



Shenzhen Huaxia Testing Technology Co., Ltd.

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

Telephone: +86-755-26648640

Fax: +86-755-26648637

Website: www.cqa-cert.com

Report Template Version: V04

Report Template Revision Date: 2018-07-06

TEST REPORT

Report No.: CQASZ20210300321E
Applicant: HONGKONG VIMAI TECHNOLOGY CO.,LIMITED
Address of Applicant: FLAT/RM H29, 1/F PHASE 2 KWAI SHING IND BLDG NO.42-46, TAI LIN PAI ROAD KWAI CHUNG, HONG KONG
Equipment Under Test (EUT):
EUT Name: wireless microphone
Model No.: EP033-TYPE-C
Brand Name: N/A
Standards: Item 19 of Article 2 Paragraph 1
Date of Receipt: 2021-3-22
Date of Test: 2021-3-22 to 2021-4-16
Date of Issue: 2021-4-16
Test Result: PASS*

*In the configuration tested, the EUT complied with the standards specified above

Tested By :

Jun Li

(Jun Li)

Reviewed By:

Ares Liu

(Ares Liu)

Approved By:

Sheek, Luo

(Sheek Luo)



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

2 Version

Version No.	Date	Description
00	2021-04-19	Original

3 Test Summary

Radio Spectrum Matter (RSM) Part			
Test	Test Requirement	Limit / Severity Uncertainty	Result
Antenna Requirement	Item 19 of Article 2 Paragraph 1	Notice 88 Appendix 43,B-1 (1)&(2)	PASS
Test frequency	Item 19 of Article 2 Paragraph 1	Notice 88 Appendix 43, A-3	PASS
Frequency Error	Item 19 of Article 2 Paragraph 1	50 PPM or less	PASS
Occupied Bandwidth	Item 19 of Article 2 Paragraph 1	Others: 26MHz or less (DSSS: 26MHz or less)	PASS
Spread-spectrum Bandwidth	Item 19 of Article 2 Paragraph 1	500kHz or more	PASS
Antenna Power	Item 19 of Article 2 Paragraph 1	Designated value: (1) FH, FH+DS, FH+OFDM : 3mW/MHz (used in the range of 2402 - 2480MHz) (2) Other than (1) of OFDM & DS : 10mW/MHz (3) Other than (1) & (2) : 10mW Tolerance +20%,-80%	PASS
Spurious Emission of Tx	Item 19 of Article 2 Paragraph 1	(1) Below 2387 MHz : -26dBm (2) 2387 to 2400 MHz : -16dBm (3) 2483.5 through 2496.5 MHz : -16dBm (4) Over 2496.5 MHz : -26dBm	PASS
Interference prevention capability	Item 19 of Article 2 Paragraph 1	Notice 88 Appendix 43, 44, 45	PASS
RF accessibility	Item 19 of Article 2 Paragraph 1	Notice 88 Appendix 43, 44, 45	PASS
Spurious Emission of Rx	Item 19 of Article 2 Paragraph 1	(1) Below 1 GHz: -54dBm (2) 1GHz or higher: -47dBm	PASS

Remark:

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

Tx: In this whole report Tx (or tx) means the product in transmitting status.

Rx: In this whole report Rx (or rx) means the product in receiving status.

RF: In this whole report RF means Radiated Frequency.

DS: Direct spreading FH: Frequency hopping

OFDM: Orthogonal frequency division multiplexing

According to the confirmation from the applicant, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, only difference being the color, silk-screen and model numbers. Therefore only one model EP033-TYPE-C was tested in this report.

4 Contents

	Page
1 COVER PAGE.....	1
2 VERSION.....	2
3 TEST SUMMARY.....	3
4 CONTENTS.....	4
5 GENERAL INFORMATION.....	5
5.1 CLIENT INFORMATION.....	5
5.2 GENERAL DESCRIPTION OF EUT.....	5
5.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD.....	5
5.4 EUT TEST ENVIRONMENT RANGE.....	5
5.5 DESCRIPTION OF SUPPORT UNITS.....	6
5.6 TEST LOCATION.....	6
5.7 TEST FACILITY.....	6
6 EQUIPMENT LIST.....	7
7 RADIO TECHNICAL REQUIREMENTS SPECIFICATION.....	8
7.1 E.U.T. TEST CONDITIONS.....	9
7.2 TRANSMITTER REQUIREMENTS.....	10
7.2.1 Antenna Requirement.....	10
7.2.2 Test frequency.....	11
7.2.3 Frequency Error.....	13
7.2.4 Occupied Bandwidth (99%).....	16
7.2.5 Spread spectrum Bandwidth(90%).....	19
7.2.6 Antenna Power.....	22
7.2.7 Spurious Emissions of Tx.....	25
7.2.8 Interference prevention function.....	34
7.2.9 RF accessibility.....	34
7.3 SPURIOUS EMISSIONS OF RX.....	35
7.4 EUT TEST SETUP(TEST MODE No.: EP033-TYPE-C).....	38
7.5 EUT CONSTRUCTIONAL DETAILS.....	38

5 General Information

5.1 Client Information

Applicant:	HONGKONG VIMAI TECHNOLOGY CO.,LIMITED
Address of Applicant:	FLAT/RM H29, 1/F PHASE 2 KWAI SHING IND BLDG NO.42-46, TAI LIN PAI ROAD KWAI CHUNG, HONG KONG
Manufacturer:	SHEN ZHEN VIMAI TECHNOLOGY CO.,LTD
Address of Manufacturer:	Floor 3, building B, no. 5 huating road, tongsheng community, dalang street, longhua district, shenzhen
Factory:	SHEN ZHEN VIMAI TECHNOLOGY CO.,LTD
Address of Factory:	Floor 3, building B, no. 5 huating road, tongsheng community, dalang street, longhua district, shenzhen

5.2 General Description of EUT

Product Name:	wireless microphone
Model No.:	EP033-TYPE-C
Trade Mark:	N/A
EUT Supports Radios application:	2.4GHz Wireless
Power Supply:	Button battery 80mAh, DC3.7V-4.2V

5.3 Product Specification subjective to this standard

Operating Frequency:	2402~2480MHz
Conductor rated power:	0.000035W/MHz
Channels:	79 Channels
Type of Modulation	FSK
Antenna Type:	PCB Antenna
Antenna Gain:	0.19dBi from 2402~2480MHz
Sample Type:	Portable production(mobile production ;fixed production)
Test Power Grade:	255(manufacturer declare)
Test Software of EUT:	Serial Debugging Assistant V1.3
Product Characteristic:	Once power on, the device will automatically search usable frequency, and then will fix at one frequency and transmit continuously.
Sample Received Date:	2021-3-22
Sample tested Date:	2021-3-22 to 2021-4-16

5.4 EUT test environment range

Temperature:	0 -45.0 °C
Humidity:	45-85 % RH
Atmospheric Pressure:	1000 -1010 mbar

5.5 Description of Support Units

The EUT has been tested stand-alone.

The EUT has been tested with associated equipment below.

1) support equipment

Description	Manufacturer	Model No.	Certification	Supplied by
Phone	XIAOMI	Redmi K30	FCC ID and DOC	CQA
Adapter	XIAOMI	MDY-08-EF	FCC ID and DOC	CQA

5.6 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.,

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

5.7 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **A2LA (Certificate No. 4742.01)**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

- **FCC Registration No.: 522263**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

6 Equipment List

Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2020/10/25	2021/10/24
Spectrum analyzer	R&S	FSU26	CQA-038	2020/10/25	2021/10/24
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2020/10/25	2021/10/24
Loop antenna	Schwarzbeck	FMZB1516	CQA-060	2020/10/21	2021/10/20
Bilog Antenna	R&S	HL562	CQA-011	2020/9/26	2021/9/25
Horn Antenna	R&S	HF906	CQA-012	2020/9/26	2021/9/25
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2020/9/25	2021/9/24
Coaxial Cable (Above 1GHz)	CQA	N/A	C007	2020/9/26	2021/9/25
Coaxial Cable (Below 1GHz)	CQA	N/A	C013	2020/9/26	2021/9/25
Antenna Connector	CQA	RFC-01	CQA-080	2020/9/26	2021/9/25
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2020/9/26	2021/9/25
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2020/9/26	2021/9/25
EMI Test Receiver	R&S	ESR7	CQA-005	2020/10/25	2021/10/24
LISN	R&S	ENV216	CQA-003	2020/10/23	2021/10/22
Coaxial cable	CQA	N/A	CQA-C009	2020/9/26	2021/9/25
DC power	KEYSIGHT	E3631A	CQA-028	2020/9/26	2021/9/25

Note:

The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

7 Radio Technical Requirements Specification

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

Items	Technical standard
Assigned frequency or designated frequency	2.400-2.483.5MHz
Communication method	One-way communication, simplex, semi-duplex, or duplex operation of digital signal transmission including spread spectrum
Tolerance of frequency ($\times 10^{-6}$)	50PPM
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 (used in the range of 2402 - 2480MHz) (2) Other than (1) of OFDM & DS : 10mW/MHz (3) Other than (1) & (2) : 10mW 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 2402-2480 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.)
Tolerance of spurious emission intensity	(1) Below 2387 MHz : 2.5 μ W (2) 2387 to 2400 MHz : 25 μ W (3) 2483.5 through 2496.5 MHz : 25 μ W (4) Over 2496.5 MHz : 2.5 μ W
Spreading bandwidth	DS,FH,FH+DS,FH+OFDM : 500kHz or more
Limit of secondary radiated emissions	(1) Below 1 GHz : 4 nW (2) 1 GHz or higher : 20 nW
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

Note: The Technical Standards described here do not cover all of the regulated items.

7.1 E.U.T. Test Conditions

Power Supply: Button battery 80mAh, DC3.7V-4.2V

別表第四十三 証明規則第2条1項第19号に掲げる無線設備の試験方法

No. 43 - Proof rule article 2, paragraph 1, section 19
Test method of Radio Equipment

1. General (Common)

1) Environment of test site

Keep the temperature and humidity of test room in the normal temperature and humidity range as regulated in JIS Z 8703:

2) Power supply voltage

(1) Characteristic test in Certificate of technical conformity

Supply the rated voltage to power supply.

(2) Other

Supply the rated voltage and the rated voltage $\pm 10\%$ to power supply. However,

If the fluctuation of input voltage to the circuit of RF unit (except power supply) of test equipment is under $\pm 1\%$, when input voltage from external power supply to the test equipment is fluctuated by $\pm 10\%$: Conduct the test with the rated voltage only.

If the test equipment is designed to operate only by the particular fluctuation range (the range of fluctuation of power supply voltage is within $\pm 10\%$), and the upper/lower limit of the particular fluctuation range is specified in the construction design specification: Conduct the test with the rated voltage and with the upper/lower limit of the particular fluctuation range.

The measurement result of the voltage fluctuation at RF circuit when DC3.7V $\pm 10\%$.

DC Input	DC3.7
4.07V	4.07V
3.7V	3.7V
3.33V	3.33V

Temperature: 5 -35.0 °C

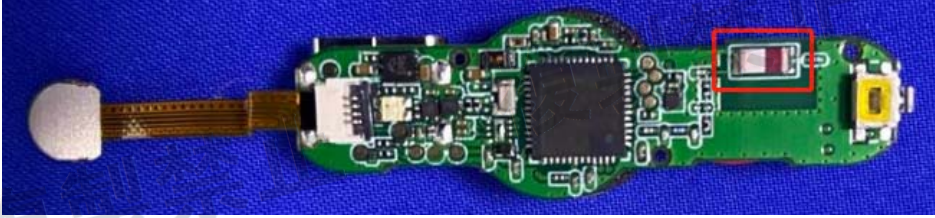
Humidity: 45-85 % RH

Atmospheric Pressure: 1000 -1010 mbar

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

7.2 Transmitter Requirements

7.2.1 Antenna Requirement

Standard requirement
Applicable for equipment with an antenna terminal, including testing terminals) If an antenna connector is available, all relevant tests will be carried out conducted. If not, tests will be carried out in an anechoic room or with a suitable test-fixture.
EUT Antenna The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi.


Result: An antenna connector is available, all relevant tests will be carried out conducted.

7.2.2 Test frequency

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, Middle and the Highest frequency (L,M and H). If there are 2 or fewer frequencies, testing shall be performed with the available frequencies.	
Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

EUT channels and frequencies list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	27	2429	54	2456
1	2403	28	2430	55	2457
2	2404	29	2431	56	2458
3	2405	30	2432	57	2459
4	2406	31	2433	58	2460
5	2407	32	2434	59	2461
6	2408	33	2435	60	2462
7	2409	34	2436	61	2463
8	2410	35	2437	62	2464
9	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479

24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

Test frequency is the lowest channel: 0 channel(2402MHz), middle channel: 38 channel(2440MHz) and highest channel: 78 channel(2480MHz)

7.2.3 Frequency Error

Test requirement: Item 19 of Article 2 Paragraph 1

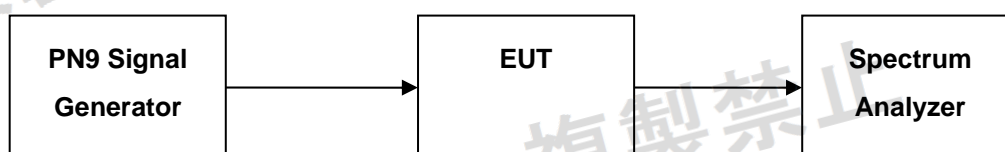
Text Method: MIC Notice No.88 Appendix No.43

EUT Operation:

Ambient: Temp.: 25.5°C Humid.: 53% Press.: 1009 mbar

Status: Enter the unmodulation mode for the product. Test in Channel lowest (2408MHz), middle (2440MHz) and highest(2474MHz), keep in continuously transmitting status.

Test Configuration:



Test Conditions: Frequency Counter or Spectrum Analyzer is used for measurement.

EUT conditions: Modulation/Spread/Hopping off, CW Tx

If EUT does not accept "Modulation OFF" mode in the measurement, you may use "Modulation ON" mode. In that case you can use the Max power Frequency as the measuring results.

Spectrum Analyzer conditions:

Frequency: Test Frequency

Span 1MHz

RBW 10KHz (Modulation ON),

VBW 10KHz (Modulation ON),

Sweep Time Auto

Detector mode Positive peak

Indication mode Max hold

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

Test result: PASS

Measurement Record:

Uncertainty: $\pm 10\text{Hz}$

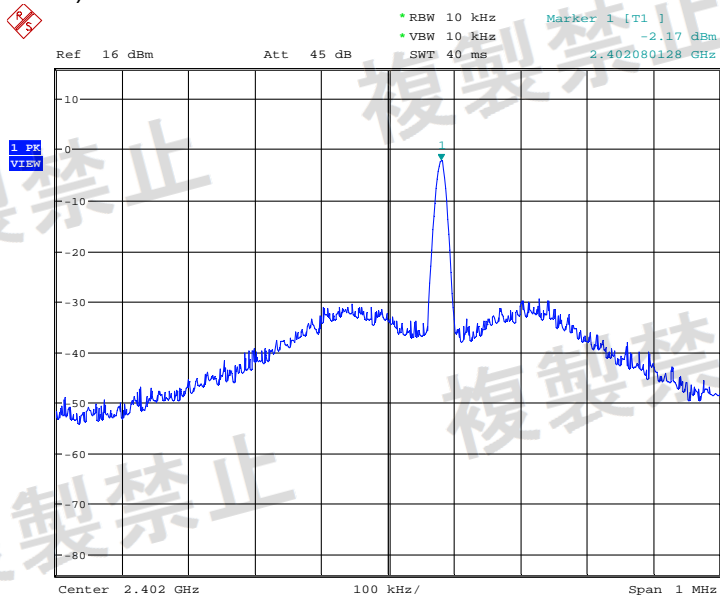
Test result:

No.	Test Items	Test ch	Test Frequency (MHz)	Test Result			Unit	Technical Regulations
				Normal Voltage	High Voltage	Low Voltage		
1	Frequency (MHz/PPM)	Lowest	2402.0	DC3.7	N/A	N/A	MHz	$\pm 50\text{ PPM}$ or less
				2402.08	N/A	N/A	PPM	
		Middle	2440.0	33.31	N/A	N/A	MHz	
				2440.08	N/A	N/A	PPM	
		Highest	2480.0	32.79	N/A	N/A	MHz	
				2480.08	N/A	N/A	PPM	

Note: The nominal frequency shall be confirmed by the applicant and test lab.

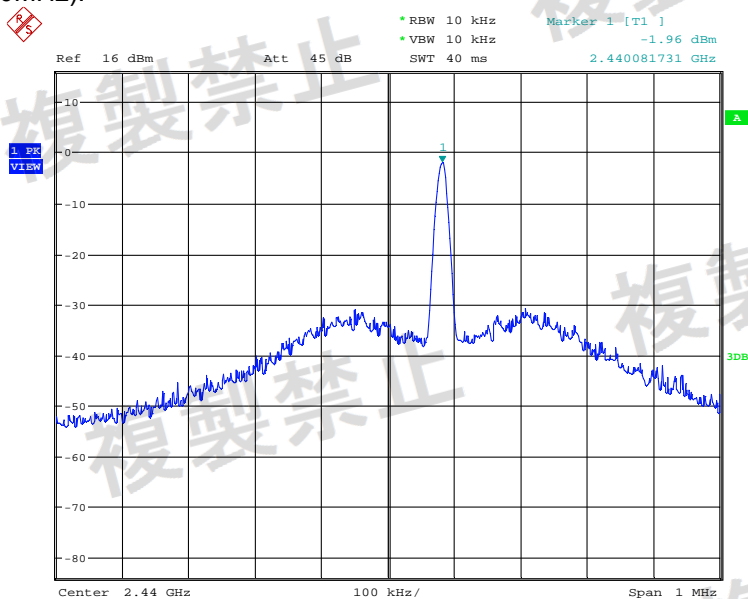
The plot please refer below:

Lowest channel(2402MHz):



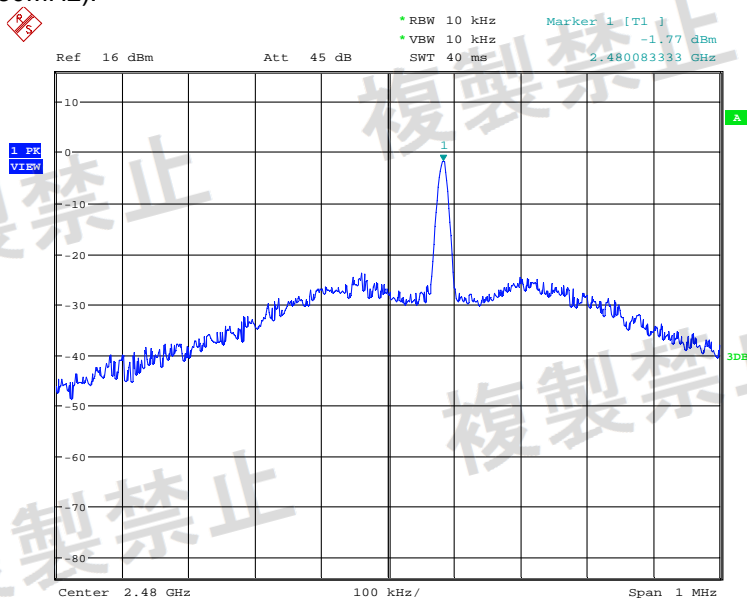
Date: 1.APR.2021 07:32:46

Middle channel(2440MHz):



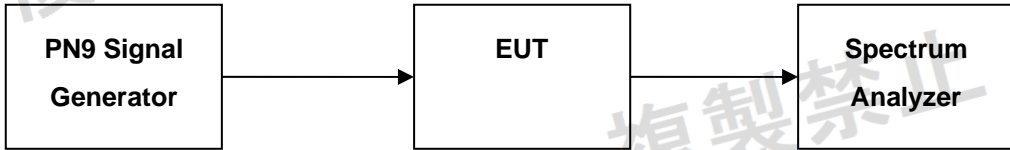
Date: 1.APR.2021 07:33:56

Highest channel(2480MHz):



Date: 1.APR.2021 07:35:00

7.2.4 Occupied Bandwidth (99%)

Test requirement:	Item 19 of Article 2 Paragraph 1		
Test Method:	MIC Notice No.88 Appendix No.43		
EUT Operation:			
Ambient:	Temp.: 25.5°C	Humid.: 53%	Press.: 1009mbar
Status:	Modulation/Spread/Hopping on transmitting mode.		
Test Configuration:	 <pre> graph LR A[PN9 Signal Generator] --> B[EUT] B --> C[Spectrum Analyzer] </pre>		
EUT conditions:	Modulation/Spread/Hopping on, PN9 Modulation Tx For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.		
Spectrum Analyzer conditions:	Frequency: Test Frequency Span 120MHz (FHSS), 40MHz (DSSS) RBW 1MHz 300kHz VBW 1MHz 300kHz Sweep Time Auto detector mode Positive peak Indication mode Max hold OBW 99%		
Technical standard:	FH : 83.5MHz FH + DS : 83.5MHz FH + OFDM : 83.5MHz OFDM : 38MHz Others : 26MHz		
Test result:	PASS		

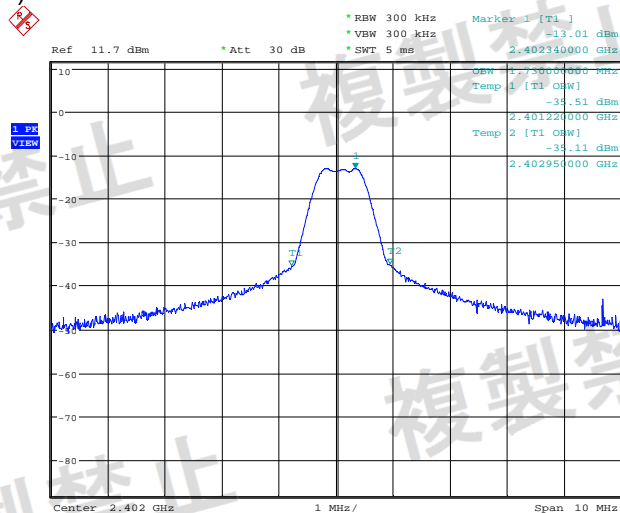
Measurement Record:

Uncertainty: $\pm 10\text{kHz}$

Test result:

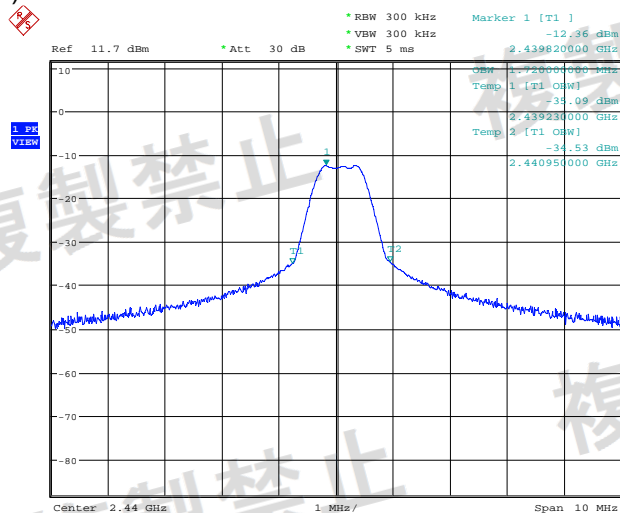
No.	Test Items		Test Result			Unit	Technical Regulations
			Normal Voltage	High Voltage	Low Voltage		
			DC3.7	N/A	N/A		
1	Occupied Bandwidth (MHz)	Lowest	1.73	N/A	N/A	MHz	26MHz or less
		Middle	1.72	N/A	N/A	MHz	
		Highest	1.69	N/A	N/A	MHz	

The plot please refer below:
Lowest channel(2402MHz):



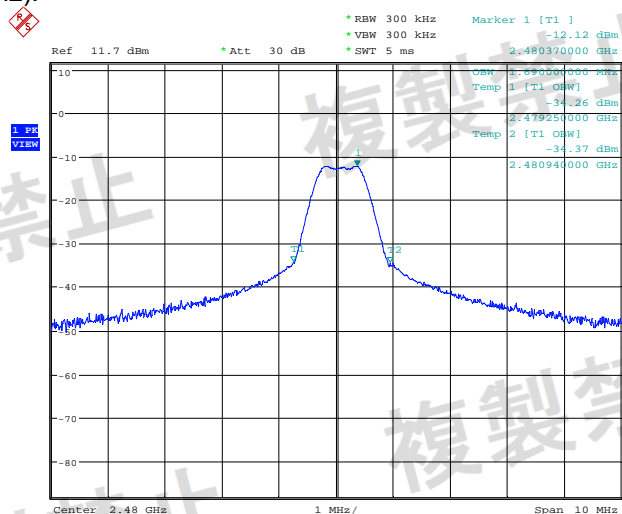
Date: 31.MAR.2021 18:07:22

Middle channel(2440MHz):



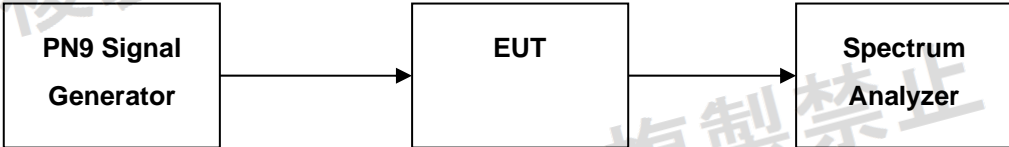
Date: 31.MAR.2021 18:06:21

Highest channel(2480MHz):



Date: 31.MAR.2021 18:04:41

7.2.5 Spread spectrum Bandwidth(90%)

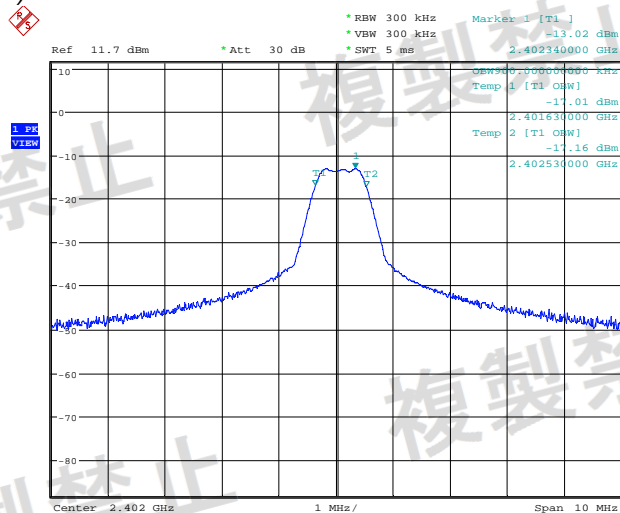
Test requirement:	Item 19 of Article 2 Paragraph 1		
Test Method:	MIC Notice No.88 Appendix No.43		
EUT Operation:			
Ambient:	Temp.: 25.5°C	Humid.: 53%	Press.: 1009 mbar
Status:	Modulation/Spread/Hopping on transmitting mode.		
Test Configuration:			
Test Procedure:			
EUT conditions:	Modulation/Spread/Hopping on, PN9 Modulation Tx For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.		
Spectrum Analyzer conditions:	Frequency: Test Frequency Span 120MHz (FHSS), 40MHz (DSSS) RBW 1MHz 300kHz VBW 1MHz 300kHz Sweep Time Auto detector mode Positive peak Indication mode Max hold OBW 90%		
Technical standard:	500kHz or more		
Test result:	PASS		

Measurement Record:

Uncertainty: $\pm 10\text{kHz}$

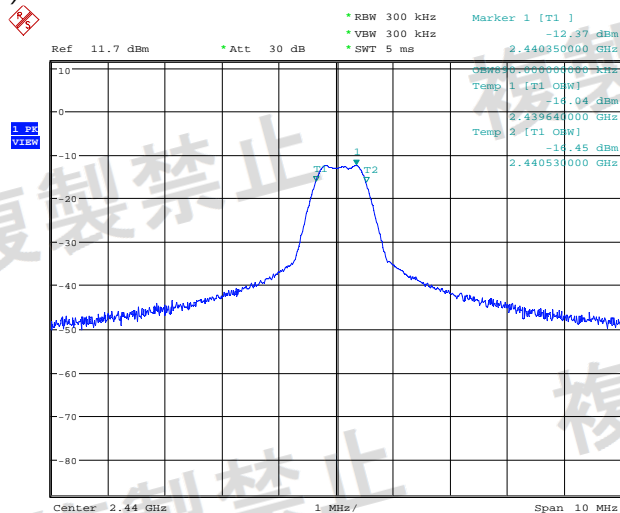
No.	Test Items		Test Result			Unit	Technical Regulations
			Normal Voltage	High Voltage	Low Voltage		
			DC3.7	N/A	N/A		
1	Spread-spectrum Bandwidth (MHz)	Lowest	0.9	N/A	N/A	MHz	500kHz or more
		Middle	0.89	N/A	N/A	MHz	
		Highest	0.9	N/A	N/A	MHz	

The plot please refer below:
Lowest channel(2402MHz):



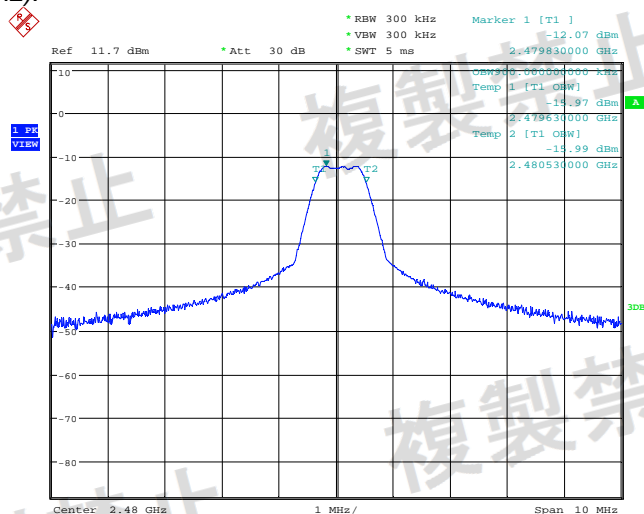
Date: 31.MAR.2021 18:09:30

Middle channel(2440MHz):



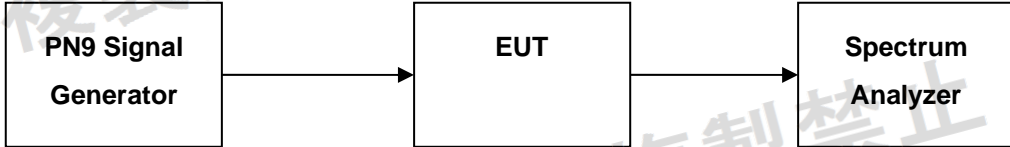
Date: 31.MAR.2021 18:10:51

Highest channel(2480MHz):



Date: 31.MAR.2021 18:11:49

7.2.6 Antenna Power

Test requirement:	Item 19 of Article 2 Paragraph 1		
Test Method:	MIC Notice No.88 Appendix No.43		
EUT Operation:			
Ambient:	Temp.: 25.5°C	Humid.: 53%	Press.: 1009mbar
Status:	Modulation/Spread/Hopping on transmitting mode.		
Test Configuration:	 <pre> graph LR A[PN9 Signal Generator] --> B[EUT] B --> C[Spectrum Analyzer] </pre>		
Test Procedure:			
EUT conditions:	Modulation/Spread/Hopping on, PN9 Modulation Tx For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.		
Spectrum Analyzer conditions(DSSS):	Frequency: Test Frequency Span 40MHz -> 10MHz RBW 1MHz VBW 1MHz Sweep Time Auto Detector mode Positive peak Indication mode Max hold		
Spectrum Analyzer conditions(FHSS):	Frequency: Test Frequency Span 120MHz RBW 1MHz VBW 1MHz Sweep Time Auto Detector mode Positive peak Indication mode Max hold		
Technical standard:	Antenna Power (1) FH, FH+DS, FH+OFDM 3mW/MHz or less (used in the range of 2402 - 2480 MHz) (2) OFDM, DS other than (1) 10mW/MHz or less (3) Other than (1) & (2) 10mW or less Tolerance: +20%> Rated Power > -80%		
Test result:	PASS		

Measurement Record:

Uncertainty: $\pm 10\text{kHz} / \pm 1\text{dB}$

Test result:

No.	Test Items		Test Result			Unit	Technical Regulations
			Normal Voltage	High Voltage	Low Voltage		
			DC3.7	N/A	N/A		
1	Antenna Power (W/MHz)	Lowest	0.000033	N/A	N/A	W	2402-2480MHz 0.0000355W/MHz or less; Other Frequency 0.01W /MHz or less; Error+20% -80%
			-5.7	N/A	N/A	%	
	Antenna Power (W/MHz)	Middle	0.00003	N/A	N/A	W	
			-14.28	N/A	N/A	%	
	Antenna Power (W/MHz)	Highest	0.000037	N/A	N/A	W	
			5.7	N/A	N/A	%	

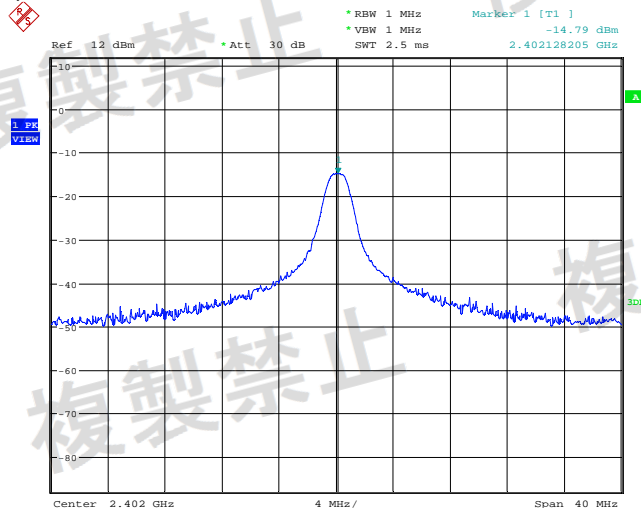
Remark:

The nominal Antenna power: 0.000035W/MHz

Tolerance (%) :[(test value- rate power)/rater power]*100

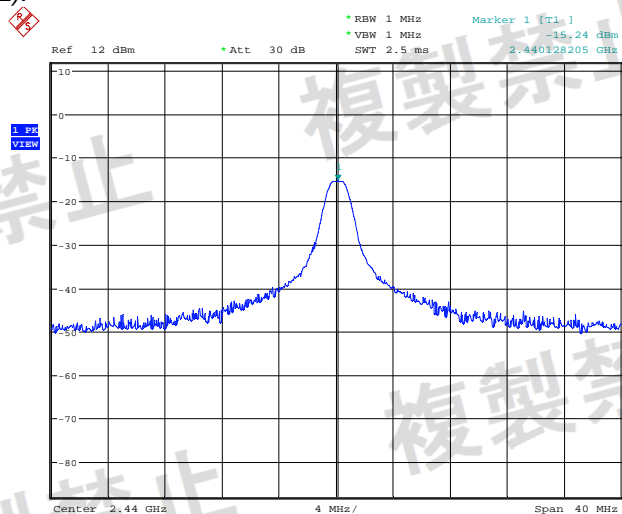
The plot please refer below:

Lowest channel(2402MHz):



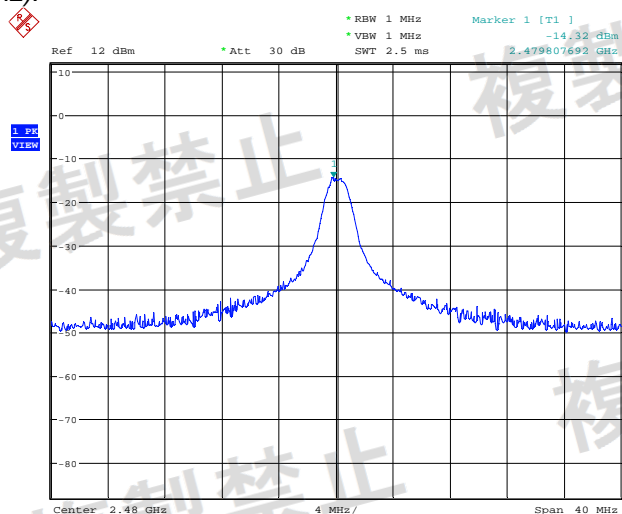
Date: 16.APR.2021 08:52:59

Middle channel(2440MHz):




Date: 16.APR.2021 08:55:00

Highest channel(2480MHz):



Date: 16.APR.2021 08:56:21

7.2.7 Spurious Emissions of Tx

Test requirement:	Item 19 of Article 2 Paragraph 1		
Test Method:	MIC Notice No.88 Appendix No.43		
EUT Operation:			
Ambient:	Temp.: 25.5°C	Humid.: 53%	Press.: 1002 mbar
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:	 <pre> graph LR A[PN9 Signal Generator] --> B[EUT] B --> C[Spectrum Analyzer] </pre>		
EUT conditions:	Modulation/Spread/Hopping on, PN9 Modulation Tx For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.		
Measurement Procedure:	Step1 All spurious are measured from 30MHz to 13GHz by peak mode. Step2 IF the value measured by Step1 is 2dB or less, measure in average mode.		
Spectrum Analyzer conditions(Step 1):	Frequency: 30MHz – 2400MHz , 2483.5MHz –13GHz RBW 1000kHz (30 – 1GHz) , 1000KHz (over 1GHz) VBW 1000kHz (30 – 1GHz) , 1000KHz (over 1GHz) Sweep Time Auto detector mode Positive peak Indication mode Max hold		
Spectrum Analyzer conditions(Step 2):	Frequency: Spurious Frequency Span 0Hz RBW 1MHz VBW 1MHz Sweep Time Auto Detector mode Sample Indication mode Max hold		
Technical standard:	(1) Below 2387 MHz : 2.5μW/MHz (2) 2387 to 2400 MHz : 25μW/MHz (3) 2483.5 through 2496.5 MHz : 25μW/MHz (4) Over 2496.5 MHz : 2.5μW/MHz		

Measurement Record:

Uncertainty: $\pm 1\text{dB}$

No.	Test Items	Channel	Test Frequency (MHz)	Test Result			Unit	Technical Regulations
				Normal Voltage	High Voltage	Low Voltage		
				DC3.7	N/A	N/A		
1	Spurious Emission of Tx (dBm)	Lowest	2020.607	-48.38	N/A	N/A	dBm	(1) Below 2020.607 MHz: -26dBm/MHz
			2399.979	-33.71	N/A	N/A	dBm	(2) 2387 to 2400 MHz: -16dBm/MHz
			2488.021	-46.46	N/A	N/A	dBm	(3) 2483.5 through 2496.5 MHz: -16dBm/MHz
			4802.557	-46.32	N/A	N/A	dBm	(4) Over 2496.5MHz: -26dBm/MHz

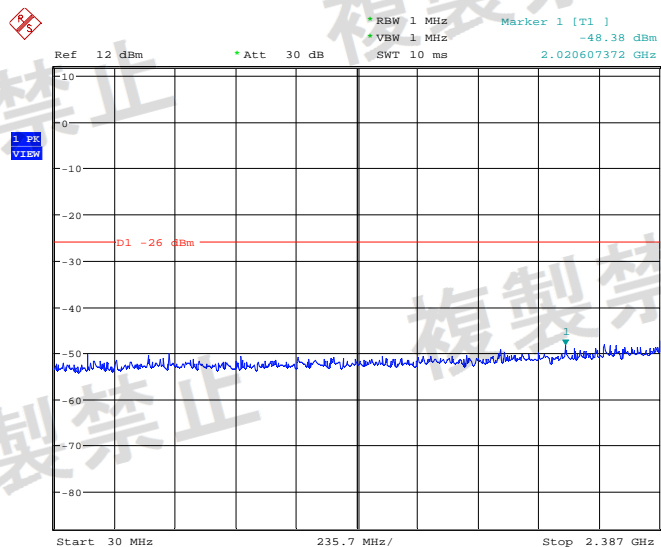
No.	Test Items	Channel	Test Frequency (MHz)	Test Result			Unit	Technical Regulations
				Normal Voltage	High Voltage	Low Voltage		
				DC3.7	N/A	N/A		
2	Spurious Emission of Tx (dBm)	Middle	1718.428	-44.33	N/A	N/A	dBm	(1) Below 2387 MHz: -26dBm/MHz
			2393.125	-47.43	N/A	N/A	dBm	(2) 2387 to 2400 MHz: -16dBm/MHz
			2489.708	-47.24	N/A	N/A	dBm	(3) 2483.5 through 2496.5 MHz: -16dBm/MHz
			4869.887	-47.44	N/A	N/A	dBm	(4) Over 2496.5 MHz: -26dBm/MHz

No.	Test Items	Channel	Test Frequency (MHz)	Test Result			Unit	Technical Regulations
				Normal Voltage	High Voltage	Low Voltage		
				DC3.7	N/A	N/A		
3	Spurious Emission of Tx (dBm)	Highest	3028.162	-48.60	N/A	N/A	dBm	(1) Below 2387 MHz: -26dBm/MHz
			2487.374	-47.09	N/A	N/A	dBm	(2) 2387 to 2400 MHz: -16dBm/MHz
			2483.604	-38.05	N/A	N/A	dBm	(3) 2483.5 through 2496.5 MHz: -16dBm/MHz
			3388.624	-46.77	N/A	N/A	dBm	(4) Over 2496.5 MHz: -26dBm/MHz

The plot please refer below:

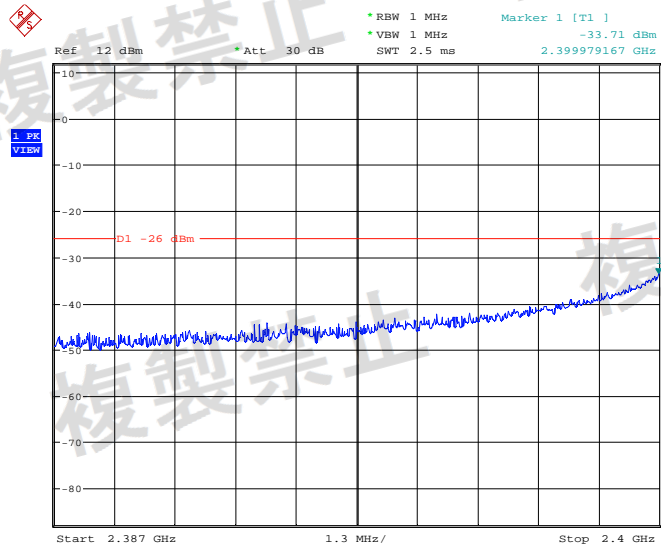
Lowest channel:

30MHz to 1GHz:



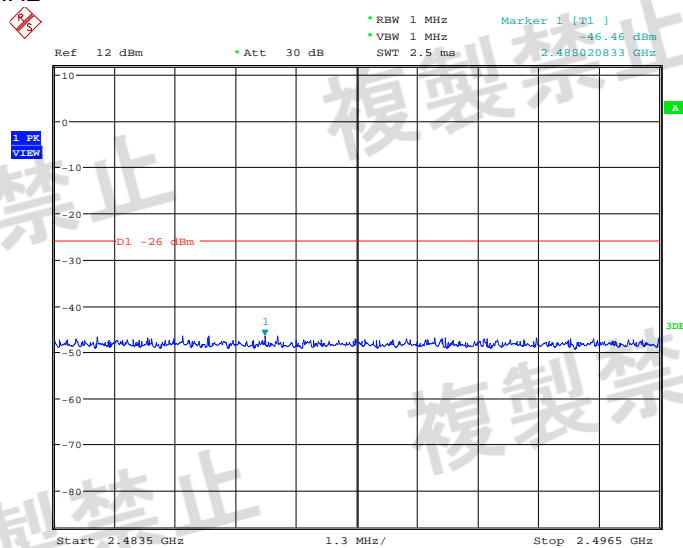
Date: 16.APR.2021 09:11:54

2.387GHz to 2.400GHz:



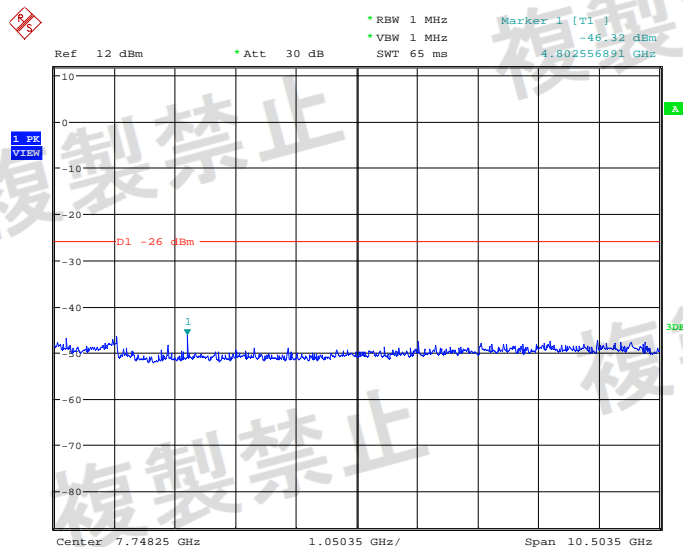
Date: 16.APR.2021 09:10:57

2.4835GHz to 2496.5MHz



Date: 16.APR.2021 09:09:42

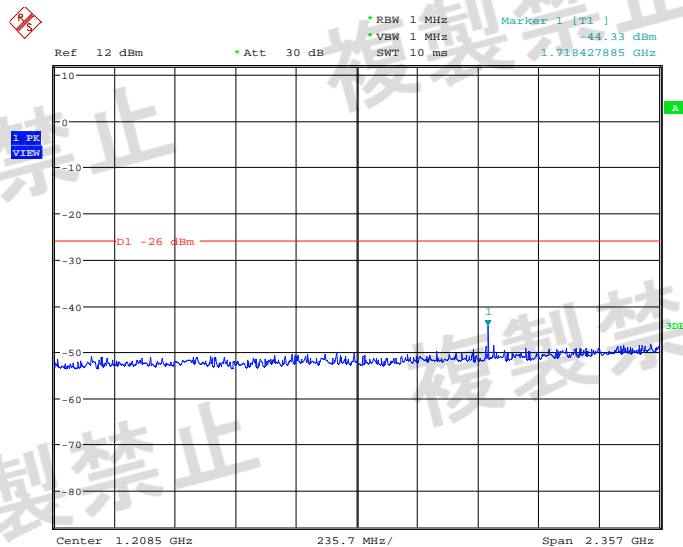
2.4965GHz to 13GHz



Date: 16.APR.2021 09:07:10

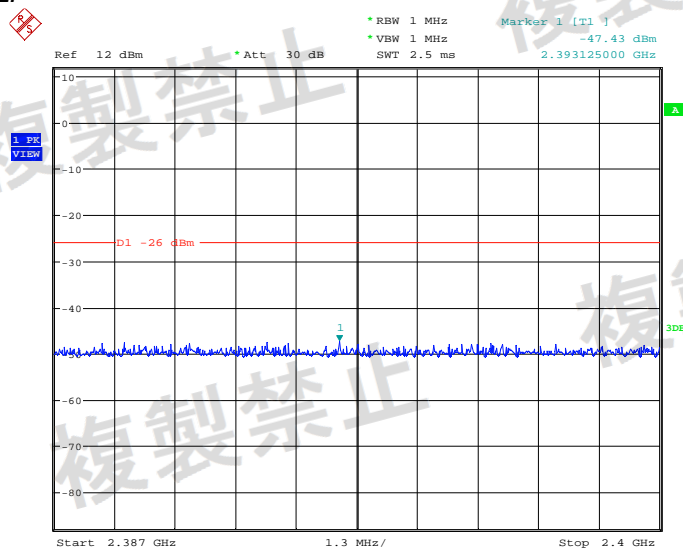
Middle channel:

30MHz to 1GHz:



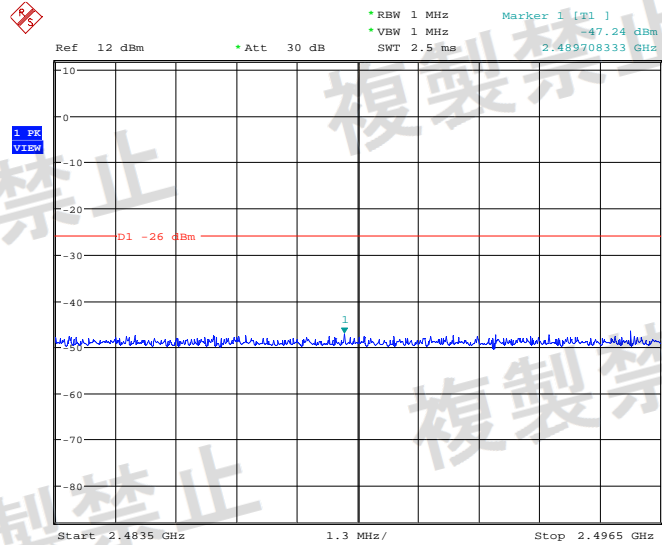
Date: 16.APR.2021 09:01:56

2.387GHz to 2.400GHz:



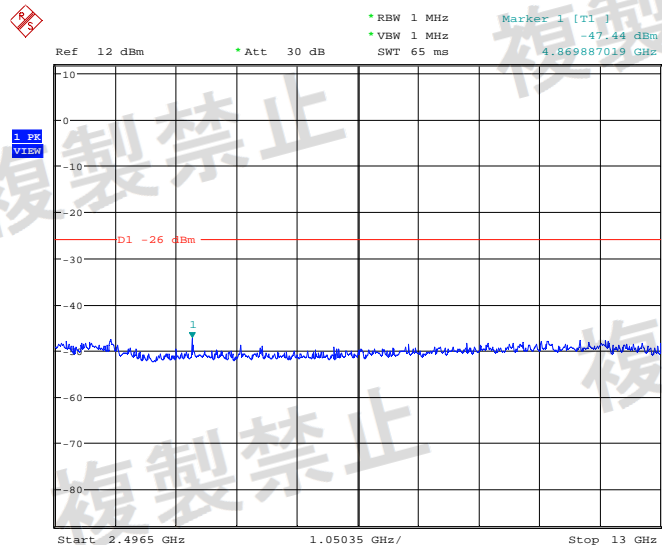
Date: 16.APR.2021 09:03:25

2.4835GHz to 2.4965GHz



Date: 16.APR.2021 09:04:26

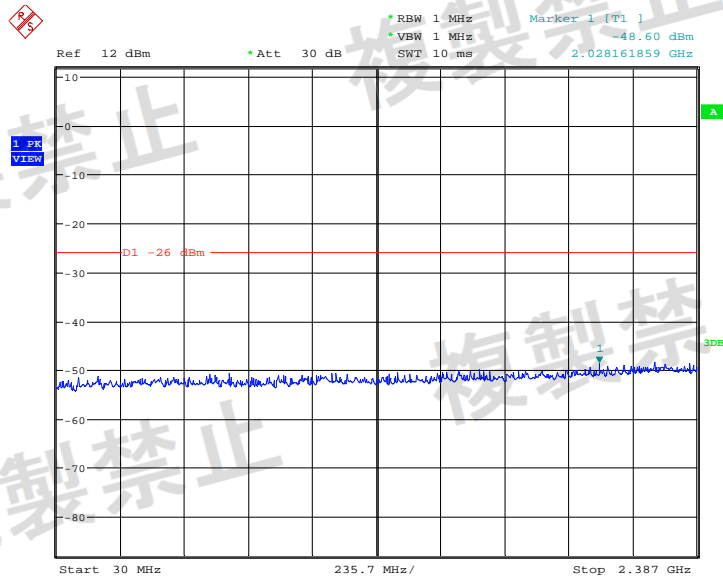
2.4965GHz to 13GHz



Date: 16.APR.2021 09:05:04

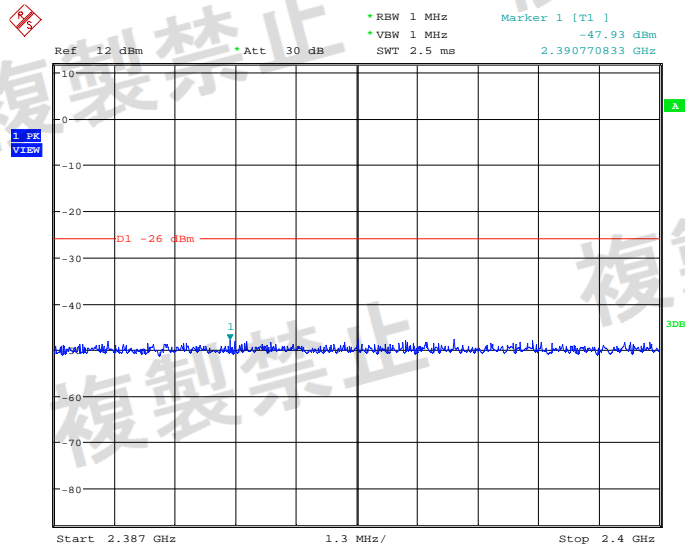
Highest channel:

30MHz to 1GHz:



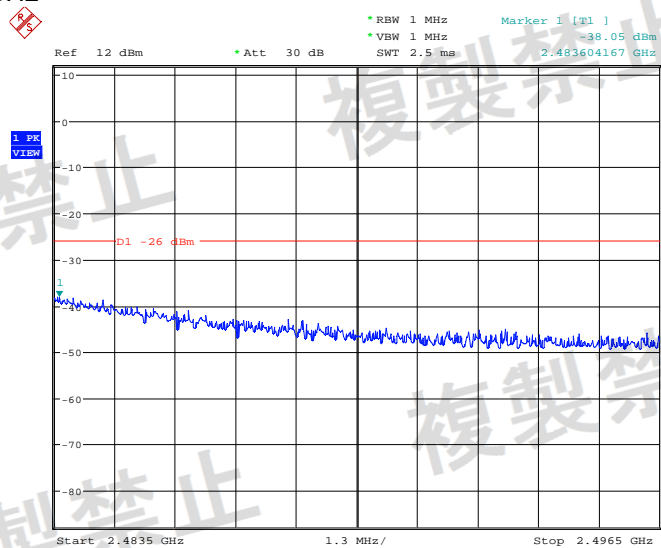
Date: 16.APR.2021 08:59:46

2.387GHz to 2.400GHz:



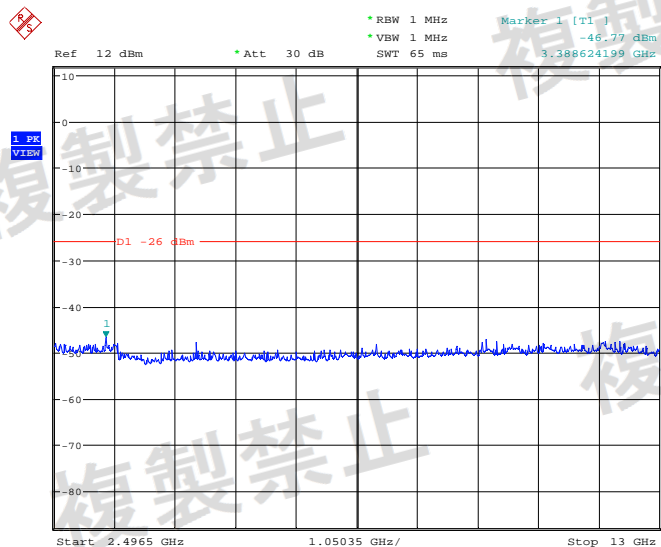
Date: 16.APR.2021 08:59:06

2.4835GHz to 2.4965GHz



Date: 16.APR.2021 08:58:10

2.4965GHz to 13GHz



Date: 16.APR.2021 08:57:16

7.2.8 Interference prevention function

The RF packet consists of two parts. They are Preamble byte and MPDU byte. The MPDU defines by user. In our product, MPDU consist of control bytes. The products has 34 channel, products will choose the usable channel for working, so it can't be interference each other. This is protocol protect. LC filter only pass 2.4GHz carrier. This is RF protect.

Test result: The unit does meet the an antenna connector is a available requirement.

7.2.9 RF accessibility

Standard requirement
Article 2, Item (19) Notice 88 Appendix 43, 44, 45 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.
Shielding method by special screw
Use special glue to shield the internal structure.


7.3 Spurious Emissions of Rx

Test Requirement:

Text Method:

Test Status:

Item 19 of Article 2-1

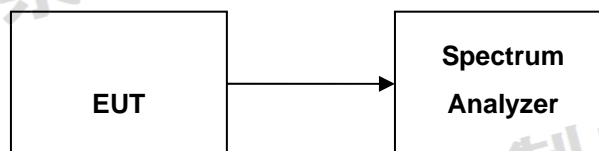
MIC Notice No.88 Appendix No.43

(1) Below 1 GHz : 4 nW(-54dBm) or less

(2) 1 GHz and over : 20 nW(-47dBm) or less

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 13 GHz by peak mode.

Step 2

IF the value measured by Step1 is 2 dB or less, measure in average mode.

Test setup for Step 1:

Frequency: 30 MHz – 2400 MHz , 2483.5 MHz –13 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

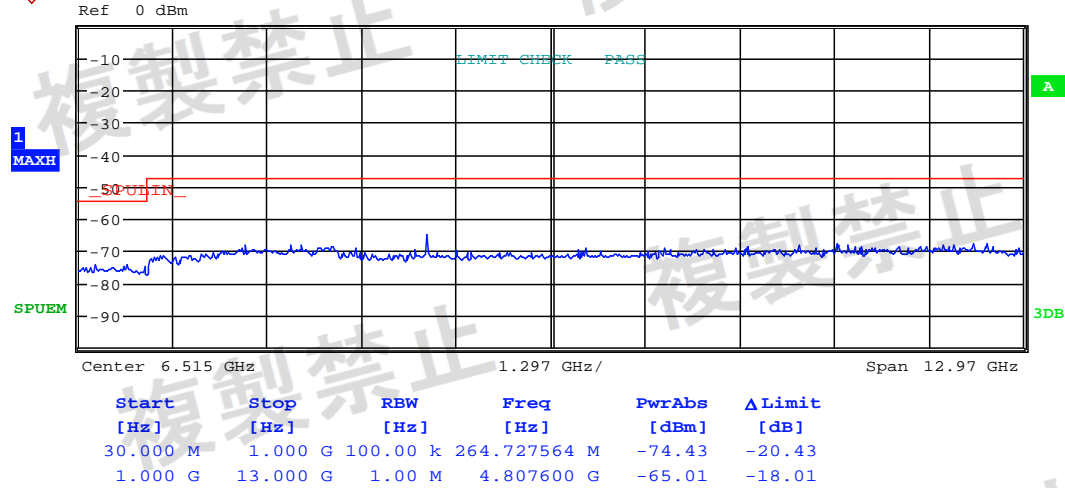
detector mode Sample

Indication mode Max hold

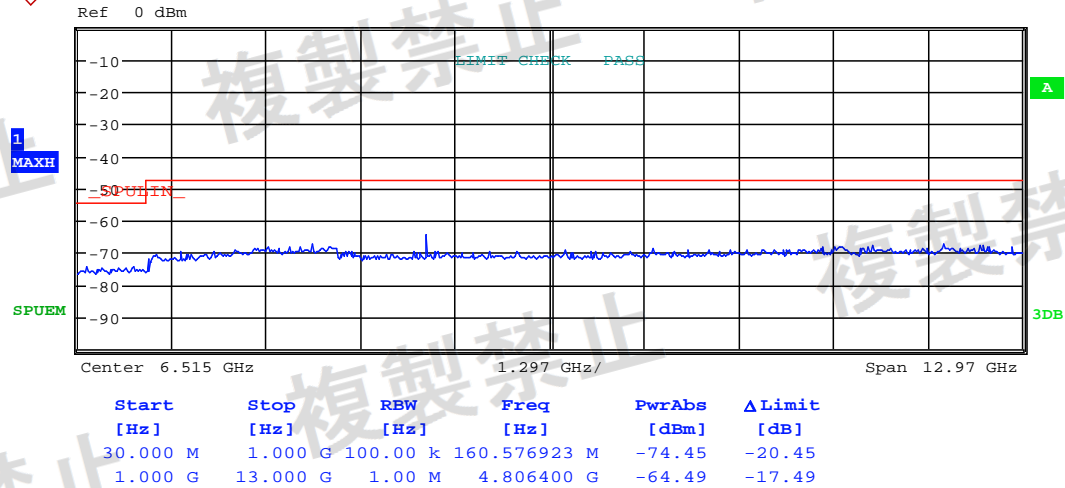
Result plot as follows:

Normal Voltage DC3.7V

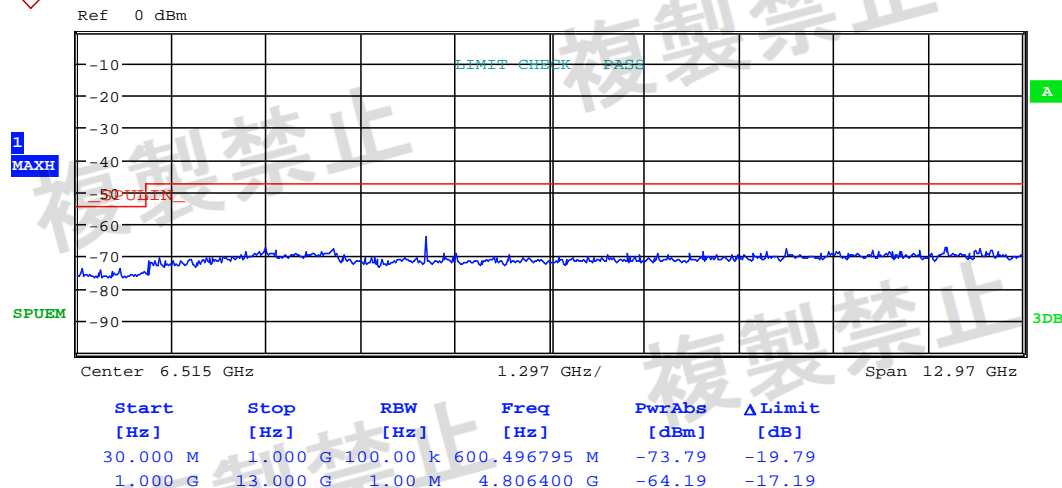
GFSK



($\pi/4$)DQPSK

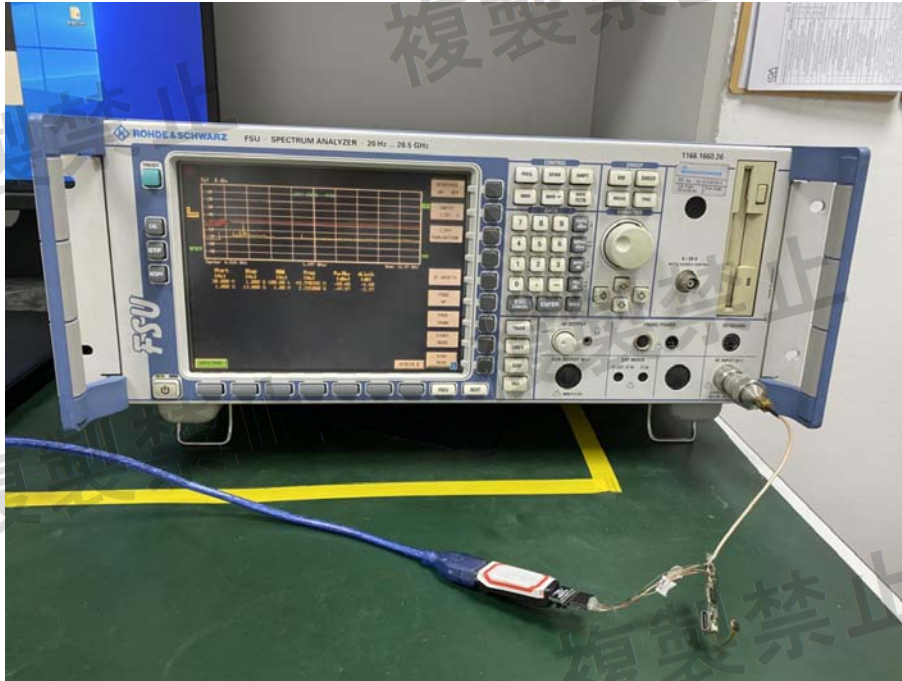


8DPSK

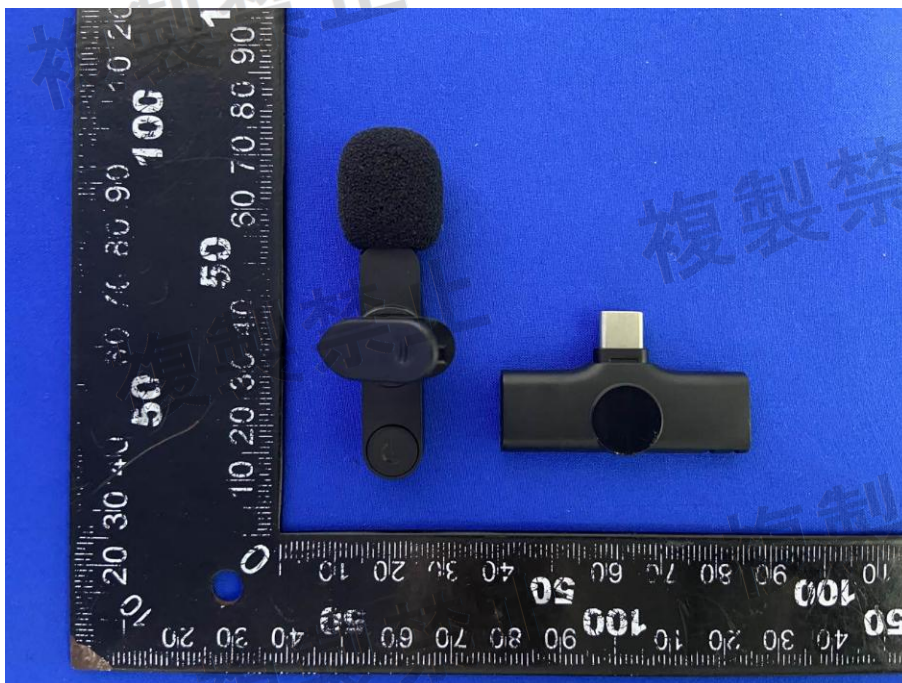


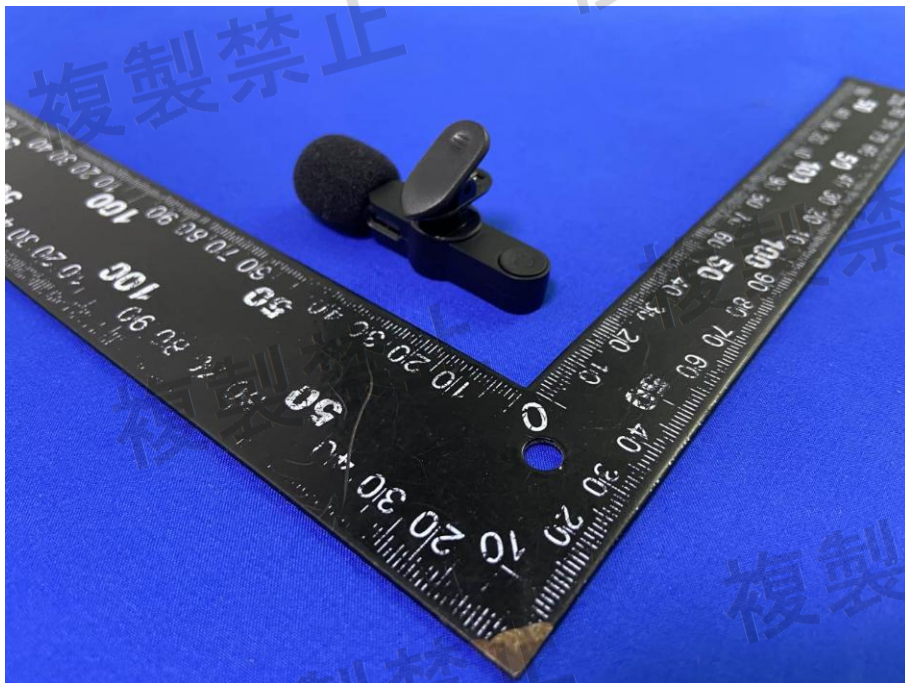
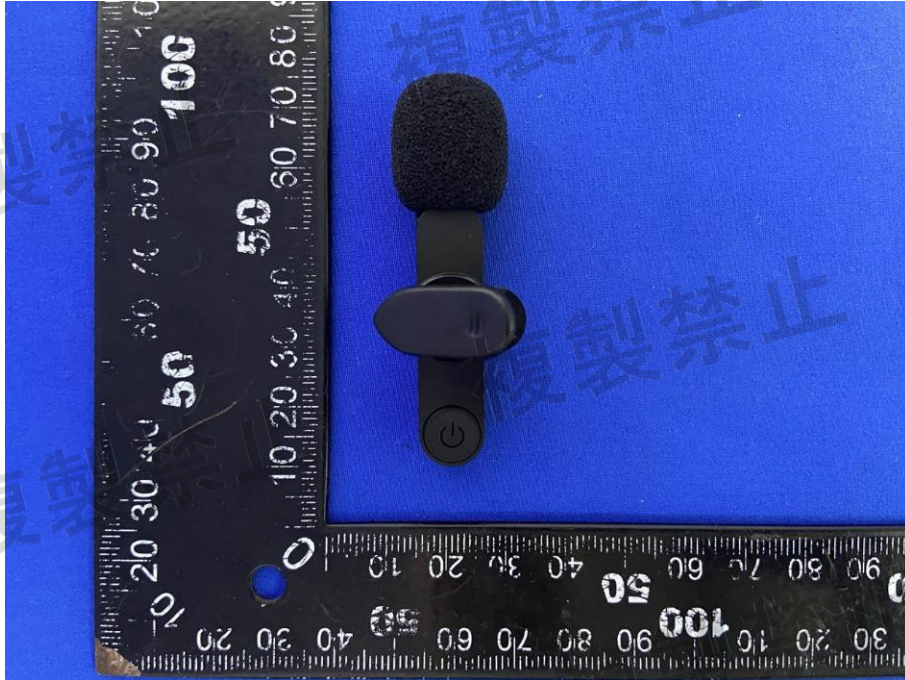
Photographs

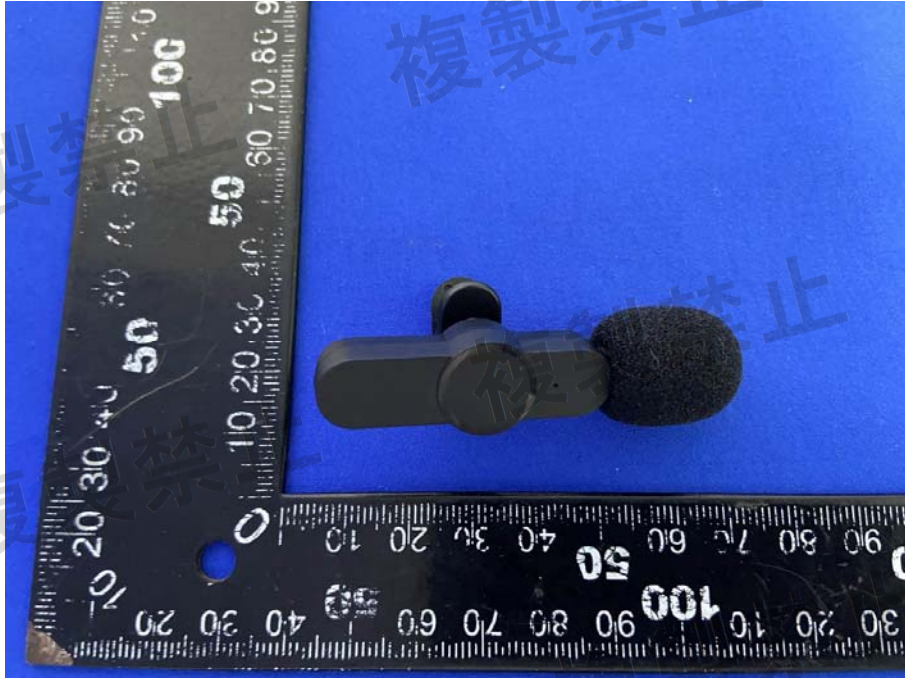
7.4 EUT Test Setup(test mode No.: EP033-TYPE-C)

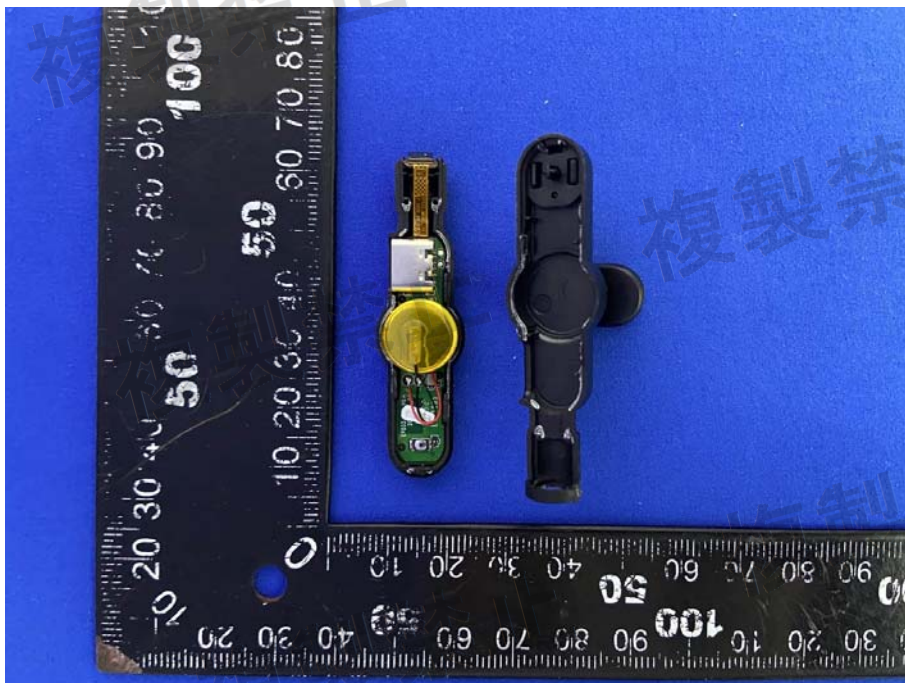
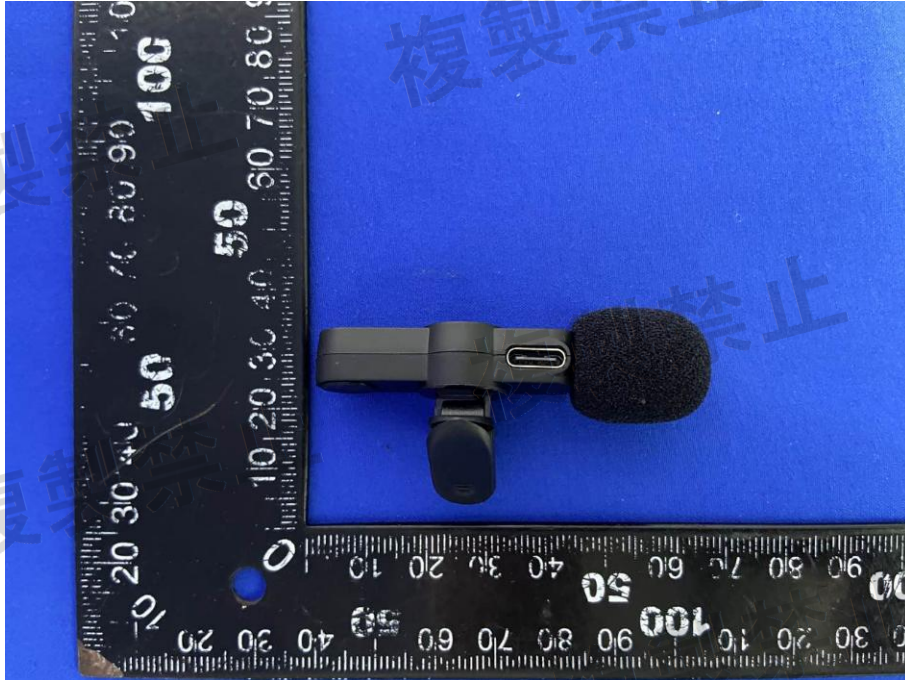


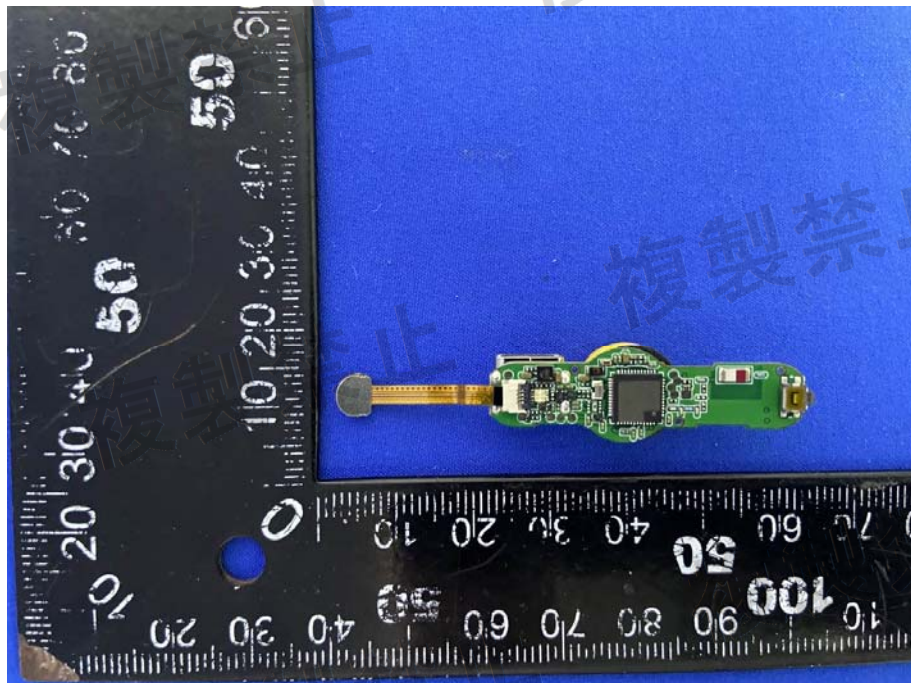
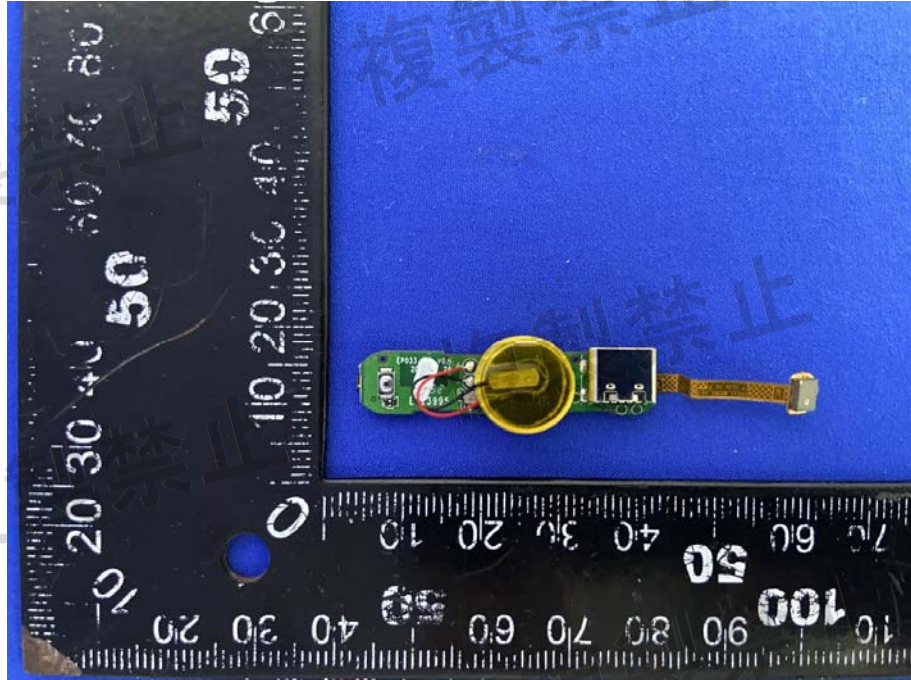
7.5 EUT Constructional Details











--End of Report--