

Microlife Corporation

TEST REPORT

SCOPE OF WORK

EMC TESTING—BP3MX1-3C

REPORT NUMBER

241011134GZU-001

ISSUE DATE

18-November-2024

[REVISED DATE]

[-----]

PAGES

42

DOCUMENT CONTROL NUMBER

MIC BLE - a

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TEST REPORT

Applicant Name & : Microlife Corporation
Address : 9F, No. 431, RuiGuang Road, NeiHu, Taipei, 114, Taiwan, China
Manufacturing Site : ONBO Electronic (Shenzhen) Co., Ltd.
No. 138, Huasheng Road, Langkou Community, Dalang Street,
Longhua District, Shenzhen, China
Intertek Report No : 241011134GZU-001

Test standards

Article 49-20 and the relevant articles of the Ordinance Regulating Radio Equipment

Sample Description

Product : Digital Blood Pressure Monitor
Model No. : BP3MX1-3C
Electrical Rating : Adapter input:100-240VAC,50/60Hz 0/3A
Output: DC6V 0.6A
Batteries:4Xaa 1.5VDC
Serial No. : Not Labeled
Date Received : 11 October 2024
Date Test : 25 October 2024
Conducted

Prepared and Checked By



Elena Lei
Project Engineer

Approved By:



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1.0 TEST RESULT SUMMARY

Test Item	Test Requirement	Limit/Severity	Result
Antenna Requirement	Item 19 of Article 2-1	Notice 88 Appendix 43, B-1 (1) & (2)	PASS
Test frequency	Item 19 of Article 2-1	Notice 88 Appendix 43, A-3	PASS
Frequency Tolerance	Item 19 of Article 2-1	±50 ppm or less	PASS
Occupied Bandwidth	Item 19 of Article 2-1	83.5MHz or less for BR/EDR 26MHz or less for BLE	PASS
Spread-spectrum Bandwidth	Item 19 of Article 2-1	500kHz or more	N/A
Antenna Power	Item 19 of Article 2-1	4.77dBm/MHz or less for BR/EDR 10dBm for BLE Tolerance: +20%, -80%	PASS
Dwell Time	Item 19 of Article 2-1	0.4 sec or less for BR/EDR	N/A
Spurious Emission of Tx	Item 19 of Article 2-1	(1) Below 2387 MHz: 2.5μW/MHz or less(≤-26dBm/MHz) (2) 2387 to 2400 MHz: 25μW/MHz or less(≤-16dBm/MHz) (3) 2483.5 through 2496.5 MHz: 25μW/MHz or less (≤-16dBm/MHz) Over 2496.5 MHz: 2.5μW/MHz or less(≤-26dBm/MHz)	PASS
Interference prevention capability	Item 19 of Article 2-1	Notice 88 Appendix 43, 44, 45	PASS
RF accessibility	Item 19 of Article 2-1	Notice 88 Appendix 43, 44, 45	PASS
Spurious Emission of Rx	Item 19 of Article 2-1	(1) Below 1 GHz: 4nW or less(≤-54dBm/MHz) (2) 1 GHz and over: 20nW or less(≤-47dBm/MHz)	PASS

Remark:

EUT: In this whole report EUT means Equipment Under Test.

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radio Frequency.

Item 19 of Article 2 Paragraph 1.

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2.0 General Description

2.1 Product Description

Operating Frequency:	2402 MHz-2480MHz
Type of Modulation:	GFSK
Number of Channels:	40 for BLE
Transmit data rate:	1Mbps
Channel Separation:	2 MHz
Antenna Type:	Chip antenna
Antenna Gain:	3 dBi max
Speciality:	Bluetooth 4.2 with BLE (Bluetooth Low Energy)
Nominal antenna power:	F1D: 1 mW (BLE)
Power Supply:	Adapter input:100-240VAC,50/60Hz 0/3A Output: DC6V 0.6A Batteries:4Xaa 1.5VDC

2.2 Test Procedure

MIC Notice No.88 Appendix No.43

2.3 Test Facility

All tests were performed at:
Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Room102/104, No 203, KeZhu Road, Science City, GETDD Guangzhou, China.
Except Interference prevention function was performed at:
101, 201, Building B, No.308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict,
LongHua District, Shenzhen.

3.0 System Test Configuration

3.1 EUT Exercising Software

Description	Manufacturer	Model No.	SN/Version	Supplied by
For fixing frequency	--	nRFgo Studio	nrf51422_xxac	clint

3.2 Special Accessories

No special accessories used.

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3.3 Equipment Modification

Any modifications installed previous to testing by Microlife Corporation will be incorporated in each production model sold / leased in Japan.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Guangzhou Branch.

3.4 Support Equipment List and Description

This product was tested with corresponding support equipment as below:

Support Equipment

Description	Manufacturer	Model No.	SN/Version	Supplied by
NoteBook	Dell	Latitude 5400	--	Intertek
Support Board	Microlife Corporation	--	--	client
ViVO Pad Air	VIVO	PA2353	MP_0.1	Intertek

Cable

Description	Model No.	Connector type	Cable length/type	Supplied by
Antenna cable	RF-01	SMA	0.2 m(shielded)	client
JTAG cables	--	JTAG	0.4m(shielded)	client

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4.0 Measurement Results

4.1 Radio Technical Requirements Specification

Table1: Radio Technical Requirements Specification for 2.4 GHz band wide-band low-power data communication system (Item 19 of Article 2-1)

Items	Technical standard
Assigned frequency or designated frequency	2400-2483.5MHz
Communication method	One-way communication, simplex, semi-duplex, or duplex operation of digital signal transmission including spread spectrum
Tolerance of frequency ($\times 10^{-6}$)	± 50
Tolerance of occupied bandwidth	FH: 83.5MHz or less FH + DS: 83.5MHz or less FH + OFDM: 83.5MHz or less OFDM: 38MHz or less Others: 26MHz or less
Antenna power	Designated value (1) FH, FH+DS, FH+OFDM: 3mW/MHz(4.77dBm/MHz) (used in the range of 2427-2470.75 MHz) (2) OFDM, DS other than (1) 10mW/MHz(10dBm/MHz) (3) Other than (1) & (2) 10mW(10dBm) (4) OFDM OBW 26- 38MHz: 5mW/MHz(6.99dBm/MHz) Tolerance:+20%, -80%
Antenna gain	(1) 12.14 dBi or less in principle (2) In case of directional antenna 1) FH, FH+DS or FH+OFDM using 2427-2470.75 MHz EIRP $\leq$ 16.91 dBm/MHz 2) OFDM or DS other than (1) EIRP $\leq$ 22.14 dBm/MHz 3) Other than (1) and (2): 22.14 dBm or less 4) OFDM OBW 26- 38MHz: 19.14dBm/MHz 5) Half-power angle of directional antenna (e) in case of the item 2): e $\leq$ 360/A (The A is 10 in maximum)
Dwell Time	0.4 sec or less
Tolerance of spurious emission intensity	(4) Below 2387 MHz: 2.5 μ W/MHz or less($\leq$ -26dBm/MHz) (5) 2387 to 2400 MHz: 25 μ W/MHz or less($\leq$ -16dBm/MHz) (6) 2483.5 through 2496.5 MHz: 25 μ W/MHz or less($\leq$ -16dBm/MHz) (7) Over 2496.5 MHz: 2.5 μ W/MHz or less($\leq$ -26dBm/MHz)
Spreading bandwidth	DS, FH, FH+DS, FH+OFDM: 500kHz or more
Spreading rate of spectrum	(Spreading bandwidth) / (Frequency corresponding to transmission rate) $\geq$ 5
Limit of secondary radiated emissions	(1) Below 1 GHz: 4 nW($\leq$ -54dBm) (2) 1 GHz or higher: 20 nW($\leq$ -47dBm)
Interference prevention function	Shall have the function of automatic transmission and reception of identification sign.
Structure	Shall be of the structure that the RF and modulator sections excluding antenna cannot easily be opened.
Note	DS: Direct spread FH: Frequency hopping OFDM: Orthogonal frequency division multiplexing

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4.2 E.U.T. test conditions

Power supply:

DC 6.0V

(The RFIC has the voltage regulator, and all voltages are within $\pm 1\%$. Therefore, the test was conducted only at DC6.0V.)

Temperature:

-15°C - +55°C

Humidity:

45-85 % RH

Atmospheric Pressure:

1000 -1010 mbar

Test frequencies:

If the EUT can be set to 3 or more different (carrier) frequencies in 1 allocated band, testing shall be performed using the Lowest and the Highest frequency (L and H). If there are 2 or fewer frequencies, testing shall be performed with the available frequencies.

Channel List

2402	2404	2406	2408	2410	2412	2414	2416	2418	2420
2422	2424	2426	2428	2430	2432	2434	2436	2438	2440
2442	2444	2446	2448	2450	2452	2454	2456	2458	2460
2462	2464	2466	2468	2470	2472	2474	2476	2478	2480

Test Channel for BLE

Lowest Channel:	0	2402MHz
Highest Channel:	39	2480MHz

TEST REPORT

4.3 Test Environment

Operating Environment:	
Temperature:	25.0 °C
Humidity:	53.0 % RH
Atmospheric Pressure:	1001 mbar

4.4 Antenna Requirement

EUT Antenna

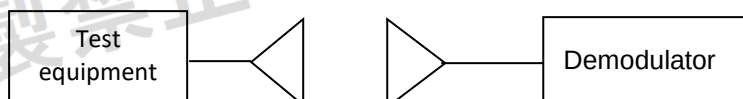
The antenna is PCB antenna on the main PCB and no consideration of replacement. The best case gain of the antenna is 3dBi max.

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4.5 Interference prevention function

1) Measurement system diagram

When transmitting identification code



2) Condition of measuring instrument

Demodulator must be able to demodulate the transmitting signal emitted by test equipment and to indicate the identification code.

3) Condition of test equipment the mode of normal use.

4) Measuring operation procedure

When test equipment has the function to transmit identification code automatically:

- A) Transmit the predetermined identification code from test equipment.
- B) Confirm the transmitted identification code by demodulator.

E0: 61: 35: 89: F5: 68

Identification code:

5) Test result: The unit does meet the requirements.

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4.6 Frequency Tolerance

Test Requirement:

Item 19 of Article 2-1

Tolerance of frequency: $\pm 50 \times 10^{-6}$

Test Status:

Test the EUT in transmitting mode without modulation.

Test Configuration:



Test Procedure:

1. Test Conditions:

Spectrum Analyzer is used for measurement.

2. EUT conditions:

Modulation/Spread/Hopping OFF, CW Tx

3. Spectrum Analyzer conditions:

Frequency: Test Frequency

Span 1MHz

RBW 10 kHz (Modulation OFF)

VBW 10 kHz (Modulation OFF)

Sweep Time Auto

Detector mode Positive peak

Indication mode Max hold

4. Alternative method in case the UUT cannot be operated in an un-modulated mode.

The UUT shall be connected to spectrum analyser.

Max Hold shall be selected and the centre frequency adjusted to that of the UUT.

The peak value of the power envelope shall be measured and noted. The span shall be reduced and the marker moved in a positive frequency increment until the upper, (relative to the centre frequency), -10 dBc point is reached. This value shall be noted as f1.

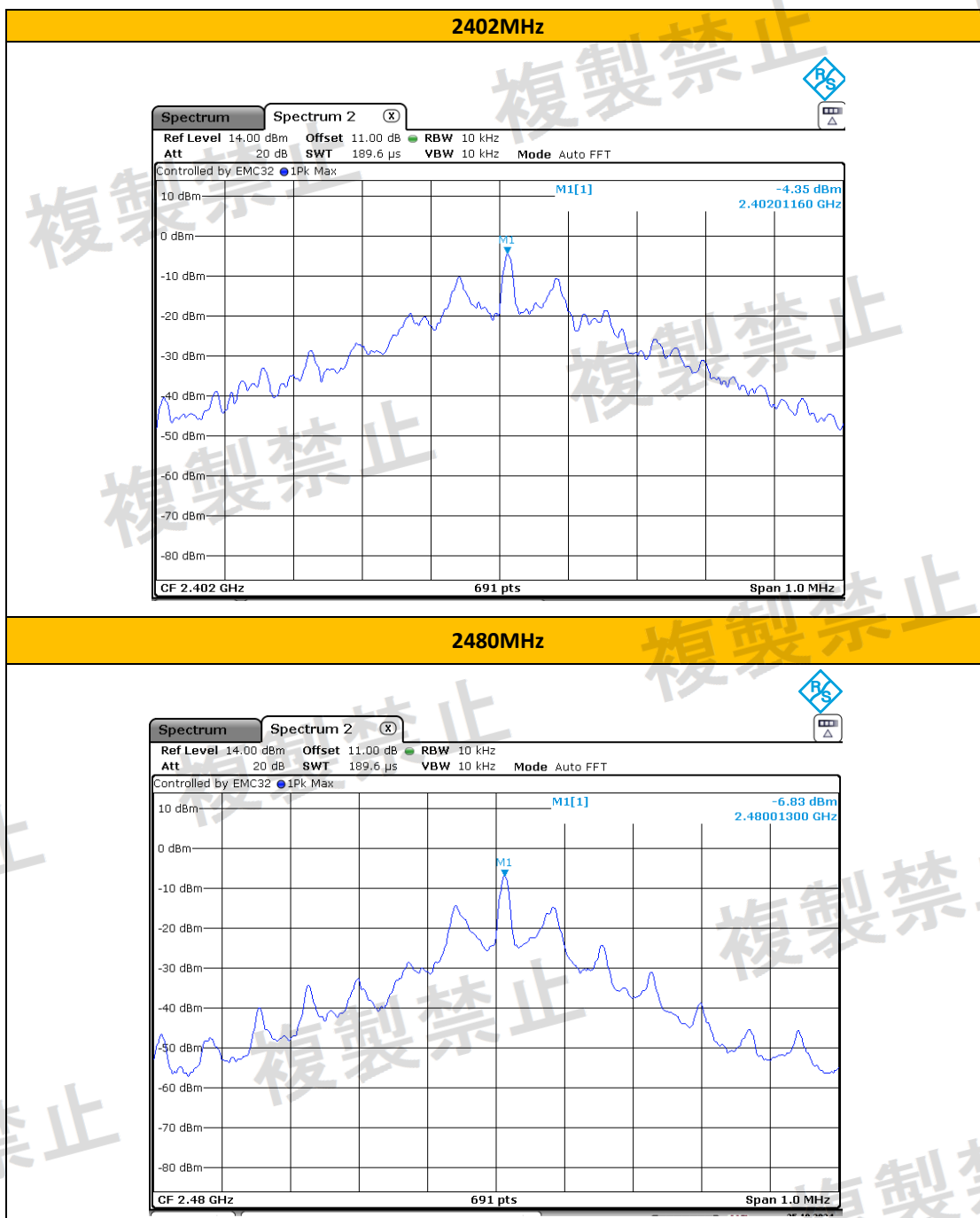
The marker shall then be moved in a negative frequency increment until the lower, (relative to the centre frequency), -10 dBc point is reached. This value shall be noted as f2.

The centre frequency is calculated as $(f1 + f2) / 2$.

Test result: PASS

TEST REPORT

Frequency Tolerance



Measurement Frequency	MHz	2402	2480	Limit	Result
Measured Value	MHz	2402.0116	2480.0130	-----	-----
Frequency Tolerance	ppm	4.83	5.24	±50 ppm or less	Pass

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4.7 Occupied Bandwidth (99%)

Test Requirement:

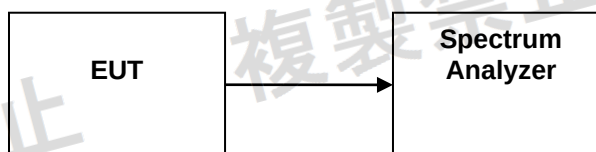
Item 19 of Article 2-1

83.5MHz

Test Status:

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

1. Test Conditions:

Spectrum Analyzer is used for measurement.

2. EUT conditions:

Modulation/Spread/Hopping ON

For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.

3. Spectrum Analyzer conditions for FHSS:

Frequency: Test Frequency

Span 120MHz (FHSS)

RBW 1MHz

VBW 1MHz

Sweep Time Auto

Detector mode Positive peak

Indication mode Max hold

OBW 99%

4. Spectrum Analyzer conditions for BLE:

Frequency: Test Frequency

Span 3MHz

RBW 30KHz

VBW 30KHz

Sweep Time Auto

Detector mode Positive peak

Indication mode Max hold

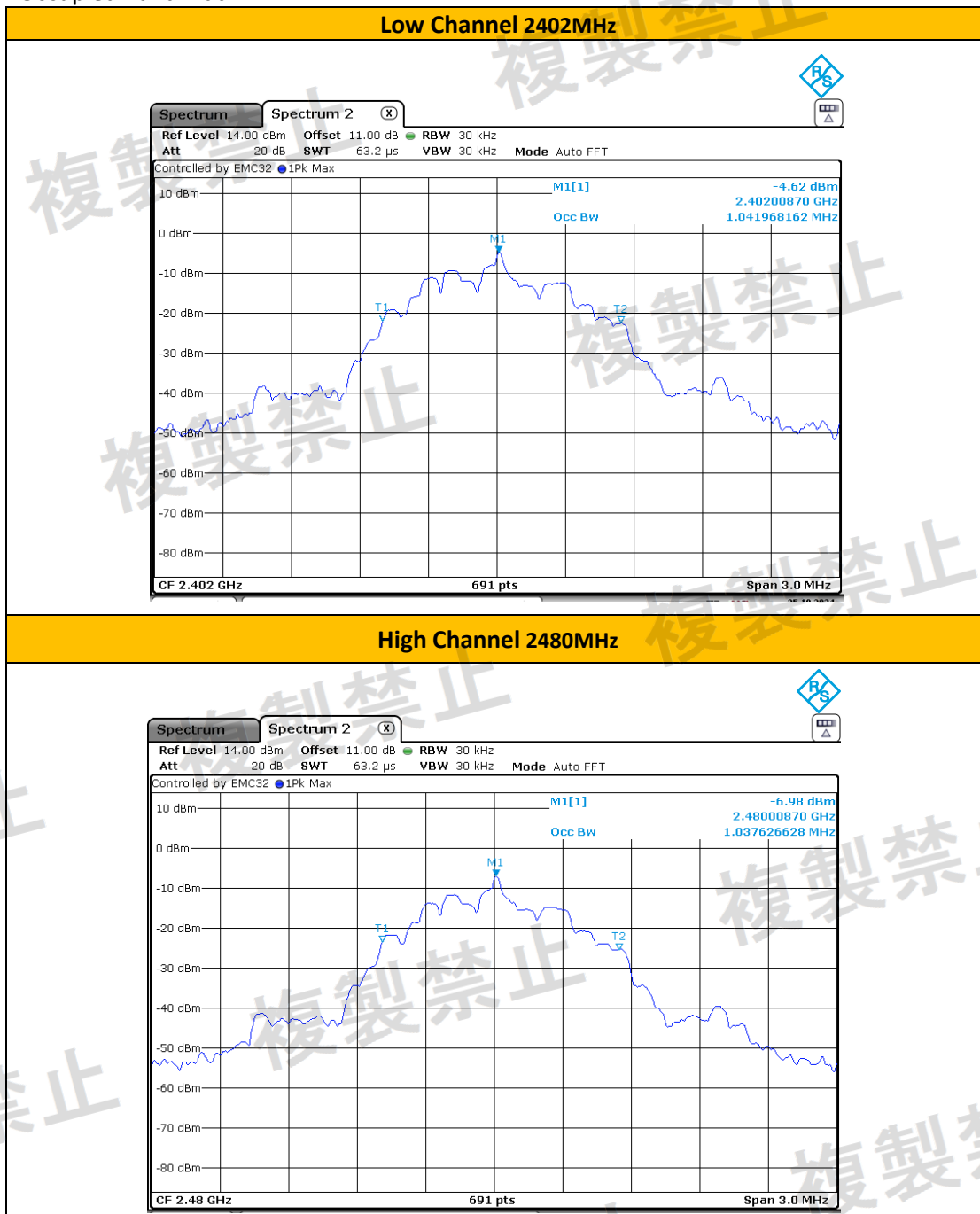
OBW 99%

Test result: Pass

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Occupied Bandwidth (99%)

Occupied Bandwidth



Measurement Frequency	2402	2480	Limit	Result
Occupied Bandwidth (MHz)	1.042	1.038	26MHz or Less	Pass

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4.8 Antenna Power

Test Requirement:

Test Status:

Item 19 of Article 2-1

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

1. Test Conditions:

Spectrum Analyzer is used for measurement.

2. EUT conditions:

Modulation/Spread/Hopping ON

For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.

3. Spectrum Analyzer conditions for FHSS:

Step 1:

Frequency: Test Frequency

Span 10 MHz (FHSS)

RBW 1 MHz

VBW 1 MHz

Sweep Time Auto

Detector mode Positive peak

Indication mode Max hold

Step 2:

Frequency: Frequency of Peak Power

Span 0 Hz

RBW 1 MHz

VBW 1 MHz

Sweep Time Auto

Detector mode Sample

4. Spectrum Analyzer conditions for BLE:

Frequency: Test Frequency

Span 10 MHz

RBW 2 MHz

VBW 2 MHz

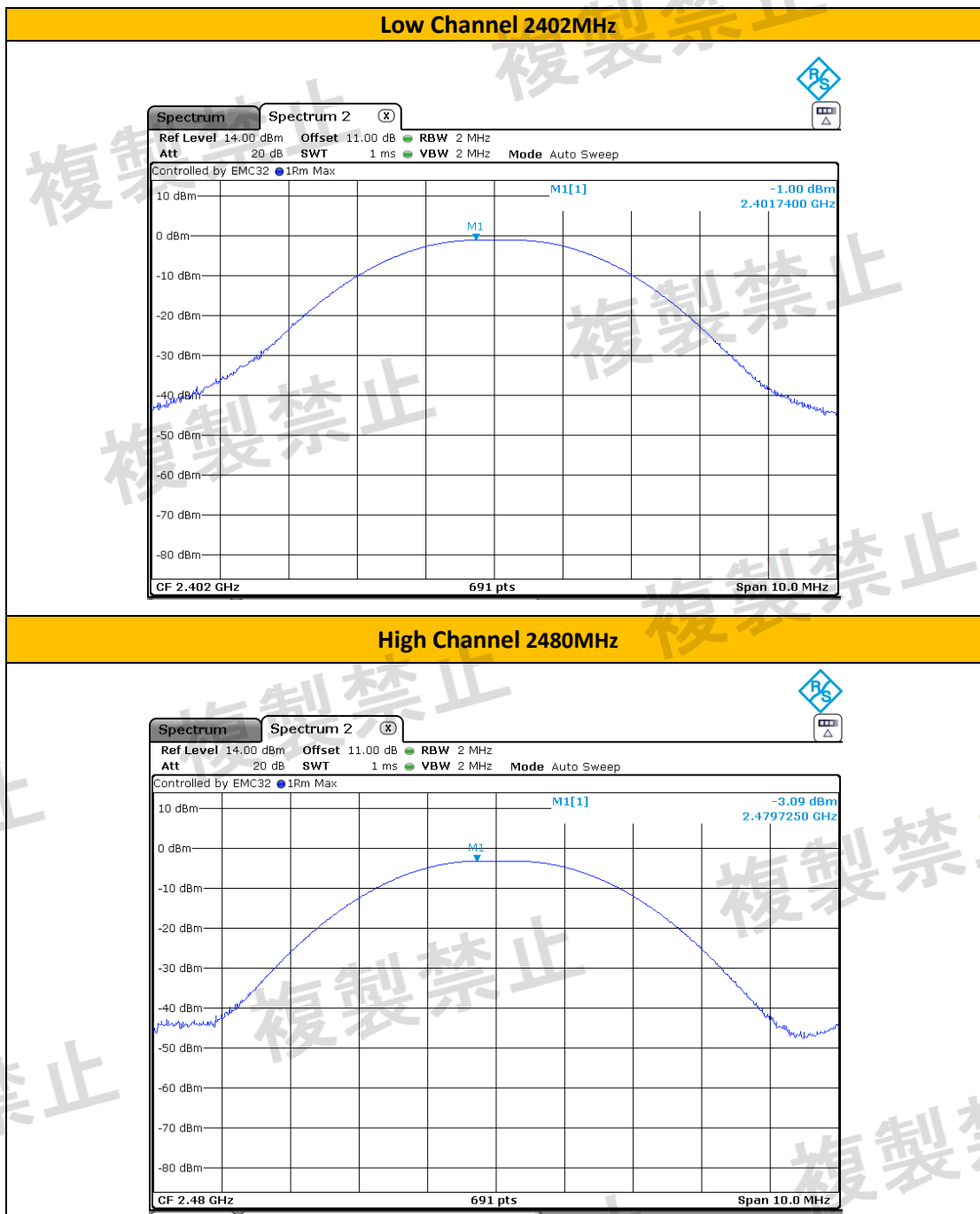
Sweep Time Auto

detector mode RMS

Indication mode Max hold

TEST REPORT

Test result: PASS
Antenna Power



Test Frequency		2402MHz	2480MHz	Limit	Result
Unit	dBm	-1.0	-3.09	10 or Less	Pass
	mW	0.79	0.49	10 or Less	Pass
Tolerance Max:		-20.57%	-50.91%	Upper +20%, Lower -80%	Pass

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4.9 Spurious Emissions of Tx

Test Requirement:

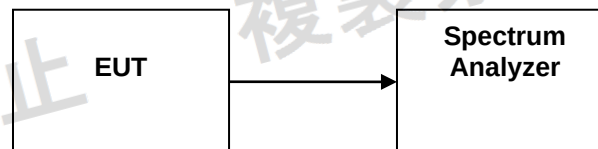
Item 19 of Article 2-1

- (1) Below 2387 MHz: $2.5\mu\text{W}/\text{MHz}$ ($\leq -26\text{dBm}/\text{MHz}$)
- (2) 2387 to 2400 MHz: $25\mu\text{W}/\text{MHz}$ ($\leq -16\text{dBm}/\text{MHz}$)
- (3) 2483.5 through 2496.5 MHz: $25\mu\text{W}/\text{MHz}$ ($\leq -16\text{dBm}/\text{MHz}$)
- (4) Over 2496.5 MHz: $2.5\mu\text{W}/\text{MHz}$ ($\leq -26\text{dBm}/\text{MHz}$)

Test Status:

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

1. Test Conditions:

Spectrum Analyzer is used for measurement.

2. EUT conditions:

Modulation/Spread/Hopping ON

For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.

3. Spectrum Analyzer conditions:

Step 1

All spurious are measured from 30 MHz to 12.5 GHz by peak mode.

Step 2

IF the value measured by Step1 is 3 dB or less, measure in average mode.

Test setup for Step 1:

Frequency: 30 MHz- 2400 MHz, 2483.5 MHz-12.5 GHz

RBW 1 MHz

VBW 1 MHz

Sweep Time Auto

Detector mode Positive peak

Indication mode Max hold

Test setup for Step 2:

Frequency: Spurious Frequency

RBW 1 MHz

VBW 1 MHz

Sweep Time Auto

Detector mode Sample

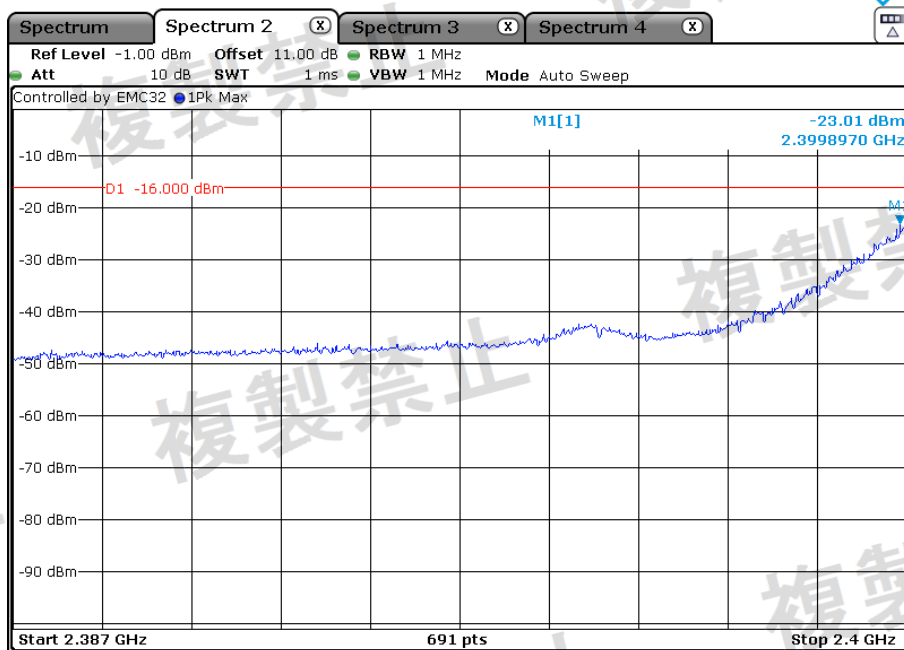
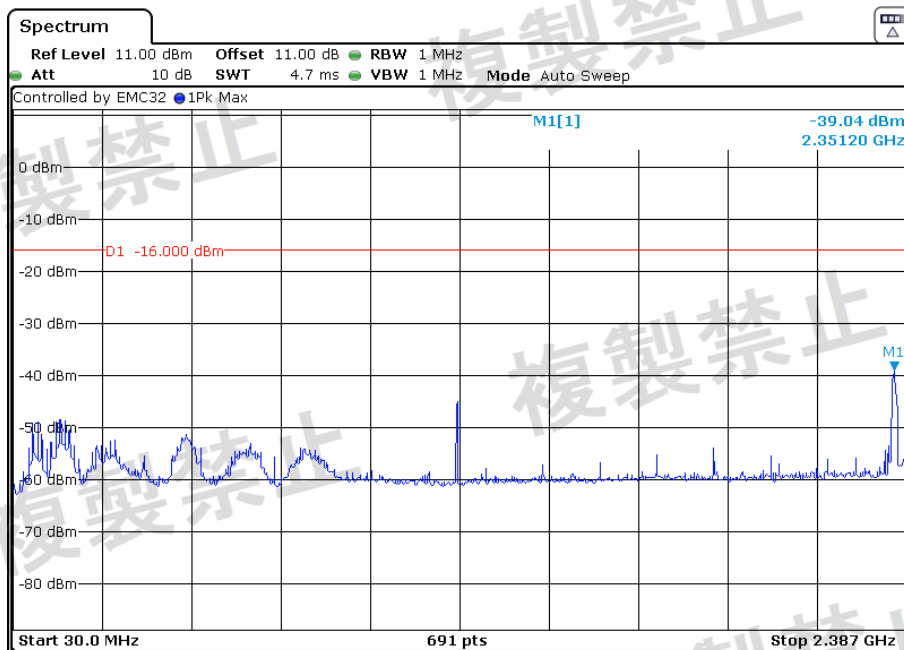
Indication mode Max hold

Test result: PASS

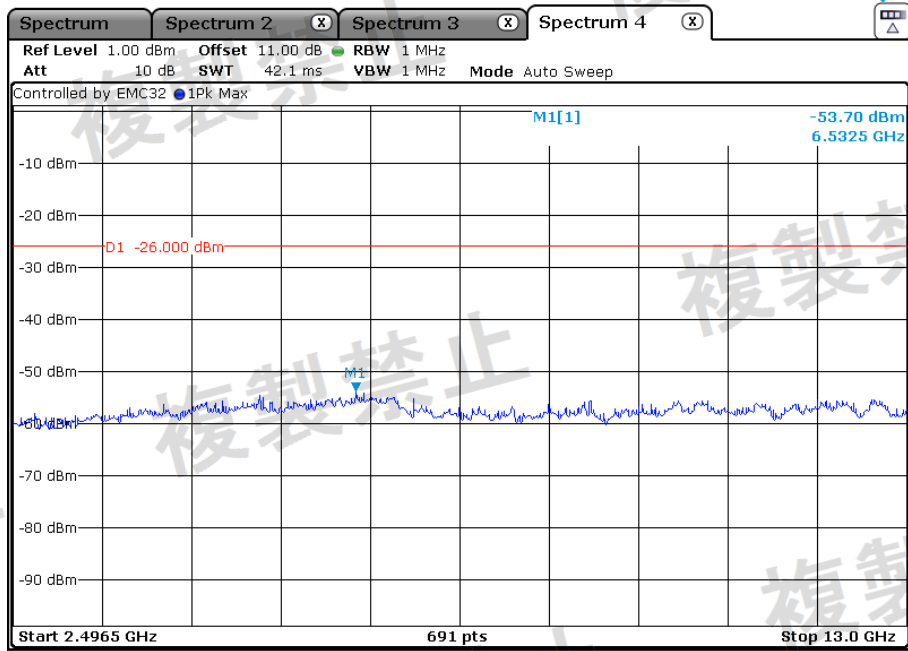
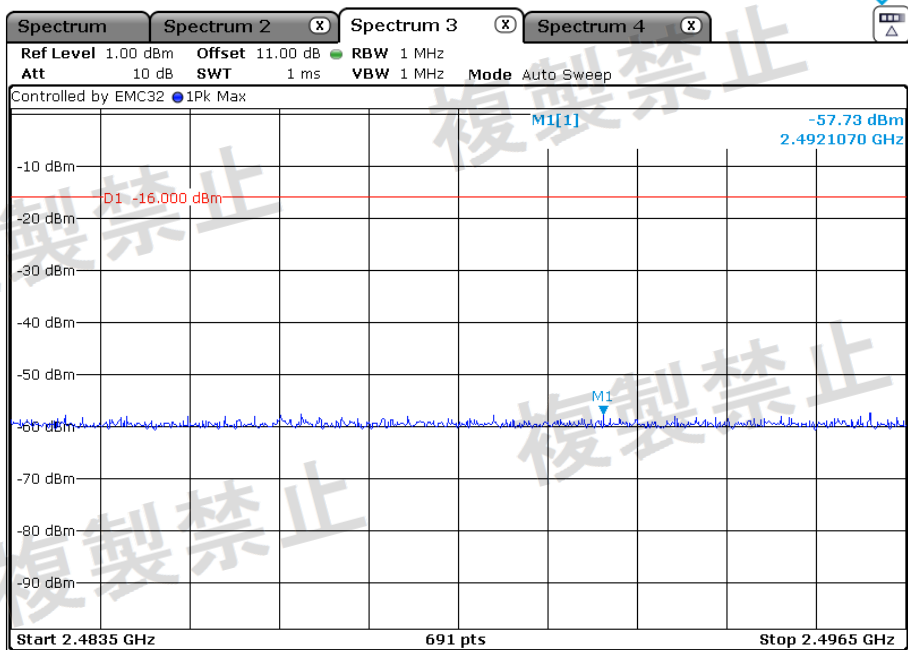
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Spurious Emissions of Tx

Low Channel 2402MHz

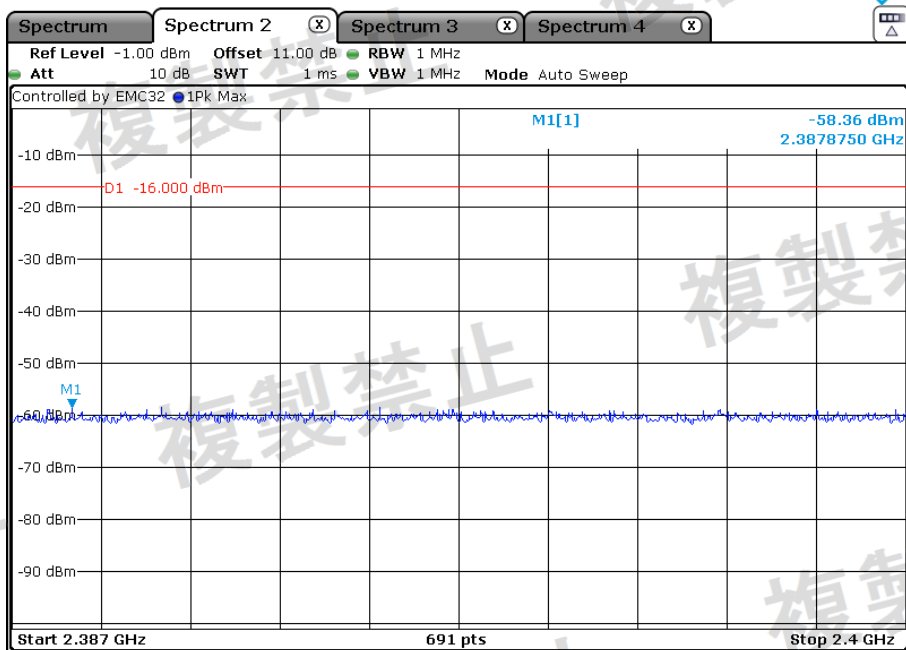
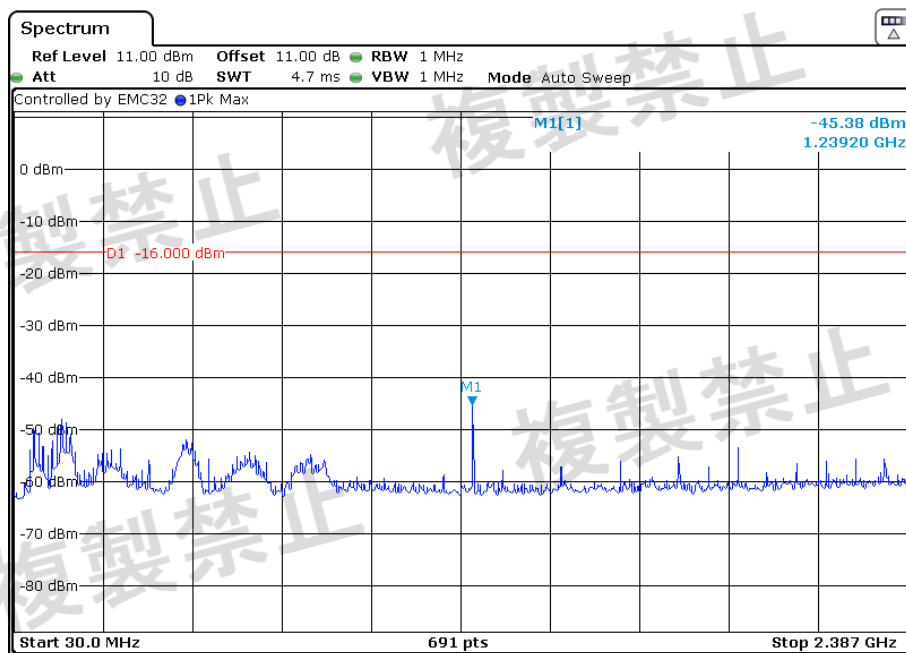


TEST REPORT

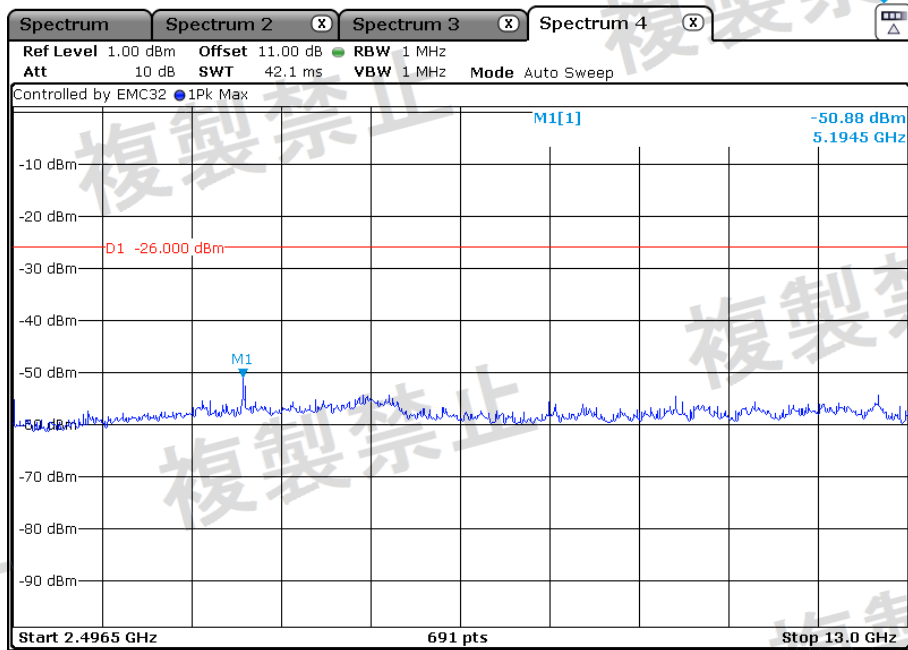
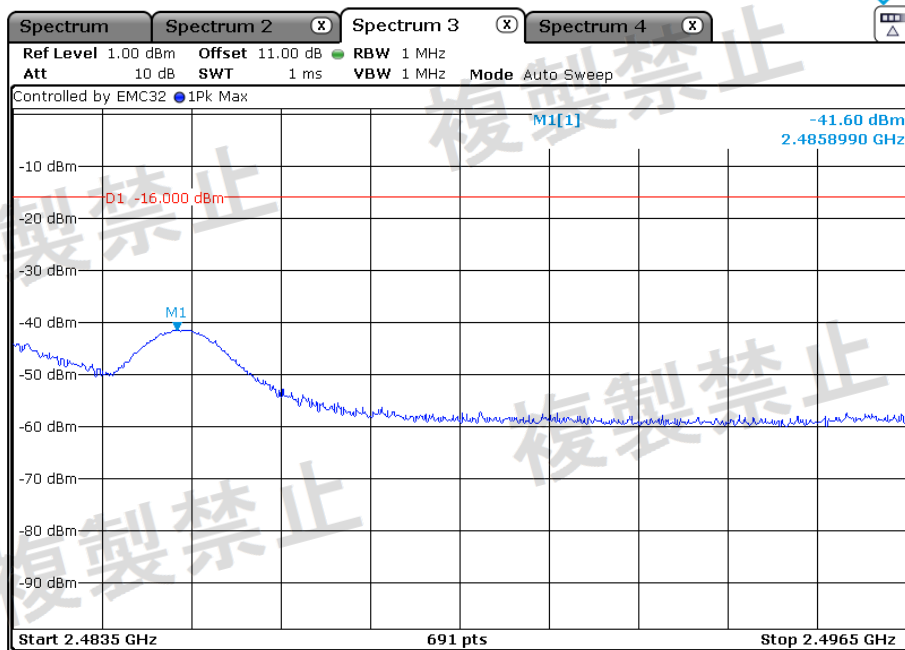


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High Channel 2480MHz



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Test frequency band	Unit	2402MHz	2480MHz	Limit	Result
Under 2387MHz	dBm/MHz	-39.04	-45.38	≤ -26	Pass
	MHz	2351.2	1239.2	-----	-----
2387-2400MHz	dBm/MHz	-23.01	-58.36	≤ -16	Pass
	MHz	2399.9	2387.9	-----	-----
2483.5-2496.5MHz	dBm/MHz	-57.73	-41.60	≤ -16	Pass
	MHz	2492.1	2485.9	-----	-----
2496.5MHz-12.5GHz	dBm/MHz	-53.70	-50.88	≤ -26	Pass
	MHz	6532.5	5194.5	-----	-----

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4.12 Spurious Emissions of Rx

Test Requirement:

Item 19 of Article 2-1

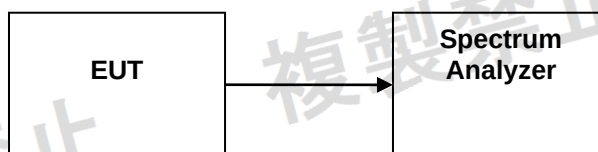
(1) Below 1 GHz: 4 nW (≤ -54 dBm)

(2) 1 GHz and over: 20 nW (≤ -47 dBm)

Test Status:

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

1. Test Conditions:

Spectrum Analyzer is used for measurement.

2. EUT conditions:

Modulation/Spread/Hopping ON

For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.

3. Spectrum Analyzer conditions:

Step 1

All spurious are measured from 30 MHz to 26 GHz by peak mode.

Step 2

IF the value measured by Step1 is 3 dB or less, measure in average mode.

Test setup for Step 1:

Frequency: 30 MHz-2400 MHz, 2483.5 MHz-26 GHz

RBW 100 kHz (30-1GHz), 1 MHz (over 1GHz)

VBW 100 kHz (30-1GHz), 1 MHz (over 1GHz)

Sweep Time Auto

Detector mode Positive peak

Indication mode Max hold

Test setup for Step 2:

Frequency: Spurious Frequency

Span 0 Hz

RBW 100 kHz (30-1GHz), 1 MHz (over 1GHz)

VBW 100 kHz (30-1GHz), 1 MHz (over 1GHz)

Sweep Time Auto

Detector mode Sample

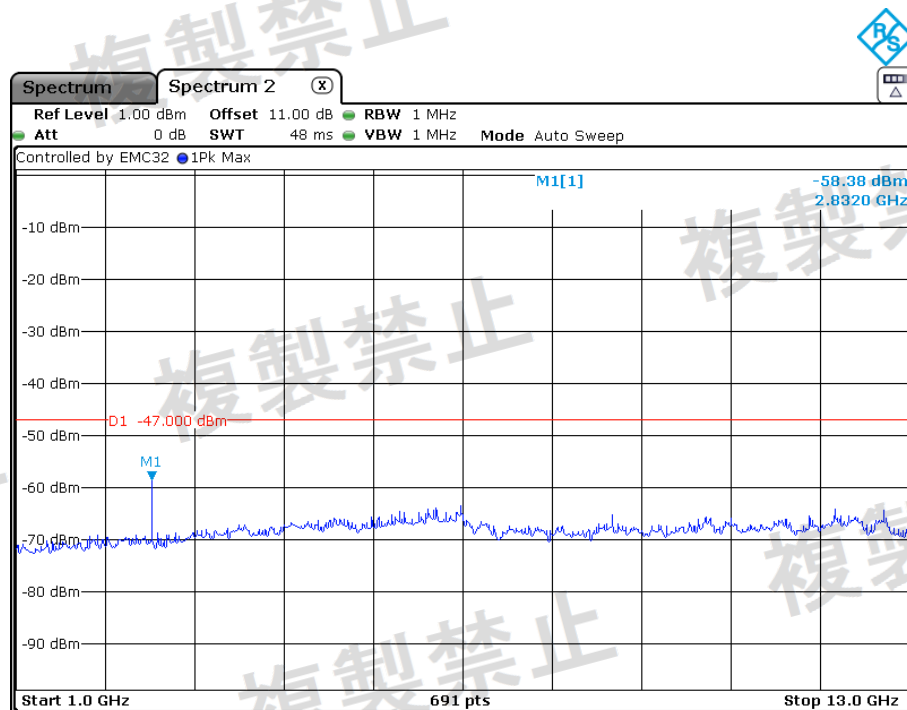
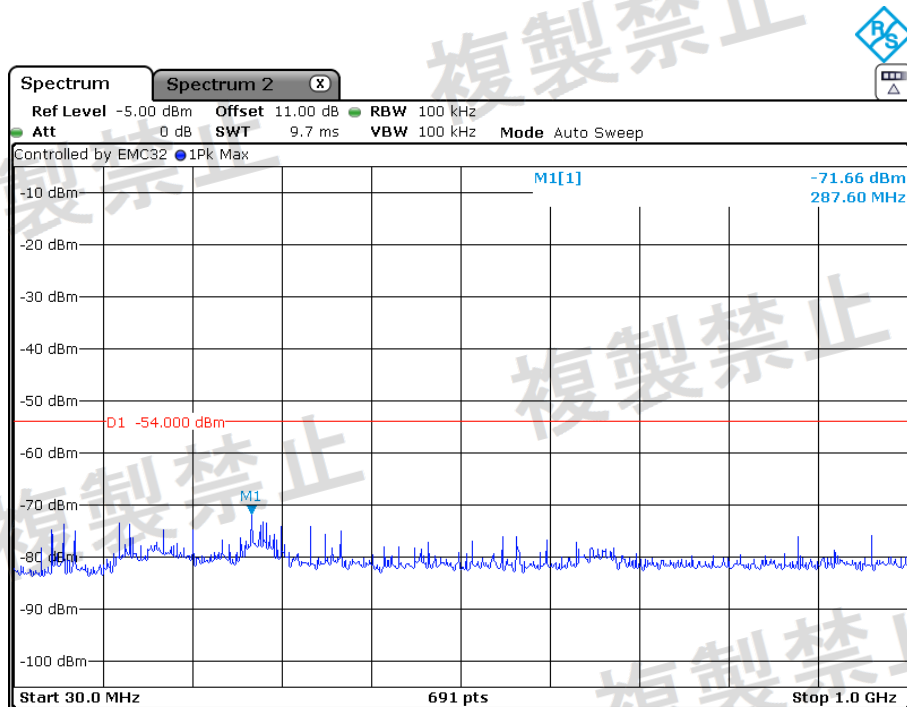
Indication mode Max hold

Test result: PASS

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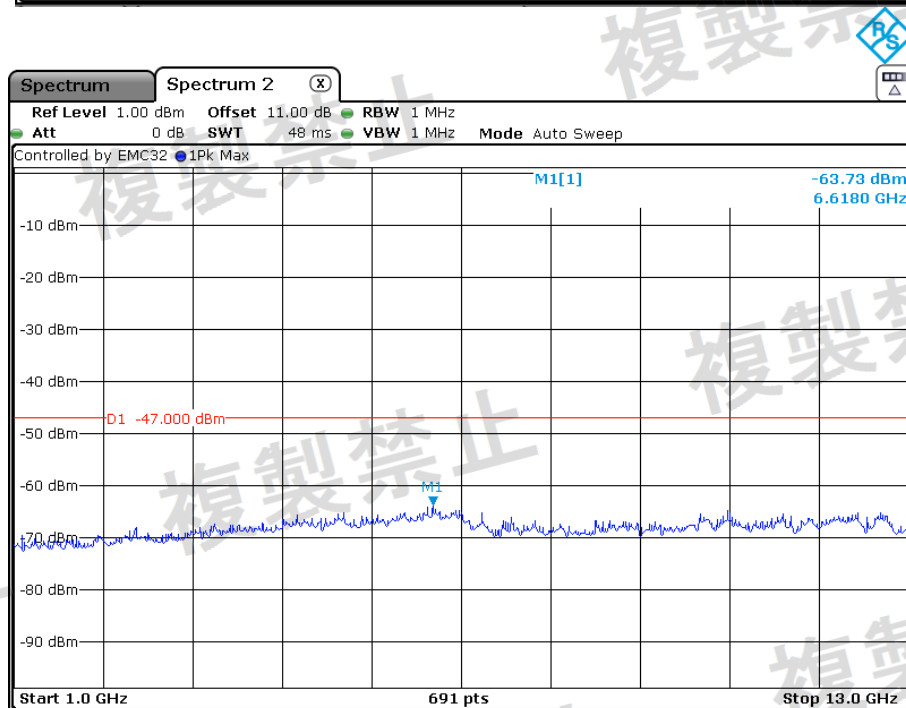
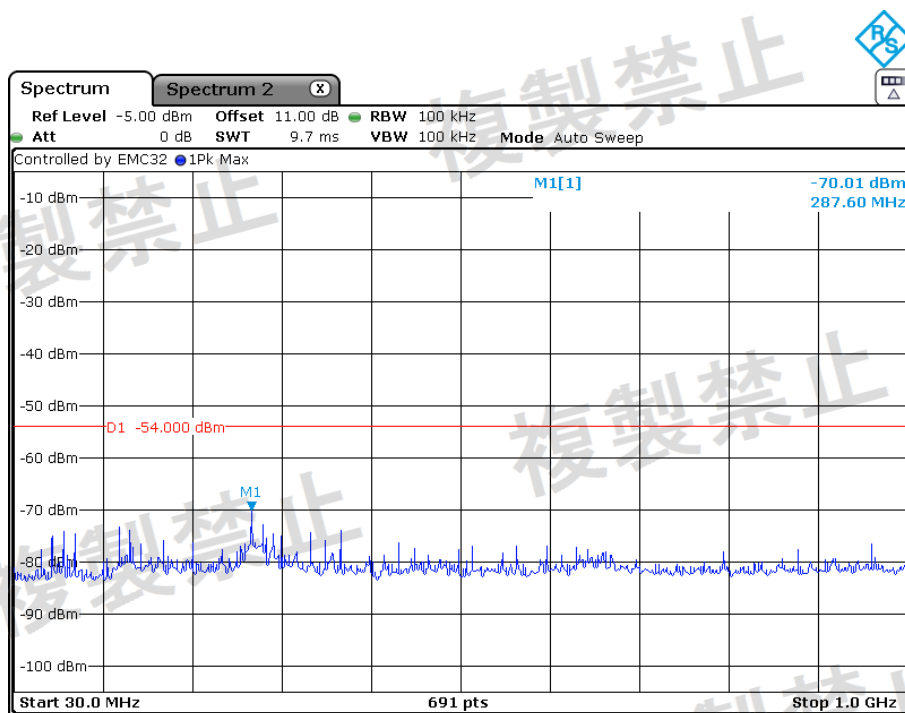
Spurious Emissions of RX

Low Channel 2402MHz



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High Channel 2480MHz



Test frequency band	Unit	2402MHz	2480MHz	Limit	Result
Under 1GHz	dBm	-71.66	-70.01	≤-54	Pass
	MHz	287.6	287.6	-----	-----
1-26GHz	dBm	-58.38	-63.73	≤-47	Pass
	MHz	2832.0	6618.0	-----	-----

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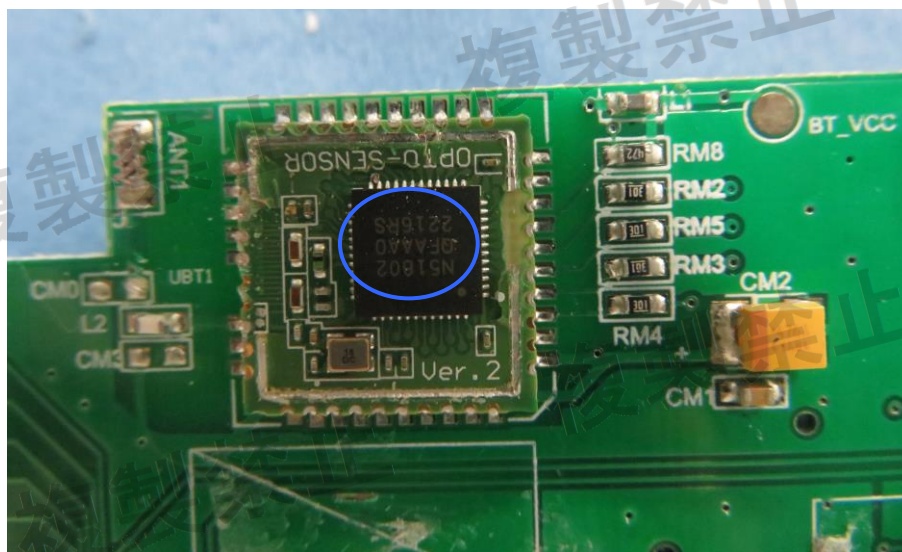
4.13 RF accessibility

Standard requirement

Article 49-20, paragraph 1 (a)

The EUT shall be constructed in such a way that sensitive RF parts, (like modulation and oscillator parts) cannot be reached easily by the user. These parts shall be covered by soldered metal caps or glue or by other mechanical covers. If the covers are fixed with screws, these shall be not the common type(s) like a Phillips, but special versions like Torx, so that the user cannot open the device with common tools.

Bluetooth IC was welding on the PCB board and cannot be open or revised easily.



RF and Modulation parts are mounted on PCB with surface mount technology, and there is no any adjustable parts on PCB or adjustable parts are not exposed. RF and Modulation parts comply with the annex of guideline "Interpretation of equipment structure-That prevents its external case from opening easily in order to prevent unlawful modification", registered approval body conference document number 001(Rev.03), so that this product cannot be opened and modified easily.

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5.0 Test Equipment List

Equipment No.	Equipment	Model	Manufacturer	Cal. Due date (YYYY-MM-DD)	Calibration body
EM031-03	Signal and Spectrum Analyzer (10 Hz~40 GHz)	R&S FSV40	R&S	2023-11-15	CHINA CEPREI LABORATORY CALIBRATION & TESTING CENTER

Remark: Calibration duration for equipment is 1 year.

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6.0 EUT Test Setup and Constructional Details

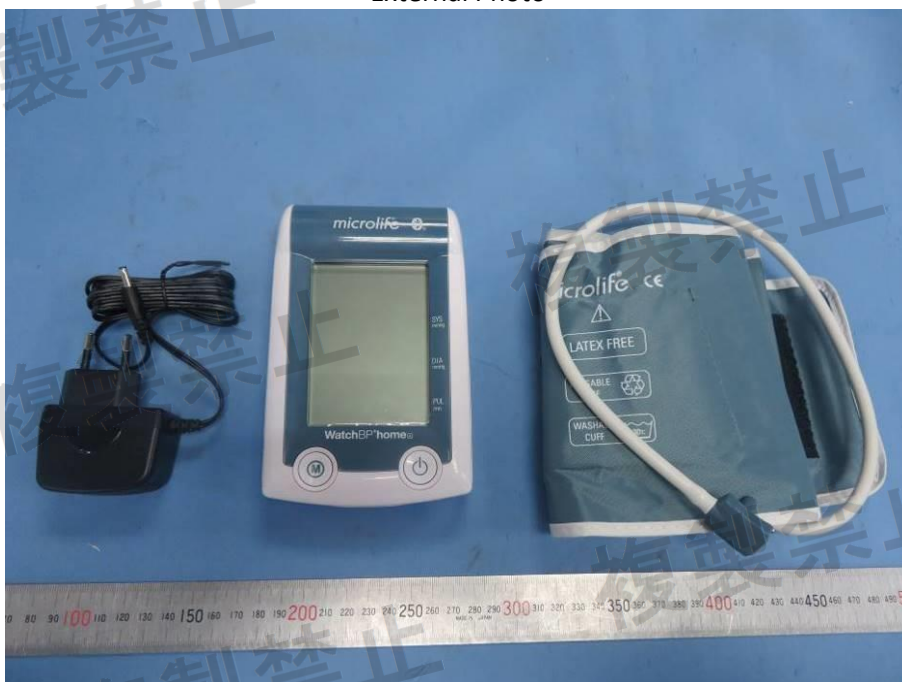
6.1 EUT Test Setup



TEST REPORT

6.2 EUT Constructional Details

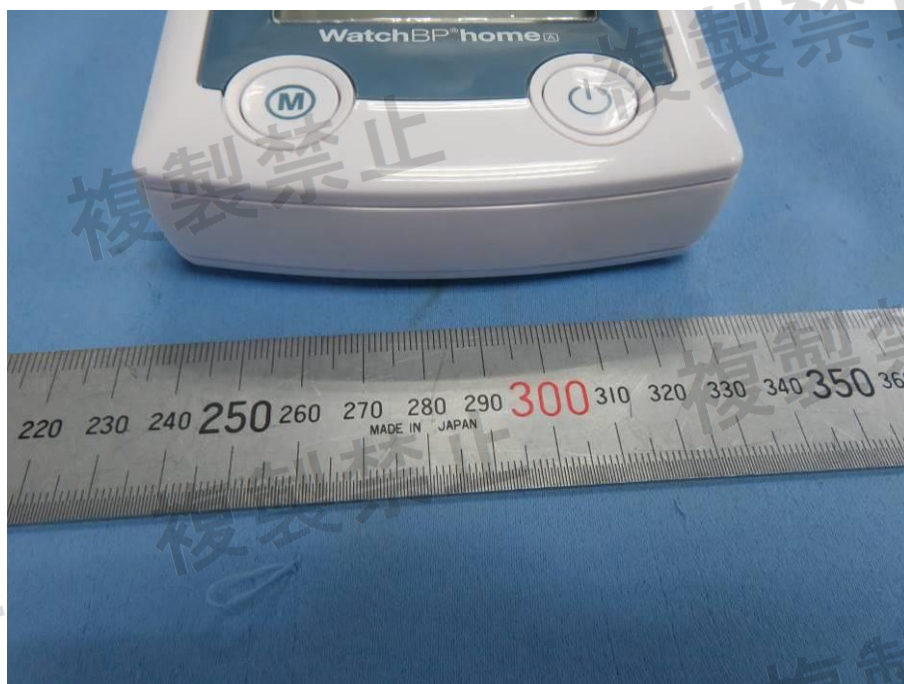
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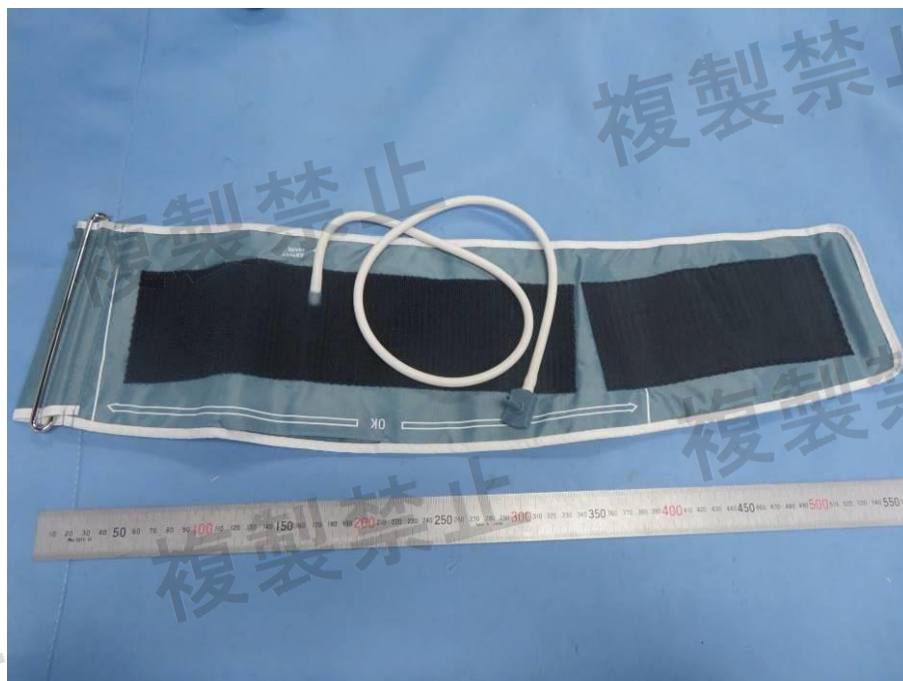
TEST REPORT



TEST REPORT



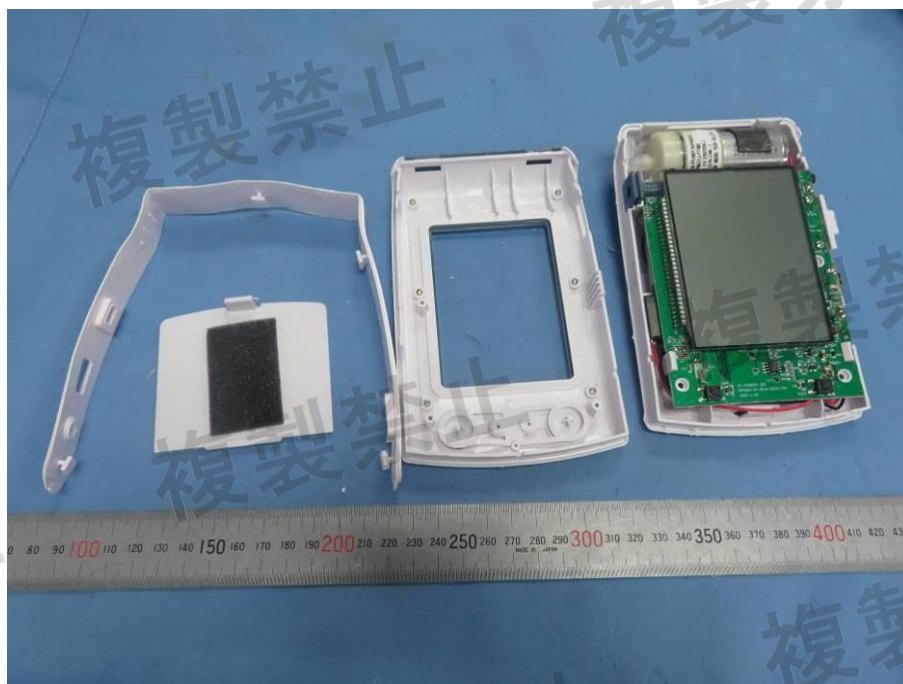
TEST REPORT



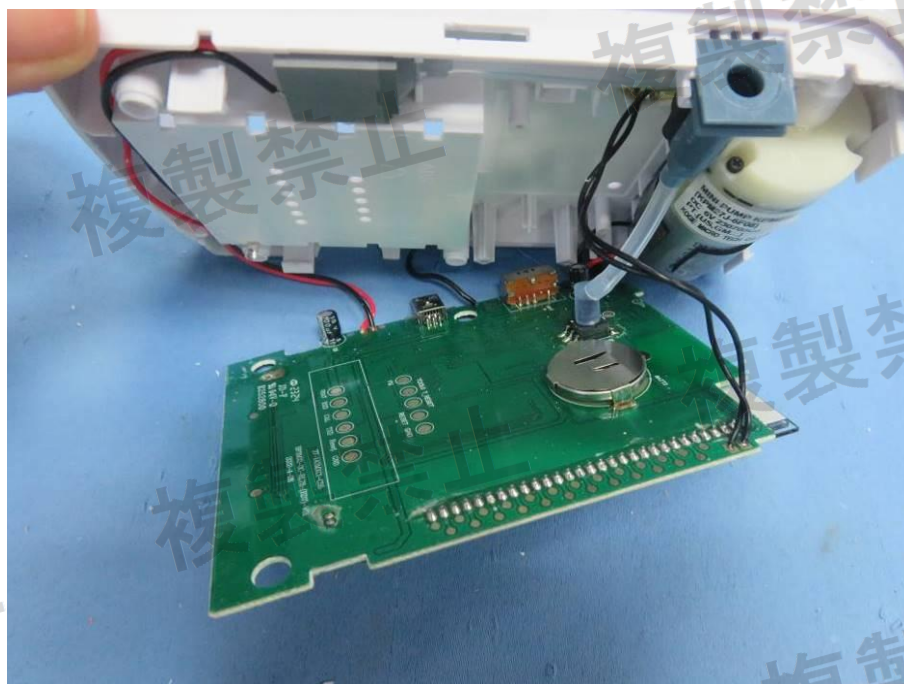
TEST REPORT



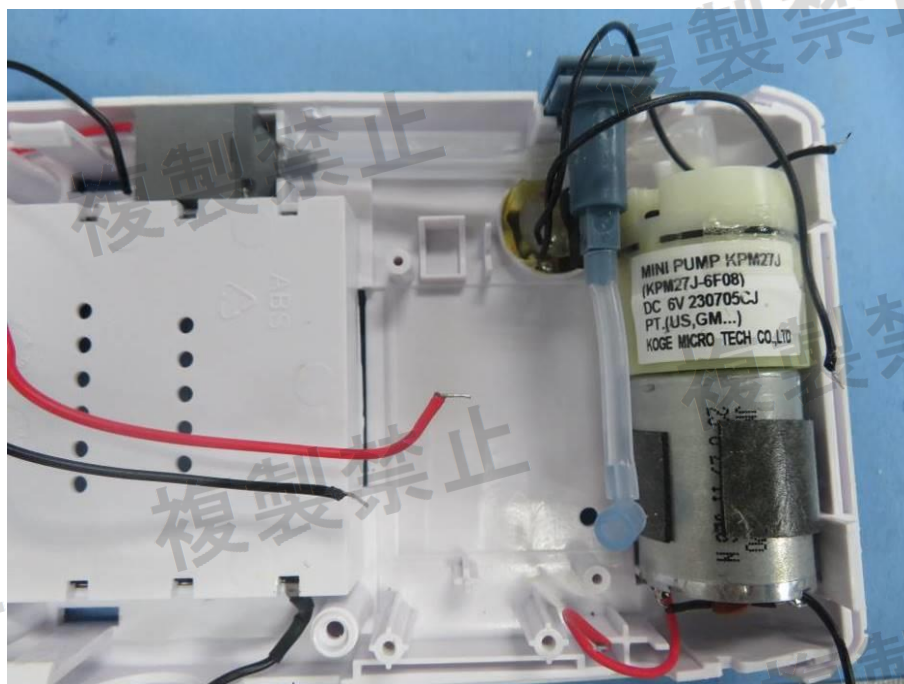
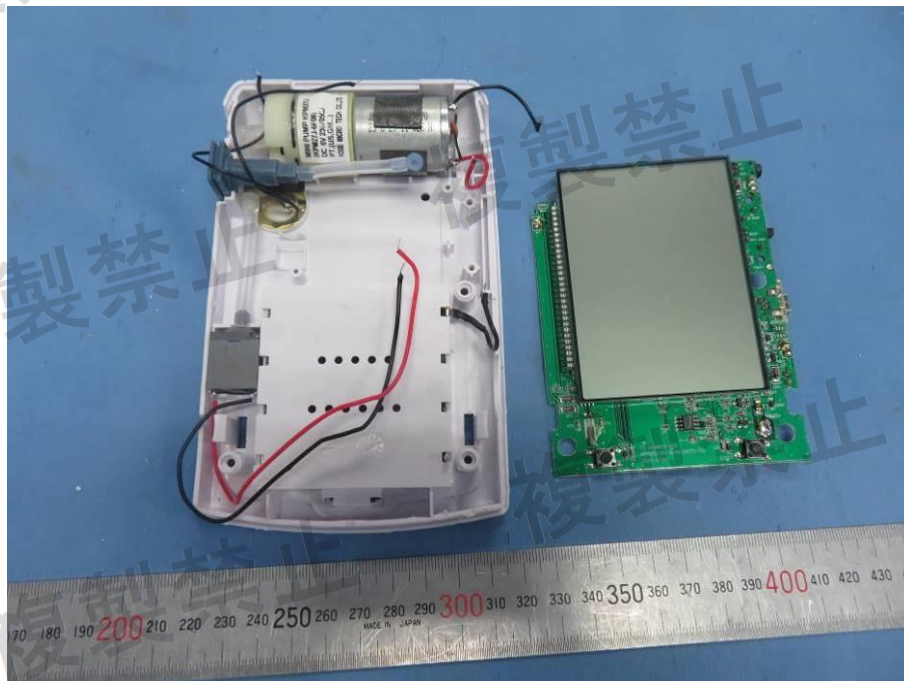
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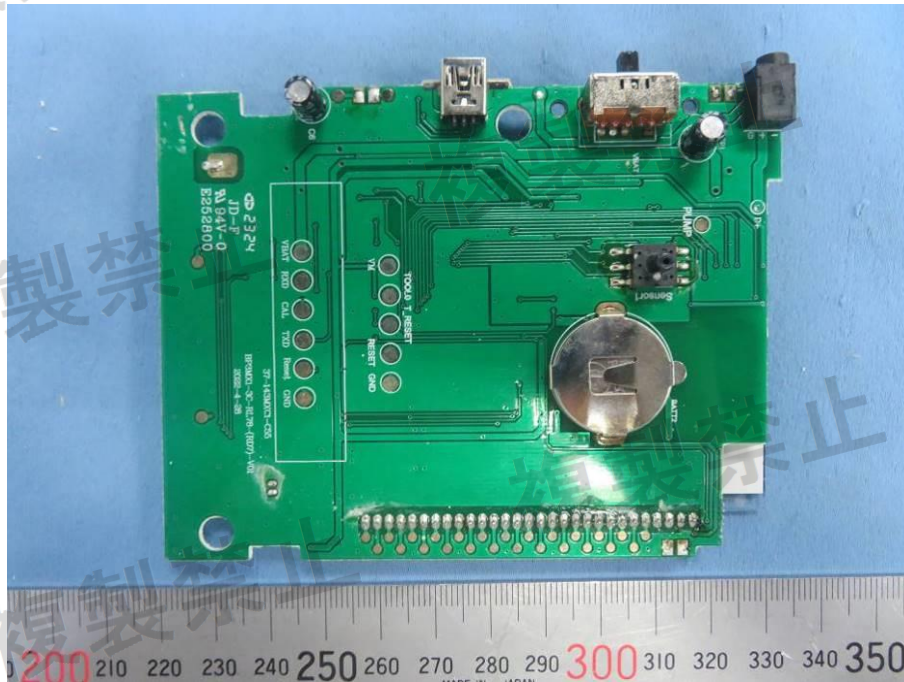
TEST REPORT



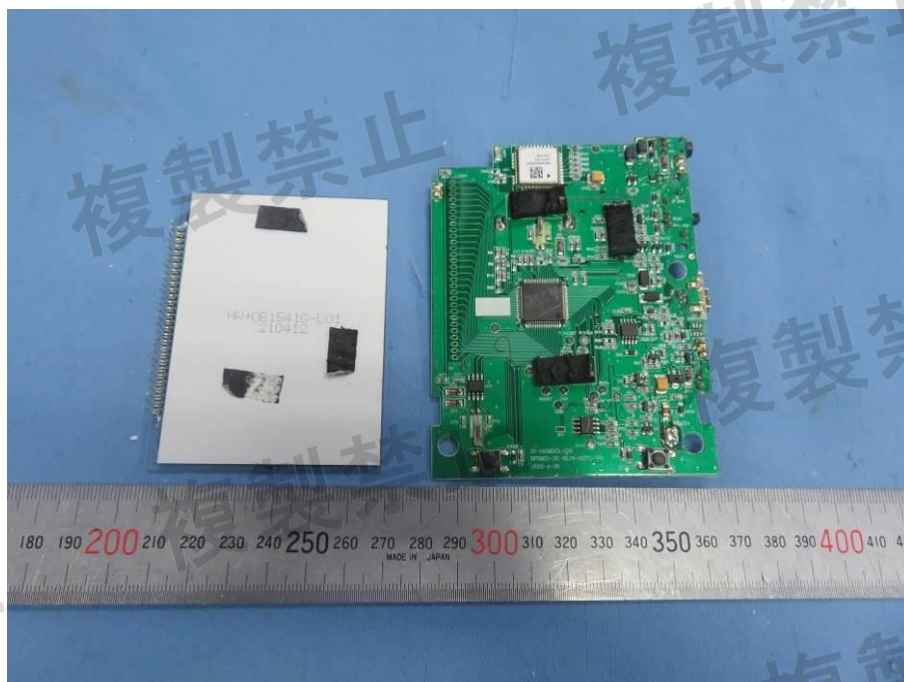
TEST REPORT



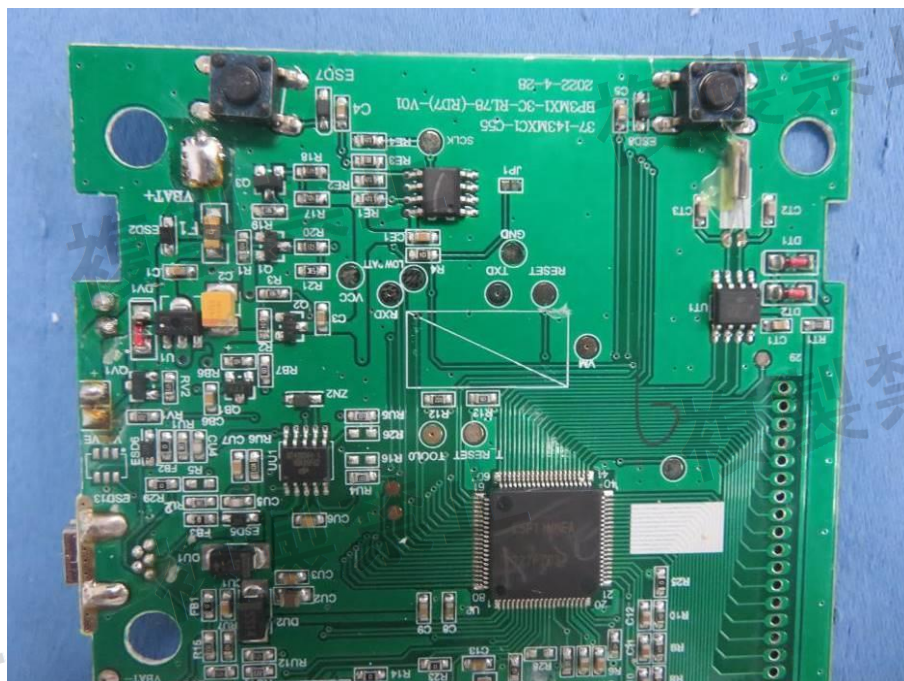
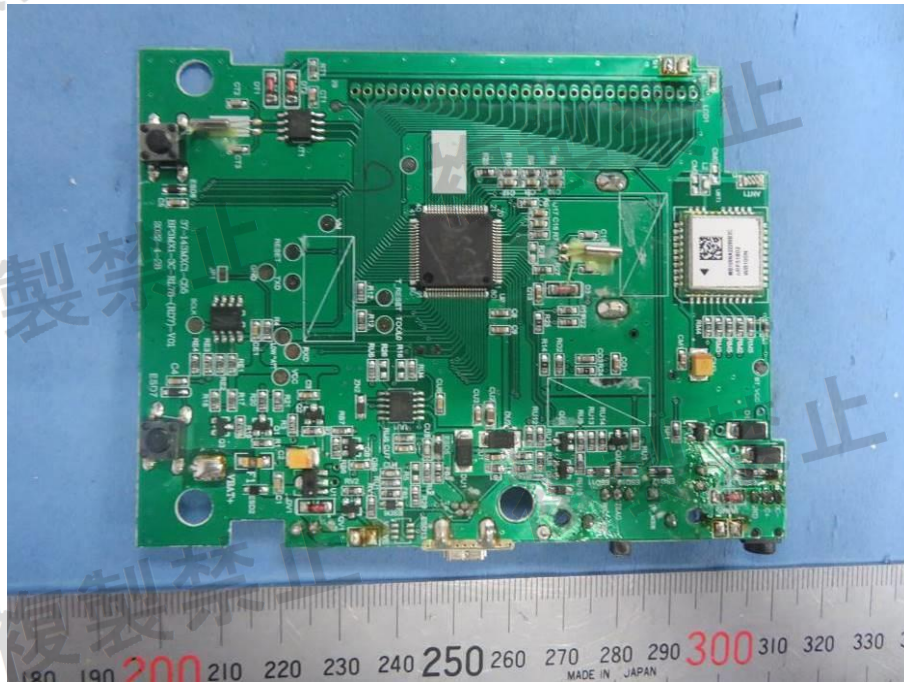
TEST REPORT



TEST REPORT



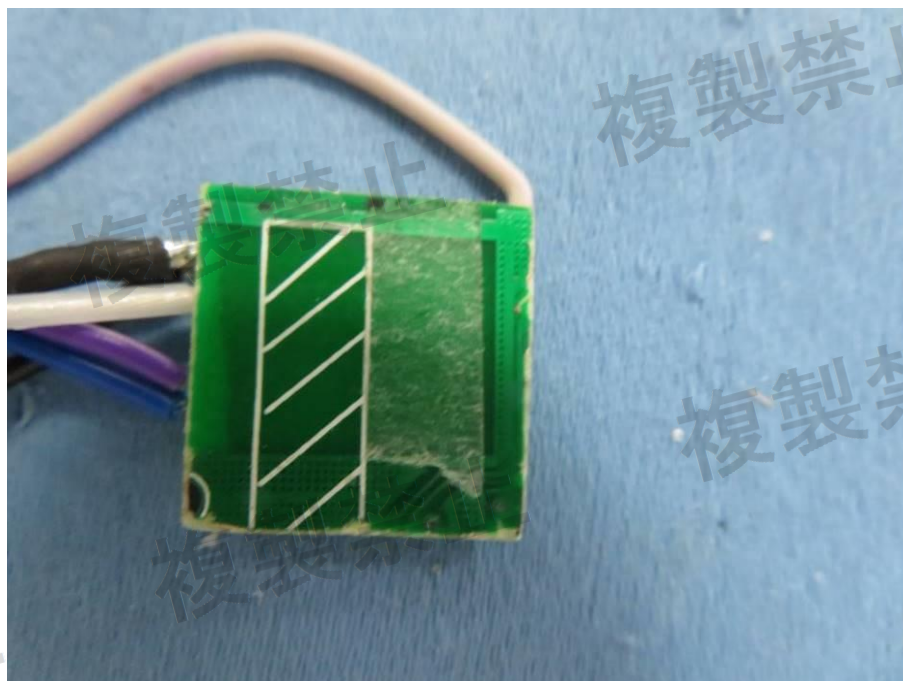
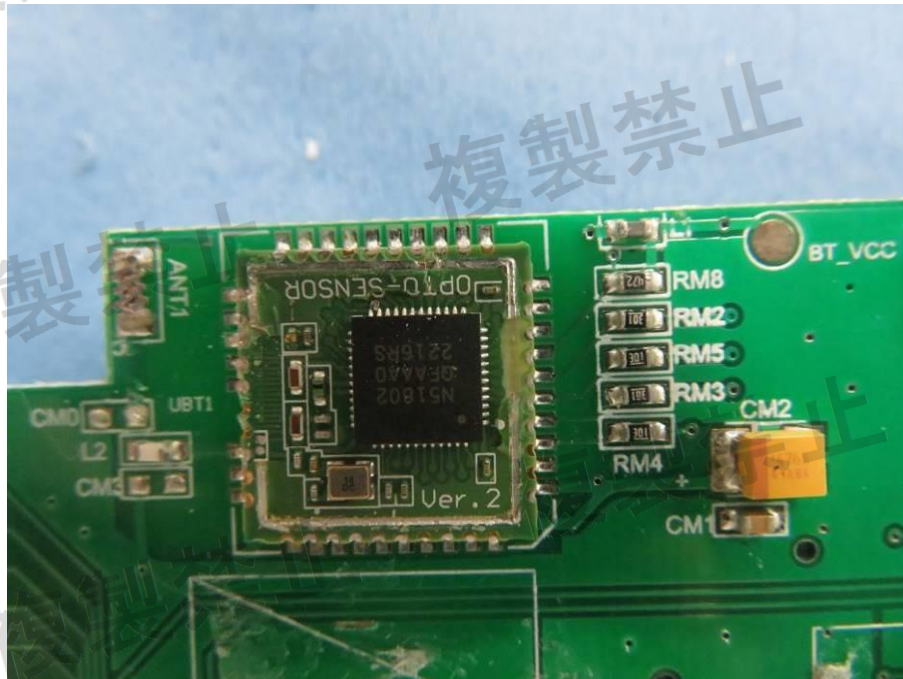
TEST REPORT



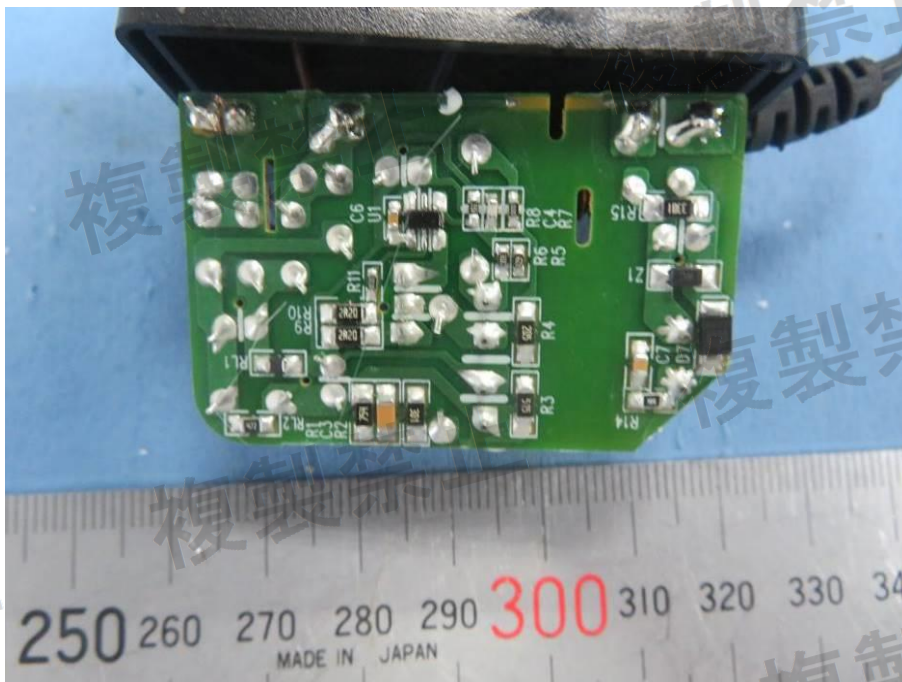
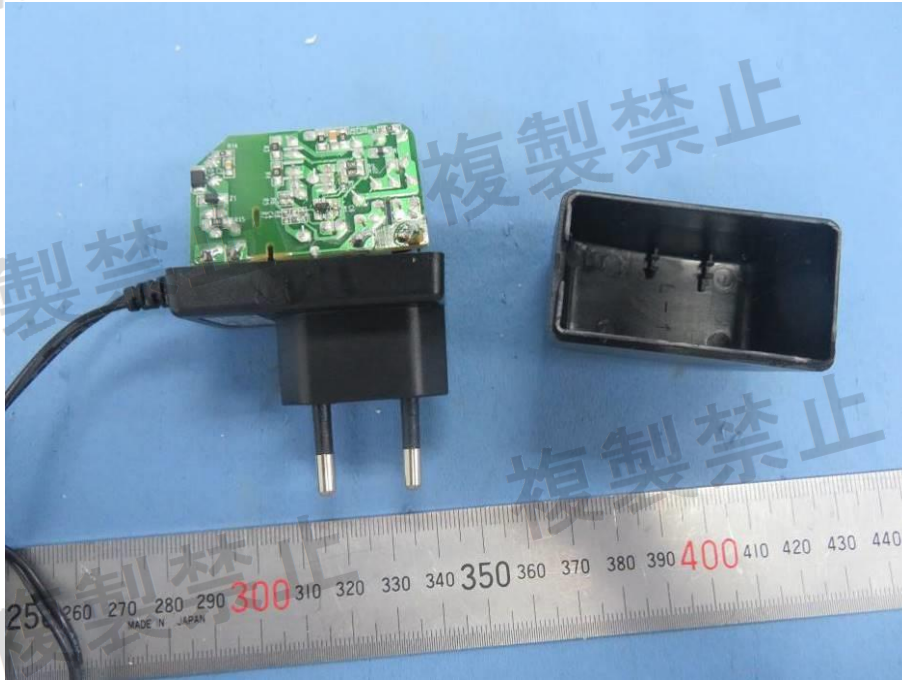
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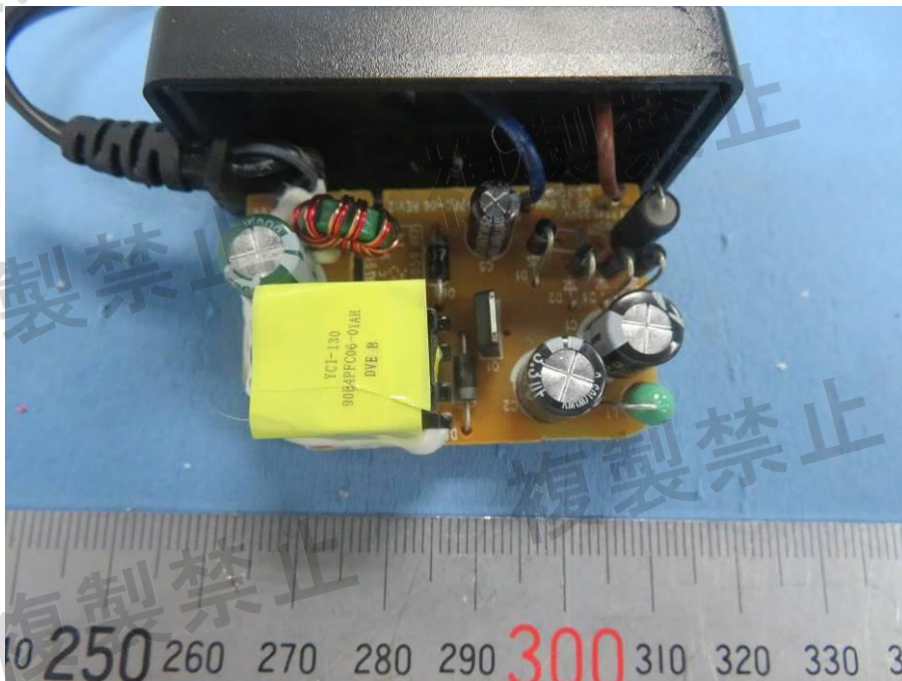
TEST REPORT



TEST REPORT



TEST REPORT



*****End of the test report*****