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# FCC Test Report

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Report No.: AGC00594170602FE04

**FCC ID** : 2A13K-CS24SA  
**APPLICATION PURPOSE** : Original Equipment  
**PRODUCT DESIGNATION** : Rugged Mobile Phone  
**BRAND NAME** : Cyrus  
**MODEL NAME** : CS24SA  
**CLIENT** : Cyrus Technology GmbH  
**DATE OF ISSUE** : July 11, 2017  
**STANDARD(S)** : FCC Part 15.247  
**TEST PROCEDURE(S)** : KDB 558074 D01 DTS Meas Guidance v04  
**REPORT VERSION** : V1.0

## Attestation of Global Compliance (Shenzhen) Co., Ltd

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### Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	July 11, 2017	Valid	Original Report

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## 1. VERIFICATION OF CONFORMITY

<b>Applicant</b>	Cyrus Technology GmbH
<b>Address</b>	Hergelsbendenstraße 49 D-52080 Aachen Germany
<b>Manufacturer</b>	Shenzhen Xin Kingbrand Enterprises Co., Ltd
<b>Address</b>	KingBrand Industrial Zone, Nanpu Road, Shang Liao Lin Pikeng, Shajing Town, Baoan District, Shenzhen City, Guangdong Province, China
<b>Product Designation</b>	Rugged Mobile Phone
<b>Brand Name</b>	Cyrus
<b>Test Model</b>	CS24SA
<b>Date of test</b>	June 23, 2017~July 11, 2017
<b>Deviation</b>	None
<b>Condition of Test Sample</b>	Normal
<b>Report Template</b>	AGCRT-US-BGN/RF

We hereby certify that:

The above equipment was tested by Dongguan Precise Testing Service 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.

Tested By	<i>donjon . huang</i>	
	_____ Donjon Huang(Huang Dongyang)	July 11, 2017
Reviewed By	<i>Bart xie</i>	
	_____ Bart Xie(Xie Xiaobin)	July 11, 2017
Approved By	<i>Solger Zhang</i>	
	_____ Solger Zhang(Zhang Hongyi) Authorized Officer	July 11, 2017

## 2. GENERAL INFORMATION

### 2.1. PRODUCT DESCRIPTION

The EUT is designed as “Rugged 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

<b>Operation Frequency</b>	2.412 GHz~2.462GHz
<b>Output Power</b>	IEEE 802.11b: <b>12.59</b> dBm, IEEE 802.11g: <b>10.62</b> dBm; IEEE 802.11n(20): <b>10.55</b> dBm, IEEE 802.11n(40): <b>10.32</b> dBm;
<b>Modulation</b>	DSSS(DBPSK/DQPSK/CCK);OFDM(BPSK/QPSK/16-QAM/64-QAM)
<b>Number of channels</b>	11
<b>Hardware Version</b>	FQ5_02
<b>Software Version</b>	V18N_smartphone_20170608_V1.04
<b>Antenna Designation</b>	Integrated Antenna
<b>Antenna Gain</b>	0.6dBi
<b>Power Supply</b>	DC3.8V by Built-in Li-ion Battery

### 2.2. TABLE OF CARRIER FREQUENCIES

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 40MHZ bandwidth system use Channel 3 to Channel 9

### 2.3. IEEE 802.11N MODULATION SCHEME

MCS Index	Nss	Modulation	R	NBPS	NCBPS		NDBPS		Data rate(Mbps)			
					800nsGI		20MHz	40MHz	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
NBPS	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: 2AI3K-CS24SA** 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

Conducted measurement: +/- 2.75dB

Radiated measurement: +/- 3.2dB

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

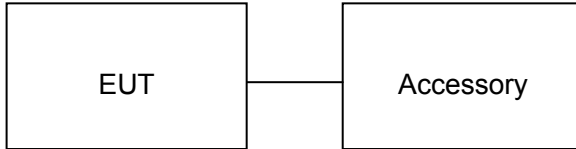
**Note:**

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	Rugged Mobile Phone	CS24SA	FCC ID: 2A13K-CS24SA	EUT
2	Adapter	TPA-10120125UU-MTK	DC 5V 2A	Accessory
3	Battery	V18H	DC3.8V/ 5000mAh	Accessory
4	USB Cable	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.

### 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

Note: The EUT received power from DC3.8V lithium battery.

## 6. TEST FACILITY

<b>Site</b>	Dongguan Precise Testing Service Co., Ltd.
<b>Location</b>	Building D,Baoding Technology Park,Guangming Road2,Dongcheng District, Dongguan, Guangdong, China,
<b>FCC Registration No.</b>	371540
<b>Description</b>	The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.10:2013.

### ALL TEST EQUIPMENT LIST

FOR RADIATED EMISSION TEST (BELOW 1GHZ)

Radiated Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 3, 2016	July 2, 2017
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 2, 2017	July 1, 2018
Trilog Broadband Antenna (25M-1GHz)	SCHWARZBECK	VULB9160	9160-3355	July 3, 2016	July 2, 2017
Trilog Broadband Antenna (25M-1GHz)	SCHWARZBECK	VULB9160	9160-3355	July 2, 2017	July 1, 2018
Signal Amplifier	SCHWARZBECK	BBV 9475	9745-0013	July 3, 2016	July 2, 2017
Signal Amplifier	SCHWARZBECK	BBV 9475	9745-0013	July 2, 2017	July 1, 2018
RF Cable	SCHWARZBECK	AK9515E	96221	July 3, 2016	July 2, 2017
RF Cable	SCHWARZBECK	AK9515E	96221	July 2, 2017	July 1, 2018
3m Anechoic Chamber	CHENGYU	966	PTS-001	June 5, 2016	June 4, 2017
3m Anechoic Chamber	CHENGYU	966	PTS-001	July 2, 2017	July 1, 2018
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A
Active loop antenna (9K-30MHz)	Schwarzbeck	FMZB1519	1519-038	June 5, 2016	June 4, 2018
Spectrum analyzer	Agilent	E4407B	MY46185649	June 5, 2016	June 4, 2017
Spectrum analyzer	Agilent	E4407B	MY46185649	June 2, 2017	June 1, 2018
Power Probe	R&S	NRP-Z23	100323	July 24,2016	July 23,2017
RF attenuator	N/A	RFA20db	68	N/A	N/A

FOR RADIATED EMISSION TEST (1GHZ ABOVE)

Radiated Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 3, 2016	July 2, 2017
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 2, 2017	July 1, 2018
Horn Antenna (1G-18GHz)	SCHWARZBECK	BBHA9120D	9120D-1246	July 10, 2016	July 9, 2018
Spectrum Analyzer	Agilent	E4411B	MY4511453	July 3, 2016	July 2, 2017
Spectrum Analyzer	Agilent	E4411B	MY4511453	July 2, 2017	July 1, 2018
Signal Amplifier	SCHWARZBECK	BBV 9718	9718-269	July 6, 2016	July 5, 2017
Signal Amplifier	SCHWARZBECK	BBV 9718	9718-269	July 2, 2017	July 1, 2018
RF Cable	SCHWARZBECK	AK9515H	96220	July 7, 2016	July 6, 2017
RF Cable	SCHWARZBECK	AK9515H	96220	July 2, 2017	July 1, 2018
3m Anechoic Chamber	CHENGYU	966	PTS-001	June 2, 2017	June 1, 2018
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A
Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170	9170-181	June 5, 2016	June 4, 2018
Power Probe	R&S	NRP-Z23	100323	July 24, 2016	July 23, 2017
RF attenuator	N/A	RFA20db	68	N/A	N/A

Conducted Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 3, 2016	July 2, 2017
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 2, 2017	July 1, 2018
Artificial Mains Network	Narda	L2-16B	000WX31025	July 7, 2016	July 6, 2017
Artificial Mains Network	Narda	L2-16B	000WX31025	July 2, 2017	July 1, 2018
Artificial Mains Network (AUX)	Narda	L2-16B	000WX31026	July 7, 2016	July 6, 2017
Artificial Mains Network (AUX)	Narda	L2-16B	000WX31026	July 2, 2017	July 1, 2018
RF Cable	SCHWARZBECK	AK9515E	96222	July 3, 2016	July 2, 2017
RF Cable	SCHWARZBECK	AK9515E	96222	July 2, 2017	July 1, 2018
Shielded Room	CHENGYU	843	PTS-002	June 2, 2017	June 1, 2018

## **7. OUTPUT POWER**

### **7.1. MEASUREMENT PROCEDURE**

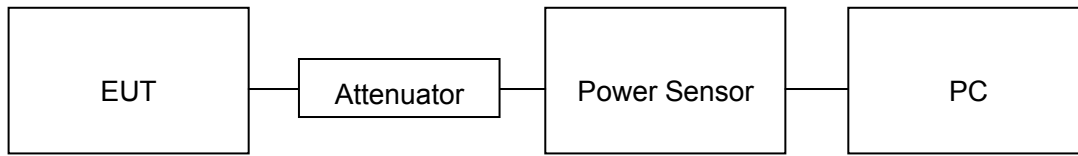
For max average conducted output power test:

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**

<b>TEST ITEM</b>	OUTPUT POWER
<b>TEST MODE</b>	802.11b with data rate 1

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	10.11	30	Pass
2.437	12.59	30	Pass
2.462	11.67	30	Pass

<b>TEST ITEM</b>	OUTPUT POWER
<b>TEST MODE</b>	802.11g with data rate 6

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	6.82	30	Pass
2.437	10.62	30	Pass
2.462	9.76	30	Pass

<b>TEST ITEM</b>	OUTPUT POWER
<b>TEST MODE</b>	802.11n 20 with data rate 6.5

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	6.85	30	Pass
2.437	10.55	30	Pass
2.462	9.80	30	Pass

<b>TEST ITEM</b>	OUTPUT POWER
<b>TEST MODE</b>	802.11n 40 with data rate 13.5

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.422	10.30	30	Pass
2.437	10.32	30	Pass
2.452	8.85	30	Pass



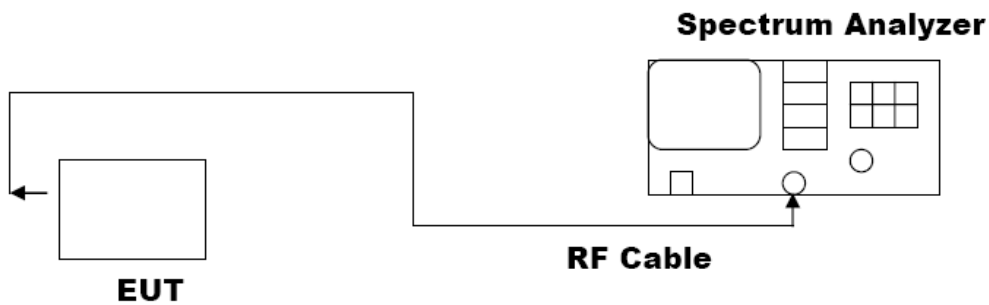
## 8. 6DB BANDWIDTH

### 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 $\geq$ 3 $\times$ 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.

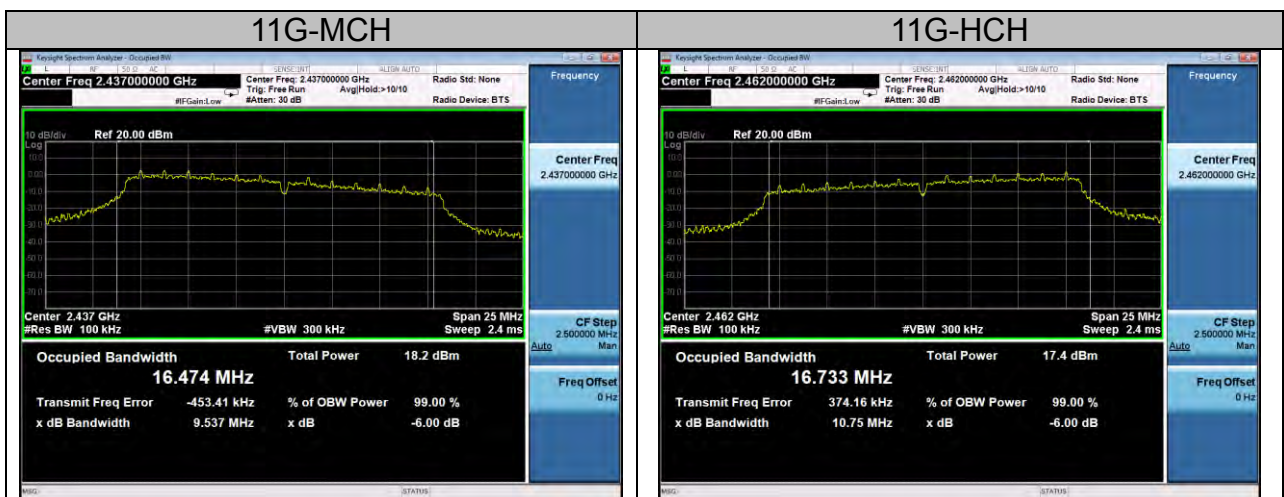
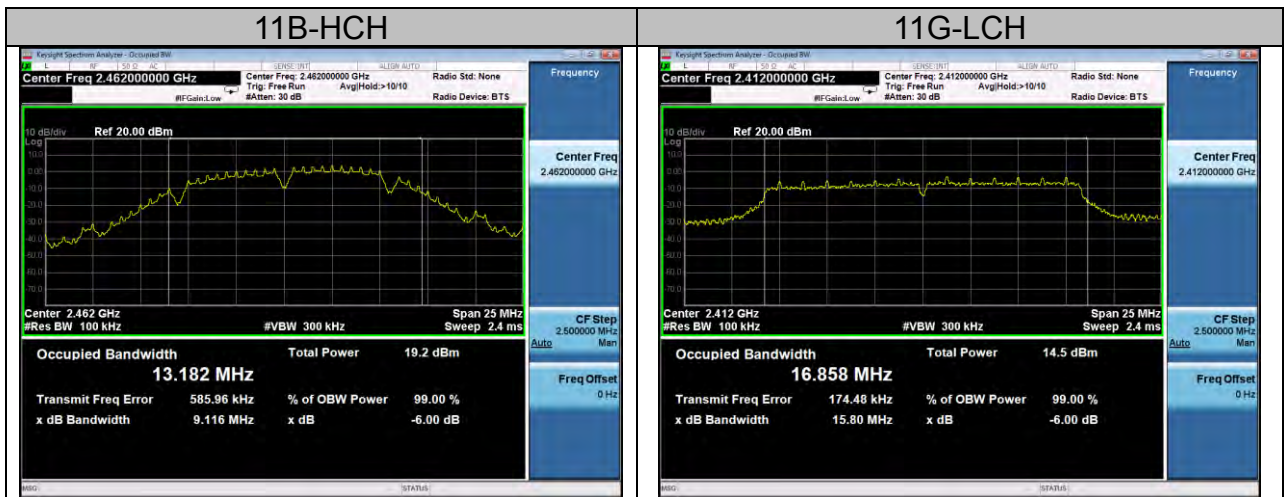
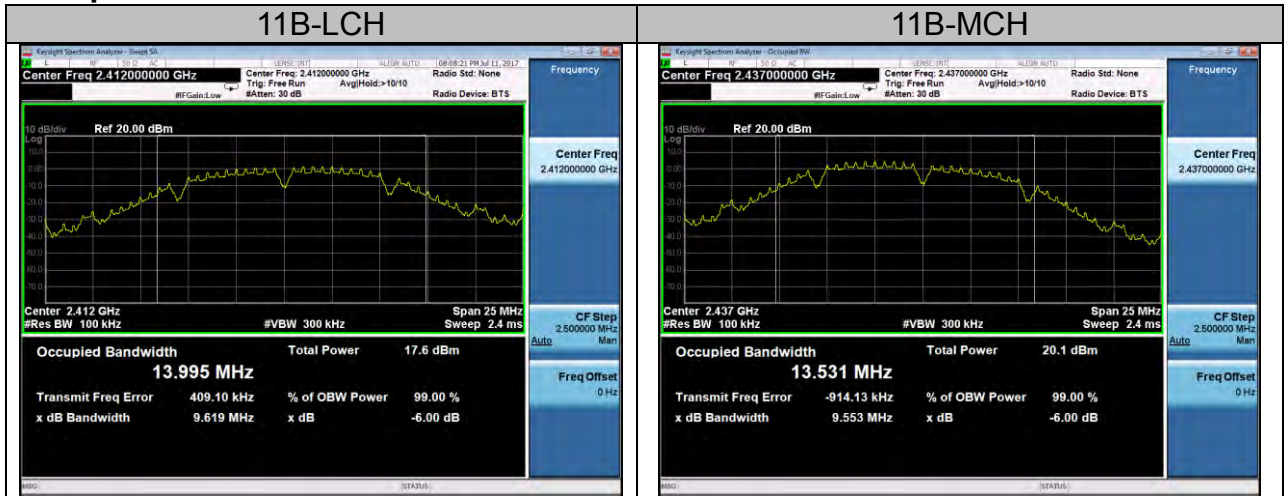
### 8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

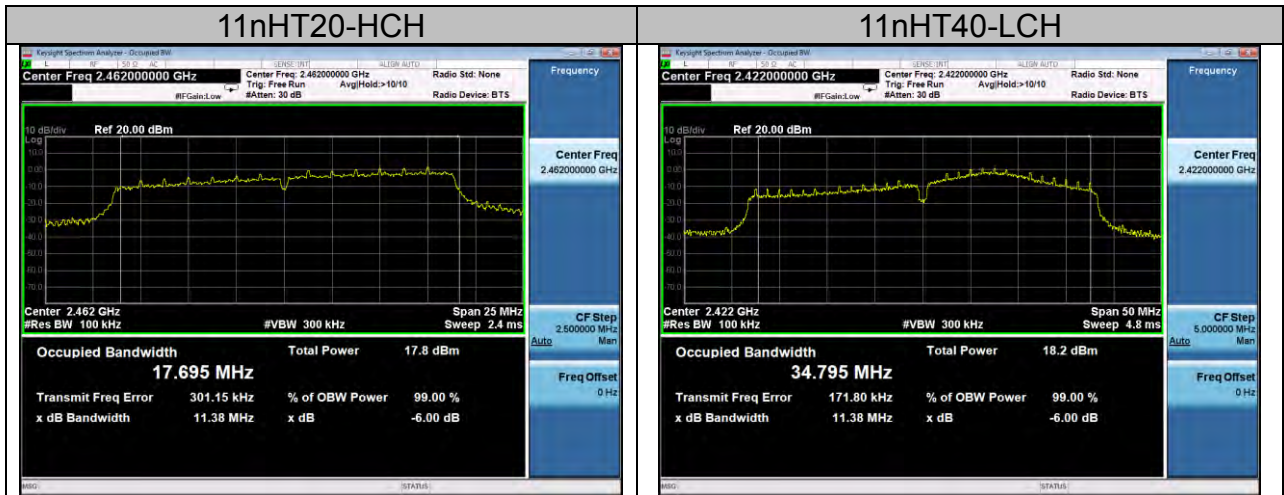
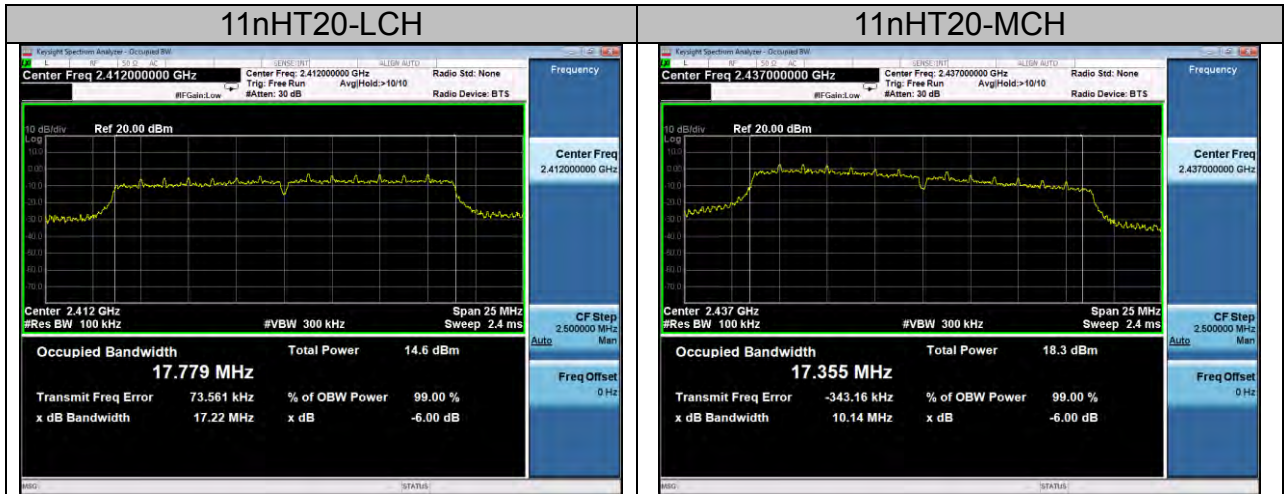


### 8.3. LIMITS AND MEASUREMENT RESULTS

Mode	Channel	6dB Bandwidth [MHz]	Verdict
11B	LCH	9.619	PASS
	MCH	9.553	PASS
	HCH	9.116	PASS
11G	LCH	15.80	PASS
	MCH	9.537	PASS
	HCH	10.75	PASS
11nHT20	LCH	17.22	PASS
	MCH	10.14	PASS
	HCH	11.38	PASS
11nHT40	LCH	11.38	PASS
	MCH	10.27	PASS
	HCH	36.12	PASS

### Test Graph





## 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.

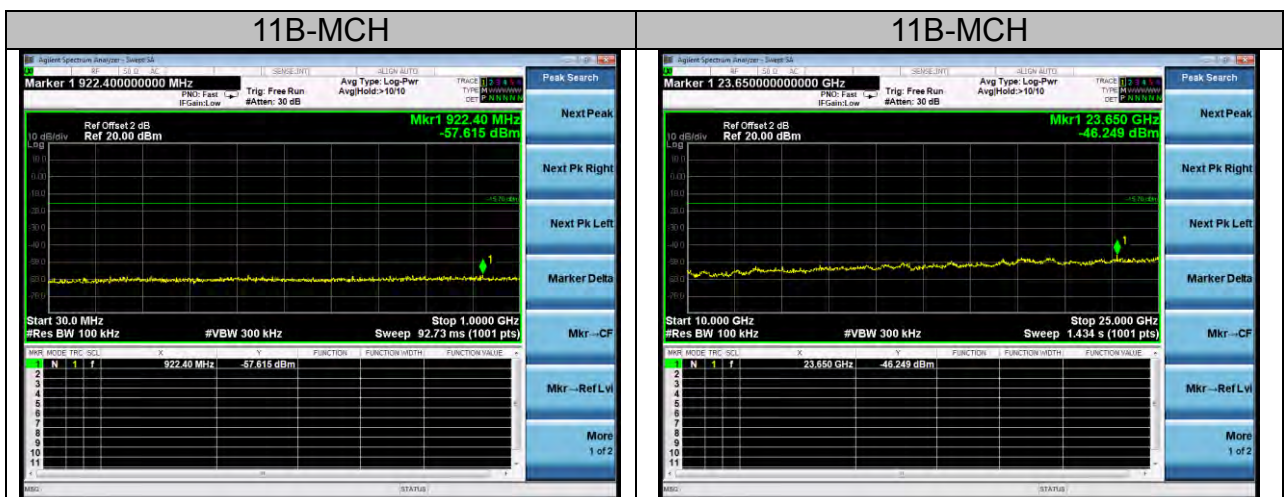
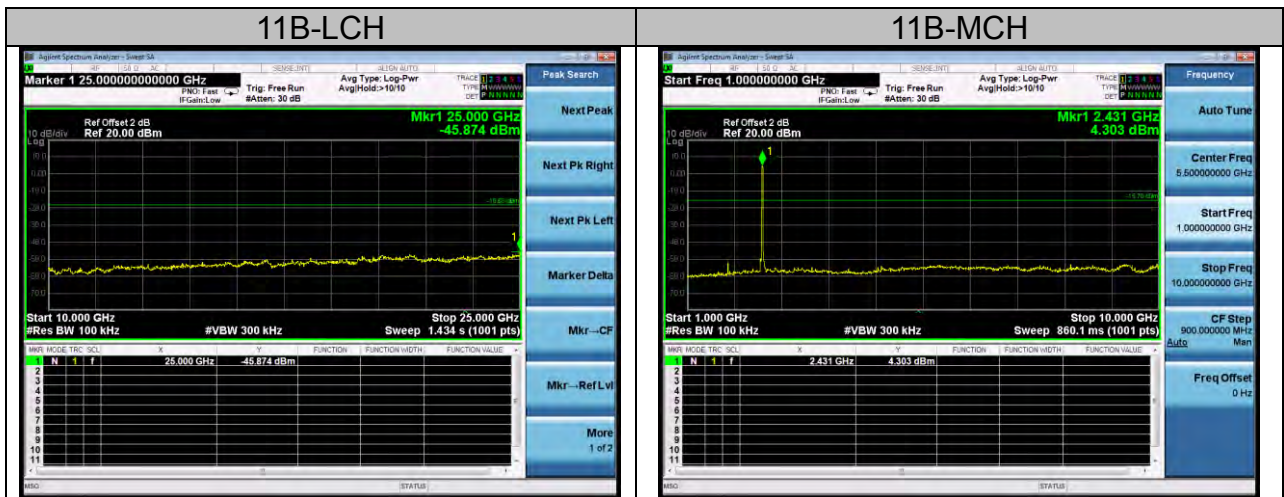
### 9.3. MEASUREMENT EQUIPMENT USED

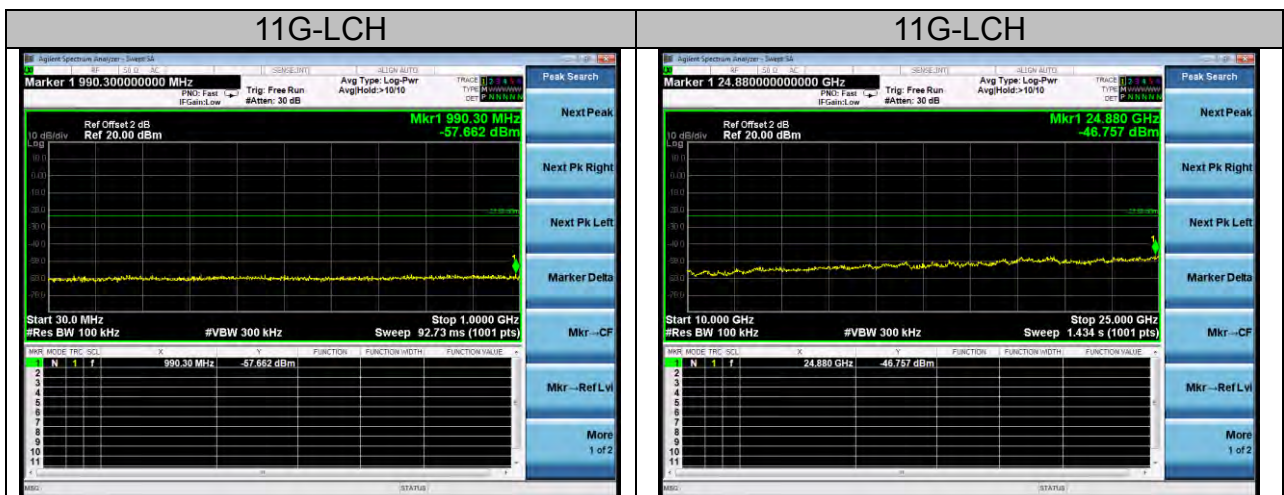
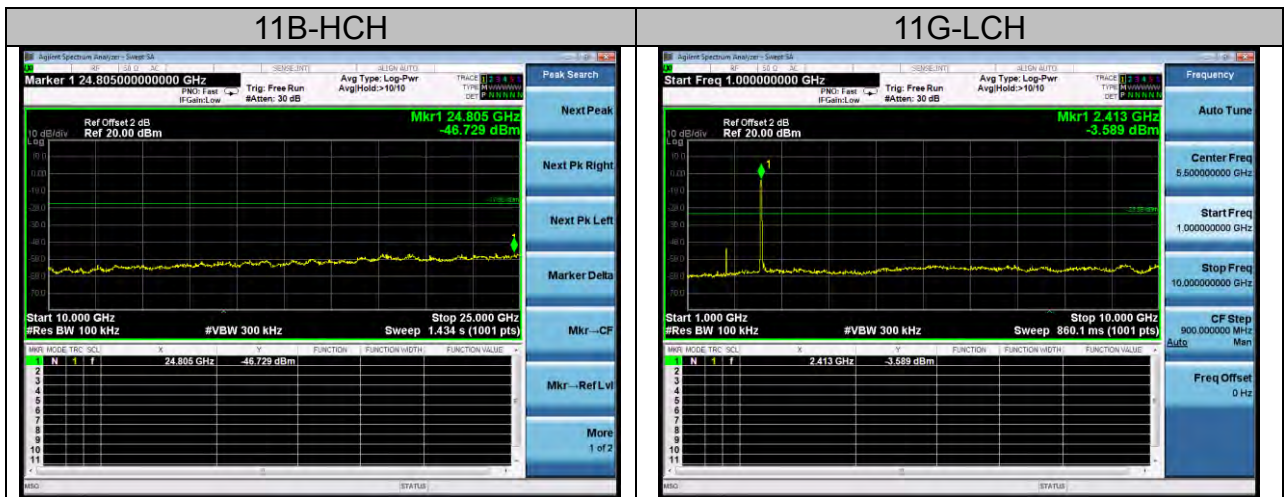
The same as described in section 6.

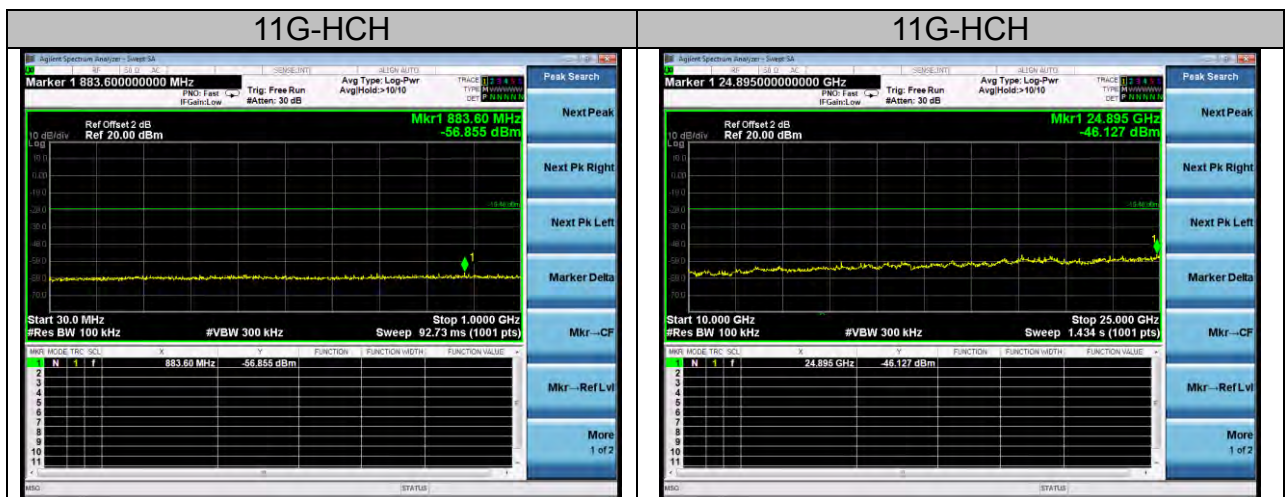
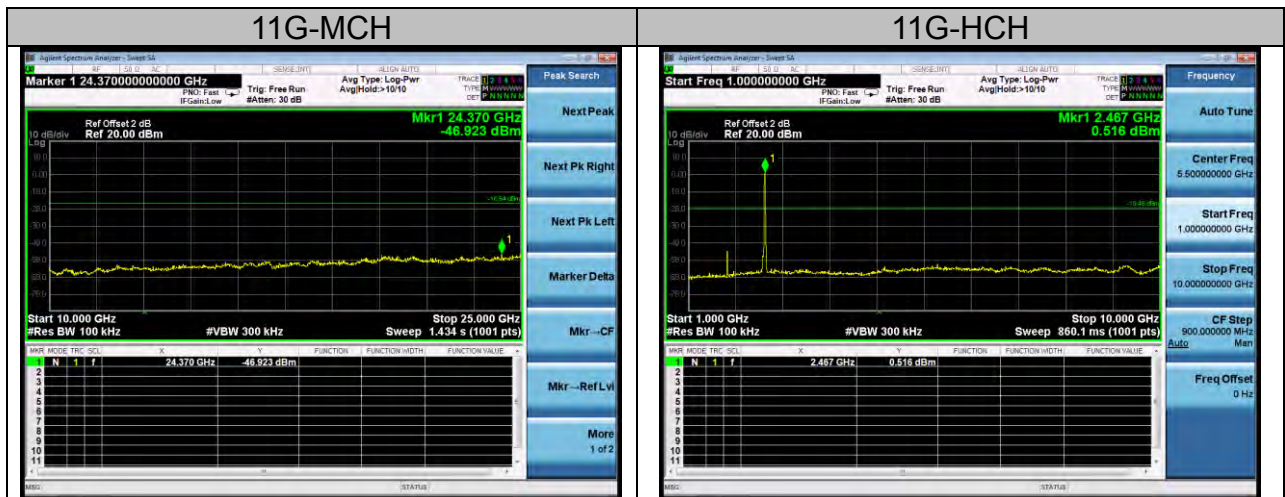
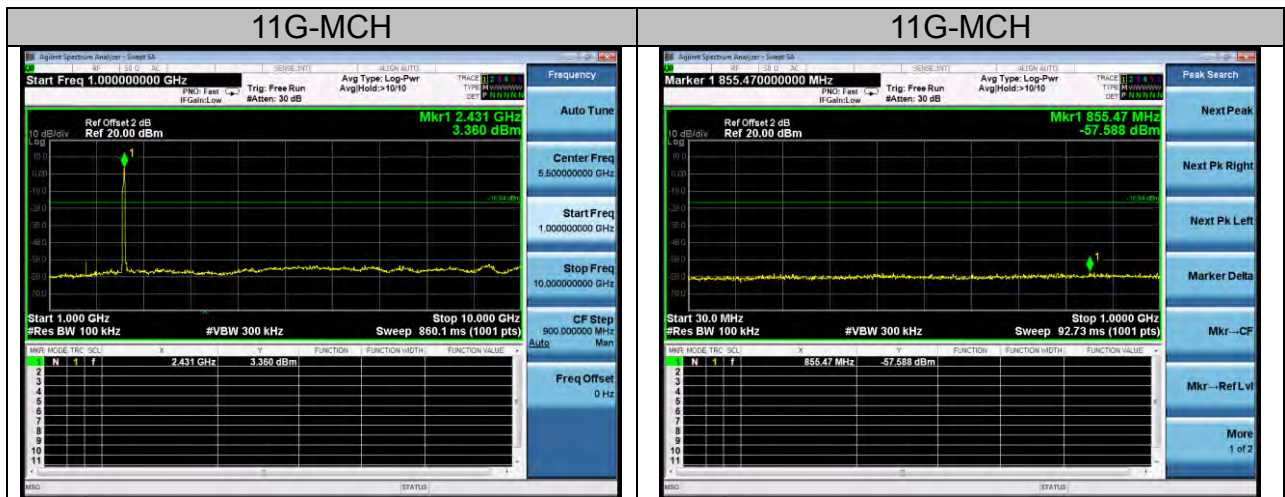
### 9.4. LIMITS AND MEASUREMENT RESULT

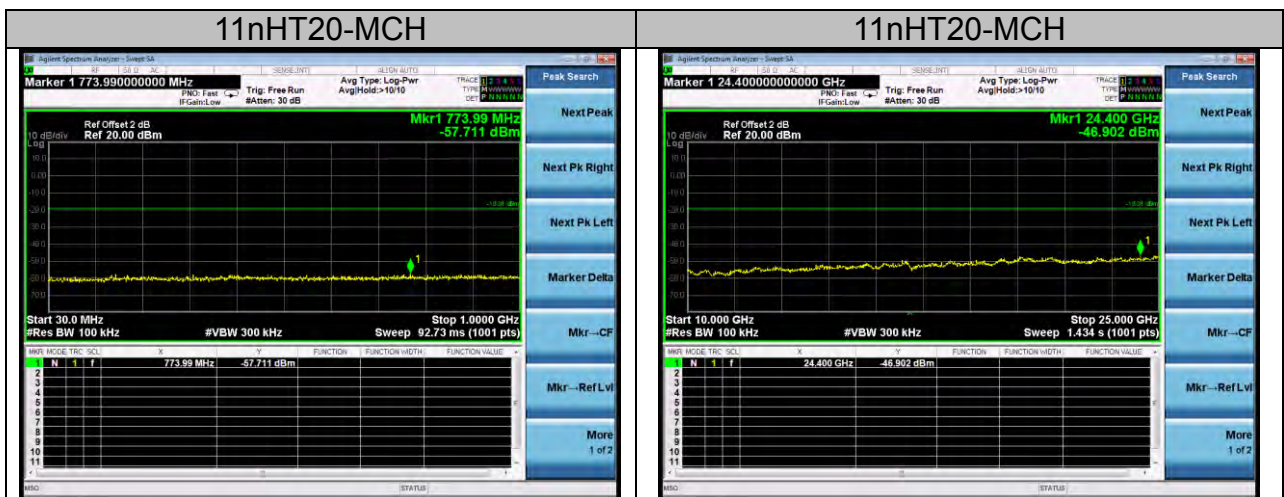
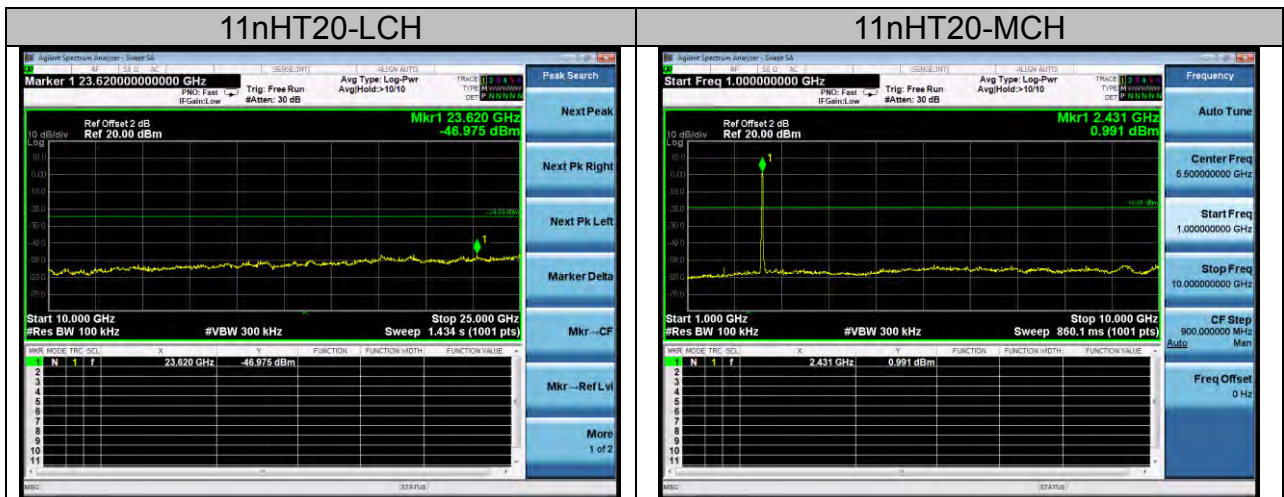
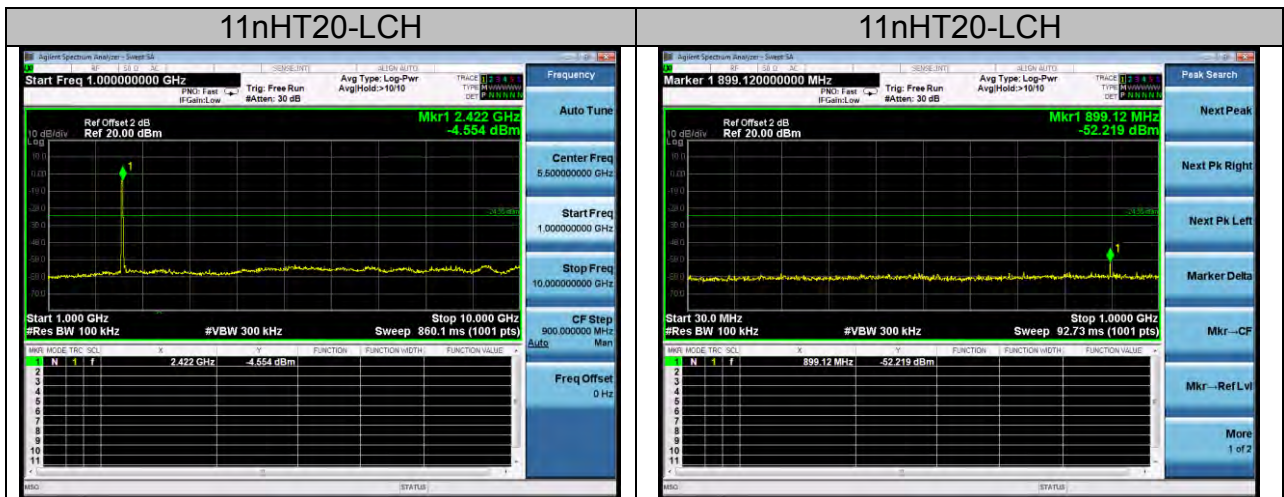
LIMITS AND MEASUREMENT RESULT		
Applicable Limits	Measurement Result	
	Test Data	Criteria
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below 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

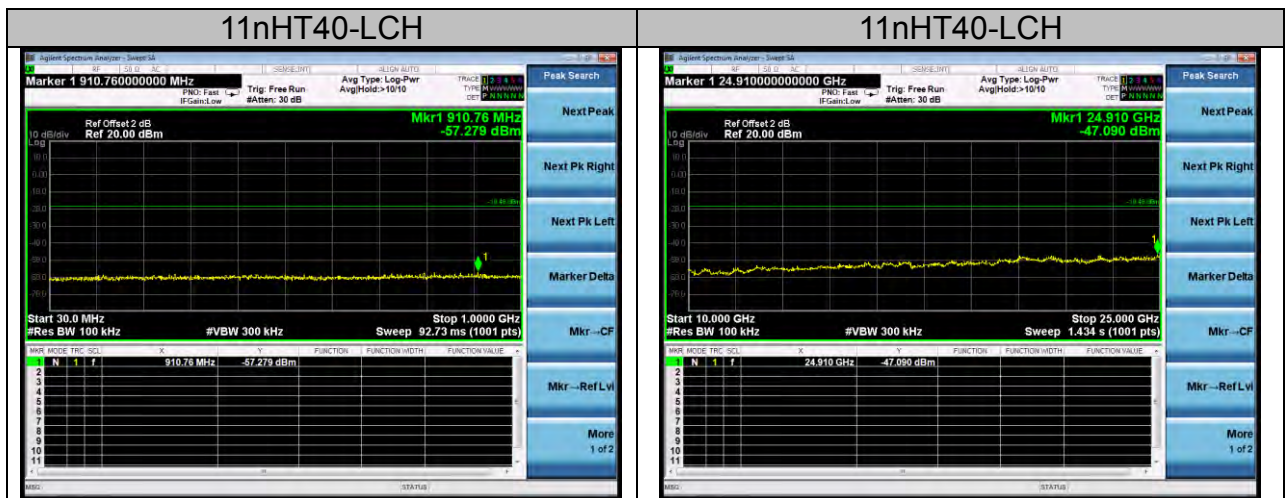
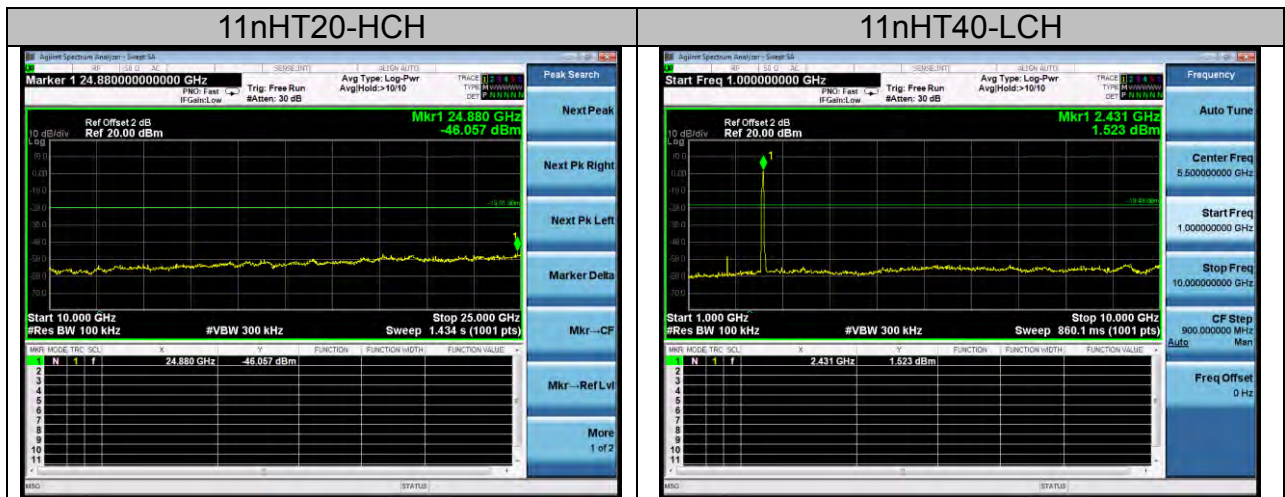
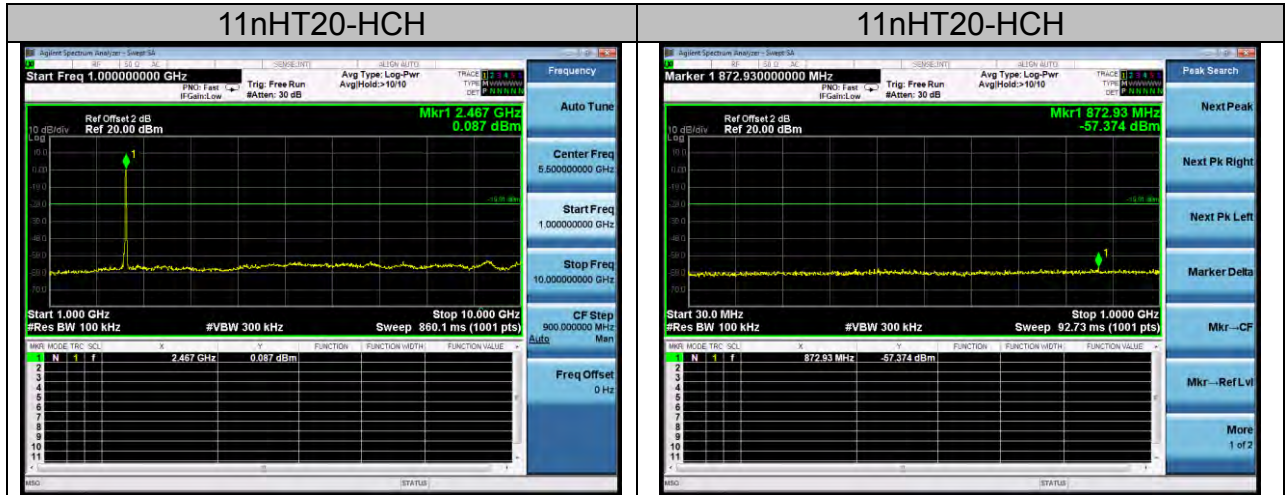


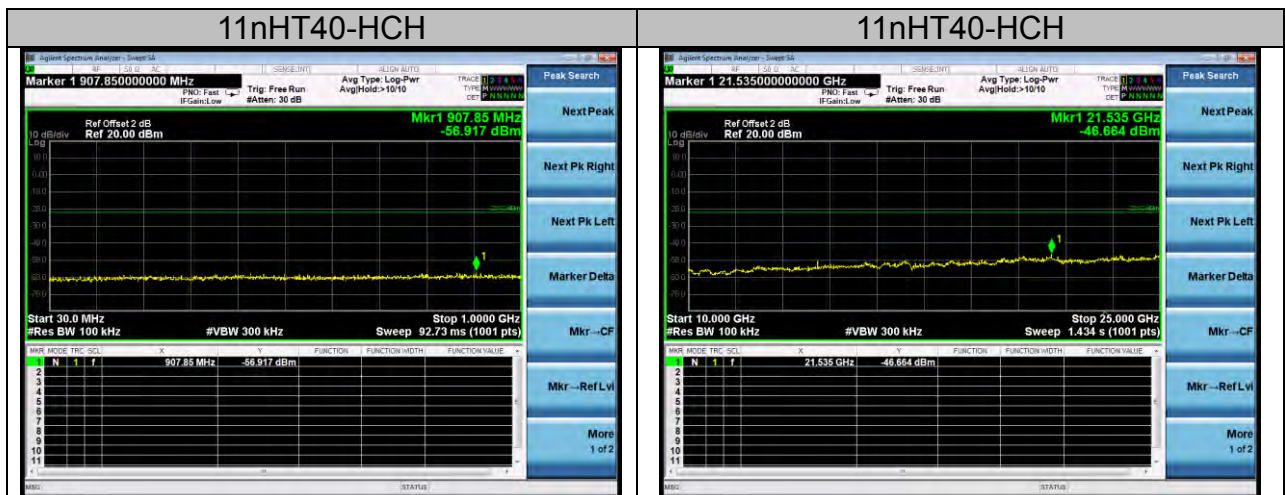
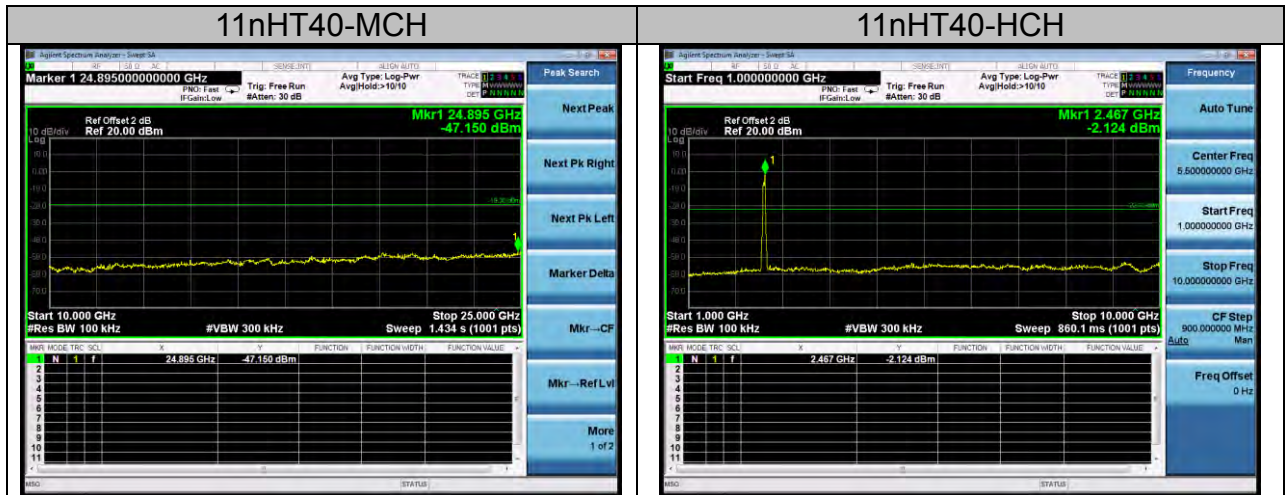
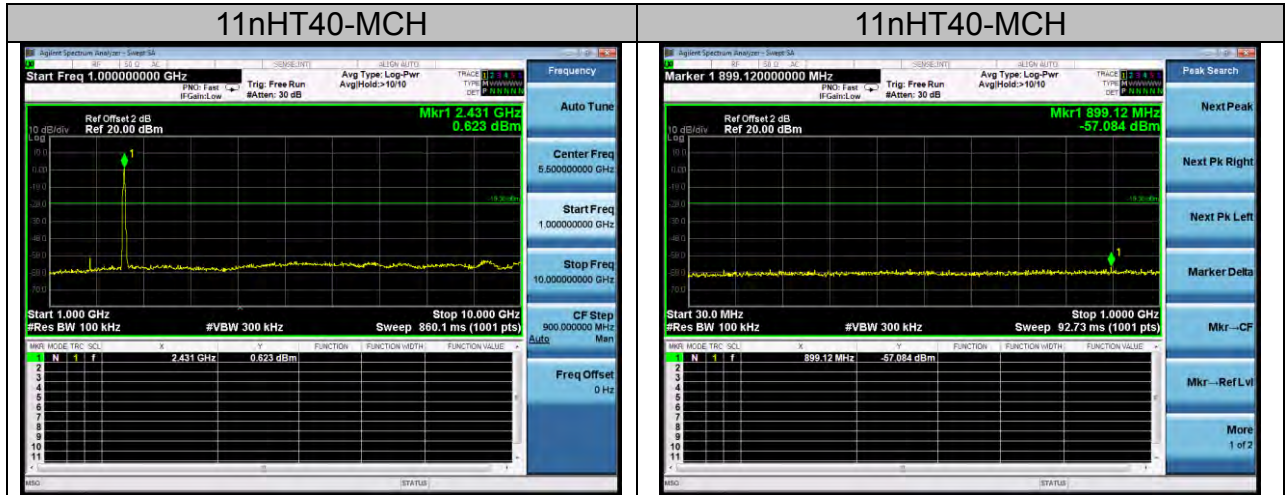












## 10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

### 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.

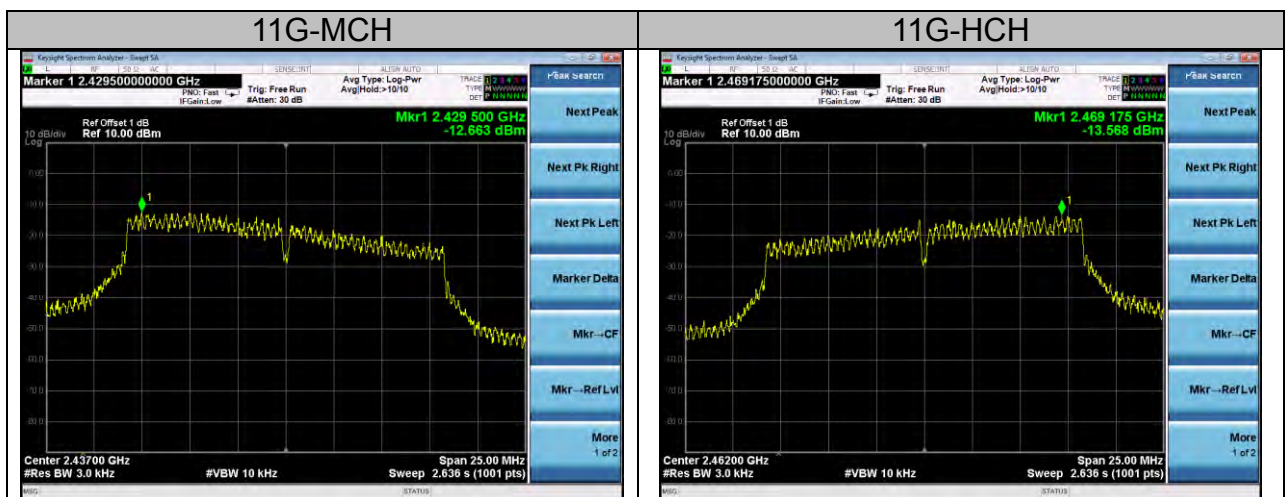
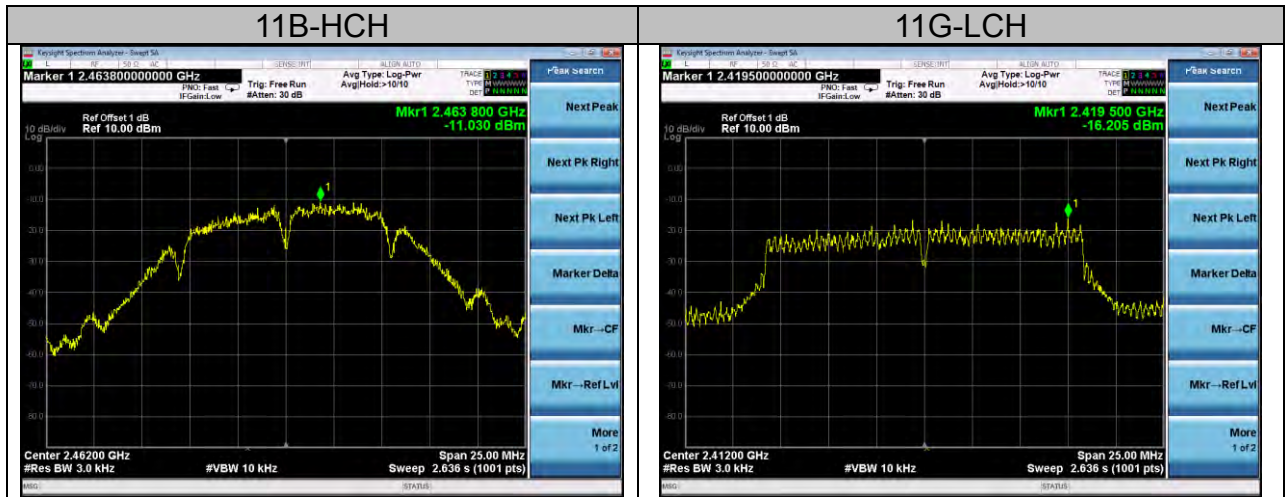
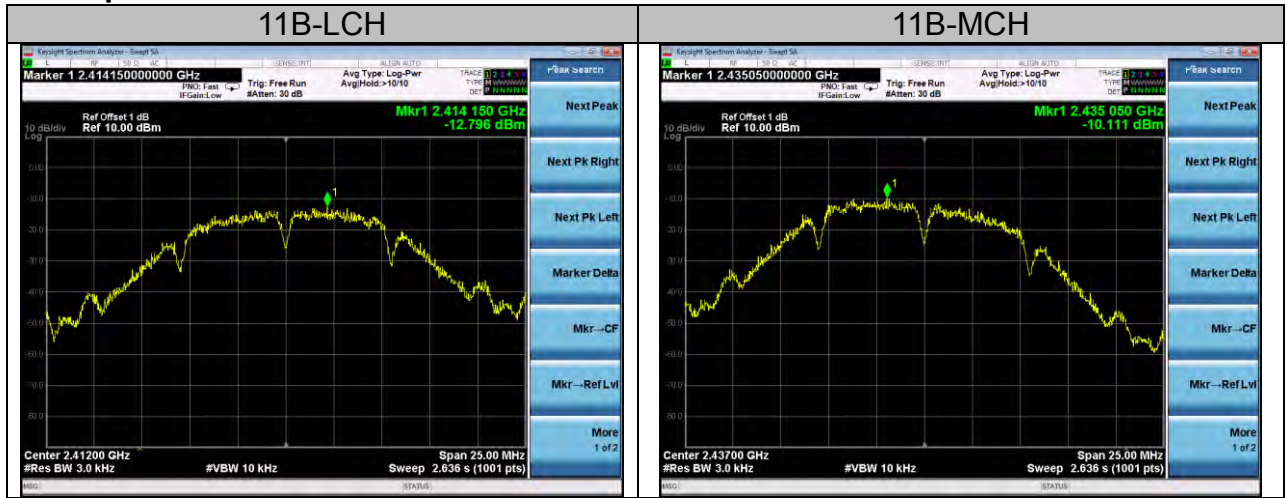
### 10.3 MEASUREMENT EQUIPMENT USED

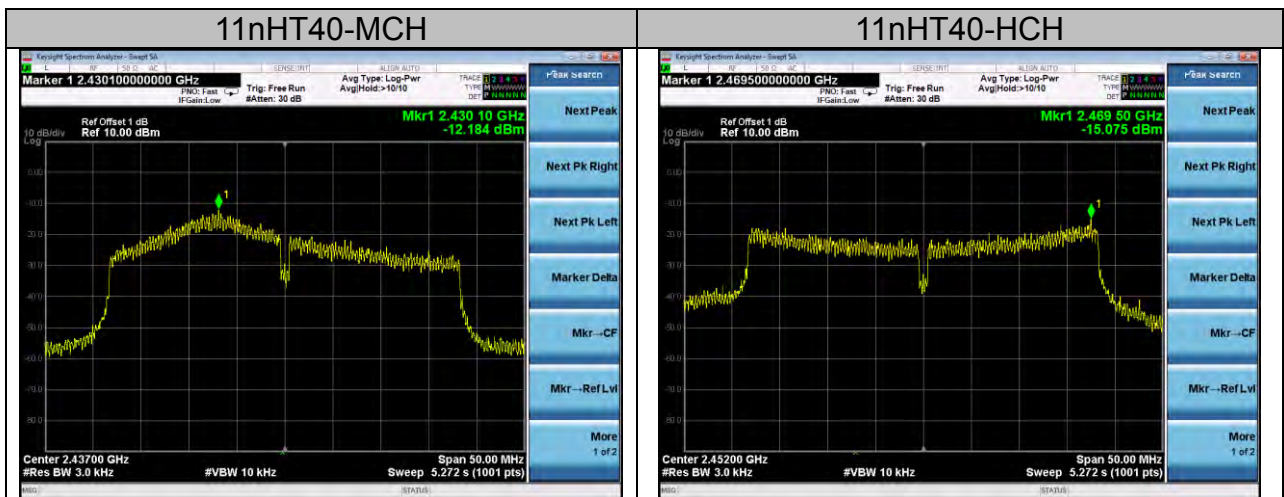
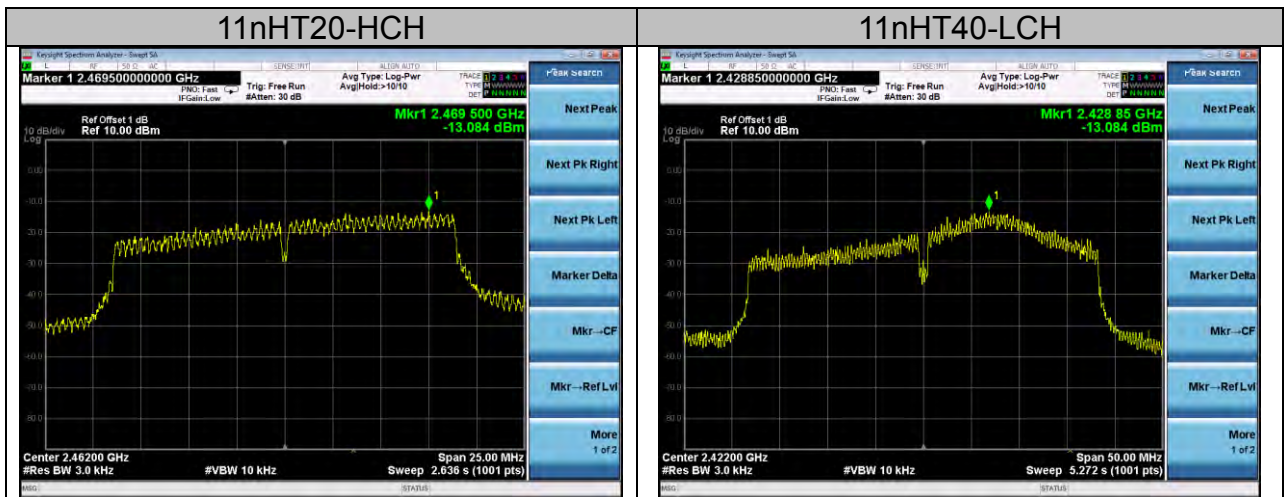
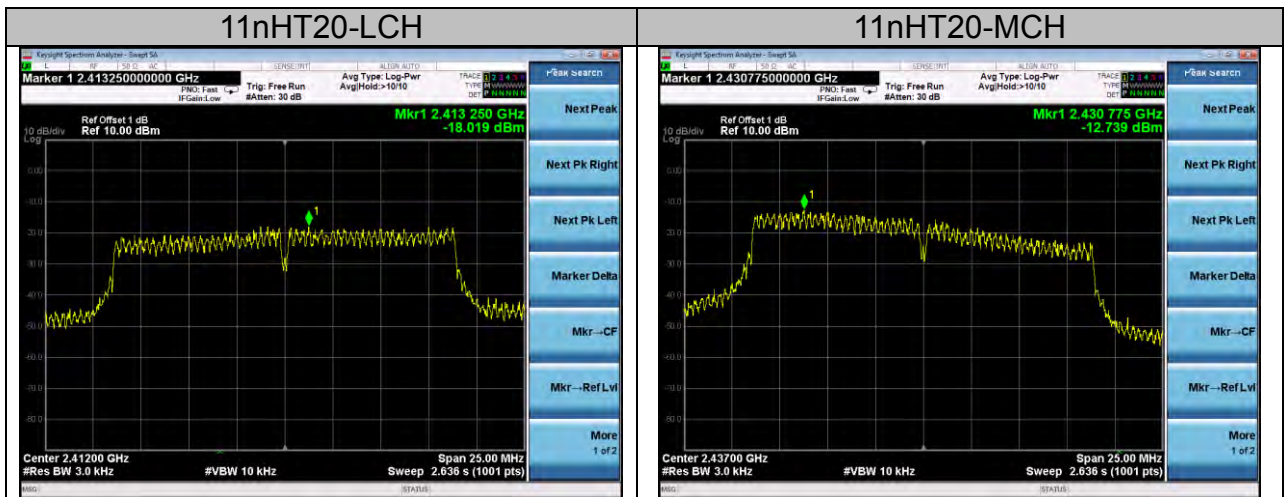
Refer To Section 6.

### 10.4 LIMITS AND MEASUREMENT RESULT

Mode	Channel	PSD [dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	LCH	-12.796	8	PASS
	MCH	-10.111	8	PASS
	HCH	-11.030	8	PASS
11G	LCH	-16.205	8	PASS
	MCH	-12.663	8	PASS
	HCH	-13.568	8	PASS
11nHT20	LCH	-18.019	8	PASS
	MCH	-12.739	8	PASS
	HCH	-13.084	8	PASS
11nHT40	LCH	-13.084	8	PASS
	MCH	-12.184	8	PASS
	HCH	-15.075	8	PASS

### Test Graph





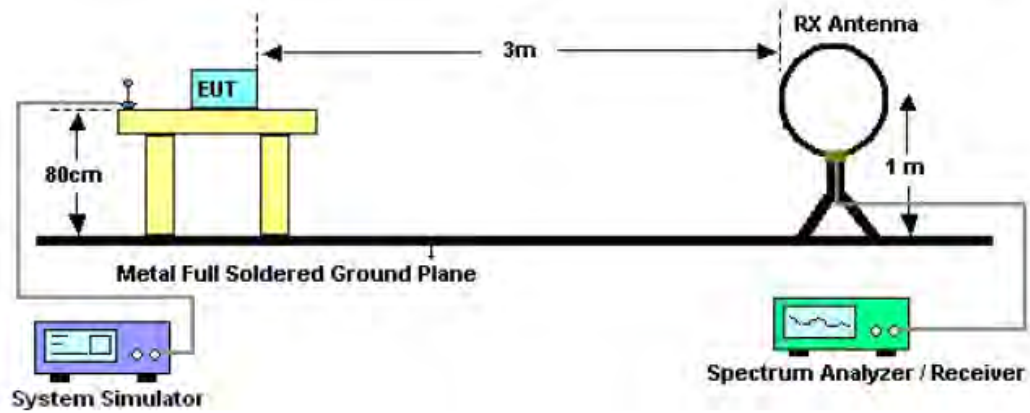
## 11. RADIATED EMISSION

### 11.1. MEASUREMENT PROCEDURE

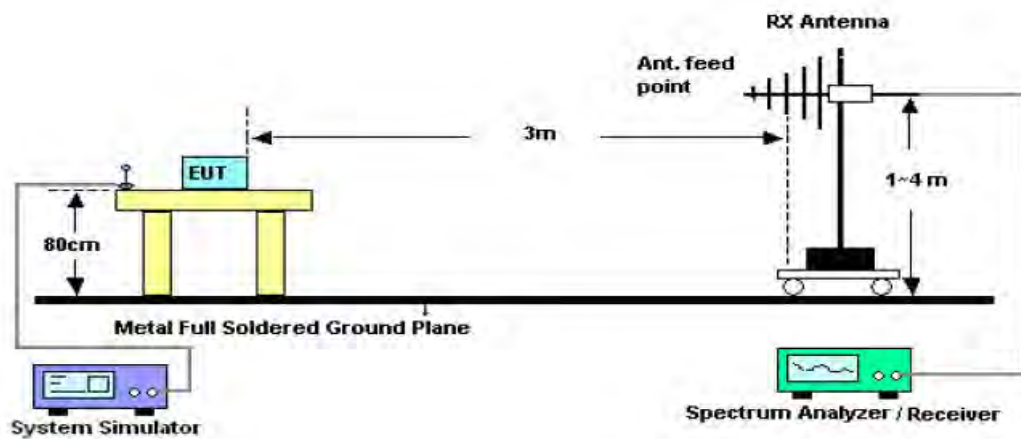
1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated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

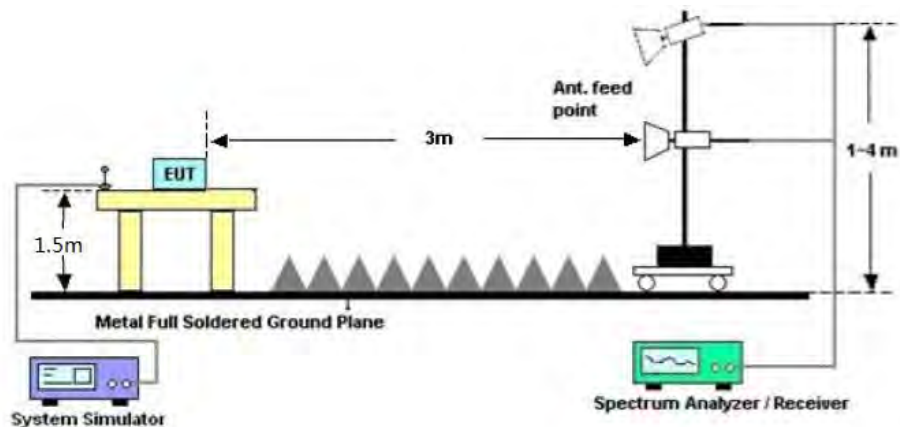
### Radiated Emission Test-Setup Frequency Below 30MHz



### 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

<b>Frequencies (MHz)</b>	<b>Field Strength (micorvolts/meter)</b>	<b>Measurement Distance (meters)</b>
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.



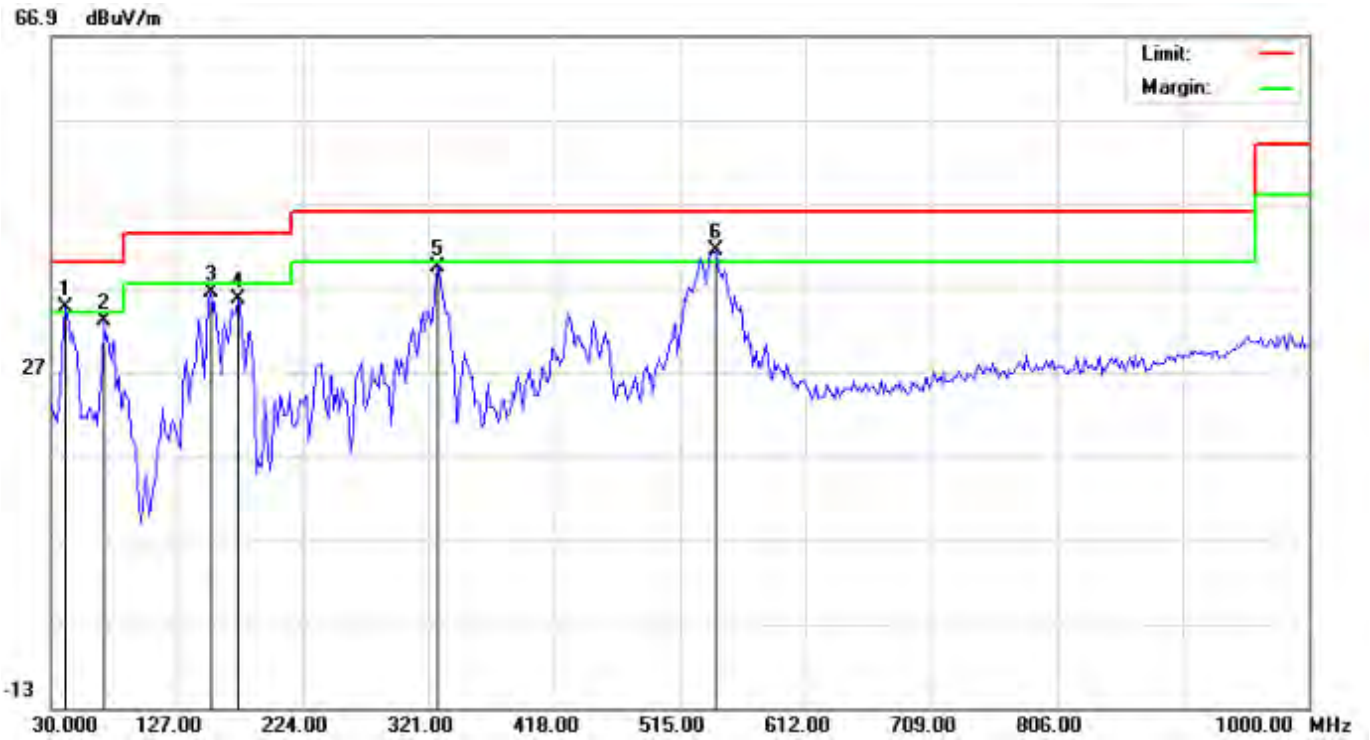
**RADIATED EMISSION BELOW 1GHZ**  
**RADIATED EMISSION TEST- (30MHZ-1GHZ) -HORIZONTAL**



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		49.4000	11.24	11.28	22.52	40.00	-17.48	peak			
2		99.5167	17.82	10.00	27.82	43.50	-15.68	peak			
3		183.5833	21.64	11.24	32.88	43.50	-10.62	peak			
4		329.0833	21.49	17.35	38.84	46.00	-7.16	peak			
5	*	539.2500	18.97	22.19	41.16	46.00	-4.84	peak			
6		940.1833	2.20	29.73	31.93	46.00	-14.07	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	!	41.3167	25.83	8.81	34.64	40.00	-5.36	peak			
2		70.4167	28.81	4.16	32.97	40.00	-7.03	peak			
3		152.8667	21.14	15.28	36.42	43.50	-7.08	peak			
4		173.8833	21.14	14.46	35.60	43.50	-7.90	peak			
5		327.4667	22.17	17.24	39.41	46.00	-6.59	peak			
6	*	542.4833	19.09	22.28	41.37	46.00	-4.63	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	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	
TX 11b 2412MHz							
4824	41.05	10.44	51.49	74	-22.51	Pk	Horizontal
4824	29.77	10.44	40.21	54	-13.79	AV	Horizontal
7236	41.96	10.39	52.35	74	-21.65	pk	Horizontal
7236	31.12	10.39	41.51	54	-12.49	AV	Horizontal
4824	42.09	10.39	52.48	74	-21.52	Pk	Vertical
4824	29.19	10.39	39.58	54	-14.42	AV	Vertical
7236	41.68	10.68	52.36	74	-21.64	Pk	Vertical
7236	30.11	10.68	40.79	54	-13.21	AV	Vertical
TX 11b 2437MHz							
4874	42.64	10.39	53.03	74	-20.72	Pk	Horizontal
4874	32.70	10.39	43.09	54	-11.97	AV	Horizontal
7311	41.47	12.68	54.15	74	-21.65	Pk	Horizontal
7311	27.55	12.68	40.23	54	-13.54	AV	Horizontal
4874	43.82	10.39	54.21	74	-22.08	Pk	Vertical
4874	30.46	10.39	40.85	54	-11.72	AV	Vertical
7311	39.51	12.68	52.19	74	-20.17	Pk	Vertical
7311	28.75	12.68	41.43	54	-13.36	AV	Vertical
TX 11b 2462MHz							
4924	43.05	10.39	53.44	74	-20.56	pk	Horizontal
4924	29.52	10.39	39.91	54	-14.09	AV	Horizontal
7386	40.47	12.68	53.15	74	-20.85	pk	Horizontal
7386	29.04	12.68	41.72	54	-12.28	AV	Horizontal
4924	42.75	10.39	53.14	74	-20.86	pk	Vertical
4924	31.17	10.39	41.56	54	-12.44	AV	Vertical
7386	39.12	12.68	51.80	74	-22.20	pk	Vertical
7386	30.09	12.68	42.77	54	-11.23	AV	Vertical

### RESULT: PASS

#### Note:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
2. Emission Level = Meter Reading + Factor
3. Margin = Emission Level - Limit
4. 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

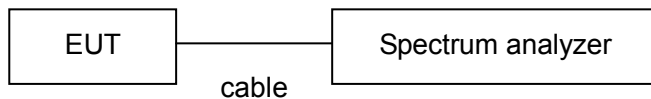
b) Set RBW=100kHz, VBW=300kHz

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	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	Type	
TX 11b 2412MHz							
2399.9	67.68	-13	54.68	74	-19.32	pk	Horizontal
2399.9	56.53	-13	43.53	54	-10.47	AV	Horizontal
2400	67.48	-12.99	54.49	74	-19.51	pk	Horizontal
2400	54.14	-12.99	41.15	54	-12.85	AV	Horizontal
2399.9	65.51	-12.97	52.54	74	-21.46	pk	Vertical
2399.9	54.77	-12.97	41.80	54	-12.20	AV	Vertical
2400	65.41	-12.94	52.47	74	-21.53	pk	Vertical
2400	55.10	-12.94	42.16	54	-11.84	AV	Vertical
TX 11b 2462MHz							
2483.5	67.16	-12.78	54.38	74	-19.62	pk	Horizontal
2483.5	54.20	-12.78	41.42	54	-12.58	AV	Horizontal
2483.6	66.33	-12.77	53.56	74	-20.44	pk	Horizontal
2483.6	54.37	-12.77	41.60	54	-12.40	AV	Horizontal
2483.5	64.95	-12.76	52.19	74	-21.81	pk	Vertical
2483.5	55.43	-12.76	42.67	54	-11.33	AV	Vertical
2483.6	64.62	-12.72	51.90	74	-22.10	pk	Vertical
2483.6	54.44	-12.72	41.72	54	-12.28	AV	Vertical

### RESULT: PASS

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

Factor=Antenna Factor + Cable loss - Amplifier gain,

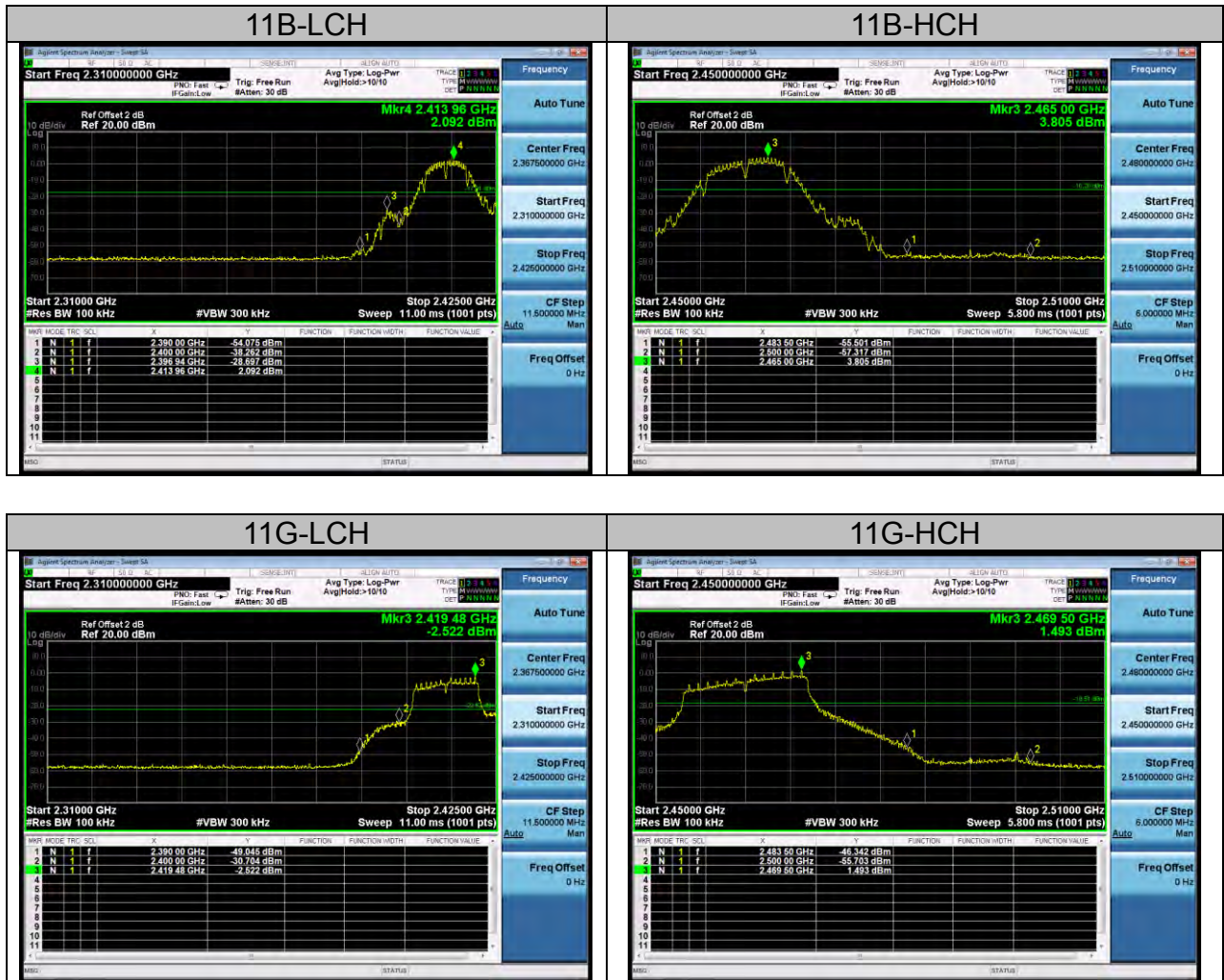
Emission Level = Meter Reading + Factor

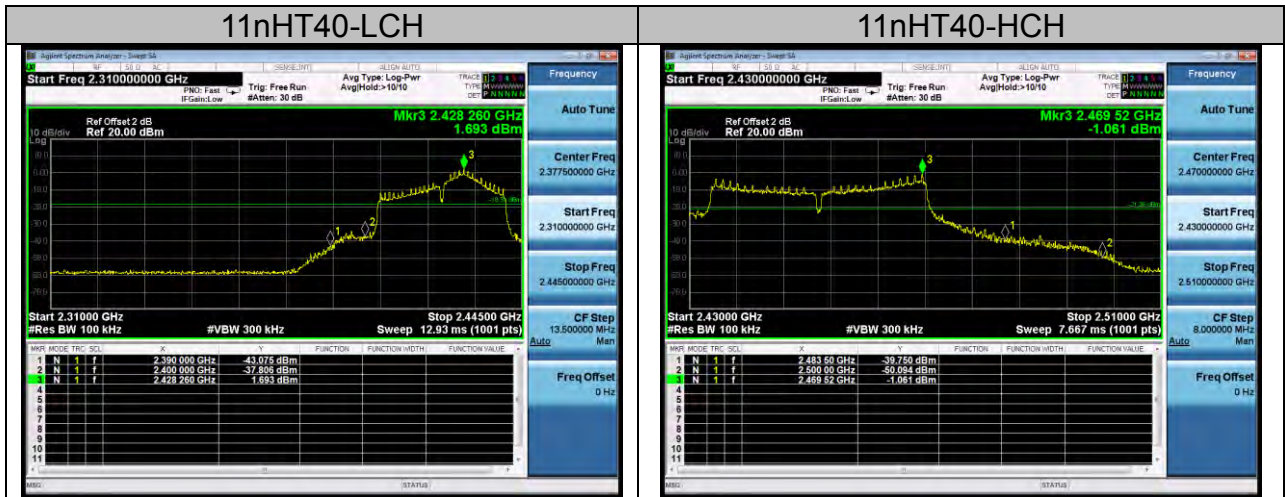
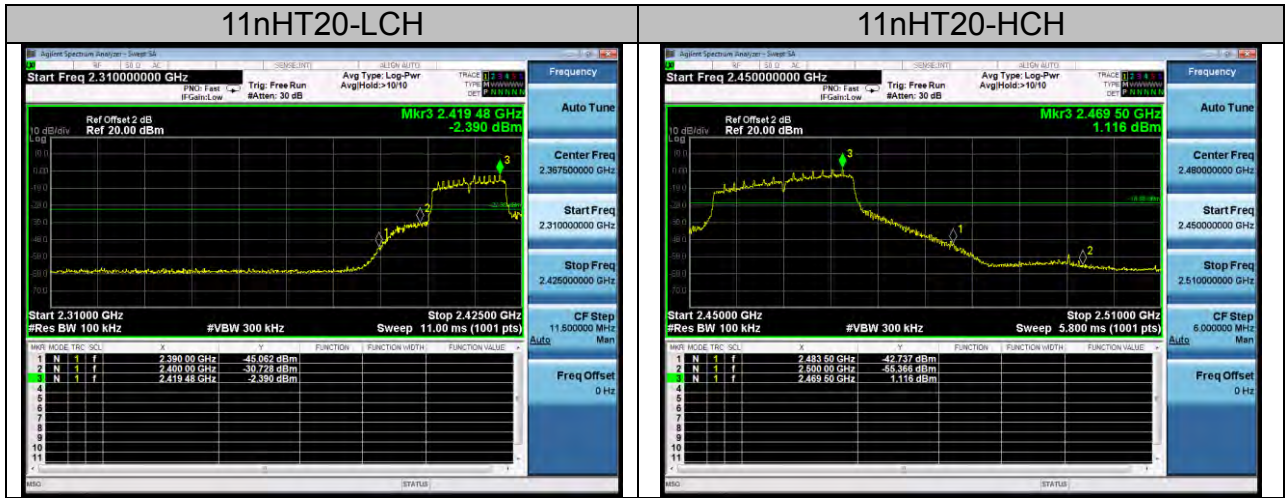
Margin= Emission Level -Limit.

The "Factor" value can be calculated automatically by software of measurement system.

## 12.4. Conducted Test Result

### Test Graph





### 13. FCC LINE CONDUCTED EMISSION TEST

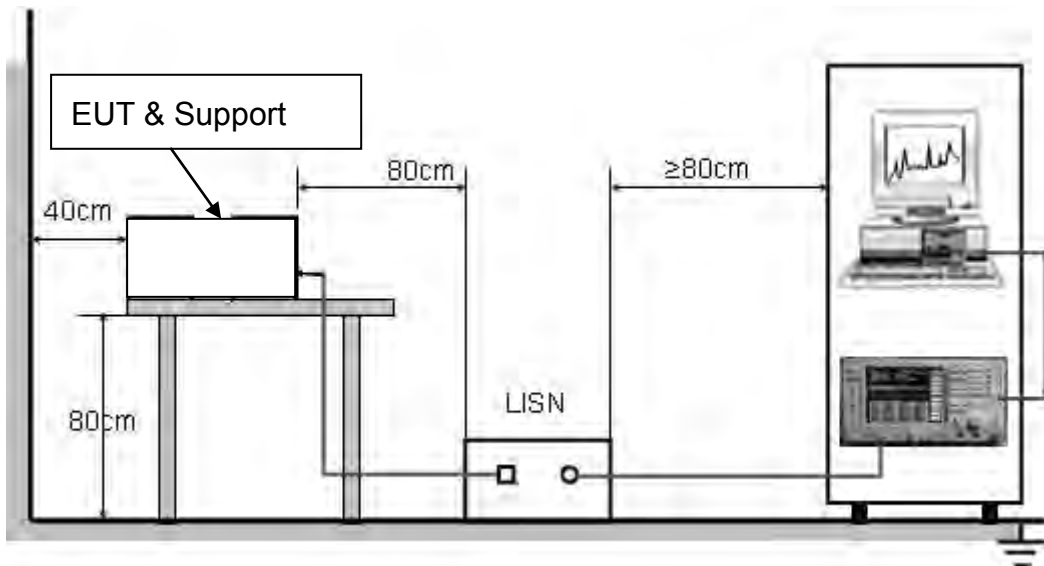
#### 13.1. LIMITS OF LINE CONDUCTED EMISSION TEST

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/60Hz power 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.

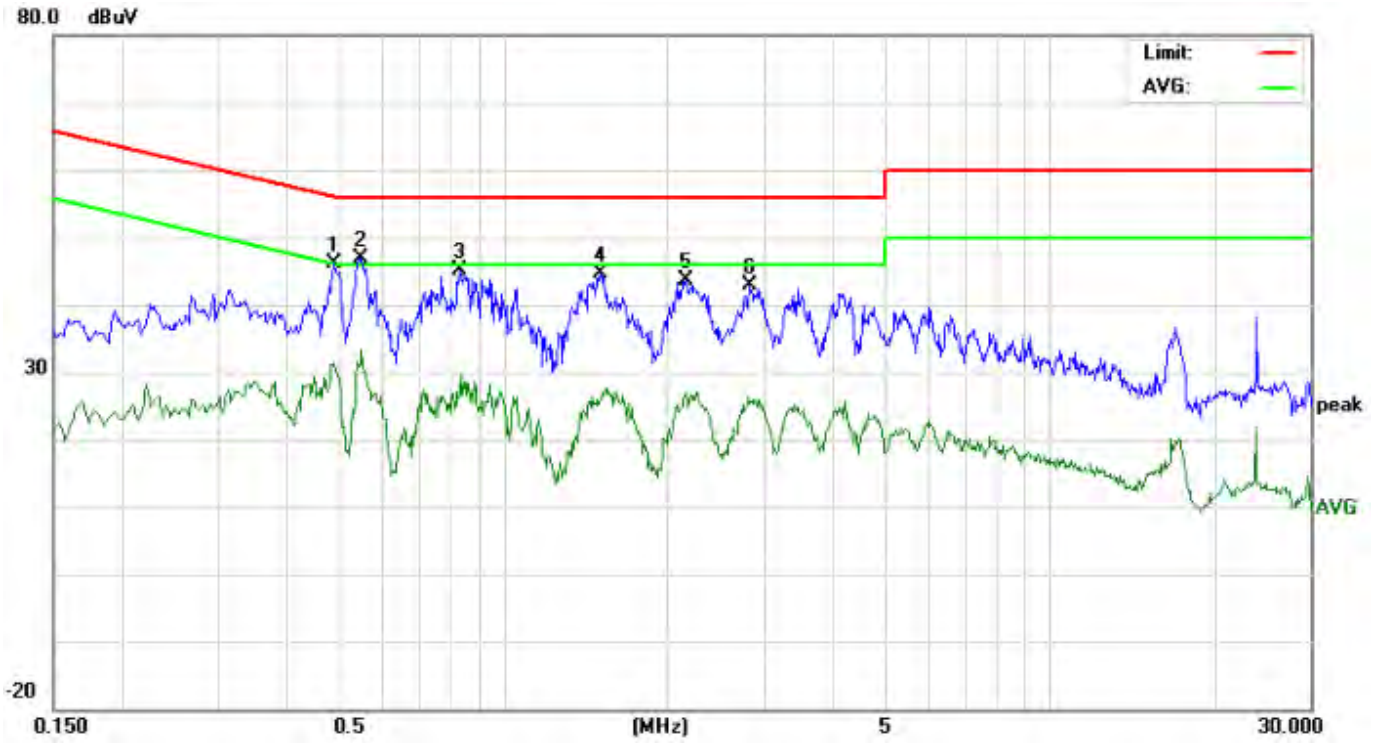
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

### **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.

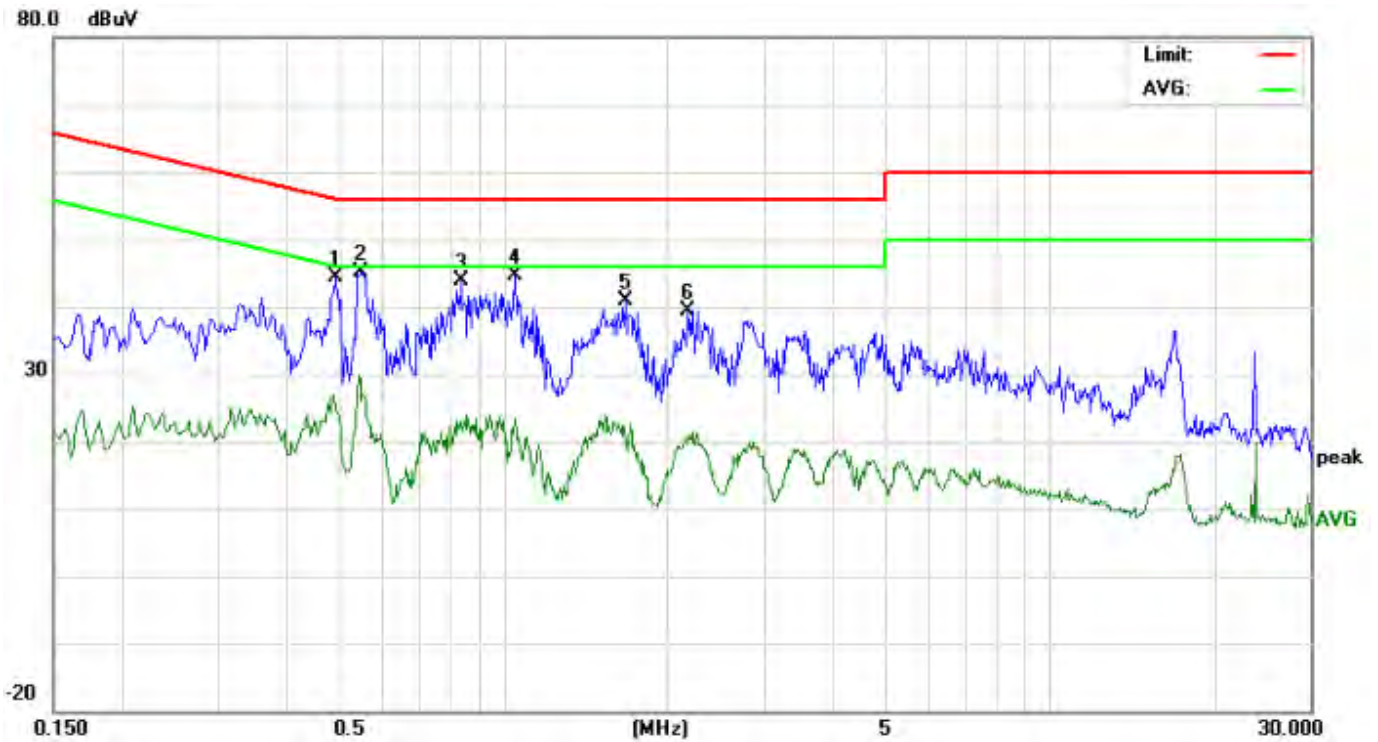
13.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

LINE CONDUCTED EMISSION TEST LINE 1-L



No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor (dB)	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.4900	35.63		21.03	10.39	46.02		31.42	56.17	46.17	-10.15	-14.75	P	
2	0.5500	36.63		22.97	10.35	46.98		33.32	56.00	46.00	-9.02	-12.68	P	
3	0.8340	34.88		16.95	10.32	45.20		27.27	56.00	46.00	-10.80	-18.73	P	
4	1.5060	34.17		15.80	10.38	44.55		26.18	56.00	46.00	-11.45	-19.82	P	
5	2.1660	33.25		16.61	10.29	43.54		26.90	56.00	46.00	-12.46	-19.10	P	
6	2.8300	32.43		14.79	10.51	42.94		25.30	56.00	46.00	-13.06	-20.70	P	

Line Conducted Emission Test Line 2-N



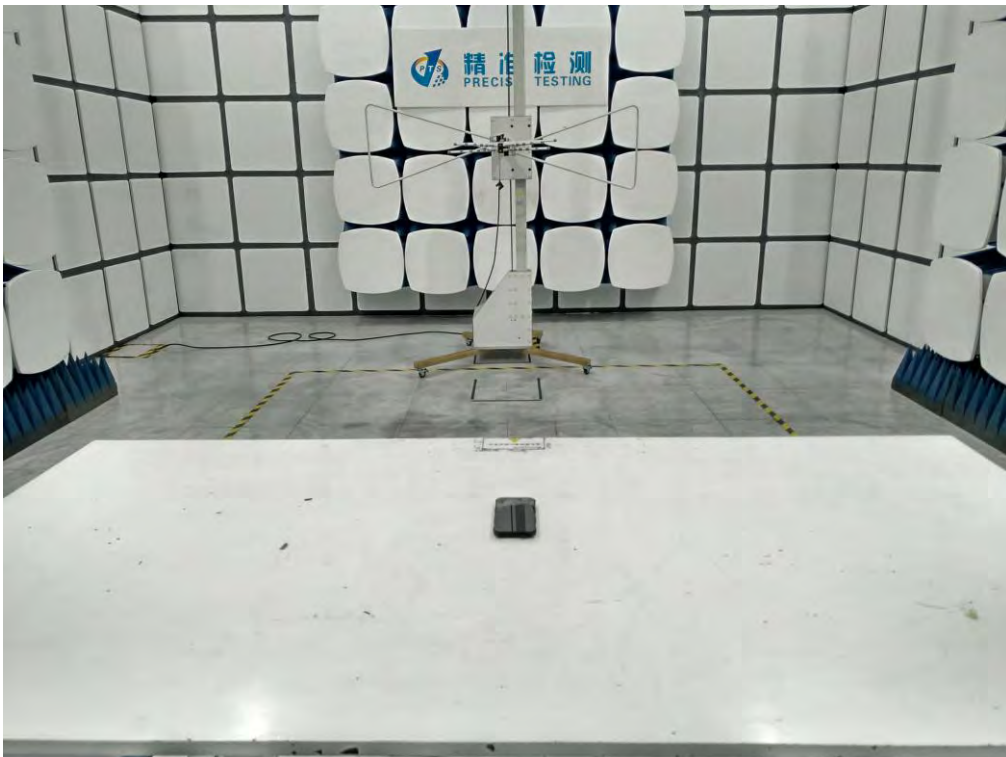
No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor (dB)	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.4940	33.93		14.25	10.40	44.33		24.65	56.10	46.10	-11.77	-21.45	P	
2	0.5500	34.89		15.88	10.35	45.24		26.23	56.00	46.00	-10.76	-19.77	P	
3	0.8380	33.62		12.74	10.33	43.95		23.07	56.00	46.00	-12.05	-22.93	P	
4	1.0540	34.16		13.11	10.37	44.53		23.48	56.00	46.00	-11.47	-22.52	P	
5	1.6780	30.44		9.79	10.32	40.76		20.11	56.00	46.00	-15.24	-25.89	P	
6	2.1860	29.20		9.36	10.30	39.50		19.66	56.00	46.00	-16.50	-26.34	P	

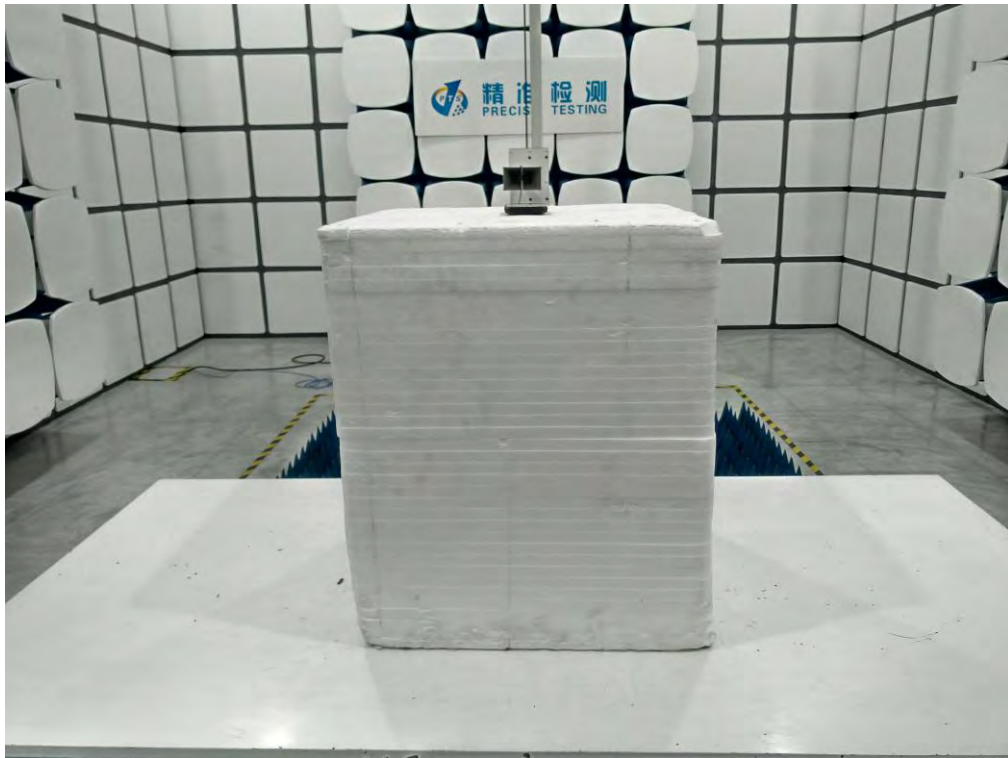
## APPENDIX A: PHOTOGRAPHS OF TEST SETUP

### LINE CONDUCTED EMISSION TEST SETUP



RADIATED EMISSION TEST SETUP





----END OF REPORT----