

FCC Test Report

Report No.: AGC02390201205FE02

FCC ID : 2ABRU-RFM207B

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION: Multiprotocol 2.4G Wireless Module - Industrial Grade

BRAND NAME : BDE

MODEL NAME : BDE-RFM207B

APPLICANT: Guangzhou BDE Technology Inc.

DATE OF ISSUE : Jan. 27, 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 | | Jan. 27, 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-RFM207B | | | |
| Date of test | Dec. 25, 2020 to Jan. 27, 2021 | | | |
| Deviation | No any deviation from the test method | | | |
| Condition of Test Sample | ole 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

Sky Dong
(Project Engineer)

Max Zhang
(Reviewer)

Approved By

Forrest Lei
(Authorized Officer)

Jan. 27, 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 | 3.644dBm (Max) For BLE 125KHz 3.707dBm (Max) For BLE 500KHz 4.808dBm (Max) For BLE 1M 3.643dBm (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 3.3V | | |
| 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 | |
|----------------|----------------|-----------|--|
| 10 | 0 | 2402 MHz | |
| | 1 _ 6 | 2404 MHz | |
| 2400~2483.5MHz | | | |
| | 38 | 2478 MHz | |
| 5 2 1 | 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-RFM207B** 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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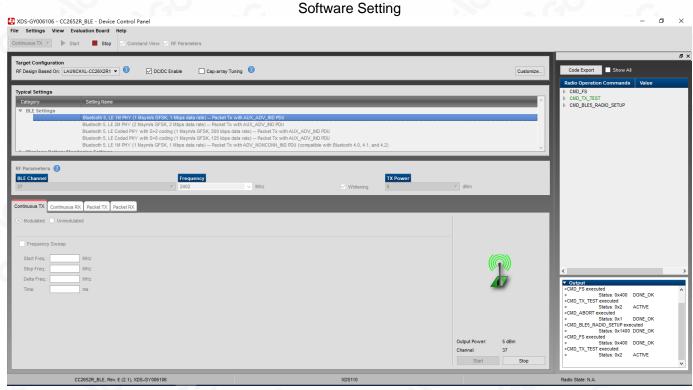
The test results

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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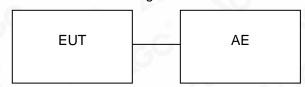


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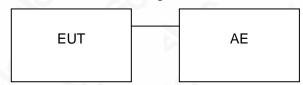
5. SYSTEM TEST CONFIGURATION

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-RFM207B 2ABRU-RFM207B | | EUT | |
| 2 | Mobile phone | TCL | J326T | AE | |
| 3 | PC | HUAWEI | DC 5V | AE | |
| 4 | Control board | СЗ | 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

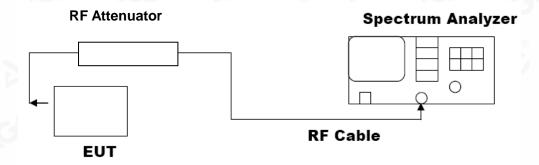
7.1. MEASUREMENT PROCEDURE

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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he test results the test report.

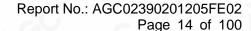
7.3. LIMITS AND MEASUREMENT RESULT 125 KHz

| PEAK OUTPUT POWER MEASUREMENT RESULT FOR GFSK MOUDULATION Frequency Peak Power Applicable Limits Pass or Fail | | | |
|--|-------|----|------|
| | | | |
| 2.402 | 3.242 | 30 | Pass |
| 2.440 | 3.424 | 30 | Pass |
| 2.480 | 3.644 | 30 | Pass |

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500 KHz

| PEAK OUTPUT POWER MEASUREMENT RESULT FOR GFSK MOUDULATION Frequency (GHz) Peak Power (dBm) Pass or Fail | | | | | | | | |
|--|-------|----|------|--|-------|-------|----|------|
| | | | | | 2.402 | 3.225 | 30 | Pass |
| | | | | | 2.440 | 3.471 | 30 | Pass |
| 2.480 | 3.707 | 30 | Pass | | | | | |

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1M

| PEAK OUTPUT POWER MEASUREMENT RESULT FOR GFSK MOUDULATION Frequency (GHz) Peak Power (dBm) Pass or Fail | | | | | | | | |
|--|-------|----|------|--|-------|-------|----|------|
| | | | | | 2.402 | 4.232 | 30 | Pass |
| | | | | | 2.440 | 4.508 | 30 | Pass |
| 2.480 | 4.808 | 30 | Pass | | | | | |

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2M

| PEAK OUTPUT POWER MEASUREMENT RESULT | | | | | |
|--|-------|----|------|--|--|
| FOR GFSK MOUDULATION | | | | | |
| Frequency (GHz) Peak Power (dBm) Applicable Limits (dBm) Pass or Fail | | | | | |
| 2.402 | 3.260 | 30 | Pass | | |
| 2.440 | 3.464 | 30 | Pass | | |
| 2.480 | 3.643 | 30 | Pass | | |

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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

| 120 11112 | | | | |
|-------------------------------|----------------|-------------------|----------|--|
| LIMITS AND MEASUREMENT RESULT | | | | |
| | | Applicable Limits | | |
| Applicable Limits | Test Data | a (kHz) | Criteria | |
| >500KHZ | Low Channel | 695.9 | PASS | |
| | Middle Channel | 684.6 | PASS | |
| | High Channel | 688.5 | 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



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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g/Inspection The test results

he test report.

500 KHz

| LIMITS AND MEASUREMENT RESULT | | | | |
|-------------------------------|-----------------|-------------------|----------|--|
| Annicable Limite | | Applicable Limits | | |
| Applicable Limits | Test Data (kHz) | | Criteria | |
| >500KHZ | Low Channel | 665.6 | PASS | |
| | Middle Channel | 655.2 | PASS | |
| | High Channel | 667.8 | PASS | |

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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g/Inspection The test results

1M

| LIMITS AND MEASUREMENT RESULT | | | | |
|-------------------------------|--------------------------|-------------------|------|--|
| A collection to the | | Applicable Limits | | |
| Applicable Limits | Test Data (kHz) Criteria | | | |
| 100 c | Low Channel | 700.1 | PASS | |
| >500KHZ | Middle Channel | 673.5 | PASS | |
| | High Channel | 676.1 | PASS | |

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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/Inspection The test results



2M

| LIMITS AND MEASUREMENT RESULT | | | | |
|-------------------------------|--------------------------|-------------------|------|--|
| Ann Paul In Line | | Applicable Limits | | |
| Applicable Limits | Test Data (MHz) Criteria | | | |
| 100 | Low Channel | 1.412 | PASS | |
| >500KHZ | Middle Channel | 1.376 | PASS | |
| | High Channel | 1.350 | 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.

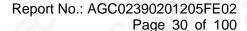
9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.

9.4. LIMITS AND MEASUREMENT RESULT

| LIMITS AND MEASUREMENT RESULT | | | | |
|--|--|----------|--|--|
| Annii alda I inii | 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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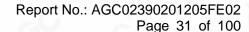


TEST RESULT FOR ENTIRE FREQUENCY RANGE 125 KHz

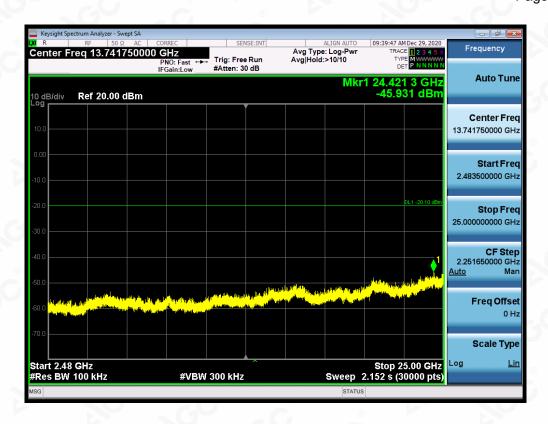
GFSK MODULATION IN LOW CHANNEL



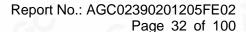
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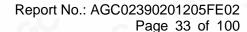




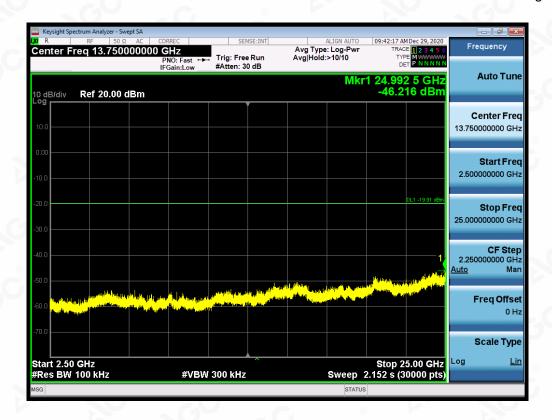
GFSK MODULATION IN MIDDLE CHANNEL



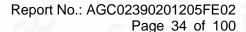
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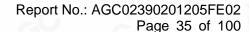




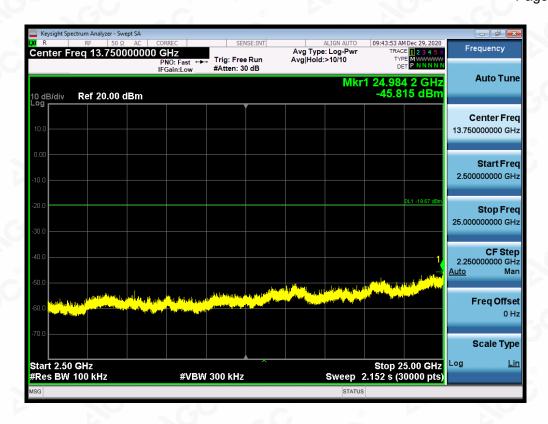
GFSK MODULATION IN HIGH CHANNEL



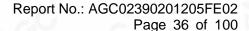
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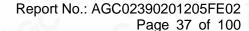




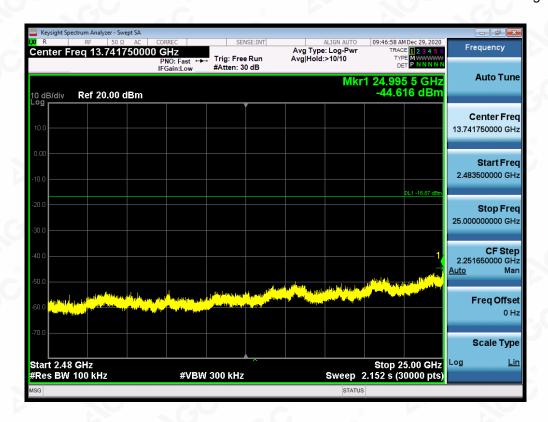
500 KHz GFSK MODULATION IN LOW CHANNEL

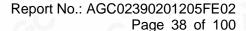


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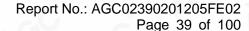




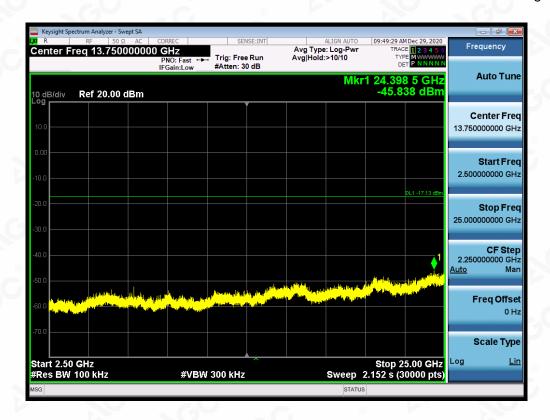


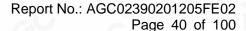
GFSK MODULATION IN MIDDLE CHANNEL







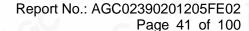




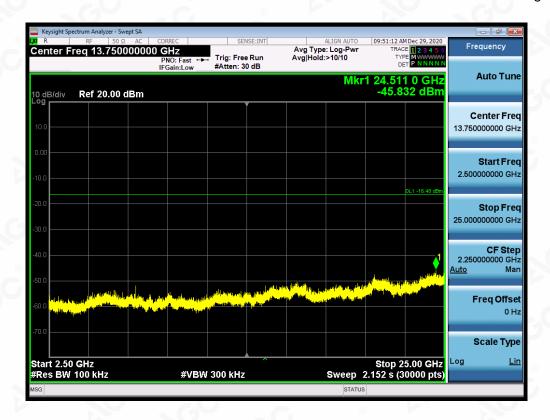


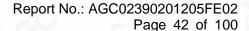
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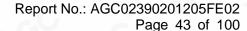




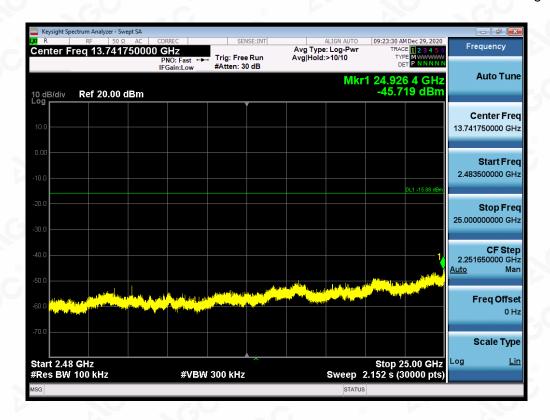


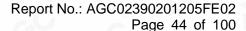
1M
GFSK MODULATION IN LOW CHANNEL







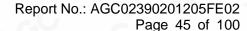




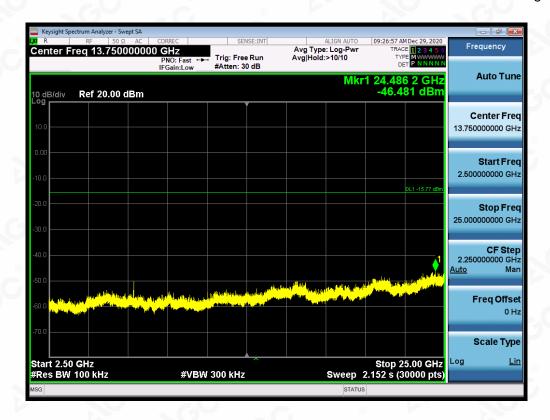


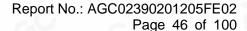
GFSK MODULATION IN MIDDLE CHANNEL







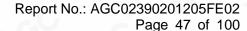




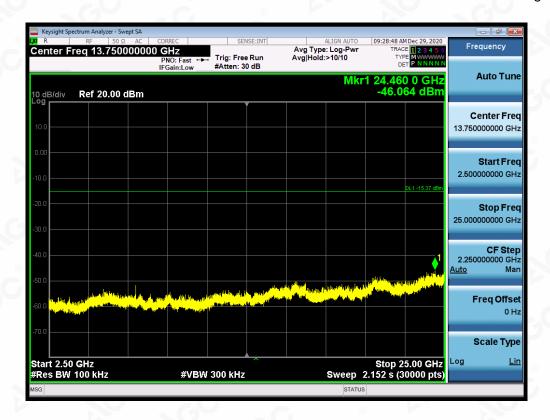


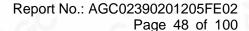
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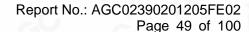




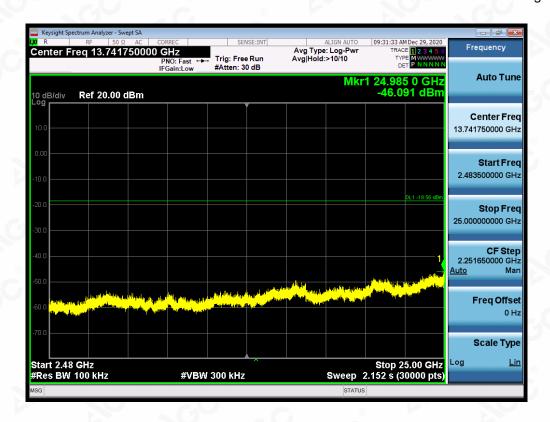


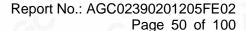
2MGFSK MODULATION IN LOW CHANNEL







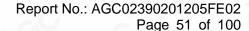




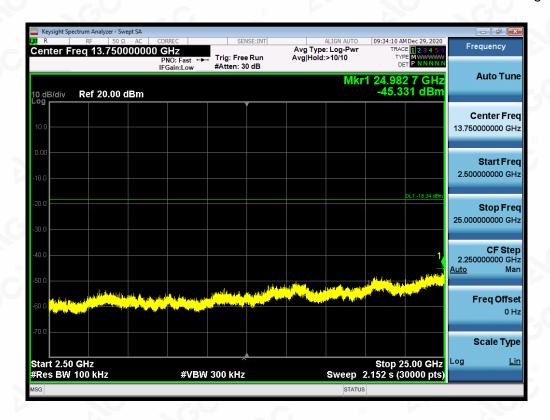


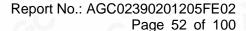
GFSK MODULATION IN MIDDLE CHANNEL













GFSK MODULATION IN HIGH CHANNEL



