



FCC Part 15C Test Report

FCC ID: 2A4Z7-B20

Applicant: Shenzhen zhongkema Technology Co., Ltd

Address: 201, complex building, No. 76, Yuxin Road, Guangpei community,
Guanlan street, Longhua District, Shenzhen

Manufacturer: Shenzhen zhongkema Technology Co., Ltd

Address: 201, complex building, No. 76, Yuxin Road, Guangpei community,
Guanlan street, Longhua District, Shenzhen

EUT: led strip lights

Trade Mark: N/A

Model Number: B20, B15, B30, lamp belt suit

Date of Receipt: Feb. 18, 2022

Test Date: Feb. 18, 2022 - Feb. 26, 2022

Date of Report: Feb. 26, 2022

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

Address: 101-201, Building C, Shuanghuan, No.8, Baoqing Road, Baolong Industrial Zone, Baolong
Street, Longgang District, Shenzhen, Guangdong, China

Applicable Standards: FCC PART 15 C 15.249
ANSI C63.10: 2013

Test Result: Pass

Report Number: DL-20220225013E

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.



Table of Contents	Page
1. SUMMARY OF TEST RESULTS.....	4
1.1 MEASUREMENT UNCERTAINTY.....	4
2. GENERAL INFORMATION.....	5
2.1 GENERAL DESCRIPTION OF EUT.....	5
2.2 DESCRIPTION OF TEST MODES.....	5
2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED.....	6
2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE).....	6
2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS.....	7
3. EMC EMISSION TEST.....	8
3.1 CONDUCTED EMISSION MEASUREMENT.....	8
3.1.1 POWER LINE CONDUCTED EMISSION Limits.....	8
3.1.2 TEST PROCEDURE.....	8
3.1.3 DEVIATION FROM TEST STANDARD.....	8
3.1.4 TEST SETUP.....	9
3.1.5 EUT OPERATING CONDITIONS.....	9
3.1.6 TEST RESULTS.....	9
3.2 RADIATED EMISSION MEASUREMENT.....	12
3.2.1 RADIATED EMISSION LIMITS.....	12
3.2.2 TEST PROCEDURE.....	13
3.2.3 DEVIATION FROM TEST STANDARD.....	13
3.2.4 TEST SETUP.....	13
3.2.5 EUT OPERATING CONDITIONS.....	14
3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)	15
3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)	16
3.2.8 TEST RESULTS (1GHZ~25GHZ).....	18
3.3 RADIATED BAND EMISSION MEASUREMENT.....	19
3.3.1 TEST REQUIREMENT:.....	19
3.3.2 TEST PROCEDURE.....	19
3.3.3 DEVIATION FROM TEST STANDARD.....	19
3.3.4 TEST SETUP.....	20
3.3.5 EUT OPERATING CONDITIONS.....	20
4. BANDWIDTH TEST.....	22
4.1 APPLIED PROCEDURES / LIMIT.....	22
4.1.1 TEST PROCEDURE.....	22
4.1.2 DEVIATION FROM STANDARD.....	22
4.1.3 TEST SETUP.....	22
4.1.4 EUT OPERATION CONDITIONS.....	22
4.1.5 TEST RESULTS.....	23



Table of Contents	Page
5. ANTENNA REQUIREMENT.....	25
5.1 STANDARD REQUIREMENT.....	25
5.2 EUT ANTENNA.....	25
6. TEST SEUUP PHOTO.....	26



1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.249) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.249(c)	Fundamental &Radiated Spurious Emission Measurement	PASS	
15.205	Band Edge Emission	PASS	
15.215	20dB Bandwidth	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:	led strip lights
Trademark	N/A
Model No.:	B20
Model Difference:	B15, B30, lamp belt suit (All models have same circuits diagram, PCB Layout, construction and rated power, only different is the model name.)
Sample No.:	DL-20220225013#
Operation Frequency:	2402~2480MHz
Channel numbers:	40 Channels
Channel separation:	2M
Modulation technology:	GFSK
Antenna Type:	PCB Antenna
Antenna gain:	0dBi
Power supply:	Model: RXW-0698-24V1A Input: AC 100-240V, 50/60Hz Output: DC 24V/1000mA

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.

3.

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 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	CH01	GFSK
Mode 2	CH20	
Mode 3	CH40	

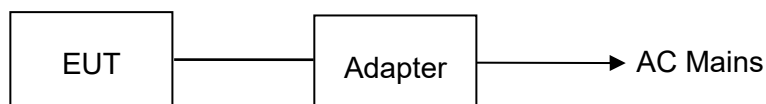
Note:

- (1) The measurements are performed at the highest, middle, lowest available channels.

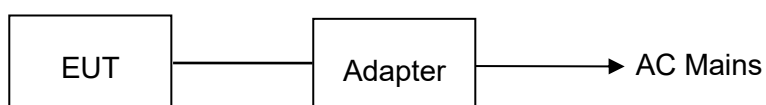


2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

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	led strip lights	B20	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note
C1	No	No	No	No

Note:

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



2.5 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. 06, 2021	Dec. 05, 2022
2	Test Receiver (9kHz-7GHz)	R&S	ESRP7	101393	Dec. 06, 2021	Dec. 05, 2022
3	Bilog Antenna (30MHz-1GHz)	R&S	VULB9162	00306	Dec. 06, 2021	Dec. 05, 2022
4	Horn Antenna (1GHz-18GHz)	Schwarzbeck	BBHA9120D	02139	Dec. 06, 2021	Dec. 05, 2022
5	Horn Antenna (18GHz-40GHz)	A.H. Systems	SAS-574	588	Dec. 06, 2021	Dec. 05, 2022
6	Amplifier (9KHz-6GHz)	Schwarzbeck	BBV9743B	00153	Dec. 06, 2021	Dec. 05, 2022
7	Amplifier (1GHz-18GHz)	EMEC	EM01G8GA	00270	Dec. 06, 2021	Dec. 05, 2022
8	Amplifier (18GHz-40GHz)	Quanjuda	DLE-161	97	Dec. 06, 2021	Dec. 05, 2022
9	Loop Antenna (9KHz-30MHz)	Schwarzbeck	FMZB1519B	00014	Dec. 06, 2021	Dec. 05, 2022
10	RF cables1 (9kHz-1GHz)	ChengYu	966	004	Dec. 06, 2021	Dec. 05, 2022
11	RF cables2 (1GHz-40GHz)	ChengYu	966	003	Dec. 06, 2021	Dec. 05, 2022
12	Antenna connector	Florida RF Labs	N/A	RF 01#	Dec. 06, 2021	Dec. 05, 2022
13	Power probe	KEYSIGHT	U2021XA	MY55210018	Dec. 06, 2021	Dec. 05, 2022
14	Signal Analyzer 9kHz-26.5GHz	Agilent	N9020A	MY55370280	Dec. 06, 2021	Dec. 05, 2022
15	Test Receiver 20kHz-40GHz	R&S	ESU 40	100376	Dec. 06, 2021	Dec. 05, 2022
16	D.C. Power Supply	LongWei	PS-305D	010964729	Dec. 06, 2021	Dec. 05, 2022

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. 06, 2021	Dec. 05, 2022
3	LISN	Schwarzbeck	NNLK 8128	5089	Dec. 06, 2021	Dec. 05, 2022
4	843 Cable 1#	ChengYu	CE Cable	001	Dec. 06, 2021	Dec. 05, 2022

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

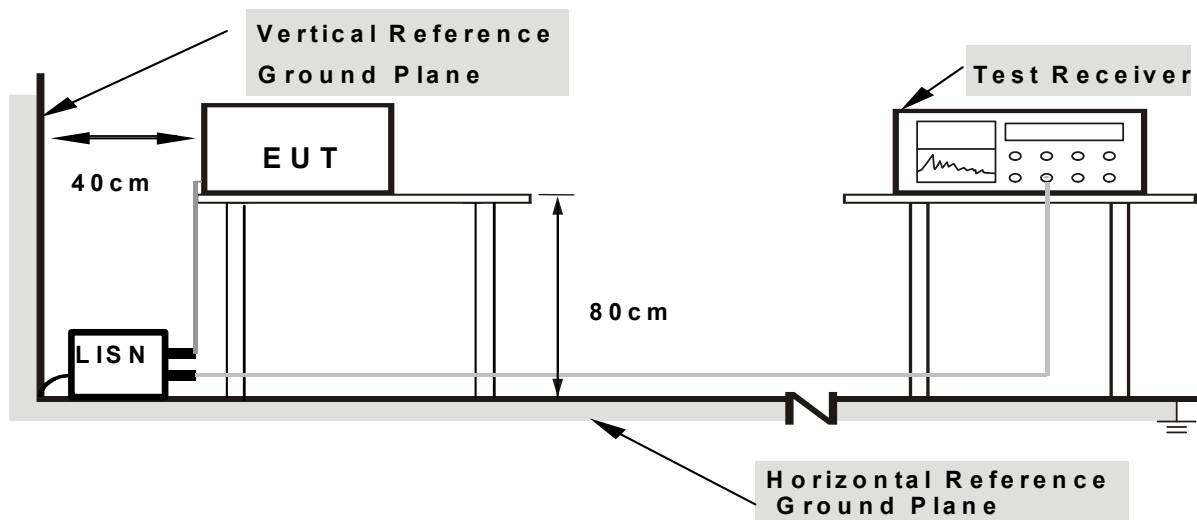
3.1.2 TEST PROCEDURE

- 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.
- 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.
- 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.
- LISN at least 80 cm from nearest part of EUT chassis.
- 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

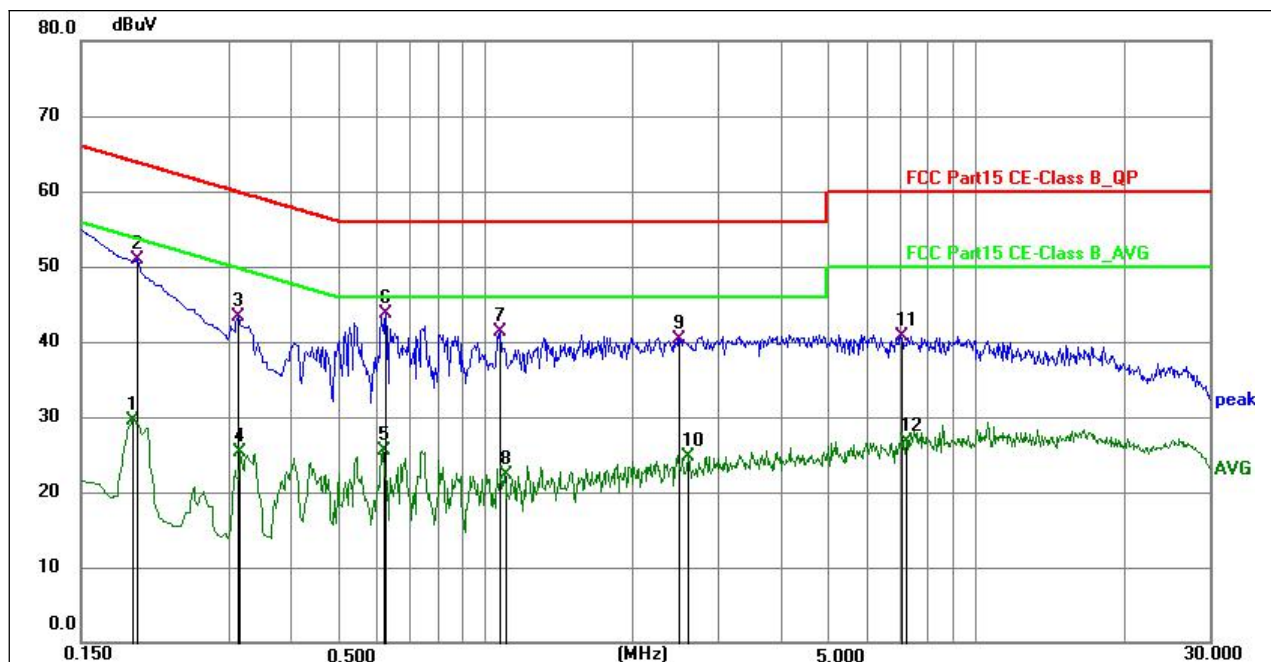
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.1.6 TEST RESULTS

Note: 1. All modes were tested at AC 120V and 240V, only the worst result of AC 120V was reported.
2. All modes were tested at Low, Middle, and High channel, only the worst result of GFSK Low Channel was reported.



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



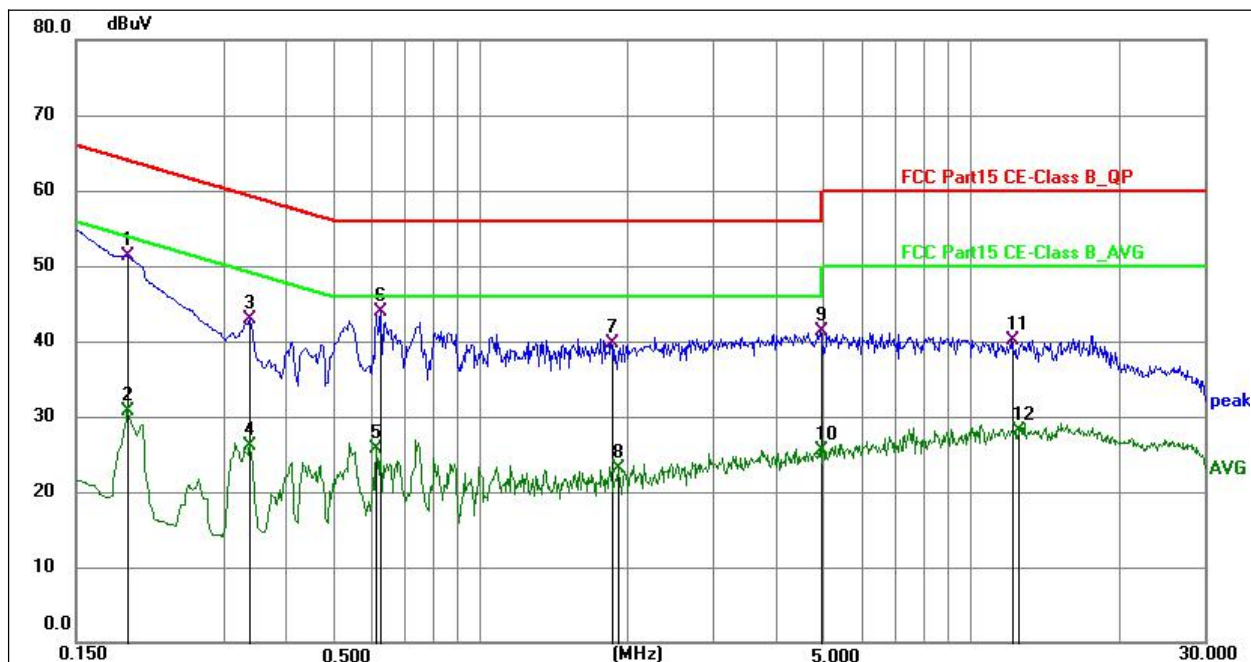
Remark:

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

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1905	19.28	10.29	29.57	54.01	-24.44	AVG
2	0.1949	40.53	10.29	50.82	63.83	-13.01	QP
3	0.3119	32.98	10.30	43.28	59.92	-16.64	QP
4	0.3165	15.04	10.30	25.34	49.80	-24.46	AVG
5	0.6180	15.13	10.32	25.45	46.00	-20.55	AVG
6 *	0.6270	33.32	10.32	43.64	56.00	-12.36	QP
7	1.0725	30.99	10.35	41.34	56.00	-14.66	QP
8	1.0949	11.92	10.35	22.27	46.00	-23.73	AVG
9	2.4944	29.96	10.39	40.35	56.00	-15.65	QP
10	2.6070	14.28	10.39	24.67	46.00	-21.33	AVG
11	7.0519	30.18	10.50	40.68	60.00	-19.32	QP
12	7.2365	16.25	10.50	26.75	50.00	-23.25	AVG



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 lose + LISN insertion loss, Level= Reading + Correct factor

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1905	41.06	10.31	51.37	64.01	-12.64	QP
2	0.1905	20.42	10.31	30.73	54.01	-23.28	AVG
3	0.3390	32.50	10.33	42.83	59.23	-16.40	QP
4	0.3390	15.78	10.33	26.11	49.23	-23.12	AVG
5	0.6134	15.43	10.34	25.77	46.00	-20.23	AVG
6 *	0.6270	33.60	10.34	43.94	56.00	-12.06	QP
7	1.8509	29.40	10.39	39.79	56.00	-16.21	QP
8	1.9094	12.79	10.39	23.18	46.00	-22.82	AVG
9	4.9379	30.77	10.47	41.24	56.00	-14.76	QP
10	4.9379	14.95	10.47	25.42	46.00	-20.58	AVG
11	12.1823	29.42	10.59	40.01	60.00	-19.99	QP
12	12.5739	17.60	10.59	28.19	50.00	-21.81	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.

Frequency (MHz)	Field Strength (micровolts/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

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 - 928 MHz	50	500
2400 - 2483.5 MHz	50	500
5725 - 5875 MHz	50	500
24.0 - 24.25 GHz	250	2500

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).

Receiver setup:

Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average



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:

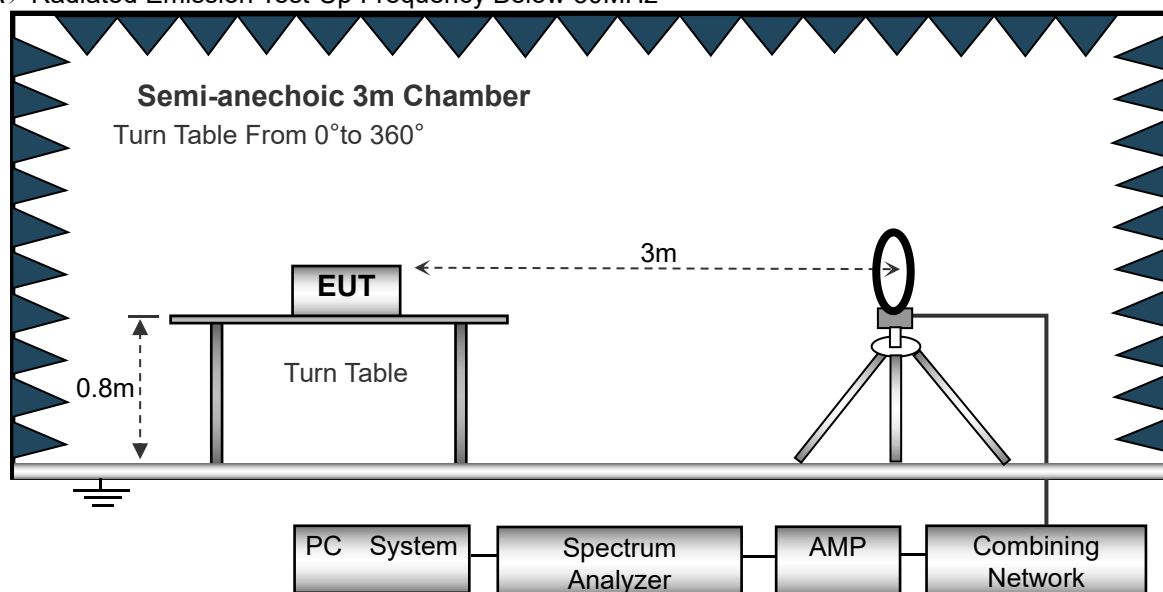
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

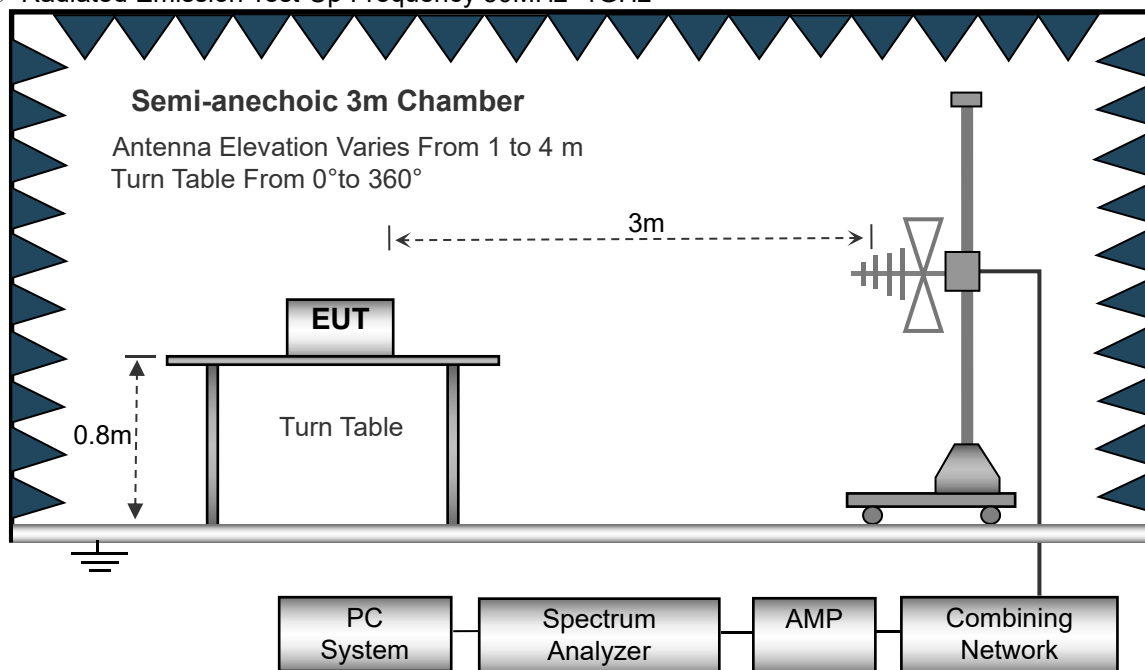
No deviation

3.2.4 TEST SETUP

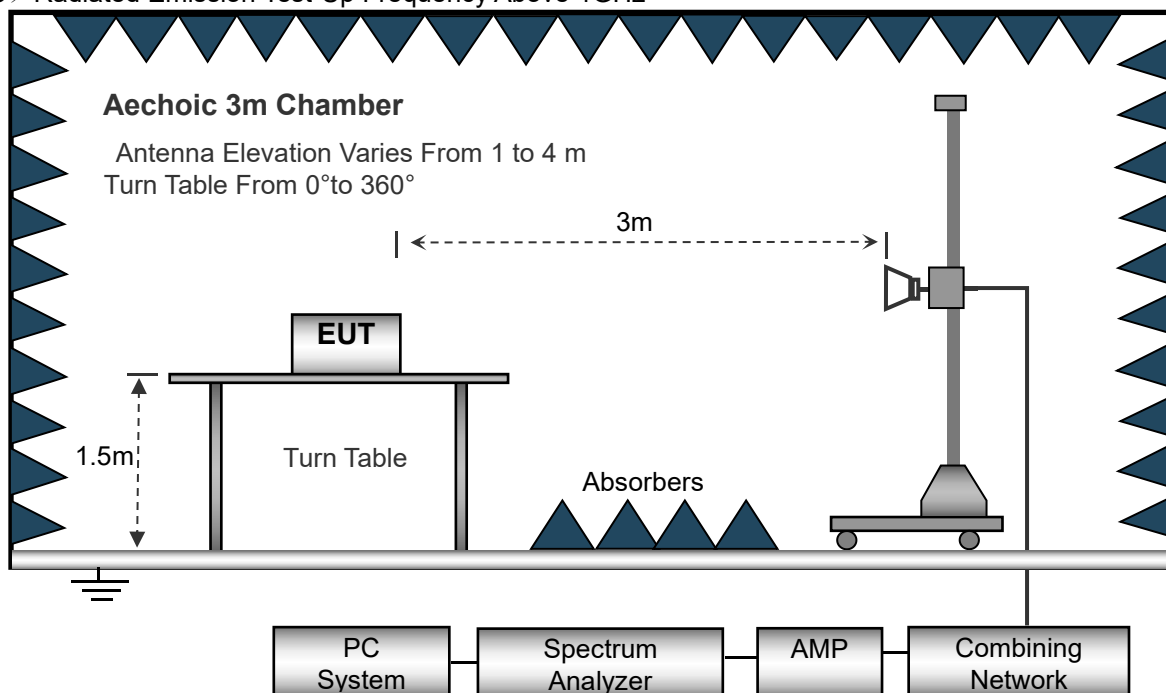
(A) Radiated Emission Test-Up Frequency Below 30MHz



(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 :	AC 120V/60Hz
Test Mode :	Mode 1	Polarization :	--

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

Note:

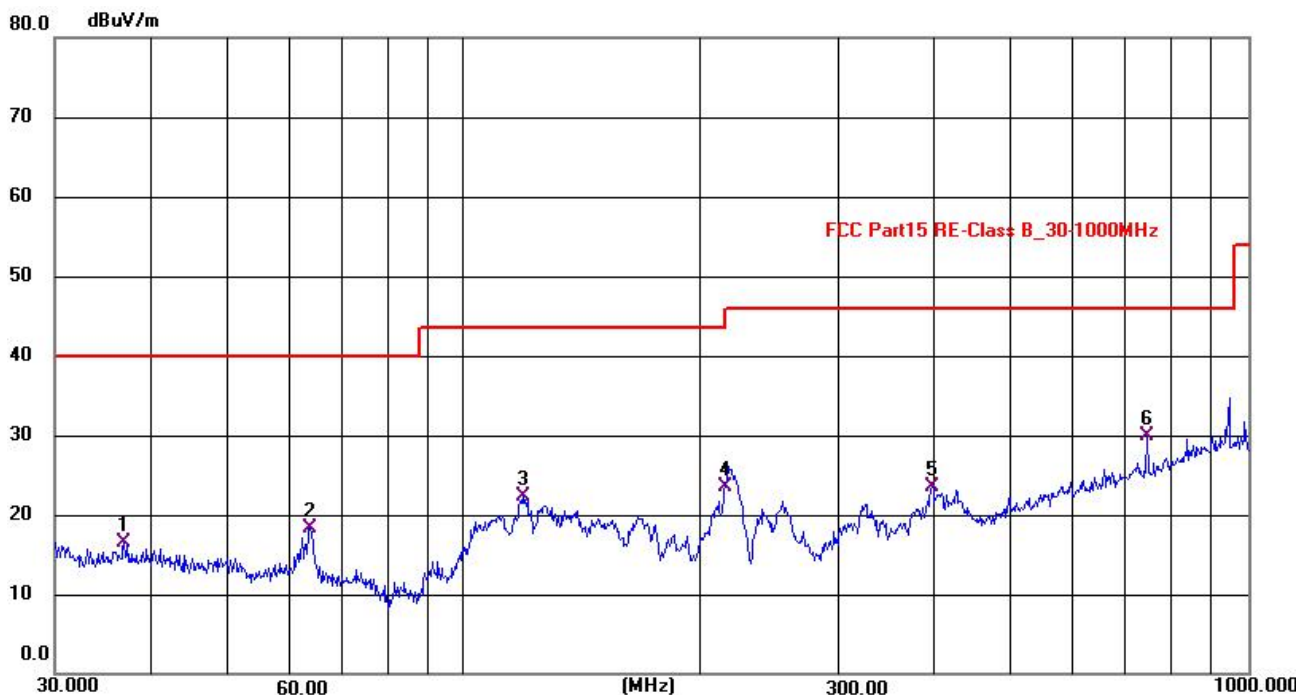
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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 :	AC 120V/60Hz		
Test Mode :	Mode 1		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	36.8177	30.06	-13.63	16.43	40.00	-23.57	QP
2	63.6135	35.01	-16.61	18.40	40.00	-21.60	QP
3	118.9971	39.48	-17.08	22.40	43.50	-21.10	QP
4	215.9861	41.44	-17.87	23.57	43.50	-19.93	QP
5	396.3803	35.97	-12.45	23.52	46.00	-22.48	QP
6 *	742.5190	35.55	-5.64	29.91	46.00	-16.09	QP

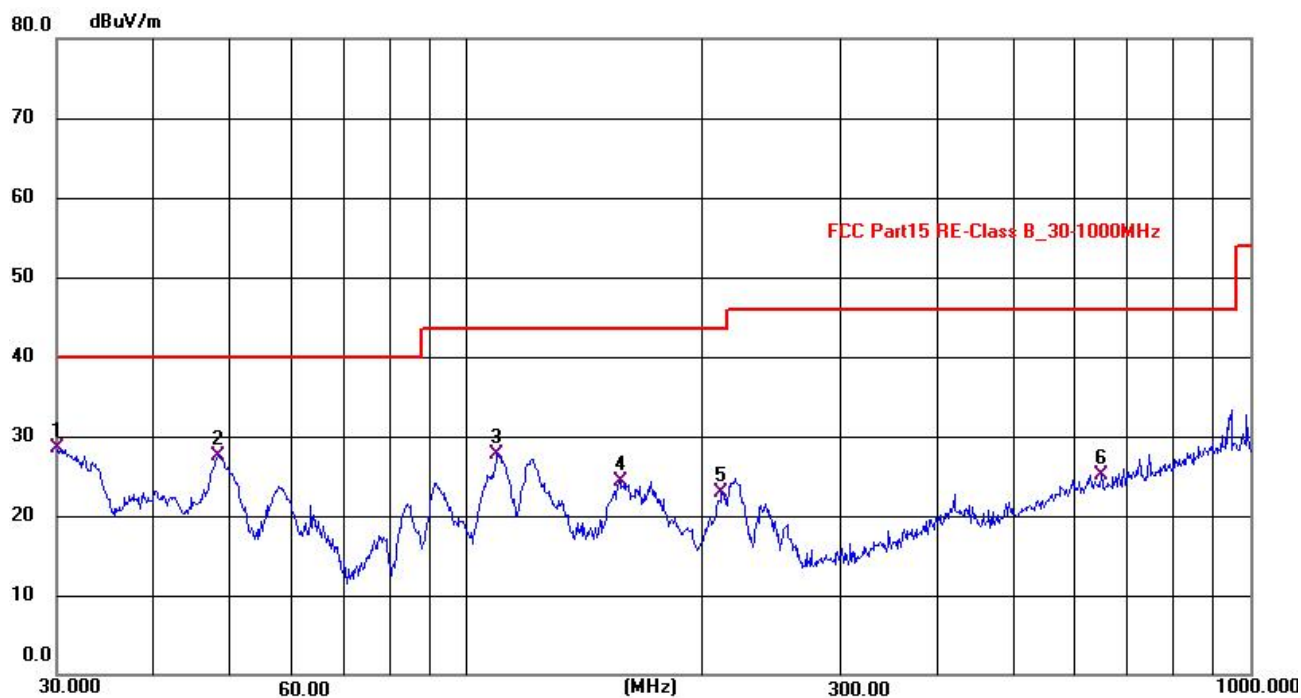
Remark:

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 :	AC 120V/60Hz		
Test Mode :	Mode 1		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	30.0210	42.39	-13.93	28.46	40.00	-11.54	QP
2	48.2894	42.44	-14.87	27.57	40.00	-12.43	QP
3	109.5844	45.79	-17.99	27.80	43.50	-15.70	QP
4	157.1450	39.64	-15.27	24.37	43.50	-19.13	QP
5	212.2322	40.97	-18.01	22.96	43.50	-20.54	QP
6	645.5720	32.28	-7.12	25.16	46.00	-20.84	QP

Remark:

Correct Factor = Cable loss + Antenna factor – Preamplifier;

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



3.2.8 TEST RESULTS (1GHZ~25GHZ)

GFSK

Frequency (MHz)	Meter Reading (dBμV)	Antenna Factor (dB)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
2402MHz									
2402	99.55	26.67	2.76	51.45	77.53	94.00	-16.47	Average	Vertical
2402	125.13	26.67	2.76	51.45	103.11	114.00	-10.89	peak	Vertical
4804	64.13	27.41	3.08	52.16	42.46	54.00	-11.54	Average	Vertical
4804	75.32	27.41	3.08	52.16	53.65	74.00	-20.35	peak	Vertical
7206	61.23	31.25	4.33	51.74	45.07	54.00	-8.93	Average	Vertical
7206	77.52	31.25	4.33	51.74	61.36	74.00	-12.64	peak	Vertical
2402	99.45	26.67	2.76	51.45	77.43	94.00	-16.57	Average	Horizontal
2402	126.35	26.67	2.76	51.45	104.33	114.00	-9.67	peak	Horizontal
4804	60.13	27.41	3.08	52.16	38.46	54.00	-15.54	Average	Horizontal
4804	74.26	27.41	3.08	52.16	52.59	74.00	-21.41	peak	Horizontal
7206	61.23	31.25	4.33	51.74	45.07	54.00	-8.93	Average	Horizontal
7206	75.32	31.25	4.33	51.74	59.16	74.00	-14.84	peak	Horizontal
2440MHz									
2440	99.52	26.76	2.79	51.67	77.40	94.00	-16.60	Average	Vertical
2440	125.82	26.76	2.79	51.67	103.70	114.00	-10.30	peak	Vertical
4880	61.11	27.47	3.12	52.11	39.59	54.00	-14.41	Average	Vertical
4880	76.03	27.47	3.12	52.11	54.51	74.00	-19.49	peak	Vertical
7320	62.23	31.34	4.37	51.77	46.17	54.00	-7.83	Average	Vertical
7320	78.54	31.34	4.37	51.77	62.48	74.00	-11.52	peak	Vertical
2440	99.81	26.23	2.56	51.34	77.26	94.00	-16.74	Average	Horizontal
2440	125.09	26.23	2.56	51.34	102.54	114.00	-11.46	peak	Horizontal
4880	62.34	32.11	3.12	52.11	45.46	54.00	-8.54	Average	Horizontal
4880	76.22	32.11	3.12	52.11	59.34	74.00	-14.66	peak	Horizontal
7320	62.65	24.33	4.37	51.77	39.58	54.00	-14.42	Average	Horizontal
7320	77.32	24.33	4.37	51.77	54.25	74.00	-19.75	peak	Horizontal
2480MHz									
2480	99.34	26.95	2.83	51.98	77.14	94.00	-16.86	Average	Vertical
2480	125.32	26.95	2.83	51.98	103.12	114.00	-10.88	peak	Vertical
4960	61.35	27.44	3.34	52.23	39.90	54.00	-14.10	Average	Vertical
4960	76.17	27.44	3.34	52.23	54.72	74.00	-19.28	peak	Vertical
7440	63.45	31.39	4.57	51.69	47.72	54.00	-6.28	Average	Vertical
7440	78.73	31.39	4.57	51.69	63.00	74.00	-11.00	peak	Vertical
2480	99.82	26.95	2.83	51.98	77.62	94.00	-16.38	Average	Horizontal
2480	125.24	26.95	2.83	51.98	103.04	114.00	-10.96	peak	Horizontal
4960	62.66	27.44	3.34	52.23	41.21	54.00	-12.79	Average	Horizontal
4960	76.56	27.44	3.34	52.23	55.11	74.00	-18.89	peak	Horizontal
7440	61.45	31.39	4.57	51.69	45.72	54.00	-8.28	Average	Horizontal
7440	77.71	31.39	4.57	51.69	61.98	74.00	-12.02	peak	Horizontal

Note:

1. Absolute Level= ReadingLevel+antenna Factor+cable loss-preamp factor.

2. Over Limit= Absolute Level - Limit.

3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has not to be reported.

4. EUT Pre-scan X/Y/Z orientation, only worst case is presented in the report (Z orientation)



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 1.5 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:

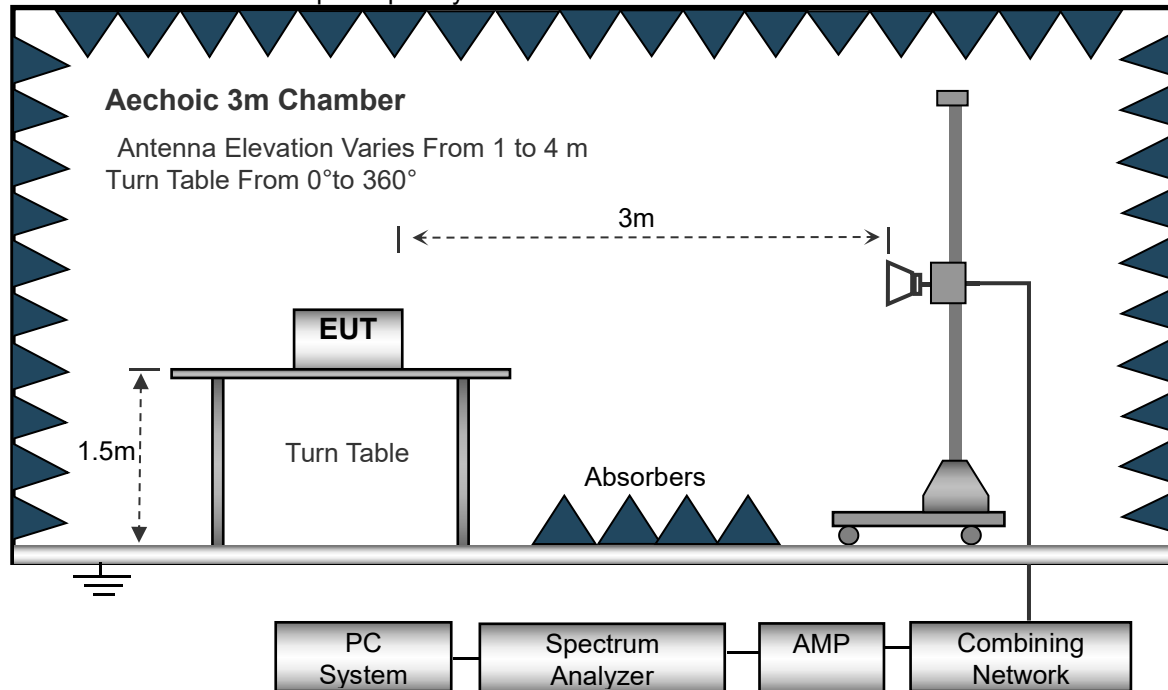
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

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

GFSK

Frequency	Meter Reading	Antenna Factor	Cable loss	Preamp factor	Emission Level	Limits	Margin	Detector Type	Comment
(MHz)	(dBμV)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
2402MHz									
2390	59.03	27.38	2.73	52.12	37.02	54.00	-16.98	Average	Vertical
2390	74.14	27.38	2.73	52.12	52.13	74.00	-21.87	peak	Vertical
2400	60.71	27.41	2.78	52.16	38.74	54.00	-15.26	Average	Vertical
2400	75.98	27.41	2.78	52.16	54.01	74.00	-19.99	peak	Vertical
2390	61.32	27.38	2.73	52.12	39.31	54.00	-14.69	Average	Horizontal
2390	74.09	27.38	2.73	52.12	52.08	74.00	-21.92	peak	Horizontal
2400	61.34	27.41	2.78	52.16	39.37	54.00	-14.63	Average	Horizontal
2400	76.32	27.41	2.78	52.16	54.35	74.00	-19.65	peak	Horizontal
2480MHz									
2483.5	59.17	27.44	2.86	52.23	37.24	54.00	-16.76	Average	Vertical
2483.5	73.87	27.44	2.86	52.23	51.94	74.00	-22.06	peak	Vertical
2500	65.32	27.49	2.88	52.26	43.43	54.00	-10.57	Average	Vertical
2500	74.99	27.49	2.88	52.26	53.10	74.00	-20.9	peak	Vertical
2483.5	60.97	27.44	2.86	52.23	39.04	54.00	-14.96	Average	Horizontal
2483.5	75.35	27.44	2.86	52.23	53.42	74.00	-20.58	peak	Horizontal
2500	62.17	27.49	2.88	52.26	40.28	54.00	-13.72	Average	Horizontal
2500	75.65	27.49	2.88	52.26	53.76	74.00	-20.24	peak	Horizontal

Note:

1.Absolute Level= ReadingLevel+antenna Factor+cable loss-preamp factor.

2.Over Limit= Absolute Level - Limit.

3.The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has not to be reported.

4.EUT Pre-scan X/Y/Z orientation, only worst case is presented in the report (Z orientation)



4. BANDWIDTH TEST

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.249) , Subpart C	
Section	Test Item
15.249	Bandwidth

4.1.1 TEST PROCEDURE

1. Set RBW = 30 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.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



4.1.4 EUT OPERATION CONDITIONS

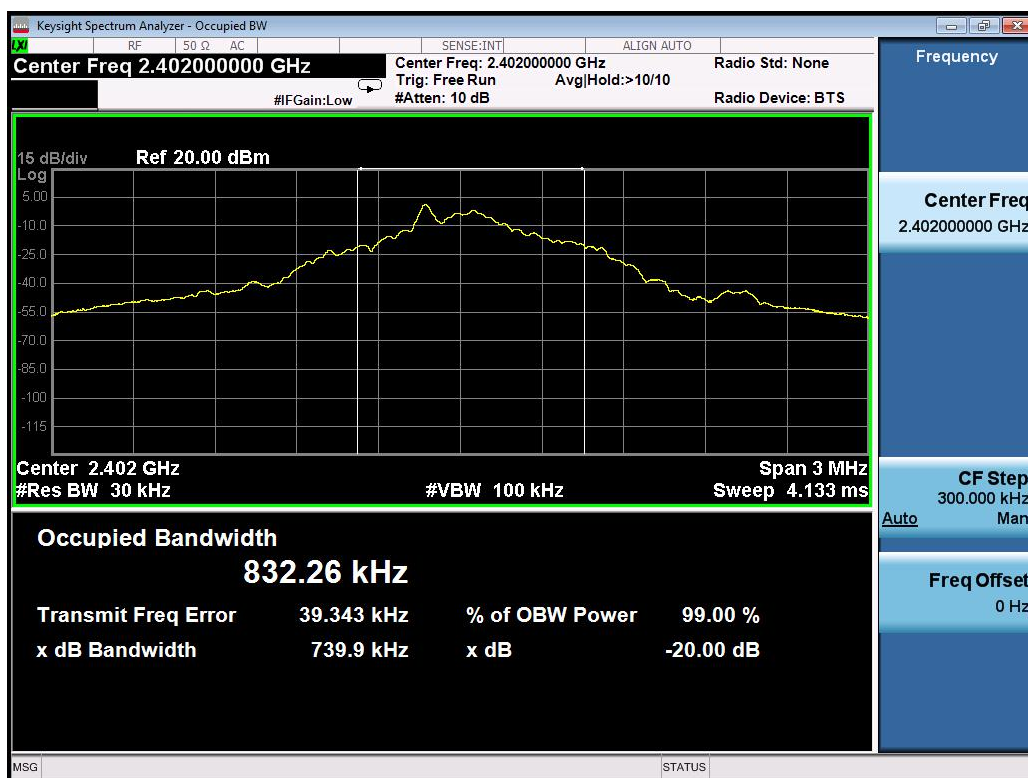
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



4.1.5 TEST RESULTS

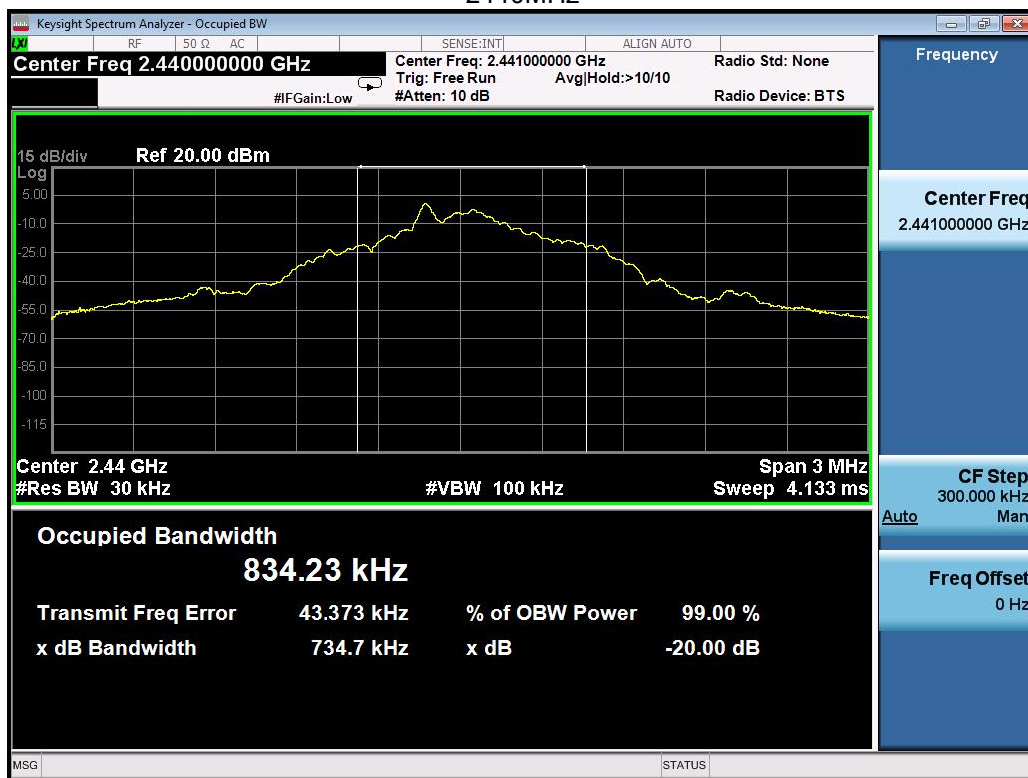
	Frequency (MHz)	20dB Bandwidth (MHz)	Result
GFSK	2402	0.740	Pass
	2440	0.735	Pass
	2480	0.743	Pass

2402MHz

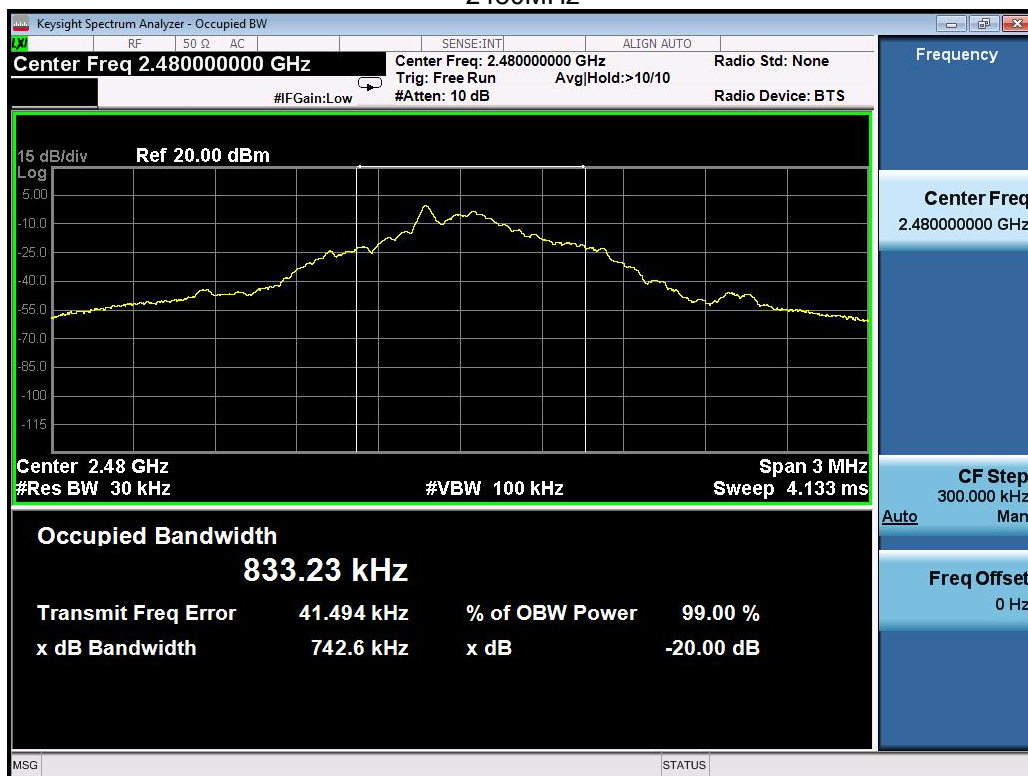




2440MHz



2480MHz



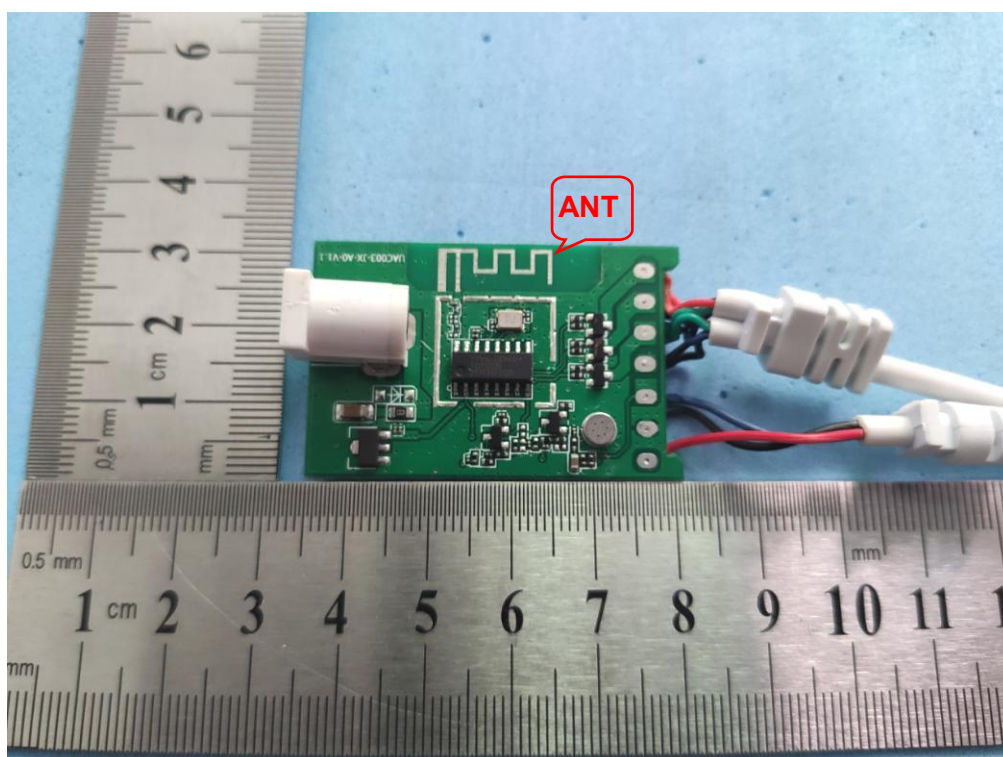
5. ANTENNA REQUIREMENT

5.1 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.

5.2 EUT ANTENNA

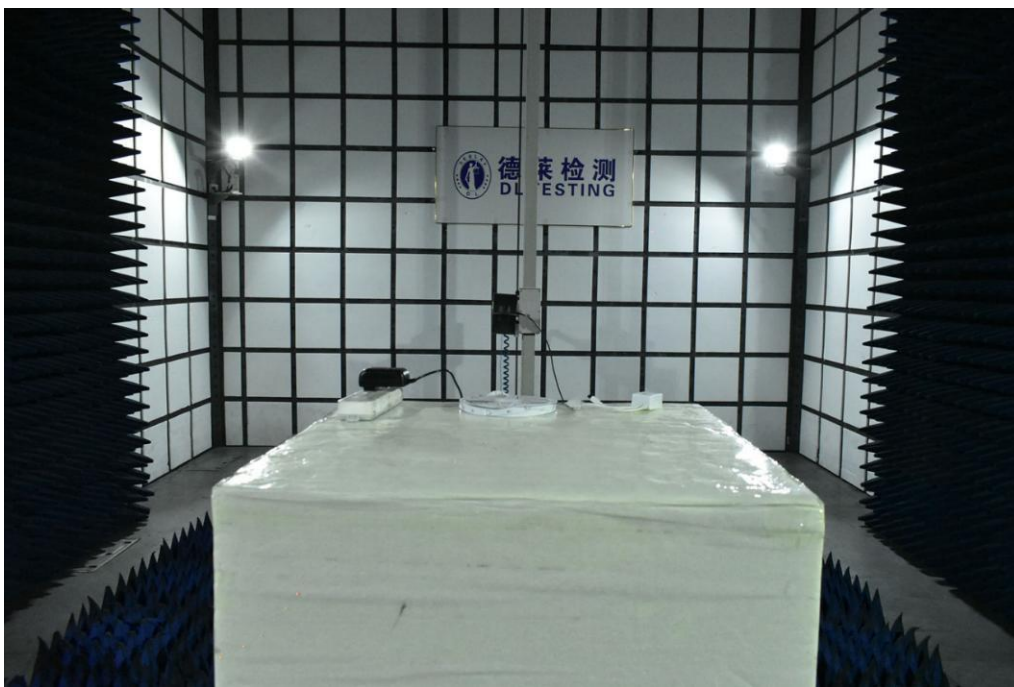
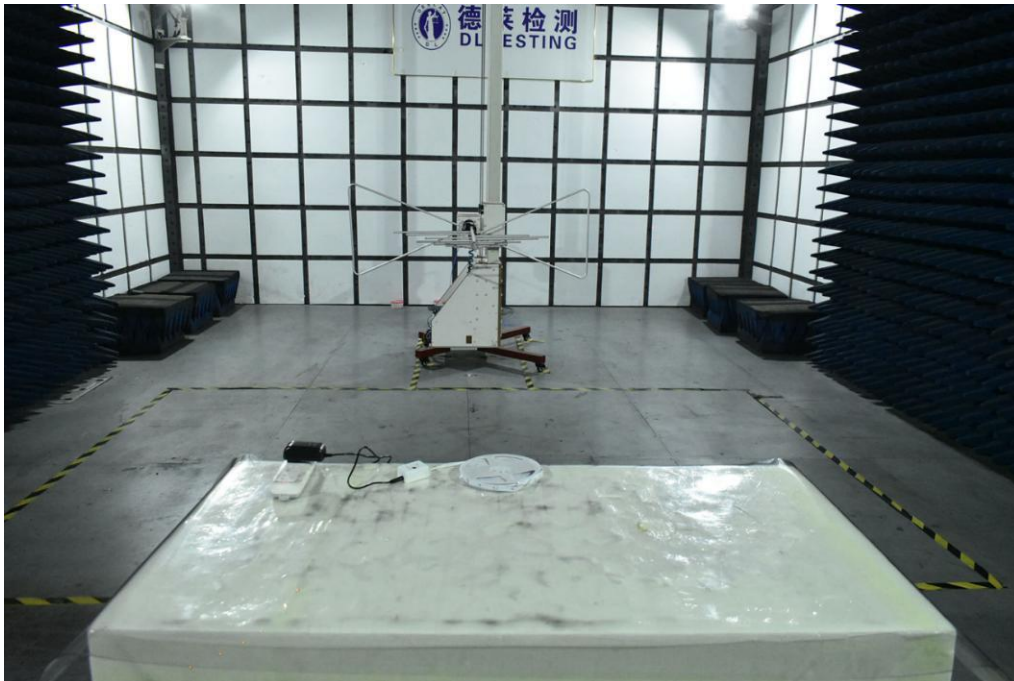
The EUT antenna is PCB antenna,. It comply with the standard requirement.





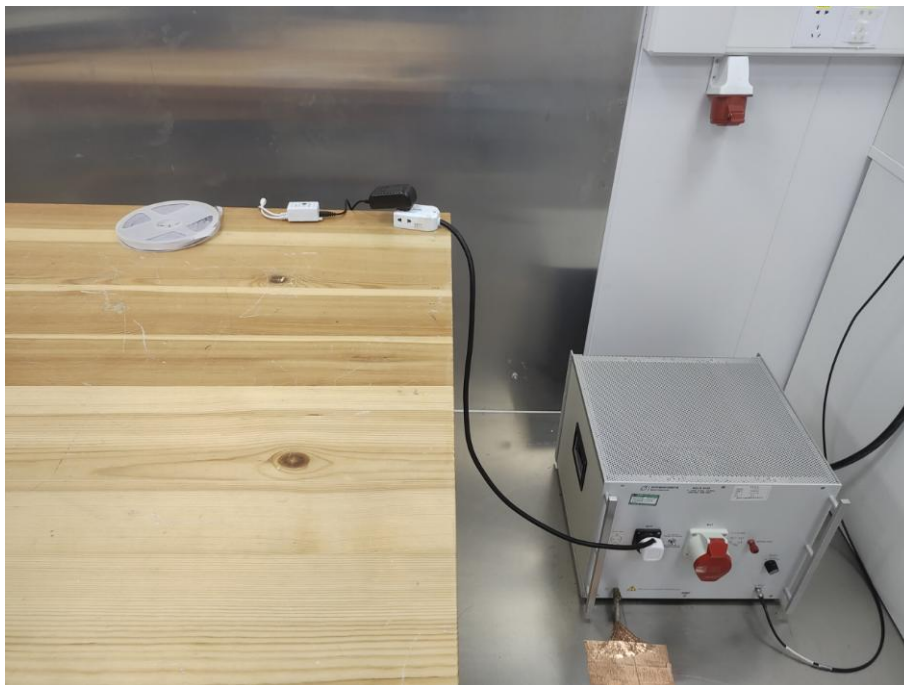
6. TEST SEUUP PHOTO

Radiated Measurement Photos





Conducted Measurement Photos



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