

JAPAN MIC

Radio Test Report

Applicant: DIGIMAX INNOVATIVE PRODUCTS LTD.
2F., No.196, Sec.2, Zhongxing Rd., Xindian Dist. New Taipei City

Manufacturer: Digisine Energytech Co., Ltd.
2F., No.196, Sec.2, Zhongxing Rd., Xindian Dist. New Taipei City

Product Name: Hearing Aid

Brand Name: Mimitakara, Digisine, Digimax

Model No.: UP-6KNX

Model Difference: N/A

Report Number: TERF2303000422E2

Date of EUT Received: March 1, 2023

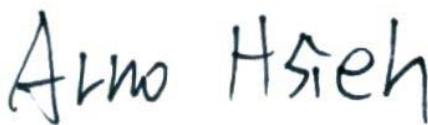
Date of Test: March 15, 2023 ~ March 23, 2023

Issue Date: June 8, 2023

Place of Testing SGS Taiwan Ltd. Central RF Lab
No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333

Test Result PASS

Classification of Specified Radio Equipment Article 2 Clause 1 Item 19



Approved By: _____

Arno Hsieh

We hereby declare that:

The data presented with this application to be true and correct; and that our testing equipment is regularly serviced and properly calibrated; and We agree to maintain records of data for a minimum of ten (10) years in our laboratory for immediate presentation upon request by the Certification Body.

Measurement was conducted by the following test method:

the test method of Ordinance Concerning Technical Regulations
Conformity Certification etc. of Specified Radio Equipment in Annex 1, the Ministry of Internal Affairs
and Communication notification in Annex 43 of Article 88, Paragraph 1 or the test method more than
equivalent.

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Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
TERF2303000422E2	00	Original	June 8, 2023	Yuri Tsai	

Note:

- 1、The remark "*" indicates modification of the report upon requests from certification body.

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1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

1.1 Product Description

Product Name:	Hearing Aid
Brand Name:	Mimitakara, Digisine, Digimax
Model No.:	UP-6KNX
Model Difference:	N/A
Hardware Version:	V1
Firmware Version:	V1
Power Supply:	3.7V from Battery or 5V from USB Cable

1.2 RF Specification

Type, frequency of
transmittable radio wave and
rated output

Bluetooth GFSK include AFH F1D 2441MHz
0.000093 ~ 0.000365W/MHz

Bluetooth $\pi/4$ -DQPSK G1D 2441MHz
include AFH 0.000069 ~ 0.000268W/MHz

Bluetooth 8DPSK include AFH G1D 2441MHz
0.000071 ~ 0.000278W/MHz

1.3 Antenna Designation

Antenna Type	Part Number	Supplier	Polarization (H or V)	Peak Gain (dBi)
Chip	N/A	N/A	H+V	2.93

Note: Antenna information is provided by the applicant.

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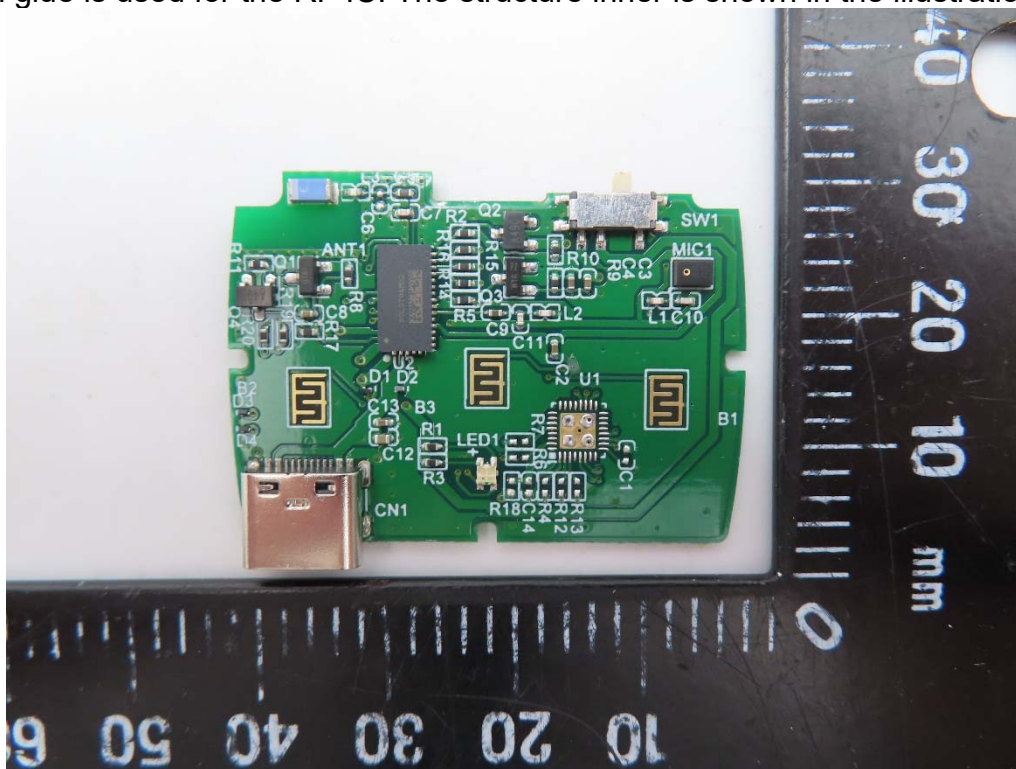
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1.4 Assemble

Special glue is used for the RF IC. The structure inner is shown in the illustration below.



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2 DESCRIPTION OF TEST

2.1 Test Conditions

				Limit	Result	Note	
Environment of Test Room	Temperature	°C	20.6~22.6		$5 \leq x \leq 35$	PASS	
	Humidity	%	60~69		$45 \leq x \leq 85$	PASS	
Peak Antenna Gain		dBi	2.93		----	----	
Number of hopping channel		----	79	20	----	----	
Declaration Output Power		mW/MHz	0.09300	0.36500	≤ 3 mW/MHz	PASS	
Declaration Output Power		dBm/MHz	-10.32	-4.38	≤ 4.77 dBm/MHz	PASS	
E.I.R.P.		dBm/MHz	-7.39	-1.45	≤ 6.91 dBm/MHz	PASS	
Tested Circuit Insertion Loss		dB	10.80	10.80	----	----	
Input Voltage		VDC	3.70		----	----	
Packet Type (Mode)		----	DH5		----	----	
Frequency equal to the transmission rate of the modulation signal		MHz	1		----	----	
Test Category		2.4GHz Band Wideband Low-Power Data Communication System (Bluetooth GFSK include AFH)					
The reason why test are performed only rated voltage							
When the input voltage to receiver RF circuit varies below ± 1% as the input voltage from the external power supply to the receiver varies ± 10% (excluding power supply).							

				Limit	Result	Note	
Environment of Test Room	Temperature	°C	20.6~22.6		$5 \leq x \leq 35$	PASS	
	Humidity	%	60~69		$45 \leq x \leq 85$	PASS	
Peak Antenna Gain		dBi	2.93		----	----	
Number of hopping channel		----	79	20	----	----	
Declaration Output Power		mW/MHz	0.06900	0.26800	≤ 3 mW/MHz	PASS	
Declaration Output Power		dBm/MHz	-11.61	-5.72	≤ 4.77 dBm/MHz	PASS	
E.I.R.P.		dBm/MHz	-8.68	-2.79	≤ 6.91 dBm/MHz	PASS	
Tested Circuit Insertion Loss		dB	10.80	10.80	----	----	
Input Voltage		VDC	3.70		----	----	
Packet Type (Mode)		----	2DH5		----	----	
Frequency equal to the transmission rate of the modulation signal		MHz	1		----	----	
Test Category		2.4GHz Band Wideband Low-Power Data Communication System (Bluetooth π/4-DQPSK include AFH)					
The reason why test are performed only rated voltage							
When the input voltage to receiver RF circuit varies below ± 1% as the input voltage from the external power supply to the receiver varies ± 10% (excluding power supply).							

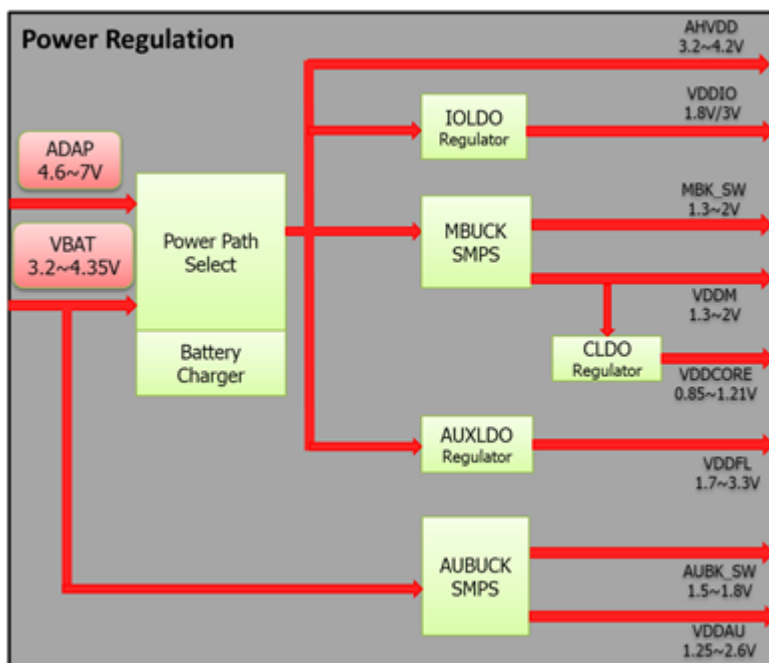
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				Limit	Result	Note
Environment of Test Room	Temperature	°C	20.6~22.6		$5 \leq x \leq 35$	PASS
	Humidity	%	60~69		$45 \leq x \leq 85$	PASS
Peak Antenna Gain		dBi	2.93		----	----
Number of hopping channel		----	79	20	----	----
Declaration Output Power		mW/MHz	0.07100	0.27800	$\leq 3 \text{ mW/MHz}$	PASS
Declaration Output Power		dBm/MHz	-11.49	-5.56	$\leq 4.77 \text{ dBm/MHz}$	PASS
E.I.R.P.		dBm/MHz	-8.56	-2.63	$\leq 6.91 \text{ dBm/MHz}$	PASS
Tested Circuit Insertion Loss		dB	10.80	10.80	----	----
Input Voltage		VDC	3.70		----	----
Packet Type (Mode)		----	3DH5		----	----
Frequency equal to the transmission rate of the modulation signal		MHz	1		----	----
Test Category		2.4GHz Band Wideband Low-Power Data Communication System (Bluetooth 8DPSK include AFH)				
The reason why test are performed only rated voltage						
When the input voltage to receiver RF circuit varies below $\pm 1\%$ as the input voltage from the external power supply to the receiver varies $\pm 10\%$ (excluding power supply).						

2.2 Voltage Variation

The voltage regulators circuit diagram as shown below.



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3 ABOUT UNCERTAINTY OF MEASURED VALUE

- *In this test, the influence of an error or uncertainty may be done according to the following factors.
- Bias of a measurement equipment, Change by aging, Attrition, Noise
 - Skill and capability of an inspector
 - Environment (Temperature, Humidity)
 - Dispersion in a EUT (Equipment Under Test)
 - Uncertainty of calibration of a measurement equipment

Therefore, Synthetic uncertainty is calculated using "k=2" of coverage factor, and about 95% of confidence level shall be obtained.

In consideration of the above, it judged as follows.

JUDGE	Measured value and Standard limit value	
PASS	Case1	Standard limit value +uncertainty -uncertainty Measured value *Even if it takes uncertainty into consideration, a standard limit value is fulfilled.
	Case2	*Although measured value is in a standard limit value, a limit value won't be fulfilled if uncertainty is taken into consideration.
FAIL	Case3	*Although measured value exceeds a standard limit value, a limit value will be fulfilled if uncertainty is taken into consideration.
	Case4	*Even if it takes uncertainty into consideration, a standard limit value isn't fulfilled.

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4 MEASUREMENT EQUIPMENT LIST

Conducted Emission Test Site: Conducted F						
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	Calibration Authority	Cal. Method
Spectrum Analyzer	KEYSIGHT	N9010B	MY59071574	06/20/2022	ETC	C)
Attenuator	Woken	WATT-218FS-10	RF18	11/16/2022	SGS	C)
Attenuator	Woken	WATT-218FS-10	RF20	11/16/2022	SGS	C)
DC Block	PASTERNAK	PE8210	RF153	11/16/2022	SGS	C)
Power Meter	Anritsu	ML2496A	1512003	07/26/2022	ETC	C)
Power Sensor	Anritsu	MA2411B	1339378	07/26/2022	ETC	C)
Test Software	SGS Taiwan	Radio Test Software	Ver.21	N.C.R	N/A	N/A

Note 1: The validity of measurement equipment is one year from the first day of the following month of the calibration date.

(e.g. If the calibration date is December 15th, 2014, measurement equipment can be used from December 15th, 2014 to December 31st, 2015.)

Note 2: Calibration Method

- a): Calibration conducted by the National Institute of Information and Communications Technology(NICT)(hereinafter referred to as "NICT") or a designated calibration agency under Article 102-18 paragraph (1)
- b): Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992)
- c) : Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph(1)
- d) : Calibration conducted by using measuring instruments and other equipment listed in the right column of Table No. 3 attached hereto, which shall have been given any of calibration, etc. listed above from a) to c)

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5 TEST RESULTS

DH5

Measurement Frequency		MHz	2402	2441		2480	Limit	Result	Note
Channel Number		Ch.	0	39		78	----	----	
Number of hopping channel		----	-	79	20	-	----	----	
Reading Frequency		MHz	2401.987	2440.987		2479.986	----	----	
Frequency Tolerance		ppm	-5.412157	-5.32569		-5.645161	-50≤x≤+50	PASS	
Occupied Bandwidth		MHz	-	78.173	19.561	-	≤83.5 MHz	PASS	
Spread Bandwidth		MHz	-	71.278	18.162	-	≥0.5 MHz	PASS	
Transmission Output Power	Calculated result	mW/MHz	-	0.09291	0.36464	-	≤3 mW/MHz	----	
	Tolerance	%	-	-0.09	-0.10	-	-80≤x≤+20	PASS	
	Measured value	dBm	-	8.2103		-	----	----	
	On Time	msec	-	2.97		-	----	----	
	Dwell Time	msec	-	316.798		-	≤400 msec	PASS	
	Burst Ratio	%	-	72.794		-	----	----	
Unwanted Emission Strength	Under 2387MHz	μW/MHz	-	0.036392		-	≤2.5uW/MHz	PASS	
		MHz	-	1238.70		-	----	----	
	2387-2400MHz	μW/MHz	-	1.361445		-	≤25uW/MHz	PASS	
		MHz	-	2400.00		-	----	----	
	2483.5-2496.5MHz	μW/MHz	-	0.052845		-	≤25uW/MHz	PASS	
		MHz	-	2483.75		-	----	----	
	Over 2496.5MHz	μW/MHz	-	0.500035		-	≤2.5uW/MHz	PASS	
		MHz	-	4812.50		-	----	----	
Secondarily Emitted Radio Wave Strength (RX Spurious)	Under 1GHz	nW	-	0.007244		-	≤4 nW	PASS	
		MHz	-	891.60		-	----	----	
	Over 1GHz	nW	-	1.104079		-	≤20 nW	PASS	
		MHz	-	5238.00		-	----	----	
	Tested Circuit Insertion Loss for RX Spurious								1
Spread Factor		----	-	71.3	18.16	-	≥5	PASS	
Dwell Time		mSec	-	285.38		-	≤400 msec	PASS	
Interference Prevention Function		----	-	good		-	----	PASS	

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2DH5

Measurement Frequency	MHz	2402	2441	2480	Limit	Result	Note
Channel Number	Ch.	0	39	78	----	----	
Number of hopping channel	----	-	79	20	-	----	
Reading Frequency	MHz	2401.986	2440.986	2479.985	----	----	
Frequency Tolerance	ppm	-5.828476	-5.73535	-6.048387	$-50 \leq x \leq +50$	PASS	
Occupied Bandwidth	MHz	-	78.399	19.961	$\leq 83.5 \text{ MHz}$	PASS	
Spread Bandwidth	MHz	-	71.385	18.340	$\geq 0.5 \text{ MHz}$	PASS	
Transmission Output Power	Calculated result	mW/MHz	-	0.06898	0.26849	$\leq 3 \text{ mW/MHz}$	----
	Tolerance	%	-	-0.03	0.18	$-80 \leq x \leq +20$	PASS
	Measured value	dBm	-	6.9233	-	----	----
	On Time	msec	-	2.99	-	----	----
	Dwell Time	msec	-	318.931	-	$\leq 400 \text{ msec}$	PASS
	Burst Ratio	%	-	72.927	-	----	----
Unwanted Emission Strength	Under 2387MHz	$\mu\text{W/MHz}$	-	0.079433	-	$\leq 2.5 \mu\text{W/MHz}$	PASS
		MHz	-	2381.70	-	----	----
	2387-2400MHz	$\mu\text{W/MHz}$	-	0.057306	-	$\leq 25 \mu\text{W/MHz}$	PASS
		MHz	-	2400.00	-	----	----
	2483.5-2496.5MHz	$\mu\text{W/MHz}$	-	1.093956	-	$\leq 25 \mu\text{W/MHz}$	PASS
		MHz	-	2484.05	-	----	----
	Over 2496.5MHz	$\mu\text{W/MHz}$	-	0.559758	-	$\leq 2.5 \mu\text{W/MHz}$	PASS
		MHz	-	4810.00	-	----	----
Secondarily Emitted Radio Wave Strength (RX Spurious)	Under 1GHz	nW	-	0.006383	-	$\leq 4 \text{ nW}$	PASS
		MHz	-	897.00	-	----	----
	Over 1GHz	nW	-	0.320627	-	$\leq 20 \text{ nW}$	PASS
		MHz	-	1728.00	-	----	----
	Tested Circuit Insertion Loss for RX Spurious						1
Spread Factor	----	-	71.4	18.34	-	≥ 5	PASS
Dwell Time	mSec	-	288.73	-	-	$\leq 400 \text{ msec}$	PASS
Interference Prevention Function	----	-	good	-	-	----	PASS

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3DH5

Measurement Frequency		MHz	2402	2441	2480	Limit	Result	Note
Channel Number		Ch.	0	39	78	----	----	
Number of hopping channel		----	-	79	20	----	----	
Reading Frequency		MHz	2401.986	2440.985	2479.985	----	----	
Frequency Tolerance		ppm	-5.828476	-6.14502	-6.048387	$-50 \leq x \leq +50$	PASS	
Occupied Bandwidth		MHz	-	78.418	19.936	$\leq 83.5 \text{ MHz}$	PASS	
Spread Bandwidth		MHz	-	71.327	18.285	$\geq 0.5 \text{ MHz}$	PASS	
Transmission Output Power	Calculated result	mW/MHz	-	0.07116	0.27760	$\leq 3 \text{ mW/MHz}$	----	
	Tolerance	%	-	0.23	-0.14	$-80 \leq x \leq +20$	PASS	
	Measured value	dBm	-	7.0552	-	----	----	
	On Time	msec	-	2.98	-	----	----	
	Dwell Time	msec	-	317.865	-	$\leq 400 \text{ msec}$	PASS	
	Burst Ratio	%	-	72.861	-	----	----	
Unwanted Emission Strength	Under 2387MHz	$\mu\text{W/MHz}$	-	0.048306	-	$\leq 2.5 \mu\text{W/MHz}$	PASS	
		MHz	-	1220.70	-	----	----	
	2387-2400MHz	$\mu\text{W/MHz}$	-	0.018664	-	$\leq 25 \mu\text{W/MHz}$	PASS	
		MHz	-	2389.15	-	----	----	
	2483.5-2496.5MHz	$\mu\text{W/MHz}$	-	0.014322	-	$\leq 25 \mu\text{W/MHz}$	PASS	
		MHz	-	2493.80	-	----	----	
	Over 2496.5MHz	$\mu\text{W/MHz}$	-	0.232809	-	$\leq 2.5 \mu\text{W/MHz}$	PASS	
		MHz	-	4882.00	-	----	----	
Secondarily Emitted Radio Wave Strength (RX Spurious)	Under 1GHz	nW	-	0.006577	-	$\leq 4 \text{ nW}$	PASS	
		MHz	-	902.20	-	----	----	
	Over 1GHz	nW	-	0.263633	-	$\leq 20 \text{ nW}$	PASS	
		MHz	-	3754.00	-	----	----	
	Tested Circuit Insertion Loss for RX Spurious						1	
Spread Factor		----	-	71.3	18.29	≥ 5	PASS	
Dwell Time		mSec	-	286.53	-	$\leq 400 \text{ msec}$	PASS	
Interference Prevention Function		----	-	good	-	----	PASS	

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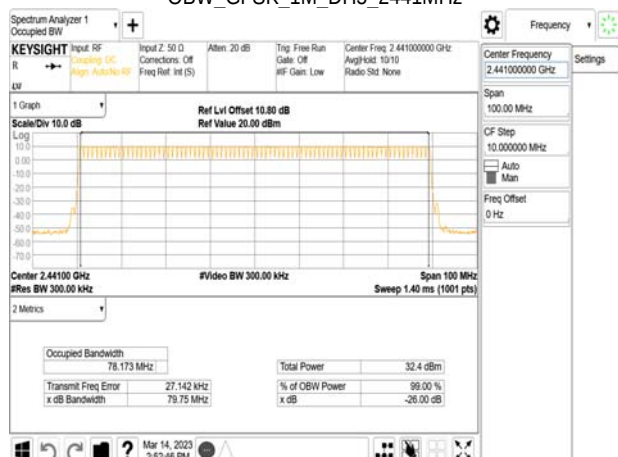
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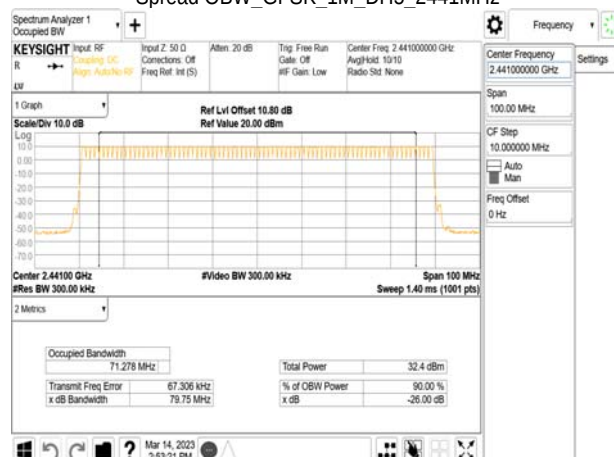
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OBW_GFSK_1M_DH5_2441MHz



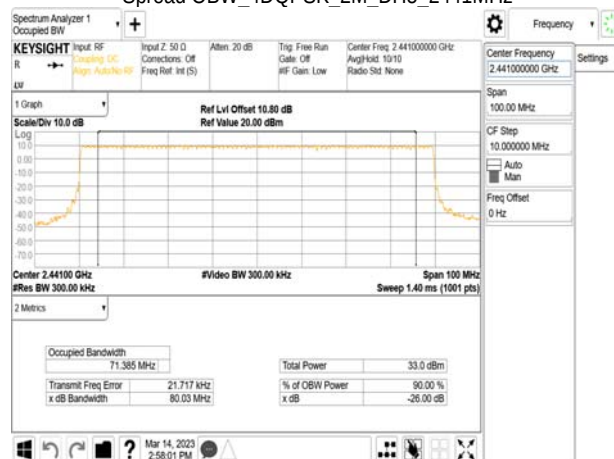
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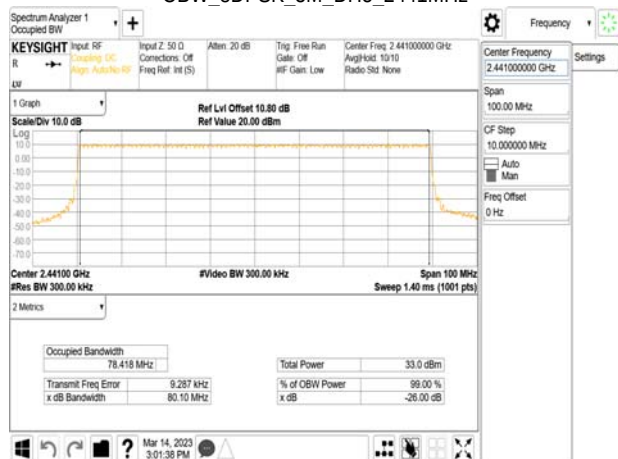
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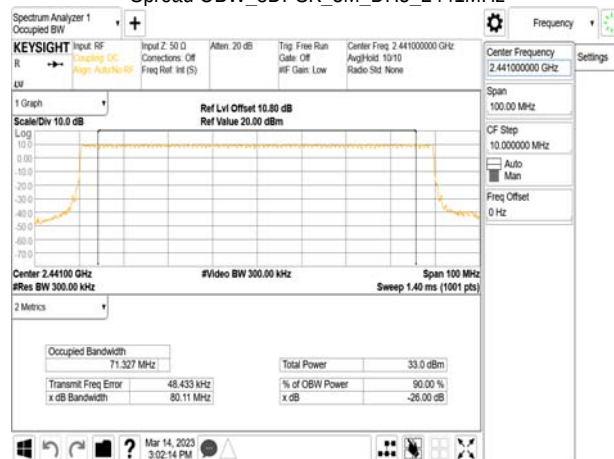
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OBW_8DPSK_3M_DH5_2441MHz



Spread OBW_8DPSK_3M_DH5_2441MHz

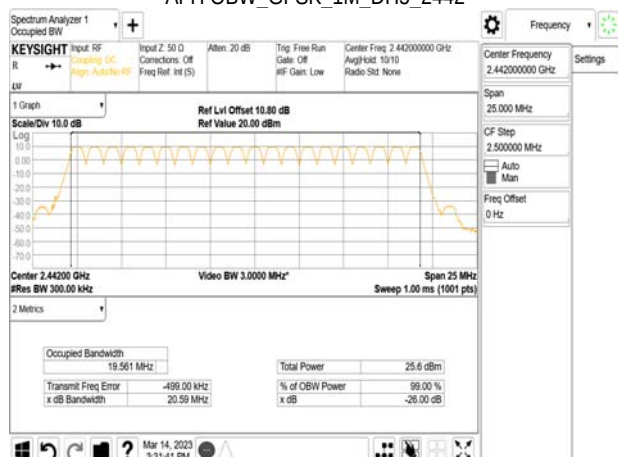


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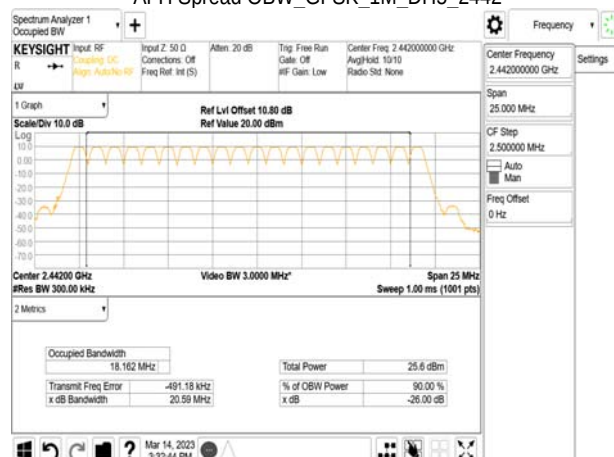
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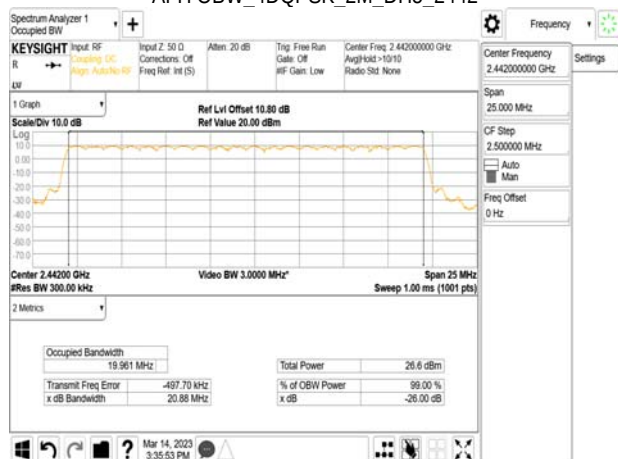
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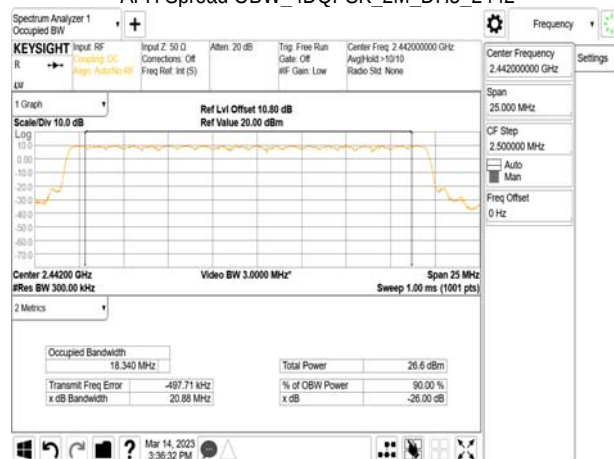
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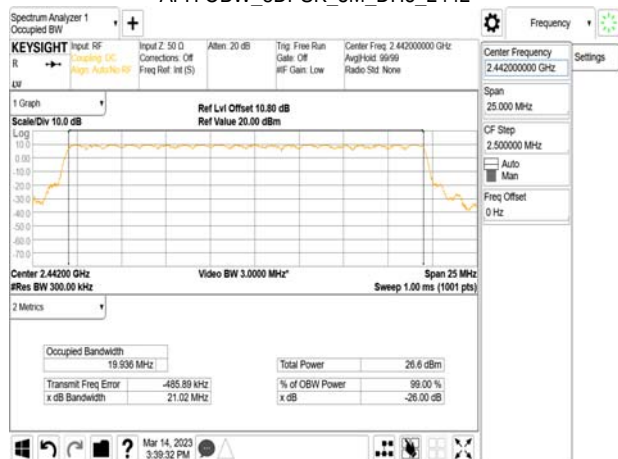
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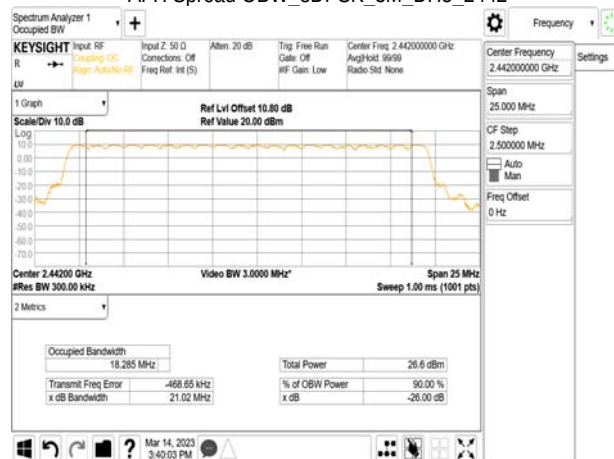
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AFH OBW_8DPSK_3M_DH5_2442



AFH Spread OBW_8DPSK_3M_DH5_2442

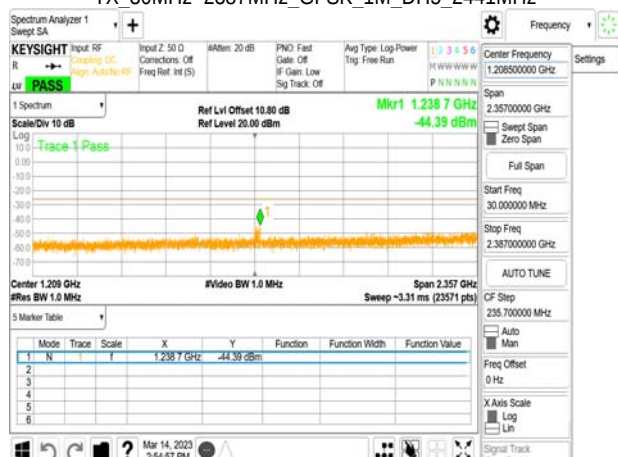


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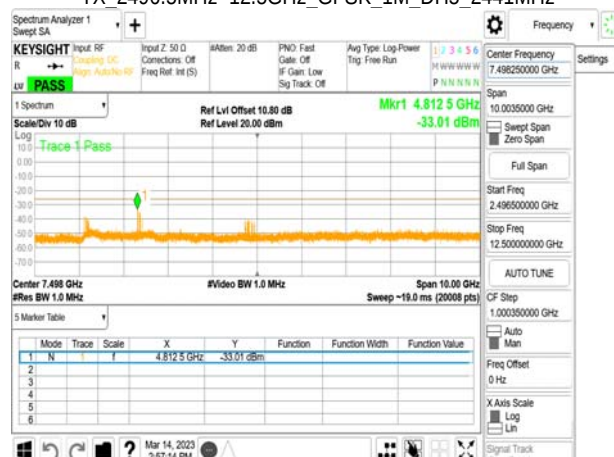
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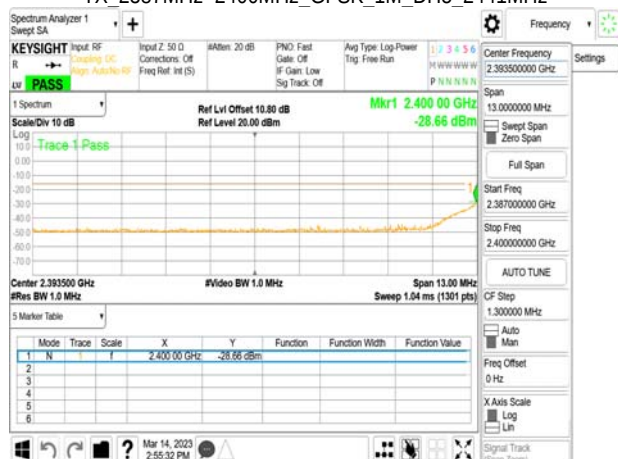
TX 30MHz~2387MHz_GFSK_1M_DH5_2441MHz



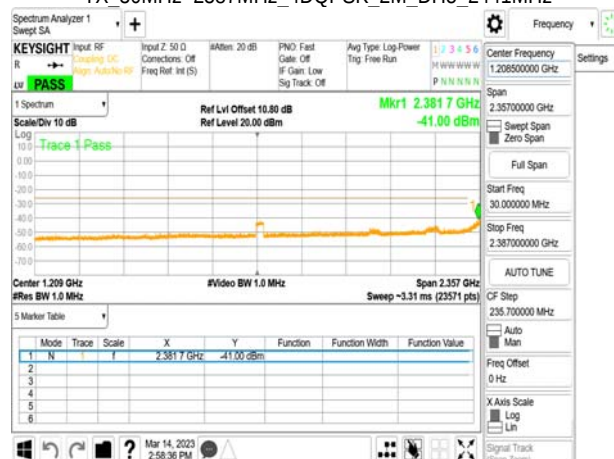
TX 2496.5MHz~12.5GHz_GFSK_1M_DH5_2441MHz



TX 2387MHz~2400MHz_GFSK_1M_DH5_2441MHz



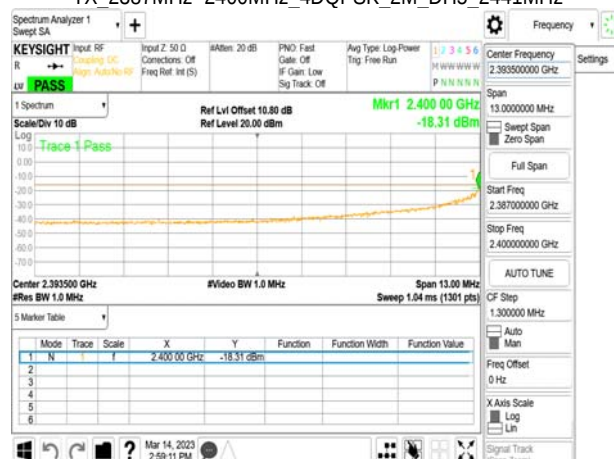
TX 30MHz~2387MHz_4DQPSK_2M_DH5_2441MHz



TX 2483.5MHz~2496.5MHz_GFSK_1M_DH5_2441MHz



TX 2387MHz~2400MHz_4DQPSK_2M_DH5_2441MHz



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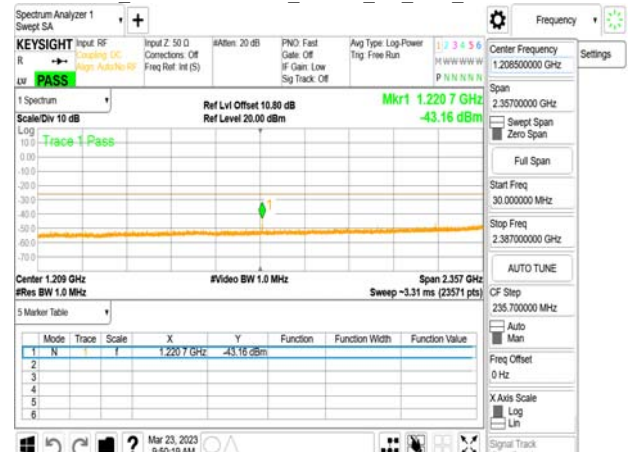
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TX 2387MHz~2400MHz_4DQPSK_2M_DH5_2441MHz Sample



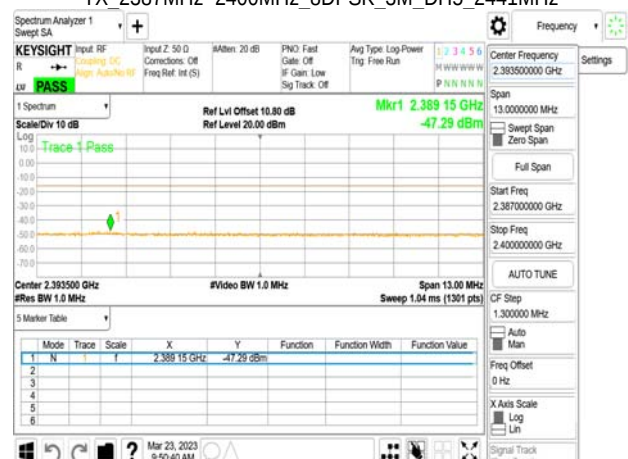
TX 30MHz~2387MHz_8DPSK_3M_DH5_2441MHz



TX 2483.5MHz~2496.5MHz_4DQPSK_2M_DH5_2441MHz



TX 2387MHz~2400MHz_8DPSK_3M_DH5_2441MHz



TX 2496.5MHz~12.5GHz_4DQPSK_2M_DH5_2441MHz



TX 2483.5MHz~2496.5MHz_8DPSK_3M_DH5_2441MHz



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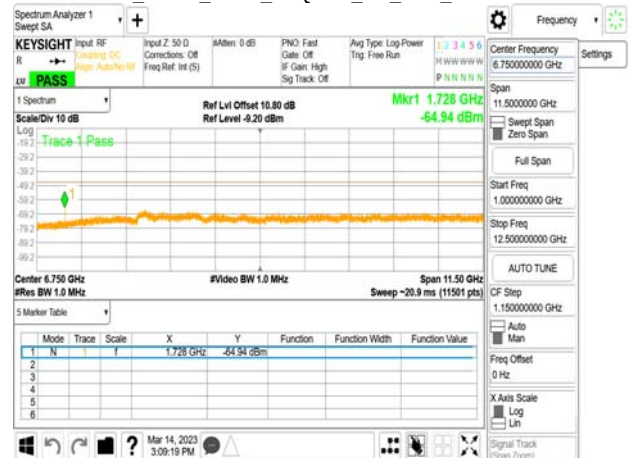
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RX_Below_1GHz_GFSK_1M_DH5_2441MHz



RX_Above_1GHz_4DQPSK_2M_DH5_2441MHz



RX_Above_1GHz_GFSK_1M_DH5_2441MHz



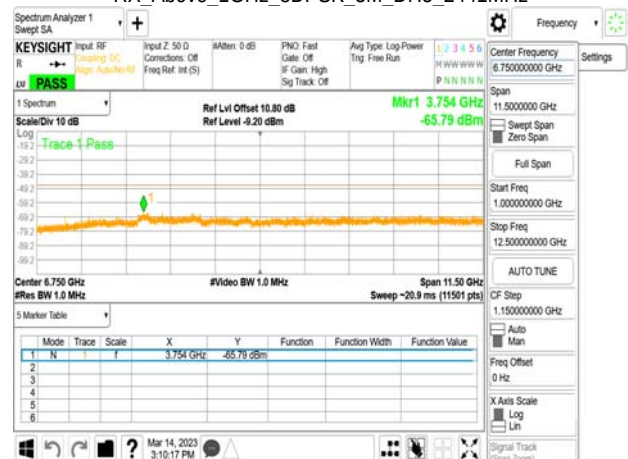
RX_Below_1GHz_8DPSK_3M_DH5_2441MHz



RX_Below_1GHz_4DQPSK_2M_DH5_2441MHz



RX_Above_1GHz_8DPSK_3M_DH5_2441MHz



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