



# FCC Part 15C Test Report

## FCC ID: 2BKAЕ-HD21

Applicant: Shenzhen Huadai Technology Co., Ltd

Address: A308 Fushi Industrial Park, No.33 Liuhe Road, Henggang Street, Longgang District, Shenzhen, China

Manufacturer: Shenzhen Huadai Technology Co., Ltd

Address: A308 Fushi Industrial Park, No.33 Liuhe Road, Henggang Street, Longgang District, Shenzhen, China

EUT: Smart Watch

Trade Mark: N/A

Model Number: HD21

Date of Receipt: May 07, 2025

Test Date: May 07, 2025 - May 17, 2025

Date of Report: May 17, 2025

Prepared By: Shenzhen DL Testing Technology Co., Ltd.

Address: 101-201, Comprehensive Building, Tongzhou Electronics Longgang Factory Area, No.1 Baolong Fifth Road, Baolong Community, Baolong Street, Longgang District, Shenzhen, China

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

Test Result: Pass

Report Number: DLE-250512042R

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*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.*

**Table of Contents****Page**

<b>1. SUMMARY OF TEST RESULTS .....</b>	<b>4</b>
<b>1.1 MEASUREMENT UNCERTAINTY .....</b>	<b>4</b>
<b>2. GENERAL INFORMATION .....</b>	<b>5</b>
<b>2.1 GENERAL DESCRIPTION OF EUT .....</b>	<b>5</b>
<b>2.2 DESCRIPTION OF TEST MODES .....</b>	<b>6</b>
<b>2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED .....</b>	<b>7</b>
<b>2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE) .....</b>	<b>7</b>
<b>2.5 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING .....</b>	<b>7</b>
<b>2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS .....</b>	<b>8</b>
<b>3. EMC EMISSION TEST .....</b>	<b>9</b>
<b>3.1 CONDUCTED EMISSION MEASUREMENT .....</b>	<b>9</b>
<b>3.1.1 POWER LINE CONDUCTED EMISSION Limits .....</b>	<b>9</b>
<b>3.1.2 TEST PROCEDURE .....</b>	<b>9</b>
<b>3.1.3 DEVIATION FROM TEST STANDARD .....</b>	<b>9</b>
<b>3.1.4 TEST SETUP .....</b>	<b>10</b>
<b>3.1.5 EUT OPERATING CONDITIONS .....</b>	<b>10</b>
<b>3.1.6 TEST RESULTS .....</b>	<b>10</b>
<b>3.2 RADIATED EMISSION MEASUREMENT .....</b>	<b>13</b>
<b>3.2.1 RADIATED EMISSION LIMITS .....</b>	<b>13</b>
<b>3.2.2 TEST PROCEDURE .....</b>	<b>14</b>
<b>3.2.3 DEVIATION FROM TEST STANDARD .....</b>	<b>14</b>
<b>3.2.4 TEST SETUP .....</b>	<b>14</b>
<b>3.2.5 EUT OPERATING CONDITIONS .....</b>	<b>15</b>
<b>3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ) .....</b>	<b>16</b>
<b>3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ) .....</b>	<b>17</b>
<b>3.2.8 TEST RESULTS (1GHZ~25GHZ) .....</b>	<b>19</b>
<b>3.3 RADIATED BAND EMISSION MEASUREMENT .....</b>	<b>20</b>
<b>3.3.1 TEST REQUIREMENT: .....</b>	<b>20</b>
<b>3.3.2 TEST PROCEDURE .....</b>	<b>20</b>
<b>3.3.3 DEVIATION FROM TEST STANDARD .....</b>	<b>20</b>
<b>3.3.4 TEST SETUP .....</b>	<b>21</b>
<b>3.3.5 EUT OPERATING CONDITIONS .....</b>	<b>21</b>
<b>3.4 CONDUCTED BAND EDGE EMISSION&amp;CONDUCTED SPURIOUS EMISSIONS MEASUREMENT .....</b>	<b>23</b>
<b>3.4.1 APPLICABLE STANDARD .....</b>	<b>23</b>
<b>3.4.2 TEST PROCEDURE .....</b>	<b>23</b>
<b>3.4.3 DEVIATION FROM STANDARD .....</b>	<b>23</b>

**Table of Contents**

	<b>Page</b>
<b>3.4.4 TEST SETUP .....</b>	<b>23</b>
<b>3.4.5 EUT OPERATION CONDITIONS .....</b>	<b>23</b>
<b>3.4.6 TEST RESULTS.....</b>	<b>23</b>
<b>4. AVERAGE OUTPUT POWER .....</b>	<b>24</b>
<b>4.1 APPLIED PROCEDURES / LIMIT .....</b>	<b>24</b>
<b>4.1.1 TEST PROCEDURE .....</b>	<b>24</b>
<b>4.1.2 DEVIATION FROM STANDARD .....</b>	<b>24</b>
<b>4.1.3 TEST SETUP .....</b>	<b>24</b>
<b>4.1.4 EUT OPERATION CONDITIONS .....</b>	<b>24</b>
<b>4.1.5 TEST RESULTS.....</b>	<b>24</b>
<b>5. POWER SPECTRAL DENSITY TEST .....</b>	<b>25</b>
<b>5.1 APPLIED PROCEDURES / LIMIT .....</b>	<b>25</b>
<b>5.1.1 TEST PROCEDURE .....</b>	<b>25</b>
<b>5.1.2 DEVIATION FROM STANDARD .....</b>	<b>25</b>
<b>5.1.3 TEST SETUP .....</b>	<b>25</b>
<b>5.1.4 EUT OPERATION CONDITIONS .....</b>	<b>25</b>
<b>5.1.5 TEST RESULTS.....</b>	<b>25</b>
<b>6. 6DB BANDWIDTH TEST .....</b>	<b>26</b>
<b>6.1 APPLIED PROCEDURES / LIMIT .....</b>	<b>26</b>
<b>6.1.1 TEST PROCEDURE .....</b>	<b>26</b>
<b>6.1.2 DEVIATION FROM STANDARD .....</b>	<b>26</b>
<b>6.1.3 TEST SETUP .....</b>	<b>26</b>
<b>6.1.4 EUT OPERATION CONDITIONS .....</b>	<b>26</b>
<b>6.1.5 TEST RESULTS.....</b>	<b>26</b>
<b>7. ANTENNA REQUIREMENT .....</b>	<b>27</b>
<b>7.1 STANDARD REQUIREMENT .....</b>	<b>27</b>
<b>7.2 EUT ANTENNA .....</b>	<b>27</b>
<b>8. TEST SEUUP PHOTO .....</b>	<b>28</b>
<b>9. EUT PHOTO .....</b>	<b>28</b>



## 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	
15.205, 15.209, 15.247(d)	Radiated Spurious Emission	PASS	
15.205, 15.247(d)	Band Edge Emission& Conducted Spurious Emissions	PASS	
15.247(b)	Average Output Power	PASS	
15.247(a)(2)	6dB Bandwidth	PASS	
15.247(e)	Power Spectral Density	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

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

Test lab: Shenzhen DL Testing Technology Co., Ltd.

Address: 101-201, Comprehensive Building, Tongzhou Electronics Longgang Factory Area, No.1 Baolong Fifth Road, Baolong Community, Baolong Street, Longgang District, Shenzhen, China

FCC Test Firm Registration Number: 854456

Designation Number: CN1307

IC Registered No.: 27485

CAB ID.: CN0118

### 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	$\pm 2\%$
8	6dB Bandwidth	$\pm 0.2\text{MHz}$
9	Power Spectral Density	$\pm 2.45\text{dBm}$



## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Product Name:	Smart Watch
Trademark	N/A
Model No.:	HD21
Model Difference	N/A
Sample ID:	DLE-250512042-001#
Operation Frequency:	2402~2480MHz
Channel numbers:	40 Channels
Modulation technology:	GFSK
Antenna Type:	Chip Antenna
Antenna gain:	2.50 dBi
Power Supply:	DC 5V from Adapter Battery: DC 3.85V/300mAh

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.

BLE Channel List							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	10	2422	20	2442	30	2462
01	2404	11	2424	21	2444	31	2464
02	2406	12	2426	22	2446	32	2466
03	2408	13	2428	23	2448	33	2468
04	2410	14	2430	24	2450	34	2470
05	2412	15	2432	25	2452	35	2472
06	2414	16	2434	26	2454	36	2474
07	2416	17	2436	27	2456	37	2476
08	2418	18	2438	28	2458	38	2478
09	2420	19	2440	29	2460	39	2480



## 2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible 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	CH00
Mode 2	CH19
Mode 3	CH39

For Conducted Emission	
Final Test Mode	Description
Mode 1	CH00
Mode 2	CH19
Mode 3	CH39

For Radiated Emission	
Final Test Mode	Description
Mode 1	CH00
Mode 2	CH19
Mode 3	CH39

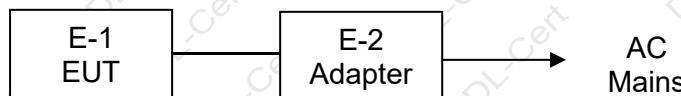
Note: 1. The measurements are performed at the highest, middle, lowest available channels.

2. During the test, the duty cycle >98%, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.

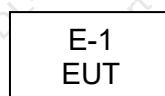


### 2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Power line conducted emission Test



Radiated 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	Smart Watch	HD21	N/A	EUT
E-2	Adapter	N/A	N/A	Model: YC-F02051500UU Input: 100-240V~ 50/60Hz 0.2A Output: DC 5V/1.5A 7.5W

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.

Max output power Setting			
Test software Version	Test program: BT_Tool		
Mode	CH00	CH19	CH39
Data Rate	1Mbps	1Mbps	1Mbps



## 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	Nov. 01, 2024	Oct. 31, 2025
2	Test Receiver (9kHz-7GHz)	R&S	ESRP7	101393	Nov. 01, 2024	Oct. 31, 2025
3	Bilog Antenna (30MHz-1GHz)	R&S	VULB9162	00306	Nov. 01, 2024	Oct. 31, 2025
4	Horn Antenna (1GHz-18GHz)	Schwarzbeck	BBHA9120D	02139	Nov. 01, 2024	Oct. 31, 2025
5	Horn Antenna (18GHz-40GHz)	A.H. Systems	SAS-574	588	Nov. 01, 2024	Oct. 31, 2025
6	Amplifier (9KHz-6GHz)	Schwarzbeck	BBV9743B	00153	Nov. 01, 2024	Oct. 31, 2025
7	Amplifier (1GHz-18GHz)	EMEC	EM01G8GA	00270	Nov. 01, 2024	Oct. 31, 2025
8	Amplifier (18GHz-40GHz)	Quanjuda	DLE-161	97	Nov. 01, 2024	Oct. 31, 2025
9	Loop Antenna (9KHz-30MHz)	Schwarzbeck	FMZB1519B	00014	Nov. 01, 2024	Oct. 31, 2025
10	RF cables1 (9kHz-1GHz)	ChengYu	966	004	Nov. 01, 2024	Oct. 31, 2025
11	RF cables2 (1GHz-40GHz)	ChengYu	966	003	Nov. 01, 2024	Oct. 31, 2025
12	Antenna connector	Florida RF Labs	N/A	RF 01#	Nov. 01, 2024	Oct. 31, 2025
13	Power probe	KEYSIGHT	U2021XA	MY55210018	Nov. 01, 2024	Oct. 31, 2025
14	Signal Analyzer 9kHz-26.5GHz	Agilent	N9020A	MY55370280	Nov. 01, 2024	Oct. 31, 2025
15	Test Receiver 20kHz-40GHz	R&S	ESU 40	100376	Nov. 01, 2024	Oct. 31, 2025
16	D.C. Power Supply	LongWei	PS-305D	010964729	Nov. 01, 2024	Oct. 31, 2025
17	Power Meter	Ceyear	2438PA/PB	/	Nov. 01, 2024	Oct. 31, 2025
18	Peak/continuous wave power probe	Ceyear	81702F	/	Nov. 01, 2024	Oct. 31, 2025

Conduction Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	843 Shielded Room	YIHENG	843 Room	843	Nov. 05, 2023	Nov. 04, 2026
2	EMI Receiver	R&S	ESR	101421	Nov. 01, 2024	Oct. 31, 2025
3	LISN	R&S	ENV216	102417	Nov. 01, 2024	Oct. 31, 2025
4	843 Cable 1#	ChengYu	CE Cable	001	Nov. 01, 2024	Oct. 31, 2025

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	FALA	EZ_EMC	EMC-CON 3A1.1
2	EMC radiation test system	FALA	EZ_EMC	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 -0.50	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

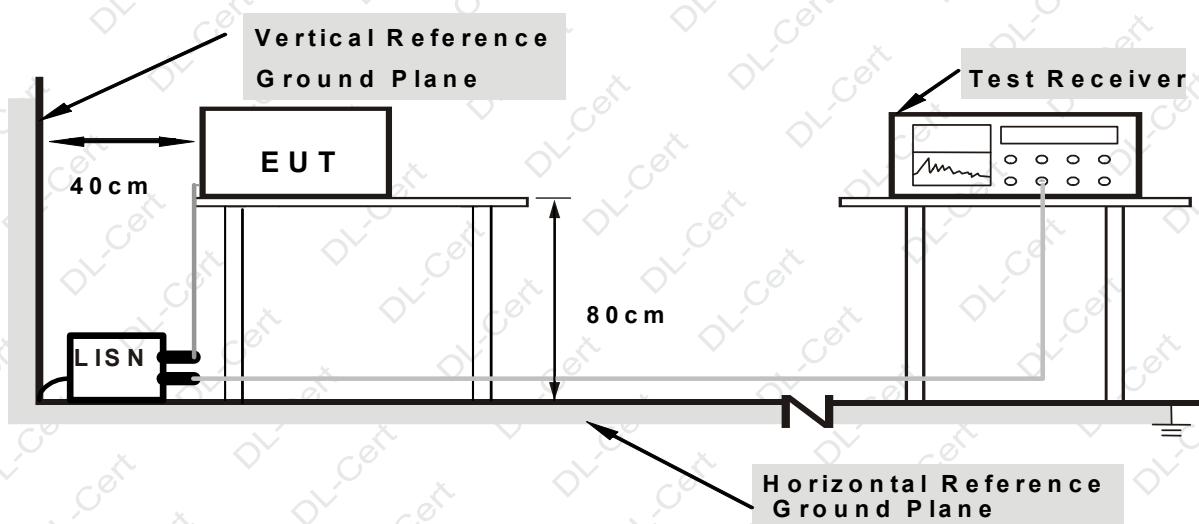
- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- 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.

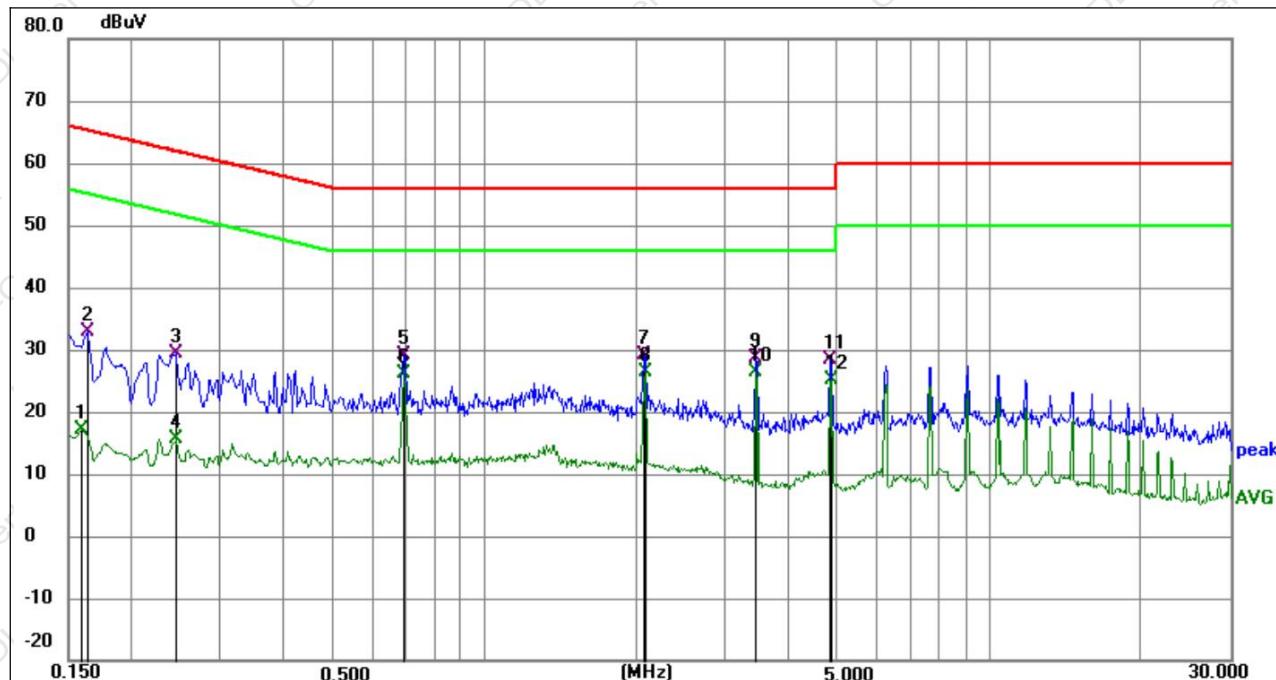
We pretest AC 120V and AC 230V, the worst voltage was AC 120V and the data recording in the report.

### 3.1.6 TEST RESULTS

All the modes were tested, the data of the worst mode 1 was recorded in the following pages, and the others modulation methods do not exceed the limits.



Temperature:	25 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 1



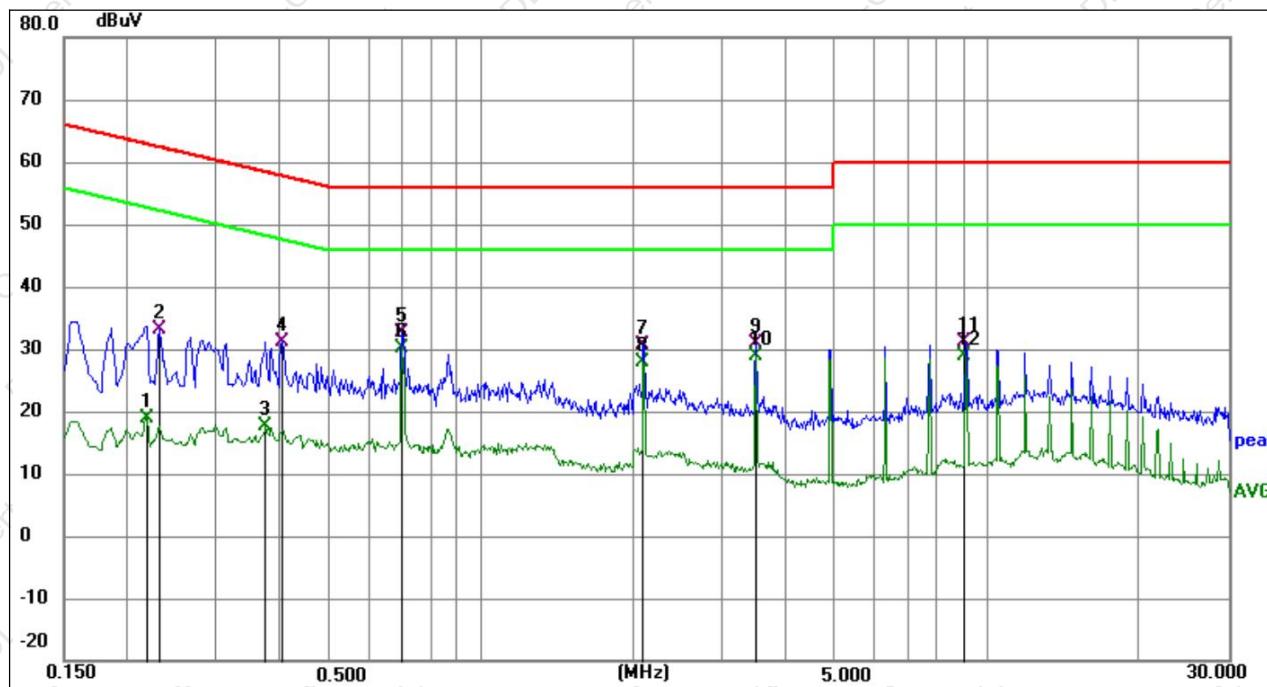
## Remark:

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

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1590	6.76	10.47	17.23	55.52	-38.29	AVG
2	0.1635	22.51	10.48	32.99	65.28	-32.29	QP
3	0.2444	18.80	10.56	29.36	61.95	-32.59	QP
4	0.2444	4.98	10.56	15.54	51.95	-36.41	AVG
5	0.6900	18.53	10.67	29.20	56.00	-26.80	QP
6	0.6900	15.58	10.67	26.25	46.00	-19.75	AVG
7	2.0670	18.44	10.68	29.12	56.00	-26.88	QP
8 *	2.0895	15.71	10.68	26.39	46.00	-19.61	AVG
9	3.4485	18.10	10.63	28.73	56.00	-27.27	QP
10	3.4485	15.64	10.63	26.27	46.00	-19.73	AVG
11	4.8300	17.64	10.72	28.36	56.00	-27.64	QP
12	4.8750	14.44	10.72	25.16	46.00	-20.84	AVG



Temperature:	25 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 1



## Remark:

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

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2174	8.38	10.56	18.94	52.92	-33.98	AVG
2	0.2310	22.59	10.56	33.15	62.41	-29.26	QP
3	0.3750	6.99	10.57	17.56	48.39	-30.83	AVG
4	0.4020	20.60	10.57	31.17	57.81	-26.64	QP
5	0.6990	21.99	10.68	32.67	56.00	-23.33	QP
6 *	0.6990	19.42	10.68	30.10	46.00	-15.90	AVG
7	2.0985	20.04	10.68	30.72	56.00	-25.28	QP
8	2.0985	17.32	10.68	28.00	46.00	-18.00	AVG
9	3.4935	20.33	10.63	30.96	56.00	-25.04	QP
10	3.4935	18.36	10.63	28.99	46.00	-17.01	AVG
11	9.1049	20.22	10.83	31.05	60.00	-28.95	QP
12	9.1049	18.09	10.83	28.92	50.00	-21.08	AVG



### 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:

- a. 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.
- 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 (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.
- 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.

Above 1GHz test procedure as below:

- g. 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.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel

Note:

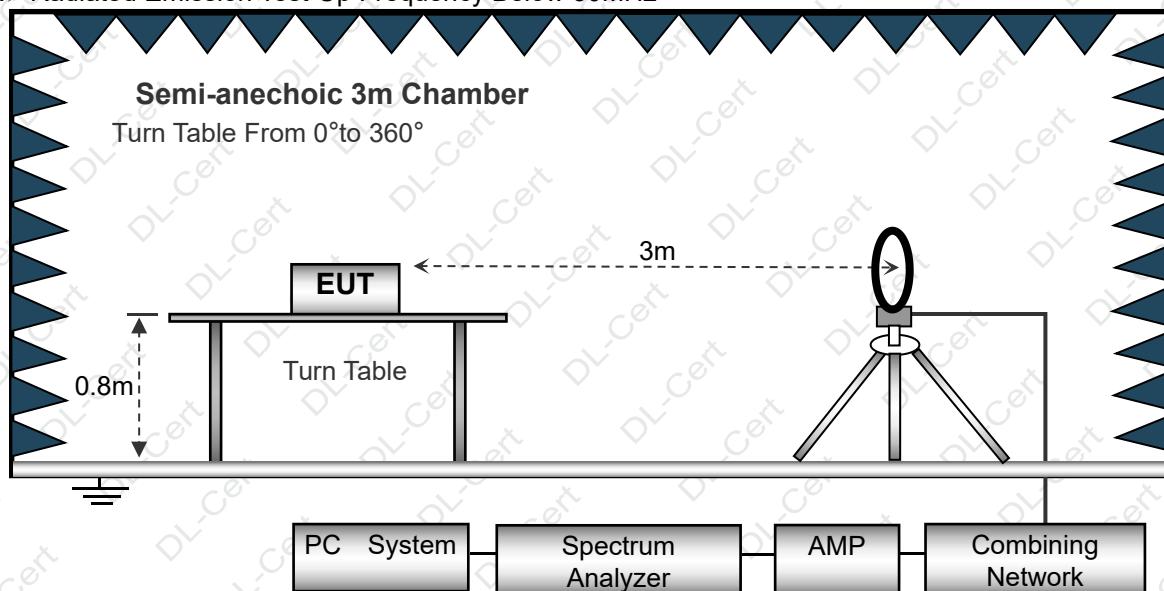
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

### 3.2.3 DEVIATION FROM TEST STANDARD

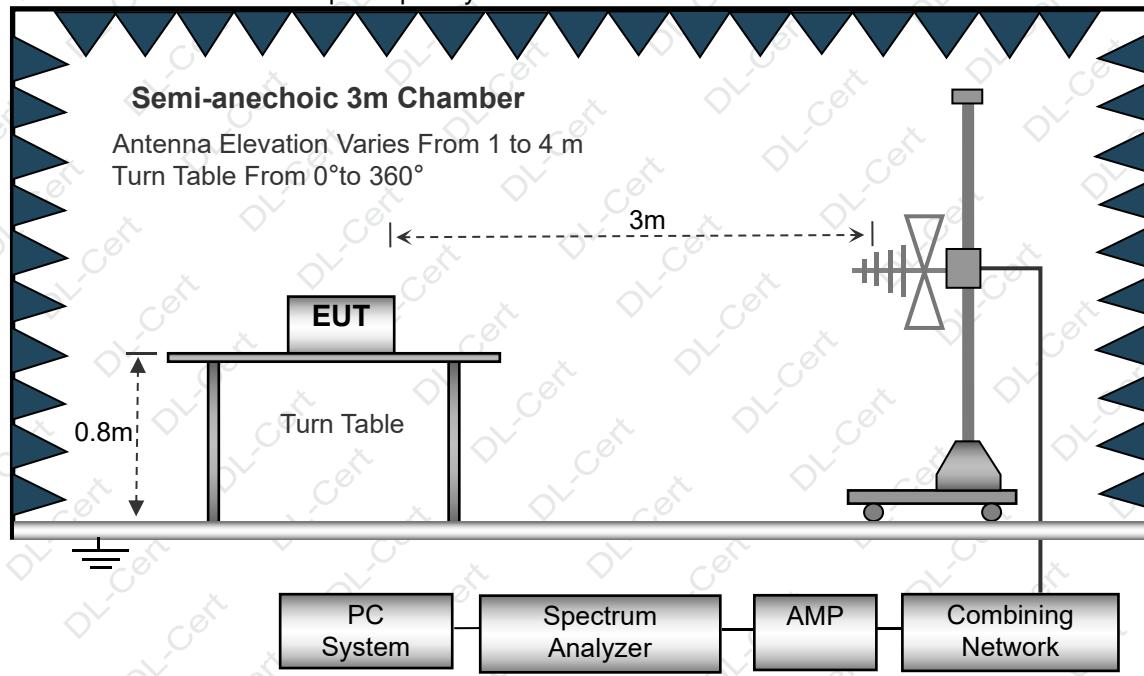
No deviation

### 3.2.4 TEST SETUP

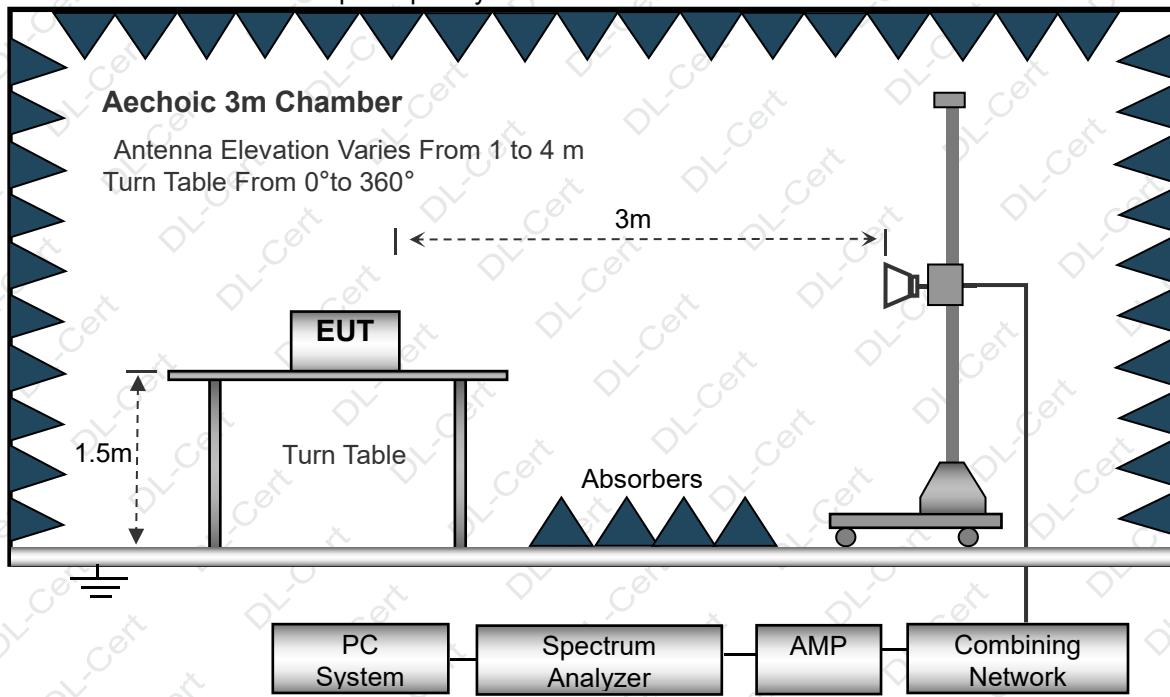
#### (A) Radiated Emission Test-Up Frequency Below 30MHz



(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°C	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	DC 3.85V
Test Mode :	Mode 1	Polarization :	--

Freq. (MHz)	Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	State
--	--	--	--	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 = $40 \log \left( \frac{\text{specific distance}}{\text{test distance}} \right) \text{dB}$ ;

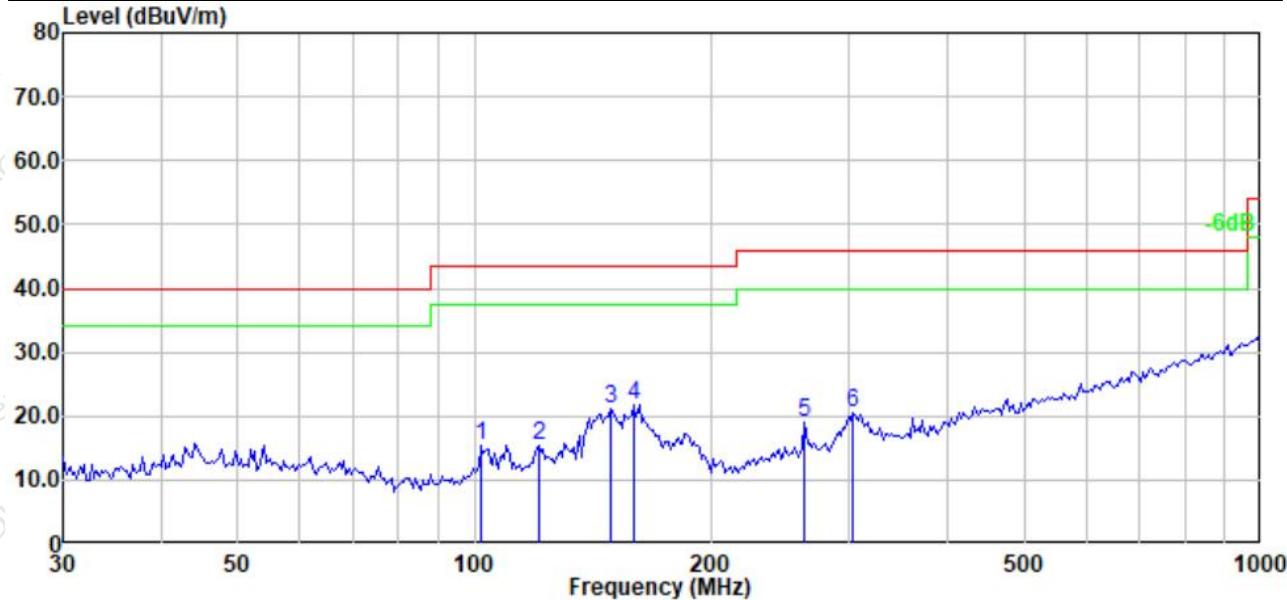
Limit line = specific limits(dBuv) + distance extrapolation factor.



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

All the modes were tested, the data of the worst mode 1 was recorded in the following pages, and the others modulation methods do not exceed the limits.

Temperature:	26°C	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Horizontal
Test Voltage :	DC 3.85V		
Test Mode :	Mode 1		



Freq	Read Level	Read Level		Factor	Limit Line	Over Limit	Over Limit Pol/Phase	Remark
		MHz	dBuV	dBuV/m	dB/m	dBuV/m	dB	
1	101.893	30.50	15.51	-14.99	43.50	-27.99	Horizontal	QP
2	120.612	28.53	15.35	-13.18	43.50	-28.15	Horizontal	QP
3	148.917	32.36	21.17	-11.19	43.50	-22.33	Horizontal	QP
4	159.759	32.70	21.79	-10.91	43.50	-21.71	Horizontal	QP
5	263.115	30.75	19.15	-11.60	46.00	-26.85	Horizontal	QP
6	302.819	29.93	20.42	-9.51	46.00	-25.58	Horizontal	QP

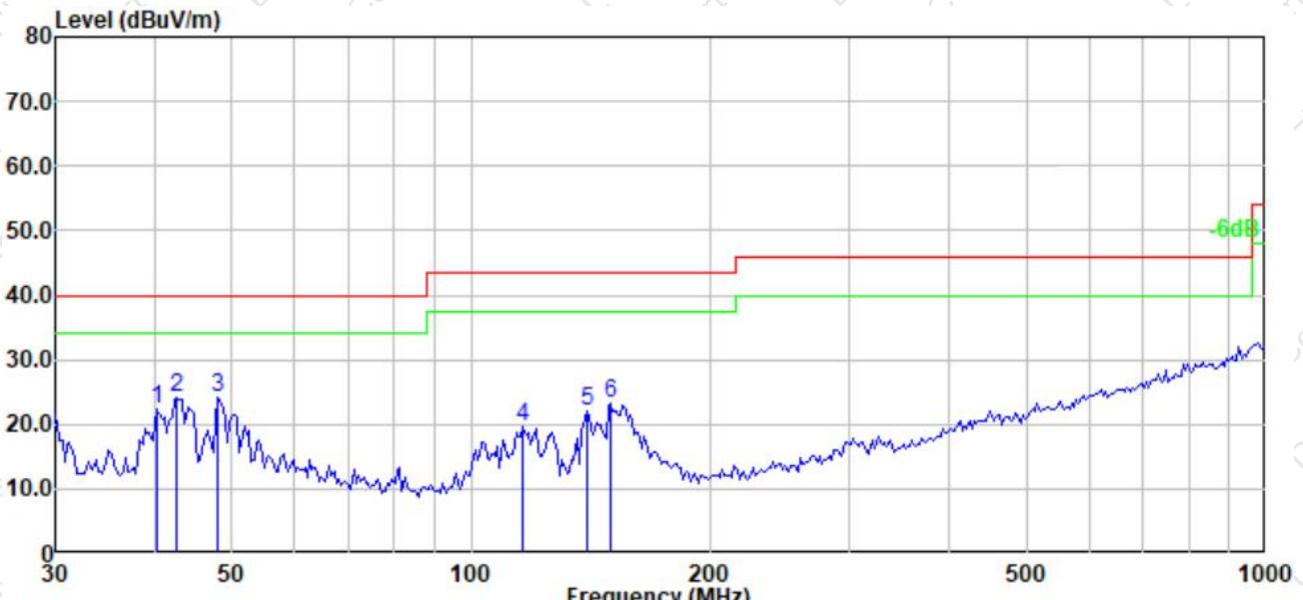
Remark:

Correct Factor = Cable loss + Antenna factor – Preamplifier;

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



Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Vertical
Test Voltage :	DC 3.85V		
Test Mode :	Mode 1		



Freq	Read		Level Factor	Limit Line	Over Limit	Over Limit Pol/Phase	Remark
	MHz	dBuV					
1	40.299	34.85	22.46	-12.39	40.00	-17.54	Vertical QP
2	42.630	36.51	24.14	-12.37	40.00	-15.86	Vertical QP
3	48.039	36.48	24.03	-12.45	40.00	-15.97	Vertical QP
4	116.448	33.09	19.53	-13.56	43.50	-23.97	Vertical QP
5	139.791	34.35	22.03	-12.32	43.50	-21.47	Vertical QP
6	149.968	34.34	23.28	-11.06	43.50	-20.22	Vertical QP

Remark:

Correct Factor = Cable loss + Antenna factor – Preamplifier;

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



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

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)	
<b>operation frequency:2402</b>									
V	4804	75.09	52.12	2.78	27.38	53.13	74.00	-20.87	Pk
V	4804	60.25	52.12	2.78	27.38	38.29	54.00	-15.71	AV
V	7206	76.25	52.16	3.08	27.41	54.58	74.00	-19.42	Pk
V	7206	59.92	52.16	3.08	27.41	38.25	54.00	-15.75	AV
V	16132	65.03	52.12	7.36	41.52	61.79	74.00	-12.21	PK
H	4804	75.14	52.12	2.78	27.38	53.18	74.00	-20.82	Pk
H	4804	60.25	52.16	2.78	27.41	38.28	54.00	-15.72	AV
H	7206	76.25	52.16	3.08	27.41	54.58	74.00	-19.42	Pk
H	7206	59.92	52.12	3.08	27.38	38.26	54.00	-15.74	AV
H	16132	64.64	51.53	7.36	41.52	61.99	74.00	-12.01	PK
<b>operation frequency:2441</b>									
V	4882	75.11	52.23	2.86	27.44	53.18	74.00	-20.82	Pk
V	4882	60.19	52.23	2.86	27.44	38.26	54.00	-15.74	AV
V	7323	76.24	52.26	3.12	27.49	54.59	74.00	-19.41	Pk
V	7323	59.96	52.26	3.12	27.49	38.31	54.00	-15.69	AV
V	16132	65.03	52.23	7.36	41.52	61.68	74.00	-12.32	PK
H	4882	75.14	52.23	2.86	27.44	53.21	74.00	-20.79	Pk
H	4882	60.25	52.26	2.86	27.49	38.34	54.00	-15.66	AV
H	7323	76.25	52.26	3.12	27.49	54.60	74.00	-19.40	Pk
H	7323	59.92	52.23	3.12	27.44	38.25	54.00	-15.75	AV
H	16132	64.66	51.53	7.36	41.52	62.01	74.00	-11.99	PK
<b>operation frequency:2480</b>									
V	4960	75.16	51.74	2.93	27.46	53.81	74.00	-20.19	Pk
V	4960	60.22	51.74	2.93	27.46	38.87	54.00	-15.13	AV
V	7440	74.91	49.98	3.15	27.52	55.60	74.00	-18.40	Pk
V	7440	57.61	49.98	3.15	27.52	38.30	54.00	-15.70	AV
V	16132	65.03	51.53	7.36	41.52	62.38	74.00	-11.62	PK
H	4960	75.14	51.74	2.93	27.46	53.79	74.00	-20.21	Pk
H	4960	60.25	51.74	2.93	27.46	38.90	54.00	-15.10	AV
H	7440	76.25	49.98	3.15	27.52	56.94	74.00	-17.06	Pk
H	7440	57.82	49.98	3.15	27.52	38.51	54.00	-15.49	AV
H	16132	64.60	51.53	7.36	41.52	61.95	74.00	-12.05	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.



### 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:

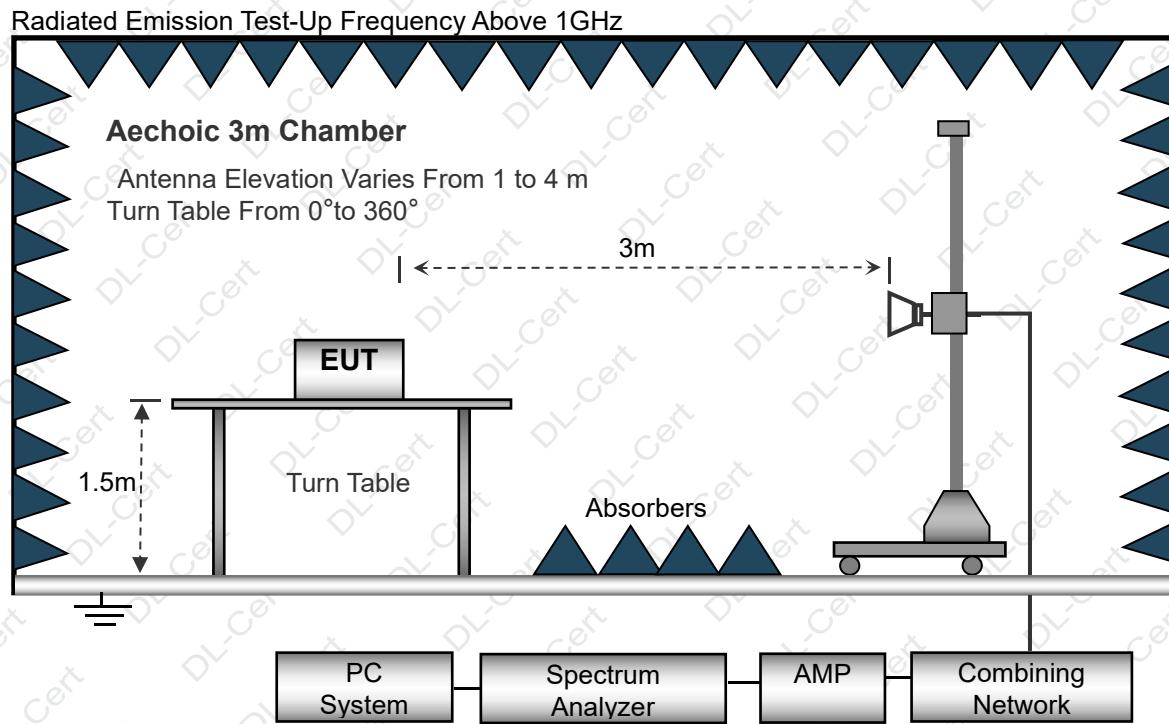
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

#### 3.3.3 DEVIATION FROM TEST STANDARD

No deviation



### 3.3.4 TEST SETUP



### 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	76.74	52.12	2.73	27.38	54.73	74.00	-19.27	PK
V	2390.00	66.24	52.12	2.73	27.38	44.23	54.00	-9.77	AV
V	2400.00	78.02	52.16	2.78	27.41	56.05	74.00	-17.95	PK
V	2400.00	65.67	52.16	2.78	27.41	43.70	54.00	-10.30	AV
H	2390.00	77.53	52.12	2.73	27.38	55.52	74.00	-18.48	PK
H	2390.00	65.65	52.12	2.73	27.38	43.64	54.00	-10.36	AV
H	2400.00	77.24	52.16	2.78	27.41	55.27	74.00	-18.73	PK
H	2400.00	66.32	52.16	2.78	27.41	44.35	54.00	-9.65	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	76.24	52.12	2.73	27.38	54.23	74.00	-19.77	PK
V	2483.50	66.73	52.12	2.73	27.38	44.72	54.00	-9.28	AV
V	2500.00	77.73	52.16	2.78	27.41	55.76	74.00	-18.24	PK
V	2500.00	65.60	52.16	2.78	27.41	43.63	54.00	-10.37	AV
H	2483.50	76.22	52.12	2.73	27.38	54.21	74.00	-19.79	PK
H	2483.50	65.24	52.12	2.73	27.38	43.23	54.00	-10.77	AV
H	2500.00	76.04	52.16	2.78	27.41	54.07	74.00	-19.93	PK
H	2500.00	67.02	52.16	2.78	27.41	45.05	54.00	-8.95	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.



### 3.4 CONDUCTED BAND EDGE EMISSION&CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

<b>Test Requirement:</b>	FCC Part15 C Section 15.247 (d)
<b>Test Method:</b>	KDB558074 D0115.247 Meas Guidance v05r02

#### 3.4.1 APPLICABLE STANDARD

in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in§15.205(a), must also comply with the radiated emission limits specified in15.209(a).

If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

#### 3.4.2 TEST PROCEDURE

Using the following spectrum analyzer setting:

Set the RBW = 100KHz.  
Set the VBW = 300KHz.  
Sweep time = auto couple.  
Detector function = peak.  
Trace mode = max hold.  
Allow trace to fully stabilize.

#### 3.4.3 DEVIATION FROM STANDARD

No deviation.

#### 3.4.4 TEST SETUP



#### 3.4.5 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.

#### 3.4.6 TEST RESULTS

Pass

Please refer to Appendix I BLE Test Data.



## 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

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Set span to at least 1.5 times the OBW.
- c. Set RBW = 1% to 5% of the OBW, not to exceed 1 MHz.
- d. Set VBW  $\geq [3 \times RBW]$ .
- e. Number of points in sweep  $\geq [2 \times \text{span} / RBW]$ . (This gives bin-to-bin spacing  $\leq RBW / 2$ , so that narrowband signals are not lost between frequency bins.)
- f. Sweep time = auto.
- g. Detector = Peak, if available. Otherwise, use sample detector mode.
- h. If transmit duty cycle  $< 98\%$ , use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at the maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no OFF intervals) or at duty cycle  $\geq 98\%$ , and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run."
- i. Trace average at least 100 traces in power averaging (rms) mode.
- j. Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

#### 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

Pass

Please refer to Appendix I BLE Test Data.



## 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	$RBW \geq 3\text{kHz}$
VB	$VBW \geq 3RBW$
Detector	power averaging (rms) or sample detector (when rms not available).
Trace	rms/average
Sweep Time	Auto

#### 5.1.1 TEST PROCEDURE

- 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

Pass

Please refer to Appendix I BLE Test Data.



## 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	>= 500KHz (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

Pass

Please refer to Appendix I BLE Test Data.



## 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 Chip Antenna, It comply with the standard requirement.



## 8. TEST SEUUP PHOTO

Reference to the appendix for details.

## 9. EUT PHOTO

Reference to the appendix for details.

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