# Test Report

Test Report No.: CQC-IVTS-2023-00145

| | |
|---|---|
| Product Name | AIR PURIFIER |
| Model Number | SCA14000-2x4, SCA14000-2x2 |
| Applicant | Surgically Clean Air Inc. |
| Approval Types | FCC ID: 2A24USCA14000<br>IC: 27694-SCA14000 |

**CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd.**

**National Quality Inspection and Testing Center for Internet of Vehicles Products**

# TEST REPORT DECLARATION

| | | |
|---|---|---|
| Equipment under Test | : | **AIR PURIFIER** |
| Model /Type | : | SCA14000-2x4, SCA14000-2x2 |
| Listed Models | : | N/A |
| **Applicant** | : | **Surgically Clean Air Inc.** |
| Address | : | 6300 Viscount Rd #1a, Mississauga, ON L4V 1H3 |
| **Manufacturer** | : | **Surgically Clean Air Inc.** |
| Address | : | 6300 Viscount Rd #1a, Mississauga, ON L4V 1H3 |

The EUT described above is tested by CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd. to determine the maximum emissions from the EUT. CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd. is assumed full responsibility for the accuracy of the test results.

| | | |
|---|---|---|
| Project Engineer: | Yankun Wang<br>(Yankun Wang 王炎坤) | Date: 2023-6-20 |
| Checked by: | Haohao Li<br>(Haohao Li 李昊昊) | Date: 2023-6-20 |
| Approved by: | Wenliang Li<br>(Wenliang Li 李文亮) | Date: 2023-6-20 |

# Contents

# 1. TEST STANDARDS

The tests were performed according to following standards: The equipment under test (EUT) has been tested at CQC-IVTS's (own or subcontracted) laboratories according to the leading reference documents giving table below:

| No | Identify | Document Title | Version/Date |
|---|---|---|---|
| 1 | 47 CFR Part 15.255 | Operation within the band 57-71 GHz | 4/11/2023 |
| 2 | RSS-210 Annex J | Licence-Exempt Radio Apparatus: Category I Equipment - Devices operating in the band 57-71 GHz | Issue 10/December 2019 |
| 3 | RSS-Gen | General Requirements for Compliance of Radio Apparatus | Issue 5/ April 2018 |
| 4 | ANSI C63.4 | American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz | 2014 |
| 5 | ANSI C63.10 | American National Standard for Testing Unlicensed Wireless Devices | 2013 |

# 2. SUMMARY

## 2.1. General Remarks

| | | |
|---|---|---|
| Date of receipt of test sample | : | March 29, 2023 |
| | | |
| Testing commenced on | : | April 6, 2023 |
| | | |
| Testing concluded on | : | April 19, 2023 |

## 2.2. Product Description*

| | |
|---|---|
| Product Name: | AIR PURIFIER |
| Model/Type reference: | SCA14000-2x4, SCA14000-2x2 |
| HMN: | -/- |
| PMN: | AIR PURIFIER |
| HVIN: | SCA14000-2x4, SCA14000-2x2 |
| FVIN: | -/- |
| Hardware Version: | -/- |
| Software Version: | -/- |
| Frequency Range: | 57 – 64 GHz |
| Number of Channels: | 1 |
| Modulation Type: | FMCW |
| Antenna: | Integrated patch antenna |
| Antenna Gain: | Maximum peak value is 6.00 dBi |
| Specified Rated Output Power E.R.I.P.): | Maximum output power is -4.00dBm |
| Power Supply: | AC 120V/60Hz |
| IC classification: | Motion sensor device |
| Emission designator: | N0N |
| Model Difference Declaration | Refer to Annex A: model difference declaration letter |

*: declared by the applicant, CQC-IVTS not responsible for accuary.

## 2.3. EUT operation mode

| EUT operating mode no | Description of operating modes | Additional information |
|---|---|---|
| op. 1 | Continuously transmitting and receiving mode | Carrier modulation (normal mode). 57 – 64 GHz, a continuous wave with 100% duty cycle |

*: declared by the applicant

## 2.4. Modifications

No modifications were implemented to meet testing criteria

## 2.5. Test Item (Equipment Under Test) Description*

| Short designation | EUT Name | EUT Description | Serial number | Hardware status | Software status |
|---|---|---|---|---|---|
| EUT A | SCA14000-2x4 | AIR PURIFIER | -/- | -/- | -/- |
| EUT B | SCA14000-2x2 | AIR PURIFIER | -/- | -/- | -/- |
| | | | | | |

*: declared by the applicant. According to customers information EUTs A and B contains same Radio transmitter devices.

## 2.6. Auxiliary Equipment (AE) Description

| AE short designation | EUT Name (if available) | EUT Description | Serial number (if available) | Software (if used) |
|---|---|---|---|---|
| AE 1 | -/- | Power Lines | -/- | -/- |
| | | | | |
| | | | | |
| | | | | |

*: declared by the applicant.

## 2.7. Test Item Set-ups Description

| | | |
|---|---|---|
| set. 1 | EUT A + AE 1 | EUT operating mode 1 |
| set. 2 | EUT B + AE 1 | EUT operating mode 2 |
| | | |

## 2.8. Test Conditions*

| Temperature, [°C] | | Voltage, [V] | |
|---|---|---|---|
| $T_{nom}$ | 20.0 | $V_{nom}$ | AC 120V |
| $T_{min}$ | -20.0 | $V_{min}$ | AC 102V |
| $T_{max}$ | 50.0 | $V_{max}$ | AC 138V |

*: declared by the applicant

## 2.9. Additional Information

| | |
|---|---|
| Test items differences | None |
| Additional application considerations to test a component or sub-assembly | none |

## 2.10. Test Location

Location 1

| | |
|---|---|
| Company: | CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd. |
| Address: | Building G5, TCL International E City, Xili Street, Nanshan District, Shenzhen, China |
| Post code: | 518112 |
| Contact Person: | Wenliang Li |
| Telephone: | +86-755-8618 9654 |
| e-Mail: | liwenliang@cqc.com.cn |

## 2.11. Abnormalities from Standard Conditions

None

## 2.12. Possible verdicts of the results

| | |
|---|---|
| Test sample meets the requirements | P (PASS) ± the measured value is below the acceptance limit, AL = TL |
| Test sample does not meet the requirements | F (FAIL) ± the measured value is above the acceptance limit, AL = TL |
| Test case does not apply to the test sample | N/A (Not applicable) |
| Test case not performed | N/P (Not performed) |

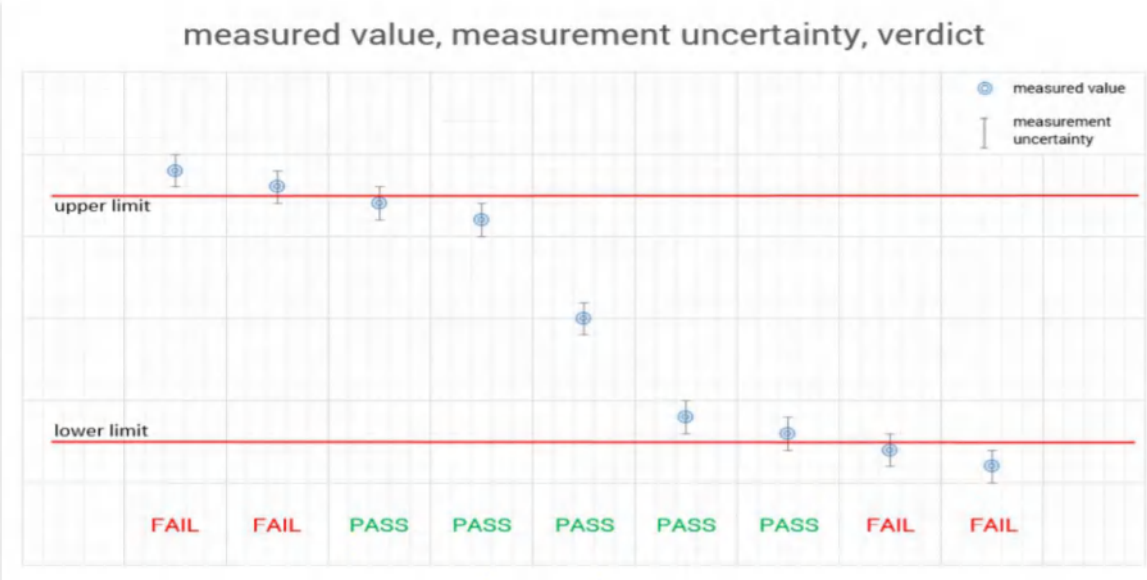
## 2.13. Formula for determination of correction values ($E_c$)

$E_C = E_R + AF + C_L + D_F - G_A$ (1)
$M = L_T - E_C$ (2)

$E_C$ = Electrical field ± corrected value
$E_R$ = Receiver reading
M = Margin
$L_T$ = Limit
AF = Antenna factor
$C_L$ = Cable loss
$D_F$ = Distance correction factor (if used)
$G_A$ = Gain of pre-amplifier (if used)
All units are dB-units, positive margin means value is below limit.

## 2.14. Reporting Statements of Conformity – Decision Rule

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed. The measurement uncertainty is mentioned in this test report, see chapter 9, but is not taken into account - neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong."



# 3. TEST ENVIRONMENT

## 3.1. Address of the test laboratory

**CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd.**
Building G5, TCL International E City, Xili Street, Nanshan District, Shenzhen, China
CQC-IVTS A2LA Certification Number: 6645.01;

## 3.2. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

| | |
|---|---|
| Normal Temperature: | 25°C |
| Lative Humidity | 55 % |
| Air Pressure | 989 hPa |

## 3.3. Test Description

| Test Specification Clause | Test Case | Temperature Condition | Power Supply | Pass | Fail | NA | NP | Results |
|---|---|---|---|---|---|---|---|---|
| §15.255(b) RSS-210 Annex J.2 | Maximum E.I.R.P | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | |
| §15.215 RSS-Gen Clause 6.6 | Occupied bandwidth (20dB) | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | |
| §15.215 RSS-Gen Clause 6.7 | Occupied bandwidth (99%) | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | |
| §15.255(c) §15.209 RSS-210 Annex J.3 RSS-Gen Clause 8.9 | Spurious Emissions | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | |
| §15.255(e) RSS-210 Annex J.6 RSS-Gen Clause 8.11 | Frequency Stability | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | |
| §15.207 RSS-Gen Clause 8.8 | AC power-line conducted emissions limits | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | |
| §15.203 RSS-Gen Clause 6.8 | Antenna requirement | -/- | -/- | ☒ | ☐ | ☐ | ☐ | |

Remark:
1. NA means “not applicable”; NP means Not Performed;
2. The measurement uncertainty is not included in the test result.

Model SCA14000-2x4 and SCA14000-2x2 share the same Radio transmitter while only difference in overall size and several components, after pre-chck E.I.R.P. at both Model SCA14000-2x4 and SCA14000-2x2, measure description as following table;

| Description | Model: SCA14000-2x4 | Model: SCA14000-2x2 |
|---|---|---|
| Maximum E.I.R.P | ☒ | ☒ |
| Occupied bandwidth (20dB) | ☒ | ☐ |
| Occupied bandwidth (99%) | ☒ | ☐ |
| Frequency Stability | ☒ | ☐ |
| AC power-line conducted emissions limits | ☒ | ☒ |
| Spurious Emissions (30 MHz – 1 GHz) | ☒ | ☒ |
| Spurious Emissions (1 GHz – 18 GHz) | ☒ | ☒ |

| | | |
|---|---|---|
| Spurious Emissions (18 GHz – 40 GHz) | ☒ | ☐ |
| Spurious Emissions (40 GHz – 220 GHz) | ☒ | ☐ |

## 3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd..quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd.:

| Test | Range | Measurement Uncertainty | Notes |
|---|---|---|---|
| Radiated Emission | 30~1000MHz | 4.90 dB | (1) |
| Radiated Emission | 1~6GHz | 4.20 dB | (1) |
| Radiated Emission | 6~18GHz | 4.50 dB | (1) |
| Radiated Emission | 18-40GHz | 5.42 dB | (1) |
| Radiated Emission | Above 40 GHz | 5.50 dB | (1) |
| Conducted Disturbance | 0.15~30MHz | 3.30 dB | (1) |

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

## 3.5. Equipments Used during the Test

| Conducted Emission | | | | | | |
|---|---|---|---|---|---|---|
| Item | Test Equipment | Manufacturer | Model No. | Equipment No. | Last Cal. | Cal.Due |
| 1 | EMI Test Receiver | R&S | ESW26 | CQC-IVTS-E-JC02 | 2022/08/25 | 2023/08/24 |
| 2 | Artificial Mains | R&S | ENV216 | CQC-IVTS-E-JC16 | 2022/08/25 | 2023/08/24 |
| 3 | Artificial Mains | R&S | ENV4200 | CQC-IVTS-E-JC17 | 2022/08/25 | 2023/08/24 |
| 4 | EMI Test Software | R&S | EMC32 | N/A | N/A | N/A |

| Radiated Emission | | | | | | |
|---|---|---|---|---|---|---|
| Item | Test Equipment | Manufacturer | Model No. | Equipment No. | Last Cal. | Cal.Due |
| 1 | EMI Test Receiver | R&S | ESW26 | 103003 | 2022/08/25 | 2023/08/24 |
| 2 | Spectrum Analyzer | R&S | FSW43 | 10182 | 2022/08/25 | 2023/08/24 |
| 3 | Ultra-Broadband Antenna | Schwarzbeck | VULB9168 | 1291 | 2021/09/05 | 2022/09/04 |
| 4 | Horn Antenna | ETS-Lindgren | 3117 | 102732 | 2021/09/05 | 2022/09/04 |
| 5 | Amplifier | R&S | SCU01F | 100369 | 2022/08/25 | 2023/08/24 |
| 6 | Amplifier | R&S | SCU18F | 100868 | 2022/08/25 | 2023/08/24 |
| 7 | Amplifier | R&S | SCU26F | 100781 | 2022/08/25 | 2023/08/24 |
| 8 | Horn Antenna | A-INFO | LB-180500H | 211008100089 | 2021/09/05 | 2022/09/04 |
| 9 | EMI Test Software | R&S | EMC32 | N/A | N/A | N/A |
| 10 | TC-RX50 | Tonscond | Receive Unit | 1544 | N/A | N/A |
| 11 | TC-RX75 | Tonscond | Receive Unit | 1545 | N/A | N/A |
| 12 | TC-RX110 | Tonscond | Receive Unit | 1546 | N/A | N/A |
| 13 | TC-RX170 | Tonscond | Receive Unit | 1547 | N/A | N/A |
| 14 | TC-RX240 | Tonscond | Receive Unit | 1548 | N/A | N/A |
| 15 | TC-RX40 | Tonscond | Receive Unit | 1543 | N/A | N/A |
| 16 | Signal Generator | R&S | SMW200A | 170436 | 2022/08/25 | 2023/08/24 |
| 17 | Thermal chamber | ESPEC | GFS-800-15 | 0050-001161 | 2022/07/26 | 2023/07/25 |

# 4. TEST CONDITIONS AND RESULTS

## 4.1. Field Strength of Emissions

### 4.1.1. LIMITS

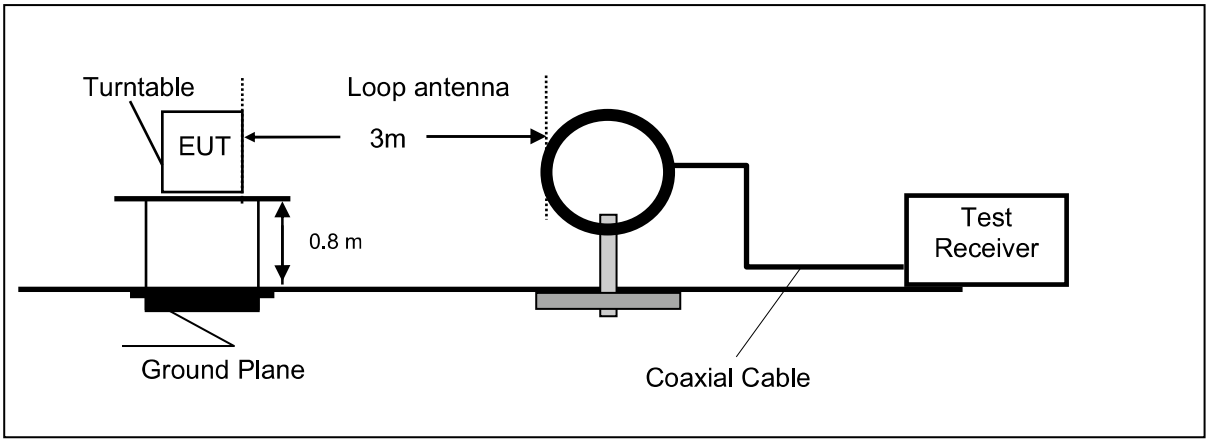
(a) According to § 15.255(d) and RSS-210 J3: Limits on spurious emissions:
(1) The power density of any emissions outside the 57–71 GHz band shall consist solely of spurious emissions.
(2) Radiated emissions below 40 GHz shall not exceed the general limits in § 15.209.and RSS-Gen.
(3) Between 40 GHz and 200 GHz, the level of these emissions shall not exceed 90 pW/cm$^2$ at a distance of 3 meters.
(4) The levels of the spurious emissions shall not exceed the level of the fundamental emission.

| Frequency (MHz) | Distance (Meters) | Radiated (dBμV/m) | Radiated (μV/m) |
|---|---|---|---|
| 0.009-0.49 | 3 | 20log(2400/F(KHz))+40log(300/3) | 2400/F(KHz) |
| 0.49-1.705 | 3 | 20log(24000/F(KHz))+ 40log(30/3) | 24000/F(KHz) |
| 1.705-30 | 3 | 20log(30)+ 40log(30/3) | 30 |
| 30-88 | 3 | 40.0 | 100 |
| 88-216 | 3 | 43.5 | 150 |
| 216-960 | 3 | 46.0 | 200 |
| Above 960 | 3 | 54.0 | 500 |

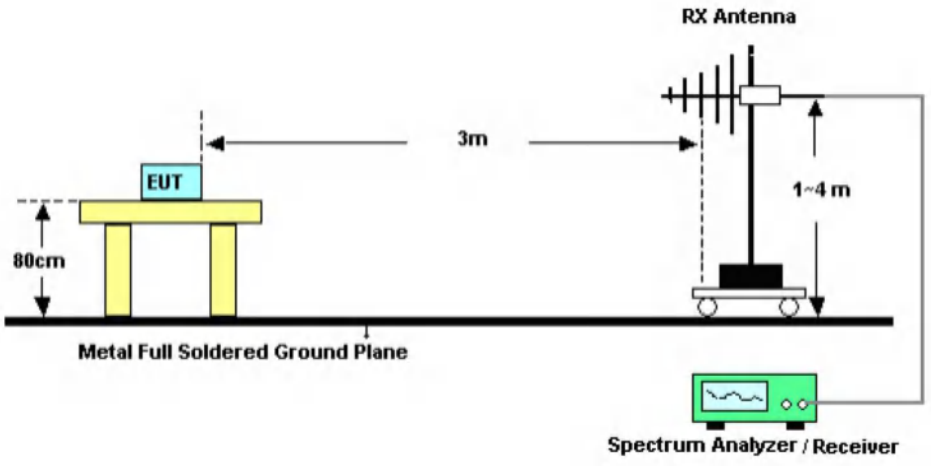
(b) Limits conversion:
P[dBm] = 10 x $\log_{10}$ (4 x Π x d$^2$ x P [W/cm$^2$]]
d = distance of the limit defined in m
when d =3m and P = 90 pW/cm$^2$,
P [dBm] = 10 x $\log_{10}$ (4 x 3.14 x 3$^2$ x 10$^4$ x 90 x 10$^{-9}$) = **- 10dBm**
(c) Measure distance conversion factor:
P [dB] = 10 x $\log_{10}$ (d $_{measured}$ / d $_{reference}$)
= 10 x $\log_{10}$(1/3)
=**-5 dB**
when measured distance is 1m and limit reference distance is 3m.

### 4.1.2. TEST CONFIGURATION

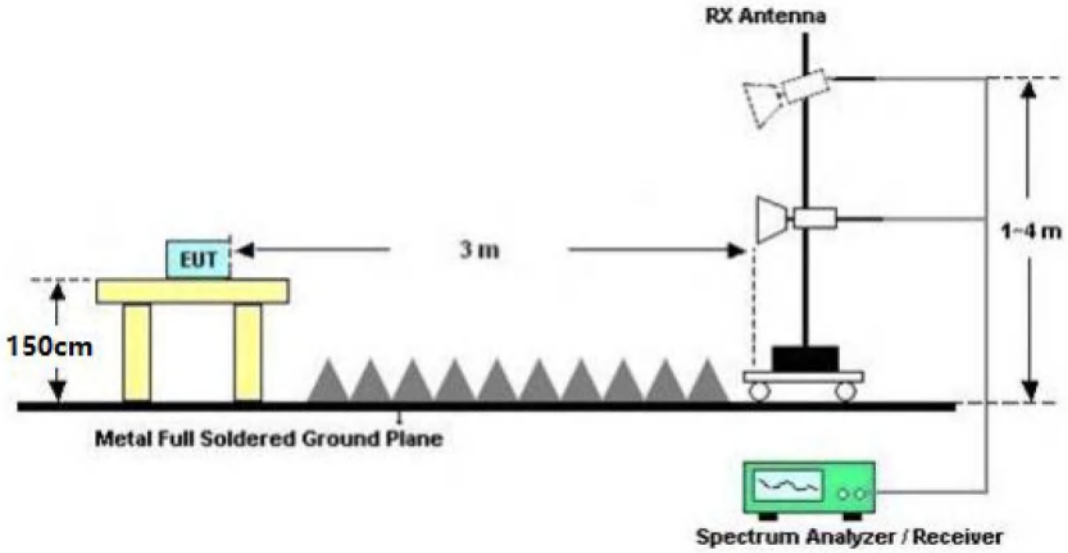
(a) Frequency range 9 KHz – 30MHz



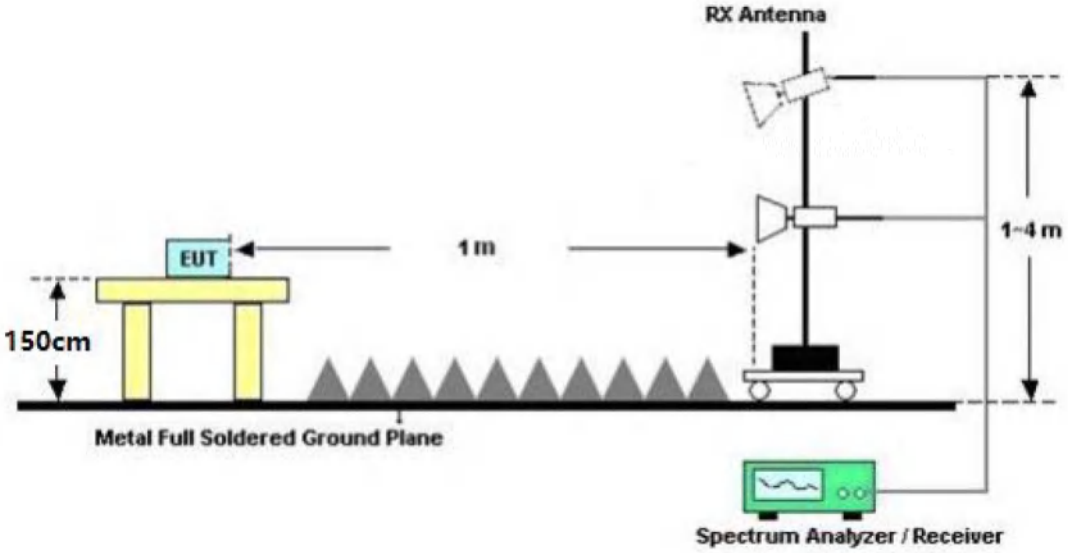
(b) Radiated emission test set-up, frequency range: 30 - 1000MHz




(c) Radiated emission test set-up, frequency range 1GHz – 18 GHz




(d) Radiated emission test set-up, frequency range above 18GHz




### 4.1.3. TEST PROCEDURE

#### 4.1.3.1 Sequence of testing radiated spurious 9 KHz to 30 MHz

**Setup**

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer
- If the EUT is a tabletop system, 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measuremet distance is 3m (see ANSI C63.4) – see test details.
- EUT is set into operation.

**Premeasurement**
- The turntable rotates from 0 degree to 360 degree.
- The antenna height is 1.5m.
- Set RBW = 200 Hz / VBW = 1 KHz, sweep time: Auto
- At each turntable position the anzlyer sweeps with position-peak detector to find the maximum of all emissions.

**Final measurement**
- Identified emissions during the premeaurement are maximized by the software by rotating the turntable from 0 degree to 360 degree.
- The final measurement is done in the position (turntable and elevation) causing the highest emissions with quasi-peak (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, conrrection factor, margin to the limit and limit will be recorded. A plot with the graph of the measurement and the limit is stored.

#### 4.1.3.2 Sequence of testing radiated spurious 30 MHz to 1 GHz

**Setup**
- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer
- If the EUT is a tabletop system, 0.8 m height is used, which is placed on the ground plance.
- If the EUT is a floor standing device, it is placed directly on the ground plane.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measuremet distance is 3m (see ANSI C63.4) – see test details.
- EUT is set into operation.

**Premeasurement**
- The turntable rotates from 0 degree to 360 degree.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1m to 4m.
- Set RBW = 120 KHz / VBW = 1 MHz, sweep time: Auto
- At each turntable position the anzlyer sweeps with position-peak detector to find the maximum of all emissions.

**Final measurement**
- The final measurement is perormed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable and antenna height between 1 and 4 m.
- The final measurement is done with quasi-peak detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, conrrection factor, margin to the limit and limit will be recorded. A plot with the graph of the measurement and the limit is stored.

#### 4.1.3.3 Sequence of testing radiated spurious 1 GHz to 18 GHz

**Setup**
- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer
- If the EUT is a tabletop system, 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turntable.

- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measuremet distance is 3m (see ANSI C63.4) – see test details.
- EUT is set into operation.

**Premeasurement**
- The turntable rotates from 0 degree to 360 degree.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1m to 4m.
- Set RBW = 1 MHz / VBW = 3 MHz, sweep time: Auto, detector: Peak for Peak, RBW = 1 MHz / VBW = 3 MHz, sweep time: Auto, detector: Average for Average.
- At each turntable position the anzlyer sweeps with position-peak detector to find the maximum of all emissions.

**Final measurement**
- The final measurement is perormed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable and antenna height between 1 and 4 m.
- The final measurement is done in the position (turntable, EUT-table and antenna polarization) causing the height emissions with Peak and Average detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, conrrection factor, margin to the limit and limit will be recorded. A plot with the graph of the measurement and the limit is stored.

#### 4.1.3.4 Sequence of testing radiated spurious above 18 GHz

**Setup**
- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer
- If the EUT is a tabletop system, 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turntable.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measuremet distance is 1m (see ANSI C63.4) – see test details.
- EUT is set into operation.

**Premeasurement**
- The turntable rotates from 0 degree to 360 degree.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1m to 4m.
- Set RBW = 1 MHz / VBW = 3 MHz, sweep time: Auto, detector: Peak for Peak, RBW = 1 MHz / VBW = 3 MHz, sweep time: Auto, detector: Average for Average.
- At each turntable position the anzlyer sweeps with position-peak detector to find the maximum of all emissions.

**Final measurement**
- The final measurement is perormed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable and antenna height between 1 and 4 m.
- The final measurement is done in the position (turntable, EUT-table and antenna polarization) causing the height emissions with Peak and RMS detector (as described in ANSI C 63.4).
- All final levels should consider distance conversion factor as format: Final values (3 m) = Measurement values (1 m) + Distance conversion factor
  Distance conversion factor = 20 x $Log_{10}$ (d/3), where d = measurement distance in m
  - Distance conversion factor = 20 x $Log_{10}$ (1/3) = -10.0 [dB]
- Final levels, frequency, measuring time, bandwidth, turntable position, conrrection factor, margin to the limit and limit will be recorded. A plot with the graph of the measurement and the limit is stored.

#### 4.1.3.5 Sequence of testing radiated spurious above 40 GHz with external mixers

**Setup**

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer
- If the EUT is a tabletop system, 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turntable.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measuremet distance is 1m (see ANSI C63.4) – see test details.
- EUT is set into operation.

**Premeasurement**

- The turntable rotates from 0 degree to 360 degree.
- The antenna with external mixer is polarized vertical and horizontal.
- The antenna height changes from 1m to 4m.
- Set RBW = 1 MHz / VBW = 3 MHz, sweep time: 220s detector: Peak.
- At each turntable position the anzlyer sweeps with position-peak detector to find the maximum of all emissions.

**Final measurement**

- The final measurement is perormed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable and antenna height between 1 and 4 m.
- The final measurement is done in the position (turntable, EUT-table and antenna polarization) causing the height emissions with Peak and RMS detector (as described in ANSI C 63.4).
- All final levels should consider distance conversion factor as format: Final values (3 m) = Measurement values (1 m) + Distance conversion factor
  Distance conversion factor = 10 x $Log_{10}$ (d/3), where d = measurement distance in m
  - Distance conversion factor = 10 x $Log_{10}$ (1/3) = -5.0 [dB]
- Final levels, frequency, measuring time, bandwidth, turntable position, conrrection factor, margin to the limit and limit will be recorded. A plot with the graph of the measurement and the limit is stored.

### 4.1.4. FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

**FS (dBuV/m) = RA (dBuV) + AF (dB/m) + CL (dB) – AG (dB)**

| | |
|---|---|
| Where FS = Field Strength | CL = Cable Attenuation Factor (Cable Loss) |
| RA = Reading Amplitude | AG = Amplifier Gain |
| AF = Antenna Factor | |

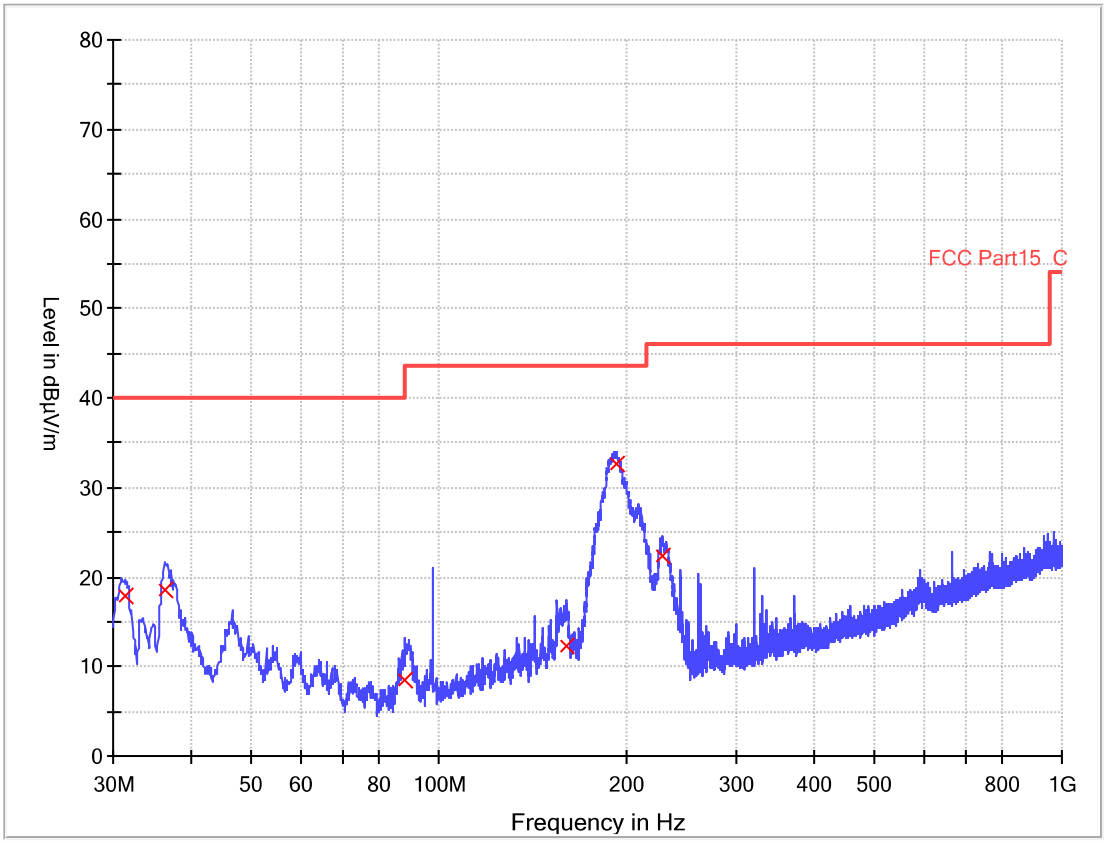
### 4.1.5. TEST RESULTS

PASS

*Remark:*

1. Radiated emission below 18 GHz (30 MHz – 18 GHz) measured both EUTs (EUT A and EUT B), radiated emission above 18 GHz measured at EUTA.
2. Not recorded values after pre-test below 30 MHz (9 KHz – 30 MHz), values at least 20 dB below limit.
3. Distance conversion factor offset in test plots.

Plots No. 1: 30 MHz to 1 GHz, Horizontal _ EUT A



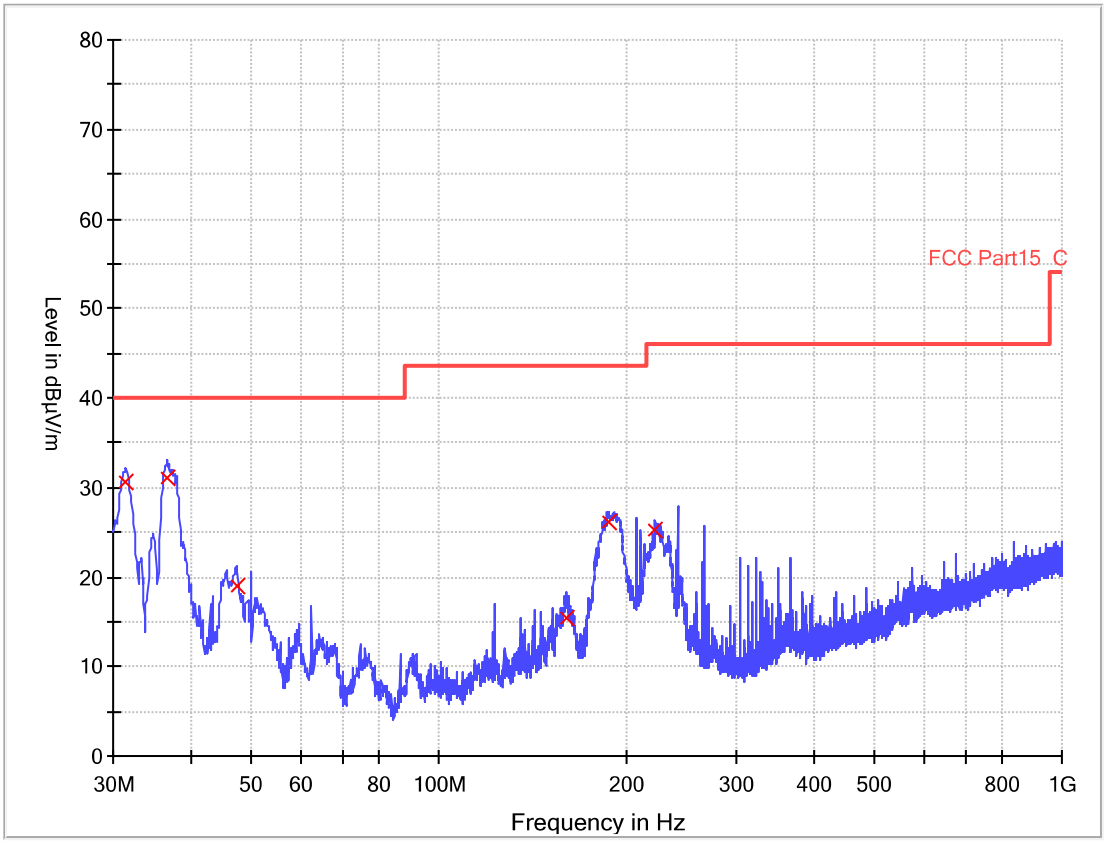

## Limit and Margin

| Frequency (MHz) | QuasiPeak (dBuV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) | Margin - QPK (dB) |
|---|---|---|---|---|---|---|---|---|
| 31.360000 | 17.8 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -25.4 | 22.2 |
| 36.320000 | 18.5 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -24.8 | 21.5 |
| 88.200000 | 8.5 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -28.3 | 35.0 |
| 160.080000 | 12.2 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -23.1 | 31.3 |
| 192.880000 | 32.7 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -26.4 | 10.8 |
| 228.360000 | 22.3 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -25.6 | 23.7 |

**(continuation of the "Limit and Margin" table from column 16 ...)**

| Frequency (MHz) | Limit - QPK (dBuV/m) | Comment |
|---|---|---|
| 31.360000 | 40.0 | |
| 36.320000 | 40.0 | |
| 88.200000 | 43.5 | |
| 160.080000 | 43.5 | |
| 192.880000 | 43.5 | |
| 228.360000 | 46.0 | |

Plots No. 2: 30 MHz to 1 GHz, Vertical Polarization _ EUT A



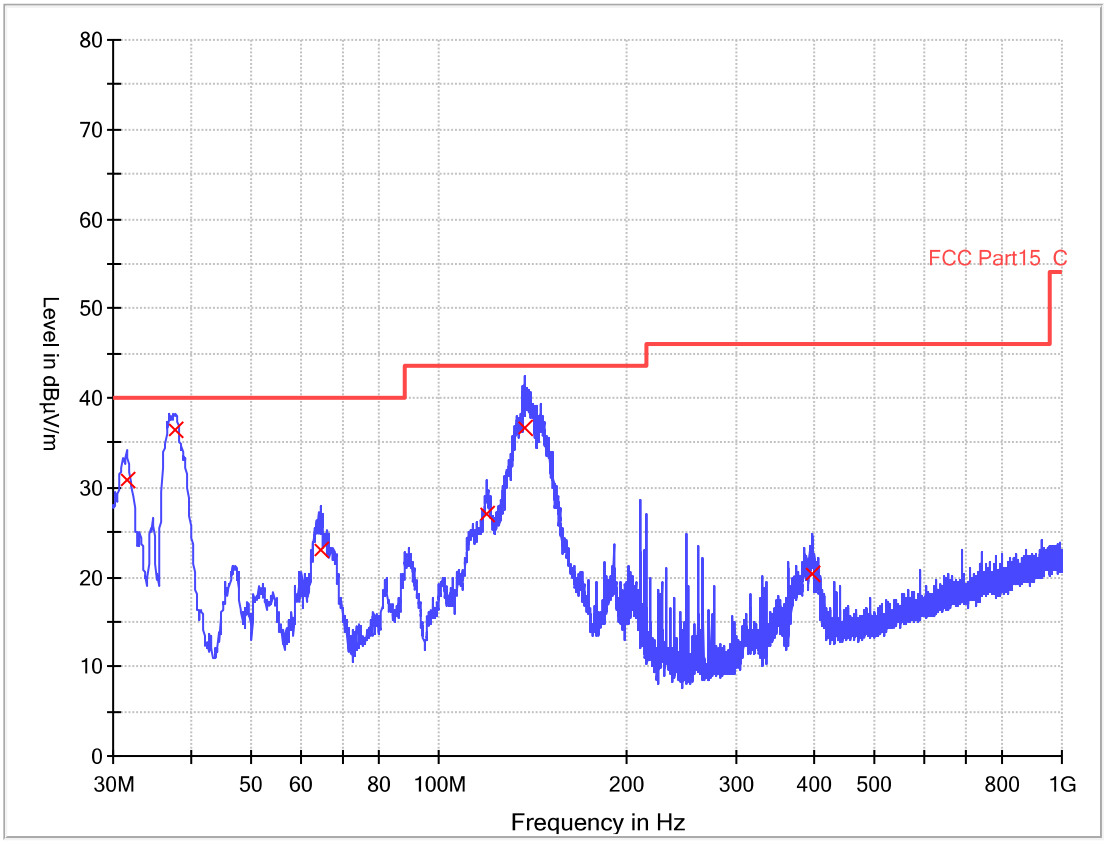

## Limit and Margin

| Frequency (MHz) | QuasiPeak (dBuV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) | Margin - QPK (dB) |
|---|---|---|---|---|---|---|---|---|
| 31.440000 | 30.7 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -25.4 | 9.4 |
| 36.600000 | 31.0 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -24.8 | 9.0 |
| 47.280000 | 19.1 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -24.7 | 20.9 |
| 160.160000 | 15.4 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -23.1 | 28.1 |
| 186.480000 | 26.0 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -26.0 | 17.5 |
| 222.360000 | 25.3 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -26.0 | 20.8 |

**(continuation of the "Limit and Margin" table from column 16 ...)**

| Frequency (MHz) | Limit - QPK (dBuV/m) | Comment |
|---|---|---|
| 31.440000 | 40.0 | |
| 36.600000 | 40.0 | |
| 47.280000 | 40.0 | |
| 160.160000 | 43.5 | |
| 186.480000 | 43.5 | |
| 222.360000 | 46.0 | |

Plots No. 3: 30 MHz to 1 GHz, Vertical Polarization _ EUT B



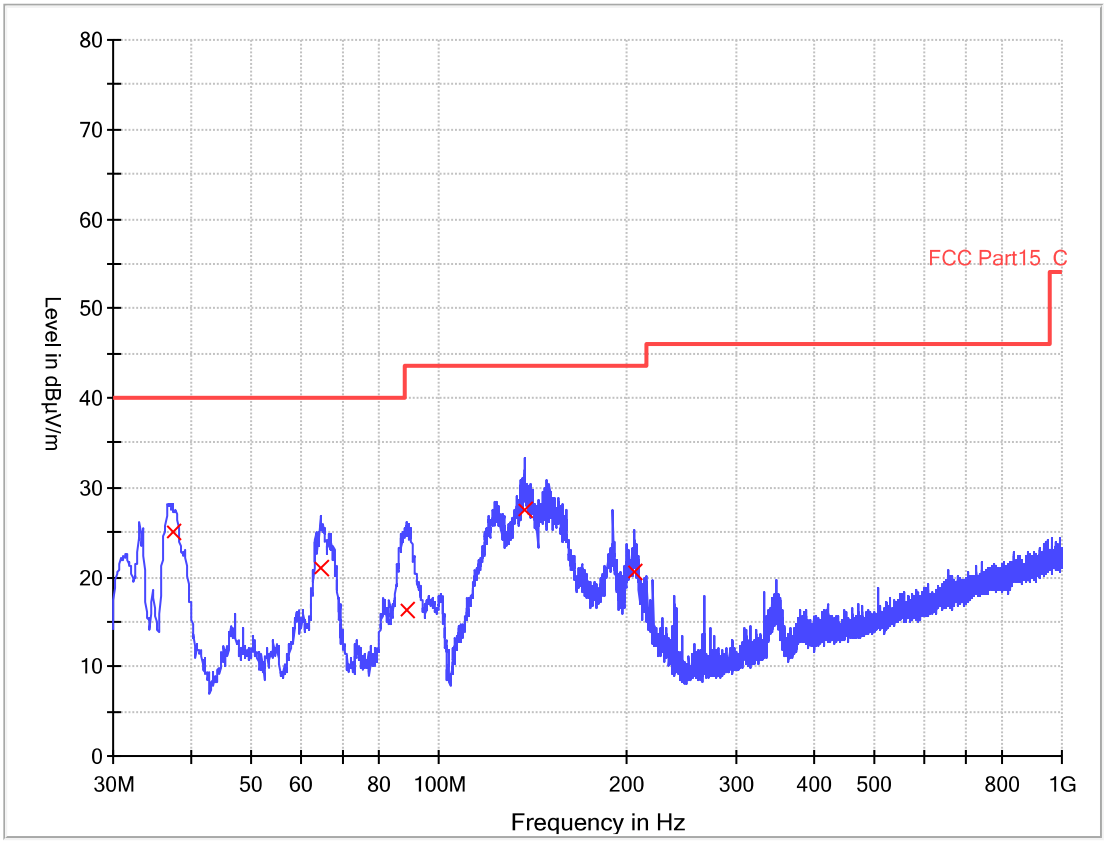

## Limit and Margin

| Frequency (MHz) | QuasiPeak (dBuV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) | Margin - QPK (dB) |
|---|---|---|---|---|---|---|---|---|
| 31.560000 | 30.9 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -25.3 | 9.1 |
| 37.760000 | 36.4 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -24.5 | 3.6 |
| 64.720000 | 23.0 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -26.1 | 17.0 |
| 119.520000 | 27.1 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -25.2 | 16.4 |
| 137.480000 | 36.7 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -24.0 | 6.8 |
| 396.280000 | 20.4 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -20.8 | 25.6 |

**(continuation of the "Limit and Margin" table from column 16 ...)**

| Frequency (MHz) | Limit - QPK (dBuV/m) | Comment |
|---|---|---|
| 31.560000 | 40.0 | |
| 37.760000 | 40.0 | |
| 64.720000 | 40.0 | |
| 119.520000 | 43.5 | |
| 137.480000 | 43.5 | |
| 396.280000 | 46.0 | |

Plots No. 4: 30 MHz to 1 GHz, Horizontal Polarization _ EUT B



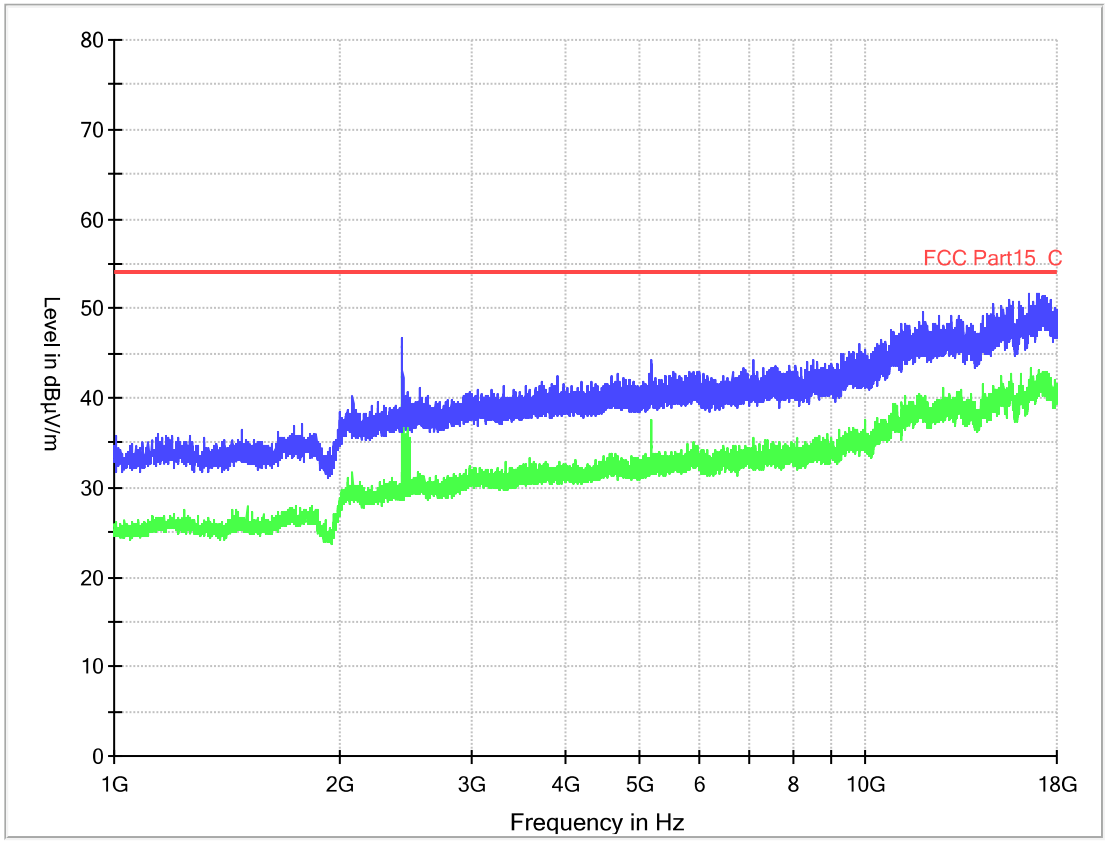

## Limit and Margin

| Frequency (MHz) | QuasiPeak (dBuV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) | Margin - QPK (dB) |
|---|---|---|---|---|---|---|---|---|
| 37.480000 | 25.1 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -24.6 | 15.0 |
| 64.520000 | 21.0 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -26.1 | 19.0 |
| 88.680000 | 16.4 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -28.2 | 27.1 |
| 137.080000 | 27.5 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -24.0 | 16.0 |
| 205.560000 | 20.5 | 1000.0 | 120.000 | 200.0 | H | 180.0 | -26.7 | 23.1 |

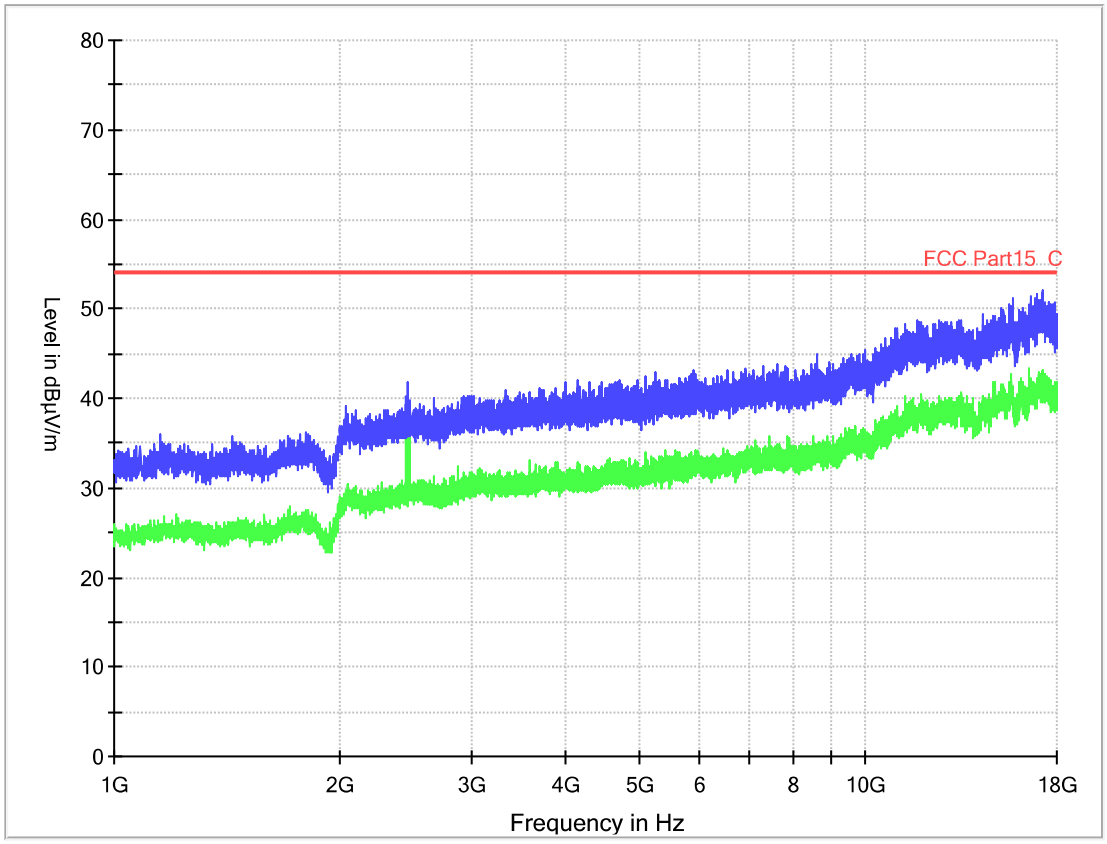
**(continuation of the "Limit and Margin" table from column 16 ...)**

| Frequency (MHz) | Limit - QPK (dBuV/m) | Comment |
|---|---|---|
| 37.480000 | 40.0 | |
| 64.520000 | 40.0 | |
| 88.680000 | 43.5 | |
| 137.080000 | 43.5 | |

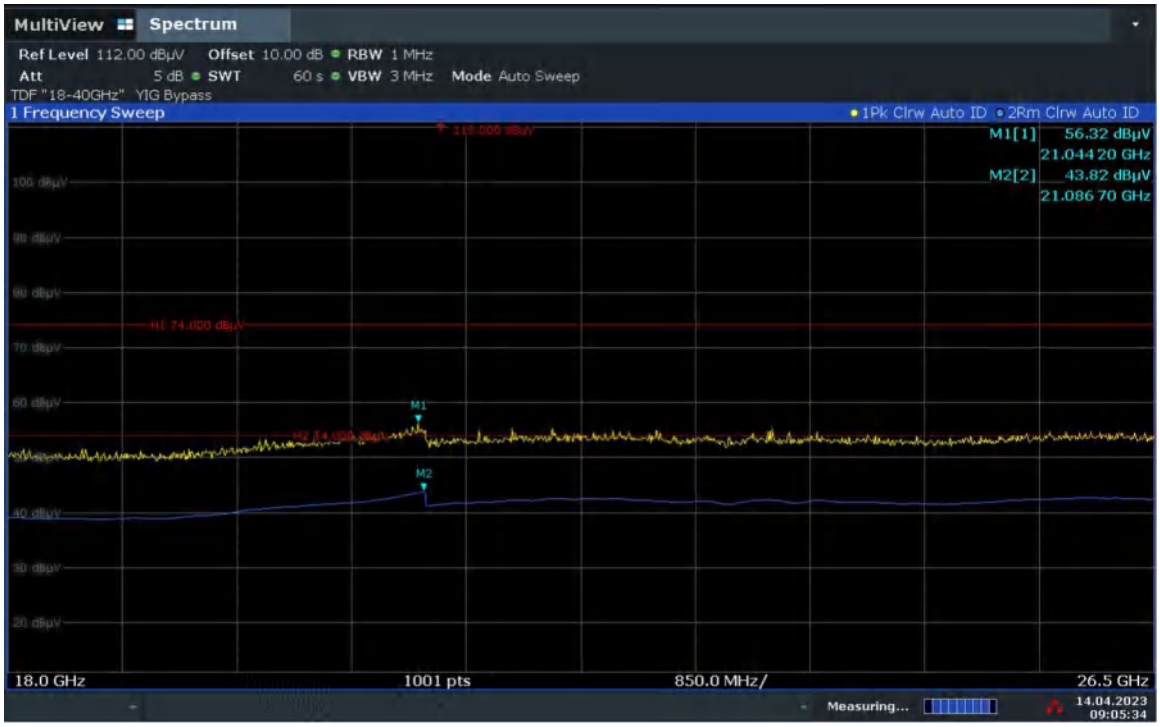
Plots No. 5: 1 GHz to 18 GHz, Horizontal / Vertical Polarization _ EUT A



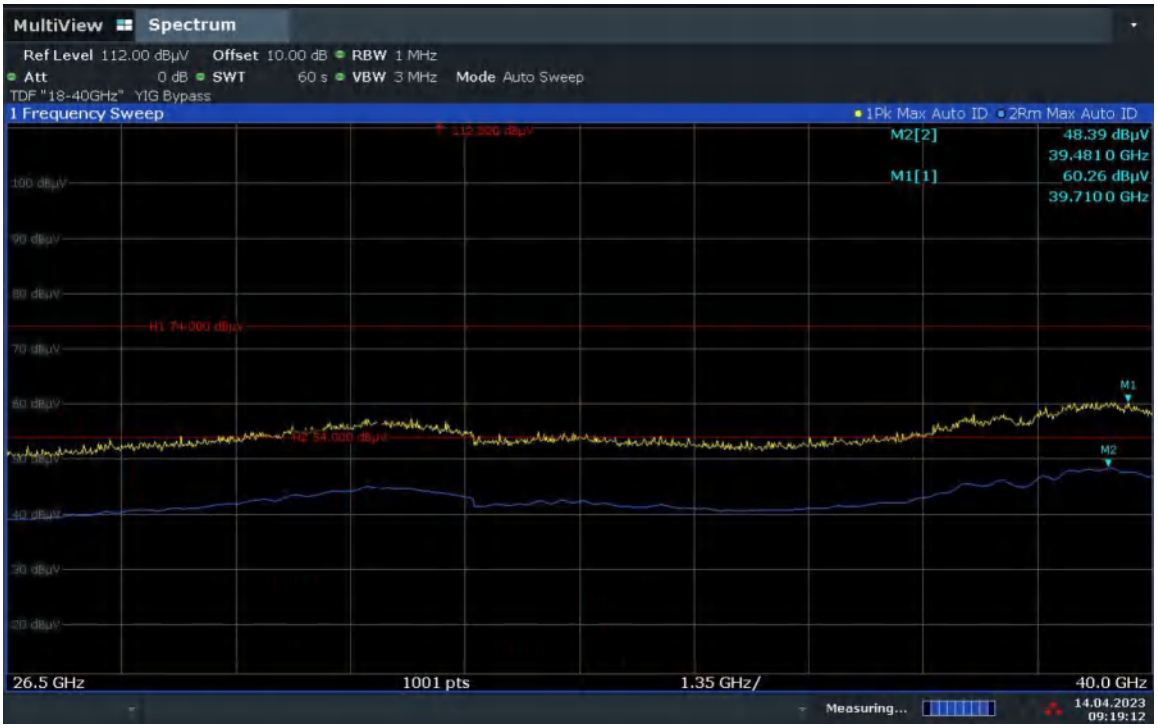

Plots No. 6: 1 GHz to 18 GHz, Horizontal / Vertical Polarization _ EUT B



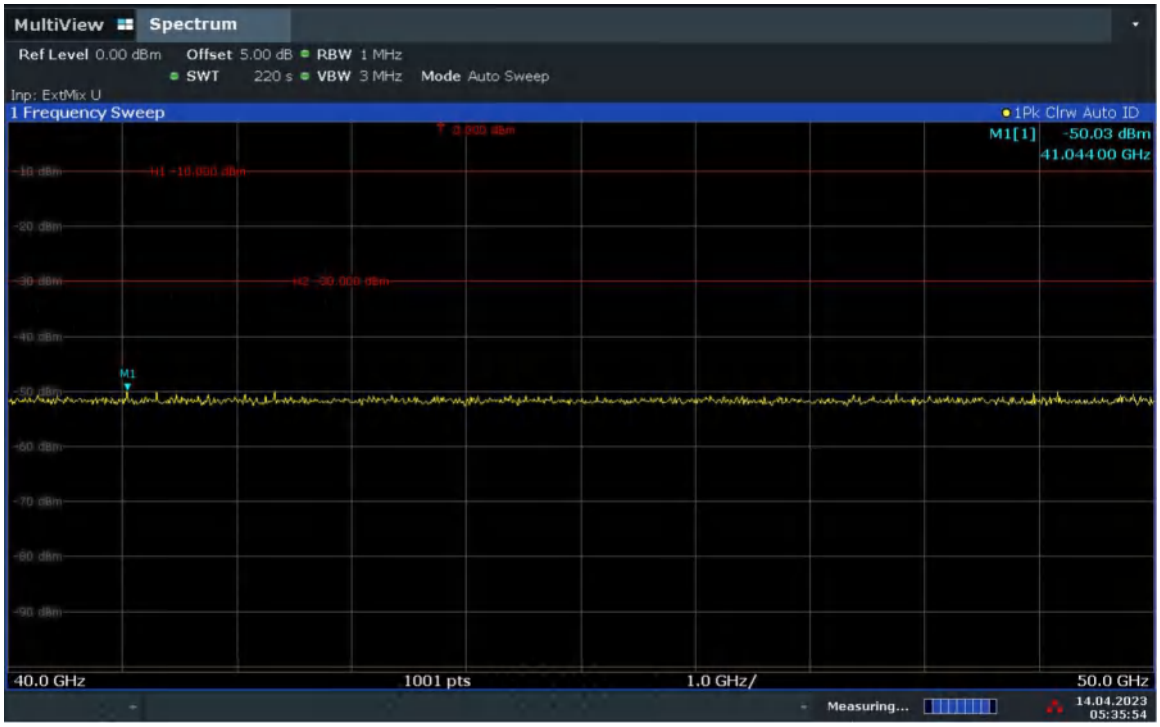
Plots No. 7: 18 GHz to 26 GHz, Horizontal / Vertical Polarization_ EUT A



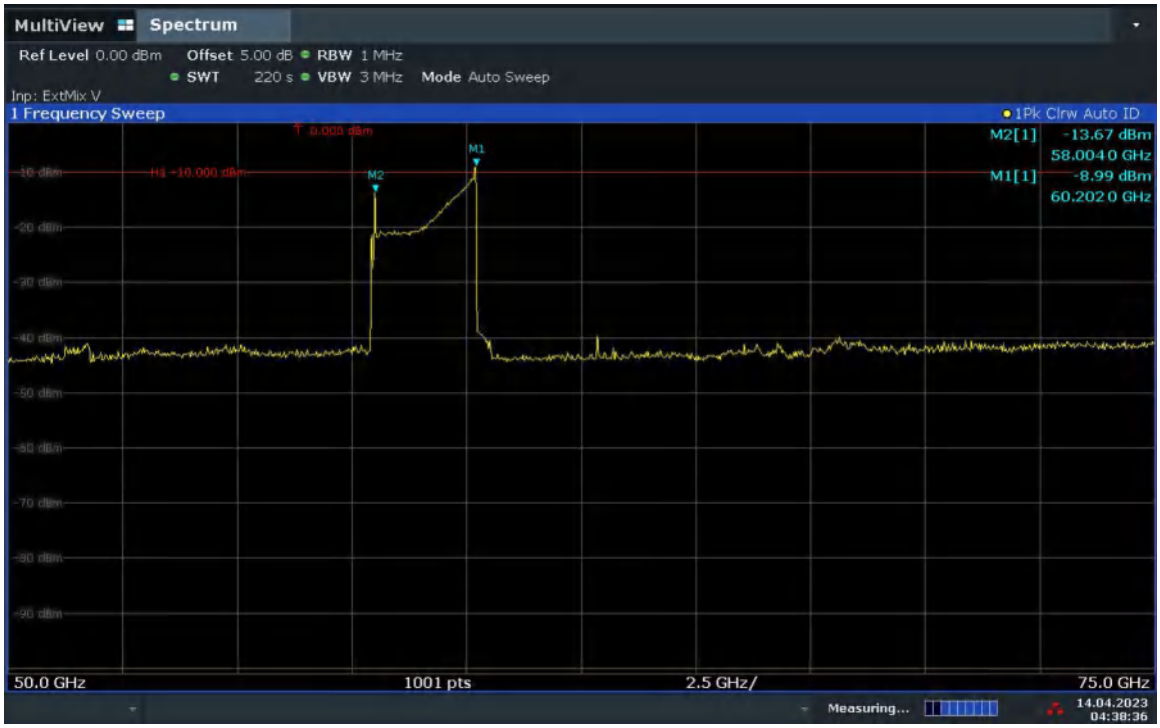

Plots No. 8: 26 GHz to 40 GHz, Horizontal / Vertical Polarization_ EUT A



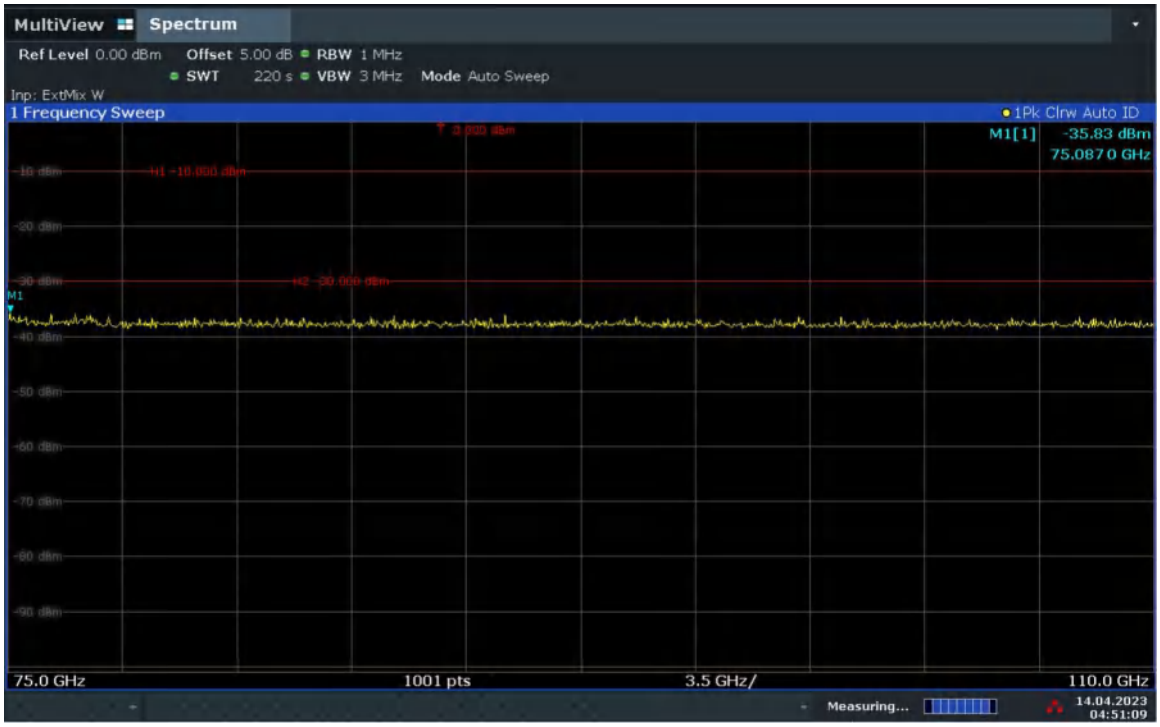
Plots No. 9: 40 GHz to 50 GHz, Horizontal / Vertical Polarization_ EUT A



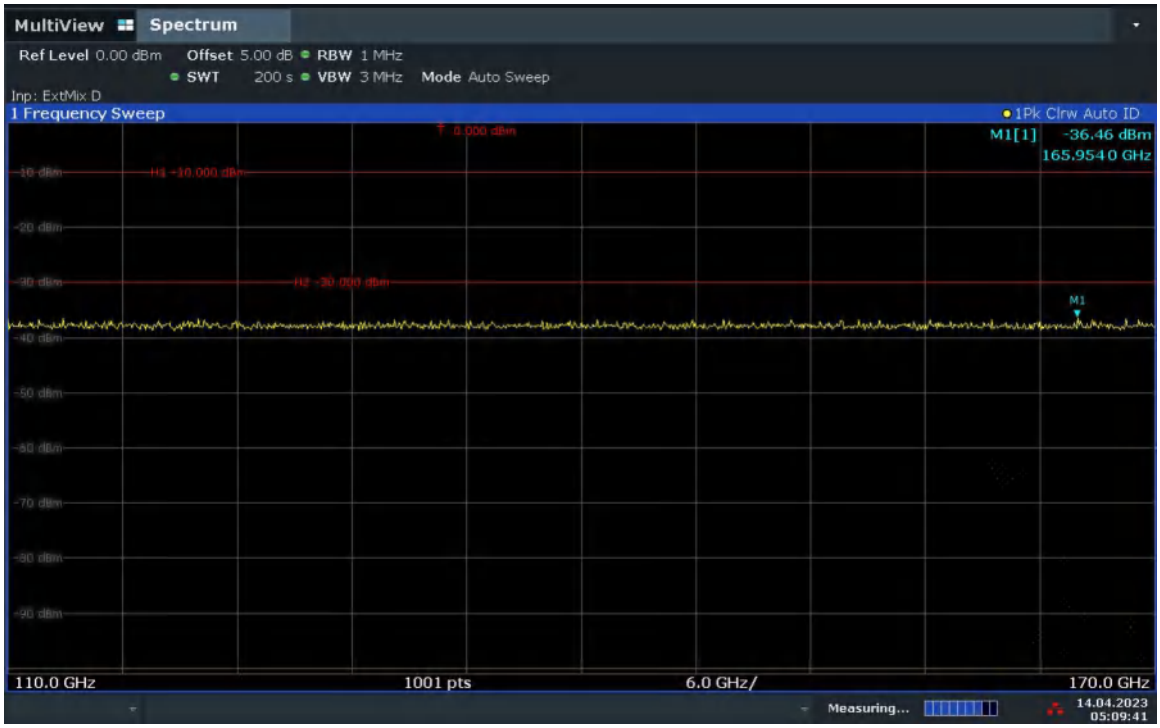

Plots No. 10: 50 GHz to 75 GHz, Horizontal / Vertical Polarization_ EUT A



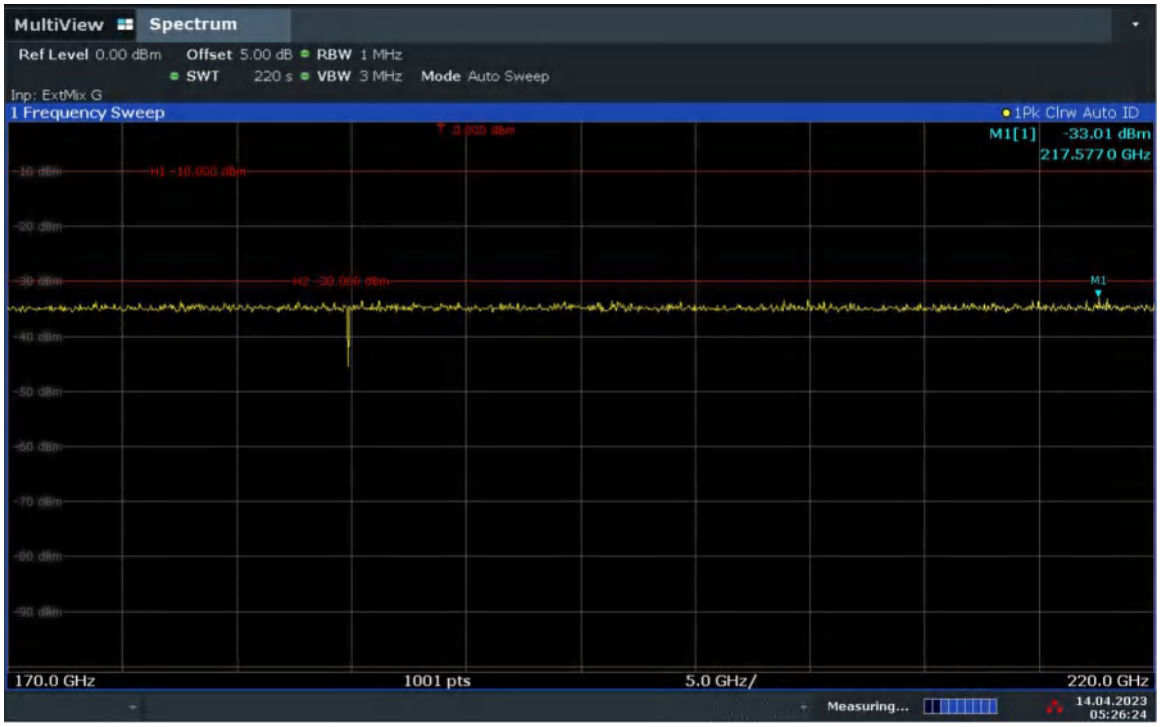
Plots No. 11: 75 GHz to 110 GHz, Horizontal / Vertical Polarization_ EUT A




Plots No. 12: 110 GHz to 170 GHz, Horizontal / Vertical Polarization_ EUT A



Plots No. 13: 170 GHz to 220 GHz, Horizontal / Vertical Polarization_ EUT A



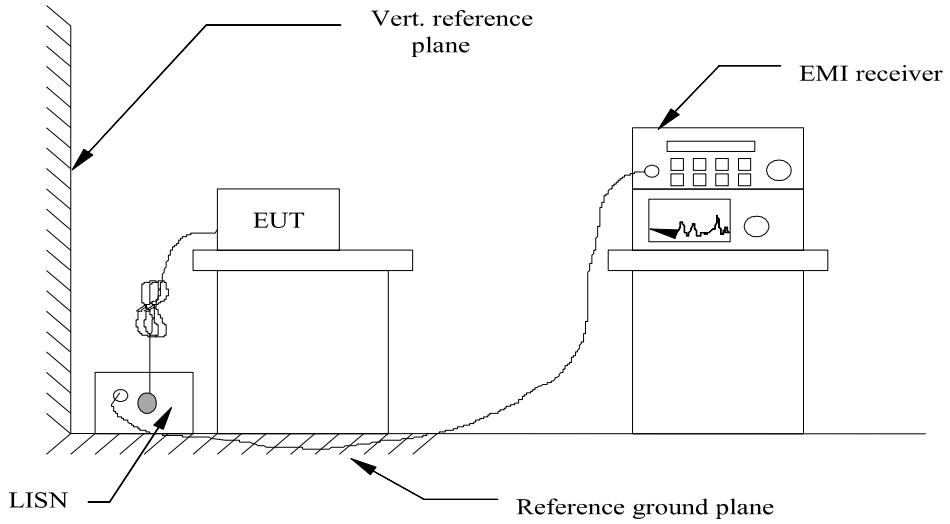
## 4.2. AC Conducted Emission

### 4.2.1. LIMITS OF DISTURBANCE

According to RSS Gen 8.8 and § 15.207(a) Line Conducted Emission Limits is as following:

| Frequency range (MHz) | Limit (dBuV) | |
|---|---|---|
| | 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. | | |

### 4.2.2. TEST CONFIGURATION




### 4.2.3. TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
2. Support equipment, if needed, was placed as per ANSI C63.10-2013
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
4. The EUT received DC 12V power from adapter, the adapter received AC120V/60Hz and AC 240V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipment received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50-ohm load; the second scan had Line 1 connected to a 50-ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

### 4.2.4. DISTURBANCE CALCULATION

The AC mains conducted disturbance is calculated by adding the 10dB Pulse Limiter and Cable Factor and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

**CD (dBuV) = RA (dBuV) + PL (dB) + CL (dB)**

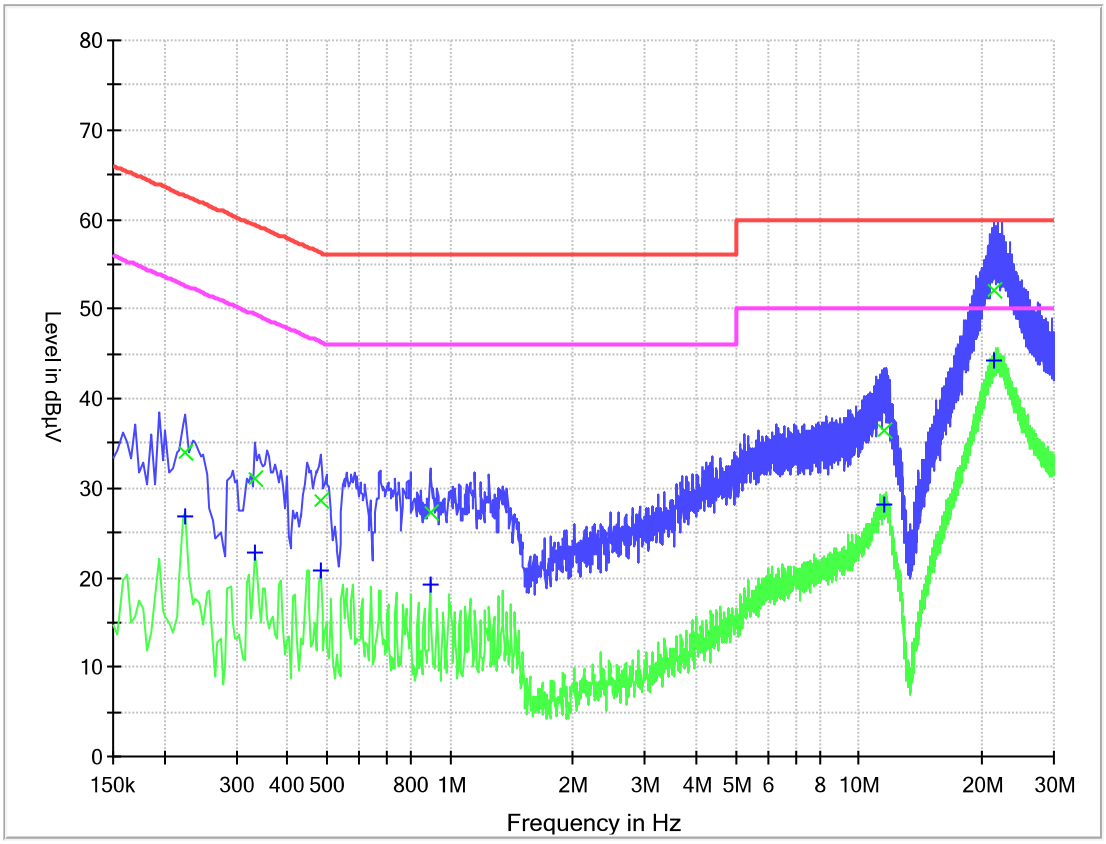
| | |
|---|---|
| Where CD = Conducted Disturbance | CL = Cable Attenuation Factor (Cable Loss) |
| RA = Reading Amplitude | PL = 10 dB Pulse Limiter Factor |

### 4.2.5. TEST RESULTS

**PASS**

*Remark:*
1. Measured both 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz power supply only reported worst case at 120 VAC, 60 Hz as below:.

Plots No. 14: Neutral Line _ EUT A



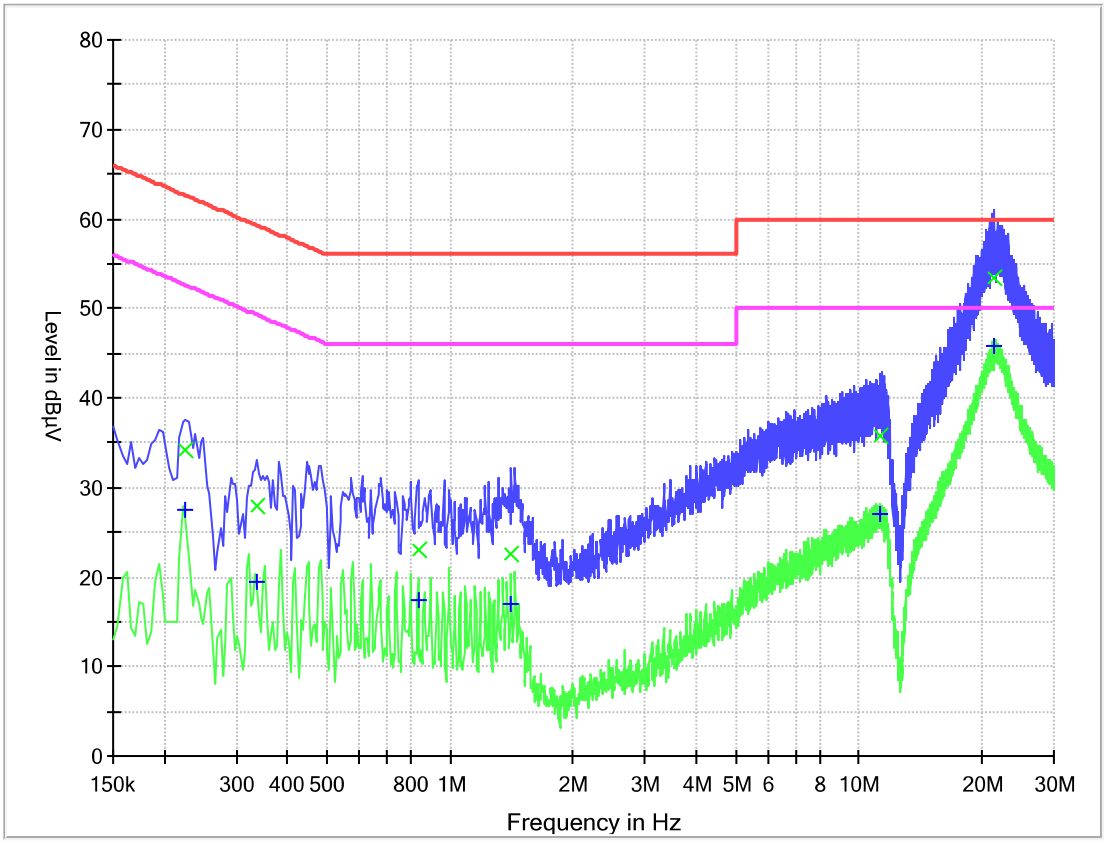

## Limit and Margin

| Frequency (MHz) | MaxPeak (dBuV) | QuasiPeak (dBuV) | Average (dBuV) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|
| 0.226000 | --- | 34.0 | 26.9 | 10.0 | 9.000 | LOCAL | OFF | 9.7 |
| 0.334000 | --- | 31.0 | 22.7 | 10.0 | 9.000 | LOCAL | OFF | 9.7 |
| 0.482000 | --- | 28.6 | 20.8 | 10.0 | 9.000 | LOCAL | OFF | 9.7 |
| 0.894000 | --- | 27.2 | 19.3 | 10.0 | 9.000 | LOCAL | OFF | 9.8 |
| 11.530000 | --- | 36.4 | 28.1 | 10.0 | 9.000 | LOCAL | OFF | 10.4 |
| 21.494000 | --- | 52.0 | 44.2 | 10.0 | 9.000 | LOCAL | OFF | 10.7 |

**(continuation of the "Limit and Margin" table from column 14 ...)**

| Frequency (MHz) | Margin - QPK (dB) | Limit - QPK (dBuV) | Margin - AVG (dB) | Limit - AVG (dBuV) | Comment |
|---|---|---|---|---|---|
| 0.226000 | 28.6 | 62.6 | 25.7 | 52.6 | |
| 0.334000 | 28.3 | 59.4 | 26.6 | 49.4 | |
| 0.482000 | 27.7 | 56.3 | 25.5 | 46.3 | |
| 0.894000 | 28.8 | 56.0 | 26.7 | 46.0 | |
| 11.530000 | 23.6 | 60.0 | 21.9 | 50.0 | |

Plots No. 15: Phase Line _ EUT A



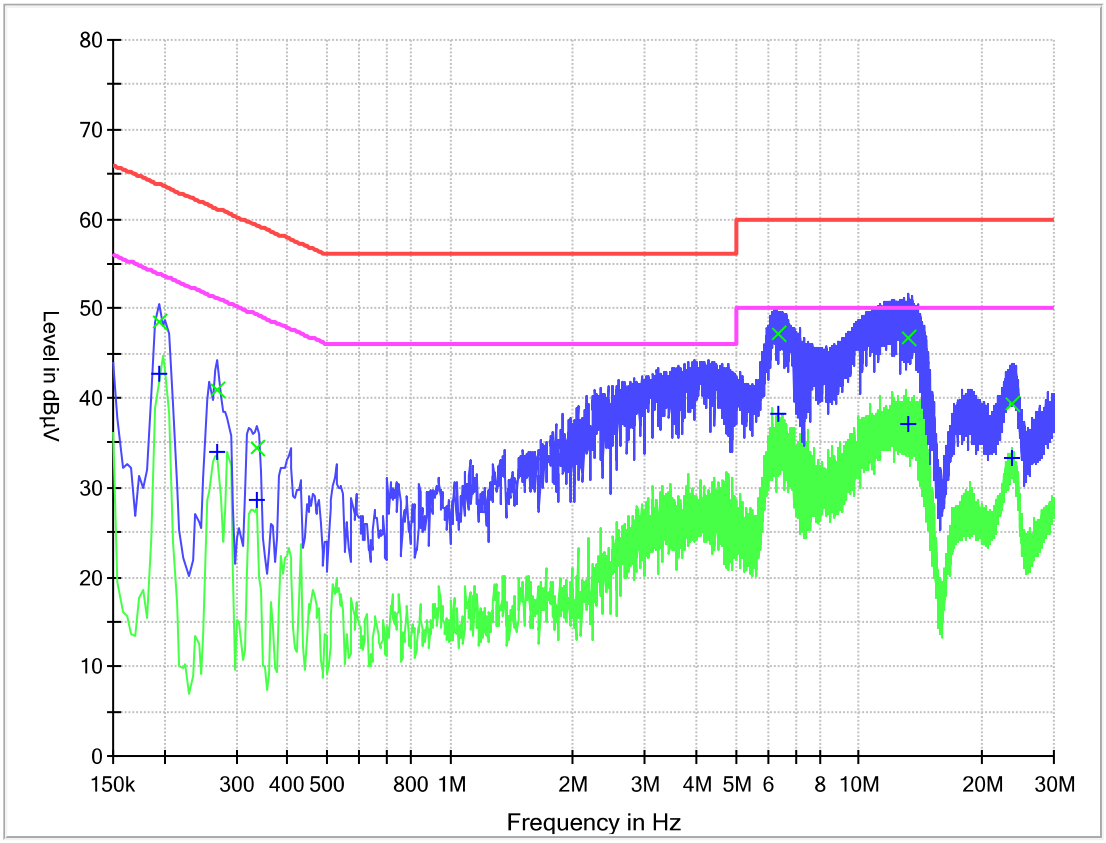

## Limit and Margin

| Frequency (MHz) | MaxPeak (dBuV) | QuasiPeak (dBuV) | Average (dBuV) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|
| 0.226000 | --- | 34.2 | 27.5 | 10.0 | 9.000 | LOCAL | OFF | 9.7 |
| 0.338000 | --- | 27.9 | 19.4 | 10.0 | 9.000 | LOCAL | OFF | 9.7 |
| 0.834000 | --- | 23.1 | 17.4 | 10.0 | 9.000 | LOCAL | OFF | 9.8 |
| 1.414000 | --- | 22.5 | 17.0 | 10.0 | 9.000 | LOCAL | OFF | 9.9 |
| 11.218000 | --- | 35.9 | 27.0 | 10.0 | 9.000 | LOCAL | OFF | 10.4 |
| 21.378000 | --- | 53.3 | 45.9 | 10.0 | 9.000 | LOCAL | OFF | 10.7 |

**(continuation of the "Limit and Margin" table from column 14 ...)**

| Frequency (MHz) | Margin - QPK (dB) | Limit - QPK (dBuV) | Margin - AVG (dB) | Limit - AVG (dBuV) | Comment |
|---|---|---|---|---|---|
| 0.226000 | 28.4 | 62.6 | 25.1 | 52.6 | |
| 0.338000 | 31.3 | 59.3 | 29.9 | 49.3 | |
| 0.834000 | 32.9 | 56.0 | 28.6 | 46.0 | |
| 1.414000 | 33.5 | 56.0 | 29.1 | 46.0 | |
| 11.218000 | 24.2 | 60.0 | 23.0 | 50.0 | |
| 21.378000 | 6.7 | 60.0 | 4.1 | 50.0 | |

Plots No. 16: Neutral Line _ EUT B



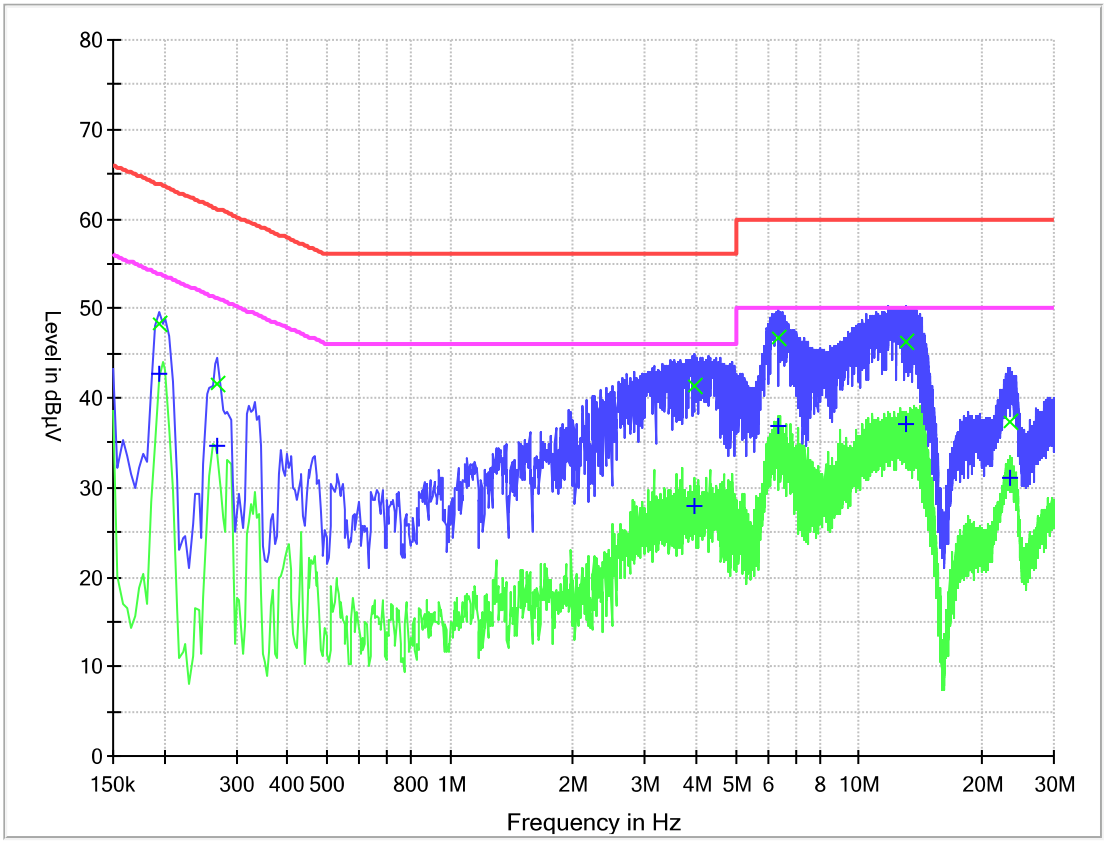

## Limit and Margin

| Frequency (MHz) | MaxPeak (dBuV) | QuasiPeak (dBuV) | Average (dBuV) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|
| 0.194000 | --- | 48.5 | 42.7 | 10.0 | 9.000 | LOCAL | OFF | 9.6 |
| 0.270000 | --- | 40.8 | 33.9 | 10.0 | 9.000 | LOCAL | OFF | 9.7 |
| 0.338000 | --- | 34.4 | 28.6 | 10.0 | 9.000 | LOCAL | OFF | 9.7 |
| 6.350000 | --- | 47.1 | 38.3 | 10.0 | 9.000 | LOCAL | OFF | 10.2 |
| 13.142000 | --- | 46.7 | 37.1 | 10.0 | 9.000 | LOCAL | OFF | 10.5 |
| 23.774000 | --- | 39.2 | 33.4 | 10.0 | 9.000 | LOCAL | OFF | 10.8 |

**(continuation of the "Limit and Margin" table from column 14 ...)**

| Frequency (MHz) | Margin - QPK (dB) | Limit - QPK (dBuV) | Margin - AVG (dB) | Limit - AVG (dBuV) | Comment |
|---|---|---|---|---|---|
| 0.194000 | 15.4 | 63.9 | 11.2 | 53.9 | |
| 0.270000 | 20.3 | 61.1 | 17.3 | 51.1 | |
| 0.338000 | 24.9 | 59.3 | 20.7 | 49.3 | |
| 6.350000 | 12.9 | 60.0 | 11.7 | 50.0 | |
| 13.142000 | 13.3 | 60.0 | 13.0 | 50.0 | |

Plots No. 17: Phase Line _ EUT B




## Limit and Margin

| Frequency (MHz) | MaxPeak (dBuV) | QuasiPeak (dBuV) | Average (dBuV) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|
| 0.194000 | --- | 48.4 | 42.6 | 10.0 | 9.000 | LOCAL | OFF | 9.6 |
| 0.270000 | --- | 41.6 | 34.6 | 10.0 | 9.000 | LOCAL | OFF | 9.7 |
| 3.950000 | --- | 41.4 | 27.9 | 10.0 | 9.000 | LOCAL | OFF | 10.1 |
| 6.334000 | --- | 46.6 | 37.0 | 10.0 | 9.000 | LOCAL | OFF | 10.2 |
| 12.998000 | --- | 46.3 | 37.0 | 10.0 | 9.000 | LOCAL | OFF | 10.5 |
| 23.358000 | --- | 37.4 | 31.1 | 10.0 | 9.000 | LOCAL | OFF | 10.8 |

**(continuation of the "Limit and Margin" table from column 14 ...)**

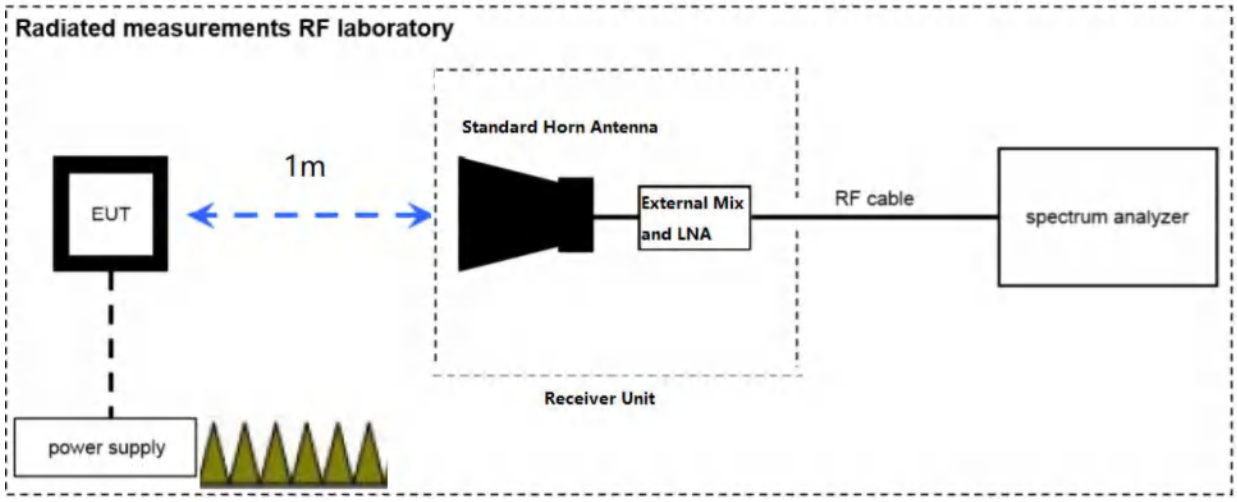
| Frequency (MHz) | Margin - QPK (dB) | Limit - QPK (dBuV) | Margin - AVG (dB) | Limit - AVG (dBuV) | Comment |
|---|---|---|---|---|---|
| 0.194000 | 15.5 | 63.9 | 11.3 | 53.9 | |
| 0.270000 | 19.5 | 61.1 | 16.5 | 51.1 | |
| 3.950000 | 14.6 | 56.0 | 18.1 | 46.0 | |
| 6.334000 | 13.4 | 60.0 | 13.0 | 50.0 | |
| 12.998000 | 13.7 | 60.0 | 13.0 | 50.0 | |
| 23.358000 | 22.6 | 60.0 | 18.9 | 50.0 | |

## 4.3. Occupied Bandwidth (99% & 20dB Bandwidth)

### 4.3.1. LIMITS

The occupied bandwidth is defined as the 99% bandwidth.
According to § 2.1049 and RSS-Gen section 6.7: The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.
The occupied bandwidth from intentional radiators operated within the specified frequency band shall comply with frequency range: 57 GHz – 71 GHz.

### 4.3.2. TEST CONFIGURATION




### 4.3.3. TEST PROCEDURE

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer
- If the EUT is a tabletop system, 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turntable.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measuremet distance is 1m (see ANSI C63.4) – see test details.
- EUT is set into operation.
- The turntable rotates from 0 degree to 360 degree.
- The antenna with external mixer is polarized vertical and horizontal.
- The antenna height changes from 1m to 4m.
- Set the resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

### 4.3.4. TEST RESULTS

| Test Conditions | EUT/Antenna Orientation | Occupied Bandwidth (99%) | | | | | Test Results |
|---|---|---|---|---|---|---|---|
| | | $F_L$ [GHz] | $F_L$ Limits [GHz] | $F_H$ [GHz] | $F_H$ Limits [GHz] | Occupied Bandwidth [GHz] | |
| $T_{nom}$ / $V_{nom}$ | X/H&V | 57.94546 | ≥ 57 | 60.19291 | ≤ 71 | 2.247 | PASS |

| Test Conditions | EUT/Antenna Orientation | Occupied Bandwidth (20dB) | | | | | Test Results |
|---|---|---|---|---|---|---|---|
| | | $F_L$ [GHz] | $F_L$ Limits [GHz] | $F_H$ [GHz] | $F_H$ Limits [GHz] | Occupied Bandwidth [GHz] | |
| $T_{nom}$ / $V_{nom}$ | X/H&V | 57.9252 | ≥ 57 | 60.1969 | ≤ 71 | 2.27 | PASS |

Plots No. 18: 99% Occupied Bandwidth, Horizontal / Vertical Polarization_ EUT A


Notes: The 99% bandwidth of the emission is contained within the frequency band.

Plots No. 19: 20dB Occupied Bandwidth, Horizontal / Vertical Polarization_ EUT A


Notes: The 20dB bandwidth of the emission is contained within the frequency band.

## 4.4. Maximum E.I.R.P. Peak / Transmitter Output Power

### 4.4.1. LIMITS

According to § 15.255 (c) and RSS-210 J2: Within the 57–71 GHz band, emission levels shall not exceed the following equivalent isotropically radiated power (EIRP):

(1) Products other than fixed field disturbance sensors and short-range devices for interactive motion sensing shall comply with one of the following emission limits, as measured during the transmit interval:
  (i) The average power of any emission shall not exceed 40 dBm and the peak power of any emission shall not exceed 43 dBm; or
  (ii) For fixed point-to-point transmitters located outdoors, the average power of any emission shall not exceed 82 dBm, and shall be reduced by 2 dB for every dB that the antenna gain is less than 51 dBi. The peak power of any emission shall not exceed 85 dBm, and shall be reduced by 2 dB for every dB that the antenna gain is less than 51 dBi.
    (A) The provisions in this paragraph (c) for reducing transmit power based on antenna gain shall not require that the power levels be reduced below the limits specified in paragraph (c)(1)(i) of this section.
    (B) The provisions of § 15.204(c)(2) and (4) that permit the use of different antennas of the same type and of equal or less directional gain do not apply to intentional radiator systems operating under this provision. In lieu thereof, intentional radiator systems shall be certified using the specific antenna(s) with which the system will be marketed and operated. Compliance testing shall be performed using the highest gain and the lowest gain antennas for which certification is sought and with the intentional radiator operated at its maximum available output power level. The responsible party, as defined in § 2.909 of this chapter, shall supply a list of acceptable antennas with the application for certification.

(2) For fixed field disturbance sensors that occupy 500 MHz or less of bandwidth and that are contained wholly within the frequency band 61.0–61.5 GHz, the average power of any emission, measured during the transmit interval, shall not exceed 40 dBm, and the peak power of any emission shall not exceed 43 dBm. In addition, the average power of any emission outside of the 61.0–61.5 GHz band, measured during the transmit interval, but still within the 57–71 GHz band, shall not exceed 10 dBm, and the peak power of any emission shall not exceed 13 dBm.

(3) For fixed field disturbance sensors other than those operating under the provisions of paragraph (c)(2) of this section, and short-range devices for interactive motion sensing, the peak transmitter conducted output power shall not exceed −10 dBm and the peak EIRP level shall not exceed 10 dBm.

(4) The peak power shall be measured with an RF detector that has a detection bandwidth that encompasses the 57–71 GHz band and has a video bandwidth of at least 10 MHz. The average emission levels shall be measured over the actual time period during which transmission occurs.

According to RSS-210 J2: Limits of radiated emissions within the band 57-71 GHz

Within the band 57-71 GHz, the power of any emissions, measured during the transmit interval, shall comply with the e.i.r.p. limits in this section.

For the purpose of this annex, the terms “average e.i.r.p.” and “peak e.i.r.p.” refer to e.i.r.p. with transmitter output power measured in terms of average value or peak value respectively.

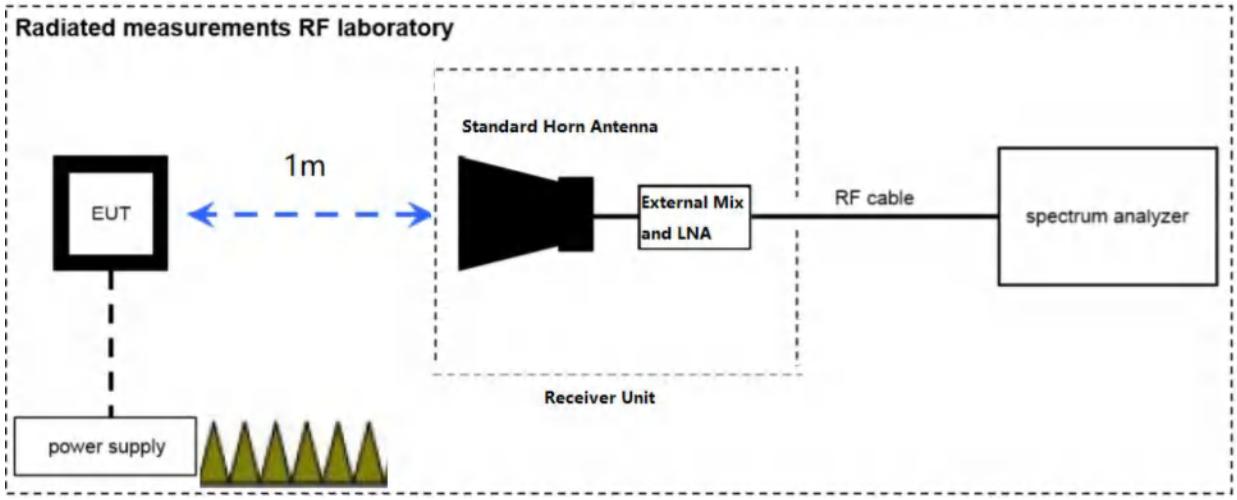
According to RSS-210 J4: Following are the conditions for peak transmitter output power:

(a) For devices with an emission bandwidth greater than or equal to 100 MHz, the peak transmitter output power shall not exceed 500 mW. For devices with an emission bandwidth less than 100 MHz, the peak transmitter output power shall be less than the product of 500 mW and their emission bandwidth divided by 100 MHz.

(b) For the purposes of demonstrating compliance with this RSS, corrections to the transmitter output power may be made to compensate for antenna and circuit loss.

(c) For the purpose of this standard, emission bandwidth is defined as the instantaneous frequency range occupied by a steady radiated signal with modulation, outside which the radiated power spectral density shall be 6 dB below the maximum radiated power spectral density in the band, as measured with a 100 kHz resolution bandwidth. The centre frequency must be stationary during the measurement interval, even if not stationary during normal operation.

### 4.4.2. TEST CONFIGURATION




### 4.4.3. TEST PROCEDURE

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer
- If the EUT is a tabletop system, 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turntable.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measuremet distance is 1m (see ANSI C63.4) – see test details.
- EUT is set into operation.
- The turntable rotates from 0 degree to 360 degree.
- The antenna with external mixer is polarized vertical and horizontal.
- The antenna height changes from 1m to 4m.
- Set the resolution bandwidth RBW=10MHz/VBW=10MHz, Sweep Time=220s, Dector: Peak.

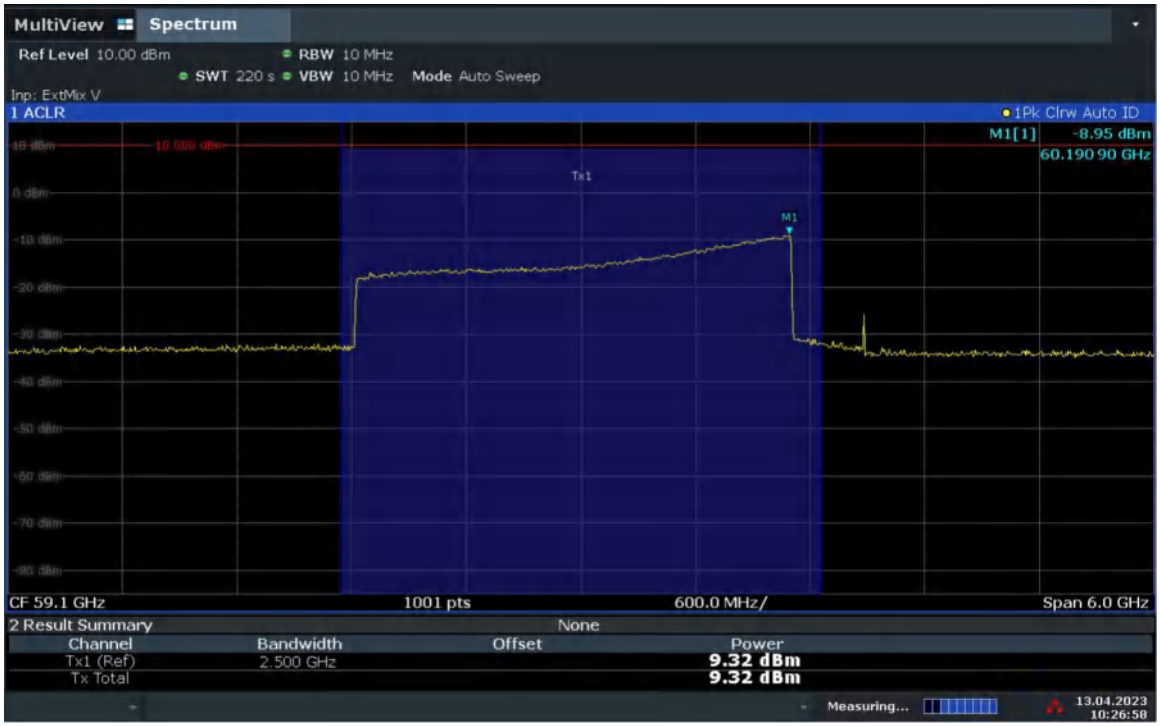
### 4.4.4. TEST RESULTS

| Test Conditions | EUT/Antenna Orientation | Maximum E.I.R.P RBW = 10MHz_ EUT A | | | | | Test Results |
|---|---|---|---|---|---|---|---|
| | | Peak E.I.R.P [dBm] | Peak E.I.R.P Limits [GHz] | Peak Transmitter Conducted Power [dBm] | Peak Transmitter Conducted Power Limit [dBm] | Average E.I.R.P [dBm]] | |
| $T_{nom}$ / $V_{nom}$ | X/H&V | -8.95 | ≤10dBm | -14.95 | ≤-10dBm | -18.61 | PASS |

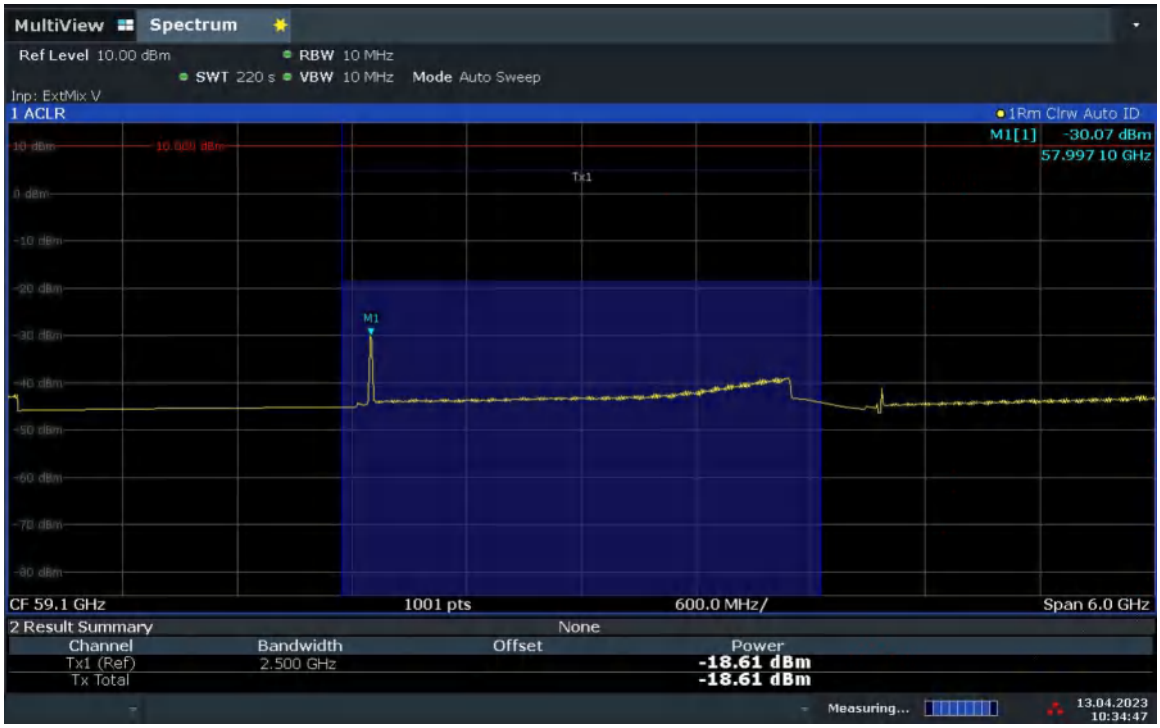
| Test Conditions | EUT/Antenna Orientation | Maximum E.I.R.P RBW = 10MHz_ EUT B | | | | | Test Results |
|---|---|---|---|---|---|---|---|
| | | Peak E.I.R.P [dBm] | Peak E.I.R.P Limits [GHz] | Peak Transmitter Conducted Power [dBm] | Peak Transmitter Conducted Power Limit [dBm] | Average E.I.R.P [dBm]] | |
| $T_{nom}$ / $V_{nom}$ | X/H&V | -9.11 | ≤10dBm | -15.11 | ≤-10dBm | -18.68 | PASS |

Remark:
(1) Peak Transmitter Conducted Power = Peak E.I.R.P. – Antenna Gain
(2) Antenna Gain values provided by customer, CQC-IVTS not responsible for accuary.
(3) Only provide measured plots at EUT A.

Plots No. 20: Peak E.I.R.P, Horizontal / Vertical Polarization_ EUT A




Plots No. 21: Average E.I.R.P, Horizontal / Vertical Polarization_ EUT A

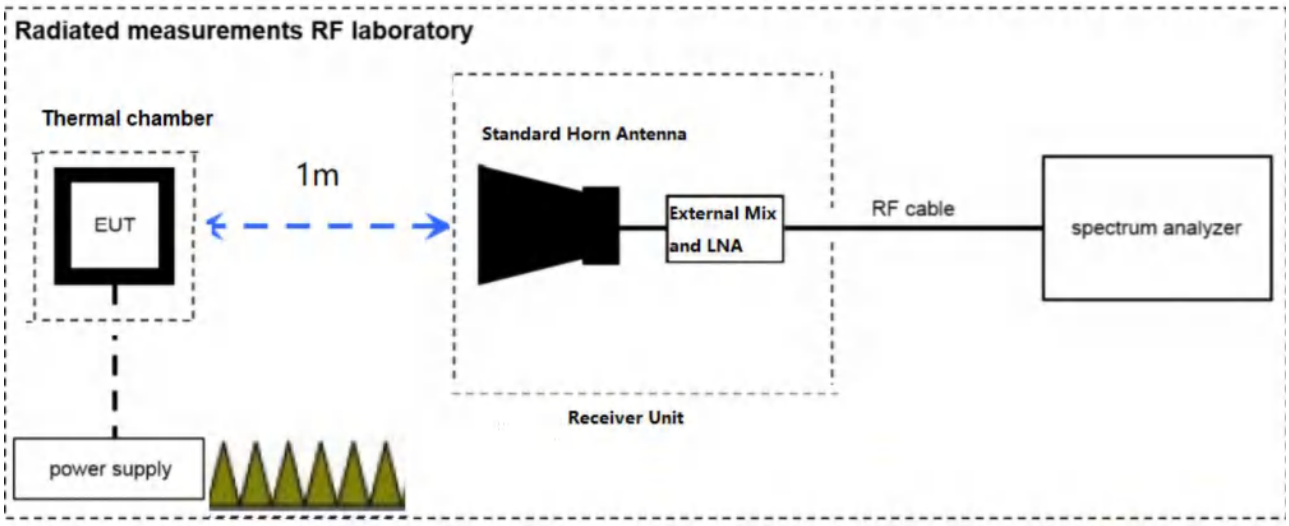


## 4.5. Frequency Stability

### 4.5.1. LIMITS

According to § 15.255 (f) and RSS-210 J6: Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation. Equipment is presumed to operate over the temperature range −20 to + 50 degrees Celsius with an input voltage variation of 85% to 115% of rated input voltage, unless justification is presented to demonstrate otherwise.

### 4.5.2. TEST CONFIGURATION




### 4.5.3. TEST PROCEDURE

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer
- If the EUT is a tabletop system, 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turntable.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measuremet distance is 1m (see ANSI C63.4) – see test details.
- EUT is set into operation.
- The antenna with external mixer is polarized vertical and horizontal.
- The antenna height changes from 1m to 4m.
- Setup corresponding Temperature / Voltage. EUT waiting for 10 minutes to stability before start testing.
- Set the resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

### 4.5.4. TEST RESULTS

| Test Conditions | | EUT/Antenna Orientation | Occupied Bandwidth (20dB) | | | | | Test Results |
|---|---|---|---|---|---|---|---|---|
| Voltage (V) | Temperature (℃) | | $F_L$ [GHz] | $F_L$ Limits [GHz] | $F_H$ [GHz] | $F_H$ Limits [GHz] | Occupied Bandwidth [GHz] | |
| 120 | -20 | X/H&V | 57.9192 | ≥ 57 | 60.2029 | ≤ 71 | 2.28 | PASS |
| 120 | -10 | X/H&V | 57.9192 | ≥ 57 | 60.2029 | ≤ 71 | 2.28 | PASS |
| 120 | 0 | X/H&V | 57.9252 | ≥ 57 | 60.1969 | ≤ 71 | 2.27 | PASS |
| 120 | 10 | X/H&V | 57.9252 | ≥ 57 | 60.1969 | ≤ 71 | 2.27 | PASS |
| 120 | 20 | X/H&V | 57.9252 | ≥ 57 | 60.1969 | ≤ 71 | 2.27 | PASS |
| 120 | 30 | X/H&V | 57.9252 | ≥ 57 | 60.1969 | ≤ 71 | 2.27 | PASS |
| 120 | 40 | X/H&V | 57.9252 | ≥ 57 | 60.1969 | ≤ 71 | 2.27 | PASS |
| 120 | 50 | X/H&V | 57.9252 | ≥ 57 | 60.1969 | ≤ 71 | 2.27 | PASS |
| 138 | 20 | X/H&V | 57.9252 | ≥ 57 | 60.1969 | ≤ 71 | 2.27 | PASS |
| 102 | 20 | X/H&V | 57.9252 | ≥ 57 | 60.1969 | ≤ 71 | 2.27 | PASS |

## 4.6. Antenna Requirement*

### 4.6.1. REQUIREMENT

According to § 15.203 and RSS-Gen: 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

### 4.6.2. VERDICT*

The EUT has an integral antenna and maximum antenna gain is 6 dBi which is not user accessible. Hence it compliances with the antenna requirements.

*Proivided by customer, CQC-IVTS not responsible for accuary.

# 5. Test Set-up Photos of the EUT

Pleae refer separate test setup photos.

# 6. External and Internal Photos of the EUT

Pleae refer separate external and internal photos of the EUT.

# Revision History

| Revision | Issue Date | Revisions | Revised By |
|---|---|---|---|
| 1.0 | 2023-4-21 | Original Issue | Wenliang Li |
| 1.1 | 2023-5-6 | Revised as customer comments | Wenliang Li |
| 1.2 | 2023-6-20 | Revised as customer comments | Wenliang Li |
| | | | |

********** End of Report **********

# DECLARATION

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.
If you have any questions on this report, please contact us within 15 days after issue this report.

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