

TEST REPORT

Applicant: Guilin Feiyu Technology Incorporated Company
Address: Feiyu Intelligent Industry Park, No.2, Chuangyou Road, Information Industry Park, Qixing District, Guilin, Guangxi, 541004, China
Equipment Type: Feiyu SCORP-Mini P 3-Axis Handheld Gimbal for Smartphone
Model Name: FeiyuMP01
Brand Name: FeiyuTech
Test Standard: MIC Notice No.88 Appendix No.43
Ordinance of MPT No.37, 1981:
Article 2 paragraph 1 item (19)
Sample Arrival Date: Apr. 07, 2023
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ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.



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Revision History

Version	Issue Date	Revisions
<u>Rev. 01</u>	<u>Apr. 18, 2023</u>	<u>Initial Issue</u>

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1. GENERAL INFORMATION

1.1 Test Laboratory

Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100

1.2 Test Location

Name	Shenzhen BALUN Technology Co., Ltd.
Location	☒ Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
	☐ 1/F, Building B, Ganghongji High-tech Intelligent Industrial Park, No. 1008, Songbai Road, Yangguang Community, Xili Sub-district, Nanshan District, Shenzhen, Guangdong Province, P. R. China

2. PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Guilin Feiyu Technology Incorporated Company
Address	Feiyu Intelligent Industry Park, No.2, Chuangyou Road, Information Industry Park, Qixing District, Guilin, Guangxi, 541004, China

2.2 Manufacturer Information

Manufacturer	Guilin Feiyu Technology Incorporated Company
Address	Feiyu Intelligent Industry Park, No.2, Chuangyou Road, Information Industry Park, Qixing District, Guilin, Guangxi, 541004, China

2.3 Factory Information

Factory	Guilin Feiyu Technology Incorporated Company
Address	Feiyu Intelligent Industry Park, No.2, Chuangyou Road, Information Industry Park, Qixing District, Guilin, Guangxi, 541004, China

2.4 General Description for Equipment under Test (EUT)

EUT Name	Feiyu SCORP-Mini P 3-Axis Handheld Gimbal for Smartphone
Model Name Under Test	FeiyuMP01
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	N/A
Software Version	N/A
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Technical Information

Network and Wireless connectivity	Bluetooth (BLE)
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The requirement for the following technical information of the EUT was tested in this report:

Modulation Technology	Bluetooth Low Energy: Digital modulation method other than orthogonal frequency division multiplexing (OFDM) or spread spectrum method
Modulation Type	Bluetooth Low Energy: GFSK
Transfer Rate	BLE: 1 Mbps
Frequency Range	The frequency range used is 2402MHz - 2480MHz; The frequency block is 2400MHz to 2483.5MHz.
Number of Channel	Bluetooth Low Energy: 40 (at intervals of 2 MHz)
Tested Channel	Bluetooth Low Energy: 0 (2402 MHz), 19 (2440 MHz), 39 (2480 MHz)
BD Address	90380C10D8AD
Antenna Type	PCB Antenna
Antenna Gain	1.58 dBi (In test items related to antenna gain, the final results reflect this figure. This value is provided by the applicant.)
Whether to support AFH mode in Classic Bluetooth	The EUT does not support AFH mode (declared by client).
Declare Max Antenna Power Density	Bluetooth Low Energy: 0.1740 mW
About the Product	Only the Bluetooth was tested in this report.

BD Address:



3. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

Part	Description	Channel (BLE)	Test Mode	Data Rate (Mbps)	Verdict
5.1	Frequency Error	Low/Middle/High	un-modulation	/	Pass
5.2	Occupied Bandwidth and Spread-spectrum Bandwidth / Factor	Low/Middle/High	GFSK(BLE)	1(BLE)	Pass
5.3	The frequency retention time	N/A	N/A	N/A	N/A
5.4	Unwanted Emission Intensity	Low/Middle/High	GFSK(BLE)	1(BLE)	Pass
5.5	Antenna Power Error	Low/Middle/High	GFSK(BLE)	1(BLE)	Pass
5.6	Limitation of Collateral Emission of Receiver	Low/Middle/High	GFSK(BLE)	1(BLE)	Pass
5.7	Transmission Antenna Gain (EIRP Antenna Power)	N/A	N/A	N/A	N/A ^{Note2}
5.8	Transmission Radiation Angle Width (3dB Beamwidth)	N/A	N/A	N/A	N/A ^{Note2}
5.9	Radio Interference Prevention Capability	Low/Middle/High	GFSK(BLE)	1(BLE)	Pass
5.10	Construction Protection Confirmation	Low/Middle/High	GFSK(BLE)	1(BLE)	Pass

Note 1: The tests were performed according to the method of measurements prescribed in MIC Notice No.88 Appendix No.43.

Note 2: The test items are only applicable to devices that use directional antennas and have a gain greater than 2.14dBi.

3.1 MEASUREMENT UNCERTAINTY

The following measurement 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.

Parameters	Uncertainty
Frequency Error / 99% & 90% Bandwidth	$(3.2 \times f \times 10^{-6})$ Hz
Antenna Power	1.82 dB
TX-RX Spurious Emissions	1.84 dB
Transmission Antenna Gain	5.36 dB
Temperature	0.82°C
Humidity	4.1%
DC / AC Power Source	0.04%

Note: “ f ” is the nominal signal frequency in Hz.

4. GENERAL TEST CONFIGURATIONS

4.1 Test Environment Conditions

During the measurement, the normal environment conditions were within the listed ranges:

Relative Humidity (%)	45% to 55%	
Atmospheric Pressure (kPa)	86 kPa to 106 kPa	
Temperature	+22.1℃ to +22.9℃	
Working Voltage of the EUT	NV (Normal Voltage)	7.4 V
	LV (Low Voltage)	6.66 V
	HV (High Voltage)	8.14 V

4.2 Test Equipment List

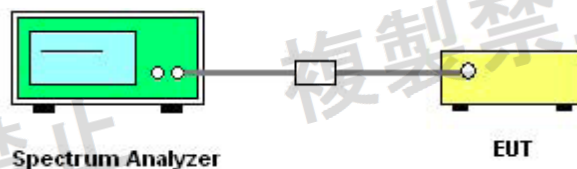
Description	Manufacturer	Model	Serial No.	Calibration Company	Calibration By	Cal. Date	Cal. Due	Calibration Method
Spectrum Analyzer	KEYSIGHT	N9020A	MY50330200	SMQ	HuanJun	2022.05.19	2023.05.18	c)
Spectrum Analyzer	KEYSIGHT	N9020A	MY46471071	SMQ	HuanJun	2022.07.26	2023.07.25	c)
multimeter	CEM	DT-9915	12104971	NACC	LiXiang	2022.12.28	2023.12.27	c)
DC power supply	ITECH	IT6863A	800014020757810006	NACC	LiXiang	2022.09.25	2023.09.24	c)

Note:

- a) Calibration conducted by the National Institute of Information and Communications Technology (NICT) (hereinafter referred to as "NICT") or a designated calibration agency under Article 102-18 paragraph (1)
- b) Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992)
- c) Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1)
- d) Calibration conducted by using measuring instruments and other equipment listed in the right column of Table No. 3 attached hereto, which shall have been given any of calibration, etc. listed above from a) to c)

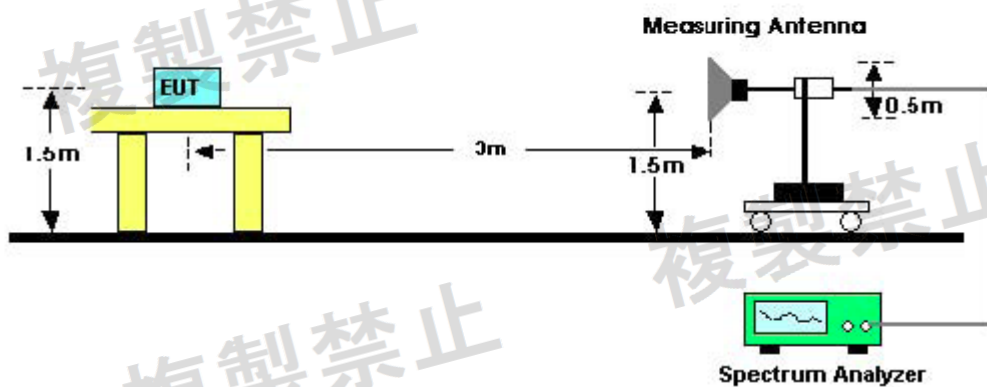
4.3 Description of Test Setup

4.3.1 For Antenna Port Test

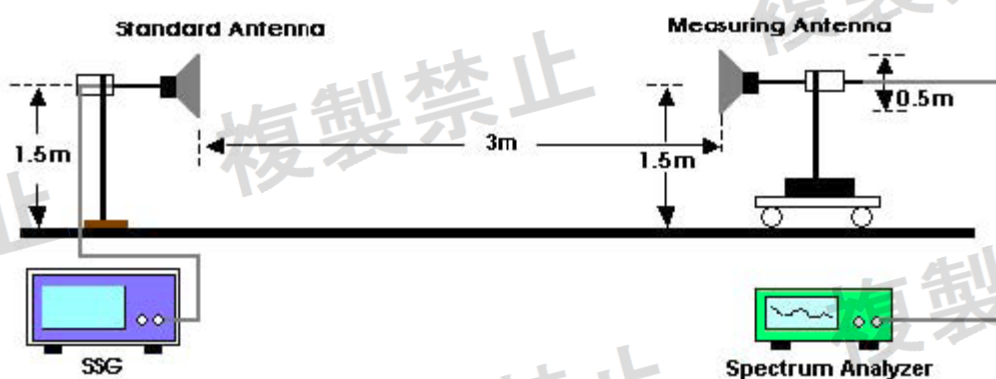


(Diagram 1)

4.3.2 For EIRP Antenna Power Test

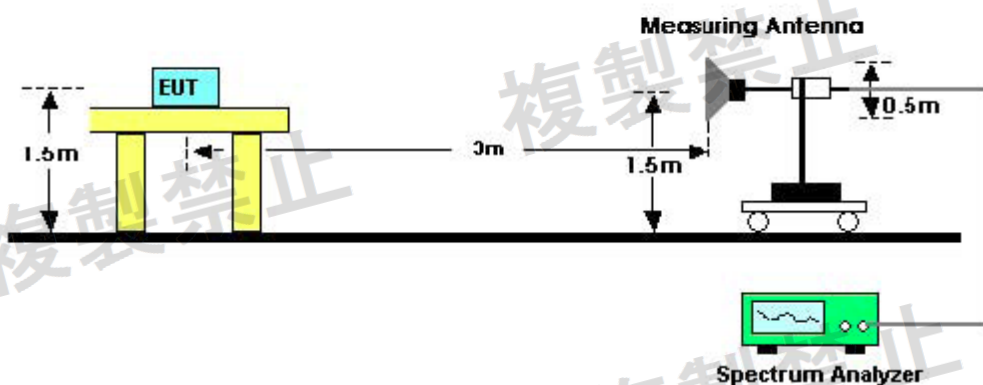


(Diagram 2)



(Diagram 3)

4.3.3 For 3dB Beamwidth Test



(Diagram 4)

5. TEST ITEMS

5.1 Frequency Error Measurement

5.1.1 Limit

Item	Limits
Frequency Tolerance	$\leq \pm 50$ ppm

5.1.2 Test Setup

See section 4.3.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.1.3 Test Procedure

- 1 Frequency accuracy of SA shall be less than 10% of limits tolerance (5 ppm)
- 2 Setting of SA is following as: RB:1 kHz / VB:3 kHz / SPAN: 100 kHz
- 3 Center Frequency: The center frequency of testing for EUT
- 4 Sweep time: Auto
- 5 Sweep mode: Continuous sweep
- 6 Detect mode: Positive peak
- 7 Mark function: Frequency Counter (Resolution 100 Hz)
- 8 EUT have transmitted absence of modulation signal and fixed channelize. f is using the mark cursor to mark the peak frequency value, fc is declaring of channel frequency. Then the frequency error formula is $(f_c - f) / f_c \times 10^6$ ppm and the limit is less than ± 50 ppm

5.1.4 Test Deviation

There is no deviation with the original standard.

5.1.5 EUT Operation during Test

The EUT was placed on the test table and programmed in un-modulation function.

5.1.6 Test Result

Please refer to ANNEX A.1.

5.2 Occupied Bandwidth and Spread-spectrum Bandwidth/Factor

5.2.1 Limit

Item	Limits
Occupied Band Width	FHSS $\leq$ 83.5MHz; OFDM $\leq$ 40MHz, DSSS $\leq$ 26MHz; Others $\leq$ 26MHz
Spread-spectrum Bandwidth	$\geq$ 500 kHz (FHSS, DSSS)

5.2.2 Test Setup

See section 4.3.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.2.3 Test Procedure

- 1 Set the spectrum analyzer as follows:

Center frequency: Test frequency

Span: Approximately 2 to 3.5 times nominal bandwidth

Resolution bandwidth: Approximately 3% or less nominal bandwidth

Video bandwidth: equivalent to resolvable bandwidth

Sweep time: auto

Sweep mode: Continuous sweep

Detection: Positive peak

Trace mode: Maximum hold

- 2 After repeating sweeps until the display shows steady data, store the values at all data points into the computer array variables.
- 3 Convert the dB values at all data points to antilogarithm on the power dimension.
- 4 Obtain sum total of the power at all data points, and store it as "total power".
- 5 Accumulate the power at each data point sequentially upward from the lowest frequency and obtain the limit data point where the accumulated power becomes 0.5% (5% for spreading bandwidth) of the "total power". Then convert the limit data point into frequency and store it as "lower limit frequency".
- 6 Accumulate the power at each data point sequentially downward from the highest frequency and obtain the limit data point where the accumulated power becomes 0.5% (5% for spreading bandwidth) of the "total power". Then convert the limit data point into frequency and store it as "upper limit frequency".
- 7 Spread Spectrum Factor = Spread Spectrum Bandwidth / modulation rate of EUT.

5.2.4 Test Deviation

There is no deviation with the original standard.

5.2.5 EUT Operation during Test

The EUT was programmed to be in continuous transmit, channel-hopping mode.

5.2.6 Test Result

Please refer to ANNEX A.2.

5.3 The frequency retention time

5.3.1 Limit

Item	Limits
retention time	For the radio equipment that uses the frequency hopping method excluding a combination of the spread spectrum method and OFDM, the total sum of the frequency retention time in any frequency within the time obtained by multiplying the diffusion rate by 0.4 second shall be 0.4 second or shorter

5.3.2 Test Setup

See section 4.3.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.3.3 Measuring Instruments and setting

Spectrum analyzer setting up is as follows.

Center frequency Hopping test frequency

Sweep bandwidth 0 Hz

Resolvable bandwidth 1 MHz

Video bandwidth equivalent to resolvable bandwidth

Y-axis scale 10 dB/Div.

Sweep time hopping cycle

Sweep mode Single sweep

Trigger condition Video trigger

Detection mode Positive peak

5.3.4 Test procedure

- (1) Set the spectrum analyzer according to the above 2 and wait the hopping signal with the hopping frequency.
- (2) Read the maximum level of the residence time of the hopping frequency at hopping cycle using marker etc. from the trace on the display and confirm that it is shorter than 0.4sec.
- (3) By means of the method same to the above (2), read the sum of the residence time of the hopping frequency at hopping cycle.
- (4) Calculate the total of frequency residence time of the hopping frequency as follows.
 1. Total = (0.4s x diffusion rate / hopping cycle) x sum of the residence time of (3)
 2. There, "diffusion rate" is a value of the diffusion bandwidth divided by a frequency equal to transmitting velocity of modulation signal.

5.3.5 Test Result

Please refer to ANNEX A.3.

5.4 Unwanted Emission Intensity Measurement

5.4.1 Limit

Item	Limits
TX Spurious Emission	$\leq 2.5\mu\text{W}$ ($2387\text{MHz} < f$; $2496.5\text{MHz} < f$)
	$\leq 25\mu\text{W}$ ($2387\text{MHz} \leq f < 2400\text{MHz}$) and ($2483.5\text{MHz} < f \leq 2496.5\text{MHz}$)

5.4.2 Test Setup

See section 4.3.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.4.3 Test Procedure

- 1 The EUT is placed in transmit mode at maximum power/modulation at a fixed channel.
- 2 Setting of SA is following as: RBW/VBW = 1MHz; / AT: 10dB / Ref: 0dBm / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold
- 3 Setting of SA is following as 30 MHz and stop frequency 2387 MHz Then to mark peak reading value + cable loss shall be less than 2.5 μW
- 4 SA adjusted to start frequency 2387 MHz and stop frequency 2400 MHz. Then to mark peak reading value + cable loss shall be less than 25 μW .
- 5 SA adjusted to start frequency 2483.5 MHz and stop frequency 2496.5 MHz Then to mark peak reading value + cable loss shall be less than 25 μW
- 6 SA adjusted to start frequency 2496.5 MHz and stop frequency 12500 MHz Then to mark peak reading value + cable loss shall be less than 2.5 μW
- 7 Measure side band spurious as follows: For 2.4 GHz band: 2374 MHz~2400 MHz and 2483.5 MHz~2509.5 MHz RBW = VBW = 30 kHz, Result_Value = Measured_Value + 15.2 [dBm]
- 8 If the Result_Value is over the requirement, take total sum of 1MHz band centered at the spur frequency like ACLP measurement as Result_Value.

5.4.4 Test Deviation

There is no deviation with the original standard.

5.4.5 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.4.6 Test Result

Please refer to ANNEX A.4.

5.5 Antenna Power Error Measurement

5.5.1 Limit

Item	Limits
Antenna Power Density	a) FH, FH+DS, or FH+OFDM form 2427 - 2470.75 MHz: ≤ 3 mW/MHz b) DS but other than a) from 2400~2483.5 MHz: ≤ 10 mW/MHz c) OFDM, but other than a): For OCB of 26MHz or less: ≤ 10 mW/MHz For OCB of over 26 MHz to 40 MHz: ≤ 5 mw/MHz d) Other than a), b) and c): ≤ 10 mW
Antenna Power Error	+20%, -80% (Base on manufacturer declare antenna power density)

5.5.2 Test Setup

See section 4.3.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.5.3 Test Procedure

- Setting of SA is following as: RB:1 MHz / VB: 3 MHz / SPAN: About twice the occupied frequency bandwidth / AT: 10 dB Ref: 10 dBm / Sweep time: Minimum time for guaranteed measurement accuracy/Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold/Trigger condition: Free run.
- Setting of SA is following as: RB:1 MHz / VB: 1 MHz / SPAN: 0 Hz/ AT: 10 dB Ref: 10 dBm / Sweep Mode: Continuous sweep
- Those using frequency hopping method (including DSSS or composite method with OFDM):
 - Confirming in the submitted document that the frequency hopping intervals in the frequency distribution of frequency hopping are equal intervals of 1 MHz or less, and that the probability of occurrence at each hopping frequency is uniform, and that the probability of occurrence at each hopping frequency is uniform. If it is, it is implemented by the following method.
 - Connect a high frequency power meter to the output of the dummy load (attenuator) and measure the total power.
 - Divide the total power by the spreading bandwidth to calculate the average power per 1 MHz.
 - Antenna power shall be as follows:
 - Value of b for continuous wave
 - For burst wave Average power in burst is calculated from the value of b and the transmission time rate.
 - If the frequency distribution of frequency hopping or the probability of occurrence at each hopping frequency is not uniform, set the spectrum analyzer as in 1 to search for the frequency that gives the maximum antenna power, and then perform spectrum analysis. Set the device as in 2, and measure the antenna power at the frequency that gives the maximum power.

4 In the case of those using OFDM or DSSS

- (1) Set the spectrum analyzer as in according to the above 1
- (2) After repeating the sweep until no change is observed in the display, measure the frequency at which the power per 1 MHz gives the maximum value.
- (3) Set the spectrum analyzer as in according to the above 2
- (4) Connect the high frequency power meter to the IF output terminal of the spectrum analyzer.
- (5) Antenna power shall be as follows:
 - a. For continuous wave
 - b. Burst wave Calculated average power in a burst from values corrected in the same way as for continuous waves and the transmission time rate

(6) In the case of using the orthogonal frequency division multiplexing system, when there are multiple subcarrier modulation systems, measure the antenna power at each time and take the largest value as the measured value.

5 In the case of items using other methods

- (1) Connect a high-frequency power meter to the output of the dummy load (attenuator) and measure the total power.
- (2) Antenna power shall be as follows:
 - a. Value of a for continuous wave
 - b. Burst wave The average power in the burst is calculated from the value of (a) and the transmission time rate.

6 Antenna Power Error is definition that actual measure antenna power tolerance between +20% to - 80% power range that base on manufacturer declare the conducted power density.

5.5.4 Test Deviation

There is no deviation with the original standard.

5.5.5 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.5.6 Test Result

Please refer to ANNEX A.5.

5.6 Limitation of Collateral Emission of Receiver Measurement

5.6.1 Limit

Item	Limits
RX Spurious Emission	$\leq 4\text{nW}$ ($f < 1\text{GHz}$)
	$\leq 20\text{nW}$ ($1\text{GHz} \leq f$)

5.6.2 Test Setup

See section 4.3.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.6.3 Test Procedure

- 1 The EUT is placed in Rx mode and set to a fixed channel.
- 2 Setting of SA is following as RB / VB: 100 kHz (below 1GHz emissions) / 1 MHz (above 1GHz emissions) / AT:10 dB / Ref: 0dBm / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold
- 3 SA set RB: 100 kHz and VB: 100 kHz. Then adjust to start frequency 30 MHz and stop frequency 1000 MHz. Search to mark peak reading value + cable loss shall be less than 4 nW
- 4 SA set RB: 1 MHz and VB: 1 MHz. Then adjust to start frequency 1000 MHz and stop frequency 12500 MHz. Search to mark peak reading value + cable loss shall be less than 20 nW
- 5 If power level of lower emissions are more than 1/10 of limit (0.4nW for $f < 1\text{GHz}$, 2 nW for $f \geq 1\text{GHz}$), all those are to be indicated in the 2nd and 3rd lines. If others are 1/10 or less more of the limit, no necessary to be indicated

5.6.4 Test Deviation

There is no deviation with the original standard.

5.6.5 EUT Operation during Test

The EUT was programmed to be in continuously receiving mode.

5.6.6 Test Result

Please refer to ANNEX A.6.

5.7 Transmission Antenna Gain (EIRP Antenna Power) Measurement

5.7.1 Limit

Item	Non-directional antennal limits	Directional antennal limits
EIRP Power Density	a) FH,FH+DS, or FH+OFDM form 2427 - 2470.75 MHz: $\leq 6.91 \text{ dBm/MHz}$ b) DS but other than a) from 2400~2483.5 MHz: $\leq 12.14 \text{ dBm/MHz}$ c) OFDM, but other than a): For OCB of 26MHz or less: $\leq 12.14 \text{ dBm/MHz}$ For OCB of over 26 MHz to 40 MHz: $\leq 9.14 \text{ dBm/MHz}$ d) Other than a), b) and c): $\leq 12.14 \text{ dBm}$	a) FH,FH+DS, or FH+OFDM form 2427 - 2470.75 MHz: $\leq 16.91 \text{ dBm/MHz}$ b) DS but other than a) from 2400~2483.5 MHz: $\leq 22.14 \text{ dBm/MHz}$ c) OFDM, but other than a): For OCB of 26MHz or less: $\leq 22.14 \text{ dBm/MHz}$ For OCB of over 26 MHz to 40 MHz: $\leq 19.14 \text{ dBm/MHz}$ d) Other than a), b) and c): $\leq 22.14 \text{ dBm}$
Note: This test item will not be applied to the transmission antenna which has a gain of 2.14dBi or less		

5.7.2 Test Setup

See section 4.3.3 for test setup description for the antenna port.

5.7.3 Test Procedure

- 1 Set EUT ad measuring antenna at the same height and roughly facing each other.
- 2 Set spectrum analyzer with RBW=1MHz, VBW=1MHz, Detector=Peak, Trace mode=Max Hold, and tune reference level to observe receiving signal position.
- 3 Move the measuring antenna height up and down within $\pm 50\text{cm}$ of EUT height and swing it to find the maximum output of the measuring antenna. The output level at the spectrum analyzer is read sa “E”.
- 4 Remove the EUT from the turn table and put the replacing antenna facing to measuring antenna at same height. Set the standard signal generator (SSG) at same frequency and transmit on then receive the signal
- 5 Swing the replacing antenna give a maximum receiving level.
- 6 Move the measuring antenna height up and down within $\pm 50\text{cm}$ of replacing antenna height and swing it to find the maximum receiving level.
- 7 Set SSG output power at Pt to give the equivalent output level of “E” or caluate Pt with SSG output which gives the nearest of “E” and difference ($\pm 1\text{dB}$). Record the Pt.
- 8 Calculate EIRP by the formula below $\text{EIRP} = \text{Gt} - \text{L} + \text{Pt}$.

Gt: gain of replacing antenna (dBi)

L: feeder loss between SSG and replacing antenna

Pt: Output power of the SSG

- 9 If the antenna for the EUT has circular polarization, sum of V-field and H-field will be result if measuring antenna is linear polarization.

5.7.4 Test Deviation

There is no deviation with the original standard.

5.7.5 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.7.6 Test Result

Please refer to ANNEX A.7.

5.8 Transmission Radiation Angle Width (3dB Beamwidth) Measurement

5.8.1 Limit

Item	Limits
3dB antenna beam width	$360/A$ (If $A < 1$; then $A = 1$) $A = \{\text{EIRP Power [mW]} / 16.36 \text{ for DS, OFDM}\}$ or $A = \{\text{EIRP Power [mW]} / 4.9 \text{ for FH}\}$
Note: This test item will not be applied to the transmission antenna which has a gain of 2.14dBi or less.	

5.8.2 Test Setup

See section 4.3.3 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.8.3 Test Procedure

- 1 Set EUT and measuring antenna at the same height and roughly facing each other.
- 2 Set spectrum analyzer with RBW=1 MHz, VBW=1 KHz, Y scale=5 dB, Detector=Peak, Trace mode=Max Hold, and tune reference level to observe receiving signal position.
- 3 Rotate directions of the EUT horizontally and vertically to find the maximum receiving power.
- 4 Move the measuring antenna height up and down within $\pm 50\text{cm}$ of EUT height and swing it to find the maximum output of measuring antenna. The output level at the spectrum analyzer is read as "E"
- 5 Calculate permitted radiation angle in horizontal and vertical using EIRP measured in another test method.
- 6 Calculate 3dB antenna beam width by the formula below $360/A$ (If $A < 1$; then $A = 1$). $A = \{\text{EIRP Power [mW]} / 16.36 \text{ for DS, OFDM}\}$ or $A = \{\text{EIRP Power [mW]} / 4.9 \text{ for FH}\}$

5.8.4 Test Deviation

There is no deviation with the original standard.

5.8.5 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.8.6 Test Result

Please refer to ANNEX A.8.

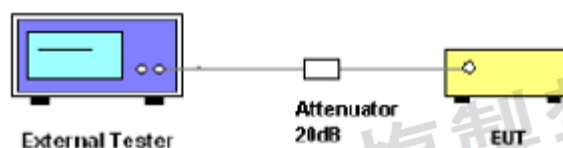
5.9 Radio Interference Prevention Capability Measurement

5.9.1 Limit

Item	Limits
Identification	≥ 48 bits

5.9.2 Test Setup

The photo of test setup please refer to ANNEX B.



5.9.3 Test Procedure

- 1 In the case that the EUT has the function of automatically transmitting the identification code: a. Transmit the predetermined identification codes form EUT. b. Check the transmitted identification codes with the demodulator.
- 2 In the case of receiving the identification code: a. Transmit the predetermined identification codes form the counterpart. b. Check if communication is normal. c. Transmit the signals other than predetermined ID codes form the counterpart. d. check if the EUT stops the transmission, or if it displays that identification codes are different from the predetermined ones.

5.9.4 Test Deviation

There is no deviation with the original standard.

5.9.5 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.9.6 Test Result

Please refer to ANNEX A.9.

ANNEX A TEST RESULT

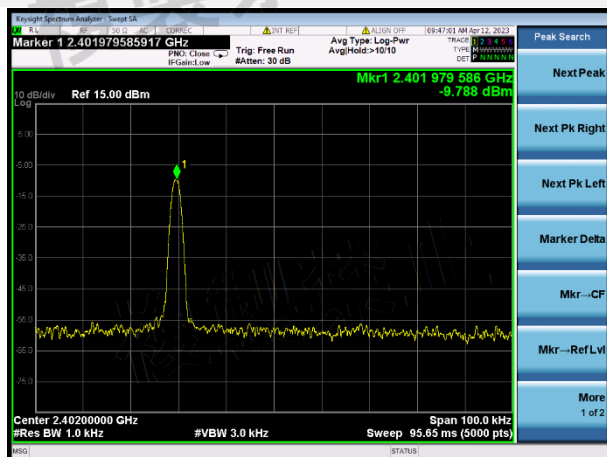
A.1 Frequency Error

Test Data

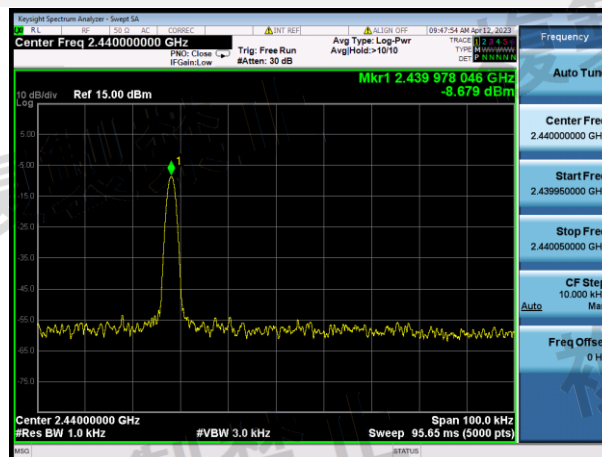
Test Mode	Test Voltage	Channel	Frequency (MHz)	Test Frequency (MHz)	Frequency Error (ppm)	Refer to Plot	Verdict
Unmodulated	LV	Low	2402	2401.979586	-8.50	A.1.1	Pass
		Middle	2440	2439.978046	-9.00	A.1.2	Pass
		High	2480	2479.977586	-9.04	A.1.3	Pass
	NV	Low	2402	2401.978906	-8.78	A.1.4	Pass
		Middle	2440	2439.977806	-9.10	A.1.5	Pass
		High	2480	2479.977405	-9.11	A.1.6	Pass
	HV	Low	2402	2401.978666	-8.88	A.1.7	Pass
		Middle	2440	2439.977646	-9.16	A.1.8	Pass
		High	2480	2479.97705	-9.25	A.1.9	Pass

Test Plots

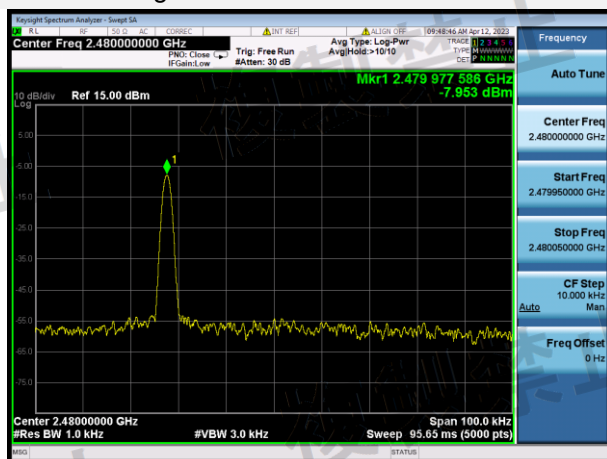
A.1.1 LV Low Channel



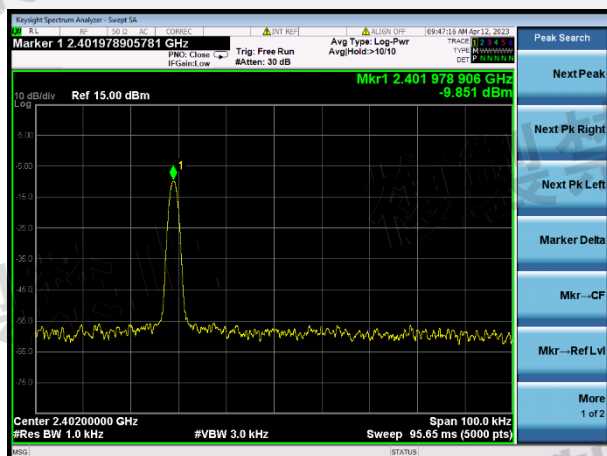
A.1.2 LV Middle Channel



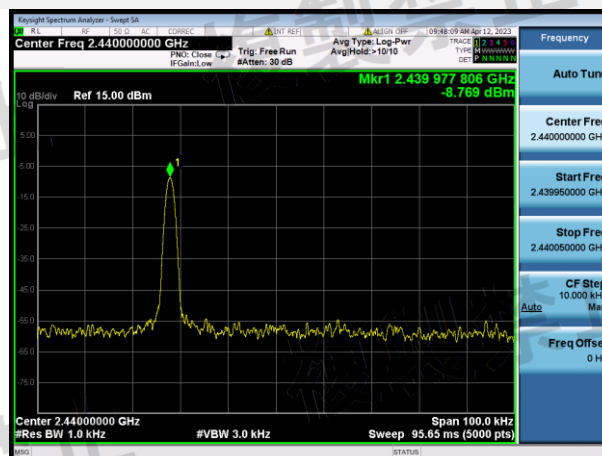
A.1.3 LV High Channel



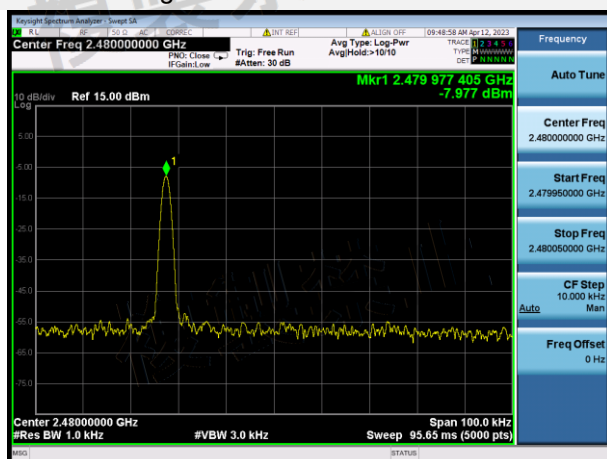
A.1.4 NV Low Channel



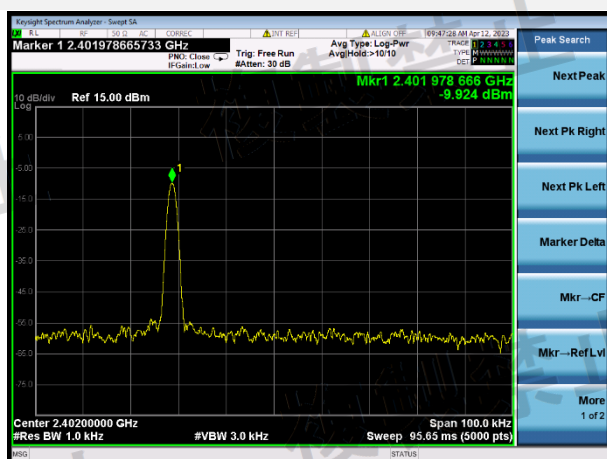
A.1.5 NV Middle Channel



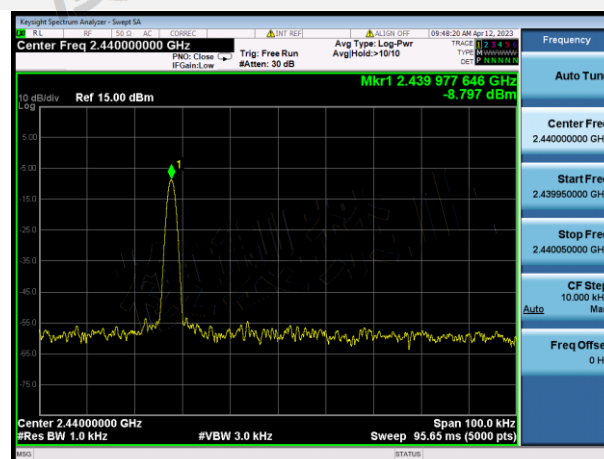
A.1.6 NV High Channel



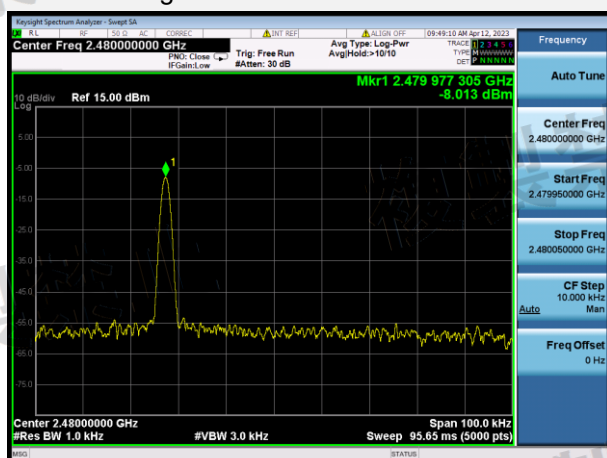
A.1.7 HV Low Channel



A.1.8 HV Middle Channel



A.1.9 HV High Channel



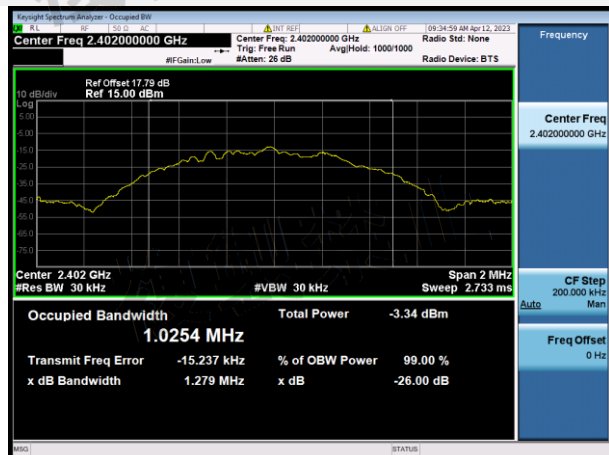
A.2 Occupied Bandwidth and Spread-spectrum Bandwidth/Factor

Test Data for GSFK (BLE 1Mbps)

Results of Occupied Bandwidth	Channel	Test Voltage	Measured 99% Occupied Bandwidth (MHz)	Refer to Plot	Verdict
	Low	LV	1.03	A.2.1	Pass
		NV	1.02	A.2.2	Pass
		HV	1.03	A.2.3	Pass
	Middle	LV	1.03	A.2.4	Pass
		NV	1.03	A.2.5	Pass
		HV	1.03	A.2.6	Pass
	High	LV	1.03	A.2.7	Pass
		NV	1.03	A.2.8	Pass
		HV	1.03	A.2.9	Pass

Test Data for GSKF (BLE 1Mbps)

A.2.1 Low Channel LV



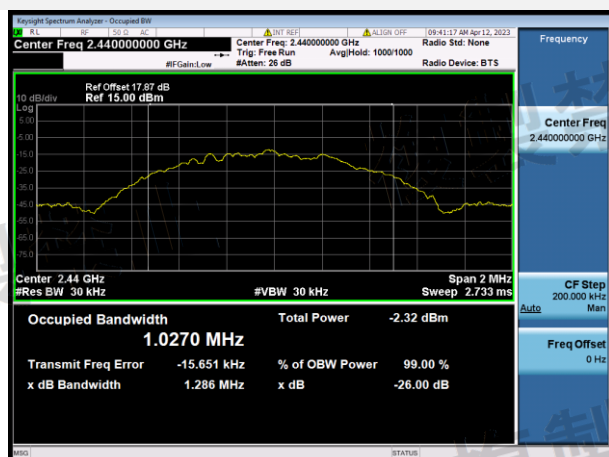
A.2.2 Low Channel NV



A.2.3 Low Channel HV



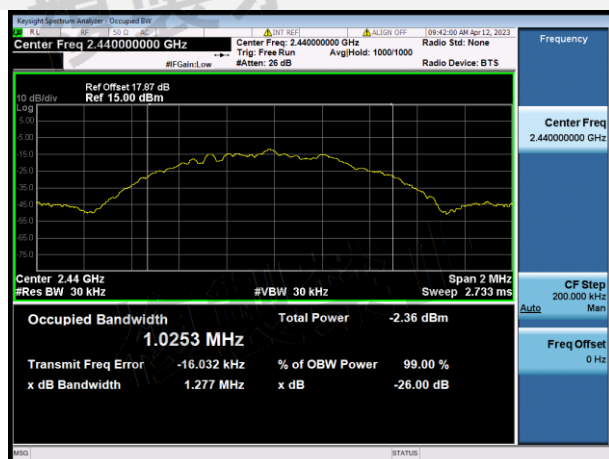
A.2.4 Middle Channel LV



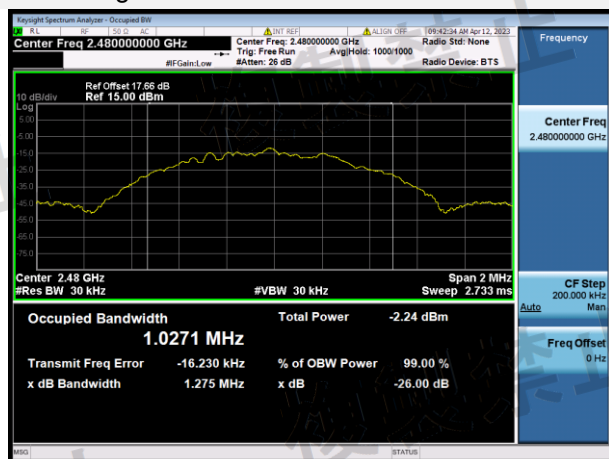
A.2.5 Middle Channel NV



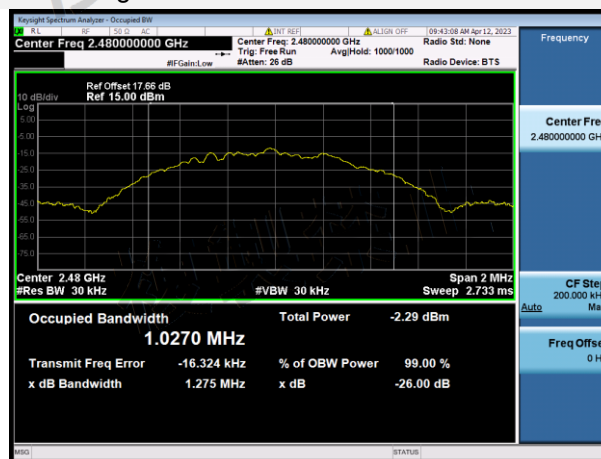
A.2.6 Middle Channel HV



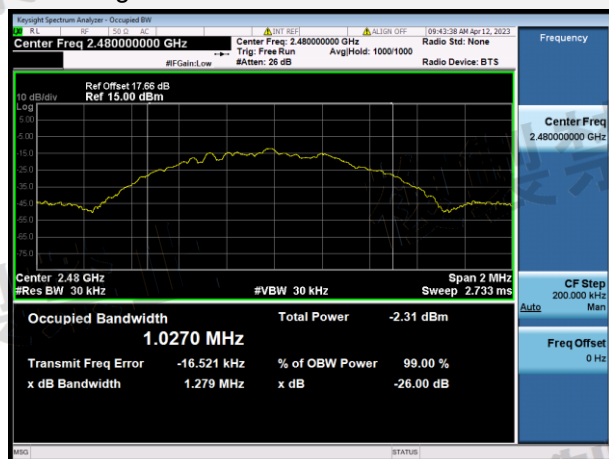
A.2.7 High Channel LV



A.2.8 High Channel NV



A.2.9 High Channel HV



A.3 The frequency retention time (Dwell time)

Note: Not applicable.

A.4 Unwanted Emission Intensity Measurement

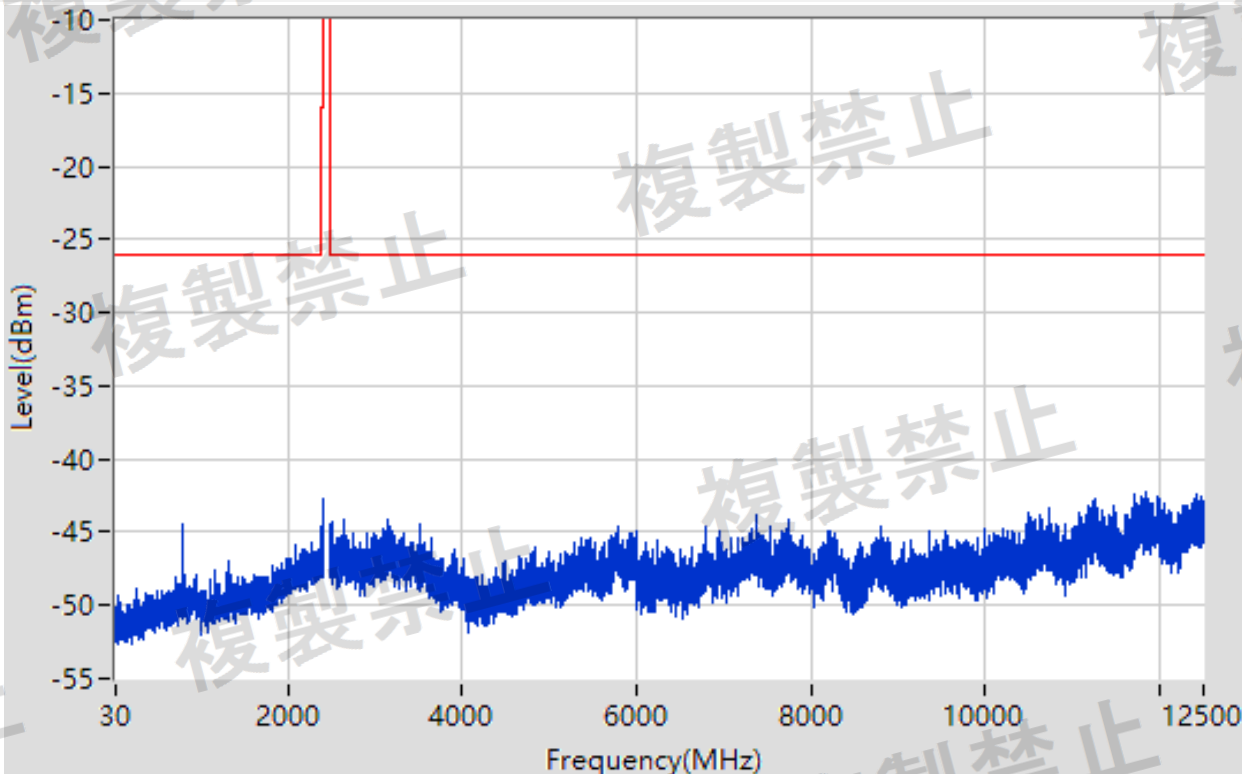
Test Data

Note: All configurations have been tested, only the worst configuration (Test Voltage NV) shown here.

Mode	Test Voltage	Channel	Refer to Plot	Verdict
GFSK (BLE 1Mbps)	NV	Low	A.4.1	Pass
		Middle	A.4.2	Pass
		High	A.4.3	Pass

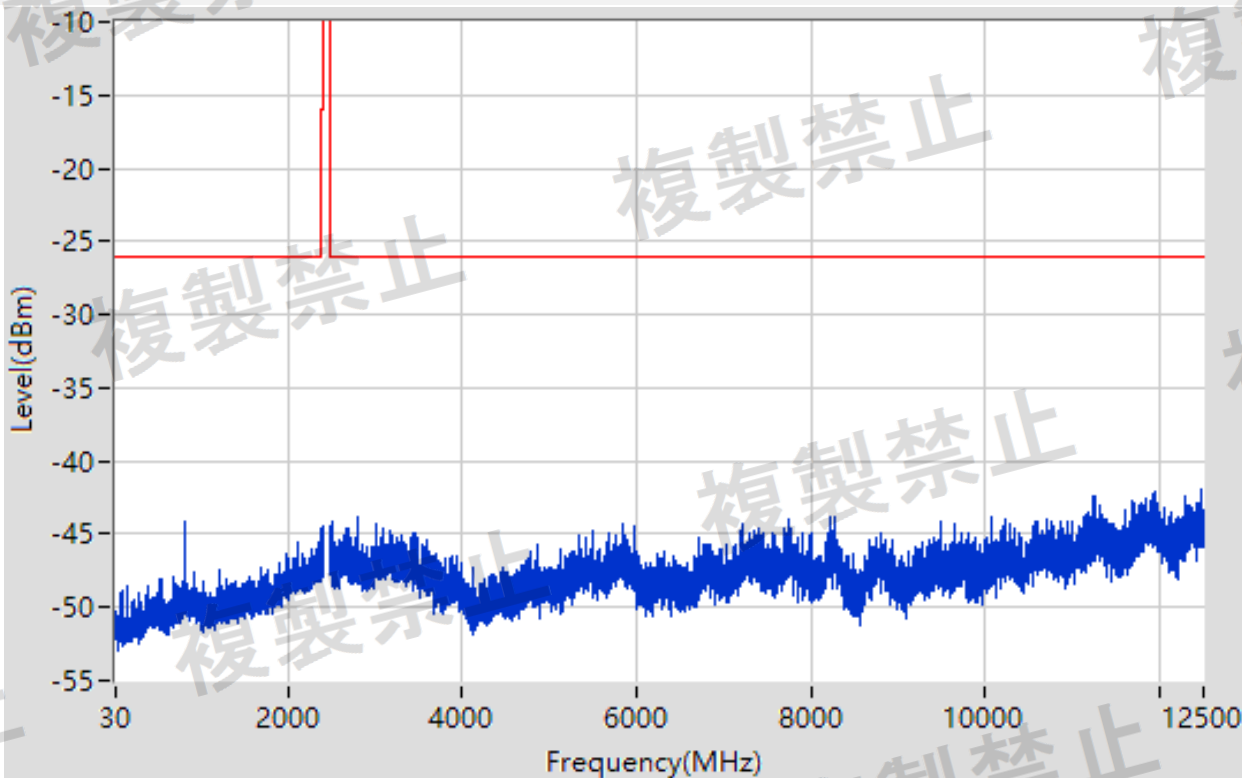
Test plots

A.4.1 GFSK (BLE 1Mbps) NV Low Channel



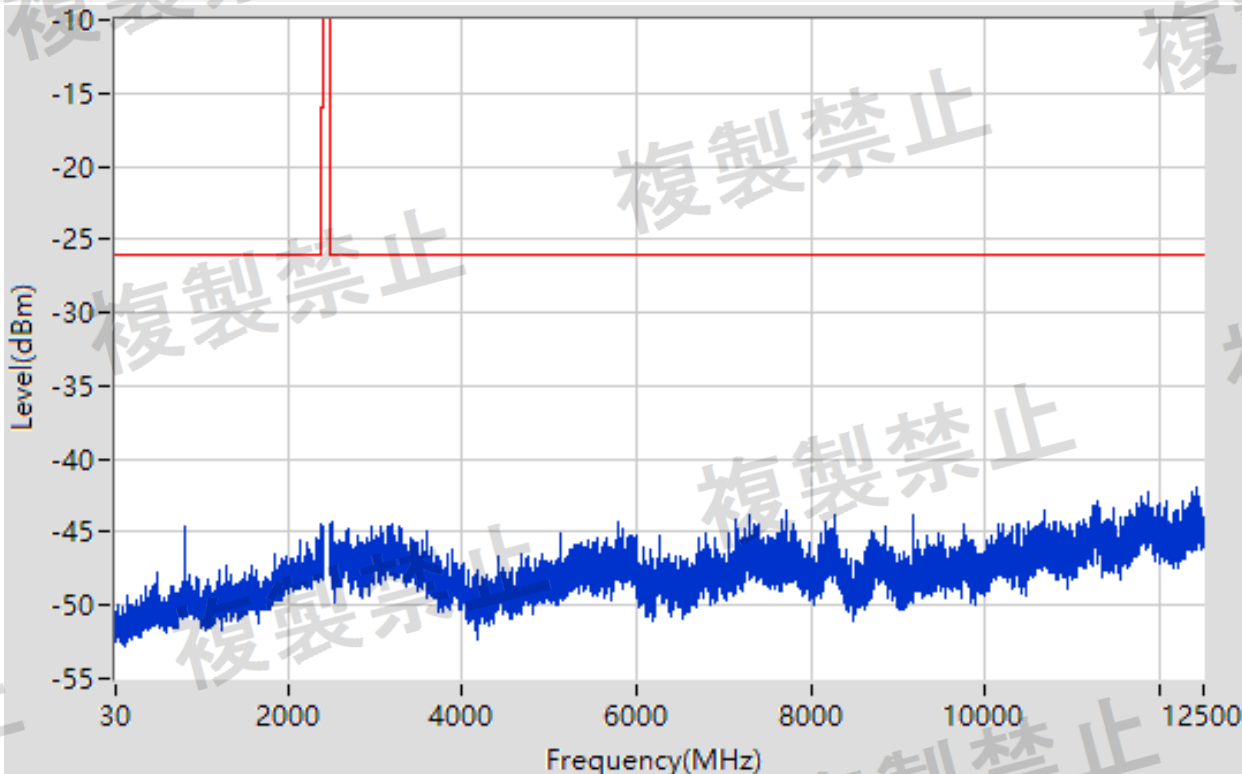
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Limit (dBm)	Verdict	Sweep Point
30	1000	1	Peak	801	-44.41	-26	Pass	971
1000	2374	1	Peak	2369	-45.19	-26	Pass	1375
2374	2387	1	Peak	2376.253	-44.59	-26	Pass	601
2387	2400	1	Peak	2400	-42.79	-16	Pass	601
2483.5	2496.5	1	Peak	2488.592	-44.51	-16	Pass	601
2496.5	2509.5	1	Peak	2509.197	-44.34	-26	Pass	601
2509.5	6000	1	Peak	2657.521	-44.17	-26	Pass	3491
6000	12500	1	Peak	11845	-42.23	-26	Pass	6501

A.4.2 GFSK (BLE 1Mbps) NV Middle Channel



Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Limit (dBm)	Verdict	Sweep Point
30	1000	1	Peak	813	-44.15	-26	Pass	971
1000	2374	1	Peak	2107	-45.55	-26	Pass	1375
2374	2387	1	Peak	2382.342	-44.64	-26	Pass	601
2387	2400	1	Peak	2397.313	-44.51	-16	Pass	601
2483.5	2496.5	1	Peak	2490.585	-44.95	-16	Pass	601
2496.5	2509.5	1	Peak	2505.903	-44.18	-26	Pass	601
2509.5	6000	1	Peak	2800.542	-43.89	-26	Pass	3491
6000	12500	1	Peak	12486	-41.96	-26	Pass	6501

A.4.3 GFSK (BLE 1Mbps) NV High Channel



Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Limit (dBm)	Verdict	Sweep Point
30	1000	1	Peak	827	-44.61	-26	Pass	971
1000	2374	1	Peak	2337	-45.38	-26	Pass	1375
2374	2387	1	Peak	2386.155	-44.51	-26	Pass	601
2387	2400	1	Peak	2394.865	-44.57	-16	Pass	601
2483.5	2496.5	1	Peak	2495.113	-44.52	-16	Pass	601
2496.5	2509.5	1	Peak	2509.002	-44.27	-26	Pass	601
2509.5	6000	1	Peak	5777.968	-44.34	-26	Pass	3491
6000	12500	1	Peak	12413	-41.91	-26	Pass	6501

A.5 Antenna Power Error Measurement

Note: All configurations have been tested, only the worst configuration (Test Voltage NV) shown here.

GFSK (BLE 1Mbps) Test Result

Duty cycle =0.834

Manufacturer declares the Antenna Power = 0.1740mW

Test Channel	Frequency (MHz)	power value (dBm)	Antenna Power (dBm)	Antenna Power (mW)	Antenna Power Error	Verdict
Low	2402	-9.34	-9.34	0.1163	-33.15%	Pass
Middle	2440	-8.90	-8.90	0.1288	-25.99%	Pass
High	2480	-8.69	-8.69	0.1352	-22.27%	Pass

A.6 Limitation of Collateral Emission of Receiver Measurement

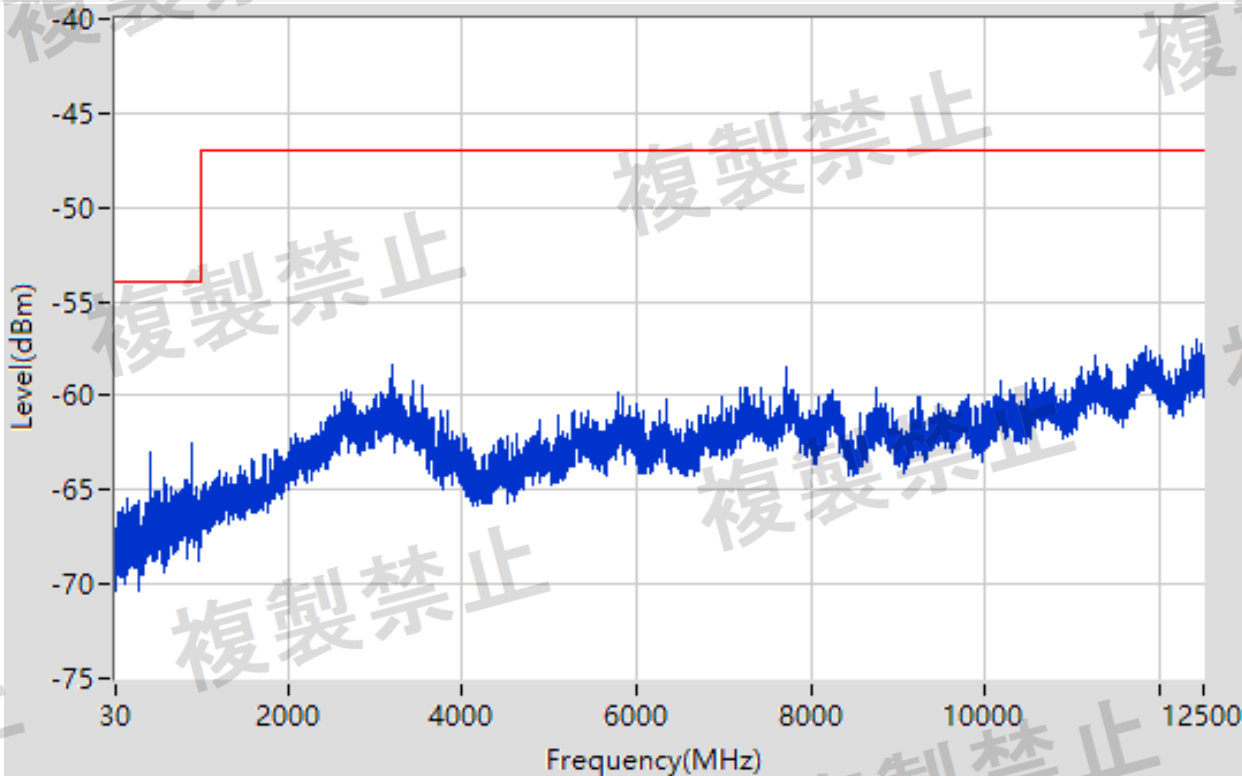
Test Data

Note: All configurations have been tested, only the worst configuration (Test Voltage NV) shown here.

Mode	Test Voltage	Channel	Refer to Plot	Verdict
GFSK (BLE 1Mbps)	NV	Low	A.6.1	Pass
		Middle	A.6.2	Pass
		High	A.6.3	Pass

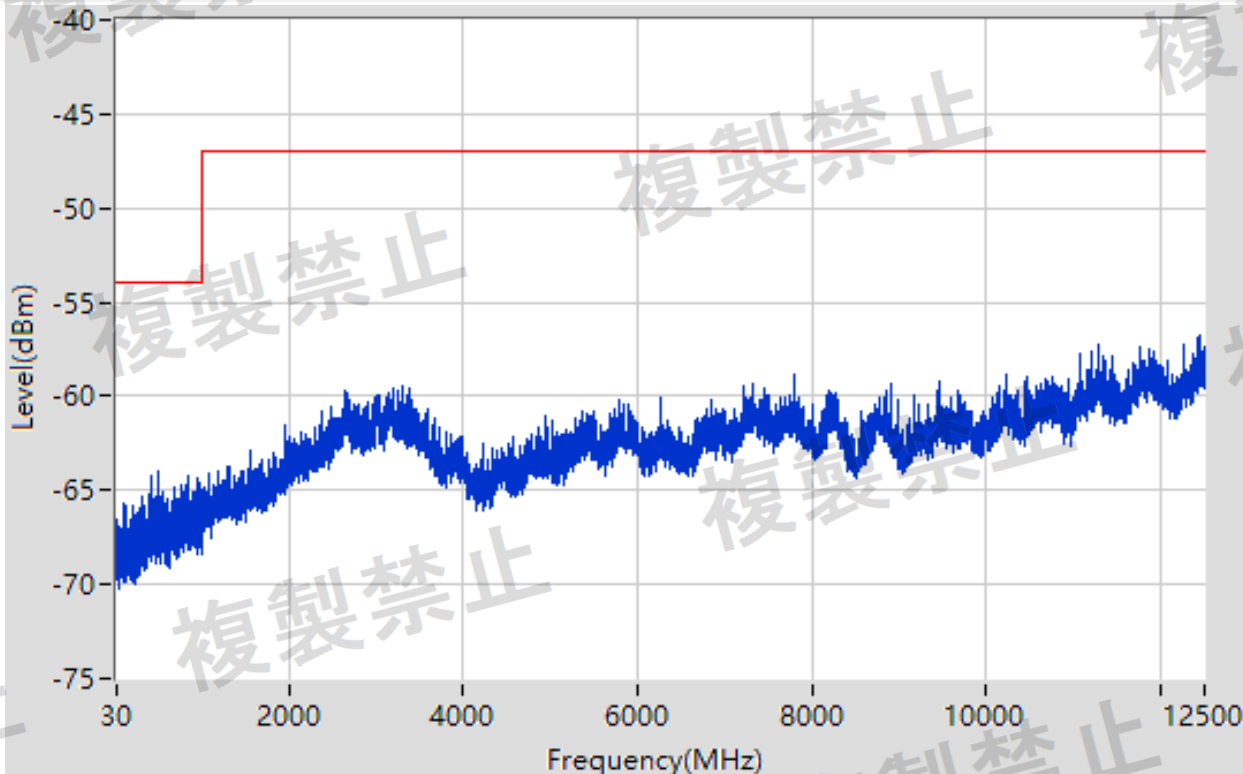
Test Plots

A.6.1 GFSK (BLE 1Mbps) NV Low Channel



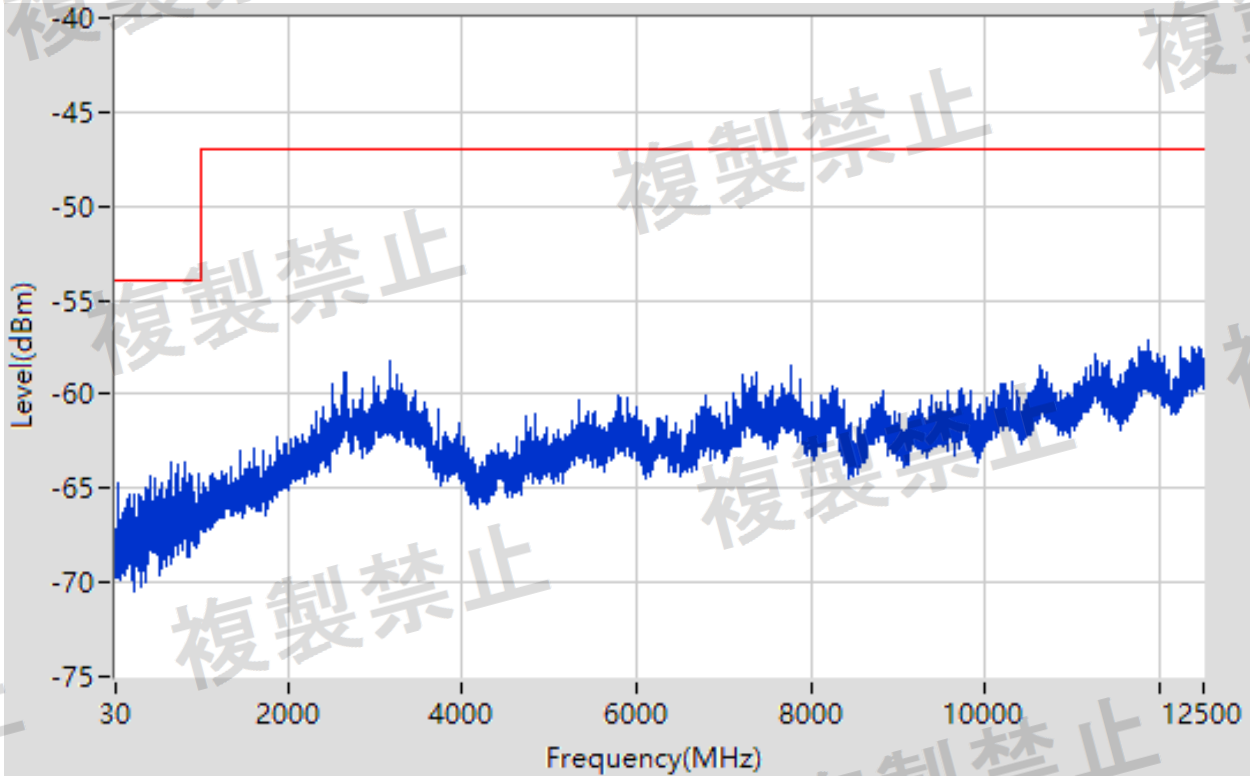
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Limit (dBm)	Verdict	Sweep Point
30	1000	0.1	Peak	895.24	-62.56	-54	Pass	1001
1000	6000	1	Peak	3205	-58.41	-47	Pass	4001
6000	12500	1	Peak	12433.375	-57.02	-47	Pass	4001

A.6.2 GFSK (BLE 1Mbps) NV Middle Channel



Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Limit (dBm)	Verdict	Sweep Point
30	1000	0.1	Peak	506.27	-64.04	-54	Pass	1001
1000	6000	1	Peak	3308.75	-59.52	-47	Pass	4001
6000	12500	1	Peak	12454.5	-56.77	-47	Pass	4001

A.6.3 GFSK (BLE 1Mbps) NV High Channel



Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Limit (dBm)	Verdict	Sweep Point
30	1000	0.1	Peak	655.65	-63.6	-54	Pass	1001
1000	6000	1	Peak	3171.25	-58.2	-47	Pass	4001
6000	12500	1	Peak	11871.125	-57.18	-47	Pass	4001

A.7 Transmission Antenna Gain (EIRP Antenna Power) Measurement

Note: Not applicable.

A.8 Transmission Radiation Angle Width (3dB Bandwidth) Measurement

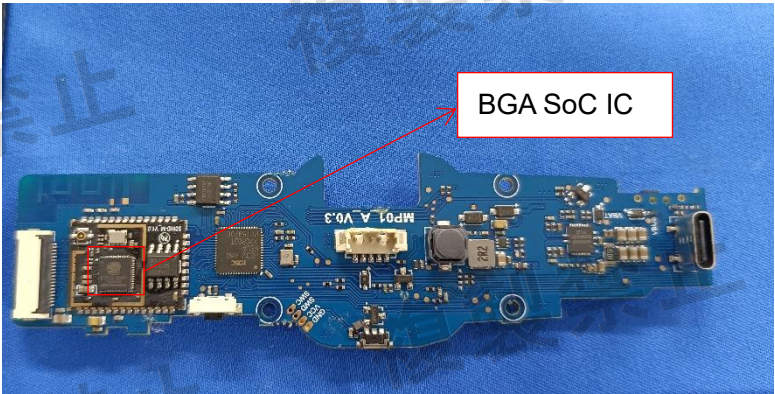
Note: Not applicable.

A.9 Radio Interference Prevention Capability Measurement

Test Voltage	Channel	Test Result (ID Code)	Verdict
LV	Low	GOOD	Pass
	Middle	GOOD	Pass
	High	GOOD	Pass
NV	Low	GOOD	Pass
	Middle	GOOD	Pass
	High	GOOD	Pass
HV	Low	GOOD	Pass
	Middle	GOOD	Pass
	High	GOOD	Pass

A.10 Construction Protection Confirmation Method

The RF and modulation portions are protected against illegal modification as following method:

Protected Method	Description
Structure protection	The RF Module is BGA SoC IC, can't be easily modified
Reference Photo	
	

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ2340262-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ2340262-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ2340262-AI.PDF”.

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--END OF REPORT--