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

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Shenzhen, Guangdong, China 518057

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Fax: +86 (0) 755 2671 0594
Email: ee.shenzhen@sgs.com



# TEST REPORT

| | |
|---|---|
| **Application No.**: | SZEM1711011895CR |
| **Applicant:** | YIDAFENG CRAFTS & TOYS FACTORY |
| **Address of Applicant:** | Feng Xin One Road, Xin Ning Industrial District, Chenghai District, Shantou, China |
| **Equipment Under Test (EUT):** | |
| **EUT Name:** | VOICE COMMAND R/C CAR |
| **Model No.:** | Please refer to section 2♣ |
| ♣ | Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical. |
| **FCC ID:** | 2AOFC75485502689 |
| **Standard(s) :** | 47 CFR Part 15, Subpart C 15.249 |
| **Date of Receipt:** | 2017-11-24 |
| **Date of Test:** | 2017-11-29 to 2017-12-04 |
| **Date of Issue:** | 2017-12-06 |
| **Test Result:** | **Pass*** |

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

.

Jack Zhang
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.
If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

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| Revision Record | | | | |
|---|---|---|---|---|
| ***Version*** | ***Chapter*** | ***Date*** | ***Modifier*** | ***Remark*** |
| *01* | | *2017-12-06* | | *Original* |
| | | | | |
| | | | | |

| | | | | |
|---|---|---|---|---|
| **Authorized for issue by:** | | | | |
| | | Peter Geng<br>**Peter Geng /Project Engineer** | | |
| | | Eric Fu<br>**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 15.249 | N/A | 47 CFR Part 15, Subpart C 15.203 | Pass |

| Radio Spectrum Matter Part | | | | |
|---|---|---|---|---|
| **Item** | **Standard** | **Method** | **Requirement** | **Result** |
| 20dB Bandwidth | 47 CFR Part 15, Subpart C 15.249 | ANSI C63.10 (2013) Section 6.9 | 47 CFR Part 15, Subpart C 15.215 | Pass |
| Field Strength of the Fundamental Signal (15.249(a)) | 47 CFR Part 15, Subpart C 15.249 | ANSI C63.10 (2013) Section 6.5&6.6 | 47 CFR Part 15, Subpart C 15.249(a) | Pass |
| Restricted Band Around Fundamental Frequency | 47 CFR Part 15, Subpart C 15.249 | ANSI C63.10 (2013) Section 6.4&6.5&6.6 | 47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209 | Pass |
| Radiated Emissions | 47 CFR Part 15, Subpart C 15.249 | ANSI C63.10 (2013) Section 6.4&6.5&6.6 | 47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d) | Pass |

**Remark:**

Model No.: YDF8801, YDF8802, YDF8803, YDF8804, YDF8805, YDF8806, YDF8807, YDF8808, YDF8809, YDF8810, YDF8811, YDF8812, YDF8813, YDF8814, YDF8801R, YDF8802R, YDF8803R, YDF8804R, YDF8805R, YDF8806R, YDF8807R, YDF8808R, YDF8809R, YDF8810R, YDF8811R, YDF8812R, YDF8813R, YDF8814R, YDF8861, YDF8862, YDF8863, YDF8864, YDF8865, YDF8866, YDF8867, YDF8868, YDF8869, YDF8870, YDF8871, YDF8872, YDF8873, YDF8874, YDF8861R, YDF8862R, YDF8863R, YDF8864R, YDF8865R, YDF8866R, YDF8867R, YDF8868R, YDF8869R, YDF8870R, YDF8871R, YDF8872R, YDF8873R, YDF8874R, VCT8801

Only the model YDF8801 was tested, since the electrical circuit design, layout, components used, internal wiring and functions were identical for all the above models, with only difference on colour, appearance, packing.

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# 4 General Information

## 4.1 Details of E.U.T.

| | |
|---|---|
| Power supply: | remote: DC 6V by 4x1.5V "LR44" button cell |
| Operation Frequency Range | 2420MHz-2465MHz(2420MHz, 2444MHz and 2465MHz were selected to conduct all tests) |
| Channel Number | 46 |
| Channel Separated | 1MHz |
| Modulated Type | GFSK |
| Antenna Type | Integral antenna |
| Antenna Gain | 0dBi |

## 4.2 Description of Support Units

The EUT has been tested as an independent unit.

## 4.3 Measurement Uncertainty

| No. | Item | Measurement Uncertainty |
|---|---|---|
| 1 | Radio Frequency | $7.25 \times 10^{-8}$ |
| 2 | Duty cycle | 0.37% |
| 3 | Occupied Bandwidth | 3% |
| 4 | RF conducted power | 0.75dB |
| 5 | RF power density | 2.84dB |
| 6 | Conducted Spurious emissions | 0.75dB |
| 7 | RF Radiated power | 4.5dB (below 1GHz) |
| | | 4.8dB (above 1GHz) |
| 8 | Radiated Spurious emission test | 4.5dB (30MHz-1GHz) |
| | | 4.8dB (1GHz-18GHz) |
| 9 | Temperature test | 1℃ |
| 10 | Humidity test | 3% |
| 11 | Supply voltages | 1.5% |
| 12 | Time | 3% |

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## 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:

• **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **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 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 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.

• **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

## 4.6 Deviation from Standards

None

## 4.7 Abnormalities from Standard Conditions

None

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# 5 Equipment List

| 20dB Bandwidth | | | | | |
|---|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Model No** | **Inventory No** | **Cal Date** | **Cal Due Date** |
| DC Power Supply | ZhaoXin | RXN-305D | SEM011-02 | 2017-09-27 | 2018-09-26 |
| Spectrum Analyzer | Rohde & Schwarz | FSP | SEM004-06 | 2017-09-27 | 2018-09-26 |
| Measurement Software | JS Tonscend | JS1120-2 BT/WIFI V2. | N/A | N/A | N/A |
| Coaxial Cable | SGS | N/A | SEM031-02 | 2017-07-13 | 2018-07-12 |
| Attenuator | Weinschel Associates | WA41 | SEM021-09 | N/A | N/A |
| Signal Generator | KEYSIGHT | N5173B | SEM006-05 | 2017-09-27 | 2018-09-26 |
| Power Meter | Rohde & Schwarz | NRVS | SEM014-02 | 2017-09-27 | 2018-09-26 |

| Radiated Emissions | | | | | |
|---|---|---|---|---|---|
| **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal. Date (yyyy-mm-dd)** | **Cal. Due date (yyyy-mm-dd)** |
| 3m Semi-Anechoic Chamber | ETS-LINDGREN | N/A | SEM001-01 | 2017-08-05 | 2020-08-04 |
| MXE EMI Receiver (20Hz-8.4GHz) | Agilent Technologies | N9038A | SEM004-05 | 2017-09-27 | 2018-09-26 |
| BiConiLog Antenna (26-3000MHz) | ETS-LINDGREN | 3142C | SEM003-01 | 2017-06-27 | 2020-06-26 |
| Pre-amplifier (0.1-1300MHz) | Agilent Technologies | 8447D | SEM005-01 | 2017-04-14 | 2018-04-13 |
| Measurement Software | AUDIX | e3 V8.2014-6-27 | N/A | N/A | N/A |
| Coaxial Cable | SGS | N/A | SEM025-01 | 2017-07-13 | 2018-07-12 |

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| Radiated Emissions | | | | | |
|---|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Model No** | **Inventory No** | **Cal Date** | **Cal Due Date** |
| 3m Semi-Anechoic Chamber | AUDIX | N/A | SEM001-02 | 2017-05-02 | 2020-05-01 |
| Measurement Software | AUDIX | e3 V8.2014-6-27 | N/A | N/A | N/A |
| Coaxial Cable | SGS | N/A | SEM026-01 | 2017-07-13 | 2018-07-12 |
| Spectrum Analyzer | Rohde & Schwarz | FSU43 | SEM004-08 | 2017-04-14 | 2018-04-13 |
| BiConiLog Antenna (26-3000MHz) | ETS-Lindgren | 3142C | SEM003-01 | 2017-06-27 | 2020-06-26 |
| Horn Antenna (1-18GHz) | Rohde & Schwarz | HF907 | SEM003-07 | 2015-06-14 | 2018-06-13 |
| Horn Antenna (15GHz-40GHz) | Schwarzbeck | BBHA 9170 | SEM003-15 | 2017-10-17 | 2020-10-16 |
| Pre-amplifier (0.1-1300MHz) | HP | 8447D | SEM005-02 | 2017-09-27 | 2018-09-26 |
| Low Noise Amplifier (100MHz-18GHz) | Black Diamond Series | BDLNA-0118-352810 | SEM005-05 | 2017-09-27 | 2018-09-27 |
| Pre-amplifier(18-26GHz) | Rohde & Schwarz | CH14-H052 | SEM005-17 | 2017-12-04 | 2018-12-03 |
| Pre-amplifier (26GHz-40GHz) | Compliance Directions Systems Inc. | PAP-2640-50 | SEM005-08 | 2017-04-14 | 2018-04-13 |
| DC Power Supply | Zhao Xin | RXN-305D | SEM011-02 | 2017-09-27 | 2018-09-26 |
| Active Loop Antenna | ETS-Lindgren | 6502 | SEM003-08 | 2017-08-22 | 2020-08-21 |
| Band filter | N/A | N/A | SEM023-01 | N/A | N/A |

| General used equipment | | | | | |
|---|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Model No** | **Inventory No** | **Cal Date** | **Cal Due Date** |
| Humidity/ Temperature Indicator | Shanghai Meteorological Industry Factory | ZJ1-2B | SEM002-03 | 2017-09-29 | 2018-09-28 |
| Humidity/ Temperature Indicator | Shanghai Meteorological Industry Factory | ZJ1-2B | SEM002-04 | 2017-09-29 | 2018-09-28 |
| Humidity/ Temperature Indicator | Mingle | N/A | SEM002-08 | 2017-09-29 | 2018-09-28 |
| Barometer | Changchun Meteorological Industry Factory | DYM3 | SEM002-01 | 2017-04-18 | 2018-04-17 |

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# 6 Radio Spectrum Technical Requirement

## 6.1 Antenna Requirement

### 6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

Limit:

15.203 requirement:

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

### 6.1.2 Conclusion

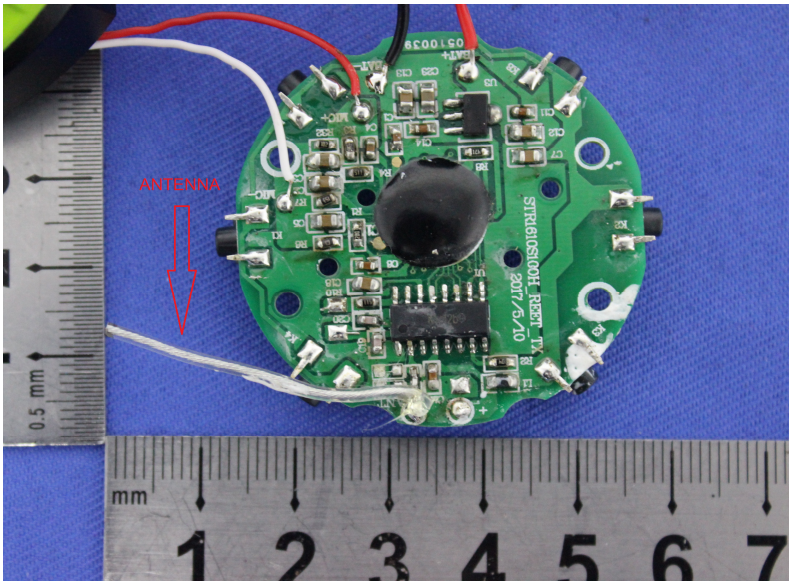
Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently

attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

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

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# 7 Radio Spectrum Matter Test Results

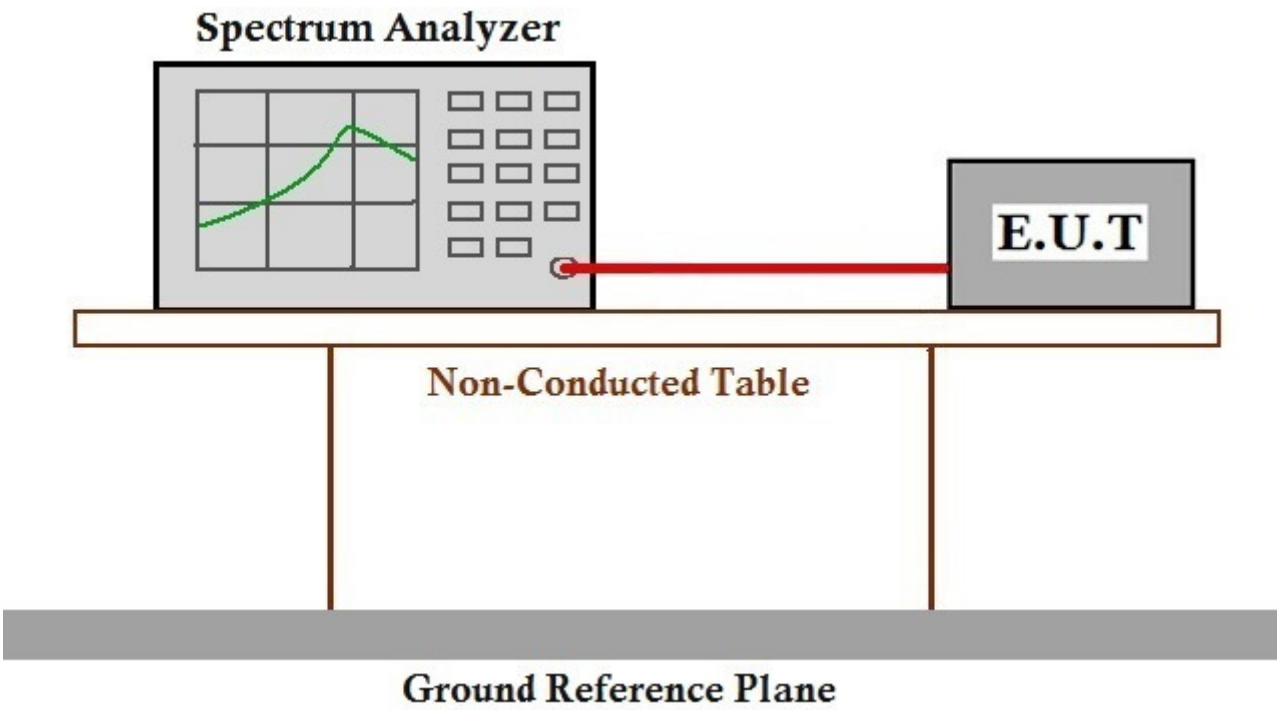
## 7.1 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.215
Test Method: ANSI C63.10 (2013) Section 6.9
Limit: N/A

### 7.1.1 E.U.T. Operation

Operating Environment:
Temperature: 25 °C Humidity: 48.5 % RH Atmospheric Pressure: 1020 mbar
Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

### 7.1.2 Test Setup Diagram




### 7.1.3 Measurement Procedure and Data

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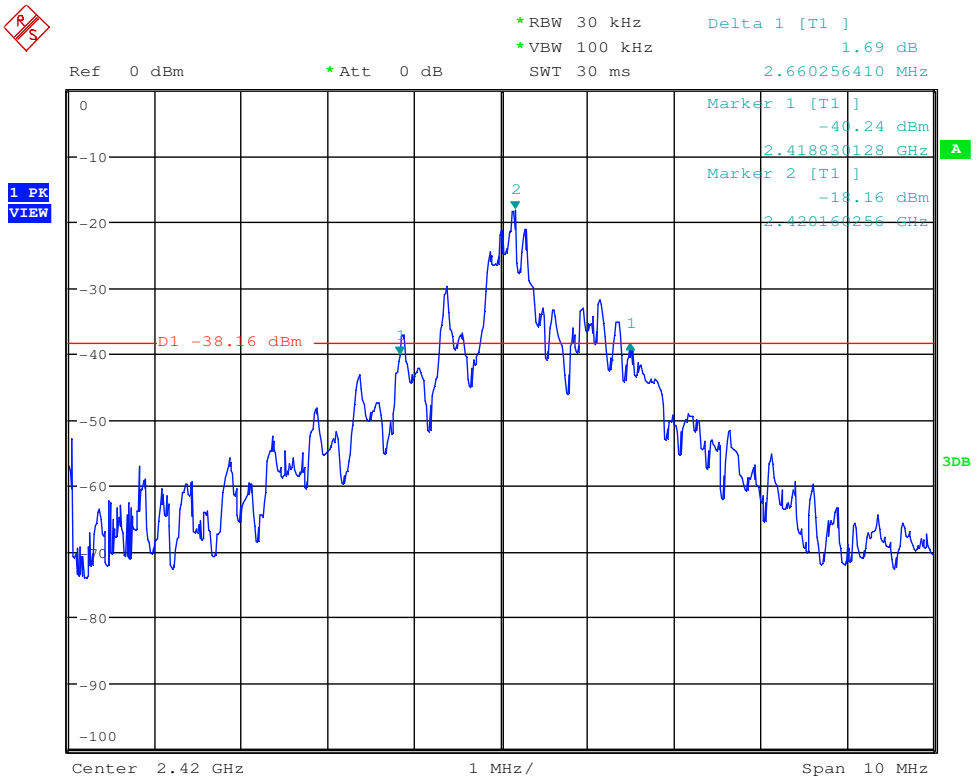


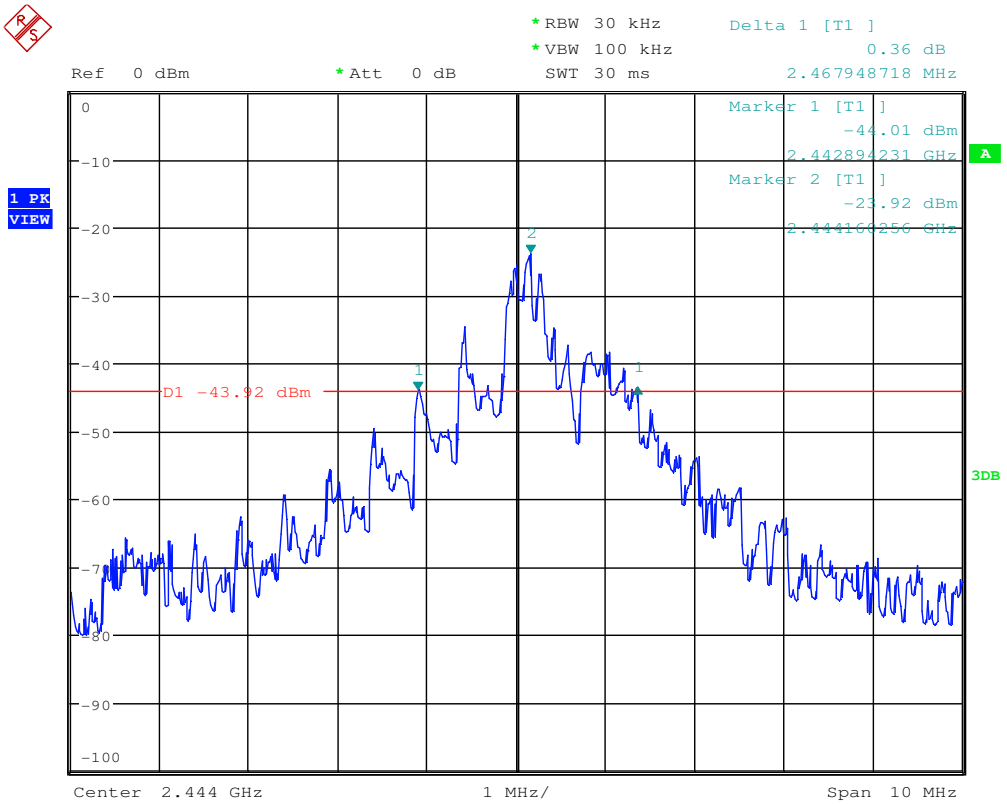


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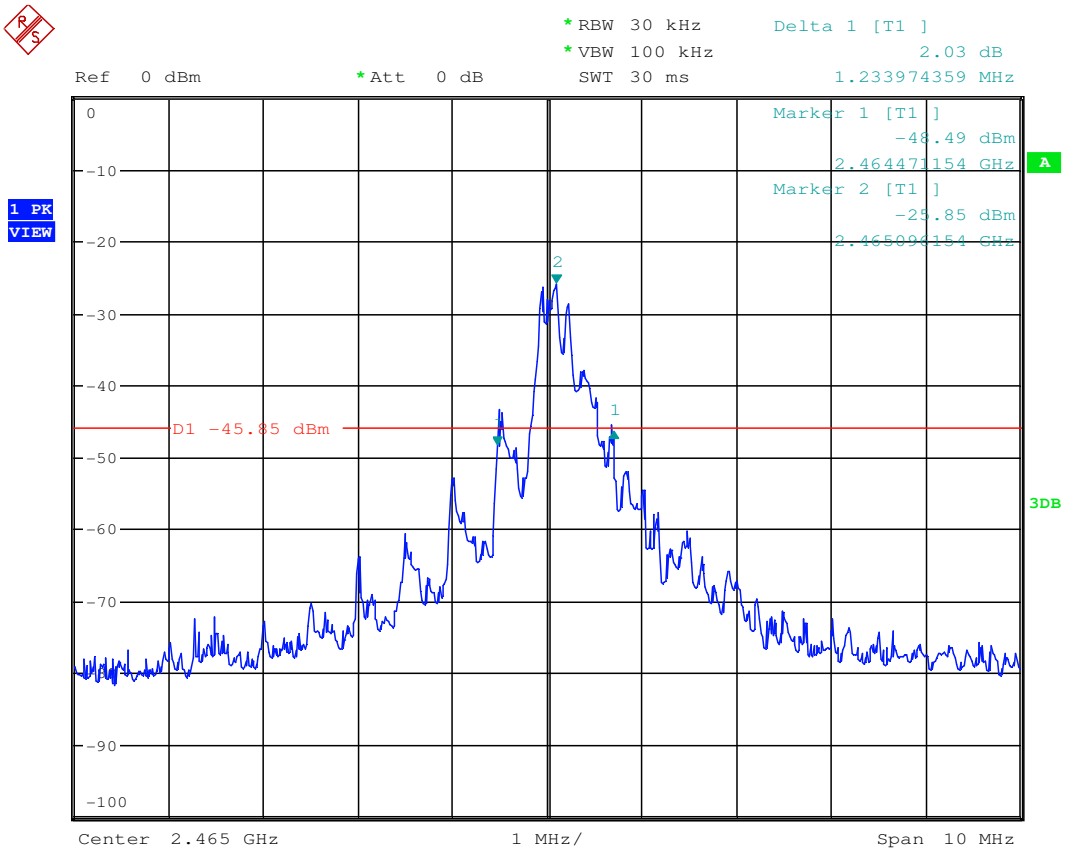


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## 7.2 Field Strength of the Fundamental Signal (15.249(a))

Test Requirement 47 CFR Part 15, Subpart C 15.249(a)
Test Method: ANSI C63.10 (2013) Section 6.5&6.6
Measurement Distance: 3m
Limit:

| Frequency | Limit (dBuV/m @3m) | Remark |
|---|---|---|
| 2400MHz-2483.5MHz | 94.0 | Average Value |
| | 114.0 | Peak Value |

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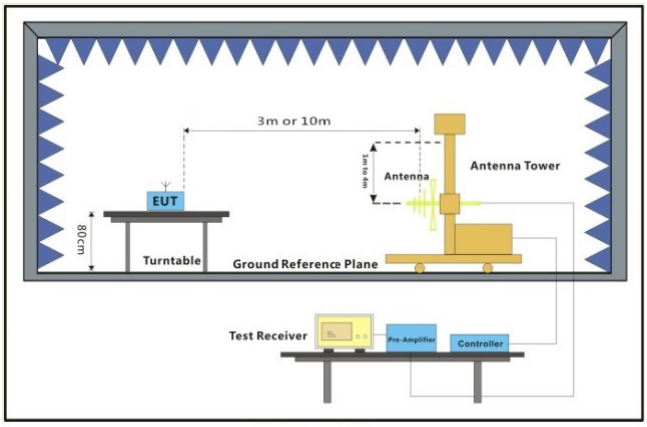
### 7.2.1 E.U.T. Operation

Operating Environment:

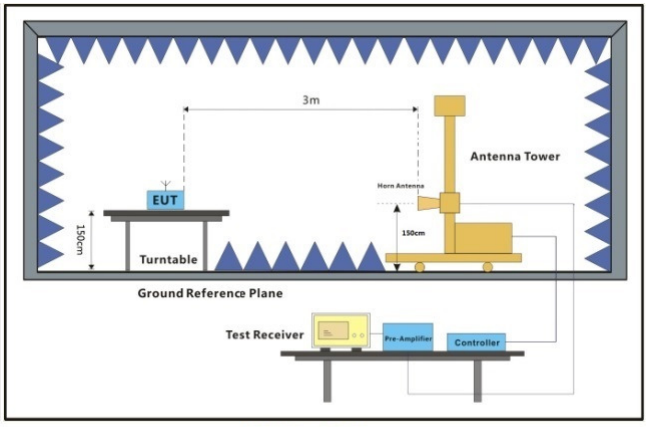
Temperature: 24.5 °C Humidity: 64.3 % RH Atmospheric Pressure: 1005 mbar

Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

### 7.2.2 Test Setup Diagram




30MHz-1GHz




Above 1GHz

### 7.2.3 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: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

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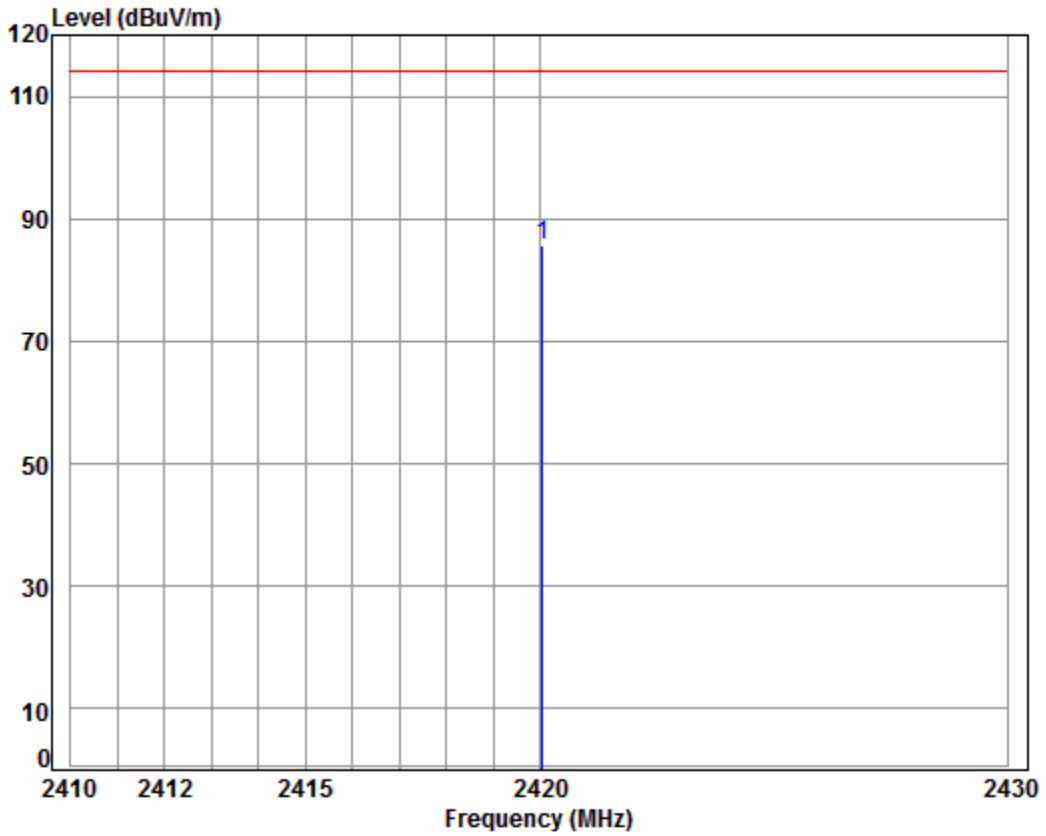
Mode:a; Polarization:Horizontal; Modulation:GFSK; Channel:Low




Condition: 3m HORIZONTAL
Job No : 11895CR
Mode : 2420 Field Strength

| | 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 pp | 2420.052 | 5.52 | 29.17 | 37.65 | 88.50 | 85.54 | 114.00 | -28.46 | peak |

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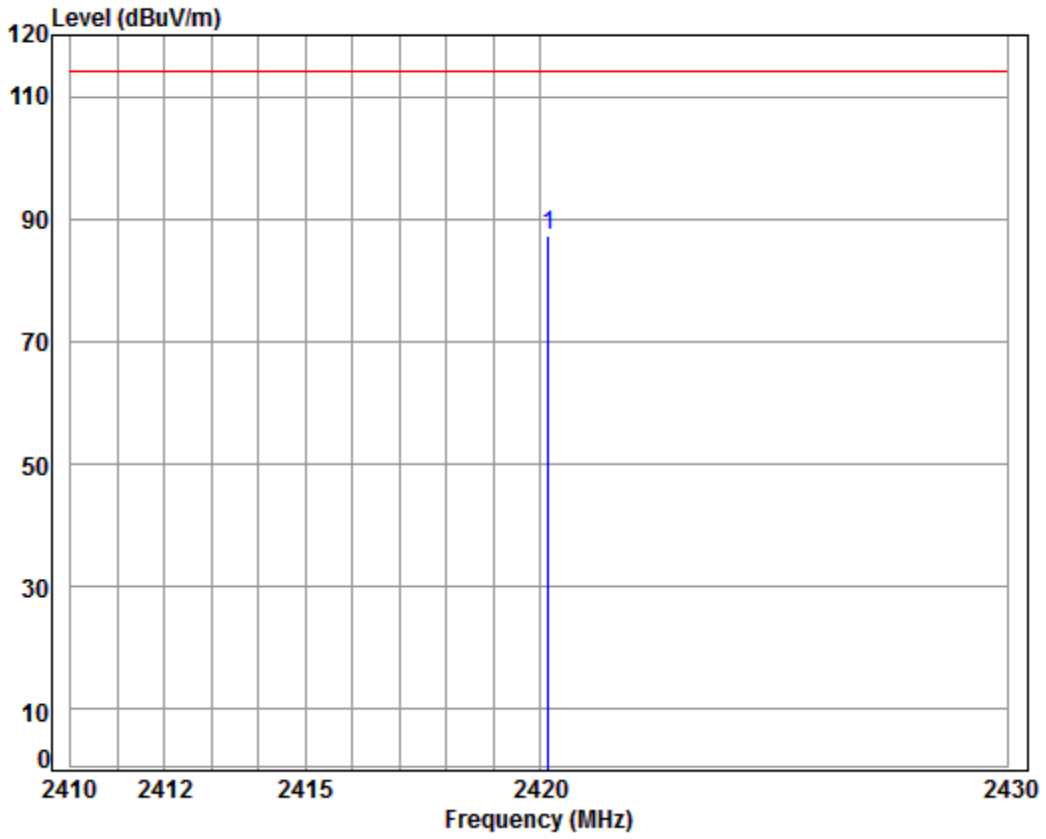
Mode:a; Polarization:Vertical; Modulation:GFSK; Channel:Low




Condition: 3m VERTICAL
Job No : 11895CR
Mode : 2420 Field Strength

| | 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 pp | 2420.175 | 5.52 | 29.17 | 37.65 | 90.42 | 87.46 | 114.00 | -26.54 | peak |

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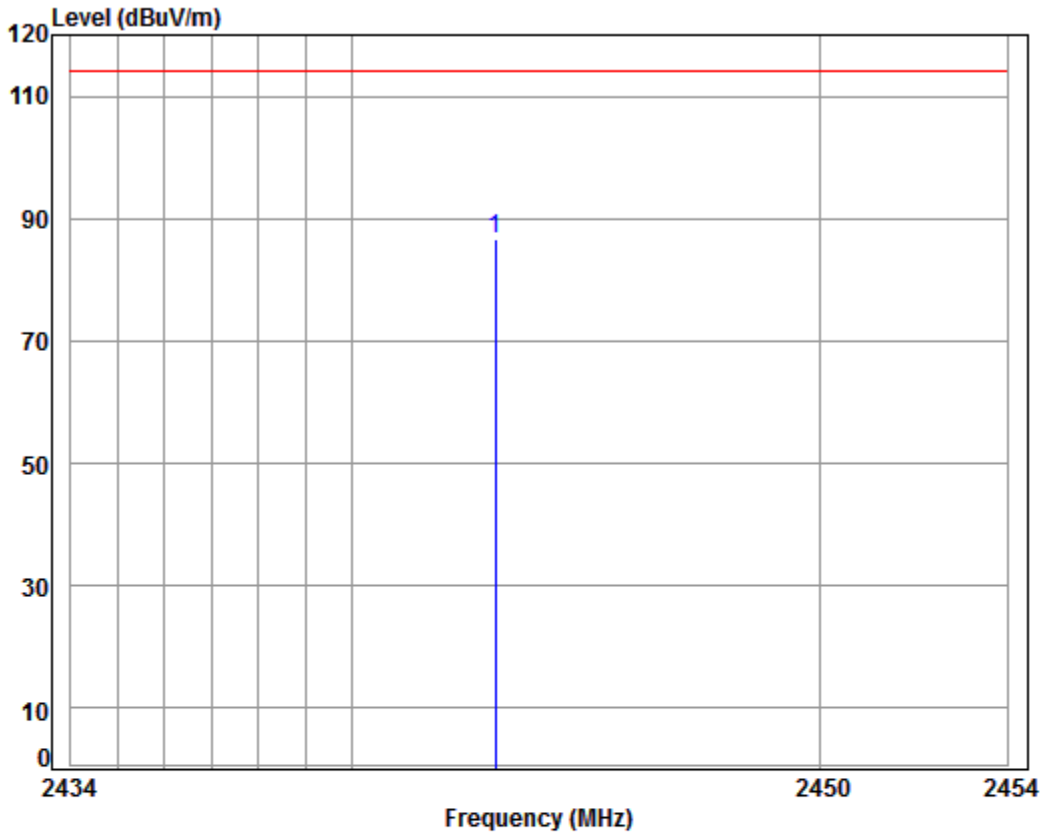
Mode:a; Polarization:Horizontal; Modulation:GFSK; Channel:middle




Condition: 3m HORIZONTAL
Job No : 11895CR
Mode : 2444 Field Strength

| | 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 pp | 2443.060 | 5.55 | 29.23 | 37.65 | 89.63 | 86.76 | 114.00 | -27.24 | Peak |

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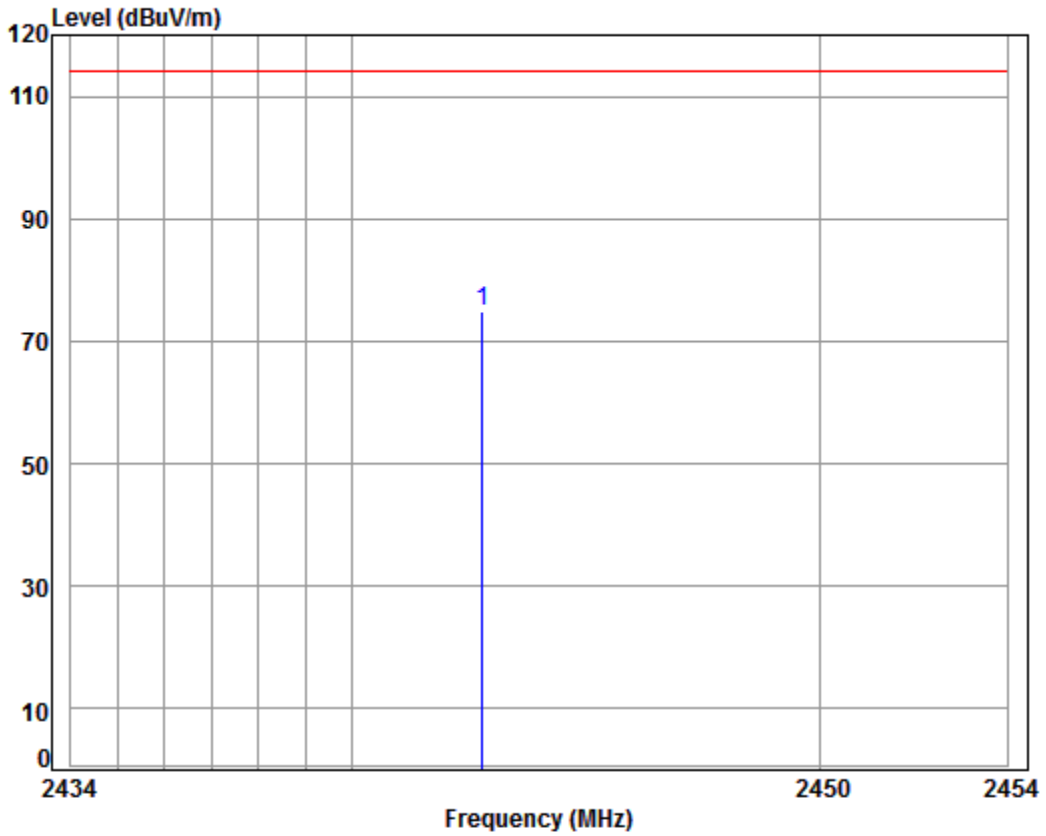
Mode:a; Polarization:Vertical; Modulation:GFSK; Channel:middle




Condition: 3m VERTICAL
Job No : 11895CR
Mode : 2444 Field Strength

| | 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 pp | 2442.780 | 5.55 | 29.23 | 37.65 | 77.74 | 74.87 | 114.00 | -39.13 | Peak |

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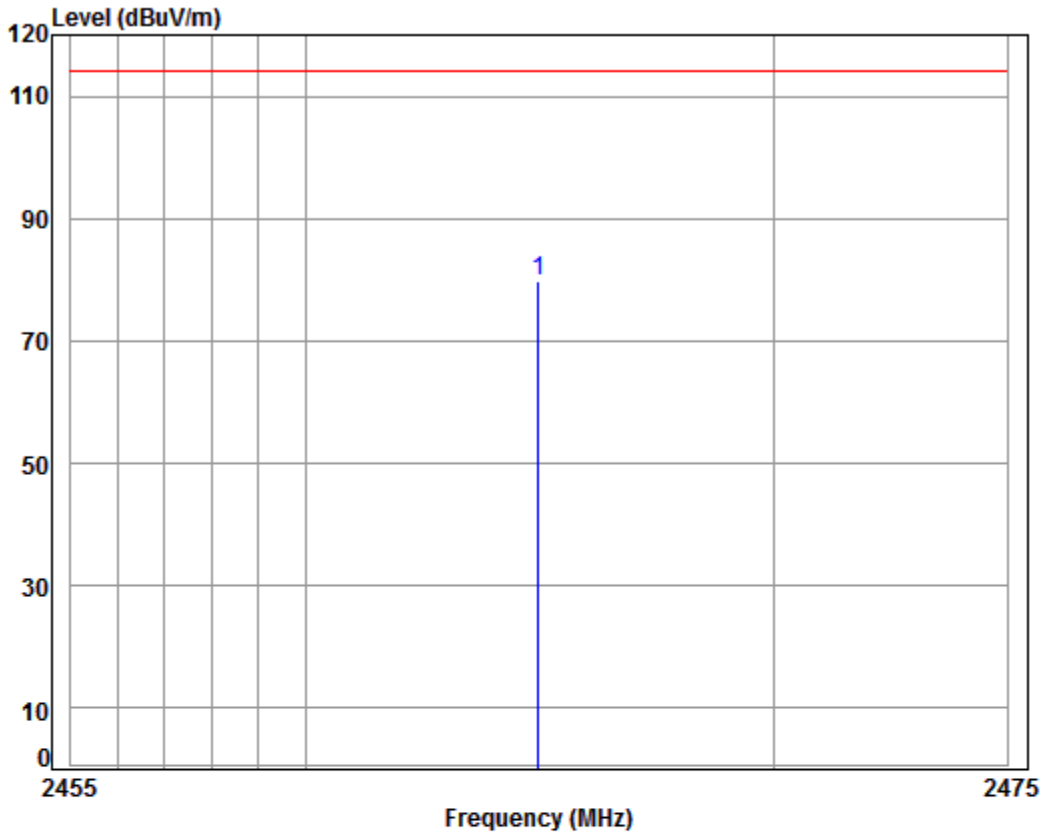
Mode:a; Polarization:Horizontal; Modulation:GFSK; Channel:High




Condition: 3m HORIZONTAL
Job No : 11895CR
Mode : 2465 Field Strength

| | 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 pp | 2464.965 | 5.57 | 29.30 | 37.65 | 82.49 | 79.71 | 114.00 | -34.29 | Peak |

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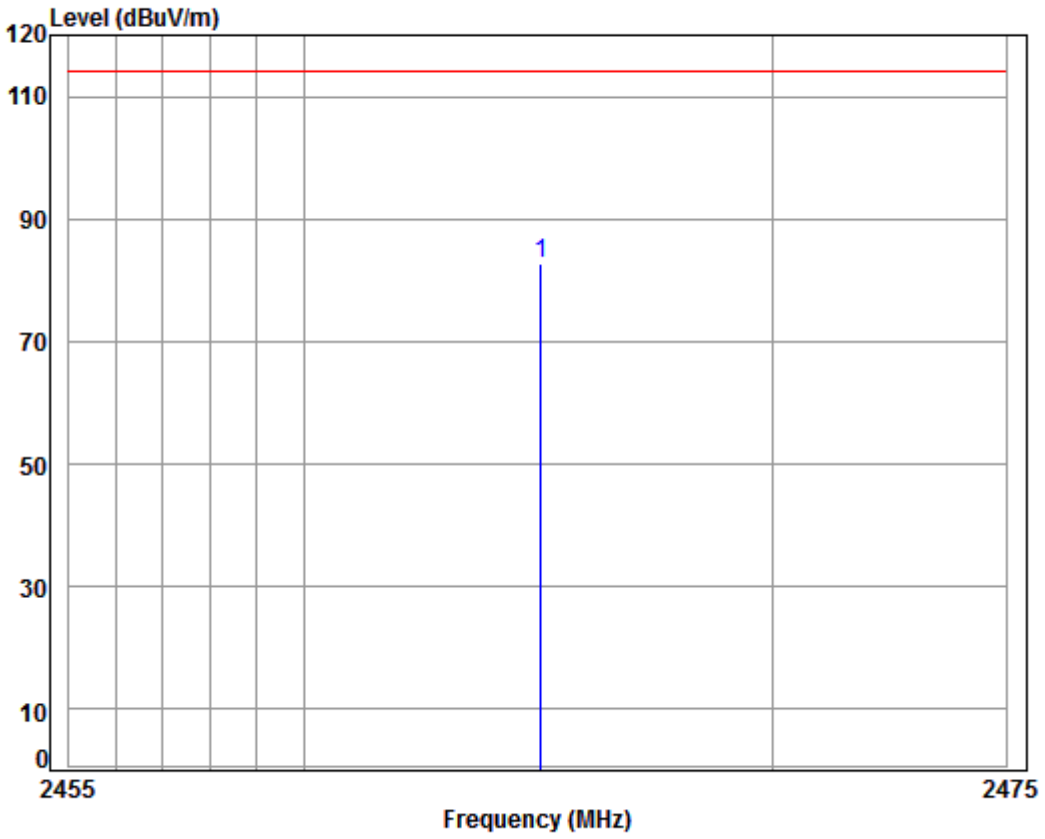
Mode:a; Polarization:Vertical; Modulation:GFSK; Channel:High




Condition: 3m VERTICAL
Job No : 11895CR
Mode : 2465 Field Strength

| | 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 pp | 2465.044 | 5.57 | 29.30 | 37.65 | 85.52 | 82.74 | 114.00 | -31.26 | peak |

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## 7.3 Restricted Band Around Fundamental Frequency

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209
Test Method: ANSI C63.10 (2013) Section 6.4&6.5&6.6
Measurement Distance: 3m
Limit:

| Frequency | Limit (dBuV/m @3m) | Remark |
|---|---|---|
| 30MHz-88MHz | 40.0 | Quasi-peak Value |
| 88MHz-216MHz | 43.5 | Quasi-peak Value |
| 216MHz-960MHz | 46.0 | Quasi-peak Value |
| 960MHz-1GHz | 54.0 | Quasi-peak Value |
| Above 1GHz | 54.0 | Average Value |
| Above 1GHz | 74.0 | Peak Value |
| Emission radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209,whichever is the lesser attenuation. | | |

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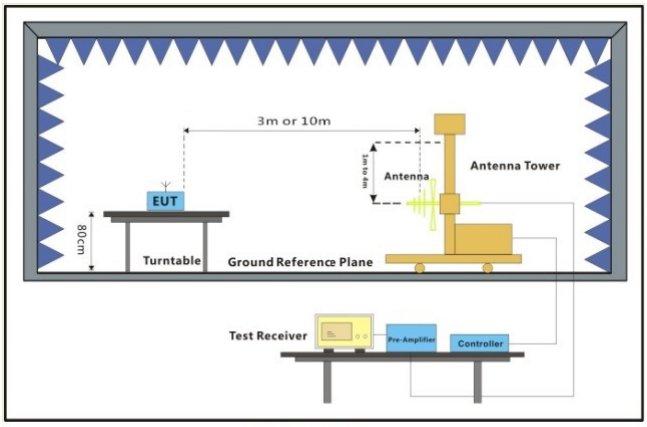
### 7.3.1 E.U.T. Operation

Operating Environment:

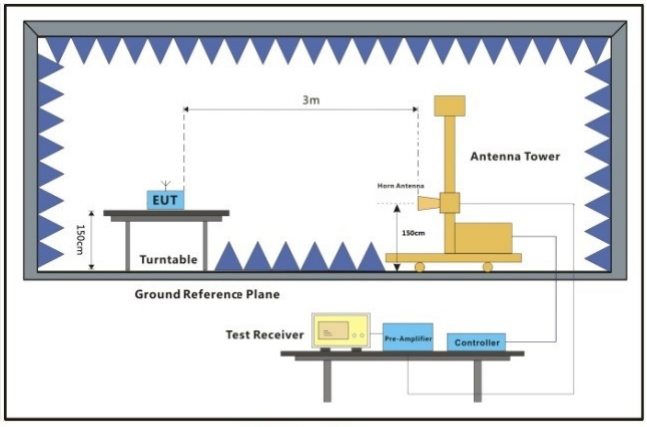
Temperature: 21.8 °C Humidity: 47.5 % RH Atmospheric Pressure: 1005 mbar

Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

### 7.3.2 Test Setup Diagram




30MHz-1GHz




Above 1GHz

### 7.3.3 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: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

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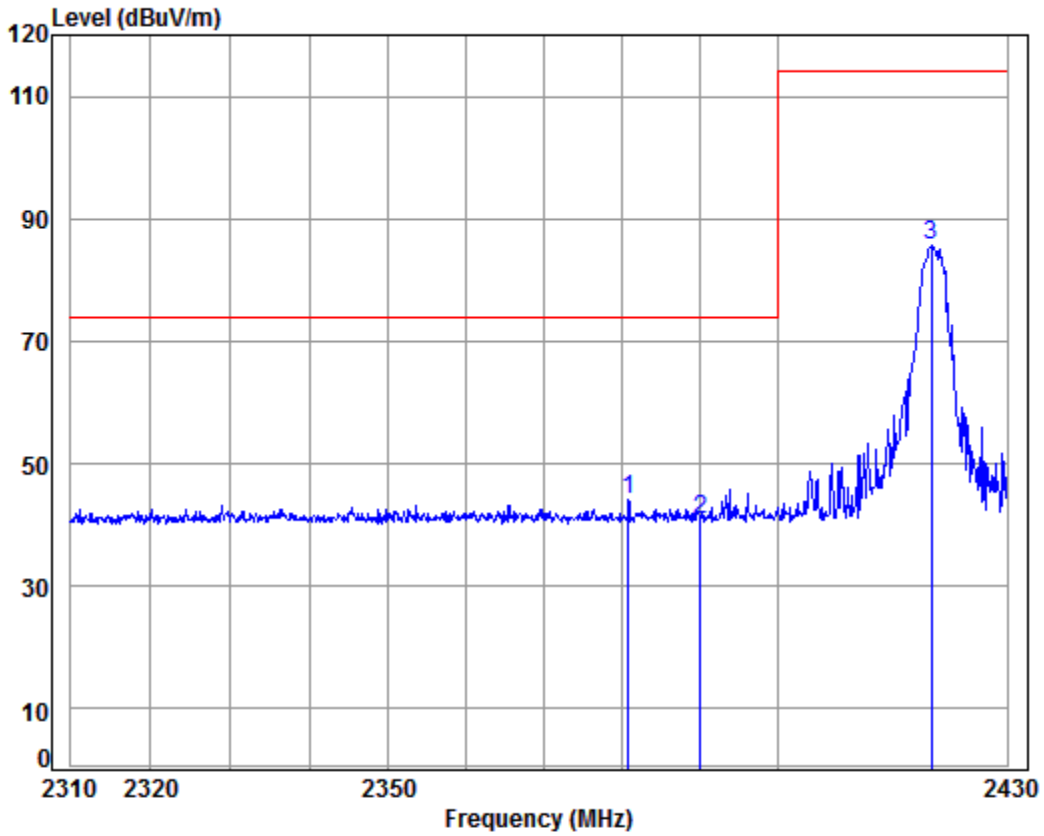
Mode:a; Polarization:Horizontal; Modulation:GFSK; Channel:Low




Condition: 3m HORIZONTAL
Job No : 11895CR
Mode : 2420 Band edge

| | 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 | 2380.787 | 5.46 | 29.05 | 37.66 | 47.15 | 44.00 | 74.00 | -30.00 | peak |
| 2 | 2390.000 | 5.47 | 29.08 | 37.66 | 44.04 | 40.93 | 74.00 | -33.07 | peak |
| 3 pp | 2420.052 | 5.52 | 29.17 | 37.65 | 88.50 | 85.54 | 114.00 | -28.46 | peak |

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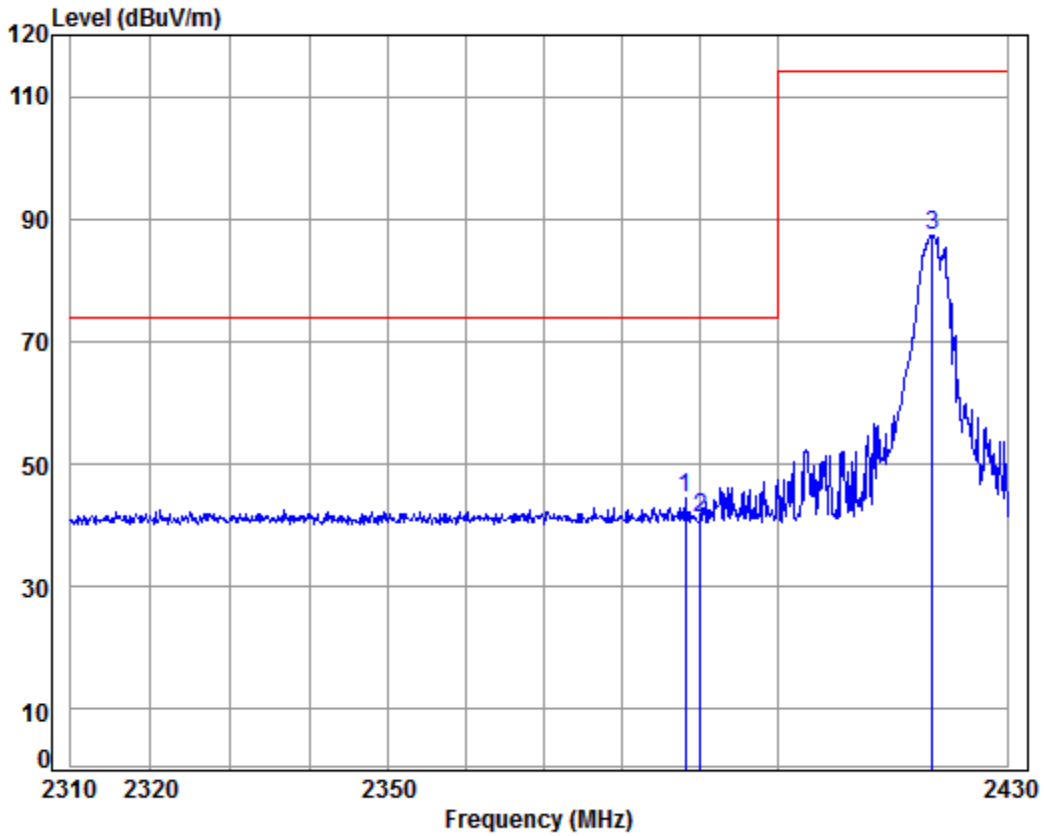
Mode:a; Polarization:Vertical; Modulation:GFSK; Channel:Low




Condition: 3m VERTICAL
Job No : 11895CR
Mode : 2420 Band edge

| | 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 | 2388.032 | 5.47 | 29.07 | 37.66 | 47.59 | 44.47 | 74.00 | -29.53 | peak |
| 2 | 2390.000 | 5.47 | 29.08 | 37.66 | 44.45 | 41.34 | 74.00 | -32.66 | peak |
| 3 pp | 2420.175 | 5.52 | 29.17 | 37.65 | 90.42 | 87.46 | 114.00 | -26.54 | peak |

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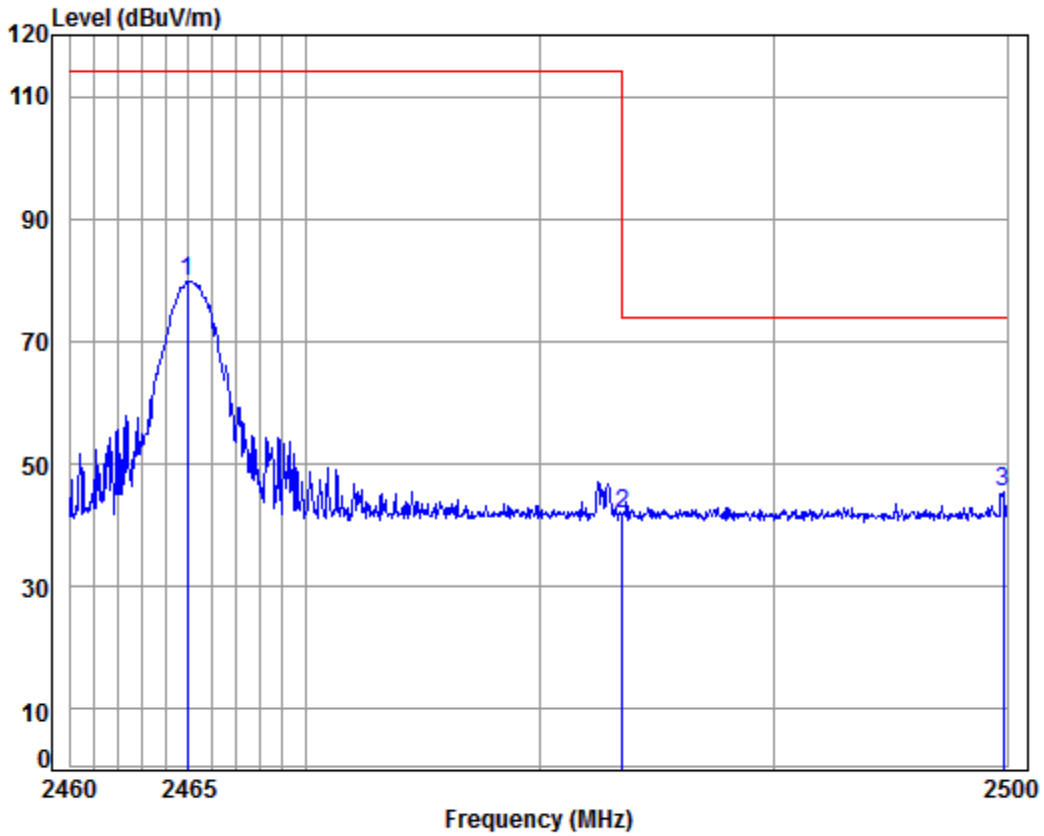
Mode:a; Polarization:Horizontal; Modulation:GFSK; Channel:High




Condition: 3m HORIZONTAL
Job No : 11895CR
Mode : 2465 Band edge

| | 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 | 2464.965 | 5.57 | 29.30 | 37.65 | 82.49 | 79.71 | 114.00 | -34.29 | peak |
| 2 | 2483.500 | 5.60 | 29.35 | 37.65 | 44.52 | 41.82 | 114.00 | -72.18 | peak |
| 3 pp | 2499.839 | 5.62 | 29.40 | 37.64 | 48.01 | 45.39 | 74.00 | -28.61 | peak |

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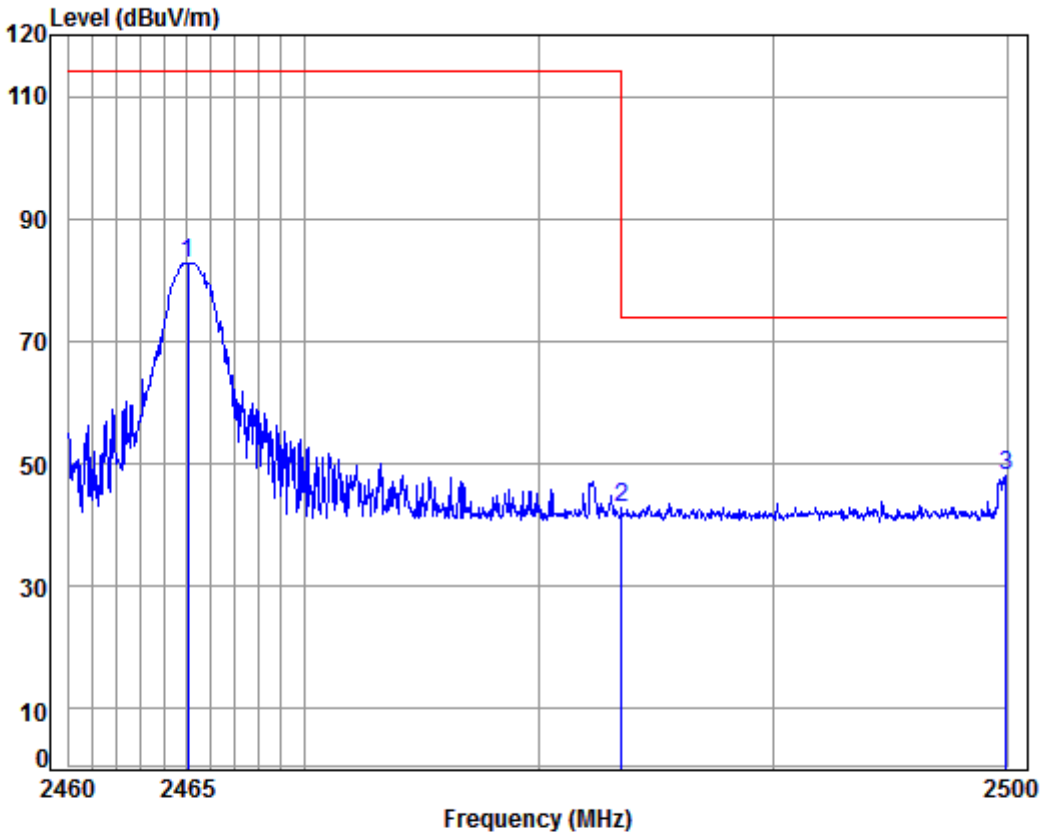
Mode:a; Polarization:Vertical; Modulation:GFSK; Channel:High




Condition: 3m VERTICAL
Job No : 11895CR
Mode : 2465 Band edge

| | 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 | 2465.044 | 5.57 | 29.30 | 37.65 | 85.52 | 82.74 | 114.00 | -31.26 | peak |
| 2 | 2483.500 | 5.60 | 29.35 | 37.65 | 45.58 | 42.88 | 114.00 | -71.12 | peak |
| 3 pp | 2499.960 | 5.62 | 29.40 | 37.64 | 50.68 | 48.06 | 74.00 | -25.94 | peak |

Remark:

1) 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
2) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only above measurement data were shown in the report.

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## 7.4 Radiated Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)
Test Method: ANSI C63.10 (2013) Section 6.4&6.5&6.6
Measurement Distance: 3/10m
Limit:

| Frequency(MHz) | Field strength (microvolts/meter) | Limit (dBuV/m) | Detector | Measurement Distance (meters) |
|---|---|---|---|---|
| 0.009-0.490 | 2400/F(kHz) | - | - | 300 |
| 0.490-1.705 | 24000/F(kHz) | - | - | 30 |
| 1.705-30 | 30 | - | - | 30 |
| 30-88 | 100 | 40.0 | QP | 3 |
| 88-216 | 150 | 43.5 | QP | 3 |
| 216-960 | 200 | 46.0 | QP | 3 |
| 960-1000 | 500 | 54.0 | QP | 3 |
| Above 1000 | 500 | 54.0 | AV | 3 |

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### 7.4.1 E.U.T. Operation

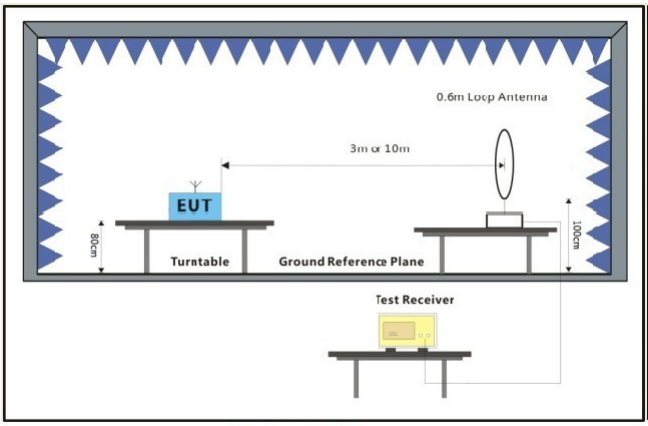
Operating Environment:

Temperature: 24 °C Humidity: 54 % RH Atmospheric Pressure: 1005 mbar

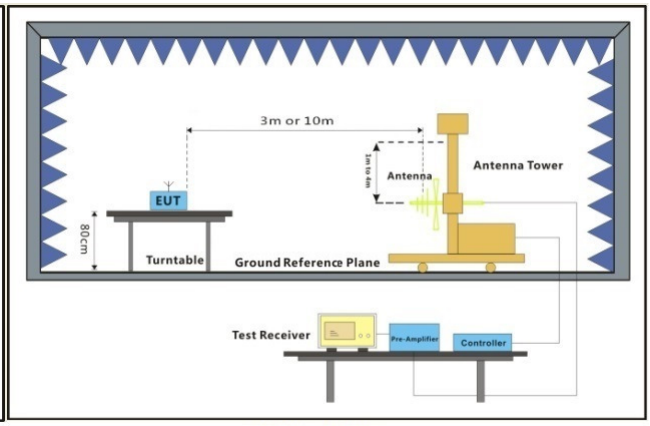
Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

For below 1GHz, tests were conducted in H/M/L channels and the worst case is reported only.

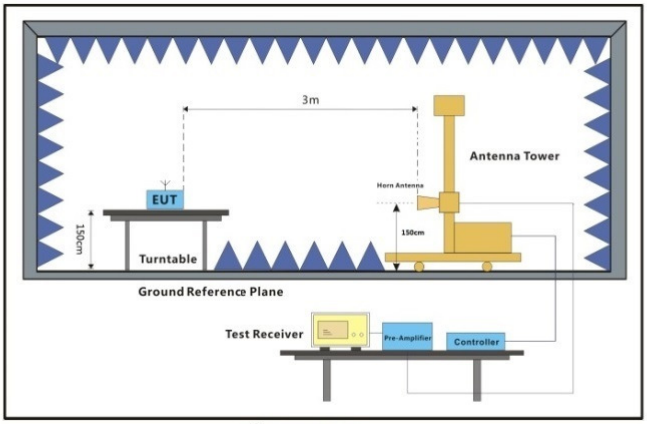
### 7.4.2 Test Setup Diagram




Below 30MHz




30MHz-1GHz




Above 1GHz

### 7.4.3 Measurement Procedure and Data

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane. Only the worst position of vertical was shown in the report.

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**Below 1GHz**

The test was performed at a 10m test site. According to below formulate and the test data at 10m test distance,

$L_3 / L_{10} = D_{10} / D_3$

Note:

$L_3$: Level @ 3m distance. Unit: uV/m;

$L_{10}$: Level @ 10m distance. Unit: uV/m;

$D_3$: 3m distance. Unit: m

$D_{10}$: 10m distance. Unit: m

The level at 3m test distance is below:

| Frequency (MHz) | Level @ 10m (dBuV/m) | Level @ 10m (uV/m) | Level @ 3m (uV/m) | Level @ 3m (dBuV/m) | Limit @ 3m (dBuV/m) | Margin (dB) | Ant. Polarization |
|---|---|---|---|---|---|---|---|
| 39.71 | 14.52 | 5.32 | 17.74 | 24.98 | 40.00 | -15.02 | V |
| 51.12 | 14.61 | 5.38 | 17.92 | 25.07 | 40.00 | -14.93 | V |
| 142.82 | 15.51 | 5.96 | 19.88 | 25.97 | 43.50 | -17.53 | V |
| 361.71 | 23.09 | 14.27 | 47.57 | 33.55 | 46.00 | -12.45 | V |
| 377.26 | 23.25 | 14.54 | 48.46 | 33.71 | 46.00 | -12.29 | V |
| 774.16 | 26.29 | 20.63 | 68.77 | 36.75 | 46.00 | -9.25 | V |
| 40.99 | 14.50 | 5.31 | 17.70 | 24.96 | 40.00 | -15.04 | H |
| 53.69 | 13.91 | 4.96 | 16.53 | 24.37 | 40.00 | -15.63 | H |
| 159.78 | 14.76 | 5.47 | 18.23 | 25.22 | 43.50 | -18.28 | H |
| 539.48 | 24.85 | 17.48 | 58.26 | 35.31 | 46.00 | -10.69 | H |
| 701.76 | 26.00 | 19.95 | 66.51 | 36.46 | 46.00 | -9.54 | H |
| 972.34 | 28.31 | 26.03 | 86.77 | 38.77 | 54.00 | -15.23 | H |

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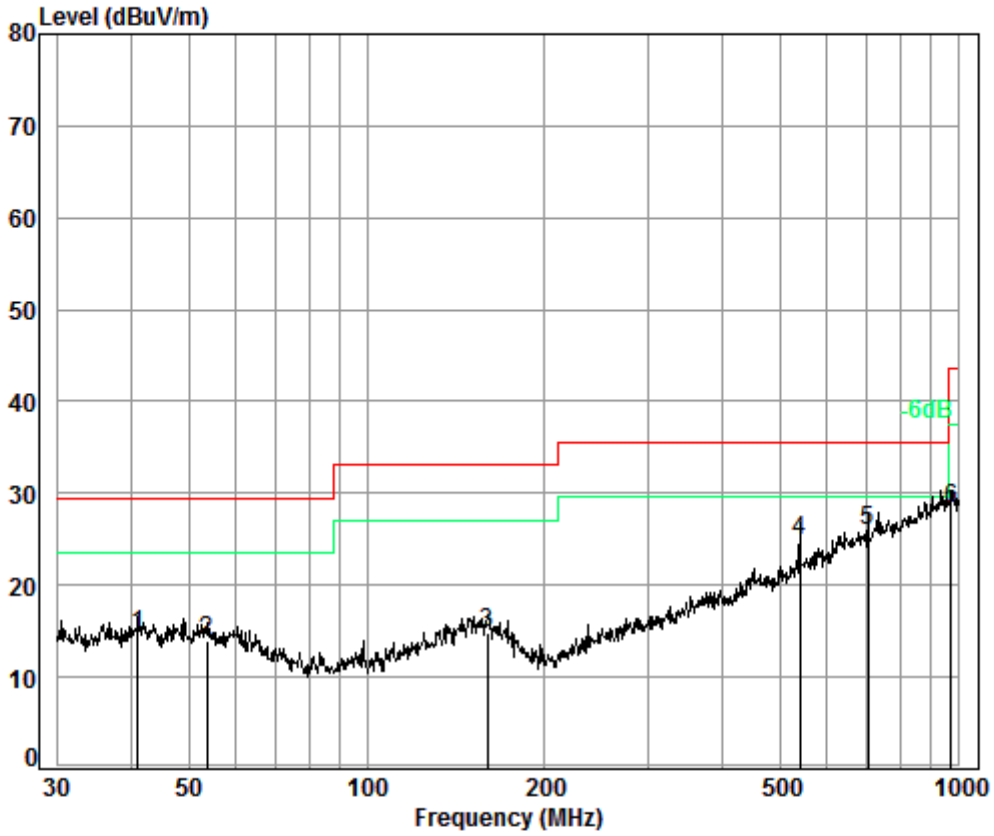
Mode:a; Polarization:Horizontal; Modulation:GFSK; Channel:Low




Condition: 10m HORIZONTAL
Job No. : 11895CR
Test Mode: a

| | Freq | Cable Loss | Ant Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit |
|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 40.99 | 6.80 | 13.23 | 32.46 | 26.93 | 14.50 | 29.50 | -15.00 |
| 2 | 53.69 | 6.97 | 12.48 | 32.43 | 26.89 | 13.91 | 29.50 | -15.59 |
| 3 | 159.78 | 7.50 | 13.39 | 32.44 | 26.31 | 14.76 | 33.10 | -18.34 |
| 4 | 539.48 | 8.75 | 17.54 | 32.29 | 30.85 | 24.85 | 35.60 | -10.75 |
| 5 pp | 701.76 | 9.16 | 20.14 | 32.27 | 28.97 | 26.00 | 35.60 | -9.60 |
| 6 | 972.34 | 9.60 | 22.80 | 30.83 | 26.74 | 28.31 | 43.50 | -15.19 |

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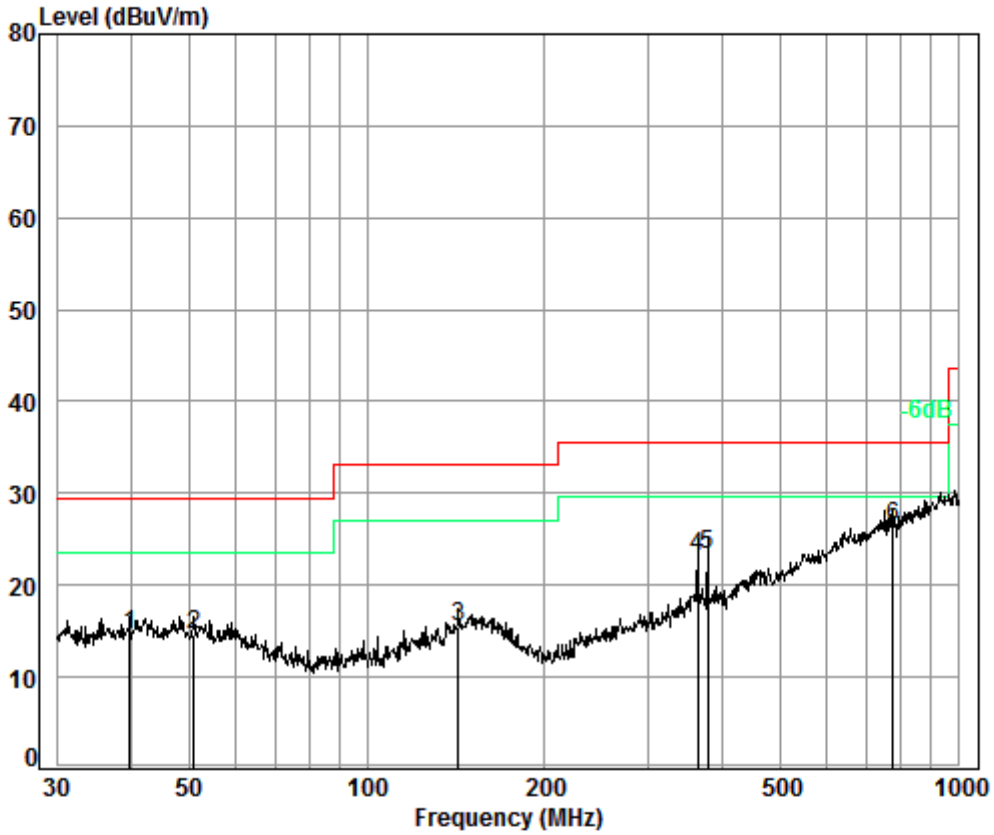
Mode:a; Polarization:Vertical; Modulation:GFSK; Channel:Low




Condition: 10m VERTICAL
Job No. : 11895CR
Test Mode: a

| | Freq | Cable Loss | Ant Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit |
|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 39.71 | 6.79 | 13.28 | 32.47 | 26.92 | 14.52 | 29.50 | -14.98 |
| 2 | 51.12 | 6.92 | 12.69 | 32.42 | 27.42 | 14.61 | 29.50 | -14.89 |
| 3 | 142.82 | 7.41 | 12.95 | 32.44 | 27.59 | 15.51 | 33.10 | -17.59 |
| 4 | 361.71 | 8.30 | 14.10 | 32.35 | 33.04 | 23.09 | 35.60 | -12.51 |
| 5 | 377.26 | 8.30 | 14.43 | 32.34 | 32.86 | 23.25 | 35.60 | -12.35 |
| 6 pp | 774.16 | 9.24 | 21.05 | 32.26 | 28.26 | 26.29 | 35.60 | -9.31 |

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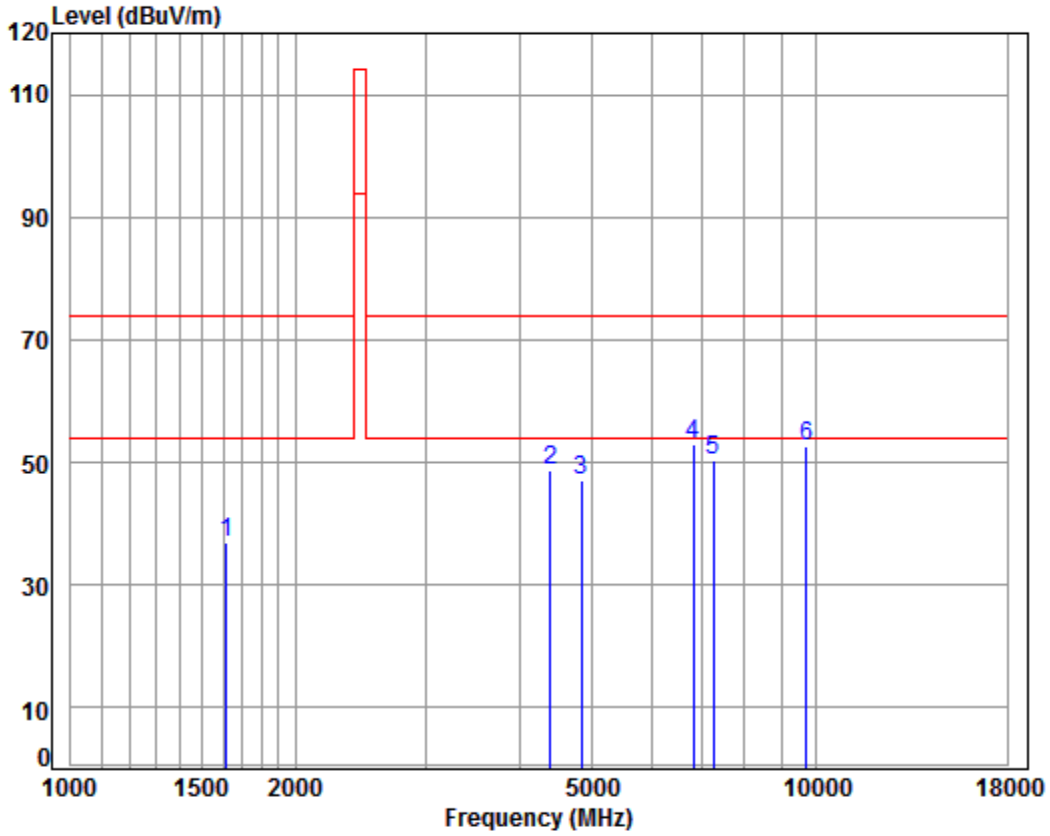
above 1GHz

Mode:a; Polarization:Horizontal; Modulation:GFSK; Channel:Low




Condition: 3m HORIZONTAL
Job No : 11895CR
Mode : 2420 TX RSE

| | 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 | 1615.754 | 5.33 | 26.32 | 37.73 | 43.02 | 36.94 | 74.00 | -37.06 | peak |
| 2 | 4392.376 | 7.44 | 33.60 | 37.18 | 44.75 | 48.61 | 74.00 | -25.39 | peak |
| 3 | 4840.000 | 7.93 | 34.22 | 37.27 | 42.25 | 47.13 | 74.00 | -26.87 | peak |
| 4 pp | 6835.278 | 10.58 | 36.05 | 37.65 | 43.84 | 52.82 | 74.00 | -21.18 | peak |
| 5 | 7260.000 | 10.06 | 36.39 | 37.55 | 41.60 | 50.50 | 74.00 | -23.50 | peak |
| 6 | 9680.000 | 10.78 | 37.54 | 35.75 | 40.21 | 52.78 | 74.00 | -21.22 | peak |

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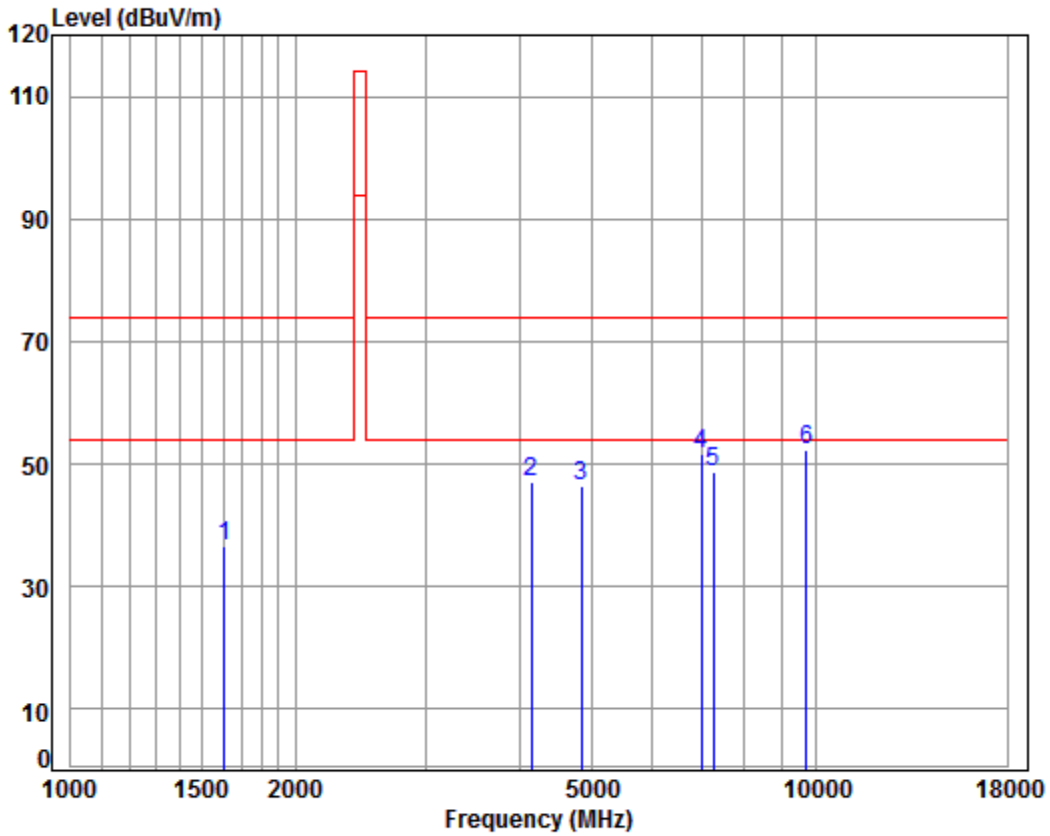
Mode:a; Polarization:Vertical; Modulation:GFSK; Channel:Low




Condition: 3m VERTICAL
Job No : 11895CR
Mode : 2420 TX RSE

| | 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 | 1606.441 | 5.34 | 26.28 | 37.73 | 42.79 | 36.68 | 74.00 | -37.32 | peak |
| 2 | 4145.664 | 7.16 | 33.60 | 37.13 | 43.59 | 47.22 | 74.00 | -26.78 | peak |
| 3 | 4840.000 | 7.93 | 34.22 | 37.27 | 41.49 | 46.37 | 74.00 | -27.63 | peak |
| 4 | 6995.172 | 10.14 | 36.49 | 37.60 | 42.80 | 51.83 | 74.00 | -22.17 | peak |
| 5 | 7260.000 | 10.06 | 36.39 | 37.55 | 39.96 | 48.86 | 74.00 | -25.14 | peak |
| 6 pp | 9680.000 | 10.78 | 37.54 | 35.75 | 39.77 | 52.34 | 74.00 | -21.66 | peak |

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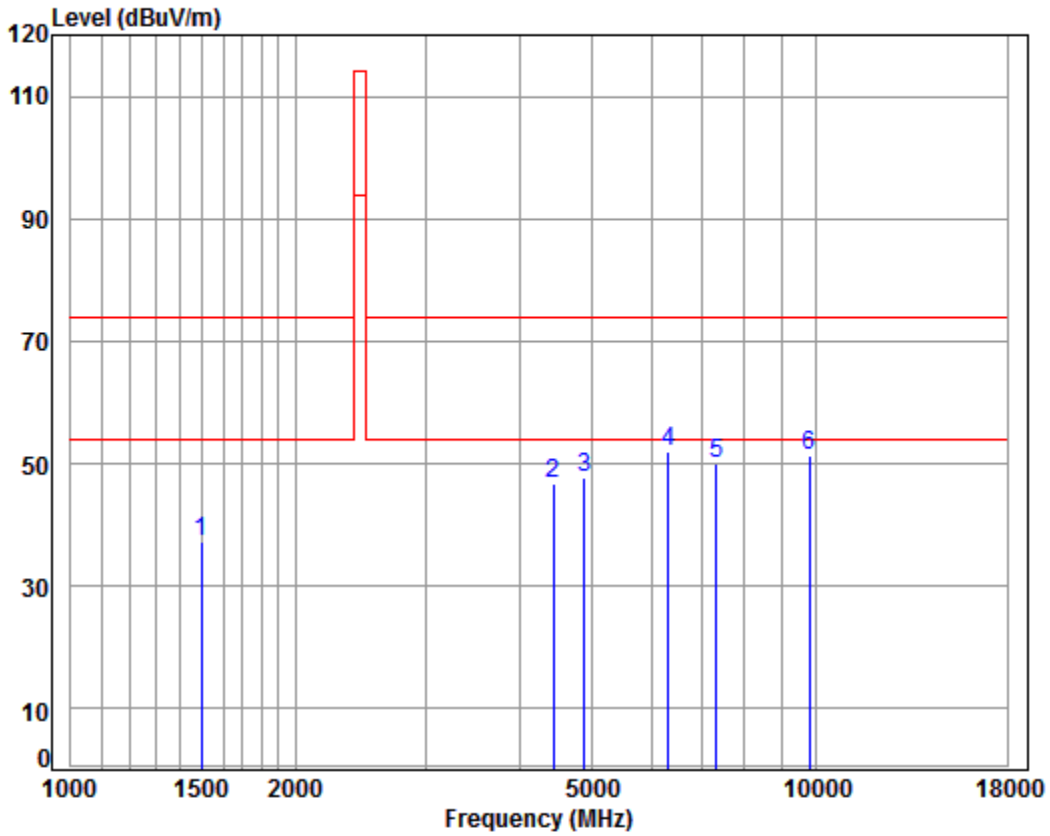
Mode:a; Polarization:Horizontal; Modulation:GFSK; Channel:middle




Condition: 3m HORIZONTAL
Job No : 11895CR
Mode : 2444 TX RSE

| | 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 | 1498.781 | 5.48 | 25.80 | 37.74 | 43.74 | 37.28 | 74.00 | -36.72 | peak |
| 2 | 4430.628 | 7.48 | 33.60 | 37.19 | 42.77 | 46.66 | 74.00 | -27.34 | peak |
| 3 | 4888.000 | 7.98 | 34.31 | 37.28 | 42.82 | 47.83 | 74.00 | -26.17 | peak |
| 4 pp | 6322.136 | 11.20 | 34.96 | 37.80 | 43.58 | 51.94 | 74.00 | -22.06 | peak |
| 5 | 7332.000 | 10.04 | 36.37 | 37.53 | 41.17 | 50.05 | 74.00 | -23.95 | peak |
| 6 | 9776.000 | 10.83 | 37.56 | 35.67 | 38.63 | 51.35 | 74.00 | -22.65 | peak |

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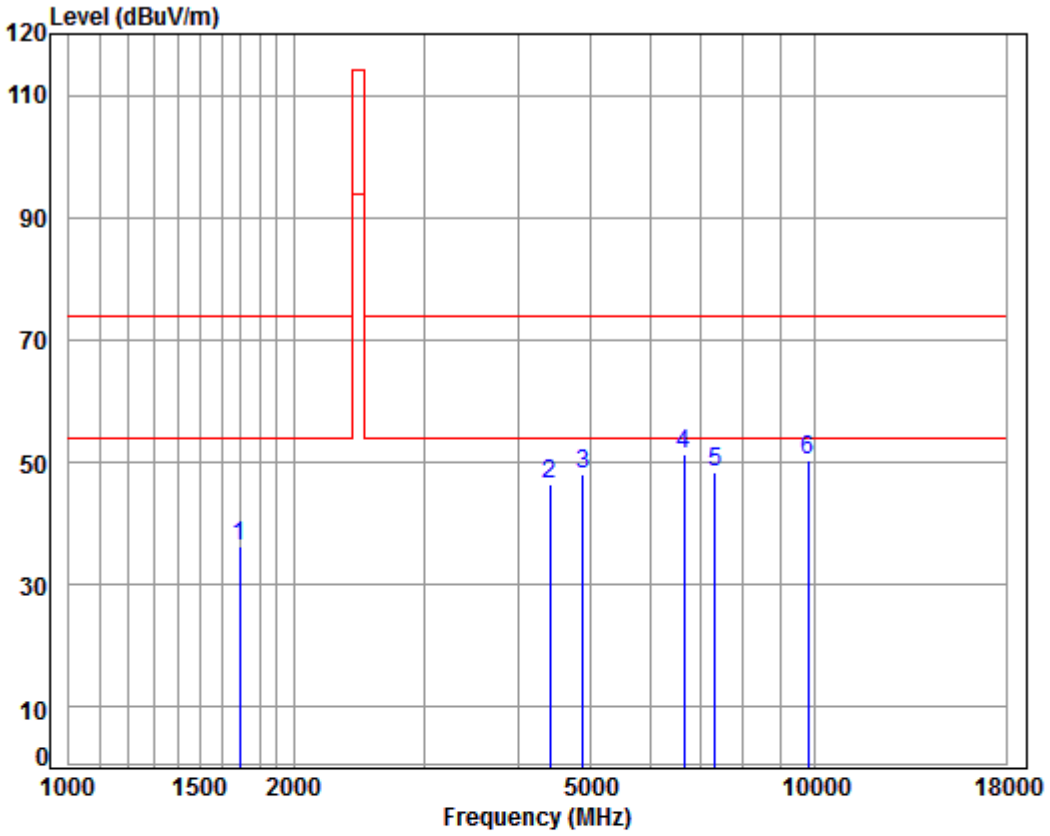
Mode:a; Polarization:Vertical; Modulation:GFSK; Channel:middle




Condition: 3m VERTICAL
Job No : 11895CR
Mode : 2444 TX RSE

| | | 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 | 5.24 | 26.64 | 37.72 | 42.19 | 36.35 | 74.00 | -37.65 | peak |
| 2 | | 4405.090 | 7.46 | 33.60 | 37.19 | 42.63 | 46.50 | 74.00 | -27.50 | peak |
| 3 | | 4888.000 | 7.98 | 34.31 | 37.28 | 42.98 | 47.99 | 74.00 | -26.01 | peak |
| 4 | pp | 6659.763 | 11.08 | 35.56 | 37.70 | 42.24 | 51.18 | 74.00 | -22.82 | peak |
| 5 | | 7332.000 | 10.04 | 36.37 | 37.53 | 39.38 | 48.26 | 74.00 | -25.74 | peak |
| 6 | | 9776.000 | 10.83 | 37.56 | 35.67 | 37.58 | 50.30 | 74.00 | -23.70 | peak |

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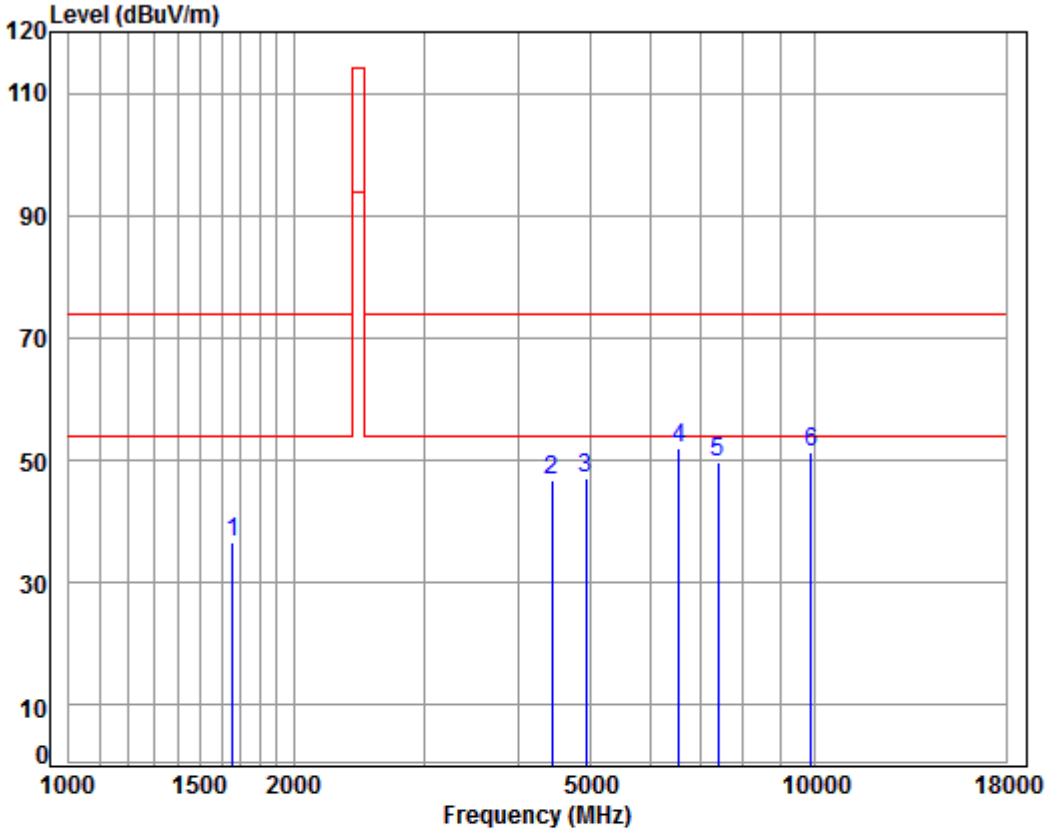
Mode:a; Polarization:Horizontal; Modulation:GFSK; Channel:High




Condition: 3m HORIZONTAL
Job No : 11895CR
Mode : 2465 TX RSE

| | | 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 | | 1658.337 | 5.28 | 26.50 | 37.73 | 42.59 | 36.64 | 74.00 | -37.36 | peak |
| 2 | | 4443.453 | 7.50 | 33.60 | 37.19 | 42.79 | 46.70 | 74.00 | -27.30 | peak |
| 3 | | 4930.000 | 8.02 | 34.38 | 37.29 | 42.08 | 47.19 | 74.00 | -26.81 | peak |
| 4 | pp | 6564.209 | 11.35 | 35.29 | 37.73 | 43.05 | 51.96 | 74.00 | -22.04 | peak |
| 5 | | 7395.000 | 10.03 | 36.34 | 37.52 | 40.79 | 49.64 | 74.00 | -24.36 | peak |
| 6 | | 9860.000 | 10.87 | 37.57 | 35.61 | 38.40 | 51.23 | 74.00 | -22.77 | peak |

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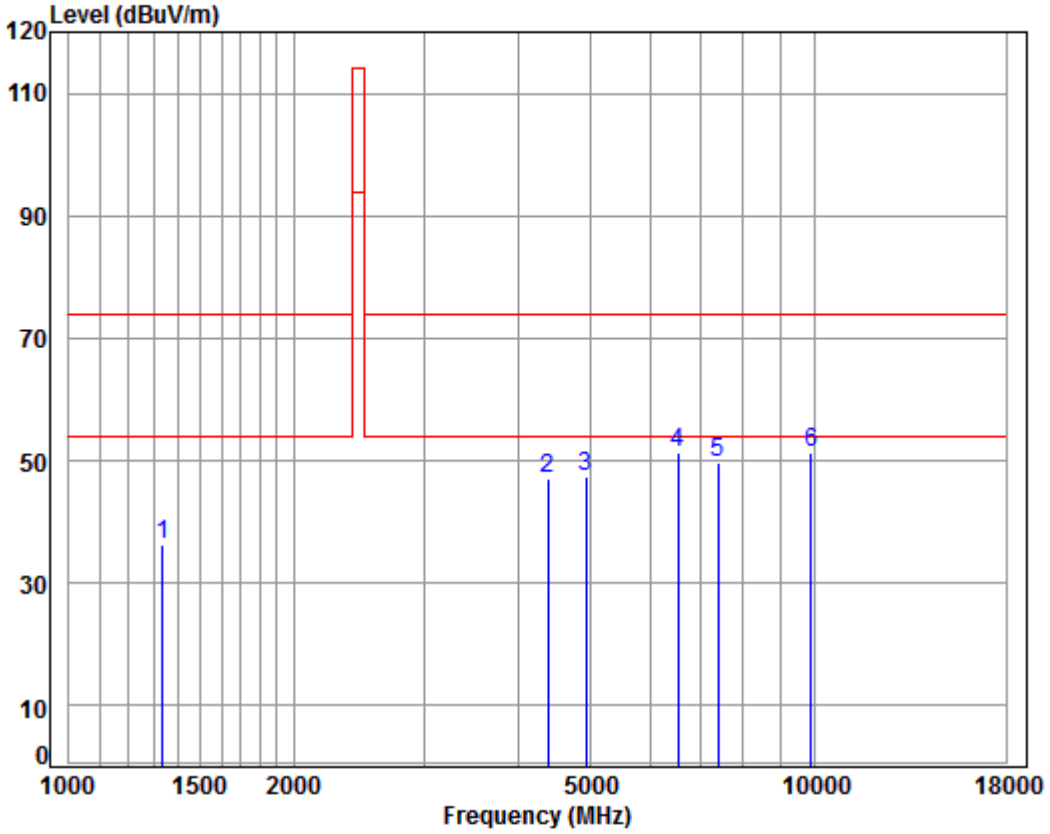
Mode:a; Polarization:Vertical; Modulation:GFSK; Channel:High




Condition: 3m VERTICAL
Job No : 11895CR
Mode : 2465 TX RSE

| | 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 | 4.93 | 25.11 | 37.76 | 43.87 | 36.15 | 74.00 | -37.85 | peak |
| 2 | 4379.699 | 7.43 | 33.60 | 37.18 | 43.32 | 47.17 | 74.00 | -26.83 | peak |
| 3 | 4930.000 | 8.02 | 34.38 | 37.29 | 42.37 | 47.48 | 74.00 | -26.52 | peak |
| 4 | 6545.263 | 11.41 | 35.23 | 37.73 | 42.38 | 51.29 | 74.00 | -22.71 | peak |
| 5 | 7395.000 | 10.03 | 36.34 | 37.52 | 40.99 | 49.84 | 74.00 | -24.16 | peak |
| 6 pp | 9860.000 | 10.87 | 37.57 | 35.61 | 38.49 | 51.32 | 74.00 | -22.68 | peak |

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Remark:

3) 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
4) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
5) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only above measurement data were shown in the report.

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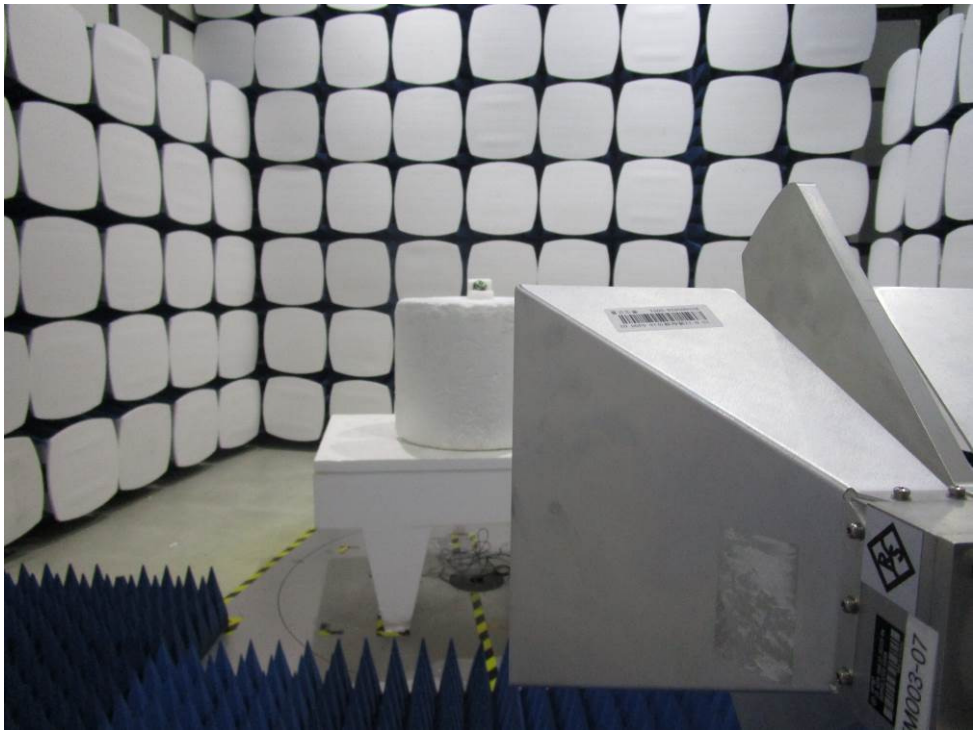
# 8 Photographs

## 8.1 Radiated Emissions Test Setup



- End of the Report -

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