

**Japan TEST REPORT**

Report Number : **68.950.21.0262.01** Date of Issue: **May 19, 2021**

Model : E-TWS-1

Product Type : True Wireless Earbud

Applicant : Kabushiki Kaisha Latino

Address : 3F Uehara MK Building, 1-30-1 Uehara, Shibuya, Tokyo 1510064 JAPAN

Factory : SHENZHEN YINHONG ELECTRONICS CO., LTD

Address : 2ND floor 2# building and 2ND floor D# building Hongzhu Yongqi

: techno park, lezhujiao village, xixiang Baoan district, Shenzhen

Test Result : **n Positive** **o Negative**

Total pages including
Appendices : 46

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

Table of Content

1	General Information	3
1.1	Notes.....	3
1.2	Testing Laboratory.....	4
1.3	Details of Applicant.....	4
1.4	Application Details	4
1.5	Test Item	4
1.6	Applied Standard	5
1.7	Test Summary	5
2	Equipment Specification	6
2.1	General Description	6
2.2	Technical Data.....	6
2.3	Test conditions and test Connections	7
2.4	Auxiliary Equipment Used during Test	8
2.5	Lists of Test Instruments	8
2.6	Measurement Uncertainty (95% confidence levels, k=2).....	8
3	Measurements Result.....	9
3.1	Antenna Power	9
3.2	Tolerances for Antenna Power	11
3.3	Frequency Tolerance.....	13
3.4	Occupied Frequency Bandwidth	15
3.5	Spread Bandwidth & Process gain	20
3.6	Dwell Time	22
3.7	Interference prevention function	24
3.8	Transmitter Spurious Emissions (Conducted) (For transmitter)	25
3.9	Secondary Radiated Emissions (Conducted) (For receiver).....	32
4	Photographs of Test Set-ups.....	34
5	Photographs of EUT	35



1 General Information

1.1 Notes

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

Prepared by
Project Engineer

2021-05-19
Date

Mark Chen
Name

Mark Chen

Signature



Approved by
Project Manager

2021-05-19
Date

John Zhi
Name

John Zhi

Signature



1.2 Testing Laboratory

Address of Test Laboratory:

TÜV SÜD Certification and Testing (China) Co., Ltd. – Shenzhen Branch
Address: Building 12&13, Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052,
P. R. China

Phone: +86-755-8828 6998
Fax: +86-755-8828 5299

1.3 Details of Applicant

Client: KabushikiKaisha Latino

Address: 3F MK Bldg, 1-30-1 Uehara, Shibuya-Ku, Tokyo 1510064 JAPAN

Product Description: True Wireless Earbud

Model No.: E-TWS-1

1.4 Application Details

Date of receipt of order:	April 19, 2021
Date of receipt of test item:	April 19, 2021
Date of test:	April 19, 2021 – April 29, 2021

1.5 Test Item

Refer to table 1



1.6 Applied Standard

APPLIED PRODUCT STANDARD

ARIB STD-T66 Version 3.7/2014-10

1.7 Test Summary

Table 1. Summary of results

Conformance requirement according to ARIB STD-T66 Version 3.7/2014-10		No.88 Annex 43 Article	Result
Essential parameter	Corresponding technical requirements		
Transmitter requirements	3.2 (2) Antenna Power	Article 14	PASS
	3.2 (3) Tolerances for Antenna Power	Article 14	PASS
	3.2 (4) Frequency Tolerance	Article 5, Table 1	PASS
	3.2 (5) Transmission Rate	Article 6, Table 2 & Article 49-20, Item1-h & 1-i	N/A*
	3.2 (7) Occupied Frequency Bandwidth	Article 6, Table 2 & Article 49-20, Item1-h & 1-i	PASS
	3.2 (8) Spread Bandwidth	Article 6, Table 2 & Article 49-20, Item1-h & 1-i	PASS
	3.2 (9) Process gain	Article 49-20(1);f(1)	PASS
	3.2 (10) Number of Carriers	Article 49-20(1);g	N/A*
	3.2 (11) Dwell Time	Article 49-20(1);j	PASS
	3.4 (1) Interference prevention function	Article 9-4, Item 9-C Article 6-2, Item 3 of the Regulation for Enforcement of the Radio Law	PASS
	3.2 (6) Spurious Emissions	Article 24	PASS
Receiver requirements	3.5 (1) Secondary Radiated Emissions	Article 24, Paragraph 2	PASS

NOTE 1 Measurement taken is within the measurement uncertainty of measurement system.

NOTE2 “*” N/A is an abbreviation for Not Applicable.

2 Equipment Specification

2.1 General Description

E-TWS-1 is True Wireless Earbud with Bluetooth function. The Bluetooth TX and RX frequency is 2402MHz-2480MHz.

This report is for BDR+EDR Only.

2.2 Technical Data

Description	True Wireless Earbud
Model	E-TWS-1
Ratings	Charging Case: Input:5VDC, 200mA Battery Capacity: 3.7VDC, 300mAh (Supplied by Polymer Li-ion Rechargeable battery) Earbud: 3.7VDC, 50mAh (Supplied by Built Li-ion battery)
Modulation	GFSK, $\pi/4$ - DQPSK, 8-DPSK
Antenna gain	-0.58dBi

Table 2. Work Frequency

Mode	Work Frequency	
	Transmitting Frequency	Receiving Frequency
BDR+EDR	2402MHz-2480MHz	2402MHz-2480MHz



Figure 1 Appearance of EUT

2.3 Test conditions and test Connections

2.3.1 Test Conditions

The EUT will be connected to test system in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

2.3.2 Test Connections

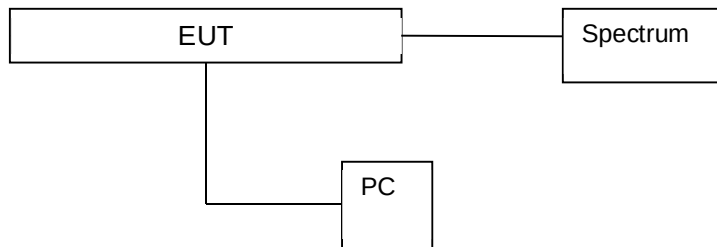


Figure 2. Test Configuration 1



2.4 Auxiliary Equipment Used during Test

Table 3. Auxiliary Equipment Used during Test

Name	Model	Manufacturer	S/N	Cal Date	Cal Interval (month)
PC	--	Lenovo	---	---	---

2.5 Lists of Test Instruments

Table 4. Lists of Test Instruments

Description	Manufacturer	Model no.	Equipment ID	Serial no.	cal interval (year)	cal. due date
Signal Analyzer	Rohde & Schwarz	FSV40	68-4-74-14-004	101030	1	2021-6-21

2.6 Measurement Uncertainty (95% confidence levels, k=2)

Uncertainty for Conduction Spurious Emission test	2.10dB
Uncertainty for Output Power test	0.94dB
Uncertainty for Bandwidth test	1×10^{-9}
Uncertainty for DC power test	0.042%
Uncertainty for test site temperature and humidity	0.6°C
	3%

3 Measurements Result

3.1 Antenna Power

3.1.1 Test condition

Channel:	Low: 2402MHz; Middle: 2441MHz; High: 2480MHz
Test position:	Transmitting
Ambient temperature:	22.5°C
Relative humidity:	50.2%
Atmosphere Pressure:	101.9KPa

3.1.2 Limit (ARIB STD-T66, Clause 3.2 (2)-a)

- The antenna power of a transmitting equipment (with a frequency band of 2,427 – 2,470.75 MHz, for spread spectrum systems using FH systems, hybrid systems of DS and FH, or hybrid systems of FH and OFDM) shall be such that the mean power within a bandwidth of 1 MHz is 3 mW or less in the case of modulation using a standard coding test signal with the same transmission rate as that of the modulation signal.
- The antenna power of a transmitting equipment using a spread spectrum system other than any of those in “a” and the OFDM system shall be such that the mean power within a bandwidth of 1 MHz is 10 mW or less in the case of modulation using a standard coding test signal with the same transmission rate as that of the modulation signal.

3.1.3 Test result

Normal Voltage:3.7V

Mode	Frequency (MHz)	Voltage (DC)	Reading (dBm)	Result A (mW)	Result B (mW/MHz)	Limit (mW/MHz)
GFSK	2402	3.7	-0.73	0.845	0.845	10
$\pi/4$ -DQPSK	2402	3.7	-0.32	0.929	0.929	10
GFSK	2441	3.7	-0.78	0.836	0.836	3
$\pi/4$ -DQPSK	2441	3.7	-0.27	0.940	0.940	3
GFSK	2480	3.7	-1.49	0.710	0.710	10
$\pi/4$ -DQPSK	2480	3.7	-0.98	0.798	0.798	10
Conclusion: PASS						

Low Voltage:3.2V

Mode	Frequency (MHz)	Voltage (DC)	Reading (dBm)	Result A (mW)	Result B (mW/MHz)	Limit (mW/MHz)
GFSK	2402	3.2	-0.74	0.843	0.843	10
$\pi/4$ -DQPSK	2402	3.2	-0.34	0.925	0.925	10
GFSK	2441	3.2	-0.79	0.834	0.834	3
$\pi/4$ -DQPSK	2441	3.2	-0.29	0.935	0.935	3
GFSK	2480	3.2	-1.51	0.706	0.706	10
$\pi/4$ -DQPSK	2480	3.2	-0.99	0.796	0.796	10
Conclusion: PASS						

High Voltage:4.2V

Mode	Frequency (MHz)	Voltage (DC)	Reading (dBm)	Result A (mW)	Result B (mW/MHz)	Limit (mW/MHz)
GFSK	2402	4.2	-0.75	0.841	0.841	10
$\pi/4$ -DQPSK	2402	4.2	-0.32	0.929	0.929	10
GFSK	2441	4.2	-0.81	0.830	0.830	3
$\pi/4$ -DQPSK	2441	4.2	-0.28	0.938	0.938	3
GFSK	2480	4.2	-1.50	0.708	0.708	10
$\pi/4$ -DQPSK	2480	4.2	-1.00	0.794	0.794	10
Conclusion: PASS						

3.1.4 Result

The equipment met the requirement of this clause.

3.2 Tolerances for Antenna Power

3.2.1 Test condition

Channel:	Low: 2402MHz; Middle: 2441MHz; High: 2480MHz
Test position:	Transmitting
Ambient temperature:	22.5°C
Relative humidity:	50.2%
Atmosphere Pressure:	101.9KPa

3.2.2 Limit (ARIB STD-T66, Clause 3.2 (3))

Upper and lower limits of the tolerance for antenna power shall be 20% and 80%, respectively. Note that they represent the tolerance for the maximum rated antenna power and that no upper and lower limits of the tolerance are regulated in the case of antenna power reduction for communications reasons.

3.2.3 Test result

Note: Deviation = (Output power – Declared Output Power) / Declared Output Power * 100%

Normal Voltage: 3.7V

Mode	Frequency (MHz)	Declared Output Power (mW/MHz)	Output Power (mW/MHz)	Tolerances (%)	Limit
GFSK	2402	1	0.845	-15.5	+20% to -80%
π/4- DQPSK	2402	1	0.929	-7.1	+20% to -80%
GFSK	2441	1	0.836	-16.4	+20% to -80%
π/4- DQPSK	2441	1	0.940	-6	+20% to -80%
GFSK	2480	1	0.710	-29	+20% to -80%
π/4- DQPSK	2480	1	0.798	-20.2	+20% to -80%
Conclusion: PASS					

Low Voltage: 3.2V

Mode	Frequency (MHz)	Declared Output Power (mW/MHz)	Output Power (mW/MHz)	Tolerances (%)	Limit
GFSK	2402	1	0.843	-15.7	+20% to -80%
π/4- DQPSK	2402	1	0.925	-7.5	+20% to -80%
GFSK	2441	1	0.834	-16.6	+20% to -80%
π/4- DQPSK	2441	1	0.935	-6.5	+20% to -80%
GFSK	2480	1	0.706	-29.4	+20% to -80%
π/4- DQPSK	2480	1	0.796	-20.4	+20% to -80%
Conclusion: PASS					

High Voltage: 4.2V

Mode	Frequency (MHz)	Declared Output Power (mW/MHz)	Output Power (mW/MHz)	Tolerances (%)	Limit
GFSK	2402	1	0.841	-15.9	+20% to -80%
$\pi/4$ - DQPSK	2402	1	0.929	-7.1	+20% to -80%
GFSK	2441	1	0.830	-17	+20% to -80%
$\pi/4$ - DQPSK	2441	1	0.938	-6.2	+20% to -80%
GFSK	2480	1	0.708	-29.2	+20% to -80%
$\pi/4$ - DQPSK	2480	1	0.794	-20.6	+20% to -80%
Conclusion: PASS					

3.2.1 Result

The equipment met the requirement of this clause.

3.3 Frequency Tolerance

3.3.1 Test condition

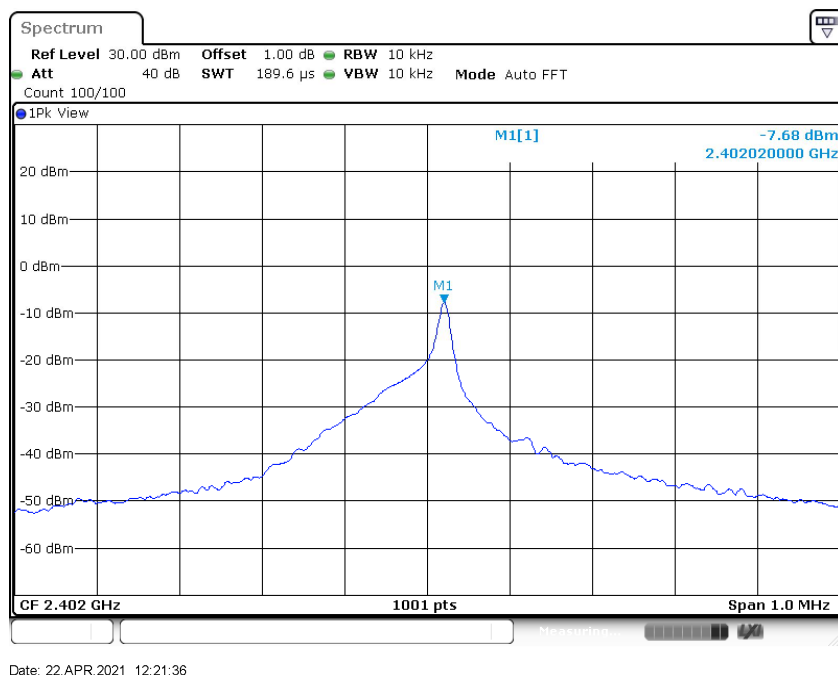
Channel:	Low: 2402MHz; Middle: 2441MHz; High: 2480MHz
Test position:	Transmitting
Ambient temperature:	22.5°C
Relative humidity:	50.2%
Atmosphere Pressure:	101.9KPa

3.3.2 Limit (ARIB STD-T66, Clause 3.2 (4))

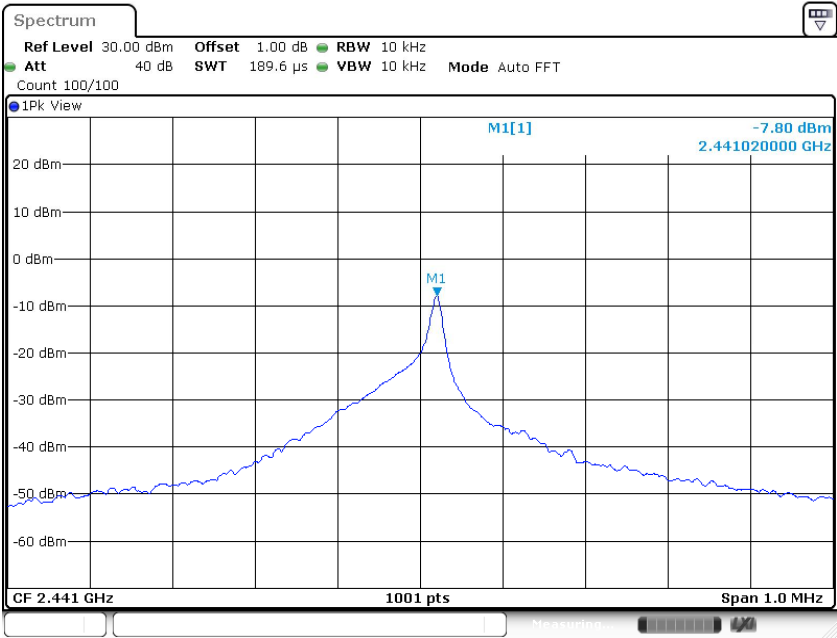
Tolerance of frequency: $\pm 50 \times 10^{-6}$.

3.3.3 Test Result

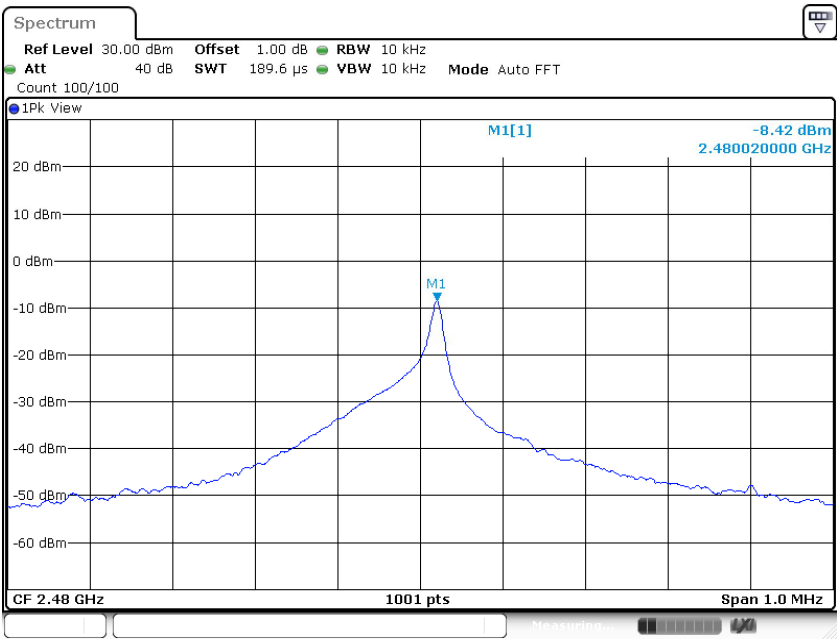
Test Frequency (MHz)	Voltage (DC)	Result (MHz)	Tolerance (kHz)	Tolerance (ppm)	Limit (ppm)
2402	4.2	2402.021	21	8.74	± 50
	3.7	2402.020	20	8.33	± 50
	3.2	2402.022	22	9.16	± 50
2441	4.2	2441.022	22	9.01	± 50
	3.7	2441.020	20	8.19	± 50
	3.2	2441.023	23	9.42	± 50
2480	4.2	2480.021	21	8.47	± 50
	3.7	2480.020	20	8.06	± 50
	3.2	2480.021	21	8.47	± 50
Conclusion: PASS					



2402MHz



2441MHz



2480MHz

3.3.4 Result

The equipment met the requirement of this clause.

3.4 Occupied Frequency Bandwidth

3.4.1 Test condition

Channel:	Low: 2402MHz; Middle: 2441MHz; High: 2480MHz
Test position:	Transmitting
Ambient temperature:	22.5°C
Relative humidity:	50.2%
Atmosphere Pressure:	101.9KPa

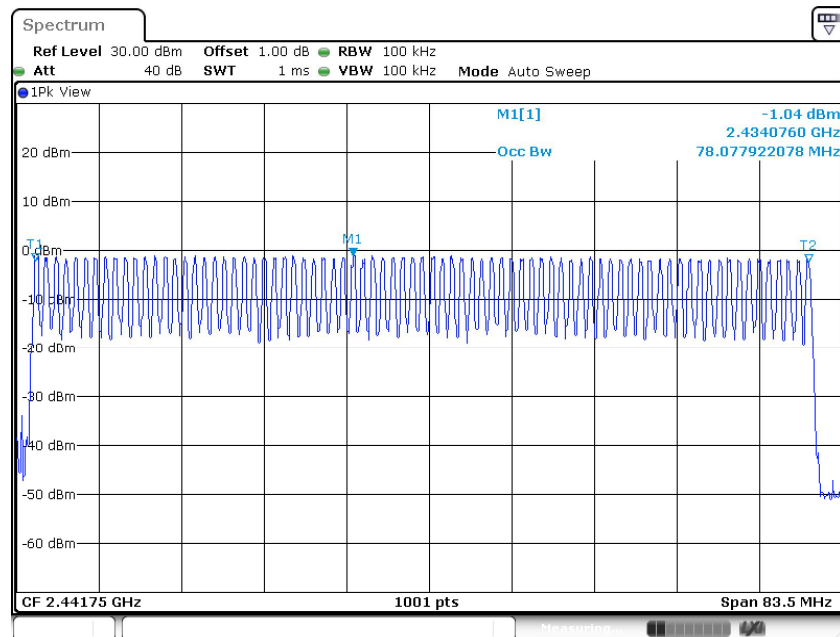
3.4.2 Limit (ARIB STD-T66, Clause 3.2 (7))

Permissible value for occupied bandwidth using the FH system, a hybrid system combining DS and FH systems, or a hybrid system combining FH and OFDM systems shall be 83.5 MHz or less, while necessary bandwidth (minimum occupied bandwidth sufficient to ensure information transmission of required quality at a required transmission rate for the system used under specified conditions for a given emission type) using a system other than any of the above shall be 26 MHz or less.

3.4.3 Test Result

GFSK:

Test Frequency (MHz)	Voltage (DC)	Result (MHz)	Limit (MHz)	Result Hopping Off (MHz)
2402	3.7	78.078	<83.5MHz	0.935
2441	3.7		<83.5MHz	0.937
2480	3.7		<83.5MHz	0.939

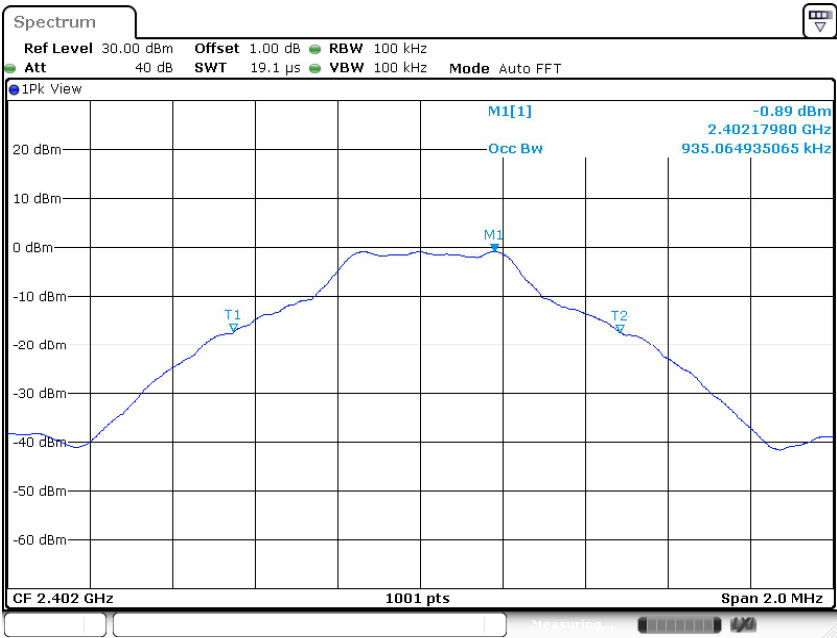


Date: 22.APR 2021 12:11:19

99% BW (Hopping On)

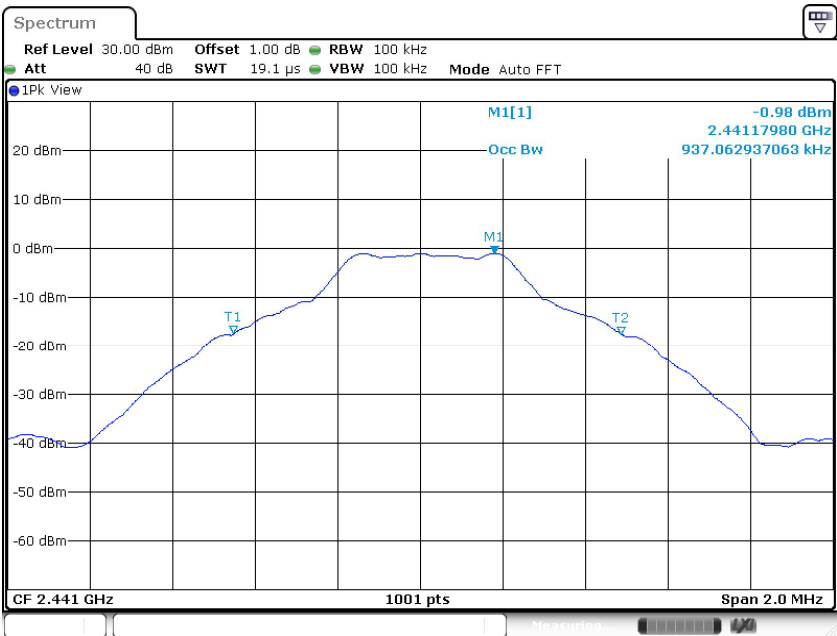


99% BW (Hopping Off)



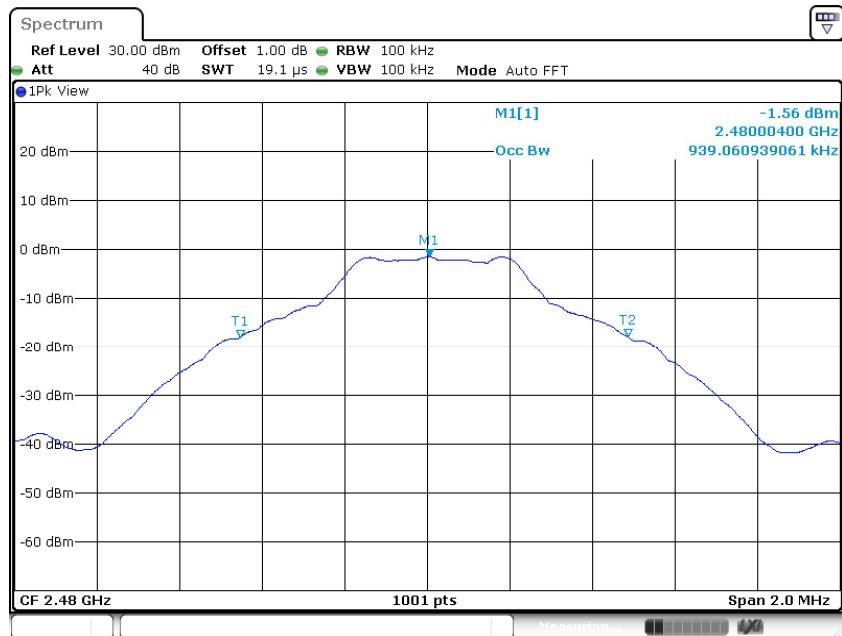
Date: 22.APR.2021 12:02:23

2402MHz



Date: 22.APR.2021 12:03:54

2441MHz

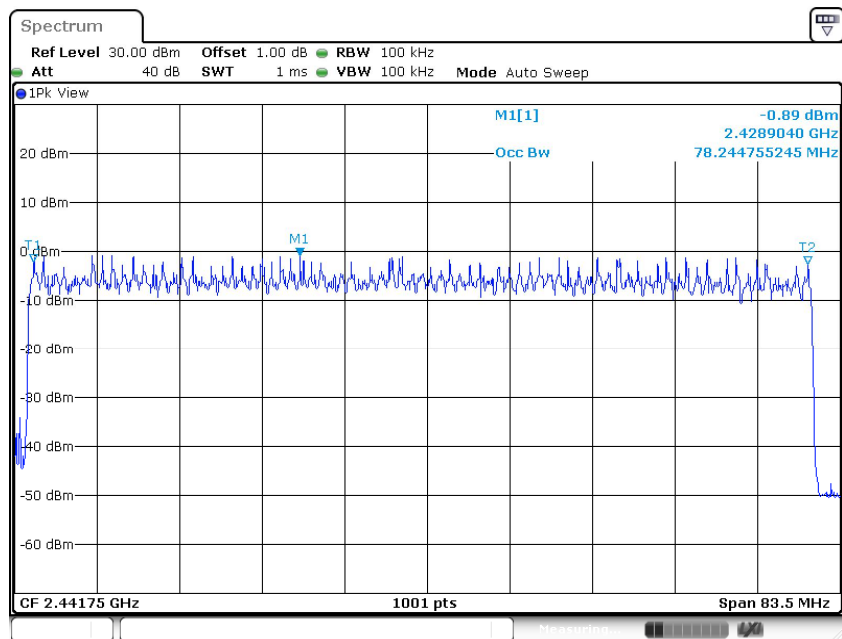


Date: 22.APR.2021 12:05:18

2480MHz

 $\pi/4$ -DQPSK:

Test Frequency (MHz)	Voltage (DC)	Result (MHz)	Limit (MHz)	Result Hopping Off (MHz)
2402	3.7	78.245	<83.5MHz	1.197
2441	3.7		<83.5MHz	1.191
2480	3.7		<83.5MHz	1.195

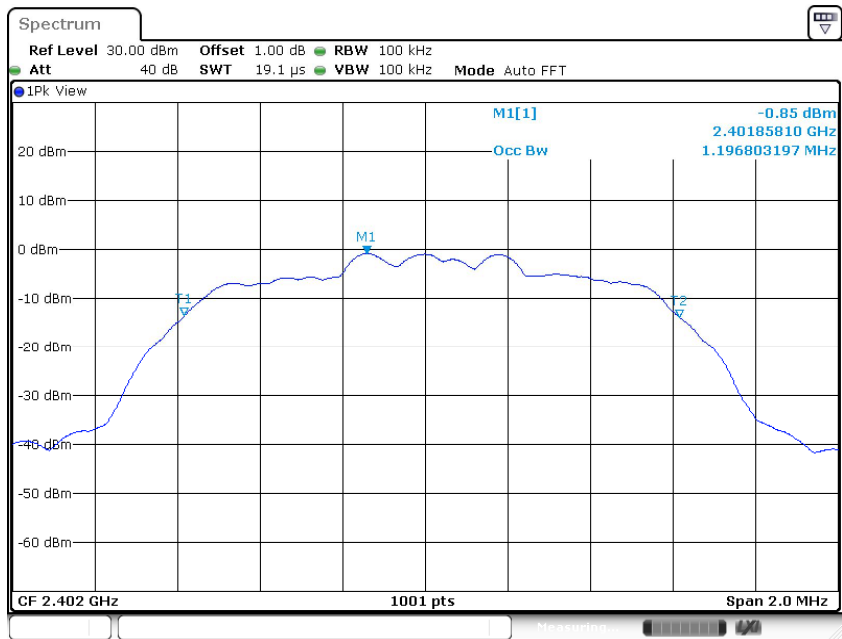


Date: 22.APR.2021 12:12:44

99% BW (Hopping On)

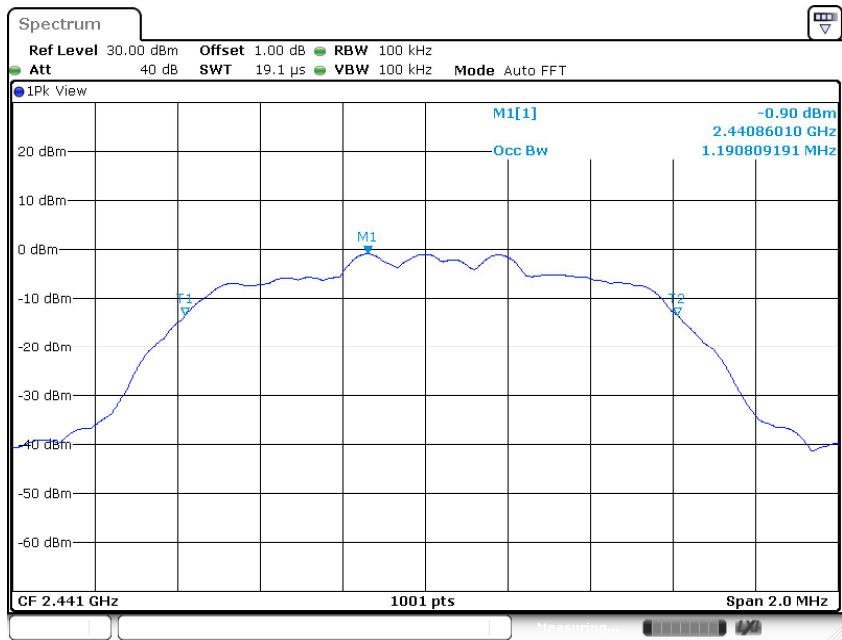


99% BW (Hopping Off)



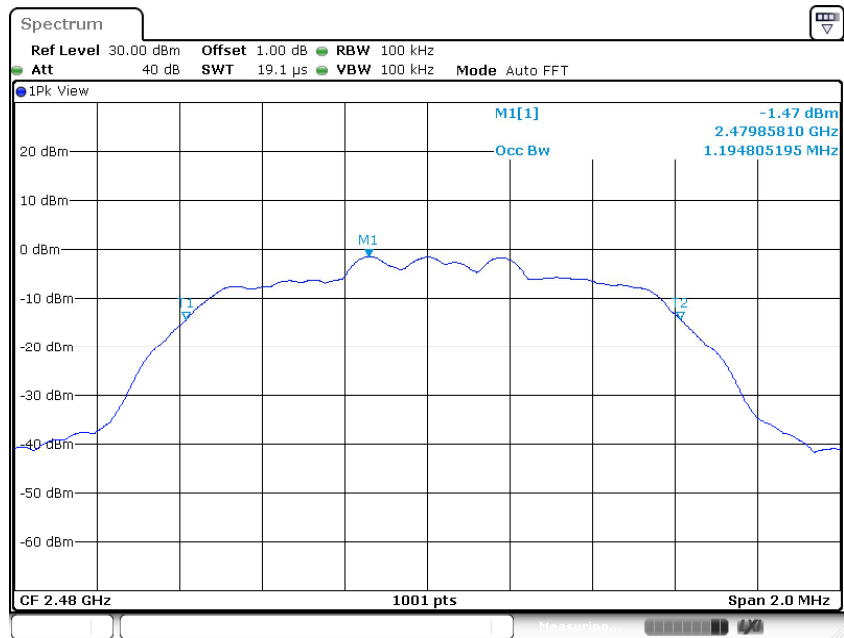
Date: 22.APR.2021 12:06:54

2402MHz



Date: 22.APR.2021 12:08:22

2441MHz



Date: 22.APR.2021 12:09:46

2480MHz

3.4.4 Result

The equipment met the requirement of this clause.

3.5 Spread Bandwidth & Process gain

3.5.1 Test condition

Channel:	Low: 2402MHz; Middle: 2441MHz; High: 2480MHz
Test position:	Transmitting
Ambient temperature:	22.5°C
Relative humidity:	50.2%
Atmosphere Pressure:	101.9KPa

3.5.2 Limit (ARIB STD-T66, Clause 3.2 (8))

In spread spectrum systems, spread bandwidth (which refers to a frequency bandwidth with an upper limit and lower limit such that each of the mean powers radiated above the upper frequency limit and below the lower frequency limit is equal to 5 % of the total mean power radiated; this also applies hereafter) shall be 500 kHz or more

Process gain (value obtained by dividing the spread bandwidth by a frequency equal to the transmission rate of the modulation signal; this also applies hereafter) in the spread spectrum system shall be 5 or more.

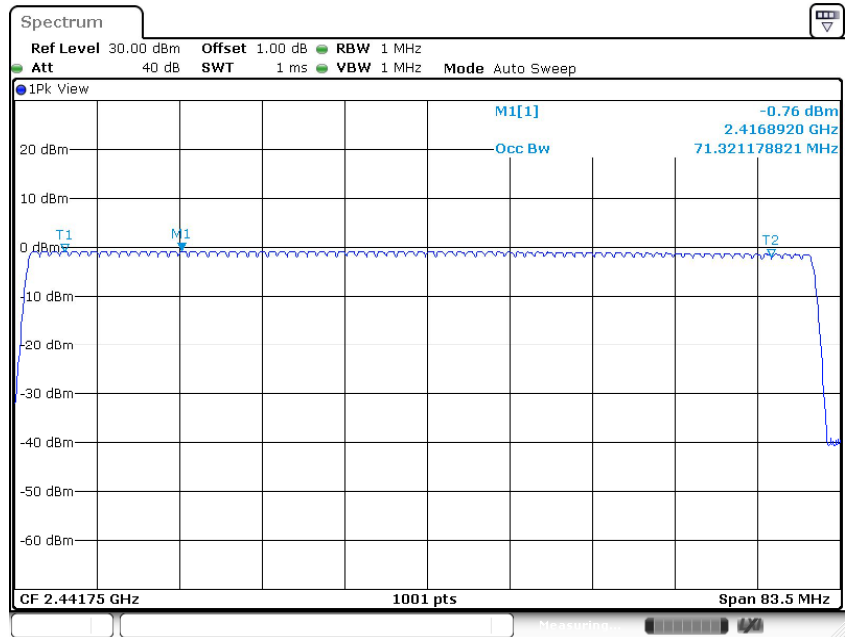
3.5.3 Test Result

Normal voltage: +3.7V

Modulation	Voltage (DC)	Spread Bandwidth (MHz)	Limit (kHz)	Symbol rate (Mbps)	Process gain	Limit
GFSK	3.7	71.321	>500	1	71.321	>5
$\pi/4$ -DQPSK	3.7	71.488	>500	2	35.744	>5

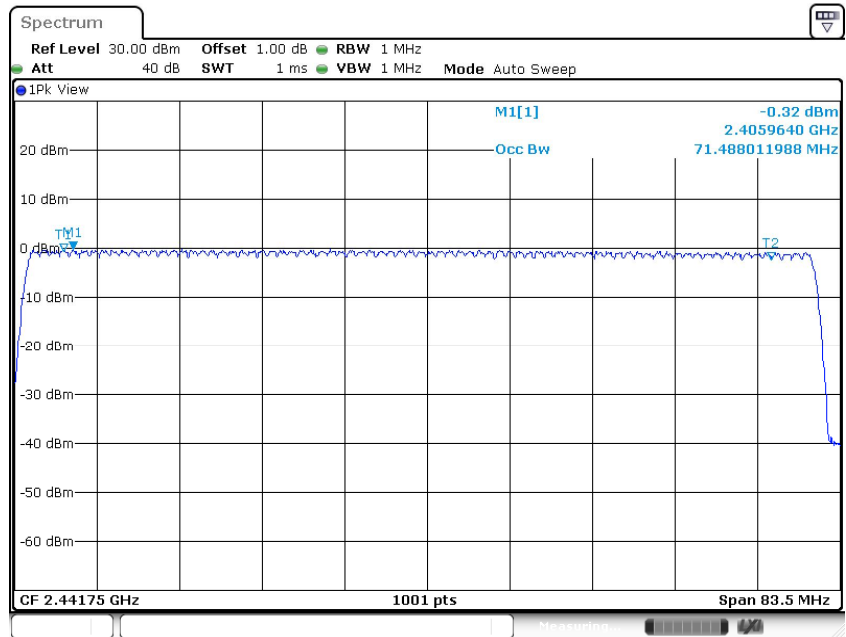


GFSK



Date: 22.APR 2021 12:11:09

$\pi/4$ - DQPSK



Date: 22.APR 2021 12:12:34

3.5.4 Result

The equipment met the requirement of this clause.

3.6 Dwell Time

3.6.1 Test condition

Channel:	Low: 2402MHz; Middle: 2441MHz; High: 2480MHz
Test position:	Transmitting
Ambient temperature:	22.5°C
Relative humidity:	50.2%
Atmosphere Pressure:	101.9KPa

3.6.2 Limit (ARIB STD-T66, Clause 3.2 (11))

Frequency dwell time (time during which radio waves continue to be emitted at a specified frequency) of a transmitting equipment using the FH system shall be 0.4 seconds or less.

3.6.3 Test Result

The Dwell Time = Burst Width * Total Hops. The detailed calculations are showed as follows:

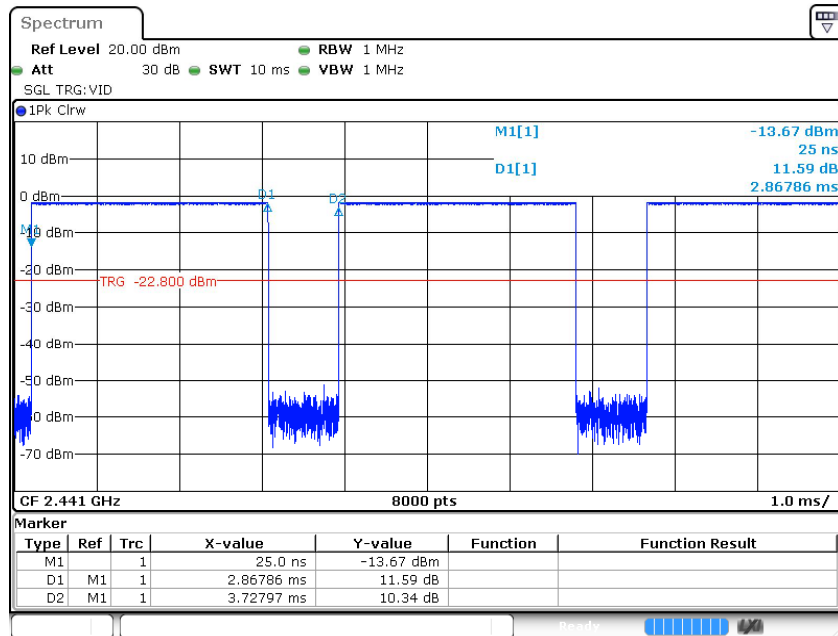
The observation time for dwell time calculation: $0.4 \text{ [s]} * \text{hopping number} = 0.4 \text{ [s]} * 79 = 31.6 \text{ [s]}$;

The burst width, which is directly measured, refers to the duration on one channel hop.

The maximum number of hopping channels in 31.6s

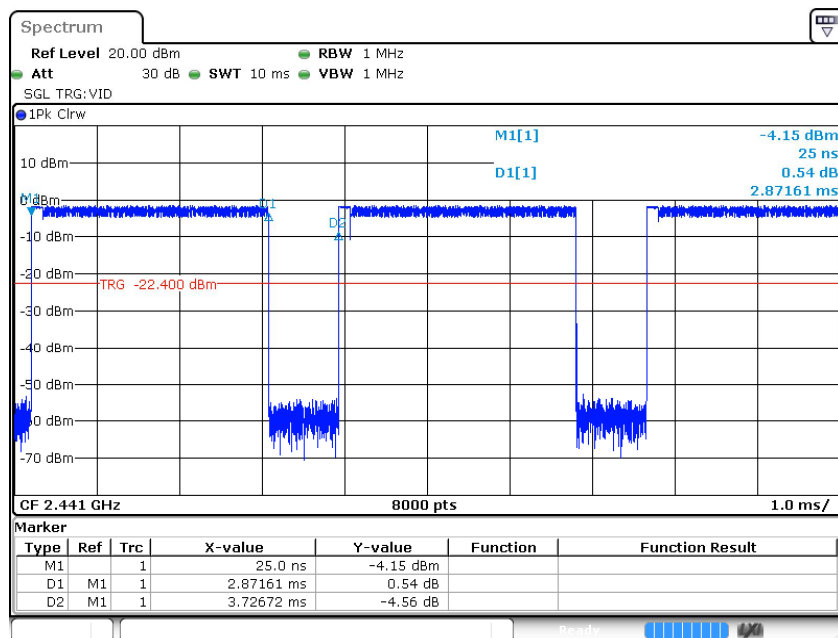
Test Result (Packet DH5, 2DH5, 3DH5 the worse result was reported to show compliance):

Modulation	Packet	Burst Width	Period	Result	Limit (ms)
GFSK	DH5	2.87	3.73	0.28	<400
$\pi/4$ -DQPSK	2DH5	2.87	3.73	0.28	<400



Date: 22.APR.2021 12:15:04

GFSK Modulation: DH5



Date: 22.APR.2021 12:16:34

 $\pi/4$ -DQPSK Modulation: 2DH5

3.6.4 Result

The equipment met the requirement of this clause.

3.7 Interference prevention function

3.7.1 Test condition

Channel:	Low: 2402MHz; Middle: 2441MHz; High: 2480MHz
Test position:	Transmitting
Ambient temperature:	22.5°C
Relative humidity:	50.2%
Atmosphere Pressure:	101.9KPa

3.7.2 Limit

Item	Limits
Identification Code	≥48 bits

Measured Result:

Test Conditions	Operation Frequency		
	2402 MHz	2441 MHz	2480 MHz
Normal Voltage (3.7V)	48	48	48

3.7.3 Result

The equipment met the requirement of this clause.

3.8 Transmitter Spurious Emissions (Conducted) (For transmitter)

3.8.1 Test condition

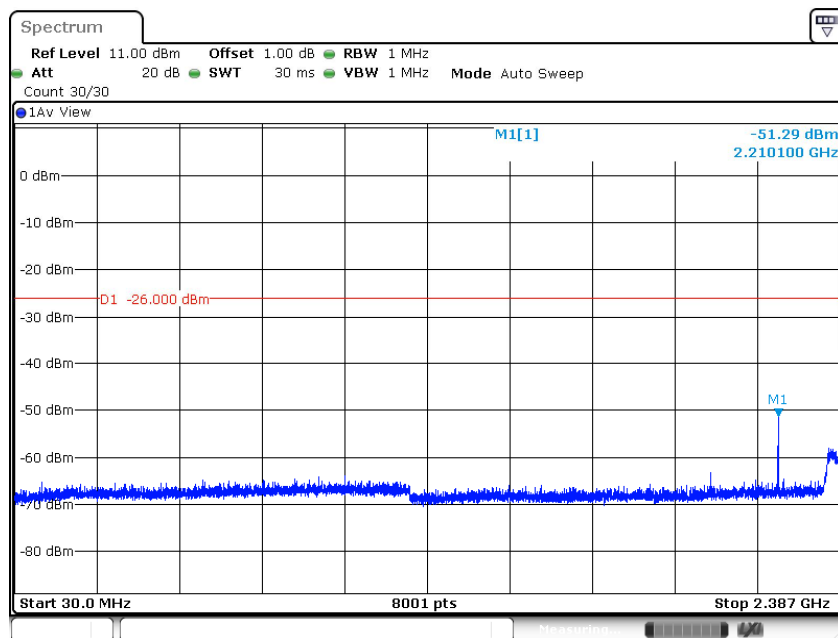
Channel:	Low: 2402MHz; Middle: 2441MHz; High: 2480MHz
Test position:	Transmitting
Ambient temperature:	22.5°C
Relative humidity:	50.2%
Atmosphere Pressure:	101.9KPa

3.8.2 Limit (ARIB STD-T66, Clause 3.2 (6))

Permissible mean power of spurious emission of each frequency supplied to a feeder, that is, mean power of spurious emission in the 1 MHz bandwidth at frequency f other than frequency band used shall be as follows: a. $2,387\text{MHz} \leq f \leq 2,400\text{MHz}$ and $2,483.55\text{MHz} < f \leq 2,496.5\text{MHz}$ 25 μW or less b. $2,387\text{MHz} > f$ and $2,496.5\text{MHz} < f$ 2.5 μW or less

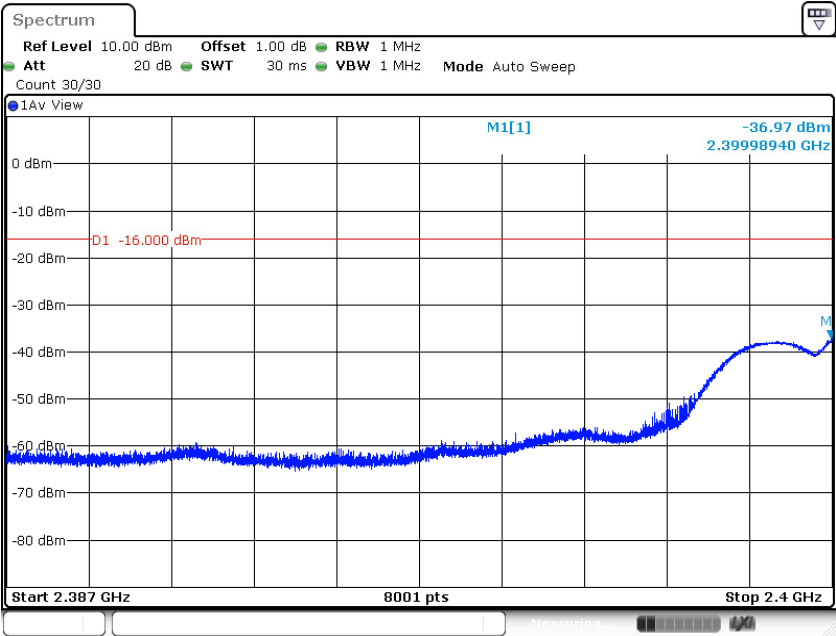
3.8.3 Test Result

GFSK, 2402MHz



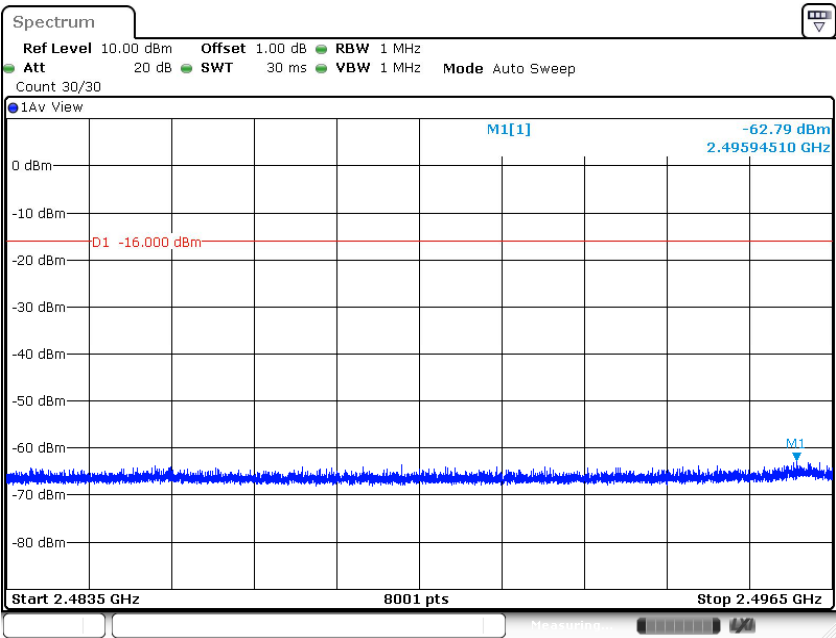
Date: 22.APR.2021 12:02:33

30MHz – 2.387GHz



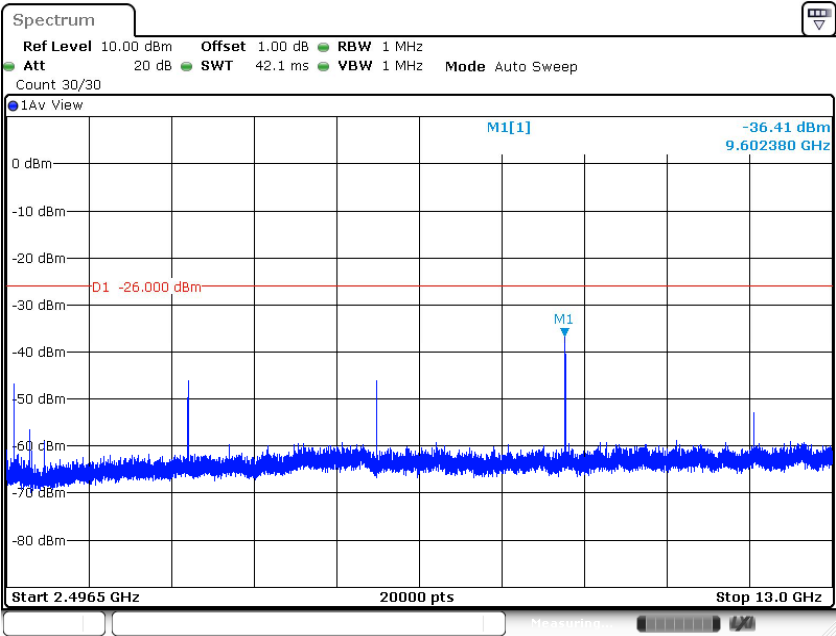
Date: 22.APR.2021 12:02:43

2.387GHz – 2.4GHz



Date: 22.APR.2021 12:02:54

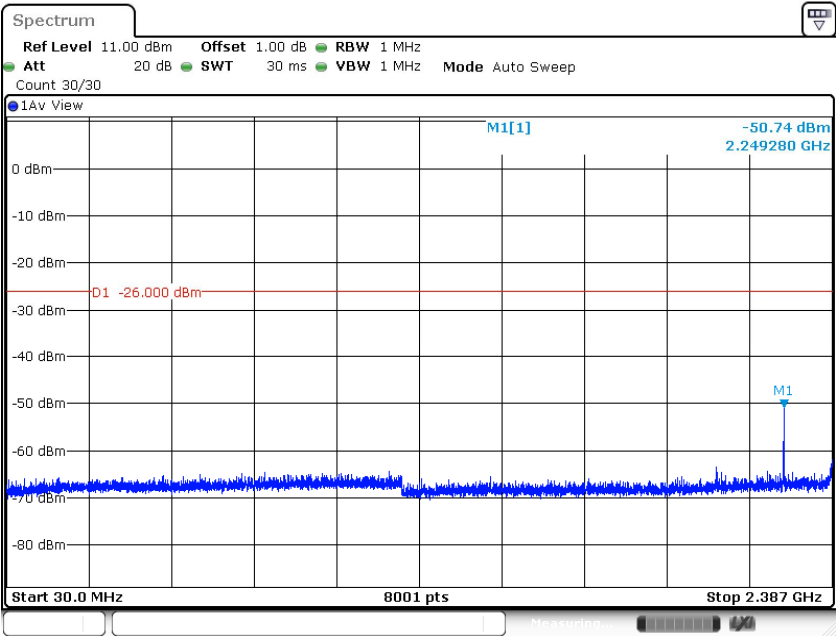
2.4835GHz – 2.4965GHz



Date: 22.APR.2021 12:03:04

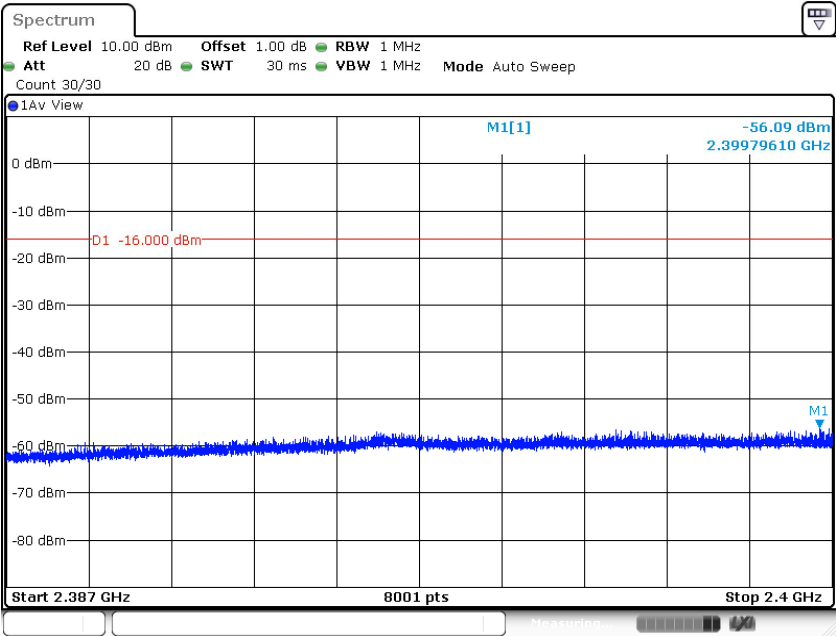
2.4965GHz – 13GHz

GFSK, 2441MHz



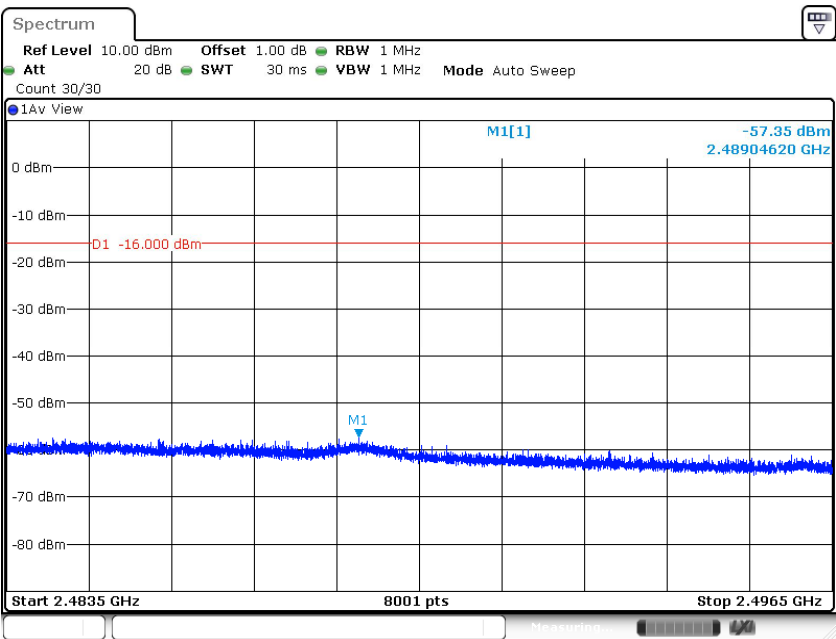
Date: 22.APR.2021 12:04:05

30MHz – 2.387GHz



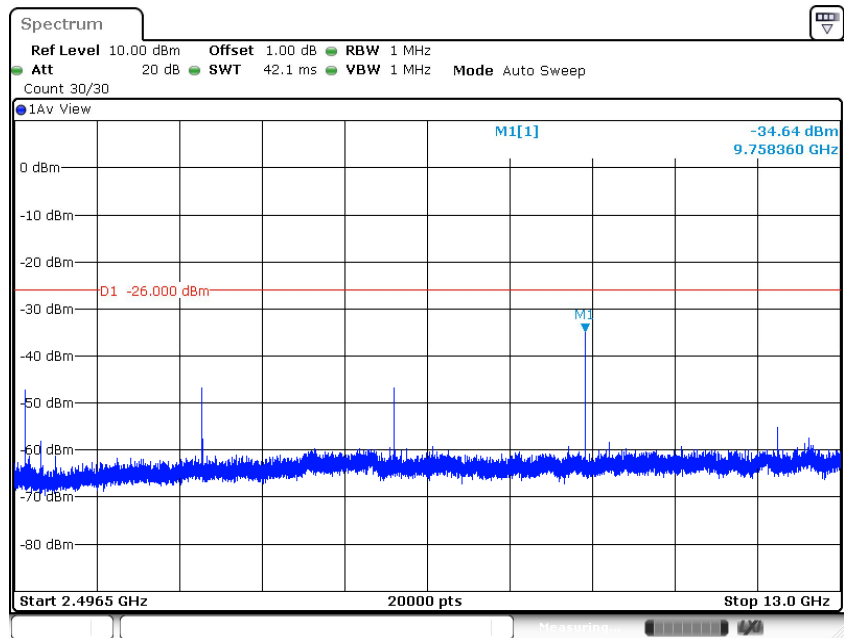
Date: 22.APR.2021 12:04:14

2.387GHz – 2.4GHz



Date: 22.APR.2021 12:04:25

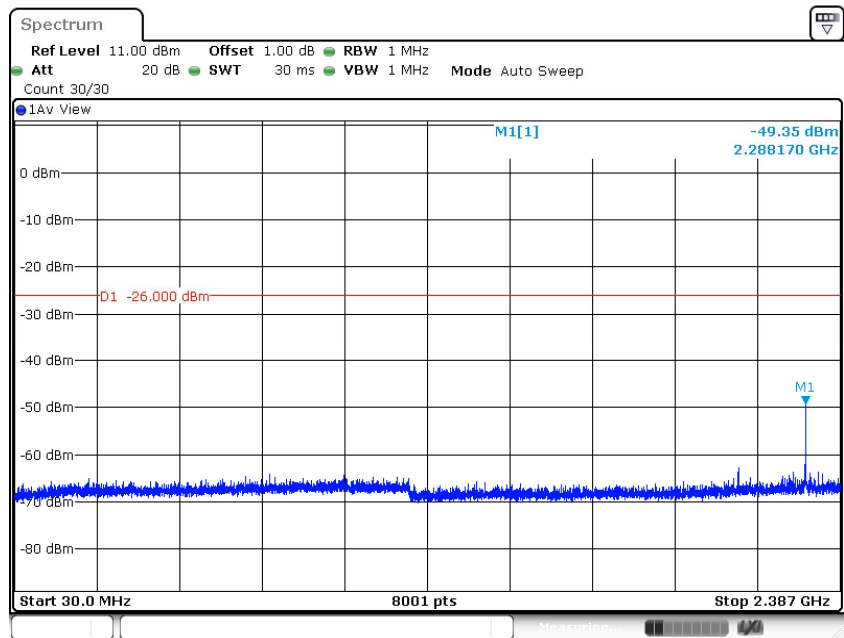
2.4835GHz – 2.4965GHz



Date: 22.APR.2021 12:04:36

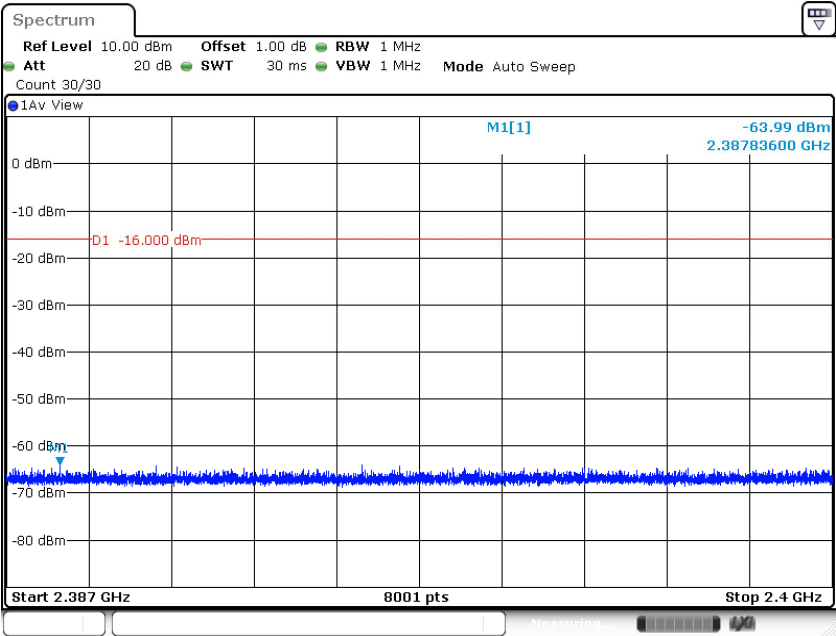
2.4965GHz – 13GHz

GFSK, 2480MHz



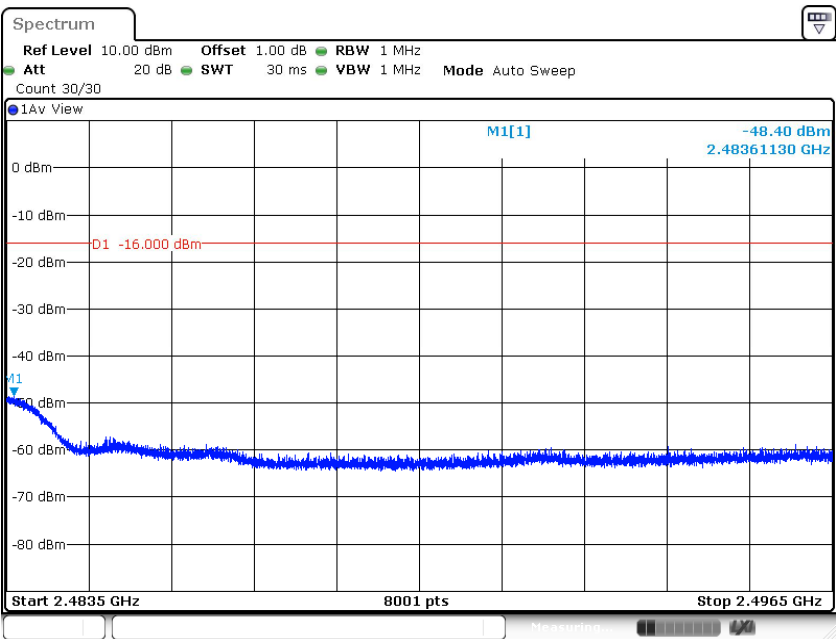
Date: 22.APR.2021 12:05:29

30MHz – 2.387GHz



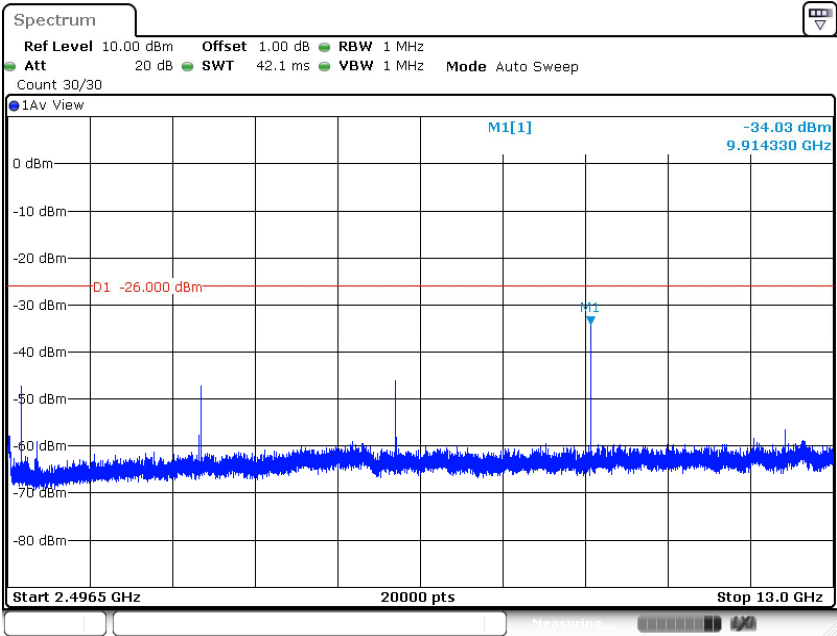
Date: 22.APR.2021 12:05:38

2.387GHz – 2.4GHz



Date: 22.APR.2021 12:05:50

2.4835GHz – 2.4965GHz



Date: 22.APR.2021 12:06:00

2.4965GHz – 13GHz



3.9 Secondary Radiated Emissions (Conducted) (For receiver)

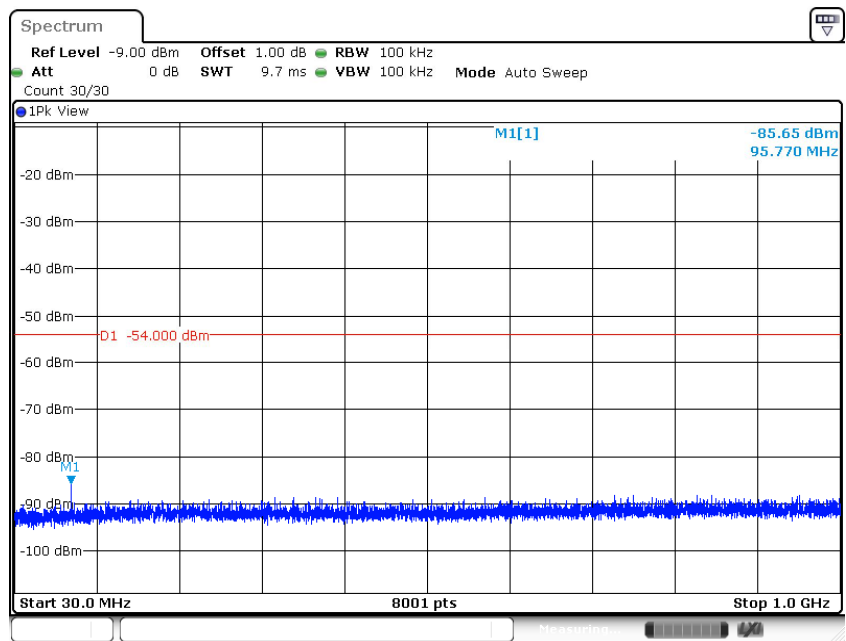
3.9.1 Test condition

Channel:	Low: 2402MHz; Middle: 2441MHz; High: 2480MHz
Test position:	RX
Ambient temperature:	22.5°C
Relative humidity:	50.2%
Atmosphere Pressure:	101.9KPa

3.9.2 Limit (ARIB STD-T66, Clause 3.5 (1))

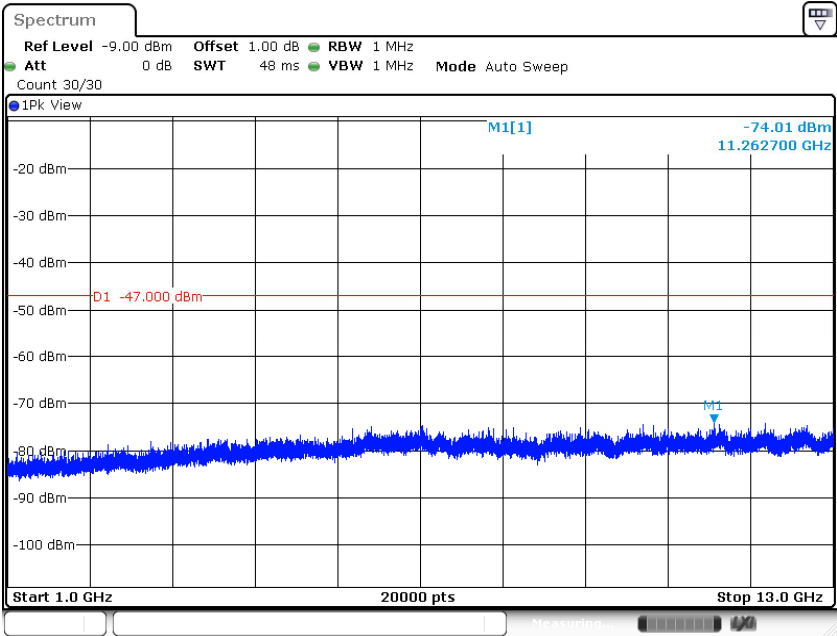
The limit on secondary emissions radiated from the receiving equipment within which the function of other radio equipment will not be impaired shall be, in terms of the power of a dummy antenna circuit that has the same electrical constant as the receiving antenna, 4 nW or less at a frequency below 1 GHz and 20 nW or less at a frequency of 1 GHz or higher as measured using the circuit.

3.9.3 Test Result



Date: 22.APR.2021 12:17:41

30MHz-1000MHz



Date: 22.APR.2021 12:17:52

1000MHz-13000MHz

4 Photographs of Test Set-ups



5 Photographs of EUT





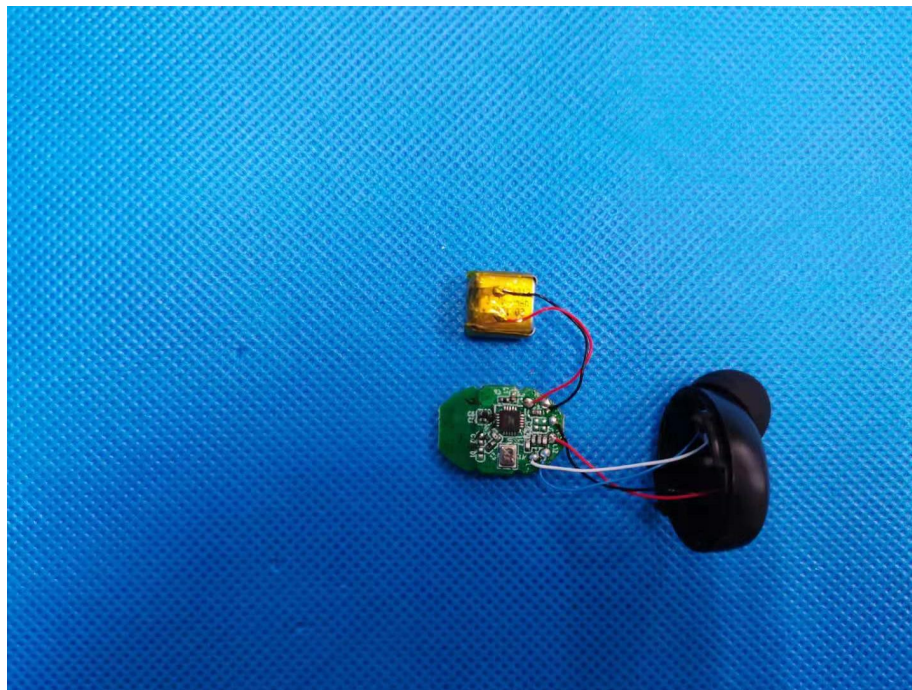




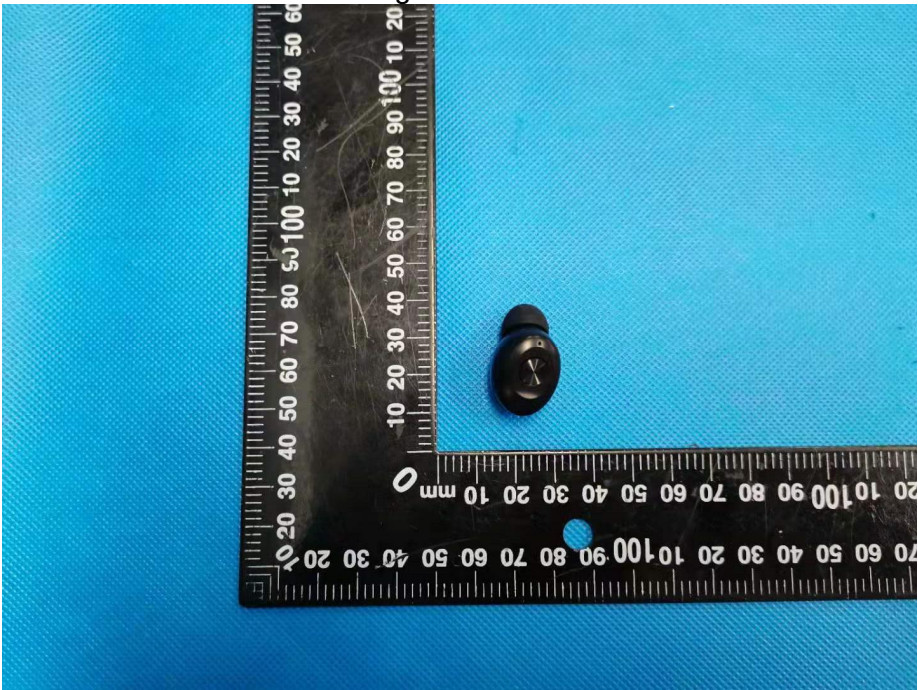


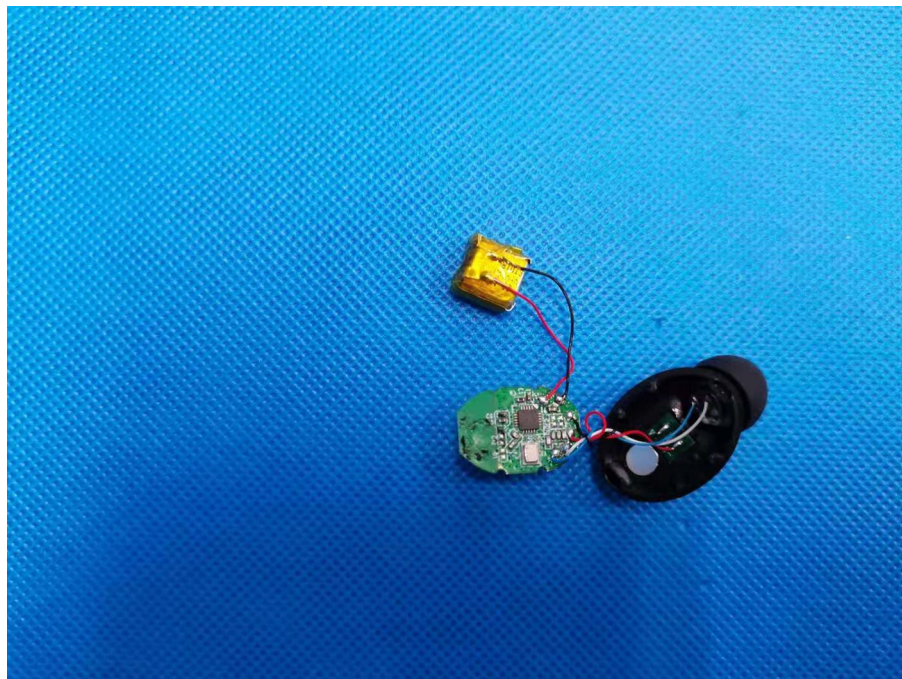
Left Earbud:

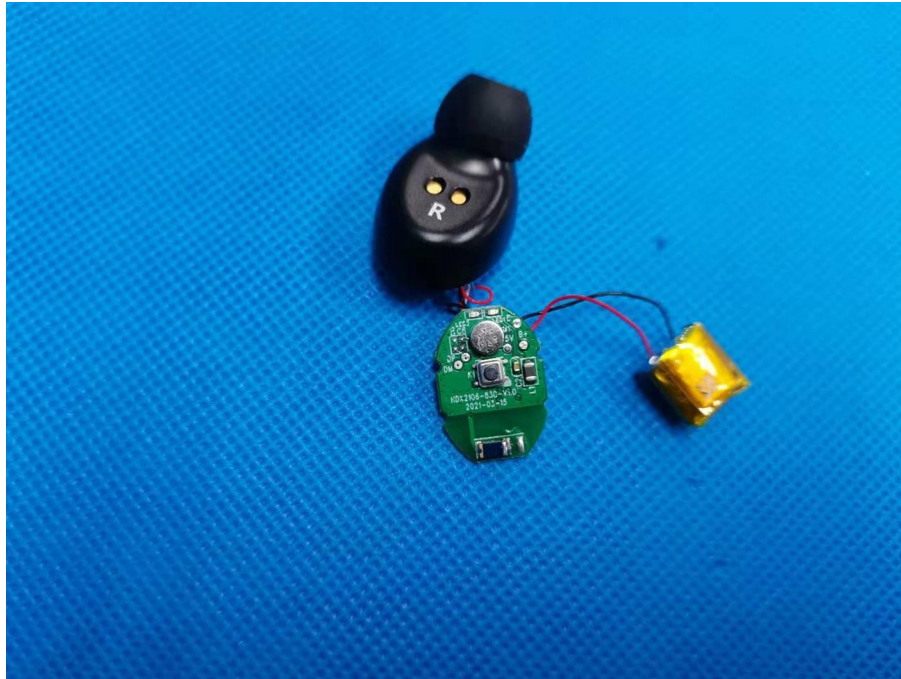


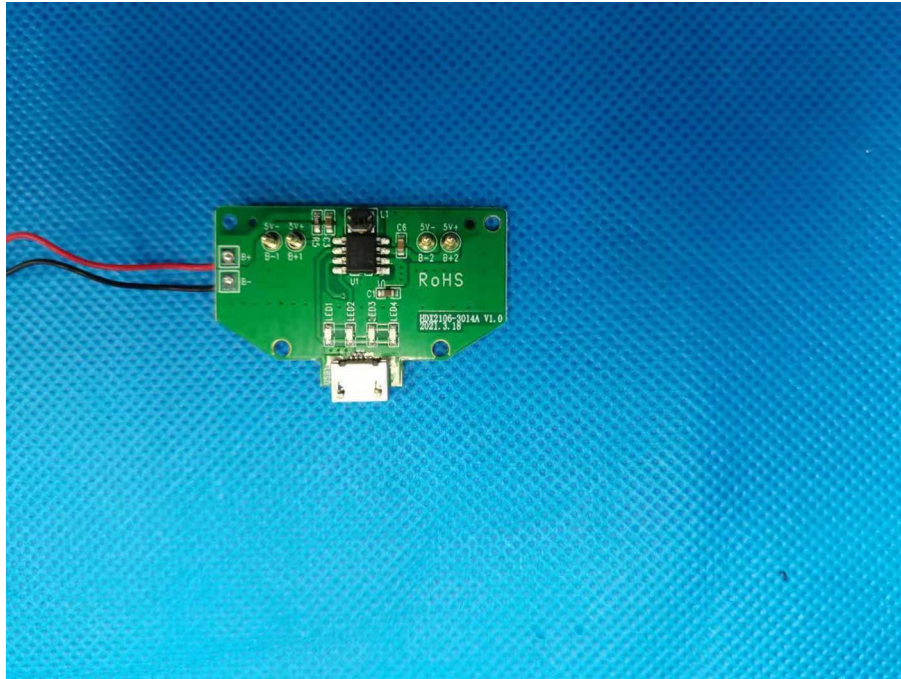
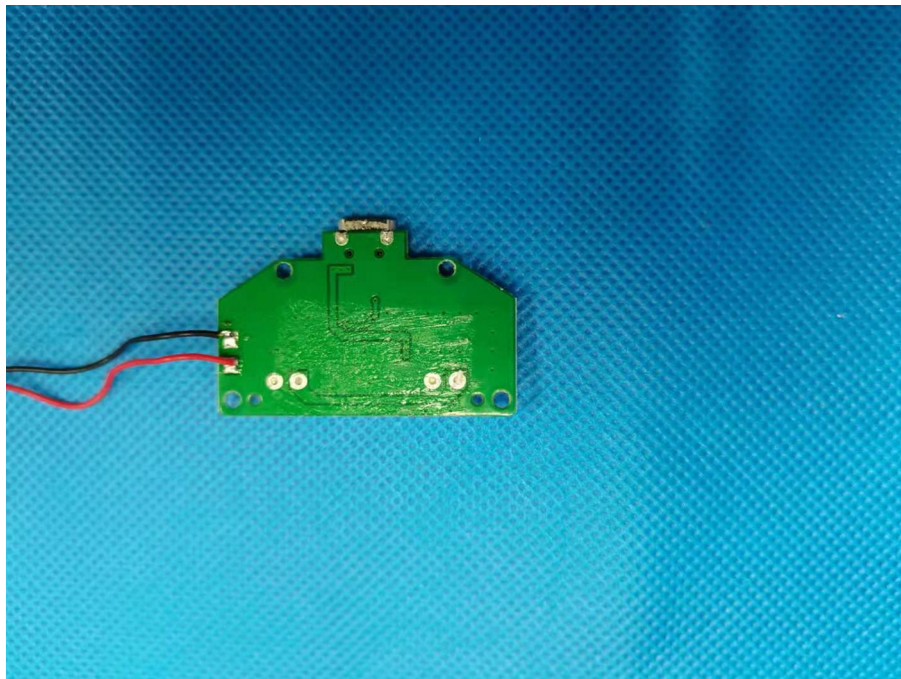


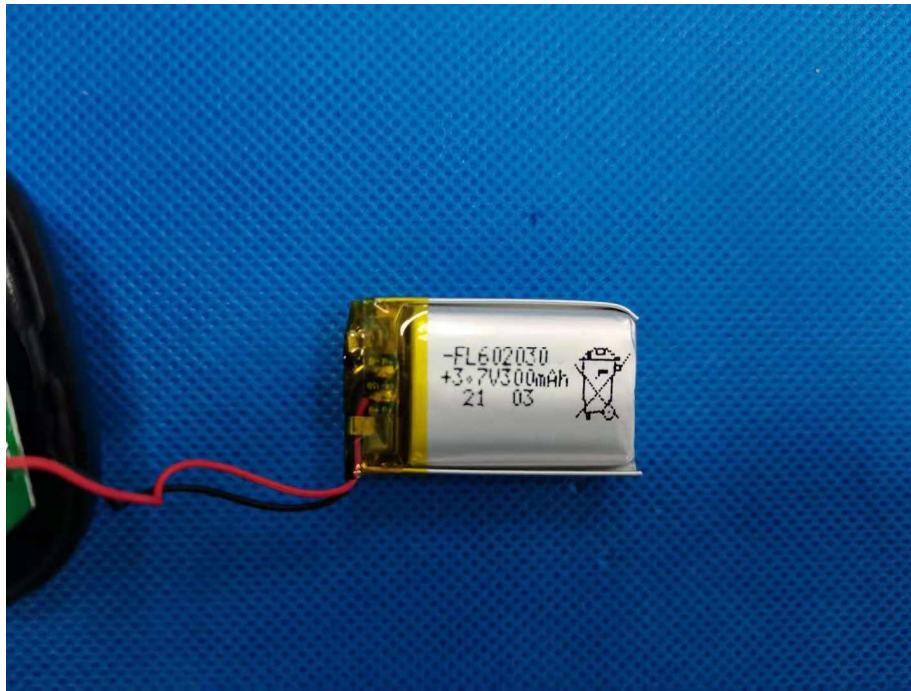
Right Earbud:











---THE END OF REPORT---