

FCC Test Report

Report No.: AGC05067200803FE02

FCC ID : K6M-DUALMWS
APPLICATION PURPOSE : Original Equipment
PRODUCT DESIGNATION : DUAL MIKE Wireless
BRAND NAME : MIDLAND
MODEL NAME : DUAL MIKE Wireless
APPLICANT : Midland Europe srl
DATE OF ISSUE : Sep. 25,2020
STANDARD(S) : FCC Part 15.247
REPORT VERSION : V1.0



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REPORT REVISE RECORD

| Report Version | Revise Time | Issued Date | Valid Version | Notes |
|----------------|-------------|--------------|---------------|-----------------|
| V1.0 | / | Sep. 25,2020 | Valid | Initial Release |

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TABLE OF CONTENTS

| | |
|--|-----------|
| 1. VERIFICATION OF COMPLIANCE..... | 5 |
| 2. GENERAL INFORMATION | 6 |
| 2.1. PRODUCT DESCRIPTION | 6 |
| 2.2. TABLE OF CARRIER FREQUENCIES | 6 |
| 2.3. RELATED SUBMITTAL(S)/GRANT(S)..... | 7 |
| 2.4. TEST METHODOLOGY | 7 |
| 2.5. SPECIAL ACCESSORIES..... | 7 |
| 2.6. EQUIPMENT MODIFICATIONS..... | 7 |
| 2.7. ANTENNA REQUIREMENT..... | 7 |
| 3. MEASUREMENT UNCERTAINTY | 8 |
| 4. DESCRIPTION OF TEST MODES | 9 |
| 5. SYSTEM TEST CONFIGURATION..... | 10 |
| 5.1. CONFIGURATION OF TESTED SYSTEM..... | 10 |
| 5.2. EQUIPMENT USED IN TESTED SYSTEM | 10 |
| 5.3. SUMMARY OF TEST RESULTS | 10 |
| 6. TEST FACILITY | 11 |
| 7. PEAK OUTPUT POWER..... | 12 |
| 7.1. MEASUREMENT PROCEDURE | 12 |
| 7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)..... | 12 |
| 7.3. LIMITS AND MEASUREMENT RESULT..... | 13 |
| 8. 6 DB BANDWIDTH..... | 15 |
| 8.1. MEASUREMENT PROCEDURE | 15 |
| 8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)..... | 15 |
| 8.3. LIMITS AND MEASUREMENT RESULTS | 15 |
| 9. CONDUCTED SPURIOUS EMISSION..... | 17 |
| 9.1. MEASUREMENT PROCEDURE | 17 |
| 9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)..... | 17 |
| 9.3. MEASUREMENT EQUIPMENT USED | 17 |
| 9.4. LIMITS AND MEASUREMENT RESULT..... | 17 |
| 10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY | 25 |
| 10.1. MEASUREMENT PROCEDURE | 25 |
| 10.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)..... | 25 |
| 10.3. MEASUREMENT EQUIPMENT USED | 25 |
| 10.4. LIMITS AND MEASUREMENT RESULT..... | 25 |
| 11. RADIATED EMISSION | 27 |
| 11.1. MEASUREMENT PROCEDURE | 27 |
| 11.2. TEST SETUP | 29 |
| 11.3. LIMITS AND MEASUREMENT RESULT..... | 30 |
| 11.4. TEST RESULT..... | 30 |
| 12. FCC LINE CONDUCTED EMISSION TEST | 40 |
| 12.1. LIMITS OF LINE CONDUCTED EMISSION TEST | 40 |
| 12.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST | 40 |

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|---|----|
| 12.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST | 41 |
| 12.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST | 41 |
| 12.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST | 42 |

| | |
|--|-----------|
| APPENDIX A: PHOTOGRAPHS OF TEST SETUP | 44 |
|--|-----------|

| | |
|---|-----------|
| APPENDIX B: PHOTOGRAPHS OF EUT | 46 |
|---|-----------|

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1. VERIFICATION OF COMPLIANCE

| | |
|---------------------------------|--|
| Applicant | Midland Europe srl |
| Address | Via Roberto Sevardi, 7 Mancasale, Reggio Emilia, 42100, Italy |
| Manufacturer | Midland Europe srl |
| Address | Via Roberto Sevardi, 7 Mancasale, Reggio Emilia, 42100, Italy |
| Factory | Shenzhen Allcomm Electronic Company Limited |
| Address | 101A , 302, 401 Building B, Building A, No. 272 Guangtian Road, Tangxiayong, Yanluo Street, Bao'an District, Shenzhen, China |
| Product Designation | DUAL MIKE Wireless |
| Brand Name | MIDLAND |
| Test Model | DUAL MIKE Wireless |
| Date of test | Sep.09,2020 to Sep. 25,2020 |
| 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.

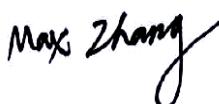
Prepared By



John Zeng
Project Engineer

Sep. 25,2020

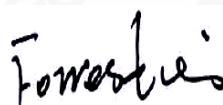
Reviewed By



Max Zhang
Reviewer

Sep. 25,2020

Approved By



Forrest Lei
Authorized Officer

Sep. 25,2020

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as a “DUAL MIKE Wireless”. 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 | 5.706dBm (Max) |
| Bluetooth Version | V4.0 |
| Modulation | BR <input type="checkbox"/> GFSK, EDR <input type="checkbox"/> π/4-DQPSK, <input type="checkbox"/> 8DPSK BLE <input checked="" type="checkbox"/> GFSK 1Mbps <input type="checkbox"/> GFSK 2Mbps |
| Number of channels | 40 Channel |
| Antenna Designation | Ceramic Antenna (Comply with requirements of the FCC part 15.203) |
| Antenna Gain | -3dBi |
| Hardware Version | 2.0 |
| Software Version | 1.0.0 |
| Power Supply | DC 3.7V by battery or DC 5V by adapter |

2.2. TABLE OF CARRIER FREQUENCIES

| Frequency Band | Channel Number | Frequency |
|----------------|----------------|-----------|
| 2400~2483.5MHz | 0 | 2402 MHz |
| | 1 | 2404 MHz |
| | : | : |
| | 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: K6M-DUALMWS** 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 $y \pm U$, 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, $U_c = \pm 3.2 \text{ dB}$
- Uncertainty of Radiated Emission below 1GHz, $U_c = \pm 3.9 \text{ dB}$
- Uncertainty of Radiated Emission above 1GHz, $U_c = \pm 4.8 \text{ dB}$
- Uncertainty of total RF power, conducted, $U_c = \pm 0.8 \text{ dB}$
- Uncertainty of RF power density, conducted, $U_c = \pm 2.6 \text{ dB}$
- Uncertainty of spurious emissions, conducted, $U_c = \pm 2.7 \text{ dB}$
- Uncertainty of Occupied Channel Bandwidth: $U_c = \pm 2 \%$

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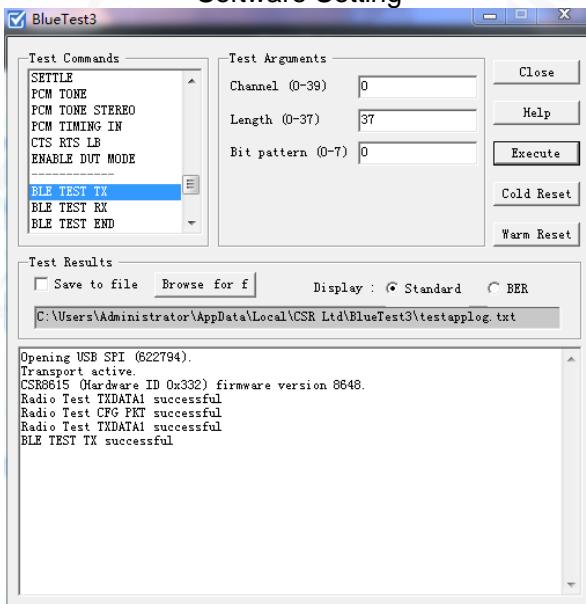
4. DESCRIPTION OF TEST MODES

| NO. | TEST MODE DESCRIPTION |
|-----|-----------------------|
| 1 | Low channel TX |
| 2 | Middle channel TX |
| 3 | High channel TX |

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 manufacturer.

Software Setting



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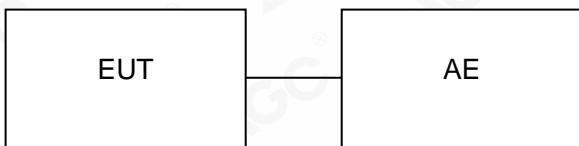
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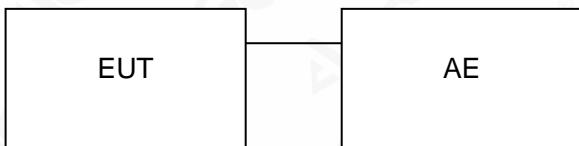
5. SYSTEM TEST CONFIGURATION

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 | DUAL MIKE Wireless | DUAL MIKE Wireless | K6M-DUALMWS | EUT |
| 2 | Adapter | TY0500100E1MN | N/A | AE |
| 3 | Charger line | N/A | 1.0m unshield | 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 | Agilent | N9010A | MY53470504 | Dec. 12, 2019 | Dec. 11, 2020 |
| 2.4GHz Filter | EM Electronics | 2400-2500MHz | N/A | Mar. 23, 2020 | Mar. 22, 2022 |
| Attenuator | ZHINAN | E-002 | N/A | N/A | N/A |
| Horn antenna | SCHWARZBECK | BBHA 9170 | #768 | Sep. 09, 2019 | Sep. 08, 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 | Oct. 15, 2019 | Oct. 16, 2020 |
| 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

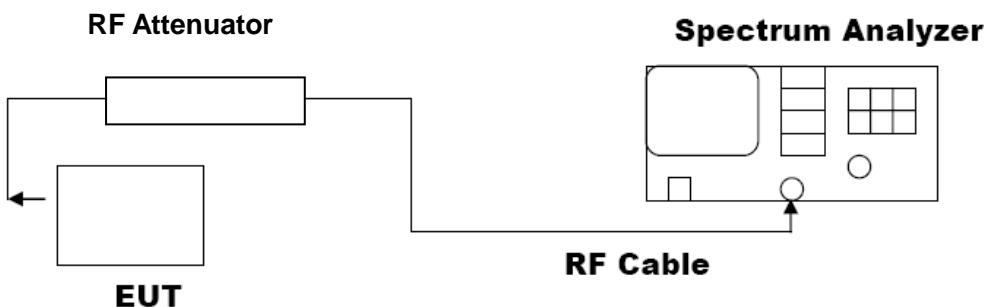
For peak power test:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. $RBW \geq DTS$ bandwidth
3. $VBW \geq 3 \times RBW$.
4. $SPAN \geq VBW$.
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

| PEAK OUTPUT POWER MEASUREMENT RESULT FOR GFSK MOUDULATION | | | |
|--|---------------------|----------------------------|--------------|
| Frequency (GHz) | Peak Power (dBm) | Applicable Limits (dBm) | Pass or Fail |
| 2.402 | 5.483 | 30 | Pass |
| 2.440 | 5.613 | 30 | Pass |
| 2.480 | 5.706 | 30 | Pass |

CH0



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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 $\geq 3 \times$ 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.

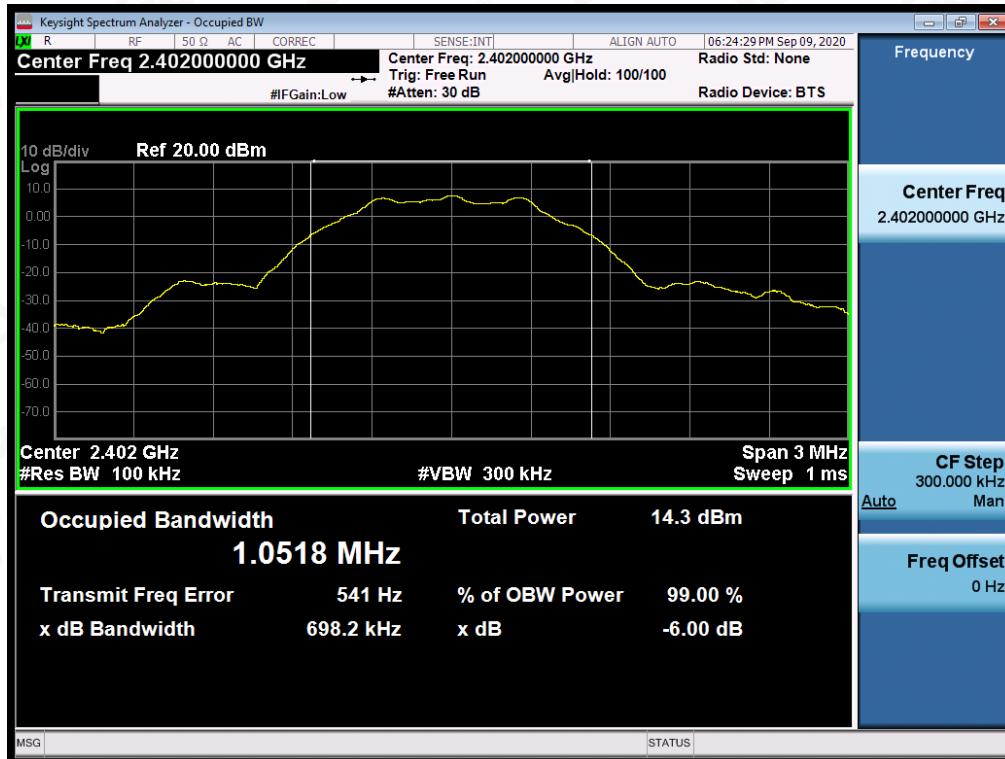
8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 7.2.

8.3. LIMITS AND MEASUREMENT RESULTS

| LIMITS AND MEASUREMENT RESULT | | | |
|-------------------------------|-------------------|-------|----------|
| Applicable Limits | Applicable Limits | | |
| | Test Data (kHz) | | Criteria |
| >500KHZ | Low Channel | 698.2 | PASS |
| | Middle Channel | 695.2 | PASS |
| | High Channel | 698.0 | PASS |

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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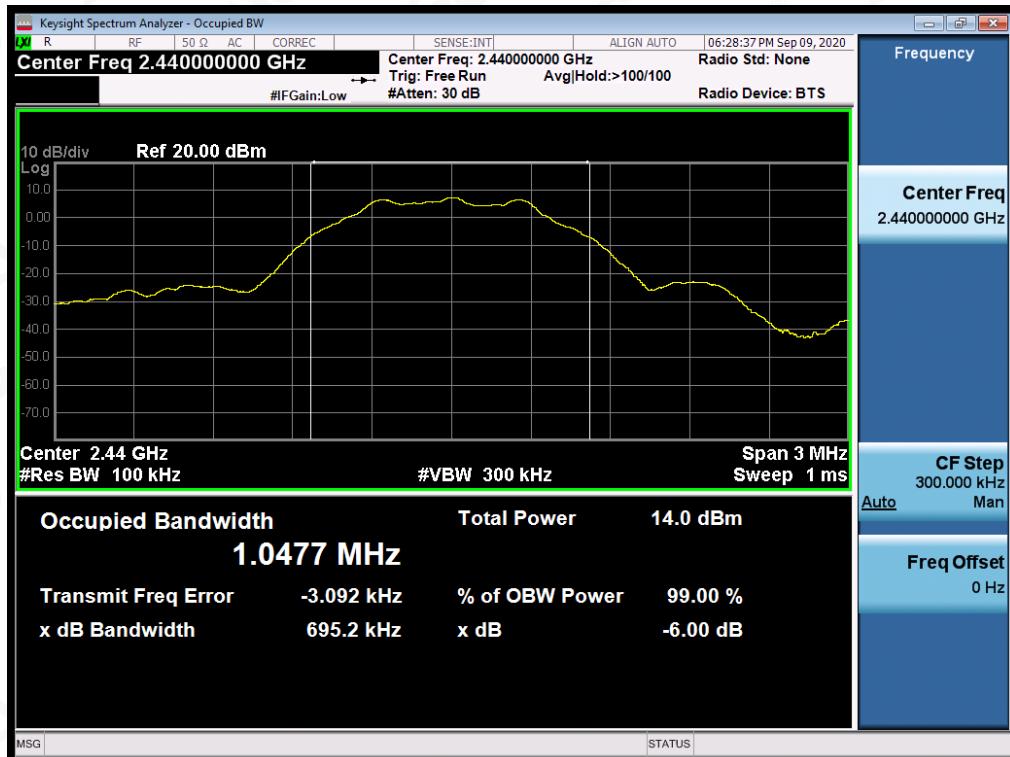
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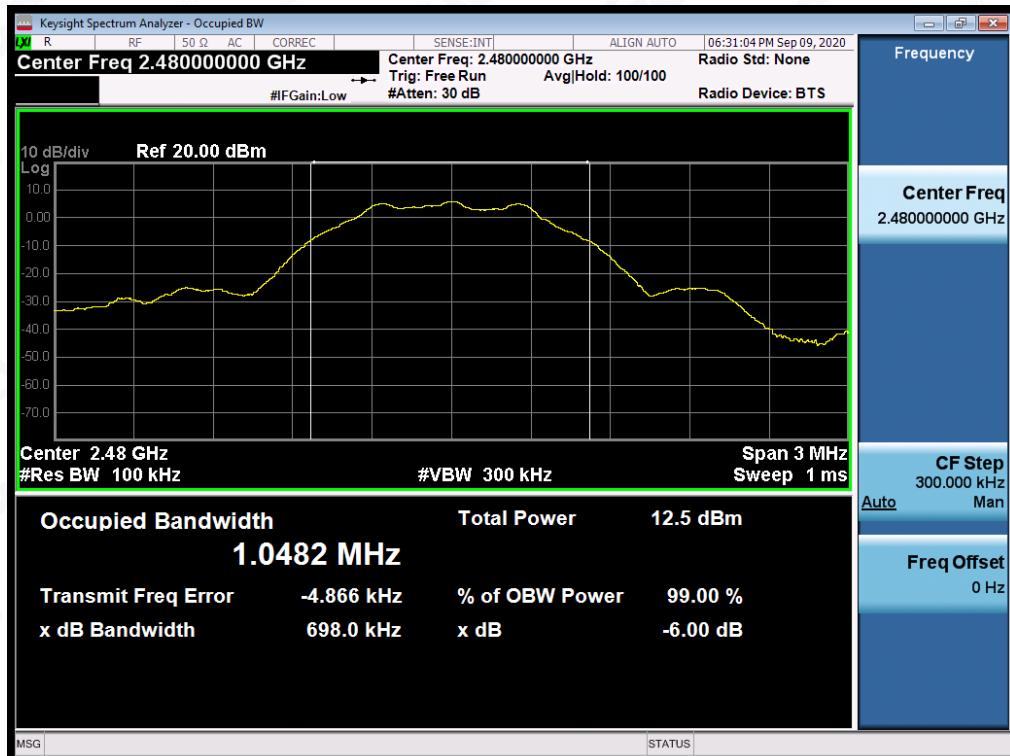
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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



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 | | |
|--|--|----------|
| Applicable Limits | Measurement Result | |
| | 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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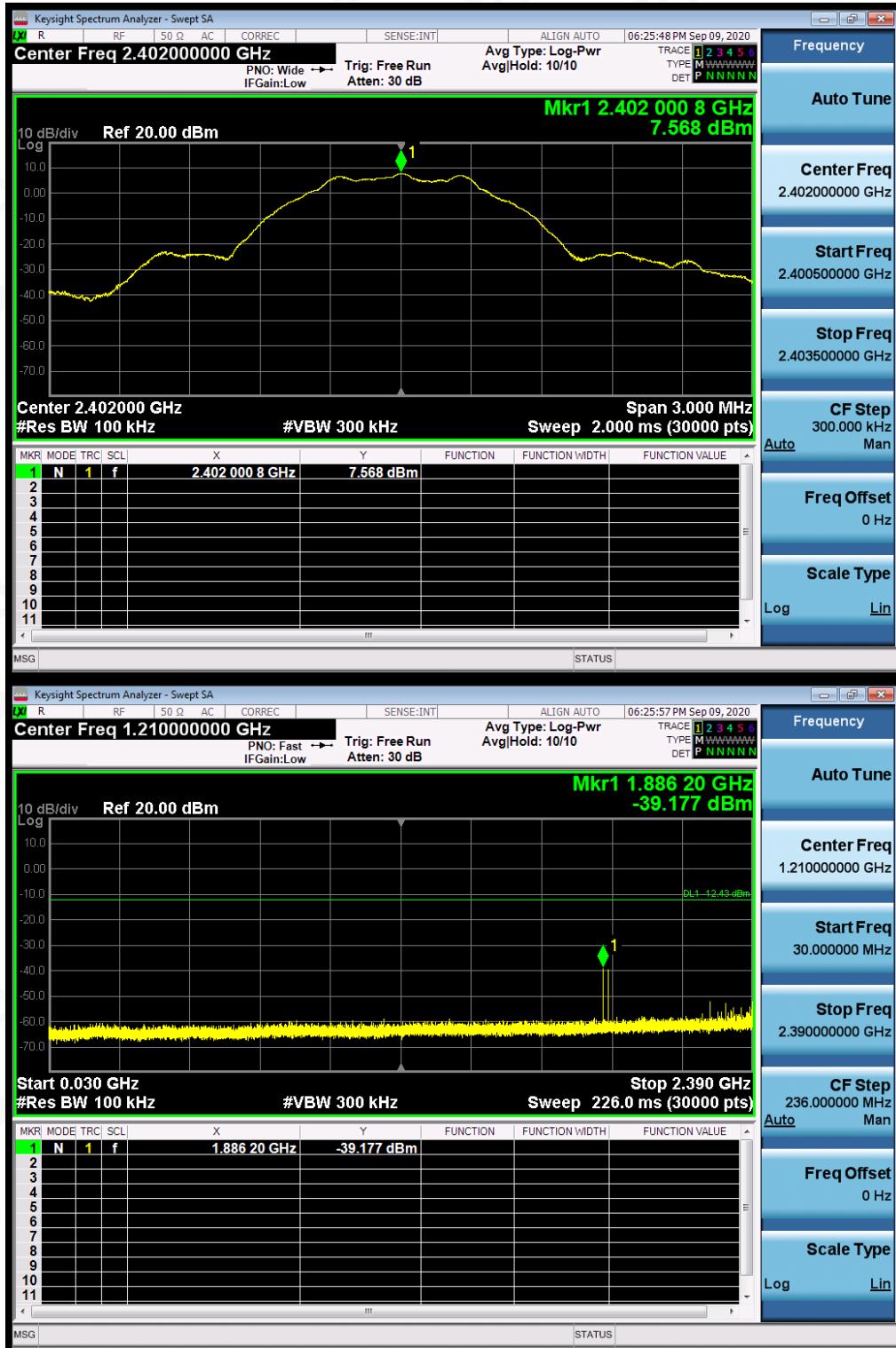
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TEST RESULT FOR ENTIRE FREQUENCY RANGE GFSK MODULATION IN LOW CHANNEL



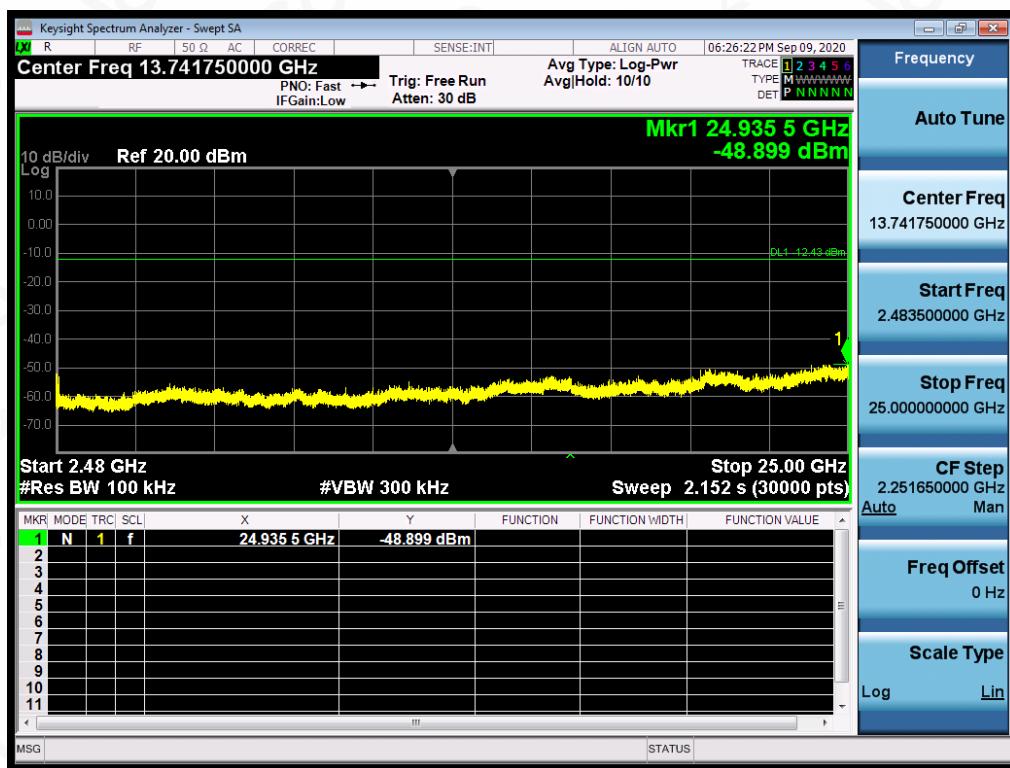
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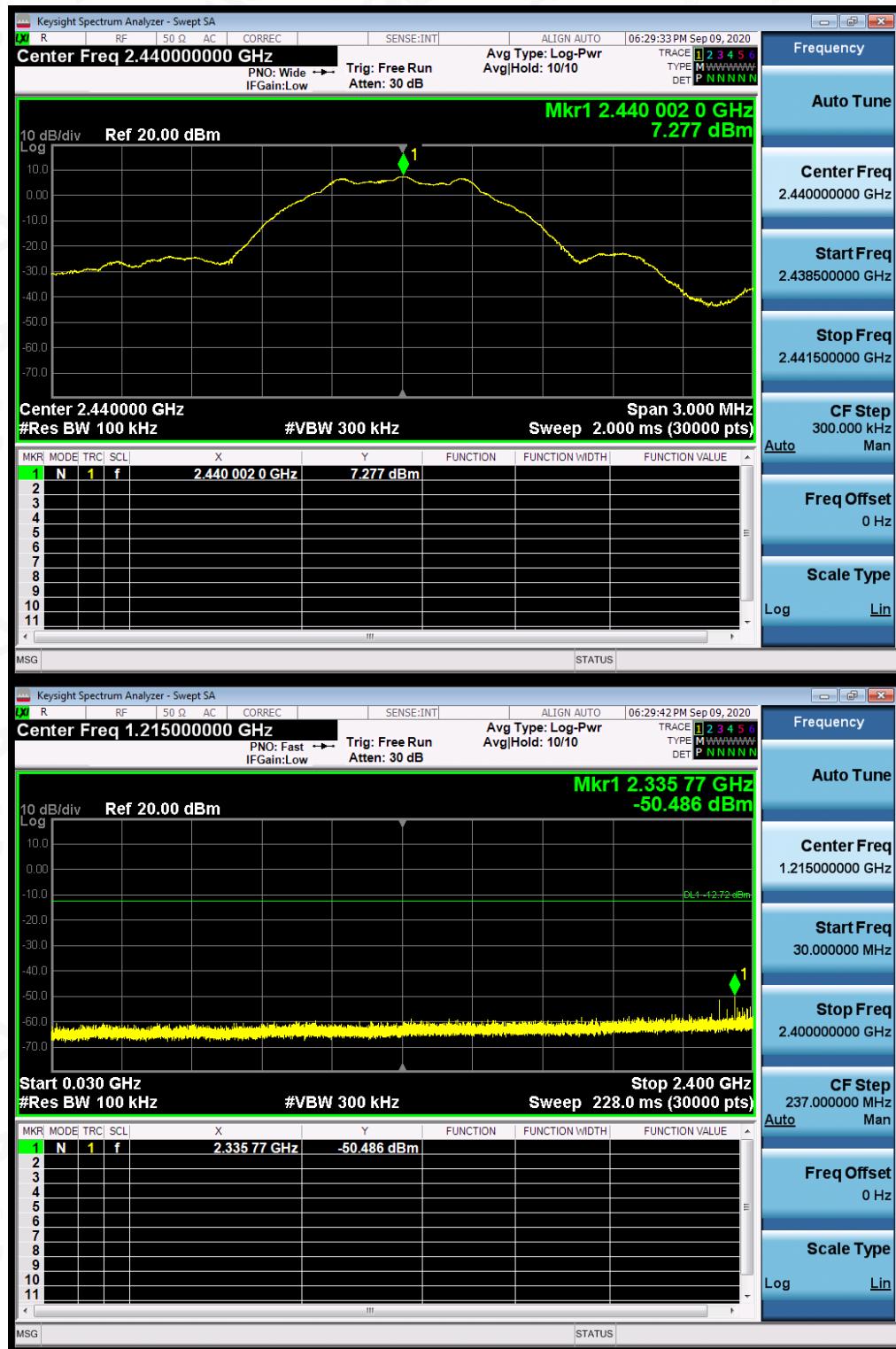
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GFSK MODULATION IN MIDDLE CHANNEL



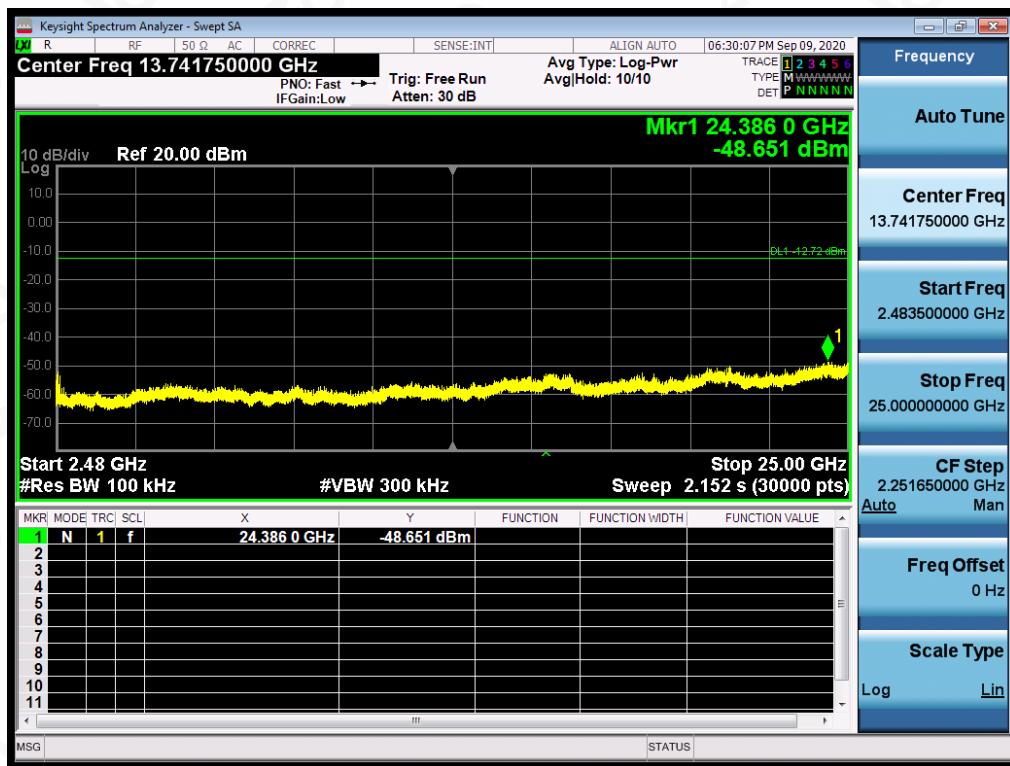
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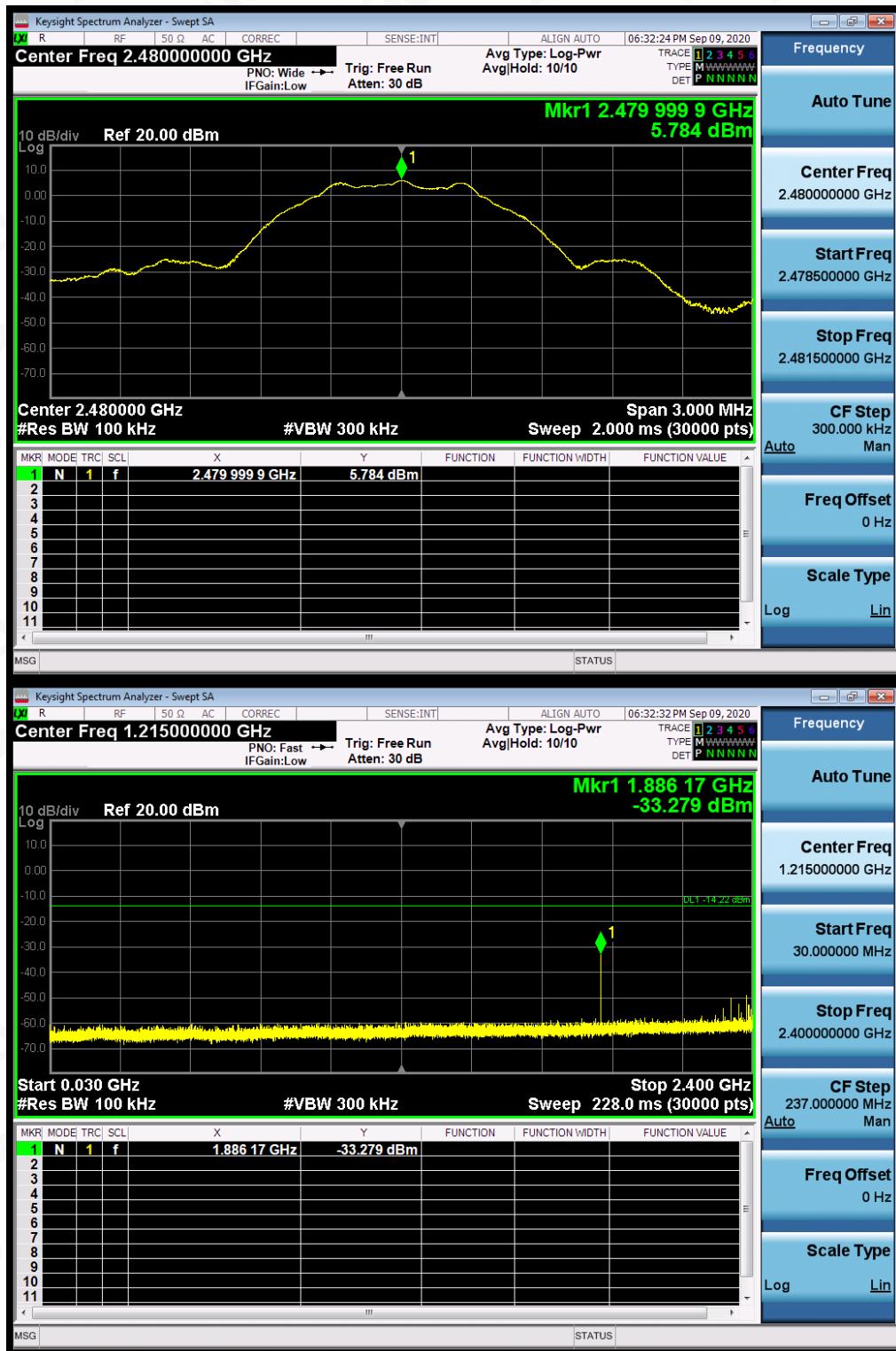
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GFSK MODULATION IN HIGH CHANNEL



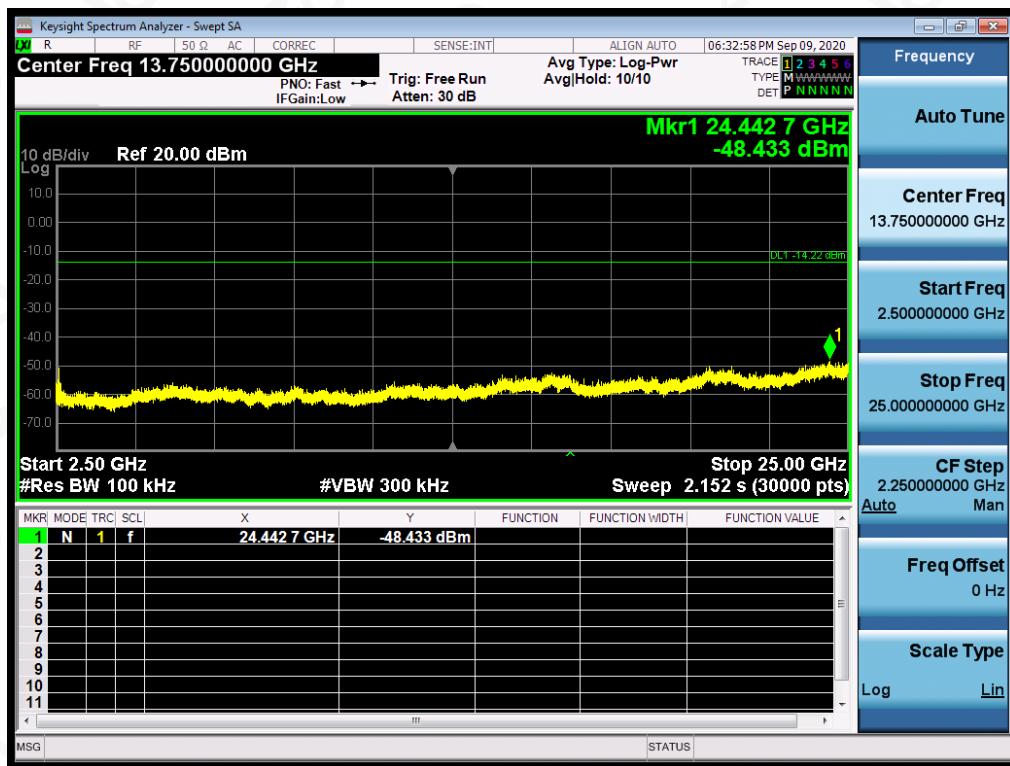
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Note: The peak emissions without marker on the above plots are fundamental wave and need not to compare with the limit.

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TEST RESULT FOR BAND EDGE GFSK MODULATION IN LOW CHANNEL



GFSK MODULATION IN HIGH CHANNEL



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10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

10.1. 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 the SPA Trace 1 Max hold, then View.

Note: The method of PKPSD in the KDB 558074 item 10.2 was used in this testing.

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

Refer to Section 7.2.

10.3. MEASUREMENT EQUIPMENT USED

Refer to Section 6.

10.4. LIMITS AND MEASUREMENT RESULT

| Channel No. | PSD (dBm/3kHz) | Limit (dBm/3kHz) | Result |
|----------------|-------------------|---------------------|--------|
| Low Channel | -7.863 | 8 | Pass |
| Middle Channel | -8.121 | 8 | Pass |
| High Channel | -9.636 | 8 | Pass |

TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL



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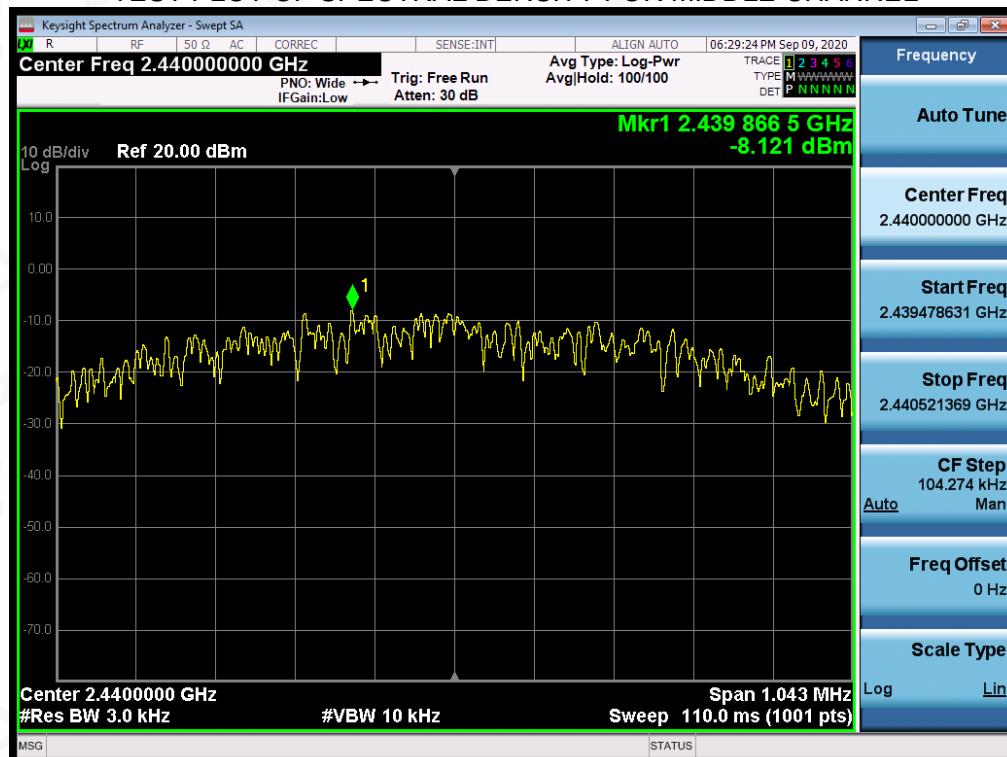
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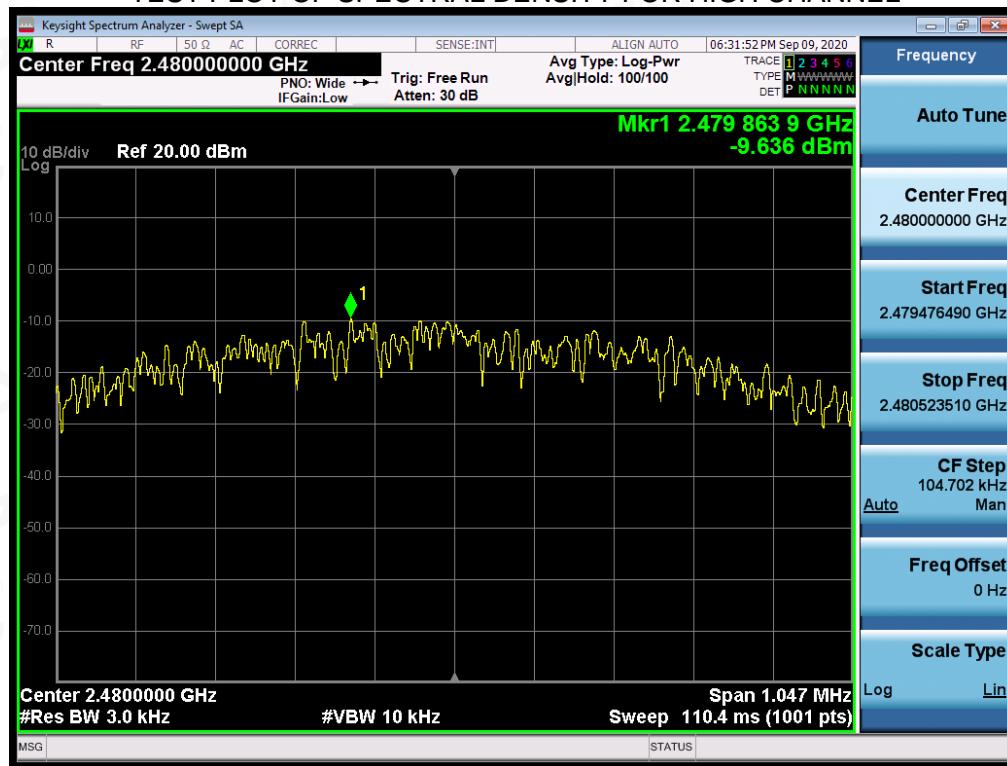
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TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



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11. RADIATED EMISSION

11.1. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

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The following table is the setting of spectrum analyzer and receiver.

| Spectrum Parameter | Setting |
|-----------------------|---|
| Start ~Stop Frequency | 9KHz~150KHz/RB 200Hz for QP |
| Start ~Stop Frequency | 150KHz~30MHz/RB 9KHz for QP |
| Start ~Stop Frequency | 30MHz~1000MHz/RB 120KHz for QP |
| Start ~Stop Frequency | 1GHz~26.5GHz 1MHz/3MHz for Peak, 1MHz/3MHz for Average |

| Receiver Parameter | Setting |
|-----------------------|--------------------------------|
| Start ~Stop Frequency | 9KHz~150KHz/RB 200Hz for QP |
| Start ~Stop Frequency | 150KHz~30MHz/RB 9KHz for QP |
| Start ~Stop Frequency | 30MHz~1000MHz/RB 120KHz for QP |

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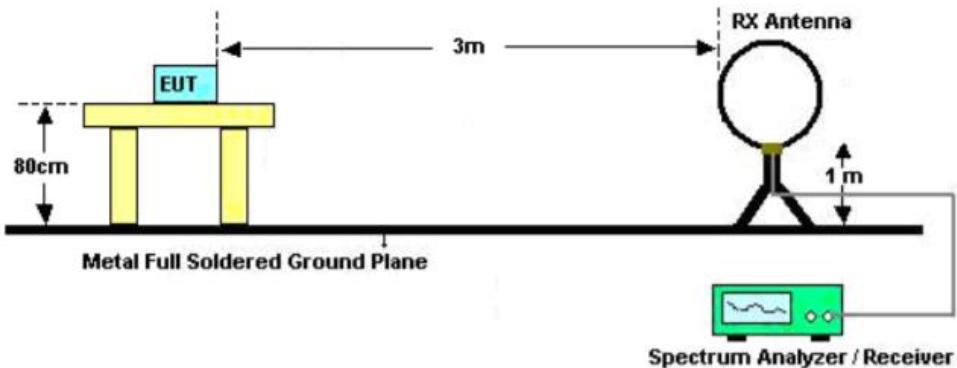
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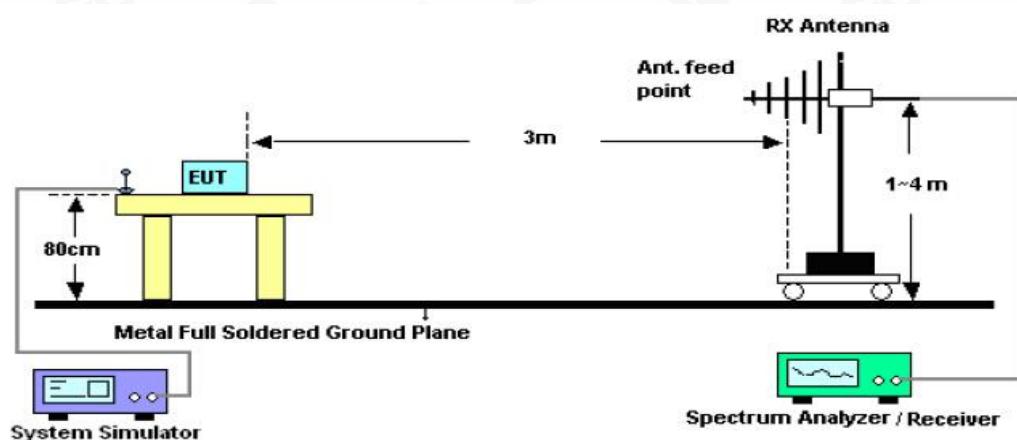


11.2. TEST SETUP

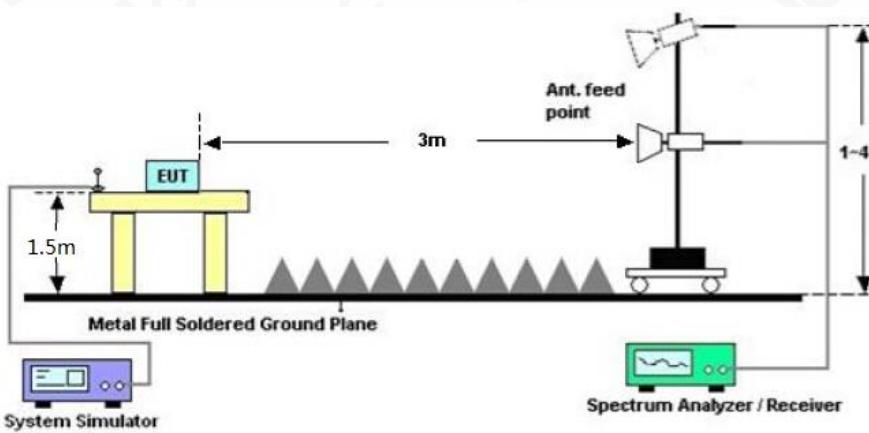
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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11.3. LIMITS AND MEASUREMENT RESULT

15.209 Limit in the below table has to be followed

| Frequencies (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|------------------------------|--|--|
| 0.009~0.490 | 2400/F(kHz) | 300 |
| 0.490~1.705 | 24000/F(kHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

11.4. TEST RESULT**RADIATED EMISSION BELOW 30MHz**

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

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