

FCC CERTIFICATION TEST REPORT

FOR

Applicant	:	Dongguan Erse Electronics Inc
Address	:	NO.6 LIUHUA XIHENGSA STREET, XIAKOU, DONGCHENG DISTRICT, DONGGUAN CITY, GUANGDONG, CHINA
Equipment under Test	:	2.4G REMOTE
Model No.	:	N/A
Trade Mark	:	N/A
FCC ID	:	2AWFX24GREMOT
Manufacturer	:	Dongguan Erse Electronics Inc
Address	:	NO.6 LIUHUA XIHENGSA STREET, XIAKOU, DONGCHENG DISTRICT, DONGGUAN CITY, GUANGDONG, CHINA

Issued By: Dongguan Dongdian Testing Service Co., Ltd.

Add.: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park,
Dongguan City, Guangdong Province, China, 523808

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REPORT

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Test Report Declare

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Test Standard Used:

FCC Rules and Regulations Part 15 Subpart C.

Test procedure used:

ANSI C63.10:2013.

We Declare:

The equipment described above is tested by Dongguan Dongdian Testing Service Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Dongguan Dongdian Testing Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC standards.

Report No:	DDT-R21061518-2E01		
Date of Receipt:	Jul. 05, 2021	Date of Test:	Jul. 05, 2021~ Aug. 11, 2021

Prepared By:

Johnny Wang

Johnny Wang/Engineer

Approved By:



Damon Hu/EMC Manager

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

Revision History

Rev.	Revisions	Issue Date	Revised By
---	Initial issue	Aug. 11, 2021	

1. Summary of Test Results

The EUT have been tested according to the applicable standards as referenced below.		
Description of Test Item	Standard	Results
20 dB Bandwidth	FCC Part 15: 15.215 ANSI C63.10:2013	Pass
Radiated Emission	FCC Part 15: 15.209 FCC Part 15: 15.249 ANSI C63.10:2013	Pass
Band Edge Compliance	FCC Part 15: 15.205 FCC Part 15: 15.249 ANSI C63.10:2013	Pass
Power Line Conducted Emission	FCC Part 15: 15.207 ANSI C63.10:2013	N/A
Antenna Requirement	FCC Part 15: 15.203	Pass
Note: N/A is an abbreviation for Not Applicable.		

2. General Test Information

2.1. Description of EUT

EUT* Name	: 2.4G REMOTE
Model Number	: N/A
EUT function description	: Please reference user manual of this device
Power Supply	: Battery 3V ("AAA" Size *2)
Operation frequency	: 2435 MHz - 2455 MHz
Modulation	: GFSK
Antenna Gain	: 2 dBi
Serial Number	: N/A

Note: EUT is the abbreviation of equipment under test.

2.2. Accessories of EUT

Description of Accessories	Manufacturer	Model number	Serial No.	Other
N/A	N/A	N/A	N/A	N/A

2.3. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	EMC Compliance	SN
N/A	N/A	N/A	N/A	N/A

2.4. Block diagram of EUT configuration for test

EUT

Test software: N/A

The FLAT key used to control EUT work in Continuous Tx mode, and select test channel, wireless mode as below table.

Tested mode, channel, information		
Mode	Channel	Frequency (MHz)
GFSK Tx mode	Low	2435
	Middle	2445
	High	2455

2.5. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	21-25 °C
Humidity range:	40-75%
Pressure range:	86-106 kPa

2.6. Deviations of test standard

No deviation.

2.7. Test laboratory

Dongguan Dongdian Testing Service Co., Ltd.

Add.: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808.

Tel.: +86-0769-38826678, <http://www.dgddt.com>, Email: ddt@dgddt.com.

CNAS Accreditation No. L6451; A2LA Accreditation Number: 3870.01

FCC Designation Number: CN1182, Test Firm Registration Number: 540522

Innovation, Science and Economic Development Canada Site Registration Number: 10288A

Conformity Assessment Body identifier: CN0048

VCCI facility registration number: C-20087, T-20088, R-20123, G-20118

2.8. Measurement uncertainty

Test Item	Uncertainty
Bandwidth	1.1%
Peak Output Power (Conducted) (Spectrum analyzer)	0.86 dB (10 MHz ≤ f < 3.6 GHz);
	1.38 dB (3.6 GHz ≤ f < 8 GHz)
Peak Output Power (Conducted) (Power Sensor)	0.74 dB
Power Spectral Density	0.74 dB (10 MHz ≤ f < 3.6 GHz);
	1.38 dB (3.6 GHz ≤ f < 8 GHz)
Conducted spurious emissions	0.86 dB (10 MHz ≤ f < 3.6 GHz);
	1.40 dB (3.6 GHz ≤ f < 8 GHz)
	1.66 dB (8 GHz ≤ f < 22 GHz)
Uncertainty for radio frequency (RBW < 20 kHz)	3×10 ⁻⁸
Temperature	0.4 °C
Humidity	2%
Uncertainty for Radiation Emission test (30 MHz - 1 GHz)	4.70 dB (Antenna Polarize: V)
	4.84 dB (Antenna Polarize: H)
Uncertainty for Radiation Emission test (1 GHz - 18 GHz)	4.10 dB (1-6 GHz)
	4.40 dB (6 GHz - 18 GHz)
Uncertainty for Power line conduction emission test	3.32 dB (150 kHz - 30 MHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

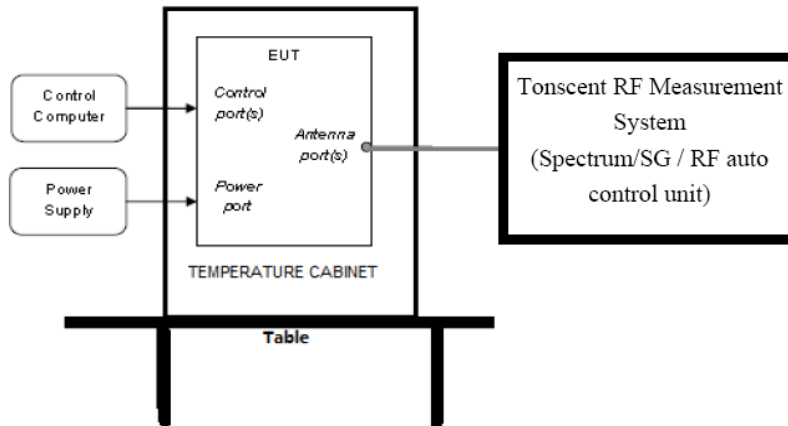
3. Equipment Used During Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☐ RF Connected Test (Tonscend RF Measurement System 1#)					
Spectrum analyzer	R&S	FSU26	200071	Sep. 25, 2020	1 Year
Wideband Radio Communication tester	R&S	CMW500	117491	Jun. 01, 2021	1 Year
Vector Signal Generator	Agilent	E8267D	US49060192	Sep. 24, 2020	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180737	Jun. 01, 2021	1 Year
RF Control Unit	Tonsend	JS0806-2	DDT-ZC0290	Jun. 01, 2021	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	Jun. 01, 2021	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.7	N/A	N/A
☒ RF Connected Test (Tonscend RF Measurement System 2#)					
Spectrum analyzer	R&S	FSU26	101472	Jun. 01, 2021	1 Year
Wideband Radio Communication tester	R&S	CMW500	120259	Jan. 19, 2021	1 Year
Vector Signal Generator	Agilent	N5182A	MY19060405	Jun. 01, 2021	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180912	Jun. 01, 2021	1 Year
RF Control Unit	Tonsend	JS0806-2	DDT-ZC01449	Jun. 01, 2021	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	Jun. 01, 2021	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.7	N/A	N/A
☐ Radiation 1#chamber					
EMI Test Receiver	R&S	ESU8	100316	Sep. 24, 2020	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Jun. 01, 2021	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	Nov. 13, 2020	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Nov. 18, 2020	1 Year
Double Ridged Horn Antenna	R&S	HF907	100276	Nov. 13, 2020	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	May 07, 2021	1 Year
Pre-amplifier	A.H.	PAM-0118	360	Sep. 28, 2020	1 Year
RF Cable	HUBSER	CP-X2+ CP-X1	W11.03+ W12.02	Sep. 24, 2020	1 Year
RF Cable	N/A	5m+6m+1m	06270619	Sep. 30, 2020	1 Year
MI Cable	HUBSER	C10-01-01-1M	1091629	Sep. 30, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
☒ Radiation 2#chamber					
EMI Test Receiver	R&S	ESCI	101364	Sep. 28, 2020	1 Year

Spectrum analyzer	Agilent	E4447A	MY50180031	Jun. 01, 2021	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB 9163	9163-994	Nov. 13, 2020	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Nov. 18, 2020	1 Year
Double Ridged Horn Antenna	Schwarzbeck	BBHA9120	02108	Jul. 17, 2021	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	May 07, 2021	1 Year
Pre-amplifier	TERA-MW	TRLA-0040 G35	1013 03	Sep. 28, 2020	1 Year
RF Cable	N/A	14+1.5m	06270619	Sep. 28, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
☐ Power Line Conducted Emissions Test 1#					
EMI Test Receiver	R&S	ESU8	100316	Sep. 24, 2020	1 Year
LISN 1	R&S	ENV216	101109	Sep. 28, 2020	1 Year
LISN 2	R&S	ESH2-Z5	100309	Sep. 28, 2020	1 Year
Pulse Limiter	R&S	ESH3-Z2	101242	Sep. 24, 2020	1 Year
CE Cable 1	HUBSER	N/A	W10.01	Sep. 24, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
☐ Power Line Conducted Emissions Test 2#					
Test Receiver	R&S	ESPI	101761	Sep. 24, 2020	1 Year
LISN 1	R&S	ENV216	101170	Sep. 28, 2020	1 Year
LISN 2	R&S	ESH2-Z5	100309	Sep. 28, 2020	1 Year
Pulse Limiter	R&S	KH43101	43101180156 8-12#	Jun. 01, 2021	1 Year
CE Cable 2	HUBSER	N/A	W11.02	Sep. 24, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A

4 Duty Cycle

4.1. Block diagram of test setup



4.2. Limits

None: for reporting purposes only.

4.3. Test procedure

Set the Centre frequency of the spectrum analyzer to the transmitting frequency;

Set the span = 0, RBW = 3 MHz, VBW = 3 MHz, Sweep time = 100 ms;

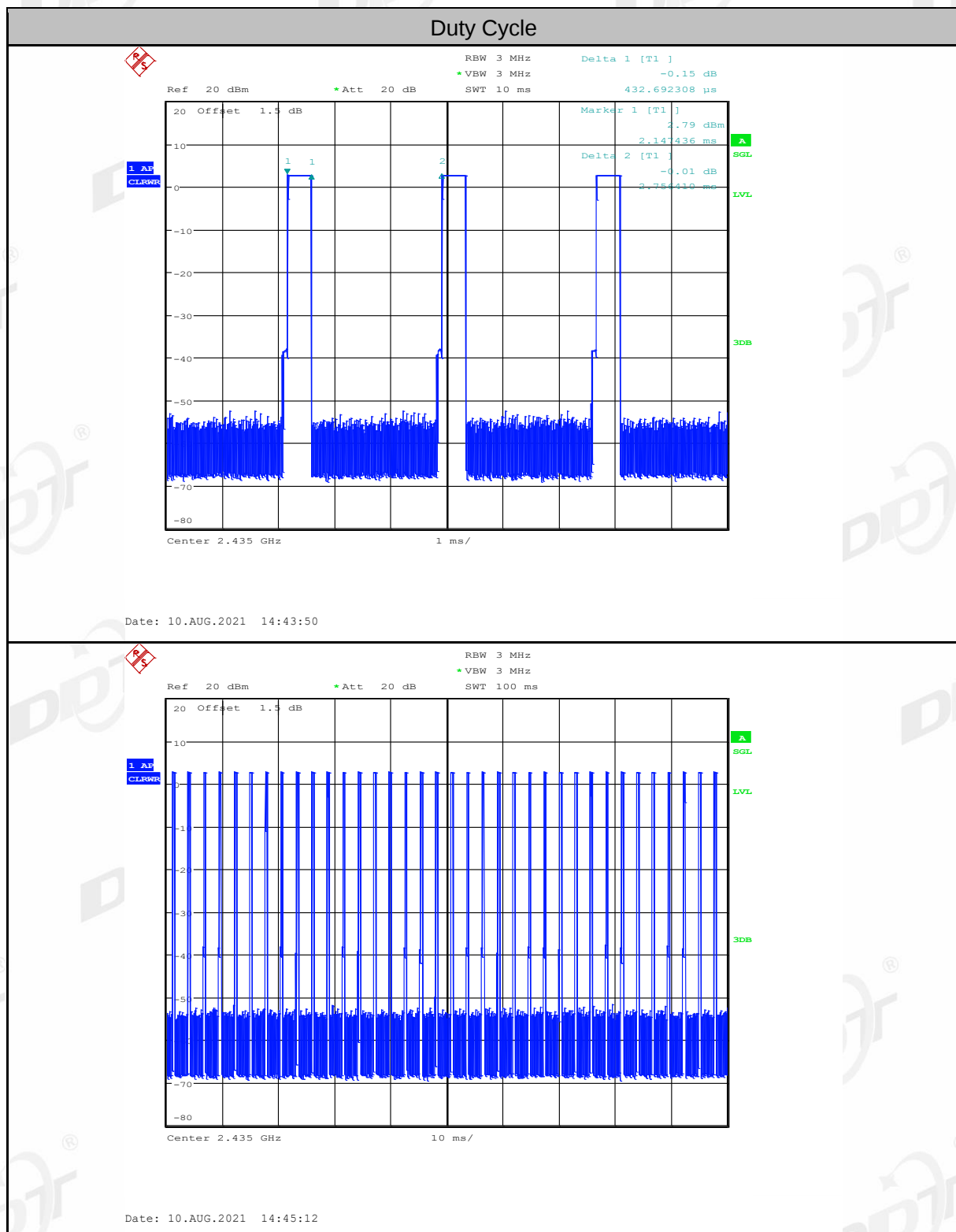
Trace mode = Single hold.

4.4. Test result

Test Channel [MHz]	Duty Cycle [%]	20log(Δ) Factor[dB]
2435	15.62	-16.13

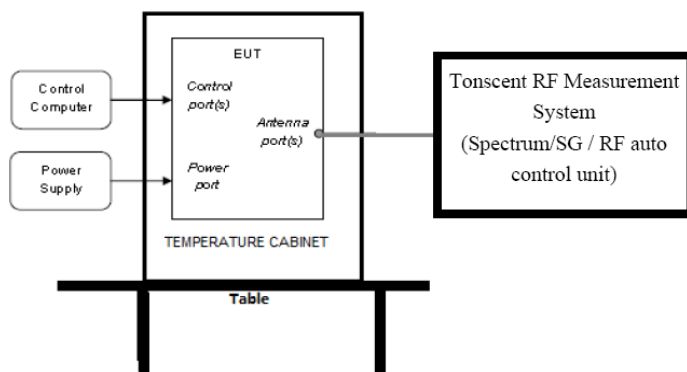
Average value:	
Calculate Formula:	Average value = Peak value + PDCF
	PDCF = 20 log(Duty cycle)
	Duty cycle = $T_{on\ time} / T_{period}$
Test data:	$T_{on\ time} = (0.433 \times 36) \text{ ms} = 15.59 \text{ ms}$
	$T_{period} = 100 \text{ ms}$
	PDCF = 20 log(Duty cycle) = 20 log(15.59/100) = -16.13 dB

4.5. Original test data



5. 20 dB Bandwidth

5.1. Block diagram of test setup



5.2. Limits

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

5.3. Test procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) Set the spectrum analyzer as follows:

RBW:	100 kHz
VBW:	300 kHz
Detector Mode:	Peak/RMS
Sweep time:	auto
Trace mode	Max hold

(3) Allow the trace to stabilize, measure the 20 dB bandwidth of signal.

5.4. Test result

Test Mode	Freq. (MHz)	20 dB bandwidth Result (MHz)	Verdict
GFSK Tx mode	2435	5.300	Pass
	2445	4.710	Pass
	2455	4.600	Pass

2435

FSK Tx mode 2435

20 dBm

Att 20 dB

RBW 100 kHz

VBW 300 kHz

SWT 5 ms

Delta 3 [T1]

0.03 dB

5.300000000 MHz

20 Offset 1.0 dB

Marker 1 [T1]

-19.03 dBm

2.432590000 GHz

Marker 2 [T1]

-1.06 dBm

2.435000000 GHz

1VL

30B

Center 2.435 GHz

1 MHz/

Span 10 MHz

Date: 11.AUG.2021 17:33:54

2445

FSK Tx mode 2445

20 dBm

Att 20 dB

RBW 100 kHz

VBW 300 kHz

SWT 5 ms

Delta 3 [T1]

0.33 dB

4.710000000 MHz

20 Offset 1.0 dB

Marker 1 [T1]

-19.56 dBm

2.443060000 GHz

Marker 2 [T1]

-1.98 dBm

2.445000000 GHz

1VL

30B

Center 2.445 GHz

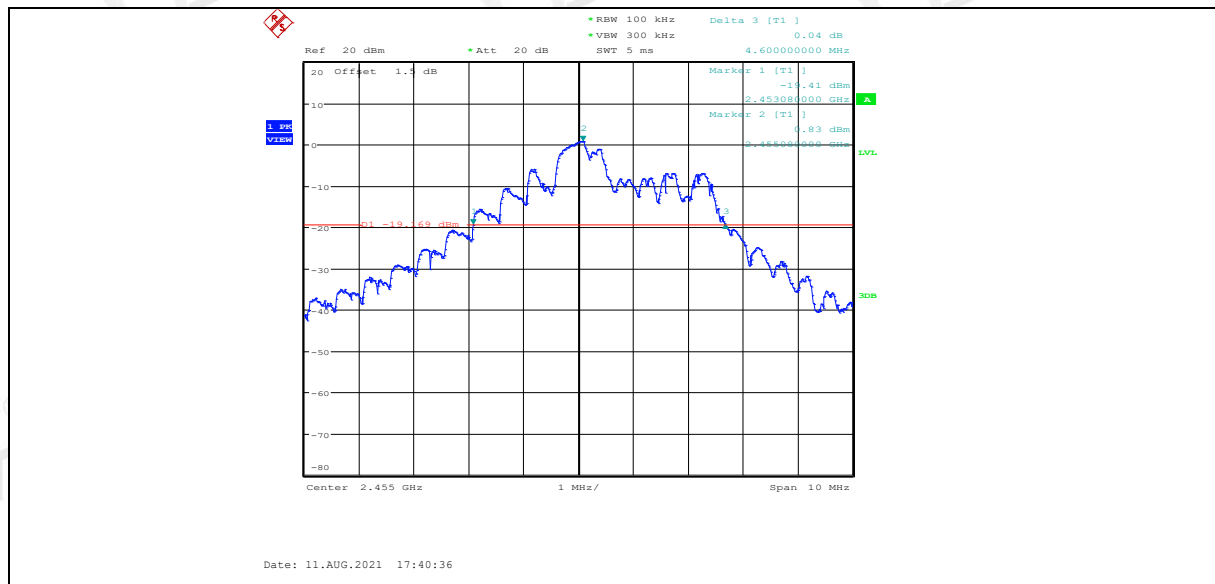
1 MHz/

Span 10 MHz

Date: 11.AUG.2021 17:37:38

2455

FSK Tx mode 2455



6.1. Block diagram of test setup

The diagram illustrates a Semi-anechoic Chamber used for EMC testing. The chamber's interior walls, floor, and ceiling are lined with pyramidal-shaped electromagnetic absorbers to eliminate reflections. A Test Receiver is connected to a PC System. The receiver is positioned 1m vertically from the floor and 3m horizontally from the center of the EUT. The EUT is placed on a TURN TABLE, which has dimensions of 1.5m(L)*1.0m(W)*0.8m(H). A ground symbol is shown at the bottom right corner of the chamber.

Semi-anechoic Chamber

ANTENNA ELEVATION VARIES FROM 1 TO 4 METERS

3m

1.5m(L)*1.0m(W)*0.8m(H)

EUT

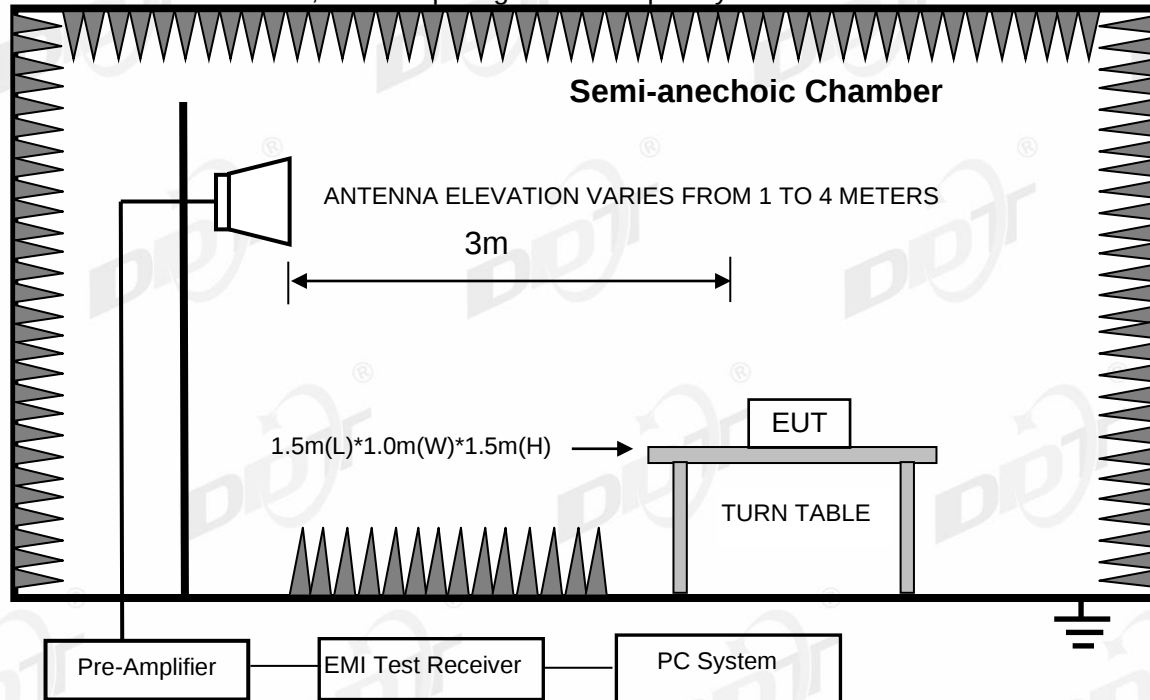
TURN TABLE

Pre-Amplifier

EMI Test Receiver

PC System

In 3 m Anechoic Chamber, test setup diagram for frequency above 1 GHz:



Note: For harmonic emissions test an appropriate high pass filter was inserted in the input port of AMP.

6.2. Limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000 MHz	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	
Field Strength of Fundamental emission for 2400 MHz – 2483.5 MHz	3	94.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average) 114.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak)	
Field Strength of Harmonics	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

Remark:

- (1) Emission level $\text{dB}\mu\text{V} = 20 \log \text{Emission level } \mu\text{V}/\text{m}$
- (2) The smaller limit shall apply at the cross point between two frequency bands.
- (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.
- (4) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz, radiated emission limits in these three bands are based on measurements employing an average detector.

6.3. Test procedure

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.
- (2) Setup EUT and assistant system according clause 2.3
- (3) Test antenna was located 3 m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.
 - (a) Change work frequency or channel of device if practicable.
 - (b) Change modulation type of device if practicable.
 - (c) Change power supply range from 85% to 115% of the rated supply voltage
 - (d) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions
- (4) Spectrum frequency from 9 kHz to 25 GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 9 kHz to 30 MHz and 18 GHz to 25 GHz, so below final test was performed with frequency range from 30 MHz to 18 GHz.
- (5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1 m and 4 m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10:2013 on Radiated Emission test.
- (6) For emissions from 30 MHz to 1 GHz, Quasi-Peak values were measured with EMI Receiver and the bandwidth of Receiver is 120 kHz.
- (7) For emissions above 1 GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1 MHz, VBW is set at 3 MHz for Peak measure; according ANSI C63.10:2013 clause 4.1.4.2.2 procedure for average measure.
- (8) For fundamental frequency test, set spectrum analyzer's RBW = 3 MHz, VBW = 10 MHz. Peak detector for PK, according ANSI C63.10:2013 clause 4.1.4.2.2 procedure for average measure.

6.4. Test result

Pass. (See below detailed test result)

All the emissions except fundamental emission from 9 kHz to 25 GHz were comply with 15.209 limit.

Note1: According exploratory test, the emission levels are 20 dB below the limit detected from 9 kHz to 30 MHz and 18 GHz to 25 GHz, so the final test was performed with frequency range from 30 MHz to 18 GHz and recorded in below.

Note2: For emissions below 1 GHz, according exploratory explorer test, when change Tx mode and channel, have no distinct influence on emissions level, so for emissions below 1 GHz, the final test was only performed with EUT working in GFSK, Tx 2455 MHz mode.

Note3: For emissions above 1 GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit.

Field Strength of the Fundamental Signal

Frequency (MHz)	PK Level (dBuV/m)	PK Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2435	97.21	114.00	-16.79	Horizontal
2445	97.20	114.00	-16.80	Horizontal
2455	97.72	114.00	-16.28	Horizontal
2435	84.06	114.00	-29.94	Vertical
2445	82.81	114.00	-31.19	Vertical
2455	84.26	114.00	-29.74	Vertical

Frequency (MHz)	AV Level (dBuV/m)	AV Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2435	81.08	94.00	-12.92	Horizontal
2445	81.07	94.00	-12.93	Horizontal
2455	81.59	94.00	-12.41	Horizontal
2435	67.93	94.00	-26.07	Vertical
2445	66.68	94.00	-27.32	Vertical
2455	68.13	94.00	-25.87	Vertical

Note: AV Level = PK Level + PDCF

Radiated Emission test (below 1 GHz)

TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 2#

D:\2021 RE2# Report Data\Q21061518-2E\FCC
BELOW1G.EM6

Test Date : 2021-08-08

Tested By : Bairong

EUT : 2.4G REMOTE

Model Number : N/A

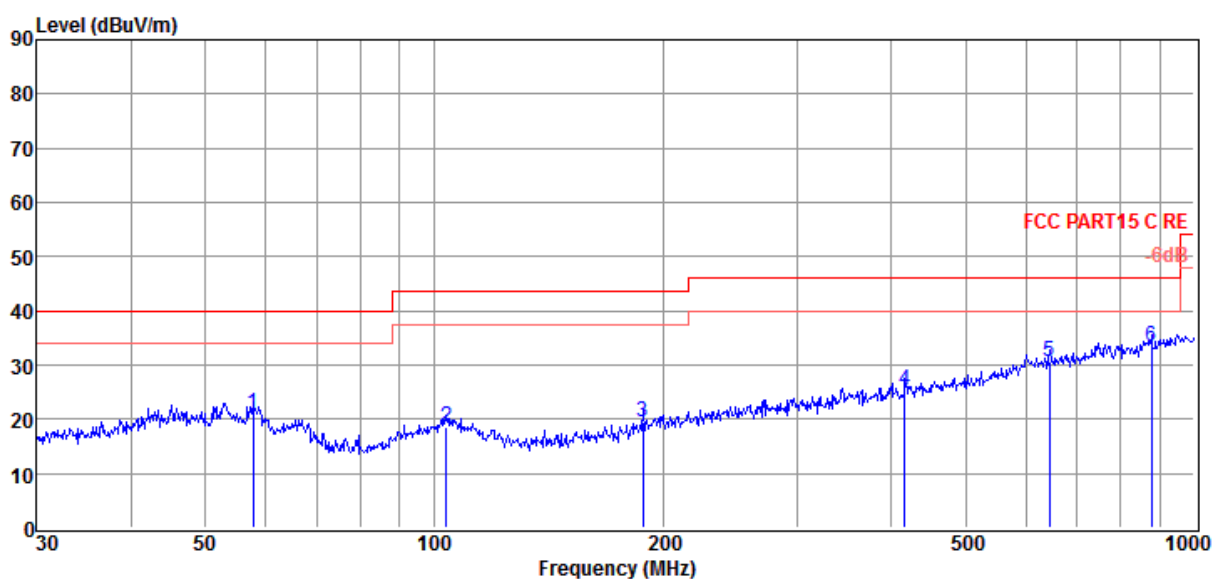
Power Supply : Battery

Test Mode : Tx mode

Condition : Temp:24.5°C,Humi:55%,Press:100.1kPa

Antenna/Distance : 2020 VULB 9163 2#/3m/HORIZONTAL

Memo :



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	57.80	5.49	11.64	3.94	21.07	40.00	-18.93	QP	HORIZONTAL
2	103.81	2.31	11.92	4.43	18.66	43.50	-24.84	QP	HORIZONTAL
3	188.41	4.50	10.13	4.98	19.61	43.50	-23.89	QP	HORIZONTAL
4	416.18	3.71	15.73	5.98	25.42	46.00	-20.58	QP	HORIZONTAL
5	645.12	4.58	19.29	6.88	30.75	46.00	-15.25	QP	HORIZONTAL
6	878.32	4.25	21.64	7.63	33.52	46.00	-12.48	QP	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 2#

D:\2021 RE2# Report Data\Q21061518-2E\FCC
BELOW1G.EM6

Test Date : 2021-08-08

Tested By : Bairong

EUT : 2.4G REMOTE

Model Number : N/A

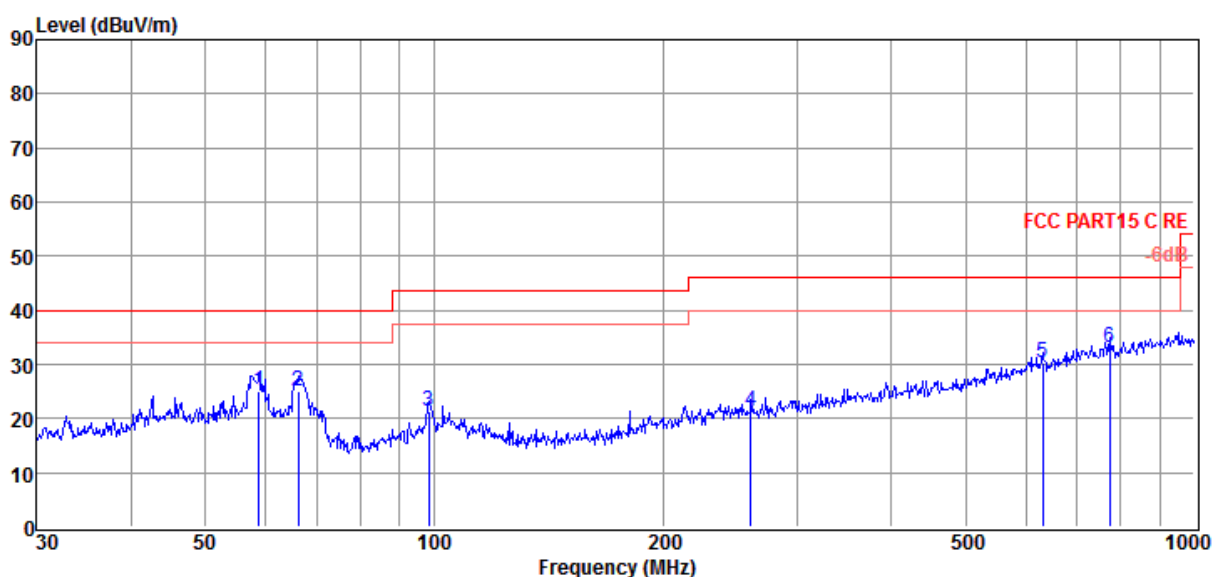
Power Supply : Battery

Test Mode : Tx mode

Condition : Temp:24.5°C,Humi:55%,Press:100.1kPa

Antenna/Distance : 2020 VULB 9163 2#/3m/VERTICAL

Memo :



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	58.82	9.73	11.52	3.95	25.20	40.00	-14.80	QP	VERTICAL
2	66.27	10.54	10.30	4.06	24.90	40.00	-15.10	QP	VERTICAL
3	98.49	6.39	10.47	4.39	21.25	43.50	-22.25	QP	VERTICAL
4	261.06	3.68	12.42	5.32	21.42	46.00	-24.58	QP	VERTICAL
5	631.69	4.16	19.26	6.84	30.26	46.00	-15.74	QP	VERTICAL
6	774.16	4.83	20.85	7.28	32.96	46.00	-13.04	QP	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

Radiated Emission test (above 1 GHz)

Freq. (MHz)	Read level (dBμV)	Antenn a Factor (dB/m)	PRM Facto r(dB)	Cable Loss (dB)	Result Level (dBμV/ m)	Limit (dBμV/ m)	Margin (dB)	Detector type	Polarization
Tx mode 2435 MHz									
4876.00	56.98	32.45	43.29	6.89	53.03	74.00	-20.97	Peak	HORIZONTAL
7613.00	45.49	37.28	42.56	8.79	49.00	74.00	-25.00	Peak	HORIZONTAL
8956.00	44.88	38.27	41.82	9.46	50.79	74.00	-23.21	Peak	HORIZONTAL
10180.00	44.87	39.09	42.33	10.31	51.94	74.00	-22.06	Peak	HORIZONTAL
13155.00	44.29	40.04	42.92	11.29	52.70	74.00	-21.30	Peak	HORIZONTAL
16011.00	44.05	39.05	42.30	12.66	53.46	74.00	-20.54	Peak	HORIZONTAL
4876.00	54.72	32.45	43.29	6.89	50.77	74.00	-23.23	Peak	VERTICAL
7630.00	46.33	37.31	42.55	8.78	49.87	74.00	-24.13	Peak	VERTICAL
9721.00	46.21	38.80	42.09	9.94	52.86	74.00	-21.14	Peak	VERTICAL
10860.00	44.86	39.74	42.81	10.51	52.30	74.00	-21.70	Peak	VERTICAL
13444.00	44.26	40.68	42.77	11.52	53.69	74.00	-20.31	Peak	VERTICAL
16266.00	42.49	40.12	42.27	12.93	53.27	74.00	-20.73	Peak	VERTICAL
Tx mode 2445 MHz									
4876.00	56.62	32.45	43.29	6.89	52.67	74.00	-21.33	Peak	HORIZONTAL
7919.00	45.85	37.77	42.35	8.66	49.93	74.00	-24.07	Peak	HORIZONTAL
9534.00	45.26	38.80	42.02	9.70	51.74	74.00	-22.26	Peak	HORIZONTAL
11319.00	44.65	39.80	42.41	10.92	52.96	74.00	-21.04	Peak	HORIZONTAL
13189.00	44.36	40.12	42.90	11.32	52.90	74.00	-21.10	Peak	HORIZONTAL
16181.00	42.38	39.76	42.28	12.84	52.70	74.00	-21.30	Peak	HORIZONTAL
4876.00	53.78	32.45	43.29	6.89	49.83	74.00	-24.17	Peak	VERTICAL
8021.00	45.55	37.90	42.29	8.64	49.80	74.00	-24.20	Peak	VERTICAL
9789.00	47.27	38.80	42.12	10.02	53.97	74.00	-20.03	Peak	VERTICAL
13155.00	44.83	40.04	42.92	11.29	53.24	74.00	-20.76	Peak	VERTICAL
14906.00	42.28	40.57	41.77	12.90	53.98	74.00	-20.02	Peak	VERTICAL
16385.00	41.87	40.62	42.26	13.05	53.28	74.00	-20.72	Peak	VERTICAL
Tx mode 2455 MHz									
4910.00	55.27	32.52	43.27	6.93	51.45	74.00	-22.55	Peak	HORIZONTAL
7630.00	46.72	37.31	42.55	8.78	50.26	74.00	-23.74	Peak	HORIZONTAL
10435.00	44.45	39.50	42.51	10.35	51.79	74.00	-22.21	Peak	HORIZONTAL
11370.00	44.34	39.80	42.33	10.98	52.79	74.00	-21.21	Peak	HORIZONTAL
13155.00	45.07	40.04	42.92	11.29	53.48	74.00	-20.52	Peak	HORIZONTAL
16266.00	42.38	40.12	42.27	12.93	53.16	74.00	-20.84	Peak	HORIZONTAL
4910.00	56.61	32.52	43.27	6.93	52.79	74.00	-21.21	Peak	VERTICAL
7800.00	46.54	37.58	42.43	8.71	50.40	74.00	-23.60	Peak	VERTICAL
9466.00	45.99	38.77	41.99	9.65	52.42	74.00	-21.58	Peak	VERTICAL
10724.00	45.35	39.69	42.71	10.46	52.79	74.00	-21.21	Peak	VERTICAL
13155.00	45.07	40.04	42.92	11.29	53.48	74.00	-20.52	Peak	VERTICAL
16215.00	43.15	39.90	42.28	12.88	53.65	74.00	-20.35	Peak	VERTICAL
Result: Pass									

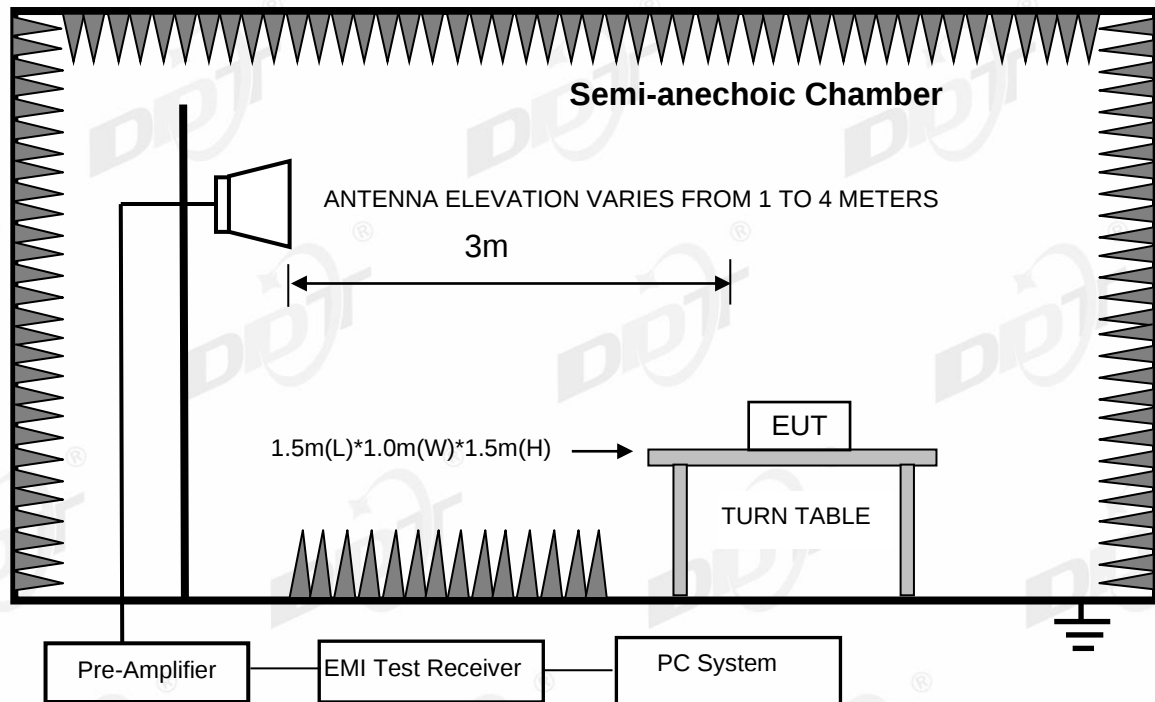
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.

2. AV Level = PK Level + PDCF, PDCF= -16.13 dB

3: For emissions above 1 GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit. All other emissions are attenuated 20 dB below the limits, so does not record.

7. Band Edge Compliance

7.1. Block diagram of test setup



7.2. Limit

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

7.3. Test procedure

Same with clause 6.3 except change investigated frequency range from 2310 MHz to 2410 MHz and 2470 MHz to 2500 MHz.

Remark: All restriction band have been tested, and only the worst case is shown in report.

7.4. Test result

Pass. (See below detailed test result)

TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 2#

D:\2021 RE2# Report Data\Q21061518-2E\FCC ABOVE
1G.EM6

Test Date : 2021-08-10

Tested By : Bairong

EUT : 2.4G REMOTE

Model Number : N/A

Power Supply : Battery

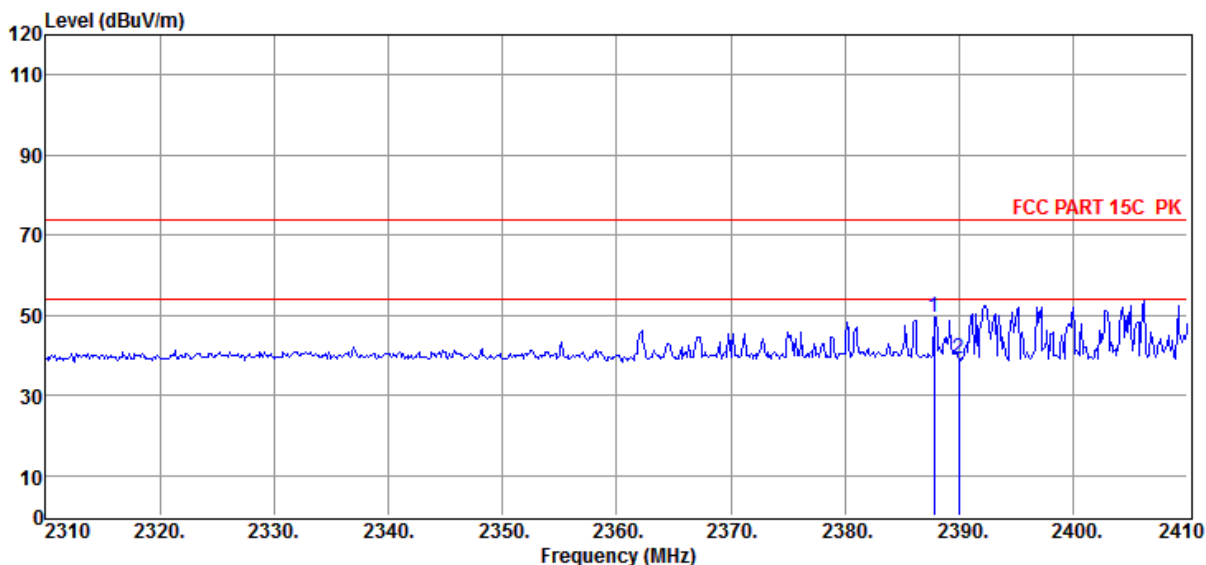
Test Mode : Tx mode

Condition : Temp:24.5°C,Humi:55%,Press:100.1kPa

Antenna/Distance : 2020 BBHA9120D/3m/HORIZONTAL

Memo : 2435

Data: 7



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2387.80	60.12	27.89	43.14	4.80	49.67	74.00	-24.33	Peak	HORIZONTAL
2	2390.00	49.66	27.89	43.14	4.80	39.21	74.00	-34.79	Peak	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

4. AV Level = PK Level + PDCF, PDCF=-16.13

TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 2#

D:\2021 RE2# Report Data\Q21061518-2E\FCC ABOVE
1G.EM6

Test Date : 2021-08-10

Tested By : Bairong

EUT : 2.4G REMOTE

Model Number : N/A

Power Supply : Battery

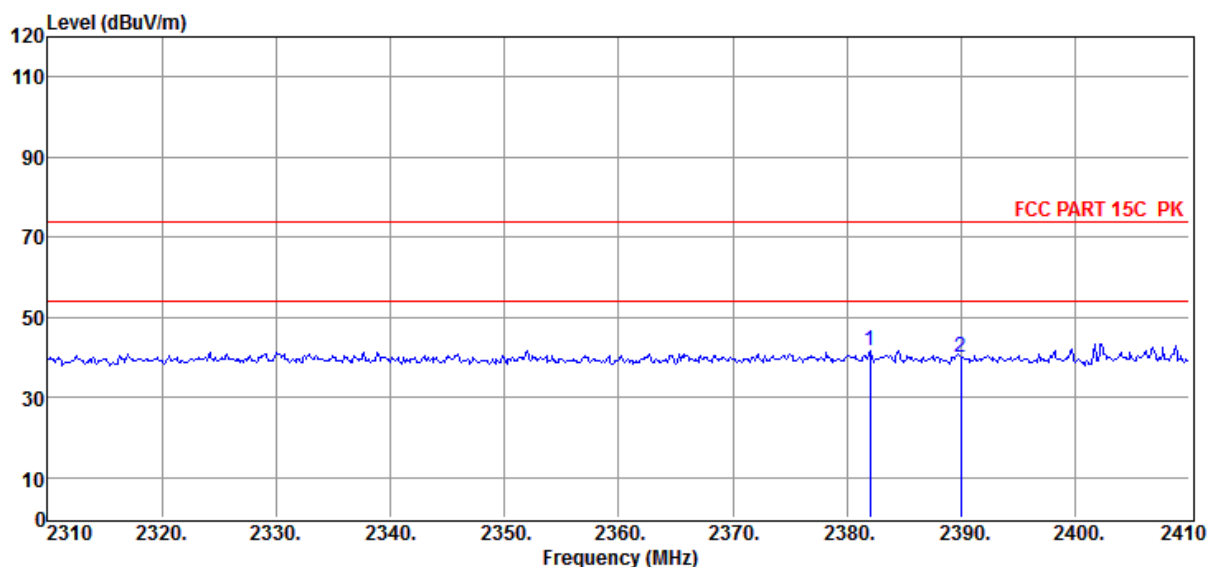
Test Mode : Tx mode

Condition : Temp:24.5°C,Humi:55%,Press:100.1kPa

Antenna/Distance : 2020 BBHA9120D/3m/VERTICAL

Memo : 2435

Data: 10



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2382.00	52.18	27.88	43.13	4.79	41.72	74.00	-32.28	Peak	VERTICAL
2	2390.00	50.49	27.89	43.14	4.80	40.04	74.00	-33.96	Peak	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

4. AV Level = PK Level + PDCF, PDCF=-16.13

TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 2#

D:\2021 RE2# Report Data\Q21061518-2E\FCC ABOVE
1G.EM6

Test Date : 2021-08-10

Tested By : Bairong

EUT : 2.4G REMOTE

Model Number : N/A

Power Supply : Battery

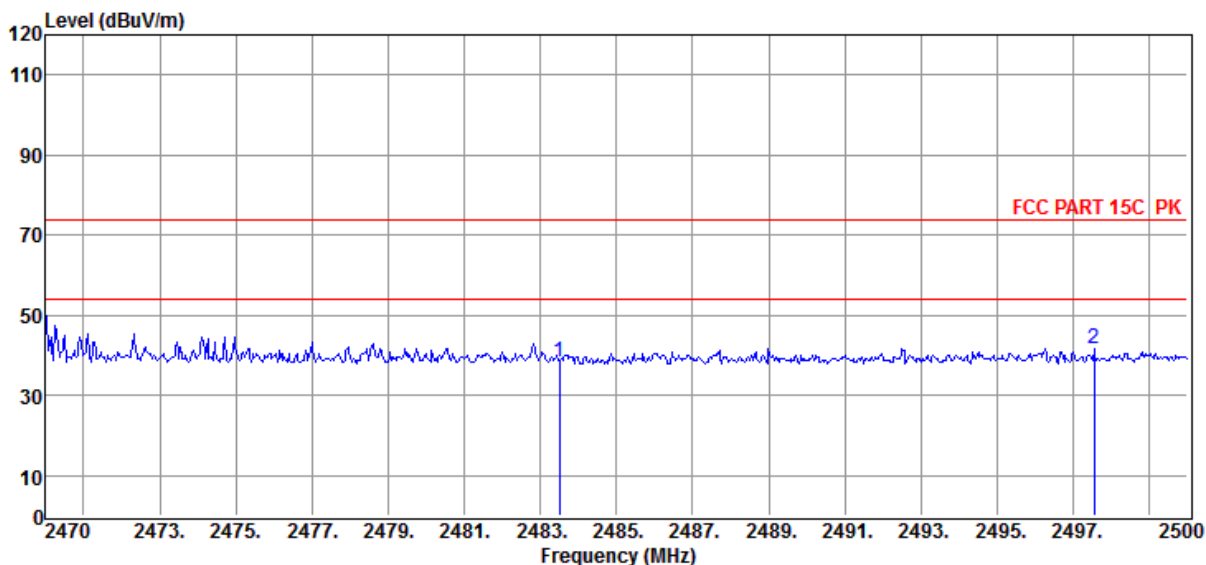
Test Mode : Tx mode

Condition : Temp:24.5°C,Humi:55%,Press:100.1kPa

Antenna/Distance : 2020 BBHA9120D/3m/VERTICAL

Memo : 2455

Data: 8



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	48.70	27.98	43.23	4.90	38.35	74.00	-35.65	Peak	VERTICAL
2	2497.54	51.96	28.00	43.25	4.92	41.63	74.00	-32.37	Peak	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

4. AV Level = PK Level + PDCF, PDCF=-16.13

TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 2#

D:\2021 RE2# Report Data\Q21061518-2E\FCC ABOVE
1G.EM6

Test Date : 2021-08-10

Tested By : Bairong

EUT : 2.4G REMOTE

Model Number : N/A

Power Supply : Battery

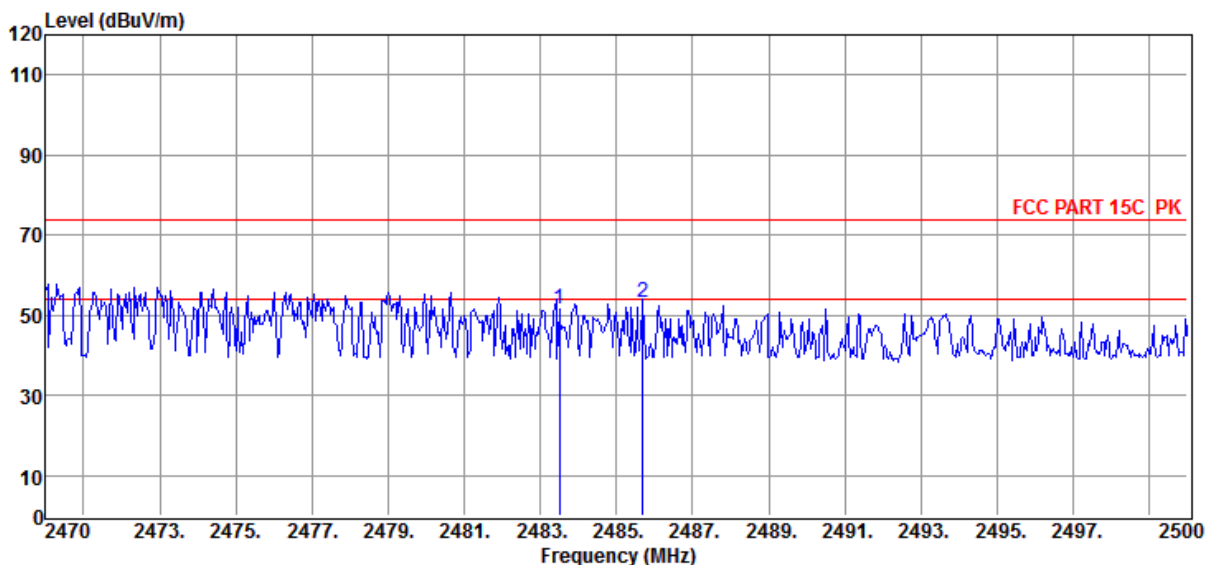
Test Mode : Tx mode

Condition : Temp:24.5°C,Humi:55%,Press:100.1kPa

Antenna/Distance : 2020 BBHA9120D/3m/HORIZONTAL

Memo : 2455

Data: 9



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	61.90	27.98	43.23	4.90	51.55	74.00	-22.45	Peak	HORIZONTAL
2	2485.69	63.36	27.99	43.24	4.90	53.01	74.00	-20.99	Peak	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.

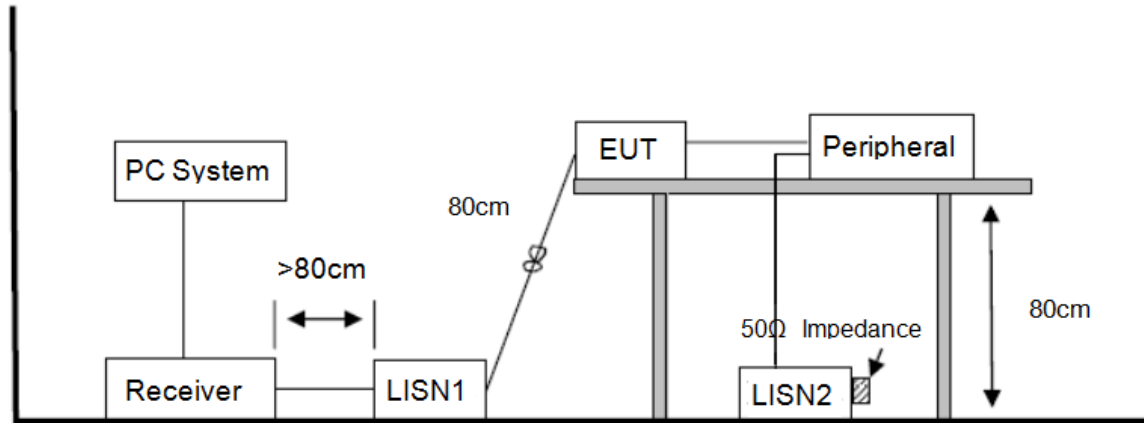
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

4. AV Level = PK Level + PDCF, PDCF=-16.13

8. Power Line Conducted Emission

8.1. Block diagram of test setup



8.2. Power line conducted emission limits

Frequency	Quasi-Peak Level dB(μ V)	Average Level dB(μ V)
150 kHz ~ 500 kHz	66 ~ 56*	56 ~ 46*
500 kHz ~ 5 MHz	56	46
5 MHz ~ 30 MHz	60	50

Note 1: * Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

8.3. Test procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80 cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 7.1 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30 MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level. The EUT configuration and worse cable configuration of the above highest emission levels were

recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 kHz.

8.4. Test result

Not Applicable, since the EUT is battery-operated device only.

9. Antenna Requirements

9.1. Limit

For intentional device, according to FCC 47 CFR Section 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.

9.2. Result

The antenna used for this product and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 2 dBi.