



Compliance Certification Services (Kunshan) Inc.

CCSEM-TRF-001 Rev. 02 Sep 01, 2023

Report No.: KSCR241000206802

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TEST REPORT

Application No.: KSCR2410002068HS
FCC ID: OU5MULW01
IC: 4048B-MULW01
Applicant: GE Medical Systems Information Technologies, Inc.
Address of Applicant: 8200 West Tower Avenue, Milwaukee, Wisconsin, 53223, United States
Manufacturer: GE Medical Systems Information Technologies, Inc.
Address of Manufacturer: 8200 West Tower Avenue, Milwaukee, Wisconsin, 53223, United States
Equipment Under Test (EUT):
EUT Name: WLAN Module
Model No.: WLANCSMOD
Trade Mark: GE HealthCare
Standard(s) : 47 CFR Part 15, Subpart C 15.247
RSS-247 Issue 3, August 2023
RSS-Gen Issue 5 Amendment 2 (February 2021)
Date of Receipt: 2024-06-06
Date of Test: 2024-06-07 to 2024-07-10
Date of Issue: 2024-07-12

| | |
|---------------------|--------------|
| Test Result: | Pass* |
|---------------------|--------------|

* In the configuration tested, the EUT complied with the standards specified above.

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.



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| Revision Record | | | |
|-----------------|-------------|------------|--------|
| Version | Description | Date | Remark |
| 00 | Original | 2024-07-12 | / |
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| | | | |

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|--------------------------|--|------------------------------------|--|
| Authorized for issue by: | | | |
| Tested By | | <i>Damon Zhou</i> | |
| | | <u>Damon_Zhou/Project Engineer</u> | |
| Approved By | | <i>Terry Hou</i> | |
| | | <u>Terry Hou /Reviewer</u> | |

2 Test Summary

| Radio Spectrum Technical Requirement | | | | |
|--------------------------------------|--|--------------------|--------|----------------------|
| Item | FCC Requirement | IC Requirement | Method | Result |
| Antenna Requirement | 47 CFR Part 15, Subpart C 15.203 & 15.247(c) | RSS-Gen Clause 6.8 | N/A | Customer Declaration |

N/A: Not applicable

| Radio Spectrum Matter Part | | | | |
|---|--|---|--|--------|
| Item | FCC Requirement | IC Requirement | Method | Result |
| Minimum 6dB Bandwidth | 47 CFR Part 15, Subpart C 15.247a(2) | RSS-247 Clause 5.2(a) | ANSI C63.10 (2013) Section 11.8.1 | Pass |
| Conducted Peak Output Power | 47 CFR Part 15, Subpart C 15.247(b)(3) | RSS-247 Clause 5.4(d) | ANSI C63.10 (2013) Section 11.9.1 | Pass |
| Power Spectrum Density | 47 CFR Part 15, Subpart C 15.247(e) | RSS-247 Clause 5.2(b) | ANSI C63.10 (2013) Section 11.10.2 | Pass |
| Conducted Band Edges Measurement | 47 CFR Part 15, Subpart C 15.247(d) | RSS-247 Clause 5.5 | ANSI C63.10 (2013) Section 11.13.3.2 | Pass |
| Conducted Spurious Emissions | 47 CFR Part 15, Subpart C 15.247(d) | RSS-247 Clause 5.5 | ANSI C63.10 (2013) Section 11.11 | Pass |
| Radiated Emissions which fall in the restricted bands | 47 CFR Part 15, Subpart C 15.209 & 15.247(d) | RSS-247 Section 3.3 & RSS-Gen Section 8.9 | ANSI C63.10 (2013) Section 6.10.5 | Pass |
| Radiated Spurious Emissions | 47 CFR Part 15, Subpart C 15.209 & 15.247(d) | RSS-247 Section 3.3 & RSS-Gen Section 8.9 | ANSI C63.10 (2013) Section 6.4,6.5,6.6 | Pass |
| 99% Bandwidth | - | RSS-Gen Section 6.7 | ANSI C63.10 Section 6.9.3 | Pass |

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4 General Information

4.1 Details of E.U.T.

| | |
|----------------------|-------------------------------------|
| Power supply: | DC 3.3V |
| Test voltage: | DC 3.3V |
| Operation Frequency: | 2402MHz to 2480MHz |
| Bluetooth Version: | V4.1 Dual mode |
| Modulation Type: | GFSK |
| Number of Channels: | 40 |
| Channel Spacing: | 2MHz |
| Antenna Type: | FPC Antenna |
| Antenna Gain: | 2.71 dBi (Provided by manufacturer) |
| Antenna Number: | 1 |
| S/N: | 9180169-003 |
| Firmware Version: | (FRev) Rev 8.9.0.0.90 |

4.2 Description of Support Units

| Description | Manufacturer | Model No. | Serial No. |
|-------------|--------------|-----------|------------|
| PC | Lenovo | - | - |

4.3 Power level setting using in test

| Channel | Power setting |
|---------|---------------|
| 0 | 5 |
| 19 | 5 |
| 39 | 5 |

4.4 Measurement Uncertainty

| No. | Item | Measurement Uncertainty |
|---|---------------------------------|-------------------------|
| 1 | Radio Frequency | 8.4 x 10 ⁻⁸ |
| 2 | Timeout | 2s |
| 3 | Duty Cycle | 0.37% |
| 4 | Occupied Bandwidth | 3% |
| 5 | RF Conducted Power | 0.6dB |
| 6 | RF Power Density | 2.9dB |
| 7 | Conducted Spurious Emissions | 0.75dB |
| 8 | RF Radiated Power | 5.2dB (Below 1GHz) |
| | | 5.9dB (Above 1GHz) |
| 9 | Radiated Spurious Emission Test | 4.2dB (Below 30MHz) |
| | | 4.5dB (30MHz-1GHz) |
| | | 5.1dB (1GHz-18GHz) |
| | | 5.4dB (Above 18GHz) |
| 10 | Temperature Test | 1°C |
| 11 | Humidity Test | 3% |
| 12 | Supply Voltages | 1.5% |
| 13 | Time | 3% |
| <p>Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.</p> | | |

4.5 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.

Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

No tests were sub-contracted.

Note:

1. SGS is not responsible for wrong test results due to incorrect information (e.g. max. clock frequency, highest internal frequency, antenna gain, cable loss, etc) is provided by the applicant. (if applicable).
2. SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (if applicable).
3. Sample source: sent by customer.

4.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• **A2LA**

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

• **FCC**

Compliance Certification Services (Kunshan) Inc. has been recognized as an accredited testing laboratory. Designation Number: CN1172.

• **ISED**

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory. Company Number: 2324E

• **VCCI**

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600, C-11707, T-11499, G-10216 respectively.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None

5 Equipment List

| Item | Equipment | Manufacturer | Model | Inventory No | Cal Date | Cal. Due Date |
|--------------------------|--------------------------------------|-----------------------|-------------------------------|-----------------------|------------|---------------|
| RF Conducted Test | | | | | | |
| 1 | Spectrum Analyzer | Keysight | N9020A | KUS1911E004-2 | 08/01/2024 | 07/31/2025 |
| 2 | Spectrum Analyzer | Keysight | N9020A | KUS2001M001-2 | 08/01/2024 | 07/31/2025 |
| 3 | Spectrum Analyzer | Keysight | N9030B | KSEM021-1 | 01/15/2024 | 01/14/2025 |
| 4 | Signal Generator | R&S | SMBV100B | KSEM032 | 03/19/2024 | 03/18/2025 |
| 5 | Signal Generator | R&S | SMW200A | KSEM020-1 | 08/02/2024 | 08/01/2025 |
| 6 | Signal Generator | Agilent | N5182A | KUS2001M001-1 | 08/01/2024 | 07/31/2025 |
| 7 | Signal Generator | Agilent | E8257C | KS301066 | 08/06/2024 | 08/05/2025 |
| 8 | Radio Communication Test Station | Anritsu | MT8000A | KSEM001-1 | 08/01/2024 | 07/31/2025 |
| 9 | Radio Communication Analyzer | Anritsu | MT8821C | KSEM002-1 | 03/19/2024 | 03/18/2025 |
| 10 | Universal Radio Communication Tester | R&S | CMW500 | KUS1911E004-1 | 08/12/2024 | 08/11/2025 |
| 11 | Switcher | TST | FY562 | KUS2001M001-4 | 01/15/2024 | 01/14/2025 |
| 12 | Conducted Test Cable | Thermax | RF01-RF04 | CZ301111- CZ301120 | 01/15/2024 | 01/14/2025 |
| 13 | Temp. / Humidity Chamber | TERCHY | MHK-120AK | KS301190 | 08/26/2024 | 08/25/2025 |
| 14 | Temperature & Humidity Recorder | Renke Control | RS-WS-N01-6J | KSEM024-5 | 03/19/2024 | 03/18/2025 |
| 15 | Test software | Tonscend | JS Tonscend BT/WIFI System | Version: 2.6 | NCR | NCR |
| RF Radiated Test | | | | | | |
| 1 | Spectrum Analyzer | R&S | FSV40 | KUS1806E003 | 08/06/2024 | 08/05/2025 |
| 2 | Universal Radio Communication Tester | R&S | CMW500 | KSEM009-1 | 03/19/2024 | 03/18/2025 |
| 4 | Loop Antenna | COM-POWER | AL-130R | KUS1806E001 | 03/18/2023 | 03/17/2025 |
| 5 | Bilog Antenna | TESEQ | CBL 6112D | KUS1806E005 | 06/29/2023 | 06/28/2025 |
| 6 | Bilog Antenna | TESEQ | CBL 6112D | KUS1806E006 | 03/19/2024 | 03/18/2025 |
| 7 | Horn-antenna(1-18GHz) | Schwarzbeck | BBHA9120D | KS301079 | 03/23/2024 | 08/22/2026 |
| 8 | Horn-antenna(1-18GHz) | ETS-LINDGREN | 3117 | KS301186 | 04/07/2023 | 04/06/2025 |
| 9 | Horn Antenna(18-40GHz) | Schwarzbeck | BBHA9170 | CZ301058 | 01/07/2024 | 01/06/2026 |
| 10 | Amplifier(30MHz~18GHz) | PANSHAN TECHNOLOGY | LNA:1~18G | KSEM010-1 | 01/15/2024 | 01/14/2025 |
| 11 | Amplifier(18~40GHz) | PANSHAN TECHNOLOGY | LNA180400G40 | KSEM038 | 08/12/2024 | 08/11/2025 |
| 12 | RE Test Cable | REBES MICROWAVE | / | CZ301097 | 08/12/2024 | 08/11/2025 |
| 13 | Temperature & Humidity Recorder | Renke Control | RS-WS-N01-6J | KSEM024-4 | 03/21/2024 | 03/20/2025 |
| 14 | Software | Faratronic | EZ_EMV-v 3A1 | / | NCR | NCR |
| 15 | Software | ESE | E3_V 6.111221a | / | NCR | NCR |

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

6.1.2 Conclusion

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is FPC antenna and no consideration of replacement. The best case gain of the antenna is 2.71 dBi.

Antenna location: Refer to internal photo.

7 Radio Spectrum Matter Test Results

7.1 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(3)

Test Method: ANSI C63.10 (2013) Section 11.9.1

Limit:

| Frequency range(MHz) | Output power of the intentional radiator(watt) |
|----------------------|--|
| 902-928 | 1 for ≥ 50 hopping channels |
| | 0.25 for $25 \leq$ hopping channels < 50 |
| | 1 for digital modulation |
| 2400-2483.5 | 1 for ≥ 75 non-overlapping hopping channels |
| | 0.125 for all other frequency hopping systems |
| | 1 for digital modulation |
| 5725-5850 | 1 for frequency hopping systems and digital modulation |

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25.9 °C

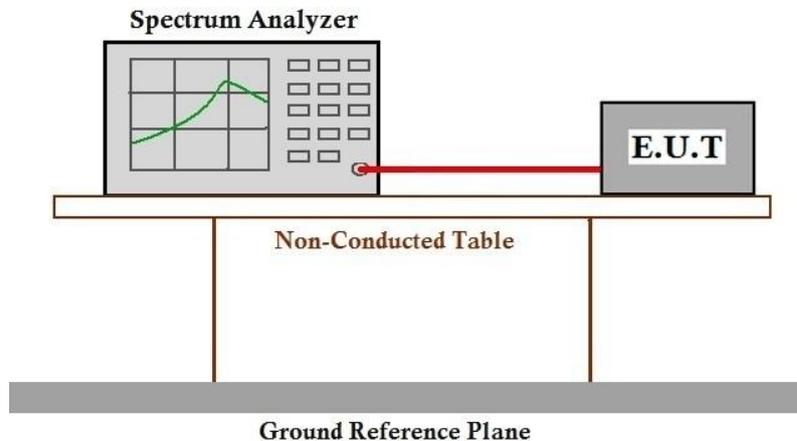
Humidity: 70.9 % RH

Atmospheric Pressure: 1010 mbar

7.1.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|-----------------------|-----------|---|
| Final test | 02 | TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation. |

7.1.3 Test Setup Diagram



7.1.4 Measurement Procedure and Data

Note: Since the verify power the same operating range bandwidth and smaller power can be covered by the higher power.

Please Refer to Appendix for Details

7.2 Minimum 6dB Bandwidth

Test Requirement: 47 CFR Part 15, Subpart C 15.247a(2)
 Test Method: ANSI C63.10 (2013) Section 11.8.1
 Limit: ≥ 500 kHz

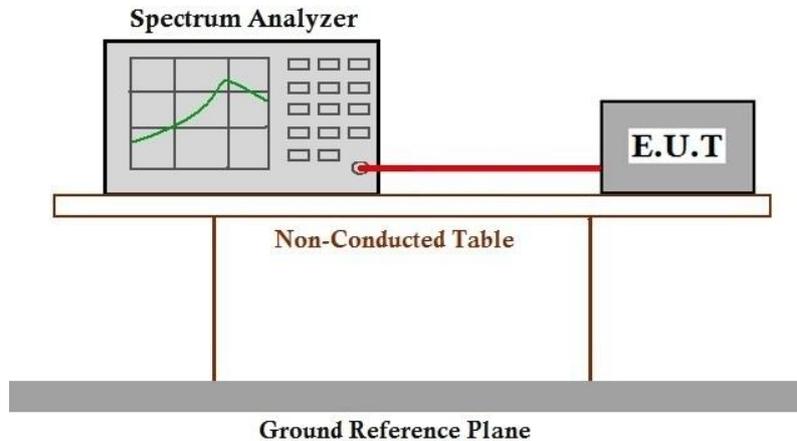
7.2.1 E.U.T. Operation

Operating Environment:
 Temperature: 25.9 °C Humidity: 70.8 % RH Atmospheric Pressure: 1010 mbar

7.2.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|-----------------------|-----------|---|
| Final test | 02 | TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation. |

7.2.3 Test Setup Diagram



7.2.4 Measurement Procedure and Data

Please Refer to Appendix for Details

7.3 Power Spectrum Density

Test Requirement 47 CFR Part 15, Subpart C 15.247(e)

Test Method: ANSI C63.10 (2013) Section 11.10.2

Limit:

≤8dBm in any 3 kHz band during any time interval of continuous transmission

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 25.9 °C

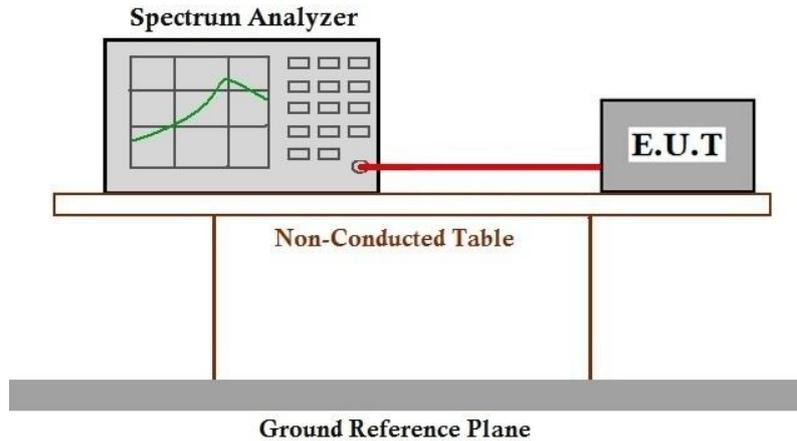
Humidity: 70.8 % RH

Atmospheric Pressure: 1010 mbar

7.3.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|-----------------------|-----------|---|
| Final test | 02 | TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation. |

7.3.3 Test Setup Diagram



7.3.4 Measurement Procedure and Data

Please Refer to Appendix for Details

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7.4 Conducted Band Edges Measurement

Test Requirement: 47 CFR Part 15, Subpart C 15.247(d)
 Test Method: ANSI C63.10 (2013) Section 11.13.3.2

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

7.4.1 E.U.T. Operation

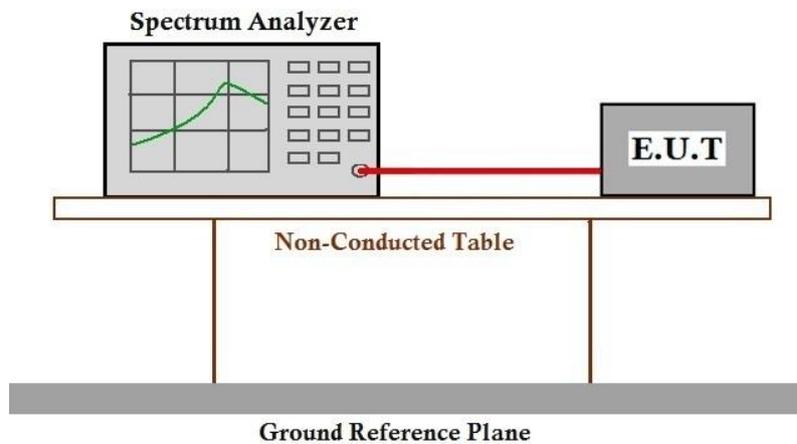
Operating Environment:

Temperature: 25.9 °C Humidity: 70.7 % RH Atmospheric Pressure: 1010 mbar

7.4.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|-----------------------|-----------|---|
| Final test | 02 | TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation. |

7.4.3 Test Setup Diagram



7.4.4 Measurement Procedure and Data

Please Refer to Appendix for Details

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7.5 Conducted Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)

Test Method: ANSI C63.10 (2013) Section 11.11

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

7.5.1 E.U.T. Operation

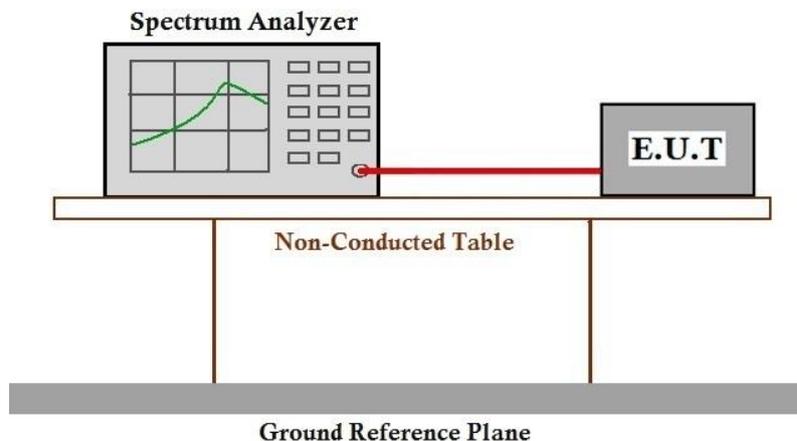
Operating Environment:

Temperature: 25.9 °C Humidity: 70.6 % RH Atmospheric Pressure: 1010 mbar

7.5.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|-----------------------|-----------|---|
| Final test | 02 | TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation. |

7.5.3 Test Setup Diagram



7.5.4 Measurement Procedure and Data

Please Refer to Appendix for Details

7.6 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.10.5

Limit:

| Frequency(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 |

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 25.9 °C

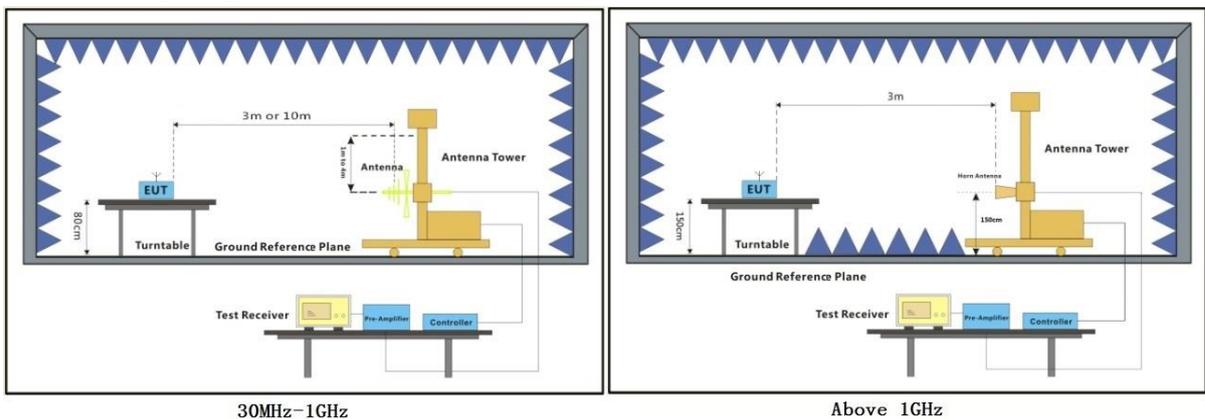
Humidity: 70.6 % RH

Atmospheric Pressure: 1010 mbar

7.6.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|-----------------------|-----------|---|
| Final test | 02 | TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation. |

7.6.3 Test Setup Diagram



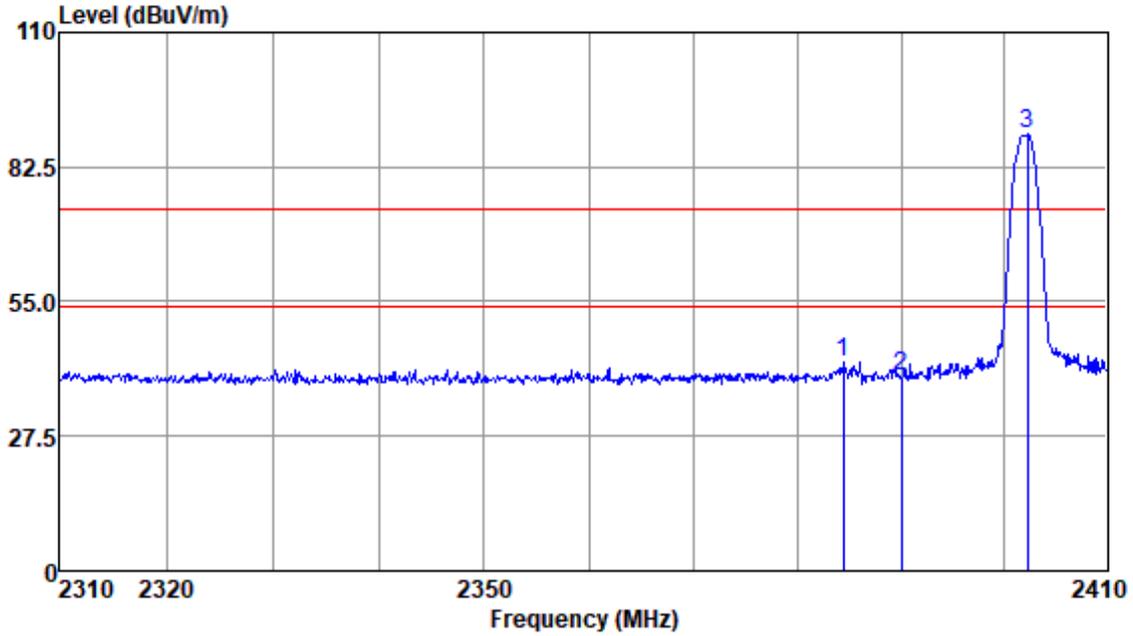
7.6.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 1: $Level = Read\ Level + Cable\ Loss + Antenna\ Factor - Preamp\ Factor$

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Antenna Polarity :HORIZONTAL
EUT/Project :1076ME

| Freq | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limit Line | Over Limit | Remark |
|---------|------------|----------------|------------|---------------|----------------|------------|------------|--------|
| MHz | dBuv | dB/m | dB | dB | dBuv/m | dBuv/m | dB | |
| 2384.40 | 45.66 | 28.80 | 3.34 | 35.18 | 42.62 | 74.00 | -31.38 | Peak |
| 2390.00 | 42.90 | 28.80 | 3.34 | 35.18 | 39.86 | 74.00 | -34.14 | Peak |
| 2402.25 | 92.10 | 28.85 | 3.34 | 35.19 | 89.10 | 74.00 | 15.10 | Peak |

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

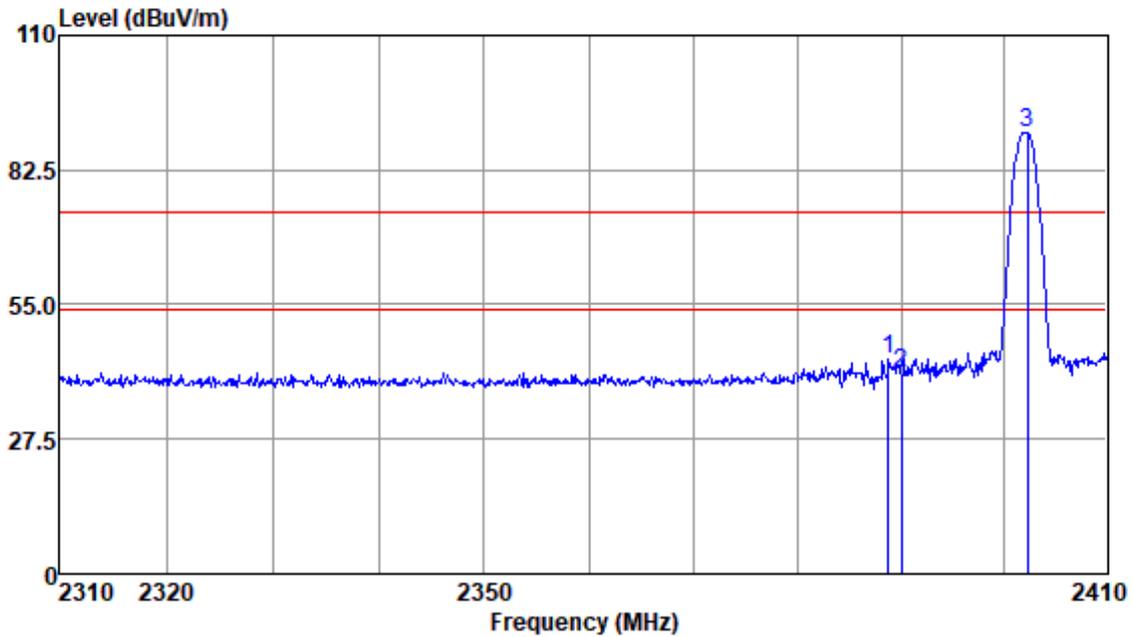
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:Low



Antenna Polarity :VERTICAL
EUT/Project :1076ME

| Freq | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limit Line | Over Limit | Remark |
|---------|------------|----------------|------------|---------------|----------------|------------|------------|--------|
| MHz | dBuv | dB/m | dB | dB | dBuv/m | dBuv/m | dB | |
| 2388.75 | 46.76 | 28.80 | 3.34 | 35.18 | 43.72 | 74.00 | -30.28 | Peak |
| 2390.00 | 43.96 | 28.80 | 3.34 | 35.18 | 40.92 | 74.00 | -33.08 | Peak |
| 2402.25 | 93.05 | 28.85 | 3.34 | 35.19 | 90.05 | 74.00 | 16.05 | Peak |

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

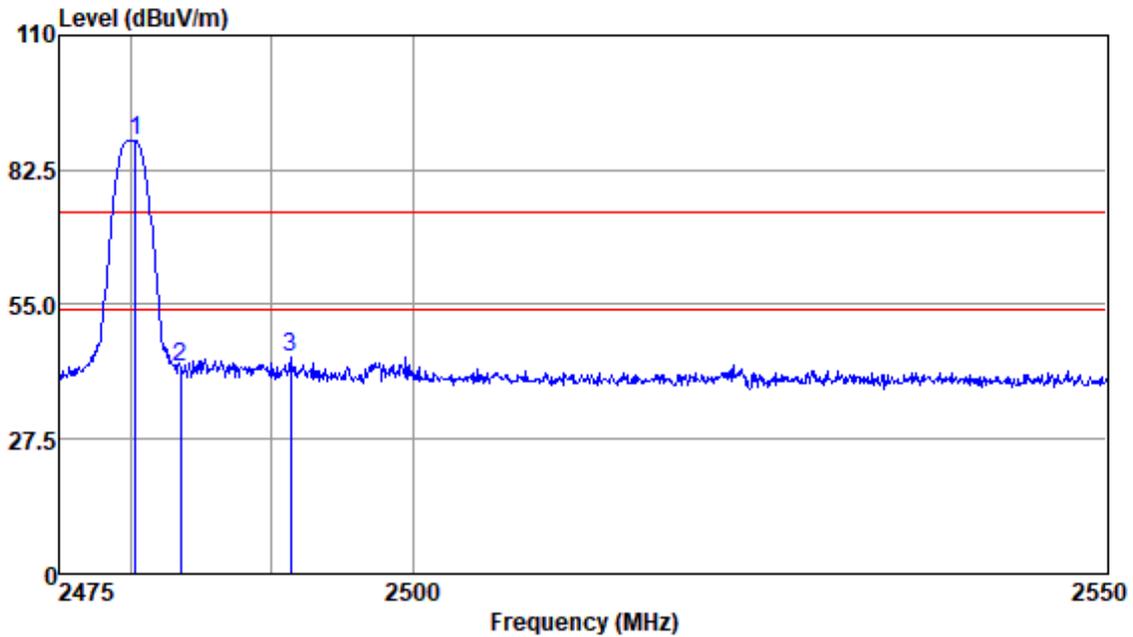
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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:High



Antenna Polarity :HORIZONTAL
EUT/Project :1076ME

| Freq | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limit Line | Over Limit | Remark |
|---------|------------|----------------|------------|---------------|----------------|------------|------------|--------|
| MHz | dBuv | dB/m | dB | dB | dBuv/m | dBuv/m | dB | |
| 2480.33 | 91.21 | 29.08 | 3.40 | 35.25 | 88.44 | 74.00 | 14.44 | Peak |
| 2483.50 | 45.07 | 29.09 | 3.36 | 35.26 | 42.26 | 74.00 | -31.74 | Peak |
| 2491.31 | 46.95 | 29.10 | 3.33 | 35.26 | 44.12 | 74.00 | -29.88 | Peak |

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

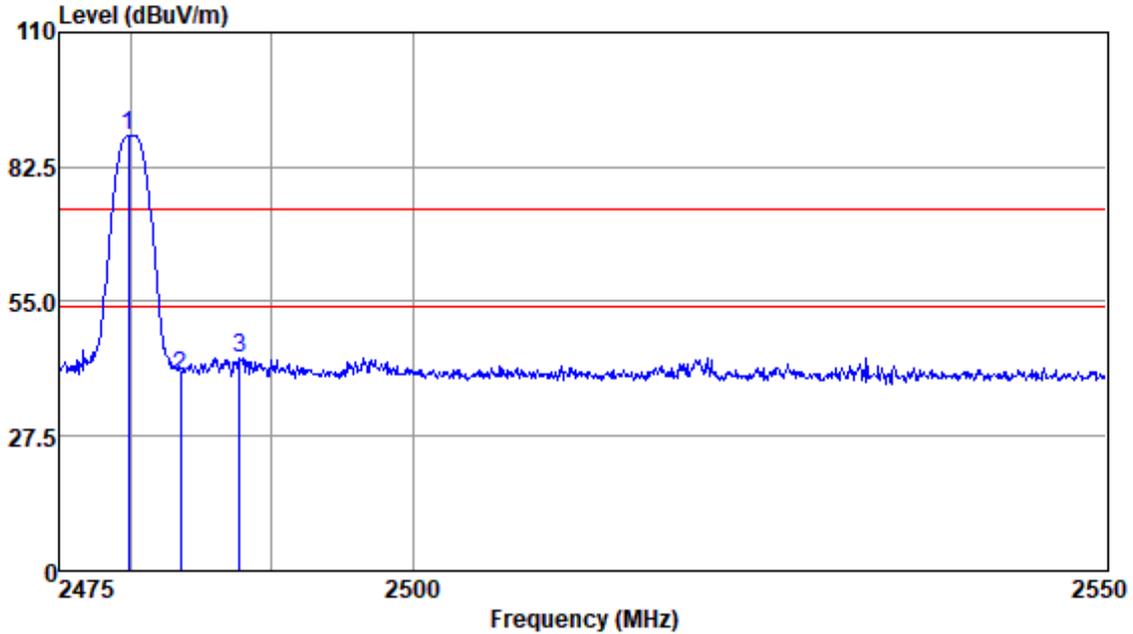
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:High



Antenna Polarity :VERTICAL
EUT/Project :1076ME

| Freq | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limit Line | Over Limit | Remark |
|---------|------------|----------------|------------|---------------|----------------|------------|------------|--------|
| MHz | dBuv | dB/m | dB | dB | dBuv/m | dBuv/m | dB | |
| 2479.81 | 91.59 | 29.08 | 3.40 | 35.25 | 88.82 | 74.00 | 14.82 | Peak |
| 2483.50 | 42.69 | 29.09 | 3.36 | 35.26 | 39.88 | 74.00 | -34.12 | Peak |
| 2487.74 | 46.41 | 29.09 | 3.36 | 35.26 | 43.60 | 74.00 | -30.40 | Peak |

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

7.7 Radiated Spurious Emissions Below 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.4,6.5

Limit:

| Frequency(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 |
| 960-1000 | 500 | 3 |

7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C

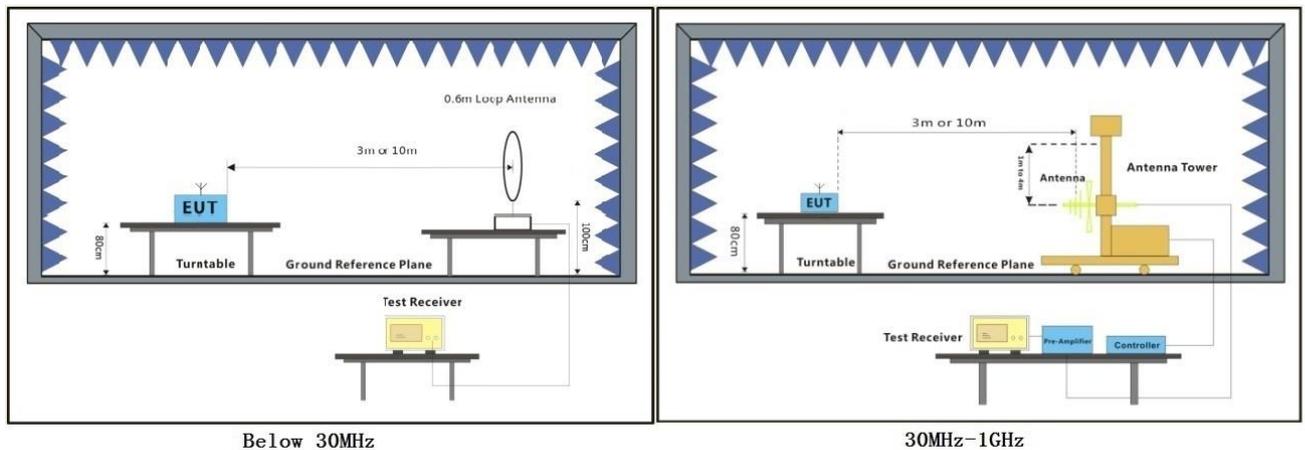
Humidity: 50 % RH

Atmospheric Pressure: 1010 mbar

7.7.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|-----------------------|-----------|---|
| Final test | 02 | TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation. |

7.7.3 Test Setup Diagram



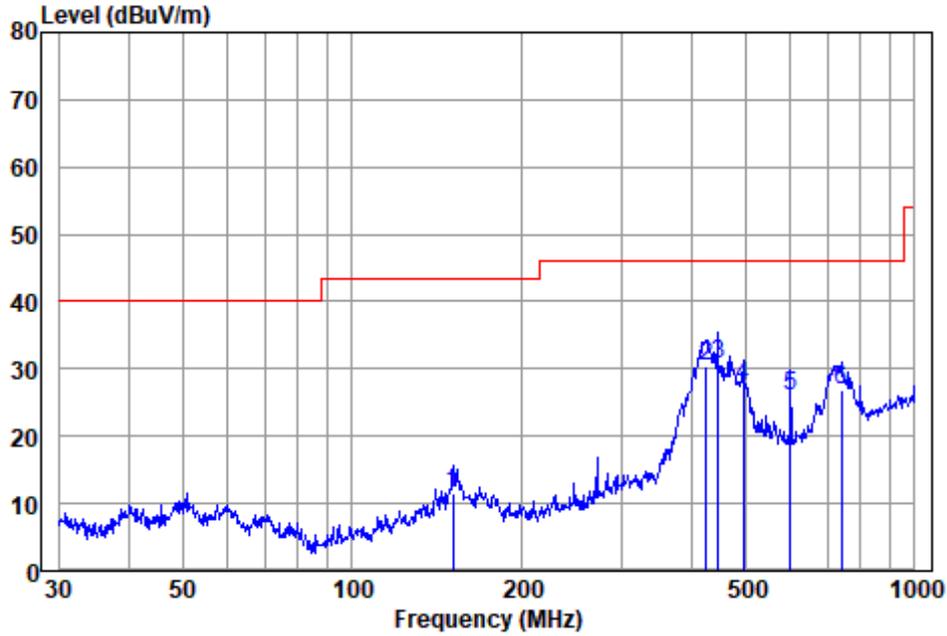
7.7.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using quasi-peak method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete.

Remark:

- 1. $Level = Read\ Level + Cable\ Loss + Antenna\ Factor - Preamp\ Factor$
- 2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

Test Mode: 02; Polarity: Horizontal

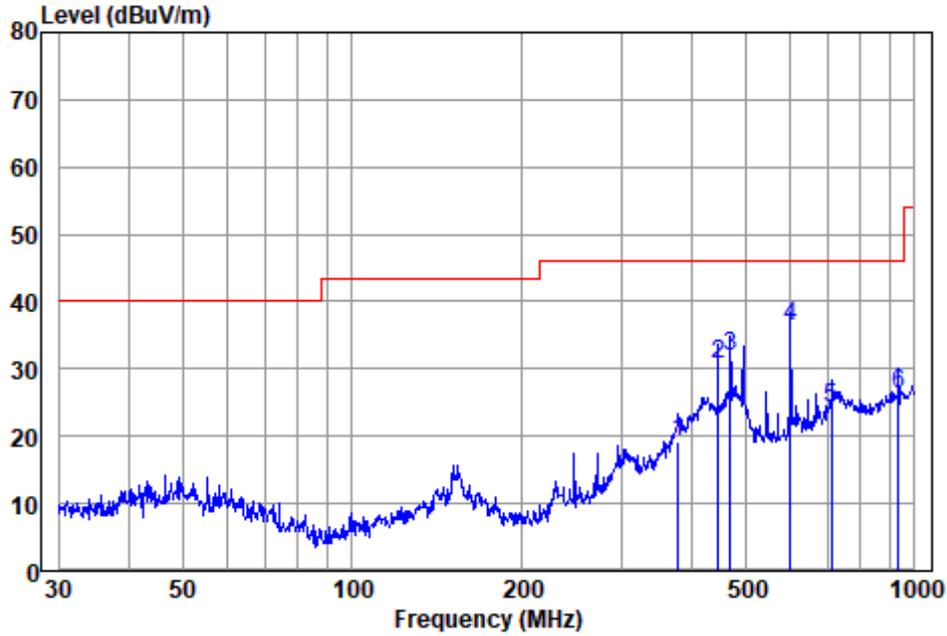


Antenna Polarity :HORIZONTAL
 EUT/Project :1076ME
 Test mode :02

| | Freq | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limit Line | Over Limit | Remark |
|---|---------|------------|----------------|------------|---------------|----------------|------------|------------|--------|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 151.067 | 28.08 | 13.80 | 2.62 | 33.00 | 11.50 | 43.50 | -32.00 | QP |
| 2 | 425.028 | 42.18 | 16.45 | 4.49 | 32.75 | 30.37 | 46.00 | -15.63 | QP |
| 3 | 446.414 | 41.45 | 17.13 | 4.70 | 32.71 | 30.57 | 46.00 | -15.43 | QP |
| 4 | 495.934 | 37.27 | 17.92 | 4.90 | 32.70 | 27.39 | 46.00 | -18.61 | QP |
| 5 | 601.427 | 33.06 | 20.02 | 5.44 | 32.69 | 25.83 | 46.00 | -20.17 | QP |
| 6 | 739.661 | 31.25 | 22.10 | 6.16 | 32.64 | 26.87 | 46.00 | -19.13 | QP |

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Test Mode: 02; Polarity: Vertical



Antenna Polarity :VERTICAL
 EUT/Project :1076ME
 Test mode :02

| | Freq | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limit | Over | Remark |
|---|---------|------------|----------------|------------|---------------|----------------|--------|--------|--------|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 379.914 | 32.55 | 15.30 | 4.14 | 32.76 | 19.23 | 46.00 | -26.77 | QP |
| 2 | 446.414 | 41.64 | 17.13 | 4.70 | 32.71 | 30.76 | 46.00 | -15.24 | QP |
| 3 | 470.523 | 42.38 | 17.50 | 4.79 | 32.70 | 31.97 | 46.00 | -14.03 | QP |
| 4 | 601.427 | 43.48 | 20.02 | 5.44 | 32.69 | 36.25 | 46.00 | -9.75 | QP |
| 5 | 711.674 | 29.41 | 21.25 | 6.01 | 32.46 | 24.21 | 46.00 | -21.79 | QP |
| 6 | 935.546 | 26.97 | 23.70 | 7.08 | 31.57 | 26.18 | 46.00 | -19.82 | QP |

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

7.8 Radiated Spurious Emissions Above 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.6

Limit:

| Frequency(MHz) | Field strength(microvolts/meter) | Measurement distance(meters) |
|----------------|----------------------------------|------------------------------|
| Above 1000 | 500 | 3 |

7.8.1 E.U.T. Operation

Operating Environment:

Temperature: 25.9 °C

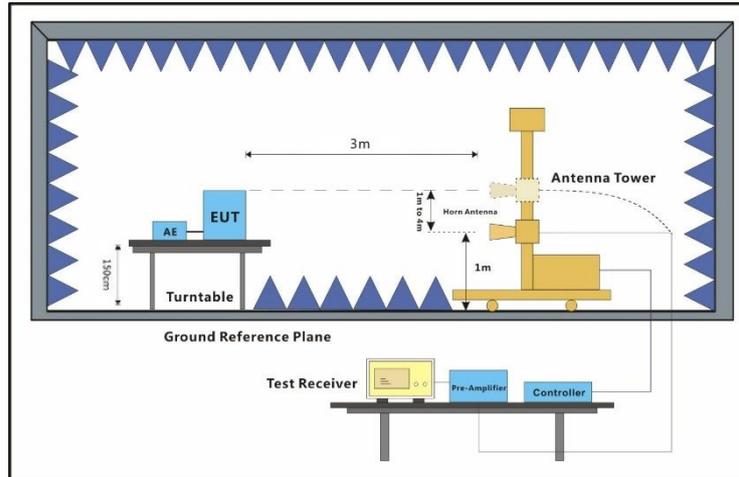
Humidity: 70.5 % RH

Atmospheric Pressure: 1010 mbar

7.8.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|-----------------------|-----------|---|
| Final test | 02 | TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation. |

7.8.3 Test Setup Diagram



7.8.4 Measurement Procedure and Data

- a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete.

Remark:

- 1. $Level = Read\ Level + Cable\ Loss + Antenna\ Factor - Preamp\ Factor$
- 2. Scan from 1GHz to 25GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

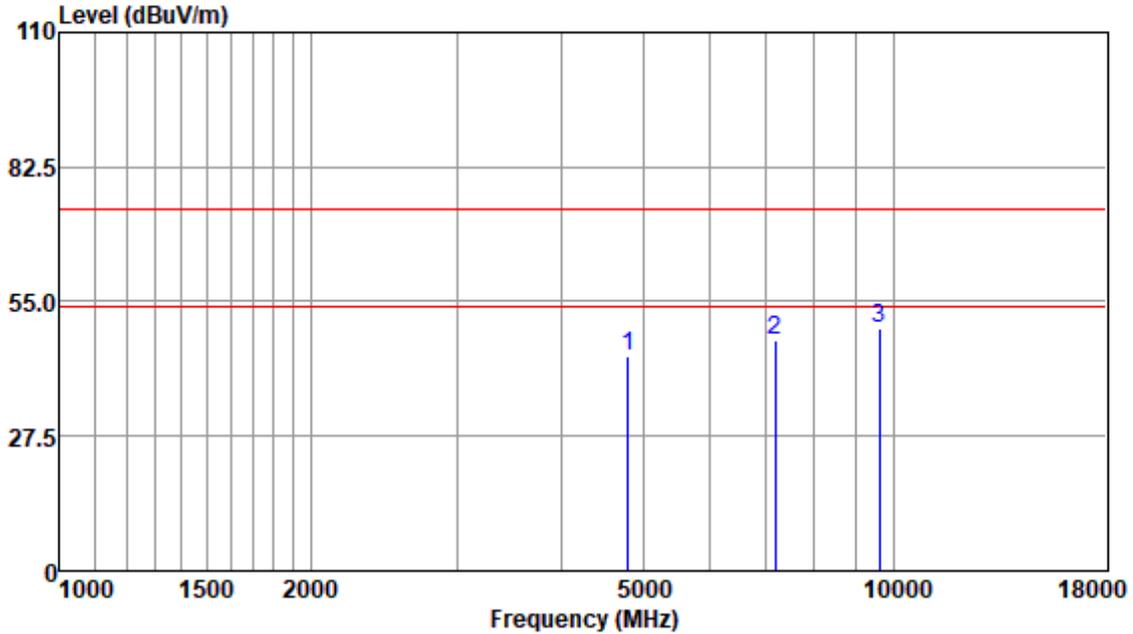
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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Antenna Polarity :HORIZONTAL
EUT/Project :1076ME

| Freq | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limit Line | Over Limit | Remark |
|---------|------------|----------------|------------|---------------|----------------|------------|------------|--------|
| MHz | dBuv | dB/m | dB | dB | dBuv/m | dBuv/m | dB | |
| 4804.11 | 42.02 | 33.57 | 5.22 | 36.79 | 44.02 | 74.00 | -29.98 | Peak |
| 7206.31 | 39.27 | 36.24 | 7.13 | 35.53 | 47.11 | 74.00 | -26.89 | Peak |
| 9608.43 | 36.49 | 37.75 | 8.66 | 33.58 | 49.32 | 74.00 | -24.68 | Peak |

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

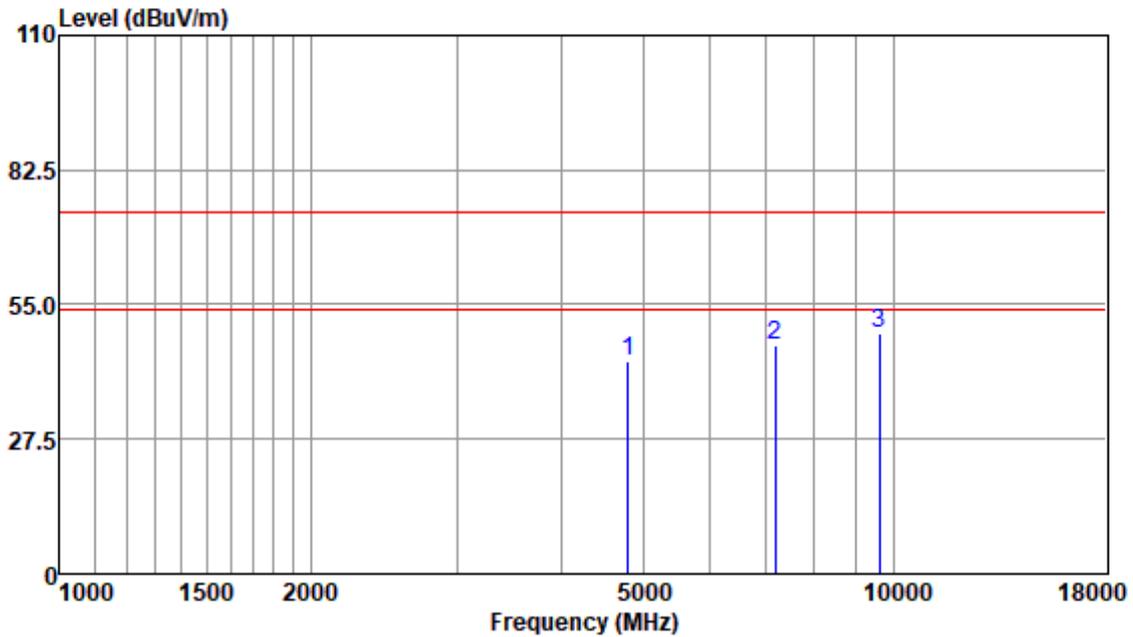
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:Low



Antenna Polarity :VERTICAL
EUT/Project :1076ME

| Read Freq | Level | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limit Line | Over Limit | Remark |
|-----------|-------|----------------|------------|---------------|----------------|------------|------------|--------|
| MHz | dBuv | dB/m | dB | dB | dBuv/m | dBuv/m | dB | |
| 4804.11 | 41.43 | 33.57 | 5.22 | 36.79 | 43.43 | 74.00 | -30.57 | Peak |
| 7206.31 | 39.03 | 36.24 | 7.13 | 35.53 | 46.87 | 74.00 | -27.13 | Peak |
| 9608.43 | 36.46 | 37.75 | 8.66 | 33.58 | 49.29 | 74.00 | -24.71 | Peak |

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

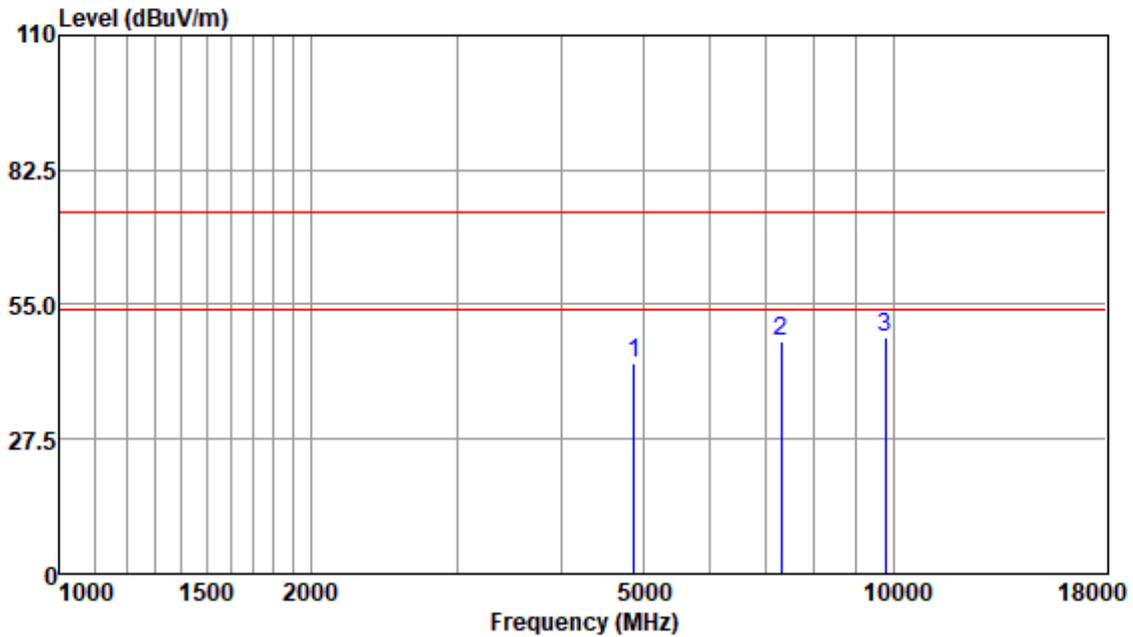
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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:middle



Antenna Polarity :HORIZONTAL
EUT/Project :1076ME

| Read Freq | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limit Line | Over Limit | Remark |
|-----------|------------|----------------|------------|---------------|----------------|------------|------------|--------|
| MHz | dBuv | dB/m | dB | dB | dBuv/m | dBuv/m | dB | |
| 4880.04 | 41.06 | 33.66 | 5.28 | 36.81 | 43.19 | 74.00 | -30.81 | Peak |
| 7320.27 | 39.06 | 36.33 | 7.33 | 35.42 | 47.30 | 74.00 | -26.70 | Peak |
| 9760.37 | 35.49 | 37.54 | 8.84 | 33.50 | 48.37 | 74.00 | -25.63 | Peak |

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

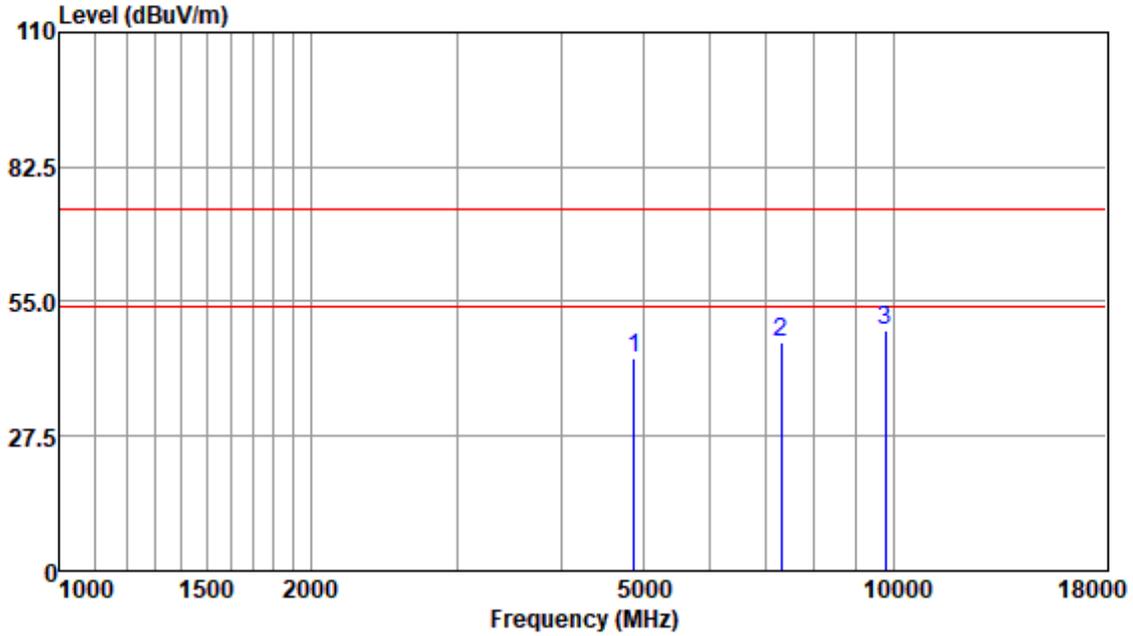
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:middle



Antenna Polarity :VERTICAL
EUT/Project :1076ME

| Read Freq | Level | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limit Line | Over Limit | Remark |
|-----------|-------|----------------|------------|---------------|----------------|------------|------------|--------|
| MHz | dBuv | dB/m | dB | dB | dBuv/m | dBuv/m | dB | |
| 4880.04 | 41.25 | 33.66 | 5.28 | 36.81 | 43.38 | 74.00 | -30.62 | Peak |
| 7320.27 | 38.61 | 36.33 | 7.33 | 35.42 | 46.85 | 74.00 | -27.15 | Peak |
| 9760.37 | 36.10 | 37.54 | 8.84 | 33.50 | 48.98 | 74.00 | -25.02 | Peak |

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

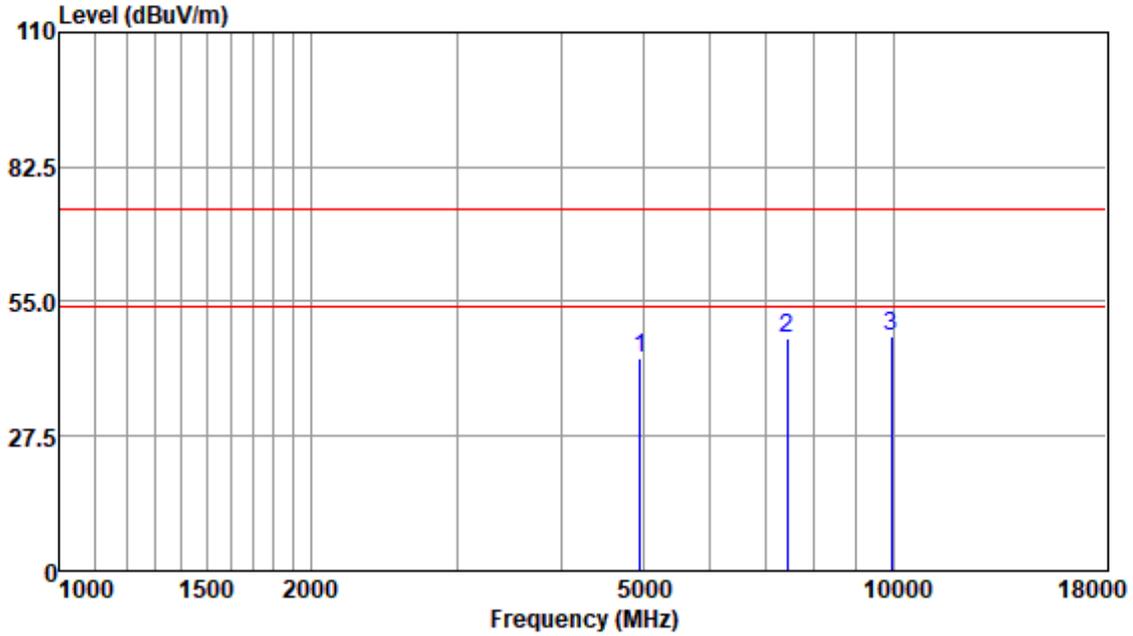
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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:High



Antenna Polarity :HORIZONTAL
EUT/Project :1076ME

| Read Freq | Level | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limit Line | Over Limit | Remark |
|-----------|-------|----------------|------------|---------------|----------------|------------|------------|--------|
| MHz | dBuv | dB/m | dB | dB | dBuv/m | dBuv/m | dB | |
| 4960.31 | 41.03 | 33.65 | 5.46 | 36.83 | 43.31 | 74.00 | -30.69 | Peak |
| 7440.91 | 39.09 | 36.31 | 7.43 | 35.34 | 47.49 | 74.00 | -26.51 | Peak |
| 9920.99 | 34.93 | 37.62 | 8.69 | 33.41 | 47.83 | 74.00 | -26.17 | Peak |

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

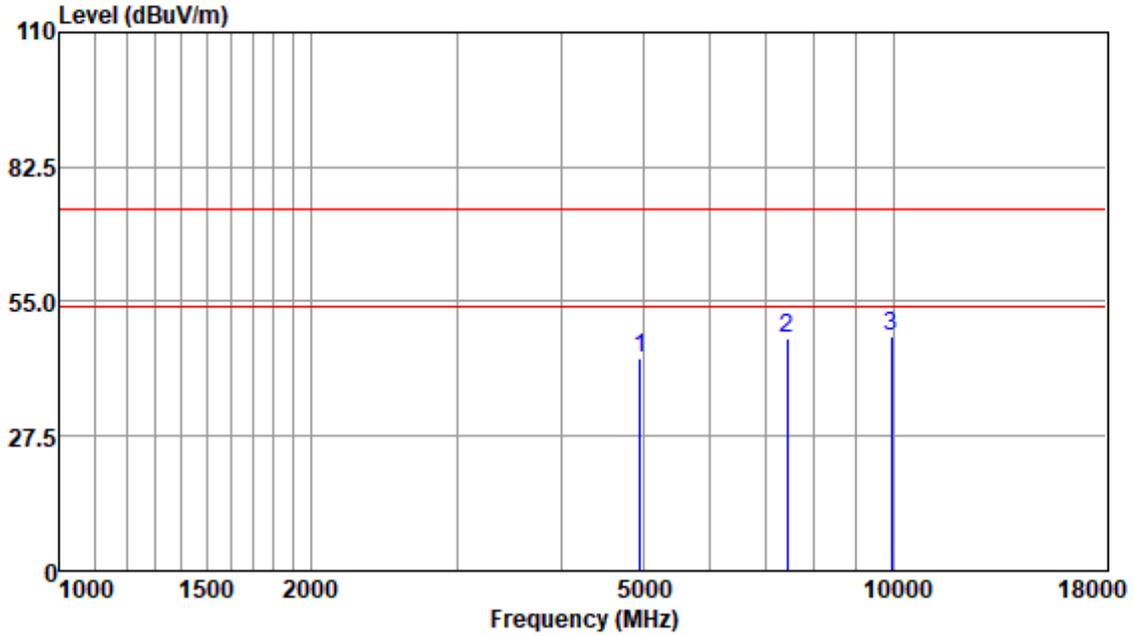
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:High



Antenna Polarity :VERTICAL
EUT/Project :1076ME

| Read Freq | Level | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limit Line | Over Limit | Remark |
|-----------|-------|----------------|------------|---------------|----------------|------------|------------|--------|
| MHz | dBuv | dB/m | dB | dB | dBuv/m | dBuv/m | dB | |
| 4960.31 | 41.33 | 33.65 | 5.46 | 36.83 | 43.61 | 74.00 | -30.39 | Peak |
| 7440.91 | 38.91 | 36.31 | 7.43 | 35.34 | 47.31 | 74.00 | -26.69 | Peak |
| 9920.99 | 35.11 | 37.62 | 8.69 | 33.41 | 48.01 | 74.00 | -25.99 | Peak |

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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7.9 99% Bandwidth

Test Requirement RSS-Gen Section 6.7
 Test Method: ANSI C63.10 (2013) Section 6.9.3

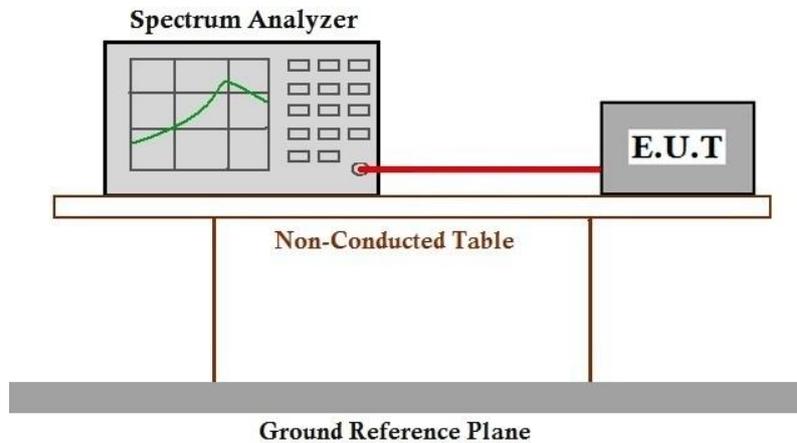
7.9.1 E.U.T. Operation

Operating Environment:
 Temperature: 25.9 °C Humidity: 70.5 % RH Atmospheric Pressure: 1010 mbar

7.9.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|-----------------------|-----------|---|
| Final test | 02 | TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation. |

7.9.3 Test Setup Diagram



7.9.4 Measurement Procedure and Data

Please Refer to Appendix for Details

8 Test Setup Photo

Refer to Appendix - Test Setup Photo for KSCR2410002068HS

9 EUT Constructional Details (EUT Photos)

Refer to Appendix - Photographs of EUT Constructional Details for KSCR2410002068HS

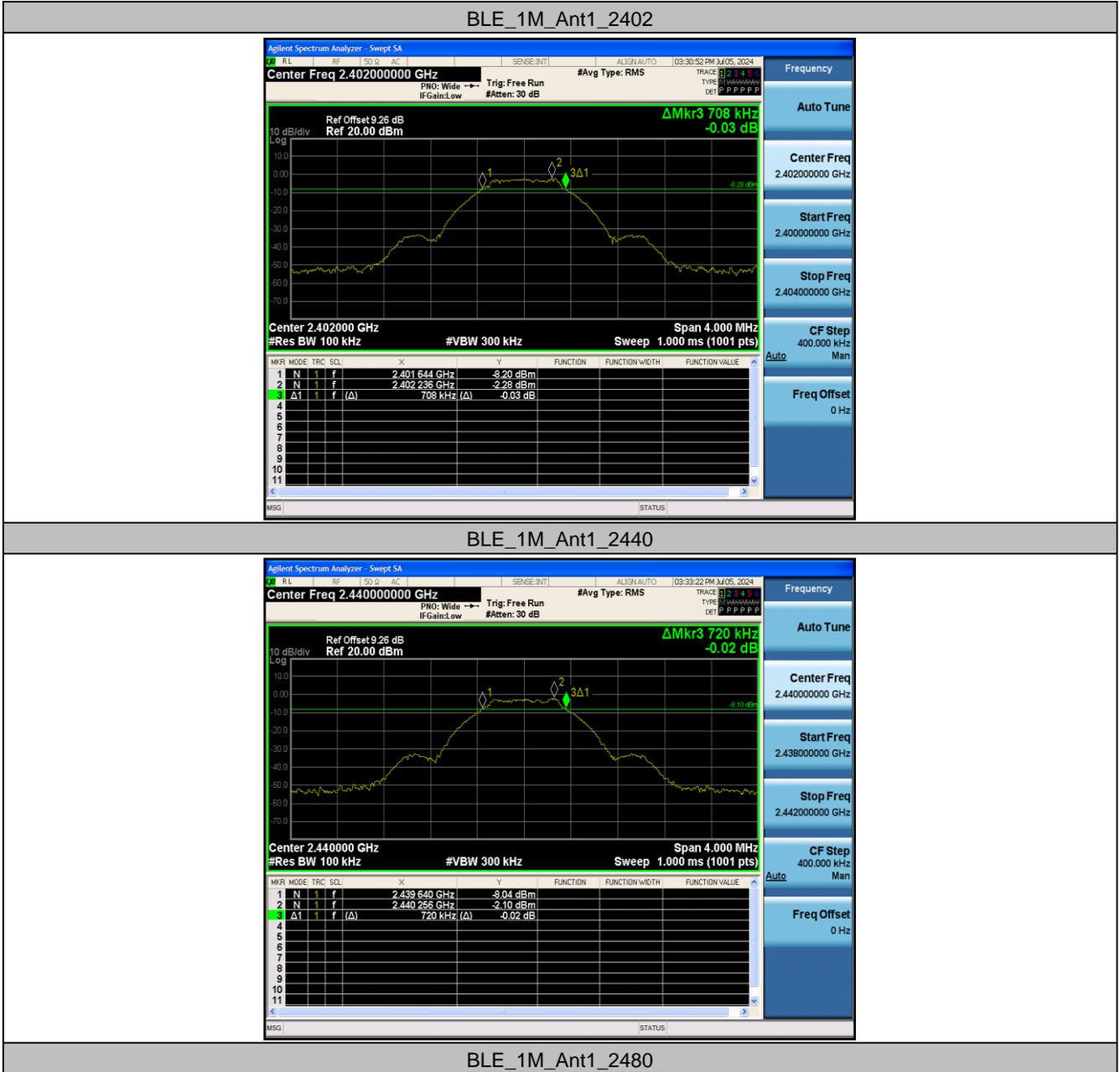
10 Appendix

10.1 Appendix A: DTS Bandwidth

10.1.1 Test Result

| Test Mode | Antenna | Channel | DTS BW [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|-----------|---------|---------|--------------|----------|----------|------------|---------|
| BLE_1M | Ant1 | 2402 | 0.708 | 2401.644 | 2402.352 | 0.5 | PASS |
| | | 2440 | 0.720 | 2439.640 | 2440.360 | 0.5 | PASS |
| | | 2480 | 0.688 | 2479.652 | 2480.340 | 0.5 | PASS |

10.1.2 Test Graphs

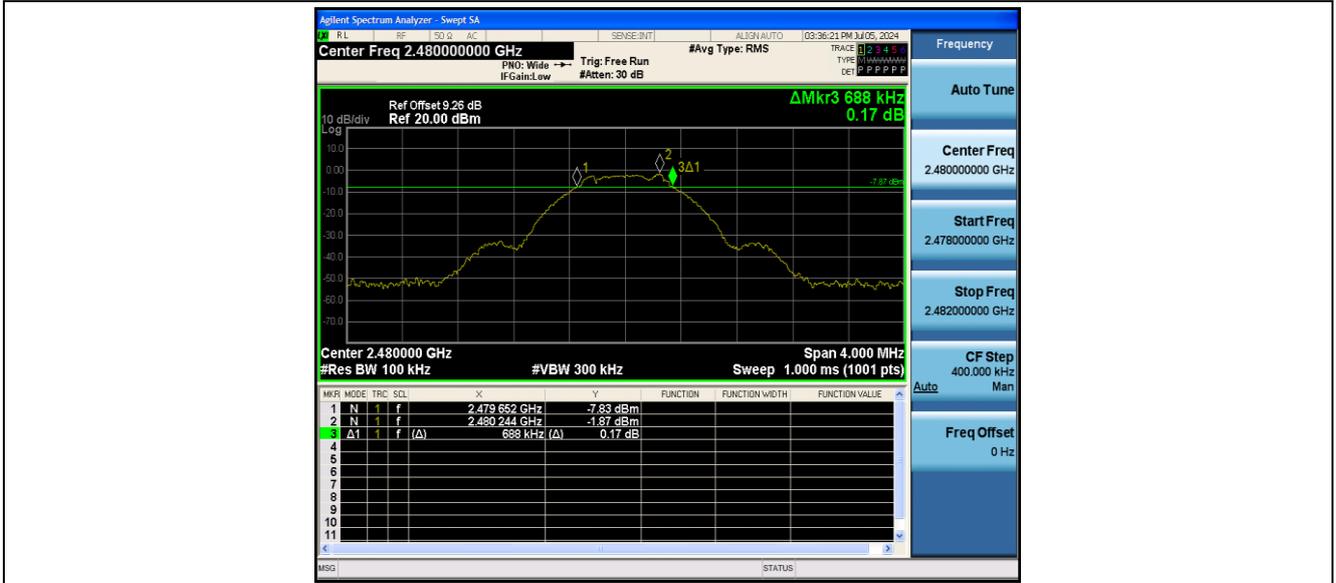


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10.2 Appendix B: Occupied Channel Bandwidth

10.2.1 Test Result

| Test Mode | Antenna | Channel | OCB [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|-----------|---------|---------|-----------|-----------|-----------|------------|---------|
| BLE_1M | Ant1 | 2402 | 1.0294 | 2401.4883 | 2402.5177 | --- | --- |
| | | 2440 | 1.0357 | 2439.4857 | 2440.5214 | --- | --- |
| | | 2480 | 1.0348 | 2479.4854 | 2480.5202 | --- | --- |

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10.2.2 Test Graphs



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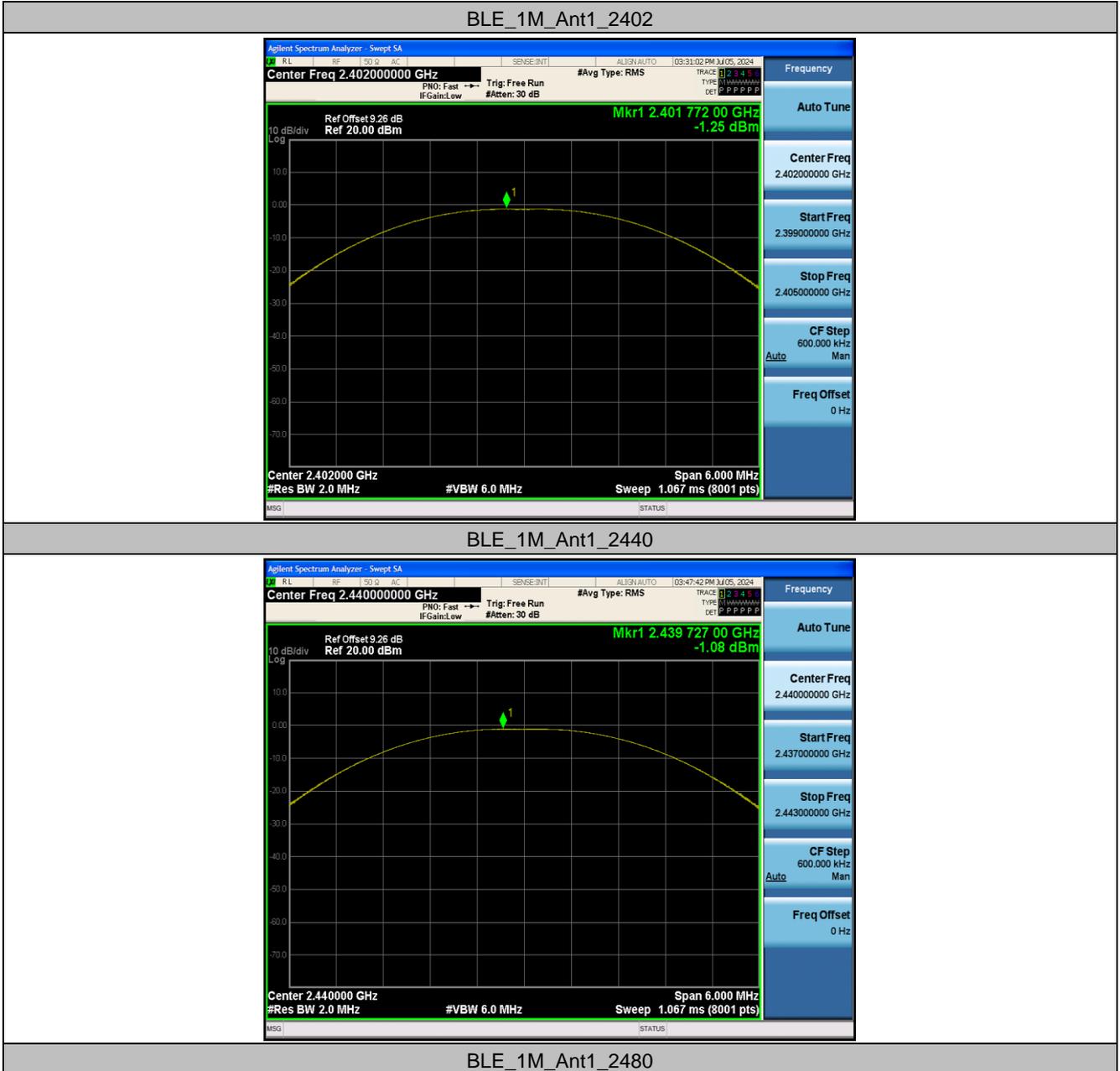


10.3 Appendix C: Maximum conducted output power

10.3.1 Test Result

| Test Mode | Antenna | Channel | Result[dBm] | Limit[dBm] | EIRP[dBm] | Limit[dBm] | Verdict |
|-----------|---------|---------|-------------|------------|-----------|------------|---------|
| BLE_1M | Ant1 | 2402 | -1.25 | ≤30 | 1.46 | ≤36.02 | PASS |
| | | 2440 | -1.08 | ≤30 | 1.63 | ≤36.02 | PASS |
| | | 2480 | -0.95 | ≤30 | 1.76 | ≤36.02 | PASS |

10.3.2 Test Graphs



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10.4 Appendix D: Maximum power spectral density

10.4.1 Test Result

| Test Mode | Antenna | Channel | Result[dBm/3kHz] | Limit[dBm/3kHz] | Verdict |
|-----------|---------|---------|------------------|-----------------|---------|
| BLE_1M | Ant1 | 2402 | -17.58 | ≤8.00 | PASS |
| | | 2440 | -17.54 | ≤8.00 | PASS |
| | | 2480 | -17.36 | ≤8.00 | PASS |

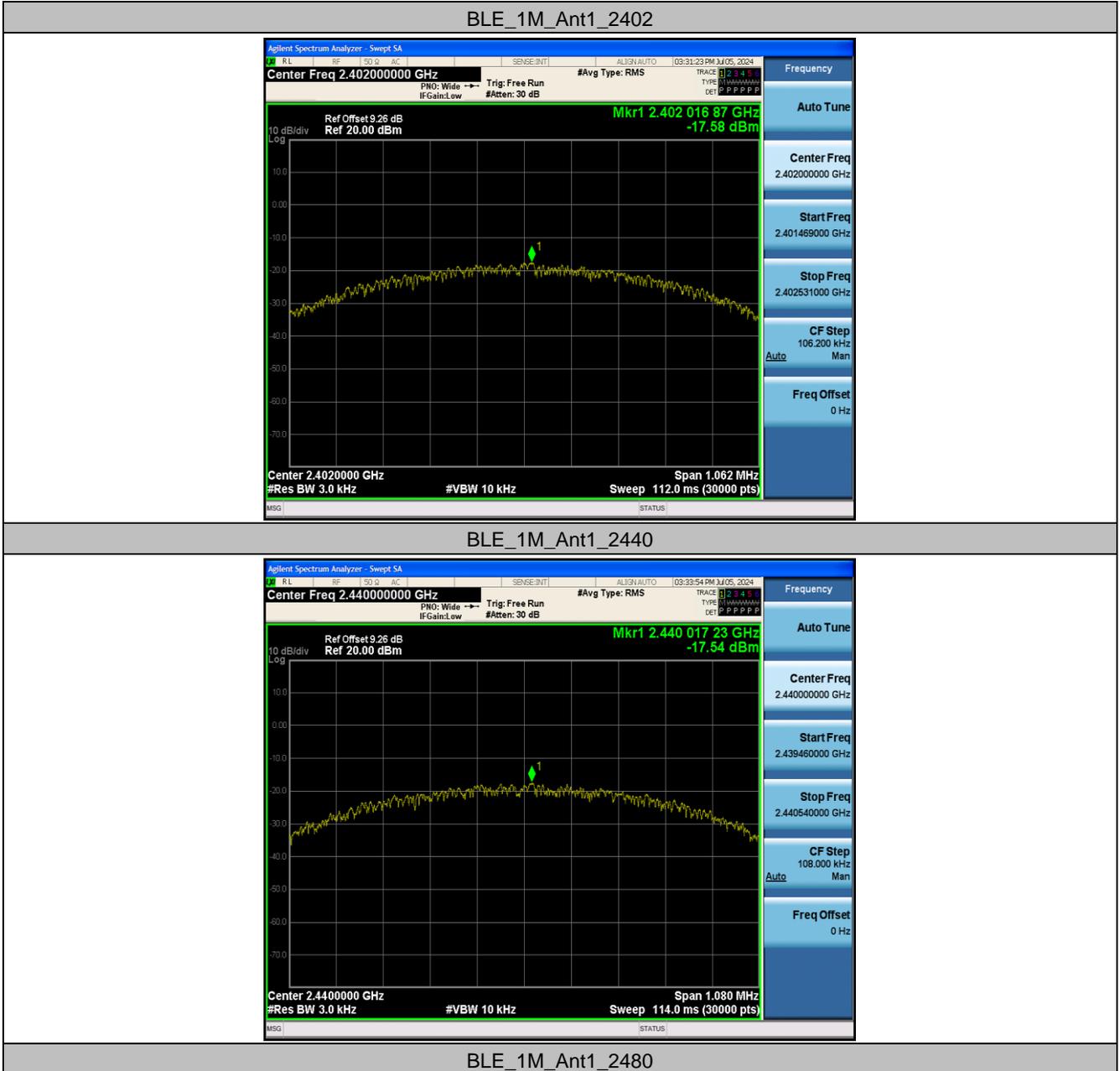
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10.4.2 Test Graphs



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10.5 Appendix E: Band edge measurements

10.5.1 Test Result

| Test Mode | Antenna | ChName | Channel | RefLevel[dBm] | Result[dBm] | Limit[dBm] | Verdict |
|-----------|---------|--------|---------|---------------|-------------|---------------|---------|
| BLE_1M | Ant1 | Low | 2402 | -2.30 | -48.82 | ≤ -22.3 | PASS |
| | | High | 2480 | -1.93 | -48.14 | ≤ -21.93 | PASS |

10.6 Appendix F: Conducted Spurious Emission

10.6.1 Test Result

| Test Mode | Antenna | Channel | FreqRange [MHz] | RefLevel [dBm] | Result[dBm] | Limit[dBm] | Verdict |
|-----------|---------|---------|-----------------|----------------|-------------|------------|---------|
| BLE_1M | Ant1 | 2402 | Reference | -2.45 | -2.45 | --- | PASS |
| | | | 30~1000 | -2.45 | -60.48 | ≤-22.45 | PASS |
| | | | 1000~26500 | -2.45 | -41.96 | ≤-22.45 | PASS |
| | | 2440 | Reference | -2.97 | -2.97 | --- | PASS |
| | | | 30~1000 | -2.97 | -60.54 | ≤-22.97 | PASS |
| | | | 1000~26500 | -2.97 | -41.22 | ≤-22.97 | PASS |
| | | 2480 | Reference | -2.85 | -2.85 | --- | PASS |
| | | | 30~1000 | -2.85 | -60.68 | ≤-22.85 | PASS |
| | | | 1000~26500 | -2.85 | -41.57 | ≤-22.85 | PASS |

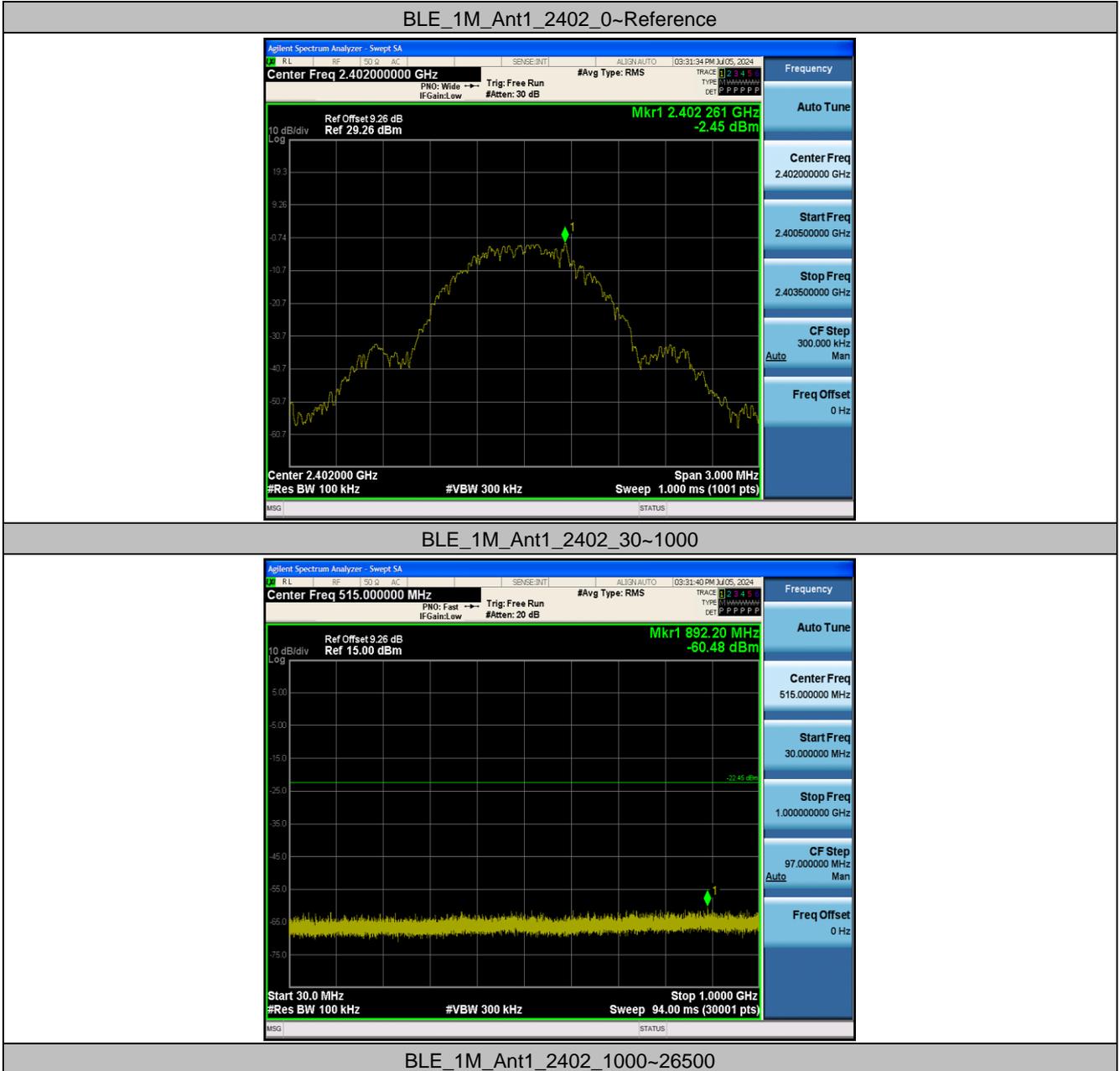
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10.6.2 Test Graphs



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BLE_1M_Ant1_2440_0~Reference



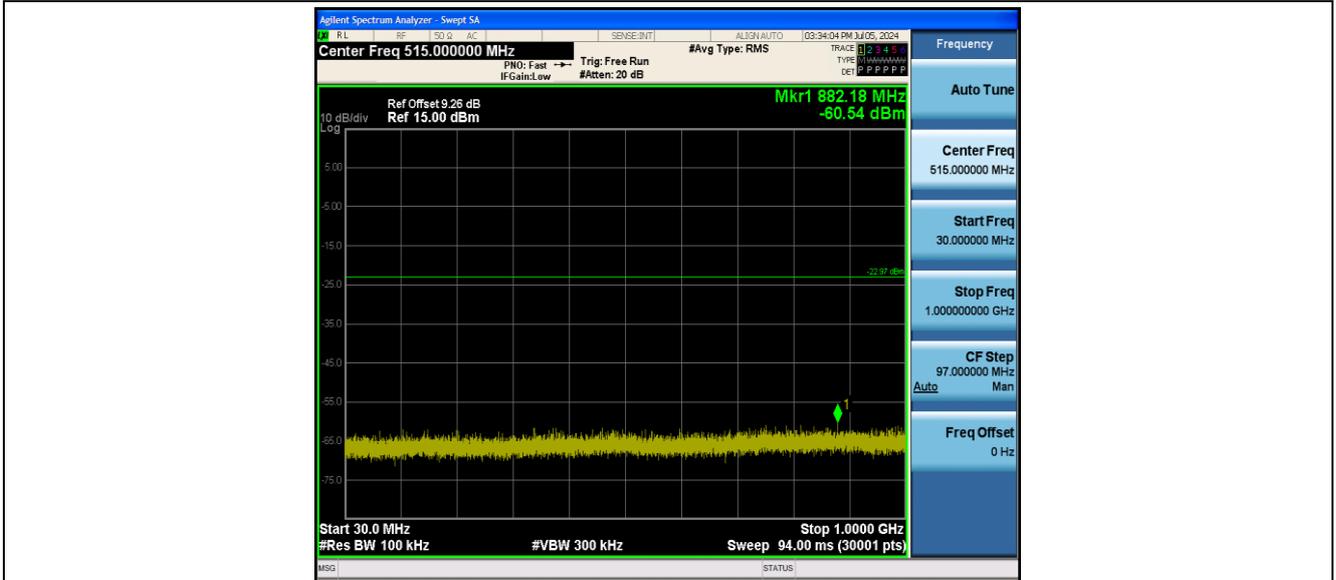
BLE_1M_Ant1_2440_30~1000

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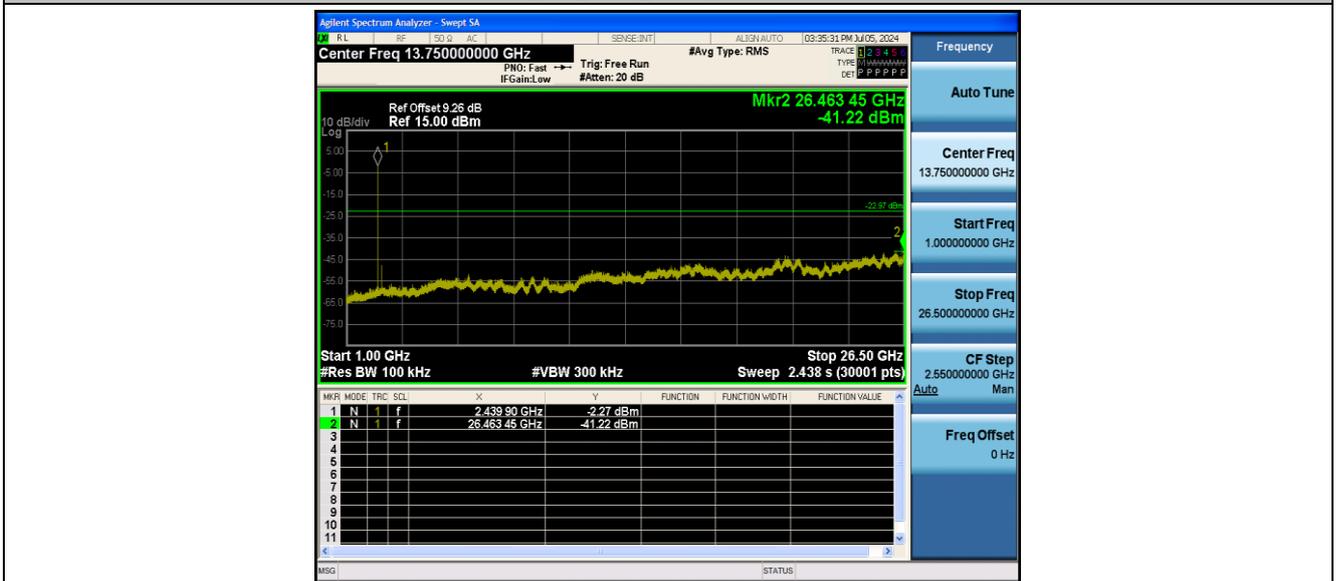
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BLE_1M_Ant1_2440_1000~26500



BLE_1M_Ant1_2480_0~Reference

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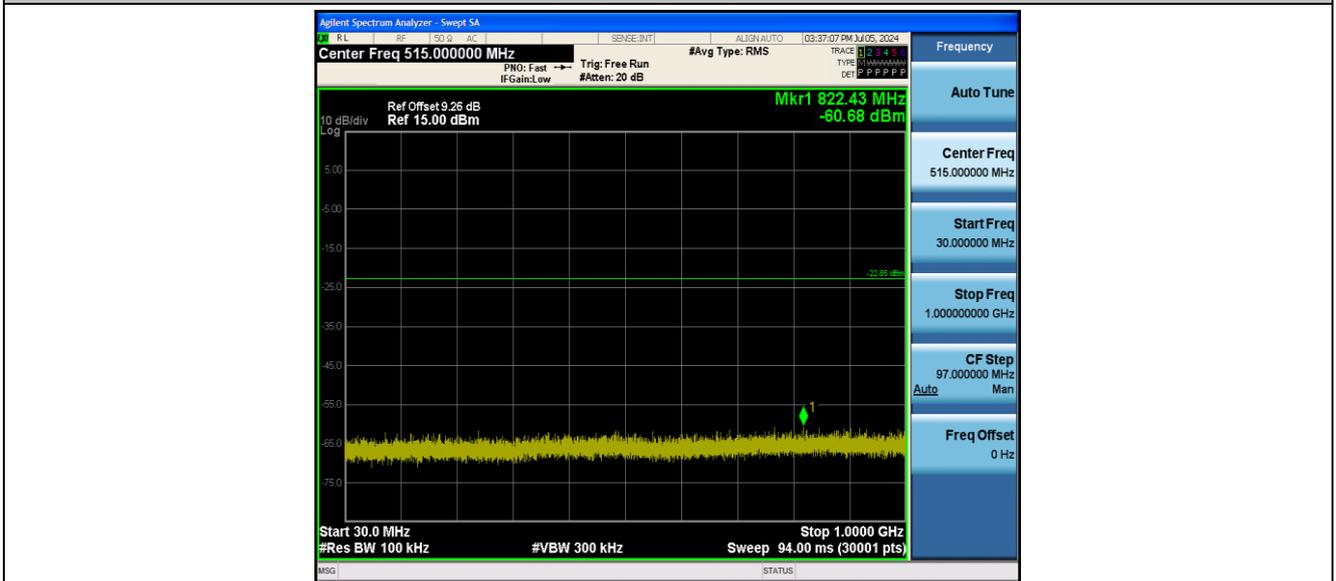
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BLE_1M_Ant1_2480_30~1000



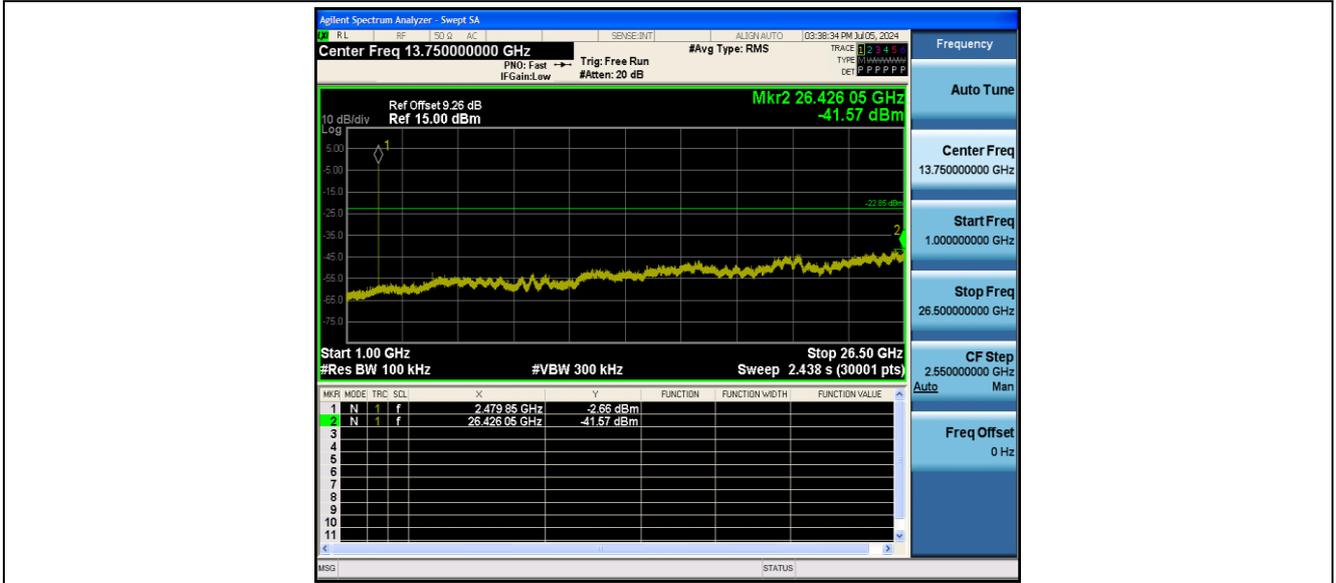
BLE_1M_Ant1_2480_1000~26500

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