Test Report acc. to FCC Title 47 CFR Part 15
relating to
s.m.s, smart microwaves sensors GmbH
COM HUB PLC System

Title 47 - Telecommunication
Part 15 - Radio Frequency Devices
Subpart B – Unintentional Radiators
Measurement Procedure:
ANSI C63.4-2014

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MANUFACTURER	
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TESTING LABORATORY	
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RELEVANT STANDARD	
Title	**47 - Telecommunication**
Part	**15 - Radio Frequency Devices**
Subpart	**Subpart B – Unintentional Radiators**
Measurement procedure	ANSI C63.4-2014

EQUIPMENT UNDER TEST (EUT)	
Equipment category	Class B digital device
Trade name	smartmicro
Type designation	**COM HUB PLC System**
Serial no.	---
Variants	---

Test results

Clause	Requirements headline	Test result		
8.1	Conducted limits	**Pass**	~~Fail~~	~~N.t.~~*
8.2	Radiated emission limits	**Pass**	~~Fail~~	~~N.t.~~*

* Not tested

As far as in this report statements on conformity are made, decision rules according to DIN EN ISO/IEC 17025:2018, 7.8.6 have been applied. For more information see clause 10.1.

The equipment passed all the conducted tests	**Yes**	~~No~~

Signature	Digital unterschrieben von Trepper Ralf Datum: 2022.12.22 13:13:55 +01'00'	Digital unterschrieben von Raschka Denis Datum: 2022.12.22 13:29:59 +01'00'
Name	**Mr. Ralf Trepper**	**Mr. Denis Raschka**
Designation	**RF Test engineer**	**Quality-Manager**
Date of issue	**2022-12-20**	**2022-12-20**

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1. Table of contents

Revision	Date of issue	Creator	Content of change
00	2022-12-20	DR	Initial release
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Table 1-1: Table of contents

TÜV NORD Hochfrequenztechnik GmbH & Co. KG
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2. Introduction

This test report **is not an expert opinion** and consists of:

- Test result summary
- List of contents
- Introduction and further information
- Performance assessment
- Detailed test information

All pages have been numbered consecutively and bear the TÜV NORD Hochfrequenztechnik GmbH & Co. KG logo, the test report number, the date, the test specification in its current version as well as the type designation of the EUT. The total number of pages in this report is **34**.

The tests were carried out at:

- TÜV NORD Hochfrequenztechnik GmbH & Co. KG, D-51069 Köln

in a representative assembly and in accordance with the test methods and/or requirements stated in:

FCC Title 47 CFR Part 15 Subpart B & ANSI C63.4-2014

The sample of the product was received on:

- 2022-11-14

The tests were carried out in the following period of time:

- 2022-11-29 – 2022-12-15

3. Testing laboratory

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- FCC Registration Number: **763407**

Accredited by:

DAkkS Deutsche Akkreditierungsstelle GmbH
DAkkS accreditation number: D-PL-12053-01-00

4. Applicant

Company name	: s.m.s, smart microwave sensors GmbH
Address	: In den Waashainen 1 38108 Braunschweig
Country	: Germany
Telephone	: +49 531 39023 0
Fax	: +49 531 39023 599
Email	: ralph.mende@smartmicro.de
Date of order	: 2022-09-20
References	: Mr. Dr. Ralph Mende

5. Product and product documentation

Samples of the following apparatus were submitted for testing:

Manufacturer	: s.m.s, smart microwave sensors GmbH
Trademark	: smartmicro
Type designation	: COM HUB PLC System
Hardware version	: COM HUB PLC Module / J-Box PLC
Serial number	: ---
Software release	: COM HUB PLC Module V.7 / J-Box PLC V.1
Type of equipment	: Low Power Communication Device
EUT power used	: 48 V DC
Highest internal frequency generated or used in the device	: 20 MHz, 27 MHz and 31.25 MHz

For issuing this report the following product documentation was used:

Title	Description	Version
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6. Conclusions, observations and comments

The test report will be filed at TÜV NORD Hochfrequenztechnik GmbH & Co. KG for a period of 10 years following the issue of this report. It may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of TÜV NORD Hochfrequenztechnik GmbH & Co. KG.

The results of the tests as stated in this report are exclusively applicable to the EUT as identified in this report. TÜV NORD Hochfrequenztechnik GmbH & Co. KG cannot be held liable for properties of the EUT that have not been observed during these tests.

TÜV NORD Hochfrequenztechnik GmbH & Co. KG assumes the sample to comply with the requirements of FCC Title 47 CFR Part 15 for the respective test sector, if the test results turn out positive.

Comments: ---

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7. Operational description

7.1 EUT details

The smartmicro COM HUB is a high performance edge computer connected to an interface panel to enable the connection to and time synchronization of up to 6 smartmicro sensors via Ethernet or HD-PLC (High-definition Power Line Communication) communication interface or up to 4 smartmicro sensors via RS485 interface.

7.2 EUT configuration

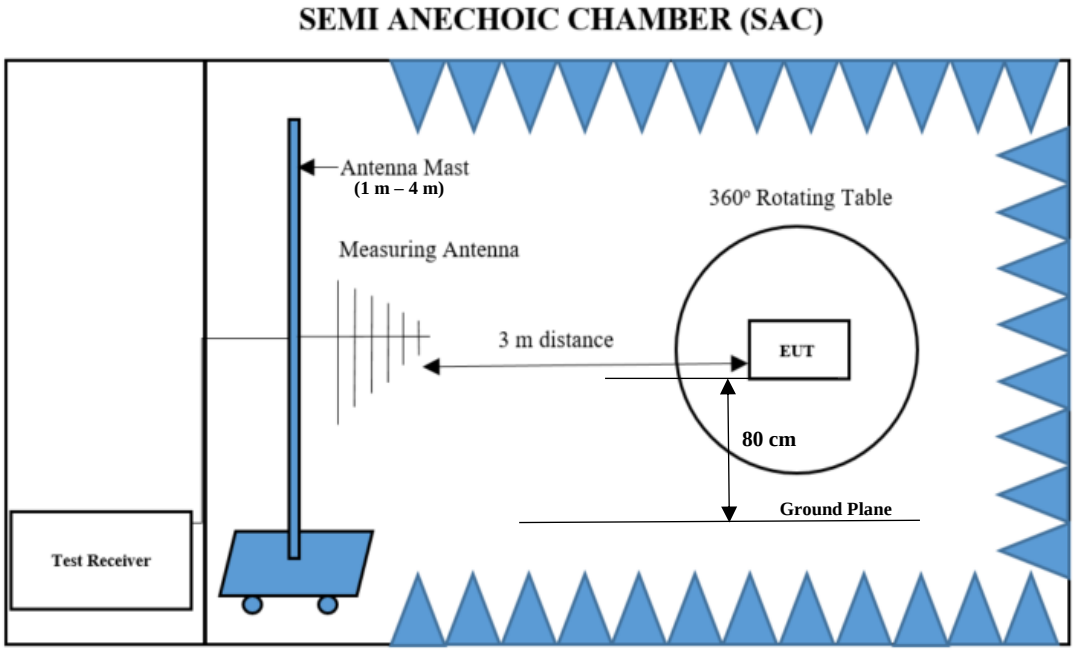
The COM HUB PLC System is the test object. The EUT consist of the COM HUB PLC and the PLC J-Box System. Both Systems are fully installed in two metal cases and are connected via a PLC cable. The EUT starts to function when connected to the power supply of 48 V DC.

7.3 EUT measurement description

Radiated measurements

The EUT was tested in a typical fashion. During preliminary emission tests the EUT was operated in the continuous measuring mode for worst case emission mode investigation. Therefore, the final qualification testing was completed with the EUT operated in continuous measuring mode. All tests were performed with the EUT's typical voltage: 48 V DC.

In order to establish the maximum radiation, firstly, there have been viewed all orthogonal adjustments of the test samples, secondly the test sample have been rotated at all adjustments around the own axis between 0° and 360°, and thirdly, the antenna polarization had been varied between horizontal and vertical.



Conducted measurements

The EUT was directly connected to the artificial mains network. It has been tested with activated EUT in continuous measuring mode.

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8. Compliance assessment

8.1 Conducted limits

8.1.1 Regulation

(a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Conducted Limits		
Frequency of Emission	**Quasi-Peak (QP)**	**Average (AV)**
[MHz]	**[dBµV]**	**[dBµV]**
0.15 - 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 -30	60	50
*Decreases with the logarithm of the frequency		

(b) For a Class A digital device that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms LISN. Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Conducted Limits		
Frequency of Emission	**Quasi-Peak (QP)**	**Average (AV)**
[MHz]	**[dBµV]**	**[dBµV]**
0.15 - 0.5	79	66
5 -30	73	60

(c) The limits shown in paragraphs (a) and (b) of this section shall not apply to carrier current systems operating as unintentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

(1) For carrier current systems containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions

(2) For all other carrier current systems: 1000 μV within the frequency band 535-1705 kHz, as measured using a 50 μH/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in §15.109(e).

(d) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for

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operation while connected to the AC power lines. Devices that include, or make provision for, the use of battery chargers which permit operating while charging, AC adaptors or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

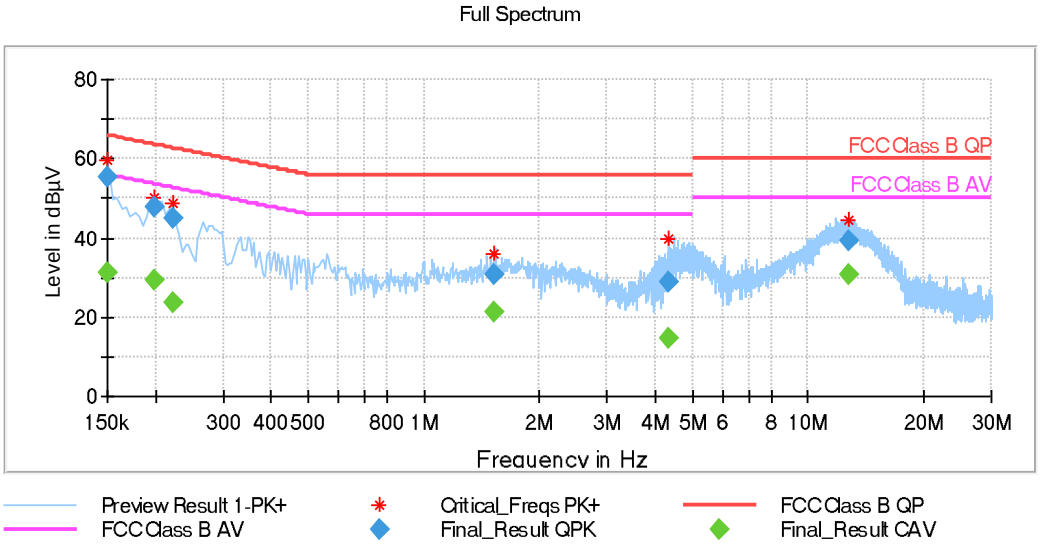
8.1.2 Test procedure

The EUT and the additional equipment (if required) are connected to the main power through a line impedance stabilization network (LISN). The LISN must be appropriate to ANSI C63.4-2014. Additional equipment must also be connected to a second LISN with the same specifications as described above (if required).

Environmental conditions	Temperature [°C]	Air pressure [hPa]	Rel. humidity [%]
	22	999	32

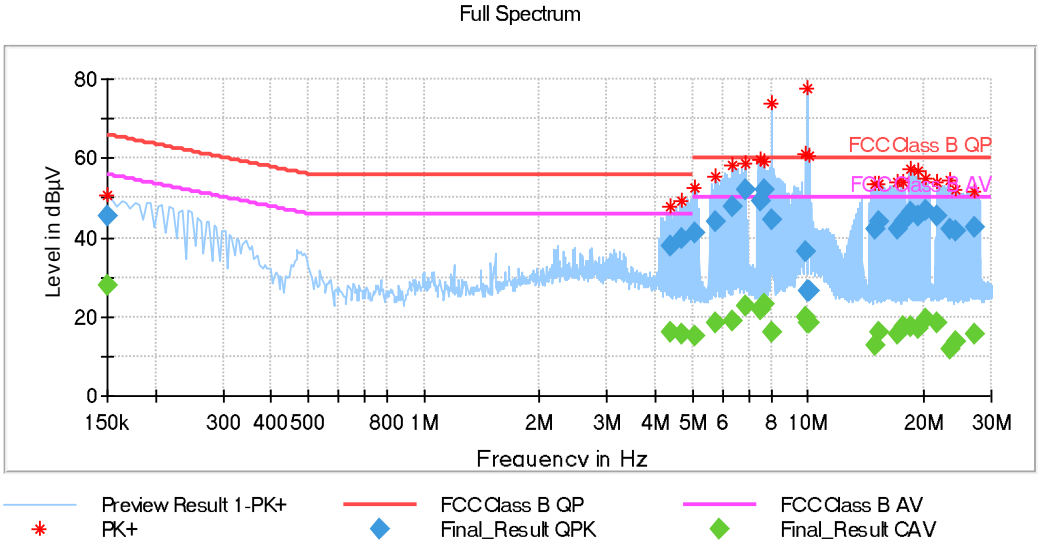
8.1.3 Result

Conducted emissions (Section 15.107) – Reference measurement: laptop only



Frequency [MHz]	**QuasiPeak [dBµV]**	**CAverage [dBµV]**	**Limit [dBµV]**	**Margin [dB]**	**Meas. Time [ms]**	**Bandwidth [kHz]**	**Line**
0.150000	55.58	---	66.00	**10.42**	1000.0	9.000	N
0.150000	---	31.32	56.00	**24.68**	1000.0	9.000	N
0.199500	47.69	---	63.63	**15.94**	1000.0	9.000	N
0.199500	---	29.20	53.63	**24.43**	1000.0	9.000	N
0.222000	44.85	---	62.74	**17.89**	1000.0	9.000	N
0.222000	---	23.46	52.74	**29.28**	1000.0	9.000	N
1.527000	30.74	---	56.00	**25.26**	1000.0	9.000	N
1.527000	---	21.40	46.00	**24.60**	1000.0	9.000	N
4.321500	---	14.83	46.00	**31.17**	1000.0	9.000	L1
4.321500	29.01	---	56.00	**26.99**	1000.0	9.000	L1
12.714000	---	30.90	50.00	**19.10**	1000.0	9.000	L1
12.714000	39.31	---	60.00	**20.69**	1000.0	9.000	L1

Conducted emissions (Section 15.107) – Test result with active EUT – Ethernet Port



Frequency [MHz]	QuasiPeak [dBµV]	CAverage [dBµV]	Limit [dBµV]	Margin [dB]	Meas. Time [ms]	Bandwidth [kHz]	Line
0.150000	45.59	---	66.00	**20.41**	1000.0	9.000	N
0.150000	---	28.13	56.00	**27.87**	1000.0	9.000	N
4.407000	37.70	---	56.00	**18.30**	1000.0	9.000	N
4.407000	---	15.88	46.00	**30.12**	1000.0	9.000	N
4.708500	---	15.39	46.00	**30.61**	1000.0	9.000	L1
4.708500	39.75	---	56.00	**16.25**	1000.0	9.000	L1
5.064000	41.16	---	60.00	**18.84**	1000.0	9.000	N
5.064000	---	15.06	50.00	**34.94**	1000.0	9.000	N
5.748000	---	18.51	50.00	**31.49**	1000.0	9.000	L1
5.748000	44.12	---	60.00	**15.88**	1000.0	9.000	L1
6.360000	---	18.94	50.00	**31.06**	1000.0	9.000	N
6.360000	47.58	---	60.00	**12.42**	1000.0	9.000	N
6.837000	52.28	---	60.00	**7.73**	1000.0	9.000	N
6.837000	---	22.65	50.00	**27.35**	1000.0	9.000	N
7.561500	---	21.87	50.00	**28.13**	1000.0	9.000	L1
7.561500	49.21	---	60.00	**10.79**	1000.0	9.000	L1
7.696500	---	23.25	50.00	**26.75**	1000.0	9.000	L1
7.696500	51.90	---	60.00	**8.10**	1000.0	9.000	L1
8.029500	44.39	---	60.00	**15.61**	1000.0	9.000	N
8.029500	---	15.93	50.00	**34.07**	1000.0	9.000	N
9.870000	---	19.97	50.00	**30.03**	1000.0	9.000	L1
9.870000	36.22	---	60.00	**23.78**	1000.0	9.000	L1
9.991500	26.55	---	60.00	**33.45**	1000.0	9.000	L1
9.991500	---	18.66	50.00	**31.34**	1000.0	9.000	L1
10.036500	---	18.67	50.00	**31.33**	1000.0	9.000	L1
10.036500	26.37	---	60.00	**33.63**	1000.0	9.000	L1

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14.923500	---	12.66	50.00	**37.34**	1000.0	9.000	L1
14.923500	42.12	---	60.00	**17.88**	1000.0	9.000	L1
15.252000	44.17	---	60.00	**15.83**	1000.0	9.000	L1
15.252000	---	16.25	50.00	**33.75**	1000.0	9.000	L1
17.038500	41.99	---	60.00	**18.01**	1000.0	9.000	N
17.038500	---	15.61	50.00	**34.39**	1000.0	9.000	N
17.700000	43.91	---	60.00	**16.09**	1000.0	9.000	N
17.700000	---	17.48	50.00	**32.52**	1000.0	9.000	N
18.555000	---	17.64	50.00	**32.36**	1000.0	9.000	L1
18.555000	46.46	---	60.00	**13.54**	1000.0	9.000	L1
19.288500	---	16.94	50.00	**33.06**	1000.0	9.000	L1
19.288500	45.56	---	60.00	**14.44**	1000.0	9.000	L1
20.143500	---	19.20	50.00	**30.80**	1000.0	9.000	L1
20.143500	46.63	---	60.00	**13.37**	1000.0	9.000	L1
21.601500	---	18.28	50.00	**31.72**	1000.0	9.000	L1
21.601500	45.45	---	60.00	**14.55**	1000.0	9.000	L1
23.388000	---	12.05	50.00	**37.95**	1000.0	9.000	N
23.388000	41.95	---	60.00	**18.05**	1000.0	9.000	N
24.355500	---	13.91	50.00	**36.09**	1000.0	9.000	N
24.355500	41.86	---	60.00	**18.14**	1000.0	9.000	N
27.222000	---	15.81	50.00	**34.19**	1000.0	9.000	N
27.222000	42.40	---	60.00	**17.60**	1000.0	9.000	N

Test Cables used	KISN2
Test equipment used	665, 60, 272, 551, 606a/b/c

The equipment passed the conducted tests	**Yes**	~~No~~	~~N.t.~~ [8]

Test setup photos / test results are attached	**Yes**	~~No~~	Page no.:33

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8.2 Radiated emission limits

8.2.1 Regulation

(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Radiated emission from unintentional radiator*- limits @ 3 m		
Frequency of emission	**Field strength**	
[MHz]	**[µV / m]**	**[dBµV / m]**
30 - 88	100	40.0
88 - 216	150	43.5
216 -960	200	46.0
Above 960	500	54.0
* Except for Class A digital device		

(b) The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the following:

Radiated emission from unintentional radiator*- limits @ 10 m		
Frequency of emission	**Field strength**	
[MHz]	**[µV / m]**	**[dBµV / m]**
30 - 88	90	39.1
88 - 216	150	43.5
216 -960	210	46.4
Above 960	300	49.5
* For Class A digital device		

(c) In the emission tables above, the tighter limit applies at the band edges. Sections 15.33 and 15.35 which specify the frequency range over which radiated emissions are to be measured and the detector functions and other measurement standards apply.

(d) For CB receivers, the field strength of radiated emissions within the frequency range of 25-30 MHz shall not exceed 40 microvolts/meter at a distance of 3 meters. The field strength of radiated emissions above 30 MHz from such devices shall comply with the limits in paragraph (a) of this section.

(e) Carrier current systems used as unintentional radiators or other unintentional radiators that are designed to conduct their radio frequency emissions via connecting wires or cables and that operate in the frequency range of 9 kHz to 30 MHz, including devices that deliver the radio frequency energy to transducers, such as ultrasonic devices not covered under part 18 of this chapter, shall comply with the radiated emission limits for intentional radiators provided in §15.209 for the frequency range of 9 kHz to 30 MHz. As an alternative, carrier current systems used as unintentional radiators and operating in the frequency range of 525 kHz to 1705 kHz may comply with the radiated emission limits provided in §15.221(a). At frequencies above 30 MHz, the limits in paragraph (a), (b), or (g) of this section, as appropriate, apply.

(f) For a receiver which employs terminals for the connection of an external receiving antenna, the receiver shall be tested to demonstrate compliance with the provisions of this section with an antenna connected to the antenna terminals unless the antenna conducted power is measured as specified in §15.111(a). If a permanently attached receiving antenna is used, the receiver shall be tested to demonstrate compliance with the provisions of this section.

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(g) As an alternative to the radiated emission limits shown in paragraphs (a) and (b) of this section, digital devices may be shown to comply with the standards contained in Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22, "Information Technology Equipment-Radio Disturbance Characteristics-Limits and Methods of Measurement" (incorporated by reference, see §15.38). In addition:

(1) The test procedure and other requirements specified in this part shall continue to apply to digital devices.

(2) If, in accordance with §15.33 of this part, measurements must be performed above 1000 MHz, compliance above 1000 MHz shall be demonstrated with the emission limit in paragraph (a) or (b) of this section, as appropriate. Measurements above 1000 MHz may be performed at the distance specified in the CISPR 22 publications for measurements below 1000 MHz, provided that the limits in paragraphs (a) and (b) of this section are extrapolated to the new measurement distance using an inverse linear distance extrapolation factor (20 dB/decade), e.g., the radiated limit above 1000 MHz for a Class B digital device is 150 uV/m, as measured at a distance of 10 meters.

(3) The measurement distances shown in CISPR Pub. 22, including measurements made in accordance with this paragraph above 1000 MHz, are considered, for the purpose of §15.31(f)(4) of this part, to be the measurement distances specified in this part.

(h) Radar detectors shall comply with the emission limits in paragraph (a) of this section over the frequency range of 11.7-12.2 GHz.

8.2.2 Test procedure

The EUT and this peripheral (when additional equipment exists) are placed on a turn table which is 0.8 m above the ground. The turn table would be allowed to rotate 360° to determine the position of the maximum emission level. The test distance between the EUT and the receiving antenna are 3m. To find the maximum emission, the polarization of the receiving antenna is changed in horizontal and vertical polarization; the position of the EUT was changed in different orthogonal determinations.

ANSI C63.4-2014 Section 8 "Radiated Emissions Testing"

Measurement procedures for electric field radiated emissions from 9 kHz - 1 GHz & 1 GHz - 40 GHz are covered in Clause 8 of ANSI C63.4-2014. The ANSI C63.4-2014 measurement procedure consists of both an exploratory test and a final measurement. The exploratory test is critical to determine the frequency of all significant emissions. For each mode of operation required to be tested, the frequency spectrum is monitored. Variations in antenna height, antenna orientation, antenna polarization, EUT azimuth, and cable or wire placement is explored to produce the emission that has the highest amplitude relative to the limit.

The final measurements are made based on the findings in the exploratory testing. When making exploratory and final measurements it is necessary to maximize the measured radiated emission. Sub clause 8.3.2 of ANSI C63.4-2014 states that the measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." We consider the "cone of radiation" to be the 3 dB beam width of the measurement antenna.

While the "bore-sighting" technique is not explicitly mentioned in ANSI C63.4-2014, it is a useful technique for measurements using a directional antenna, such as a double-ridged waveguide antenna. Several precautions must be observed, including: knowledge of the beam width of the antenna and the resulting illumination area relative to the size of the EUT, estimation for source of the emission and general location within larger EUTs, measuring system sensitivity, etc.

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ANSI C63.4-2014 requires that the measurement antenna is kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. That means that if the directional radiation pattern of the EUT results in a maximum emission at an upwards angle from the EUT, when a directional antenna is used to make the measurement it will be necessary for it to be pointed towards the source of the emission within the EUT. This can be done by either pointing the antenna at an angle towards the source of the emission, or by rotating the EUT, in both height and polarization, to maximize the measured emission. The emission must be kept within the illumination area of the 3 dB beamwidth of the antenna so that the maximum emission from the EUT is measured.

Radiated emissions test characteristics	
Frequency range	9 kHz – Above 960 MHz
Test distance	3 m*
Test instrumentation minimum resolution bandwidth	9 kHz (Below 30 MHz)
	120 kHz (30 MHz - 1,000 MHz)
	1 MHz (Above 1000 MHz)
Detector Type	Quasi peak and Average based on frequency range
Receive antenna scan height	1 m - 4 m
Receive antenna polarization	Vertical/horizontal

* According to Section 15.31 (f) (1): At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

8.2.3 Calculation of the field strength

The field strength is calculated by the following calculation:

Corrected Level = Receiver Level + Correction Factor (without the use of a pre-amplifier)

Corrected Level = Receiver Level + Correction Factor – Pre-amplifier (with the use of a pre-amplifier)

Receiver Level : Receiver reading without correction factors
Correction Factor : Antenna factor + cable loss

For example:
The receiver reading is 32.7 dBµV. The antenna factor for the measured frequency is +2.5 dB (1/m) and the cable factor for the measured frequency is 0.71 dB, giving a field strength of 35.91 dBµV/m.
The 35.91 dBµV/m value can be mathematically converted to its corresponding level in µV/m.

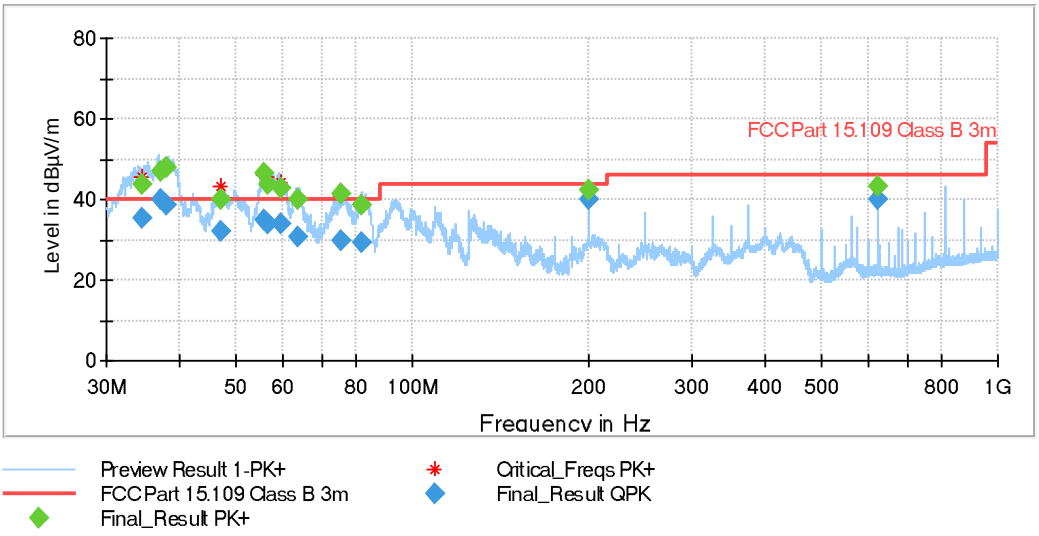
Level in µV/m = Common Antilogarithm (35.91/20) = 62.44

For test distance other than what is specified, but fulfilling the requirements of Section 15.31 (f) (1) the field strength is calculated by adding additionally an extrapolation factor of 20 dB/decade (inverse linear distance for field strength measurements).

8.2.4 Result

Environmental conditions	Temperature [°C]	Air pressure [hPa]	Rel. humidity [%]
	21	1008	37

Radiated emissions (Section 15.109)



Frequency [MHz]	**QuasiPeak [dBµV/m]**	**MaxPeak [dBµV/m]**	**Limit [dBµV/m]**	**Margin [dB]**	**Meas. Time [ms]**	**Bandwidth [kHz]**	**Height [cm]**	**Pol**
34.520000	---	43.90	---	---	1000.0	120.000	100.0	V
34.520000	35.54	---	40.00	**4.46**	1000.0	120.000	100.0	V
37.140000	---	47.08	---	---	1000.0	120.000	100.0	V
37.140000	39.77	---	40.00	**0.23**	1000.0	120.000	100.0	V
37.940000	---	48.12	---	---	1000.0	120.000	104.0	V
37.940000	38.59	---	40.00	**1.41**	1000.0	120.000	104.0	V
47.110000	---	39.87	---	---	1000.0	120.000	100.0	V
47.110000	32.22	---	40.00	**7.78**	1000.0	120.000	100.0	V
55.650000	34.95	---	40.00	**5.05**	1000.0	120.000	130.0	V
55.650000	---	46.41	---	---	1000.0	120.000	130.0	V
56.520000	---	43.56	---	---	1000.0	120.000	100.0	V
56.520000	34.13	---	40.00	**5.87**	1000.0	120.000	100.0	V
59.580000	---	43.01	---	---	1000.0	120.000	100.0	V
59.580000	33.91	---	40.00	**6.09**	1000.0	120.000	100.0	V
63.930000	---	39.84	---	---	1000.0	120.000	130.0	V
63.930000	30.55	---	40.00	**9.45**	1000.0	120.000	130.0	V
75.570000	---	41.38	---	---	1000.0	120.000	100.0	V
75.570000	29.94	---	40.00	**10.06**	1000.0	120.000	100.0	V
82.170000	---	38.57	---	---	1000.0	120.000	154.0	V
82.170000	29.20	---	40.00	**10.80**	1000.0	120.000	154.0	V

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200.010000	39.86	---	43.50	**3.64**	1000.0	120.000	152.0	H
200.010000	---	42.46	---	---	1000.0	120.000	152.0	H
624.990000	---	43.32	---	---	1000.0	120.000	100.0	V
624.990000	39.92	---	46.00	**6.08**	1000.0	120.000	100.0	V

Test Cables used	K189, K193, K195
Test equipment used	406, 660, 665, 667, 668, 669

The equipment passed the conducted tests	**Yes**	~~No~~	~~N.t.~~ [a]

Test setup photos / test results are attached	**Yes**	~~No~~	Page no.:34

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9. Additional information to the test report

Remark	Description
N.t.[1]	Not tested, because not applicable to the EUT.
N.t.[2]	Not tested, because not ordered.

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10. Measurement Uncertainty

The total uncertainty of measurement is the result of the mathematically-statistically distribution of the individual measurement uncertainty (MU) of the used measurement equipment. It is supposed that all individual deviations accidentally but not inevitable normally distributed. The total deviation is supposed to be normally distributed (RSS=Root-Sum-of-the-Squares deviation corresponds to a measurement uncertainty which will be not exceeded with a probability of 68 %). Measurement uncertainty Δ, which will be not exceeded with a probability of 95 %, is 2 x RSS. For the following measurements and tests are the values as from the laboratory given:

Measurement /Test	Frequency range	Value of expanded MU	State
Conducted emission disturbing voltage (LISN)	9 kHz – 150 kHz	± 3.70 dB	Feb. 02.2021
	150 kHz – 30 MHz	± 3.31 dB	Feb. 02.2021
Radiated emission (3 m SAC)	150 kHz – 30 MHz	± 3.34 dB	Feb. 02.2021
	30 MHz - 1 GHz	± 4.18 dB	
	1 GHz – 6 GHz	± 4.79 dB	

Table 10-1: Uncertainty of measurement

10.1 Decision rule

As far as in this report statements on conformity are made, decision rules according to DIN EN ISO/IEC 17025:2018, 7.8.6 have been applied. If the report does not state otherwise, procedure 1 according to IEC Guide 115 ed.2.0 2021 (uncertainty of measurement calculated) has been applied on measurement and test procedures which are the base of this report.

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11. List of test equipment

State Dec. 20, 2022					
Marking	**Manufacturer**	**SW/Type/Serial-No.**	**Last Cal./Val.**	**Next Cal./Val.**	**No.**
1 Measuring Instruments					
Attenuator	Radiall	---	*Nov 19*	*Nov 22*	*62*
Attenuator 3dB	Suhner	6803/17	*Nov 19*	*Nov 22*	*137*
Attenuator 3dB / 18 GHz	Suhner	3dB/18GHz	*Nov 19*	*Nov 22*	*299*
Terminator	Texcan	---	*Nov 19*	*Nov 22*	*304*
Attenuator 6dB / 18 GHz	Suhner	6dB/18GHz	*Nov 19*	*Nov 22*	*344*
Attenuator 20dB / 20GHz	Parzich	40AH-20	*Nov 19*	*Nov 22*	*354*
Terminator	KDI	T173CS	*Nov 19*	*Nov 22*	*490*
Variable transformer	RFT	LS 002	---	---	*154a*
Variable transformer	Schunt+Ben	---	---	---	*155*
Power sensor	Marconi	6914	*Dec 22*	*Dec 24*	*258*
Power sensor	Rohde & Schwarz	NRP18SN	*Feb 22*	*Feb 24*	*651*
3-Path Diode Power Sensor 10 MHz to 8 GHz	Rohde & Schwarz	NRP8S	*Dec 22*	*Dec 24*	*663*
3-Path Diode Power Sensor 10 MHz to 18 GHz	Rohde & Schwarz	NRP18S-20	*Dec 22*	*Dec 24*	*664*
Diode Power Sensor 100 kHz – 6 GHz	Rohde & Schwarz	NRV-Z5 S/N: 829562/008	*Nov 22*	*Nov 24*	*390*
Coaxial Directional Coupler	Narda	3003-20	*Jan 21*	*Jan 24*	*370/342*
Coaxial directional coupler	Mini Circuits	ZFDC-20-5	*Mai 22*	*Mai 24*	*434*
Coaxial directional coupler	Narda+Suhner	4246B-20	*Sep 22*	*Sep 25*	*472/492*
Coaxial directional coupler	Narda	3045C-10	*Sep 22*	*Sep 25*	*110a*
Coaxial directional coupler	Narda	3044B-10	*Sep 22*	*Sep 25*	*21a*
Coaxial directional coupler	Narda	3044B-30	*Sep 22*	*Sep 25*	*327*
Coaxial directional coupler	Narda	3022 / 50204	*Sep 22*	*Sep 25*	*303*
Coaxial High Pass Filter	Mini circuits	NHP-700	*Apr 21*	*Apr 24*	*435*
Coaxial High Pass Filter	Mini circuits	NHP-200	*Apr 21*	*Apr 24*	*405*
Coaxial High Pass Filter	Mini circuits	NHP-25+	*Apr 21*	*Apr 24*	*455*
High Pass Filter	Mini circuits	VHF-3500+	*Sep 22*	*Sep 25*	*451*
High Pass Filter	Mini circuits	VHF-1200+	*Apr 21*	*Apr 24*	*452*
Bandpass Filter	Schomandl	BN86871	*Nov 21*	*Nov 24*	*66*
Bandpass Filter	Schomandl	BN68673	*Nov 21*	*Nov 24*	*67*
Low Pass Filter	Mini circuits	SLP550	*Apr 21*	*Apr 24*	*273*
Low Pass Filter	Mini circuits	SLP550	*Apr 21*	*Apr 24*	*274*
RF Current Probe 9 kHz – 30 MHz	Rohde & Schwarz	ESH2-Z1	*Aug 21*	*Aug 24*	*42*
Passive Test Probe – 9 kHz – 30 MHz	TÜV NORD	VDE 0876	*Apr 21*	*Apr 24*	*45*
Coaxial Fixed Attenuator DC – 1 GHz	Texscan	HFP50/10	*Jul 20*	*Jul 23*	*60*
8 Wire Impedance Stabilisation Network	Schwarzbeck	CAT5 8158	*Nov 21*	*Nov 23*	*71a*
T-Section - 50 W	Rohde & Schwarz	BN 42441/50	*Nov 21*	*Nov 24*	*93*
RF Current Injection Clamp 0.15 – 1GHz	Lüthi GmbH	EM 101	*Nov 19*	*Nov 22*	*156*
Absorbing Clamp MDS 30MHz – 1GHz	Lüthi GmbH	MDS-21	*Nov 19*	*Nov 22*	*160*
Insertion Unit	Rohde & Schwarz	URV5-Z4	*Jul 22*	*Jul 24*	*162*
Coaxial RF Termination - 0 – 1000 MHz	Telewave Inc.	TWL 35	*Nov 21*	*Nov 24*	*164*
Coaxial RF Termination - 0 – 1000 MHz	Telewave Inc.	TWL 60	*Nov 21*	*Nov 24*	*165*
Fixed Attenuator - DC – 1.5GHz	Bird	Mod/ 8343-060	*Apr. 20*	*Apr. 23*	*177*
Rotary Step Attenuator DC – 2 GHz	Texscan	TA – 50	*Mar20*	*Mar 23*	*184*
CDN up to 230 MHz	MEB	KEN-M 2 /M 3	*Oct 22*	*Oct 24*	*262*
CDN up to 230 MHz	MEB	KEN-M 2 /M 3	*Dec 21*	*Dec 23*	*264*
Impulse limiter 10 dB	Rohde & Schwarz	ESH3 Z2	*Jun 22*	*Jun 24*	*272*
Fixed Attenuator - DC – 18 GHz | 30 dB	MTS	---	*Nov 20*	*Nov 23*	*275*
Fixed Attenuator - DC – 18 GHz | 30 dB	MTS	---	*Mai 22*	*Mai 24*	*276*

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Passive Probe - 9 kHz – 30 MHz | 2.5 kΩ	RFT	TK 121	*Jun 20*	*Jun 23*	*302*
Passive probe 1.5kΩ	Schwarzbeck	TK 9416	*Oct 20*	*Oct 23*	*621*
Termination Resistor 50 W	Radiall	404011	*Nov 21*	*Nov 23*	*309*
Branching device (4x) 50W	Rohde & Schwarz	892228/20	*Sep 22*	*Sep 25*	*320*
Dummy-Load - 2 – 18 GHz	Narda	MODEL 367NF	*Nov 19*	*Nov 22*	*343*
DC Block Adapter - 0.045 – 26.5 GHz	Hewlett-Packard	11742A	*Apr 21*	*Apr 24*	*356*
RF Probe 0.02 – 1000 MHz	Rohde & Schwarz	URY-Z7	*Aug 22*	*Aug 25*	*368*
150W attenuator	Weinschel	49-20-33	*Oct 19*	*Oct 22*	*374*
Fixed Coaxial Attenuator - DC – 18 GHz	Weinschel	23-6-34	*Feb 20*	*Feb 23*	*375*
Insertion Unit 100V | 100 kHz – 2 GHz	Rohde & Schwarz	URY-Z4	*Jun 22*	*Jun 24*	*417*
Panoramic Adapter (Monitoring)	Schwarzbeck	PAN1550	---	---	*429*
DC-BLOCK - DC – 6.0 GHz |50 W	Mini Circuits	BLK-6-N+	*Nov 21*	*Nov 24*	*462*
Terminating resistor 50Ω SMA	---	---	*Nov 19*	*Nov 22*	*493*
Terminating resistor 50Ω SMA	---	SC 60-601-0000-31	*Nov 19*	*Nov 22*	*497*
Fixed Attenuator –0 – 40 GHz	Anritsu	41KC-10	*Nov 19*	*Nov 22*	*504*
Fixed Attenuator – 0 – 40 GHz	Anritsu	41KC-10	*Nov 19*	*Nov 22*	*505*
Fixed Attenuator – 0 – 40 GHz	Anritsu	41KC-6	*Nov 19*	*Nov 22*	*506*
Fixed Attenuator – 0 – 40 GHz	Anritsu	41KC-3	*Nov 19*	*Nov 22*	*507*
Electric Dummy Load	RA-NAV Lab.	DA-75U	---	---	*526*
Power Splitter / Combiner	Mini Circuits	ZESC-2-11	*Nov 19*	*Nov 22*	*527*
3 Way Power Splitter / Combiner	Mini Circuits	ZFSC-3-1	*Mar 20*	*Mar 23*	*529*
3 Way Power Splitter / Combiner	Mini Circuits	ZFSC-3-1	*Mar 20*	*Mar 23*	*530*
RF-Attenuator - 6 dB	Haefely	---	*Mar 20*	*Mar 23*	*540*
RF-Attenuator - 1– 120 MHz | 12 dB	Haefely	---	*Mar 20*	*Mar 23*	*541*
RF-Attenuator - 1– 120 MHz | 39 dB	Haefely	---	*Mar 20*	*Mar 23*	*542*
LISN 9kHz – 30 MHz	Schwarzbeck	NNLA 8120 (SN: 8120499A)	*Oct 22*	*Oct 24*	*551*
HV Probe P6013A	Tektronix	P6013A	*Jul 22*	*Jul 24*	*559*
VLISN 5µH	Schwarzbeck	8125-1944	*Nov 21*	*Nov 23*	*585*
VLISN 5µH	Schwarzbeck	8125-1945	*Nov 21*	*Nov 23*	*586*
20dB Attenuator, up to 18 GHz	Mini Circuit	BW-N20W5+	*Nov 19*	*Nov 22*	*594*
Step Attenuator - DC-18 GHz | 0 to 11 dB	Hewlett-Packard	8494B	*Nov 19*	*Nov 22*	*604*
Analyser Reference System	Spitzenberger & Spies	PAS 1000 SyCore + ARS 16/1	*Mar 22*	*Mar 24*	*606a/b/c*
Capacitive Coupling Clamp 5 kV	Schlöder	SFT 415	*Mai 20*	*Mai 23*	*608*
RF Probes for 50 Ω Receivers	Schwarzbeck	TK 9416	*Jun 22*	*Jun 24*	*612*
Current probe TRMS	BEHA APROB	CHB35	*Nov 22*	*Nov 24*	*652*
Semi Anechoic Chamber	COMTEST	SAC-3m	*Apr 21*	*Apr 23*	*660*
Maturo Turntable	Maturo	TT2.0SI (SN: TT2.05SI/817 SW: 1.0.0.4473)	---	---	*667*
Maturo Antenna Mast	Maturo	TAM4.5-E-10kg (SN: 10011/216/2588.01)	---	---	*668*
Maturo Controller	Maturo	FCU3.0/009/2588.01 (SN: 10014/2019)	---	---	*669*
Current probe 20 Hz – 100 MHz	Rohde & Schwarz	EZ-17 (0816.2063.03)	*Mar 20*	*Mar 23*	*670*
Coupling Decoupling Network	AMETEK	CDN ST08A	*Oct 22*	*Oct 24*	*672*
BONN HF Switch Matrix DC – 8 GHz	BONN Elektronik	BAS 0080-3	---	---	*682*
External Directional Coupler	BONN Elektronik	BDC 1060-40/500	*Dec 20*	*Dec 22*	*683*
BI-Directional Coax. Coup. 50-1000 MHz	Narda	3020A	*Nov 21*	*Nov23*	*141*
Vertical coupling plate	TÜV NORD HFT	---	---	---	*265*
Measuring table	TÜV NORD HFT	---	---	---	*106*
Data line coupling network	EM Test AG	CNV 504/ 508	---	---	285
2 Generators					

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EFT/Burst Generator	Schlöder	SFT 1400	*Sep 22*	*Sep 24*	*46a*
ESD Generator	Schlöder	SESD 216	*Dec 21*	*Dec 23*	*653*
Signal Generator	Rohde & Schwarz	SMB100A SW 4.20.028.58	*Sep 22*	*Sep 24*	*571*
RF Generator	Rohde & Schwarz	SGT100A	*Jun 22*	*Jun 24*	*636*
Signal Generator	Rohde & Schwarz	SMG	*Jun 22*	*Jun 24*	*136a*
Signal Generator	Marconi	2042	*Jul 22*	*Jul 24*	*6*
Signal Generator	Marconi	2024	*Jul 22*	*Jul 24*	*213*
Puls Generator	EM Test	MPG 200	*Cal. before use*	*Cal. before use*	*181*
Surge Generator	H+H	MIG063 IN S-T	*Apr 21*	*Apr 23*	*561*
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500 S/N: 171332	*Aug 22* *Factory cal.*	*Aug 23*	*691*
3. Antennas					
Loop Ant. 9kHz-30MHz	Schwarzbeck	FMZB1516	*Oct 21*	*Oct 23*	*23*
Biconical Ant. 30-300 MHz	Schwarzbeck	VHA9103/BBA9106	*Mai 22*	*Mai 24*	*80/616*
Double Ridged Horn	Schwarzbeck	BBHA9120C	*Feb 22*	*Feb 24*	*169*
Double Ridged Horn	Schwarzbeck	BBHA 9120A	*Mai 20*	*Mai 24*	*284*
Tri-Log Broadband	Schwarzbeck	VULB9168	*Mai 21*	*Mai 23*	*406*
Broadband Horn 14-40 GHz	Schwarzbeck	BBHA9170	*Feb 22*	*Feb 24*	*442*
Log Per Antenna 0.7-20 GHz	Schwarzbeck	STLP9148	*Mai 21*	*Mai 23*	*445a*
Bilog Ant.	CHASE	CBL6111	*Cal. before use*	*Cal. before use*	*167*
Spectrum analyser Mixer 220 – 325 GHz	Radiometer Physics	SAM325 / 20029	*Aug 21*	*Aug 23*	*591*
Dual Mode Potter Horn 220-325 GHz	Radiometer Physics	325-WR2	---	---	*592*
Dual Mode Potter Horn 75-110 GHz	Radiometer Physics	---	---	---	*649*
Gain Horn Antenna 50-75 GHz	Dorado	GH-15-20	---	---	*511*
Standard Gain Horn 1.7 – 2.6 GHz	Narda	645	---	---	*514*
W-band active Sextupler with input drive amplifier	Spacek Labs Inc.	AW-6XW-0	---	---	*221a*
60 to 65 GHz active frequency quadrupler	Spacek Labs Inc.	A625-4XW-0	---	---	*222a*
Harmonic Mixer 40-60 GHz	Rohde & Schwarz	FS-Z60/ 100037	*Aug 21*	*Aug 23*	*515*
Gain Horn Antenna 40-60 GHz	Dorado	GH-19-20 / 070106	---	---	*518*
Spectrum analyser Mixer 90-140 GHz	Radiometer Physics	SAM140 / 20006	*Aug 21*	*Aug 23*	*545*
Dual Mode Potter Horn 90-140 GHz	Radiometer Physics	140-WR8	---	---	*547*
Spectrum analyser Mixer 140-220GHz	Radiometer Physics	SAM220 / 20002	*Aug 21*	*Aug 23*	*546*
Dual Mode Potter Horn 140-220 GHz	Radiometer Physics	220-WR5.1	---	---	*548*
Harmonic Mixer 60-90 GHz	Rohde & Schwarz	FS-Z90 / 100062	*Aug 21*	*Aug 23*	*501*
Dual Mode Potter Horn 60-90 GHz	Radiometer Physics	90-W12	---	---	*549*
Gain Horn 33-55 GHz	Dorado	040810	---	---	*383*
Gain Horn 50-75 GHz	Dorado	031003	---	---	*384*
Gain Horn 75-110 GHz	Dorado	040808	---	---	*385*
Standard Gain Ant. 26.5-40 GHz	Maury Microwave	U211C	---	---	*532/628*
Waveguide Harmonic Mixer 50 – 75 GHz	Keysight	M1971V	*Jan 22*	*Jan 24*	*673*
Waveguide Harmonic Mixer 75 – 110 GHz	Keysight	M1971W	*Jan 22*	*Jan 24*	*674*
Stacked Log.-Per. Antenna 70 MHz – 10 GHz	Schwarzbeck	STLP 9129	---	---	*662*
Spectrum/Signal Analyzer Extension Module 110 GHz – 170 GHz (WR-6.5)	Virginia Diodes, Inc.	SAX 637	Jun 22	Jun 24	675
Spectrum/Signal Analyzer Extension Module 140 GHz – 220 GHz (WR-5.1)	Virginia Diodes, Inc.	SAX 636	Jun 22	Jun 24	677
Spectrum/Signal Analyzer Extension Module 220 GHz – 330 GHz (WR-3.4)	Virginia Diodes, Inc.	SAX 635	Jun 22	Jun 24	679
Conical Gain Horn Ant. 110 GHz – 170 GHz [21 dBi]	Virginia Diodes, Inc.	Conical Antenna WR-6.5	---	---	687
Conical Gain Horn Ant. 140 GHz – 220 GHz [21 dBi]	Virginia Diodes, Inc.	Conical Antenna WR-5.1	---	---	688
Diagonal Gain Horn Ant. 220 GHz – 330 GHz [26 dBi]	Virginia Diodes, Inc.	Diagonal Antenna WR-3.4	---	---	689

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4. Amplifier					
RF-Power Amplifier 250 kHz – 150 MHz	ENI	3100LA	---	---	*123*
RF pre-amplifier 100kHz-1.3GHz	HP	8447E	*Sep 20*	*Sep 24*	*166a*
Mitteq amplifier 26.5-40 GHz	Mitteq	---	*Sep 22*	*Sep 24*	*223a*
RF pre-amplifier 1-18GHz	Narda	---	*Sep 22*	*Sep 24*	*345*
Mitteq Amplifier 18-26GHz	Mitteq	---	*Apr 20*	*Apr 23*	*433*
Microwave amplifier 12-28GHz	Schwarzbeck	BBV9719	*Sep 22*	*Sep 24*	*443*
Microwave amplifier 0.5-18GHz	Schwarzbeck	BBV9718	*Sep 22*	*Sep 24*	*444*
RF-Power Amplifier 10kHz-1000 MHz	Poetschke	8100 (Band 1) BHED (Band 2) BHED (Band 3)	---	---	*684*
RF-Power Amplifier 800 MHz – 4,2 GHz	Amplifier Research	10S1G4	---	---	*685*
RF-Power Amplifier 4 GHz – 8 GHz	Amplifier Research	35S4G8A	---	---	*686*
RF-Power Amplifier 0.69 GHz – 6 GHz	Rohde & Schwarz	BBA150-D110/E60	---	---	*690*
5. Power supplies					
Programmable Power Supply	Fluke	PM 2813	---	---	*28a*
Power Supply	HP	---	---	---	*125*
Power Supply	Sorensen	LM 30-6	---	---	*134a*
Power Supply	HP	6034L	---	---	*226*
Regulated Power Supply	Farnell	AP60-50	---	---	*408*
Power Supply	EA	PSI 8080-40-DT	---	---	*560*
Power Supply	HP	6032A	---	---	*644*
6. Meters					
Microwave Frequency Counter	Hewlett-Packard	5351B	*Nov 20*	*Nov 22*	*432*
Temperature test cabinet	Heraeus Vötsch	VMT04/35	---	---	*102a*
Temperature test cabinet	Brabender	TTE 32/40 H	---	---	*87*
Digital-Hygro-Thermometer	Greisinger	GFTH95	*Nov 19*	*Nov 22*	*57a*
Volt & RF Power Meter	Rohde & Schwarz	URV35	*Jun 22*	*Jun 25*	*161*
Power Meter	Marconi	6960/ S.N: 1214	*Dec 22*	*Dec 25*	*139a*
Multimeter	Gossen Metrawatt	Metrahit pro	*Nov 21*	*Nov 23*	*215a*
Humidity/Temperature Measuring device	TESTO	Testo 625	*Nov 21*	*Nov 23*	*259a*
Volt & RF Power Meter	Rohde & Schwarz	URV35	*Cal. before use*	*Cal. before use*	*271*
Multimeter	Gossen Metrawatt	Metrahit 26S	*Oct 22*	*Oct 24*	*313*
Level and Power Meter - 9 kHz – 3 GHz	Rohde & Schwarz	URY	*Apr 22*	*Apr 24*	*307*
Temperature test device	Ahlhorn	Almemo 2390-5 PT100	*Mar 20*	*Mar 23*	*401/402*
Digital-Vacuum-/Barometer	Greisinger	GDH12AN	*Oct 19*	*Oct 22*	*558*
Digital Storage Oscilloscope	Tektronix	TDS 2012C	*Nov 22*	*Nov 24*	*568*
Digital-Vacuum-/Barometer	Greisinger	GDH-200-14	*Nov 21*	*Nov 23*	*632*
Network Analyser 9 kHz -6 GHz	Rohde & Schwarz	ZVL6 (SN: 101268)	*Sep 22*	*Sep 24*	*534*
Signal Analyser 10 Hz – 30 GHz	Rohde & Schwarz	FSV 30 S/N: 100932	*Aug 21*	*Aug 23*	*502*
EMI Test receiver ESW26	Rohde & Schwarz	R&S ESW26 (SN: 101383/26 SW: R&S ESW2.10)	*Nov 21*	*Nov 23*	*665*
Signal analyser Keysight 50GHz	Keysight	UXA N9040B (SN: MY57213006 SW: A.27.02/2020 1.0)	*Jan 22*	*Jan 24*	*666*
7. Test / control software					
EMC32	Rohde & Schwarz	V10.60.20	---	---	---
Maturo mcApp	Maturo	SW: V3.4.9.4537 (19.04.04)	---	---	---
SPS EMC	Spitzenberger & Spies	SW: V4.1.3	---	---	---
EMV-Soft	Schlöder GmbH	SW: V11.95	---	---	---
ISMISO	EM Test AG	SW:V3.63	---	---	---

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12. Cable list

Internal Cable Number	Connector Type	Frequency Range (MHz)	Cable Length (m)	Manufacturer
3	N	0,5 - 8000	3	Cellflex
4	N	0,5 - 8000	3	Cellflex
4a	BNC	10 – 1500	0.50	Telemeter
12a	N	10 – 265000	6	Huber + Suhner
14a	BNC	10 – 1000	1.00	Telemeter
17a	APC3.5	10 – 26500	2.13	Huber + Suhner
18a	APC3.5	10 – 26500	2.13	Huber + Suhner
22	BNC	10 – 1000	1.50	---
27	BNC	10 – 1000	1.00	Fabrica Milanese Cond.
35	N	10 – 2000	1.10	Fujikura
40	BNC	---	0.50	Aircell
43	SMA	10 – 18000	0.50	Rosenberger
44	SMA	---	0.50	Huber + Suhner
45	SMA	10 – 18000	0.50	Huber + Suhner
48	SMA		0.50	Huber + Suhner
49	N	10 – 18000	1.00	Huber + Suhner
50	N	10 – 18000	1.00	Huber + Suhner
51	N	10 – 18000	1.00	Huber + Suhner
52	N	10 – 18000	1.00	Huber + Suhner
54	BNC	10 – 3500	1.00	Aircell
58	N	10 – 18000	2.00	Huber + Suhner
59	N	10 – 18000	1.00	Huber + Suhner
60	N	10 – 18000	2.00	Huber + Suhner
61	N	10 – 18000	1.00	Huber + Suhner
62	SMA	---	0.50	Huber + Suhner
63	SMA	10 – 18000	0.50	Huber + Suhner
64	SMA	10 – 18000	0.50	Huber + Suhner
65	APC3.5	10 – 26500	0.60	---
66	APC3.5	10 – 26500	0.60	---
67	APC3.5	10 – 26500	0.60	---
68	APC3.5	10 – 26500	0.60	---
72	BNC	---	0.40	---
73	BNC	---	0.40	---
76	SMA	10 – 30000	3.00	Gore
79	BNC/N	10 – 1000	5.00	---
80	SMA	---	0.25	Huber + Suhner
87	SMA	10 – 18000	0.15	Huber + Suhner
88	SMA	10 – 18000	0.15	Huber + Suhner
89	SMA	10 – 18000	0.15	Huber + Suhner
90	SMA	10 – 18000	0.15	Huber + Suhner
91	SMA	---	1.50	Huber + Suhner
94	BNC	---	1.10	---
95	BNC	---	0.80	---
96	BNC	---	0.80	---
100	N	10 – 26500	6.00	Rosenberg
101	N	10 – 18000	2.90	Huber + Suhner
102	SMA	10 – 18000	2.00	Huber + Suhner
111	BNC	10 – 1000	0.50	---
112	BNC	10 – 1000	0.50	---
114	SMA	10 – 18000	0.25	Huber + Suhner
116	SMA	10 – 18000	0.25	Huber + Suhner
119	N	10 – 20000	8.00	Jyebao
121	SMA	10 – 18000	1.50	Huber + Suhner
122	SMA	10 – 18000	2.00	Huber + Suhner

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Internal Cable Number	Connector Type	Frequency Range (MHz)	Cable Length (m)	Manufacturer
123	SMA	10 – 18000	2.00	Huber + Suhner
145	SMA	10 – 26500	8.00	Huber + Suhner
147	APC3.5	10 – 40000	1.50	Jyebao
148	APC3.5	10 – 40000	3.00	Jyebao
151	SMA	10 – 18000	0.50	Rosenberger
152	SMA	10 – 18000	0.50	Rosenberger
154	BNC	10 – 1000	1.00	---
155	N/BNC	---	0.85	---
157	BNC	---	0.50	---
158	SMA	10 – 26500	2.00	Huber + Suhner
160	SMA	10 – 18000	0.40	Nortel Networks
161	SMA	10 – 18000	1.00	Huber + Suhner
162	APC3.5	10 – 26500	2.00	Huber + Suhner
163	APC3.5	10 - 26500	2.00	Huber + Suhner
164	APC3.5	10 – 26500	2.00	Huber + Suhner
165	APC2.9	10 – 26500	2.00	Huber + Suhner
166	APC3.5	10 – 26500	5.70	Rosenberger
167	APC3.5	10 – 40000	1.00	Jyebao
168	APC3.5	10 – 40000	1.00	Jyebao
169	APC3.5	10 – 40000	1.00	Jyebao
170	APC3.5	10 – 40000	1.00	Jyebao
171	APC3.5	10 – 40000	1.00	Jyebao
172	SAM	---	0.90	Huber + Suhner
173	APC	10 – 26500	2.00	Huber + Suhner
174	APC	10 – 26500	---	Huber + Suhner
175	SMA	10 – 18000	0.40	Huber + Suhner
176	N-SMA	10 – 18000	0.50	Huber + Suhner
188	N	10 – 18000	5.00	Huber + Suhner
189	PC-PC	10 – 26500	6.00	Jyebao
190	PC-PC	10 – 26500	6.00	Jyebao
192	N-N	10 – 18000	3.0	Jyebao
193	N-N	10 – 18000	3.0	Jyebao
194	N-SMA	10 – 18000	2.0	Jyebao
195	N-SMA	10 – 18000	2.0	Jyebao
EMV 1	BNC	---	2.00	Henn
EMV 2	BNC	10 – 1000	2.00	Henn
EMV 4	BNC	---	9.70	Henn
EMV 5	BNC	---	3.80	Henn
EMV 6	BNC/N	10 – 1000	5.00	Lüthi
EMV 7	BNC	10 – 1000	1.50	Henn
EMV 8	BNC	10 – 1500	1.70	Henn
EMV 9	BNC	10 – 1000	1.70	Henn
EMV 11	BNC	---	5.20	Hasselt
EMV 12	BNC	10 – 1000	2.40	Hasselt
EMV 13	BNC	10 – 1000	4.10	Hasselt
EMV 14	BNC	10 – 1000	2.50	Hasselt
EMV 15	BNC	---	0.90	Henn
EMV 16	Fischer	---	2.00	---
EMV 18a	Fischer	---	1.00	---
EMV 19a	Fischer	---	1.50	---
KISN2	BNC	10 – 2000	4.80	---

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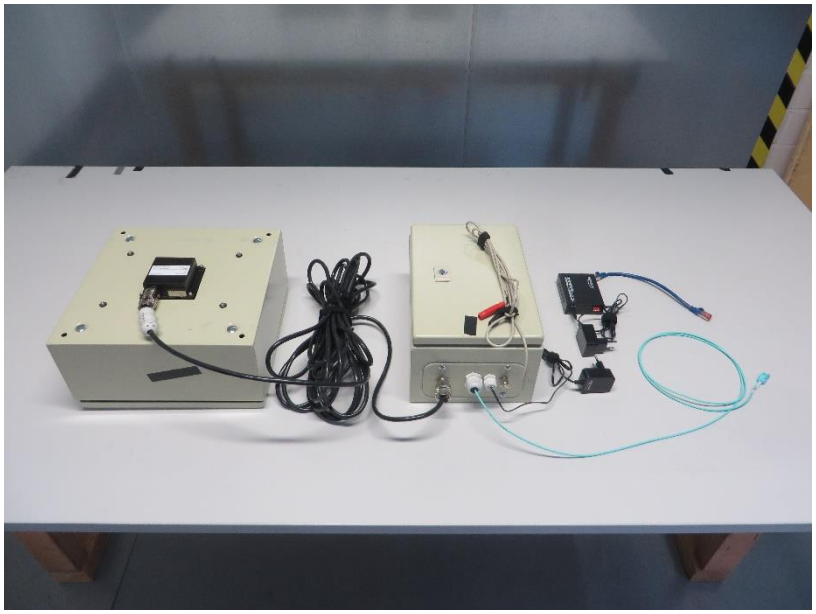
13. Photographs of the EUT

Photographs of the test equipment (EUT) – Assembly of units or parts



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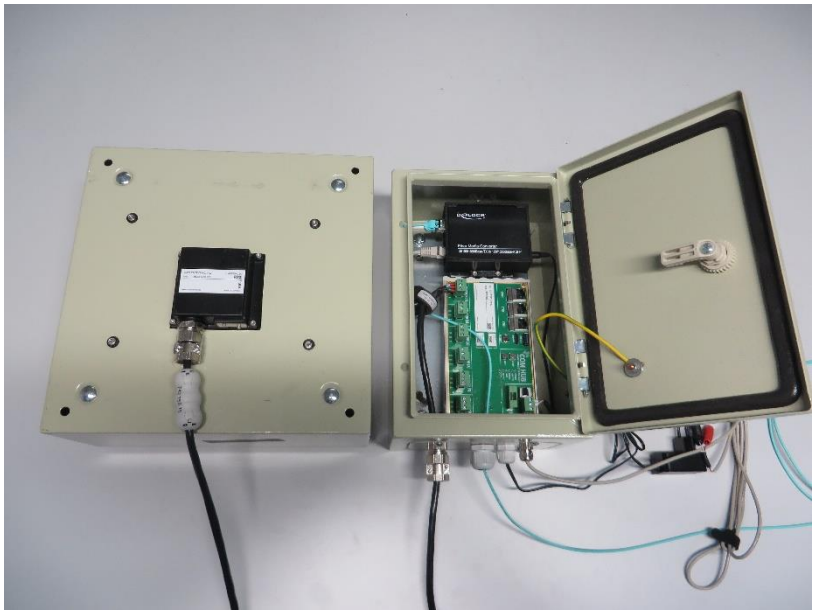
Photographs of the test equipment (EUT) – Upper side of unit



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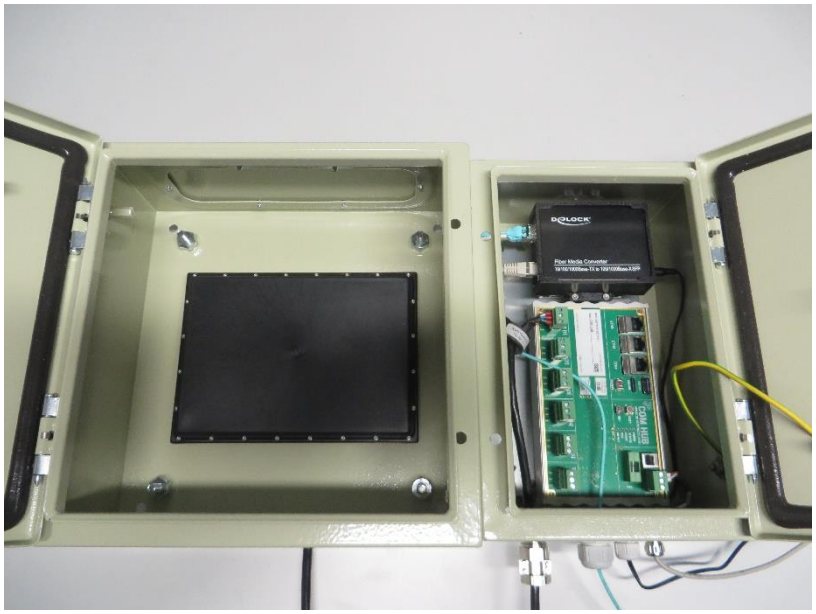
Photographs of the test equipment (EUT) - Internal construction



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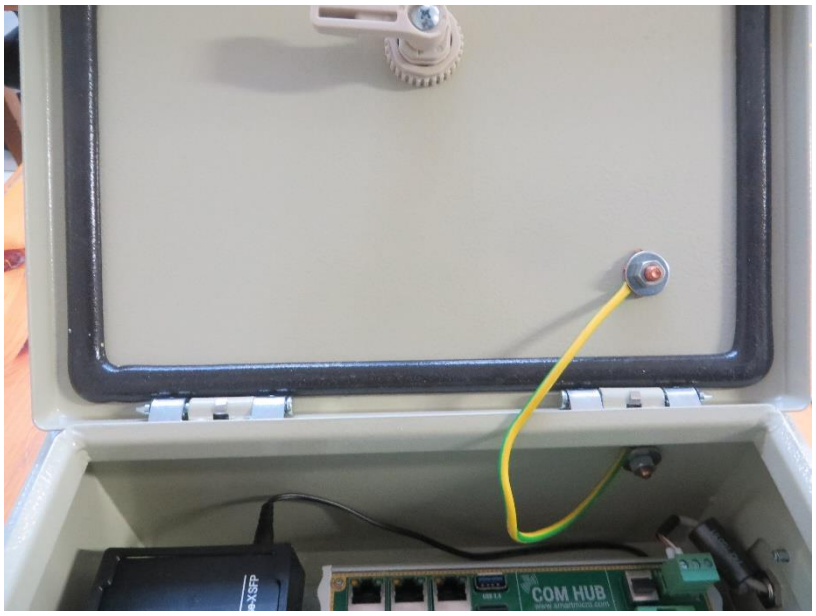

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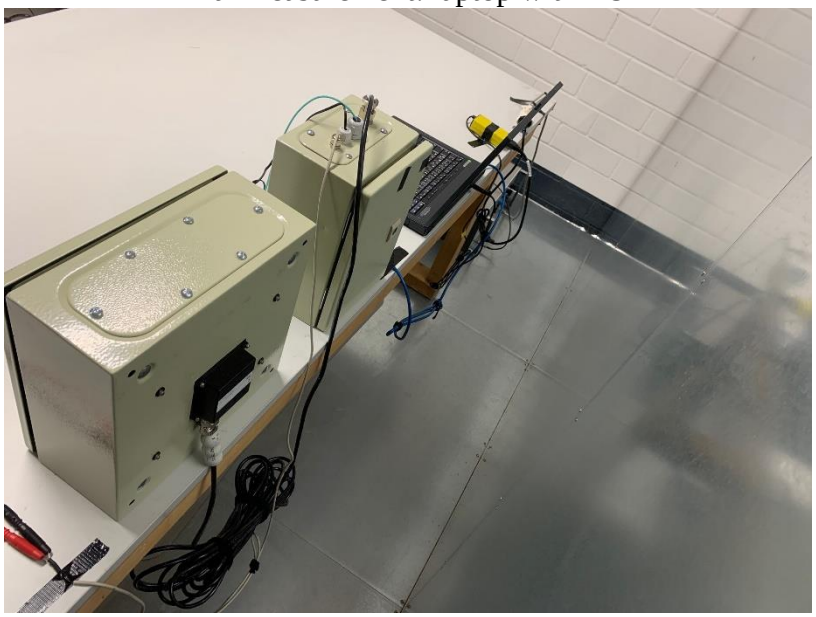
14. Photographs to the test setup

Photographs from the test: Conducted limits – Ethernet Port

Reference measurement: only laptop

Final measurement: laptop with EUT



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Photographs from the test: Radiated emission

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End of test report

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