

JAPAN SPECIFIED RADIO TEST REPORT

Client Name : Ugreen Group Limited

Address : UGREEN Building, Longcheng Industrial Park, Longguanxi Road, Longhua, ShenZhen China

Product Name : HiTune X5 True Wireless Stereo Earbuds

Date : Jun. 22, 2021



Shenzhen Anbotech Compliance Laboratory Limited

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TEST REPORT

Applicant : Ugreen Group Limited
Manufacturer : Ugreen Group Limited
Product Name : HiTune X5 True Wireless Stereo Earbuds
Model No. : WS108, 50648
Trade Mark : UGREEN
Rating(s) : Charging Box Input: DC 5V, 320mA (with DC 3.7V, 400 mAh Battery inside)
Single Earbuds Input: DC 5V, 40mA (with DC 3.7V, 40 mAh Battery inside)
**Test Standard(s) : MIC Notice No.88 Annex43
Certificate regulation article 2, paragraph 1, item 19**

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the MIC Notice No.88 Annex43 and Certificate regulation article 2, paragraph 1, item 19 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Receipt

Apr. 20, 2020

Date of Test

Apr. 20~May 14, 2020

Prepared By

Ella Liang

(Ella Liang)

Approved & Authorized Signer

Kingkong Jin

(Kingkong Jin)

1. General Information

1.1. Client Information

Applicant	:	Ugreen Group Limited
Address	:	UGREEN Building,Longcheng Industrial Park, Longguanxi Road,Longhua, Shenzhen China
Manufacturer	:	Ugreen Group Limited
Address	:	UGREEN Building,Longcheng Industrial Park, Longguanxi Road,Longhua, Shenzhen China
Factory	:	Dongguan Koppo Electronics Co.,Ltd.
Address	:	No.2 Road3,Buxinji Industrial Area,Guanjingtuo Village,Fenggang Town, Dongguan City.

1.2. Description of Device (EUT)

Product Name	:	HiTune X5 True Wireless Stereo Earbuds
Model No.	:	WS108, 50648 (Note: All samples are the same except the model number, so we prepare "WS108" for test only.)
Trade Mark	:	UGREEN
Test Power Supply	:	DC 3.7V battery inside
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Engineering Sample)
Product Description	Operation Frequency:	2402~2480MHz
	Transfer Rate:	1/2/3 Mbits/s
	Number of Channel:	79 Channels
	Modulation Type:	GFSK, $\pi/4$ -DQPSK, 8-DPSK
	Antenna Type:	FPC Antenna
	Antenna Gain(Peak):	L: -1.98 dBi R: -0.46 dBi
	Rated output Power:	R: 0.04 mw/MHz; L: 0.03 mw/MHz
	Hardware version:	V4.1
	Software version:	V0.2.2

Remark: 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2) The left and right earphone, both have been tested and only the test data of right earphone and power & spurious emissions of Left earphone recorded in this report.

1.3. Auxiliary Equipment Used During Test

N/A	
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1.4. Description of Test Modes

The EUT has been tested under operating condition.

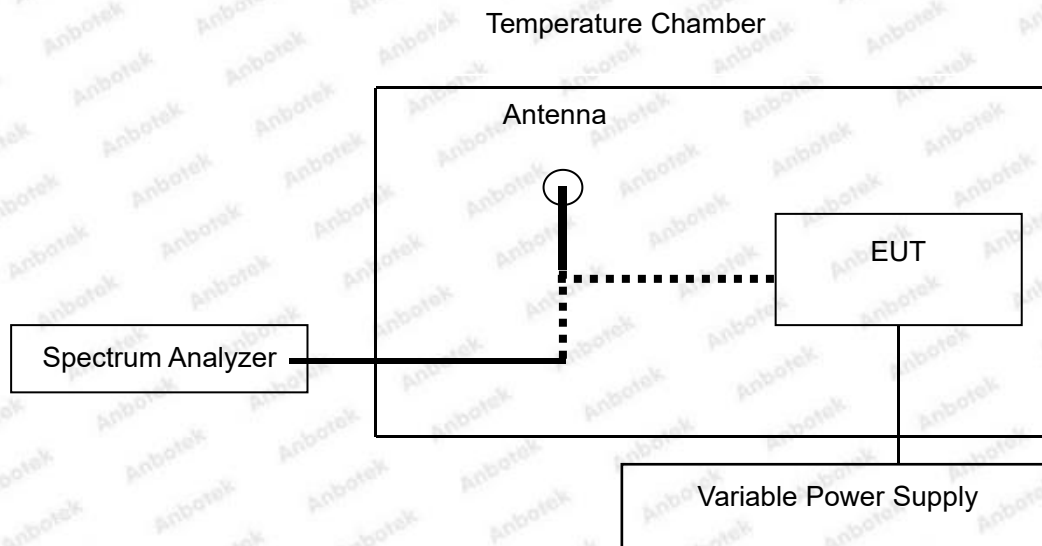
Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel 1(2402MHz), Channel 40(2441MHz) and Channel 79(2480MHz) are chosen to be tested.

1.5. Test Conditions

	Normal Test Conditions	Extreme Test Conditions
Temperature	15°C - 35°C	-10°C ~ 40°C
Relative Humidity	20% - 75%	N/A
Supply Voltage	DC 3.7V battery inside	DC 3.33V~DC 4.07V

1.6. Test Configuration



1.7. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	Oct. 26, 2020	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Oct. 26, 2020	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	Oct. 26, 2020	1 Year
4.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Oct. 26, 2020	1 Year
5.	MAX Spectrum Analysis	Agilent	N9020A	MY51170037	Oct. 26, 2020	1 Year
6.	Preamplifier	SKET Electronic	BK1G18G30 D	KD17503	Oct. 26, 2020	1 Year
7.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Nov. 02, 2020	2 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Nov. 02, 2020	2 Year
9.	Loop Antenna	Schwarzbeck	FMZB1519B	00053	Nov. 02, 2020	2 Year
10.	Horn Antenna	A-INFO	LB-180400-K F	J211060628	Nov. 02, 2020	2 Year
11.	Pre-amplifier	SONOMA	310N	186860	Oct. 26, 2020	1 Year
12.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
13.	RF Test Control System	YIHENG	YH3000	2017430	Oct. 26, 2020	1 Year
14.	Power Sensor	DAER	RPR3006W	15I00041SN045	Oct. 26, 2020	1 Year
15.	Power Sensor	DAER	RPR3006W	15I00041SN046	Oct. 26, 2020	1 Year
16.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Oct. 26, 2020	1 Year
17.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Oct. 26, 2020	1 Year
18.	Signal Generator	Agilent	E4421B	MY41000743	Oct. 26, 2020	1 Year
19.	DC Power Supply	IVYTECH	IV3605	1804D360510	Oct. 26, 2020	1 Year
20.	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80 B	N/A	Oct. 26, 2020	1 Year

1.8. Description of Test Facility

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

FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, 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. 184111, September 30, 2020.

ISED-Registration No.: 8058A

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A, September 30, 2020.

Test Location

Shenzhen Anbotek Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518128

2. Summary of Test Results

Test Items	Subclause	Required	Results
General Provisions			
Frequency Tolerance	5	Yes	Complies
Occupied Bandwidth	6	Yes	Complies
Spurious Emissions	7	Yes	Complies
Transmitting equipment			
Antenna power	14	Yes	Complies
SAR	14.2	N/A	N/A
Frequency stabilization	15	Yes	Complies
Transmitter antenna			
Type, configuration, etc. of transmitting antenna	20	Yes	Complies
Directional pattern of transmitting antenna	22	Yes	Complies
Receiving equipment			
Spurious emission of receiver	24	Yes	Complies
Refer to all articles for transmitter antenna	26	Yes	Complies
Operating frequency 2400-2483.5MHz			
High Frequency/modulation section cannot be opened easily	49.20(1); a	Yes	Complies
Communication method	49.20(1); b	N/A	N/A
Modulation method	49.20(1); c	Yes	Complies
Spread spectrum method	49.20(1); d	Yes	Complies
Antenna power	49.20(1); e	Yes	Complies
Absolute gain of transmitting antenna	49.20(1); f(1)	N/A	N/A
Angular width of principal radiation (AWPR)	49.20(1); f(2)	N/A	N/A
Number of carriers within 1 MHz bandwidth in OFDM	49.20(1); g	N/A	N/A
Diffusion bandwidth	49.20(1); h	Yes	Complies
Spreading factor	49.20(1); i	Yes	Complies
Dwell time measurement	49.20(1); j	Yes	Complies
Carrier sensing function	--	N/A	N/A
interference prevention function	--	Yes	Complies
Note: "N/A" denotes test is not applicable in this Test Report.			

3. FREQUENCY TOLERANCE TEST

3.1. Test Limit

Test Limit	±50 ppm
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3.2. Test Equipment

Same as 1.7.

3.3. Test Configuration

Same as 1.6.

3.4. Test Data

PASS

Please refer to the following data.

Low Voltage: DC 3.33V

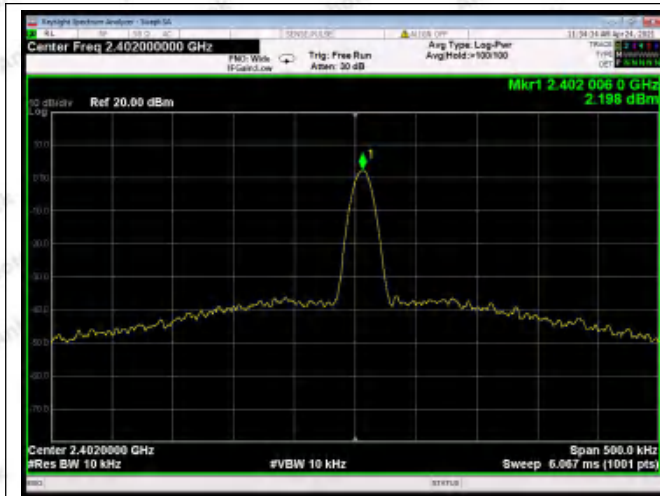
Frequency(MHz)	Reading(MHz)	Tolerance(ppm)	Limit(ppm)
2402.0000	2402.0087	3.622	±50
2441.0000	2441.0032	1.311	±50
2480.0000	2480.0052	2.097	±50

High Voltage: DC 4.07V

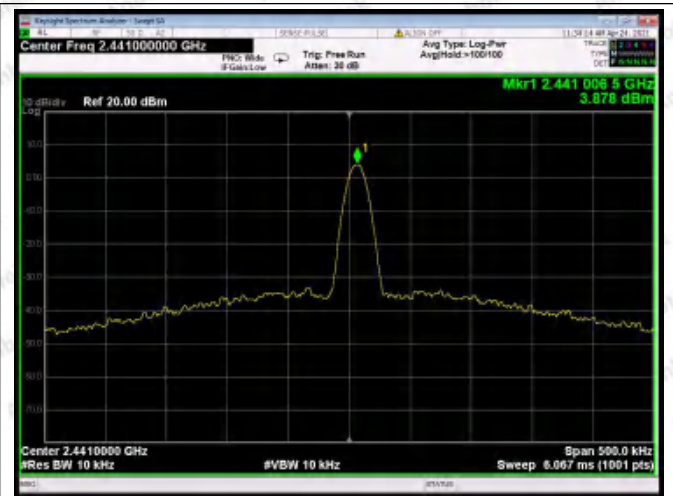
Frequency(MHz)	Reading(MHz)	Tolerance(ppm)	Limit(ppm)
2402.0000	2402.0117	4.871	±50
2441.0000	2441.0103	4.220	±50
2480.0000	2480.0118	4.758	±50

Normal Voltage: DC 3.7V battery inside

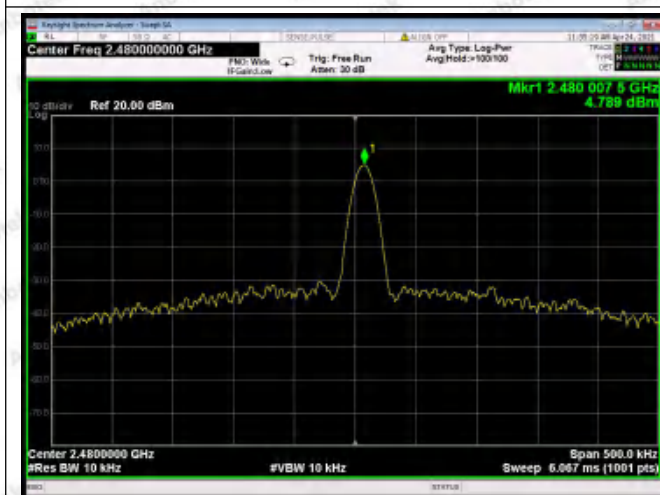
Frequency(MHz)	Reading(MHz)	Tolerance(ppm)	Limit(ppm)
2402.0000	2402.0060	2.498	±50
2441.0000	2441.0065	2.663	±50
2480.0000	2480.0075	3.024	±50



Frequency Error--2402MHz



Frequency Error--2441MHz



Frequency Error--2480MHz

- Remark: 1. That only normal voltage's plot is reported in the report.
2. The EDR was tested on ($\pi/4$ QPSK, 8DPSK) modes, only the worst data of (8DPSK) is reported in the report.
3. The left and right earphone, both have been tested and this Report only show the test data of the worst case (R).

4. OCCUPIED BANDWIDTH (99%) TEST

4.1. Test Limit

Under all test conditions	FH: 83.5 MHz
	FH + DS: 83.5 MHz
	FH + OFDM: 83.5MHz
	OFDM, DS: 26MHz
	Others: 26MHz
	OFDM equipment with 40MHz channel separation: 40MHz

4.2. Test Equipment

Same as 1.7

4.3. Test Configuration

Same as 1.6

4.4. Test Data

PASS

Please refer to the following data.

Low Voltage: DC 3.33V

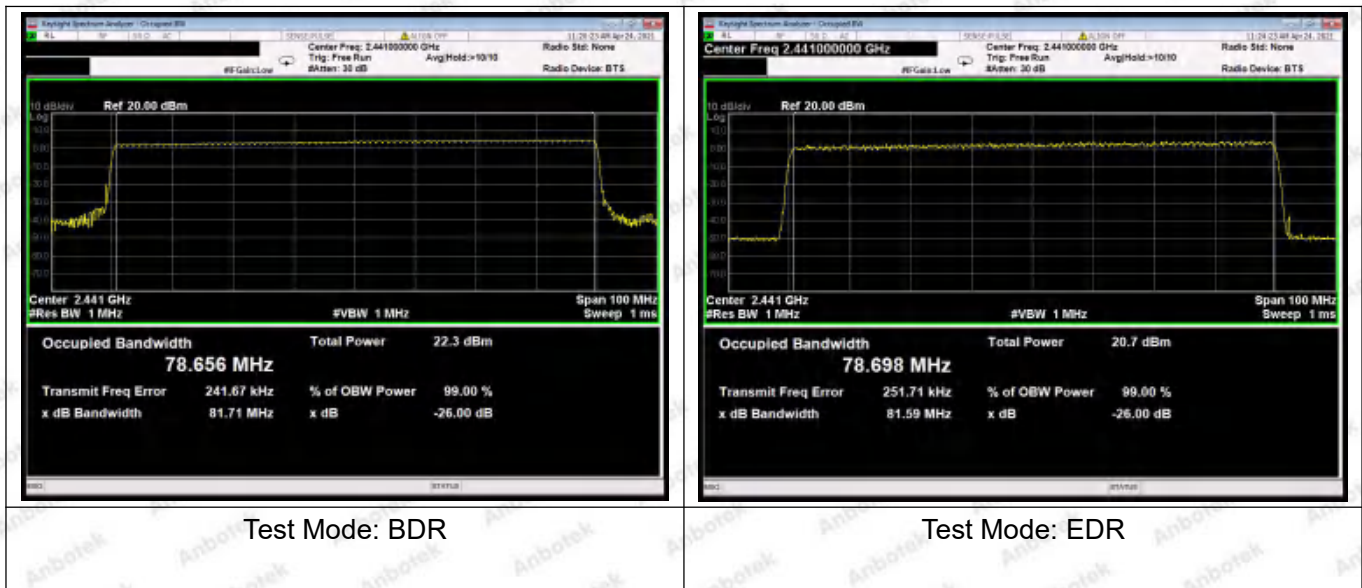
Frequency(MHz)	99% Bandwidth(MHz)	Remark
2402-2480	78.655	BDR
2402-2480	78.697	EDR

High Voltage: DC 4.07V

Frequency(MHz)	99% Bandwidth(MHz)	Remark
2402-2480	78.653	BDR
2402-2480	78.701	EDR

Normal Voltage: DC 3.7V battery inside

Frequency(MHz)	99% Bandwidth(MHz)	Remark
2402-2480	78.656	BDR
2402-2480	78.698	EDR



- Remark:
1. That only normal voltage's plot is reported in the report.
 2. The EDR was tested on ($\pi/4$ QPSK, 8DPSK) modes, only the worst data of (8DPSK) is reported in the report.
 3. The left and right earphone, both have been tested and this Report only show the test data of the worst case (R).

5. SPREAD-SPECTRUM BANDWIDTH (90%) TEST

5.1. Test Limit

Test Limit	Spread bandwidth: $\geq 500\text{KHz}$,
	Spread factor ≥ 5

5.2. Test Equipment

Same as 1.7

5.3. Test Configuration

Same as 1.6

5.4. Test Data

Pass

Please refer to the following data.

Low Voltage: DC 3.33V

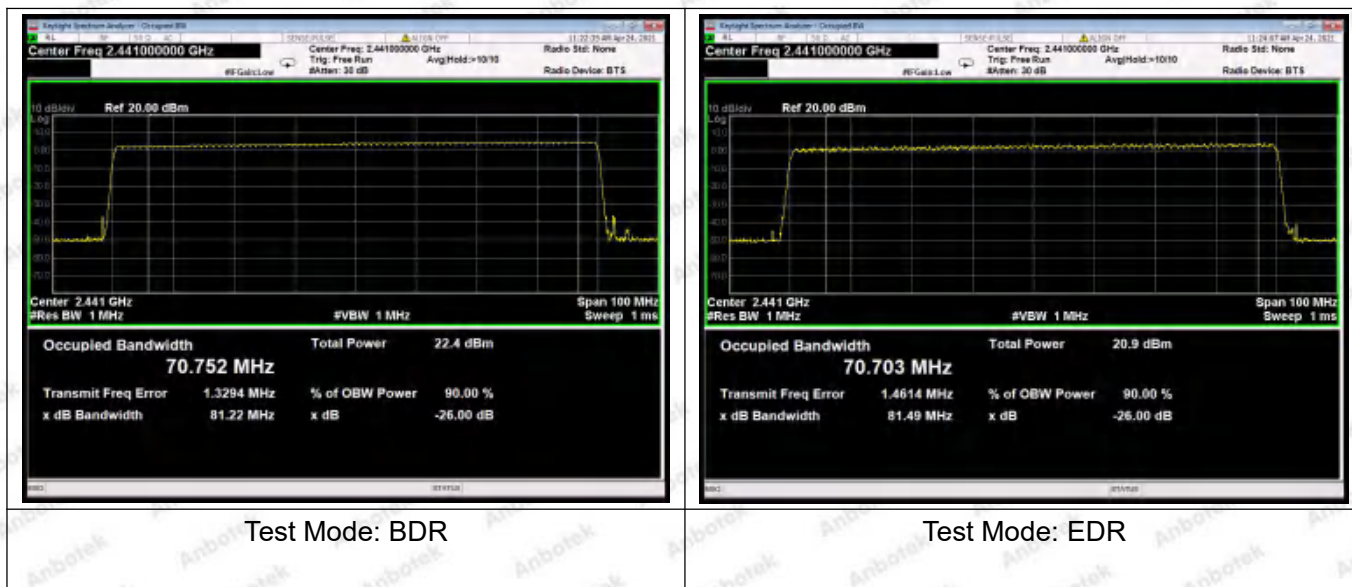
Frequency(MHz)	90% Bandwidth(MHz)	Spread Factor	Remark
2402-2480	70.753	70.753	BDR
2402-2480	70.709	23.570	EDR
Limit	≥ 0.5	≥ 5	

High Voltage: DC 4.07V

Frequency(MHz)	90% Bandwidth(MHz)	Spread Factor	Remark
2402-2480	70.752	70.752	BDR
2402-2480	70.706	23.569	EDR
Limit	≥ 0.5	≥ 5	

Normal Voltage: DC 3.7V battery inside

Frequency(MHz)	90% Bandwidth(MHz)	Spread Factor	Remark
2402-2480	70.752	70.752	BDR
2402-2480	70.703	23.568	EDR
Limit	≥ 0.5	≥ 5	



- Remark:
1. That only normal voltage's plot is reported in the report.
 2. The EDR was tested on ($\pi/4$ QPSK, 8DPSK) modes, only the worst data of (8DPSK) is reported in the report.
 3. The left and right earphone, both have been tested and this Report only show the test data of the worst case (R).

6. SPURIOUS EMISSIONS INTENSITY TEST

6.1. Test Equipment

Same as 1.7

6.2. Test Configuration

Same as 1.6

6.3. Test Data

Scanning Bandwidth	:	30~ 1000MHz
		1000~ 2387MHz
		2387~ 2400MHz
		2483.5~ 2496.5MHz
		2496.5~ 12500MHz

Pass

Please refer to the following data.

Low Voltage: DC 3.33V

R:

BDR:

Frequency(MHz)	Reading(dBm)	Scanning Bandwidth	Limit
2402.000	-81.050	30~ 1000MHz	≤ -36dBm
	-68.881	1000~ 2387MHz	≤ -26dBm
	-69.193	2387~ 2400MHz	≤ -16dBm
	-69.309	2483.5~ 2496.5MHz	≤ -16dBm
	-67.350	2496.5~ 12500MHz	≤ -26dBm
2441.000	-82.045	30~ 1000MHz	≤ -36dBm
	-69.887	1000~ 2387MHz	≤ -26dBm
	-68.569	2387~ 2400MHz	≤ -16dBm
	-68.554	2483.5~ 2496.5MHz	≤ -16dBm
	-68.317	2496.5~ 12500MHz	≤ -26dBm
2480.000	-81.461	30~ 1000MHz	≤ -36dBm
	-69.498	1000~ 2387MHz	≤ -26dBm
	-68.488	2387~ 2400MHz	≤ -16dBm
	-69.414	2483.5~ 2496.5MHz	≤ -16dBm
	-67.916	2496.5~ 12500MHz	≤ -26dBm

EDR:

Frequency(MHz)	Reading(dBm)	Scanning Bandwidth	Limit
2402.000	-81.527	30~ 1000MHz	≤ -36dBm
	-69.763	1000~ 2387MHz	≤ -26dBm
	-69.190	2387~ 2400MHz	≤ -16dBm
	-68.728	2483.5~ 2496.5MHz	≤ -16dBm
	-68.734	2496.5~ 12500MHz	≤ -26dBm
2441.000	-81.951	30~ 1000MHz	≤ -36dBm
	-69.734	1000~ 2387MHz	≤ -26dBm
	-68.011	2387~ 2400MHz	≤ -16dBm
	-68.654	2483.5~ 2496.5MHz	≤ -16dBm
	-68.539	2496.5~ 12500MHz	≤ -26dBm
2480.000	-81.508	30~ 1000MHz	≤ -36dBm
	-69.149	1000~ 2387MHz	≤ -26dBm
	-67.917	2387~ 2400MHz	≤ -16dBm
	-67.715	2483.5~ 2496.5MHz	≤ -16dBm
	-68.153	2496.5~ 12500MHz	≤ -26dBm

High Voltage: DC 4.07V

BDR:

Frequency(MHz)	Reading(dBm)	Scanning Bandwidth	Limit
2402.000	-80.266	30~ 1000MHz	≤ -36dBm
	-68.186	1000~ 2387MHz	≤ -26dBm
	-69.586	2387~ 2400MHz	≤ -16dBm
	-68.652	2483.5~ 2496.5MHz	≤ -16dBm
	-67.264	2496.5~ 12500MHz	≤ -26dBm
2441.000	-82.067	30~ 1000MHz	≤ -36dBm
	-70.272	1000~ 2387MHz	≤ -26dBm
	-68.471	2387~ 2400MHz	≤ -16dBm
	-69.053	2483.5~ 2496.5MHz	≤ -16dBm
	-68.403	2496.5~ 12500MHz	≤ -26dBm
2480.000	-82.066	30~ 1000MHz	≤ -36dBm
	-69.636	1000~ 2387MHz	≤ -26dBm
	-68.301	2387~ 2400MHz	≤ -16dBm
	-68.577	2483.5~ 2496.5MHz	≤ -16dBm
	-68.045	2496.5~ 12500MHz	≤ -26dBm

EDR:

Frequency(MHz)	Reading(dBm)	Scanning Bandwidth	Limit
2402.000	-81.363	30~ 1000MHz	≤ -36dBm
	-69.274	1000~ 2387MHz	≤ -26dBm
	-69.048	2387~ 2400MHz	≤ -16dBm
	-69.281	2483.5~ 2496.5MHz	≤ -16dBm
	-68.456	2496.5~ 12500MHz	≤ -26dBm
2441.000	-82.222	30~ 1000MHz	≤ -36dBm
	-69.996	1000~ 2387MHz	≤ -26dBm
	-68.616	2387~ 2400MHz	≤ -16dBm
	-68.716	2483.5~ 2496.5MHz	≤ -16dBm
	-68.714	2496.5~ 12500MHz	≤ -26dBm
2480.000	-81.381	30~ 1000MHz	≤ -36dBm
	-69.726	1000~ 2387MHz	≤ -26dBm
	-67.866	2387~ 2400MHz	≤ -16dBm
	-67.421	2483.5~ 2496.5MHz	≤ -16dBm
	-67.697	2496.5~ 12500MHz	≤ -26dBm

Normal Voltage: DC 3.7V battery inside

BDR:

Frequency(MHz)	Reading(dBm)	Scanning Bandwidth	Limit
2402.000	-80.830	30~ 1000MHz	≤ -36dBm
	-68.499	1000~ 2387MHz	≤ -26dBm
	-69.408	2387~ 2400MHz	≤ -16dBm
	-69.042	2483.5~ 2496.5MHz	≤ -16dBm
	-67.831	2496.5~ 12500MHz	≤ -26dBm
2441.000	-81.863	30~ 1000MHz	≤ -36dBm
	-70.027	1000~ 2387MHz	≤ -26dBm
	-69.029	2387~ 2400MHz	≤ -16dBm
	-69.194	2483.5~ 2496.5MHz	≤ -16dBm
	-68.474	2496.5~ 12500MHz	≤ -26dBm
2480.000	-82.098	30~ 1000MHz	≤ -36dBm
	-69.284	1000~ 2387MHz	≤ -26dBm
	-68.876	2387~ 2400MHz	≤ -16dBm
	-69.220	2483.5~ 2496.5MHz	≤ -16dBm
	-67.912	2496.5~ 12500MHz	≤ -26dBm

EDR:

Frequency(MHz)	Reading(dBm)	Scanning Bandwidth	Limit
2402.000	-81.215	30~ 1000MHz	≤ -36dBm
	-69.678	1000~ 2387MHz	≤ -26dBm
	-68.867	2387~ 2400MHz	≤ -16dBm
	-69.095	2483.5~ 2496.5MHz	≤ -16dBm
	-68.476	2496.5~ 12500MHz	≤ -26dBm
2441.000	-81.953	30~ 1000MHz	≤ -36dBm
	-69.893	1000~ 2387MHz	≤ -26dBm
	-68.384	2387~ 2400MHz	≤ -16dBm
	-68.501	2483.5~ 2496.5MHz	≤ -16dBm
	-68.495	2496.5~ 12500MHz	≤ -26dBm
2480.000	-81.765	30~ 1000MHz	≤ -36dBm
	-69.651	1000~ 2387MHz	≤ -26dBm
	-67.838	2387~ 2400MHz	≤ -16dBm
	-68.048	2483.5~ 2496.5MHz	≤ -16dBm
	-68.070	2496.5~ 12500MHz	≤ -26dBm

Remark 1: That worst case normal voltage's plot is reported in the report.

2. The EDR was tested on (π/4QPSK, 8DPSK) modes, only the worst data of (8DPSK) is reported in the report.

L: BDR:

Frequency(MHz)	Reading(dBm)	Scanning Bandwidth	Limit
2402.000	-84.978	30~ 1000MHz	≤ -36dBm
	-71.381	1000~ 2387MHz	≤ -26dBm
	-71.135	2387~ 2400MHz	≤ -16dBm
	-70.630	2483.5~ 2496.5MHz	≤ -16dBm
	-68.994	2496.5~ 12500MHz	≤ -26dBm
2441.000	-84.900	30~ 1000MHz	≤ -36dBm
	-72.140	1000~ 2387MHz	≤ -26dBm
	-71.598	2387~ 2400MHz	≤ -16dBm
	-71.042	2483.5~ 2496.5MHz	≤ -16dBm
	-69.498	2496.5~ 12500MHz	≤ -26dBm
2480.000	-84.185	30~ 1000MHz	≤ -36dBm
	-73.198	1000~ 2387MHz	≤ -26dBm
	-71.771	2387~ 2400MHz	≤ -16dBm
	-71.458	2483.5~ 2496.5MHz	≤ -16dBm
	-70.070	2496.5~ 12500MHz	≤ -26dBm

EDR:

Frequency(MHz)	Reading(dBm)	Scanning Bandwidth	Limit
2402.000	-87.367	30~ 1000MHz	≤ -36dBm
	-74.529	1000~ 2387MHz	≤ -26dBm
	-74.233	2387~ 2400MHz	≤ -16dBm
	-74.375	2483.5~ 2496.5MHz	≤ -16dBm
	-73.900	2496.5~ 12500MHz	≤ -26dBm
2441.000	-87.535	30~ 1000MHz	≤ -36dBm
	-74.671	1000~ 2387MHz	≤ -26dBm
	-75.175	2387~ 2400MHz	≤ -16dBm
	-73.898	2483.5~ 2496.5MHz	≤ -16dBm
	-72.599	2496.5~ 12500MHz	≤ -26dBm
2480.000	-86.938	30~ 1000MHz	≤ -36dBm
	-75.372	1000~ 2387MHz	≤ -26dBm
	-74.690	2387~ 2400MHz	≤ -16dBm
	-75.434	2483.5~ 2496.5MHz	≤ -16dBm
	-70.534	2496.5~ 12500MHz	≤ -26dBm

High Voltage: DC 4.07V

BDR:

Frequency(MHz)	Reading(dBm)	Scanning Bandwidth	Limit
2402.000	-84.699	30~ 1000MHz	≤ -36dBm
	-70.744	1000~ 2387MHz	≤ -26dBm
	-71.833	2387~ 2400MHz	≤ -16dBm
	-70.969	2483.5~ 2496.5MHz	≤ -16dBm
	-69.276	2496.5~ 12500MHz	≤ -26dBm
2441.000	-84.515	30~ 1000MHz	≤ -36dBm
	-72.161	1000~ 2387MHz	≤ -26dBm
	-71.369	2387~ 2400MHz	≤ -16dBm
	-71.388	2483.5~ 2496.5MHz	≤ -16dBm
	-70.318	2496.5~ 12500MHz	≤ -26dBm
2480.000	-84.847	30~ 1000MHz	≤ -36dBm
	-73.030	1000~ 2387MHz	≤ -26dBm
	-72.128	2387~ 2400MHz	≤ -16dBm
	-71.713	2483.5~ 2496.5MHz	≤ -16dBm
	-70.228	2496.5~ 12500MHz	≤ -26dBm

EDR:

Frequency(MHz)	Reading(dBm)	Scanning Bandwidth	Limit
2402.000	-83.854	30~ 1000MHz	≤ -36dBm
	-72.501	1000~ 2387MHz	≤ -26dBm
	-71.746	2387~ 2400MHz	≤ -16dBm
	-71.752	2483.5~ 2496.5MHz	≤ -16dBm
	-71.371	2496.5~ 12500MHz	≤ -26dBm
2441.000	-84.935	30~ 1000MHz	≤ -36dBm
	-71.984	1000~ 2387MHz	≤ -26dBm
	-71.794	2387~ 2400MHz	≤ -16dBm
	-71.460	2483.5~ 2496.5MHz	≤ -16dBm
	-69.509	2496.5~ 12500MHz	≤ -26dBm
2480.000	-83.901	30~ 1000MHz	≤ -36dBm
	-72.517	1000~ 2387MHz	≤ -26dBm
	-71.877	2387~ 2400MHz	≤ -16dBm
	-72.186	2483.5~ 2496.5MHz	≤ -16dBm
	-71.340	2496.5~ 12500MHz	≤ -26dBm

Normal Voltage: DC 3.7V battery inside

BDR:

Frequency(MHz)	Reading(dBm)	Scanning Bandwidth	Limit
2402.000	-84.705	30~ 1000MHz	≤ -36dBm
	-71.274	1000~ 2387MHz	≤ -26dBm
	-71.653	2387~ 2400MHz	≤ -16dBm
	-71.226	2483.5~ 2496.5MHz	≤ -16dBm
	-69.319	2496.5~ 12500MHz	≤ -26dBm
2441.000	-84.799	30~ 1000MHz	≤ -36dBm
	-72.719	1000~ 2387MHz	≤ -26dBm
	-71.518	2387~ 2400MHz	≤ -16dBm
	-71.563	2483.5~ 2496.5MHz	≤ -16dBm
	-70.025	2496.5~ 12500MHz	≤ -26dBm
2480.000	-84.729	30~ 1000MHz	≤ -36dBm
	-72.805	1000~ 2387MHz	≤ -26dBm
	-71.926	2387~ 2400MHz	≤ -16dBm
	-71.576	2483.5~ 2496.5MHz	≤ -16dBm
	-70.323	2496.5~ 12500MHz	≤ -26dBm

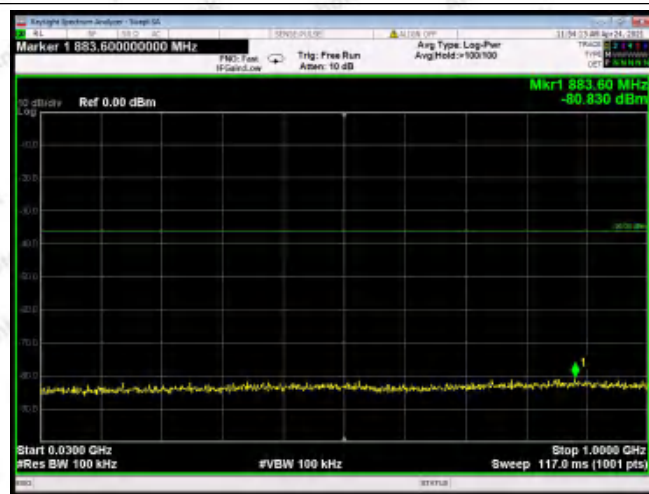
EDR:

Frequency(MHz)	Reading(dBm)	Scanning Bandwidth	Limit
2402.000	-84.270	30~ 1000MHz	≤ -36dBm
	-72.165	1000~ 2387MHz	≤ -26dBm
	-71.789	2387~ 2400MHz	≤ -16dBm
	-71.879	2483.5~ 2496.5MHz	≤ -16dBm
	-71.532	2496.5~ 12500MHz	≤ -26dBm
2441.000	-84.595	30~ 1000MHz	≤ -36dBm
	-72.195	1000~ 2387MHz	≤ -26dBm
	-72.162	2387~ 2400MHz	≤ -16dBm
	-71.219	2483.5~ 2496.5MHz	≤ -16dBm
	-69.926	2496.5~ 12500MHz	≤ -26dBm
2480.000	-83.870	30~ 1000MHz	≤ -36dBm
	-72.154	1000~ 2387MHz	≤ -26dBm
	-71.696	2387~ 2400MHz	≤ -16dBm
	-72.275	2483.5~ 2496.5MHz	≤ -16dBm
	-70.964	2496.5~ 12500MHz	≤ -26dBm

Remark 1: That worst case normal voltage's plot is reported in the report.

2. The EDR was tested on ($\pi/4$ QPSK, 8DPSK) modes, only the worst data of (8DPSK) is reported in the report.

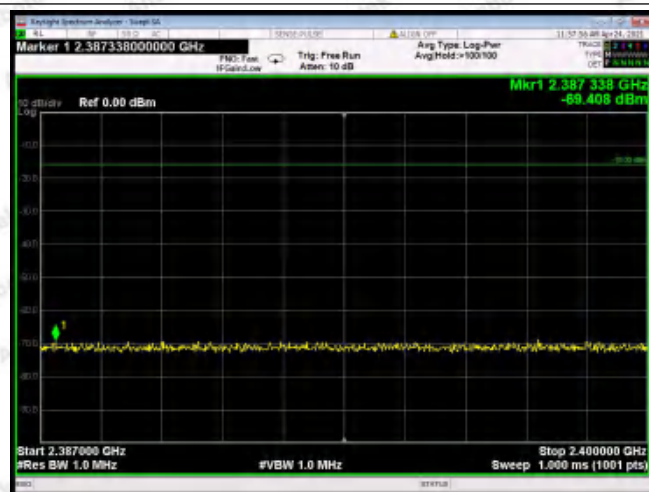
R:



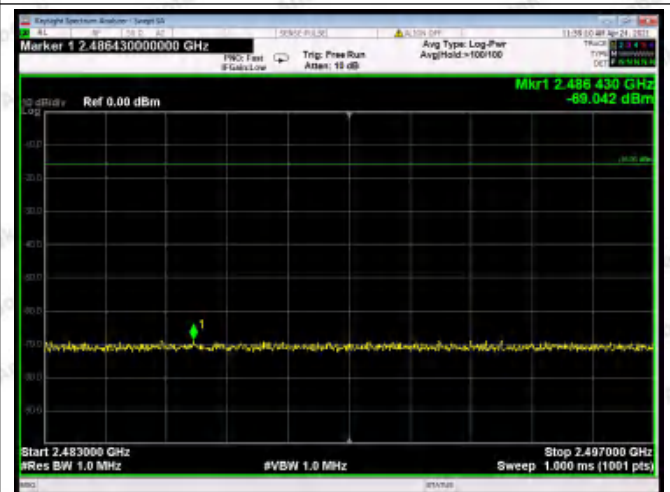
Test Mode: BDR--Low---30~ 1000MHz



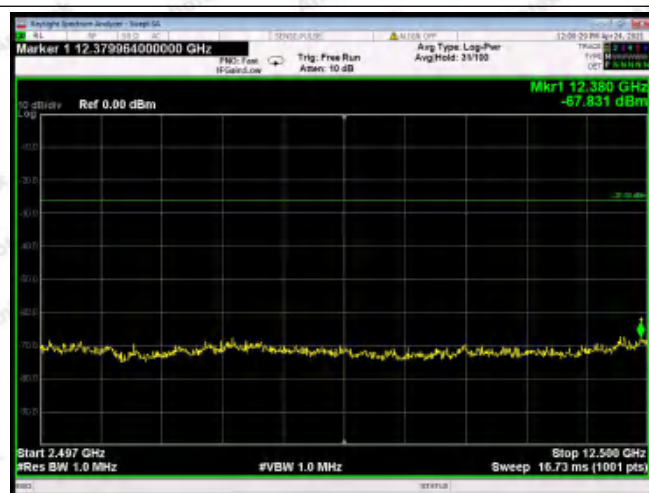
Test Mode: BDR--Low---1000~ 2387MHz



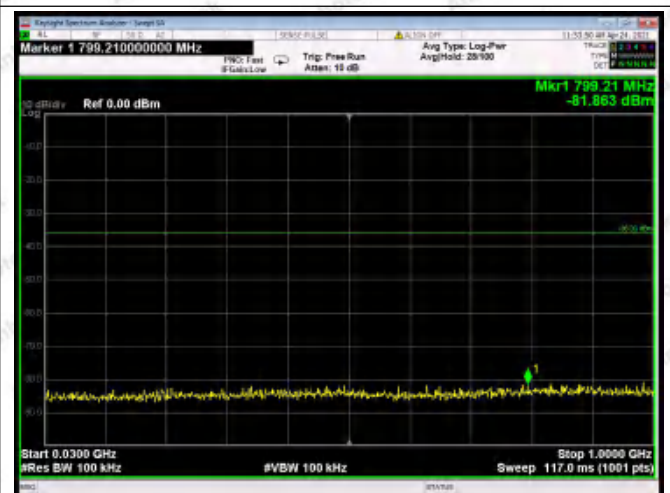
Test Mode: BDR--Low---2387~ 2400MHz



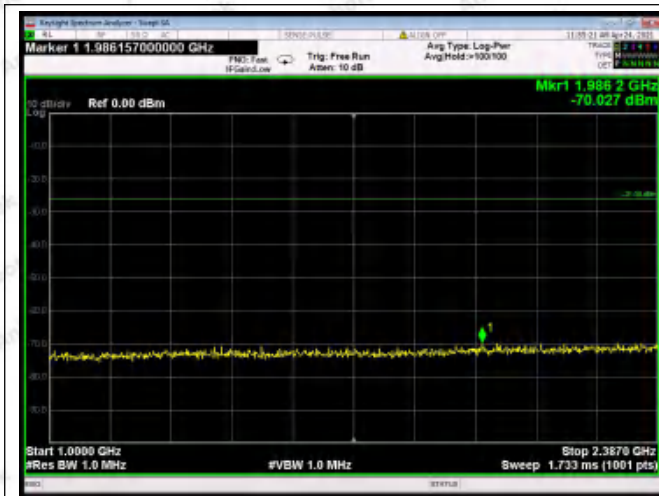
Test Mode: BDR--Low---2483.5~ 2496.5MHz



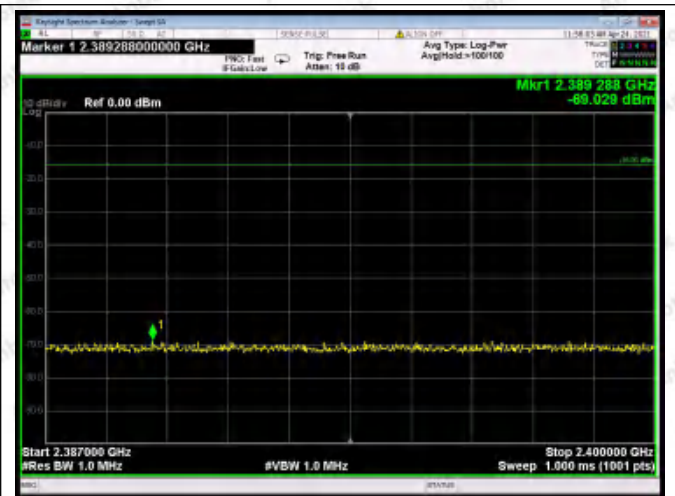
Test Mode: BDR--Low---2496.5~ 12500MHz



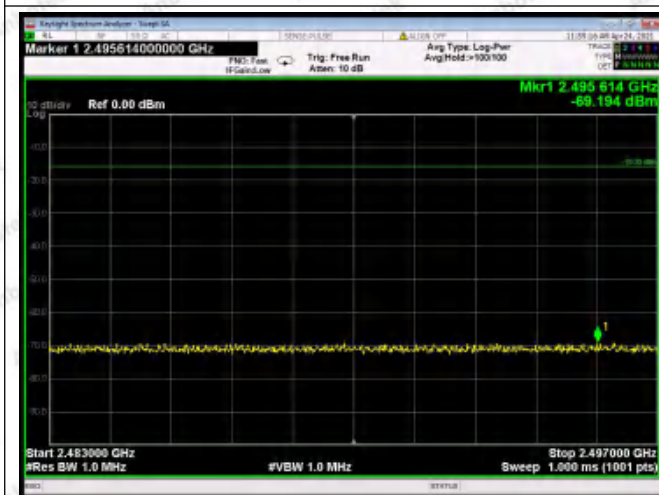
Test Mode: BDR--Mid---30~ 1000MHz



Test Mode: BDR--Mid---1000~ 2387MHz



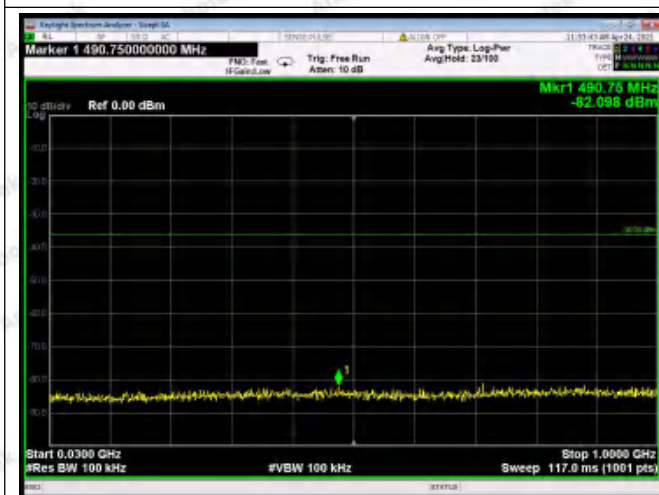
Test Mode: BDR--Mid---2387~ 2400MHz



Test Mode: BDR--Mid---2483.5~ 2496.5MHz



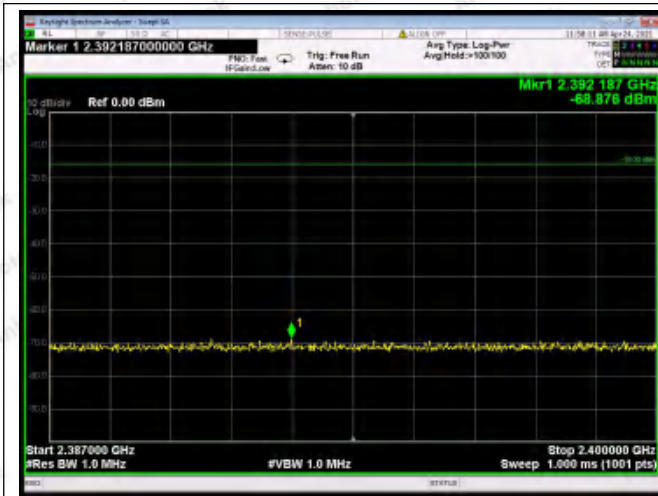
Test Mode: BDR--Mid---2496.5~ 12500MHz



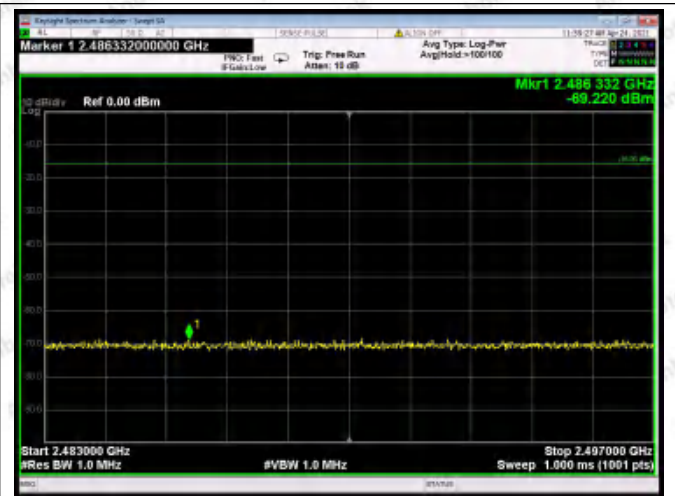
Test Mode: BDR--High---30~ 1000MHz



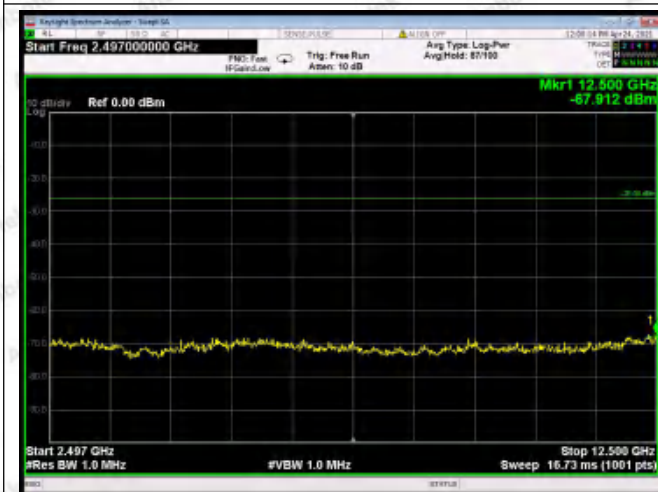
Test Mode: BDR--High---1000~ 2387MHz



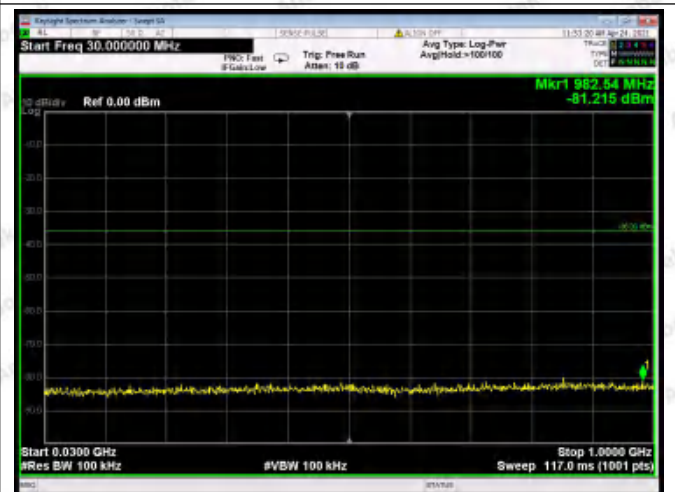
Test Mode: BDR--High---2387~ 2400MHz



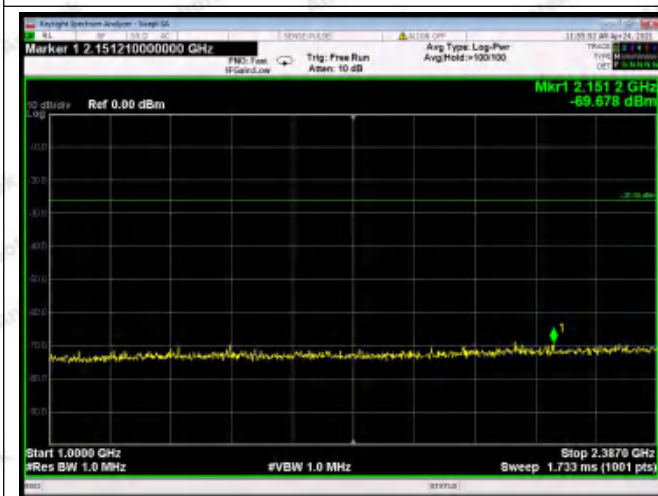
Test Mode: BDR--High---2483.5~ 2496.5MHz



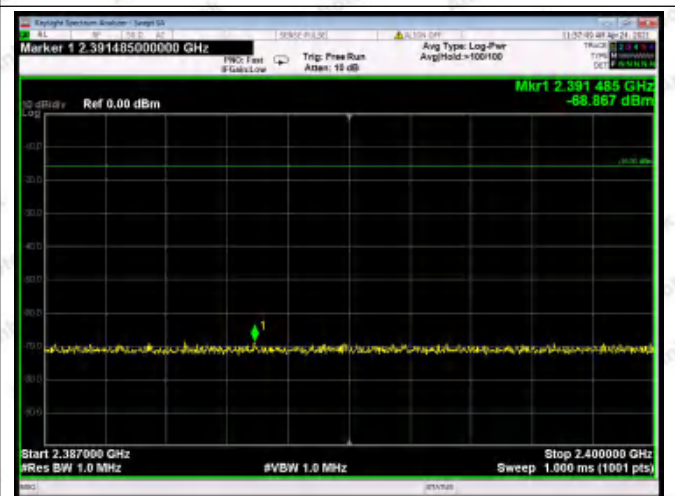
Test Mode: BDR--High---2496.5~ 12500MHz



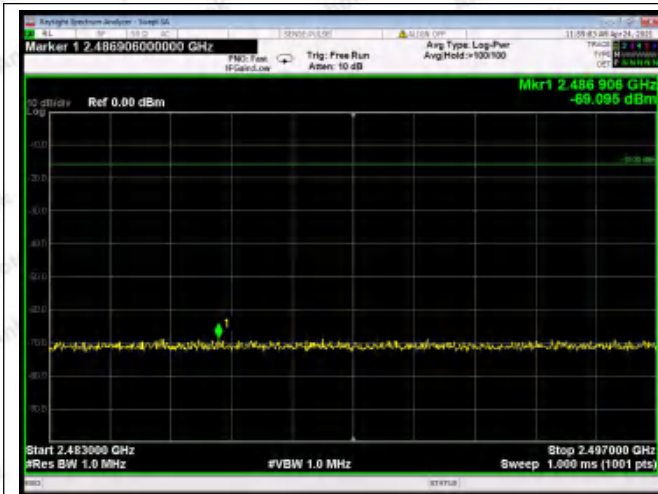
Test Mode: EDR--Low---30~ 1000MHz



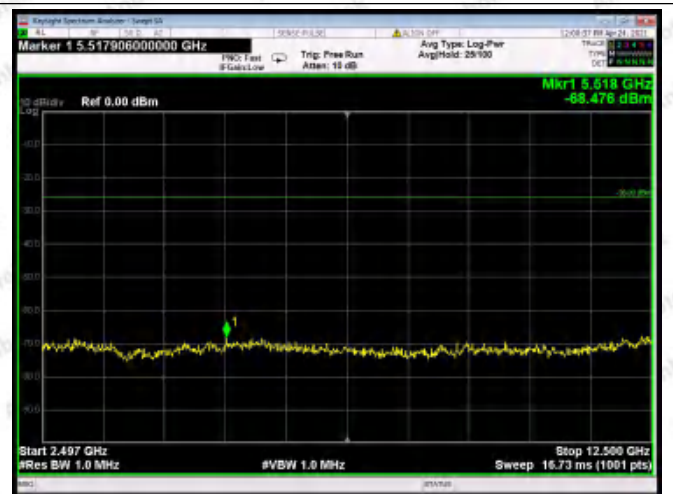
Test Mode: EDR---Low---1000~ 2387MHz



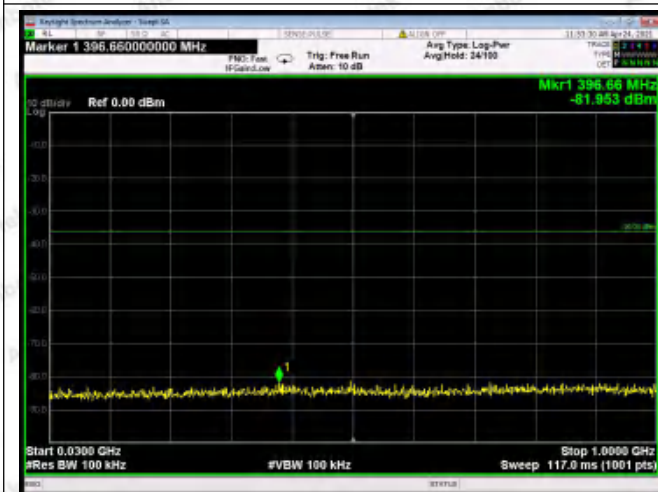
Test Mode: EDR---Low---2387~ 2400MHz



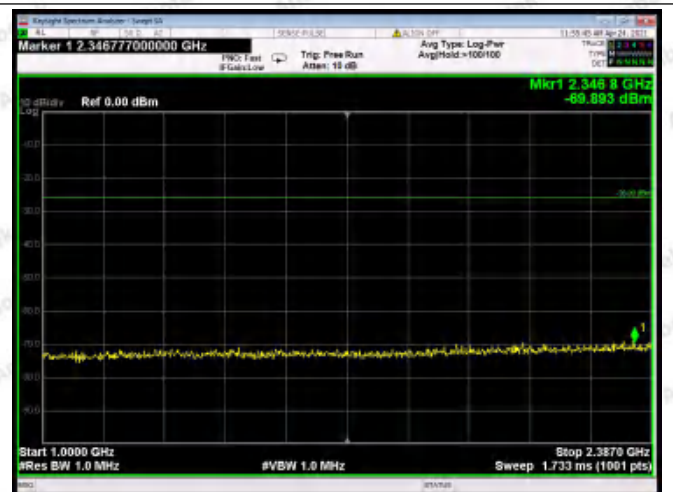
Test Mode: EDR--Low---2483.5~ 2496.5MHz



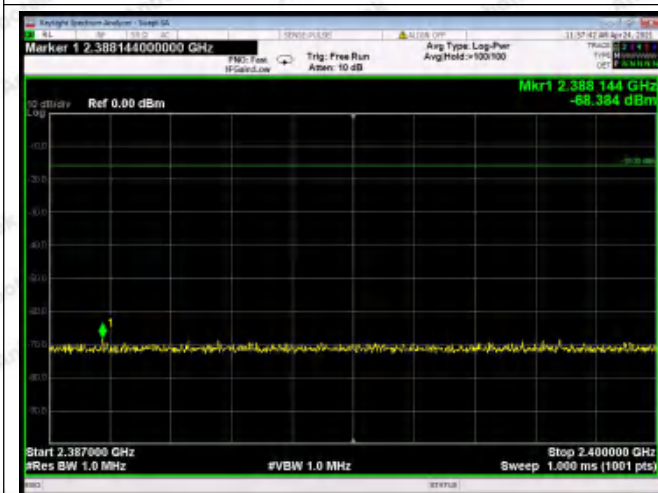
Test Mode: EDR--Low---2496.5~ 12500MHz



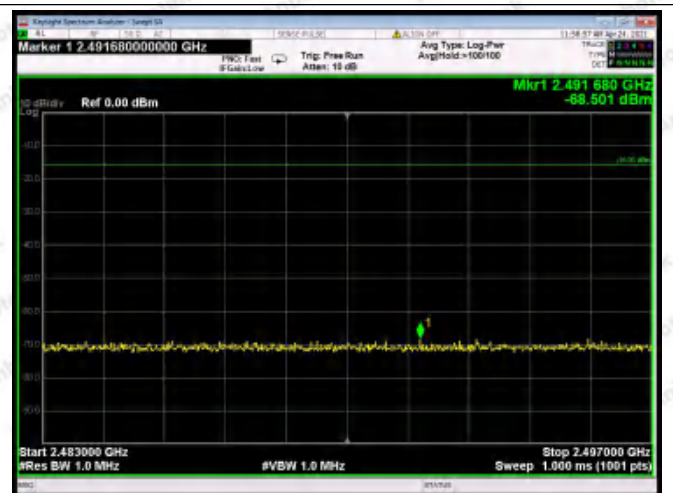
Test Mode: EDR--Mid---30~ 1000MHz



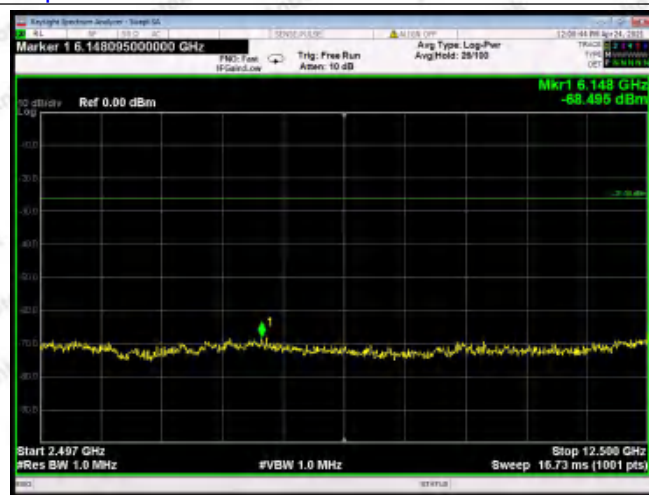
Test Mode: EDR--Mid---1000~ 2387MHz



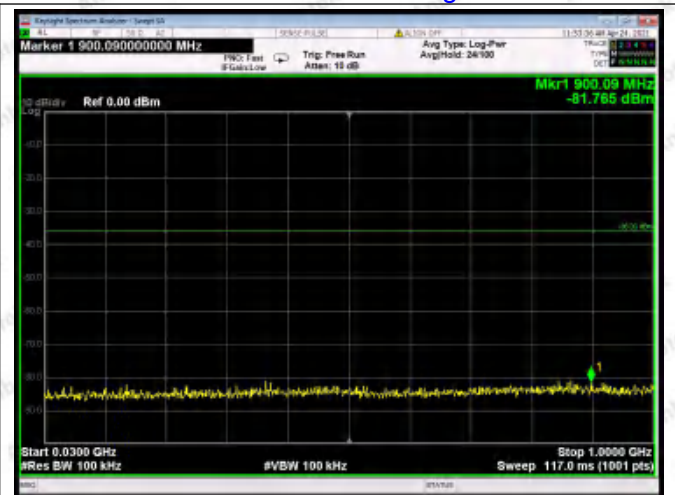
Test Mode: EDR--Mid---2387~ 2400MHz



Test Mode: EDR--Mid---2483.5~ 2496.5MHz



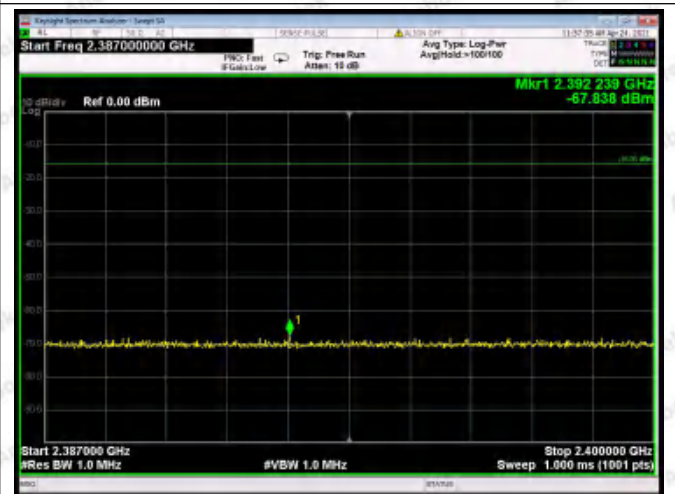
Test Mode: EDR--Mid---2496.5~ 12500MHz



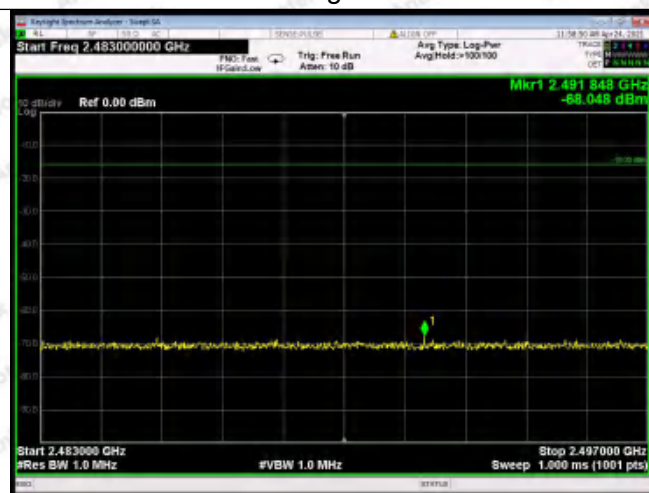
Test Mode: EDR--High---30~ 1000MHz



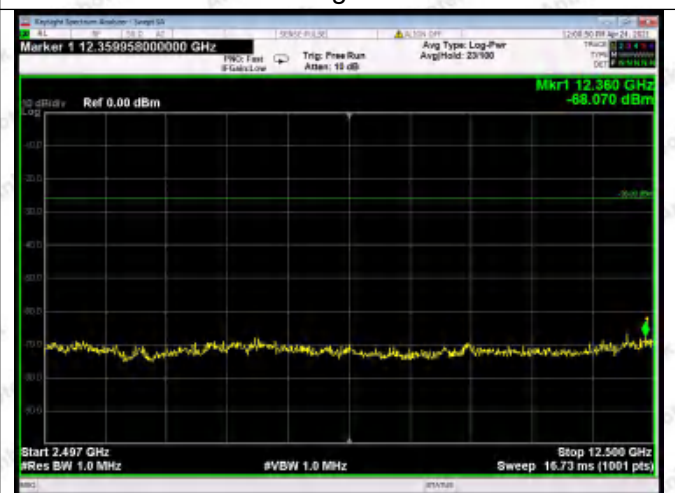
Test Mode: EDR--High---1000~ 2387MHz



Test Mode: EDR--High---2387~ 2400MHz



Test Mode: EDR--High---2483.5~ 2496.5MHz



Test Mode: EDR--High---2496.5~ 12500MHz

Remark: 1. That only normal voltage's plot is reported in the report.

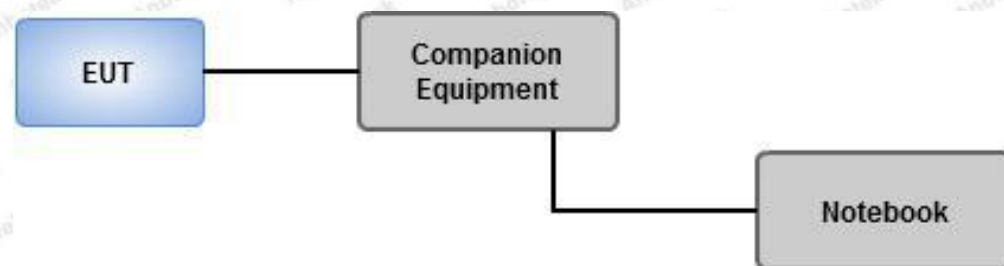
2. The EDR was tested on ($\pi/4$ QPSK, 8DPSK) modes, only the worst data of (8DPSK) is reported in the report. 3. This Report only show the test plots of the worst case (R).

7. Interference prevention function

7.1. Test Limit

Test Limit	The identification code shall be 48 bits long
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7.2. Test Setup



7.3. Test Configuration

1. Set EUT under operating mode and link up with companion equipment
2. Check communication status between EUT and companion equipment is normal
3. Record the max. reading.
4. Confirm the MAC address of EUT

7.4. Test Data

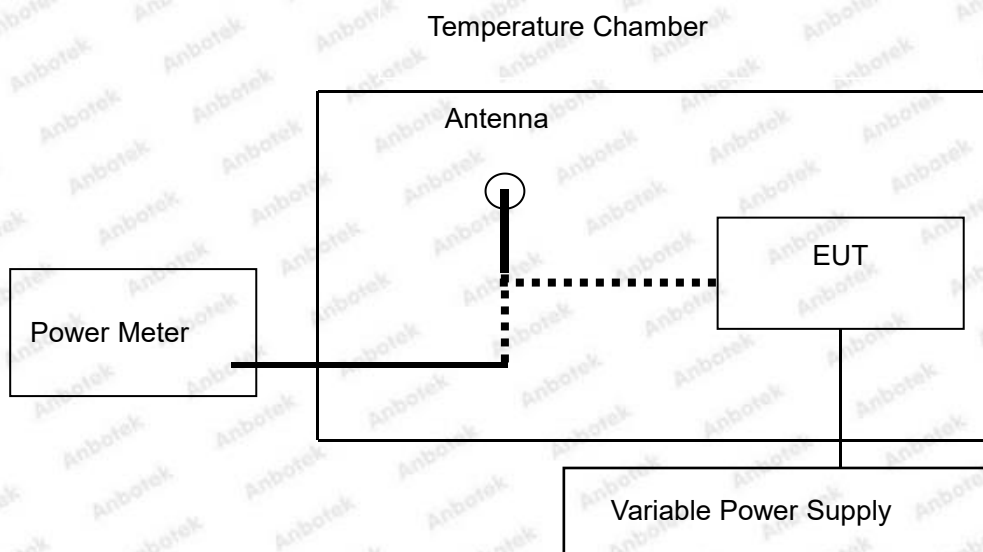
Test Mode	ID Code	Test Results
BDR+EDR	B3:36:4A:C2:F3:22	Pass

8. ANTENNA POWER TEST

8.1. Test Equipment

Same as 1.7

8.2. Test Setup



8.3. Test Data

Pass

Please refer to the following data.

R:

Low Voltage: DC 3.33V

Test Mode	Frequency (MHz)	conducted antenna power density (mW/MHz)				Rated Conducted power density (mW/MHz)	Antenna Power Error (-80%, +20%)
		dBm	mw	90% bandwidth (MHz)	mw/MHz		
BDR	2402-2480	4.909	3.097	70.753	0.044	0.04	10.00%
EDR	2402-2480	4.385	2.745	70.709	0.039	0.04	-3.00%

High Voltage: DC 4.07V

Test Mode	Frequency (MHz)	conducted antenna power density (mW/MHz)				Rated Conducted power density (mW/MHz)	Antenna Power Error (-80%, +20%)
		dBm	mw	90% bandwidth (MHz)	mw/MHz		
BDR	2402-2480	4.910	3.098	70.752	0.044	0.04	10.00%
EDR	2402-2480	4.391	2.749	70.706	0.039	0.04	-3.00%

Normal Voltage: DC 3.7V battery inside

Test Mode	Frequency (MHz)	conducted antenna power density (mW/MHz)				Rated Conducted power density (mW/MHz)	Antenna Power Error (-80%, +20%)
		dBm	mw	90% bandwidth (MHz)	mw/MHz		
BDR	2402-2480	4.91	3.097	70.752	0.044	0.04	10.00%
EDR	2402-2480	4.386	2.745	70.703	0.039	0.04	-3.00%

L:

Low Voltage: DC 3.33V

Test Mode	Frequency (MHz)	conducted antenna power density (mW/MHz)				Rated Conducted power density (mW/MHz)	Antenna Power Error (-80%, +20%)
		dBm	mw	90% bandwidth (MHz)	mw/MHz		
BDR	2402-2480	4.894	3.086	70.754	0.044	0.04	10.00%
EDR	2402-2480	4.208	2.635	70.708	0.037	0.04	-8.00%

High Voltage: DC 4.07V

Test Mode	Frequency (MHz)	conducted antenna power density (mW/MHz)				Rated Conducted power density (mW/MHz)	Antenna Power Error (-80%, +20%)
		dBm	mw	90% bandwidth (MHz)	mw/MHz		
BDR	2402-2480	4.897	3.088	70.750	0.044	0.04	10.00%
EDR	2402-2480	4.210	2.637	70.707	0.037	0.04	-8.00%

Normal Voltage: DC 3.7V battery inside

Test Mode	Frequency (MHz)	conducted antenna power density (mW/MHz)				Rated Conducted power density (mW/MHz)	Antenna Power Error (-80%, +20%)
		dBm	mw	90% bandwidth (MHz)	mw/MHz		
BDR	2402-2480	4.89	3.083	70.753	0.044	0.04	10.00%
EDR	2402-2480	4.210	2.636	70.704	0.037	0.04	-8.00%

9. LIMITATION OF COLLATERAL EMISSIONS OF RECEIVER TEST

9.1. Test Equipment

Same as 1.7

9.2. Test Configuration

Same as 1.6

9.3. Test Data

Scanning Bandwidth	:	30~ 1000MHz
		1000~ 12750MHz

Pass

Please refer to the following data.

Remark: The left and right earphone, both have been tested and this Report only show the test plots of the worst case (R).

Low Voltage: DC 3.33V

BDR

Frequency(MHz)	Reading(dBm)	Scanning Bandwidth	Limit
2402.000	-80.807	30~ 1000MHz	≤ -54dBm
	-67.720	1000~ 12750MHz	≤ -47dBm
2441.000	-80.919	30~ 1000MHz	≤ -54dBm
	-68.875	1000~ 12750MHz	≤ -47dBm
2480.000	-81.513	30~ 1000MHz	≤ -54dBm
	-67.751	1000~ 12750MHz	≤ -47dBm

EDR

Frequency(MHz)	Reading(dBm)	Scanning Bandwidth	Limit
2402.000	-81.958	30~ 1000MHz	≤ -54dBm
	-67.543	1000~ 12750MHz	≤ -47dBm
2441.000	-81.784	30~ 1000MHz	≤ -54dBm
	-67.858	1000~ 12750MHz	≤ -47dBm
2480.000	-80.746	30~ 1000MHz	≤ -54dBm
	-67.341	1000~ 12750MHz	≤ -47dBm

High Voltage: DC 4.07V

BDR

Frequency(MHz)	Reading(dBm)	Scanning Bandwidth	Limit
2402.000	-80.639	30~ 1000MHz	≤ -54dBm
	-67.312	1000~ 12750MHz	≤ -47dBm
2441.000	-81.561	30~ 1000MHz	≤ -54dBm
	-68.755	1000~ 12750MHz	≤ -47dBm
2480.000	-80.909	30~ 1000MHz	≤ -54dBm
	-67.519	1000~ 12750MHz	≤ -47dBm

EDR

Frequency(MHz)	Reading(dBm)	Scanning Bandwidth	Limit
2402.000	-81.282	30~ 1000MHz	≤ -54dBm
	-67.191	1000~ 12750MHz	≤ -47dBm
2441.000	-81.808	30~ 1000MHz	≤ -54dBm
	-68.326	1000~ 12750MHz	≤ -47dBm
2480.000	-80.159	30~ 1000MHz	≤ -54dBm
	-67.776	1000~ 12750MHz	≤ -47dBm

Normal Voltage: DC 3.7V battery inside
BDR

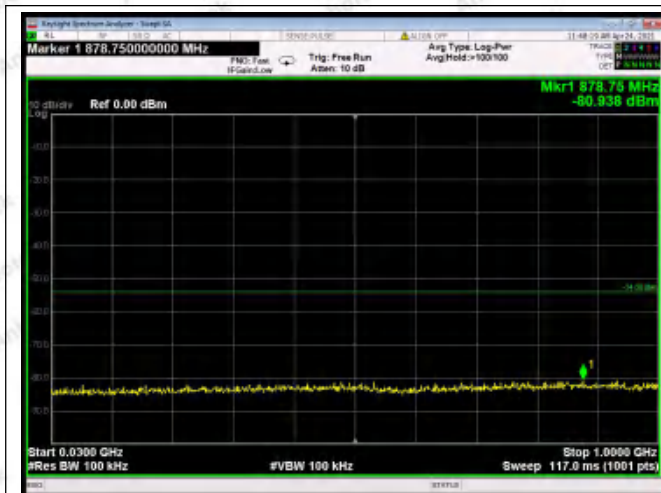
Frequency(MHz)	Reading(dBm)	Scanning Bandwidth	Limit
2402.000	-80.938	30~ 1000MHz	≤ -54dBm
	-67.883	1000~ 12750MHz	≤ -47dBm
2441.000	-81.447	30~ 1000MHz	≤ -54dBm
	-68.611	1000~ 12750MHz	≤ -47dBm
2480.000	-81.251	30~ 1000MHz	≤ -54dBm
	-68.011	1000~ 12750MHz	≤ -47dBm

EDR

Frequency(MHz)	Reading(dBm)	Scanning Bandwidth	Limit
2402.000	-81.878	30~ 1000MHz	≤ -54dBm
	-67.178	1000~ 12750MHz	≤ -47dBm
2441.000	-81.940	30~ 1000MHz	≤ -54dBm
	-67.957	1000~ 12750MHz	≤ -47dBm
2480.000	-80.624	30~ 1000MHz	≤ -54dBm
	-67.653	1000~ 12750MHz	≤ -47dBm

Remark: That worst case normal voltage's plot is reported in the report.

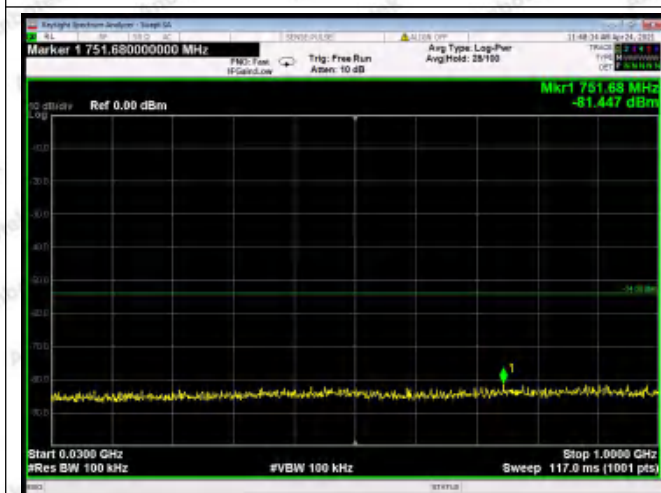
2. The EDR was tested on ($\pi/4$ QPSK, 8DPSK) modes, only the worst data of (8DPSK) is reported in the report.



Test Mode: BDR--Low (30~ 1000MHz)



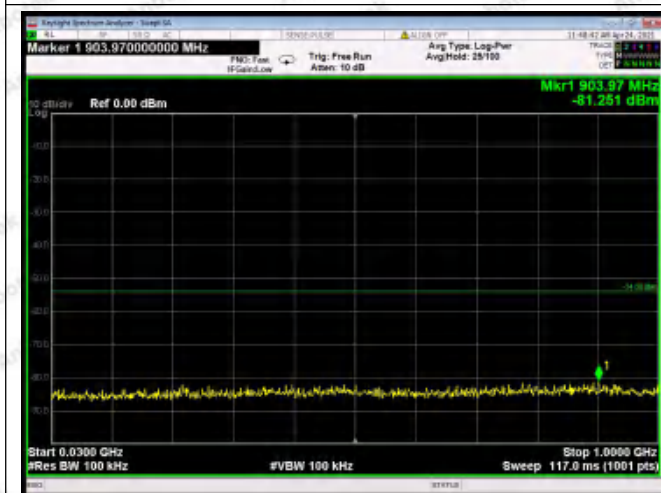
Test Mode: BDR--Low (1000~ 12750MHz)



Test Mode: BDR--Mid (30~ 1000MHz)



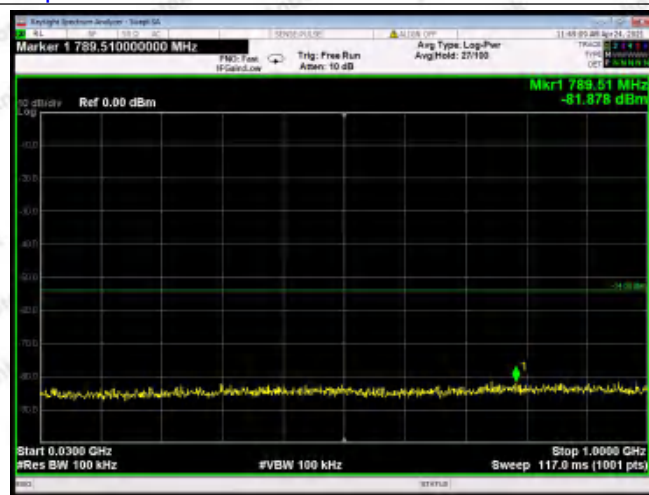
Test Mode: BDR--Mid (1000~ 12750MHz)



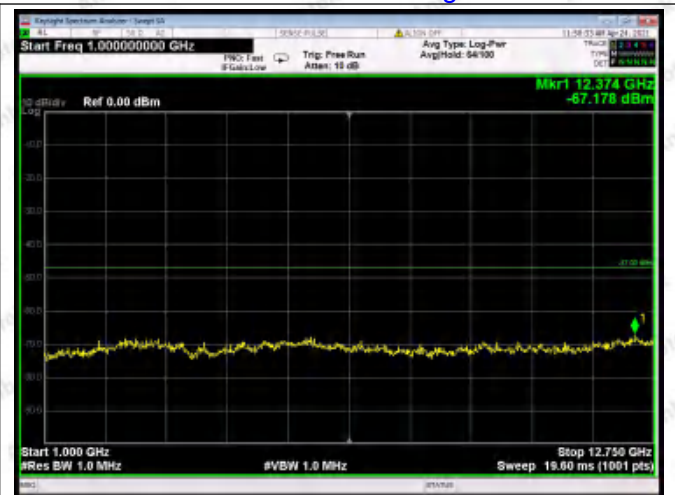
Test Mode: BDR--High (30~ 1000MHz)



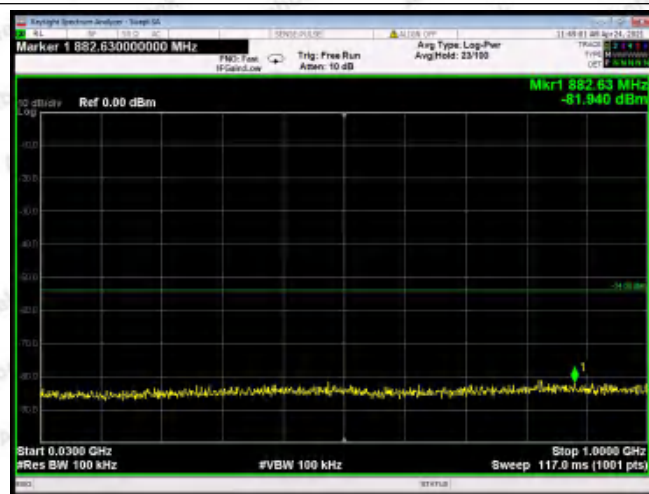
Test Mode: BDR--High (1000~ 12750MHz)



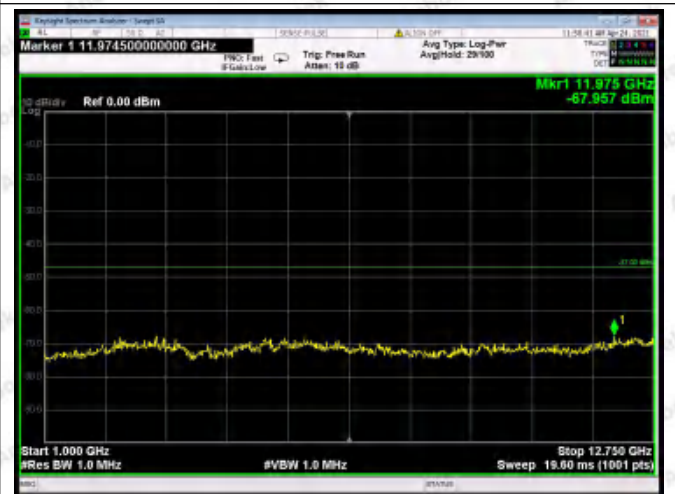
Test Mode: EDR--Low (30~ 1000MHz)



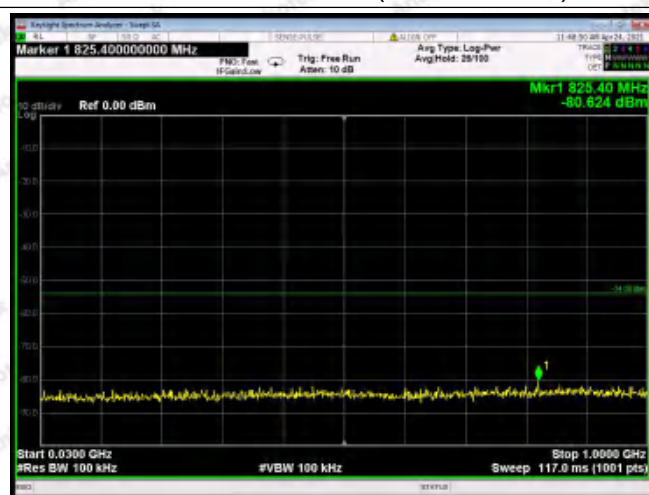
Test Mode: EDR--Low (1000~ 12750MHz)



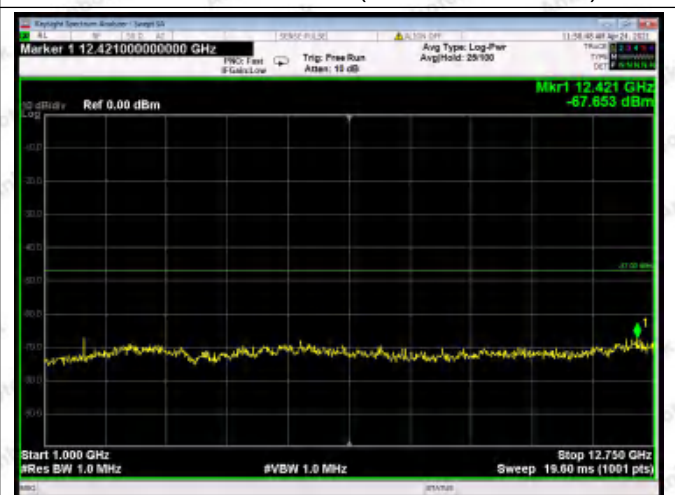
Test Mode: EDR--Mid (30~ 1000MHz)



Test Mode: EDR--Mid (1000~ 12750MHz)



Test Mode: EDR--High (30~ 1000MHz)



Test Mode: EDR--High (1000~ 12750MHz)

Remark: 1. That only normal voltage's plot is reported in the report.

2. The EDR was tested on ($\pi/4$ QPSK, 8DPSK) modes, only the worst data of (8DPSK) is reported in the report.

10. Dwell time measurement

10.1. Test Equipment

Same as 1.7

10.2. Test Configuration

Same as 1.6

10.3. Test Data

Pass

Please refer to the following data.

Package Type	T on (ms)	T on+ T off (ms)	Duty cycle	SPREAD-SPECTRUM BANDWIDTH (MHz)	Transmission rate (Mbits/s)	Spread Factor	Number of channels	Dwell time (s)	Mode
DH1	0.416	1.260	0.3302	70.755	1	70.755	79	0.1183	BDR
DH3	1.665	2.500	0.6660	70.752	1	70.752	79	0.2386	BDR
DH5	2.960	3.752	0.7889	70.751	1	70.751	79	0.2826	BDR
3DH1	0.410	1.250	0.3280	70.706	3	23.569	79	0.0391	EDR
3DH3	1.675	2.505	0.6687	70.703	3	23.568	79	0.0798	EDR
3DH5	2.920	3.744	0.7799	70.709	3	23.570	79	0.0931	EDR

Remark:

1.Duty cycle=T on/ (T on+T off)

2.Spread Factor=SPREAD-SPECTRUM BANDWIDTH/Transmission rate

3.Dwell time=0.4*Spread Factor*Duty cycle/Number of channels



DH1



DH3



DH5



3DH1



3DH3



3DH5

Remark: 1. That only normal voltage's plot is reported in the report.

2. The EDR was tested in ($\pi/4$ QPSK, 8DPSK) modes, only the worst data of (8DPSK) is reported in the report.

Shenzhen Anbotech Compliance Laboratory Limited

Address: 1/F., Building D, Sogood Science and Technology Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.

Tel: (86) 755-26066440 Fax: (86) 755-26014772 Email: service@anbotech.com

Code:AB-RF-07-a

Hotline
400-003-0500
www.anbotech.com

APPENDIX I -- TEST SETUP PHOTOGRAPH



APPENDIX II -- EXTERNAL PHOTOGRAPH





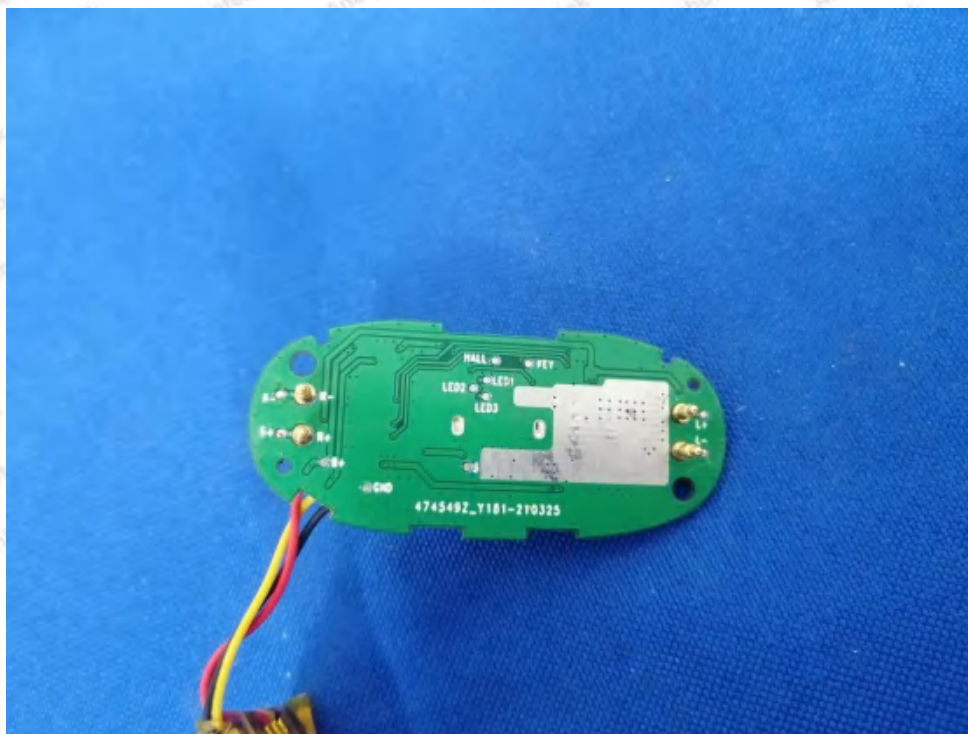
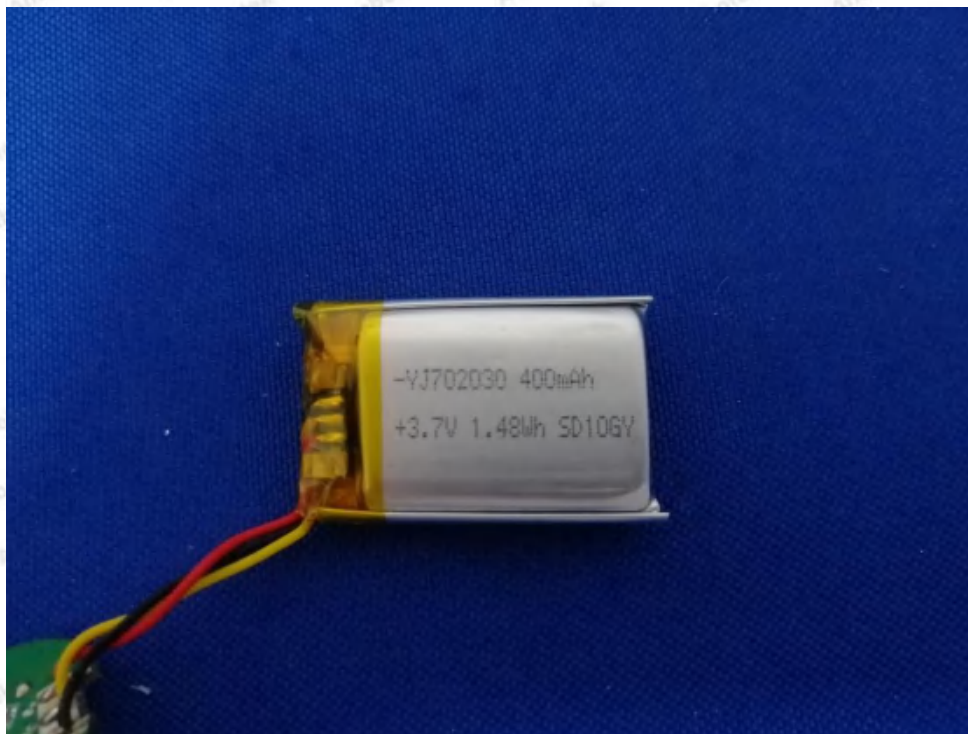


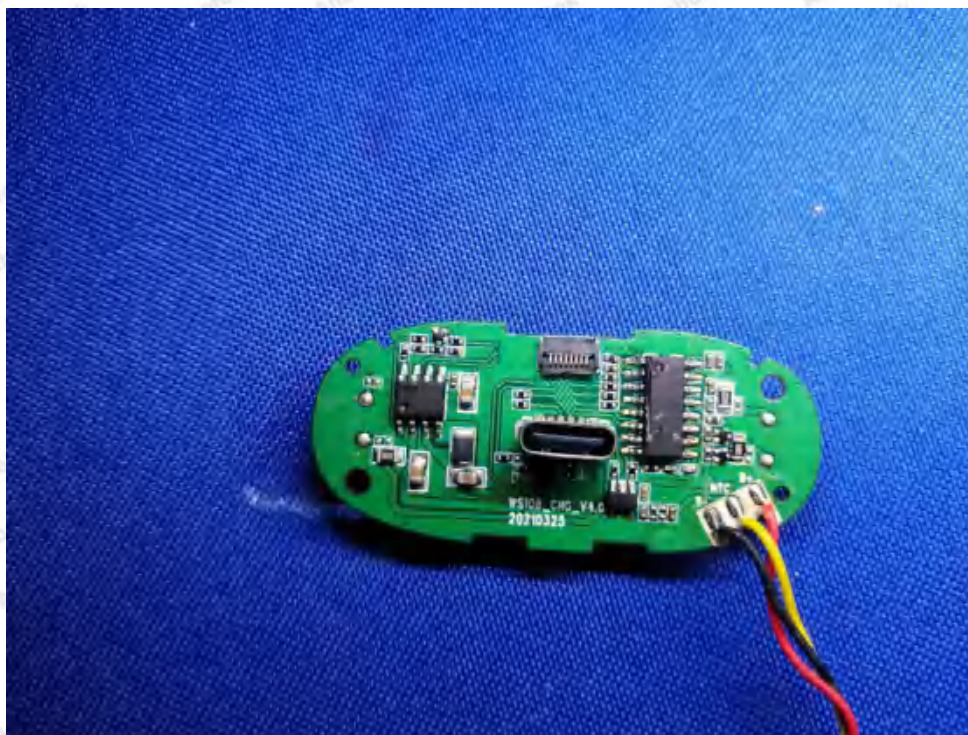




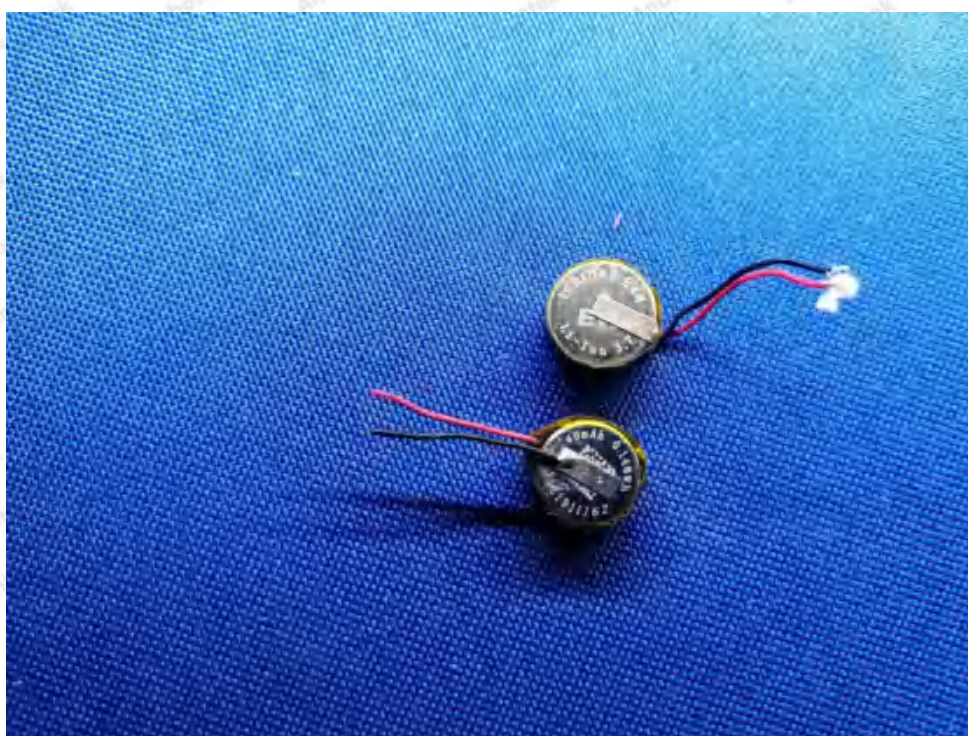
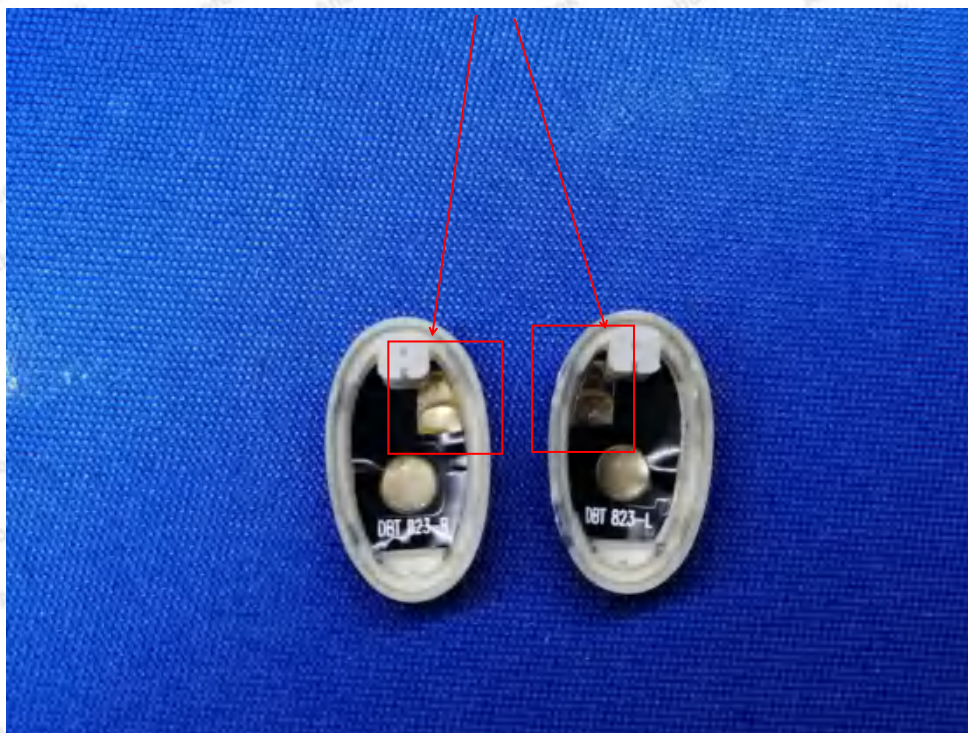


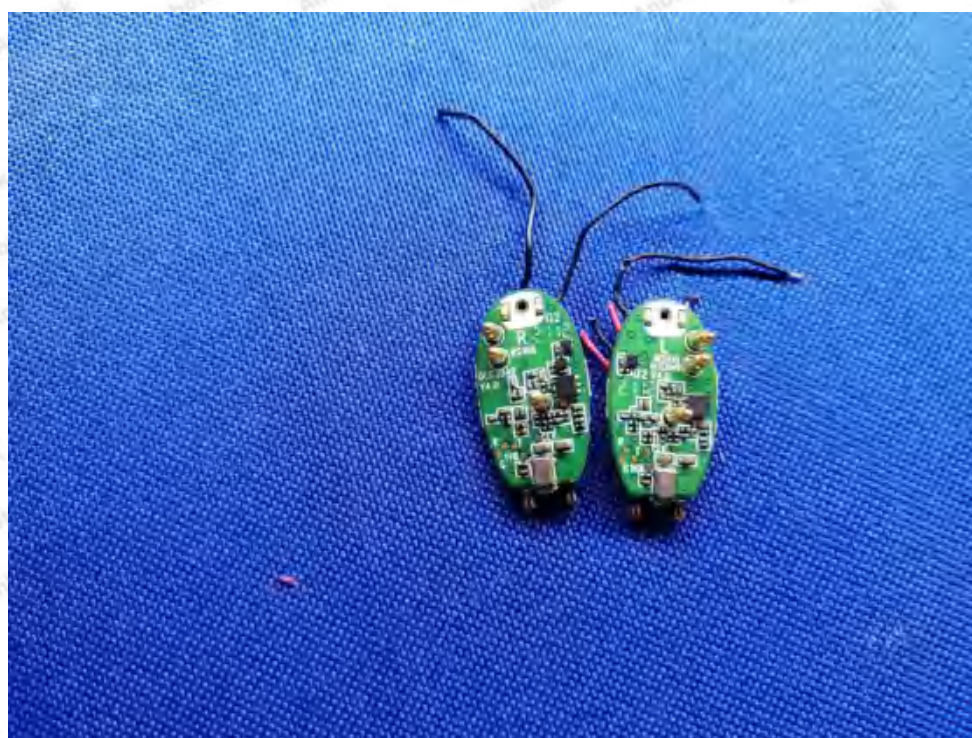
APPENDIX III -- INTERNAL PHOTOGRAPH

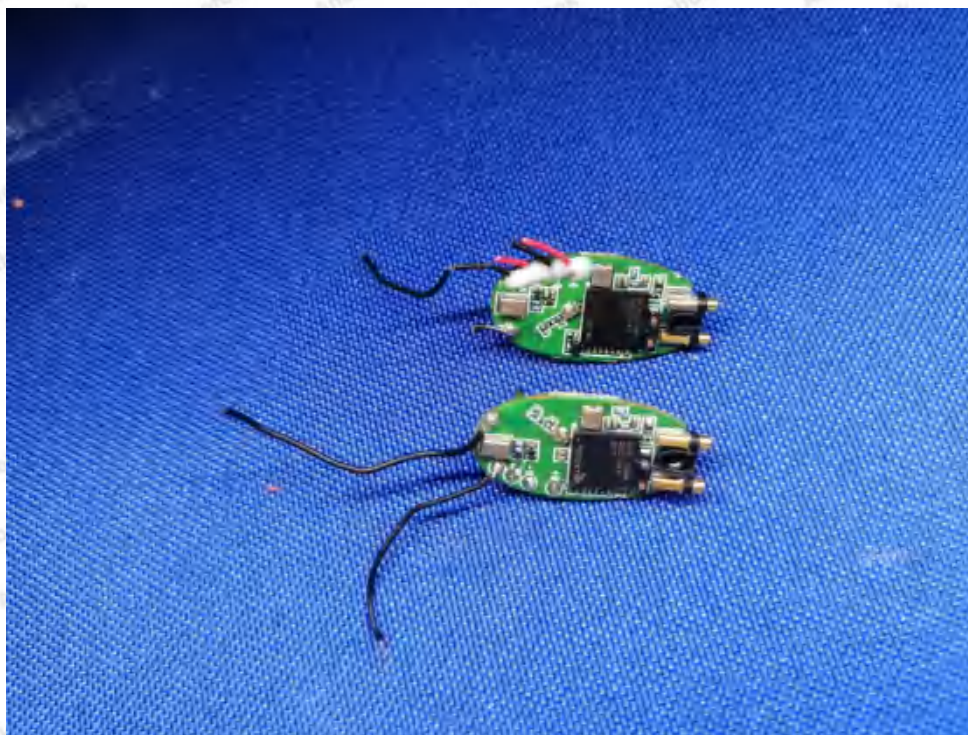




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----- End of Report -----

Shenzhen Anbotech Compliance Laboratory Limited

Address: 1/F., Building D, Sogood Science and Technology Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.

Tel: (86) 755-26066440 Fax: (86) 755-26014772 Email: service@anbotech.com

Code:AB-RF-07-a

 Hotline
400-003-0500
www.anbotech.com