

# **TEST REPORT**

47 CFR Part 15, Subpart C 15.247

Report Reference No.: CTL2501228011-WF

Compiled by:

( position+printed name+signature)

Tested by:

( position+printed name+signature)

Approved by:

( position+printed name+signature)

Happy Guo (File administrators)

James Yu (Test Engineer)

Ivan Xie (Manager)



Product Name.....: Bluetooth Speaker

Model/Type reference...... UBT1
List Model(s)...... N/A

Trade Mark : SSV Works

FCC ID...... 2AHSG-UBT1

Applicant's name...... SSV Works, Inc.

Test Firm Shenzhen CTL Testing Technology Co., Ltd.

Address of Test Firm...... Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road,

Nanshan District, Shenzhen, China 518055

Test specification.....

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 27, 2025

**Date of Test Date**..... February 27, 2025 - March 7, 2025

**Date of Issue**...... March 11, 2025

Result..... Pass

#### Shenzhen CTL Testing Technology Co., Ltd. All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen CTL Testing Technology Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen CTL Testing Technology 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.

# **TEST REPORT**

Toot Poport No.:	CTL2501228011-WF	March 11, 2025
Test Report No. :	C1L2501226011-WF	Date of issue

Equipment under Test : Bluetooth Speaker

Sample No : CTL2501228011

Model /Type : UBT1

Listed Models : N/A

Applicant : SSV Works, Inc

Address : 4610 Calle Quetzal Camarillo, CA 93012 USA

Manufacturer : Shenzhen Trendwoo Tech. Co., Ltd.

Address : Units 3202&3208, 32nd floor, Block C, Phase 2 Galaxy

World, Minle community, Minzhi street, Longhua

district, Shenzhen, China

Test result	Pass *
-------------	--------

<sup>\*</sup>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.

# \*\* Modified History \*\*

Revisions	Description	Issued Data	Report No.	Remark
Version 1.0	Initial Test Report Release	March 11, 2025	CTL2501228011-WF	Tracy Qi
		117		
		All and a second		
				-
	and the		- A T	
				Diam's
	. 0 0 0		_ 0 /	
	- N			

	Table of Contents	Page
1. SUMMARY		5
1 1 TEST STANDARDS		r
1.3. TEST FACILITY		ε
1.4. STATEMENT OF THE MEASUREMENT UNCERTA	INTY	6
2. GENERAL INFORMATION		8
2.1. Environmental conditions		
	QUENCY	
3. TEST CONDITIONS AND RESULTS		12
3.1. CONDUCTED EMISSIONS TEST		12
3.2. RADIATED EMISSIONS AND BAND EDGE		15
,		
	UENCE	
	UENCE	
5. PHOTOS OF THE FUT		35

V1.0 Page 5 of 41 Report No.: CTL2501228011-WF

## 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: 2013: American National Standard for Testing Unlicensed Wireless Devices

KDB 558074 D01 v05r02: KDB558074 D01 15.247 Meas Guidance v05r02

## 1.2. Test Description

AC Power Conducted Emission	PASS
20dB Bandwidth	PASS
Spurious RF Conducted Emission	PASS
Maximum Peak Output Power	PASS
Pseudorandom Frequency Hopping Sequence	PASS
Number of hopping frequency& Time of Occupancy	PASS
Frequency Separation	PASS
Radiated Emissions	PASS
Band Edge Compliance of RF Emission	PASS
Antenna Requirement	PASS
	20dB Bandwidth  Spurious RF Conducted Emission  Maximum Peak Output Power  Pseudorandom Frequency Hopping Sequence  Number of hopping frequency& Time of Occupancy  Frequency Separation  Radiated Emissions  Band Edge Compliance of RF Emission

V1.0 Page 6 of 41 Report No.: CTL2501228011-WF

### 1.3. Test Facility

#### 1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co.,Ltd.

Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.10 and CISPR 32/EN 55032 requirements.

#### 1.3.2 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 Registration No.: 9618B

**CAB identifier: CN0041** 

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 Registration No.: 9618B.

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. 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
Transmitter power Radiated	±2.20 dB	(1)
Radiated Emission 9KHz~30MHz	±3.66dB	(1)
Radiated Emission 30~1000MHz	±4.08dB	(1)
Radiated Emission Above 1GHz	±4.32dB	(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 DE Spurious Emission	9kHz-7GHz:±1.09dB	(1)
Conducted RF Spurious Emission	7GHz-26.5GHz: ±3.27dB	(1)

<sup>(1)</sup> This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

# 2. GENERAL INFORMATION

## 2.1. Environmental conditions

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

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

# 2.2. General Description of EUT

Product Name:	Bluetooth Speaker
Model/Type reference:	UBT1
Power supply:	DC 5V==-1A from adapter or DC 3.7V from battery
Bluetooth:	
Version:	Supported BR/EDR
Modulation:	GFSK, π/4DQPSK, 8DPSK
Operation frequency:	2402MHz~2480MHz
Channel number:	79
Channel separation:	1MHz
Antenna type:	PCB Antenna
Antenna gain:	1.08dBi

Note1: For more details, please refer to the user's manual of the EUT.

Note2: Antenna gain provided by the applicant.

# 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
	1 2 2 2
38	2440
39	2441
40	2442
- P	10.00
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	DH5/2DH5/3DH5
20dB Bandwidth	DH5/2DH5/3DH5
Frequency Separation	DH5/2DH5/3DH5 Middle channel
Number of hopping frequency	DH5/2DH5/3DH5
Time of Occupancy (Dwell Time)	DH1/DH3/DH5 Middle channel 2DH1/2DH3/2DH5 Middle channel 3DH1/3DH3/3DH5 Middle channel
Out-of-band Emissions	DH5/2DH5/3DH5

Software Version:	FCC_assist_1.0.2.2.exe
Test Mode Power level	
BT BR	10
BT EDR	10

# 2.4. Equipments Used during the Test

Conducted Emission						
Test Equipment	Manufacturer	Model No.	Serial No.	Previous calibration	Last Cal.	Cal.Due
EMI Test Receiver	ROHDE & SCHWARZ	ESCI	1166.5950.03	2023/05/04	2024/04/30	2025/04/29
LISN	ROHDE & SCHWARZ	ESH2-Z5	860014/010	2023/05/04	2024/04/30	2025/04/29
Limitator	ROHDE & SCHWARZ	ESH3-Z2	100408	2023/05/04	2024/04/30	2025/04/29
Software:	PEAN					VG
Nam	ne of Software:			Version	on:	
1,012	ES-K1	8/		V1.7	1	D. CO.

Radiated Emission								
Test Equipment	Manufacturer	Model No.	Serial No.	Previous calibration	Last Cal.	Cal.Due		
Active Loop Antenna	Da Ze	ZN30900A	1	2021/05/13	2024/04/30	2025/04/29		
Double cone logarithmic antenna	Schwarzbeck	VULB 9168	824	1	2023/02/13	2026/02/12		
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	1	2024/11/25	2027/11/24		
Horn Antenna	Ocean Microwave	OBH100400	26999002	1	2024/12/21	2027/12/20		
Amplifier	MRT-AP01M06	MRT	S-001	2023/05/04	2024/04/30	2025/04/29		
Amplifier	Agilent	8449B	3008A02306	2023/05/04	2024/04/30	2025/04/29		
Amplifier	Brief&Smart	LNA-4018	2104197	2023/05/05	2024/05/03	2025/05/02		
EMI Test Receiver	ROHDE & SCHWARZ	ESCI	1166.5950.03	2023/05/04	2024/04/30	2025/04/29		
Spectrum Analyzer	RS	FSP	1164.4391.38	2023/05/05	2024/05/03	2025/05/02		
Software:					a (C )	Desir.		
Nar	ne of Software:			Versi	on:			
EZ_E	MC(Below 1GHz)		V1.1.4.2					
EZ_EI	MC(Above 1GHz)			V1.1.	4.2			

RF Conducted						
Test Equipment	Manufacturer	Model No.	Serial No.	Previous calibration	Last Cal.	Cal.Due
Spectrum Analyzer	Keysight	N9020A	MY53420874	2023/05/04	2024/05/01	2025/04/30
Temperature/Humidity Meter	Ji Yu	MC501	1	2023/05/09	2024/05/04	2025/05/03
Software:			8 B A			
Name of	Software:	100	Vers	ion:		
TST-	-PASS		Lab.	V2	.0	

# 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.

V1.0 Page 11 of 41 Report No.: CTL2501228011-WF

# 2.6. Modifications

No modifications were implemented to meet testing criteria.

#### 3. TEST CONDITIONS AND RESULTS

#### 3.1. Conducted Emissions Test

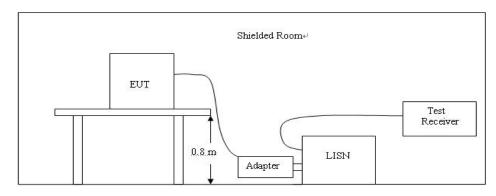
#### **LIMIT**

FCC CFR Title 47 Part 15 Subpart C Section 15.207

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

<sup>\*</sup> Decreases with the logarithm of the frequency.

#### **TEST CONFIGURATION**

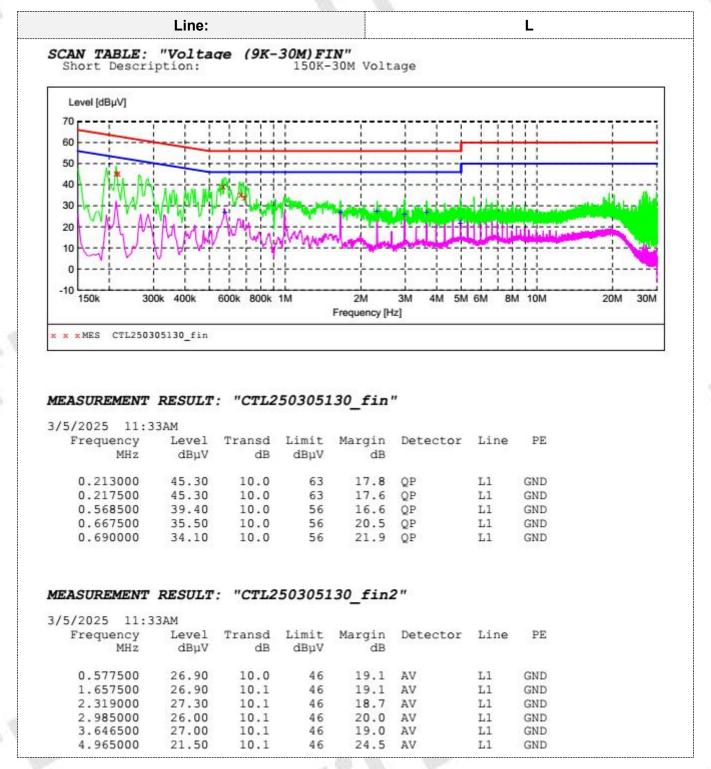


#### **TEST PROCEDURE**

- 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 C63.10:2013.
- 2. Support equipment, if needed, was placed as per ANSI C63.10:2013.
- 3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
- 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.

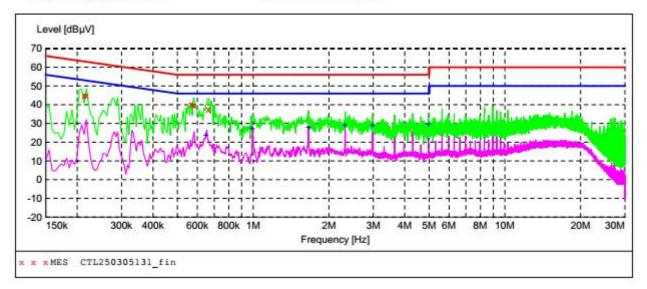
#### **TEST RESULTS**

Remark: All modes of GFSK, Pi/4 DQPSK, and 8DPSK were test at Low, Middle, and High channel; only the worst result of GFSK Low Channel was reported as below:





SCAN TABLE: "Voltage (9K-30M)FIN"
Short Description: 150K-30M Voltage



### MEASUREMENT RESULT: "CTL250305131 fin"

3/5/2025 11:3	6AM						
Frequency	Level	Transd	Limit	Margin	Detector	Line	PE
MHz	dΒμV	dB	dΒμV	dB			
0.213000	45.30	10.0	63	17.8	QP	N	GND
0.217500	45.20	10.0	63	17.7	QP	N	GND
0.568500	40.10	10.0	56	15.9	QP	N	GND
0.582000	39.60	10.0	56	16.4	QP	N	GND
0.663000	37.40	10.0	56	18.6	QP	N	GND

#### MEASUREMENT RESULT: "CTL250305131\_fin2"

3/5/2025	11:3	6AM						
Freque	ncy MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.649	500	23.70	10.0	46	22.3	AV	N	GND
0.991	500	27.10	10.1	46	18.9	AV	N	GND
1.657	7500	28.00	10.1	46	18.0	AV	N	GND
2.319	000	28.90	10.1	46	17.1	AV	N	GND
2.980	500	28.90	10.1	46	17.1	AV	N	GND
4.965	000	29.30	10.1	46	16.7	AV	N	GND

# 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.

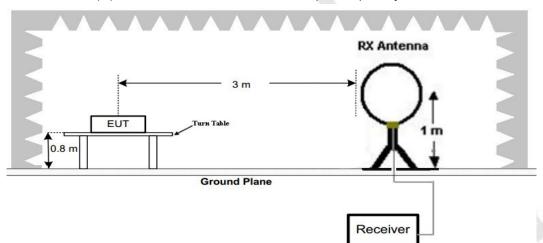
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Radiated emission limits

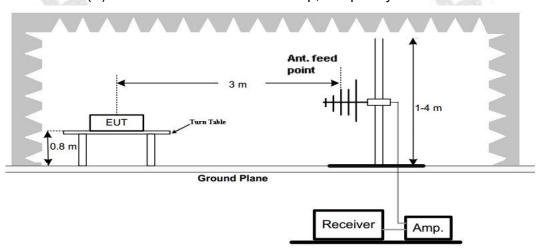
Frequency (MHz)	Distance (Meters)	Radiated (dBµV/m)	Radiated (µV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

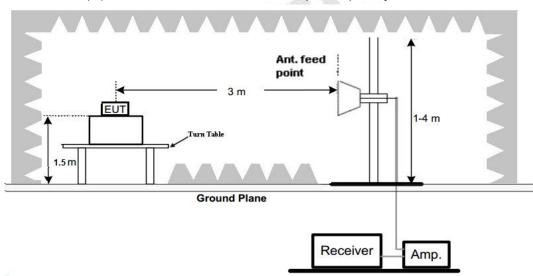
#### **TEST CONFIGURATION**

(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**

- 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.
- Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C 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,  $\pi/4$  DQPSK and 8DPSK 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.
- 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.

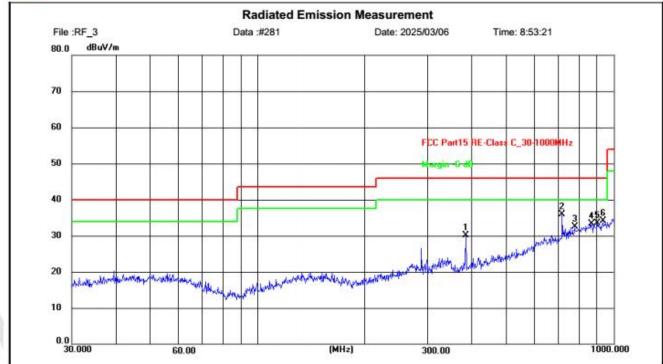
V1.0 Page 17 of 41 Report No.: CTL2501228011-WF

#### For 30MHz-1GHz

#### Horizontal



Shenzhen CTL Testing Technology Co., Ltd Tel: +86-755-89486194



Site LAB Chamber 2

Limit: FCC Part15 RE-Class C\_30-1000MHz

EUT: / Distance: 3m

M/N: UBT1

Mode: BT 2402MHz TX Note: SSV Works, Inc.

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	384.1001	13.19	16.91	30.10	46.00	15.90	peak	100	135	Р	
2	717.9396	12.70	23.21	35.91	46.00	10.09	peak	100	193	Р	
3	777.9000	7.32	25.16	32.48	46.00	13.52	peak	100	7	Р	
4	866.8474	7.22	26.16	33.38	46.00	12.62	peak	100	21	Р	
5	901.3318	6.92	26.62	33.54	46.00	12.46	peak	100	36	Р	
6	934.7265	7.01	27.08	34.09	46.00	11.91	peak	100	78	Р	

Power:

Polarization: Horizontal

Temperature:

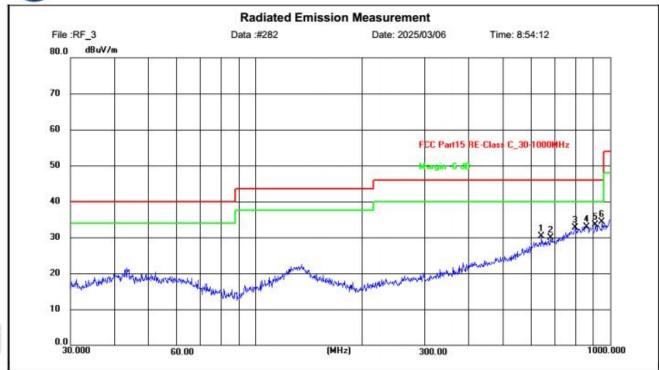
Humidity:

25(C)

#### Vertical



Shenzhen CTL Testing Technology Co., Ltd Tel: +86-755-89486194



Site LAB Chamber 2 Polarization: Vertical

Limit: FCC Part15 RE-Class C\_30-1000MHz Power: Humidity: 50 %

Temperature:

25(C)

EUT: / Distance: 3m

M/N: UBT1

Mode: BT 2402MHz TX Note: SSV Works, Inc.

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	641.7352	7.46	22.76	30.22	46.00	15.78	peak	100	280	Р	
2	680.2581	7.23	22.72	29.95	46.00	16.05	peak	100	10	Р	
3	797.5801	7.04	25.59	32.63	46.00	13.37	peak	100	152	Р	
4	859.2816	6.63	26.35	32.98	46.00	13.02	peak	100	351	Р	
5	910.4645	6.89	26.65	33.54	46.00	12.46	peak	100	109	Р	
6	949.5931	7.10	27.11	34.21	46.00	11.79	peak	100	67	Р	

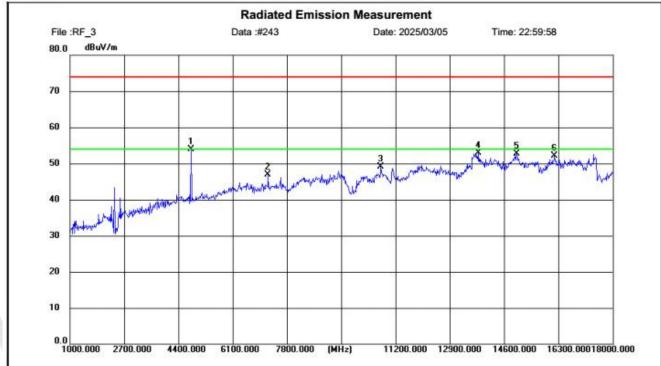
V1.0 Page 19 of 41 Report No.: CTL2501228011-WF

#### For 1GHz to 25GHz

#### Horizontal



Shenzhen CTL Testing Technology Co., Ltd Tel: +86-755-89486194



Site LAB Chamber 2

100 200 NO. 100 NO.

Polarization: Horizontal

Temperature: 25(C)

Limit: FCC Part15 RE-Class C\_Above 1GHz\_PK

Power:

Humidity: 50 %

EUT: /

Distance: 3m

M/N: UBT1

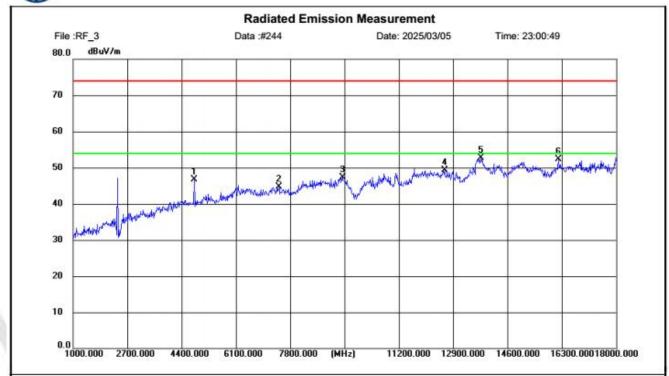
Mode: BT 2402MHz TX Note: SSV Works, Inc.

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	4803.750	61.99	-8.09	53.90	74.00	20.10	peak	150	142	Р	
2	7205.000	50.24	-3.29	46.95	74.00	27.05	peak	150	283	Р	
3	10743.125	48.81	0.31	49.12	74.00	24.88	peak	150	326	Р	
4	13803.125	49.10	3.73	52.83	74.00	21.17	peak	150	339	Р	
5	14997.375	49.35	3.33	52.68	74.00	21.32	peak	150	297	Р	
6	16187.375	46.88	5.20	52.08	74.00	21.92	peak	150	184	Р	

#### Vertical



Shenzhen CTL Testing Technology Co., Ltd Tel: +86-755-89486194



Site LAB Chamber 2

Limit: FCC Part15 RE-Class C\_Above 1GHz\_PK

EUT: / M/N: UBT1

Mode: BT 2402MHz TX

Note: SSV Works, Inc.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4803.750	54.88	-8.09	46.79	74.00	27.21	peak	150	290	Р	
2	7451.500	47.56	-2.80	44.76	74.00	29.24	peak	150	149	Р	
3	9432.000	47.14	0.25	47.39	74.00	26.61	peak	150	318	Р	
4	12640.750	47.07	2.21	49.28	74.00	24.72	peak	150	21	Р	
5	13769.125	48.97	3.78	52.75	74.00	21.25	peak	150	35	Р	
6	16212.875	47.03	5.27	52.30	74.00	21.70	peak	150	35	Р	

Power:

Distance: 3m

#### **REMARKS**:

1. 18GHz-26GHz not recorded for no spurious point have a margin of less than 6 dB with respect to the limits.

Polarization: Vertical

Temperature:

Humidity:

25(C)

2. PK detector measurement value is lower than the average limit. Therefore, there is no need to test AV detector measurements.

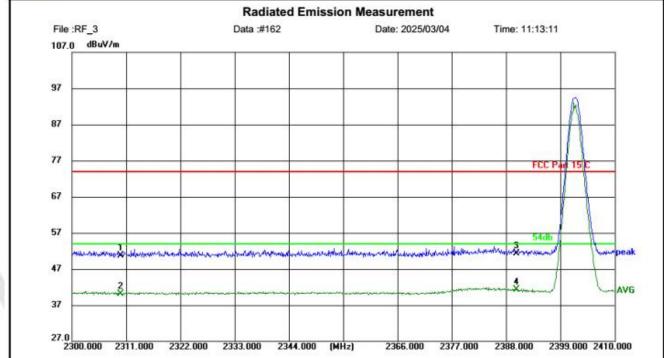
V1.0 Page 21 of 41 Report No.: CTL2501228011-WF

#### Results of Band Edges Test (Radiated)

Note: GFSK, Pi/4 DQPSK and 8DPSK all have been tested, only worse case GFSK is

reported.





Site LAB Chamber 2 Polarization: Horizontal Temperature: 25(C)
Limit: FCC Part 15 C Power: Humidity: 50 %

EUT: / Distance: 3m

M/N: UBT1

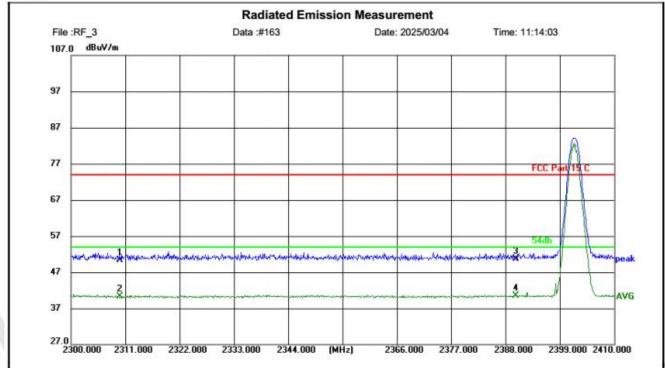
Mode: BT 2402MHz TX Note: SSV Works, Inc.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	41.05	9.69	50.74	74.00	23.26	peak	150	21	Р	
2	2310.000	30.45	9.69	40.14	54.00	13.86	AVG	150	21	Р	
3	2390.000	41.46	9.77	51.23	74.00	22.77	peak	150	260	Р	
4	2390.000	31.45	9.77	41.22	54.00	12.78	AVG	150	260	Р	

CH00 Vertical



Shenzhen CTL Testing Technology Co., Ltd Tel: +86-755-89486194



Site LAB Chamber 2

Limit: FCC Part 15 C

EUT: / Distance: 3m

M/N: UBT1

Mode: BT 2402MHz TX Note: SSV Works, Inc.

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	40.68	9.69	50.37	74.00	23.63	peak	150	77	Р	
2	2310.000	30.65	9.69	40.34	54.00	13.66	AVG	150	77	Р	
3	2390.000	40.97	9.77	50.74	74.00	23.26	peak	150	99	Р	
4	2390.000	30.72	9.77	40.49	54.00	13.51	AVG	150	99	Р	

Power:

Polarization: Vertical

Temperature:

Humidity:

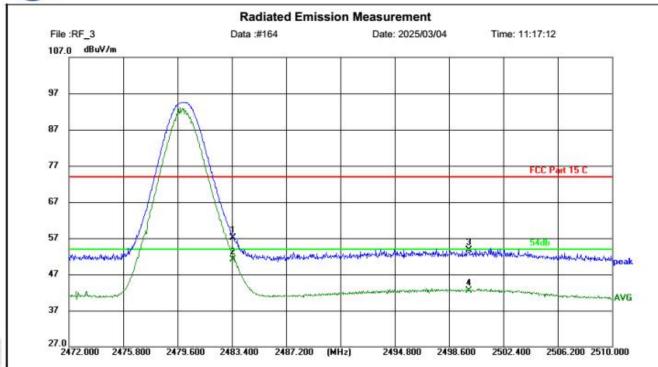
25(C)

50 %

CH78 Horizontal



Shenzhen CTL Testing Technology Co., Ltd Tel: +86-755-89486194



Site LAB Chamber 2

Limit: FCC Part 15 C

EUT: /

M/N: UBT1

Mode: BT 2480MHz TX Note: SSV Works, Inc. Polarization: Horizontal Temperature: 25(C)
Power: Humidity: 50 %

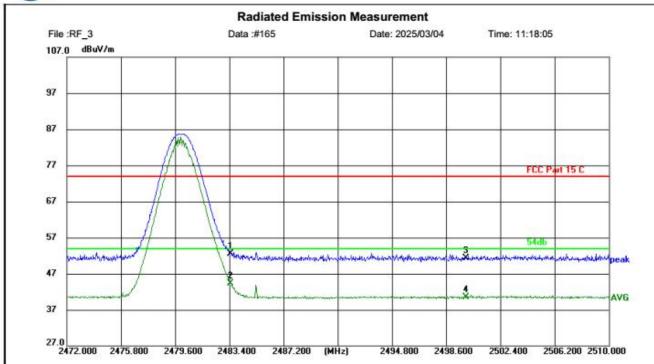
Distance: 3m

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	47.14	9.93	57.07	74.00	16.93	peak	150	130	Р	5.
2	2483.500	41.15	9.93	51.08	54.00	2.92	AVG	150	130	Р	
3	2500.000	43.75	10.00	53.75	74.00	20.25	peak	150	130	Р	
4	2500.000	32.59	10.00	42.59	54.00	11.41	AVG	150	130	Р	

**CH78** Vertical



Shenzhen CTL Testing Technology Co., Ltd Tel: +86-755-89486194



Site LAB Chamber 2 Polarization: Vertical Temperature: 25(C)

Limit: FCC Part 15 C Power: Humidity: 50 %

EUT: / Distance: 3m

M/N: UBT1

Mode: BT 2480MHz TX Note: SSV Works, Inc.

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	42.64	9.93	52.57	74.00	21.43	peak	150	0	Р	
2	2483.500	34.39	9.93	44.32	54.00	9.68	AVG	150	0	Р	
3	2500.000	41.25	10.00	51.25	74.00	22.75	peak	150	273	Р	
4	2500.000	30.54	10.00	40.54	54.00	13.46	AVG	150	273	Р	

V1.0 Page 25 of 41 Report No.: CTL2501228011-WF

### 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. CTL2501228011-WF\_Bluetooth\_Appendix.

V1.0 Page 26 of 41 Report No.: CTL2501228011-WF

#### 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. CTL2501228011-WF\_Bluetooth\_Appendix.

V1.0 Page 27 of 41 Report No.: CTL2501228011-WF

## 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 with 300 KHz RBW and 300 KHz VBW.

#### **TEST CONFIGURATION**



#### **TEST RESULTS**

Raw data reference to Section 3 of document No. CTL2501228011-WF\_Bluetooth\_Appendix.

V1.0 Page 28 of 41 Report No.: CTL2501228011-WF

# 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. CTL2501228011-WF\_Bluetooth\_Appendix.

V1.0 Page 29 of 41 Report No.: CTL2501228011-WF

# 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. CTL2501228011-WF\_Bluetooth\_Appendix.

V1.0 Page 30 of 41 Report No.: CTL2501228011-WF

#### 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. CTL2501228011-WF\_Bluetooth\_Appendix.

### 3.9. Pseudorandom Frequency Hopping Sequence

#### **TEST APPLICABLE**

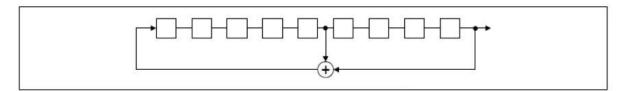
#### For 47 CFR Part 15C section 15.247 (a) (1) requirement:

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**

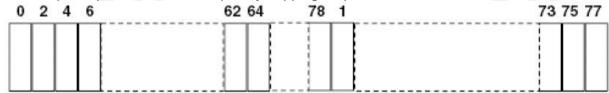
The pseudorandom frequency hopping sequence may be generated in a nice-stage shift register whose 5<sup>th</sup> and 9<sup>th</sup> stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first one of 9 consecutive 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.

V1.0 Page 32 of 41 Report No.: CTL2501228011-WF

# 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.

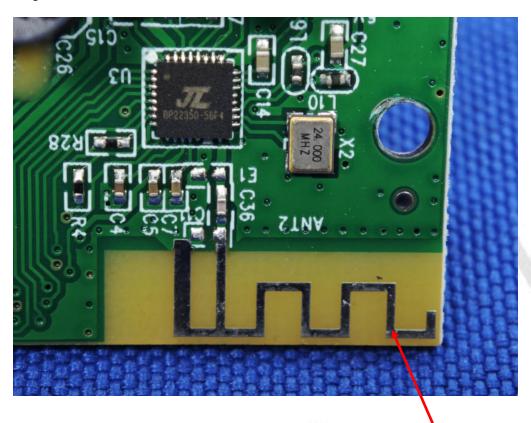
And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

#### 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 1.08dBi.

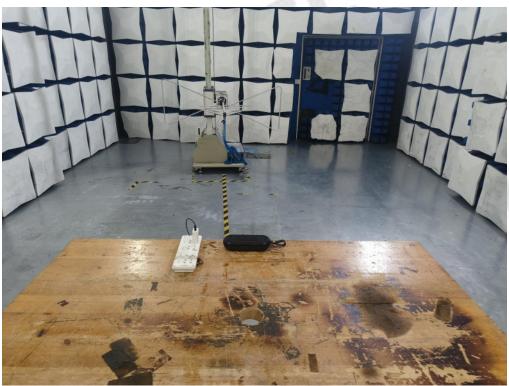


Bluetooth Antenna

V1.0 Page 33 of 41 Report No.: CTL2501228011-WF

# 4. Test Setup Photos of the EUT





V1.0 Page 34 of 41 Report No.: CTL2501228011-WF



V1.0 Page 35 of 41 Report No.: CTL2501228011-WF

# 5. Photos of the EUT

**External Photos of EUT** 





V1.0 Page 36 of 41 Report No.: CTL2501228011-WF





V1.0 Page 37 of 41 Report No.: CTL2501228011-WF





V1.0 Page 38 of 41 Report No.: CTL2501228011-WF

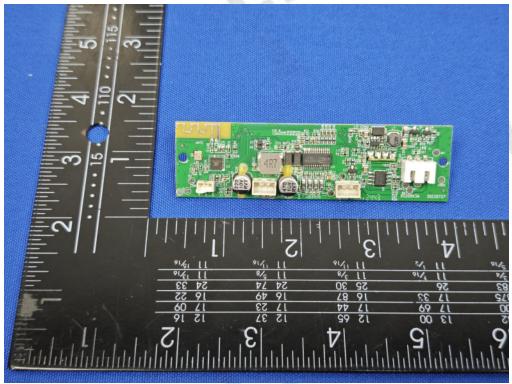




V1.0 Page 39 of 41 Report No.: CTL2501228011-WF

# **Internal Photos of EUT**





V1.0 Page 40 of 41 Report No.: CTL2501228011-WF

