

WSCT

## **TEST REPORT**

FCC ID: 2AXYP-OTW-630-R

**Product: True Wireless Earbuds** 

Model No.: OTW-630

WSC1

**Trade Mark: oraimo** 

Report No.: WSCT-ANAB-R&E241200080A-BT

Issued Date: 13 January 2025

Issued for:

W5 C7

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

WSET

Issued By:

WSC

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 5 11

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tested sample.

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	WSET WSET WSET WSET	S C T
X		
WSET	WSET WSET WSET WSET	
		7

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## **Test Certification**

True Wireless Earbuds Product:

Model No.: OTW-630

oraimo 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

WSCI

Date of Test: 15 December 2024 to 13 January 2025

**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)

Checked By:

(Chen Xu)

Approved By:

(Li Huaibi)

WSLT

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## **Test Result Summary** 2.

/	Requirement	CFR 47 Section	Result
	Antenna Requirement	§15.203/§15.247 (c)	PASS
<b>7</b> 1	AC Power Line Conducted Emission	<b>W5</b> ET §15.207	NA NA
	Conducted Peak Output W5 [7] Power W5 [	§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
	Dwell Time	§15.247 (a)(1)	PASS
7	Radiated Emission	§15.205/§15.209 W-§2.1053, §2.1057 W-5 ET	PASS <sub>VSET</sub>

Note:

NS E

1. PASS: Test item meets the requirement.

Band Edge

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.

**PASS** 

§15.247(d)

§2.1051, §2.1057

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#### **EUT Description** 3.

	Product Name:	True Wireless Earbuds 7 W5 [7]	V5 CT
$\times$	Model :	OTW-630	
WSET	Trade Mark:	oraimo	
ZVEISI	Operation Frequency:	2402MHz~2480MHz	
	Channel Separation:	1MHz	$\times$
	Number of Channel:	797 WSET WSET	V5 CT
$\times$	Modulation Type:	GFSK, π/4-DQPSK, 8-DPSK	
WSET	Modulation Technology:	FHSS WSET WSET WSET	
	Antenna Type:	PIFA Antenna	$\times$
	Antenna Gain:	1.33dBi W5	N5 CT
Auren	Operating Voltage	Li-ion Battery:ZWD14280PV 650mAh 3.8V 2.47Wh Button Type Lithium Ion Cell:CH1254AA 3.85V 76mAh 0.2926Wh	
<u> WSET</u>	Remark:	N/A.	

	WS CT	W5 CT	WSET	WSCT	AWS CT
WSG	Ws	CT W	SET W	$\times$	SET
	WSET	WSCT	WSCT	WSET	WSET
WSCI					SET

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Operation Frequency each of channel for GFSK,  $\pi/4$ -DQPSK, 8DPSK

	Operatio	ii i requenc	y cacil o	CHamilei	n or or,	ווויד-טעו טו	it, obligi	1
	Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
	MO5 [7	2402MHz	<b>V20 C1</b>	2422MHz	40 [	2442MHz	605	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		X		X		X	
	18	2420MHz	38	2440MHz	58	2460MHz	78	2480MHz
	<b></b>	2421MHz	<b>4/39 67</b>	2441MHz	<b>159 C</b>	2461MHz	W5E	7 -
/	Remark: (	Channel 0 3	0 8.78 ha	ve heen tes	ted for C	FSK T//_D(	DOK BE	)DSK

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

X	modulation	mode.	X		no i bar ort,	X	
WSET		WSLT	WSET		NS ET	W5ET*	
	WSCT		SET	WSCT	W5		WSCT
WSET		WSET	WSET		WSET	WSET	
	WSCT		SET	WSET	WS		WSET
WSET		WSET	WSET		WSET	WSET	
	WSCT		SET	WSCT	Ws	<i>ET</i> 2	WSCT
WSET		WSET	WSET		WS ET	WSET	
	WSCT		SET	WSET	WS	ET ation	& Téste VI
WSET		WSCT	WSET		WSCT	W.5	esuno Goup (Shenzhor)
	Baoli'an Industrial Park No		hiyan Street, Bao'an District, Shenz			SPIJOM	PITION

SET WSET

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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.

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

#### 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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#### **Facilities and Accreditations** 5.

## 5.1. Facilities

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

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

W5	ET" W	SET	WSET	WSET	WSET
WSET	WSET	WSET	WSET	$\langle \ \rangle$	
W.5		SET	WSCT	WSET	WSCT
WSCT	WSCT	WSET	WSEI	$\langle \ \rangle$	
W/S		SET	WSET	WSET	WSET
WSCT	WSET	WSET	WSGI	$\langle \ \rangle$	
		SET	WSCT	$\times$	X
WSCT	WSET	WSET	WSET	ogration con	WSCT Sealing Group (Shenza)

'an Industrial Park, No.58 a



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## **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 %.

WSCT	No.	Item	MU	
	1	Conducted Emission Test	±3.2dB	X
	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	
	6	Temperature	±0.5°C	X
	7	Humidity	±2.0%	wer
	/ 1//////			

	71/10	7/1/2	770		CCT
W5	ET W5	ET W5 L	WSET WS	WSET	SET WSET
WS	$\langle \hspace{0.1cm} \rangle$	$\langle \hspace{0.1cm} \rangle$			SET
	W5 ET	WSET	WSCT	W5ET*	WSET
WS	$\langle \hspace{0.1cm} \rangle$	$\langle \hspace{0.2cm} \rangle$	$\langle \hspace{0.1cm} \rangle$		S C T
	W5 CT	WSCT	WSET	WSET	suitcations Testing C
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## **5.4. MEASUREMENT INSTRUMENTS**

	5.4. WEASU		$\wedge$				
	NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	Calibration Date	Calibration Due.	'5 C T
<	Test software		EZ-EMC	CON-03A	-	<u>X</u> -	
	Test software		MTS8310	WSCT	- /	VSCT	
	EMI Test Receiver	R&S	ESCI	100005	11/05/2024	11/04/2025	
	LISN	AFJ	LS16	16010222119	11/05/2024	11/04/2025	
	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 i	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.ET	HP8447E 5 /	2945A02715	11/05/2024	11/04/2025	15 C T
	Pre-Amplifier	CDSI	PAP-1G18-38		11/05/2024	11/04/2025	
	Bi-log Antenna	SCHWARZBECK	VULB9168	01488	11/05/2024	11/04/2025	
5	9*6*6 Anechoic	ET V	VS CT L	W.S CT	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	15 E 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	
4	Turn Table	ccs	/5//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	6502 <b>W5</b> L	00042960	11/05/2024	11/04/2025	rs et
1	Horn Antenna	SCHWARZBECK	BBHA 9170	1123	11/05/2024	11/04/2025	
1	Power meter	Anritsu	ML2487A	6K00003613	11/05/2024	11/04/2025	
7	Power sensor	Anritsu	MX248XD	WSEI	11/05/2024	11/04/2025	
	Spectrum Analyzer	Keysight	N9010B	MY60241089	11/05/2024	11/04/2025	X

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#### Test Results and Measurement Data 6.

## 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. 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 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 PIFA Antenna. it meets the standards, and the best case gain of the antenna is 1.33dBi.

Please refer to the attachment "OTW-630(R) Internal Photo" for the antenna location

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#### **Conducted Emission** 6.2.

6.2.1. Test S	necification
0.2.1. 1631 3	pecification

	6.2.1. Test Specification	WS 41 WS 41 WS	SET
X	Test Requirement:	FCC Part15 C Section 15.207	
5 <i>CT</i> °	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	S C T
SET	Limits:	Frequency range (MHz)         Limit (dBuV)           0.15-0.5         Quasi-peak         Average           0.5-5         56         46           5-30         60         50	
	$\times$	Reference Plane	X
Z	W5 CT W5 C	40cm 80cm LISN Filter AC power	S E T°
S E T	Test Setup: W5 [7]	Test table/Insulation plane  Remark: E.U.T. Equipment Under Test LISN: Line Impedence Stabilization Network Test table height=0.8m	SET
$\times$	Test Mode:	Refer to item 4.1	
5 <i>C T</i> °	WSET	1. The E.U.T is connected to an adapter through a line	
	WS ET WS E	power through a LISN that provides a 50ohm/50uH	SET
SET	Test Procedure:	coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).  3. Both sides of A.C. line are checked for maximum	
	W5ET W5E	conducted interference. In order to find the maximum emission, the relative positions of equipment and all of	3.5 Gran
X	Test Result:	NA WS CT	p(Sher







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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°	WSET	WSET	WSCT	
	$\times$	SET WS	$\langle \ \ \ \ \ \rangle$		VSET
WSET	WSET	WSET	WSET	WSET	
	$\times$	SET WS	$\langle \hspace{0.1cm} \rangle$		VSCT
WSET	WSCT	WSET	WSET	WSCT	,
	$\times$	SET WS			VSET
WSET	WSET	WSCT	WSCT	WSCT	,
	$\times$	SCT WS	$\langle \hspace{0.1cm} \rangle$		
WSET	WSET	WSET	WSET	Continuation & To	Group (Shenzhen
				30,	2003

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#### **Conducted Output Power** 6.3.

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## 6.3.1. Test Specification

X	Y Y Y
Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.10:2014
Limit:	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.
Test Setup:	Spectrum Analyzer EUT
Test Mode:	Transmitting mode with modulation
Test Procedure:	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.
Test Result:	PASS

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6.3.2. Test Data

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- 1						
	GFSK mode					
	Test channel	Peak Output Power (dBm)	Limit (dBm)	Result		
0	Lowest	7.85	20.97	PASS		
1	Middle	7.78	20.97	PASS		
	Highest	7.3	20.97	PASS		

Pi/4DQPSK mode Peak Output Power Limit (dBm) Test channel Result (dBm) 8.38 20.97 PASS Lowest **PASS** Middle 8.39 20.97 **PASS** Highest 8.02 20.97

8DPSK mode Peak Output Power Test channel Limit (dBm) Result (dBm) 8.68 20.97 **PASS** Lowest Middle 8.71 20.97 **PASS** Highest 8.16 20.97 **PASS** 

Test plots as follows:

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WSCT WSCT WSCT WSCT

WSCT WSCT WSCT WSCT WSCT

WSCT WSCT WSCT WSCT

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**Test Graphs** Power 1-DH5 2402MHz Spectrum Analyzer 1 Swept SA SCPI Input Z: 50 Ω #Atten: 30 dB Preamp: Off Avg Type: Log-Power Avg|Hold: 100/100 Trig: Free Run KEYSIGHT Input: RF PNO: Fast 1 2 3 4 5 6 Corr CCorr Freq Ref: Int (S) Gate: Off IF Gain: Low Sig Track: Off Align: Auto  $M \leftrightarrow W \leftrightarrow W \leftrightarrow W$ 1 Spectrum Mkr1 2.402 004 GHz Ref Lvi Offset 2.26 dB Ref Level 20.00 dBm Scale/Div 10 dB 7.85 dBm Center 2.402000 GHz #Res BW 2.0 MHz Span 10.00 MHz Sweep 1.33 ms (10001 pts) #Video BW 6.0 MHz Jan 05, 2025 4:26:54 PM Power 1-DH5 2441MHz 15 C Spectrum Analyzer 1 Swept SA SCPI + Input Z: 50 Ω Corr CCorr Freq Ref: Int (S) #Atten: 30 dB Preamp: Off PNO: Fast Gate: Off Avg Type: Log-Power Avg|Hold: 100/100 Trig: Free Run KEYSIGHT Input: RF 1 2 3 4 5 6 Align: Auto IF Gain: Low Sig Track: Off Mkr1 2.440 947 GHz 1 Spectrum Ref LvI Offset 2.28 dB 7.78 dBm Scale/Div 10 dB Ref Level 20.00 dBm Center 2.441000 GHz #Res BW 2.0 MHz Span 10.00 MHz Sweep 1.33 ms (10001 pts) #Video BW 6.0 MHz Jan 05, 2025 4:30:51 PM ation& Test

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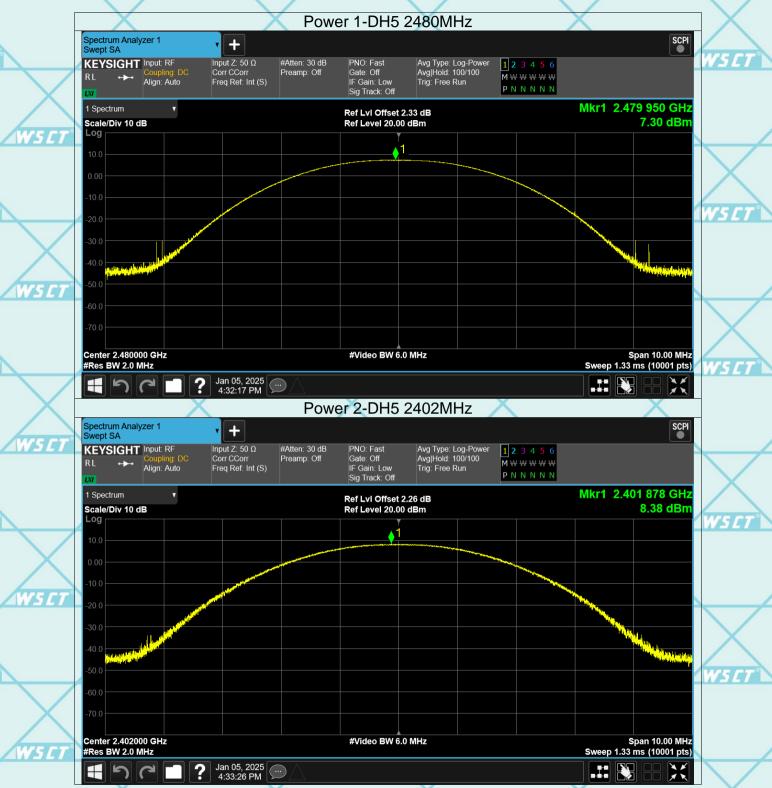




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W5 ET



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W5 ET



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W5 C1



WSET Report No.: WSCT-ANAB-R&E241200080A-BT









Report No.: WSCT-ANAB-R&E241200080A-BT

W5CT

## 6.4. 20dB Occupy Bandwidth

WSET

W5CT°

W5CT

## 6.4.1. Test Specification

WSCT	Test Requirement:	FCC Part15 C Section 15.247 (a)(1)		
Z11-1-1-1	Test Method:	ANSI C63.10:2014		
	Limit:	N/A	$\times$	
	Test Setup:	Spectrum Analyzer EUT	W5ET°	
WSET	Test Mode:	Transmitting mode with modulation		
WSET	Test Procedure:	<ol> <li>The testing follows ANSI C63.10:2014 Measurement Guidelines.</li> <li>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.</li> <li>Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>Use the following spectrum analyzer settings for 20dB Bandwidth measurement.</li> <li>Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel; 1%≤</li> </ol>		
WSCT		RBW≤5% of the 20 dB bandwidth; VBW≥3RBW; Sweep = auto; Detector function = peak; Trace = max hold.  5. Measure and record the results in the test report.		
	Test Result:	PASS		

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WSET<sup>®</sup> WSET<sup>®</sup>

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**WSCT** 

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WSET

WSCT

W5 CT





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W5 CT

## 6.4.2. Test data

A		MV C			
	Toot channel	-20	dB Occupy Band	dwidth (MHz	2)
	Test channel	GFSK	π/4-DQPSK	8DPSK	Conclusion
	Lowest	0.971W5	1.314	1.301	PASS//5
1	Middle	1.018	1.314	1.325	PASS
	Highest	0.998	1.31	1.293	PASS

Test plots as follows:

W5E1 W5 CT W5 CI WS CI W5 E1

WS CI WS CI WSEI WSE WSE

> W5 E7 W5 CT W5 CT WS ET W5 C1

W5 E WSE W5 C W5C

W5 CI WS ET W5 CT W5 C1

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W5 CT

W5C1





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Report No.: WSCT-ANAB-R&E241200080A-BT

World Standardization Certification & Testing Group (Shenzhen) Co., ltd. Mahalalak W5 CI -20dB Bandwidth 1-DH5 2480MHz Spectrum Analyzer 1 Occupied BW SCPI + Input Z: 50 Ω Center Freq: 2.480000000 GHz Avg|Hold: 100/100 Radio Std: None Atten: 30 dB Preamp: Off Trig: Free Run Gate: Off KEYSIGHT Input: RF Corr CCorr Align: Auto Freq Ref: Int (S) #IF Gain: Low Mkr3 2.480500000 GHz 1 Graph Ref Lvl Offset 2.33 dB Ref Value 22.33 dBm -16.22 dBm Scale/Div 10.0 dB **⊘**2 **▲**3

Center 2.480000 GHz #Res BW 30.000 kHz

2 Metrics

Span 2 MHz Sweep 2.67 ms (10001 pts) Measure Trace Trace 1 Occupied Bandwidth 897.43 kHz 13.6 dBm Total Power % of OBW Power 99.00 % Transmit Freq Error 843 Hz 998.2 kHz -20 00 dB x dB Bandwidth x dB Jan 05, 2025 4:31:29 PM 

#Video BW 91.000 kHz

-20dB Bandwidth 2-DH5 2402MHz



Jan 05, 2025 4:32:44 PM

ation& Test 10M #

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W5 C



6.5.

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W5 CI

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Report No.: WSCT-ANAB-R&E241200080A-BT

W5 CT

# **Carrier Frequencies Separation** 6.5.1. Test Specification 5 77

o.s.r. rest specification	
Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
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.
Test Setup:	Spectrum Analyzer EUT W5/77
Test Mode:	Hopping mode
	<ol> <li>The testing follows ANSI C63.10:2014 Measurement Guidelines.</li> <li>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.</li> <li>Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>Enable the EUT hopping function.</li> </ol>
Test Procedure:	<ul> <li>5. 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.</li> <li>6. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Record the value in report.</li> </ul>

	WSET	WS CT°	WSET	WSET	W5 CT°
		X	X	X	
WS ET	WSET	W5 C	WSCT	WSE	7
	X	X	X	X	X

**Test Result:** 

PASS

Report No.: WSCT-ANAB-R&E241200080A-BT

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## 6.5.2. Test data

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	WSIT	WSTT	/C/T	15 [ ]	1
	GFSK mode				
1	Test channel	Carrier Frequencies Separation (MHz)	Limit (MHz)	Result	
0	Lowest	0.986	0.647	PASS	_
	Middle	0.996	0.679	PASS	
	Highest	1.008	0.665	PASS	4

		Pi/4 DQPSK mode					
0	Test channel	Carrier Frequencies Separation (MHz)	Limit (MHz)	Result			
	Lowest	1	0.876	PASS			
	Middle	1.002	0.876	PASS			
7	Highest	WSET 1 W	<b>5</b> <i>CT</i> 0.873	5 CT PASS			

8DPSK mode					
0	Test channel	Carrier Frequencies Separation (MHz)	Limit (MHz)	Result	
	Lowest	0.996	0.867	PASS	
	Middle	1.018	0.883	PASS	
/	Highest	0.996	0.862	PASS	

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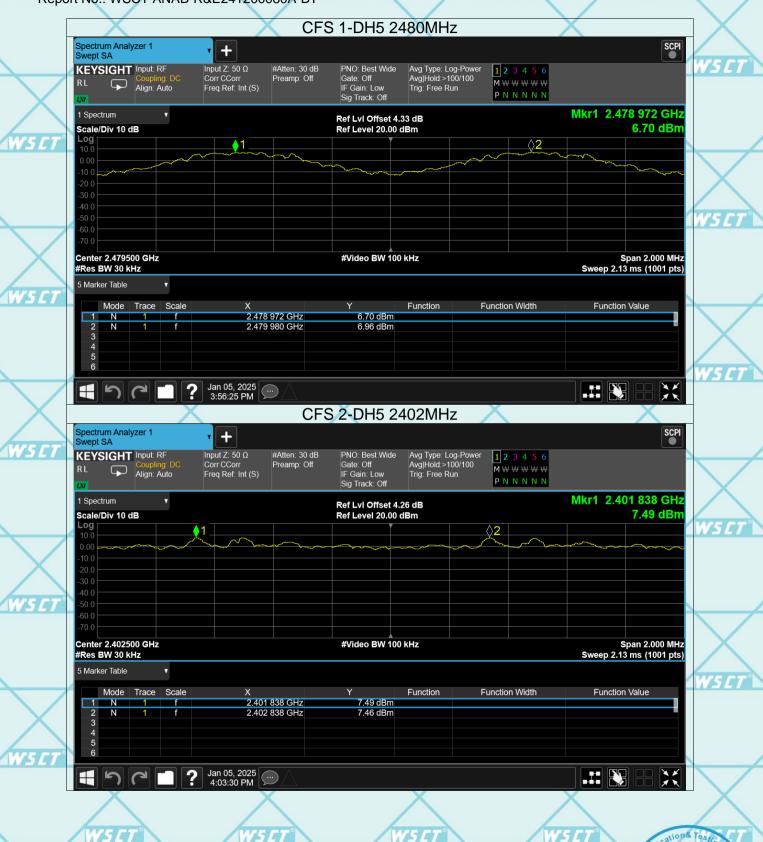




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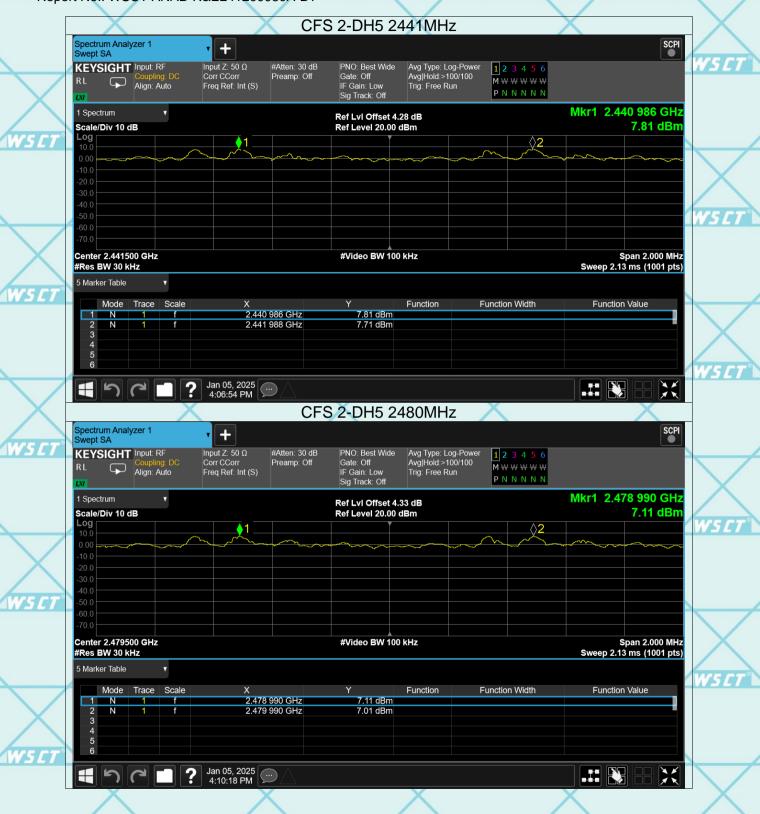




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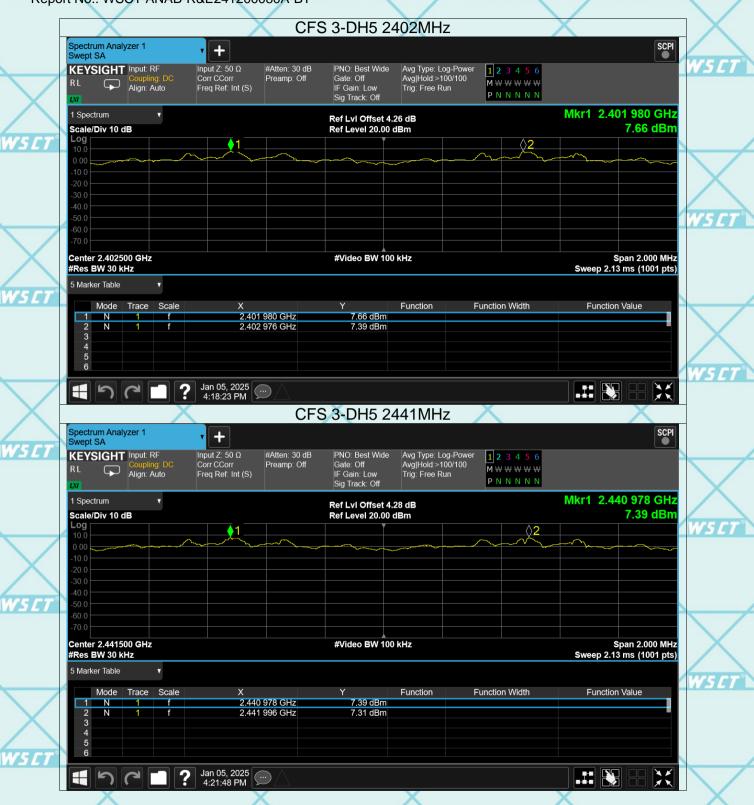




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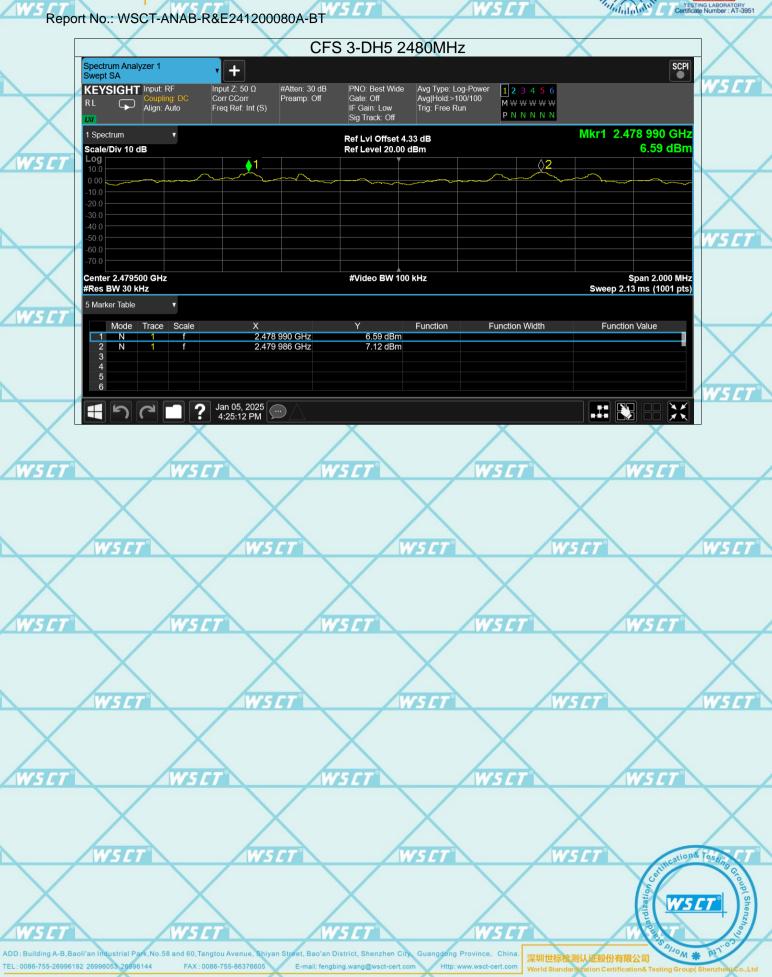
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VS C







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W5CT"

## 6.6. Hopping Channel Number

W5CT

W5CT°

W5ET

## 6.6.1. Test Specification

WSET	Test Requirement:	FCC Part15 C Section 15.247 (a)(1)	
AW3/6/	Test Method:	ANSI C63.10:2014	
	Limit:	Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.	$\triangle$
WSET	Test Setup:	Spectrum Analyzer EUT	WS ET
	Test Mode:	Hopping mode	$\overline{}$
Test Mode:  Test Procedure:	Test Procedure:	<ol> <li>The testing follows ANSI C63.10:2014 Measurement Guidelines.</li> <li>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.</li> <li>Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>Enable the EUT hopping function.</li> <li>Use the following spectrum analyzer settings: Span =</li> </ol>	WSET
WSET		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 the number of total channel.  7. Record the measurement data in report.	WSET
	Test Result:	PASS	WELL
	1713		TIP!

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W5CT

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W5CT"





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W5CT°

### 6.6.2. Test data

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

W5 [T] Test plots as follows: W5 [T] W5 [T] W5 [T]

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WSET WSET WSET WSET

WSET WSET WSET WSET WSET

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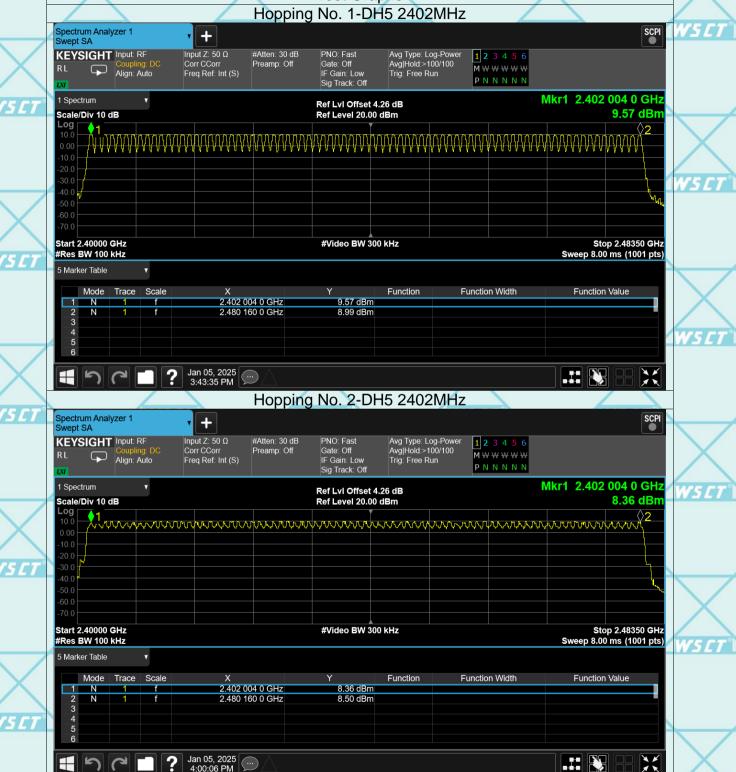






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Malalalal Test Graphs Hopping No. 1-DH5 2402MHz SCPI +

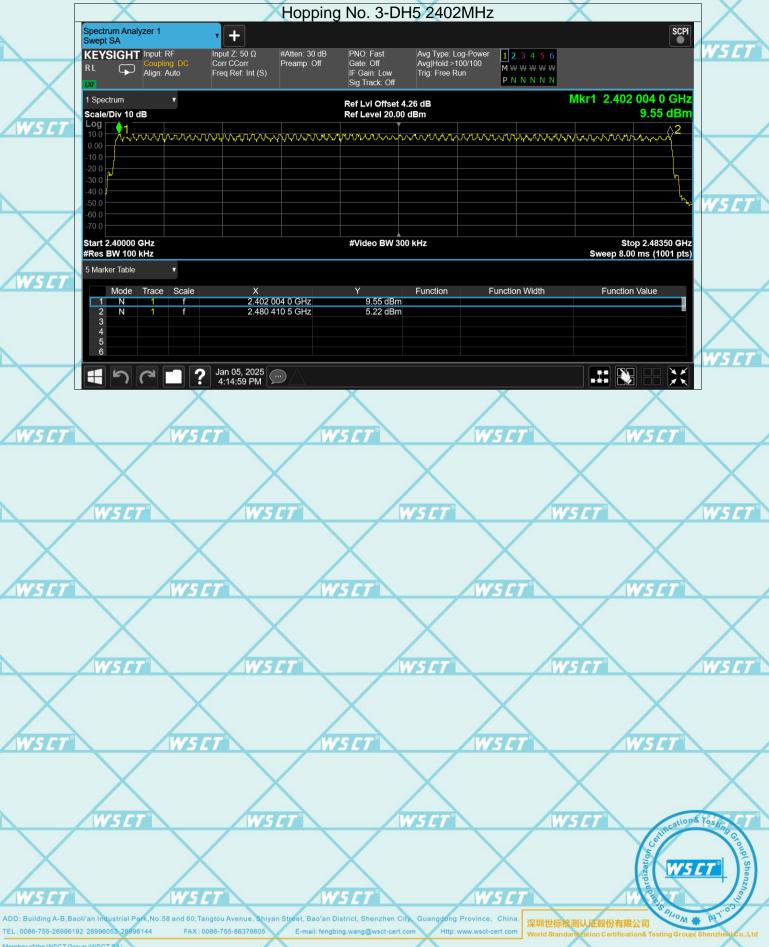


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## 6.7. Dwell Time

## 6.7.1. Test Specification

W5ET<sup>®</sup>

W5 CT

**W**5CT

W5 CT

X	Test Requirement:	FCC Part15 C Section 15.247 (a)(1)	
W5 ET	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.	WSET
X	Test Setup:	Spectrum Analyzer EUT	
W5CT"	Test Mode:	Hopping mode WSET WSET	
WSET	Test Procedure:	<ol> <li>The testing follows ANSI C63.10:2014 Measurement Guidelines.</li> <li>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.</li> <li>Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>Enable the EUT hopping function.</li> <li>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 &gt;&gt; 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.</li> <li>Measure and record the results in the test report.</li> </ol>	WSCT
	Test Result:	PASS	$\triangle$
	MPL	WSU WSU	WSCT

WSET

WSCT

WSET

W5 ET

WSET WSET

WSET WSE

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WS CT WS CT



400

400

31600

31600

Pass

Pass



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### **6.7.2. Test Data**

1-DH5

1-DH5

**Total Dwell Time** Frequency **Period Time** Limit Verdict Mode **Pulse Time** Burst (MHz) Count (ms) (ms) (ms) (ms) 1-DH1 122.24 Pass 2402 0.382 320 31600 400 1-DH1 2441 0.383 122.177 319 400 Pass 31600 1-DH1 2480 0.382 121.858 31600 400 Pass 319 1-DH3 2402 1.639 254.045 155 31600 400 **Pass** 1-DH3 2441 1.639 263.879 161 31600 400 Pass 1-DH3 2480 1.638 265.356 162 31600 400 Pass 1-DH5 2402 2.888 332.12 115 31600 400 **Pass** 

352.092

326.118

WSET

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

2.886

2.886

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

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

122

113

For DH5, With channel hopping rate (1600 / 6 / 79) in Occupancy Time Limit  $(0.4 \times 79)$  (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:

2441

2480

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