



# RF - TEST REPORT

- FCC Part 15.247, RSS-247, partly -

Type / Model Name : PRA 91 (02)

Product Description : Automatic Tripod

Applicant : Hilti Corporation

Address : Feldkircherstrasse 100

9494 SCHAAN, LIECHTENSTEIN

Manufacturer : Hilti Corporation

Address : Feldkircherstrasse 100

9494 SCHAAN, LIECHTENSTEIN

Test Result according to the standards  
listed in clause 1 test standards:

**POSITIVE**

Test Report No. : 80183250-04 Rev\_1

03. December 2024

Date of issue



Deutsche  
Akkreditierungsstelle  
D-PL-12030-01-03  
D-PL-12030-01-04

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ATTACHMENTS A and B as separate supplement

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

# 1 TEST STANDARDS

The tests were performed according to following standards:

## **FCC Rules and Regulations Part 15, Subpart A - General (May 2024)**

|                                   |                                               |
|-----------------------------------|-----------------------------------------------|
| Part 15, Subpart A, Section 15.31 | Measurement standards                         |
| Part 15, Subpart A, Section 15.33 | Frequency range of radiated measurements      |
| Part 15, Subpart A, Section 15.35 | Measurement detector functions and bandwidths |

## **FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (May 2024)**

|                                                  |                                                                                 |
|--------------------------------------------------|---------------------------------------------------------------------------------|
| Part 15, Subpart C, Section 15.203               | Antenna requirement                                                             |
| Part 15, Subpart C, Section 15.204 modifications | External radio frequency power amplifiers and antenna                           |
| Part 15, Subpart C, Section 15.205               | Restricted bands of operation                                                   |
| Part 15, Subpart C, Section 15.207               | Conducted limits                                                                |
| Part 15, Subpart C, Section 15.209               | Radiated emission limits, general requirements                                  |
| Part 15, Subpart C, Section 15.247               | Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz |

ANSI C63.10: 2013                      Testing Unlicensed Wireless Devices

ETSI TR 100 028 V1.3.1: 2001-03,                      Electromagnetic Compatibility and Radio Spectrum Matters (ERM);  
Uncertainties in the Measurement of Mobile Radio Equipment  
Characteristics—Part 1 and Part 2

KDB 558074 D01 v05r02                      Guidance for compliance measurements on DTS; FHSS and hybrid  
system devices operating under Section 15.247 of the FCC rules,  
April 2, 2019.

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

## **2 EQUIPMENT UNDER TEST**

### **2.1 Information provided by the Client**

Please note, we do not take any responsibility for information provided by the client or his representative which may have an influence on the validity of the test results.

### **2.2 Sampling**

The customer is responsible for the choice of sample. Sample configuration, start-up and operation is carried out by the customer or according to his/her instructions.

### **2.3 General remarks:**

This report covers the emissions of the Hilti BLE Module "2392755" in combination with the host device PRA 91 (02).

### **2.4 Photo documentation of the EUT – Detailed photos see ATTACHMENT A**

### **2.5 Equipment type**

BLE device

### **2.6 Short description of the equipment under test (EUT)**

The PRA 91 is an automatic tripod onto which a rotating laser can be fitted. The tripod can be moved upwards and downwards using a remote control unit. Using the tripod and the rotating laser fitted to it, a horizontal laser plane can be established which is directed onto a particular target height. Examples of applications using the rotating laser are the transfer of meter marks, horizontal alignment at a target height or the examination of horizontal heights. The combination of the automatic tripod, the rotating laser and the laser receiver enables a laser plane to be automatically aligned onto a precise point. In this operation, only the target height has to be indicated using the laser receiver and the automatic tripod moves the laser plane of the rotating laser exactly to the required height.

|                           |                    |
|---------------------------|--------------------|
| Number of tested samples: | 1                  |
| Serial number:            | Sample for testing |
| Firmware version:         | 1.1.0-264          |

### **2.7 Variants of the EUT**

There are no variants.

## 2.8 Operation frequency and channel plan

The operating frequency is 2400 MHz to 2483.5 MHz.

Channel plan:

| Channel No. | Frequency (MHZ) | Channel No. | Frequency (MHZ) |
|-------------|-----------------|-------------|-----------------|
| 37          | 2402            | 18          | 2442            |
| 0           | 2404            | 19          | 2444            |
| 1           | 2406            | 20          | 2446            |
| 2           | 2408            | 21          | 2448            |
| 3           | 2410            | 22          | 2450            |
| 4           | 2412            | 23          | 2452            |
| 5           | 2414            | 24          | 2454            |
| 6           | 2416            | 25          | 2456            |
| 7           | 2418            | 26          | 2458            |
| 8           | 2420            | 27          | 2460            |
| 9           | 2422            | 28          | 2462            |
| 10          | 2424            | 29          | 2464            |
| 38          | 2426            | 30          | 2466            |
| 11          | 2428            | 31          | 2468            |
| 12          | 2430            | 32          | 2470            |
| 13          | 2432            | 33          | 2472            |
| 14          | 2434            | 34          | 2474            |
| 15          | 2436            | 35          | 2476            |
| 16          | 2438            | 36          | 2478            |
| 17          | 2440            | 39          | 2480            |

Note: the marked frequencies are determined for final testing.

## 2.9 Transmit operating modes

The EUT uses GFSK modulation and may provide following data rates:

- 125 kbps

(kbps = kilobits per second)

## 2.10 Antenna

The following antenna shall be used with the EUT:

| Number | Characteristic | Model number           | Plug | Frequency range (GHz) | Gain (dBi) |
|--------|----------------|------------------------|------|-----------------------|------------|
| 1      | Omni           | PCB inverted F antenna | PCB  | 2.4 – 2.5             | 1.1        |

## 2.11 Power supply system utilised

Power supply voltage,  $V_{nom}$  : 7.2 V DC

## 2.12 Peripheral devices and interface cables

The following peripheral devices and interface cables are connected during the measurements:

- Battery adapter incl. USB and DC cables      Model : Made by applicant
- Notebook      Model : HP EliteBook 840

## 2.13 Determination of worst-case conditions for final measurement

Preliminary tests are performed in all three orthogonal axes of the EUT to locate at which position and at what setting of the EUT produce the maximum of the emissions.

The tests are carried out in the following frequency band:

**2400 MHz – 2483.5 MHz**

For the final test the following channels and test modes are selected:

| Wireless system | Available channel | Tested channels | Modulation | Modulation type | Data rate |
|-----------------|-------------------|-----------------|------------|-----------------|-----------|
| 802.15.1        | 0 - 39            | 37, 39          | DSSS       | GFSK            | 125 kbps  |

### 2.13.1 Test jig

No test jig is used.

### 2.13.2 Test software

The applicant provides a special software that allows enabling a continuous transmission modulated and receiving mode for the test samples.

### 3 TEST RESULT SUMMARY

| FCC Rule Part | RSS Rule Part    | Description                         | Result         |
|---------------|------------------|-------------------------------------|----------------|
| 15.207(a)     | RSS-Gen, 8.8     | AC power line conducted emissions   | Not applicable |
| 15.247(a)(2)  | RSS-247, 5.2.(a) | -6 dB EBW                           | Not tested     |
| 15.247(b)(3)  | RSS-247, 5.2(d)  | Maximum peak conducted output power | Passed         |
| 15.247(b)(4)  | -                | Defacto limit                       | Not tested     |
| 15.247(d)     | RSS-247, 5.5     | Out-of-band emission, radiated      | Passed         |
| 15.247(d)     | RSS-Gen, 8.9     | Emissions in restricted bands       | Passed         |
| 15.247(e)     | RSS-247, 5.2(b)  | PSD                                 | Not tested     |
| 15.35(c)      | RSS-Gen, 6.10    | Pulsed operation                    | Not tested     |
| 15.203        | RSS-Gen, 6.6     | Antenna requirement                 | Passed         |
| -             | RSS-Gen, 6.11    | Transmitter frequency stability     | Not tested     |
| -             | RSS-Gen, 6.6     | 99 % Bandwidth                      | Not tested     |

The mentioned new RSS Rule Parts in the above table are related to:  
RSS-Gen, Issue 5 + Amendment 1 + Amendment 2, March 2019  
RSS-247, Issue 3, August 2023

#### 3.1 Revision history of test report

| Test report No | Rev. | Issue Date       | Changes                                                                                                                                                                                                             |
|----------------|------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 80183250-04    | 0    | 24 June 2024     | Initial test report                                                                                                                                                                                                 |
|                | 1    | 03 December 2024 | clause 3: correction of references in summary table<br>clause 4.5.3.2.4: correction of table height<br>clause 5: removing test setup photos, see attachment B<br>clause 5.3: clarification of measurement procedure |

The test report with the highest revision number replaces the previous test reports.

### 3.2 Final assessment

The equipment under test fulfills the requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 27 May 2024

Testing concluded on : 12 June 2024

Checked by:

Tested by:

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Klaus Gegenfurtner  
Teamleader Radio

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Franz-Xaver Schrettenbrunner  
Radio Team

## 4 TEST ENVIRONMENT

### 4.1 Address of the test laboratory

**CSA Group Bayern GmbH**  
**Ohmstrasse 1-4**  
**94342 STRASSKIRCHEN**  
**GERMANY**

### 4.2 Environmental conditions

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

Temperature: 15 - 35 °C

Humidity: 30 - 60 %

Atmospheric pressure: 86 - 106 kPa

### 4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor  $k = 2$ . The true value is located in the corresponding interval with a probability of 95 %. The measurement uncertainty was calculated for all measurements listed in this test report on basis of the ETSI Technical Report TR 100 028 Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1 and Part 2. The results are documented in the 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.

| Measurement Type                    | Range                  | Confidence Level | Calculated Uncertainty   |
|-------------------------------------|------------------------|------------------|--------------------------|
| AC power line conducted emissions   | 0.15 MHz to 30 MHz     | 95%              | $\pm 3.29$ dB            |
| EBW and OBW                         | 2400 MHz to 3000 MHz   | 95%              | $\pm 2.5 \times 10^{-7}$ |
| Maximum peak conducted output power | 2400 MHz to 3000 MHz   | 95%              | $\pm 0.62$ dB            |
| Power spectral density              | 2400 MHz to 3000 MHz   | 95%              | $\pm 0.62$ dB            |
| Conducted Spurious Emissions        | 9 kHz to 10000 MHz     | 95%              | $\pm 2.15$ dB            |
| Conducted Spurious Emissions        | 10000 MHz to 40000 MHz | 95%              | $\pm 3.47$ dB            |
| Radiated Spurious Emissions         | 9 kHz to 30 MHz        | 95%              | $\pm 3.53$ dB            |
| Radiated Spurious Emissions         | 30 MHz to 1000 MHz     | 95%              | $\pm 3.71$ dB            |
| Radiated Spurious Emissions         | 1000 MHz to 30000 MHz  | 95%              | $\pm 2.34$ dB            |
| Field strength of the fundamental   | 100 kHz to 100 MHz     | 95%              | $\pm 3.53$ dB            |

## 4.4 Conformity Decision Rule

The applied conformity decision rule is based on ILAC G8:09/2019 clause 4.2.1 Binary Statement for Simple Acceptance Rule ( $w = 0$ ).

Details can be found in the procedure CSA\_B\_V50\_29.

## 4.5 Measurement protocol for FCC and ISED

### 4.5.1 General information

CSA Group Bayern GmbH is recognized as wireless testing laboratory under the CAB identifier:

**FCC: DE 0011**

**ISED: DE0009**

### 4.5.2 General Standard information

The test methods used comply with ANSI C63.10 - "Testing Unlicensed Wireless Devices".

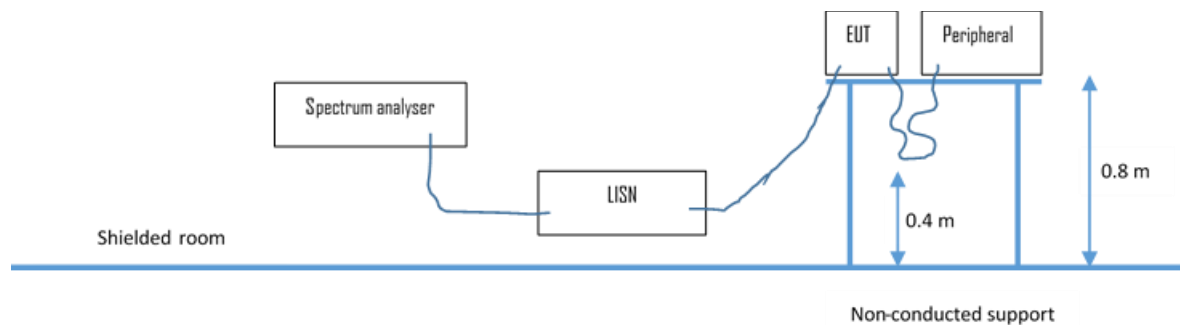
#### 4.5.2.1 Justification

The equipment under test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions.

### 4.5.3 Details of test procedures

#### 4.5.3.1 Conducted emission

Test setup according ANSI C63.10



The final level, expressed in dB $\mu$ V, is arrived at by taking the reading directly from the Spectrum analyser. This level is compared to the limit.

To convert between dB $\mu$ V and  $\mu$ V, the following conversions apply:

$$\text{dB}\mu\text{V} = 20(\log \mu\text{V})$$

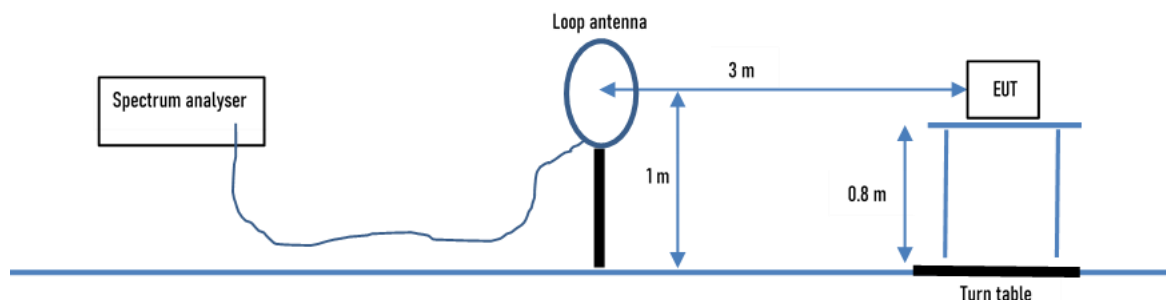
$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a Line Impedance Stabilization Network (LISN) with 50  $\Omega$  / 50  $\mu$ H (CISPR 16) characteristics. The receiver is protected by means of an impedance matched pulse limiter connected directly to the RF input. Table top equipment is placed on a non-conducting table 80 centimetres above the floor and is positioned 40 centimetres from the vertical ground plane (wall) of the screen room. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emission is re-measured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

#### 4.5.3.2 Radiated emission

##### 4.5.3.2.1 OATS1 test site (9 kHz - 30 MHz):

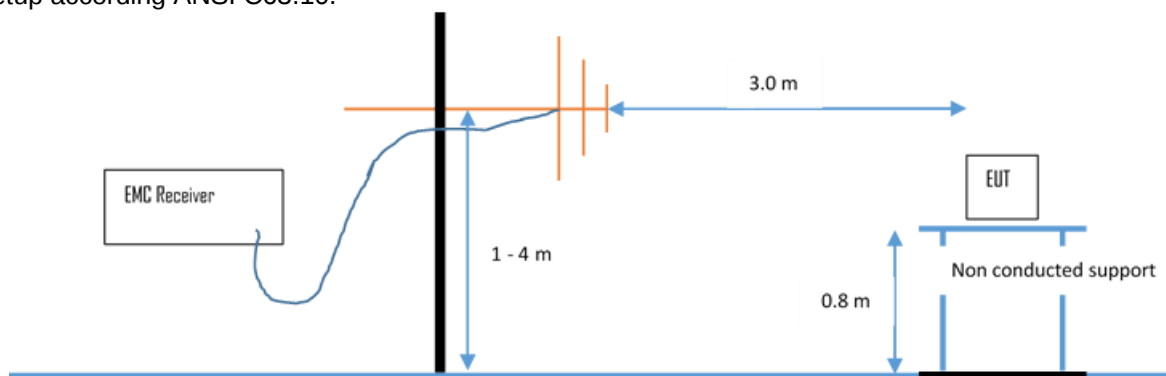
Test setup according ANSI C63.10



Emissions from the EUT are measured in the frequency range of 9 MHz to 30 MHz using a tuned receiver and a calibrated loop antenna. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. The antenna is positioned 3, 10 or 30 metres horizontally from the EUT and is repeated vertically. To locate maximum emissions from the test sample the antenna is varied along the site axis and the EUT is rotated 360 degrees.

##### 4.5.3.2.2 OATS1 test site (30 MHz - 1 GHz):

Test setup according ANSI C63.10.



Spurious emissions from the EUT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarised antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres and the EUT is rotated 360 degrees. The final level in dB $\mu$ V/m is calculated by taking the reading from the EMI receiver (Level dB $\mu$ V) and adding the correction factors and cable loss factor (dB). The FCC limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

The resolution bandwidth setting:

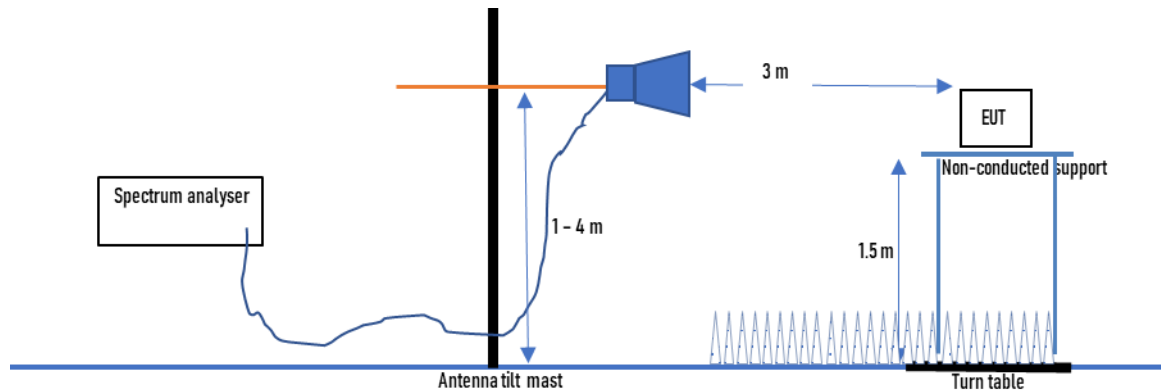
30 MHz – 1000 MHz: RBW: 120 kHz

Example:

| Frequency<br>(MHz) | Level<br>(dB $\mu$ V) | + | Factor<br>(dB) | = | Level<br>(dB $\mu$ V/m) | - | Limit<br>(dB $\mu$ V/m) | = | Delta<br>(dB) |
|--------------------|-----------------------|---|----------------|---|-------------------------|---|-------------------------|---|---------------|
| 719.0              | 75.0                  | + | 32.6           | = | 107.6                   | - | 110.0                   | = | -2.4          |

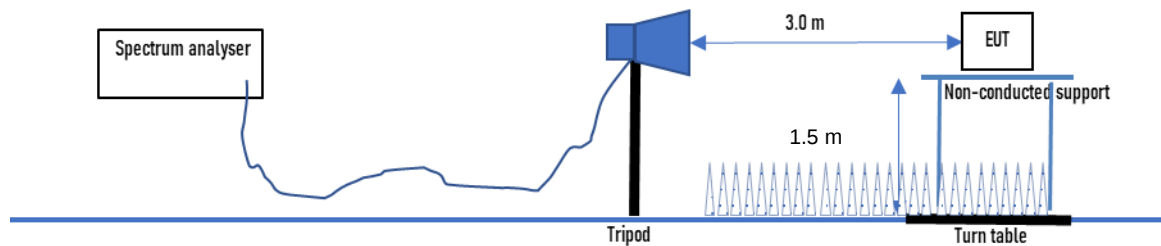
#### 4.5.3.2.3 Anechoic chamber 1 (1000 MHz – 18000 MHz)

Test setup according ANSI C63.10.



Radiated emissions from the EUT are measured in the frequency range 1 GHz up to 18 GHz as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a non-conducting table, 1.5 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the centre, forming a bundle 30 cm to 40 cm long. Measurements are made in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements.

#### 4.5.3.2.4 Anechoic chamber 1 (18 GHz – 40 GHz)



Emissions from the EUT are measured in the frequency range 18 GHz up to 40 GHz as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a non-conducting table, 1.5 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the centre, forming a bundle 30 cm to 40 cm long. Measurements are made in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements. Where appropriate, the test distance may be reduced in order to detect emissions under better uncertainty. The limit is adopted.

## 5 TEST CONDITIONS AND RESULTS

### 5.1 Maximum peak radiated output power

For test instruments and accessories used see section 6 Part **CPR 3**.

#### 5.1.1 Description of the test location

Test location: Anechoic chamber 1

#### 5.1.2 Photo documentation of the test set-up – Detailed photos see attachment B

#### 5.1.3 Applicable standard

According to FCC Part 15, Section 15.247(b)(3):

According to FCC Part 15, Section 15.247(b)(3):

The maximum peak conducted output power of the intentional radiator shall not exceed the following:

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.

#### 5.1.4 Description of Measurement

The maximum peak radiated output power is measured using a spectrum analyser following the procedure set out in ANSI C63.10, item 11.9.2.2. The EUT is set in TX continuous mode while measuring. The radiated measurement was performed in terms of fieldstrength. Therefore, the formula set out in ANSI C63.10, item 9.5 (Equation 22) is changed into the following term:

$$E = \text{EIRP} - (20 \cdot \log_{10}(3)) + 104.7$$

### 5.1.5 Test result

| 802.15.1, 125 kbps, TX  |           | Test results radiated       |               |                     |                |
|-------------------------|-----------|-----------------------------|---------------|---------------------|----------------|
|                         |           | Fieldstrength<br>E (dBμV/m) | EIRP<br>(dBm) | EIRP Limit<br>(dBm) | Margin<br>(dB) |
| Lowest frequency: CH37  |           |                             |               |                     |                |
| $T_{nom}$               | $V_{nom}$ | 106.3                       | 11.1          | 36.0                | -24.9          |
| Highest frequency: CH39 |           |                             |               |                     |                |
| $T_{nom}$               | $V_{nom}$ | 105.6                       | 10.4          | 36.0                | -24.6          |

Peak Power Limit according to FCC Part 15, Section 15.247(b)(3):

| Frequency<br>(MHz) | Peak Power Limit |            |
|--------------------|------------------|------------|
|                    | (dBm)            | (W)        |
| 902-928            | 36               | 4.0        |
| <b>2400-2483.5</b> | <b>36</b>        | <b>4.0</b> |
| 5725-5850          | 36               | 4.0        |

The requirements are **FULFILLED**.

**Remarks:**      None.

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## 5.2 Radiated emissions in restricted bands

For test instruments and accessories used see section 6 Part **SER 2, SER 3**.

### 5.2.1 Description of the test location

Test location: OATS 1  
Test location: Anechoic chamber 1  
Test distance: 3 m

### 5.2.2 Photo documentation of the test set-up – Detailed photos see attachment B

### 5.2.3 Applicable standard

According to FCC Part 15, Section 15.205(a):

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limit specified in Section 15.209(a).

### 5.2.4 Description of Measurement

The restricted bands are measured radiated. The span of the spectrum analyser is set wide enough to capture the restricted band and measure the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation. The restricted bands are measured falling emissions into it and the nearest restricted band are checked for emissions also the restricted band for the harmonics of the carrier.

Test receiver settings for SER2:

RBW: 120 MHz, Detector: Quasi peak, Mes. Time: 1 s,

Spectrum analyser settings for SER3:

RBW: 1 MHz, VBW: 3 MHz, Detector: Max. peak, Trace: Max. hold, Sweep: Auto

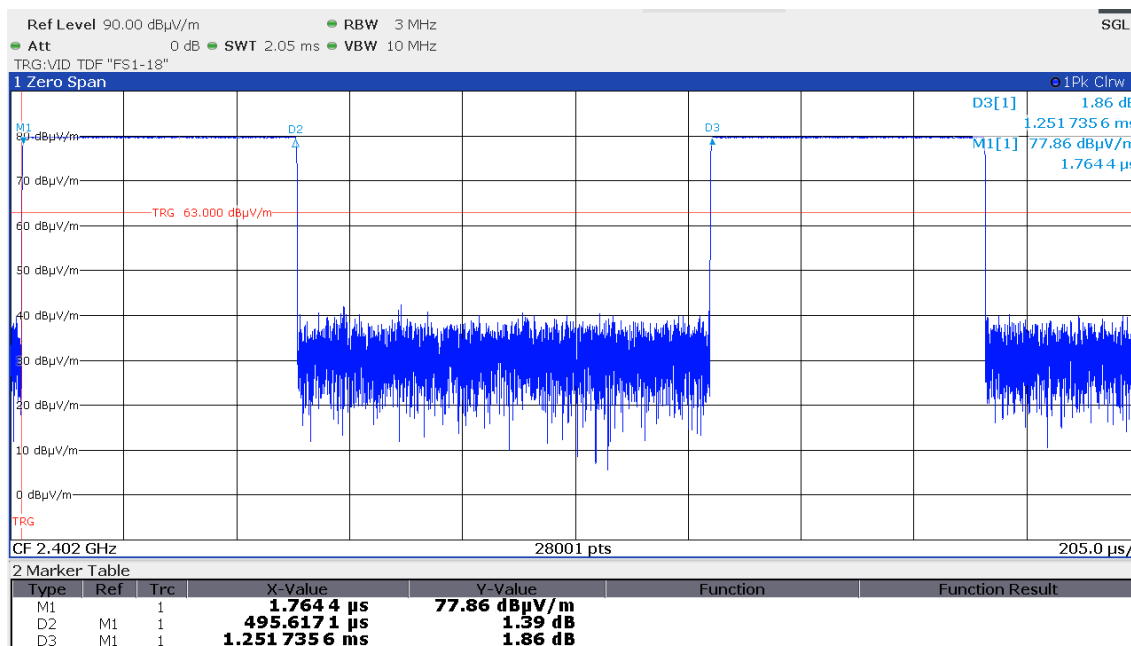
### 5.2.5 Test result

$f < 1000 \text{ MHz}$

| Frequency (MHz) | Reading Vert. (dB $\mu$ V) | Reading Hor. (dB $\mu$ V) | Correct. Vert. (dB) | Correct. Hor. (dB) | Level Vert. (dB $\mu$ V/m) | Level Hor. (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Dlimit (dB) |
|-----------------|----------------------------|---------------------------|---------------------|--------------------|----------------------------|---------------------------|----------------------|-------------|
| 84.00           | 16.2                       | 3.9                       | 13.8                | 13.7               | 30.0                       | 17.6                      | 40.0                 | -10.0       |
| 119.89          | 1.1                        | 2.2                       | 17.3                | 16.8               | 18.4                       | 19.0                      | 43.5                 | -24.5       |
| 190.49          | 4.8                        | 4.6                       | 17.7                | 17.1               | 22.5                       | 21.7                      | 43.5                 | -21.0       |
| 368.20          | -4.1                       | -2.5                      | 22.3                | 22.7               | 18.2                       | 20.2                      | 46.0                 | -25.8       |
| 424.19          | -0.6                       | -9.0                      | 23.9                | 24.2               | 23.3                       | 15.2                      | 46.0                 | -22.7       |
| 710.00          | -9.2                       | -9.1                      | 30.0                | 30.5               | 20.8                       | 21.4                      | 46.0                 | -24.6       |

f > 1000 MHz

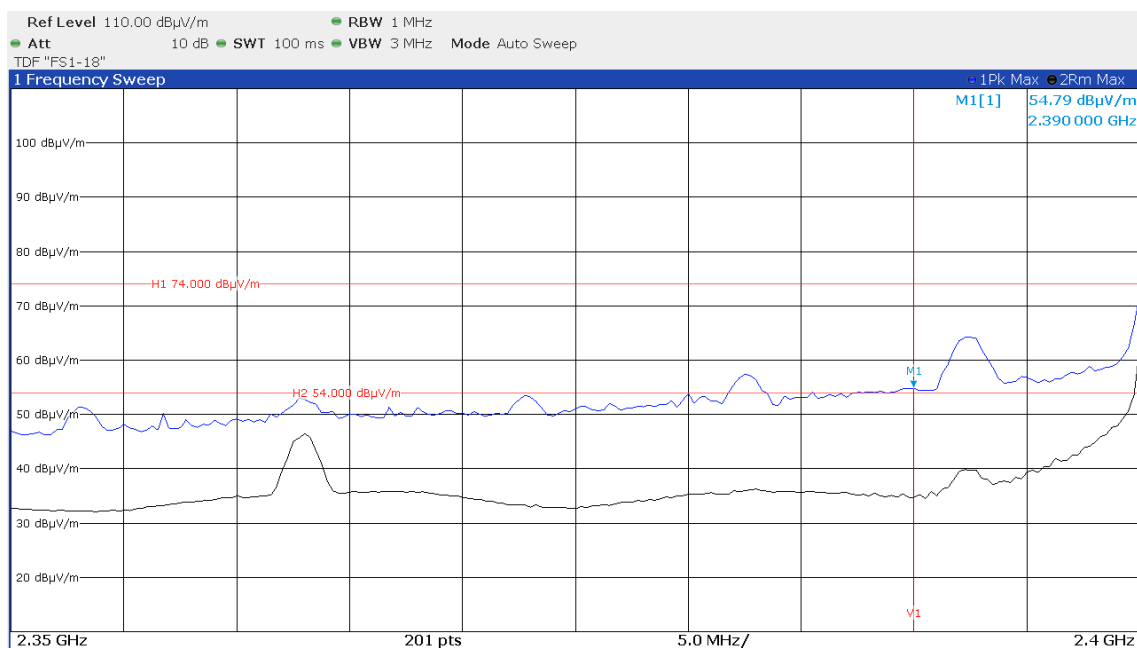
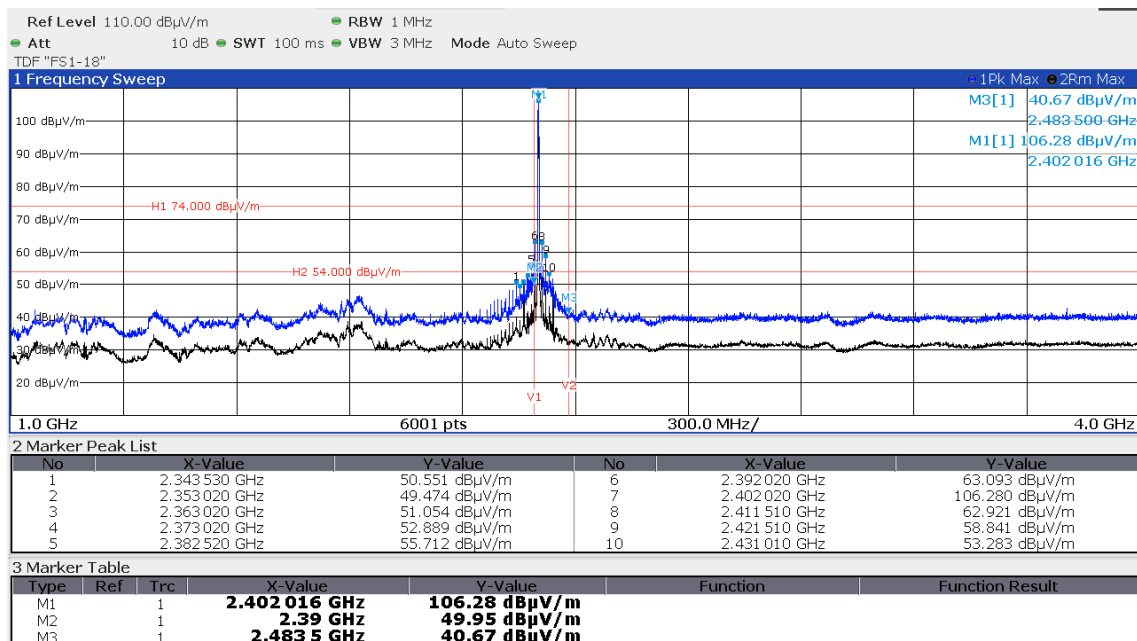
## Duty Cycle of the EUT

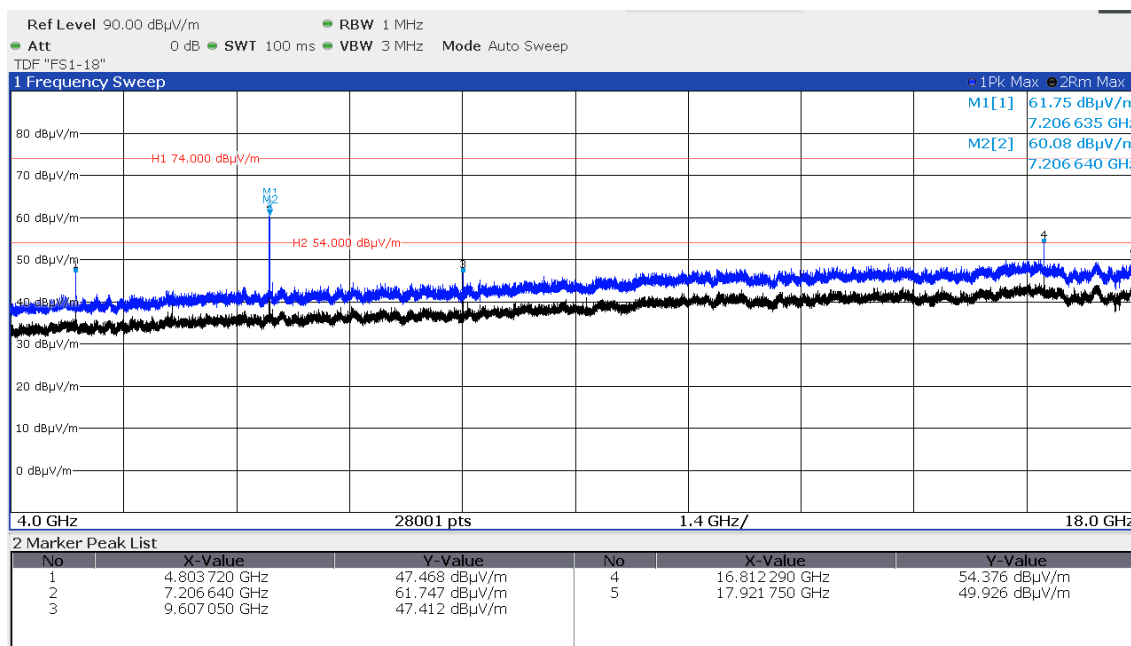


According to procedures for duty cycle correction, the factor can be calculated as  $\delta(\text{dB}) = 20\log(\Delta)$ . The duty cycle is equal for all used frequencies with  $T_{\text{ON}} = 495.6\mu\text{s}$  and  $T_{\text{OFF}} = 756.1\mu\text{s}$ , therefore all peak values can be corrected with a factor  $\delta(\text{dB}) = -8.0\text{ dB}$ .

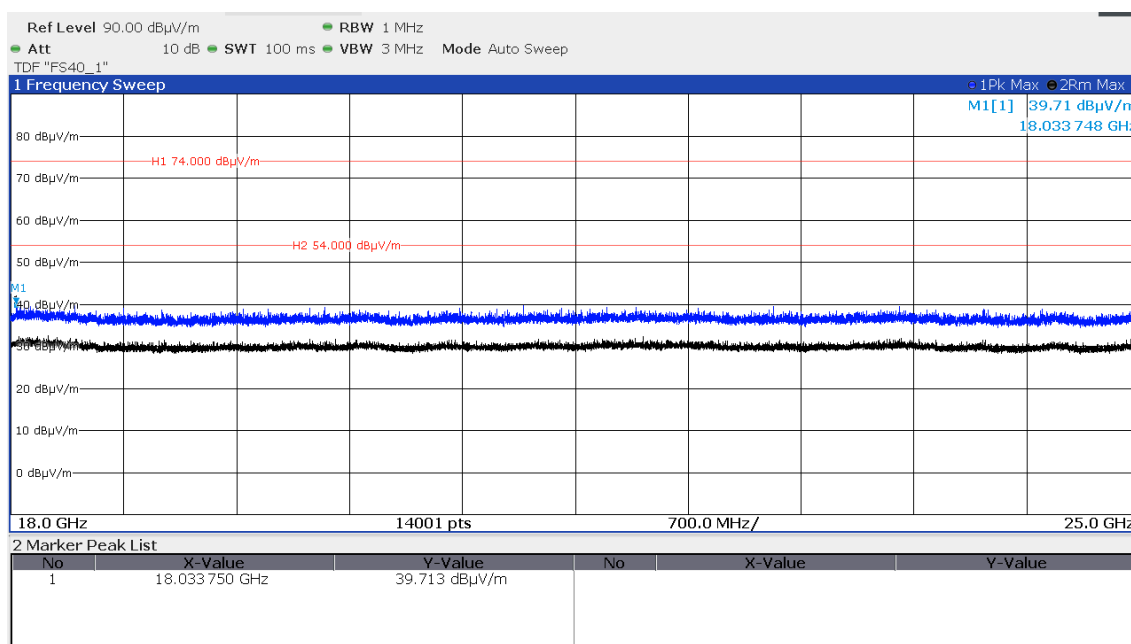
The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

# CH37 horizontal

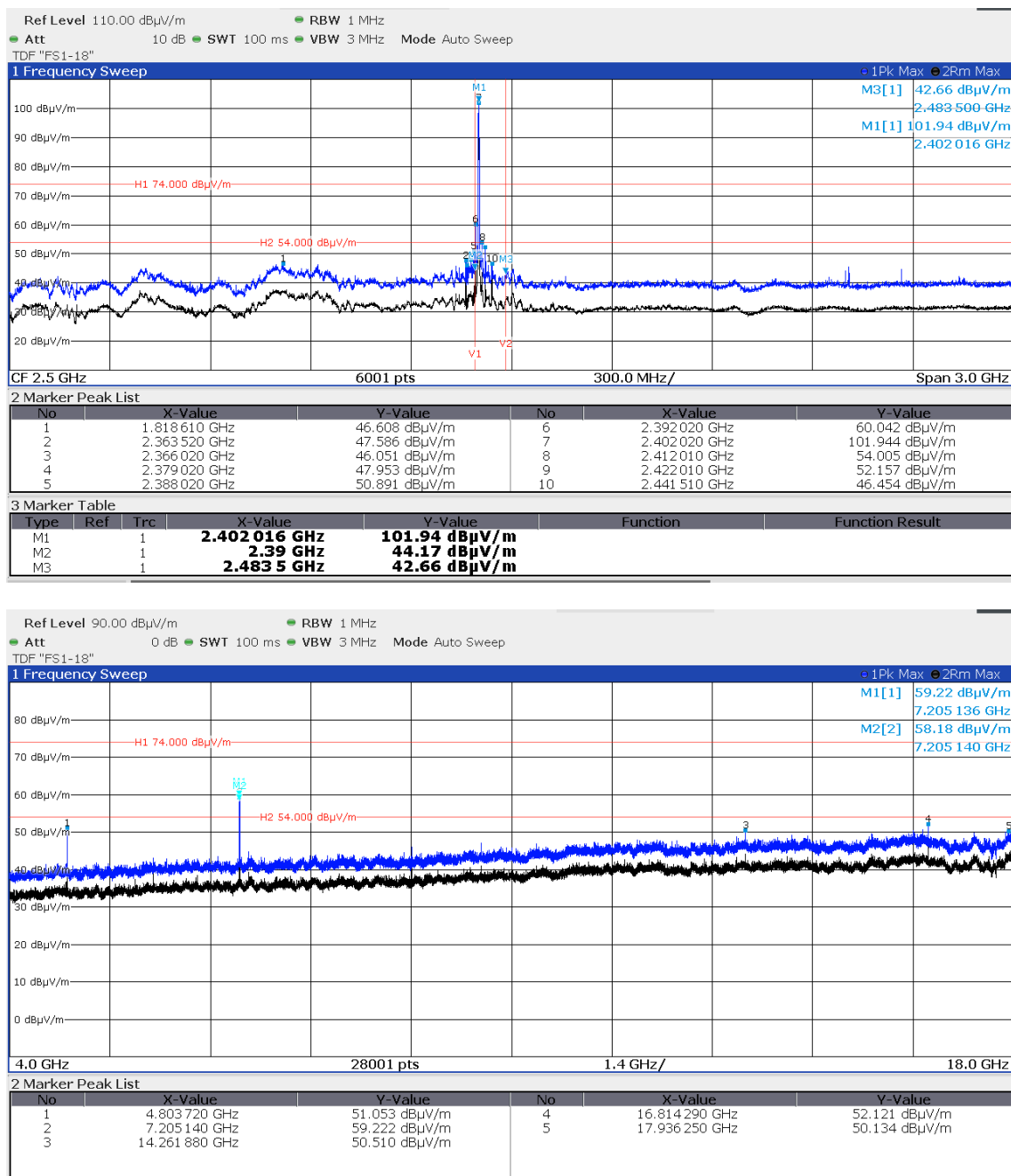




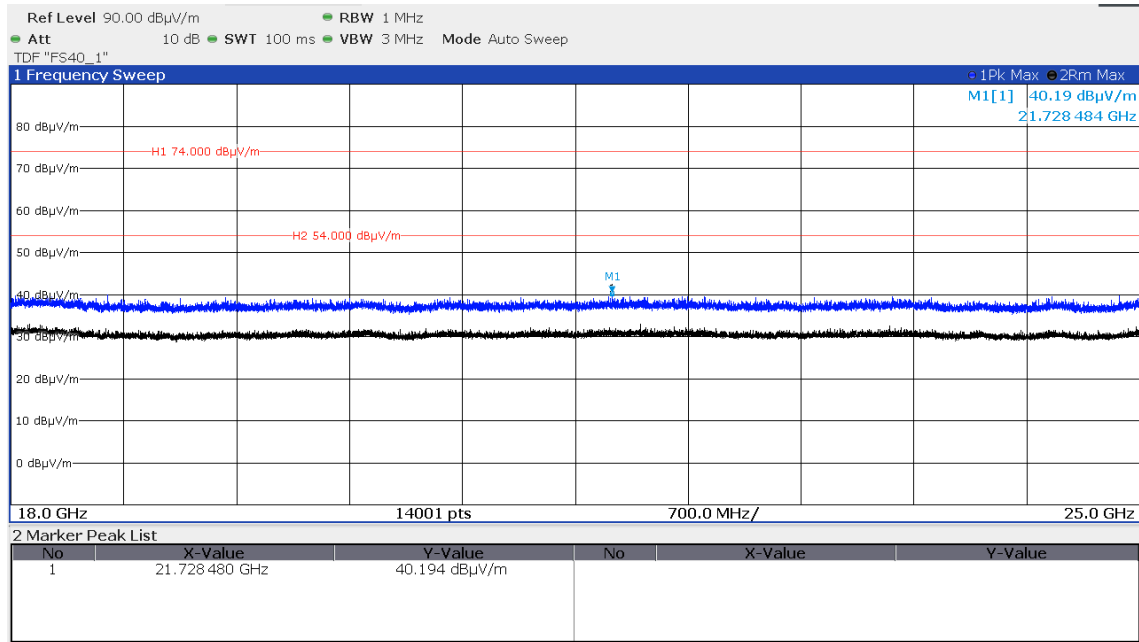
| MP (#) | f (GHz)  | Peak (dBµV/m) | DC corr. (dB) | AV (dBµV/m) | AV Limit (dBµV/m) | Margin (dB) |
|--------|----------|---------------|---------------|-------------|-------------------|-------------|
| 2      | 7.20664  | 61.7          | -8.0          | 53.7        | 54.0              | -0.3        |
| 4      | 16.81229 | 54.4          | -8.0          | 46.4        | 54.0              | -7.6        |



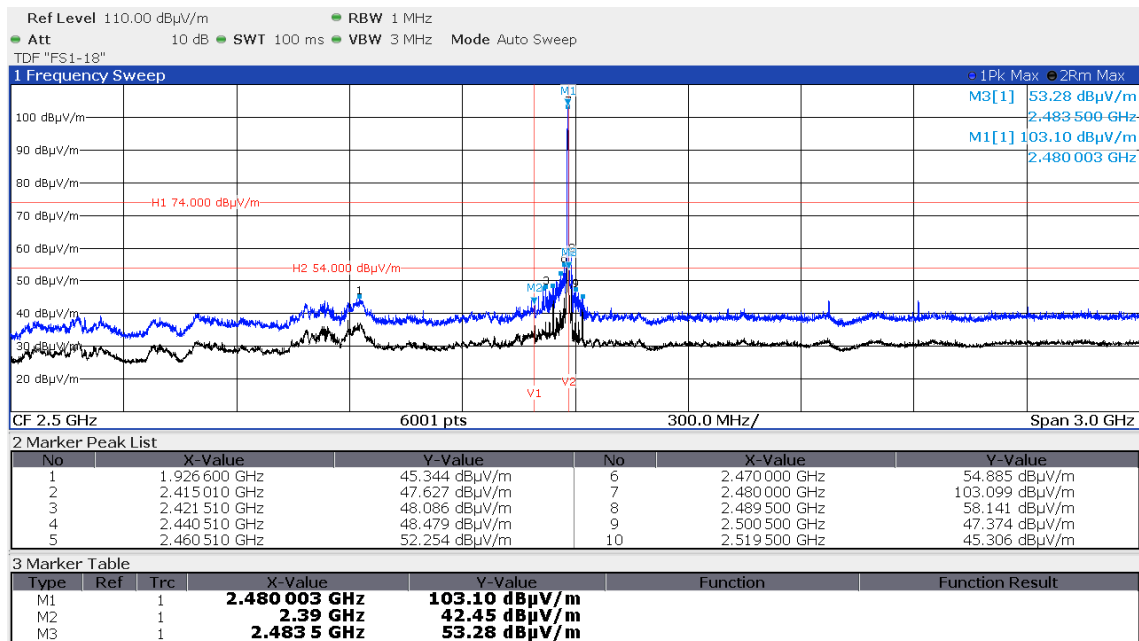
# CH37 vertical

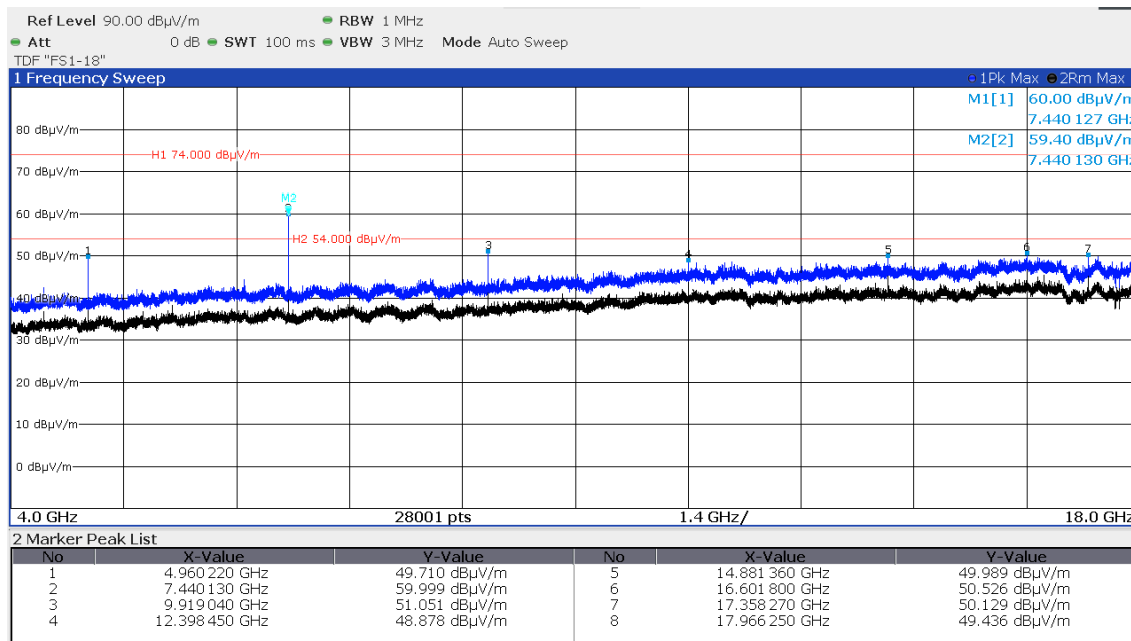
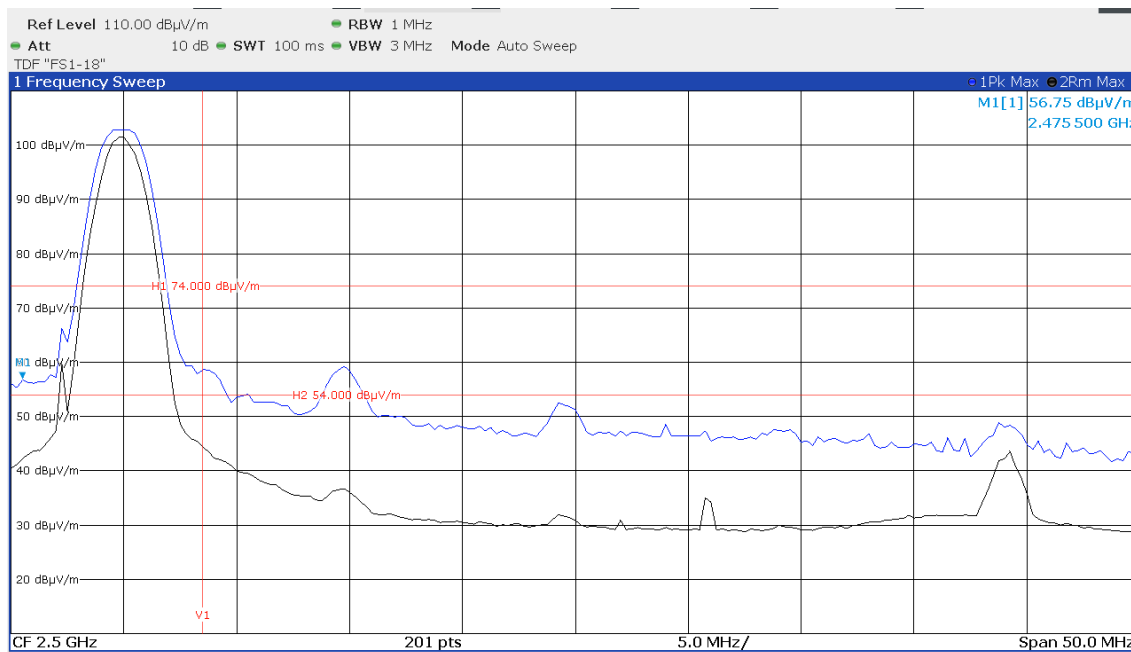


| MP (#) | f (GHz) | Peak (dBμV/m) | DC corr. (dB) | AV (dBμV/m) | AV Limit (dBμV/m) | Margin (dB) |
|--------|---------|---------------|---------------|-------------|-------------------|-------------|
| 2      | 7.20514 | 59.2          | -8.0          | 51.2        | 54.0              | -2.8        |

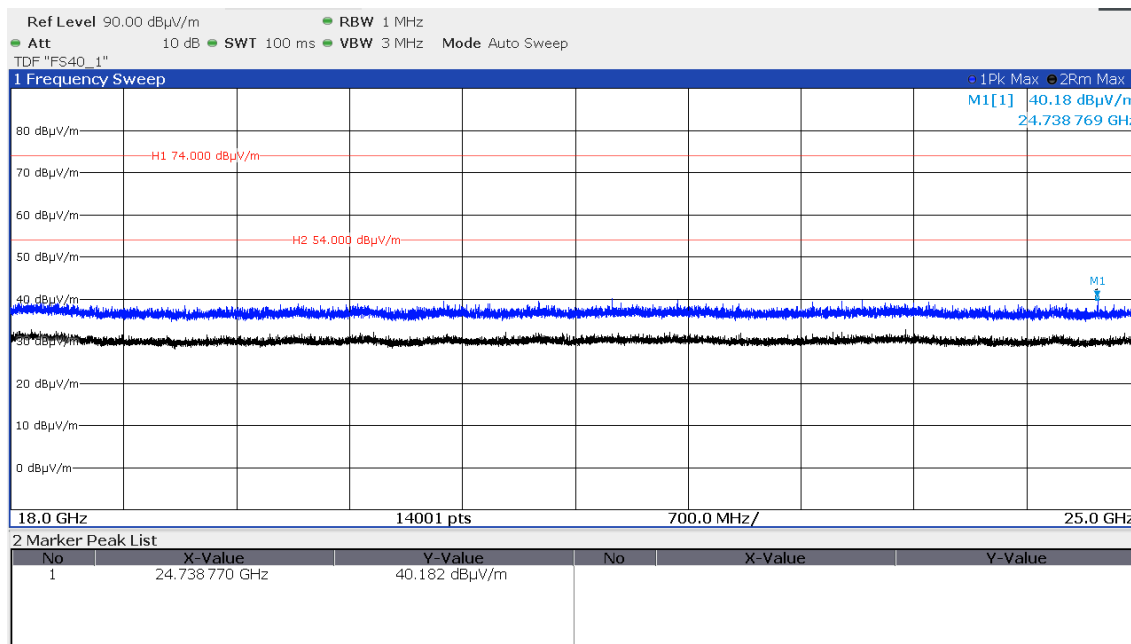


## CH39 horizontal

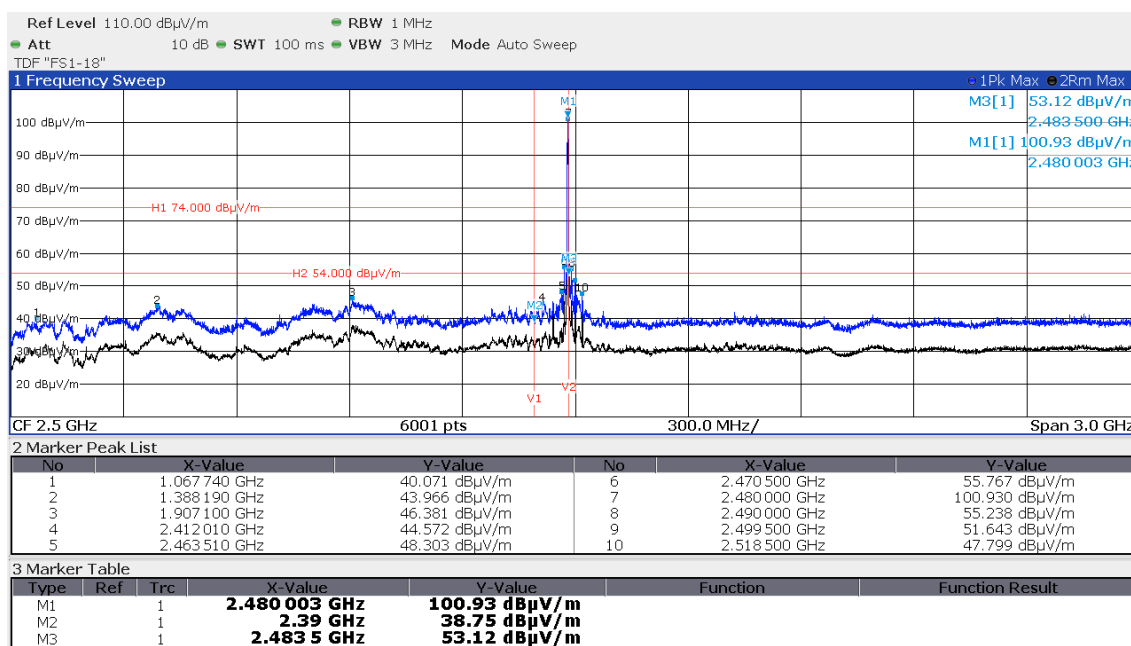


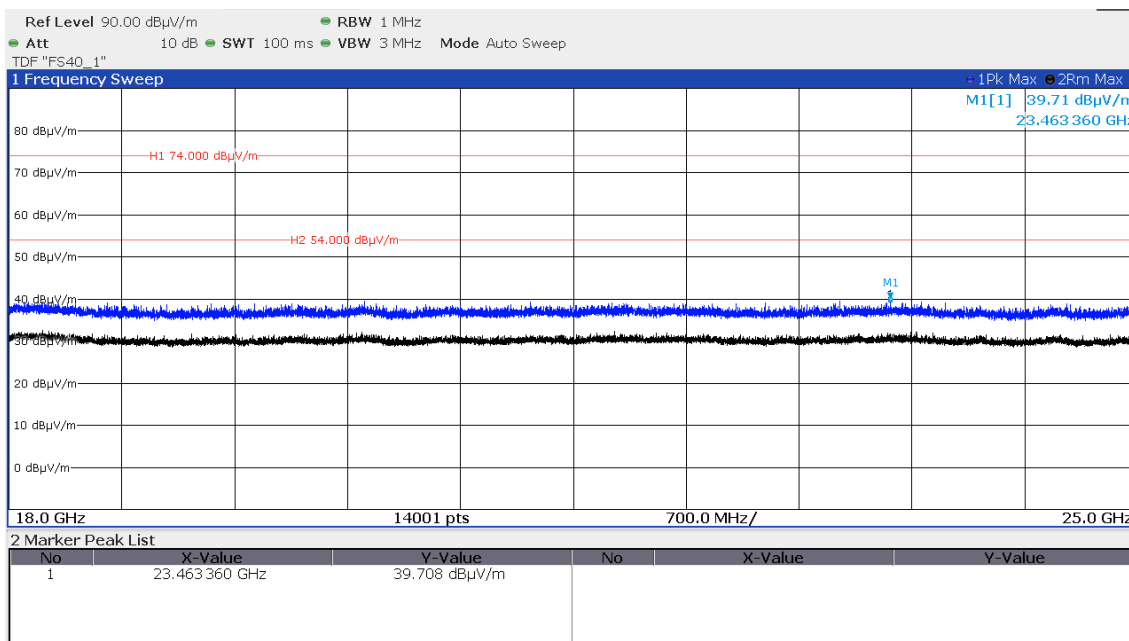
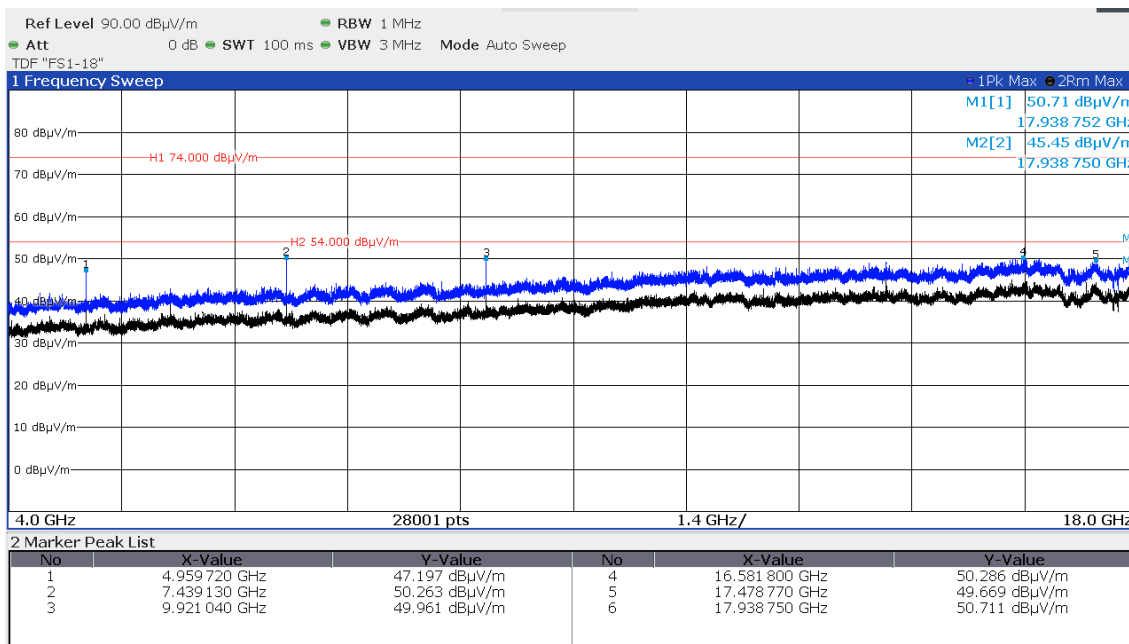


| MP (#) | f (GHz) | Peak (dB $\mu$ V/m) | DC corr. (dB) | AV (dB $\mu$ V/m) | AV Limit (dB $\mu$ V/m) | Margin (dB) |
|--------|---------|---------------------|---------------|-------------------|-------------------------|-------------|
| 2      | 7.44013 | 60.0                | -8.0          | 52.0              | 54.0                    | -2.0        |



## CH39 vertical





Radiated limits according to FCC Part 15 Section 15.209(a) for spurious emissions which fall in restricted bands:

| Frequency<br>(MHz) | Field strength of spurious emissions |                       | Measurement distance<br>(metres) |
|--------------------|--------------------------------------|-----------------------|----------------------------------|
|                    | ( $\mu\text{V/m}$ )                  | dB( $\mu\text{V/m}$ ) |                                  |
| 0.009-0.490        | 2400/F (kHz)                         |                       | 300                              |
| 0.490-1.705        | 24000/F (kHz)                        |                       | 30                               |
| 1.705-30           | 30                                   | 29.5                  | 30                               |
| 30-88              | 100                                  | 40                    | 3                                |
| 88-216             | 150                                  | 43.5                  | 3                                |
| 216-960            | 200                                  | 46                    | 3                                |
| Above 960          | 500                                  | 54                    | 3                                |

### Restricted bands of operation:

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209

| MHz                 | MHz                   | MHz             | GHz           |
|---------------------|-----------------------|-----------------|---------------|
| 0.090 – 0.110       | 16.42 – 16.423        | 399.9 – 410     | 4.5 – 5.15    |
| 0.495 – 0.505       | 16.69475 – 16.69525   | 608 – 614       | 5.35 – 5.46   |
| 2.1735 – 2.1905     | 16.80425 – 16.80475   | 960 – 1240      | 7.25 – 7.75   |
| 4.125 – 4.128       | 25.5 – 25.67          | 1300 – 1427     | 8.025 – 8.5   |
| 4.17725 – 4.17775   | 37.5 – 38.25          | 1435 – 1626.5   | 9.0 – 9.2     |
| 4.20725 – 4.20775   | 73 – 74.6             | 1645.5 – 1646.5 | 9.3 – 9.5     |
| 6.215 – 6.218       | 74.8 – 75.2           | 1660 – 1710     | 10.6 – 12.7   |
| 6.26775 – 6.26825   | 108 – 121.94          | 1718.8 – 1722.2 | 13.25 – 13.4  |
| 6.31175 – 6.31225   | 123 – 138             | 2200 – 2300     | 14.47 – 14.5  |
| 8.291 – 8.294       | 149.9 – 150.05        | 2310 – 2390     | 15.35 – 16.2  |
| 8.362 – 8.366       | 156.52475 – 156.52525 | 2483.5 – 2500   | 17.7 – 21.4   |
| 8.37625 – 8.38675   | 156.7 – 156.9         | 2690 – 2900     | 22.01 – 23.12 |
| 8.41425 – 8.41475   | 162.0125 – 167.17     | 3260 – 3267     | 23.6 – 24.0   |
| 12.29 – 12.293      | 167.72 – 173.2        | 3332 – 3339     | 31.2 – 31.8   |
| 12.51975 – 12.52025 | 240 – 285             | 3345.8 – 3358   | 36.43 – 36.5  |
| 12.57675 – 12.57725 | 322 – 335.4           | 3600 – 4400     | Above 38.6    |

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

# RSS-Gen, Table 6 – Restricted Frequency Bands

| MHz                 | MHz                   | MHz             | GHz           |
|---------------------|-----------------------|-----------------|---------------|
| 0.090 - 0.110       | 12.57675 - 12.57725   | 399.9 - 410     | 7.250 - 7.750 |
| 0.495 - 0.505       | 13.36 - 13.41         | 608 - 614       | 8.025 – 8.500 |
| 2.1735 - 2.1905     | 16.42 - 16.423        | 960 - 1427      | 9.0 - 9.2     |
| 3.020 - 3.026       | 16.69475 - 16.69525   | 1435 - 1626.5   | 9.3 - 9.5     |
| 4.125 - 4.128       | 16.80425 - 16.80475   | 1645.5 - 1646.5 | 10.6 - 12.7   |
| 4.17725 - 4.17775   | 25.5 - 25.67          | 1660 - 1710     | 13.25 - 13.4  |
| 4.20725 - 4.20775   | 37.5 - 38.25          | 1718.8 - 1722.2 | 14.47 - 14.5  |
| 5.677 - 5.683       | 73 - 74.6             | 2200 - 2300     | 15.35 - 16.2  |
| 6.215 - 6.218       | 74.8 - 75.2           | 2310 - 2390     | 17.7 - 21.4   |
| 6.26775 - 6.26825   | 108 – 138             | 2483.5 - 2500   | 22.01 - 23.12 |
| 6.31175 - 6.31225   | 149.9 - 150.05        | 2655 - 2900     | 23.6 - 24.0   |
| 8.291 - 8.294       | 156.52475 - 156.52525 | 3260 – 3267     | 31.2 - 31.8   |
| 8.362 - 8.366       | 156.7 - 156.9         | 3332 - 3339     | 36.43 - 36.5  |
| 8.37625 - 8.38675   | 162.0125 - 167.17     | 3345.8 - 3358   | Above 38.6    |
| 8.41425 - 8.41475   | 167.72 - 173.2        | 3500 - 4400     |               |
| 12.29 - 12.293      | 240 – 285             | 4500 - 5150     |               |
| 12.51975 - 12.52025 | 322 - 335.4           | 5350 - 5460     |               |

The requirements are **FULFILLED**.

**Remarks:** The measurement was performed up to the 10<sup>th</sup> harmonic. Only the worst-case plots are listed.

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

## 5.3 Spurious emissions radiated

### 5.3.1 Description of the test location

Test location: NONE

Test distance: -

### 5.3.2 Applicable standard

According to FCC Part 15, Section 15.247(d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

### 5.3.3 Description of Measurement

The restricted bands are measured radiated. The span of the spectrum analyser is set wide enough to capture the restricted band and measure the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation. The restricted bands are measured falling emissions into it and the nearest restricted band are checked for emissions also the restricted band for the harmonics of the carrier.

The radiated power of the spurious emission from the EUT is measured in a test setup following the procedures set out in ANSI C63.10. If the emission level of the EUT in peak mode complies with the average limit is 20 dB lower, then testing will be stopped and peak values of the EUT will be reported, otherwise the emission will be measured in average mode again and reported.

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

### 5.3.4 Test result

Measurements are performed in following order:

1) Measurement of emissions according to General Limit specified in section 15.209(a):

Test receiver settings for SER1, SER2:

|              |              |                       |                  |
|--------------|--------------|-----------------------|------------------|
| 9kHz-150kHz  | RBW: 200 Hz  | Detector: Quasi peak* | Meas. Time: 1 s, |
| 150kHz-30MHz | RBW: 9 kHz   | Detector: Quasi peak* | Meas. Time: 1 s, |
| 30MHz-1GHz   | RBW: 120 MHz | Detector: Quasi peak  | Meas. Time: 1 s, |

\*AV Detector in the ranges 9-90kHz and 110-490kHz

Spectrum analyser settings for SER3:

|            |            |                     |                  |             |
|------------|------------|---------------------|------------------|-------------|
| 1GHz-26GHz | RBW: 1 MHz | Detector: Max. peak | Trace: Max. hold | Sweep: Auto |
|------------|------------|---------------------|------------------|-------------|

2) If emissions outside the Restricted Bands are above General Limit additional measurements of emissions according to Spurious Emissions Limit specified in section 15.247(d) are performed:

Spectrum analyser settings:

|              |              |                     |                  |             |
|--------------|--------------|---------------------|------------------|-------------|
| RBW: 100 kHz | VBW: 300 kHz | Detector: Max. peak | Trace: Max. hold | Sweep: Auto |
|--------------|--------------|---------------------|------------------|-------------|

**Result: All emissions are below general limit, see clause 5.2.**

The requirements are **FULFILLED**.

**Remarks:** None.

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## 5.4 Antenna application

### 5.4.1 Applicable standard

According to FCC Part 15C, Section 15.203:

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 shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit that broken antennas can be replaced by the user, but the use of a standard antenna jack is prohibited.

**The supplied antenna meets the requirements of part 15.203 and 15.204.**

Remarks:

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The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

## 6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

| Test ID | Model Type               | Equipment No.   | Next Calib. | Last Calib. | Next Verif. | Last Verif. |
|---------|--------------------------|-----------------|-------------|-------------|-------------|-------------|
| CPR 3   | FSW43                    | 02-02/11-15-001 | 13/05/2025  | 13/05/2024  |             |             |
|         | AMF-6D-01002000-22-10P   | 02-02/17-15-004 |             |             |             |             |
|         | 3117                     | 02-02/24-05-009 | 12/07/2024  | 12/07/2023  |             |             |
|         | BAM 4.5-P                | 02-02/50-17-024 |             |             |             |             |
|         | NCD 02-02/50-17-025      |                 |             |             |             |             |
|         | KK-SF106-2X11N-6,5M      | 02-02/50-18-016 |             |             |             |             |
|         | 18N-20                   | 02-02/50-21-009 | 17/10/2024  | 17/04/2024  |             |             |
|         | BAT-EMC 2023.0.8.0       | 02-02/68-13-001 |             |             |             |             |
| SER 2   | ESCI02-02/03-05-004      | 05/10/2024      | 05/10/2023  |             |             |             |
|         | ESCI02-02/03-05-005      | 15/12/2024      | 15/12/2023  |             |             |             |
|         | ESR 7                    | 02-02/03-13-001 | 14/03/2025  | 14/03/2024  |             |             |
|         | ESCI02-02/03-15-001      | 03/07/2024      | 03/07/2023  |             |             |             |
|         | UHALP 9108 A             | 02-02/24-05-022 | 23/05/2025  | 23/05/2024  |             |             |
|         | BBA 9106 / VHA 9103      | 02-02/24-05-023 | 23/05/2025  | 23/05/2024  |             |             |
|         | HCM                      | 02-02/50-05-115 |             |             |             |             |
|         | N-3000-N                 | 02-02/50-05-191 |             |             |             |             |
|         | ON100493                 | 02-02/50-14-014 |             |             |             |             |
|         | KK-SF406-2X11N-20.0M     | 02-02/50-16-021 |             |             |             |             |
|         | KK-EF393                 | 02-02/50-16-025 |             |             |             |             |
| SER 3   | FSW43                    | 02-02/11-15-001 | 13/05/2025  | 13/05/2024  |             |             |
|         | AMF-6D-01002000-22-10P   | 02-02/17-15-004 |             |             |             |             |
|         | LNA-40-18004000-33-5P    | 02-02/17-20-002 |             |             |             |             |
|         | 3117                     | 02-02/24-05-009 | 12/07/2024  | 12/07/2023  |             |             |
|         | BBHA 9170                | 02-02/24-05-013 | 21/03/2026  | 21/03/2023  | 22/01/2025  | 22/01/2024  |
|         | WHK 3.0/18G-10EF         | 02-02/50-05-180 |             |             |             |             |
|         | BAM 4.5-P                | 02-02/50-17-024 |             |             |             |             |
|         | NCD 02-02/50-17-025      |                 |             |             |             |             |
|         | KK-SF106-2X11N-6,5M      | 02-02/50-18-016 |             |             |             |             |
|         | KMS116-GL140SE-KMS116-1. | 02-02/50-20-026 |             |             |             |             |
|         | BAT-EMC 2023.0.8.0       | 02-02/68-13-001 |             |             |             |             |

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