



Shenzhen CTL Testing Technology Co., Ltd.
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TEST REPORT

FOR FCC PART 15 SUBPART C 15.249

Report Reference No. : CTL2407253031-WF

Compiled by:
(position+printed name+signature)

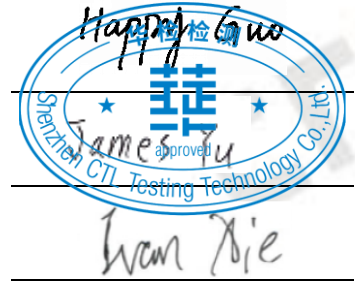
Happy Guo
(File administrators)

Tested by:
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James Yu
(Test Engineer)

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Ivan Xie
(Manager)



Product Name : REMOTE CONTROL GLIDER TOYS

Model/Type reference : L0713

List Model(s)..... : L0712, L0714, L0715, L0716, L0717, L0718, L0719, L0720,
L0721, L0722, L0723, L0724, L0725, L0726, L0727, L0728,
L0729, L0730, L0731, L0732, L0733, L0734, L0735, L0736,
L0737, L0738, L0739, L0740, L0741, L0742, L0743, L0744,
L0745, L0746, L0747, L0748, L0749, L0750, L0751, L0752,
L0753, L0754, L0755

Trade Mark..... : N/A

FCC ID..... : 2A9DA-L0713

Applicant's name : SHANTOU CITY CHENGHAI DISTRICT HONGWANG
ELECTRONICS CO., LTD
1ST AND 2ND FLOOR, NO. 3,YIZHOU ROAD, CHENCUEZHOU
Address of applicant : INDUSTRIAL ZONE, LIANXIA TOWN, CHENGHAI DISTRICT,
SHANTOU CITY, China

Test Firm..... : Shenzhen CTL Testing Technology Co., Ltd.

Address of Test Firm : Zone A, 1st Floor, Warehouse 2, Baisha Logistics Company, No.
3011 Shahe West Road, Nanshan District, Shenzhen

Test specification..... :
Standard : FCC Part 15.249:Operation within the bands 920-928 MHz,
2400-2483.5 MHz, 5725-5850 MHz and 24.0 - 24.25 GHz.
TRF Originator : Shenzhen CTL Testing Technology Co., Ltd.
Master TRF : Dated 2011-01

Date of receipt of test item : July.25, 2024

Date of Test Date..... : July.25, 2024-September.04, 2023

Data of Issue..... : September.05, 2023

Result..... : Pass

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TEST REPORT

Test Report No. :	CTL2407253031-WF	September.05, 2023
		Date of issue

Equipment under Test : REMOTE CONTROL GLIDER TOYS

Sample No. CTL2407253031

Model /Type : L0713

Listed Models : L0712, L0714, L0715, L0716, L0717, L0718, L0719, L0720, L0721, L0722, L0723, L0724, L0725, L0726, L0727, L0728, L0729, L0730, L0731, L0732, L0733, L0734, L0735, L0736, L0737, L0738, L0739, L0740, L0741, L0742, L0743, L0744, L0745, L0746, L0747, L0748, L0749, L0750, L0751, L0752, L0753, L0754, L0755

Applicant : SHANTOU CITY CHENGHAI DISTRICT
HONGWANG ELECTRONICS CO., LTD

Address : 1ST AND 2ND FLOOR, NO. 3,YIZHOU ROAD,
CHENCUEZHOU INDUSTRIAL ZONE, LIANXIA
TOWN, CHENGHAI DISTRICT, SHANTOU CITY,
China

Manufacturer : SHANTOU CITY CHENGHAI DISTRICT
HONGWANG ELECTRONICS CO., LTD

Address : 1ST AND 2ND FLOOR, NO. 3,YIZHOU ROAD,
CHENCUEZHOU INDUSTRIAL ZONE, LIANXIA
TOWN, CHENGHAI DISTRICT, SHANTOU CITY,
China

Test result	Pass *
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* In the configuration tested, the EUT complied with the standards specified page 5.

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.

** Modified History **

[illegible]

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1. SUMMARY

1.1. TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15.249](#): Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz.

[ANSI C63.10:2013](#) : American National Standard for Testing Unlicensed Wireless Devices

1.2. Test Description

FCC PART 15.249		
FCC Part 15.249(a)	Field Strength of Fundamental	PASS
FCC Part 15.209	Spurious Emission	PASS
FCC Part 15.209	Band edge	PASS
FCC Part 15.215(c)	20dB bandwidth	PASS
FCC Part 15.207	Conducted Emission	N/A
FCC Part 15.203	Antenna Requirement	PASS

1.3. Test Facility

1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.

Zone A, 1st Floor, Warehouse 2, Baisha Logistics Company, No. 3011 Shahe West Road, Nanshan District, Shenzhen

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

1.3.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L7497

Shenzhen CTL Testing Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No. 4343.01

Shenzhen CTL Testing Technology Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

IC Registration No.: 9618B

CAB identifier: CN0041

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements with Registration No.: 9618B.

1.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Measurement Uncertainty	Notes
Transmitter power conducted	± 0.57 dB	(1)
Transmitter power Radiated	± 2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	± 2.20 dB	(1)
Occupied Bandwidth	± 0.01 ppm	(1)
Radiated Emission 9KHz~30MHz	± 3.40 dB	(1)
Radiated Emission 30~1000MHz	± 4.10 dB	(1)
Radiated Emission Above 1GHz	± 4.32 dB	(1)

Conducted Disturbance0.15~30MHz	$\pm 3.20\text{dB}$	(1)
---------------------------------	---------------------	-----

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

2. GENERAL INFORMATION

2.1. Environmental conditions

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

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2. General Description of EUT

Product Name:	REMOTE CONTROL GLIDER TOYS
Model/Type reference:	L0713
Power supply:	DC 4.5V from battery
2.4G	
Modulation:	GFSK
Operation frequency:	2449MHz~2475MHz
Channel number:	27
Antenna type:	PCB Antenna
Antenna gain:	0dBi

Note1: For more details, please refer to the user's manual of the EUT.

Note2: Antenna gain provided by the applicant.

Note3: The product cannot be configured to operate outside the current frequency band plan through software configuration, Third parties are not allowed to change any software parameter configuration of the product.

2.3. Description of Test Modes and Test Frequency

The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. There are 27 channels provided to the EUT and Channel 01/14/27 were selected for testing.

Operation Frequency List :

Channel	Frequency (MHz)
01	2449
02	2450
:	:
13	2461
14	2462
15	2463
:	:
26	2474
27	2475

Note: The line display in grey is the channel selected to perform test.

2.4. Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ESH2-Z5	860014/010	2024/04/30	2025/04/29
Limitator	ROHDE & SCHWARZ	ESH3-Z2	100408	2024/04/30	2025/04/29
EMI Test Receiver	ROHDE & SCHWARZ	ESCI	1166.5950.03	2024/04/30	2025/04/29
Double cone logarithmic antenna	Schwarzbeck	VULB 9168	824	2023/02/13	2026/02/12
EMI Test Receiver	R&S	ESCI	1166.5950.03	2024/04/30	2025/04/29
Spectrum Analyzer	Agilent	N9020A	US46220290	2024/05/02	2025/05/01
Spectrum Analyzer	Keysight	N9020A	MY53420874	2024/05/02	2025/05/01
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2021/12/23	2024/12/22
Active Loop Antenna	Da Ze	ZN30900A	/	2024/04/30	2025/04/29
Horn Antenna	Ocean Microwave	OBH100400	26999002	2021/12/22	2024/12/21
Amplifier	Agilent	8449B	3008A02306	2024/04/30	2025/04/29
Amplifier	Brief&Smart	LNA-4018	2104197	2024/05/03	2025/05/02
Temperature/Humidity Meter	Ji Yu	MC501	/	2024/05/04	2025/05/03
Power measurement module	TSTPASS	TSPS2023R	TSCB220016	2024/05/03	2025/05/02
Power Sensor	Agilent	U2021XA	MY53340004	2024/05/04	2025/05/03
Power Sensor	Agilent	U2021XA	MY54080012	2024/05/03	2025/05/02
Test Software					
Name of Software			Version		
TST-PASS			V2.0		
EZ_EMG(Below 1GHz)			V1.1.4.2		
EZ_EMG((Above 1GHz)			V1.1.4.2		

2.5. Related Submittal(s) / Grant(s)

This submittal(s) (test report) is intended to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

3. TEST CONDITIONS AND RESULTS

3.1. Conducted Emissions Test

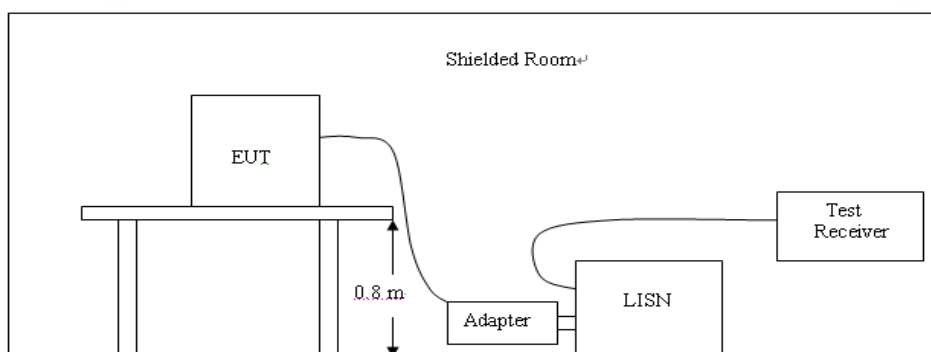
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10:2013.
2. Support equipment, if needed, was placed as per ANSI C63.10:2013.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
4. If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST RESULTS

Battery powered products do not require this test.

3.2. Radiated Emissions and Band Edge

Limit

According 15.249, the field strength of emissions from intentional radiators operated within 2400MHz-2483.5 MHz shall not exceed 94dB μ V/m (50mV/m):

FCC PART 15.249(d) 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.

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 in §15.209(a)

Radiated emission limits

Frequency (MHz)	Distance (Meters)	Radiated (dB μ V/m)	Radiated (μ V/m)
0.009-0.49	3	$20\log(2400/F(\text{KHz}))+40\log(300/3)$	$2400/F(\text{KHz})$
0.49-1.705	3	$20\log(24000/F(\text{KHz}))+40\log(30/3)$	$24000/F(\text{KHz})$
1.705-30	3	$20\log(30)+40\log(30/3)$	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

According to §15.249 (a): Except as provided in paragraph (b) of this section, 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

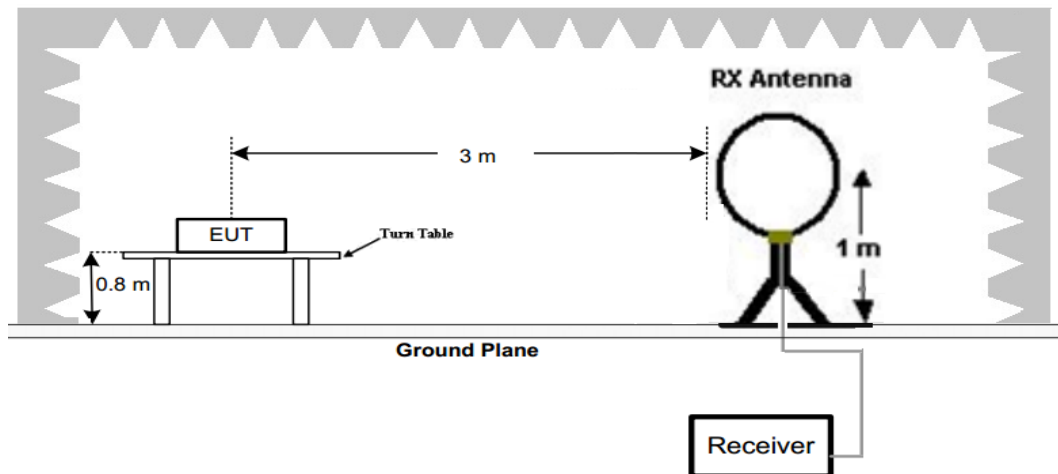
* Field strength limits are specified at a distance of 3 meters.

* As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

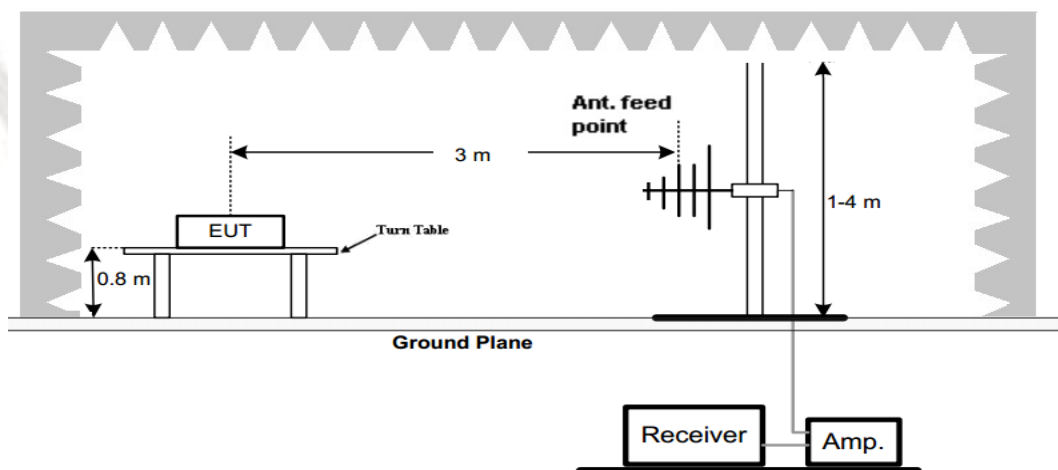
* Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

TEST CONFIGURATION

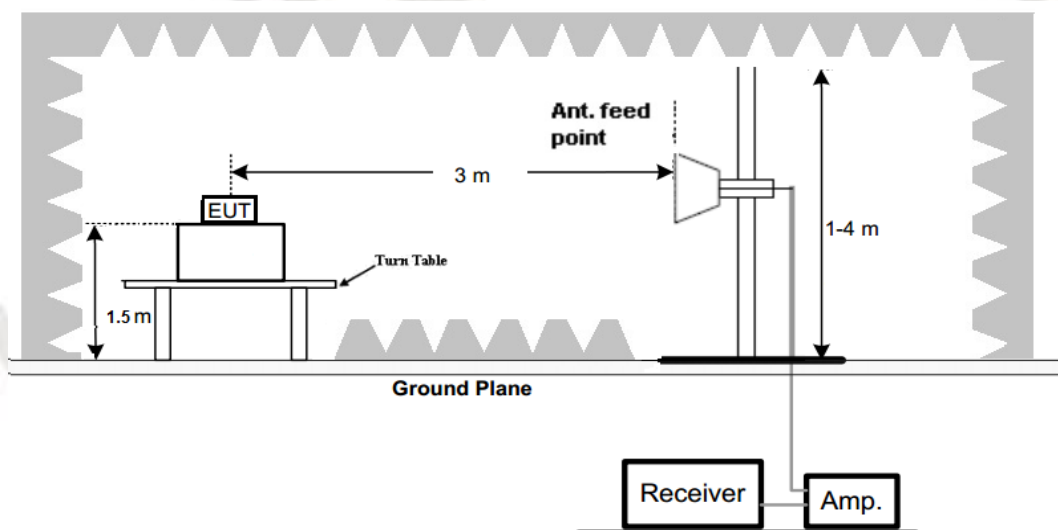
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



Test Procedure

1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. Radiated emission test frequency band from 9KHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Bilog Antenna	3
1GHz-18GHz	Horn Antenna	3
18GHz-25GHz	Horn Antenna	1

7. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz, Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz, Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz, Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

TEST RESULTS

Remark:

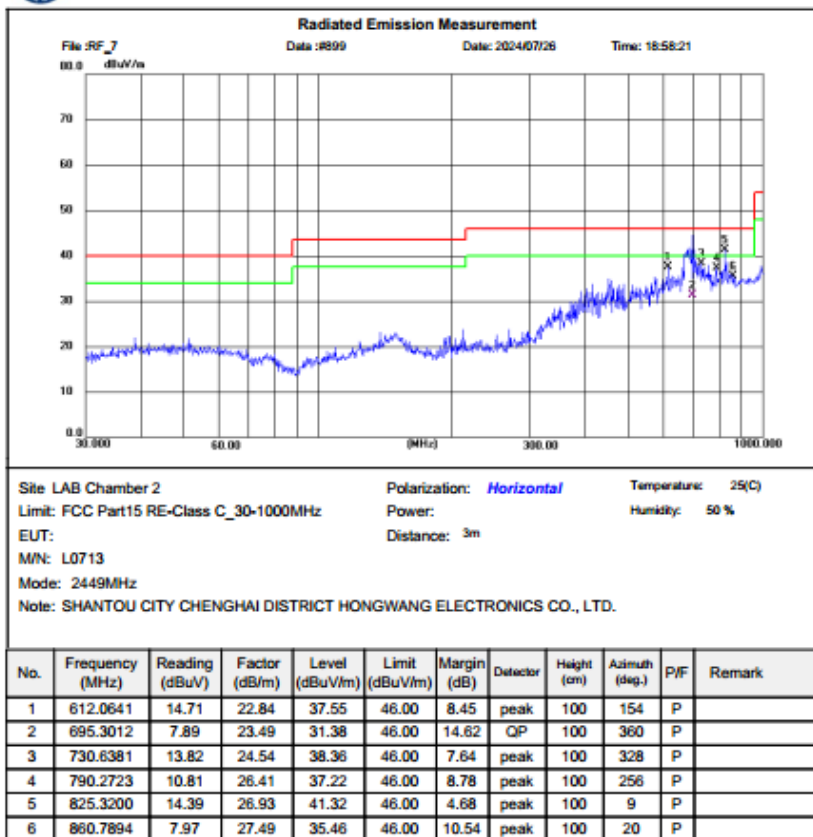
1. We measured Radiated Emission at GFSK mode from 9 KHz to 25GHz and recorded worst case.
2. For below 1GHz testing recorded worst at GFSK low channel.
3. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

For 30MHz-1GHz

Horizontal



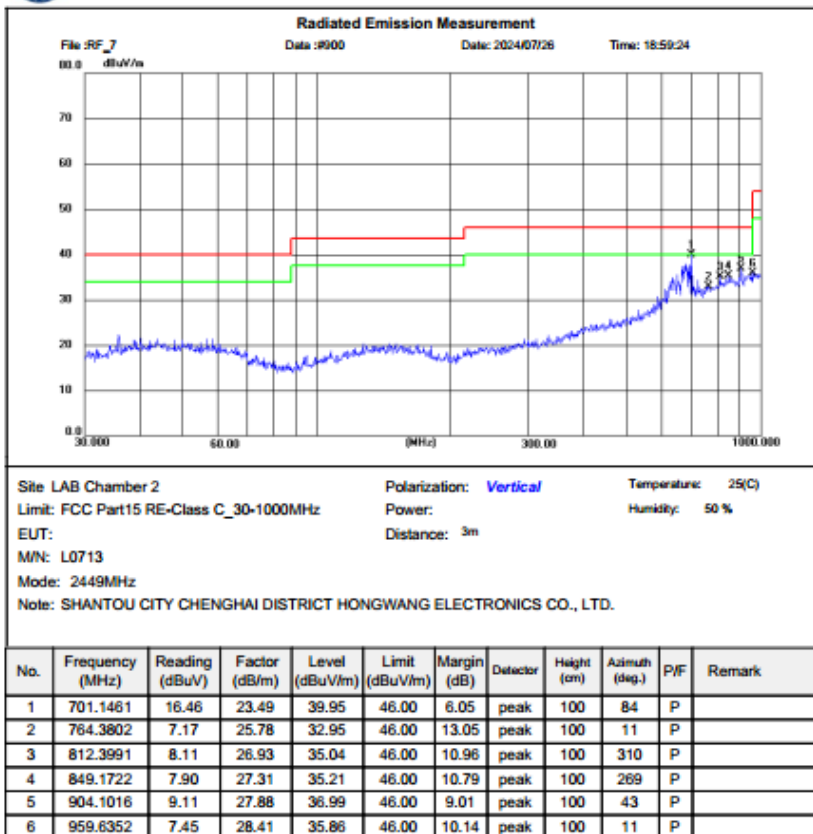
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Vertical



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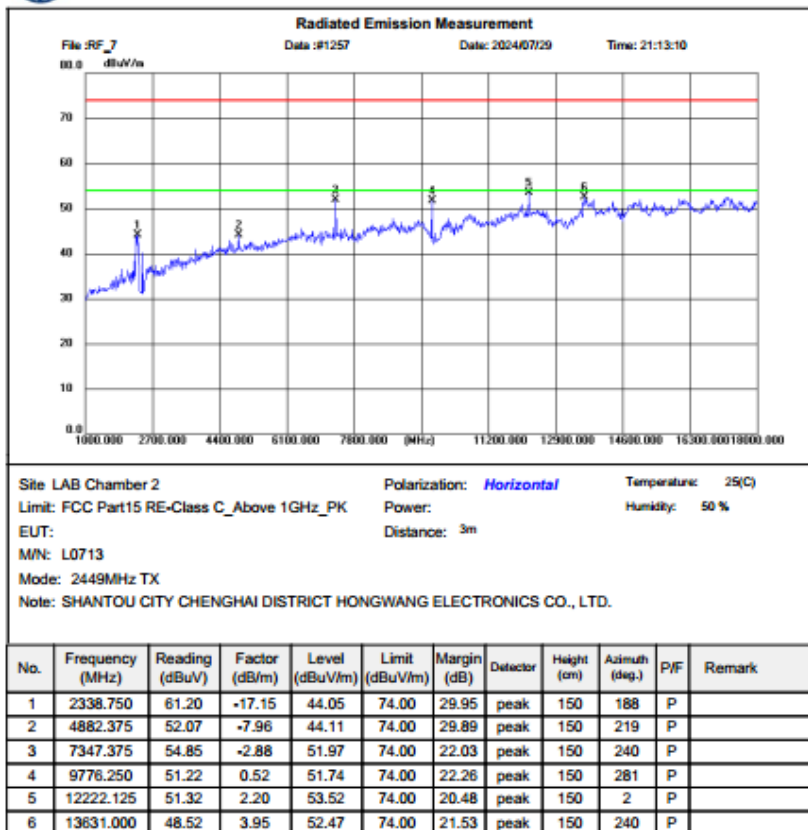


For 1GHz to 10GHz 2449MHz

Horizontal



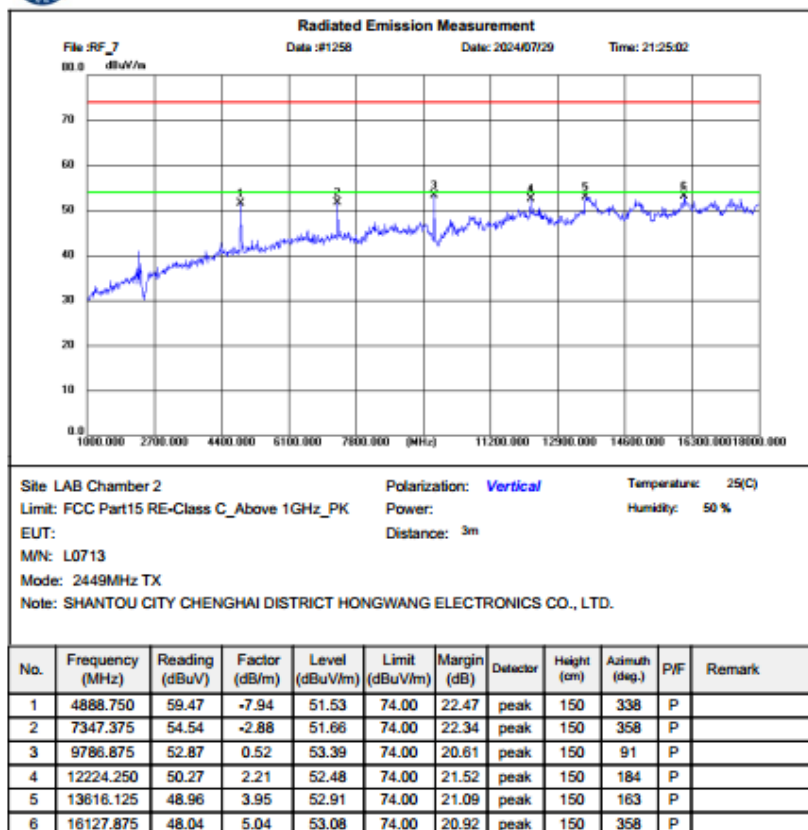
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Vertical



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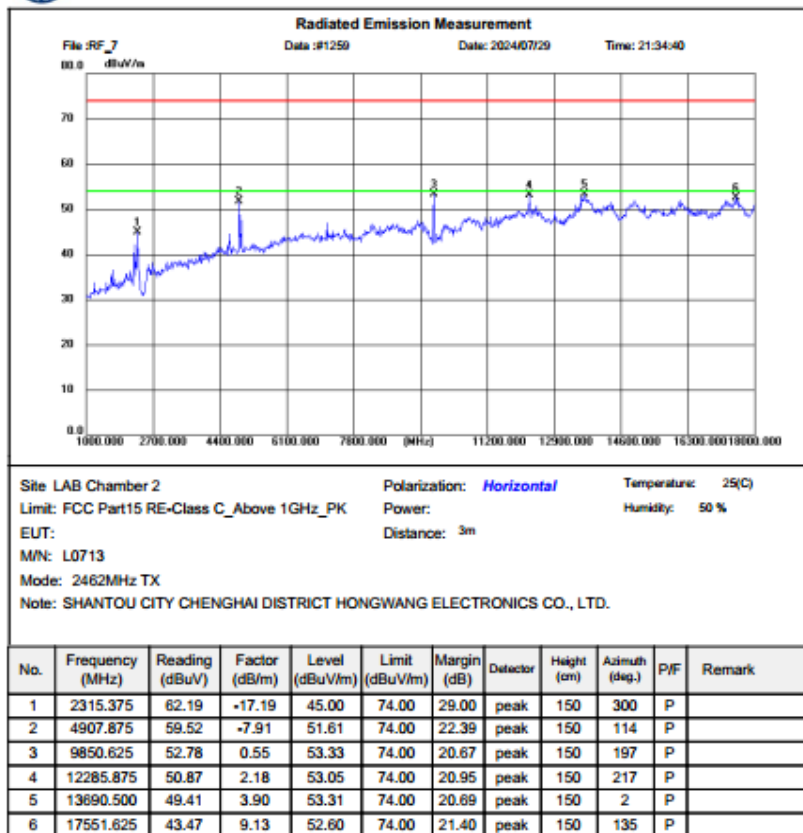


2462MHz

Horizontal



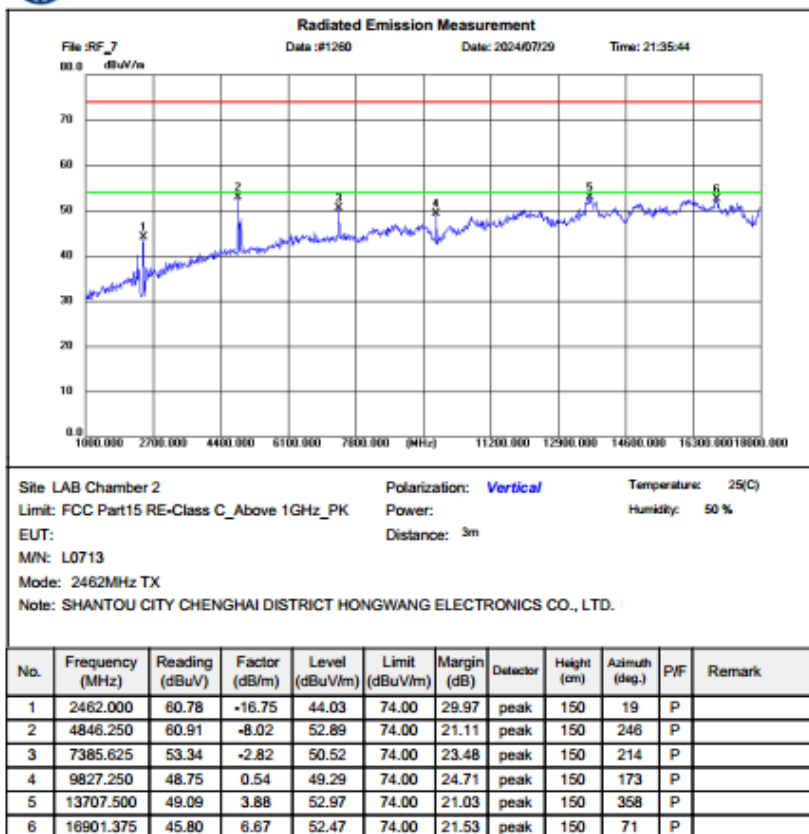
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Vertical



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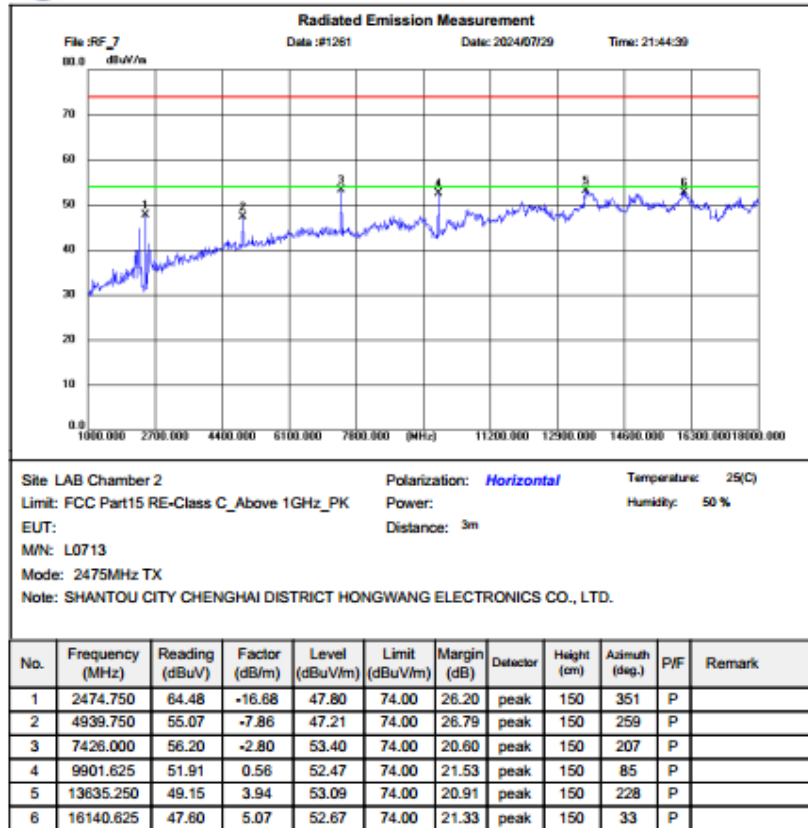


2475MHz

Horizontal



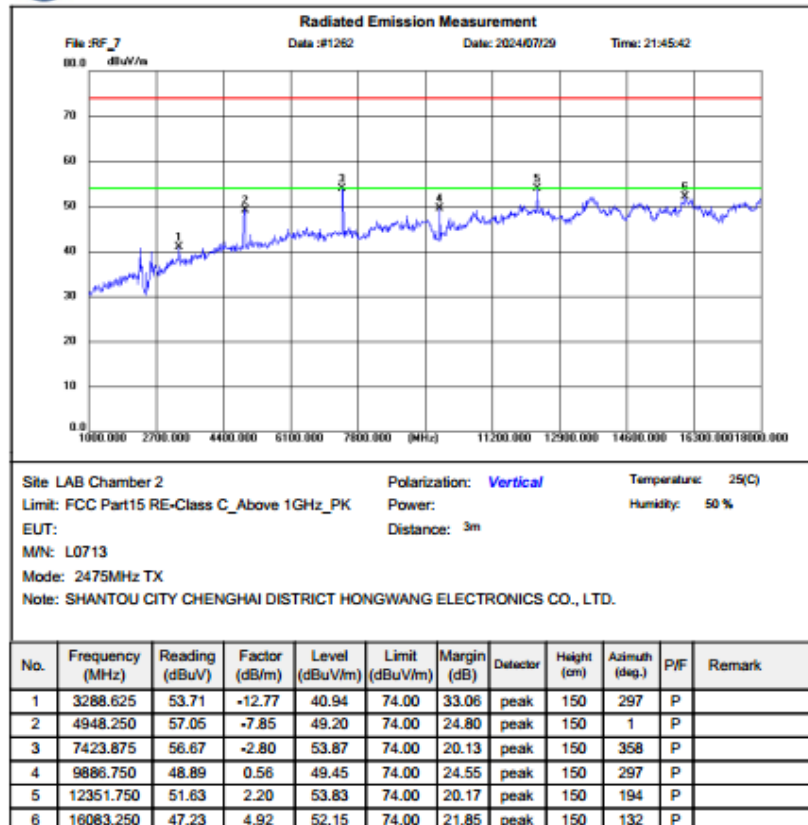
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Vertical



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REMARKS:

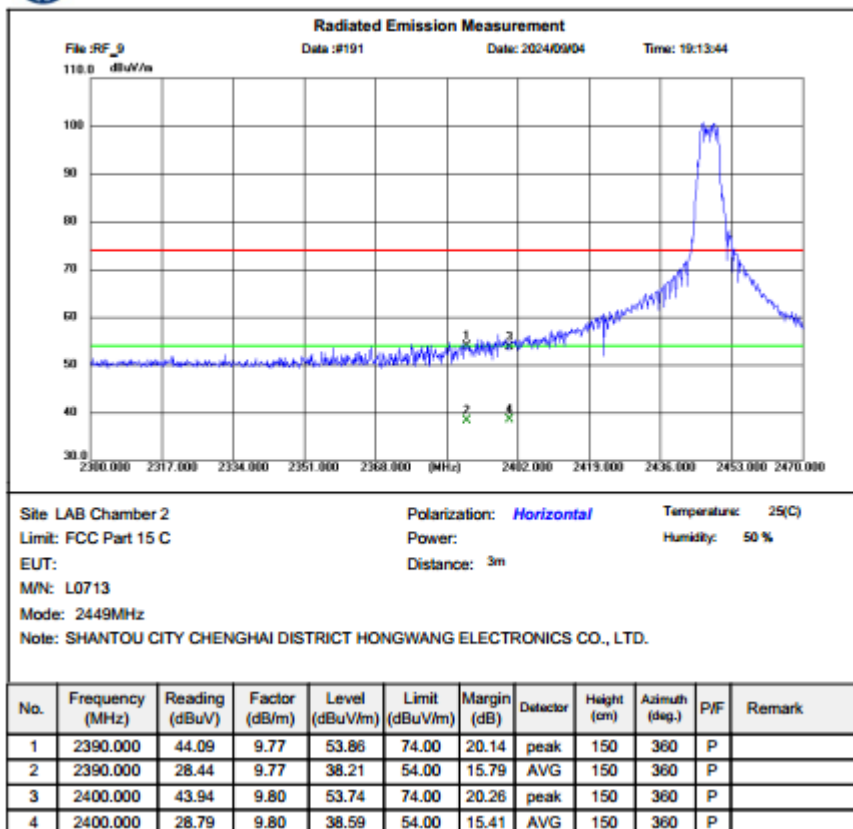
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
3. Margin value = Limit value - Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW 1MHz VBW 3MHz Peak detector is for PK value; RBW 1MHz VBW 10Hz Peak detector is for AV value.
7. For fundamental frequency, RBW 3MHz VBW 3MHz Peak detector is for PK Value ; RMS detector is for AV value.

Frequency bands 2449MHz

Horizontal



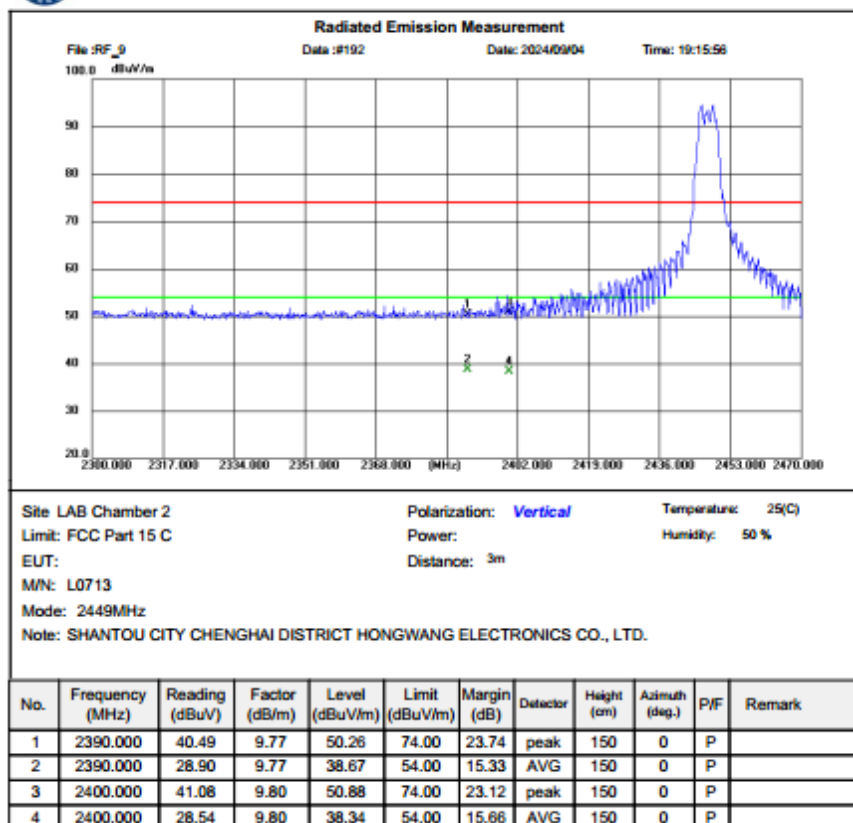
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Vertical



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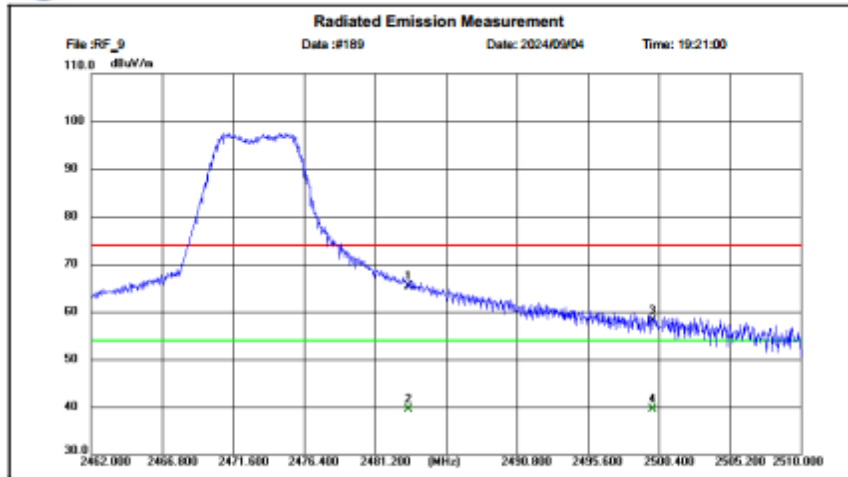
Frequency bands

2475MHz

Horizontal



Shenzhen CTL Testing Technology Co., Ltd
Tel: +86-755-89486194



Site: LAB Chamber 2

Limit: FCC Part 15 C

EUT:

M/N: L0713

Mode: 2475MHz

Note: SHANTOU CITY CHENGHAI DISTRICT HONGWANG ELECTRONICS CO., LTD.

Polarization: **Horizontal**

Temperature: 25(C)

Power:

Humidity: 50 %

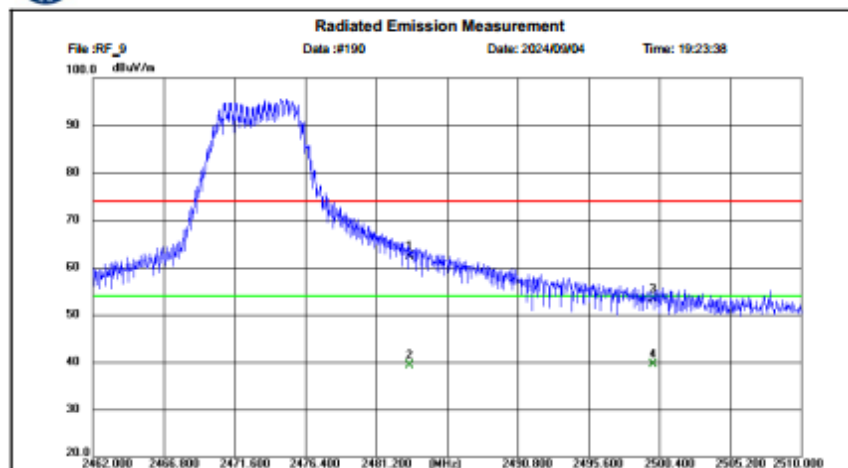
Distance: 3m

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2483.500	55.43	9.93	65.36	74.00	8.64	peak	150	360	P	
2	2483.500	29.64	9.93	39.57	54.00	14.43	AVG	150	360	P	
3	2500.000	48.01	10.00	58.01	74.00	15.99	peak	150	360	P	
4	2500.000	29.53	10.00	39.53	54.00	14.47	AVG	150	360	P	

Vertical



Shenzhen CTL Testing Technology Co., Ltd
Tel: +86-755-89486194



Site: LAB Chamber 2

Limit: FCC Part 15 C

EUT:

M/N: L0713

Mode: 2475MHz

Note: SHANTOU CITY CHENGHAI DISTRICT HONGWANG ELECTRONICS CO., LTD.

Polarization: **Vertical**

Temperature: 25(C)

Power:

Humidity: 50 %

Distance: 3m

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2483.500	52.46	9.93	62.39	74.00	11.61	peak	150	0	P	
2	2483.500	29.34	9.93	39.27	54.00	14.73	AVG	150	0	P	
3	2500.000	43.38	10.00	53.38	74.00	20.62	peak	150	0	P	
4	2500.000	29.46	10.00	39.46	54.00	14.54	AVG	150	0	P	

Field Strength of Fundamental

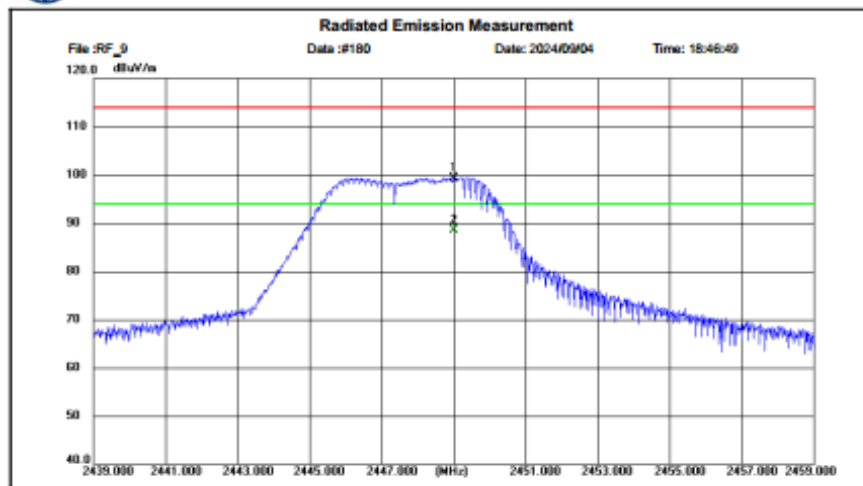
Remark: This test was performed with EUT in X, Y, Z position and the worst case was found when EUT in X position.

2449MHz

Horizontal



Shenzhen CTL Testing Technology Co., Ltd
Tel: +86-755-89486194



Site: LAB Chamber 2

Polarization: **Horizontal**

Temperature: 25(C)

Limit: 114

Power:

Humidity: 50 %

EUT:

Distance: 3m

M/N: L0713

Mode: 2449MHz

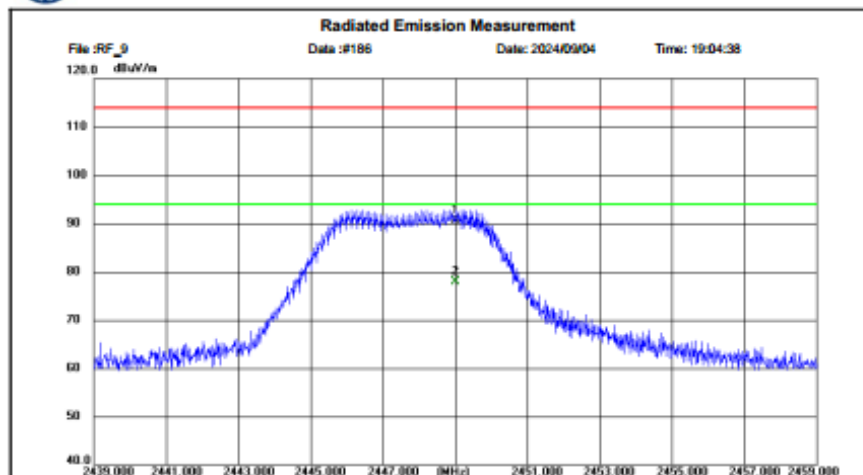
Note: SHANTOU CITY CHENGHAI DISTRICT HONGWANG ELECTRONICS CO., LTD.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2449.000	79.56	19.66	99.22	114.00	14.78	peak	150	0	P	
2	2449.000	68.77	19.66	88.43	94.00	5.57	AVG	150	360	P	

Vertical



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Site: LAB Chamber 2

Polarization: **Vertical**

Temperature: 25(C)

Limit: 114

Power:

Humidity: 50 %

EUT:

Distance: 3m

M/N: L0713

Mode: 2449MHz

Note: SHANTOU CITY CHENGHAI DISTRICT HONGWANG ELECTRONICS CO., LTD.

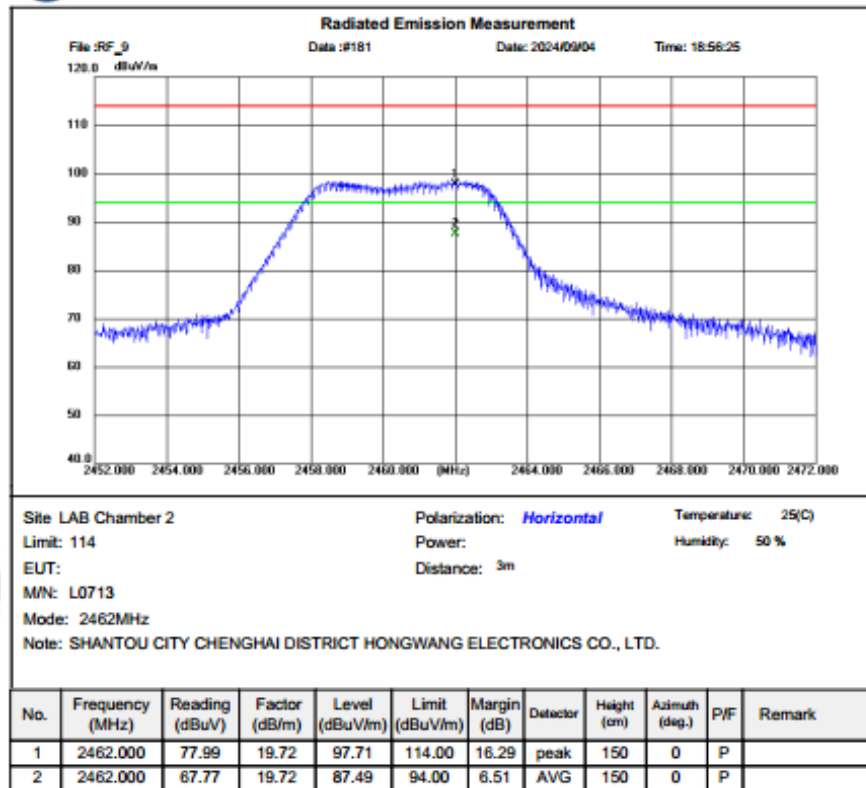
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2449.000	71.12	19.66	90.78	114.00	23.22	peak	150	0	P	
2	2449.000	58.18	19.66	77.84	94.00	16.16	AVG	150	360	P	

Field Strength of Fundamental 2462MHz

Horizontal



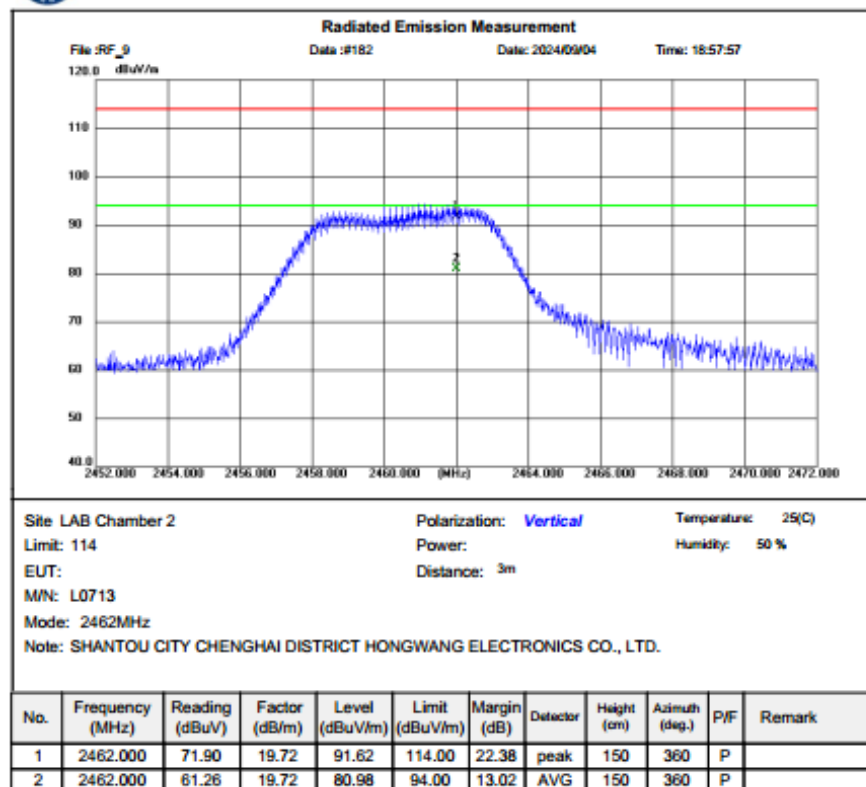
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Vertical



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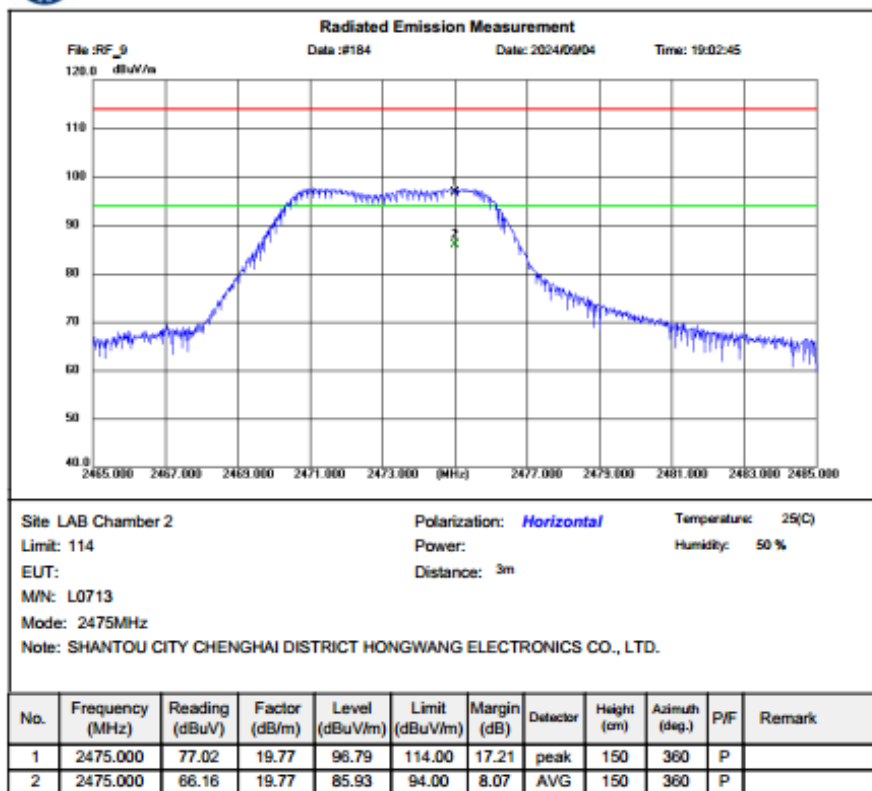


Field Strength of Fundamental 2475MHz

Horizontal



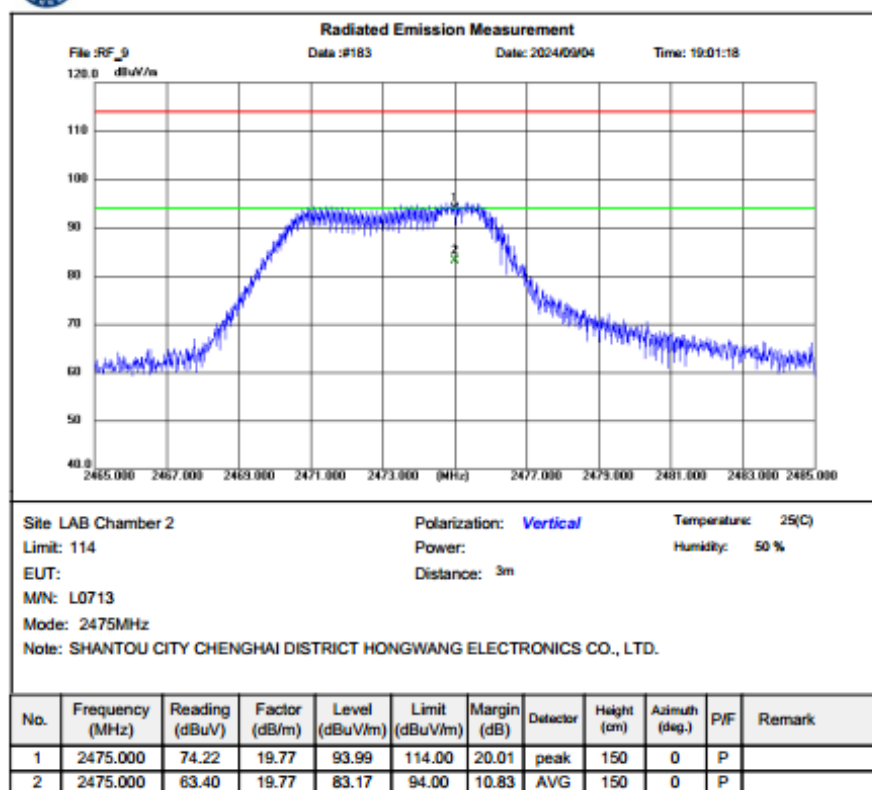
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Vertical



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REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
3. Margin value = Limit value - Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW 1MHz VBW 3MHz Peak detector is for PK value; RBW 1MHz VBW 10Hz Peak detector is for AV value.
7. For fundamental frequency, RBW 3MHz VBW 3MHz Peak detector is for PK Value; RMS detector is for AV value.

3.3. Occupied Bandwidth Measurement

Limit

N/A

Test Configuration



Test Procedure

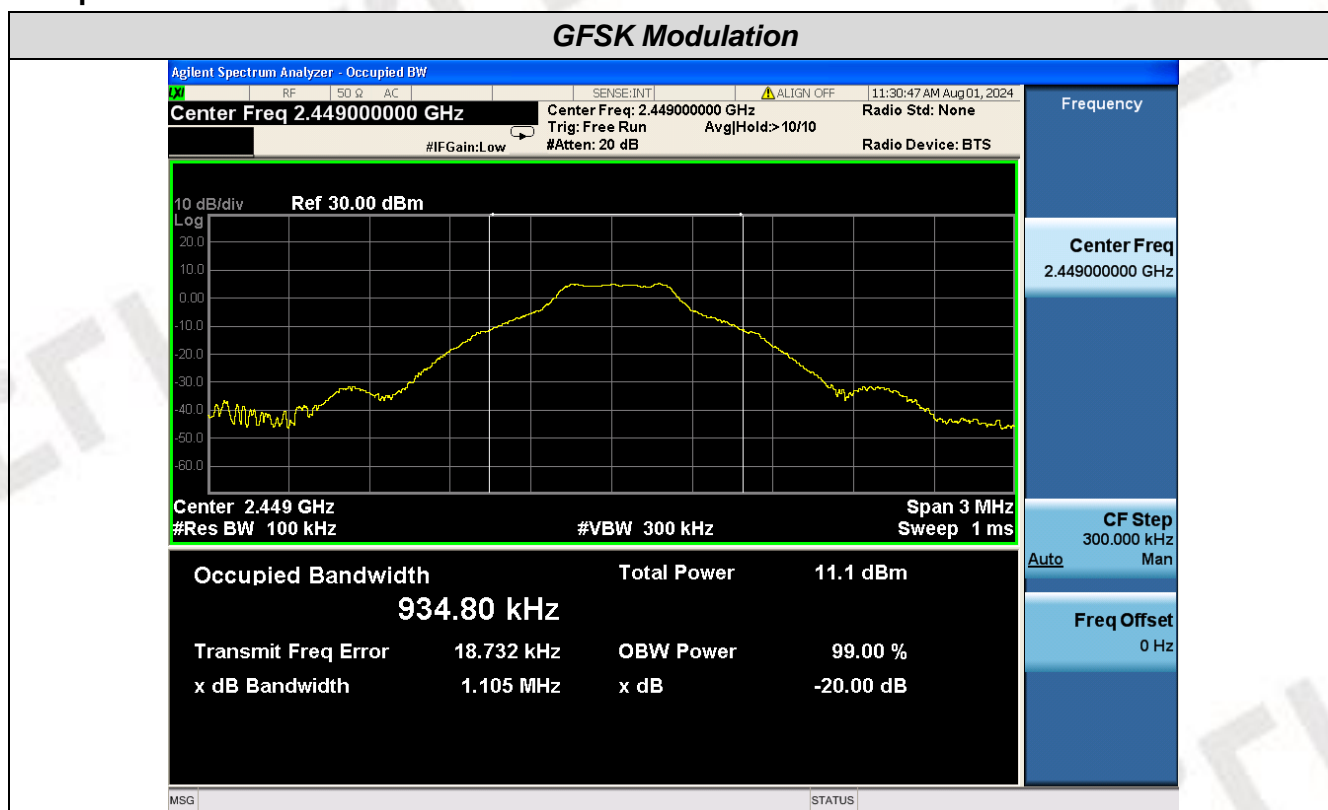
The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100KHz RBW and 300KHz VBW.

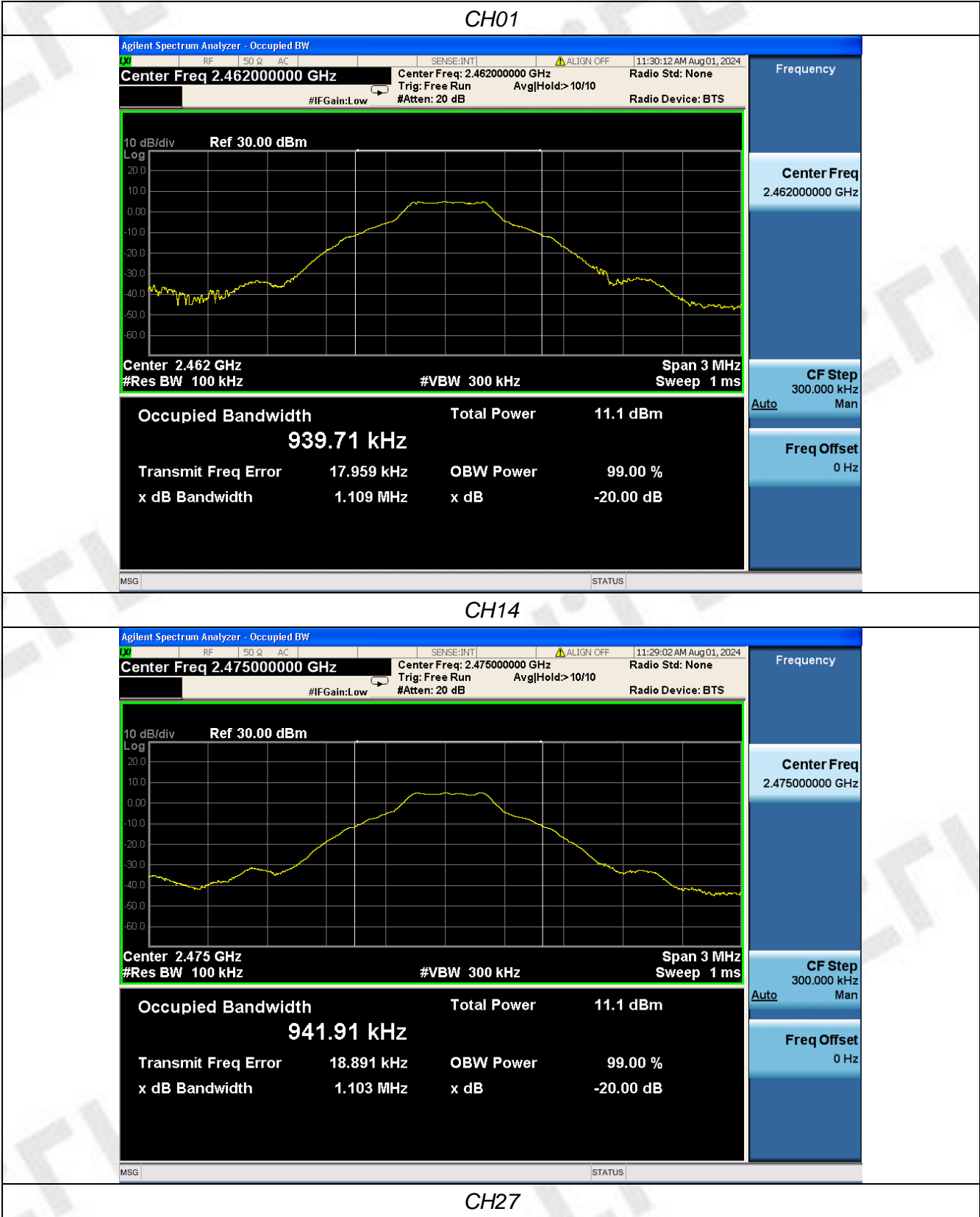
The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

Test Results

Modulation	Channel	99% OBW (MHz)	20dB bandwidth (MHz)	Result
GFSK	CH01	0.93480	1.105	Pass
	CH14	0.93971	1.109	
	CH27	0.94191	1.103	

Test plot as follows:





3.4. Antenna Requirement

Standard Applicable

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.

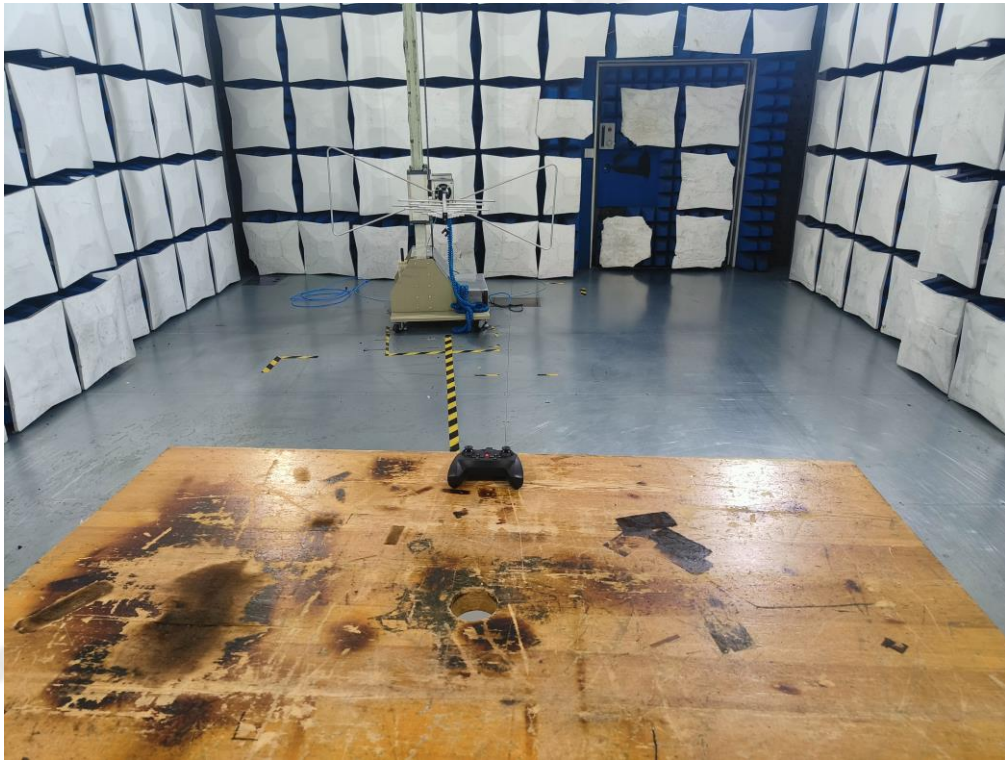
Refer to statement below for compliance.

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

Antenna Connected Construction

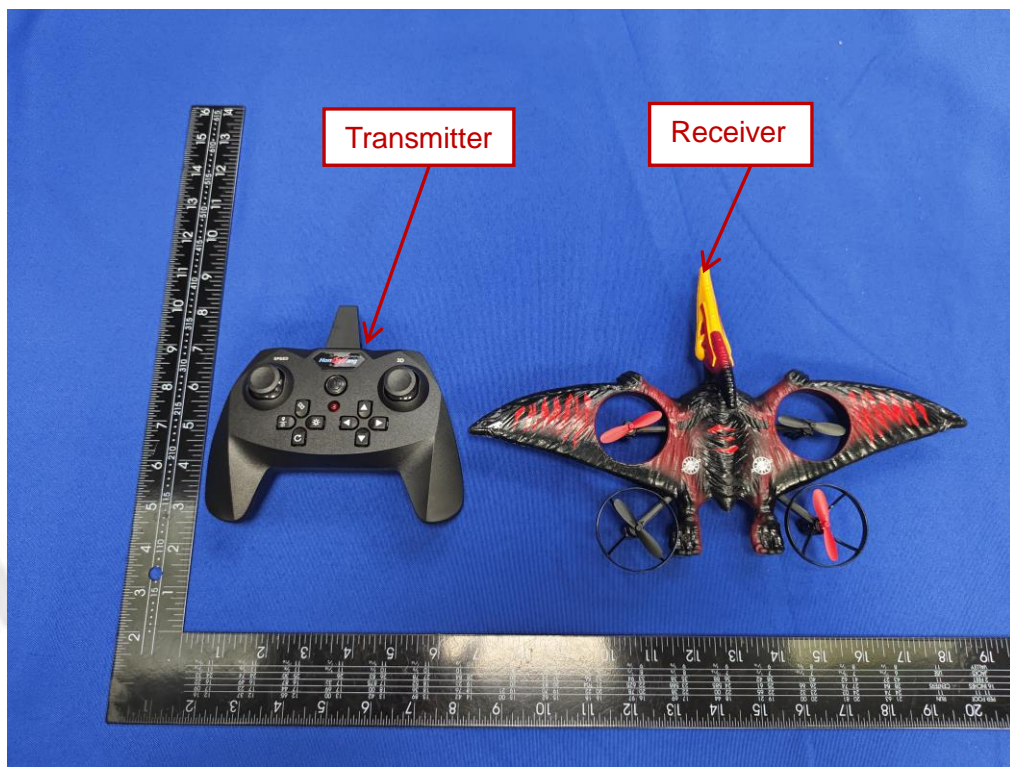
The antenna used in this product is a PCB Antenna, The directional gains of antenna used for transmitting is 0dBi.

4. Test Setup Photos of the EUT



5. External and Internal Photos of the EUT

External Photos of EUT

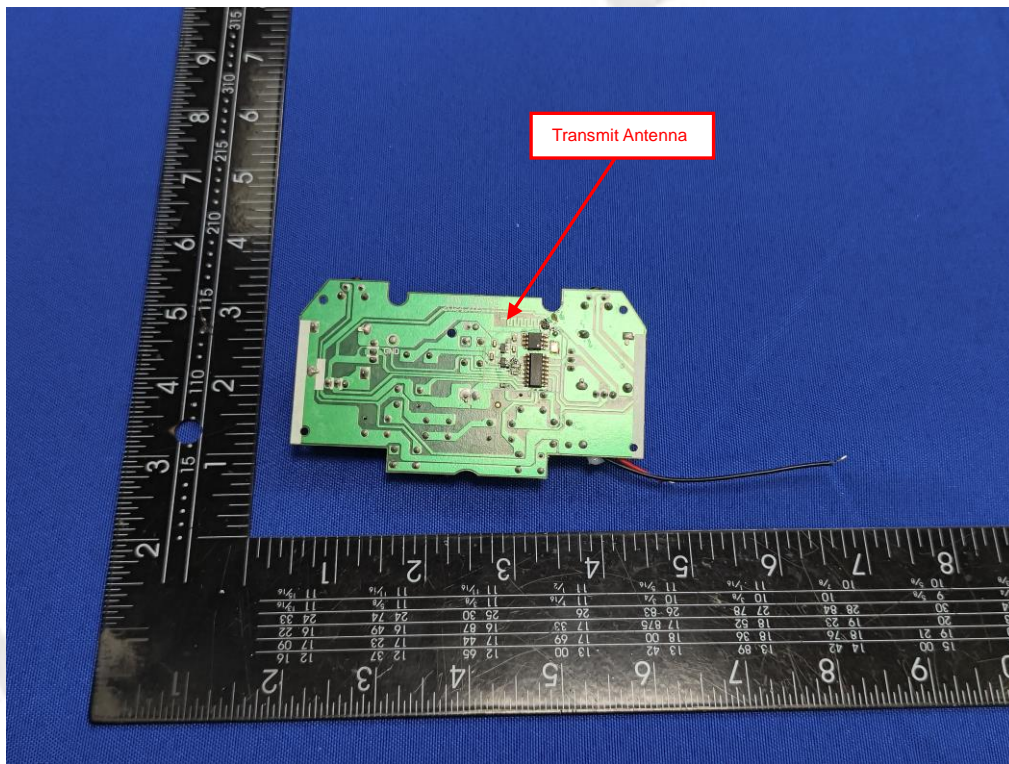


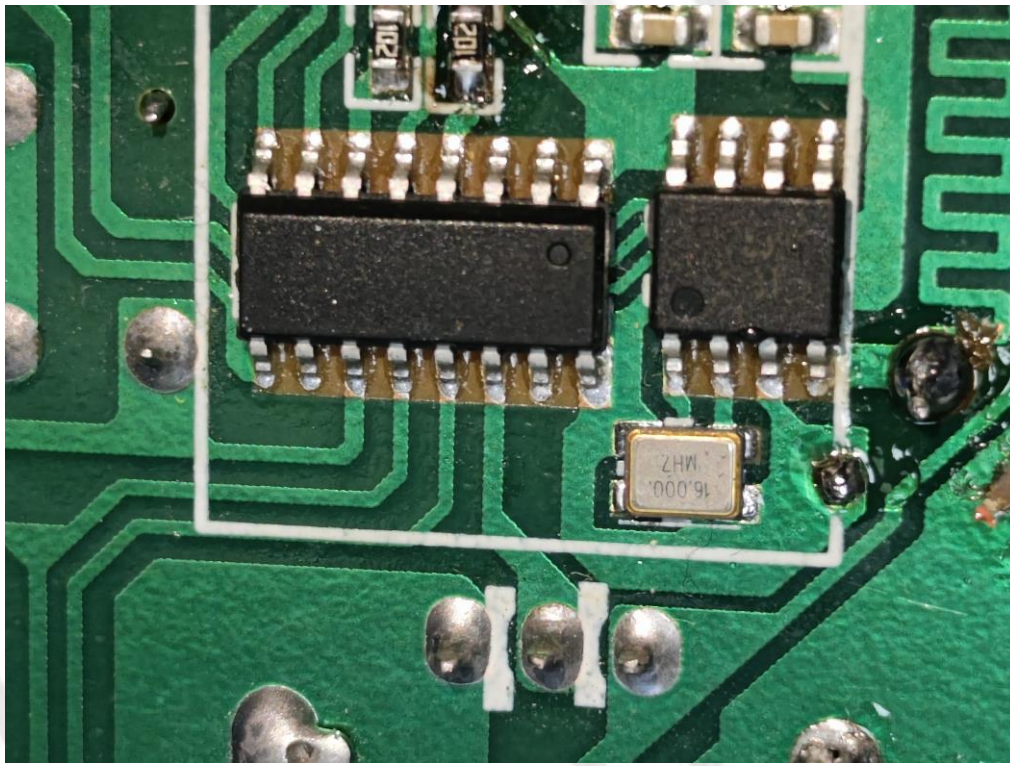
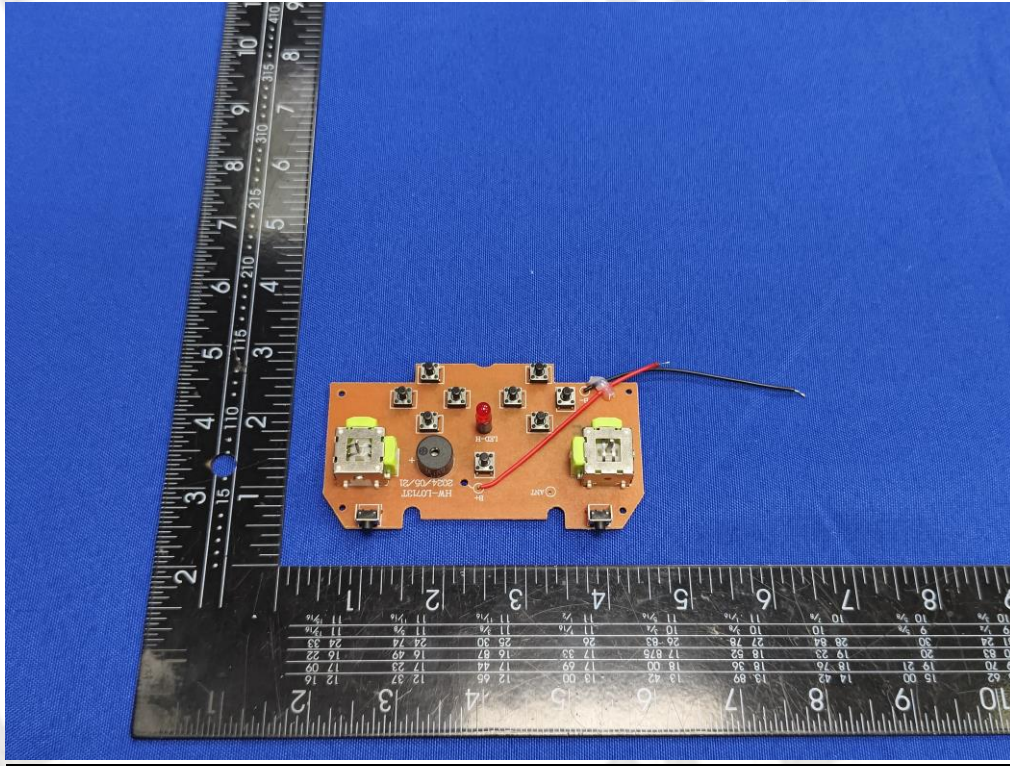






Internal Photos of EUT





***** End of Report *****