FCC Part 15, Subpart C

Test Report

FCC ID:	2AR2STAB8507RE
Applicant:	MMD Hong Kong Holding Limited
Address:	Unit 1006, 10th Floor, C-Bons International Center, 108 Wai Yip Street, Kwun Tong, Kowloon, Hong Kong
Manufacturer:	MMD Hong Kong Holding Limited
Address:	Unit 1006, 10th Floor, C-Bons International Center, 108 Wai Yip Street, Kwun Tong, Kowloon, Hong Kong
Product(s):	Soundbar speaker
Brand(s):	PHILIPS or
Test Model(s):	TAB8507
Series Model(s):	See section 2.1
Test Date:	Apr. 06, 2022 ~ Apr. 25, 2022
Issued Date:	May 17, 2022
Issued By:	Hwa-Hsing (Dongguan) Testing Co., Ltd.
Address:	No.101, Bld. N1, Yuyuan 2Rd, Yuyuan Industrial Park, HuangJiang Town, Dongguan, China
Test Firm Registration No.:	915896
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.249) ANSI C63.10:2013

The above equipment has been tested by **Hwa-Hsing (Dongguan) Testing Co., Ltd.**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Tank Tan — *Tank Tan*

Reviewed by : Scott He — *Scott He*

Approved by : — *Harry Li*

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Release Control Record

Issue No.	Description	Date Issued
220218KH01-1-RF-US-04	Original Release	May 17, 2022

1. Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.249) ANSI C63.10:2013			
Clause	Test Item	Result	Remarks
§15.203	Antenna Requirement	Pass	Meet the requirement of limit.
§15.207 (a)	Conducted Emission	Pass	Meet the requirement of limit.
§15.205	Restricted Band of Operation	Pass	Meet the requirement of limit.
§15.209 §15.249(a)	Radiated Emission	Pass	Meet the requirement of limit.
§15.215(c)	20dB Bandwidth Test	Pass	Meet the requirement of limit.

Note: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

1.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

The listed uncertainties are the worst cases uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.66 dB
Radiated Emissions up to 1 GHz	9KHz ~ 30MHz	2.16 dB
	30MHz ~ 1000MHz	3.47 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	4.84 dB
	18GHz ~ 40GHz	4.67 dB

1.2 Modification Record

There were no modifications required for compliance.

2. General Information

2.1 General Description of EUT

Product(s)	Soundbar speaker	
Test Model(s)	TAB8507	
Sample No.	HS220311-02-07; HS220311-02-09	
Series Model(s)	TAB8507B, TAB8507RE, TAB8507BRE, TAB8507/10, TAB8507B/10, TAB8507RE/10, TAB8507BRE/10, TAB8507/37, TAB8507B/37, TAB8507RE/37, TAB8507BRE/37, TAB8507/98, TAB8507B/98, TAB8507RE/98, TAB8507BRE/98, TAB8507xx/yy, TAB8507Bxx/yy (x=A-Z or blank, yy=00-99 or blank for country code)	
Status of EUT	Engineering prototype	
Power Supply Rating	100-240V~, 50/60Hz, 35W	
Modulation technology	GFSK	
Operating Frequency	5729~5850MHz	
Antenna Type	FPC Antenna	
Antenna Gain	3.0dBi	
Maximum Field strength	94.62dBuV/m	
RF Exposure Calculate	0.869mW	≤1mW Test Exemption by KDB 447498 D04
Antenna Connector	I-PEX	
Accessory Device	IR remote control	
Cable Supplied	AC Lines: 150cm	

Note:

1. Please refer to the EUT photo document (Reference No.: 220218KH01-1-01&-02) for detailed product photo.
2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.
3. Model difference: These models are only different for model name for trade purpose.

2.2 Channel listing:

Channel	Frequency MHz	Channel	Frequency MHz	Channel	Frequency MHz
1	5729	22	5771	43	5813
2	5731	23	5773	44	5815
3	5733	24	5775	45	5817
4	5735	25	5777	46	5819
5	5737	26	5779	47	5821
6	5739	27	5781	48	5823
7	5741	28	5783	49	5825
8	5743	29	5785	50	5827
9	5745	30	5787	51	5829
10	5747	31	5789	52	5831
11	5749	32	5791	53	5833
12	5751	33	5793	54	5835
13	5753	34	5795	55	5837
14	5755	35	5797	56	5839
15	5757	36	5799	57	5841
16	5759	37	5801	58	5843
17	5761	38	5803	59	5845
18	5763	39	5805	60	5847
19	5765	40	5807	61	5850
20	5767	41	5809		
21	5769	42	5811		

2.3 Test Mode Applicability and Tested Channel Detail

Applicable test items	X-Axis	Y-Axis	Z-Axis	Voltage Supply
AC Power Conducted Emission	N/A	N/A	N/A	AC120V/60Hz
Radiated Emissions	√	√	√	
Restricted Band of Operation	N/A	N/A	N/A	
20dB Bandwidth Test	N/A	N/A	N/A	
1. The EUT had been pre-tested on the positioned of each 3 Axis. 2. “N/A” means no effect.				

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Radiated Emission Test (Above 1GHz):

EUT Configure Mode	Tested Channel	Modulation Technology	Data Rate (Mbps)
TX	1; 31; 61	GFSK	1.0

Radiated Emission Test (Below 1GHz):

EUT Configure Mode	Tested Channel	Modulation Technology	Data Rate (Mbps)
TX	1	GFSK	1.0

Power Line Conducted Emission Test:

EUT Configure Mode	Tested Channel	Modulation Technology	Data Rate (Mbps)
TX	1; 31; 61	GFSK	1.0

Antenna Port Conducted Measurement:

EUT Configure Mode	Tested Channel	Modulation Technology	Data Rate (Mbps)
TX	1; 31; 61	GFSK	1.0

Test Condition:

Applicable test items	Environmental Conditions	Tested by
AC Power Conducted Emission	25deg. C, 65%RH	Jim Xu
Radiated Emissions	25deg. C, 65%RH	Jim Xu
Antenna Port Conducted Measurement	25deg. C, 65%RH	Dragon long

2.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

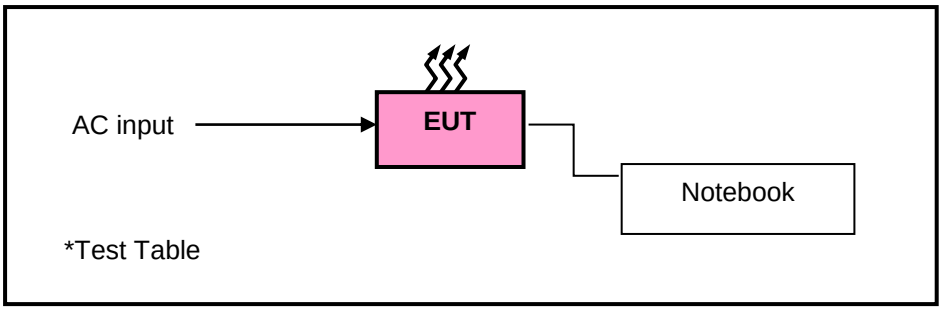
No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	N/A	N/A	N/A	N/A	N/A

Insert Cable Connections to/from EUT provided by test team.

No.	Signal Cable Description Of The Above Support Units
1.	N/A

2.5 Configuration of System under Test

WIRELESS TX/RX:



3. Test Types and Results

3.1 Radiated Emission and Band-edge Measurement

3.1.1 Limits of radiated emission and band-edge measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/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
* DTS emissions in non-restricted frequency bands Subclause 11.11 of ANSI C63.10 is applicable. * DTS emissions in restricted frequency bands Subclause 11.12 of ANSI C63.10 is applicable		

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (milli-volts/meter)	Field strength of harmonics (micro-volts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500
The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.		

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

3.1.2 Test Instruments

Radiated emission below 30MHz:

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR7	100962	2023-01-13
3m Semi-anechoic Chamber	MAORUI	9m*6m*6m	NSEMC003	2023-04-15*
Test software	FARAD	FARAD	EZ_EMCV1.1.4.2	N/A
Loop Antenna	EMCI	HLA 6121	56735	2023-04-15*
Preamplifier	EMCI	EMC001340	980201	2022-09-08
Antenna Tower	MF	MFA-440H	NA	NA
Turn Table	MF	MFT-201SS	NA	NA
Antenna Tower&Turn Table Controller	MF	MF-7802	NA	NA

Frequency Range below 1GHz:

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
3m Semi-anechoic Chamber	MAORUI	9m*6m*6m	NSEMC003	2023-04-15*
EMI Test Receiver	Rohde&Schwarz	ESR7	100962	2023-01-13
Broadband antenna	Schwarzbeck	VULB 9168	00937	2023-09-12*
Signal Amplifier	Com-power	PAM-103	18020051	2022-09-08
Attenuator	Rohde&Schwarz	TS2GA-6dB	18101101	N/A
Test software	FARAD	FARAD	EZ_EMCV1.1.4.2	N/A

Frequency Range 1-18GHz:

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
3m Semi-anechoic Chamber	MAORUI	9m*6m*6m	NSEMC003	2023-04-15*
Horn Antenna	Schwarzbeck	BBHA 9120D	01959	2022-09-12*
Broadband Coaxial Preamplifier	Com-power	PAM-118A	1804003	2022-09-07
Spectrum	Keysight	N9020A	MY51240612	2022-09-08
Antenna Tower	MF	MFA-440H	NA	NA
Turn Table	MF	MFT-201SS	NA	NA
Antenna Tower&Turn Table Controller	MF	MF-7802	NA	NA

Frequency Range 18-40GHz:

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
3m Semi-anechoic Chamber	MAORUI	9m*6m*6m	NSEMC003	2023-04-15*
Spectrum Analyzer	Rohde&Schwarz	FSV-40N	101783	2023-01-13
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170242	2023-04-10*
Pre-Amplifier	EMCI	EMC 184045	980102	2023-01-12
Antenna Tower	MF	MFA-440H	NA	NA
Turn Table	MF	MFT-201SS	NA	NA
Antenna Tower&Turn Table Controller	MF	MF-7802	NA	NA

Note: 1. The calibration interval of the above test instruments is 12/24months(*) and the calibrations are traceable to CEPREI/CHINA.

2. The test was performed in 966.

3.1.3 Test Procedures

a. Peak emission levels are measured by setting the instrument as follow:

1) RBW & VBW setting as a function of frequency:

Frequency	RBW	VBW
9kHz~150kHz	200Hz	600Hz
0.15MHz~30MHz	9kHz	30kHz
30MHz~1000MHz	120kHz	300kHz
>1000MHz	1MHz	3MHz

2) Detector = peak.
3) Sweep time = auto.
4) Trace mode = max hold.
5) Allow sweeps to continue until the trace stabilizes. (Note that the required measurement time may be lengthened for low-duty-cycle applications.)

Note: If the peak-detected amplitude can be shown to comply with the average limit, then it is not necessary to perform a separate average measurement

b. Average emission levels are measured by setting the instrument as follow:

- **Trace averaging with continuous EUT transmission at full power**

If the EUT can be configured or modified to transmit continuously (D ≥ 98%). then the average emission levels shall be measured using the following method (with EUT transmitting continuously):

1) RBW=1 MHz (unless otherwise specified).
2) VBW ≥ 3 *RBW.
3) Detector =RMS
4) Sweep time = auto.
5) Perform a trace average of at least 100 traces.

- **Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction**

If continuous transmission of the EUT (D ≥ 98%) cannot be achieved and the duty cycle is constant (duty cycle variations are less than ±2%). then the following procedure shall be used

1) The EUT shall be configured to operate at the maximum achievable duty cycle.
2) Measure the duty cycle D of the transmitter output signal as described in 11.6.
3) RBW=1 MHz (unless otherwise specified).
4) VBW ≥ 3 *RBW.
5) Detector =RMS
6) Sweep time = auto.
7) Perform a trace average of at least 100 traces.

A correction factor shall be added to the measurement results prior to comparing with the emission limit to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:

*If power averaging (rms) mode was used in step 5). then the applicable correction factor is [10 10g (1/ D)], where D is the duty cycle.

**If linear voltage averaging mode was used in step f). then the applicable correction factor is [20 10g (1/D)], where D is the duty cycle.

***If a specific emission is demonstrated to be continuous (D > 98%) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that

- **Reduced VBW Averaqing across ON and OFF times of the EUT transmissions with max hold**

If continuous transmission of the EUT (D > 98%) cannot be achieved and the duty cycle is not constant (duty cycle variations exceed ±2%), then the following procedure shall be used:

1) RBW = 1 MHz.
2) VBW ≥ 1/T.
3) Detector =peak
4) Sweep time = auto.
5) Trace mode = max hold.
6) Allow max hold to run for at least [50 x (1/ D)] traces

c. The EUT was placed on the top of a rotating table 0.8 meters (below 1GHz) / 1.5 meters (1-18GHz) / 1.5 meters (18-40GHz) above the reference ground. The table was rotated 360 degrees to determine the position of the highest radiation.
d. The EUT was set 3 meters away from the interference-receiving antenna (Below 1GHz) & (Above 1-18GHz), which was mounted on the top of a variable-height antenna tower. The EUT was set 1meters away from the interference-receiving antenna (18-40GHz).
e. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
f. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
g. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
h. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

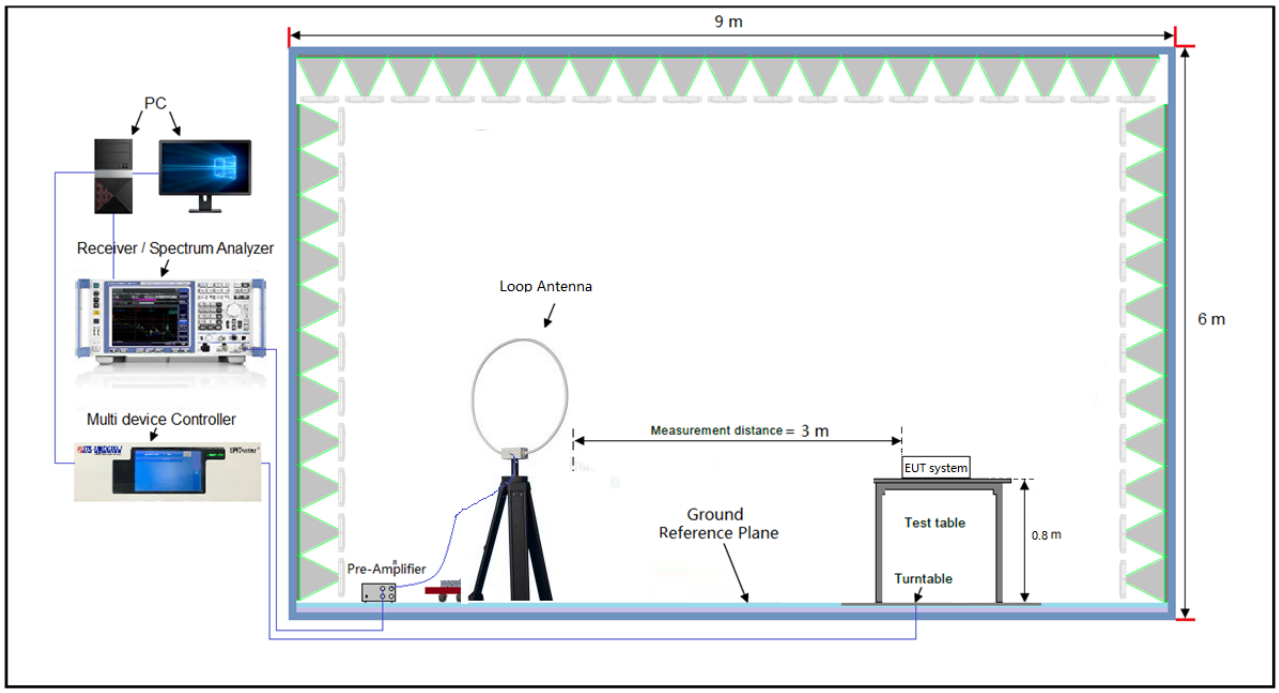
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz & 360kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth =3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth =1/T for Average (Duty cycle < 98 %) detection at frequency above 1 GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is =10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

3.1.4 Deviation from Test Standard

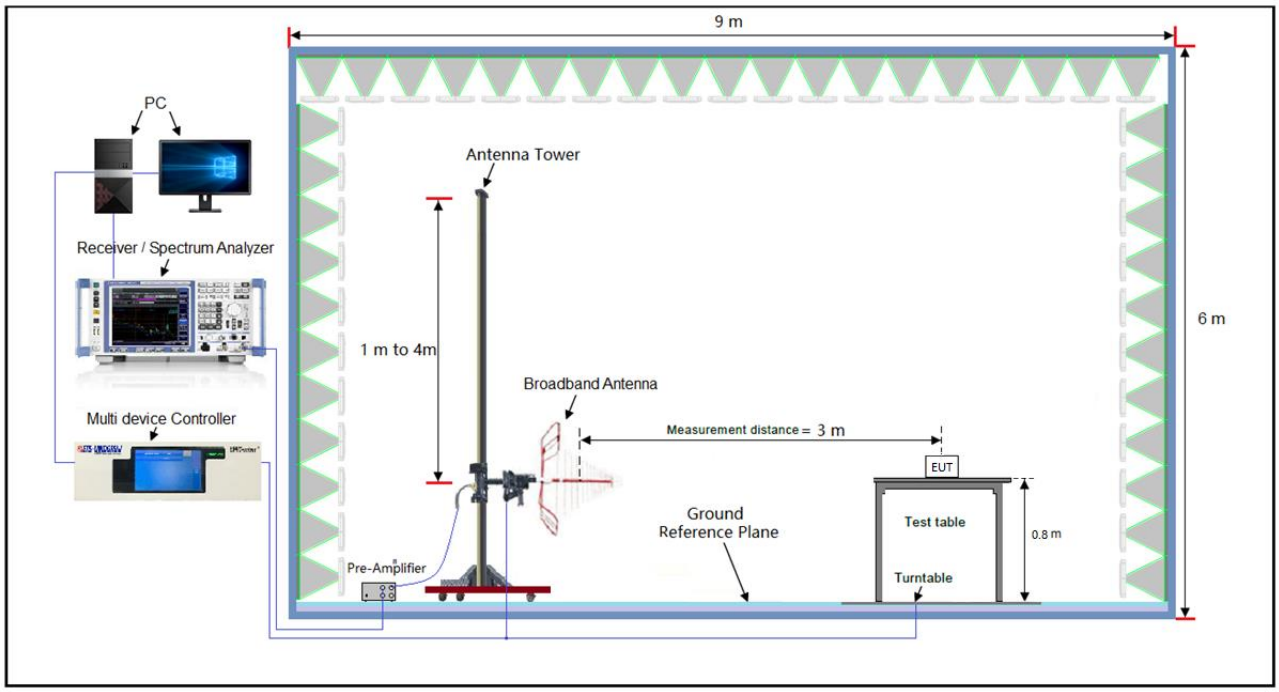
No deviation.

3.1.5 Test Setup

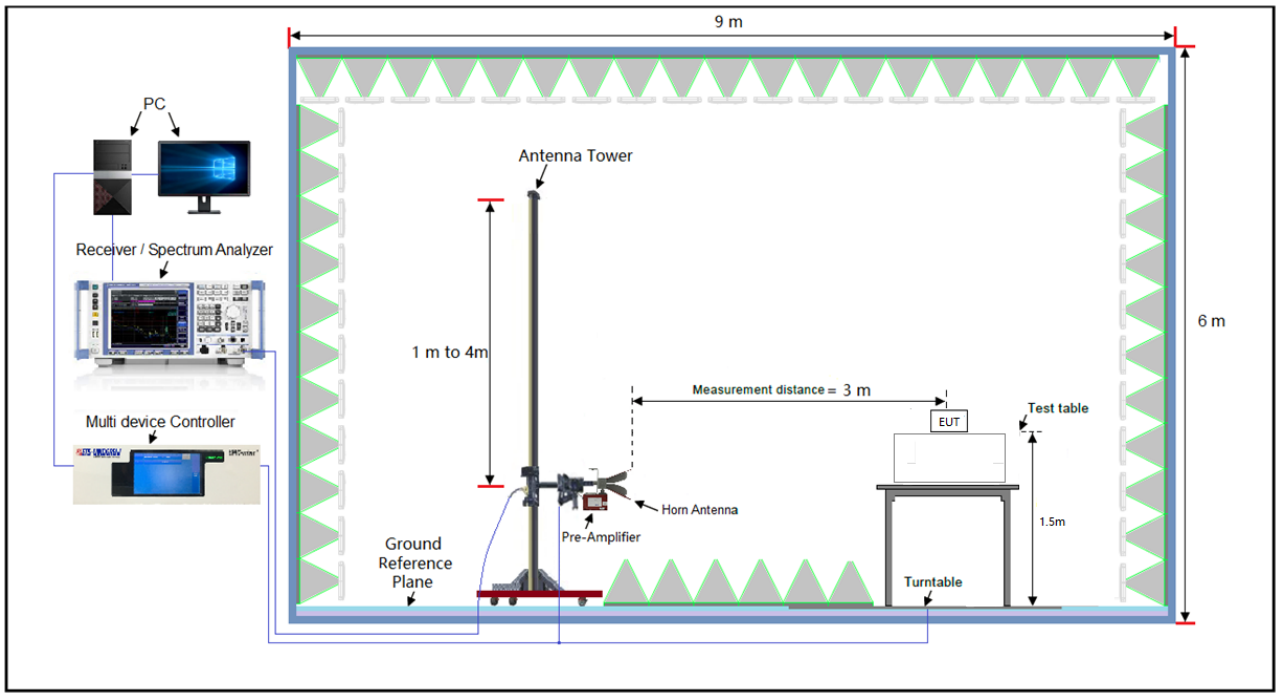
Radiated emission below 30MHz:



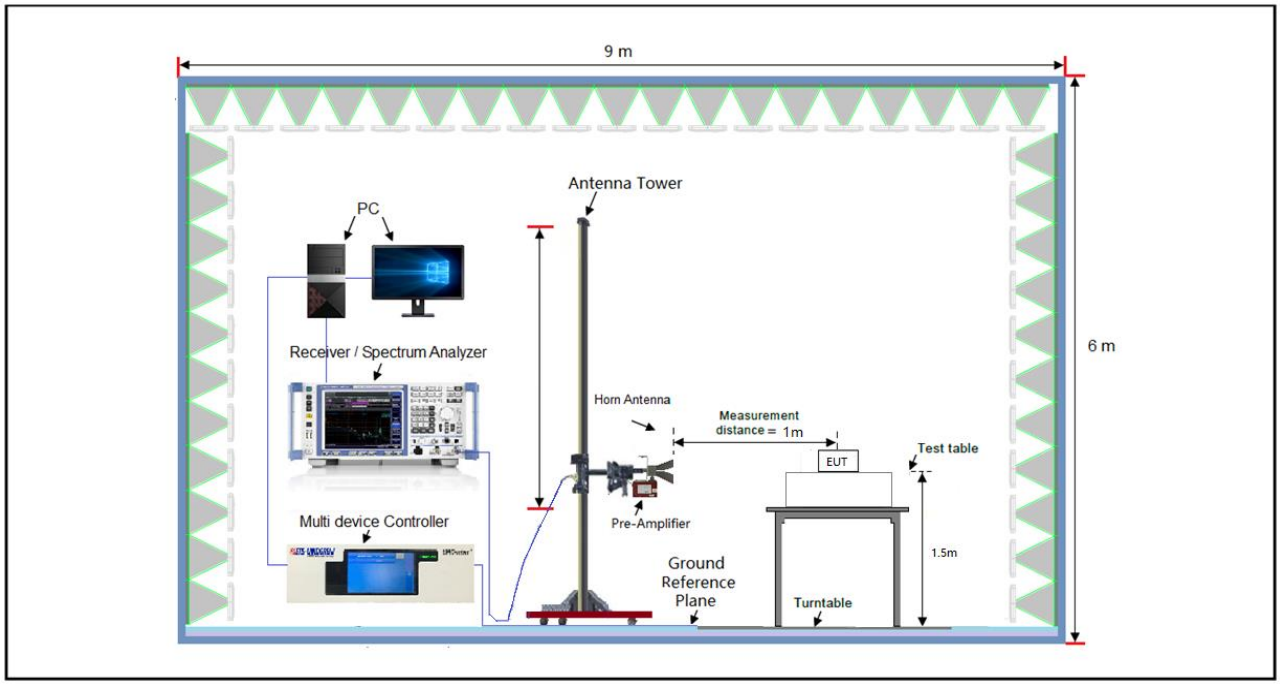
Frequency Range below 1GHz:



Frequency Range 1-18GHz:



Frequency Range 18-40GHz:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

3.1.6 EUT Operating Conditions

a. Placed the EUT on the testing table.

b. Set the EUT under transmission condition continuously at specific channel frequency.

3.1.7 Test Results

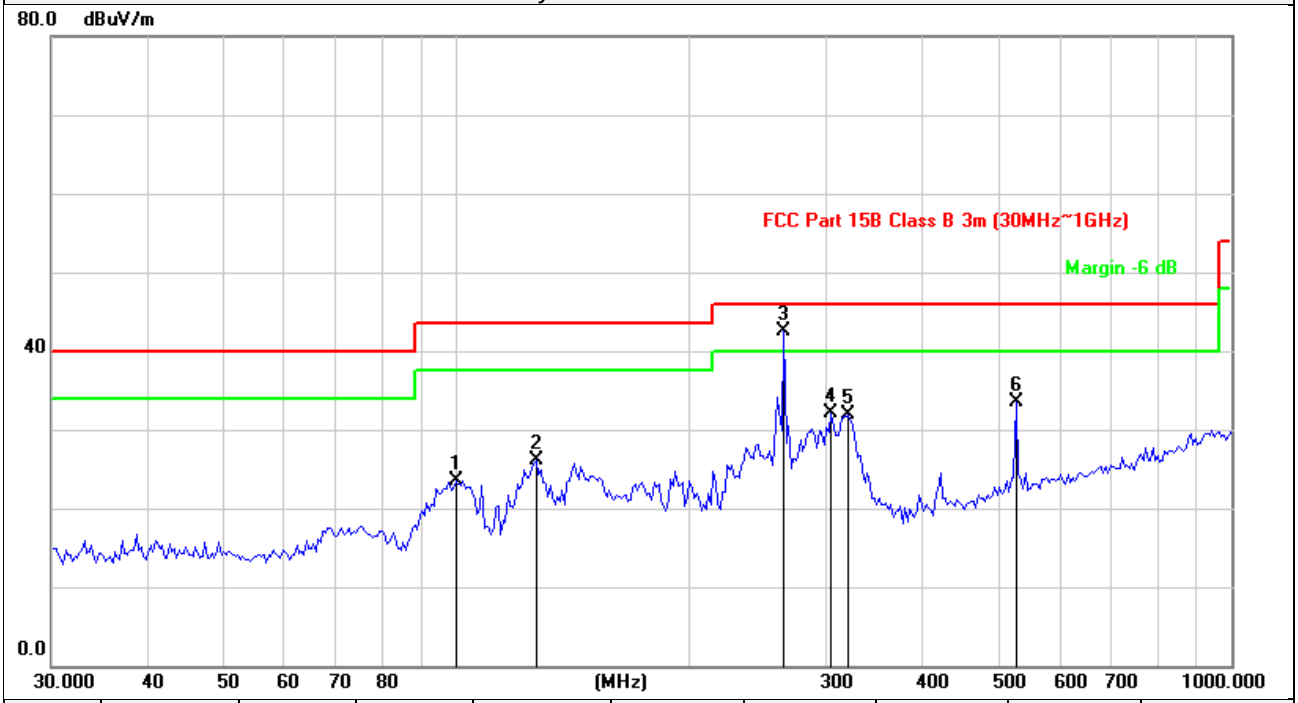
9kHz ~ 30MHz Data:

The amplitude of spurious emissions attenuated more than 20dB below the permissible value is not required to be report.

30MHz ~ 1GHz Worst-Case Data:

Test Mode	TX		
Test Channel	Channel 1	Frequency Range	30MHz ~ 1GHz
Detector Function	Peak (PK) & Quasi-peak (QP)	Tested By	Jim Xu

Antennal Polarity &Test Distance: Horizontal at 3m



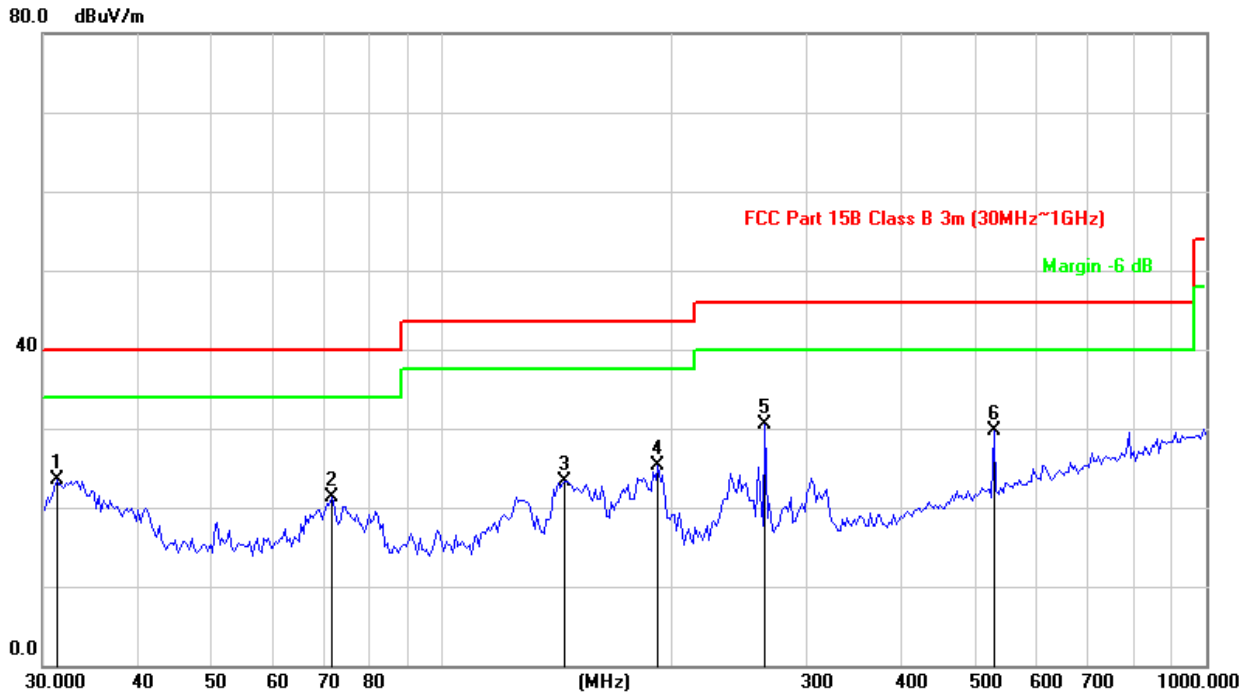
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1	99.7676	40.98	-17.44	23.54	43.50	-19.96	peak	300	166
2	126.6931	41.91	-15.81	26.10	43.50	-17.40	peak	100	177
3	264.9709	57.50	-14.94	42.56	46.00	-3.44	peak	100	296
4	304.9548	46.15	-14.06	32.09	46.00	-13.91	peak	200	288
5	320.3306	45.44	-13.61	31.83	46.00	-14.17	peak	200	125
6	527.5707	42.15	-8.58	33.57	46.00	-12.43	peak	200	45

Remarks:

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value

Test Mode	TX		
Test Channel	Channel 1	Frequency Range	30MHz ~ 1GHz
Detector Function	Peak (PK) & Quasi-peak (QP)	Tested By	Jim Xu

Antennal Polarity& Test Distance: Vertical at 3m



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1	31.2919	40.21	-16.80	23.41	40.00	-16.59	peak	300	125
2	71.7054	38.53	-17.18	21.35	40.00	-18.65	peak	200	254
3	144.7899	38.17	-14.83	23.34	43.50	-20.16	peak	200	88
4	191.7841	41.23	-15.88	25.35	43.50	-18.15	peak	100	45
5	264.9709	45.42	-14.94	30.48	46.00	-15.52	peak	100	210
6	527.5707	38.19	-8.58	29.61	46.00	-16.39	peak	100	77

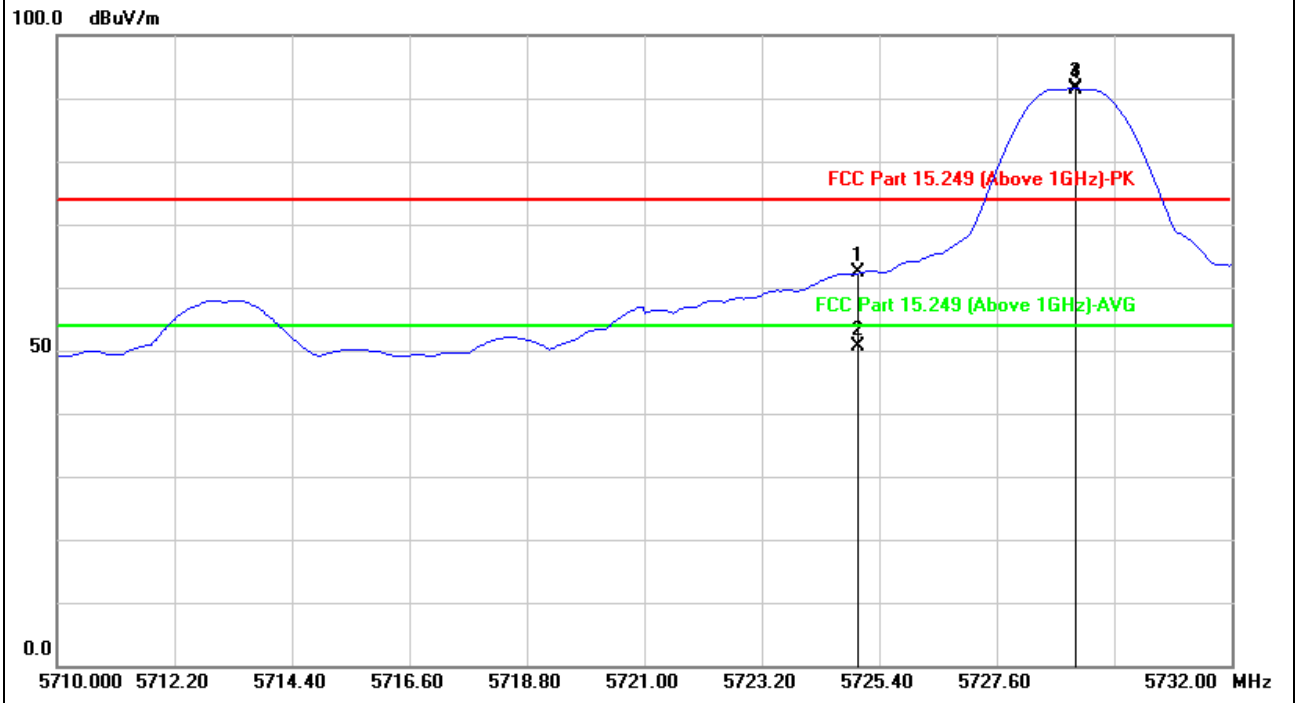
Remarks:

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value

Above 1GHz Data:

Test Mode	Lowest channel TX		
Test channel	Channel 1	Frequency Range	1GHz ~ 40GHz
Detector Function	Peak (PK) & Quasi-peak (QP)	Tested By	Jim Xu

Antennal Polarity& Test distance: Horizontal at 3 M



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1	5725.000	55.62	6.71	62.33	74.00	-11.67	peak	390	30
2	5725.000	43.82	6.71	50.53	54.00	-3.47	AVG	390	30
3	5729.090	84.82	6.71	91.53	114.00	-22.47	peak	390	30
4	5729.090	84.55	6.71	91.26	94.00	-2.74	AVG	390	30
5	11458.000	41.14	16.06	57.20	74.00	-16.80	peak	227	34
6	11458.000	33.96	16.06	50.02	54.00	-3.98	AVG	227	34
7	17187.000	36.68	23.65	60.33	74.00	-13.67	peak	100	166
8	17187.000	25.27	23.65	48.92	54.00	-5.08	AVG	100	166

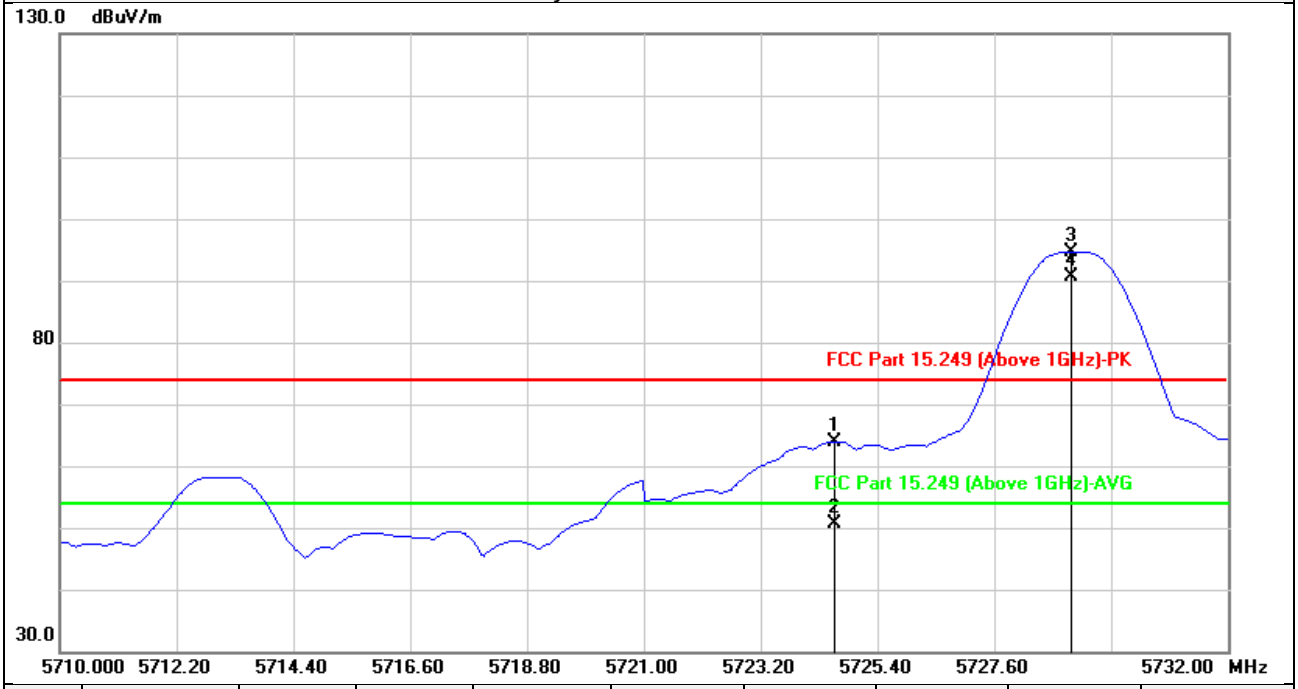
Remarks:

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value

3.The other spurious emissions attenuated more than 20 dB below the permissible value is not required to be report

Test Mode	Low channel TX		
Test channel	Channel 1	Frequency Range	1GHz ~ 40GHz
Detector Function	Peak (PK) & Average (AVG)	Tested By	Jim Xu

Antennal Polarity& Test Distance: Vertical at 3m



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1	5724.593	57.26	6.71	63.97	74.00	-10.03	peak	100	258
2	5724.593	43.94	6.71	50.65	54.00	-3.35	AVG	100	258
3	5729.046	87.91	6.71	94.62	114.00	-19.38	peak	100	258
4	5729.046	83.97	6.71	90.68	94.00	-3.32	AVG	100	258
5	11458.000	41.35	16.06	57.41	74.00	-16.59	peak	209	3
6	11458.000	34.32	16.06	50.38	54.00	-3.62	AVG	209	3
7	17187.000	35.94	23.65	59.59	74.00	-14.41	peak	100	159
8	17187.000	24.26	23.65	47.91	54.00	-6.09	AVG	100	159

Remarks:

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value

3.The other spurious emissions attenuated more than 20 dB below the permissible value is not required to be report

Test Mode	Mid channel TX		
Test channel	Channel 31	Frequency Range	1GHz ~ 40GHz
Detector Function	Peak (PK) & Average (AVG)	Tested By	Jim Xu

Antennal Polarity& Test Distance: Horizontal at 3m									
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1	5789.000	83.90	6.78	90.68	114.00	-23.32	peak	100	164
2	5789.000	83.36	6.78	90.14	94.00	-3.86	peak	100	164
3	11578.000	41.56	16.10	57.66	74.00	-16.34	peak	321	26
4	11578.000	34.10	16.10	50.20	54.00	-3.80	AVG	321	26
5	17367.000	36.24	24.83	61.07	74.00	-12.93	peak	100	255
6	17367.000	23.45	24.83	48.28	54.00	-5.72	AVG	100	255
Antennal Polarity& Test Distance: Vertical at 3 M									
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1	5789.000	87.06	6.78	93.84	114.00	-20.16	peak	100	247
2	5789.000	86.34	6.78	93.12	94.00	-0.88	AVG	100	247
3	11578.000	42.16	16.10	58.26	74.00	-15.74	peak	100	24
4	11578.000	34.56	16.10	50.66	54.00	-3.34	AVG	100	24
5	17367.000	35.31	24.83	60.14	74.00	-13.86	peak	100	199
6	17367.000	23.32	24.83	48.15	54.00	-5.85	AVG	100	199

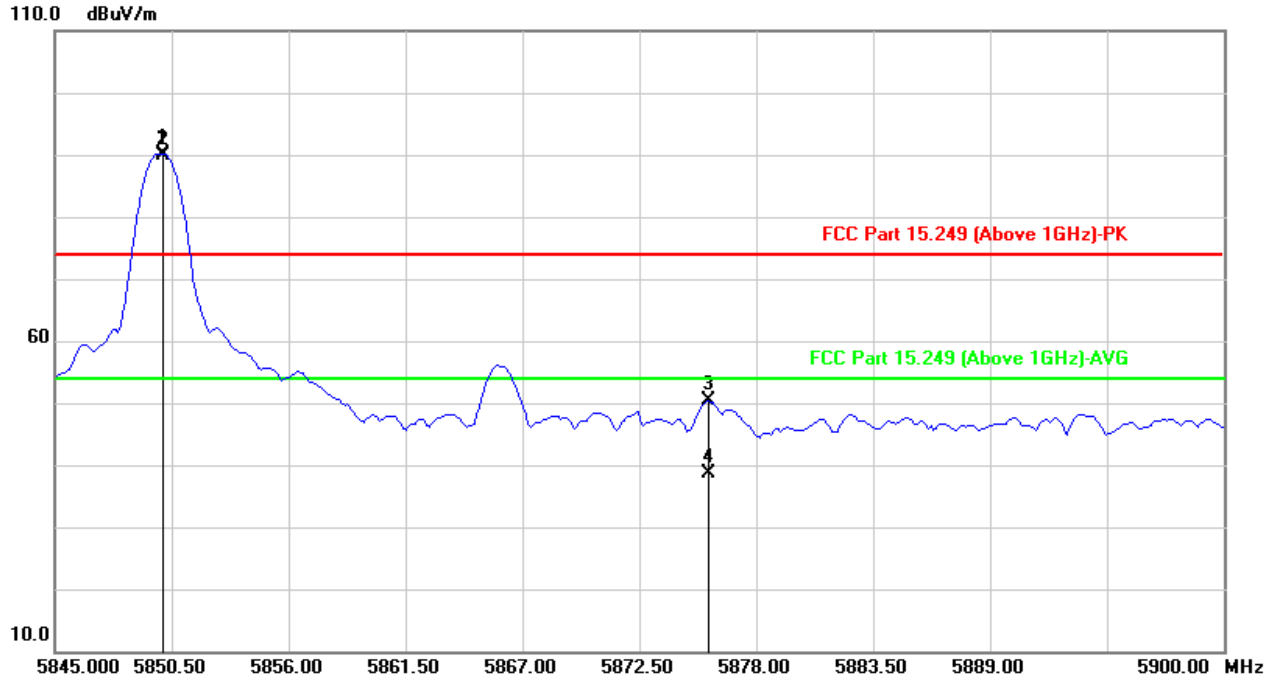
Remarks:

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value

3.The other spurious emissions attenuated more than 20 dB below the permissible value is not required to be report

Test Mode	High channel TX		
Test channel	Channel 61	Frequency Range	1GHz ~ 40GHz
Detector Function	Peak (PK) & Average (AVG)	Tested By	Jim Xu

Antennal Polarity& Test distance: Horizontal at 3 M



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1	5850.070	83.34	6.85	90.19	114.00	-23.81	peak	391	299
2	5850.070	83.15	6.85	90.00	94.00	-4.00	AVG	391	299
3	5875.752	43.39	6.88	50.27	74.00	-23.73	peak	391	299
4	5875.752	31.68	6.88	38.56	54.00	-15.44	AVG	391	299
5	11700.000	38.96	16.14	55.10	74.00	-18.90	peak	100	314
6	11700.000	31.85	16.14	47.99	54.00	-6.01	AVG	100	314
7	17550.000	34.93	26.01	60.94	74.00	-13.06	peak	100	201
8	17550.000	22.66	26.01	48.67	54.00	-5.33	AVG	100	201

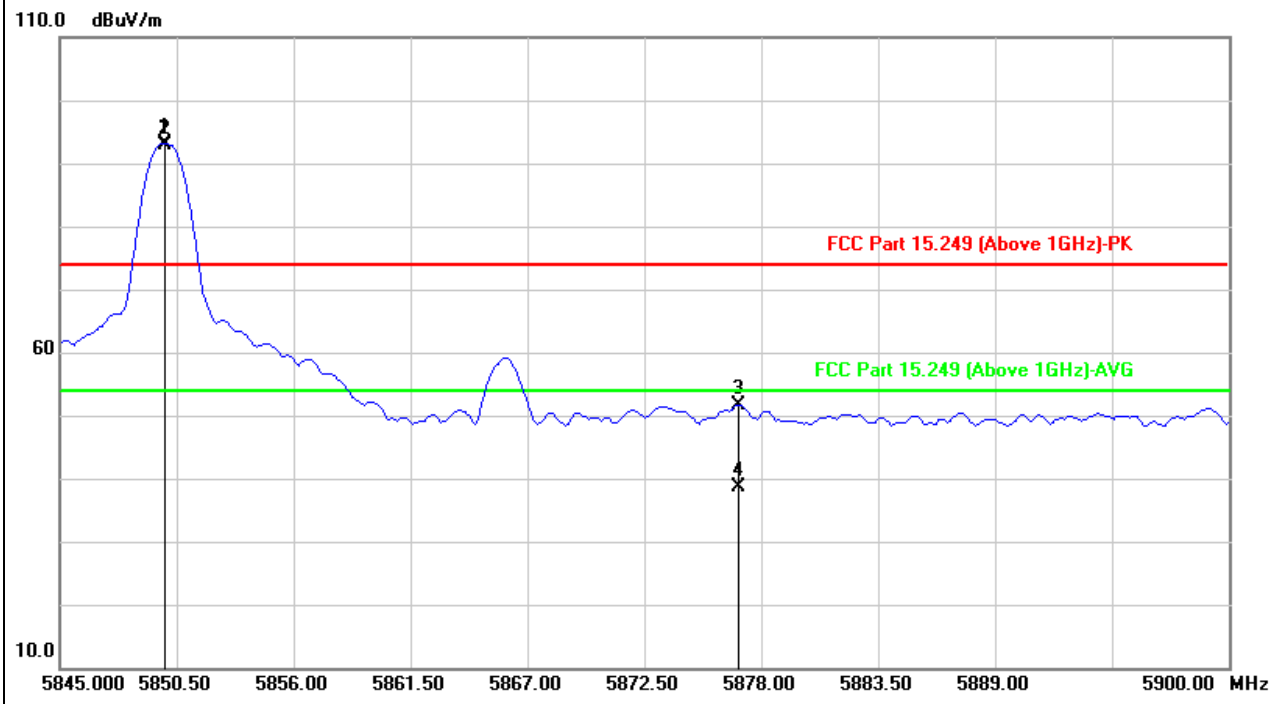
Remarks:

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value

3.The other spurious emissions attenuated more than 20 dB below the permissible value is not required to be report

Test Mode	High channel TX		
Test channel	Channel 61	Frequency Range	1GHz ~ 40GHz
Detector Function	Peak (PK) Average (AVG)	Tested By	Jim Xu

Antennal Polarity& Test Distance: Vertical at 3m



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1	5849.960	86.19	6.85	93.04	114.00	-20.96	peak	126	257
2	5849.960	86.04	6.85	92.89	94.00	-1.11	AVG	126	257
3	5876.964	44.70	6.88	51.58	74.00	-22.42	peak	126	257
4	5876.964	31.64	6.88	38.52	54.00	-15.48	AVG	126	257
5	11700.000	41.43	16.14	57.57	74.00	-16.43	peak	195	315
6	11700.000	34.19	16.14	50.33	54.00	-3.67	AVG	195	315
7	17550.000	35.52	26.01	61.53	74.00	-12.47	peak	100	215
8	17550.000	23.94	26.01	49.95	54.00	-4.05	AVG	100	215

Remarks:

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value

3.The other spurious emissions attenuated more than 20 dB below the permissible value is not required to be report

3.2 Conducted Emission Measurement

3.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to0.50MHz.

3.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Due Date of Calibration
EMI Test Receiver Rohde&Schwarz	ESR 7	101961	2023-01-13
Artificial Mains Network Rohde&Schwarz	ENV216	3560.6550.15	2023-01-12
Test software FARAD	EZ_EMC V1.1.4.2	N/A	N/A

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA.
2. The test was performed in Shielded Room 1.

3.2.3 Test Procedures

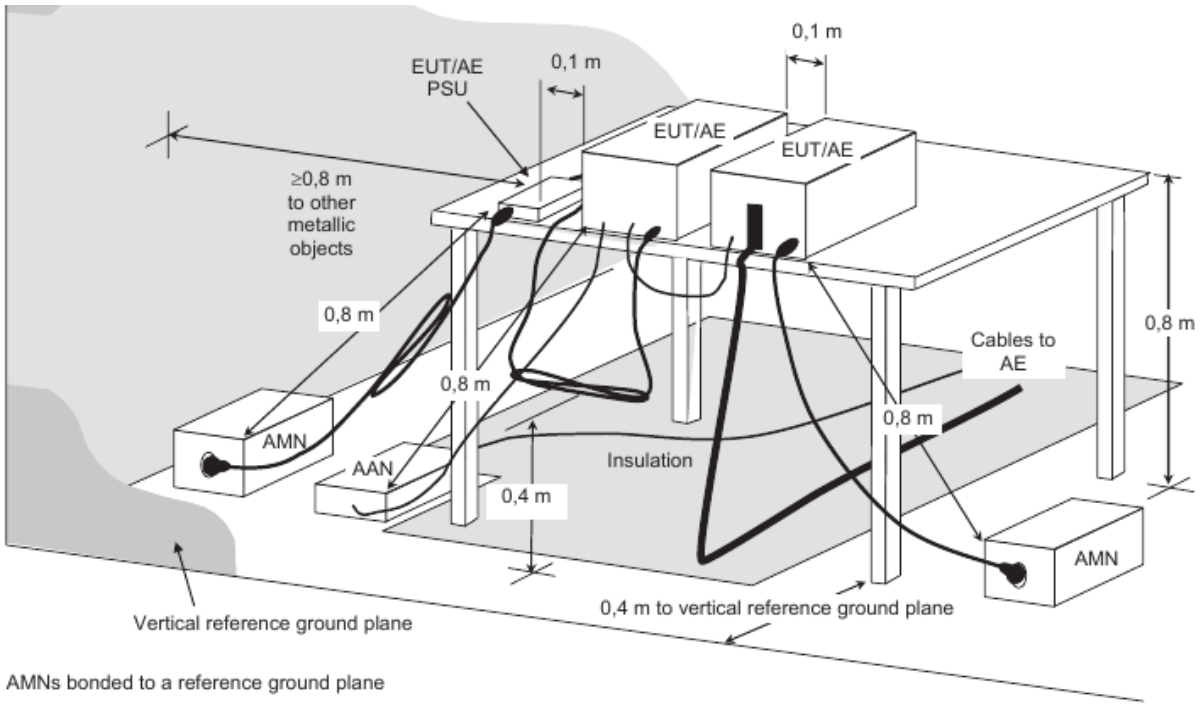
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50uH of coupling impedance for the measuring instrument.
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit – 20dB) was not recorded.

Note: All modes of operation were investigated and the worst-case emissions are reported.

3.2.4 Deviation from Test Standard

No deviation.

3.2.5 Test setup



AMNs bonded to a reference ground plane

3.2.6 EUT Operating Conditions

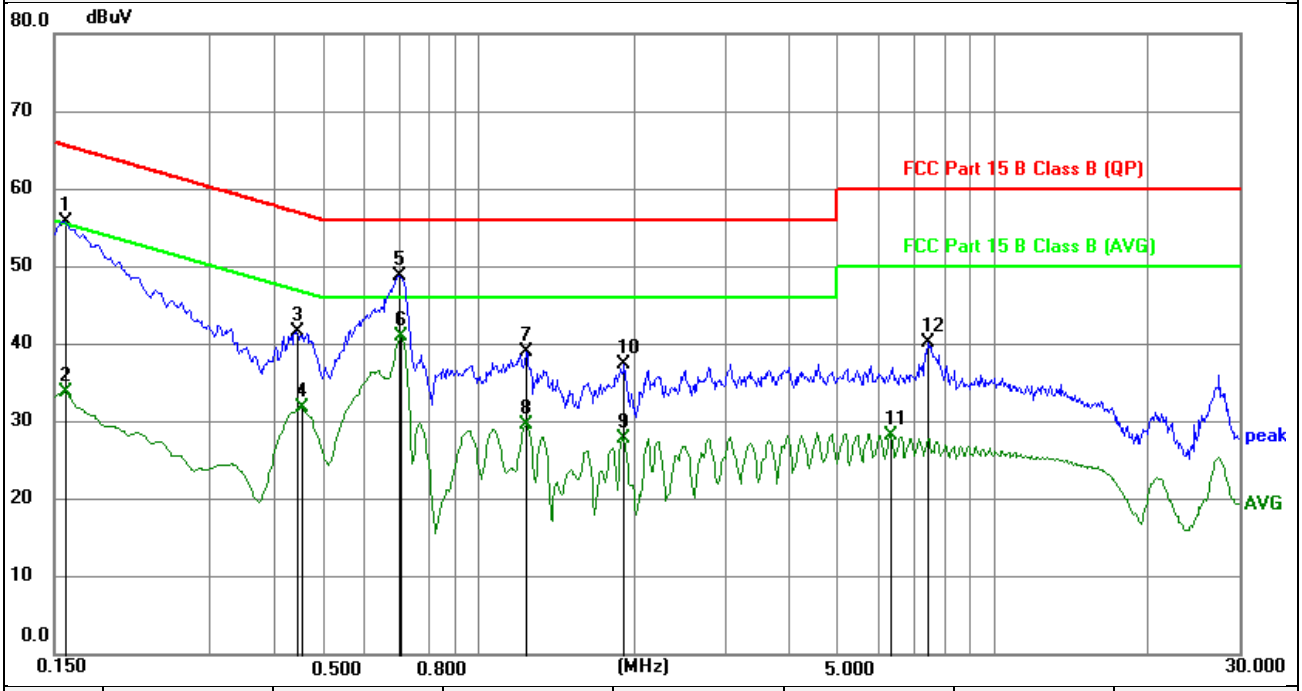
a. Placed the EUT on the testing table.

b. Set the EUT under transmission condition continuously at specific channel frequency.

3.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

Phase of Power: Line (L)



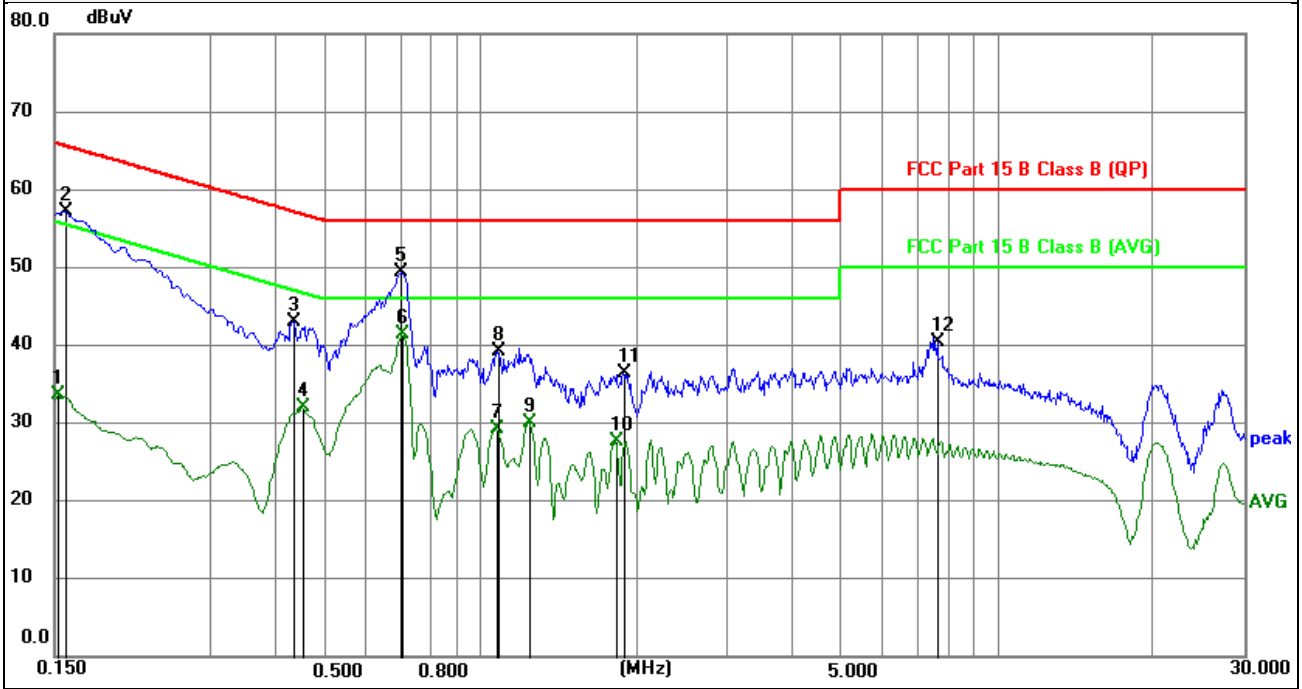
No	Frequency	Reading	Correction Factor	Emission Level	Limit	Margin	Remark
	(MHz)	(dBuV)	dB	(dBuV)	(dBuV)	(dB)	Detector
1	0.1568	45.65	10.17	55.82	65.63	-9.81	peak
2	0.1568	23.57	10.17	33.74	55.63	-21.89	AVG
3	0.4425	31.44	10.10	41.54	57.01	-15.47	peak
4	0.4537	21.77	10.11	31.88	46.81	-14.93	AVG
5	0.6990	38.76	10.11	48.87	56.00	-7.13	peak
6	0.7102	30.85	10.11	40.96	46.00	-5.04	AVG
7	1.2390	28.87	10.05	38.92	56.00	-17.08	peak
8	1.2390	19.49	10.05	29.54	46.00	-16.46	AVG
9	1.9095	17.82	10.09	27.91	46.00	-18.09	AVG
10	1.9185	27.30	10.09	37.39	56.00	-18.61	peak
11	6.3239	18.32	10.00	28.32	50.00	-21.68	AVG
12	7.4805	30.18	10.03	40.21	60.00	-19.79	peak

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

Phase of Power: Neutral (N)



No.	Frequency	Reading	Correction Factor	Emission Level	Limit	Margin	Remark
	(MHz)	(dBuV)	dB	(dBuV)	(dBuV)	(dB)	Detector
1	0.1522	23.34	10.18	33.52	55.88	-22.36	AVG
2	0.1568	47.08	10.17	57.25	65.63	-8.38	peak
3	0.4357	32.91	10.09	43.00	57.14	-14.14	peak
4	0.4537	21.84	10.11	31.95	46.81	-14.86	AVG
5	0.7035	39.27	10.10	49.37	56.00	-6.63	peak
6	0.7080	31.28	10.10	41.38	46.00	-4.62	AVG
7	1.0747	19.11	10.05	29.16	46.00	-16.84	AVG
8	1.0770	29.06	10.05	39.11	56.00	-16.89	peak
9	1.2435	19.89	10.06	29.95	46.00	-16.05	AVG
10	1.8218	17.49	10.09	27.58	46.00	-18.42	AVG
11	1.8960	26.29	10.10	36.39	56.00	-19.61	peak
12	7.6538	30.36	10.05	40.41	60.00	-19.59	peak

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

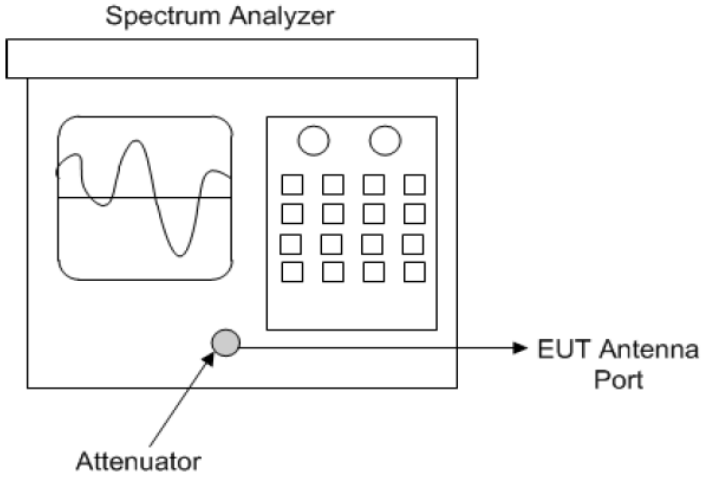
3.3 Occupied Bandwidth Measurement

3.3.1 Limits of Occupied Bandwidth Measurement

According to FCC 15.215(c), must be designed to ensure that the Occupied bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

3.3.2 Test Setup

Subclause 11.8 of ANSI C63.10 is applicable.



3.3.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Due Date of Calibration
Spectrum Keysight	N9020A	MY51240612	2022-09-08
Spectrum Analyzer Rohde&Schwarz	FSV-40N	101783	2023-01-13
Power Meter 10Hz~18GHz Tonscend	JS0806-2	188060126	2022-09-08
Signal generator Keysight	E4421B	GB40051020	2022-09-12
Signal generator Keysight	N5182A	MY47420944	2022-09-08
Test Software Tonscend	JS0806-2	NA	NA
Hygrothermograph Yuhuaze	HTC-1	NA	2022-09-09

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA.
2. The test was performed in Chamber 1.

3.3.4 Test Procedure

Option 1:

a. Set resolution bandwidth (RBW) = 30kHz
b. Set the video bandwidth (VBW) ≥ 3 x RBW
c. Detector = Peak.
d. Trace mode = max hold.
e. Sweep = auto couple.
f. Allow the trace to stabilize.
g. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 20dB relative to the maximum level measured in the fundamental emission

3.3.5 Deviation from Test Standard

No deviation.

3.3.6 EUT Operating Conditions

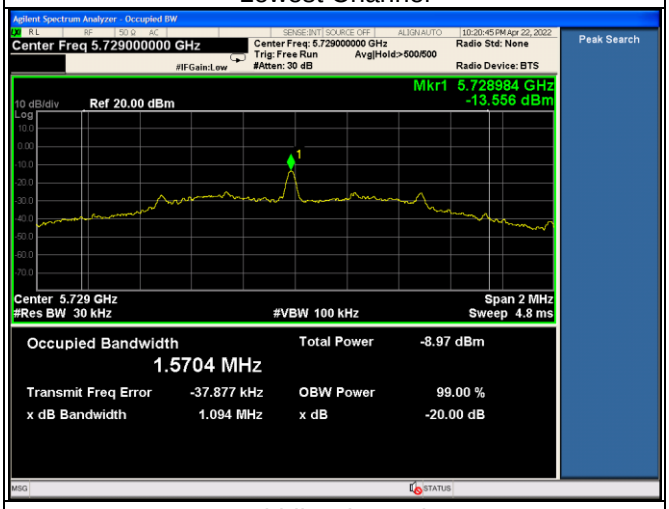
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

3.3.7 Test Result

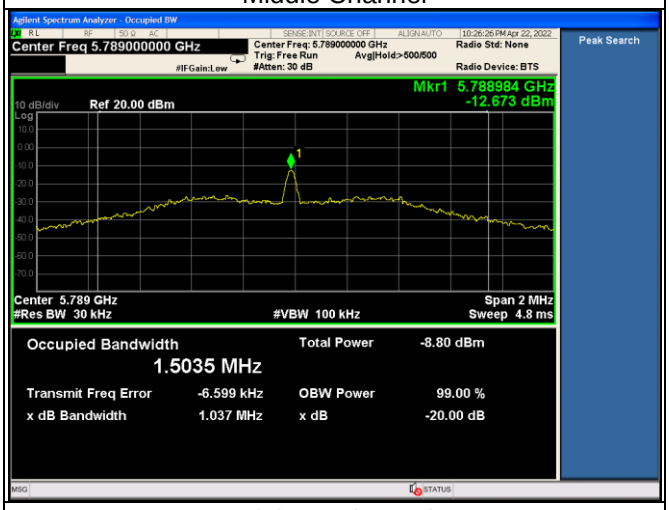
Test Mode	Channel	Frequency (MHz)	20dB Occupied Bandwidth (MHz)	Verdict
TX	1	5729	1.094	Pass
	31	5789	1.037	Pass
	61	5850	0.943	Pass

Test Mode	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Verdict
TX	1	5729	1.5704	Pass
	31	5789	1.5035	Pass
	61	5850	1.4337	Pass

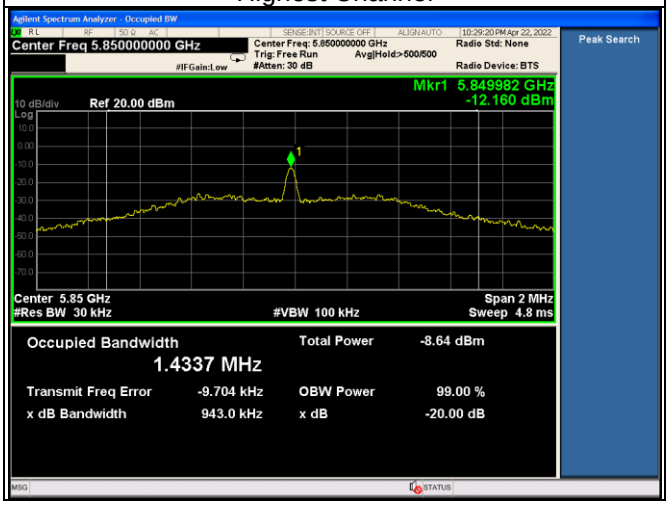
Lowest Channel



Middle Channel



Highest Channel



4. Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information on The Testing Laboratories

We, Hwa-Hsing (Dongguan) Co., Ltd., A global provider of TESTING and CERTIFICATION services for consumer products, electronic products and wireless information technology products. Adhering to the core values “HONEST and TRUSTWORTHY, OBJECTIVE and IMPARTIALITY, RIGOROUS and AFFICIENT”, commitment to provide professional, perfect and efficient comprehensive ONE-STOP solution of TESTING and CERTIFICATION services for Manufacturers, Buyers, Traders, Brands, Retailers. Assist client to better manage risk, protect their brands, reduce costs and cut time to over 150 markets in global. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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