Test Report

FCC Part15 Subpart C& Industry Canada RSS-247 Issue 1

Product Name	:	IP-STB
Model No.	:	3710X/3700X
FCC ID	:	TC2-R1012
IC	:	5959A-R1012

Applicant	:	Roku Inc.
Address	:	150 Winchester Circle Los Gatos 95032 California, USA

Date of Receipt	:	Jul. 04, 2016
Test Date	:	Jul. 04, 2016~ Jul. 19, 2016
Issued Date	:	Sep. 07, 2016
Report No.	:	1672011R-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.
This report must not be used to claim product endorsement by TAF,CNAS or any agency of the government.
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Test Report Certification

Issued Date : Sep.07, 2016
Report No. : 1672011R-RF-US-P06V01

Product Name	:	IP-STB
Applicant	:	Roku Inc.
Address	:	150 Winchester Circle Los Gatos 95032 California, USA
Manufacturer	:	Ambit Mircosystems (Shanghai) LTD.
Address	:	1925, Nanle Road, Songjiang Export Processing Zone, Shanghai, China 201613
Model No.	:	3710X/3700X
FCC ID	:	TC2-R1012
IC	:	5959A-R1012
EUT Voltage	:	DC 5V
Brand Name	:	Roku
Applicable Standard	:	FCC CFR Title 47 Part 15 Subpart C ANSI C63.4:2014; ANSI C63.10:2013; KDB 558074 D01v03r05 Industry Canada RSS-Gen Issue 4/RSS-247 Issue 1
Test Result	:	Complied
Performed Location	:	Quietek Corporation - Suzhou EMC Laboratory No.99 Hongye Rd., Suzhou Industrial Park, Suzhou, 215006, Jiangsu, China TEL: +86-512-6251-5088 / FAX: +86-512-6251-5098 FCC Registration Number: 800392 ; IC Lab Code: 4075B

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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/english/about/certificates.aspx?bval=5
The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : http://www.quietek.com/index_en.aspx
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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
1672011R-RF-US-P06V01	V1.0	Initial Issued Report	Sep. 07, 2016

1. General Information

1.1. EUT Description

Product Name	IP-STB
Brand Name	Roku
Model No.	3710X/3700X
EUT Voltage	DC 5V
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-DBPSK, DQPSK, CCK
	802.11g: OFDM-BPSK, QPSK, 16QAM, 64QAM
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

Note: The RF specifications of the two models are identical.

1.2. Working Frequency of Each Channel:

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

1.3. Antenna information

Model No.	ANT016008LCS2442MA1					
Antenna manufacturer	Roku					
Antenna Delivery	☒	1*TX+2*RX	☐	2*TX+2*RX	☐	3*TX+3*RX
Antenna technology	☒	SISO				
	☐	MIMO	☐	Basic		
			☐	CDD		
			☐	Sectorized		
			☐	Beam-forming		
Antenna Type	☐	External	☐	Dipole		
			☐	Sectorized		
	☒	Internal	☐	PIFA		
			☐	PCB		
			☒	Ceramic Chip Antenna		
			☐	Metal plate type F antenna		
Antenna Gain	1.6dBi					

1.4. Mode of Operation

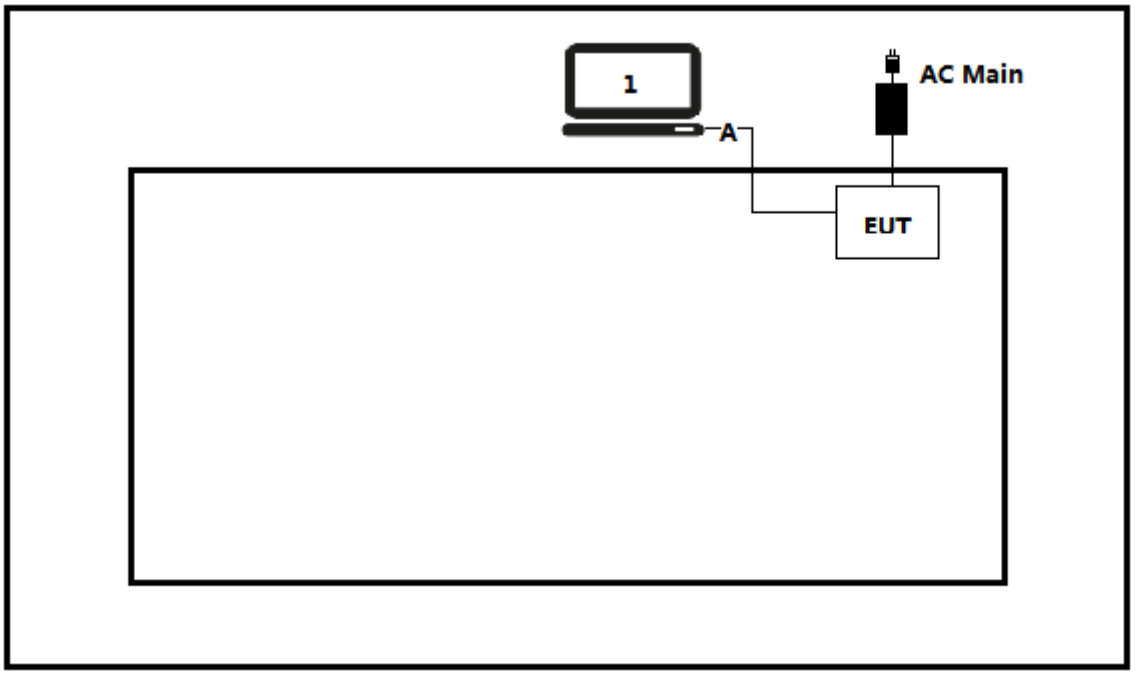
Test Modes List
Mode 1: Transmit by 802.11b
Mode 2: Transmit by 802.11g
Mode 3: Transmit by 802.11n(20MHz)

1.5. Tested System Details

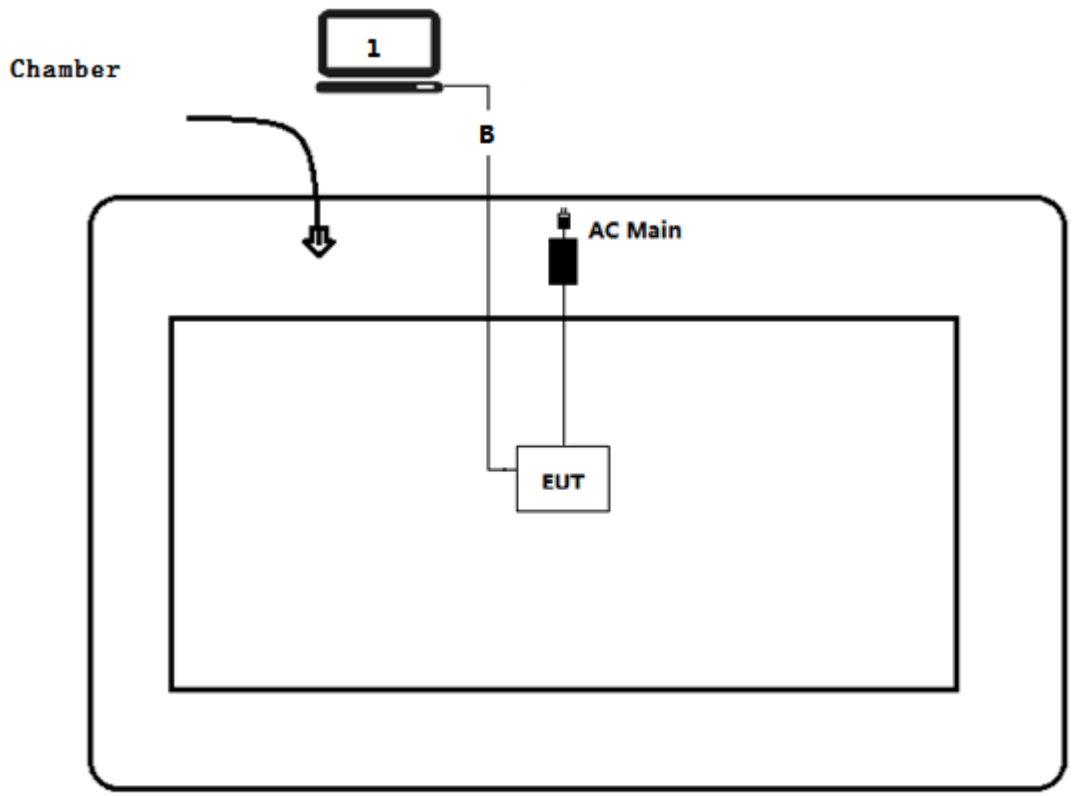
The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

No.	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook	Lenovo	Think pad x220	SUA0600195	Non-shielded
A	LAN cable	N/A	N/A	N/A	Non-shielded,1.5m
B	LAN cable	N/A	N/A	N/A	Non-shielded,10m

1.6. Configuration of Tested System

Test setup Diagram- AC Line Conducted Emission Test


Test setup Diagram- Radiated Emission



2. Technical Test

2.1. Summary of Test Result

Performed Test Item	Normative References	Limit	Result
AC Power Line Conducted Emission	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.207	FCC 15.207	PASS
Emissions in restricted frequency bands	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.209	FCC 15.209	PASS
Emissions in non-restricted frequency bands	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(d)	≥20dBc	PASS
Radiated Emission Band Edge	FCC CFR Title 47 Part 15 Subpart C: 2015 15.247(d)	FCC 15.209	PASS
Occupied Bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(a)(2)	≥500kHz	PASS
Fundamental emission output power	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(b)(3)	≤30dBm	PASS
Power Spectral Density	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(e)	≤8dBm/3kHz	PASS

Performed Test Item	Normative References	Worst case mode	Limit	Result
AC Power Line Conducted Emission	RSS-Gen Issue 4 Section 8.8	Mode 1	RSS-Gen	PASS
Emissions in restricted frequency bands	RSS-Gen Issue 4 Section 8.9	Mode 1	RSS-Gen	PASS
Emissions in non-restricted frequency bands	RSS-247 Issue 1 Section A5.5	Mode 1	≥20dBc	PASS
Radiated Emission Band Edge	RSS-247 Issue 1 Section A5.5	Mode 1	RSS-247	PASS
Occupied Bandwidth	RSS-Gen Issue 4 Section 6.6 RSS-247 Issue 1 Section A5.2(1)	Mode 1	≥500kHz	PASS
Fundamental emission output power	RSS-247 Issue 1 Section A5.4(4)	Mode 1	≤30dBm	PASS
Power Spectral Density	RSS-247 Issue 1 Section A5.2(2)	Mode 1	≤8dBm/3kHz	PASS

2.2. Test Frequency configuration:

Modulation Mode	Channel	Frequency	Channel	Frequency	Channel	Frequency
802.11b	01	2412 MHz	06	2437 MHz	11	2462MHz
802.11g	01	2412 MHz	06	2437 MHz	11	2462MHz
802.11n(20MHz)	01	2412 MHz	06	2437 MHz	11	2462MHz

2.3. Power setting parameter

Test Software	ART 2	
Modulation Mode	Test Frequency	Ant 0
802.11b	2412	65
	2437	65
	2462	65
802.11g	2412	75
	2437	75
	2462	75
802.11n(20MHz)	2412	75
	2437	75
	2462	75

2.4. Power vs Data Rate

MCS Index for 802.11n	Spatial Streams	Data Rate (Mbps)						
		802.11b	802.11g		20MHz Bandwidth		40MHz Bandwidth	
					800ns GI	400ns GI	800ns GI	400ns GI
0	1	1	6	---	6.5	7.2	13.5	15.0
1	1	2	9	---	13.0	14.4	27.0	30.0
2	1	5.5	12	---	19.5	21.7	40.5	45.0
3	1	11	18	---	26.0	28.9	54.0	60.0
4	1	---	24	---	39.0	43.3	81.0	90.0
5	1	---	36	---	52.0	57.8	108.0	120.0
6	1	---	48	---	58.5	65.0	121.5	135.0
7	1	---	54	---	65.0	72.2	135.0	150.0
8	2	---	---	---	13.0	14.4	27.0	30.0
9	2	---	---	---	26.0	28.9	54.0	60.0
10	2	---	---	---	39.0	43.3	81.0	90.0
11	2	---	---	---	52.0	57.8	108.0	120.0
12	2	---	---	---	78.0	86.7	162.0	180.0
13	2	---	---	---	104.0	115.6	216.0	240.0
14	2	---	---	---	117.0	130.0	243.0	270.0
15	2	---	---	---	130.0	144.0	270.0	300.0

Note 1 : The blue form is the maximum power data rate

Note 2 : The EUT has one spatial Streams

2.5. 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

2.6. Measurement Uncertainty

Test Items	Uncertainty
AC Power Line Conducted Emission	±2.02dB
Radiated Emission	Below 1GHz ±3.8 dB
	Above 1GHz ±3.9 dB
RF Antenna Port Conducted Emission	±1.27dB
Radiated Emission Band Edge	±3.9dB
Occupied Bandwidth	±1kHz
Power Spectral Density	±1.27dB

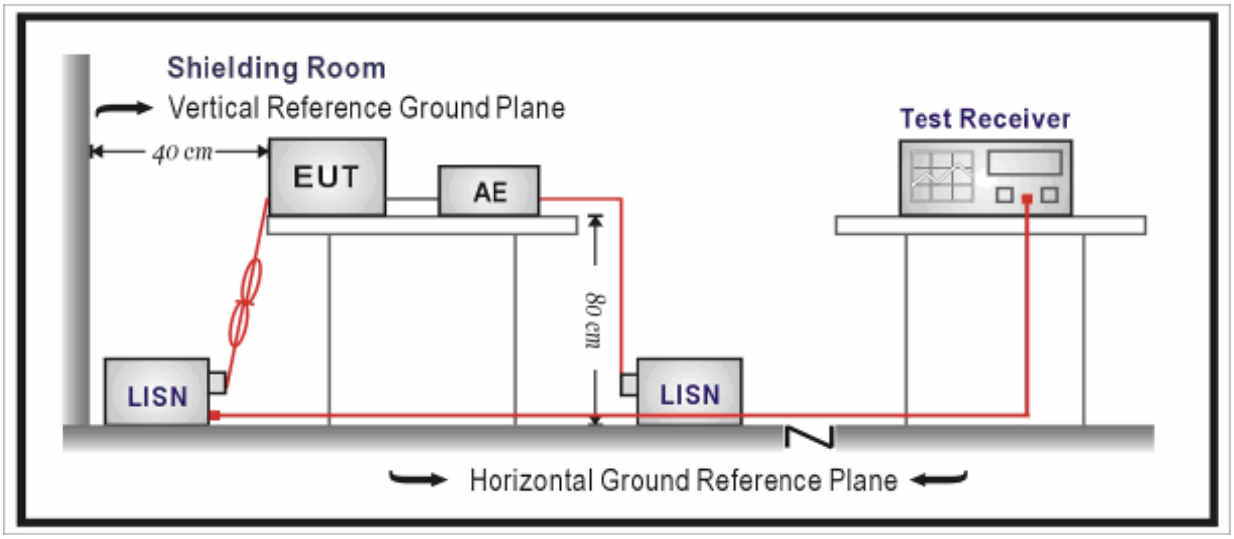
3. AC Power Line Conducted Emission

3.1. Test Equipment

AC Power Line Conducted Emission / TR-1					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100726	2016.03.29	2017.03.28
Two-Line V-Network	R&S	ENV216	100043	2016.03.29	2017.03.28
Two-Line V-Network	R&S	ENV216	100044	2015.09.17	2016.09.16
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	2016.03.02	2017.03.01
50ohm Termination	SHX	TF2	07081401	2015.09.17	2016.09.16
Temperature/Humidity Meter	zhichen	ZC1-2	TR1-TH	2016.01.04	2017.01.03
Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

3.2. Test Setup

AC Power Line Conducted Emission test setup



3.3. Limit

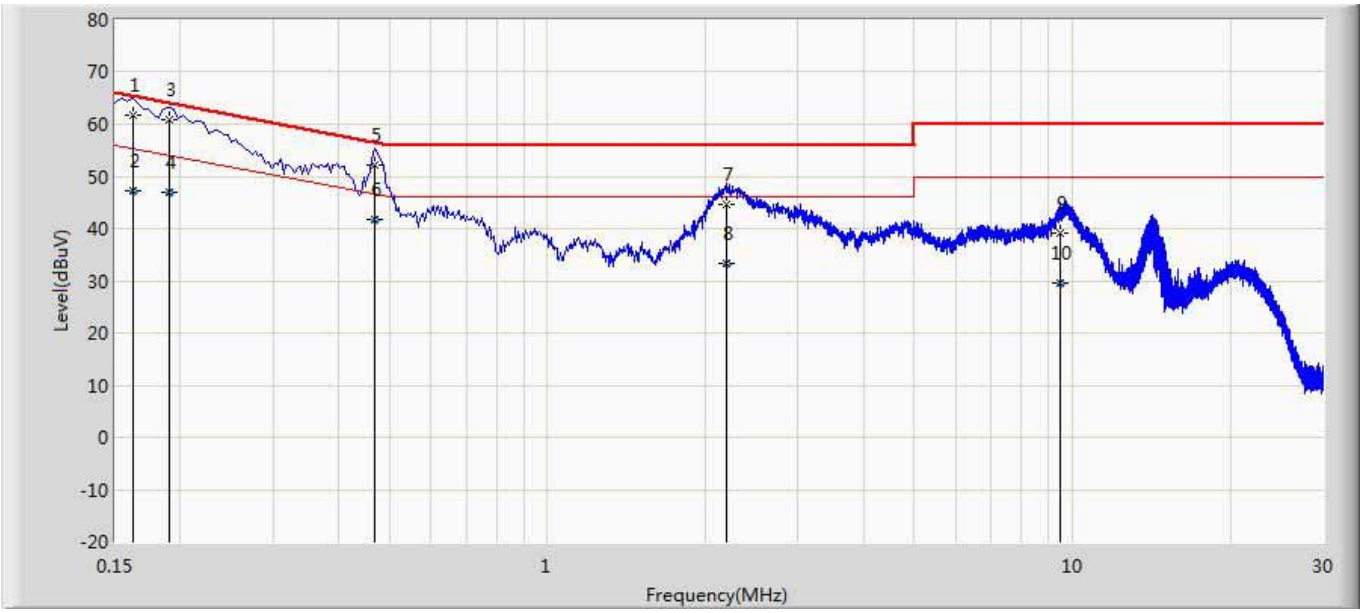
Frequency of Emission (MHz)	Conducted Limit	
	Quasi-peak (dB μ V)	Average(dB μ V)
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50
Note 1: The lower limit shall apply at the transition frequencies. Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.		

3.4. Test Procedure

Test Method			
	References Rule	Chapter	Item
☒	ANSI C63.10-2013	6.2	Standard test method for ac power-line conducted emissions from unlicensed wireless devices
☒	ANSI C63.4-2014	7	AC power-line conducted emission measurements

3.5. Test Result

Engineer: Barlow	
Site: TR1	Time: 2016/07/08 - 22:06
Limit: FCC_Part15.107_CE_AC Power_ClassB	Margin: 0
Probe: ENV216_101044(0.009-30MHz)	Polarity: Line
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 1	

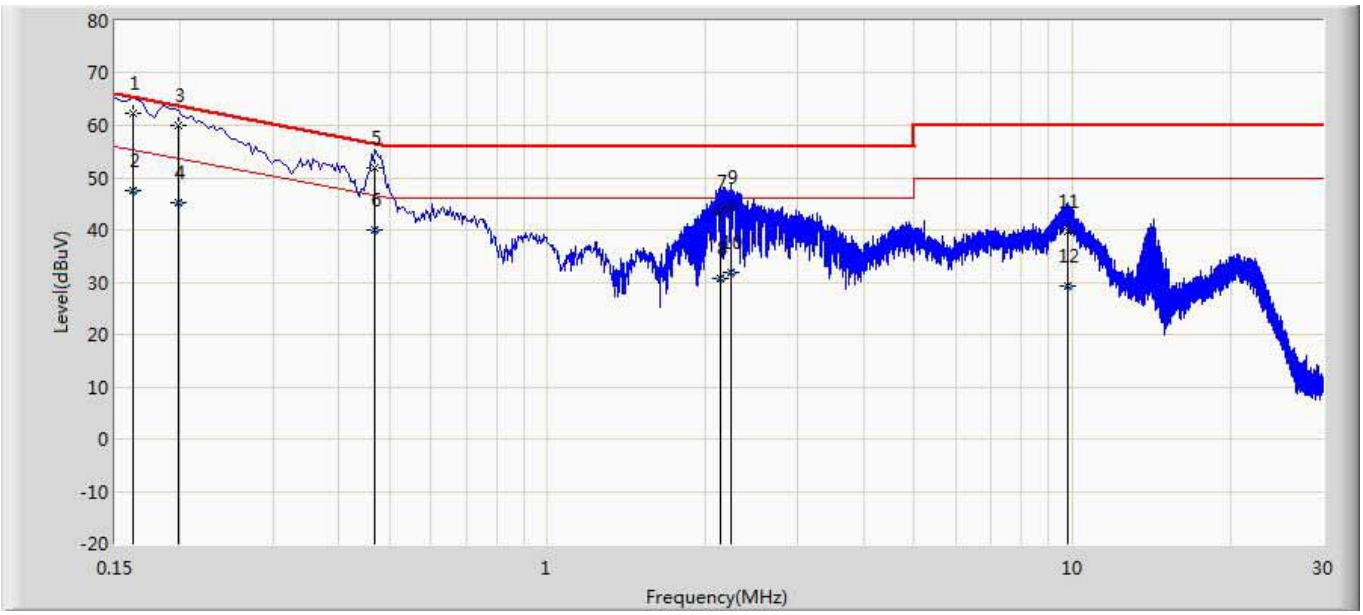


No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1		0.162	61.747	52.127	-3.614	65.361	9.597	0.023	0.000	QP
2		0.162	47.235	37.615	-8.126	55.361	9.597	0.023	0.000	AV
3	*	0.190	60.898	51.279	-3.138	64.037	9.592	0.028	0.000	QP
4		0.190	47.068	37.449	-6.968	54.037	9.592	0.028	0.000	AV
5		0.470	52.084	42.451	-4.430	56.514	9.590	0.043	0.000	QP
6		0.470	41.648	32.016	-4.866	46.514	9.590	0.043	0.000	AV
7		2.198	44.687	34.982	-11.313	56.000	9.611	0.094	0.000	QP
8		2.198	33.334	23.628	-12.666	46.000	9.611	0.094	0.000	AV
9		9.502	38.990	29.152	-21.010	60.000	9.640	0.198	0.000	QP
10		9.502	29.597	19.759	-20.403	50.000	9.640	0.198	0.000	AV

Note:

1. " * ", means this data is the worst emission level.
2. Measurement Level = Reading Level + Factor (Probe+Cable-Amp).

Engineer: Barlow	
Site: TR1	Time: 2016/07/08 - 22:14
Limit: FCC_Part15.107_CE_AC Power_ClassB	Margin: 0
Probe: ENV216_101044(0.009-30MHz)	Polarity: Neutral
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1	*	0.162	62.236	52.636	-3.125	65.361	9.577	0.023	0.000	QP
2		0.162	47.609	38.009	-7.752	55.361	9.577	0.023	0.000	AV
3		0.198	60.081	50.479	-3.613	63.694	9.572	0.030	0.000	QP
4		0.198	45.167	35.566	-8.527	53.694	9.572	0.030	0.000	AV
5		0.470	51.959	42.337	-4.555	56.514	9.579	0.043	0.000	QP
6		0.470	39.875	30.254	-6.638	46.514	9.579	0.043	0.000	AV
7		2.142	43.605	33.920	-12.395	56.000	9.591	0.094	0.000	QP
8		2.142	30.587	20.903	-15.413	46.000	9.591	0.094	0.000	AV
9		2.234	44.302	34.616	-11.698	56.000	9.592	0.094	0.000	QP
10		2.234	31.973	22.287	-14.027	46.000	9.592	0.094	0.000	AV
11		9.814	39.795	29.952	-20.205	60.000	9.639	0.204	0.000	QP
12		9.814	29.398	19.555	-20.602	50.000	9.639	0.204	0.000	AV

Note:

1. " * ", means this data is the worst emission level.
2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp)

4. Emissions in restricted frequency bands

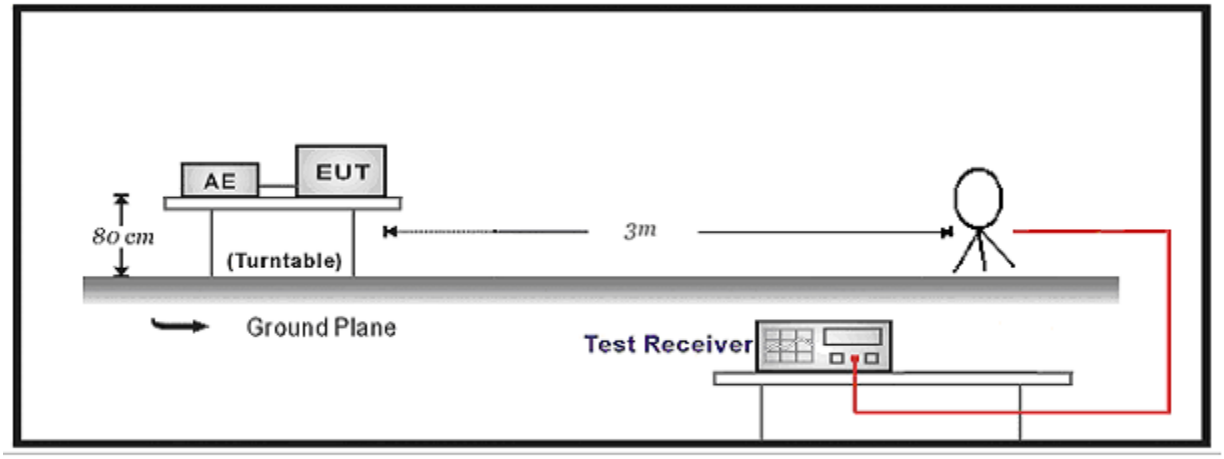
4.1. Test Equipment

Radiated Emission(Below 1GHz) / AC-2					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100573	2016.03.29	2017.03.28
Loop Antenna	R&S	HFH2-Z2	833799/003	2015.11.16	2016.11.17
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2015.10.16	2016.10.15
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC2-C	2016.03.02	2017.03.01
Temperature/Humidity Meter	Zhichen	ZC1-2	AC2-TH	2016.01.04	2017.01.03
Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

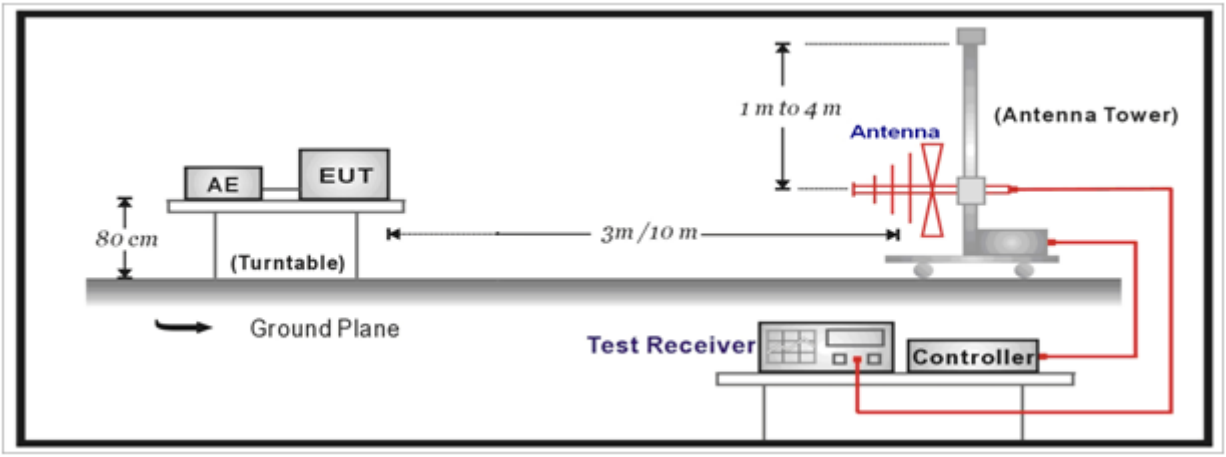
Radiated Emission(Above 1GHz) / AC-5					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016.01.04	2017.01.03
Preamplifier	Miteq	NSP1800-25	1364185	2016.05.06	2017.05.05
Preamplifier	QuieTek	AP-040G	CHM-0906001	2016.05.06	2017.05.05
DRG Horn	ETS-Lindgren	3117	00123988	2016.01.22	2017.01.21
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2015.11.25	2016.11.24
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2016.03.02	2017.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2016.03.02	2017.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2016.03.02	2017.03.01
EMI Receiver	Agilent	N9038A	MY51210196	2016.06.10	2017.06.09
Temperature/Humidity Meter	Zhichen	ZC1-2	AC5-TH	2016.01.04	2017.01.03
Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

4.2. Test Setup

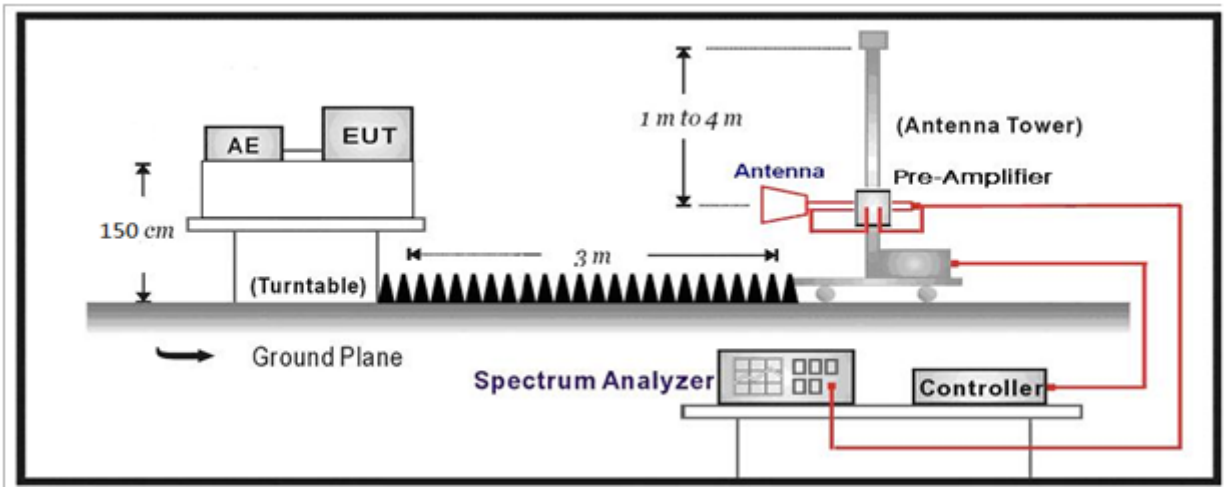
Below 30MHz Test Setup:



30MHz-1GHz Test Setup:



Above 1GHz Test Setup:



4.3. Limit

Restricted Bands of operation			
Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
0.495 – 0.505	16.69475 –16.69525	608 – 614	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1645.5 – 1646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1660 – 1710	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	1718.8 – 1722.2	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2200 – 2300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2310 – 2390	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2483.5 – 2500	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	2690 – 2900	22.01 – 23.12
8.81425 – 8.81475	162.0125 – 167.17	3260 – 3267	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3332 – 3339	31.2 – 31.8
12.51975–12.52025	240 – 285	3345.8 – 3358	36.43 – 36.5
12.57675–12.57725	322 – 335.4	3600 – 4400	
13.36 – 13.41			

Restricted Band Emissions Limit			
Frequency (MHz)	Field strength (μ V/m)	Field strength (dB μ V/m)	Measurement distance (m)
0.009 - 0.49	2400/F(kHz)	48.5 – 13.8	300(Note 1)
0.49 - 1.705	24000/F(kHz)	33.8 - 23	30(Note 1)
1.705 - 30	30	29.5	30(Note 1)
30 - 88	100	40	3(Note 2)
88 - 216	150	43.5	3(Note 2)
216 - 960	200	46	3(Note 2)
Above 960	500	54	3(Note 2)

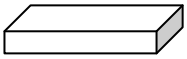
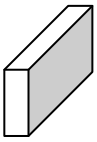
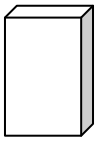
Note 1: At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

Note 2: At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

4.4. Test Procedure

Test Method						
	References Rule				Chapter	Description
☐	ANSI C63.10				11.11	Emissions in non-restricted frequency bands
	☐	ANSI C63.10			11.11.2	Reference level measurement
	☐	ANSI C63.10			11.11.3	Emission level measurement
☒	ANSI C63.10				11.12	Emissions in restricted frequency bands
	☒	ANSI C63.10			11.12.1	Radiated emission measurements
	☒	ANSI C63.10			11.12.2.7	Radiated spurious emission test
		☒	ANSI C63.10		6.4	Radiated emissions from unlicensed wireless devices below 30 MHz
		☒	ANSI C63.10		6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz
		☒	ANSI C63.10		6.6	Radiated emissions from unlicensed wireless devices above 1 GHz
	☐	ANSI C63.10			11.12.2	Antenna-port conducted measurements
		☒	ANSI C63.10		11.12.2.3	Quasi-peak measurement procedure
		☒	ANSI C63.10		11.12.2.4	Peak power measurement procedure
		☒	ANSI C63.10		11.12.2.5	Average power measurement procedures
			☐	ANSI C63.10	11.12.2.5.1	Trace averaging with continuous EUT transmission at full power
			☐	ANSI C63.10	11.12.2.5.2	Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction
			☒	ANSI C63.10	11.12.2.5.3	Reduced VBW averaging across ON and OFF times of the EUT transmissions with max hold

4.5. EUT test Axis definition

Item	Emissions in restricted frequency bands			
Device Category	☒	Fixed position use		
	☐	Mobile position use		
Test mode	Mode 1~3			
Test method	☒	Radiated		
		X Axis	Y Axis	Z Axis
				
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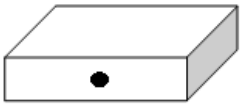
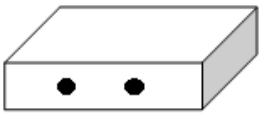
	☐	Conducted		
	☐	Chain 1		
				
	☐	Chain 1	Chain 2	
				
	☐	Chain 1	Chain 2	Chain 3

4.6. Test Result

Product Name	:	IP-STB	Power	:	AC 120V/60Hz
Test Mode	:	Mode 1	Test Site	:	AC-5

Chain	CH	Antenna Polarity	Frequency (MHz)	Reading Level (dB μ V)	Factor (dB)	Measured Level (dB μ V/m)	Limit (dB μ V/m)	Over Limit (dB)	Detector
Ant 0	1	H	4824.000	47.283	5.764	53.047	74(Note 3)	-20.953	PK
		H	7236.000	39.950	9.873	49.824	74(Note 3)	-24.176	PK
		H	9648.000	38.518	12.968	51.486	74(Note 3)	-22.514	PK
		V	4824.000	43.643	5.764	49.407	74(Note 3)	-24.593	PK
		V	7236.000	39.969	9.873	49.843	74(Note 3)	-24.157	PK
		V	9648.000	36.912	12.968	49.88	74(Note 3)	-24.120	PK
	6	H	4974.000	38.985	6.219	45.204	74(Note 3)	-28.796	PK
		H	7311.000	40.365	9.342	49.706	74(Note 3)	-24.294	PK
		H	9748.000	39.931	12.681	52.612	74(Note 3)	-21.388	PK
		V	4874.000	41.390	5.670	47.060	74(Note 3)	-26.940	PK
		V	7311.000	39.004	9.342	48.345	74(Note 3)	-25.655	PK
		V	9748.000	39.345	12.681	52.026	74(Note 3)	-21.974	PK
	11	H	4924.000	39.669	6.097	45.766	74(Note 3)	-28.234	PK
		H	7386.000	37.450	9.499	46.949	74(Note 3)	-27.051	PK
		H	9848.000	38.831	12.862	51.694	74(Note 3)	-22.306	PK
		V	4924.000	39.478	6.097	45.575	74(Note 3)	-28.425	PK
		V	7386.000	37.189	9.499	46.688	74(Note 3)	-27.312	PK
		V	9848.000	37.975	12.862	50.838	74(Note 3)	-23.162	PK

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

Note: 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.

Note: 3. This limit for average detector is 54dBuV/m, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Note: 4. The VBW setting, see Clause 6.6.

Product Name	:	IP-STB	Power	:	AC 120V/60Hz
Test Site	:	Mode 2	Test Site	:	AC-5

Chain	CH	Antenna Polarity	Frequency (MHz)	Reading Level (dB μ V)	Factor (dB)	Measured Level (dB μ V/m)	Limit (dB μ V/m)	Over Limit (dB)	Detector
Ant 0	1	H	4824.000	41.262	5.764	47.026	74(Note 3)	-26.974	PK
		H	7236.000	39.353	9.873	49.227	74(Note 3)	-24.773	PK
		H	9648.000	37.488	12.968	50.456	74(Note 3)	-23.544	PK
		V	4824.000	41.147	5.764	46.911	74(Note 3)	-27.089	PK
		V	7236.000	40.086	9.873	49.960	74(Note 3)	-24.040	PK
		V	9648.000	37.972	12.968	50.940	74(Note 3)	-23.060	PK
	6	H	4874.000	42.570	5.670	48.240	74(Note 3)	-25.760	PK
		H	7311.000	39.268	9.342	48.609	74(Note 3)	-25.391	PK
		H	9748.000	38.614	12.681	51.295	74(Note 3)	-22.705	PK
		V	4874.000	39.703	5.670	45.373	74(Note 3)	-28.627	PK
		V	7311.000	39.056	9.342	48.397	74(Note 3)	-25.603	PK
		V	9748.000	38.491	12.681	51.172	74(Note 3)	-22.828	PK
	11	H	4924.000	39.774	6.097	45.871	74(Note 3)	-28.129	PK
		H	7386.000	37.306	9.499	46.805	74(Note 3)	-27.195	PK
		H	9848.000	37.681	12.862	50.544	74(Note 3)	-23.456	PK
		V	4924.000	38.876	6.097	44.973	74(Note 3)	-29.027	PK
		V	7386.000	36.685	9.499	46.184	74(Note 3)	-27.816	PK
		V	9848.000	37.504	12.862	50.367	74(Note 3)	-23.633	PK

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

Note: 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.

Note: 3. This limit for average detector is 54dBuV/m, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Note: 4. The VBW setting, see Clause 6.6.

Product Name	:	IP-STB	Power	:	AC 120V/60Hz
Test Site	:	Mode 3	Test Site	:	AC-5

Chain	CH	Antenna Polarity	Frequency (MHz)	Reading Level (dB μ V)	Factor (dB)	Measured Level (dB μ V/m)	Limit (dB μ V/m)	Over Limit (dB)	Detector
Ant 0	1	H	4824.000	41.502	5.764	47.266	74(Note 3)	-26.734	PK
		H	7236.000	39.600	9.873	49.474	74(Note 3)	-24.526	PK
		H	9648.000	37.211	12.968	50.179	74(Note 3)	-23.821	PK
		V	4824.000	41.451	5.764	47.215	74(Note 3)	-26.785	PK
		V	7236.000	40.083	9.873	49.957	74(Note 3)	-24.043	PK
		V	9648.000	37.934	12.968	50.902	74(Note 3)	-23.098	PK
	6	H	4874.000	42.144	5.670	47.814	74(Note 3)	-26.186	PK
		H	7311.000	39.022	9.342	48.363	74(Note 3)	-25.637	PK
		H	9748.000	38.360	12.681	51.041	74(Note 3)	-22.959	PK
		V	4874.000	40.339	5.670	46.009	74(Note 3)	-27.991	PK
		V	7311.000	39.184	9.342	48.525	74(Note 3)	-25.475	PK
		V	9748.000	38.483	12.681	51.164	74(Note 3)	-22.836	PK
	11	H	4924.000	40.282	6.097	46.379	74(Note 3)	-27.621	PK
		H	7386.000	37.222	9.499	46.721	74(Note 3)	-27.279	PK
		H	9848.000	38.424	12.862	51.287	74(Note 3)	-22.713	PK
		V	4924.000	40.073	6.097	46.170	74(Note 3)	-27.830	PK
		V	7386.000	38.382	9.499	47.881	74(Note 3)	-26.119	PK
		V	9848.000	38.737	12.862	51.600	74(Note 3)	-22.400	PK

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

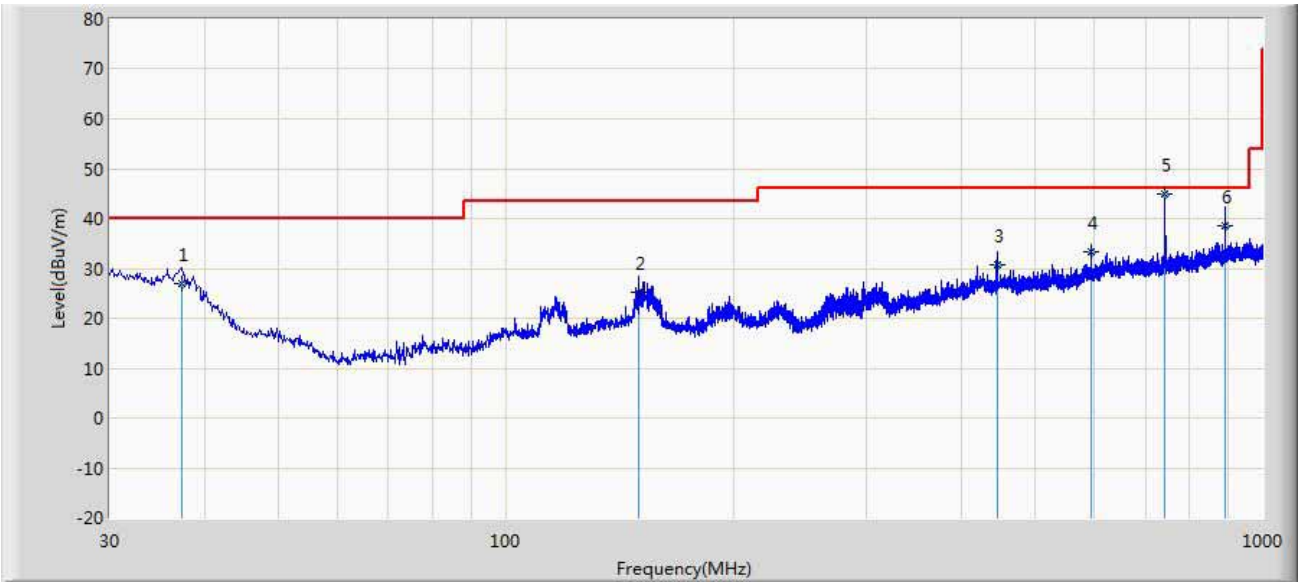
Note: 2. The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 6dB below the limits, therefore no data appear in the report.

Note: 3. This limit for average detector is 54dBuV/m, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Note: 4. The VBW setting, see Clause 6.6.

The worst case of Radiated Emission below 1GHz:

Site: AC2	Time: 2016/07/21 - 10:00
Limit: FCC_Part15.109_RE(3m)_ClassB	Margin: 0
Probe: AC2_3M(30-1000M)	Polarity: Horizontal
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode1	

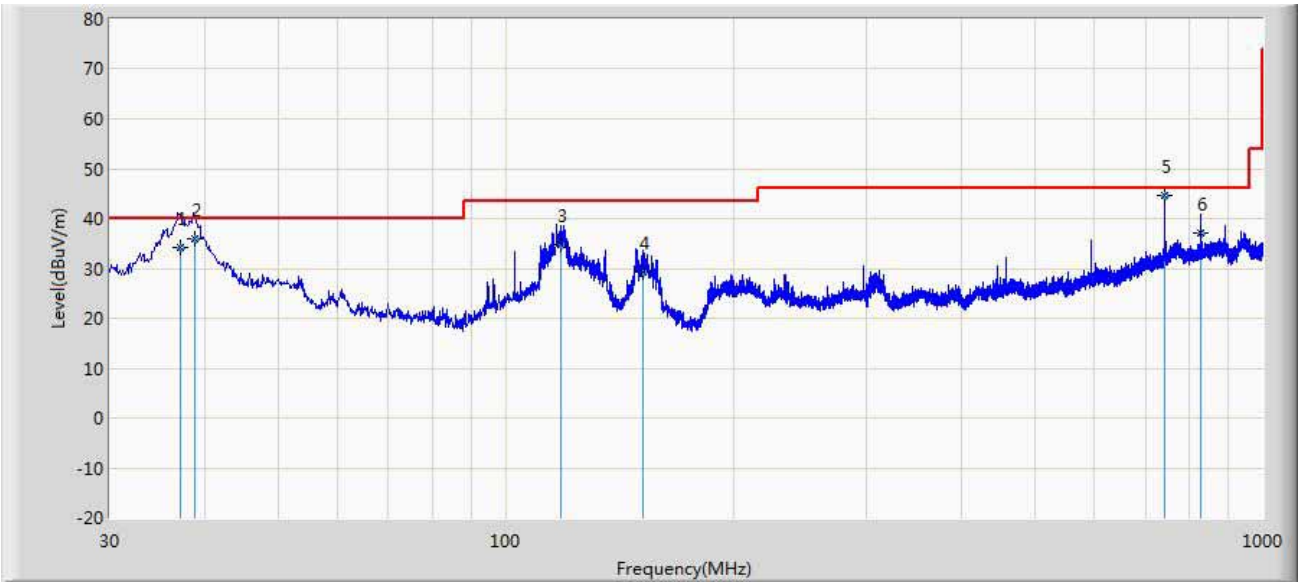


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1		37.417	26.903	2.500	-13.097	40.000	17.894	6.508	0.000	200	319	QP
2		150.105	25.337	8.100	-18.163	43.500	10.151	7.086	0.000	100	111	QP
3		445.563	30.832	4.200	-15.168	46.000	18.604	8.028	0.000	100	59	QP
4		594.365	33.323	5.100	-12.677	46.000	19.805	8.418	0.000	100	316	QP
5	*	742.832	44.883	15.700	-1.117	46.000	20.428	8.755	0.000	100	295	QP
6		891.255	38.579	7.200	-7.421	46.000	22.299	9.080	0.000	200	187	QP

Note:

1. " * ", means this data is the worst emission level.
2. Measurement Level = Reading Level + Factor (Probe+Cable-Amp).

Site: AC2	Time: 2016/07/21 - 10:00
Limit: FCC_Part15.109_RE(3m)_ClassB	Margin: 0
Probe: AC2_3M(30-1000M)	Polarity: Vertical
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode1	



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		37.182	34.224	12.800	-5.776	40.000	14.916	6.507	0.000	100	250	QP
2		38.816	36.032	15.500	-3.968	40.000	14.014	6.519	0.000	200	351	QP
3		118.316	34.775	13.500	-8.725	43.500	14.343	6.933	0.000	100	56	QP
4		151.926	29.272	10.600	-14.228	43.500	11.583	7.088	0.000	200	289	QP
5	*	742.622	44.664	14.100	-1.336	46.000	21.809	8.754	0.000	100	148	QP
6		827.532	37.203	4.900	-8.797	46.000	23.359	8.944	0.000	200	5	QP

Note:

1. " * ", means this data is the worst emission level.
2. Measurement Level = Reading Level + Factor (Probe+Cable-Amp).

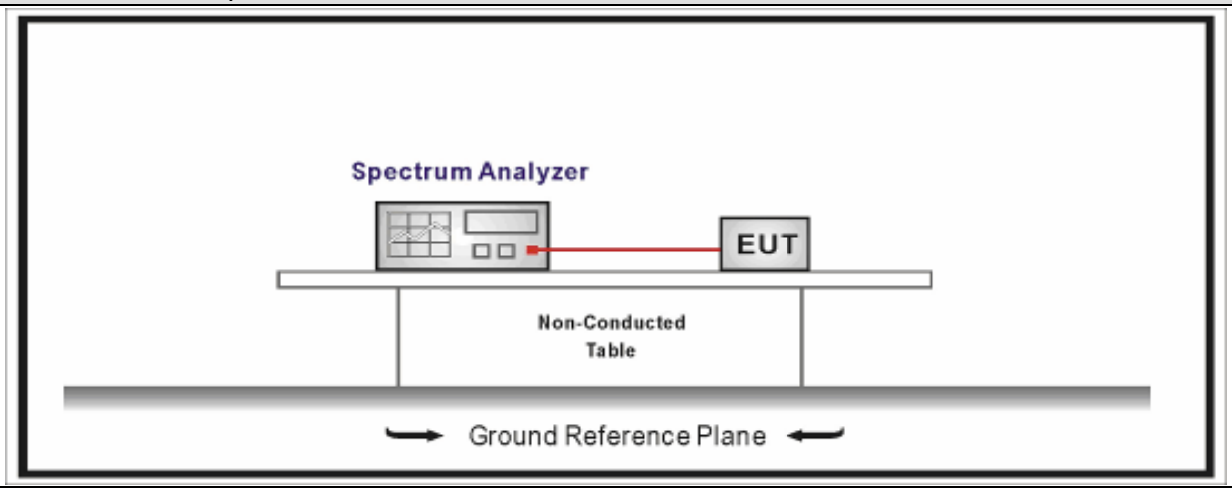
5. Emissions in non-restricted frequency bands

5.1. Test Equipment

Emissions in non-restricted frequency bands / TR-8					
Instrument	Instrument	Instrument	Instrument	Instrument	Instrument
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016.01.04	2017.01.03
Spectrum Analyzer	Agilent	N9010A	MY48030494	2016.03.11	2017.03.10
Temperature/Humidity Meter	zhichen	ZC1-2	TR8-TH	2016.04.10	2017.04.09
Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

5.2. Test Setup

Conducted Test Setup:



5.3. Limit

Un-Restricted Band Emissions Limit	
RF Output power (Detection methods)	Limit(dB)
RF Output power(Average detector)	30c(Note1)
RF Output power(PK detector)	20c(Note2)

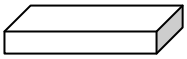
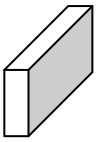
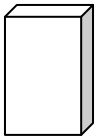
Note 1: If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc).

Note 2: If the maximum peak conducted output power procedure was used, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc).

5.4. Test Procedure

Test Method						
	References Rule				Chapter	Description
☒	ANSI C63.10				11.11	Emissions in non-restricted frequency bands
	☒	ANSI C63.10			11.11.2	Reference level measurement
	☒	ANSI C63.10			11.11.3	Emission level measurement
☐	ANSI C63.10				11.12	Emissions in restricted frequency bands
	☐	ANSI C63.10			11.12.1	Radiated emission measurements
	☐	ANSI C63.10			11.12.2.7	Radiated spurious emission test
☐	ANSI C63.10				6.4	Radiated emissions from unlicensed wireless devices below 30 MHz
☐	ANSI C63.10				6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz
☒	ANSI C63.10				6.6	Radiated emissions from unlicensed wireless devices above 1 GHz
	☒	ANSI C63.10			11.12.2	Antenna-port conducted measurements
		☐	ANSI C63.10		11.12.2.3	Quasi-peak measurement procedure
		☒	ANSI C63.10		11.12.2.4	Peak power measurement procedure
		☐	ANSI C63.10		11.12.2.5	Average power measurement procedures
			☐	ANSI C63.10	11.12.2.5.1	Trace averaging with continuous EUT transmission at full power
			☐	ANSI C63.10	11.12.2.5.2	Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction
			☐	ANSI C63.10	11.12.2.5.3	Reduced VBW averaging across ON and OFF times of the EUT transmissions with max hold

5.5. EUT test Axis definition

Item	Emissions in non-restricted frequency bands			
Device Category	☒	Fixed position use		
	☐	Mobile position use		
Test mode	Mode 1 ~ Mode 4			
Test method	☐	Radiated		
		X Axis	Y Axis	Z Axis
				
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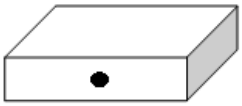
	☒	Conducted		
	☒	Chain 0		
				
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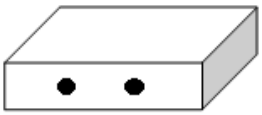
				
	☐	Chain 0	Chain 1	Chain 2

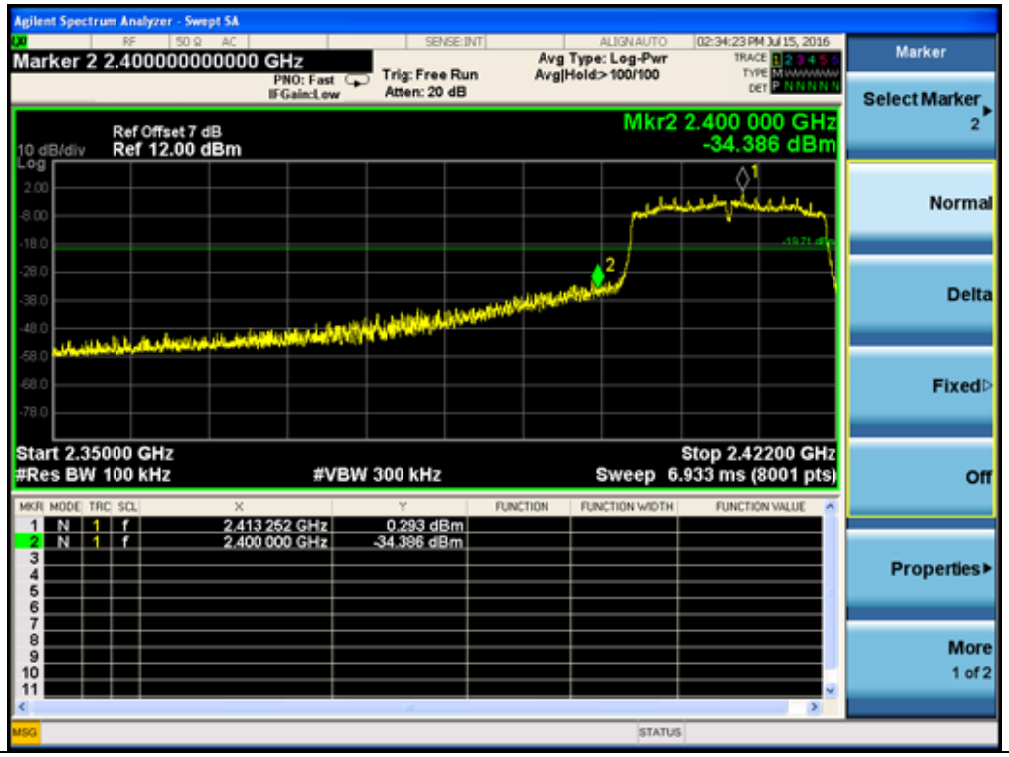
5.6. Test Result

Product Name	:	IP-STB	Test Power	:	AC 120V/60Hz
Test Site	:	TR8			

Antenna #0

Mode	Channel	Test Frequency (MHz)	In-Band PSD[a] (dBm/100kHz)	Frequency (MHz)	Out-Band PSD[b] (dBm/100kHz)	[a]-[b] (dB)	Limit (dB)	Result
1	01	2412	8.578	2396.976	-31.266	39.844	>20	Pass
1	06	2437	8.426	2585.24	-50.233	58.659	>20	Pass
1	11	2462	8.039	2500	-52.011	60.050	>20	Pass
2	01	2412	1.715	2400	-33.637	35.352	>20	Pass
2	06	2437	1.524	2504.28	-57.771	59.295	>20	Pass
2	11	2462	1.125	2500	-50.561	51.686	>20	Pass
3	01	2412	0.293	2400	-34.385	34.678	>20	Pass
3	06	2437	-0.264	2525.63	-58.586	58.322	>20	Pass
3	11	2462	-0.742	2500	-55.404	54.662	>20	Pass
Note: The worst case of emissions in non-restricted frequency bands as below:								

Mode 3 CH01(2412MHz)



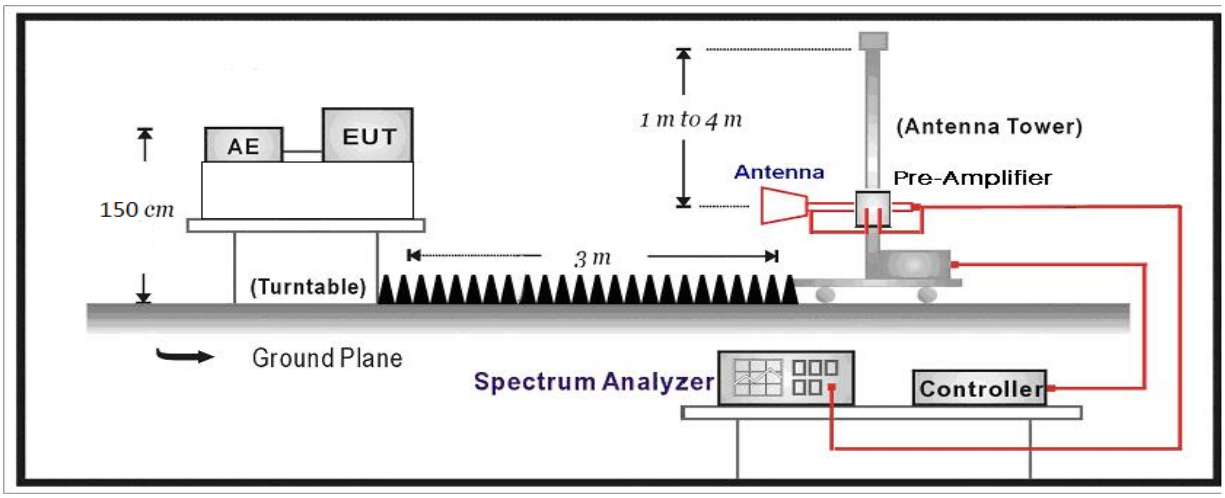
6. Radiated Emission Band Edge

6.1. Test Equipment

Radiated Emission(Above 1GHz) / AC-5					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016.01.04	2017.01.03
Preamplifier	Miteq	NSP1800-25	1364185	2016.05.06	2017.05.05
Preamplifier	QuieTek	AP-040G	CHM-0906001	2016.05.06	2017.05.05
DRG Horn	ETS-Lindgren	3117	00123988	2016.01.22	2017.01.21
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2015.11.25	2016.11.24
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2016.03.02	2017.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2016.03.02	2017.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2016.03.02	2017.03.01
EMI Receiver	Agilent	N9038A	MY51210196	2016.06.10	2017.06.09
Temperature/Humidity Meter	Zhichen	ZC1-2	AC5-TH	2016.01.04	2017.01.03
Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

6.2. Test Setup

Above 1GHz Test Setup:



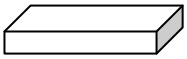
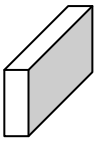
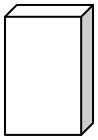
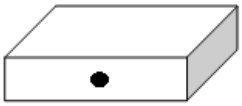
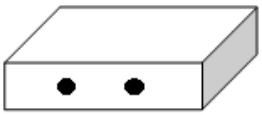
6.3. Limit

Band edge Limit				
Frequency bands (MHz)	Detector	Limit (dB μ V/m)	RBW (MHz)	Distance (m)
2310-2390 2483.5-2500	PK	74	1	3
	AV	54	1	3
Note: The field strength of emissions appearing within these frequency bands shall not exceed the limits.				

6.4. Test Procedure

Test Method						
	References Rule				Chapter	Description
☒	ANSI C63.10				6.10	Band-edge testing
	☒	ANSI C63.10			6.10.5	Restricted-band band-edge measurements
	☐	ANSI C63.10			6.10.6	Marker-delta method
☒	ANSI C63.10				11.12	Emissions in restricted frequency bands
	☒	ANSI C63.10			11.12.1	Radiated emission measurements
	☒	ANSI C63.10			11.12.2.7	Radiated spurious emission test
☐	ANSI C63.10				6.4	Radiated emissions from unlicensed wireless devices below 30 MHz
☐	ANSI C63.10				6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz
☒	ANSI C63.10				6.6	Radiated emissions from unlicensed wireless devices above 1 GHz
	☐	ANSI C63.10			11.12.2	Antenna-port conducted measurements
		☐	ANSI C63.10		11.12.2.3	Quasi-peak measurement procedure
		☒	ANSI C63.10		11.12.2.4	Peak power measurement procedure
		☒	ANSI C63.10		11.12.2.5	Average power measurement procedures
			☐	ANSI C63.10	11.12.2.5.1	Trace averaging with continuous EUT transmission at full power
			☐	ANSI C63.10	11.12.2.5.2	Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction
			☒	ANSI C63.10	11.12.2.5.3	Reduced VBW averaging across ON and OFF times of the EUT transmissions with max hold

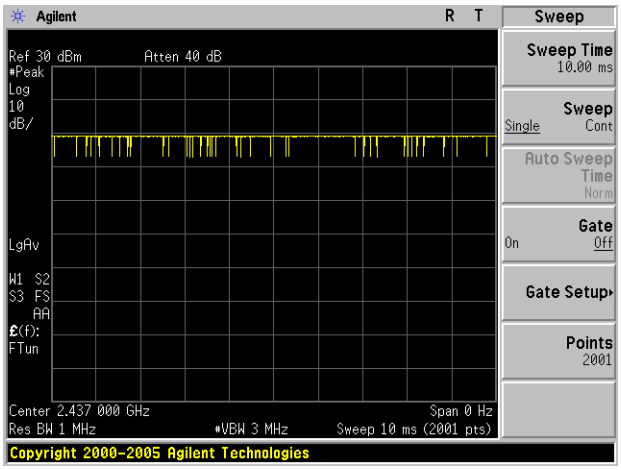
6.5. EUT test definition

Item	Emissions in non-restricted frequency bands			
Device Category	☒	Fixed position use		
	☐	Mobile position use		
Test mode	Mode 1~3			
Test method	☒	Radiated		
		X Axis	Y Axis	Z Axis
				
		Worst Axis ☐	Worst Axis ☐	Worst Axis ☒
	☐	Conducted		
	☐	Chain 0		
				
	☐	Chain 0	Chain 1	
				
	☐	Chain 0	Chain 1	Chain 2

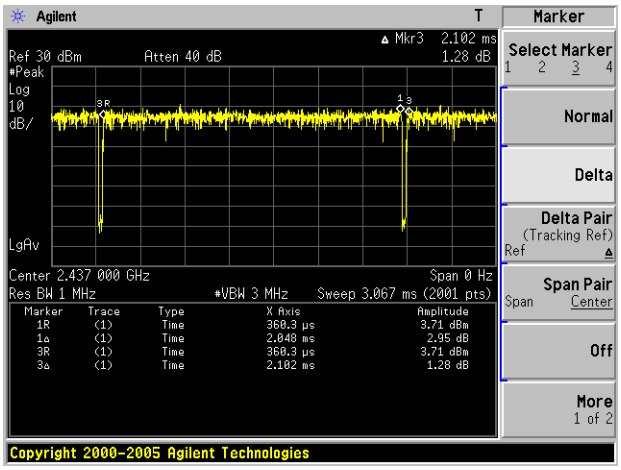
6.6. Duty Cycle

Test Mode	Tx On (ms)	Tx Off (ms)	VBW	Tx On + Tx Off (ms)	Duty Cycle
802.11b	N/A	N/A	10Hz	N/A	99.99%
802.11g	2.048	0.054	488Hz	2.102	97.43%
802.11n(20MHz)	1.911	0.048	523Hz	1.959	97.55%

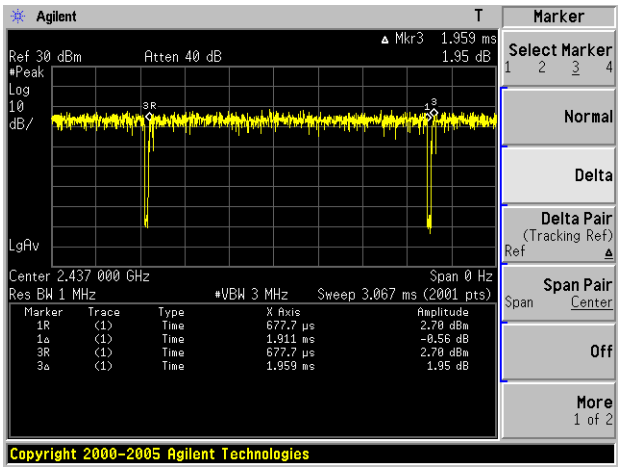
802.11b



802.11g

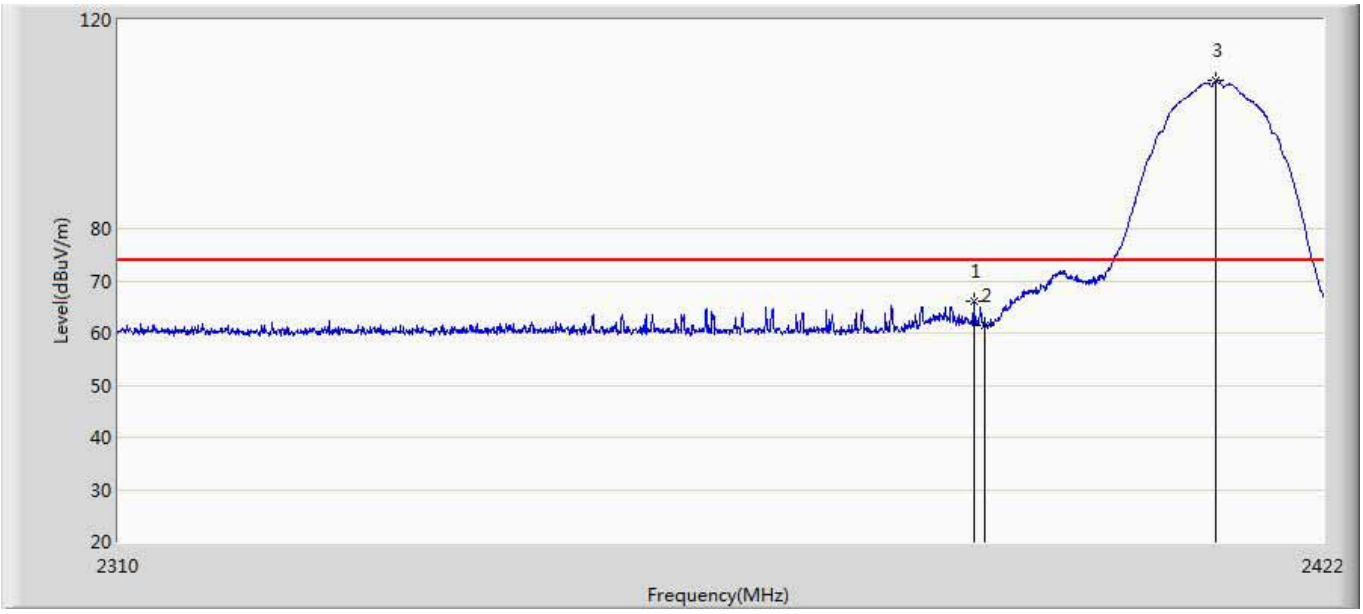


802.11n(20MHz)



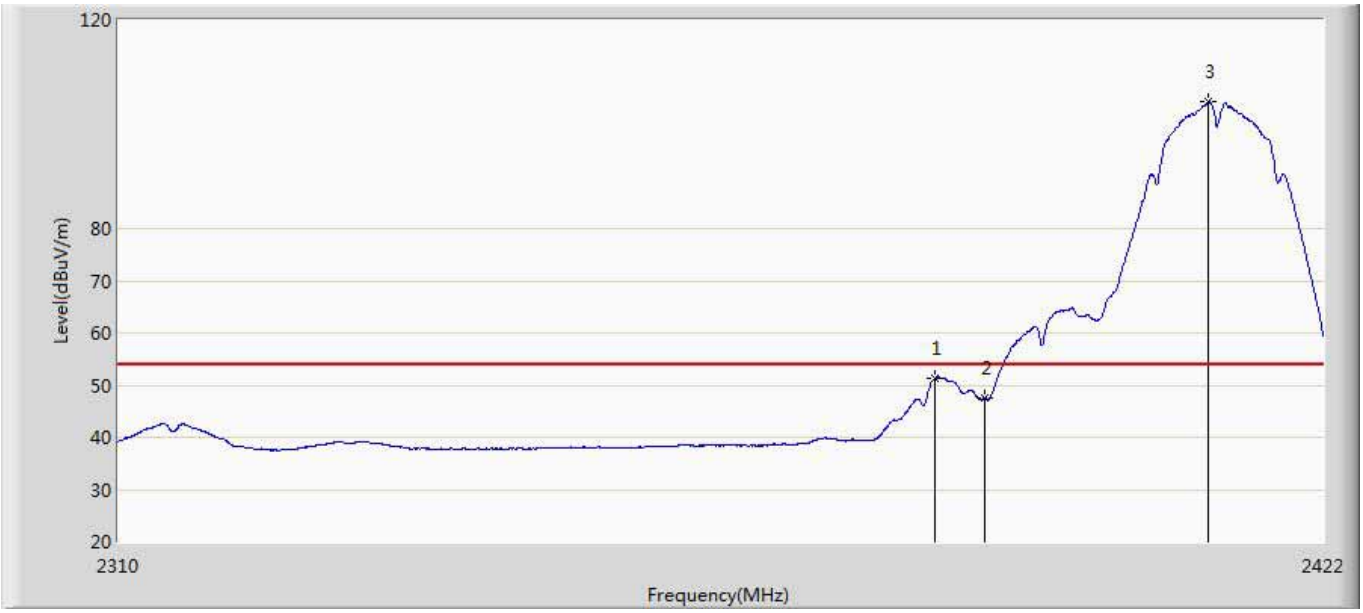
6.7. Test Result

Profile: 1672011R	Page No.: 1
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 11:01
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 1:Transmit at CH2412Mhz by 802.11b	



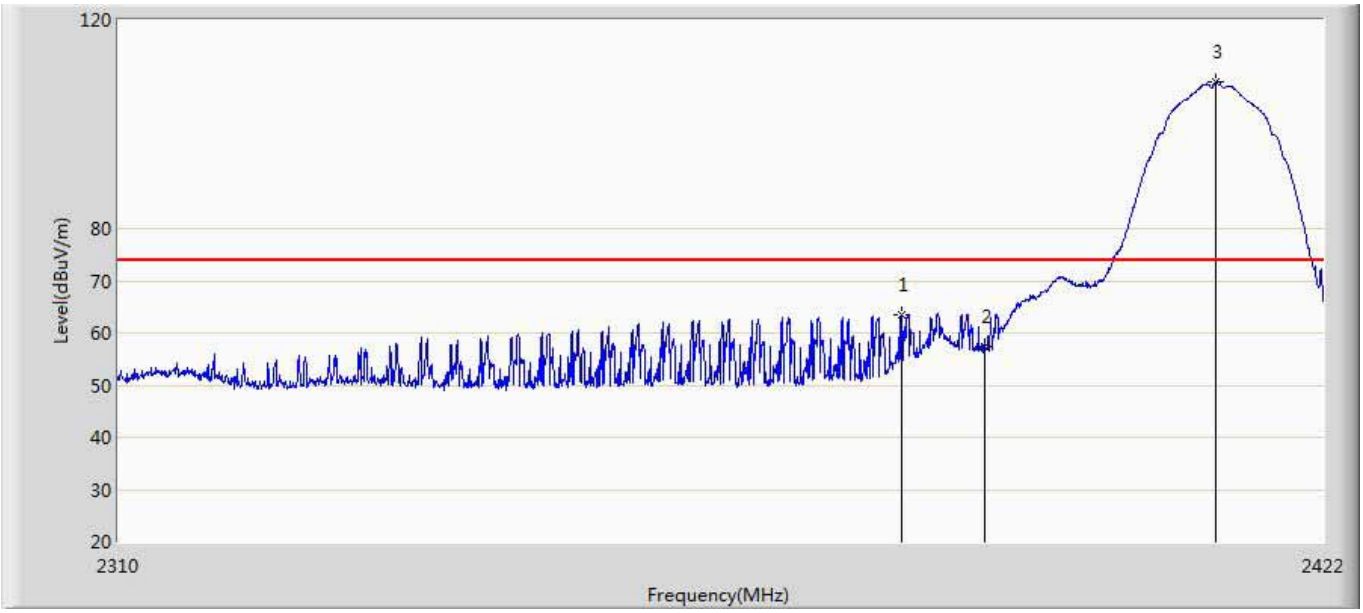
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1		2389.016	66.046	29.973	-7.954	74.000	32.167	3.906	0.000	PK
2		2390.000	61.593	25.520	-12.407	74.000	32.168	3.905	0.000	PK
3	*	2411.864	108.381	72.295	34.381	74.000	32.194	3.892	0.000	PK

Profile: 1672011R	Page No.: 2
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 11:06
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 1:Transmit at CH2412Mhz by 802.11b	



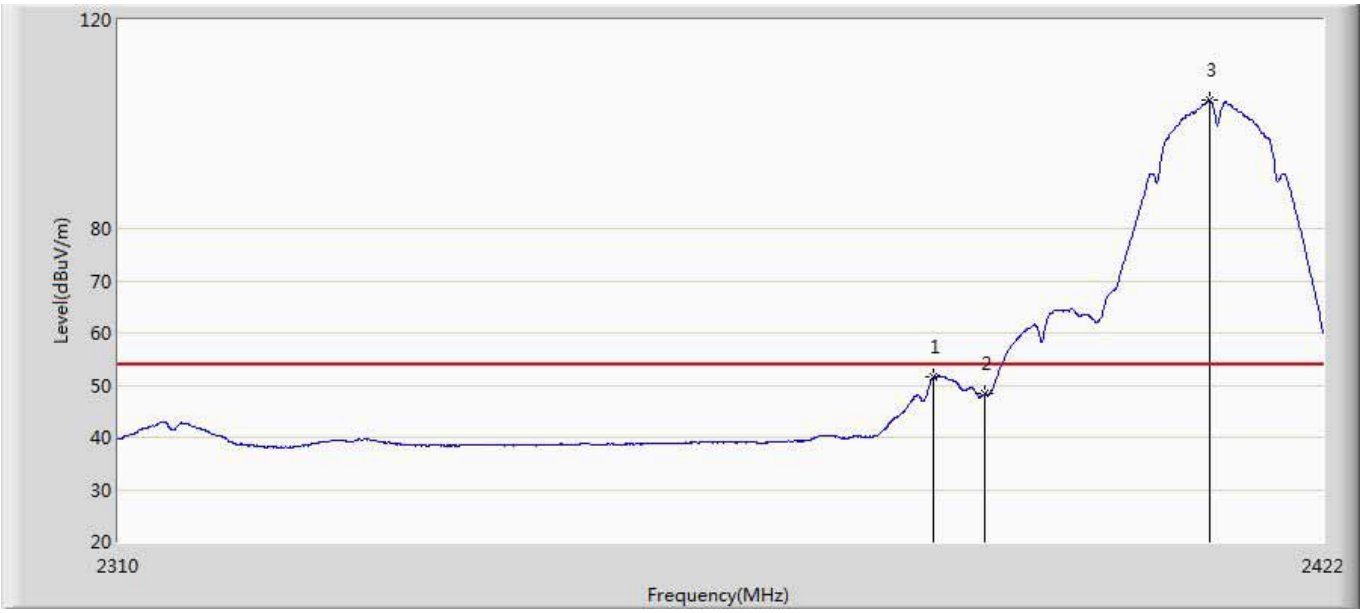
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1		2385.376	51.219	15.547	-2.781	54.000	32.162	3.509	0.000	AV
2		2390.000	47.577	11.895	-6.423	54.000	32.168	3.514	0.000	AV
3	*	2411.136	104.331	68.593	50.331	54.000	32.193	3.545	0.000	AV

Profile: 1672011R	Page No.: 3
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 11:10
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 1:Transmit at CH2412Mhz by 802.11b	



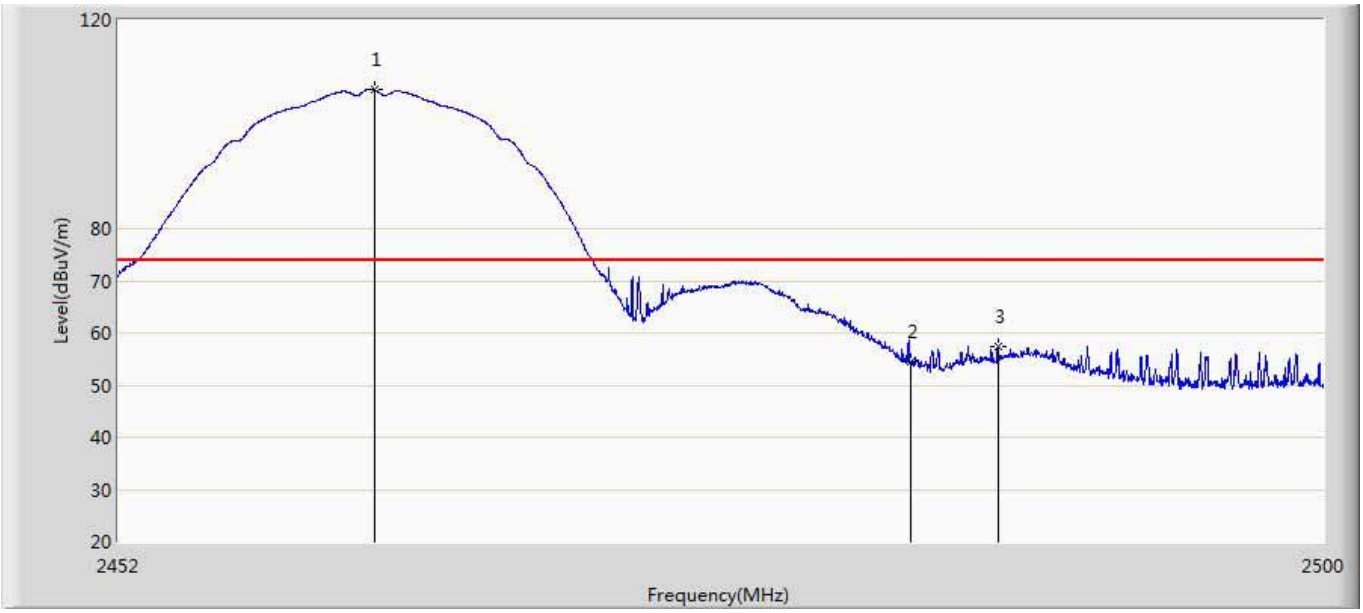
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1		2382.184	63.583	27.507	-10.417	74.000	32.158	3.917	0.000	PK
2		2390.000	57.420	21.347	-16.580	74.000	32.168	3.905	0.000	PK
3	*	2411.864	108.129	72.043	34.129	74.000	32.194	3.892	0.000	PK

Profile: 1672011R	Page No.: 4
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 11:13
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 1:Transmit at CH2412Mhz by 802.11b	



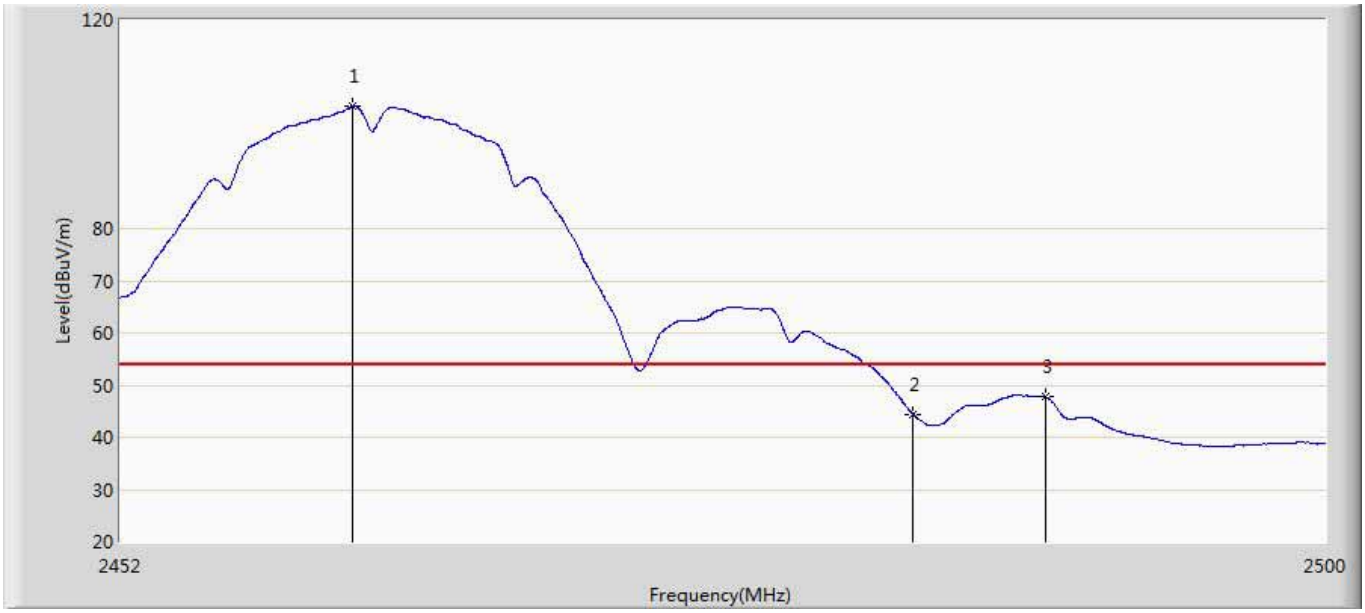
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1		2385.264	51.524	15.449	-2.476	54.000	32.162	3.912	0.000	AV
2		2390.000	48.261	12.188	-5.739	54.000	32.168	3.905	0.000	AV
3	*	2411.192	104.642	68.556	50.642	54.000	32.193	3.893	0.000	AV

Profile: 1672011R	Page No.: 5
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 11:17
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 1:Transmit at CH2462Mhz by 802.11b	



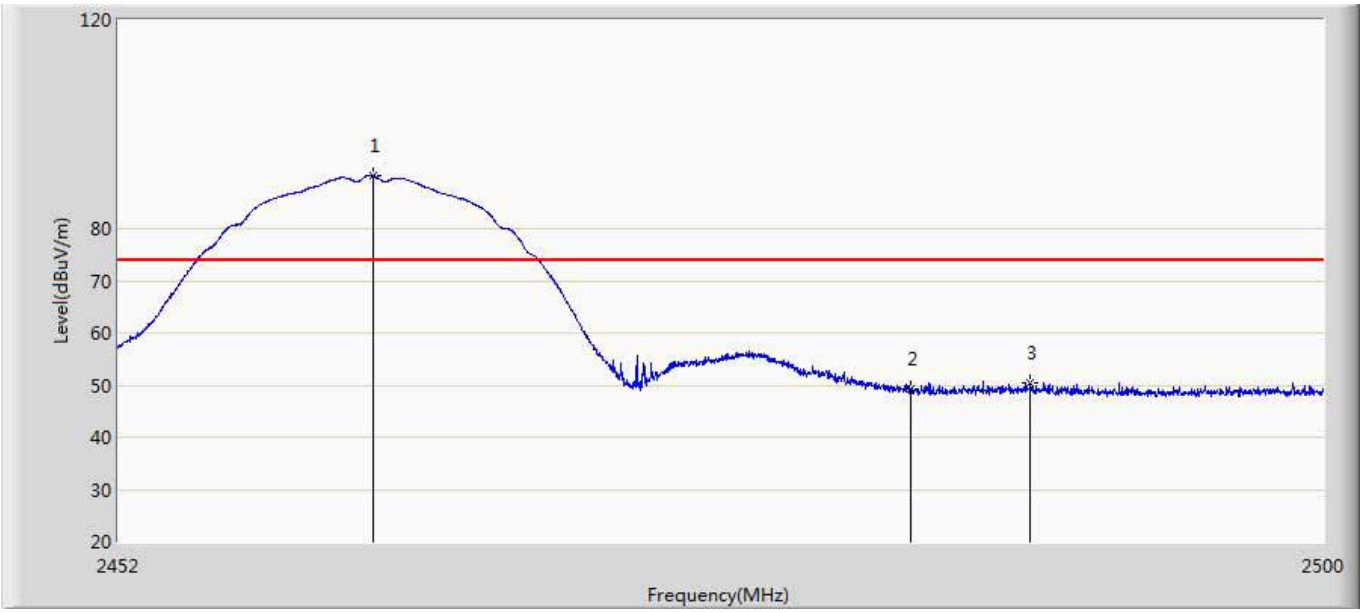
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1	*	2462.176	106.533	70.163	32.533	74.000	32.254	4.116	0.000	PK
2		2483.500	54.370	17.975	-19.630	74.000	32.280	4.115	0.000	PK
3		2486.968	57.463	21.081	-16.537	74.000	32.284	4.098	0.000	PK

Profile: 1672011R	Page No.: 6
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 11:24
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 1:Transmit at CH2462Mhz by 802.11b	



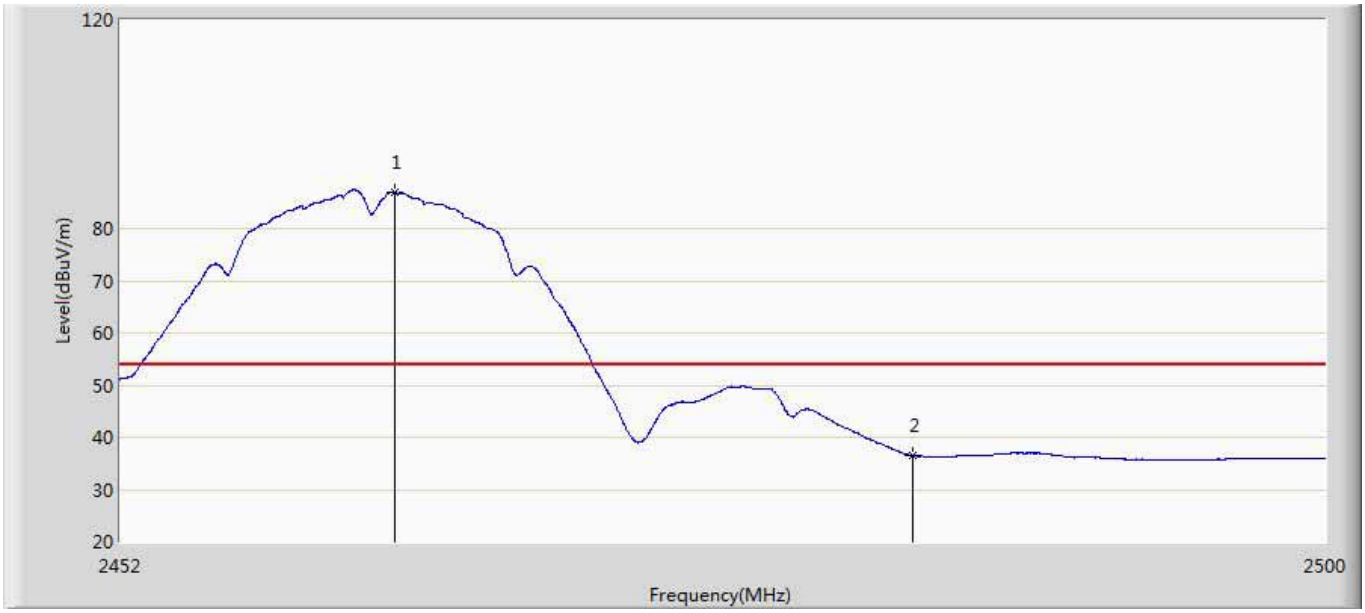
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1	*	2461.192	103.389	67.024	49.389	54.000	32.253	4.112	0.000	AV
2		2483.500	44.349	7.954	-9.651	54.000	32.280	4.115	0.000	AV
3		2488.768	47.850	11.474	-6.150	54.000	32.286	4.089	0.000	AV

Profile: 1672011R	Page No.: 7
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 11:27
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 1:Transmit at CH2462Mhz by 802.11b	



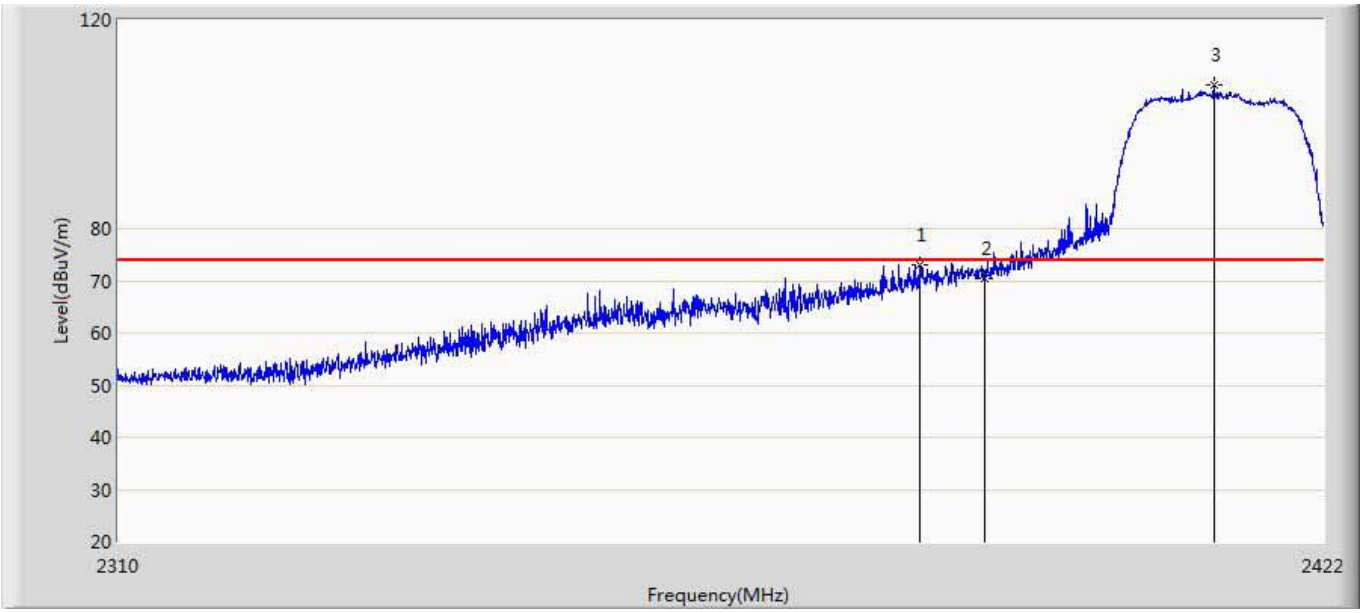
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1	*	2462.104	90.154	53.784	16.154	74.000	32.254	4.116	0.000	PK
2		2483.500	49.145	12.750	-24.855	74.000	32.280	4.115	0.000	PK
3		2488.264	50.419	14.041	-23.581	74.000	32.286	4.092	0.000	PK

Profile: 1672011R	Page No.: 8
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 11:30
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 1:Transmit at CH2462Mhz by 802.11b	



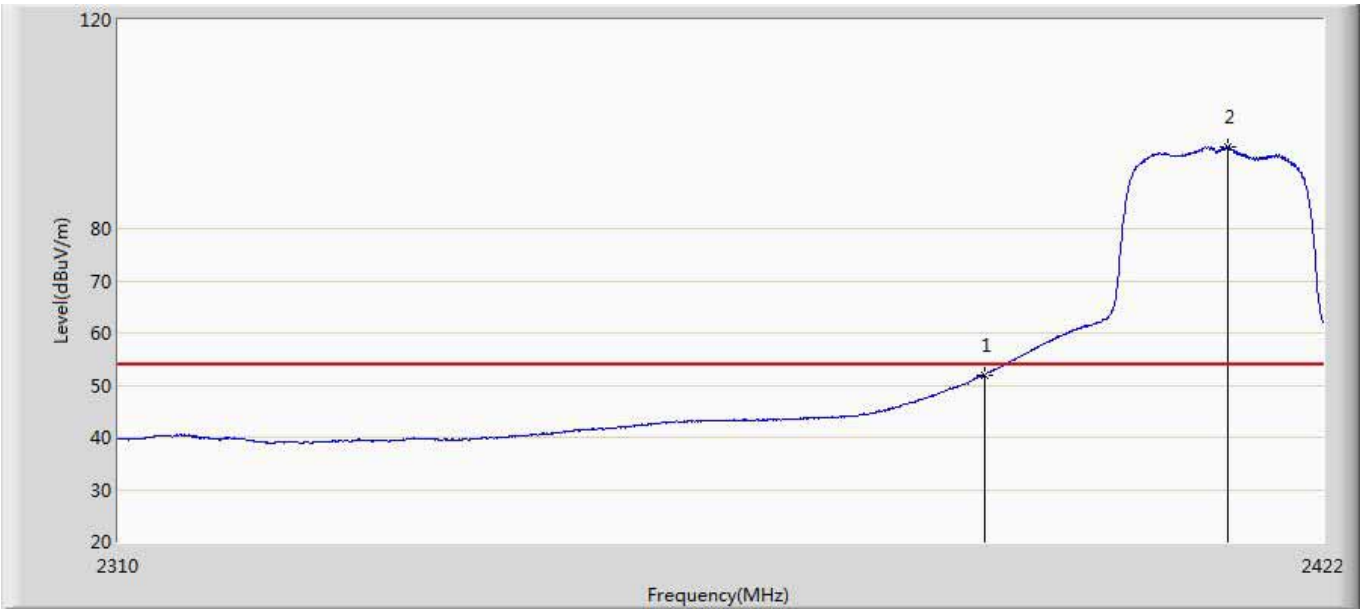
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1	*	2462.872	86.979	50.607	32.979	54.000	32.255	4.117	0.000	AV
2		2483.500	36.533	0.138	-17.467	54.000	32.280	4.115	0.000	AV

Profile: 1672011R	Page No.: 9
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 11:52
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 2:Transmit at CH2412Mhz by 802.11g	



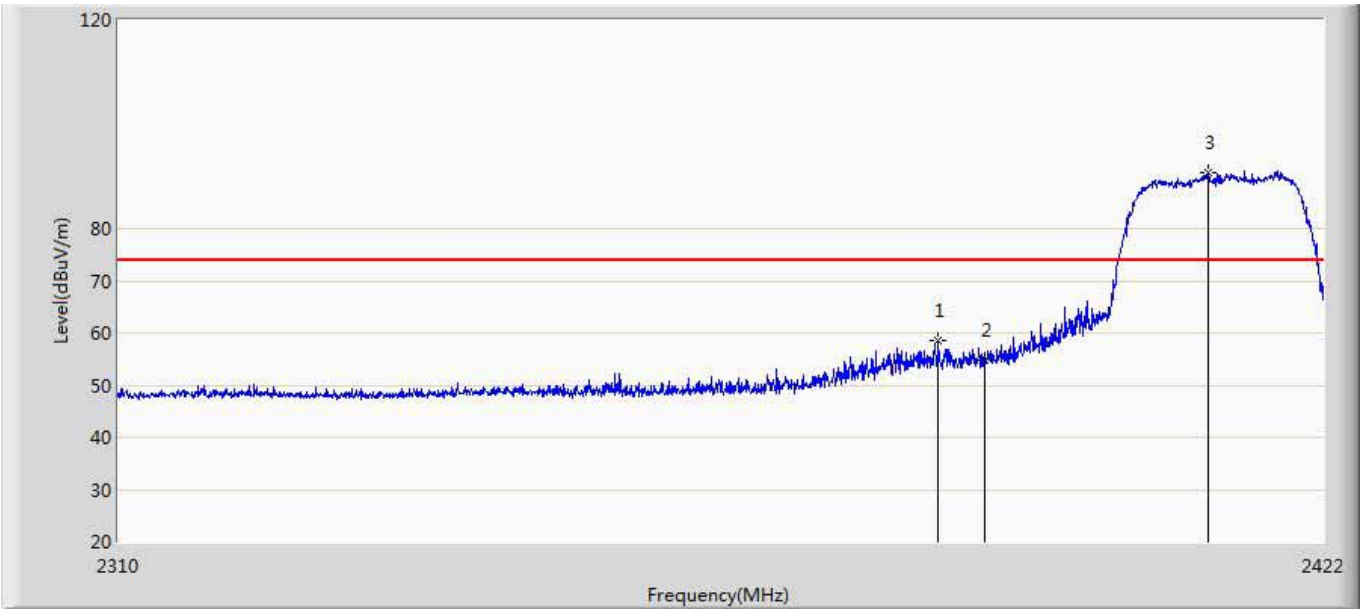
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1		2383.920	72.970	36.895	-1.030	74.000	32.161	3.915	0.000	PK
2		2390.000	70.510	34.437	-3.490	74.000	32.168	3.905	0.000	PK
3	*	2411.640	107.463	71.377	33.463	74.000	32.194	3.892	0.000	PK

Profile: 1672011R	Page No.: 10
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 11:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 2:Transmit at CH2412Mhz by 802.11g	



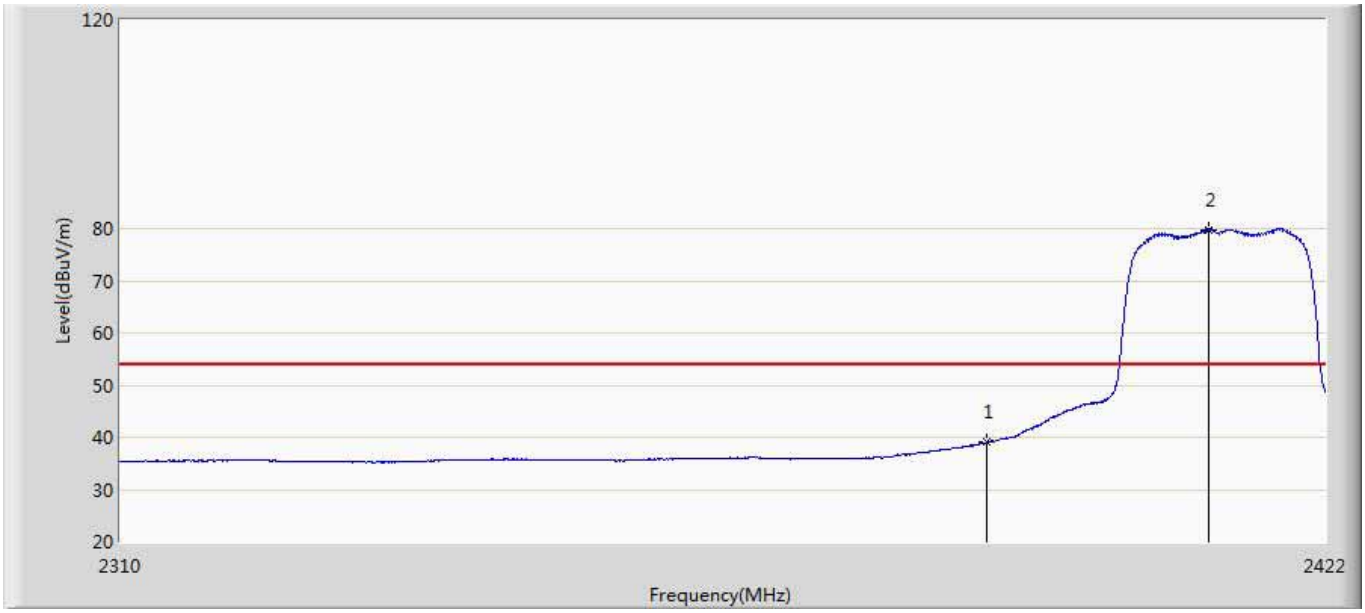
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1		2390.000	51.932	15.859	-2.068	54.000	32.168	3.905	0.000	AV
2	*	2412.984	95.510	59.425	41.510	54.000	32.195	3.890	0.000	AV

Profile: 1672011R	Page No.: 11
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 11:55
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 2:Transmit at CH2412Mhz by 802.11g	



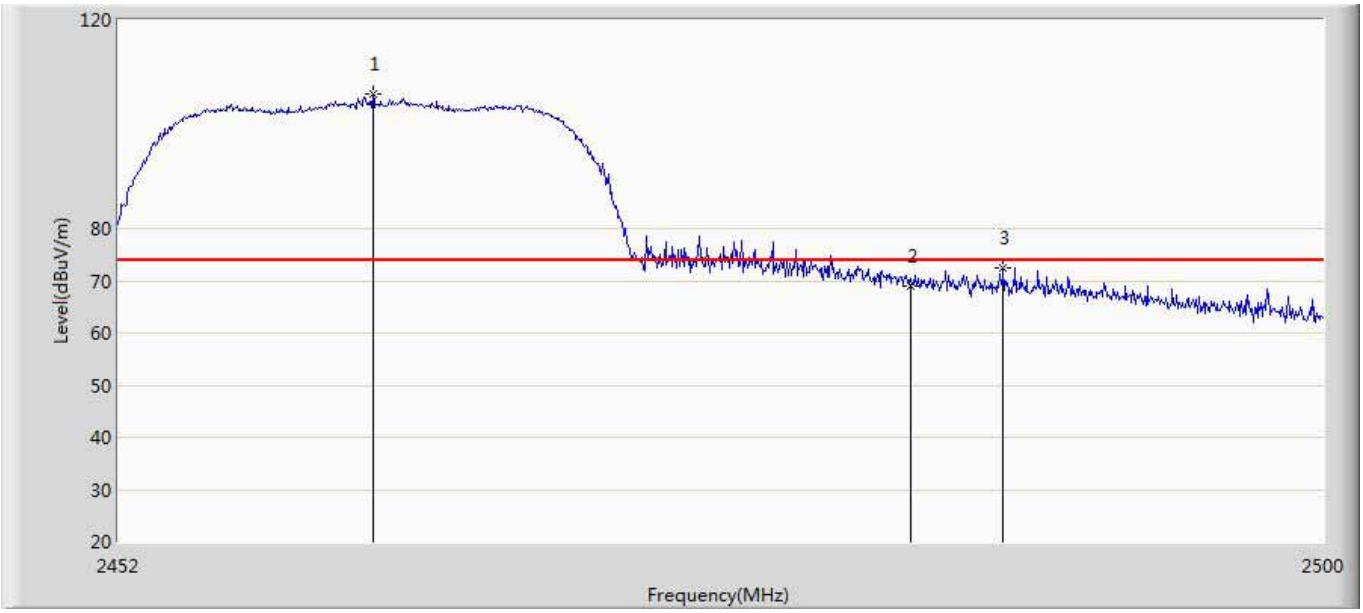
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1		2385.656	58.461	22.387	-15.539	74.000	32.163	3.912	0.000	PK
2		2390.000	54.796	18.723	-19.204	74.000	32.168	3.905	0.000	PK
3	*	2411.136	90.833	54.747	16.833	74.000	32.193	3.893	0.000	PK

Profile: 1672011R	Page No.: 12
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 11:58
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 2:Transmit at CH2412Mhz by 802.11g	



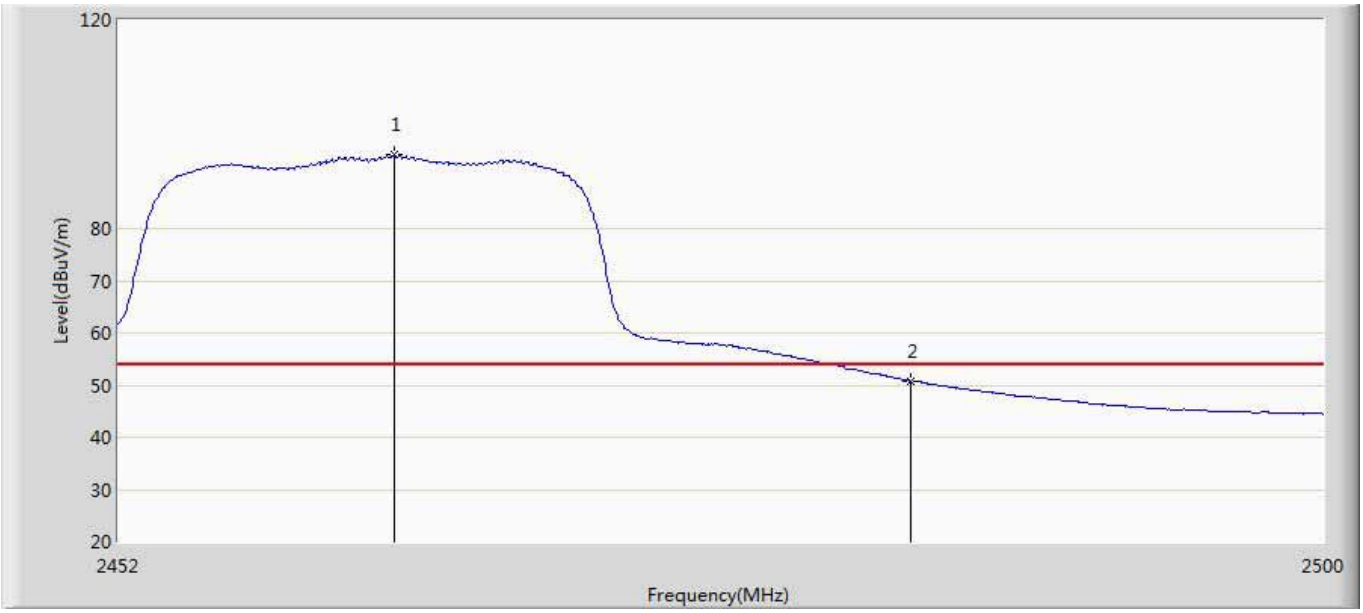
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1		2390.000	38.988	2.915	-15.012	54.000	32.168	3.905	0.000	AV
2	*	2410.912	79.785	43.699	25.785	54.000	32.193	3.893	0.000	AV

Profile: 1672011R	Page No.: 13
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 13:27
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 2:Transmit at CH2462Mhz by 802.11g	



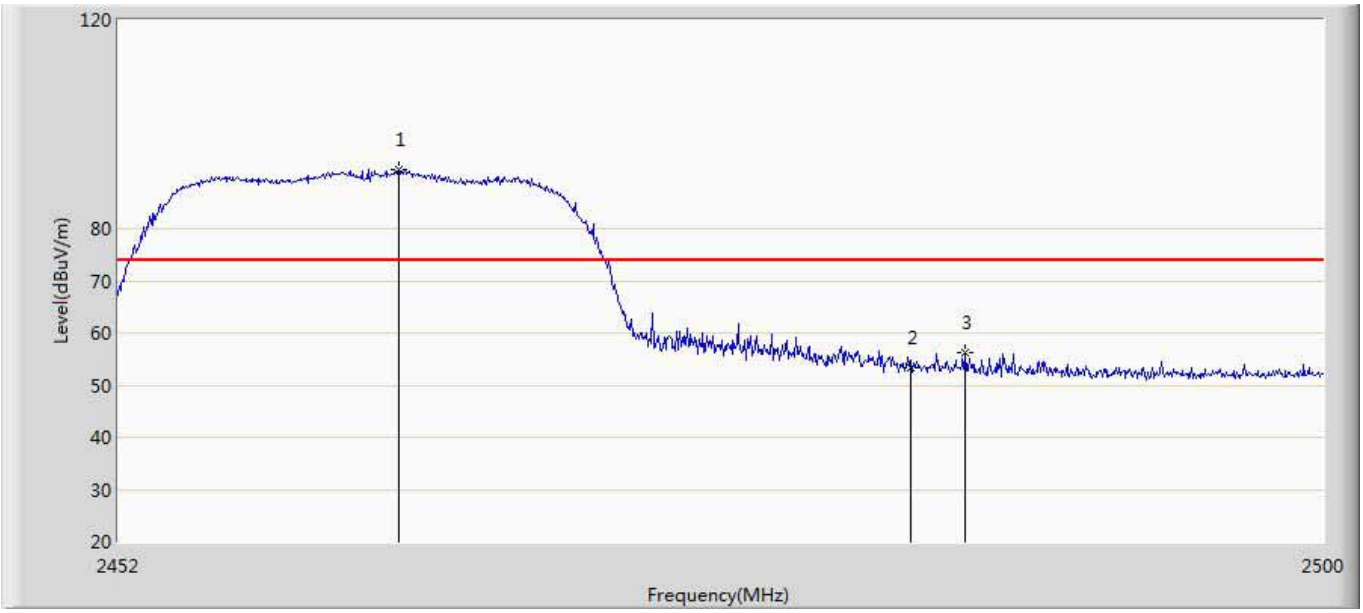
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1	*	2462.080	105.811	69.441	31.811	74.000	32.254	4.116	0.000	PK
2		2483.500	69.094	32.699	-4.906	74.000	32.280	4.115	0.000	PK
3		2487.184	72.476	36.094	-1.524	74.000	32.285	4.097	0.000	PK

Profile: 1672011R	Page No.: 14
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 13:37
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 2:Transmit at CH2462Mhz by 802.11g	



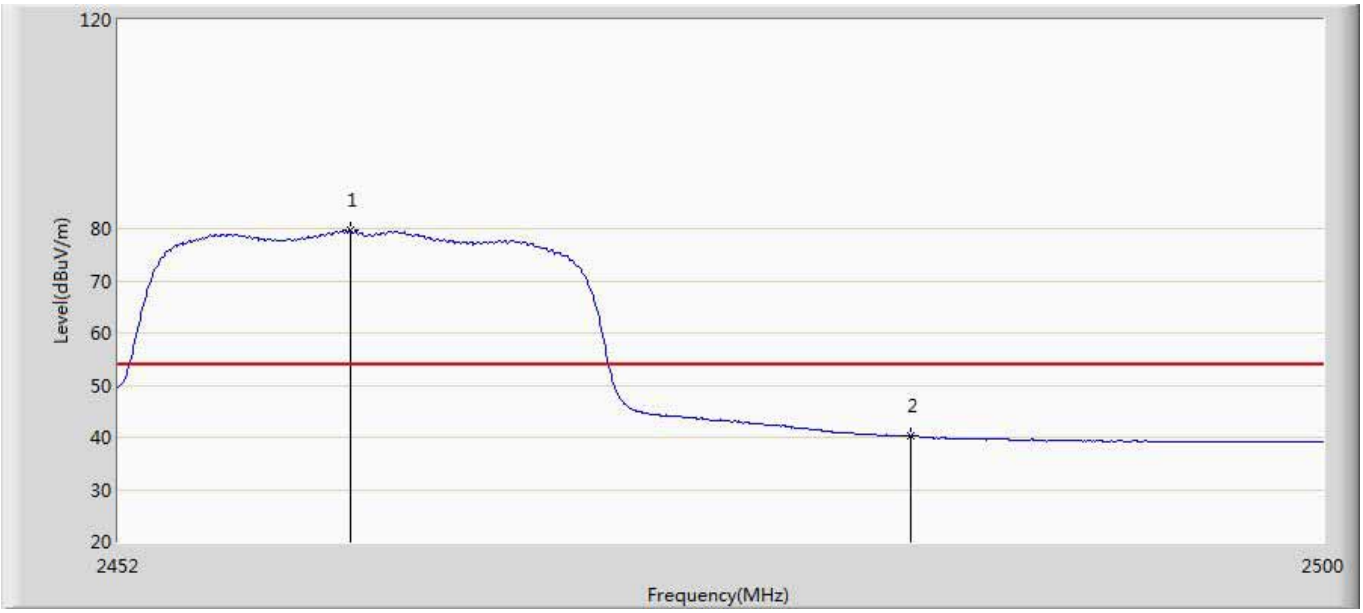
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1	*	2462.896	94.082	57.710	40.082	54.000	32.255	4.117	0.000	AV
2		2483.500	50.859	14.464	-3.141	54.000	32.280	4.115	0.000	AV

Profile: 1672011R	Page No.: 15
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 13:38
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 2:Transmit at CH2462Mhz by 802.11g	



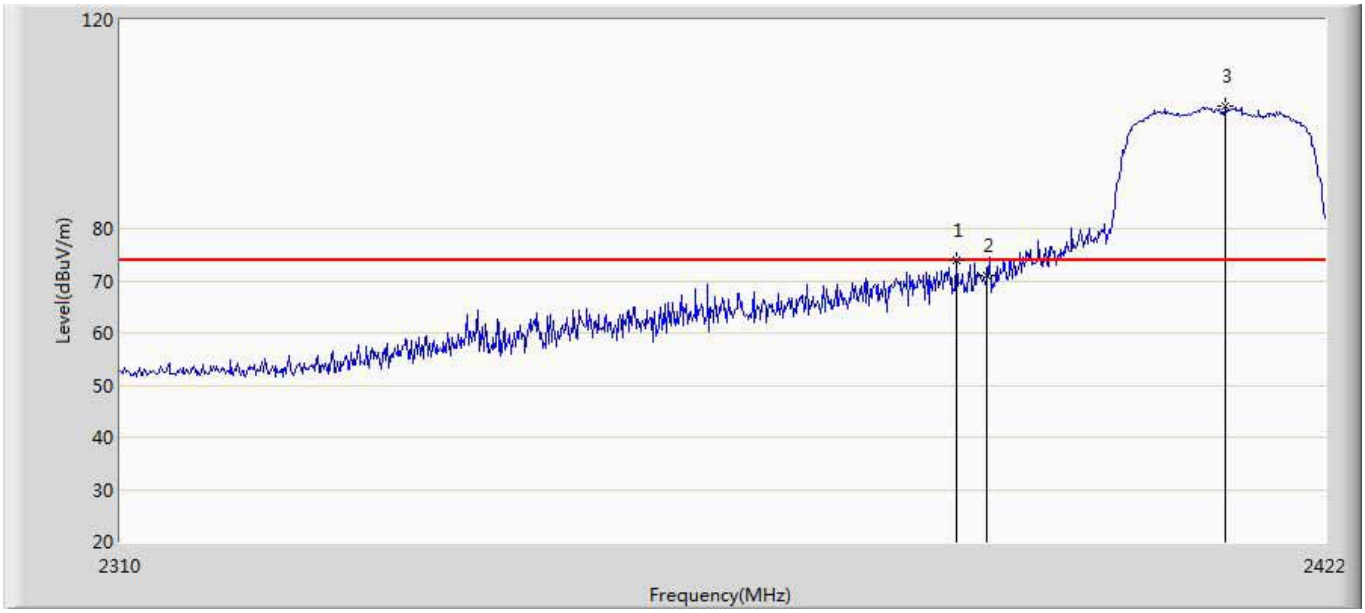
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1	*	2463.088	91.396	55.024	17.396	74.000	32.255	4.117	0.000	PK
2		2483.500	53.436	17.041	-20.564	74.000	32.280	4.115	0.000	PK
3		2485.648	56.152	19.765	-17.848	74.000	32.283	4.104	0.000	PK

Profile: 1672011R	Page No.: 16
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 13:39
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 2:Transmit at CH2462Mhz by 802.11g	



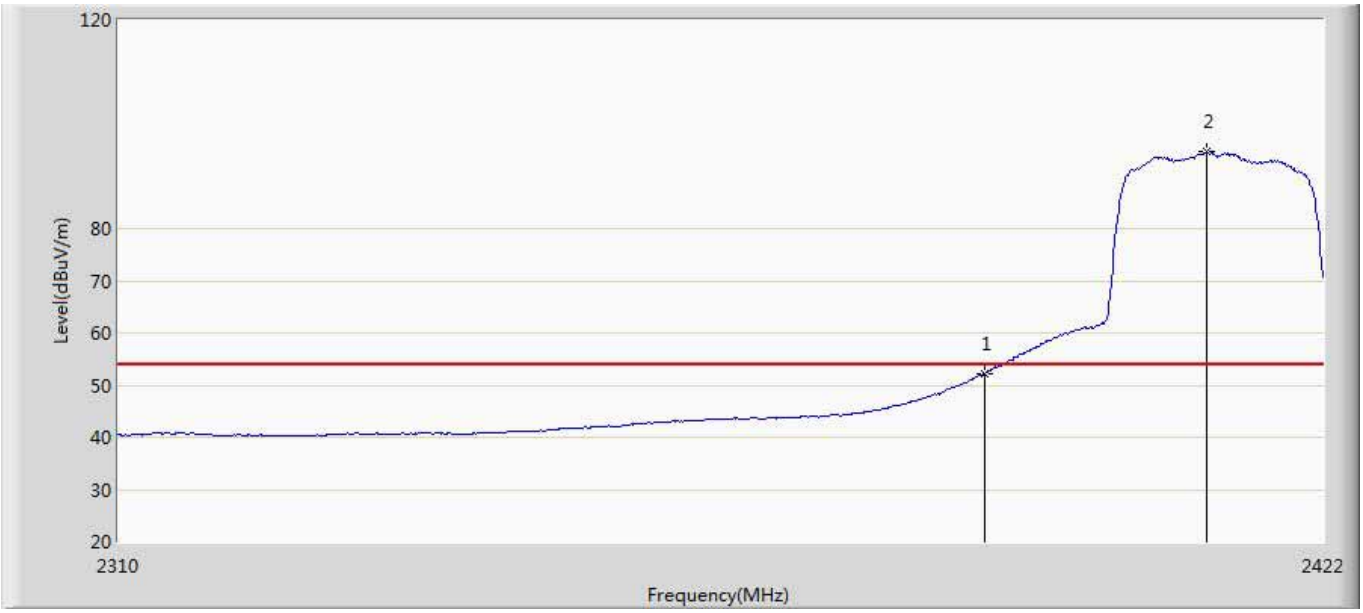
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1	*	2461.168	79.617	43.252	25.617	54.000	32.253	4.112	0.000	AV
2		2483.500	40.184	3.789	-13.816	54.000	32.280	4.115	0.000	AV

Profile: 1672011R	Page No.: 21
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 14:13
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 3:Transmit at CH2412Mhz by 802.11n20	



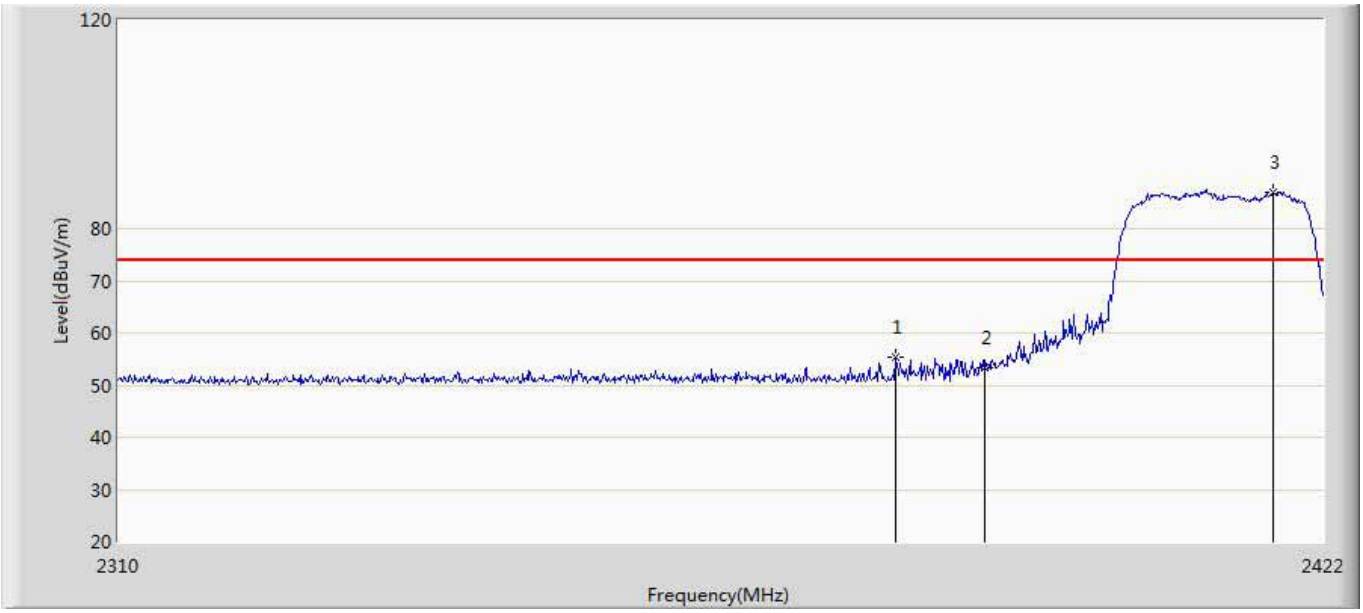
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1		2387.168	73.775	37.701	-0.225	74.000	32.165	3.909	0.000	PK
2		2390.000	71.043	34.970	-2.957	74.000	32.168	3.905	0.000	PK
3	*	2412.592	103.492	67.407	29.492	74.000	32.195	3.891	0.000	PK

Profile: 1672011R	Page No.: 22
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 14:25
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 3:Transmit at CH2412Mhz by 802.11n20	



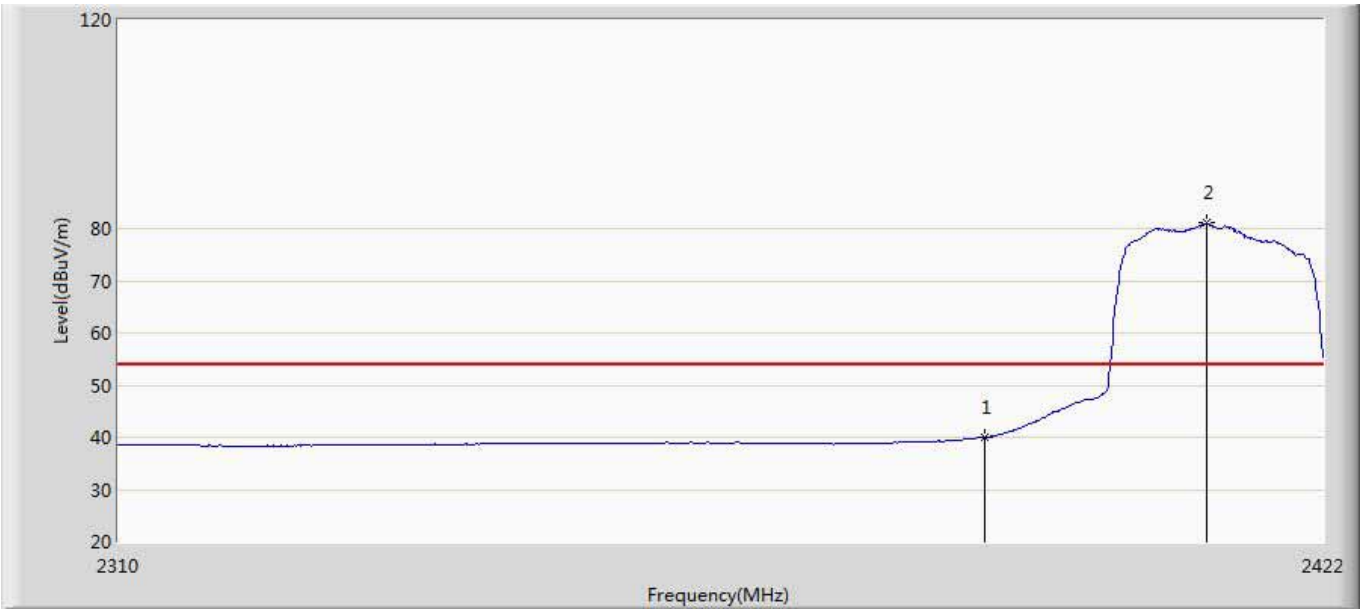
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1		2390.000	52.202	16.129	-1.798	54.000	32.168	3.905	0.000	AV
2	*	2410.912	94.732	58.646	40.732	54.000	32.193	3.893	0.000	AV

Profile: 1672011R	Page No.: 23
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 14:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 3:Transmit at CH2412Mhz by 802.11n20	



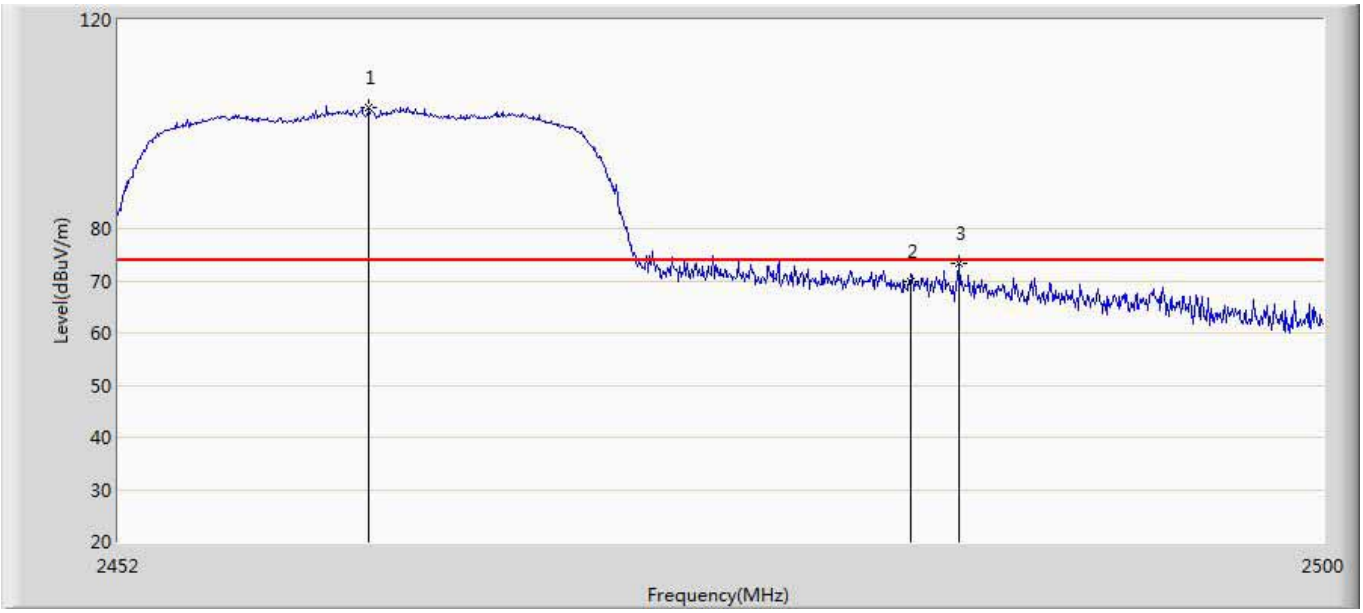
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1		2381.680	55.444	19.368	-18.556	74.000	32.158	3.918	0.000	PK
2		2390.000	53.291	17.218	-20.709	74.000	32.168	3.905	0.000	PK
3	*	2417.296	86.961	50.878	12.961	74.000	32.201	3.882	0.000	PK

Profile: 1672011R	Page No.: 24
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 14:27
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 3:Transmit at CH2412Mhz by 802.11n20	



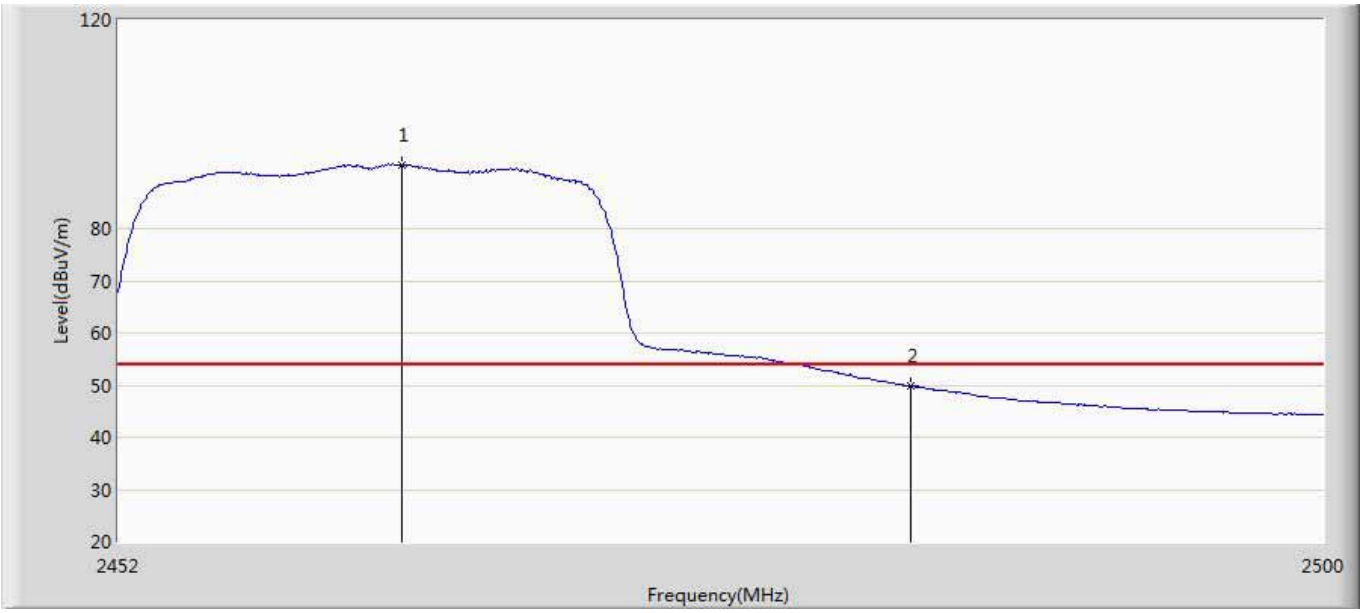
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1		2390.000	39.975	3.902	-14.025	54.000	32.168	3.905	0.000	AV
2	*	2411.024	81.047	44.961	27.047	54.000	32.193	3.893	0.000	AV

Profile: 1672011R	Page No.: 17
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 13:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 3:Transmit at CH2462Mhz by 802.11n20	



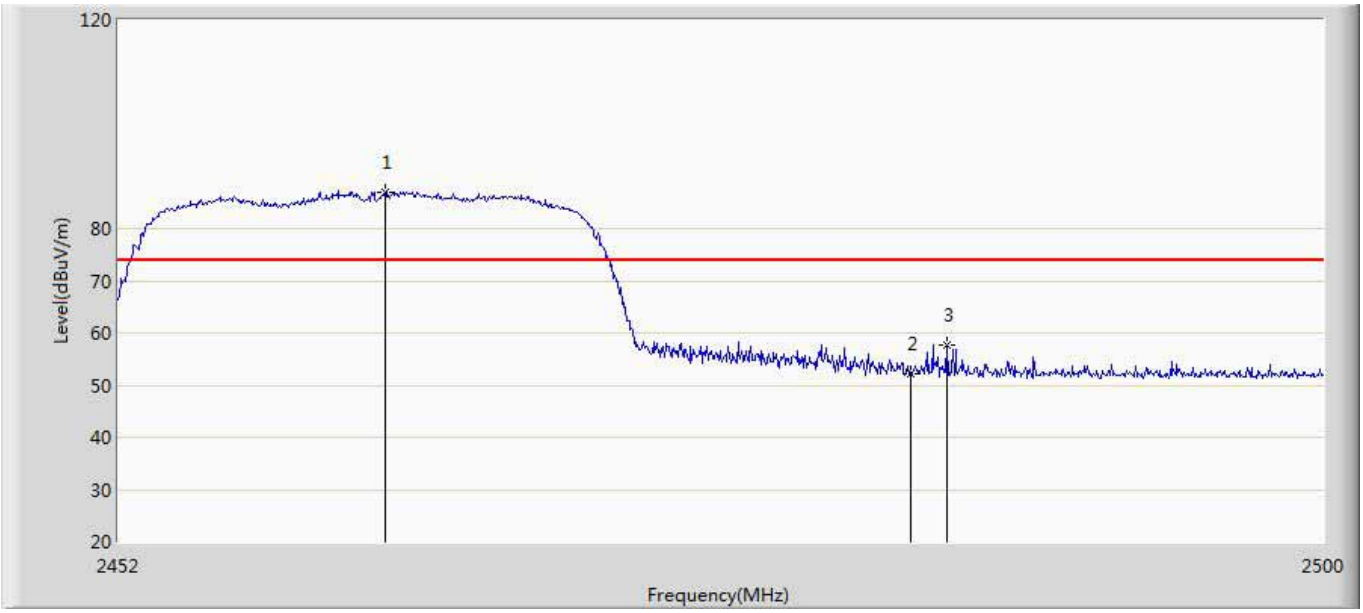
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1	*	2461.936	103.223	66.854	29.223	74.000	32.254	4.115	0.000	PK
2		2483.500	69.957	33.562	-4.043	74.000	32.280	4.115	0.000	PK
3		2485.408	73.422	37.034	-0.578	74.000	32.283	4.106	0.000	PK

Profile: 1672011R	Page No.: 18
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 14:03
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 3:Transmit at CH2462Mhz by 802.11n20	



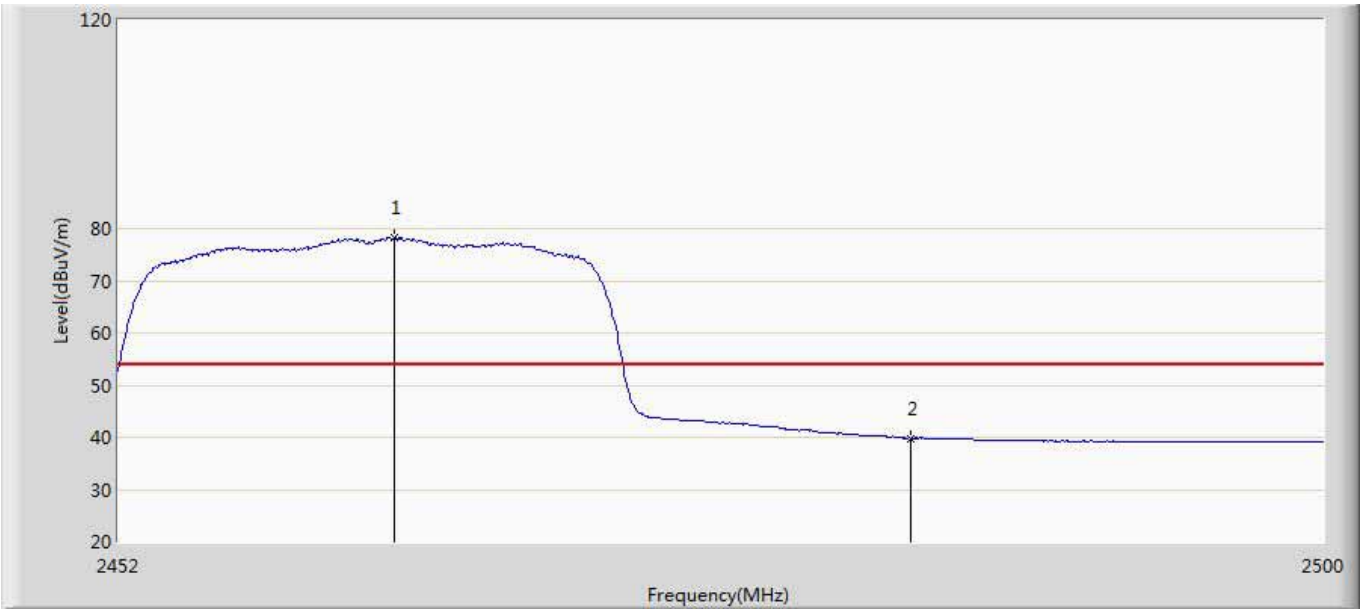
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1	*	2463.232	92.296	55.923	38.296	54.000	32.256	4.117	0.000	AV
2		2483.500	49.761	13.366	-4.239	54.000	32.280	4.115	0.000	AV

Profile: 1672011R	Page No.: 19
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 14:04
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 3:Transmit at CH2462Mhz by 802.11n20	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1	*	2462.560	87.015	50.644	13.015	74.000	32.255	4.116	0.000	PK
2		2483.500	52.289	15.894	-21.711	74.000	32.280	4.115	0.000	PK
3		2484.928	57.788	21.398	-16.212	74.000	32.282	4.108	0.000	PK

Profile: 1672011R	Page No.: 20
Engineer: Scott	
Site: AC5	Time: 2016/07/18 - 14:06
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 3:Transmit at CH2462Mhz by 802.11n20	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Type
1	*	2462.944	78.290	41.918	24.290	54.000	32.255	4.117	0.000	AV
2		2483.500	39.842	3.447	-14.158	54.000	32.280	4.115	0.000	AV

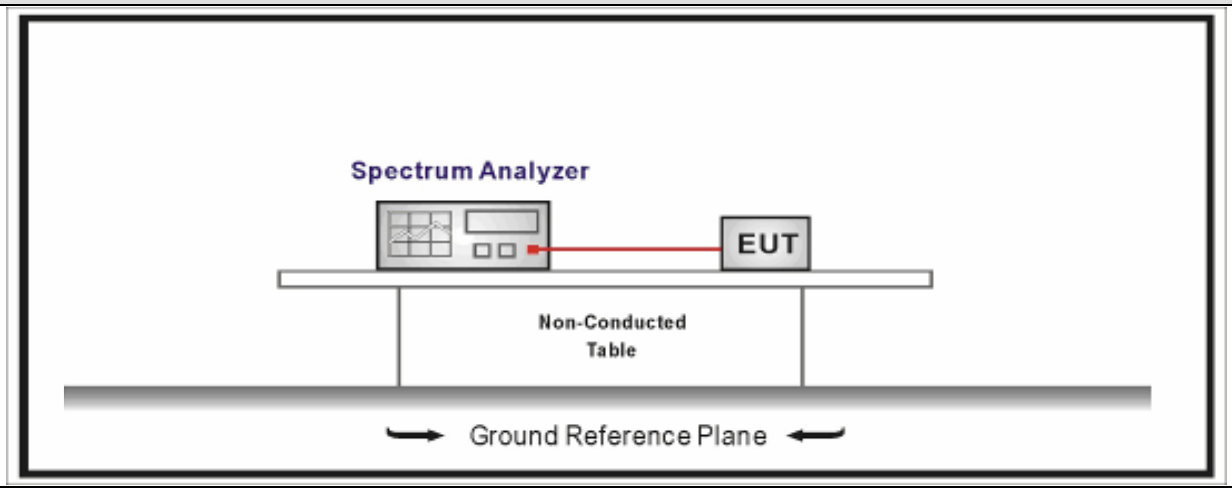
7. Occupied Bandwidth

7.1 Test Equipment

Occupied Bandwidth / TR-8					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016.01.04	2017.01.03
Spectrum Analyzer	Agilent	N9010A	MY48030494	2016.03.11	2017.03.10
Temperature/Humidity Meter	zhichen	ZC1-2	TR8-TH	2016.04.10	2017.04.09
Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

7.2 Test Setup

Occupied Bandwidth test setup:



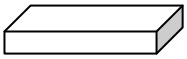
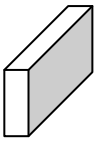
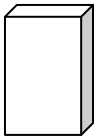
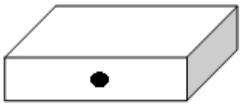
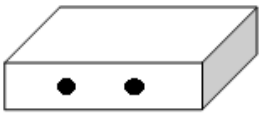
7.3 Limit

Occupied Bandwidth
Systems using digital modulation techniques operate in the2400-2483.5 MHz .The minimum 6 dB bandwidth shall be at least 500 kHz

7.4 Test Procedure

Test Method				
	Reference Rule		Chapter	Description
☒	ANSI C63.10		11.8	DTS bandwidth
	☐	ANSI C63.10	11.8.1	Option 1
	☒	ANSI C63.10	11.8.2	Option 2

7.5 EUT test definition

Item	Occupied Bandwidth			
Device Category	☒	Fixed position use		
	☐	Mobile position use		
Test mode	Mode 1~3			
Test method	☐	Radiated		
		X Axis	Y Axis	Z Axis
				
		Worst Axis ☐	Worst Axis ☐	Worst Axis ☐
	☒	Conducted		
	☒	Chain 0		
				
	☐	Chain 0	Chain 1	
				
	☐	Chain 0	Chain 1	Chain 2

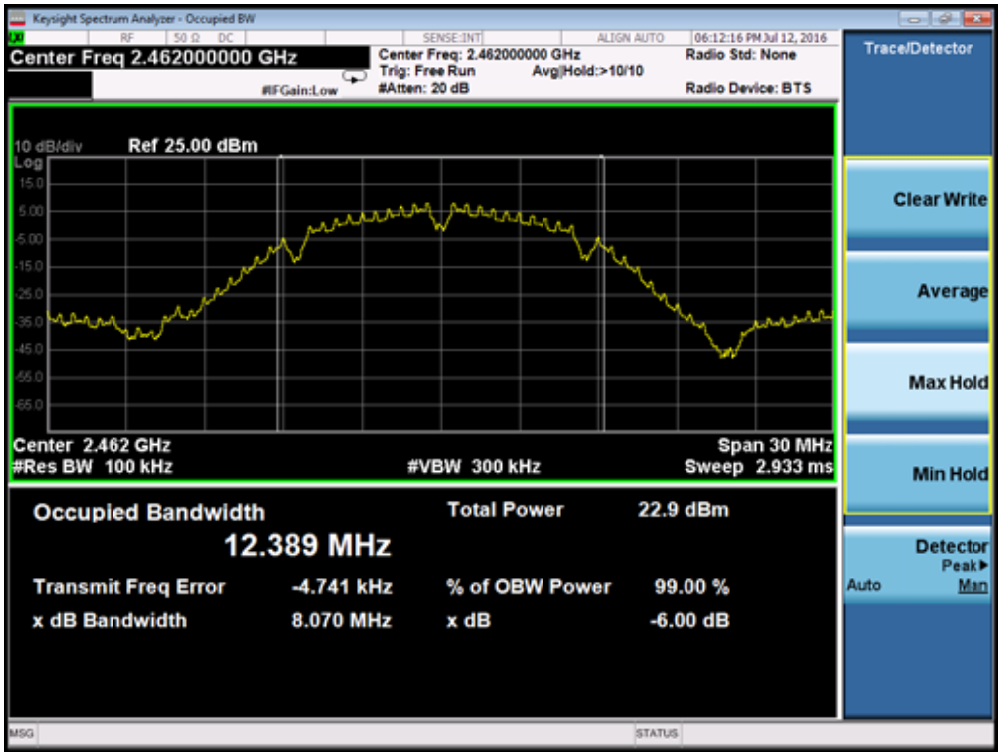
7.6 Test Result

Product Name	:	IP-STB	Test Power	:	AC 120V/60Hz
Test Site	:	TR-8			

Mode	CH.	Test Freq. (MHz)	99% Occupied Bandwidth (MHz)	6dB Occupied Bandwidth (MHz)	Limit (kHz)	Result
1	01	2412	12.385	8.084	>500	Pass
1	06	2437	12.141	8.071	>500	Pass
1	11	2462	12.389	8.070	>500	Pass
2	01	2412	16.342	15.140	>500	Pass
2	06	2437	17.115	15.140	>500	Pass
2	11	2462	16.350	15.140	>500	Pass
3	01	2412	17.496	15.140	>500	Pass
3	06	2437	17.714	15.130	>500	Pass
3	11	2462	17.495	15.140	>500	Pass

Note : The worst case of Occupied Bandwidth as below in next page:

Mode 1 CH11 (2462MHz)



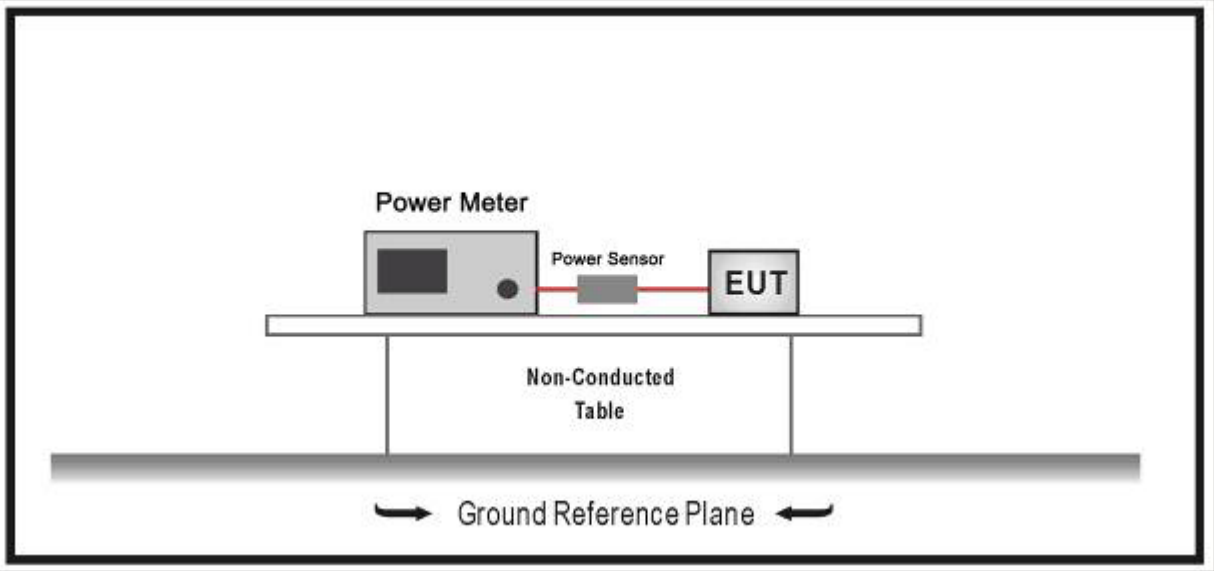
8 Fundamental emission output power

8.1 Test Equipment

Fundamental emission output power/ TR-8					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016.01.04	2017.01.03
Spectrum Analyzer	Agilent	N9010A	MY48030494	2016.03.11	2017.03.10
Wideband Peak Power Meter	Anritsu	ML2495A	0905006	2015.11.11	2016.11.10
Power Sensor	Anritsu	MA2411B	0846014	2015.11.11	2016.11.10
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2016.04.10	2017.04.09
Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

8.2 Test Setup

Fundamental emission output power test setup



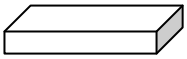
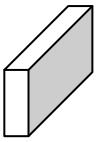
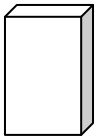
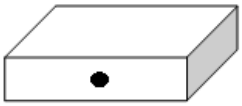
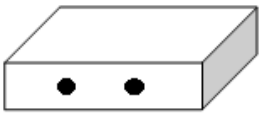
8.3 Limit

Fundamental emission output power Limit			
☒	G_{TX} ＜6dBi		P_{out}≤30dBm
☐	G_{TX} ＞6dBi		
	☐	Non-Fix point-point	P_{out}≤30-(G_{TX} -6)
	☐	Fix point-point	P_{out}≤30-[(G_{TX}-6)]/3
	☐	Point-to-multipoint	Pout≤30-(GTX-6)
	☐	Overlap Beams	P_{out}≤30-[(G_{TX}-6)]/3
	☐	Aggregate power transmitted simultaneously on all beams	P_{out}≤30-[(G_{TX}-6)]/3
	☐	single directional beam	P_{out}≤30-[(G_{TX}-6)]/3+8dB
Note 1 : G_{TX} directional gain of transmitting antennas. Note 2 : P_{out} is maximum peak conducted output power .			

8.4 Test Procedure

Fundamental emission output power Test Method							
	References Rule					Chapter	Description
☒	ANSI C63.10					11.9	Fundamental emission output power
	☒	ANSI C63.10				11.9.1	Maximum peak conducted output power
		☐	ANSI C63.10			11.9.1.1	RBW ≥ DTS bandwidth
		☐	ANSI C63.10			11.9.1.2	Integrated band power method
		☒	ANSI C63.10			11.9.1.3	PKPM1 Peak power meter method
	☐	ANSI C63.10				11.9.2	Maximum conducted (average) output power
		☐	ANSI C63.10			11.9.2.2	Measurement using a spectrum analyzer (SA)
			☐	ANSI C63.10		11.9.2.2.2	Method AVGSA-1(Duty cycle≥98%)
			☐	ANSI C63.10		11.9.2.2.3	Method AVGSA-1A(Duty cycle≥98%)
			☐	ANSI C63.10		11.9.2.2.4	Method AVGSA-2(Duty cycle≤98%)
			☐	ANSI C63.10		11.9.2.2.5	Method AVGSA-2A(Duty cycle≤98%)
			☐	ANSI C63.10		11.9.2.2.4	Method AVGSA-3
			☐	ANSI C63.10		11.9.2.2.5	Method AVGSA-3A
		☐	ANSI C63.10			11.9.2.3	Measurement using a power meter (PM)
			☐	ANSI C63.10		11.9.2.3.1	Method AVGPM
			☐	ANSI C63.10		11.9.2.3.2	Method AVGPM-G

8.5 EUT test definition

Item	Fundamental emission output power			
Device Category	☒	Fixed position use		
	☐	Mobile position use		
Test mode	Mode 1~3			
Test method	☐	Radiated		
		X Axis	Y Axis	Z Axis
				
		Worst Axis ☐	Worst Axis ☐	Worst Axis ☐
	☒	Conducted		
	☒	Chain 0		
				
	☐	Chain 0	Chain 1	
				
	☐	Chain 0	Chain 1	Chain 2

8.6 Test Result

Product Name	:	IP-STB	Test Power	:	AC 120V/60Hz
Test Site	:	TR8			

Mode	Channel	Test Frequency (MHz)	Measurement Power Output (dBm)	Limit (dBm)	Result
1	01	2412	19.35	30	Pass
1	06	2437	22.74	30	Pass
1	11	2462	19.08	30	Pass
2	01	2412	23.17	30	Pass
2	06	2437	24.53	30	Pass
2	11	2462	22.73	30	Pass
3	01	2412	22.37	30	Pass
3	06	2437	24.48	30	Pass
3	11	2462	21.93	30	Pass

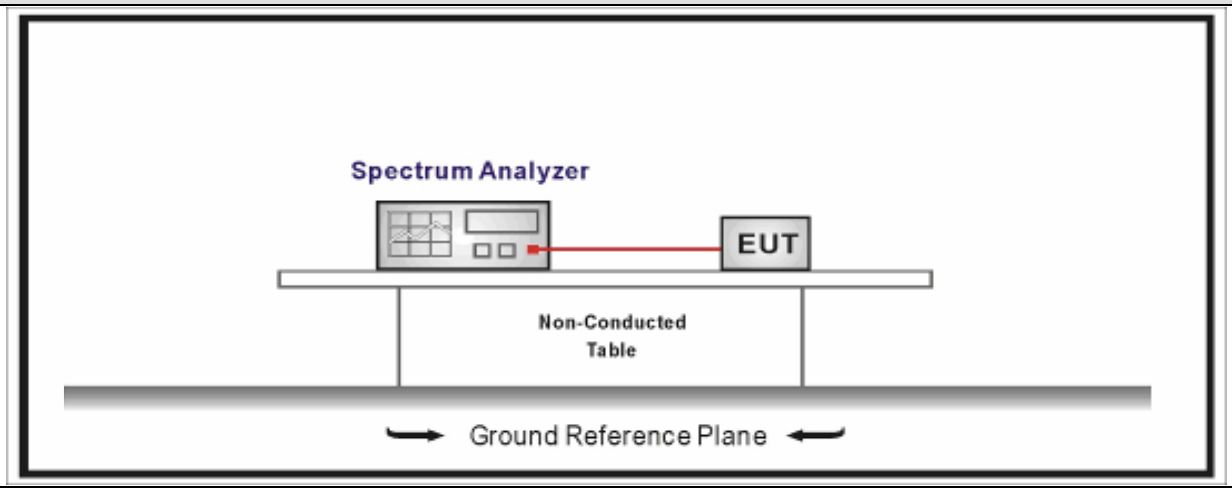
9 Power Spectral Density

9.1 Test Equipment

Power Spectral Density / TR-8					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016.01.04	2017.01.03
Spectrum Analyzer	Agilent	N9010A	MY48030494	2016.03.11	2017.03.10
Temperature/Humidity Meter	zhichen	ZC1-2	TR8-TH	2016.04.10	2017.04.09
Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

9.2 Test Setup

Power Spectral Density test setup



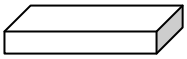
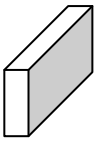
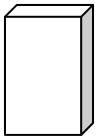
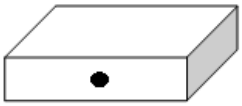
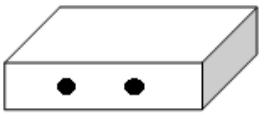
9.3 Limit

Power Spectral Density Limit
Power Spectral Density≤8dBm/3kHz

9.4 Test Procedure

Power Spectral Density Test Method				
	References Rule		Chapter	Description
☒	ANSI C63.10		11.10	Maximum power spectral density level in the fundamental emission
	☒	ANSI C63.10	11.10.2	Method PKPSD (peak PSD)
	☐	ANSI C63.10	11.10.3	Method AVGPSD-1(Duty cycle≥98%)
	☐	ANSI C63.10	11.10.4	Method AVGPSD-1A(Duty cycle≥98%)
	☐	ANSI C63.10	11.10.5	Method AVGPSD-2(Duty cycle＜98%)
	☐	ANSI C63.10	11.10.6	Method AVGPSD-2A(Duty cycle＜98%)
	☐	ANSI C63.10	11.10.7	Method AVGPSD-3
	☐	ANSI C63.10	11.10.8	Method AVGPSD-3A

9.5 EUT test definition

Item	Power Spectral Density Test Method			
Device Category	☒	Fixed position use		
	☐	Mobile position use		
Test mode	Mode 1~3			
Test method	☐	Radiated		
		X Axis	Y Axis	Z Axis
				
		Worst Axis ☐	Worst Axis ☐	Worst Axis ☐
	☒	Conducted		
	☒	Chain 0		
				
	☐	Chain 0	Chain 1	
				
	☐	Chain 0	Chain 1	Chain 2

9.6 Test Result

Product Name	:	IP-STB	Test Power	:	AC 120V/60Hz
Test Site	:	TR8			

Mode	Channel	Test Frequency (MHz)	Measurement PSD (dBm/3kHz)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
1	01	2412	-4.681	-4.681	8.0	Pass
1	06	2437	-1.792	-1.792	8.0	Pass
1	11	2462	-5.956	-5.956	8.0	Pass
2	01	2412	-11.471	-11.471	8.0	Pass
2	06	2437	-6.114	-6.114	8.0	Pass
2	11	2462	-13.220	-13.220	8.0	Pass
3	01	2412	-13.931	-13.931	8.0	Pass
3	06	2437	-5.457	-5.457	8.0	Pass
3	11	2462	-13.827	-13.827	8.0	Pass

Mode 1 CH06(2437MHz)

The End