FCC TEST REPORT

Test report

On Behalf of

Cellacom Technologies Company Limited

For

MOBILE PHONE

Model No.: W20, W20a, W20b

FCC ID: 2AQ6D-W20

Prepared for :	**Cellacom Technologies Company Limited** **RM. 05-15, 13A/F, SOUT TOWER, WORLD FINANCE CENTER** **Harbour City, 17 Canton Road, Tsim Sha Tsui, Kowloon, Hongkong**
Prepared By :	**Shenzhen HUAK Testing Technology Co., Ltd.** **1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China**
Date of Test:	**Sep. 04, 2018~Sep. 28, 2018**
Date of Report:	**Sep. 28, 2018**
Report Number:	**HK1809111019E**

TEST RESULT CERTIFICATION

Applicant's name ..... :	Cellacom Technologies Company Limited
Address ..... :	RM. 05-15, 13A/F, SOUT TOWER, WORLD FINANCE CENTER Harbour City, 17 Canton Road, Tsim Sha Tsui, Kowloon, Hongkong
Manufacture's Name ..... :	Cellacom Technologies Company Limited
Address ..... :	RM. 05-15, 13A/F, SOUT TOWER, WORLD FINANCE CENTER Harbour City, 17 Canton Road, Tsim Sha Tsui, Kowloon, Hongkong
Product description	MOBILE PHONE
Brand Name	Cellacom
Mode Name	W20,W20a,W20b
Difference Description	All the same except for model name.
Standards ..... :	FCC Rules and Regulations Part 15 Subpart C Section 15.247 KDB 558074 D01 15.247 Meas Guidance v05

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Date of Test.....:	
Date (s) of performance of tests.....:	**Sep. 04, 2018~Sep. 28, 2018**
Date of Issue.....:	**Oct. 08, 2018**
Test Result.....:	**Pass**

Testing Engineer : Gary Qian

(Gary Qian)

Technical Manager : Eden Hu

(Eden Hu)

Authorized Signatory : Jason Zhou

(Jason Zhou)

Revision	Issue Date	Revisions	Revised By
V1.0	Sep. 28, 2018	Initial Issue	Jason Zhou
V1.1	Oct. 08, 2018	Revise Report	Jason Zhou

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1. GENERAL INFORMATION

1.1. 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:**11.86**dBm, IEEE 802.11g:**9.77**dBm; IEEE 802.11n(20):**9.72**dBm
Modulation	DSSS(DBPSK/DQPSK/CCK);OFDM(BPSK/QPSK/16-QAM/64-QAM)
Number of channels	11 Channels (IEEE802.11b/g/n20)
Hardware Version	FS330-MB-V0.2C
Software Version	Cellacom_W20_V1.0_20180829
Antenna Designation	PIFA Antenna
Antenna Gain	1.0dBi
Power Supply	DC3.7V by Built-in Li-ion Battery

1.2. 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

1.3. 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

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

This submittal(s) (test report) is intended for **FCC ID: 2AQ6D-W20** filing to comply with the FCC Part 15 requirements.

1.5. 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.

1.6. SPECIAL ACCESSORIES

Refer to section 5.2.

1.7. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2. MEASUREMENT UNCERTAINTY

Test	Measurement Uncertainty	Notes
Transmitter power conducted	±0.57 dB	(1)
Transmitter power Radiated	±2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	±2.20 dB	(1)
Occupied Bandwidth	±0.01ppm	(1)
Radiated Emission 30~1000MHz	±4.10dB	(1)
Radiated Emission Above 1GHz	±4.32dB	(1)
Conducted Disturbance0.15~30MHz	±3.20dB	(1)

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3. 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)	

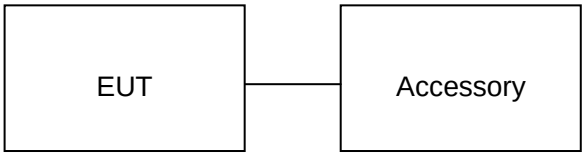
Note:

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.

4 SYSTEM TEST CONFIGURATION

4.1. CONFIGURATION OF EUT SYSTEM

Configure:



4.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	MOBILE PHONE	W20	2AQ6D-W20	EUT
2	Adapter	W20	DC 5.0V 500mA	Accessory
3	Battery	W20	DC3.7V/ 1000mAh	Accessory
4	USB	N/A	N/A	Accessory
5	Earphone	N/A	N/A	Accessory

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

4.3. 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

5. TEST FACILITY

Site	Shenzhen HUAK Testing Technology Co., Ltd.
Location	1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China
Designation Number	CN1229
Test Firm Registration Number : 616276	

ALL TEST EQUIPMENT LIST

RF Test Room				
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Power meter	Agilent	E4417B	HKE-107	Dec. 28, 2018
Power Sensor	Agilent	E9327A	HKE-113	Dec. 28, 2018
RF cable	Times	1-40G	HKE-034	Dec. 28, 2018
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 28, 2018
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2018
RF Cable (9KHz-26.5GHz)	Tonscend	170660	N/A	Dec. 28, 2018
Signal generator	Agilent	N5183A	HKE-071	Dec. 28, 2018
Receiver	R&S	ESCI-7	HKE-010	Dec. 28, 2018
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2018
Preamplifier	EMCI	EMC051845SE	HKE-015	Dec. 28, 2018
Preamplifier	Agilent	83051A	HKE-016	Dec. 28, 2018
Loop antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 28, 2018
Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	Dec. 28, 2018
Horn antenna	Schwarzbeck	9120D	HKE-013	Dec. 28, 2018
Antenna Mast	Keleto	CC-A-4M	N/A	N/A
Position controller	Taiwan MF	MF7802	HKE-011	Dec. 28, 2018
Radiated test software	Tonscend	TS+ Rev 2.5.0.0	HKE-082	N/A
RF cable (9KHz-1GHz)	Times	381806-001	N/A	N/A
RF cable	Times	1-40G	HKE-034	Dec. 28, 2018

6. OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

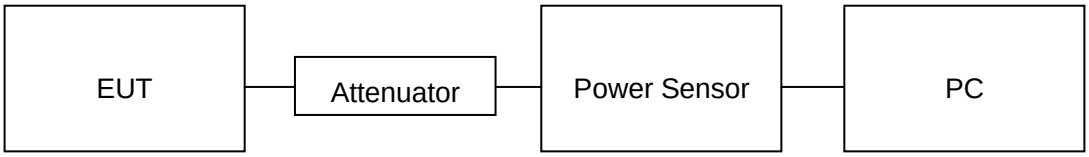
For max average conducted output power test:

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.

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

AVERAGE POWER SETUP



6.3. 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	11.10	30	Pass
2.437	11.32	30	Pass
2.462	**11.86**	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	7.23	30	Pass
2.437	9.29	30	Pass
2.462	**9.77**	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	7.21	30	Pass
2.437	9.30	30	Pass
2.462	**9.72**	30	Pass

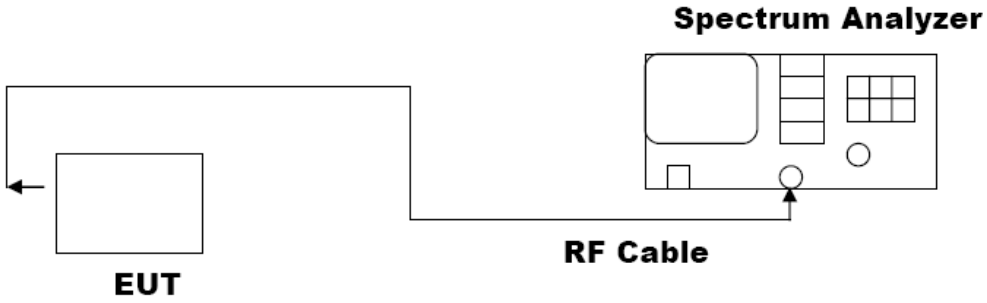
7. 6dB BANDWIDTH

7.1. 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.

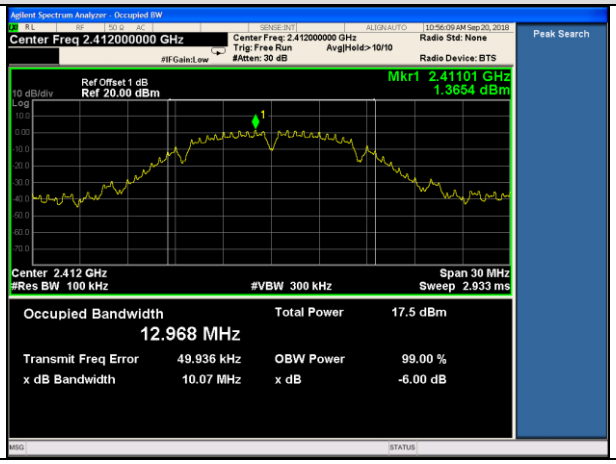
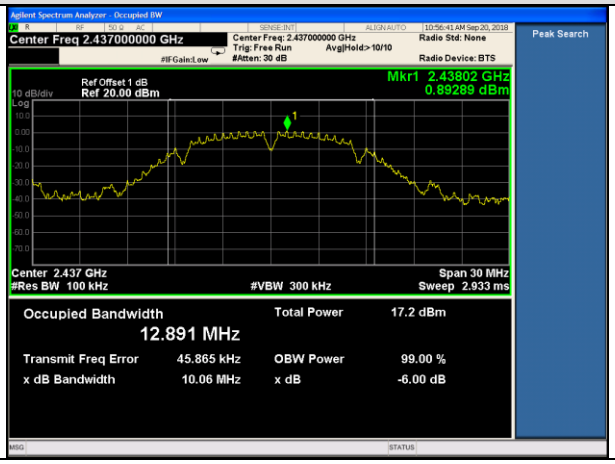
7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

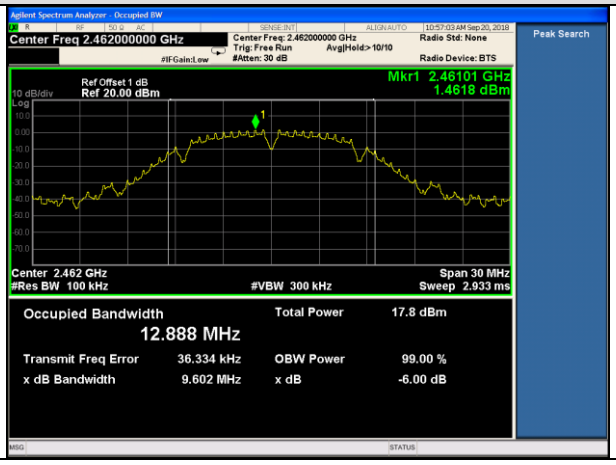
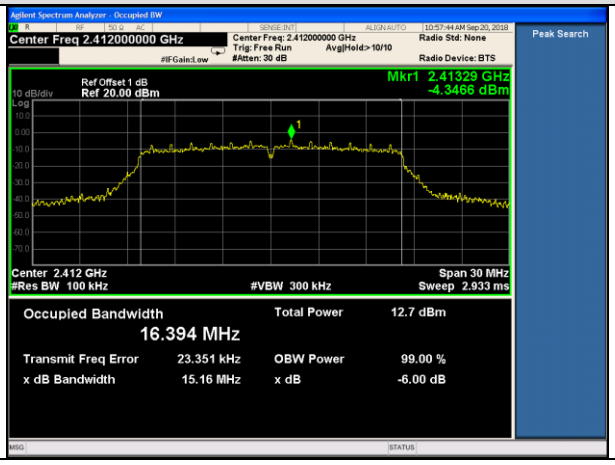


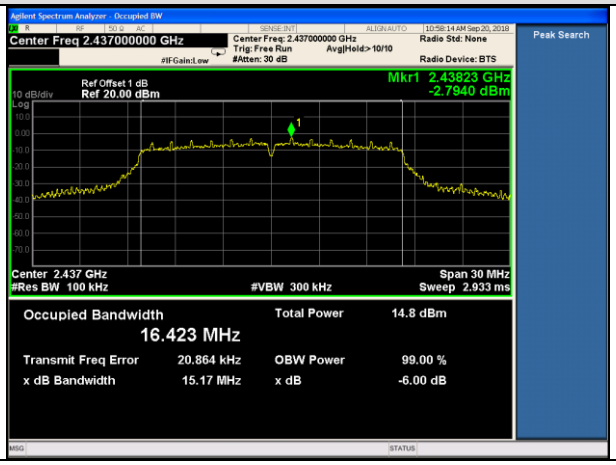
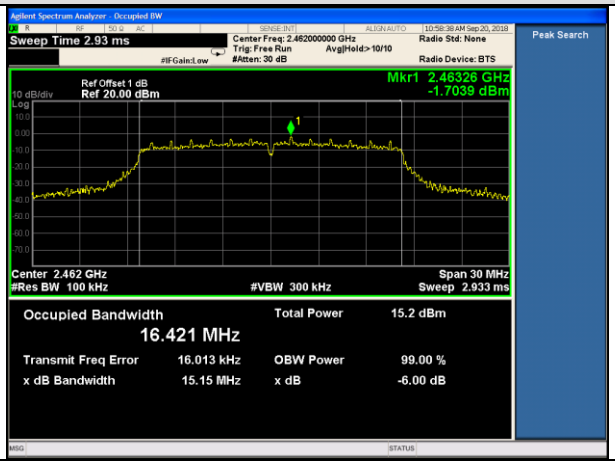
8.3. LIMITS AND MEASUREMENT RESULTS

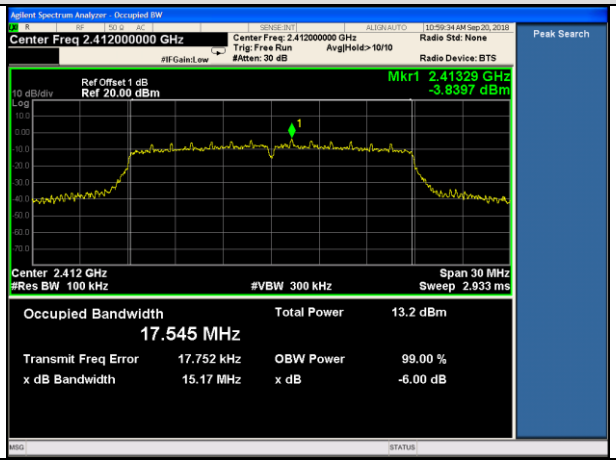
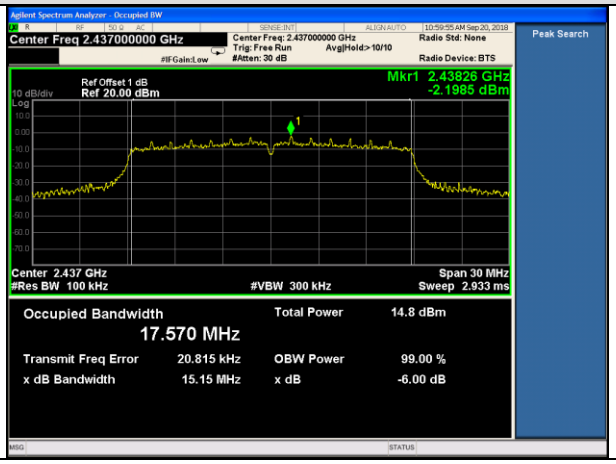
Mode	Channel	6dB Bandwidth [MHz]	Verdict
11b	LCH	10.07	PASS
	MCH	10.06	PASS
	HCH	9.602	PASS
11g	LCH	15.16	PASS
	MCH	15.17	PASS
	HCH	15.15	PASS
11nHT20	LCH	15.17	PASS
	MCH	15.15	PASS
	HCH	15.16	PASS

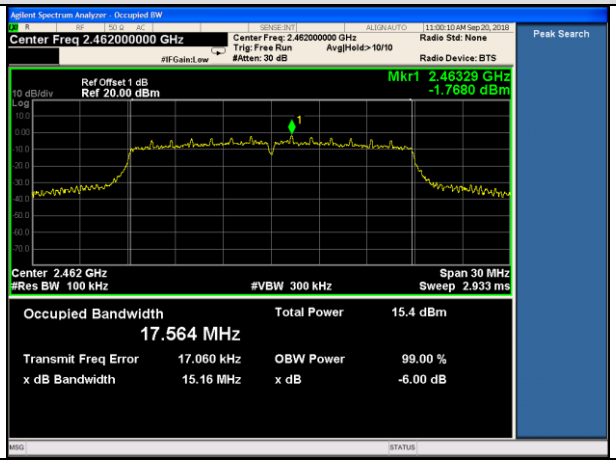
Test Graph

11b-LCH	11b-MCH
	

11b-HCH	11g-LCH
	

11g-MCH	11g-HCH
	

11nHT20-LCH	11nHT20-MCH
	

11nHT20-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.

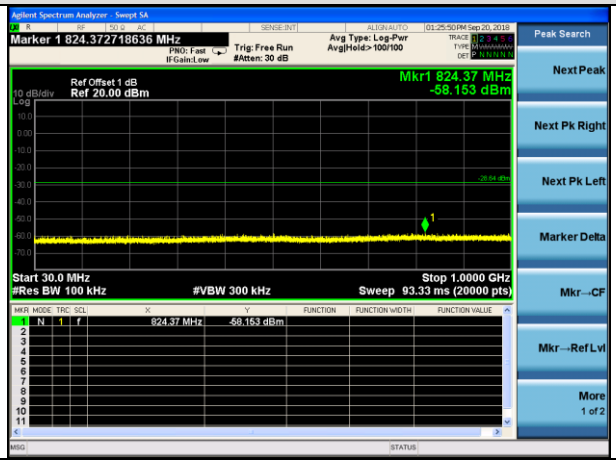
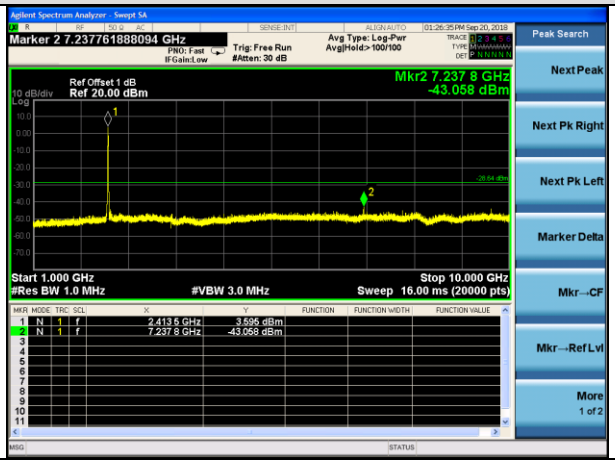
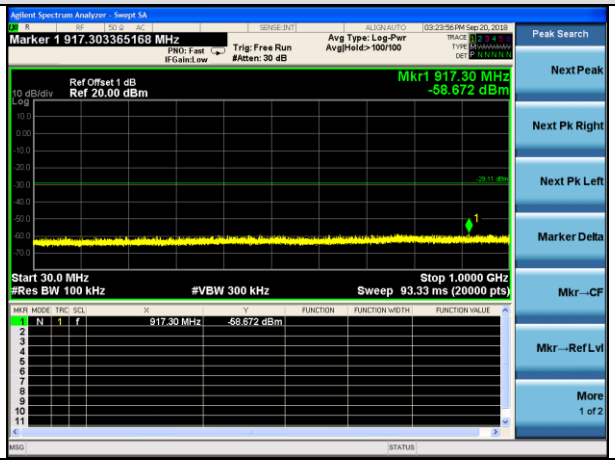
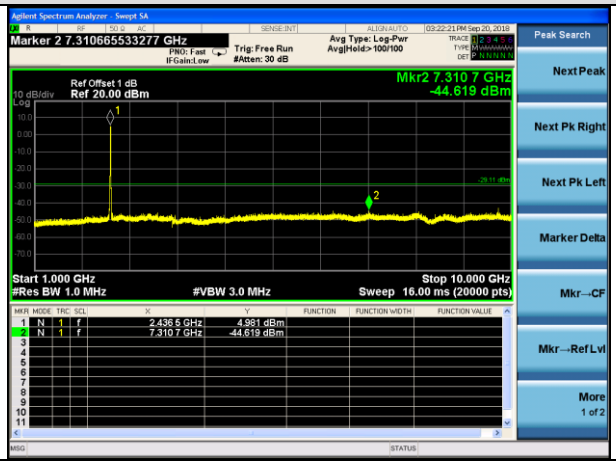
9.3. MEASUREMENT EQUIPMENT USED

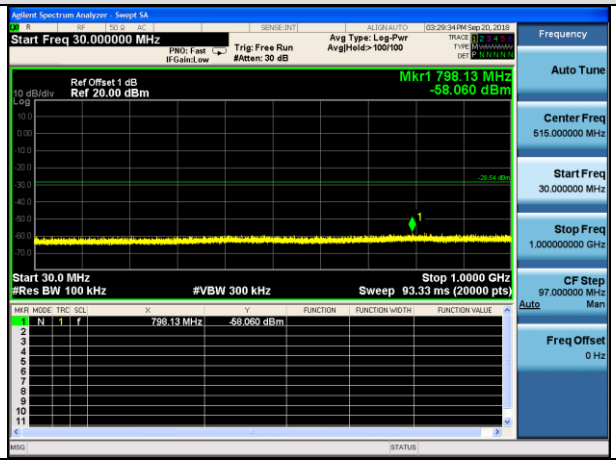
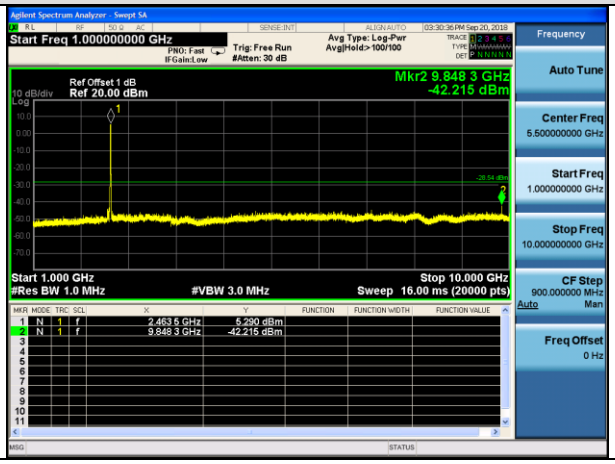
The same as described in section 6.

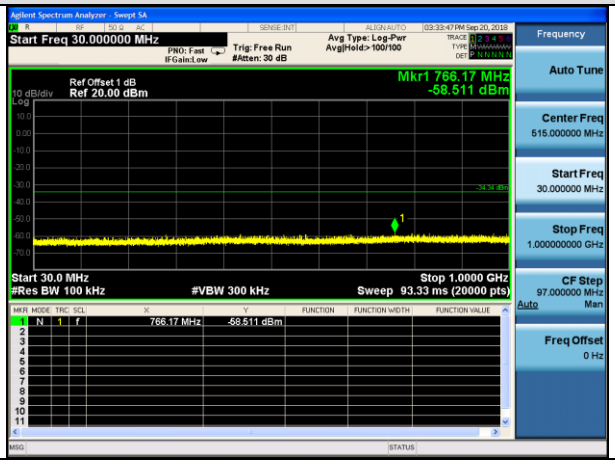
9.4. LIMITS AND MEASUREMENT RESULT

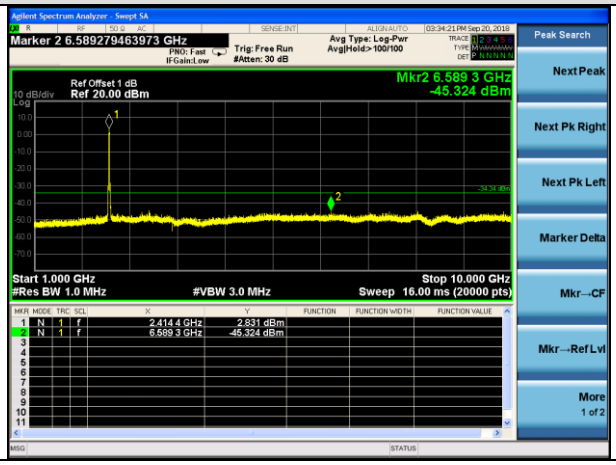
LIMITS AND MEASUREMENT RESULT		
Applicable Limits	**Measurement Result**	
	Test Data	**Criteria**
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 30 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))	Refer Test Graph	PASS

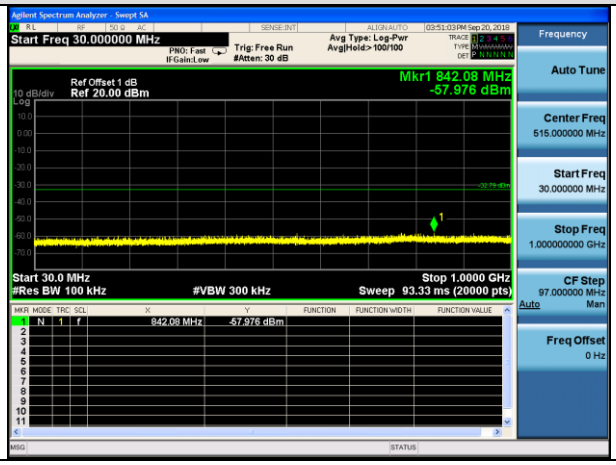
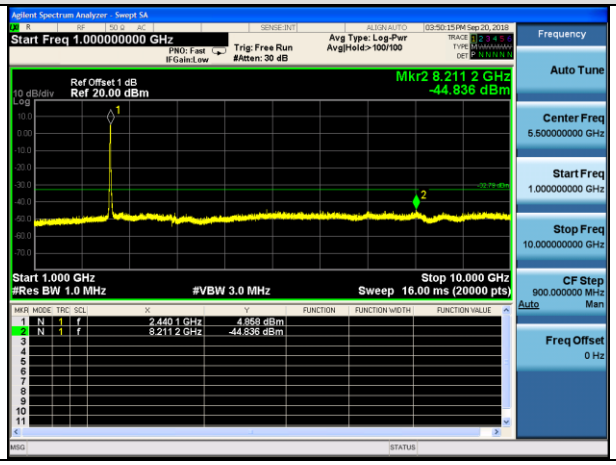
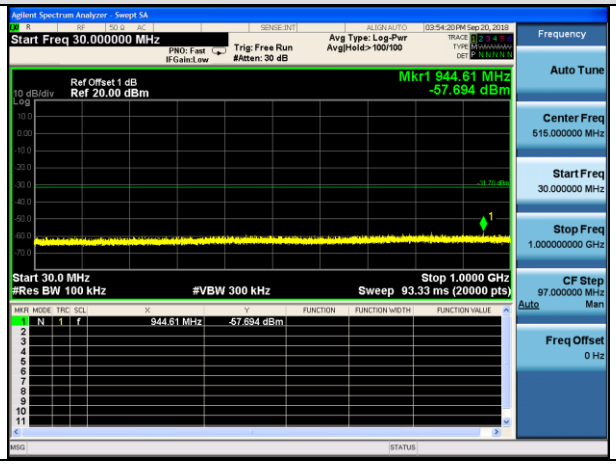
Test Graph

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
	
11G-MCH	11G-HCH
	
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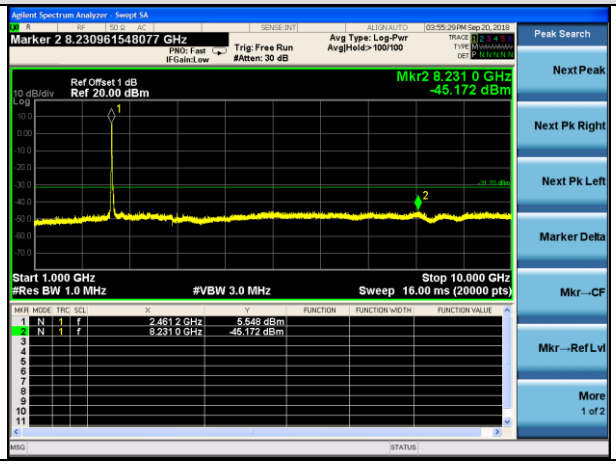
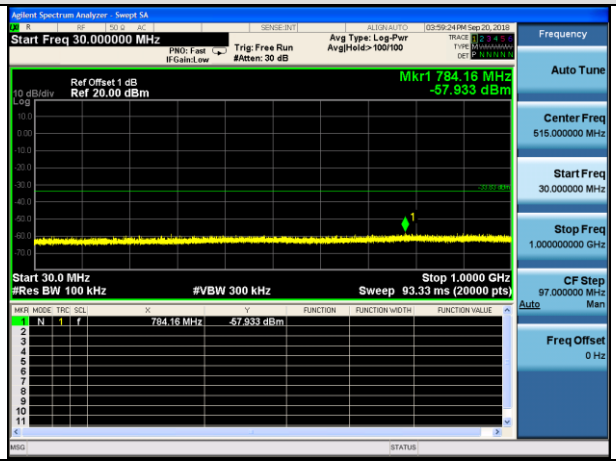
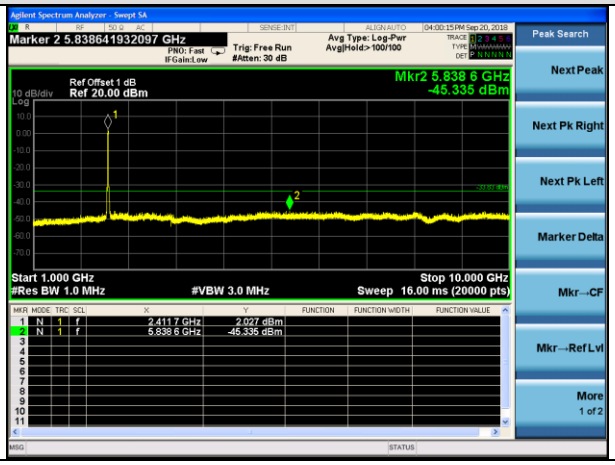
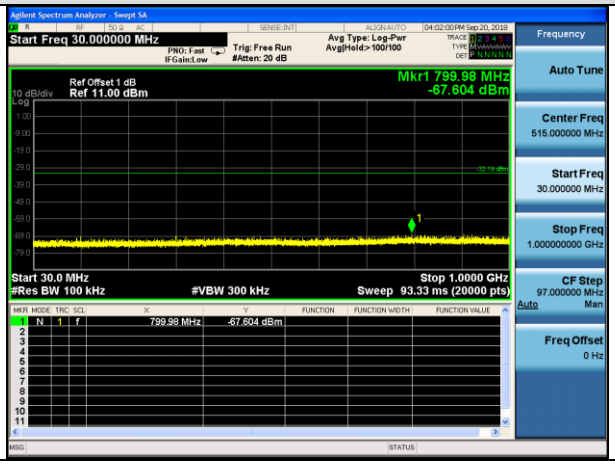
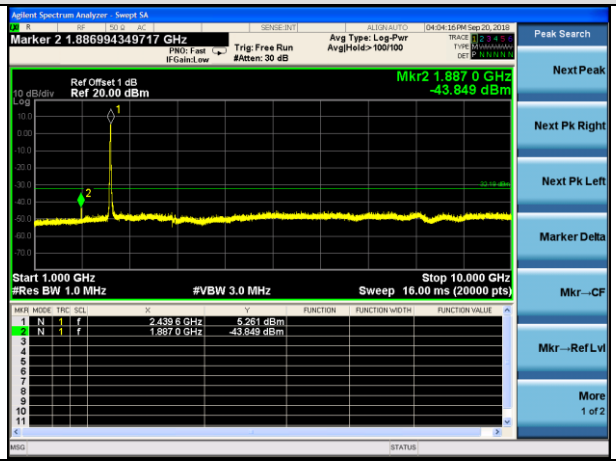
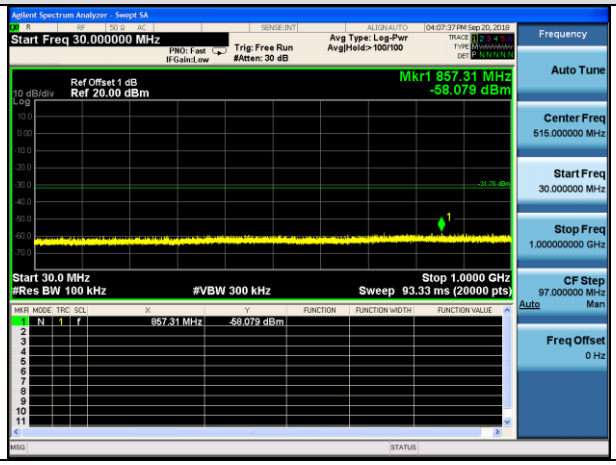
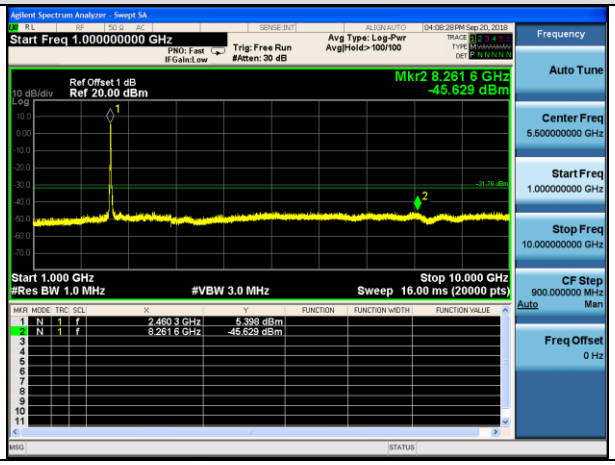
	

11nHT20-LCH	11nHT20-LCH
	
11nHT20-LCH	11nHT20-MCH
	
11nHT20-MCH	11nHT20-MCH
	

11nHT20-HCH	11nHT20-HCH
	

11nHT20-HCH	11nHT40-LCH

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-1 in the ANSI C63.10 (2013) item 11.10 was used in this testing.

10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer To Section 8.2.

10.3 MEASUREMENT EQUIPMENT USED

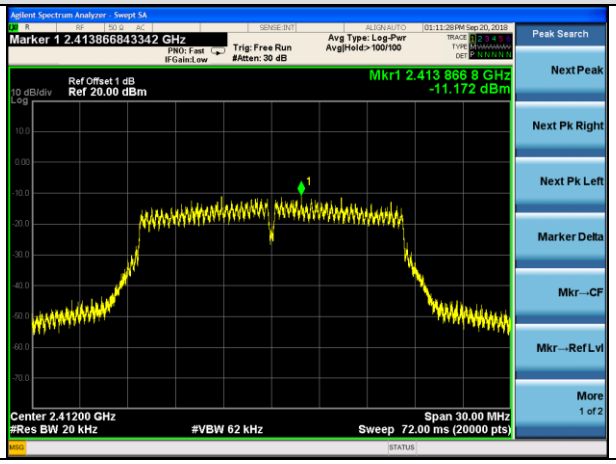
Refer To Section 6.

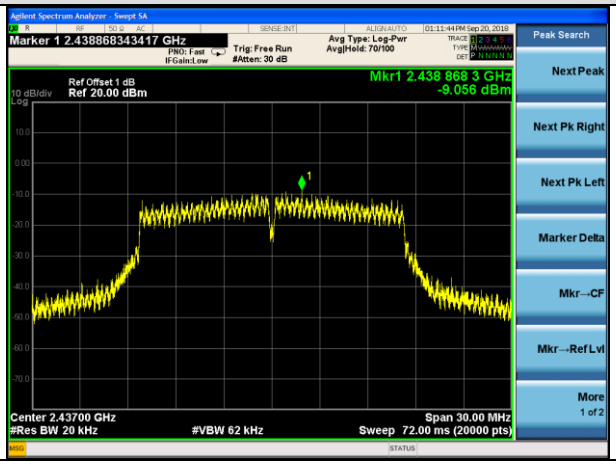
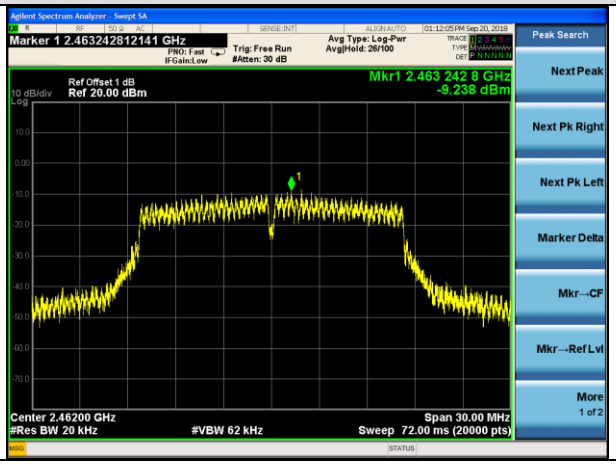
10.4 LIMITS AND MEASUREMENT RESULT

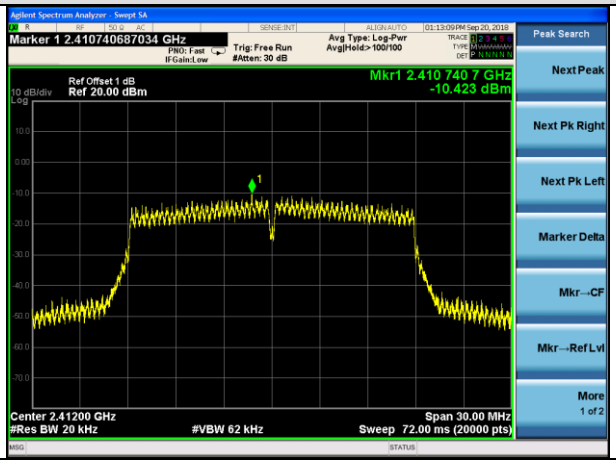
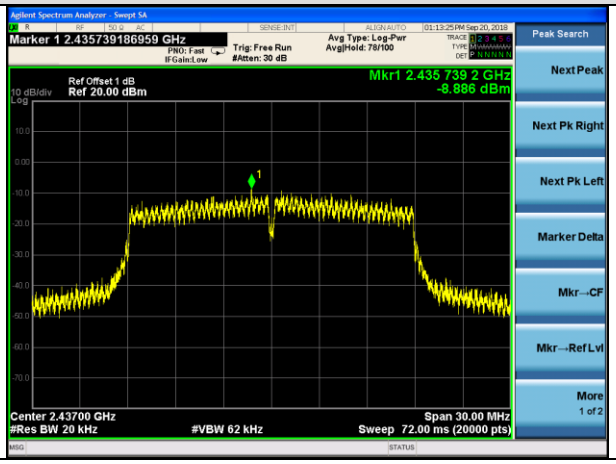
Mode	Channel	PSD [dBm/20kHz]	Limit[dBm/3kHz]	Verdict
11b	LCH	-4.983	8	PASS
	MCH	-8.973	8	PASS
	HCH	-8.217	8	PASS
11g	LCH	-11.172	8	PASS
	MCH	-9.056	8	PASS
	HCH	-9.238	8	PASS
11nHT20	LCH	-10.423	8	PASS
	MCH	-8.886	8	PASS
	HCH	-7.865	8	PASS

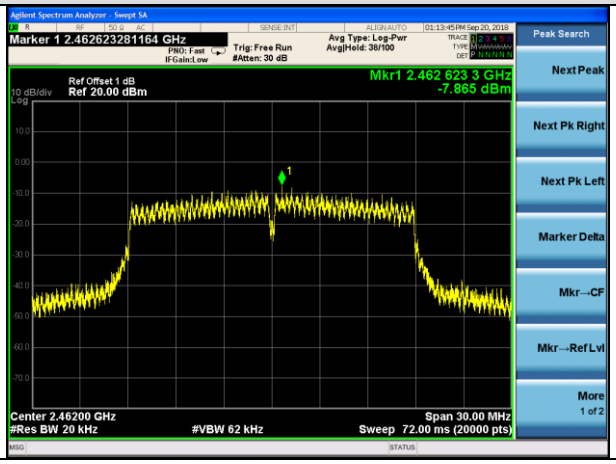
Test Graph

11b-LCH	11b-MCH

11b-HCH	11g-LCH
	

11g-MCH	11g-HCH
	

11nHT20-LCH	11nHT20-MCH
	

11nHT20-HCH	
	

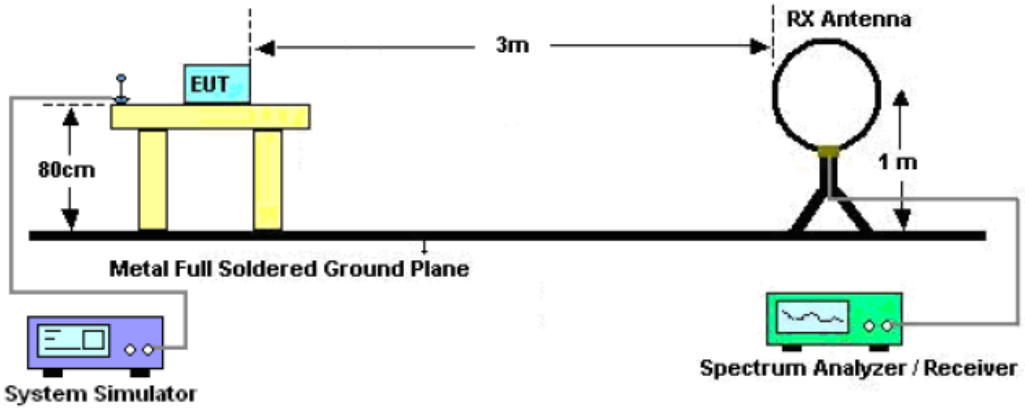
11. RADIATED EMISSION

11.1. MEASUREMENT PROCEDURE

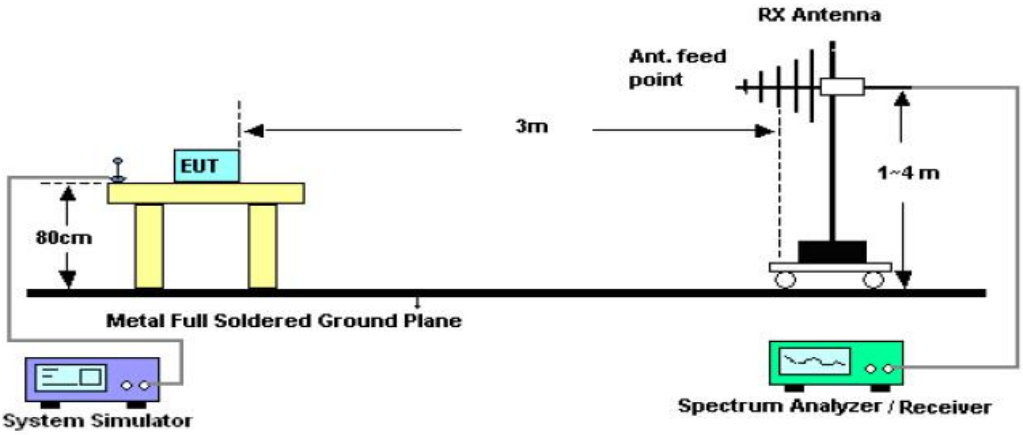
1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated 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

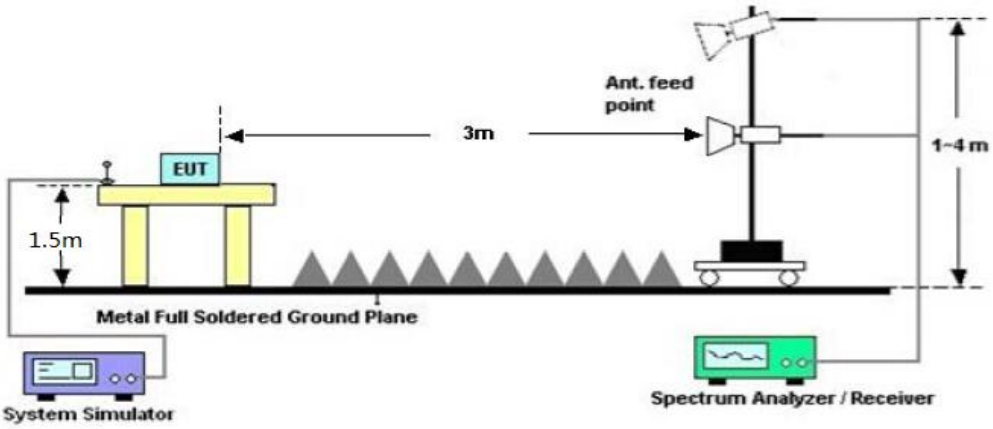
Radiated Emission Test-Setup Frequency Below 30MHz



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.

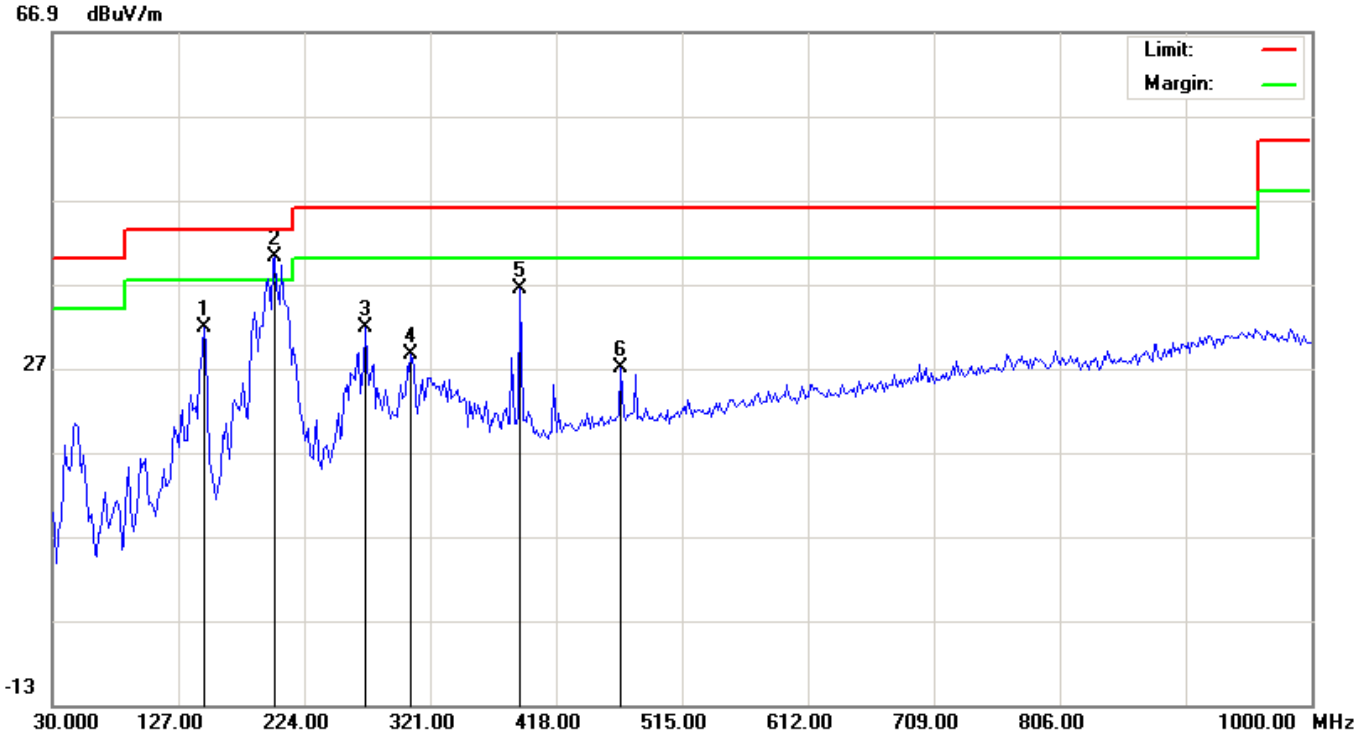
11.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

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

RADIATED EMISSION BELOW 1GHZ

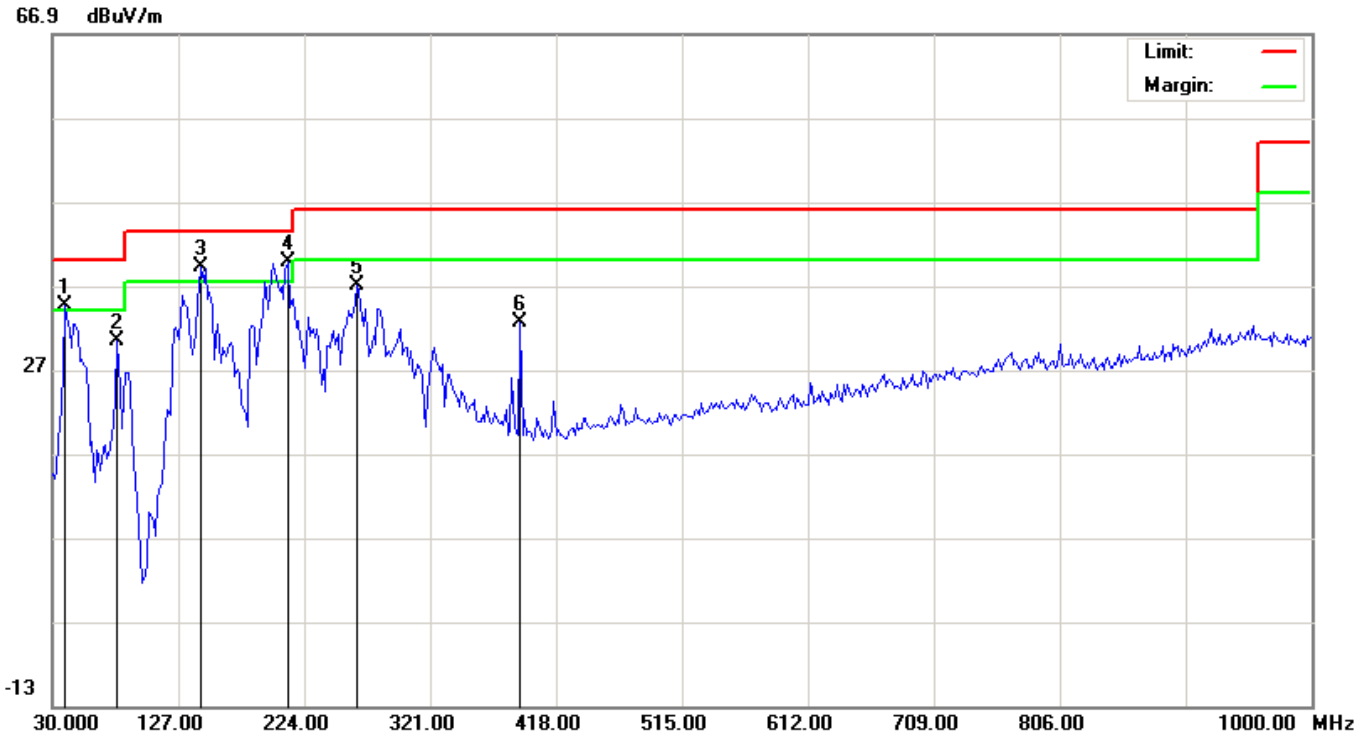
RADIATED EMISSION TEST- (30MHZ-1GHZ) -HORIZONTAL



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		146.4000	18.18	13.64	31.82	43.50	-11.68	peak			
2	*	201.3667	28.35	11.86	40.21	43.50	-3.29	peak			
3		270.8833	21.43	10.45	31.88	46.00	-14.12	peak			
4		306.4500	12.73	15.84	28.57	46.00	-17.43	peak			
5		390.5167	17.36	19.01	36.37	46.00	-9.63	peak			
6		468.1167	6.24	20.79	27.03	46.00	-18.97	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	!	39.7000	26.11	8.51	34.62	40.00	-5.38	peak			
2		80.1167	28.59	1.84	30.43	40.00	-9.57	peak			
3	!	144.7833	24.05	15.23	39.28	43.50	-4.22	peak			
4	*	211.0667	29.68	10.08	39.76	43.50	-3.74	peak			
5		264.4166	22.73	14.34	37.07	46.00	-8.93	peak			
6		390.5167	13.56	19.01	32.57	46.00	-13.43	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	38.62	74	-35.38	Pk	Horizontal
4824	40.24	54	-13.76	AV	Horizontal
7236	41.74	74	-32.26	pk	Horizontal
7236	42.52	54	-11.48	AV	Horizontal
4824	39.08	74	-34.92	Pk	Vertical
4824	39.98	54	-14.02	AV	Vertical
7236	52.01	74	-21.99	Pk	Vertical
7236	43.18	54	-10.82	AV	Vertical
TX 11b 2437MHz					
4874	38.51	74	-35.49	Pk	Horizontal
4874	40.31	54	-13.69	AV	Horizontal
7311	41.77	74	-32.23	Pk	Horizontal
7311	42.48	54	-11.52	AV	Horizontal
4874	38.88	74	-35.12	Pk	Vertical
4874	39.86	54	-14.14	AV	Vertical
7311	52.20	74	-21.80	Pk	Vertical
7311	43.22	54	-10.78	AV	Vertical
TX 11b 2462MHz					
4924	38.63	74	-35.37	Pk	Horizontal
4924	40.55	54	-13.45	AV	Horizontal
7386	41.68	74	-32.32	Pk	Horizontal
7386	42.53	54	-11.47	AV	Horizontal
4924	38.77	74	-35.23	Pk	Vertical
4924	40.26	54	-13.74	AV	Vertical
7386	52.36	74	-21.64	Pk	Vertical
7386	43.22	54	-10.78	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

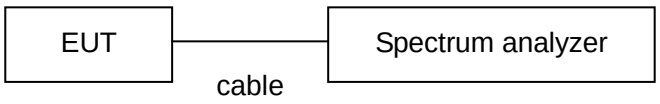
b)Set RBW=100kHz,VBW=300kHz

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	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBμV/m)	(dBμV/m)	(dB)	Type	
TX 11b 2412MHz					
2399.9	38.73	74	-35.27	pk	Horizontal
2399.9	40.68	54	-13.32	AV	Horizontal
2400	41.70	74	-32.30	pk	Horizontal
2400	42.65	54	-11.35	AV	Horizontal
2399.9	39.01	74	-34.99	pk	Vertical
2399.9	40.26	54	-13.74	AV	Vertical
2400	52.12	74	-21.88	pk	Vertical
2400	43.14	54	-10.86	AV	Vertical
TX 11b 2462MHz					
2483.5	38.58	74	-35.42	pk	Horizontal
2483.5	40.67	54	-13.33	AV	Horizontal
2483.6	41.36	74	-32.64	pk	Horizontal
2483.6	42.61	54	-11.39	AV	Horizontal
2483.5	38.96	74	-35.04	pk	Vertical
2483.5	40.27	54	-13.73	AV	Vertical
2483.6	52.00	74	-22.00	pk	Vertical
2483.6	43.07	54	-10.93	AV	Vertical

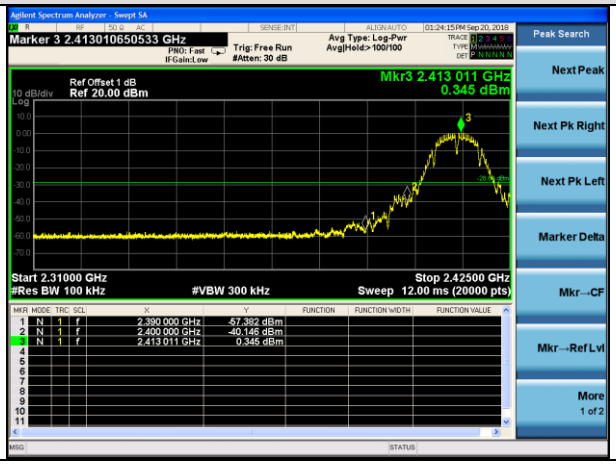
RESULT: PASS

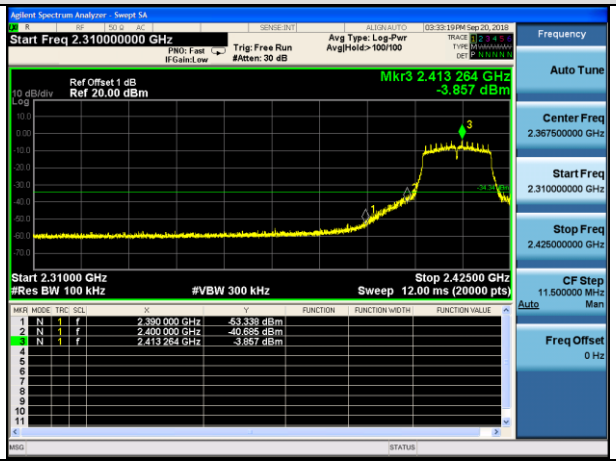
Note: Scan with 11b,11g,11n, the worst case is 11b Mode

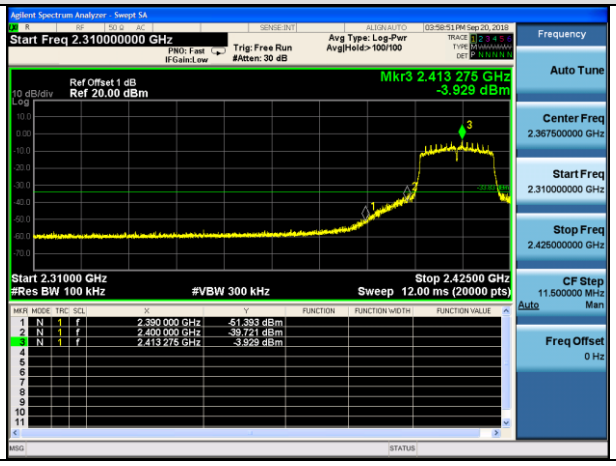
Margin= Emission Level -Limit.

12.4. CONDUCTED TEST RESULT

Test Graph

11b-LCH	11b-HCH
	

11g-LCH	11g-HCH
	

11nHT20-LCH	11nHT20-HCH
	

13. FCC LINE CONDUCTED EMISSION TEST

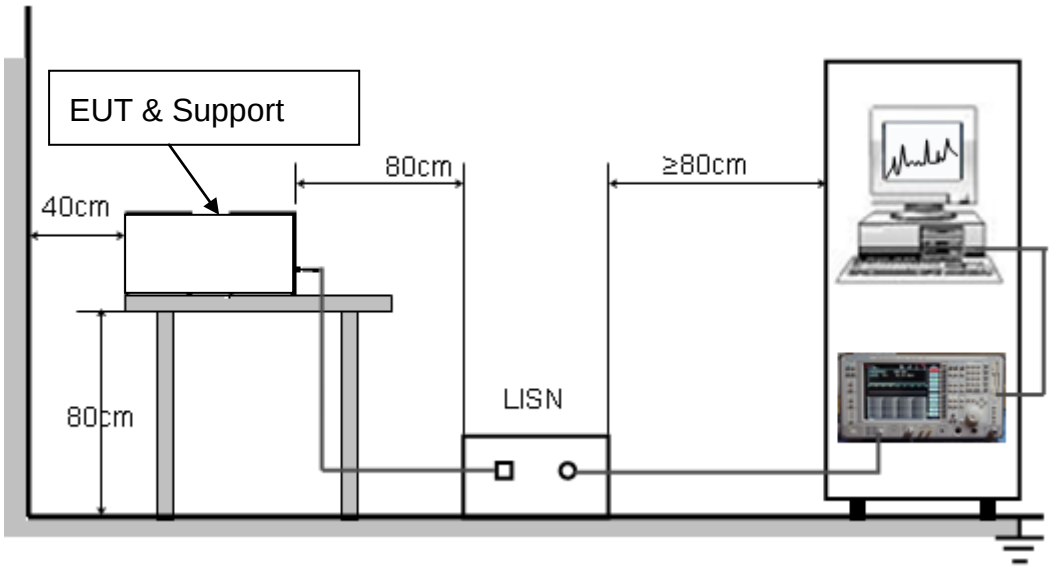
13.1. LIMITS OF LINE CONDUCTED EMISSION TEST

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.

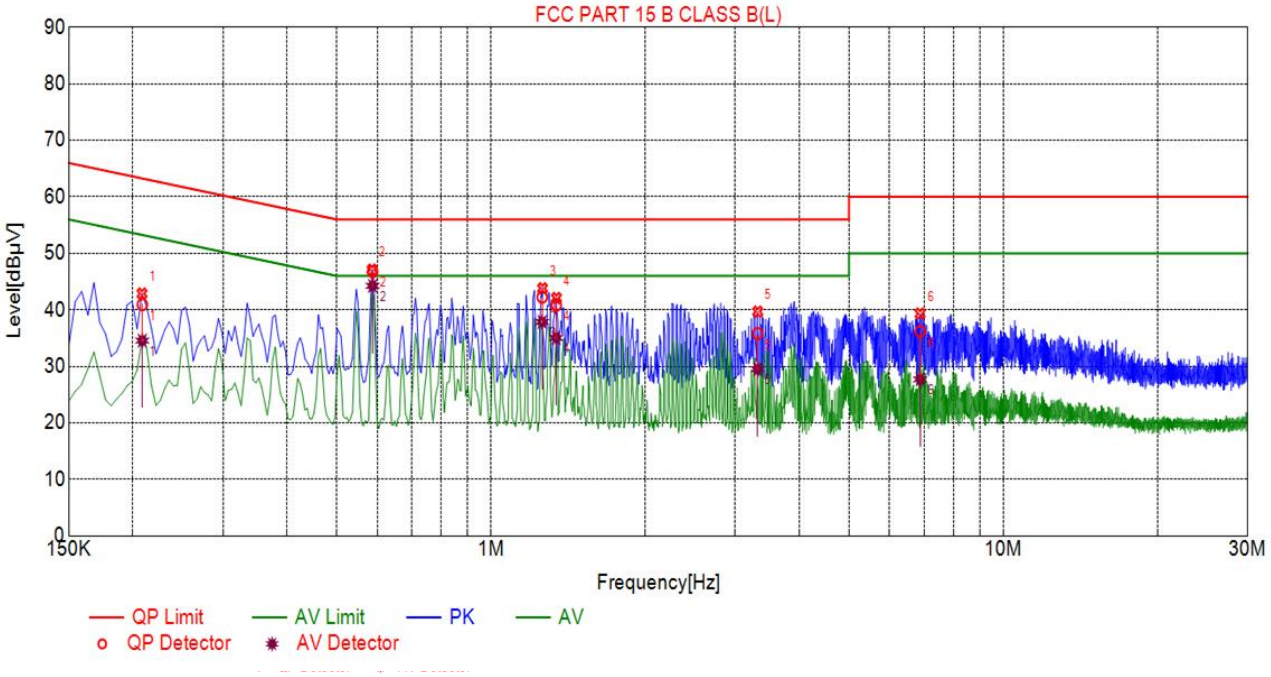
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

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

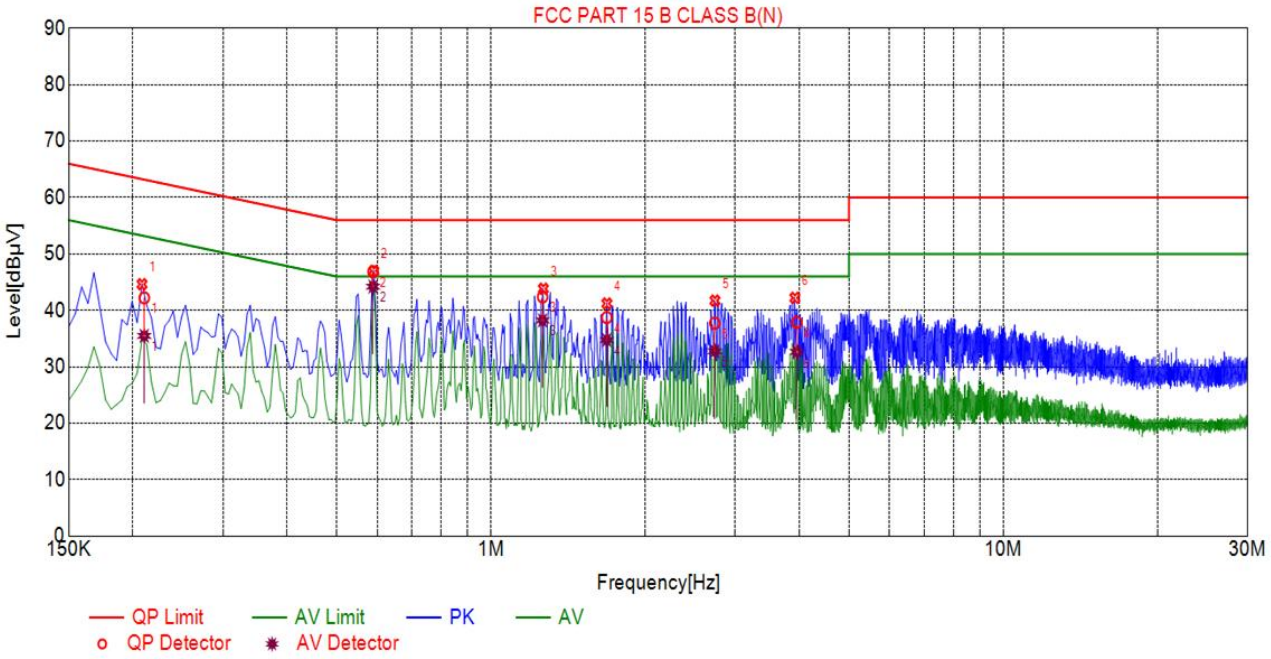
LINE CONDUCTED EMISSION TEST LINE 1-L



Suspected List						
NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Detector
1	0.2085	42.88	10.04	63.27	20.39	PK
2	0.5865	47.11	10.05	56.00	8.89	PK
3	1.2615	43.81	10.09	56.00	12.19	PK
4	1.3425	42.09	10.10	56.00	13.91	PK
5	3.3180	39.68	10.24	56.00	16.32	PK
6	6.8820	39.33	10.20	60.00	20.67	PK

Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]
1	0.2088	10.04	40.93	63.25	22.32	34.56	53.25	18.69
2	0.5877	10.05	46.76	56.00	9.24	44.25	46.00	1.75
3	1.2589	10.09	42.26	56.00	13.74	37.85	46.00	8.15
4	1.3410	10.10	40.82	56.00	15.18	35.03	46.00	10.97
5	3.3159	10.24	35.80	56.00	20.20	29.50	46.00	16.50
6	6.8816	10.20	36.16	60.00	23.84	27.69	50.00	22.31

Line Conducted Emission Test Line 2-N



Suspected List

NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Detector
1	0.2085	44.64	10.04	63.27	18.63	PK
2	0.5910	46.99	10.05	56.00	9.01	PK
3	1.2660	43.83	10.09	56.00	12.17	PK
4	1.6845	41.21	10.13	56.00	14.79	PK
5	2.7375	41.73	10.21	56.00	14.27	PK
6	3.9210	42.22	10.25	56.00	13.78	PK

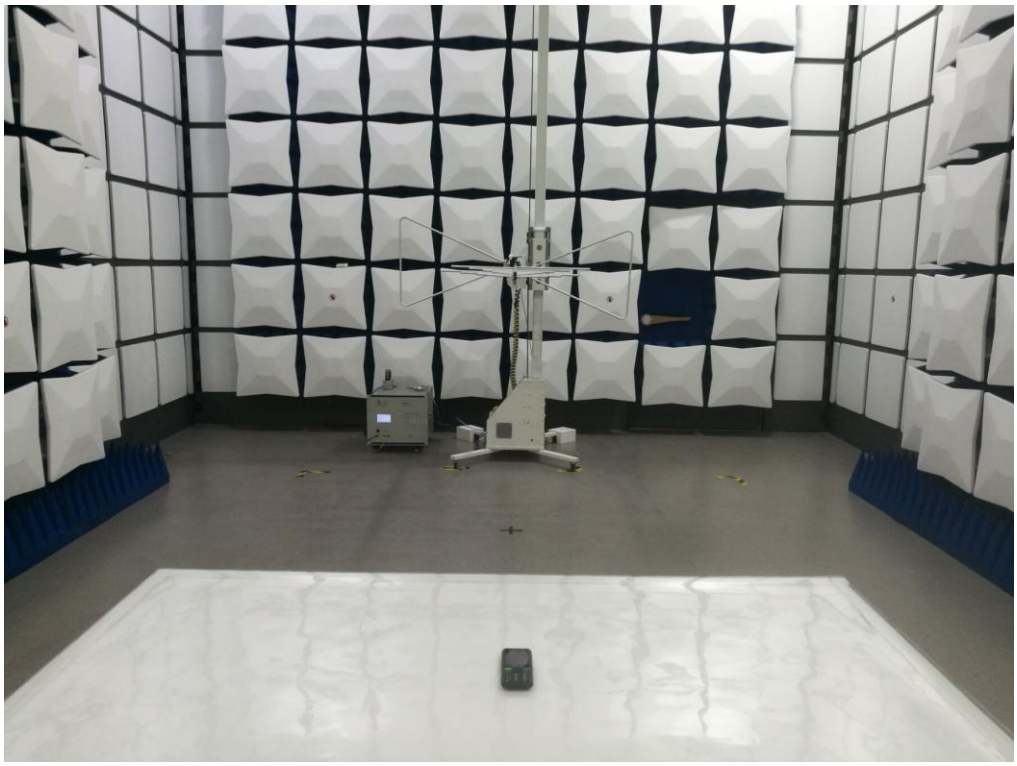
Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]
1	0.2106	10.04	42.22	63.18	20.96	35.48	53.18	17.70
2	0.5888	10.05	46.85	56.00	9.15	44.21	46.00	1.79
3	1.2613	10.09	42.40	56.00	13.60	38.22	46.00	7.78
4	1.6829	10.13	38.74	56.00	17.26	34.75	46.00	11.25
5	2.7346	10.21	37.74	56.00	18.26	32.76	46.00	13.24
6	3.9541	10.25	37.89	56.00	18.11	32.63	46.00	13.37

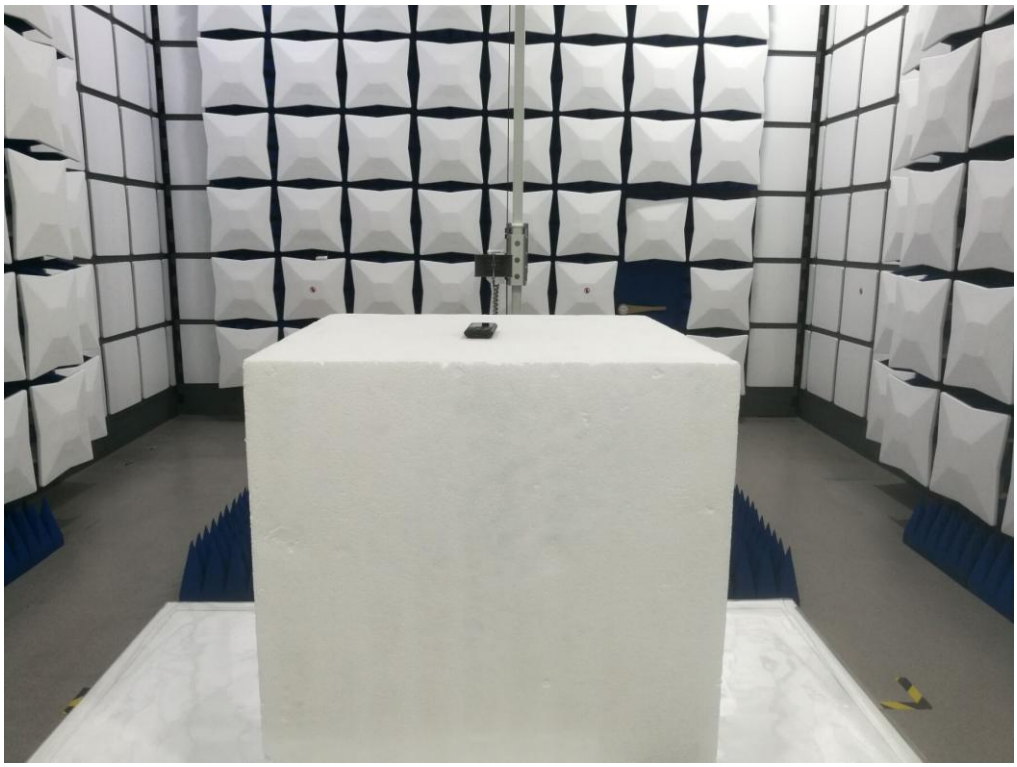
APPENDIX A: PHOTOGRAPHS OF TEST SETUP

LINE CONDUCTED EMISSION TEST SETUP

RADIATED EMISSION TEST SETUP



RADIATED EMISSION ABOVE 1G TEST SETUP



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