

**FCC PART 15.249
TEST REPORT**

For

Taizhou Jiaojiang Yingxing Electronic Co.,Ltd

No. 69 Hong Lin RD., Hongjia Taizhou, China

FCC ID: 2ATJ9-YJ-BT-01

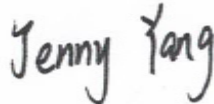
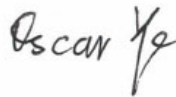
Report Type: Original Report	Product Name: wireless remote
Report Number:	<u>RHZ240617001-00A</u>
Report Date:	<u>2024-08-08</u>
Reviewed By:	<u>Jenny Yang</u> 
Approved By:	<u>Oscar Ye</u> 
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REPORT REVISION HISTORY

Number of Revisions	Report No.	Version	Issue Date	Description
0	RHZ240617001-00A	R1V1	2024-08-08	Initial Release

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant:	Taizhou Jiaojiang Yingxing Electronic Co.,Ltd
Product Name:	wireless remote
Tested Model	YJ-BT-01
Power Supply:	DC 3V from battery
RF Function:	SRD
Operating Band/Frequency:	2402 MHz
Modulation Type:	GFSK
Antenna Type:	PCB Antenna
★Maximum Antenna Gain:	0.07 dBi

Note: The maximum antenna gain was declared by the manufacturer.

All measurement and test data in this report was gathered from production sample serial number: RHZ240617001-1 (Assigned by the BACL (Kunshan). The EUT supplied by the applicant was received on 2024-06-17.)

Objective

This type approval report is prepared for *Taizhou Jiaojiang Yingxing Electronic Co.,Ltd* in accordance with Part 2-Subpart J, and Part 15-Subparts A and C of the Federal Communication Commission rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209, 15.215 and 15.249 rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19 dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	9 kHz~150 kHz	3.8dB
	150 kHz~30 MHz	3.4dB
	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	6GHz~18GHz	5.23dB
	18GHz~40GHz	5.65dB
Occupied Bandwidth		0.5kHz
Temperature		1.0°C
Humidity		6%

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu Province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) is accredited in accordance with ISO/IEC 17025:2017 by NVLAP (Lab code: 600338-0), and the lab has been recognized as the FCC accredited lab under the KDB 974614 D01, the FCC Designation No. : CN5055.

SYSTEM TEST CONFIGURATION**Justification**

Channel list:

Channel	Frequency (MHz)
1	2402

EUT Exercise Software

RF test software: Engineering mode

Support Equipment List and Details

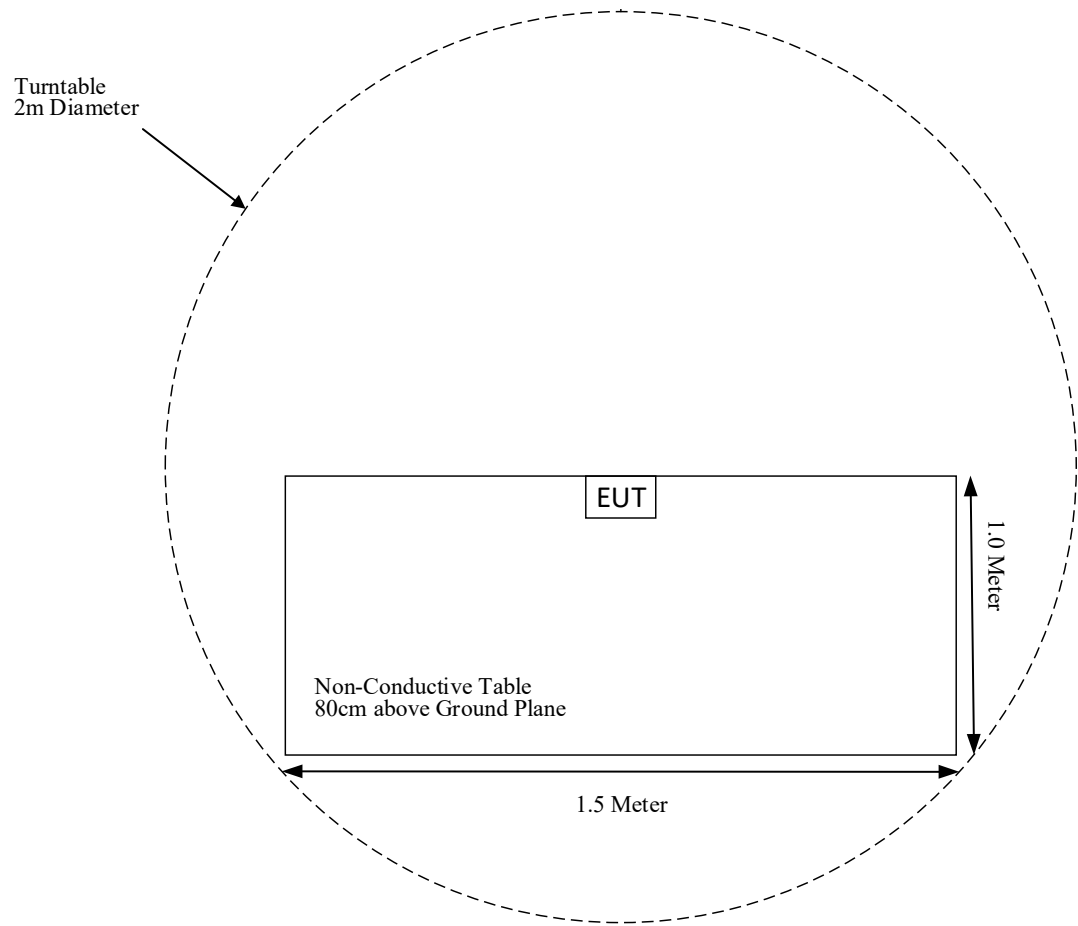
Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

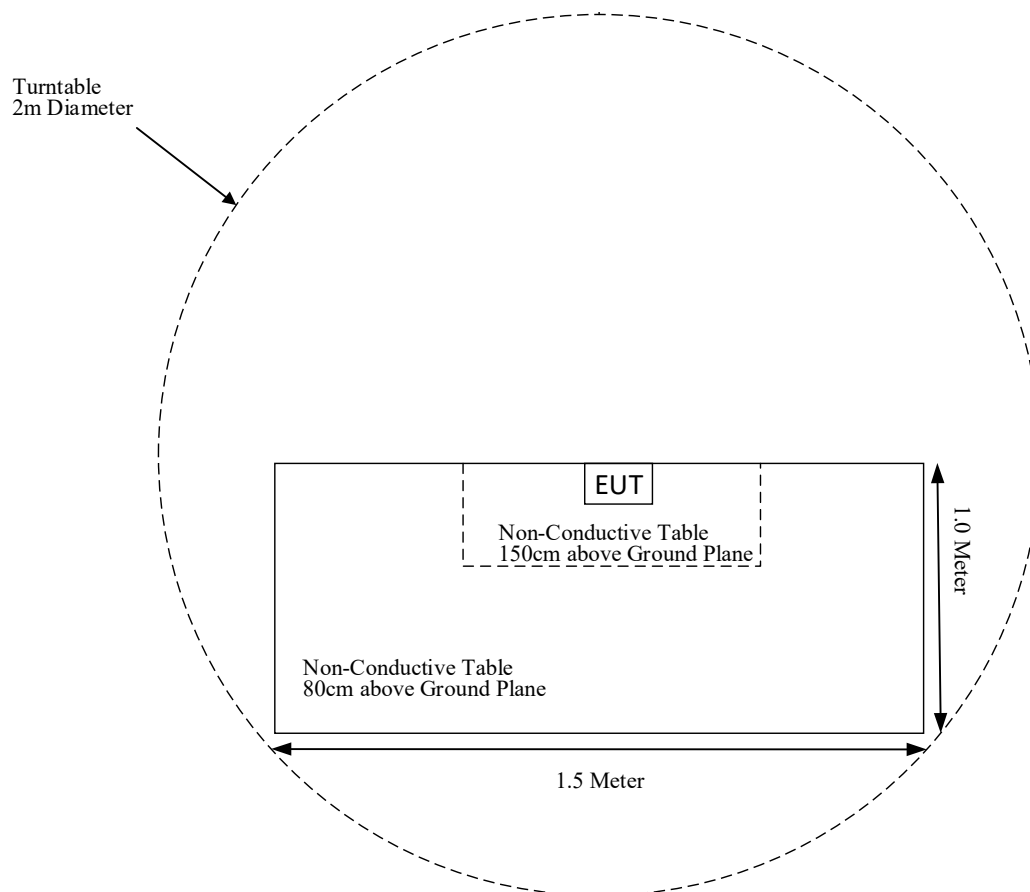
Cable Description	Length (m)	From Port	To
/	/	/	/

Block Diagram of Test Setup

For Radiated Emissions(Below 1GHz):



For Radiated Emissions (Above 1 GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307 (b)(3) & §2.1093	RF Exposure	Compliant
§15.203	Antenna Requirement	Compliant
§15.207 (a)	AC Line Conducted Emissions	Not Applicable
15.205, §15.209, §15.249	Radiated Emissions & Out of Band Emission	Compliant
§15.215 (c)	20 dB Bandwidth	Compliant

Not Applicable: The EUT is powered by battery.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test (Chamber 1#)					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2024-04-23	2025-04-22
Sunol Sciences	Hybrid Antenna	JB3	A090314-1	2023-11-11	2024-11-10
ETS-LINDGREN	Loop Antenna	6512	108100	2023-11-09	2024-11-08
Narda	6dB Attenuator	773-6	10690812-2-1	2024-01-12	2025-01-11
Sonoma Instrument	Amplifier	310N	171205	2024-04-23	2025-04-22
MICRO-COAX	Coaxial Cable	Cable-8	008	2024-04-23	2025-04-22
MICRO-COAX	Coaxial Cable	Cable-9	009	2024-04-23	2025-04-22
MICRO-COAX	Coaxial Cable	Cable-10	010	2024-04-23	2025-04-22
Rohde & Schwarz	Test Software	EMC32	100361	N/A	N/A
Radiated Emission Test (Chamber 2#)					
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2024-04-25	2025-04-24
ETS-LINDGREN	Horn Antenna	3115	9207-3900	2024-06-27	2025-06-26
ETS-LINDGREN	Horn Antenna	3116	2516	2023-12-08	2024-12-07
A.H.Systems, inc	Amplifier	PAM-0118P	512	2024-04-25	2025-04-24
EM Electronics Corporation	Amplifier	EM18G40G	060726	2024-04-25	2025-04-24
MICRO-TRONICS	Band Reject Filter	BRM50702	G024	2024-04-25	2025-04-24
Narda	Attenuator	20dB	020	2024-04-23	2025-04-22
Rohde & Schwarz	Auto Test Software	EMC32	100361	N/A	N/A
MICRO-COAX	Coaxial Cable	Cable-6	006	2024-04-23	2025-04-22
MICRO-COAX	Coaxial Cable	Cable-11	011	2024-04-23	2025-04-22
MICRO-COAX	Coaxial Cable	Cable-12	012	2024-04-23	2025-04-22
MICRO-COAX	Coaxial Cable	Cable-13	013	2024-04-23	2025-04-22
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2024-04-24	2025-04-23
XHFDZ	RG316 Coaxial Cable	SMA-316	XHF-1175	Each time	N/A

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

§1.1307 & §2.1093 – RF EXPOSURE

Applicable Standard

According to §2.1093 and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D01 General RF Exposure Guidance

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}]$$

 ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

1. $f(\text{GHz})$ is the RF channel transmit frequency in GHz.
2. Power and distance are rounded to the nearest mW and mm before calculation.
3. The result is rounded to one decimal place for comparison.
4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

Result

Mode	Frequency Range	Tune-up Conducted Power		Minimum Distance	Calculated Value	Threshold (1-g SAR)	SAR Test Exclusion
	(MHz)	(dBm)	(mW)	(mm)			
SRD	2402	-1.0	0.79	5	0.245	3.0	Yes

Note:

1. The power of EUT: E Field@3m is 93.65dBuV/m = -1.55 dBm
2. $E[\text{dB}\mu\text{V/m}] = \text{EIRP}[\text{dBm}] + 95.2$ for $d = 3$ m.
3. The tune-up power provide by applicant.

Result: Compliance

FCC§15.203 - ANTENNA REQUIREMENT

Applicable Standard

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.

Antenna Connector Construction

The EUT has a PCB antenna for SRD, which was permanently attached to the EUT, antenna gain is 0.07 dBi, fulfill the requirement of this section, please refer to the EUT photos.

Result: Compliant.

FCC§15.205, §15.209&§15.249- RADIATED EMISSIONS& OUT OF BAND EMISSION

Applicable Standard

As per FCC§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:

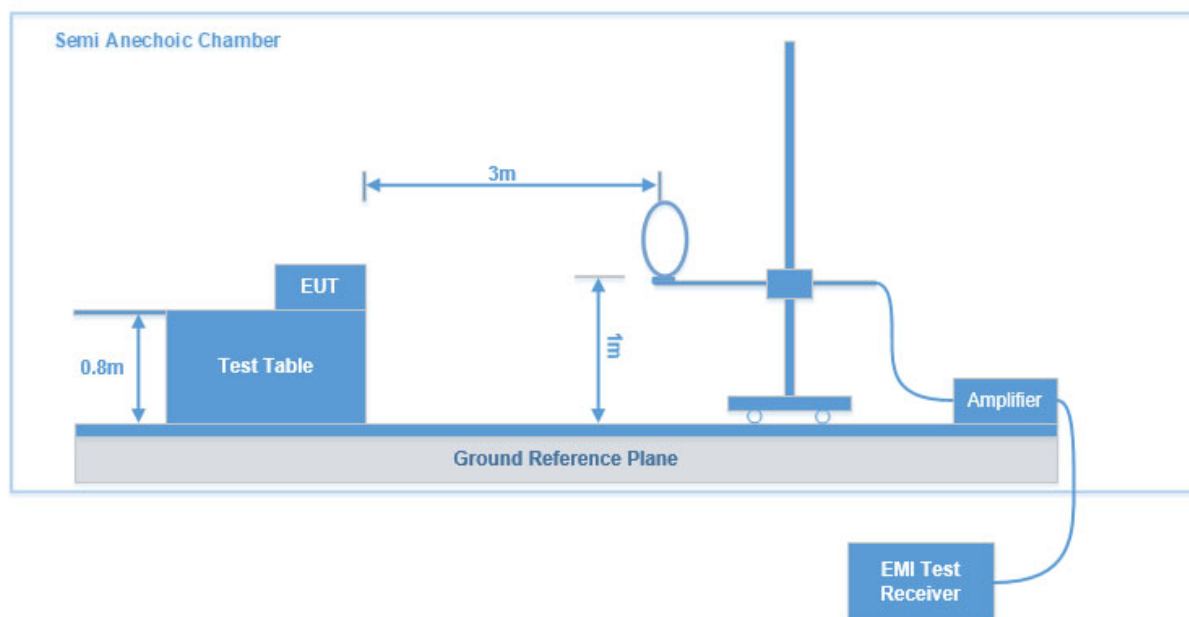
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24GHz-24.25GHz	250	2500

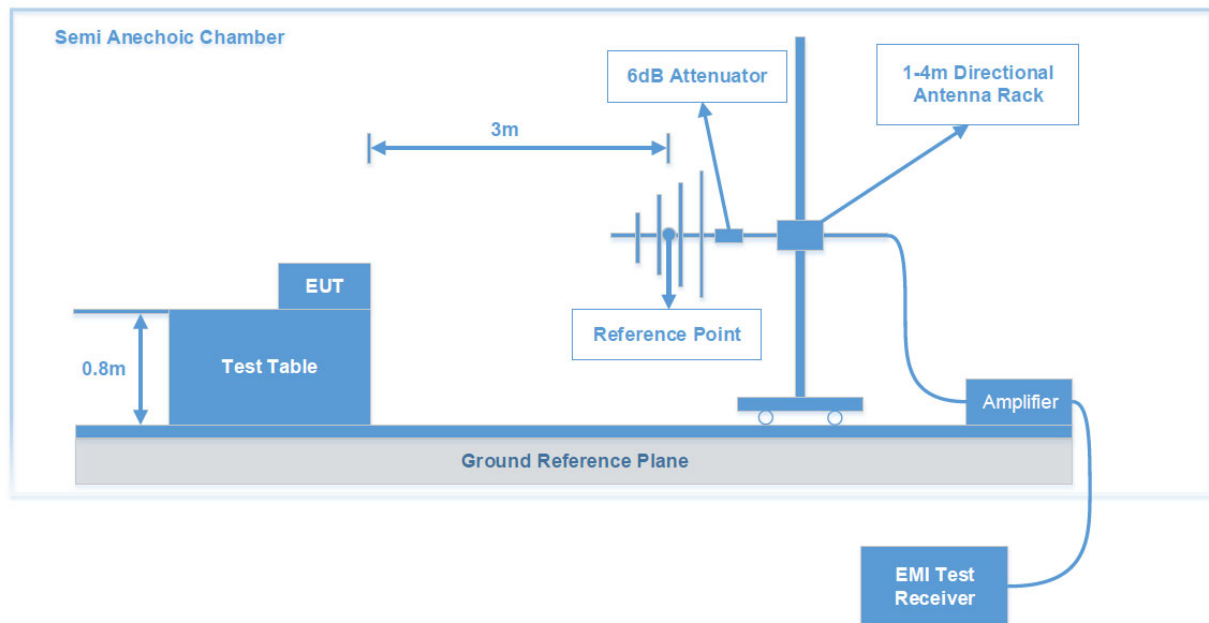
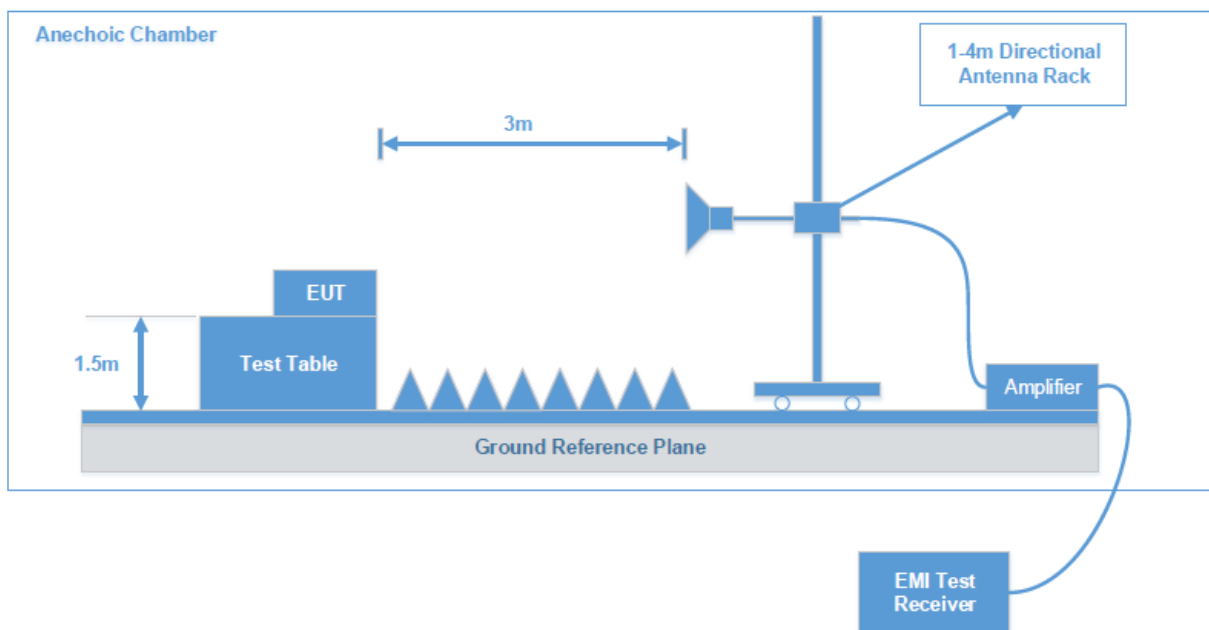
As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

(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.

Test System Setup

9kHz - 30MHz:



30 MHz - 1 GHz:**Above 1GHz:**

The radiated emission and out of band emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209/15.205 and FCC 15.249 limits.

Test Equipment Setup

The system was investigated from 9 kHz to 25 GHz.

During the radiated emission test, the EMI test receiver Setup was set with the following configurations:

Frequency Range	RBW	VBW	IF B/W	Measurement
9 kHz – 150 kHz	200 Hz	1 kHz	200 Hz	QP/Average
150 kHz – 30 MHz	9 kHz	30 kHz	9 kHz	QP/ Average
30 MHz – 1000 MHz	100 kHz	300 kHz	/	Peak
	/	/	120 kHz	QP
Above 1GHz	1MHz	3 MHz	/	Peak
	1MHz	3 MHz	/	Average
	Band edge			
	1MHz	3 MHz	/	Peak
	1MHz	10Hz	/	Average

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

If the measured peak level of the emissions that the measuring receiver reading level plus corrected factor is at least 10 dB below the QP emission limit, there's no need to record the measured QP level of the emissions in the report.

For 9 kHz-30MHz test, the lowest height of the magnetic antenna shall be 1 m above the ground and three antenna orientations (parallel, perpendicular, and ground-parallel) shall be measured.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude (dBμV/m) = Meter Reading (dBμV) + Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB)

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV/m)

Note: The QuasiPeak (dBμV/m), MaxPeak (dBμV/m), Average (dBμV/m) which shown in the data table are all Corrected Amplitude.

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209 &15.205 & 15.249.

Test Data: See Appendix

FCC §15.215(c) - 20 dB BANDWIDTH TESTING

Applicable Standard

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.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on the test table without connection to measurement instrument. Turn on the EUT. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Data: See Appendix

APPENDIX - TEST DATA

Environmental Conditions & Test Information

Test Item:	RADIATED EMISSIONS& OUT OF BAND EMISSION			20 DB BANDWIDTH TESTING
	9kHz - 1GHz	1 GHz - 18 GHz	18 GHz - 25 GHz	
Test Date:	2024-07-20	2024-07-24	2024-07-24	2024-08-08
Temperature:	25.5 °C	24.3 °C	23.6 °C	23.5 °C
Relative Humidity:	48 %	52 %	56 %	54 %
ATM Pressure:	100.7 kPa	100.5kPa	100.1 kPa	100.7 kPa
Test Result:	Pass	Pass	Pass	Pass
Test Engineer:	Grace Luo	Klein Zhu	Hugh Wu	Hardy Huang

RADIATED EMISSIONS& OUT OF BAND EMISSION

Test mode: Transmitting

After pre-scan in the X, Y and Z axes of orientation, the worst case is below:

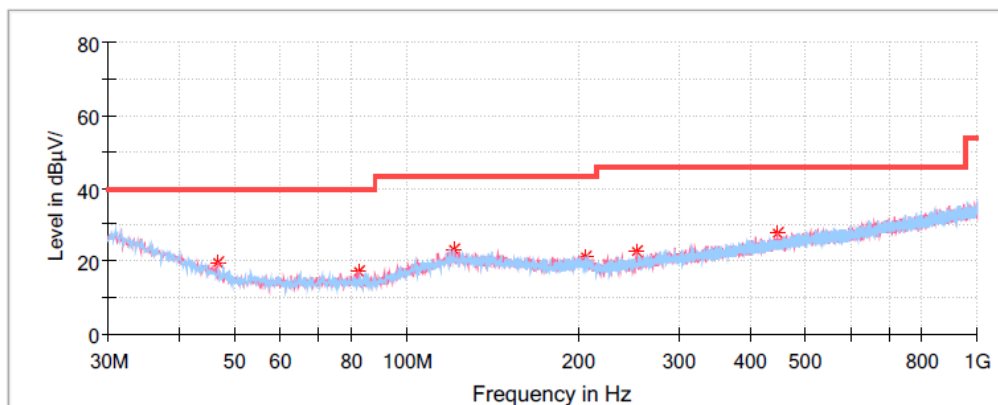
For 9 kHz-30 MHz, The amplitude of spurious emissions attenuated more than 20 dB below the limit was not be recorded.

**Spurious Emission Test:
30MHz-1GHz:**

Channel: 2402 MHz

Common Information

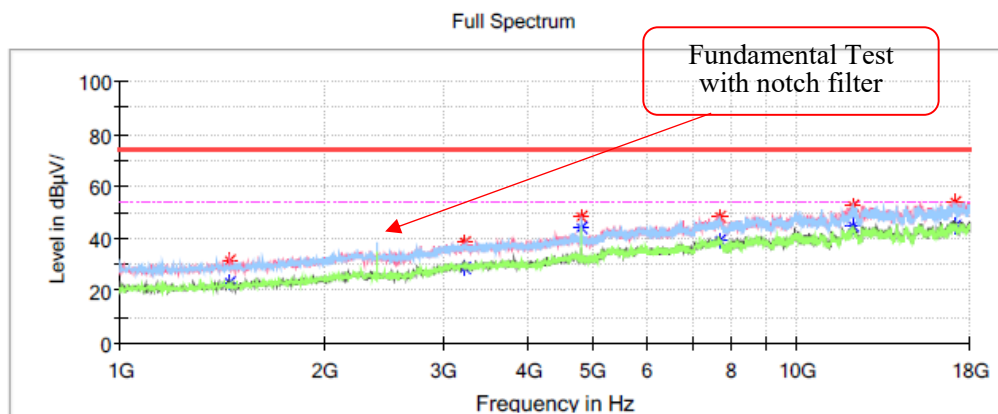
Project No:	RHZ240617001
EUT Model:	YJ-BT-01
Test Mode:	SRD
Standard:	FCC Part 15.205 & FCC Part 15.209 & FCC Part 249
Test Equipment:	ESCI, JB3, 310N
Temperature:	25.5°C
Humidity:	48%
Barometric Pressure:	100.7kPa
Test Engineer:	Grace Luo
Test Date:	2024/7/20

**Critical_Freqs**

Frequency (MHz)	MaxPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB)
46.732500	19.83	40.00	20.17	V	-15.0
82.622500	17.11	40.00	22.89	V	-17.2
121.180000	22.96	43.50	20.54	H	-10.9
205.570000	21.20	43.50	22.30	H	-12.6
253.221250	22.54	46.00	23.46	V	-12.2
446.615000	27.89	46.00	18.11	V	-6.8

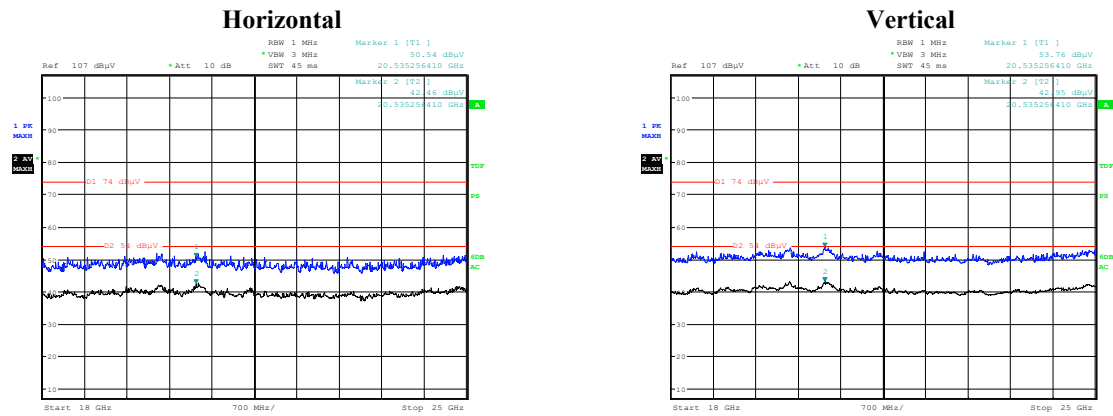
1GHz-18GHz**Low Channel: 2402 MHz****Common Information**

Project No.: PHZ240617001
Test Mode: SRD
Standard: FCC Part 15.249 & FCC Part 15.205 & FCC Part 15.209
Test Engineer: Klein Zhu

**Critical Freqs**

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1453.900000	31.19	---	74.00	42.81	V	-14.8
1453.900000	---	23.33	54.00	30.67	V	-14.8
3221.900000	38.58	---	74.00	35.42	V	-7.5
3221.900000	---	28.77	54.00	25.23	V	-7.5
4802.900000	48.49	---	74.00	25.51	H	-3.2
4802.900000	---	44.04	54.00	9.96	H	-3.2
7711.600000	48.05	---	74.00	25.95	V	3.9
7711.600000	---	39.43	54.00	14.57	V	3.9
12124.800000	52.21	---	74.00	21.79	V	9.1
12124.800000	---	45.10	54.00	8.90	V	9.1
17172.100000	54.03	---	74.00	19.97	V	12.0
17172.100000	---	45.09	54.00	8.91	V	12.0

18GHz-25GHz:



Project No : RHZ240617001 Tester :Hugh Wu
Date: 24.JUL.2024 20:07:20

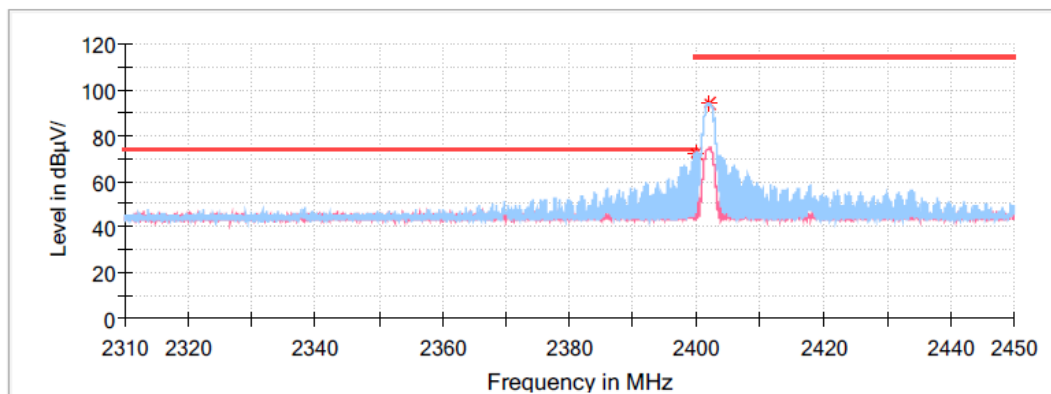
Project No : RHZ240617001 Tester :Hugh Wu
Date: 24.JUL.2024 20:20:42

Note: The test distance is 3m. The limit is 74dBμV/m (Peak) and 54dBμV/m (Average).

Band Edge:**Common Information**

Project No.: RHZ240617001
Test Mode: SRD
Standard: FCC Part 15.249 & FCC Part 15.205 & FCC Part 15.209
Test Engineer: Klein Zhu

Full Spectrum

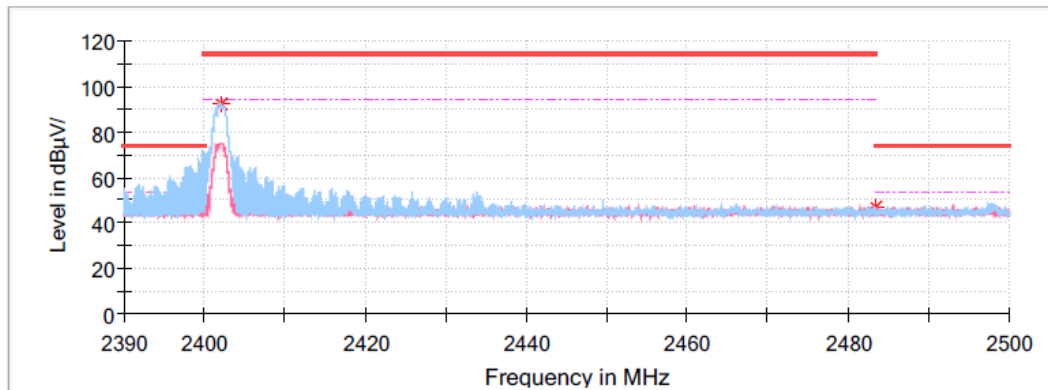
**Critical_Freqs**

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2399.964000	72.45	---	74.00	1.55	H	-0.5
2399.964000	---	39.11	54.00	14.89	H	-0.5
2401.994000	93.65	---	114.00	20.35	H	-0.5
2401.994000	---	60.31	94.00	33.69	H	-0.5

Common Information

Project No.: RHZ240617001
Test Mode: SRD
Standard: FCC Part 15.249 & FCC Part 15.205 & FCC Part 15.209
Test Engineer: Klein Zhu

Full Spectrum



Critical_Freqs

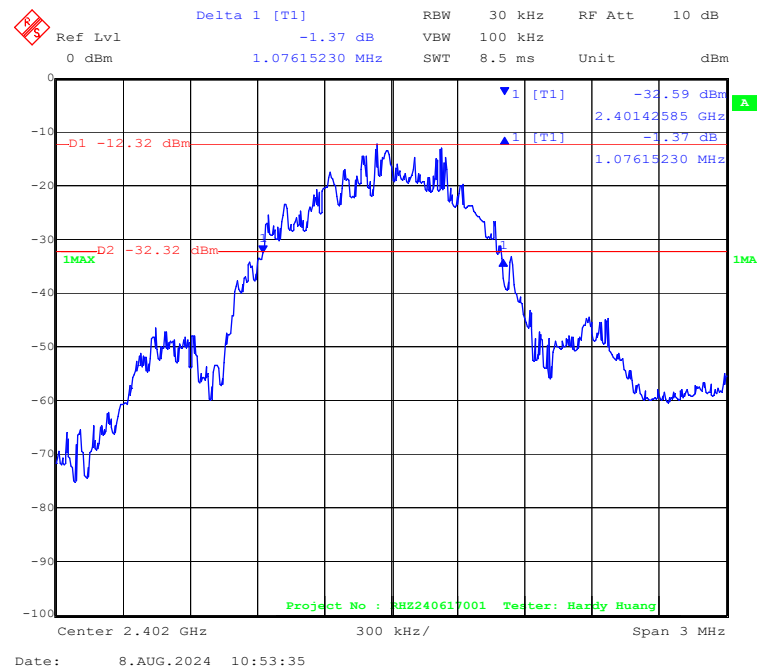
Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2402.012000	91.96	---	114.00	22.04	H	-0.5
2402.012000	---	58.62	94.00	35.38	H	-0.5
2483.500000	46.63	---	74.00	27.37	H	-0.3
2483.500000	---	13.29	54.00	40.71	H	-0.3

20 dB BANDWIDTH TESTING

Test Result: Compliant.

Test Mode: Transmitting

Frequency (MHz)	20 dB Bandwidth (MHz)
2402	1.076



EUT PHOTOGRAPHS

Please refer to the attachment EXHIBIT A - EUT EXTERNAL PHOTOGRAPHS and EXHIBIT B - EUT INTERNAL PHOTOGRAPHS.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment EXHIBIT C - TEST SETUP PHOTOGRAPHS.

Declarations

1. The laboratory is not responsible for the authenticity of any information provided by the applicant. Information from the applicant that may affect test results is marked with “★”.
2. The test data was only valid for the test sample(s).
3. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.
4. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
5. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor $k=2$ with the 95.45% confidence interval.

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