

RADIO TEST REPORT

Product	:	Gaming Headset
Model Name	:	AW720H
FCC ID	:	2AYYS-AW720H
Test Regulation	:	FCC 47 CFR Part 15 Subpart C (Section 15.247)
Received Date	:	2022/10/4
Test Date	:	2022/10/12 ~ 2022/11/2
Issued Date	:	2022/11/7
Applicant	:	Luxshare Precision Industry Co., Ltd. 2nd floor, A building, Sanyo New Industrial Area, West of Maoyi, Shajing Street, Ban'an District, Shenzhen City, Guangdong Province, China
Issued By	:	Underwriters Laboratories Taiwan Co., Ltd. Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report are responsible of the test sample(s) provided by the client only and are not to be used to indicate applicability to other similar products.



REVISION HISTORY

Original Test Report No.: 4790592589-US-R0-V0

Rev. Original	Test report No. 4790592589-US-R0-V0	Date 2022/11/7	Page revised	Contents
Original	4790592589-US-R0-V0	2022/11/7	-	Initial issue



Table of Contents

1.	Att	estation of Test Results	4
2.	Sun	nmary of Test Results	5
3.	Tes	t Methodology and Reference Procedures	6
4.	Fac	ilities and Accreditation	6
5.	Mea	asurement Uncertainty	7
6.	Equ	nipment under Test	8
	6.1.	Description of EUT	
	5.2.	Channel List	
	5.3.	Test Condition	
	6.4. 6.5.	Description of Available Antennas	
	5.5. 6.6.	Test Mode Applicability and Tested Channel Detail Duty cycle	
7.	Tes	t Equipment	
8.	Des	cription of Test Setup	
9.	Tes	t Results	
Ç	9.1.	Channel Bandwidth	17
Ģ	9.2.	Conducted Output Power	
(9.3.	Hopping Channel Separation	
	9.4.	Number of Hopping Frequency Used	
-	9.5.	Dwell Time on Each Channel	
	9.6.	Conducted Out of Band Emission	
-	9.7.	Radiated Spurious Emission	
(9.8.	AC Power Line Conducted Emission	



1. Attestation of Test Results **APPLICANT:** Luxshare Precision Industry Co., Ltd. 2nd floor, A building, Sanyo New Industrial Area, West of Maoyi, Shajing Street, Ban'an District, Shenzhen City, Guangdong Province, China. **MANUFACTURER:** Luxshare Precision Industry Co., Ltd. 2nd floor, A building, Sanyo New Industrial Area, West of Maoyi, Shajing Street, Ban'an District, Shenzhen City, Guangdong Province, China **EUT DESCRIPTION:** Gaming Headset **BRAND: ALIENWARE MODEL:** AW720H Engineering Verification Test sample SAMPLE STAGE: DATE of TESTED: 2022/10/12 ~ 2022/11/2

APPLICABLE STANDARDS				
STANDARD	Test Results			
FCC 47 CFR PART 15 Subpart C (Section 15.247)	PASS			

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:

CIM

Cindy Hsin Project Handler Date : 2022/11/7

Approved and Authorized By:

Eric Lee Date : 2022/11/7 Senior Laboratory Engineer

Underwriters Laboratories Taiwan Co., Ltd.



2. Summary of Test Results

Summary of Test Results				
FCC Clause	Result			
15.247(a)(1) (iii)	Number of Hopping Frequency Used	PASS		
15.247(a)(1) (iii)	Dwell Time on Each Channel	PASS		
15.247(a)(1)	 Hopping Channel Separation Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System 	PASS		
15.247(b)	Conducted Output Power	PASS		
15.247(d)	Antenna Port Emission	PASS		
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS		
15.207	AC Power Conducted Emission	PASS		
15.203	Antenna Requirement	PASS		



3. Test Methodology and Reference Procedures

The tests documented in this report were performed in accordance with 47 CFR FCC Part 2, KDB558074 D01 Meas Guidance v05r02, KDB414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013.

4. Facilities and Accreditation

Test Location	Underwriters Laboratories Taiwan Co., Ltd.		
Address	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan		
Accreditation Certificate	Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398.		



5. Measurement Uncertainty

For statement of conformity, accuracy method (Section 8.2.4 and 8.2.5 of ISO Guide 98-4) was applied as decision rule for measurement in this test report.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor k=2.

Measurement	Frequency	Uncertainty
Conducted disturbance at mains terminals ports	150kHz ~ 30MHz	±2.9 dB
RF Conducted	9 kHz - 40GHz	±2.4 dB
Radiated disturbance below 30MHz	9 kHz - 30 MHz	±1.9 dB
Radiated disturbance below 1 GHz	30MHz ~ 1GHz	±5.8 dB
Radiated disturbance above 1 GHz	1GHz ~ 40GHz	±4.8 dB



6. Equipment under Test

6.1. Description of EUT

Product	Gaming Headset	
Brand Name	ALIENWARE	
Model Name	AW720H	
Operating Frequency	2402MHz ~ 2480MHz	
Modulation	GFSK, $\pi/4$ -DQPSK and 8DPSK	
Transfer Rate	Up to 3 Mbps	
Number of Channel	79	
Maximum Output Power	8.67 dBm	
Normal Valtage	5Vdc from host	
Normal Voltage	3.7Vdc from battery	
Sample ID	Conducted Test: 5415496	
Sample ID	Radiated Test: 5418498	

Note:

1. The EUT contains following accessory devices:

Product Brand		Model	Description	
Charging cable	harging cable Luxshare LX001 Le		Length: 1.5 m	
Inline cable	Luxshare	LX001	Length: 1.5 m	
USB-C Adapter	Luxshare	LX001	N/A	

The EUT could be supplied with rechargeable battery as the following table: 2.

Brand Name	Model	Description		
Hangzhou Future Power	FT573439P	3.7 Vdc, 750 mAh		

- 3. The EUT may have a lot of colors for marketing requirement.
- 4. The above EUT information is declared by manufacturer and for more detailed features description, please refer the manufacturer's or user's manual.



Test report No.	: 4790592589-US-R0-V0
Page	: 9 of 60
Issued date	: 2022/11/7
FCC ID	: 2AYYS-AW720H

6.2. Channel List

79 channels are provided for BT-EDR mode:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461	-	-

6.3. Test Condition

Test Item	Test Site No.	Environmental Condition	Input Power	Test Date	Tested by
Antenna Port Conducted Measurement	SR4	23~25°C/ 60~63%RH	5Vdc from host	2022/10/17~ 2022/10/17	Jubo Shen
Radiated Spurious Emission	966-2	23~25°C/ 61~64%RH	5Vdc from host	2022/10/12~ 2022/11/02	Jubo Shen
AC power Line Conducted Emission	SR1	23~25°C/ 62~63%RH	5Vdc from host	2022/10/19~ 2022/11/02	Jubo Shen

FCC Test Firm Registration Number: 498077

Underwriters Laboratories Taiwan Co., Ltd.



Test report No.	: 4790592589-US-R0-V0
Page	: 10 of 60
Issued date	: 2022/11/7
FCC ID	: 2AYYS-AW720H

6.4. Description of Available Antennas

Ant. No.	Transmitter Circuit	Brand Name	Model Name	Ant. Type	Maximum Gain (dBi)
1	Chain (0)	Luxshare	Headset_PCB	PIFA	-1.8

Note: The above antenna information was provided from customer and for more detailed features description, please refer the manufacturer's specification or user's manual.

U	Test report No. Page Issued date FCC ID	: 4790592589-US-R0-V0 : 11 of 60 : 2022/11/7 : 2AYYS-AW720H	
	Issued date		

6.5. Test Mode Applicability and Tested Channel Detail

- The EUT has been evaluated for power supply as: 5Vdc from host(Latitude E5470), 5Vdc from Adapter(TC P900-US) and 3.7Vdc from Battery(FT573439P). Among them, 5Vdc from host(Latitude E5470) with the worst case. The final measurement is carried out in this power supply, and the test result is recorded in the report.
- The EUT in the charge mode (the Latitude E5470 is charge to DUT), was evaluate radiated emission below 1GHz and AC power line conducted emission.
- The fundamental of the EUT was investigated in three orthogonal axes X-Y/Y-Z/X-Z, it was determined that Y-Z plane was worst-case. Therefore, all final radiated testing was performed with the EUT in Y-Z plane.
- The Packet Type for DH1, DH3, and DH5 have all been pre-tested, the fundamental worst case of the Packet Type was found in the DH5. Therefore, only DH5 Packet Type is recorded in the report. (Except Dwell Time).
- The modulation and bandwidth are similar for $\pi/4$ -DQPSK mode and 8DPSK mode, therefore investigated 8DPSK mode to representative mode in test report.
- For Antenna Port Conducted Measurement, this item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.
- For below 1 GHz radiated emission and AC power line conducted emission have performed all modes of operation were investigated and the worst-case emissions are reported.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Since the DUT is a Bluetooth device, the AFH mode and non-AFH mode follow the Bluetooth timing protocol, and the same timing level has the same time interval, but the non-AFH mode has worse results, therefore only the test data of this type were recorded in this report.

Test Item	Modulation Type	Available Channel	Test Channel	Packet Type	
Radiated Emissions	GFSK	0 to 78	0,39,78	DH5	
(Above 1GHz)	8DPSK	0 to 78	0,39,78	3DH5	
Radiated Emissions (Below 1GHz)	GFSK	0 to 78	0	DH5	
AC Power Line Conducted Emission	GFSK	0 to 78	0	DH5	
Antenna Port Conducted	GFSK	0 to 78	0,39,78	DH1*,DH3*,DH5	
Measurement	8DPSK	0 to 78	0,39,78	3DH1*,3DH3*, 3DH5	
Test Item	Test Configuration				
Radiated Emissions (Below 1GHz)	Charging Mode				
AC Power Line Conducted Emission	Charging Mode				

* Only for Dwell Time on Each Channel test

Underwriters Laboratories Taiwan Co., Ltd.



6.6. Duty cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle	Duty Factor (dB)	VBW Set (above 1GHz)
GFSK(DH5)	2.870	3.750	0.7653	1.16	510Hz
8DPSK(3DH5)	2.870	3.750	0.7653	1.16	510Hz

GFSK(DH5)					8D	PSK(3DH5))	
Spectrum			Spectrum						
Ref Level 20.00 dBm			Ref Level 2	0.00 dBm	🖷 R	BW 1 MHz			(-
Att 30 dB			🕳 Att	30 dB	SWT 20 ms	BW 1 MHz			
Count 10/10 TDF			Count 10/10		DF				
GFSK(DH5) 1Pk View			8DPSK(3DH5)	●1Pk View					
M1 M2 M3	M1[1]	9.03 dBm 5.63000 ms			M	M	M1[1] 2 M3		9.02 dBm 7.53000 ms
-10.dBm	M2[1]	8.79 dBm 8.50000 ms	10.dBm	~~ [*		*****			10.40000 ms
0 dBm			0 dBm						
-10 dBm			-10 dBm						
-20 d8m			-20 dBm						
-30 dBm-			-30 dBm						
								- N / I	
-40 digata higher mayo	harite	HARAGE H	-40 dBm	WWW.	(kingl-f)	1 1	enere a	ANAL I	HALLAN
-50 dBm			-50 dBm						
-60 dBm			-60 dBm					_	
-70 dBm			-70 dBm						
CF 2.402 GHz 2001	ots	2.0 ms/	CF 2.402 GH	z		2001 pt	s		2.0 ms/
Marker Type Ref Trc X-value Y-value	I monthly I	Function Result	Marker	- I	Marchae I.				on Result
Type Ref Trc X-value Y-value M1 1 5.63 ms 9.03 dBn	Function	Function Result	Type Ref M1	1	X-value 7.53 ms	Y-value 9.02 dBm	Function	Function	on Result
M2 1 8.5 ms 8.79 dBn			M2	1	10.4 ms	8.41 dBm			
M3 1 9.38 ms 9.02 dBn			M3	1	11.28 ms	9.03 dBm			



7. Test Equipment

	Test Equipment List							
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Expired date			
Radiated Spurious Emission								
Spectrum Analyzer	Keysight	N9010A	MY56070827	2021/11/9	2022/11/8			
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	2021/12/10	2022/12/9			
Loop Antenna	ETS lindgren	6502	00213440	2021/12/23	2022/12/22			
Trilog- Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT- N0538	2022/2/8	2023/2/7			
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01690	2021/12/13	2022/12/12			
Horn Antenna (18-40 GHz)	Schwarzbeck	BBHA 9170	781	2021/12/17	2022/12/16			
Preamplifier (30-1000 MHz)	EMCI	EMC330E	980405	2022/6/7	2023/6/6			
Preamplifier (1-18 GHz)	EMCI	EMC051835BE	980406	2022/2/16	2023/2/15			
Preamplifier (18-40GHz)	EMCI	EMC184040SEE	980426	2022/5/17	2023/5/16			
Cables	Hanyitek	K1K50-UP0264- K1K50-2500	170214-4 & 170425-2	2021/12/3	2022/12/2			
Cables	Hanyitek	K1K50-UP0264- K1K50-2500	170214-1 & 170214-2	2021/12/3	2022/12/2			



Test Equipment List								
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Expired date			
Antenna Port Conducted Measurement								
Spectrum Analyzer	Rohde & Schwarz	FSV40	101490	2022/9/12	2023/9/11			
Pulse Power Sensor	Anritsu	MA2411B	1531202	2021/12/22	2022/12/21			
Power Meter	Anritsu	ML2495A	1645002	2021/12/22	2022/12/21			
	АС ро	wer Line Con	ducted Emission					
EMI Test Receiver	Rohde & Schwarz	ESR7	101753	2021/11/15	2022/11/14			
Two-Line V- Network	Rohde & Schwarz	ENV216	102136	2022/8/29	2023/8/28			
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	2022/8/30	2023/8/29			
Cables	TITAN	CFD200	T0732ACFD20 020A300-2	2022/4/9	2023/4/8			

UL Software						
Description	Name	Version				
Radiated measurement	e3	6.191211 (V6)				
Conducted measurement	RF-Conducted-FCC 15247	ver 1.0				
AC power Line Conducted Emission	EZ_EMC	UL-3A1.2				



8. Description of Test Setup

Support Equipment

ID	Equipment	Brand Name	Model Name	S/N	Remark
Α	Laptop	DELL	Latitude E5470	5M2MWF2	Provide by lab
В	Battery	Hangzhou Future Power	FT573439P	-	Provide by client

I/O Cables

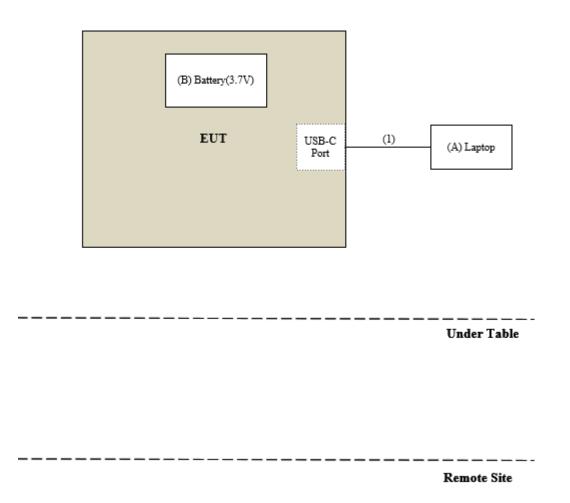
ID	Equipment	Brand Name	Model Name	Length (m)	Remark
1	Type C Cable	Luxshare	LX001	1.5	Provide by client



Test Setup

Controlled using a bespoke application (AB1565_AB1568_Tool_v2.10.4) on a test Notebook. The application was used to enable a continuous transmission mode and to select the test channels, data rates, modulation schemes and power setting as required.

Setup Diagram for Test





9. Test Results

9.1. Channel Bandwidth

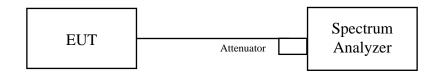
<u>Requirements</u>

For frequency hopping system operating in the 2400-2483.5MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dBbandwidth of hopping channel shall be a minimum limit for the hopping channel separation.

Test procedure

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- d. Repeat above procedures until all frequencies measured were complete.

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

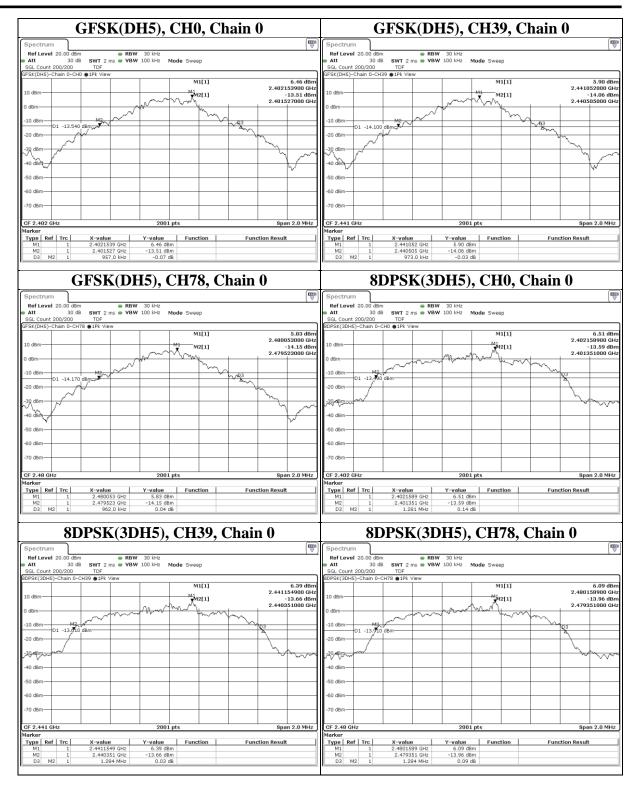


Test report No.	: 4790592589-US-R0-V0
Page	: 18 of 60
Issued date	: 2022/11/7
FCC ID	: 2AYYS-AW720H

Test Data

Mode	СН	CH Freq 20dB BW (MHz) (MHz)		Limit (MHz)	Result
GFSK(DH5)	0	2402	0.957	N/A	Pass
GFSK(DH5)	39	2441	0.973	N/A	Pass
GFSK(DH5)	78	2480	0.962	N/A	Pass
8DPSK(3DH5)	0	2402	1.281	N/A	Pass
8DPSK(3DH5)	39	2441	1.284	N/A	Pass
8DPSK(3DH5)	78	2480	1.284	N/A	Pass







9.2. Conducted Output Power

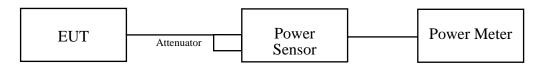
Requirements

The Maximum Output Power Measurement is 125mW.

Test Procedure

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

Test Setup



The loss between RF output port of the EUT and the input port of the Power Meter has been taken into consideration.



Test Data

Peak Power

BT GFSK

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
0	2402	7.362	8.67	20.97	PASS
39	2441	7.112	8.52	20.97	PASS
78	2480	6.714	8.27	20.97	PASS

BT 8DPSK

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	
0	2402	7.345	8.66	20.97	PASS
39	2441	7.129	8.53	20.97	PASS
78	2480	6.792	8.32	20.97	PASS

Average Power (Reference Only)

BT GFSK

Channel	Frequency (MHz)		
0	2402	7.178	8.56
39	2441	6.95	8.42
78	2480	6.577	8.18

BT 8DPSK

Channel	Frequency (MHz)			
0	2402	7.194	8.57	
39	2441	6.761	8.30	
78	2480	6.592	8.19	



9.3. Hopping Channel Separation

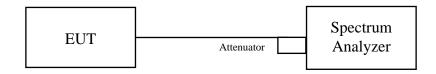
Requirements

At least 25kHz or two-third of 20dB hopping channel bandwidth (whichever is greater).

Test procedure

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
- c. By using the MaxHold function record the separation of two adjacent channels.
- d. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.



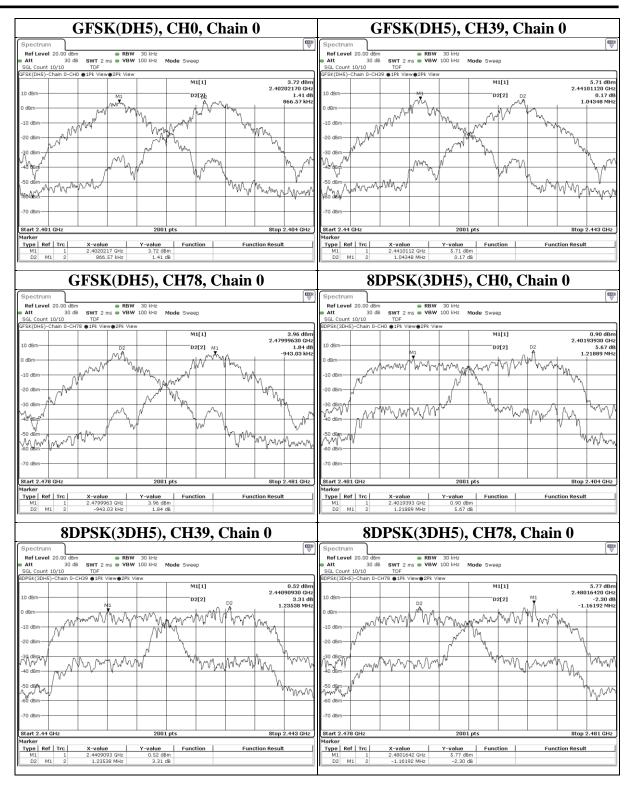
Test report No.	: 4790592589-US-R0-V0
Page	: 23 of 60
Issued date	: 2022/11/7
FCC ID	: 2AYYS-AW720H

Test Data

Mode	СН	Freq (MHz)	Channel Separation (MHz)	> Limit (MHz)
GFSK(DH5)	0	2402	0.867	0.638
GFSK(DH5)	39	2441	1.044	0.649
GFSK(DH5)	78	2480	0.943	0.641
8DPSK(3DH5)	0	2402	1.219	0.943
8DPSK(3DH5)	39	2441	1.235	0.856
8DPSK(3DH5)	78	2480	1.162	0.856



Test report No.	: 4790592589-US-R0-V0
Page	: 24 of 60
Issued date	: 2022/11/7
FCC ID	: 2AYYS-AW720H



Underwriters Laboratories Taiwan Co., Ltd. Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948

Doc No: 17-EM-F0876 / 6.0



9.4. Number of Hopping Frequency Used

Requirements

At least 15 channels frequencies, and should be equally spaced.

Test procedure

- a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- c. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
- d. Set the SA on View mode and then plot the result on SA screen.
- e. Repeat above procedures until all frequencies measured were complete.

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.



Test Data

There are 79 hopping frequencies in the hopping mode. On the plots, it shows that the hopping frequencies are equally spaced.

GFSK(DH5), Fl	HSS, Cl	nain	0				8 D	PSK	K(3D)	H5),	FHS	5 S , C	Chair	1 O	
Spectrum					₽		Spectrum	Ĵ								ſ
	• RBW 100 kHz					1		20.00 dBm		RBW						
Att 30 dB SWT 8 ms SGL Count 3000/3000 TDF	VBW 300 kHz Mod	le Sweep				•	Att SGL Count	30 dB 3000/3000	SWT 8 r TDF	ms 👄 VBW	300 kHz 1	Mode Swee	р			
GFSK(DH5)-Chain 0-FHSS @1Pk View									HSS @1Pk \	View						
M1		M1[1]		2.40	9.09 dBm 51610 GHz				M1			м	1[1]	I	2.41	9.08 d 81640 (
10 dBr# 	1888.010 (STREAM AND	idenahidhanann	MAANAAN	MAAAAM	AAAAA			al Wild	MANYANA	Manatha	alaillia	halladly	MANN	Mandith	ol.Wannad	Addan
o dBm				())))))))			10 dBm-						1		* • • • • • • • •	1
-20 dBm							20 dBm-									
-20 dBm						llls	30 dBm-									
40 dBm						ľ	40 dBm-									
					1.00											
-50 dBm							50 dBm-									
-60 dBm							60 dBm									
-70 dBm							70 dBm									
Start 2.4 GHz	8001 pts	s		Stop 2.	4835 GHz		Start 2.4 G	Hz			8001	pts		1	Stop 2.	4835 GI



9.5. Dwell Time on Each Channel

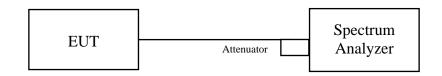
Requirements

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 procedure

- a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- c. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- e. Repeat above procedures until all different time-slot modes have been completed.
- f. Measure the maximum time duration of one single pulse.
- A Period Time = (channel number)*0.4
 For normal mode:
 DH1 Time Slot: Reading * (1600/2)*31.6/(channel number)
 DH3 Time Slot: Reading * (1600/4)*31.6/(channel number)
 DH5 Time Slot: Reading * (1600/6)*31.6/(channel number)
 For AFH mode:
 DH1 Time Slot: Reading * (800/2)*31.6/(channel number)
 DH3 Time Slot: Reading * (800/4)*31.6/(channel number)
 DH3 Time Slot: Reading * (800/4)*31.6/(channel number)

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

Underwriters Laboratories Taiwan Co., Ltd.



Test report No.	: 4790592589-US-R0-V0
Page	: 28 of 60
Issued date	: 2022/11/7
FCC ID	: 2AYYS-AW720H

Test Data

Mode	Freq (MHz)	Length of transmission time (ms)	Dwell Time (ms)	Limit (ms)	Result
GFSK(DH1)	2441	0.360	115.200	400	PASS
GFSK(DH3)	2441	1.625	260.000	400	PASS
GFSK(DH5)	2441	2.870	306.133	400	PASS
8DPSK(3DH1)	2441	0.380	121.600	400	PASS
8DPSK(3DH3)	2441	1.625	260.000	400	PASS
8DPSK(3DH5)	2441	2.875	306.667	400	PASS



Spectrum Spectrum Ref Level 10.00 dBm • RBW 1 MHz • Att 20 dB • SWT 10 ms • VBW 3 MHz GF5K(DH1)-Chain 0-CH39 • 1Pk View • M1 11 -2.26 dBm 0 dBm • M1 142 • Att 20 dB • SWT 10 ms - 10 dBm • M1 142 • Att 20 dB • SWT 10 ms - 20 dBm • M1 142 • Att 20 dB • SWT 10 ms - 36 dBm	
Att 20 dB • SWT 10 ms ● VBW 3 MHz Att 20 dB • SWT 10 ms ● VBW 3 MHz GFSK(DH1)-Chain 0-CH39 ●1Pk View -2.06 dBm -2.06 dBm M1[1] -2.06 dBm 0 dBm M1_M2 M2[1] -2.01 dBm M1 M2 -10 dBm -10 dBm -2.01 dBm -2.01 dBm -2.01 dBm -2.01 dBm	
GFSK(DH3)-Chain 0-CH39 @1Pk View M1[1] -2.8 dBm D dBm M1[1] -2.8 dBm 0 dBm M1 M2 M2[1] -2.9 dBm 0 dBm M1[1] 0.4 dBm -10 dBm -10 dBm -2.9 dBm -2.0 dBm -2.0 dBm -2.0 dBm	
0 dBm M1 M2 3.06000 mm 0 dBm M1 M2 -10 dBm -29 dBm -29 dBm -0 dBm <td< th=""><th></th></td<>	
-10 dBm20 dB	-2.83 dBn 2.85000 m
-10 dBm	-3.12 dBn 4.47500 m
-30 dBm	
-40 dBm	
-50 dBm	
oo geer yaa waxayaa waxayaa waxayaa waxayaa waxayaa waxayaa waxayaa aa	Hua baayi
אישין ויידעינע בן אייניע בן אייניע בן אייניע בער איין איינע בער איין איינע בער איין איינע בער איינע אייעע אייעע דייען איינע בן איינע בער איינע גער איינע ג	her mered.
-80 dBm	
CF 2.441 GHz 2001 pts 1.0 ms/ CF 2.441 GHz 2001 pts	1.0 ms/
Marker Type [Ref Trc X-value Y-value Function Function Result Type [Ref Trc X-value Y-value Function	Function Result
M1 1 3.68 ms -2.80 dBm M1 1 2.85 ms -2.80 dBm M2 1 4.04 ms -2.91 dBm M2 1 4.475 ms -3.12 dBm	
GFSK(DH5), CH39, Chain 0 8DPSK(3DH1), CH39, Cha	in A
Spectrum Spectrum Ref Level 10.00 dkm Ref Level 10.00 dkm Ref Level 10.00 dkm	
Ref Level 10.00 dBm RBW 1 MHz Att 20 dB SWT 10 ms VBW 3 MHz	
GFSK(DH5)-Chain 0-CH39 @1Pk View 800PSK(3DH1)-Chain 0-CH39 @1Pk View	
M1[1] -2.90 dBm 3.10500 ms 9.40- M1	-2.95 dBn 3.27500 m
0 d8m	-4.27 dBn 3.655007m
-10 dBm	
-20 dBm	
-30 dbm	
-40 dBm	
-50 dbm	
-so dem university of the second of the seco	MARKAN HALANA
	Lutionic cut a sea
-80 dBm	
CF 2.441 GHz 2001 pts 1.0 ms/ CF 2.441 GHz 2001 pts Marker	1.0 ms/
Type Ref Trc X-value Y-value Function Function Result Type Ref Trc X-value Y-value Function	Function Result
M1 1 3.105 ms -2.09 dbm M2 1 5.975 ms -3.13 dbm M2 1 5.957 ms -4.27 dbm	
Sana Sana Sana Sana Sana Sana Sana Sana	
8DPSK(3DH3), CH39, Chain 0 8DPSK(3DH5), CH39, Cha	nin O
Spectrum Image: Spectrum RefLevel 10.00 dBm ● RBW 1 MHz RefLevel 10.00 dBm ● RBW 1 MHz	(\
Att 20 dB • SWT 10 ms • VBW 3 MHz	
BDPSK(3DH3)-Chain 0-CH39 ●1Pk View BDPSK(3DH3)-Chain 0-CH39 ●1Pk View	-2.86 dBn
0 dbm M2 M2[1] -3.531 dbm 0 dbm M1 M2[1]	2.16500 m -4.14 dBn
	5.04000 m
4.14500 ms	
-10 dBm	
4.14500 ms	
-10 dBm	
10 d8m 10 d8m <td></td>	
10 dem 10 dem <td>konspansko pris</td>	konspansko pris
10 d8m 10 d8m <td>- Without</td>	- Without
10 dbm 10 dbm <td>linifalvéképi</td>	linifalvéképi
10 dm 1 <td></td>	
10 dm 1	1.0 ms/
10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 20 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 30 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 40 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 30 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 50 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 60 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 60 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 60 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 80 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 60 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 90 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 60 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 60 dbm 10 dbm 10 dbm </td <td></td>	
10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 20 dbm 10 dbm 10 dbm 10 dbm 10 dbm 30 dbm 10 dbm 10 dbm 10 dbm 30 dbm 10 dbm 10 dbm 10 dbm 50 dbm 10 dbm 10 dbm 10 dbm 50 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 50 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 50 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm 10 dbm	1.0 ms

Doc No: 17-EM-F0876 / 6.0



9.6. Conducted Out of Band Emission

Requirements

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 conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies 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

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100 kHz and 300 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

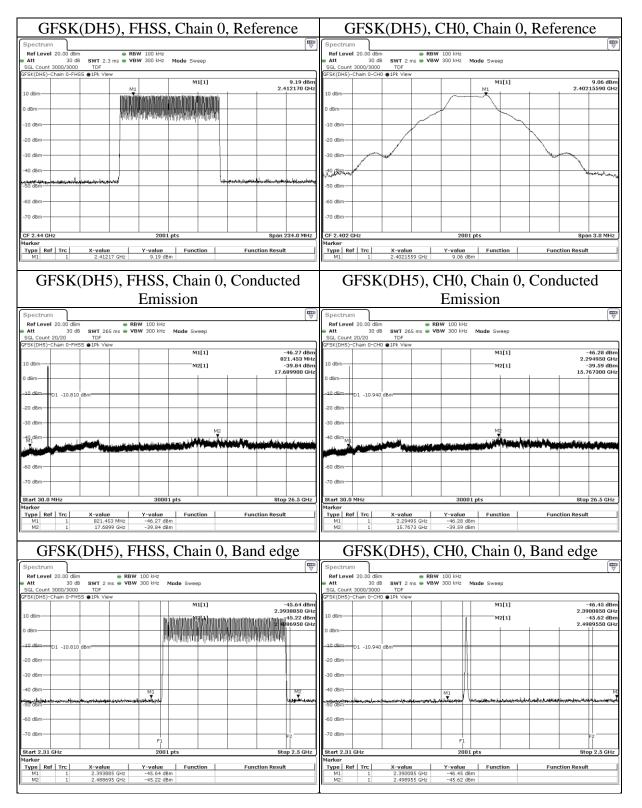
<u>Test Setup</u>



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.



Test Data



Underwriters Laboratories Taiwan Co., Ltd.



Test report No.	: 4790592589-US-R0-V0
Page	: 32 of 60
Issued date	: 2022/11/7
FCC ID	: 2AYYS-AW720H

GFSK(DH5), CH39, Chain 0, Reference	GFSK(DH5), CH78, Chain 0, Reference
Spectrum 🕎	Spectrum 🕎
RefLevel 20.00 dbm RBW 100 kHz Att 30 db SWT 2 ms VBW 300 kHz Mode Sweep SGL Count 3000/3000 TOF TOF SUBSCH 2 ms SUBSCH 2 ms	Ref Level 20.00 dBm ● RBW 100 kHz ● Att 30 dB SWT 2 ms ● VBW 300 kHz Mode Sweep SGL Count 3000/3000 TOF ■ ■ ■ ■
GFSK(DHS)-Chain D-CH39 ●1Pk View M1[1] 8.99 dBm	GFSK(DH5)-Chain 0-CH78 ●1Pk View M1[1] 8.71 dBm
10 dBm M1 2.44115590 GHz	10 dBm M1 2.48015590 GHz
0 dBm	0 d8m
-10 dBm	-10 dBm
-20 dBm	-20 dBm
-30 dBm	-30 dBm
the second	-tussary
-50 dBm	-50 dBm-
-60 dBm-	-60 dBm
-70 dBm	-70 dBm
CF 2.441 GHz 2001 pts Span 3.0 MHz	CF 2.48 GHz 2001 pts Span 3.0 MHz
Marker Type Ref Trc X-value Y-value Function Function Result	Marker Type Ref Trc X-value Y-value Function Function Result
M1 1 2.4411559 GHz 8.99 dBm	M1 1 2.4801559 GHz 8.71 dBm
GFSK(DH5), CH39, Chain 0, Conducted	GFSK(DH5), CH78, Chain 0, Conducted
Emission	Emission
Spectrum	Spectrum (100 kHz) Ref Level 20.00 dBm ● RBW 100 kHz
Att 30 dB SWT 265 ms VBW 300 kHz Mode Sweep SGL Count 20/20 TDF	Att 30 dB SWT 265 ms ● VBW 300 kHz Mode Sweep SGL Count 20/20 TDF
GFSK(DH5)-Chain 0-CH39 ●1Pk View	GFSK(DH5)-Chain 0-CH78 PlPk View
10 dBm M2[1] -46.44 dBm 1.073800 GHz 7.073800 GHz 7.078800 GHz 7.0788000 GHz 7.07880000 GHz 7.078800000	10 dBm M1[1]46.35 dBm 2.194364 GHz 10 dBm M2[1]38.38 dBm
0 dBm	0 dBm
	01 *11.290 dbin
-20 dBm	-20 dBm-
-30 dBm M2	-30 dBm M2
-60 dBm	-60 dBm-
-70 dBm-	-70 dBm
Start 30.0 MHz 30001 pts Stop 26.5 GHz	Start 30.0 MHz 30001 pts Stop 26.5 GHz
Marker Type Ref Trc X-value Y-value Function Function Result	Marker Type Ref Trc X-value Y-value Function Function Result
M1 1 1.0738 GHz -46.44 dBm M2 1 15.98347 GHz -39.74 dBm	M1 1 2.194364 GHz ~46.35 dBm M2 1 15.98082 GHz ~38.38 dBm
GFSK(DH5), CH39, Chain 0, Band edge	GFSK(DH5), CH78, Chain 0, Band edge
Spectrum □□□□ Ref Level 20.00 dBm ● RBW 100 kHz	Spectrum (♥) Ref Level 20.00 dBm ● RBW 100 kHz
Att 30 dB SWT 2 ms • VBW 300 kHz Mode Sweep SGL Count 3000/3000 TDF	Att 30 dB SWT 2 ms VBW 300 kHz Mode Sweep SGL Count 3000/3000 TDF
GFSK(DH5)-Chain 0-CH39 ●1Pk View M1[1] -46.08 dBm	GFSK(DHS)-Chain D-CH78 Plv View M1[1] -46.29 dBm
10 dBm M2[1] -45.71 dBm	10 dBm M2[1] 745.52 dBm
0 dBm	0 dBm 2.4962000 GHz
-10.dBm 01 -11.010 dBm	-10 dBm 01 -11.290 dBm
-20 dBm	-20 dBm
-30 dBm	-30 dBm-
-40 dbm M1 Mary 200 dbm Mary and a star and a star and a star and a star a star Star a star a	
00 00m	-50'dBm
-60 dBm	-60 dBm-
-70 dBm F1 F2	-70 dBm - F1 F2 - F2 - F2 - F1 F2 - F2 - F2 - F
Start 2.31 GHz 2001 pts Stop 2.5 GHz	Start 2.31 GHz 2001 pts Stop 2.5 GHz
Marker Type Ref Trc X-value Y-value Function Function Result	Marker Type Ref Trc X-value Y-value Function Function Result
M1 1 2.39987 GHz -46.08 dBm M2 1 2.48575 GHz -45.71 dBm	M1 1 2.395595 GHz -46.29 dBm M2 1 2.4962 GHz -45.52 dBm



Test report No.	: 4790592589-US-R0-V0
Page	: 33 of 60
Issued date	: 2022/11/7
FCC ID	: 2AYYS-AW720H

8DPSK(3DH5), FHSS, Chain 0, Reference	8DPSK(3DH5), CH0, Chain 0, Reference		
Spectrum 🕎	Spectrum 🕎		
RefLevel 15.00 dBm ■ RBW 100 HHz ■ Att 25 dB SWT 2.3 ms ■ VBW 300 HHz Mode Sweep SGL Count 3000/3000 TDF ■ DEF D	RefLevel 10.00 dBm ● RBW 100 kHz ● Att 20 dB SWT 2 ms ● VBW 300 kHz Mode Sweep SGL Count 3000/3000 TDF ■ ■ ■ DPSK(20HS)-Chain O-CHO @ 10k View ■ ■ ■ ■		
10 dam M1 M1[1] 9.07 dBm	MM1[1] 9.10 dBm		
10 dBm 2.435210 GHz	0 dBm 2.40215590 GHz		
	-10 dBm		
-10 dBm	-20 dBm		
-20 dBm			
-30 dBm	-30 dBm-		
-40 dBm	-40 dBm		
	-50 dBm		
มร้างเป็นสี่มีการแห่งสามารถ และสามารถสามารถสามารถสามารถสามารถสามารถสามารถสามารถสามารถสามารถสามารถสามารถสามารถส	-60 dBm-		
-60 dBm	-70 dBm		
-70 dBm			
-80 dBm	-80 dBm-		
CF 2.44 GHz 2001 pts Span 234.0 MHz	CF 2.402 GHz 2001 pts Span 3.0 MHz		
Marker Type Ref Trc X-value Y-value Function Function Result	Marker Type Ref Trc X-value Y-value Function Function Result		
M1 1 2.43521 GHz 9.07 dBm	M1 1 2.4021559 GHz 9.10 dBm		
8DPSK(3DH5), FHSS, Chain 0, Conducted 8DPSK(3DH5), CH0, Chain 0, Conducted			
Emission	Emission		
Spectrum 🕎	Spectrum 🕎		
Ref Level 15.00 dBm RBW 100 kHz Att 25 dB SWT 265 ms VBW 300 kHz Mode Sweep	Ref Level 10.00 dBm RBW 100 kHz Att 20 dB SWT 265 ms VBW 300 kHz Mode Sweep		
SGL Count 20/20 TDF BDPSK(3DH5)-Chain D-FHSS @1Pk View	SGL Count 20/20 TDF BDPSK(3DH5)-Chain 0-CH0 @1Pk View		
10 dBm	M1[1] -55.70 dBm 2.174070 GHz		
M2[1] -45.72 dBm	0 dBm M2[1] -48.37 dBm		
	-10.dBm-D1 -10.900 dBm-D1 -10.900 dB		
-10.dBm-01 -10.930 dBm-	-20 dBm		
-20 dBm	-30 dBm		
-30 dBm			
-40 dBm M2	-40 dBm M2		
	-70 dBm		
-70 dBm-	-80 dBm-		
-30 dBm			
Start 30.0 MHz 30001 pts Stop 26.5 GHz Marker	Start 30.0 MHz 30001 pts Stop 26.5 GHz Marker		
Type Ref Trc X-value Y-value Function Function Result M1 1 1.040272 GHz -51.51 dBm M2 1 6.951905 GHz -45.72 dBm	Type Ref Trc X-value Y-value Function Function Result M1 1 2.17407 GHz -55.70 dBm M2 1 17.6899 GHz -48.37 dBm		
8DPSK(3DH5), FHSS, Chain 0, Band edge	8DPSK(3DH5), CH0, Chain 0, Band edge		
Spectrum	Spectrum		
Ref Level 15.00 dBm	Ref Level 10.00 dBm		
Att 25 dB SWT 2 ms VBW 300 kHz Mode Sweep SGL Count 3000/3000 TDF	Att 20 dB SWT 2 ms VBW 300 kHz Mode Sweep SGL Count 3000/3000 TDF		
8DPSK(3DH5)-Chain 0-FHSS @1Pk View 10.40	8DPSK(3DH5)-Chain 0-CH0 @1Pk View M1[1] -44.82 dBm		
10 dbm	0 dBm 2.3996800 GHz		
0 dBm2.4940150 GHz	2.4906900 GHz		
-10 dBm01 -10.930 dBm	-20 dBm		
-20 dBm-			
-30 dBm	-30 dBm-		
-40 dBm	-40 dBm		
M2	-50 dBm M2		
his manufactor in the second	men her have a proper to be here and a second a		
-60 dBm-	-70 dBm		
-70 dBm	-80 dBm		
-80 dBm - F1 - F2 - F2	F1		
Start 2.31 GHz 2001 pts Stop 2.5 GHz Marker	Start 2.31 GHz 2001 pts Stop 2.5 GHz Marker		
Type Ref Trc X-value Y-value Function Function Result Type Ref Trc X-value Function Function Result M1 1 2.39949 GHz -45.95 dBm M1 1 2.39968 GHz -44.82 dBm			
M1 1 2.39949 GHz ~45.95 dBm M2 1 2.494015 GHz ~50.70 dBm	M1 1 2.39966 GHz -44.82 dBm M2 1 2.49069 GHz -56.04 dBm		



8DPSK(3DH5), CH39, Chain 0, Reference	8DPSK(3DH5), CH78, Chain 0, Reference
Spectrum 🕎	Spectrum 🕎
Ref Level 10.00 dBm ■ RBW 100 kHz ■ Att 20 dB SWT 2 ms ■ VBW 300 kHz	RefLevel 15.00 dBm ● RBW 100 kHz ● Att 25 dB SWT 2 ms ● VBW 300 kHz Mode Sweep
SGL Count 3000/3000 TDF BDPSK(3DH5)-Chain 0-CH39 ●1Pk View	SGL Count 3000/3000 TDF BDPSK(3DH5)-Chain 0-CH78 @1Pk View
Mk1[1] 8.98 dBm 2.44115590 GHz	10 dBm M1 [1] 8.78 dBm 2.48015440 GHz
0 dBm	
-10 dBm	0 dBm
	-10 dBm
	-20 dBm
-30 dBm	
-40 dBm	-30 dBm
	-40 dBm
-50 d8m	-50 dBm
-60 dBm	-Jo dom
-70 dBm	-60 dBm-
-yo dan	-70 d8m-
-80 dBm	-80 dBm
CF 2.441 GHz 2001 pts Span 3.0 MHz	CF 2.48 GHz 2001 pts Span 3.0 MHz
Marker	Marker
Type Ref Trc X-value Y-value Function Function Result M1 1 2.4411559 GHz 8.98 dBm	Type Ref Trc X-value Y-value Function Function Result M1 1 2.4801544 GHz 8.78 dBm
8DPSK(3DH5), CH39, Chain 0, Conducted	8DPSK(3DH5), CH78, Chain 0, Conducted
Emission	Emission
Spectrum 🕎	Spectrum 🕎
Ref Level 10.00 dBm	Ref Level 15.00 dBm
att 20 dB SWT 265 ms	Att 25 dB SWT 265 ms VBW 300 kHz Mode Sweep SGL Count 20/20 TDF
8DPSK(3DH5)-Chain 0-CH39 1Pk View	8DPSK(3DH5)-Chain 0-CH78 1Pk View
M1[1] -56.55 dBm 957.332 MHz	10 dBm
0 dBm M2[1] -47.27 dBm 17.717250 GHz	0 dBm M2[1] -45.24 dBm 6.991610 GHz
-10.dBm D1 -11.020.dBm	
-20 dBm	-10.dBm D1 -11.220 dBm
	-20 dBm
-30 dBm	-30 dBm
-40 dBm- M2	
	-40 dBm M2
	-50 ZBm
	-60 d8m
-70 dBm	-70 dBm-
-80 dBm	
	-80 dBm
Start 30.0 MHz 30001 pts Stop 26.5 GHz Marker	Start 30.0 MHz 30001 pts Stop 26.5 GHz Marker
Type Ref Trc X-value Y-value Function Function Result M1 1 957.332 MHz -56.55 dBm -56.55 dBm <td< th=""><th>Type Ref Trc X-value Y-value Function Function Result M1 1 1.084388 GHz -50.95 dBm <t< th=""></t<></th></td<>	Type Ref Trc X-value Y-value Function Function Result M1 1 1.084388 GHz -50.95 dBm -50.95 dBm <t< th=""></t<>
M2 1 17.71725 GHz -47.27 dBm	M2 1 6.99161 GHz -45.24 dBm
8DPSK(3DH5), CH39, Chain 0, Band edge	8DPSK(3DH5), CH78, Chain 0, Band edge
Spectrum III III IIII IIII IIIII IIIIIIIIIIII	Spectrum 🕎
Ref Level 10.00 dBm	Ref Level 15.00 dBm
Att 20 dB SWT 2 ms VBW 300 kHz Mode Sweep SGL Count 3000/3000 TDF	Att 25 dB SWT 2 ms VBW 300 kHz Mode Sweep SGL Count 3000/3000 TDF
8DPSK(3DH5)-Chain 0-CH39 ●1Pk View M1[1] -56.44 dBm	8DPSK(3DH5)-Chain 0-CH78 ●1Pk View
0 d8m 2.3930300 GHz	10 dBm 2.3970200 GHz
M2[1] -56.11 dBm 2.4881250 GHz	0 dBm M2[1] \$50.20 dBm 2.4996200 GHz
-10.dBm	
-20 dBm	-10.dBm 01 -11.220 dBm
-30 dBm	-20 dBm
	-30 dBm
-40 dBm	-40 dBm
-50 dBm M1 M2	M1
-50 dBm- usubjection of the second s	will be an
	-60 dBm
-70 dBm	-70 dBm
-80 dBm F2	F2
F1	-80 dBm F1 Start 2.31 GHz 2001 pts Stop 2.5 GHz
Stort 2.31 GHz 2001 pts Stop 2.5 GHz Marker	Marker
Type Ref Trc X-value Y-value Function Function Result M1 1 2.39303 GHz -56.44 dBm	Type Ref Trc X-value Y-value Function Function Result M1 1 2.39702 GHz -50.85 dBm -50.85 dBm <td< th=""></td<>
M2 1 2.488125 GHz -56.11 dBm	M2 1 2.49962 GHz -50.20 dBm



9.7. Radiated Spurious Emission

Requirements

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE:

- 1. The lower limit shall apply at the transition frequencies.
- 2. Emission level $(dBuV/m) = 20 \log Emission level (uV/m)$.
- 3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



Test Procedures

[For 9 kHz ~ 30 MHz]

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. For measurement below 30MHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

[For above 30 MHz]

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
- f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.



Test report No.	: 4790592589-US-R0-V0
Page	: 37 of 60
Issued date	: 2022/11/7
FCC ID	: 2AYYS-AW720H

Note:

- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
- The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.

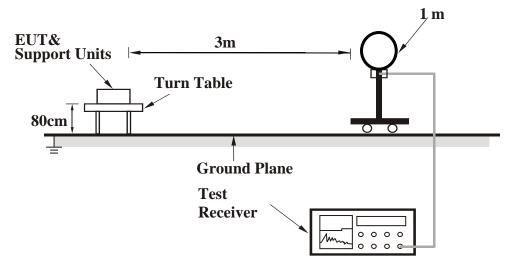
Configuration	Average			
Configuration	RBW	VBW		
Bluetooth	1MHz	Refer to section 6.6 for duty cycle.		

- 4. All modes of operation were investigated (includes all external accessories) and the worst-case emissions are reported, the other emission levels were low against the limit.
- 5. Test data of Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
- 6. Test data of Margin(dB) = Result value (dBuV/m) Limit value (dBuV/m).
- 7. Test data of Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) Preamp Factor (dB).
- 8. Test data of Notation "@" = Fundamental Frequency
- 9. Test data of Notation " * " = The peak result under 20 dB above and complies with AVG limit, AVG result is deemed to comply with AVG limit.

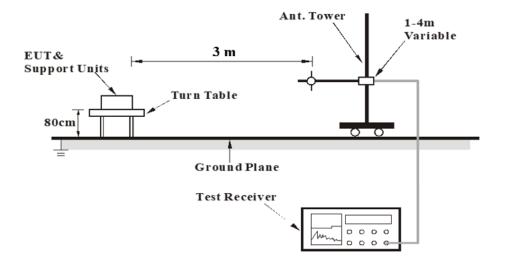
Test report No.	: 4790592589-US-R0-V0
Page	: 38 of 60
Issued date	: 2022/11/7
FCC ID	: 2AYYS-AW720H

Test Setup

<Frequency Range 9 kHz ~ 30 MHz>

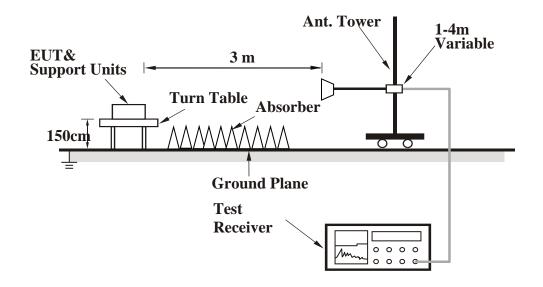


<Frequency Range 30 MHz ~ 1 GHz >





<Frequency Range above 1 GHz>



For the actual test configuration, please refer to the Setup Configurations.



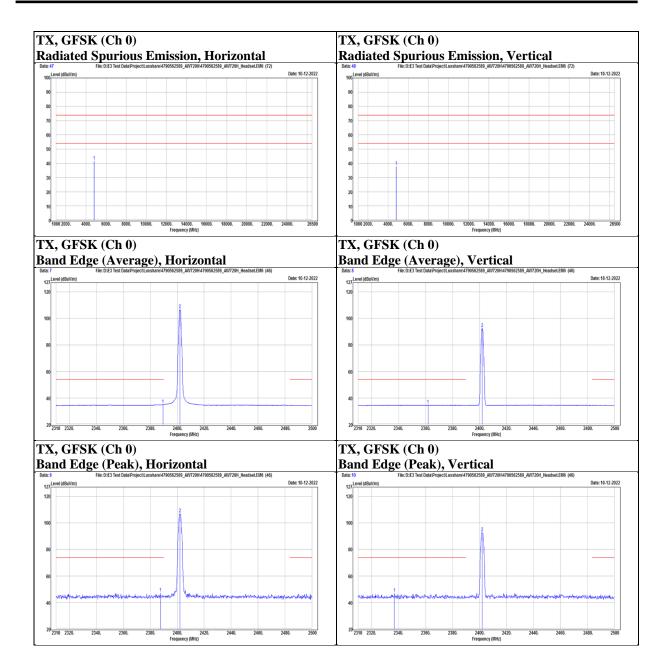
Test report No.	: 4790592589-US-R0-V0
Page	: 40 of 60
Issued date	: 2022/11/7
FCC ID	: 2AYYS-AW720H

Test Data

Above 1 GHz

Mode	GFSK	GFSK Channel 0						
Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
Polarization	Notation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Remark
		2387.52	41.4	5.82	47.22	74	-26.78	PK
		2389.42	29.36	5.82	35.18	54	-18.82	AVG
Horizontal	@	2402	101.06	5.8	106.86	N/A	N/A	PK
	@	2402	100.81	5.8	106.61	N/A	N/A	AVG
	*	4804	39.27	2.33	41.6	74	-32.4	PK
		2336.98	41.07	5.89	46.96	74	-27.04	PK
		2361.87	28.82	5.88	34.7	54	-19.3	AVG
Vertical	@	2402	86.82	5.8	92.62	N/A	N/A	PK
	@	2402	86.57	5.8	92.37	N/A	N/A	AVG
	*	4804	35.56	2.33	37.89	74	-36.11	РК



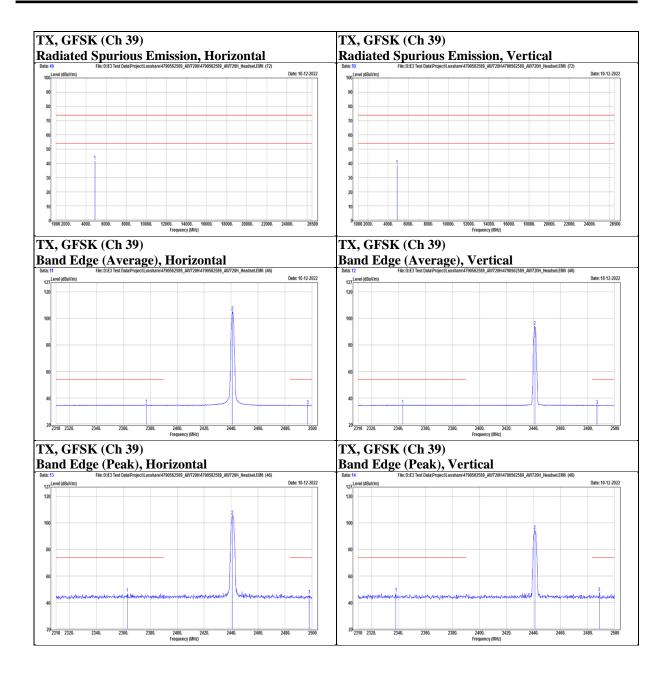




Test report No.	: 4790592589-US-R0-V0
Page	: 42 of 60
Issued date	: 2022/11/7
FCC ID	: 2AYYS-AW720H

Mode	GFSK Channel 39							
Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
FOIalization	Notation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kelliark
		2363.01	41.18	5.88	47.06	74	-26.94	PK
		2377.07	29.26	5.84	35.1	54	-18.9	AVG
	@	2441	99.48	5.94	105.42	N/A	N/A	РК
Horizontal	@	2441	99.21	5.94	105.15	N/A	N/A	AVG
		2496.77	28.97	5.57	34.54	54	-19.46	AVG
		2497.91	40.19	5.57	45.76	74	-28.24	РК
	*	4882	39.47	2.41	41.88	74	-32.12	РК
		2338.12	41.45	5.89	47.34	74	-26.66	РК
		2343.25	28.81	5.9	34.71	54	-19.29	AVG
	@	2441	88.29	5.94	94.23	N/A	N/A	РК
Vertical	@	2441	88.13	5.94	94.07	N/A	N/A	AVG
		2487.08	28.83	5.66	34.49	54	-19.51	AVG
		2488.79	41.83	5.64	47.47	74	-26.53	РК
	*	4882	36.23	2.41	38.64	74	-35.36	РК



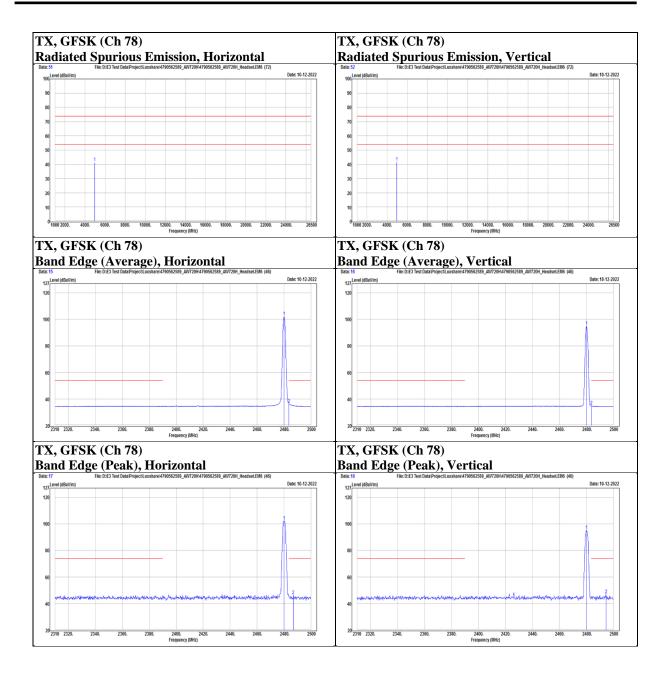




Test report No.	: 4790592589-US-R0-V0
Page	: 44 of 60
Issued date	: 2022/11/7
FCC ID	: 2AYYS-AW720H

Mode	GFSK	GFSK Channel 78						
Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
Folalization	Notation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kelliark
	@	2480	96.57	5.72	102.29	N/A	N/A	PK
	@	2480	96.31	5.72	102.03	N/A	N/A	AVG
Horizontal		2483.66	30.69	5.68	36.37	54	-17.63	AVG
		2486.89	40.31	5.66	45.97	74	-28.03	РК
	*	4960	38.93	2.43	41.36	74	-32.64	РК
	@	2480	89.34	5.72	95.06	N/A	N/A	РК
	@	2480	89.12	5.72	94.84	N/A	N/A	AVG
Vertical		2483.66	29.23	5.68	34.91	54	-19.09	AVG
		2494.49	41.1	5.6	46.7	74	-27.3	PK
	*	4960	39.13	2.43	41.56	74	-32.44	PK



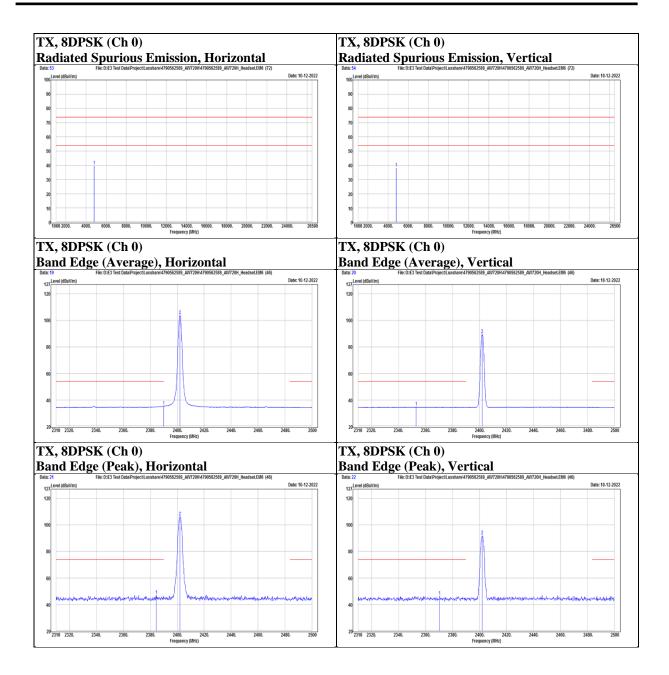




Test report No.	: 4790592589-US-R0-V0
Page	: 46 of 60
Issued date	: 2022/11/7
FCC ID	: 2AYYS-AW720H

Mode	8DPSK	8DPSK Channel 0						
Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
Folalization	Notation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kemark
		2384.48	41.27	5.83	47.1	74	-26.9	PK
		2389.99	29.64	5.82	35.46	54	-18.54	AVG
Horizontal	@	2402	100.35	5.8	106.15	N/A	N/A	PK
	@	2402	97.81	5.8	103.61	N/A	N/A	AVG
	*	4804	37.41	2.33	39.74	74	-34.26	PK
		2353.13	28.85	5.9	34.75	54	-19.25	AVG
		2370.42	40.49	5.86	46.35	74	-27.65	PK
Vertical	@	2402	85.91	5.8	91.71	N/A	N/A	PK
	@	2402	83.49	5.8	89.29	N/A	N/A	AVG
	*	4804	35.97	2.33	38.3	74	-35.7	PK



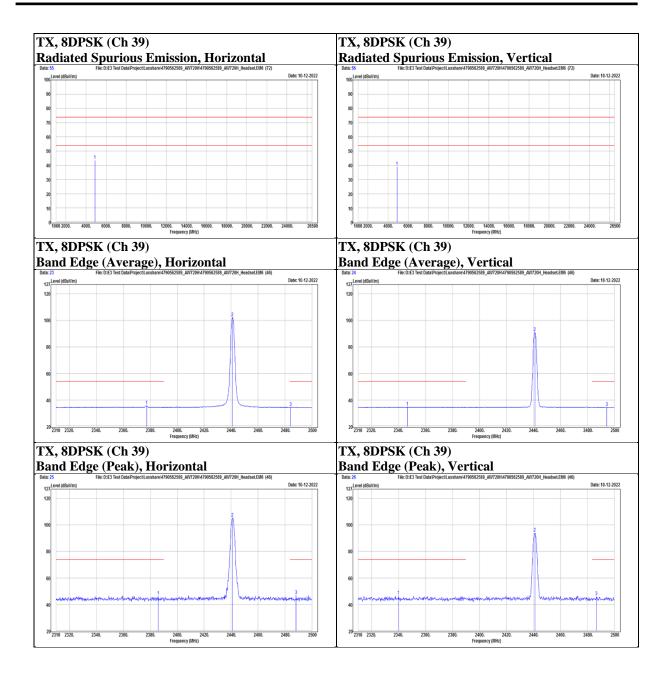




Test report No.	: 4790592589-US-R0-V0
Page	: 48 of 60
Issued date	: 2022/11/7
FCC ID	: 2AYYS-AW720H

Mode	8DPSK			Chai	nnel 39			
Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
FOIalization	Notation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kennark
		2377.26	29.82	5.84	35.66	54	-18.34	AVG
		2385.81	40.63	5.83	46.46	74	-27.54	PK
Horizontal	@	2441	99.34	5.94	105.28	N/A	N/A	PK
	@	2441	96.34	5.94	102.28	N/A	N/A	AVG
		2484.04	28.85	5.68	34.53	54	-19.47	AVG
		2488.22	41.22	5.65	46.87	74	-27.13	PK
	*	4882	41.1	2.41	43.51	74	-30.49	PK
		2340.02	40.69	5.9	46.59	74	-27.41	PK
		2346.67	28.88	5.9	34.78	54	-19.22	AVG
	@	2441	87.88	5.94	93.82	N/A	N/A	PK
Vertical	@	2441	85.05	5.94	90.99	N/A	N/A	AVG
		2486.7	40.37	5.66	46.03	74	-27.97	PK
		2494.3	29	5.6	34.6	54	-19.4	AVG
	*	4882	36.72	2.41	39.13	74	-34.87	РК



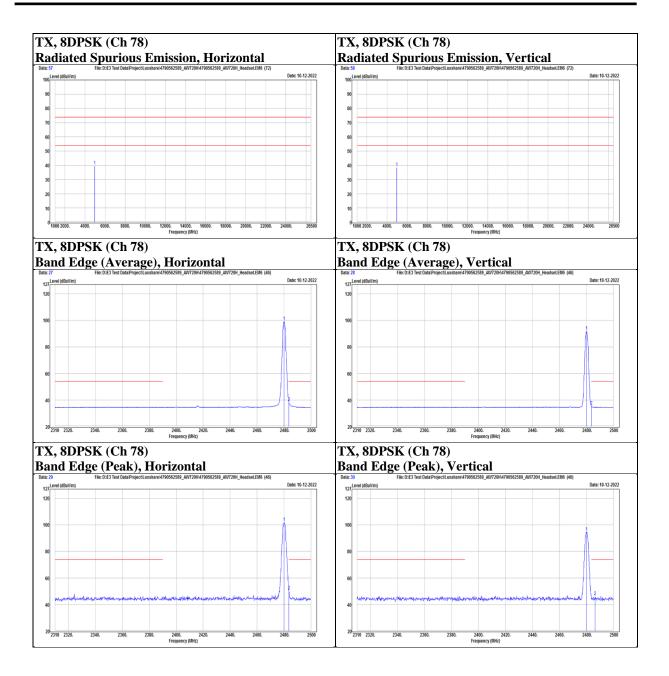




Test report No.	: 4790592589-US-R0-V0
Page	: 50 of 60
Issued date	: 2022/11/7
FCC ID	: 2AYYS-AW720H

Mode	8DPSK			Char	nnel 78			
Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
1 Ofalization	Notation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kemark
	@	2480	96.19	5.72	101.91	N/A	N/A	PK
Horizontal	@	2480	93.5	5.72	99.22	N/A	N/A	AVG
		2483.66	44.69	5.68	50.37	74	-23.63	PK
		2483.66	32.43	5.68	38.11	54	-15.89	AVG
	*	4960	37.08	2.43	39.51	74	-34.49	PK
	@	2480	88.99	5.72	94.71	N/A	N/A	PK
Vertical	@	2480	86.08	5.72	91.8	N/A	N/A	AVG
		2483.66	29.63	5.68	35.31	54	-18.69	AVG
		2486.32	40.49	5.67	46.16	74	-27.84	PK
	*	4960	35.97	2.43	38.4	74	-35.6	PK







Test report No.	: 4790592589-US-R0-V0
Page	: 52 of 60
Issued date	: 2022/11/7
FCC ID	: 2AYYS-AW720H

Below 1 G	Hz							
Mode	GFSK			Chai	nnel 0			
Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
Folalization	Notation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kelliark
		53.28	31.35	-11.78	19.57	40	-20.43	РК
Horizontal		148.34	39.38	-11.98	27.4	43.5	-16.1	РК
		213.33	38.42	-14.32	24.1	43.5	-19.4	PK
		264.74	39.07	-11.82	27.25	46	-18.75	PK
		777.87	31.56	0.11	31.67	46	-14.33	РК
		942.77	31.43	2.95	34.38	46	-11.62	PK
		45.52	40.8	-12	28.8	40	-11.2	РК
		83.35	47.7	-17.32	30.38	40	-9.62	PK
Vertical		148.34	36.17	-11.98	24.19	43.5	-19.31	PK
		341.37	31.93	-9.62	22.31	46	-23.69	PK
		510.15	40.64	-5.31	35.33	46	-10.67	PK
		955.38	31.96	3.28	35.24	46	-10.76	РК

	FSK (C			•				TX, GFS					
	ed Spu									ious Emis			
59 Level (dBuVin		Test Data Projec	tiLuxsharei479056	52589_AW720HI47	90562589_AW720	I_Headset.EM6 (60)	Date: 10-12-2022	Data: 60 80 Level (dBuVim)	File: D:IE3 Test	DatalProjectiLuxsharei479056	2589_AW720H4790562	2589_AW720H_Headset.EM6 (60)	Date: 10-12-2022
1													
								70					
								60					
							-6dB	50					-6dB
								40					
]						5	6				5		6
	2 3	1						30 1	3				
								20					
				_				10					
30 10	00. 200.	300.	400.	500. 6 requency (MHz)	00. 700.	800.	900. 1000	30 100.	200.	300. 400.	500. 600. equency (MHz)	700. 800.	900. 1000



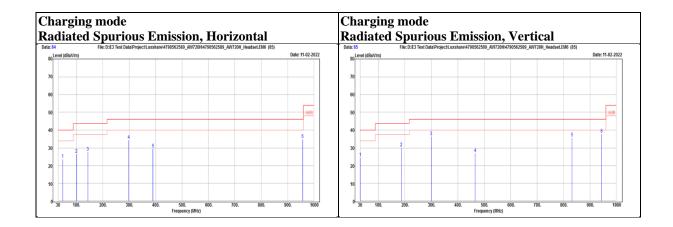
Test report No.	: 4790592589-US-R0-V0
Page	: 53 of 60
Issued date	: 2022/11/7
FCC ID	: 2AYYS-AW720H

Charging mode

Below 1 GHz

	Mode	Charging mode	Channel	N/A
--	------	---------------	---------	-----

Delanization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Demonte
Polarization	@	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Remark
		47.46	35.43	-11.91	23.52	40	-16.48	PK
		99.84	42.78	-16.37	26.41	43.5	-17.09	PK
Horizontal		143.49	39.68	-12.09	27.59	43.5	-15.91	PK
Horizontai		297.72	45.28	-10.86	34.42	46	-11.58	PK
		389.87	37.65	-8.23	29.42	46	-16.58	PK
		957.32	31.52	3.24	34.76	46	-11.24	PK
		30.97	37.29	-12.9	24.39	40	-15.61	PK
		186.17	43.51	-13.45	30.06	43.5	-13.44	PK
Vertical		299.66	47.18	-10.81	36.37	46	-9.63	PK
		465.53	32.92	-5.96	26.96	46	-19.04	PK
		832.19	34.93	0.91	35.84	46	-10.16	РК
		943.74	34.82	2.94	37.76	46	-8.24	РК





9 kHz ~ 30 MHz Data:

For 9 kHz to 30 MHz radiated emission have performed all modes of operation were investigated. The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

No non-compliance noted: KDB 414788 D01 OATS and Chamber Correlation Justification

- Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

- OATs and chamber correlation testing had been performed and chamber measured test results is the worst case test result.

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30m open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.



9.8. AC Power Line Conducted Emission

Requirements

Engunney (MHz)	Conducted limit (dBµV)			
Frequency (MHz)	Quasi-peak	Average		
0.15 - 0.5	66 - 56	56 - 46		
0.50 - 5.0	56	46		
5.0 - 30	60	50		

Note:

1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

Test Procedures

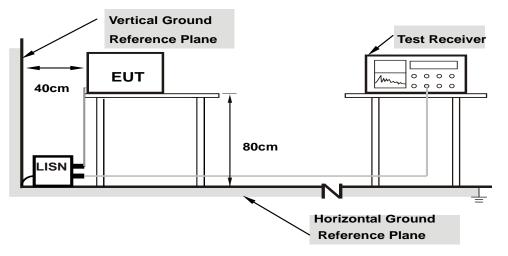
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit 20dB) was not recorded.

NOTE:

- 1. The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.
- 2. All modes of operation were investigated (includes all external accessories) and the worst-case emissions are reported, the other emission levels were low against the limit.
- 3. Test data of Result value (dBuV) = Reading value (dBuV) + Correction Factor (dB).
- 4. Test data of Margin(dB) = Result value (dBuV) Limit value (dBuV).
- 5. Test data of Correction Factor (dB) = Insertion loss(dB) + Cable loss(dB).

Test report No Page Issued date FCC ID	 a. : 4790592589-US-R0-V0 b. : 56 of 60 c) : 2022/11/7 c) : 2AYYS-AW720H
---	--

Test Setup



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the Setup Configurations.



Test Data

5

6

7

8

9

10

11 12 0.6340

0.6340

1.1199

1.1199

2.9353

2.9353

4.8953

4.8953

-5.78

-6.85

-5.68

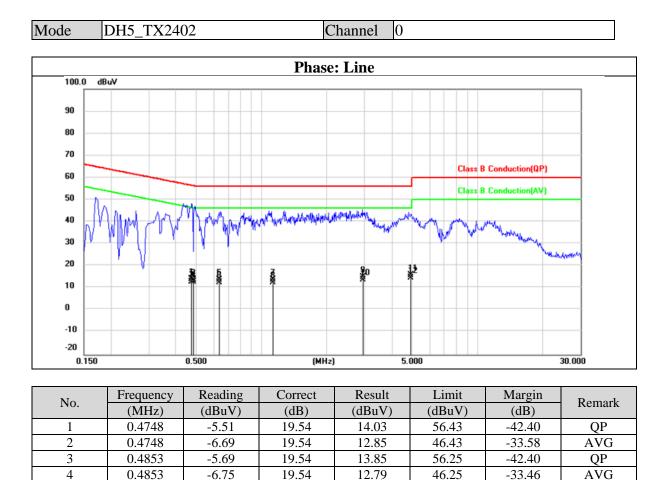
-6.88

-4.71

-5.88

-3.82

-4.88



19.54

19.54

19.56

19.56

19.59

19.59

19.65

19.65

13.76

12.69

13.88

12.68

14.88

13.71

15.83

14.77

56.00

46.00

56.00

46.00

56.00

46.00

56.00

46.00

-42.24

-33.31

-42.12

-33.32

-41.12

-32.29

-40.17

-31.23

QP

AVG

QP

AVG

QP

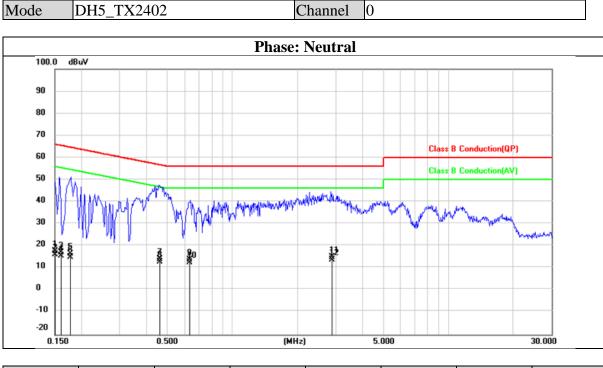
AVG

QP

AVG



Test report No.	: 4790592589-US-R0-V0
Page	: 58 of 60
Issued date	: 2022/11/7
FCC ID	: 2AYYS-AW720H



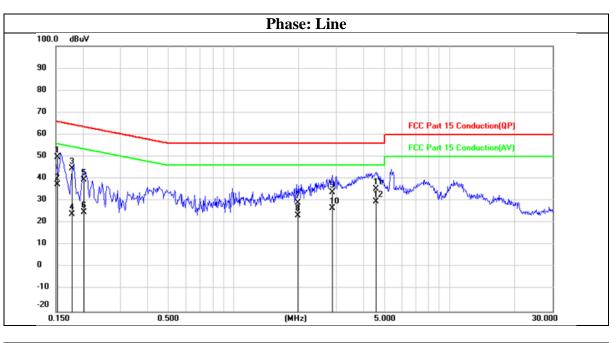
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	
1	0.1512	-1.87	19.54	17.67	65.93	-48.26	QP
2	0.1512	-3.25	19.54	16.29	55.93	-39.64	AVG
3	0.1607	-2.42	19.54	17.12	65.43	-48.31	QP
4	0.1607	-4.13	19.54	15.41	55.43	-40.02	AVG
5	0.1762	-3.17	19.54	16.37	64.66	-48.29	QP
6	0.1762	-4.62	19.54	14.92	54.66	-39.74	AVG
7	0.4591	-5.49	19.55	14.06	56.71	-42.65	QP
8	0.4591	-6.68	19.55	12.87	46.71	-33.84	AVG
9	0.6312	-5.80	19.55	13.75	56.00	-42.25	QP
10	0.6312	-6.85	19.55	12.70	46.00	-33.30	AVG
11	2.8856	-4.73	19.60	14.87	56.00	-41.13	QP
12	2.8856	-5.93	19.60	13.67	46.00	-32.33	AVG



Mode

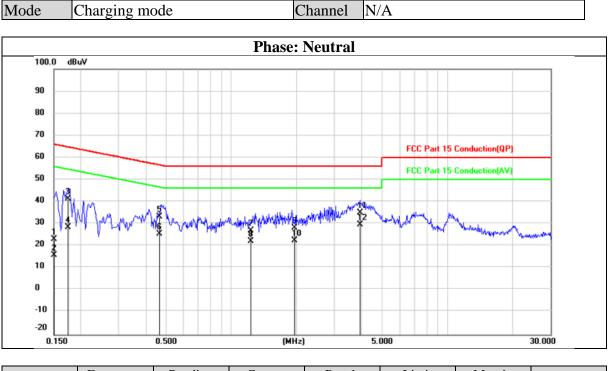
Charging mode

Channel N/A



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	
1	0.1537	30.24	19.53	49.77	65.80	-16.03	QP
2	0.1537	17.81	19.53	37.34	55.80	-18.46	AVG
3	0.1770	25.12	19.53	44.65	64.63	-19.98	QP
4	0.1770	4.56	19.53	24.09	54.63	-30.54	AVG
5	0.2016	20.05	19.53	39.58	63.54	-23.96	QP
6	0.2016	5.29	19.53	24.82	53.54	-28.72	AVG
7	1.9977	9.56	19.57	29.13	56.00	-26.87	QP
8	1.9977	3.78	19.57	23.35	46.00	-22.65	AVG
9	2.8656	14.24	19.58	33.82	56.00	-22.18	QP
10	2.8656	7.08	19.58	26.66	46.00	-19.34	AVG
11	4.5653	15.60	19.62	35.22	56.00	-20.78	QP
12	4.5653	9.96	19.62	29.58	46.00	-16.42	AVG





No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	
1	0.1494	3.59	19.53	23.12	66.03	-42.91	QP
2	0.1494	-3.76	19.53	15.77	56.03	-40.26	AVG
3	0.1736	21.85	19.53	41.38	64.79	-23.41	QP
4	0.1736	9.03	19.53	28.56	54.79	-26.23	AVG
5	0.4654	13.62	19.53	33.15	56.60	-23.45	QP
6	0.4654	5.89	19.53	25.42	46.60	-21.18	AVG
7	1.2354	7.50	19.54	27.04	56.00	-28.96	QP
8	1.2354	2.67	19.54	22.21	46.00	-23.79	AVG
9	1.9595	8.45	19.56	28.01	56.00	-27.99	QP
10	1.9595	2.89	19.56	22.45	46.00	-23.55	AVG
11	3.9399	15.54	19.62	35.16	56.00	-20.84	QP
12	3.9399	10.07	19.62	29.69	46.00	-16.31	AVG

END OF REPORT