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Qingdao Richmat Intelligence Technology Inc

RF TEST REPORT

Report Type:
FCC Part 15.249 RF report

Model:
HJH13B Ble, HJH103 Ble

REPORT NUMBER:
2411B2492SHA-001

ISSUE DATE:
Jan 10, 2025

DOCUMENT CONTROL NUMBER:
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TEST REPORT

Report no.: 2411B2492SHA-001

Applicant:	Qingdao Richmat Intelligence Technology Inc NO.78 Kongquehe 4th Road, Qingdao Clothing Industry park, Jimo, Qingdao, Shandong Province, China.
Manufacturer:	Qingdao Richmat Intelligence Technology Inc NO.78 Kongquehe 4th Road, Qingdao Clothing Industry park, Jimo, Qingdao, Shandong Province, China.
FCC ID:	2AJJGHJ6200

SUMMARY:

The equipment complies with the requirements according to the following standard(s) or Specification:

47CFR Part 15 (2023): Radio Frequency Devices (Subpart C)

ANSI C63.10 (2013): American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

PREPARED BY:	**REVIEWED BY:**
Project Engineer Teddy Yin	Reviewer Wakeyou Wang

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TEST REPORT

Content

TEST REPORT

Revision History

Report No.	Version	Description	Issued Date
2411B2492SHA-001	Rev. 01	Initial issue of report	Jan 10, 2025

Measurement result summary

TEST ITEM	FCC REFERANCE	RESULT
Radiated emission	15.249 & 15.209	Pass
Power line conducted emission	15.207	NA
Assigned bandwidth (20dB bandwidth)	15.215(c)	Pass
Antenna requirement	15.203	Pass

Notes: 1: NA =Not Applicable

2: Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

3: Additions, Deviations and Exclusions from Standards: None.

TEST REPORT

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	Handset
Type/Model:	HJH13B Ble, HJH103 Ble
Description of EUT:	The EUT is Remote Control that contains BLE module. Both models have the same BLE module. Both models were tested and the worst data is listed in the report.
Rating:	DC 3V
Category of EUT:	Class B
EUT type:	☒ Table top ☐ Floor standing
Software Version:	WLT6200&1.0
Hardware Version:	WLT6200&1.6
Sample No.:	A241122-93-002, A241122-93-004
Sample received date:	Dec 8, 2024
Date of test:	Dec 8~24, 2024

1.2 Technical Specification

Frequency Range:	2402-2480MHz
Support Standards:	Bluetooth LE 5.2
Type of Modulation:	GFSK
Channel Number:	40
Data Rate:	1Mbps
Channel Separation:	2MHz
Antenna Information:	-1.42dBi, PCB antenna(declared by the manufacturer)

1.3 Description of Test Facility

Name:	Intertek Testing Services (Shanghai FTZ) Co., Ltd.
Address:	Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R. China
Telephone:	86 21 61278200
Telefax:	86 21 54262353

The test facility is recognized, certified, or accredited by these organizations:	CNAS Accreditation Lab Registration No. CNAS L21189
	FCC Accredited Lab Designation Number: CN0175
	IC Registration Lab CAB identifier.: CN0014
	VCCI Registration Lab Registration No.: R-14243, G-10845, C-14723, T-12252
	A2LA Accreditation Lab Certificate Number: 3309.02

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2023)
ANSI C63.10 (2013)

2.2 Mode of operation during the test

The EUT is a handheld device, so three axes (X, Y, Z) were observed while the test receiver worked as "max hold" continuously and the highest reading among the whole test procedure was recorded.
X axis is the worst case.
The lowest, middle and highest channel were tested as representatives.

Frequency Band (MHz)				2402 ~ 2480			
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	**2402**	10	2422	**20**	**2442**	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	**39**	**2480**

Data rate VS Power:
The test setting software is offered by the manufactory. The pre-scan for the conducted power with all rates in each modulation and bands was used, and the worst case was found and used in all test cases.

Test software and Power Setting parameter			
Test Software	UartAssist.exe		
Working Mode	BLE		
Test Channel	2402MHz	2442MHz	2480MHz
Power Setting	default	default	default

While testing transmitting mode of EUT, the internal modulation and continuously transmission was applied.

Radiated test mode: EUT transmitted signal with BT antenna;

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	ESxS-K1	R&S	V2.1.0
Radiated emission	ES-K1	R&S	V1.71

2.4 Test peripherals list

Item No.	Name	Band and Model	Description
1	Laptop computer	HP ProBook 6470b	100-240V AC, 50/60Hz
/	/	/	/
/	/	/	/

2.5 Test environment condition:

Test items	Temperature	Humidity
Radiated emission	22°C	55% RH
Assigned bandwidth (20dB bandwidth)	22°C	55% RH
Power line conducted emission	/	/

2.6 Instrument list

Conducted Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☐	Test Receiver	R&S	ESR7	EC 6194	2025-02-27
☐	A.M.N.	R&S	ESH2-Z5	EC 3119	2025-07-23
☐	Shielded room	Zhongyu	-	EC 2838	2025-01-11
Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESIB 26	EC 3045	2025-08-18
☒	TRILOG broadband Antenna	Schwarzbeck	VULB9168	EC 6402	2025-03-19
☒	Pre-amplifier	Tonscend	tap01018050	EC 6432-1	2025-12-07
☒	Horn antenna	Tonscend	bha9120d	EC 6432-2	2025-03-20
☒	Horn antenna	ETS	3116c	EC 5955	2025-08-14
☒	Semi-anechoic chamber	Albatross	-	EC 3048	2026-07-11
RF test					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Spectrum Analyzer	Keysight	N9030B	EC 6078	2025-03-18
☒	Coaxial cable	ETS	/	/	2025-03-05
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Therom-Hygrograph	Testo	175h1	EC 6640	2025-08-29
☒	Therom-Hygrograph	Testo	175h1	EC 6641	2025-08-29

2.7 Measurement uncertainty

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

Test item	Measurement uncertainty
Maximum peak output power	± 0.74dB
Radiated Emissions in restricted frequency bands below 1GHz	± 4.90dB
Radiated Emissions in restricted frequency bands above 1GHz	± 5.02dB
Emission outside the frequency band	± 2.89dB
Occupied Channel Bandwidth	± 0.88 %
Power line conducted emission	± 3.19dB

3 Radiated emission

Test result: **Pass**

3.1 Limit

Fundamental Frequency (MHz)	Fundamental limit (dBuV/m)	Harmonic limit (dBuV/m)
☐ 902 - 928	94	54
☒ 2400 - 2483.5	94	54
☐ 5725 - 5875	94	54
☐ 24000 - 24250	108	68

The radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits:

Frequencies (MHz)	Field Strength (microvolts/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

3.2 Measurement Procedure

For Radiated emission below 30MHz:

a) The EUT was placed on the top of a rotating table 0.8 meters(0.1 meters for floor-standing device) above the ground at a 3 meter chamber room. 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, the lowest height of the magnetic antenna was 1 m above the ground.
c) Both X and Y axes of the antenna are set to make the measurement.
d) For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e) The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

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For Radiated emission above 30MHz:

a) The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) or 0.1 meters (for floor-standing device) above the ground at 3 meter chamber room for test. 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 height of antenna 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 rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

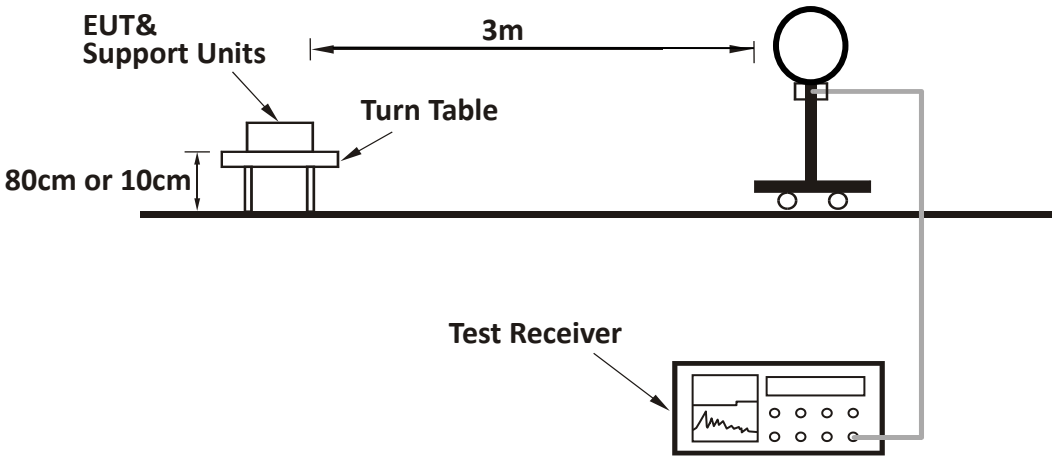
f) The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

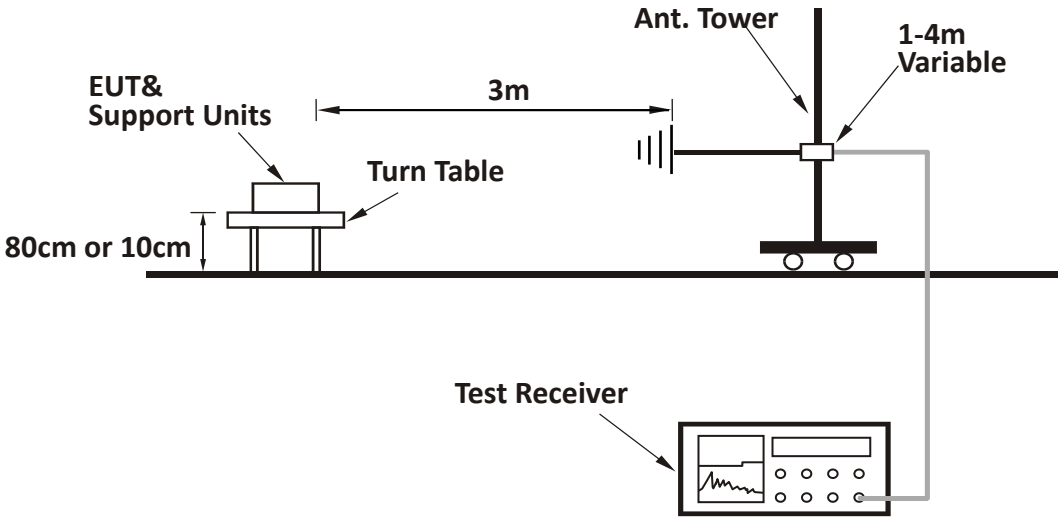
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 3 x RBW (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported

3.3 Test Configuration

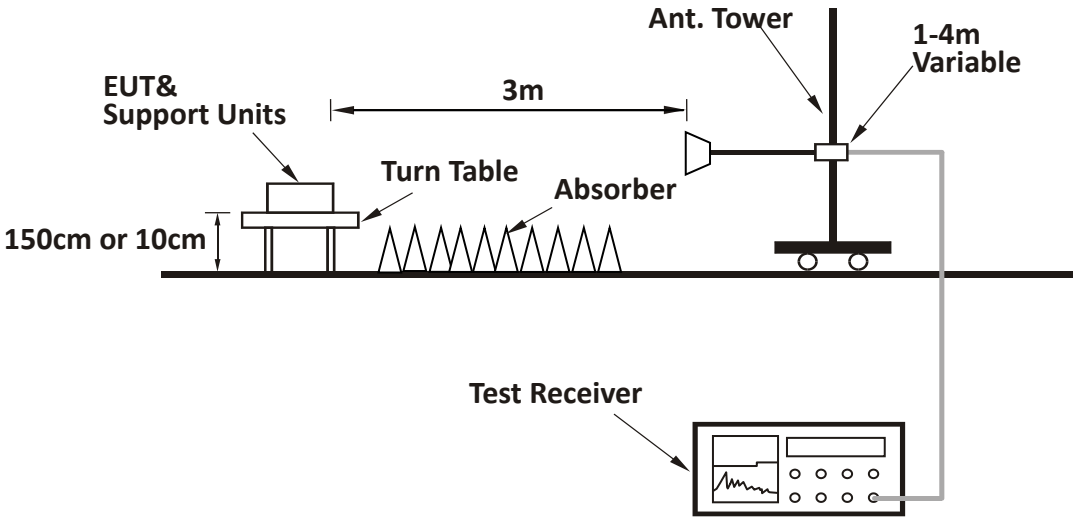
For Radiated emission below 30MHz:



For Radiated emission 30MHz to 1GHz:



For Radiated emission above 1GHz:

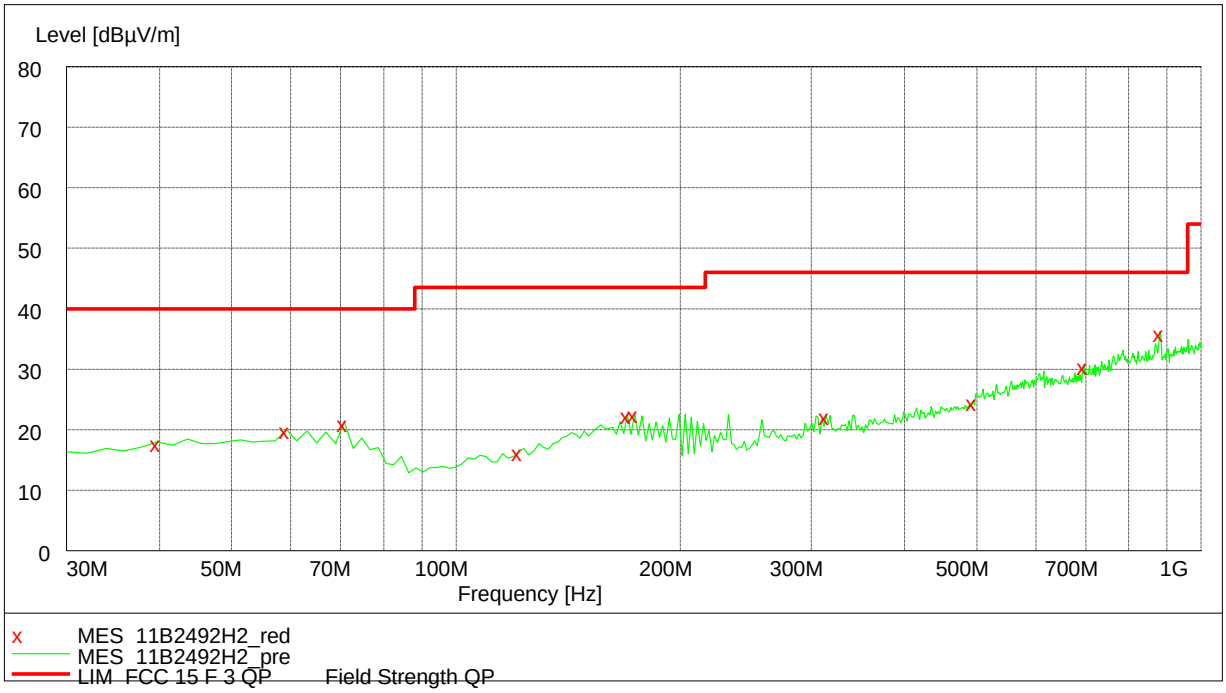


3.4 Test Results of Radiated Emissions

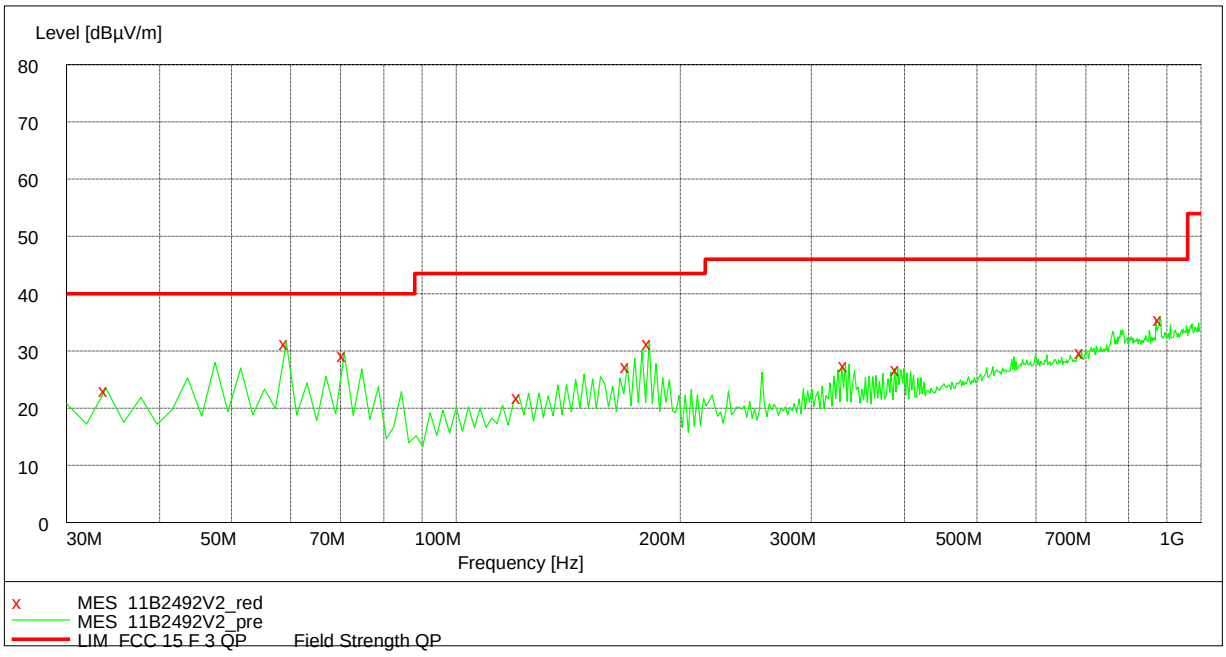
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

The worst waveform from 30MHz to 1000MHz is listed as below:
Model: HJH13B Ble

Horizontal



Vertical



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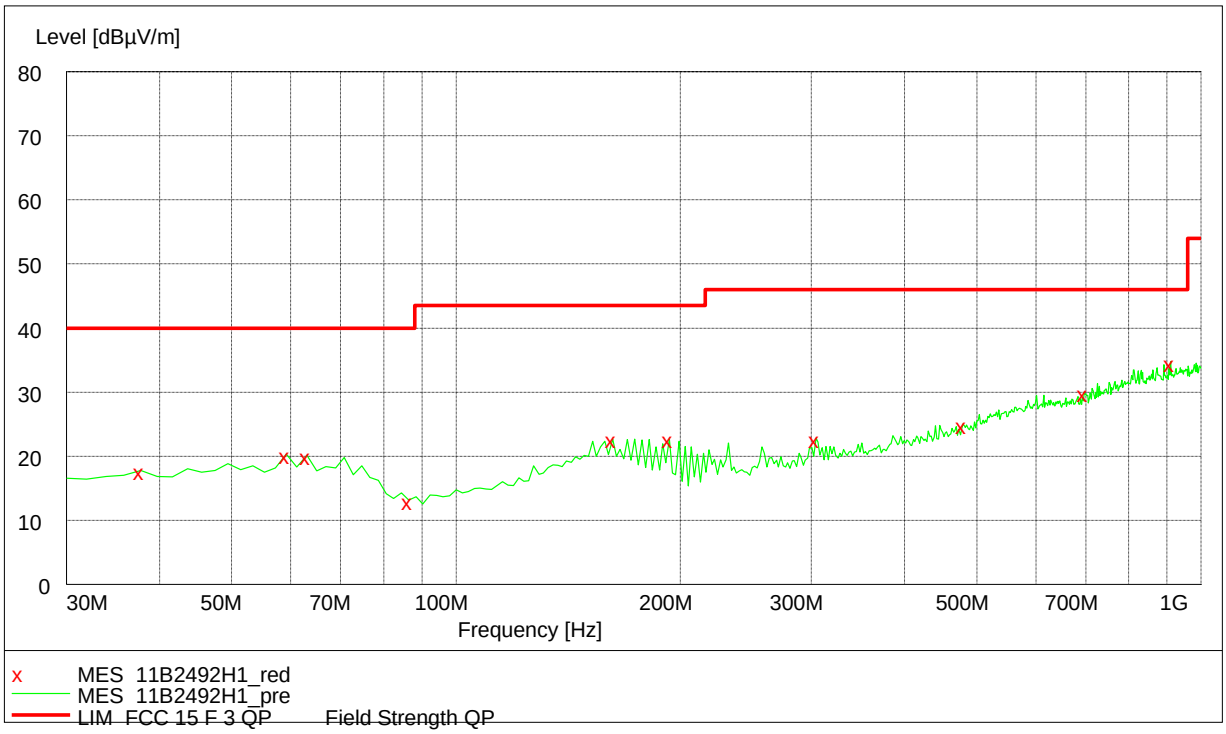
Test data below 1GHz

Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	59.16	20.10	14.20	40.00	19.90	PK
H	70.82	21.30	12.50	40.00	18.70	PK
H	173.85	22.70	13.60	43.50	20.80	PK
H	494.59	24.80	20.00	46.00	21.20	PK
H	696.75	30.80	23.50	46.00	15.20	PK
H	881.42	36.20	26.10	46.00	9.80	PK
V	33.89	23.40	13.20	40.00	16.60	PK
V	59.16	31.50	14.20	40.00	8.50	PK
V	70.82	29.60	12.50	40.00	10.40	PK
V	181.62	31.60	13.00	43.50	11.90	PK
V	690.92	30.00	23.40	46.00	16.00	PK
V	881.42	35.80	26.10	46.00	10.20	PK

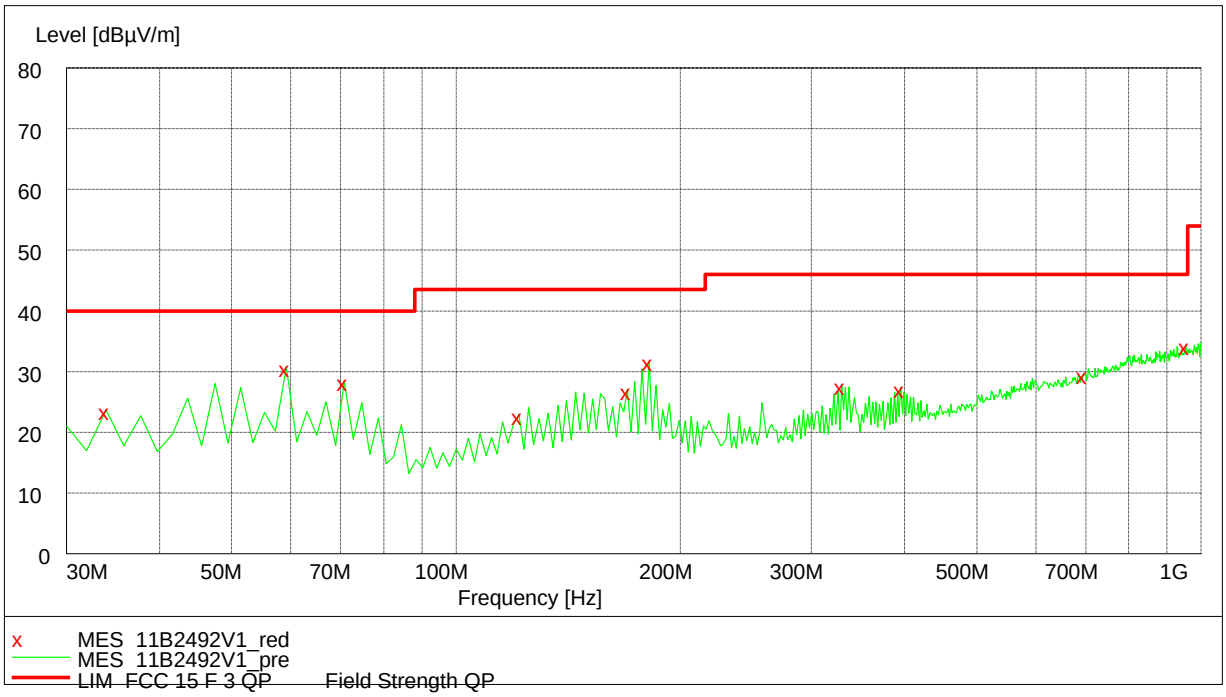
Model: HJH103 Ble

Horizontal



TEST REPORT

Vertical



‘

Test data below 1GHz

Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	59.16	20.30	14.20	40.00	19.70	PK
H	63.05	20.10	13.70	40.00	19.90	PK
H	162.18	22.70	14.70	43.50	20.80	PK
H	193.29	22.70	11.90	43.50	20.80	PK
H	696.75	29.90	23.50	46.00	16.10	PK
H	910.58	34.70	26.30	46.00	11.30	PK
V	33.89	23.60	13.20	40.00	16.40	PK
V	59.16	30.80	14.20	40.00	9.20	PK
V	70.82	28.40	12.50	40.00	11.60	PK
V	181.62	31.70	13.00	43.50	11.80	PK
V	694.81	29.60	23.40	46.00	16.40	PK
V	953.35	34.30	26.80	46.00	11.70	PK

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Test result above 1GHz:

CH	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H/V	2402.00	88.90	32.60	114.00	25.10	PK
	H/V	2402.00	87.30	32.60	94.00	6.70	AV
	H/V	2390.00	56.21	32.60	74.00	17.79	PK
	H/V	2390.00	41.64	32.60	54.00	12.36	AV
	H/V	4804.00	51.37	-12.90	74.00	22.63	PK
	H/V	4804.00	45.11	-12.90	54.00	8.89	AV
M	H/V	2442.00	89.30	32.70	114.00	24.70	PK
	H/V	2442.00	87.90	32.70	94.00	6.10	AV
	H/V	4884.00	51.53	-12.40	74.00	22.47	PK
	H/V	4884.00	45.65	-12.40	54.00	8.35	AV
H	H/V	2480.00	90.60	32.90	114.00	23.40	PK
	H/V	2480.00	89.20	32.90	94.00	4.80	AV
	H/V	2483.50	67.47	32.90	74.00	6.53	PK
	H/V	2483.50	52.13	32.90	54.00	1.87	AV
	H/V	4960.00	52.17	-12.20	74.00	21.83	PK
	H/V	4960.00	45.72	-12.20	54.00	8.28	AV

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (- Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = Limit - Corrected Reading
4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10.00dBuV,
Limit = 40.00dBuV/m.
Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;
Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m;
Margin = 40.00dBuV/m - 10.20dBuV/m = 29.80dB.

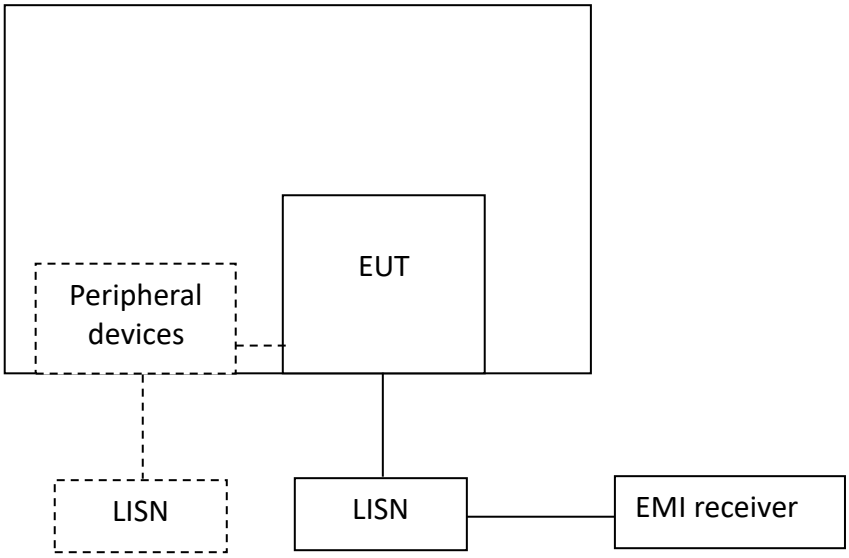
4 Power line conducted emission

Test result: **NA**

4.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
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.		

4.2 Test Configuration



4.3 Measurement Procedure

Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having 50 Ω input impedance. All other ports are terminated in 50 Ω loads.

Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

The bandwidth of the test receiver is set at 9 kHz.

4.4 Test Results of Power line conducted emission

Remark: 1. Factor = LISN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.

2. Level = Original Receiver Reading + Factor

3. Delta = Level- Limit

4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

5 Assigned bandwidth (20dB bandwidth)

Test result: **Pass**

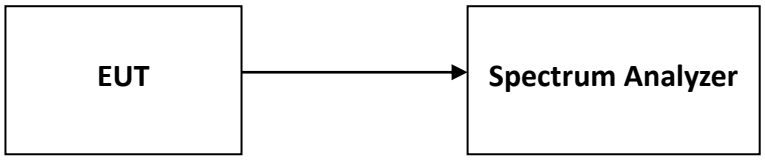
5.1 Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emission is contained within the allocated frequency band.

5.2 Measurement Procedure

The 20dB Bandwidth is measured using the Spectrum Analyzer.
Set Span = 2 to 3 times the 20 dB bandwidth, RBW = approximately 1% of the 20 dB bandwidth, VBW>RBW, Sweep = auto, Detector = peak, Trace = max hold.
The test was performed at 2 channels (lowest and highest channel).

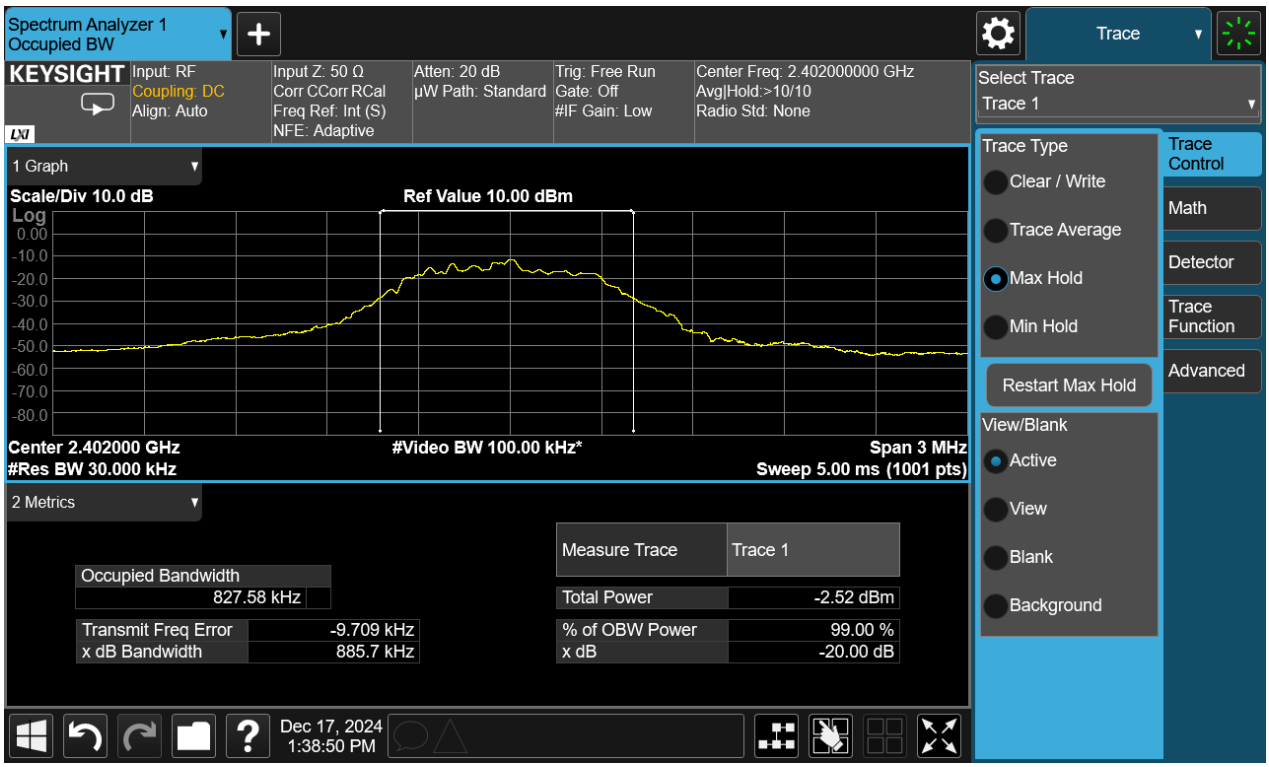
5.3 Test Configuration



5.4 The results

Test Mode	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)	F_L at 20dB BW (MHz)	F_H at 20dB BW (MHz)
/	2402	0.8857	0.8276	>2400	/
	2480	1.040	0.9186	/	<2483.5
Limit		N/A	N/A	F_L >2400	F_H <2483.5
Result		**Complied**			

Channel L



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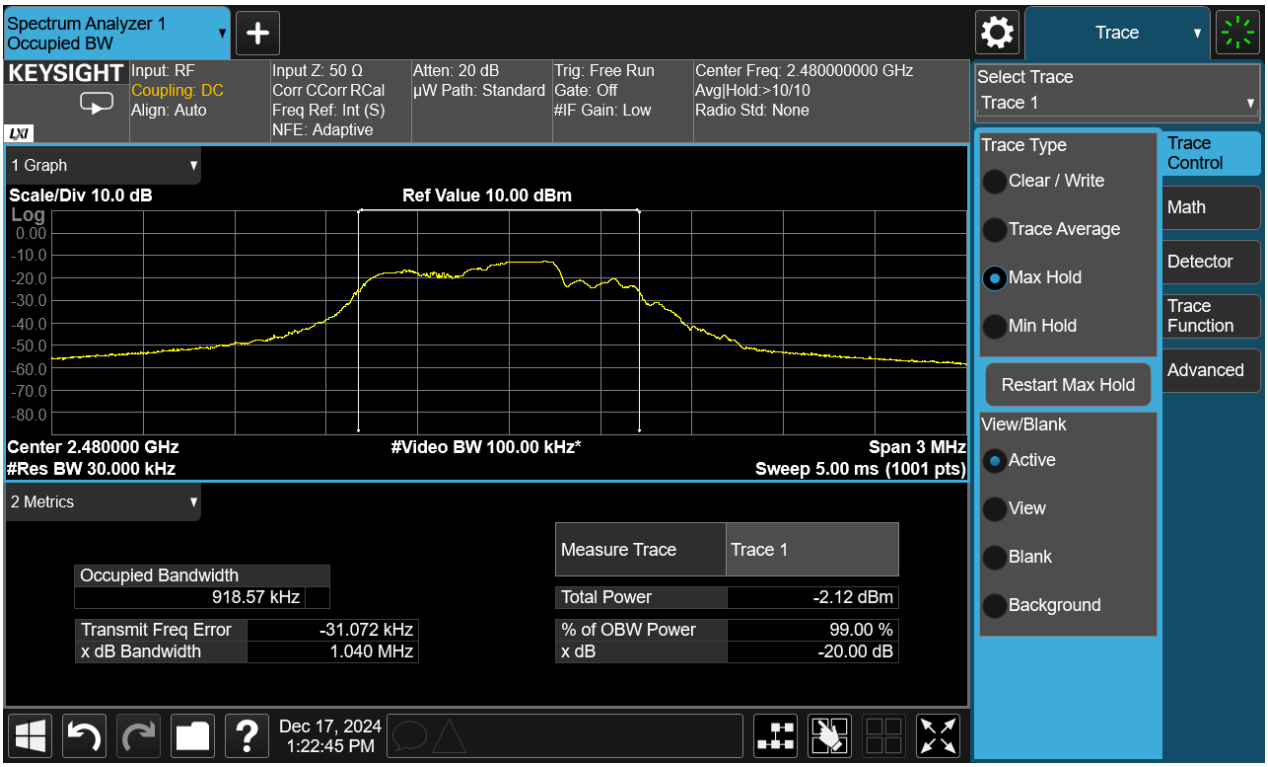
Channel H



6 Antenna requirement

Requirement:
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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

Result:
EUT uses PCB antenna to the intentional radiator, so it can comply with the provisions of this section.

********** END **********