RF MEASUREMENT REPORT

FCC ID:	BRWHBZ9505
Applicant:	Horizon Hobby, LLC
Product:	2.4GHz Transmitter
Model No.:	HBZ9505
Brand Name:	Blade
FCC Classification:	Digital Transmission System (DTS)
FCC Rule Part(s):	Part 15 Subpart C (Section 15.247)
Result:	Complies
Received Date:	2023-02-03
Test Date:	2023-02-03 ~ 2023-02-13

Reviewed By: Sunny Sun

Approved By: Robin Wu

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

Revision History

Report No.	Version	Description	Issue Date	Note
2302RSU001-U1	V01	Initial Report	2023-06-16	Valid

CONTENTS

1. General Information

1.1. Applicant

Horizon Hobby, LLC

2904 Research Road, Champaign, IL, 61822

1.2. Manufacturer

Horizon Hobby, LLC

2904 Research Road, Champaign, IL, 61822

1.3. Testing Facility

☒	**Test Site – MRT Suzhou Laboratory**				
	Laboratory Location (Suzhou - Wuzhong)				
	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China				
	Laboratory Location (Suzhou - SIP)				
	4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China				
	Laboratory Accreditations				
	A2LA: 3628.01		CNAS: L10551		
	FCC: CN1166		ISED: CN0001		
	VCCI:	☐R-20025	☐G-20034	☐C-20020	☐T-20020
		☐R-20141	☐G-20134	☐C-20103	☐T-20104
☐	**Test Site – MRT Shenzhen Laboratory**				
	Laboratory Location (Shenzhen)				
	1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China				
	Laboratory Accreditations				
	A2LA: 3628.02		CNAS: L10551		
	FCC: CN1284		ISED: CN0105		
☐	**Test Site – MRT Taiwan Laboratory**				
	Laboratory Location (Taiwan)				
	No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)				
	Laboratory Accreditations				
	TAF: L3261-190725				
	FCC: 291082, TW3261		ISED: TW3261		

1.4. Product Information

Product Name	2.4GHz Transmitter
Model No.	HBZ9505
Sample No.	20230207Sample#01 for Radiated; 20230203Sample#05 for Conducted
Power Type	4 * AA Batteries
Note: The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

1.5. Radio Specification under Test

Frequency Range	2405 ~ 2475MHz
Channel Number	15
Type of Modulation	GFSK
Data Rate	500kbps

1.6. Working Frequencies

Channel	Frequency	Channel	Frequency	Channel	Frequency
11	2405 MHz	12	2410 MHz	13	2415 MHz
14	2420 MHz	15	2425 MHz	16	2430 MHz
17	2435 MHz	18	2440 MHz	19	2445 MHz
20	2450 MHz	21	2455 MHz	22	2460 MHz
23	2465 MHz	24	2470 MHz	25	2475 MHz

1.7. Antenna Details

Antenna Type	Frequency Band (MHz)	Antenna Model	Max Antenna Gain (dBi)
Monopole	2405 ~ 2475	**31mm single conductor 1/4 wave antenna**	2.11
		NB2400-0305CU11370MMIX	0.37

Notes:

1. There are two optional antennas for the device, but only the one with the maximum antenna gain is selected for testing and calculation. The chosen antenna is identified in bold font in the table above.
2. The information above is from the antenna specification.

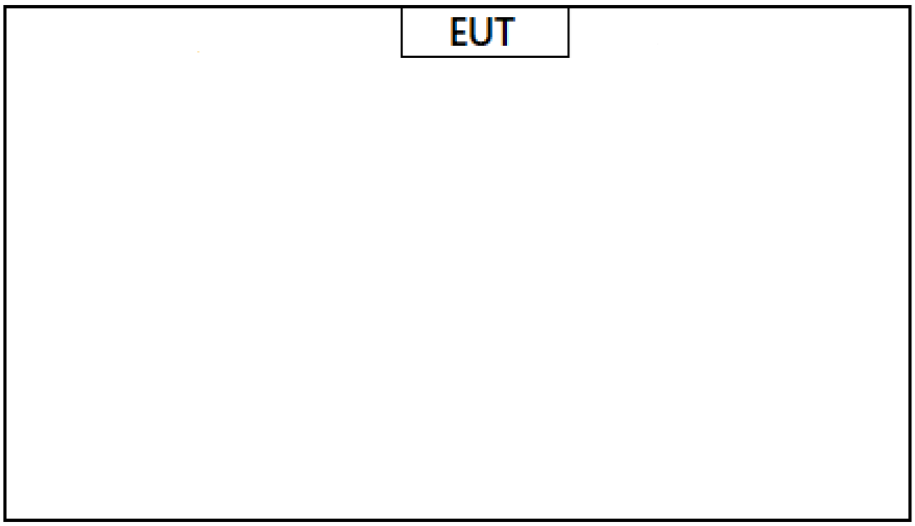
2. Test Configuration

2.1. Test Mode

Mode 1: Transmit at 2405MHz
Mode 2: Transmit at 2440MHz
Mode 3: Transmit at 2475MHz

2.2. Test System Connection Diagram

The device was tested per the guidance ANSI C63.10: 2013 was used to reference the appropriate EUT setup for radiated emissions testing.

Connection Diagram – Radiated Emission testing


2.3. The test utility

N/A.

2.4. Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15.247
- KDB 558074 D01v05r02
- ANSI C63.10-2013

2.5. Test Environment Condition

Ambient Temperature	15 ~ 35°C
Relative Humidity	20 ~ 75%RH

3. Antenna Requirements

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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."

- The antenna of the device is **permanently attached.**
- There are no provisions for connection to an external antenna.

Conclusion:

The unit complies with the requirement of §15.203.

4. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2023-09-29	WZ-AC2
TRILOG Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2023-05-20	WZ-AC2
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06171	1 year	2023-10-13	WZ-AC2
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2023-11-05	WZ-AC2
Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2023-05-08	WZ-AC2
Preamplifier	EMCI	EMC184045SE	MRTSUE06640	1 year	2024-01-12	WZ-AC2
EMI Test Receiver	Agilent	N9038A	MRTSUE06125	1 year	2023-06-04	WZ-AC2
Thermohygrometer	testo	608-H1	MRTSUE11038	1 year	2023-11-01	WZ-AC2
Thermohygrometer	Mingle	ETH529	MRTSUE06170	1 year	2023-11-27	WZ-AC2
Anechoic Chamber	RIKEN	WZ-AC2	MRTSUE06213	1 year	2023-04-21	WZ-AC2
USB Power Sensor	Keysight	U2021XA	MRTSUE06446	1 year	2023-06-04	WZ-SR4
Signal Analyzer	Keysight	N9010B	MRTSUE07027	1 year	2023-11-25	WZ-SR4
Attenuator	MVE	MVE2213	MRTSUE11087	1 year	2023-06-09	WZ-SR4
Shielding Room	HUAMING	WZ-SR4	MRTSUE06441	N/A	N/A	WZ-SR4

Software	Version	Function
EMI Software	V3.0.0	EMI Test Software
Controller_MF 7802	1.02	RE Antenna & Turntable
BenchVue Power Meter	2018.1	Power

5. Decision Rules and Measurement Uncertainty

5.1. Decision Rules

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.2. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Radiated Disturbance
Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): Horizontal: 30MHz~300MHz: 5.04dB 300MHz~1GHz: 4.95dB 1GHz~40GHz: 6.40dB Vertical: 30MHz~300MHz: 5.24dB 300MHz~1GHz: 6.03dB 1GHz~40GHz: 6.40dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.78dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.13dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.15dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.28%

6. Test Result

6.1. Summary

FCC Section(s)	Test Description	Test Condition	Verdict
15.247(a)(2)	6dB Bandwidth	Conducted	Pass
15.247(b)(3)	Output Power		Pass
15.247(e)	Power Spectral Density		Pass
15.247(d)	Band Edge / Out-of-Band Emissions		Pass
15.205 15.209	General Field Strength (Restricted Bands and Radiated Emission)	Radiated	Pass
15.207	AC Conducted Emissions 150kHz - 30MHz	Line Conducted	N/A

Notes:

1. The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
2. For radiated emission tests, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst-case emissions.
3. “N/A” means this item is not applicable, and the details refer to relevant section.

6.2. 6dB Bandwidth Measurement

6.2.1. Test Limit

The minimum 6dB bandwidth shall be at least 500 kHz.

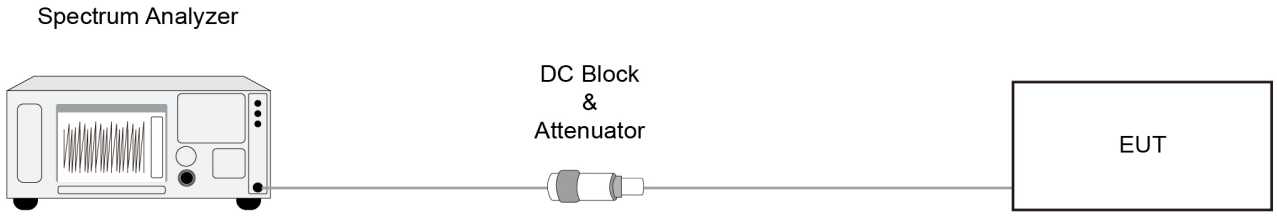
6.2.2. Test Procedure

ANSI C63.10 - 2013 - Section 11.8

6.2.3. Test Setting

1. The Spectrum's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. Set RBW = 100 kHz
3. VBW ≥ 3 × RBW
4. Detector = Peak
5. Trace mode = Max hold
6. Sweep = Auto couple
7. Allow the trace to stabilize

6.2.4. Test Setup



6.2.5. Test Result

Refer to Appendix A.2.

6.3. Output Power Measurement

6.3.1. Test Limit

The maximum output power shall be less 1 Watt (30dBm).

The conducted output power limit specified in paragraph FCC Part 15.247(b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs FCC Part 15.247(b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

6.3.2. Test Procedure

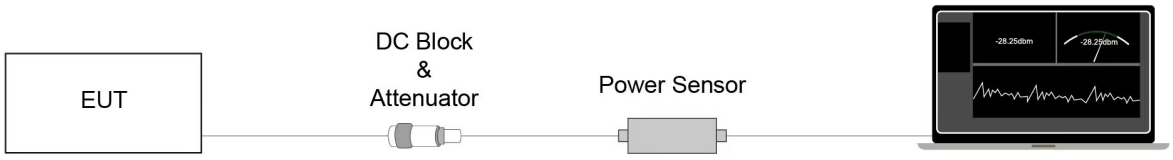
ANSI C63.10 - 2013 - Section 11.9.2.3.2

6.3.3. Test Setting

Average Power Measurement

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

6.3.4. Test Setup



6.3.5. Test Result

Refer to Appendix A.3.

6.4. Power Spectral Density Measurement

6.4.1. Test Limit

The maximum permissible power spectral density is 8dBm in any 3 kHz band.

The same method of determining the conducted output power shall be used to determine the power spectral density.

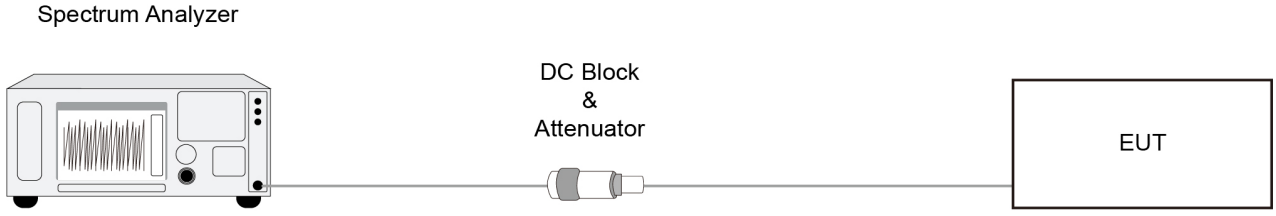
6.4.2. Test Procedure

ANSI C63.10 - 2013 - Section 11.10.5

6.4.3. Test Setting

1. Measure the duty cycle (x) of the transmitter output signal.
2. Set instrument center frequency to DTS channel center frequency.
3. Set span to at least 1.5 times the OBW.
4. RBW = 10 kHz.
5. VBW = 30 kHz.
6. Detector = RMS.
7. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
8. Sweep time = auto couple.
9. Don’t use sweep triggering. Allow sweep to “free run”.
10. Employ trace averaging (RMS) mode over a minimum of 100 traces.
11. Use the peak marker function to determine the maximum amplitude level.
12. Add 10 log (1/x), where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time. If measured value exceeds requirement specified by regulatory agency, then reduce RBW (but no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced).

6.4.4. Test Setup



6.4.5. Test Result

Refer to Appendix A.4.

6.5. Conducted Band Edge and Out-of-Band Emissions Measurement

6.5.1. Test Limit

The limit for out-of-band spurious emissions at the band edge is 30dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100 kHz bandwidth per the PSD procedure.

6.5.2. Test Procedure

ANSI C63.10-2013 - Section 11.11

6.5.3. Test Settitng

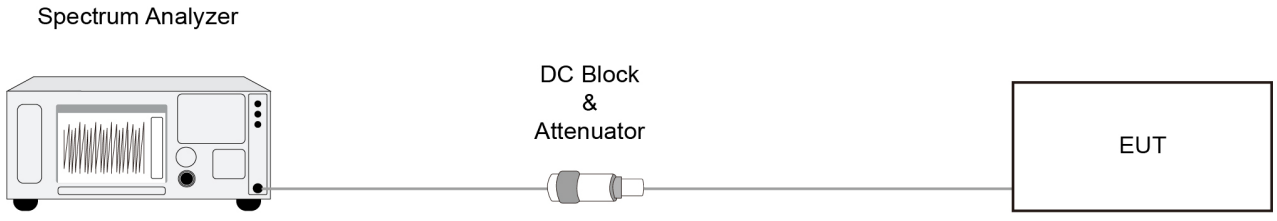
Reference level measurement

1. Set instrument center frequency to DTS channel center frequency
2. Set the span to ≥ 1.5 times the DTS bandwidth
3. Set the RBW = 100 kHz
4. Set the VBW ≥ 3 x RBW
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Allow trace to fully stabilize

Emission level measurement

1. Set the center frequency and span to encompass frequency range to be measured
2. RBW = 100kHz
3. VBW = 300kHz
4. Detector = Peak
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

6.5.4. Test Setup



6.5.5. Test Result

Refer to Appendix A.5.

6.6. Radiated Spurious Emission Measurement

6.6.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

6.6.2. Test Procedure

ANSI C63.10 - 2013 - Section 11.11 & 11.12

ANSI C63.10 - 2013 - Section 7.5

ANSI C63.10 - 2013 - Section 6.3 (General Requirements)

ANSI C63.10 - 2013 - Section 6.4 (Standard test method below 30MHz)

ANSI C63.10 - 2013 - Section 6.5 (Standard test method above 30MHz to 1GHz)

ANSI C63.10 - 2013 - Section 6.6 (Standard test method above 1GHz)

6.6.3. Test Setting

Table 1 - RBW as a function of frequency

Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000MHz	1MHz

Quasi-Peak Measurements below 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = as specified in Table 1
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

Peak Measurements above 1GHz

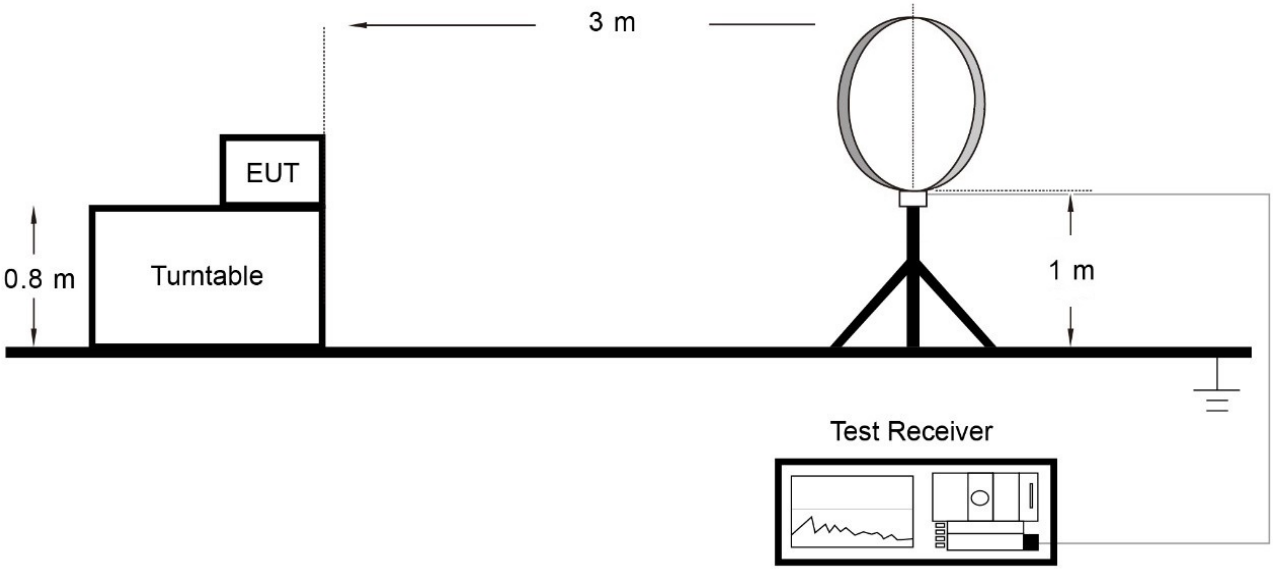
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Measurement of pulsed emissions

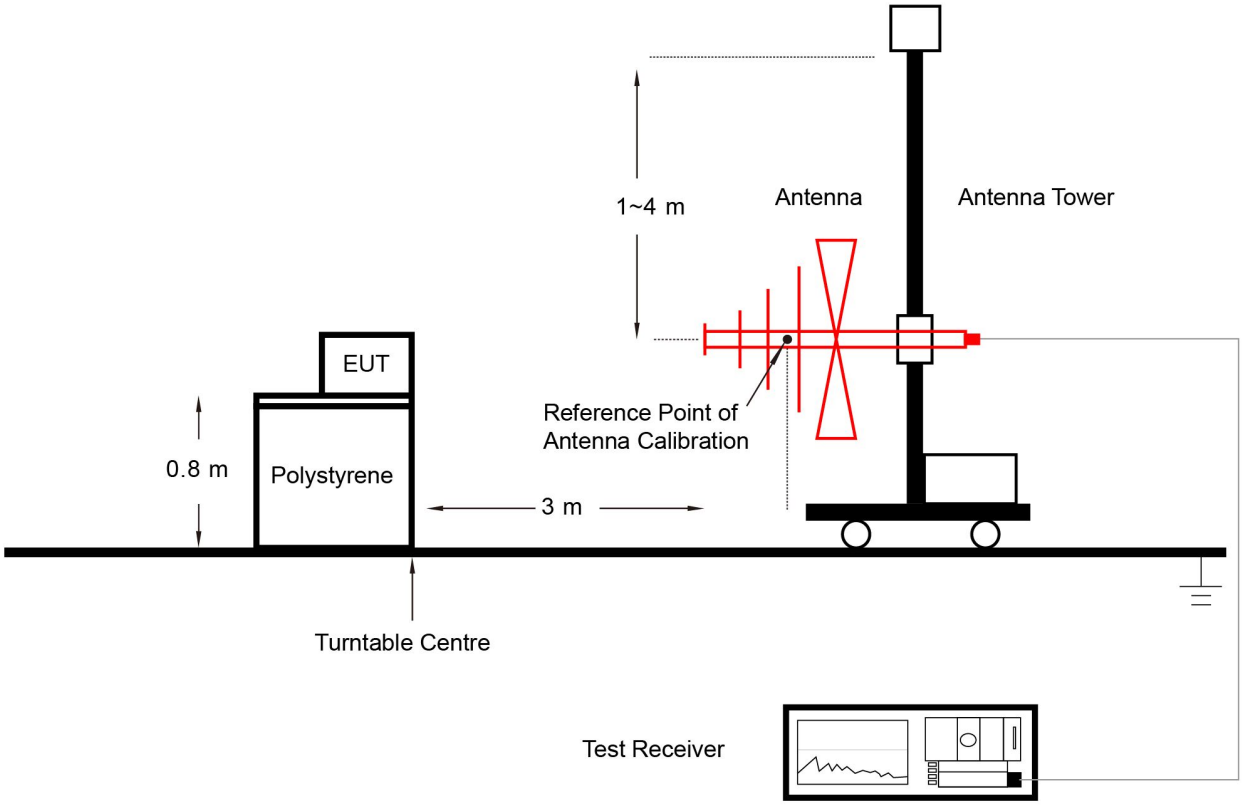
1. Make EUT is transmitting to obtain the “worst-case” pulse ON time.
2. Couple the final radio frequency output signal to the input of a spectrum analyzer.
3. Adjust the center frequency of the spectrum analyzer to the center of the RF signal.
4. Set the spectrum analyzer for ZERO SPAN.
5. Sweep time = 100ms
6. Set the TRIGGER on the spectrum analyzer to capture at least one period of the pulse train, including any blanking intervals.
7. Determine the total maximum pulse “ON time” (t_{ON}) over one period of the pulse train.
8. The duty cycle is then determined by dividing the total maximum “ON time” by the period of the pulse train (t_{ON}/100ms).
9. Determine the duty cycle correction factor. Duty Cycle Factor = 20*Log (Duty Cycle)
10. This correction factor may then be subtracted from the peak pulse amplitude (in dB) to find the average emission.

6.6.4. Test Setup

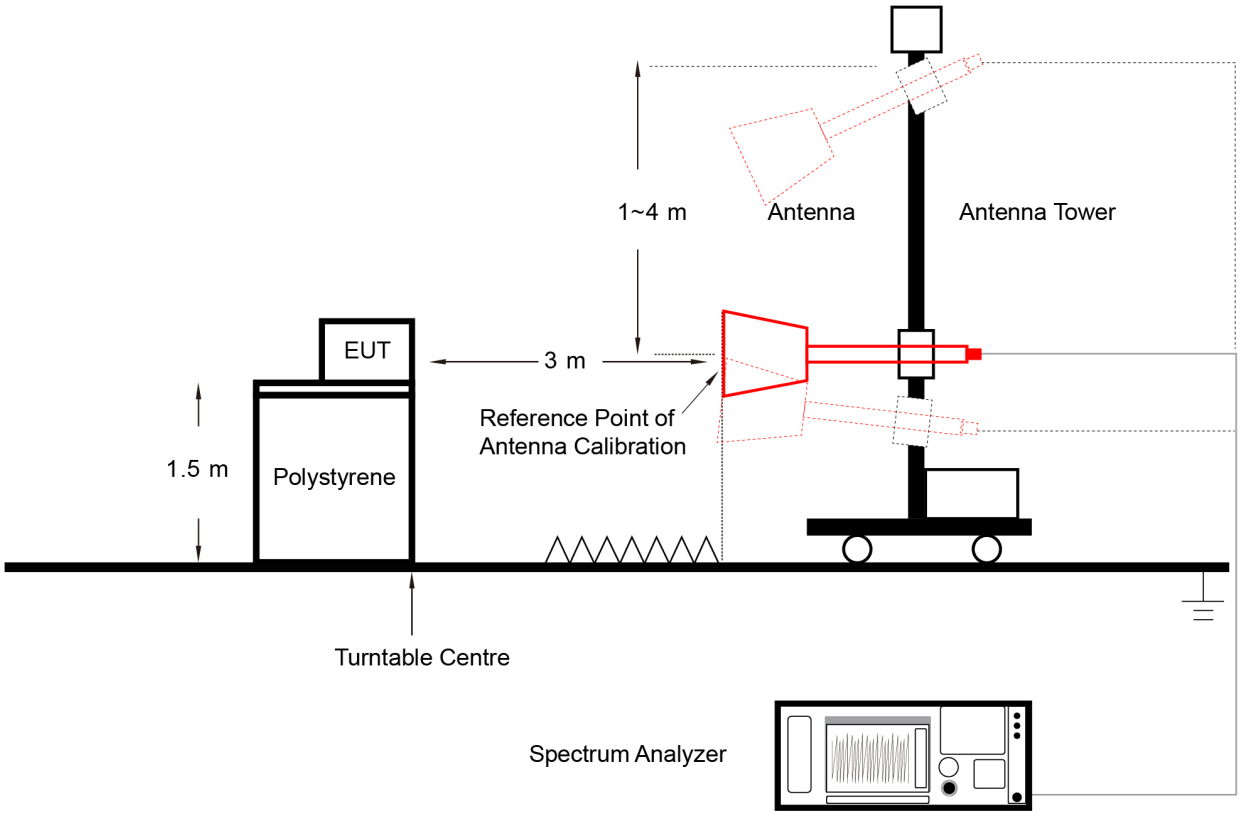
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



6.6.5. Test Result

Refer to Appendix A.6.

6.7. Radiated Restricted Band Edge Measurement

6.7.1. Test Limit

For 15.205 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a).

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1] 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41	--	--	--

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

6.7.2. Test Procedure

ANSI C63.10-2013 Section 6.3 & 6.6 & 7.5 & 11.13

6.7.3. Test Setting

Peak Field Strength Measurements

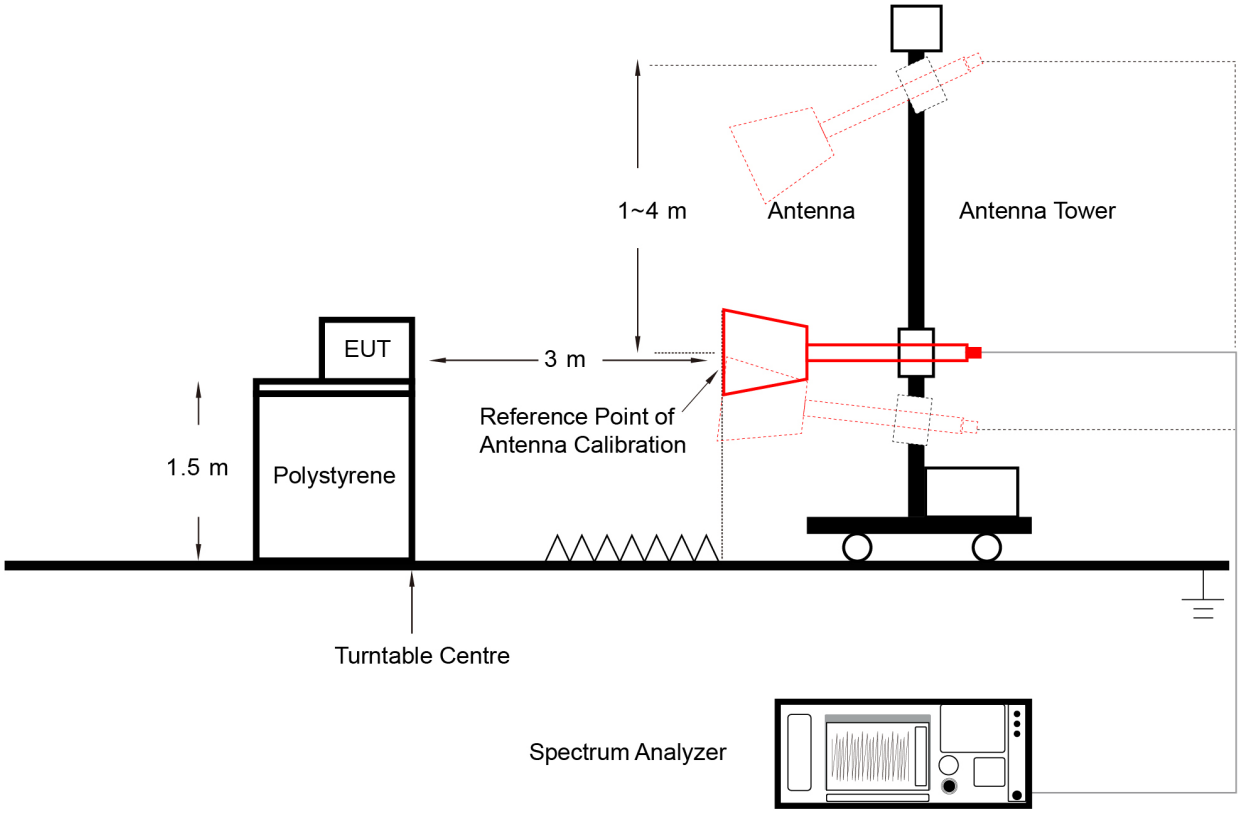
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Measurement of pulsed emissions

1. Make EUT is transmitting to obtain the “worst-case” pulse ON time.
2. Couple the final radio frequency output signal to the input of a spectrum analyzer.
3. Adjust the center frequency of the spectrum analyzer to the center of the RF signal.
4. Set the spectrum analyzer for ZERO SPAN.
5. Sweep time = 100ms
6. Set the TRIGGER on the spectrum analyzer to capture at least one period of the pulse train, including any blanking intervals.
7. Determine the total maximum pulse “ON time” (t_{ON}) over one period of the pulse train.

8. The duty cycle is then determined by dividing the total maximum “ON time” by the period of the pulse train (t_{ON}/100ms).
9. Determine the duty cycle correction factor. Duty Cycle Factor = 20*Log (Duty Cycle)
10. This correction factor may then be subtracted from the peak pulse amplitude (in dB) to find the average emission.

6.7.4. Test Setup



6.7.5. Test Result

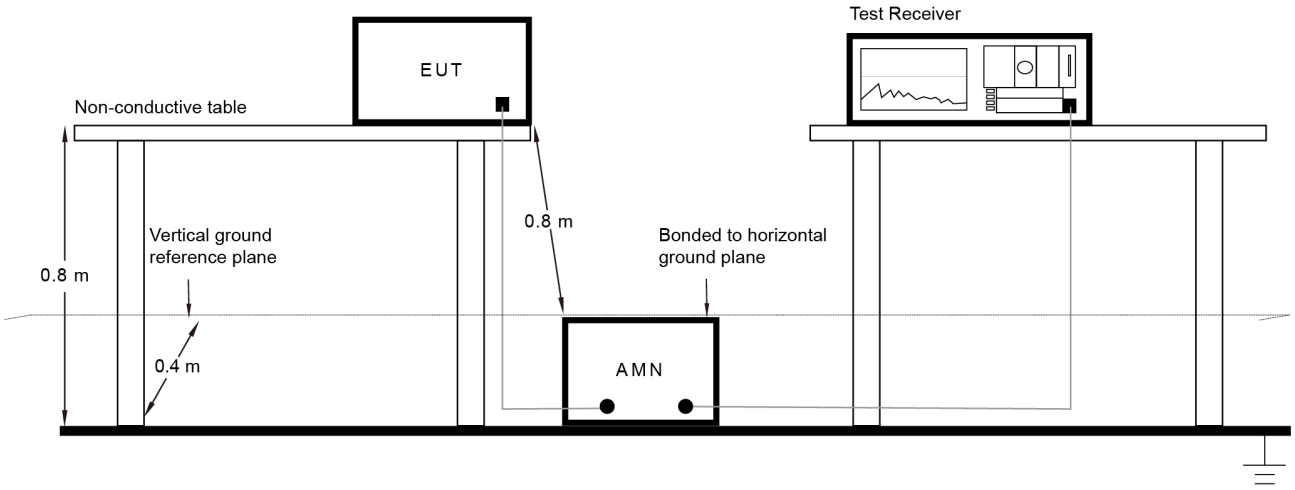
Refer to Appendix A.7.

6.8. AC Conducted Emissions Measurement

6.8.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50
Note 1: The lower limit shall apply at the transition frequencies. Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.		

6.8.2. Test Setup



6.8.3. Test Result

Refer to Appendix A.8.

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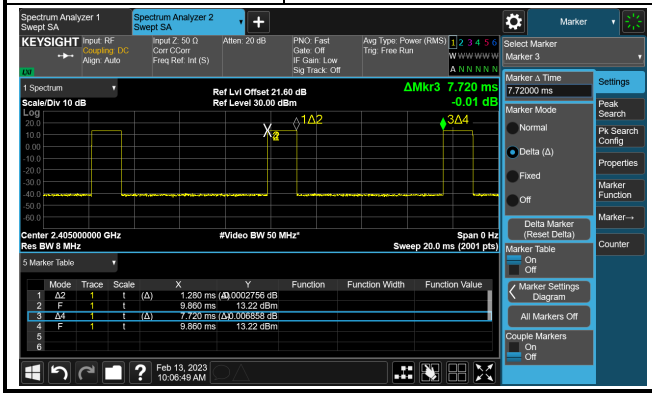
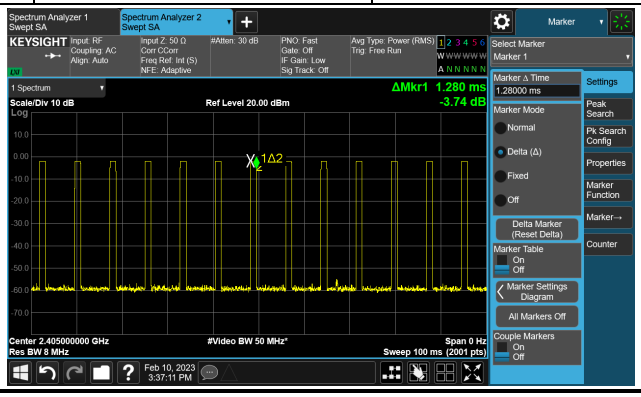
Appendix A – Test Result

A.1 Duty Cycle & Duty Cycle Correction Factor Test Result

Test Site	WZ-SR4	Test Engineer	Lynn Yang
Test Date	2023-02-13		

Modulation	T (Transmission Duration)	Duty Cycle	Duty Cycle Correction Factor
GFSK	1.280ms	16.58%	-15.6 dB





Note: Duty Cycle Correction Factor = 20 * Log (Duty Cycle) = 20 * Log (0.1658) = -15.6 dB

A.2 6dB Bandwidth Test Result

Test Site	WZ-SR4	Test Engineer	Lynn Yang
Test Date	2023-02-10		

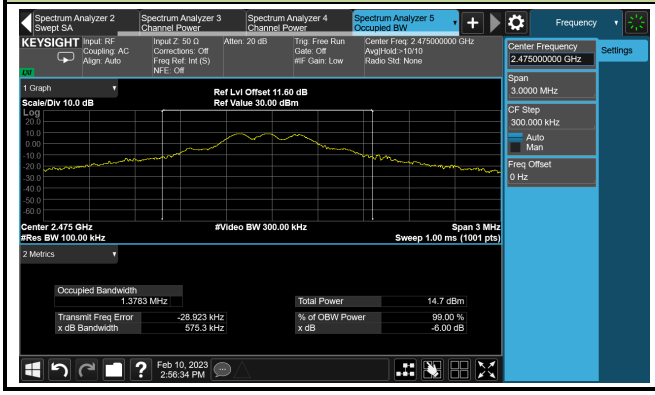
Modulation	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
GFSK	11	2405	0.5656	≥ 0.5	Pass
GFSK	18	2440	0.5697	≥ 0.5	Pass
GFSK	25	2475	0.5753	≥ 0.5	Pass

802.15.4 6dB Bandwidth

Channel 11 (2405MHz)

Channel 18 (2440MHz)

Channel 25 (2475MHz)



A.3 Output Power Test Result

Test Site	WZ-SR4	Test Engineer	Lynn Yang
Test Date	2023-02-10		

Test Result of Average Output Power

Modulation	Channel No.	Freq. (MHz)	Average Power (dBm)	Limit (dBm)	Result
GFSK	11	2405	12.61	≤ 30.00	Pass
GFSK	18	2440	12.43	≤ 30.00	Pass
GFSK	25	2475	12.18	≤ 30.00	Pass

A.4 Power Spectral Density Test Result

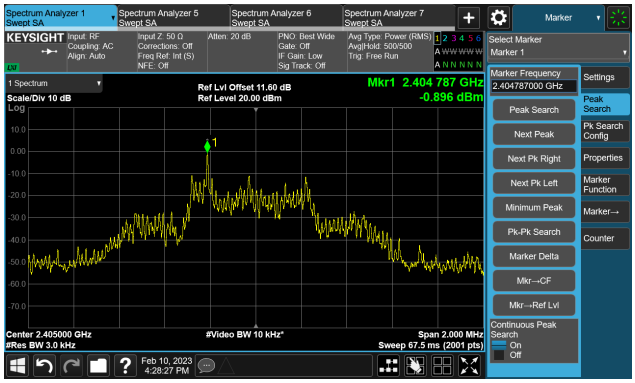
Test Site	WZ-SR4	Test Engineer	Lynn Yang
Test Date	2023-02-10		

Modulation	Channel No.	Frequency (MHz)	AV PSD (dBm / 3kHz)	Total PSD (dBm / 3kHz)	Limit (dBm / 3kHz)	Result
GFSK	11	2405	-0.90	6.91	≤ 8.00	Pass
GFSK	18	2440	-1.35	6.45	≤ 8.00	Pass
GFSK	25	2475	-1.96	5.84	≤ 8.00	Pass

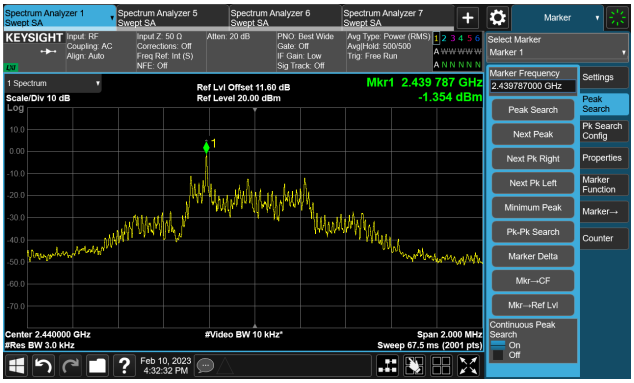
Total PSD (dBm / 3kHz) = AV PSD (dBm / 3kHz) + 10*log (1/duty cycle).

802.15.4 Power Density

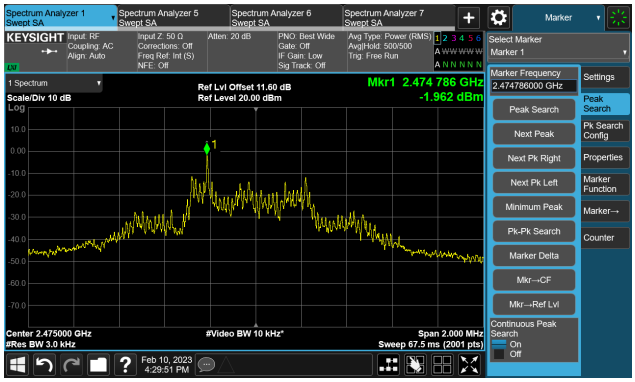
Channel 11 (2405MHz)



Channel 18 (2440MHz)



Channel 25 (2475MHz)



A.5 Conducted Band Edge and Out-of-Band Emissions Test Result

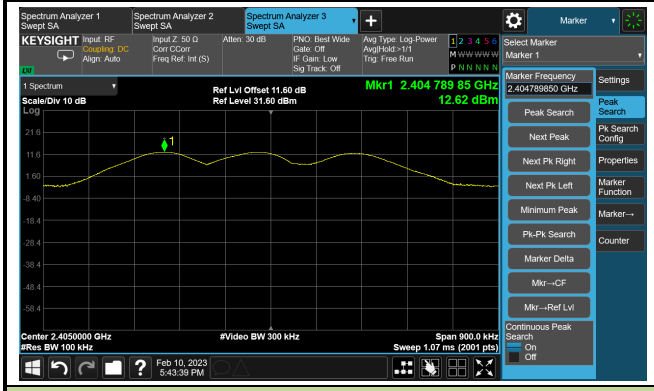
Test Site	WZ-SR4	Test Engineer	Lynn Yang
Test Date	2023-02-10		

Modulation	Channel No.	Frequency (MHz)	Limit (dBc)	Result
GFSK	11	2405	> 30	Pass
GFSK	18	2440	> 30	Pass
GFSK	25	2475	> 30	Pass

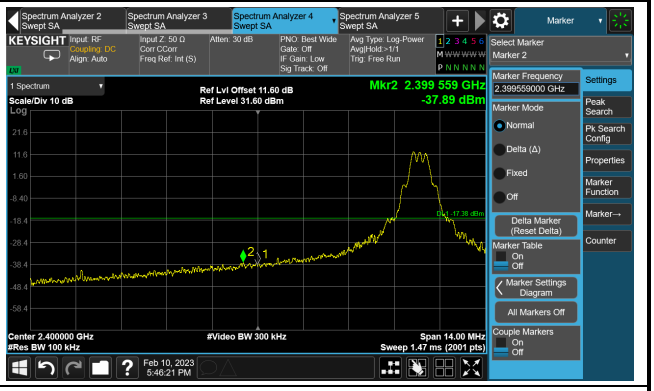
802.15.4 Out-of-Band Emissions

Channel 11 (2405MHz)

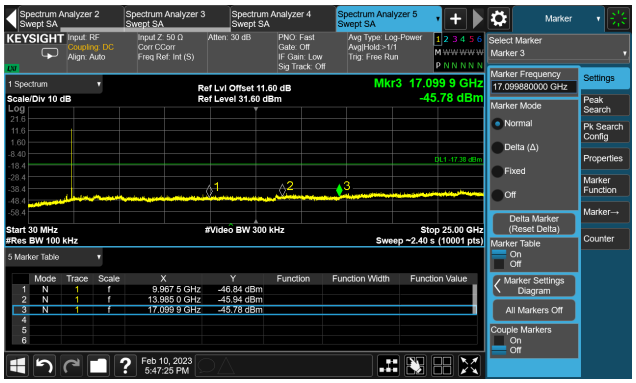
100kHz PSD Reference Level



Low Band Edge

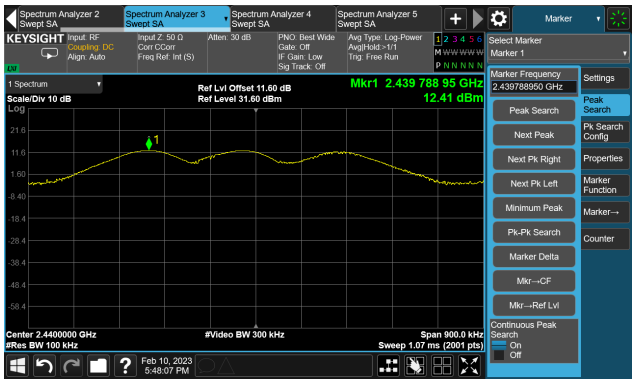


Spurious Emission

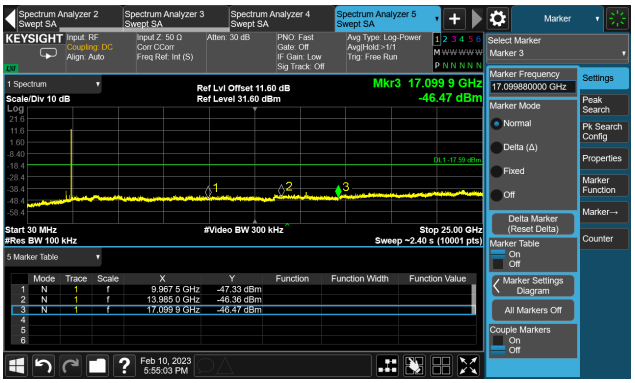


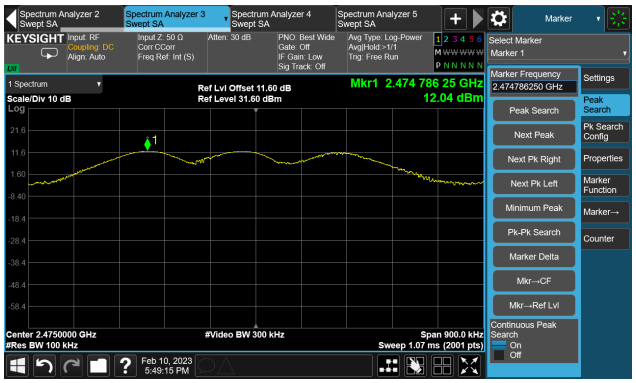
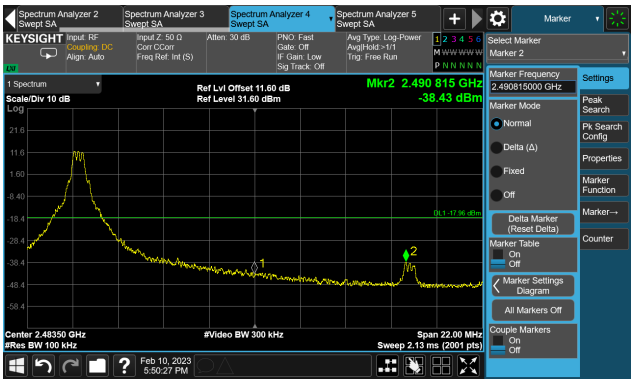
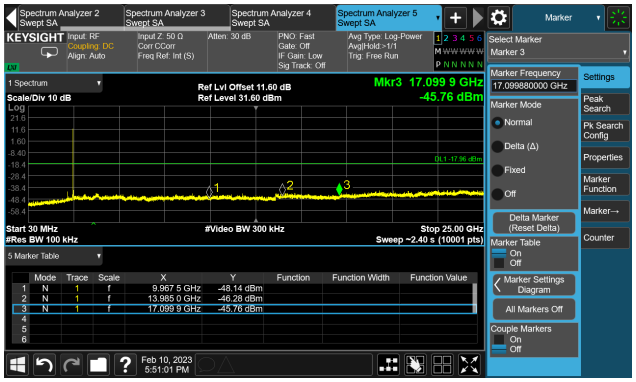
Channel 18 (2440MHz)

100kHz PSD Reference Level



Spurious Emission



Channel 25 (2475MHz)	
100kHz PSD Reference Level	High Band Edge
	
Spurious Emission	
	

A.6 Radiated Spurious Emission Test Result

Test Site	WZ-AC2	Test Engineer	Dick Shen
Test Date	2023-02-03		
Remark:	1. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report. 2. The average value is calculated by peak value and Duty Cycle Correction Factor.		

Test Channel	Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Duty Cycle Correction Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
11	4808.0	57.4	3.7	N/A	61.1	74.0	-12.9	PK	Horizontal
	4808.0	57.4	3.7	-15.6	45.5	54.0	-8.5	AV	Horizontal
	12024.5	39.1	17.1	N/A	56.2	74.0	-17.8	PK	Horizontal
	12024.5	39.1	17.1	-15.6	40.6	54.0	-13.4	AV	Horizontal
	15671.0	30.3	18.9	N/A	49.2	74.0	-24.8	PK	Horizontal
	15671.0	30.3	18.9	-15.6	33.6	54.0	-20.4	AV	Horizontal
	4808.0	55.5	3.7	N/A	59.2	74.0	-14.8	PK	Vertical
	4808.0	55.5	3.7	-15.6	43.6	54.0	-10.4	AV	Vertical
	8106.0	32.5	12.0	N/A	44.5	74.0	-29.5	PK	Vertical
	8106.0	32.5	12.0	-15.6	28.9	54.0	-25.1	AV	Vertical
	12024.5	39.7	17.1	N/A	56.8	74.0	-17.2	PK	Vertical
	12024.5	39.7	17.1	-15.6	41.2	54.0	-12.8	AV	Vertical
18	4876.0	58.3	3.7	N/A	62.0	74.0	-12.0	PK	Horizontal
	4876.0	58.3	3.7	-15.6	46.4	54.0	-7.6	AV	Horizontal
	7315.5	53.8	11.2	N/A	65.0	74.0	-9.0	PK	Horizontal
	7315.5	53.8	11.2	-15.6	49.4	54.0	-4.6	AV	Horizontal
	12203.0	36.8	17.6	N/A	54.4	74.0	-19.6	PK	Horizontal
	12203.0	36.8	17.6	-15.6	38.8	54.0	-15.2	AV	Horizontal
	4876.0	56.0	3.7	N/A	59.7	74.0	-14.3	PK	Vertical
	4876.0	56.0	3.7	-15.6	44.1	54.0	-9.9	AV	Vertical
	7315.0	51.5	11.2	N/A	62.7	74.0	-11.3	PK	Vertical
	7315.0	51.5	11.2	-15.6	47.1	54.0	-6.9	AV	Vertical
	12203.0	33.0	17.6	N/A	50.6	74.0	-23.4	PK	Vertical
	12203.0	33.0	17.6	-15.6	35.0	54.0	-19.0	AV	Vertical
25	4952.5	61.1	3.7	N/A	64.8	74.0	-9.2	PK	Horizontal
	4952.5	61.1	3.7	-15.6	49.2	54.0	-4.8	AV	Horizontal
	7426.0	54.6	11.9	N/A	66.5	74.0	-7.5	PK	Horizontal

	7426.0	54.6	11.9	-15.6	50.9	54.0	-3.1	AV	Horizontal
	12373.0	33.2	16.7	N/A	49.9	74.0	-24.1	PK	Horizontal
	12373.0	33.2	16.7	-15.6	34.3	54.0	-19.7	AV	Horizontal
	4952.5	55.2	3.7	N/A	58.9	74.0	-15.1	PK	Vertical
	4952.5	55.2	3.7	-15.6	43.3	54.0	-10.7	AV	Vertical
	7426.0	51.9	11.9	N/A	63.8	74.0	-10.2	PK	Vertical
	7426.0	51.9	11.9	-15.6	48.2	54.0	-5.8	AV	Vertical
	11242.5	31.9	17.5	N/A	49.4	74.0	-24.6	PK	Vertical
	11242.5	31.9	17.5	-15.6	33.8	54.0	-20.2	AV	Vertical

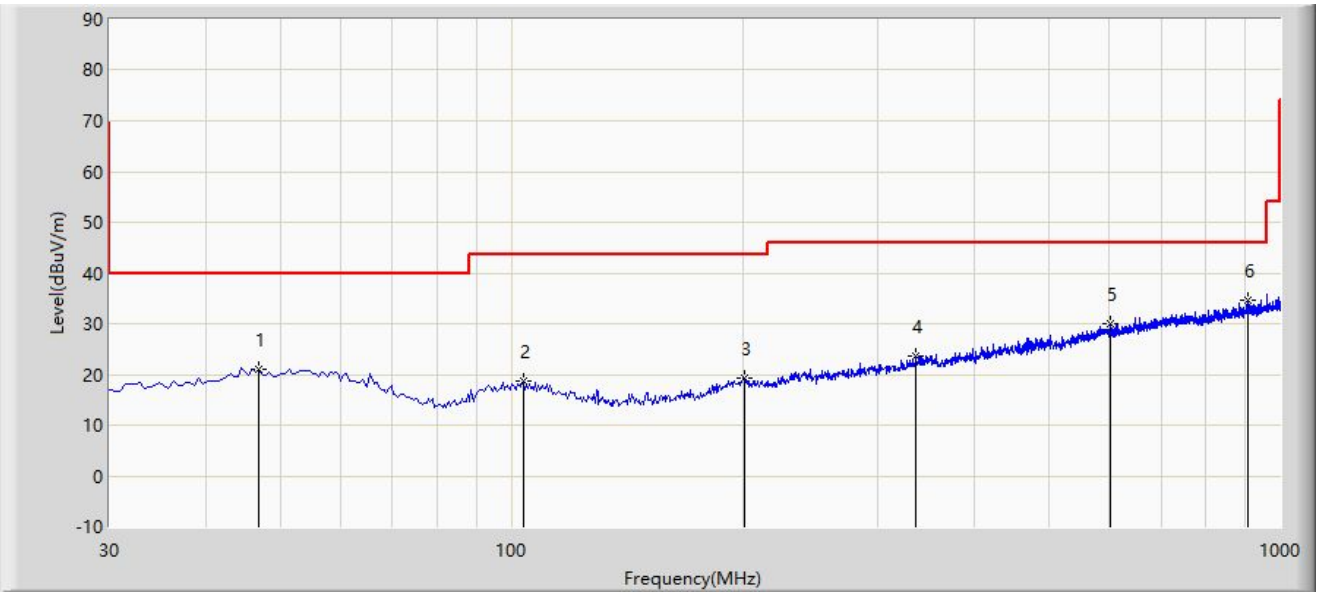
Note: PK Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)

Factor ((dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

AV Level (dBμV/m) = PK Level (dBμV/m) + Duty Cycle Correction Factor (dB)

The Result of Radiated Emission below 1GHz:

Site: WZ-AC2	Test Date: 2023-02-07
Limit: FCC_Part15.209_RSE(3m)	Engineer: Dick Shen
Probe: VULB9162_30-7000MHz	Polarity: Horizontal
EUT: HBZ9505	Power: By Battery
Note: Transmit at 2405MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		46.975	21.039	0.823	-18.961	40.000	20.217	PK
2		103.720	18.717	0.134	-24.783	43.500	18.583	PK
3		200.720	19.187	0.453	-24.313	43.500	18.734	PK
4		336.035	23.564	1.592	-22.436	46.000	21.972	PK
5		601.330	30.003	3.155	-15.997	46.000	26.848	PK
6	*	908.335	34.621	3.358	-11.379	46.000	31.262	PK

Note 1: " * ", means this data is the worst emission level.

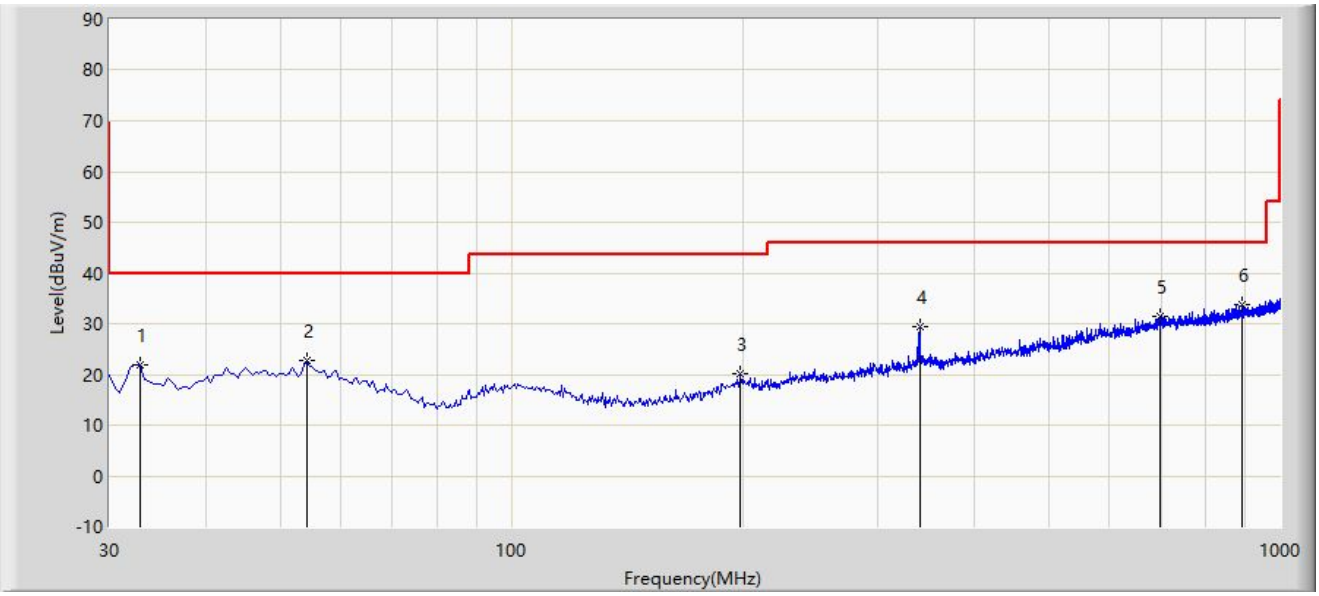
Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 4: Quasi-Peak measurement was not performed when peak measure level was lower than the quasi-peak limit.

Note 5: The amplitude of Radiated emissions (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), is that proximity to ambient noise, which also are attenuated more than 20 dB below the permissible value. Therefore, the data is not presented in the report.

Site: WZ-AC2	Test Date: 2023-02-07
Limit: FCC_Part15.209_RSE(3m)	Engineer: Dick Shen
Probe: VULB9162_30-7000MHz	Polarity: Vertical
EUT: HBZ9505	Power: By Battery
Note: Transmit at 2405MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		32.910	21.778	4.960	-18.222	40.000	16.818	PK
2		54.250	22.742	2.416	-17.258	40.000	20.326	PK
3		198.780	20.243	1.409	-23.257	43.500	18.834	PK
4		340.400	29.502	7.278	-16.498	46.000	22.224	PK
5		698.330	31.561	3.064	-14.439	46.000	28.497	PK
6	*	892.330	33.636	2.576	-12.364	46.000	31.060	PK

Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

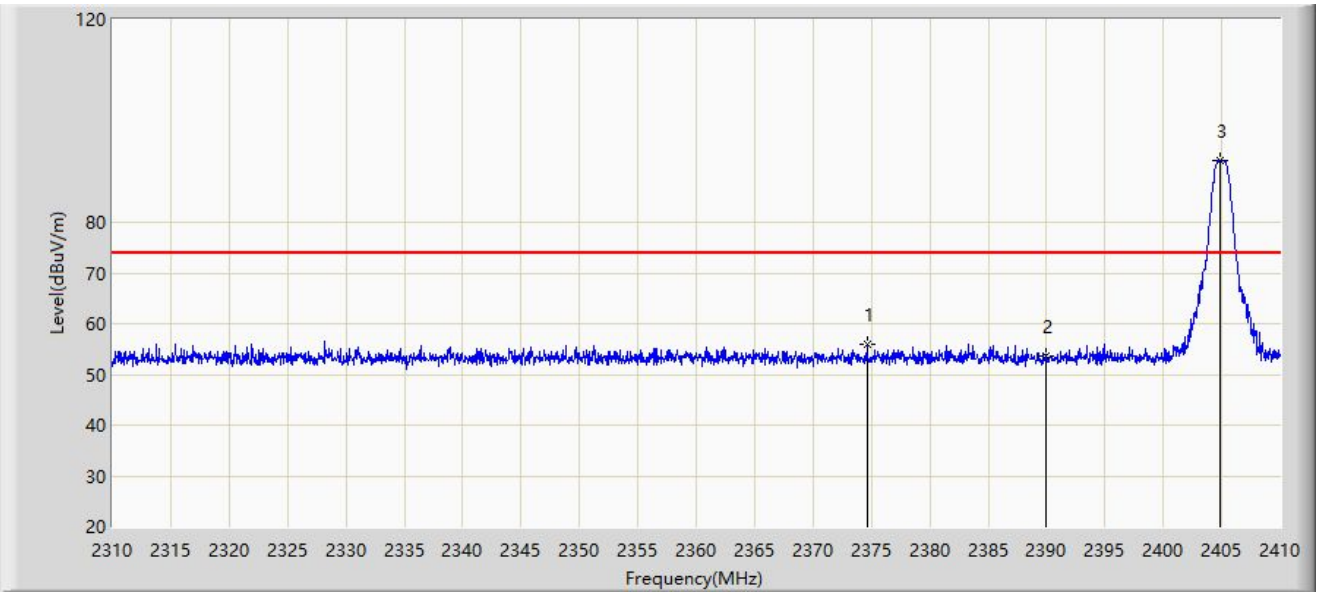
Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 4: Quasi-Peak measurement was not performed when peak measure level was lower than the quasi-peak limit.

Note 5: The amplitude of Radiated emissions (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), is that proximity to ambient noise, which also are attenuated more than 20 dB below the permissible value. Therefore, the data is not presented in the report.

A.7 Radiated Restricted Band Edge Test Result

Site: WZ-AC2	Test Date: 2023-02-10
Limit: FCC_2.4G_RE(3m)	Engineer: Dick Shen
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: 2.4GHz Transmitter	Power: By Battery
Test Mode: Transmit at 2405MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Duty Cycle Correction Factor (dB)	Type
1		2374.650	55.992	24.253	-18.008	74.000	31.740	N/A	PK
	*	2374.650	40.392	24.253	-13.608	54.000	31.740	-15.600	AV
2		2390.000	53.703	22.015	-20.297	74.000	31.688	N/A	PK
		2390.000	38.103	22.015	-15.897	54.000	31.688	-15.600	AV
3		2404.850	92.228	60.588	N/A	N/A	31.640	N/A	PK

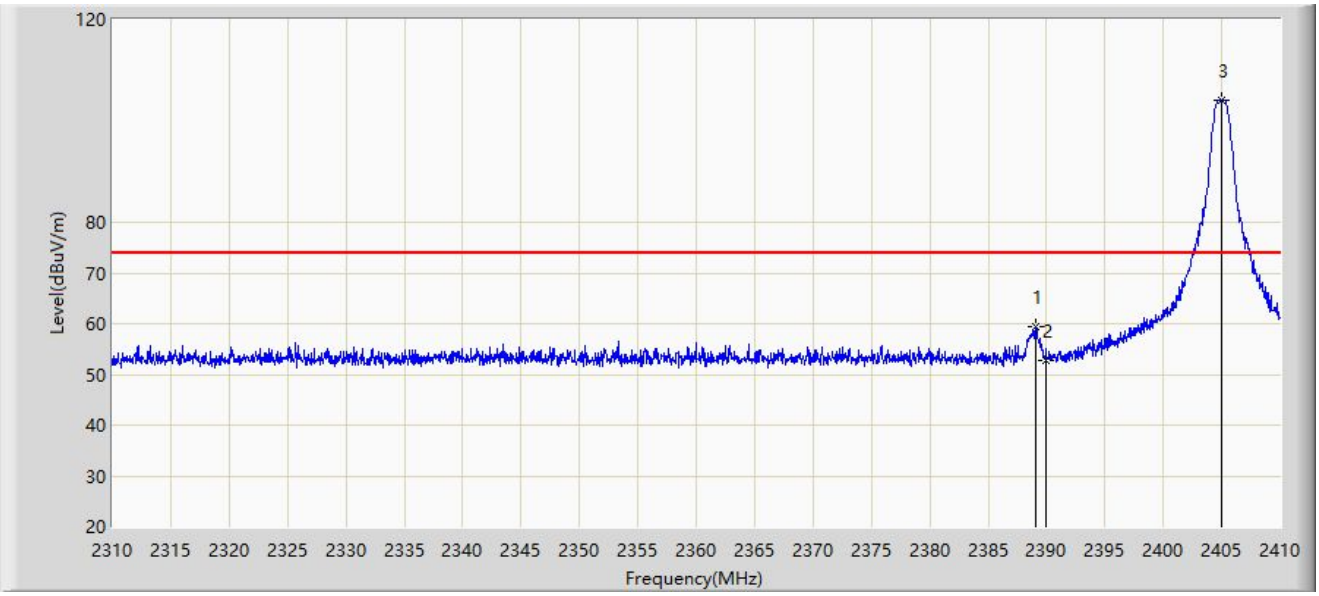
Note 1: " * ", means this data is the worst emission level.

Note 2: PK Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 4: AV Level (dBuV/m) = PK Level (dBuV/m) + Duty Cycle Correction Factor (dB)

Site: WZ-AC2	Test Date: 2023-02-10
Limit: FCC_2.4G_RE(3m)	Engineer: Dick Shen
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: 2.4GHz Transmitter	Power: By Battery
Test Mode: Transmit at 2405MHz	



No	Mark	Frequency (MHz)	Measure Level (dBµV/m)	Reading Level (dBµV)	Margin (dB)	Limit (dBµV/m)	Factor (dB/m)	Duty Cycle Correction Factor (dB)	Type
1		2389.050	59.448	27.756	-14.552	74.000	31.692	N/A	PK
	*	2389.050	43.848	27.756	-10.152	54.000	31.692	-15.600	AV
2		2390.000	52.884	21.196	-21.116	74.000	31.688	N/A	PK
		2390.000	37.284	21.196	-16.716	54.000	31.688	-15.600	AV
3		2405.050	104.036	72.397	N/A	N/A	31.640	N/A	PK

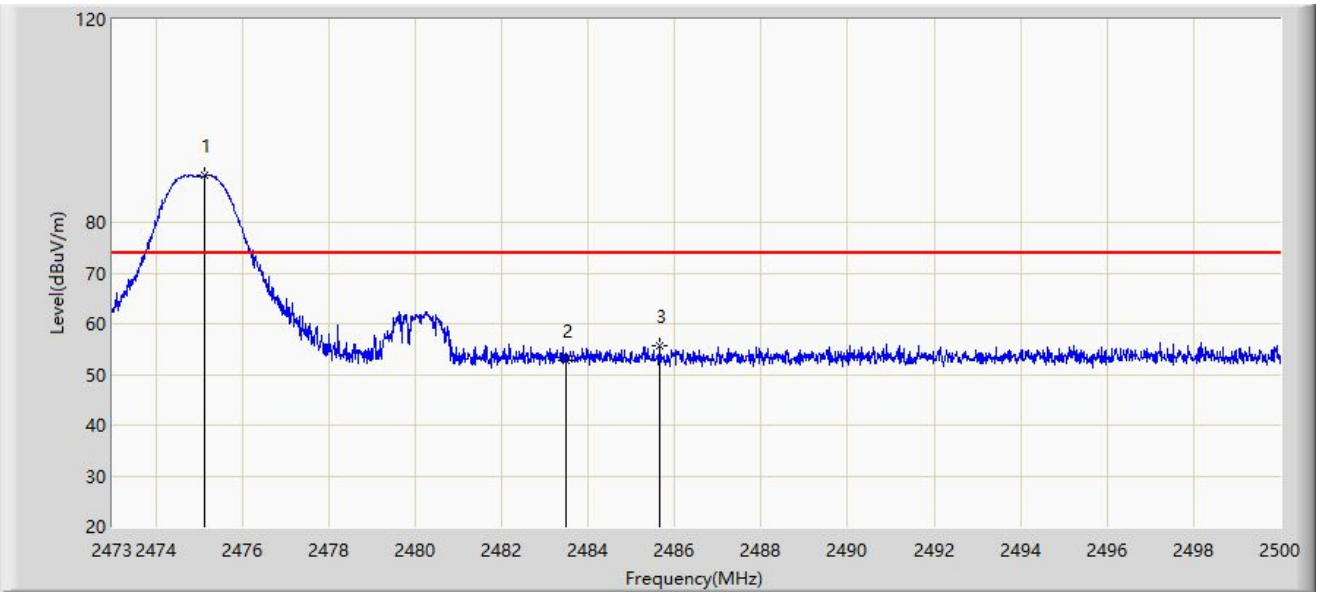
Note 1: " * ", means this data is the worst emission level.

Note 2: PK Level (dBµV/m) = Reading Level (dBµV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 4: AV Level (dBuV/m) = PK Level (dBuV/m) + Duty Cycle Correction Factor (dB)

Site: WZ-AC2	Test Date: 2023-02-10
Limit: FCC_2.4G_RE(3m)	Engineer: Dick Shen
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: 2.4GHz Transmitter	Power: By Battery
Test Mode: Transmit at 2475MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Duty Cycle Correction Factor (dB)	Type
1		2475.119	89.139	57.580	N/A	N/A	31.560	N/A	PK
2		2483.500	52.706	21.137	-21.294	74.000	31.569	N/A	PK
		2483.500	37.106	21.137	-16.894	54.000	31.569	-15.600	AV
3		2485.663	55.542	23.969	-18.458	74.000	31.573	N/A	PK
	*	2485.663	39.942	23.969	-14.058	54.000	31.573	-15.600	AV

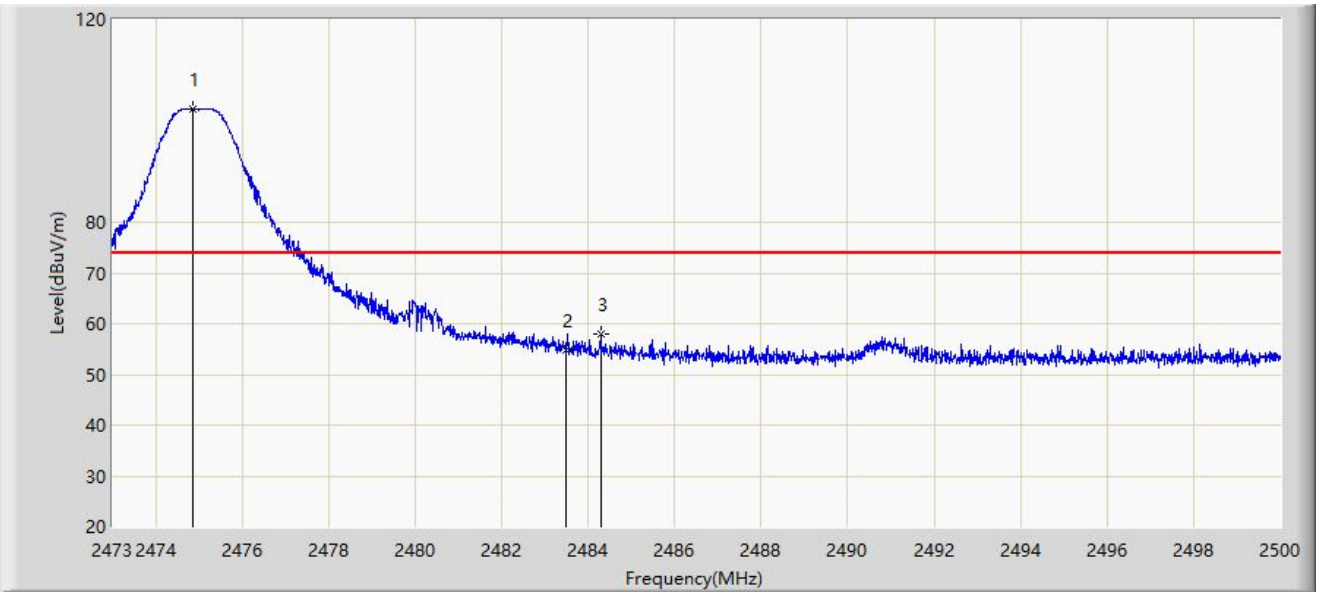
Note 1: " * ", means this data is the worst emission level.

Note 2: PK Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 4: AV Level (dBuV/m) = PK Level (dBuV/m) + Duty Cycle Correction Factor (dB)

Site: WZ-AC2	Test Date: 2023-02-10
Limit: FCC_2.4G_RE(3m)	Engineer: Dick Shen
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: 2.4GHz Transmitter	Power: By Battery
Test Mode: Transmit at 2475MHz	



No	Mark	Frequency (MHz)	Measure Level (dBµV/m)	Reading Level (dBµV)	Margin (dB)	Limit (dBµV/m)	Factor (dB/m)	Duty Cycle Correction Factor (dB)	Type
1		2474.876	102.332	70.773	N/A	N/A	31.559	N/A	PK
2		2483.500	54.885	23.316	-19.115	74.000	31.569	N/A	PK
		2483.500	39.285	23.316	-14.715	54.000	31.569	-15.600	AV
3		2484.300	57.862	26.292	-16.138	74.000	31.570	N/A	PK
	*	2484.300	42.262	26.292	-11.738	54.000	31.570	-15.600	AV

Note 1: " * ", means this data is the worst emission level.

Note 2: PK Level (dBµV/m) = Reading Level (dBµV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 4: AV Level (dBuV/m) = PK Level (dBuV/m) + Duty Cycle Correction Factor (dB)

A.8 AC Conducted Emissions Test Result

The device is powered by AA* 4 battery, so this test item is not applicable.

Appendix B – Test Setup Photograph

Refer to “2302RSU001-UT” file.

Appendix C – EUT Photograph

Refer to “2302RSU001-UE” file.

The End