

JAPAN MIC

Radio Test Report

FOR

Applicant: WILLCOM CO.,LTD.
2-11-2 FUKUURA KANAZAWA-KU
YOKOHAMA,KANAGAWA,JAPAN

Product Name: BLUETOOTH EARPHONE

Brand Name: N/A

Model No.: BT-110-01

Model Difference: N/A

Report Number: ER/2019/B0109

Issue Date: Jan. 09, 2020

Date of Test: Nov. 26, 2019 ~ Dec.11 , 2019

Date of EUT Received: Nov. 26, 2019

Place of Testing No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District,
New Taipei City, Taiwan 24803

Test Result PASS

Classification of Specified Radio Equipment Article 2 Clause 1 Item 19

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 SGS Japan Inc.

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.



Approved By:

Jazz Huang / Asst. Supervisor

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Revision History

Revision	Description	Issue Date	Remark
Rev.00	Original	Jan. 09, 2020	Revised by: Stefanie Yu

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1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

1.1 General information

General:

Product Name:	BLUETOOTH EARPHONE	
Brand Name:	N/A	
Model No.:	BT-110-01	
Model difference:	N/A	
Hardware Version:	N/A	
Software Version:	N/A	
Power Supply:	3.7Vdc from Rechargeable Li-Ion Battery or 5V from USB Cable	
	Battery:	Model No.: N/A, Supplier: N/A.

Type, frequency of
transmittable radio wave and
rated output

Bluetooth GFSK include AFH	F1D 2441MHz 0.000001 ~ 0.000002W/MHz
Bluetooth $\pi/4$ -DQPSK include AFH	G1D 2441MHz 0.000001 ~ 0.000003W/MHz

Antenna Designation

Antenna Type	Part Number	Supplier	Polarization (H or V)	Peak Gain (dBi)
Chip	WAN3216F245C0X	ONEWAVE	H	1.05

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1.2 Assemble

The housings are combined inaccessible by ultrasound. The plastic housing will be destroyed when trying to open.



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2 DESCRIPTION OF TEST

				Limit	Result	Note	
Environment of Test Room	Temperature	°C	24.5		$5 \leq x \leq 35$	PASS	
	Humidity	%	52		$45 \leq x \leq 85$	PASS	
Peak Antenna Gain		dBi	1.05		-----	-----	
Number of hopping channel		-----	79	20	-----	-----	
Rated output		mW/MHz	0.00100	0.00200	≤ 3 mW/MHz	PASS	
Rated output		dBm/MHz	-30.00	-26.99	≤ 4.77 dBm/MHz	PASS	
E.I.R.P.		dBm/MHz	-28.95	-25.94	≤ 6.91 dBm/MHz	PASS	
Tested Circuit Insertion Loss		dB	0.50	0.50	-----	-----	
Input Voltage		VDC	5.00		-----	-----	
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 $\pm 1\%$ as the input voltage from the external power supply to the receiver varies $\pm 10\%$ (excluding power supply).							

				Limit	Result	Note
Environment of Test Room	Temperature	°C	24.5		$5 \leq x \leq 35$	PASS
	Humidity	%	52		$45 \leq x \leq 85$	PASS
Peak Antenna Gain		dBi	1.05		-----	-----
Number of hopping channel		-----	79	20	-----	-----
Rated output		mW/MHz	0.00100	0.00300	≤ 3 mW/MHz	PASS
Rated output		dBm/MHz	-30.00	-25.23	≤ 4.77 dBm/MHz	PASS
E.I.R.P.		dBm/MHz	-28.95	-24.18	≤ 6.91 dBm/MHz	PASS
Tested Circuit Insertion Loss		dB	0.50	0.50	-----	-----
Input Voltage		VDC	5.00		-----	-----
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 $\pi/4$ -DQPSK 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).						

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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.

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4 MEASUREMENT EQUIPMENT LIST

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	Calibration Authority	LAST CAL.	Cal. Method
Power Meter	Anritsu	ML2496A	1804001	ETC	02/13/2019	c)
Power Sensor	Anritsu	MA2411B	1726104	ETC	02/13/2019	c)
Power Sensor	Anritsu	MA2411B	1726107	ETC	02/13/2019	c)
EXA Spectrum Analyzer	Agilent	N9010A	MY5042019 5	ETC	05/02/2019	c)
DC Block	Mini-Circuits	BLK-18-S+	1	SGS	01/02/2019	c)
Notebook	Lenovo	L430	R9-XFG0X	N/A	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:

GFSK_1M_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	2402.002	2441.0018		2480.002	-----	-----	
Frequency Tolerance		ppm	0.791007	0.73740		0.705645	-50≤x≤+50	PASS	
Occupied Bandwidth		MHz	-	78.275	19.519	-	≤83.5 MHz	PASS	
Spread Bandwidth		MHz	-	70.935	18.469	-	≥ 0.5 MHz	PASS	
Transmission Output Power	Calculated result	mW/MHz	-	0.00050	0.00194	-	≤ 3 mW/MHz	-----	
	Tolerance	%	-	-49.52	-3.05	-	-80≤x≤+20	PASS	
	Measured value	dBm	-	-14.460		-	-----	-----	
	On Time	msec	-	2.929		-	≤ 400 msec	PASS	
	Off Time	msec	-	0.827		-	-----	-----	
	Burst Ratio	%	-	78.0		-	-----	-----	
Unwanted Emission Strength	2387MHz Under	μW/MHz	-	0.019364		-	≤2.5uW/MHz	PASS	
		MHz	-	2385.23		-	-----	-----	
	2387-2400MHz	μW/MHz	-	0.503501		-	≤25uW/MHz	PASS	
		MHz	-	2398.48		-	-----	-----	
	2483.5-2496.5MHz	μW/MHz	-	0.119674		-	≤25uW/MHz	PASS	
		MHz	-	2483.93		-	-----	-----	
	2496.5MHz Over	μW/MHz	-	0.059293		-	≤2.5uW/MHz	PASS	
		MHz	-	4922.35		-	-----	-----	
Secondarily Emitted Radio Wave Strength (RX Spurious)	1GHz Under	nW	-	0.009036		-	≤ 4 nW	PASS	
		MHz	-	103.24		-	-----	-----	
	1GHz Over	nW	-	0.359749		-	≤ 20 nW	PASS	
		MHz	-	2674		-	-----	-----	
	Tested Circuit Insertion Loss for RX Spurious								1
Spread Factor		-----	-	70.9	18.47	-	≥5	PASS	
Dwell Time		mSec	-	280.08		-	≤400 msec	PASS	
Interference Prevention Function		-----	-	good		-	-----	PASS	

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$\pi/4$ DQPSK_2M_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	2402.002	2441.00176		2480.002	----	----	
Frequency Tolerance		ppm	0.720233	0.72102		0.721774	-50≤x≤+50	PASS	
Occupied Bandwidth		MHz	-	78.305	19.520	-	≤83.5 MHz	PASS	
Spread Bandwidth		MHz	-	70.707	18.388	-	≥ 0.5 MHz	PASS	
Transmission Output Power	Calculated result	mW/MHz	-	0.00087	0.00335	-	≤3 mW/MHz	----	
	Tolerance	%	-	-13.00	11.52	-	-80≤x≤+20	PASS	
	Measured value	dBm	-	-12.11		-	----	----	
	On Time	msec	-	2.929		-	≤400 msec	PASS	
	Off Time	msec	-	0.814		-	----	----	
	Burst Ratio	%	-	78.3		-	----	----	
Unwanted Emission Strength	2387MHz Under	μW/MHz	-	0.018793		-	≤2.5uW/MHz	PASS	
		MHz	-	2344.57		-	----	----	
	2387-2400MHz	μW/MHz	-	0.598412		-	≤25uW/MHz	PASS	
		MHz	-	2399.61		-	----	----	
	2483.5-2496.5MHz	μW/MHz	-	0.132434		-	≤25uW/MHz	PASS	
		MHz	-	2483.62		-	----	----	
	2496.5MHz Over	μW/MHz	-	0.056234		-	≤2.5uW/MHz	PASS	
		MHz	-	4822.31		-	----	----	
Secondarily Emitted Radio Wave Strength (RX Spurious)	1GHz Under	nW	-	0.007925		-	≤ 4 nW	PASS	
		MHz	-	47.95		-	----	----	
	1GHz Over	nW	-	0.420727		-	≤ 20 nW	PASS	
		MHz	-	2672.5		-	----	----	
	Tested Circuit Insertion Loss for RX Spurious								1
Spread Factor		-----	-	70.7	18.39	-	≥5	PASS	
Dwell Time		mSec	-	280.15		-	≤400 msec	PASS	
Interference Prevention Function		-----	-	good		-	----	PASS	

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VOLTAGE VARIATION

Voltage Fluctuation Test	Normal Voltage	High Voltage + 10% of Normal Voltage	Low Voltage - 10% of Normal Voltage
Input DC Power	5	5.5	4.5
Output DC Power	3.3	3.311	3.3
Voltage Variation (%)	0	0.33	0.00
Note: Voltage Variation (%) = (Output High or Low Voltage - Output Normal Voltage)/Output Normal Voltage X 100			
During the input supply voltage to the EUT from the external power source is varied by +/- 10%, if output voltage had been confirmed that the fluctuation of power supply to the RF circuit of EUT (excluding power source) is equal to or less than +/- 1%. Exempt extremely high and low supply voltage condition tests, EUT only operated in normal voltage to test all regulations.			

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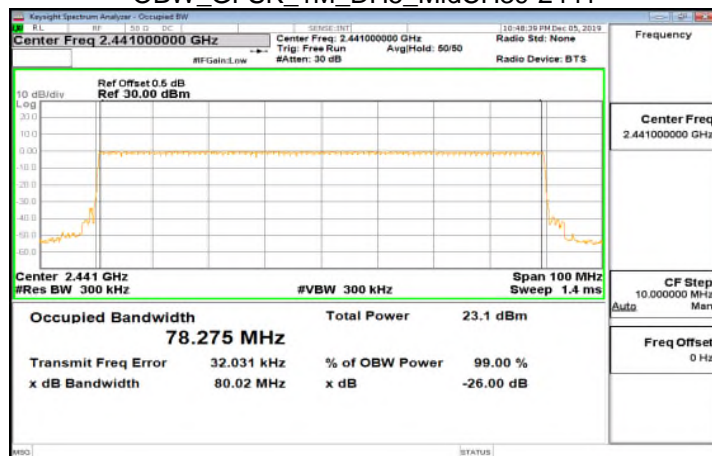
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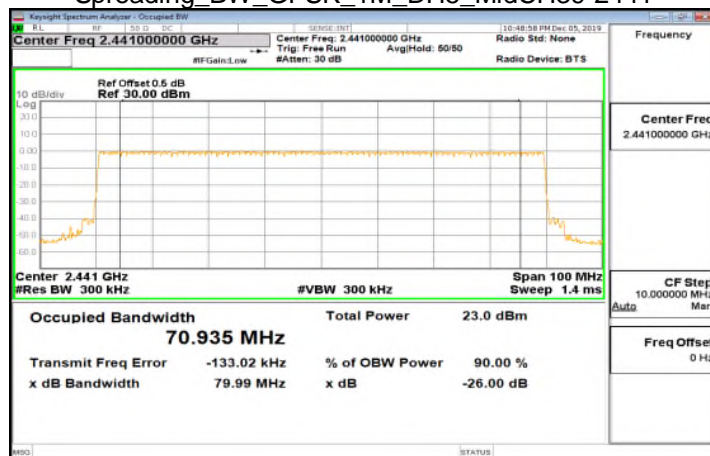
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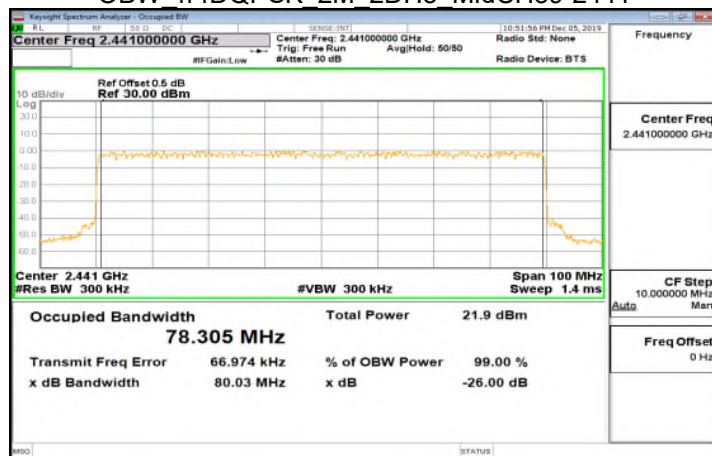
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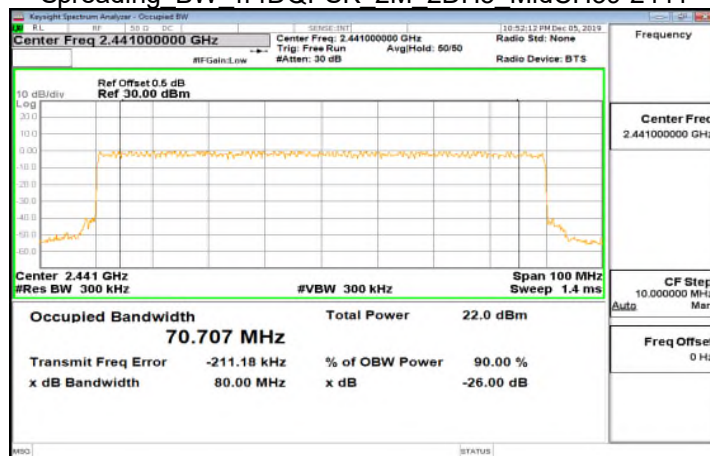
Spreading BW_GFSK_1M_DH5_MidCH39-2441



OBW π 4DQPSK_2M_2DH5_MidCH39-2441



Spreading BW π 4DQPSK_2M_2DH5_MidCH39-2441

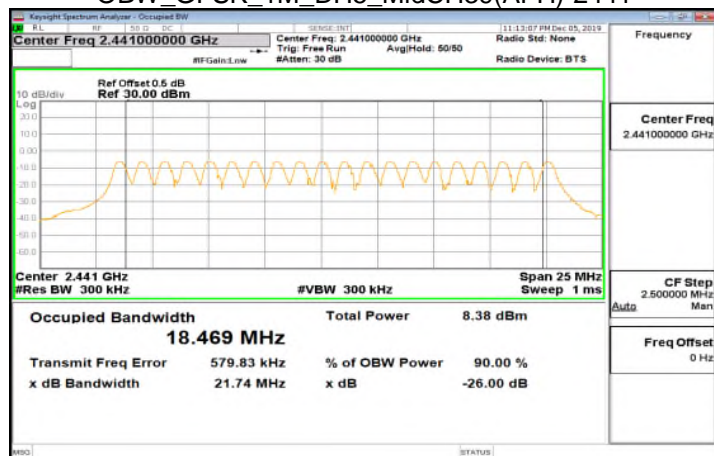


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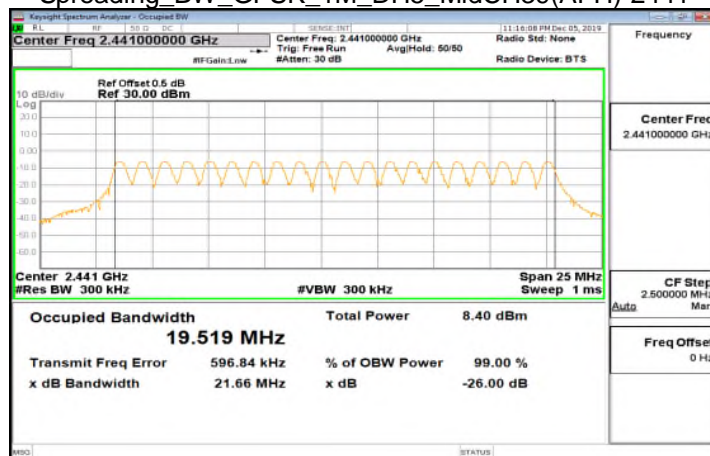
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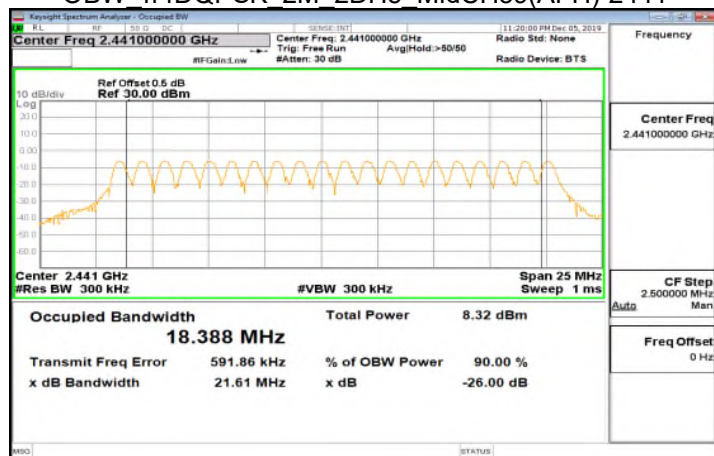
OBW_GFSK_1M_DH5_MidCH39(AFH)-2441



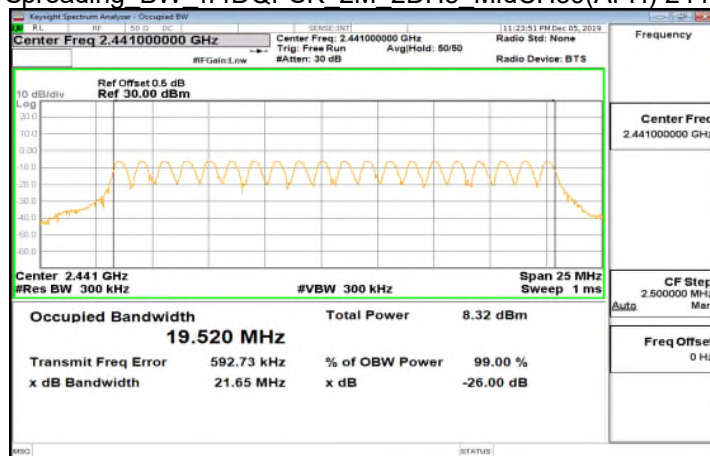
Spreading BW_GFSK_1M_DH5_MidCH39(AFH)-2441



OBW_π4DQPSK_2M_2DH5_MidCH39(AFH)-2441



Spreading BW_π4DQPSK_2M_2DH5_MidCH39(AFH)-2441

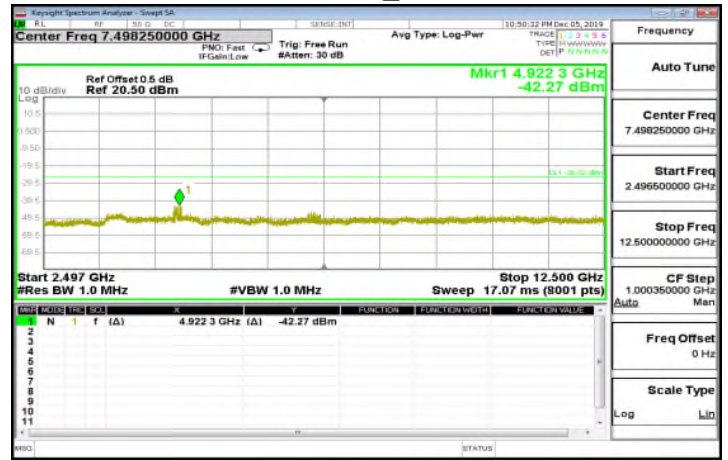
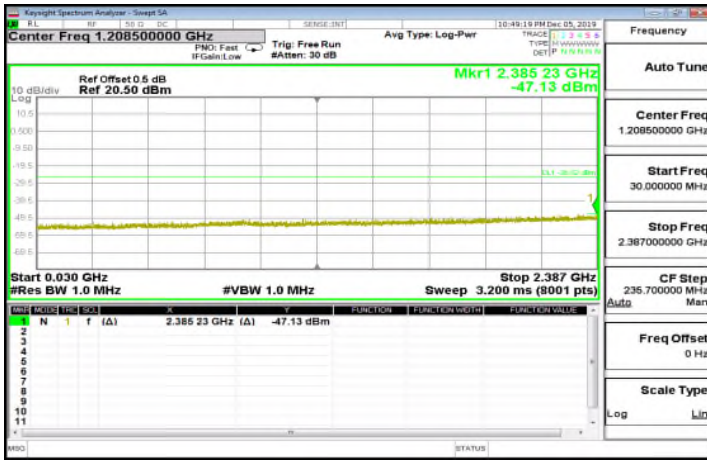


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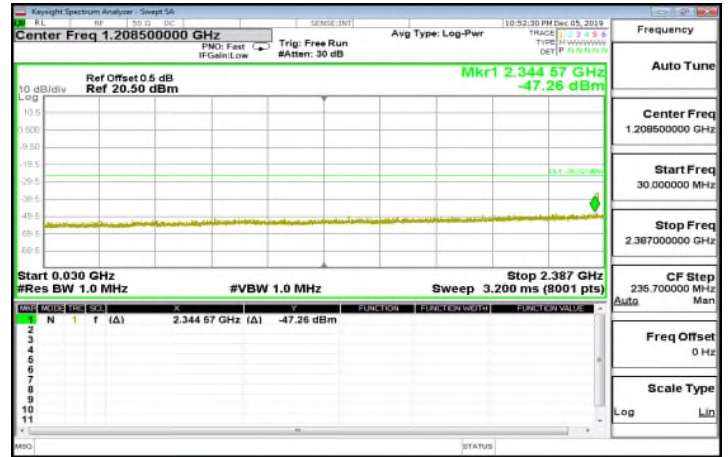
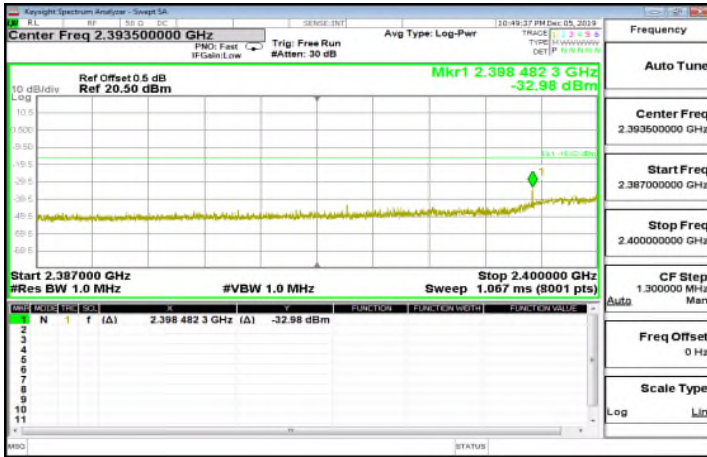
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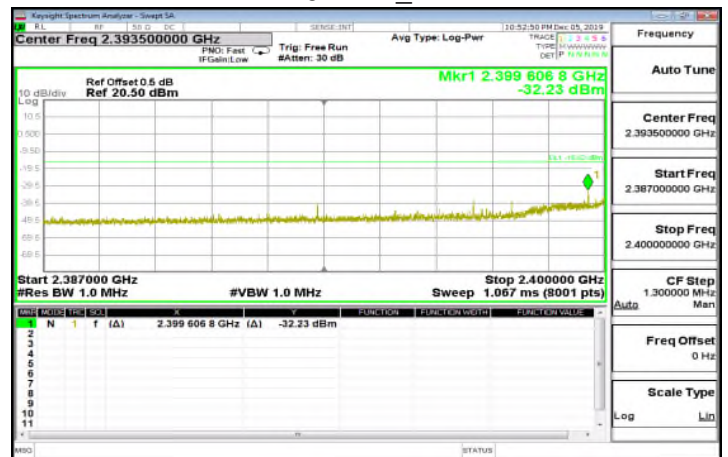
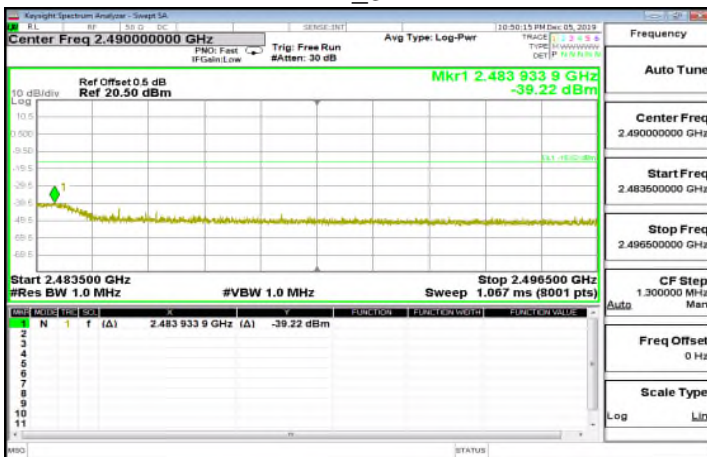
TX_30MHz~1000MHz_GFSK_1M_DH5_MidCH39-2441_TX_2483.5MHz~2496.5MHz_GFSK_1M_DH5_MidCH39-2441_4



TX_1000MHz~2387MHz_GFSK_1M_DH5_MidCH39-244 TX_30MHz~1000MHz_π4DQPSK_2M_2DH5_MidCH39-2441_1



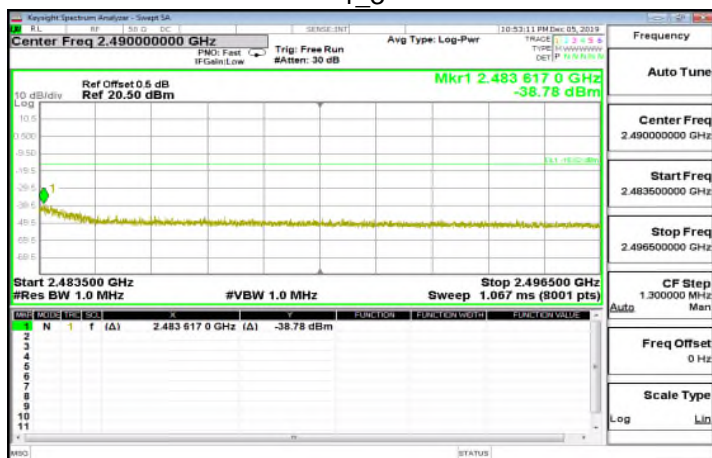
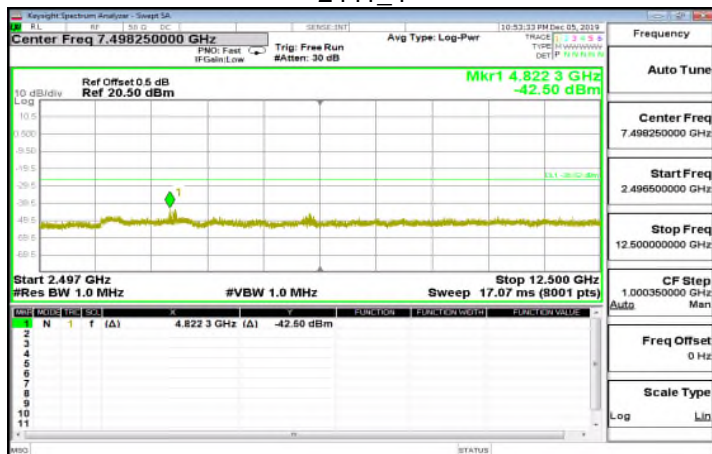
TX_2387MHz~2400MHz_GFSK_1M_DH5_MidCH39-244 TX_1000MHz~2387MHz_π4DQPSK_2M_2DH5_MidCH39-2441_2



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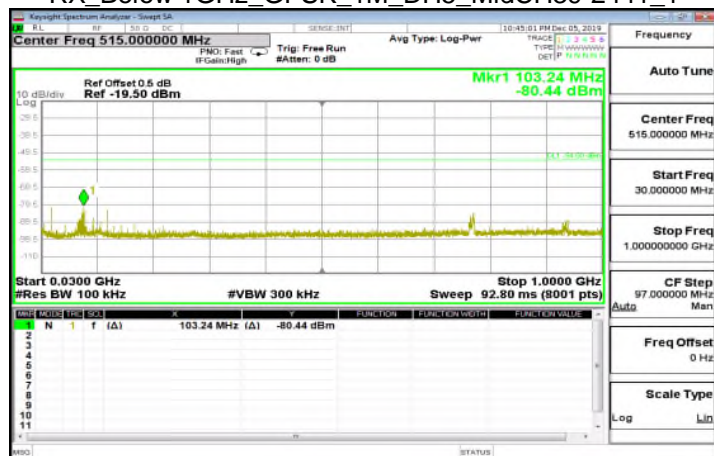
TX_2387MHz~2400MHz_π4DQPSK_2M_2DH5_MidCH39-244
1_3TX_2483.5MHz~2496.5MHz_π4DQPSK_2M_2DH5_MidCH39-
2441_4

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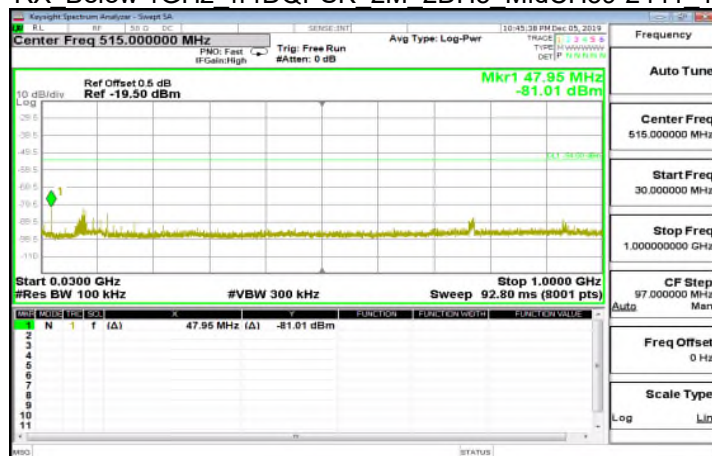
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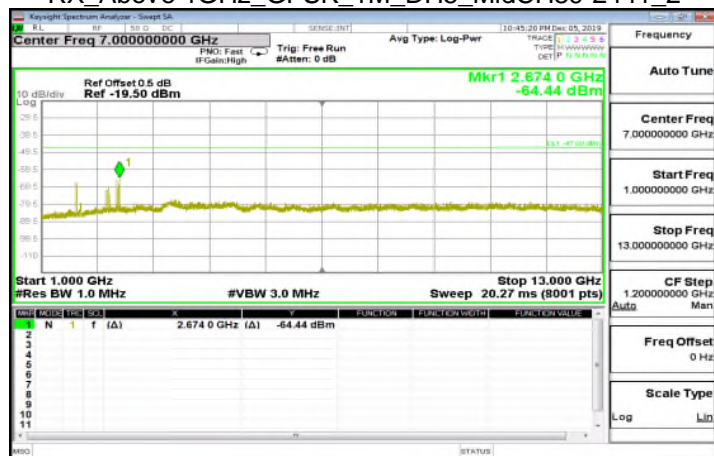
RX_Below 1GHz_GFSK_1M_DH5_MidCH39-2441_1



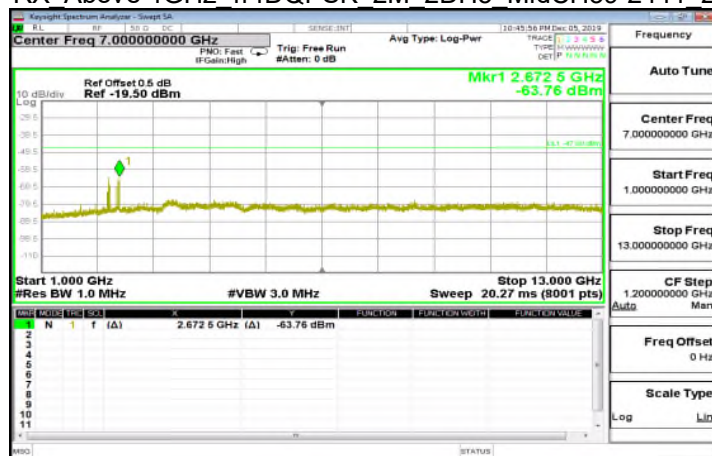
RX_Below 1GHz_π4DQPSK_2M_2DH5_MidCH39-2441_1



RX_Above 1GHz_GFSK_1M_DH5_MidCH39-2441_2



RX_Above 1GHz_π4DQPSK_2M_2DH5_MidCH39-2441_2



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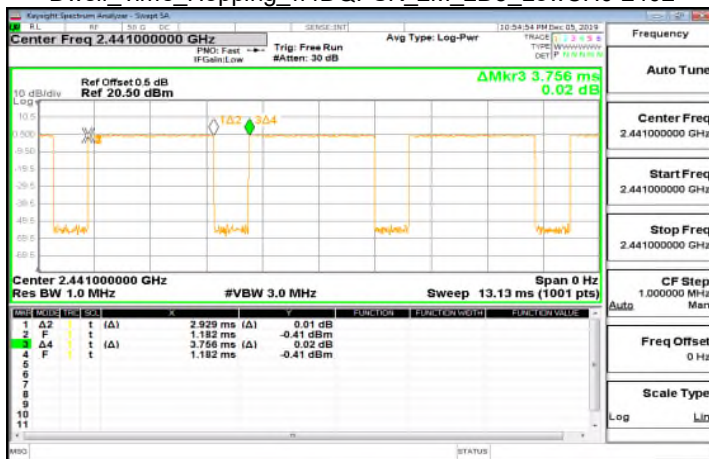
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Dwell Time Hopping_GFSK_1M_DH5_MidCH39-2441



Dwell Time Hopping_π4DQPSK_2M_2D5_LowCH0-2402

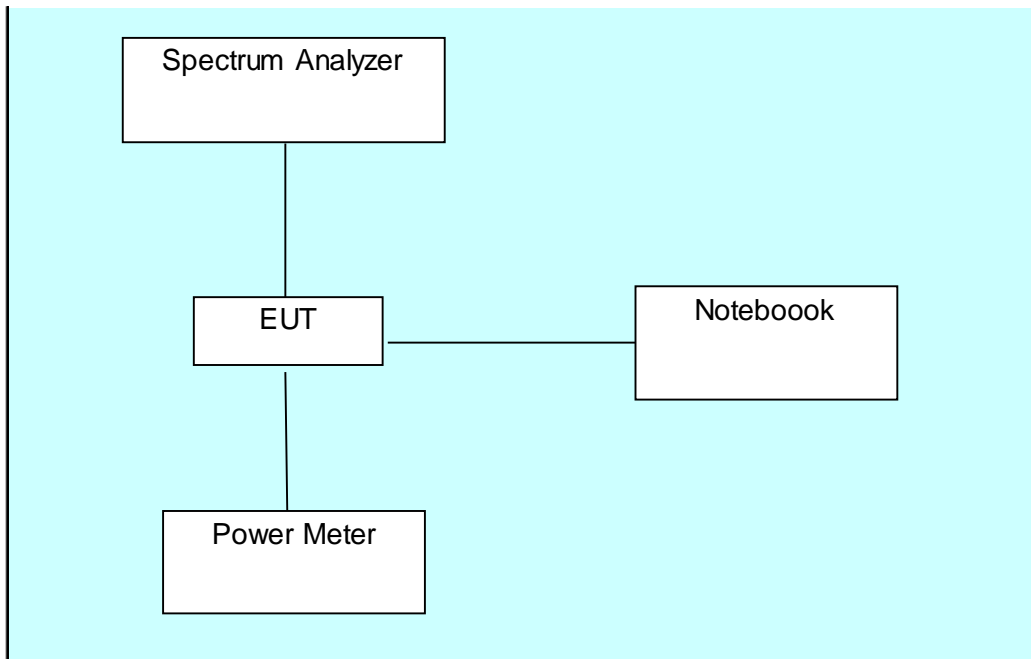


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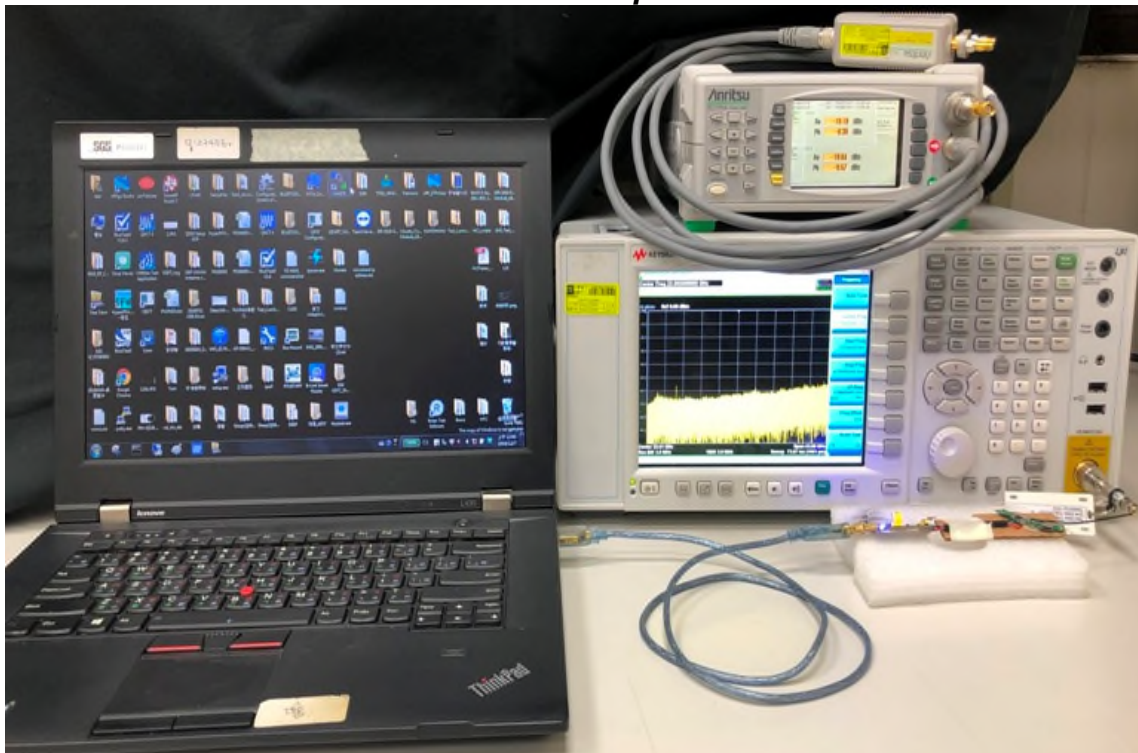
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PHOTOGRAPHS OF SET UP



Test Setup



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~ End of Report ~

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