FCC Measurement/Technical Report on

AXIS D2210-VE Radar

FCC ID: PNB-AXISD2210-VE
IC: 3919A-D2210VE

Test Report Reference: MDE_AXIS_2401_FCC_01_REV03

Test Laboratory:
7layers GmbH
Borsigstrasse 11
40880 Ratingen
Germany

Deutsche
Akkreditierungsstelle
D-PL-12140-01-00

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1 APPLIED STANDARDS AND TEST SUMMARY

1.1 APPLIED STANDARDS

Type of Authorization
Certification for an Intentional Radiator.

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 (10-1-23 Edition). The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

Part 15, Subpart C – Intentional Radiators

§ 15.201 Equipment authorization requirement

§ 15.209 Radiated emission limits; general requirements

§ 15.255 Operation within the band 57–71 GHz.

Summary Test Results:

The EUT complied with all performed tests as listed in chapter 1.3 Measurement Summary / Signatures.

1.2 FCC-IC CORRELATION TABLE

Correlation of measurement requirements for Radar equipment within the band 57-71 GHz FCC and IC

Measurement	FCC reference	IC reference
AC Power Line Conducted Emissions	§ 15.207	RSS-Gen Issue 5: 8.8
Emission Bandwidth	§ 15.215 (c)	RSS-Gen Issue 5: 6.7 RSS210 Issue 11: Annex J, J.3.2
Peak Output Power	§ 15.255 (c)(1-3) & (e)	RSS-Gen Issue 5: 6.12 RSS210 Issue 11: Annex J, J.3.2, J.3.3
Unwanted Emissions	§ 15.209 & 15.255 (d)	RSS-Gen Issue 5: 6.13 RSS210 Issue 11: Annex J, J.4
Frequency Stability	§ 15.255 (f)	RSS-Gen Issue 5: 6.11 RSS210 Issue 11: Annex J, J.6

1.3 MEASUREMENT SUMMARY / SIGNATURES

47 CFR CHAPTER I FCC PART 15 Subpart C §15.255	**§ 15.255 (c) (1-3) & (e)**			
Peak Output Power The measurement was performed according to ANSI C63.10 (2020), chapter 9.8			**Final Result**	
OP-Mode: outside tank enclosure Radio Technology, Operating Frequency, Measurement range	**Setup**	**Date**	**FCC**	**IC**
FMCW Radar, 61.25 – 61.5 GHz, 61.1 GHz – 61.6 GHz	S01_AA01	2024-10-21	Passed	Passed
FMCW Radar, 61.0 – 61.25 GHz, 60.9 GHz – 61.4 GHz	S01_AA01	2024-10-21	Passed	Passed

2 REVISION HISTORY

Report version control			
Version	**Release date**	**Change Description**	**Version validity**
initial	2024-11-26	--	invalid
REV01	2024-12-20	- IC reference change in chapter 2.1 - Insert reference to test report "MDE_AXIS-2301_FCC_02_REV03" for the 'outdoor mode (high power)' test cases in chapter 4.1 and 4.2	invalid
REV02	2025-01-02	- IC reference changed in chapter 5.1.2	invalid
REV03	2025-01-10	- Not required text removed in chapter 5.1.2	valid

COMMENT:
According to applicants request were not all testcases performed, only the peak output power testcase is documented in this report.

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

(responsible for testing and report)
B.Sc. Mohamed Fraitat

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-12140-01-00
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:	2019-06-20

3.2 PROJECT DATA

Responsible for testing and report:	B.Sc. Mohamed Fraitat
Employees who performed the tests:	documented internally at 7Layers
Date of Report:	2025-01-10
Testing Period:	2024-10-21 to 2024-10-21

3.3 APPLICANT DATA

Company Name: Address:	Axis Communications AB Gränden 1 SE-223 69 Lund Sweden
Contact Person:	Mr. Martin Alumets

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	Surveillance Radar
Product name	AXIS D2210-VE Radar
Type	D2210-VE Radar
Declared EUT data by the supplier	
Voltage Type	12 V DC
Voltage Level	INPUT ancillary equipment: 120 V / 60 Hz OUTPUT ancillary equipment: 12 V DC
Tested Modulation Type	61.5 GHz FMCW
Antenna Gain	6 dBi
General product description	The EUT is a network-radar intended for a continuous surveillance operation.
The EUT provides the following ports:	Ethernet/PoE ≥ 30 m (max. length) DC power < 3 m (max. length) Separate Ground < 3 m (max. length) I/O cable ≥ 30 m (max. length)
Special software used for testing	Putty + Web-Browser
software/firmware change to add new power mode	The D2210-VE has two selectable power modes 'indoor mode (low power)' and 'outdoor mode (high power)'. The 'indoor mode (low power)' was tested and reported in this test report. For other test items please see original test report (Report number: MDE_AXIS-2301_FCC_02_REV03)

The main components of the EUT are listed and described in chapter 3.2 EUT Main components.

4.2 EUT MAIN COMPONENTS

Sample Name	**Sample Code**	**Description**
EUT A	DE1476003aa01	Radiated sample
Sample Parameter	**Value**	
Serial No.	B8A44F936214	
HW Version	R1	
SW Version	12.2	
Comment	-	

Hint: HW Version "D2210-VE" was used in the test report MDE_AXIS-2301_FCC_02_REV03 for the 'outdoor mode (high power)' mode test cases

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**
AUX01	Axis, POE60S-1BT, REV B, -, -, -	PoE Adapter
AUX02	Axis, switching Power Adapter T8006 PS12, -, -, -	AC/DC-Adapter

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**
S01_AA01	EUT A + AUX01 + AUX02	Radiated Setup

4.6 OPERATING MODES

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

4.6.1 TEST CHANNELS

FMCW Radar Signal with an operational frequency range from
Channel 0: 61.25 GHz to 61.50 GHz
Channel 1: 61.00 GHz to 61.25 GHz

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

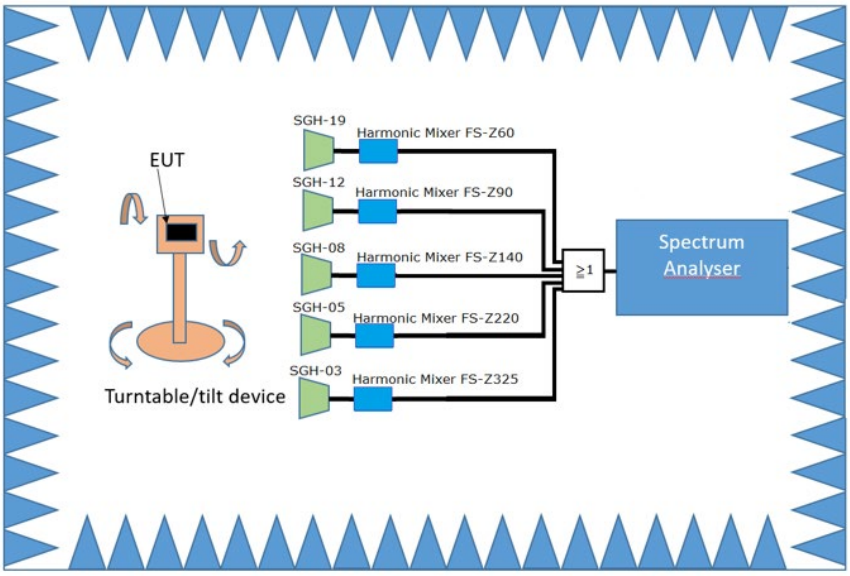
5.1 PEAK OUTPUT POWER

Standard **FCC Part 15 Subpart C**

The test was performed according to:
ANSI C63.10

5.1.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was set up on a non-conductive support (tilt device) at 1.5 m height in the fully-anechoic chamber.
All steps were performed with one height (1.5 m) of the receiving antenna only.
The EUT is turned during the pre-measurement to find the direction where the highest output power is emitted by the EUT, the turn table step size (azimuth angle) for the measurement is 1°, the Turntable angle range: –180° to +180°. When the position of the highest radiation is detected, the output power is measured in this position.



Test Setup (40 GHz - 320 GHz)

Deviation from standard:
The device under test is a FMCW Radar device. In this mode a narrow transmission is swept rapidly across the range of frequencies over a short time. Each narrow transmission during a single chirp has a Bandwidth less than 1 MHz.

Analyzer settings:

- Resolution Bandwidth (RBW): 1 MHz
- Video Bandwidth (VBW): 3 MHz
- Span: 500 MHz
- Trace: Maxhold
- Sweeps: allow the trace to stabilize
- Sweeptime: 1 s
- Detector: Peak
- Measurement distance: 1 m

5.1.2 TEST REQUIREMENTS / LIMITS

§15.255 (c)
Within the 57–71 GHz band, emission levels shall not exceed the following equivalent isotropically radiated power (EIRP):

(1) Products other than fixed field disturbance sensors and short-range devices for interactive motion sensing shall comply with one of the following emission limits, as measured during the transmit interval:

(i) The average power of any emission shall not exceed 40 dBm and the peak power of any emission shall not exceed 43 dBm; or

(ii) For fixed point-to-point transmitters located outdoors, the average power of any emission shall not exceed 82 dBm, and shall be reduced by 2 dB for every dB that the antenna gain is less than 51 dBi. The peak power of any emission shall not exceed 85 dBm, and shall be reduced by 2 dB for every dB that the antenna gain is less than 51 dBi.

(A) The provisions in this paragraph (c) for reducing transmit power based on antenna gain shall not require that the power levels be reduced below the limits specified in paragraph (c)(1)(i) of this section.

(B) The provisions of § 15.204(c)(2) and (4) that permit the use of different antennas of the same type and of equal or less directional gain do not apply to intentional radiator systems operating under this provision. In lieu thereof, intentional radiator systems shall be certified using the specific antenna(s) with which the system will be marketed and operated. Compliance testing shall be performed using the highest gain and the lowest gain antennas for which certification is sought and with the intentional radiator operated at its maximum available output power level. The responsible party, as defined in § 2.909 of this chapter, shall supply a list of acceptable antennas with the application for certification.

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

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

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

§15.255 (e)
Except as specified paragraph (e)(1) of this section, the peak transmitter conducted output power shall not exceed 500 mW. Depending on the gain of the antenna, it may be necessary to operate the intentional radiator using a lower peak transmitter output power in order to comply with the EIRP limits specified in paragraph (b) of this section.

(e)(1)
Transmitters with an emission bandwidth of less than 100 MHz must limit their peak transmitter conducted output power to the product of 500 mW times their emission bandwidth divided by 100 MHz. For the purposes of this paragraph, emission bandwidth is defined as the instantaneous frequency range occupied by a steady state radiated signal with modulation, outside which the radiated power spectral density never exceeds 6 dB below the maximum radiated power spectral density in the band, as measured with a 100 kHz resolution bandwidth spectrum analyzer. The center frequency must be stationary during the measurement interval, even if not stationary during normal operation (e.g., for frequency hopping devices).

(e)(2)
Peak transmitter conducted output power shall be measured with an RF detector that has a detection bandwidth that encompasses the 57–71 GHz band and that has a video bandwidth of at least 10 MHz.

(e)(3)
For purposes of demonstrating compliance with this paragraph, corrections to the transmitter conducted output power may be made due to the antenna and circuit loss.

§15.255 (i)
Measurement procedures that have been found to be acceptable to the Commission in accordance with § 2.947 of this chapter may be used to demonstrate compliance.

RSS210 Issue 11: Annex J, J.3.2, J.3.3
J.3.2:
Following are the conditions for fixed field disturbance sensors and interactive motion sensors:

FDS devices operating in the 57-71 GHz band shall not exceed –10 dBm peak transmitter conducted output power and 10 dBm peak e.i.r.p. The following exceptions apply:

a. FDS devices that occupy a bandwidth of 500 MHz or less and where this bandwidth is contained wholly within the frequency band 61.0-61.5 GHz shall comply with the following limits: the equipment shall not exceed 40 dBm average e.i.r.p. and 43 dBm peak e.i.r.p. in the 61.0-61.5 GHz band. In addition, the average and peak e.i.r.p. of any emission outside of the band 61.0-61.5 GHz, but still within the band 57-71 GHz, shall not exceed 10 dBm average e.i.r.p. and 13 dBm peak e.i.r.p.

b. FDS devices may operate in any mode as indicated in J.3.2(b)(i) and J.3.2(b)(ii), as long as they operate in only one of these modes for at least 33 ms before switching to another mode.
(i) FDS devices operating in the 57.0-59.4 GHz band shall comply with one of the following limits, depending on the operating condition of the device:

(1) the peak e.i.r.p. shall not exceed 20 dBm for indoor usage (devices operating and situated in or designed to be used in, or carried within the interior of a building)

(2) the peak e.i.r.p. for outdoor usage (devices operating, situated in, designed to be used in, or carried in open air) shall not exceed 30 dBm

(ii) FDS devices operating in the 57.0-61.56 GHz band shall have the peak e.i.r.p. not exceeding 3 dBm or, if the sum of continuous transmitter off-times of at least 2 ms equals at least 16.5 ms within any contiguous interval of 33 ms, the peak e.i.r.p. shall not exceed 20 dBm.

(iii) FDS operating in the 57.0-64.0 GHz band shall comply with one of the following limits, depending on the operating condition of the device:

(1) the peak e.i.r.p. shall not exceed 14 dBm and the sum of continuous transmitter off-times of at least 2 ms shall equal at least 25.5 ms within any contiguous interval of 33 ms

(2) for devices employed for outdoor operation (temporary or permanently fixed application) or vehicular uses (excluding in-cabin applications and operations), the peak e.i.r.p. shall not exceed 20 dBm and the sum of continuous transmitter off-times of at least 2 ms shall equal at least 16.5 ms within any contiguous interval of 33 ms.

c. For pulsed FDS devices operating in the 57-64 GHz band that have a maximum pulse duration of 6 ns:

(i) the average e.i.r.p. shall not exceed 13 dBm and the transmit duty cycle shall not exceed 10% during any 0.3 μs time window

(ii) the average integrated e.i.r.p. within the 61.5-64.0 GHz band shall not exceed 5 dBm in any 0.3 μs time window

(iii) peak emissions shall not exceed 20 dB above the maximum permitted average emission limit applicable to the device

(iv) the bandwidth is the frequency band bounded by the points that are 10 dB below the highest radiated emission, as based on the complete transmission system including the antenna

d. For FDS devices installed on UAVs, their peak e.i.r.p. shall not exceed 20 dBm and the sum of continuous transmitter off-times of at least 2 ms shall equal at least 16.5 ms within any contiguous interval of 33 ms. See also J.2(d).

J.3.3:
Following are the conditions for devices other than FDS:

a. Except when J.3.3(b) applies, the average e.i.r.p. of any emission shall not exceed 40 dBm and the peak e.i.r.p. of any emission shall not exceed 43 dBm.

b. For fixed point-to-point equipment located outdoors:
(i) The average e.i.r.p. of any emission shall not exceed 82 dBm minus 2 dB for every dB the antenna gain is less than 51 dBi. The peak e.i.r.p. of any emission shall not exceed 85 dBm minus 2 dB for every dB the antenna gain is less than 51 dBi.

(ii) The provisions for reducing the transmit power based on the antenna gain, as per J.3.3(b)(i), shall not require that the power levels be reduced below the limits specified in J.3.3(a).

(iii) Compliance testing shall be performed using the highest gain and the lowest gain antennas with which the equipment is certified. Further, this equipment shall not be marketed and operated with antennas other than those listed in the certification application with which the equipment is certified.

c. Except as specified in J.3.3(d), the peak transmitter conducted output power shall not exceed 500 mW. Depending on the gain of the antenna, it may be necessary to operate the intentional radiator using a lower peak transmitter output power in order to comply with the e.i.r.p. limits specified in J.3.3(a) and J.3.3(b).

d. For devices with an emission bandwidth less than 100 MHz, the peak transmitter conducted output power (PTCOP) shall be less than or equal to the product of 500 mW times their emission bandwidth divided by 100 MHz. For the purpose of J.3.3(d), emission bandwidth is the instantaneous frequency range occupied by a steady radiated signal with modulation, outside which the radiated power spectral density is 6 dB below the maximum radiated power spectral density in the band, as measured with a 100 kHz resolution bandwidth. The centre frequency shall be stationary during the measurement interval, even if not stationary during normal operation (e.g. for frequency hopping devices).

5.1.3 TEST PROTOCOL

Ambient temperature: 22 °C
Air Pressure: 1004 hPa
Humidity: 32 %

Channel	Measured Peak Power E.I.R.P. [dBm]	FMCW desensitization factor [dB]	Peak Power E.I.R.P (incl. desensitization factor) [dBm]	Limit [dBm]	Margin to Limit [dB]	Verdict
1	-12.8	6.5	-6.3	43	49.3	Passed
2	-15.18	6.5	-8.68	43	51.7	Passed

Desensitization Factor:

$$\alpha = \frac{1}{\left(1+\left[\left(\frac{2\times\ln(2)}{\pi}\right)^2\times\left(\frac{BW_{\text{Chirp}}}{T_{\text{Chirp}}\times RBW^2}\right)^2\right]\right)^{0.25}}$$

$BW_{Chirp} = 230\ MHz$
$T_{Chirp} = 23.3237\ \mu s$

Channel	Average Power E.I.R.P. [dBm]	Limit [dBm]	Margin to Limit [dB]	Verdict
1	-18.27	40	58.3	Passed
2	-19.14	40	59.1	Passed

Channel	Calculated Conducted Power [mW]	Limit [mW]	Margin to Limit [mW]	Verdict
0	0.004	500	499.996	Passed
1	0.003	500	499.997	Passed

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

Comment: the conducted output power is by the radiated measurement result and the antenna gain

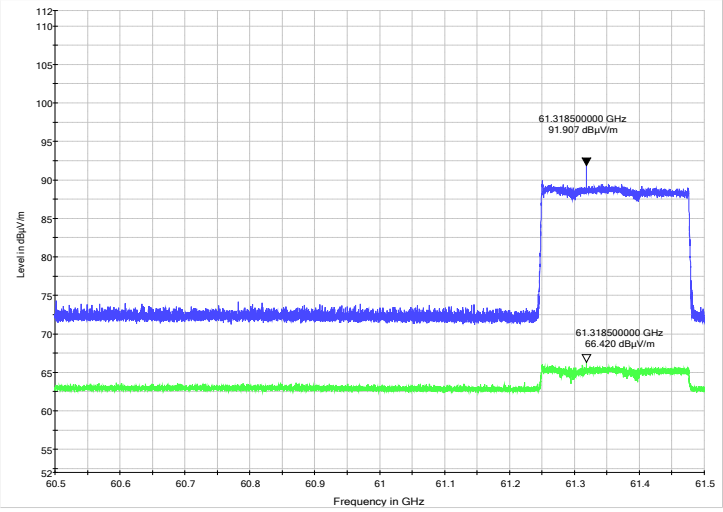
Equation from ANSI C63.10:

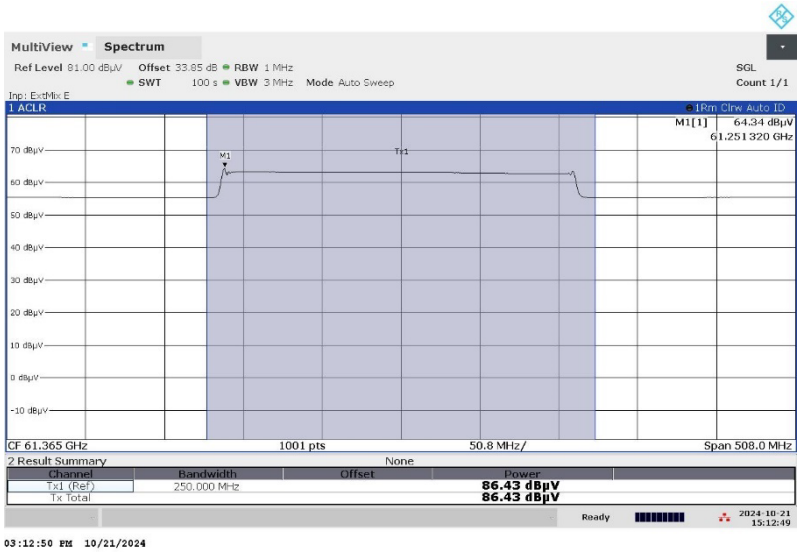
$EIRP = E_{Meas} + 20\log(d_{Meas}) - 104.7$

$d_{Meas} = 1\ m$

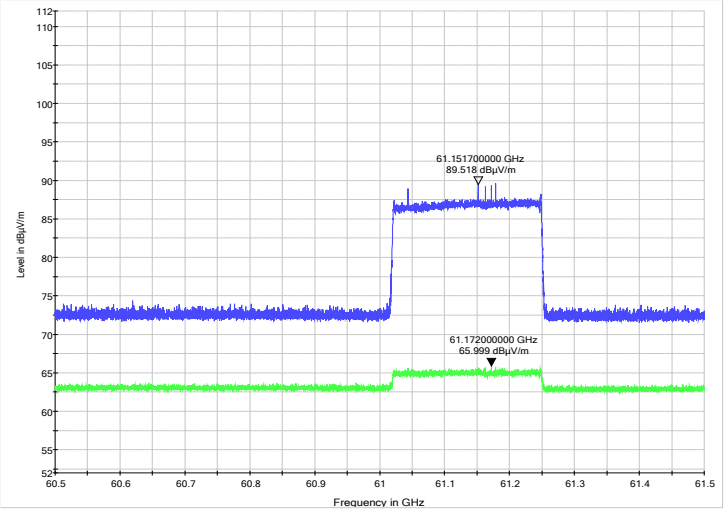
5.1.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, “WORST CASE”)

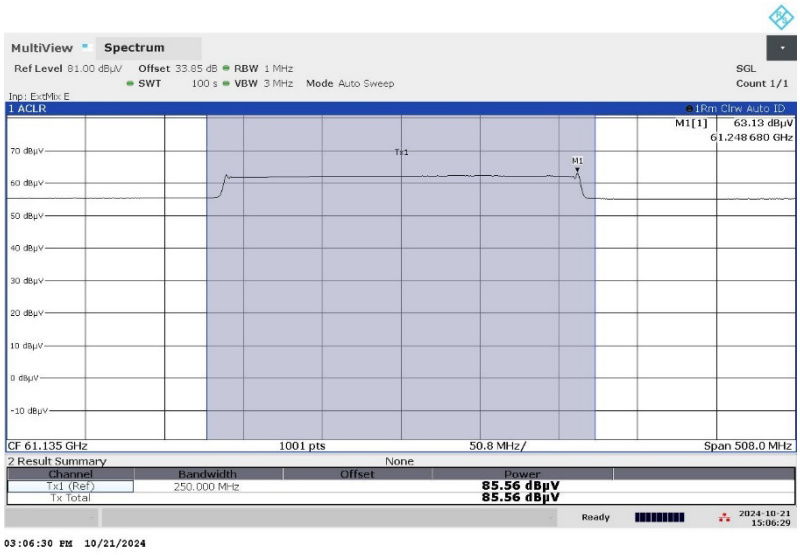
Channel 0





Channel 1





5.1.5 TEST EQUIPMENT USED

- Radiated Emissions FAR FCC

6 TEST EQUIPMENT

1.1 TEST EQUIPMENT HARDWARE

3 Radiated Emissions FAR FCC
Radiated emission tests in a fully anechoic room

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	2023-12	2025-12
1.2	Innco Systems CO3000	Controller for bore sight mast FAC	-	CO3000/1460/54740522/P	-	-
1.3	AMF-7D00101800-30-10P-R	Broadband Amplifier 100 MHz - 18 GHz	Miteq	-	-	-
1.4	Anechoic Chamber 03	FAR, 8.80m x 4.60m x 4.05m (l x w x h)	Albatross Projects	P26971-647-001-PRB	2023-05	2025-05
1.5	Fluke 177	Digital Multimeter 03 (Multimeter)	Fluke Europe B.V.	86670383	2023-08	2025-08
1.6	JS4-18002600-32-5P	Broadband Amplifier 18 GHz - 26 GHz	Miteq	849785	-	-
1.7	FSW43	Spectrum Analyzer	Rohde & Schwarz GmbH & Co. KG	103779	2023-04	2025-04
1.8	EP 1200/B, NA/B1	AC Source, Amplifier with integrated variable Oscillator	Spitzenberger & Spies GmbH & Co. KG	B6278	-	-
1.9	3160-09	Standard Gain / Pyramidal Horn Antenna 26.5 GHz	EMCO Elektronic GmbH	00083069	-	-
1.10	WHKX 7.0/18G-8SS	High Pass Filter	Wainwright Instruments GmbH	09	-	-
1.11	MA3000/0800-XP-ET-compact	Bore Sight Antenna Mast	-	-	-	-
1.12	TT 1.5 WI	Turn Table	Maturo GmbH	-	-	-
1.13	5HC3500/18000-1.2-KK	High Pass Filter	Trilithic	200035008	-	-
1.14	Opus 20 THI (8120.00)	ThermoHygro Datalogger	Lufft Mess- und Regeltechnik GmbH	115.0318.0802.033	-	-
1.15	TD1.5-10kg	EUT Tilt Device (Rohacell)	Maturo GmbH	TD1.5-10kg/024/3790709	-	-
1.16	AFS42-00101800-25-S-42	Broadband Amplifier 25 MHz - 18 GHz	Miteq	2035324	-	-
1.17	HF 906	Double-ridged horn	Rohde & Schwarz	357357/002	2022-07	2025-07

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
1.18	FS-Z60	Harmonic Mixer 40 - 60 GHz	Rohde & Schwarz Messgerätebau GmbH	100178	2023-06	2026-06
1.19	FS-Z220	Harmonic Mixer 140 - 220 GHz	Rohde & Schwarz Messgerätebau GmbH	101005	2023-05	2026-05
1.20	SGH-05	Standard Gain / Pyramidal Horn Antenna (140 - 220 GHz)	Millitech	075	-	-
1.21	SGH-19	Standard Gain / Pyramidal Horn Antenna (40 - 60 GHz)	Millitech	093	-	-
1.22	FS-Z325	Harmonic Mixer 220 - 325 GHz	Rohde & Schwarz Messgerätebau GmbH	101006	2023-06	2026-06
1.23	3160-10	Standard Gain / Pyramidal Horn Antenna 40 GHz	EMCO Elektronic GmbH	00086675	-	-
1.24	MA4985-XP-ET	Bore Sight Antenna Mast	innco systems GmbH	none	-	-
1.25	SGH-08	Standard Gain / Pyramidal Horn Antenna (90 - 140 GHz)	Millitech	064	-	-
1.26	SGH-12	Standard Gain / Pyramidal HornAntenna (60 - 90 GHz)	Millitech	326		
1.27	FS-Z140	Harmonic Mixer 90 -140 GHz	Rohde & Schwarz Messgerätebau GmbH	101007	2023-05	2026-05
1.28	SGH-03	Standard Gain / Pyramidal Horn Antenna (220 - 325 GHz)	Millitech	060		
1.29	FS-Z90	Harmonic Mixer 60 - 90 GHz	Rohde & Schwarz Messgerätebau GmbH	101686	2023-06	2026-06

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

1.2 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 Cotrolller	11.10
MATURO Mast Controller	12.10
INNCO Mast Controller	1.02.62
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.

7.7 ANTENNA SGH-19 (40 GHZ – 60 GHZ)

Frequency	AF SGH-19	Corr.		cable loss 1 (inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit)	Harmonic Mixer FS-Z60	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
40.0	39.6	3.8					19.4	-15.6	3	0.5
41.0	39.7	2.7					18.3	-15.6	3	0.5
42.0	39.8	3.3					18.9	-15.6	3	0.5
43.0	39.9	2.7					18.3	-15.6	3	0.5
44.0	40.1	4.0					19.6	-15.6	3	0.5
45.0	40.2	3.8					19.4	-15.6	3	0.5
46.0	40.3	4.0					19.6	-15.6	3	0.5
47.0	40.4	4.3					19.9	-15.6	3	0.5
48.0	40.5	3.5					19.1	-15.6	3	0.5
49.0	40.6	3.2					18.8	-15.6	3	0.5
50.0	40.8	3.6					19.2	-15.6	3	0.5
51.0	40.9	2.6					18.2	-15.6	3	0.5
52.0	41.1	1.5					17.1	-15.6	3	0.5
53.0	41.1	0.1					15.7	-15.6	3	0.5
54.0	41.3	-1.0					14.6	-15.6	3	0.5
55.0	41.4	-0.8					14.8	-15.6	3	0.5
56.0	41.5	-1.2					14.4	-15.6	3	0.5
57.0	41.6	-0.8					14.8	-15.6	3	0.5
58.0	41.8	-0.9					14.7	-15.6	3	0.5
59.0	41.9	0.0					15.6	-15.6	3	0.5
60.0	42.1	1.3					16.9	-15.6	3	0.5

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.

7.8 ANTENNA SGH-12 (60 GHZ – 90 GHZ)

Frequency	AF SGH-12	Corr.	cable loss 1 (inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit)	Harmonic Mixer FS-Z90	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
60.0	43.3	8.2				24.4	-15.6	3	0.5
61.5	43.4	7.3				23.8	-15.6	3	0.5
63.0	43.5	4.2				22.9	-15.6	3	0.5
64.5	43.6	4.2				19.8	-15.6	3	0.5
66.0	43.7	2.0				19.8	-15.6	3	0.5
67.5	43.8	3.4				17.6	-15.6	3	0.5
69.0	43.9	3.2				19.0	-15.6	3	0.5
70.5	44.0	2.4				18.8	-15.6	3	0.5
72.0	44.1	1.6				18.0	-15.6	3	0.5
73.5	44.2	1.7				17.2	-15.6	3	0.5
75.0	44.4	0.1				17.3	-15.6	3	0.5
76.5	44.5	-0.5				15.7	-15.6	3	0.5
78.0	44.6	-0.5				15.1	-15.6	3	0.5
79.5	44.7	-1.6				15.1	-15.6	3	0.5
81.0	44.8	-1.7				14.0	-15.6	3	0.5
82.5	45.0	-0.3				13.9	-15.6	3	0.5
84.0	45.1	2.2				15.3	-15.6	3	0.5
85.5	45.2	3.7				17.8	-15.6	3	0.5
87.0	45.4	5.9				19.3	-15.6	3	0.5
88.5	45.5	5.2				21.5	-15.6	3	0.5
90.0	45.6	8.2				20.8	-15.6	3	0.5

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.

7.9 ANTENNA SGH-08 (90 GHZ – 140 GHZ)

Frequency	AF SGH-19	Corr.		cable loss 1 (inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit)	Harmonic Mixer FS-Z140	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
90.0	46.9	12.2					27.8	-15.6	3	0.5
92.5	47.0	10.8					26.4	-15.6	3	0.5
95.0	47.1	9.2					24.8	-15.6	3	0.5
97.5	47.2	7.5					23.1	-15.6	3	0.5
100.0	47.3	5.8					21.4	-15.6	3	0.5
102.5	47.4	6.0					21.6	-15.6	3	0.5
105.0	47.6	7.0					22.6	-15.6	3	0.5
107.5	47.7	5.8					21.4	-15.6	3	0.5
110.0	47.8	4.7					20.3	-15.6	3	0.5
112.5	47.9	4.1					19.7	-15.6	3	0.5
115.0	48.0	6.8					22.4	-15.6	3	0.5
117.5	48.2	7.3					22.9	-15.6	3	0.5
120.0	48.3	7.5					23.1	-15.6	3	0.5
122.5	48.4	10.4					26.0	-15.6	3	0.5
125.0	48.6	13.6					29.2	-15.6	3	0.5
127.5	48.7	15.5					31.1	-15.6	3	0.5
130.0	48.9	18.1					33.7	-15.6	3	0.5
132.5	49.0	13.5					29.1	-15.6	3	0.5
135.0	49.2	14.6					30.2	-15.6	3	0.5
137.5	49.3	14.1					29.7	-15.6	3	0.5
140.0	49.4	11.5					27.1	-15.6	3	0.5

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.

7.10 ANTENNA SGH-05 (140 GHZ – 200 GHZ)

Frequency	AF SGH-19	Corr.		cable loss 1 (inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit)	Harmonic Mixer FS-Z140	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
140.0	50.8	15.1					30.7	-15.6	3	0.5
142.0	50.8	11.0					26.6	-15.6	3	0.5
144.0	50.9	11.1					26.7	-15.6	3	0.5
146.0	50.9	12.1					27.7	-15.6	3	0.5
148.0	51.0	13.1					28.7	-15.6	3	0.5
150.0	51.0	15.4					31.0	-15.6	3	0.5
152.0	51.1	15.0					30.6	-15.6	3	0.5
154.0	51.1	16.9					32.5	-15.6	3	0.5
156.0	51.2	15.1					30.7	-15.6	3	0.5
158.0	51.3	15.3					30.9	-15.6	3	0.5
160.0	51.3	14.5					30.1	-15.6	3	0.5
162.0	51.4	14.2					29.8	-15.6	3	0.5
164.0	51.4	15.4					31.0	-15.6	3	0.5
166.0	51.5	13.5					29.1	-15.6	3	0.5
168.0	51.6	14.0					29.6	-15.6	3	0.5
170.0	51.6	15.1					30.7	-15.6	3	0.5
172.0	51.7	14.3					29.9	-15.6	3	0.5
174.0	51.8	14.7					30.3	-15.6	3	0.5
176.0	51.8	14.8					30.4	-15.6	3	0.5
178.0	51.9	14.6					30.2	-15.6	3	0.5
180.0	51.9	14.9					30.5	-15.6	3	0.5
182.0	52.0	14.7					30.3	-15.6	3	0.5
184.0	52.1	15.6					31.2	-15.6	3	0.5
186.0	52.1	16.8					32.4	-15.6	3	0.5
188.0	52.2	15.2					30.8	-15.6	3	0.5
190.0	52.3	16.8					32.4	-15.6	3	0.5
192.0	52.3	16.1					31.7	-15.6	3	0.5
194.0	52.4	14.8					30.4	-15.6	3	0.5
196.0	52.5	15.1					30.7	-15.6	3	0.5
198.0	52.6	13.8					29.4	-15.6	3	0.5
200.0	52.6	13.7					29.3	-15.6	3	0.5
202.0	52.7	14.0					29.6	-15.6	3	0.5
204.0	52.8	13.7					29.3	-15.6	3	0.5
206.0	52.8	13.4					29.0	-15.6	3	0.5
208.0	52.9	13.4					29.0	-15.6	3	0.5
210.0	53.0	13.9					29.5	-15.6	3	0.5
212.0	53.1	12.9					28.5	-15.6	3	0.5
214.0	53.2	13.1					28.7	-15.6	3	0.5
216.0	53.2	13.5					29.1	-15.6	3	0.5
218.0	53.3	14.5					30.1	-15.6	3	0.5
220.0	53.4	14.0					29.6	-15.6	3	0.5

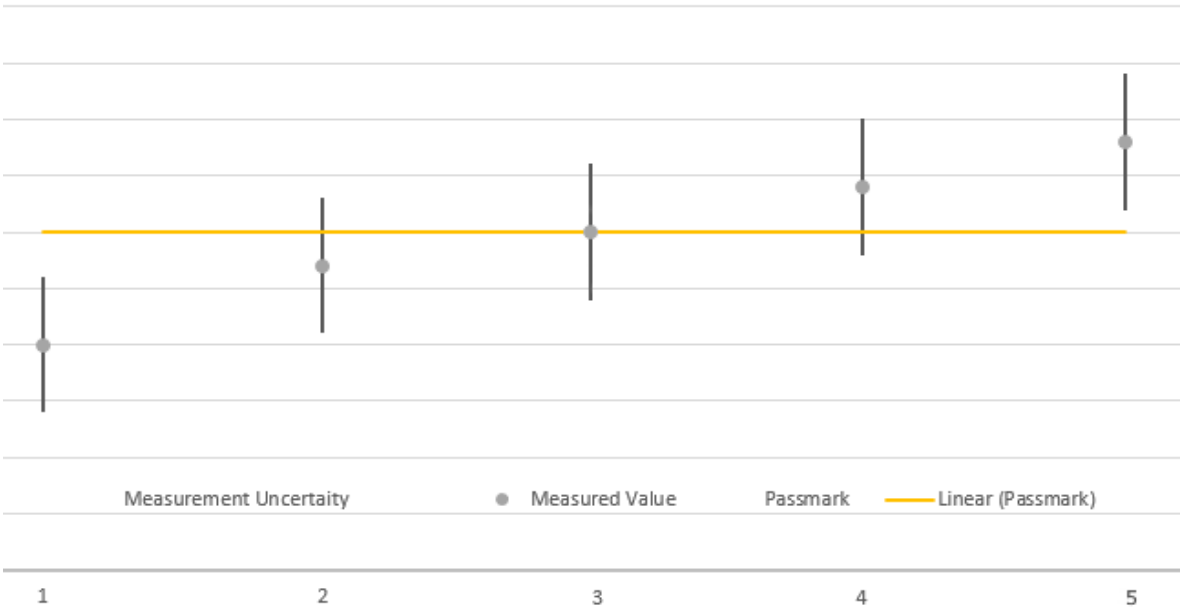
Sample calculation

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	Maximum expanded Measurement uncertainty
Radio frequency	Frequency	± 1 x 10^{-7}
AC Power Line	Power	± 3.4 dB
Field Strength of spurious radiation (up to 40 GHz)	Power	± 5.5 dB
Field Strength of spurious radiation (40 to 66 GHz)	Power	± 8 dB
Field Strength of spurious radiation (66 to 100 GHz)	Power	± 10 dB
Field Strength of spurious radiation (above 100 GHz)	Power	± 10 dB
Temperature	Temperature	± 1 °C
Humidity	Humidity	± 5 %
DC and low voltages	Voltage	± 3 %

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.

**********END OF REPORT**********