

FCC Test Report

Report No.: AGC02390201203FE02

FCC ID : 2ABRU-RFM208P24

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION: Multi-Band Wireless Module with PA

BRAND NAME : BDE

MODEL NAME : BDE-RFM208P-2.4

APPLICANT: Guangzhou BDE Technology Inc.

DATE OF ISSUE : Apr. 23, 2021

STANDARD(S) : FCC Part 15.247

REPORT VERSION: V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Apr. 23, 2021	Valid	Initial Release

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1. VERIFICATION OF COMPLIANCE

Applicant	Guangzhou BDE Technology Inc.	
Address	B2-403, Chuangyi Building, 162 Science Avenue, Huangpu District, Guangzhou 510663, China	
Manufacturer	Guangzhou BDE Technology Inc.	
Address	B2-403, Chuangyi Building, 162 Science Avenue, Huangpu District, Guangzhou 510663, China	
Factory	Guangzhou BDE Technology Inc.	
Address	B2-403, Chuangyi Building, 162 Science Avenue, Huangpu District, Guangzhou 510663, China	
Product Designation	Multi-Band Wireless Module with PA	
Brand Name	BDE	
Test Model	BDE-RFM208P-2.4	
Date of test	Dec. 29, 2020 to Apr. 23, 2021	
Deviation	No any deviation from the test method	
Condition of Test Sample	Normal	
Test Result	Pass	
Report Template	AGCRT-US-BLE/RF	

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC part 15.247.

Prepared By	Eddy Lin	
	Eddy Liu (Project Engineer)	Apr. 23, 2021
Reviewed By	Max 2hang	
GC C	Max Zhang (Reviewer)	Apr. 23, 2021
Approved By	Formerlies	
SOC -	Forrest Lei (Authorized Officer)	Apr. 23, 2021

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as a "Multi-Band Wireless Module with PA". It is designed by way of utilizing the GFSK technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480GHz	
RF Output Power	4.622dBm (Max) For LE Coded PHY with S=8 coding 14.139dBm (Max) For LE Coded PHY with S=2 coding 14.139dBm (Max) For LE 1M PHY 11.074dBm (Max) For LE 2M PHY	
Bluetooth Version V5.0		
Modulation	BR □GFSK, EDR □π /4-DQPSK, □8DPSK BLE □GFSK 125kbps□GFSK 500 kbps □GFSK 1Mbps □GFSK 2M	
Number of channels	40 Channels	
Antenna Designation PCB Antenna (Comply with requirements of the FCC part 15.203)		
Antenna Gain	2.9dBi	
Hardware Version	V1.0	
Software Version V1.0		
Power Supply	DC 3.3V	
Note: 1. The EUT doesn't su 2. All of the models a	re tested and the main model test data recorded in this report.	

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency	
	0	2402 MHz	
	1 _ 6	2404 MHz	
2400~2483.5MHz			
	38	2478 MHz	
	39	2480 MHz	

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2.3. RELATED SUBMITTAL(S)/GRANT(S)

This submittal(s) (test report) is intended for **FCC ID: 2ABRU-RFM208P24** filing to comply with the FCC Part 15.247 requirements.

2.4. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

2.5. SPECIAL ACCESSORIES

Refer to section 5.2.

2.6. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2.7. ANTENNA REQUIREMENT

This intentional radiator is designed with a permanently attached antenna of an antenna to ensure that no antenna other than that furnished by the responsible party shall be used with the device. For more information of the antenna, please refer to the APPENDIX B: PHOTOGRAPHS OF EUT.

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3. MEASUREMENT UNCERTAINTY

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

- Uncertainty of Conducted Emission, Uc = ±3.1 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±4.0 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB
- Uncertainty of total RF power, conducted, Uc = ±0.8 dB
- Uncertainty of RF power density, conducted, Uc = ±2.6 dB
- Uncertainty of spurious emissions, conducted, $Uc = \pm 2.7 dB$
- Uncertainty of Occupied Channel Bandwidth: Uc = ±2 %

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4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION			
1	Low channel TX(2402MHz)			
2	Middle channel TX(2440MHz)			
3	High channel TX(2480MHz)			

Note:

- 1. Only the result of the worst case was recorded in the report, if no other cases.
- 2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
- 3. For Conducted Test method, a temporary antenna connector is provided by the manufacture.

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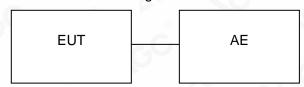


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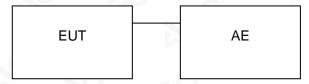
5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF TESTED SYSTEM

Radiated Emission Configure:



Conducted Emission Configure:



5.2. EQUIPMENT USED IN TESTED SYSTEM

Item	Equipment	Model No. ID or Specification		Remark	
1	Multi-Band Wireless Module with PA	BDE-RFM208P-2.4	2ABRU-RFM208P24	EUT	
2	PC	N/A	N/A	AE	
3	Control board	CC2642R1/CC2652R1	DC 3.3V	AE	

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT	
15.247 (b)(3)	Peak Output Power	Compliant	
15.247 (a)(2)	6 dB Bandwidth	Compliant	
15.247 (d)	Conducted Spurious Emission	Compliant	
15.247 (e)	Maximum Conducted Output Power Density	Compliant	
15.209 Radiated Emission		Compliant	
15.207 Conducted Emission		Compliant	

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6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd		
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China		
Designation Number	CN1259		
FCC Test Firm Registration Number	975832		
A2LA Cert. No.	5054.02		
Description	Attestation of Global Compliance (Shenzhen) Co., Ltd is accredited by A2LA		

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	May 15, 2020	May 14, 2021
LISN	R&S	ESH2-Z5	100086	Jul. 03, 2020	Jul. 02, 2021
Test software	R&S	ES-K1(Ver.V1.71)	N/A	N/A	N/A

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2020	May 14, 2021
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 07, 2020	Dec. 06, 2021
2.4GHz Filter	EM Electronics	2400-2500MHz	N/A	Mar. 23, 2020	Mar. 22, 2022
Attenuator	ZHINAN	E-002	N/A	Sep. 03, 2020	Sep. 02, 2022
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep. 21, 2019	Sep. 20, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May 17, 2019	May 16, 2021
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 03, 2020	Sep. 02, 2022
ANTENNA	SCHWARZBECK	VULB9168	494	Sep. 20, 2019	Sep. 19, 2021
Test software	Tonscend	JS32-RE (Ver.2.5)	N/A	N/A	N/A

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7. PEAK OUTPUT POWER

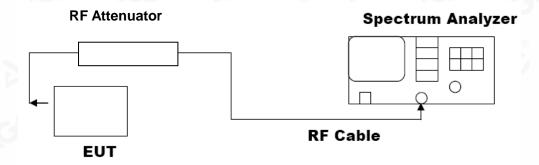
7.1. MEASUREMENT PROCEDURE

For peak power test:

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. RBW ≥ DTS bandwidth
- 3. VBW≥3*RBW.
- 4. SPAN≥VBW.
- 5. Sweep: Auto.
- 6. Detector function: Peak.
- 7. Trace: Max hold.

Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) PEAK POWER TEST SETUP



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a/Inspection The test results he test report.

7.3. LIMITS AND MEASUREMENT RESULT 125kbps

PEAK OUTPUT POWER MEASUREMENT RESULT				
FOR GFSK MOUDULATION Frequency Peak Power (dBm) (dBm) Pass or Fail				
2.402	4.622	30	Pass	
2.440	4.442	30	Pass	
2.480	4.155	30	Pass	

CH₀



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CH19



CH39



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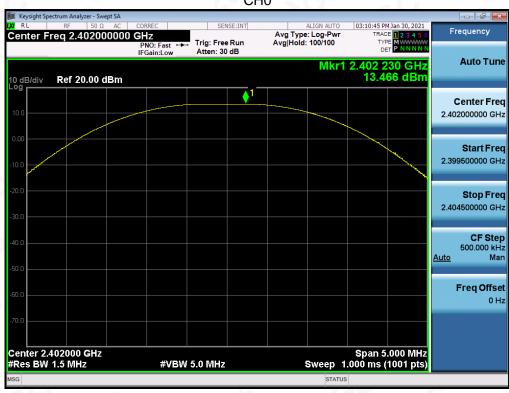


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500kbps

PEAK OUTPUT POWER MEASUREMENT RESULT				
	FOR GFSK MOUL	DULATION		
Frequency (GHz) Peak Power (dBm) Applicable Limits (dBm) Pass or Fai				
2.402	13.466	30	Pass	
2.440	14.000	30	Pass	
2.480	14.139	30	Pass	

CH₀



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CH19



CH39



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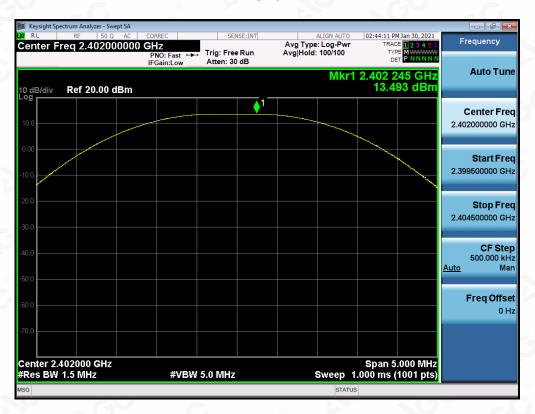
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he test results the test report.

1M

PEAK OUTPUT POWER MEASUREMENT RESULT					
	FOR GFSK MOUDULATION				
Frequency Peak Power Applicable Limits (GHz) (dBm) Pass or Fail					
2.402	13.493	30	Pass		
2.440	13.998	30	Pass		
2.480	14.139	30	Pass		

CH₀



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CH19



CH39



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2M

PEAK OUTPUT POWER MEASUREMENT RESULT FOR GFSK MOUDULATION Frequency Peak Power Applicable Limits			
2.402	10.686	30	Pass
2.440	11.074	30	Pass
2.480	10.971	30	Pass

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CH19



CH39



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8. 6 DB BANDWIDTH

8.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 kHz, VBW ≥ 3×RBW.
- 4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 for compliance to FCC PART 15.247 requirements.

8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 7.2.

8.3. LIMITS AND MEASUREMENT RESULTS

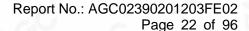
125kbps

LIMITS AND MEASUREMENT RESULT				
Applicable Limits				
Applicable Limits	Test Data (kHz)		Criteria	
>500KHZ	Low Channel	598.5	PASS	
	Middle Channel	604.3	PASS	
	High Channel	612.6	PASS	

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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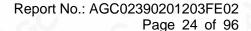
500kbps

LIMITS AND MEASUREMENT RESULT				
Anniharbia Limita	Applicable Limits			
Applicable Limits	Test Data	Test Data (kHz)		
>500KHZ	Low Channel	678.2	PASS	
	Middle Channel	676.3	PASS	
	High Channel	666.4	PASS	

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the Bedicated Festivo/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written portorization of AGC the test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15day after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc@agc-cert.com.



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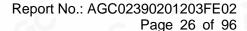
1M

LIMITS AND MEASUREMENT RESULT				
Annliaghla Limita	Applicable Limits			
Applicable Limits	Test Data (kHz)		Criteria	
>500KHZ	Low Channel	702.7	PASS	
	Middle Channel	705.5	PASS	
	High Channel	688.3	PASS	

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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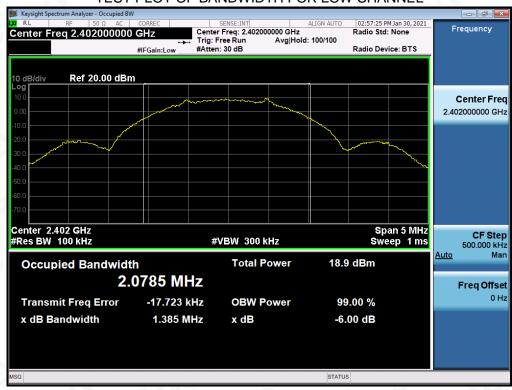


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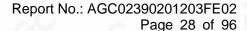
2M

LIMITS AND MEASUREMENT RESULT				
Applicable Limite	Applicable Limits			
Applicable Limits	Test Data (kHz) Criteria			
>500KHZ	Low Channel	1384.8	PASS	
	Middle Channel	1440.1	PASS	
	High Channel	1361.5	PASS	

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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9. CONDUCTED SPURIOUS EMISSION

9.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 for compliance to FCC PART 15.247 requirements.

9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 7.2.

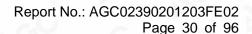
9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.

9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT				
Measurement Result				
Applicable Limits	Test Data	Criteria		
In any 100 kHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power.	At least -20dBc than the reference level	PASS		

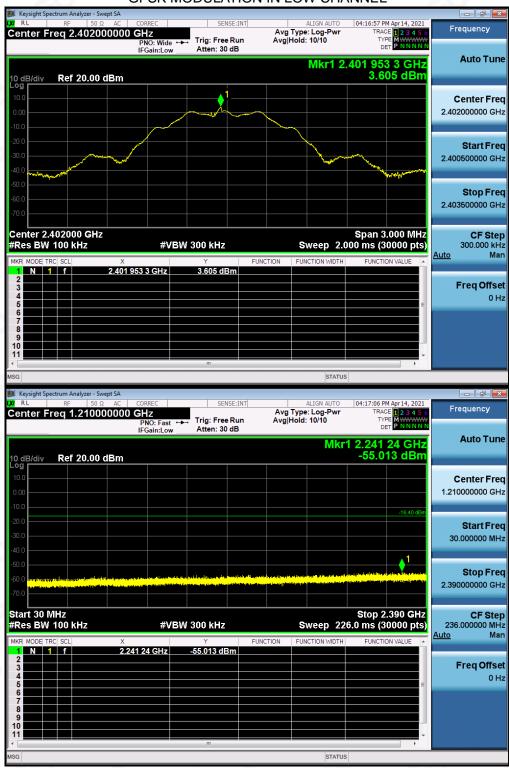
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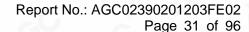


TEST RESULT FOR ENTIRE FREQUENCY RANGE 125kbps

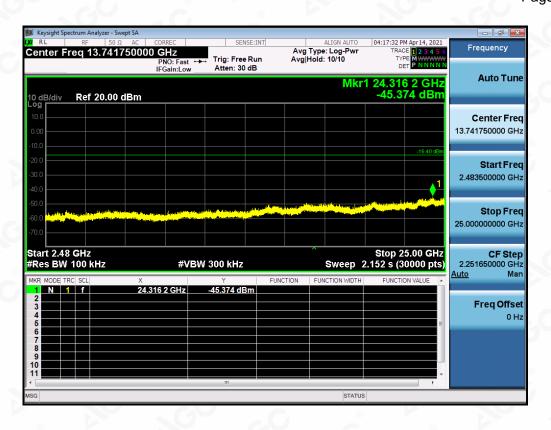
GFSK MODULATION IN LOW CHANNEL



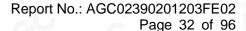
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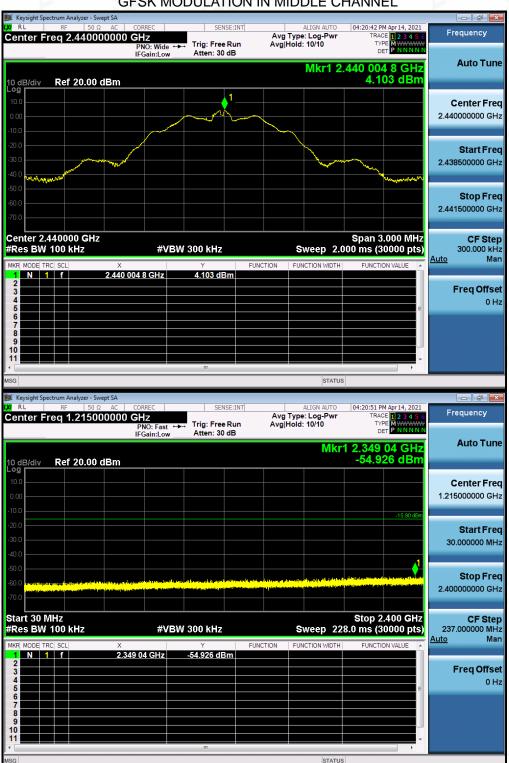


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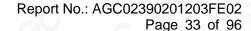




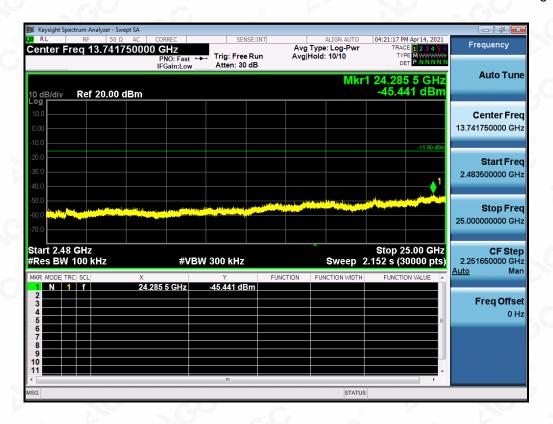
GFSK MODULATION IN MIDDLE CHANNEL



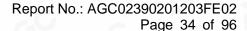
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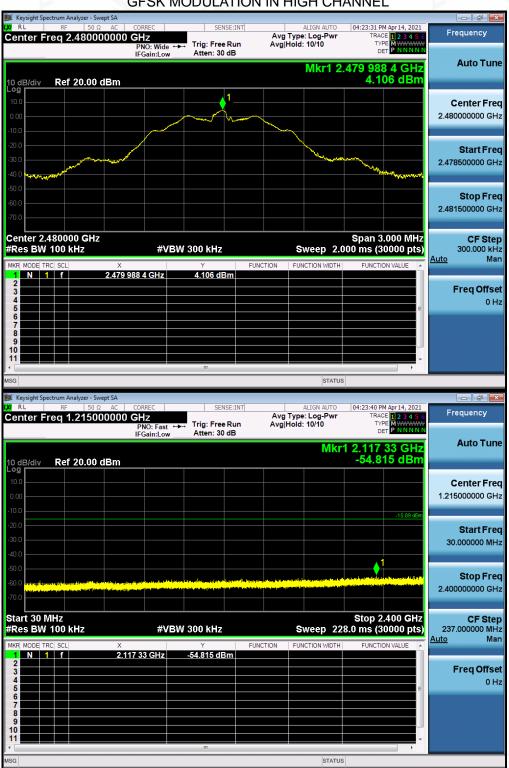


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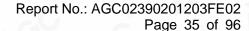




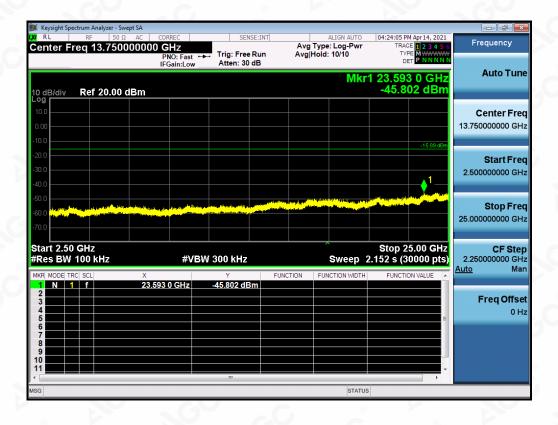
GFSK MODULATION IN HIGH CHANNEL



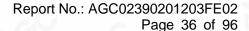
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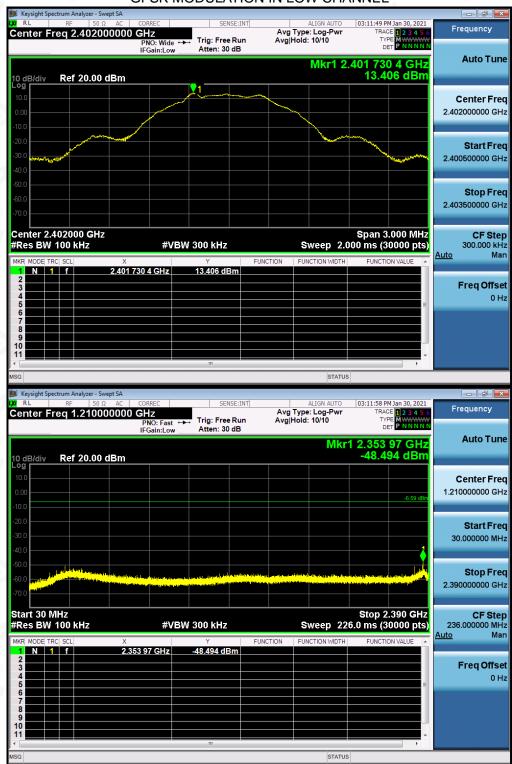


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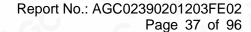




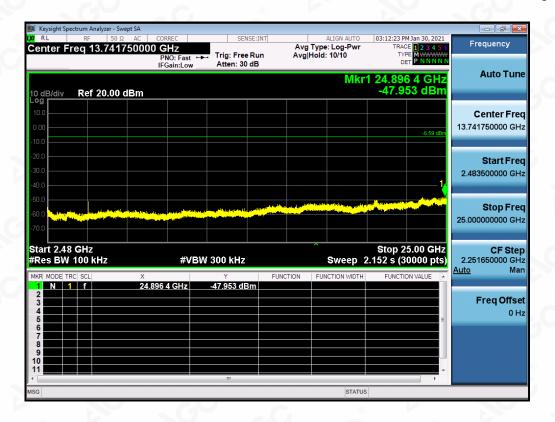
500kbpsGFSK MODULATION IN LOW CHANNEL

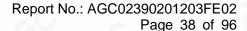


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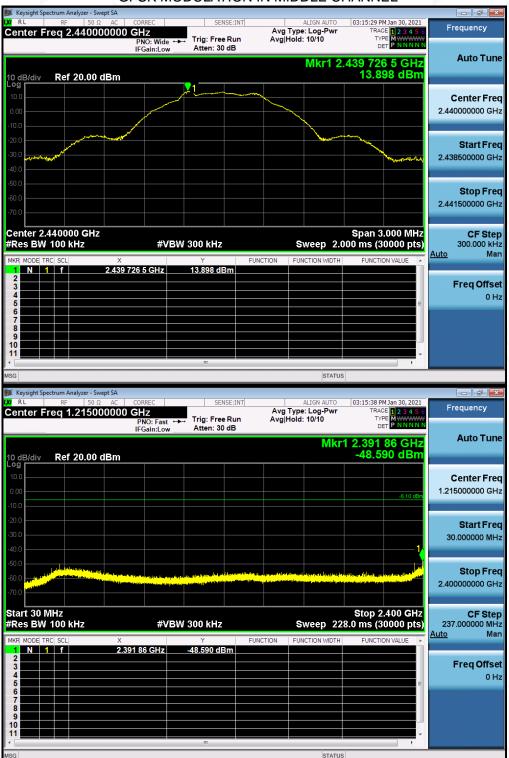


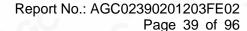




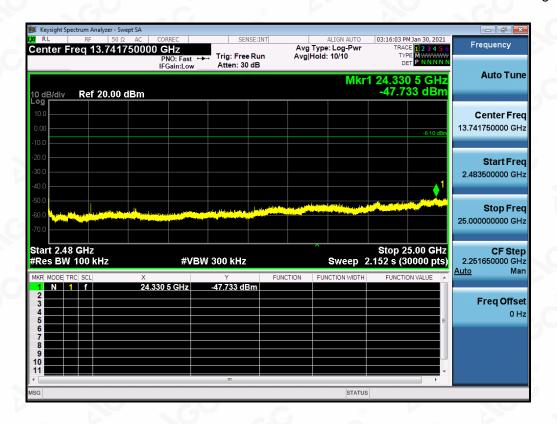


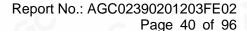
GFSK MODULATION IN MIDDLE CHANNEL





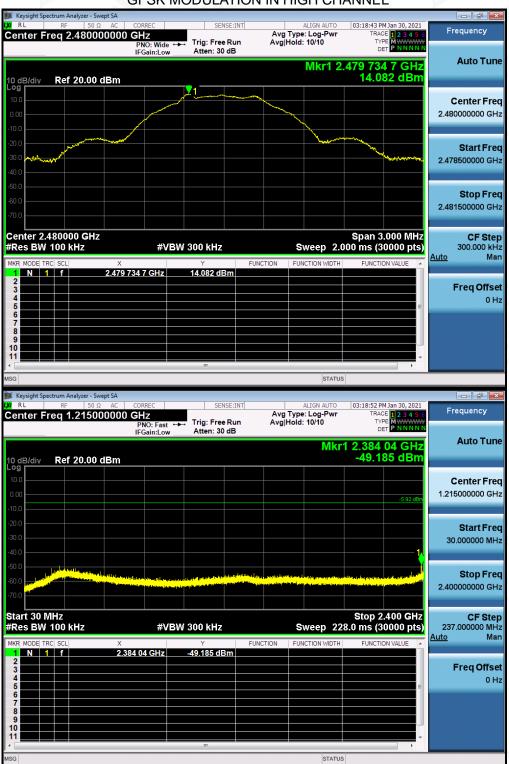


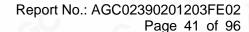




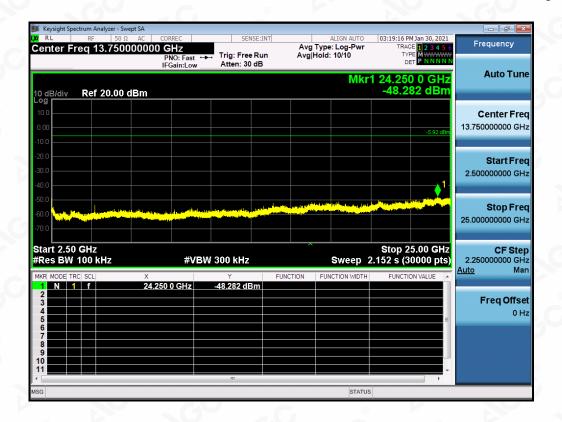


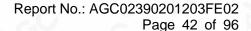
GFSK MODULATION IN HIGH CHANNEL





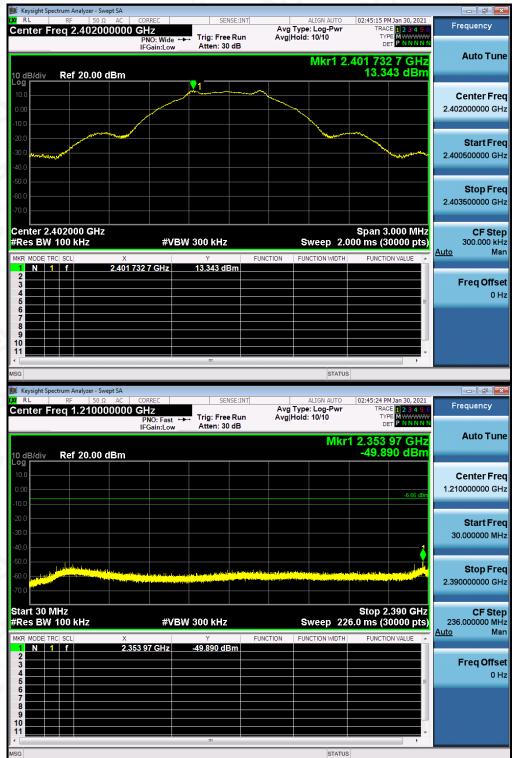


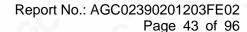




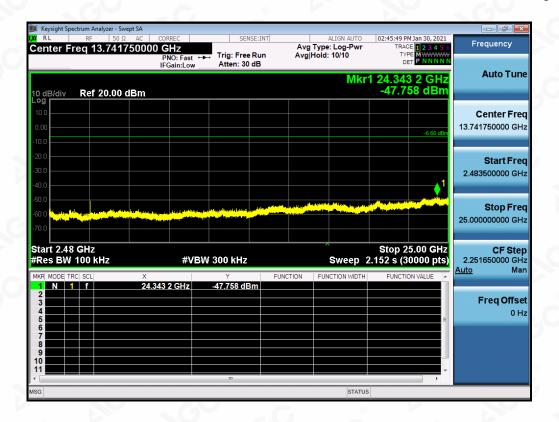


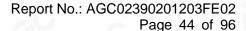
1**M**GFSK MODULATION IN LOW CHANNEL





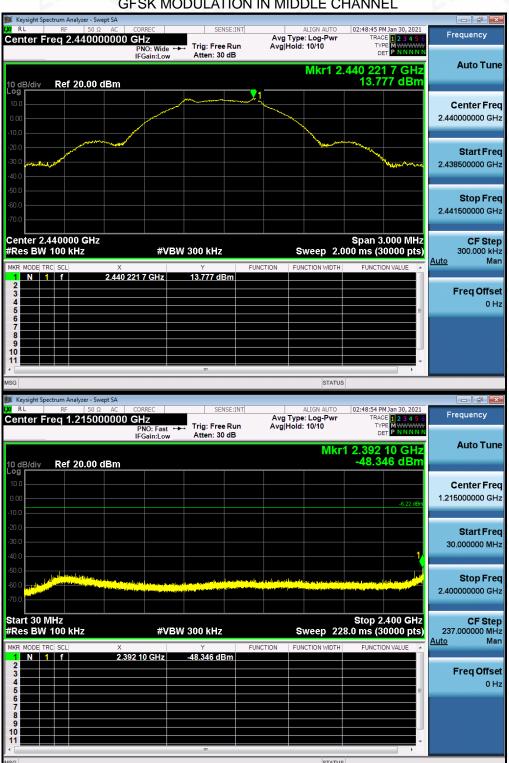


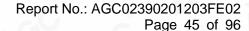




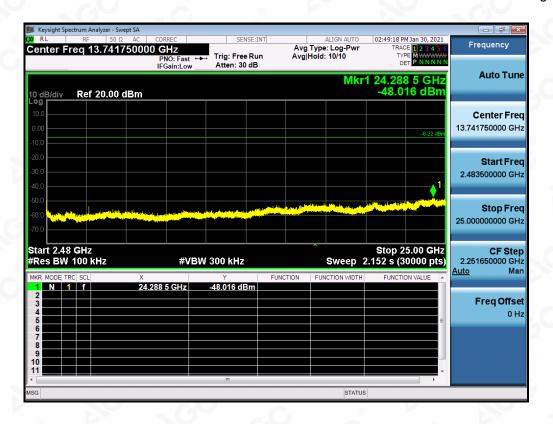


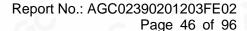
GFSK MODULATION IN MIDDLE CHANNEL





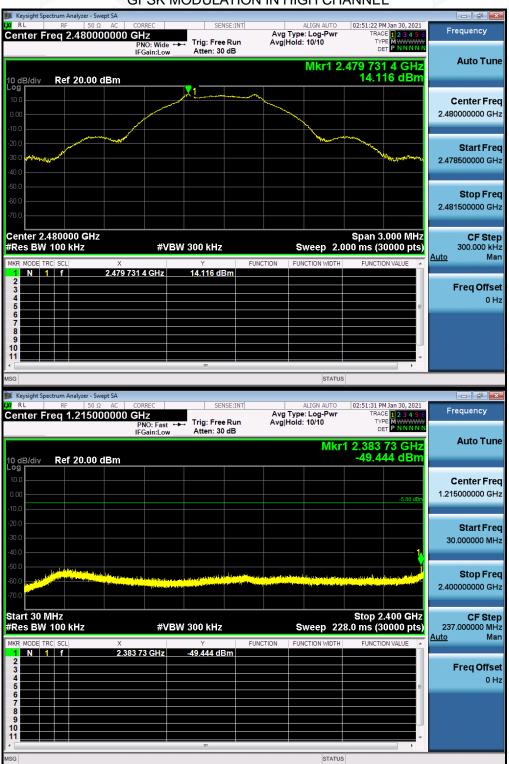


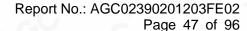




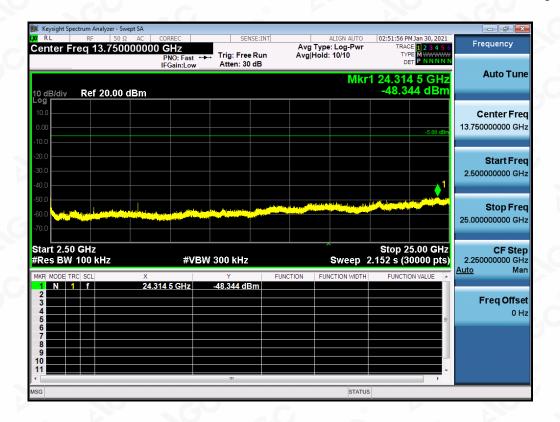


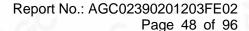
GFSK MODULATION IN HIGH CHANNEL





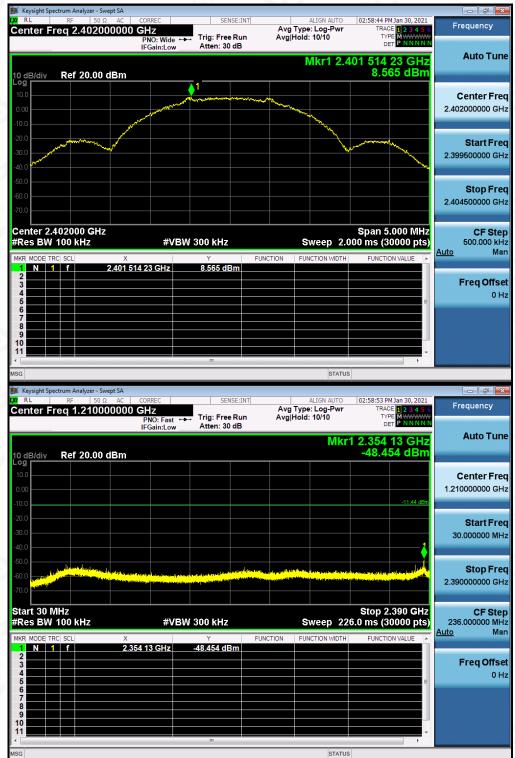


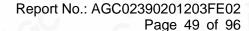






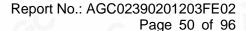
2MGFSK MODULATION IN LOW CHANNEL





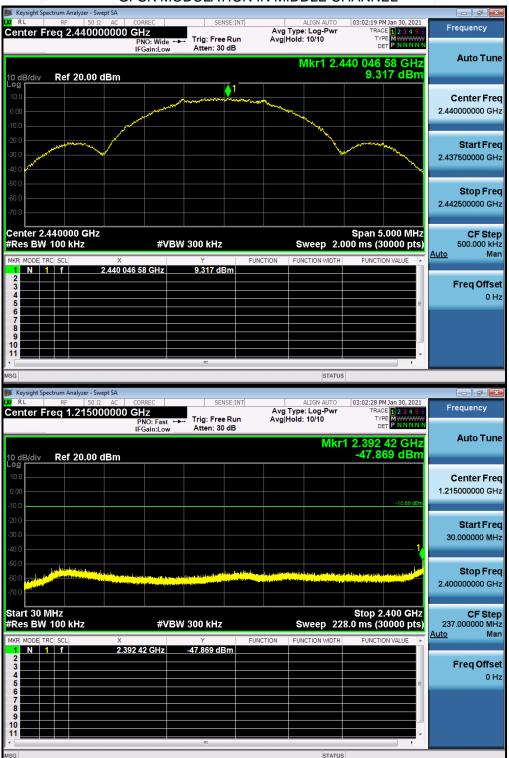


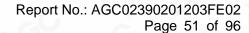




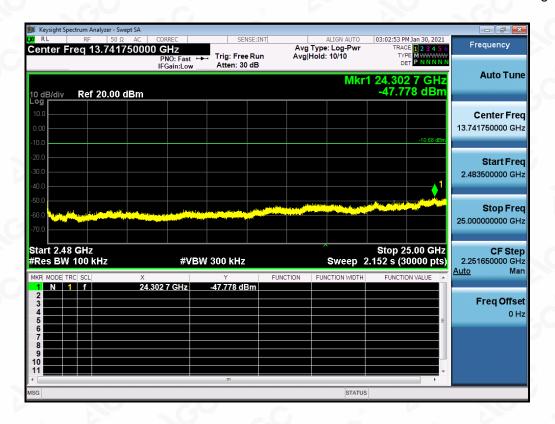


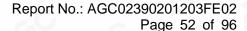
GFSK MODULATION IN MIDDLE CHANNEL













GFSK MODULATION IN HIGH CHANNEL

