FCC Test Report

Report No.: AGC02707180601FE04

FCC ID	:	2AP7L-ETHOS
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Mobile Phone
BRAND NAME	:	MI
MODEL NAME	:	ETHOS
CLIENT	:	Whoop International Trading Limited
DATE OF ISSUE	:	July 05, 2018
STANDARD(S) **TEST PROCEDURE(S)**	:	FCC Part 15.247 KDB 558074 D01 DTS Meas Guidance v04
REPORT VERSION	:	V1.0

***A**ttestation of **G**lobal **C**ompliance (Shenzhen) Co., Ltd*

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	July 05, 2018	Valid	Initial Release

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1. VERIFICATION OF CONFORMITY

Applicant	Whoop International Trading Limited
Address	Flat-B 8/F Chong Gming Building 72 Cheung Sha Wan Road, Kowloon, Hong Kong, China
Manufacturer	Shenzhen Fortune Ship Technology Co.,Ltd.
Address	6-7th Floor, Kingson Building, New energy and innovation industrial park, 1st Chuangsheng Road , Xili town, Nanshan District, Shenzhen, China
Product Designation	Mobile Phone
Brand Name	MI
Test Model	ETHOS
Date of test	June 12, 2018~July 05, 2018
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-US-BGN/RF

We hereby certify that:
The above equipment was tested by Attestation of Global Compliance(Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with requirement of FCC Part 15 Rules requirement.
The test results of this report relate only to the tested sample identified in this report.

Tested By	Nice.xie	
	Nice Xie(Xie xiaosong)	July 05, 2018
Reviewed By	Bart xie	
	Bart Xie(Xie Xiaobin)	July 05, 2018
Approved By	Forrest Lei	
	Forrest Lei(Lei Yonggang) Authorized Officer	July 05, 2018

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as “Mobile Phone ”. It is designed by way of utilizing the DSSS and OFDM technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	2.412 GHz～2.462GHz
Output Power	IEEE 802.11b:**12.12**dBm, IEEE 802.11g:**9.51**dBm; IEEE 802.11n(20):**9.43**dBm,IEEE 802.11n(40):**9.19**dBm
Modulation	DSSS(DBPSK/DQPSK/CCK);OFDM(BPSK/QPSK/16-QAM/64-QAM)
Number of channels	11 Channels (IEEE802.11b/g/n20)& 7 Channels (IEEE802.11n40)
Hardware Version	YK736_MB_V0.2
Software Version	MI_ETHOS_V1.2_20180623
Antenna Designation	PIFA Antenna
Antenna Gain	1.0dBi
Power Supply	DC3.8V by Built-in Li-ion Battery

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
2400~2483.5MHZ	1	2412 MHZ
	2	2417 MHZ
	3	2422 MHZ
	4	2427 MHZ
	5	2432 MHZ
	6	2437 MHZ
	7	2442 MHZ
	8	2447 MHZ
	9	2452 MHZ
	10	2457 MHZ
	11	2462 MHZ

Note: For 20MHZ bandwidth system use Channel 1 to Channel 11

For 802.11n 40MHZ bandwidth system use Channel 3 to Channel 9.

2.3. IEEE 802.11N MODULATION SCHEME

MCS Index	Nss	Modulation	R	NBPSC	NCBPS		NDBPS		Data rate(Mbps)	
									800nsGI	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0
6	1	64-QAM	3/4	6	312	648	234	489	58.5	121.5
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	Guard interval

2.4. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AP7L-ETHOS** filing to comply with the FCC Part 15 requirements.

2.5. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013).
Radiated testing was performed at an antenna to EUT distance 3 meters.
Others testing (listed at item 5.3) was performed according to the procedures in FCC Part 15.247 rules KDB 558074 D01 DTS Meas Guidance v04.

2.6. SPECIAL ACCESSORIES

Refer to section 5.2.

2.7. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

3. MEASUREMENT UNCERTAINTY

-Uncertainty of Conducted Emission, Uc=±3.2dB

- Uncertainty of Radiated Emission below 1GHz, Uc±3.9dB

- Uncertainty of Radiated Emission above 1GHz, Uc±4.8dB

4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel TX
2	Middle channel TX
3	High channel TX
4	Normal operating

Note:
Transmit by 802.11b with Date rate (1/2/5.5/11)
Transmit by 802.11g with Date rate (6/9/12/18/24/36/48/54)
Transmit by 802.11n (20MHz) with Date rate (6.5/13/19.5/26/39/52/58.5/65)
Transmit by 802.11n (40MHz) with Date rate (13.5/27/40.5/54/81/108/121.5/135)

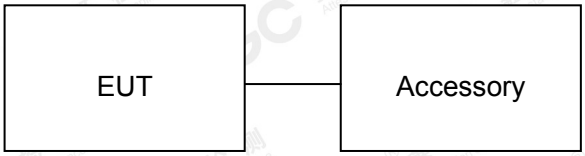
Note:

1. The EUT has been set to operate continuously on the lowest, middle and highest operation frequency Individually, and the eut is operating at its maximum duty cycle>or equal 98%
2. All modes under which configure applicable have been tested and the worst mode test data recording in the test report, if no other mode data.
3. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure:



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Mobile Phone	ETHOS	2AP7L-ETHOS	EUT
2	Adapter	TPA-46B050100UU	DC 5.0V 1A	Accessory
3	Battery	ETHOS-B01	DC 3.8V/2450mAh	Accessory
4	Earphone	N/A	N/A	Accessory
5	USB Cable	N/A	N/A	Accessory

Note: All the accessories have been used during the test in conduction emission test.

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.247	Output Power	Compliant
§15.247	6 dB Bandwidth	Compliant
§15.247	Conducted Spurious Emission	Compliant
§15.247	Maximum Conducted Output Power SPECTRAL Density	Compliant
§15.209	Radiated Emission	Compliant
§15.247	Band Edges	Compliant
§15.207	Line Conduction Emission	Compliant

6. TEST FACILITY

Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2F., Bldg.2, No.1-4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang, Bao'an District B112-B113, Bldg.12, Baoan Bldg Materials Center, No.1 of Xixiang Inner Ring Road, Baoan District, Shenzhen 518012
NVLAP LAB CODE	600153-0
Designation Number	CN5028
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by National Voluntary Laboratory Accreditation program, NVLAP Code 600153-0

ALL TEST EQUIPMENT LIST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	Jun.12, 2018	Jun.11, 2019
LISN	R&S	ESH2-Z5	100086	Aug.21, 2017	Aug.20, 2018
TEST RECEIVER	R&S	ESCI	10096	Jun.12, 2018	Jun.11, 2019
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec.08, 2017	Dec.07, 2018
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.20, 2017	Sep.19, 2018
preamplifier	ChengYi	EMC184045SE	980508	Sep.15, 2017	Sep.14, 2018
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May.18, 2017	May.17, 2019
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun.12, 2018	Jun.11, 2019
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep.28, 2017	Sep.27, 2018
SIGNAL ANALYZER	Agilent	N9020A	MY52090123	Sep. 21, 2017	Sep. 20, 2018
USB Wideband Power Sensor	Agilent	U2021XA	MY54110007	Sep. 21, 2017	Sep. 20, 2018
LOOP ANTENNA	A.H	SAS-562B	/	Mar.01, 2018	Feb.28, 2019

7. OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

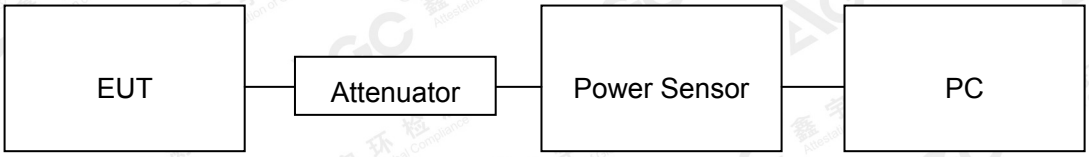
For max average conducted output power test:

1. Connect EUT RF output port to power probe through an RF attenuator.
2. Connect the power probe to the PC.
3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
4. Record the maximum power from the software.

Note：The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

AVERAGE POWER SETUP



7.3. LIMITS AND MEASUREMENT RESULT

TEST ITEM	OUTPUT POWER
TEST MODE	802.11b with data rate 1

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	11.99	30	Pass
2.437	10.74	30	Pass
2.462	**12.12**	30	Pass

TEST ITEM	OUTPUT POWER
TEST MODE	802.11g with data rate 6

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	8.70	30	Pass
2.437	9.14	30	Pass
2.462	**9.51**	30	Pass

TEST ITEM	OUTPUT POWER
TEST MODE	802.11n 20 with data rate 6.5

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	9.12	30	Pass
2.437	9.07	30	Pass
2.462	**9.43**	30	Pass

TEST ITEM	OUTPUT POWER
TEST MODE	802.11n 40 with data rate 13.5

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.422	**9.19**	30	Pass
2.437	8.14	30	Pass
2.452	8.18	30	Pass

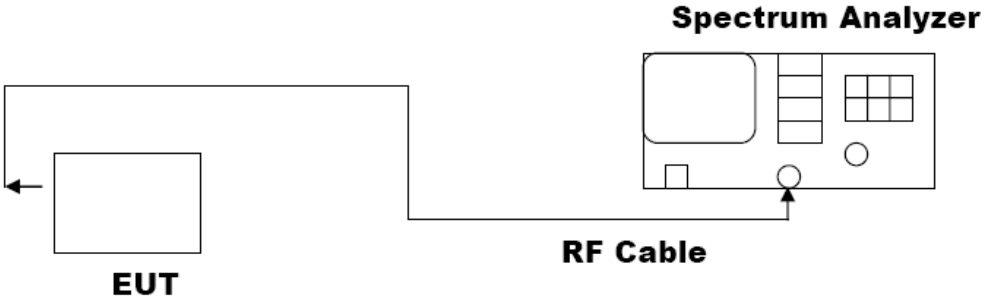
8. 6dB BANDWIDTH

8.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW≥ 3×RBW.
4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

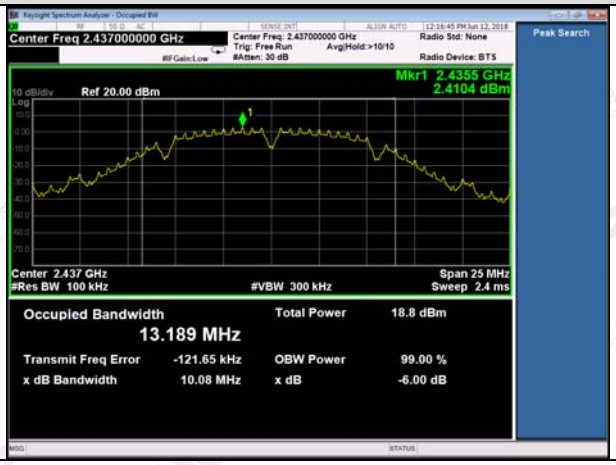
8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

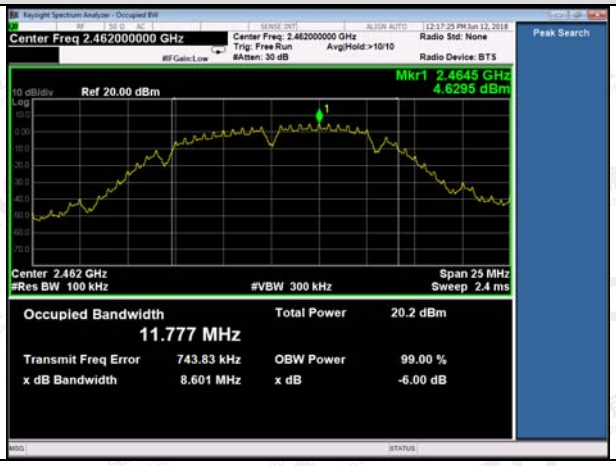
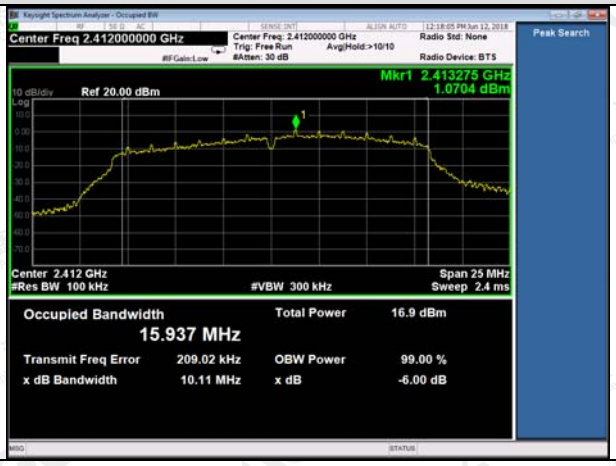


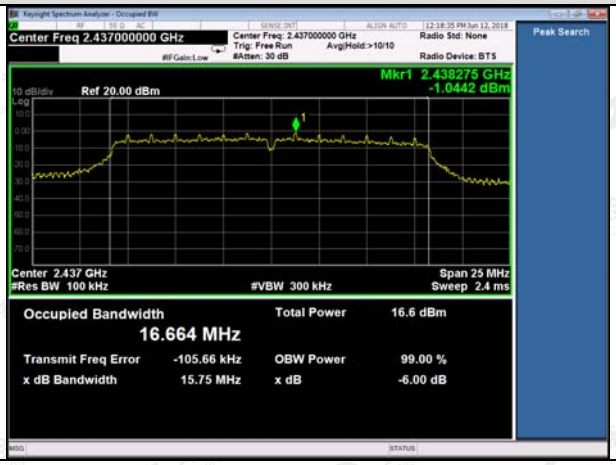
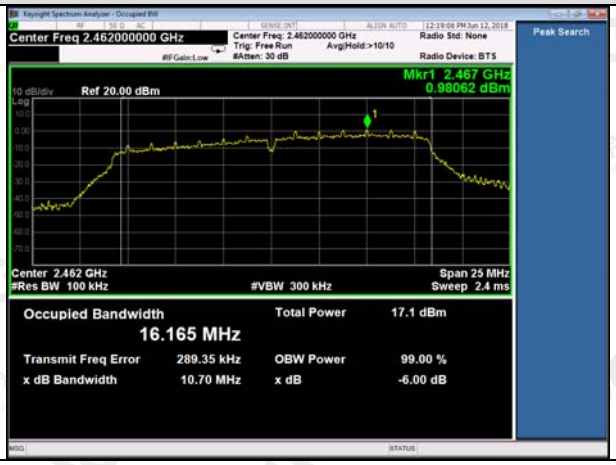
8.3. LIMITS AND MEASUREMENT RESULTS

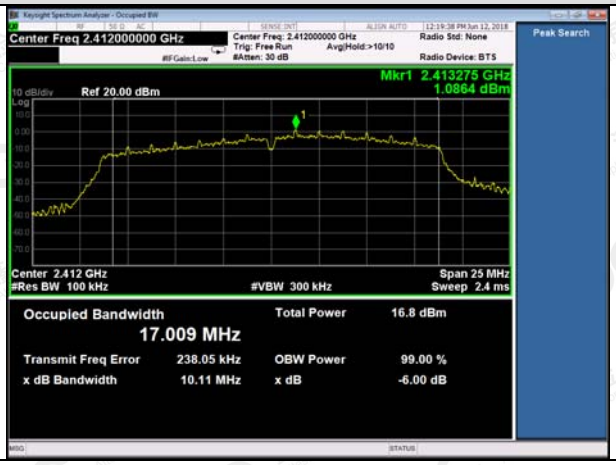
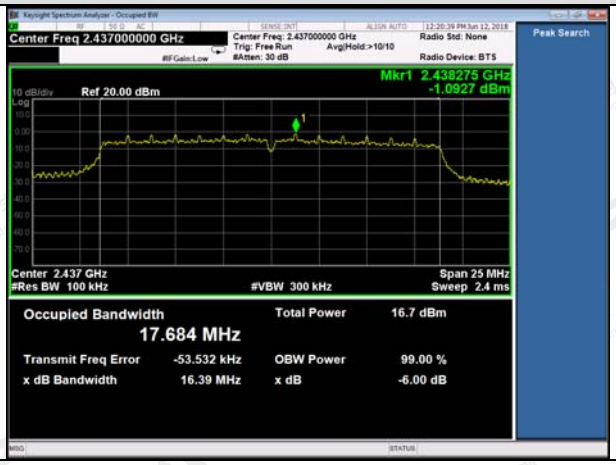
Mode	Channel	6dB Bandwidth [MHz]	Verdict
11b	LCH	7.612	PASS
	MCH	10.08	PASS
	HCH	8.601	PASS
11g	LCH	10.11	PASS
	MCH	15.75	PASS
	HCH	10.70	PASS
11nHT20	LCH	10.11	PASS
	MCH	16.39	PASS
	HCH	11.30	PASS
11nHT40	LCH	15.09	PASS
	MCH	35.73	PASS
	HCH	10.48	PASS

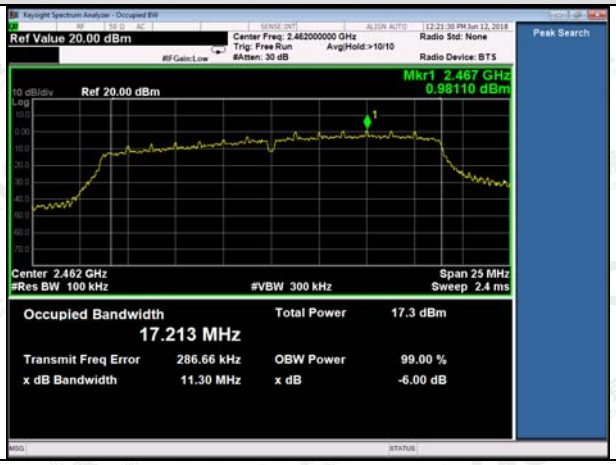
Test Graph

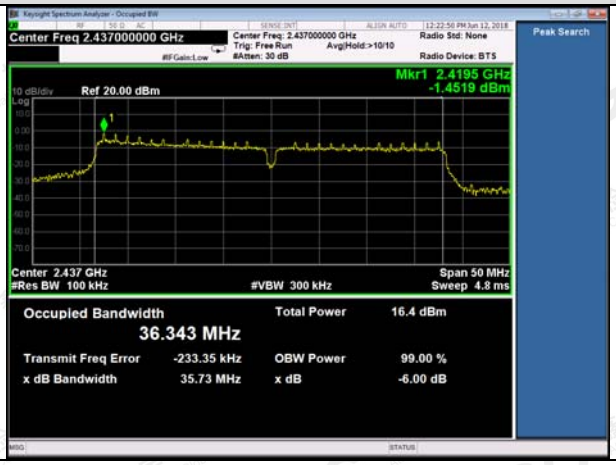
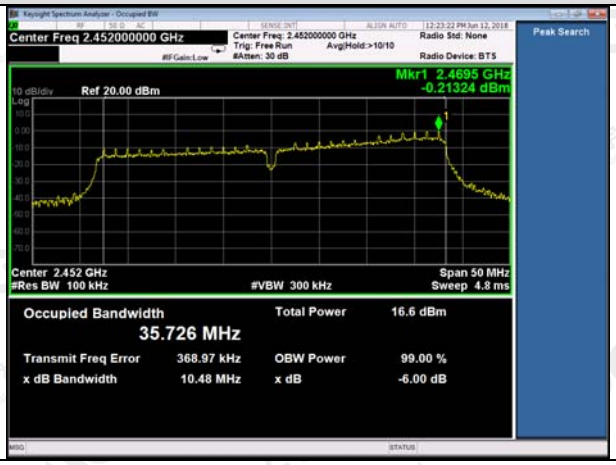
11b-LCH	11b-MCH
	

11b-HCH	11g-LCH
	

11g-MCH	11g-HCH
	

11nHT20-LCH	11nHT20-MCH
	

11nHT20-HCH	11nHT20-LCH
	

11nHT40-MCH	11nHT40-HCH
	

9. CONDUCTED SPURIOUS EMISSION

9.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements. Owing to satisfy the requirements of the number of measurement points, we set the RBW=1MHz, VBW＞RBW, scan up through 10th harmonic, and consider the tested results as the worst case, if the tested results conform to the requirement, we can deem that the real tested results(set the RBW=100KHz, VBW＞RBW) are conform to the requirement.

9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 8.2.

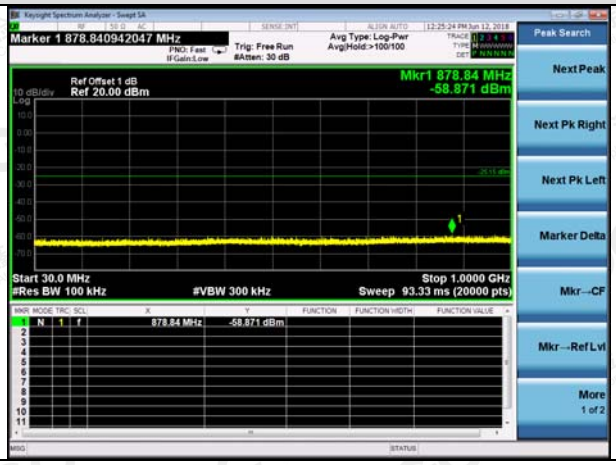
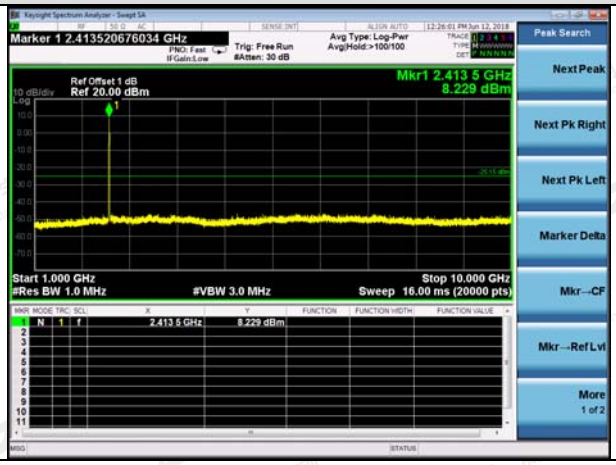
9.3. MEASUREMENT EQUIPMENT USED

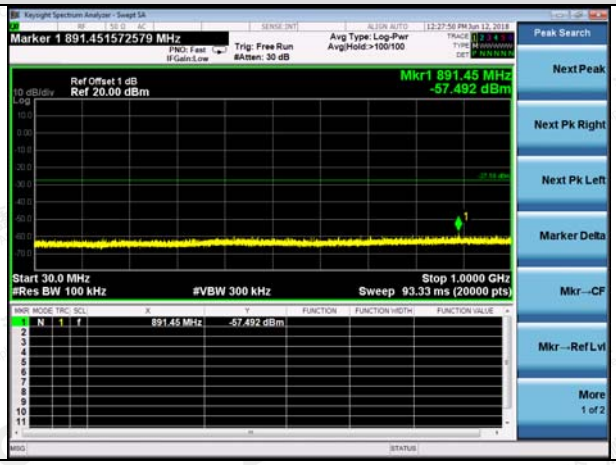
The same as described in section 6.

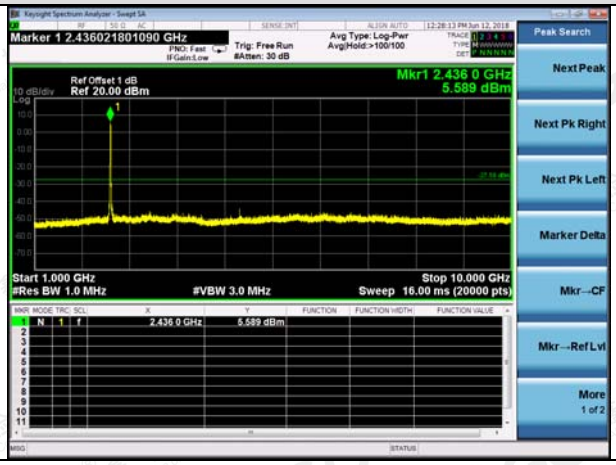
9.4. LIMITS AND MEASUREMENT RESULT

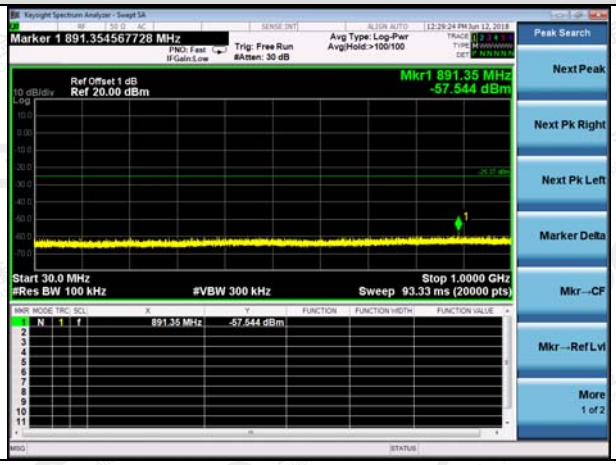
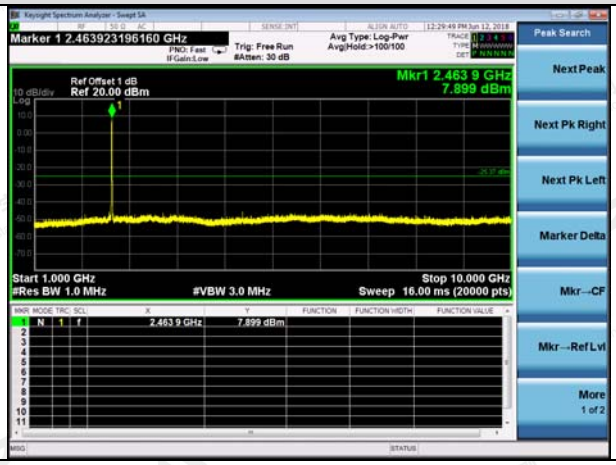
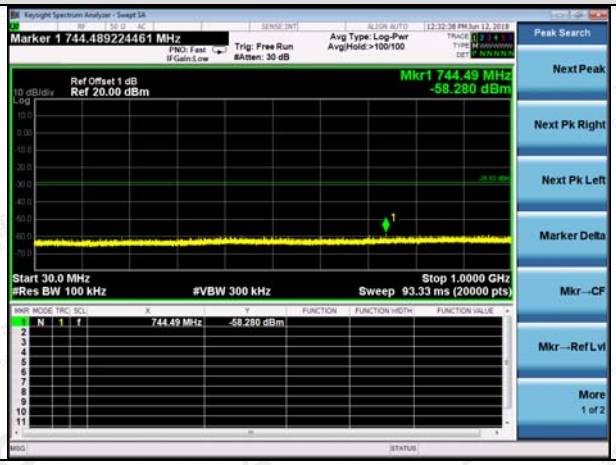
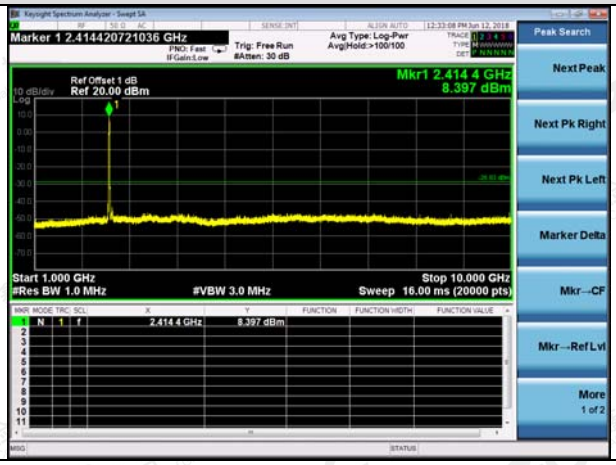
LIMITS AND MEASUREMENT RESULT		
Applicable Limits	**Measurement Result**	
	Test Data	**Criteria**
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in§15.209(a))	At least -20dBc than the limit Specified on the BOTTOM Channel	PASS
	At least -20dBc than the limit Specified on the TOP Channel	PASS

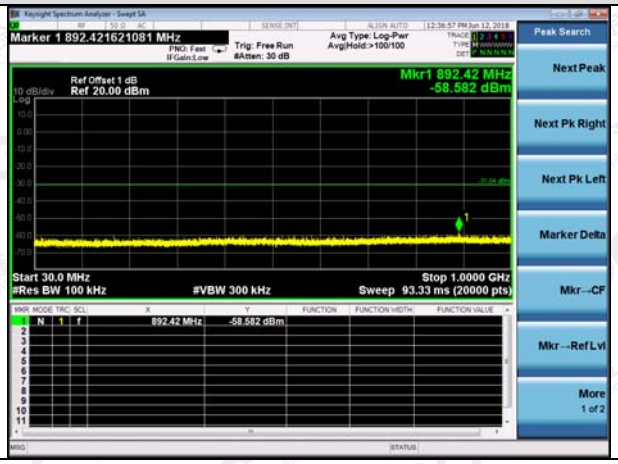
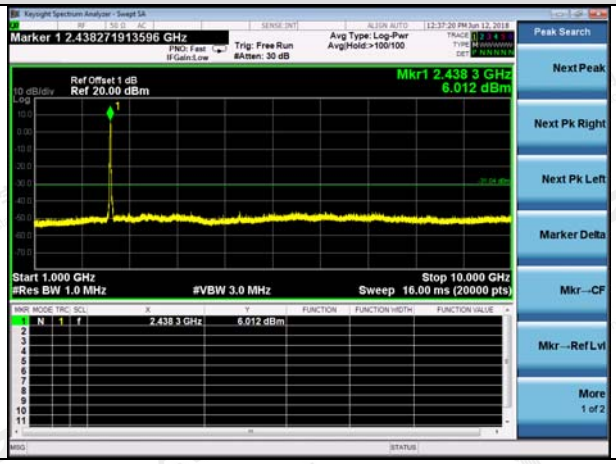
Test Graph

11B-LCH	11B-LCH
	

11B-LCH	11B-MCH
	

11B-MCH	11B-MCH
	

11B-HCH	11B-HCH
	
11B-HCH	11G-LCH
	
11G-LCH	11G-LCH
	

11G-MCH	11G-MCH
	
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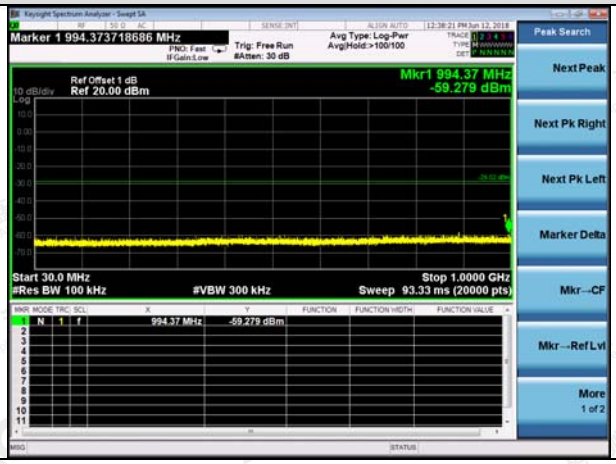
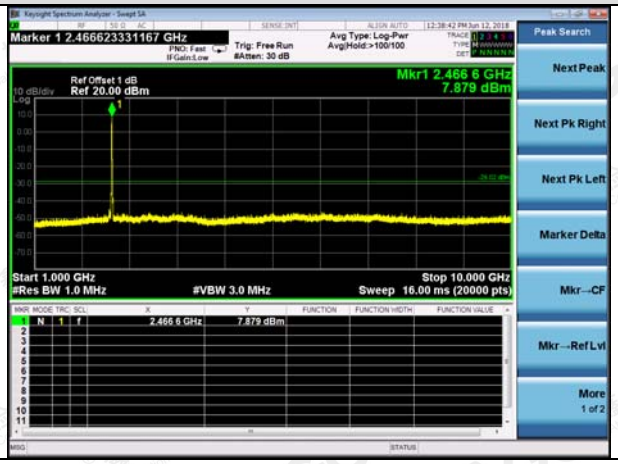
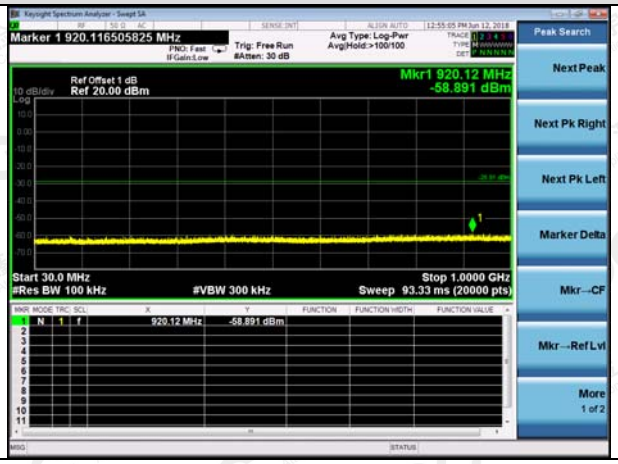
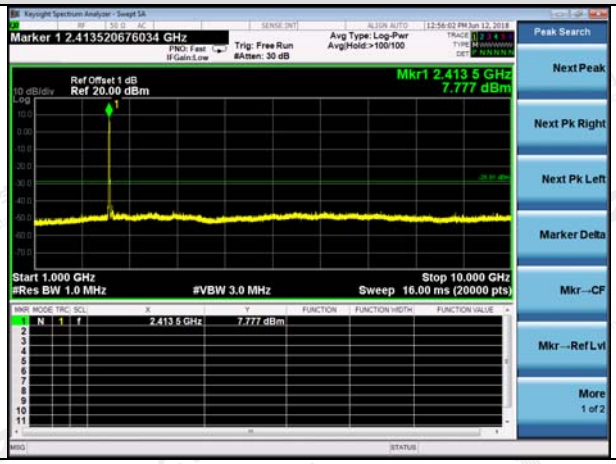
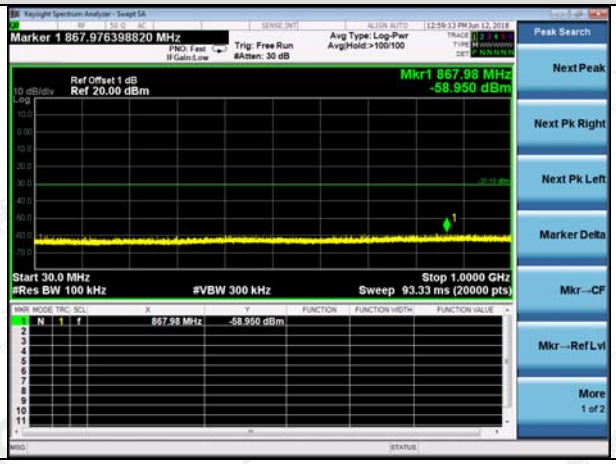
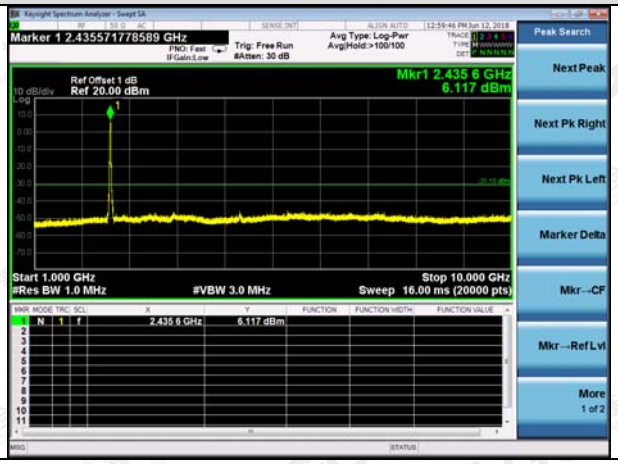
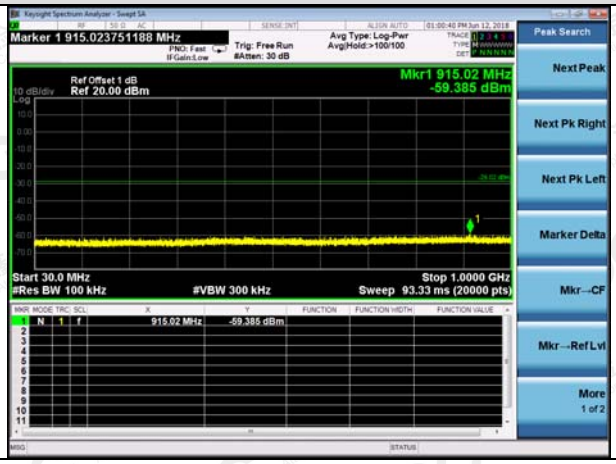
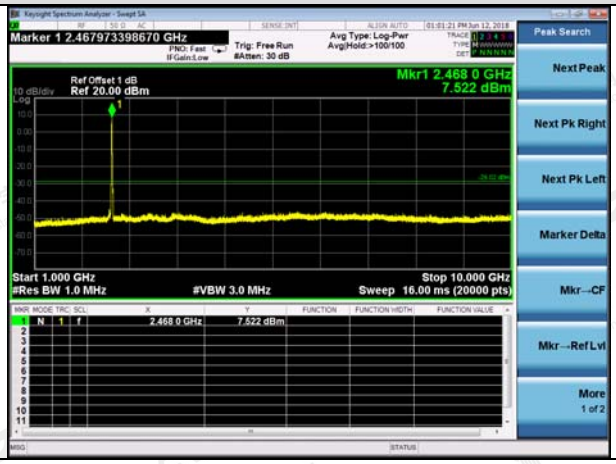
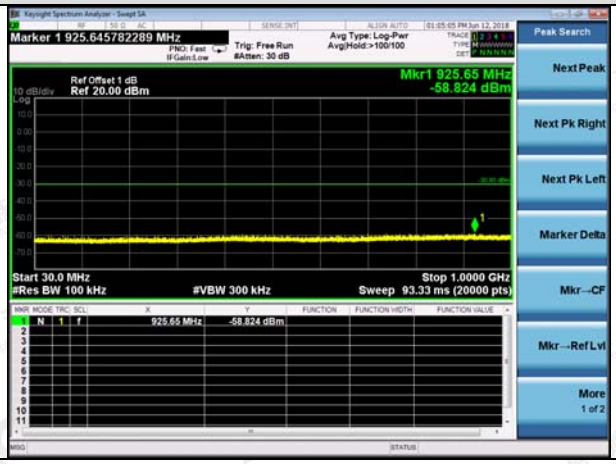
	
11G-HCH	11G-HCH
	

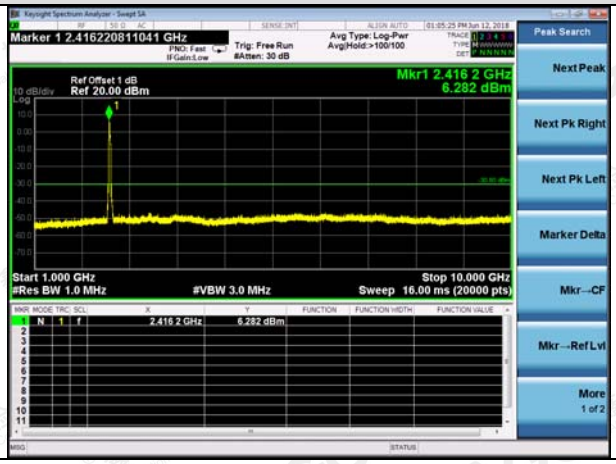
11nHT20-LCH	11nHT20-LCH
	

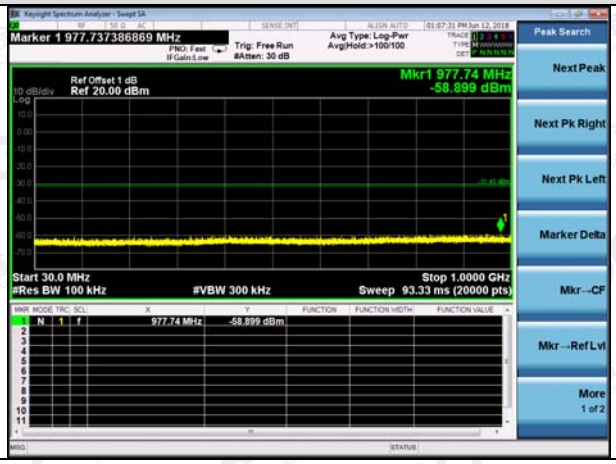
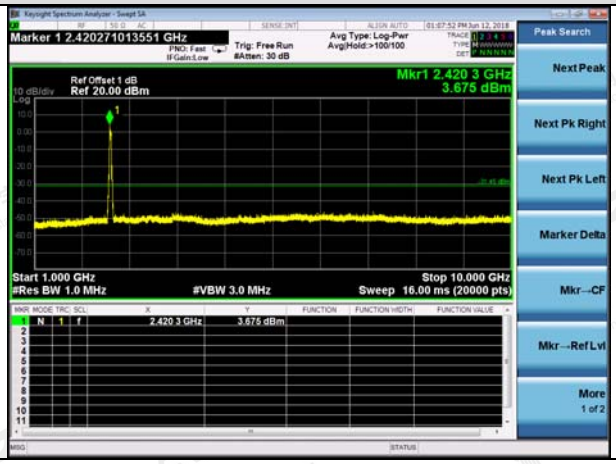
11nHT20-LCH	11nHT20-MCH
	

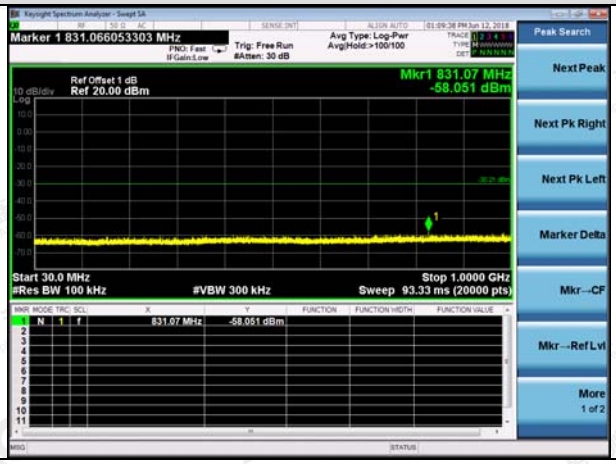
11nHT20-MCH	11nHT20-MCH
	

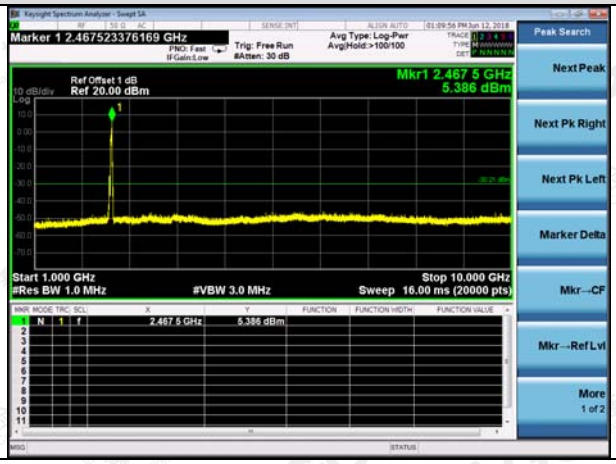
11nHT20-HCH	11nHT20-HCH
	

11nHT20-HCH	11nHT40-LCH
	

11nHT40-LCH	11nHT40-LCH
	

11nHT40-MCH	11nHT40-MCH
	

11nHT40-MCH	11nHT40-HCH
	

11nHT40-HCH	11nHT40-HCH
	

10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

10.1 MEASUREMENT PROCEDURE

(1). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator

(2). Set the EUT Work on the top, the middle and the bottom operation frequency individually.

(3). Set SPA Trace 1 Max hold, then View.

Note: The method of AVGPSD in the KDB 558074 item 10.3 was used in this testing.

10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer To Section 8.2.

10.3 MEASUREMENT EQUIPMENT USED

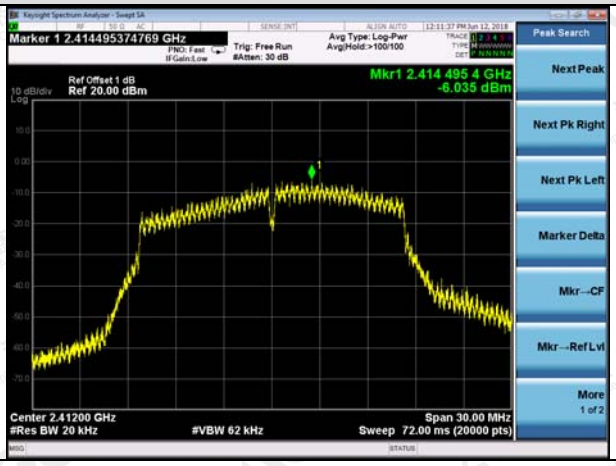
Refer To Section 6.

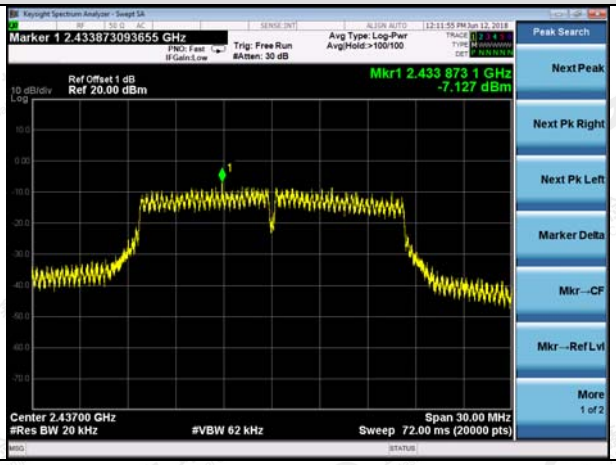
10.4 LIMITS AND MEASUREMENT RESULT

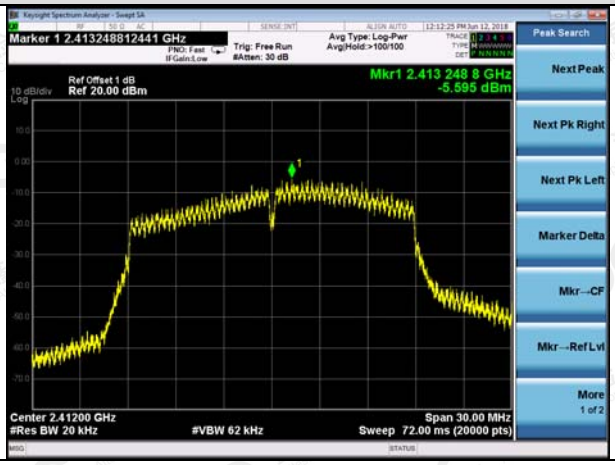
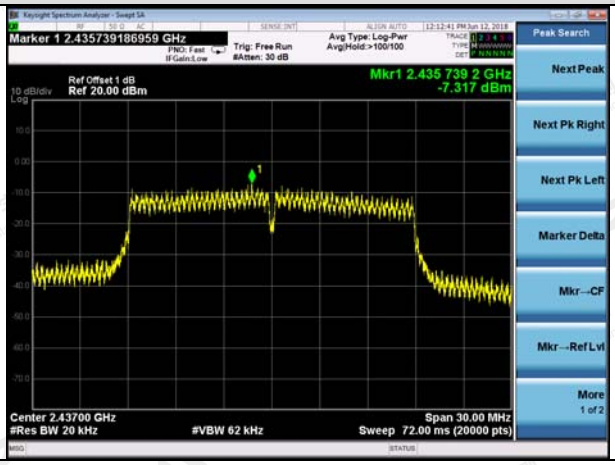
Mode	Channel	PSD [dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11b	LCH	-0.352	8	PASS
	MCH	-4.076	8	PASS
	HCH	2.461	8	PASS
11g	LCH	-6.035	8	PASS
	MCH	-7.127	8	PASS
	HCH	-5.526	8	PASS
11nHT20	LCH	-5.595	8	PASS
	MCH	-7.317	8	PASS
	HCH	-5.098	8	PASS
11NHT40	LCH	-7.944	8	PASS
	MCH	-8.185	8	PASS
	HCH	-7.607	8	PASS

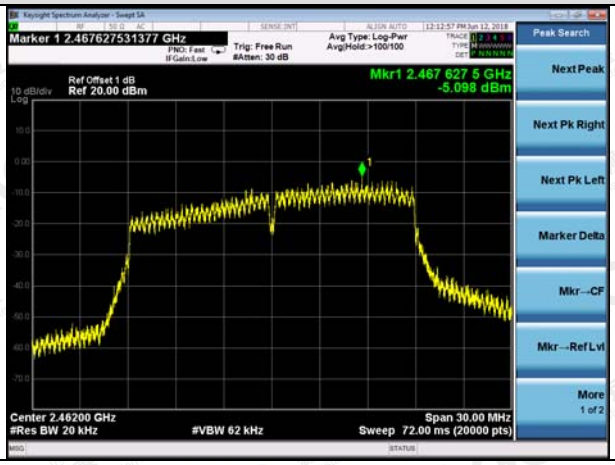
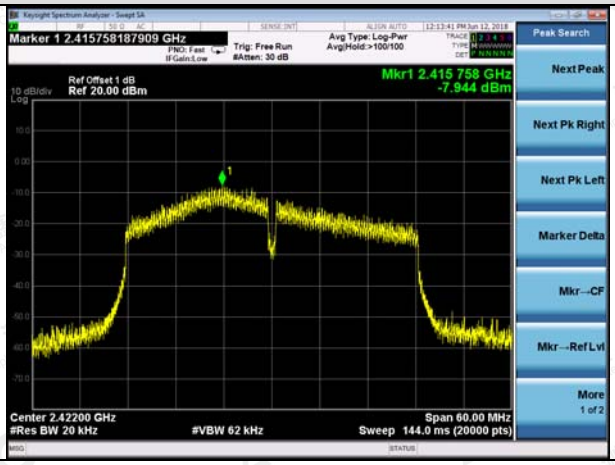
Test Graph

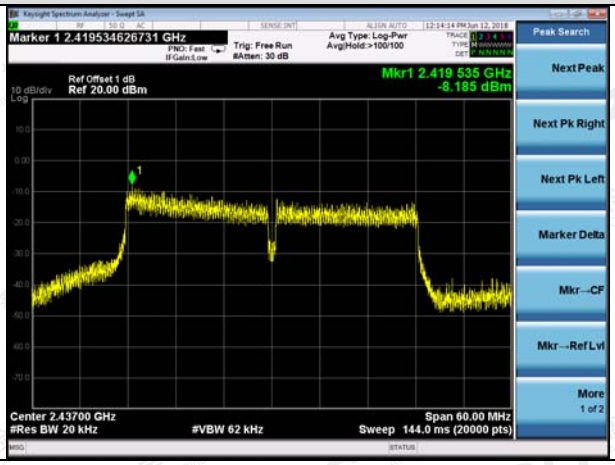
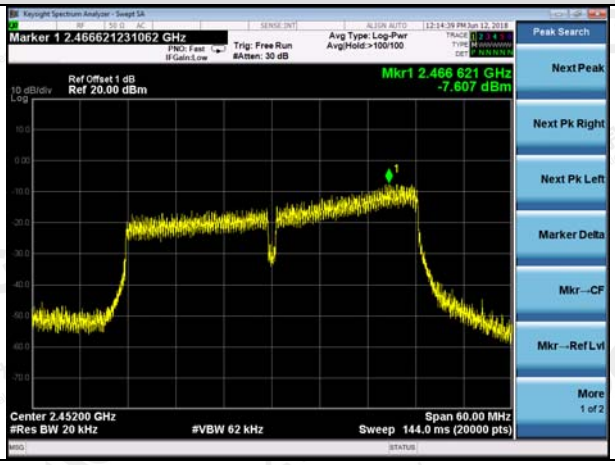
11b-LCH	11b-MCH
	

11b-HCH	11g-LCH
	

11g-MCH	11g-HCH
	

11nHT20-LCH	11nHT20-MCH
	

11nHT20-HCH	11nHT40-LCH
	

11nHT40-MCH	11nHT40-HCH
	

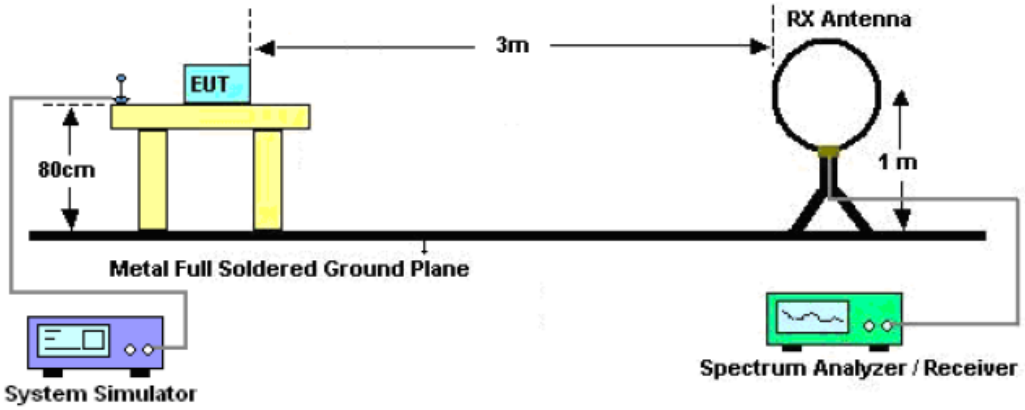
11. RADIATED EMISSION

11.1. MEASUREMENT PROCEDURE

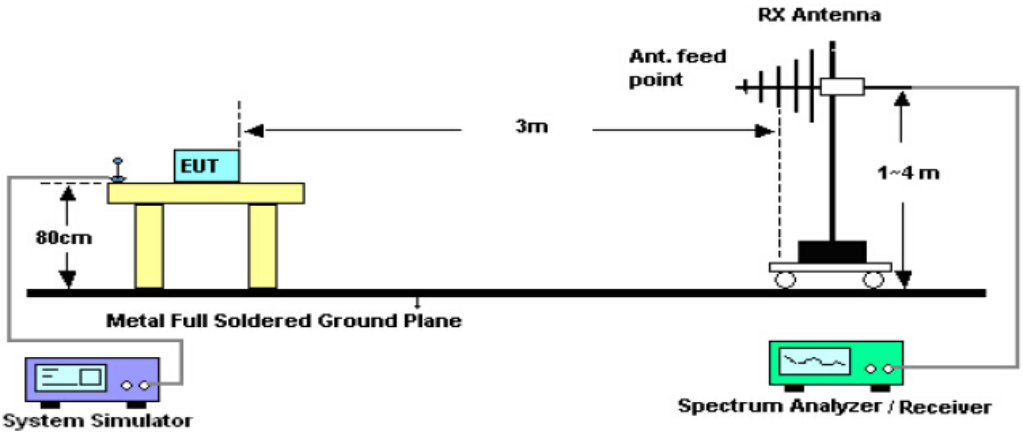
1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

11.2. TEST SETUP

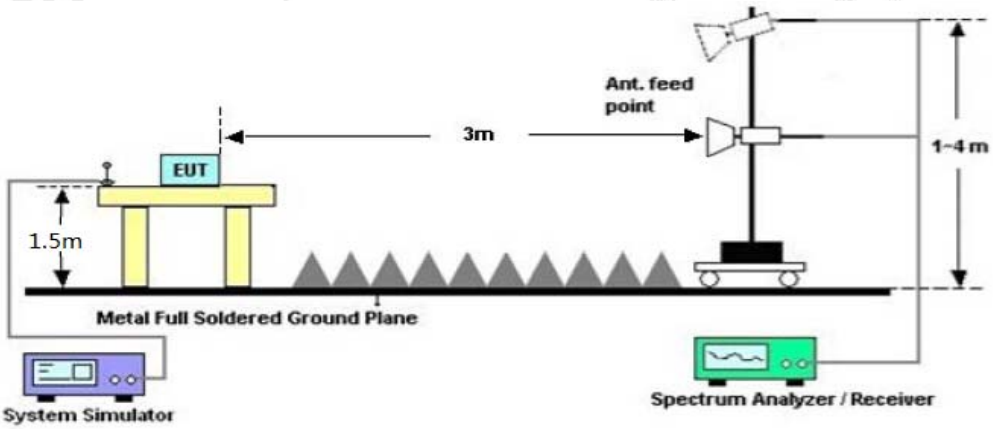
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



11.3. LIMITS AND MEASUREMENT RESULT

15.209(a) Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (micorvolts/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

Note: All modes were tested For restricted band radiated emission,
the test records reported below are the worst result compared to other modes.

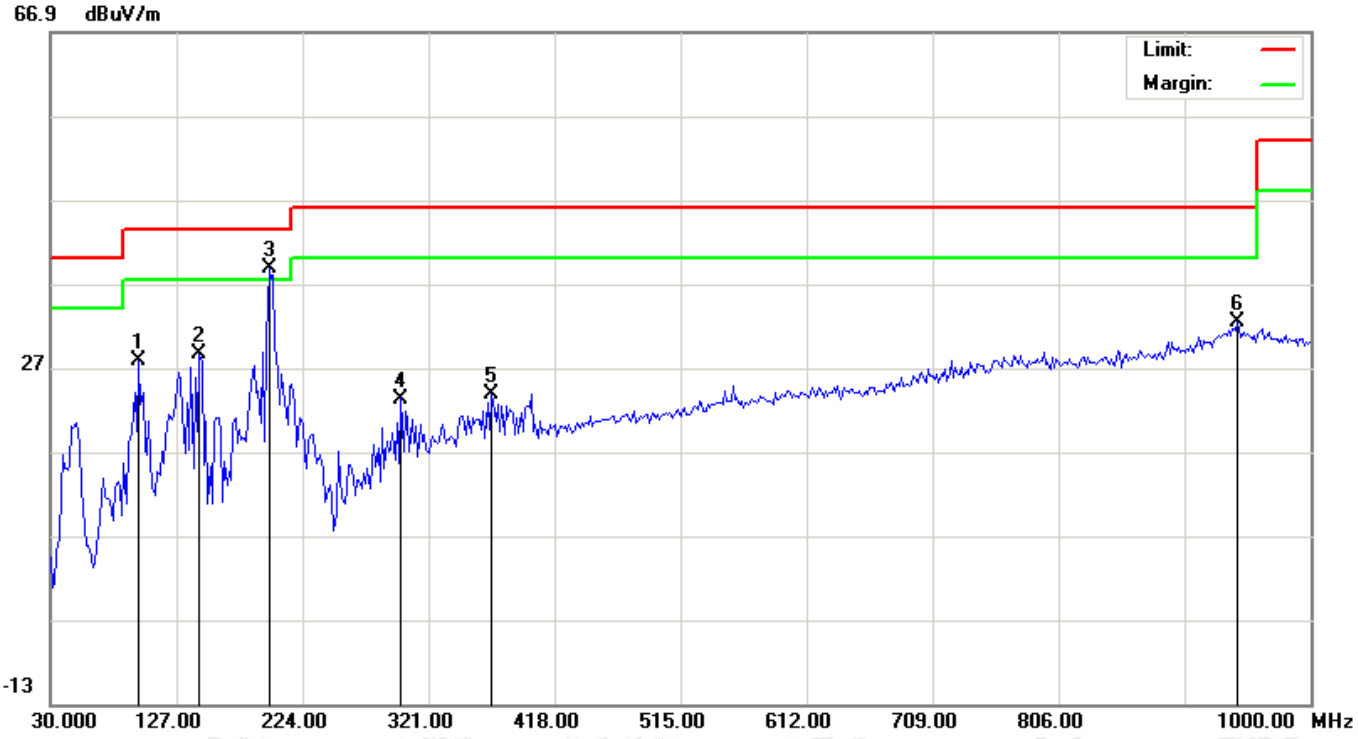
11.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW 1GHZ

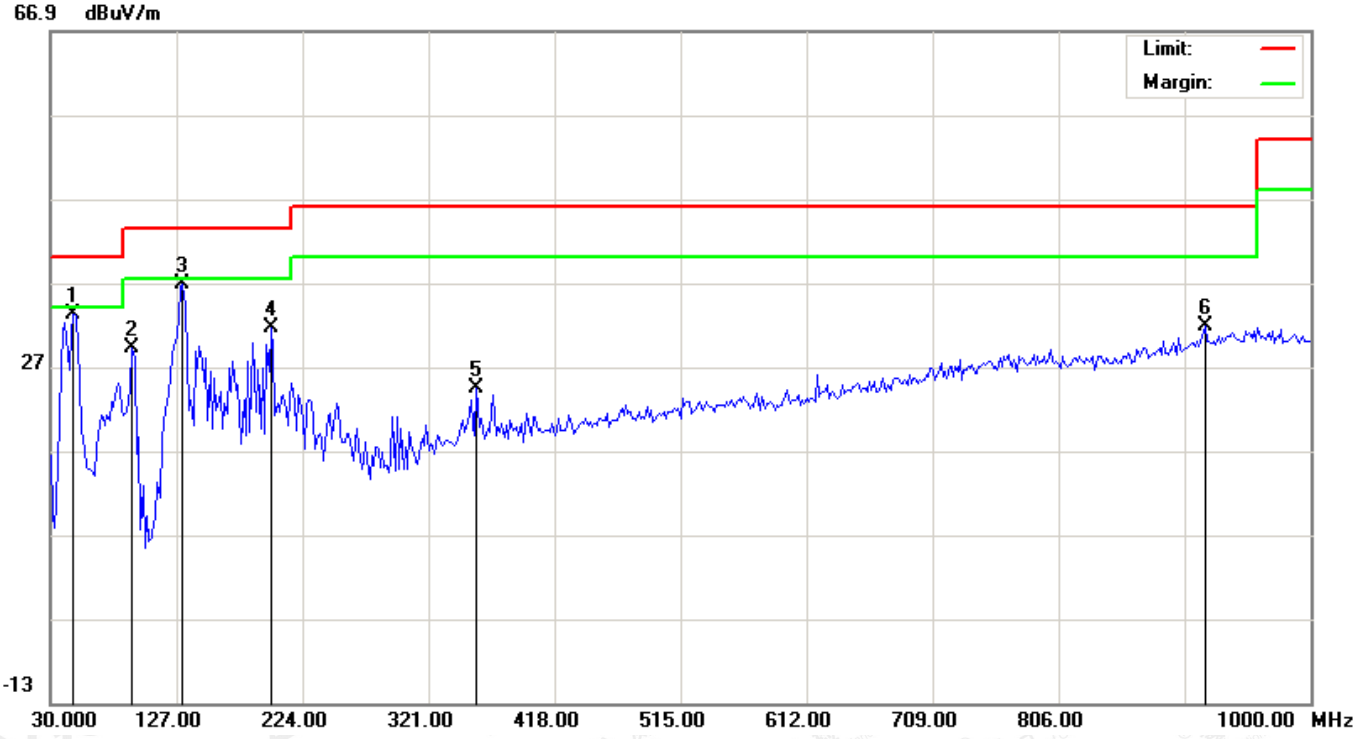
RADIATED EMISSION TEST- (30MHZ-1GHZ) -HORIZONTAL



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		97.9000	19.42	8.38	27.80	43.50	-15.70	peak			
2		144.7833	14.58	14.04	28.62	43.50	-14.88	peak			
3	*	198.1333	26.81	11.91	38.72	43.50	-4.78	peak			
4		299.9833	7.89	15.41	23.30	46.00	-22.70	peak			
5		369.5000	4.98	18.87	23.85	46.00	-22.15	peak			
6		943.4167	2.50	29.82	32.32	46.00	-13.68	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHZ-1GHZ) -VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		47.7833	24.77	8.39	33.16	40.00	-6.84	peak			
2		93.0500	26.43	2.79	29.22	43.50	-14.28	peak			
3	*	131.8500	25.06	11.80	36.86	43.50	-6.64	peak			
4		199.7500	22.60	9.06	31.66	43.50	-11.84	peak			
5		358.1833	5.59	18.79	24.38	46.00	-21.62	peak			
6		919.1667	2.58	29.14	31.72	46.00	-14.28	peak			

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin= Result -Limit.

2. The “Factor” value can be calculated automatically by software of measurement system.

3. All test modes had been pre-tested. The 802.11b at low channel is the worst case and recorded in the report.

RADIATED EMISSION ABOVE 1GHZ

Frequency (MHz)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
TX 11b 2412MHz					
4824	50.01	74	-23.99	Pk	Horizontal
4824	35.51	54	-18.49	AV	Horizontal
7236	49.86	74	-24.14	pk	Horizontal
7236	34.83	54	-19.17	AV	Horizontal
4824	50.33	74	-23.67	Pk	Vertical
4824	34.53	54	-19.47	AV	Vertical
7236	50.06	74	-23.94	Pk	Vertical
7236	39.46	54	-14.54	AV	Vertical
TX 11b 2437MHz					
4874	48.77	74	-25.23	Pk	Horizontal
4874	32.44	54	-21.56	AV	Horizontal
7311	45.63	74	-28.37	Pk	Horizontal
7311	35.29	54	-18.71	AV	Horizontal
4874	49.95	74	-24.05	Pk	Vertical
4874	39.97	54	-14.03	AV	Vertical
7311	48.47	74	-25.53	Pk	Vertical
7311	38.77	54	-15.23	AV	Vertical
TX 11b 2462MHz					
4924	50.49	74	-23.51	Pk	Horizontal
4924	34.84	54	-19.16	AV	Horizontal
7386	48.22	74	-25.78	Pk	Horizontal
7386	39.01	54	-14.99	AV	Horizontal
4924	51.03	74	-22.97	Pk	Vertical
4924	38.00	54	-16.00	AV	Vertical
7386	49.38	74	-24.62	Pk	Vertical
7386	37.78	54	-16.22	AV	Vertical

RESULT: PASS

Note:

1. Margin = Emission Leve - Limit

2.1GHz-25GHz(All test modes had been pre-tested. The 802.11b mode is the worst case and recorded in the report. No recording in the test report at least have 20dB margin).

12. BAND EDGE EMISSION

12.1. MEASUREMENT PROCEDURE

1)Radiated restricted band edge measurements

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting

2)Conducted Emissions at the bang edge

a)The transmitter output was connected to the spectrum analyzer

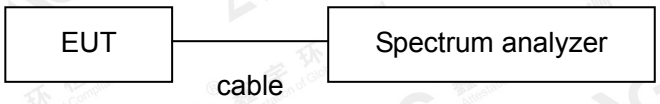
b)Set RBW=100kHz,VBW=300kHz

c)Suitable frequency span including 100kHz bandwidth from band edge

12.2. TEST SET-UP

Radiated same as 11.2

Conducted set up



12.3. RADIATED TEST RESULT

Frequency (MHz)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
TX 11b 2412MHz					
2399.9	47.85	74	-26.15	pk	Horizontal
2399.9	41.37	54	-12.63	AV	Horizontal
2400	49.68	74	-24.32	pk	Horizontal
2400	35.44	54	-18.56	AV	Horizontal
2399.9	53.42	74	-20.58	pk	Vertical
2399.9	38.41	54	-15.59	AV	Vertical
2400	49.23	74	-24.77	pk	Vertical
2400	38.68	54	-15.32	AV	Vertical
TX 11b 2462MHz					
2483.5	47.74	74	-26.26	pk	Horizontal
2483.5	38.86	54	-15.14	AV	Horizontal
2483.6	48.34	74	-25.66	pk	Horizontal
2483.6	39.34	54	-14.66	AV	Horizontal
2483.5	48.88	74	-25.12	pk	Vertical
2483.5	34.87	54	-19.13	AV	Vertical
2483.6	53.05	74	-20.95	pk	Vertical
2483.6	39.77	54	-14.23	AV	Vertical

RESULT: PASS

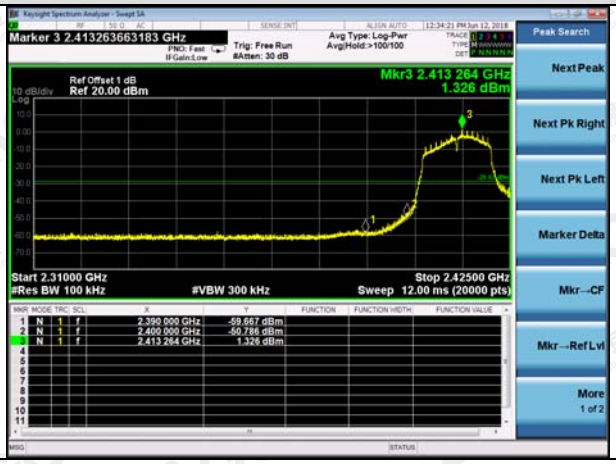
Note: Scan with 11b,11g,11n, the worst case is 11b Mode

Margin= Emission Level -Limit.

12.4. CONDUCTED TEST RESULT

Test Graph

11b-LCH	11b-HCH
	

11g-LCH	11g-HCH
	

11N20-LCH	11N20-HCH
	

11N40-LCH	11N40-HCH
	

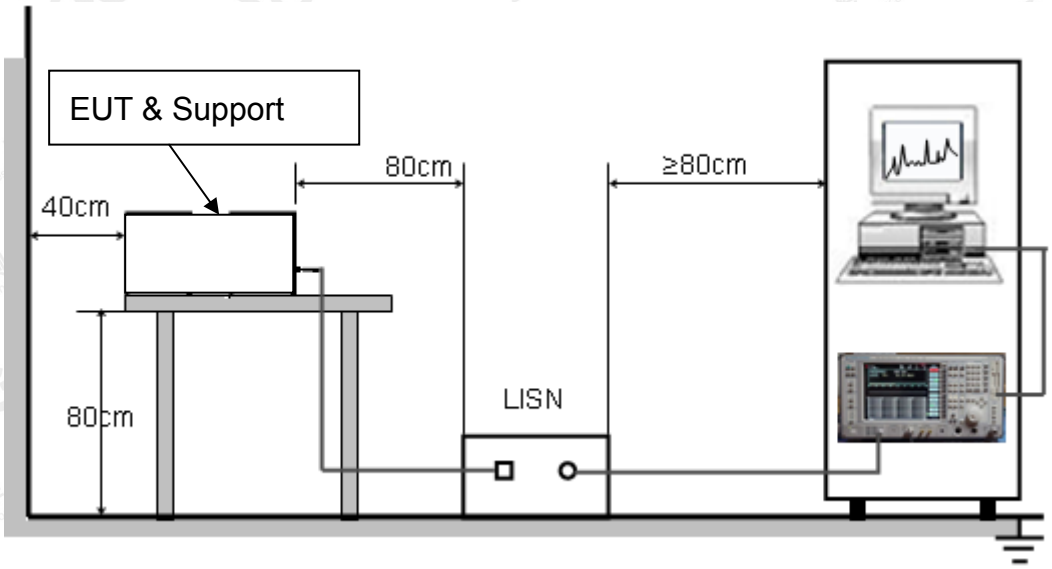
13. FCC LINE CONDUCTED EMISSION TEST

13.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:
1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

13.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



13.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received charging voltage by adapter which received 120V/60Hzpower by a LISN..
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

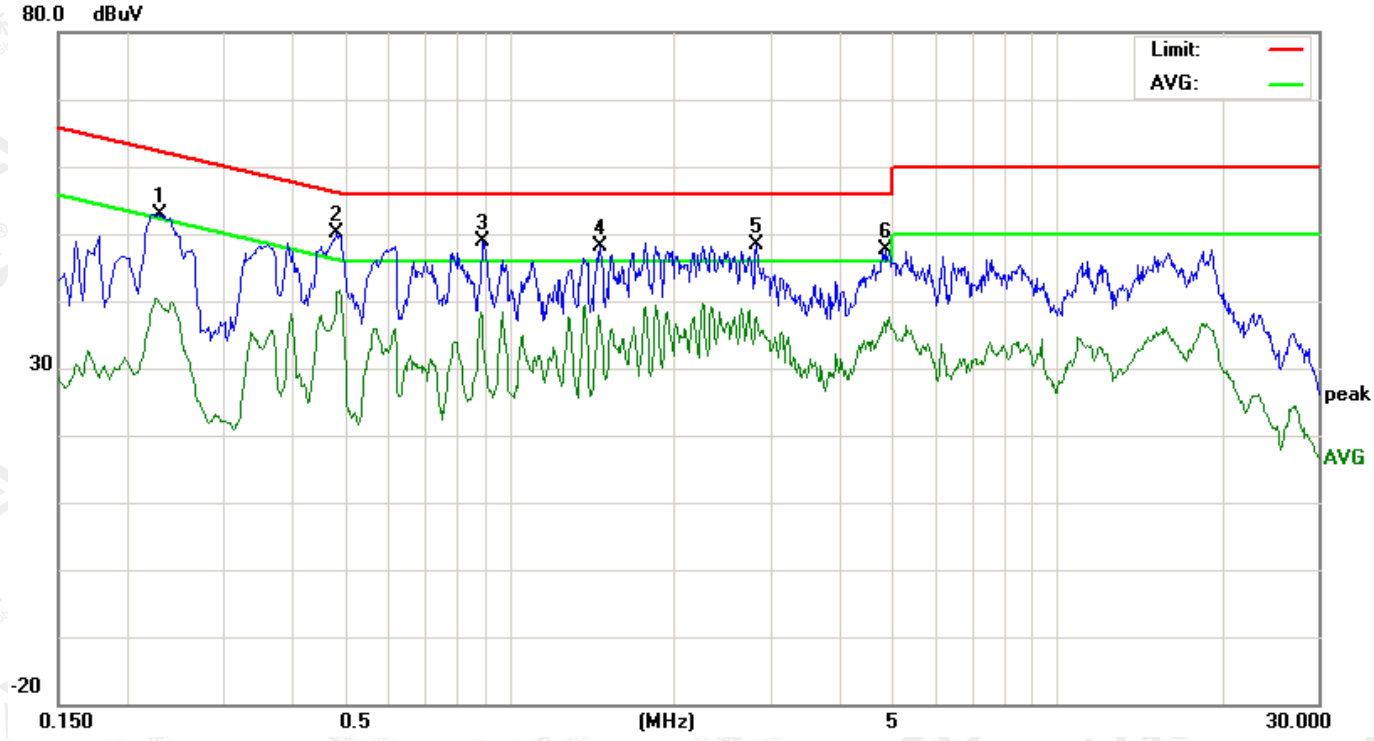
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

13.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

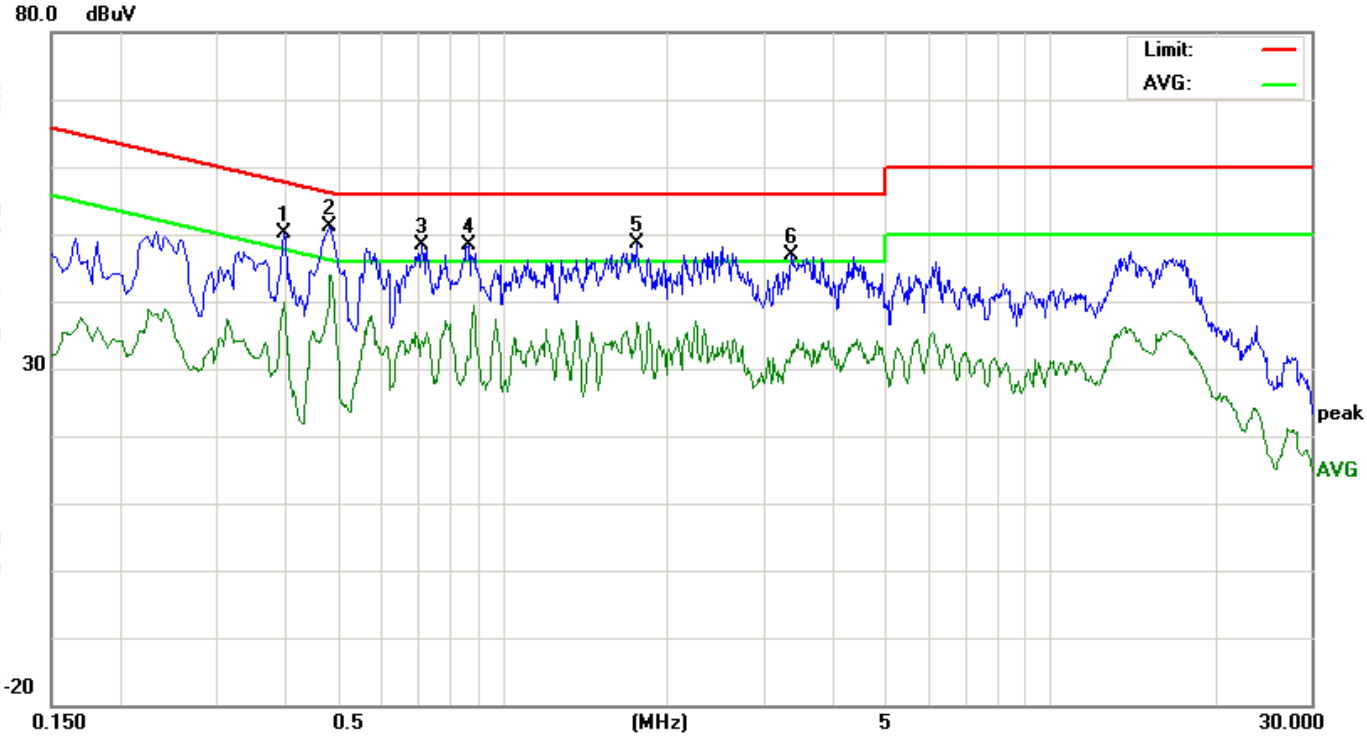
13.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

LINE CONDUCTED EMISSION TEST LINE 1-L



No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.2300	42.63		29.48	10.25	52.88		39.73	62.45	52.45	-9.57	-12.72	P	
2	0.4858	39.69		30.90	10.39	50.08		41.29	56.24	46.24	-6.16	-4.95	P	
3	0.8900	38.47		27.55	10.40	48.87		37.95	56.00	46.00	-7.13	-8.05	P	
4	1.4658	37.65		26.61	10.38	48.03		36.99	56.00	46.00	-7.97	-9.01	P	
5	2.8260	37.75		27.17	10.51	48.26		37.68	56.00	46.00	-7.74	-8.32	P	
6	4.8498	37.35		26.40	10.23	47.58		36.63	56.00	46.00	-8.42	-9.37	P	

Line Conducted Emission Test Line 2-N

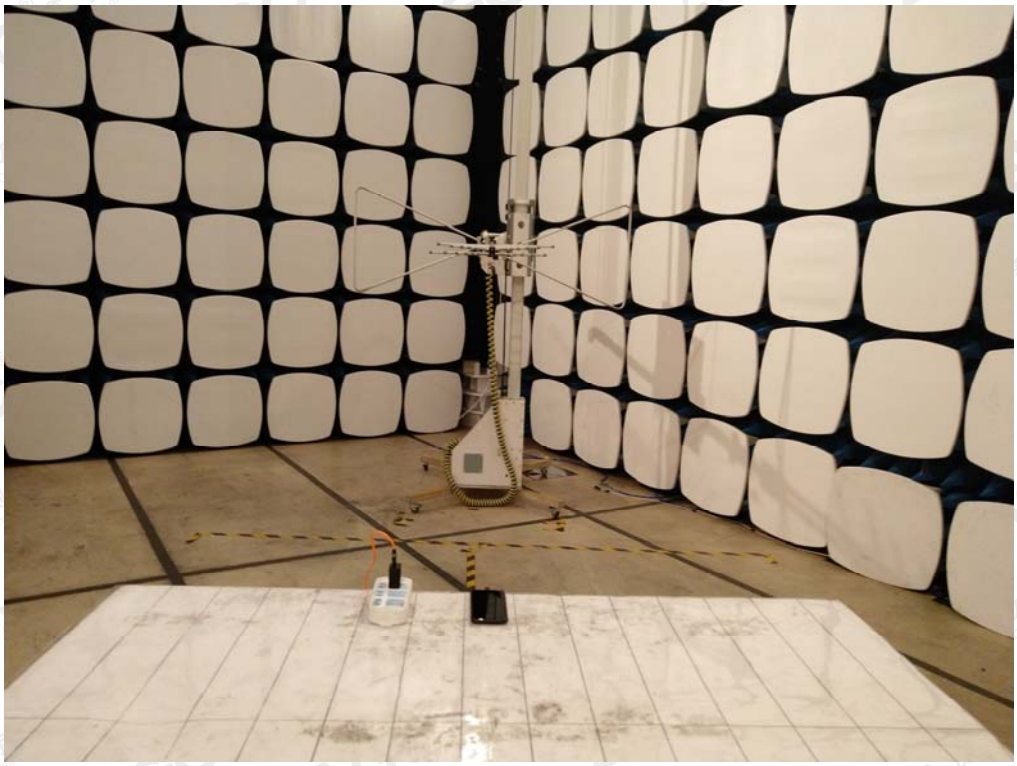


No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.3996	39.72		28.80	10.33	50.05		39.13	57.86	47.86	-7.81	-8.73	P	
2	0.4858	40.82		33.55	10.39	51.21		43.94	56.24	46.24	-5.03	-2.30	P	
3	0.7137	37.98		23.81	10.34	48.32		34.15	56.00	46.00	-7.68	-11.85	P	
4	0.8699	38.02		21.03	10.37	48.39		31.40	56.00	46.00	-7.61	-14.60	P	
5	1.7620	38.27		25.35	10.30	48.57		35.65	56.00	46.00	-7.43	-10.35	P	
6	3.3780	36.28		22.21	10.52	46.80		32.73	56.00	46.00	-9.20	-13.27	P	

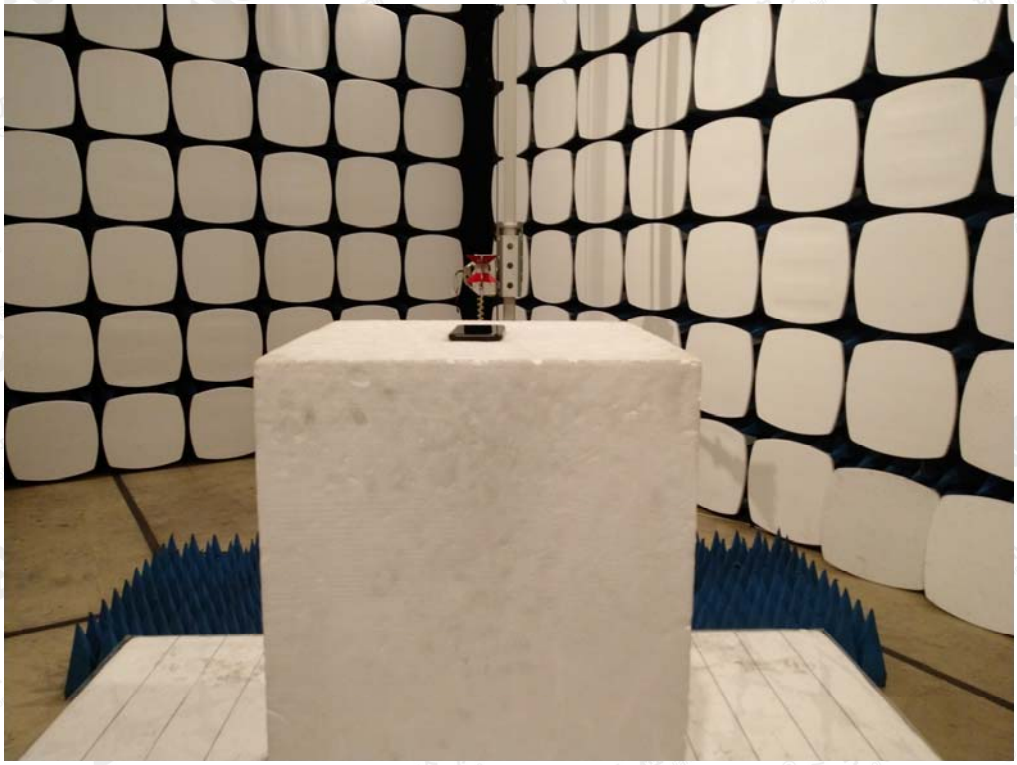
APPENDIX A: PHOTOGRAPHS OF TEST SETUP

LINE CONDUCTED EMISSION TEST SETUP

RADIATED EMISSION TEST SETUP



RADIATED EMISSION ABOVE 1G TEST SETUP



----END OF REPORT----