FCC Measurement/Technical Report on

AXIS W120 Body Worn Camera

FCC ID: PNBAXISW120

Contains FCC ID:
PNB-RC76B (Cellular)
PNB-LB1ZM (WiFi/Bluetooth)

Contains IC:
3919A-RC76B (Cellular)
3919A-LB1ZM(WiFi/Bluetooth)

Test Report Reference: MDE_AXIS_2001_FCC_01_rev01

Test Laboratory:
7layers GmbH
Borsigstrasse 11
40880 Ratingen
Germany

Deutsche
Akkreditierungsstelle
D-PL-12140-01-01
D-PL-12140-01-02
D-PL-12140-01-03

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1 APPLIED STANDARDS AND TEST SUMMARY

1.1 APPLIED STANDARDS

Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 2 and 15 (10-1-21 Edition). The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

Part 15, Subpart B – Unintentional Radiators

§ 15.107 Conducted limits

§ 15.109 Radiated emission limits; general requirements

Applicable ISED Standards

ICES-Gen, Issue 1 + Amendment 1 (February 2021)

ICES-003, Issue 7

Note:
ANSI C63.4–2014 is applied.

1.2 FCC-IC CORRELATION TABLE

Correlation of measurement requirements for
Information Technology Equipment (ITE)
from
FCC and ISED Canada

Measurement	FCC reference	ISED reference
Conducted Emissions (AC Power Line)	§15.107	ICES-003 Issue 7: 3.3.1
Radiated Spurious Emissions	§15.109	ICES-003 Issue 7: 3.3.2

Remarks:

1. FCC Part 15 subpart B, ICES 003 and CISPR 22 contain different definitions of Class A and Class B limits, i.e. which class is applicable to which kind of EUT.
   ICES 003 and CISPR 22 distinguish between the location where the EUT is intended to operate whilst FCC refers to the method of commercial distribution (distributive trades).
2. The correct assignment of the appropriate class to the concrete EUT is not scope of this test report!
3. A radio apparatus that is specifically subject to an ISED Radio Standard Specification (RSS) and which contains an ITE is not subject to ICES-003 provided the ITE is used only to enable operation of the radio apparatus and the ITE does not control additional functions or capabilities.
4. ISM (Industrial, Scientific or Medical) radio frequency generators, though they may contain ITE, are excluded from the definition of ITE and are not subject to ICES-003. They are instead subject to the Interference-Causing Equipment Standard ICES-001, which specifically addresses ISM radio frequency generators.

1.3 MEASUREMENT SUMMARY

47 CFR CHAPTER I FCC PART 15 Subpart B	**§ 15.107 Class B**			
Conducted Emissions at AC mains The measurement was performed according to ANSI C63.4			**Final Result**	
OP-Mode	**Setup**	**Date**	**FCC**	**IC**
AC mains connection, Test setup				
via auxiliary equipment, computer peripheric	S03_AA01	2023-08-04	Passed	Passed
via auxiliary equipment, computer peripheric	S04_AA01	2023-08-04	Passed	Passed
via auxiliary equipment, stand-alone	S02_AA01	2023-07-22	Passed	Passed

47 CFR CHAPTER I FCC PART 15 Subpart B	**§ 15.109 Class B**			
Radiated Emissions The measurement was performed according to ANSI C63.4			**Final Result**	
OP-Mode	**Setup**	**Date**	**FCC**	**IC**
AC mains connection, Measurement range, Test setup				
via auxiliary equipment, 30 MHz - 1 GHz, stand-alone	S02_AA01	2023-07-22	Passed	Passed
via auxiliary equipment, 30 MHz - 1 GHz, computer peripheric	S03_AA01	2023-07-22	Passed	Passed
via auxiliary equipment, 1 GHz - 18 GHz, computer peripheric	S03_AA01	2023-07-22	Passed	Passed
via auxiliary equipment, 30 MHz - 1 GHz, computer peripheric	S04_AA01	2023-07-22	Passed	Passed

Remark:
Setup S03_AA01 was chosen as worst case scenario by the applicant. Therefore only spotchecks have been performed for the setup S02_AA01 and S04_AA01.
Radiated Spurious Emission Tests from 18 – 40 GHz have not been performed, due to no critical emissions up to 18 GHz.

N/A: Not applicable
N/P: Not performed

2 REVISION HISTORY / SIGNATURES

Report version control			
Version	**Release date**	**Change Description**	**Version validity**
initial	2023-08-24	--	invalid
rev01	2024-02-14	Change in ID	valid
--	--	--	--

COMMENT: -

(responsible for accreditation scope)
Dipl.-Ing. Robert Machulec

(responsible for testing and report)
B.Eng. Jasmin Urowski

7 layers GmbH, Borsigstr. 11
40880 Ratingen, Germany
Phone +49 (0)2102 749 0

3 ADMINISTRATIVE DATA

3.1 TESTING LABORATORY

Company Name:	7layers GmbH
Address:	Borsigstr. 11 40880 Ratingen Germany

The test facility is accredited by the following accreditation organisation:

Laboratory accreditation no:	DAkkS D-PL-12140-01-01| -02 | -03
FCC Designation Number:	DE0015
FCC Test Firm Registration:	929146
ISED CAB Identifier	DE0007; ISED#: 3699A
Responsible for accreditation scope:	Dipl.-Ing. Robert Machulec
Report Template Version:	2022-12-29

3.2 PROJECT DATA

Responsible for testing and report:	B.Eng. Jasmin Urowski
Employees who performed the tests:	documented internally at 7Layers
Date of Report:	2023-08-24
Testing Period:	2023-07-22 to 2023-08-04

3.3 APPLICANT DATA

Company Name:	Axis Communications AB
Address:	Gränden 1, SE-223 69 Lund Sweden
Contact Person:	Mr. Daniel Nydemark

3.4 MANUFACTURER DATA

Company Name:	please see Applicant Data
Address:	
Contact Person:	

4 TEST OBJECT DATA

4.1 GENERAL EUT DESCRIPTION

Kind of Device product description	portable, body-worn surveillance device
Product name	AXIS W120 Body Worn Camera
Type	AXIS W120
Declared EUT data by the supplier	
Power Supply Type	EUT A: DC, Li-Pol battery AUX22 / AUX23: AC (EUT charged during test with AUX22 or AUX23)
Test Voltage / Frequency	EUT A: 3.7 V, AUX22 / AUX23: 120 V / 60 Hz
Highest internal frequency	5850 MHz (WLAN 5 GHz)
General Description	The EUT is a portable, body-worn surveillance device with an integrated Cellular (LTE), GNSS, Bluetooth and WLAN module (2.4 GHz and 5 GHz).
Ports	EUT A: USB port Type C, USB cable connected to AUX23 for setup S02_AA01 EUT A: connected to AUX22 while in docking station (charging) and LAN traffic during connection to AUX1 for the setup S03_AA01 and S04_AA01
Special software used for testing	fping program

4.2 EUT MAIN COMPONENTS

Sample Name	**Sample Code**	**Description**
EUT A	DE1476002aa01	Radiated FCC Sample
Sample Parameter	**Value**	
Serial No.	B8A44F8E6F55	
HW Version	Rev.1	
SW Version	5.4	
Comment	-	

NOTE:The short description is used to simplify the identification of the EUT in this test report.

4.3 ANCILLARY EQUIPMENT

For the purposes of this test report, ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Ancillary Equipment can influence the test results.

Device	**Details (Manufacturer, Type Model, OUT Code)**	**Description**
-	-	-

4.4 AUXILIARY EQUIPMENT

For the purposes of this test report, auxiliary equipment is defined as equipment which is used temporarily to enable operational and control features especially used for the tests of the EUT which is not used during normal operation or equipment that is used during the tests in combination with the EUT but is not subject of this test report. It is necessary to configure the system in a typical fashion, as a customer would normally use it.
But nevertheless Auxiliary Equipment can influence the test results.

Device	**Details (Manufacturer, Type Model, HW, SW, S/N)**	**Description**
AUX1	Fujitsu, Lifebook E Series U758, 2018-06, Win10 Pro Engl., DSAL006396	Test-Laptop
AUX2	Fujitsu, A13-065N3A, -, -, 184903C604	AC/DC Adapter for Laptop
AUX3	Logitech, M-BT58, -, -, HC60915A2XC	Mouse
AUX4	Cherry, RS 6000 USB ON, -, -, G 0000273 2P28	Keyboard
AUX5	LG, L17MB-P, -, -, 412WAPL0U560	Monitor
AUX21	AXIS, AXIS W700, Rev.2, -, UnitID: 0U0067F610	Docking Station
AUX22	AXIS, FSP015-DPAN3, Rev.1, -, H1220000938	Switching Power Adapter for Docking Station
AUX23	Samsung, EP-TA20EBE, 2022-02, -, R37T1RW9BD1SEB	AC/DC USB Charger, Type-C
AUX24	-, CAT.6 STP, -, -, -	1m shielded LAN cable
AUX25	-, CAT.5E UTP, -, -, -	1m unshielded LAN cable

4.5 EUT SETUPS

This chapter describes the combination of EUTs and equipment used for testing. The rationale for selecting the EUTs, ancillary and auxiliary equipment and interconnecting cables, is to test a representative configuration meeting the requirements of the referenced standards.

Setup	Combination of EUTs	Description and Rationale
S02_AA01	EUT A, AUX23	Typical setup for Stand Alone with USB Charger
S03_AA01	EUT A, AUX1-5, AUX21, AUX22, AUX24	Typical setup for computer peripheral setup, with Docking Station W700 and shielded LAN
S04_AA01	EUT A, AUX1-5, AUX21, AUX22, AUX25	Typical setup for computer peripheral setup, with Docking Station W700 and unshielded LAN

4.6 OPERATING MODES / TEST CHANNELS

This chapter describes the operating modes of the EUTs used for testing.

Active operating modes during tests:

S02_AA01:

- Charging mode
- LTE eFDD 2 idle mode
- Wifi in idle mode 2.4 GHz CH:7 (Receive Mode)

S03_AA01 / S04_AA01:

- Charging mode (RF off while in docking station)
- LAN Ping

4.7 PRODUCT LABELLING

4.7.1 FCC ID LABEL

Please refer to the documentation of the applicant.

4.7.2 LOCATION OF THE LABEL ON THE EUT

Please refer to the documentation of the applicant.

5 TEST RESULTS

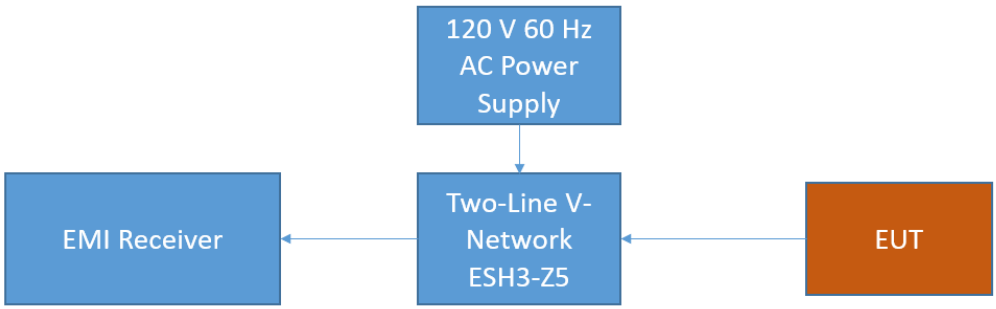
5.1 CONDUCTED EMISSIONS AT AC MAINS

Standard **FCC Part 15 Subpart B**

The test was performed according to:
ANSI C63.4

5.1.1 TEST DESCRIPTION

The test set-up was made in accordance with the general provisions of ANSI C 63.4.
The Equipment Under Test (EUT) was setup in a shielded room to perform the conducted emissions measurements in a typical installation configuration. The EUT was powered from 50µH || 50 Ohm Line Impedance Stabilization Network (LISN). The LISN's unused connections were terminated with 50 Ohm loads.



FCC Conducted Emissions on AC

The measurement procedure consists of two steps. It is implemented into the EMI test software EMC-32 from R&S.

Step 1: Preliminary scan
Intention of this step is, to determine the conducted EMI-profile of the EUT.
EMI receiver settings:
- Detector: Quasi-Peak & Average, trace Max-hold
- Frequency range: 150 kHz – 30 MHz
- Frequency steps: 2.5 kHz
- IF–Bandwidth: 9 kHz
- Measuring time / Frequency step: 100 ms (FFT-based)
- Measurement combinations:
1) Neutral lead - reference ground (PE grounded)
2) Phase lead - reference ground (PE grounded)
3) Neutral lead - reference ground (PE floating)
4) Phase lead - reference ground (PE floating)

On basis of this preliminary scan the highest amplitudes and the corresponding frequencies relative to the limit are identified. Emissions above the limit and emissions which are in the 10 dB range below the limit are considered.

Step 2: Final measurement
Intention of this step is, to determine the highest emissions with the settings defined in the test specification for the frequencies and leads identified in step 1.
EMI receiver settings:
- Detector: Quasi-Peak & CISPR-Average
- IF Bandwidth: 9 kHz
- Measuring time: 15 x 1 s / frequency

The highest value is reported in the table.

5.1.2 TEST REQUIREMENTS / LIMITS

FCC Part 15, Subpart B, §15.107

Class B:

Frequency (MHz)	QP Limits (dBµV)	AV Limits (dBµV)
0.15 – 0.5	66 - 56	56 - 46
0.5 - 5	56	46
5 - 30	60	50

Class A:

Frequency (MHz)	QP Limits (dBµV)	AV Limits (dBµV)
0.15 – 0.5	79	66
0.5 - 30	73	60

5.1.3 TEST PROTOCOL

S03_AA01:

Temperature: 28 °C
Air Pressure: 986 hPa
Humidity: 31 %
via auxiliary equipment, computer peripheric

Power line	PE	Frequency [MHz]	Level [dBµV]	Detector	Limit [dBµV]	Margin [dB]
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S04_AA01:

Temperature: 28 °C
Air Pressure: 986 hPa
Humidity: 31 %
via auxiliary equipment, computer peripheric

Power line	PE	Frequency [MHz]	Level [dBµV]	Detector	Limit [dBµV]	Margin [dB]
---	---	---	---	---	---	---

S02_AA01:

Temperature: 22 °C
Air Pressure: 1010 hPa
Humidity: 41 %
via auxiliary equipment, stand-alone

Power line	PE	Frequency [MHz]	Level [dBµV]	Detector	Limit [dBµV]	Margin [dB]
---	---	---	---	---	---	---

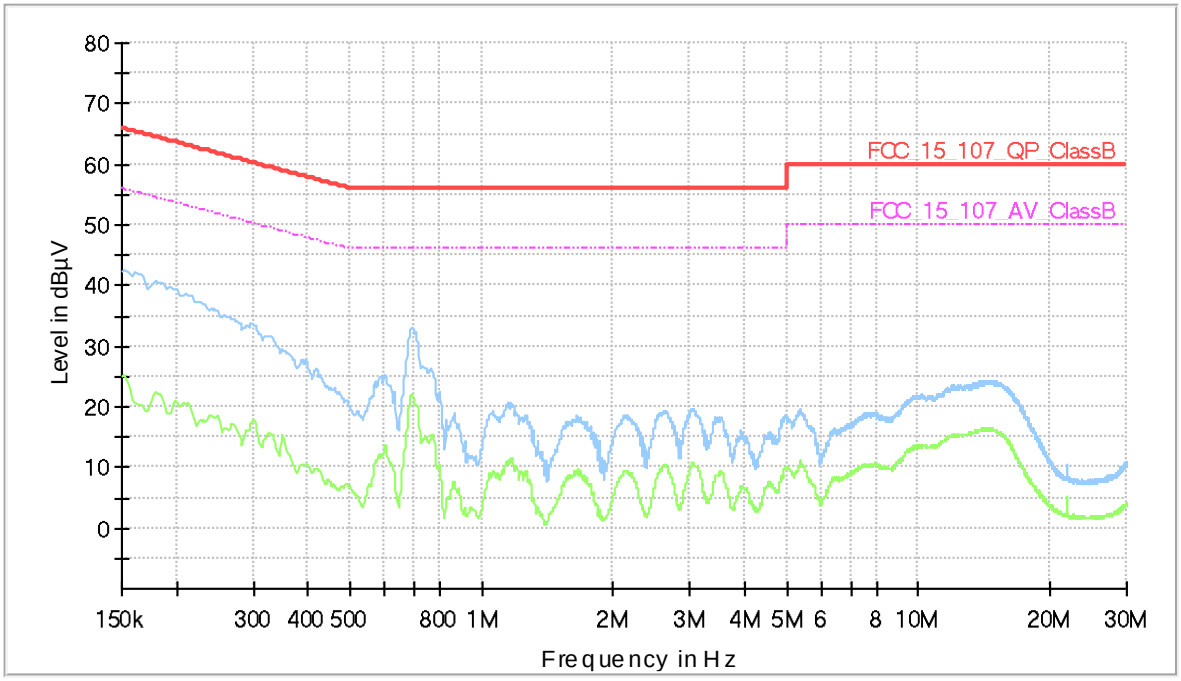
Remark: Please see next sub-clause for the measurement plot.

5.1.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

AC mains connection = via auxiliary equipment, Test setup = computer peripheric (S02_AA01)

Common Information

Test Description:	Conducted Emissions
Test Standard:	FCC §15.107, ANSI C63.4
EUT / Setup Code:	DE1476002aa01 / setup: S02_AA01
Operating Conditions:	LTE eFDD2 idle mode, WLAN idle mode CH:7, charging mode
Operator Name:	URO
Comment:	AC/DC Adapter: 120 V 60 Hz, standalone setup
Legend:	Trace: blue = QP, green = CISPR AV; Star: red or blue = critical frequency; Rhombus: blue = final QP, green = final CISPR AV
Tested Port / used LISN:	AC mains => 1st LISN ESH3-Z5
Termination of other ports:	N/A



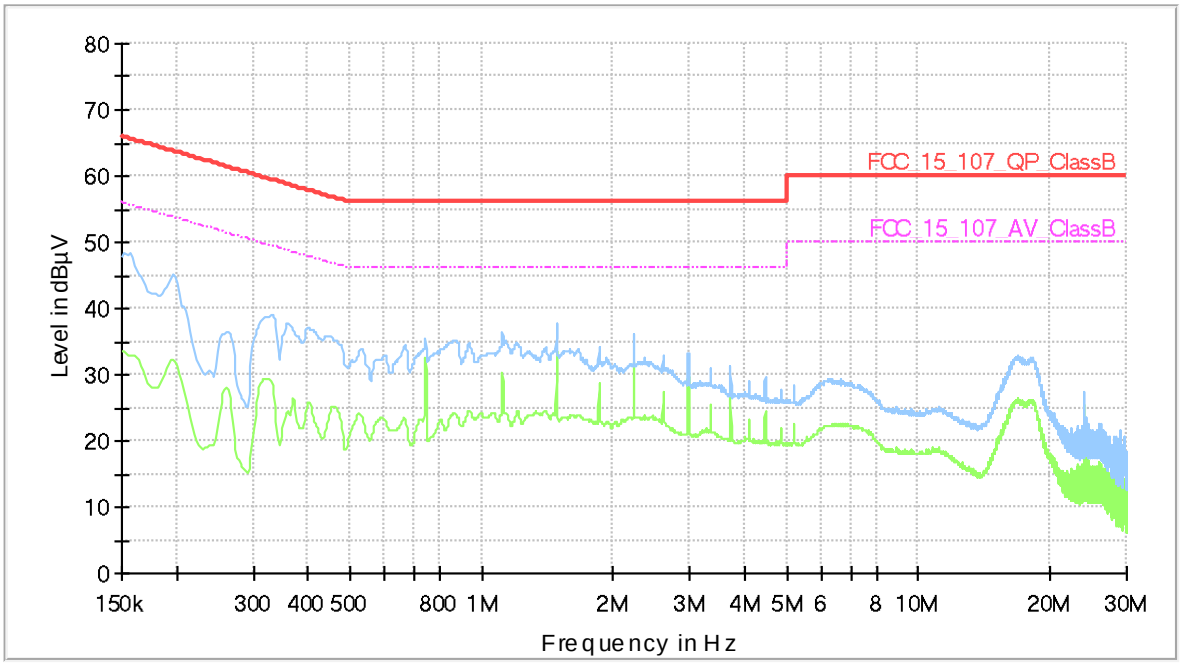
Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Line	PE	Corr. (dB)
---	---	---	---	---	---	---			---

AC mains connection = via auxiliary equipment, Test setup = computer peripheric (S03_AA01)

Common Information

Test Description:	Conducted Emissions
Test Standard:	FCC §15.107, ANSI C63.4
EUT / Setup Code:	DE1476002aa01 / setup S03_AA01
Operating Conditions:	charging mode (RF off while in docking station), fping running via Ethernet (1m shielded LAN cable)
Operator Name:	URO
Comment:	Computer Peripheral Setup; 120 V / 60 Hz
Legend:	Trace: blue = QP, green = CISPR AV; Star: red or blue = critical frequency; Rhombus: blue = final QP, green = final CISPR AV
Tested Port / used LISN:	AC mains => 1st LISN ESH3-Z5
Termination of other ports:	AC of AUX => 2nd LISN ESH3-Z5 +50 Ohm



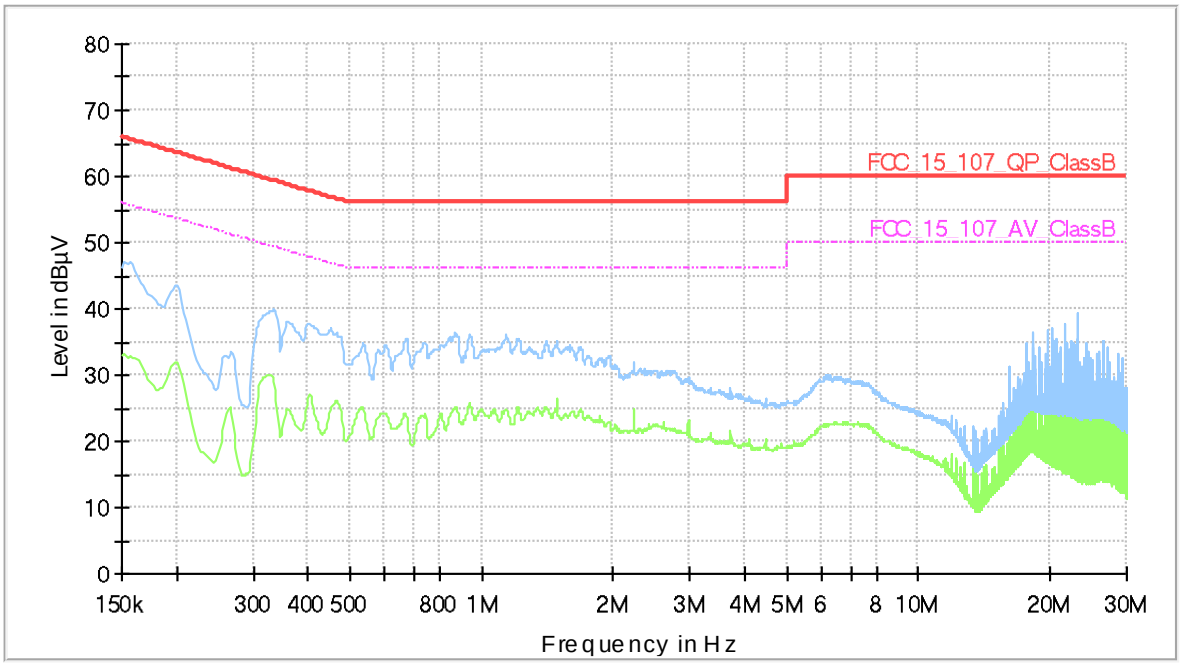
Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Line	PE	Corr. (dB)
---	---	---	---	---	---	---			---

AC mains connection = via a AC mains connection = via auxiliary equipment, Test setup = computer peripheric
(S04_AA01)

Common Information

Test Description:	Conducted Emissions
Test Standard:	FCC §15.107, ANSI C63.4
EUT / Setup Code:	DE1476002aa01 / setup: S04_AA01
Operating Conditions:	fping running via Ethernet (1m unshielded LAN cable), charging mode (RF off while in docking station)
Operator Name:	URO
Comment:	Computer Peripheral Setup; 120 V / 60 Hz
Legend:	Trace: blue = QP, green = CISPR AV; Star: red or blue = critical frequency; Rhombus: blue = final QP, green = final CISPR AV
Tested Port / used LISN:	AC mains => 1st LISN ESH3-Z5
Termination of other ports:	AC of AUX => 2nd LISN ESH3-Z5 +50 Ohm



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Line	PE	Corr. (dB)
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5.1.5 TEST EQUIPMENT USED

- Conducted Emissions FCC

5.2 RADIATED EMISSIONS

Standard **FCC Part 15 Subpart B**

The test was performed according to:
ANSI C63.4

5.2.1 TEST DESCRIPTION

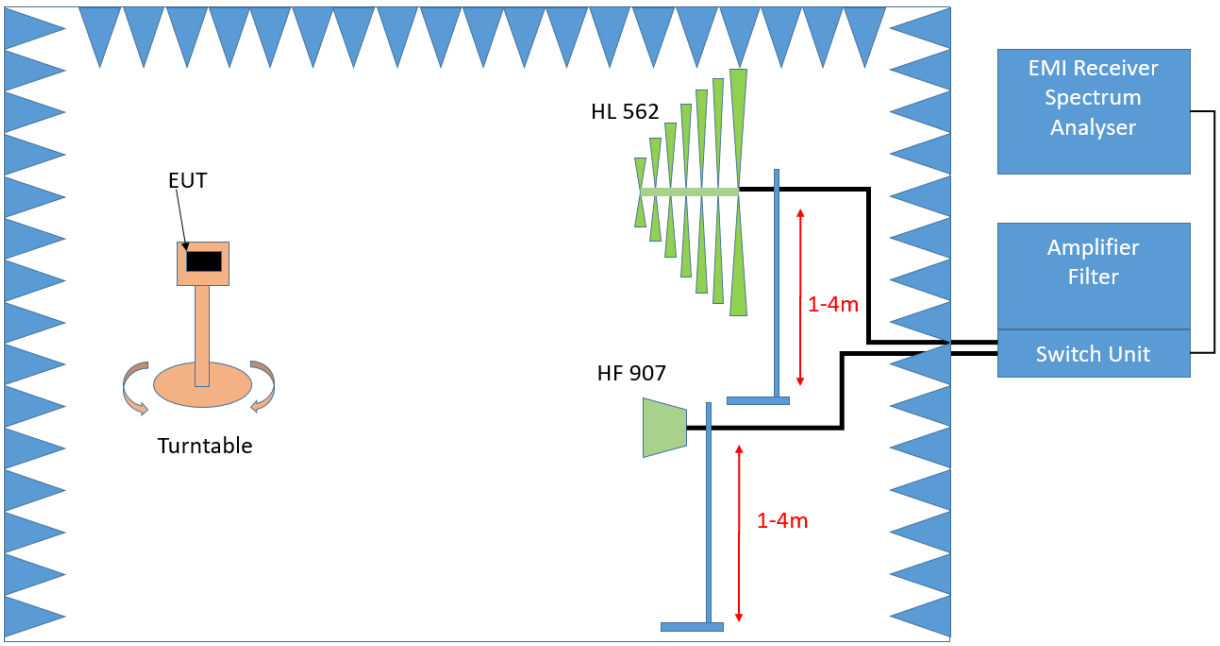
The test set-up was made in accordance to the general provisions of ANSI C63.4 in a typical installation configuration. The measurements were performed according to the following sub-chapters of ANSI C63.4:

- 30 MHz – 1 GHz: Chapter 8.3.2.1
- > 1 GHz: Chapter 8.3.2.2

The measurement procedure is implemented into the EMI test software EMC32 from R&S. Exploratory tests are performed at 3 orthogonal axes to determine the worst-case orientation of a body-worn or handheld EUT. The final test on all kind of EUTs is also performed at 3 axes. A pre-check is performed while the EUT is powered.

The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The influence of the EUT support table that is used between 30–1000 MHz was evaluated.

1. Measurement setup



Test Setup; Spurious Emission Radiated (SAC)

Frequency range 30 MHz – 1 GHz

Step 1: Preliminary scan
This is a preliminary test to identify the highest amplitudes relative to the limit.
Settings for step 1:
- Antenna distance: 3 m
- Detector: Peak-Max-hold / Quasi-Peak (FFT-based)
- Frequency range: 30 – 1000 MHz
- Frequency steps: 30 kHz
- IF–Bandwidth: 120 kHz
- Measuring time / Frequency step: 100 ms
- Turntable angle range: –180° to 90°
- Turntable step size: 90°
- Height variation range: 1 – 4 m
- Height variation step size: 1.5 m
- Polarisation: Horizontal + Vertical

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: Adjustment measurement
In this step the accuracy of the turntable azimuth and antenna height will be improved. This is necessary to find out the maximum value of every frequency.
For each frequency, which was determined the turntable azimuth and antenna height will be adjusted. The turntable azimuth will slowly vary by 360°. During this action, the value of emission is continuously measured. The turntable azimuth at the highest emission will be recorded and adjusted. In this position, the antenna height will slowly vary between 1 – 4 m. During this action, the value of emission is also continuously measured. The antenna height of the highest emission will also be recorded and adjusted.
- Detector: Peak – Max-hold
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 100 ms
- Turntable angle range: 360 °
- Height variation range:1 – 4 m
- Antenna Polarization: max. value determined in step 1

Step 3: Final measurement with QP detector
With the settings determined in step 2, the final measurement will be performed:
EMI receiver settings for step 3:
- Detector: Quasi-Peak
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 1 s

Above 1 GHz:

The following changes apply to the measurement procedure for the frequency range above 1 GHz:

Step 1:
- Turntable step size: 45°
- Detector: Peak, Average (Max-hold)
- IF – Bandwidth: 1 MHz
- Frequency steps: 250 kHz
- Measuring time: 500 ms / GHz

Step 2:
- IF – Bandwidth: 1 MHz

Step 3:
- Detector: Peak / CISPR Average
- IF – Bandwidth: 1 MHz

After every measurement a plot will be generated which contains a diagram with the results of the preliminary scan and a chart with the frequencies and values of the results of the final measurement.

5.2.2 TEST REQUIREMENTS / LIMITS

FCC Part 15, Subpart B, §15.109, Radiated Emission Limits

Class B:

Frequency (MHz)	Limit (µV/m)	Measurement distance (m)	Limits (dBµV/m)
30 – 88	100@3m	3	40.0@3m
88 – 216	150@3m	3	43.5@3m
216 – 960	200@3m	3	46.0@3m
960 - 26000	500@3m	3	54.0@3m
26000 - 40000	500@3m	1	54.0@3m

Class A:

Frequency (MHz)	Limit (µV/m)	Measurement distance (m)	Limits (dBµV/m)
30 – 88	90@10m	3	39.1@10m
88 – 216	150@10m	3	43.5@10m
216 – 960	210@10m	3	46.4@10m
960 - 26000	300@10m	3	49.5@10m
26000 - 40000	300@10m	1	49.5@10m

The measured values for Class A and for Class B (> 26 GHz) measurements are corrected with an inverse linear distance extrapolation factor (20 dB/decade).

§15.35(b) ..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit....

Used conversion factor: Limit (dBµV/m) = 20 log (Limit (µV/m)/1µV/m)

5.2.3 TEST PROTOCOL

S02_AA01:

Ambient temperature: 22 °C
Air Pressure: 1010 hPa
Humidity: 38 %
via auxiliary equipment, stand-alone

Spurious Freq. [MHz]	Spurious Level [dBµV/m]	Detector	RBW [kHz]	Limit [dBµV/m]	Margin to Limit [dB]
37.08	33.57	QP	120	40.00	6.43

S03_AA01:

Ambient temperature: 22 °C
Air Pressure: 1010 hPa
Humidity: 38 %
via auxiliary equipment, computer peripheric

Spurious Freq. [MHz]	Spurious Level [dBµV/m]	Detector	RBW [kHz]	Limit [dBµV/m]	Margin to Limit [dB]
30.75	26.05	QP	120	40.00	13.95
45.63	36.34	QP	120	40.00	3.66
84.51	35.84	QP	120	40.00	4.16
449.85	15.20	QP	120	46.00	30.80
599.52	28.83	QP	120	46.00	17.17

S04_AA01:

Ambient temperature: 22 °C
Air Pressure: 1010 hPa
Humidity: 38 %
via auxiliary equipment, computer peripheric

Spurious Freq. [MHz]	Spurious Level [dBµV/m]	Detector	RBW [kHz]	Limit [dBµV/m]	Margin to Limit [dB]
30.72	28.07	QP	120	40.00	11.93
45.84	25.69	QP	120	40.00	14.31
63.39	26.21	QP	120	40.00	13.79
86.85	27.12	QP	120	40.00	12.88
449.01	17.91	QP	120	46.00	28.09
599.46	27.09	QP	120	46.00	18.91

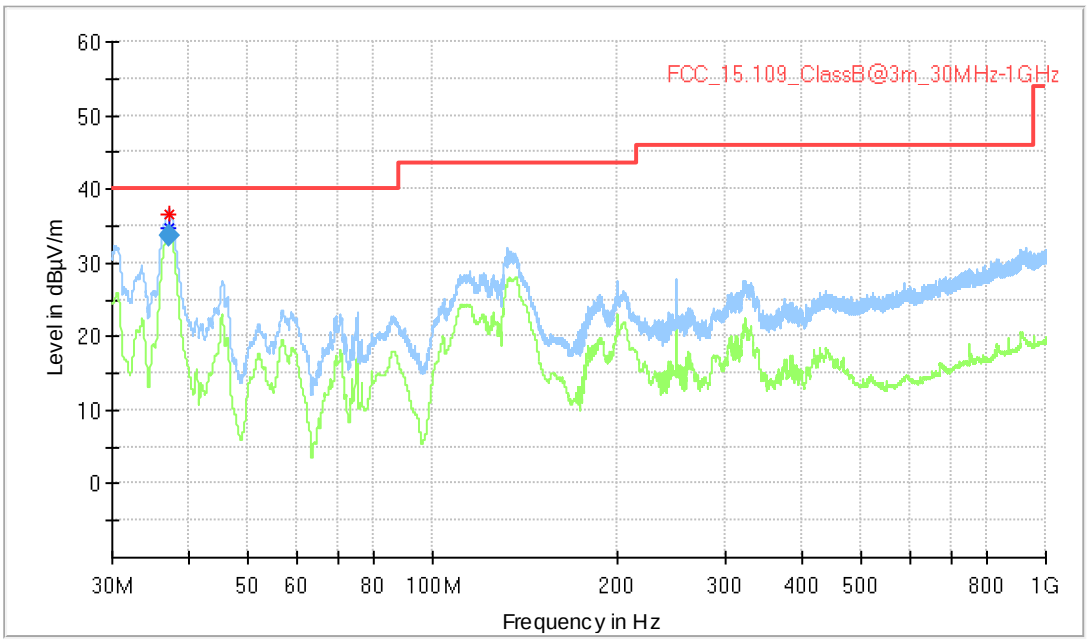
Remark: Please see next sub-clause for the measurement plot.

5.2.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

AC mains connection = via auxiliary equipment, Measurement range = 30 MHz - 1 GHz,
Test setup = stand-alone
(S02_AA01)

Common Information

Test Description:	Radiated Emissions, Test Site: Semi Anechoic Chamber @ 3 m
Test Standard:	FCC §15.109, ANSI C63.4, Class B
EUT / Setup Code:	DE1476002aa01 / setup S02_AA01
Operating Conditions:	LTE eFDD2 idle mode, WLAN idle mode CH:7, charging mode
Operator Name:	URO
Comment:	Standalone setup
Legend:	Trace (preview): blue = PK, green = QP; Star: red or blue = critical frequency; Rhombus: blue = final QP



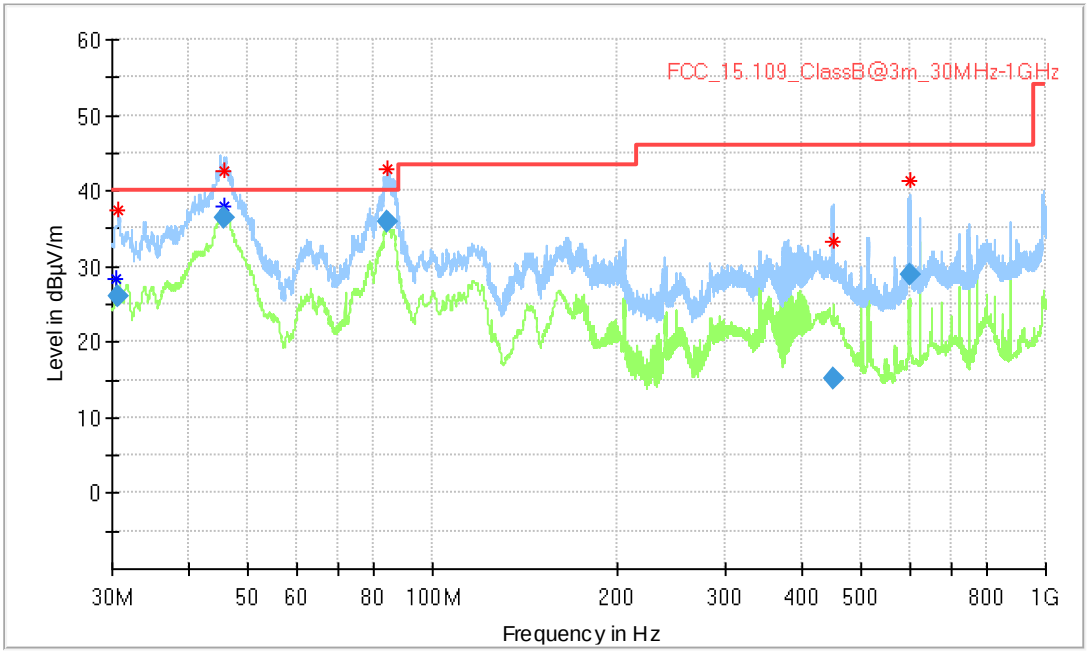
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
37.080000	33.57	40.00	6.43	1000.0	120.000	104.0	V	227.0	15.2

AC mains connection = via ancillary equipment, Measurement range = 30 MHz - 1 GHz,
Test setup = computer peripheric
(S03_AA01)

Common Information

Test Description:	Radiated Emissions, Test Site: Semi Anechoic Chamber @ 3 m
Test Standard:	FCC §15.109, ANSI C63.4, Class B
EUT / Setup Code:	DE1476002aa01 / setup S03_AA01
Operating Conditions:	fping running via Ethernet (1m shielded LAN cable), charging mode (RF off while in docking station)
Operator Name:	URO
Comment:	shielded LAN cable CAT6 connected
Legend:	Trace (preview): blue = PK, green = QP; Star: red or blue = critical frequency; Rhombus: blue = final QP



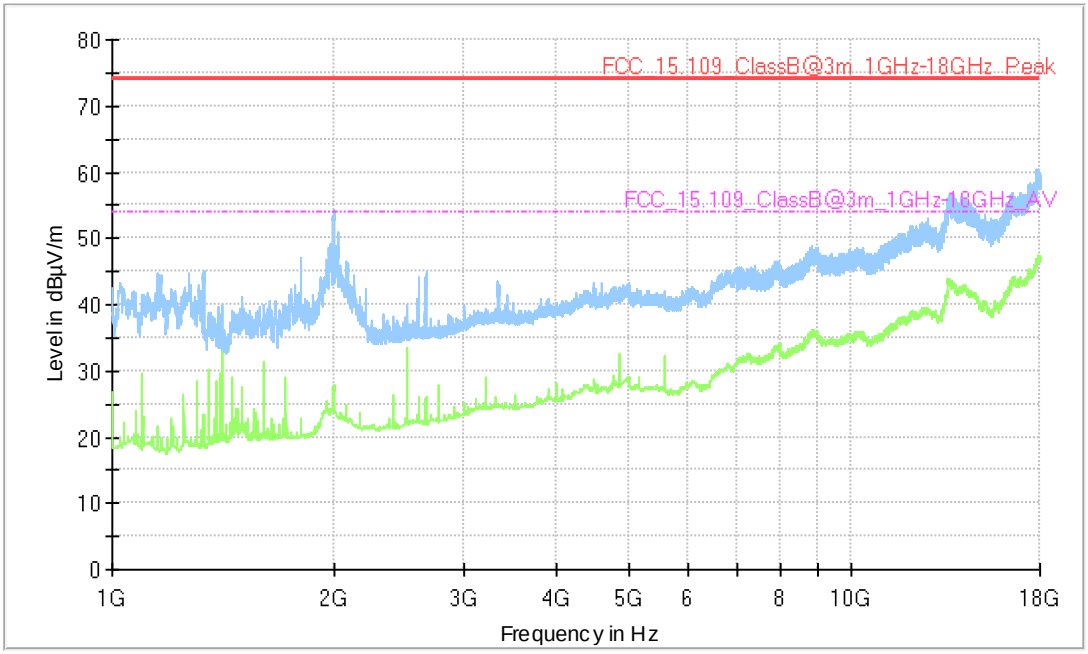
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.750000	26.05	40.00	13.95	1000.0	120.000	123.0	V	124.0	18.6
45.630000	36.34	40.00	3.66	1000.0	120.000	139.0	V	267.0	9.8
84.510000	35.84	40.00	4.16	1000.0	120.000	106.0	V	303.0	10.1
449.850000	15.20	46.00	30.80	1000.0	120.000	290.0	V	83.0	18.0
599.520000	28.83	46.00	17.17	1000.0	120.000	112.0	H	17.0	20.9

AC mains connection = via ancillary equipment, Measurement range = 1 GHz - 18 GHz,
Test setup = computer peripheric
(S03_AA01)

Common Information

Test Description:	Radiated Emissions @ 3 m, SAC + mobile floor absorber
Test Standard:	FCC §15.109, ANSI C63.4, Class B
EUT / Setup Code:	DE1476002aa01 / setup S03_AA01
Operating Conditions:	fping running via Ethernet (1m unshielded LAN cable), charging mode (RF off while in docking station)
Operator Name:	URO
Comment:	Computer peripheral setup, 120 V / 60 Hz
Legend:	Trace (preview): blue = PK, green = AV; Star: red or blue = critical frequency; Rhombus: blue = final Peak, green = Final CISPR AV



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
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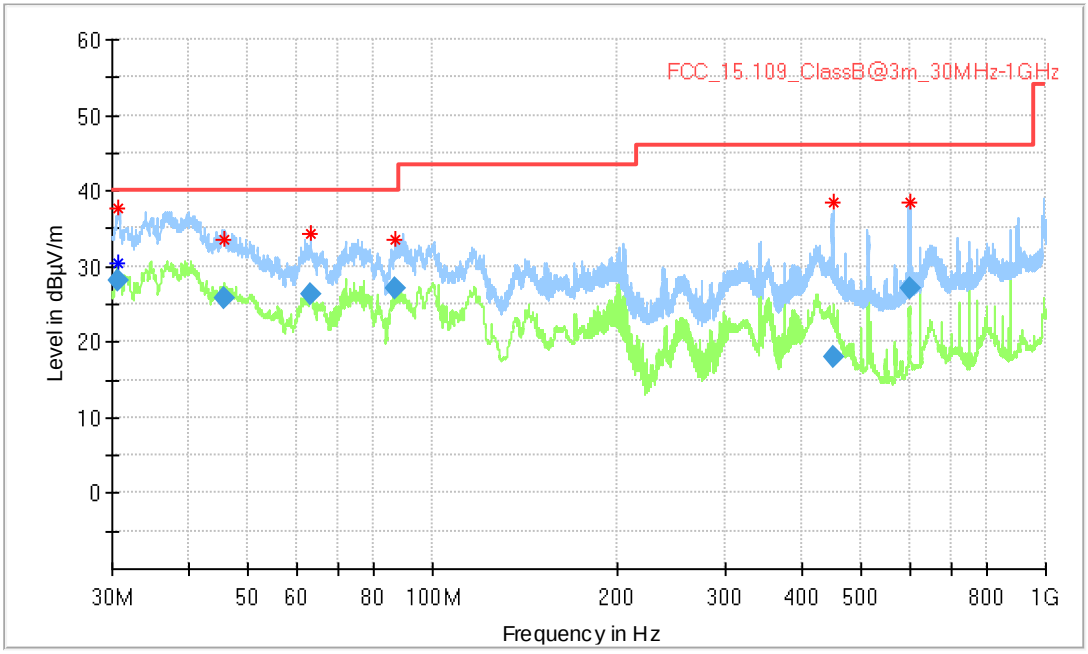
AC mains connection = via ancillary equipment, Measurement range = 30 MHz - 1 GHz,
Test setup = computer peripheric
(S04_AA01)

Common Information

Test Description:	Radiated Emissions, Test Site: Semi Anechoic Chamber @ 3 m
Test Standard:	FCC §15.109, ANSI C63.4, Class B
EUT / Setup Code:	DE1476002aa01 / setup_03
Operating Conditions:	fping running via Ethernet (1m unshielded LAN cable), charging mode (RF off while in docking station)
Operator Name:	URO
Comment:	unshielded 1m LAN cable CAT5e connected
Legend:	Trace (preview): blue = PK, green = QP; Star: red or blue = critical frequency; Rhombus: blue = final QP



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.720000	28.07	40.00	11.93	1000.0	120.000	112.0	V	0.0	18.7
45.840000	25.69	40.00	14.31	1000.0	120.000	115.0	V	335.0	9.6
63.390000	26.21	40.00	13.79	1000.0	120.000	138.0	V	129.0	6.8
86.850000	27.12	40.00	12.88	1000.0	120.000	133.0	V	203.0	10.3
449.010000	17.91	46.00	28.09	1000.0	120.000	104.0	V	130.0	18.0
599.460000	27.09	46.00	18.91	1000.0	120.000	176.0	H	211.0	20.9

5.2.5 TEST EQUIPMENT USED

- Radiated Emissions SAC above 1 GHz
- Radiated Emissions SAC up to 1 GHz

6 TEST EQUIPMENT

6.1 TEST EQUIPMENT HARDWARE

1 Conducted Emissions FCC
Conducted Emissions AC Mains for FCC standards

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
1.1	Opus10 TPR (8253.00)	T/P Logger 13	Lufft Mess- und Regeltechnik GmbH	13936	2021-10	2023-10
1.2	Fluke 177	Digital Multimeter 03 (Multimeter)	Fluke Europe B.V.	86670383	2022-06	2024-06
1.3	ESH3-Z5	Two-Line V-Network (AUX)	Rohde & Schwarz GmbH & Co. KG	828304/029	2021-08	2023-08
1.4	EP 1200/B, NA/B1	AC Source, Amplifier with integrated variable Oscillator	Spitzenberger & Spies GmbH & Co. KG	B6278	N/A	N/A
1.5	Chroma 6404	AC Source	Chroma ATE INC.	64040001304	N/A	N/A
1.6	Shielded Room 02	Shielded Room 4m x 3m	Frankonia Germany EMC Solution GmbH	-	N/A	N/A
1.7	ESH3-Z5	Two-Line V-Network (EUT)	Rohde & Schwarz GmbH & Co. KG	829996/002	2021-08	2023-08
1.8	ESR 7	EMI Receiver / Spectrum Analyzer	Rohde & Schwarz	101424	2023-01	2025-01
1.9	Opus10 THI (8152.00)	T/H Logger 02	Lufft Mess- und Regeltechnik GmbH	7489	2021-10	2023-10
1.10	CS-RUB6	Rubidium Frequency Standard	Rohde & Schwarz GmbH & Co. KG	100321	2022-10	2023-10

2 Radiated Emissions SAC above 1 GHz

Radiated emission tests above 1 GHz in a semi anechoic room with floor absorbers

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
2.1	N5000/NP	Filter for EUT, 2 Lines, 250 V, 16 A	ETS-LINDGREN	241515	N/A	N/A
2.2	Opus10 TPR (8253.00)	T/P Logger 13	Lufft Mess- und Regeltechnik GmbH	13936	2021-10	2023-10
2.3	ESW44	EMI Receiver / Spectrum Analyzer	Rohde & Schwarz GmbH & Co. KG	101603	2022-01	2024-01
2.4	Anechoic Chamber 01	SAC/FAR, 10.58 m x 6.38 m x 6.00 m	Frankonia	none	N/A	N/A
2.5	Fluke 177	Digital Multimeter 03 (Multimeter)	Fluke Europe B.V.	86670383	2022-06	2024-06
2.6	Opus10 THI (8152.00)	T/H Logger 10	Lufft Mess- und Regeltechnik GmbH	12488	2021-08	2023-08
2.7	EP 1200/B, NA/B1	AC Source, Amplifier with integrated variable Oscillator	Spitzenberger & Spies GmbH & Co. KG	B6278	N/A	N/A
2.8	DS 420S	Turn Table 2 m diameter	HD GmbH	420/573/99	N/A	N/A
2.9	JS4-00102600-42-5A	Broadband Amplifier 30 MHz - 26 GHz	Miteq	619368	N/A	N/A
2.10	MA4985-XP-ET	Bore Sight Antenna Mast	innco systems GmbH	none	N/A	N/A
2.11	BB4312-C30-H3x	Filter Universal 1A	Siemens Matsushita Components	none	N/A	N/A
2.12	CS-RUB6	Rubidium Frequency Standard	Rohde & Schwarz GmbH & Co. KG	100321	2022-10	2023-10
2.13	HF 907-2	Double-ridged horn	Rohde & Schwarz	102817	2022-07	2025-07

3 Radiated Emissions SAC up to 1 GHz
Radiated emission tests up to 1 GHz in a semi anechoic room

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
3.1	N5000/NP	Filter for EUT, 2 Lines, 250 V, 16 A	ETS-LINDGREN	241515	N/A	N/A
3.2	Opus10 TPR (8253.00)	T/P Logger 13	Lufft Mess- und Regeltechnik GmbH	13936	2021-10	2023-10
3.3	ESW44	EMI Receiver / Spectrum Analyzer	Rohde & Schwarz GmbH & Co. KG	101603	2022-01	2024-01
3.4	Anechoic Chamber 01	SAC/FAR, 10.58 m x 6.38 m x 6.00 m	Frankonia	none	N/A	N/A
3.5	HL 562 ULTRALOG	Biconical-log-per antenna (30 MHz - 3 GHz) with HL 562E biconicals	Rohde & Schwarz GmbH & Co. KG	830547/003	2021-09	2024-09
3.6	Fluke 177	Digital Multimeter 03 (Multimeter)	Fluke Europe B.V.	86670383	2022-06	2024-06
3.7	Opus10 THI (8152.00)	T/H Logger 10	Lufft Mess- und Regeltechnik GmbH	12488	2021-08	2023-08
3.8	EP 1200/B, NA/B1	AC Source, Amplifier with integrated variable Oscillator	Spitzenberger & Spies GmbH & Co. KG	B6278	N/A	N/A
3.9	DS 420S	Turn Table 2 m diameter	HD GmbH	420/573/99	N/A	N/A
3.10	CS-RUB6	Rubidium Frequency Standard	Rohde & Schwarz GmbH & Co. KG	100321	2022-10	2023-10
3.11	AM 4.0	Antenna Mast 4 m	Maturo GmbH	AM4.0/180/1192 0513	N/A	N/A

The calibration interval is the time interval between “Last Calibration” and “Calibration Due”

6.2 TEST EQUIPMENT SOFTWARE

Semi-Anechoic Chamber:	
Software	Version
EMC32 Measurement Software	10.60.10
INNCO Mast Controller	1.02.62
INNCO Mast Height	34.10
INNCO Mast Elevation	36.11
MATURO Controller	1.24
MATURO Mast	12.19
MATURO Turn-Table	30.10
Fully-Anechoic Chamber:	
Software	Version
EMC32 Measurement Software	10.60.10
MATURO Controller	1.30
MATURO Turn-Unit	11.10
MATURO Mast	12.10
MATURO Turntable	12.11
INNCO Controller	1.03.02
INNCO Mast Height	34.10
INNCO Mast Elevation	36.11
TS 8997	
WMS32 Measurement Software	11.60.00
Conducted AC Emissions:	
Software	Version
EMC32 Measurement Software	10.60.20

7 ANTENNA FACTORS, CABLE LOSS AND SAMPLE CALCULATIONS

This chapter contains the antenna factors with their corresponding path loss of the used measurement path for all antennas as well as the insertion loss of the LISN.

7.1 LISN R&S ESH3-Z5 (150 KHZ – 30 MHZ)

Frequency		Corr.	LISN insertion loss ESH3-Z5	cable loss (incl. 10 dB atten-uator)
MHz		dB	dB	dB
0.15		10.1	0.1	10.0
5		10.3	0.1	10.2
7		10.5	0.2	10.3
10		10.5	0.2	10.3
12		10.7	0.3	10.4
14		10.7	0.3	10.4
16		10.8	0.4	10.4
18		10.9	0.4	10.5
20		10.9	0.4	10.5
22		11.1	0.5	10.6
24		11.1	0.5	10.6
26		11.2	0.5	10.7
28		11.2	0.5	10.7
30		11.3	0.5	10.8

Sample calculation

U_{LISN} (dB µV) = U (dB µV) + Corr. (dB)
U = Receiver reading
LISN Insertion loss = Voltage Division Factor of LISN
Corr. = sum of single correction factors of used LISN, cables, switch units (if used)
Linear interpolation will be used for frequencies in between the values in the table.

7.2 ANTENNA R&S HFH2-Z2 (9 KHZ – 30 MHZ)

Frequency	AF HFH-Z2)	Corr.	cable loss 1 (inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit)	cable loss 4 (to receiver)	distance corr. (-40 dB/ decade)	d_{Limit} (meas. distance (limit)	d_{used} (meas. distance (used)
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB	m	m
0.009	20.50	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.01	20.45	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.015	20.37	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.02	20.36	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.025	20.38	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.03	20.32	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.05	20.35	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.08	20.30	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.1	20.20	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.2	20.17	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.3	20.14	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.49	20.12	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.490001	20.12	-39.6	0.1	0.1	0.1	0.1	-40	30	3
0.5	20.11	-39.6	0.1	0.1	0.1	0.1	-40	30	3
0.8	20.10	-39.6	0.1	0.1	0.1	0.1	-40	30	3
1	20.09	-39.6	0.1	0.1	0.1	0.1	-40	30	3
2	20.08	-39.6	0.1	0.1	0.1	0.1	-40	30	3
3	20.06	-39.6	0.1	0.1	0.1	0.1	-40	30	3
4	20.05	-39.5	0.2	0.1	0.1	0.1	-40	30	3
5	20.05	-39.5	0.2	0.1	0.1	0.1	-40	30	3
6	20.02	-39.5	0.2	0.1	0.1	0.1	-40	30	3
8	19.95	-39.5	0.2	0.1	0.1	0.1	-40	30	3
10	19.83	-39.4	0.2	0.1	0.2	0.1	-40	30	3
12	19.71	-39.4	0.2	0.1	0.2	0.1	-40	30	3
14	19.54	-39.4	0.2	0.1	0.2	0.1	-40	30	3
16	19.53	-39.3	0.3	0.1	0.2	0.1	-40	30	3
18	19.50	-39.3	0.3	0.1	0.2	0.1	-40	30	3
20	19.57	-39.3	0.3	0.1	0.2	0.1	-40	30	3
22	19.61	-39.3	0.3	0.1	0.2	0.1	-40	30	3
24	19.61	-39.3	0.3	0.1	0.2	0.1	-40	30	3
26	19.54	-39.3	0.3	0.1	0.2	0.1	-40	30	3
28	19.46	-39.2	0.3	0.1	0.3	0.1	-40	30	3
30	19.73	-39.1	0.4	0.1	0.3	0.1	-40	30	3

Sample calculation

E (dB µV/m) = U (dB µV) + AF (dB 1/m) + Corr. (dB)
U = Receiver reading
AF = Antenna factor
Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)
distance correction = -40 * LOG (d_{Limit}/ d_{used})
Linear interpolation will be used for frequencies in between the values in the table.
Table shows an extract of values

7.3 ANTENNA R&S HL562 (30 MHZ – 1 GHZ)

(d_{Limit} = 3 m)

Frequency	AF R&S HL562	Corr.	cable loss 1 (inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit)	cable loss 4 (to receiver)	distance corr. (-20 dB/ decade)	d_{Limit} (meas. distance (limit)	d_{used} (meas. distance (used)
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB	m	m
30	18.6	0.6	0.29	0.04	0.23	0.02	0.0	3	3
50	6.0	0.9	0.39	0.09	0.32	0.08	0.0	3	3
100	9.7	1.2	0.56	0.14	0.47	0.08	0.0	3	3
150	7.9	1.6	0.73	0.20	0.59	0.12	0.0	3	3
200	7.6	1.9	0.84	0.21	0.70	0.11	0.0	3	3
250	9.5	2.1	0.98	0.24	0.80	0.13	0.0	3	3
300	11.0	2.3	1.04	0.26	0.89	0.15	0.0	3	3
350	12.4	2.6	1.18	0.31	0.96	0.13	0.0	3	3
400	13.6	2.9	1.28	0.35	1.03	0.19	0.0	3	3
450	14.7	3.1	1.39	0.38	1.11	0.22	0.0	3	3
500	15.6	3.2	1.44	0.39	1.20	0.19	0.0	3	3
550	16.3	3.5	1.55	0.46	1.24	0.23	0.0	3	3
600	17.2	3.5	1.59	0.43	1.29	0.23	0.0	3	3
650	18.1	3.6	1.67	0.34	1.35	0.22	0.0	3	3
700	18.5	3.6	1.67	0.42	1.41	0.15	0.0	3	3
750	19.1	4.1	1.87	0.54	1.46	0.25	0.0	3	3
800	19.6	4.1	1.90	0.46	1.51	0.25	0.0	3	3
850	20.1	4.4	1.99	0.60	1.56	0.27	0.0	3	3
900	20.8	4.7	2.14	0.60	1.63	0.29	0.0	3	3
950	21.1	4.8	2.22	0.60	1.66	0.33	0.0	3	3
1000	21.6	4.9	2.23	0.61	1.71	0.30	0.0	3	3

(d_{Limit} = 10 m)

30	18.6	-9.9	0.29	0.04	0.23	0.02	-10.5	10	3
50	6.0	-9.6	0.39	0.09	0.32	0.08	-10.5	10	3
100	9.7	-9.2	0.56	0.14	0.47	0.08	-10.5	10	3
150	7.9	-8.8	0.73	0.20	0.59	0.12	-10.5	10	3
200	7.6	-8.6	0.84	0.21	0.70	0.11	-10.5	10	3
250	9.5	-8.3	0.98	0.24	0.80	0.13	-10.5	10	3
300	11.0	-8.1	1.04	0.26	0.89	0.15	-10.5	10	3
350	12.4	-7.9	1.18	0.31	0.96	0.13	-10.5	10	3
400	13.6	-7.6	1.28	0.35	1.03	0.19	-10.5	10	3
450	14.7	-7.4	1.39	0.38	1.11	0.22	-10.5	10	3
500	15.6	-7.2	1.44	0.39	1.20	0.19	-10.5	10	3
550	16.3	-7.0	1.55	0.46	1.24	0.23	-10.5	10	3
600	17.2	-6.9	1.59	0.43	1.29	0.23	-10.5	10	3
650	18.1	-6.9	1.67	0.34	1.35	0.22	-10.5	10	3
700	18.5	-6.8	1.67	0.42	1.41	0.15	-10.5	10	3
750	19.1	-6.3	1.87	0.54	1.46	0.25	-10.5	10	3
800	19.6	-6.3	1.90	0.46	1.51	0.25	-10.5	10	3
850	20.1	-6.0	1.99	0.60	1.56	0.27	-10.5	10	3
900	20.8	-5.8	2.14	0.60	1.63	0.29	-10.5	10	3
950	21.1	-5.6	2.22	0.60	1.66	0.33	-10.5	10	3
1000	21.6	-5.6	2.23	0.61	1.71	0.30	-10.5	10	3

Sample calculation

E (dB µV/m) = U (dB µV) + AF (dB 1/m) + Corr. (dB)
U = Receiver reading
AF = Antenna factor
Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)
distance correction = -20 * LOG (d_{Limit}/ d_{used})
Linear interpolation will be used for frequencies in between the values in the table.
Tables show an extract of values.

7.4 ANTENNA R&S HF907 (1 GHZ – 18 GHZ)

Frequency	AF R&S HF907	Corr.	cable loss 1 (relay + cable inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit, atten-uator & pre-amp)	cable loss 4 (to receiver)		
MHz	dB (1/m)	dB	dB	dB	dB	dB		
1000	24.4	-19.4	0.99	0.31	-21.51	0.79		
2000	28.5	-17.4	1.44	0.44	-20.63	1.38		
3000	31.0	-16.1	1.87	0.53	-19.85	1.33		
4000	33.1	-14.7	2.41	0.67	-19.13	1.31		
5000	34.4	-13.7	2.78	0.86	-18.71	1.40		
6000	34.7	-12.7	2.74	0.90	-17.83	1.47		
7000	35.6	-11.0	2.82	0.86	-16.19	1.46		

Frequency	AF R&S HF907	Corr.	cable loss 1 (relay inside chamber)	cable loss 2 (inside chamber)	cable loss 3 (outside chamber)	cable loss 4 (switch unit, atten-uator & pre-amp)	cable loss 5 (to receiver)	used for FCC 15.247
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB	
3000	31.0	-23.4	0.47	1.87	0.53	-27.58	1.33	
4000	33.1	-23.3	0.56	2.41	0.67	-28.23	1.31	
5000	34.4	-21.7	0.61	2.78	0.86	-27.35	1.40	
6000	34.7	-21.2	0.58	2.74	0.90	-26.89	1.47	
7000	35.6	-19.8	0.66	2.82	0.86	-25.58	1.46	

Frequency	AF R&S HF907	Corr.	cable loss 1 (relay inside chamber)	cable loss 2 (High Pass)	cable loss 3 (pre-amp)	cable loss 4 (inside chamber)	cable loss 5 (outside chamber)	cable loss 6 (to receiver)
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB	dB
7000	35.6	-57.3	0.56	1.28	-62.72	2.66	0.94	1.46
8000	36.3	-56.3	0.69	0.71	-61.49	2.84	1.00	1.53
9000	37.1	-55.3	0.68	0.65	-60.80	3.06	1.09	1.60
10000	37.5	-56.2	0.70	0.54	-61.91	3.28	1.20	1.67
11000	37.5	-55.3	0.80	0.61	-61.40	3.43	1.27	1.70
12000	37.6	-53.7	0.84	0.42	-59.70	3.53	1.26	1.73
13000	38.2	-53.5	0.83	0.44	-59.81	3.75	1.32	1.83
14000	39.9	-56.3	0.91	0.53	-63.03	3.91	1.40	1.77
15000	40.9	-54.1	0.98	0.54	-61.05	4.02	1.44	1.83
16000	41.3	-54.1	1.23	0.49	-61.51	4.17	1.51	1.85
17000	42.8	-54.4	1.36	0.76	-62.36	4.34	1.53	2.00
18000	44.2	-54.7	1.70	0.53	-62.88	4.41	1.55	1.91

Sample calculation

E (dB µV/m) = U (dB µV) + AF (dB 1/m) + Corr. (dB)
U = Receiver reading
AF = Antenna factor
Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)
Linear interpolation will be used for frequencies in between the values in the table.
Tables show an extract of values.

7.5 ANTENNA EMCO 3160-09 (18 GHZ – 26.5 GHZ)

Frequency	AF EMCO 3160-09	Corr.	cable loss 1 (inside chamber)	cable loss 2 (pre-amp)	cable loss 3 (inside chamber)	cable loss 4 (switch unit)	cable loss 5 (to receiver)
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB
18000	40.2	-23.5	0.72	-35.85	6.20	2.81	2.65
18500	40.2	-23.2	0.69	-35.71	6.46	2.76	2.59
19000	40.2	-22.0	0.76	-35.44	6.69	3.15	2.79
19500	40.3	-21.3	0.74	-35.07	7.04	3.11	2.91
20000	40.3	-20.3	0.72	-34.49	7.30	3.07	3.05
20500	40.3	-19.9	0.78	-34.46	7.48	3.12	3.15
21000	40.3	-19.1	0.87	-34.07	7.61	3.20	3.33
21500	40.3	-19.1	0.90	-33.96	7.47	3.28	3.19
22000	40.3	-18.7	0.89	-33.57	7.34	3.35	3.28
22500	40.4	-19.0	0.87	-33.66	7.06	3.75	2.94
23000	40.4	-19.5	0.88	-33.75	6.92	3.77	2.70
23500	40.4	-19.3	0.90	-33.35	6.99	3.52	2.66
24000	40.4	-19.8	0.88	-33.99	6.88	3.88	2.58
24500	40.4	-19.5	0.91	-33.89	7.01	3.93	2.51
25000	40.4	-19.3	0.88	-33.00	6.72	3.96	2.14
25500	40.5	-20.4	0.89	-34.07	6.90	3.66	2.22
26000	40.5	-21.3	0.86	-35.11	7.02	3.69	2.28
26500	40.5	-21.1	0.90	-35.20	7.15	3.91	2.36

Sample calculation

E (dB µV/m) = U (dB µV) + AF (dB 1/m) + Corr. (dB)
U = Receiver reading
AF = Antenna factor
Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)
Linear interpolation will be used for frequencies in between the values in the table.
Table shows an extract of values.

7.6 ANTENNA EMCO 3160-10 (26.5 GHZ – 40 GHZ)

Frequency	AF EMCO 3160-10	Corr.	cable loss 1 (inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit)	cable loss 4 (to receiver)	distance corr. (-20 dB/ decade)	d_{Limit} (meas. distance (limit)	d_{used} (meas. distance (used)
GHz	dB (1/m)	dB	dB	dB	dB	dB	dB	m	m
26.5	43.4	-11.2	4.4				-9.5	3	1.0
27.0	43.4	-11.2	4.4				-9.5	3	1.0
28.0	43.4	-11.1	4.5				-9.5	3	1.0
29.0	43.5	-11.0	4.6				-9.5	3	1.0
30.0	43.5	-10.9	4.7				-9.5	3	1.0
31.0	43.5	-10.8	4.7				-9.5	3	1.0
32.0	43.5	-10.7	4.8				-9.5	3	1.0
33.0	43.6	-10.7	4.9				-9.5	3	1.0
34.0	43.6	-10.6	5.0				-9.5	3	1.0
35.0	43.6	-10.5	5.1				-9.5	3	1.0
36.0	43.6	-10.4	5.1				-9.5	3	1.0
37.0	43.7	-10.3	5.2				-9.5	3	1.0
38.0	43.7	-10.2	5.3				-9.5	3	1.0
39.0	43.7	-10.2	5.4				-9.5	3	1.0
40.0	43.8	-10.1	5.5				-9.5	3	1.0

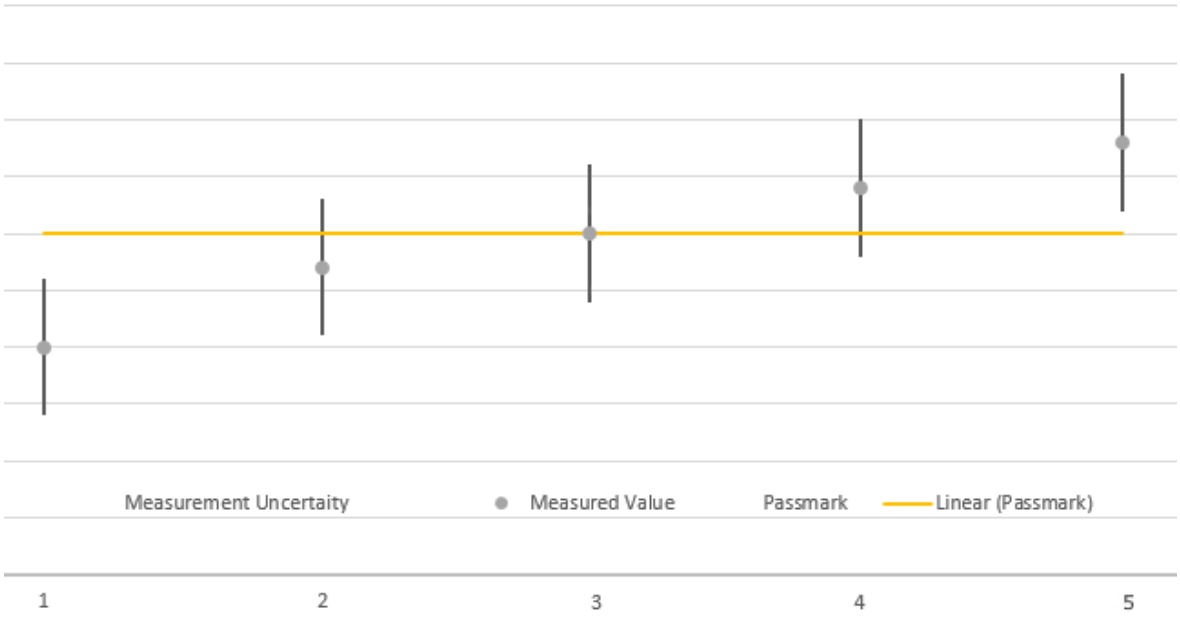
Sample calculation

E (dB µV/m) = U (dB µV) + AF (dB 1/m) + Corr. (dB)
U = Receiver reading
AF = Antenna factor
Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)
Linear interpolation will be used for frequencies in between the values in the table.
distance correction = -20 * LOG (d_{Limit}/ d_{used})
Linear interpolation will be used for frequencies in between the values in the table.
Table shows an extract of values.

8 MEASUREMENT UNCERTAINTIES

Test Case	Parameter	Uncertainty
Conducted Emissions at AC mains	Voltage	± 3.4 dB
Radiated Emissions	Field Strength	± 5.5 dB

The measurement uncertainties for all parameters are calculated with an expansion factor (coverage factor) k = 1.96. This means, that the true value is in the corresponding interval with a probability of 95 %.



The verdicts in this test report are given according the above diagram:

Case	Measured Value	Uncertainty Range	Verdict
1	below pass mark	below pass mark	Passed
2	below pass mark	within pass mark	Passed
3	on pass mark	within pass mark	Passed
4	above pass mark	within pass mark	Failed
5	above pass mark	above pass mark	Failed

That means, the laboratory applies, as decision rule (see ISO/IEC 17025:2017), the so-called shared risk principle.

9 PHOTO REPORT

Please see separate photo report.