

#### 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 produced 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

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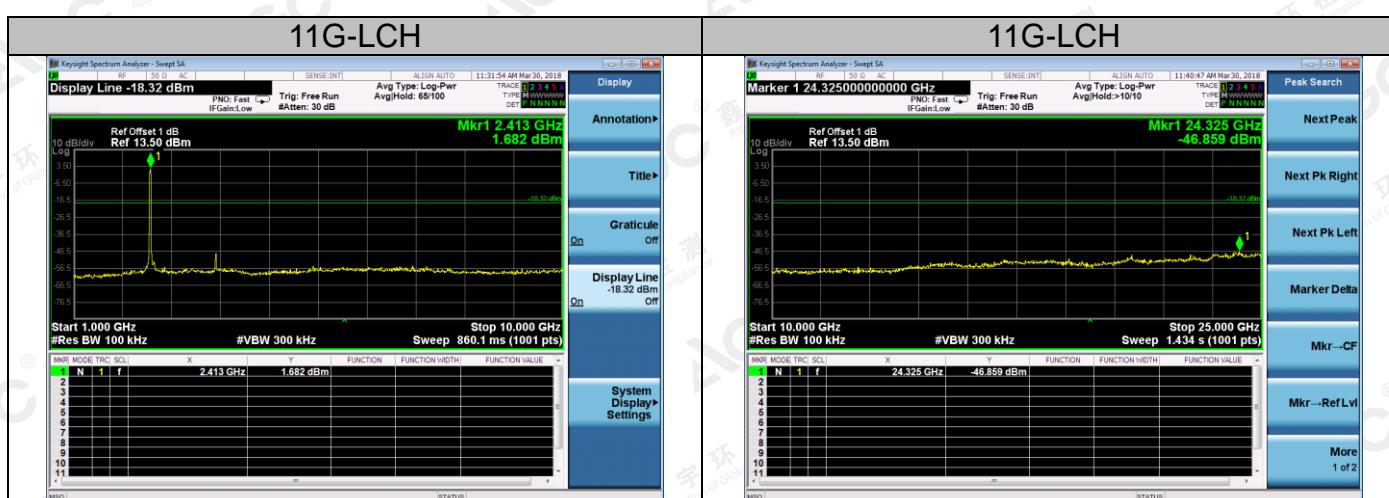
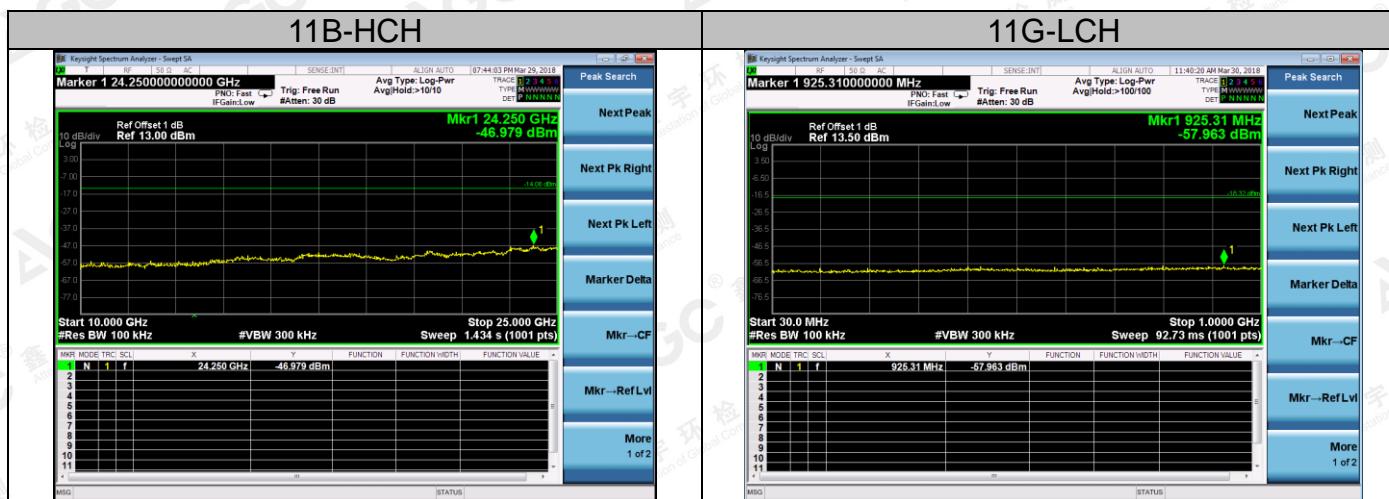
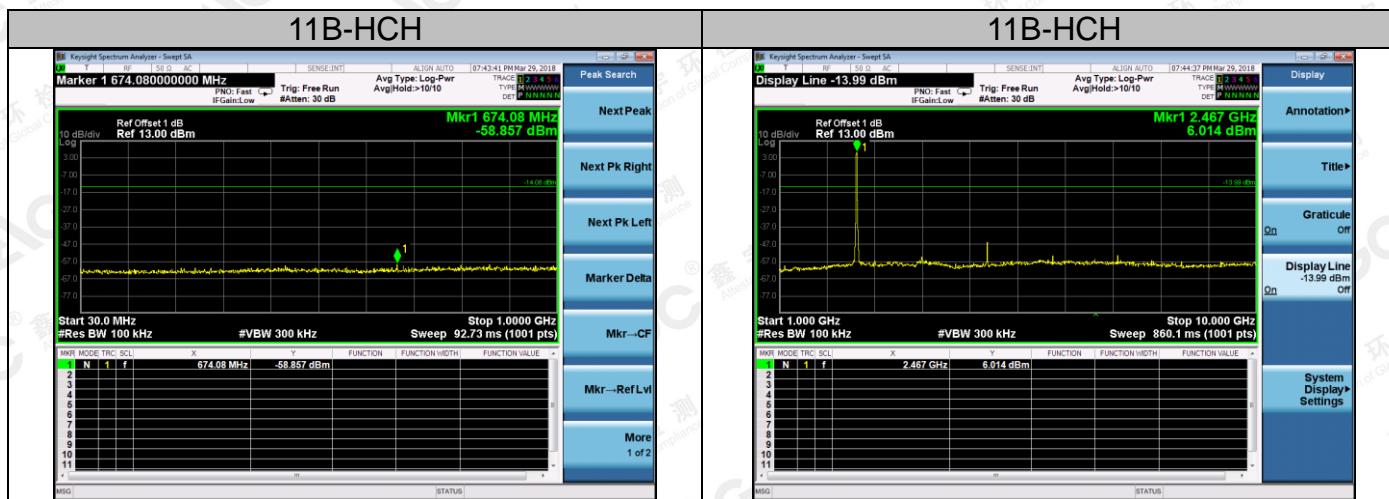
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## Test Graph



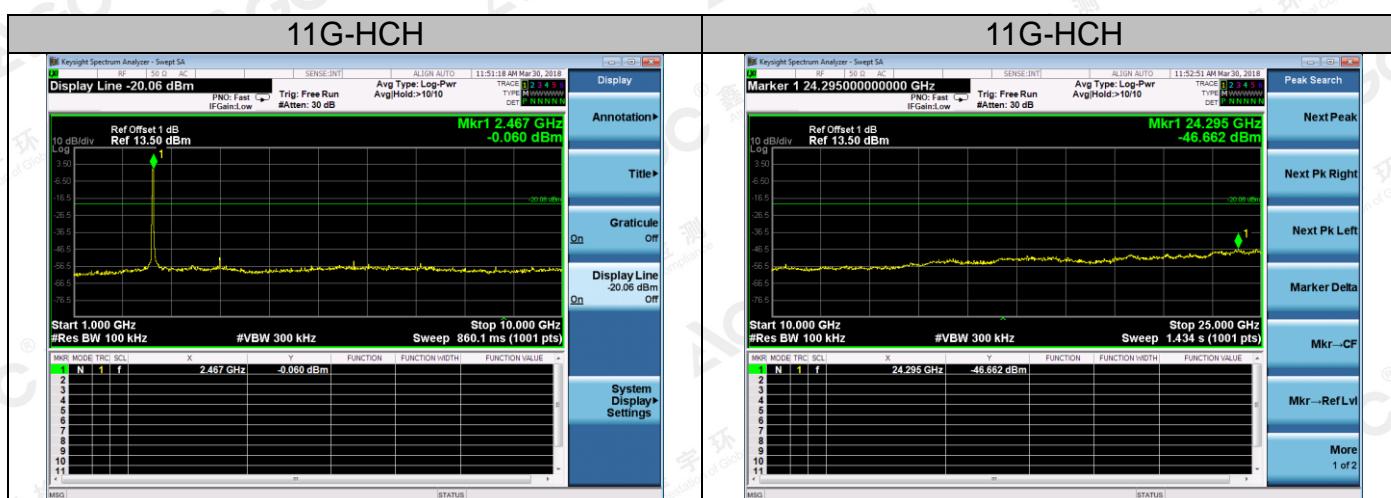
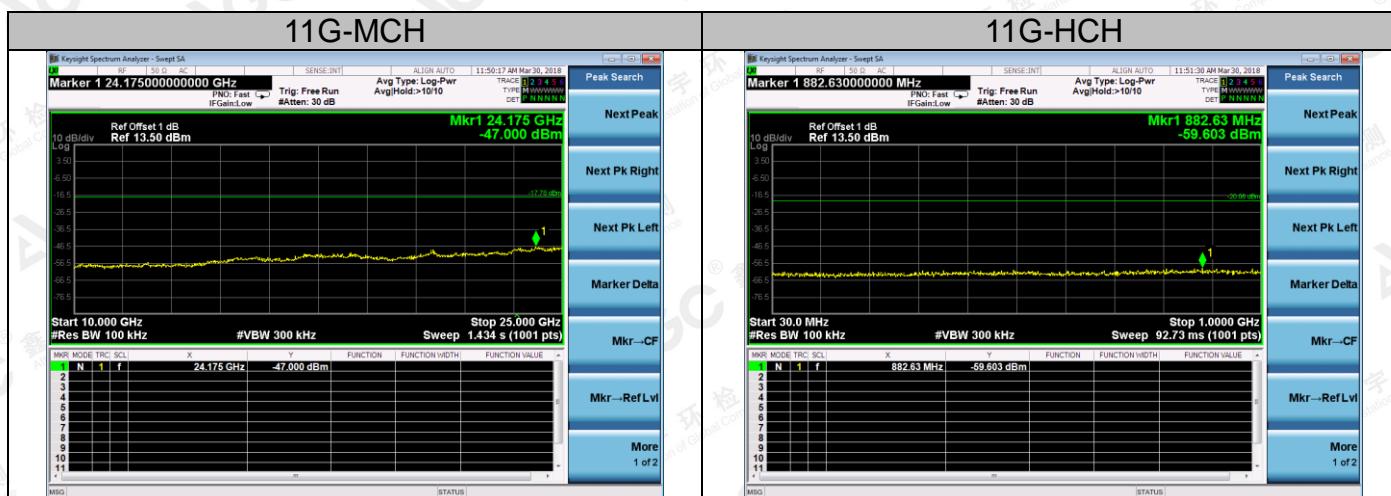
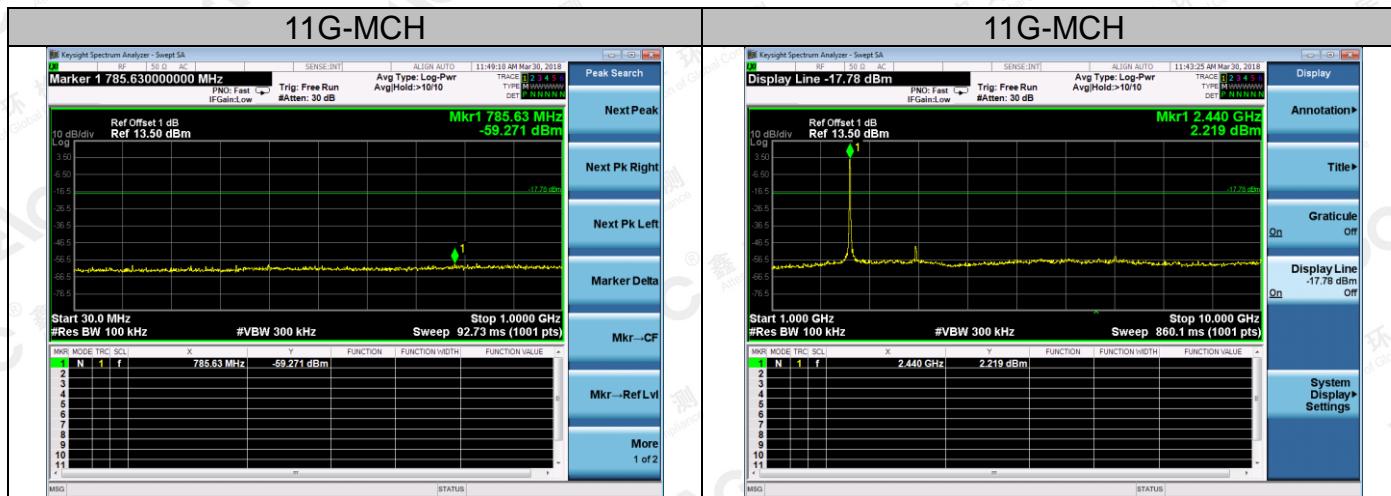
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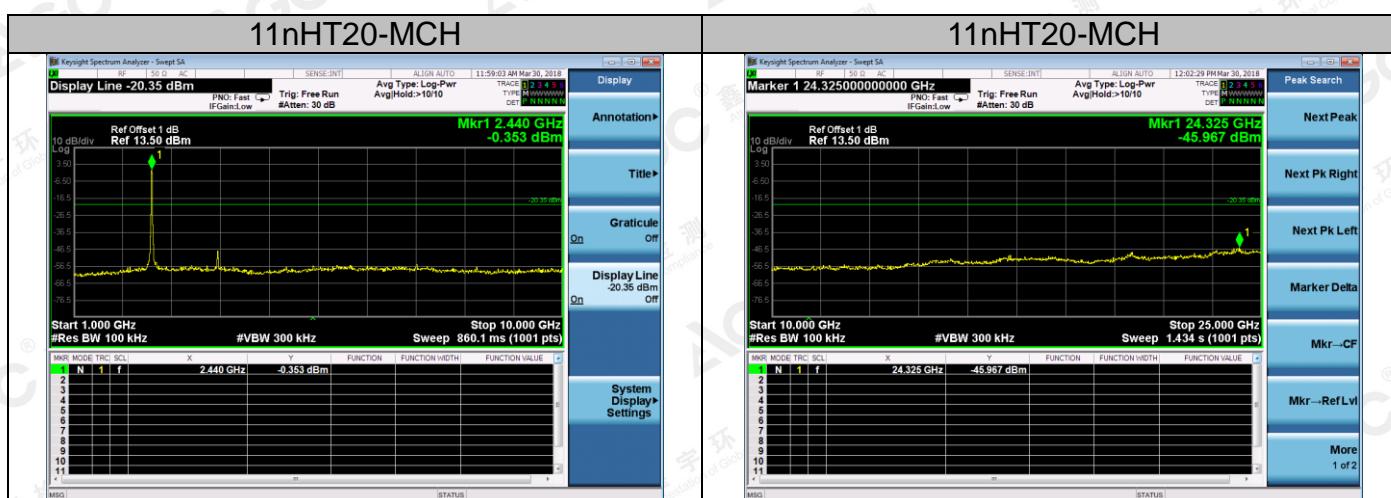
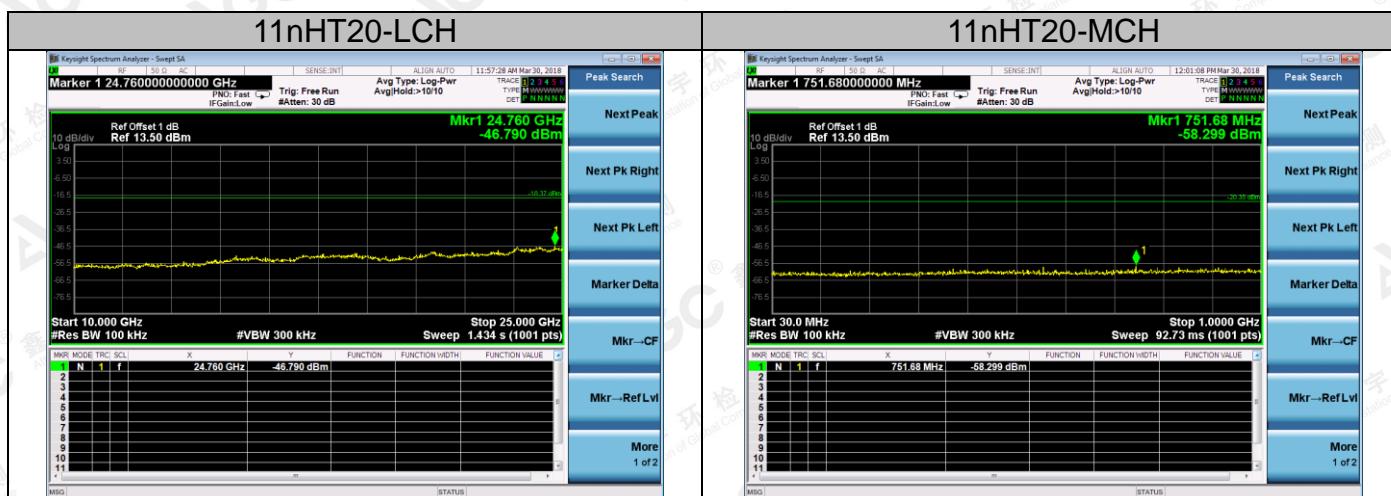
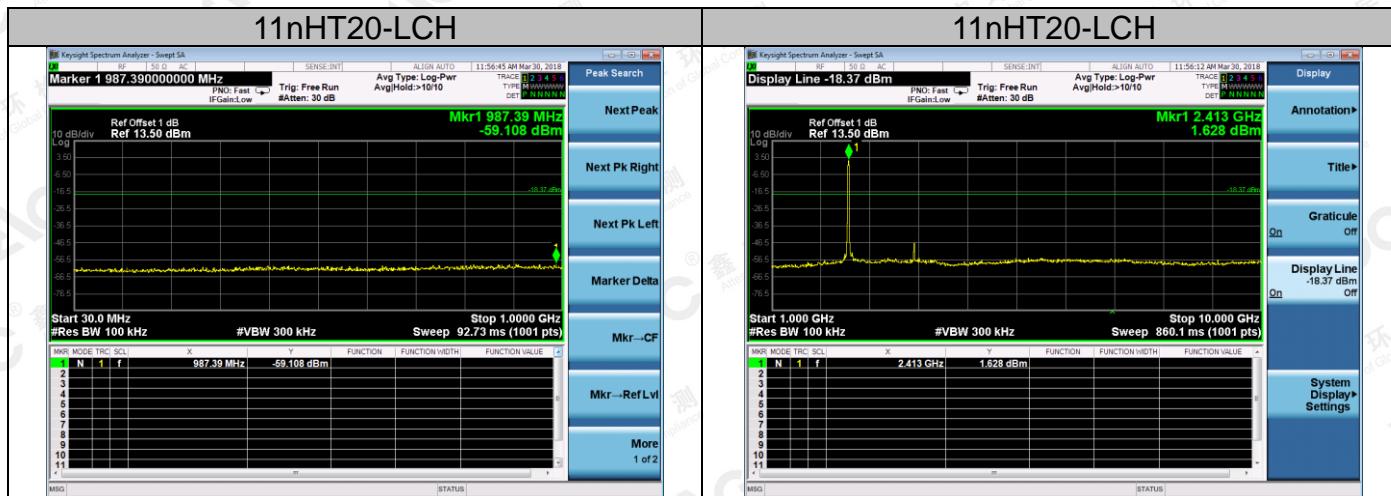
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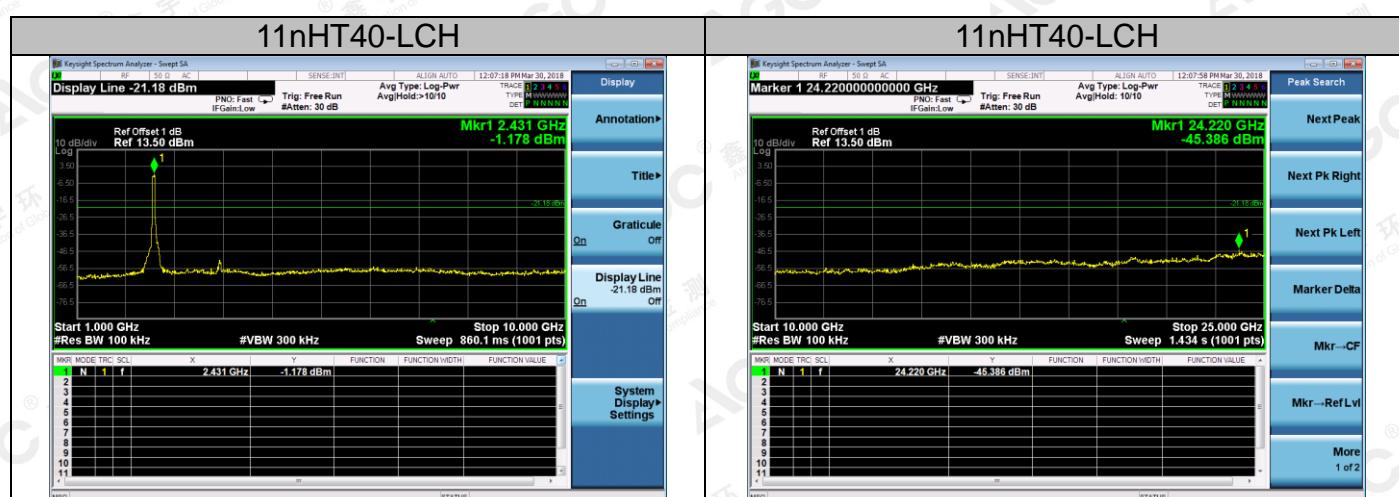
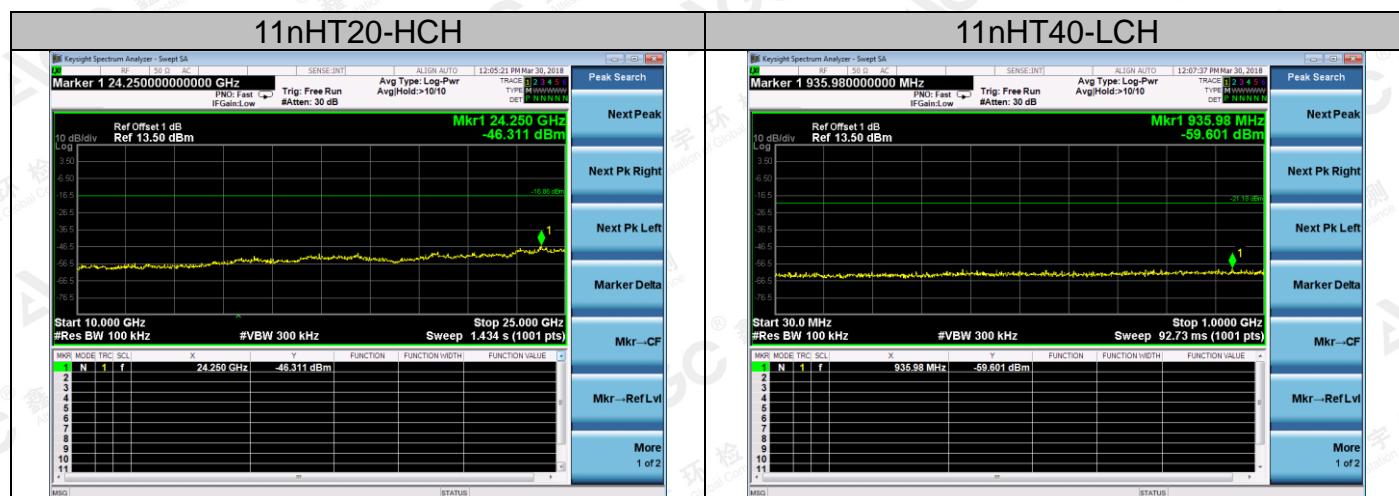
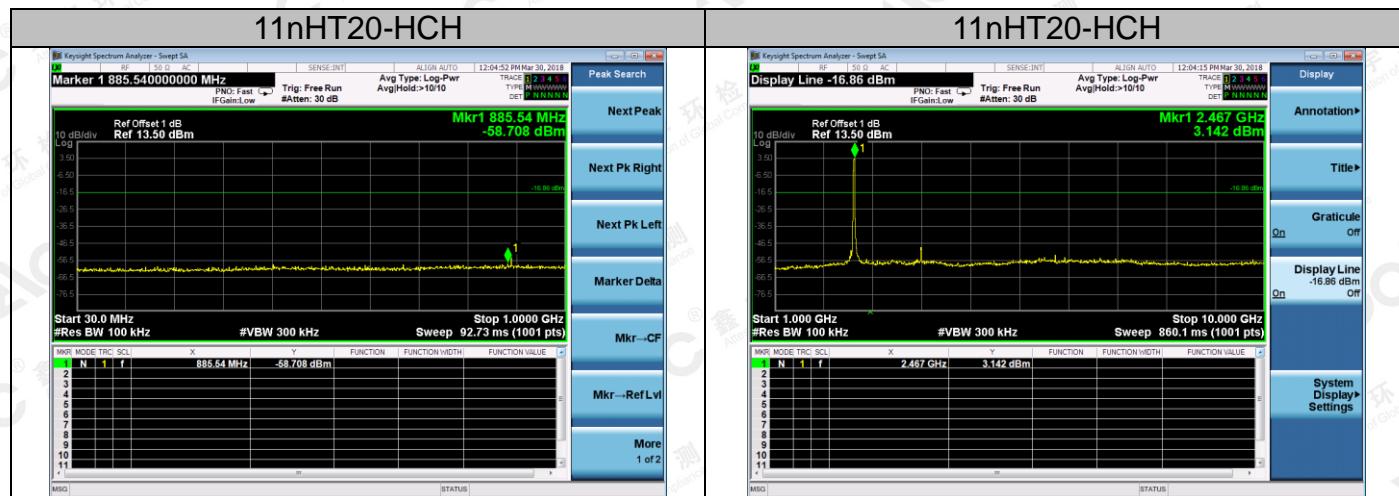
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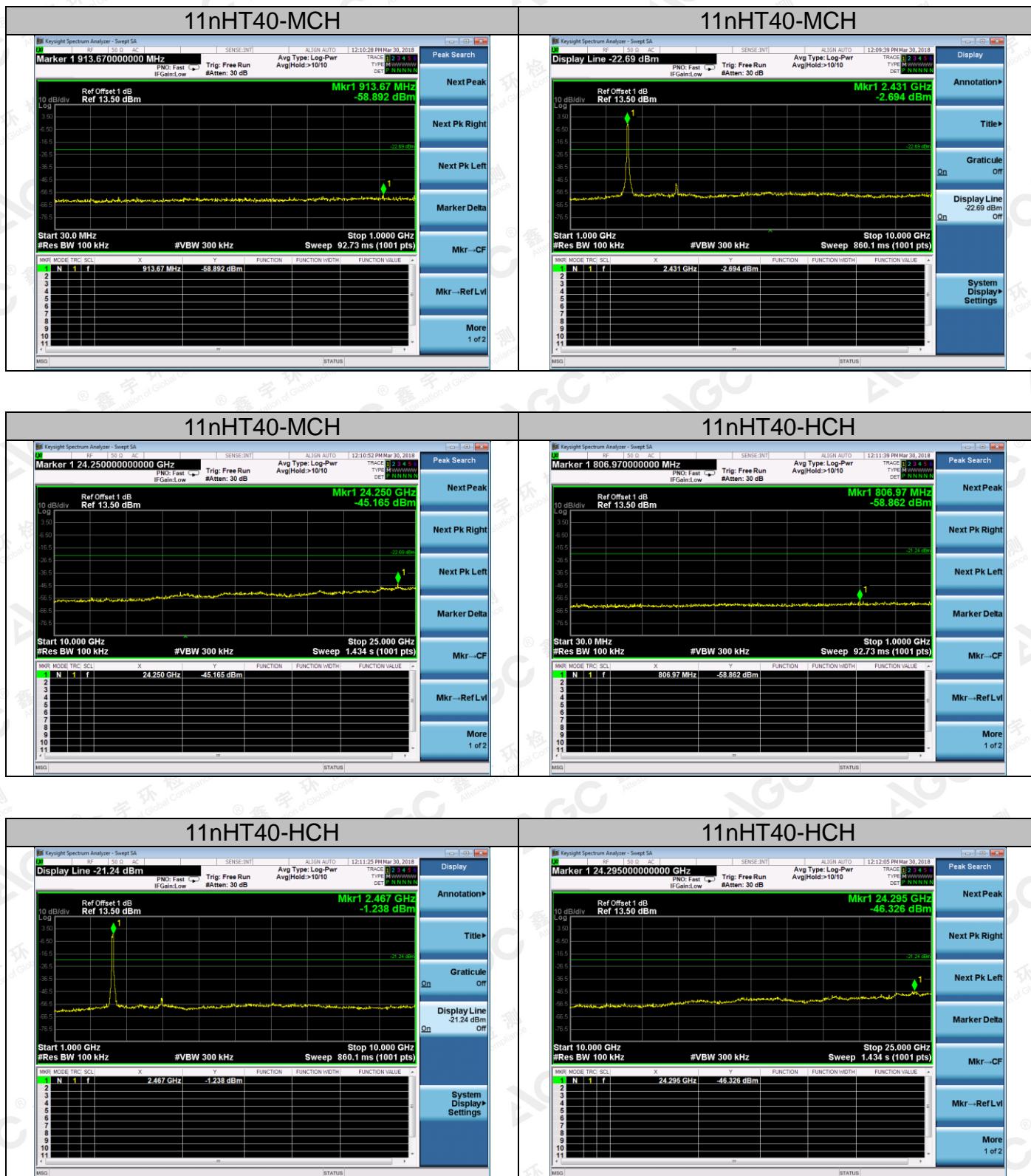
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## 10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

### 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.



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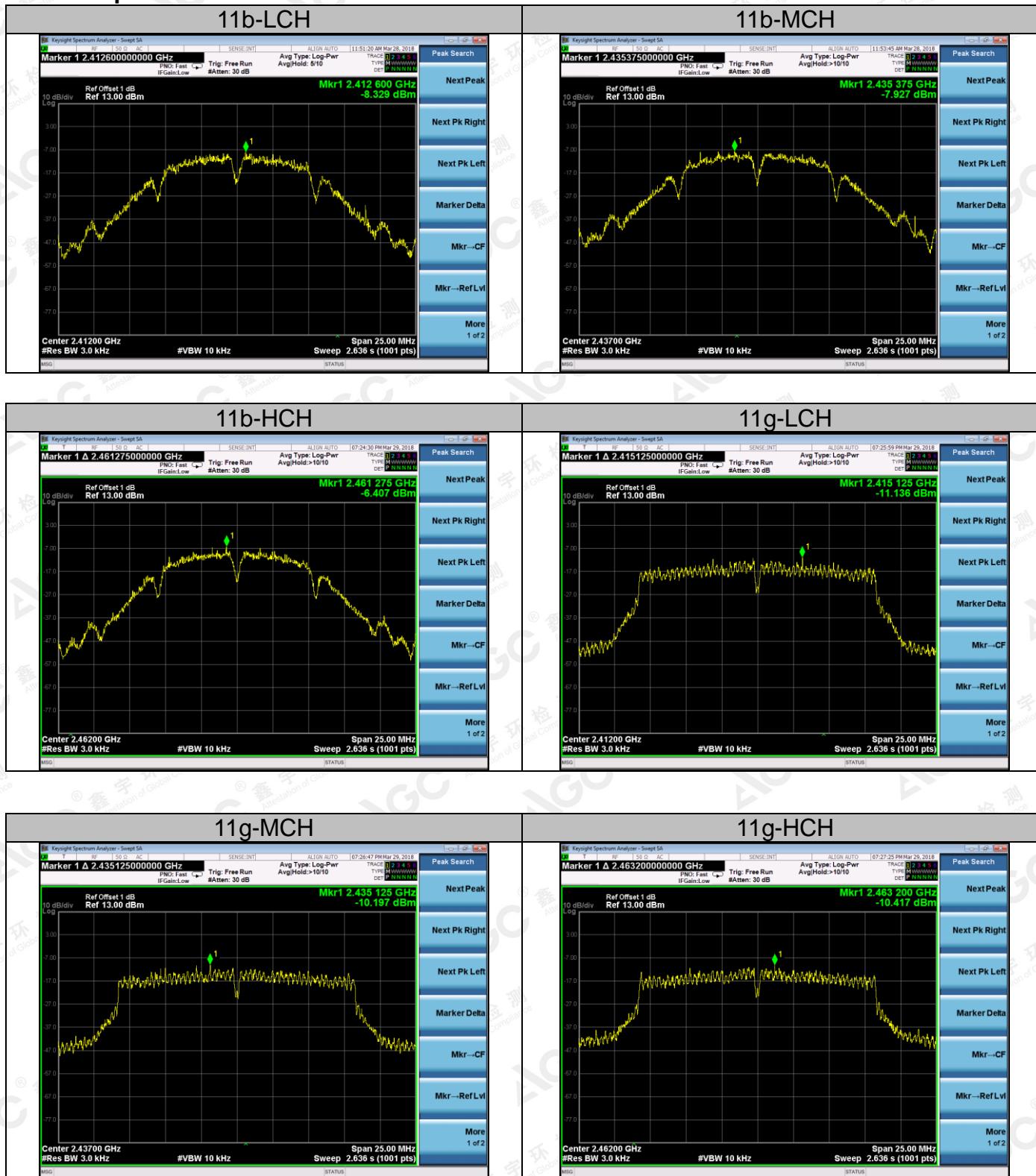
#### 10.4 LIMITS AND MEASUREMENT RESULT

Mode	Channel	PSD [dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11b	LCH	-8.329	8	PASS
	MCH	-7.927	8	PASS
	HCH	-6.407	8	PASS
11g	LCH	-11.136	8	PASS
	MCH	-10.197	8	PASS
	HCH	-10.417	8	PASS
11nHT20	LCH	-11.695	8	PASS
	MCH	-11.136	8	PASS
	HCH	-10.986	8	PASS
11NHT40	LCH	-14.073	8	PASS
	MCH	-13.901	8	PASS
	HCH	-12.974	8	PASS

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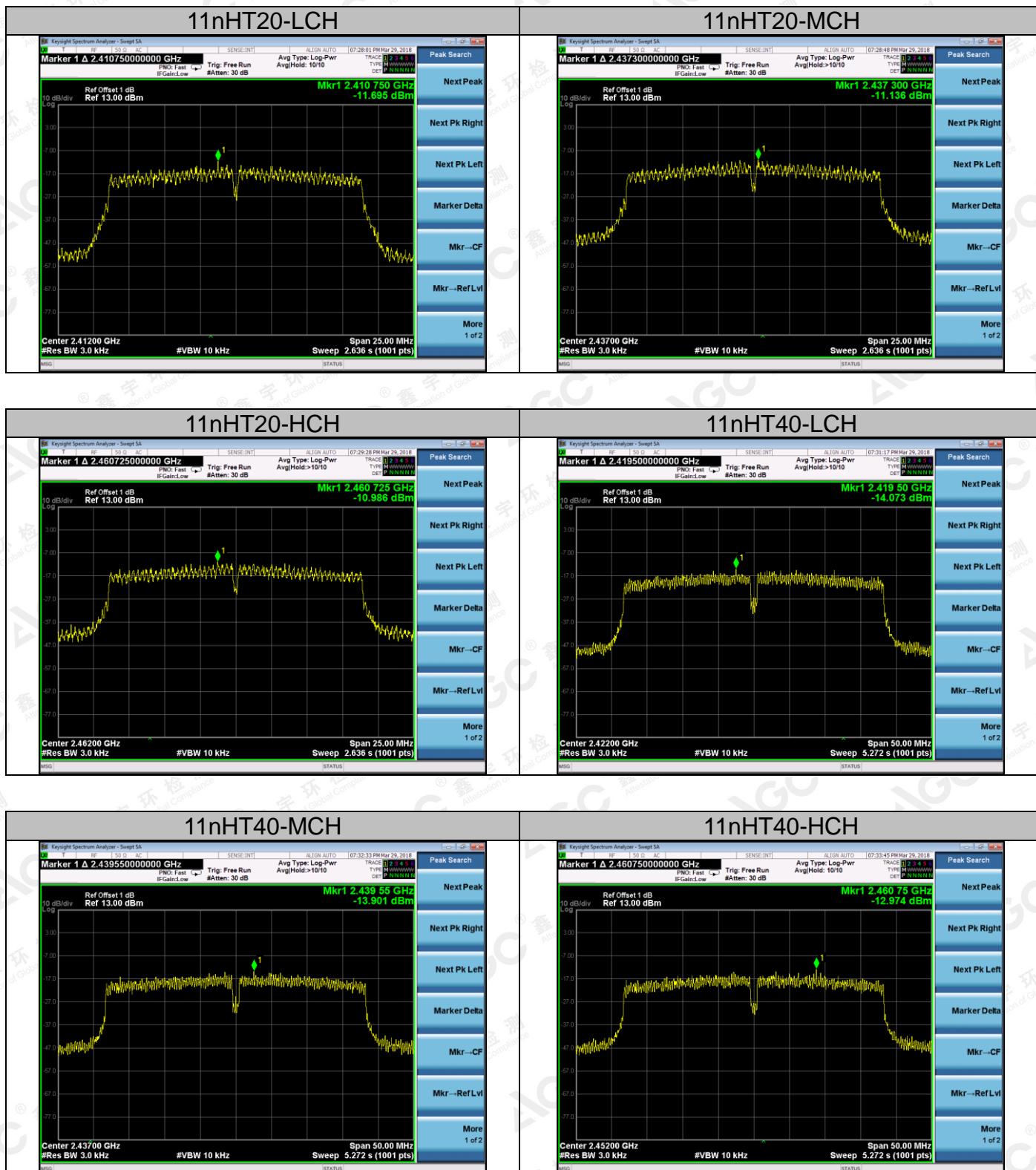


## Test Graph



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## 11. RADIATED EMISSION

### 11.1. MEASUREMENT PROCEDURE

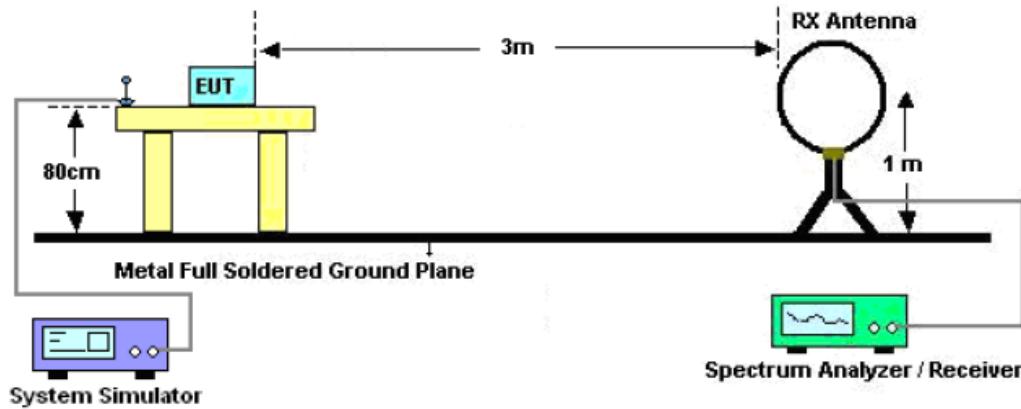
1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated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

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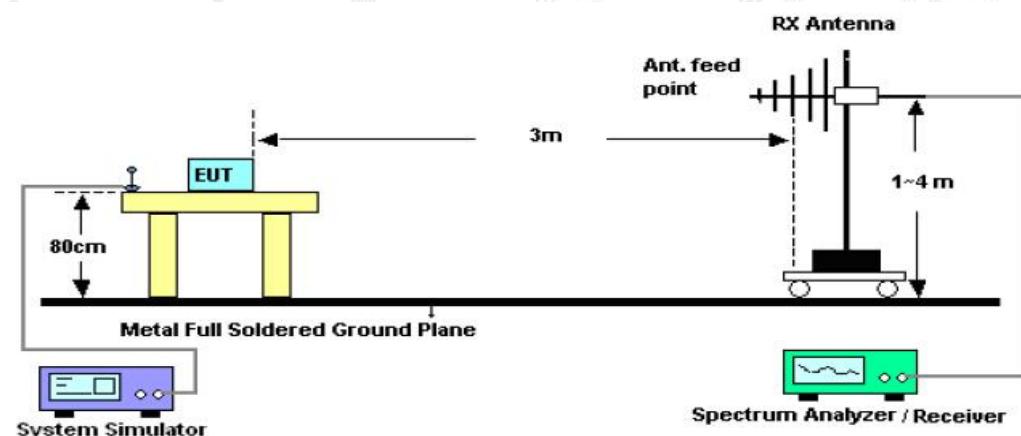


## 11.2. TEST SETUP

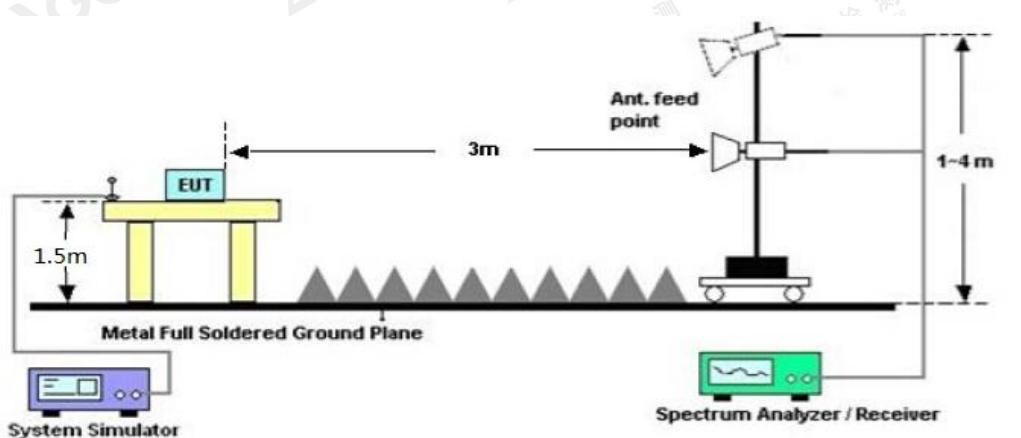
### Radiated Emission Test-Setup Frequency Below 30MHz



### RADIATED EMISSION TEST SETUP 30MHz-1000MHz



### RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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### 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.

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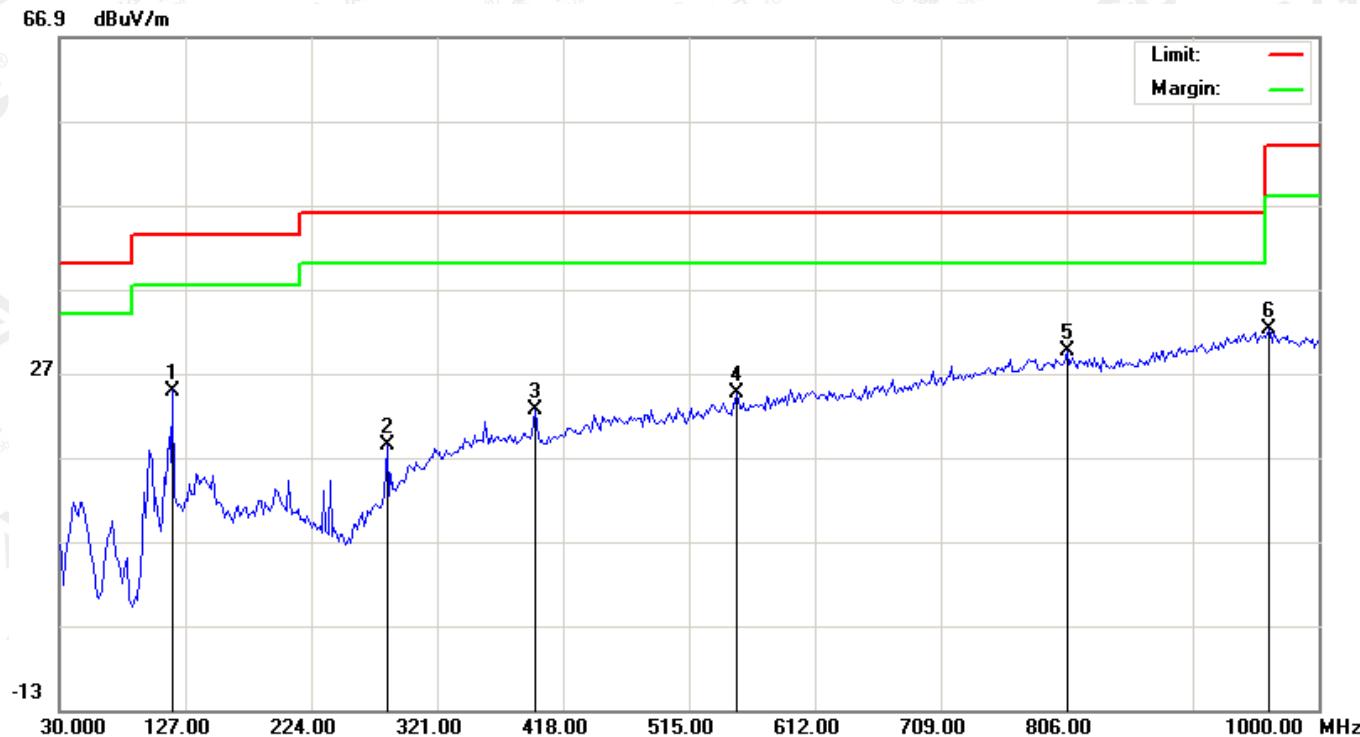
## 11.4. TEST RESULT

### 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		117.3000	18.42	6.48	24.90	43.50	-18.60	peak			
2		282.2000	5.94	12.38	18.32	46.00	-27.68	peak			
3		396.9833	3.51	19.05	22.56	46.00	-23.44	peak			
4		552.1833	2.11	22.53	24.64	46.00	-21.36	peak			
5	*	806.0000	2.30	27.32	29.62	46.00	-16.38	peak			
6		961.2000	2.23	29.89	32.12	54.00	-21.88	peak			

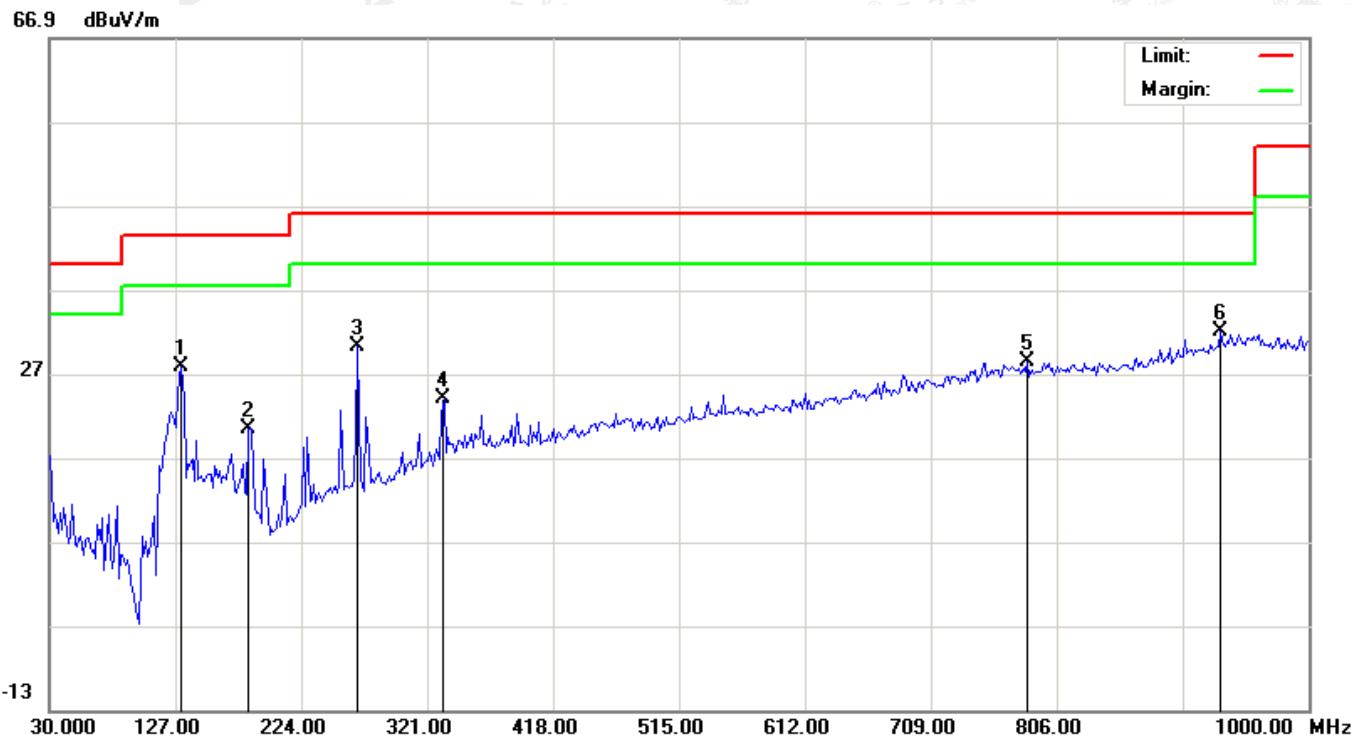
**RESULT: PASS**

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



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dB <sub>UV</sub>	dB/m	dB <sub>UV</sub> /m	dB <sub>UV</sub> /m	dB		cm	degree	
1		131.8499	16.04	11.80	27.84	43.50	-15.66	peak			
2		183.5833	7.23	13.16	20.39	43.50	-23.11	peak			
3		267.6499	15.68	14.43	30.11	46.00	-15.89	peak			
4		333.9332	6.25	17.67	23.92	46.00	-22.08	peak			
5		783.3667	1.23	27.09	28.32	46.00	-17.68	peak			
6	*	932.1000	2.46	29.50	31.96	46.00	-14.04	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.

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**RADIATED EMISSION ABOVE 1GHZ**

Frequency (MHz)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type	Comment
TX 11b 2412MHz					
4824	48.88	74	-25.12	Pk	Horizontal
4824	34.51	54	-19.49	AV	Horizontal
7236	52.98	74	-21.02	pk	Horizontal
7236	38.37	54	-15.63	AV	Horizontal
4824	43.81	74	-30.19	Pk	Vertical
4824	25.81	54	-28.19	AV	Vertical
7236	48.63	74	-25.37	Pk	Vertical
7236	33.44	54	-20.56	AV	Vertical
TX 11b 2437MHz					
4874	47.87	74	-26.13	Pk	Horizontal
4874	41.64	54	-12.36	AV	Horizontal
7311	48.45	74	-25.55	Pk	Horizontal
7311	41.99	54	-12.01	AV	Horizontal
4874	48.97	74	-25.03	Pk	Vertical
4874	42.64	54	-11.36	AV	Vertical
7311	49.86	74	-24.14	Pk	Vertical
7311	41.97	54	-12.03	AV	Vertical
TX 11b 2462MHz					
4924	48.88	74	-25.12	Pk	Horizontal
4924	41.85	54	-12.15	AV	Horizontal
7386	48.64	74	-25.36	Pk	Horizontal
7386	41.37	54	-12.63	AV	Horizontal
4924	47.79	74	-26.21	Pk	Vertical
4924	41.68	54	-12.32	AV	Vertical
7386	49.79	74	-24.21	Pk	Vertical
7386	41.45	54	-12.55	AV	Vertical

**RESULT: PASS**
**Note:**

- 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).

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## 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

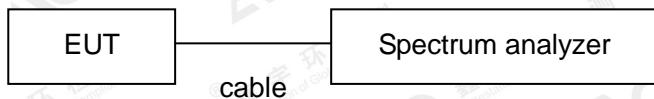
#### 2) Conducted Emissions at the band edge

- 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



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### 12.3. RADIATED TEST RESULT

Frequency (MHz)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type	Comment
TX 11b 2412MHz					
2399.9	48.89	74	-25.11	pk	Horizontal
2399.9	42.08	54	-11.92	AV	Horizontal
2400	49.28	74	-24.72	pk	Horizontal
2400	41.69	54	-12.31	AV	Horizontal
2399.9	47.81	74	-26.19	pk	Vertical
2399.9	41.07	54	-12.93	AV	Vertical
2400	49.09	74	-24.91	pk	Vertical
2400	41.20	54	-12.80	AV	Vertical
TX 11b 2462MHz					
2483.5	49.41	74	-24.59	pk	Horizontal
2483.5	42.37	54	-11.63	AV	Horizontal
2483.6	47.53	74	-26.47	pk	Horizontal
2483.6	41.44	54	-12.56	AV	Horizontal
2483.5	47.52	74	-26.48	pk	Vertical
2483.5	42.61	54	-11.39	AV	Vertical
2483.6	48.39	74	-25.61	pk	Vertical
2483.6	40.13	54	-13.87	AV	Vertical

### RESULT: PASS

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

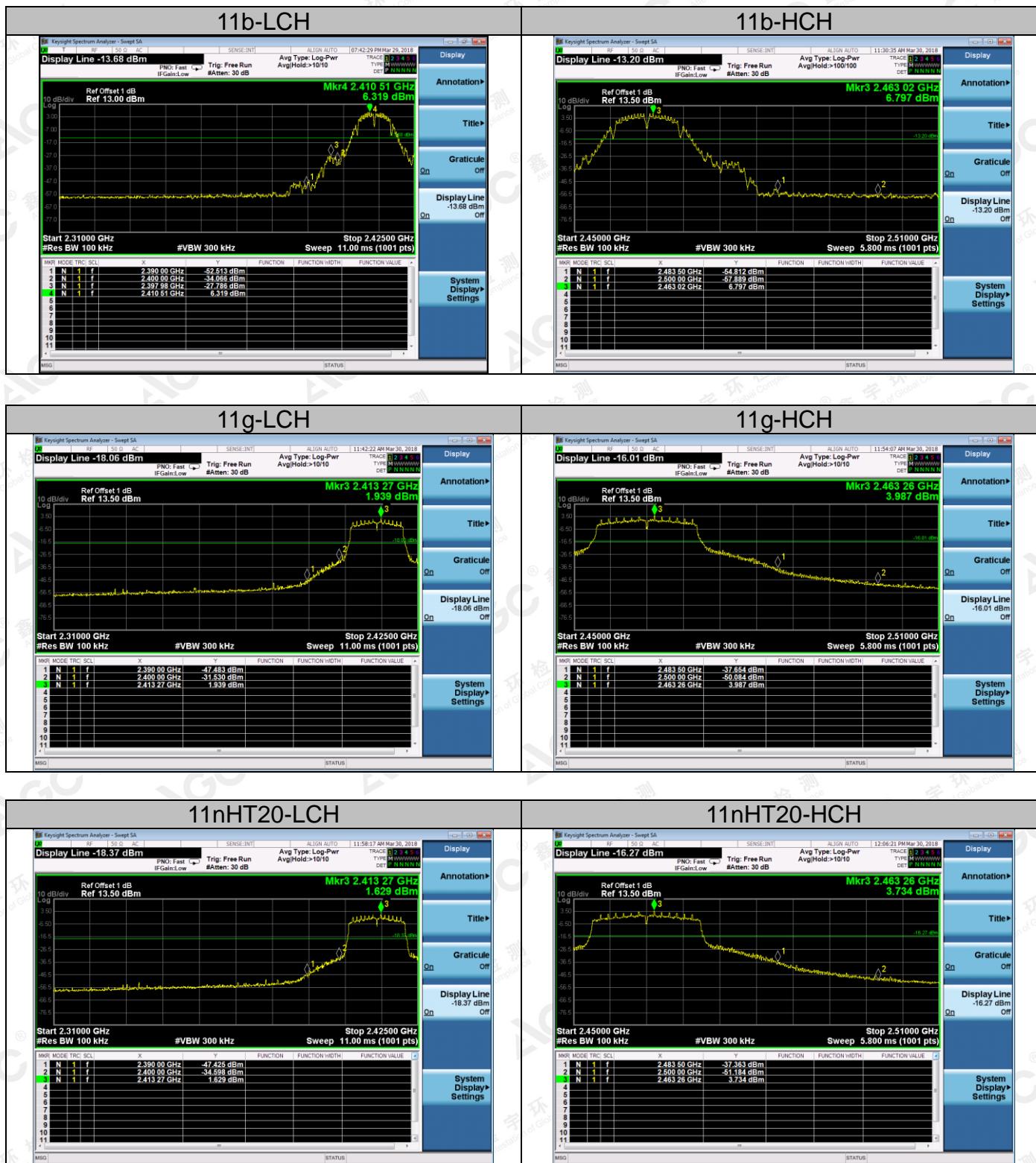
Margin= Emission Level -Limit.

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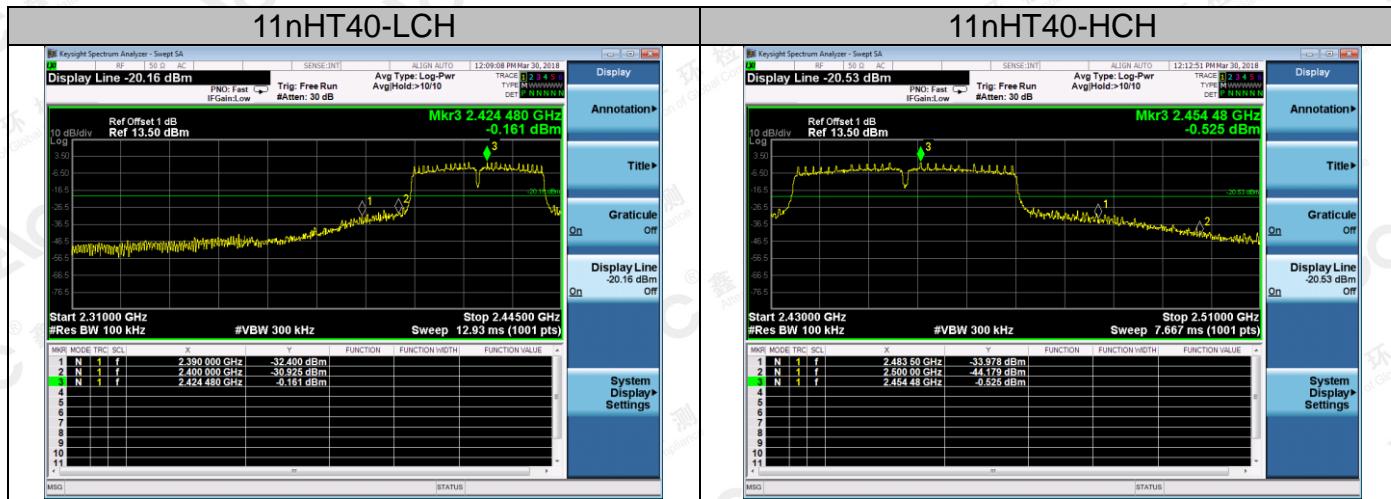
## 12.4. CONDUCTED TEST RESULT

### Test Graph



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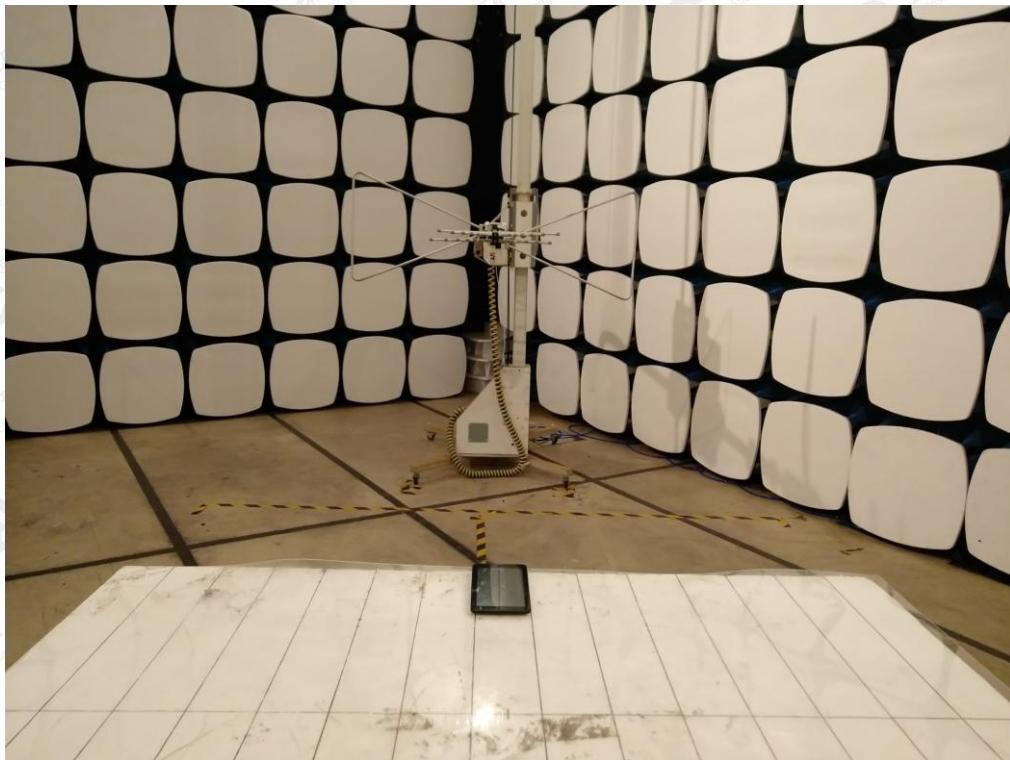


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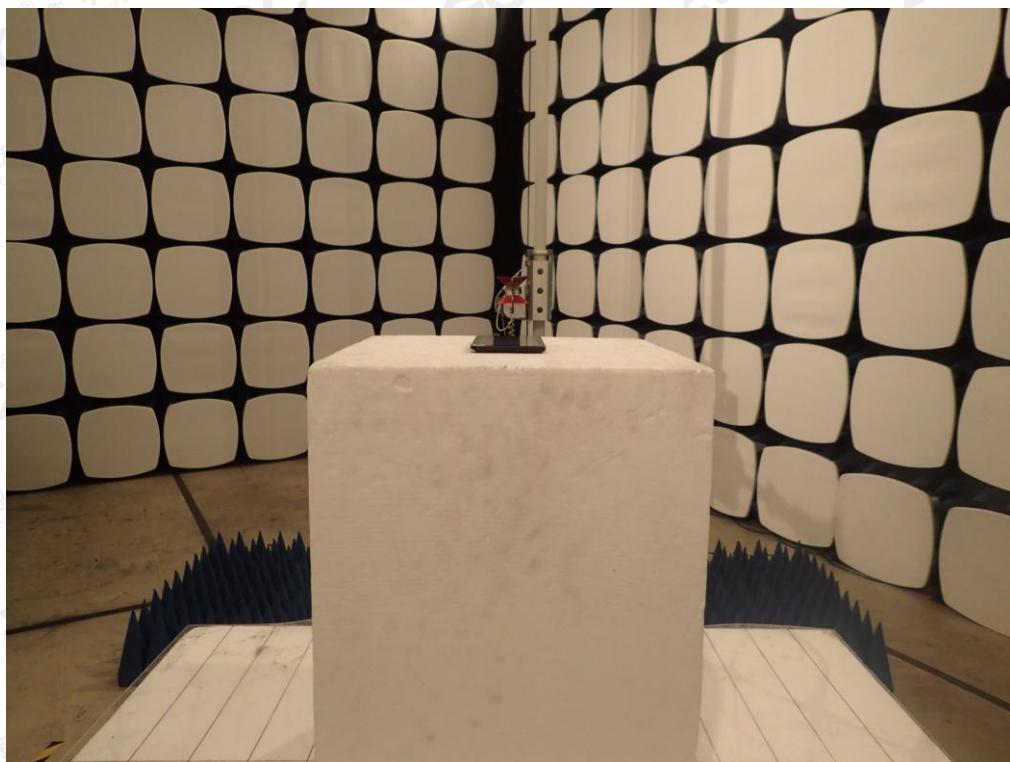
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## APPENDIX A: PHOTOGRAPHS OF TEST SETUP

### RADIATED EMISSION TEST SETUP



RADIATED EMISSION ABOVE 1G TEST SETUP



----END OF REPORT----

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