

Report No.: GZCR210300002502

Page: 1 of 47

FCC ID: 2AW48-017302XSO

TEST REPORT

Application No.: GZCR2103000025AT
Applicant: SOLA-Messwerkzeuge GmbH
Address of Applicant: Unteres Tobel 25, 6840Götzis, Austria
Manufacturer: Guilin Gemred Sensor Technology Co., Ltd
Address of Manufacturer: No.D-08,Information Industrial Park, Chaoyang Road Qixing District ,Guilin City, Guangxi zhuang Autonomous Region
Factory: Guilin Gemred Sensor Technology Co., Ltd
Address of Factory: No.D-08,Information Industrial Park, Chaoyang Road Qixing District ,Guilin City, Guangxi zhuang Autonomous Region

Equipment Under Test (EUT):

FCC ID: 2AW48-017302XSO

EUT Name: BIG RED digital

Model No.: 017308XSO, 017314XSO, 017364XSO, 017358XSO, 017302XSO, 017316XSO ♣

♣

Please refer to section 2 of this report which indicates which item was actually tested and which were electrically identical.

Trade mark: SOLA

Standard(s) : 47 CFR Part 15, Subpart C 15.247

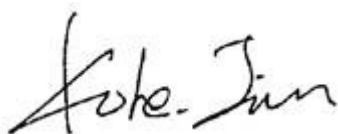
Date of Receipt: 2021-03-10

Date of Test: 2021-03-15 to 2021-03-22

Date of Issue: 2021-03-24

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

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



Kobe Jian
EMC Laboratory Manager



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| Revision Record | | | | |
|-----------------|---------|------------|----------|----------|
| Version | Chapter | Date | Modifier | Remark |
| 01 | | 2021-03-24 | | Original |
| | | | | |
| | | | | |

| | | | | |
|-------------------------|--|---|--|--|
| Authorized for issue by | | | | |
| Tested By | |  | | |
| | | Kevin Zhang/Project Engineer | | |
| Reviewed By | |  | | |
| | | Ricky Liu/Reviewer | | |

2 Test Summary

| Radio Spectrum Technical Requirement | | | | |
|--------------------------------------|----------------------------------|--------|---|--------|
| Item | Standard | Method | Requirement | Result |
| Antenna Requirement | 47 CFR Part 15, Subpart C 15.247 | N/A | 47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4) | Pass |

| Radio Spectrum Matter Part | | | | |
|---|----------------------------------|--|---|--------|
| Item | Standard | Method | Requirement | Result |
| Conducted Peak Output Power | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 11.9.1 | 47 CFR Part 15, Subpart C 15.247(b)(3) | Pass |
| Minimum 6dB Bandwidth | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 11.8.1 | 47 CFR Part 15, Subpart C 15.247a(2) | Pass |
| Power Spectrum Density | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 11.10.2 | 47 CFR Part 15, Subpart C 15.247(e) | Pass |
| Conducted Band Edges Measurement | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 11.13.3.2 | 47 CFR Part 15, Subpart C 15.247(d) | Pass |
| Conducted Spurious Emissions | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 11.11 | 47 CFR Part 15, Subpart C 15.247(d) | Pass |
| Radiated Emissions which fall in the restricted bands | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 6.10.5 | 47 CFR Part 15, Subpart C 15.205 & 15.209 | Pass |
| Radiated Spurious Emissions | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 6.4,6.5,6.6 | 47 CFR Part 15, Subpart C 15.205 & 15.209 | Pass |

Note: E.U.T./EUT means Equipment Under Test.

✦ Remark for the report GZCR210300002502:

Model No.: 017308XSO, 017314XSO, 017364XSO, 017358XSO, 017302XSO, 017316XSO

According to the declaration from the applicant, the electrical circuit design, layout, components used and internal wiring were identical for all models, with only difference on the body length.

Therefore, only model 017302XSO was full test in this report GZCR210300002502.



3 Contents

| | Page |
|---|------|
| 1 Cover Page | 1 |
| 2 Test Summary..... | 3 |
| 3 Contents | 4 |
| 4 General Information..... | 6 |
| 4.1 Details of E.U.T. | 6 |
| 4.2 Description of Support Units | 6 |
| 4.3 Measurement Uncertainty | 6 |
| 4.4 Test Location | 7 |
| 4.5 Test Facility..... | 8 |
| 4.6 Deviation from Standards..... | 9 |
| 4.7 Abnormalities from Standard Conditions..... | 9 |
| 4.8 Duty cycle of the EUT..... | 9 |
| 5 Equipment List | 10 |
| 6 Radio Spectrum Technical Requirement..... | 12 |
| 6.1 Antenna Requirement | 12 |
| 6.1.1 Test Requirement: | 12 |
| 6.1.2 Conclusion | 12 |
| 7 Radio Spectrum Matter Test Results..... | 13 |
| 7.1 Conducted Peak Output Power | 13 |
| 7.1.1 E.U.T. Operation | 13 |
| 7.1.2 Test Mode Description | 13 |
| 7.1.3 Test Setup Diagram | 13 |
| 7.1.4 Measurement Procedure and Data..... | 13 |
| 7.2 Minimum 6dB Bandwidth..... | 14 |
| 7.2.1 E.U.T. Operation | 14 |
| 7.2.2 Test Mode Description | 14 |
| 7.2.3 Test Setup Diagram | 14 |
| 7.2.4 Measurement Procedure and Data..... | 14 |
| 7.3 Power Spectrum Density | 15 |
| 7.3.1 E.U.T. Operation | 15 |
| 7.3.2 Test Mode Description | 15 |
| 7.3.3 Test Setup Diagram | 15 |
| 7.3.4 Measurement Procedure and Data..... | 15 |
| 7.4 Conducted Band Edges Measurement | 16 |
| 7.4.1 E.U.T. Operation | 16 |
| 7.4.2 Test Mode Description | 16 |
| 7.4.3 Test Setup Diagram | 16 |
| 7.4.4 Measurement Procedure and Data..... | 16 |
| 7.5 Conducted Spurious Emissions | 17 |
| 7.5.1 E.U.T. Operation | 17 |
| 7.5.2 Test Mode Description | 17 |



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| | | |
|----------|---|-----------|
| 7.5.3 | Test Setup Diagram | 17 |
| 7.5.4 | Measurement Procedure and Data | 17 |
| 7.6 | Radiated Emissions which fall in the restricted bands | 18 |
| 7.6.1 | E.U.T. Operation | 18 |
| 7.6.2 | Test Mode Description | 18 |
| 7.6.3 | Test Setup Diagram | 18 |
| 7.6.4 | Measurement Procedure and Data | 19 |
| 7.7 | Radiated Spurious Emissions | 24 |
| 7.7.1 | E.U.T. Operation | 24 |
| 7.7.2 | Test Mode Description | 24 |
| 7.7.3 | Test Setup Diagram | 24 |
| 7.7.4 | Measurement Procedure and Data | 25 |
| 8 | Appendix | 34 |
| 8.1 | Appendix A: DTS Bandwidth | 34 |
| 8.1.1 | Test Result | 34 |
| 8.1.2 | Test Graphs | 34 |
| 8.2 | Appendix B: Maximum conducted output power | 36 |
| 8.2.1 | Test Result | 36 |
| 8.2.2 | Test Graphs | 36 |
| 8.3 | Appendix C: Maximum power spectral density | 38 |
| 8.3.1 | Test Result | 38 |
| 8.3.2 | Test Graphs | 38 |
| 8.4 | Appendix D: Band edge measurements | 40 |
| 8.4.1 | Test Result | 40 |
| 8.4.2 | Test Graphs | 40 |
| 8.5 | Appendix E: Conducted Spurious Emission | 41 |
| 8.5.1 | Test Result | 41 |
| 8.5.2 | Test Graphs | 41 |
| 8.6 | Appendix F: Duty Cycle | 46 |
| 8.6.1 | Test Result | 46 |
| 8.6.2 | Test Graphs | 46 |

4 General Information

4.1 Details of E.U.T.

| | |
|----------------------|--------------------------------|
| Power supply: | 3 x size "AAA" 1.5V batteries. |
| Test Voltage: | DC 4.5 V |
| Operation Frequency: | 2402MHz to 2480MHz |
| Modulation Type: | GFSK |
| Number of Channels: | 40 |
| Channel Spacing: | 2MHz |
| Antenna Type: | PCB Antenna |
| Antenna Gain: | 0dBi declared by applicant. |
| Hardware: | GR2418GNB V1.4 |
| Software: | V01 |
| S/N: | 20190519 |
| Test Software | nrfgostudio.exe |
| Power Setting | 0dBm can't be changed by user |

4.2 Description of Support Units

| Description | Manufacturer | Model No. | Serial No. |
|--------------|--------------|-------------------------|------------|
| Note Book PC | LENOVO | Lenovo Xiaoxinchao 5000 | PF0TNMG8 |

4.3 Measurement Uncertainty

| Test Item | Measurement Uncertainty |
|---|--|
| Conducted Peak Output Power | ± 0.75dB |
| Minimum 6dB Bandwidth | ± 3% |
| Power Spectrum Density | ± 2.84dB |
| Conducted Band Edges Measurement | ± 0.75dB |
| Conducted Spurious Emissions | ± 0.75dB |
| Radiated Emissions which fall in the restricted bands | ± 4.5dB (Below 1GHz); ± 4.8dB (Above 1GHz) |
| Radiated Spurious Emissions | ± 4.5dB (Below 1GHz); ± 4.8dB (Above 1GHz) |

Remark:

The U_{lab} (lab Uncertainty) is less than U_{CISPR} (CISPR Uncertainty), so the test results

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.



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4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Sciotech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.



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4.5 Test Facility

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

- **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

- **FCC Recognized 2.948 Listed Test Firm(Registration No.: 282399)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818, Jul 13, 2017.

- **Industry Canada (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

- **VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-10449 and T-11179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.



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4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

4.8 Duty cycle of the EUT

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percent.

Formula:

Duty Cycle = Ton/(Ton+Toff)

Measurement Procedure:

1. Set span = Zero
2. RBW=8MHz
3. VBW=8MHz
4. Detector=Peak

| Mode | Channel(MHz) | Duty Cycle(%) | Correction Factor(dB)* |
|------|--------------|---------------|------------------------|
| BLE | 2402 | 62.50 | 2.04 |
| | 2440 | 62.40 | 2.04 |
| | 2480 | 62.40 | 2.04 |

*Correction Factor(dB) = 10log(1/Duty Cycle)

Please refer to appendix for details.

5 Equipment List

| Conducted Peak Output Power | | | | | |
|-----------------------------|----------------------|----------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| EXA Signal Analyzer | Agilent Technologies | N9010A | EMC2138 | 2020-09-17 | 2021-09-16 |
| 6dB Attenuator | HP | 8491A | EMC2062 | 2020-04-15 | 2022-04-14 |
| Test Software JS1120-3 | HangTianXing | V2.6 | GZE100-69 | N/A | N/A |
| MI CABLE | SGS-EMC | 0.8M | EMC2136 | 2019-11-02 | 2021-11-01 |

| Minimum 6dB Bandwidth | | | | | |
|------------------------|----------------------|----------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| EXA Signal Analyzer | Agilent Technologies | N9010A | EMC2138 | 2020-09-17 | 2021-09-16 |
| 6dB Attenuator | HP | 8491A | EMC2062 | 2020-04-15 | 2022-04-14 |
| Test Software JS1120-3 | HangTianXing | V2.6 | GZE100-69 | N/A | N/A |
| MI CABLE | SGS-EMC | 0.8M | EMC2136 | 2019-11-02 | 2021-11-01 |

| Power Spectrum Density | | | | | |
|------------------------|----------------------|----------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| EXA Signal Analyzer | Agilent Technologies | N9010A | EMC2138 | 2020-09-17 | 2021-09-16 |
| 6dB Attenuator | HP | 8491A | EMC2062 | 2020-04-15 | 2022-04-14 |
| Test Software JS1120-3 | HangTianXing | V2.6 | GZE100-69 | N/A | N/A |
| MI CABLE | SGS-EMC | 0.8M | EMC2136 | 2019-11-02 | 2021-11-01 |

| Conducted Band Edges Measurement | | | | | |
|----------------------------------|----------------------|----------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| EXA Signal Analyzer | Agilent Technologies | N9010A | EMC2138 | 2020-09-17 | 2021-09-16 |
| 6dB Attenuator | HP | 8491A | EMC2062 | 2020-04-15 | 2022-04-14 |
| Test Software JS1120-3 | HangTianXing | V2.6 | GZE100-69 | N/A | N/A |
| MI CABLE | SGS-EMC | 0.8M | EMC2136 | 2019-11-02 | 2021-11-01 |

| Conducted Spurious Emissions | | | | | |
|------------------------------|----------------------|----------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| EXA Signal Analyzer | Agilent Technologies | N9010A | EMC2138 | 2020-09-17 | 2021-09-16 |
| 6dB Attenuator | HP | 8491A | EMC2062 | 2020-04-15 | 2022-04-14 |
| Test Software JS1120-3 | HangTianXing | V2.6 | GZE100-69 | N/A | N/A |
| MI CABLE | SGS-EMC | 0.8M | EMC2136 | 2019-11-02 | 2021-11-01 |



| Radiated Emissions which fall in the restricted bands | | | | | |
|---|--------------------------------|---------------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| Chamber cable | HangTianXing | N/A | EMC0542 | 2019-06-28 | 2021-06-27 |
| Horn Antenna | SCHWARZBECK MESS-ELEKTRONIK | BBHA 9120D | EMC2016 | 2019-09-25 | 2022-09-24 |
| 1GHz-26.5 GHz Pre-Amplifier | Agilent | 8449B | EMC0521 | 2021-01-08 | 2022-01-07 |
| 2.4GHz Filter | Micro-Tronics | BRM 50702 | EMC2069 | 2021-01-08 | 2022-01-07 |
| 966 Anechoic Chamber | C.R.T | 9m x 6m x 6m | EMC2142 | 2020-12-20 | 2023-12-19 |
| MXE EMI Receiver | Keysight | N9038A | EMC2139 | 2020-11-13 | 2021-11-12 |
| EXA Signal Analyzer | Keysight | N9010A | EMC2138 | 2020-09-17 | 2021-09-16 |
| Test Software E3 | Audix | Ver.6.120110a | GZE100-61 | N/A | N/A |

| Radiated Spurious Emissions | | | | | |
|---|--------------------------------|---------------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| EMI Test Receiver | Rohde & Schwarz | ESIB26 | EMC0522 | 2021-01-08 | 2022-01-07 |
| Chamber cable | HangTianXing | N/A | EMC0542 | 2019-06-28 | 2021-06-27 |
| Trilog Broadband Antenna 30MHz-1GHz | SCHWARZBECK MESS-ELEKTRONIK | VULB 9168 | SEM003-18 | 2019-02-22 | 2022-02-22 |
| Amplifier | HP | 8447F | EMC2065 | 2020-05-26 | 2021-05-25 |
| Active Loop Antenna | ETS-Lindgren | 6502 | EMC2190 | 2019-12-27 | 2021-12-26 |
| 10m Semi-Anechoic Chamber | ETS | N/A | EMC0530 | 2019-10-20 | 2022-10-19 |
| Test Software E3 | Audix | Ver.6.120110a | GZE100-61 | N/A | N/A |

| General used equipment | | | | | |
|------------------------|--------------|----------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| DMM | Fluke | 73 | EMC0006 | 2020-07-09 | 2021-07-08 |
| DMM | Fluke | 73 | EMC0007 | 2020-07-09 | 2021-07-08 |



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:

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level. When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

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 integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0 dBi.

Please refer to internal photos.



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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: 25.2 °C

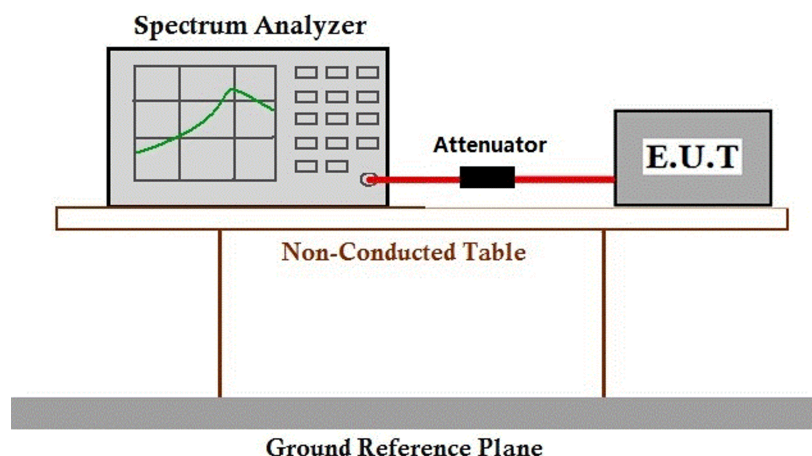
Humidity: 48.9 % RH

Atmospheric Pressure: 1010 mbar

7.1.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|-----------------------|-----------|--|
| Final test | 02 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation. |

7.1.3 Test Setup Diagram



7.1.4 Measurement Procedure and Data

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

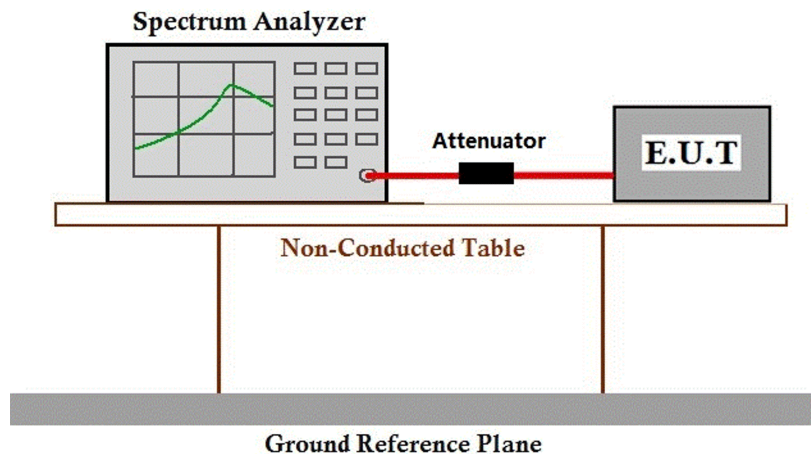
7.2.1 E.U.T. Operation

Operating Environment:
 Temperature: 25.2 °C Humidity: 48.8 % RH Atmospheric Pressure: 1010 mbar

7.2.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|--------------------------|--------------|--|
| Final test | 02 | TX mode_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: $\leq 8\text{dBm}$ in any 3 kHz band during any time interval of continuous transmission

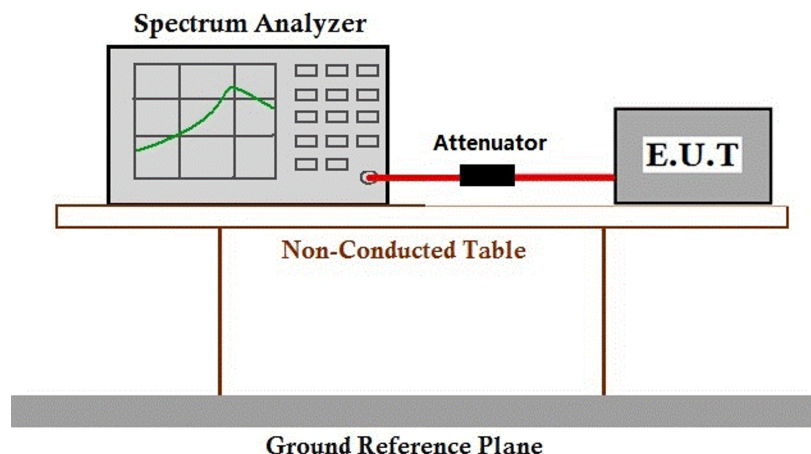
7.3.1 E.U.T. Operation

Operating Environment:
 Temperature: 25.2 °C Humidity: 48.8 % RH Atmospheric Pressure: 1010 mbar

7.3.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|-----------------------|-----------|--|
| Final test | 02 | TX mode_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

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)).

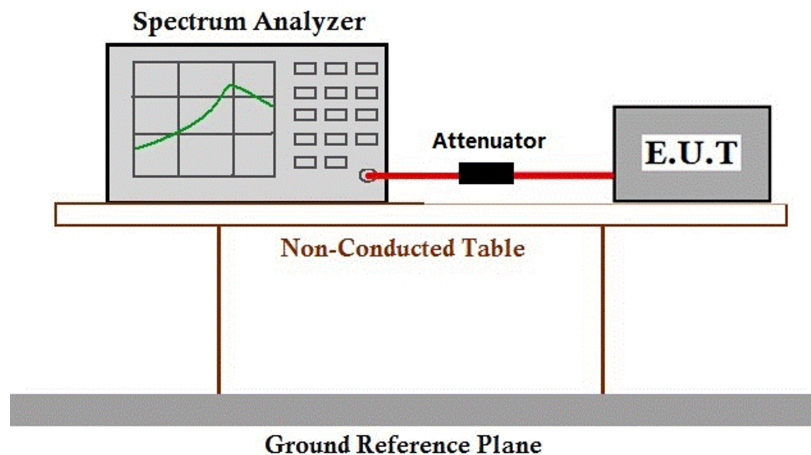
7.4.1 E.U.T. Operation

Operating Environment:
 Temperature: 25.2 °C Humidity: 48.7 % RH Atmospheric Pressure: 1010 mbar

7.4.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|--------------------------|--------------|--|
| Final test | 02 | TX mode_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

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: 25.2 °C

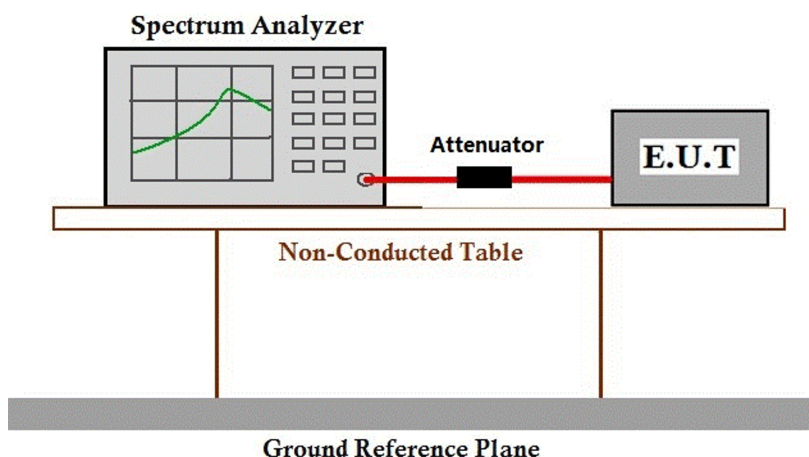
Humidity: 48.7 % RH

Atmospheric Pressure: 1010 mbar

7.5.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|--------------------------|--------------|--|
| Final test | 02 | TX mode_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: 25.0 °C

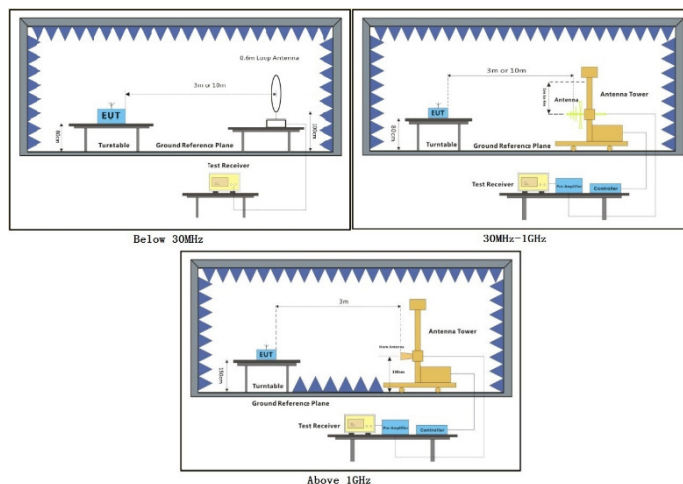
Humidity: 66.7 % RH

Atmospheric Pressure: 1010 mbar

7.6.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|--------------------------|--------------|--|
| Final test | 02 | TX mode_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.

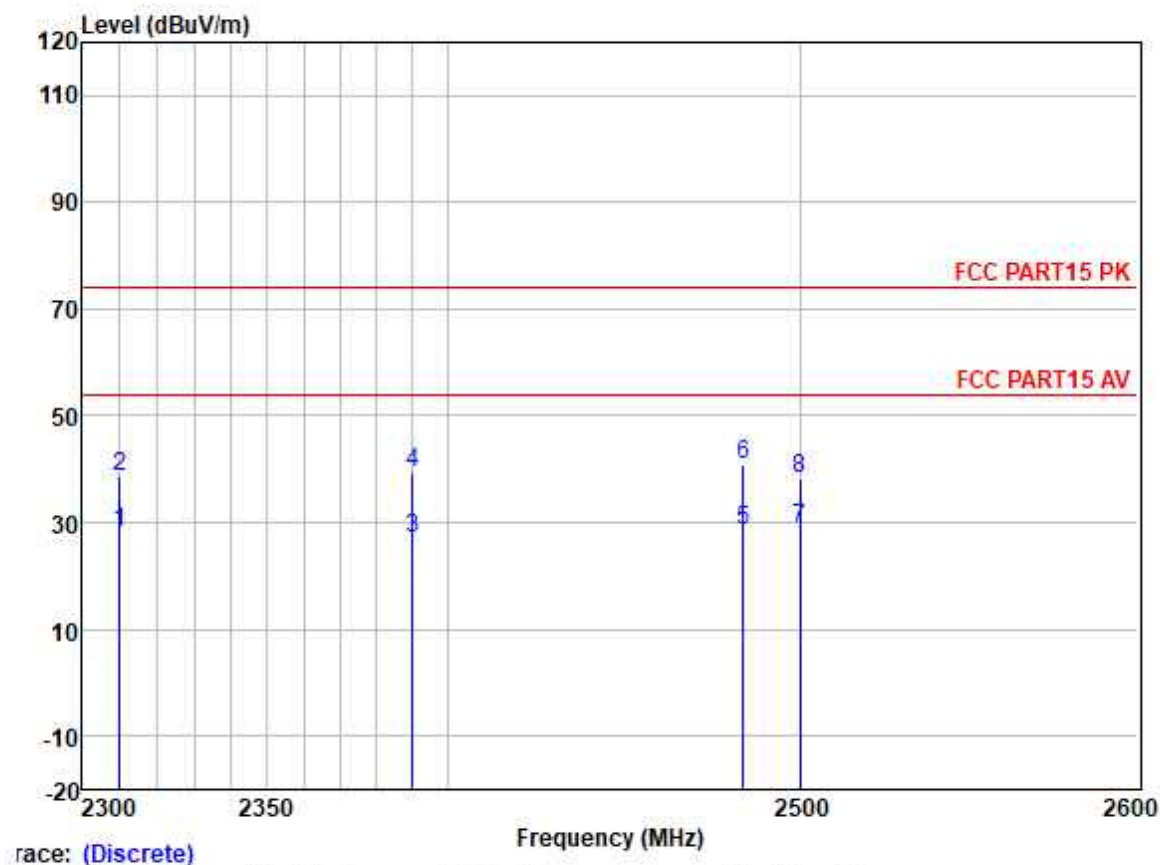
Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

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.



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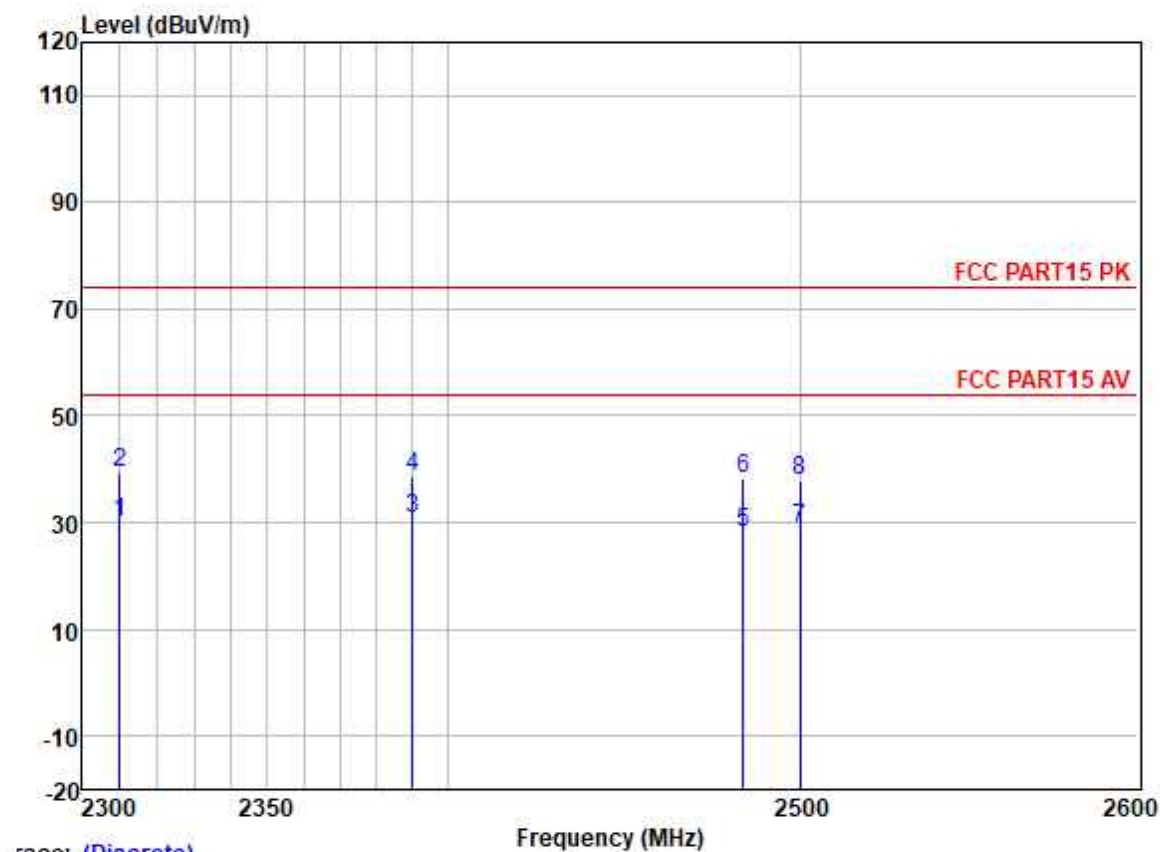
Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; ; Channel:High;



Trace: (Discrete)

| | Freq | Read Level | Antenna Factor | Cable Loss | Preamplifier Factor | Level | Limit Line | Over Limit | Pol/Phase | Remark |
|---|----------|------------|----------------|------------|---------------------|--------|------------|------------|------------|---------|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | | |
| 1 | 2310.000 | 35.46 | 27.15 | 3.32 | 37.62 | 28.31 | 54.00 | -25.69 | HORIZONTAL | Average |
| 2 | 2310.000 | 45.89 | 27.15 | 3.32 | 37.62 | 38.74 | 74.00 | -35.26 | HORIZONTAL | Peak |
| 3 | 2390.000 | 33.73 | 27.33 | 3.48 | 37.59 | 26.95 | 54.00 | -27.05 | HORIZONTAL | Average |
| 4 | 2390.000 | 46.30 | 27.33 | 3.48 | 37.59 | 39.52 | 74.00 | -34.48 | HORIZONTAL | Peak |
| 5 | 2483.500 | 35.18 | 27.48 | 3.53 | 37.57 | 28.62 | 54.00 | -25.38 | HORIZONTAL | Average |
| 6 | 2483.500 | 47.59 | 27.48 | 3.53 | 37.57 | 41.03 | 74.00 | -32.97 | HORIZONTAL | Peak |
| 7 | 2500.000 | 35.60 | 27.50 | 3.40 | 37.56 | 28.94 | 54.00 | -25.06 | HORIZONTAL | Average |
| 8 | 2500.000 | 44.82 | 27.50 | 3.40 | 37.56 | 38.16 | 74.00 | -35.84 | HORIZONTAL | Peak |

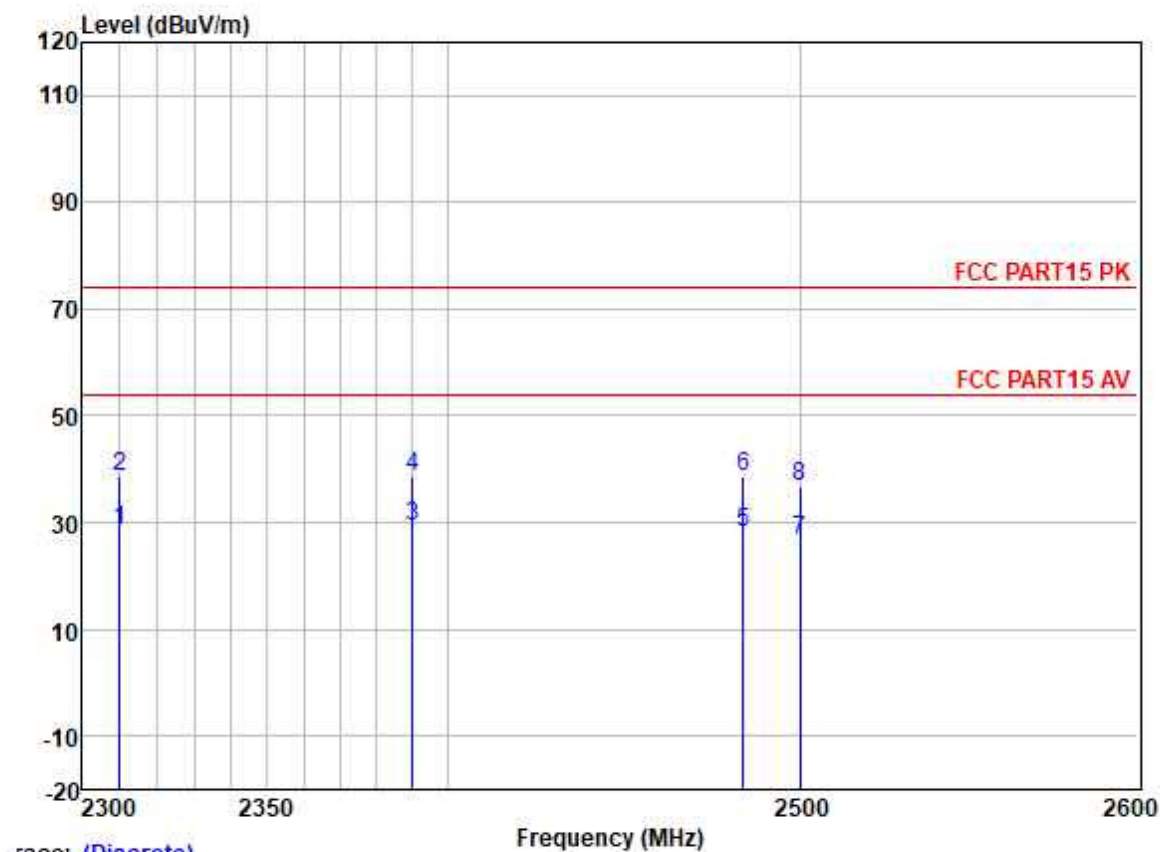
Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low;



Trace: (Discrete)

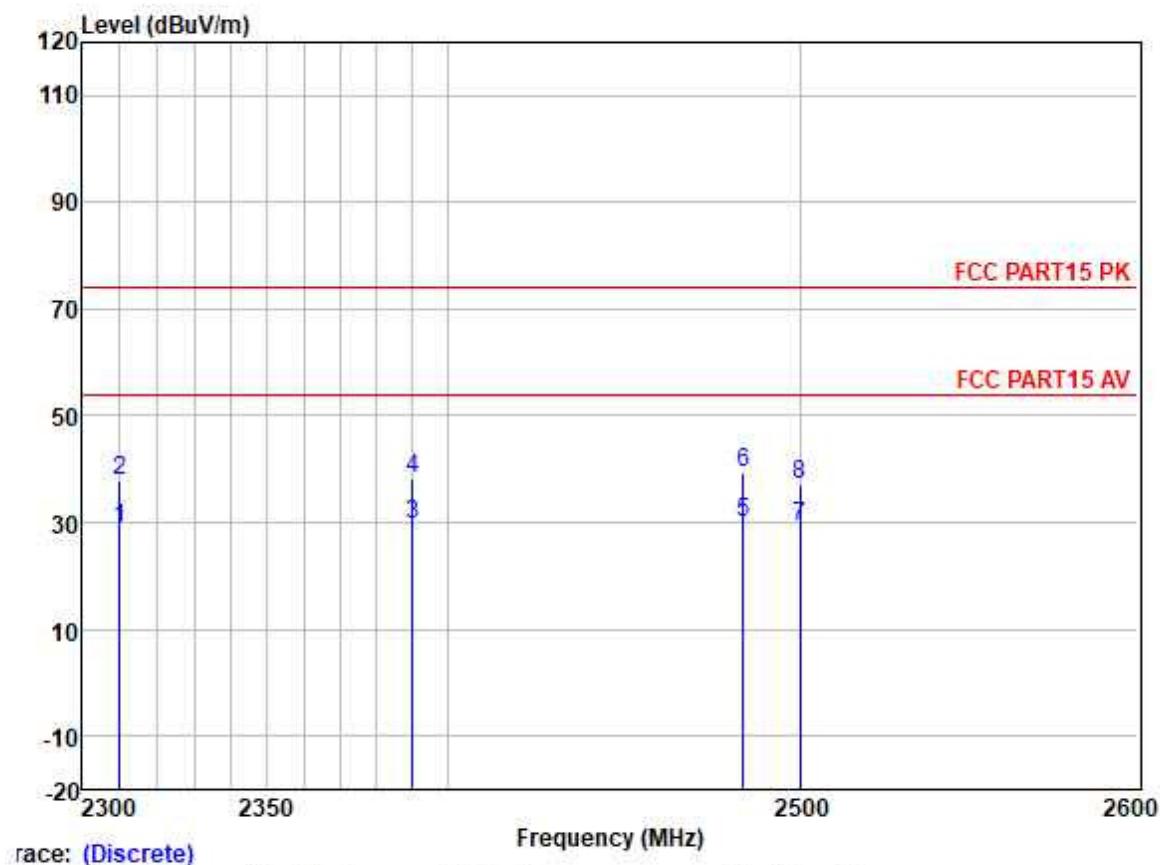
| | Freq | Read Level | Antenna Factor | Cable Loss | Preamplifier Factor | Level | Limit Line | Over Limit | Pol/Phase | Remark |
|---|----------|------------|----------------|------------|---------------------|--------|------------|------------|------------|---------|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | | |
| 1 | 2310.000 | 37.13 | 27.15 | 3.32 | 37.62 | 29.98 | 54.00 | -24.02 | HORIZONTAL | Average |
| 2 | 2310.000 | 46.39 | 27.15 | 3.32 | 37.62 | 39.24 | 74.00 | -34.76 | HORIZONTAL | Peak |
| 3 | 2390.000 | 37.67 | 27.33 | 3.48 | 37.59 | 30.89 | 54.00 | -23.11 | HORIZONTAL | Average |
| 4 | 2390.000 | 45.35 | 27.33 | 3.48 | 37.59 | 38.57 | 74.00 | -35.43 | HORIZONTAL | Peak |
| 5 | 2483.500 | 34.73 | 27.48 | 3.53 | 37.57 | 28.17 | 54.00 | -25.83 | HORIZONTAL | Average |
| 6 | 2483.500 | 44.84 | 27.48 | 3.53 | 37.57 | 38.28 | 74.00 | -35.72 | HORIZONTAL | Peak |
| 7 | 2500.000 | 35.52 | 27.50 | 3.40 | 37.56 | 28.86 | 54.00 | -25.14 | HORIZONTAL | Average |
| 8 | 2500.000 | 44.37 | 27.50 | 3.40 | 37.56 | 37.71 | 74.00 | -36.29 | HORIZONTAL | Peak |

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



| | Freq | Read Level | Antenna Factor | Cable Loss | Preamplifier Factor | Level | Limit Line | Over Limit | Pol/Phase | Remark |
|---|----------|------------|----------------|------------|---------------------|--------|------------|------------|-----------|---------|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | | |
| 1 | 2310.000 | 35.59 | 27.15 | 3.32 | 37.62 | 28.44 | 54.00 | -25.56 | VERTICAL | Average |
| 2 | 2310.000 | 45.89 | 27.15 | 3.32 | 37.62 | 38.74 | 74.00 | -35.26 | VERTICAL | Peak |
| 3 | 2390.000 | 35.91 | 27.33 | 3.48 | 37.59 | 29.13 | 54.00 | -24.87 | VERTICAL | Average |
| 4 | 2390.000 | 45.26 | 27.33 | 3.48 | 37.59 | 38.48 | 74.00 | -35.52 | VERTICAL | Peak |
| 5 | 2483.500 | 34.57 | 27.48 | 3.53 | 37.57 | 28.01 | 54.00 | -25.99 | VERTICAL | Average |
| 6 | 2483.500 | 45.09 | 27.48 | 3.53 | 37.57 | 38.53 | 74.00 | -35.47 | VERTICAL | Peak |
| 7 | 2500.000 | 33.25 | 27.50 | 3.40 | 37.56 | 26.59 | 54.00 | -27.41 | VERTICAL | Average |
| 8 | 2500.000 | 43.49 | 27.50 | 3.40 | 37.56 | 36.83 | 74.00 | -37.17 | VERTICAL | Peak |

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



| | Freq | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Pol/Phase | Remark |
|---|----------|------------|----------------|------------|---------------|--------|------------|------------|-----------|---------|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | | |
| 1 | 2310.000 | 36.21 | 27.15 | 3.32 | 37.62 | 29.06 | 54.00 | -24.94 | VERTICAL | Average |
| 2 | 2310.000 | 45.10 | 27.15 | 3.32 | 37.62 | 37.95 | 74.00 | -36.05 | VERTICAL | Peak |
| 3 | 2390.000 | 36.35 | 27.33 | 3.48 | 37.59 | 29.57 | 54.00 | -24.43 | VERTICAL | Average |
| 4 | 2390.000 | 44.91 | 27.33 | 3.48 | 37.59 | 38.13 | 74.00 | -35.87 | VERTICAL | Peak |
| 5 | 2483.500 | 36.73 | 27.48 | 3.53 | 37.57 | 30.17 | 54.00 | -23.83 | VERTICAL | Average |
| 6 | 2483.500 | 45.76 | 27.48 | 3.53 | 37.57 | 39.20 | 74.00 | -34.80 | VERTICAL | Peak |
| 7 | 2500.000 | 35.86 | 27.50 | 3.40 | 37.56 | 29.20 | 54.00 | -24.80 | VERTICAL | Average |
| 8 | 2500.000 | 43.81 | 27.50 | 3.40 | 37.56 | 37.15 | 74.00 | -36.85 | VERTICAL | Peak |

7.7 Radiated Spurious Emissions

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

Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6

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.

7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C

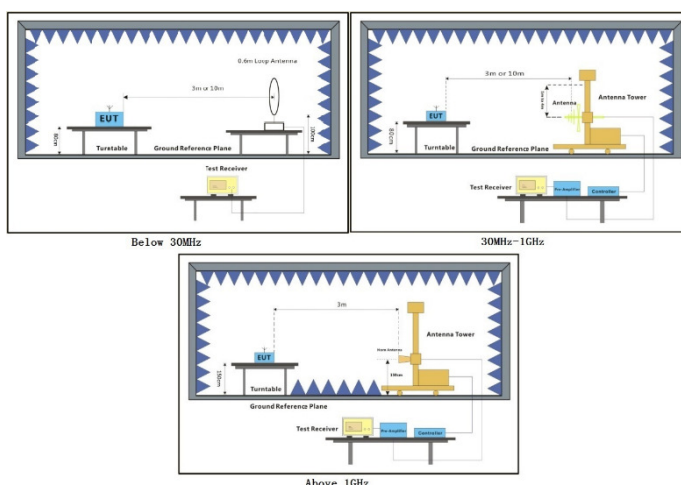
Humidity: 52 % RH

Atmospheric Pressure: 1010 mbar

7.7.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|-----------------------|-----------|--|
| Final test | 02 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation. |

7.7.3 Test Setup Diagram



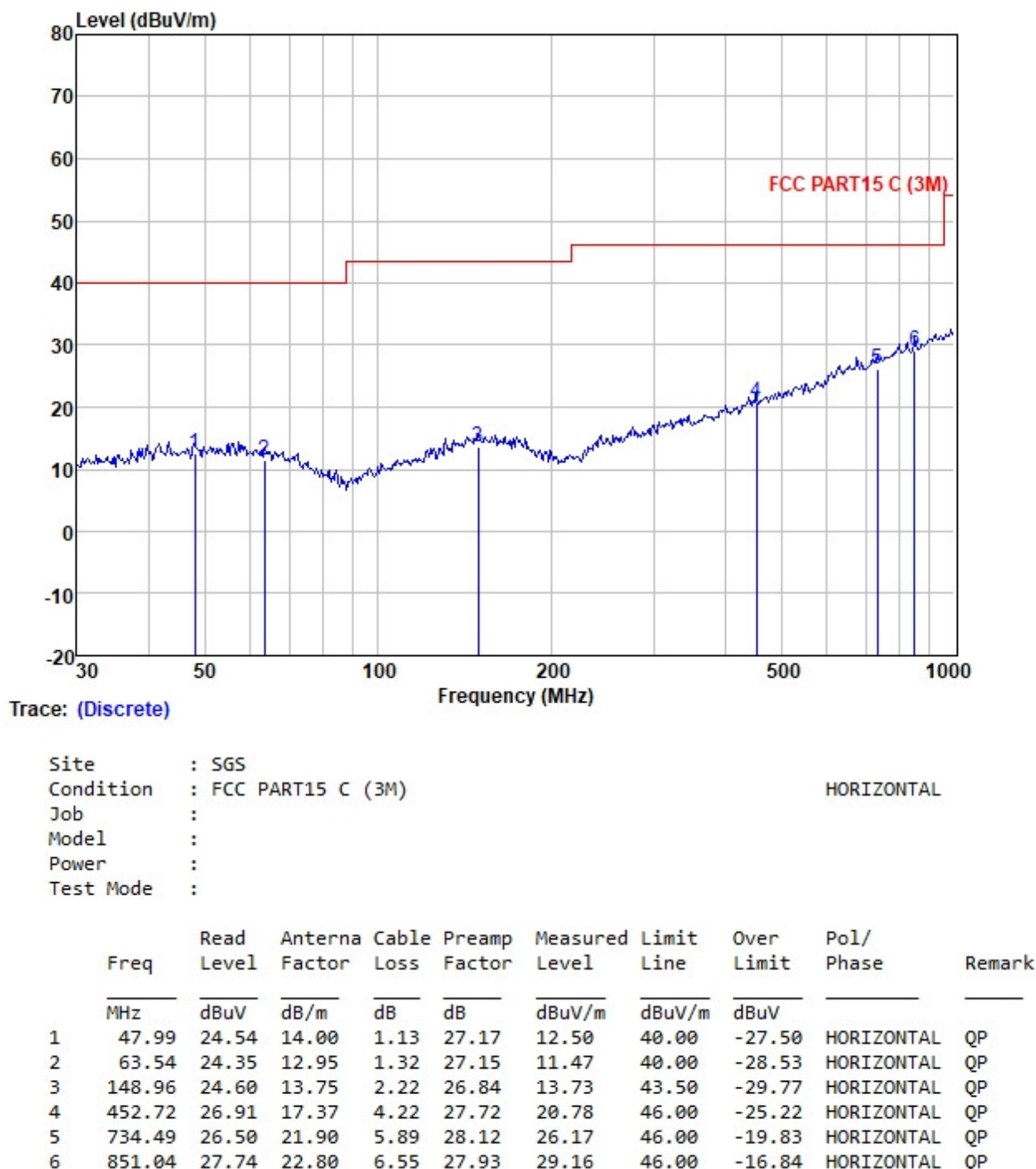
7.7.4 Measurement Procedure and Data

- 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. 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.

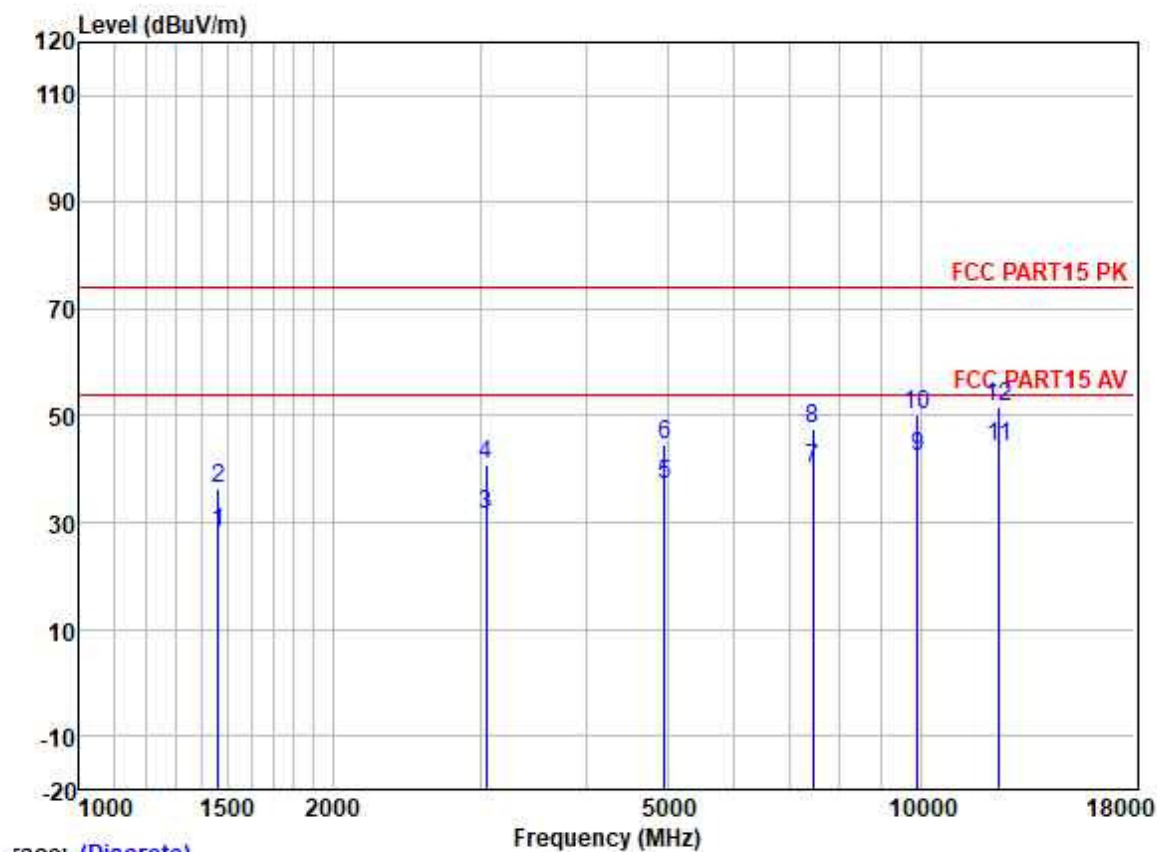
Remark:

- 1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
 Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor
- 3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and 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.
- 4) 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

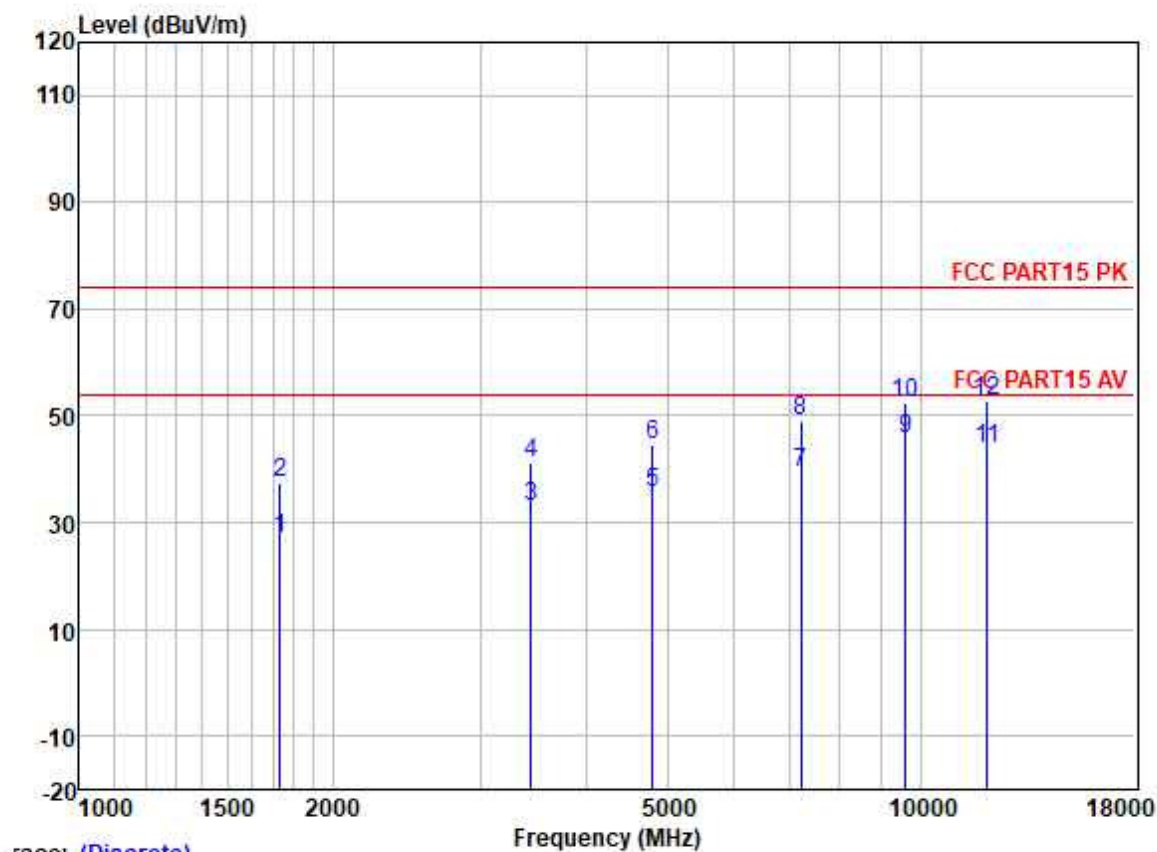


Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; ; Channel:High;



| | Freq | ReadAntenna | Cable | Preamp | Level | Limit | Over | | |
|----|-----------|-------------|--------|--------|--------|--------|--------|-----------|--------------------|
| | MHz | Level | Factor | Loss | Factor | Line | Limit | Pol/Phase | Remark |
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 1464.522 | 38.24 | 25.47 | 2.74 | 38.13 | 28.32 | 54.00 | -25.68 | HORIZONTAL Average |
| 2 | 1464.522 | 46.15 | 25.47 | 2.74 | 38.13 | 36.23 | 74.00 | -37.77 | HORIZONTAL Peak |
| 3 | 3042.846 | 36.54 | 28.43 | 3.84 | 37.20 | 31.61 | 54.00 | -22.39 | HORIZONTAL Average |
| 4 | 3042.846 | 45.74 | 28.43 | 3.84 | 37.20 | 40.81 | 74.00 | -33.19 | HORIZONTAL Peak |
| 5 | 4960.668 | 36.75 | 31.65 | 5.65 | 36.84 | 37.21 | 54.00 | -16.79 | HORIZONTAL Average |
| 6 | 4960.668 | 44.17 | 31.65 | 5.65 | 36.84 | 44.63 | 74.00 | -29.37 | HORIZONTAL Peak |
| 7 | 7440.778 | 34.99 | 36.27 | 6.22 | 37.47 | 40.01 | 54.00 | -13.99 | HORIZONTAL Average |
| 8 | 7440.778 | 42.66 | 36.27 | 6.22 | 37.47 | 47.68 | 74.00 | -26.32 | HORIZONTAL Peak |
| 9 | 9920.123 | 34.21 | 38.65 | 6.96 | 37.40 | 42.42 | 54.00 | -11.58 | HORIZONTAL Average |
| 10 | 9920.123 | 42.15 | 38.65 | 6.96 | 37.40 | 50.36 | 74.00 | -23.64 | HORIZONTAL Peak |
| 11 | 12400.600 | 34.70 | 38.57 | 7.97 | 36.88 | 44.36 | 54.00 | -9.64 | HORIZONTAL Average |
| 12 | 12400.600 | 41.90 | 38.57 | 7.97 | 36.88 | 51.56 | 74.00 | -22.44 | HORIZONTAL Peak |

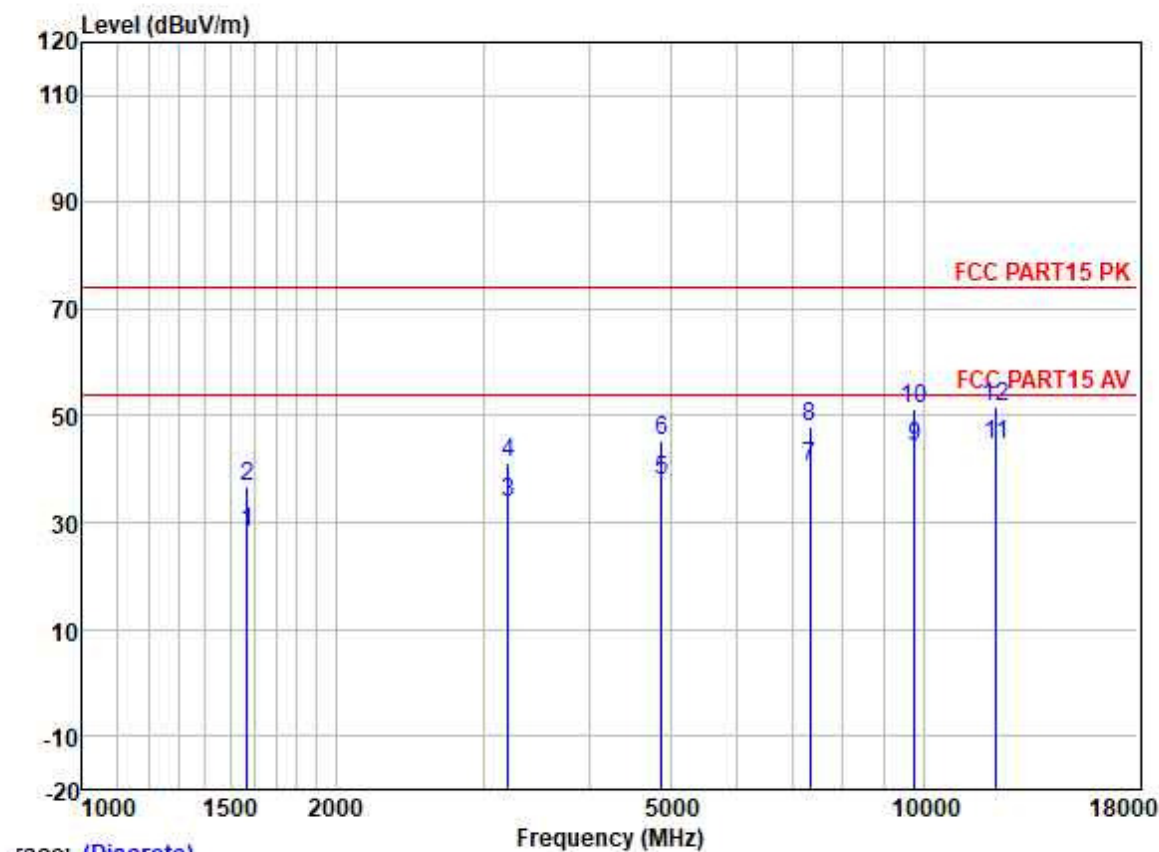
Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low;



race: (Discrete)

| | Freq | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Pol/Phase | Remark |
|----|-----------|------------|----------------|------------|---------------|--------|------------|------------|------------|---------|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | | |
| 1 | 1731.816 | 36.23 | 25.80 | 2.85 | 37.87 | 27.01 | 54.00 | -26.99 | HORIZONTAL | Average |
| 2 | 1731.816 | 46.70 | 25.80 | 2.85 | 37.87 | 37.48 | 74.00 | -36.52 | HORIZONTAL | Peak |
| 3 | 3445.535 | 37.01 | 28.87 | 4.18 | 36.96 | 33.10 | 54.00 | -20.90 | HORIZONTAL | Average |
| 4 | 3445.535 | 45.30 | 28.87 | 4.18 | 36.96 | 41.39 | 74.00 | -32.61 | HORIZONTAL | Peak |
| 5 | 4804.412 | 35.72 | 31.42 | 5.40 | 36.83 | 35.71 | 54.00 | -18.29 | HORIZONTAL | Average |
| 6 | 4804.412 | 44.62 | 31.42 | 5.40 | 36.83 | 44.61 | 74.00 | -29.39 | HORIZONTAL | Peak |
| 7 | 7206.260 | 35.38 | 35.54 | 5.98 | 37.38 | 39.52 | 54.00 | -14.48 | HORIZONTAL | Average |
| 8 | 7206.260 | 45.11 | 35.54 | 5.98 | 37.38 | 49.25 | 74.00 | -24.75 | HORIZONTAL | Peak |
| 9 | 9608.018 | 37.82 | 38.37 | 7.07 | 37.42 | 45.84 | 54.00 | -8.16 | HORIZONTAL | Average |
| 10 | 9608.018 | 44.51 | 38.37 | 7.07 | 37.42 | 52.53 | 74.00 | -21.47 | HORIZONTAL | Peak |
| 11 | 12010.350 | 33.86 | 38.90 | 8.19 | 37.10 | 43.85 | 54.00 | -10.15 | HORIZONTAL | Average |
| 12 | 12010.350 | 42.78 | 38.90 | 8.19 | 37.10 | 52.77 | 74.00 | -21.23 | HORIZONTAL | Peak |

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



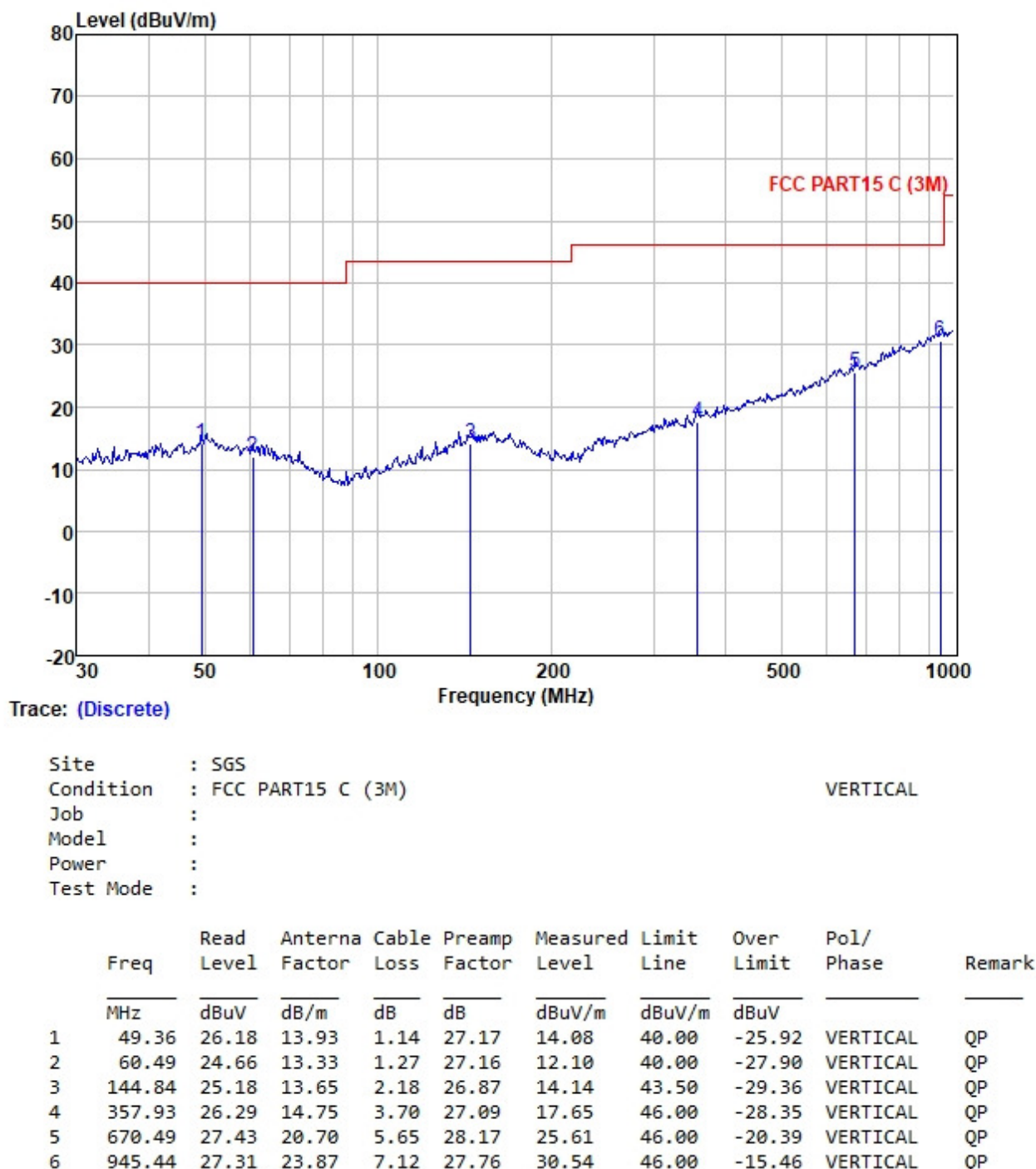
Trace: (Discrete)

| | Freq | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Pol/Phase | Remark |
|----|-----------|------------|----------------|------------|---------------|--------|------------|------------|------------|---------|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | | |
| 1 | 1569.721 | 37.69 | 25.55 | 2.80 | 38.00 | 28.04 | 54.00 | -25.96 | HORIZONTAL | Average |
| 2 | 1569.721 | 46.35 | 25.55 | 2.80 | 38.00 | 36.70 | 74.00 | -37.30 | HORIZONTAL | Peak |
| 3 | 3205.345 | 38.33 | 28.60 | 4.00 | 37.09 | 33.84 | 54.00 | -20.16 | HORIZONTAL | Average |
| 4 | 3205.345 | 45.65 | 28.60 | 4.00 | 37.09 | 41.16 | 74.00 | -32.84 | HORIZONTAL | Peak |
| 5 | 4884.184 | 37.51 | 31.56 | 5.52 | 36.84 | 37.75 | 54.00 | -16.25 | HORIZONTAL | Average |
| 6 | 4884.184 | 45.06 | 31.56 | 5.52 | 36.84 | 45.30 | 74.00 | -28.70 | HORIZONTAL | Peak |
| 7 | 7326.052 | 35.70 | 36.00 | 6.13 | 37.43 | 40.40 | 54.00 | -13.60 | HORIZONTAL | Average |
| 8 | 7326.052 | 43.09 | 36.00 | 6.13 | 37.43 | 47.79 | 74.00 | -26.21 | HORIZONTAL | Peak |
| 9 | 9768.187 | 36.09 | 38.53 | 7.01 | 37.41 | 44.22 | 54.00 | -9.78 | HORIZONTAL | Average |
| 10 | 9768.187 | 43.10 | 38.53 | 7.01 | 37.41 | 51.23 | 74.00 | -22.77 | HORIZONTAL | Peak |
| 11 | 12210.240 | 34.66 | 38.74 | 8.08 | 37.00 | 44.48 | 54.00 | -9.52 | HORIZONTAL | Average |
| 12 | 12210.240 | 41.98 | 38.74 | 8.08 | 37.00 | 51.80 | 74.00 | -22.20 | HORIZONTAL | Peak |

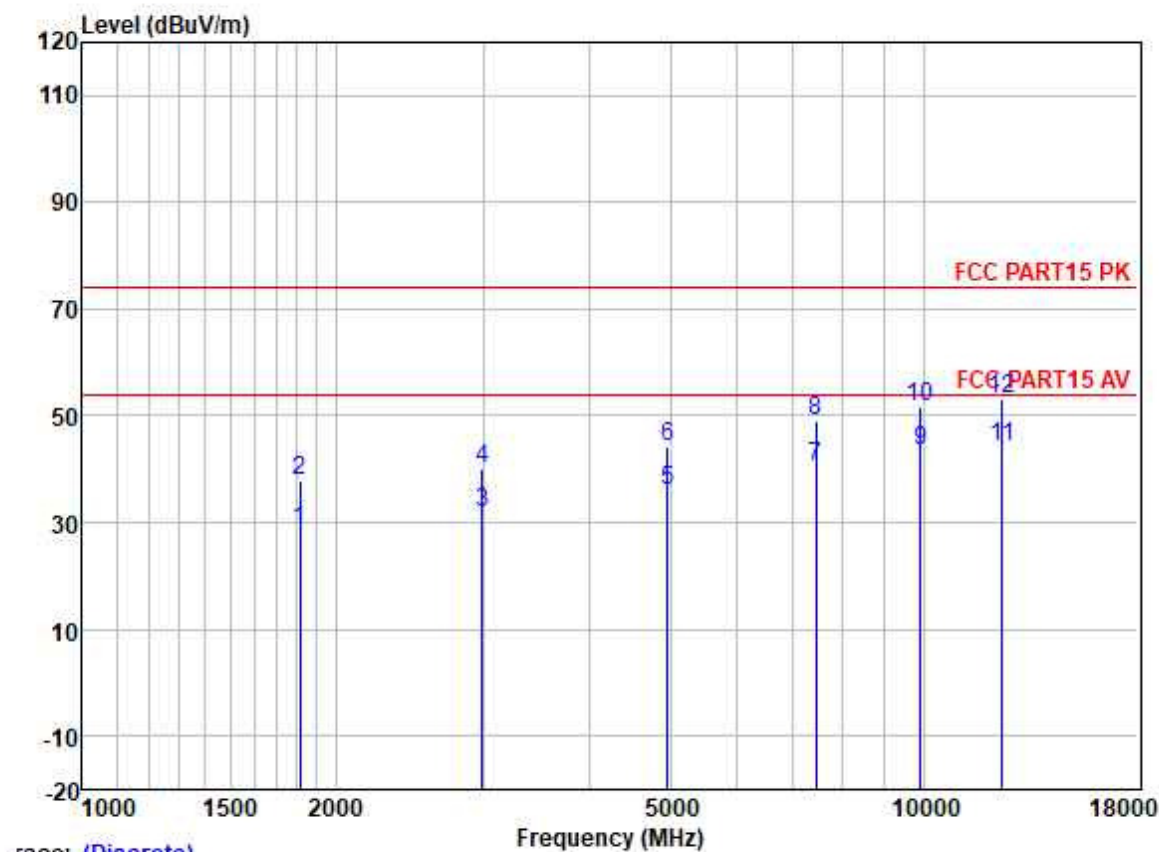


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Test Mode: 02; Polarity: Vertical



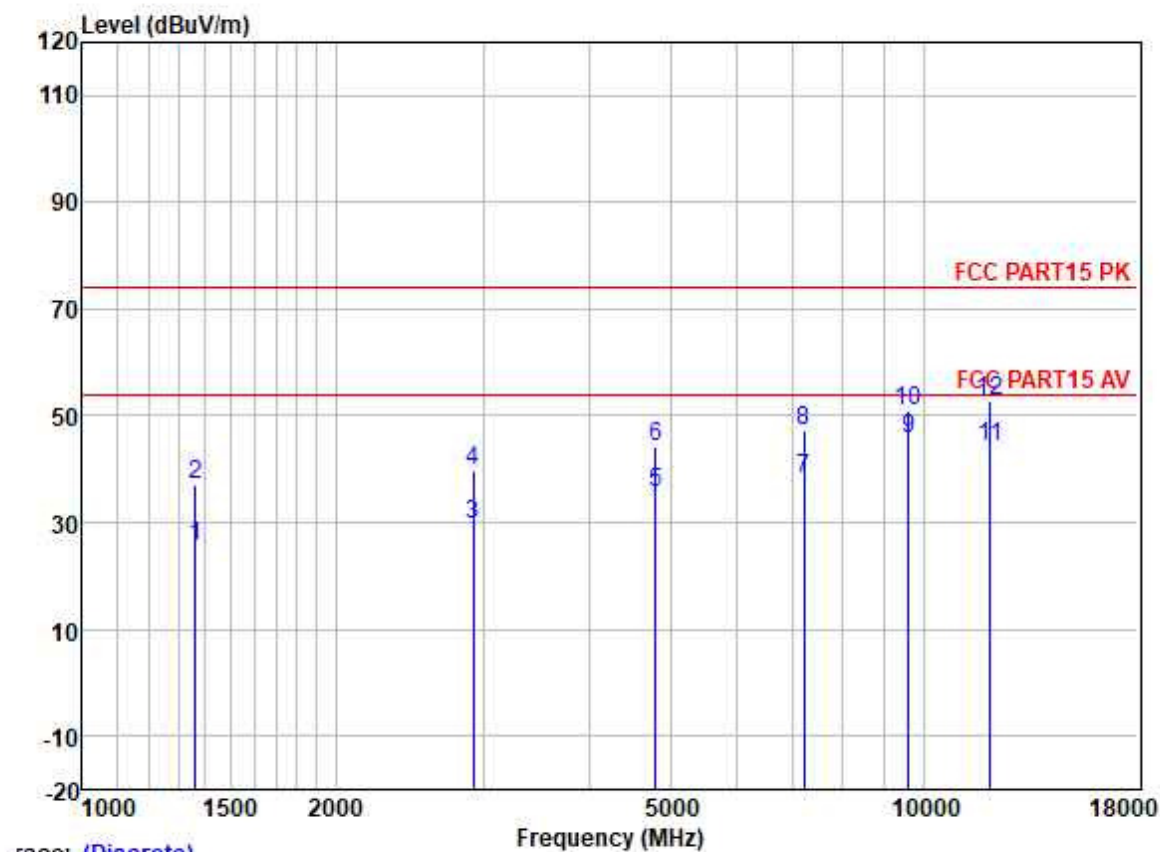
Test Mode: 02; Polarity: Vertical; Modulation: GFSK; ; Channel: High;



Trace: (Discrete)

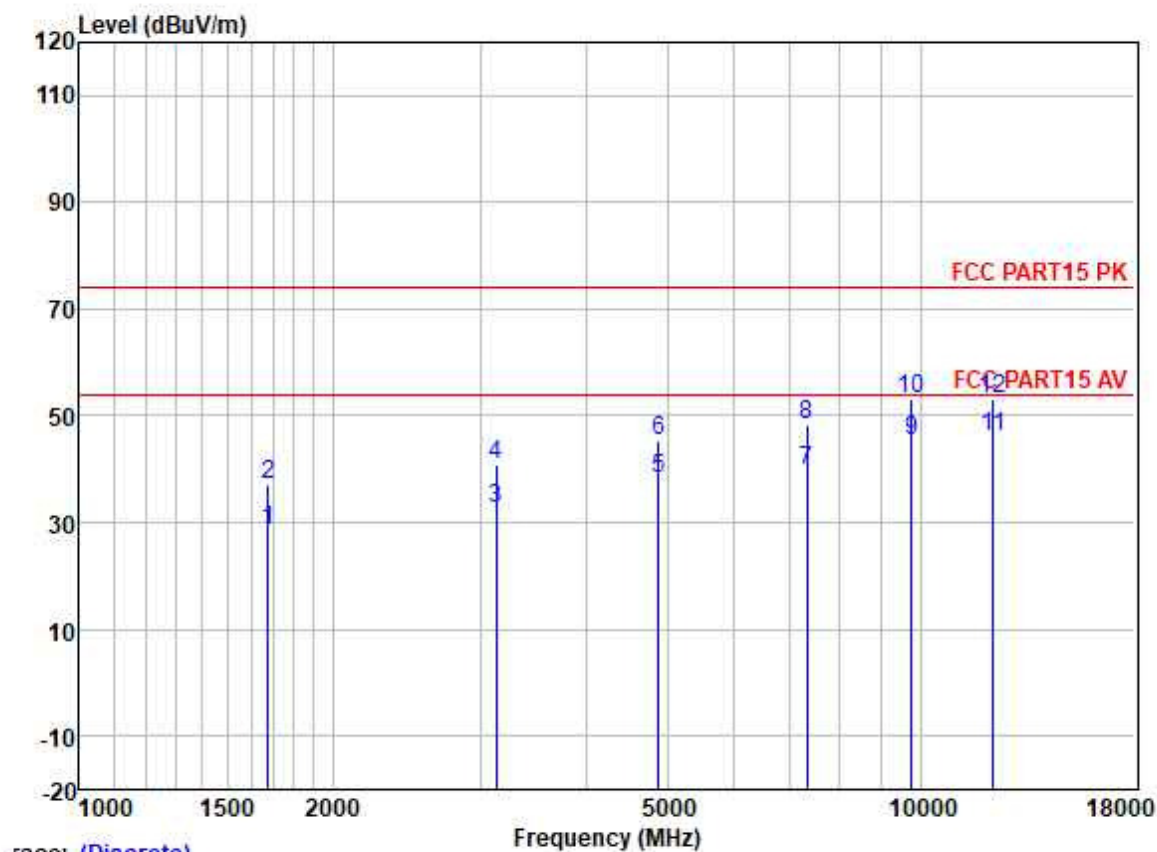
| | Freq | ReadAntenna | Cable | Preamp | Level | Limit | Over | | |
|----|-----------|-------------|--------|--------|--------|--------|--------|-----------|----------|
| | MHz | Level | Factor | Loss | Factor | Line | Limit | Pol/Phase | Remark |
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 1813.786 | 37.26 | 25.96 | 2.99 | 37.80 | 28.41 | 54.00 | -25.59 | VERTICAL |
| 2 | 1813.786 | 46.55 | 25.96 | 2.99 | 37.80 | 37.70 | 74.00 | -36.30 | VERTICAL |
| 3 | 2990.531 | 37.12 | 28.39 | 3.79 | 37.25 | 32.05 | 54.00 | -21.95 | VERTICAL |
| 4 | 2990.531 | 45.13 | 28.39 | 3.79 | 37.25 | 40.06 | 74.00 | -33.94 | VERTICAL |
| 5 | 4960.197 | 35.53 | 31.65 | 5.65 | 36.84 | 35.99 | 54.00 | -18.01 | VERTICAL |
| 6 | 4960.197 | 43.82 | 31.65 | 5.65 | 36.84 | 44.28 | 74.00 | -29.72 | VERTICAL |
| 7 | 7440.741 | 35.38 | 36.27 | 6.22 | 37.47 | 40.40 | 54.00 | -13.60 | VERTICAL |
| 8 | 7440.741 | 44.08 | 36.27 | 6.22 | 37.47 | 49.10 | 74.00 | -24.90 | VERTICAL |
| 9 | 9920.725 | 35.25 | 38.65 | 6.96 | 37.40 | 43.46 | 54.00 | -10.54 | VERTICAL |
| 10 | 9920.725 | 43.30 | 38.65 | 6.96 | 37.40 | 51.51 | 74.00 | -22.49 | VERTICAL |
| 11 | 12400.580 | 34.44 | 38.57 | 7.97 | 36.88 | 44.10 | 54.00 | -9.90 | VERTICAL |
| 12 | 12400.580 | 43.60 | 38.57 | 7.97 | 36.88 | 53.26 | 74.00 | -20.74 | VERTICAL |

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



| | Freq | ReadAntenna | Cable | Preamp | Level | Limit | Over | | |
|----|-----------|-------------|--------|--------|--------|--------|--------|-----------|----------|
| | MHz | Level | Factor | Loss | Factor | Line | Limit | Pol/Phase | Remark |
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 1362.430 | 36.04 | 25.33 | 2.60 | 38.27 | 25.70 | 54.00 | -28.30 | VERTICAL |
| 2 | 1362.430 | 47.46 | 25.33 | 2.60 | 38.27 | 37.12 | 74.00 | -36.88 | VERTICAL |
| 3 | 2913.740 | 34.84 | 28.31 | 3.71 | 37.32 | 29.54 | 54.00 | -24.46 | VERTICAL |
| 4 | 2913.740 | 45.11 | 28.31 | 3.71 | 37.32 | 39.81 | 74.00 | -34.19 | VERTICAL |
| 5 | 4804.396 | 35.71 | 31.42 | 5.40 | 36.83 | 35.70 | 54.00 | -18.30 | VERTICAL |
| 6 | 4804.396 | 44.19 | 31.42 | 5.40 | 36.83 | 44.18 | 74.00 | -29.82 | VERTICAL |
| 7 | 7206.806 | 34.28 | 35.54 | 5.98 | 37.38 | 38.42 | 54.00 | -15.58 | VERTICAL |
| 8 | 7206.806 | 43.25 | 35.54 | 5.98 | 37.38 | 47.39 | 74.00 | -26.61 | VERTICAL |
| 9 | 9608.160 | 37.59 | 38.37 | 7.07 | 37.42 | 45.61 | 54.00 | -8.39 | VERTICAL |
| 10 | 9608.160 | 43.01 | 38.37 | 7.07 | 37.42 | 51.03 | 74.00 | -22.97 | VERTICAL |
| 11 | 12010.980 | 34.18 | 38.90 | 8.19 | 37.10 | 44.17 | 54.00 | -9.83 | VERTICAL |
| 12 | 12010.980 | 42.65 | 38.90 | 8.19 | 37.10 | 52.64 | 74.00 | -21.36 | VERTICAL |

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



Trace: (Discrete)

| | Freq | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Pol/Phase | Remark |
|----|-----------|------------|----------------|------------|---------------|--------|------------|------------|-----------|---------|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | | |
| 1 | 1677.621 | 37.87 | 25.68 | 2.80 | 37.91 | 28.44 | 54.00 | -25.56 | VERTICAL | Average |
| 2 | 1677.621 | 46.60 | 25.68 | 2.80 | 37.91 | 37.17 | 74.00 | -36.83 | VERTICAL | Peak |
| 3 | 3132.079 | 37.20 | 28.51 | 3.95 | 37.14 | 32.52 | 54.00 | -21.48 | VERTICAL | Average |
| 4 | 3132.079 | 45.67 | 28.51 | 3.95 | 37.14 | 40.99 | 74.00 | -33.01 | VERTICAL | Peak |
| 5 | 4884.049 | 37.92 | 31.56 | 5.52 | 36.84 | 38.16 | 54.00 | -15.84 | VERTICAL | Average |
| 6 | 4884.049 | 45.08 | 31.56 | 5.52 | 36.84 | 45.32 | 74.00 | -28.68 | VERTICAL | Peak |
| 7 | 7326.741 | 35.04 | 36.00 | 6.13 | 37.43 | 39.74 | 54.00 | -14.26 | VERTICAL | Average |
| 8 | 7326.741 | 43.74 | 36.00 | 6.13 | 37.43 | 48.44 | 74.00 | -25.56 | VERTICAL | Peak |
| 9 | 9768.430 | 37.28 | 38.53 | 7.01 | 37.41 | 45.41 | 54.00 | -8.59 | VERTICAL | Average |
| 10 | 9768.430 | 44.95 | 38.53 | 7.01 | 37.41 | 53.08 | 74.00 | -20.92 | VERTICAL | Peak |
| 11 | 12210.710 | 36.38 | 38.74 | 8.08 | 37.00 | 46.20 | 54.00 | -7.80 | VERTICAL | Average |
| 12 | 12210.710 | 43.45 | 38.74 | 8.08 | 37.00 | 53.27 | 74.00 | -20.73 | VERTICAL | Peak |

8 Appendix

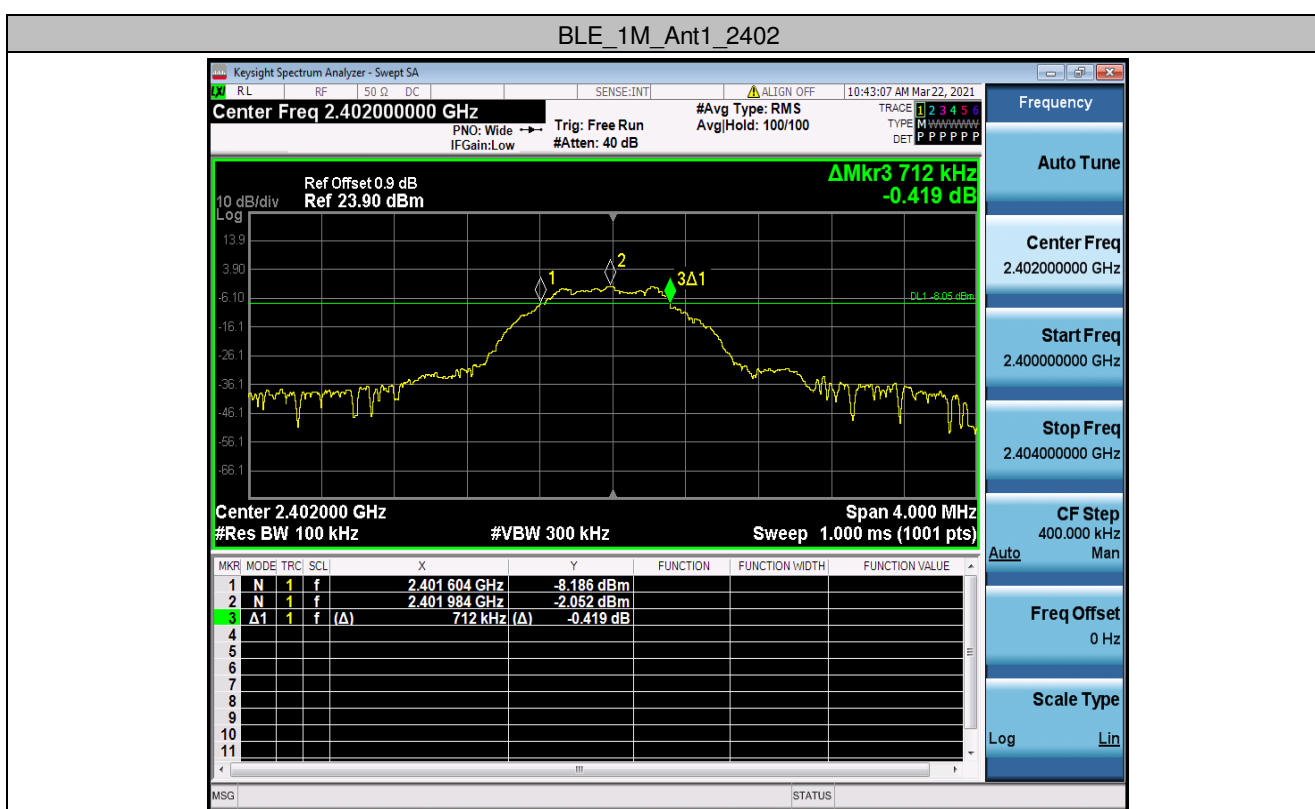
(Cable loss=0.9dB)

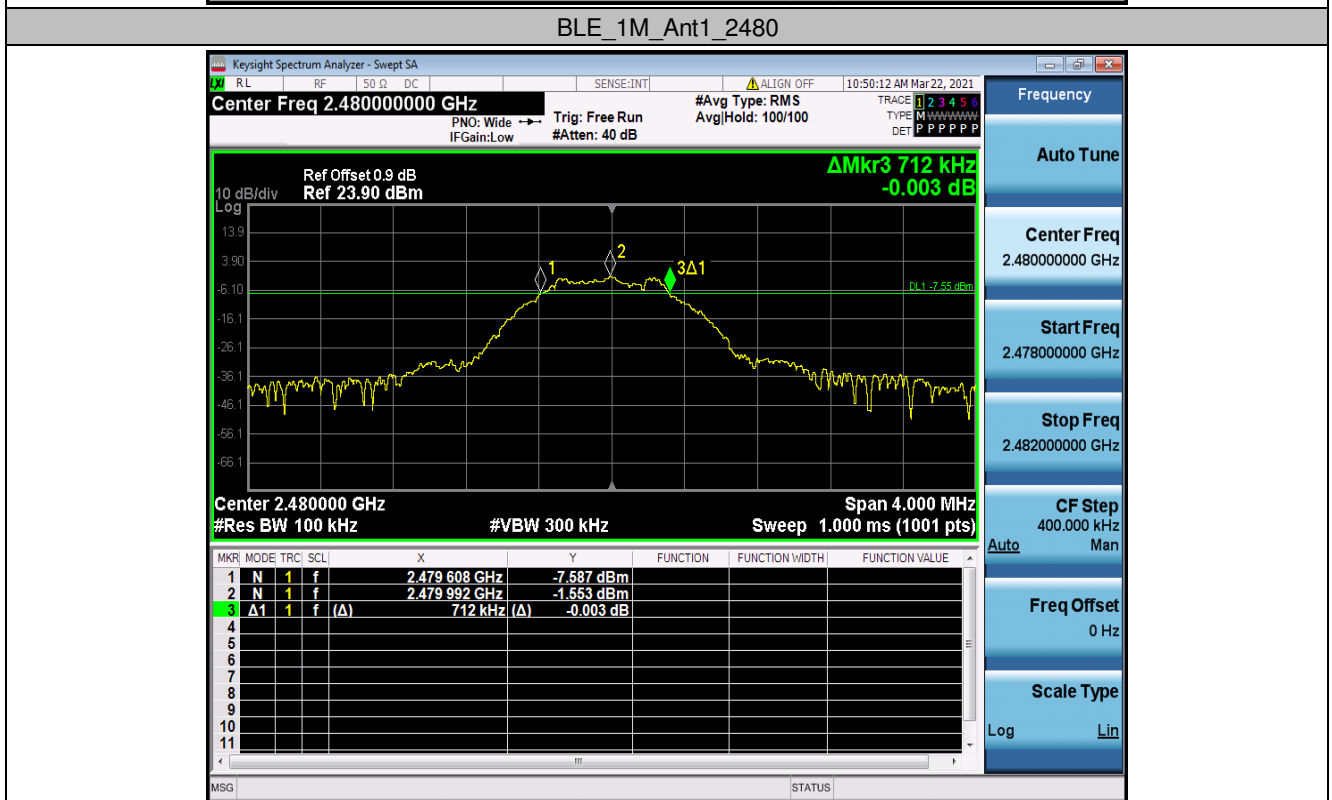
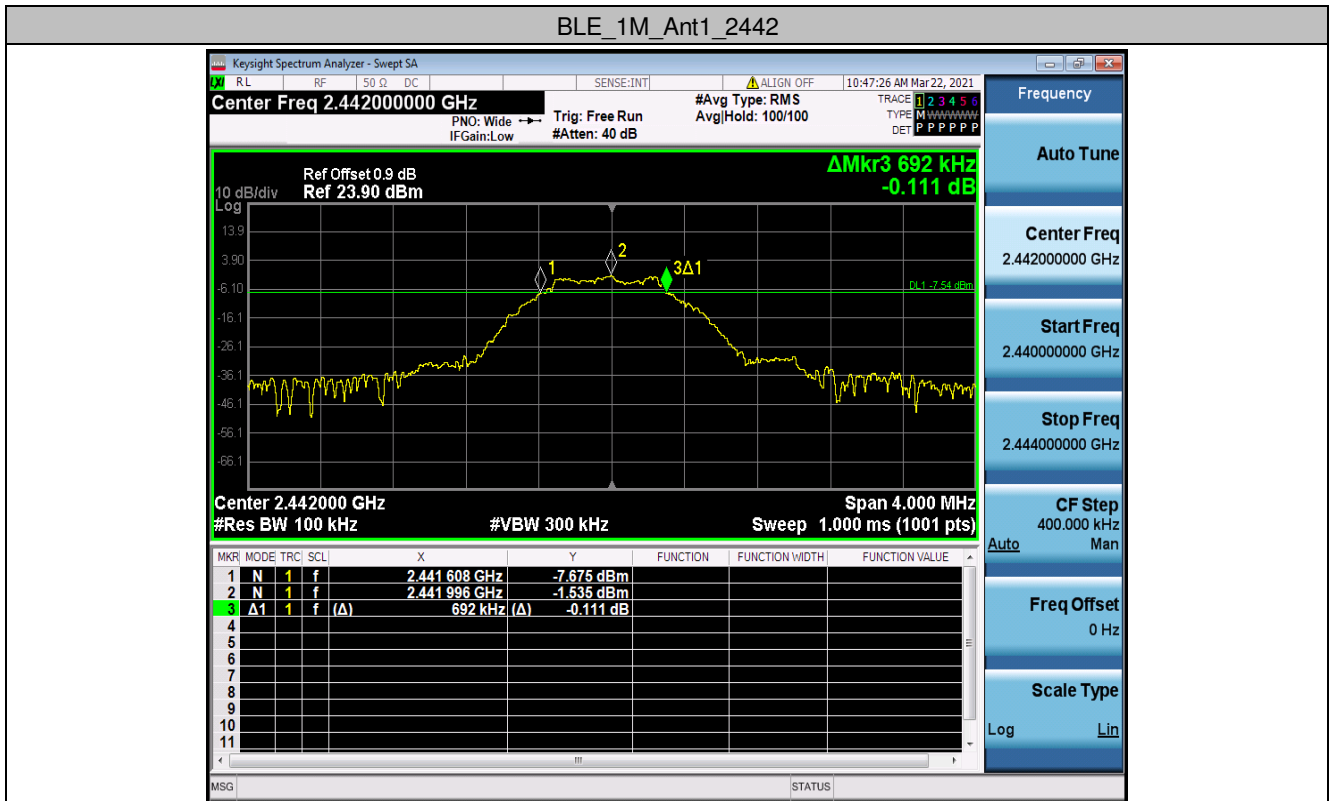
8.1 Appendix A: DTS Bandwidth

8.1.1 Test Result

| TestMode | Antenna | Channel | DTS BW [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|----------|---------|---------|--------------|----------|----------|------------|---------|
| BLE_1M | Ant1 | 2402 | 0.712 | 2401.604 | 2402.316 | >=0.5 | PASS |
| | | 2442 | 0.692 | 2441.608 | 2442.300 | >=0.5 | PASS |
| | | 2480 | 0.712 | 2479.608 | 2480.320 | >=0.5 | PASS |

8.1.2 Test Graphs



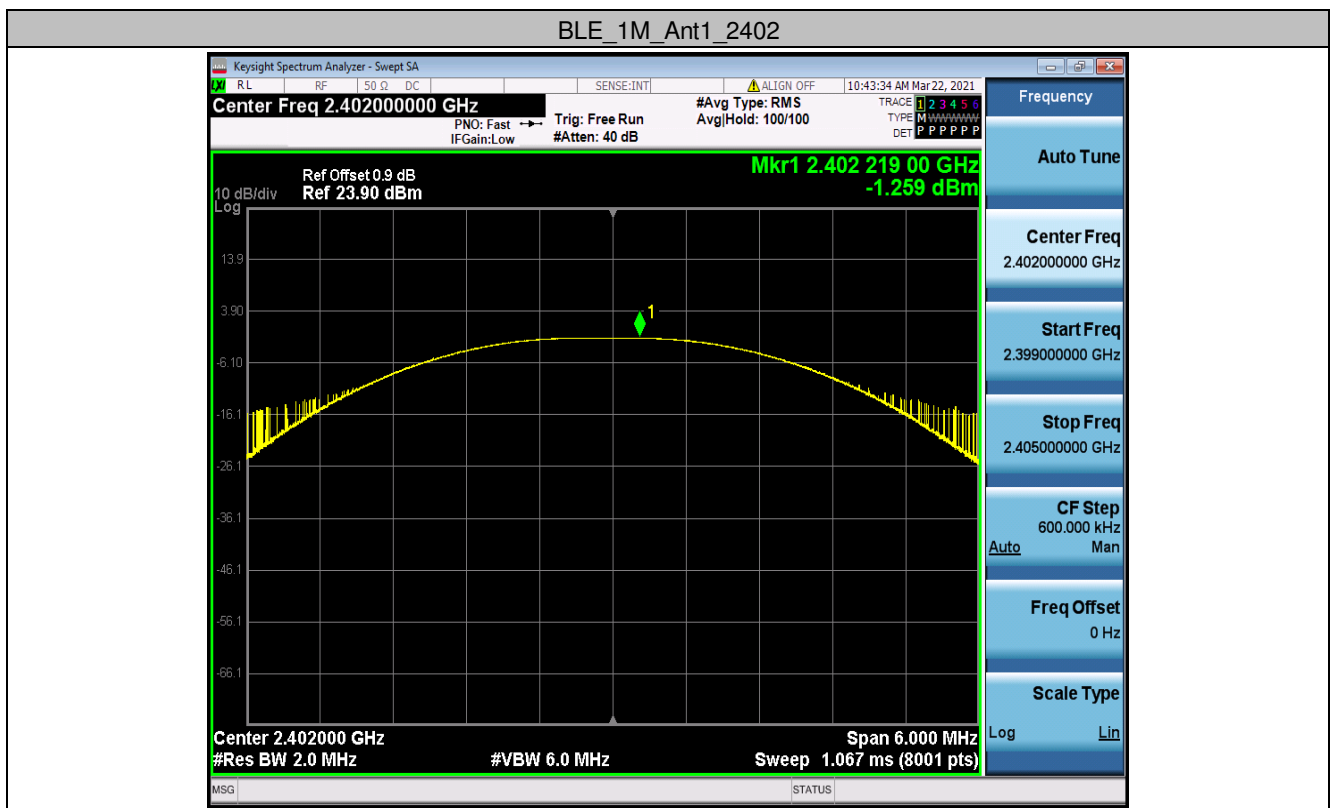


8.2 Appendix B: Maximum conducted output power

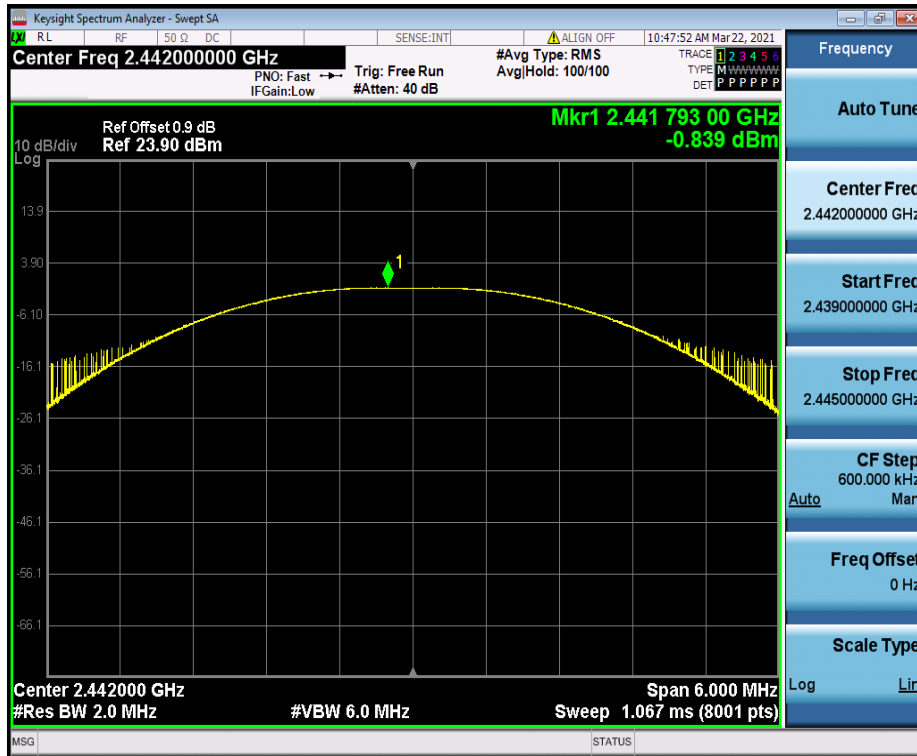
8.2.1 Test Result

| TestMode | Antenna | Channel | Result[dBm] | Limit[dBm] | Verdict |
|----------|---------|---------|-------------|------------|---------|
| BLE_1M | Ant1 | 2402 | -1.26 | <=30 | PASS |
| | | 2442 | -0.84 | <=30 | PASS |
| | | 2480 | -0.82 | <=30 | PASS |

8.2.2 Test Graphs



BLE_1M_Ant1_2442



BLE_1M_Ant1_2480



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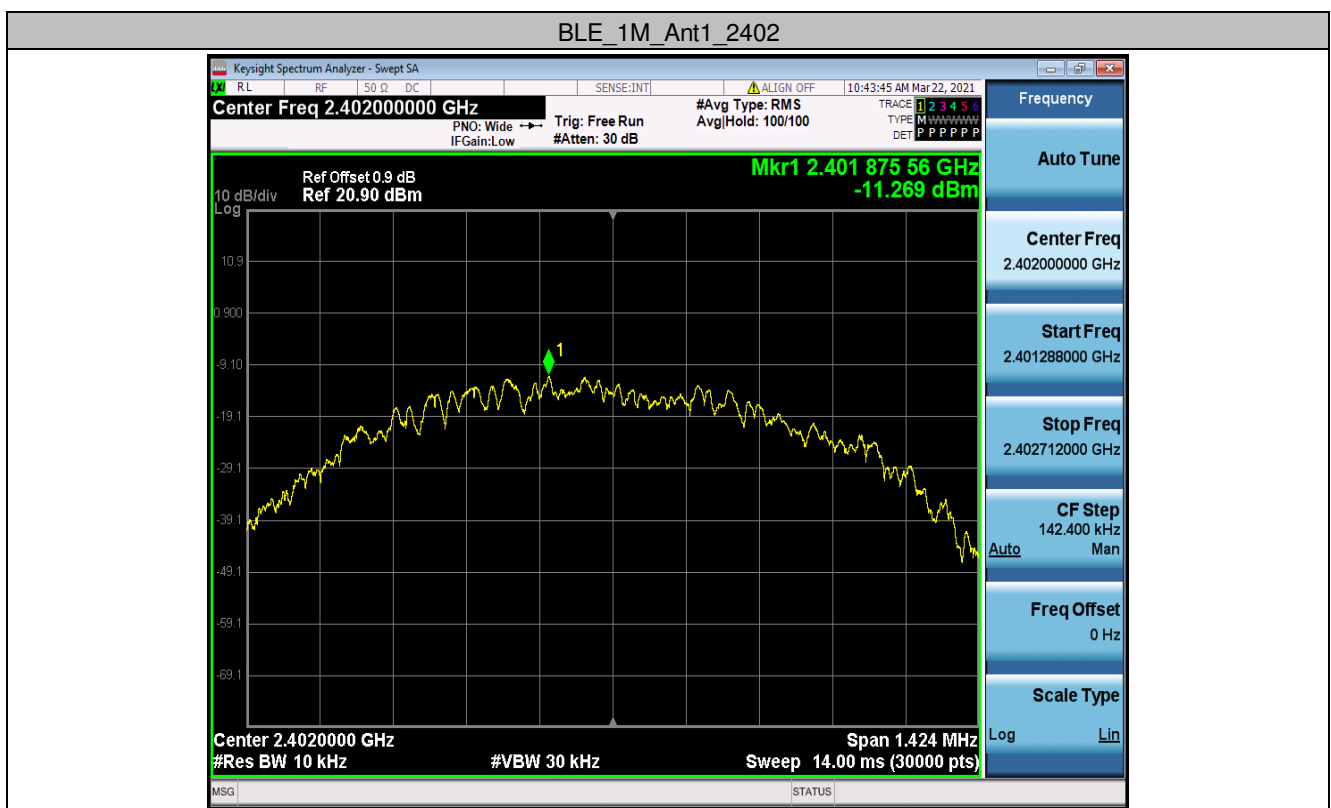


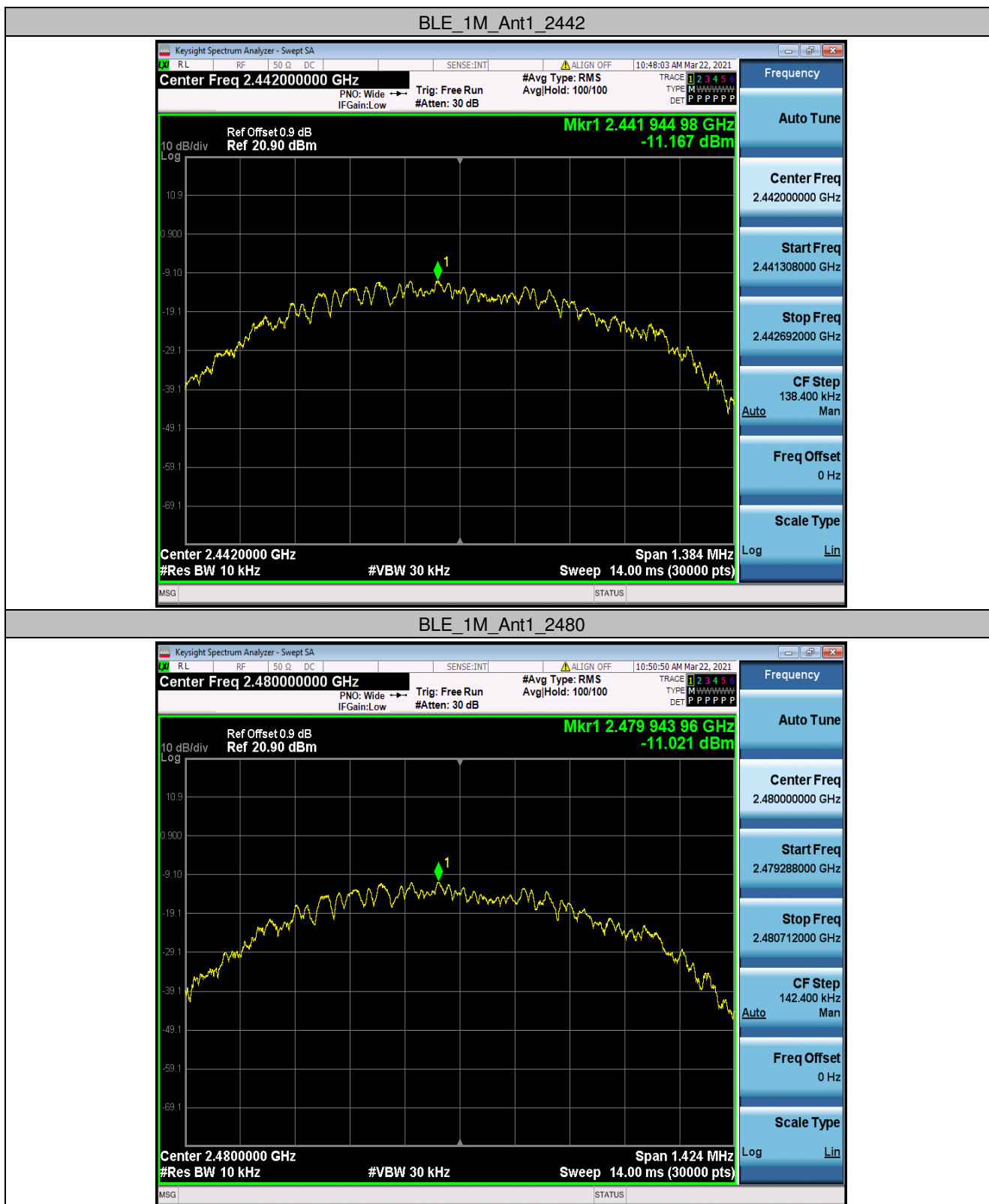
8.3 Appendix C: Maximum power spectral density

8.3.1 Test Result

| TestMode | Antenna | Channel | Result[dBm/3-100kHz] | Limit[dBm/3kHz] | Verdict |
|----------|---------|---------|----------------------|-----------------|---------|
| BLE_1M | Ant1 | 2402 | -11.27 | <=8 | PASS |
| | | 2442 | -11.17 | <=8 | PASS |
| | | 2480 | -11.02 | <=8 | PASS |

8.3.2 Test Graphs





8.4 Appendix D: Band edge measurements

8.4.1 Test Result

| TestMode | Antenna | ChName | Channel | RefLevel[dBm] | Result[dBm] | Limit[dBm] | Verdict |
|----------|---------|--------|---------|---------------|-------------|------------|---------|
| BLE_1M | Ant1 | Low | 2402 | -1.94 | -39.51 | <=-21.94 | PASS |
| | | High | 2480 | -1.41 | -43.22 | <=-21.41 | PASS |

8.4.2 Test Graphs



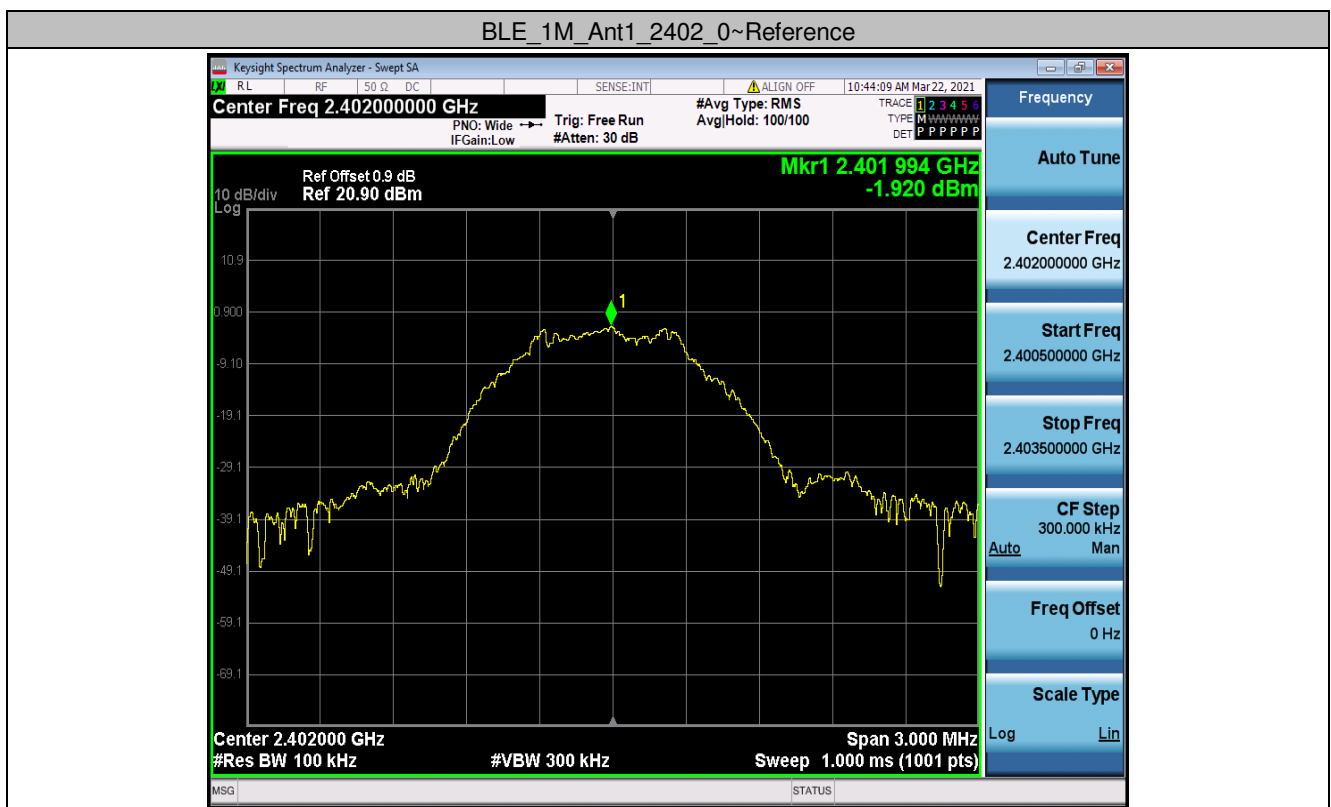


8.5 Appendix E: Conducted Spurious Emission

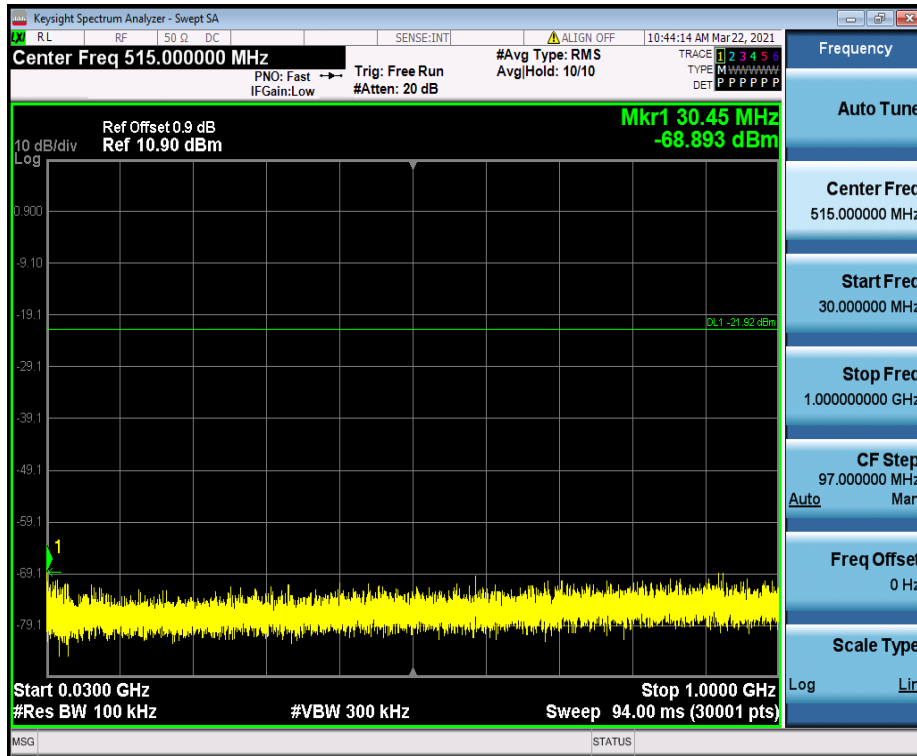
8.5.1 Test Result

| TestMode | Antenna | Channel | FreqRange [MHz] | RefLevel [dBm] | Result[dBm] | Limit[dBm] | Verdict |
|----------|---------|---------|-----------------|----------------|-------------|------------|---------|
| BLE_1M | Ant1 | 2402 | Reference | -1.92 | -1.92 | --- | PASS |
| | | | 30~1000 | 30~1000 | -68.893 | <=-21.92 | PASS |
| | | | 1000~26500 | 1000~26500 | -50.885 | <=-21.92 | PASS |
| | | 2442 | Reference | -1.74 | -1.74 | --- | PASS |
| | | | 30~1000 | 30~1000 | -68.723 | <=-21.738 | PASS |
| | | | 1000~26500 | 1000~26500 | -50.821 | <=-21.738 | PASS |
| | | 2480 | Reference | -1.52 | -1.52 | --- | PASS |
| | | | 30~1000 | 30~1000 | -68.376 | <=-21.515 | PASS |
| | | | 1000~26500 | 1000~26500 | -49.095 | <=-21.515 | PASS |

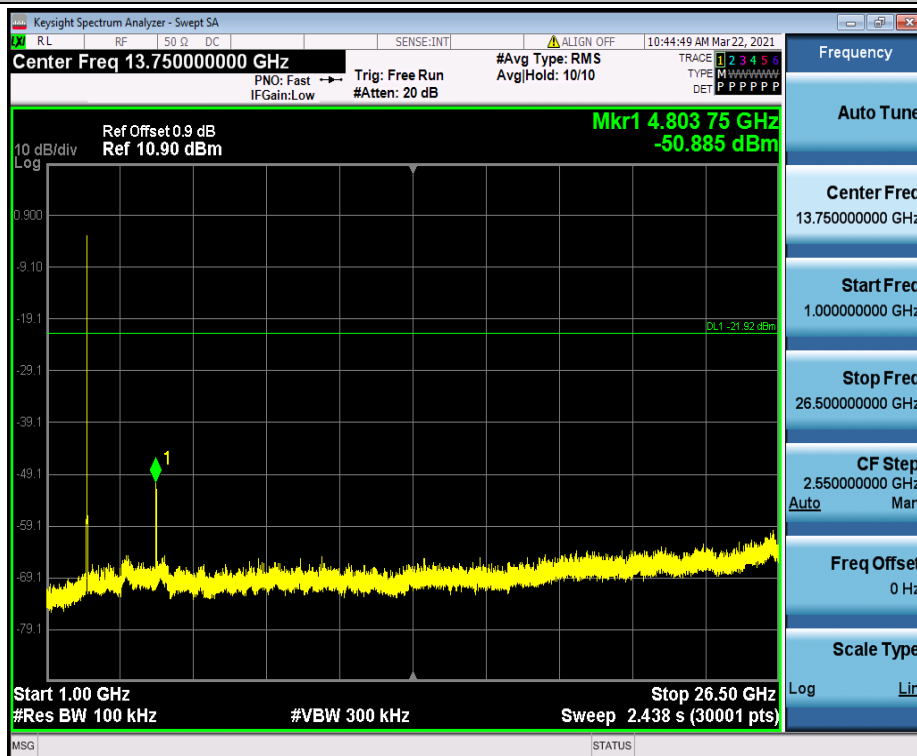
8.5.2 Test Graphs



BLE_1M_Ant1_2402_30~1000

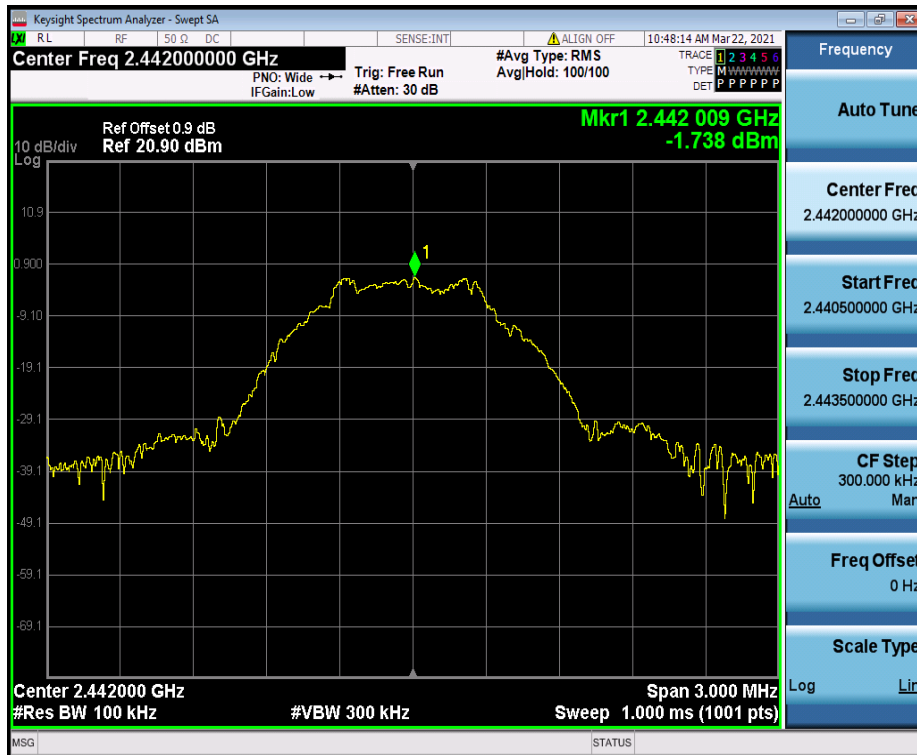


BLE_1M_Ant1_2402_1000~26500

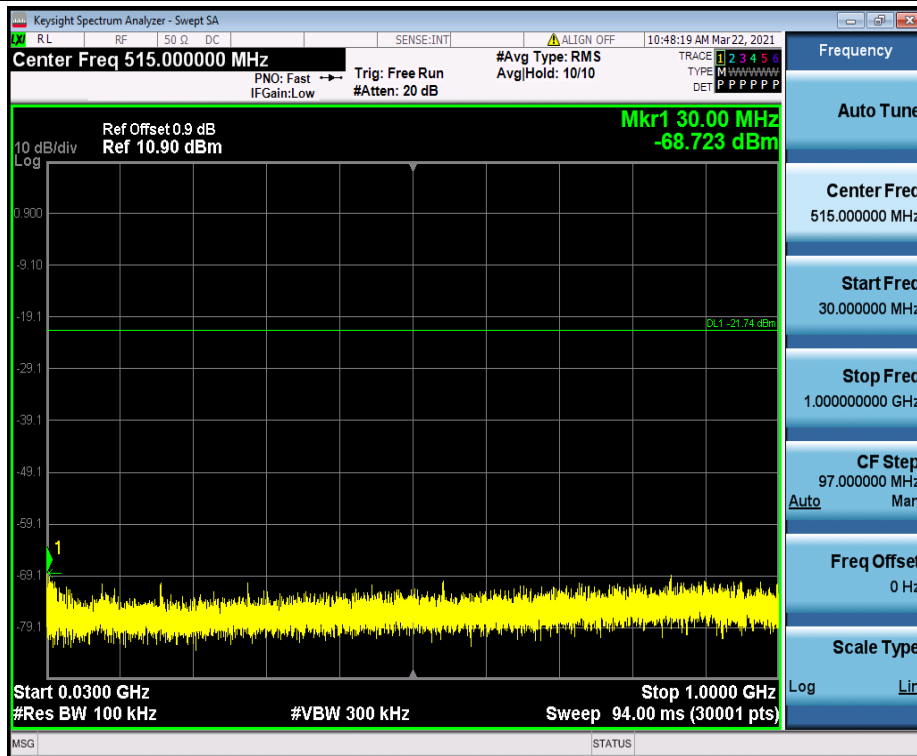


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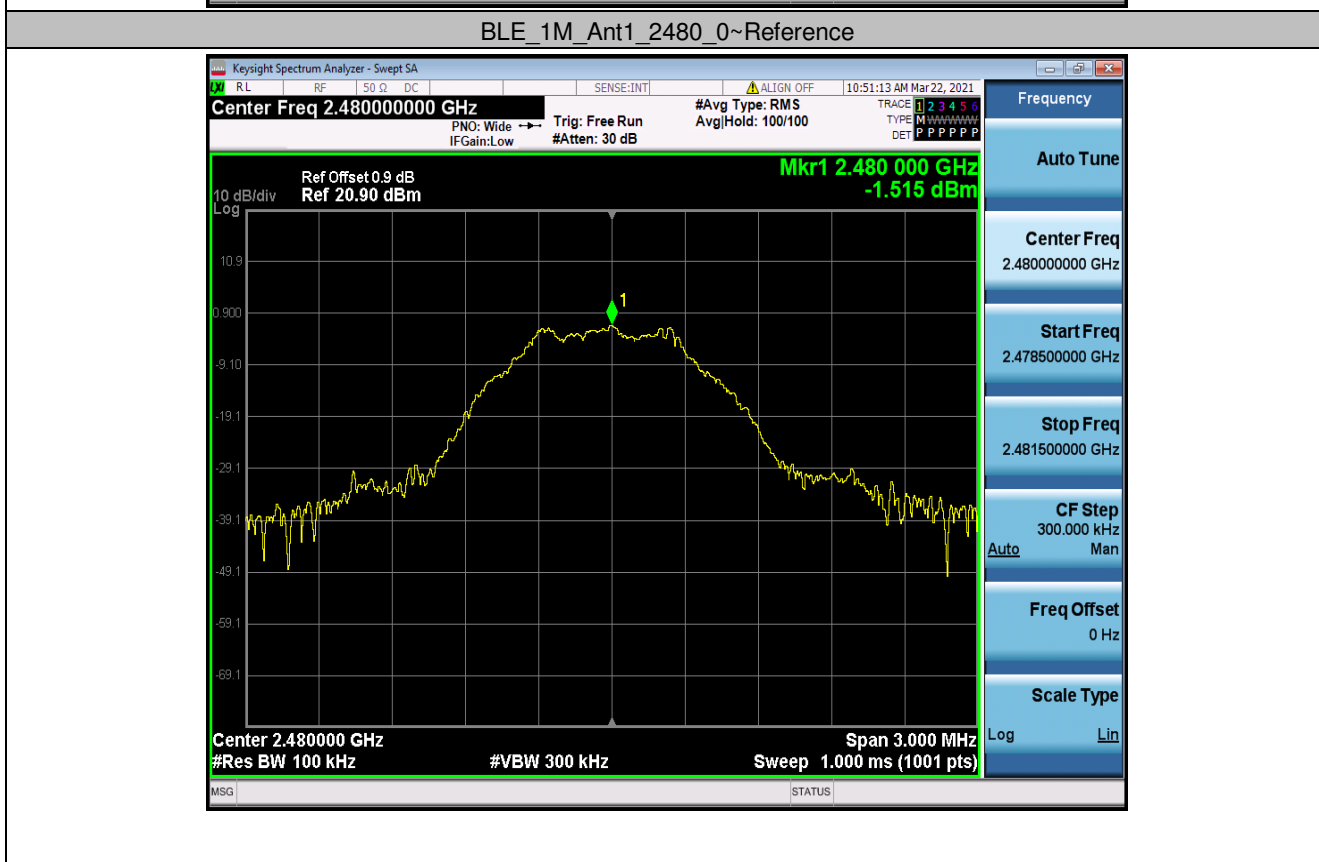
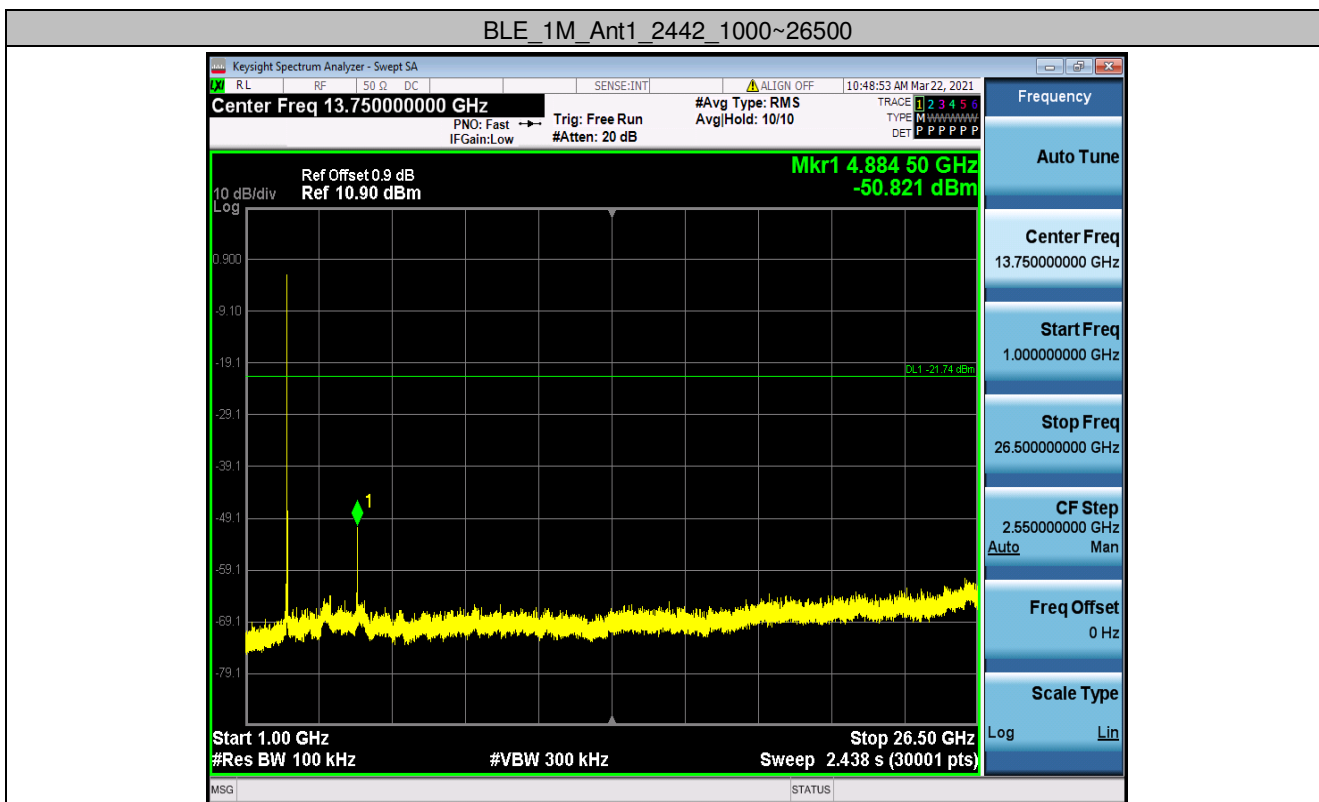
BLE_1M_Ant1_2442_0~Reference



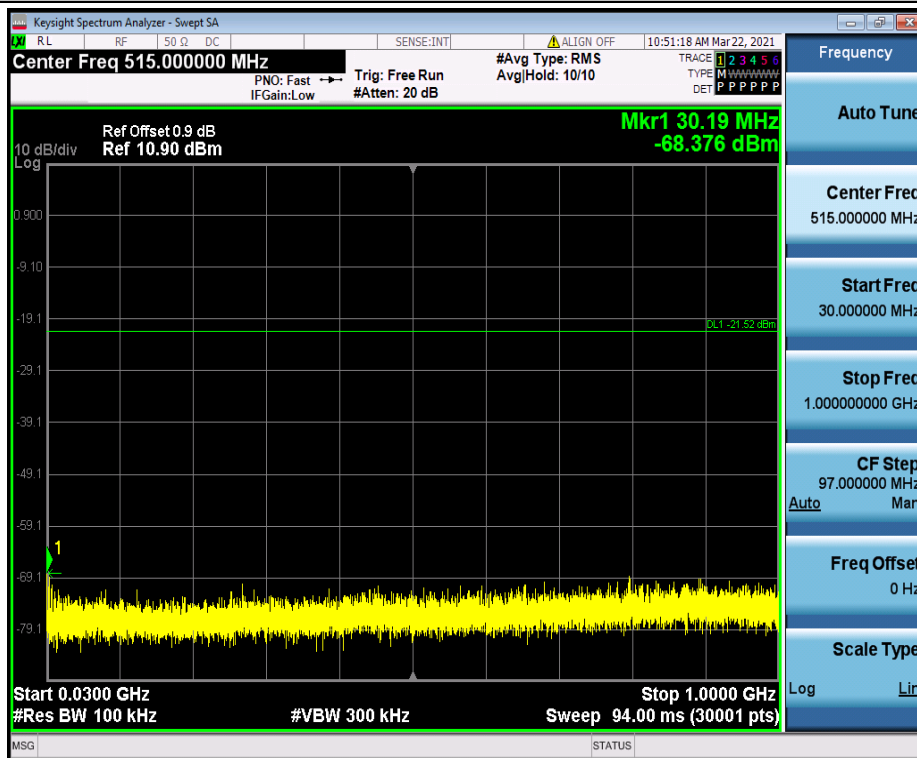
BLE_1M_Ant1_2442_30~1000



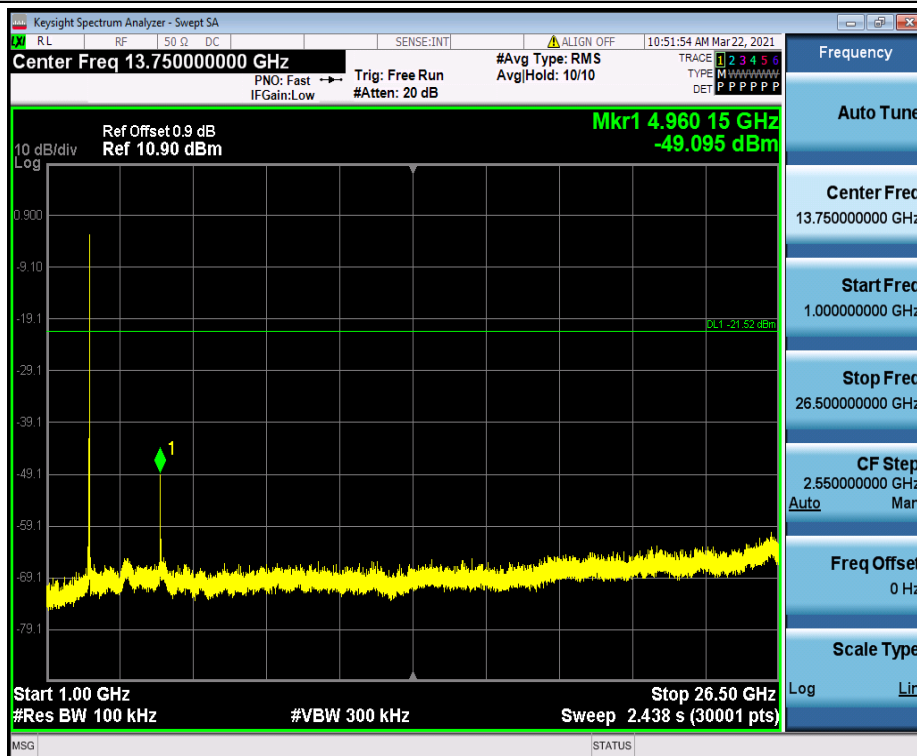
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BLE_1M_Ant1_2480_30~1000



BLE_1M_Ant1_2480_1000~26500



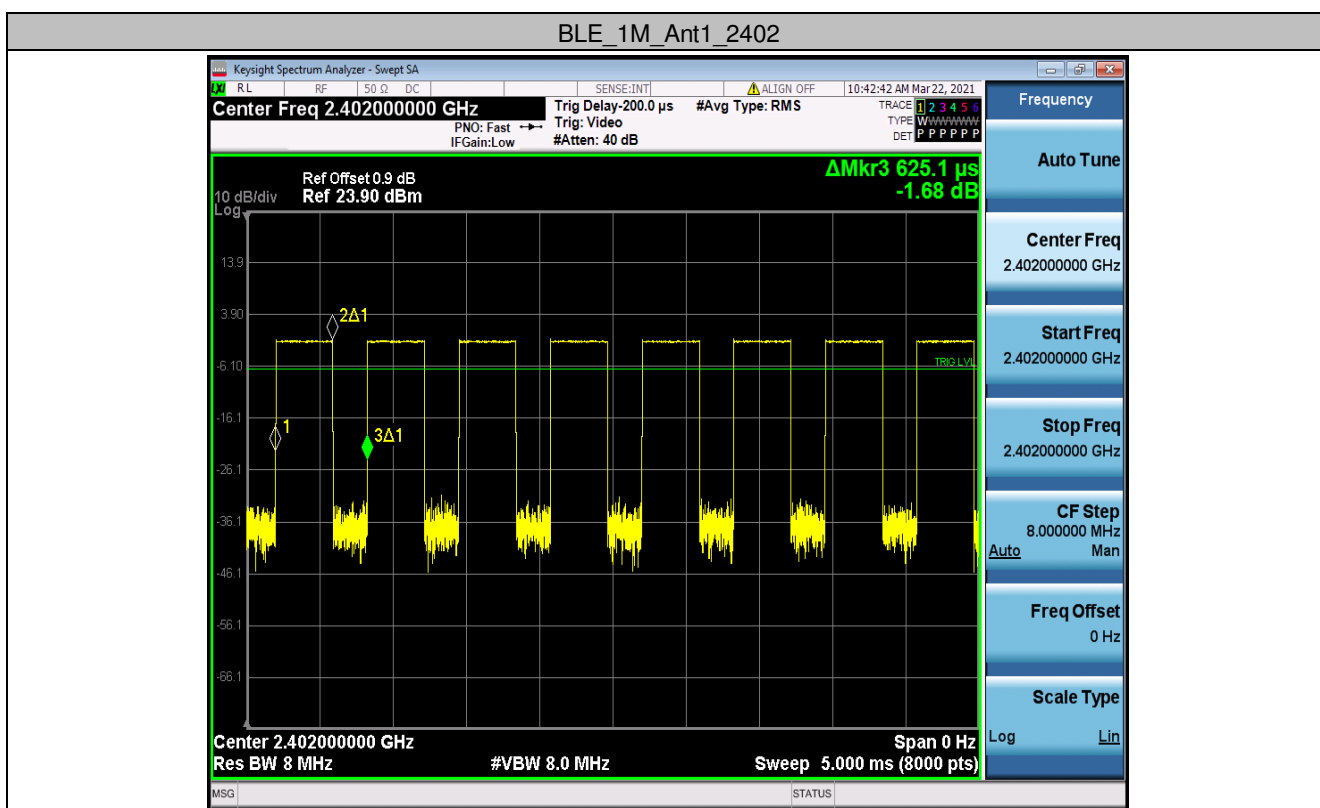
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8.6 Appendix F: Duty Cycle

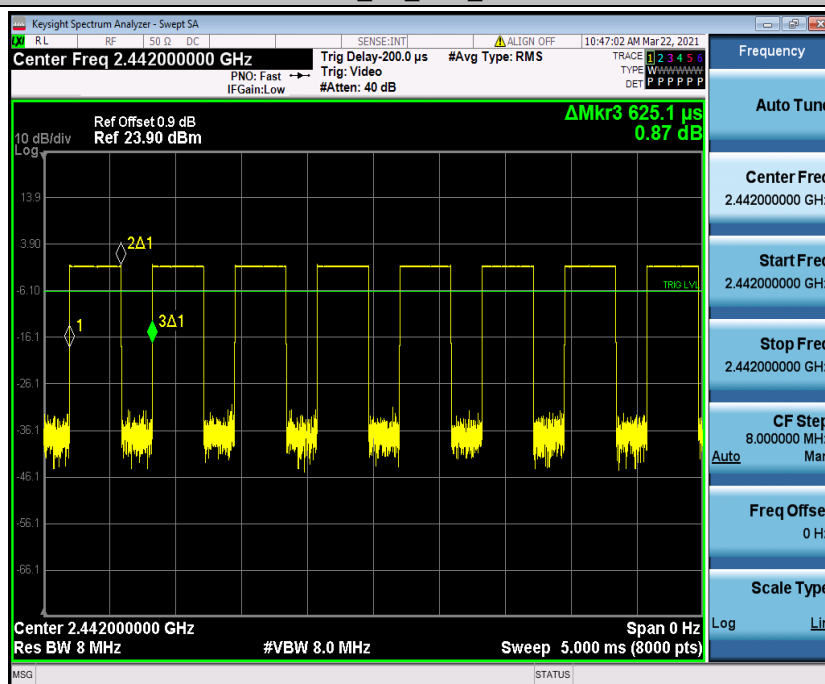
8.6.1 Test Result

| TestMode | Antenna | Channel | Transmission Duration [ms] | Transmission Period [ms] | Duty Cycle [%] |
|----------|---------|---------|----------------------------|--------------------------|----------------|
| BLE_1M | Ant1 | 2402 | 0.39 | 0.63 | 62.50 |
| | | 2442 | 0.39 | 0.63 | 62.40 |
| | | 2480 | 0.39 | 0.63 | 62.40 |

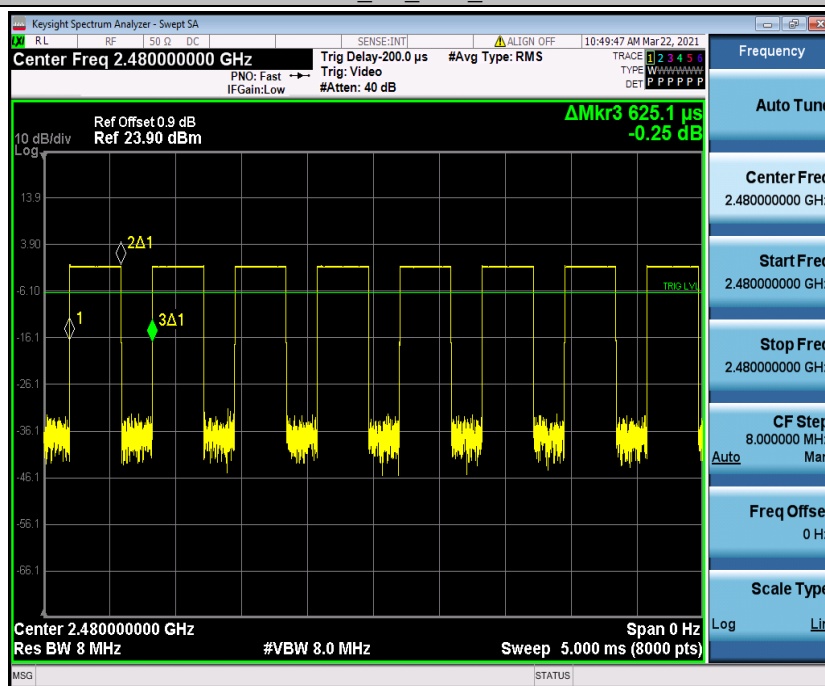
8.6.2 Test Graphs



BLE_1M_Ant1_2442



BLE_1M_Ant1_2480



- End of the Report -