

WSCT

TEST REPORT

WSET

WSCT

FCC ID: 2AXYP-OTW-323-R

Product: True Wireless Earbuds

Model No.: OTW-323

Trade Mark: oraimo

Report No.: WSCT-ANAB-R&E241200078A-BT

Issued Date: 03 January 2025

Issued for:

ORAIMO TECHNOLOGY LIMITED FLAT N 16/F BLOCK B UNIVERSAL INDUSTRIAL CENTRE 19-25 W5 SHAN MEI STREET FOTAN NT HONGKONG

Issued By:

World Standardization Certification & Testing Group(Shenzhen) Co., Ltd. Building A-B, Baoli'an Industrial Park, No. 58 and 60, Tangtou Avenue, Shiyan Street, Bao'an District, Shenzhen City, Guangdong Province, China

> TEL: +86-755-26996192 FAX: +86-755-86376605

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/				
X	X	X	X	
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Test Certification

True Wireless Earbuds Product:

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Model No.: OTW-323

Trade Mark:

Applicant: **ORAIMO TECHNOLOGY LIMITED**

FLAT N 16/F BLOCK B UNIVERSAL INDUSTRIAL CENTRE

19-25 SHAN MEI STREET FOTAN NT HONGKONG

ORAIMO TECHNOLOGY LIMITED Manufacturer:

FLAT N 16/F BLOCK B UNIVERSAL INDUSTRIAL CENTRE

19-25 SHAN MEI STREET FOTAN NT HONGKONG

Date of Test: 15 December 2024 to 03 January 2025 // 5 //

Applicable FCC CFR Title 47 Part 15 Subpart C Section 15.247 Standards:

The above equipment has been tested by World Standardization Certification & Testing Group(Shenzhen)Co., Ltd. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

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Tested By:

(Wang Xiang) W5 /

Checked By:

(Chen Xu)

Approved By:

(Li Huaibi)

Date: 05

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Test Result Summary 2.

	MAC CT MAC C	TAPE PT	MAR CT.
/	Requirement	CFR 47 Section	Result
	Antenna Requirement	§15.203/§15.247 (c)	PASS
7 °	AC Power Line Conducted Emission	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	NA NA
_	Conducted Peak Output Power Power	§15.247 (b)(1) §2.1046	W5 PASS
	20dB Occupied Bandwidth	§15.247 (a)(1) §2.1049	PASS
	Carrier Frequencies Separation	§15.247 (a)(1)	PASS
	Hopping Channel Number	§15.247 (a)(1)	PASS
7	Dwell Time	§15.247 (a)(1)	PASS
7°	Radiated Emission	§15.205/§15.209 W §2.1053, §2.1057 W 5 E 7	PASS _{V5ET}
	Band Edge	§15.247(d) §2.1051, §2.1057	PASS

Note:

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- 1. PASS: Test item meets the requirement.
- 2. Fail: Test item does not meet the requirement.
- 3. N/A: Test case does not apply to the test object.
- 4. The test result judgment is decided by the limit of test standard.

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3. EUT Description

	Product Name:	True Wireless Earbuds / W5 / T	SET"
\times	Model :	OTW-323	
WSET	Trade Mark:	oraimo	,
ZVPL	Operation Frequency:	2402MHz~2480MHz	$\overline{}$
	Channel Separation:	1MHz	\times
	Number of Channel:	797 WSCT WSCT	SET
\times	Modulation Type:	GFSK, π/4-DQPSK, 8-DPSK	
WSET	Modulation Technology:	FHSS WSET WSET WSET	
	Antenna Type:	Chip Antenna	X
	Antenna Gain:	1.73dBi W 5 CT W 5 CT	VS CT
WSET		Charging Box: Model: OTW-323 Input: 5V1A Output: 5V400mA Capacity: 500mAh 3.7V 1.85Wh	
	Operating Voltage	Charging Box Battery: Li-ion Battery: 802035 Voltage: 3.7V Rated Capacity: 500mAh 1.85Wh	VSET
X		Earphone Battery: Li-ion Battery: 451012 Rated Voltage: 3.7V Rated Capacity: 35mAh 0.1895Wh	
WSET	Remark:	N/A. WSL WSL	

	W5 CT		AWS CT	W5 C	7	NSCT	W5CT 1
	X	X		X	X	X	
1	V5CT°	W5 ET	<i>(</i>	NS CT	WSCT	WSET	
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		/ 1					

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Bao'an District, Shenzhen City, Guangdong Province, Chin

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Operation Frequency each of channel for GFSK, π/4-DQPSK, 8DPSK

						, -		
	Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
	MO5 <i>C1</i>	2402MHz	V20 [7	2422MHz	40 [2442MHz	605	7 2462MHz
	1	2403MHz	21	2423MHz	41	2443MHz	61	2463MHz
0	10	2412MHz	30	2432MHz	50	2452MHz	70	2472MHz
	11	2413MHz	31	2433MHz	51	2453MHz	71	2473MHz
	X		\sim		X		X	
	18	2420MHz	38	2440MHz	58	2460MHz	78	2480MHz
_		2421MHz	4 39 <i>C</i> 7	2441MHz	159 C	2461MHz	W5 E	7 -
/	Domark:	Channal 0 2	0 878 ha	vo boon too	tod for C	ECK THAT	JDCK OL	JDCK /

Remark: Channel 0, 39 &78 have been tested for GFSK, π/4-DQPSK, 8DPSK

\times	modulation mode.	, 39 &78 have been te	ested for GFSK, 11/4	FDQPSK, 8DPSK	
WSET	WSE	WSCI	W5	ET WS	CT .
	WSET	WSET	WSET	WSET	WSET
WSET	WSC	WSCI	W.5	ET WS	ET°
	WSET	W5 ET	WSET	WSET	WSET
WSCI	$\langle \hspace{0.1cm} \rangle$	$\langle \rangle$			
	WSET	WSET	WSET	WSET	WSCT
WSET	$\langle \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	$\langle \rangle$	$\langle \ \rangle$		
	WSET	WSET	WSET	WSIT	sione Tee
WSCI		$\langle \rangle$		urdization,	WSET Shenzha
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Genera Information 4.

4.1. Test environment and mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	56 % RH
Atmospheric Pressure:	1010 mbar

Test Mode:

Engineering mode: Keep the EUT in continuous transmitting by select channel and modulations with Fully-charged battery

The sample was placed 0.8m & 1.5m for the measurement below & above 1GHz above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

8	Equipment	Model No.	Serial No.	FCC ID	Trade Name
	Adapter	XCU32	1	1	X /

Note:

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
- 3. For conducted measurements (Output Power, 20dB Occupied Bandwidth, Carrier Frequencies Separation, Hopping Channel Number, Dwell Time, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.

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5. Facilities and Accreditations

5.1. Facilities

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All measurement facilities used to collect the measurement data are located at World Standardization Certification & Testing Group (Shenzhen) Co., Ltd. Building A-B,Baoli'an Industrial Park,No.58 and 60,Tangtou Avenue, Shiyan Street, Bao'an District, Shenzhen City, Guangdong Province, China

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.2.ACCREDITATIONS

ANAB - Certificate Number: AT-3951

WS The EMC Laboratory has been accredited by the American Association for Laboratory Accreditation (ANAB). Certification Number: AT-3951

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	$\langle \hspace{0.1cm} \rangle$	$\langle \hspace{0.1cm} \rangle$	$\langle \hspace{0.1cm} \rangle$		'SET
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5.3. Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

				_
WS ET	No.	Item	MU	
	1	Conducted Emission Test	±3.2dB	\setminus
	2	RF power, conducted	±0.16dB	
	3	Spurious emissions, conducted	±0.21dB	W5 C
X	4	All emissions, radiated(<1GHz)	±4.7dB	
WSET	5	All emissions, radiated(>1GHz)	±4.7dB/5_7	
	6	Temperature	±0.5°C	\setminus
	7	Humidity	±2.0%	WSC

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5.4. MEASUREMENT INSTRUMENTS

	J.4. WILAGO			\wedge			
_	NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	Calibration Date	Calibration Due.	'S E T
<	Test software		EZ-EMC	CON-03A	-	X-	
C I	Test software		MTS8310	WSIT	- /	V5 [T	
	EMI Test Receiver	R&S	ESCI	100005	11/05/2024	11/04/2025	
	LISN	AFJ	LS16	16010222119	11/05/2024	11/04/2025	\wedge
	LISN(EUT)	Mestec	AN3016	04/10040	11/05/2024	11/04/2025	'S E T
<	Universal Radio Communication Tester	R&S	CMU 200	1100.0008.02	11/05/2024	11/04/2025	
C	Coaxial cable	Megalon	LMR400	N/A	11/05/2024	11/04/2025	
	GPIB cable	Megalon	GPIB	N/A	11/05/2024	11/04/2025	
	Spectrum Analyzer	R&S	FSU	100114	11/05/2024	11/04/2025	\wedge
	Pre Amplifier	H.P. <i>ET</i>	HP8447E 5 /	2945A02715	11/05/2024	11/04/2025	SET
	Pre-Amplifier	CDSI	PAP-1G18-38		11/05/2024	11/04/2025	
1	Bi-log Antenna	SCHWARZBECK	VULB9168	01488	11/05/2024	11/04/2025	
C	9*6*6 Anechoic	ET V	VS CT	W.S ET L	11/05/2024	11/04/2025	
	Horn Antenna	COMPLIANCE ENGINEERING	CE18000		11/05/2024	11/04/2025	X
	Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-631	11/05/2024	11/04/2025	/5 C T
	Cable	TIME MICROWAVE	LMR-400	N-TYPE04	11/05/2024	11/04/2025	
	System-Controller	ccs	N/A	N/A	N.C.R	N.C.R	
C i	Turn Table	ccs	N/A	N/A	N.C.R	N.C.R	
	Antenna Tower	ccs	N/A	N/A	N.C.R	N.C.R	
	RF cable	Murata	MXHQ87WA300 0	-	11/05/2024	11/04/2025	
	Loop Antenna	EMCO	6502W5 L	7 00042960	11/05/2024	11/04/2025	rs et
1	Horn Antenna	SCHWARZBECK	BBHA 9170	1123	11/05/2024	11/04/2025	
	Power meter	Anritsu	ML2487A	6K00003613	11/05/2024	11/04/2025	
5	Power sensor	Anritsu	MX248XD	WSET	11/05/2024	11/04/2025	
	Spectrum Analyzer	Keysight	N9010B	MY60241089	11/05/2024	11/04/2025	X

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6. Test Results and Measurement Data

6.1. Antenna requirement

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Standard requirement:

FCC Part15 C Section 15.203 /247(c)

15.203 requirement:

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.

15.247(c) (1)(i) requirement:

(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain of greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

E.U.T Antenna:

The Bluetooth antenna is a Chip Antenna. it meets the standards, and the best case gain of the antenna is 1.73dBi.

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Please refer to the attachment "OTW-323(R) Internal Photo" for the antenna location

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Conducted Emission 6.2.

	6.2.1. Test Specification	T WSET WSET	W5CT
X	Test Requirement:	FCC Part15 C Section 15.207	
SET	Test Method: 5 [7]	ANSI C63.10:2014 W5 ET W5 ET	
	Frequency Range:	150 kHz to 30 MHz	\times
	Receiver setup:	RBW=9 kHz, VBW=30 kHz, Sweep time=auto	West or
SET	Limits:	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	WSET
	X	Reference Plane	X
	WSET WSE	40cm 80cm LISN	WSET
SET [®]	Test Setup: _{W5CT}	E.U.T AC power	
	WSET WSE	Receiver Remark E.U.T: Equipment Under Test LISN: Line Impedence Stabilization Network Test table height=0.8m	WSCT
X	Test Mode:	Refer to item 4.1	
'S CT	WSET WSE	 The E.U.T is connected to an adapter through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH 	X
SET	Test Procedure:	coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).	
	WSET WSE	3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to	Test
7		ANSI C63.10:2014 on conducted measurement.	Who Gree

NA

Test Result:







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6.2.2. EUT OPERATING CONDITIONS

The EUT is working in the Normal link mode. All modes have been tested and normal link mode is worst.

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 60 Hz and 240 VAC, 50 Hz) for which the device is capable of operation. So, The configuration 120 VAC, 60 Hz and 240 VAC, 50 Hz were tested respectively, but only the worst configuration (120 VAC, 60 Hz) shown here.

Test data:

Note: EUT is powered by batteries and cannot transmit normally while charging. This project does not require testing

WSET	WSET*	WSCT	WSET	WSET
	SET WS	$\langle \hspace{0.1cm} \rangle$	$\langle \hspace{0.2cm} \rangle$	$\langle \times \rangle$
WSET	WSET	WSCT	WSET	WS CT °
	SET WS	$\langle \hspace{0.1cm} \rangle$	$\langle \hspace{0.2cm} \rangle$	
WSET	WSET	WSCT	WSET	WSCT
	SET WS	$\langle \hspace{0.1cm} \rangle$	$\langle \hspace{0.1cm} \rangle$	
WSET	W5ET	WSCT	WSET	WS CT
	SET WS	$\langle \hspace{0.1cm} \rangle$	$\langle \hspace{0.2cm} \rangle$	
WSET	WSET	WSCT	WSET	WS CT October 1997
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Conducted Output Power 6.3.

6.3.1. Test Specification

Walt	

FCC Part15 C Section 15.247 (b)(3)
ANSI C63.10:2014
Section 15.247 (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band 0.125 watts.
Spectrum Analyzer EUT
Transmitting mode with modulation
Use the following spectrum analyzer settings: Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel RBW > the 20 dB bandwidth of the emission being measured VBW ≥ RBW Sweep = auto Detector function = peak Trace = max hold Allow the trace to stabilize, Use the marker-to-peak function to set the marker to the peak of the emission.
PASS

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6.3.2. Test Data

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	Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
	Lowest	4.5	20.97	PASS
1	Middle	3.96	20.97	PASS
	Highest	3.15	20.97	PASS

7	Pi/4DQPSK mode						
	Test channel	Peak Output Power (dBm)	Limit (dBm)	Result			
9	Lowest	5.235	20.97	PASS CT			
	Middle	4.78	20.97	PASS			
	Highest	3.91	20.97	PASS			

8DPSK mode						
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result			
Lowest	5.58	20.97	PASS			
Middle	5.1	20.97	PASS			
Highest	W5 [T] 4.31	20.97	PASS			

Test plots as follows:

ZWSLI	WSLI	AWSLI	AWSLI	AWS LI	
	WSCT	WSET	WSET	WSET	WSET
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V5 CT

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W5 CT







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WSET Power 3-DH5 2402MHz Spectrum Analyzer 1 Swept SA + Avg Type: Log-Power Avg|Hold: 100/100 Trig: Free Run Input Z: 50 Ω KEYSIGHT Input: RF #Atten: 30 dB 1 2 3 4 5 6 Gate: Off IF Gain: Low Corr CCorr Freq Ref: Int (S) Preamp: Off $M \leftrightarrow W \leftrightarrow W \leftrightarrow W$ Align: Auto Sig Track: Off Mkr1 2.402 014 GHz 1 Spectrum Ref Lvi Offset 4.26 dB Ref Level 20.00 dBm 5.58 dBm Scale/Div 10 dB Center 2.402000 GHz #Res BW 2.0 MHz #Video BW 6.0 MHz Span 10.00 MHz Sweep 1.33 ms (10001 pts) Dec 30, 2024 9:23:04 AM Power 3-DH5 2441MHz SCPI Spectrum Analyzer 1 + Input Z: 50 Ω #Atten: 30 dB Preamp: Off PNO: Fast Gate: Off IF Gain: Low Sig Track: Off KEYSIGHT Input: RF Avg Type: Log-Power Avg|Hold: 100/100 Corr CCorr Freq Ref: Int (S) M ₩ ₩ ₩ ₩ Align: Auto Trig: Free Run Mkr1 2.440 863 GHz Ref Lvl Offset 4.28 dB 5.10 dBm Scale/Div 10 dB Ref Level 20.00 dBm

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#Video BW 6.0 MHz

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Dec 30, 2024 9:24:05 AM

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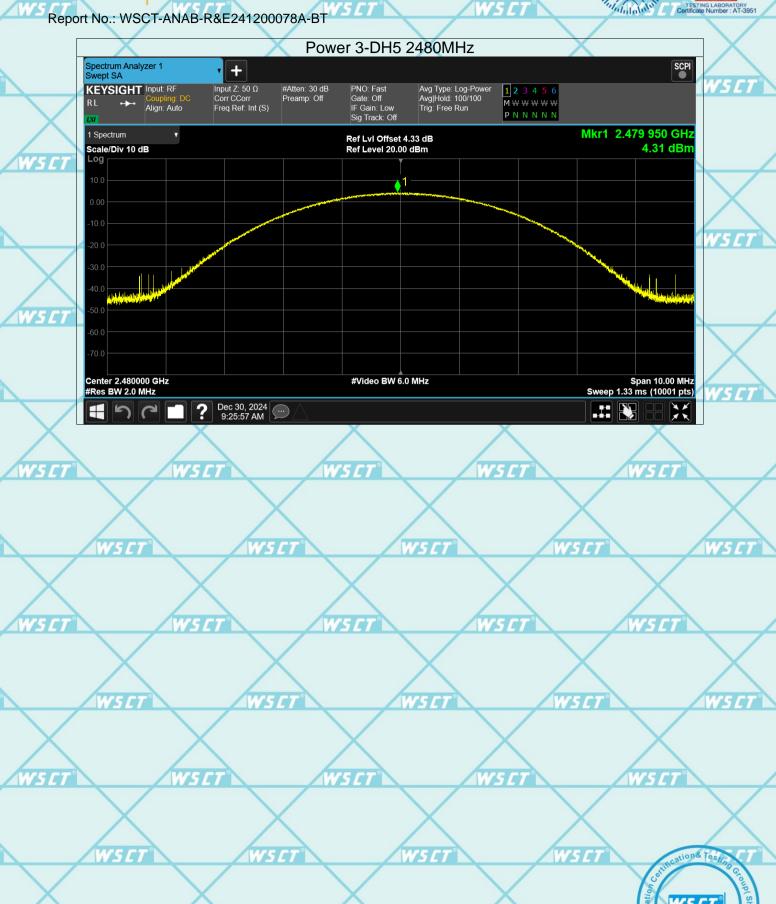
Span 10.00 MHz Sweep 1.33 ms (10001 pts)

Center 2.441000 GHz #Res BW 2.0 MHz









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Report No.: WSCT-ANAB-R&E241200078A-BT

W5 CT

20dB Occupy Bandwidth 6.4.

W5E1

W5 C7

W5 CI

6.4.1. Test Specification

Neg ex	Test Requirement:	FCC Part15 C Section 15.247 (a)(1)	
<u>WSCT</u>	Test Method:	ANSI C63.10:2014	
	Limit:	N/A	X
	Test Setup:	Spectrum Analyzer EUT	WS ET
/WSCT [®]	Test Mode:	Transmitting mode with modulation	
WSET	Test Procedure:	 The testing follows ANSI C63.10:2014 Measurement Guidelines. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. Set to the maximum power setting and enable the EUT transmit continuously. Use the following spectrum analyzer settings for 20dB Bandwidth measurement. Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel; 1%≤ RBW≤5% of the 20 dB bandwidth; VBW≥3RBW; Sweep = auto; Detector function = peak; Trace = max hold. Measure and record the results in the test report. 	WSET
	Test Result:	PASS	X
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W5 CT W5 CT W5 CT

W5 E1

W5CT

W5CT





W5 C

Report No.: WSCT-ANAB-R&E241200078A-BT

W5CT

6.4.2. Test data

W5 CT

1		WETT	WALL		
	Test channel	-20	dB Occupy Band	dwidth (MHz)
	rest channel	GFSK	π/4-DQPSK	8DPSK	Conclusion
	Lowest	1.012W5	1.305	1.309	PASS//5
	Middle	1	1.345	1.314	PASS
/	Highest	1.005	1.304	1.309	PASS

Test plots as follows:

W5E1 W5 CT W5 C1 WS CI W5 C1

WS CI WS CT WSEI WSEI WSE

> W5 CT W5 CT WS ET W5E1 W5 C1

W5 E WSE W5 C W5C

W5 CI WS ET W5 CT W5 C1

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W5 CT

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W5 CT





W5 CI



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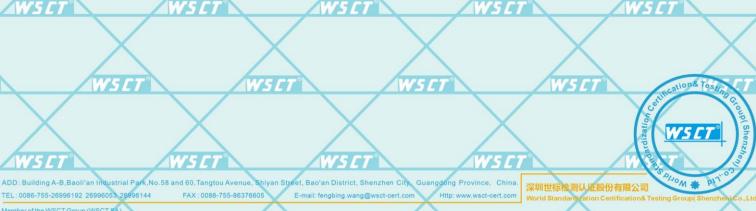
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W5 CT





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Report No.: WSCT-ANAB-R&E241200078A-BT

W5 CT

Carrier Frequencies Separation 6.5.

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		P	

W5 C1

W5C7

X	Test Requirement:	FCC Part15 C Section 15.247 (a)(1)	
WSCT	Test Method:	ANSI C63.10:2014 W5 [T] W5 [T]	
	Limit:	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.	WSET
WSLT	Test Setup:	Spectrum Analyzer EUT WS [7]	
	Test Mode:	Hopping mode	
WSET	Test Procedure:	 The testing follows ANSI C63.10:2014 Measurement Guidelines. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. Set to the maximum power setting and enable the EUT transmit continuously. Enable the EUT hopping function. Use the following spectrum analyzer settings: Span = wide enough to capture the peaks of two adjacent channels; RBW is set to approximately 30% of the channel spacing, adjust as necessary to best identify the center of each individual channel; VBW≥RBW; Sweep = auto; Detector function = peak; Trace = max hold. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Record the value in report. 	WSCT
	Test Result:	PASS	

W5 CT

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W5 CT

W5 C7

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6.5.2. Test data

W5 CT

W5 C1

W5 ET

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WS CT°

GFSK mode			
Test channel	Carrier Frequencies Separation (MHz)	Limit (MHz)	Result
Lowest	WSET	0.675	PASS
Middle	0.994	0.667	PASS
Highest	1.024	0.670	PASS

Pi/4 DQPSK mode Carrier Frequencies Limit (MHz) Test channel Result Separation (MHz) 0.870 1.004 **PASS** Lowest 0.897 Middle 1 **PASS** 0.869 Highest 0.998 **PASS**

	8DPSK mode			
10	Test channel	Carrier Frequencies Separation (MHz)	Limit (MHz)	Result
	Lowest	1	0.873	PASS
	Middle	1.004	0.876	PASS
1	Highest	0.986	0.873	PASS

WSET WSET WSET WSET

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W5C7





WS CT



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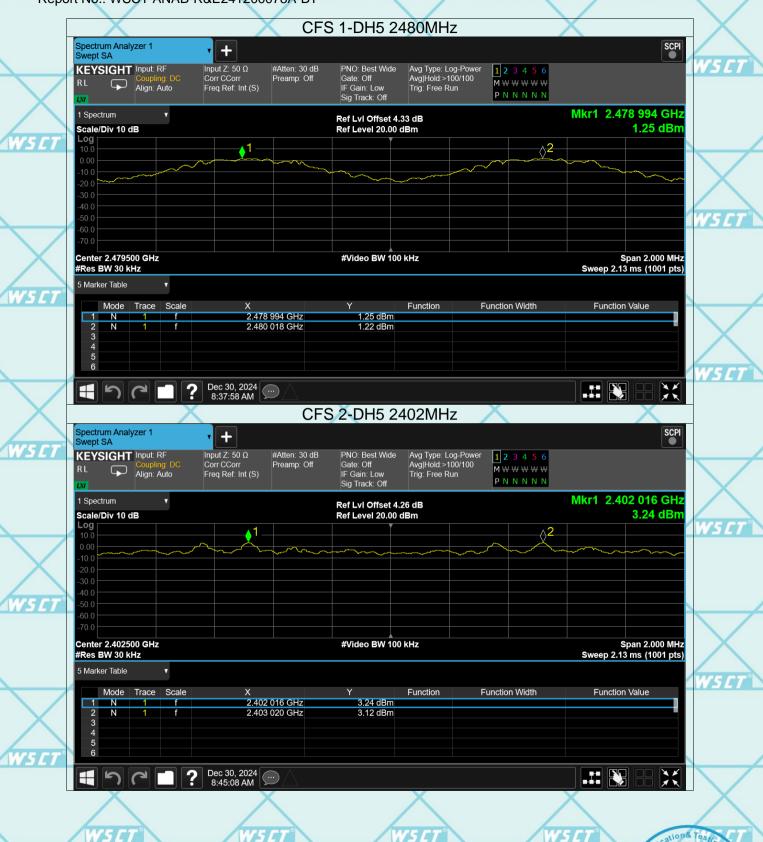




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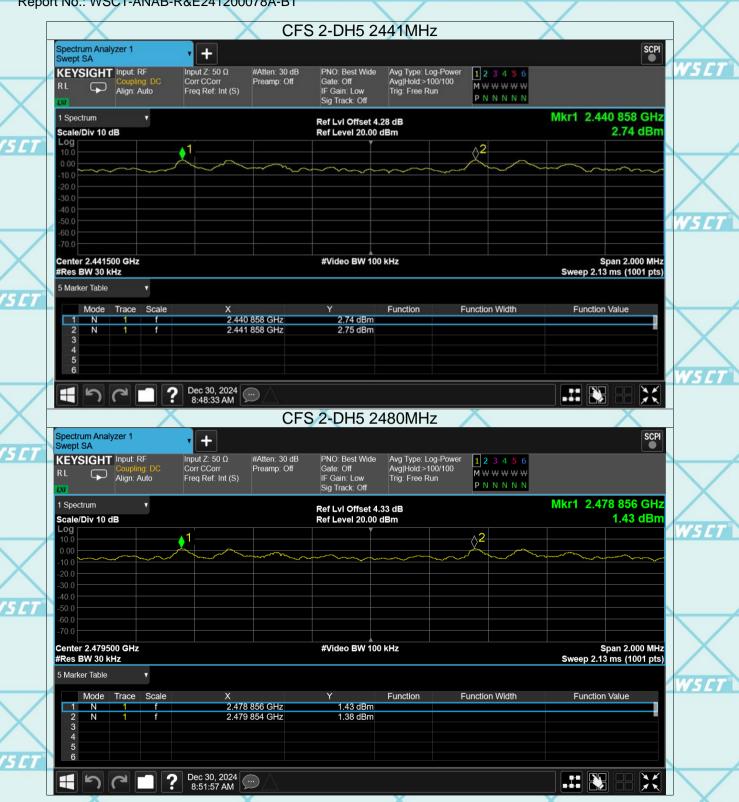




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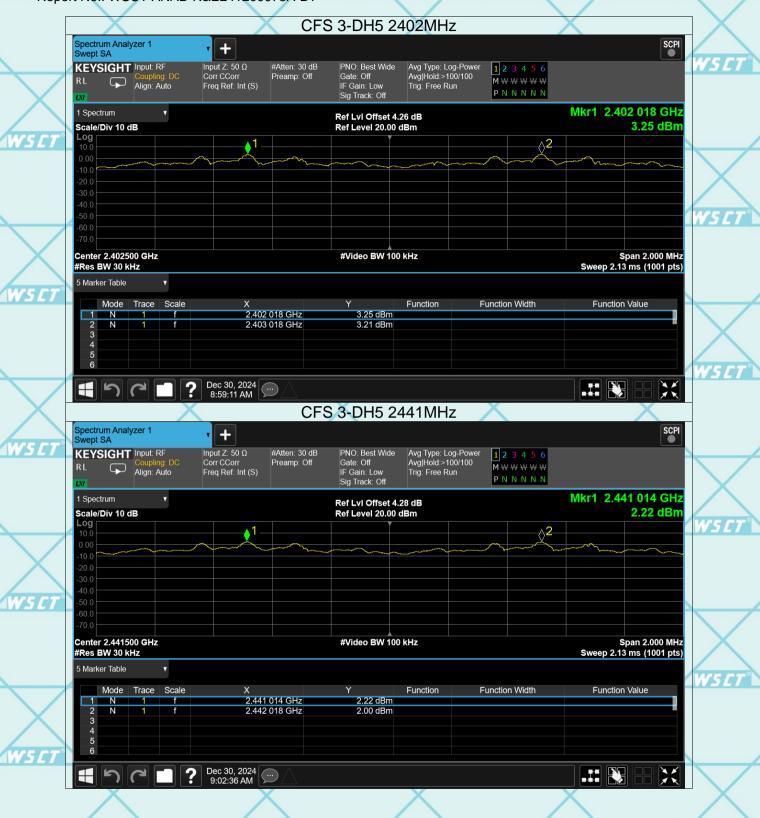




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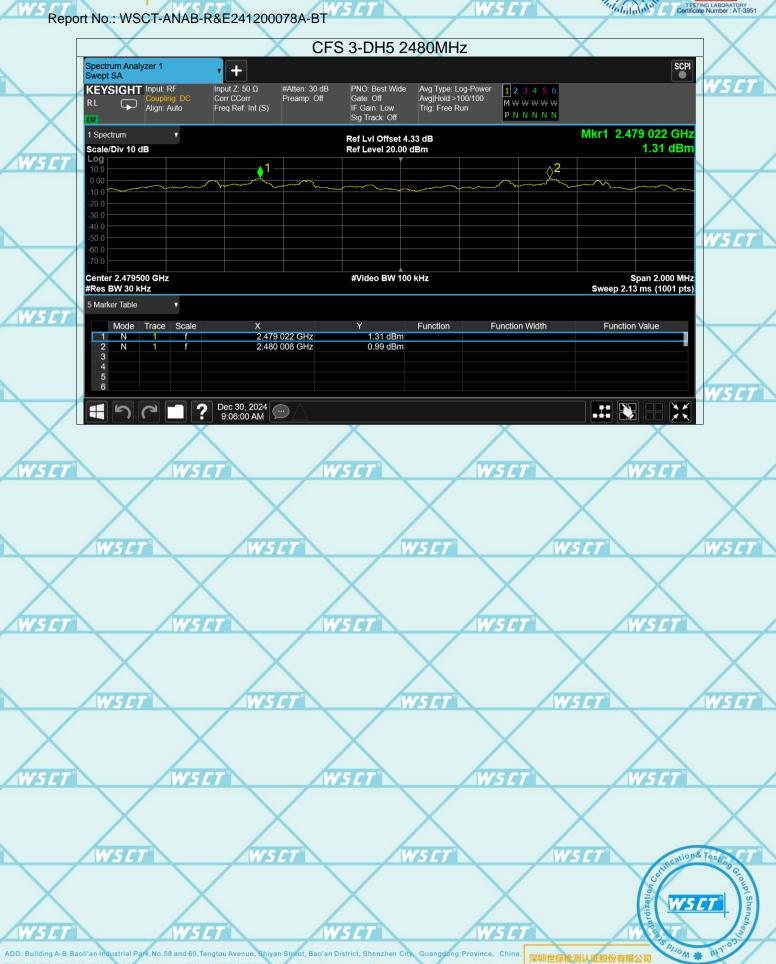


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VS C







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W5CT"

6.6. Hopping Channel Number

W5 CT

W5ET

W5CT

6.6.1. Test Specification

WSCT	Test Requirement:	FCC Part15 C Section 15.247 (a)(1)	
AW361	Test Method:	ANSI C63.10:2014	
	Limit:	Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.	\angle
WSET	Test Setup:	Spectrum Analyzer EUT WS [7]	WS ET
	Test Mode:	Hopping mode	$\overline{}$
WSET		 The testing follows ANSI C63.10:2014 Measurement Guidelines. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. Set to the maximum power setting and enable the 	W5 CT
WSET	Test Procedure:	 EUT transmit continuously. 4. Enable the EUT hopping function. 5. Use the following spectrum analyzer settings: Span = the frequency band of operation; set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller; VBW≥RBW; Sweep = auto; Detector function = peak; Trace = max hold. 6. The number of hopping frequency used is defined as 	
	Test Result:	the number of total channel. 7. Record the measurement data in report. PASS	\times
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W5 CT

WSCT







WS CI

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W5 CT

6.6.2. Test data

_	Mode	Hopping channel numbers	Limit	Result	W5 E1
	GFSK, P/4-DQPSK, 8DPSK	79	15	PASS	

Test plots as follows:

W5 C1 W5 CT WSCI

W5CI W5E7 W5 C7 W5 CT W5 CI

W5 E1 WS CI WS CI WSEI

WS ET

W5 E W5 C W5 C W5 CI

W5 CI

W5 CI WS ET W5 CT W5 C1

W5 CT

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W5E1

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W5 CT

W5 C1

W5C1







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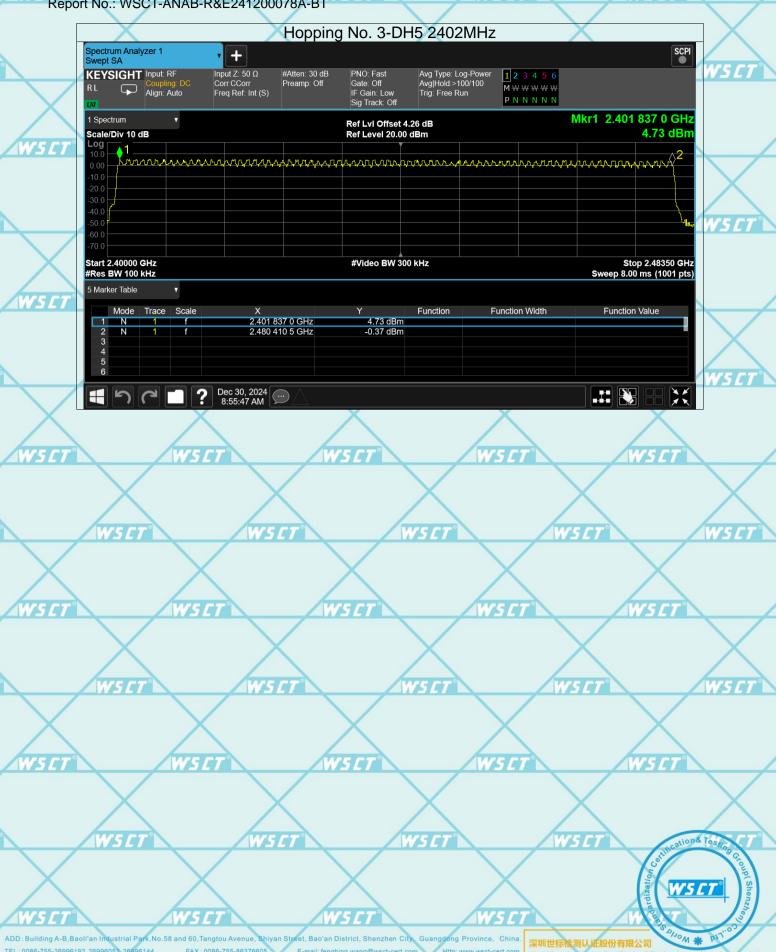


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6.7. Dwell Time

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0.7.1.	Test (Specificati	OH

W5ET°

W5 CT

W5CT

W5 CT

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)	
Test Method:	ANSI C63.10:2014 W5 [T] W5 [T]	
Limit:	The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.	W5L
Test Setup:	Spectrum Analyzer EUT	
Test Mode:	Hopping mode WSET WSET	
Test Procedure:	 The testing follows ANSI C63.10:2014 Measurement Guidelines. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. Set to the maximum power setting and enable the EUT transmit continuously. Enable the EUT hopping function. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; 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; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold. Measure and record the results in the test report. 	WSI
Test Result:	PASS	
	Test Method: Limit: Test Setup: Test Mode: Test Procedure:	Test Method: ANSI C63.10:2014 The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Test Setup: Hopping mode 1. The testing follows ANSI C63.10:2014 Measurement Guidelines. 2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 3. Set to the maximum power setting and enable the EUT transmit continuously. 4. Enable the EUT hopping function. 5. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; 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; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold. 6. Measure and record the results in the test report.

4W5L1

WS CT

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W5 CT

W5 CT

WSET

W5ET°

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WSET

WSCT





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6.7.2. Test Data

Total Dwell Time Frequency **Period Time** Limit Verdict Mode **Pulse Time** Burst (MHz) Count (ms) (ms) (ms) (ms) 121.858 1-DH1 Pass 2402 0.382 319 31600 400 1-DH1 2441 0.381 121.158 400 Pass 318 31600 0.382 1-DH1 2480 121.476 318 31600 400 Pass 1-DH3 2402 1.638 265.356 162 31600 400 **Pass** 1-DH3 2441 1.638 257.166 157 31600 400 Pass 1-DH3 2480 1.639 258.962 158 31600 400 Pass 1-DH5 2402 2.887 291.587 101 31600 400 **Pass** 400 Pass 1-DH5 2441 2.887 277.152 96 31600 400 1-DH5 2480 2.886 106 31600 Pass

Note: 1. In normal mode, hopping rate is 1600 hops/s with 6 slots in 79 hopping channels.

For DH1, With channel hopping rate (1600 / 2 / 79) in Occupancy Time Limit (0.4 x 79) (s), Hops Over Occupancy Time comes to $(1600/2/79) \times (0.4 \times 79) = 320 \text{ hops}$

305.916

For DH3, With channel hopping rate (1600 / 4 / 79) in Occupancy Time Limit (0.4 x 79) (s), Hops Over Occupancy Time comes to $(1600 / 4 / 79) \times (0.4 \times 79) = 160 \text{ hops}$

For DH5, With channel hopping rate (1600 / 6 / 79) in Occupancy Time Limit (0.4 x 79) (s), Hops Over Occupancy Time comes to $(1600 / 6 / 79) \times (0.4 \times 79) = 106.67$ hops

2. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time

Test plots as follows:

W5 C WSE

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