

# **FCC Test Report**

Report No.: AGC02390201201FE02

FCC ID : 2ABRU-RFM207

APPLICATION PURPOSE : Original Equipment

**PRODUCT DESIGNATION**: Multiprotocol 2.4G Wireless Module - Industrial Grade

**BRAND NAME** : BDE

**MODEL NAME** : BDE-RFM207, BDE-RFM207-IN

**APPLICANT**: Guangzhou BDE Technology Inc.

**DATE OF ISSUE** : Feb. 01, 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		Feb. 01, 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	Multiprotocol 2.4G Wireless Module - Industrial Grade
Brand Name	BDE
Test Model	BDE-RFM207
Series Model	BDE-RFM207-IN
Difference description	All the series models are the same as the test model except for the model names and BDE-RFM207-IN can operate from -40 $^{\circ}$ C to 105 $^{\circ}$ C, while BDE-RFM207 operates from -40 $^{\circ}$ C to 85 $^{\circ}$ C
Date of test	Dec. 04, 2020 to Feb. 01, 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.

Reviewed By

Eddy. Liu
(Project Engineer)

Max Zhang
(Reviewer)

Feb. 01, 2021

Feb. 01, 2021

Forrest Lei
(Authorized Officer)

Feb. 01, 2021

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# 2. GENERAL INFORMATION

#### 2.1. PRODUCT DESCRIPTION

The EUT is designed as a "Multiprotocol 2.4G Wireless Module - Industrial Grade". 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	4.539dBm (Max) For BLE 125KHz 4.539dBm (Max) For BLE 500KHz 4.437dBm (Max) For BLE 1M 4.489dBm (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	2.18dBi		
Hardware Version	V1.1		
Software Version	V1.0		
Power Supply	DC 5V by PC		
Note: 1. The EUT doesn't su 2. All of the models a	upport BR/EDR.  are 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-RFM207** 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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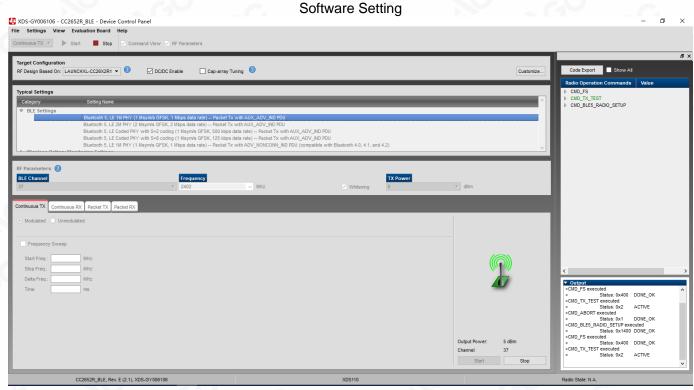
The test results

## 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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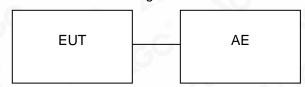


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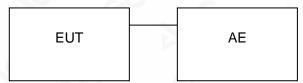
# 5. SYSTEM TEST CONFIGURATION

#### **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	Multiprotocol 2.4G Wireless Module - Industrial Grade	BDE-RFM207	BDE-RFM207 2ABRU-RFM207	
2	Mobile phone	TCL	J326T	EUT
3	PC	HUAWEI	N/A	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	Tonscend	JS32-RE (Ver.2.5)	N/A	N/A	N/A

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#### 7. PEAK OUTPUT POWER

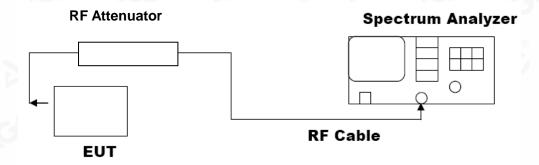
#### 7.1. MEASUREMENT PROCEDURE

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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he test results the test report.

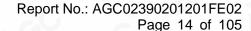
# 7.3. LIMITS AND MEASUREMENT RESULT 125 KHz

PEAK OUTPUT POWER MEASUREMENT RESULT					
	FOR GFSK MOUDULATION				
Frequency Peak Power Applicable Limits (GHz) (dBm) (dBm)					
2.402	4.539	30	Pass		
2.440	4.319	30	Pass		
2.480	4.016	30	Pass		

#### CH0



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#### **CH19**



#### **CH39**



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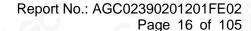
#### 500 KHz

PEAK OUTPUT POWER MEASUREMENT RESULT FOR GFSK MOUDULATION					
					Frequency (GHz)  Peak Power (dBm)  Applicable Limits (dBm)  Pass or Fail
2.402	4.539	30	Pass		
2.440	4.317	30	Pass		
2.480	4.043	30	Pass		

CH<sub>0</sub>



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#### **CH39**



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#### **1M**

PEAK OUTPUT POWER MEASUREMENT RESULT FOR GFSK MOUDULATION				
Frequency Peak Power Applicable Limits (GHz) (dBm) Pass or F				
2.402	4.437	30	Pass	
2.440	4.236	30	Pass	
2.480	3.978	30	Pass	

CH<sub>0</sub>



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#### **CH19**



#### **CH39**



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#### **2M**

PEAK OUTPUT POWER MEASUREMENT RESULT FOR GFSK MOUDULATION  Frequency (GHz) Peak Power (dBm) Pass or Fail								
					2.402	4.489	30	Pass
					2.440	4.189	30	Pass
2.480	3.931	30	Pass					

CH<sub>0</sub>



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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**

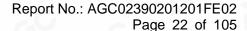
#### 125 KHz

LIMITS AND MEASUREMENT RESULT					
Applicable Limits		Applicable Limits			
	Test Data	(kHz)	Criteria		
>500KHZ	Low Channel	690.1	PASS		
	Middle Channel	712.6	PASS		
	High Channel	722.1	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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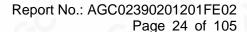
#### 500 KHz

LIMITS AND MEASUREMENT RESULT					
A		Applicable Limits			
Applicable Limits	Test Data	(kHz)	Criteria		
100 c	Low Channel	673.2	PASS		
>500KHZ	Middle Channel	678.4	PASS		
	High Channel	697.4	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



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/Inspection The test results the test report.

#### **1M**

LIMITS AND MEASUREMENT RESULT				
Applicable Limits		Applicable Limits		
	Test Data	(kHz)	Criteria	
>500KHZ	Low Channel	691.2	PASS	
	Middle Channel	707.7	PASS	
	High Channel	690.6	PASS	

# TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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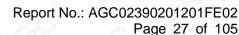
#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



#### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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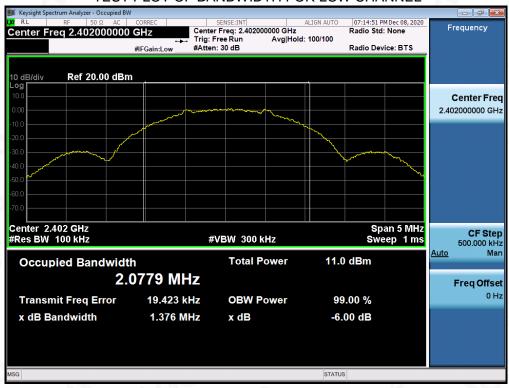




**2M** 

LIMITS AND MEASUREMENT RESULT				
Annii adda Lindia		Applicable Limits		
Applicable Limits	Test Data	a (kHz)	Criteria	
>500KHZ	Low Channel	1376	PASS	
	Middle Channel	1493	PASS	
	High Channel	1409	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.

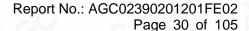
#### 9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.

#### 9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT				
A marilla a la l	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		

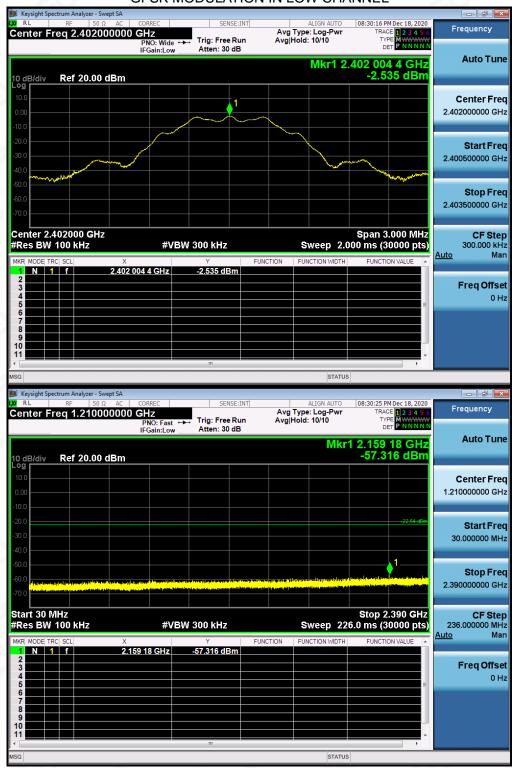
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# TEST RESULT FOR ENTIRE FREQUENCY RANGE 125 KHz

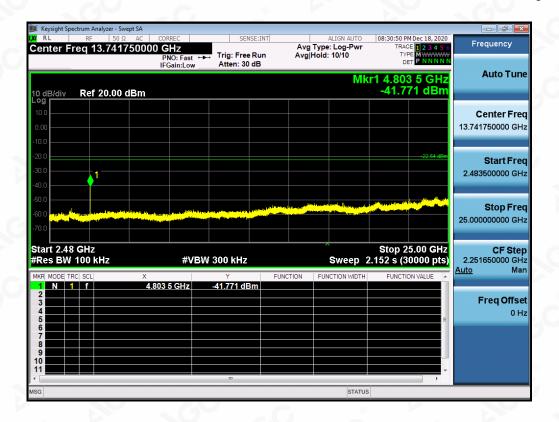
GFSK MODULATION IN LOW CHANNEL



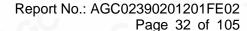
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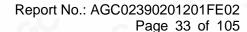




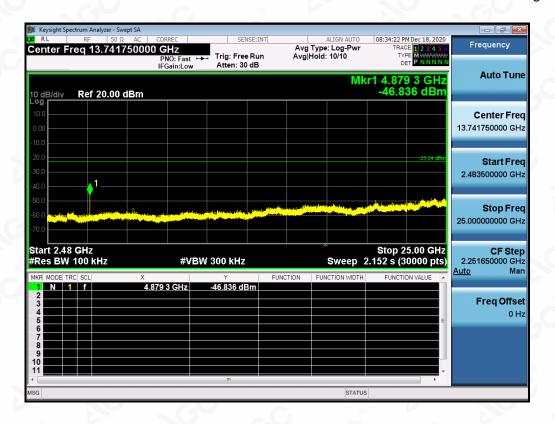
#### GFSK MODULATION IN MIDDLE CHANNEL



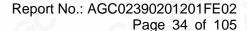
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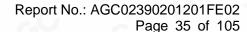




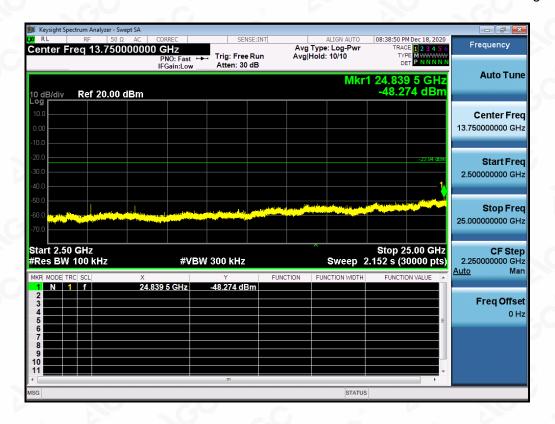
#### GFSK MODULATION IN HIGH CHANNEL



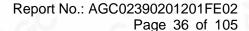
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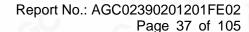




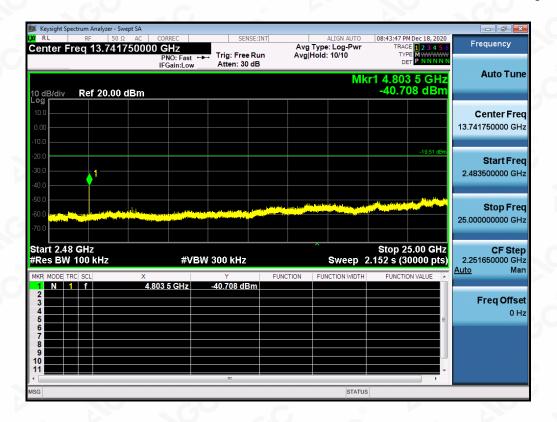
500 KHz GFSK MODULATION IN LOW CHANNEL



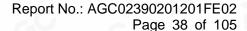
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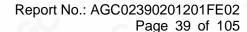




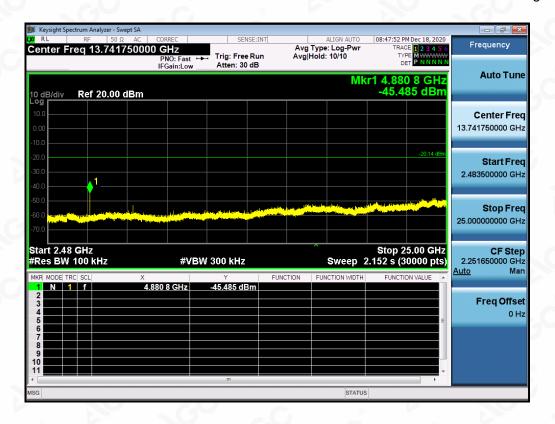
# GFSK MODULATION IN MIDDLE CHANNEL



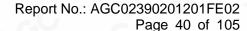
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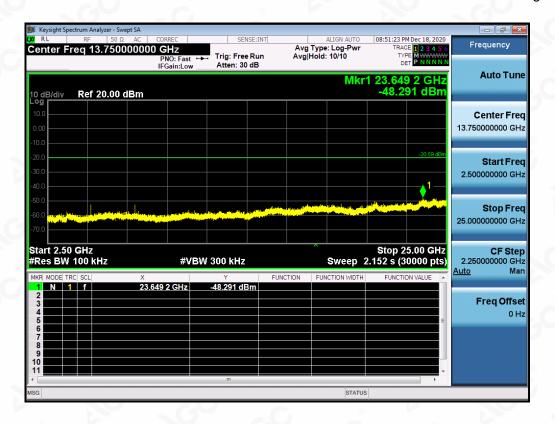
# GFSK MODULATION IN HIGH CHANNEL



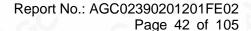
Compliance Bedicated Festi Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the Dedicated Post not/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results to the test deemed any objections to report issued by AGC should be submitted to AGC within 15days after the issuence 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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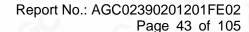




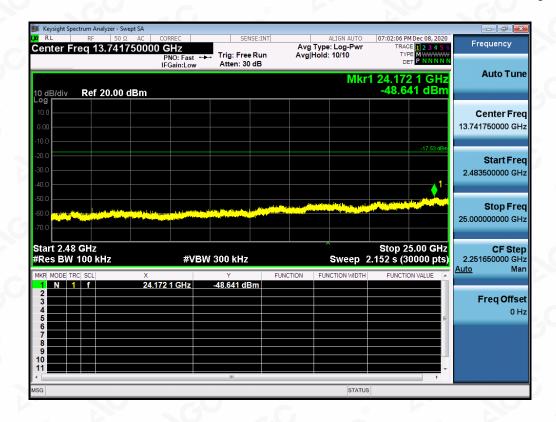
1M
GFSK MODULATION IN LOW CHANNEL



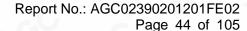
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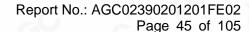




# GFSK MODULATION IN MIDDLE CHANNEL



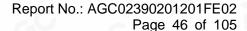
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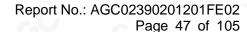




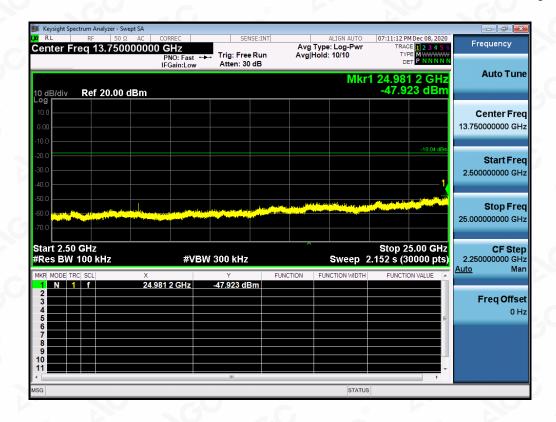
# GFSK MODULATION IN HIGH CHANNEL



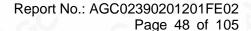
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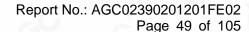




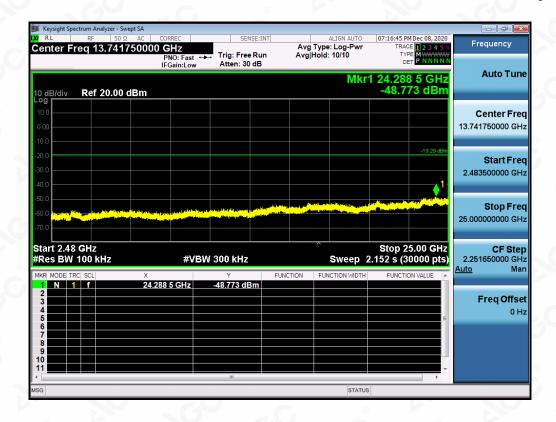
**2M**GFSK MODULATION IN LOW CHANNEL



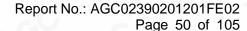
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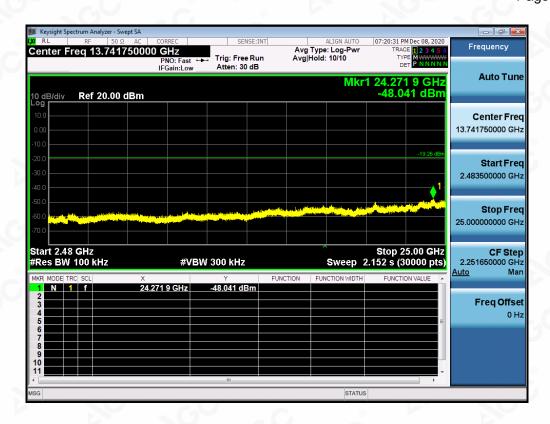
# GFSK MODULATION IN MIDDLE CHANNEL



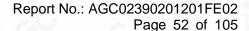
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