



# RF - TEST REPORT

- FCC Part 15B -

**Type / Model Name** : R&S® QPS Walk2000

**Product Description** : Walk-through security scanner

**Applicant** : Rohde & Schwarz GmbH & Co. KG

**Address** : Mühldorfstraße 15  
81614 MÜNCHEN, GERMANY

**Manufacturer** : Rohde & Schwarz GmbH & Co. KG

**Address** : Mühldorfstraße 15  
81614 MÜNCHEN, GERMANY

<b>Test Result</b> according to the standards listed in clause 1 test standards:	<b>POSITIVE</b>
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<b>Test Report No. :</b> <b>80119127-03 Rev0</b>	<u>19. May 2022</u> Date of issue
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Deutsche  
Akkreditierungsstelle  
D-PL-12030-01-03  
D-PL-12030-01-04

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ATTACHMENT A1, A2 and B as separate supplements



## 2 TEST RESULT SUMMARY

FCC Rule Part	ISED Standard	Description
15.107	ICES-003/RSS-Gen	AC power line conducted emissions
15.109	ICES-003/RSS-Gen	Radiated Emissions

Type of test	Test result
Emission:	
A4 Conducted emission (AC mains power / DC power)	passed
A5 Radiated emission (< 1 GHz)	passed
SER 3 Radiated emission (> 1 GHz)	passed

### 2.1 Revision history of test report

Test report No	Rev.	Issue Date	Changes
80119127-03	0	19 May 2022	Initial test report

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

### 2.2 Final assessment

Select final Assessment

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

Testing commenced on : 19 April 2022

Testing concluded on : 29 April 2022

Checked by:

Tested by:

\_\_\_\_\_  
Klaus Gegenfurtner  
Teamleader Radio

\_\_\_\_\_  
Franz-Xaver Schrettenbrunner  
Radio Team

## **3 EQUIPMENT UNDER TEST**

### **3.1 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.

### **3.2 Sampling**

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

### **3.3 Photo documentation of the EUT – Detailed photos see ATTACHMENT A1 and A2**

### **3.4 General remarks**

None.

### **3.5 Power supply system utilised**

Power supply voltage : 120 V AC

All tests were carried out with a supply voltage of 120 V, 60 Hz unless otherwise stated.

### **3.6 Highest internal frequency**

Highest internal frequency : 9.6 GHz (according 10dBc of UWB transmitter)

### **3.7 Short description of the Equipment under Test (EUT)**

The QPS Walk2000 is the next generation of a walk through body scanning, designed to improve individuals' security. The system is meant to be installed in fixed indoor locations, generally in entrances to secured areas. The QPS Walk2000 automatically detects the existence of concealed unauthorized objects on an individual's body.

The end device consists of 224 transmitter modules and 448 receiver modules. All measurements were performed on a single transmitter to demonstrate that all requirements are fulfilled.

Number of tested samples: 1  
Serial number: 1341.9999K02

### 3.8 EUT operation mode

The equipment under test was operated during the measurement under the following conditions:

- stand-by: complete functionality of EUT without UWB transmitting

### 3.9 EUT configuration

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

- --- Model : ---

Port	Cable	Screening	Transmission	Status	Length
1	AC power line	unshielded	analogue	active	2 m

**Modifications during the EMC test: None**

## 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.

### 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

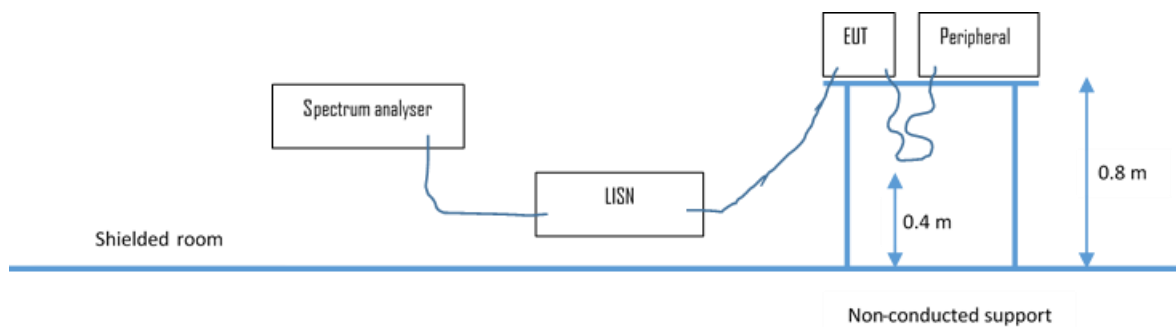
CSA Group Bayern GmbH is recognized as wireless testing laboratory under the CAB identifier:

**FCC: DE 0011**  
**ISED: DE0009**

### 4.5.2 Details of test procedures

#### 4.5.2.1 Conducted emission

Test setup according ANSI C63.4



#### Description of measurement

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

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

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

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

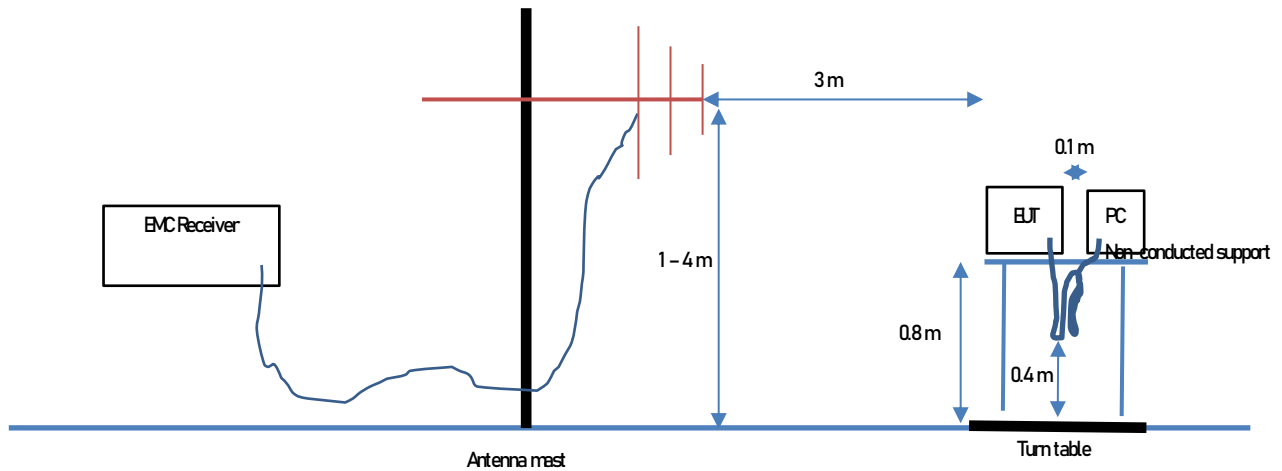
Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a Line Impedance Stabilization Network (LISN) with  $50 \Omega / 50 \mu\text{H}$  (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.



## 4.5.2.2 Radiated emission

### 4.5.2.2.1 OATS1 test site (30 MHz - 1 GHz)

Test setup according ANSI C63.4



### Description of measurement

Spurious emission from the EUT is measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarized 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 metre non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The setup of the equipment under test is established in accordance with ANSI C63.4. The interface cables that are closer than 40 centimetres to the ground plane are bundled in the centre in a serpentine fashion so that they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the centre of the table and to a screened room located outside the test area.

The antenna is positioned 3 or 10 metres horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres, measurement scans are made with both horizontal and vertical antenna polarization planes and the EUT is rotated 360 degrees.

The final level is calculated in a calculation sheet by taking the reading from the EMI receiver (Level dB $\mu$ V) and adding the correction factors and cable loss factor (Factor dB) on to it. The limit is subtracted from this result in order to provide the limit margin listed in the measurement protocols.

Example:

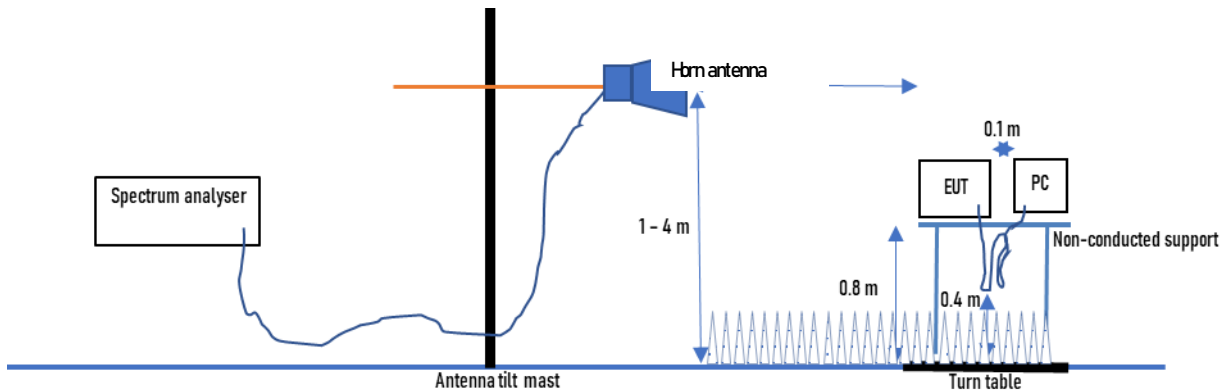
Frequency (MHz)	Reading (dB $\mu$ V)	+	Correction* (dB/m)	=	Level (dB $\mu$ V/m)	-	Limit (dB $\mu$ V/m)	=	Dlimit (dB)
719.0	75.0	+	32.6	=	107.6	-	110.0	=	-2.4

\*Correction Factor = Antenna Factor + Cable Attenuation = 30 dB/m + 2.6 dB = 32.6 dB/m

The resolution bandwidth during the measurement is as follows:

30 MHz – 1000 MHz: RBW: 120 kHz

#### 4.5.2.2.2 Anechoic chamber 1, 1000 MHz – 18000 MHz Test setup according ANSI C63.4



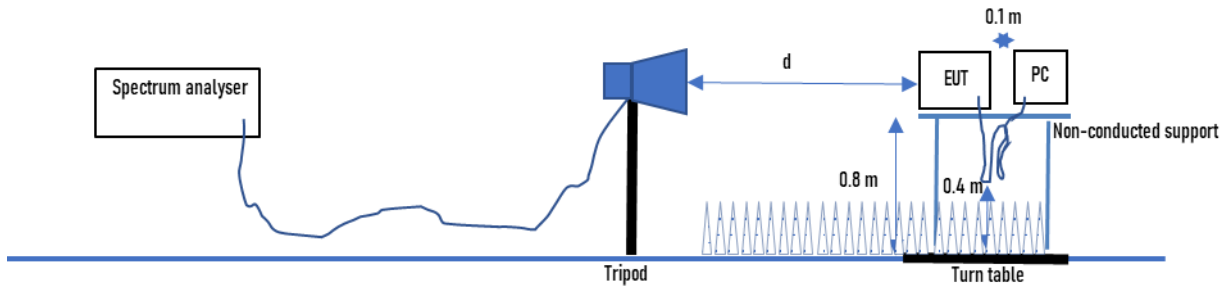
#### Description of measurement

Radiated emission from the EUT are measured in the frequency range of 1 GHz to the maximum frequency as specified in 47 CFR Part 15 Subpart A section 15.33, using a tuned receiver (spectrum analyser) and appropriate linearly polarized antennas. Table top equipment is placed on a 0.65 X 1.0 metre non-conducting table 80 centimetres above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12).

The interface cables that are closer than 40 centimetres to the ground plane are bundled in the centre in a serpentine fashion, so they are at least 40 centimetres from the ground plane. Measurements are made in both the horizontal and vertical polarization planes in a fully anechoic room using a spectrum analyser set to a peak detector function and a RBW= 1 MHz and VBW = 3 MHz. All tests are performed at a test distance of 3 metres. Hand-held or body-worn devices are rotated around three orthogonal axes in order to determine the position, angle and configuration having the maximum emission. The antenna height is then adjusted from 1 m to 4 m maximizing the measured value. The antenna is mounted to a boresight axis, so the antenna centre always points to the EUT. The turntable is rotated 360° until the spectrum analyser displays the maximum level at the observed frequency. The antenna height is then adjusted from 1 m to 4 m maximizing the measured value. The turntable is re-adjusted to re-affirm the maximum emission value which is then recorded. This procedure is repeated for all frequencies of interest.

#### 4.5.2.2.3 Anechoic chamber 1, 18 GHz – 40 GHz

Test setup according ANSI C63.4



#### Description of measurement

Radiated emission from the EUT are measured in the frequency range of 1 GHz to the maximum frequency as specified in 47 CFR Part 15 Subpart A section 15.33, using a tuned receiver (spectrum analyser) and appropriate linearly polarized antennas. Table top equipment is placed on a 0.65 X 1.0 metre non-conducting table 80 centimetres above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12).

The interface cables that are closer than 40 centimetres to the ground plane are bundled in the centre in a serpentine fashion, so they are at least 40 centimetres from the ground plane. Measurements are made in both the horizontal and vertical polarization planes in a fully anechoic room using a spectrum analyser set to a peak detector function and an RBW= 1 MHz and VBW = 3 MHz. All tests are performed at a test distance of 3 metres. Hand-held or body-worn devices are rotated around three orthogonal axes in order to determine the position, angle and configuration having the maximum emission. The turntable is rotated 360° until the spectrum analyser displays the maximum level at the observed frequency, the maximum emission value is then recorded. This procedure is repeated for all frequencies of interest.

Where appropriate in frequency range 18 GHz - 40 GHz, the test distance may be reduced to 1 m in order to reduce the noise level to hold a minimum distance between noise level and limit. The limit will be adopted to the measurement distance.

## 5 TEST CONDITIONS AND RESULTS

### 5.1 Conducted emission

For test instruments and accessories used see section 6 Part A 4.

#### 5.1.1 Description of the test location

Test location: Anechoic chamber 1

#### 5.1.2 Photo documentation of the test setup – see ATTACHMENT B

#### 5.1.3 Test result

Frequency range: 0.15 MHz - 30 MHz  
Min. limit margin -17.0 dB at 0.191 MHz

The requirements are **FULFILLED**.

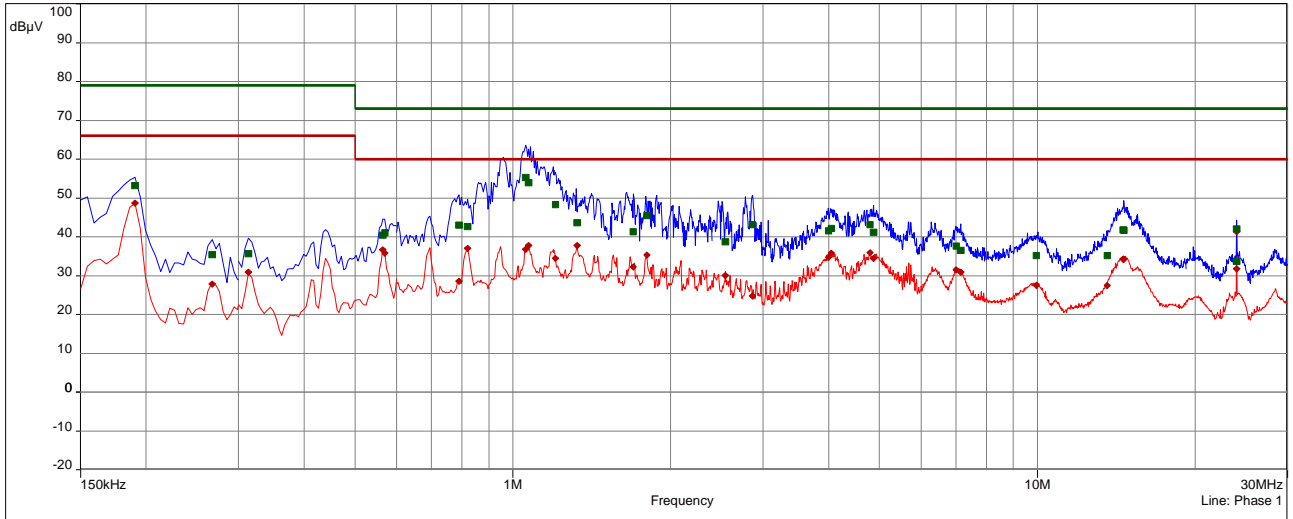
**Remarks:** For detailed results, please see the following page(s).  
For description of the measurement see 4.5.2.

### 5.1.4 Test protocol

Test point: L1  
 Operation mode: stand-by:  
 Remarks: None  
 Date: 25.04.2022  
 Tested by: Markus Friedl

Result: passed

- FCC/FCC Part 15B (15.107) A - Average/
- FCC/FCC Part 15B (15.107) A - QPeak/
- Peak (Phase 1)
- CISPR.AVG (Phase 1)
- QuasiPeak (Finals) (Phase 1)
- ◆ CISPR AV (Finals) (Phase 1)



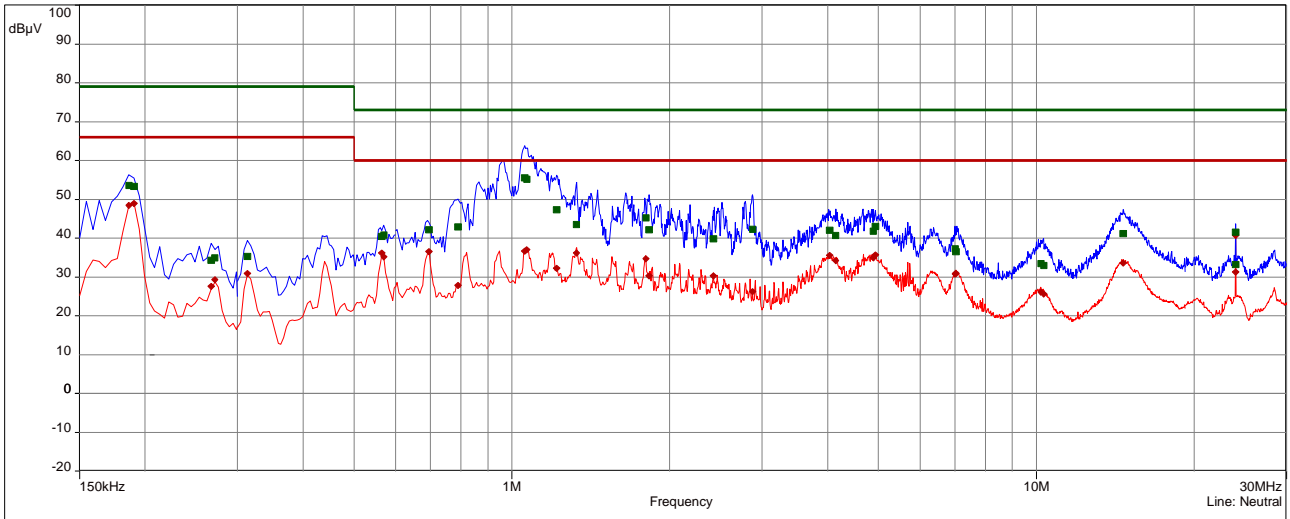
FCC/FCC Part 15B (15.107)A

freq MHz	QP dBµV	margin dB	limit dBµV	AV dBµV	margin dB	limit dBµV
0.191	53.3	-25.8	79.0	48.8	-17.2	66.0
0.267	35.5	-43.6	79.0	27.8	-38.2	66.0
0.314	35.7	-43.3	79.0	30.9	-35.1	66.0
0.566	40.5	-32.5	73.0	36.7	-23.3	60.0
0.570	41.1	-31.9	73.0	35.8	-24.2	60.0
0.789	43.0	-30.0	73.0	28.7	-31.3	60.0
0.821	42.8	-30.3	73.0	37.1	-22.9	60.0
1.059	55.4	-17.6	73.0	36.9	-23.1	60.0
1.073	54.0	-19.0	73.0	37.8	-22.2	60.0
1.205	48.3	-24.7	73.0	34.5	-25.5	60.0
1.326	43.7	-29.3	73.0	37.9	-22.2	60.0
1.700	41.4	-31.6	73.0	32.2	-27.8	60.0
1.799	45.5	-27.5	73.0	35.3	-24.7	60.0
2.544	38.8	-34.2	73.0	30.1	-29.9	60.0
2.864	43.2	-29.9	73.0	24.8	-35.2	60.0
3.993	41.6	-31.4	73.0	34.7	-25.3	60.0
4.043	42.2	-30.8	73.0	35.9	-24.1	60.0
4.805	43.2	-29.8	73.0	36.0	-24.0	60.0
4.877	41.3	-31.7	73.0	34.5	-25.5	60.0
7.001	37.7	-35.3	73.0	31.6	-28.4	60.0
7.140	36.5	-36.5	73.0	30.9	-29.1	60.0
9.969	35.3	-37.7	73.0	27.5	-32.5	60.0
13.565	35.2	-37.8	73.0	27.4	-32.6	60.0
14.568	41.8	-31.2	73.0	34.2	-25.8	60.0
14.595	41.8	-31.2	73.0	34.3	-25.8	60.0
24.002	42.1	-30.9	73.0	41.4	-18.7	60.0
24.006	33.7	-39.3	73.0	31.8	-28.2	60.0

Test point: N  
 Operation mode: stand-by:  
 Remarks: None  
 Date: 25.04.2022  
 Tested by: Markus Friedl

Result: passed

- FCC/FCC Part 15B (15.107) A - Average/
- FCC/FCC Part 15B (15.107) A - QPeak/
- Peak (Neutral)
- CISPR.AVG (Neutral)
- QuasiPeak (Finals) (Neutral)
- ◆ CISPR AV (Finals) (Neutral)



FCC/FCC Part 15B (15.107)A

freq MHz	QP dBµV	margin dB	limit dBµV	AV dBµV	margin dB	limit dBµV
0.186	53.6	-25.4	79.0	48.5	-17.5	66.0
0.191	53.3	-25.7	79.0	49.0	-17.0	66.0
0.267	34.4	-44.6	79.0	27.6	-38.4	66.0
0.272	35.0	-44.0	79.0	29.3	-36.7	66.0
0.314	35.4	-43.6	79.0	30.9	-35.1	66.0
0.566	40.4	-32.6	73.0	36.2	-23.8	60.0
0.570	40.8	-32.2	73.0	35.2	-24.8	60.0
0.695	42.2	-30.8	73.0	36.6	-23.5	60.0
0.789	42.9	-30.1	73.0	27.9	-32.1	60.0
1.059	55.6	-17.4	73.0	36.7	-23.3	60.0
1.068	55.2	-17.8	73.0	37.1	-22.9	60.0
1.218	47.4	-25.6	73.0	32.3	-27.7	60.0
1.331	43.6	-29.4	73.0	36.2	-23.8	60.0
1.799	45.3	-27.7	73.0	34.7	-25.3	60.0
1.826	42.2	-30.8	73.0	30.3	-29.7	60.0
2.423	39.9	-33.2	73.0	30.3	-29.7	60.0
2.877	42.4	-30.6	73.0	26.2	-33.8	60.0
4.038	42.1	-30.9	73.0	35.6	-24.4	60.0
4.151	40.7	-32.3	73.0	34.3	-25.7	60.0
4.895	41.8	-31.2	73.0	35.0	-25.0	60.0
4.935	43.0	-30.0	73.0	35.7	-24.3	60.0
6.996	37.3	-35.7	73.0	30.8	-29.2	60.0
7.028	36.6	-36.4	73.0	30.9	-29.1	60.0
10.194	33.5	-39.5	73.0	26.1	-33.9	60.0
10.334	33.1	-39.9	73.0	25.7	-34.3	60.0
14.640	41.2	-31.8	73.0	33.6	-26.4	60.0
24.002	41.6	-31.4	73.0	40.8	-19.2	60.0
24.006	33.2	-39.8	73.0	31.3	-28.7	60.0

## 5.2 Radiated emission < 1 GHz (electric field)

For test instruments and accessories used see section 6 Part A 5.

### 5.2.1 Description of the test location

Test location: OATS 1  
Test distance: 10 m

### 5.2.2 Photo documentation of the test setup – see ATTACHMENT B

### 5.2.3 Test result

Frequency range: 30 MHz - 1000 MHz  
Min. limit margin -4.1 dB at 120.0 MHz

The requirements are **FULFILLED**.

**Remarks:** For detailed results, please see the following page(s).

For description of the measurement see 4.5.2.

## 5.2.4 Test protocol

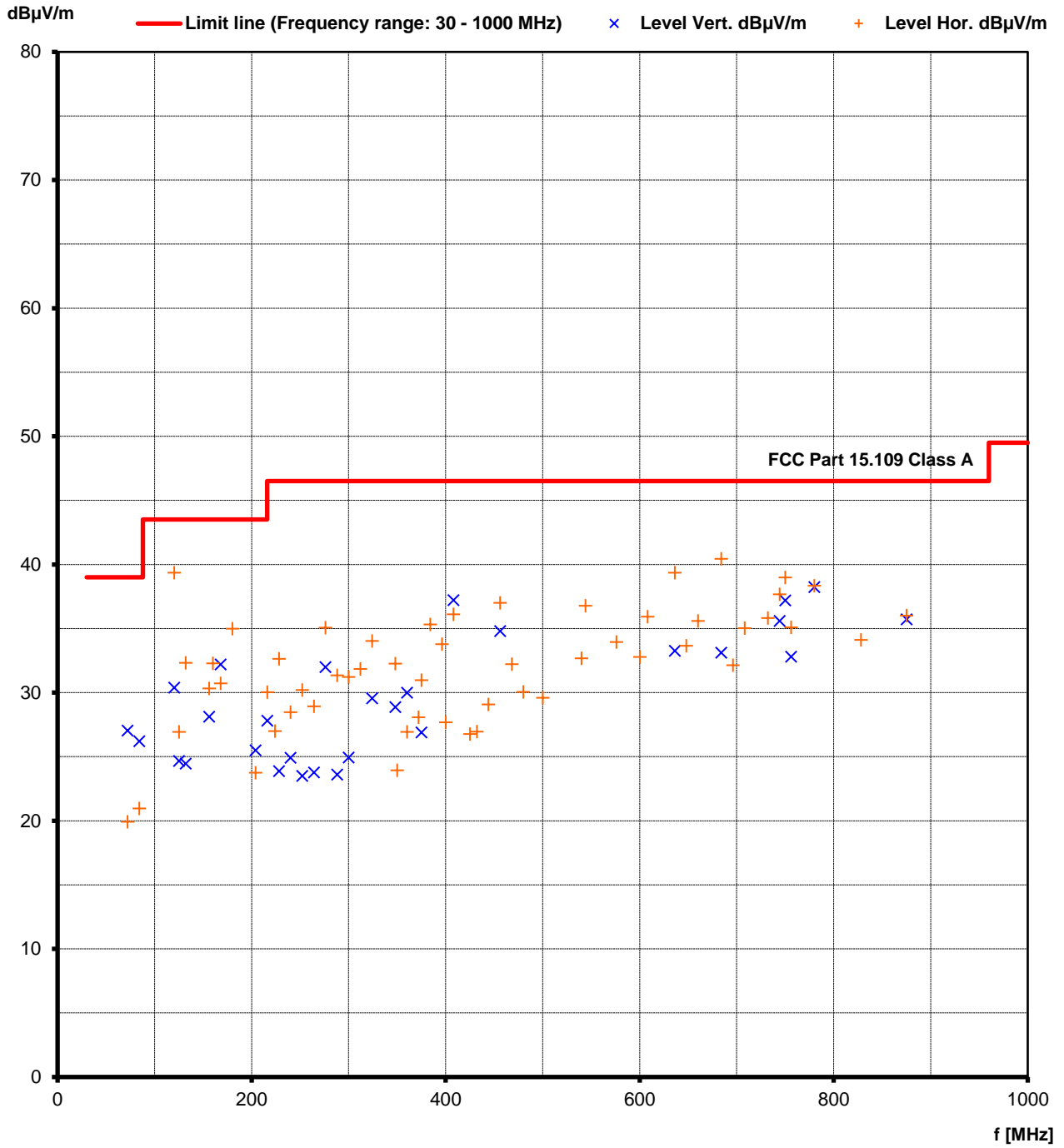
Operation mode: stand-by:  
 Remarks: None  
 Date: 28.04.2022  
 Tested by: Franz-Xaver Schrettenbrunner

Result: passed

Frequency (MHz)	Reading Vert. (dBµV)	Reading Hor. (dBµV)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level Vert. (dBµV/m)	Level Hor. (dBµV/m)	Limit (dBµV/m)	Dlimit (dB)
72.00	11.3	4.1	15.7	15.9	27.1	19.9	39.0	-11.9
84.00	12.7	7.5	13.5	13.5	26.2	21.0	39.0	-12.8
120.00	14.6	23.0	15.8	16.4	30.4	39.4	43.5	-4.1
125.00	8.4	10.2	16.3	16.8	24.7	26.9	43.5	-16.6
132.00	7.4	15.0	17.1	17.3	24.5	32.3	43.5	-11.2
156.00	9.5	11.7	18.6	18.6	28.1	30.3	43.5	-13.2
160.00		13.5		18.8		32.3	43.5	-11.2
168.00	14.0	12.5	18.2	18.2	32.2	30.7	43.5	-11.3
180.00		17.6		17.4		35.0	43.5	-8.5
204.00	8.6	8.1	16.9	15.7	25.5	23.8	43.5	-18.0
216.00	10.6	13.8	17.2	16.2	27.8	30.0	43.5	-13.5
224.00		10.4		16.6		27.0	46.5	-19.5
228.00	6.3	15.9	17.6	16.8	23.9	32.6	46.5	-13.9
240.00	7.0	11.2	17.9	17.3	24.9	28.5	46.5	-18.0
252.00	5.2	12.3	18.3	17.9	23.5	30.2	46.5	-16.3
264.00	5.0	10.5	18.8	18.4	23.8	28.9	46.5	-17.6
276.00	12.8	16.1	19.2	18.9	32.0	35.1	46.5	-11.4
288.00	3.9	11.9	19.7	19.5	23.6	31.4	46.5	-15.1
300.00	4.8	11.2	20.2	20.0	25.0	31.2	46.5	-15.3
312.00		11.5		20.3		31.8	46.5	-14.7
324.00	8.7	13.4	20.9	20.7	29.6	34.0	46.5	-12.5
348.00	7.3	10.9	21.5	21.4	28.9	32.3	46.5	-14.2
350.00		2.5		21.5		24.0	46.5	-22.5
360.00	8.1	5.2	21.9	21.7	30.0	27.0	46.5	-16.5
372.00		6.0		22.1		28.1	46.5	-18.4
375.00	4.6	8.8	22.3	22.2	26.9	31.0	46.5	-15.5
384.00		12.9		22.4		35.3	46.5	-11.2
396.00		11.0		22.8		33.8	46.5	-12.7
400.00		4.8		22.9		27.7	46.5	-18.8
408.00	14.0	13.0	23.2	23.1	37.2	36.1	46.5	-9.3
425.00		3.2		23.6		26.8	46.5	-19.7
432.00		3.2		23.8		27.0	46.5	-19.5
444.00		5.0		24.1		29.1	46.5	-17.4
456.00	10.3	12.6	24.5	24.4	34.8	37.0	46.5	-9.5
468.00		7.5		24.7		32.2	46.5	-14.3
480.00		5.0		25.1		30.1	46.5	-16.4
500.00		4.0		25.6		29.6	46.5	-16.9
540.00		6.0		26.7		32.7	46.5	-13.8
544.00		10.0		26.8		36.8	46.5	-9.7
576.00		6.3		27.7		34.0	46.5	-12.5
600.00		4.5		28.3		32.8	46.5	-13.7
608.00		7.5		28.4		35.9	46.5	-10.6
636.00	4.5	10.5	28.8	28.9	33.3	39.4	46.5	-7.1
648.00		4.6		29.1		33.7	46.5	-12.8
660.00		6.4		29.3		35.6	46.5	-10.9
684.00	3.6	10.8	29.5	29.6	33.1	40.5	46.5	-6.0
696.00		2.3		29.8		32.1	46.5	-14.4
708.00		5.0		30.0		35.0	46.5	-11.5
732.00		5.4		30.5		35.8	46.5	-10.7
744.00	5.0	7.0	30.6	30.7	35.6	37.7	46.5	-8.8
750.00	6.5	8.2	30.7	30.8	37.2	39.0	46.5	-7.5
756.00	2.0	4.2	30.8	30.9	32.8	35.1	46.5	-11.4
780.00	7.0	7.0	31.2	31.3	38.2	38.3	46.5	-8.2
828.00		2.0		32.1		34.1	46.5	-12.4
875.00	3.0	3.2	32.7	32.8	35.7	36.0	46.5	-10.5

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.





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### 5.3 Radiated emission > 1 GHz (electric field)

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

#### 5.3.1 Description of the test location

Test location: Anechoic chamber 1  
Test distance: 3 m

#### 5.3.2 Photo documentation of the test setup – see ATTACHMENT B

#### 5.3.3 Test result

Frequency range: 1 GHz – 40 GHz  
Min. limit margin -1.5 dB at 2388.2 MHz

The requirements are **FULFILLED**.

**Remarks:** For detailed results, please see the following page(s).

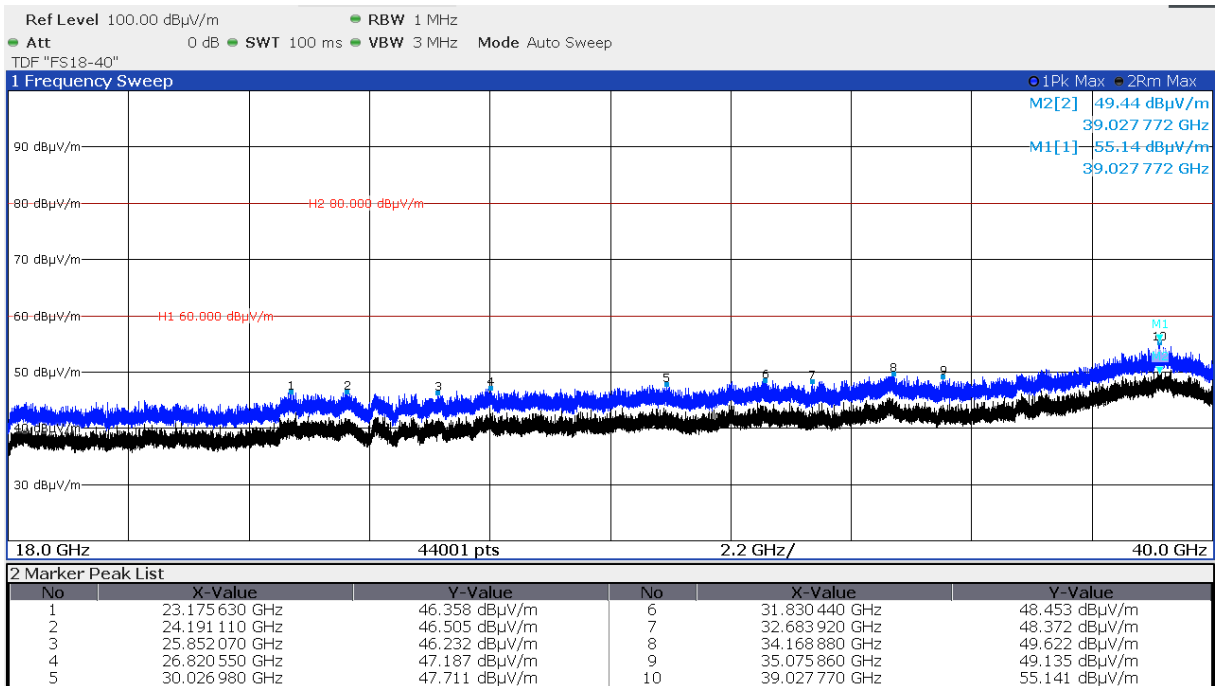
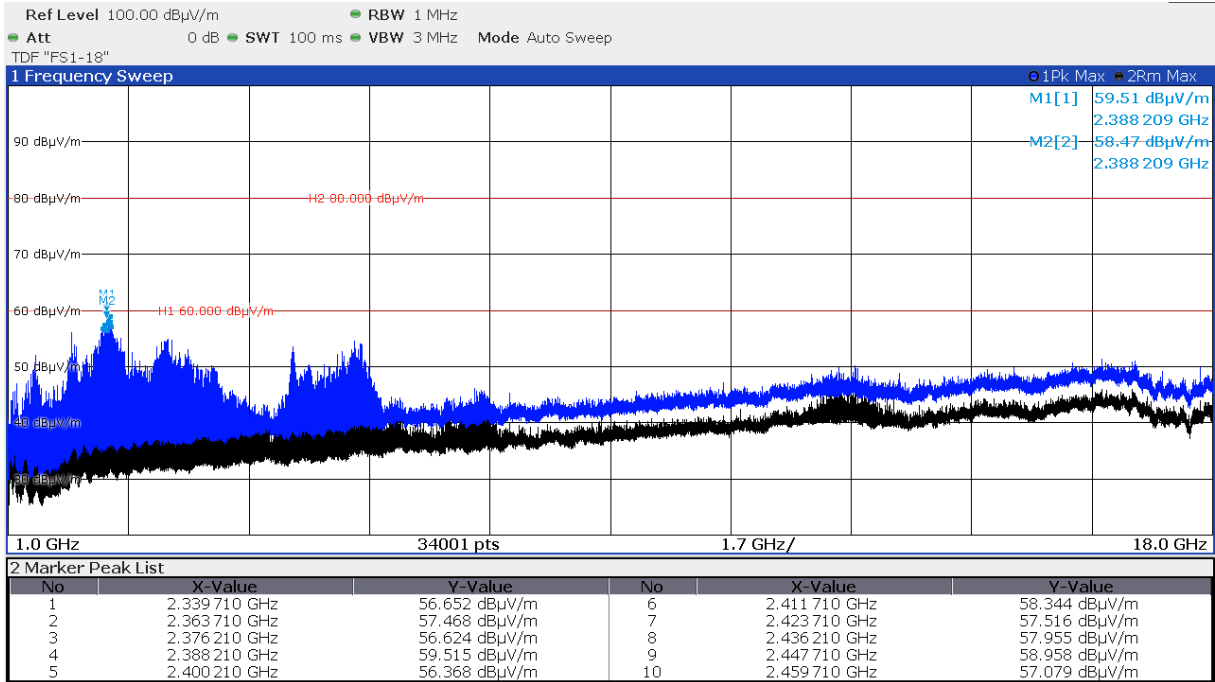
For description of the measurement see 4.5.2.

### 5.3.4 Test protocol

Operation mode: stand-by:  
 Remarks: None  
 Date: 21.04.2022  
 Tested by: Franz-Xaver Schrettenbrunner

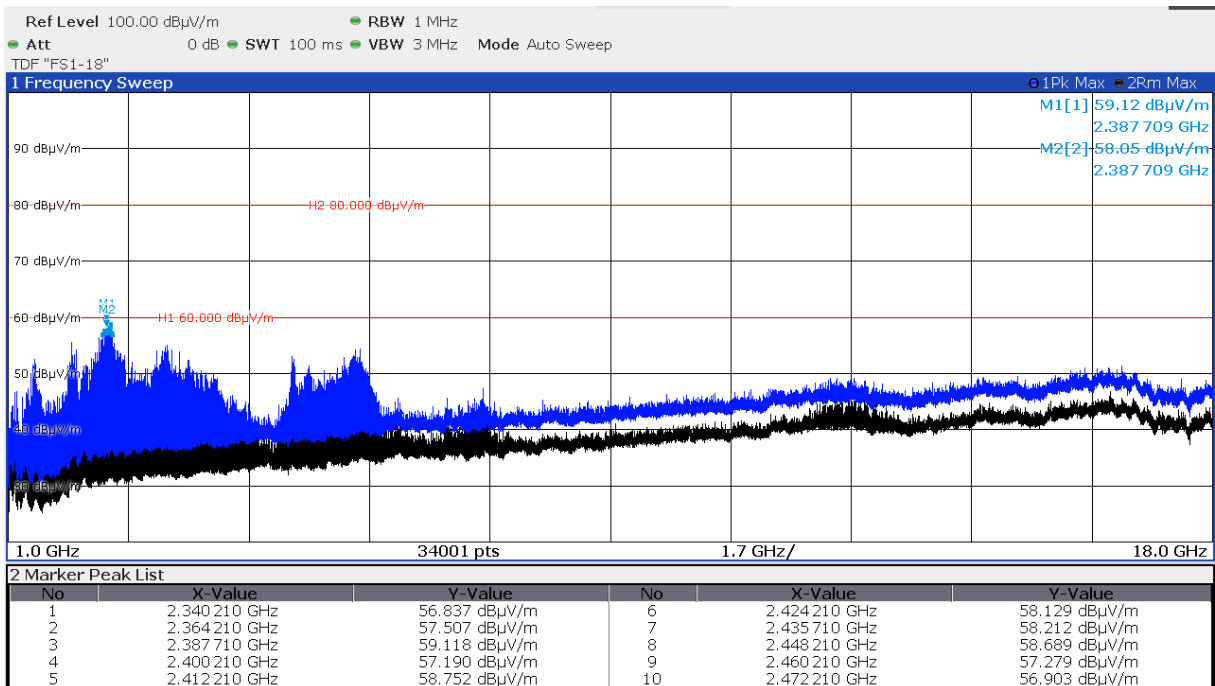
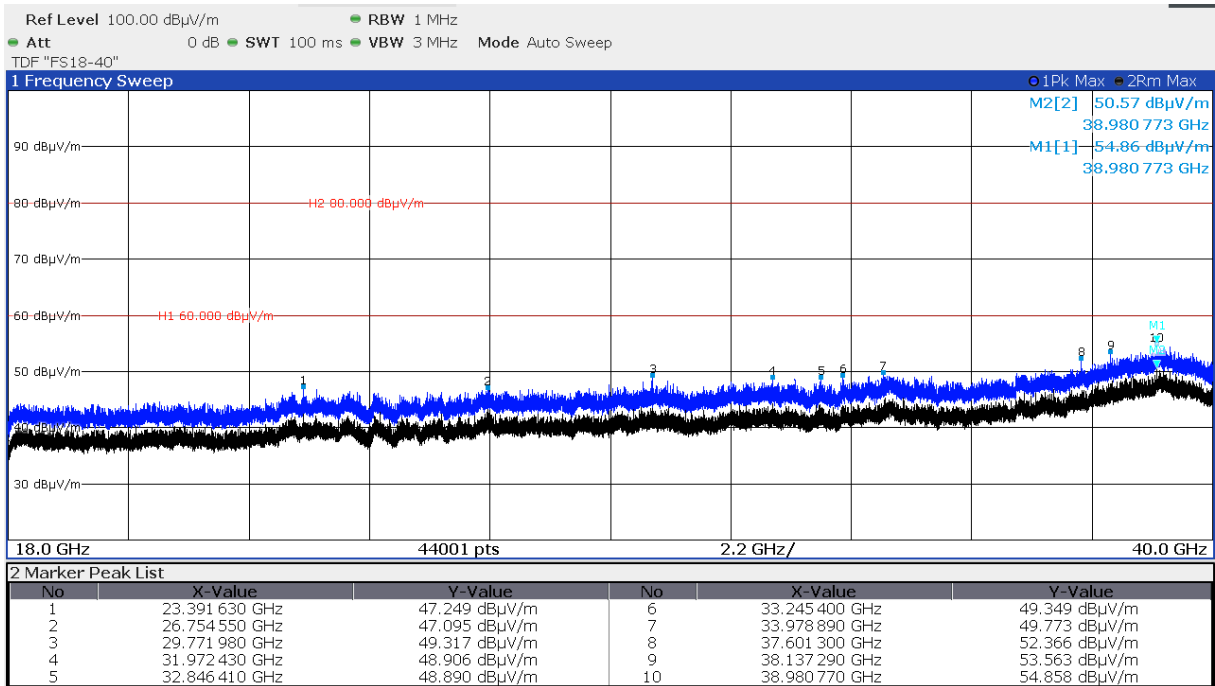
Result: passed

horizontal



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.

vertical



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, in addition to the test accessories, are calibrated and verified regularly.

Test ID	Model Type	Kind of Equipment	Manufacturer	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
A 4	BAT-EMC 3.21.0.24	Nexio Software	EMCO Elektronik GmbH	01-02/68-13-001				
	ESCI	EMI Test Receiver	Rohde & Schwarz München	02-02/03-15-001	21/06/2022	21/06/2021		
	ESH 2 - Z 5	LISN	Rohde & Schwarz München	02-02/20-05-004	31/10/2022	31/10/2019	22/09/2022	22/03/2022
	N-4000-BNC	RF Cable	CSA Group Bayern GmbH	02-02/50-05-138				
	ESH 3 - Z 2	Pulse Limiter	Rohde & Schwarz München	02-02/50-05-155	13/11/2022	13/11/2019	08/09/2022	08/03/2022
A 5	ESVS 30	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-006	09/07/2022	09/07/2021		
	VULB 9168	Trilog Broadband	Schwarzbeck Mess-Elektron	02-02/24-05-005	20/12/2022	20/12/2021	07/07/2022	07/07/2021
	NW-2000-NB	RF Cable	Huber + Suhner	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	RF Cable 20m	Huber + Suhner	02-02/50-12-018				
	KK-SD_7/8-2X21N-33,0M	RF Cable 33 m	Huber + Suhner AG	02-02/50-15-028				
	50F-003 N 3 dB	Dämpfungsglied 3dB_5	Tactron Elektronik	02-02/50-21-010				
SER 3	FSW43	Spectrum Analyser	Rohde & Schwarz München	02-02/11-21-001	08/05/2022	08/04/2021		
	AMF-6D-01002000-22-10P	RF Amplifier	MITEQ, Inc.	02-02/17-15-004				
	LNA-40-18004000-33-5P	Amplifier 18-40 GHz	MITEQ, Inc.	02-02/17-20-002				
	3117	Horn Antenna 1 - 18 GH	EMCO Elektronik GmbH	02-02/24-05-009	28/06/2022	28/06/2021		
	BBHA 9170	SHF-EHF Horn Antenna	Schwarzbeck Mess-Elektron	02-02/24-05-013	19/05/2023	19/05/2020	10/03/2023	10/03/2022
	BAM 4.5-P	Antenna Mast	matur GmbH	02-02/50-17-024				
	NCD	Controller for Antenna M	matur GmbH	02-02/50-17-025				
	KK-SF106-2X11N-6,5M	RF Cable	Huber + Suhner	02-02/50-18-016w				
	KMS116-GL140SE-KMS116	Cable DC-40GHz	GigaLane Co., Ltd.	02-02/50-20-026				
	BAT-EMC 3.21.0.24	Nexio Software	EMCO Elektronik GmbH	02-02/68-13-001				

## 7 Detailed measurement uncertainty

### 7.1 Overview

Measurement instrumentation uncertainty shall be taken into account when determining compliance or non-compliance with a disturbance limit.

The measurement instrumentation uncertainty for a test laboratory shall be evaluated. The standard uncertainty  $u(x_i)$  in decibels and the sensitivity coefficient  $c_i$  shall be evaluated for the estimate  $x_i$  of each quantity. The combined standard uncertainty  $u_c(y)$  of the estimate  $y$  of the measurand shall be calculated as

$$u_c(y) = \sqrt{\sum_i c_i^2 u^2(x_i)}$$

The expanded measurement instrumentation uncertainty  $U_{lab}$  for a test laboratory shall be calculated as  $U_{lab} = 2 u_c(y)$

$$U_{lab} = 2 u_c(y)$$

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

If  $U_{lab}$  is less than or equal to  $U_{cispr}$  in the table below, then:

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

If  $U_{lab}$  is greater than  $U_{cispr}$  in the table below, then:

- compliance is deemed to occur if no measured disturbance, increased by  $(U_{lab} - U_{cispr})$ , exceeds the disturbance limit.
- non-compliance is deemed to occur if any measured disturbance, increased by  $(U_{lab} - U_{cispr})$ , exceeds the disturbance limit.

### 7.2 Definitions and symbols

$X_i$	Input quantity
$x_i$	estimate of $X_i$
$u(x_i)$	standard uncertainty of $x_i$
$c_i$	sensitivity coefficient
$u_c(y)$	(combined) standard uncertainty of $y$
$Y$	result of a measurement, (the estimate of the measured), corrected for all recognised significant systematic effects
$U$	expanded uncertainty of $y$

### 7.3 Measurement uncertainty

Measurement	$U_{lab}$ [dB]
<b>Conducted disturbance</b>	+ 2.53 / - 2.77
<b>Radiated disturbance (electric field)</b>	
- 10 m test distance	+ 3.16 / - 3.22
- 3 m test distance	+ 3.16 / - 3.22
- Frequency range: 30 MHz – 200 MHz	
<b>Radiated disturbance (electric field)</b>	
- 10 m test distance	+ 4.51 / - 4.51
- 3 m test distance	+ 4.51 / - 4.51
- Frequency range: 200 MHz – 1000 MHz	
<b>Radiated disturbance (electric field)</b>	
- 3 m test distance	+ 5.07 / - 3.70
- Frequency range: 1 GHz – 30 GHz	