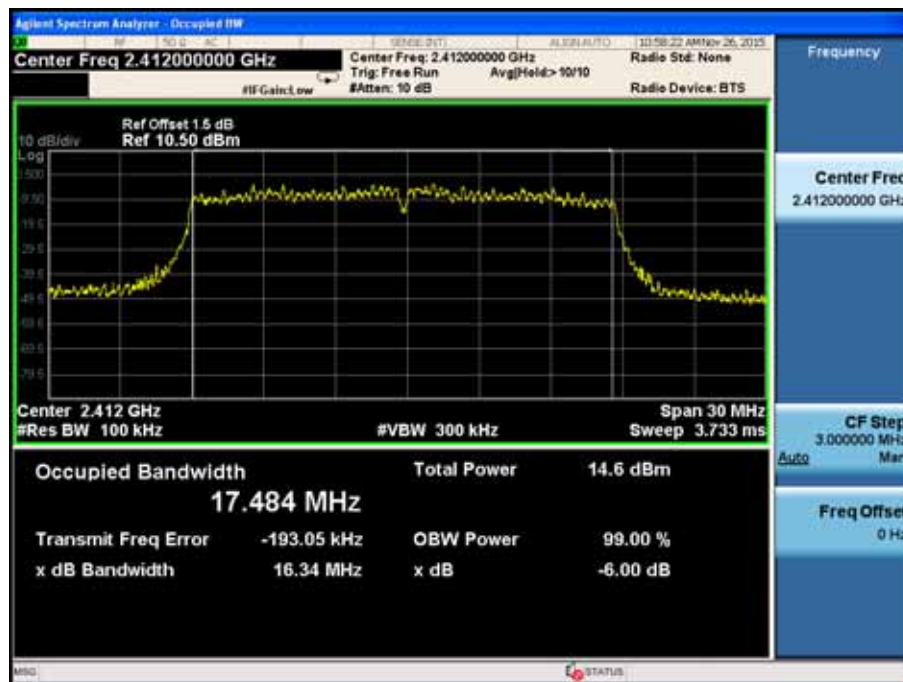
Channel 11 (2462MHz) (Ant 2)



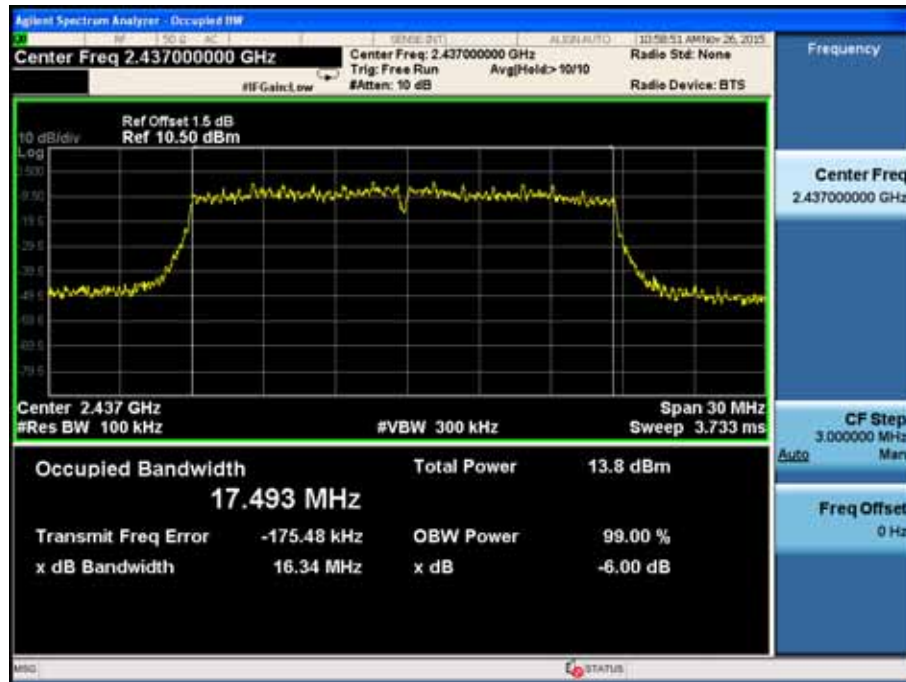
Product	:	Cassia Hub
Test Item	:	99% Occupied Bandwidth
Test Mode	:	Mode 3: Transmit by 802.11n(20MHz)

Channel No.	Frequency (MHz)	99%Occupied Bandwidth (kHz)	6dB Occupied Bandwidth (kHz)	Limit (kHz)	Result
01	2412	17484	16340	500	Pass
06	2437	17493	16340	500	Pass
11	2462	17481	16030	500	Pass

Channel 01 (2412MHz) (Ant 2)



Channel 06 (2437MHz) (Ant 2)



Channel 11 (2462MHz) (Ant 2)



8. Power Output

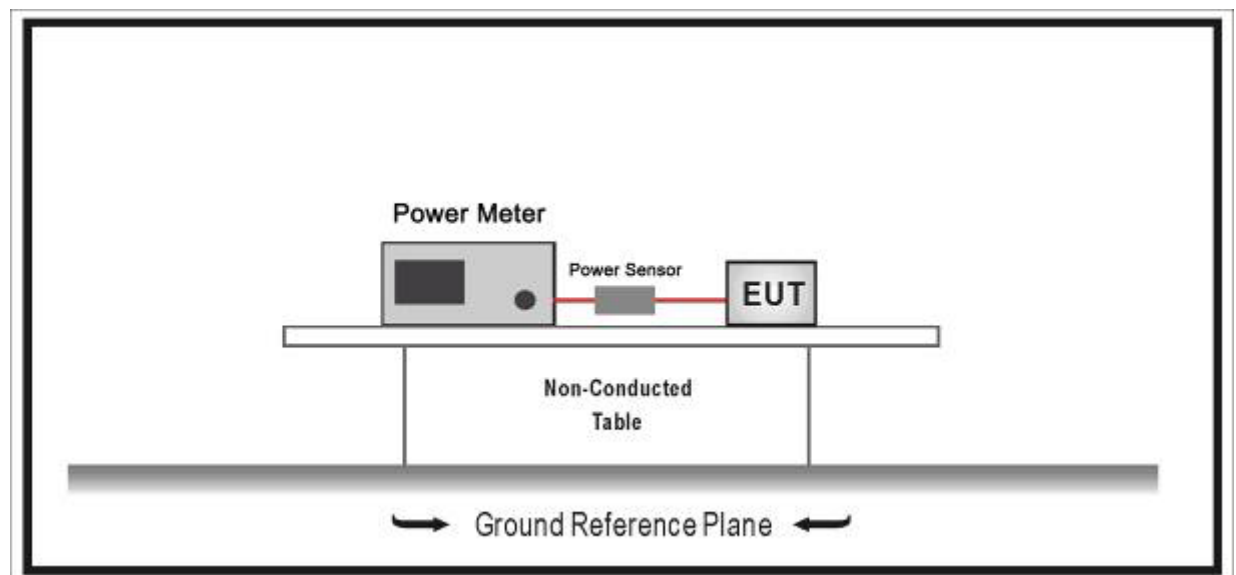
8.1. Test Equipment

Power Output / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Wideband Peak Power Meter	Anritsu	ML2495A	0905006	2016.11.10
Power Sensor	Anritsu	MA2411B	0846014	2016.11.10
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2016.04.09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

8.2. Test Setup



8.3. Limit

For FCC&IC

The maximum peak power shall be less 1 Watt (30dBm).

Note: the conducted output power limit specified above is based on the use the antennas with directional gains that do not exceed 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values above, as appropriate, by the amount in dB that the directional gain of antenna exceeds 6 dBi.

Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

8.4. Test Procedure

The EUT was tested According to FCC ANSI C63.4: 2014 & ANSI C63.10: 2013& FCC 47CFR 15.247& KDB 558074 D01v03r03& Industry Canada RSS-Gen Issue 4& RSS-247 Issue 1

The maximum conducted output power using ANSI C63.10 section 11.9.1.3 PKPM1 Peak power meter method

Power meter and sensor's minimum video bandwidth is 50MHz, larger than 802.11n(20MHz) bandwidth;

1. Fast responding diode sensors respond immediately to changes in power level to reduce total test time.
2. Use average detector to test.

8.5. Uncertainty

The measurement uncertainty is defined as ± 1.27 dB

8.6. Test Result

Power output test was verified over all data rates of each mode shown as below, and then choose the maximum power output (blue marker) for final test of each channel.

Power output at various data rates:

Test Mode	Bandwidth	Frequency (MHz)	Channel	Data Rate	Peak Power (dBm)
802.11b	20	2437	6	1	12.61
				5.5	14.56
				11	16.40
802.11g(Ant 1+2)	20	2437	6	6	18.40
				24	18.65
				54	18.91
802.11n (Ant 1+2)	20	2437	6	MCS0	18.26
				MCS4	18.30
				MCS7	18.61

Product	:	Cassia Hub
Test Item	:	Power Output
Test Site	:	TR8
Test Mode	:	Mode 1: Transmit by 802.11b

Channel No.	Frequency (MHz)	Measurement Power Output (Average) (dBm)	Limit (dBm)	Result
1	2412	16.33	30.00	Pass
6	2437	16.40	30.00	Pass
11	2462	16.51	30.00	Pass

Product	:	Cassia Hub
Test Item	:	Power Output
Test Site	:	TR8
Test Mode	:	Mode 2: Transmit by 802.11g

Channel No.	Frequency (MHz)	Measurement Power Output (Average) (dBm)	Limit (dBm)	Result
1	2412	18.85	30.00	Pass
6	2437	18.91	30.00	Pass
11	2462	18.98	30.00	Pass

Product	:	Cassia Hub
Test Item	:	Power Output
Test Site	:	TR8
Test Mode	:	Mode 3: Transmit by 802.11n(20MHz) (Ant 1+2)

Channel No.	Frequency (MHz)	Measurement Power Output (Average) (dBm)	Limit (dBm)	Result
1	2412	18.56	30.00	Pass
6	2437	18.61	30.00	Pass
11	2462	18.69	30.00	Pass

9. Power Spectral Density

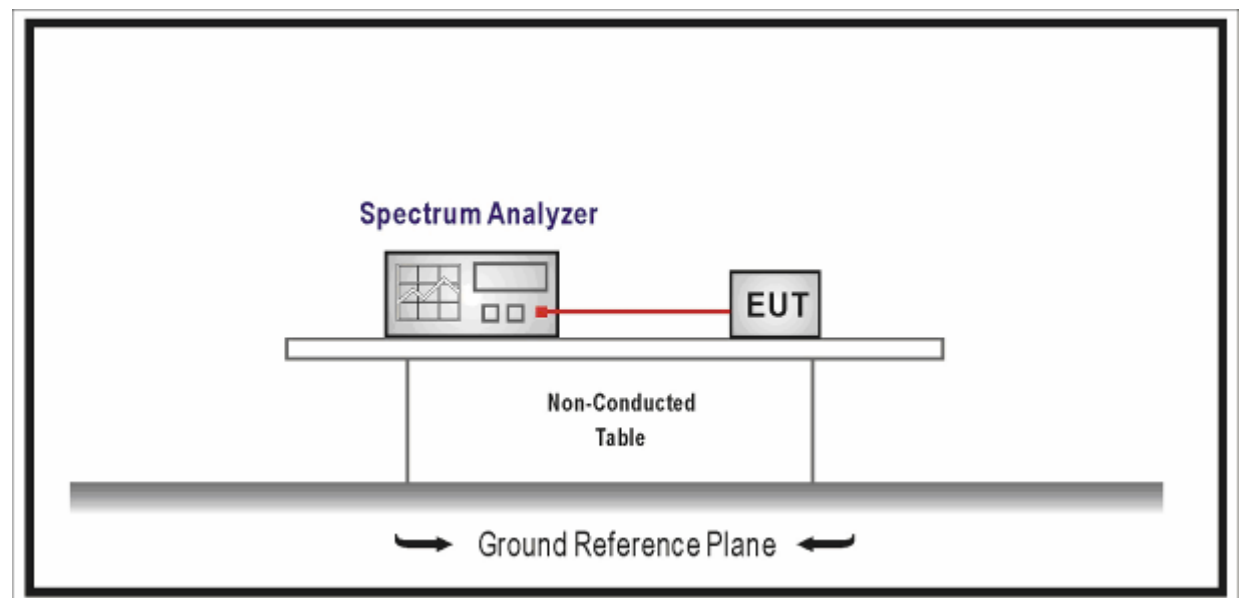
9.1. Test Equipment

Power Spectral Density / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016.01.07
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2016.04.09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

9.2. Test Setup



9.3. Limit

For FCC&IC

For digitally modulated systems, the power spectral density conducted from the intentional radiated to the Antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

9.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2014; tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

The maximum power spectral density using KDB 558074 section 10.2 PKPSD (peak PSD) method.

- a) Set analyzer center frequency to DTS channel center frequency.
- b) Set the span to 1.5 times the DTS bandwidth.
- c) Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$. (Actually we use 3kHz RBW)
- d) Set the VBW $\geq 3 \times \text{RBW}$.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level within the band.
- j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

9.5. Uncertainty

The measurement uncertainty is defined as $\pm 1.27 \text{ dB}$

9.6. Test Result

Product	:	Cassia Hub
Test Item	:	Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit by 802.11b

Channel No.	Frequency (MHz)	Measurement PPSD (dBm)	Limit (dBm)	Result
01	2412	-13.048	8	Pass
06	2437	-12.081	8	Pass
11	2462	-11.548	8	Pass

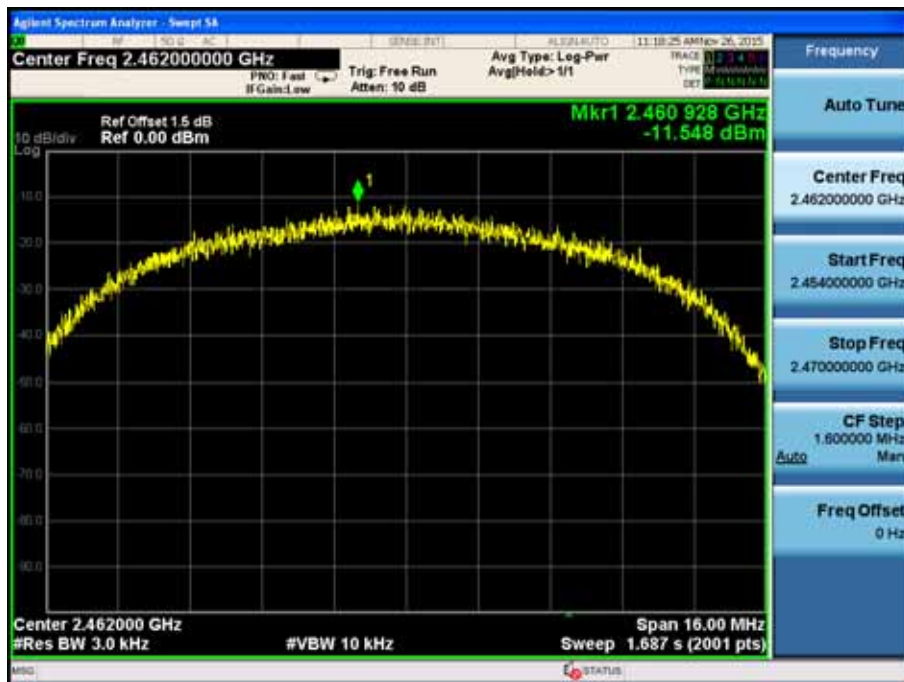
Channel 01 (2412MHz)



Channel 06 (2437MHz)



Channel 11 (2462MHz)



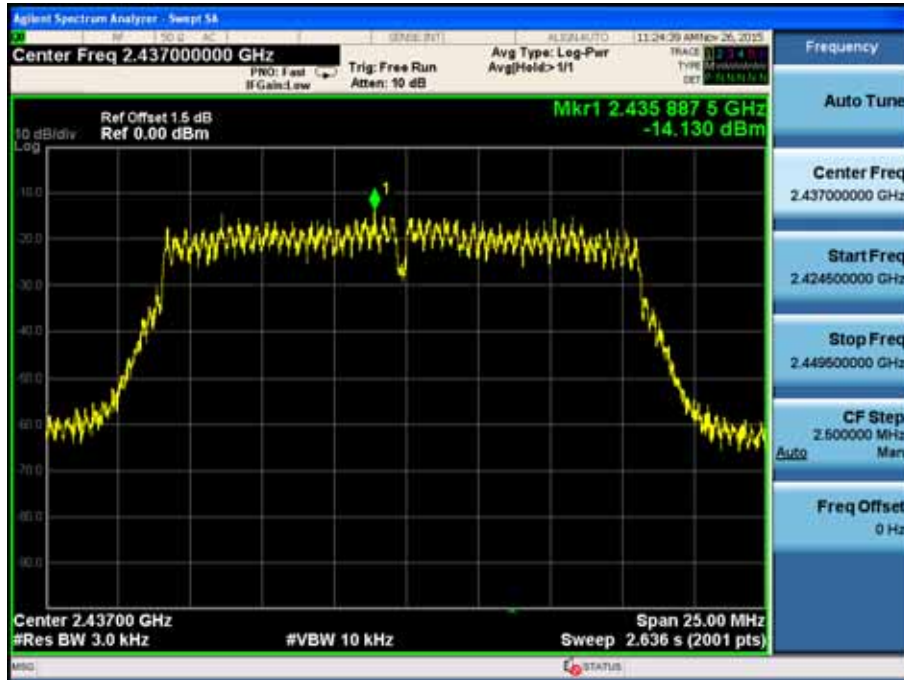
Product	:	Cassia Hub
Test Item	:	Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmit by 802.11g

Channel No.	Frequency (MHz)	Measurement PPSD (dBm)	Limit (dBm)	Result
01	2412	-13.794	8	Pass
06	2437	-14.130	8	Pass
11	2462	-14.039	8	Pass

Channel 01 (2412MHz)



Channel 06 (2437MHz)



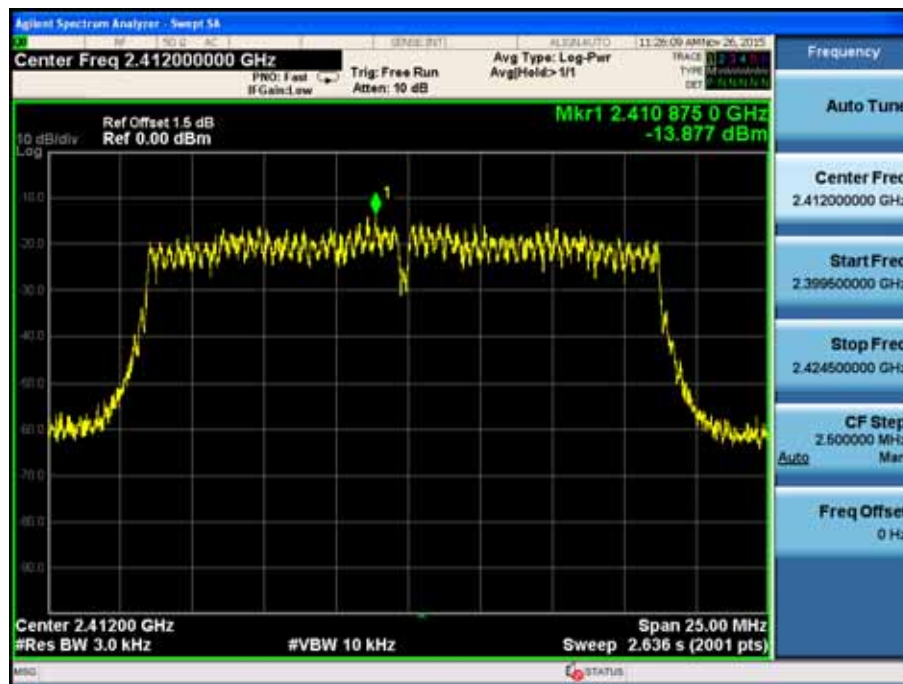
Channel 11 (2462MHz)



Product	:	Cassia Hub
Test Item	:	Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmit by 802.11n(20MHz)

Channel No.	Frequency (MHz)	Measurement PPSD (dBm)	Limit (dBm)	Result
01	2412	-13.877	8	Pass
06	2437	-15.430	8	Pass
11	2462	-13.829	8	Pass

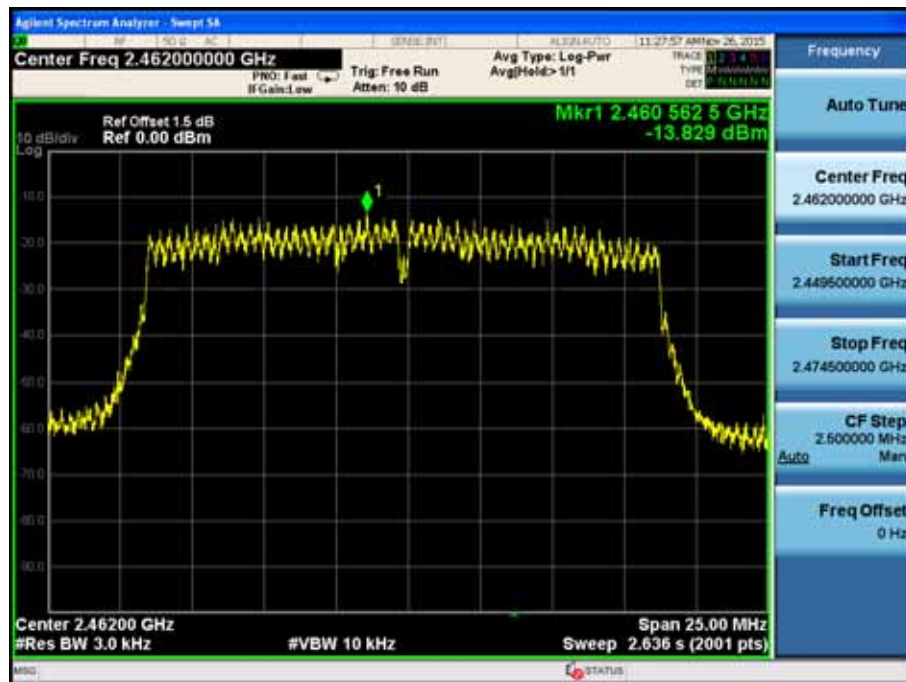
Channel 01 (2412MHz)



Channel 06 (2437MHz)



Channel 11 (2462MHz)



The End