

# **FCC Test Report**

Report No.: AGC02390201202FE02

FCC ID : 2ABRU-RFM207P

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION: Multi-Protocol Wireless Module with PA

**BRAND NAME** : BDE

**MODEL NAME** : BDE-RFM207P

**APPLICANT**: Guangzhou BDE Technology Inc.

**DATE OF ISSUE** : Apr. 16, 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. 16, 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-Protocol Wireless Module with PA		
Brand Name	BDE		
Test Model	BDE-RFM207P		
Date of test	Dec. 08, 2020 to Apr. 16, 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 Liu	
	Eddy Liu Project Engineer	Apr. 16, 2021
Reviewed By	Max 2 hang	
200 a	Max Zhang Reviewer	Apr. 16, 2021
Approved By	Formesties	
	Forrest Lei Authorized Officer	Apr. 16, 2021

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# 2. GENERAL INFORMATION

#### 2.1. PRODUCT DESCRIPTION

The EUT is designed as a "Multi-Protocol 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	4.485dBm (Max) For BLE 125KHz 16.497dBm (Max) For BLE 500KHz 16.776dBm (Max) For BLE 1M 17.664dBm (Max) For BLE 2M	
Bluetooth Version	V5.0	
Modulation	BR □GFSK, EDR □π /4-DQPSK, □8DPSK BLE □GFSK 125KHz□GFSK 500KHz □GFSK 1Mbps □GFSK 2Mbps	
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	upport BR/EDR. re tested and the main model test data recorded in this report.	

#### 2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency	
10	0	2402 MHz	
	1 _G	2404 MHz	
2400~2483.5MHz	: 10	20 :2	
	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-RFM207P** 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 = ±2.7 dB
- Uncertainty of Occupied Channel Bandwidth: Uc = ±2 %

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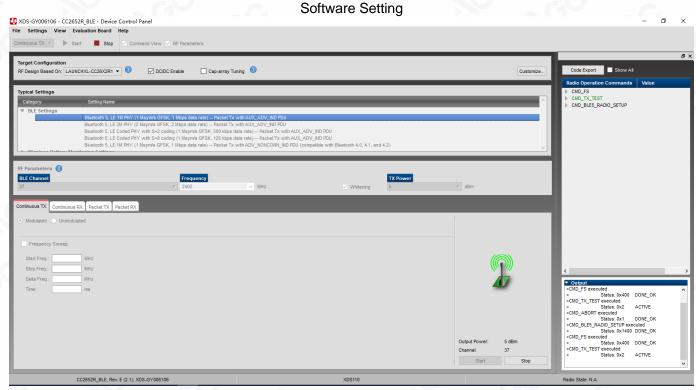
The test results

# 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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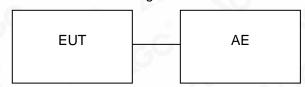


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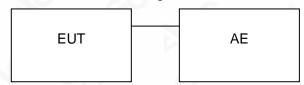
# 5. SYSTEM TEST CONFIGURATION

#### **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-Protocol Wireless Module with PA	BDE-RFM207P	2ABRU-RFM207P	EUT
2	Mobile phone	TCL	J326T	AE
3	PC	HUAWEI		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	Jan. 09, 2019	Jan. 08, 2021
Test software	FARA	EZ-EMC (Ver RA-03A)	N/A	N/A	N/A

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#### 7. PEAK OUTPUT POWER

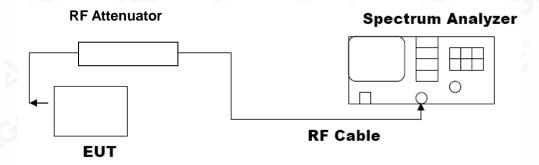
#### 7.1. MEASUREMENT PROCEDURE

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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# 7.3. LIMITS AND MEASUREMENT RESULT 125 KHz

PEAK OUTPUT POWER MEASUREMENT RESULT  FOR GFSK MOUDULATION			
2.402	4.485	30	Pass
2.440	4.250	30	Pass
2.480	4.227	30	Pass

#### CH0



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#### **CH19**



#### **CH39**



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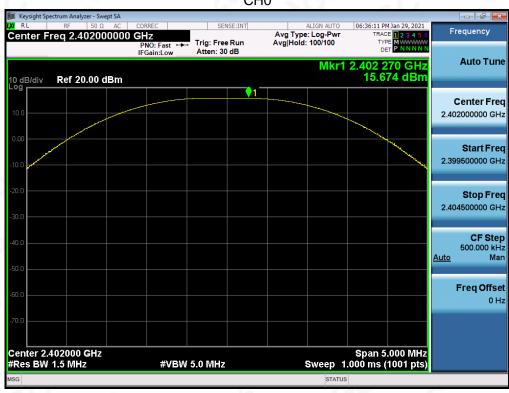


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#### 500 KHz

PEAK OUTPUT POWER MEASUREMENT RESULT				
FOR GFSK MOUDULATION				
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail	
2.402	15.674	30	Pass	
2.440	16.490	30	Pass	
2.480	16.497	30	Pass	

CH<sub>0</sub>



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#### **CH19**



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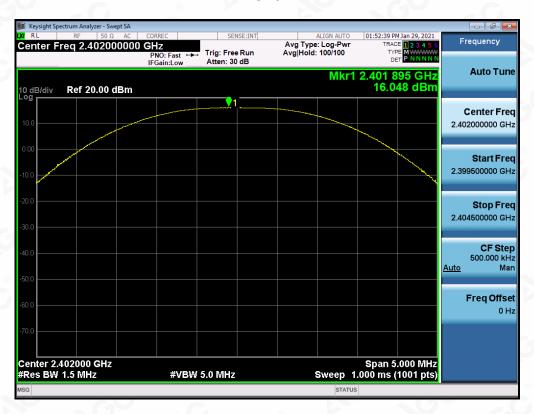
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he test results the test report.

#### **1M**

PEAK OUTPUT POWER MEASUREMENT RESULT				
	FOR GFSK MOUL	DULATION		
Frequency Peak Power Applicable Limits (GHz) (dBm) Pass or Fa				
2.402	16.048	30	Pass	
2.440	16.776	30	Pass	
2.480	17.678	30	Pass	

CH<sub>0</sub>



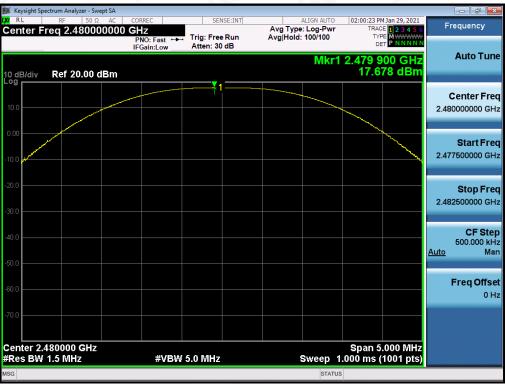
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#### **CH19**



#### **CH39**



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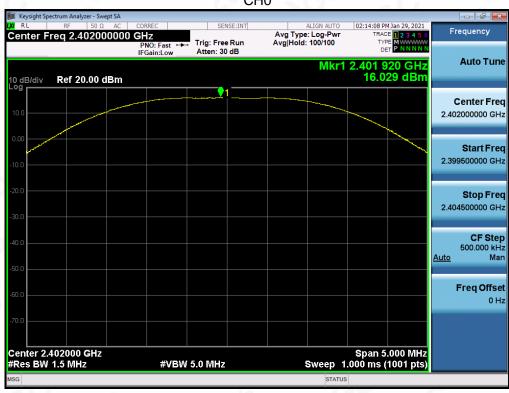
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he test report.

#### **2M**

PEAK OUTPUT POWER MEASUREMENT RESULT				
FOR GFSK MOUDULATION				
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail	
2.402	16.029	30	Pass	
2.440	16.750	30	Pass	
2.480	17.664	30	Pass	

CH<sub>0</sub>



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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**

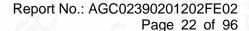
#### 125 KHz

LIMITS AND MEASUREMENT RESULT				
Applicable Limits				
Applicable Limits Test Data (kHz)			Criteria	
>500KHZ	Low Channel	601.6	PASS	
	Middle Channel	605.0	PASS	
go e '	High Channel	609.2	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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he test report.

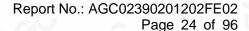
#### 500 KHz

	LIMITS AND MEASUR	REMENT RESULT		
Amuliaabla Limita	Applicable Limits			
Applicable Limits	Test Data (kHz)		Criteria	
CO C	Low Channel	707.3	PASS	
>500KHZ	Middle Channel	686.2	PASS	
	High Channel	678.0	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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/Inspection The test results the test report.

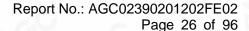
**1M** 

LIMITS AND MEASUREMENT RESULT				
Applicable Limite	Applicable Limits			
Applicable Limits	Test Data (kHz)		Criteria	
>500KHZ	Low Channel	649.1	PASS	
	Middle Channel	671.1	PASS	
	High Channel	632.1	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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/Inspection The test results the test report.

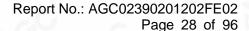
#### 2M

LIMITS AND MEASUREMENT RESULT				
Applicable Limite	Applicable Limits			
Applicable Limits	Test Data (kHz) Criteria			
>500KHZ	Low Channel	1055.4	PASS	
	Middle Channel	1012.0	PASS	
	High Channel	1174.5	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.

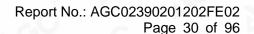
#### 9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.

#### 9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT				
A soulis able 1 insite	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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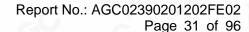


TEST RESULT FOR ENTIRE FREQUENCY RANGE 125 KHz

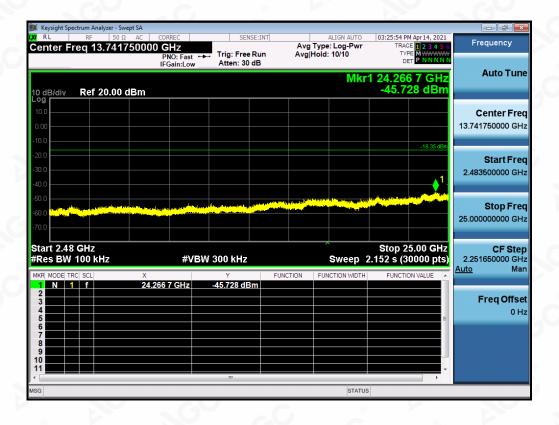
GFSK MODULATION IN LOW CHANNEL



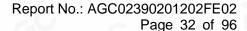
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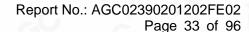
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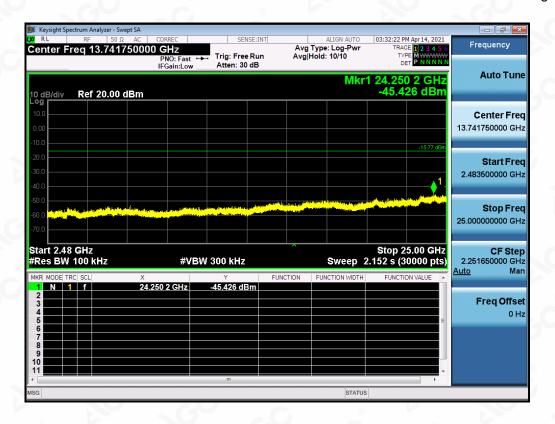




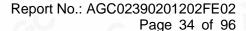
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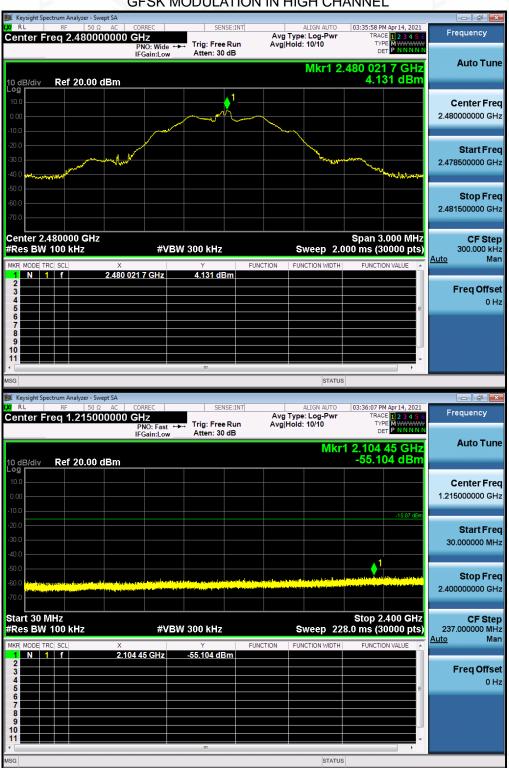


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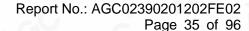




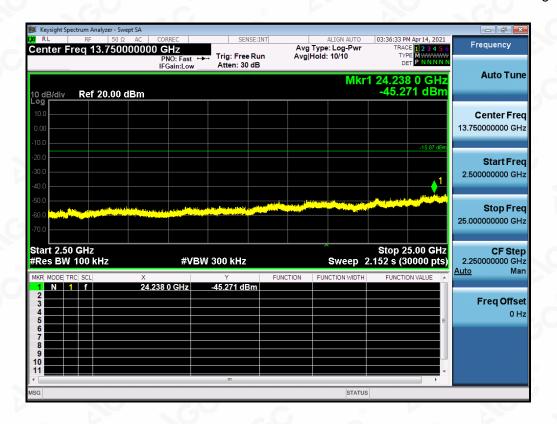
#### GFSK MODULATION IN HIGH CHANNEL



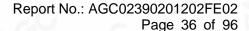
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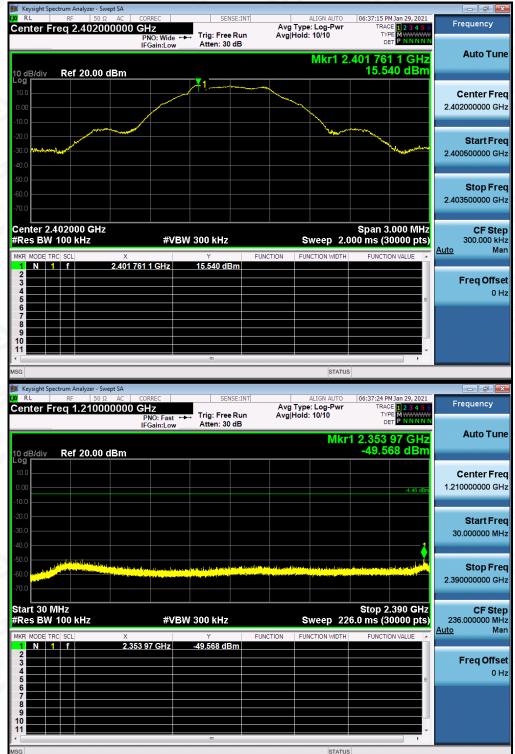


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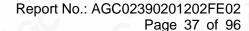




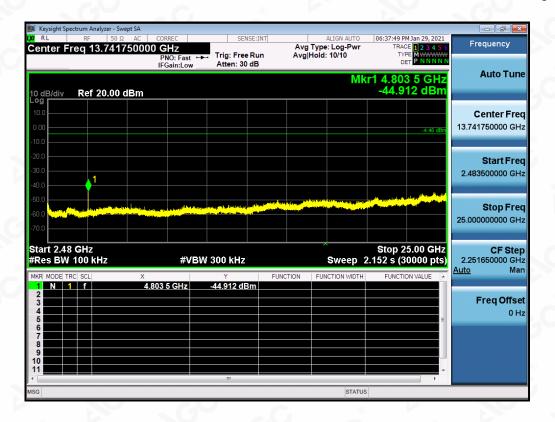
**500 KHz**GFSK MODULATION IN LOW CHANNEL

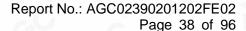


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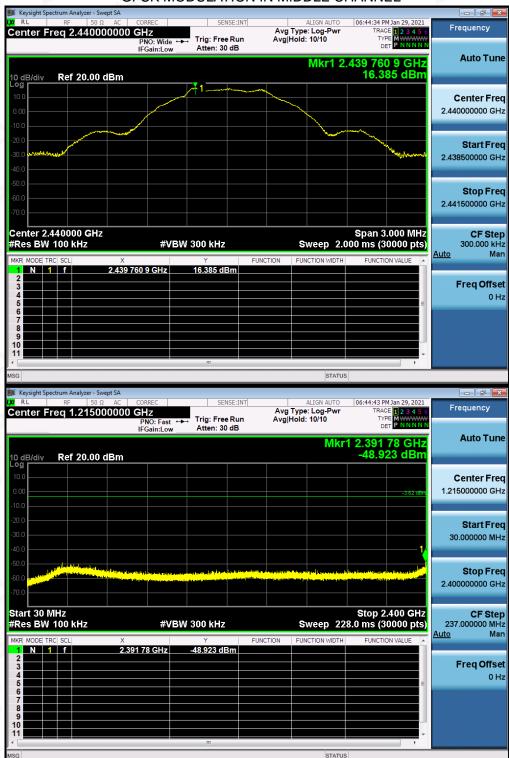


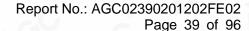




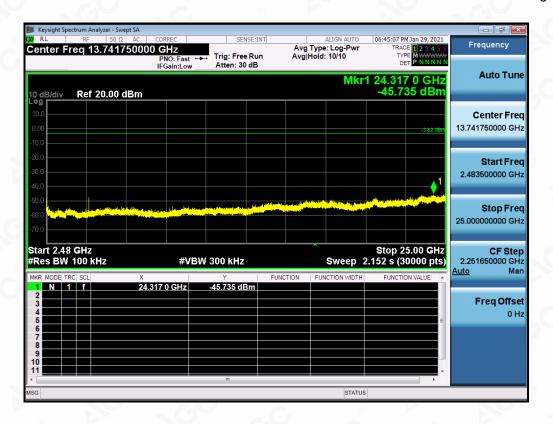


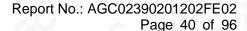
# GFSK MODULATION IN MIDDLE CHANNEL





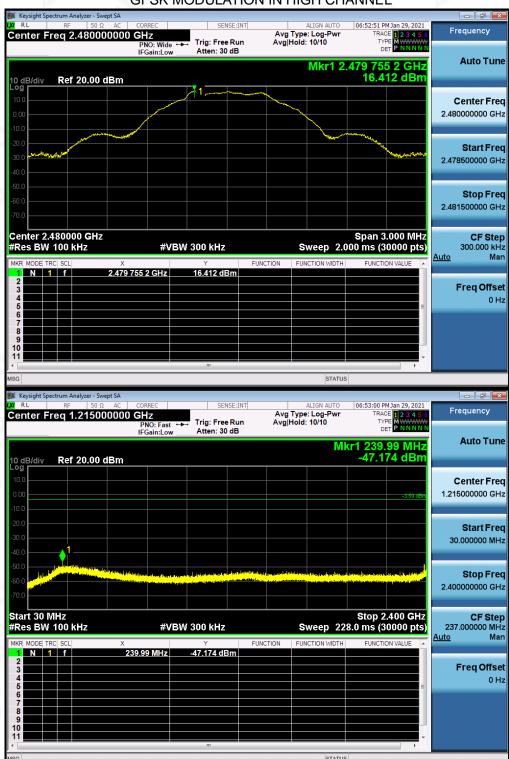


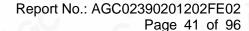




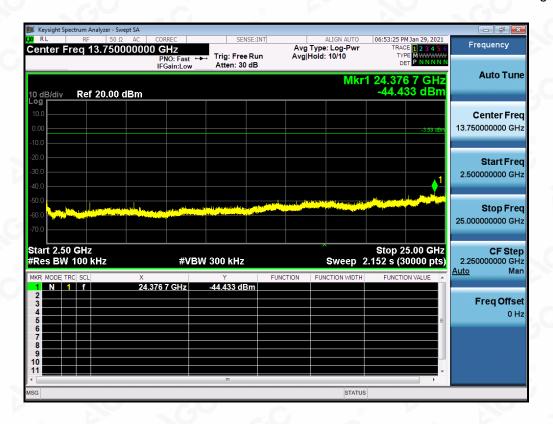


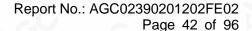
# GFSK MODULATION IN HIGH CHANNEL









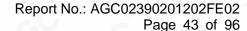




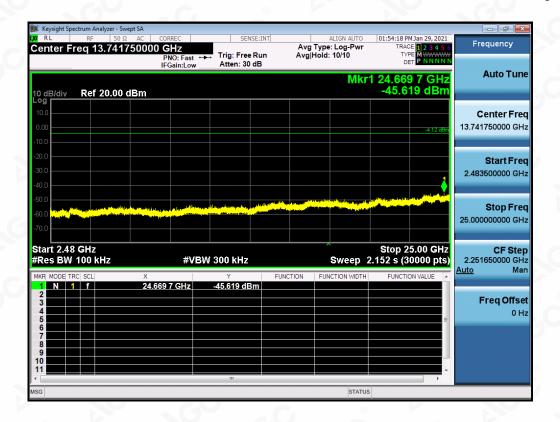
1**M**GFSK MODULATION IN LOW CHANNEL

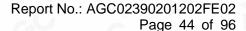


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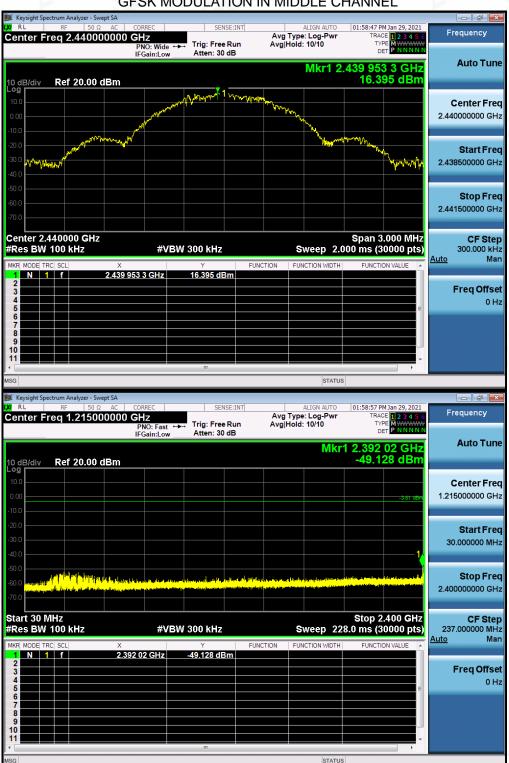


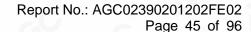






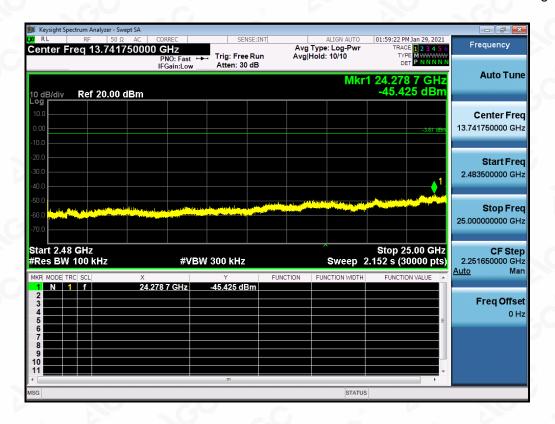
GFSK MODULATION IN MIDDLE CHANNEL

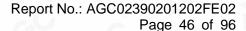




The test results the test report.



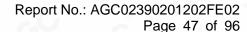




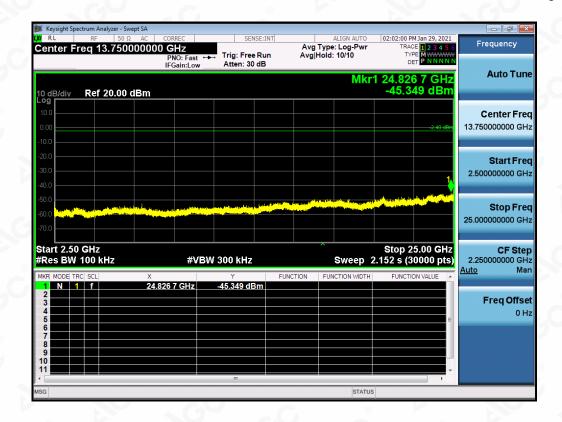


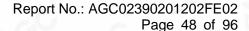
# GFSK MODULATION IN HIGH CHANNEL









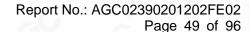




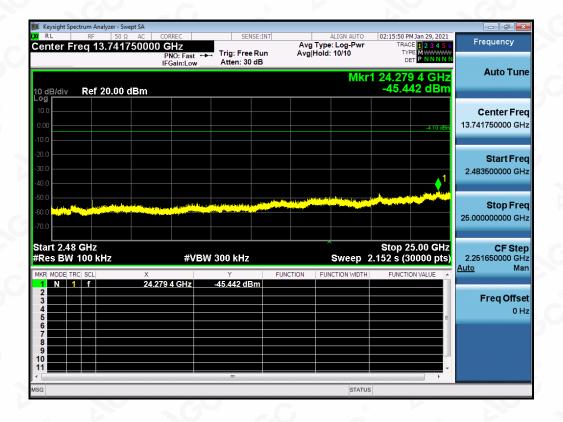
**2M**GFSK MODULATION IN LOW CHANNEL

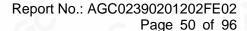


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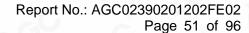




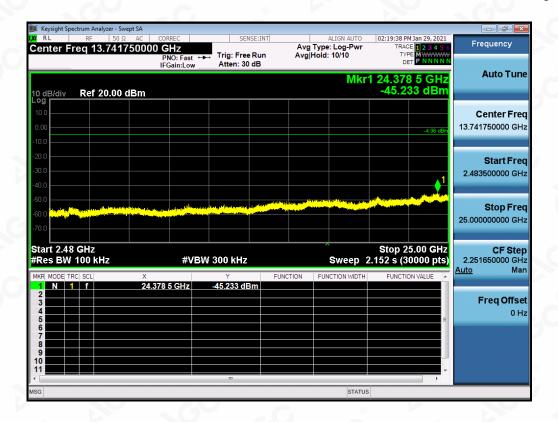


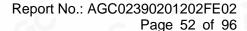
# GFSK MODULATION IN MIDDLE CHANNEL













# GFSK MODULATION IN HIGH CHANNEL

