

TEST REPORT

For Bluetooth-LE



Report No..... : CHTW25120135

Project No : SHT2510024301W

FCC ID : 2A3NOTE103

Applicant's name : ZHENGZHOU YSAIR TECHNOLOGY CO.,LTD

Address..... : Room 2101, 21st Floor of B Block, Silicon Valley Plaza, 82 Culture Street,Jinshui District,Zhengzhou City,Henan Province, China

Product Name..... : Hearing Aids

Trade Mark..... : RETEKESS

Model No..... : TE103

Listed Model(s) : -

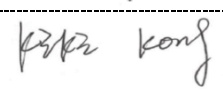
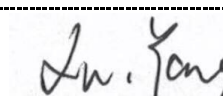
Standard : **FCC CFR Title 47 Part 15 Subpart C § 15.247**

Date of receipt of test sample..... : 2025/10/27

Date of testing..... : 2025/10/27- 2025/12/30

Date of issue..... : 2025/12/31

Result..... : **Pass**

Compiled by (Position+Printed name+Signature) :	File administrator	Xiaodong Zhao	
Supervised by (Position+Printed name+Signature) :	Project Engineer	Kiki Kong	
Approved by (Position+Printed name+Signature) :	RF Manager	Xu Yang	

Testing Laboratory Name : **Shenzhen Huatongwei International Inspection Co., Ltd.**

Address..... : Building 7, Baiwang Idea Factory, No.1051, Songbai Road, Yangguang Community, Xili Subdistrict, Nanshan District, Shenzhen, Guangdong, China

Test Report Form No. : R0066

Test Report Form(s) Originator : Shenzhen Huatongwei International Inspection Co., Ltd.

Master TRF : Dated 2025-07

Shenzhen Huatongwei International Inspection Co., Ltd. All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen Huatongwei International Inspection Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen Huatongwei International Inspection Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context. The test report merely correspond to the test sample. The authenticity of this Test Report and its contents can be verified by contacting the Laboratory, responsible for this Test Report.

Contents

<u>1.</u>	<u>TEST STANDARDS AND REPORT VERSION</u>	<u>3</u>
1.1.	Test Standards	3
1.2.	Report version	3
<u>2.</u>	<u>TEST DESCRIPTION</u>	<u>4</u>
<u>3.</u>	<u>SUMMARY</u>	<u>5</u>
3.1.	Client Information	5
3.2.	Product Description	5
3.3.	Radio Specification Description	5
3.4.	Testing Laboratory Information	6
<u>4.</u>	<u>TEST CONFIGURATION</u>	<u>7</u>
4.1.	Test frequency list	7
4.2.	Descriptions of Test mode	7
4.3.	Test sample information	7
4.4.	Support unit used in test configuration and system	8
4.5.	Testing environmental condition	8
4.6.	Statement of the measurement uncertainty	8
4.7.	Equipment Used during the Test	9
<u>5.</u>	<u>TEST CONDITIONS AND RESULTS</u>	<u>11</u>
5.1.	Antenna Requirement	11
5.2.	AC Conducted Emission	12
5.3.	Peak Output Power	15
5.4.	Power Spectral Density	16
5.5.	6dB bandwidth	17
5.6.	99% Occupied Bandwidth	18
5.7.	Duty Cycle	19
5.8.	Conducted Band edge and Spurious Emission	20
5.9.	Radiated Band edge Emission	21
5.10.	Radiated Spurious Emission	24
<u>6.</u>	<u>TEST SETUP PHOTOS</u>	<u>31</u>
<u>7.</u>	<u>EXTERNAL AND INTERNAL PHOTOS</u>	<u>34</u>
7.1.	External Photos	34
7.2.	Internal Photos	40
<u>8.</u>	<u>APPENDIX REPORT</u>	<u>44</u>

1. TEST STANDARDS AND REPORT VERSION

1.1. Test Standards

The tests were performed according to following standards:

- [FCC CFR Title 47 Part 15 Subpart C § 15.247](#): Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz
- [ANSI C63.10:2020](#): American National Standard for Testing Unlicensed Wireless Devices
- [KDB 558074 D01 15.247 Meas Guidance v05r02](#): Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating under Section 15.247 of The FCC Rules

1.2. Report version

Revision No.	Date of issue	Description
N/A	2025-12-31	Original

2. TEST DESCRIPTION

Report clause	Test Items	Standard Requirement	Result	Test Engineer
5.1	Antenna Requirement	15.203/15.247(c)	PASS	Xiangyu Wei
5.2	AC Conducted Emission	15.207	PASS	JUNXU.LIN
5.3	Peak Output Power	15.247(b)(3)	PASS	Xiangyu Wei
5.4	Power Spectral Density	15.247(e)	PASS	Xiangyu Wei
5.5	6dB Bandwidth	15.247(a)(2)	PASS	Xiangyu Wei
5.6	99% Occupied Bandwidth	-	PASS ^{*1}	Xiangyu Wei
5.7	Duty cycle	-	PASS ^{*1}	Xiangyu Wei
5.8	Conducted Band Edge and Spurious Emission	15.247(d)/15.205	PASS	Xiangyu Wei
5.9	Radiated Band Edge Emission	15.205/15.209	PASS	Sijiaxing
5.10	Radiated Spurious Emission	15.247(d)/15.205/15.209	PASS	JUNMAN.WANG JUNXU.LIN

Note:

- The measurement uncertainty is not included in the test result.
- ^{*1}: No requirement on standard, only report these test data.

3. SUMMARY

3.1. Client Information

Applicant:	ZHENGZHOU YSAIR TECHNOLOGY CO.,LTD
Address:	Room 2101, 21st Floor of B Block, Silicon Valley Plaza, 82 Culture Street,Jinshui District,Zhengzhou City,Henan Province, China
Manufacturer:	HONG KONG RETEKESS CO.,LIMITED
Address:	FLAT/RM 1019B 10/F LIVEN HOUSE NO.61-63 KING YIP STREET KWUN TONG KL
Factory:	XIAMEN NEWSOUND TECHNOLOGY CO.LTD
Address:	No. 13, Xiangyue Road, Industrial Zone, Torch High-tech Zone (Xiang'an), Xiamen, Fujian Province

3.2. Product Description

Main unit information:	
Product Name:	Hearing Aids
Trade Mark:	RETEKESS
Model No.:	TE103
Listed Model(s):	-
Power supply:	DC 3.6V from Battery
Hardware version:	V3.1
Software version:	V1.0

3.3. Radio Specification Description

Bluetooth version:	V5.0
Support function:	BLE1M,BLE2M
Modulation:	GFSK
Operation frequency:	2402MHz~2480MHz
Channel number:	40
Channel separation:	2MHz
Antenna type:	FPC Antenna
Antenna gain:	-1.88dBi

3.4. Testing Laboratory Information

Laboratory Name	Shenzhen Huatongwei International Inspection Co., Ltd.	
Laboratory Location	Building 7, Baiwang Idea Factory, No.1051, Songbai Road, Yangguang Community, Xili Subdistrict, Nanshan District, Shenzhen, Guangdong, China	
Contact information:	Phone: 400-963-0755 E-mail: cs@szhtw.com.cn http://www.szhtw.com.cn	
Qualifications	Type	Accreditation Number
	FCC Registration Number	762235
	FCC Designation Number	CN1181

4. TEST CONFIGURATION

4.1. Test frequency list

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channels which were tested. The Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the below blue front.

Channel	Frequency (MHz)
00	2402
01	2404
. . .	. . .
19	2440
. . .	. . .
38	2478
39	2480

4.2. Descriptions of Test mode

For RF test items
The engineering test program was provided and enabled to make EUT continuous transmit.
For Radiated spurious emissions:
The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data Recorded in the report.
For AC Conducted Emission:
Charging

4.3. Test sample information

Test item	HTW sample no.
RF Conducted test items	Please refer to the description in the appendix report
RF Radiated test items	YPHT25100243005
EMI test items	YPHT25100243001

Note:

RF Conducted test items: Peak Output Power, Power Spectral Density, 6dB Bandwidth, 99% Occupied Bandwidth, Duty cycle, Conducted Band Edge and Spurious Emission

RF Radiated test items: Radiated Band Edge Emission, Radiated Spurious Emission

EMI test items: AC Conducted Emission

4.4. Support unit used in test configuration and system

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Whether support unit is used?			
✓ Yes			
Item	Equipment	Trade Name	Model No.
1	Adapter	-	HW-050200C01
2			

4.5. Testing environmental condition

Type	Requirement	Actual
Temperature:	15~35°C	25°C
Relative Humidity:	25~75%	50%
Air Pressure:	860~1060mbar	1000mbar

4.6. Statement of the measurement uncertainty

No.	Test Items	Measurement Uncertainty
1	AC Conducted Emission	3.21dB
2	Peak Output Power	1.07
3	Power Spectral Density	1.07
4	6dB Bandwidth	0.002%
5	99% Occupied Bandwidth	0.002%
6	Duty cycle	-
7	Conducted Band Edge and Spurious Emission	1.68dB
8	Radiated Band Edge Emission	4.54dB for 30MHz-1GHz 5.10dB for above 1GHz
9	Radiated Spurious Emission	4.54dB for 30MHz-1GHz 5.10dB for above 1GHz

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.

4.7. Equipment Used during the Test

● EMC Test Software					
Used	Test Item	Software Name	Manufacturer	Equipment No.	Version
●	Conducted Emission	EMC32	R&S	HTWER012	V10.60.20
●	Radiated Emission	EMC32	R&S	HTWER012	V10.60.20
●	Radiated Spurious Emission	E3	AUDIX	HTWER006	V6.110407a
●	RF Conducted	JS1120-3 RF Test Software	Tonscend	-	V3.6.21

● RF Conducted test item							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Signal and spectrum Analyzer	R&S	HTWE0242	FSV40	100048	2025/8/19	2026/8/18
●	Vector signal generator	R&S	HTWE0244	SMBV100A	260790	2025/3/13	2026/3/12
●	OSP	R&S	HTWE0243	OSP120	101317	2025/8/19	2026/8/18
●	10dB Attenuator	R&S	HTWE0250-01	10dB Attenuator-1	N/A	2025/8/22	2026/8/21
●	10dB Attenuator	R&S	HTWE0250-02	10dB Attenuator-2	N/A	2025/8/22	2026/8/21
●	10dB Attenuator	R&S	HTWE0250-03	10dB Attenuator-3	N/A	2025/8/22	2026/8/21
●	10dB Attenuator	R&S	HTWE0250-04	10dB Attenuator-4	N/A	2025/8/22	2026/8/21
●	30dB Attenuator	R&S	HTWE0250-05	30dB Attenuator-5	N/A	2025/8/22	2026/8/21

● Auxiliary Equipment							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Climate chamber	ESPEC	HTWS0715	GPL-2	N/A	2025/6/11	2026/6/10
●	Walk-in Constant Temperature And Humidity Cabinet	重庆银河	HTWS0383	SDJ610A	201800463	2025/6/11	2026/6/10
○	DC Power Supply	Gwinstek	HTWE0274	SPS-2415	GER835793	N/A	N/A
○	DC Power Supply	MESTEK	HTWE0705	DP6010	00230820197	N/A	N/A

● Conducted Emission

Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	EMI Test Receiver	R&S	HTWE0111	ESCI	101247	2025/8/6	2026/8/5
●	Artificial Mains	SCHWARZBECK	HTWE0113	NNLK 8121	573	2025/8/6	2026/8/5
●	Protection Network	SCHWARZBECK	HTWE0567	VTSD9561FN	00899	2025/8/6	2026/8/5
●	ISN	FCC	HTWE0148	FCC-TLISN-T2-02	20371	2025/8/6	2026/8/5
●	ISN	FCC	HTWE0150	FCC-TLISN-T8-02	20375	2025/8/6	2026/8/5

● Radiated emission- 9kHz~30MHz

Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2023/4/6	2026/4/5
●	EMI Test Receiver	R&S	HTWE0099	ESCI 7	100900	2025/8/6	2026/8/5
●	Loop Antenna	R&S	HTWE0546	HFH2-Z2E	101073	2024/4/8	2027/4/7

● Radiated emission- 30MHz~1GHz

Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2023/4/6	2026/4/5
●	EMI Test Receiver	R&S	HTWE0099	ESCI 7	100900	2025/8/6	2026/8/5
●	Ultra-Broadband Antenna	SCHWARZBECK	HTWE0119	VULB9163	546	2023/2/22	2026/2/21
●	Pre-Amplifier	SCHWARZBECK	HTWE0295	BBV 9742	/	2025/5/26	2026/5/25
●	CMAD	SCHWARZBECK	HTWE0537	CMAD1614	1614-530	2025/8/4	2026/8/3

● Radiated emission- Above 1GHz

Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Full-Anechoic Chamber	Albatross projects	HTWE0122	SAC-3m-01	C11122	2023/4/17	2026/4/16
●	Spectrum Analyzer	R&S	HTWE0098	FSP40	100597	2025/8/6	2026/8/5
●	Horn Antenna	SCHWARZBECK	HTWE0126	BBHA 9120D	1011	2023/2/14	2026/2/13
●	Broadband Pre-amplifier	SCHWARZBECK	HTWE0551	SCU18F	100855	2025/5/26	2026/5/25

● Auxiliary Equipment

Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
○	DC Power Supply	Gwinstek	HTWE0274	SPS-2415	GER835793	N/A	N/A
○	DC Power Supply	MESTEK	HTWE0705	DP6010	00230820197	N/A	N/A

5. TEST CONDITIONS AND RESULTS

5.1. Antenna Requirement

REQUIREMENT

FCC CFR Title 47 Part 15 Subpart C Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

TEST RESULT

☒ Passed ☐ Not Applicable

The antenna type is a FPC antenna, please refer to the below antenna photo.



5.2. AC Conducted Emission

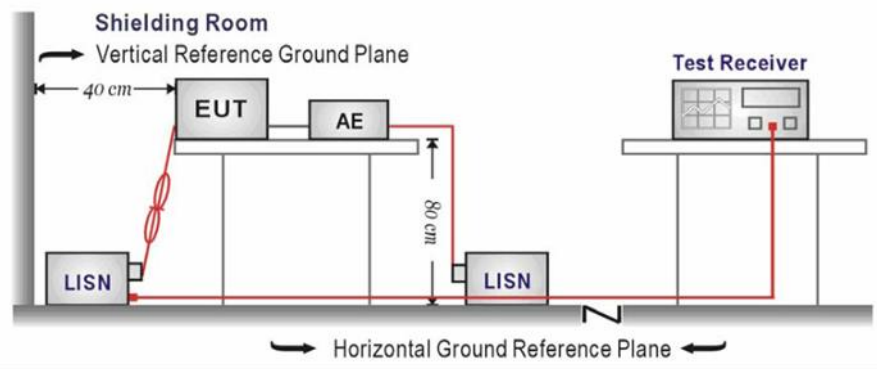
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup according to ANSI C63.10 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST MODE

Refer to the clause 4.2

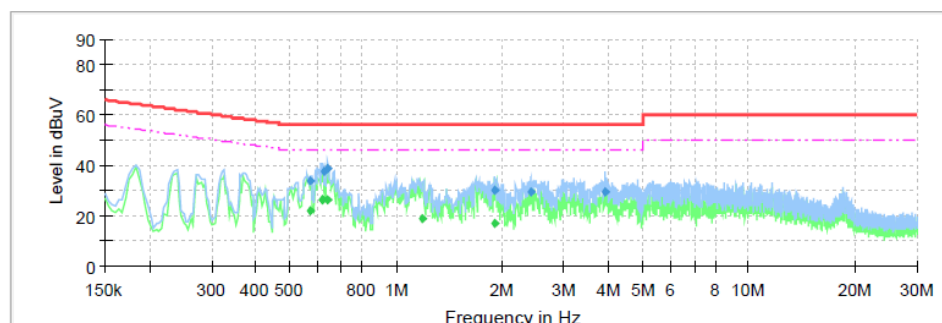
TEST RESULT

☒ Passed ☐ Not Applicable

BLE1M:

Test Line:

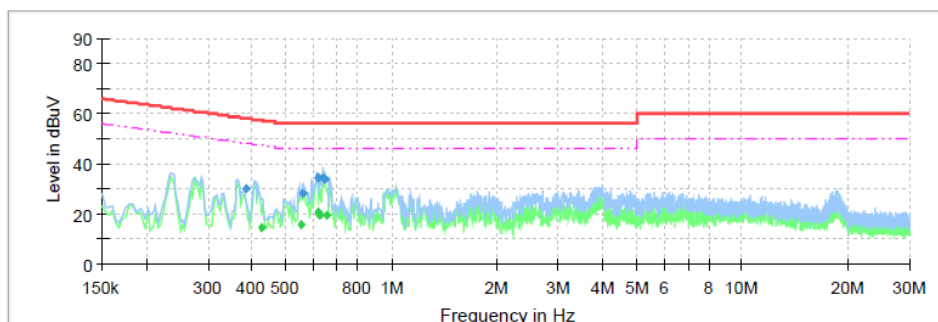
L

**Final Result**

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
0.5699	---	21.71	46.00	24.29	L1	10.2
0.5739	33.81	---	56.00	22.19	L1	10.2
0.6155	---	25.99	46.00	20.01	L1	10.2
0.6179	---	25.99	46.00	20.01	L1	10.2
0.6259	37.74	---	56.00	18.26	L1	10.2
0.6400	38.61	---	56.00	17.39	L1	10.2
0.6400	---	26.05	46.00	19.95	L1	10.2
1.1874	---	18.54	46.00	27.46	L1	10.2
1.8969	---	17.03	46.00	28.97	L1	10.4
1.9129	29.83	---	56.00	26.17	L1	10.4
2.4124	29.58	---	56.00	26.42	L1	10.4
3.9233	29.12	---	56.00	26.88	L1	10.2

Test Line:

N

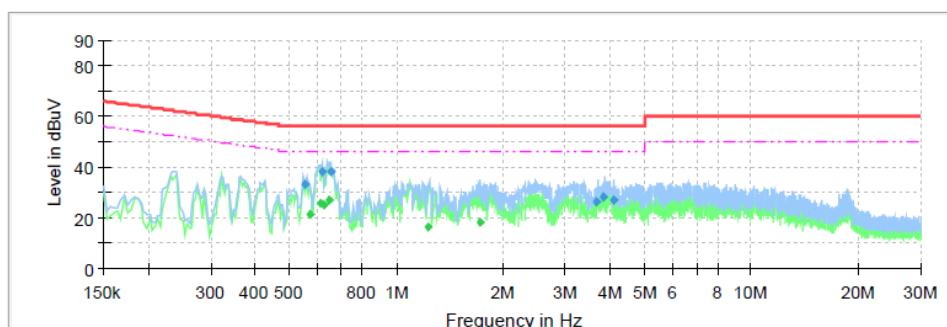
**Final Result**

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
0.3850	29.91	---	58.17	28.26	N	10.3
0.4290	---	14.29	47.27	32.98	N	10.3
0.5550	---	15.46	46.00	30.54	N	10.3
0.5579	28.17	---	56.00	27.83	N	10.3
0.6165	34.11	---	56.00	21.89	N	10.3
0.6165	---	20.41	46.00	25.59	N	10.3
0.6222	34.64	---	56.00	21.36	N	10.3
0.6222	---	20.04	46.00	25.96	N	10.3
0.6240	---	19.38	46.00	26.62	N	10.3
0.6400	34.60	---	56.00	21.40	N	10.3
0.6499	33.97	---	56.00	22.03	N	10.3
0.6539	---	19.24	46.00	26.76	N	10.3

BLE2M:

Test Line:

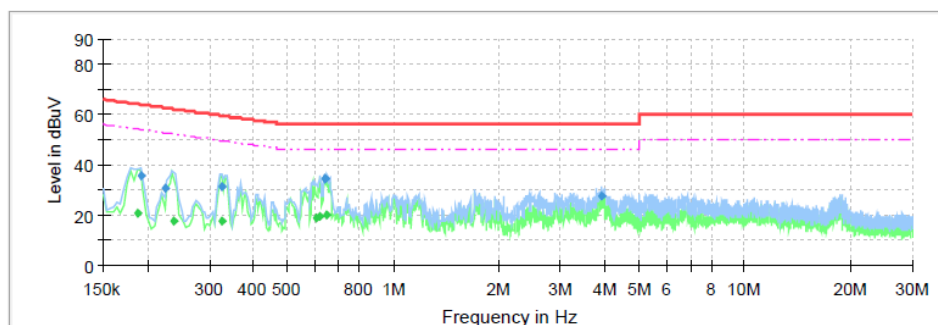
L

**Final Result**

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
0.5547	33.40	---	56.00	22.60	L1	10.1
0.5707	---	21.55	46.00	24.45	L1	10.2
0.6139	---	25.80	46.00	20.20	L1	10.2
0.6179	38.34	---	56.00	17.66	L1	10.2
0.6224	---	25.11	46.00	20.89	L1	10.2
0.6475	---	26.80	46.00	19.20	L1	10.2
0.6515	38.37	---	56.00	17.63	L1	10.2
1.2290	---	16.42	46.00	29.58	L1	10.2
1.7146	---	17.87	46.00	28.13	L1	10.4
3.6805	26.33	---	56.00	29.67	L1	10.3
3.8444	28.43	---	56.00	27.57	L1	10.3
4.1074	26.86	---	56.00	29.14	L1	10.2

Test Line:

N

**Final Result**

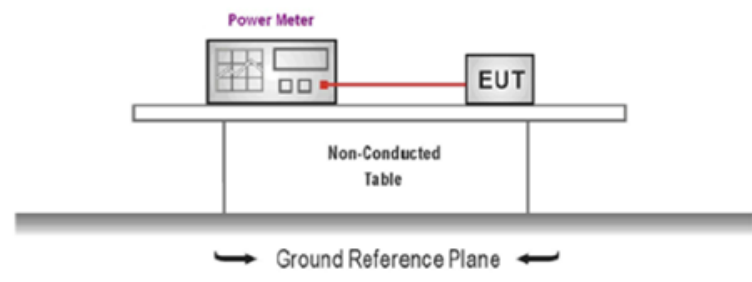
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
0.1888	---	20.66	54.09	33.43	N	10.1
0.1925	35.84	---	63.93	28.09	N	10.1
0.2253	30.77	---	62.62	31.85	N	10.2
0.2373	---	17.37	52.19	34.82	N	10.2
0.3269	31.35	---	59.53	28.18	N	10.3
0.3269	---	17.48	49.53	32.05	N	10.3
0.6038	---	18.75	46.00	27.25	N	10.3
0.6216	---	19.42	46.00	26.58	N	10.3
0.6426	34.28	---	56.00	21.72	N	10.3
0.6435	34.38	---	56.00	21.62	N	10.3
0.6475	---	20.04	46.00	25.96	N	10.3
3.9158	27.25	---	56.00	28.75	N	10.1

5.3. Peak Output Power

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(3): 30dBm

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was tested according to ANSI C63.10 and KDB 558074 D01 requirements.
2. The maximum peak conducted output power may be measured using a broadband peak RF power meter.
3. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.
4. Record the measurement data.

TEST MODE

Refer to the clause 4.2

TEST RESULT

☒ Passed ☐ Not Applicable

TEST DATA

Refer to the appendix report

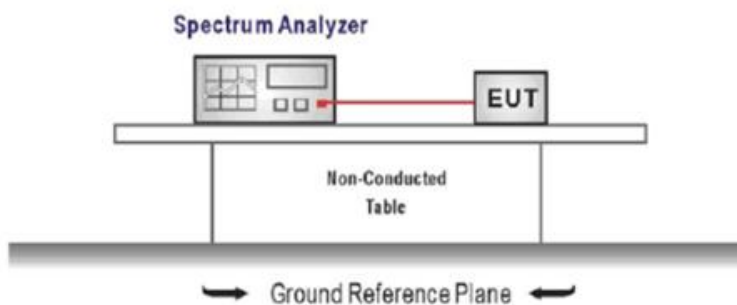
5.4. Power Spectral Density

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (e):

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input,
2. Configure the spectrum analyzer as shown below:
Center frequency=DTS channel center frequency
Span =1.5 times the DTS bandwidth
 $RBW = 3 \text{ kHz} \leq RBW \leq 100 \text{ kHz}$, $VBW \geq 3 \times RBW$
Sweep time = auto couple
Detector = peak
Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter wave form on the spectrum analyzer.
4. Use the peak marker function to determine the maximum amplitude level within the RBW.
5. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

TEST MODE

Refer to the clause 4.2

TEST RESULT

☒ Passed ☐ Not Applicable

TEST DATA

Refer to the appendix report

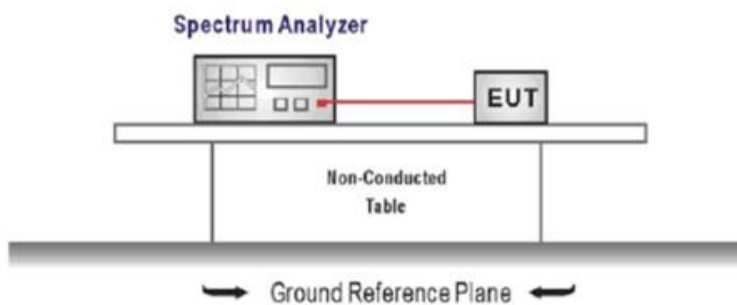
5.5. 6dB bandwidth

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(2):

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).
Center Frequency = DTS channel center frequency
Span = 4 MHz
RBW = 100 kHz, VBW $\geq 3 \times$ RBW
Sweep time = auto couple
Detector = Peak
Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission, and record the pertinent measurements.

TEST MODE

Refer to the clause 4.2

TEST RESULT

☒ Passed ☐ Not Applicable

TEST DATA

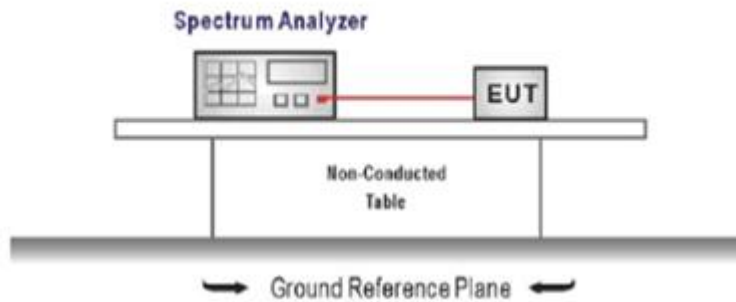
Refer to the appendix report

5.6. 99% Occupied Bandwidth

LIMIT

N/A

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).
 Center Frequency = channel center frequency
 Span $\geq 1.5 \times \text{OBW}$
 RBW = 1%~5%OBW
 VBW $\geq 3 \times \text{RBW}$
 Sweep time = auto couple
 Detector = Peak
 Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.

TEST MODE

Refer to the clause 4.2

TEST RESULT

☒ Passed ☐ Not Applicable

TEST DATA

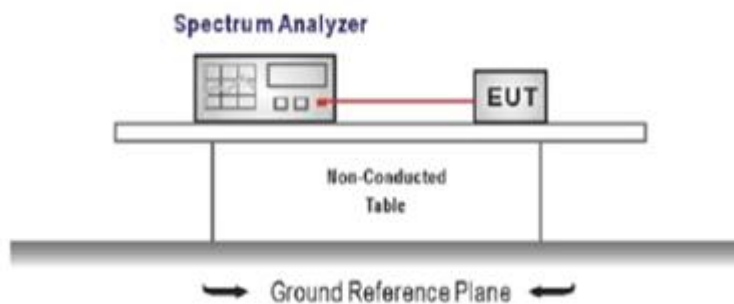
Refer to the appendix report

5.7. Duty Cycle

LIMIT

N/A

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
Span=zero span, Frequency=centered channel, RBW= 10 MHz, VBW $\geq$ RBW
Sweep=as necessary to capture the entire dwell time,
Detector function = peak, Trigger mode
4. Measure and record the duty cycle data

TEST MODE

Refer to the clause 4.2

TEST DATA

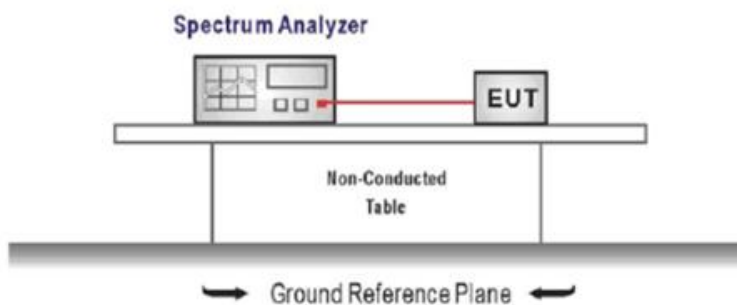
Refer to the appendix report

5.8. Conducted Band edge and Spurious Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Emission level measurement
 Set the center frequency and span to encompass frequency range to be measured
 $RBW = 100 \text{ kHz}$, $VBW \geq 3 \times RBW$
 Detector = peak, Sweep time = auto couple, Trace mode = max hold
 Allow trace to fully stabilize
 Use the peak marker function to determine the maximum amplitude level.
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.
4. Ensure that the amplitude of all unwanted emission outside of the authorized frequency band excluding restricted frequency bands) are attenuated by at least the minimum requirements specified (at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz). Report the three highest emission relative to the limit.

TEST MODE

Refer to the clause 4.2

TEST RESULT

☒ Passed ☐ Not Applicable

TEST DATA

Refer to the appendix report

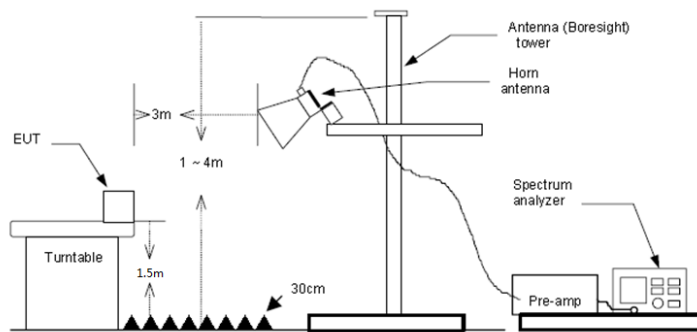
5.9. Radiated Band edge Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, Radiated Emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the Radiated Emissions limits specified in §15.209(a) (see §15.205(c)).

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10 .
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10 on radiated measurement.
5. Use the following spectrum analyzer settings:
 - a) Span shall wide enough to fully capture the emission being measured
 - b) Set RBW=100kHz for <1GHz, VBW=3*RBW, Sweep time=auto, Detector=peak, Trace=max hold
 - c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement

For average measurement:

 - VBW=10Hz, When duty cycle is no less than 98 percent
 - $VBW \geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation, so refer to this clause 5.6 duty cycle.

TEST MODE

Refer to the clause 4.2

TEST RESULT

☒ Passed ☐ Not Applicable

Note:

- 1) Level= Reading + Factor; Factor =Antenna Factor+ Cable Loss- Preamp Factor
- 2) Over Limit = Level– Limit
- 3) Average measurement was not performed if peak level is lower than average limit(54 dBuV/m).

BLE 1M

Test channel		CH00			Polarity		Horizontal		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2310.00	41.68	27.86	4.11	41.00	32.65	74.00	-41.35	Peak
2	2390.01	53.43	27.54	4.19	41.00	44.16	74.00	-29.84	Peak

Test channel		CH00			Polarity		Vertical		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2310.00	42.47	27.86	4.11	41.00	33.44	74.00	-40.56	Peak
2	2390.01	52.97	27.54	4.19	41.00	43.70	74.00	-30.30	Peak

Test channel		CH39			Polarity		Horizontal		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.50	66.63	27.33	4.27	41.00	57.23	74.00	-16.77	Peak
2	2500.00	47.83	27.30	4.28	41.00	38.41	74.00	-35.59	Peak

Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.50	52.68	27.33	4.27	41.00	43.28	54.00	-10.72	Average
2	2500.00	38.94	27.30	4.28	41.00	29.52	54.00	-24.48	Average

Test channel		CH39			Polarity		Vertical		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.50	64.85	27.33	4.27	41.00	55.45	74.00	-18.55	Peak
2	2500.00	47.51	27.30	4.28	41.00	38.09	74.00	-35.91	Peak

Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.50	52.72	27.33	4.27	41.00	43.32	54.00	-10.68	Average
2	2500.00	39.39	27.30	4.28	41.00	29.97	54.00	-24.03	Average

BLE 2M

Test channel		CH00				Polarity		Horizontal		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark	
1	2310.00	43.03	27.86	4.11	41.00	34.00	74.00	-40.00	Peak	
2	2380.42	57.16	27.58	4.18	41.00	47.92	74.00	-26.08	Peak	
3	2390.01	54.79	27.54	4.19	41.00	45.52	74.00	-28.48	Peak	
Test channel		CH00				Polarity		Vertical		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark	
1	2310.00	43.48	27.86	4.11	41.00	34.45	74.00	-39.55	Peak	
2	2390.01	56.40	27.54	4.19	41.00	47.13	74.00	-26.87	Peak	

Test channel		CH39			Polarity			Horizontal		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark	
1	2483.50	61.44	27.33	4.27	41.00	52.04	74.00	-21.96	Peak	
2	2484.42	63.41	27.33	4.27	41.00	54.01	74.00	-19.99	Peak	
3	2500.00	51.36	27.30	4.28	41.00	41.94	74.00	-32.06	Peak	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark	
1	2483.50	50.29	27.33	4.27	41.00	40.89	54.00	-13.11	Average	
2	2500.00	41.66	27.30	4.28	41.00	32.24	54.00	-21.76	Average	

Test channel		CH39			Polarity			Vertical		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark	
1	2483.50	61.14	27.33	4.27	41.00	51.74	74.00	-22.26	Peak	
2	2483.60	65.20	27.33	4.27	41.00	55.80	74.00	-18.20	Peak	
3	2500.00	53.10	27.30	4.28	41.00	43.68	74.00	-30.32	Peak	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark	
1	2483.50	48.67	27.33	4.27	41.00	39.27	54.00	-14.73	Average	
2	2500.00	40.69	27.30	4.28	41.00	31.27	54.00	-22.73	Average	

5.10. Radiated Spurious Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209

Frequency	Limit (dBuV/m)	Value
0.009 MHz ~0.49 MHz	2400/F(kHz) @300m	Quasi-peak
0.49 MHz ~ 1.705 MHz	24000/F(kHz) @30m	Quasi-peak
1.705 MHz ~30 MHz	30 @30m	Quasi-peak

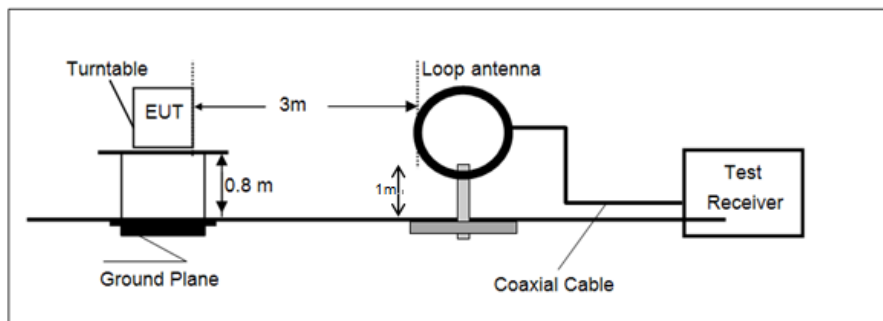
Note: Limit dBuV/m @3m = Limit dBuV/m @300m + 40*log(300/3)= Limit dBuV/m @300m +80,

Limit dBuV/m @3m = Limit dBuV/m @30m +40*log(30/3)= Limit dBuV/m @30m + 40.

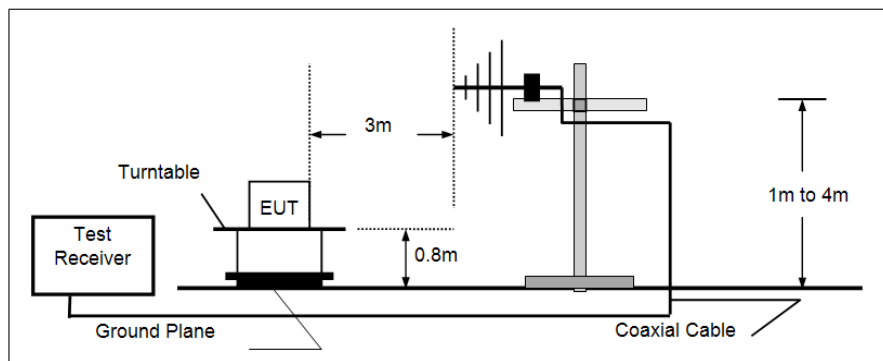
Frequency	Limit (dBuV/m @3m)	Value
30MHz~88MHz	40.00	Quasi-peak
88MHz~216MHz	43.50	Quasi-peak
216MHz~960MHz	46.00	Quasi-peak
960MHz~1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

- 9 kHz ~ 30 MHz



- 30 MHz ~ 1 GHz



- Above 1 GHz

For 9 kHz ~ 30 MHz

The EUT was pre-scanned this frequency band, found the radiated level 20dB lower than the limit, so don't show data on this report.

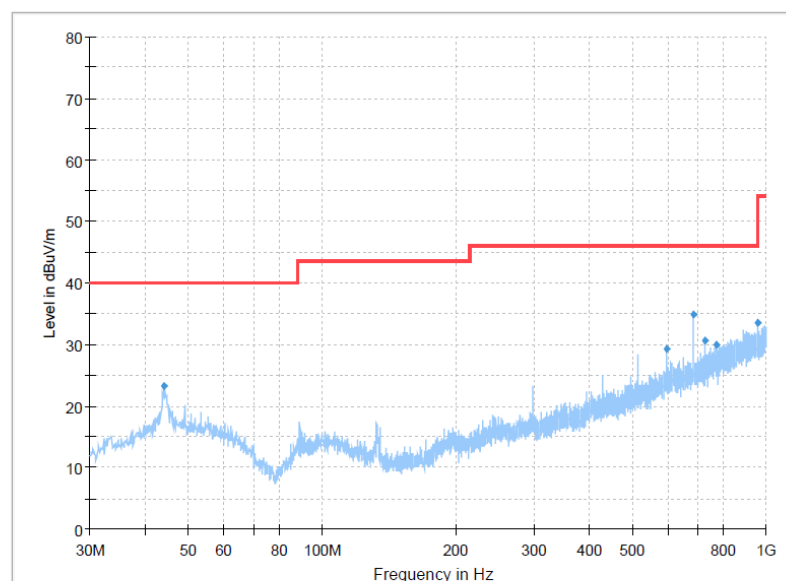
For 30 MHz ~ 1000 MHz

Have pre-scan all test channel, found CH39 which it was worst case, so only show the worst case's data on this report.

BLE 1M

Polarization:

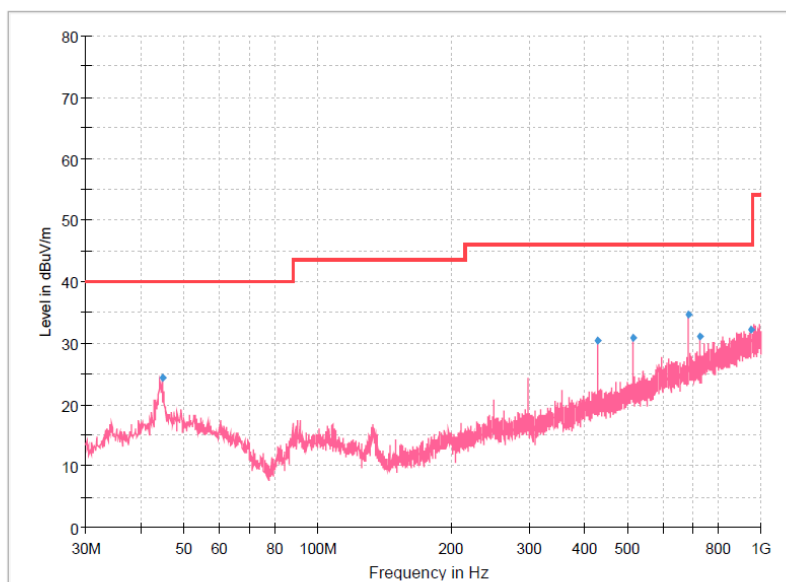
Horizontal

**Final Result**

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
44.1863	23.30	40.00	16.70	100.0	H	249.0	-8.8
595.2675	29.32	46.00	16.68	100.0	H	222.0	0.8
687.5388	34.76	46.00	11.24	100.0	H	291.0	2.1
729.1275	30.65	46.00	15.35	100.0	H	0.0	3.2
774.4750	30.05	46.00	15.95	100.0	H	0.0	4.1
956.5925	33.51	46.00	12.49	100.0	H	12.0	7.3

Polarization:

Vertical

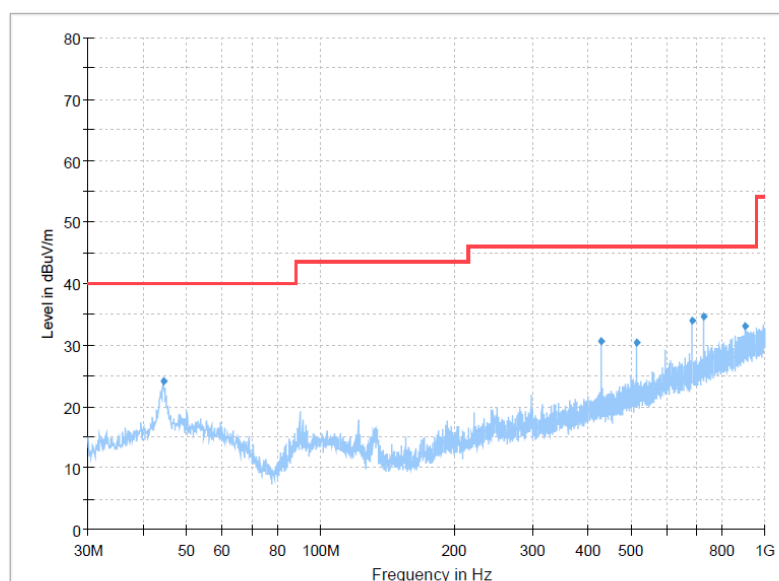
**Final Result**

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
44.5500	24.38	40.00	15.62	100.0	V	60.0	-8.8
427.4575	30.39	46.00	15.61	100.0	V	359.0	-3.5
513.0600	30.74	46.00	15.26	100.0	V	246.0	-1.7
687.5388	34.64	46.00	11.36	100.0	V	172.0	2.1
729.1275	30.99	46.00	15.01	100.0	V	11.0	3.2
951.0150	32.25	46.00	13.75	100.0	V	0.0	7.1

BLE 2M

Polarization:

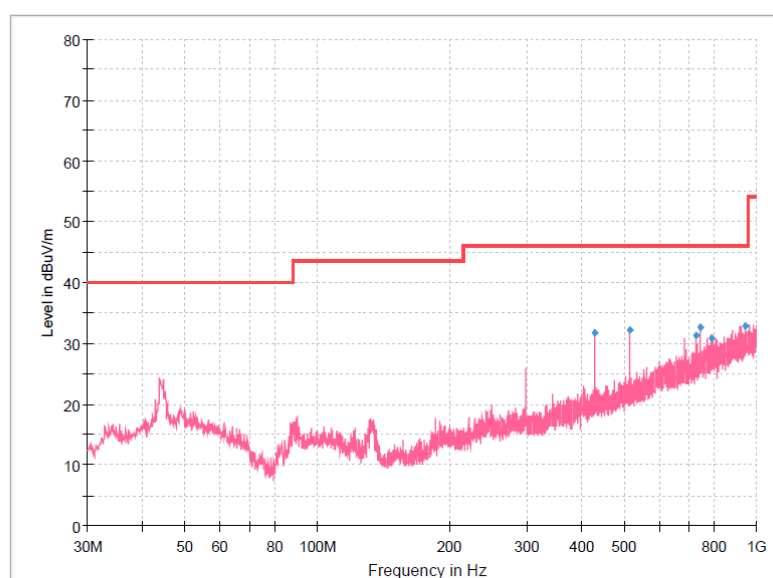
Horizontal

**Final Result**

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
44.3075	24.21	40.00	15.79	100.0	H	276.0	-8.8
427.4575	30.51	46.00	15.49	100.0	H	354.0	-3.5
513.0600	30.49	46.00	15.51	100.0	H	192.0	-1.7
687.5388	34.03	46.00	11.97	100.0	H	335.0	2.1
729.0063	34.59	46.00	11.41	100.0	H	0.0	3.2
900.0900	33.08	46.00	12.92	100.0	H	250.0	6.5

Polarization:

Vertical

**Final Result**

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
427.4575	31.83	46.00	14.17	100.0	V	203.0	-3.5
513.0600	32.25	46.00	13.75	100.0	V	27.0	-1.7
729.1275	31.37	46.00	14.63	100.0	V	355.0	3.2
744.0413	32.54	46.00	13.46	100.0	V	355.0	3.6
788.0550	30.87	46.00	15.13	100.0	V	115.0	4.2
944.8313	32.90	46.00	13.10	100.0	V	1.0	7.1

For 1 GHz ~ 25 GHz**BLE 1M**

Test channel		CH00			Polarity			Horizontal		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark	
1	4801.18	45.05	31.30	6.16	40.11	42.40	74.00	-31.60	Peak	
2	7368.02	42.12	36.20	7.89	39.13	47.08	74.00	-26.92	Peak	
3	8576.93	40.95	37.41	8.57	39.47	47.46	74.00	-26.54	Peak	
4	11538.55	39.63	40.42	9.36	40.05	49.36	74.00	-24.64	Peak	

Test channel		CH00			Polarity			Vertical		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark	
1	4251.70	51.60	30.01	5.83	40.37	47.07	74.00	-26.93	Peak	
2	6973.84	45.54	35.00	7.70	38.90	49.34	74.00	-24.66	Peak	
3	9812.32	40.27	39.32	8.80	40.60	47.79	74.00	-26.21	Peak	
4	11405.76	39.73	40.41	9.22	40.11	49.25	74.00	-24.75	Peak	

Test channel		CH19			Polarity			Horizontal		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark	
1	3995.23	47.79	29.79	5.58	40.41	42.75	74.00	-31.25	Peak	
2	7325.50	41.53	36.15	7.88	39.06	46.50	74.00	-27.50	Peak	
3	9260.54	40.63	39.12	8.70	40.50	47.95	74.00	-26.05	Peak	
4	11372.80	40.31	40.32	9.20	40.15	49.68	74.00	-24.32	Peak	

Test channel		CH19			Polarity			Vertical		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark	
1	3977.93	53.55	29.76	5.56	40.42	48.45	74.00	-25.55	Peak	
2	4245.56	55.78	29.99	5.82	40.38	51.21	74.00	-22.79	Peak	
3	5328.34	49.07	31.36	6.70	39.67	47.46	74.00	-26.54	Peak	
4	8515.10	42.01	37.23	8.57	39.33	48.48	74.00	-25.52	Peak	

Test channel		CH39			Polarity			Horizontal		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark	
1	7443.03	43.14	36.20	7.93	39.20	48.07	74.00	-25.93	Peak	
2	8527.43	40.94	37.25	8.57	39.36	47.40	74.00	-26.60	Peak	
3	9587.77	40.36	39.05	8.80	40.60	47.61	74.00	-26.39	Peak	
4	11389.27	40.35	40.37	9.21	40.13	49.80	74.00	-24.20	Peak	

Test channel		CH39			Polarity			Vertical		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark	
1	3995.23	50.79	29.79	5.58	40.41	45.75	74.00	-28.25	Peak	
2	8059.55	41.45	37.00	8.39	39.21	47.63	74.00	-26.37	Peak	
3	9897.88	40.90	39.30	8.80	40.60	48.40	74.00	-25.60	Peak	
4	11405.76	39.74	40.41	9.22	40.11	49.26	74.00	-24.74	Peak	

For 1 GHz ~ 25 GHz**BLE 2M**

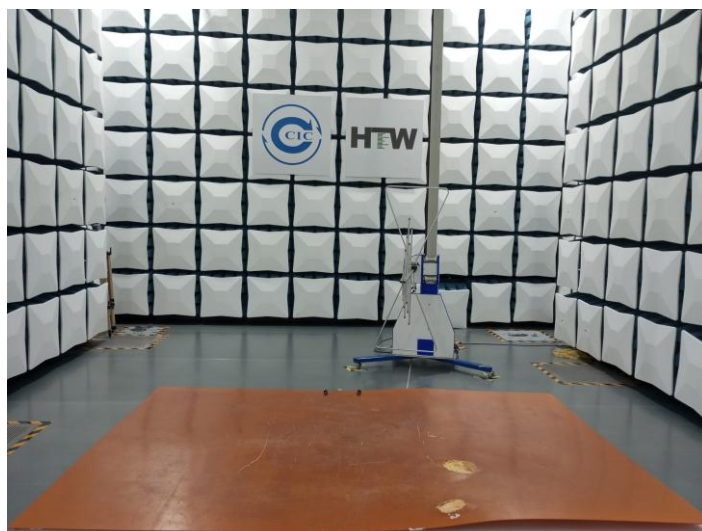
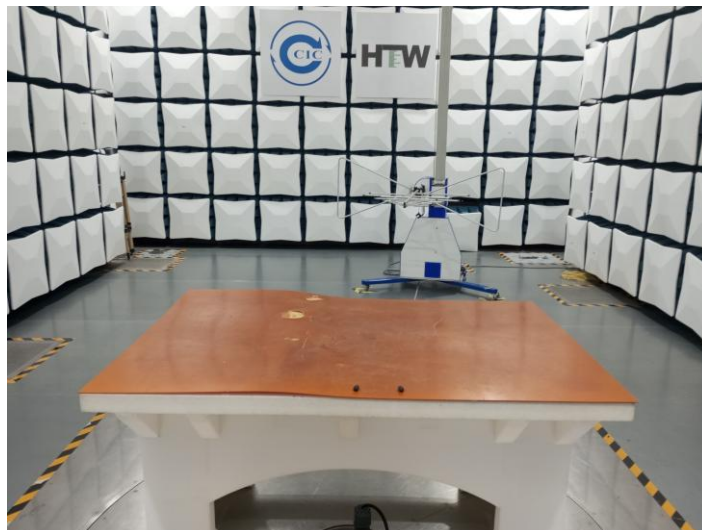
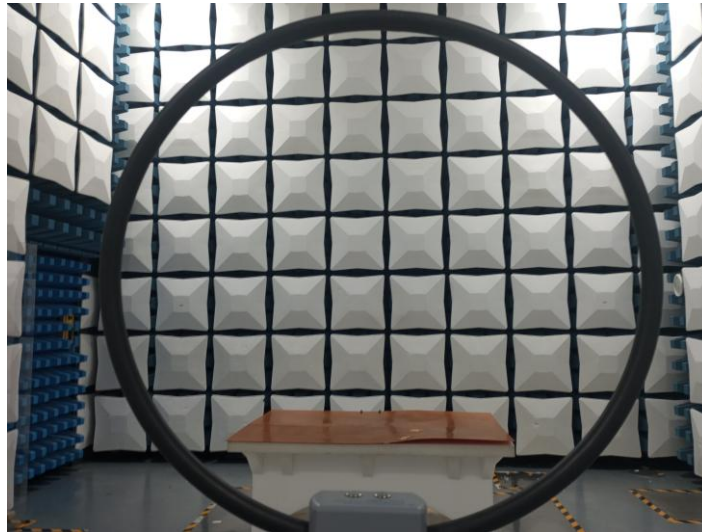
Test channel		CH00			Polarity		Horizontal		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	7507.92	40.77	36.18	7.98	39.20	45.73	74.00	-28.27	Peak
2	8527.43	40.94	37.25	8.57	39.36	47.40	74.00	-26.60	Peak
3	9287.38	39.64	39.17	8.71	40.51	47.01	74.00	-26.99	Peak
4	11225.66	41.27	40.03	9.08	40.33	50.05	74.00	-23.95	Peak
Test channel		CH00			Polarity		Vertical		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	6973.84	47.87	35.00	7.70	38.90	51.67	74.00	-22.33	Peak
2	8626.71	40.55	37.55	8.58	39.58	47.10	74.00	-26.90	Peak
3	10889.70	39.93	40.48	8.97	40.75	48.63	74.00	-25.37	Peak
4	11372.80	39.60	40.32	9.20	40.15	48.97	74.00	-25.03	Peak

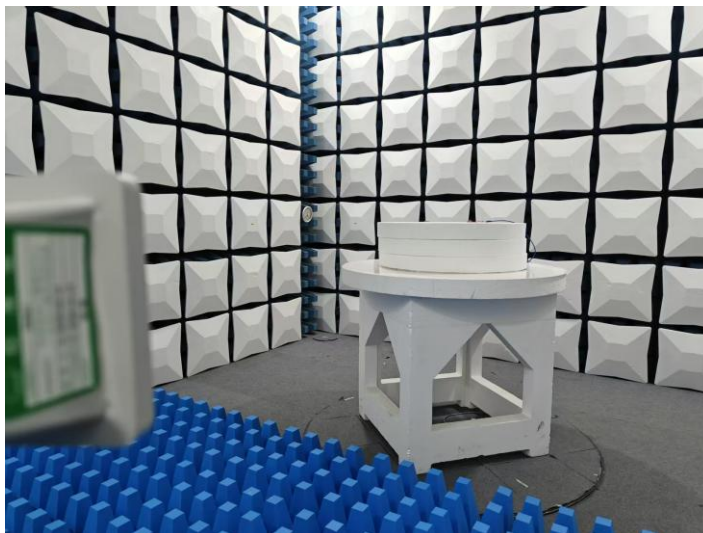
Test channel		CH19			Polarity		Horizontal		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	7325.50	42.38	36.15	7.88	39.06	47.35	74.00	-26.65	Peak
2	8539.78	41.80	37.28	8.57	39.39	48.26	74.00	-25.74	Peak
3	9629.48	40.50	39.16	8.80	40.60	47.86	74.00	-26.14	Peak
4	11605.53	39.17	40.28	9.47	40.15	48.77	74.00	-25.23	Peak
Test channel		CH19			Polarity		Vertical		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	4245.56	54.02	29.99	5.82	40.38	49.45	74.00	-24.55	Peak
2	6994.05	46.35	35.08	7.69	38.90	50.22	74.00	-23.78	Peak
3	9955.33	40.53	39.29	8.80	40.60	48.02	74.00	-25.98	Peak
4	11241.92	40.38	40.04	9.09	40.31	49.20	74.00	-24.80	Peak

Test channel		CH39			Polarity		Horizontal		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	7357.37	41.96	36.20	7.89	39.11	46.94	74.00	-27.06	Peak
2	8453.72	40.87	36.92	8.59	39.29	47.09	74.00	-26.91	Peak
3	9713.44	40.22	39.30	8.80	40.60	47.72	74.00	-26.28	Peak
4	11389.27	39.71	40.37	9.21	40.13	49.16	74.00	-24.84	Peak
Test channel		CH39			Polarity		Vertical		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	3983.69	49.93	29.77	5.57	40.42	44.85	74.00	-29.15	Peak
2	6994.05	45.67	35.08	7.69	38.90	49.54	74.00	-24.46	Peak
3	9048.61	40.76	38.10	8.62	40.42	47.06	74.00	-26.94	Peak
4	11032.43	39.61	40.40	8.93	40.56	48.38	74.00	-25.62	Peak

6. TEST SETUP PHOTOS

Radiated Emission



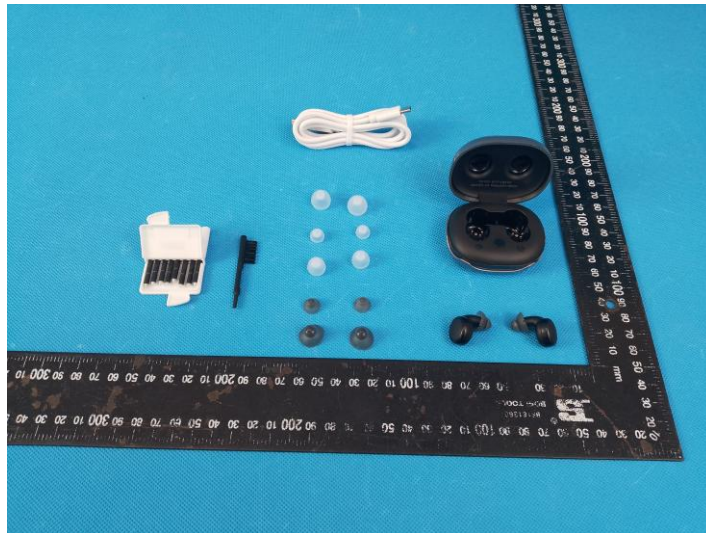


AC Conducted Emission



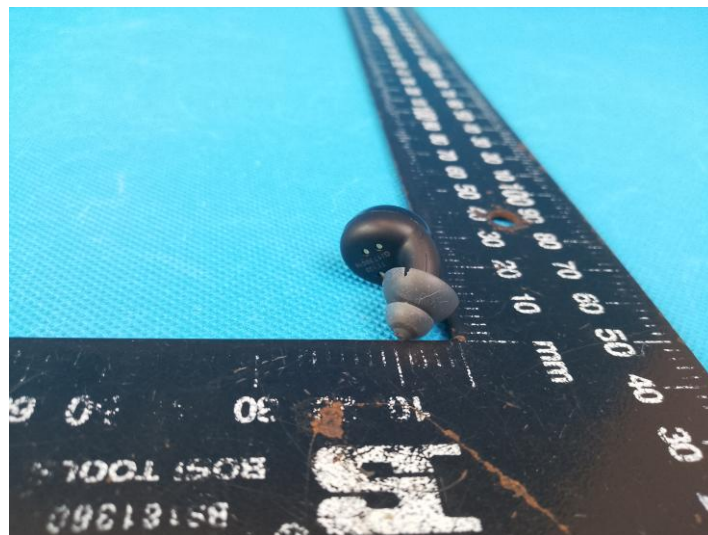
7. EXTERNAL AND INTERNAL PHOTOS

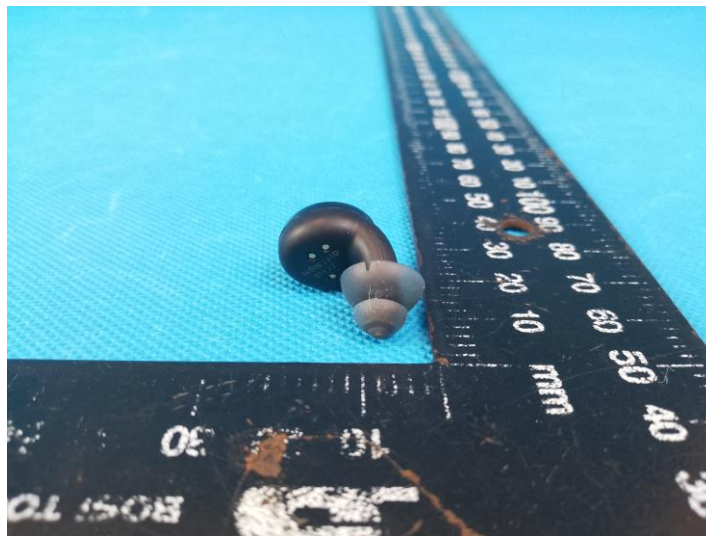
7.1. External Photos



Right





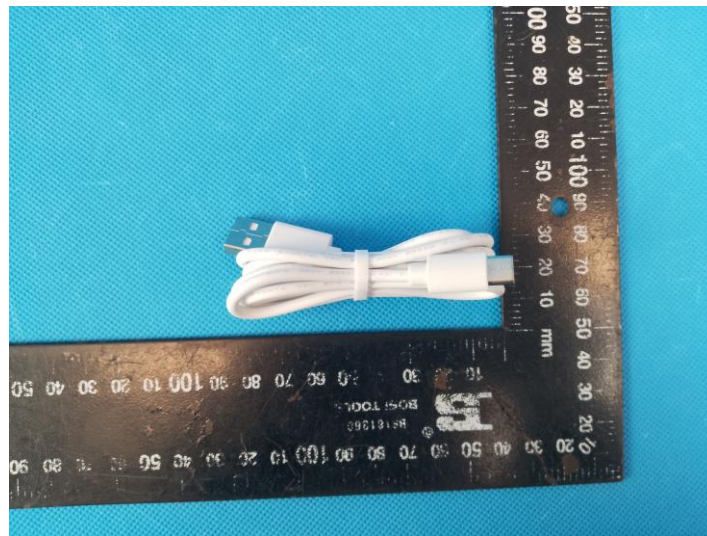


Left





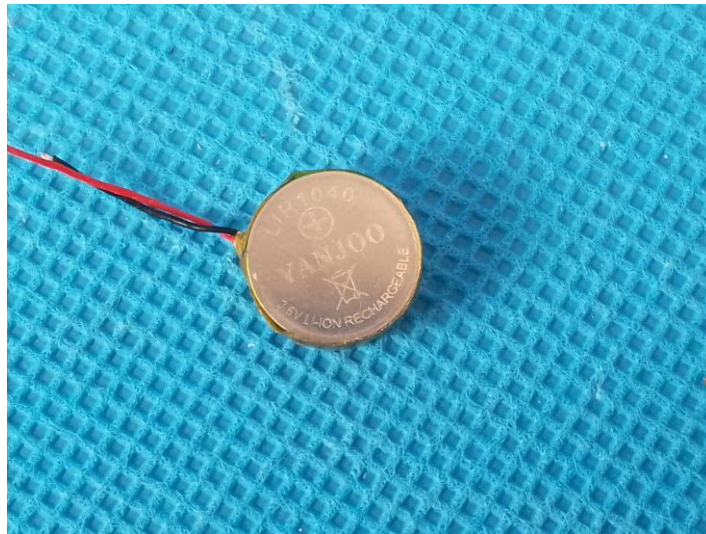


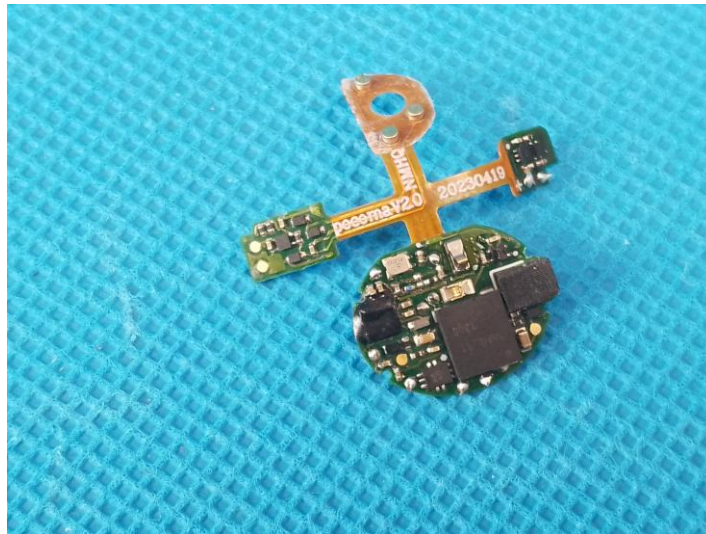


7.2. Internal Photos

Right

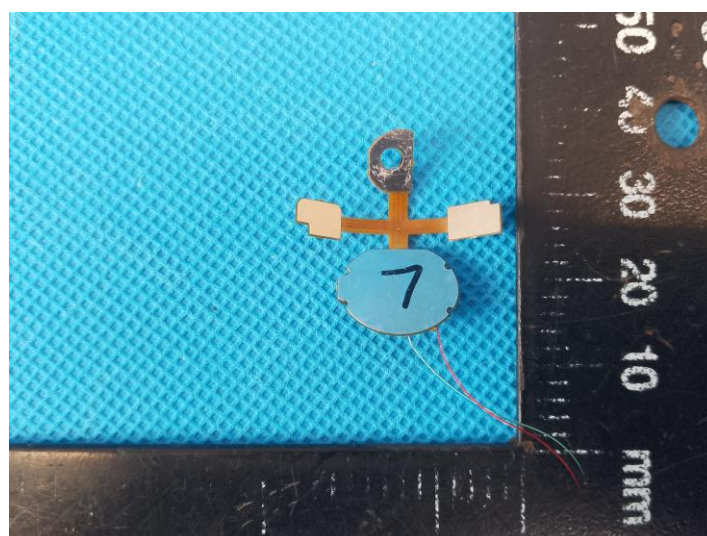
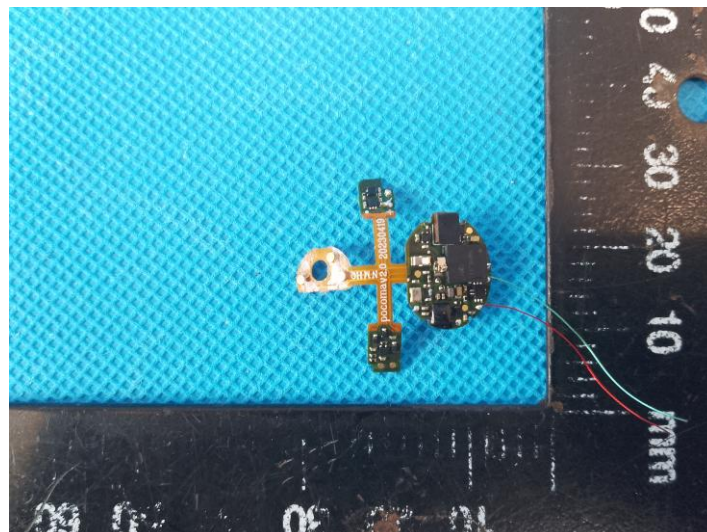
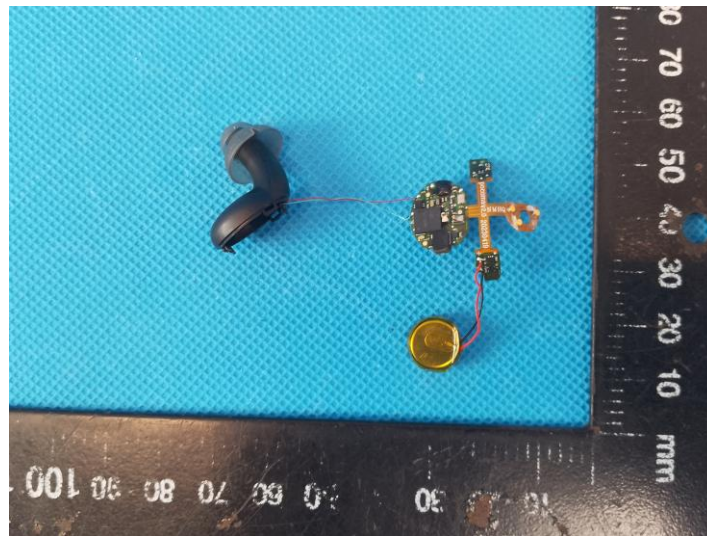


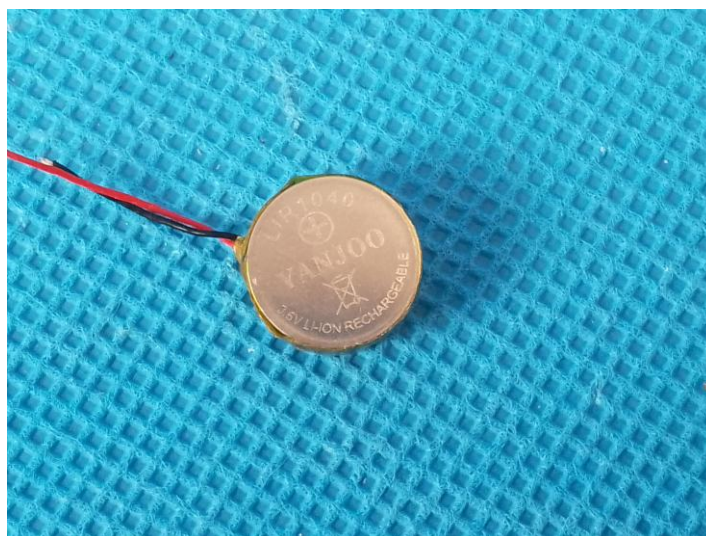
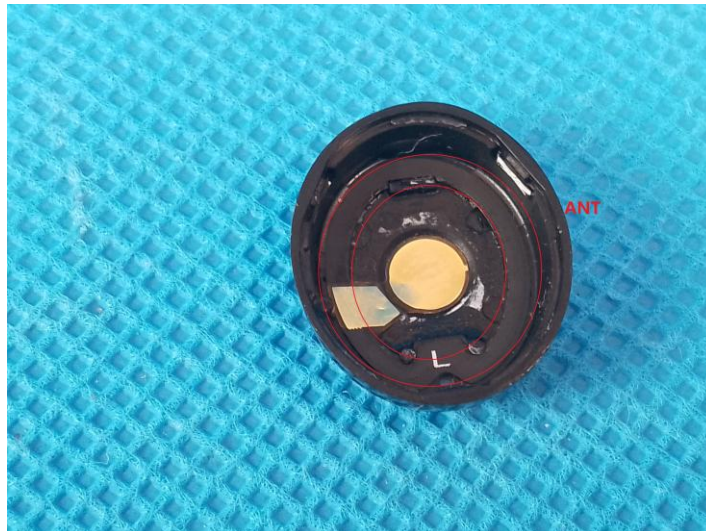
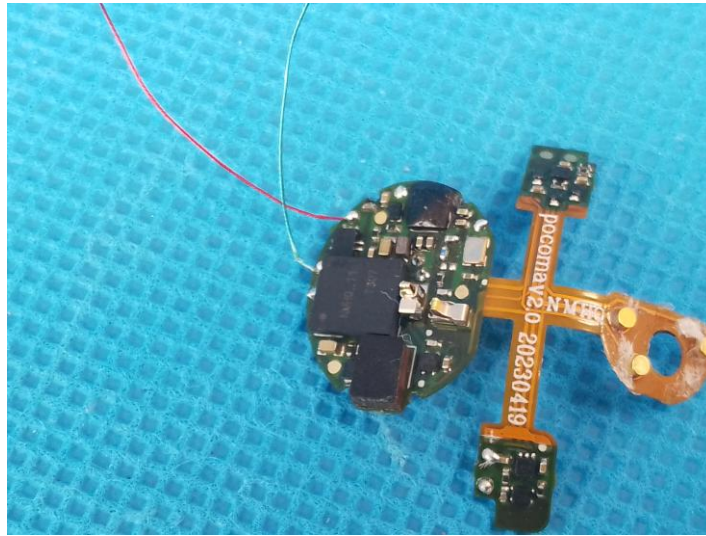




Left







8. APPENDIX REPORT