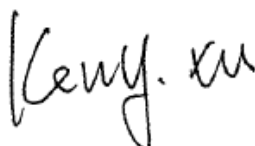


TEST REPORT

Application No.: SZEM2103002456CR
Applicant: UBTECH ROBOTICS CORP LTD
Address of Applicant: 16th and 22ND Floor, block C1 Nanshan I Park, NO.1001 Xueyuan Road, Nanshan District, Shenzhen City, 518055, P.R.CHINA
Manufacturer: UBTECH ROBOTICS CORP LTD
Address of Manufacturer: 16th and 22ND Floor, block C1 Nanshan I Park, NO.1001 Xueyuan Road, Nanshan District, Shenzhen City, 518055, P.R.CHINA
Factory: UBTECH ROBOTICS CORP LTD BAOAN BRANCH
Address of Factory: 1-2Floor, Block B, Huilongda Industry Park, Shilongzai, Shiyan Street, Baoan District, Shenzhen City, P.R.CHINA
Equipment Under Test (EUT):
EUT Name: ADIBOT-S
Model No.: ADAS101
Trade Mark: UBTECH
FCC ID: 2AHJX-ADAS101S
Standard(s) : 47 CFR Part 15, Subpart C 15.247
Date of Receipt: 2021-03-05
Date of Test: 2021-03-09 to 2021-03-23
Date of Issue: 2021-03-23

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

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



Keny Xu
EMC Laboratory Manager



SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch, EMC Laboratory

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| Revision Record | | | | |
|-----------------|---------|------------|----------|----------|
| Version | Chapter | Date | Modifier | Remark |
| 01 | | 2021-03-23 | | Original |
| | | | | |
| | | | | |

| | | | | |
|--------------------------|--|-------------------------|--|--|
| Authorized for issue by: | | | | |
| | | Leo Li | | |
| | | Leo Li/Project Engineer | | |
| | | Eric Fu | | |
| | | Eric Fu/Reviewer | | |



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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 | | ANSI C63.10 (2013) Section 11.8.1 | 47 CFR Part 15, Subpart C 15.247a(2) | Pass |
| Power Spectrum Density | | ANSI C63.10 (2013) Section 11.10.2 | 47 CFR Part 15, Subpart C 15.247(e) | Pass |
| Conducted Band Edges Measurement | | ANSI C63.10 (2013) Section 11.13.3.2 | 47 CFR Part 15, Subpart C 15.247(d) | Pass |
| Conducted Spurious Emissions | | 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 | | ANSI C63.10 (2013) Section 6.10.5 | 47 CFR Part 15, Subpart C 15.205 & 15.209 | Pass |
| Radiated Spurious Emissions | | ANSI C63.10 (2013) Section 6.4,6.5,6.6 | 47 CFR Part 15, Subpart C 15.205 & 15.209 | Pass |
| Conducted Emissions at AC Power Line (150kHz-30MHz) | | ANSI C63.10 (2013) Section 6.2 | 47 CFR Part 15, Subpart C 15.207 | Pass |



3 Contents

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| | | |
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4 General Information

4.1 Details of E.U.T.

| | |
|----------------------|-------------------------------------|
| Power supply: | AC 120V/60Hz |
| AC cable: | 800cm unshielded |
| Operation Frequency: | 2402MHz to 2480MHz (ABLU module) |
| Bluetooth Version: | V5.1LE |
| Data Rate: | 1Mb/s & 2Mb/s |
| Modulation Type: | GFSK |
| Number of Channels: | 40 |
| Channel Spacing: | 2MHz |
| Antenna Type: | FPC Antenna |
| Antenna Gain: | 5.1dBi |
| Operation Frequency: | 2402MHz to 2480MHz (LB-LINK module) |
| Bluetooth Version: | V5.1LE |
| Data Rate: | 1Mb/s |
| Modulation Type: | GFSK |
| Number of Channels: | 40 |
| Channel Spacing: | 2MHz |
| Antenna Type: | FPC Antenna |
| Antenna Gain: | 5.1dBi |

4.2 Description of Support Units

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

The EUT has been tested as an independent unit.

4.3 Measurement Uncertainty

| Test Item | Measurement Uncertainty |
|---|--|
| Conducted Emissions at AC Power Line (150kHz-30MHz) | $\pm 3.0\text{dB}$ (150kHz to 30MHz) |
| Conducted Peak Output Power | $\pm 0.75\text{dB}$ |
| Minimum 6dB Bandwidth | $\pm 3\%$ |
| Power Spectrum Density | $\pm 2.84\text{dB}$ |
| Conducted Band Edges Measurement | $\pm 0.75\text{dB}$ |
| Conducted Spurious Emissions | $\pm 0.75\text{dB}$ |
| Radiated Emissions which fall in the restricted bands | $\pm 4.5\text{dB}$ (Below 1GHz); $\pm 4.8\text{dB}$ (Above 1GHz) |
| Radiated Spurious Emissions | $\pm 4.5\text{dB}$ (Below 1GHz); $\pm 4.8\text{dB}$ (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.



4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China.
518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

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

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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5 Equipment List

| Conducted Emissions at AC Power Line (150kHz-30MHz) | | | | | |
|---|------------------|-----------------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| Shielding Room | ZhongYu Electron | GB-88 | SEM001-06 | 2019-06-13 | 2022-06-12 |
| EMI Test Receiver | Rohde&Schwarz | ESCI | SEM004-02 | 2020-03-24 | 2021-03-23 |
| Measurement Software | AUDIX | e3 V8.2014-6-27 | N/A | N/A | N/A |
| Coaxial Cable | SGS | N/A | SEM024-01 | 2020-07-10 | 2021-07-09 |
| LISN | Rohde&Schwarz | ENV216 | SEM007-01 | 2020-09-23 | 2021-09-22 |
| LISN | ETS-LINDGREN | 3816/2 | SEM007-02 | 2020-04-01 | 2021-03-31 |

| Conducted Peak Output Power | | | | | |
|-----------------------------|-----------------|-----------------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| Shielding Room | SAEMC | MSR733 | SEM001-09 | 2019-06-13 | 2022-06-12 |
| DC Power Supply | Rohde & Schwarz | NGSM 32/10 | SEM011-04 | 2020-03-24 | 2021-03-23 |
| Spectrum Analyzer | Rohde & Schwarz | FSU43 | SEM004-08 | 2020-04-01 | 2021-03-31 |
| Signal Generator | KEYSIGHT | N5173B | SEM006-05 | 2020-09-23 | 2021-09-22 |
| Measurement Software | TST | TST PASS V1.0.5 | N/A | N/A | N/A |
| Coaxial Cable | SGS | N/A | SEM031-02 | 2020-07-10 | 2021-07-09 |
| Attenuator | Huber+Suhner | 6620_SMA-50-1 | SEM021-09 | 2020-05-21 | 2021-05-20 |

| Minimum 6dB Bandwidth | | | | | |
|-----------------------|-----------------|-----------------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| Shielding Room | SAEMC | MSR733 | SEM001-09 | 2019-06-13 | 2022-06-12 |
| DC Power Supply | Rohde & Schwarz | NGSM 32/10 | SEM011-04 | 2020-03-24 | 2021-03-23 |
| Spectrum Analyzer | Rohde & Schwarz | FSU43 | SEM004-08 | 2020-04-01 | 2021-03-31 |
| Signal Generator | KEYSIGHT | N5173B | SEM006-05 | 2020-09-23 | 2021-09-22 |
| Measurement Software | TST | TST PASS V1.0.5 | N/A | N/A | N/A |
| Coaxial Cable | SGS | N/A | SEM031-02 | 2020-07-10 | 2021-07-09 |
| Attenuator | Huber+Suhner | 6620_SMA-50-1 | SEM021-09 | 2020-05-21 | 2021-05-20 |



| Power Spectrum Density | | | | | |
|------------------------|-----------------|-----------------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| Shielding Room | SAEMC | MSR733 | SEM001-09 | 2019-06-13 | 2022-06-12 |
| DC Power Supply | Rohde & Schwarz | NGSM 32/10 | SEM011-04 | 2020-03-24 | 2021-03-23 |
| Spectrum Analyzer | Rohde & Schwarz | FSU43 | SEM004-08 | 2020-04-01 | 2021-03-31 |
| Signal Generator | KEYSIGHT | N5173B | SEM006-05 | 2020-09-23 | 2021-09-22 |
| Measurement Software | TST | TST PASS V1.0.5 | N/A | N/A | N/A |
| Coaxial Cable | SGS | N/A | SEM031-02 | 2020-07-10 | 2021-07-09 |
| Attenuator | Huber+Suhner | 6620_SMA-50-1 | SEM021-09 | 2020-05-21 | 2021-05-20 |

| Conducted Band Edges Measurement | | | | | |
|----------------------------------|-----------------|-----------------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| Shielding Room | SAEMC | MSR733 | SEM001-09 | 2019-06-13 | 2022-06-12 |
| DC Power Supply | Rohde & Schwarz | NGSM 32/10 | SEM011-04 | 2020-03-24 | 2021-03-23 |
| Spectrum Analyzer | Rohde & Schwarz | FSU43 | SEM004-08 | 2020-04-01 | 2021-03-31 |
| Signal Generator | KEYSIGHT | N5173B | SEM006-05 | 2020-09-23 | 2021-09-22 |
| Measurement Software | TST | TST PASS V1.0.5 | N/A | N/A | N/A |
| Coaxial Cable | SGS | N/A | SEM031-02 | 2020-07-10 | 2021-07-09 |
| Attenuator | Huber+Suhner | 6620_SMA-50-1 | SEM021-09 | 2020-05-21 | 2021-05-20 |

| Conducted Spurious Emissions | | | | | |
|------------------------------|-----------------|-----------------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| Shielding Room | SAEMC | MSR733 | SEM001-09 | 2019-06-13 | 2022-06-12 |
| DC Power Supply | Rohde & Schwarz | NGSM 32/10 | SEM011-04 | 2020-03-24 | 2021-03-23 |
| Spectrum Analyzer | Rohde & Schwarz | FSU43 | SEM004-08 | 2020-04-01 | 2021-03-31 |
| Signal Generator | KEYSIGHT | N5173B | SEM006-05 | 2020-09-23 | 2021-09-22 |
| Measurement Software | TST | TST PASS V1.0.5 | N/A | N/A | N/A |
| Coaxial Cable | SGS | N/A | SEM031-02 | 2020-07-10 | 2021-07-09 |
| Attenuator | Huber+Suhner | 6620_SMA-50-1 | SEM021-09 | 2020-05-21 | 2021-05-20 |



| Radiated Emissions which fall in the restricted bands | | | | | |
|---|------------------------------------|-----------------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| 3m Semi-Anechoic Chamber | AUDIX | N/A | SEM001-02 | 2018-03-27 | 2021-03-26 |
| | | | | 2021-03-26 | 2024-03-25 |
| EXA Signal Analyzer | Agilent Technologies Inc | N9010A | SEM004-12 | 2020-04-09 | 2021-04-08 |
| Horn Antenna | Rohde&Schwarz | HF907 | SEM003-07 | 2018-04-13 | 2021-04-12 |
| Pre-Amplifier | Compliance Directions Systems Inc. | PAP-0126 | SEM004-11 | 2020-09-23 | 2021-09-22 |
| Measurement Software | AUDIX | e3 V8.2014-6-27 | N/A | N/A | N/A |
| Coaxial Cable | SGS | N/A | SEM026-01 | 2020-07-10 | 2021-07-09 |
| Horn Antenna | Schwarzbeck | BBHA 9170 | SEM003-15 | 2020-11-14 | 2023-11-13 |
| Pre-Amplifier | Compliance Directions Systems Inc. | PAP-2640-50 | SEM005-08 | 2020-04-01 | 2021-03-31 |

| Radiated Spurious Emissions (Above 1GHz) | | | | | |
|--|------------------------------------|-----------------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| 3m Semi-Anechoic Chamber | AUDIX | N/A | SEM001-02 | 2018-03-27 | 2021-03-26 |
| | | | | 2021-03-26 | 2024-03-25 |
| EXA Signal Analyzer | Agilent Technologies Inc | N9010A | SEM004-12 | 2020-04-09 | 2021-04-08 |
| Horn Antenna | Rohde&Schwarz | HF907 | SEM003-07 | 2018-04-13 | 2021-04-12 |
| Pre-Amplifier | Compliance Directions Systems Inc. | PAP-0126 | SEM004-11 | 2020-09-23 | 2021-09-22 |
| Measurement Software | AUDIX | e3 V8.2014-6-27 | N/A | N/A | N/A |
| Coaxial Cable | SGS | N/A | SEM026-01 | 2020-07-10 | 2021-07-09 |
| Horn Antenna | Schwarzbeck | BBHA 9170 | SEM003-15 | 2020-11-14 | 2023-11-13 |
| Pre-Amplifier | Compliance Directions Systems Inc. | PAP-2640-50 | SEM005-08 | 2020-04-01 | 2021-03-31 |

| Radiated Spurious Emissions (30MHz-1GHz) | | | | | |
|--|----------------------|----------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| 3m Semi-Anechoic Chamber | ETS-LINDGREN | N/A | SEM001-01 | 2020-07-19 | 2023-07-18 |
| MXE EMI Receiver | Agilent Technologies | N9038A | SEM004-15 | 2020-11-02 | 2021-11-01 |
| BiConiLog Antenna | ETS-LINDGREN | 3142C | SEM003-02 | 2019-05-24 | 2022-05-23 |



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| | | | | | |
|----------------------|----------------------|-----------------|-----------|------------|------------|
| Pre-Amplifier | Agilent Technologies | 8447D | SEM005-01 | 2020-04-01 | 2021-03-31 |
| Measurement Software | AUDIX | e3 V8.2014-6-27 | N/A | N/A | N/A |
| Coaxial Cable | SGS | N/A | SEM025-01 | 2020-07-10 | 2021-07-09 |

| General used equipment | | | | | |
|---------------------------------|---|----------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| Humidity/ Temperature Indicator | Shanghai Meteorological Industry Factory | ZJ1-2B | SEM002-04 | 2020-09-15 | 2021-09-14 |
| Humidity/ Temperature Indicator | Mingle | N/A | SEM002-08 | 2020-09-15 | 2021-09-14 |
| Barometer | Changchun Meteorological Industry Factory | DYM3 | SEM002-01 | 2020-04-07 | 2021-04-06 |



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)

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 use an unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

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.

This requirement does not apply to carrier current devices or to devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site.

However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

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 5.1dBi.

Antenna location: Refer to Internal photos.

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

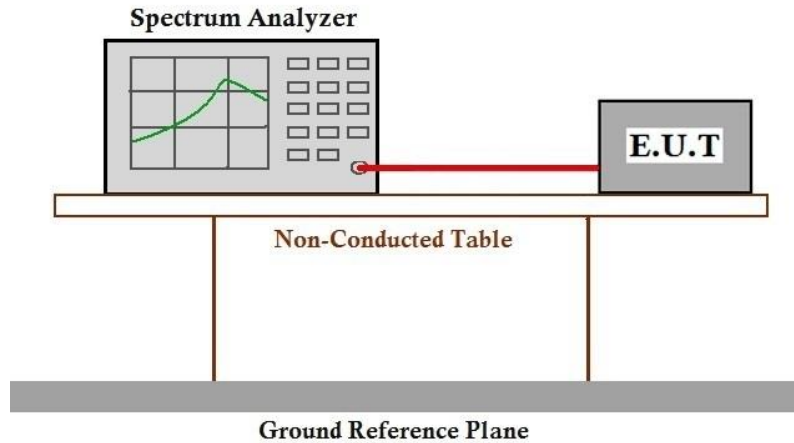
Operating Environment:
Temperature: 21.1 °C Humidity: 39.8 % RH Atmospheric Pressure: 1010 mbar

7.1.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|-----------------------|-----------|--|
| Final test | 01 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.(ABLU Module) |
| Final test | 05 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.(LB-LINK Module) |



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

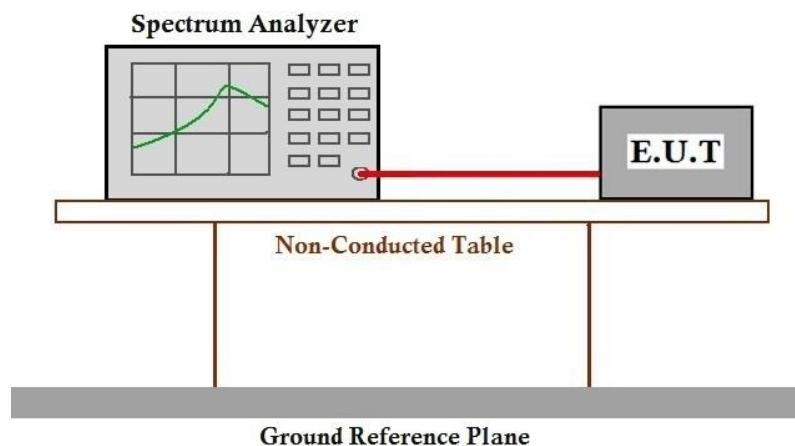
7.2.1 E.U.T. Operation

Operating Environment:
Temperature: 21.1 °C Humidity: 39.8 % RH Atmospheric Pressure: 1010 mbar

7.2.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|-----------------------|-----------|--|
| Final test | 01 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.(ABLU Module) |
| Final test | 05 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.(LB-LINK Module) |

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: 21.1 °C

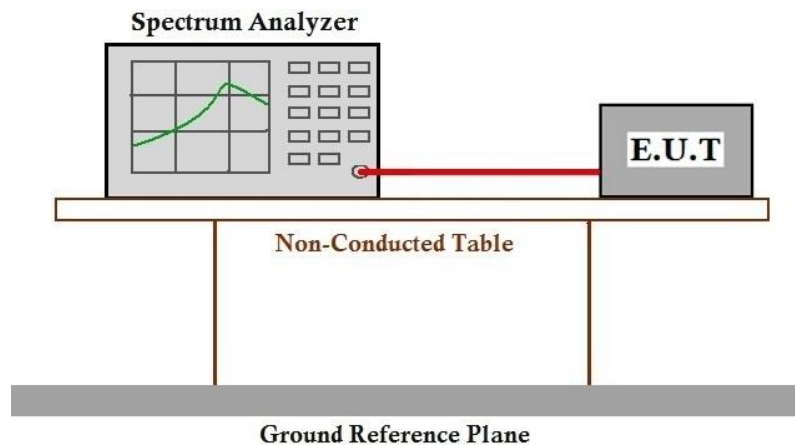
Humidity: 39.8 % RH

Atmospheric Pressure: 1010 mbar

7.3.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|-----------------------|-----------|--|
| Final test | 01 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.(ABLU Module) |
| Final test | 05 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.(LB-LINK Module) |

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

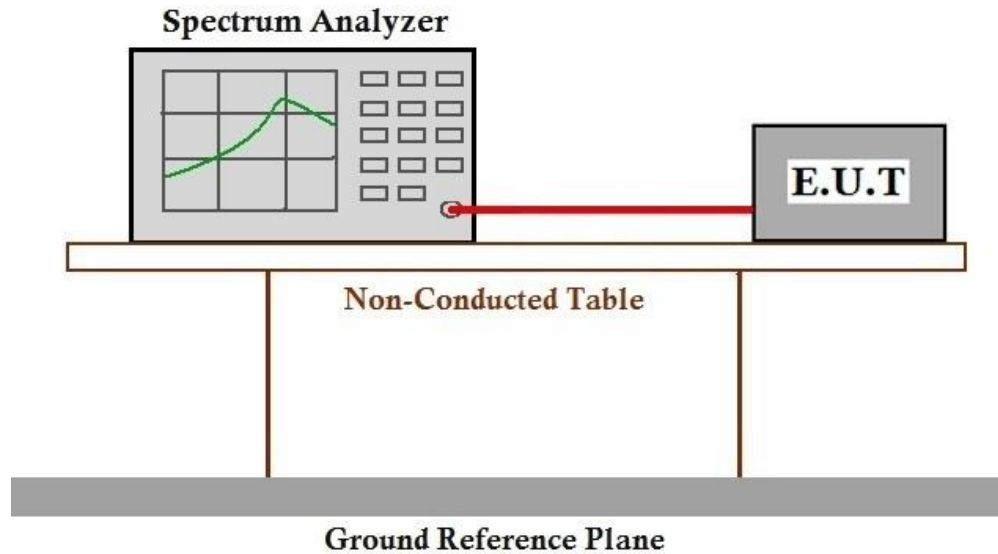
Operating Environment:
Temperature: 21.1 °C Humidity: 39.8 % RH Atmospheric Pressure: 1010 mbar

7.4.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|-----------------------|-----------|--|
| Final test | 01 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.(ABLU Module) |
| Final test | 05 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.(LB-LINK Module) |



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:

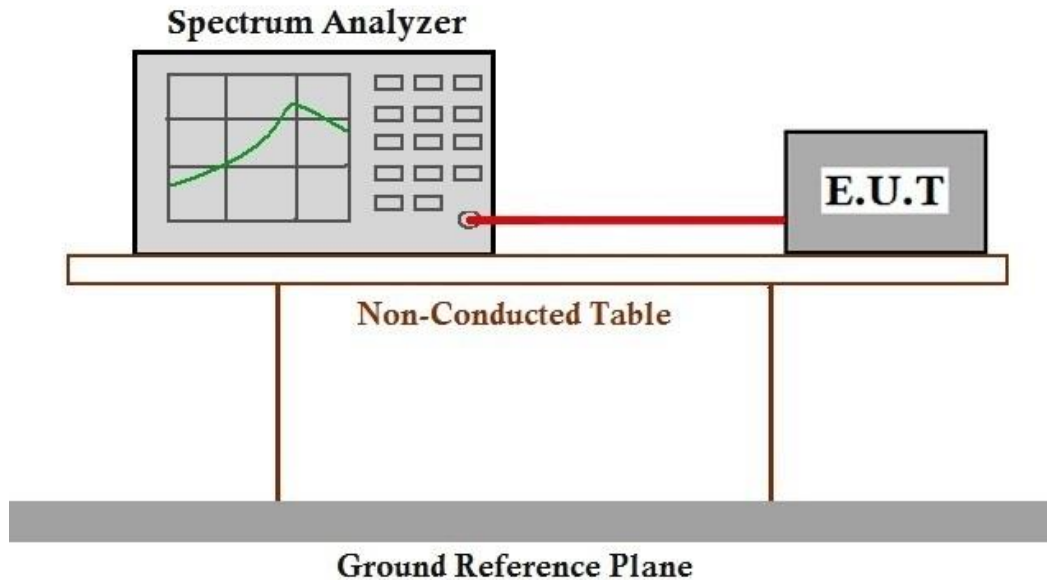
Temperature: 21.1 °C Humidity: 39.8 % RH Atmospheric Pressure: 1010 mbar

7.5.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|-----------------------|-----------|--|
| Final test | 01 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.(ABLU Module) |
| Final test | 05 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.(LB-LINK Module) |



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:

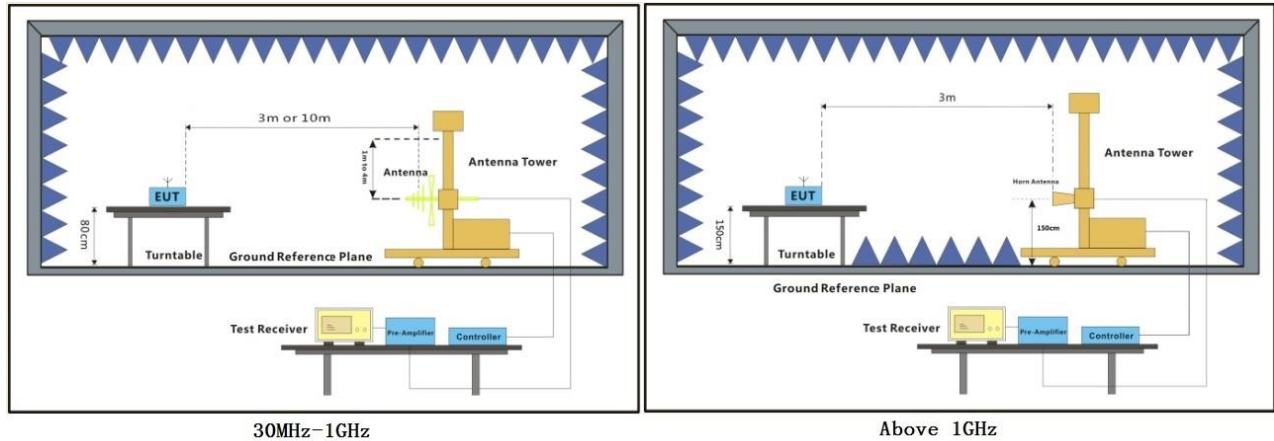
Temperature: 23.5 °C Humidity: 56.3 % RH Atmospheric Pressure: 1010 mbar

7.6.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|-----------------------|-----------|--|
| Final test | 01 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.(ABLU Module) |
| Final test | 05 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.(LB-LINK Module) |



7.6.3 Test Setup Diagram



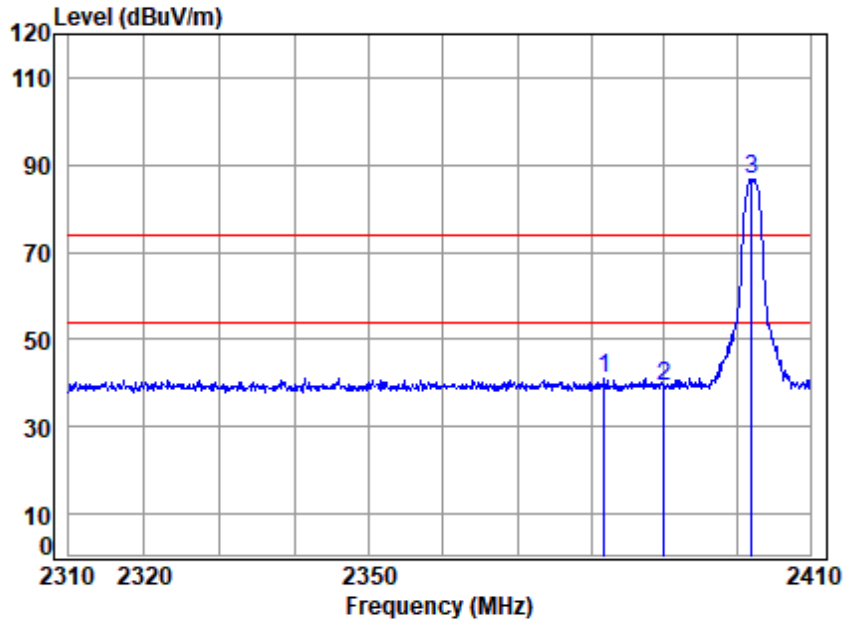
7.6.4 Measurement Procedure and Data

- 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.
- 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.
- 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.
- 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.
- 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.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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.
- Test the EUT in the lowest channel, the middle channel, the Highest channel.
- 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.
- 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: 05; Polarity: Horizontal; Modulation:GFSK; Channel:Low

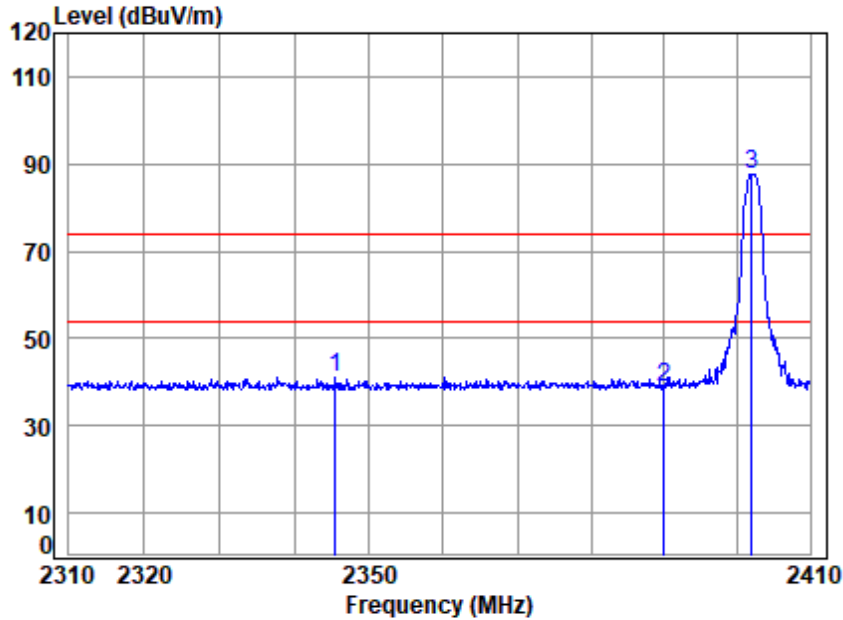


Site : chamber
Condition: 3m HORIZONTAL
Job No : 02456CR
Mode : 2402 Band edge
Note : BLE LB-Link

| | | Cable | Ant | Preamp | Read | Limit | Over | |
|-----|----------|-------|--------|--------|-------|--------|--------|--------------|
| | Freq | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 2381.773 | 4.33 | 28.50 | 40.42 | 48.82 | 41.23 | 74.00 | -32.77 peak |
| 2 | 2390.000 | 4.34 | 28.52 | 40.42 | 46.97 | 39.41 | 74.00 | -34.59 peak |
| 3 * | 2402.000 | 4.36 | 28.54 | 40.43 | 94.04 | 86.51 | 74.00 | 12.51 peak |



Test Mode: 05; Polarity: Vertical; Modulation:GFSK; Channel:Low

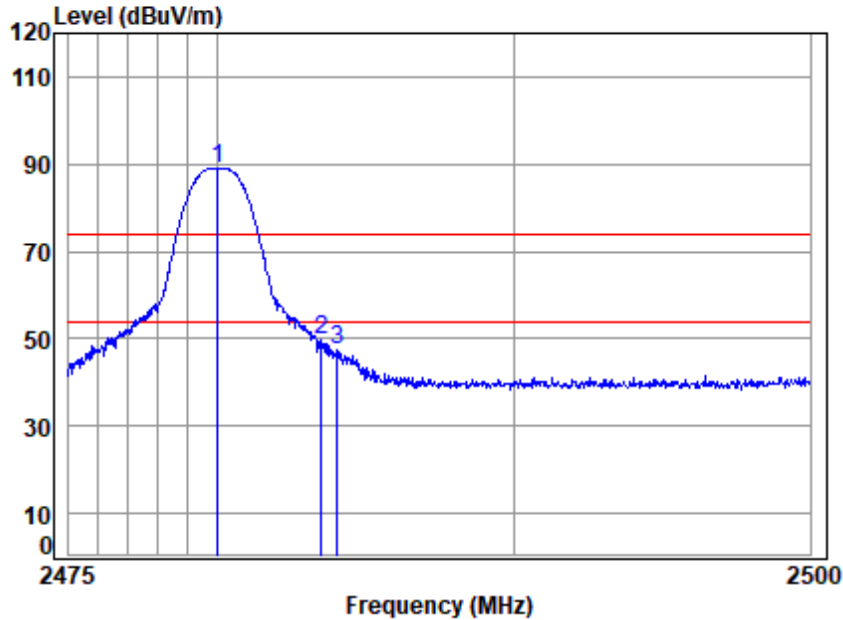


Site : chamber
Condition: 3m VERTICAL
Job No : 02456CR
Mode : 2402 Band edge
Note : BLE LB-Link

| | | Cable | Ant | Preamp | Read | Limit | Over | |
|-----|----------|-------|--------|--------|-------|--------|--------|--------------|
| | Freq | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 2345.513 | 4.27 | 28.44 | 40.40 | 48.96 | 41.27 | 74.00 | -32.73 peak |
| 2 | 2390.000 | 4.34 | 28.52 | 40.42 | 46.43 | 38.87 | 74.00 | -35.13 peak |
| 3 * | 2402.000 | 4.36 | 28.54 | 40.43 | 95.04 | 87.51 | 74.00 | 13.51 peak |



Test Mode: 05; Polarity: Horizontal; Modulation:GFSK; Channel:High

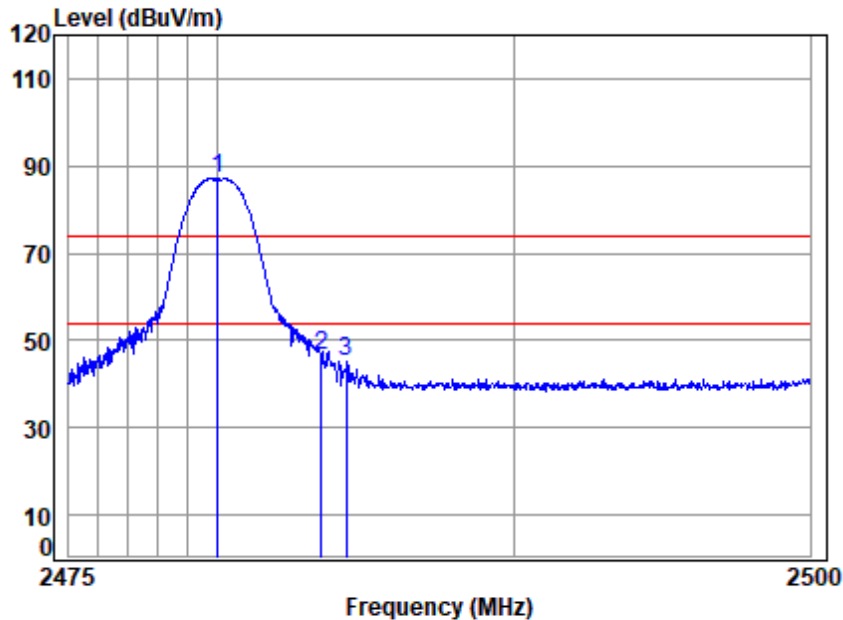


Site : chamber
Condition: 3m HORIZONTAL
Job No : 02456CR
Mode : 2480 Band edge
Note : BLE LB-Link

| | Cable | Ant | Preamp | Read | Limit | Over | |
|--------------|-------|--------|--------|-------|--------|--------|--------------|
| Freq | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 * 2480.000 | 4.49 | 28.67 | 40.47 | 96.26 | 88.95 | 74.00 | 14.95 peak |
| 2 2483.500 | 4.49 | 28.67 | 40.47 | 56.88 | 49.57 | 74.00 | -24.43 peak |
| 3 2484.021 | 4.50 | 28.67 | 40.47 | 54.65 | 47.35 | 74.00 | -26.65 peak |



Test Mode: 05; Polarity: Vertical; Modulation:GFSK; Channel:High

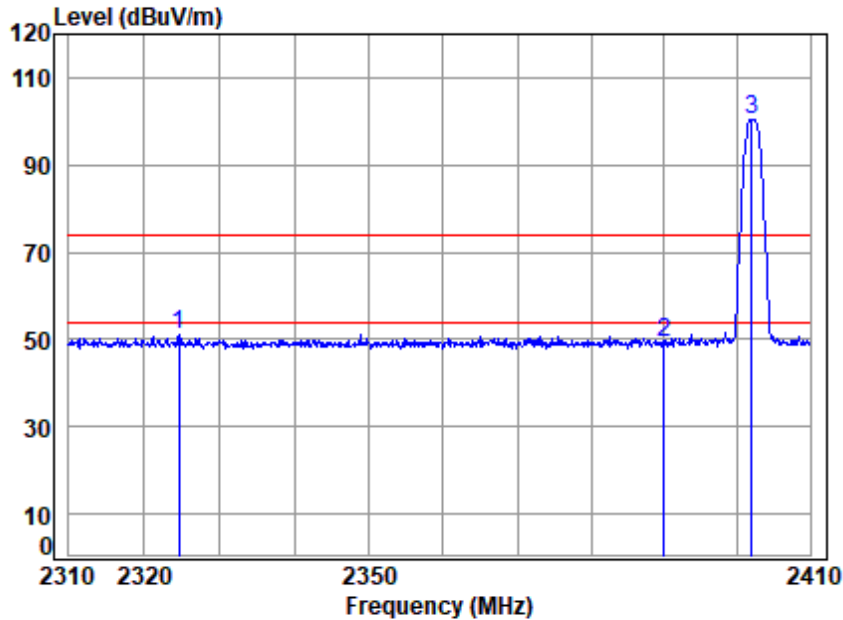


Site : chamber
Condition: 3m VERTICAL
Job No : 02456CR
Mode : 2480 Band edge
Note : BLE LB-Link

| | | Cable | Ant | Preamp | Read | Limit | Over | |
|------|----------|-------|--------|--------|-------|--------|--------|--------------|
| Freq | | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| MHz | | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 * | 2480.000 | 4.49 | 28.67 | 40.47 | 94.28 | 86.97 | 74.00 | 12.97 peak |
| 2 | 2483.500 | 4.49 | 28.67 | 40.47 | 53.91 | 46.60 | 74.00 | -27.40 peak |
| 3 | 2484.345 | 4.50 | 28.67 | 40.47 | 52.53 | 45.23 | 74.00 | -28.77 peak |



Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:Low

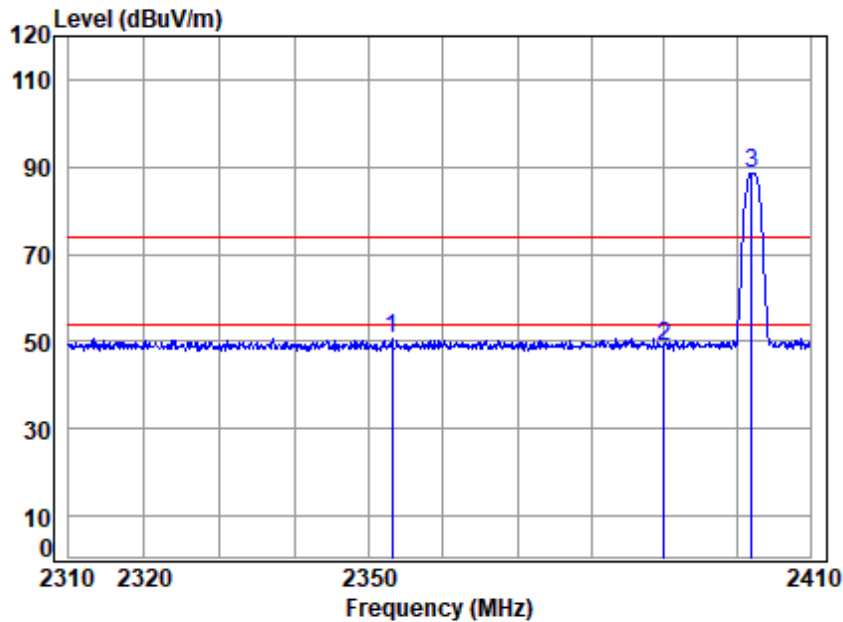


Site : chamber
Condition: 3m HORIZONTAL
Job No : 02456CR
Mode : 2402 Band edge
Note : BLE 1M ABLUE

| | | Cable | Ant | Preamp | Read | Limit | Over | |
|-----|----------|-------|--------|--------|--------|--------|--------|--------------|
| | Freq | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 2324.534 | 4.24 | 28.41 | 40.39 | 58.65 | 50.91 | 74.00 | -23.09 peak |
| 2 | 2390.000 | 4.34 | 28.52 | 40.42 | 57.05 | 49.49 | 74.00 | -24.51 peak |
| 3 * | 2402.000 | 4.36 | 28.54 | 40.43 | 107.93 | 100.40 | 74.00 | 26.40 peak |



Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:Low

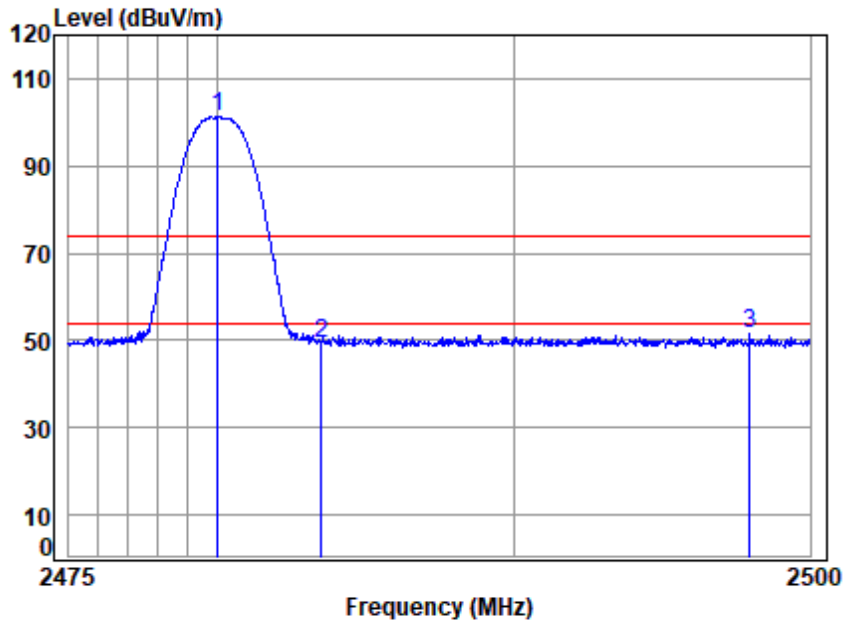


Site : chamber
Condition: 3m VERTICAL
Job No : 02456CR
Mode : 2402 Band edge
Note : BLE 1M ABLUE

| | | Cable | Ant | Preamp | Read | Limit | Over | |
|------|----------|-------|--------|--------|-------|--------|--------|--------------|
| Freq | | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| MHz | | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 2353.079 | 4.28 | 28.46 | 40.40 | 58.39 | 50.73 | 74.00 | -23.27 peak |
| 2 | 2390.000 | 4.34 | 28.52 | 40.42 | 56.47 | 48.91 | 74.00 | -25.09 peak |
| 3 * | 2402.000 | 4.36 | 28.54 | 40.43 | 96.01 | 88.48 | 74.00 | 14.48 peak |



Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:High

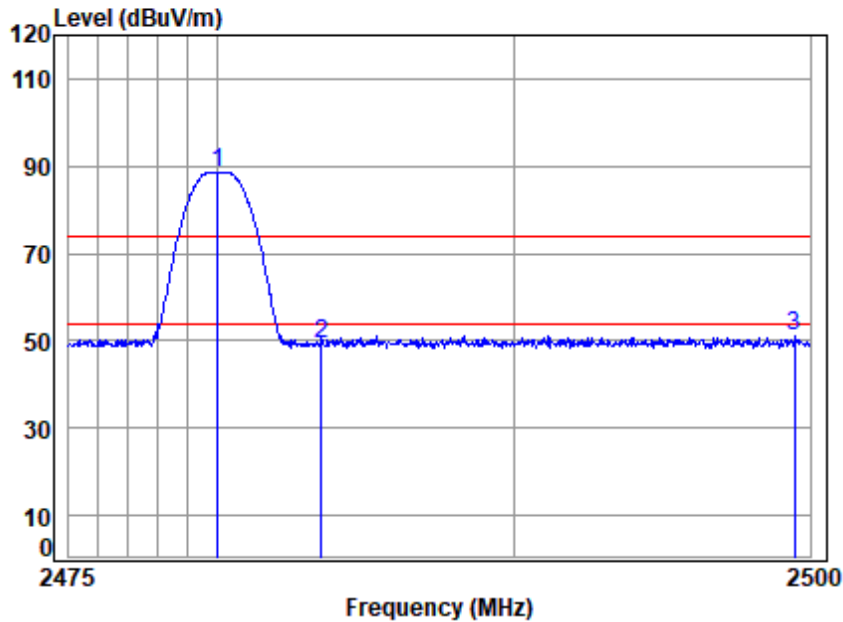


Site : chamber
Condition: 3m HORIZONTAL
Job No : 02456CR
Mode : 2480 Band edge
Note : BLE 1M ABLUE

| | | Cable | Ant | Preamp | Read | Limit | Over | |
|------|----------|-------|--------|--------|--------|--------|--------|--------------|
| Freq | | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| MHz | | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 * | 2480.000 | 4.49 | 28.67 | 40.47 | 108.45 | 101.14 | 74.00 | 27.14 peak |
| 2 | 2483.500 | 4.49 | 28.67 | 40.47 | 56.60 | 49.29 | 74.00 | -24.71 peak |
| 3 | 2497.966 | 4.52 | 28.70 | 40.47 | 58.78 | 51.53 | 74.00 | -22.47 peak |



Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:High

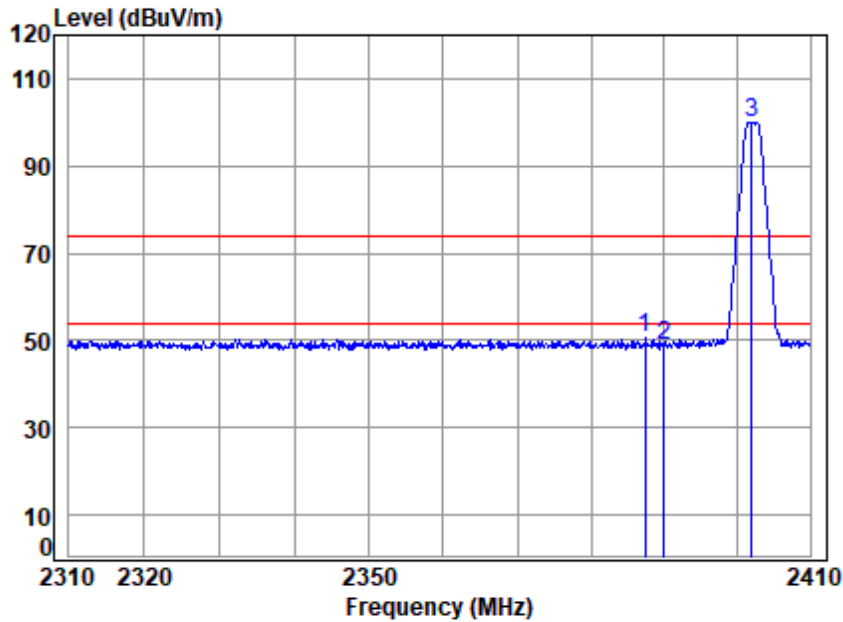


Site : chamber
Condition: 3m VERTICAL
Job No : 02456CR
Mode : 2480 Band edge
Note : BLE 1M ABLUE

| | Cable | Ant | Preamp | Read | Limit | Over | |
|--------------|-------|--------|--------|-------|--------|--------|--------------|
| Freq | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 * 2480.000 | 4.49 | 28.67 | 40.47 | 96.03 | 88.72 | 74.00 | 14.72 peak |
| 2 2483.500 | 4.49 | 28.67 | 40.47 | 56.43 | 49.12 | 74.00 | -24.88 peak |
| 3 2499.472 | 4.52 | 28.70 | 40.47 | 58.38 | 51.13 | 74.00 | -22.87 peak |



Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:Low

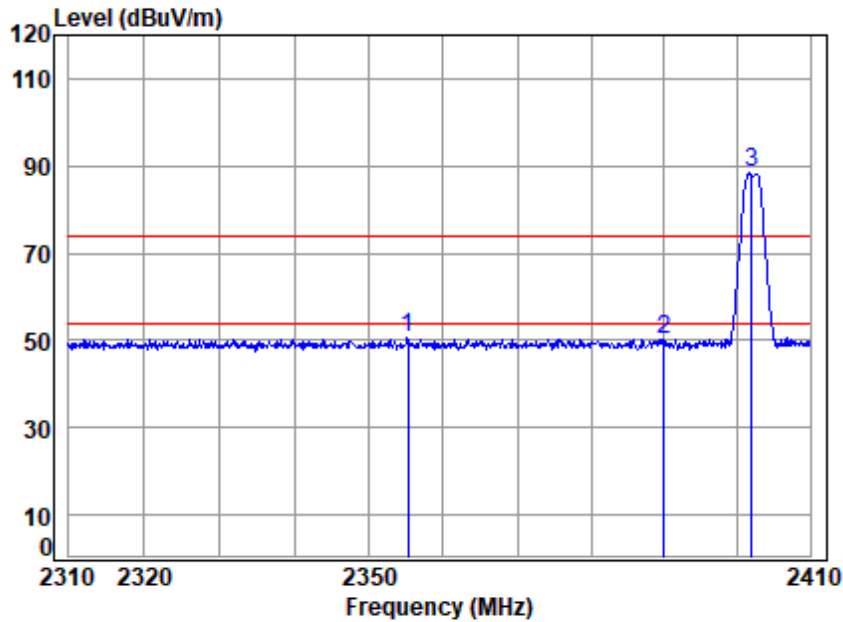


Site : chamber
Condition: 3m HORIZONTAL
Job No : 02456CR
Mode : 2402 Band edge
Note : BLE 2M ABLUE

| | | Cable | Ant | Preamp | Read | Limit | Over | |
|-----|----------|-------|--------|--------|--------|--------|--------|--------------|
| | Freq | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 2387.433 | 4.34 | 28.51 | 40.42 | 58.28 | 50.71 | 74.00 | -23.29 peak |
| 2 | 2390.000 | 4.34 | 28.52 | 40.42 | 56.25 | 48.69 | 74.00 | -25.31 peak |
| 3 * | 2402.000 | 4.36 | 28.54 | 40.43 | 107.62 | 100.09 | 74.00 | 26.09 peak |



Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:Low

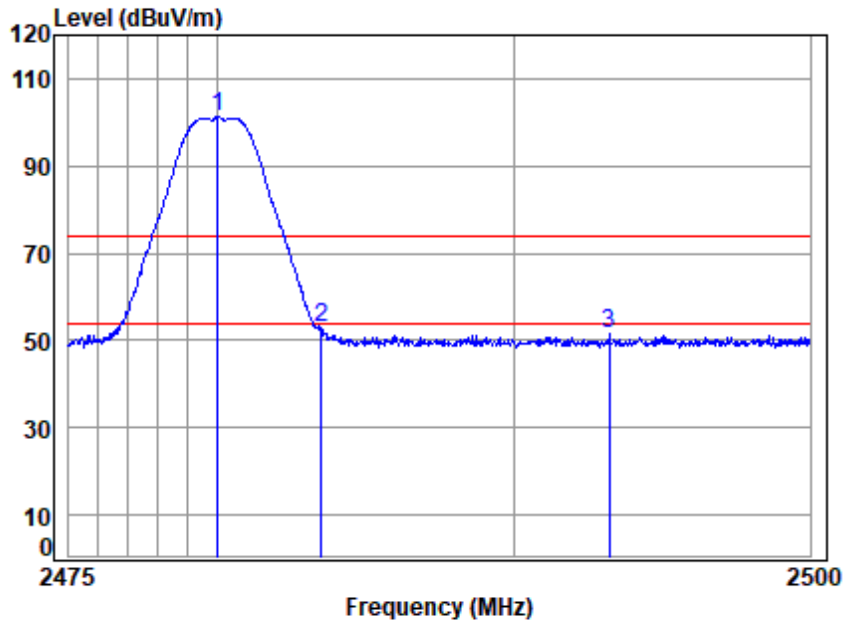


Site : chamber
Condition: 3m VERTICAL
Job No : 02456CR
Mode : 2402 Band edge
Note : BLE 2M ABLUE

| | | Cable | Ant | Preamp | Read | Limit | Over | |
|-----|----------|-------|--------|--------|-------|--------|--------|--------------|
| | Freq | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 2355.175 | 4.29 | 28.46 | 40.40 | 58.09 | 50.44 | 74.00 | -23.56 peak |
| 2 | 2390.000 | 4.34 | 28.52 | 40.42 | 57.75 | 50.19 | 74.00 | -23.81 peak |
| 3 * | 2402.000 | 4.36 | 28.54 | 40.43 | 95.86 | 88.33 | 74.00 | 14.33 peak |



Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:High

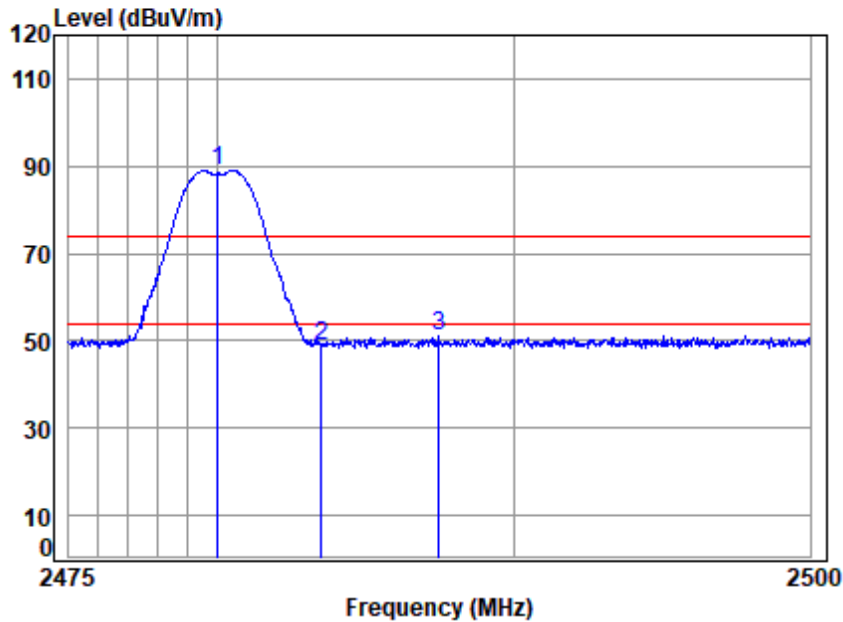


Site : chamber
Condition: 3m HORIZONTAL
Job No : 02456CR
Mode : 2480 Band edge
Note : BLE 2M ABLUE

| | | Cable | Ant | Preamp | Read | Limit | Over | |
|--------------|--|-------|--------|--------|--------|--------|--------|--------------|
| Freq | | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| MHz | | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 * 2480.000 | | 4.49 | 28.67 | 40.47 | 108.43 | 101.12 | 74.00 | 27.12 peak |
| 2 2483.500 | | 4.49 | 28.67 | 40.47 | 60.06 | 52.75 | 74.00 | -21.25 peak |
| 3 2493.200 | | 4.51 | 28.69 | 40.47 | 58.61 | 51.34 | 74.00 | -22.66 peak |



Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber
Condition: 3m VERTICAL
Job No : 02456CR
Mode : 2480 Band edge
Note : BLE 2M ABLUE

| | Cable | Ant | Preamp | Read | Limit | Over | |
|--------------|-------|--------|--------|-------|--------|--------|--------------|
| Freq | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 * 2480.000 | 4.49 | 28.67 | 40.47 | 96.23 | 88.92 | 74.00 | 14.92 peak |
| 2 2483.500 | 4.49 | 28.67 | 40.47 | 55.98 | 48.67 | 74.00 | -25.33 peak |
| 3 2487.444 | 4.50 | 28.68 | 40.47 | 58.50 | 51.21 | 74.00 | -22.79 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
Measurement Distance: 3m
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

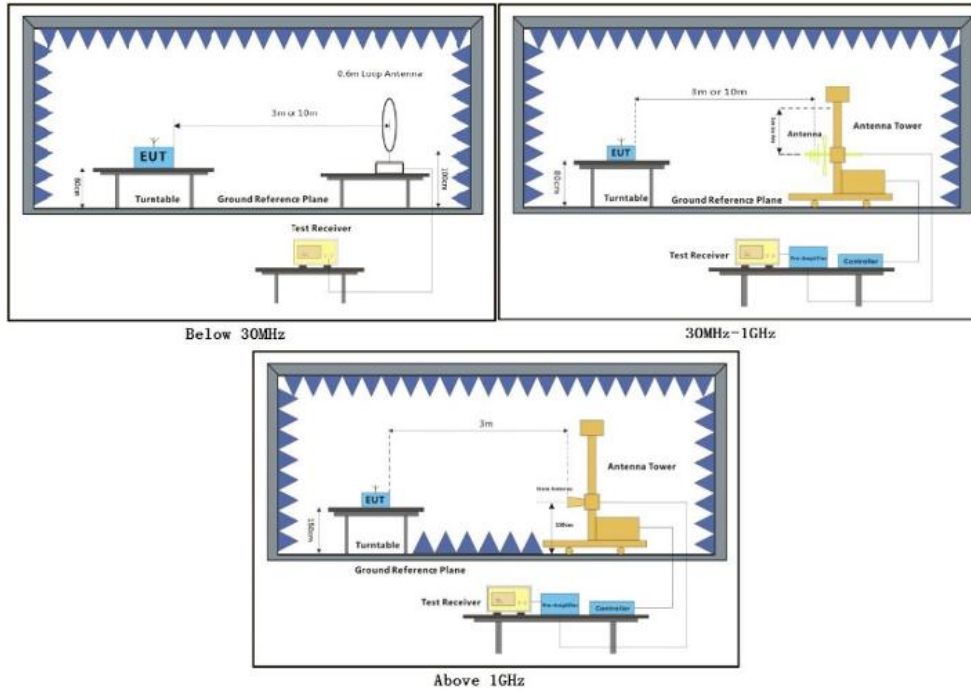
Operating Environment:
Temperature: 23.5 °C Humidity: 56.3 % RH Atmospheric Pressure: 1010 mbar

7.7.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|-----------------------|-----------|--|
| Final test | 01 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.(ABLU Module) |
| Final test | 05 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.(LB-LINK Module) |



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:

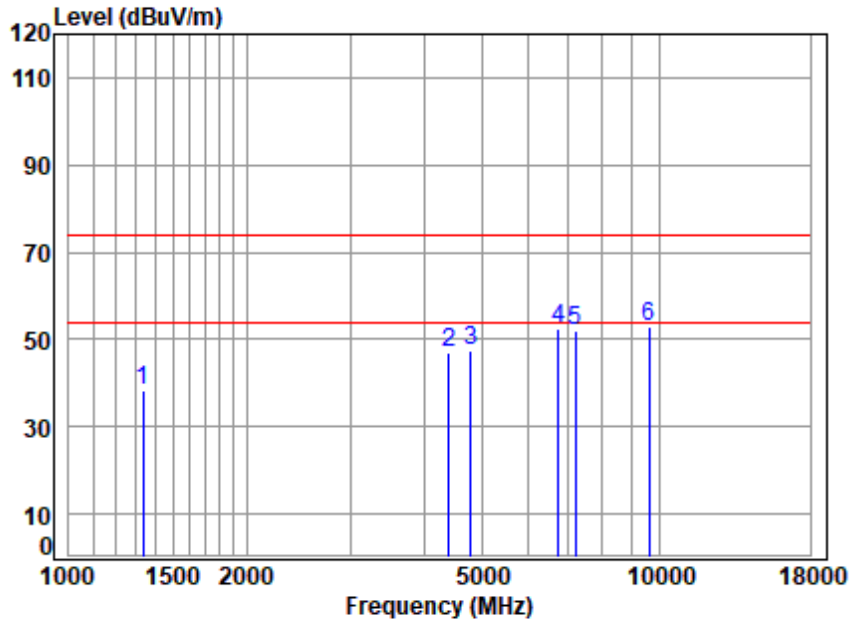
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor

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: 05; Polarity: Horizontal; Modulation:GFSK; Channel:Low

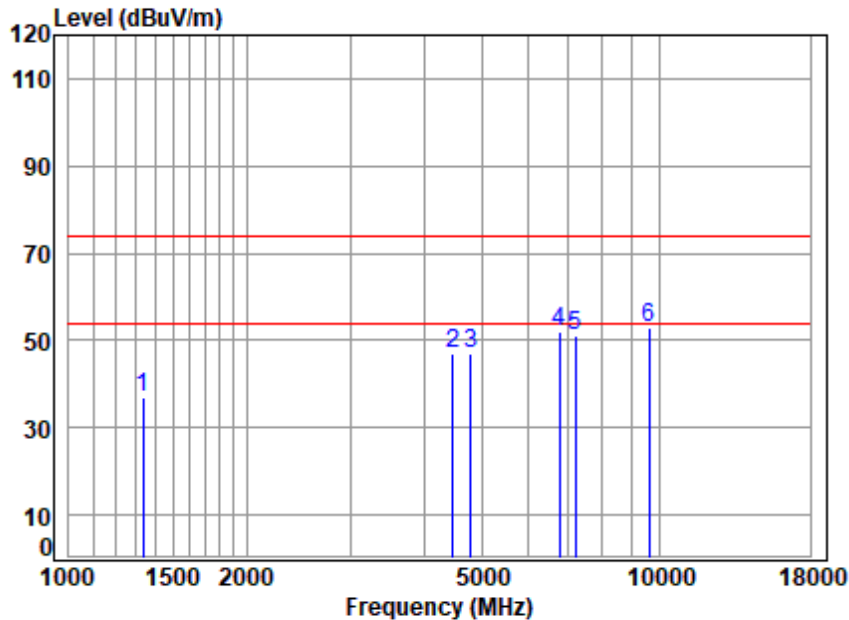


Site : chamber
Condition: 3m HORIZONTAL
Job No : 02456CR
Mode : 2402 TX SE
Note : BLE-LB-Link

| | Freq | Cable Loss | Ant Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|----------|------------|------------|---------------|------------|--------|------------|------------|--------|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 1335.141 | 3.00 | 25.17 | 39.85 | 50.10 | 38.42 | 74.00 | -35.58 | peak |
| 2 | 4405.090 | 6.67 | 33.44 | 41.79 | 48.57 | 46.89 | 74.00 | -27.11 | peak |
| 3 | 4804.000 | 7.10 | 33.97 | 42.14 | 48.75 | 47.68 | 74.00 | -26.32 | peak |
| 4 | 6756.708 | 8.42 | 35.76 | 41.86 | 50.34 | 52.66 | 74.00 | -21.34 | peak |
| 5 | 7206.000 | 8.74 | 36.07 | 41.50 | 48.63 | 51.94 | 74.00 | -22.06 | peak |
| 6 | 9608.000 | 10.81 | 37.67 | 37.76 | 42.00 | 52.72 | 74.00 | -21.28 | peak |



Test Mode: 05; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber
Condition: 3m VERTICAL
Job No : 02456CR
Mode : 2402 TX SE
Note : BLE-LB-Link

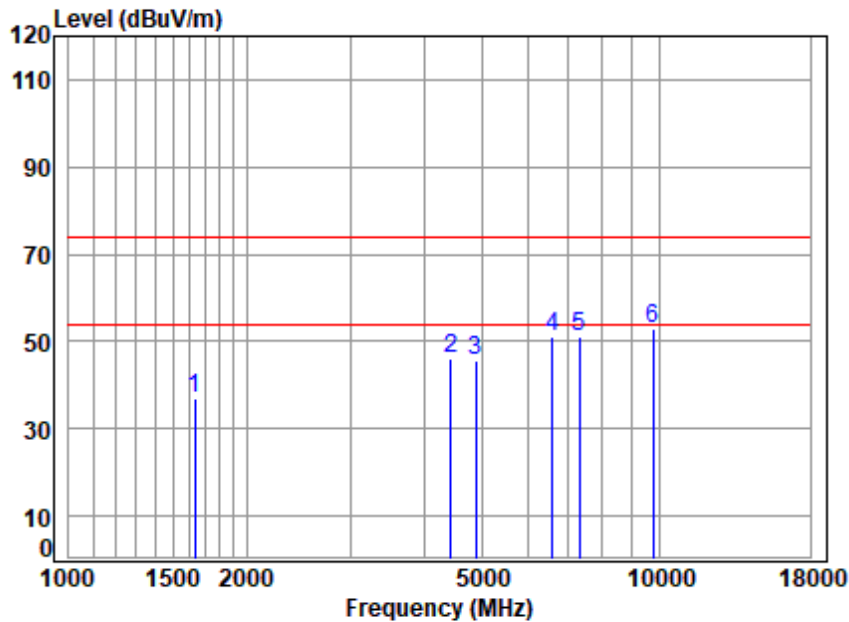
| | Freq | Cable Loss | Ant Factor | Preamplifier Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|----------|------------|------------|---------------------|------------|--------|------------|------------|--------|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 1335.141 | 3.00 | 25.17 | 39.85 | 48.42 | 36.74 | 74.00 | -37.26 | peak |
| 2 | 4469.214 | 6.73 | 33.55 | 41.85 | 48.72 | 47.15 | 74.00 | -26.85 | peak |
| 3 | 4804.000 | 7.10 | 33.97 | 42.14 | 47.95 | 46.88 | 74.00 | -27.12 | peak |
| 4 | 6776.265 | 8.43 | 35.77 | 41.85 | 49.57 | 51.92 | 74.00 | -22.08 | peak |
| 5 | 7206.000 | 8.74 | 36.07 | 41.50 | 47.98 | 51.29 | 74.00 | -22.71 | peak |
| 6 | 9608.000 | 10.81 | 37.67 | 37.76 | 42.33 | 53.05 | 74.00 | -20.95 | peak |



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Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

Test Mode: 05; Polarity: Horizontal; Modulation:GFSK; Channel:middle

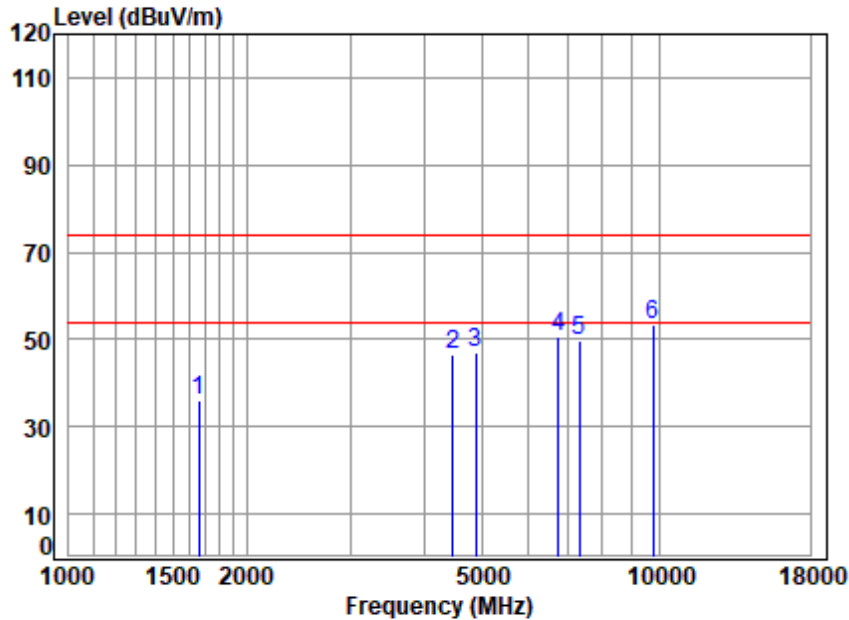


Site : chamber
Condition: 3m HORIZONTAL
Job No : 02456CR
Mode : 2440 TX SE
Note : BLE-LB-Link

| | Freq | Cable Loss | Ant Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|----------|------------|------------|---------------|------------|--------|------------|------------|--------|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 1634.543 | 3.38 | 26.40 | 40.03 | 47.15 | 36.90 | 74.00 | -37.10 | peak |
| 2 | 4430.628 | 6.70 | 33.48 | 41.81 | 47.72 | 46.09 | 74.00 | -27.91 | peak |
| 3 | 4880.000 | 7.18 | 34.06 | 42.20 | 46.61 | 45.65 | 74.00 | -28.35 | peak |
| 4 | 6583.209 | 8.32 | 35.65 | 41.98 | 49.13 | 51.12 | 74.00 | -22.88 | peak |
| 5 | 7320.000 | 8.84 | 36.16 | 41.40 | 47.36 | 50.96 | 74.00 | -23.04 | peak |
| 6 | 9760.000 | 10.76 | 37.76 | 37.50 | 42.05 | 53.07 | 74.00 | -20.93 | peak |



Test Mode: 05; Polarity: Vertical; Modulation:GFSK; Channel:middle

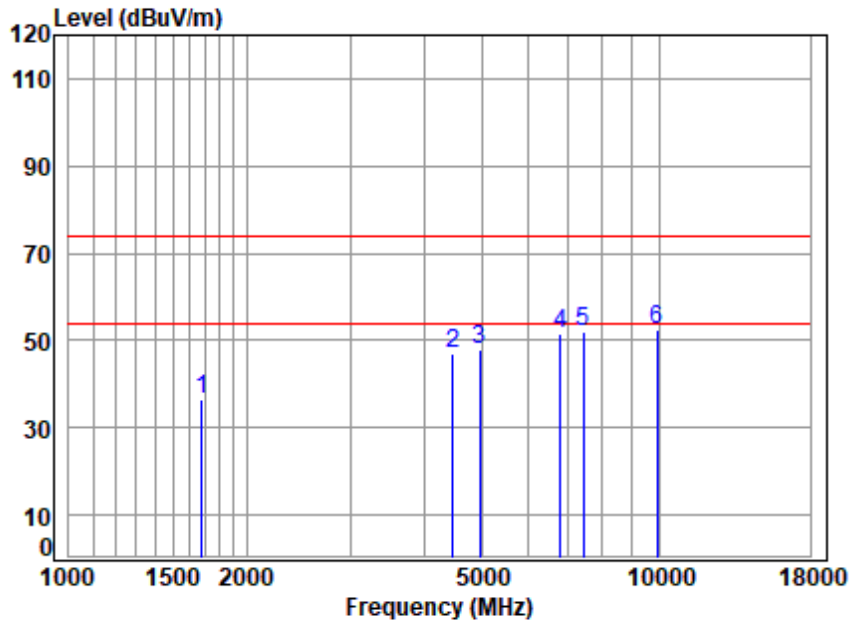


Site : chamber
Condition: 3m VERTICAL
Job No : 02456CR
Mode : 2440 TX SE
Note : BLE-LB-Link

| | | Cable | Ant | Preamp | Read | Limit | Over | |
|---|----------|-------|--------|--------|-------|--------|--------|--------------|
| | Freq | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 1658.337 | 3.40 | 26.50 | 40.04 | 46.33 | 36.19 | 74.00 | -37.81 peak |
| 2 | 4469.214 | 6.73 | 33.55 | 41.85 | 47.99 | 46.42 | 74.00 | -27.58 peak |
| 3 | 4880.000 | 7.18 | 34.06 | 42.20 | 47.94 | 46.98 | 74.00 | -27.02 peak |
| 4 | 6756.708 | 8.42 | 35.76 | 41.86 | 48.45 | 50.77 | 74.00 | -23.23 peak |
| 5 | 7320.000 | 8.84 | 36.16 | 41.40 | 46.19 | 49.79 | 74.00 | -24.21 peak |
| 6 | 9760.000 | 10.76 | 37.76 | 37.50 | 42.24 | 53.26 | 74.00 | -20.74 peak |



Test Mode: 05; Polarity: Horizontal; Modulation:GFSK; Channel:High

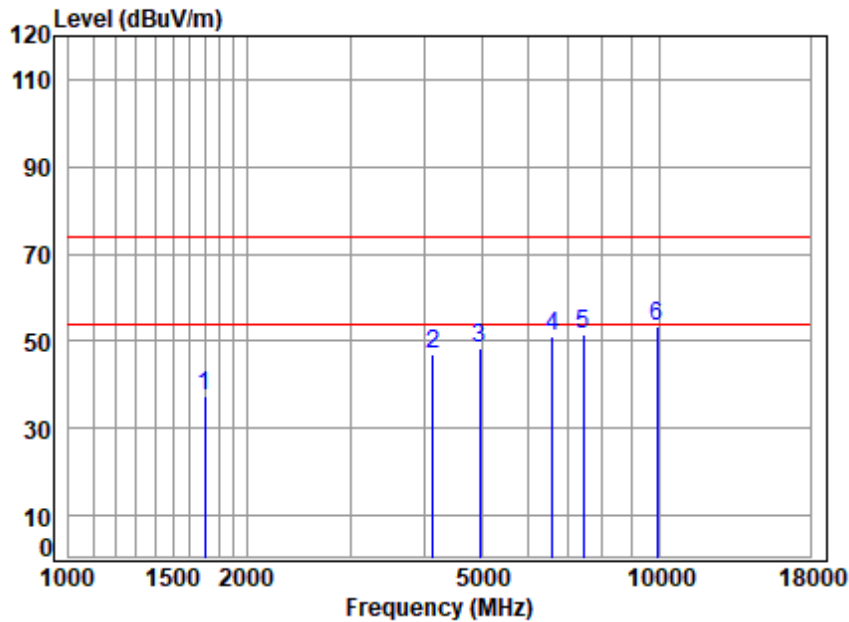


Site : chamber
Condition: 3m HORIZONTAL
Job No : 02456CR
Mode : 2480 TX SE
Note : BLE-LB-Link

| | Freq | Cable Loss | Ant Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|----------|------------|------------|---------------|------------|--------|------------|------------|--------|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 1677.621 | 3.41 | 26.58 | 40.05 | 46.68 | 36.62 | 74.00 | -37.38 | peak |
| 2 | 4469.214 | 6.73 | 33.55 | 41.85 | 48.44 | 46.87 | 74.00 | -27.13 | peak |
| 3 | 4960.000 | 7.26 | 34.15 | 42.27 | 48.92 | 48.06 | 74.00 | -25.94 | peak |
| 4 | 6795.879 | 8.44 | 35.78 | 41.83 | 49.16 | 51.55 | 74.00 | -22.45 | peak |
| 5 | 7440.000 | 8.96 | 36.25 | 41.29 | 47.88 | 51.80 | 74.00 | -22.20 | peak |
| 6 | 9920.000 | 10.71 | 37.85 | 37.23 | 41.30 | 52.63 | 74.00 | -21.37 | peak |



Test Mode: 05; Polarity: Vertical; Modulation:GFSK; Channel:High

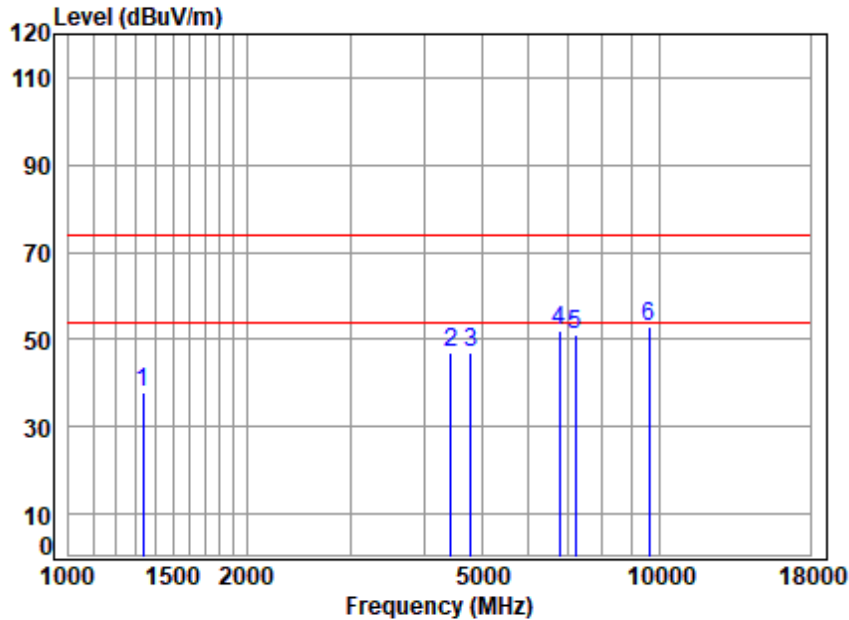


Site : chamber
Condition: 3m VERTICAL
Job No : 02456CR
Mode : 2480 TX SE
Note : BLE-LB-Link

| | Freq | Cable Loss | Ant Factor | Preamplifier Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|----------|------------|------------|---------------------|------------|--------|------------|------------|--------|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 1697.129 | 3.43 | 26.66 | 40.06 | 47.28 | 37.31 | 74.00 | -36.69 | peak |
| 2 | 4133.699 | 6.41 | 32.95 | 41.53 | 49.16 | 46.99 | 74.00 | -27.01 | peak |
| 3 | 4960.000 | 7.26 | 34.15 | 42.27 | 49.27 | 48.41 | 74.00 | -25.59 | peak |
| 4 | 6583.209 | 8.32 | 35.65 | 41.98 | 49.08 | 51.07 | 74.00 | -22.93 | peak |
| 5 | 7440.000 | 8.96 | 36.25 | 41.29 | 47.85 | 51.77 | 74.00 | -22.23 | peak |
| 6 | 9920.000 | 10.71 | 37.85 | 37.23 | 42.09 | 53.42 | 74.00 | -20.58 | peak |



Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:Low

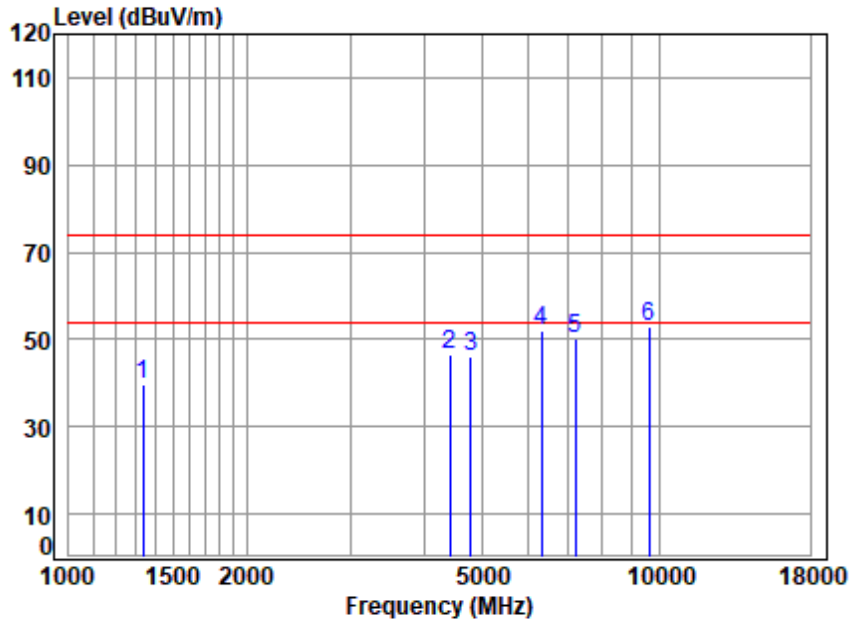


Site : chamber
Condition: 3m HORIZONTAL
Job No : 02456CR
Mode : 2402 TX SE
Note : BLE 1M ABLUE

| | | Cable | Ant | Preamp | Read | Limit | Over | |
|---|----------|-------|--------|--------|-------|--------|--------|--------------|
| | Freq | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 1335.141 | 3.00 | 25.17 | 39.85 | 49.58 | 37.90 | 74.00 | -36.10 peak |
| 2 | 4443.453 | 6.71 | 33.50 | 41.82 | 48.70 | 47.09 | 74.00 | -26.91 peak |
| 3 | 4804.000 | 7.10 | 33.97 | 42.14 | 48.13 | 47.06 | 74.00 | -26.94 peak |
| 4 | 6776.265 | 8.43 | 35.77 | 41.85 | 49.66 | 52.01 | 74.00 | -21.99 peak |
| 5 | 7206.000 | 8.74 | 36.07 | 41.50 | 47.89 | 51.20 | 74.00 | -22.80 peak |
| 6 | 9608.000 | 10.81 | 37.67 | 37.76 | 42.21 | 52.93 | 74.00 | -21.07 peak |



Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:Low

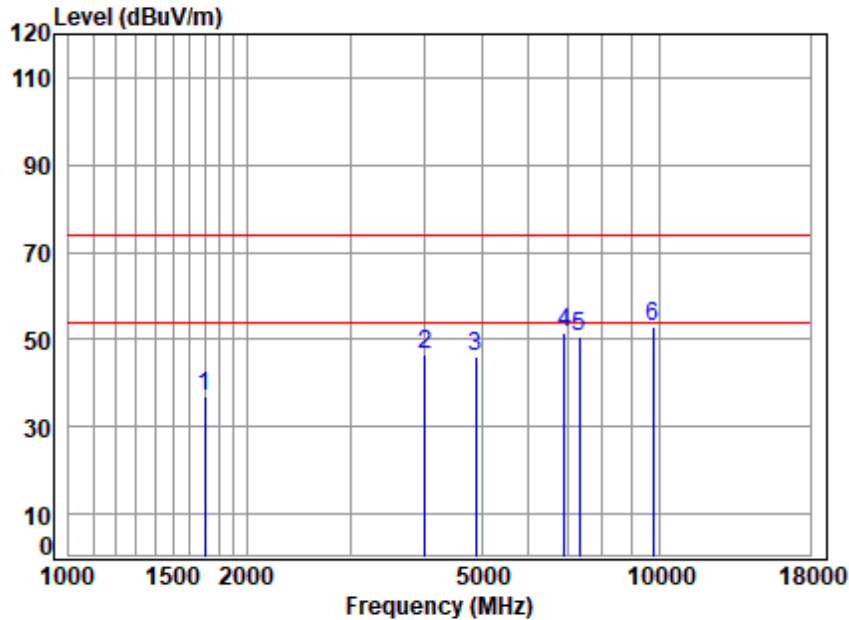


Site : chamber
Condition: 3m VERTICAL
Job No : 02456CR
Mode : 2402 TX SE
Note : BLE 1M ABLUE

| | Freq | Cable Loss | Ant Factor | Preamplifier Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|----------|------------|------------|---------------------|------------|--------|------------|------------|--------|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 1335.141 | 3.00 | 25.17 | 39.85 | 51.55 | 39.87 | 74.00 | -34.13 | peak |
| 2 | 4417.841 | 6.68 | 33.46 | 41.80 | 48.08 | 46.42 | 74.00 | -27.58 | peak |
| 3 | 4804.000 | 7.10 | 33.97 | 42.14 | 47.13 | 46.06 | 74.00 | -27.94 | peak |
| 4 | 6322.136 | 8.27 | 35.43 | 42.16 | 50.33 | 51.87 | 74.00 | -22.13 | peak |
| 5 | 7206.000 | 8.74 | 36.07 | 41.50 | 47.10 | 50.41 | 74.00 | -23.59 | peak |
| 6 | 9608.000 | 10.81 | 37.67 | 37.76 | 42.22 | 52.94 | 74.00 | -21.06 | peak |



Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:middle

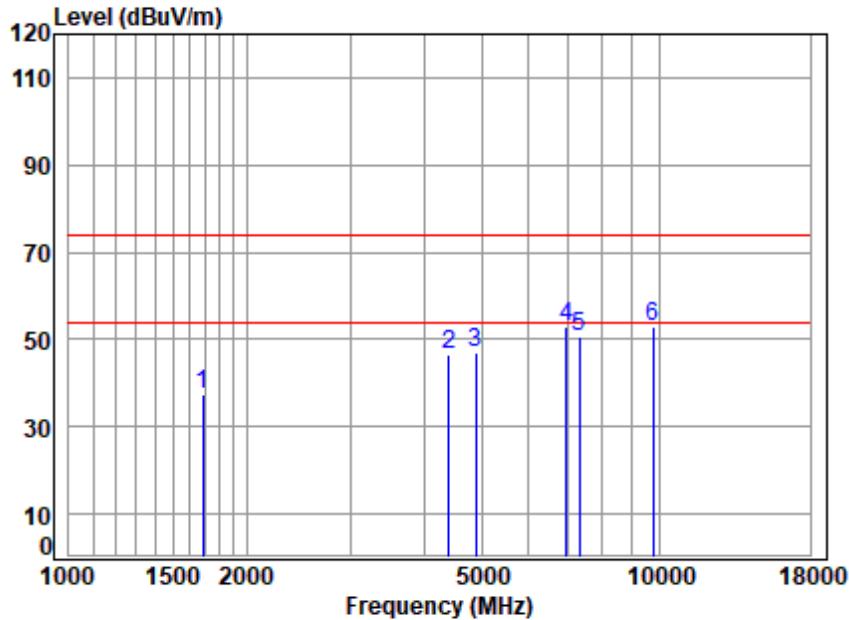


Site : chamber
Condition: 3m HORIZONTAL
Job No : 02456CR
Mode : 2440 TX SE
Note : BLE 1M ABLUE

| | | Cable | Ant | Preamp | Read | Limit | Over | |
|---|----------|-------|--------|--------|-------|--------|--------|--------------|
| | Freq | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 1697.129 | 3.43 | 26.66 | 40.06 | 47.13 | 37.16 | 74.00 | -36.84 peak |
| 2 | 4004.339 | 6.28 | 32.71 | 41.40 | 49.17 | 46.76 | 74.00 | -27.24 peak |
| 3 | 4880.000 | 7.18 | 34.06 | 42.20 | 47.02 | 46.06 | 74.00 | -27.94 peak |
| 4 | 6914.763 | 8.50 | 35.85 | 41.76 | 48.83 | 51.42 | 74.00 | -22.58 peak |
| 5 | 7320.000 | 8.84 | 36.16 | 41.40 | 47.25 | 50.85 | 74.00 | -23.15 peak |
| 6 | 9760.000 | 10.76 | 37.76 | 37.50 | 42.02 | 53.04 | 74.00 | -20.96 peak |



Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:middle

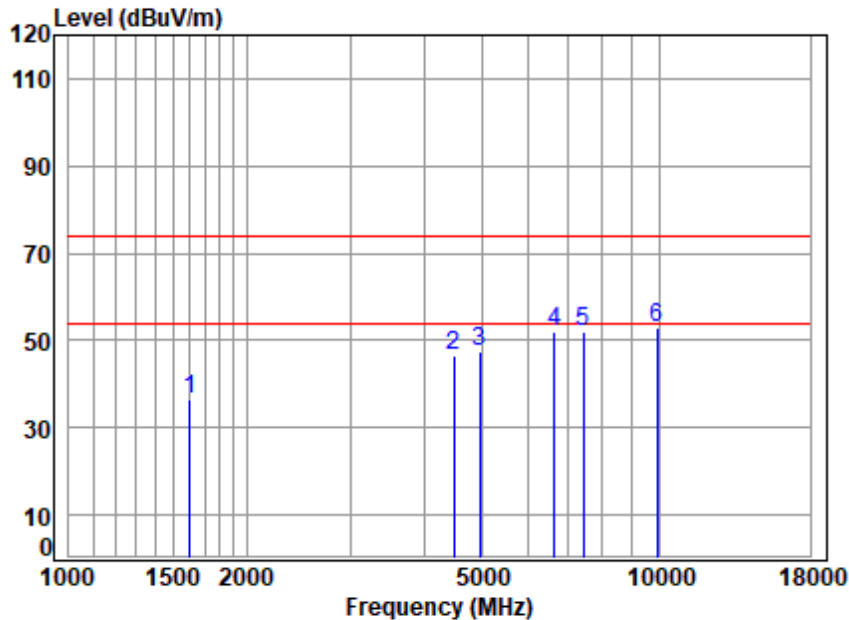


Site : chamber
Condition: 3m VERTICAL
Job No : 02456CR
Mode : 2440 TX SE
Note : BLE 1M ABLUE

| | Cable | Ant | Preamp | Read | Limit | Over | |
|------|-------|--------|--------|-------|--------|--------|--------|
| Freq | Loss | Factor | Factor | Level | Level | Line | Limit |
| MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 3.42 | 26.62 | 40.05 | 47.54 | 37.53 | 74.00 | -36.47 |
| 2 | 6.67 | 33.44 | 41.79 | 48.15 | 46.47 | 74.00 | -27.53 |
| 3 | 7.18 | 34.06 | 42.20 | 48.16 | 47.20 | 74.00 | -26.80 |
| 4 | 8.52 | 35.87 | 41.73 | 50.21 | 52.87 | 74.00 | -21.13 |
| 5 | 8.84 | 36.16 | 41.40 | 47.25 | 50.85 | 74.00 | -23.15 |
| 6 | 10.76 | 37.76 | 37.50 | 42.12 | 53.14 | 74.00 | -20.86 |



Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:High

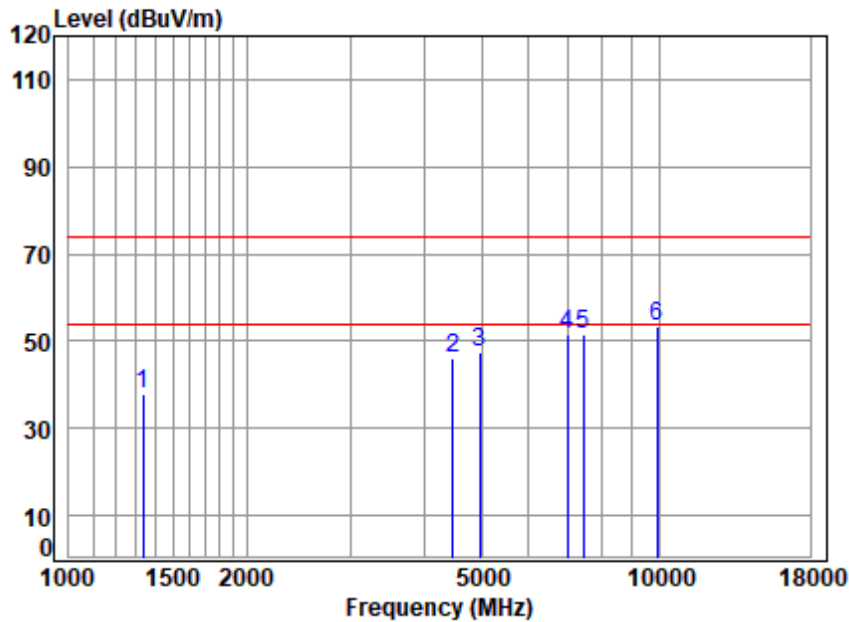


Site : chamber
Condition: 3m HORIZONTAL
Job No : 02456CR
Mode : 2480 TX SE
Note : BLE 1M ABLUE

| | Cable | Ant | Preamp | Read | Limit | Over | |
|------|----------|--------|--------|-------|--------|--------|-------------------|
| Freq | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 1601.804 | 3.35 | 26.26 | 40.01 | 47.10 | 36.70 | 74.00 -37.30 peak |
| 2 | 4495.125 | 6.76 | 33.59 | 41.87 | 47.86 | 46.34 | 74.00 -27.66 peak |
| 3 | 4960.000 | 7.26 | 34.15 | 42.27 | 48.43 | 47.57 | 74.00 -26.43 peak |
| 4 | 6640.542 | 8.36 | 35.69 | 41.94 | 49.87 | 51.98 | 74.00 -22.02 peak |
| 5 | 7440.000 | 8.96 | 36.25 | 41.29 | 48.12 | 52.04 | 74.00 -21.96 peak |
| 6 | 9920.000 | 10.71 | 37.85 | 37.23 | 41.46 | 52.79 | 74.00 -21.21 peak |



Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:High

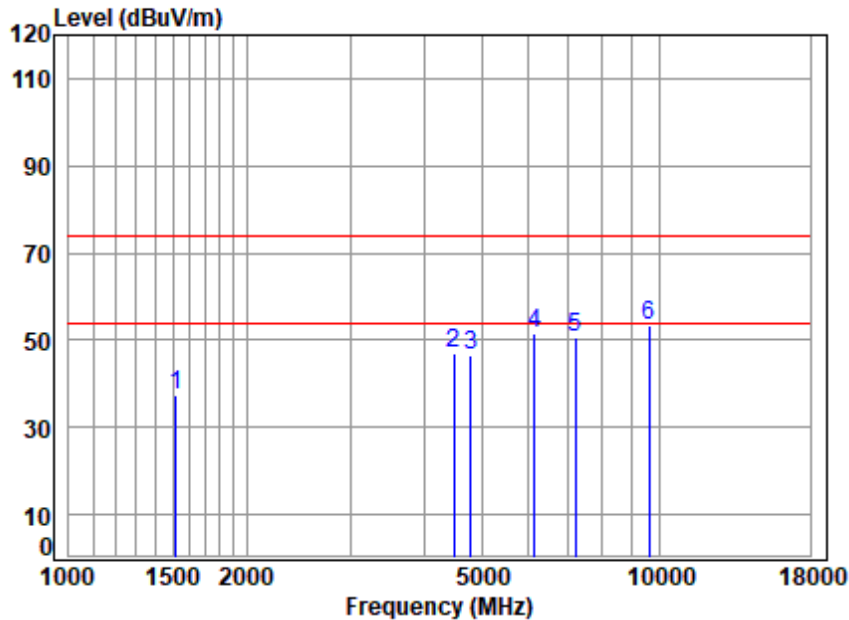


Site : chamber
Condition: 3m VERTICAL
Job No : 02456CR
Mode : 2480 TX SE
Note : BLE 1M ABLUE

| | Cable | Ant | Preamp | Read | Limit | Over | |
|------|----------|--------|--------|-------|--------|--------|-------------------|
| Freq | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 1335.141 | 3.00 | 25.17 | 39.85 | 49.52 | 37.84 | 74.00 -36.16 peak |
| 2 | 4469.214 | 6.73 | 33.55 | 41.85 | 47.57 | 46.00 | 74.00 -28.00 peak |
| 3 | 4960.000 | 7.26 | 34.15 | 42.27 | 48.25 | 47.39 | 74.00 -26.61 peak |
| 4 | 6974.982 | 8.53 | 35.89 | 41.72 | 48.70 | 51.40 | 74.00 -22.60 peak |
| 5 | 7440.000 | 8.96 | 36.25 | 41.29 | 47.85 | 51.77 | 74.00 -22.23 peak |
| 6 | 9920.000 | 10.71 | 37.85 | 37.23 | 42.06 | 53.39 | 74.00 -20.61 peak |



Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:Low

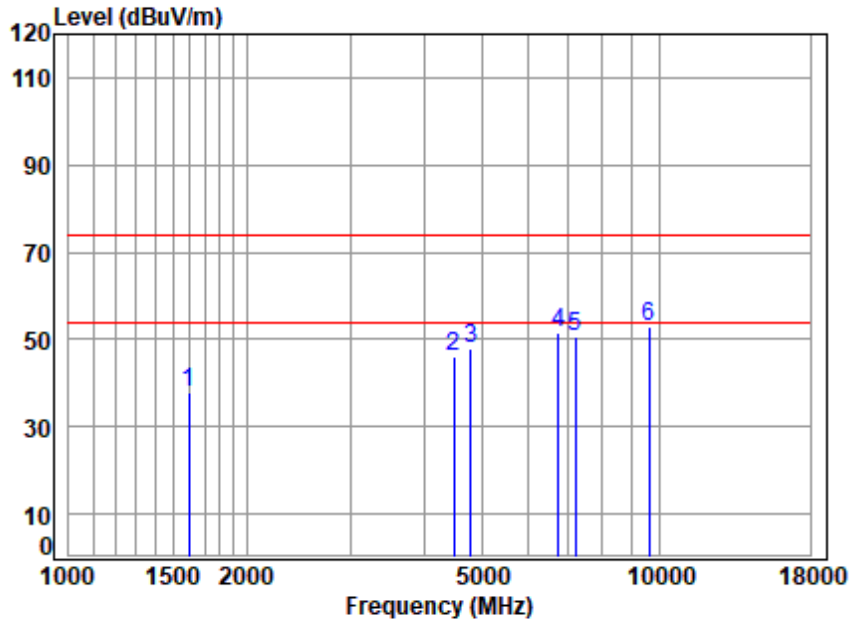


Site : chamber
Condition: 3m HORIZONTAL
Job No : 02456CR
Mode : 2402 TX SE
Note : BLE 2M ABLUE

| | | Cable | Ant | Preamp | Read | Limit | Over | |
|---|----------|-------|--------|--------|-------|--------|--------|--------------|
| | Freq | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 1520.598 | 3.28 | 25.89 | 39.96 | 47.98 | 37.19 | 74.00 | -36.81 peak |
| 2 | 4482.150 | 6.74 | 33.57 | 41.86 | 48.56 | 47.01 | 74.00 | -26.99 peak |
| 3 | 4804.000 | 7.10 | 33.97 | 42.14 | 47.65 | 46.58 | 74.00 | -27.42 peak |
| 4 | 6142.019 | 8.27 | 35.25 | 42.29 | 50.35 | 51.58 | 74.00 | -22.42 peak |
| 5 | 7206.000 | 8.74 | 36.07 | 41.50 | 47.42 | 50.73 | 74.00 | -23.27 peak |
| 6 | 9608.000 | 10.81 | 37.67 | 37.76 | 42.88 | 53.60 | 74.00 | -20.40 peak |



Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:Low

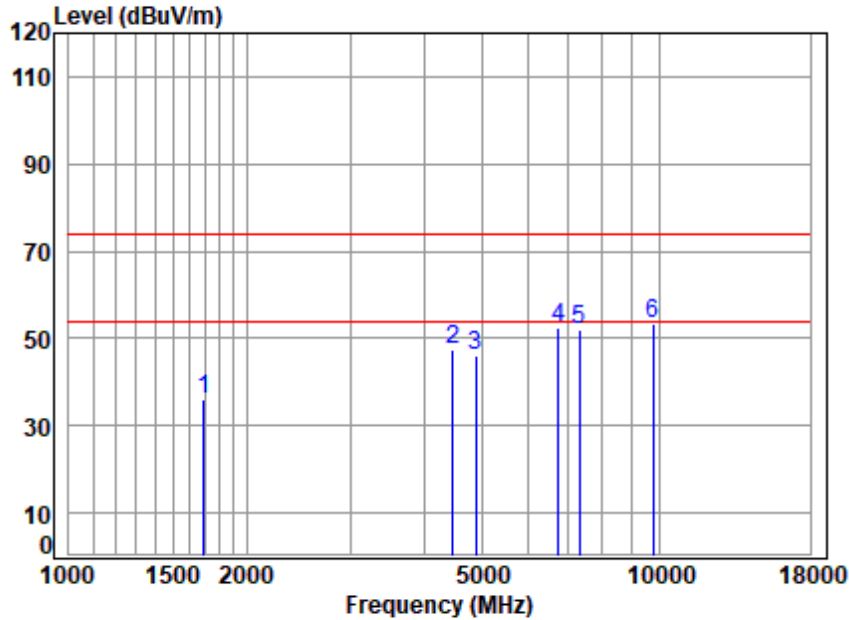


Site : chamber
Condition: 3m VERTICAL
Job No : 02456CR
Mode : 2402 TX SE
Note : BLE 2M ABLUE

| | Freq | Cable Loss | Ant Factor | Preampl Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|----------|------------|------------|----------------|------------|--------|------------|------------|--------|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 1597.181 | 3.35 | 26.24 | 40.01 | 48.17 | 37.75 | 74.00 | -36.25 | peak |
| 2 | 4482.150 | 6.74 | 33.57 | 41.86 | 47.70 | 46.15 | 74.00 | -27.85 | peak |
| 3 | 4804.000 | 7.10 | 33.97 | 42.14 | 48.78 | 47.71 | 74.00 | -26.29 | peak |
| 4 | 6756.708 | 8.42 | 35.76 | 41.86 | 49.27 | 51.59 | 74.00 | -22.41 | peak |
| 5 | 7206.000 | 8.74 | 36.07 | 41.50 | 47.45 | 50.76 | 74.00 | -23.24 | peak |
| 6 | 9608.000 | 10.81 | 37.67 | 37.76 | 42.21 | 52.93 | 74.00 | -21.07 | peak |



Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:middle

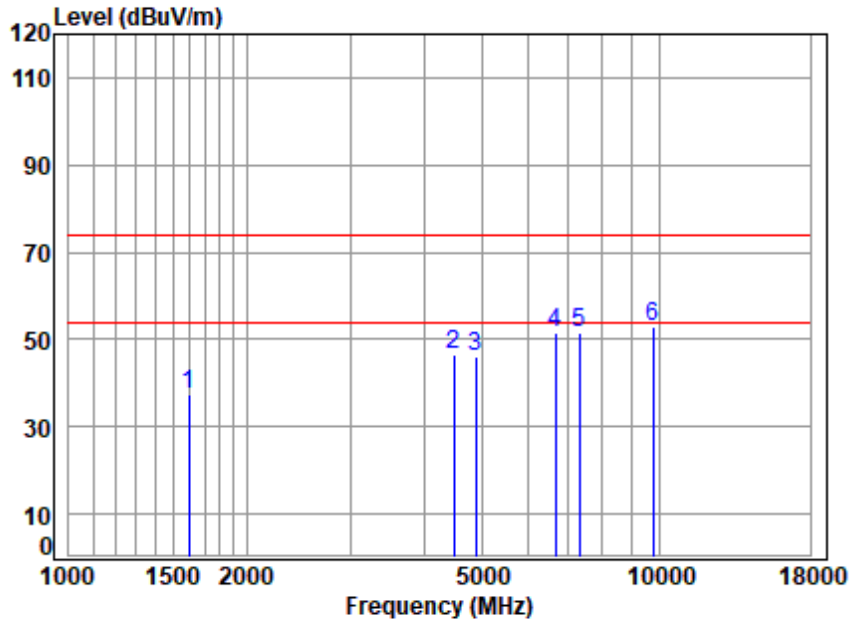


Site : chamber
Condition: 3m HORIZONTAL
Job No : 02456CR
Mode : 2440 TX SE
Note : BLE 2M ABLUE

| | Freq | Cable Loss | Ant Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|----------|------------|------------|---------------|------------|--------|------------|------------|--------|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 1692.231 | 3.42 | 26.64 | 40.06 | 46.19 | 36.19 | 74.00 | -37.81 | peak |
| 2 | 4469.214 | 6.73 | 33.55 | 41.85 | 48.87 | 47.30 | 74.00 | -26.70 | peak |
| 3 | 4880.000 | 7.18 | 34.06 | 42.20 | 47.14 | 46.18 | 74.00 | -27.82 | peak |
| 4 | 6737.207 | 8.41 | 35.75 | 41.87 | 49.96 | 52.25 | 74.00 | -21.75 | peak |
| 5 | 7320.000 | 8.84 | 36.16 | 41.40 | 48.36 | 51.96 | 74.00 | -22.04 | peak |
| 6 | 9760.000 | 10.76 | 37.76 | 37.50 | 42.16 | 53.18 | 74.00 | -20.82 | peak |



Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:middle

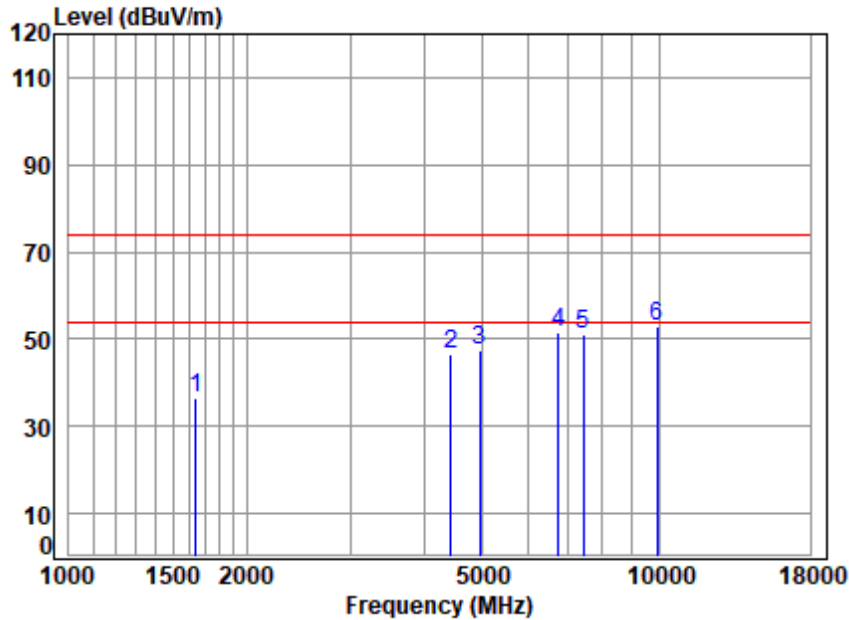


Site : chamber
Condition: 3m VERTICAL
Job No : 02456CR
Mode : 2440 TX SE
Note : BLE 2M ABLUE

| | | Cable | Ant | Preamp | Read | Limit | Over | |
|---|----------|-------|--------|--------|-------|--------|--------|--------------|
| | Freq | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 1597.181 | 3.35 | 26.24 | 40.01 | 47.97 | 37.55 | 74.00 | -36.45 peak |
| 2 | 4482.150 | 6.74 | 33.57 | 41.86 | 48.21 | 46.66 | 74.00 | -27.34 peak |
| 3 | 4880.000 | 7.18 | 34.06 | 42.20 | 47.14 | 46.18 | 74.00 | -27.82 peak |
| 4 | 6679.040 | 8.38 | 35.71 | 41.91 | 49.60 | 51.78 | 74.00 | -22.22 peak |
| 5 | 7320.000 | 8.84 | 36.16 | 41.40 | 47.96 | 51.56 | 74.00 | -22.44 peak |
| 6 | 9760.000 | 10.76 | 37.76 | 37.50 | 41.97 | 52.99 | 74.00 | -21.01 peak |



Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:High

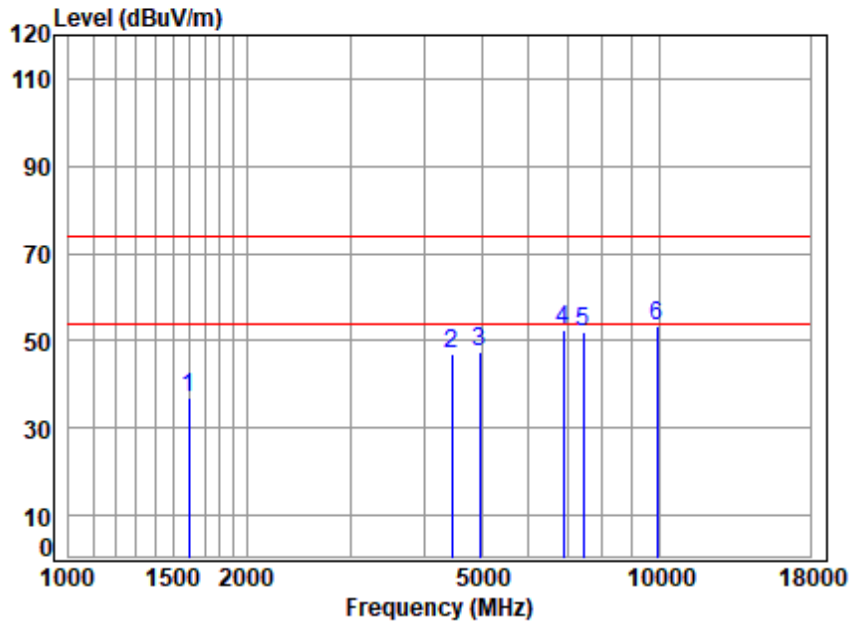


Site : chamber
Condition: 3m HORIZONTAL
Job No : 02456CR
Mode : 2480 TX SE
Note : BLE 2M ABLUE

| | Cable | Ant | Preamp | Read | Limit | Over | |
|------------|-------|--------|--------|-------|--------|--------|--------------|
| Freq | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 1644.019 | 3.38 | 26.44 | 40.03 | 46.92 | 36.71 | 74.00 | -37.29 peak |
| 2 4443.453 | 6.71 | 33.50 | 41.82 | 48.07 | 46.46 | 74.00 | -27.54 peak |
| 3 4960.000 | 7.26 | 34.15 | 42.27 | 48.49 | 47.63 | 74.00 | -26.37 peak |
| 4 6756.708 | 8.42 | 35.76 | 41.86 | 49.11 | 51.43 | 74.00 | -22.57 peak |
| 5 7440.000 | 8.96 | 36.25 | 41.29 | 47.11 | 51.03 | 74.00 | -22.97 peak |
| 6 9920.000 | 10.71 | 37.85 | 37.23 | 41.40 | 52.73 | 74.00 | -21.27 peak |



Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:High

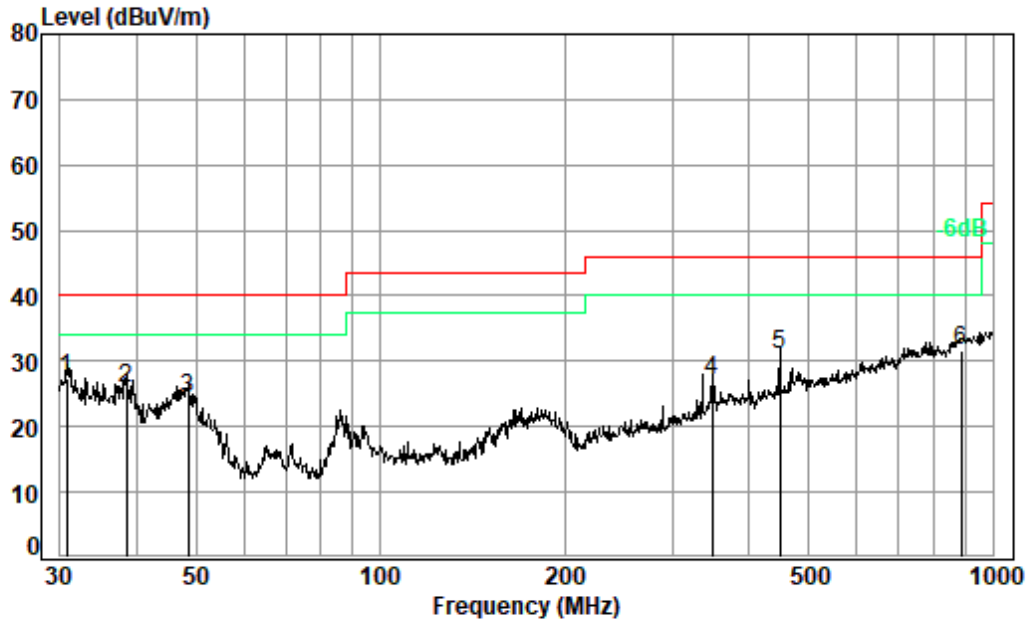


Site : chamber
Condition: 3m VERTICAL
Job No : 02456CR
Mode : 2480 TX SE
Note : BLE 2M ABLUE

| | | Cable | Ant | Preamp | Read | Limit | Over | |
|---|----------|-------|--------|--------|-------|--------|--------|--------------|
| | Freq | Loss | Factor | Factor | Level | Level | Line | Limit Remark |
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 1597.181 | 3.35 | 26.24 | 40.01 | 47.37 | 36.95 | 74.00 | -37.05 peak |
| 2 | 4456.315 | 6.72 | 33.53 | 41.84 | 48.58 | 46.99 | 74.00 | -27.01 peak |
| 3 | 4960.000 | 7.26 | 34.15 | 42.27 | 48.38 | 47.52 | 74.00 | -26.48 peak |
| 4 | 6874.906 | 8.48 | 35.83 | 41.78 | 50.13 | 52.66 | 74.00 | -21.34 peak |
| 5 | 7440.000 | 8.96 | 36.25 | 41.29 | 48.15 | 52.07 | 74.00 | -21.93 peak |
| 6 | 9920.000 | 10.71 | 37.85 | 37.23 | 42.28 | 53.61 | 74.00 | -20.39 peak |



Test Mode: 05; Polarity: Horizontal; Data rate: 1M



Condition: 3m HORIZONTAL

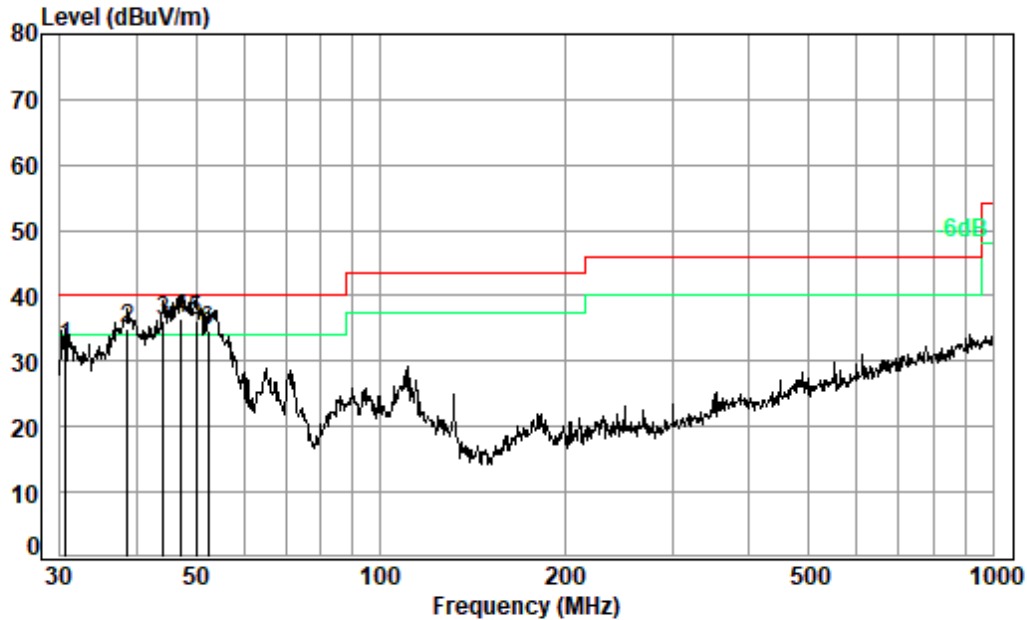
Job No. : 02456CR

Test Mode: 05

| | | Cable | Ant | Preamp | Read | | Limit | Over | |
|------|--------|-------|--------|--------|-------|--------|--------|--------|--------|
| | Freq | Loss | Factor | Factor | Level | Level | Line | Limit | Remark |
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB | |
| 1 pp | 30.75 | 0.61 | 22.43 | 27.73 | 32.07 | 27.38 | 40.00 | -12.62 | QP |
| 2 | 38.48 | 0.69 | 18.91 | 27.71 | 33.94 | 25.83 | 40.00 | -14.17 | QP |
| 3 | 48.67 | 0.70 | 14.43 | 27.69 | 36.88 | 24.32 | 40.00 | -15.68 | QP |
| 4 | 348.03 | 2.15 | 20.88 | 27.14 | 31.12 | 27.01 | 46.00 | -18.99 | QP |
| 5 | 449.56 | 2.40 | 22.78 | 27.61 | 33.36 | 30.93 | 46.00 | -15.07 | QP |
| 6 | 887.61 | 3.48 | 29.02 | 27.23 | 26.27 | 31.54 | 46.00 | -14.46 | QP |



Test Mode: 05; Polarity: Vertical; Data rate: 1M



Condition: 3m VERTICAL

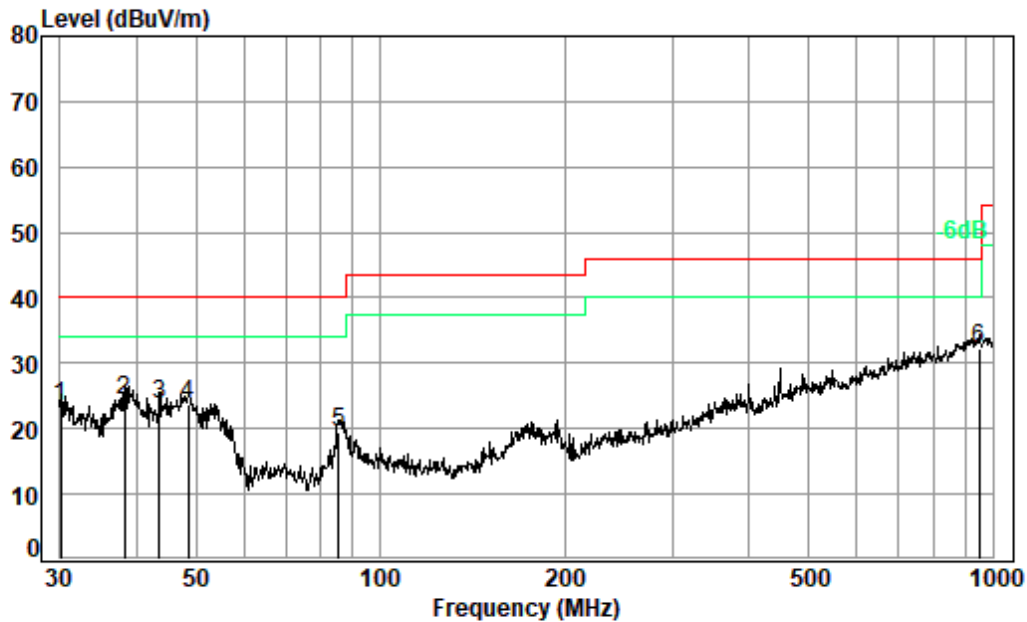
Job No. : 02456CR

Test Mode: 05

| | Freq | Cable Loss | Ant Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|------|-------|------------|------------|---------------|------------|--------|------------|------------|--------|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 30.64 | 0.61 | 22.51 | 27.73 | 36.70 | 32.09 | 40.00 | -7.91 | QP |
| 2 | 38.62 | 0.69 | 18.82 | 27.71 | 43.21 | 35.01 | 40.00 | -4.99 | QP |
| 3 | 44.28 | 0.70 | 16.12 | 27.69 | 47.00 | 36.13 | 40.00 | -3.87 | QP |
| 4 pp | 47.33 | 0.70 | 14.93 | 27.69 | 48.47 | 36.41 | 40.00 | -3.59 | QP |
| 5 | 50.06 | 0.70 | 14.08 | 27.68 | 49.24 | 36.34 | 40.00 | -3.66 | QP |
| 6 | 52.39 | 0.73 | 13.50 | 27.68 | 48.22 | 34.77 | 40.00 | -5.23 | QP |



Test Mode: 01; Polarity: Horizontal



Condition: 3m HORIZONTAL

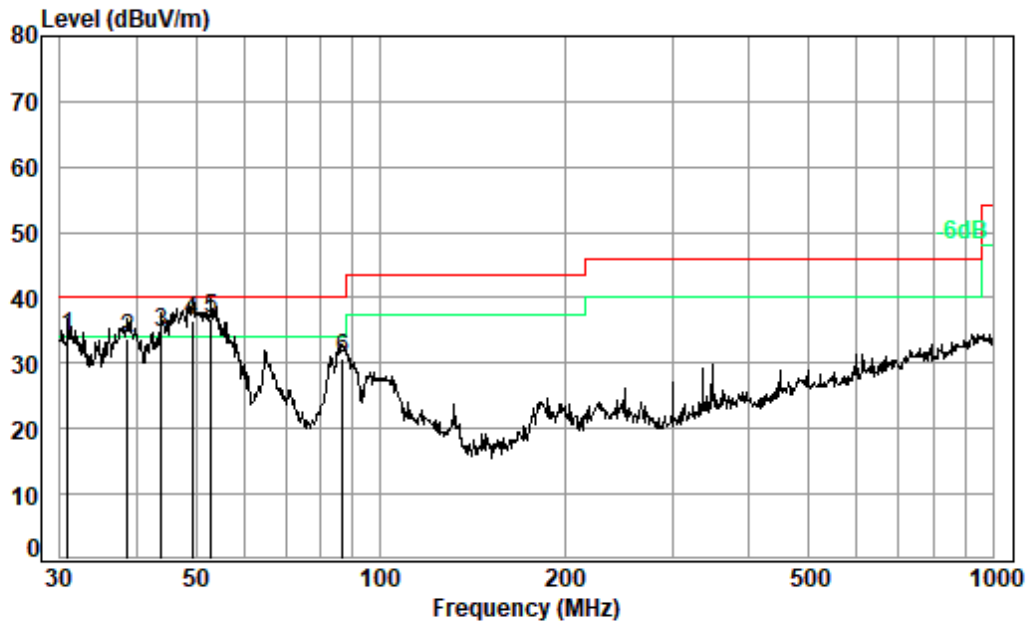
Job No. : 02456CR

Test Mode: 01

| | Freq | Cable Loss | Ant Factor | Preamp Factor | Read Level | Level | Limit | Over Limit | Remark |
|------|--------|------------|------------|---------------|------------|--------|--------|------------|--------|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 30.11 | 0.60 | 22.92 | 27.74 | 27.56 | 23.34 | 40.00 | -16.66 | QP |
| 2 | 38.21 | 0.68 | 19.07 | 27.71 | 32.41 | 24.45 | 40.00 | -15.55 | QP |
| 3 | 43.66 | 0.70 | 16.40 | 27.70 | 34.30 | 23.70 | 40.00 | -16.30 | QP |
| 4 | 48.67 | 0.70 | 14.43 | 27.69 | 36.18 | 23.62 | 40.00 | -16.38 | QP |
| 5 | 85.60 | 1.26 | 12.46 | 27.63 | 33.28 | 19.37 | 40.00 | -20.63 | QP |
| 6 pp | 948.76 | 3.55 | 29.33 | 26.91 | 26.39 | 32.36 | 46.00 | -13.64 | QP |



Test Mode: 01; Polarity: Vertical



Condition: 3m VERTICAL

Job No. : 02456CR

Test Mode: 01

| | Freq | Cable Loss | Ant Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|------|-------|------------|------------|---------------|------------|--------|------------|------------|--------|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 30.85 | 0.61 | 22.35 | 27.73 | 38.70 | 33.93 | 40.00 | -6.07 | QP |
| 2 | 38.62 | 0.69 | 18.82 | 27.71 | 42.08 | 33.88 | 40.00 | -6.12 | QP |
| 3 | 43.97 | 0.70 | 16.22 | 27.70 | 45.56 | 34.78 | 40.00 | -5.22 | QP |
| 4 | 49.36 | 0.70 | 14.26 | 27.68 | 49.37 | 36.65 | 40.00 | -3.35 | QP |
| 5 pp | 52.95 | 0.73 | 13.50 | 27.68 | 50.14 | 36.69 | 40.00 | -3.31 | QP |
| 6 | 86.81 | 1.27 | 12.66 | 27.62 | 44.50 | 30.81 | 40.00 | -9.19 | QP |



7.8 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement: 47 CFR Part 15, Subpart C 15.247
47 CFR Part 15, Subpart C 15.207

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

| Frequency of emission(MHz) | Conducted limit(dBμV) | |
|----------------------------|-----------------------|-----------|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

*Decreases with the logarithm of the frequency.

Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

7.8.1 E.U.T. Operation

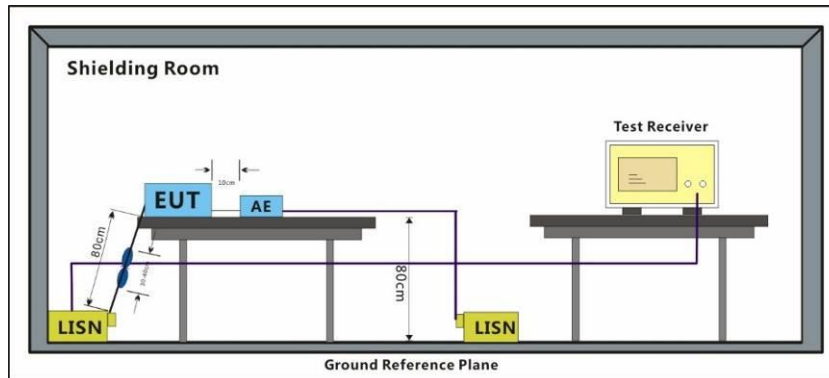
Operating Environment:

Temperature: 21.0 °C Humidity: 52.3 % RH Atmospheric Pressure: 1010 mbar

7.8.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|-----------------------|-----------|--|
| Final test | 01 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.(ABLU Module) |
| Pre-scan | 05 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.(LB-LINK Module) |

7.8.3 Test Setup Diagram



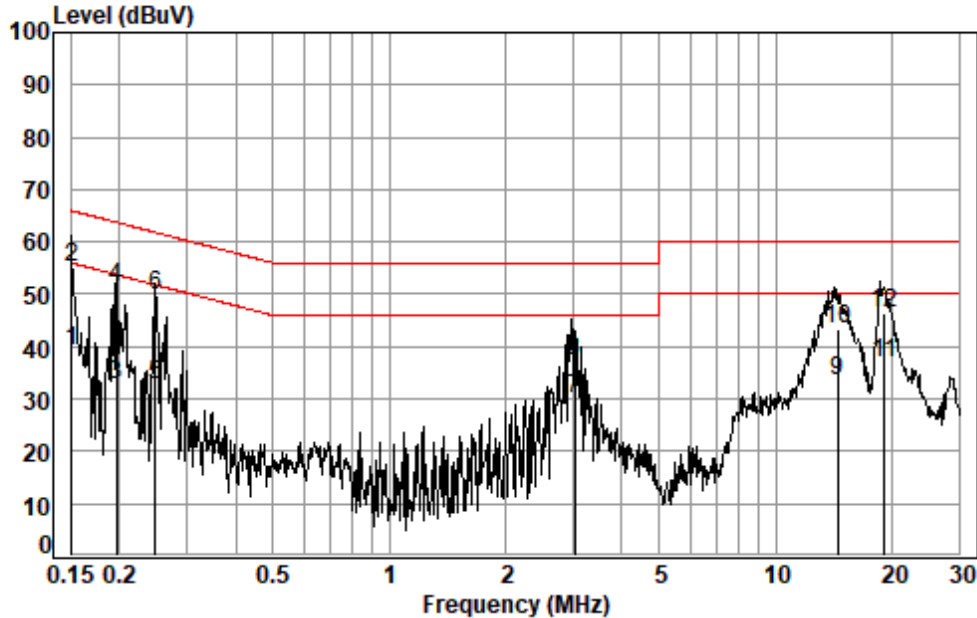
7.8.4 Measurement Procedure and Data

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50μH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Remark: LISN=Read Level+ Cable Loss+ LISN Factor



Test Mode: 01; Line: Live line



Site : Shielding Room
Condition: Line
Job No. : 02456CR
Test mode: 01

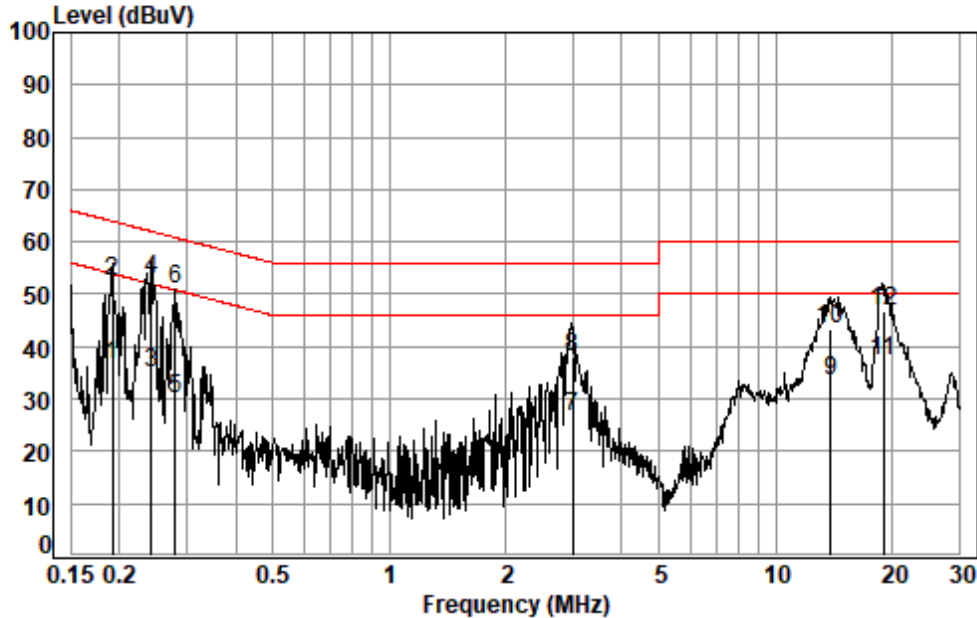
| | Freq | Cable Loss | LISN Factor | Read Level | Limit Line | Over Limit | Remark |
|----|---------|------------|-------------|------------|------------|------------|---------|
| | MHz | dB | dB | dBuV | dBuV | dB | |
| 1 | 0.1508 | 0.03 | 9.62 | 29.44 | 39.09 | 55.96 | Average |
| 2 | 0.1508 | 0.03 | 9.62 | 45.49 | 55.14 | 65.96 | QP |
| 3 | 0.1965 | 0.04 | 9.64 | 23.19 | 32.87 | 53.76 | Average |
| 4 | 0.1965 | 0.04 | 9.64 | 41.50 | 51.18 | 63.76 | QP |
| 5 | 0.2481 | 0.05 | 9.65 | 22.91 | 32.61 | 51.82 | Average |
| 6 | 0.2481 | 0.05 | 9.65 | 40.22 | 49.92 | 61.82 | QP |
| 7 | 3.0223 | 0.14 | 9.71 | 20.30 | 30.15 | 46.00 | Average |
| 8 | 3.0223 | 0.14 | 9.71 | 27.42 | 37.27 | 56.00 | QP |
| 9 | 14.5171 | 0.16 | 9.96 | 23.36 | 33.48 | 50.00 | Average |
| 10 | 14.5171 | 0.16 | 9.96 | 33.20 | 43.32 | 60.00 | QP |
| 11 | 19.1220 | 0.17 | 9.93 | 26.71 | 36.81 | 50.00 | Average |
| 12 | 19.1220 | 0.17 | 9.93 | 36.44 | 46.54 | 60.00 | QP |



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Test Mode: 01; Line: Neutral Line



Site : Shielding Room
Condition: Neutral
Job No. : 02456CR
Test mode: 01

| | Freq | Cable Loss | LISN Factor | Read Level | Limit Line | Over Limit | Remark |
|----|---------|------------|-------------|------------|------------|------------|---------|
| | MHz | dB | dB | dBuV | dBuV | dB | |
| 1 | 0.1924 | 0.04 | 9.63 | 26.94 | 53.93 | -17.32 | Average |
| 2 | 0.1924 | 0.04 | 9.63 | 42.77 | 63.93 | -11.49 | QP |
| 3 | 0.2416 | 0.04 | 9.65 | 25.31 | 52.04 | -17.04 | Average |
| 4 | 0.2416 | 0.04 | 9.65 | 43.01 | 62.04 | -9.34 | QP |
| 5 | 0.2788 | 0.05 | 9.65 | 20.40 | 50.85 | -20.75 | Average |
| 6 | 0.2788 | 0.05 | 9.65 | 41.11 | 60.85 | -10.04 | QP |
| 7 | 2.9778 | 0.14 | 9.70 | 16.61 | 46.00 | -19.55 | Average |
| 8 | 2.9778 | 0.14 | 9.70 | 28.03 | 56.00 | -18.13 | QP |
| 9 | 13.9146 | 0.16 | 9.99 | 23.13 | 50.00 | -16.72 | Average |
| 10 | 13.9146 | 0.16 | 9.99 | 33.06 | 60.00 | -16.79 | QP |
| 11 | 19.0210 | 0.17 | 9.97 | 27.12 | 50.00 | -12.74 | Average |
| 12 | 19.0210 | 0.17 | 9.97 | 36.73 | 60.00 | -13.13 | QP |



8 Test Setup Photo

Refer to Setup Photos

9 EUT Constructional Details (EUT Photos)

Refer to EUT External and Internal photos



10 Appendix

Appendix for 15.247

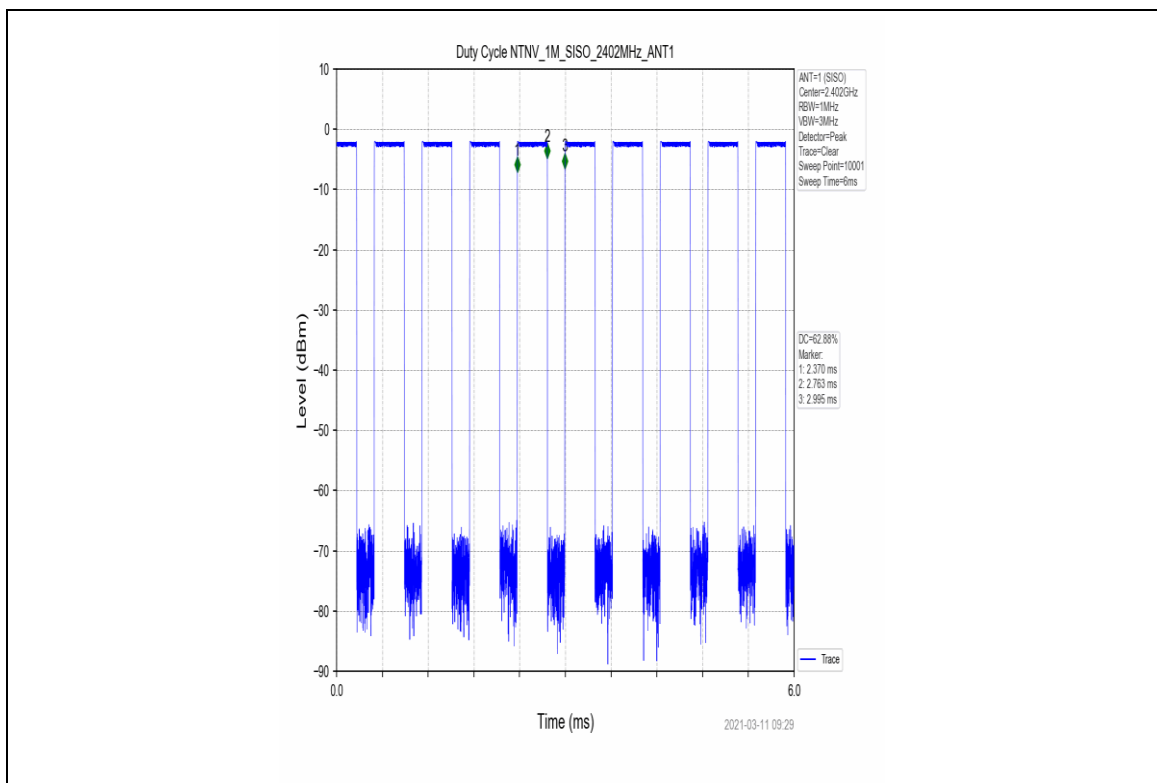
For LB-LINK Module

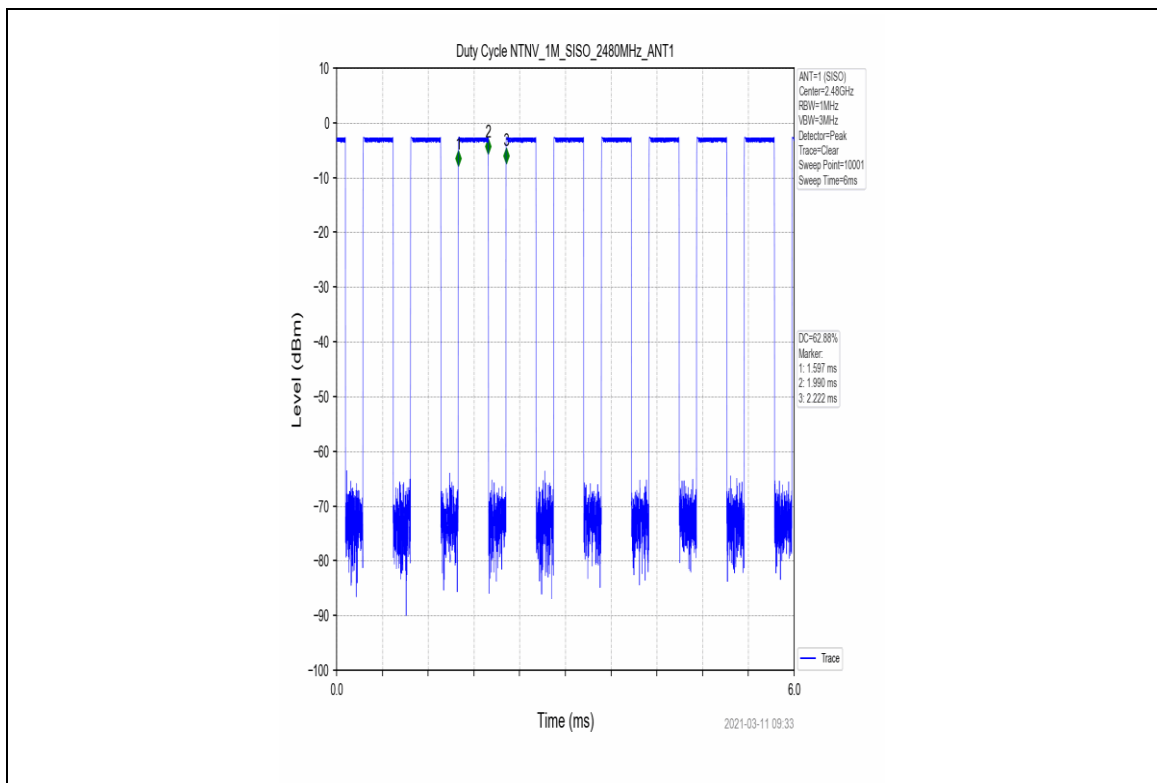
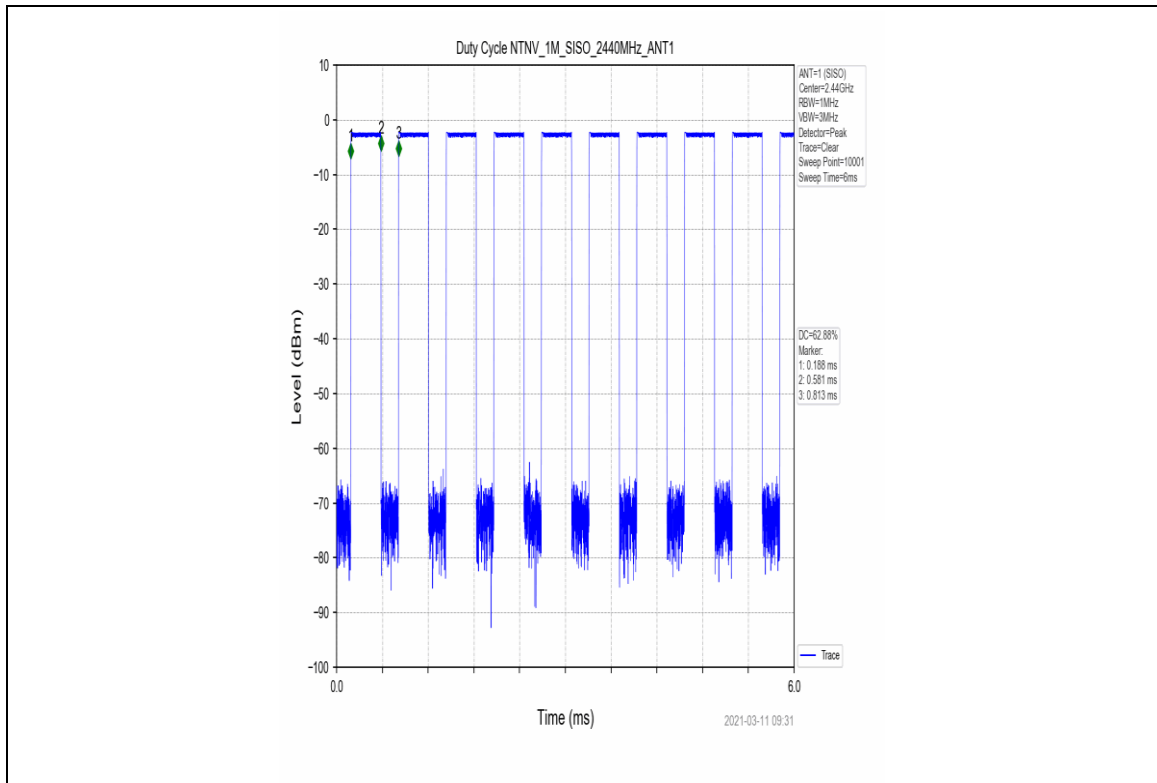
1. Duty Cycle

1.1 Test Result

| Test Mode | Channel Frequency (MHz) | TX Type | ANT No. | T_on (ms) | Period (ms) | Duty Cycle (%) | Duty Cycle Correction Factor (dB) |
|-----------|-------------------------|---------|---------|-----------|-------------|----------------|-----------------------------------|
| 1M | 2402 | SISO | 1 | 0.393 | 0.625 | 62.88 | 2.01 |
| | 2440 | SISO | 1 | 0.393 | 0.625 | 62.88 | 2.01 |
| | 2480 | SISO | 1 | 0.393 | 0.625 | 62.88 | 2.01 |

1.2 Test Graph





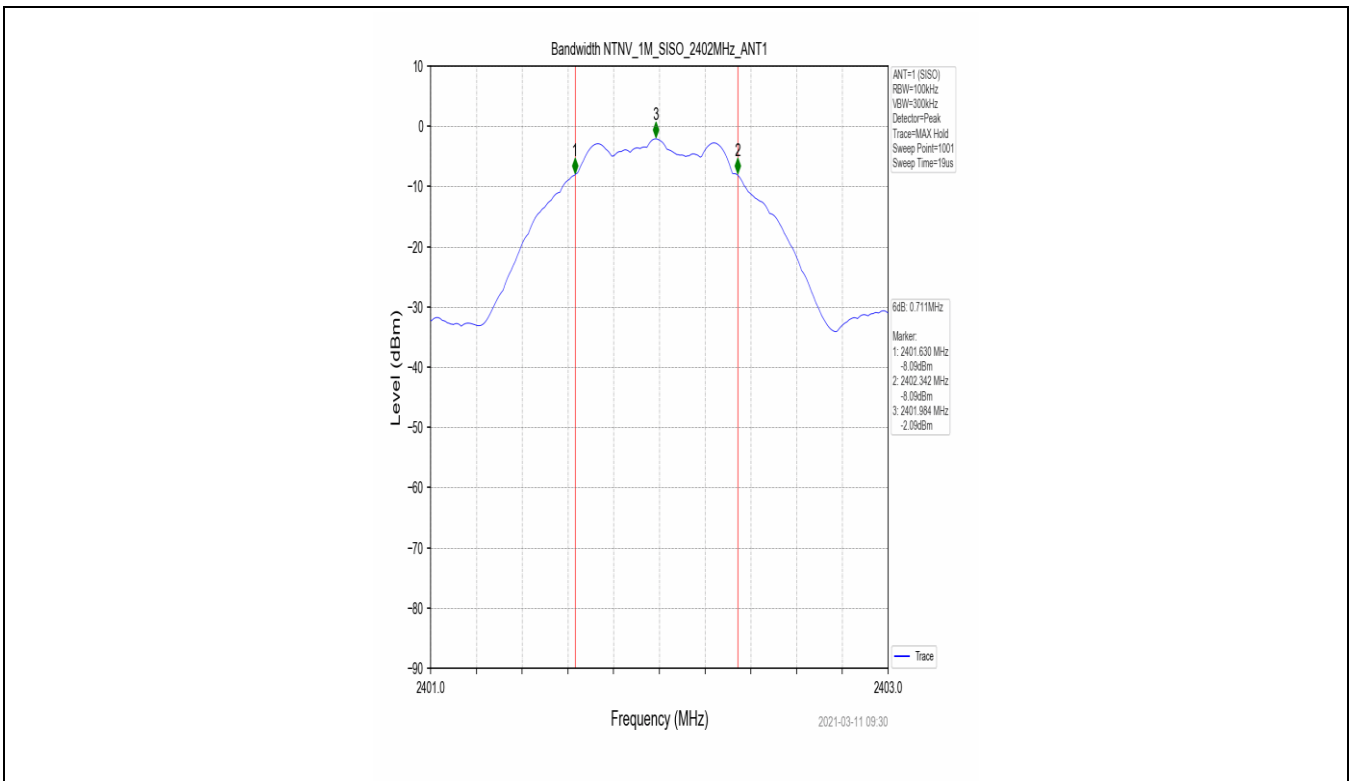
2. Bandwidth

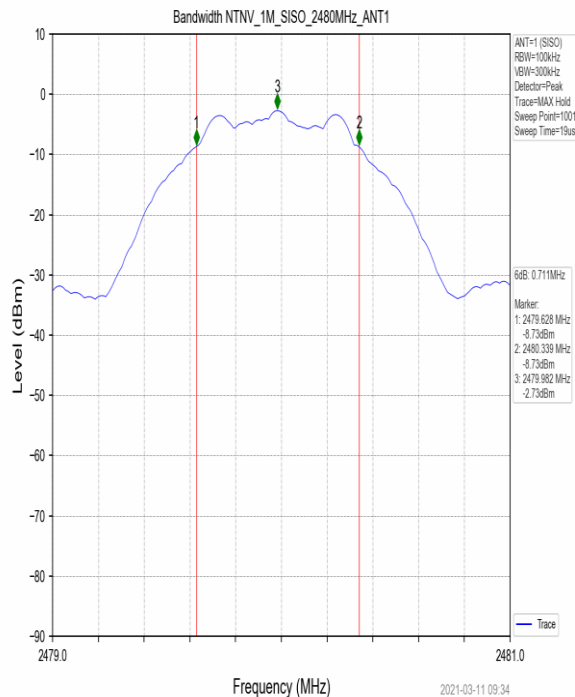
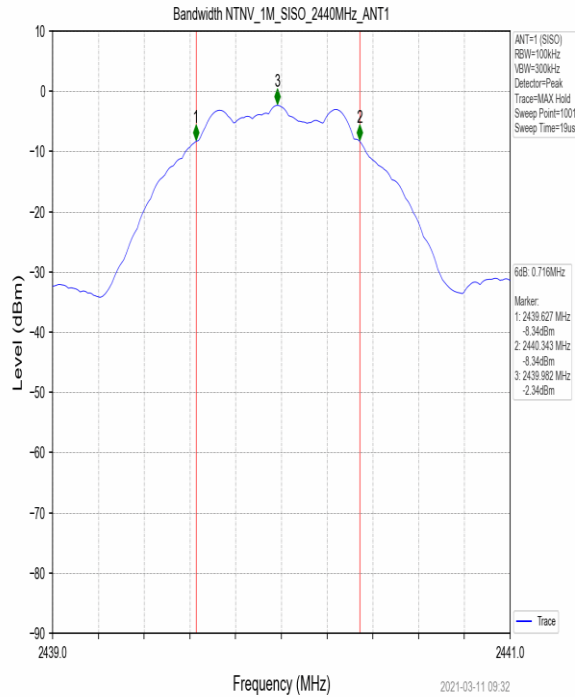
2.1 Test Result

| Test Mode | Frequency (MHz) | TX Type | ANT No. | 6dB Bandwidth | | Verdict |
|-----------|-----------------|---------|---------|-------------------|--------------|---------|
| | | | | Test Result (MHz) | Limits (MHz) | |
| 1M | 2402 | SISO | 1 | 0.711 | ≥0.5 | PASS |
| | 2440 | SISO | 1 | 0.716 | ≥0.5 | PASS |
| | 2480 | SISO | 1 | 0.711 | ≥0.5 | PASS |

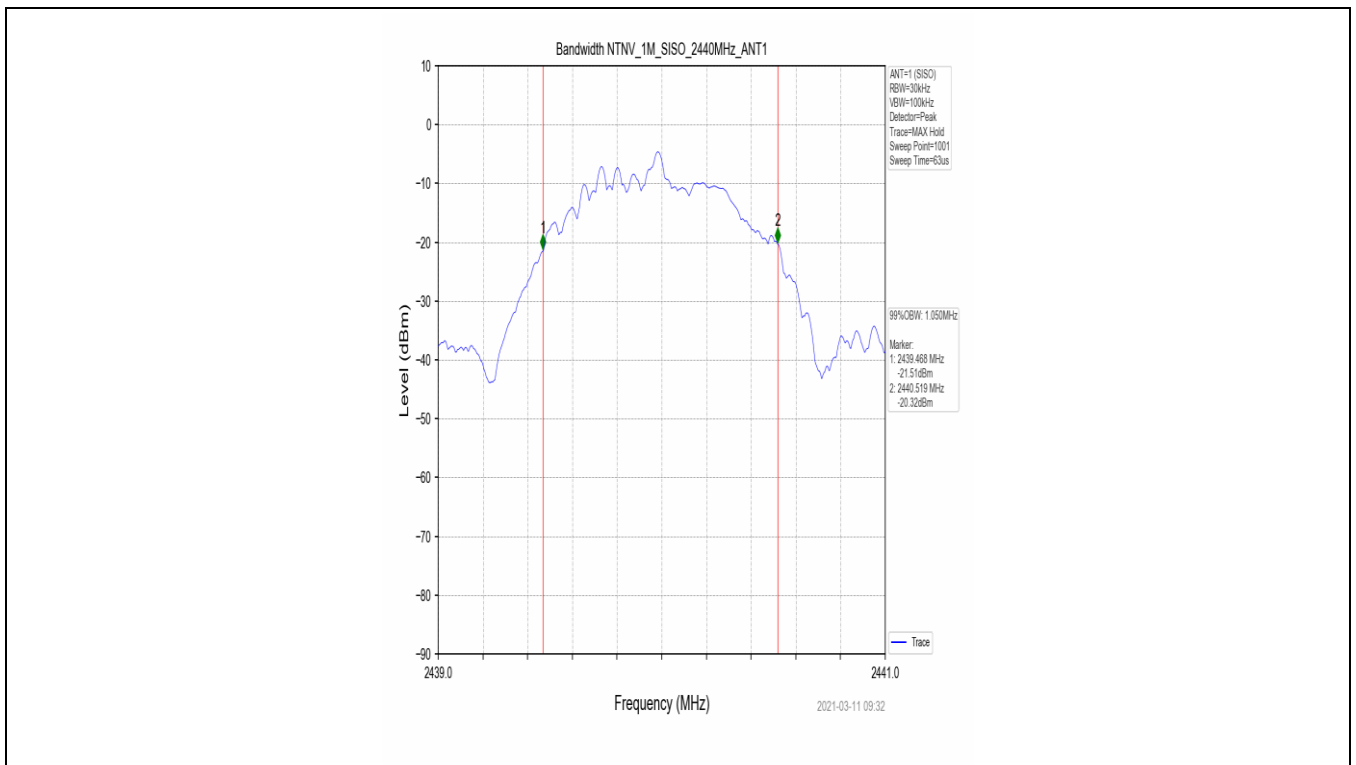
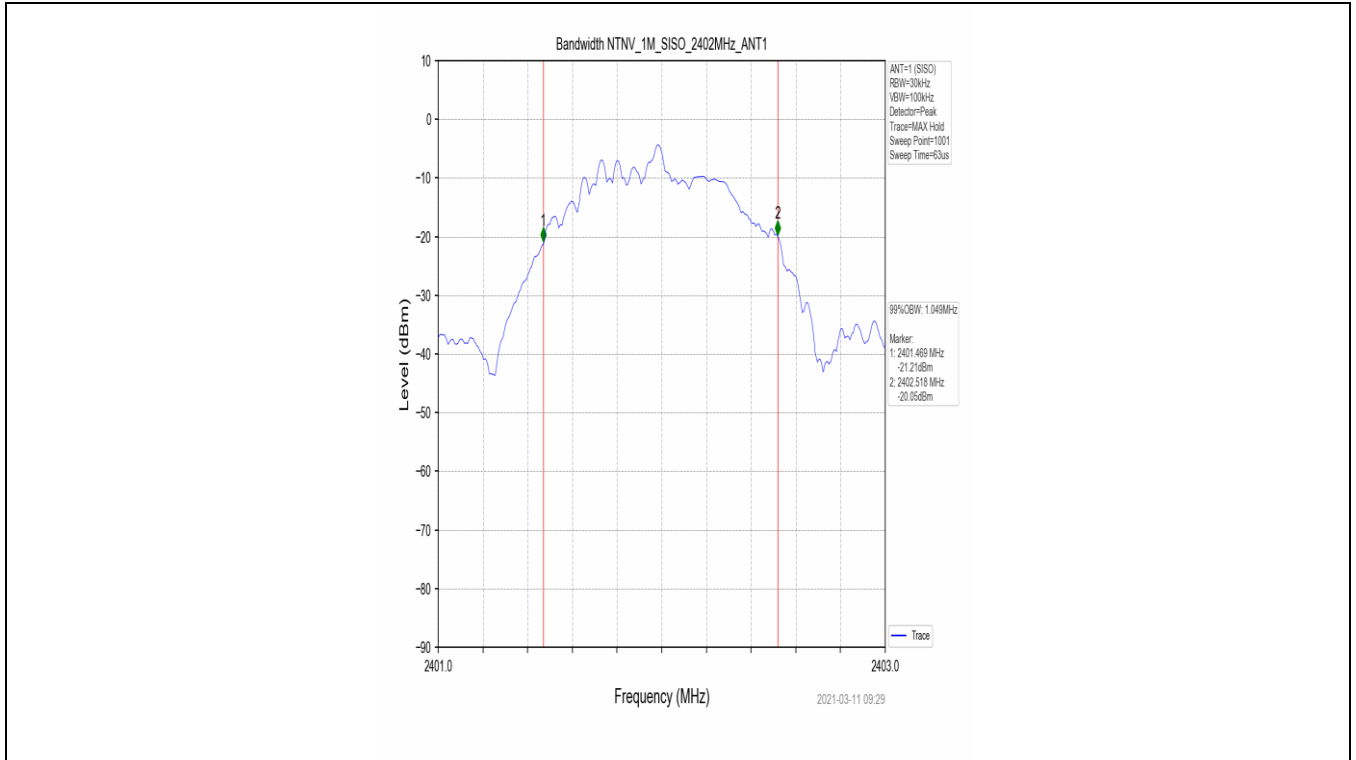
| Test Mode | Frequency (MHz) | TX Type | ANT No. | 99% Occupied Bandwidth | |
|-----------|-----------------|---------|---------|------------------------|---------------------|
| | | | | Test Result (MHz) | |
| 1M | 2402 | SISO | 1 | 1.049 | Only for Report Use |
| | 2440 | SISO | 1 | 1.050 | Only for Report Use |
| | 2480 | SISO | 1 | 1.051 | Only for Report Use |

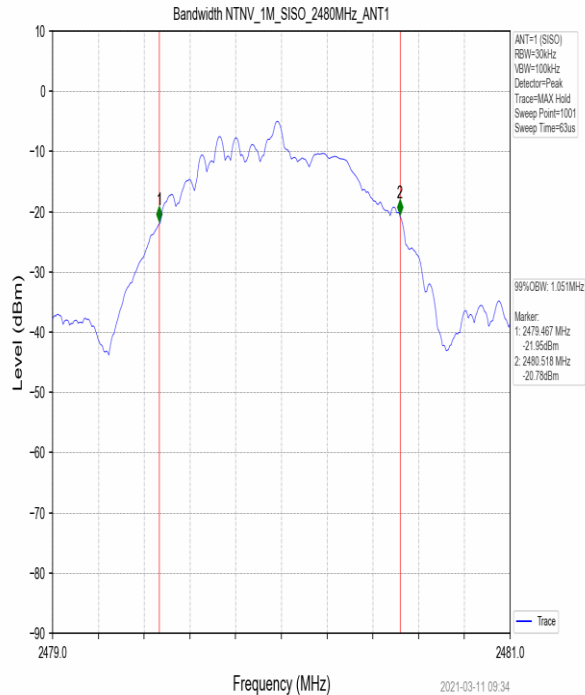
2.2 Test Graph - 6dB Bandwidth





2.3 Test Graph - 99% Occupied Bandwidth



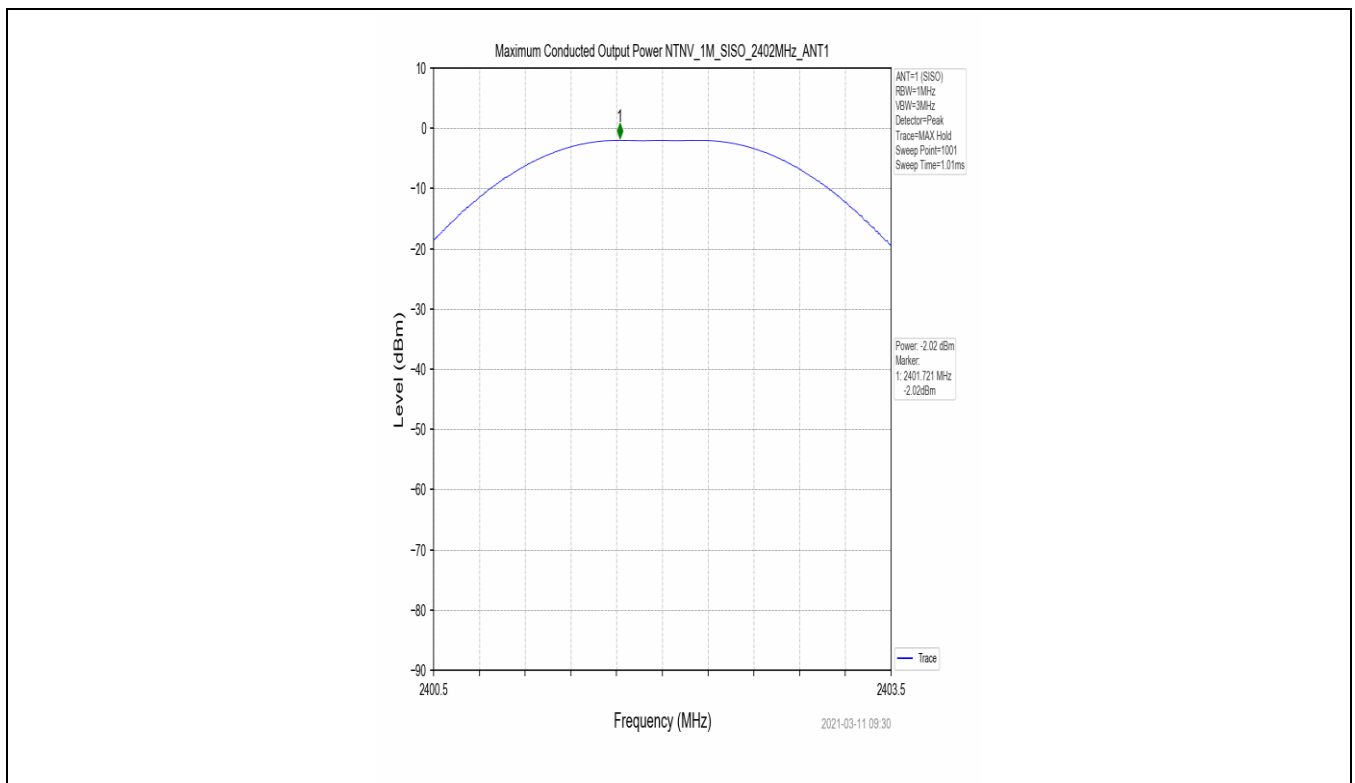


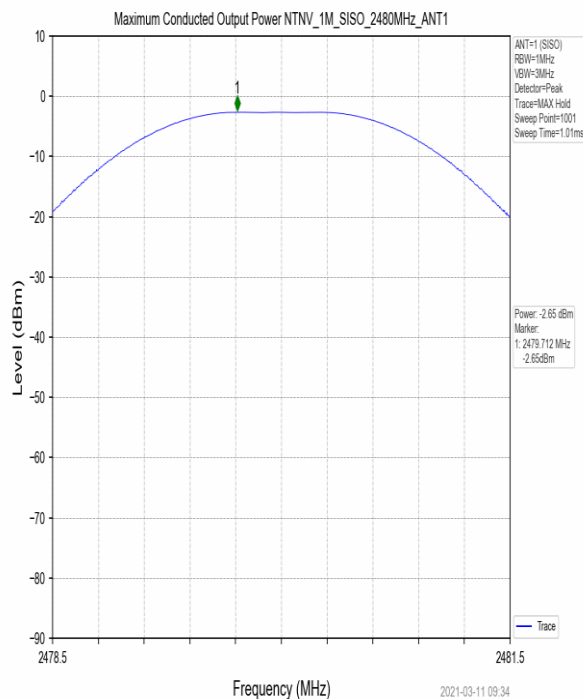
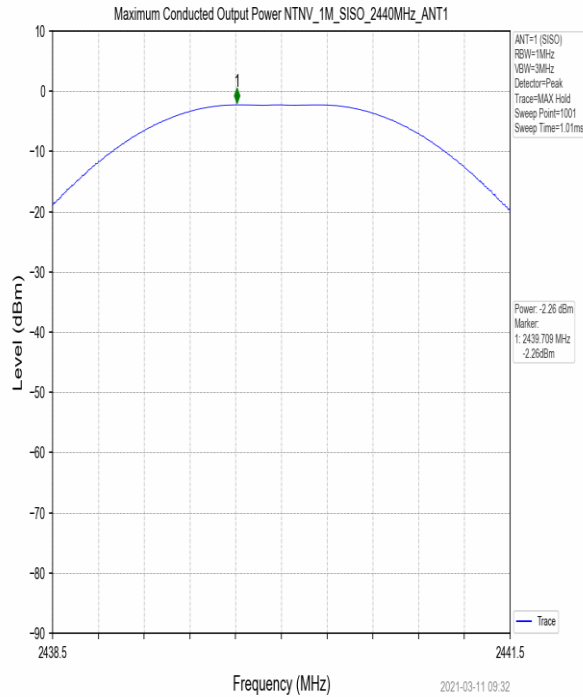
3. Maximum Conducted Output Power

3.1 Test Result

| Test Mode | Frequency (MHz) | Tx Type | Measured Peak Output Power (dBm) | Limits (dBm) | Verdict |
|-----------|-----------------|---------|----------------------------------|--------------|---------|
| | | | Ant 1 | | |
| 1M | 2402 | SISO | -2.02 | 30 | PASS |
| | 2440 | SISO | -2.26 | 30 | PASS |
| | 2480 | SISO | -2.65 | 30 | PASS |

3.2 Test Graph



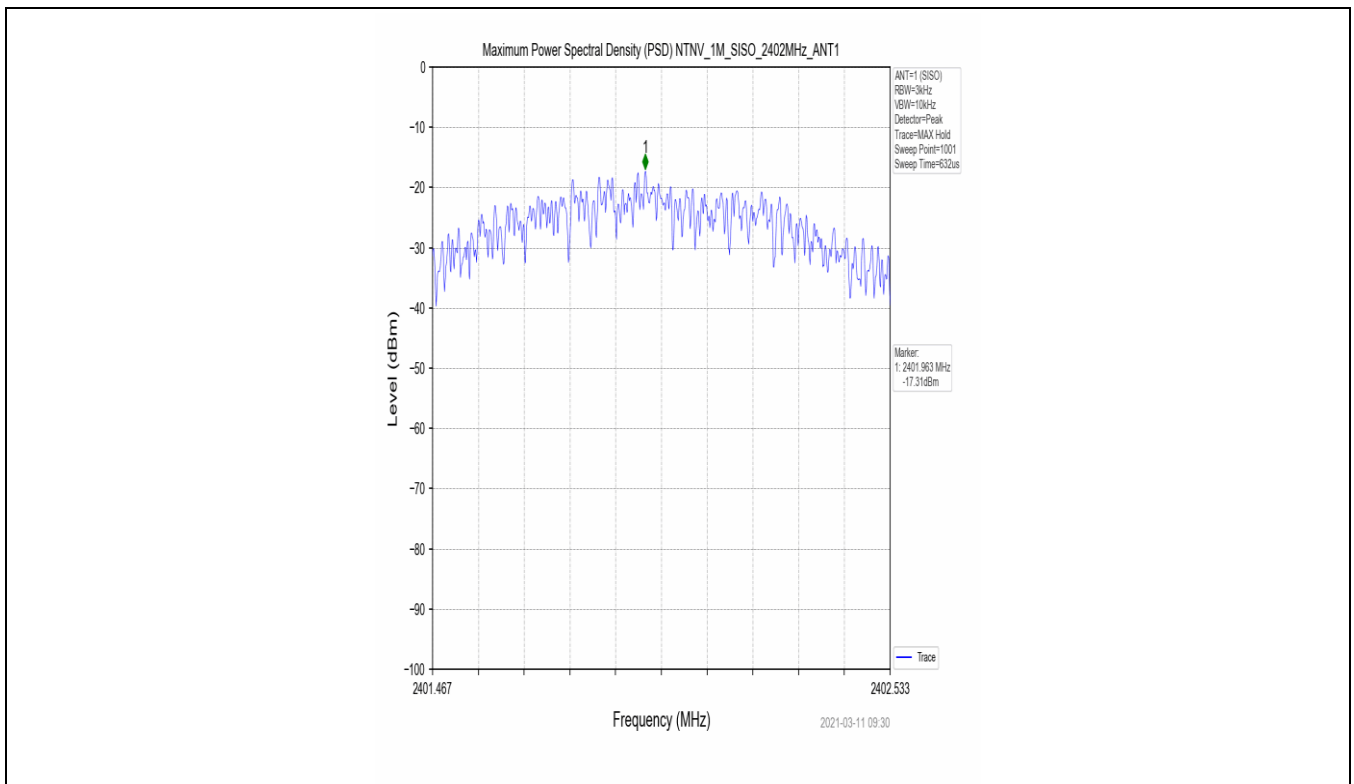


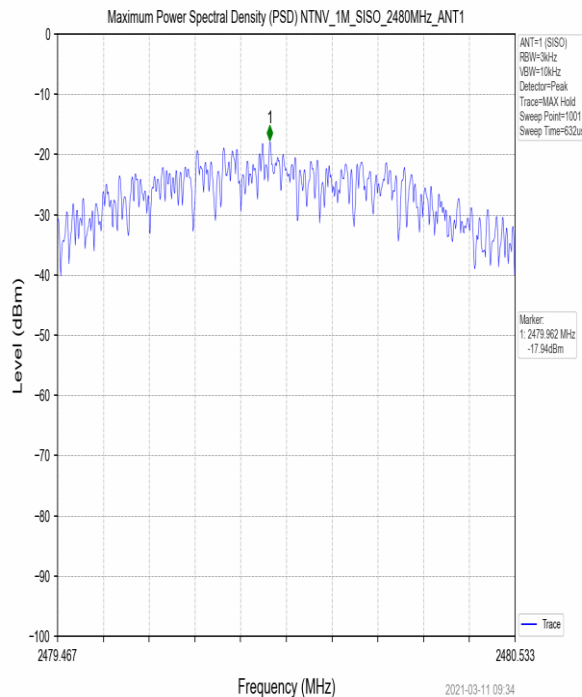
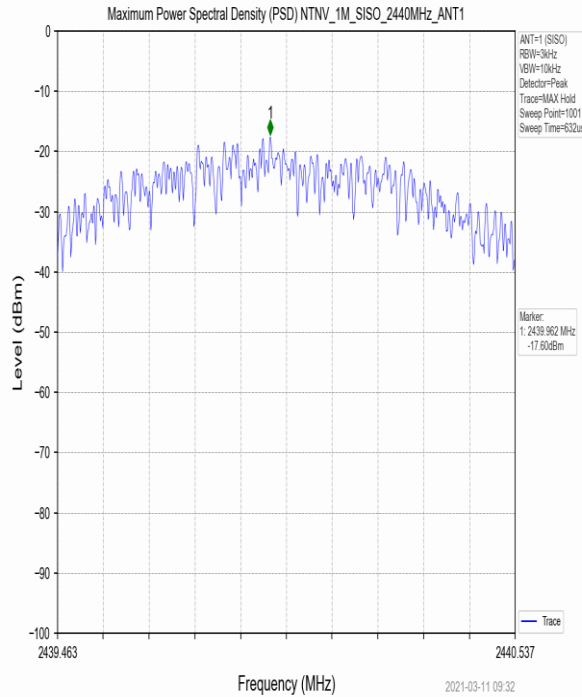
4. Maximum Power Spectral Density (PSD)

4.1 Test Result

| Test Mode | Frequency (MHz) | Tx Type | Maximum Power Spectral Density (dBm/3KHz) | Limits (dBm/3KHz) | Verdict |
|-----------|-----------------|---------|---|-------------------|---------|
| | | | Ant 1 | | |
| 1M | 2402 | SISO | -17.31 | ≤8 | PASS |
| | 2440 | SISO | -17.60 | ≤8 | PASS |
| | 2480 | SISO | -17.94 | ≤8 | PASS |

4.2 Test Graph



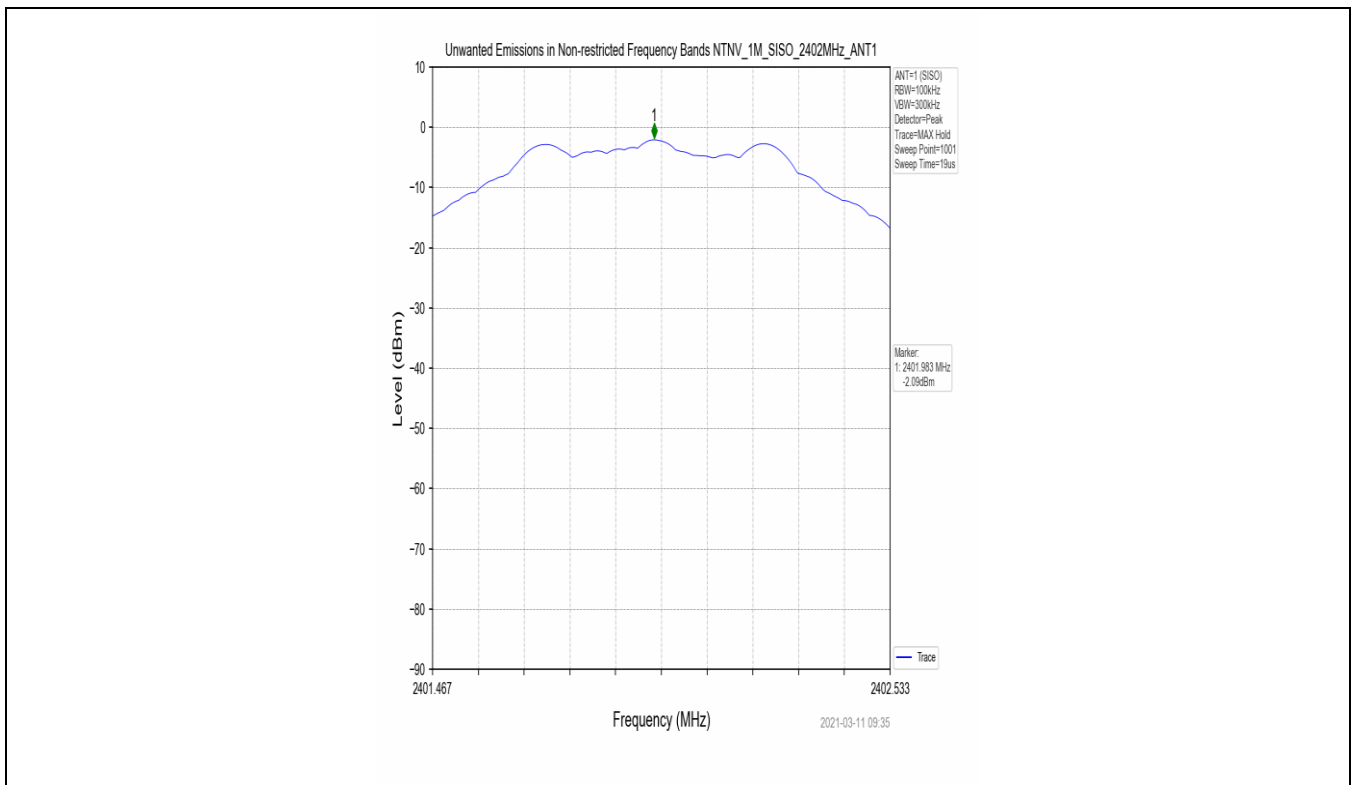


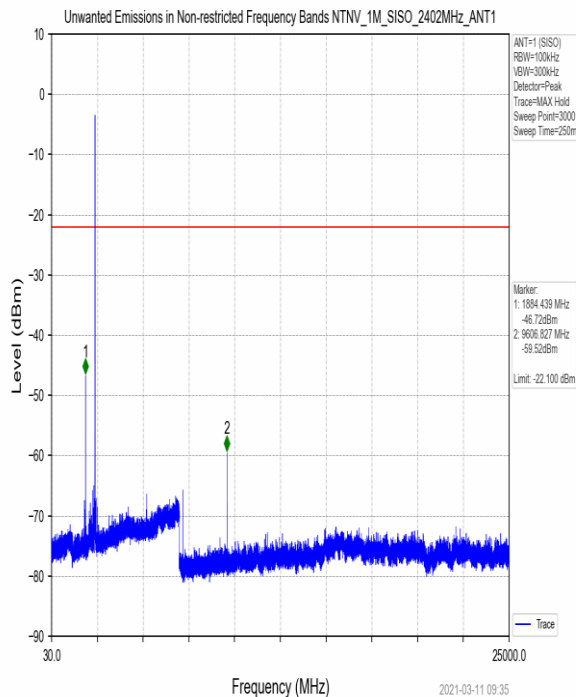
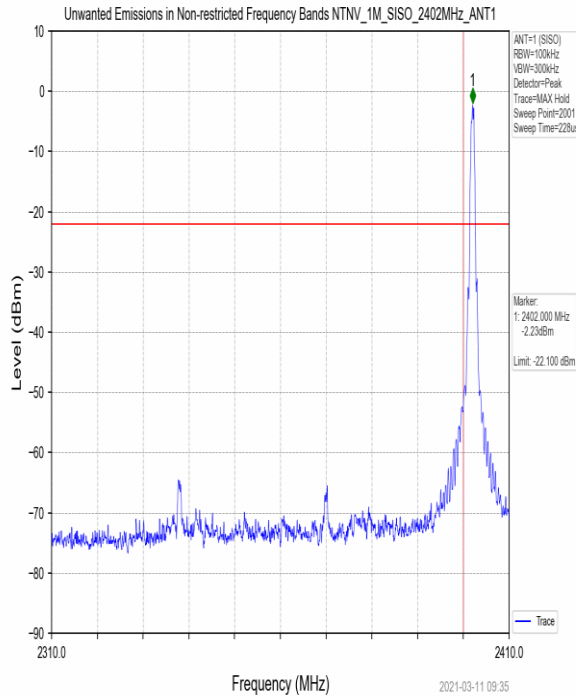
5. Unwanted Emissions in Non-restricted Frequency Bands

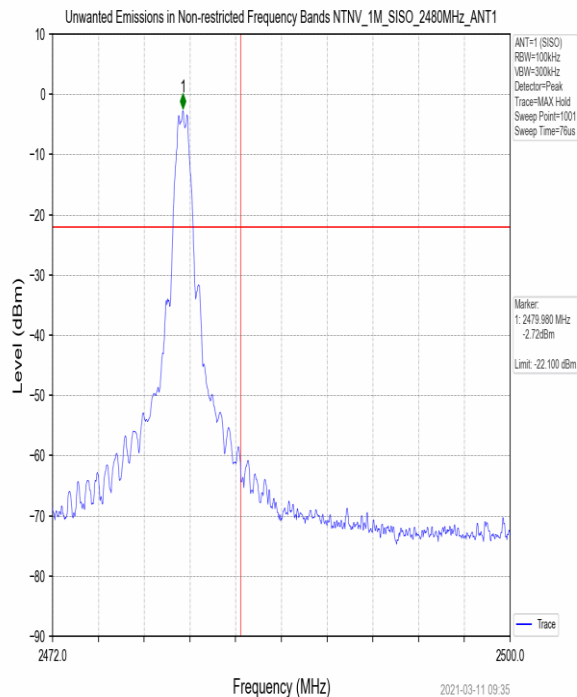
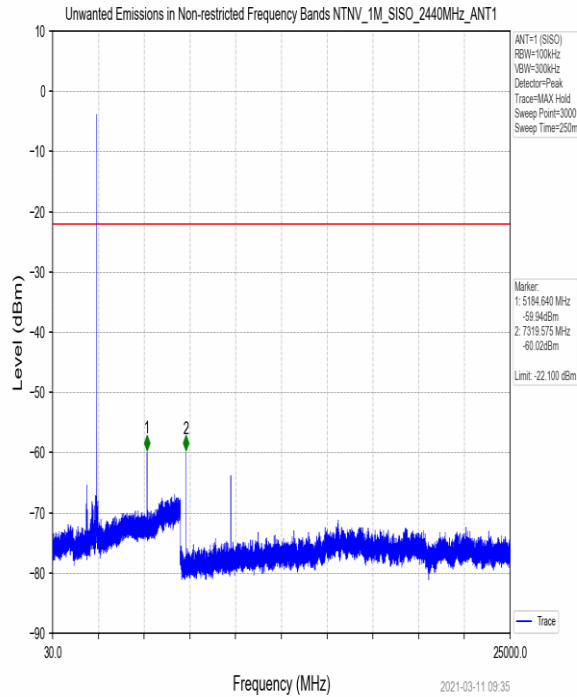
5.1 Test Result

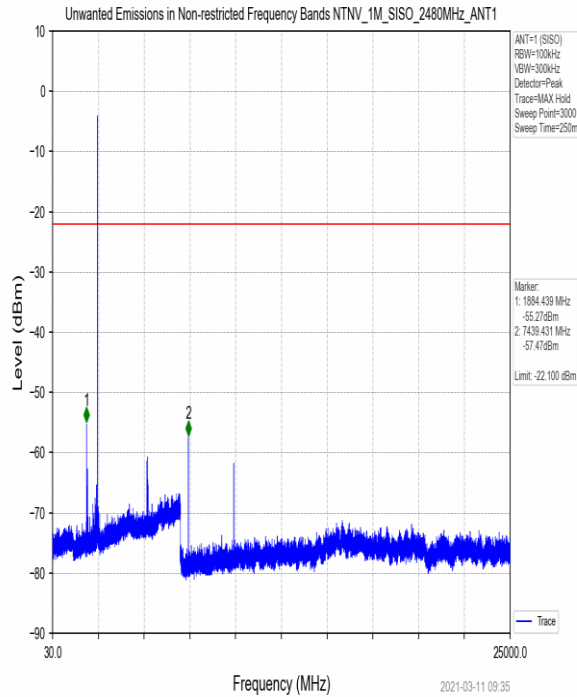
| Test Mode | Frequency (MHz) | TX Type | ANT No. | Spurious Conducted Emission (dBm) | Limits (dBm) | Verdict |
|-----------|-----------------|---------|---------|-----------------------------------|--------------|---------|
| 1M | 2402 | SISO | 1 | Refer to test graph | -22.10 | PASS |
| | 2440 | SISO | 1 | Refer to test graph | -22.10 | PASS |
| | 2480 | SISO | 1 | Refer to test graph | -22.10 | PASS |

5.2 Test Graph









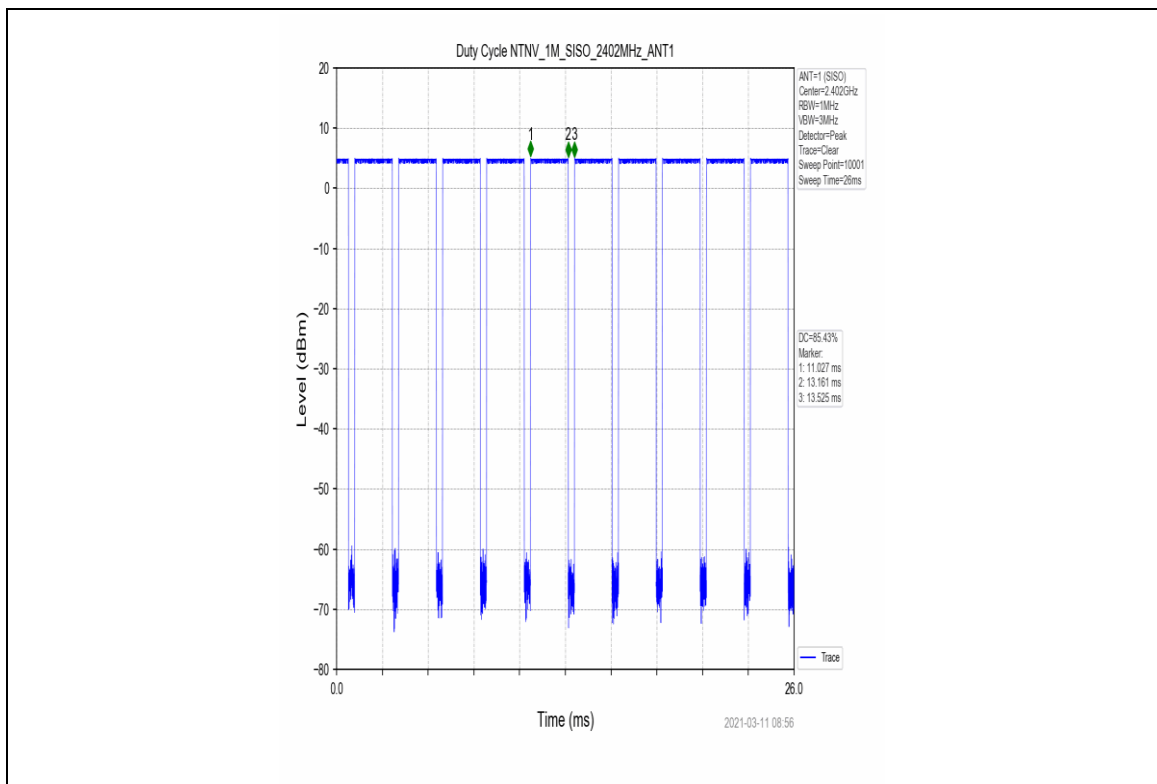
For ABLUE Module

1. Duty Cycle

1.1 Test Result

| Test Mode | Channel Frequency (MHz) | TX Type | ANT No. | T_on (ms) | Period (ms) | Duty Cycle (%) | Duty Cycle Correction Factor (dB) |
|-----------|-------------------------|---------|---------|-----------|-------------|----------------|-----------------------------------|
| 1M | 2402 | SISO | 1 | 2.134 | 2.498 | 85.43 | 0.68 |
| | 2440 | SISO | 1 | 2.134 | 2.498 | 85.43 | 0.68 |
| | 2480 | SISO | 1 | 2.135 | 2.499 | 85.43 | 0.68 |
| 2M | 2402 | SISO | 1 | 1.075 | 1.868 | 57.55 | 2.40 |
| | 2440 | SISO | 1 | 1.080 | 1.874 | 57.63 | 2.39 |
| | 2480 | SISO | 1 | 1.080 | 1.876 | 57.57 | 2.40 |

1.2 Test Graph

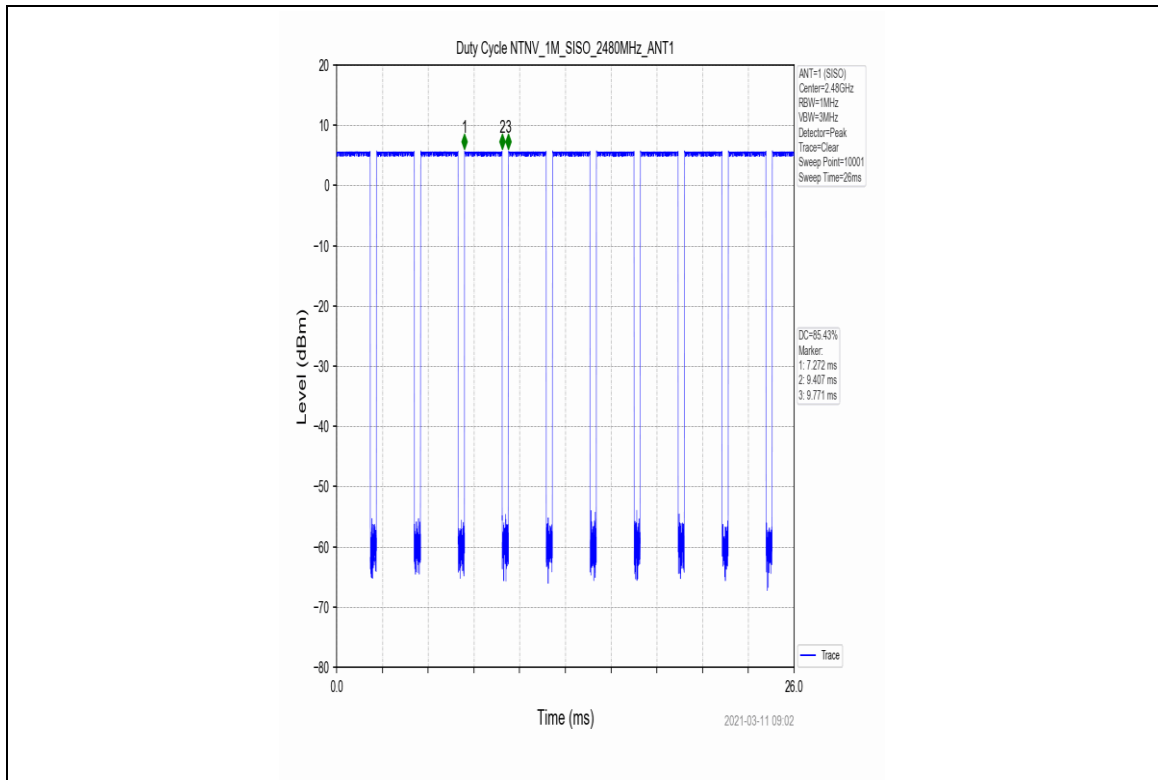
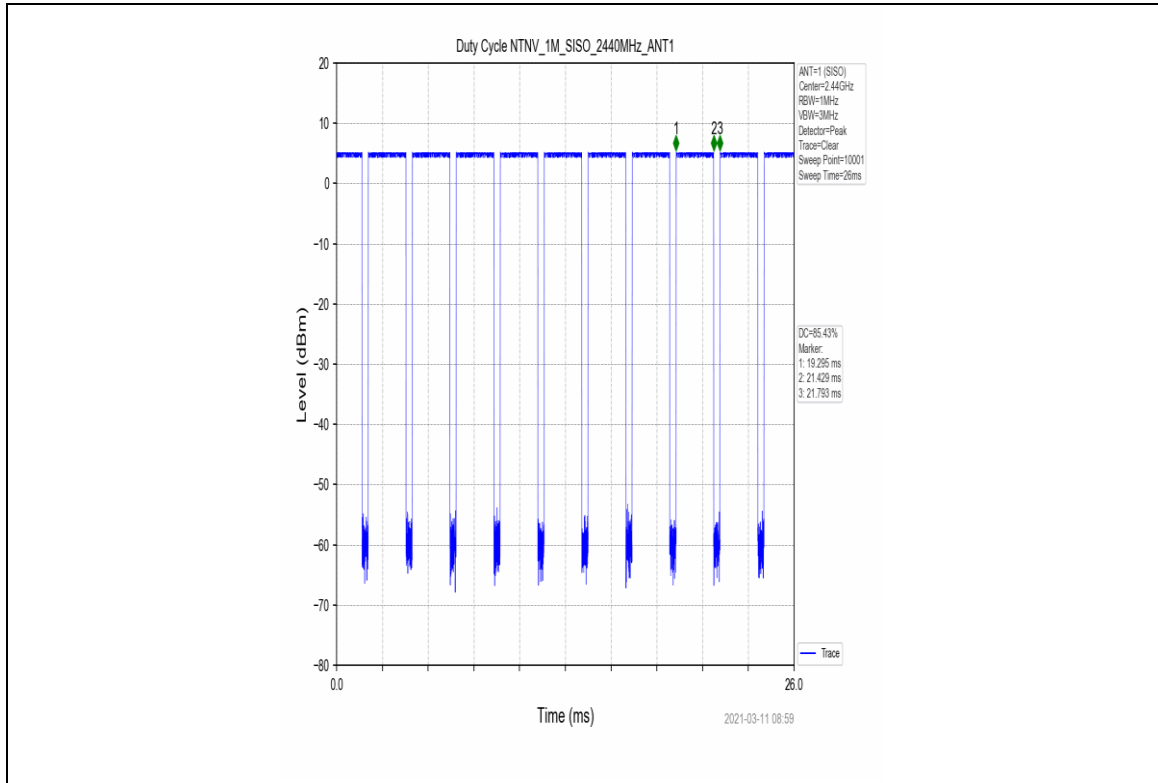


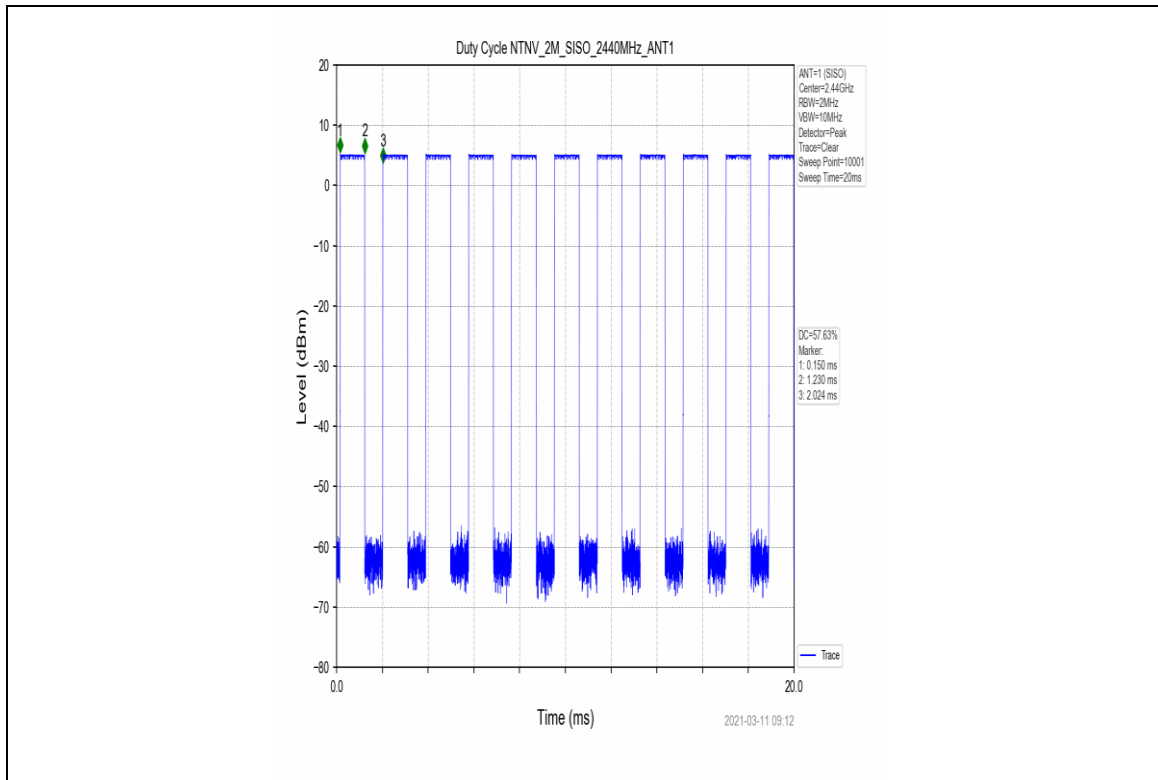
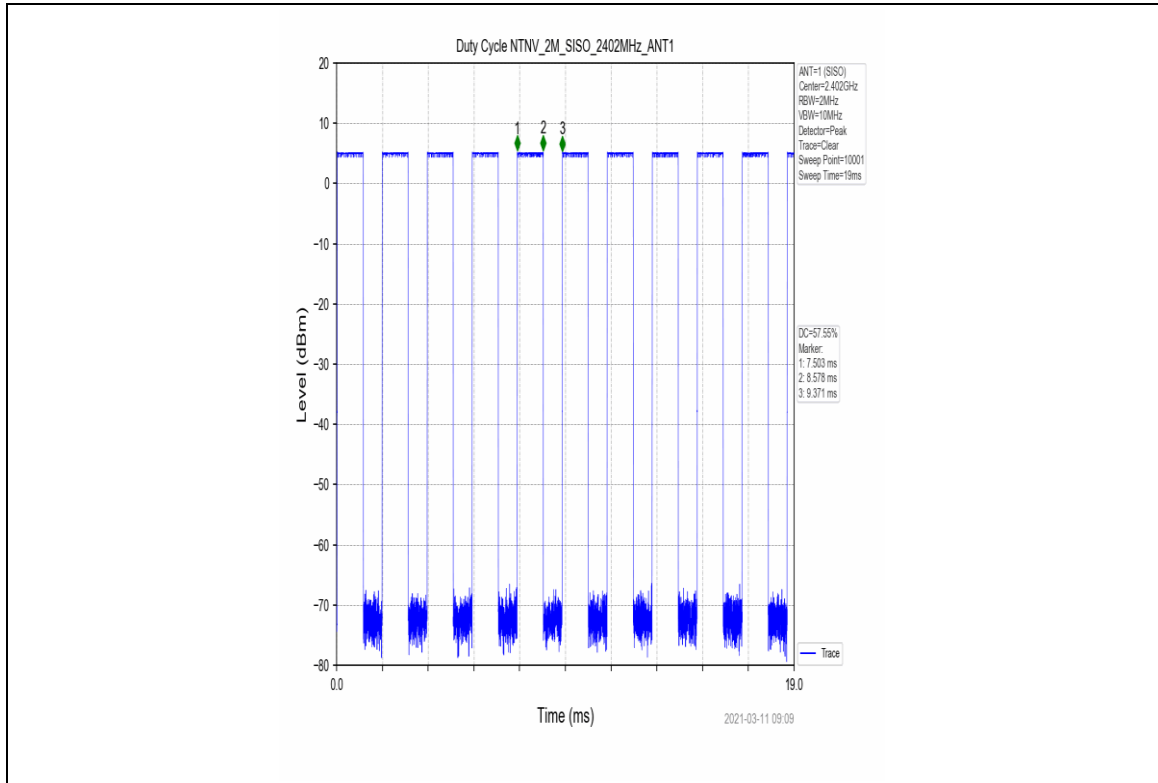
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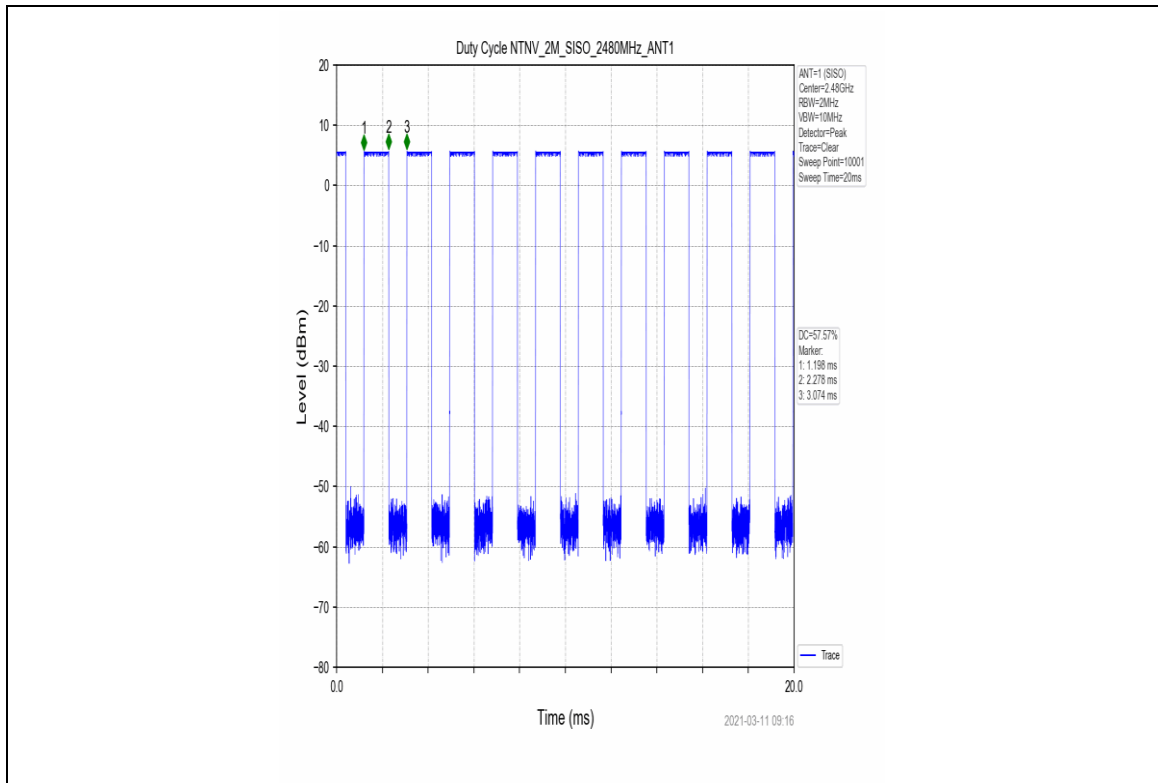
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2. Bandwidth

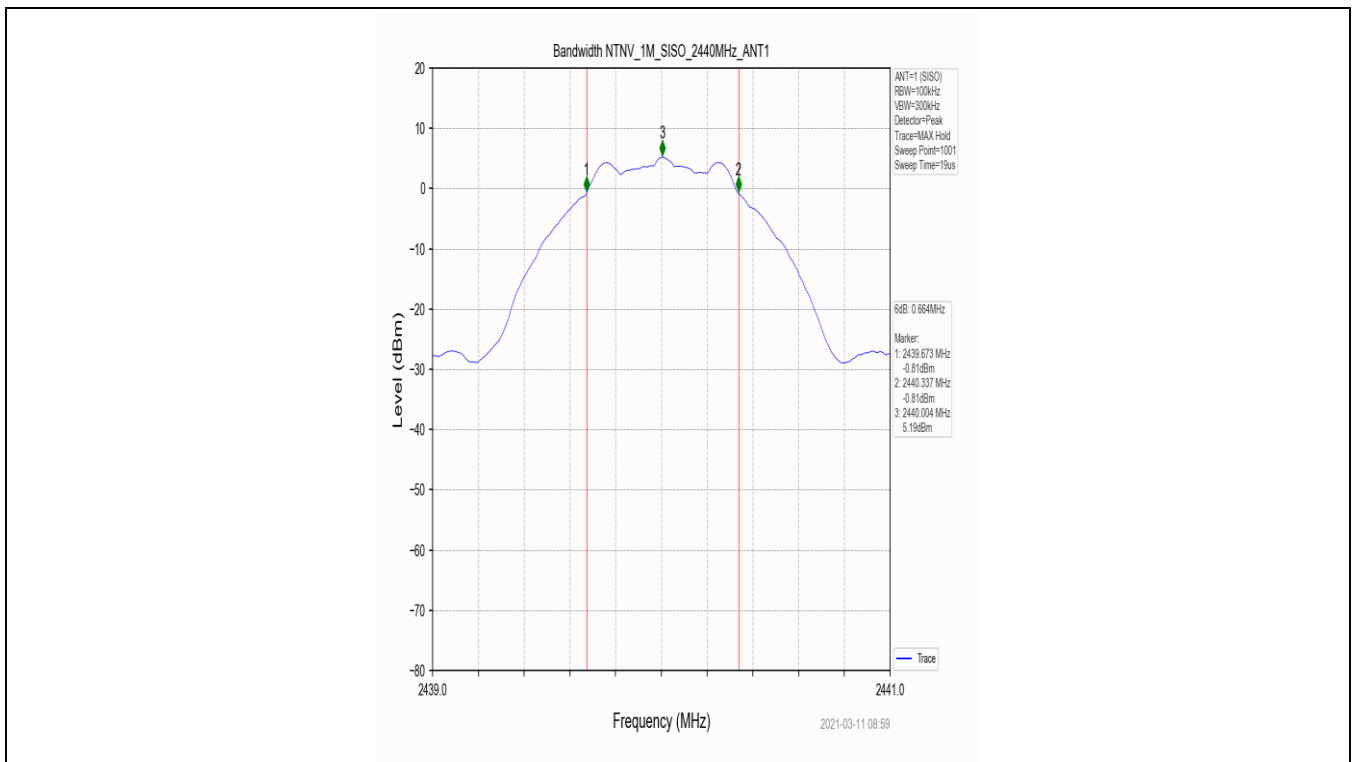
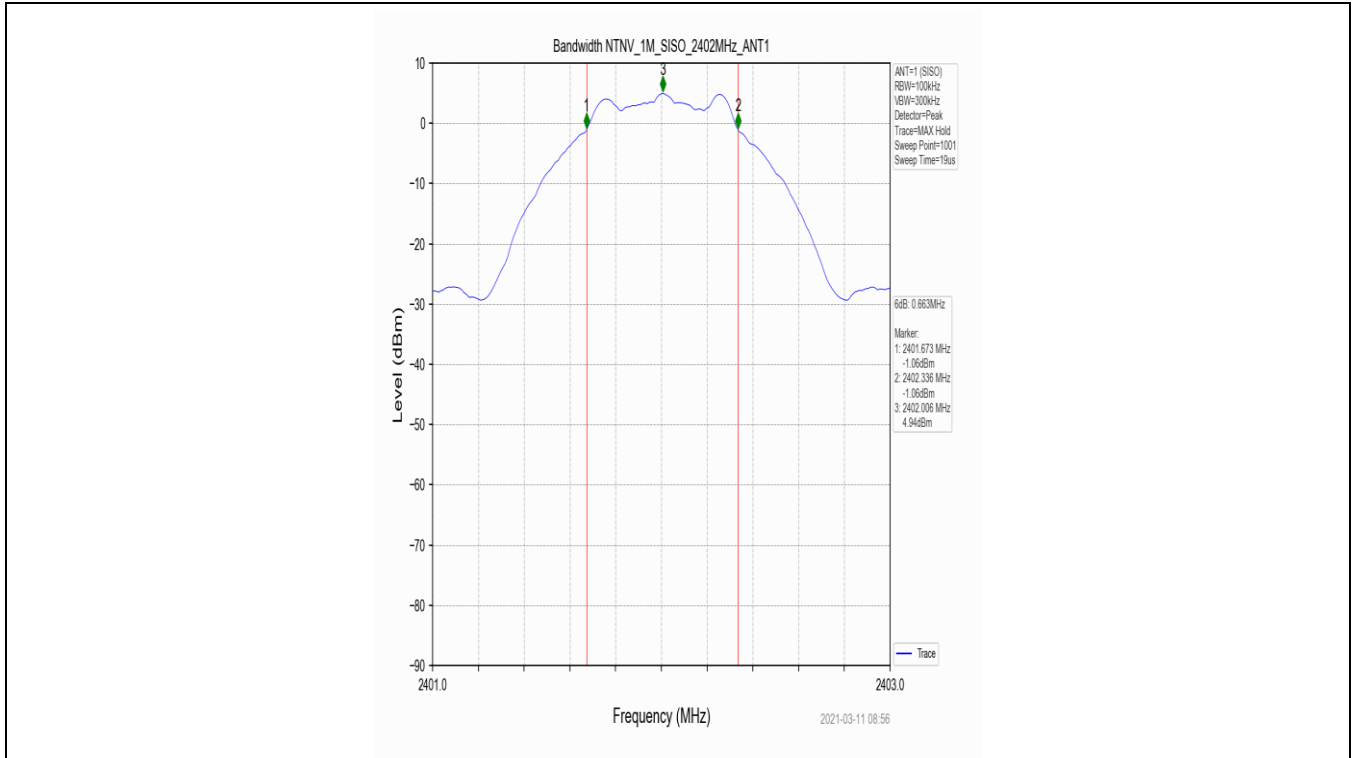
2.1 Test Result

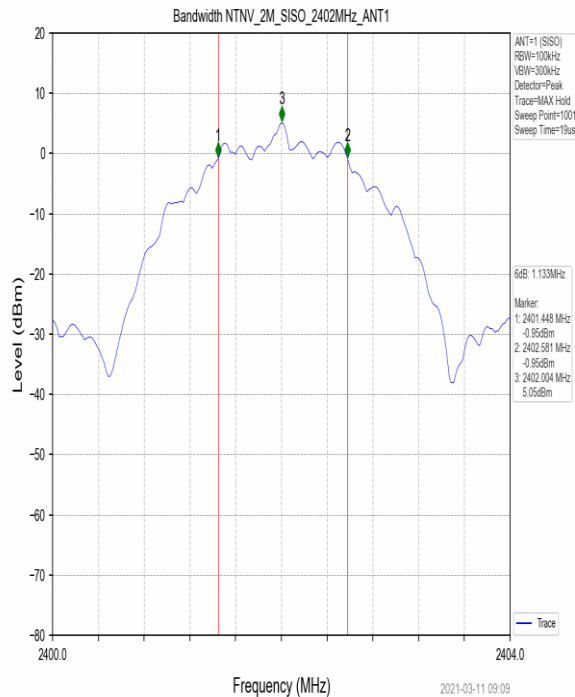
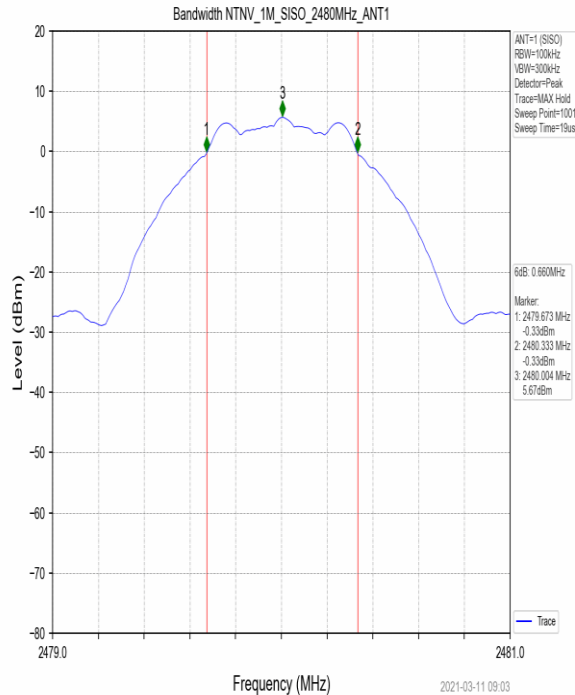
| Test Mode | Frequency (MHz) | TX Type | ANT No. | 6dB Bandwidth | | Verdict |
|-----------|-----------------|---------|---------|-------------------|--------------|---------|
| | | | | Test Result (MHz) | Limits (MHz) | |
| 1M | 2402 | SISO | 1 | 0.663 | ≥0.5 | PASS |
| | 2440 | SISO | 1 | 0.664 | ≥0.5 | PASS |
| | 2480 | SISO | 1 | 0.660 | ≥0.5 | PASS |
| 2M | 2402 | SISO | 1 | 1.133 | ≥0.5 | PASS |
| | 2440 | SISO | 1 | 1.122 | ≥0.5 | PASS |
| | 2480 | SISO | 1 | 1.120 | ≥0.5 | PASS |

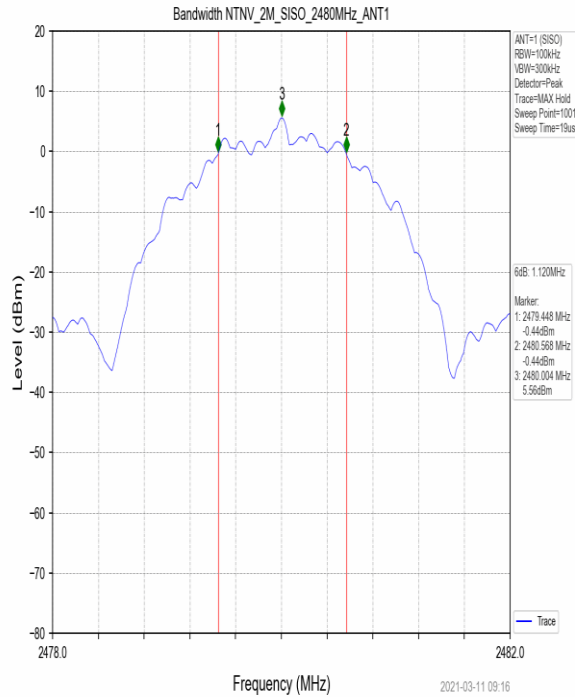
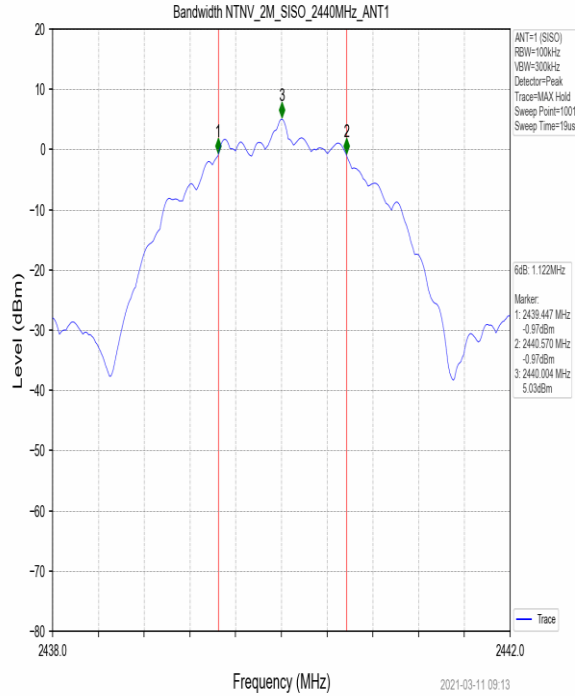
| Test Mode | Frequency (MHz) | TX Type | ANT No. | 99% Occupied Bandwidth | |
|-----------|-----------------|---------|---------|------------------------|---------------------|
| | | | | Test Result (MHz) | |
| 1M | 2402 | SISO | 1 | 1.014 | Only for Report Use |
| | 2440 | SISO | 1 | 1.018 | Only for Report Use |
| | 2480 | SISO | 1 | 1.026 | Only for Report Use |
| 2M | 2402 | SISO | 1 | 2.037 | Only for Report Use |
| | 2440 | SISO | 1 | 2.037 | Only for Report Use |
| | 2480 | SISO | 1 | 2.035 | Only for Report Use |



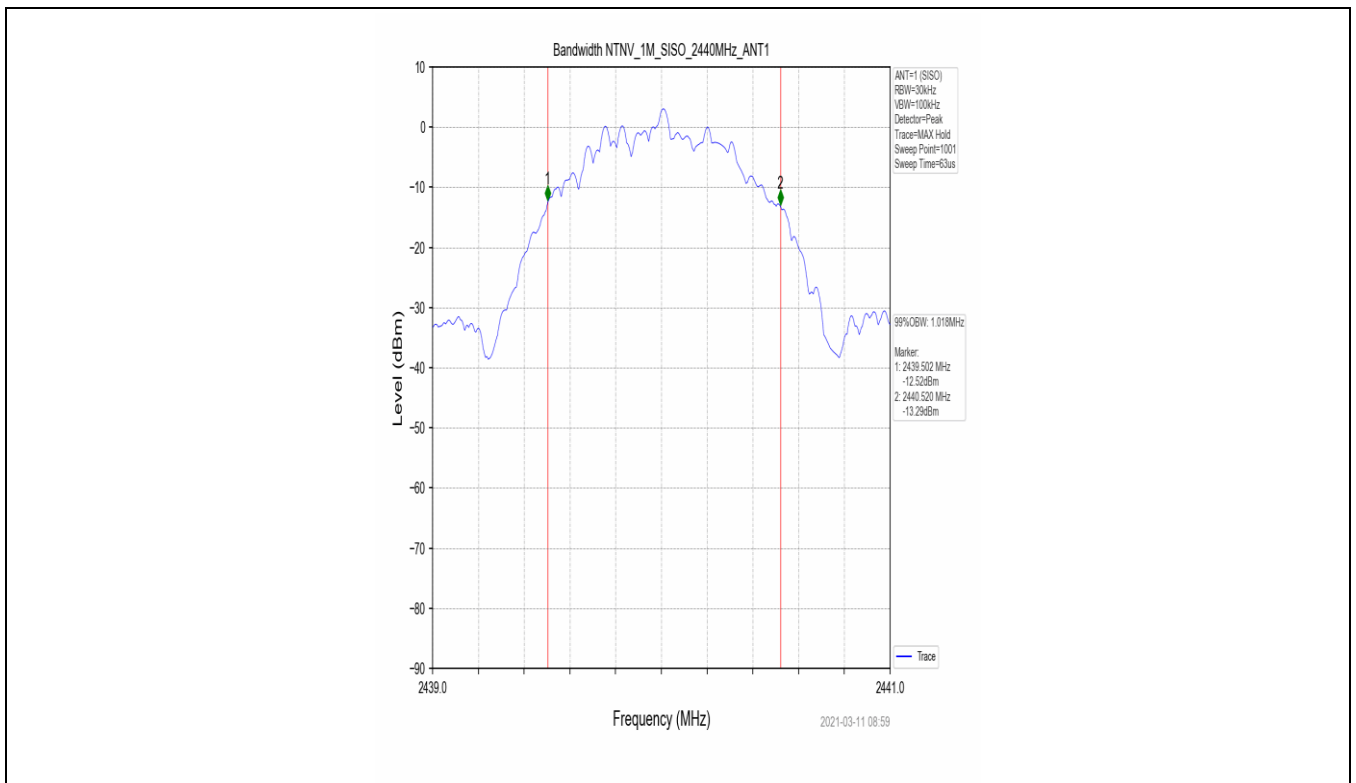
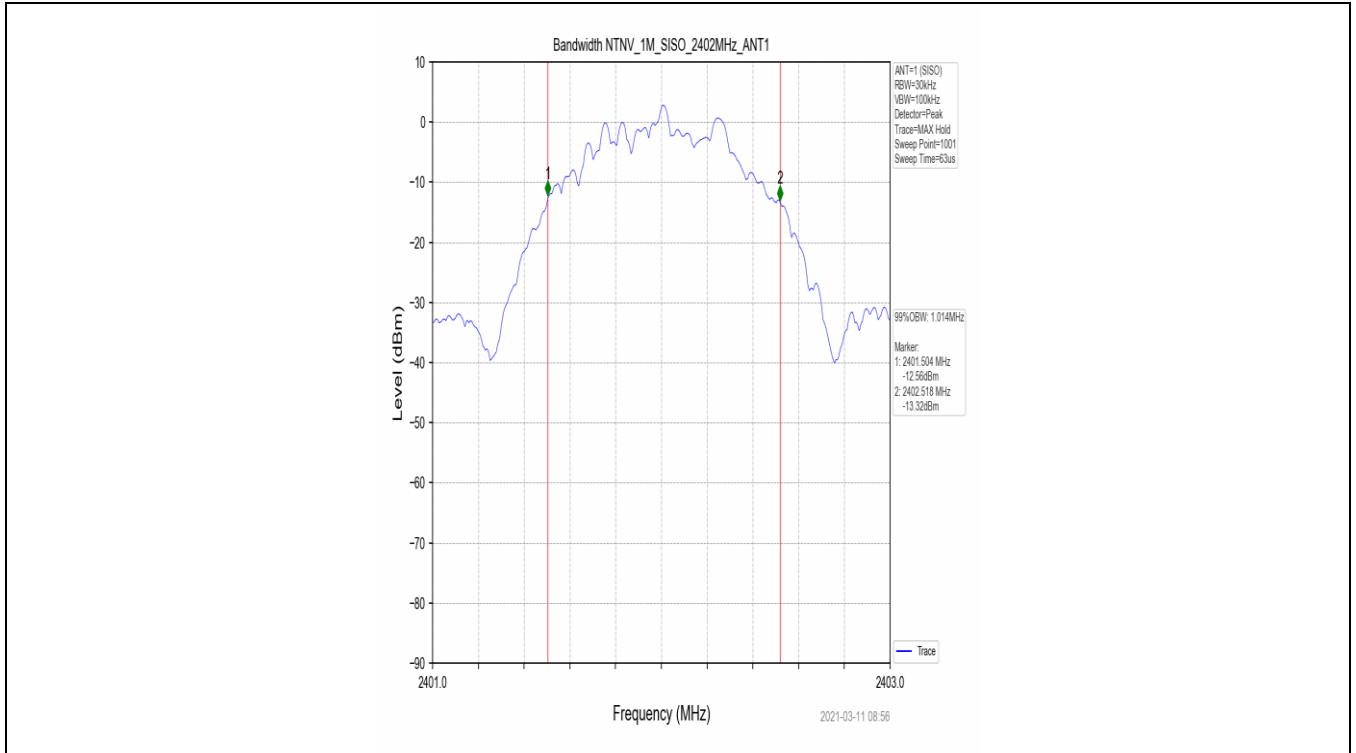
2.2 Test Graph - 6dB Bandwidth

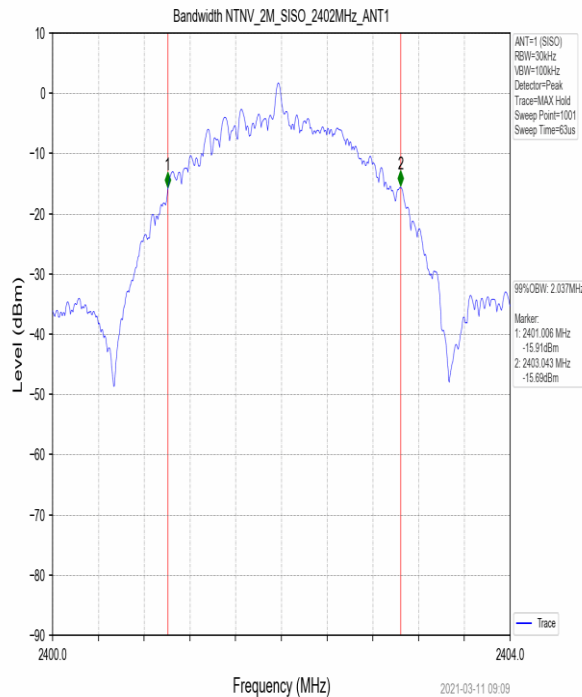
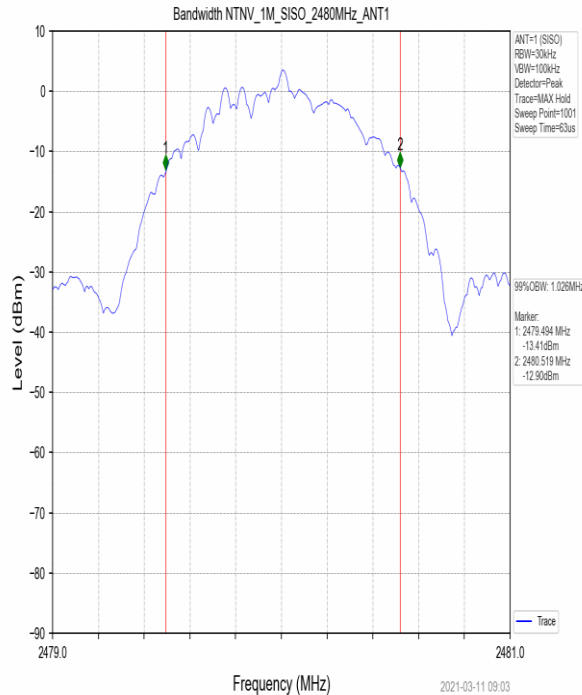


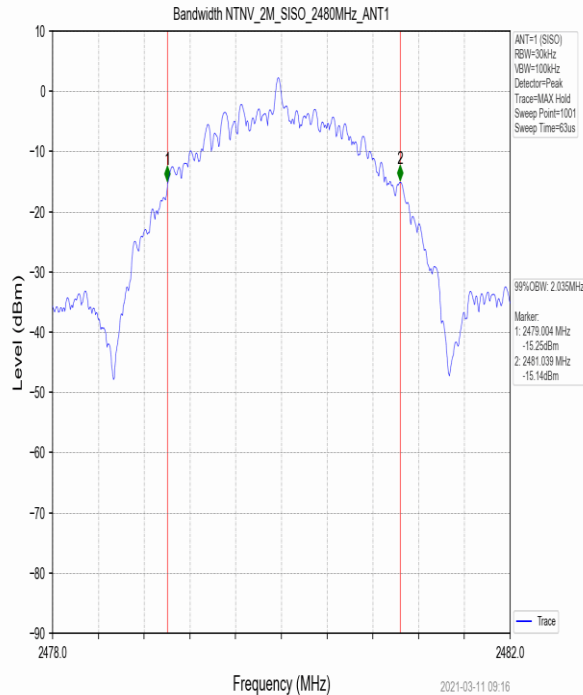
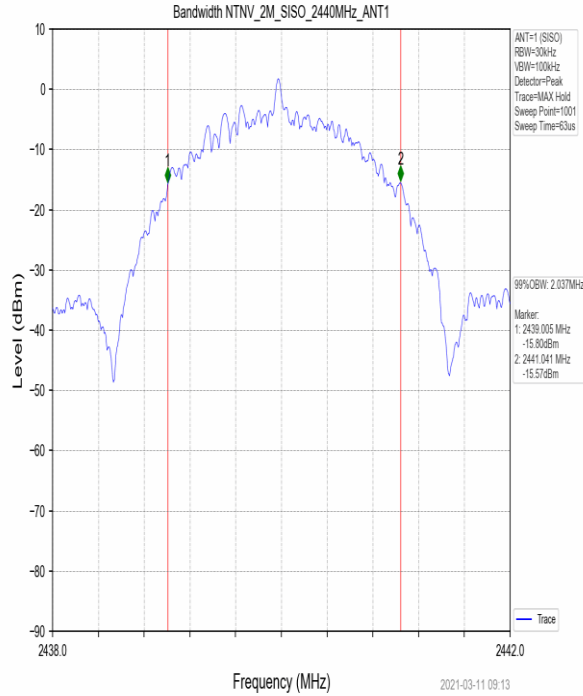




2.3 Test Graph - 99% Occupied Bandwidth





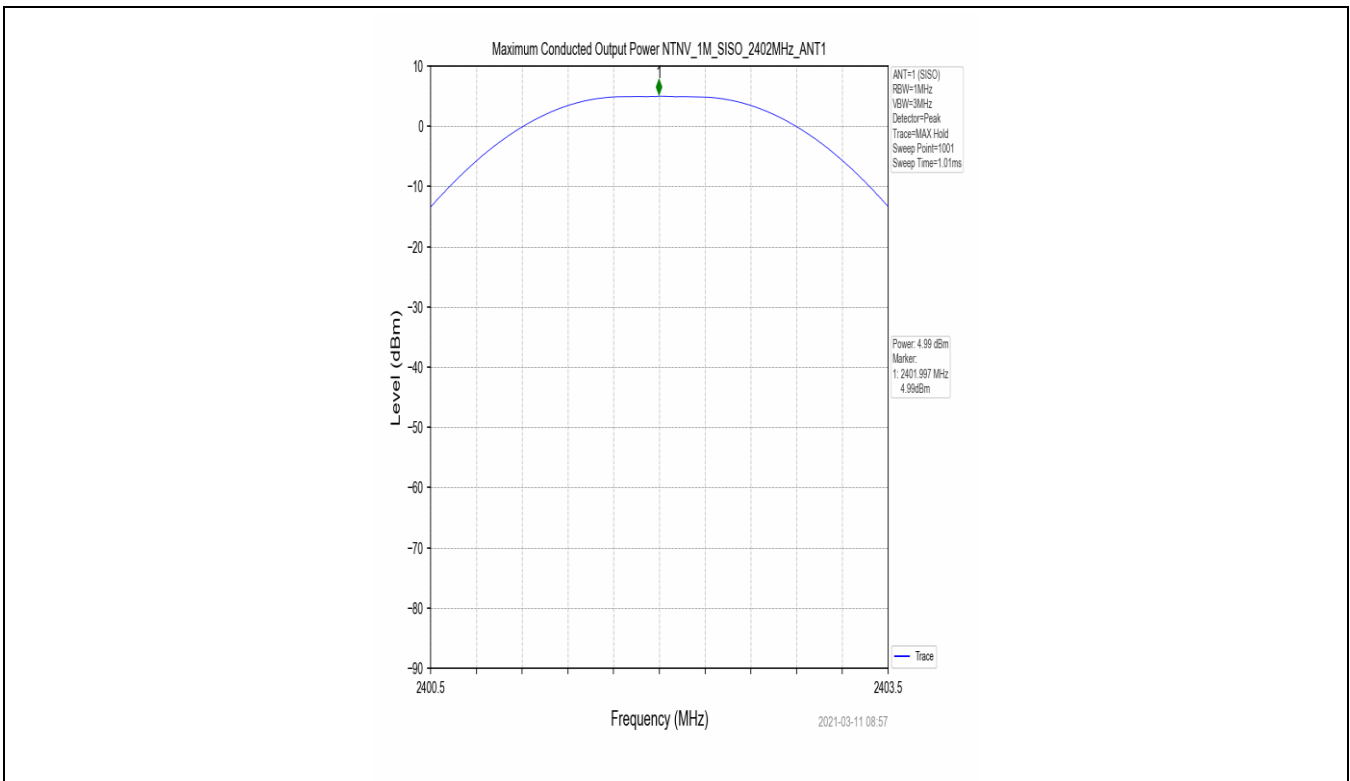


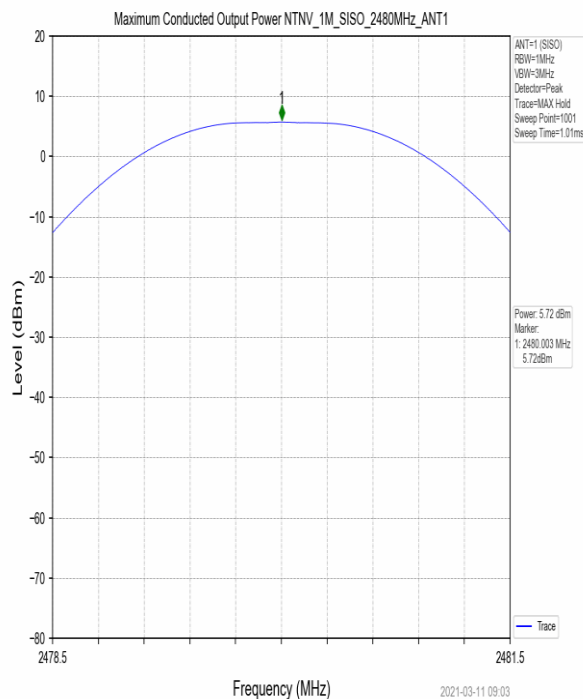
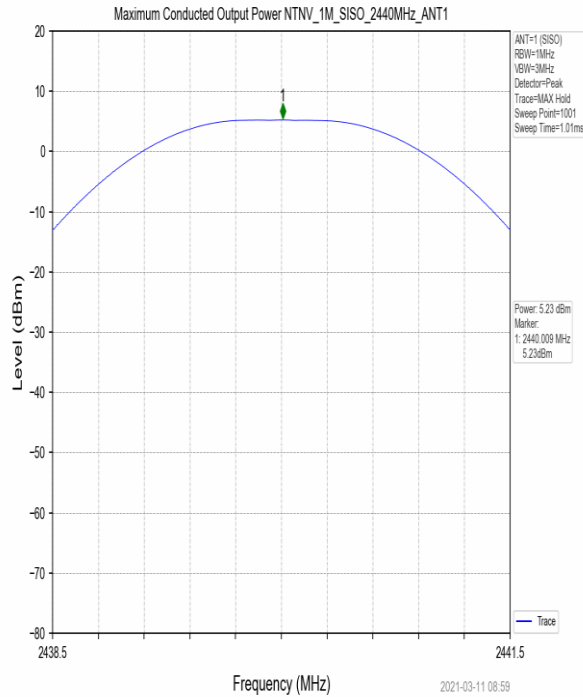
3. Maximum Conducted Output Power

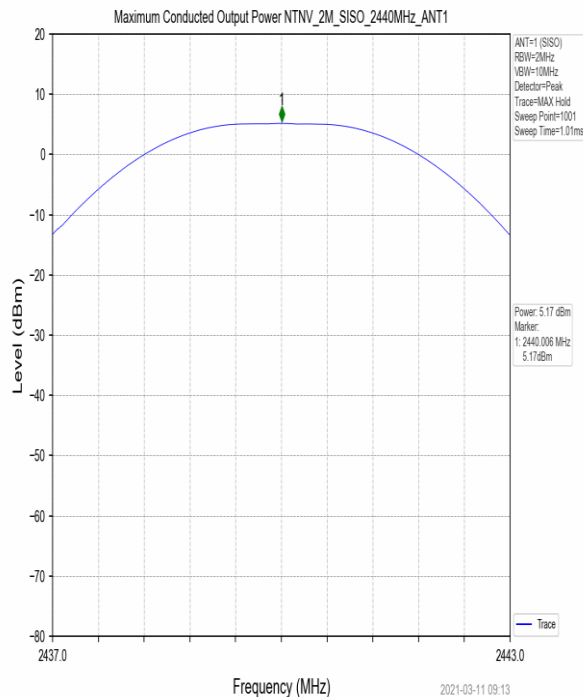
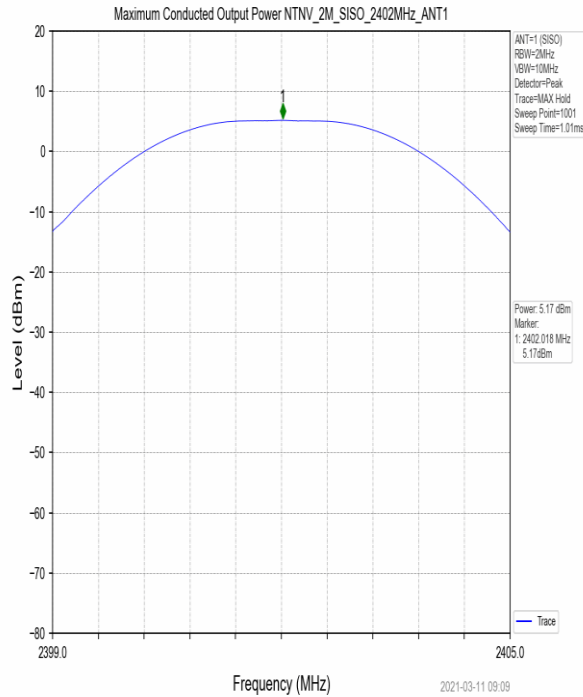
3.1 Test Result

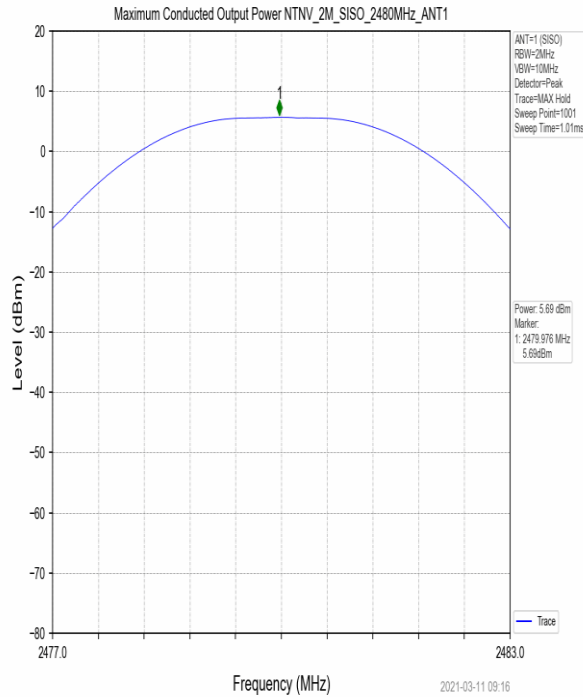
| Test Mode | Frequency (MHz) | Tx Type | Measured Peak Output Power (dBm) | Limits (dBm) | Verdict |
|-----------|-----------------|---------|----------------------------------|--------------|---------|
| | | | Ant 1 | | |
| 1M | 2402 | SISO | 4.99 | 30 | PASS |
| | 2440 | SISO | 5.23 | 30 | PASS |
| | 2480 | SISO | 5.72 | 30 | PASS |
| 2M | 2402 | SISO | 5.17 | 30 | PASS |
| | 2440 | SISO | 5.17 | 30 | PASS |
| | 2480 | SISO | 5.69 | 30 | PASS |

3.2 Test Graph







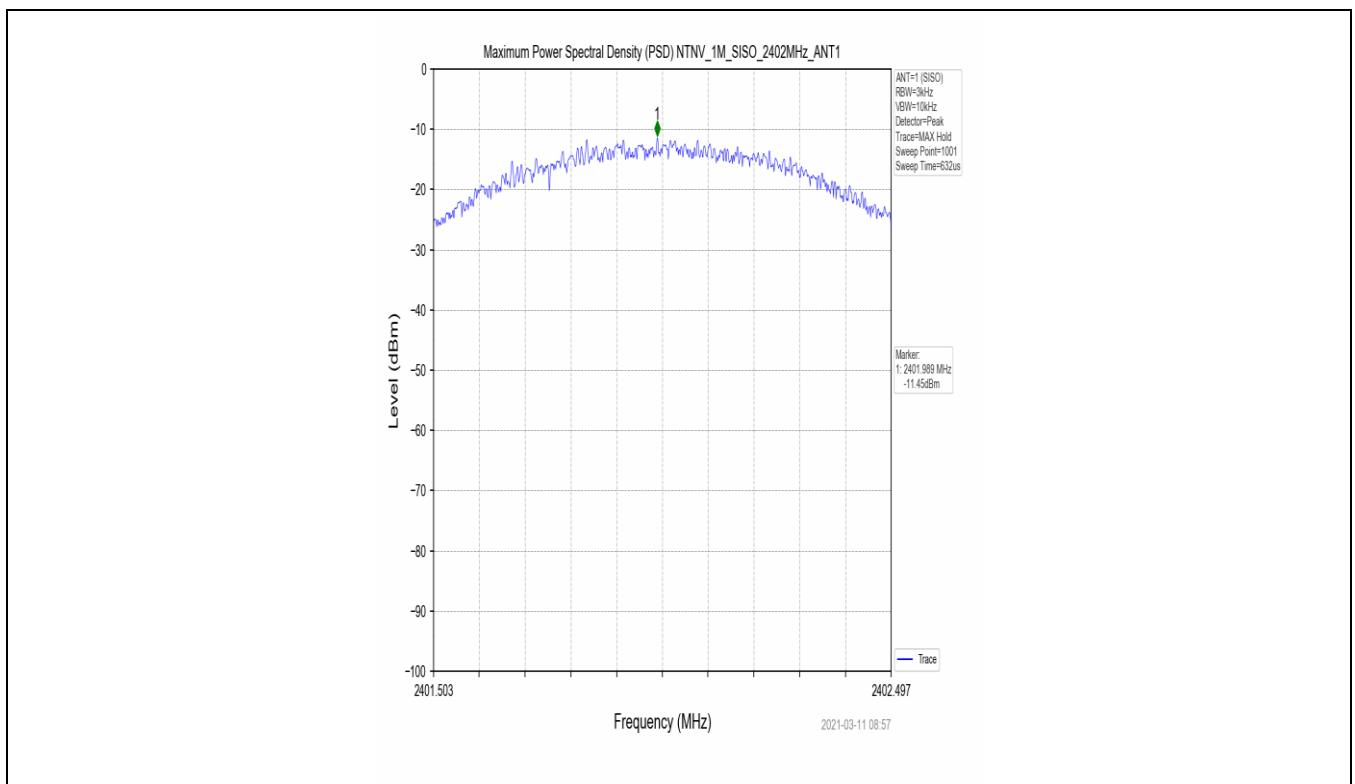


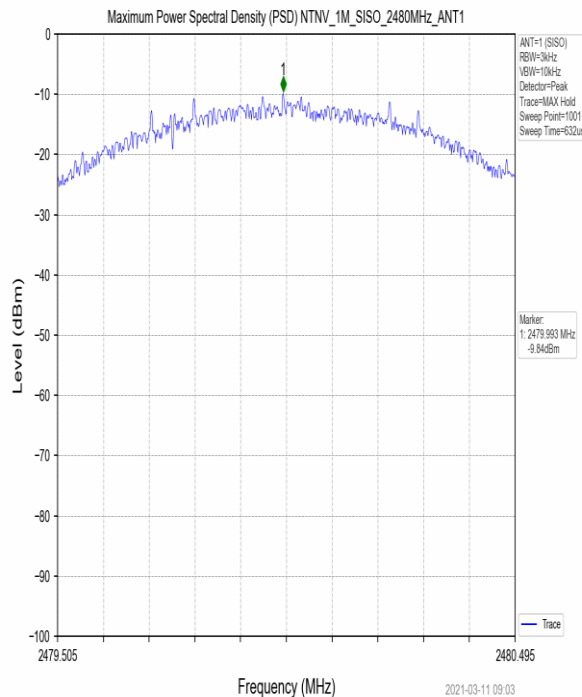
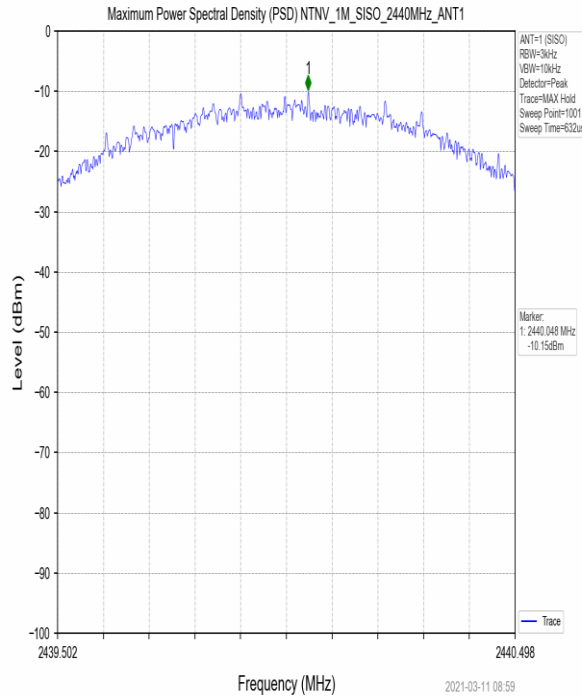
4. Maximum Power Spectral Density (PSD)

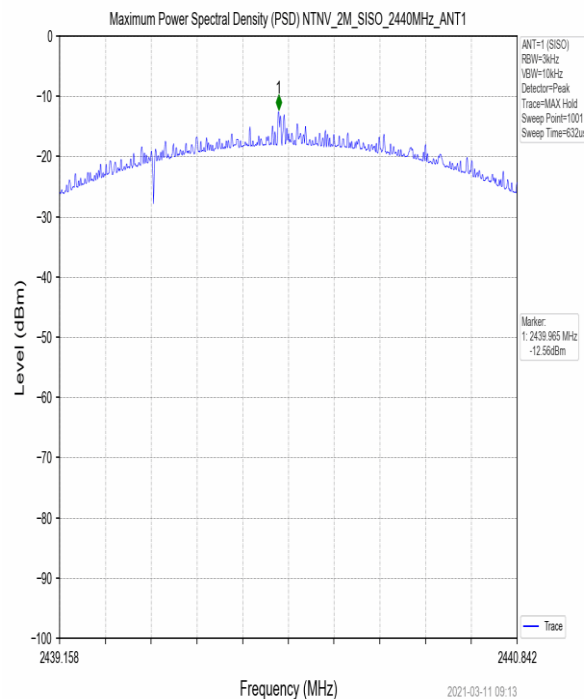
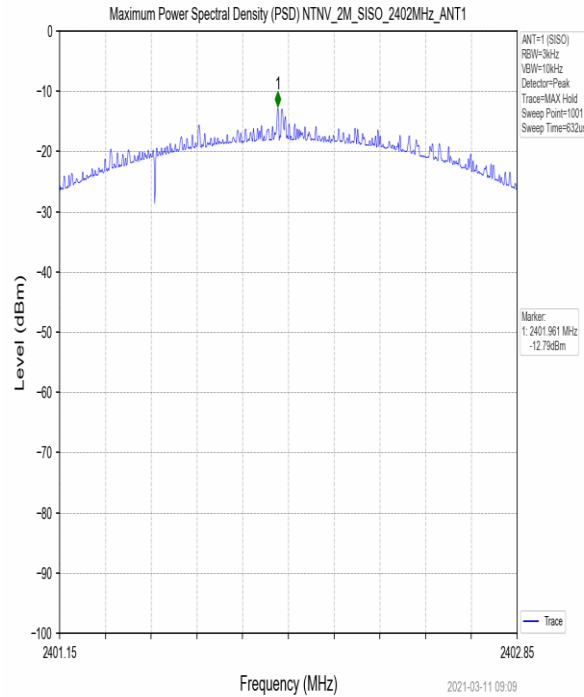
4.1 Test Result

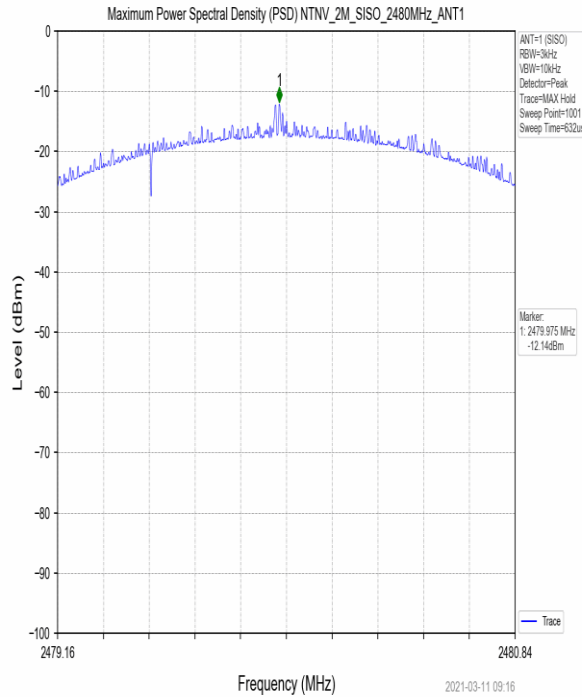
| Test Mode | Frequency (MHz) | Tx Type | Maximum Power Spectral Density (dBm/3KHz) | Limits (dBm/3KHz) | Verdict |
|-----------|-----------------|---------|---|-------------------|---------|
| | | | Ant 1 | | |
| 1M | 2402 | SISO | -11.45 | ≤8 | PASS |
| | 2440 | SISO | -10.15 | ≤8 | PASS |
| | 2480 | SISO | -9.84 | ≤8 | PASS |
| 2M | 2402 | SISO | -12.79 | ≤8 | PASS |
| | 2440 | SISO | -12.56 | ≤8 | PASS |
| | 2480 | SISO | -12.14 | ≤8 | PASS |

4.2 Test Graph







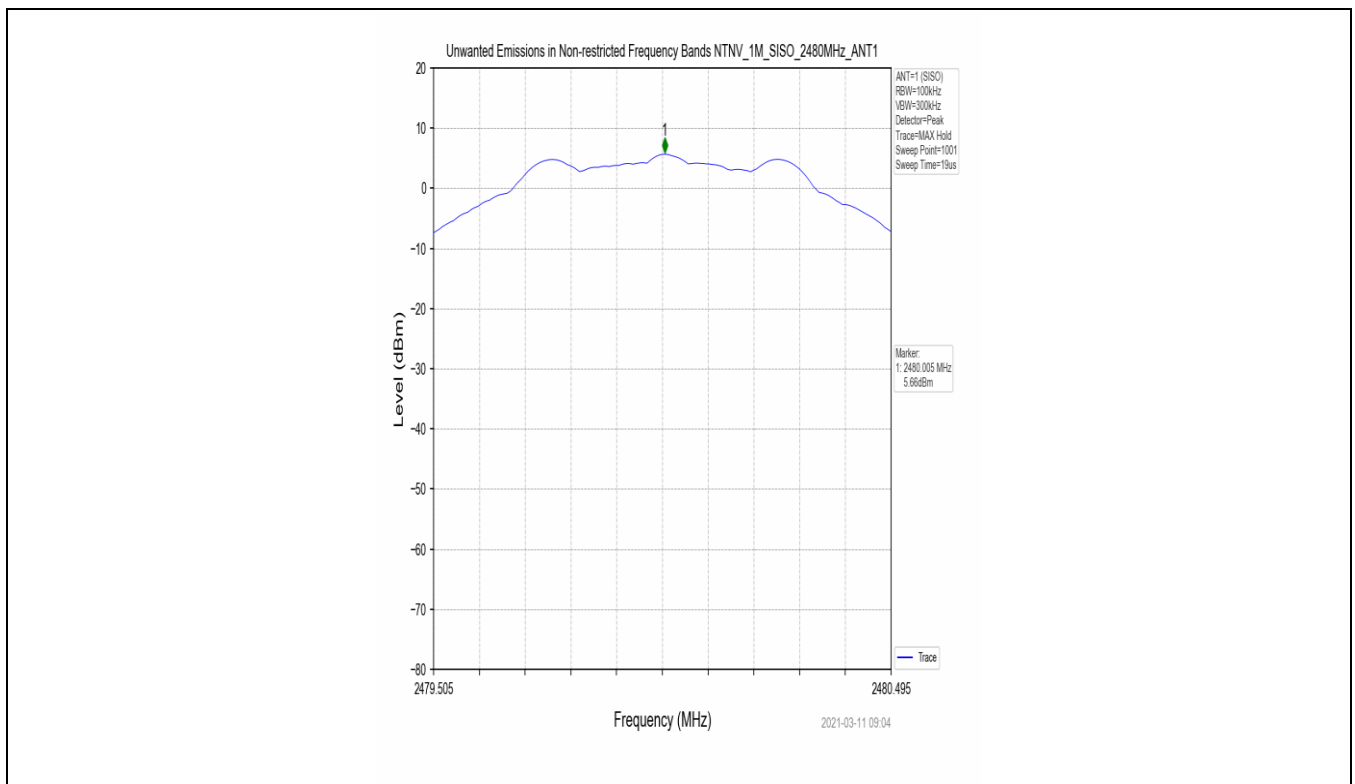


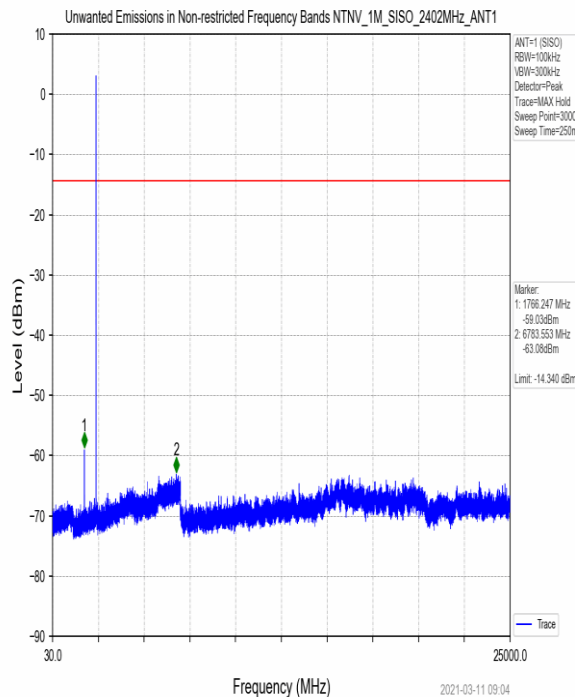
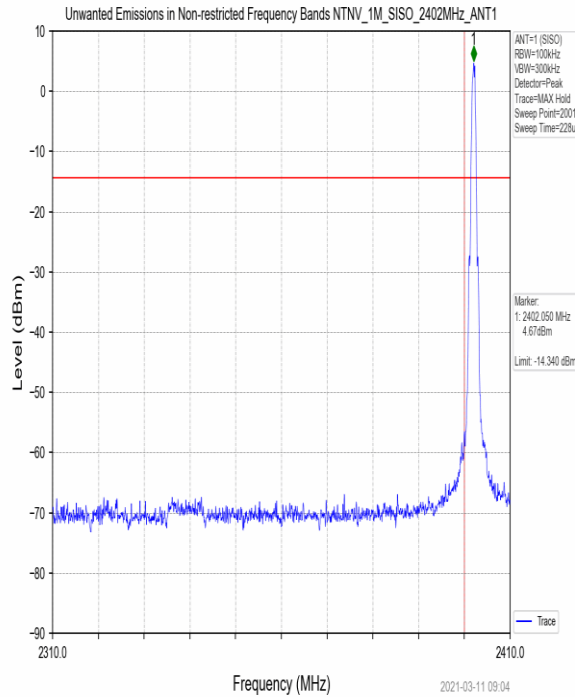
5. Unwanted Emissions in Non-restricted Frequency Bands

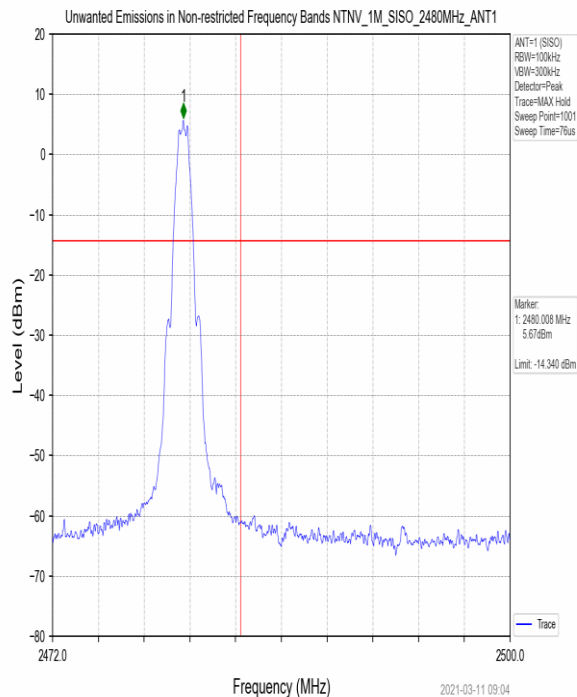
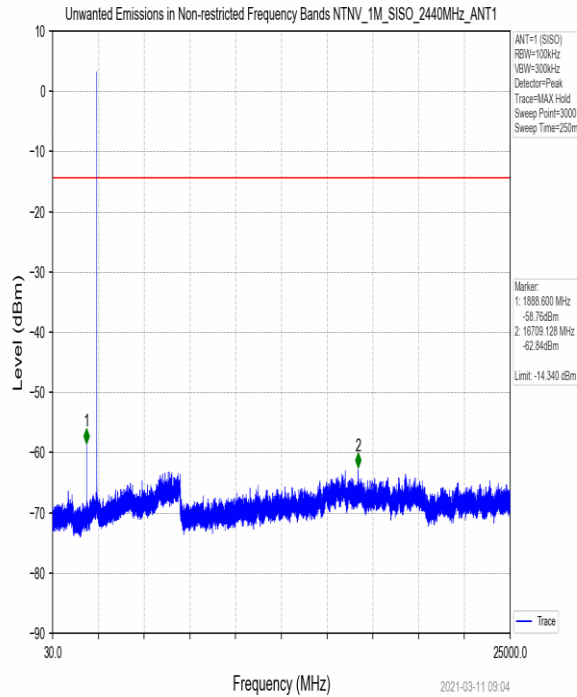
5.1 Test Result

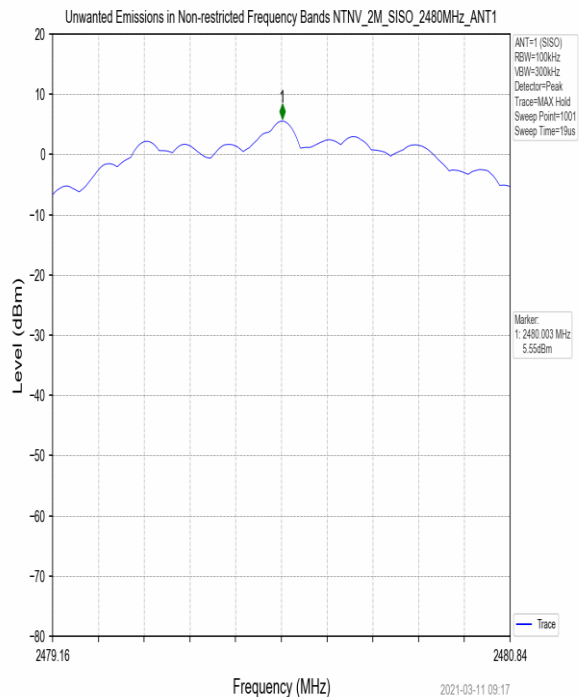
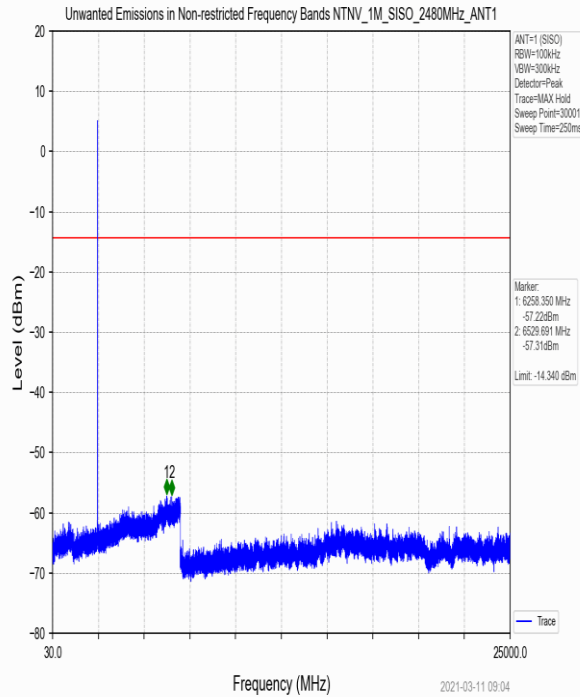
| Test Mode | Frequency (MHz) | TX Type | ANT No. | Spurious Conducted Emission (dBm) | Limits (dBm) | Verdict |
|-----------|-----------------|---------|---------|-----------------------------------|--------------|---------|
| 1M | 2402 | SISO | 1 | Refer to test graph | -14.34 | PASS |
| | 2440 | SISO | 1 | Refer to test graph | -14.34 | PASS |
| | 2480 | SISO | 1 | Refer to test graph | -14.34 | PASS |
| 2M | 2402 | SISO | 1 | Refer to test graph | -14.45 | PASS |
| | 2440 | SISO | 1 | Refer to test graph | -14.45 | PASS |
| | 2480 | SISO | 1 | Refer to test graph | -14.45 | PASS |

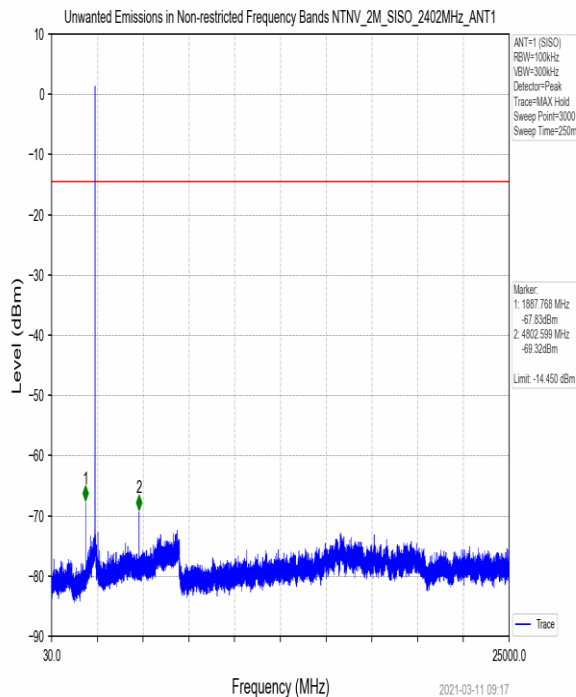
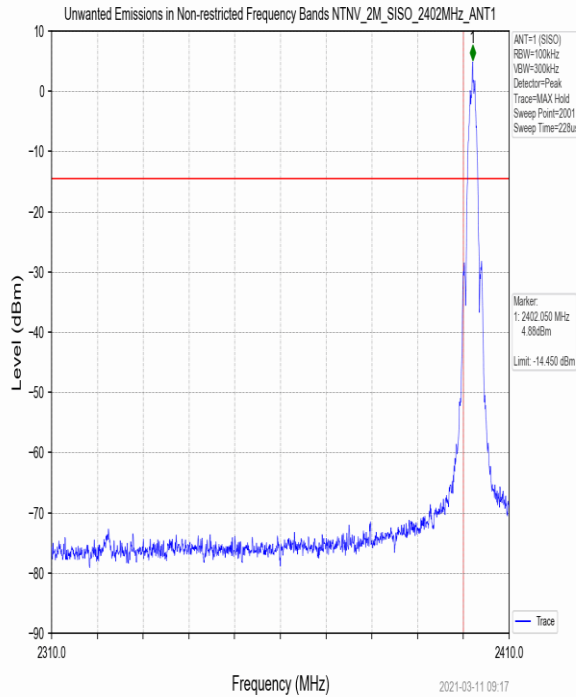
5.2 Test Graph

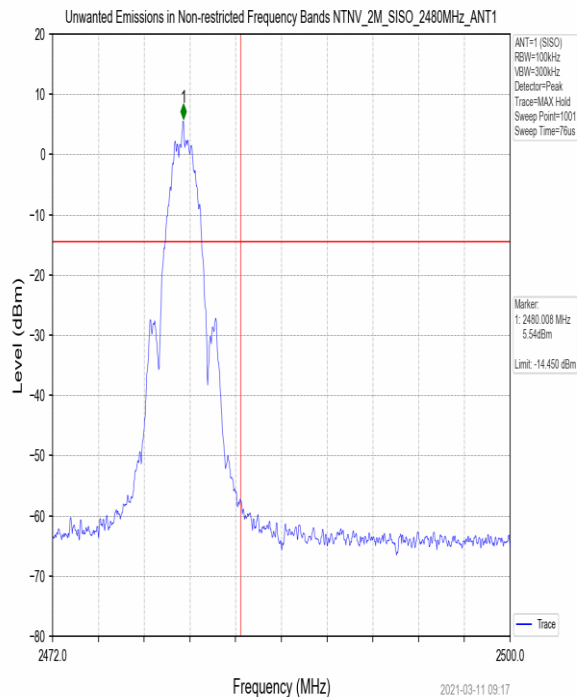
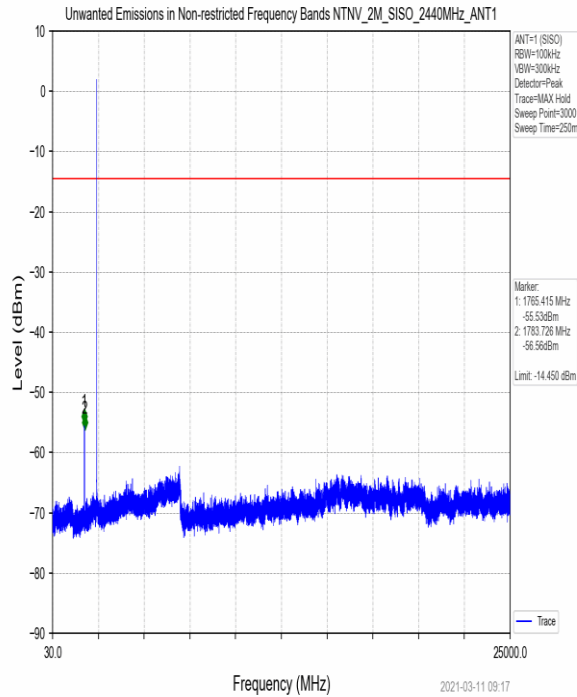


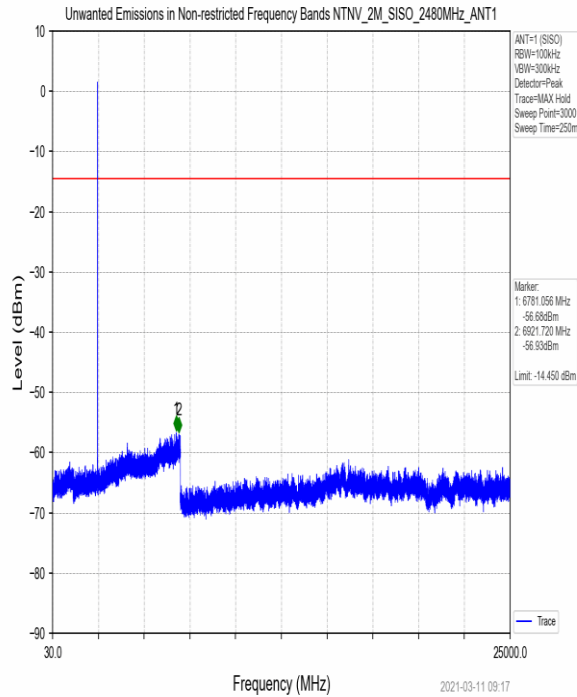












- End of the Report -

