FCC Radio Test Report

FCC ID: 2AC2S-X8

Original Grant

Report No.	:	TB-FCC141908
Applicant	:	Wm Wireless& Mobile Ltda.
Equipment Under Test (EUT)		
EUT Name	:	Rugged smart phone
Model No.	:	Rock X8
Serial No.	:	N/A
Brand Name	:	Extrem
Receipt Date	:	2014-08-11
Test Date	:	2014-08-11 to 2014-08-29
Issue Date	:	2014-09-03
Standards	:	FCC Part 15, Subpart C (15.247)
Test Method	:	ANSI C63.4:2003
Conclusions	:	**PASS**

In the configuration tested, the EUT complied with the standards specified above,
The EUT technically complies with the FCC and IC requirements

Test/Witness Engineer	:	IVAN SU
Approved& Authorized	:	

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, China
Tel: +86 75526509301 Fax: +86 75526509195

Contents

1. General Information about EUT

1.1 Client Information

Applicant	:	Wm Wireless& Mobile Ltda.
Address	:	Calle 84#28-12 Bogota-Colombia
Manufacturer	:	Shenzhen Ematic Technology Co.,Ltd
Address	:	Hua lun Industrial Zone Phoenix Street Fu yong Town Bao an district Shen zhen City.

1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	Rugged smart phone	
Models No.	:	Rock X8	
Model Difference	:	N/A	
Product Description	:	Operation Frequency: 802.11b/g/n(HT20): 2412MHz~2462MHz	
		Number of Channel:	802.11b/g/n(HT20):11 channels **see note(3)**
		RF Output Power:	802.11b: 18.45 dBm 802.11g: 20.63 dBm 802.11n (HT20): 20.35 dBm
		Antenna Gain:	-1.0 dBi (PIFA Antenna)
		Modulation Type:	802.11b: DSSS (CCK, QPSK, BPSK) 802.11g: OFDM 802.11n: OFDM
		Bit Rate of Transmitter:	802.11b:11/5.5/2/1 Mbps 802.11g:54/48/36/24/18/12/9/6 Mbps 802.11n:up to 65Mbps
Power Supply	:	DC power supplied by AC/DC Adapter DC Voltage supplied from Li-Polymer battery.	
Power Rating	:	AC/DC Adapter Input: AC 100~240V 50-60 Hz 0.15A Max Output: DC 5V 500mA DC 3.7V 2800mAh Li-ion battery	
Connecting I/O Port(S)	:	Please refer to the User's Manual	

Note:

(1) This Test Report is FCC Part 15.247 for 802.11b/g/n, the test procedure follows the FCC KDB 558074 D01 DTS Meas Guidance v03r02.

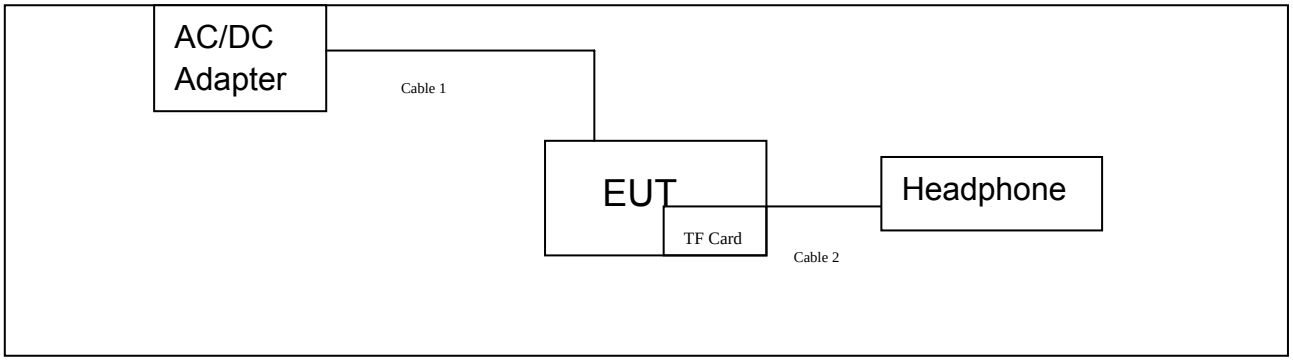
(2) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

(3) Antenna information provided by the applicant.
(4) Channel List:
CH 01~CH 11 for 802.11b/g/n(HT20)

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	05	2432	09	2452
02	2417	06	2437	10	2457
03	2422	07	2442	11	2462
04	2427	08	2447		

1.3 Block Diagram Showing the Configuration of System Tested

TX Mode



Equipment Information				
Name	**Model**	**S/N**	**Manufacturer**	**Used "√"**
Cable Information				
Number	**Shielded Type**	**Ferrite Core**	**Length**	**Note**
Cable 1	YES	NO	0.8M	USB Line
Cable 2	NO	NO	1.0M	Headphone Line

1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated respectively.

For Conducted Test	
Final Test Mode	**Description**
Mode 1	TX B Mode

For Radiated Test	
Final Test Mode	**Description**
Mode 3	TX Mode B Mode Channel 01/06/11
Mode 4	TX Mode G Mode Channel 01/06/11
Mode 5	TX Mode N(HT20) Mode Channel 01/06/11

Note:

(1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate.

According to ANSI C63.4 standards, the measurements are performed at the highest, middle, lowest available channels, and the worst case data rate as follows:

802.11b Mode: CCK (1 Mbps)

802.11g Mode: OFDM (6 Mbps)

802.11n (HT20) Mode: MCS 0 (6.5 Mbps)

(2) During the testing procedure, the continuously transmitting with the maximum power mode was programmed by the customer.

(3) The EUT is considered a mobile unit; in normal use it was positioned on X-plane. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.

1.6 Description of Test Software Setting

During testing channel& Power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of WLAN.

Test Software Version	**Test Program: *#*#3646633#*#***		
Channel	CH 01	CH 06	CH 11
IEEE 802.11b DSSS	19	19	19
IEEE 802.11g OFDM	16	16	16
IEEE 802.11n (HT20)	16	16	16

1.7 Test Facility

The tests were performed at:
Shenzhen Certification Technology Service Co., Ltd
2F, Building B, East Area of Nanchang Second Industrial Zone, Gushu 2nd Road, Bao'an District, Shenzhen, 518126, China
Tel: 86-755-86375552 Fax: 86-755-26736857

The test report was fulfilled by Shenzhen Toby Technology Co., Ltd. Shenzhen Toby Technology Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements results.

2. Test Summary

FCC Part 15 Subpart C(15.247)			
Standard Section FCC	**Test Item**	**Judgment**	**Remark**
15.203	Antenna Requirement	PASS	N/A
15.207	Conducted Emission	PASS	N/A
15.205	Restricted Bands	PASS	N/A
15.247(a)(2)	6dB Bandwidth	PASS	N/A
15.247(b)	Peak Output Power	PASS	N/A
15.247(e)	Power Spectral Density	PASS	N/A
15.247(d)	Transmitter Radiated Spurious Emission	PASS	N/A
Note: "/" for no requirement for this test item. N/A is an abbreviation for Not Applicable.			

3. Conducted Emission Test

3.1 Test Standard and Limit

3.1.1Test Standard

FCC Part 15.207

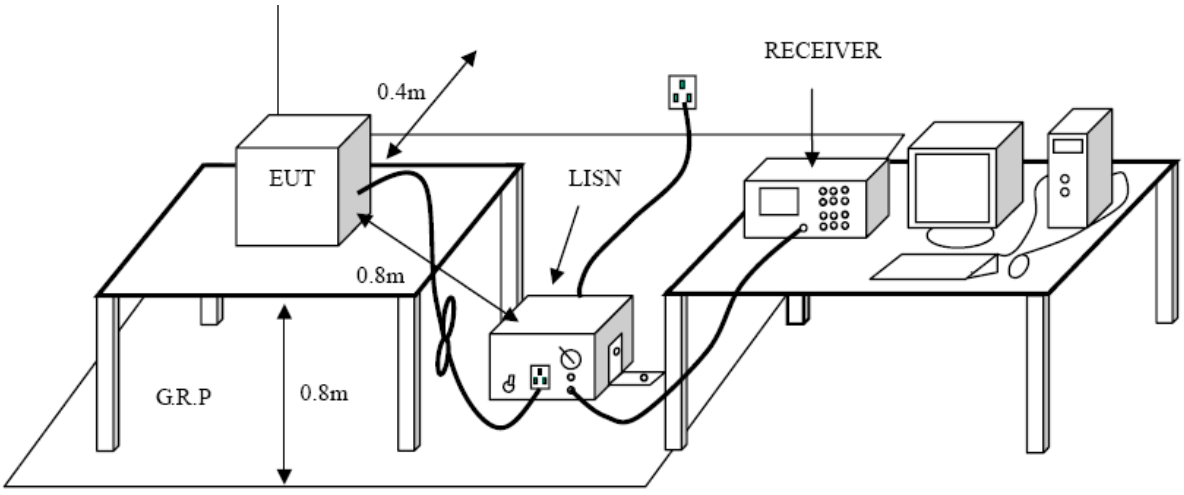
3.1.2 Test Limit

Conducted Emission Test Limit

Frequency	Maximum RF Line Voltage (dBμV)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Notes:
(1) *Decreasing linearly with logarithm of the frequency.
(2) The lower limit shall apply at the transition frequencies.
(3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

3.2 Test Setup



3.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from nearest part of EUT chassis.

The bandwidth of EMI test receiver is set at 9kHz, and the test frequency band is from 0.15MHz to 30MHz.

3.4 Test Equipment Used

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test Receiver	ROHDE& SCHWARZ	ESCI	100321	Aug. 08, 2014	Aug.07, 2015
50ΩCoaxial Switch	Anritsu	MP59B	X10321	Aug. 08, 2014	Aug.07, 2015
L.I.S.N	Rohde & Schwarz	ENV216	101131	Aug. 08, 2014	Aug.07, 2015
L.I.S.N	SCHWARZBECK	NNBL 8226-2	8226-2/164	Aug. 08, 2014	Aug.07, 2015

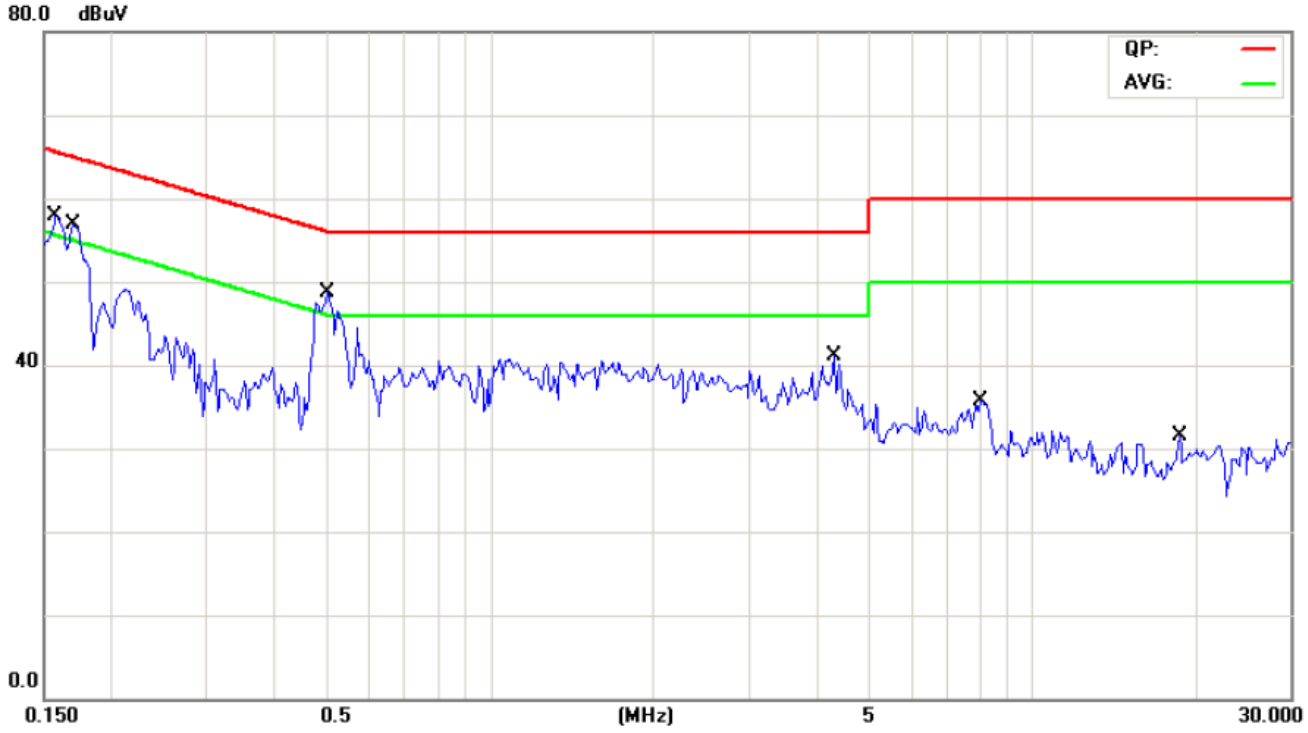
3.5 EUT Operating Mode

Please refer to the description of test mode.

3.6 Test Data

Please see the next page.

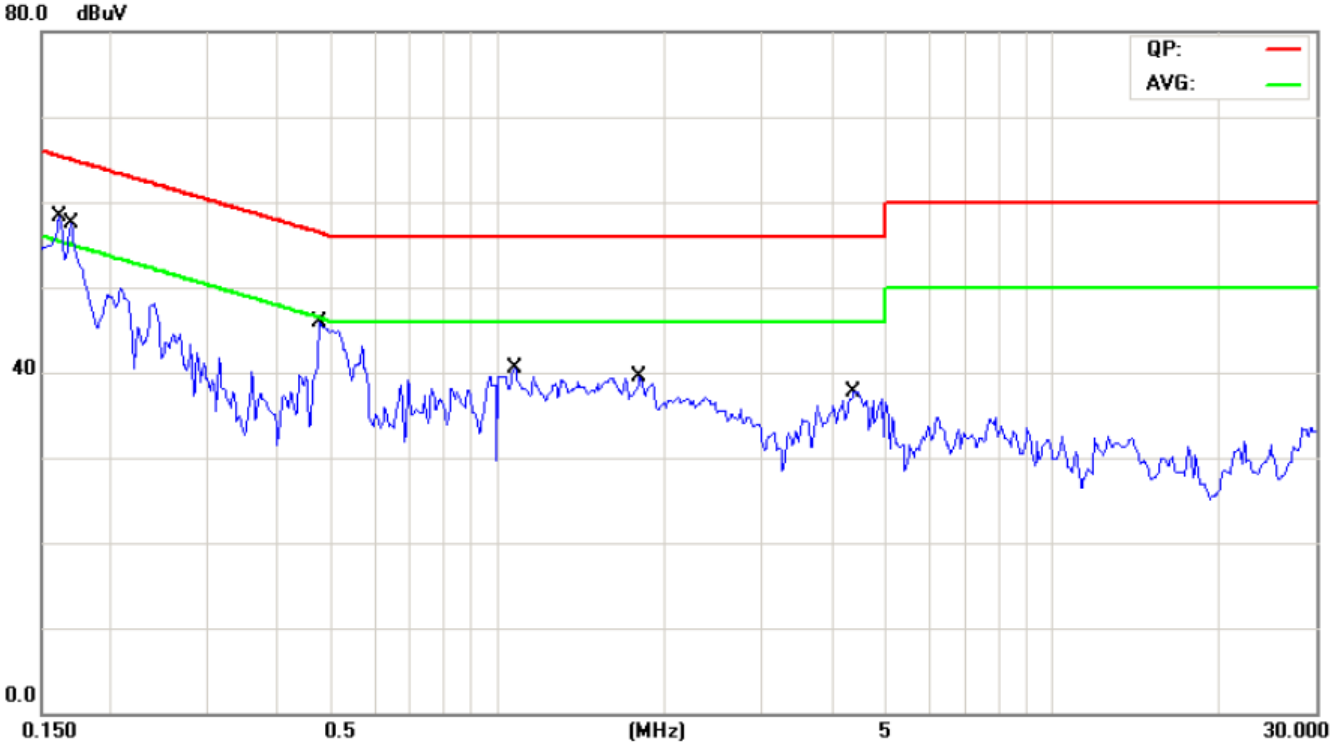
E.U.T :	Rugged smart phone	Model Name :	Rock X8
Temperature :	21°C	Relative Humidity :	51 %
Terminal	Line		
Test Voltage :	AC 120 V / 60Hz		
Test Mode :	Mode 1: TX B Mode		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1578	43.31	10.67	53.98	65.57	-11.59	QP	
2		0.1578	24.93	10.67	35.60	55.57	-19.97	AVG	
3		0.1695	42.45	10.57	53.02	64.98	-11.96	QP	
4		0.1695	27.99	10.57	38.56	54.98	-16.42	AVG	
5	*	0.5016	34.20	10.45	44.65	56.00	-11.35	QP	
6		0.5016	23.71	10.45	34.16	46.00	-11.84	AVG	
7		4.3320	21.82	10.93	32.75	56.00	-23.25	QP	
8		4.3320	13.75	10.93	24.68	46.00	-21.32	AVG	
9		8.0313	17.40	11.06	28.46	60.00	-31.54	QP	
10		8.0313	9.58	11.06	20.64	50.00	-29.36	AVG	
11		18.7500	12.40	11.04	23.44	60.00	-36.56	QP	
12		18.7500	6.81	11.04	17.85	50.00	-32.15	AVG	

Note: * remark the worst frequency in the range of 0.15MHz to 30MHz

E.U.T :	Rugged smart phone	Model Name :	Rock X8
Temperature :	26°C	Relative Humidity :	51 %
Terminal	Neutral		
Test Voltage :	AC 120 V / 60Hz		
Test Mode :	Mode 1: TX B Mode		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1617	41.32	10.63	51.95	65.37	-13.42	QP	
2		0.1617	22.59	10.63	33.22	55.37	-22.15	AVG	
3	*	0.1695	42.81	10.57	53.38	64.98	-11.60	QP	
4		0.1695	26.50	10.57	37.07	54.98	-17.91	AVG	
5		0.4781	30.03	10.37	40.40	56.37	-15.97	QP	
6		0.4781	18.63	10.37	29.00	46.37	-17.37	AVG	
7		1.0758	21.95	10.47	32.42	56.00	-23.58	QP	
8		1.0758	9.10	10.47	19.57	46.00	-26.43	AVG	
9		1.8062	20.79	10.49	31.28	56.00	-24.72	QP	
10		1.8062	12.46	10.49	22.95	46.00	-23.05	AVG	
11		4.4063	19.67	10.92	30.59	56.00	-25.41	QP	
12		4.4063	12.17	10.92	23.09	46.00	-22.91	AVG	

Note: * remark the worst frequency in the range of 0.15MHz to 30MHz

4. Radiated Emission Test

4.1 Test Standard and Limit

4.1.1 Test Standard

FCC Part 15.209

4.1.2 Test Limit

Radiated Emission Limits (9kHz~1000MHz)

Frequency (MHz	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Radiated Emission Limit (Above 1000MHz)

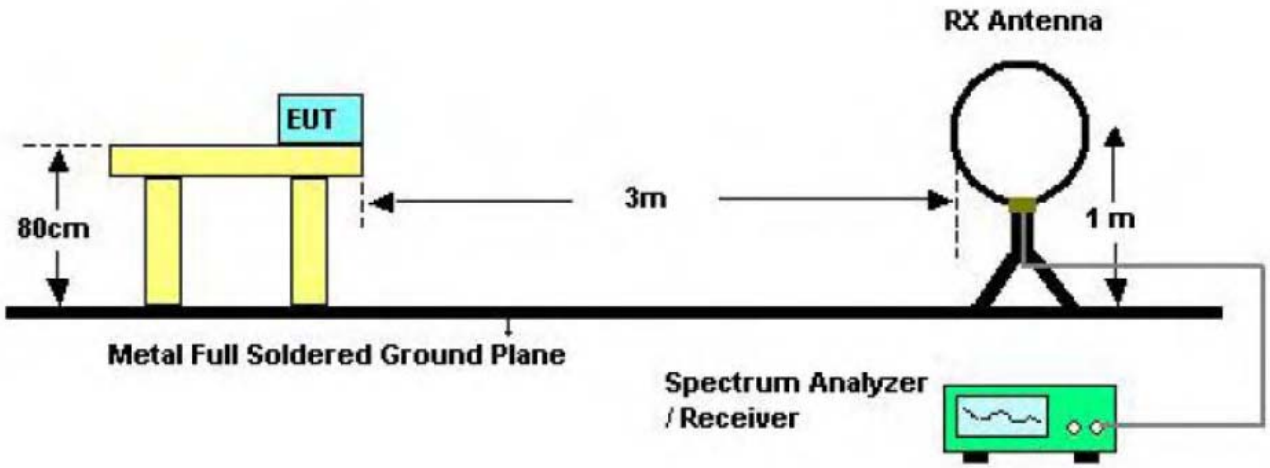
Frequency (MHz)	Class A (dBuV/m)(at 3 M)		Class B (dBuV/m)(at 3 M)	
	Peak	Average	Peak	Average
Above 1000	80	60	74	54

Note:

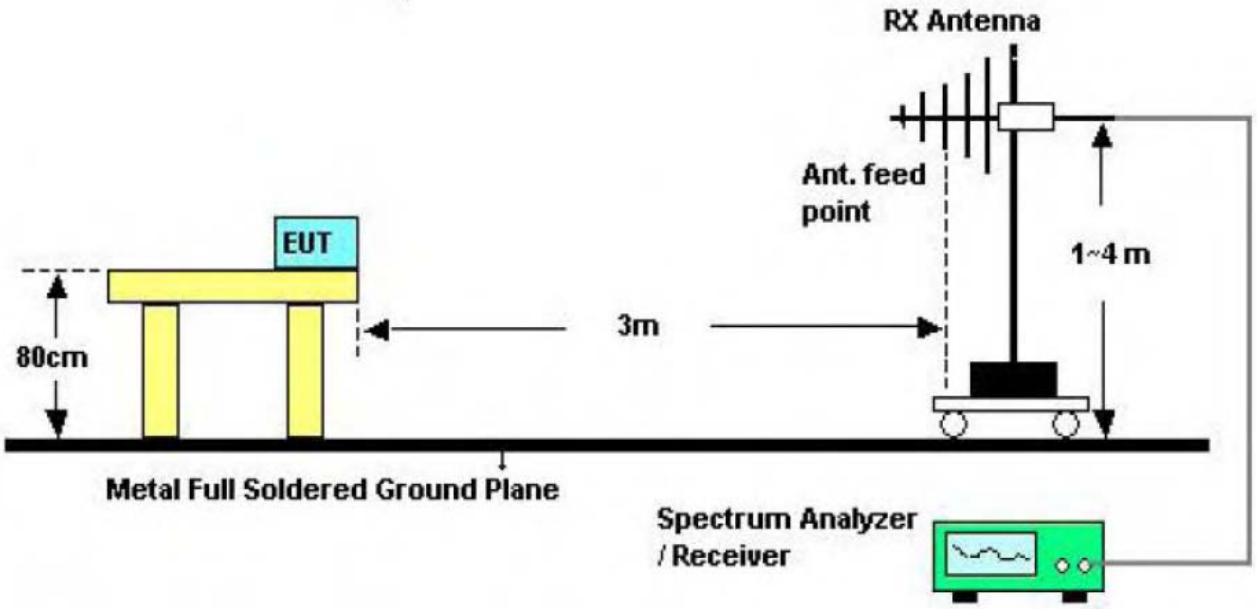
(1) The tighter limit applies at the band edges.

(2) Emission Level(dBuV/m)=20log Emission Level(uV/m)

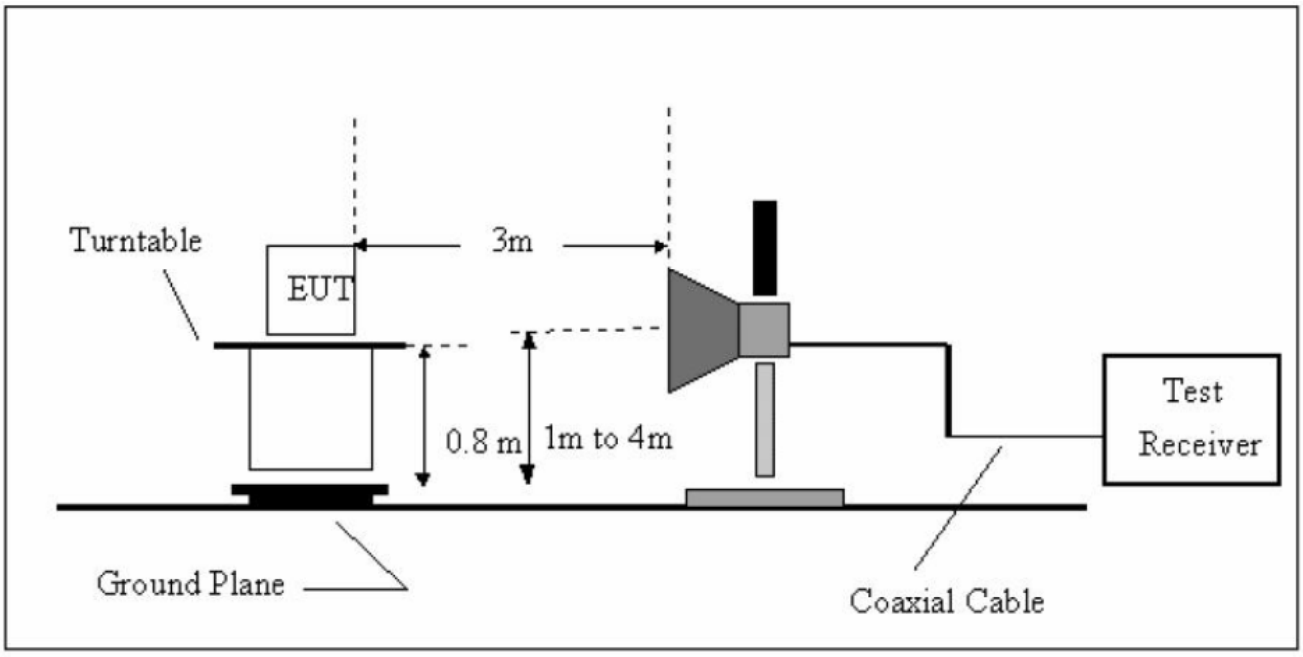
4.2 Test Setup



Bellow 30MHz Test Setup



Bellow 1000MHz Test Setup



Above 1GHz Test Setup

4.3 Test Procedure

(1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
(2) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
(3) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
(4) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
(5) For the actual test configuration, please see the test setup photo.

4.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.
Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
Test data please refer the following pages.

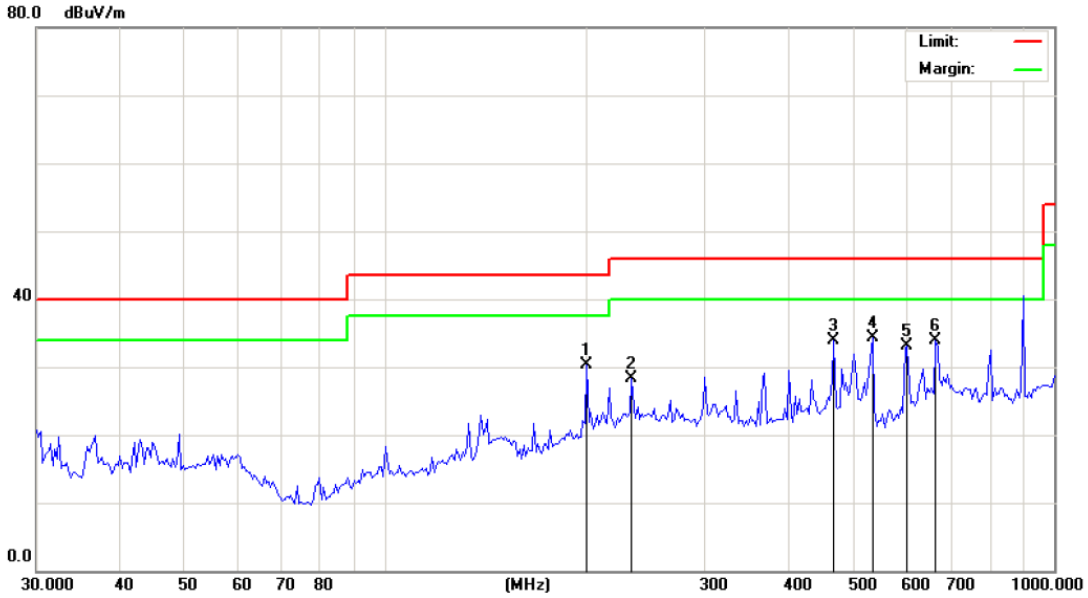
4.5 Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Mar. 20, 2014	Mar. 19, 2015
Spectrum Analyzer	Rohde & Schwarz	FSP30	DE25181	Aug. 08, 2014	Aug.07, 2015
EMI Test Receiver	Rohde & Schwarz	ESCI	101165	Aug. 08, 2014	Aug.07, 2015
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 07, 2014	Mar.06, 2015
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 07, 2014	Mar.06, 2015
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 07, 2014	Mar.06, 2015
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar. 07, 2014	Mar.06, 2015
Pre-amplifier	HP	11909A	185903	Mar. 07, 2014	Mar.06, 2015
Pre-amplifier	HP	8447B	3008A00849	Mar. 07, 2014	Mar.06, 2015
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 07, 2014	Mar.06, 2015
Signal Generator	Rohde & Schwarz	SML03	IKW682-054	Feb. 11, 2014	Feb.10, 2015
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A

4.6 Test Data

Please see the next page.

EUT:	Rugged smart phone	Model Name :	Rock X8
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Ant. Pol.	Horizontal		
Test Mode:	TX B Mode 2412MHz		
Remark:	N/A		

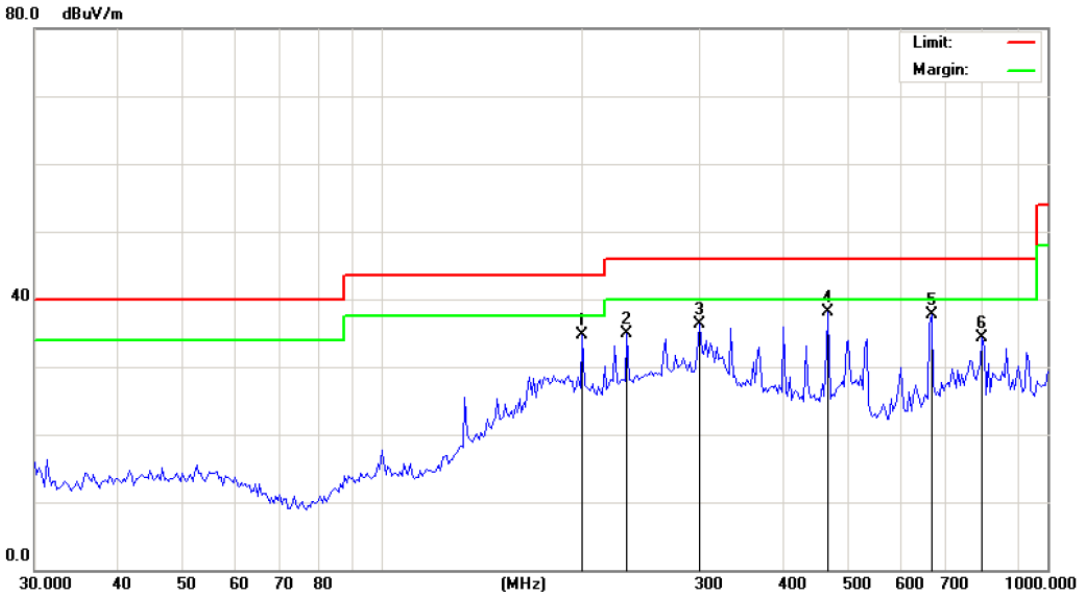


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		200.0432	41.93	-11.58	30.35	43.50	-13.15	peak		0	
2		233.4881	37.99	-9.59	28.40	46.00	-17.60	peak		0	
3		468.1650	37.01	-3.05	33.96	46.00	-12.04	peak		0	
4	*	535.0377	35.91	-1.66	34.25	46.00	-11.75	peak		0	
5		602.9287	37.69	-4.68	33.01	46.00	-12.99	peak		0	
6		665.2610	37.87	-4.03	33.84	46.00	-12.16	peak		0	

Emission Level= Read Level+ Correct Factor

Note: * remark the worst frequency in the range of 30MHz to 1000MHz

EUT:	Rugged smart phone	Model Name :	Rock X8
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Ant. Pol.	Vertical		
Test Mode:	TX B Mode 2412MHz		
Remark:	N/A		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		200.0432	46.32	-11.58	34.74	43.50	-8.76	peak		0	
2		233.4881	44.42	-9.59	34.83	46.00	-11.17	peak		0	
3		300.6988	43.88	-7.52	36.36	46.00	-9.64	peak		0	
4	*	468.1650	41.11	-3.05	38.06	46.00	-7.94	peak		0	
5		669.9523	41.63	-3.97	37.66	46.00	-8.34	peak		0	
6		798.6205	36.20	-1.87	34.33	46.00	-11.67	peak		0	

Emission Level= Read Level+ Correct Factor

Note: * remark the worst frequency in the range of 30MHz to 1000MHz

Fundamental & Harmonics Radiated Emission Data (1000MHz-25000MHz)

IEEE 802.11b mode: Low channel: 2412 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
2389.78	H	74.20	---	-4.20	70.00	---	74.00	54.00	-4.00
2389.01	H	---	54.51	-4.20	---	50.31	74.00	54.00	-3.69
4824.00	H	51.20	---	-3.94	47.26	---	74.00	54.00	-6.74
7236.00	H	49.35	---	0.52	49.87	---	74.00	54.00	-4.13
---	---	---	---	---	---	---	---	---	---
2389.45	V	72.62	---	-4.20	68.42	---	74.00	54.00	-5.58
2388.36	V	---	54.71	-4.20	---	50.51	74.00	54.00	-3.49
4824.00	V	49.53	---	-3.94	45.59	---	74.00	54.00	-8.41
7236.00	V	44.00	---	0.52	44.52	---	74.00	54.00	-9.48
---	---	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

IEEE 802.11b mode: Middle channel: 2437 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
4874.00	H	50.20	---	-3.98	46.22	---	74.00	54.00	-7.78
7311.00	H	48.31	---	0.57	48.88	---	74.00	54.00	-5.12
---	---	---	---	---	---	---	---	---	---
4874.00	V	51.42	---	-3.98	47.44	---	74.00	54.00	-6.56
7311.00	V	42.63	---	0.57	43.20	---	74.00	54.00	-10.8
---	---	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

IEEE 802.11b mode: High channel: 2462 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
2483.82	H	72.42	---	-2.38	70.04	---	74.00	54.00	-3.96
2483.24	H	---	51.79	-2.38	---	49.41	74.00	54.00	-4.59
4924.00	H	72.03	---	-3.98	68.36	---	74.00	54.00	-5.64
7386.00	H	47.29	---	0.57	47.86	---	74.00	54.00	-6.14
---	---	---	---	---	---	---	---	---	---
2493.51	H	73.10	---	-2.38	70.72	---	74.00	54.00	-3.28
2493.51	H	---	52.51	-2.38	---	50.13	74.00	54.00	-3.87
4924.00	V	52.70	---	-3.98	48.72	---	74.00	54.00	-5.28
7386.00	V	48.32	---	0.57	48.89	---	74.00	54.00	-5.11
---	---	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

IEEE 802.11g mode: Low channel: 2412 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
2379.35	H	70.15	---	-4.20	65.95	---	74.00	54.00	-8.05
2379.35	H	---	54.51	-4.20	---	50.31	74.00	54.00	-3.69
4824.00	H	50.32	---	-3.94	46.38	---	74.00	54.00	-7.62
7236.00	H	46.57	---	0.52	47.09	---	74.00	54.00	-6.91
---	---	---	---	---	---	---	---	---	---
2388.00	V	73.97	---	-4.20	69.77	---	74.00	54.00	-4.23
2388.00	V	---	53.10	-4.20	---	48.9	74.00	54.00	-5.10
4824.00	V	48.82	---	-3.94	44.88	---	74.00	54.00	-9.12
7236.00	V	44.31	---	0.52	44.83	---	74.00	54.00	-9.17
---	---	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

IEEE 802.11g mode: Middle channel: 2437 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
4874.00	H	51.33	---	-3.98	47.35	---	74.00	54.00	-6.65
7311.00	H	47.21	---	0.57	47.78	---	74.00	54.00	-6.22
---	---	---	---	---	---	---	---	---	---
4874.00	V	51.16	---	-3.98	47.18	---	74.00	54.00	-6.82
7311.00	V	44.21	---	0.57	44.78	---	74.00	54.00	-9.22
---	---	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

IEEE 802.11g mode: High channel: 2462 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
2489.55	H	71.32	---	-2.38	68.94	---	74.00	54.00	-5.06
2489.55	H	---	50.31	-2.38	---	47.93	74.00	54.00	-6.07
4924.00	H	72.67	---	-3.98	68.69	---	74.00	54.00	14.69
7386.00	H	47.28	---	0.57	47.85	---	74.00	54.00	-6.15
---	---	---	---	---	---	---	---	---	---
2493.51	H	71.03	---	-2.38	68.65	---	74.00	54.00	-5.35
2493.51	H	---	49.32	-2.38	---	46.94	74.00	54.00	-7.06
4924.00	V	51.29	---	-3.98	47.31	---	74.00	54.00	-6.69
7386.00	V	44.32	---	0.57	44.89	---	74.00	54.00	-9.11
---	---	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

IEEE 802.11n(20MHz) mode: Low channel: 2412 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
2386.08	H	71.00	---	-4.20	66.8	---	74.00	54.00	-7.2
2386.08	H	---	50.28	-4.20	---	46.08	74.00	54.00	-7.92
4824.00	H	51.28	---	-3.94	47.34	---	74.00	54.00	-6.66
7236.00	H	47.20	---	0.52	47.72	---	74.00	54.00	-6.28
---	---	---	---	---	---	---	---	---	---
2379.35	V	73.42	---	-4.20	69.22	---	74.00	54.00	-4.78
2379.35	V	---	50.28	-4.20	---	46.08	74.00	54.00	-7.92
4824.00	V	46.11	---	-3.94	42.17	---	74.00	54.00	-11.83
7236.00	V	43.37	---	0.52	43.89	---	74.00	54.00	-10.11
---	---	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

IEEE 802.11n(20MHz) mode: Middle channel: 2437 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
4874.00	H	51.32	---	-3.98	47.34	---	74.00	54.00	-6.66
7311.00	H	47.62	---	0.57	48.19	---	74.00	54.00	-5.81
---	---	---	---	---	---	---	---	---	---
4874.00	V	54.02	---	-3.98	50.04	---	74.00	54.00	-3.96
7311.00	V	41.82	---	0.57	42.39	---	74.00	54.00	-11.61
---	---	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

IEEE 802.11n(20MHz) mode: High channel: 2462 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
2480.05	H	70.10	---	-2.38	67.72	---	74.00	54.00	-6.28
2480.05	H	---	50.09	-2.38	---	47.71	74.00	54.00	-6.29
4924.00	H	52.03	---	-3.98	48.05	---	74.00	54.00	-5.95
7386.00	H	47.29	---	0.57	47.86	---	74.00	54.00	-6.14
---	---	---	---	---	---	---	---	---	---
2493.51	H	72.30	---	-2.38	69.92	---	74.00	54.00	-4.08
2493.51	H	---	50.37	-2.38	---	47.99	74.00	54.00	-6.01
4924.00	V	50.42	---	-3.98	46.44	---	74.00	54.00	-7.56
7386.00	V	47.28	---	0.57	47.85	---	74.00	54.00	-6.15
---	---	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

5. Restricted Bands Requirement

5.1 Test Standard and Limit

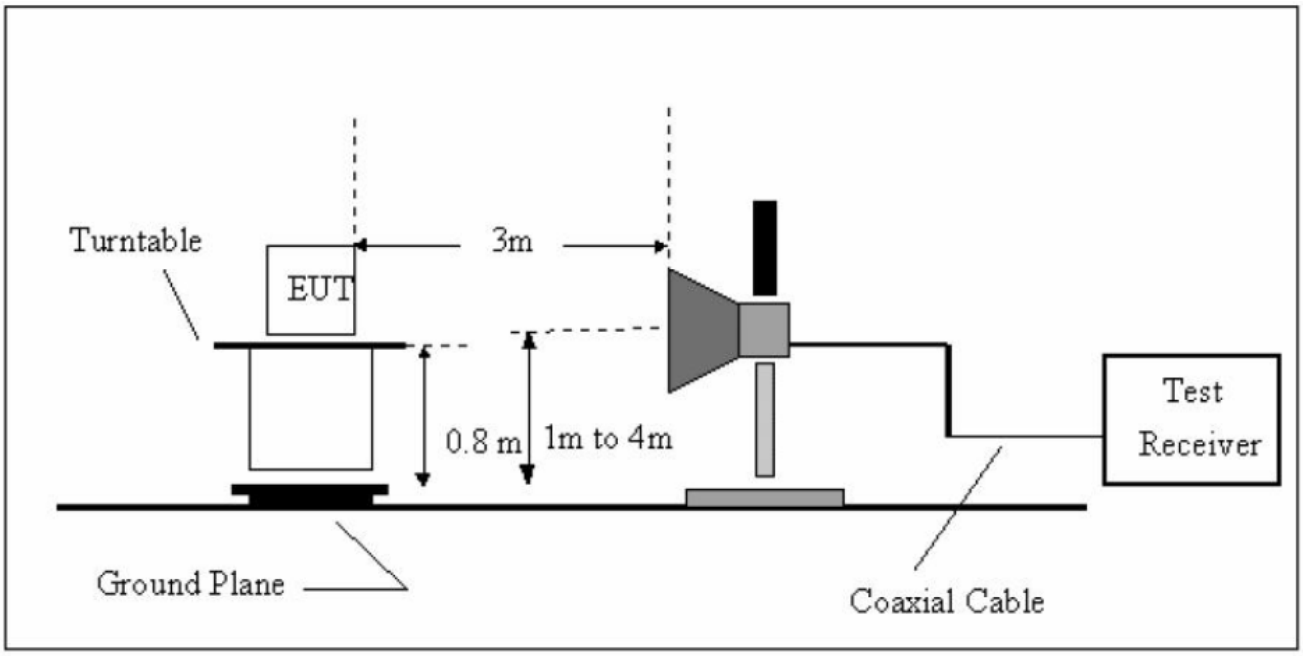
5.1.1 Test Standard

FCC Part 15.209 FCC Part 15.205

5.1.2 Test Limit

Restricted Frequency Band (MHz)	Class B (dBuV/m)(at 3 M)	
	Peak	Average
2310 ~2390	74	54
2483.5 ~2500	74	54

5.2 Test Setup



5.3 Test Procedure

(1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.

(2) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.

(3) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

(4) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit

Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.

Peak Detection:

Set the center frequency of the emission to be measured (within 2 MHz of the authorized band edge), set span to 2 MHz, with RBW/VBW=100 kHz/300 kHz, detector mode is Peak, then use band power function to measure the Bandwidth of 1 MHz.

Average Detection (EUT transmitting continuously and duty cycle>=98 percent):

Set the center frequency of the emission to be measured (within 2 MHz of the authorized band edge), set span to 2 MHz, with RBW/VBW=100 kHz/300 kHz, detector mode is RMS or Average, then use band power function to measure the Bandwidth of 1 MHz.

(5) For the actual test configuration, please see the test setup photo.

5.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

5.5 Test Equipment

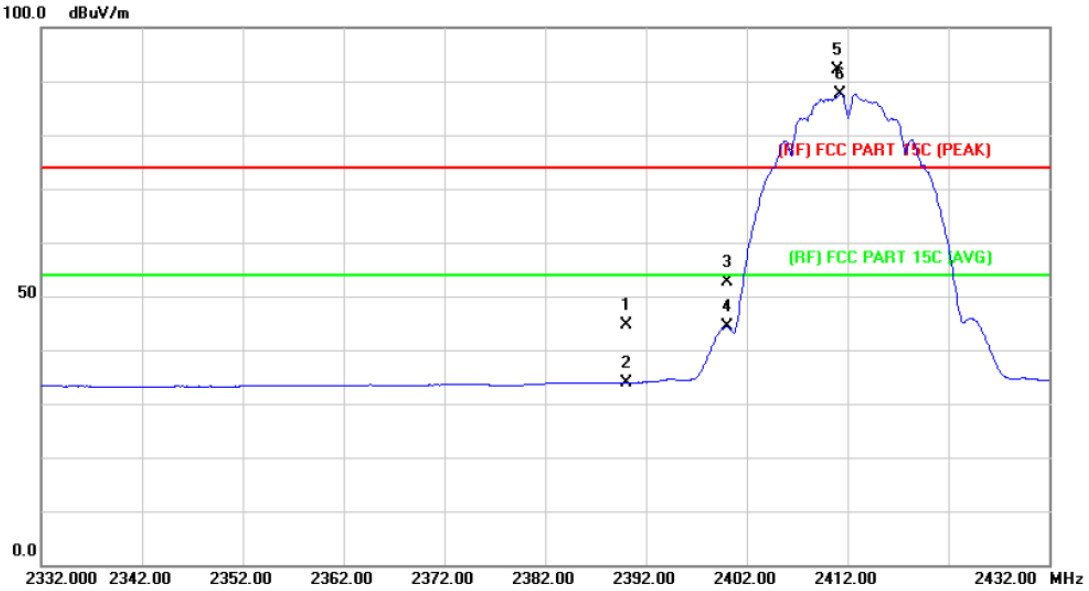
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Mar. 20, 2014	Mar. 19, 2015
Spectrum Analyzer	Rohde & Schwarz	FSP30	DE25181	Aug. 08, 2014	Aug. 07, 2015
EMI Test Receiver	Rohde & Schwarz	ESCI	101165	Aug. 08, 2014	Aug. 07, 2015
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 07, 2014	Mar.06, 2015
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 07, 2014	Mar.06, 2015
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 07, 2014	Mar.06, 2015
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar. 07, 2014	Mar.06, 2015
Pre-amplifier	HP	11909A	185903	Mar. 07, 2014	Mar.06, 2015
Pre-amplifier	HP	8447B	3008A00849	Mar. 07, 2014	Mar.06, 2015
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 07, 2014	Mar.06, 2015
Signal Generator	Rohde & Schwarz	SML03	IKW682-054	Feb. 11, 2014	Feb.10, 2015
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A

5.6 Test Data

Please see the next page.

(1) Radiation Test

EUT:	Rugged smart phone	Model Name :	Rock X8
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Ant. Pol.	Horizontal		
Test Mode:	TX B Mode 2412MHz		
Remark:	N/A		



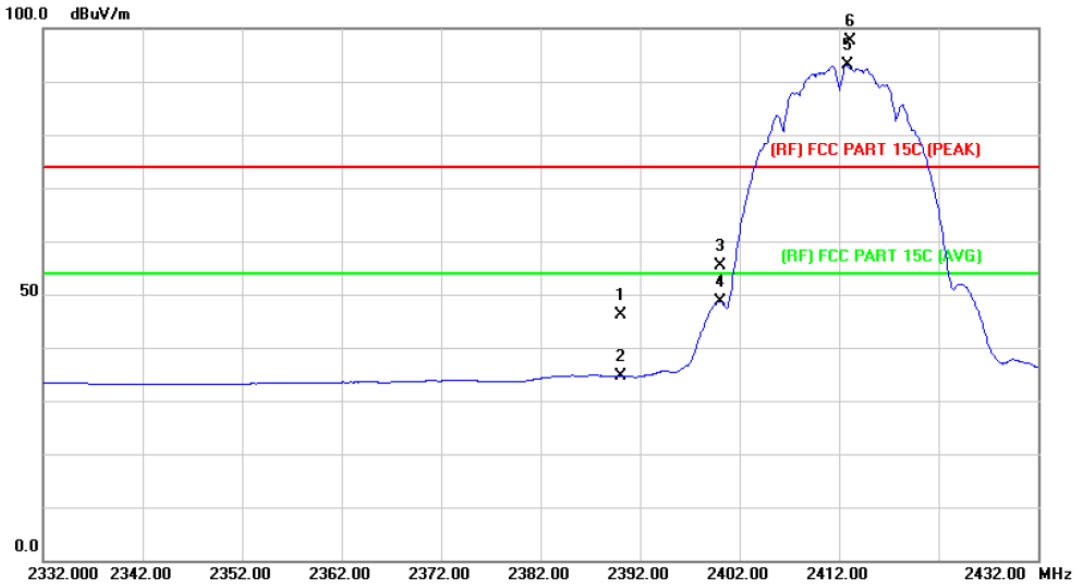
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	43.97	0.77	44.74	74.00	-29.26	peak
2		2390.000	33.18	0.77	33.95	54.00	-20.05	AVG
3		2400.000	51.90	0.81	52.71	74.00	-21.29	peak
4		2400.000	43.47	0.81	44.28	54.00	-9.72	AVG
5	X	2411.000	91.35	0.86	92.21	74.00	18.21	peak
6	*	2411.300	86.81	0.86	87.67	54.00	33.67	AVG

Emission Level= Read Level+ Correct Factor

Note: x remark the frequency above the peak limit

*** remark the worst average value have been tested**

EUT:	Rugged smart phone	Model Name :	Rock X8
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Ant. Pol.	Vertical		
Test Mode:	TX B Mode 2412MHz		
Remark:	N/A		



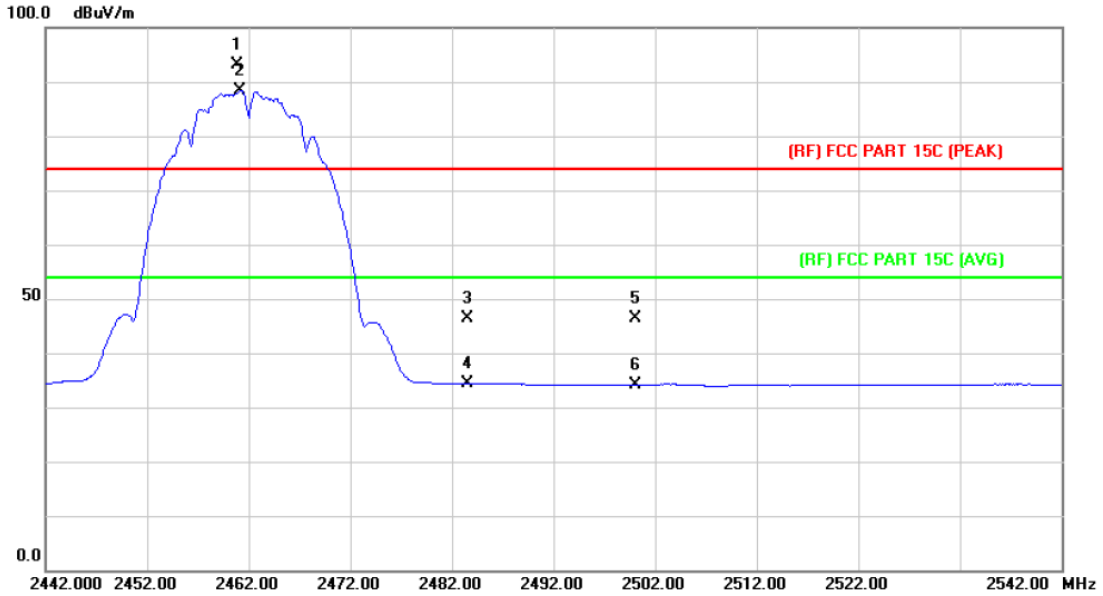
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	45.29	0.77	46.06	74.00	-27.94	peak
2		2390.000	33.78	0.77	34.55	54.00	-19.45	AVG
3		2400.000	54.53	0.81	55.34	74.00	-18.66	peak
4		2400.000	47.76	0.81	48.57	54.00	-5.43	AVG
5	*	2412.800	92.20	0.86	93.06	54.00	39.06	AVG
6	X	2413.200	96.82	0.86	97.68	74.00	23.68	peak

Emission Level= Read Level+ Correct Factor

Note: x remark the frequency above the peak limit

*** remark the worst average value have been tested**

EUT:	Rugged smart phone	Model Name :	Rock X8
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Ant. Pol.	Horizontal		
Test Mode:	TX B Mode 2462MHz		
Remark:	N/A		



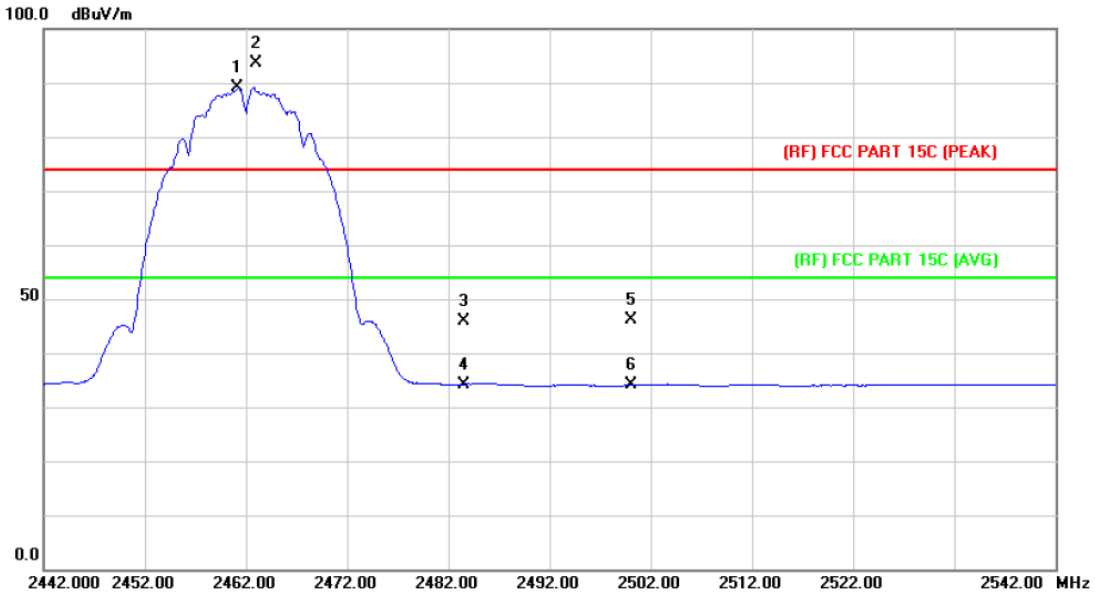
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	X	2460.900	92.05	1.06	93.11	74.00	19.11	peak
2	*	2461.200	87.41	1.07	88.48	54.00	34.48	AVG
3		2483.500	45.21	1.17	46.38	74.00	-27.62	peak
4		2483.500	33.21	1.17	34.38	54.00	-19.62	AVG
5		2500.000	45.20	1.23	46.43	74.00	-27.57	peak
6		2500.000	32.92	1.23	34.15	54.00	-19.85	AVG

Emission Level= Read Level+ Correct Factor

Note: x remark the frequency above the peak limit

*** remark the worst average value have been tested**

EUT:	Rugged smart phone	Model Name :	Rock X8
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Ant. Pol.	Vertical		
Test Mode:	TX B Mode 2462MHz		
Remark:	N/A		



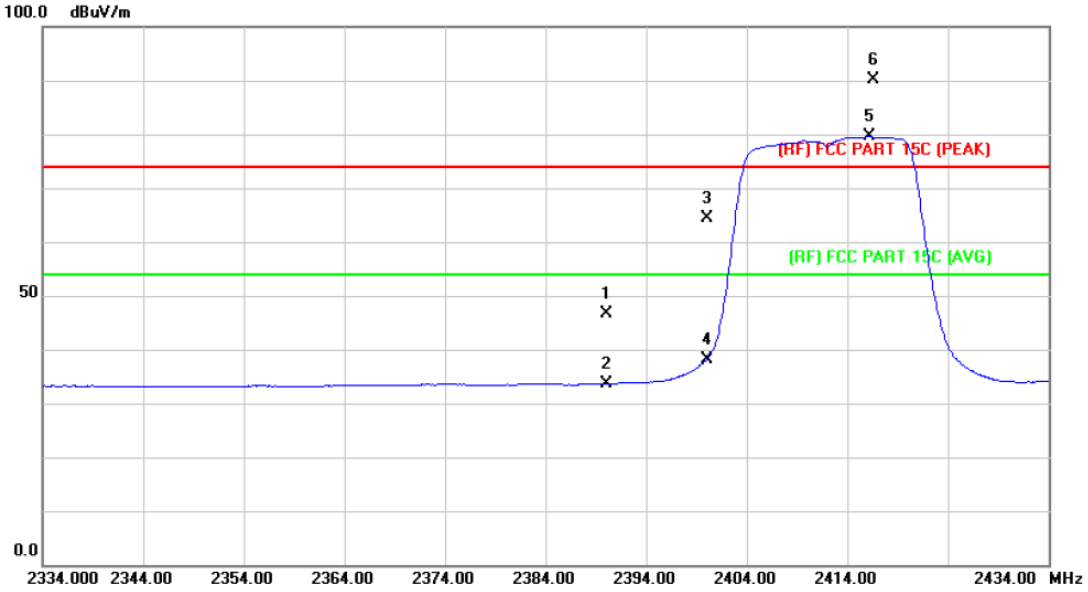
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	2461.200	88.00	1.07	89.07	54.00	35.07	AVG
2	X	2463.000	92.62	1.08	93.70	74.00	19.70	peak
3		2483.500	44.68	1.17	45.85	74.00	-28.15	peak
4		2483.500	33.07	1.17	34.24	54.00	-19.76	AVG
5		2500.000	44.79	1.23	46.02	74.00	-27.98	peak
6		2500.000	32.81	1.23	34.04	54.00	-19.96	AVG

Emission Level= Read Level+ Correct Factor

Note: x remark the frequency above the peak limit

*** remark the worst average value have been tested**

EUT:	Rugged smart phone	Model Name :	Rock X8
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Ant. Pol.	Horizontal		
Test Mode:	TX G Mode 2412MHz		
Remark:	N/A		



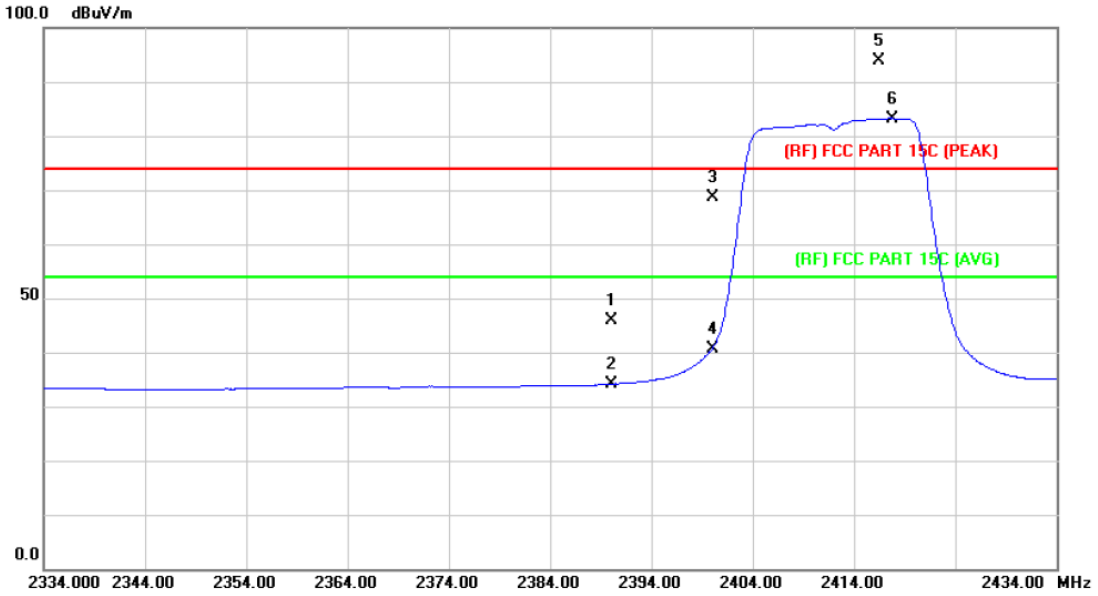
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	45.76	0.77	46.53	74.00	-27.47	peak
2		2390.000	32.92	0.77	33.69	54.00	-20.31	AVG
3		2400.000	63.45	0.81	64.26	74.00	-9.74	peak
4		2400.000	37.33	0.81	38.14	54.00	-15.86	AVG
5	*	2416.200	78.67	0.88	79.55	54.00	25.55	AVG
6	X	2416.600	89.31	0.88	90.19	74.00	16.19	peak

Emission Level= Read Level+ Correct Factor

Note: x remark the frequency above the peak limit

*** remark the worst average value have been tested**

EUT:	Rugged smart phone	Model Name :	Rock X8
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Ant. Pol.	Vertical		
Test Mode:	TX G Mode 2412MHz		
Remark:	N/A		



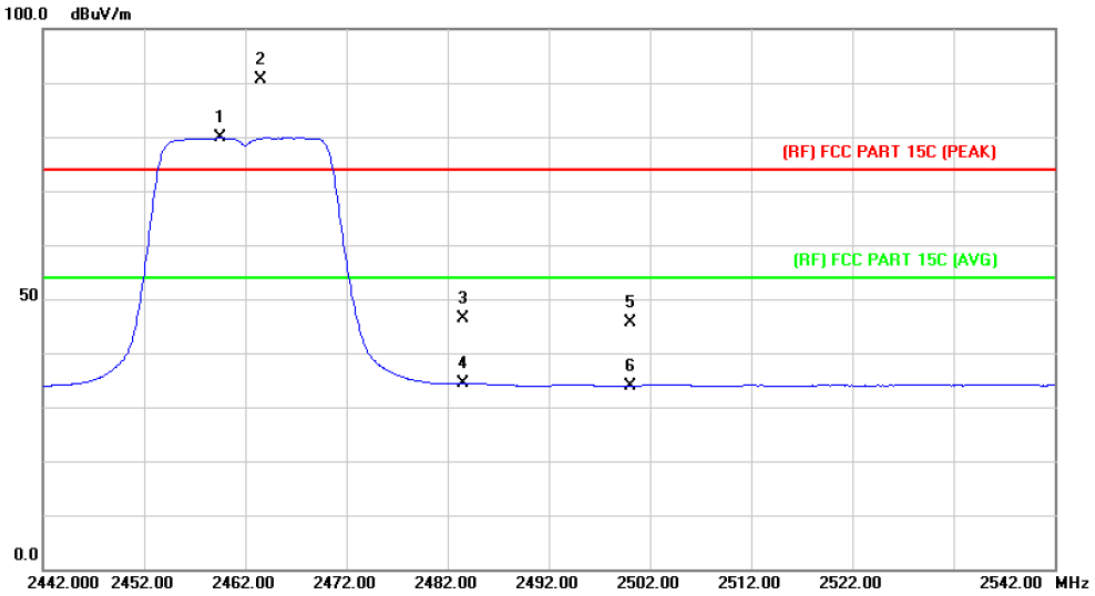
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	45.22	0.77	45.99	74.00	-28.01	peak
2		2390.000	33.41	0.77	34.18	54.00	-19.82	AVG
3		2400.000	67.79	0.81	68.60	74.00	-5.40	peak
4		2400.000	39.83	0.81	40.64	54.00	-13.36	AVG
5	X	2416.500	92.99	0.88	93.87	74.00	19.87	peak
6	*	2417.800	82.36	0.89	83.25	54.00	29.25	AVG

Emission Level= Read Level+ Correct Factor

Note: x remark the frequency above the peak limit

*** remark the worst average value have been tested**

EUT:	Rugged smart phone	Model Name :	Rock X8
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Ant. Pol.	Horizontal		
Test Mode:	TX G Mode 2462MHz		
Remark:	N/A		



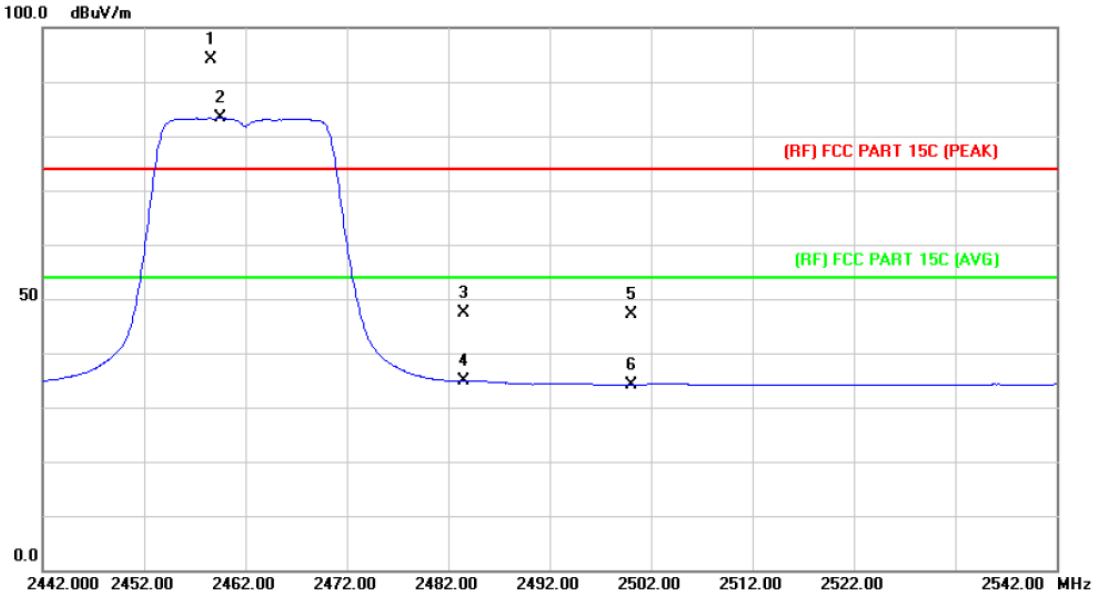
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	2459.600	78.82	1.06	79.88	54.00	25.88	AVG
2	X	2463.600	89.52	1.08	90.60	74.00	16.60	peak
3		2483.500	45.31	1.17	46.48	74.00	-27.52	peak
4		2483.500	33.14	1.17	34.31	54.00	-19.69	AVG
5		2500.000	44.51	1.23	45.74	74.00	-28.26	peak
6		2500.000	32.71	1.23	33.94	54.00	-20.06	AVG

Emission Level= Read Level+ Correct Factor

Note: x remark the frequency above the peak limit

*** remark the worst average value have been tested**

EUT:	Rugged smart phone	Model Name :	Rock X8
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Ant. Pol.	Vertical		
Test Mode:	TX G Mode 2462MHz		
Remark:	N/A		



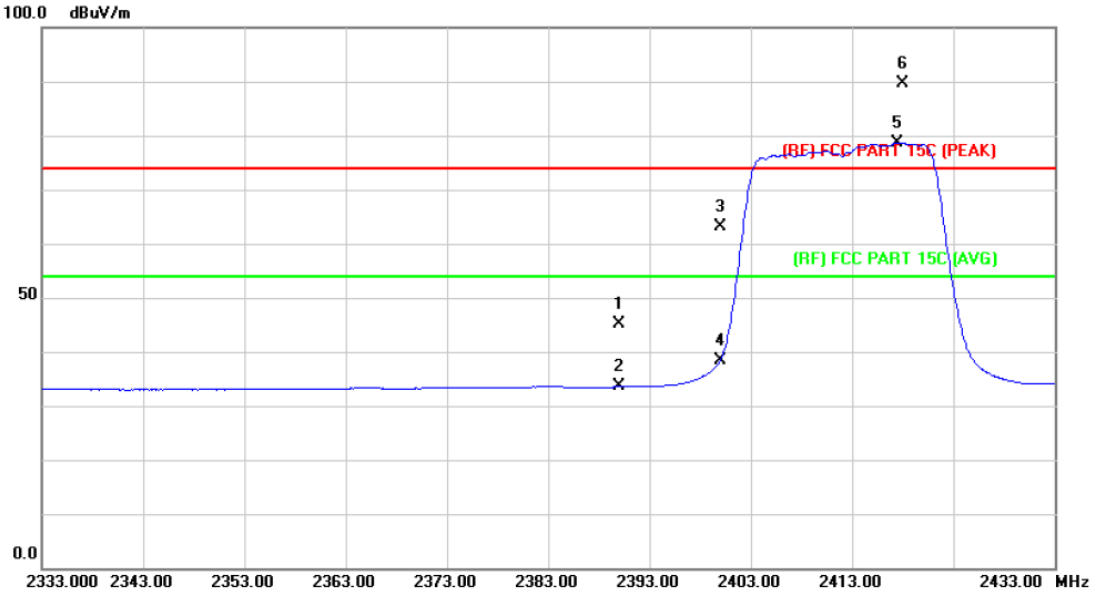
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	X	2458.600	93.13	1.06	94.19	74.00	20.19	peak
2	*	2459.500	82.40	1.06	83.46	54.00	29.46	AVG
3		2483.500	46.09	1.17	47.26	74.00	-26.74	peak
4		2483.500	33.74	1.17	34.91	54.00	-19.09	AVG
5		2500.000	45.90	1.23	47.13	74.00	-26.87	peak
6		2500.000	32.90	1.23	34.13	54.00	-19.87	AVG

Emission Level= Read Level+ Correct Factor

Note: x remark the frequency above the peak limit

*** remark the worst average value have been tested**

EUT:	Rugged smart phone	Model Name :	Rock X8
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Ant. Pol.	Horizontal		
Test Mode:	TX N(HT20) Mode 2412MHz		
Remark:	N/A		



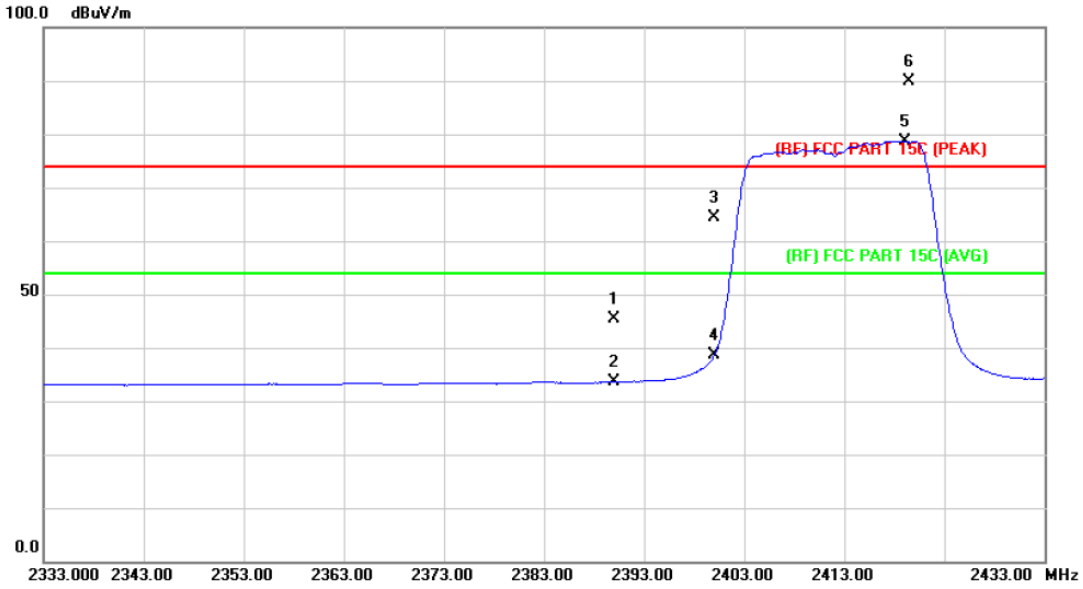
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	44.43	0.77	45.20	74.00	-28.80	peak
2		2390.000	32.75	0.77	33.52	54.00	-20.48	AVG
3		2400.000	62.41	0.81	63.22	74.00	-10.78	peak
4		2400.000	37.64	0.81	38.45	54.00	-15.55	AVG
5	*	2417.400	77.77	0.89	78.66	54.00	24.66	AVG
6	X	2418.000	88.75	0.89	89.64	74.00	15.64	peak

Emission Level= Read Level+ Correct Factor

Note: x remark the frequency above the peak limit

*** remark the worst average value have been tested**

EUT:	Rugged smart phone	Model Name :	Rock X8
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Ant. Pol.	Vertical		
Test Mode:	TX N(HT20) Mode 2412MHz		
Remark:	N/A		



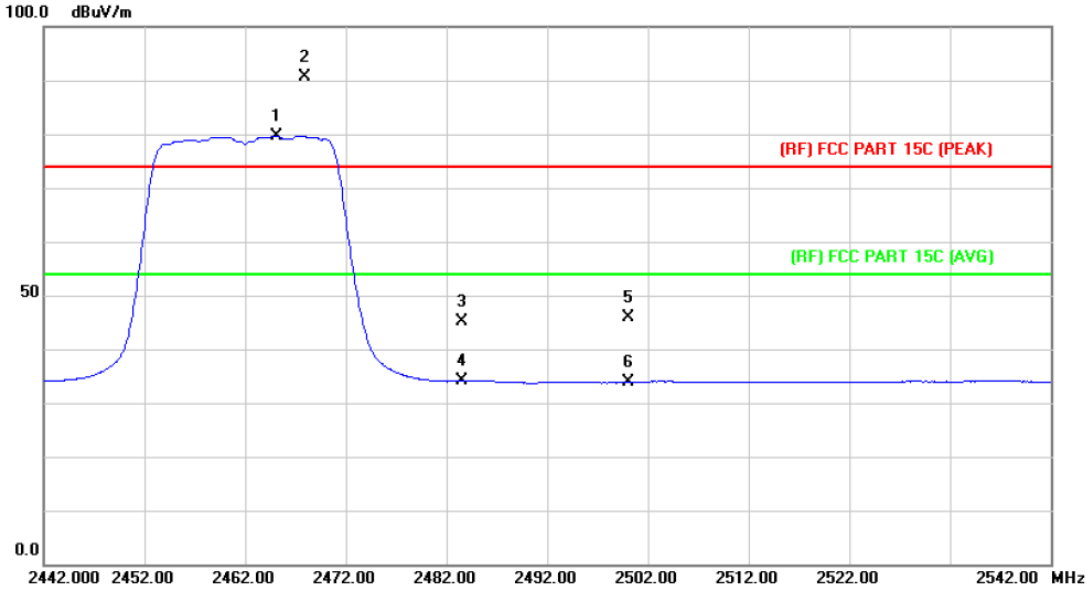
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	44.52	0.77	45.29	74.00	-28.71	peak
2		2390.000	32.82	0.77	33.59	54.00	-20.41	AVG
3		2400.000	63.56	0.81	64.37	74.00	-9.63	peak
4		2400.000	37.72	0.81	38.53	54.00	-15.47	AVG
5	*	2419.100	77.85	0.89	78.74	54.00	24.74	AVG
6	X	2419.400	88.89	0.89	89.78	74.00	15.78	peak

Emission Level= Read Level+ Correct Factor

Note: x remark the frequency above the peak limit

*** remark the worst average value have been tested**

EUT:	Rugged smart phone	Model Name :	Rock X8
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Ant. Pol.	Horizontal		
Test Mode:	TX N(HT20) Mode 2462MHz		
Remark:	N/A		



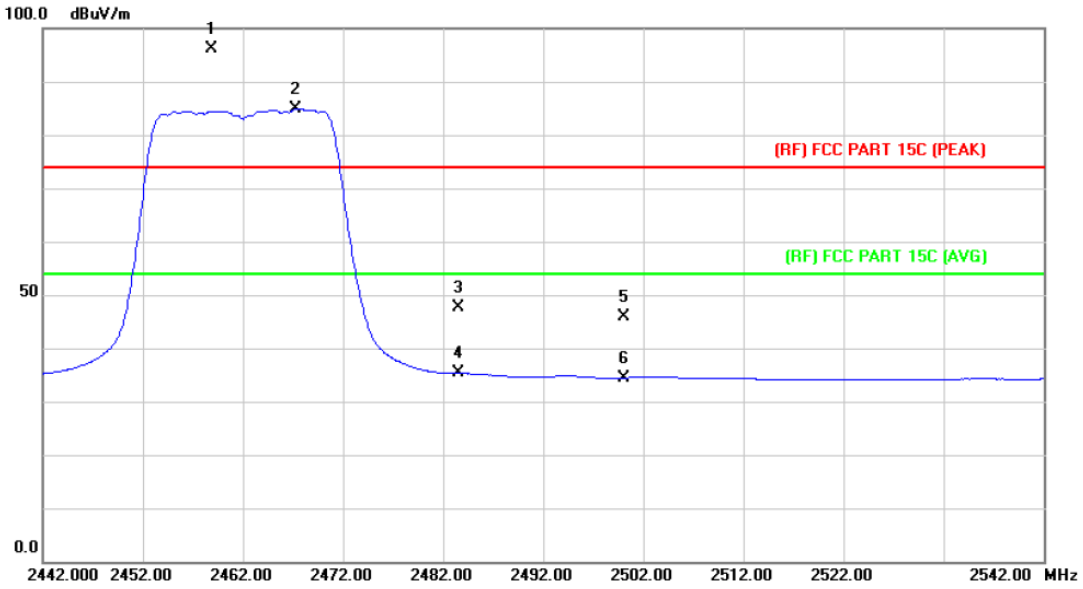
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	2465.100	78.63	1.09	79.72	54.00	25.72	AVG
2	X	2467.900	89.50	1.10	90.60	74.00	16.60	peak
3		2483.500	44.03	1.17	45.20	74.00	-28.80	peak
4		2483.500	32.91	1.17	34.08	54.00	-19.92	AVG
5		2500.000	44.61	1.23	45.84	74.00	-28.16	peak
6		2500.000	32.59	1.23	33.82	54.00	-20.18	AVG

Emission Level= Read Level+ Correct Factor

Note: x remark the frequency above the peak limit

*** remark the worst average value have been tested**

EUT:	Rugged smart phone	Model Name :	Rock X8
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Ant. Pol.	Vertical		
Test Mode:	TX N(HT20) Mode 2462MHz		
Remark:	N/A		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	X	2458.900	94.95	1.06	96.01	74.00	22.01	peak
2	*	2467.300	83.73	1.10	84.83	54.00	30.83	AVG
3		2483.500	46.48	1.17	47.65	74.00	-26.35	peak
4		2483.500	34.16	1.17	35.33	54.00	-18.67	AVG
5		2500.000	44.70	1.23	45.93	74.00	-28.07	peak
6		2500.000	33.22	1.23	34.45	54.00	-19.55	AVG

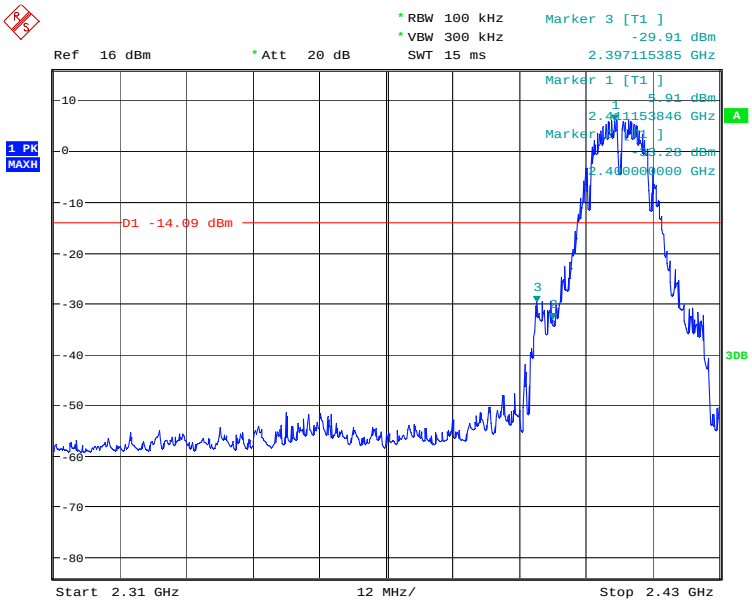
Emission Level= Read Level+ Correct Factor

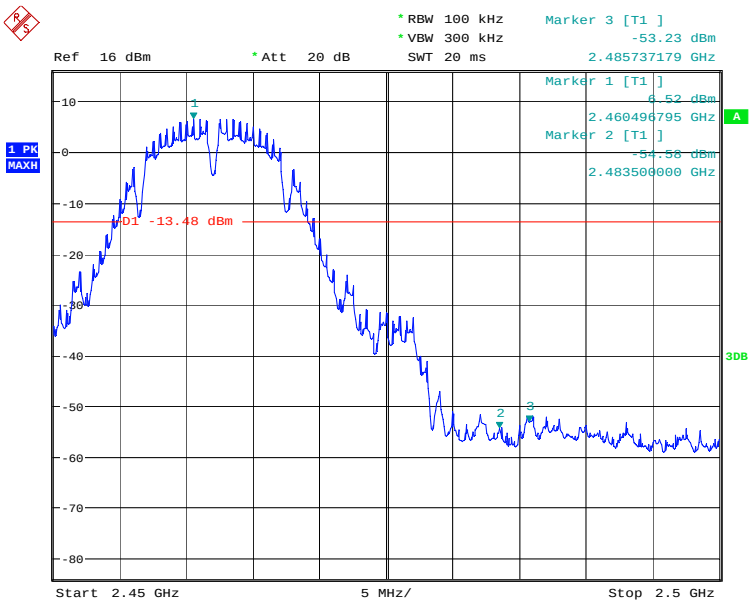
Note: x remark the frequency above the peak limit

*** remark the worst average value have been tested**

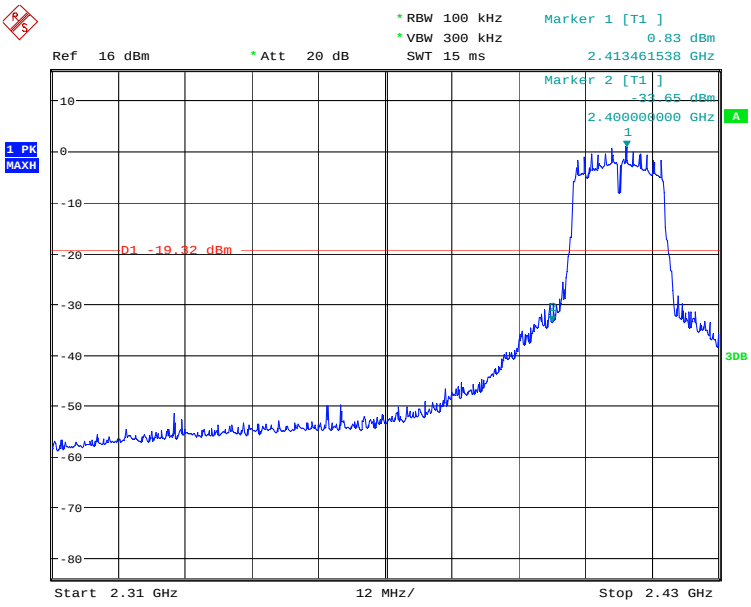
(2) Conducted Test

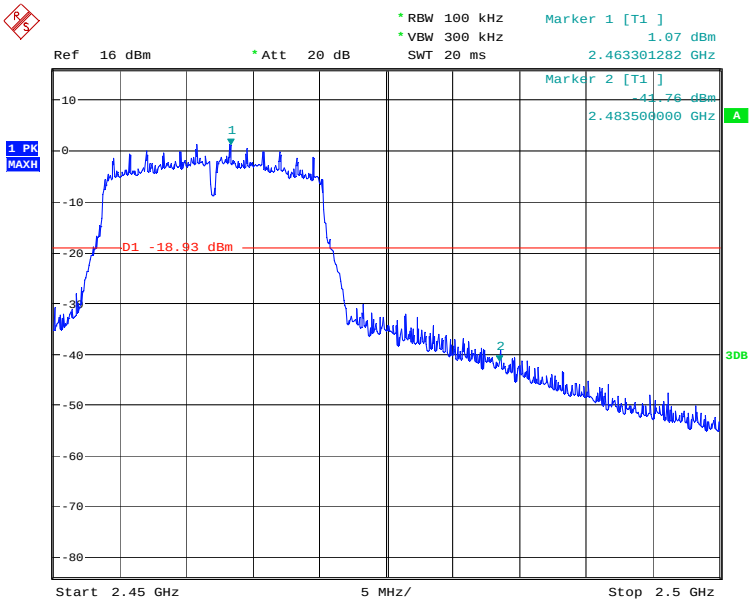
EUT:	Rugged smart phone	Model Name :	Rock X8
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Test Mode:	TX B Mode 2412MHz / TX B Mode 2462MHz		



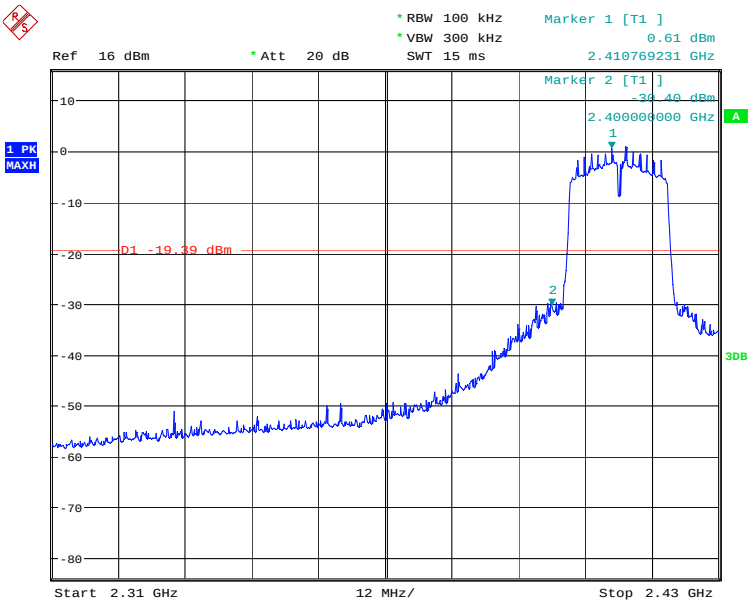


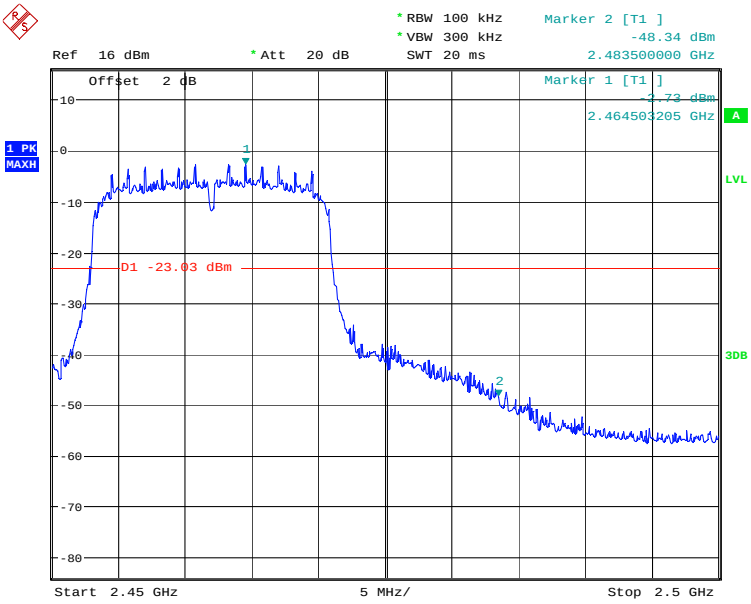
EUT:	Rugged smart phone	Model Name :	Rock X8
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Test Mode:	TX G Mode 2412MHz / TX G Mode 2462MHz		





EUT:	Rugged smart phone	Model Name :	Rock X8
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Test Mode:	TX N(HT20) Mode 2412MHz / TX N(HT20) Mode 2462MHz		





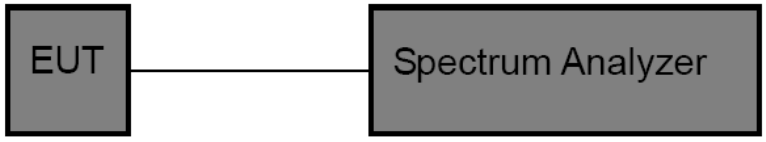
6. Bandwidth Test

6.1 Test Standard and Limit

8.1.1 Test Standard
FCC Part 15.247 (a)(2)
8.1.2 Test Limit

FCC Part 15 Subpart C(15.247)/RSS-210		
Test Item	**Limit**	**Frequency Range(MHz)**
Bandwidth	>=500 KHz (6dB bandwidth)	2400~2483.5

6.2 Test Setup



6.3 Test Procedure

(1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
(2) The bandwidth is measured at an amplitude level reduced 6dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst –case (i.e the widest) bandwidth.
(3)Measure the channel separation the spectrum analyzer was set to Resolution Bandwidth:100 kHz, and Video Bandwidth:300 kHz, Detector: Peak, Sweep Time set auto.

6.4 EUT Operating Condition

The EUT was set to continuously transmitting in each mode and low, middle and high channel for the test.

6.5 Test Equipment

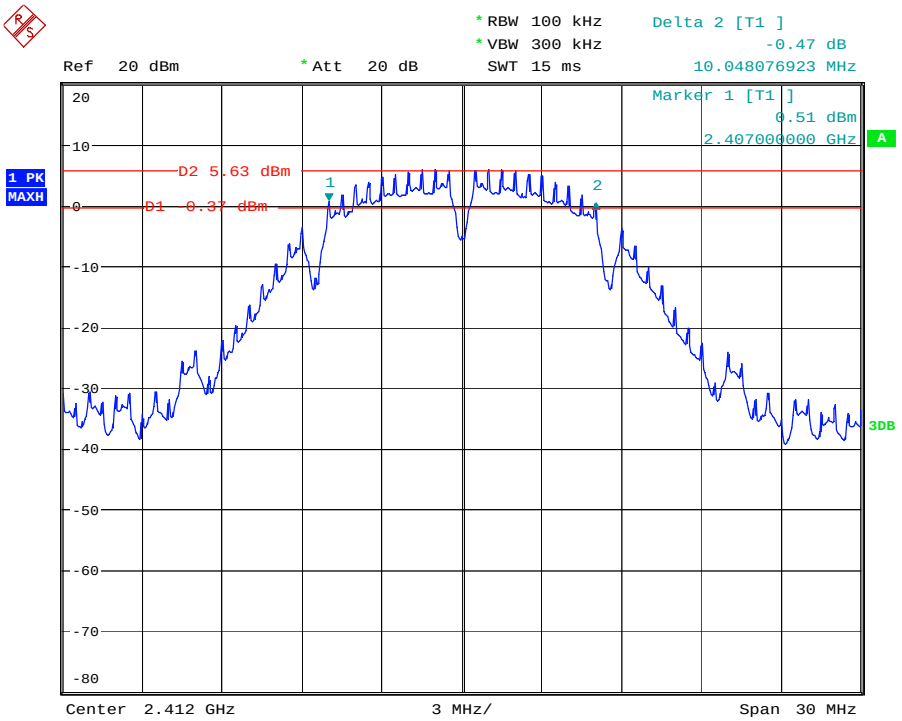
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Rohde & Schwarz	FSP30	DE25181	Aug. 08, 2014	Aug. 07, 2015

6.6 Test Data

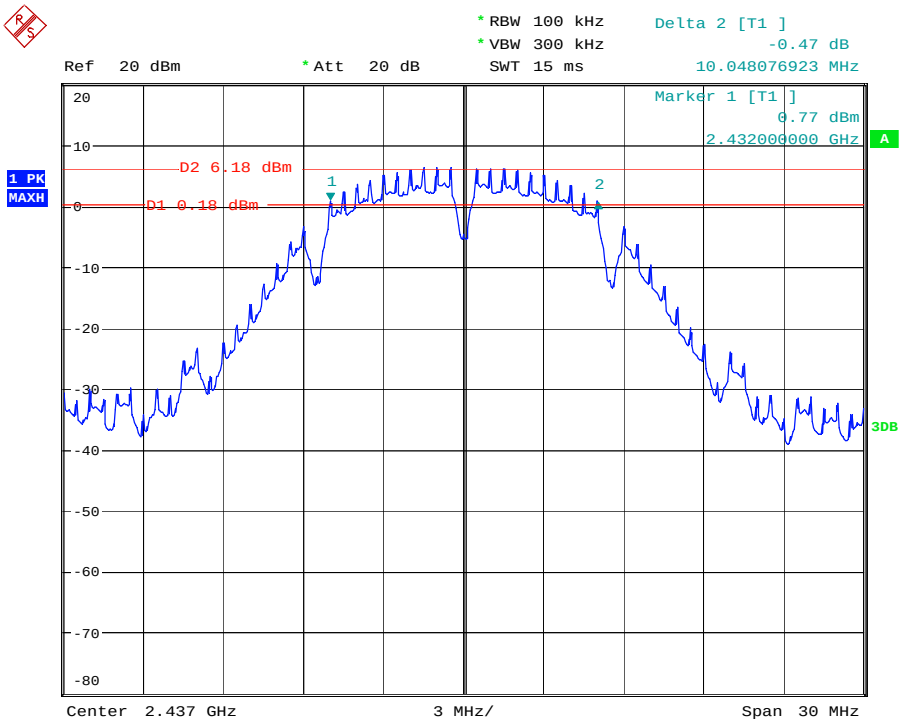
802.11B			
Channel frequency (MHz)	**6dB Bandwidth (MHz)**	**Limit**	**Result**
2412	10.048	>=500 kHz	PASS
2437	10.048	>=500 kHz	PASS
2462	10.096	>=500 kHz	PASS
802.11G			
Channel frequency (MHz)	**6dB Bandwidth (MHz)**	**Limit**	**Result**
2412	15.962	>=500 kHz	PASS
2437	16.010	>=500 kHz	PASS
2462	15.865	>=500 kHz	PASS
802.11N(HT20)			
Channel frequency (MHz)	**6dB Bandwidth (MHz)**	**Limit**	**Result**
2412	16.923	>=500 kHz	PASS
2437	16.923	>=500 kHz	PASS
2462	16.827	>=500 kHz	PASS

Test Mode: IEEE 802.11b mode

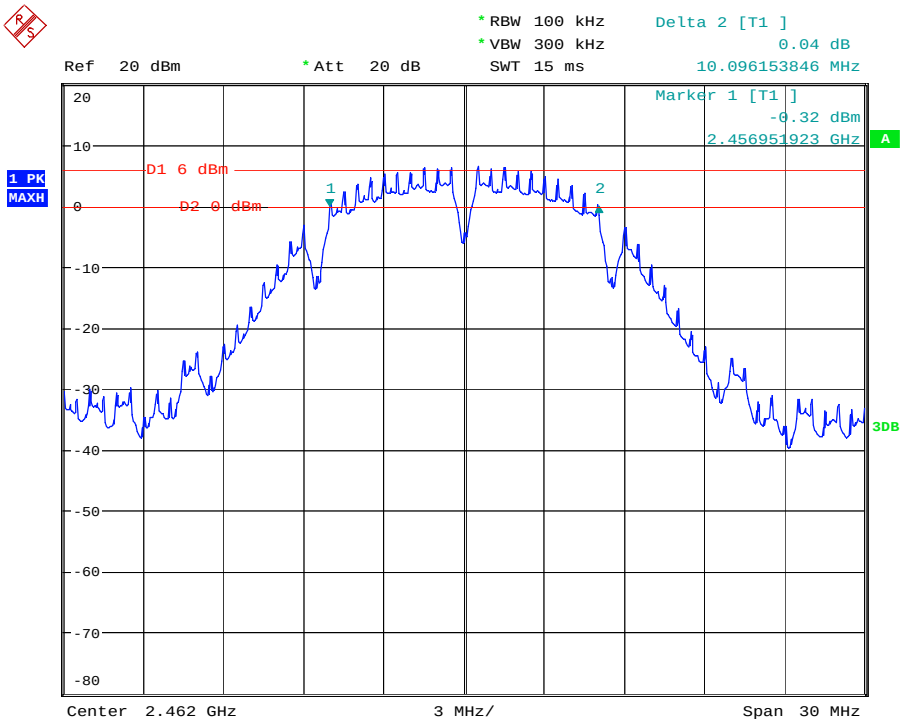
Low channel



Middle channel

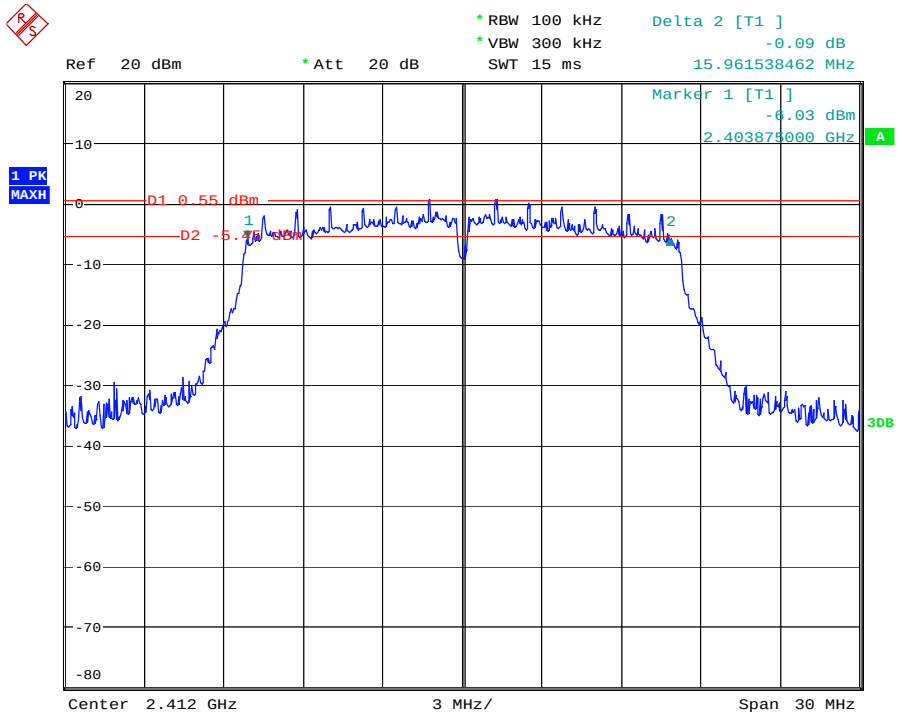


High channel

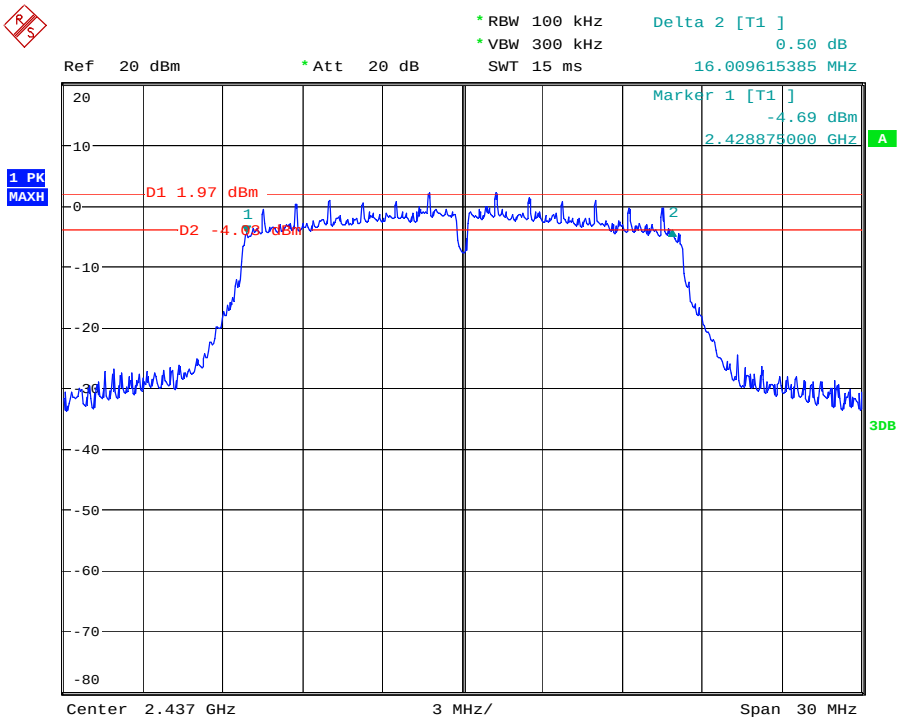


Test Mode: IEEE 802.11g mode

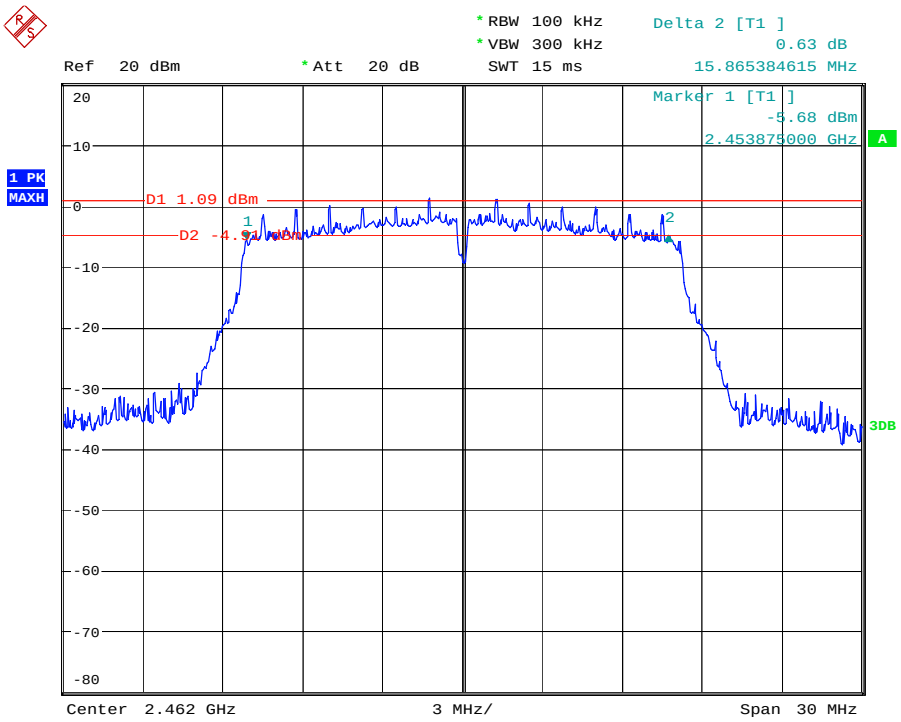
Low channel



Middle channel

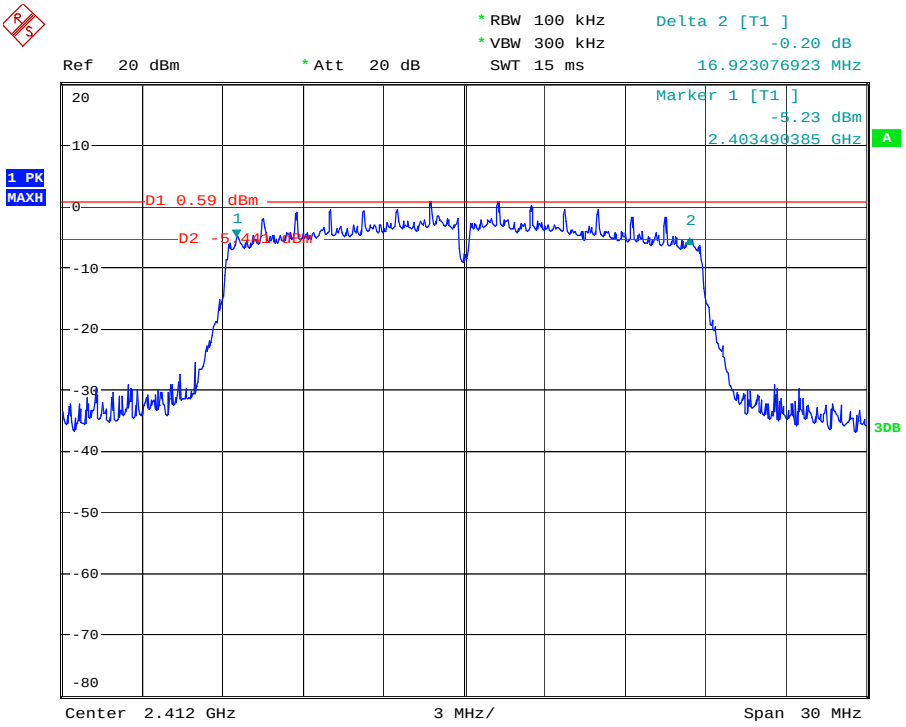


High channel

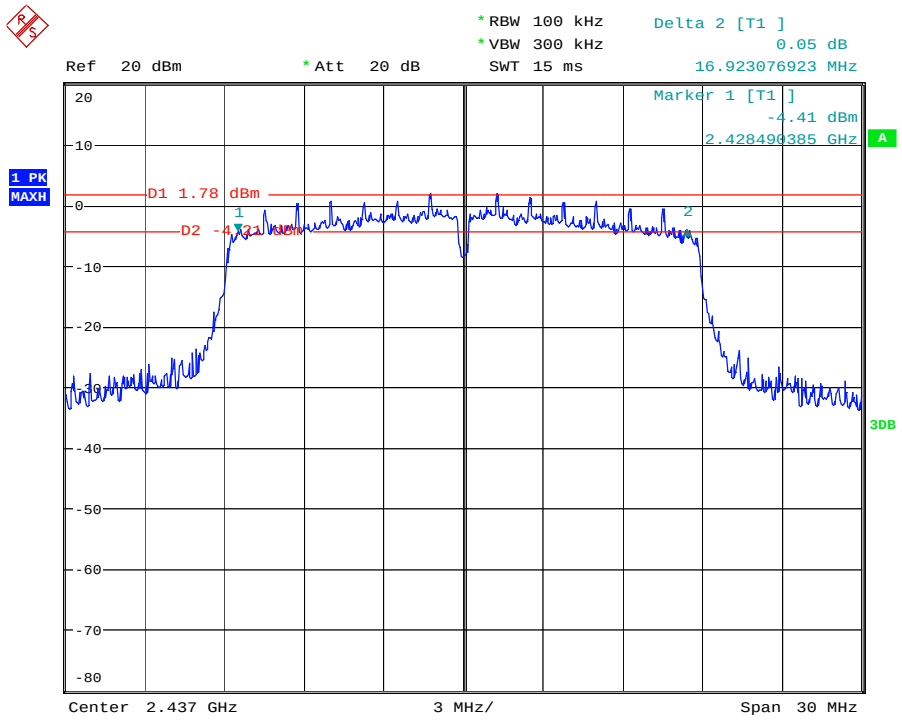


Test Mode: IEEE 802.11n (HT 20) mode

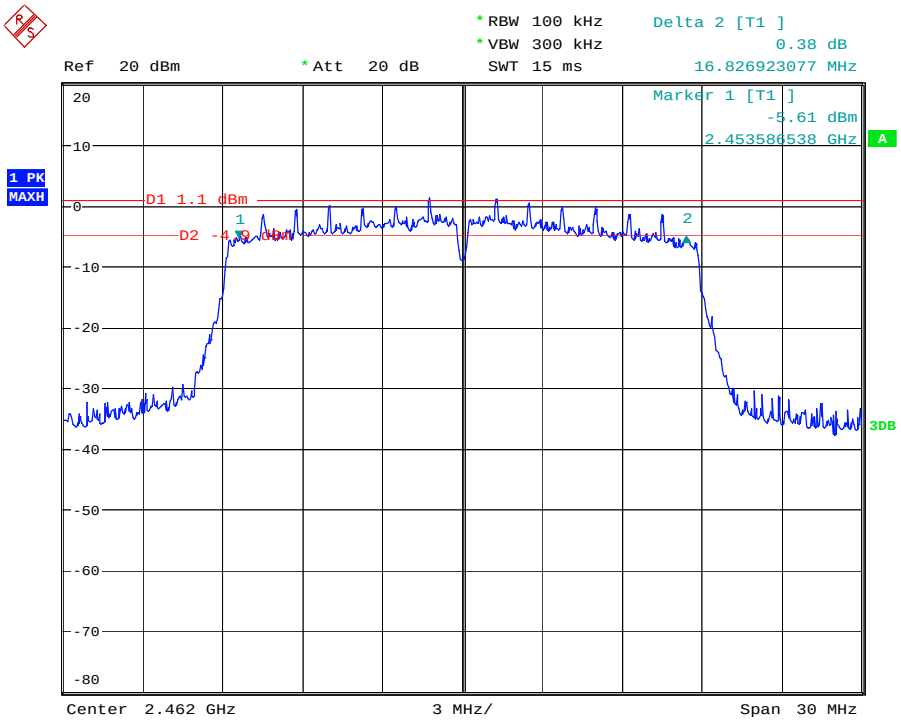
Low channel



Middle channel



High channel



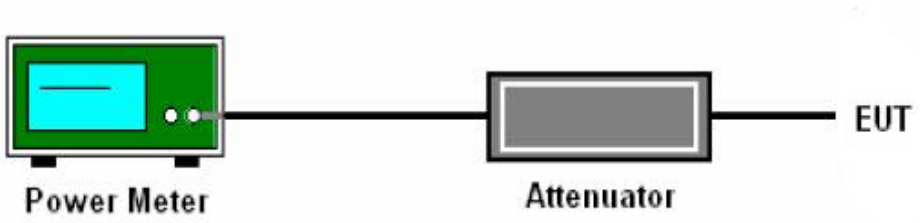
7. Peak Output Power Test

7.1 Test Standard and Limit

9.1.1 Test Standard
FCC Part 15.247 (b)
9.1.2 Test Limit

FCC Part 15 Subpart C(15.247)/RSS-210		
Test Item	**Limit**	**Frequency Range(MHz)**
Peak Output Power	1 Watt or 30 dBm	2400~2483.5

7.2 Test Setup



7.3 Test Procedure

1. The testing follows FCC KDB Publication NO558074 (Measurement Guidance of DTS)
2. The RF output of EUT was connected to the power meter by a low loss cable
3. Measure the power by power meter
4. Use the data rate as follows in maximum transmit power: 1Mbps for 802.11b, 6Mbps for 802.11g, 6.5Mbps for 802.11n(H20).

7.4 EUT Operating Condition

The EUT was set to continuously transmitting in the max power during the test.

7.5 Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Power Meter	Agilent	E4416A	MY45101555	Dec. 20, 2013	Dec. 19, 2014
Power Sensor	Agilent	U2021XA	MY53480008	Dec. 20, 2013	Dec. 19, 2014

7.6 Test Data

801.11b Mode			
Test Channel	**Frequency (MHz)**	**Peak Output Power (dBm)**	**Limit (dBm)**
CH01	2412	17.98	30
CH 06	2437	18.04	30
CH11	2462	18.45	30

801.11g Mode			
Test Channel	**Frequency (MHz)**	**Peak Output Power (dBm)**	**Limit (dBm)**
CH01	2412	19.04	30
CH 06	2437	20.63	30
CH11	2462	19.58	30

801.11n(HT20) Mode			
Test Channel	**Frequency (MHz)**	**Peak Output Power (dBm)**	**Limit (dBm)**
CH01	2412	19.07	30
CH 06	2437	20.35	30
CH11	2462	19.76	30

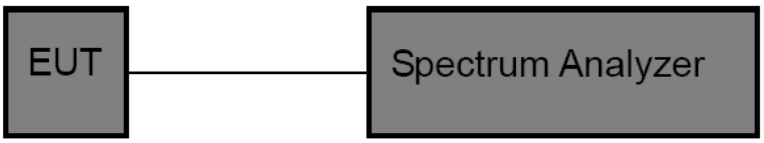
8. Power Spectral Density Test

8.1 Test Standard and Limit

8.1.1 Test Standard
FCC Part 15.247 (e)
8.1.2 Test Limit

FCC Part 15 Subpart C(15.247)		
Test Item	**Limit**	**Frequency Range(MHz)**
Power Spectral Density	8dBm(in any 3 kHz)	2400~2483.5

8.2 Test Setup



8.3 Test Procedure

(1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
(2) Measure the spectral power density the spectrum analyzer was set to Resolution Bandwidth=3KHz to 100 kHz, and Video Bandwidth≥3RBW, Detector: Peak, Span to 5%~30% greater than EBW, Sweep time auto.

8.4 EUT Operating Condition

The EUT was set to continuously transmitting in each mode and low, middle and high channel for the test.

8.5 Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Rohde & Schwarz	FSP30	DE25181	Aug. 08, 2014	Aug.07, 2015

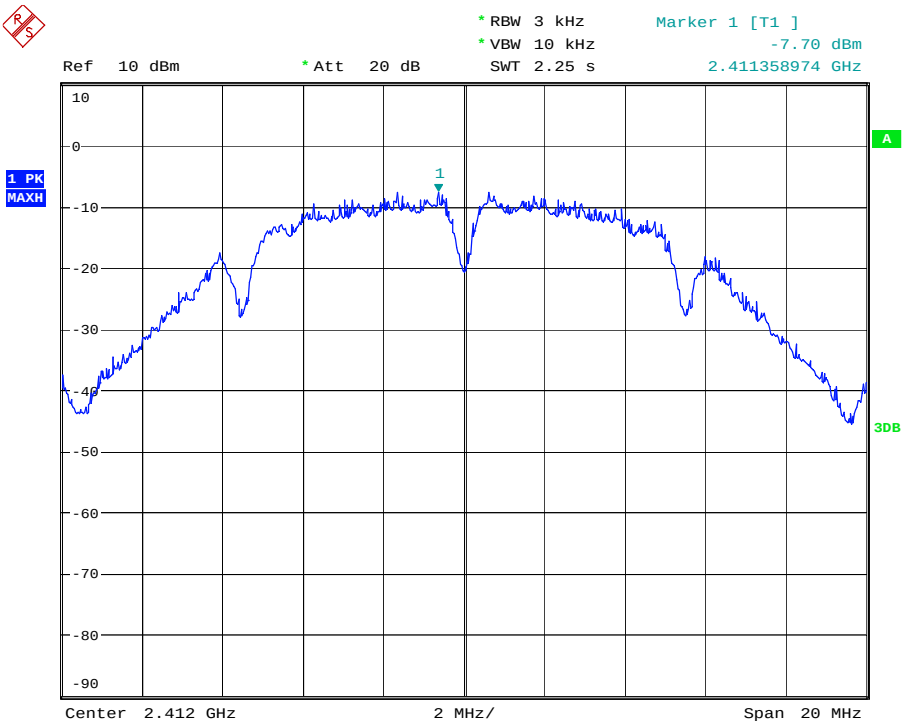
8.6 Test Data

802.11B Mode			
Test Channel	**Frequency (MHz)**	**Power Density (3 kHz/dBm)**	**Limit (dBm)**
CH 01	2412	-7.70	8
CH 06	2437	-7.96	8
CH 11	2462	-8.39	8
802.11G Mode			
Test Channel	**Frequency (MHz)**	**Power Density (3 kHz/dBm)**	**Limit (dBm)**
CH 01	2412	-13.34	8
CH 06	2437	-12.44	8
CH 11	2462	-12.56	8
802.11N(HT20) Mode			
Test Channel	**Frequency (MHz)**	**Power Density (3 kHz/dBm)**	**Limit (dBm)**
CH 01	2412	-14.53	8
CH 06	2437	-11.61	8
CH 11	2462	-12.27	8

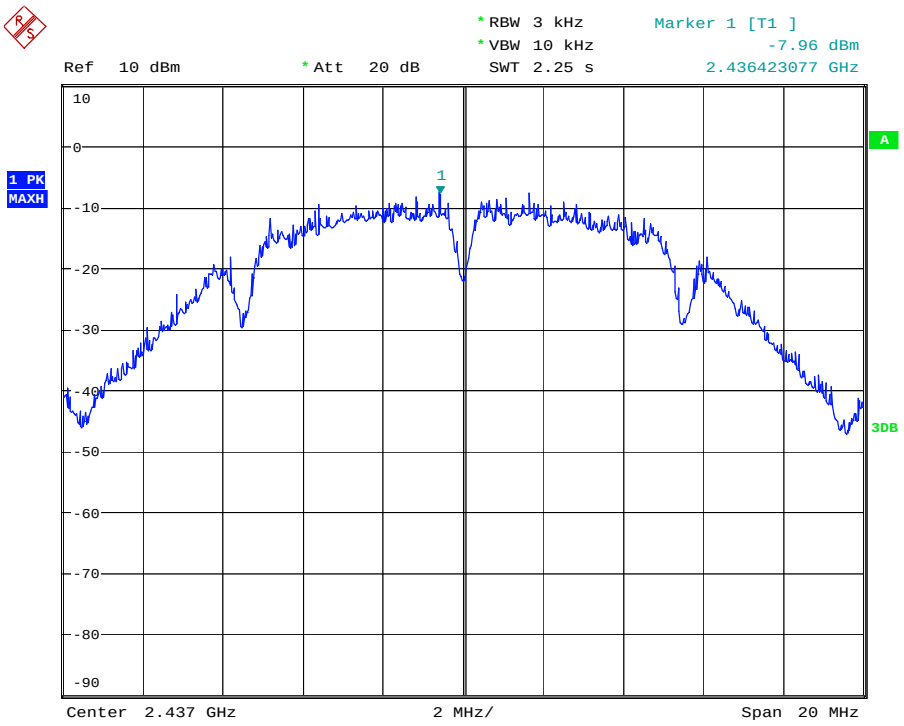
Test plots:

Test Mode: IEEE 802.11b mode

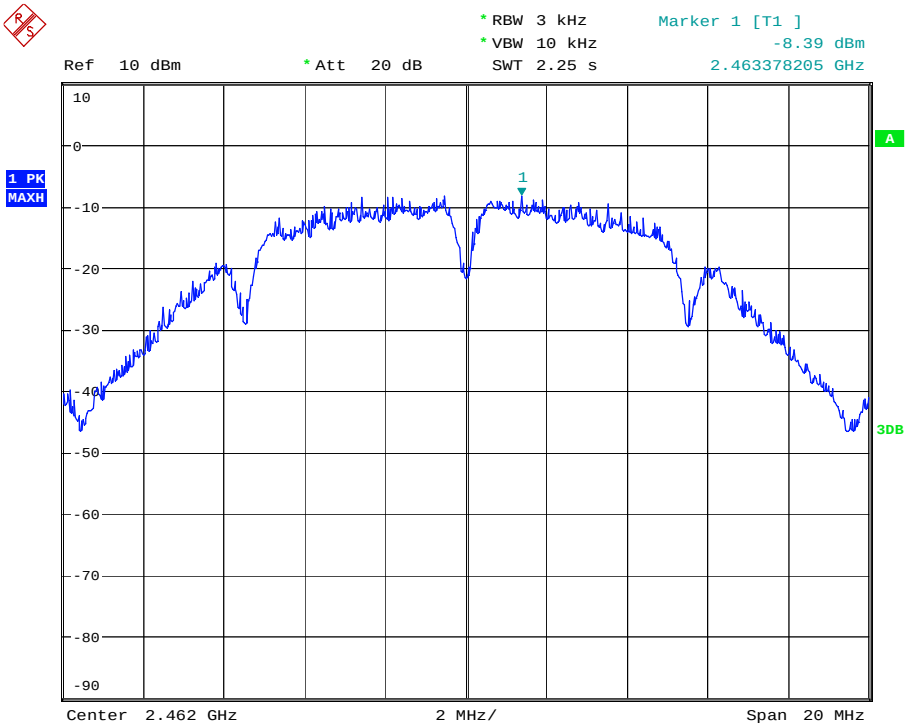
Low channel



Middle channel

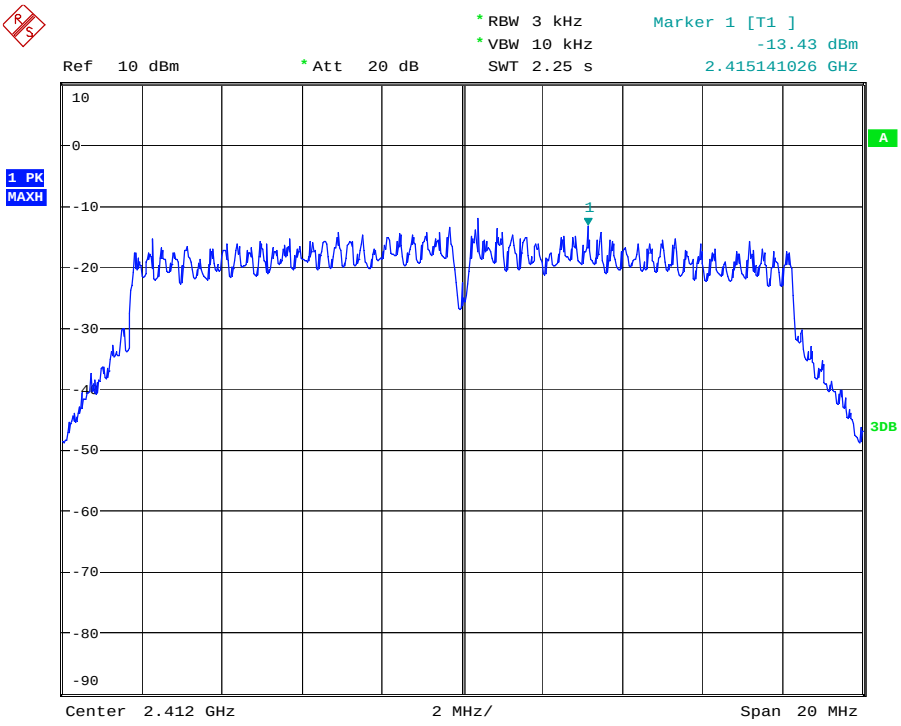


High channel

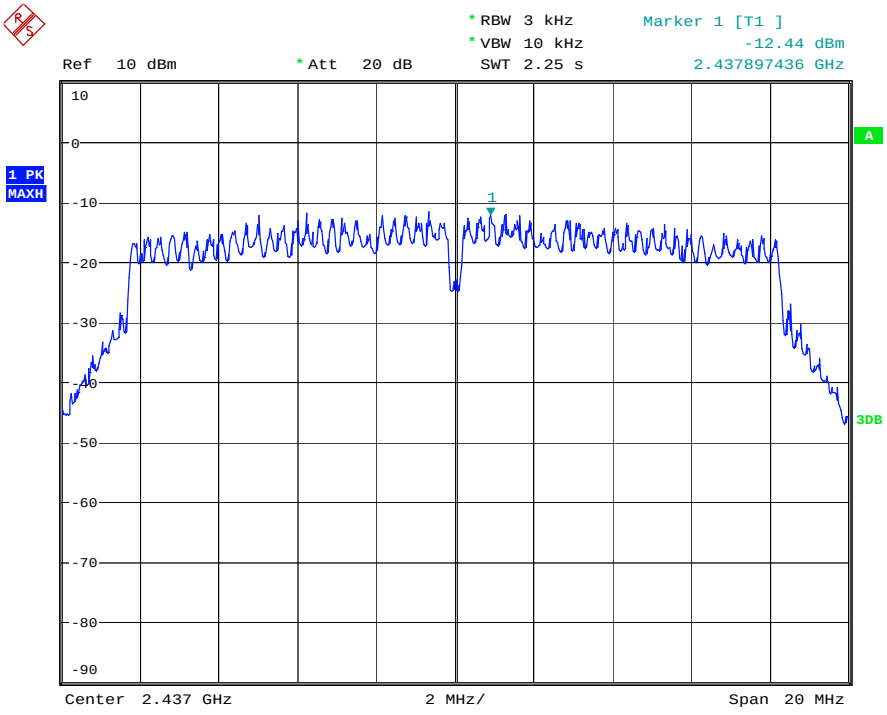


Test Mode: IEEE 802.11g mode

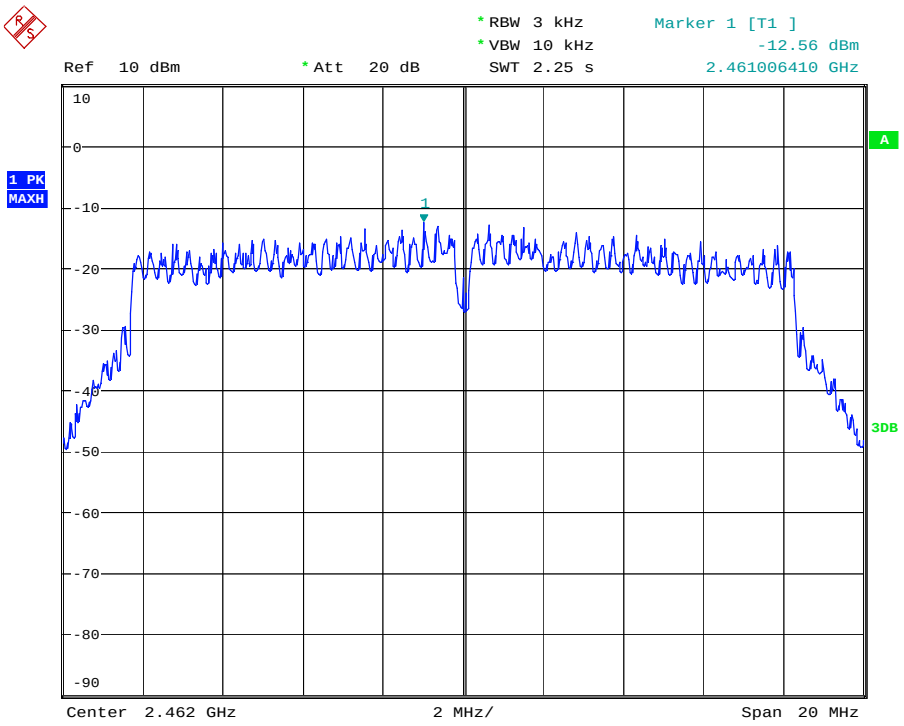
Low channel



Middle channel

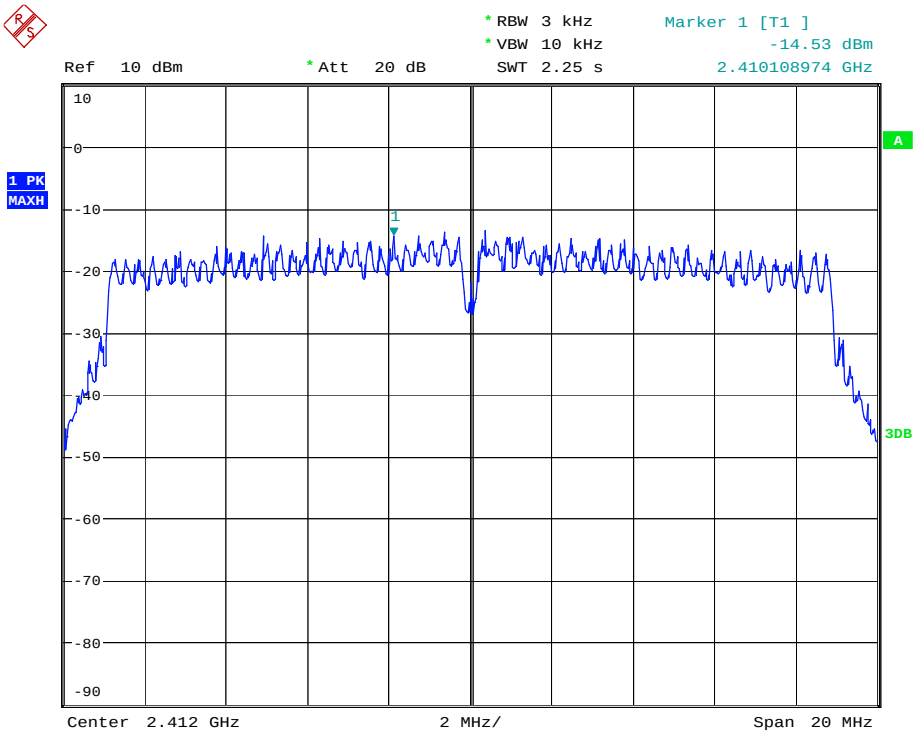


High channel

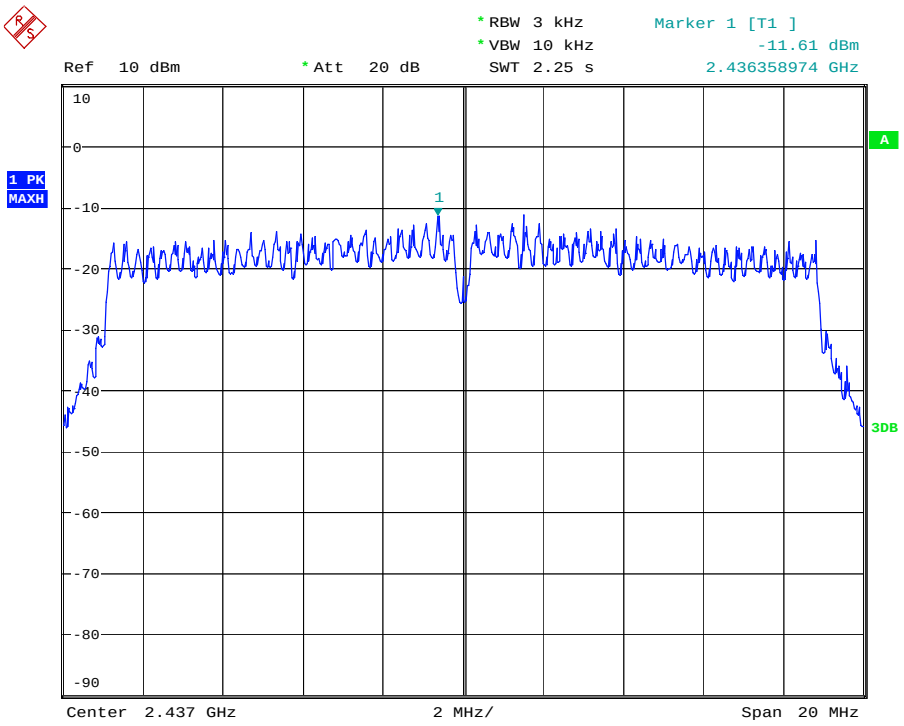


Test Mode: IEEE 802.11n (HT 20) mode

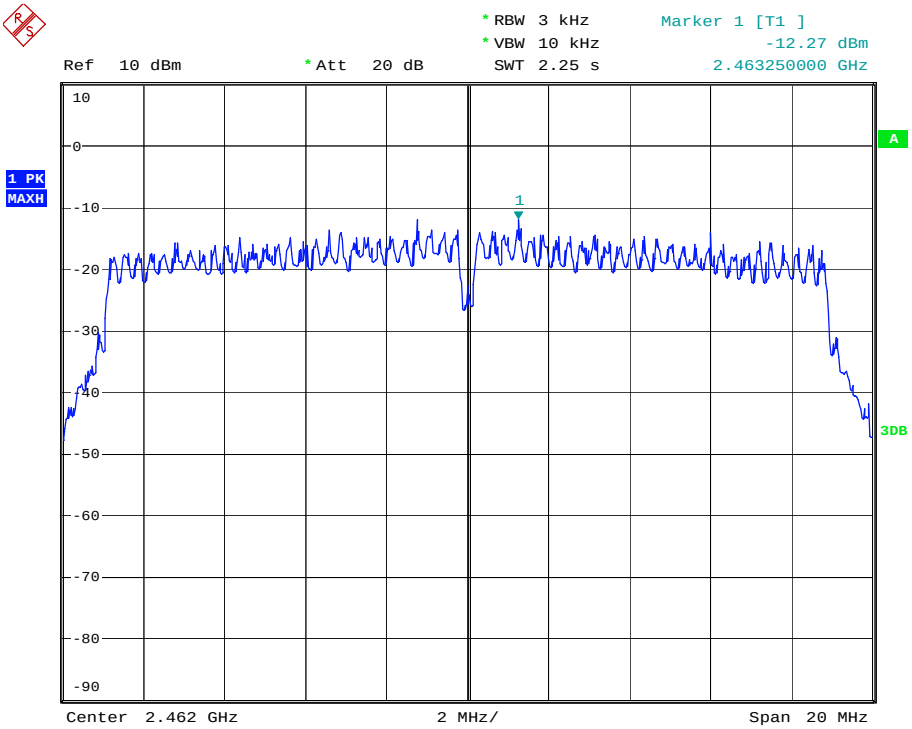
Low channel



Middle channel



High channel



9. Antenna Requirement

9.1 Standard Requirement

9.1.1 Standard

FCC Part 15.203

9.1.2 Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

9.2 Antenna Connected Construction

The directional gains of the antenna used for transmitting is -1.0 dBi, and the antenna de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

9.2 Result

The EUT antenna is an PIFA Antenna. It complies with the standard requirement.