FCC Measurement/Technical Report on

Industrial WLAN Access Point / Client SCALANCE W700 / MSAX MSAX-W1-RJ-E2

FCC ID: LYHMSAXV1 IC: 267AA-MSAXV1

Test Report Reference: MDE_SIEM_2207_FCC_03

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

Table of Contents

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

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 A / 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	S02_ACDC_AC02	2022-10-13	Passed	Passed

47 CFR CHAPTER I FCC PART 15 Subpart B	**§ 15.109 Class A / 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, 1 GHz - 18 GHz, computer peripheric	S02_ACDC_AC02	2022-10-13	Passed	Passed
via auxiliary equipment, 18 GHz - 40 GHz, computer peripheric	S02_ACDC_AC03	2023-01-24	Passed	Passed
via auxiliary equipment, 30 MHz - 1 GHz, computer peripheric	S02_ACDC_AC02	2022-10-13	Passed	Passed

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

2 REVISION HISTORY / SIGNATURES

Report version control			
Version	**Release date**	**Change Description**	**Version validity**
initial	2023-01-26	--	valid
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COMMENT: -

(responsible for accreditation scope)
Dipl.-Ing. Marco Kullik

(responsible for testing and report)
Dipl.-Ing. Daniel Gall

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. Marco Kullik
Report Template Version:	2022-05-25

3.2 PROJECT DATA

Responsible for testing and report:	Dipl.-Ing. Daniel Gall
Employees who performed the tests:	documented internally at 7Layers
Date of Report:	2023-01-26
Testing Period:	2022-10-13 to 2023-01-24

3.3 APPLICANT DATA

Company Name:	SIEMENS AG
Address:	Östliche Rheinbrückenstr. 50 76187 Karlsruhe Germany
Contact Person:	Malgorzata Janson

3.4 MANUFACTURER DATA

Company Name:	SIEMENS AG
Address:	76181 Karlsruhe Germany
Contact Person:	Kilian Löser

4 TEST OBJECT DATA

4.1 GENERAL EUT DESCRIPTION

Kind of Device product description	Industrial WLAN Access Point / Client
Product name	SCALANCE W700 / MSAX
Type	MSAX-W1-RJ-E2
Declared EUT data by the supplier	
Power Supply Type	DC
Nominal Voltage / Frequency	24 V
Test Voltage / Frequency	120 V 60 Hz at Auxiliary AC/DC power supply, 24 V DC at EUT
Highest internal frequency	5825 MHz
Specific product description for the EUT	The MSAX-W1-RJ-E2 device is a wireless LAN access point / client for industrial applications supporting following WLAN modes and frequency bands: • 802.11 ax/ac/a/h/n Mode: 5.15 - 5.35 GHz and 5.47 - 5.85 GHz • 802.11 ax/b/g/n Mode: 2400 - 2483.5 MHz 2 Reverse SMA connectors are available for usage with external antennas. 2x2 MIMO operation is possible in both bands. Simultaneous operation of the device in both frequency bands is supported. Module may be used either as Master or as Client WLAN device. The device supports 10/100/1000 Mbit/s Ethernet at 4 RJ45 ports. Additionally, the device features one digital input and one digital output signalling line, a configuration/licensing plug and a sleep timer. Supply power is 24Vdc.
Ports	• Enclosure • DC port: cable length appr. 1.0m • Digital I/O port: cable length 2.0m (terminated with DIDO box) • LAN port: cable length (shielded), appr. 3.0m • USB C service port • 2 Antenna ports, Reverse SMA connector, appr. 1.0 m & antenna
Special software used for testing	Test commands in command window interface of EUT with connection by LAN Port of EUT

4.2 EUT MAIN COMPONENTS

Sample Name	Sample Code	Description
EUT ac02	DE1039038ac02	
Sample Parameter	**Value**	
Serial No.	VPP7205251	
HW Version	02	
SW Version	V02.00.00	
Comment		

Sample Name	Sample Code	Description
EUT ac03	DE1039038ac03	
Sample Parameter	**Value**	
Serial No.	VPP7205251	
HW Version	02	
SW Version	V02.00.00	
Comment	FW with allowed Bands U-NII-2A and 2C	

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**
6005D (30 V / 5 A)	PeakTech, 6005D (30 V / 5 A):Laboratory Power Supply 120 V 60 Hz, -, -, 81062045	Laboratory Power Supply 120 V 60 Hz
AC Adapter RE03 /W10	Fujitsu Ltd., AC Adapter RE03 /W10:SED110P2-19.0, -, -, 07813018A	SED110P2-19.0
AUX100	Siemens, ANT795-6MN, -, - , -	Omni directional dipole antenna, linear polarisation, gain 6 dBi in 2.4 and 8 dBi in 5 GHz band
AUX101	Siemens, ANT795-6MN, -, - , -	Omni directional dipole antenna, linear polarisation, gain 6 dBi in 2.4 and 8 dBi in 5 GHz band
AUX201	Siemens, -, -, - , -	RF-Cable (1m, reverse sma-connector)
AUX202	Siemens, -, -, - , -	RF-Cable (1m, reverse sma-connector)
AUX301	Siemens, -, -, - , -	DI/DO Test box with cable
Laptop RE03 /W10	Fujitsu Ltd., Laptop RE03 /W10:Lifebook E-Series E781, -, -, DSCK013809	Lifebook E-Series E781
TFT Display 5 (LG)	LG, TFT Display 5 (LG):L17MB-P, -, -, 412WAPL0U560	L17MB-P
Keyboard	DELL, SK-8115, Rev A02, -, CN-0DJ317-71616-78L-0N3Z	Keyboard
Mouse	Logitech, M-BT58, -, -, -	Mouse

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_ACDC _AC02	EUT ac02, AUX301, AUX202, AUX100, AUX101, AUX201, Laptop RE03 /W10, TFT Display 5 (LG), 6005D (30 V / 5 A), AC Adapter RE03 /W10, Keyboard, Mouse	AC Conducted Emissions Setup
S02_ACDC _AC03	EUT ac03, AUX301, AUX202, AUX100, AUX101, AUX201, Laptop RE03 /W10, TFT Display 5 (LG), 6005D (30 V / 5 A), AC Adapter RE03 /W10, Keyboard, Mouse	AC Conducted Emissions Setup

4.6 OPERATING MODES / TEST CHANNELS

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

WLAN active in RX-Mode on channel 48. The EUT is continuously pinged via the ethernet interface.

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

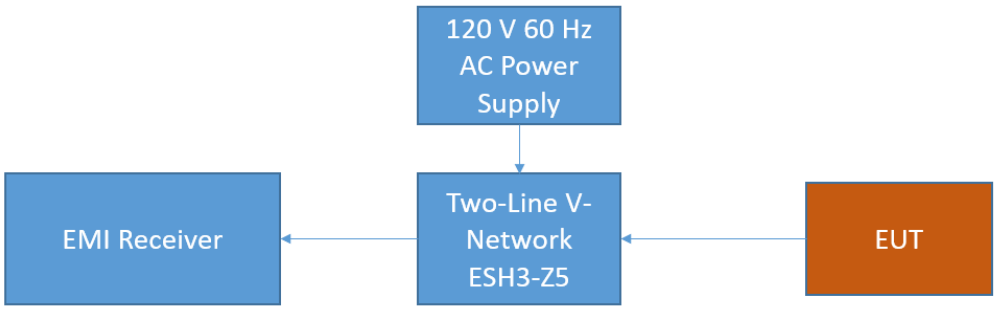
5.1 CONDUCTED EMISSIONS AT AC MAINS

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 to 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: Peak – Maxhold & Average
- Frequency range: 150 kHz – 30 MHz
- Frequency steps: 2.5 kHz
- IF–Bandwidth: 9 kHz
- Measuring time / Frequency step: 100 ms (FFT-based)
- Measurement on phase + neutral lines of the power cords

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 identified in step 1.
EMI receiver settings:
- Detector: Quasi-Peak & (CISPR) Average

- IF Bandwidth: 9 kHz
- Measuring time: 1 s / frequency

At each frequency determined in step 1, four measurements are performed in the following 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)

The highest value is reported.

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

Temperature: 24 °C
Air Pressure: 1010 hPa
Humidity: 43 %
via auxiliary equipment, computer peripheric

Power line	PE	Frequency [MHz]	Level [dBµV]	Detector	Limit [dBµV]	Margin [dB]
N	GND	0.15	54.2	QP	65.9	11.7
N	GND	0.26	47.3	QP	61.6	14.3
L1	FLO	0.39	32.7	AV	48.0	15.3
L1	FLO	0.78	34.8	AV	46.0	11.2
L1	FLO	1.18	39.5	QP	56.0	16.5
L1	FLO	1.18	34.2	AV	46.0	11.8
N	FLO	1.57	33.2	AV	46.0	12.8
N	FLO	1.57	38.8	QP	56.0	17.2
N	FLO	1.96	39.4	QP	56.0	16.6
N	FLO	1.96	32.8	AV	46.0	13.2
L1	GND	11.56	43.0	---	60.0	17.0
L1	GND	11.65	36.4	AV	50.0	13.6

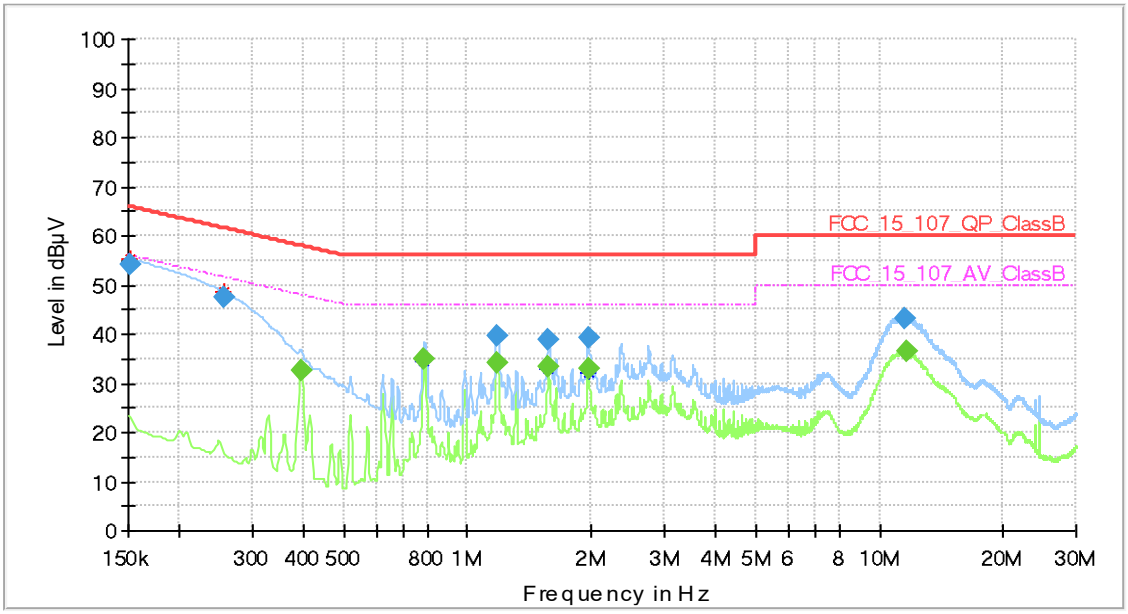
Remark: Please see next sub-clause for the measurement plot.

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

AC mains connection = via auxiliary equipment, Test setup = computer peripheric (S02_ACDC_AC02)

Common Information

Test Description:	Conducted Emissions
Test Standard:	FCC §15.107, ANSI C63.4
EUT / Setup Code:	DE1039038ac02
Operating Conditions:	120 V 60 Hz, 24 V DC WLAN5G CH48 RX
Operator Name:	HAE/SAW
Comment:	
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, 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)
0.152250	54.19	---	65.88	11.69	1000.0	9.000	N	GND	10.0
0.255750	47.28	---	61.57	14.29	1000.0	9.000	N	GND	10.1
0.393000	---	32.73	48.00	15.27	1000.0	9.000	L1	FLO	10.1
0.784500	---	34.76	46.00	11.24	1000.0	9.000	L1	FLO	10.1
1.176000	39.50	---	56.00	16.50	1000.0	9.000	L1	FLO	10.1
1.178250	---	34.24	46.00	11.76	1000.0	9.000	L1	FLO	10.1
1.569750	---	33.22	46.00	12.78	1000.0	9.000	N	FLO	10.2
1.569750	38.82	---	56.00	17.18	1000.0	9.000	N	FLO	10.2
1.961250	39.38	---	56.00	16.62	1000.0	9.000	N	FLO	10.2
1.961250	---	32.80	46.00	13.20	1000.0	9.000	N	FLO	10.2
11.555250	42.99	---	60.00	17.01	1000.0	9.000	L1	GND	10.7
11.654250	---	36.40	50.00	13.60	1000.0	9.000	L1	GND	10.7

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

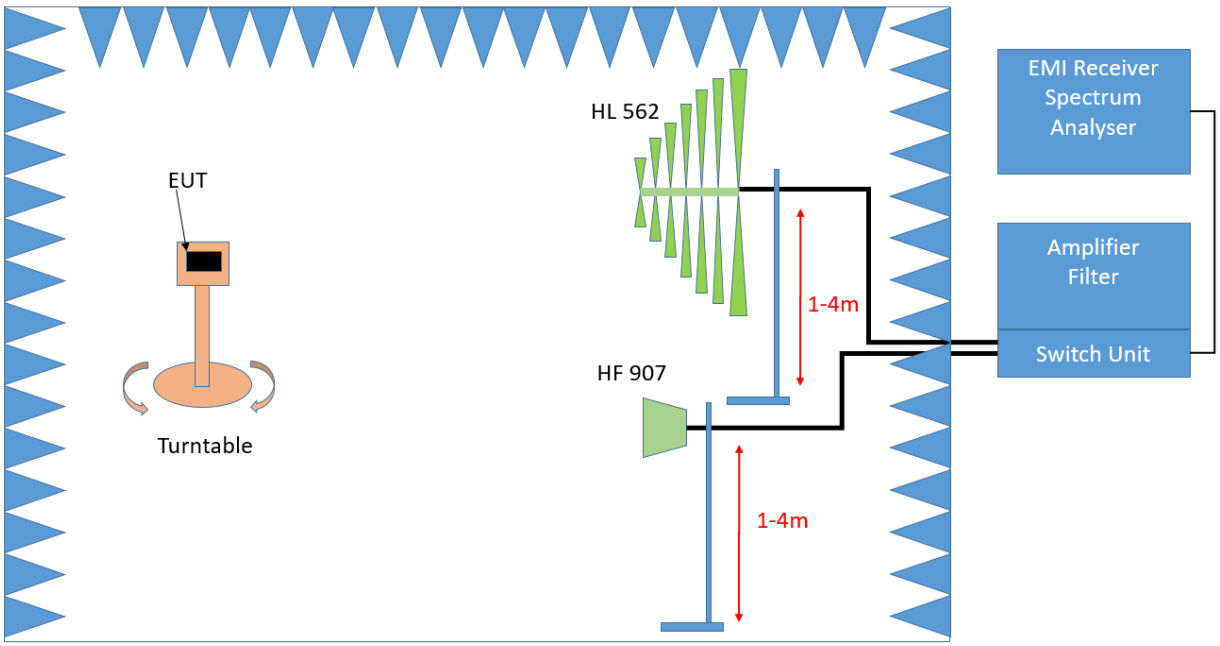
The test set-up was made in accordance to the general provisions of ANSI C63.4 in a typical installation configuration. The measurements were performed according the following sub-chapters of ANSI C63.4:

- 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-Maxhold / Quasipeak (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 – Maxhold
- 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 Polarisation: 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 > 1 GHz:

Step 1:
- Turntable step size: 45°
- Detector: Peak, Average (Maxhold)
- 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

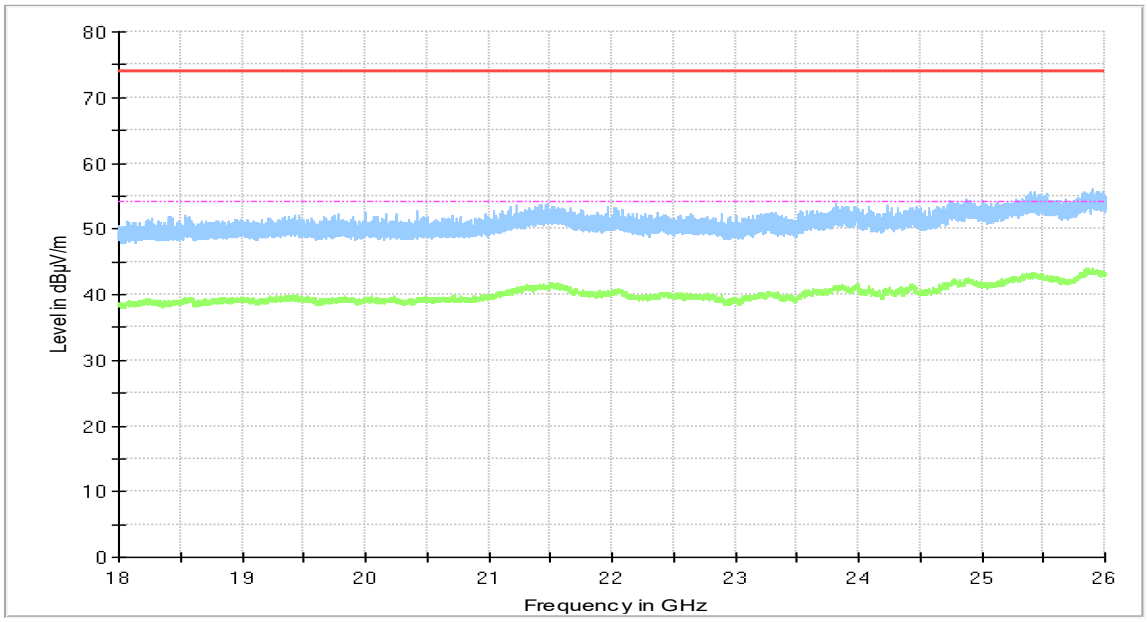
Ambient temperature: 23 °C
Air Pressure: 1011–1031 hPa
Humidity: 32–43 %
via auxiliary equipment, computer peripheric

Spurious Freq. [MHz]	Spurious Level [dBµV/m]	Detector	RBW [kHz]	Limit [dBµV/m]	Margin to Limit [dB]
34.0	32.0	QP	120	40.0	8.0
71.4	25.8	QP	120	40.0	14.2
117.4	29.7	QP	120	43.5	13.8
300.7	38.4	QP	120	46.0	7.7
334.3	36.6	QP	120	46.0	9.4
509.8	27.6	QP	120	46.0	18.4
724.4	28.8	QP	120	46.0	17.2
1071.0	57.7	PEAK	1000	74.0	16.3
1071.0	28.0	AV	1000	54.0	26.0
1994.3	54.0	PEAK	1000	74.0	20.0
1994.3	24.3	AV	1000	54.0	29.7

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 = 18 GHz - 40 GHz, Test setup = computer peripheric
(S02_ACDC_AC03)



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)	Comment
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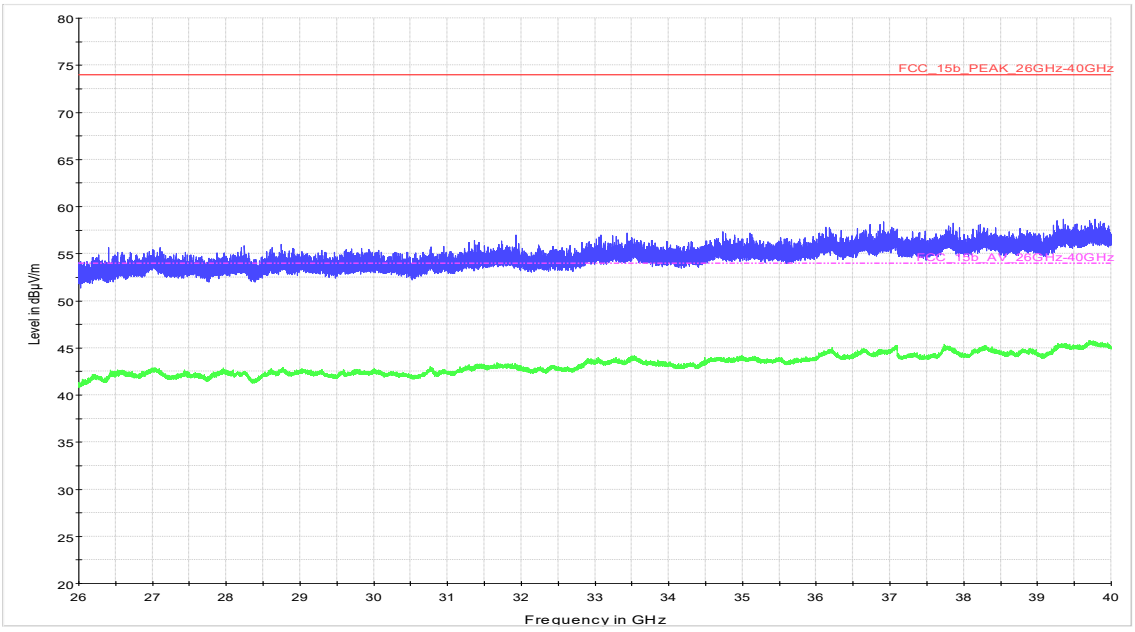
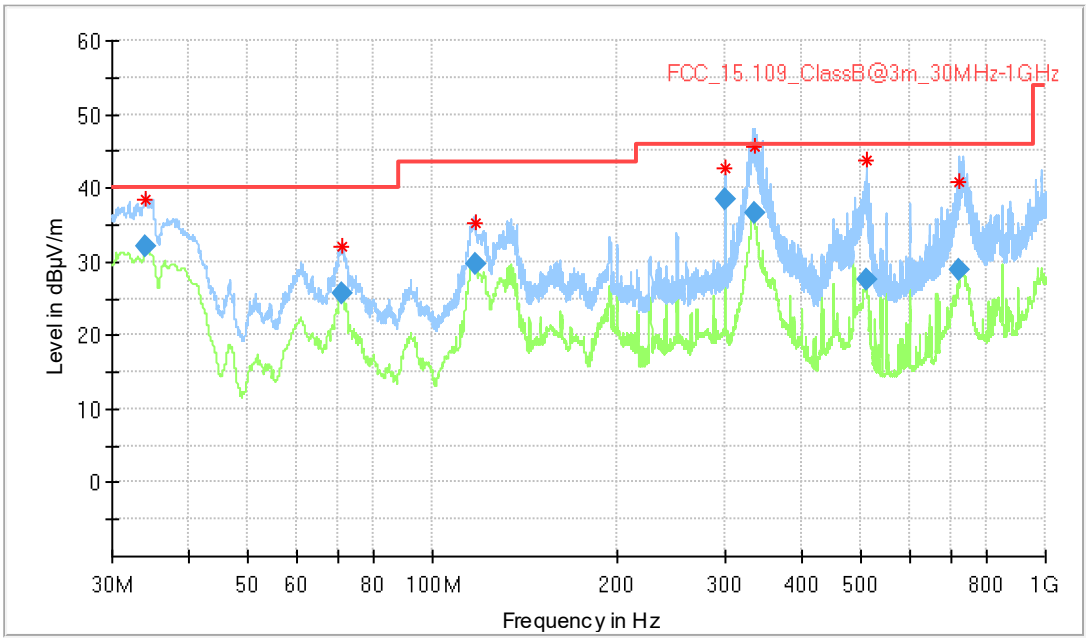


AC mains connection = via auxiliary equipment, Measurement range = 30 MHz - 1 GHz, Test setup = computer peripheric
(S02_ACDC_AC02)

Common Information

Test Description:	Radiated Emissions, Test Site: Semi Anechoic Chamber @ 3 m
Test Standard:	FCC §15.109, ANSI C63.4
EUT / Setup Code:	DE1039038ac02
Operating Conditions:	120 V 60 Hz, 24 V DC, WLAN5G CH48 RX, LAN Ping
Operator Name:	SAW
Comment:	-
Legend:	Trace (preview): blue = PK, green = QP; Star: red or blue = critical frequency; Rhombus: blue = final QP



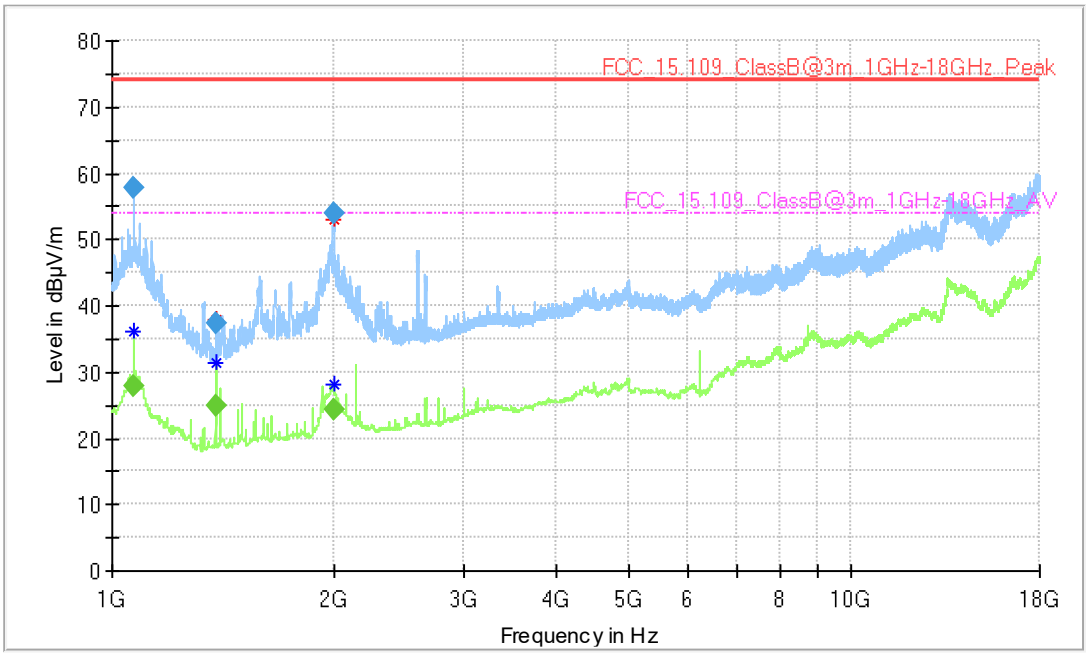
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
33.990000	31.97	40.00	8.03	1000.0	120.000	115.0	V	39.0	17.0
71.400000	25.76	40.00	14.24	1000.0	120.000	104.0	V	291.0	8.8
117.390000	29.74	43.50	13.76	1000.0	120.000	126.0	V	202.0	11.7
300.720000	38.35	46.00	7.65	1000.0	120.000	126.0	H	265.0	13.9
334.260000	36.57	46.00	9.43	1000.0	120.000	150.0	H	208.0	15.2
509.820000	27.57	46.00	18.43	1000.0	120.000	110.0	H	94.0	19.6
724.440000	28.81	46.00	17.19	1000.0	120.000	227.0	V	181.0	23.5

AC mains connection = via auxiliary equipment, Measurement range = 1 GHz - 18 GHz, Test setup = computer peripheric
(S02_ACDC_AC02)

Common Information

Test Description:	Radiated Emissions @ 3 m, SAC + mobile floor absorber
Test Standard:	FCC 15.109 Class B
EUT / Setup Code:	DE1039038ac02
Operating Conditions:	120 V 60 Hz, 24 V DC, WLAN5G CH48 RX, LAN Ping
Operator Name:	SAW
Comment:	-
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)
1071.000000	---	27.97	54.00	26.03	200.0	1000.000	282.0	V	-141.0	-0.5
1071.000000	57.67	---	74.00	16.33	200.0	1000.000	150.0	H	95.0	-0.5
1380.000000	37.44	---	74.00	36.56	200.0	1000.000	282.0	V	-141.0	0.8
1380.000000	---	24.80	54.00	29.20	200.0	1000.000	150.0	H	95.0	0.8
1994.250000	---	24.29	54.00	29.71	200.0	1000.000	282.0	V	-141.0	5.3
1994.250000	53.99	---	74.00	20.01	200.0	1000.000	100.0	V	-58.0	5.3

5.2.5 TEST EQUIPMENT USED

- Radiated Emissions 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	Chroma 6404	AC Source	Chroma ATE INC.	64040001304		
1.5	Shielded Room 02	Shielded Room 4m x 3m	Frankonia Germany EMC Solution GmbH	-		
1.6	ESH3-Z5	Two-Line V-Network (EUT)	Rohde & Schwarz GmbH & Co. KG	829996/002	2021-08	2023-08
1.7	ESR 7	EMI Receiver / Spectrum Analyzer	Rohde & Schwarz	101424	2021-01	2023-01
1.8	Opus10 THI (8152.00)	T/H Logger 02	Lufft Mess- und Regeltechnik GmbH	7489	2021-10	2023-10
1.9	CS-RUB6	Rubidium Frequency Standard	Rohde & Schwarz GmbH & Co. KG	100321	2022-10	2023-10

2 Radiated Emissions above 1 GHz
Radiated emission tests above 1 GHz

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		
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		
2.5	Opus10 THI (8152.00)	T/H Logger 10	Lufft Mess- und Regeltechnik GmbH	12488	2021-08	2023-08
2.6	EP 1200/B, NA/B1	AC Source, Amplifier with integrated variable Oscillator	Spitzenberger & Spies GmbH & Co. KG	B6278		
2.7	DS 420S	Turn Table 2 m diameter	HD GmbH	420/573/99		
2.8	JS4-00102600-42-5A	Broadband Amplifier 30 MHz - 26 GHz	Miteq	619368		

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
2.9	MA4985-XP-ET	Bore Sight Antenna Mast	innco systems GmbH	none		
2.10	BB4312-C30-H3x	Filter Universal 1A	Siemens Matsushita Components	none		
2.11	HF 907-2	Double-ridged horn	Rohde & Schwarz	102817	2022-07	2025-07
2.12	Opus10 TPR (8253.00)	T/P Logger 13	Lufft Mess- und Regeltechnik GmbH	13936	2021-10	2023-10
2.13	Anechoic Chamber 03	FAR, 8.80m x 4.60m x 4.05m (l x w x h)	Albatross Projects	P26971-647-001-PRB	2021-04	2023-04
2.14	Fluke 177	Digital Multimeter 03 (Multimeter)	Fluke Europe B.V.	86670383	2022-06	2024-06
2.15	JS4-18002600-32-5P	Broadband Amplifier 18 GHz - 26 GHz	Miteq	849785		
2.16	FSW43	Spectrum Analyzer	Rohde & Schwarz GmbH & Co. KG	103779	2022-11	2024-11
2.17	EP 1200/B, NA/B1	AC Source, Amplifier with integrated variable Oscillator	Spitzenberger & Spies GmbH & Co. KG	B6278		
2.18	3160-09	Standard Gain / Pyramidal Horn Antenna 26.5 GHz	EMCO Elektronic GmbH	00083069		
2.19	TT 1.5 WI	Turn Table	Maturo GmbH	-		
2.20	3160-10	Standard Gain / Pyramidal Horn Antenna 40 GHz	EMCO Elektronic GmbH	00086675		
2.21	FSW43	Signal Analyser	Rohde & Schwarz GmbH & Co. KG	102013	2021-06	2023-06
2.22	PAS 2.5 - 10 kg	Antenna Mast	Maturo GmbH	-		

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		
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		

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
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	Opus10 THI (8152.00)	T/H Logger 10	Lufft Mess- und Regeltechnik GmbH	12488	2021-08	2023-08
3.7	EP 1200/B, NA/B1	AC Source, Amplifier with integrated variable Oscillator	Spitzenberger & Spies GmbH & Co. KG	B6278		
3.8	DS 420S	Turn Table 2 m diameter	HD GmbH	420/573/99		
3.9	AM 4.0	Antenna Mast 4 m	Maturo GmbH	AM4.0/180/1192 0513		

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
MATURO Mast Controller	12.19
MATURO Turn-Table Controller	30.10
Fully-Anechoic Chamber:	
Software	Version
EMC32 Measurement Software	10.60.10
MATURO Turn-Unit Controller	11.10
MATURO Mast Controller	12.10
MATURO Turntable Controller	12.11
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

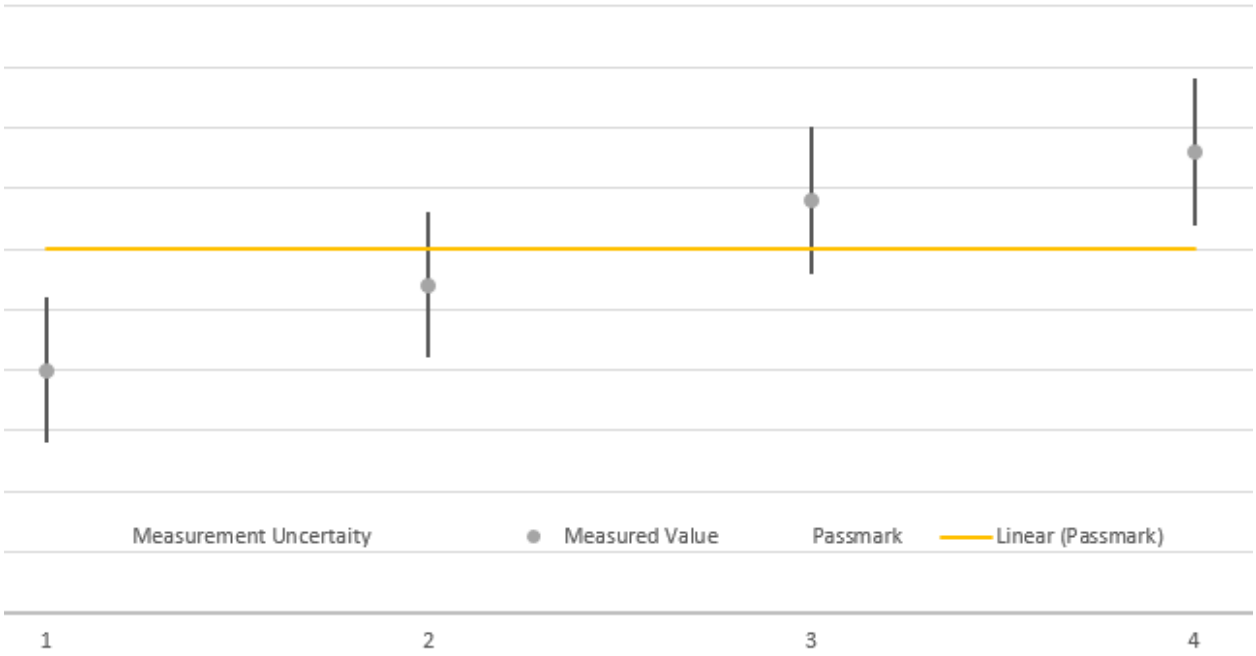
Sample calculation

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	above pass mark	within pass mark	Failed
4	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.