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TEST REPORT

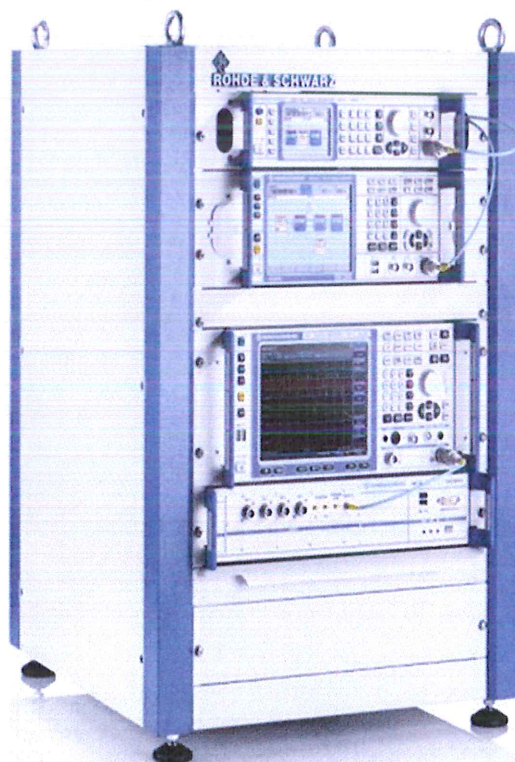
ISSUED BY
Shenzhen BALUN Technology Co., Ltd.



FOR
SwitchBot Curtain

ISSUED TO
Woan Technology (Shenzhen) Co., Ltd.

Room 708-715, Building A, Huafeng Bao'an Zhigu Technology
Innovation Park, Yintian Road, Xixiang Street, Bao'an District,
Shenzhen, Guangdong, P.R. China, 518102



Tested by: Ye Hongji

Date: Jun. 10, 2020

Approved by: Mel Yanquan

(Chief Engineer)

Date: Jun. 10, 2020

Report No: BL-SZ2030158-601

EUT Name: SwitchBot Curtain

Model Name: W0701600

Brand Name: SwitchBot

Test Rule: MIC Notice No.88 Appendix No.43

Test Standard: MIC Ordinance Regulating Radio
Equipment Article 49.20

Test Conclusion: Pass

Test Date: May 19, 2020 ~ May 29, 2020

Date of Issue: Jun. 10, 2020

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Revision History

Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>Jun. 10, 2020</u>	<u>Initial Issue</u>

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1. ADMINISTRATIVE DATA (GENERAL INFORMATION)

1.1 Identification of the Testing Laboratory

Company Name:	Shenzhen BALUN Technology Co., Ltd.
Address:	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, ShenZhen, GuangDong Province, P. R. China
Phone Number:	+86 755 6685 0100
Fax Number:	+86 755 6182 4271

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1. The laboratory has been listed by US Federal Communications Commission to perform electromagnetic emission measurements. The recognition numbers of test site are 832625. The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Laboratory Condition

Ambient Temperature	20°C to 25°C
Ambient Relative Humidity	45% to 55%
Ambient Pressure	100 kPa to 102 kPa

1.4 Announce

- (1) The test report reference to the report template version v5.3.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
- (5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.
- (6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.
- (7) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.

2. PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 708-715, Building A, Huafeng Bao'an Zhigu Technology Innovation Park, Yintian Road, Xixiang Street, Bao'an District, Shenzhen, Guangdong, P.R. China, 518102

2.2 Manufacturer Information

Manufacturer	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 708-715, Building A, Huafeng Bao'an Zhigu Technology Innovation Park, Yintian Road, Xixiang Street, Bao'an District, Shenzhen, Guangdong, P.R. China, 518102

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	SwitchBot Curtain
Under Test Model Name	W0701600
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 4.0 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)
Antenna Type	Spring Antenna
Antenna Gain	2.72 dBi (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: 7.59 mW
About the Product	Only the Bluetooth was tested in this report.

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	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
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)	Low/Middle/High	GFSK(BLE)	1(BLE)	Pass
5.8	Transmission Radiation Angle Width (3dB Beamwidth)	Low/Middle/High	GFSK(BLE)	1(BLE)	Pass
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.

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.

Measurement	Value
Frequency Error / 99% & 90% Bandwidth	$\pm 0.1 \times 10^{-6}$
Antenna Power	$\pm 0.82\text{dB}$
TX-RX Spurious Emissions	$\pm 0.58\text{dB}$
Transmission Antenna Gain	$\pm 2.32\text{dB}$
Temperature	$\pm 0.6^{\circ}\text{C}$
Humidity	$\pm 4.0\%$
DC / AC Power Source	$\pm 0.04\%$

4. GENERAL TEST CONFIGURATIONS

4.1 Test Environment Conditions

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

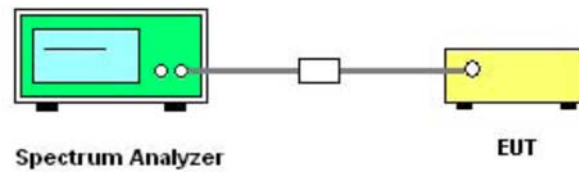
Relative Humidity (%)	45% to 85%	
Atmospheric Pressure (kPa)	86 kPa to 106 kPa	
Temperature	-10°C to +45°C	
Working Voltage of the EUT	NV (Normal Voltage)	3.7 V
	LV (Low Voltage)	3.5 V
	HV (High Voltage)	4.2 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Calibration Company	Calibration By	Cal. Date	Cal. Due
Spectrum Analyzer	ROHDE&SC HWAZ	Spectrum Analyzer	FSV-30	SMQ	Li Zhi	2019.06.13	2020.06.12
Bluetooth Tester	ROHDE&SC HWAZ	CBT	101005	SMQ	Li Zhi	2019.06.13	2020.06.12
Power Splitter	KMW	DCPD-LDC	1305003 215	SMQ	Li Zhi	--	--
Attenuator	KMW	20dB	1106170 91	SMQ	Li Zhi	--	--
EMI Receiver	ROHDE&SC HWAZ	ESRP	101036	SMQ	You Shuifu	2019.06.13	2020.06.12
LISN	SCHWARZB ECK	NSLK 8127	8127-687	SMQ	You Shuifu	2019.06.13	2020.06.12
Test Antenna-Bi-Log	SCHWARZB ECK	VULB 9163	9163-624	SCHWARZ BECK	Dieter	2018.08.22	2020.08.21
Test Antenna-Horn	SCHWARZB ECK	BBHA 9120D	9120D- 1148	SCHWARZ BECK	Dieter	2018.07.11	2020.07.10
Test Antenna-Loop	SCHWARZB ECK	FMZB 1519	1519-037	SCHWARZ BECK	Dieter	2017.11.09	2020.11.08
Anechoic Chamber	RAINFORD	9 m*6 m*6 m	N/A	GRGT	Liao Shibo	2017.02.21	2022.02.20
DC Power Supply	ROHDE&SC HWAZ	HMP202 0	0181416 64	--	--	2019.06.18	2020.06.17

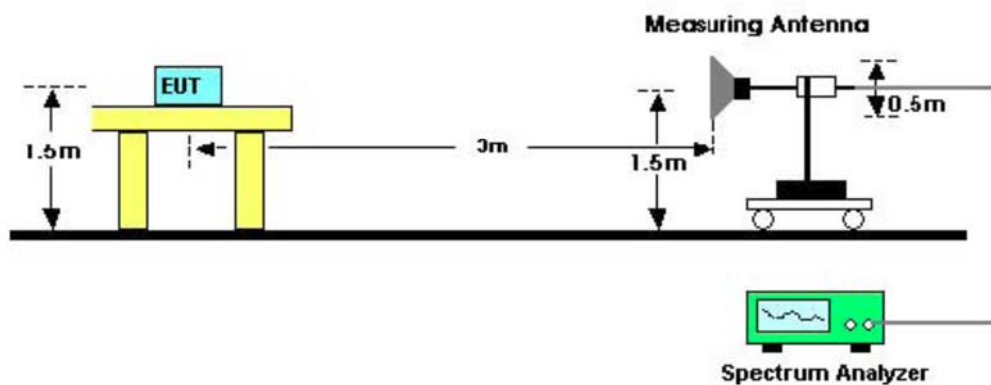
4.3 Description of Test Setup

4.3.1 For Antenna Port Test

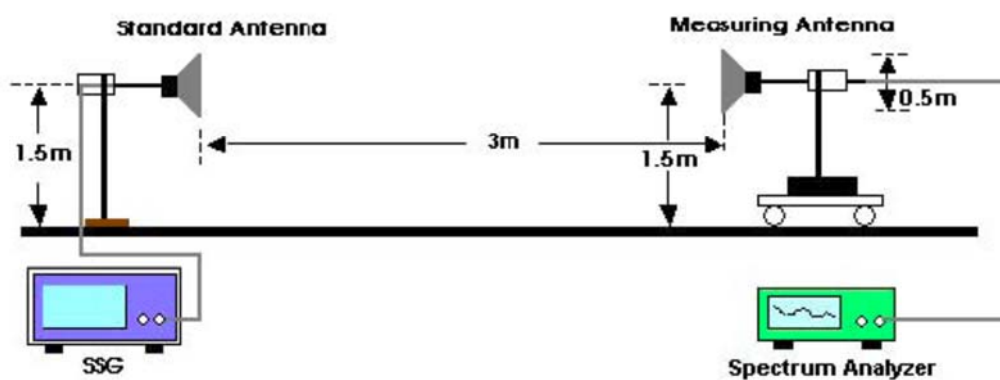


(Diagram 1)

4.3.2 For EIRP Antenna Power Test

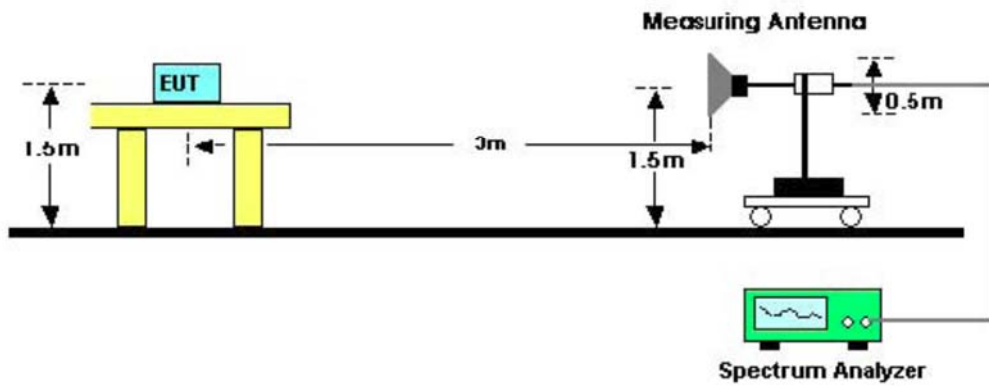


(Diagram 2)



(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:10 kHz / VB:30 kHz / SPAN: 50 kHz / AT: 20 dB / Ref: 10 dBm
- 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, f_c is declaring of channel frequency. Then the frequency error formula is $(f - f_c) / f_c \times 10^6$ 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,DSSS $\leq$ 26MHz; Others $\leq$ 26MHz
Spread-spectrum Bandwidth	$\geq$ 500 kHz (FHSS, DSSS)
Spreading Spectrum Factor	$\geq$ 5 , Operating Frequency 2400 -2483.5 MHz $\geq$ 10 , Operating Frequency 2471 -2497 MHz

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: 3 times resolution 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

Resoluble 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. $\text{Total} = (0.4\text{s} \times \text{diffusion rate} / \text{hopping cycle}) \times \text{sum of the residence time of (3)}$
 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

This limit apply to the equipment is using FHSS

Item	Limits
TX Spurious Emission	$\leq 250 \text{ nW}$ ($30 \leq f \leq 1000 \text{ MHz}$),
	$\leq 2.5 \text{ }\mu\text{W}$ ($1000 \text{ MHz} \leq f < 2387 \text{ MHz}$; $2496.5 \text{ MHz} < f$)
	$\leq 25 \text{ }\mu\text{W}$ ($2387 \text{ MHz} \leq f < 2400 \text{ MHz}$) and ($2483.5 \text{ MHz} < f \leq 2496.5 \text{ MHz}$)

This limit apply to the equipment is using wide band modulations other than FHSS.

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

- The EUT is placed in transmit mode at maximum power/modulation at a fixed channel.
- Setting of SA is following as: 30 MHz to 1000 MHz with RBW/VBW = 100 kHz, above 1 GHz with RBW/VBW = 1MHz; / AT: 10dB / Ref: 0dBm / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold
- . Setting of SA is following as 30 MHz and stop frequency 1000 MHz Then to mark peak reading value + cable loss shall be less than 250 nW
- Setting of SA is following as 1000 MHz and stop frequency 2387 MHz Then to mark peak reading value + cable loss shall be less than 2.5 μW
- 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 .
- 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
- 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
- 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]
- 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	$\leq 3 \text{ mW/MHz}$ (FH form 2427 - 2470.75 MHz) $\leq 10 \text{ mW/MHz}$ (OFDM, DS from 2400~2483.5 MHz) $\leq 10 \text{ mW}$ (Other from 2400~2483.5 MHz)
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

1 EUT have transmitted continuous maximum power of hopping mode (For FHSS Device).

2 The Antenna Power Density (PD) is equal to the:

$PD = \text{Power meter value (dBm)} + \text{Cable loss (dB)} + 10 \log_{10}(1/\text{Duty cycle}) \text{ (dB)} + 10 \log_{10}(1/\text{Spread Spectrum Bandwidth}) \text{ (dB)}$

3 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	Modulation system	Frequency band used	Limits	
			Omnidirectional case	Directional case
EIRP Power Density	DS, OFDM	2400 - 2483.5 MHz	12.14 dBm/MHz	22.14 dBm/MHz
	FH, DS-FH FH-OFDM	2400 - 2483.5 MHz	6.91 dBm/MHz	16.91 dBm/MHz
		Excluding 2,427 - 2,470.75 MHz	12.14 dBm/MHz	22.14 dBm/MHz
	Other than the above	2,400 - 2,483.5 MHz	12.14 dBm	22.14 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 and 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 ± 50 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 as "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 ± 50 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 calculate Pt with SSG output which gives the nearest of "E" and difference (± 1 dB). Record the Pt.
- 8 Calculate EIRP by the formula below $EIRP = G_t - L + P_t$.
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

- In the case that the EUT has the function of automatically transmitting the identification code: a. Transmit the predetermined identification codes from EUT. b. Check the transmitted identification codes with the demodulator.
- In the case of receiving the identification code: a. Transmit the predetermined identification codes from the counterpart. b. Check if communication is normal. c. Transmit the signals other than predetermined ID codes from 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

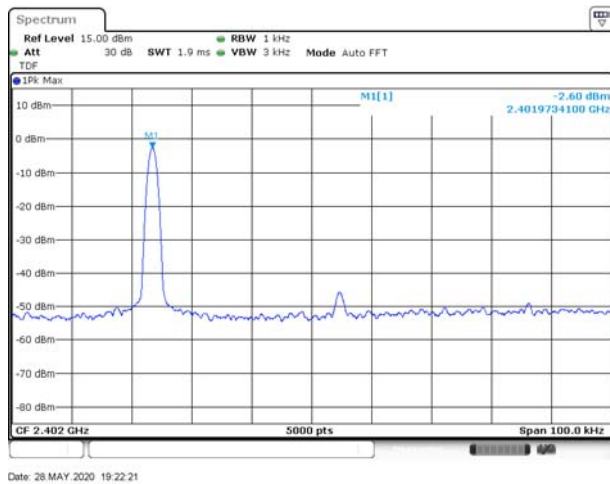
A.1 Frequency Error

Test Data

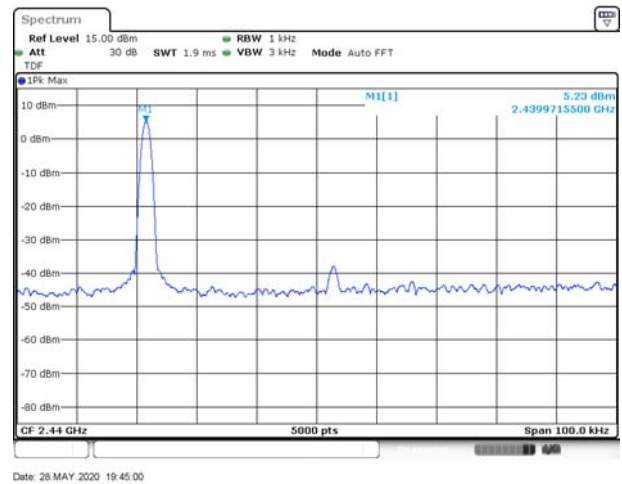
Test Mode	Test Voltage	Channel	Frequency fc (MHz)	Test Frequency f (MHz)	Frequency Error ppm	Refer to Plot	Verdict
Unmodulated	LV	Low	2402	2401.97341	-11.07	A.1.1	Pass
		Middle	2440	2439.97155	-11.66	A.1.2	Pass
		High	2480	2479.97097	-11.71	A.1.3	Pass
	NV	Low	2402	2401.97201	-11.65	A.1.4	Pass
		Middle	2440	2439.97151	-11.68	A.1.5	Pass
		High	2480	2479.97095	-11.71	A.1.6	Pass
	HV	Low	2402	2401.97191	-11.69	A.1.7	Pass
		Middle	2440	2439.97131	-11.76	A.1.8	Pass
		High	2480	2479.97093	-11.72	A.1.9	Pass

Test Plots

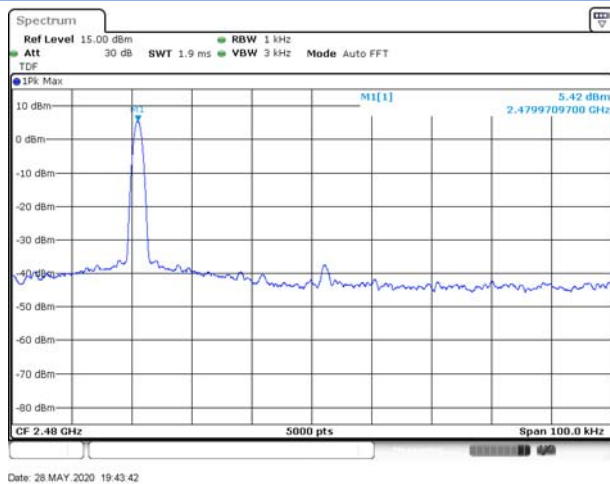
A.1.1, LV Low Channel:



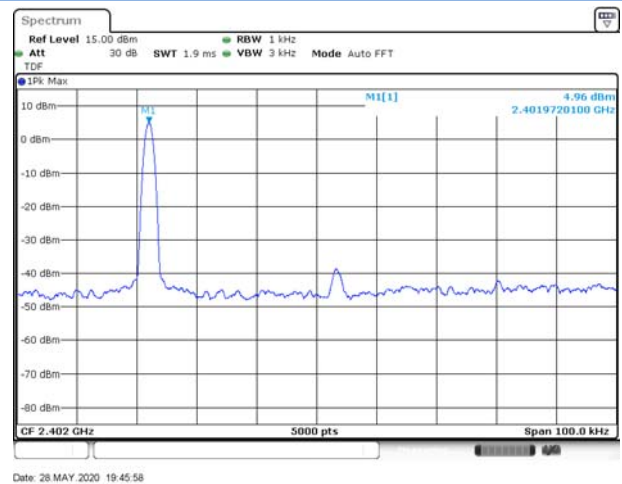
A.1.2, LV Middle Channel:



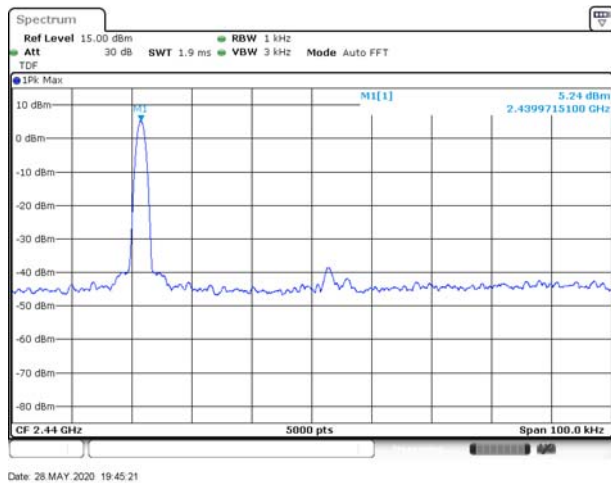
A.1.3, LV High Channel:



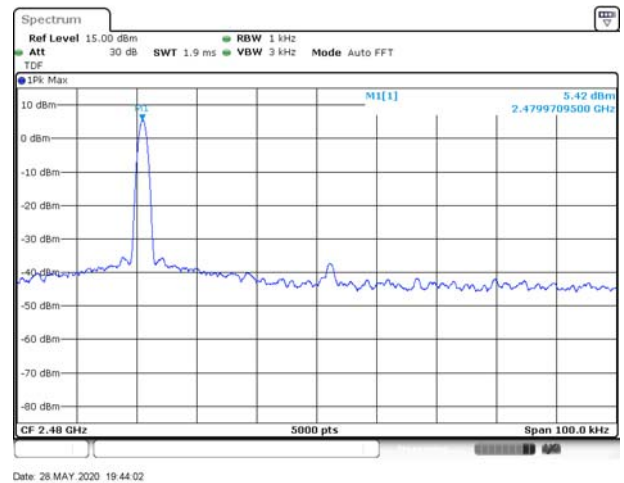
A.1.4, NV Low Channel:



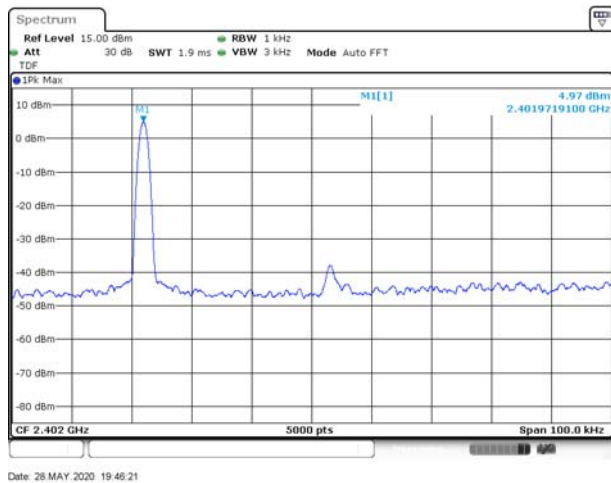
A.1.5, NV Middle Channel:



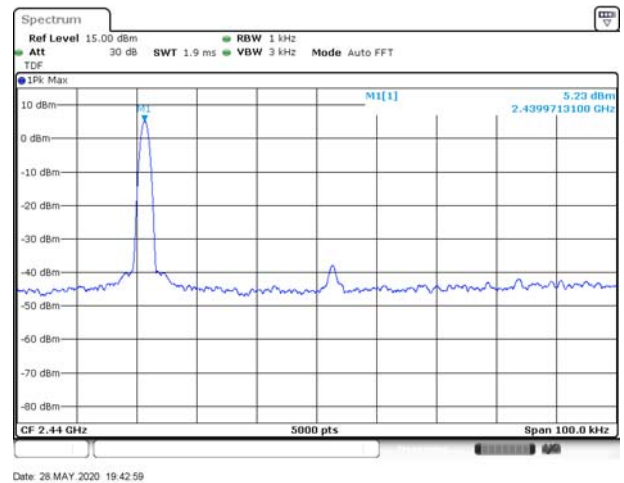
A.1.6, NV High Channel:



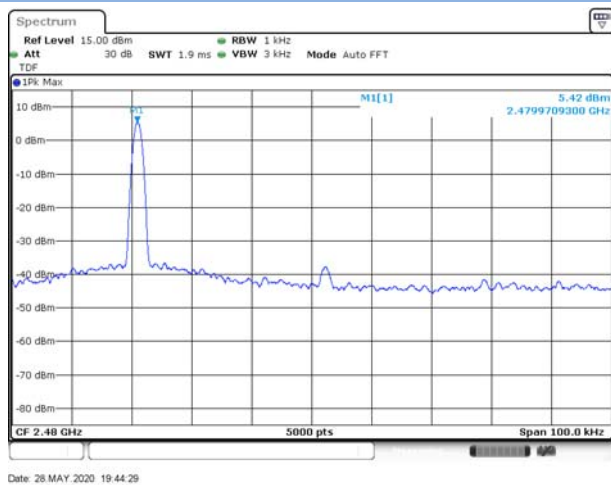
A.1.7, HV Low Channel:



A.1.8, HV Middle Channel:



A.1.9, HV High Channel:



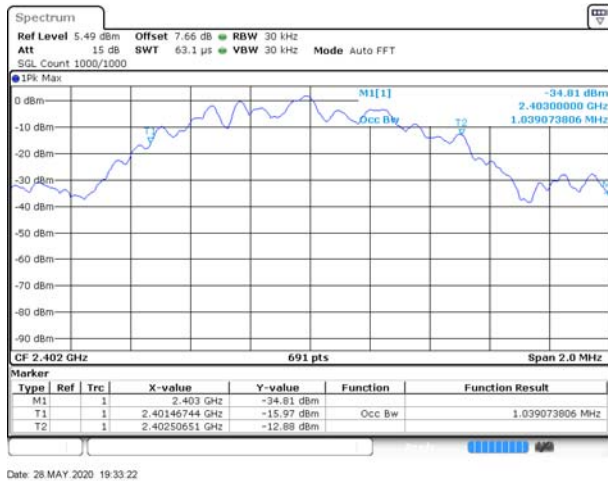
A.2 Occupied Bandwidth and Spread-spectrum Bandwidth/Factor

Test Data for GSKF (BLE)

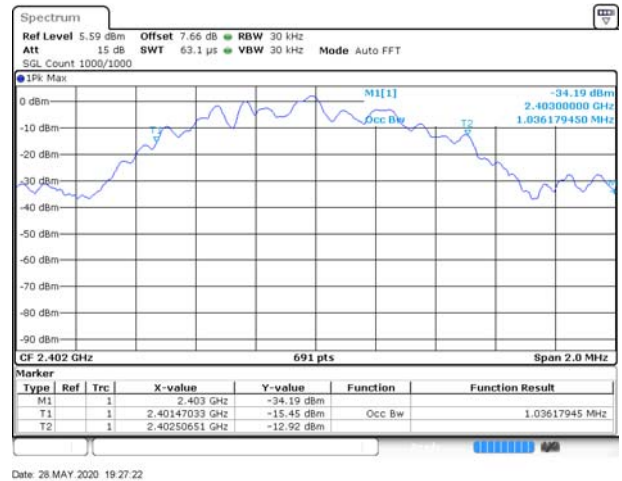
Results of Occupied Bandwidth	Channel	Test Voltage	Measured 99% Occupied Bandwidth (MHz)	Refer to Plot	Verdict
	Low	LV	1.04	A.2.1	Pass
		NV	1.04	A.2.2	Pass
		HV	1.04	A.2.3	Pass
	Middle	LV	1.04	A.2.4	Pass
		NV	1.04	A.2.5	Pass
		HV	1.04	A.2.6	Pass
	High	LV	1.04	A.2.7	Pass
		NV	1.04	A.2.8	Pass
		HV	1.04	A.2.9	Pass

Test Data for GSKF (BLE)

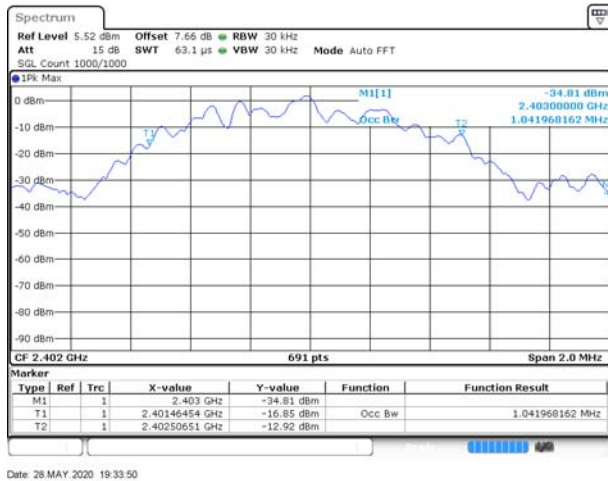
A.2.1, Low Channel LV:



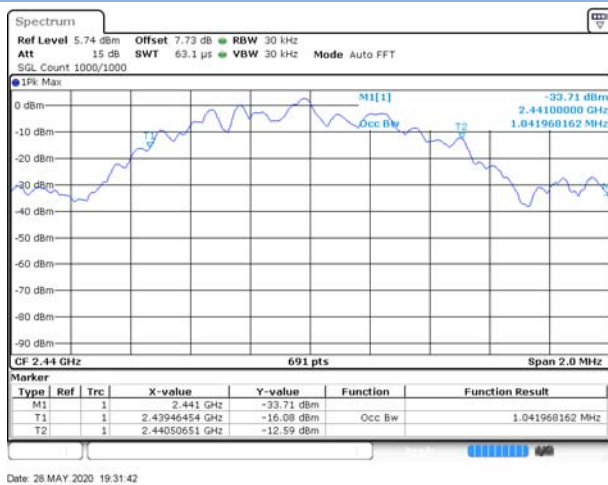
A.2.2, Low Channel NV:



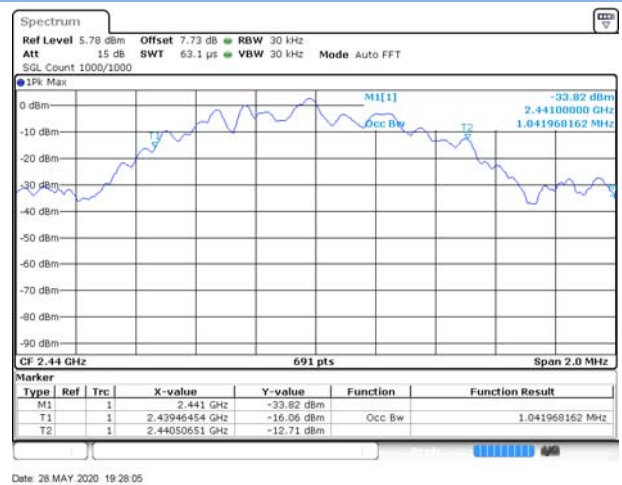
A.2.3, Low Channel HV:



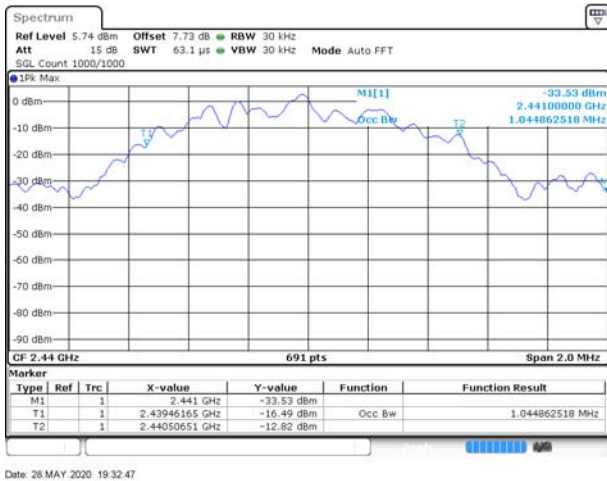
A.2.4, Middle Channel LV:



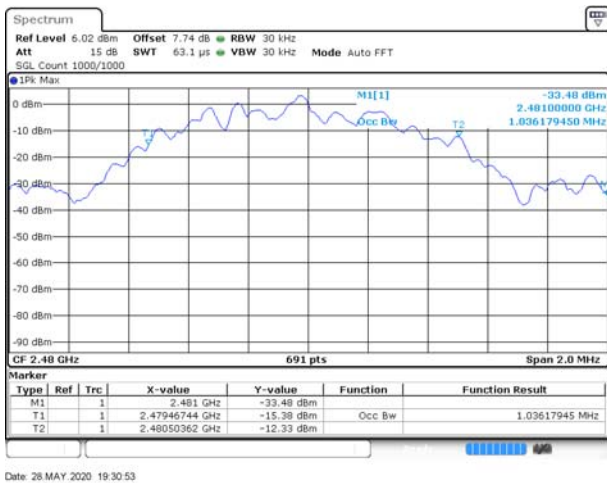
A.2.5, Middle Channel NV:



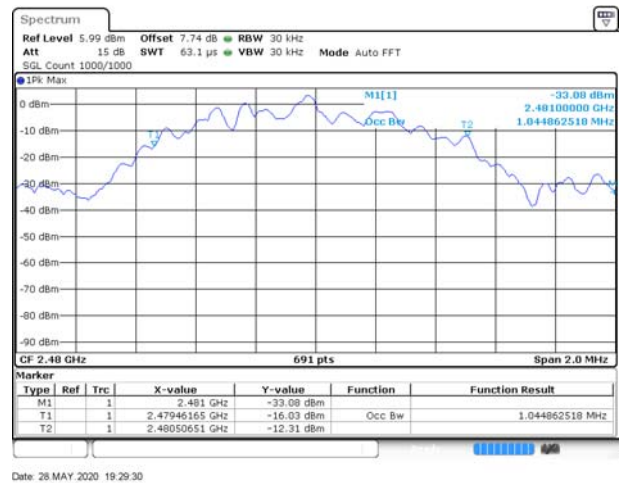
A.2.6, Middle Channel HV:



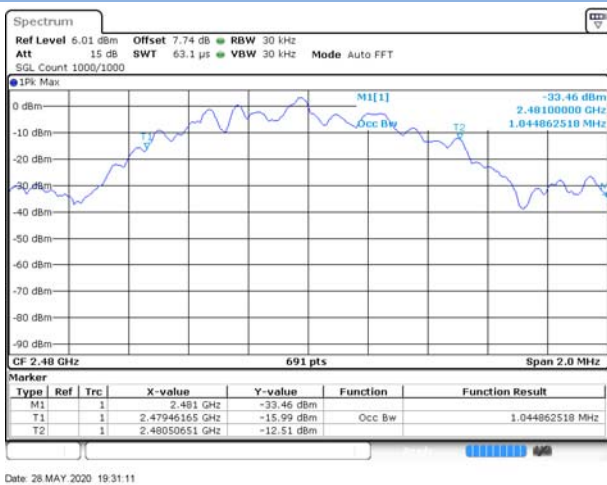
A.2.7, High Channel LV:



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

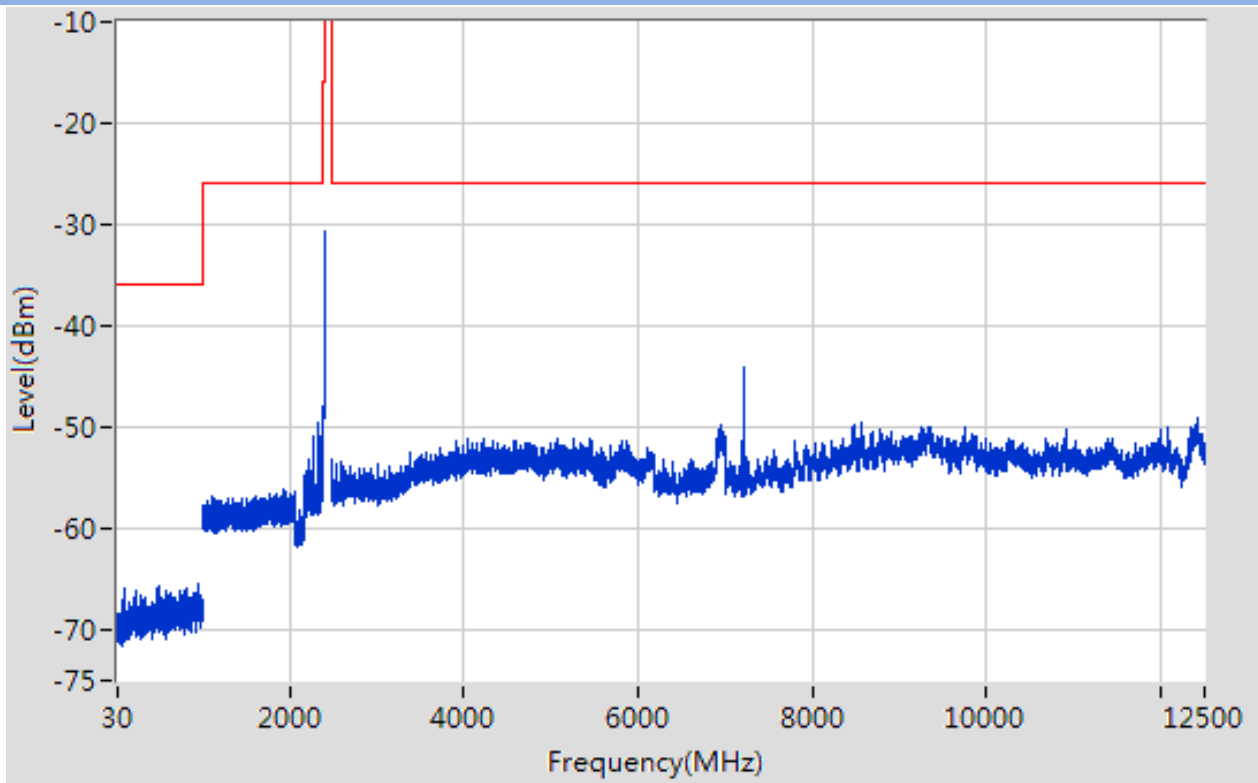
Test Data

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)	NV	Low	A.4.1	Pass
		Middle	A.4.2	Pass
		High	A.4.3	Pass

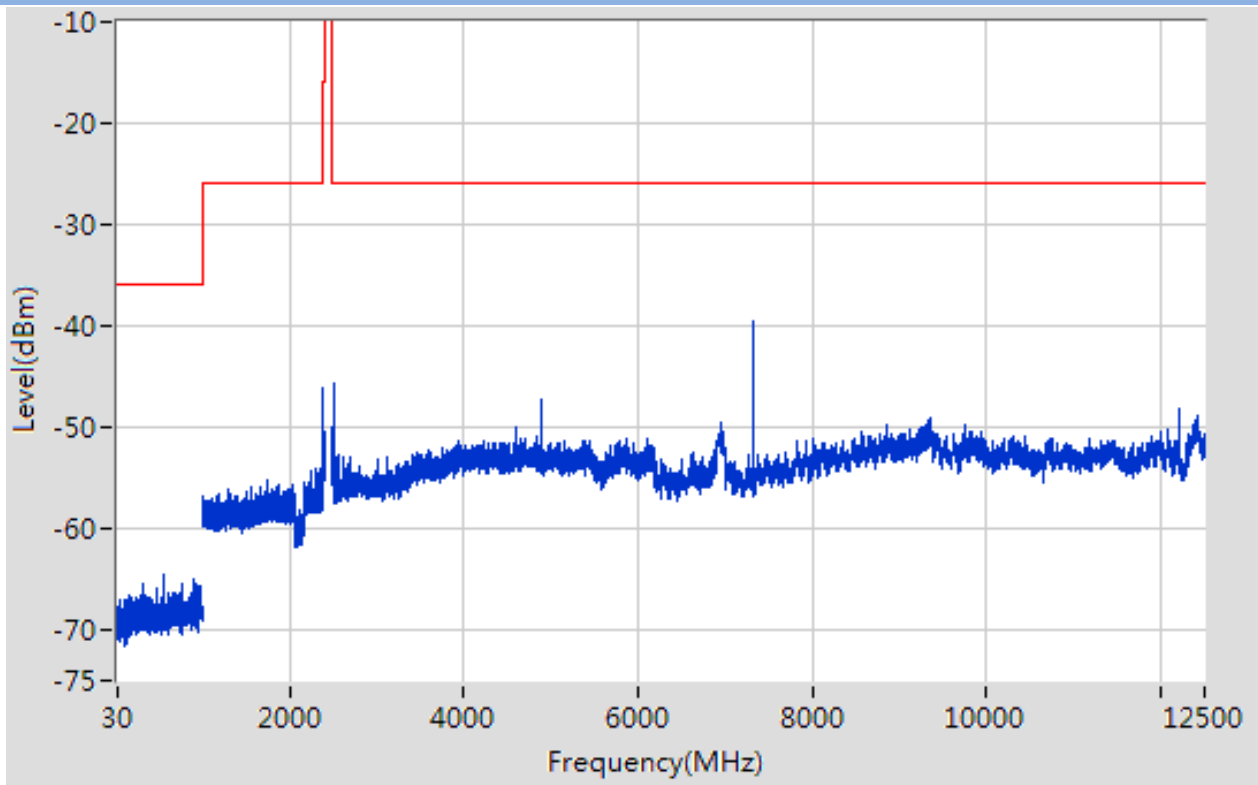
Test plots

A.4.1, GFSK (BLE) NV Low Channel:



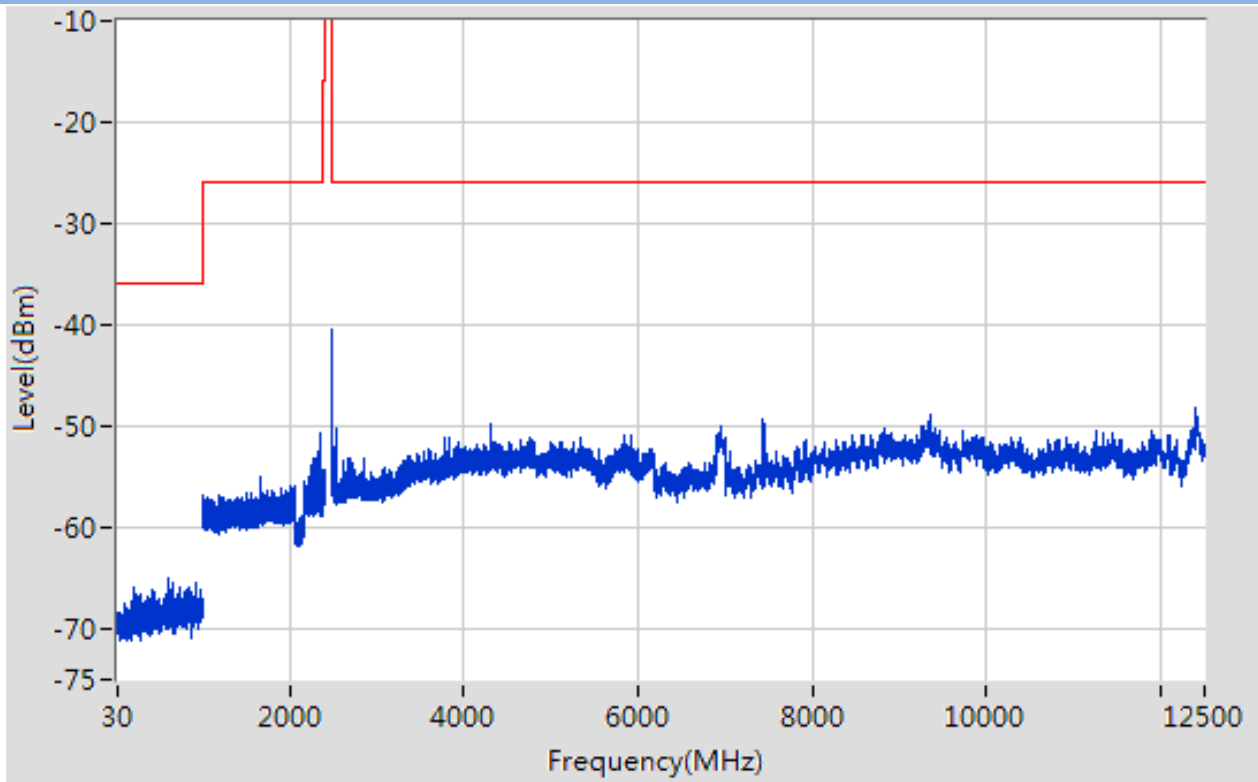
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Limit (dBm)	Verdict	Sweep Point
30	1000	0.1	Peak	946.65	-65.36	-36	Pass	1001
1000	2387	1	Peak	2338.108	-49.62	-26	Pass	4001
2387	2400	1	Peak	2400	-30.62	-16	Pass	1001
2483.5	2496.5	1	Peak	2492.626	-53.08	-16	Pass	1001
2496.5	6000	1	Peak	4037.164	-51.03	-26	Pass	4001
6000	12500	1	Peak	7207.375	-44.06	-26	Pass	4001

A.4.2, GFSK (BLE) 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	563.5	-64.51	-36	Pass	1001
1000	2387	1	Peak	2375.904	-46.1	-26	Pass	4001
2387	2400	1	Peak	2398.219	-50.43	-16	Pass	1001
2483.5	2496.5	1	Peak	2495.681	-50.31	-16	Pass	1001
2496.5	6000	1	Peak	2503.507	-45.79	-26	Pass	4001
6000	12500	1	Peak	7319.5	-39.61	-26	Pass	4001

A.4.3, GFSK (BLE) 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	603.27	-65.03	-36	Pass	1001
1000	2387	1	Peak	2352.672	-50.72	-26	Pass	4001
2387	2400	1	Peak	2390.77	-54.29	-16	Pass	1001
2483.5	2496.5	1	Peak	2483.552	-40.44	-16	Pass	1001
2496.5	6000	1	Peak	4311.313	-49.82	-26	Pass	4001
6000	12500	1	Peak	12400.875	-48.24	-26	Pass	4001

A.5 Antenna Power Error Measurement

GFSK (BLE) Test Result

Duty cycle = 0.627

Antenna Power Density PD = power meter value dBm (contains cable loss dB) +10 log₁₀(1/ Duty cycle) dB

Manufacturer declares the conducted power density = 7.59 mW

Test Channel	Power meter value (dBm)	Antenna Power Density PD (dBm)	Antenna Power Density PD (mW)	Antenna Power Error	Verdict
Low	5.13	7.16	5.20	-31.47%	Pass
Middle	5.36	7.39	5.48	-27.75%	Pass
High	5.56	7.59	5.74	-24.34%	Pass

A.6 Limitation of Collateral Emission of Receiver Measurement

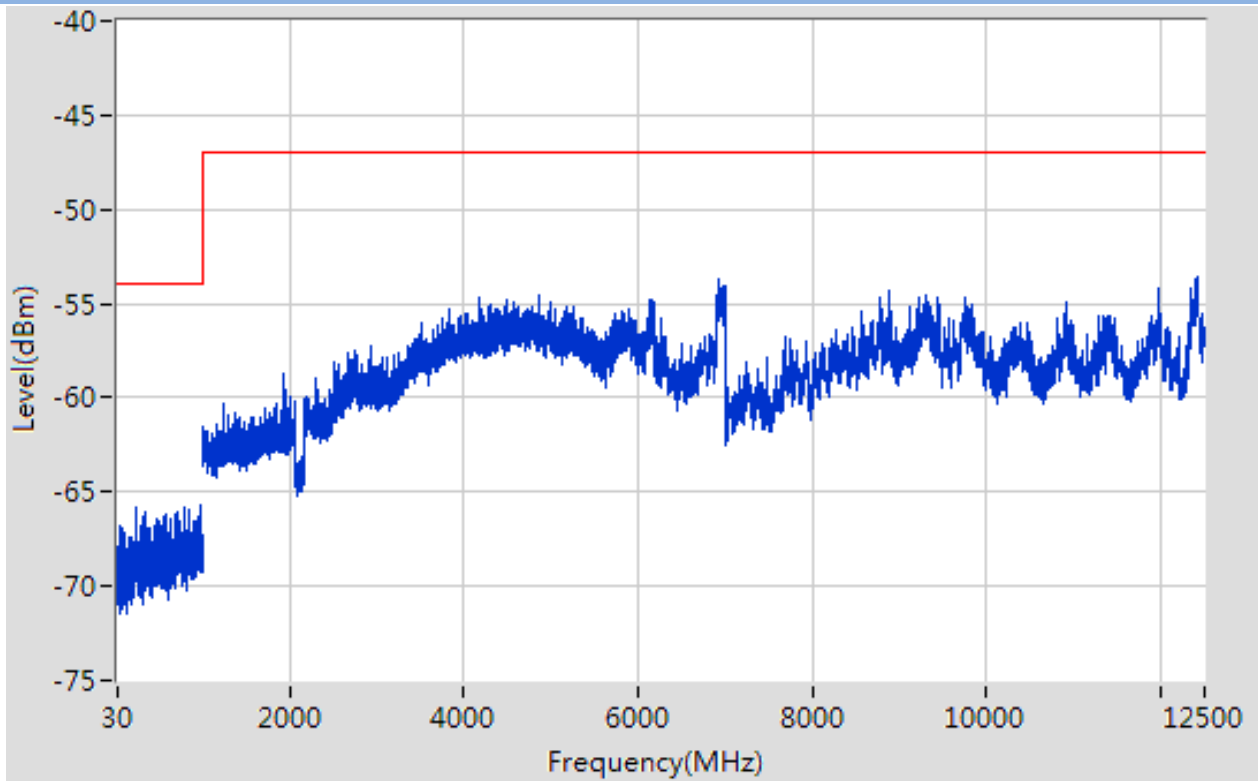
Test Data

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)	NV	Low	A.6.1	Pass
		Middle	A.6.2	Pass
		High	A.6.3	Pass

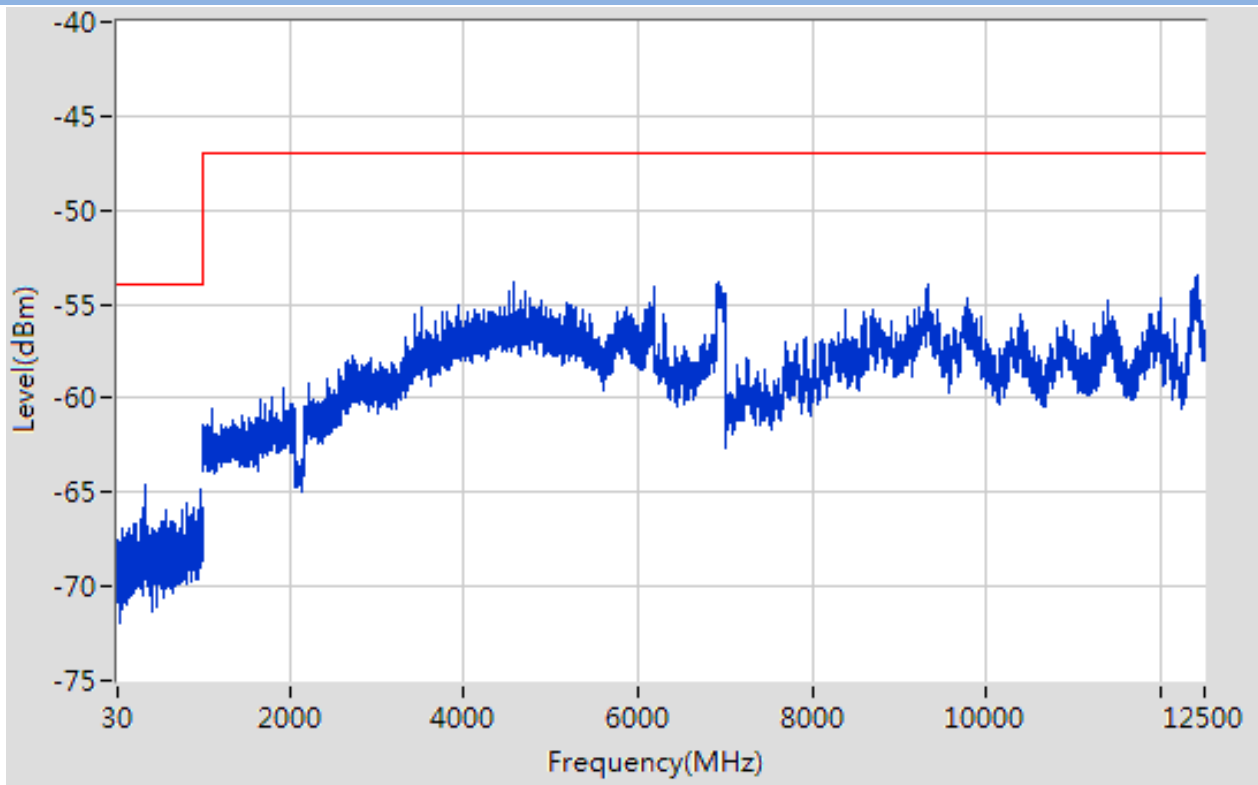
Test Plots

A.6.1, GFSK (BLE) NV Low Channel



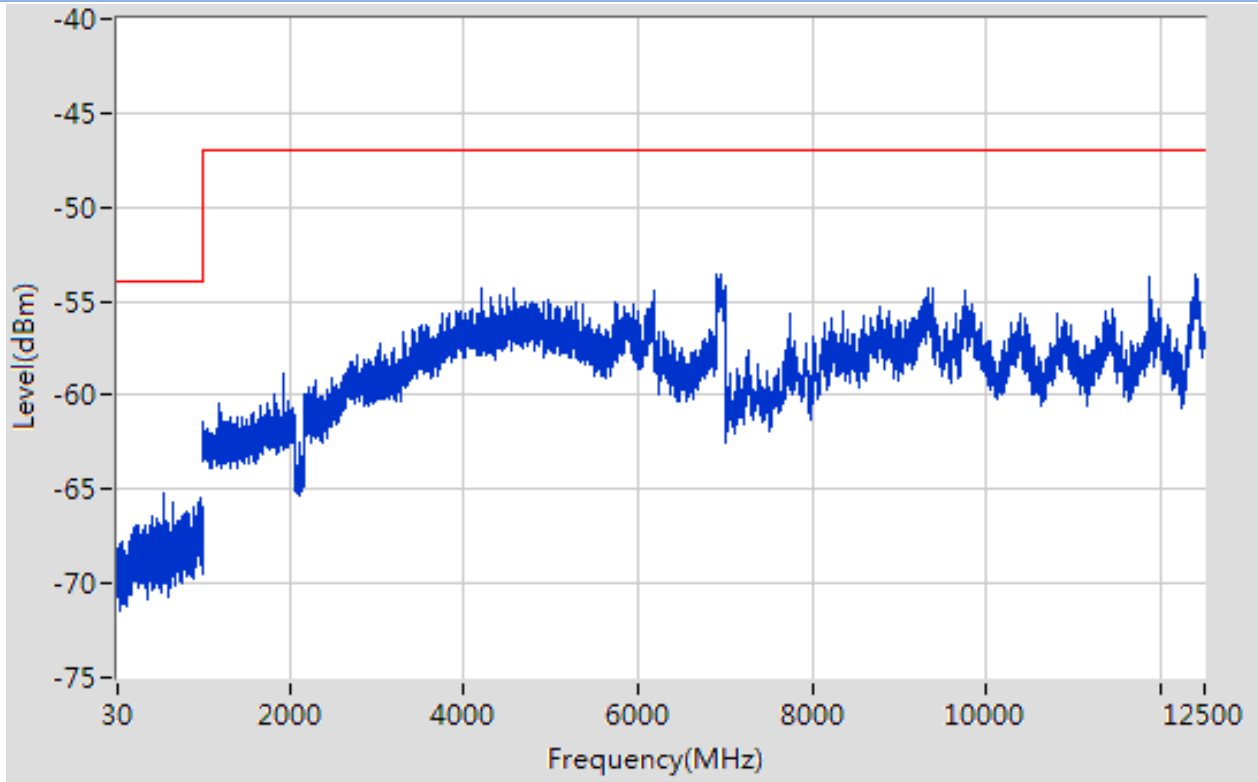
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Limit (dBm)	Verdict	Sweep Point
30	1000	0.1	Peak	987.39	-65.69	-54	Pass	1001
1000	6000	1	Peak	4876.25	-54.58	-47	Pass	4001
6000	12500	1	Peak	12412.25	-53.6	-47	Pass	4001

A.6.2, GFSK (BLE) 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	349.13	-64.62	-54	Pass	1001
1000	6000	1	Peak	4577.5	-53.87	-47	Pass	4001
6000	12500	1	Peak	12428.5	-53.46	-47	Pass	4001

A.6.3, GFSK (BLE) 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	547.98	-65.17	-54	Pass	1001
1000	6000	1	Peak	4205	-54.27	-47	Pass	4001
6000	12500	1	Peak	6947.375	-53.56	-47	Pass	4001

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

GFSK(BLE) Test result:

Channel	Frequency (MHz)	Measured EIRP (dBm/ MHz)	Limit (dBm/MHz)	Verdict
Low	2402	7.85	12.14	Pass
Middle	2440	8.08		Pass
High	2480	8.28		Pass

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

GFSK(BLE) Test result:

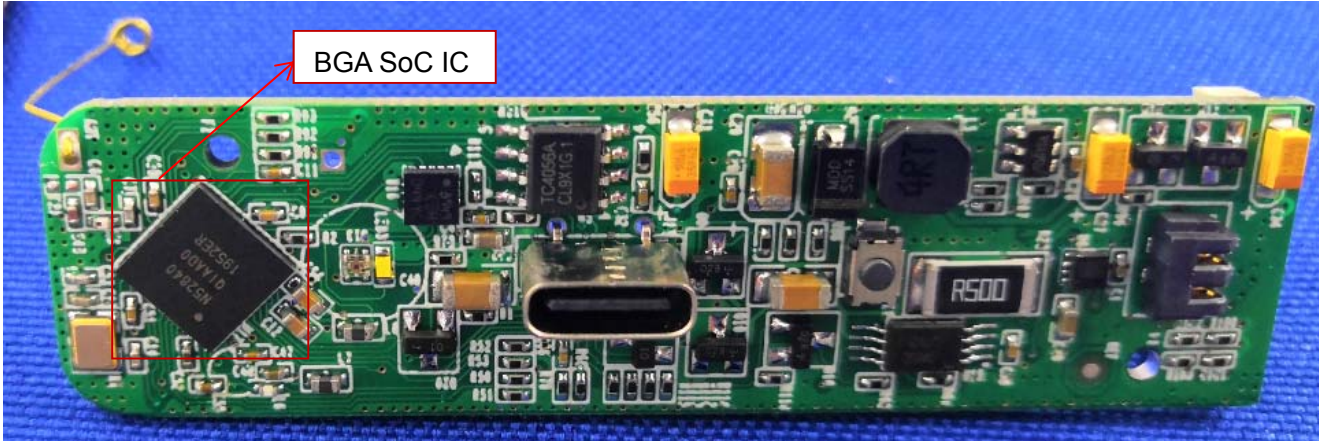
Channel	Frequency (MHz)	3dB Beamwidth (Degree)	Measured EIRP (mW/ MHz)	Limit (Degree)	Verdict
Low	2402	61.02	6.10	360	Pass
Middle	2440	57.52	6.43	360	Pass
High	2480	51.66	6.73	360	Pass

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-SZ2030158-AR.PDF".

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document "BL-SZ2030158-AW.PDF".

ANNEX D EUT INTERNAL PHOTOS

Please refer the document "BL-SZ2030158-AI.PDF".

-- END OF REPORT --