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TEST REPORT

47 CFR Part 15, Subpart C 15.247

Report Reference No.:	**CTL2602022061-WF01**	
Compiled by: (printed name+signature)	Gary Gao	Gary Gao
Reviewed by: (printed name+signature)	Happy Guo	Happy Guo
Approved by: (printed name+signature)	Ivan Xie	Ivan Xie

Product Name..... :	Bluetooth FM TRANSMITTER
Model/Type reference..... :	BT98LL
List Model(s)..... :	MFT2-1001, MFT2-1001-BLK
Trade Mark..... :	N/A
FCC ID..... :	**2AHASBT98LL**
Applicant's name..... :	**JEM ACCESSORIES INC.**
Address of applicant..... :	32 Brunswick Avenue Edison New Jersey 08817 United States
Test specification..... :	
Standard..... :	**47 CFR Part 15, Subpart C 15.247:** Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz.
TRF Originator..... :	Shenzhen CTL Testing Technology Co., Ltd.
Master TRF..... :	Dated 2011-01
Date of receipt of test item..... :	February 4, 2026
Date of Test Date..... :	February 4, 2026-March 30, 2026
Date of Issue..... :	March 31, 2026
Result..... :	**Pass**

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TEST REPORT

Test Report No. :	CTL2602022061-WF01	March 31, 2026 Date of issue

Equipment under Test	:	Bluetooth FM TRANSMITTER
Sample No	:	CTL260202206001, CTL260202206002, CTL260202206003, CTL260202206005, CTL260202206006
Model /Type	:	BT98LL
Listed Models	:	MFT2-1001, MFT2-1001-BLK
Applicant	:	**JEM ACCESSORIES INC.**
Address	:	32 Brunswick Avenue Edison New Jersey 08817 United States
Manufacturer	:	**JEM ACCESSORIES INC.**
Address	:	32 Brunswick Avenue Edison New Jersey 08817 United States

Test result	Pass *

*In the configuration tested, the EUT complied with the standards specified page 5.

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.
The device (Product Name: Bluetooth FM TRANSMITTER) Models Name: BT98LL, MFT2-1001, MFT2-1001-BLK. All product models are different in shell color or customer number. Its internal structure, circuit principle, PCB board wiring of the product, and all key components related to safety and electromagnetic compatibility performance are exactly the same.

** Modified History **

Revisions	Description	Issued Data	Report No.	Remark
Version 1.0	Initial Test Report Release	March 31, 2026	CTL2602022061-WF01	Tracy Qi

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1. SUMMARY

1.1. TEST STANDARDS

The tests were performed according to following standards:

47 CFR Part 15, Subpart C 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 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 v05r02: KDB558074 D01 15.247 Meas Guidance v05r02

1.2. Test Description

47 CFR Part 15, Subpart C 15.247		
47 CFR Part 15, Subpart C 15.207	AC Power Conducted Emission	N/A
47 CFR Part 15, Subpart C 15.247(a)(1)(i)	20dB Bandwidth	PASS
47 CFR Part 15, Subpart C 15.247(d)	Spurious RF Conducted Emission	PASS
47 CFR Part 15, Subpart C 15.247(b)	Maximum Peak Output Power	PASS
47 CFR Part 15, Subpart C 15.247(a)	Pseudorandom Frequency Hopping Sequence	PASS
47 CFR Part 15, Subpart C 15.247(a)(1)(iii)	Number of hopping frequency& Time of Occupancy	PASS
47 CFR Part 15, Subpart C 15.247(a)(1)	Frequency Separation	PASS
47 CFR Part 15, Subpart C 15.205/15.209	Radiated Emissions	PASS
47 CFR Part 15, Subpart C 15.247(d)	Band Edge Compliance of RF Emission	PASS
47 CFR Part 15, Subpart C 15.203/15.247 (b)	Antenna Requirement	PASS

Note: N/A= not applicable

1.3. Test Facility

1.3.1 Test laboratory

Company Name:	Shenzhen CTL Testing Technology Co., Ltd.
Address 1:	Zone A.1/F..Warehouse 2.Baisha Technology Park, No.3011,Shahexi Road, Nanshan District,Shenzhen.518055,P.R.C.
Address 2:	Fl.A1, Bldg.A3, No.2533 GuanGuang Road, Fenghuang Community Fenghuang Street, Guangming District, Shenzhen, Guangdong, PR.C

1.3.2 Test location

All tests were performed at:

Company Name:	Shenzhen CTL Testing Technology Co., Ltd.
☐ Main location	Zone A.1/F..Warehouse 2.Baisha Technology Park, No.3011,Shahexi Road, Nanshan District,Shenzhen.518055,P.R.C.
☒ Satellite location	Fl.A1, Bldg.A3, No.2533 GuanGuang Road, Fenghuang Community Fenghuang Street, Guangming District, Shenzhen, Guangdong, PR.C

1.3.3 Laboratory accreditation

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

CNAS-Lab Code: L7497

Shenzhen CTL Testing Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No. 4343.01

Shenzhen CTL Testing Technology Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

IC CAB identifier: CN0041

Main Company Number :9618B

Satellite Company Number:35187

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements with Main Company Number:9618B and Satellite Company Number:35187.

FCC-Registration No.: 399832

Designation No.: CN1216

Shenzhen CTL Testing Technology Co., Ltd. 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. Designation No.: CN1216. Test Firm Registration 399832.

1.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole

responsibility of continued compliance of the device.
Hereafter the best measurement capability for CTL laboratory is reported:

Test	Measurement Uncertainty	Notes
Conducted Emission 0.15-30MHz	±3.11dB	(1)
Radiated Emission 0.009~30MHz	±3.66dB	(1)
Radiated Emission 30~1000MHz	±4.5dB	(1)
Radiated Emission Above 1GHz	±5.08dB	(1)
20dB Emission Bandwidth	±1.9%	(1)
Carrier Frequency Separation	±1.9%	(1)
Maximum Power Spectral Density Level	±0.98 dB	(1)
Number of Hopping Channel	±1.9%	(1)
Time of Occupancy	±0.11%	(1)
Max Peak Conducted Output Power	±0.98 dB	(1)
Band-edge Spurious Emission	±1.21dB	(1)
Conducted RF Spurious Emission	9kHz-7GHz:±1.09dB 7GHz-26.5GHz: ±3.27dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.
(2) Decision rule for Statement of Conformity: The measurement uncertainty is not taken into account but only measured result.

2. GENERAL INFORMATION

2.1. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	18°C-28°C
Relative Humidity:	30%-60%
Air Pressure:	965Pa-1030Pa

2.2. General Description of EUT

Product Name:	Bluetooth FM TRANSMITTER
Model/Type reference:	BT98LL
EUT Rated Voltage:	DC 12-24V
Test Voltage:	DC 24V
Bluetooth	
Version:	Supported BR/EDR
Modulation:	GFSK, π/4DQPSK
Operation frequency:	2402MHz~2480MHz
Channel number:	79
Channel separation:	1MHz
Antenna type:	PCB Antenna
Antenna gain:	-0.68dBi provided by ☒ Applicant ☐ Manufacturer

Note1: For more details, please refer to the user's manual of the EUT.
Note2:The model BT98LL is selected as representative model for full tests

2.3. Description of Test Modes and Test Frequency

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing.There are 79 channels provided to the EUT and Channel 00/39/78 were selected to test.

Operation Frequency：

Channel	Frequency (MHz)
00	**2402**
01	2403
⋮	⋮
38	2440
39	**2441**
40	2442
⋮	⋮
77	2479
78	**2480**

Preliminary tests were performed in each mode and packet length of BT, and found worst case as bellow, finally test were conducted at those mode and recorded in this report.

Test Items	Worst case
Conducted Emissions	DH5 Middle channel
Radiated Emissions and Band Edge	DH5
Maximum Conducted Output Power	DH5/2DH5
20dB Bandwidth	DH5/2DH5
Frequency Separation	DH5/2DH5 Middle channel
Number of hopping frequency	DH5/2DH5
Time of Occupancy (Dwell Time)	DH1/DH3/DH5 Middle channel 2DH1/2DH3/2DH5 Middle channel
Out-of-band Emissions	DH5/2DH5

RF Cable List and Details

RF Cable	RF Cable loss	RF Cable loss provided by
RG316	0.5dB	☒ Applicant ☐ Manufacturer ☐ Testing Laboratory(CTL)

Software Version: FCCAssist2.4	
Test Mode	Power level
BT BR	9
BT EDR	9

2.4. Equipments Used during the Test

Conducted Emission					
Test Equipment	Manufacturer	Model No.	Serial No.	Last calibration	Calibration Due
EMI Test Receiver	ROHDE & SCHWARZ	ESCI	1166.5950.03	2026/01/05	2027/01/04
LISN	ROHDE & SCHWARZ	ESH2-Z5	860014/010	2026/01/05	2027/01/04
Limitator	ROHDE & SCHWARZ	ESH3-Z2	100408	2026/01/05	2027/01/04
Software:					
Name of Software:			Version:		
ES-K1			V1.71		

Radiated Emission					
Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
Active Loop Antenna	Da Ze	ZN30900A	/	2025/07/02	2026/07/01
ULTRA-BROADBAND ANTENNA	Sunol Sciences Corp.	JB1 Antenna	A061713	2025/07/02	2026/07/01
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2026/01/05	2027/01/04
Horn Antenna	Ocean Microwave	OBH100400	26999002	2025/07/03	2026/07/02
Amplifier	Brief&Smart	LNA-4018	2104197	2025/07/03	2026/07/02
EMI Test Receiver	ROHDE & SCHWARZ	ESPI	100434	2025/07/02	2026/07/01
Spectrum Analyzer	RS	FSP	1164.4391.38	2025/07/03	2026/07/02
DC power supply	Agilent	E3632A	MY40015577	2025/07/03	2026/07/02
Software:					
Name of Software:			Version:		
EZ_EMC(Below 1GHz)			V1.1.4.2		
EZ_EMC(Above 1GHz)			V1.1.4.2		

RF Conducted					
Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
Spectrum Analyzer	Keysight	N9020A	MY53420874	2025/07/03	2026/07/02
Temperature/Humidity Meter	Ji Yu	MC501	/	2025/07/03	2026/07/02
Software:					
Name of Software:			Version:		
TST-PASS			V2.0.2		

2.5. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended to comply with Section 15.247 of the 47 CFR Part 15, Subpart C Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

3. TEST CONDITIONS AND RESULTS

3.1. Conducted Emissions Test

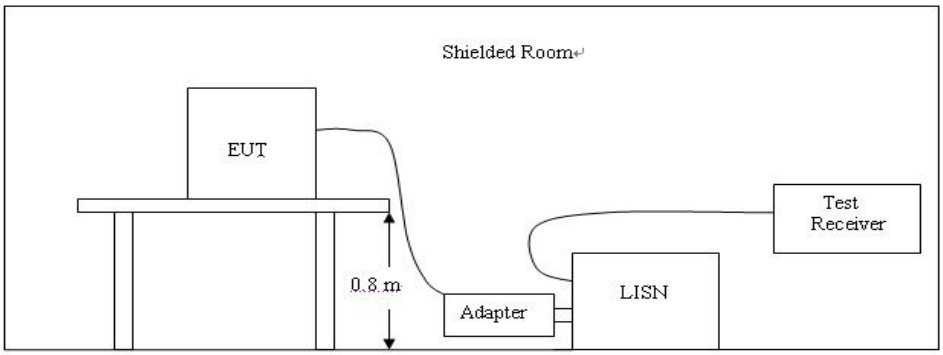
LIMIT

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 equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10:2020.
2. Support equipment, if needed, was placed as per ANSI C63.10:2020.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2020.
4. The adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST RESULTS

Not applicable to this device, for it is powered by car battery.

3.2. Radiated Emissions and Band Edge

Limit

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance.

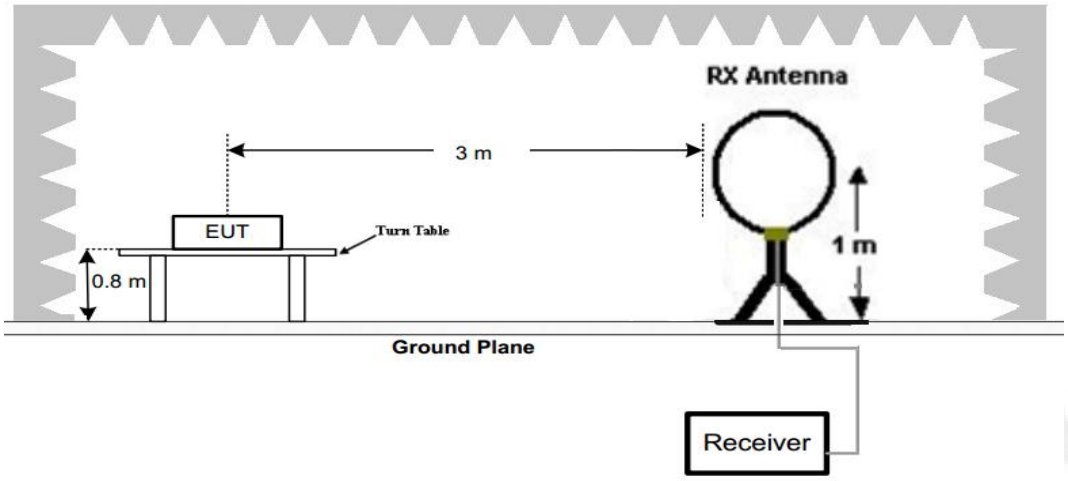
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Radiated emission limits

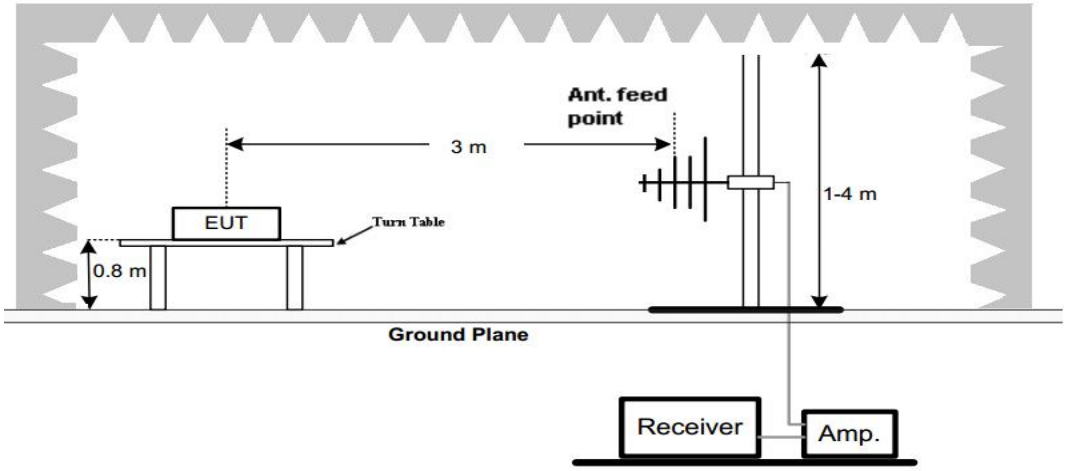
Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST CONFIGURATION

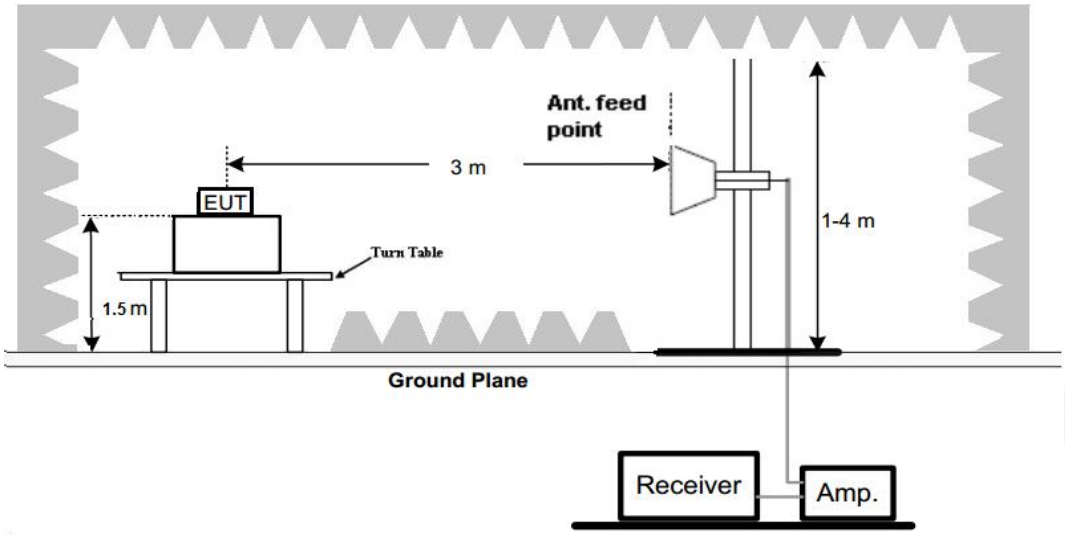
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



Test Procedure

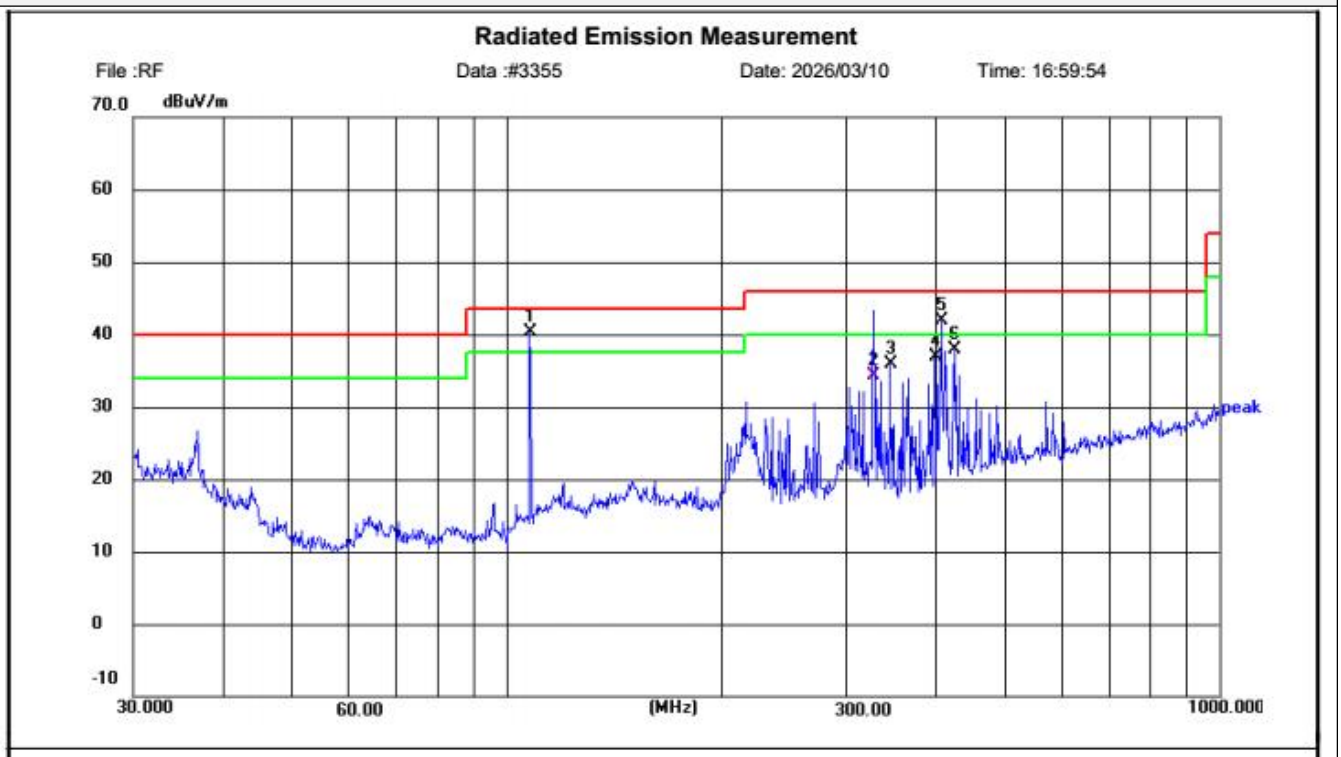
1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement –X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.

TEST RESULTS

Remark:
1. We measured Radiated Emission at GFSK, π/4 DQPSK mode from 9 KHz to 25GHz and recorded worst case at GFSK DH5 mode..
2. For below 1GHz testing recorded worst at GFSK DH5 low channel.
3. For above 1GHz testing recorded worst at GFSK DH5 low channel.
4. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, Found the emission level are attenuated 20dB below the limits from 9 kHz to 30MHz, so it does not recorded in report.

For 30MHz-1GHz

Horizontal



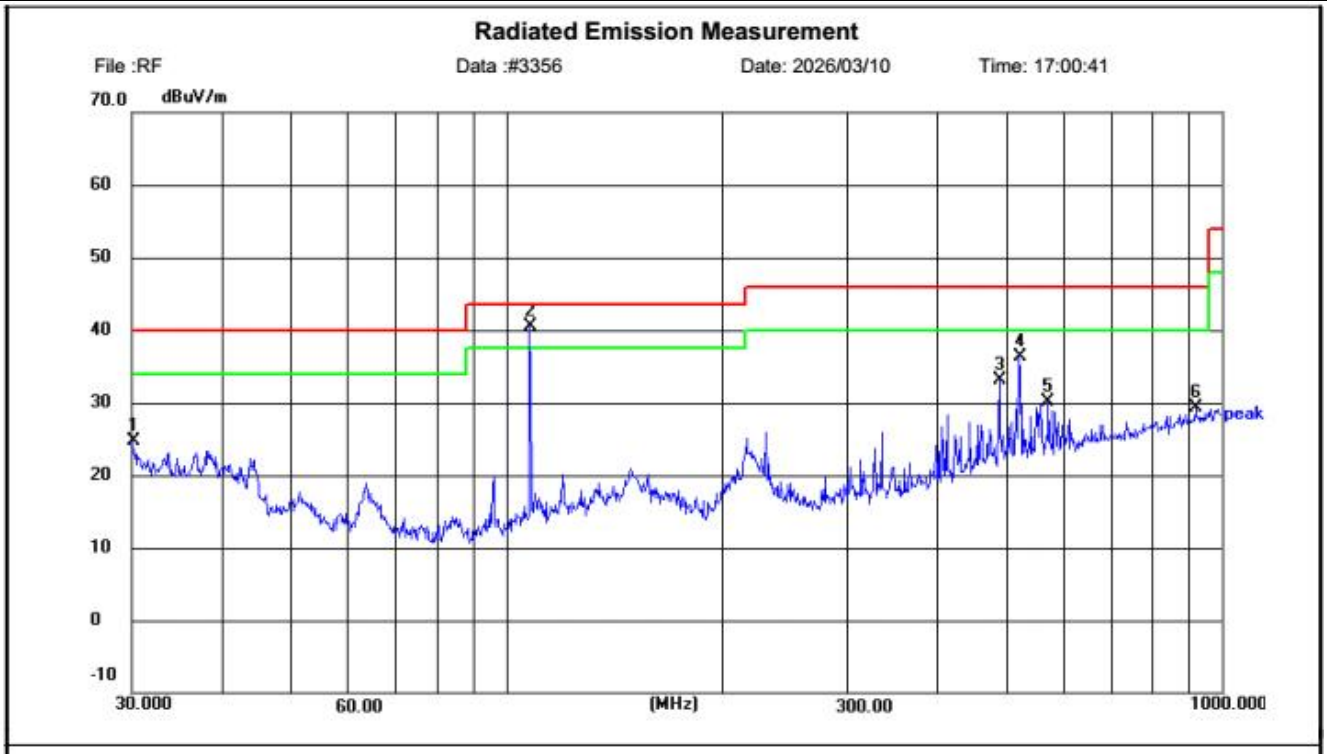
Site LAB Chamber 1
Limit: FCC Part15 Class C_30-1000MHz
EUT:
M/N:
Mode: BT 2402MHz
Note: CTL2602022061-WF

Polarization: ***Horizontal***
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	107.8877	62.79	-22.54	40.25	43.50	3.25	peak	100	326	P	
2	327.1172	53.21	-18.85	34.36	46.00	11.64	QP	100	360	P	
3	345.5952	54.69	-18.69	36.00	46.00	10.00	peak	100	326	P	
4	399.0302	54.18	-17.33	36.85	46.00	9.15	peak	100	345	P	
5	407.5144	59.00	-17.10	41.90	46.00	4.10	peak	100	197	P	
6	425.0280	54.01	-16.02	37.99	46.00	8.01	peak	100	197	P	

Vertical



Site LAB Chamber 1
Limit: FCC Part15 Class C_30-1000MHz
EUT:
M/N:
Mode: BT 2402MHz
Note: CTL2602022061-WF

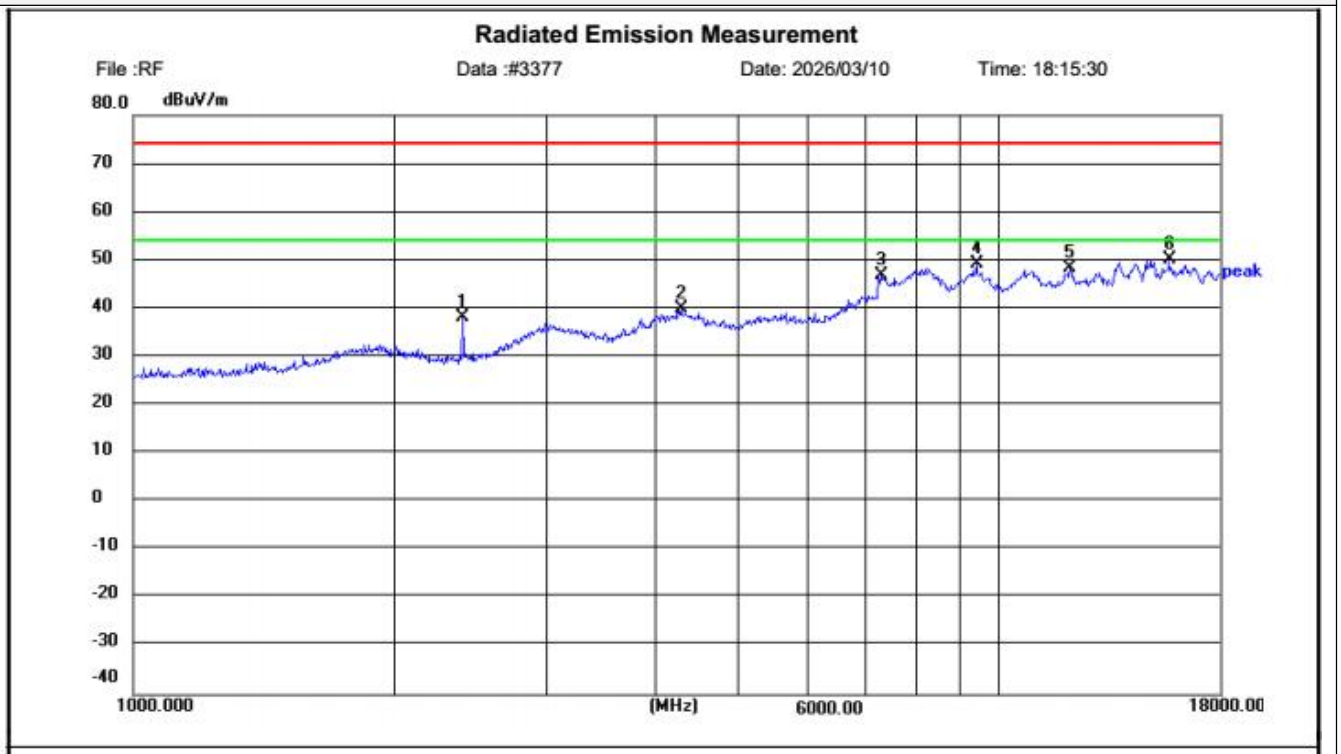
Polarization: *Vertical*
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	30.1054	35.43	-10.68	24.75	40.00	15.25	peak	100	34	P	
2	107.8877	63.07	-22.54	40.53	43.50	2.97	peak	100	62	P	
3	489.0269	47.23	-14.18	33.05	46.00	12.95	peak	100	273	P	
4	520.8882	49.72	-13.50	36.22	46.00	9.78	peak	100	319	P	
5	572.6144	43.03	-12.89	30.14	46.00	15.86	peak	100	62	P	
6	919.2866	37.83	-8.52	29.31	46.00	16.69	peak	100	62	P	

For 1GHz to 25GHz

Horizontal



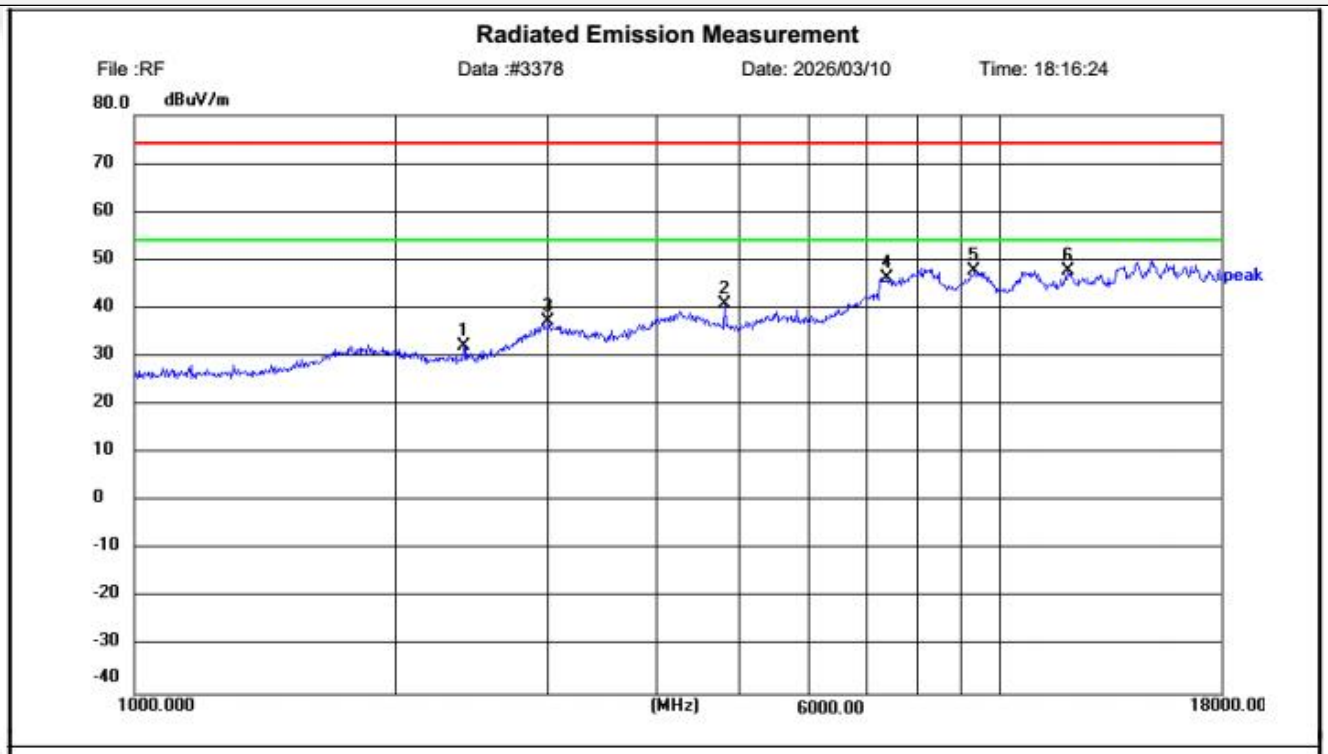
Site LAB Chamber 1
Limit: FCC PART 15C ABOVE 1GHz PK
EUT:
M/N:
Mode: BT 2402MHz
Note: CTL2602022061-WF

Polarization: ***Horizontal***
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2400.753	55.28	-17.20	38.08	74.00	35.92	peak	150	360	P	
2	4291.977	48.51	-8.62	39.89	74.00	34.11	peak	150	360	P	
3	7326.267	88.84	-41.91	46.93	74.00	27.07	peak	150	360	P	
4	9420.880	90.47	-41.11	49.36	74.00	24.64	peak	150	360	P	
5	12079.387	88.53	-40.15	48.38	74.00	25.62	peak	150	360	P	
6	15713.564	88.12	-38.10	50.02	74.00	23.98	peak	150	360	P	

Vertical



Site LAB Chamber 1
Limit: FCC PART 15C ABOVE 1GHz PK
EUT:
M/N:
Mode: BT 2402MHz
Note: CTL2602022061-WF

Polarization: *Vertical*
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2400.753	49.94	-17.78	32.16	74.00	41.84	peak	150	0	P	
2	4804.110	50.01	-9.26	40.75	74.00	33.25	peak	150	0	P	
3	3007.868	51.17	-13.82	37.35	74.00	36.65	peak	150	0	P	
4	7411.461	88.20	-41.86	46.34	74.00	27.66	peak	150	0	P	
5	9339.543	89.01	-41.17	47.84	74.00	26.16	peak	150	0	P	
6	11975.098	87.98	-40.21	47.77	74.00	26.23	peak	150	0	P	

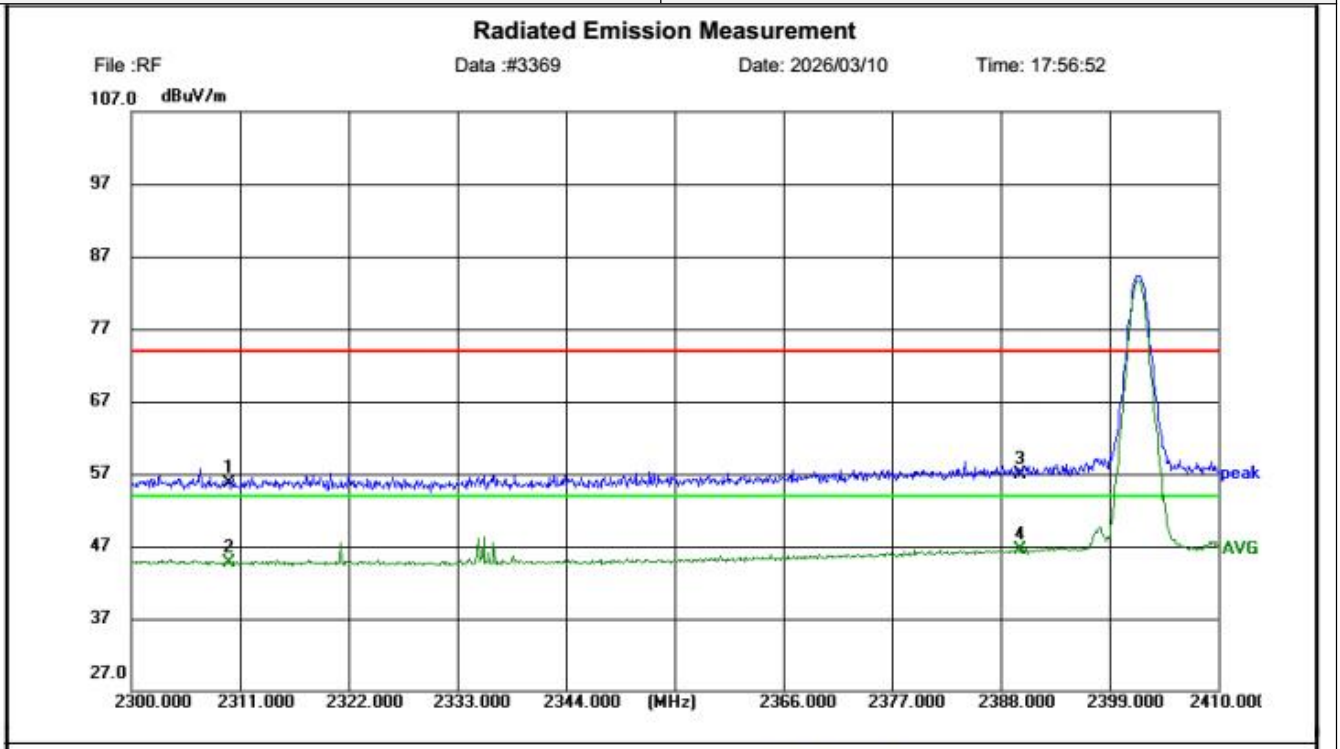
REMARKS:

1. 18GHz-26GHz not recorded for no spurious point have a margin of less than 20 dB with respect to the limits.
2. PK detector measurement value is lower than the average limit. Therefore, there is no need to test AV detector measurements.
3. While performing the testing, the notch filter is used for avoiding test instrument overload.

Results of Band Edges Test (Radiated)

Note：GFSK, Pi/4 DQPSK all have been tested, only worse case GFSK is reported.

CH00	Horizontal



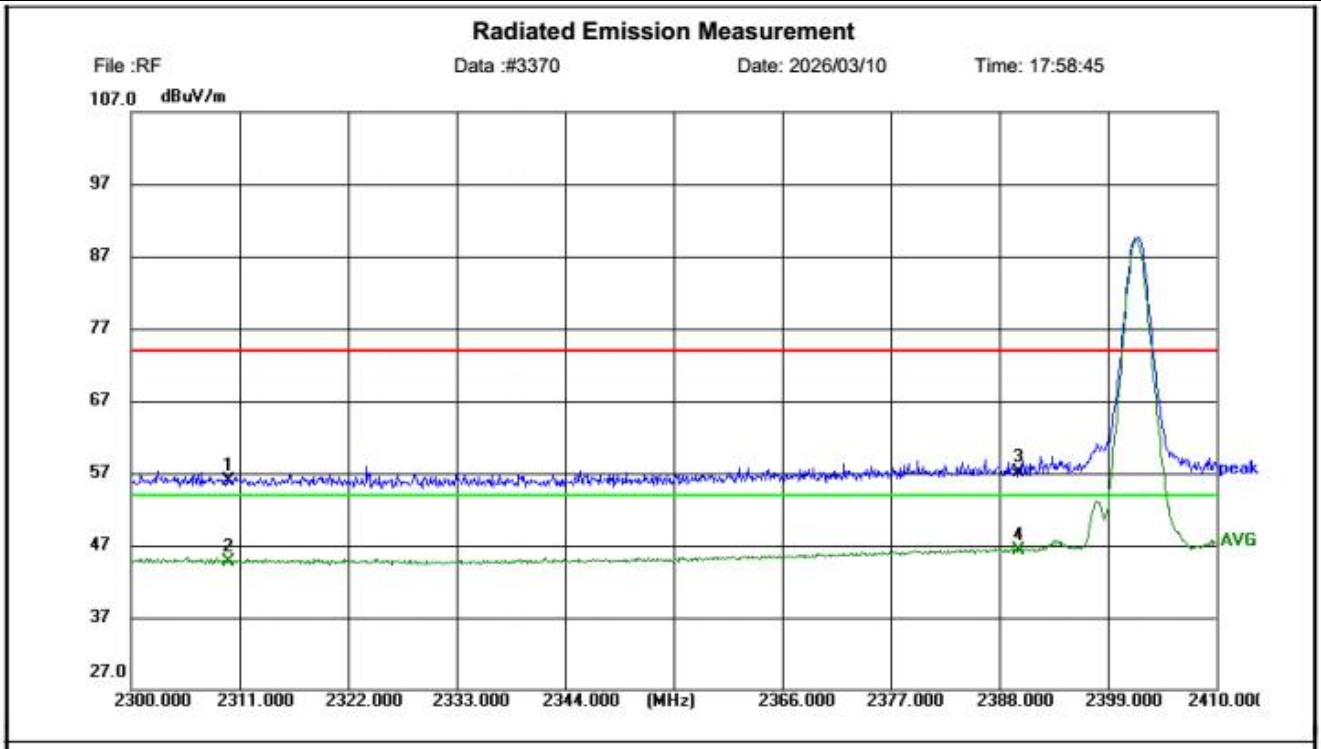
Site LAB Chamber 1
Limit: FCC PART 15C
EUT:
M/N:
Mode: BT 2402MHz
Note: CTL2602022061-WF

Polarization: ***Horizontal***
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	24.81	30.82	55.63	74.00	18.37	peak	150	0	P	
2	2310.000	13.84	30.82	44.66	54.00	9.34	AVG	150	0	P	
3	2390.000	24.70	32.25	56.95	74.00	17.05	peak	150	0	P	
4	2390.000	14.22	32.25	46.47	54.00	7.53	AVG	150	0	P	

CH00	Vertical



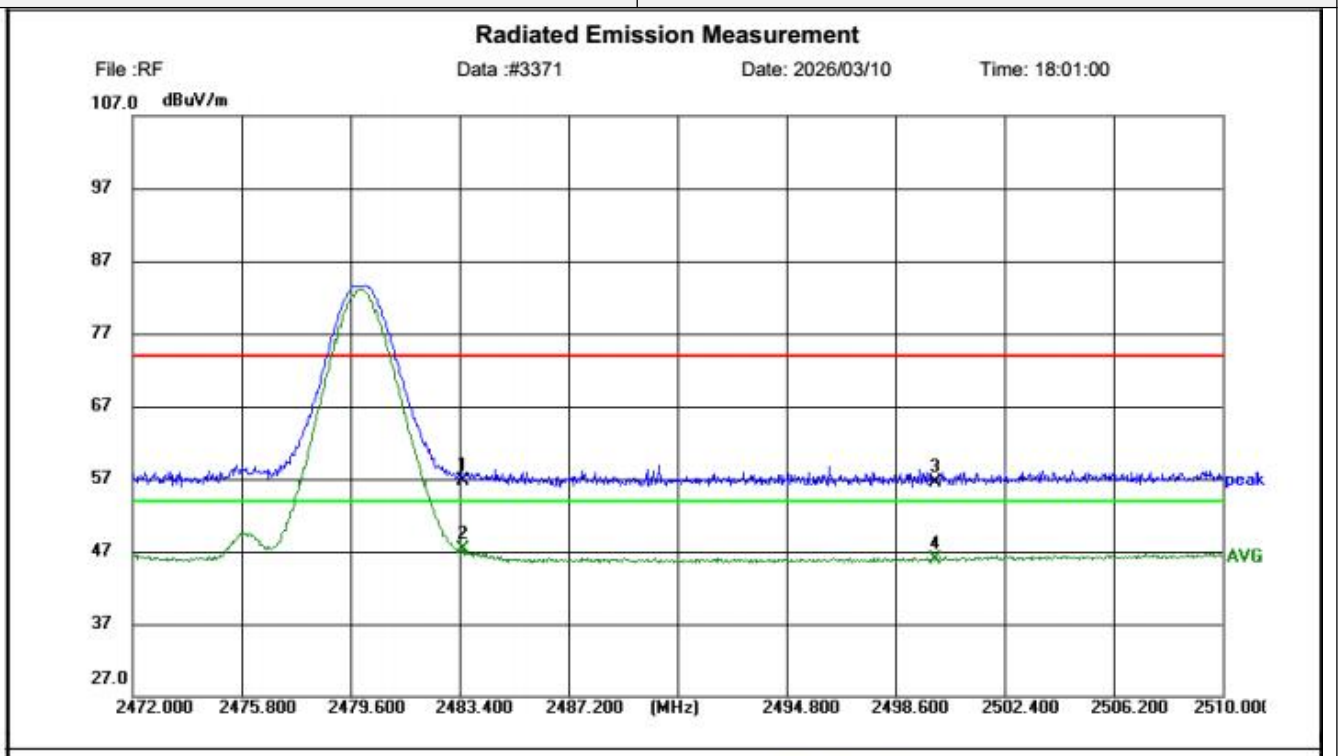
Site LAB Chamber 1
Limit: FCC PART 15C
EUT:
M/N:
Mode: BT 2402MHz
Note: CTL2602022061-WF

Polarization: *Vertical*
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	25.12	30.82	55.94	74.00	18.06	peak	150	360	P	
2	2310.000	13.98	30.82	44.80	54.00	9.20	AVG	150	360	P	
3	2390.000	24.89	32.25	57.14	74.00	16.86	peak	150	360	P	
4	2390.000	14.05	32.25	46.30	54.00	7.70	AVG	150	360	P	

CH78	Horizontal



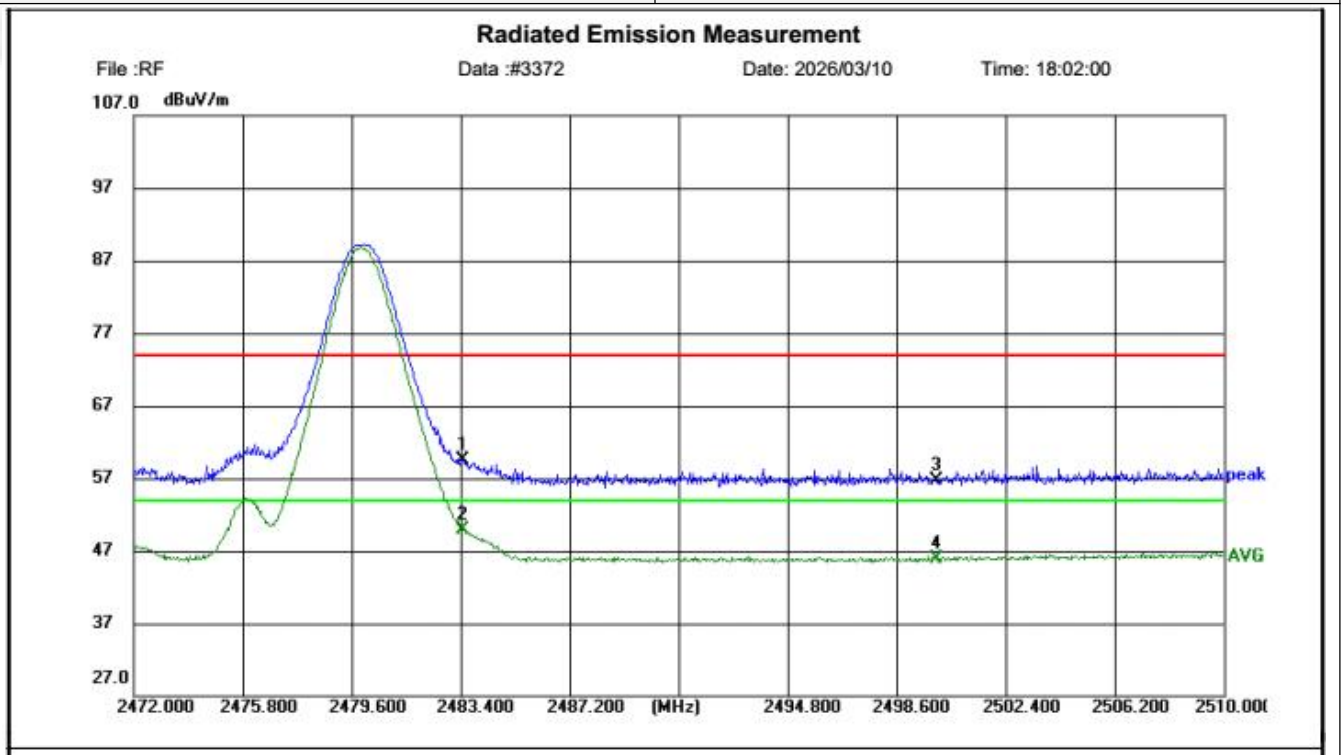
Site LAB Chamber 1
Limit: FCC PART 15C
EUT:
M/N:
Mode: BT 2480MHz
Note: CTL2602022061-WF

Polarization: ***Horizontal***
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2483.500	24.44	32.28	56.72	74.00	17.28	peak	150	0	P	
2	2483.500	14.92	32.28	47.20	54.00	6.80	AVG	150	0	P	
3	2500.000	24.28	32.32	56.60	74.00	17.40	peak	150	0	P	
4	2500.000	13.64	32.32	45.96	54.00	8.04	AVG	150	0	P	

CH78	Vertical



Site LAB Chamber 1
Limit: FCC PART 15C
EUT:
M/N:
Mode: BT 2480MHz
Note: CTL2602022061-WF

Polarization: *Vertical*
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2483.500	27.31	32.28	59.59	74.00	14.41	peak	150	360	P	
2	2483.500	17.66	32.28	49.94	54.00	4.06	AVG	150	360	P	
3	2500.000	24.41	32.32	56.73	74.00	17.27	peak	150	360	P	
4	2500.000	13.66	32.32	45.98	54.00	8.02	AVG	150	360	P	

3.3. Maximum Peak Output Power

Limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels: 1 watt.

For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum Analyzer.

a) Set the RBW > 20 dB bandwidth of the emission being measured.

b) Set VBW ⩾ RBW.

c) Set span Approximately five times the 20 dB bandwidth, centered on a hopping channel.

d) Sweep time = Auto.

e) Detector=Peak.

f) Trace mode=Max hold.

g) Allow trace to fully stabilize.

h) Use peak marker function to determine the peak amplitude level..

Test Configuration

Test Results

Raw data reference to Section 2 of document No. CTL2602022061-WF01_Bluetooth_Appendix.

3.4. 20dB Bandwidth

Limit

For frequency hopping systems operating in the 2400MHz-2483.5MHz no limit for 20dB bandwidth.

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW= 1% to 5% of the OBW, VBW= approximately 3×RBW.

The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

Test Configuration

Test Results

Raw data reference to Section 1 of document No. CTL2602022061-WF01_Bluetooth_Appendix.

3.5. Frequency Separation

LIMIT

According to 15.247(a)(1),frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the 2/3*20dB bandwidth of the hopping channel, whichever is greater.

TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with300 KHz RBW and 300 KHz VBW.

TEST CONFIGURATION

TEST RESULTS

Raw data reference to Section 3 of document No. CTL2602022061-WF01_Bluetooth_Appendix.

3.6. Number of hopping frequency

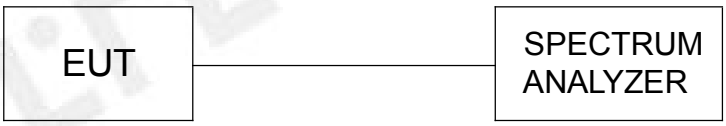
Limit

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. Set spectrum analyzer start 2400MHz to 2483.5MHz with 300 KHz RBW and 300 KHz VBW.

Test Configuration



Test Results

Raw data reference to Section 4 of document No. CTL2602022061-WF01_Bluetooth_Appendix.

3.7. Time of Occupancy (Dwell Time)

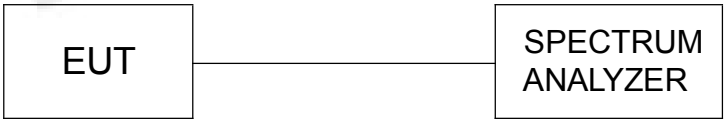
Limit

The average time of occupancy on any channel shall not be greater than 400 milliseconds within a period of 400 milliseconds multiplied by the number of hopping channels employed.

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. Set center frequency of spectrum analyzer=operating frequency, RBW shall be≤channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel, VBW=RBW, Span 0Hz.

Test Configuration



Test Results

Raw data reference to Section 5 of document No. CTL2602022061-WF01_Bluetooth_Appendix.

3.8. Out-of-band Emissions

Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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 con-ducted or a radiated measurement, pro-vided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter com-plies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

Test Procedure

Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector , and max hold. Measurements utilizing these setting are made of the in-band reference level, bandedge and out-of-band emissions.

Test Configuration

Test Results

Raw data reference to Section 6 of document No. CTL2602022061-WF01_Bluetooth_Appendix.

3.9. Pseudorandom Frequency Hopping Sequence

TEST APPLICABLE

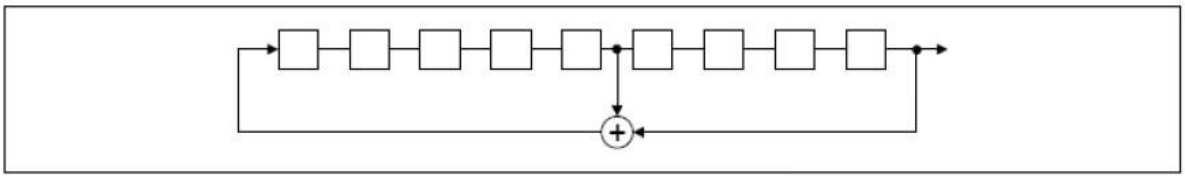
For 47 CFR Part 15C section 15.247 (a) (1) requirement:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hop-ping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hop-ping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

EUT Pseudorandom Frequency Hopping Sequence Requirement

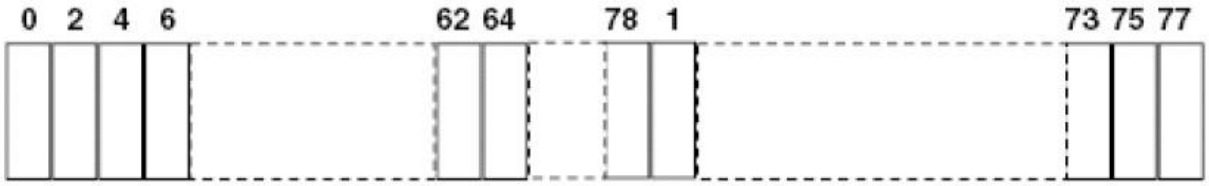
The pseudorandom frequency hopping sequence may be generated in a nice-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first one of 9 consecutive ones, for example: the shift register is initialized with nine ones.

- Number of shift register stages:9
- Length of pseudo-random sequence:29-1=511 bits
- Longest sequence of zeros:8(non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of pseudorandom frequency hopping sequence as follows:



Each frequency used equally one the average by each transmitter.

The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitter and shift frequencies in synchronization with the transmitted signals.

3.10. Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR 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.

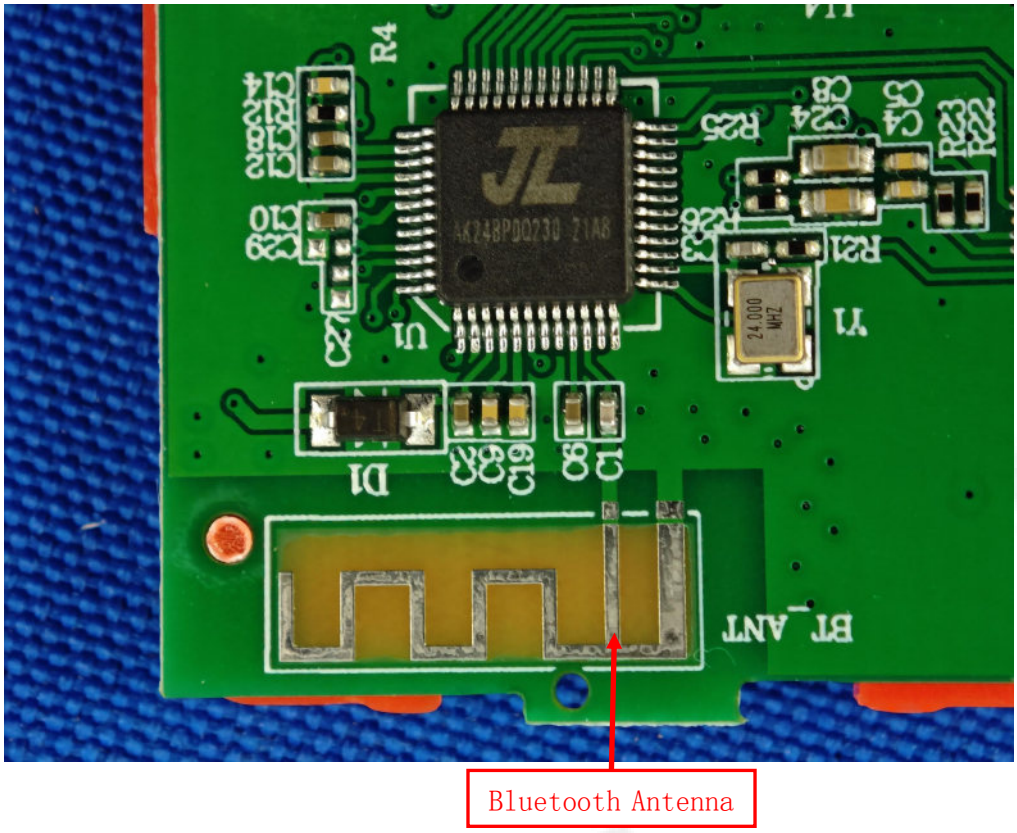
And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Refer to statement below for compliance

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

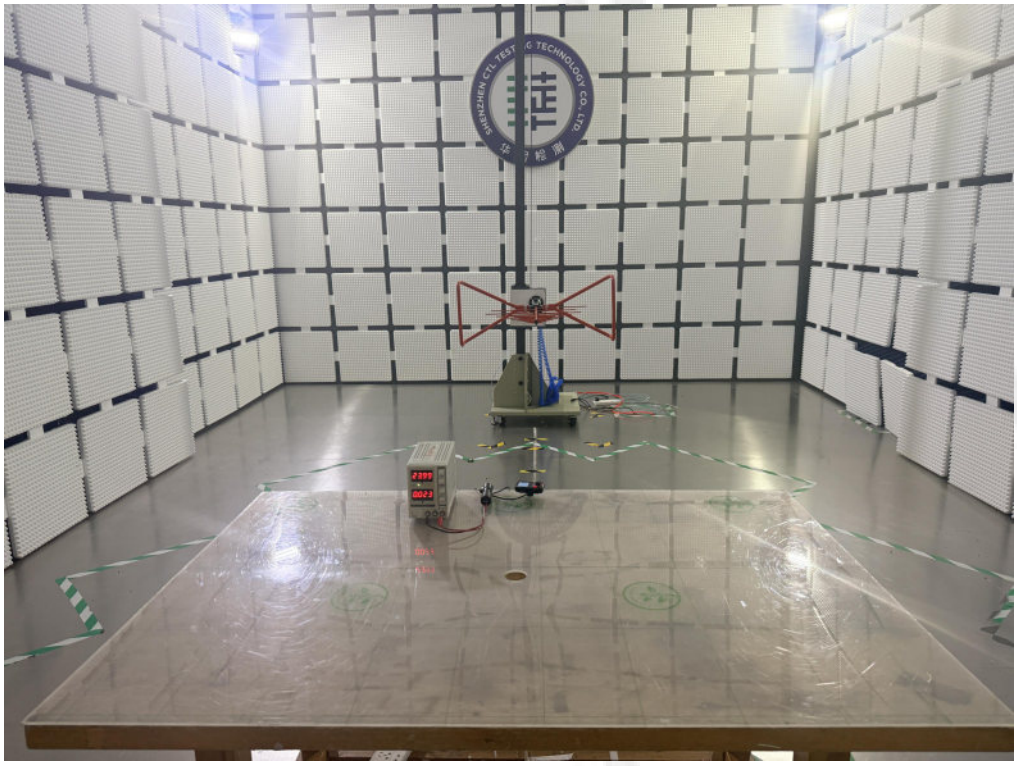
Antenna Connected Construction

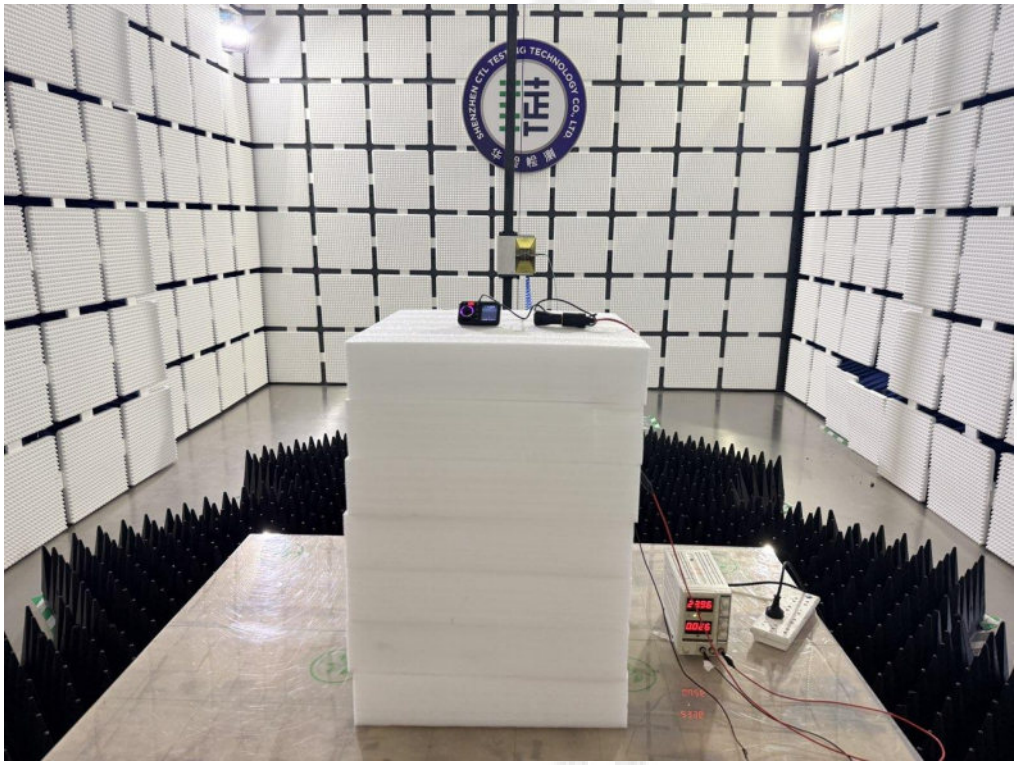
The maximum gain of antenna was -0.68dBi.

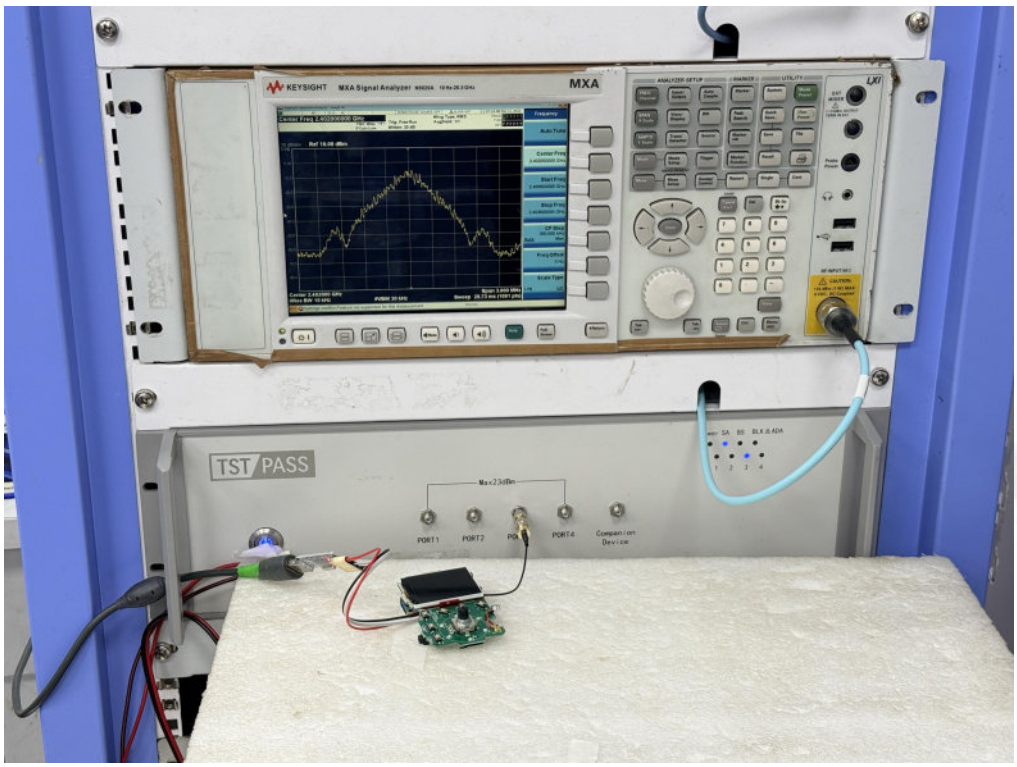


Bluetooth Antenna

4. Test Setup Photos of the EUT



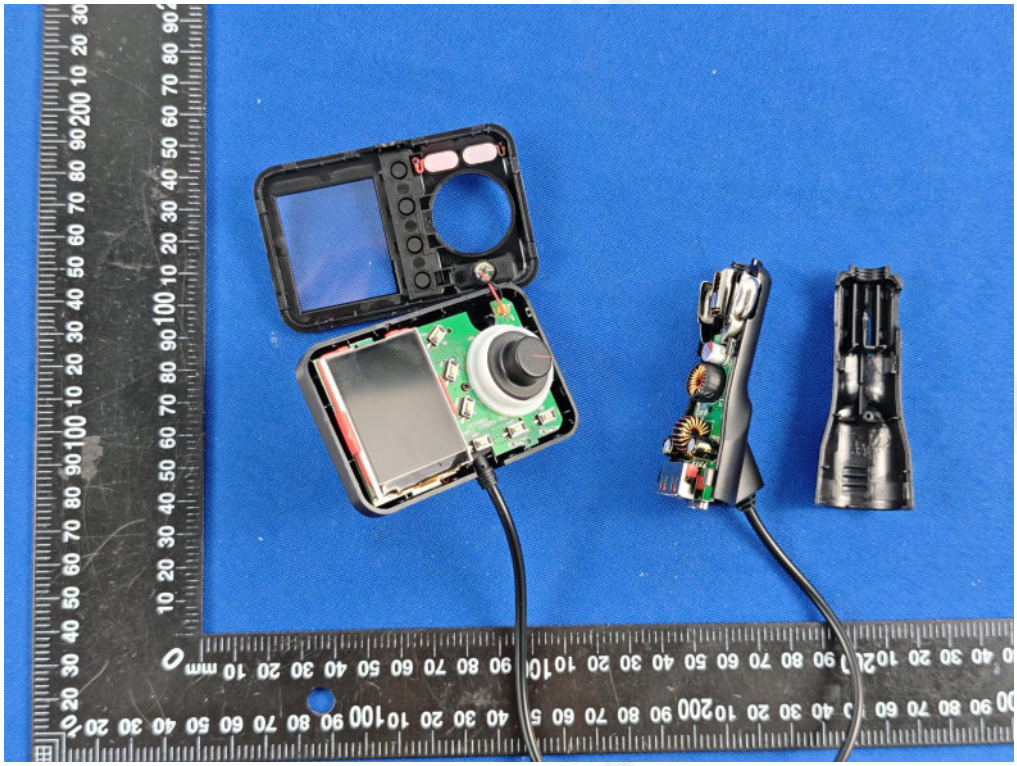


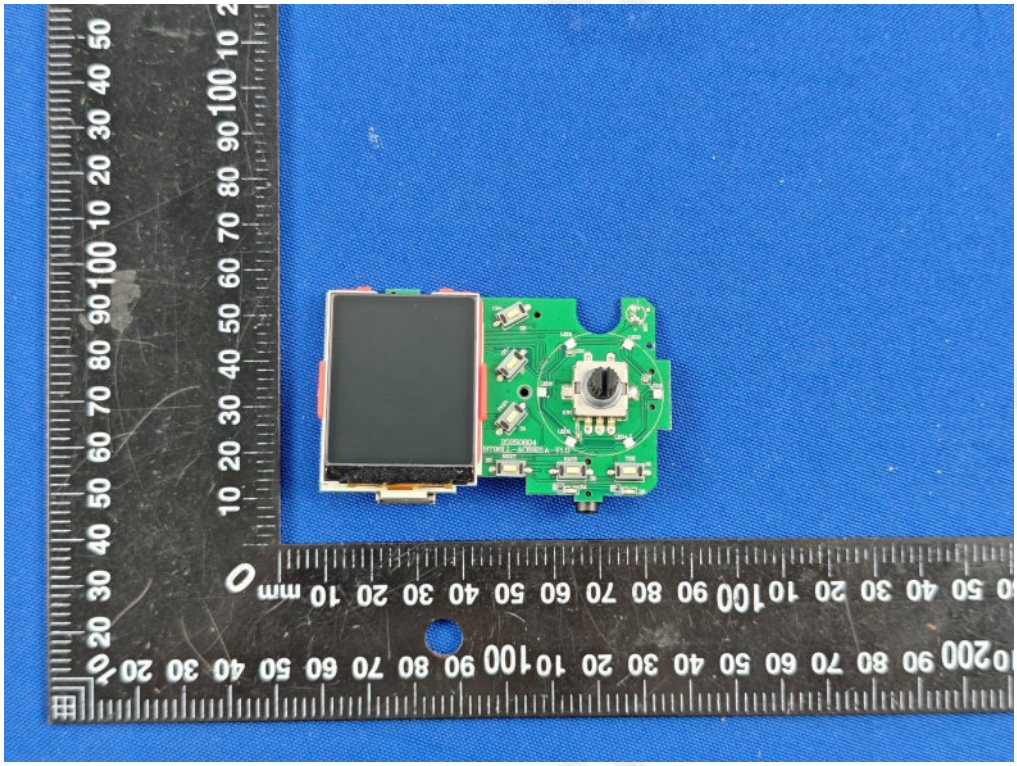

KEYSIGHT
MXA Signal Analyzer
MXA
TST/PASS
PORT1
PORT2
PORT4
Comparison Device

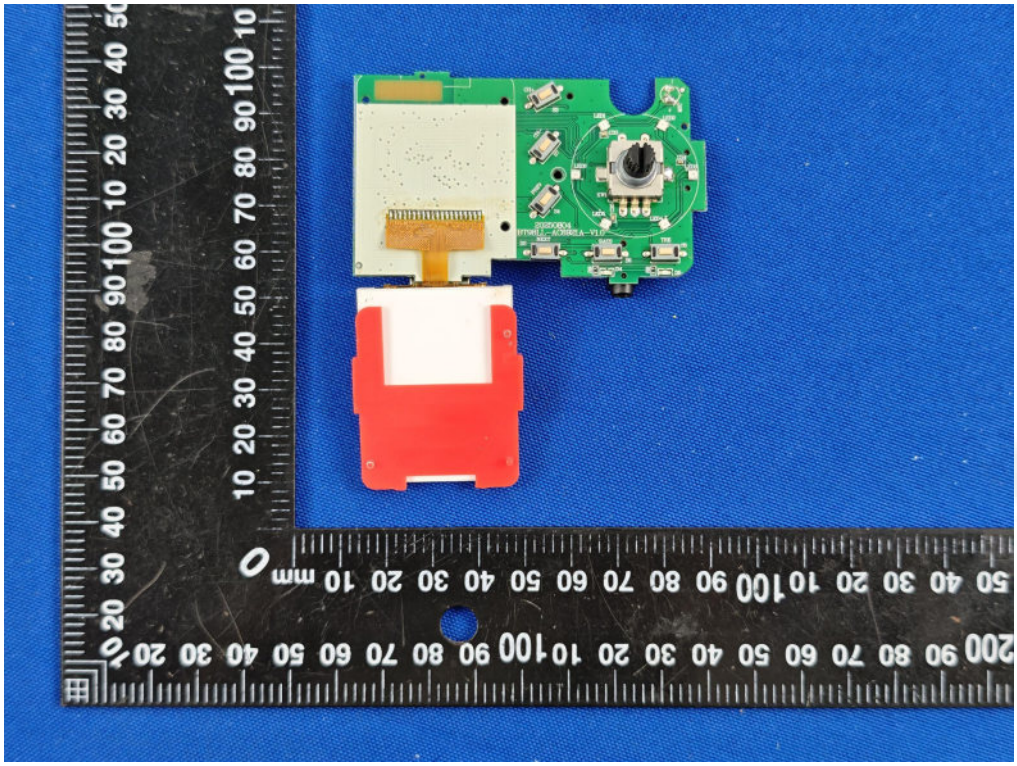
5. Photos of the EUT

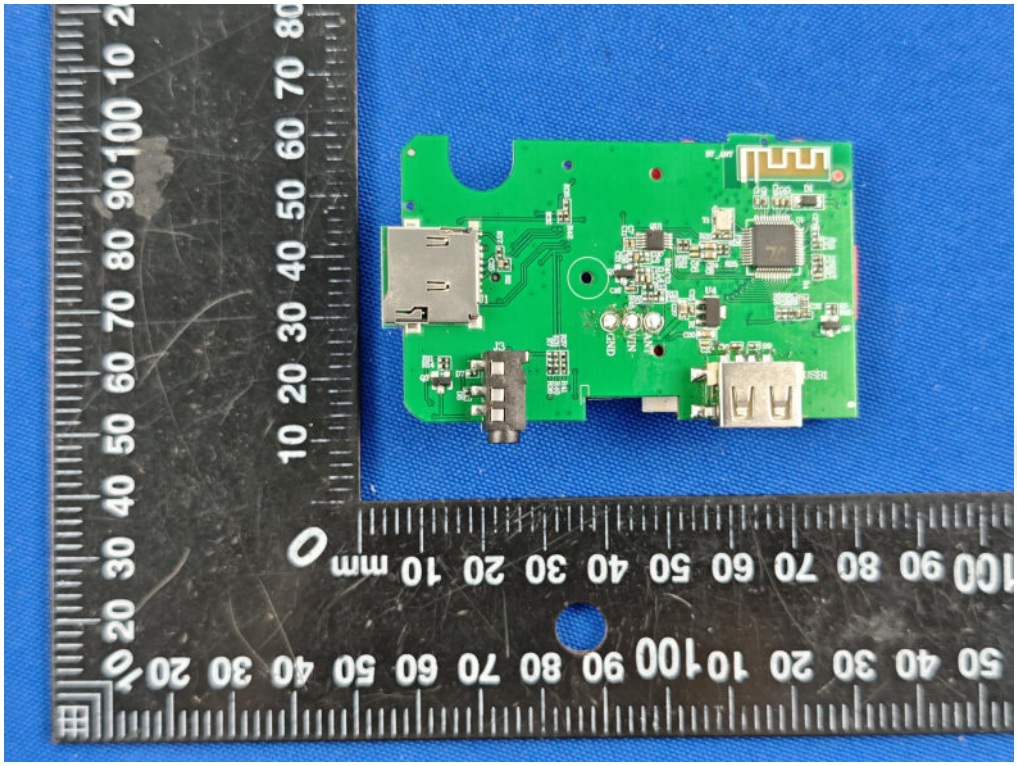
External Photos of EUT

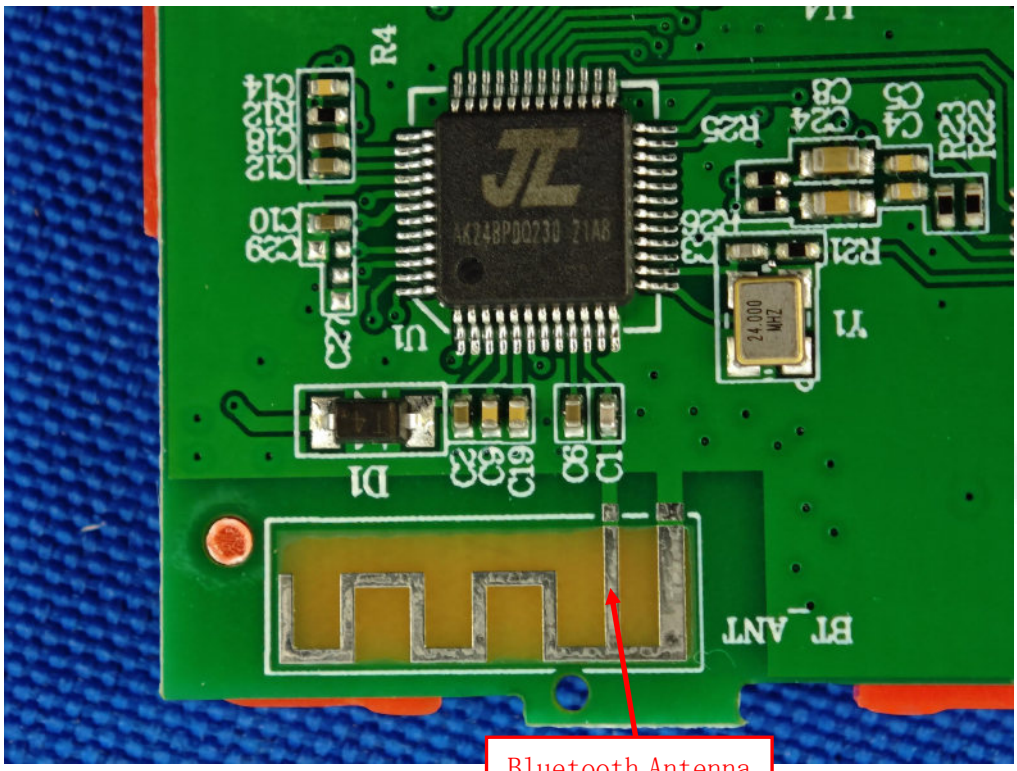
Internal Photos of EUT



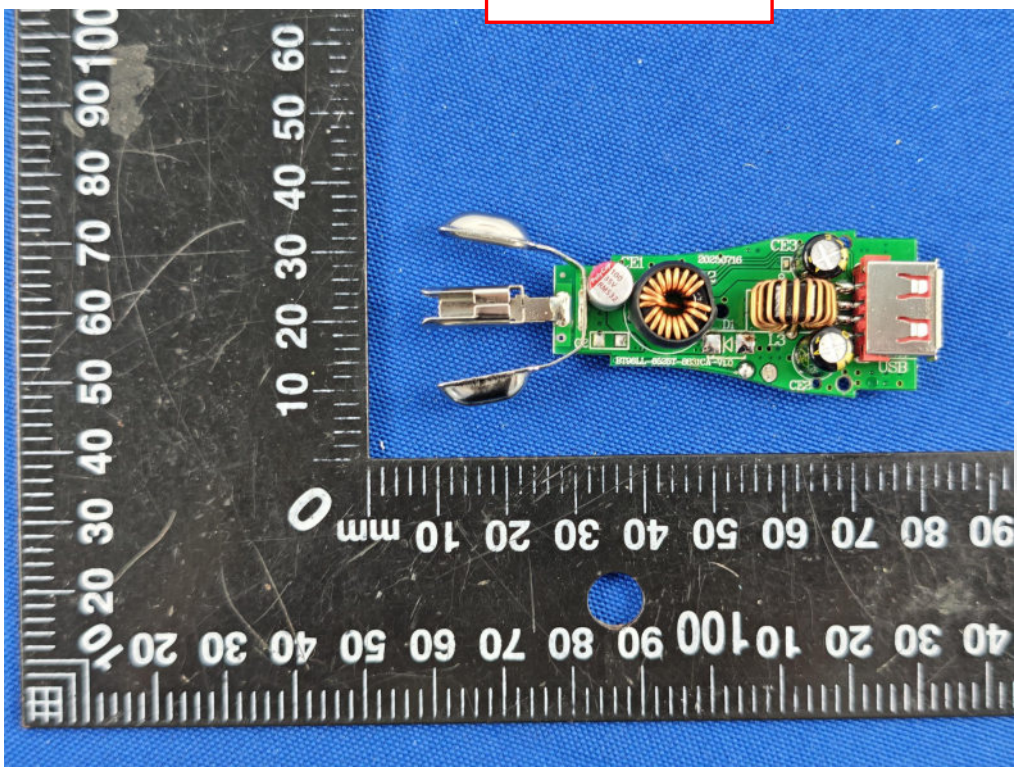


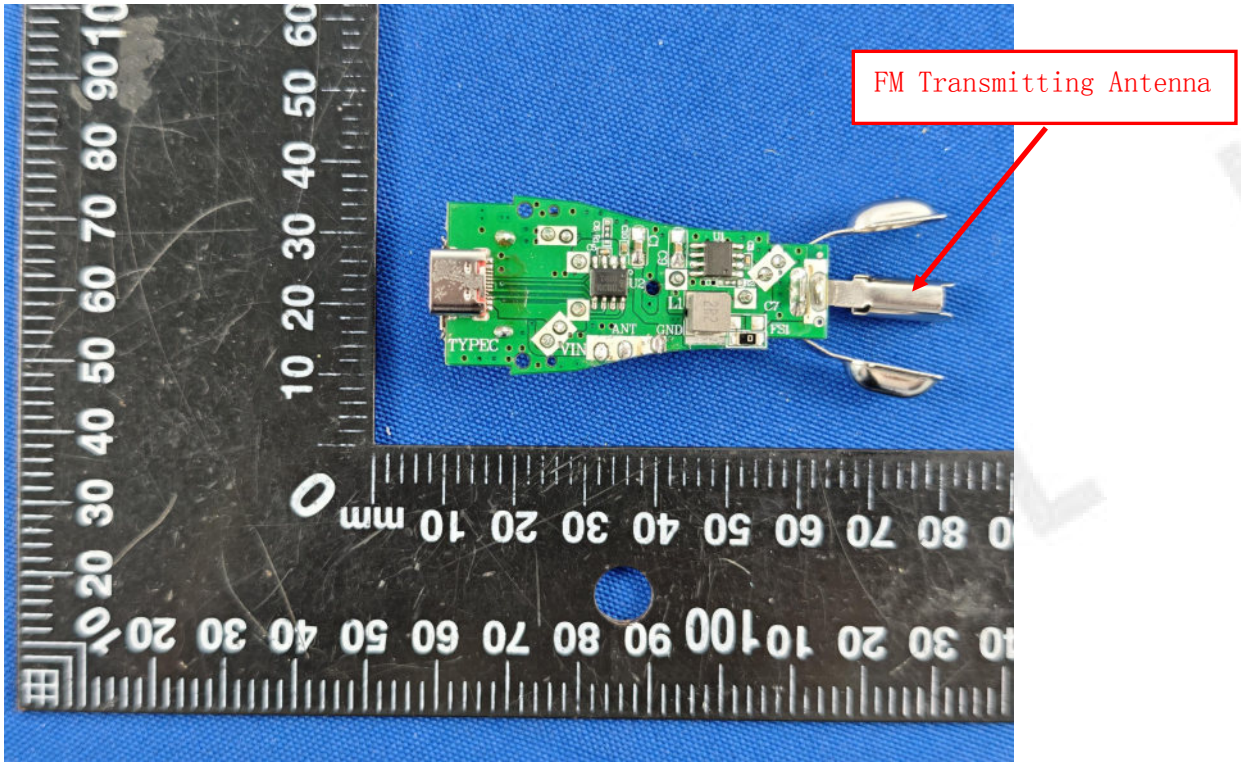






Bluetooth Antenna





********** End of Report **********