

# TEST REPORT

**Product Name** : Wireless Bluetooth remote control  
**Brand Mark** : N/A  
**Model No.** : B28  
**FCC ID** : 2BACK-B28  
**Report Number** : BLA-EMC-202302-A2002  
**Date of Sample Receipt** : 2023/2/15  
**Date of Test** : 2023/2/16 to 2023/2/21  
**Date of Issue** : 2023/2/22  
**Test Standard** : 47 CFR Part 15, Subpart C 15.247  
**Test Result** : Pass

Prepared for:

**Guangzhou Aoli Electronic Technology Co., Ltd**  
**101, No. 1, Baiyun Road East, Fenghuang Village, Huadu District,**  
**Guangzhou City, Guangdong Province**

Prepared by:

**BlueAsia Technical Services (Shenzhen) Co.,Ltd.**  
**No.41, South of Beihuan Road, Shangwu Community, Shiyan Subdistrict,**  
**Bao'an District, Shenzhen, Guangdong, China**  
**TEL: +86-755-23059481**

Compiled by: *charlie*  
Approved by: *Blue Zheng*

Review by: *Sueels*  
Date: 2023/2/22



## REPORT REVISE RECORD

Version No.	Date	Description
00	2023/2/22	Original

## TABLE OF CONTENTS

<b>1 TEST SUMMARY .....</b>	<b>5</b>
<b>2 GENERAL INFORMATION .....</b>	<b>6</b>
<b>3 GENERAL DESCRIPTION OF E.U.T.....</b>	<b>6</b>
<b>4 TEST ENVIRONMENT .....</b>	<b>7</b>
<b>5 TEST MODE .....</b>	<b>7</b>
<b>6 MEASUREMENT UNCERTAINTY .....</b>	<b>7</b>
<b>7 DESCRIPTION OF SUPPORT UNIT .....</b>	<b>8</b>
<b>8 LABORATORY LOCATION .....</b>	<b>8</b>
<b>9 TEST INSTRUMENTS LIST .....</b>	<b>9</b>
<b>10 CONDUCTED BAND EDGES MEASUREMENT .....</b>	<b>11</b>
10.1 LIMITS .....	11
10.2 BLOCK DIAGRAM OF TEST SETUP .....	11
10.3 TEST DATA .....	12
<b>11 RADIATED SPURIOUS EMISSIONS .....</b>	<b>13</b>
11.1 LIMITS .....	13
11.2 BLOCK DIAGRAM OF TEST SETUP .....	14
11.3 PROCEDURE .....	14
11.4 TEST DATA .....	16
<b>12 ANTENNA REQUIREMENT .....</b>	<b>24</b>
12.1 CONCLUSION .....	24
<b>13 RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS .....</b>	<b>25</b>
13.1 LIMITS .....	25
13.2 BLOCK DIAGRAM OF TEST SETUP .....	26
13.3 PROCEDURE .....	26
13.4 TEST DATA .....	28
<b>14 CONDUCTED SPURIOUS EMISSIONS .....</b>	<b>32</b>
14.1 LIMITS .....	32
14.2 BLOCK DIAGRAM OF TEST SETUP .....	32
14.3 TEST DATA .....	33

<b>15 POWER SPECTRUM DENSITY .....</b>	<b>34</b>
15.1 LIMITS .....	34
15.2 BLOCK DIAGRAM OF TEST SETUP .....	34
15.3 TEST DATA .....	34
<b>16 CONDUCTED PEAK OUTPUT POWER .....</b>	<b>35</b>
16.1 LIMITS .....	35
16.2 BLOCK DIAGRAM OF TEST SETUP .....	35
16.3 TEST DATA .....	36
<b>17 MINIMUM 6DB BANDWIDTH .....</b>	<b>37</b>
17.1 LIMITS .....	37
17.2 BLOCK DIAGRAM OF TEST SETUP .....	37
17.3 TEST DATA .....	37
<b>18 APPENDIX .....</b>	<b>38</b>
18.1 MAXIMUM CONDUCTED OUTPUT POWER .....	38
18.2 -6dB BANDWIDTH .....	40
18.3 OCCUPIED CHANNEL BANDWIDTH .....	42
18.4 MAXIMUM POWER SPECTRAL DENSITY LEVEL .....	44
18.5 BAND EDGE .....	46
18.6 CONDUCTED RF SPURIOUS EMISSION .....	49
<b>APPENDIX A: PHOTOGRAPHS OF TEST SETUP .....</b>	<b>53</b>
<b>APPENDIX B: PHOTOGRAPHS OF EUT .....</b>	<b>54</b>

## 1 TEST SUMMARY

Test item	Test Requirement	Test Method	Class/Severity	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	N/A
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.8 & Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(c)	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.6 & Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass
Power Spectrum Density	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.5	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Minimum 6dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass

Remark:

N/A: Not Applicable

## 2 GENERAL INFORMATION

<b>Applicant</b>	Guangzhou Aoli Electronic Technology Co., Ltd
<b>Address</b>	101, No. 1, Baiyun Road East, Fenghuang Village, Huadu District, Guangzhou City, Guangdong Province
<b>Manufacturer</b>	Guangzhou Aoli Electronic Technology Co., Ltd
<b>Address</b>	101, No. 1, Baiyun Road East, Fenghuang Village, Huadu District, Guangzhou City, Guangdong Province
<b>Factory</b>	Guangzhou Aoli Electronic Technology Co., Ltd
<b>Address</b>	101, No. 1, Baiyun Road East, Fenghuang Village, Huadu District, Guangzhou City, Guangdong Province
<b>Product Name</b>	Wireless Bluetooth remote control
<b>Test Model No.</b>	B28

## 3 GENERAL DESCRIPTION OF E.U.T.

<b>Hardware Version</b>	N/A
<b>Software Version</b>	N/A
<b>Operation Frequency:</b>	2402MHz-2480MHz
<b>Modulation Type:</b>	GFSK
<b>Channel Spacing:</b>	2MHz
<b>Number of Channels:</b>	40
<b>Antenna Type:</b>	PCB antenna
<b>Antenna Gain:</b>	2dBi (Provided by the customer)

#### 4 TEST ENVIRONMENT

Environment	Temperature	Voltage
Normal	25°C	DC3V

#### 5 TEST MODE

TEST MODE	TEST MODE DESCRIPTION
TX	Keep the EUT in transmitting mode
Remark: Only the data of the worst mode would be recorded in this report.	

#### 6 MEASUREMENT UNCERTAINTY

Parameter	Expanded Uncertainty (Confidence of 95%)
Radiated Emission(9kHz-30MHz)	±4.34dB
Radiated Emission(30MHz-1000MHz)	±4.24dB
Radiated Emission(1GHz-18GHz)	±4.68dB
AC Power Line Conducted Emission(150kHz-30MHz)	±3.45dB

## 7 DESCRIPTION OF SUPPORT UNIT

Device Type	Manufacturer	Model Name	Serial No.	Remark
PC	HASEE	K610D	N/A	N/A

## 8 LABORATORY LOCATION

All tests were performed at:  
BlueAsia Technical Services (Shenzhen) Co.,Ltd.  
No.41, South of Beihuan Road, Shangwu Community, Shiyan Subdistrict, Bao'an District, Shenzhen,  
Guangdong, China  
Telephone: TEL: +86-755-28682673 FAX: +86-755-28682673  
No tests were sub-contracted.



## 9 TEST INSTRUMENTS LIST

Test Equipment Of Radiated Spurious Emissions					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Chamber 1	SKET	966	N/A	2020/11/10	2023/11/9
Chamber 2	SKET	966	N/A	2021/07/20	2024/07/19
Spectrum	R&S	FSP40	100817	2022/09/15	2023/09/14
Receiver	R&S	ESR7	101199	2022/09/15	2023/09/14
Receiver	R&S	ESPI7	101477	2022/07/16	2023/07/15
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	2022/09/15	2023/09/14
Horn Antenna	Schwarzbeck	BBHA9120D	01892 P:00331	2022/09/13	2025/09/12
Amplifier	SKET	LNPA_30M01G-30	SK2021060801	2022/07/16	2023/07/15
Amplifier	SKET	PA-000318G-45	N/A	2022/09/13	2023/09/12
Amplifier	SKET	LNPA_18G40G-50	SK2022071301	2022/07/14	2023/07/13
Filter group	SKET	2.4G/5G Filter group r	N/A	2022/07/16	2023/07/15
EMI software	EZ	EZ-EMC	EEMC-3A1	N/A	N/A
Loop antenna	SCHNARZBECK	FMZB1519B	00102	2022/9/14	2025/9/13
Controller	SKET	N/A	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-02	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-03	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-01	N/A	N/A	N/A

**Test Equipment Of Conducted Emissions at AC Power Line (150kHz-30MHz)**

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Shield room	SKET	833	N/A	2020/11/25	2023/11/24
Receiver	R&S	ESPI3	101082	2022/09/14	2023/09/13
LISN	R&S	ENV216	3560.6550.15	2022/09/14	2023/09/13
LISN	AT	AT166-2	AKK1806000003	2022/09/14	2023/09/13
ISN	TESEQ	ISNT8-cat6	53580	2022/09/14	2023/09/13
Single-channel vehicle artificial power network	Schwarzbeck	NNBM 8124	01045	2022/08/17	2023/08/16
Single-channel vehicle artificial power network	Schwarzbeck	NNBM 8124	01075	2022/08/17	2023/08/16
EMI software	EZ	EZ-EMC	EEMC-3A1	N/A	N/A

**Test Equipment Of RF Conducted Test**

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	2022/09/15	2023/09/14
Spectrum	Agilent	N9020A	MY49100060	2022/09/07	2023/09/06
Spectrum	KEYSIGHT	N9030A	MY52350152	2022/07/01	2023/06/30
Spectrum	KEYSIGHT	N9010A	MY54330814	2022/07/01	2023/06/30
Signal Generator	Agilent	N5182A	MY47420955	2022/09/07	2023/09/06
Signal Generator	Agilent	E8257D	MY44320250	2022/07/01	2023/06/30
Signal Generator	Agilent	N5181A	MY46240904	2022/08/02	2023/08/01
Signal Generator	R&S	CMW500	132429	2022/09/07	2023/09/06
BluetoothTester	Anritsu	MT8852B	06262047872	2022/09/07	2023/09/06
Power probe	DARE	RPR3006W	14I00889SN042	2022/09/07	2023/09/06
DCPowersupply	zhaoxin	KXN-305D	20K305D1221363	2022/09/14	2023/09/13
DCPowersupply	zhaoxin	RXN-1505D	19R1505D050168	2022/09/14	2023/09/13
Audio Analyzer	Audioprecision	N/A	ATSI-41094	2022/7/1	2023/6/30
2.4GHz/5GHz RF Test software	MTS	MTS 8310	Version 2.0.0.0	N/A	N/A

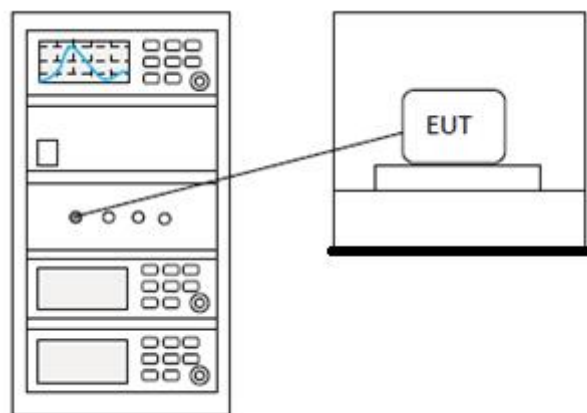
## 10 CONDUCTED BAND EDGES MEASUREMENT

<b>Test Standard</b>	47 CFR Part 15, Subpart C 15.247
<b>Test Method</b>	ANSI C63.10 (2013) Section 7.8.8 & Section 11.13.3.2
<b>Test Mode (Pre-Scan)</b>	TX
<b>Test Mode (Final Test)</b>	TX
<b>Tester</b>	Charlie
<b>Temperature</b>	25°C
<b>Humidity</b>	60%

### 10.1 LIMITS

<b>Limit:</b>	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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) (see §15.205(c)).
---------------	--

### 10.2 BLOCK DIAGRAM OF TEST SETUP



### 10.3 TEST DATA

**Pass: Please Refer To Appendix: Appendix1 For Details**

BlueAsia

## 11 RADIATED SPURIOUS EMISSIONS

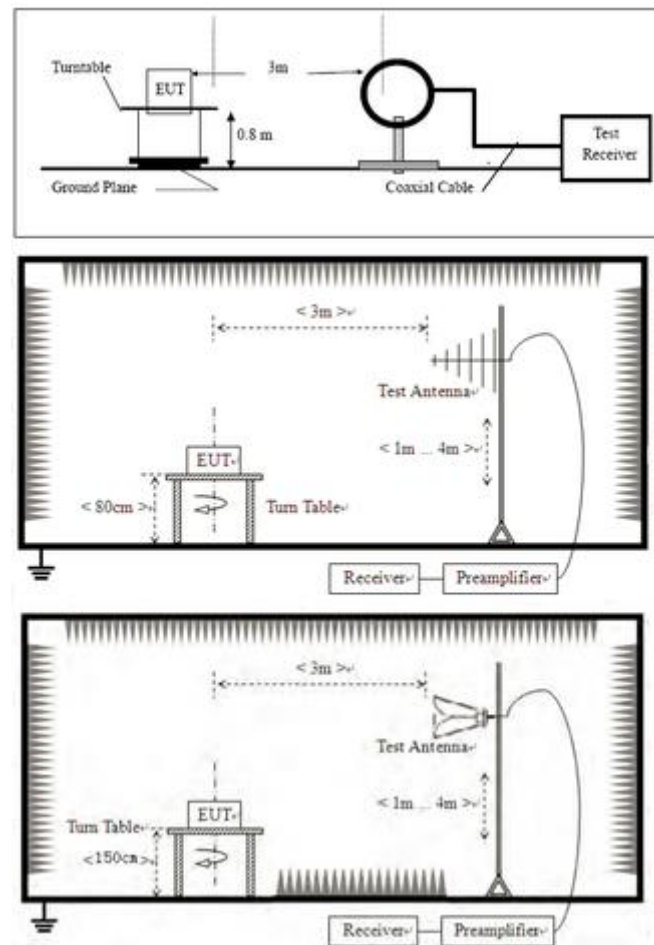
<b>Test Standard</b>	47 CFR Part 15, Subpart C 15.247
<b>Test Method</b>	ANSI C63.10 (2013) Section 6.4,6.5,6.6
<b>Test Mode (Pre-Scan)</b>	TX
<b>Test Mode (Final Test)</b>	TX
<b>Tester</b>	Charlie
<b>Temperature</b>	25℃
<b>Humidity</b>	60%

### 11.1 LIMITS

<b>Frequency(MHz)</b>	<b>Field strength(microvolts/meter)</b>	<b>Measurement distance(meters)</b>
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

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, 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.

## 11.2 BLOCK DIAGRAM OF TEST SETUP



## 11.3 PROCEDURE

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height 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.
- 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

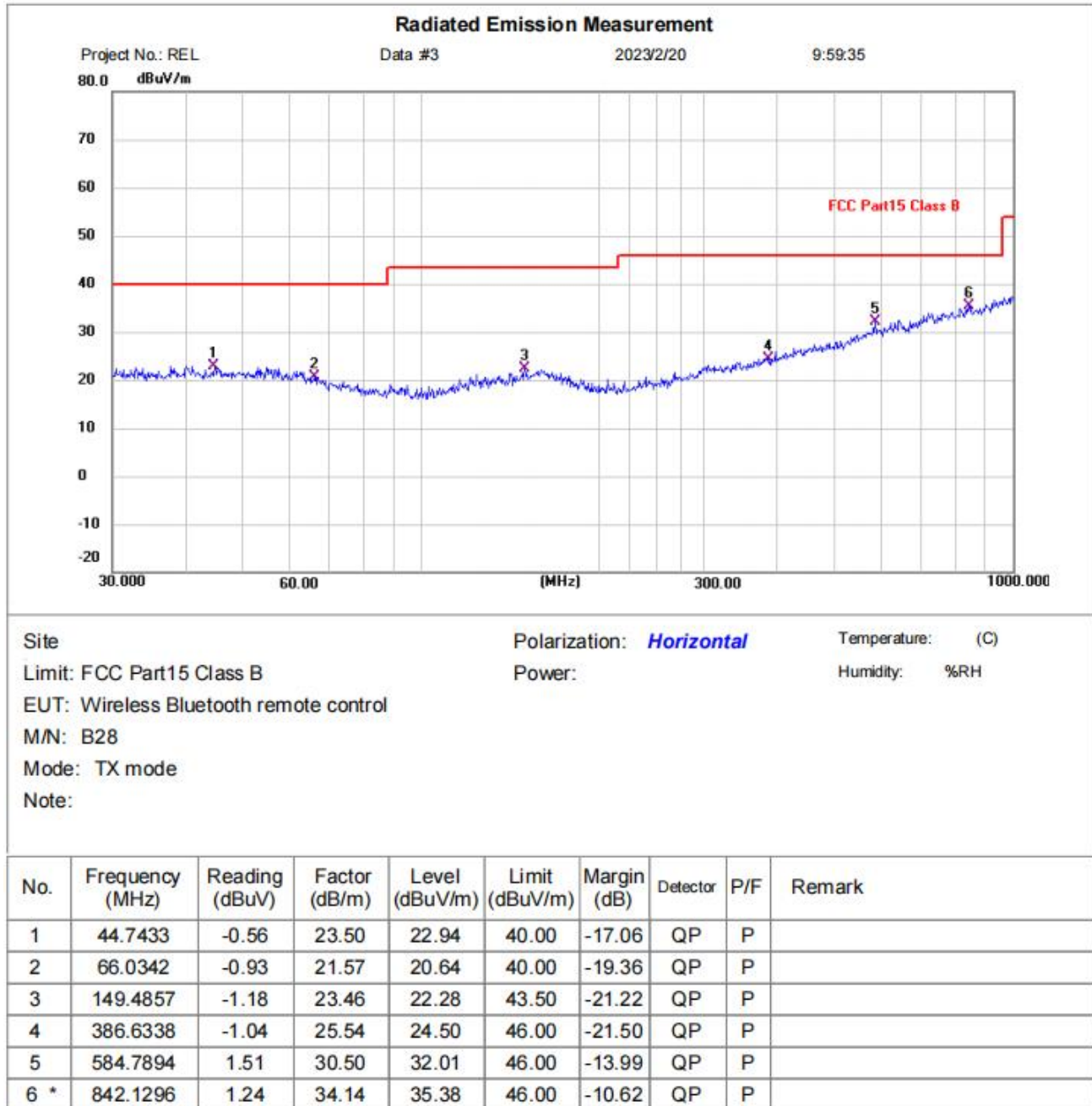
Remark:

- 1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:  
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor
- 3) Scan from 9kHz to 25GHz, the disturbance above 12.75GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. fundamental frequency is blocked by filter, and only spurious emission is shown.
- 4) For frequencies above 1GHz, the field strength limits 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 the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

## 11.4 TEST DATA

Below 1GHz

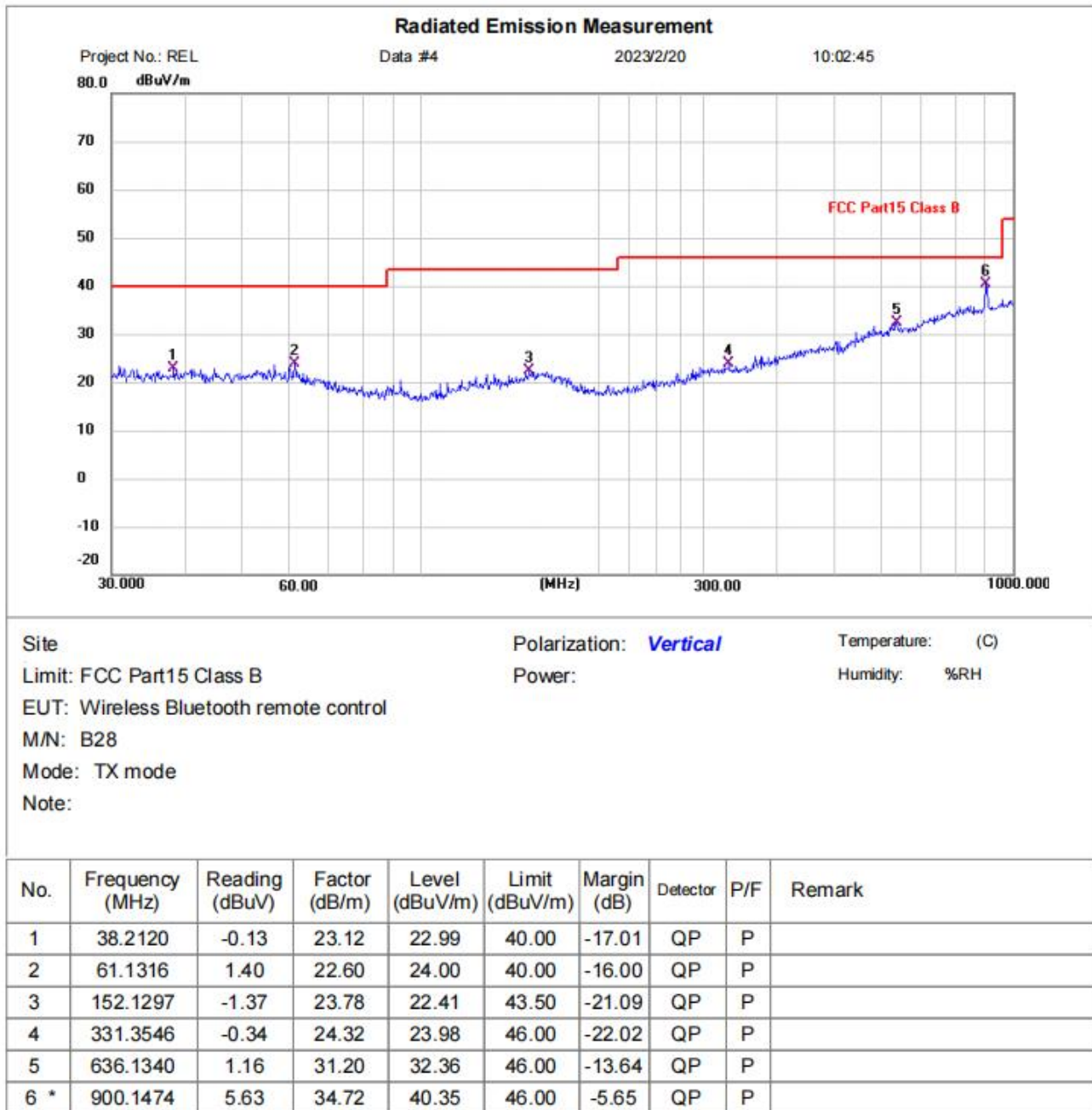
[TestMode: TX]; [Polarity: Horizontal]



**Test Result: Pass**



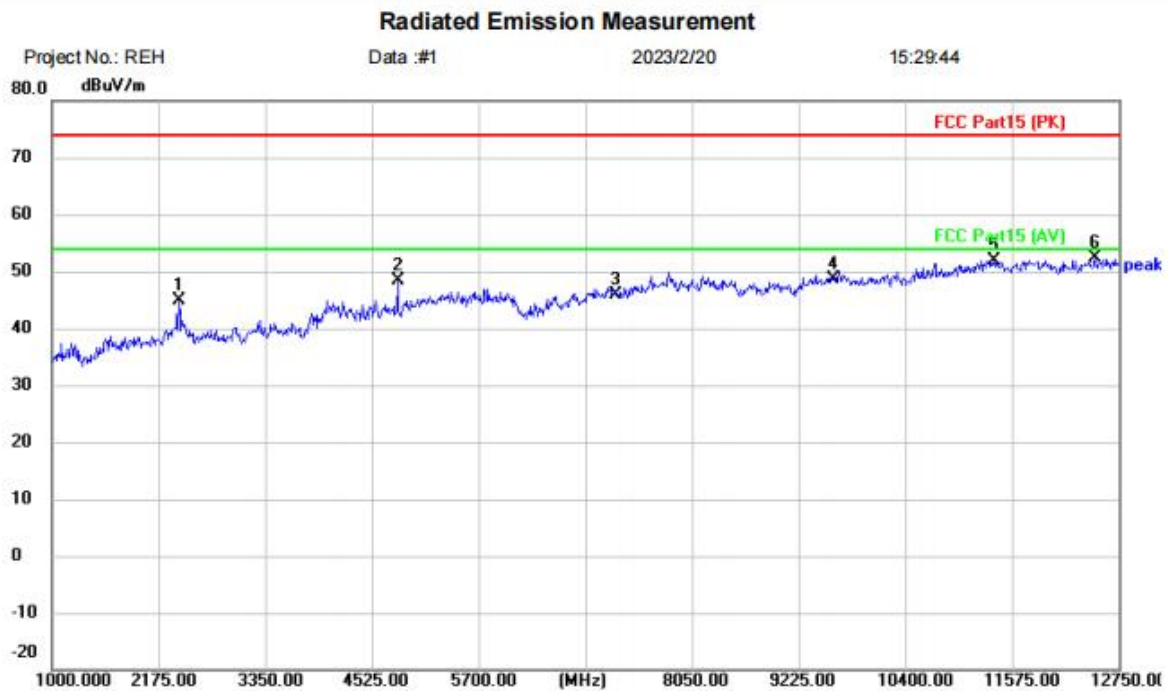
[TestMode: TX]; [Polarity: Vertical]



**Test Result: Pass**

Above 1GHz:

[TestMode: TX low channel]; [Polarity: Horizontal]

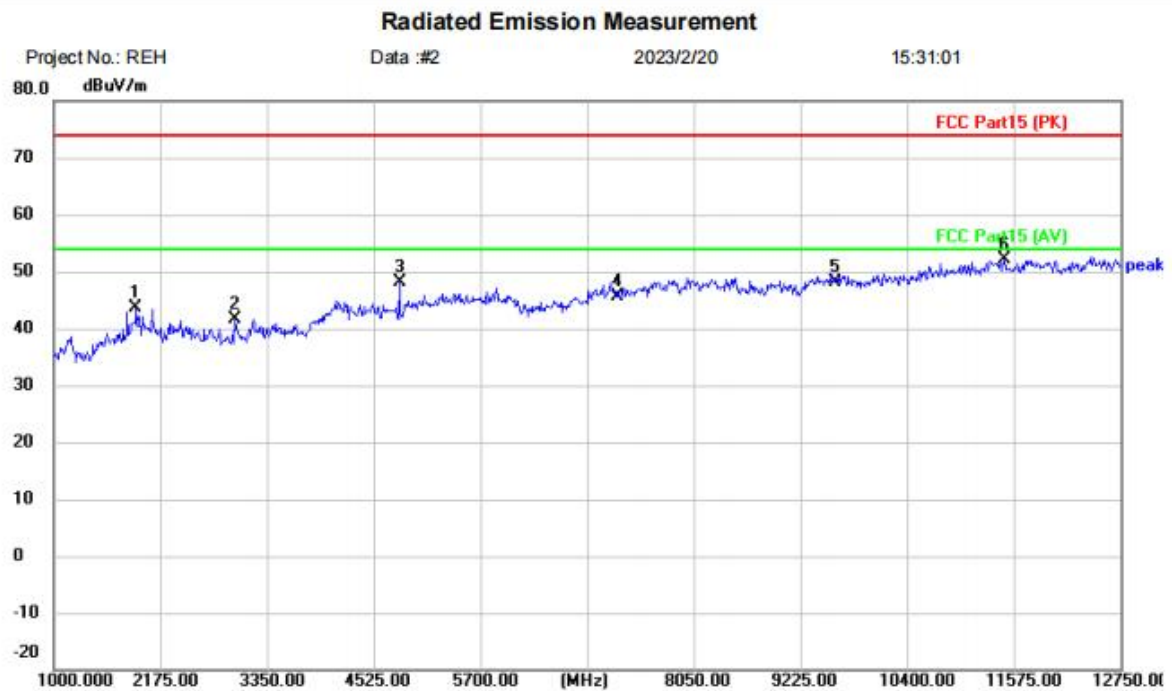


Site:      Polarization: **Horizontal**      Temperature: (C)  
Limit: FCC Part15 (PK)      Power:      Humidity: %RH  
EUT: Wireless Bluetooth remote control  
M/N: B28  
Mode: TX-L  
Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2398.250	45.93	-1.14	44.79	74.00	-29.21	peak	
2		4807.000	44.38	4.07	48.45	74.00	-25.55	peak	
3		7206.000	37.96	7.93	45.89	74.00	-28.11	peak	
4		9608.000	37.79	10.90	48.69	74.00	-25.31	peak	
5		11375.250	38.37	13.62	51.99	74.00	-22.01	peak	
6	*	12491.500	38.59	13.87	52.46	74.00	-21.54	peak	

**Test Result: Pass**

[TestMode: TX low channel]; [Polarity: Vertical]



Site      Polarization: **Vertical**      Temperature: (C)

Limit: FCC Part15 (PK)      Power:      Humidity: %RH

EUT: Wireless Bluetooth remote control

M/N: B28

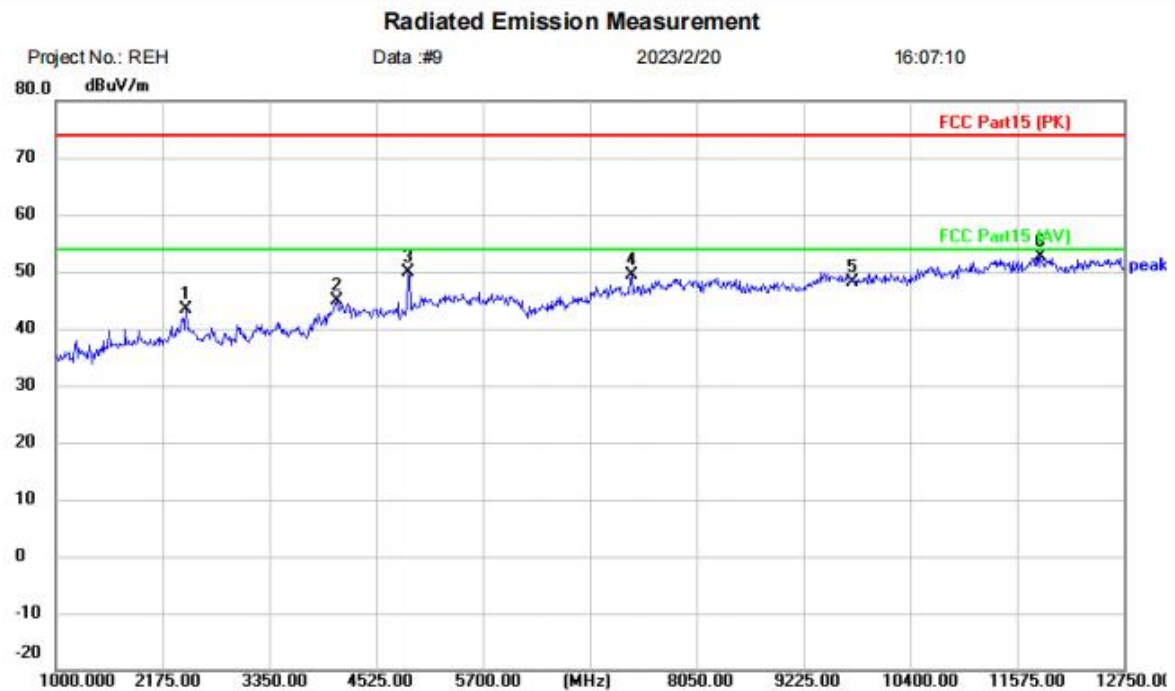
Mode: TX-L

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		1904.750	48.52	-4.78	43.74	74.00	-30.26	peak	
2		2997.500	44.14	-2.52	41.62	74.00	-32.38	peak	
3		4807.000	43.94	4.07	48.01	74.00	-25.99	peak	
4		7206.000	37.70	7.93	45.63	74.00	-28.37	peak	
5		9608.000	37.23	10.90	48.13	74.00	-25.87	peak	
6	*	11469.250	38.35	13.66	52.01	74.00	-21.99	peak	

**Test Result: Pass**

[TestMode: TX middle channel]; [Polarity: Horizontal]



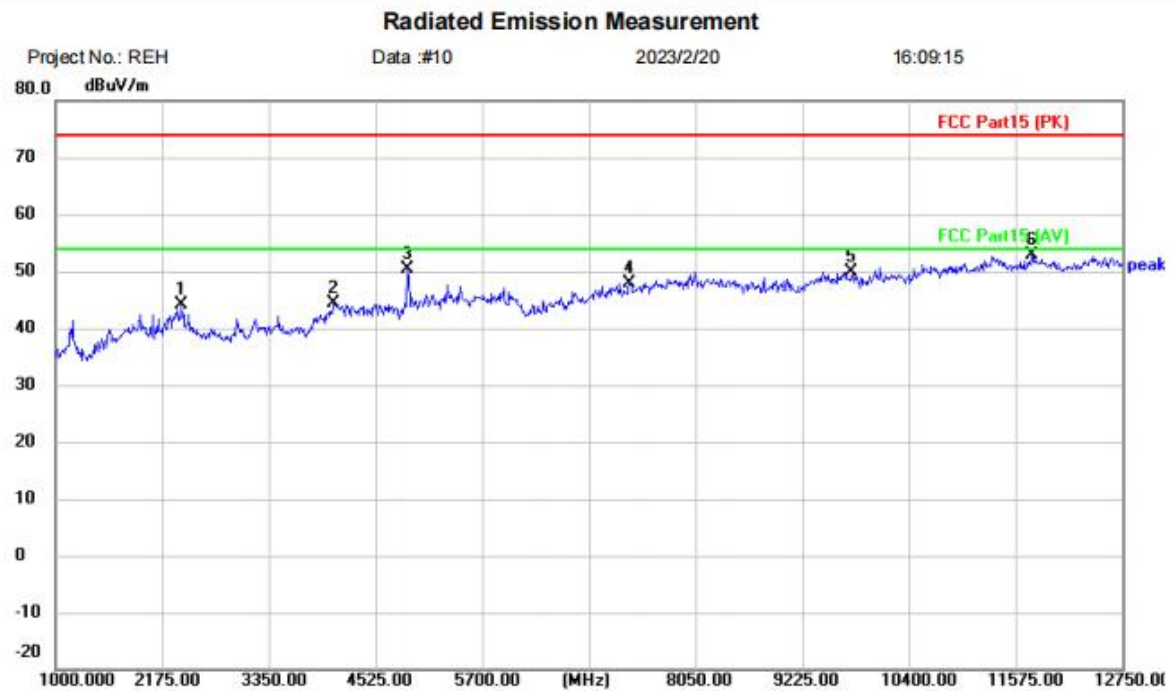
Site  
Limit: FCC Part15 (PK)  
EUT: Wireless Bluetooth remote control  
M/N: B28  
Mode: TX-M  
Note:

Polarization: **Horizontal**      Temperature: (C)  
Power:      Humidity: %RH

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		2433.500	44.82	-1.52	43.30	74.00	-30.70	peak	
2		4090.250	42.17	2.63	44.80	74.00	-29.20	peak	
3		4877.500	45.55	4.35	49.90	74.00	-24.10	peak	
4		7333.250	41.25	8.24	49.49	74.00	-24.51	peak	
5		9768.000	36.84	11.31	48.15	74.00	-25.85	peak	
6	*	11833.500	38.70	13.82	52.52	74.00	-21.48	peak	

**Test Result: Pass**

[TestMode: TX middle channel]; [Polarity: Vertical]



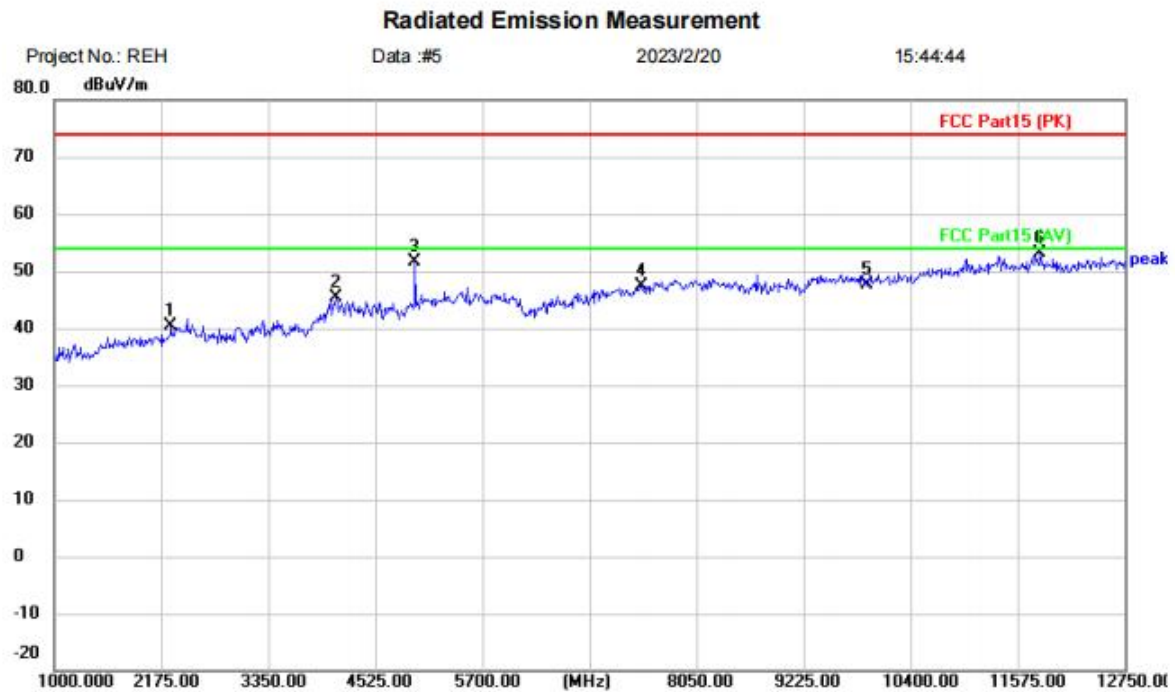
Site:      Polarization: **Vertical**      Temperature: (C)  
Limit: FCC Part15 (PK)      Power:      Humidity: %RH  
EUT: Wireless Bluetooth remote control  
M/N: B28  
Mode: TX-M  
Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2386.500	45.32	-1.11	44.21	74.00	-29.79	peak	
2		4066.750	41.78	2.48	44.26	74.00	-29.74	peak	
3		4877.500	45.99	4.35	50.34	74.00	-23.66	peak	
4		7326.000	39.73	8.21	47.94	74.00	-26.06	peak	
5		9768.000	38.67	11.31	49.98	74.00	-24.02	peak	
6	*	11751.250	39.19	13.79	52.98	74.00	-21.02	peak	

**Test Result: Pass**



[TestMode: TX High channel]; [Polarity: Horizontal]



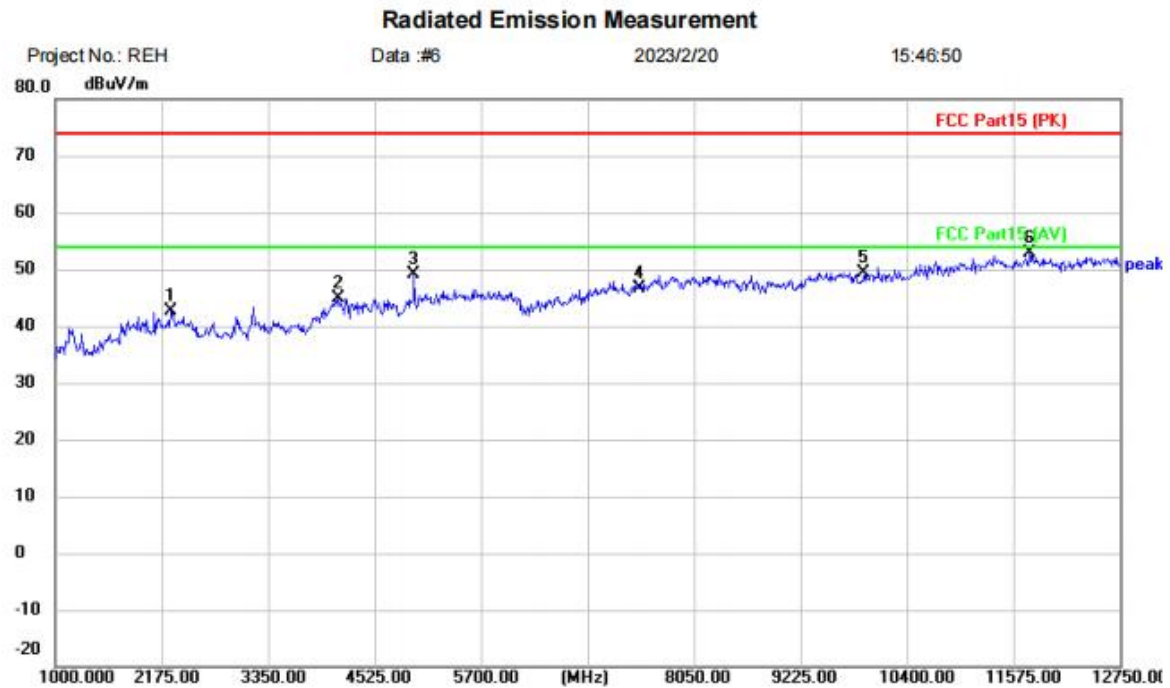
Site  
Limit: FCC Part15 (PK)  
EUT: Wireless Bluetooth remote control  
M/N: B28  
Mode: TX-H  
Note:

Polarization: **Horizontal**      Temperature: (C)  
Power:      Humidity: %RH

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2280.750	43.48	-3.15	40.33	74.00	-33.67	peak	
2		4090.250	42.75	2.63	45.38	74.00	-28.62	peak	
3		4959.750	46.28	5.42	51.70	74.00	-22.30	peak	
4		7440.000	38.82	8.48	47.30	74.00	-26.70	peak	
5		9920.000	36.01	11.69	47.70	74.00	-26.30	peak	
6	*	11821.750	39.27	13.82	53.09	74.00	-20.91	peak	

**Test Result: Pass**

[TestMode: TX High channel]; [Polarity: Vertical]



Site:      Polarization: **Vertical**      Temperature: (C)  
Limit: FCC Part15 (PK)      Power:      Humidity: %RH  
EUT: Wireless Bluetooth remote control  
M/N: B28  
Mode: TX-H  
Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2280.750	45.84	-3.15	42.69	74.00	-31.31	peak	
2		4125.500	41.57	3.34	44.91	74.00	-29.09	peak	
3		4959.750	43.81	5.42	49.23	74.00	-24.77	peak	
4		7440.000	38.24	8.48	46.72	74.00	-27.28	peak	
5		9920.000	37.60	11.69	49.29	74.00	-24.71	peak	
6	*	11751.250	39.08	13.79	52.87	74.00	-21.13	peak	

**Test Result: Pass**

## 12 ANTENNA REQUIREMENT

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	N/A

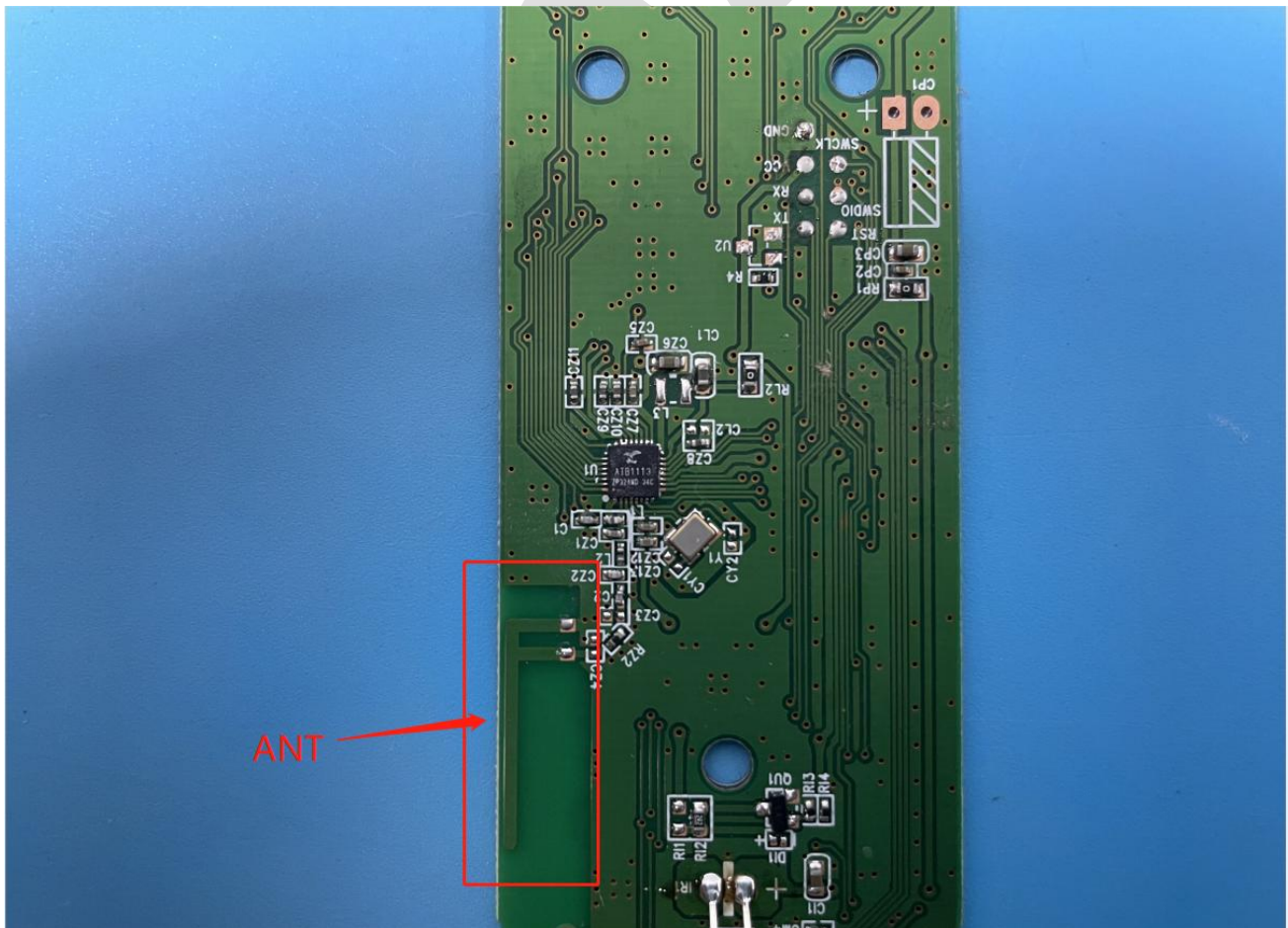
### 12.1 CONCLUSION

Standard 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 an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 2dBi.





### 13 RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS

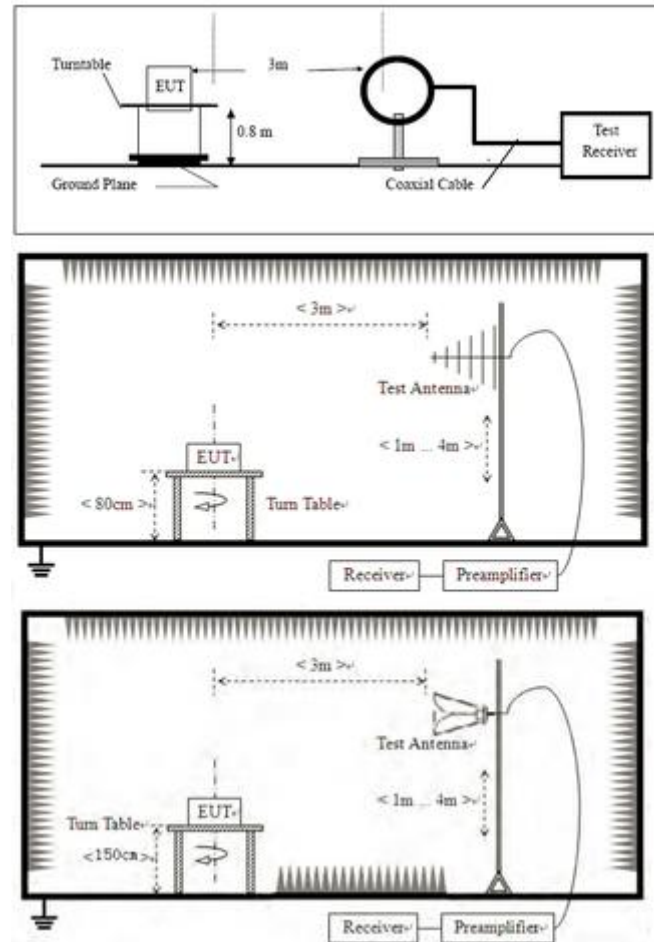
<b>Test Standard</b>	47 CFR Part 15, Subpart C 15.247
<b>Test Method</b>	ANSI C63.10 (2013) Section 6.10.5
<b>Test Mode (Pre-Scan)</b>	TX
<b>Test Mode (Final Test)</b>	TX
<b>Tester</b>	Charlie
<b>Temperature</b>	25°C
<b>Humidity</b>	60%

#### 13.1 LIMITS

<b>Frequency(MHz)</b>	<b>Field strength(microvolts/meter)</b>	<b>Measurement distance(meters)</b>
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

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, 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.

### 13.2 BLOCK DIAGRAM OF TEST SETUP



### 13.3 PROCEDURE

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height 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.
- 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

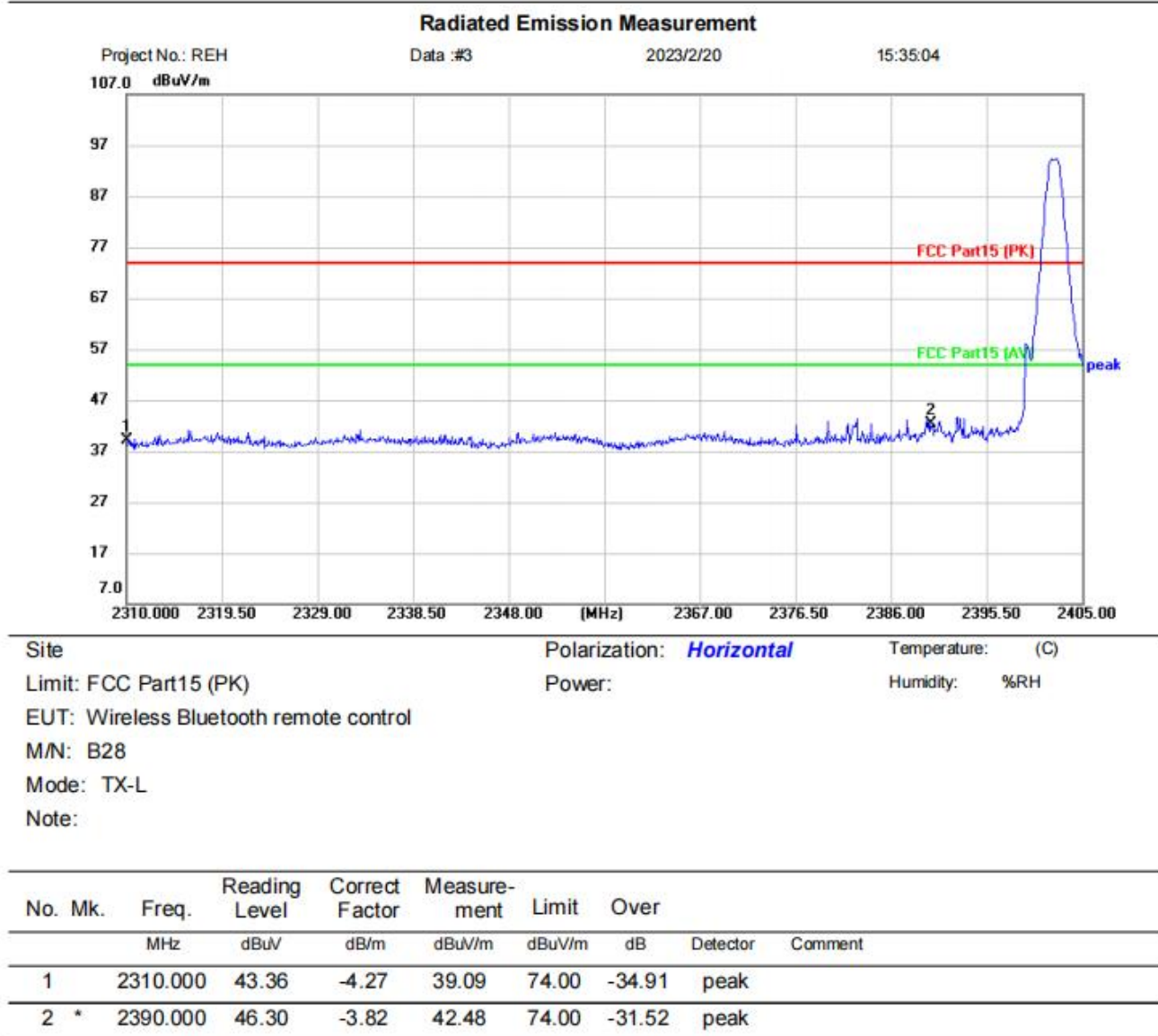
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 1:  $\text{Level} = \text{Read Level} + \text{Cable Loss} + \text{Antenna Factor} - \text{Preamp Factor}$

Remark 2: For frequencies above 1GHz, the field strength limits 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 the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

### 13.4 TEST DATA

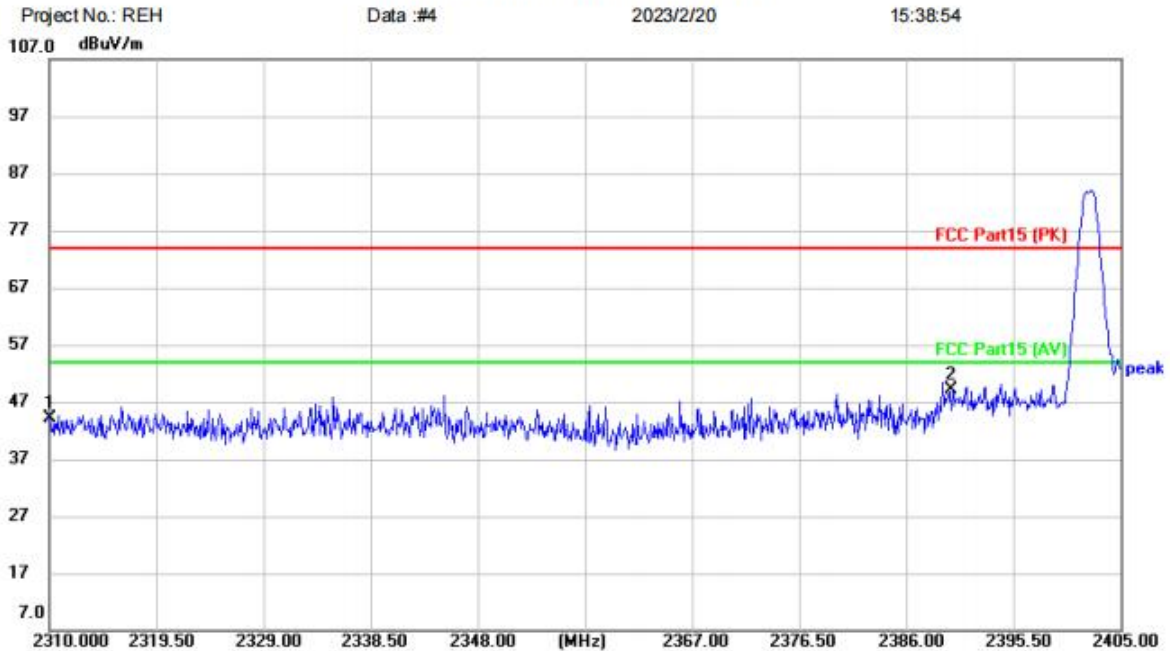
[TestMode: TX low channel]; [Polarity: Horizontal]



**Test Result: Pass**

[TestMode:TX low channel]; [Polarity: Vertical]

### Radiated Emission Measurement

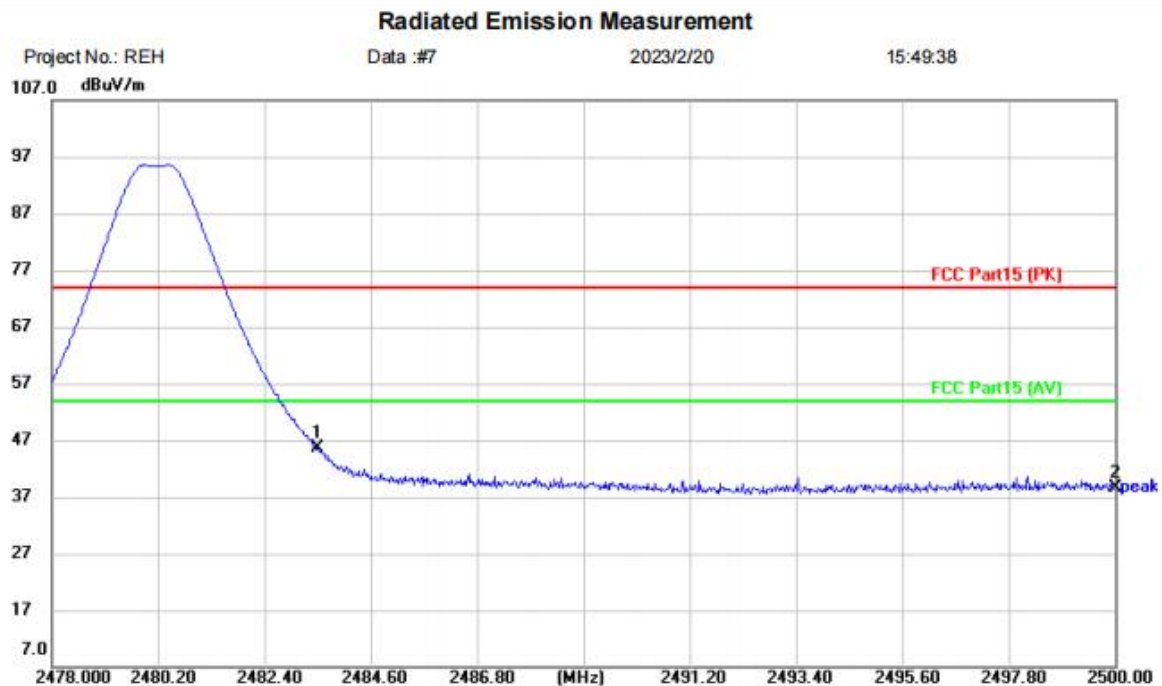


Site Polarization: **Vertical** Temperature: (C)  
 Limit: FCC Part15 (PK) Power: Humidity: %RH  
 EUT: Wireless Bluetooth remote control  
 M/N: B28  
 Mode: TX-L  
 Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2310.000	48.29	-4.27	44.02	74.00	-29.98	peak	
2	*	2390.000	53.00	-3.82	49.18	74.00	-24.82	peak	

**Test Result: Pass**

[TestMode: TX High channel]; [Polarity: Horizontal]



Site      Polarization: **Horizontal**      Temperature: (C)

Limit: FCC Part15 (PK)      Power:      Humidity: %RH

EUT: Wireless Bluetooth remote control

M/N: B28

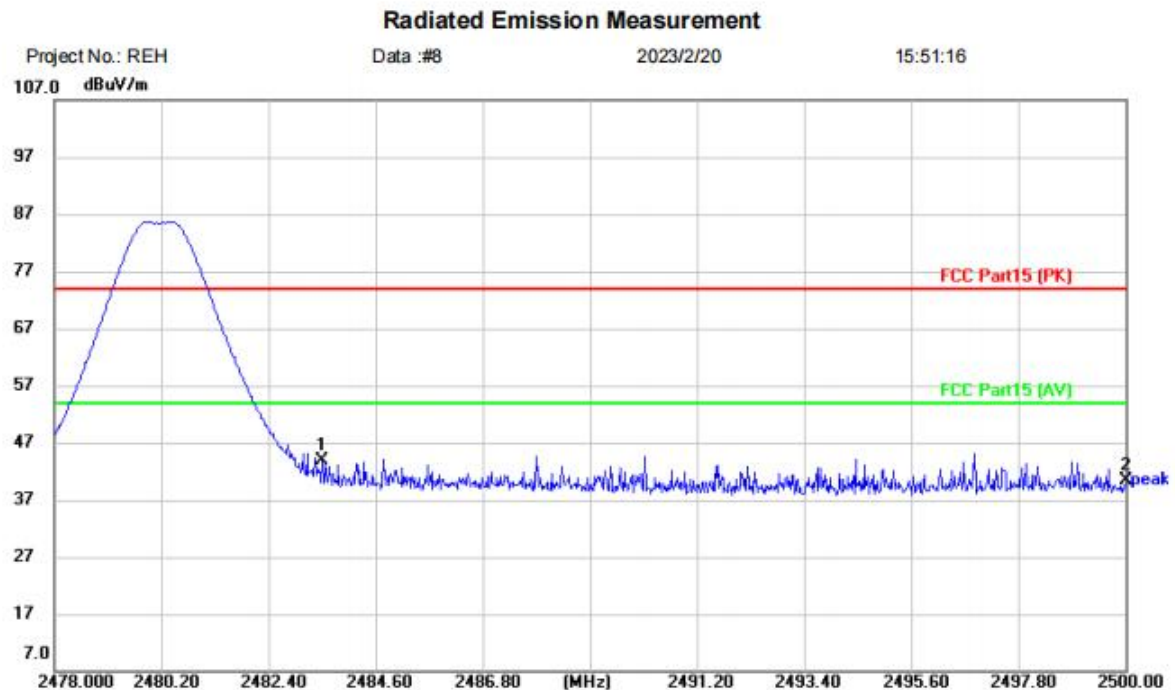
Mode: TX-H

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	2483.500	49.66	-3.96	45.70	74.00	-28.30	peak	
2		2500.000	42.73	-4.00	38.73	74.00	-35.27	peak	

**Test Result: Pass**

[TestMode:TX High channel]; [Polarity: Vertical]



Site  
Limit: FCC Part15 (PK)  
EUT: Wireless Bluetooth remote control  
M/N: B28  
Mode: TX-H  
Note:

Polarization: **Vertical**      Temperature: (C)  
Power:      Humidity: %RH

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	2483.500	47.75	-3.96	43.79	74.00	-30.21	peak	
2		2500.000	44.43	-4.00	40.43	74.00	-33.57	peak	

**Test Result: Pass**



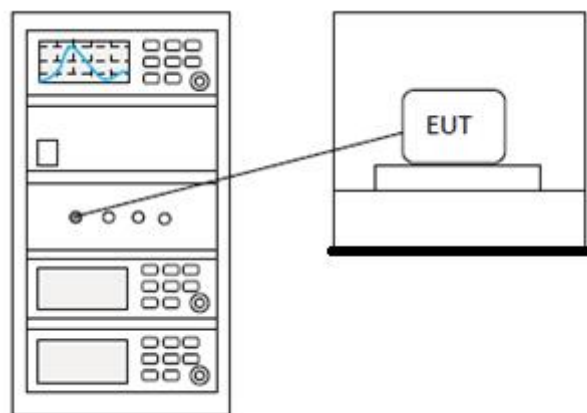
## 14 CONDUCTED SPURIOUS EMISSIONS

<b>Test Standard</b>	47 CFR Part 15, Subpart C 15.247
<b>Test Method</b>	ANSI C63.10 (2013) Section 7.8.6 & Section 11.11
<b>Test Mode (Pre-Scan)</b>	TX
<b>Test Mode (Final Test)</b>	TX
<b>Tester</b>	Charlie
<b>Temperature</b>	25°C
<b>Humidity</b>	60%

### 14.1 LIMITS

<b>Limit:</b>	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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) (see §15.205(c)).
---------------	--

### 14.2 BLOCK DIAGRAM OF TEST SETUP





### 14.3 TEST DATA

**Pass: Please Refer To Appendix: Appendix1 For Details**

BlueAsia

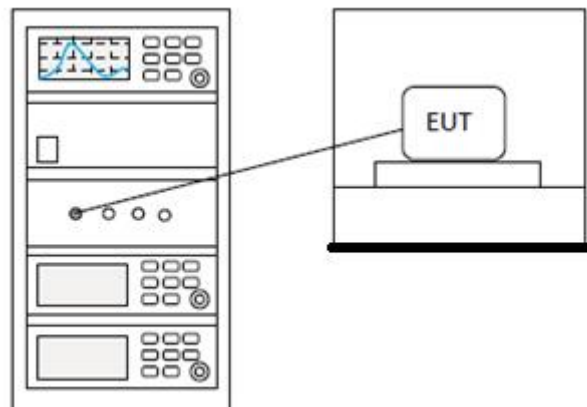
## 15 POWER SPECTRUM DENSITY

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 11.10.2
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Charlie
Temperature	25°C
Humidity	60%

### 15.1 LIMITS

**Limit:**  $\leq 8\text{dBm}$  in any 3 kHz band during any time interval of continuous transmission

### 15.2 BLOCK DIAGRAM OF TEST SETUP



### 15.3 TEST DATA

**Pass: Please Refer To Appendix: Appendix1 For Details**

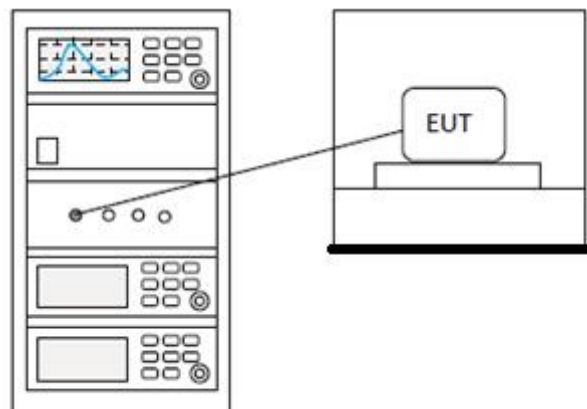
## 16 CONDUCTED PEAK OUTPUT POWER

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.5
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Charlie
Temperature	25°C
Humidity	60%

### 16.1 LIMITS

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for $\geq 50$ hopping channels
	0.25 for $25 \leq \text{hopping channels} < 50$
	1 for digital modulation
2400-2483.5	1 for $\geq 75$ non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

### 16.2 BLOCK DIAGRAM OF TEST SETUP



**16.3 TEST DATA**

**Pass: Please Refer To Appendix: Appendix1 For Details**

BlueAsia

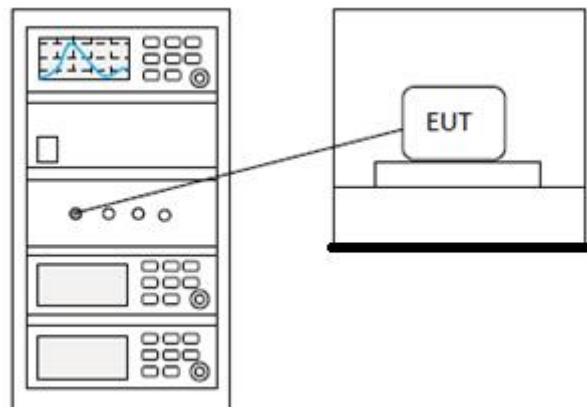
## 17 MINIMUM 6DB BANDWIDTH

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 11.8.1
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Charlie
Temperature	25°C
Humidity	60%

### 17.1 LIMITS

Limit:	$\geq 500$ kHz
--------	----------------

### 17.2 BLOCK DIAGRAM OF TEST SETUP



### 17.3 TEST DATA

**Pass: Please Refer To Appendix: Appendix1 For Details**

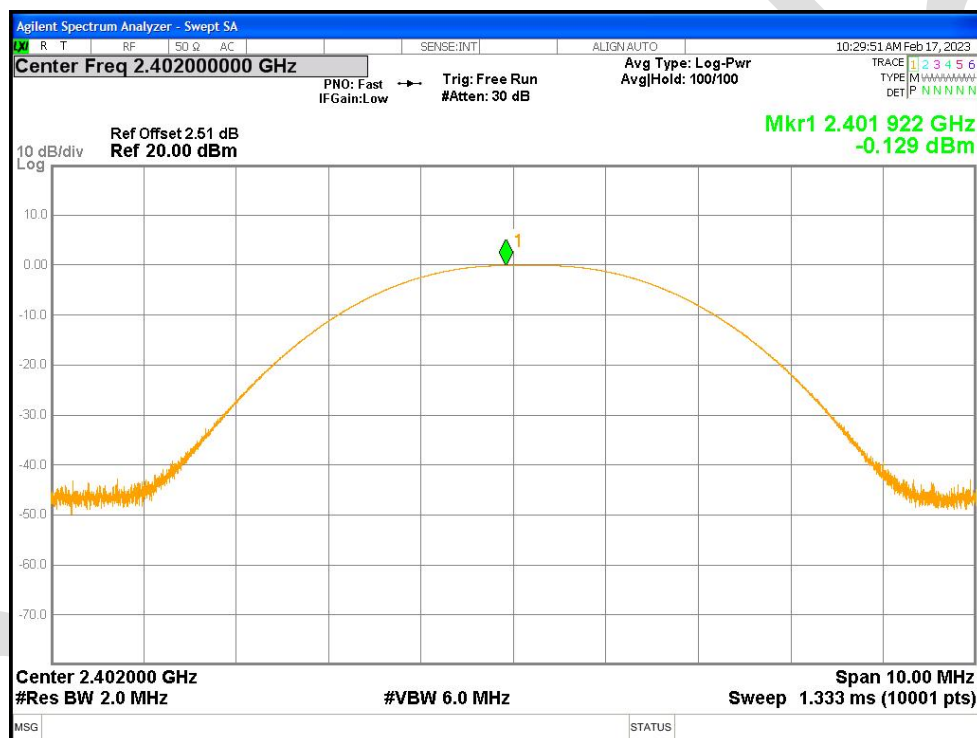
## 18 APPENDIX

### Appendix1

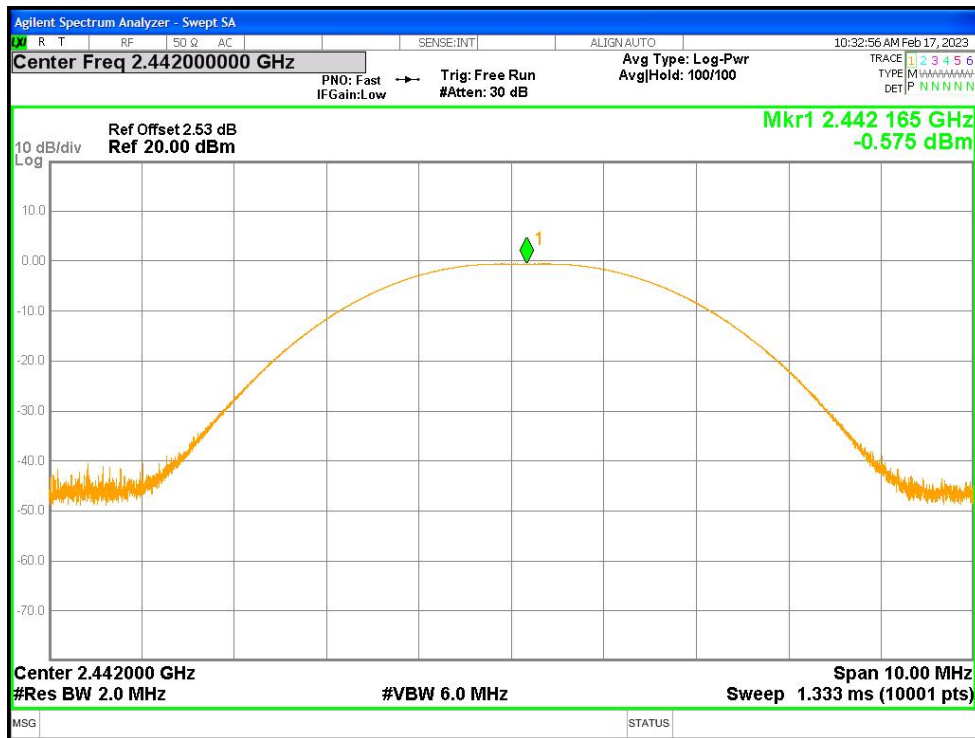
#### 18.1 MAXIMUM CONDUCTED OUTPUT POWER

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	Ant1	-0.129	30	Pass
NVNT	BLE 1M	2442	Ant1	-0.575	30	Pass
NVNT	BLE 1M	2480	Ant1	0.215	30	Pass

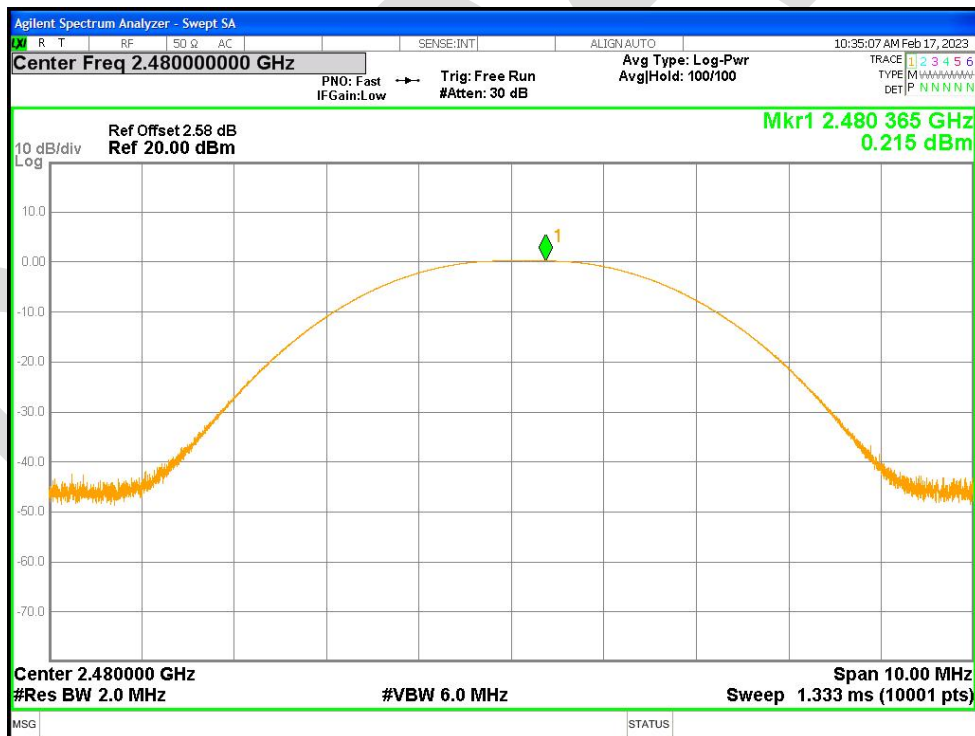
Power NVNT BLE 1M 2402MHz Ant1



Power NVNT BLE 1M 2442MHz Ant1



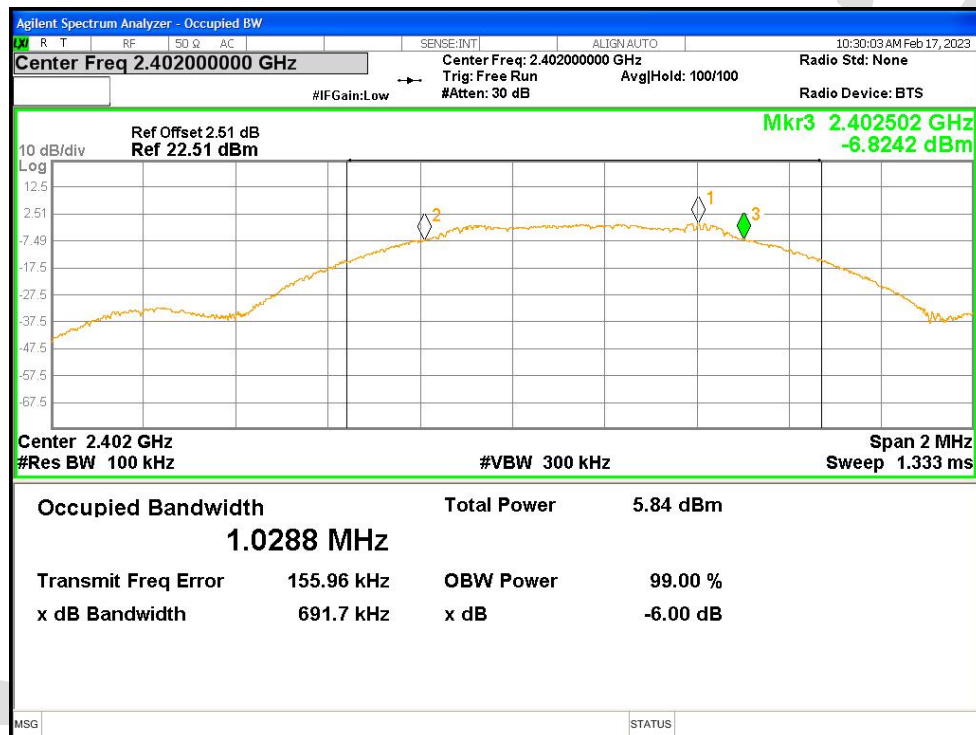
Power NVNT BLE 1M 2480MHz Ant1



## 18.2 -6DB BANDWIDTH

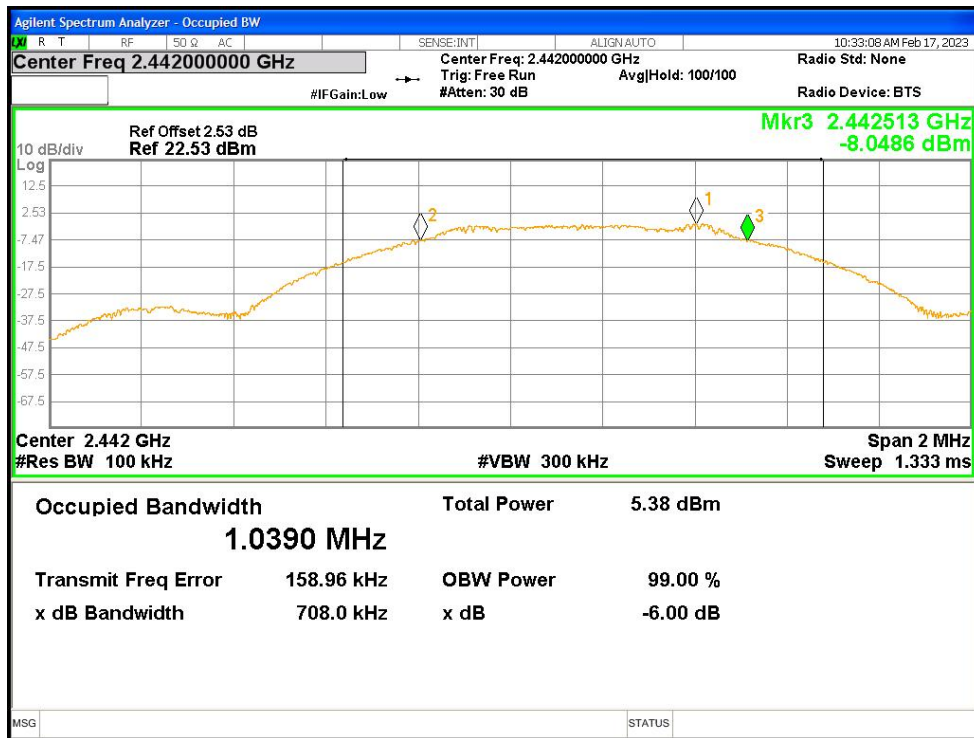
Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE 1M	2402	Ant1	0.692	0.5	Pass
NVNT	BLE 1M	2442	Ant1	0.708	0.5	Pass
NVNT	BLE 1M	2480	Ant1	0.697	0.5	Pass

-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1

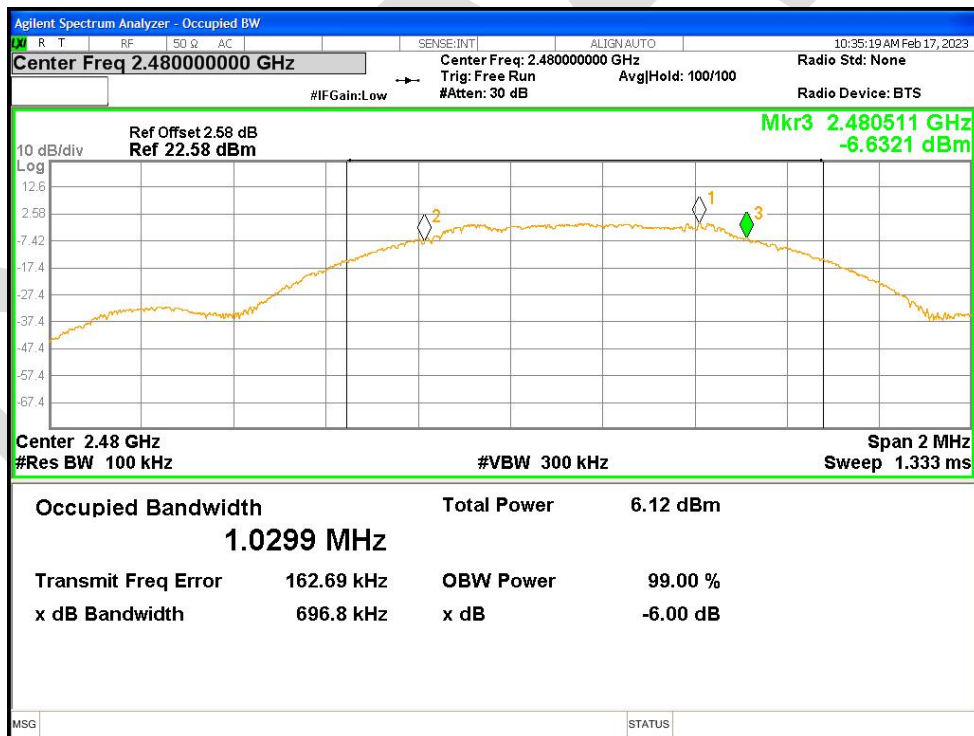


-6dB Bandwidth NVNT BLE 1M 2442MHz Ant1





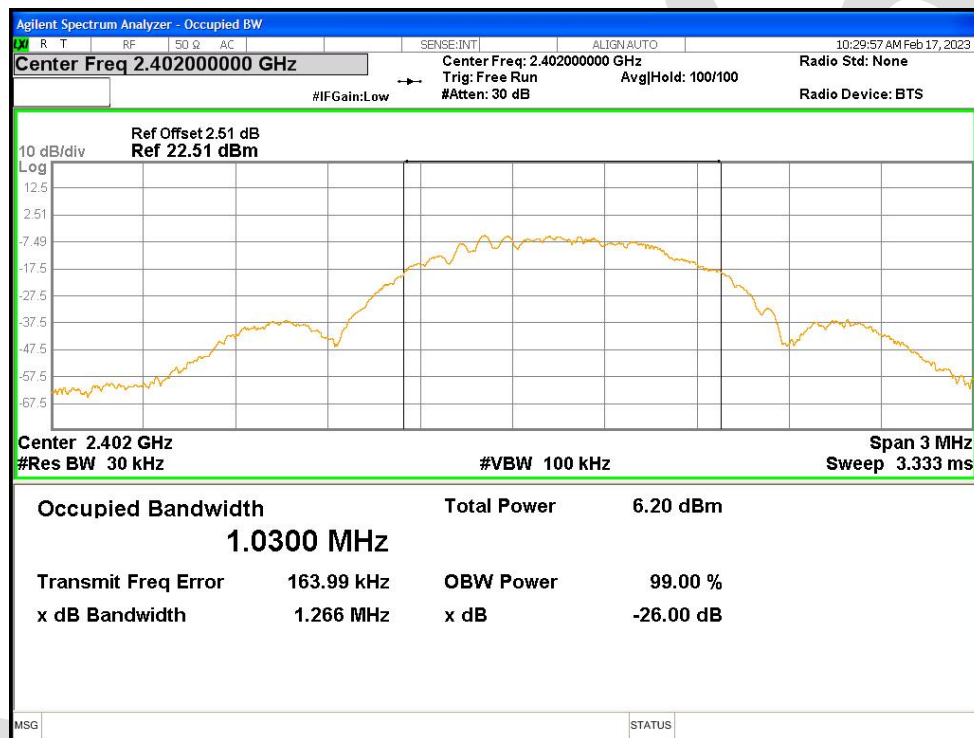
-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1



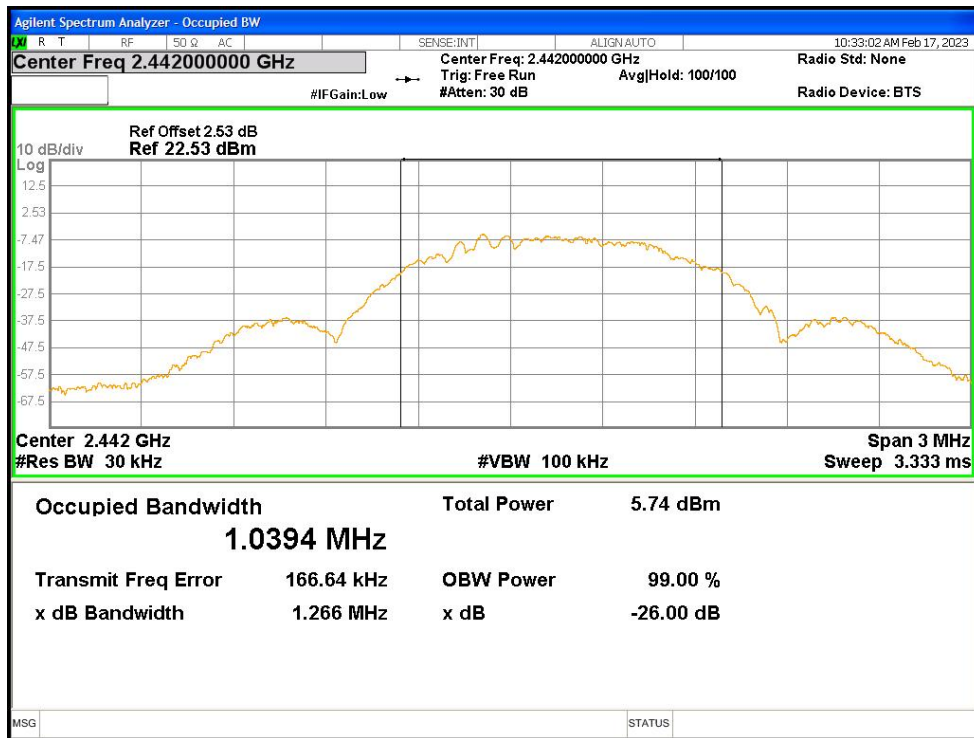
### 18.3 OCCUPIED CHANNEL BANDWIDTH

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	BLE 1M	2402	Ant1	1.0300
NVNT	BLE 1M	2442	Ant1	1.0394
NVNT	BLE 1M	2480	Ant1	1.0315

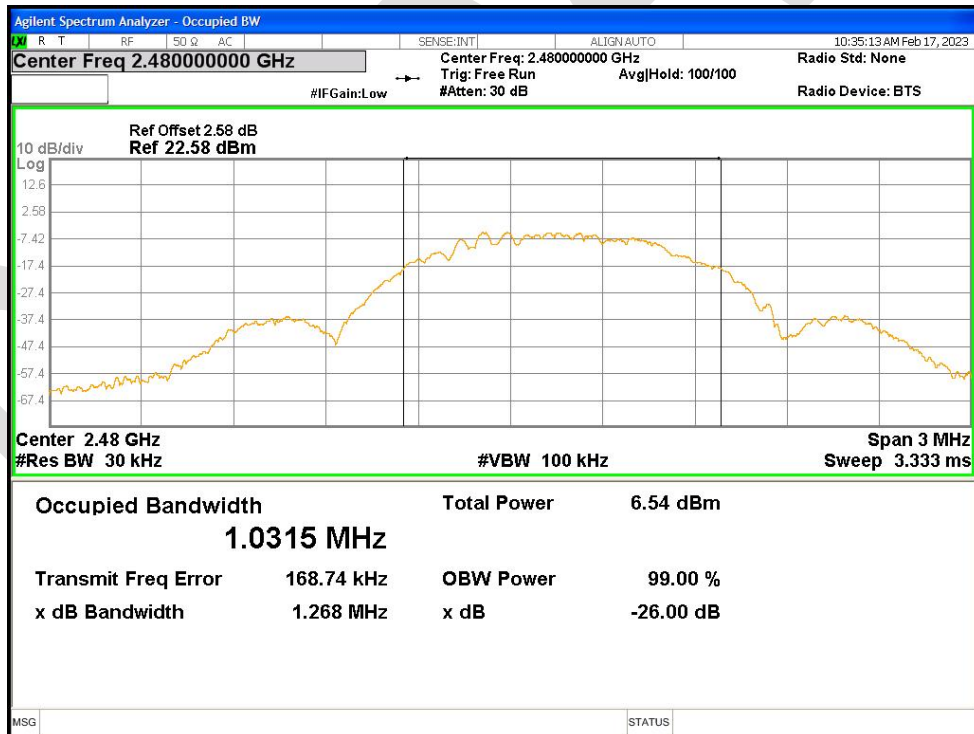
OBW NVNT BLE 1M 2402MHz Ant1



OBW NVNT BLE 1M 2442MHz Ant1



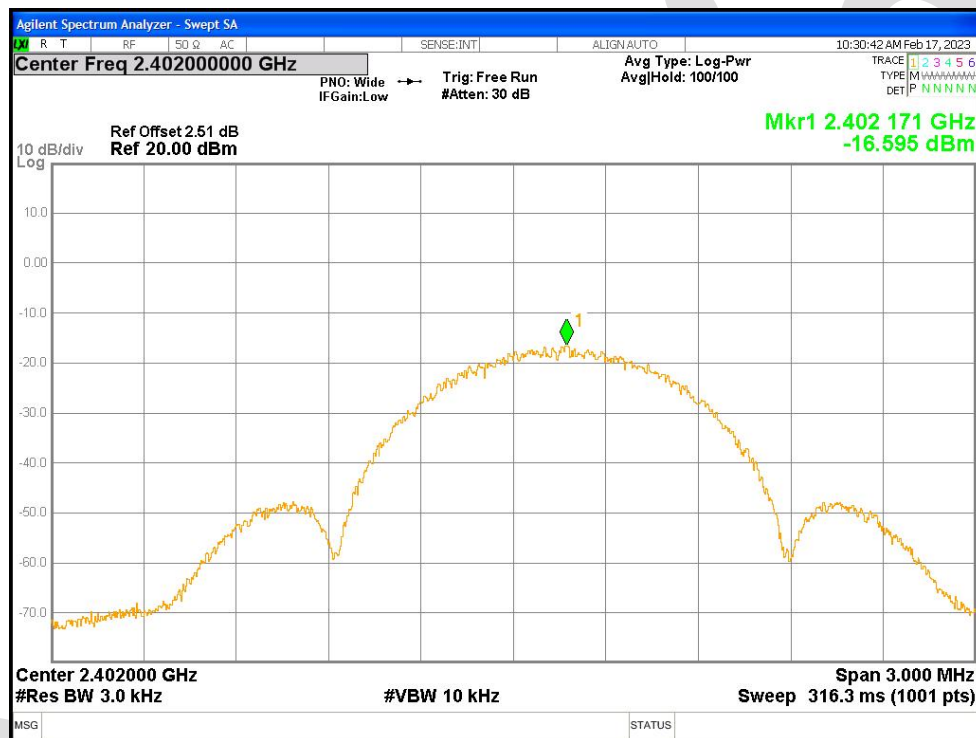
OBW NVNT BLE 1M 2480MHz Ant1



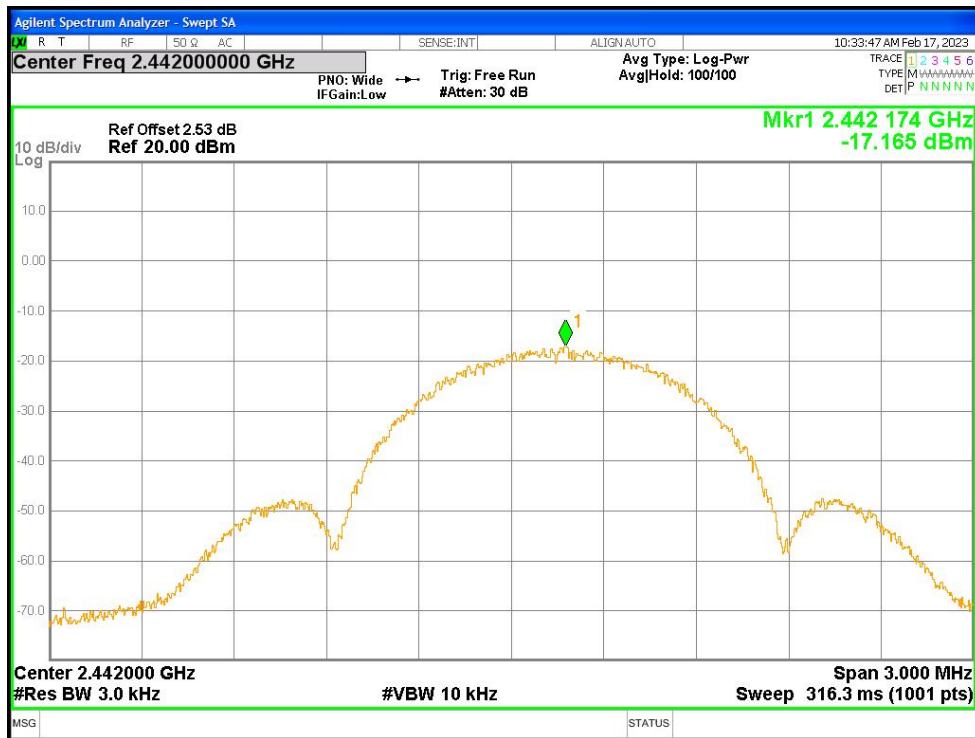
#### 18.4 MAXIMUM POWER SPECTRAL DENSITY LEVEL

Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	Ant1	-16.595	8	Pass
NVNT	BLE 1M	2442	Ant1	-17.165	8	Pass
NVNT	BLE 1M	2480	Ant1	-16.234	8	Pass

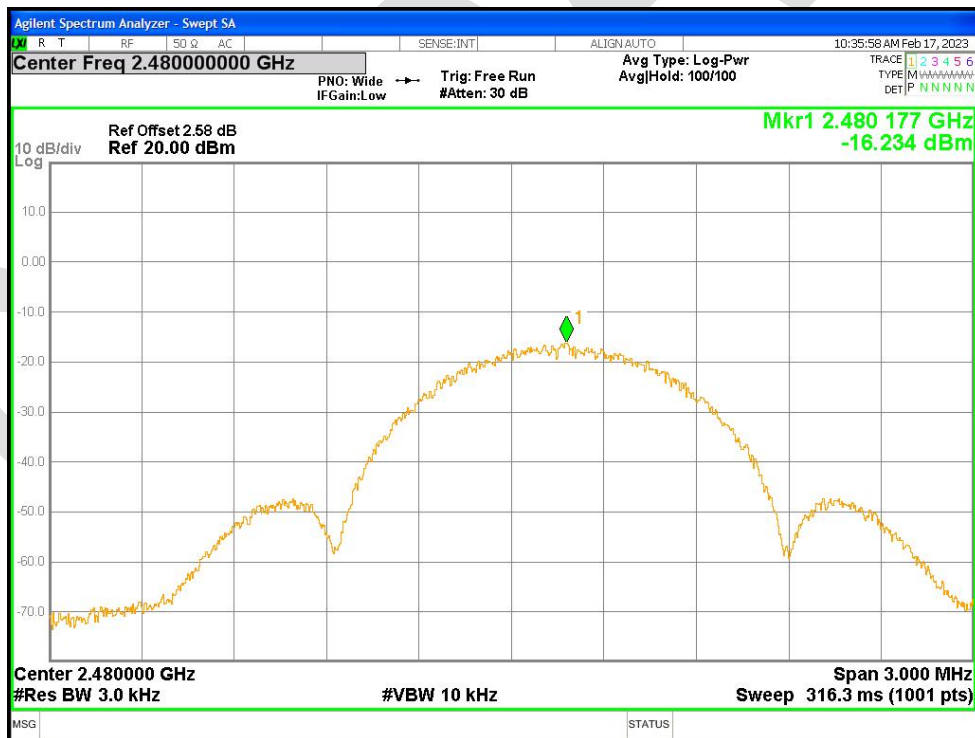
PSD NVNT BLE 1M 2402MHz Ant1



PSD NVNT BLE 1M 2442MHz Ant1



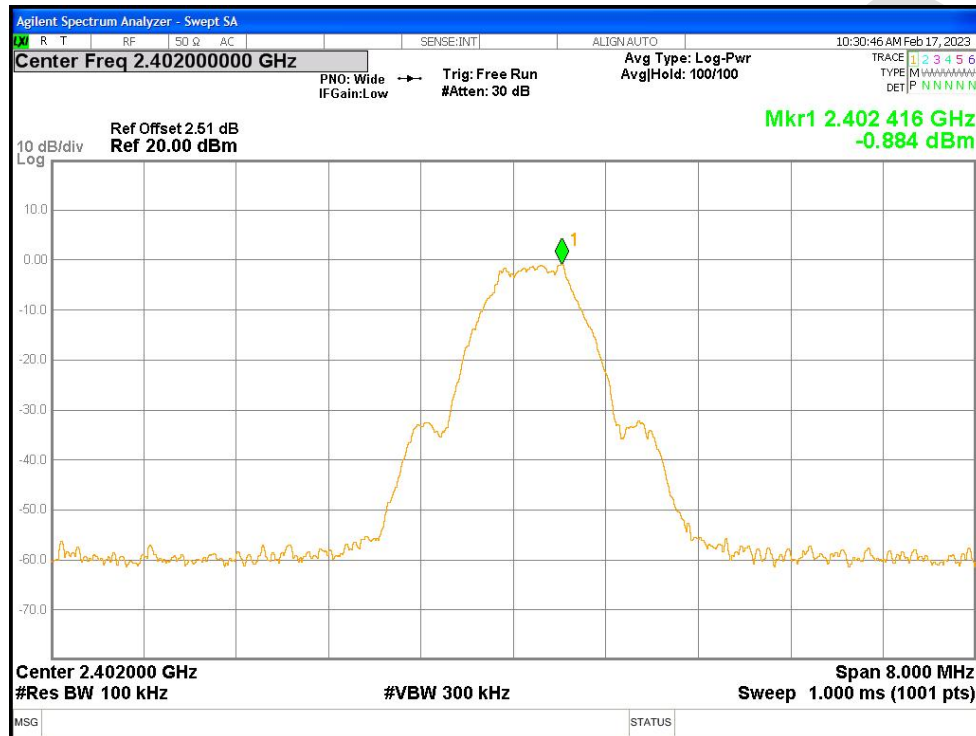
PSD NVNT BLE 1M 2480MHz Ant1



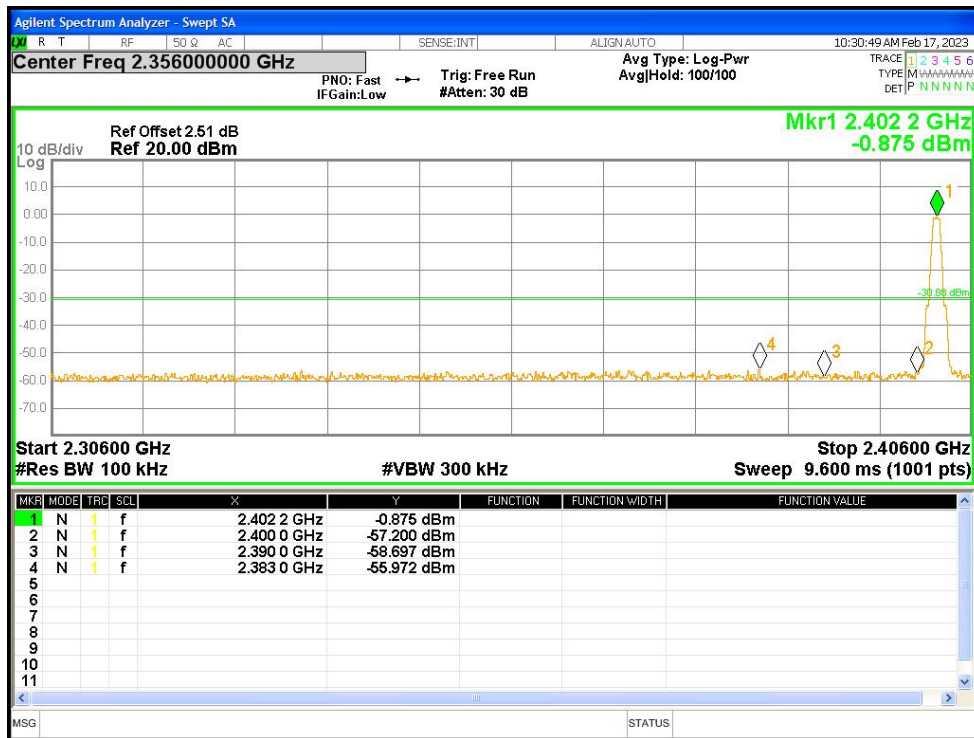
### 18.5 BAND EDGE

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-55.09	-30	Pass
NVNT	BLE 1M	2480	Ant1	-54.86	-30	Pass

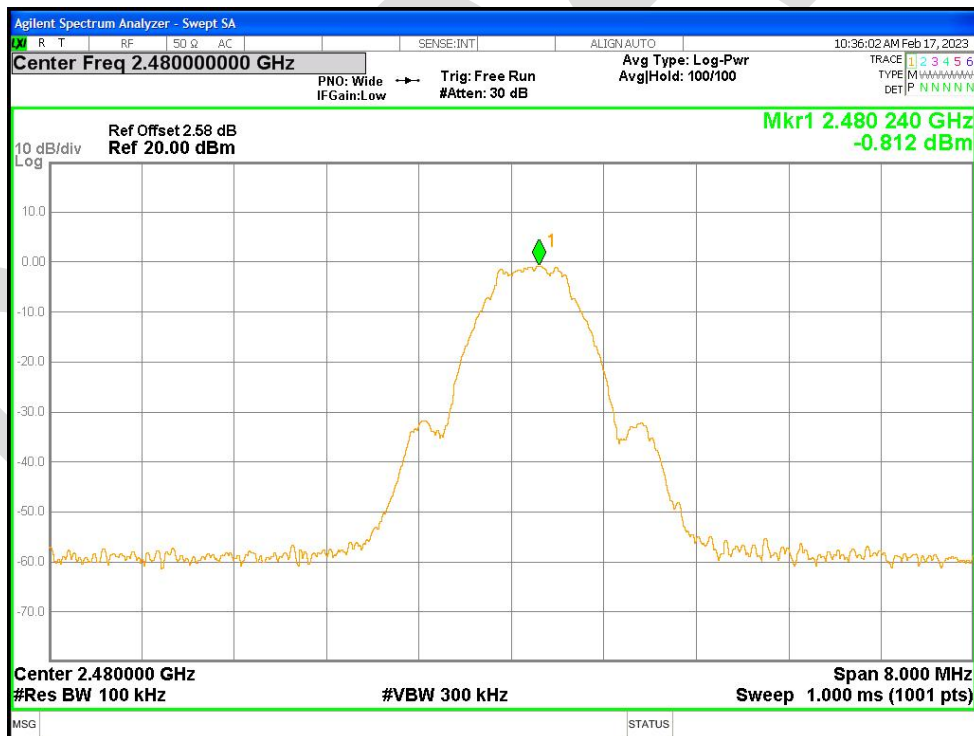
Band Edge NVNT BLE 1M 2402MHz Ant1 Ref



Band Edge NVNT BLE 1M 2402MHz Ant1 Emission

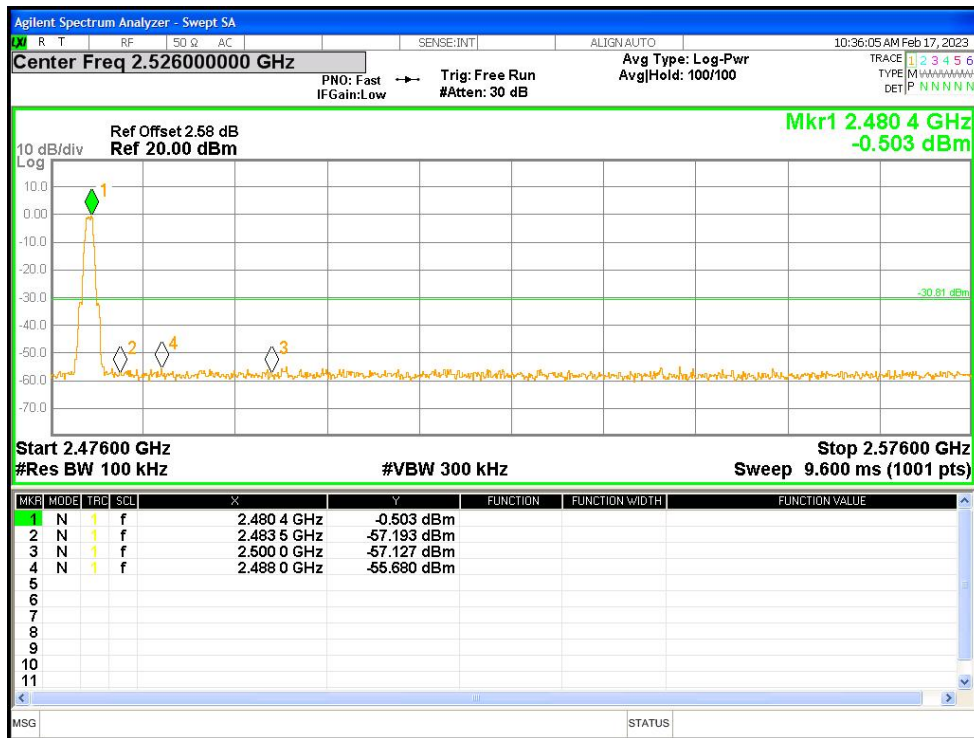


Band Edge NVNT BLE 1M 2480MHz Ant1 Ref



Band Edge NVNT BLE 1M 2480MHz Ant1 Emission

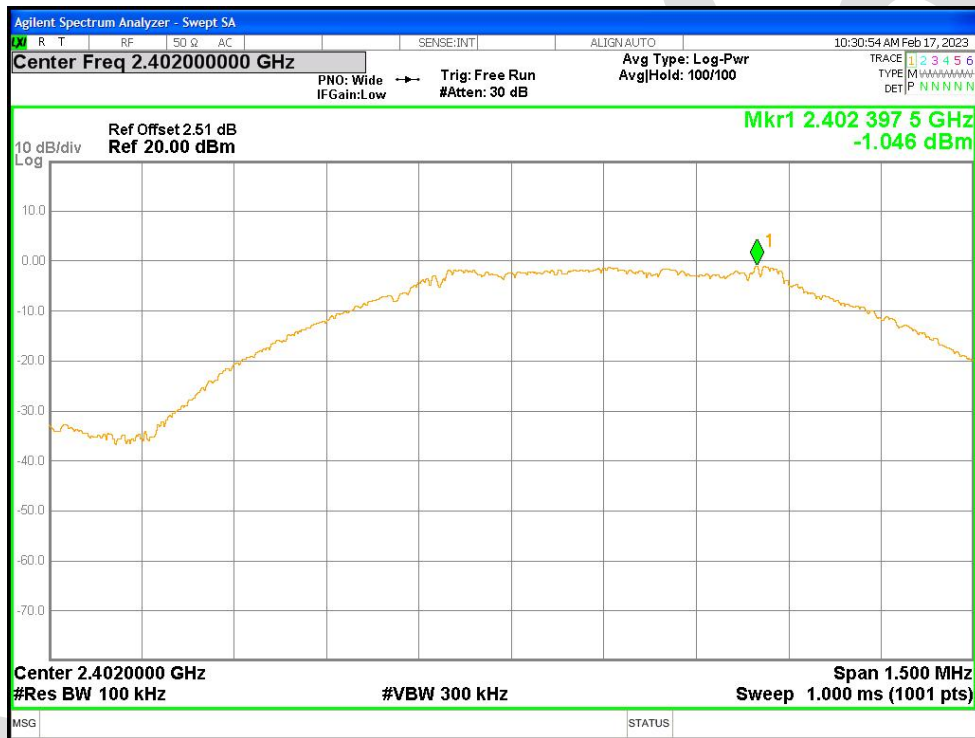




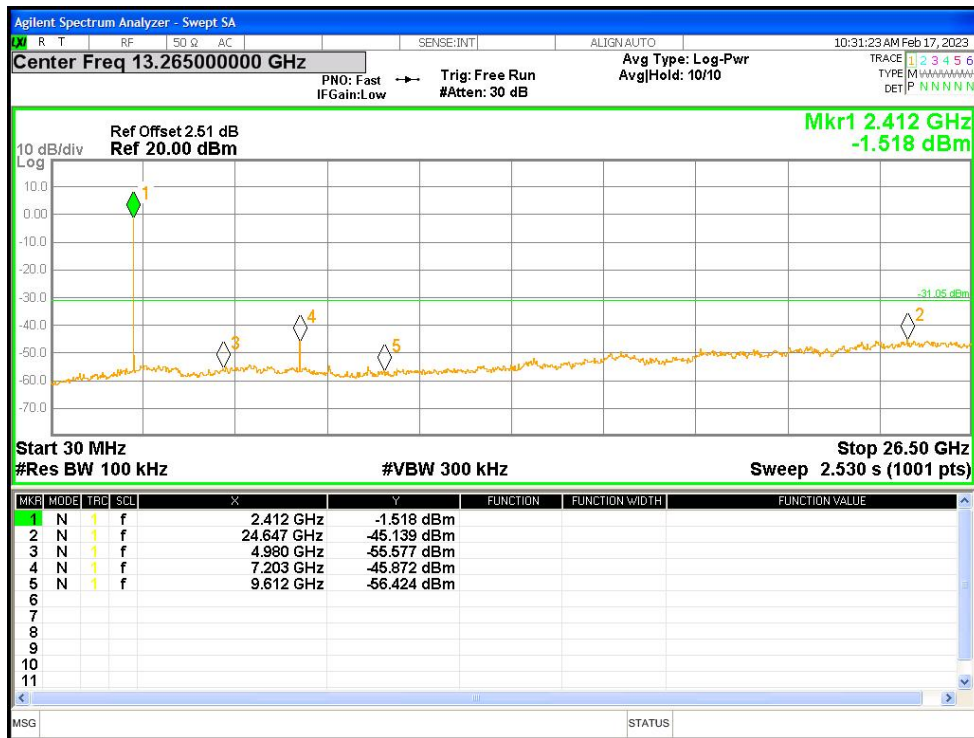
### 18.6 CONDUCTED RF SPURIOUS EMISSION

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-44.08	-30	Pass
NVNT	BLE 1M	2442	Ant1	-43.19	-30	Pass
NVNT	BLE 1M	2480	Ant1	-41.32	-30	Pass

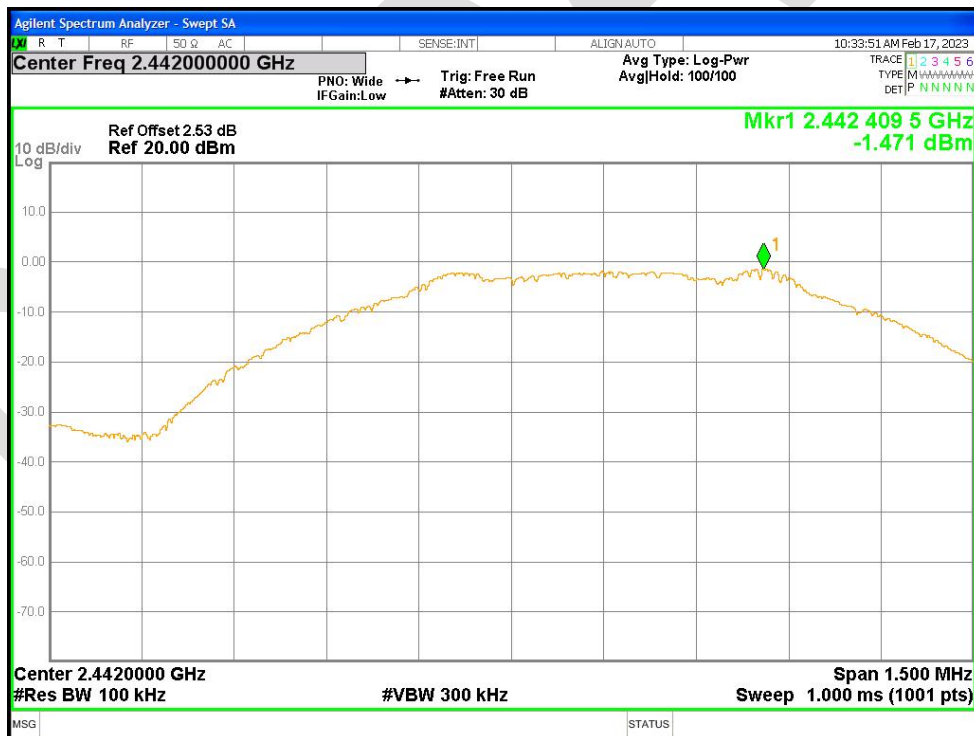
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Ref



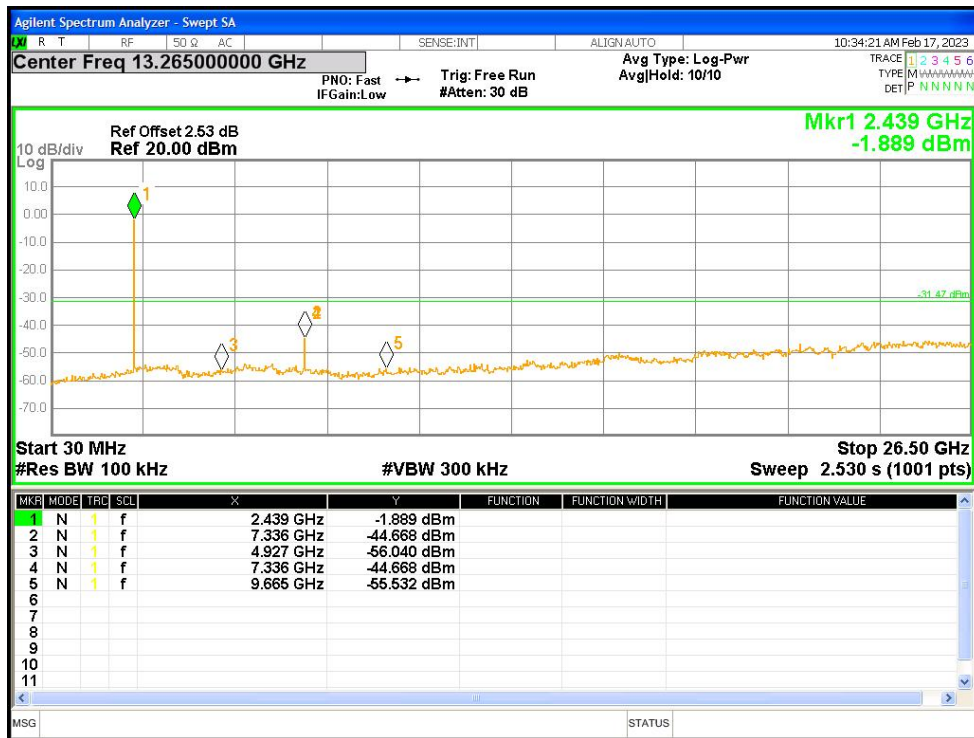
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission



Tx. Spurious NVNT BLE 1M 2442MHz Ant1 Ref



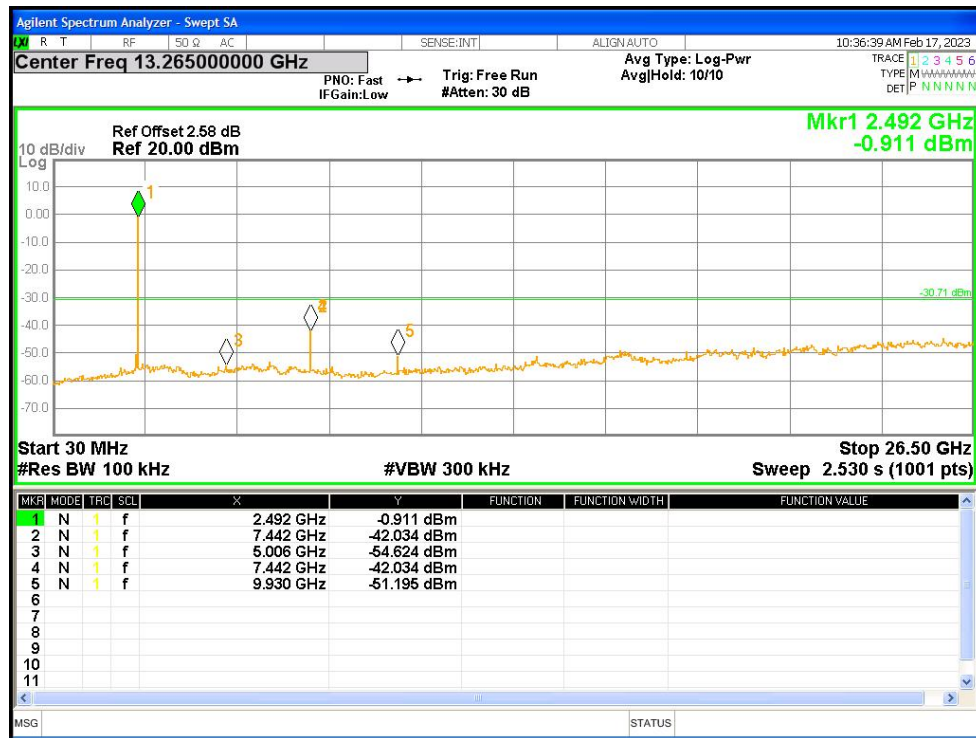
Tx. Spurious NVNT BLE 1M 2442MHz Ant1 Emission



Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Ref



Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission



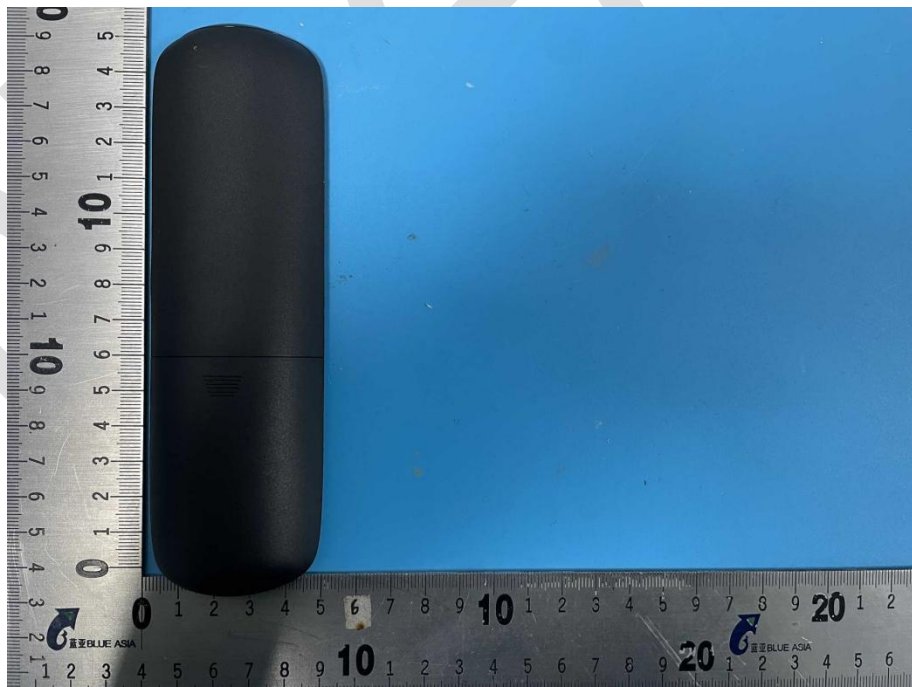


## APPENDIX A: PHOTOGRAPHS OF TEST SETUP

### Radiated Spurious Emissions



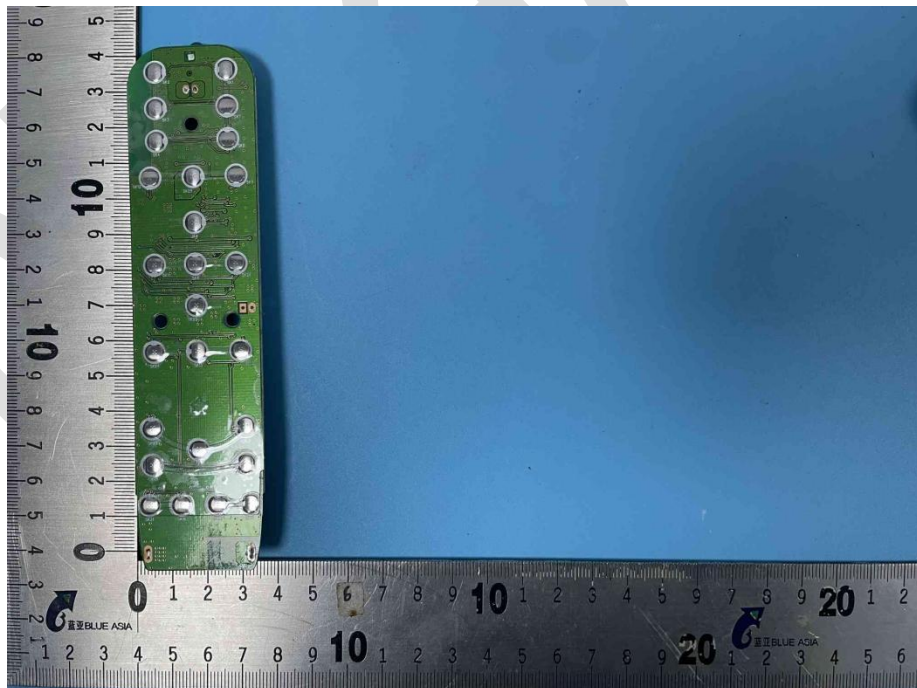
## APPENDIX B: PHOTOGRAPHS OF EUT



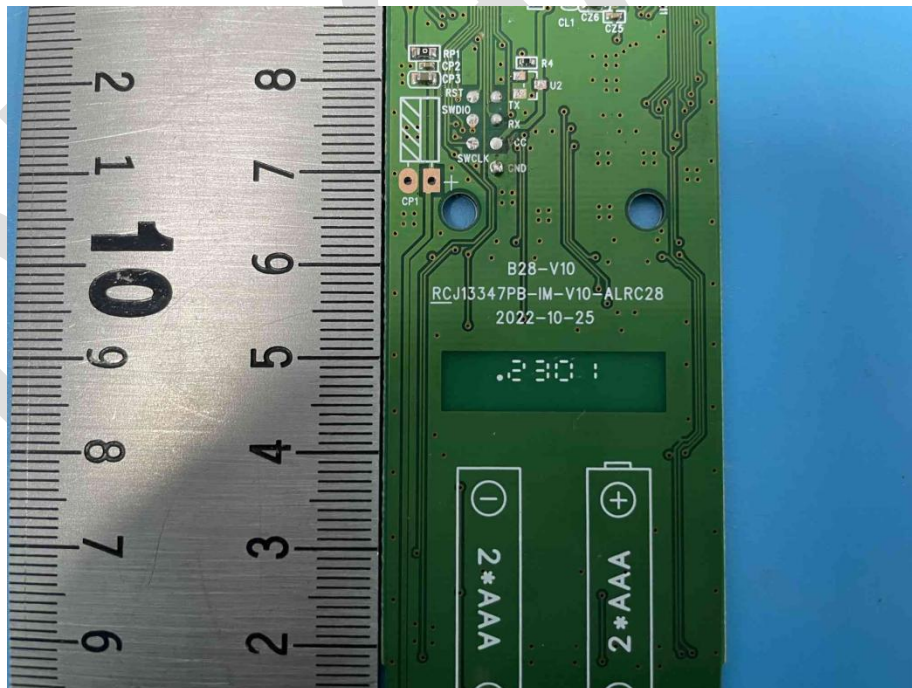
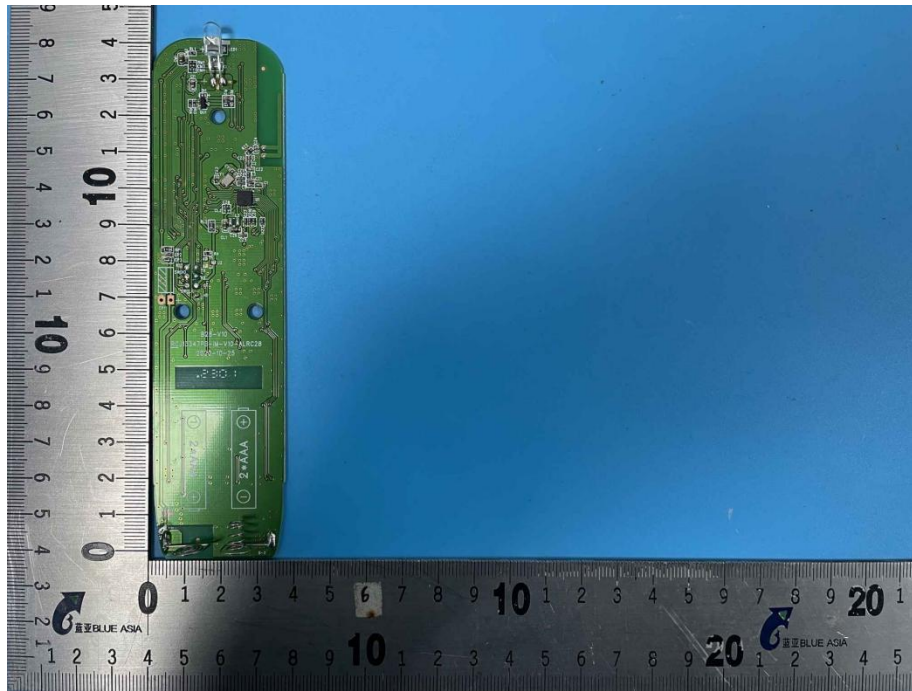


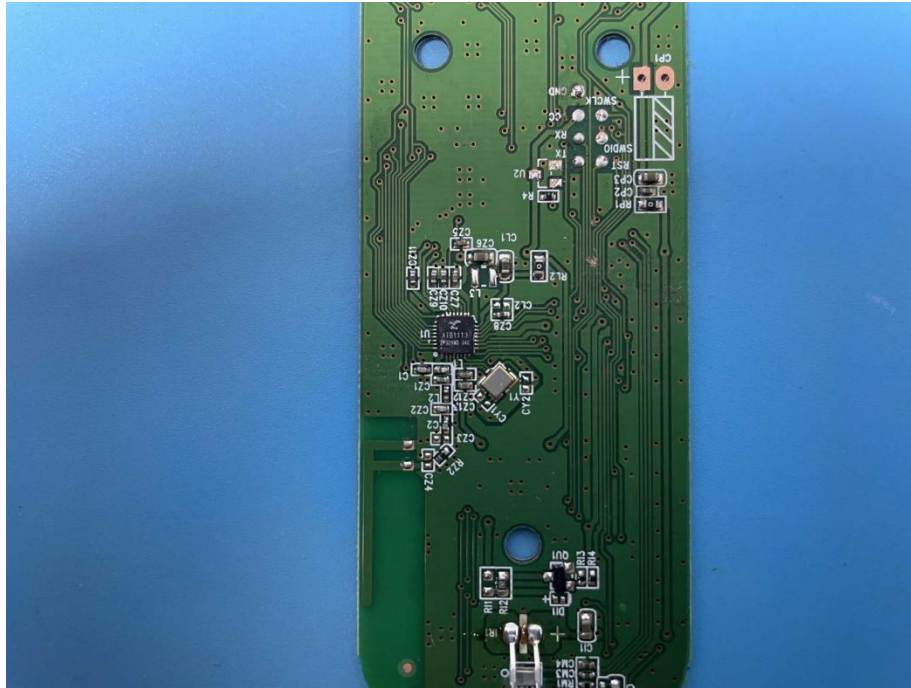












**----END OF REPORT----**

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of BlueAsia, this report can't be reproduced except in full.