



FCC Part 15C Test Report

FCC ID:2AR7Z-18US117

Applicant: Shenzhen Topwell Technology Co., Ltd

Address: Room B518-520, Yousong Keji Building, Donghuan 1st Road, Longhua New District, Shenzhen City, Guangdong Province, China

Manufacturer: Shenzhen Topwell Technology Co., Ltd

Address: Room B518-520, Yousong Keji Building, Donghuan 1st Road, Longhua New District, Shenzhen City, Guangdong Province, China

EUT: Home Assistant for Seniors and Disabled

Trade Mark: Sofihub

Model Number: 18US1-1.7

Date of Receipt: Jul. 04, 2021

Test Date: Jul. 04, 2021 - Jul. 12, 2021

Date of Report: Jul. 12, 2021

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Applicable Standards: FCC PART 15 C 15.247
ANSI C63.10:2013

Test Result: Pass

Report Number: DL-20210712045E

Prepared (Test Engineer): Pxing Huang

Reviewer (Supervisor): Jack Bu

Approved (Manager): Jade Yang



This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Shenzhen DL Testing Technology Co., Ltd.



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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247(c)	Radiated Spurious Emission	PASS	
15.205	Band Edge Emission	PASS	
15.247(b)(1)	Peak Output Power	PASS	
15.247(a)(2)	6dB Bandwidth	PASS	
15.247(d)	Power Spectral Density	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

1.1 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$ providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 2.56\text{dB}$
2	RF power,conducted	$\pm 0.42\text{dB}$
3	Spurious emissions,conducted	$\pm 2.76\text{dB}$
4	All emissions,radiated(<1G)	$\pm 3.65\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name:	Home Assistant for Seniors and Disabled
Trademark	Sofihub
Model No.:	18US1-1.7
Model Difference	N/A
BT Version:	5.0
Operation Frequency:	2402~2480MHz
Channel numbers:	40 Channels
Channel separation:	2M
Modulation technology:	GFSK
Antenna Type:	FPCB Antenna
Antenna gain:	1.0dBi
Power supply:	DC 3.7V from battery DC 6V from adapter

Note:

- 1.For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- 2.The EUT's all information provided by client.

2. Channel Lis

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2402	11	2422	23	2444
02	2404	12	2424	24	2446
~	~	~	~		
9	2418	20	2440	39	2478
10	2420	21	2442	40	2480



2.2 DESCRIPTION OF TEST MODES

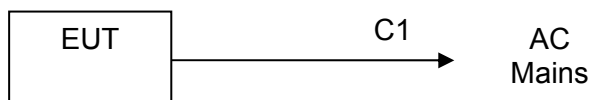
To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	CH01
Mode 2	CH20
Mode 3	CH40
Mode 5	Link Mode
For Conducted Emission	
Final Test Mode	Description
Mode 5	Link Mode
For Radiated Emission	
Final Test Mode	Description
Mode 1	CH01
Mode 2	CH20
Mode 3	CH40

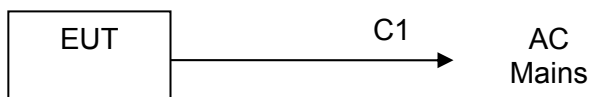
Note: 1. The measurements are performed at the highest, middle, lowest available channels.

2.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



Conducted Spurious Emission Test





2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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.

Item	Equipment	Model/Type No.	Series No.	Note
E-1	Home Assistant for Seniors and Disabled	18US1-1.7	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.5 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

During testing, channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the end product.

Test software Version	Test program: AXDS1.0		
Frequency	2402 MHz	2440MHz	2480 MHz
Power Setting of Softwave	10	10	10



2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation test, Band-edge test and 6db bandwidth test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4408B	MY50140780	Dec. 07, 2020	Dec. 06, 2021
2	Test Receiver (9kHz-7GHz)	R&S	ESRP7	101393	Dec. 07, 2020	Dec. 06, 2021
3	Bilog Antenna (30MHz-1GHz)	R&S	VULB9162	00306	Dec. 07, 2020	Dec. 06, 2021
4	Horn Antenna (1GHz-18GHz)	Schwarzbeck	BBHA9120D	02139	Dec. 07, 2020	Dec. 06, 2021
5	Horn Antenna (18GHz-40GHz)	A.H. Systems	SAS-574	588	Dec. 07, 2020	Dec. 06, 2021
6	Amplifier (9KHz-6GHz)	Schwarzbeck	BBV9743B	00153	Dec. 07, 2020	Dec. 06, 2021
7	Amplifier (1GHz-18GHz)	EMEC	EM01G8GA	00270	Dec. 07, 2020	Dec. 06, 2021
8	Amplifier (18GHz-40GHz)	Quanjuda	DLE-161	97	Dec. 07, 2020	Dec. 06, 2021
9	Loop Antenna (9KHz-30MHz)	Schwarzbeck	FMZB1519B	00014	Dec. 07, 2020	Dec. 06, 2021
10	RF cables1 (9kHz-1GHz)	ChengYu	966	004	Dec. 07, 2020	Dec. 06, 2021
11	RF cables2 (1GHz-40GHz)	ChengYu	966	003	Dec. 07, 2020	Dec. 06, 2021
12	Antenna connector	Florida RF Labs	N/A	RF 01#	Dec. 07, 2020	Dec. 06, 2021
13	Power probe	KEYSIGHT	U2021XA	MY55210018	Dec. 07, 2020	Dec. 06, 2021
14	Signal Analyzer 9kHz-26.5GHz	Agilent	N9020A	MY55370280	Dec. 07, 2020	Dec. 06, 2021
15	Test Receiver 20kHz-40GHz	R&S	ESU 40	100376	Dec. 07, 2020	Dec. 06, 2021
16	D.C. Power Supply	LongWei	PS-305D	010964729	Dec. 07, 2020	Dec. 06, 2021

Conduction Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	843 Shielded Room	ChengYu	843 Room	843	Nov. 25, 2019	Nov. 24, 2022
2	EMI Receiver	R&S	ESR	101421	Dec. 07, 2020	Dec. 06, 2021
3	LISN	R&S	ENV216	102417	Dec. 07, 2020	Dec. 06, 2021
4	843 Cable 1#	ChengYu	CE Cable	001	Dec. 07, 2020	Dec. 06, 2021

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	FALA	EZ_EMCC	EMC-CON 3A1.1
2	EMC radiation test system	FALA	EZ_EMCC	FA-03A2
3	RF test system	MAIWEI	MTS8310	2.0.0.0
4	RF communication test system	MAIWEI	MTS8200	2.0.0.0



3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

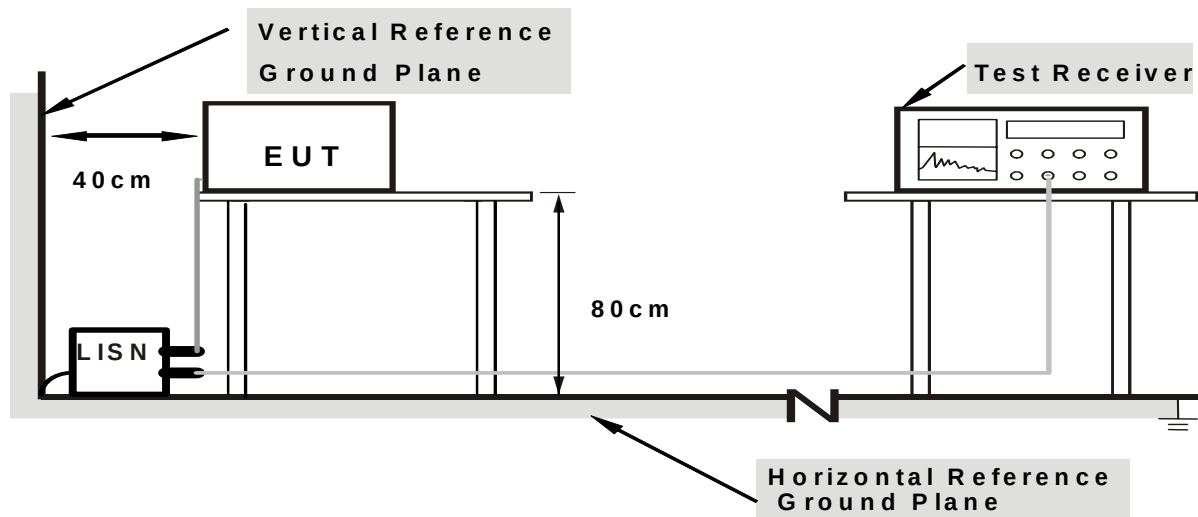
3.1.2 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

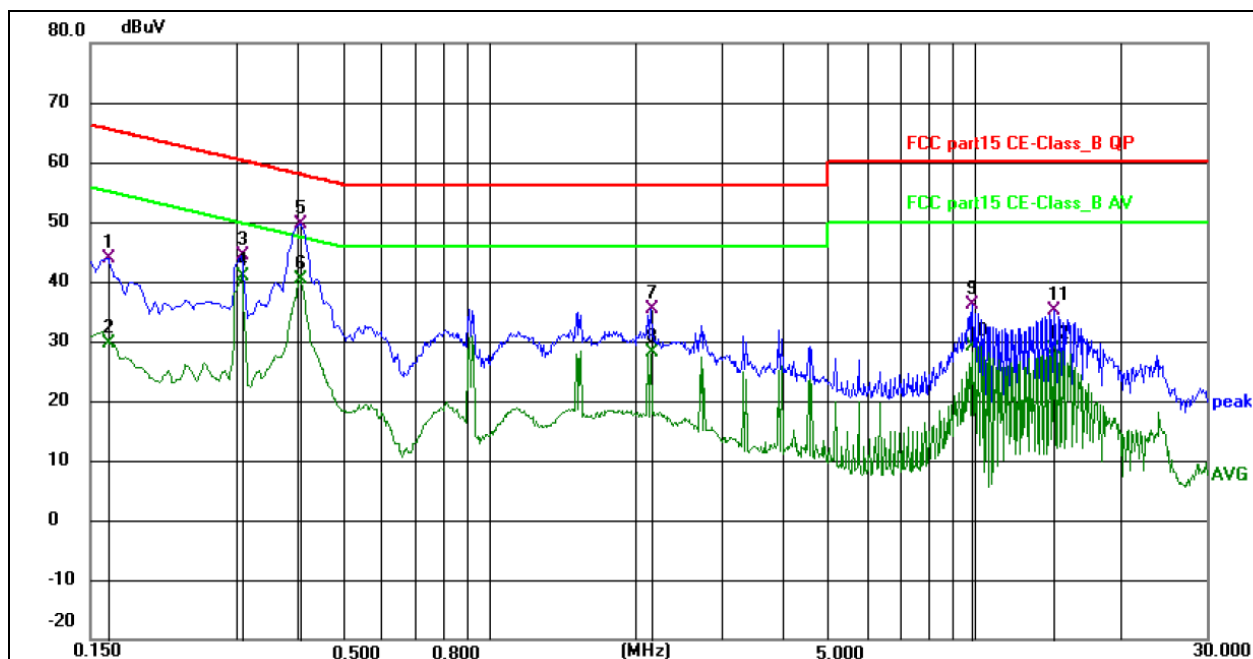
3.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.1.6 TEST RESULTS



Temperature:	25 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 4



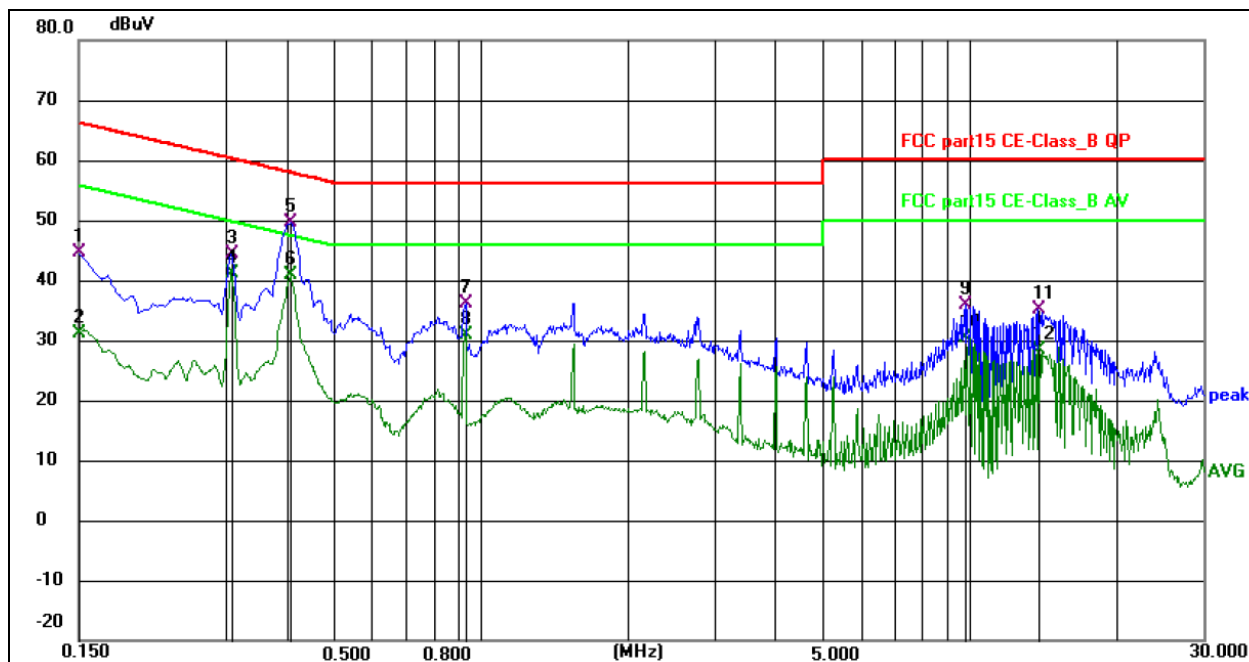
Remark:

 $\text{Margin} = \text{Limit} - \text{Level}$, $\text{Correct Factor} = \text{Cable lose} + \text{LISN insertion loss}$, $\text{Level} = \text{Reading} + \text{Correct factor}$

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1635	33.48	10.40	43.88	65.28	21.40	QP	P	
2	0.1635	19.15	10.40	29.55	55.28	25.73	AVG	P	
3	0.3075	35.18	9.19	44.37	60.04	15.67	QP	P	
4	0.3075	31.65	9.19	40.84	50.04	9.20	AVG	P	
5	0.4065	40.41	9.31	49.72	57.72	8.00	QP	P	
6 *	0.4065	31.11	9.31	40.42	47.72	7.30	AVG	P	
7	2.1479	25.46	9.83	35.29	56.00	20.71	QP	P	
8	2.1479	18.32	9.83	28.15	46.00	17.85	AVG	P	
9	9.8610	26.02	9.99	36.01	60.00	23.99	QP	P	
10	9.8610	19.10	9.99	29.09	50.00	20.91	AVG	P	
11	14.5724	24.94	10.19	35.13	60.00	24.87	QP	P	
12	14.5724	18.32	10.19	28.51	50.00	21.49	AVG	P	



Temperature:	25 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 4



Remark:

Margin = Limit – Level, Correct Factor = Cable lose + LISN insertion loss, Level= Reading + Correct factor

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1500	33.98	10.53	44.51	66.00	21.49	QP	P	
2	0.1500	20.72	10.53	31.25	56.00	24.75	AVG	P	
3	0.3075	35.08	9.24	44.32	60.04	15.72	QP	P	
4	0.3075	31.87	9.24	41.11	50.04	8.93	AVG	P	
5	0.4065	40.20	9.42	49.62	57.72	8.10	QP	P	
6 *	0.4065	31.54	9.42	40.96	47.72	6.76	AVG	P	
7	0.9284	26.55	9.52	36.07	56.00	19.93	QP	P	
8	0.9284	21.43	9.52	30.95	46.00	15.05	AVG	P	
9	9.8565	25.62	10.18	35.80	60.00	24.20	QP	P	
10	9.8565	20.29	10.18	30.47	50.00	19.53	AVG	P	
11	13.8255	24.84	10.32	35.16	60.00	24.84	QP	P	
12	13.8255	17.99	10.32	28.31	50.00	21.69	AVG	P	



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below 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

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	25GHz
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP



3.2.2 TEST PROCEDURE

Below 1GHz test procedure as below:

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height 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.
- 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

- Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).
- Test the EUT in the lowest channel, the middle channel, the Highest channel

Note:

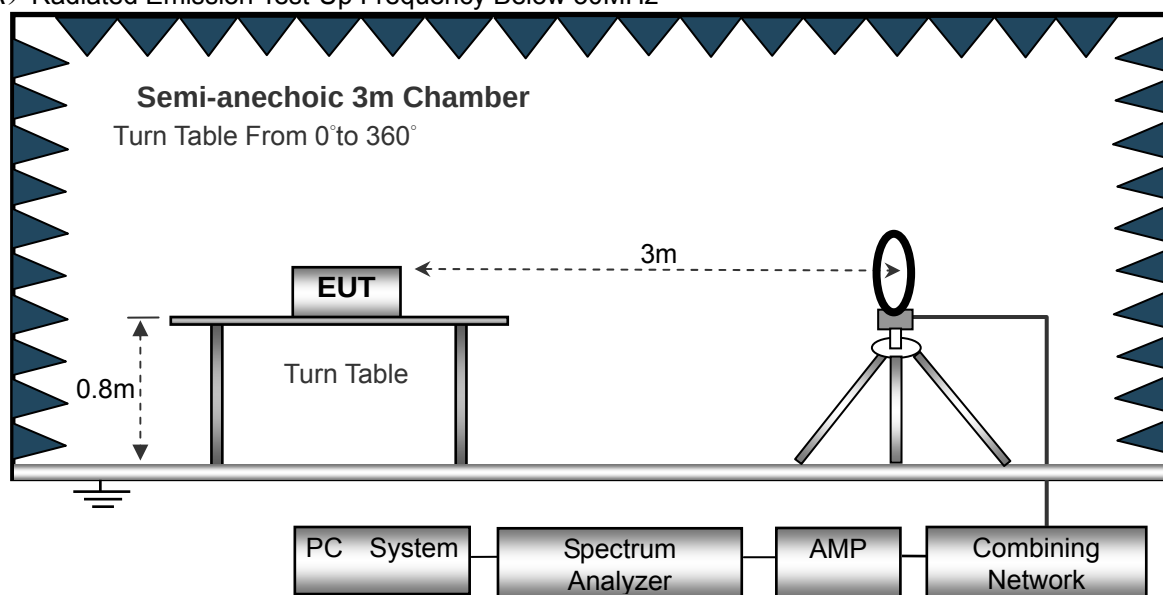
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

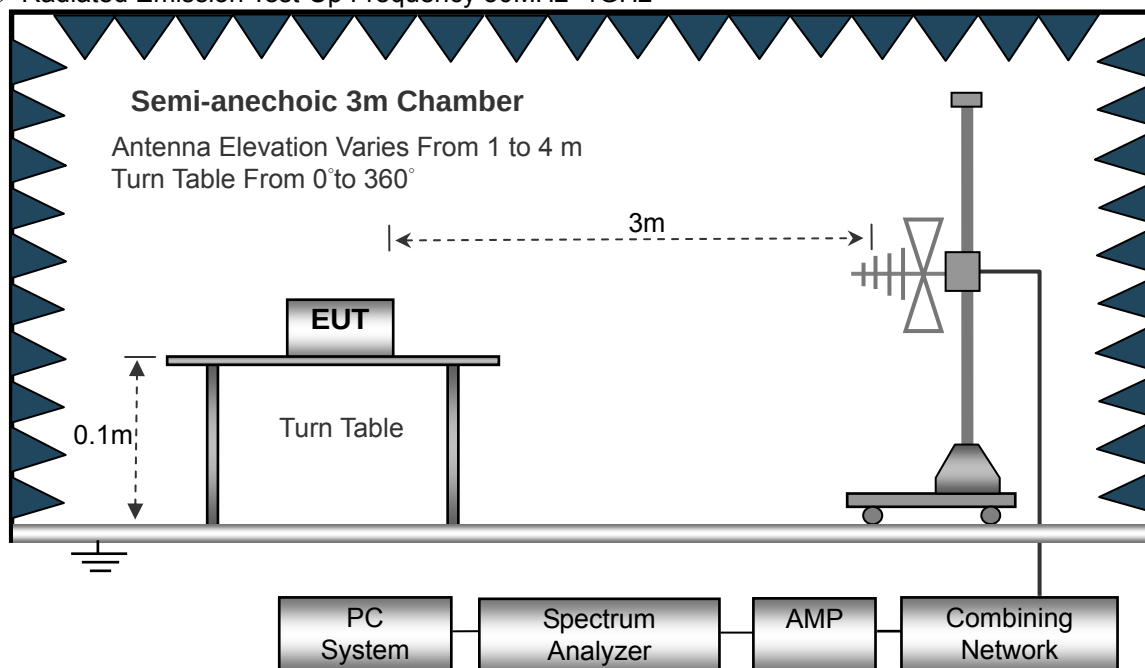
No deviation

3.2.4 TEST SETUP

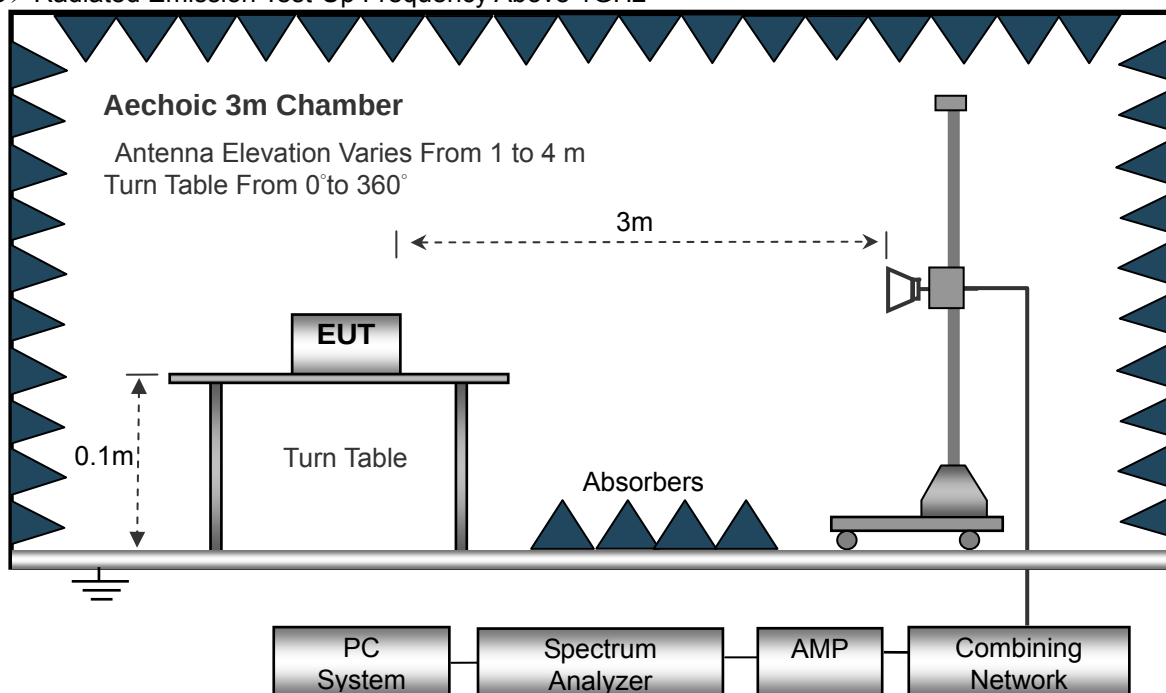
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

**3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)**

Temperature:	20℃	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	Mode 5	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

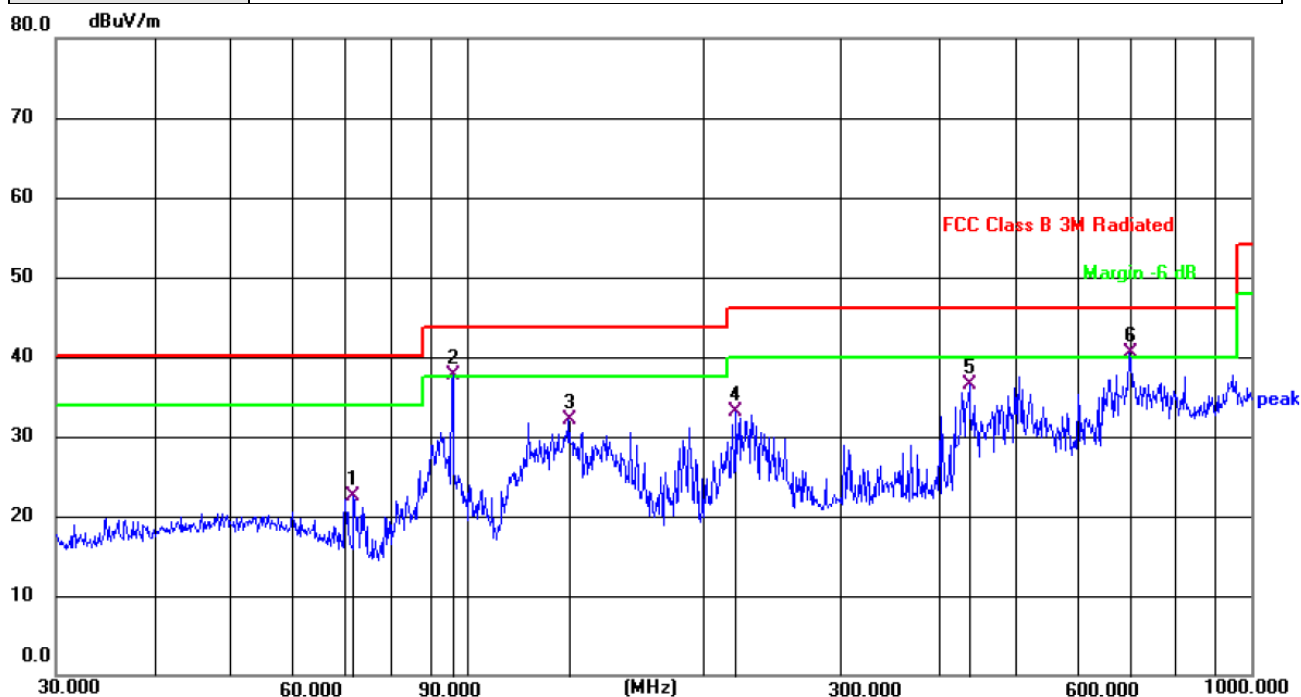
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuV) + distance extrapolation factor.

**3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)**

Temperature:	26℃	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Horizontal
Test Voltage :	DC 3.7V		
Test Mode :	Mode 5		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		71.8320	40.21	-17.65	22.56	40.00	17.44	QP
2	!	96.0986	55.14	-17.45	37.69	43.50	5.81	QP
3		135.0319	50.57	-18.56	32.01	43.50	11.49	QP
4		220.6171	48.17	-15.14	33.03	46.00	12.97	QP
5		437.1199	46.42	-9.85	36.57	46.00	9.43	QP
6	*	699.3046	44.90	-4.49	40.41	46.00	5.59	QP

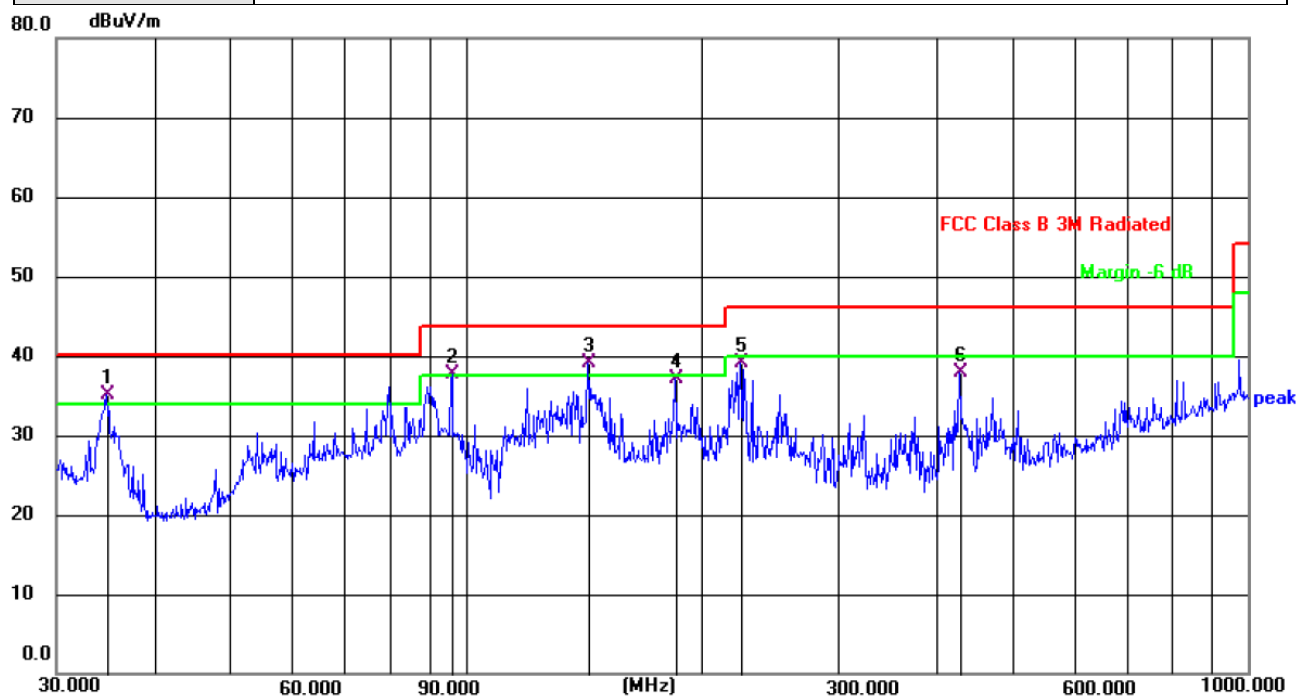
Remark:

Correct Factor = Cable loss + Antenna factor – Preamplifier;

Level = Reading Level + Correct Factor; Margin = Limit – Level;



Temperature:	26℃	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Vertical
Test Voltage :	DC 3.7V		
Test Mode :	Mode 5		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	!	34.7602	50.23	-15.19	35.04	40.00	4.96	QP
2	!	96.0986	55.15	-17.45	37.70	43.50	5.80	QP
3	*	143.3261	57.90	-18.89	39.01	43.50	4.49	QP
4		185.1379	54.10	-16.98	37.12	43.50	6.38	QP
5		224.5193	54.13	-14.97	39.16	46.00	6.84	QP
6		428.0193	48.08	-10.11	37.97	46.00	8.03	QP

Remark:

Correct Factor = Cable loss + Antenna factor – Preamplifier;

Level = Reading Level + Correct Factor; Margin = Limit – Level;

**3.2.8 TEST RESULTS (1GHZ~25GHZ)**

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre- amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2402									
V	4804.00	61.10	51.74	3.08	31.25	54.07	74.00	-19.93	PK
V	4804.00	46.05	51.74	3.08	31.25	39.02	54.00	-14.98	AV
V	7236.00	66.55	49.98	7.16	36.63	60.24	74.00	-13.76	PK
V	7236.00	54.80	49.98	7.16	36.63	48.49	54.00	-5.51	AV
V	16087.00	48.97	51.53	11.34	41.52	50.34	74.00	-23.66	PK
H	4804.00	61.10	51.74	3.08	31.25	54.07	74.00	-19.93	PK
H	4804.00	46.05	51.74	3.08	31.25	39.02	54.00	-14.98	AV
H	7236.00	69.76	49.98	7.16	36.63	63.45	74.00	-10.55	PK
H	7236.00	53.67	49.98	7.16	36.63	47.36	54.00	-6.64	AV
H	16087.00	48.93	51.53	11.34	41.52	50.30	74.00	-23.70	PK
operation frequency:2440									
V	4880.00	61.37	51.77	3.03	31.34	54.69	74.00	-19.31	PK
V	4880.00	45.56	51.77	3.03	31.34	38.88	54.00	-15.12	AV
V	7311.00	69.41	50.02	7.24	36.63	63.17	74.00	-10.83	PK
V	7311.00	53.46	50.02	7.24	36.63	41.94	54.00	-12.06	AV
V	16087.00	48.80	51.53	11.34	41.52	50.17	74.00	-23.83	PK
H	4880.00	61.37	51.77	3.03	31.34	54.69	74.00	-19.31	PK
H	4880.00	45.56	51.77	3.03	31.34	38.88	54.00	-15.12	AV
H	7311.00	69.50	50.02	7.24	36.63	63.26	74.00	-10.74	PK
H	7311.00	53.57	50.02	7.24	36.63	42.05	54.00	-11.95	AV
H	16087.00	48.76	51.53	11.34	41.52	50.13	74.00	-23.87	PK
operation frequency:2480									
V	4960.00	62.12	51.69	3.05	31.39	54.69	74.00	-18.35	PK
V	4960.00	46.18	51.69	3.05	31.39	38.88	54.00	-14.29	AV
V	7386.00	69.19	50.11	7.25	36.58	62.90	74.00	-11.10	PK
V	7386.00	53.34	50.11	7.25	36.58	41.75	54.00	-12.25	AV
V	16087.00	49.16	51.53	11.34	41.52	50.53	74.00	-23.47	PK
H	4960.00	62.12	51.69	3.05	31.39	54.69	74.00	-18.35	PK
H	4960.00	46.18	51.69	3.05	31.39	38.88	54.00	-14.29	AV
H	7386.00	67.43	50.11	7.25	36.58	61.14	74.00	-12.86	PK
H	7386.00	55.37	50.11	7.25	36.58	43.78	54.00	-10.22	AV
H	16087.00	49.12	51.53	11.34	41.52	50.49	74.00	-23.51	PK
Remark: 1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit 2. If peak below the average limit, the average emission was no test. 3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.									



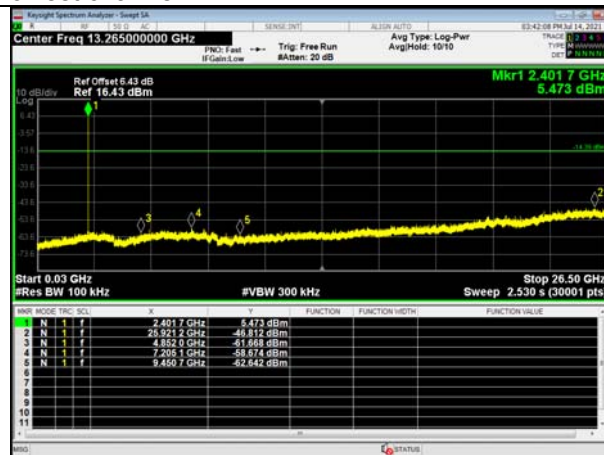
For Conducted

Test channel:



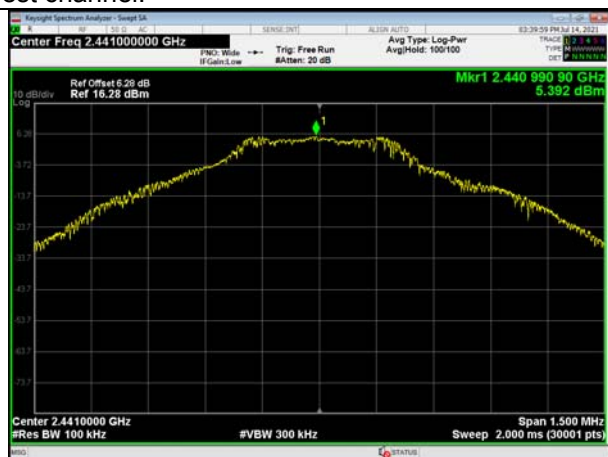
30MHz~10GHz

Lowest channel



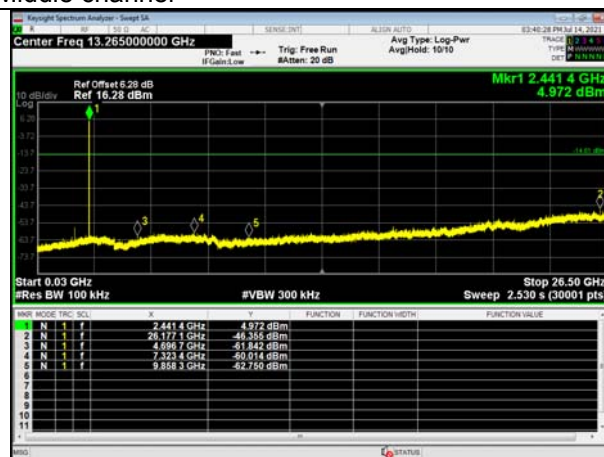
10GHz~25GHz

Test channel:



30MHz~10GHz

Middle channel



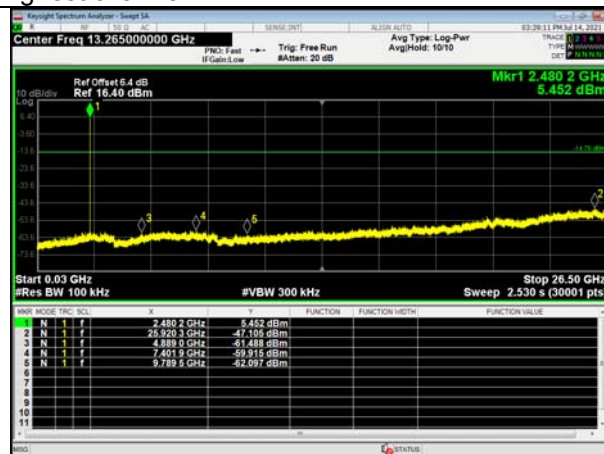
10GHz~25GHz

Test channel:



30MHz~10GHz

Highest channel



10GHz~25GHz



3.3 RADIATED BAND EMISSION MEASUREMENT

3.3.1 TEST REQUIREMENT:

FCC Part15 C Section 15.209 and 15.205

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	2300MHz
Stop Frequency	2520
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

3.3.2 TEST PROCEDURE

Above 1GHz test procedure as below:

- a. 1. The EUT was placed on the top of a rotating table 0.1 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height 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.
- d. 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel,the Highest channel

Note:

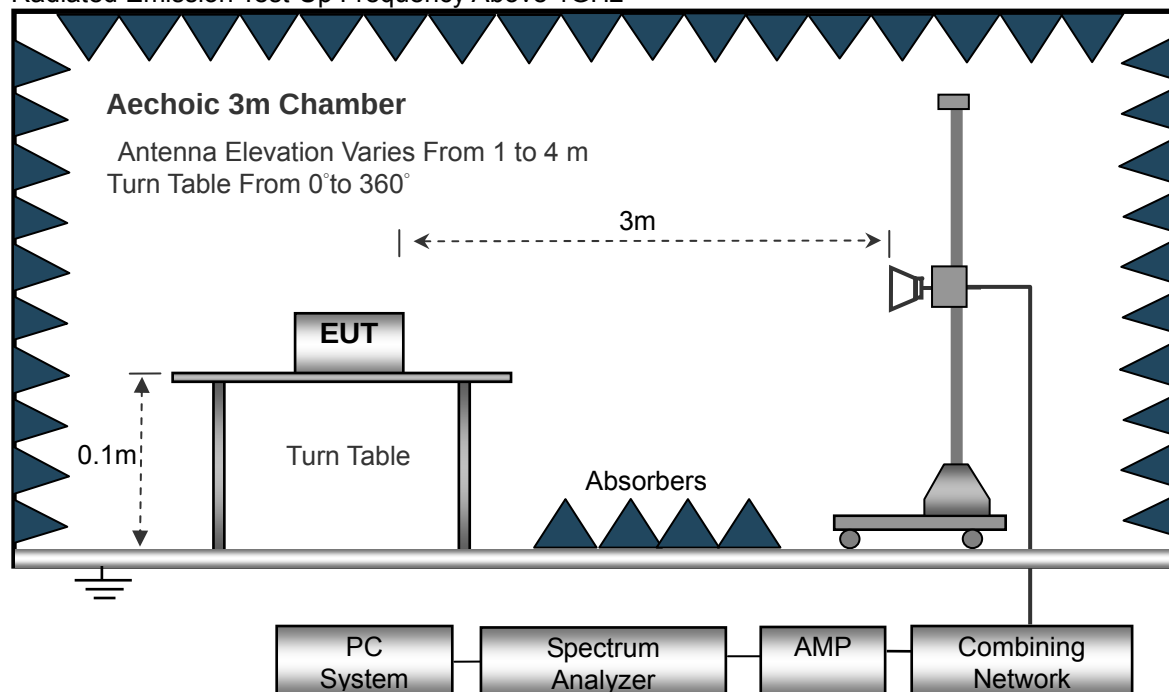
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



3.3.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



3.3.6 TEST RESULT

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:2402									
V	2390.00	76.44	52.12	2.73	27.38	54.43	74.00	-19.57	PK
V	2390.00	65.19	52.12	2.73	27.38	43.18	54.00	-10.82	AV
V	2400.00	76.65	52.16	2.78	27.41	54.68	74.00	-19.32	PK
V	2400.00	64.78	52.16	2.78	27.41	42.81	54.00	-11.19	AV
H	2390.00	76.73	52.12	2.73	27.38	54.72	74.00	-19.28	PK
H	2390.00	65.22	52.12	2.73	27.38	43.21	54.00	-10.79	AV
H	2400.00	76.60	52.16	2.78	27.41	54.63	74.00	-19.37	PK
H	2400.00	65.16	52.16	2.78	27.41	43.19	54.00	-10.81	AV

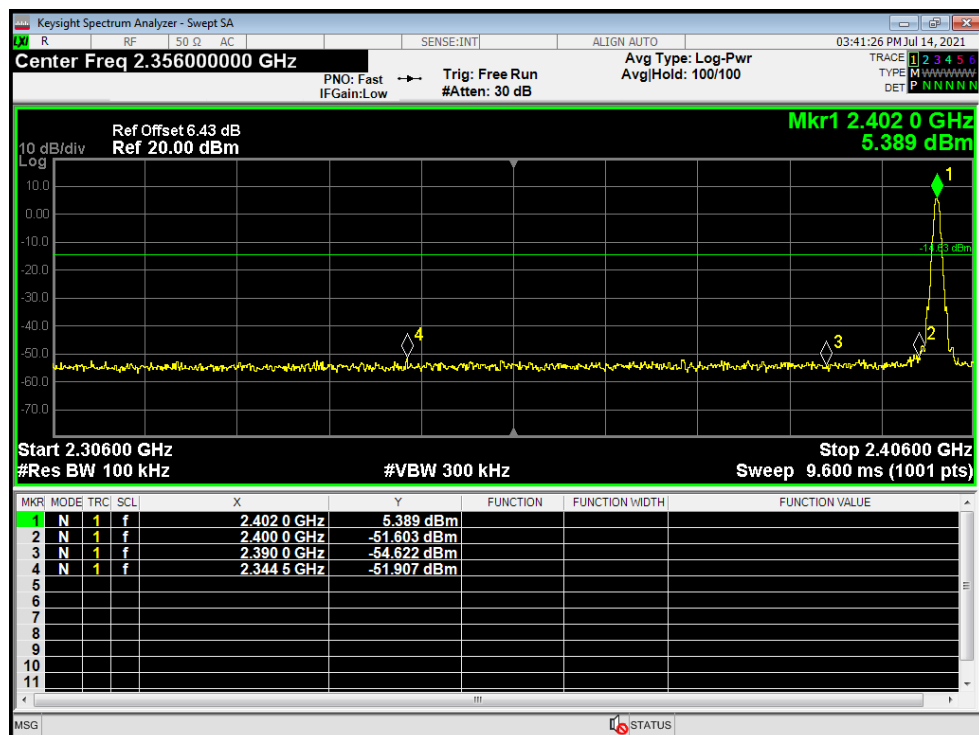
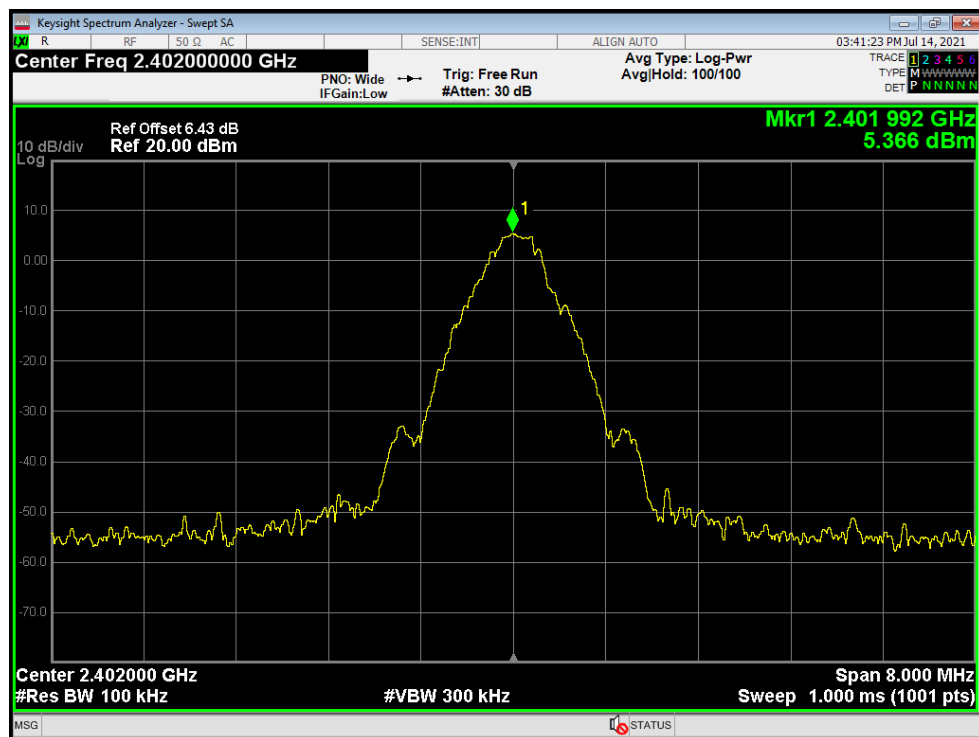
Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:2480									
V	2483.50	76.65	52.23	2.86	27.44	54.72	74.00	-19.28	PK
V	2483.50	65.43	52.23	2.86	27.44	43.50	54.00	-10.50	AV
V	2500.00	76.59	52.26	2.88	27.49	54.70	74.00	-19.30	PK
V	2500.00	64.89	52.26	2.88	27.49	43.00	54.00	-11.00	AV
H	2483.50	76.77	52.23	2.86	27.44	54.84	74.00	-19.16	PK
H	2483.50	65.47	52.23	2.86	27.44	43.54	54.00	-10.46	AV
H	2500.00	76.39	52.26	2.88	27.49	54.50	74.00	-19.50	PK
H	2500.00	65.73	52.26	2.88	27.49	43.84	54.00	-10.16	AV

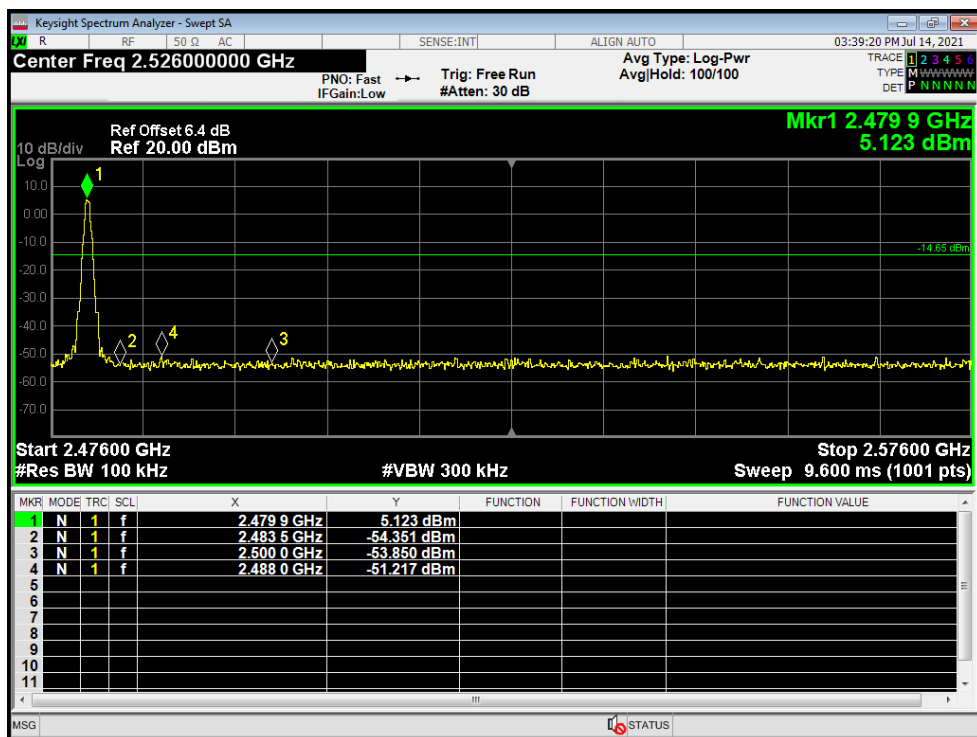
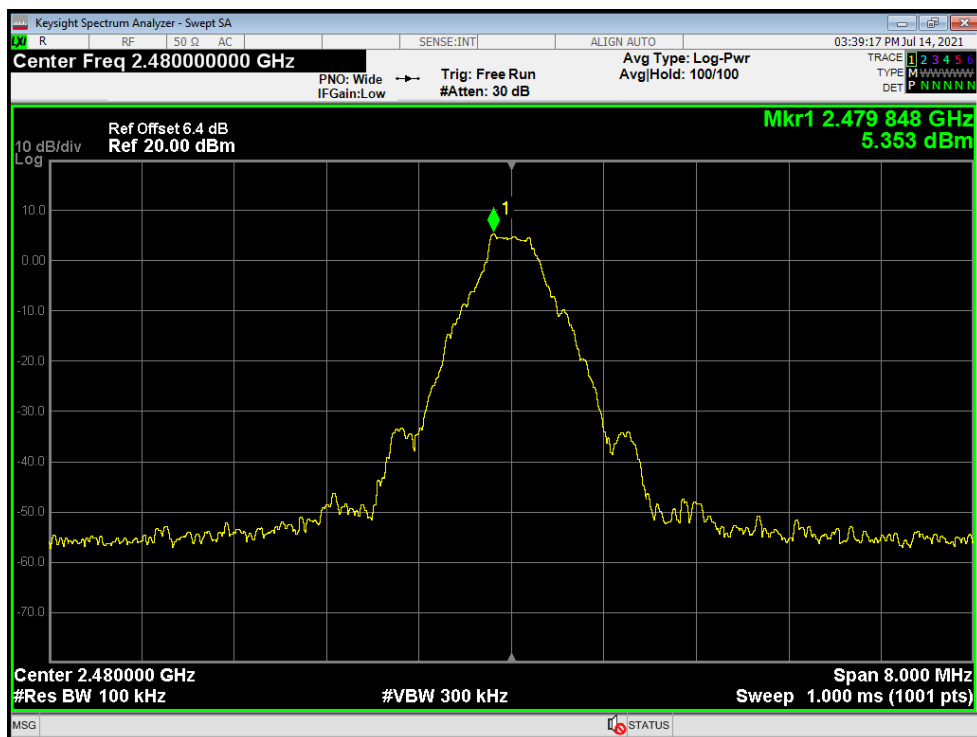
Remark:

1. Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



For Conducted







4. PEAK OUTPUT POWER

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

4.1.1 TEST PROCEDURE

- The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW > the 20 dB bandwidth of the emission being measured
Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
VBW $\geq$ RBW
Sweep = auto
Detector function = peak
Trace = max hold

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



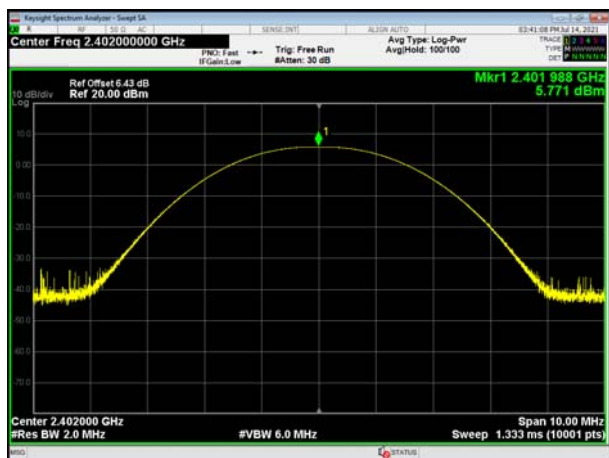
4.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

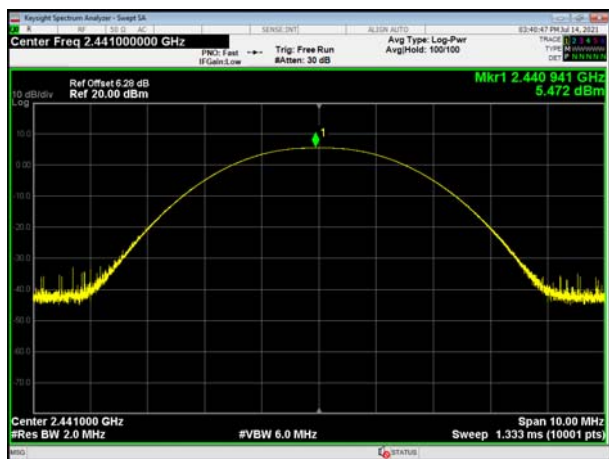
**4.1.5 TEST RESULTS**

Temperature:	25 °C	Relative Humidity:	60%
Pressure:	1012 hPa	Test Voltage :	DC 3.7V

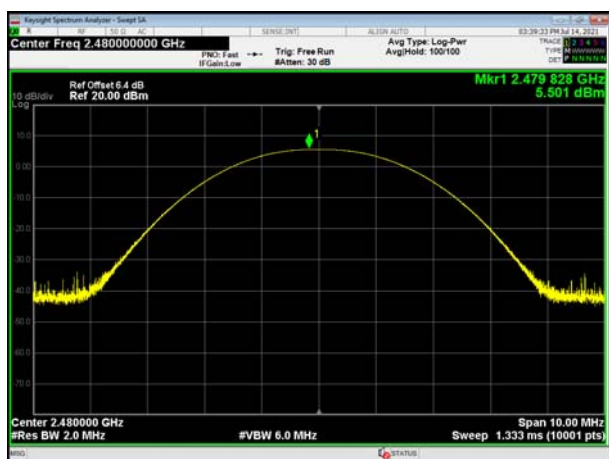
Test Channel	Peak Output Power (dBm)	LIMIT (dBm)
Low	5.771	30.00
Moddle	5.472	30.00
High	5.501	30.00



2402MHz



2440MHz



2480MHz



5. POWER SPECTRAL DENSITY TEST

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	= the frequency band of operation
RB	$RBW \geq 3kHz$
VB	$VBW \geq 3RBW$
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

5.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

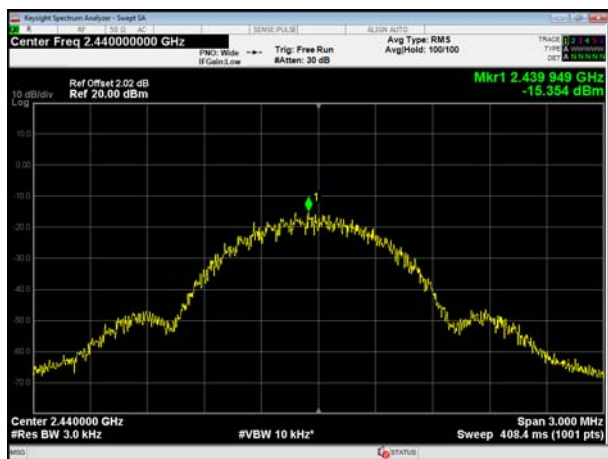
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 TEST RESULTS

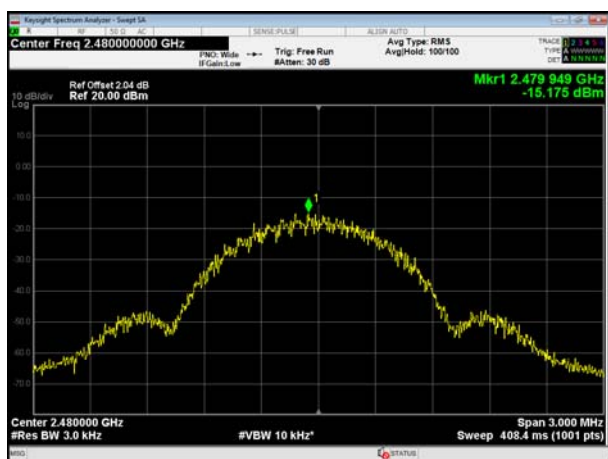
Test Channel	Reading Level (dBm)	Limit(dBm)	Result
Low	-15.415	8	PASS
Moddle	-15.354	8	PASS
High	-15.175	8	PASS



2402MHz



2440MHz



2480MHz



6. 6DB BANDWIDTH TEST

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range(MHz)	Result
15.247(a)(2)	Bandwidth	$\geq 500\text{KHz}$ (6dB bandwidth)	2400-2483.5	PASS

6.1.1 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) $\geq$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

6.1.5 TEST RESULTS

Test Channel	6dB Bandwidth (MHz)	Limit (MHz)	Result
Low	0.836	0.5	Pass
Middle	0.817	0.5	Pass
High	0.819	0.5	Pass



2402MHz



2440MHz



2480MHz



7. ANTENNA REQUIREMENT

7.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

7.2 EUT ANTENNA

The EUT antenna is internal antenna,. It comply with the standard requirement.



8. TEST SEUUP PHOTO

Reference to the appendix I for details.

9. EUT PHOTO

Reference to the appendix II for details.

***** END OF REPORT *****