

## FCC - TEST REPORT

Report Number : **68.950.23.0497.01** Date of Issue: **August 19, 2023**

Model : **HH4V-152600-1000-10**

Product Type : **Electronic Fence Receiver**

Applicant : **Hangzhou Hopechart IoT Technology Co., Ltd.**

Address : **17th Floor, Hongquan Building, 35 Qizhi Street, Xixing Street,  
Binjiang District, 310051, Hangzhou city, Zhejiang Province,  
PEOPLE'S REPUBLIC OF CHINA**

Manufacturer : **Zhejiang Hongquan Electronic Technology Co., Ltd**

Address : **508 Tianzihu Avenue, Tianzihu Town, Anji County,  
313300, Huzhou City, Zhejiang Province,  
PEOPLE'S REPUBLIC OF CHINA**

Test Result : ☒ **Positive** ☐ Negative

Total pages including Appendices : **29**

Any use for advertising purposes must be granted in writing. This technical report may only be quoted in full. This report is the result of a single examination of the object in question and is not generally applicable evaluation of the quality of other products in regular production. For further details, please see testing and certification regulation, chapter A-3.4.

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## 2 Details about the Test Laboratory

### Details about the Test Laboratory

#### Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch  
Building 12 & 13, Zhiheng Wisdomland Business Park, Guankou Erlu,  
Nantou, Nanshan District  
Shenzhen 518052  
P.R. China

Telephone: 86 755 8828 6998

Fax: 86 755 8828 5299

FCC Registration No.: 514049

FCC Designation Number: CN5009

IC Registration No.: 10320A

### 3 Description of the Equipment Under Test

Product:	Electronic Fence Receiver
Model no.:	HH4V-152600-1000-10
FCC ID:	2A2NKHQB204-S01-023
Options and accessories:	N/A
Rating:	Rechargeable Li-ion battery (3.5-4.2VDC) or powered by external USB (5VDC)
RF Transmission Frequency:	2402MHz-2480MHz
No. of Operated Channel:	40
Modulation:	GFSK
Antenna Type:	Ceramic antenna
Antenna Gain:	2.86dBi
Description of the EUT:	The Equipment Under Test (EUT) is an Electronic Fence Receiver which supports Bluetooth function operated at 2.4GHz.

## 4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2021 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

Test Method:

KDB 558074 D01 15.247 Meas Guidance v05r02

ANSI C63.10-2020, American National Standard of Procedures for Compliance Testing of  
Unlicensed Wireless Devices

## 5 Summary of Test Results

Technical Requirements					
FCC Part 15 Subpart C					
Test Condition		Test Site	Test Result		
			Pass	Fail	N/A
§15.207	Conducted emission AC power port	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.247 (b) (3)	Conducted peak output power	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.247(a)(1)	20dB bandwidth	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.247(a)(1)	Carrier frequency separation	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.247(a)(1)(iii)	Number of hopping frequencies	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.247(a)(1)(iii)	Dwell Time	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.247(a)(2)	6dB bandwidth	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.247(e)	Power spectral density	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.247(d)	Spurious RF conducted emissions	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.247(d)	Band edge	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.247(d) & §15.209 & §15.205	Spurious radiated emissions for transmitter	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.203	Antenna requirement	See note 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note 1: N/A=Not Applicable.

Note 2: The EUT uses a ceramic antenna, which gain is 2.86dBi. In accordance to §15.203, it is considered sufficiently to comply with the provisions of this section.

## 6 General Remarks

### Remarks

This submittal(s) (test report) is intended for FCC ID: 2A2NKHQB204-S01-023 complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C rules.

### SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

□ - **Not** Performed

The Equipment under Test

■ - **Fulfills** the general approval requirements.

□ - **Does not** fulfill the general approval requirements.

Sample Received Date: June 25, 2023

Testing Start Date: June 25, 2023

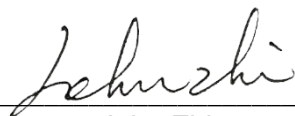
Testing End Date: July 3, 2023

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch -

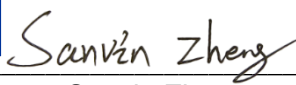
Reviewed by:

Prepared by:

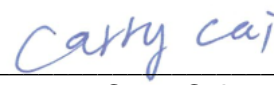
Tested by:



John Zhi  
Project Manager



Sanvin Zheng  
Project Engineer

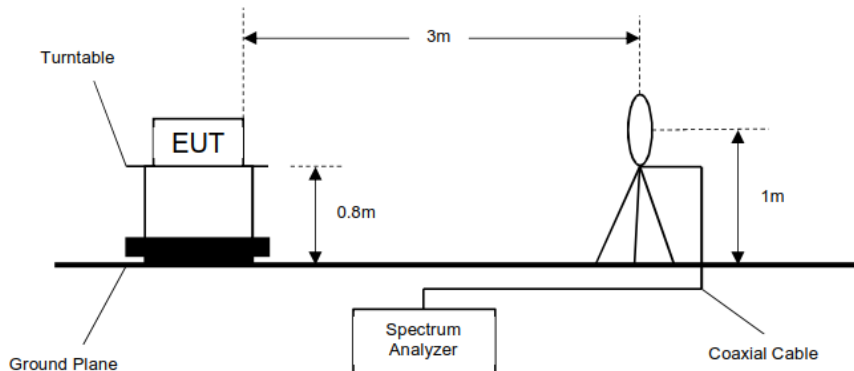


Carry Cai  
Test Engineer

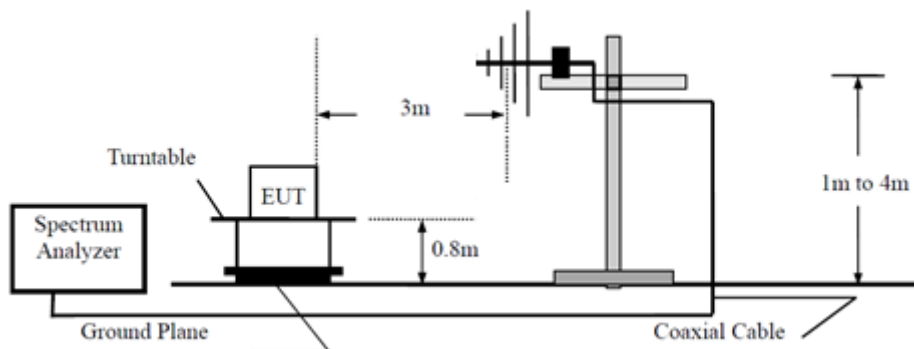
## 7 Test Setups

### 7.1 Radiated test setups

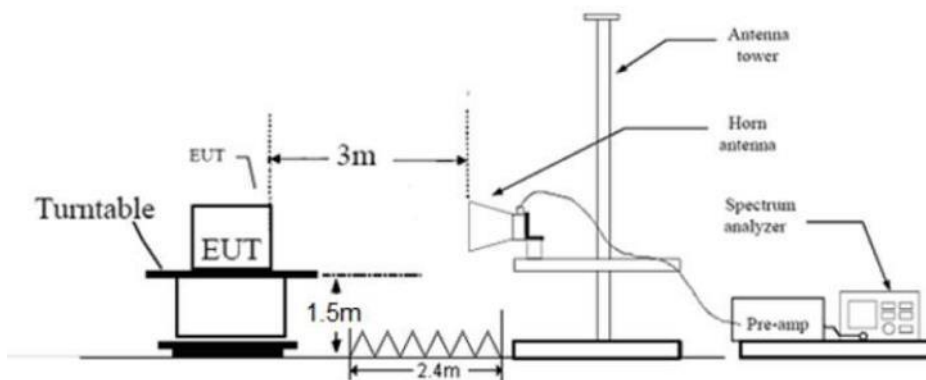
9kHz - 30MHz



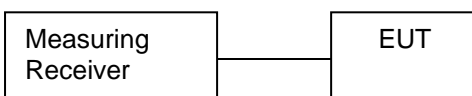
30MHz - 1GHz



Above 1GHz



### 7.2 Conducted RF test setups



## 8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.	S/N
Notebook	Thinkpad	X220	---

Test software information:

Test Software Version	EspRFTTestTool_v2.8_Manual.exe	
Modulation	Setting TX Power	Packet Type
GFSK	9	PRBS9

The system was configured to non-hopping mode, testing channel 0, 19, 39.

## 9 Technical Requirement

### 9.1 Conducted peak output power

#### Test Method

1. The EUT was placed on 0.8m height table, the RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Use the following test receiver settings:  
Span = approximately 5 times the 20dB bandwidth, centered on a hopping channel  
RBW > the 20dB bandwidth of the emission being measured, VBW ≥ RBW,  
Sweep = auto, Detector function = peak, Trace = max hold
4. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power and record the results in the test report.
5. Repeat above procedures until all frequencies measured were complete.

#### Limits

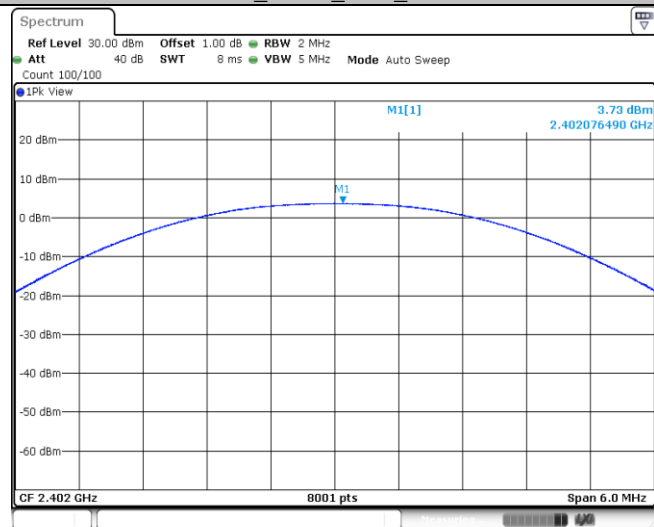
According to §15.247 (b) (3), conducted peak output power limit as below:

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

Test result as below table

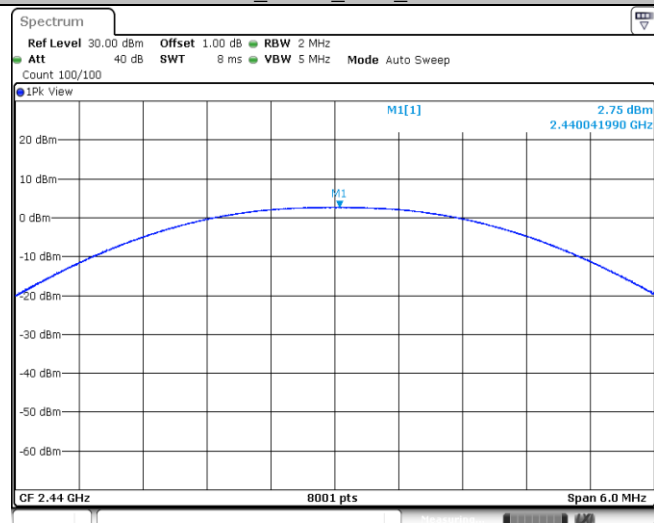
Frequency MHz	Conducted Peak Output Power dBm	Result
Bottom channel 2402MHz	3.73	Pass
Middle channel 2440MHz	2.75	Pass
Top channel 2480MHz	2.51	Pass

## BLE\_BT4.0\_Ant1\_2402



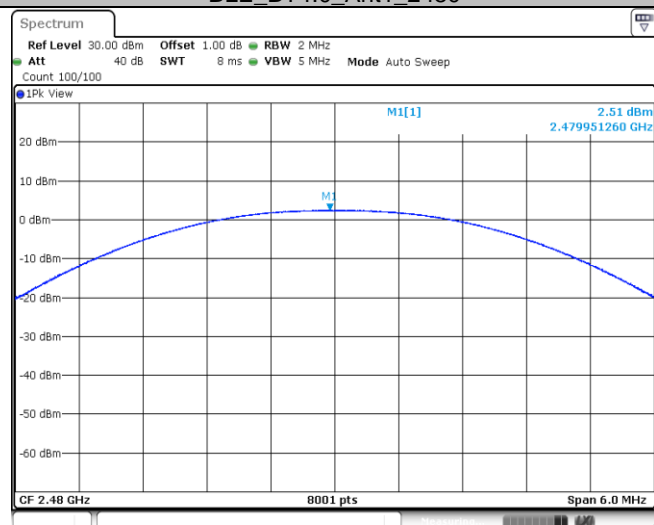
Date: 30 JUN 2023 15:11:51

## BLE\_BT4.0\_Ant1\_2440



Date: 30 JUN 2023 15:14:45

## BLE\_BT4.0\_Ant1\_2480



Date: 30 JUN 2023 15:16:30

## 9.2 Power spectral density

### Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

1. The RF output of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting, the instrument center frequency is set to the nominal EUT channel center frequency enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:
4. Set analyzer center frequency to DTS channel center frequency. RBW=3kHz, VBW $\geq$ 3RBW, Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
5. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
6. Repeat above procedures until other frequencies measured were completed.

### Limit

According to §15.247 (e), power spectral density limit as below:

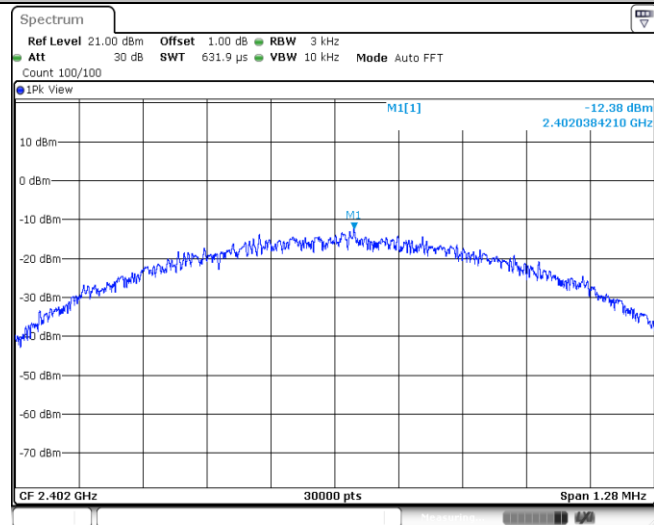
**Limit [dBm/3KHz]**

$\leq 8$

### Test result

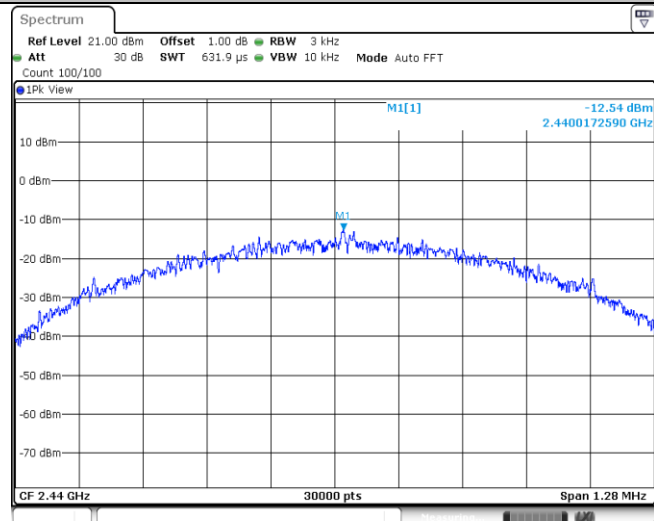
Frequency MHz	Power spectral density dBm/3kHz	Result
Bottom channel 2402MHz	-12.38	Pass
Middle channel 2440MHz	-12.54	Pass
Top channel 2480MHz	-13.52	Pass

## BLE\_BT4.0\_Ant1\_2402



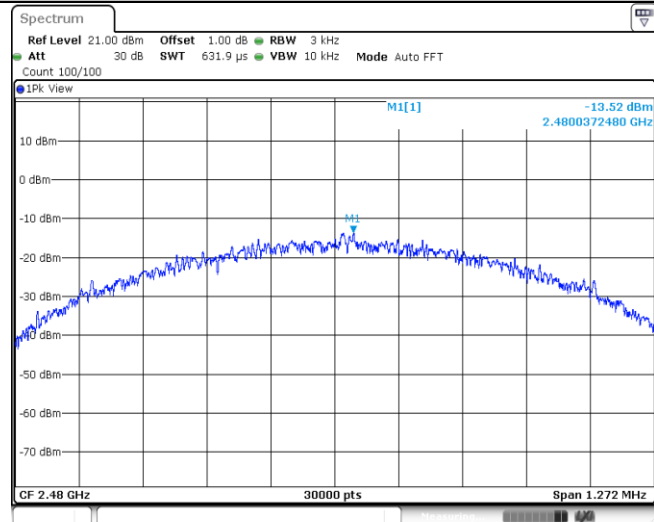
Date: 30 JUN 2023 15:11:57

## BLE\_BT4.0\_Ant1\_2440



Date: 30 JUN 2023 15:14:51

## BLE\_BT4.0\_Ant1\_2480



Date: 30 JUN 2023 15:16:35

### 9.3 6 dB Bandwidth

#### Test Method

1. The RF output of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting, the instrument center frequency is set to the nominal EUT channel center frequency enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:  
RBW=100KHz, VBW $\geq$ 3RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Use the automatic bandwidth measurement capability of an instrument, use the X dB bandwidth mode with X set to 6 dB.
5. Allow the trace to stabilize, record the 6 dB Bandwidth value.

#### Limit

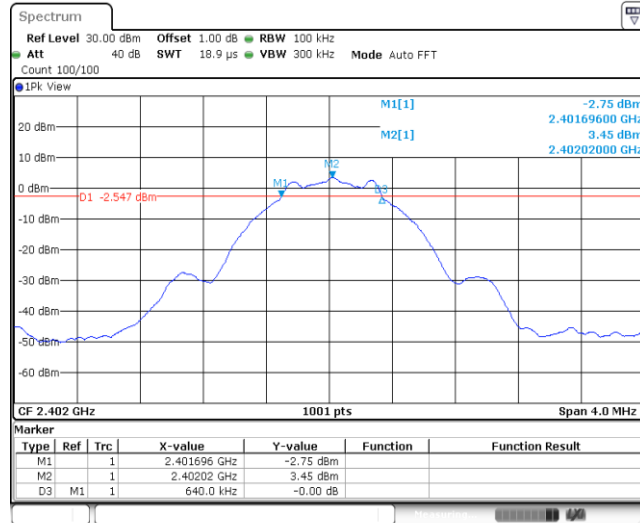
According to §15.247 (a) (2), 6 dB Bandwidth limit as below:

**Limit [kHz]**

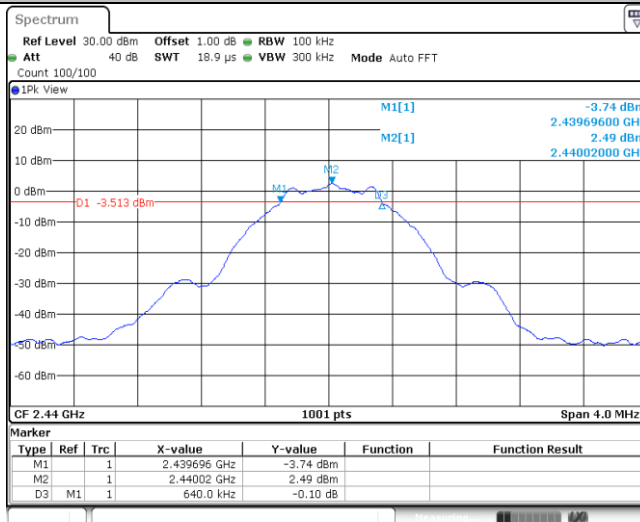
$\geq 500$

#### Test result

Frequency MHz	6dB bandwidth MHz	Result
Bottom channel 2402MHz	0.640	Pass
Middle channel 2440MHz	0.640	Pass
Top channel 2480MHz	0.636	Pass

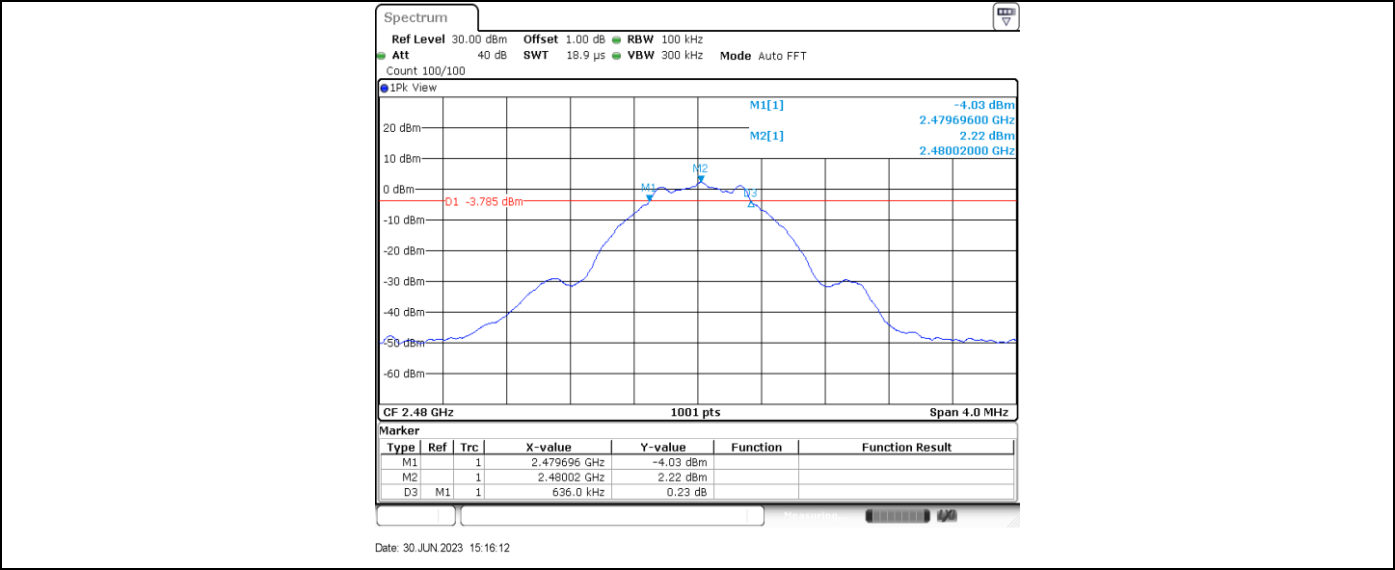
**6 dB Bandwidth****BLE\_BT4.0\_Ant1\_2402**

Date: 30 JUN 2023 15:11:34

**BLE\_BT4.0\_Ant1\_2440**

Date: 30 JUN 2023 15:14:28

**BLE\_BT4.0\_Ant1\_2480**



## 9.4 Spurious RF conducted emissions

### Test Method

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting, the instrument center frequency is set to the nominal EUT channel center frequency enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:  
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10<sup>th</sup> harmonic. Typically, several plots are required to cover this entire span.  
RBW = 100 kHz, VBW $\geq$ 3RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
5. The level displayed must comply with the limit specified in this Section. Submit these plots.
6. Repeat above procedures until all frequencies measured were complete.

### Limit

According to §15.247 (d), spurious RF conducted emissions limit as below:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that 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 § 15.247(b)(3), the attenuation required shall be 30 dB instead of 20 dB.

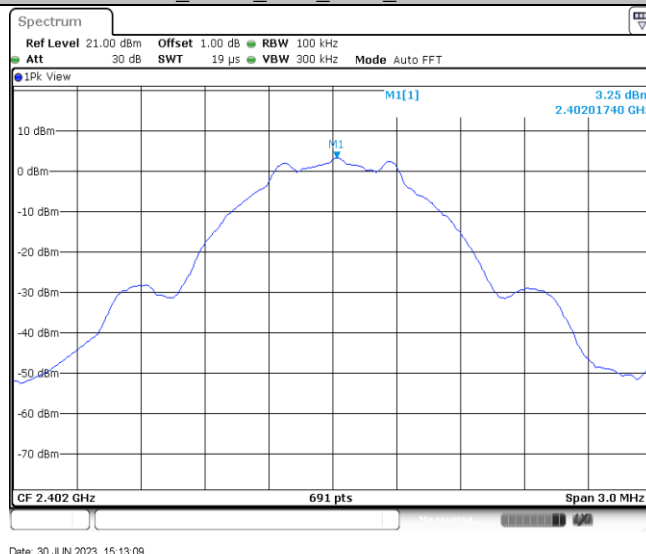
Frequency Range MHz	Limit (dBc)
30-25000	-20

## Spurious RF conducted emissions

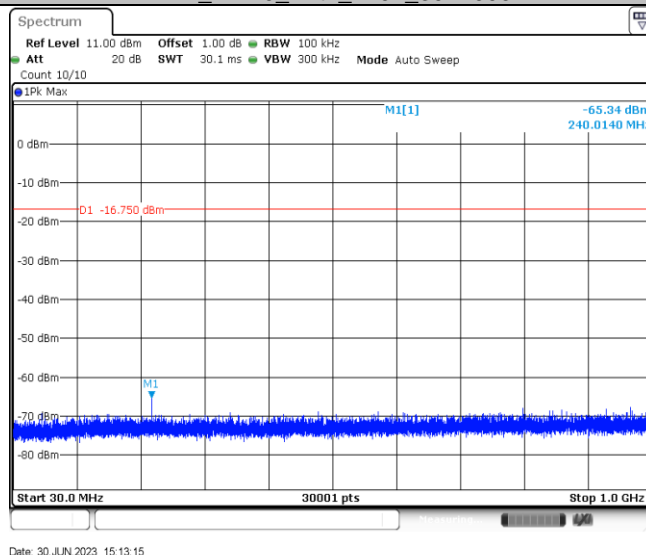
Test Mode	Antenna	Channel [MHz]	Freq. Range [MHz]	Reference Level	Result [dBm]	Limit [dBm]	Verdict
BLE_BT4.0	Ant1	2402	Reference	3.25	3.25	---	PASS
			30~1000	30~1000	-65.34	<=-16.75	PASS
			1000~26500	1000~26500	-41.93	<=-16.75	PASS
		2440	Reference	2.54	2.54	---	PASS
			30~1000	30~1000	-64.13	<=-17.46	PASS
			1000~26500	1000~26500	-41.82	<=-17.46	PASS
		2480	Reference	2.09	2.09	---	PASS
			30~1000	30~1000	-65.72	<=-17.91	PASS
			1000~26500	1000~26500	-41.36	<=-17.91	PASS

Remark: The emissions exceed limit is fundamental signal.

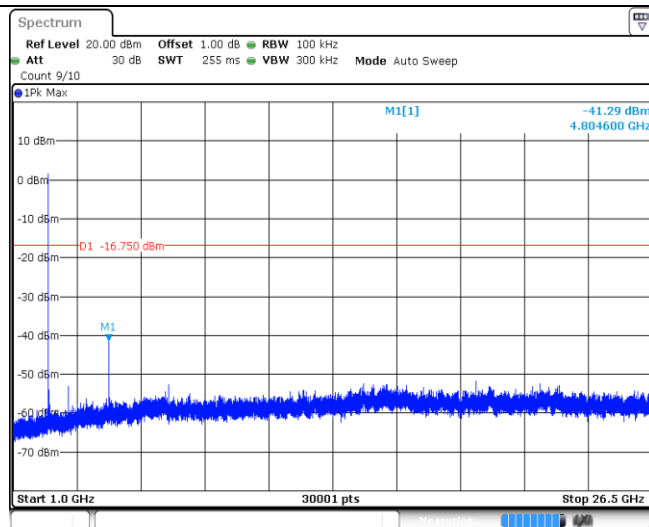
BLE\_BT4.0\_Ant1\_2402\_0~Reference



BLE\_BT4.0\_Ant1\_2402\_30~1000

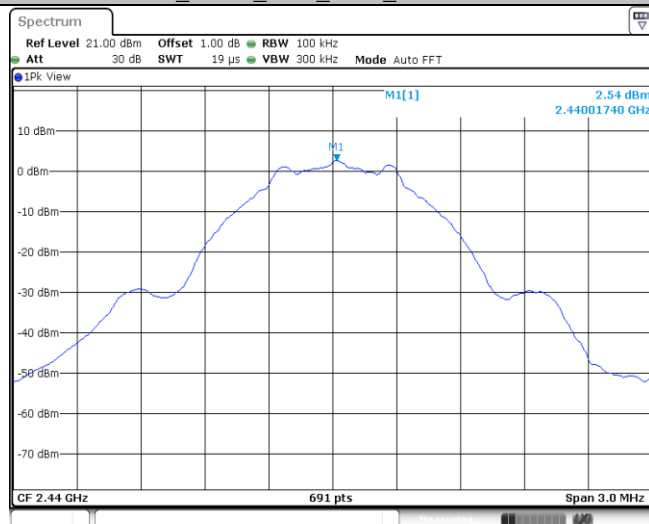


BLE\_BT4.0\_Ant1\_2402\_1000~26500



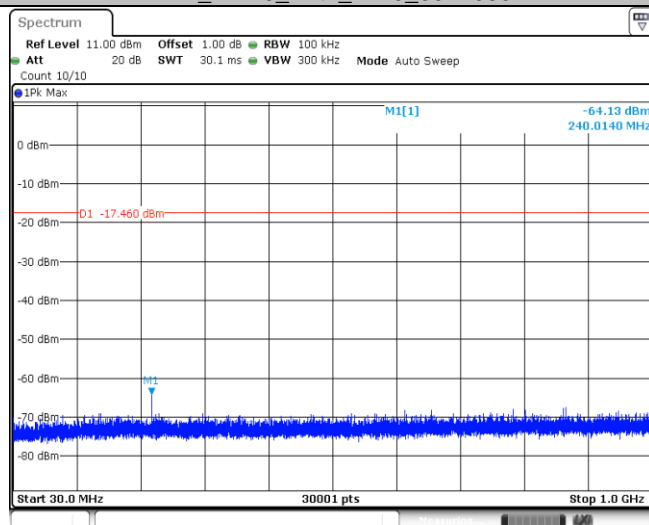
Date: 30 JUN 2023 15:13:23

## BLE\_BT4.0\_Ant1\_2440\_0~Reference



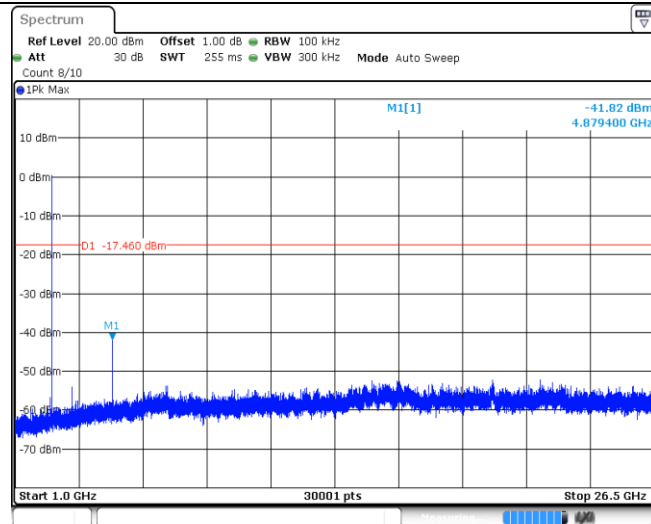
Date: 30 JUN 2023 15:14:57

## BLE\_BT4.0\_Ant1\_2440\_30~1000



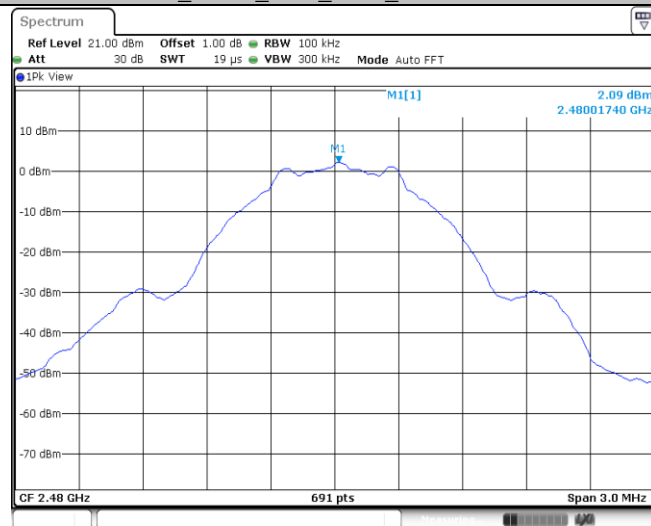
Date: 30 JUN 2023 15:15:03

## BLE\_BT4.0\_Ant1\_2440\_1000~26500



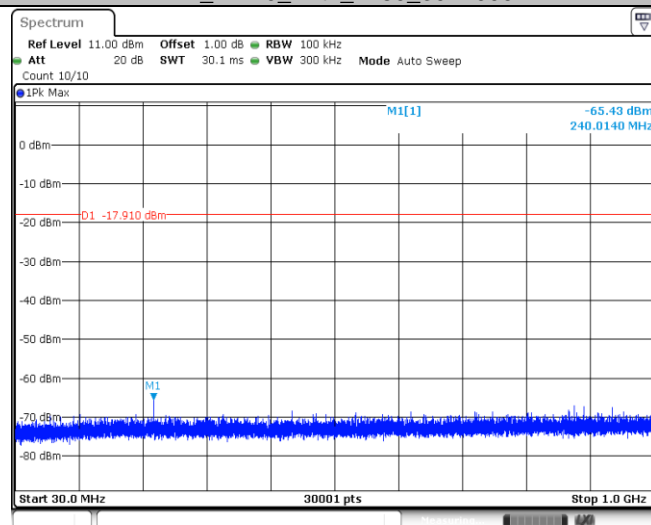
Date: 30 JUN 2023 15:15:10

## BLE\_BT4.0\_Ant1\_2480\_0~Reference



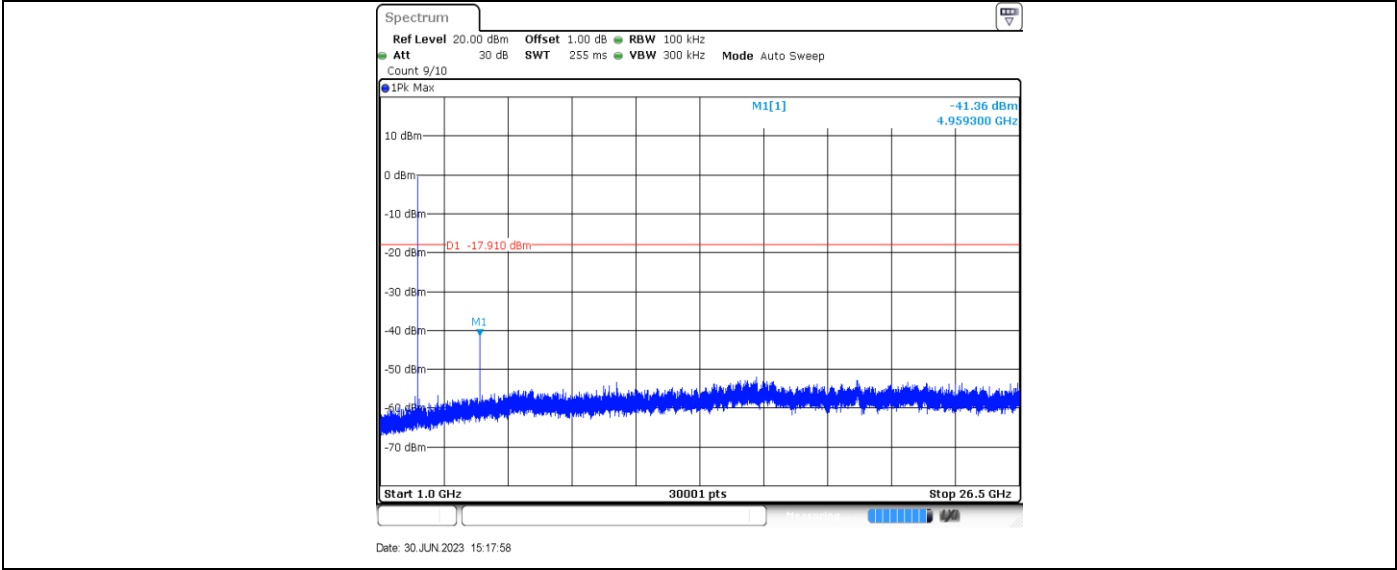
Date: 30 JUN 2023 15:17:44

## BLE\_BT4.0\_Ant1\_2480\_30~1000



Date: 30 JUN 2023 15:17:50

## BLE\_BT4.0\_Ant1\_2480\_1000~26500



## 9.5 Band edge

### Test Method

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting, the instrument center frequency is set to the nominal EUT channel center frequency enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:  
Span = wide enough to capture the peak level of the in-band emission and all spurious  
RBW = 100 kHz, VBW $\geq$ 3RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Allow the trace to stabilize, use the peak and delta measurement to record the result.
5. The level displayed must comply with the limit specified in this Section.
6. Repeat above procedures until all frequencies measured were complete and submit all the plots.

### Limit

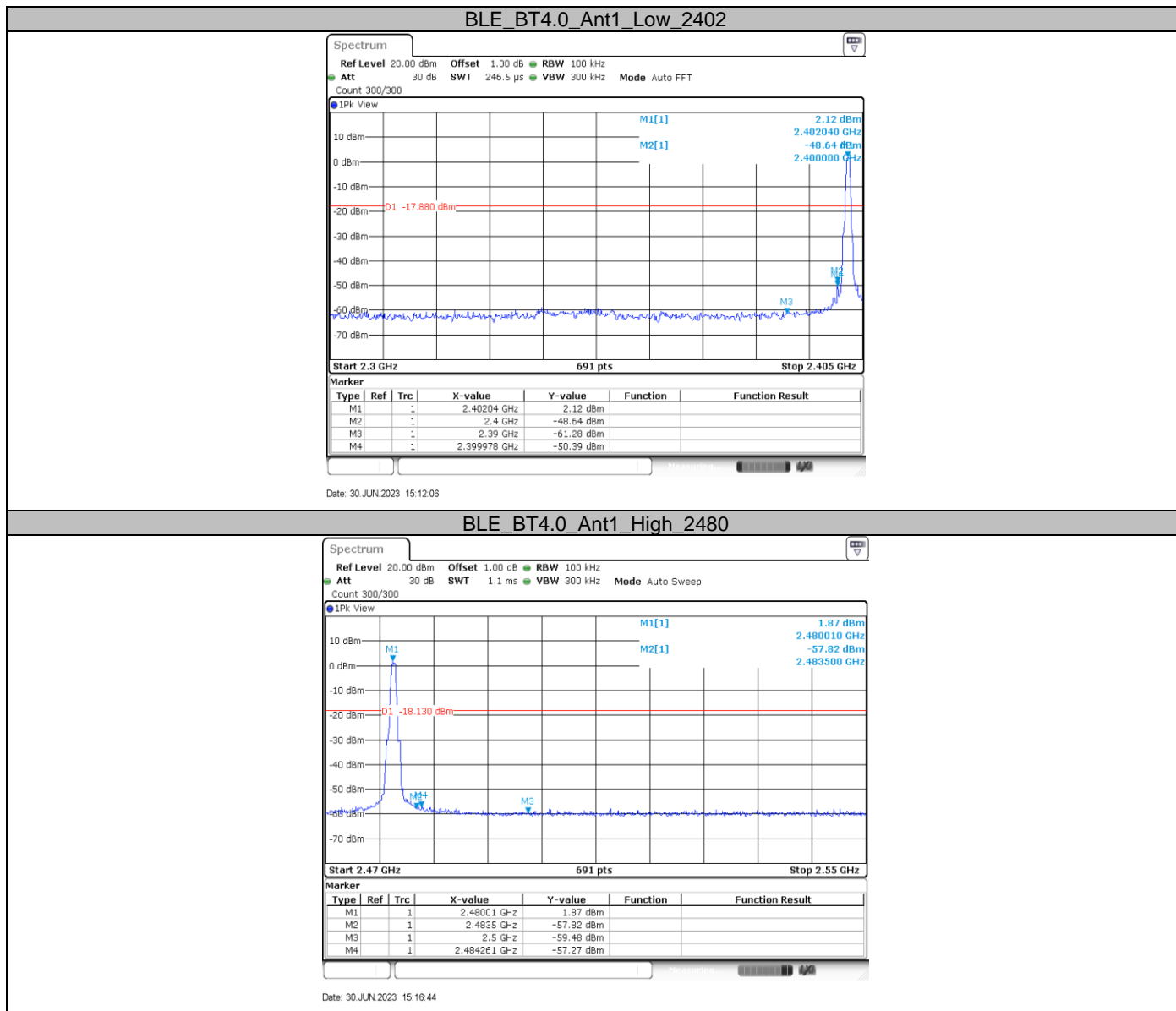
According to §15.247 (d), Band edge limit as below:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that 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 § 15.247(b)(3), the attenuation required shall be 30 dB instead of 20 dB.

Frequency Range MHz	Limit (dBc)
30-25000	-20

**Band edge testing**

Test Mode	Antenna	Ch. Name	Channel (MHz)	Ref. Level (dBm)	Result (dBm)	Limit (dBm)	Verdict
BLE_BT4.0	Ant1	Low	2402	2.12	-50.39	<=-17.88	PASS
		High	2480	1.87	-57.27	<=-18.13	PASS



## 9.6 Spurious radiated emissions for transmitter

### Test Method

- 1: The EUT was placed on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
- 3: 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.
- 4: 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.
- 5: Use the following spectrum analyzer settings According to C63.10:

For Below 1GHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious  
 RBW = 100kHz to 120kHz, VBW ≥ RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Peak unwanted emissions Above 1GHz:

Span = wide enough to capture the peak level of the in-band emission and all spurious  
 RBW = 1MHz, VBW ≥ RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Procedures for average unwanted emissions measurements above 1000 MHz

- a) RBW = 1MHz.
- b) VBW \ [3 × RBW].
- c) Detector = RMS (power averaging), if [span / (# of points in sweep)] \ RBW / 2. Satisfying this condition can require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, then the detector mode shall be set to peak.
- d) Averaging type = power (i.e., rms) (As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.)
- e) Sweep time = auto.
- f) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of 1 / D, where D is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 100 traces shall be averaged.)
- g) If tests are performed with the EUT transmitting at a duty cycle less than 98%, then a correction factor shall be added to the measurement results prior to comparing with the emission limit, to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
  - 1) If power averaging (rms) mode was used in the preceding step e), then the correction factor is [10 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB shall be added to the measured emission levels.

- 2) If linear voltage averaging mode was used in the preceding step e), then the correction factor is  $[20 \log (1 / D)]$ , where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB shall be added to the measured emission levels.
- 3) If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

### Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that 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 § 15.247(b)(3), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength 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).

Frequency MHz	Field Strength uV/m	Field Strength dBµV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

## Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

### Transmitting spurious emission test result as below:

Test data\_30MHz to 1000MHz

Frequency Band	Frequency MHz	Emission Level dBμV/m	Polarization	Limit dBμV/m	Detector	Margin dBμV/m	Correct factor (dB/m)	Result
30-1000MHz	56.621111	23.15	H	40.00	QP	16.85	17.62	Pass
	110.025000	21.61	H	43.50	QP	21.89	15.87	Pass
	159.980000	28.09	H	43.50	QP	15.41	13.35	Pass
	191.181667	25.24	H	43.50	QP	18.26	15.76	Pass
	319.976111	30.94	H	46.00	QP	15.06	19.30	Pass
	460.572222	33.11	H	46.00	QP	12.89	22.29	Pass
	Other Frequencies	--	H	--	QP	--	--	Pass
	37.867778	23.74	V	40.00	QP	16.26	15.69	Pass
	56.998333	29.05	V	40.00	QP	10.95	17.62	Pass
	159.980000	34.42	V	43.50	QP	9.08	13.35	Pass
	216.078333	26.15	V	46.00	QP	19.85	16.26	Pass
	300.899444	27.81	V	46.00	QP	18.19	18.86	Pass
	583.923889	32.81	V	46.00	QP	13.19	25.04	Pass
	Other Frequencies	--	V	--	QP	--	--	Pass

BLE\_1M of low channel 2402MHz

Frequency Band	Frequency MHz	Emission Level dBμV/m	Polarization	Limit dBμV/m	Detector	Margin dBμV/m	Correct factor (dB/m)	Result
1000-2500MHz	2444.500000	49.11	H	74.00	PK	24.89	-4.42	Pass
	10586.000000	45.04	H	74.00	PK	28.96	13.35	Pass
	14707.000000	48.08	H	74.00	PK	25.92	18.85	Pass
	Other Frequencies	--	H	--	PK	--	--	Pass
	2447.000000	48.89	V	74.00	PK	25.11	-4.41	Pass
	3195.000000	50.10	V	74.00	PK	23.90	-0.36	Pass
	11956.000000	44.41	V	74.00	PK	29.59	15.15	Pass
	Other Frequencies	--	V	--	PK	--	--	Pass

## BLE\_1M of Middle channel 2440MHz

Frequency Band	Frequency MHz	Emission Level dBμV/m	Polarization	Limit dBμV/m	Detector	Margin dBμV/m	Correct factor (dB/m)	Result
1000-25000MHz	2444.500000	50.68	H	74.00	PK	23.32	-4.42	Pass
	9133.000000	43.41	H	74.00	PK	30.59	12.39	Pass
	11852.000000	43.82	H	74.00	PK	30.18	14.92	Pass
	Other Frequencies	--	H	--	PK	--	--	Pass
	1594.500000	45.90	V	74.00	PK	28.10	-9.46	Pass
	2445.500000	50.45	V	74.00	PK	23.55	-4.42	Pass
	11625.000000	45.12	V	74.00	PK	28.88	14.56	Pass
	Other Frequencies	--	V	--	PK	--	--	Pass

## BLE\_1M of high channel 2480MHz

Frequency Band	Frequency MHz	Emission Level dBμV/m	Polarization	Limit dBμV/m	Detector	Margin dBμV/m	Correct factor (dB/m)	Result
1000-25000MHz	2445.500000	48.84	H	74.00	PK	25.16	-4.42	-4.42
	8996.000000	42.84	H	74.00	PK	31.16	12.47	Pass
	11189.500000	46.24	H	74.00	PK	27.76	14.32	Pass
	Other Frequencies	--	H	--	PK	--	--	Pass
	6389.500000	45.28	V	74.00	PK	28.72	7.44	Pass
	8947.000000	43.21	V	74.00	PK	30.79	12.49	Pass
	12615.000000	44.82	V	74.00	PK	29.18	15.19	Pass
	Other Frequencies	--	V	--	PK	--	--	Pass

## Remark:

- (1) Data of measurement within frequency ranges 9kHz-30MHz and 18-26GHz are the noise floor or attenuated more than 20dB below the permissible limits or the field strength is too small to be measured, so test data does not present in this report,
- (2) Level= Reading Level + Correction Factor
- (3) Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain  
Below 1GHz: Corrector factor = Antenna Factor + Cable Loss  
(The Reading Level is recorded by software which is not shown in the sheet)

## 10 Test Equipment List

### List of Test Instruments

#### Radiated Emission 1# Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 7	68-4-74-19-001	102176	2024-5-20
Loop Antenna	Rohde & Schwarz	HFH2-Z2	68-4-80-14-006	100398	2023-8-17
3m Semi-anechoic chamber	TDK	SAC-3 #1	68-4-90-14-001	----	2024-5-28
Test software	Rohde & Schwarz	EMC32	68-4-90-14-001-A10	Version10.35.02	N/A

#### Radiated Emission 2# Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	68-4-74-14-002	101269	2024-5-20
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9162	68-4-80-19-003	284	2024-3-5
Wave Guide Antenna	ETS	3117	68-4-80-19-001	00218954	2024-4-26
Pre-amplifier	Rohde & Schwarz	SCU 18F	68-4-29-19-001	100745	2024-5-19
Sideband Horn Antenna	Q-PAR	QWH-SL-18-40-K-SG	68-4-80-14-008	12827	2023-7-10
Pre-amplifier	Rohde & Schwarz	SCU 40A	68-4-29-14-002	100432	2023-7-10
Attenuator	Mini-circuits	UNAT-6+	68-4-81-21-002	15542	2024-5-19
3m Semi-anechoic chamber	TDK	SAC-3 #2	68-4-90-19-006	----	2024-5-28
Test software	Rohde & Schwarz	EMC32	68-4-90-19-006-A01	Version10.35.02	N/A

#### Conducted RF Test System

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DUE DATE
Signal Analyzer	Rohde & Schwarz	FSV40	68-4-74-14-004	101030	2024-5-19
RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157W	68-4-93-14-003	101226/100929	2024-5-20
Test software	Tonscend	System for BT/WIFI	68-4-74-14-006-A13	Version 2.6.77.0518	N/A
Shielding Room	TDK	TS8997	68-4-90-19-003	----	2025-10-15

## 11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Radiated Emission in 3m chamber 9kHz-30MHz	4.70dB
Uncertainty for Radiated Emission in new 3m chamber 30MHz-1000MHz	Horizontal: 4.63dB; Vertical: 4.78dB;
Uncertainty for Radiated Emission in new 3m 1000MHz-18000MHz	Horizontal: 5.38dB; Vertical: 5.38dB;
Uncertainty for Radiated Emission 18000MHz-40000MHz	Horizontal: 5.10dB; Vertical: 5.10dB
Uncertainty for Conducted RF test	RF Power Conducted: 1.31dB Frequency test involved: 0.6×10 <sup>-8</sup> or 1%

Measurement Uncertainty Decision Rule:

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2021, clause 4.4.3 and 4.5.1.

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THE END