Test Report acc. to FCC Title 47 CFR Part 15
relating to
TEWS ELEKTRONIK GmbH & Co. KG
MW 55 Option Bales and Boxes

Title 47 - Telecommunication
Part 15 - Radio Frequency Devices
Subpart C – Intentional Radiators
Measurement Procedure:
ANSI C63.4-2014
ANSI C63.10-2013

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-12053-01-03

TÜV NORD Hochfrequenztechnik GmbH & Co. KG
LESKANPARK, Gebäude 10, Waltherstr. 49-51, 51069 Köln, Germany
Tel.: +49 221 8888950
hf@tuev-nord.de

MANUFACTURER	
Manufacturer name	**TEWS ELEKTRONIK GmbH & Co. KG**
Manufacturer's grantee code	**2AAX7**
Manufacturer's address	Sperberhorst 10 22459 Hamburg
Phone	+49 40 55 911 53
Fax	+49 40 555 911 99
Email	Stephan.Eichner@tewsworks.com

TESTING LABORATORY	
Test engineer	Mr. Ralf Trepper
Testing laboratory name	**TÜV NORD Hochfrequenztechnik GmbH & Co. KG**
Testing laboratory address	LESKANPARK, Building 10 Waltherstr. 49-51, 51069 Cologne Germany
Phone	+49 221 8888950
Email	**rtrepper@tuev-nord.de**

RELEVANT STANDARD	
Title	**47 - Telecommunication**
Part	**15 - Radio Frequency Devices**
Subpart	**Subpart C – Intentional Radiators - Section 15.517**
Measurement procedure	**ANSI C63.4-2014 & ANSI C63.10-2013**

EQUIPMENT UNDER TEST (EUT)	
Equipment category	Measurement Device
Trade name	MW 55 Option Bales and Boxes
Type designation	MW 55 Option Bales and Boxes
Serial no.	1.0
Variants	---

EUT: MW 55 Option Bales and Boxes **FCC ID: 2AAX7MW55BB** **FCC Title 47 CFR Part 15** **Date of issue: 2023-09-19**

Test result summary

The following table summarizes the results for the tested EUT corresponding with the essential requirements. Full testing may not be required. If partial testing was performed, this shall be indicated in the relevant column (N.t.[x], not tested, see clause 10) of the table below.

Clause	47 CFR Part 15 §	Requirements headline	Test result
8.1	15.517	General requirements	**Pass**
8.2	15.203	Antenna requirement	**Pass**
8.3	15.207	Conducted limits	**Pass**
8.4	15.209	Radiated emission limits, general requirements	**Pass**
8.5	15.517 (c) 15.517 (d)	Radiated emissions above 960 MHz Radiated emissions in the GPS Receive Bands	**Pass**
8.6	15.517 (b)	UWB Bandwidth requirement (-10 dB)	**Pass**
8.7	15.519 (e)	Peak Power within a 50MHz bandwidth	**Pass**

* 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 performed tests	
☒ **Yes**	☐ **No**

Signature	TÜVNORD Digital unterschrieben von Shrestha Anup Datum: 2024.01.18 17:16:01 +01'00'	TÜVNORD Digital unterschrieben von Trepper Ralf Datum: 2024.01.18 17:17:35 +01'00'
Name	**Mr. Anup Shrestha**	**Mr. Ralf Trepper**
Designation	**RF Test engineer**	**Laboratory-Manager**
Date of issue	**2023-09-19**	**2023-09-19**

Table of contents

TÜV NORD Hochfrequenztechnik GmbH & Co. KG
LESKANPARK, Gebäude 10, Walther str. 49-51, 51069 Köln, Germany
Tel.: +49 221 8888950
hf@tuev-nord.de

1. Revision history

Revision	Date of issue	Creator	Content of change
00	2023-04-27	DG	Initial release
01	2023-09-19	AS	Annexes updated (Clause 4.1), frequencies corrected (Clause 4.3), Antenna Gain corrected (clause 8.2)
---	---	---	---

Table 0-1: Revision history

Note: If the document has been changed by revision number, all previous documents are no longer valid and must be destroyed.

2. Introduction

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

- Test result summary
- List of contents
- Introduction and further information
- Equipment application data
- Detailed test information
- List of measurement equipment with calibration validity
- Photographs and further test results (plots, graphs, etc.)

The tests were carried out in a representative assembly and in accordance with the test methods and/or requirements stated in:

Item	Applied Standard
Radio test	**FCC Title 47 CFR Part 15 Subpart F Section 15.517** Technical requirements for indoor UWB systems
Radio test	**ANSI C63.4-2014** American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
Radio test	**ANSI C63.10-2013** American National Standard for Procedures for Compliance Testing of Unlicensed Wireless Devices

3. Administrative Data

3.1 Testing laboratory

TÜV NORD Hochfrequenztechnik GmbH & Co. KG
LESKANPARK, Building 10
Waltherstr. 49-51
51069 Cologne
Germany

Phone: +49 221 8888 950

Accredited by:

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

3.2 Applicant´s details

Company name	: TEWS ELEKTRONIK GmbH & Co. KG
Address	:
	Sperberhorst 10
Country	: 22459 Hamburg
Contact person	: Mister Stephan Eichner
Telephone	: +49 40 55 911 53
Fax	: +49 40 555 911 99
Email	: Stephan.Eichner@tewsworks.com
Date of order	: 2023-03-10
Date of receipt	: 2023-03-13
Period of testing time	: 2023-03-13 - 2023-04-27

3.3 Manufacturer´s details

Manufacturer´s name	: (please see Applicant´s details)
Address	: (please see Applicant´s details)

4. Equipment under test (EUT)

4.1 EUT: short description

EUT Type designation	**Type** of equipment	**Trademark**	**S/N** Serial no.	**HW** Hardware status	**SW** Software status
MW 55 Option Bales and Boxes	Measuring Equipment	TEWS	MW55.2309.5764	1.0	1.0
PEPPERL+FUCHS	Optical Sensor Reflection	---	801762	---	---
PIDSO	Vivaldi Antenna	---	---	---	---

ITU emission class	FCC ID
---	2AAX7MW55BB

For issuing this report the following product documentation was used:

Description	Date	Identifications
External photographs of the **E**quipment **U**nder **T**est (EUT)	2023-07-11	Annex no. 1
Internal photographs of the **E**quipment **U**nder **T**est (EUT)	2023-07-11	Annex no. 2
Channel occupancy / bandwidth	2023-07-11	Annex no. 3
Label sample	2023-07-11	Annex no. 4
Functional description / User manual	2023-07-11	Annex no. 5
Test setup photos	2023-07-11	Annex no. 6
Block diagram	2023-07-11	Annex no. 7
Operational description	2023-07-11	Annex no. 8
Schematics	2023-07-11	Annex no. 9
Parts list	2023-07-11	Annex no. 10

4.2 Additionally Equipment: Short description

Additional Equipment	Type

4.3 Additional declaration and description of EUT

(Application´s declaration: ☐= not selected, ☒= selected)

EUT	☐ tabletop unit ☒ floor-standing ☒ wall-mounted ☐ base station ☐ mobile ☐ not defined	Typical use ☒ fixed use ☐ portable use ☐ vehicular use
Operating frequency bands over which the equipment is intended to operate	3100 MHz – 6000 MHz	
Generated or used frequencies	10 MHz (crystal) 4249 MHz (carrier)	

Power line				
☒ AC	☒ L1, ☐ L2, ☐ L3, ☒ N, ☒ PE	--- V/ AC	☐ 50 Hz ☒ 60 Hz	EUT grounding: ☐ none ☒ with power supply ☐ additional
☐ DC	120 V/ DC			

Ports

Port type	Function	Shielding	Total cable length used during the test
AC Port	Power supply	☒ screened ☐ unscreened	2.7 m
3 x Sensor Port	Communication with optical sensors	☒ screened ☐ unscreened	3.0 m
2 x Coax Antenna Port	Communication with antenna	☒ screened ☐ unscreened	2.9 m
		☐ screened ☐ unscreened	

TÜV NORD Hochfrequenztechnik GmbH & Co. KG
LESKANPARK, Gebäude 10, Waltherstr. 49-51, 51069 Köln, Germany
Tel.: +49 221 8888950
hf@tuev-nord.de

6. Conclusions, observations and comments

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: ---

7. Operational description

7.1 EUT details

The EUT is a device for measuring the moisture in hay bales. For this purpose, the hay bales are placed between two antennas. These antennas are connected to a network analyser, which is located in a metal box. The network analyser is used to determine the change in dielectric properties between the antennas when a hay bale passes through. Additional sensors are used to detect whether a hey-ball is present or not.

7.2 EUT configuration

The EUT is configured via a touch screen. After booting, a menu is visible. If necessary, the configuration can be changed here.

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: 120 V AC

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

Conducted measurements

The EUT was directly connected to the artificial mains network. It has been tested in two runs: first, with the EUT in stand by mode, then with the activated EUT in continuous measuring mode.

TÜV NORD Hochfrequenztechnik GmbH & Co. KG
LESKANPARK, Gebäude 10, Waltherstr. 49-51, 51069 Köln, Germany
Tel.: +49 221 8888950
hf@tuev-nord.de

8.1 General requirements

8.1.1 Regulation

(a) Operation under the provisions of this section is limited to UWB transmitters employed solely for indoor operation.

(1) Indoor UWB devices, by the nature of their design, must be capable of operation only indoors. The necessity to operate with a fixed indoor infrastructure, e.g., a transmitter that must be connected to the AC power lines, may be considered sufficient to demonstrate this.

(2) The emissions from equipment operated under this section shall not be intentionally directed outside of the building in which the equipment is located, such as through a window or a doorway, to perform an outside function, such as the detection of persons about to enter a building.

(3) The use of outdoor mounted antennas, e.g., antennas mounted on the outside of a building or on a telephone pole, or any other outdoors infrastructure is prohibited.

(4) Field disturbance sensors installed inside of metal or underground storage tanks are considered to operate indoors provided the emissions are directed towards the ground.

(5) A communications system shall transmit only when the intentional radiator is sending information to an associated receiver.

(b) The UWB bandwidth of a UWB system operating under the provisions of this section must be contained between 3100 MHz and 10,600 MHz.

8.1.2 Result

The equipment passed the performed tests	☒ **Yes**	☐ **No**	☐ **N.t.ˣ**

Test setup photos / test results are attached	☐ **Yes**	☒ **No**	Annexe no.:

8.2 Antenna requirements

8.2.1 Regulation

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

8.2.2 Result

Antenna Type	Antenna description	Frequency (GHz)	Gain (dBi)	Number of Antennas
Vivaldi Antenna	Linear ultra-broadband	1.5 – 7 GHz	16 dBi (max)	Tx Antenna: 1
Vivaldi Antenna	Linear ultra-broadband	1.5 – 7 GHz	16 dBi (max)	Rx Antenna: 1

The antennas shall only be installed by professional personnel. When measuring the dielectric properties of a DUT, the antennas face each other. One antenna is used for the receive path and one for the transmit path.

The equipment passed the performed tests	☒ **Yes**	☐ **No**	☐ **N.t.ˣ**

Test setup photos / test results are attached	☐ **Yes**	☒ **No**	Annexe no.: 2

8.3 Conducted limits

8.3.1 Regulation

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator 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 boundary between the frequency ranges.

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

1) For carrier current system 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 §15.205, §15.209, §15.221, §15.223, or §15.227, as appropriate.

(c) 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 operation while connected to the AC power lines. Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters 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.

8.3.2 Test procedures

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 Section 7.
Additional equipment must also be connected to a second LISN with the same specifications described in the above section (if required).

EUT: MW 55 Option Bales and Boxes **FCC ID: 2AAX7MW55BB** **FCC Title 47 CFR Part 15** **Date of issue: 2023-09-19**

8.3.3 Result

Test location and equipment

Test site	EMV Laboratory TÜV NORD Hochfrequenztechnik
Receiver	☒ 665
Additional equipment	☒ 272 ☒ 60 ☒ 551
Cable	☒ KISN2

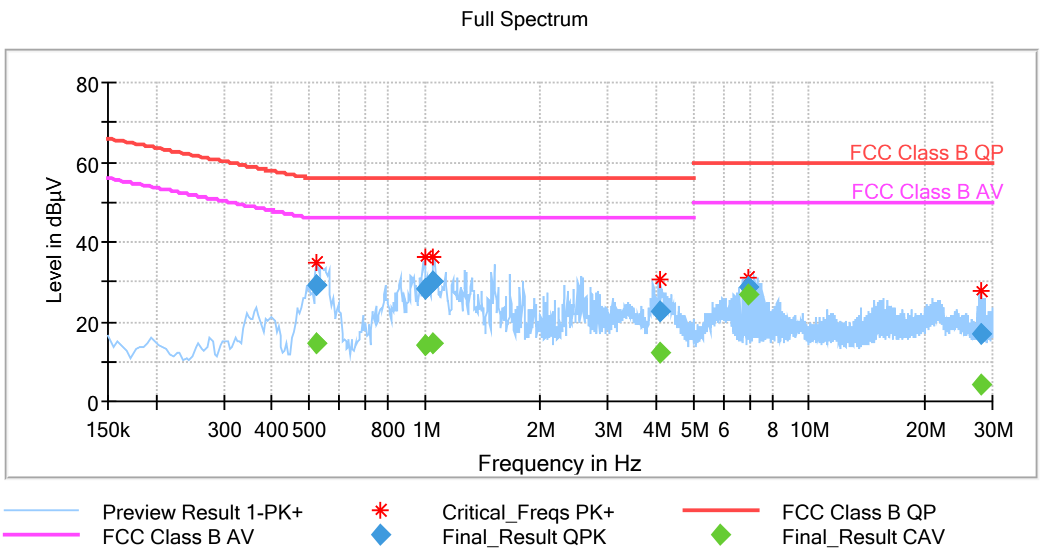
Environmental conditions

Environmental conditions	Temperature [°C]	Air pressure [hPa]	Rel. humidity [%]
	24	1010	25

Measurement results

Conducted emissions

EUT in standby mode

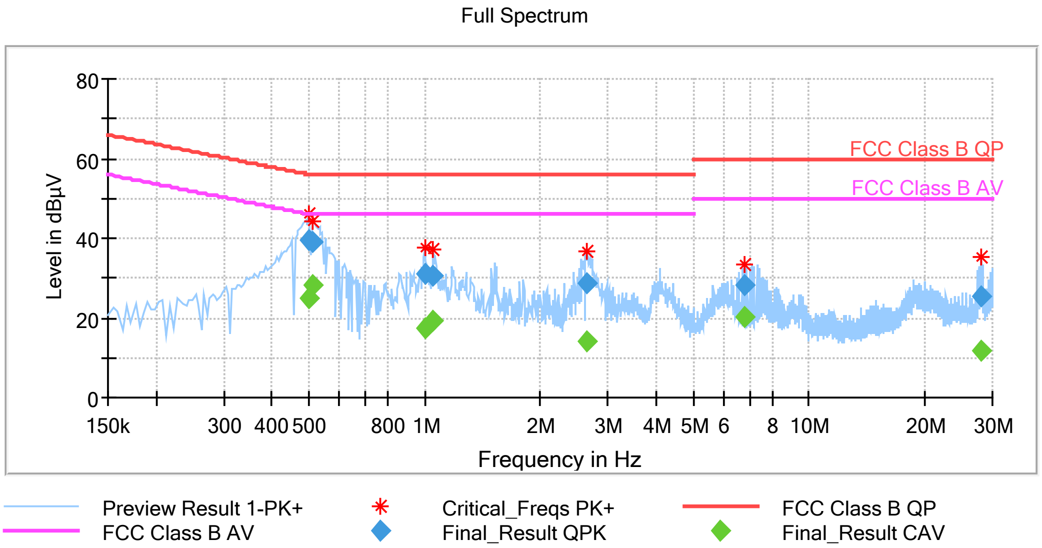


TÜV NORD Hochfrequenztechnik GmbH & Co. KG
LESKANPARK, Gebäude 10, Waltherstr. 49-51, 51069 Köln, Germany
Tel.: +49 221 8888950
hf@tuev-nord.de

EUT: MW 55 Option Bales and Boxes **FCC ID: 2AAX7MW55BB** **FCC Title 47 CFR Part 15** **Date of issue: 2023-09-19**

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.5235	---	14.48	46.0	31.52	9.0	L1	GND	20.1
0.5235	29.1	---	56.0	26.9	9.0	L1	GND	20.1
1.005	---	14.26	46.0	31.74	9.0	L1	GND	20.1
1.005	28.3	---	56.0	27.7	9.0	L1	GND	20.1
1.05	30.02	---	56.0	25.98	9.0	N	GND	20.1
1.05	---	14.77	46.0	31.23	9.0	N	GND	20.1
4.0785	---	12.1	46.0	33.9	9.0	N	GND	20.2
4.0785	22.76	---	56.0	33.24	9.0	N	GND	20.2
6.9135	28.58	---	60.0	31.42	9.0	L1	GND	20.4
6.9135	---	26.89	50.0	23.11	9.0	L1	GND	20.4
28.068	---	4.37	50.0	45.63	9.0	N	GND	21.4
28.068	16.93	---	60.0	43.07	9.0	N	GND	21.4

EUT in normal operating Mode



Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.501	---	25.04	46.0	20.96	9.0	N	GND	20.0
0.501	39.63	---	56.0	16.37	9.0	N	GND	20.0
0.51	---	28.14	46.0	17.86	9.0	N	GND	20.0
0.51	39.27	---	56.0	16.73	9.0	N	GND	20.0
1.0005	---	17.33	46.0	28.67	9.0	N	GND	20.0
1.0005	31.21	---	56.0	24.79	9.0	N	GND	20.0
1.05	---	19.07	46.0	26.93	9.0	N	GND	20.1
1.05	30.64	---	56.0	25.36	9.0	N	GND	20.1
2.652	---	14.05	46.0	31.95	9.0	N	GND	20.2
2.652	28.77	---	56.0	27.23	9.0	N	GND	20.2
6.7965	---	20.16	50.0	29.84	9.0	N	GND	20.3
6.7965	28.37	---	60.0	31.63	9.0	N	GND	20.3
28.1625	---	11.88	50.0	38.12	9.0	N	GND	21.4
28.1625	25.44	---	60.0	34.56	9.0	N	GND	21.4

Measurement uncertainty < ± 2 dB
****The average limit is not met when using a quasi-peak detector, therefore measurement with the average detector is unnecessary.**

The equipment passed the performed tests	☒ **Yes**	☐ **No**	☐ **N.t.ˣ**

Test setup photos / test results are attached	☒ **Yes**	☐ **No**	Annexe no.: 6

8.4 Radiated emission limits, general requirements

84.1 Regulation

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Intentional radiator- radiated emission limits		
Frequency	**Field Strength**	**Measurement distance**
MHz	**µV / m**	**m**
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
above 960	500	3
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 MHz, 76– 88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.		

(b) In the emission table above, the tighter limit applies at the band edges.

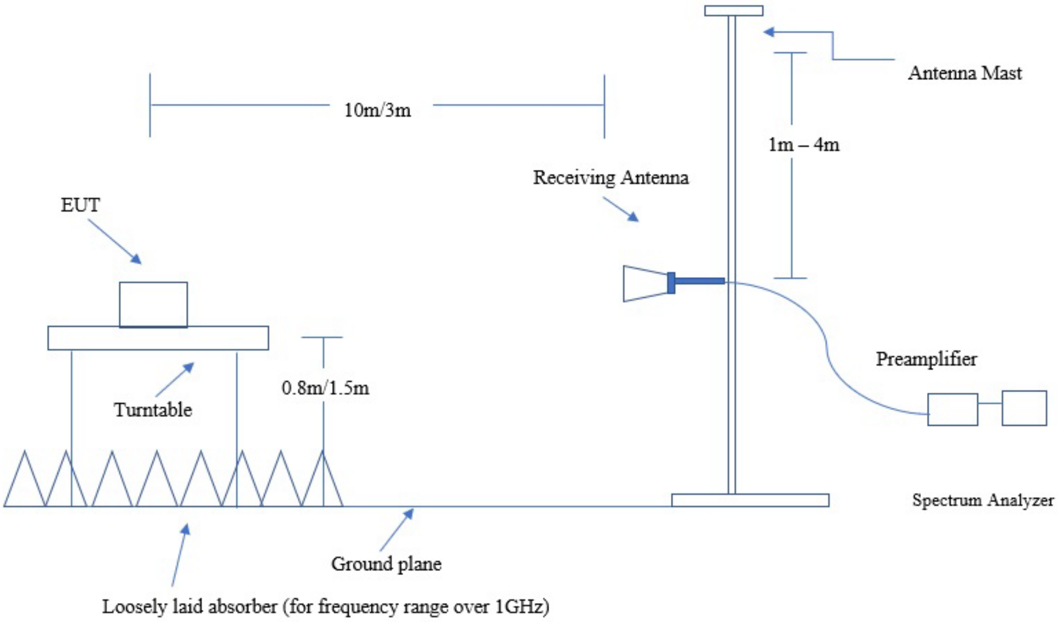
(c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

(e) The provisions in §§ 15.31, 15.33, and 15.35 for measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

(f) In accordance with Section 15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in Section 15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in Section 15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit. Emissions which must be measured above the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator and which fall within the restricted bands shall comply with the general radiated emission limits in Section 15.109 that are applicable to the incorporated digital device.

8.4.2 Test setup sketch



8.4.3 Test procedure

The EUT and this peripheral (when additional equipment exists) are placed on a nonconducting platform with nominal top surface dimensions 1 m by 1.5 m turn table. For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. 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 is 3m above 30 MHz and is 10m within frequency range 9kHz to 30 MHz. 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.

Measurement procedures for electric field radiated emissions from frequency range within 9 kHz to 1 GHz & above 1 GHz are consisting 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. 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.

Bore-sighting technique is used 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.

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 measurement above 1 GHz is made by placing loose-laid RF absorber material on the ground plane

Radiated emissions test characteristics	
Frequency range	9 kHz – 231 GHz
Test distance	10 m (below 30 MHz) 3 m* (above 30 MHz)
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).

8.4.4 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 35.91dBµV/m. The 35.91dBµV/m value can be mathematically converted to its corresponding level in µV/m.

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

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. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

For example: Distance limit (d_{limit}) = 3, Distance measured ($d_{measured}$) = 1
Distance Extrapolation Factor (DEF) = 20 * log ($d_{limit}/d_{measured}$) = 20 * log (3/1) = 9.5

At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). This paragraph (f) shall not apply to Access BPL devices operating below 30 MHz.

For example: Distance limit (d_{limit}) = 300, Distance measured ($d_{measured}$) = 10
Distance Extrapolation Factor (DEF) = 40 * log ($d_{limit}/d_{measured}$) = 40 * log (300/10) = 59.1

EUT: MW 55 Option Bales and Boxes **FCC ID: 2AAX7MW55BB** **FCC Title 47 CFR Part 15** **Date of issue: 2023-09-19**

8.3.5 Result

Test location and equipment

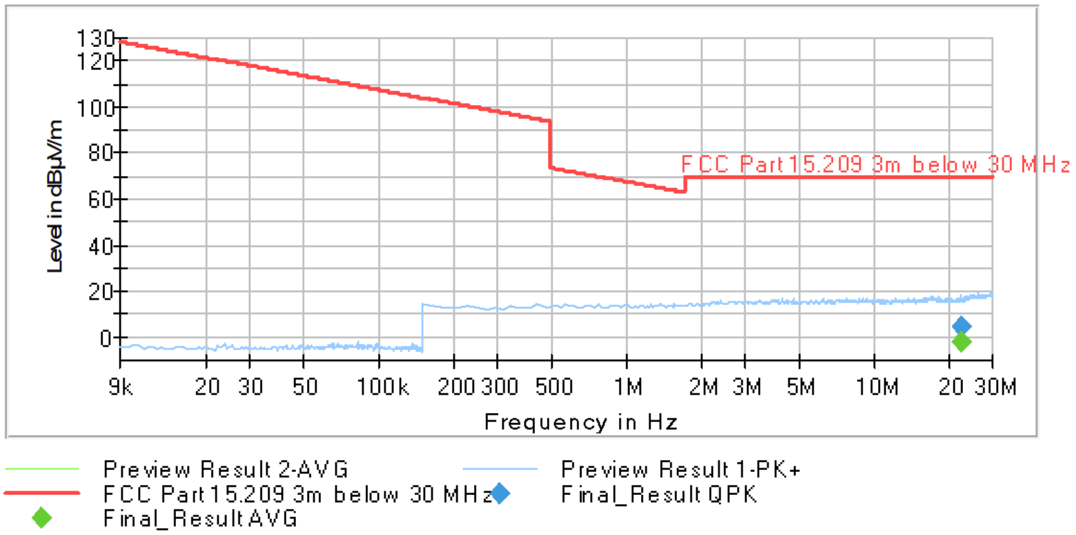
Test site	☒ 660 Semi Anechoic Chamber ☒ 667 ☒ 668 ☒ 669
Receiver	☒ 665
Antenna	☒ 23 ☒ 406
Additional equipment	
Cable	☒ K189 ☒ K191 ☒ K194

Environmental conditions and operating mode during the test

Environmental conditions	Temperature [°C]	Air pressure [hPa]	Rel. humidity [%]
	22	987	34

Measurement results

Radiated emissions below 30 MHz (Section 15.209)



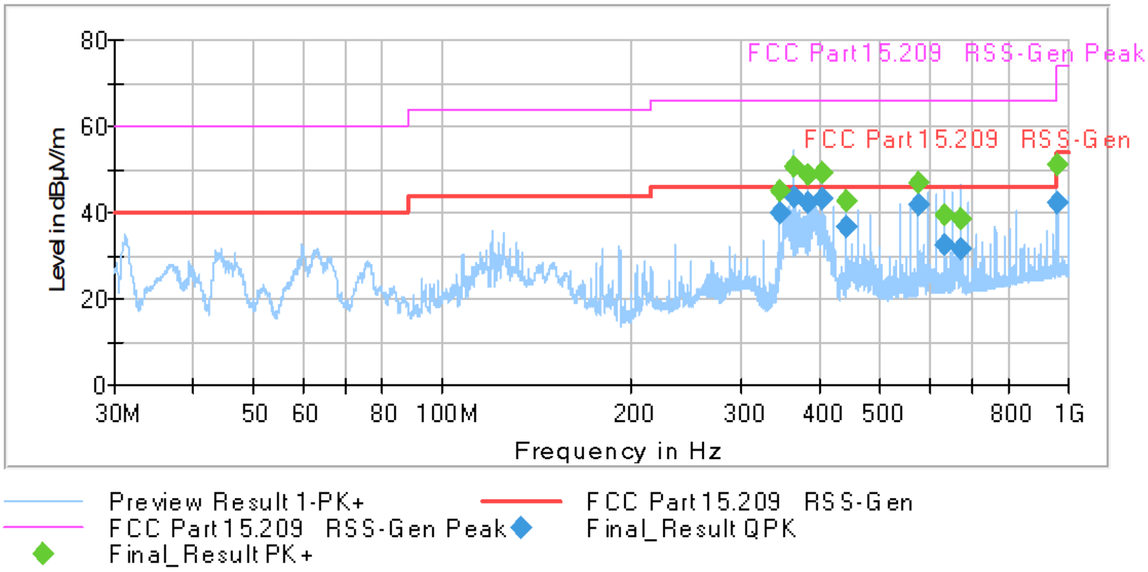
Frequency (MHz)	QuasiPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB/m)
22.32525	---	-1.76	---	---	9.0	H	63.0	19.6
22.32525	4.27	---	69.5	65.23	9.0	H	63.0	19.6

Measurement uncertainty < ± 4 dB
Remarks:
Remark: *[1] Noise level of the measuring instrument ≤ 4.0dBµV@ 10m distance (0.009 MHz –30 MHz) Remark: * Peak Limit according to Section 15.35 (b). Unless otherwise specified, e.g., see §§15.250, 15.252, 15.253(d), 15.255, 15.256, and 15.509 through 15.519 of this part, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

The equipment passed the performed tests	☒ **Yes**	☐ **No**	☐ **N.t.**[x]
Test setup photos / test results are attached	☒ **Yes**	☐ **No**	Annexe no.: 6

EUT: MW 55 Option Bales and Boxes **FCC ID: 2AAX7MW55BB** **FCC Title 47 CFR Part 15** **Date of issue: 2023-09-19**

Radiated emissions above 30 MHz up to 1 GHz (Section 15.209)



Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
345.6	39.83	---	46.0	6.17	120.0	178.0	H	114.0	16.3
345.6	---	45.26	66.0	20.74	120.0	178.0	H	114.0	16.3
364.99	43.54	---	46.0	2.46	120.0	140.0	H	17.0	16.8
364.99	---	50.53	66.0	15.47	120.0	140.0	H	17.0	16.8
384.03	42.52	---	46.0	3.48	120.0	142.0	H	65.0	17.3
384.03	---	48.81	66.0	17.19	120.0	142.0	H	65.0	17.3
403.2	43.25	---	46.0	2.75	120.0	142.0	H	32.0	17.8
403.2	---	49.53	66.0	16.47	120.0	142.0	H	32.0	17.8
441.59	36.57	---	46.0	9.43	120.0	104.0	H	43.0	19.0
441.59	---	42.75	66.0	23.25	120.0	104.0	H	43.0	19.0
576.03	41.96	---	46.0	4.04	120.0	215.0	H	150.0	21.6
576.03	---	46.85	66.0	19.15	120.0	215.0	H	150.0	21.6
633.59	32.6	---	46.0	13.4	120.0	142.0	H	153.0	23.0
633.59	---	39.5	66.0	26.5	120.0	142.0	H	153.0	23.0
672.03	31.53	---	46.0	14.47	120.0	100.0	V	137.0	23.1
672.03	---	38.81	66.0	27.19	120.0	100.0	V	137.0	23.1
960.04	42.25	---	54.0	11.75	120.0	100.0	H	155.0	27.2
960.04	---	51.02	74.0	22.98	120.0	100.0	H	155.0	27.2

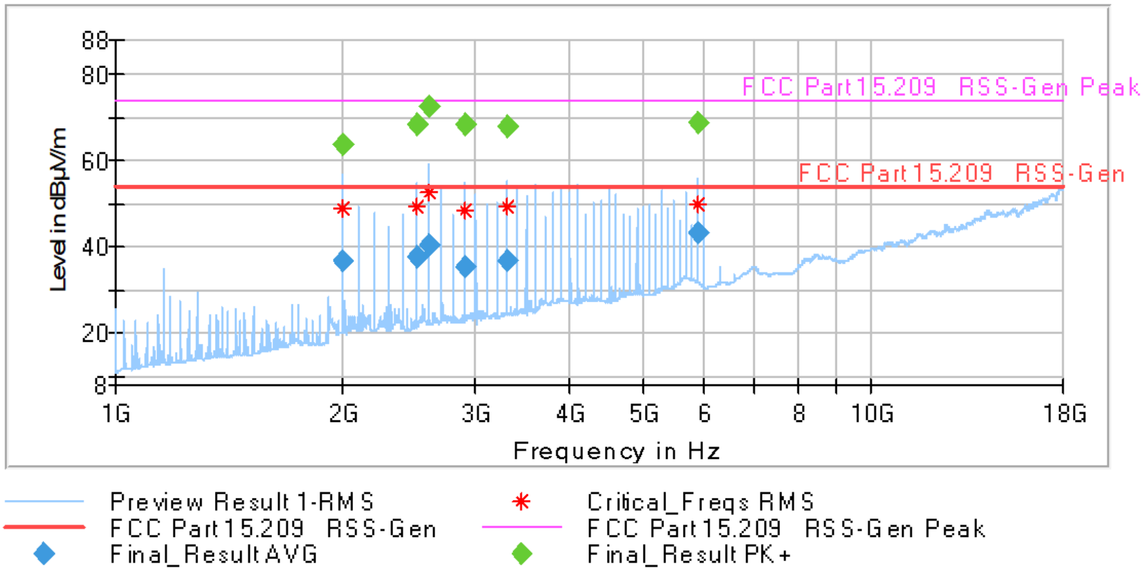
Measurement uncertainty < ± 4 dB
Remarks:
Remark: *[1] Noise level of the measuring instrument ≤ 4.0dBµV@ 10m distance (0.009 MHz –30 MHz) Remark: * Peak Limit according to Section 15.35 (b). Unless otherwise specified, e.g., see §§15.250, 15.252, 15.253(d), 15.255, 15.256, and 15.509 through 15.519 of this part, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test

The equipment passed the performed tests	☒ **Yes**	☐ **No**	☐ **N.t.**[x]
Test setup photos / test results are attached	☒ **Yes**	☐ **No**	Annexe no.: 6

TÜV NORD Hochfrequenztechnik GmbH & Co. KG
LESKANPARK, Gebäude 10, Waltherstr. 49-51, 51069 Köln, Germany
Tel.: +49 221 8888950
hf@tuev-nord.de

EUT: MW 55 Option Bales and Boxes **FCC ID: 2AAX7MW55BB** **FCC Title 47 CFR Part 15** **Date of issue: 2023-09-19**

Radiated emissions above 1 GHz up to 18 GHz (Section 15.209)



Frequency (MHz)	Average (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2000.125	36.94	---	54.0	17.06	1000.0	324.0	H	42.0	33.8
2000.125	---	63.59	74.0	10.41	1000.0	324.0	H	42.0	33.8
2499.875	---	68.47	74.0	5.53	1000.0	144.0	H	313.0	34.9
2499.875	38.0	---	54.0	16.0	1000.0	144.0	H	313.0	34.9
2599.875	40.75	---	54.0	13.25	1000.0	138.0	H	290.0	35.9
2599.875	---	72.86	74.0	1.14	1000.0	138.0	H	290.0	35.9
2900.125	35.46	---	54.0	18.54	1000.0	110.0	H	-29.0	36.0
2900.125	---	68.38	74.0	5.62	1000.0	110.0	H	-29.0	36.0
3299.875	36.85	---	54.0	17.15	1000.0	137.0	H	53.0	37.9
3299.875	---	68.02	74.0	5.98	1000.0	137.0	H	53.0	37.9
5900.125	---	69.03	74.0	4.97	1000.0	380.0	H	113.0	45.6
5900.125	43.4	---	54.0	10.6	1000.0	380.0	H	113.0	45.6

Measurement uncertainty < ± 4 dB
Remarks:

The equipment passed the performed tests	☒ Yes	☐ No	☐ N.t.ˣ
Test setup photos / test results are attached	☒ Yes	☐ No	Annexe no.: 6

V. 1.23

Radiated emissions above 18 GHz up to 40 GHz (Section 15.209)

Measurement uncertainty < ± 4 dB
Remarks:

The equipment passed the performed tests	☒ **Yes**	☐ **No**	☐ **N.t.**[x]

Test setup photos / test results are attached	☒ **Yes**	☐ **No**	Annexe no.: 6

8.5 Radiated emissions above 960 MHz

8.5.1 Regulation

The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

Frequency in MHz	E.i.r.p. in dBm
960-1610	-75.3
1610-1990	-53.3
1990-3100	-51.3
3100-10600	-41.3
Above 10600	-51.3

(d) In addition to the radiated emission limits specified in the table in paragraph (c) of this section, UWB transmitters operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of no less than 1 kHz

Frequency in MHz	E.i.r.p. in dBm
1164-1240	-85.3
1559-1610	-85.3

(e) There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, f_M. That limit is 0 dBm EIRP. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in §15.521.

8.5.2 Test procedure

The following provisions apply when measuring average and peak transmission power levels from any device using UWB technology:

(a) Measurements of radiated emissions at and below 960 MHz are to be made using a CISPR quasi-peak detector.

(b) Measurements of radiated emissions above 960 MHz are to be made using a root-mean-square(RMS) average detector having a 1 MHz resolution bandwidth. The averaging time shall be one millisecond or less.

(c) Peak measurements shall be made in addition to average measurements. Transmissions shall not exceed 0 dBm e.i.r.p. in any 50 MHz bandwidth when the average limit is -41.3 dBm/MHz. This is the equivalent peak limit as calculated by combining the 6 dB peak-to-average conversion with a resolution bandwidth (RBW) scaling factor of 20 log(1 MHz/50 MHz). Only the 50 MHz bandwidth, centred on the frequency fM where the highest power occurs, needs to be measured to satisfy the peak requirements for all frequencies. A different resolution bandwidth and a correspondingly different peak limit may also be used, in which case the RBW may be set anywhere between 1 MHz and 50 MHz. The peak e.i.r.p. limit is then calculated as 20 log(RBW/50) dBm where the RBW is in MHz. This may be converted to a peak field strength level at 3 metres using E(dBuV/m) = P(e.i.r.p.(dBm)) + 95.2. If the RBW is greater than 3 MHz, the application for certification shall contain a detailed description of the test procedure, the calibration of the test set-up and the instrumentation used in the testing.

(d) For a device under test (DUT) with an external modulation connector, the test data used as input into the DUT shall be similar to the data transmitted during normal operation. For UWB communication devices, data patterns for the fixed part of control signals and frame structures shall be used. However, pseudo-random data patterns may be used for the message part of the signal.

(e) If the transmitter uses pulse gating, measurement shall be made with the gating active.

(f) The measurement of average and peak transmission levels for hopped, stepped, sequenced or gated devices shall be repeated over multiple sweeps with the analyzer set for maximum hold until the amplitude stabilizes.

(g) If the UWB device operates using a different number of hopped, stepped or sequenced channels, the device shall comply with the UWB transmission limits under all possible operating conditions.

(h) The highest frequency used to determine the frequency range over which measurements are made (from RSS-Gen provisions for transmitter unwanted emissions) shall be based on the centre frequency (fC). The spectrum shall be investigated from the lowest frequency generated in the UWB transmitter, without going below 9 kHz, to the highest frequency indicated in RSS-Gen or up to fC +3/(pulse width in seconds), whichever is higher.

- If the centre frequency is less than 10 GHz, there is no requirement to measure beyond 40 GHz.
- If the centre frequency is at or above 10 GHz and below 30 GHz, there is no requirement to measure beyond 100 GHz.
- If the centre frequency is at or above 30 GHz, there is no requirement to measure beyond 200 GHz.

(i) For a measurement procedure below 960 MHz and when the reflection from the ground screen cannot be eliminated, the following procedure is to be used:

- Examine the transmission in small frequency segments such that reflections, gains and losses do not vary significantly over the segment.
- For tabletop-sized devices, place the DUT on a non-conducting surface at a height of 80 cm.
- Use conventional device rotation and elevation searches to maximize reception of the transmission.
- Take a measurement.
- Factor in gains and losses and consider the ground screen contribution if applicable.
- Take sufficient measurements both in azimuth and elevation to ascertain that the maximum transmission value has been recorded.
- Repeat at each frequency of interest.

(j) For a measurement procedure above 960 MHz in a semi-anechoic chamber, the floor between the DUT and the receiving antenna is to be treated with an RF absorber to remove the ground screen influence. A scan of the receiving antenna between 1 and 4 metres shall show a maximum emission near the height at which the DUT has been positioned, if the floor has been properly treated. Note that for a free-space measurement, there is no requirement to maintain a height of 80 cm for the DUT. The DUT may be positioned at any height that minimizes reflections from the floor. A highly directional receiving antenna helps in reducing the effect of the ground screen reflection. The measurement shall be recorded without correction for the ground reflection. For tabletop-sized DUT, the following procedure is to be used:

- Place the DUT on a non-conducting surface at an appropriate height.
- The floor between the receiving antenna and the DUT shall be treated with material to absorb RF energy suitable for the frequency range being measured.
- Vary the height of the receiving antenna to verify that reflections from the floor have been minimized. It may be necessary to alter the height of the DUT to achieve the lowest reflections from the floor. The main lobe of the receiving antenna shall not receive a floor reflection. The receiving antenna height is to remain fixed throughout the measurement.
- Take a measurement.
- Factor in the gains and losses. The addition of absorbers in the reflected path eliminates the ground screen contribution.
- Take sufficient measurements both in azimuth and elevation to ensure that the maximum value has been recorded.
- Repeat for each frequency of interest.

(k) The DUT is to be oriented so as to ensure the reception of the maximum radiated signal. Determining this orientation can be made easier by using a non-conductive turntable or other form of positioning system to systematically search for the orientation that provides the maximum response within the measurement system. Regardless of how the orientation is determined, a sufficient number of radials shall be considered to determine the radial at which the maximum response is captured by the measurement system.

(l) A separation distance of three metres shall be used between the transmitting antenna of the DUT and the receiving antenna. In some cases, it may not be possible to measure UWB transmission levels without amplification and/or reducing the separation between the transmitting antenna and the receiving antenna. In such cases, care shall be exercised to maintain the far field condition.

(m) Emissions from digital circuitry (used only to enable the operation of the UWB transmitter and that does not control additional functions or capabilities) shall comply with the average and peak power limits applicable to the UWB transmitter. If it can be clearly demonstrated that an emission from a UWB transmitter is due solely to emissions from digital circuitry contained within the transmitter, and that the emission is not intended to be radiated from the transmitter’s antenna, the limits for emissions from digital circuitry prescribed in RSS-Gen apply to that emission rather than the UWB limits.

(n) Spurious emissions from an UWB receiver are subject to the requirements prescribed in RSS-Gen.

(o) A device using UWB technology that contains digital circuitry not directly associated with the operation of the transmitter is also subject to the requirements for digital circuits prescribed in RSS-Gen.

8.5.3 Calculation of the radiated power

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 : Substituted factor for the measured frequency + cable loss

For using a pre-amplifier the substitution will be accomplished in this configuration

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

For example:
The receiver reading @ 3.45 GHz is -75.5 dBm. The correction factor for the measured frequency is +9.2 dB, giving a radiated power of -66.3dBm (e.i.r.p.).

8.5.4 Result

Test location and equipment

Test site	☒ 660 Semi Anechoic Chamber ☒ 667 ☒ 668 ☒ 669
Receiver	☒ 665 ☒ 666
Antenna	☐ 406 ☒ 442 ☒ 445a ☐ 169
Additional equipment	
Cable	☒ K189 ☒ K191 ☒ K194 ☒ K147

Environmental conditions and operating mode during the test

Environmental conditions	Temperature [°C]	Air pressure [hPa]	Rel. humidity [%]
	22	987	34

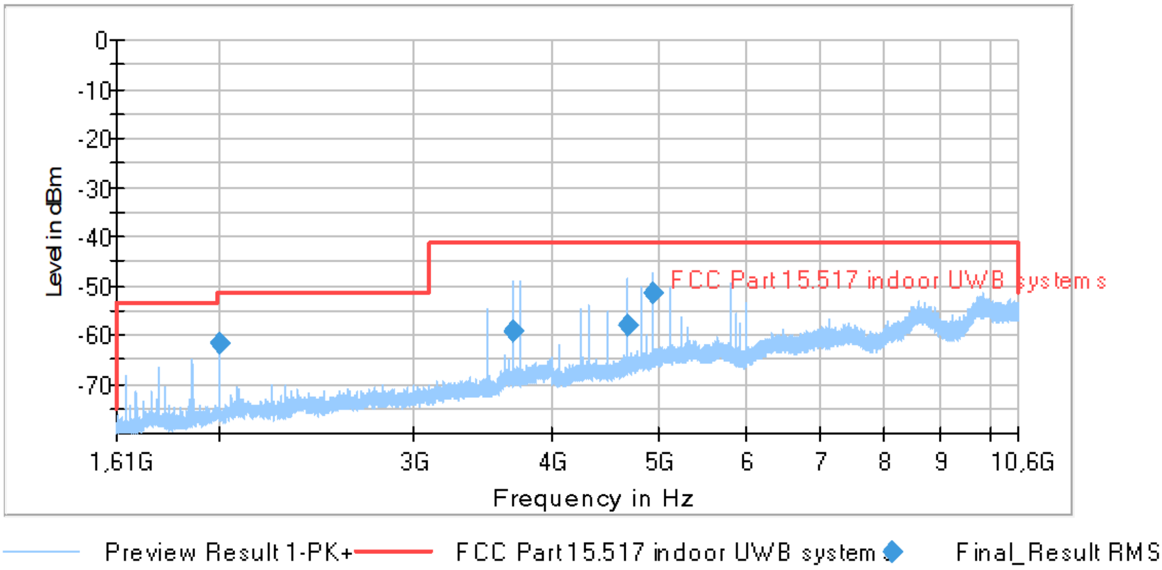
Measurement results

Radiated emissions above 960 MHz (Section 15.517 (c))

Radiated emissions from 960 MHz to 1610 MHz

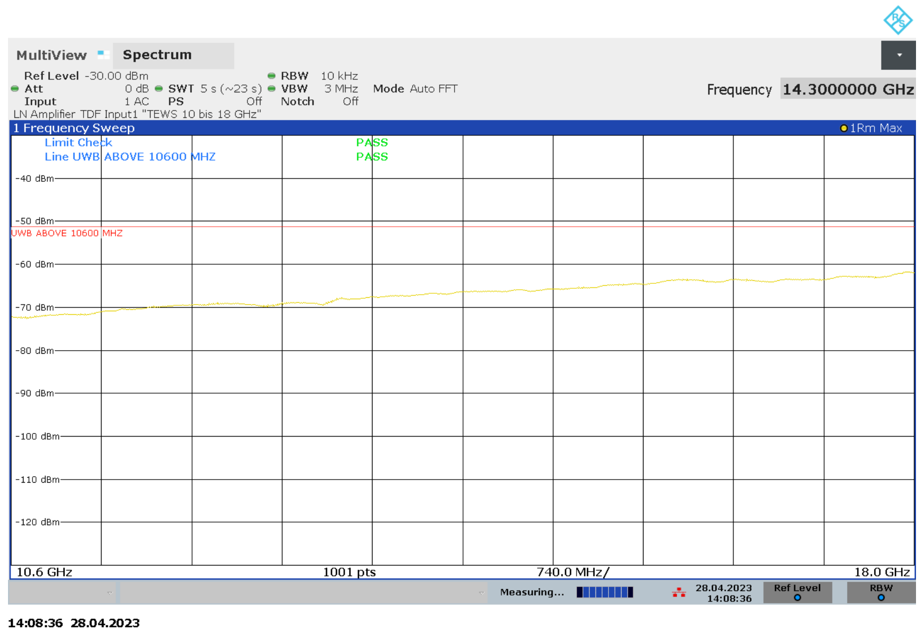
TÜV NORD Hochfrequenztechnik GmbH & Co. KG
LESKANPARK, Gebäude 10, Waltherstr. 49-51, 51069 Köln, Germany
Tel.: +49 221 8888950
hf@tuev-nord.de

Radiated emissions from 1610 MHz to 10600 MHz



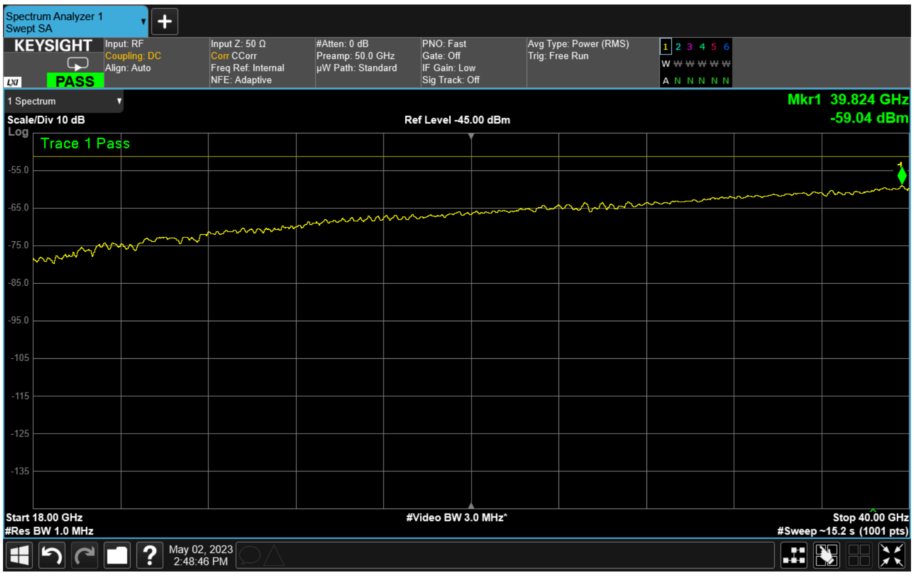
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1997.319167	-61.82	-51.3	10.52	1000.0	100.0	V	83.0	-62.7
3687.439167	-59.07	-41.3	17.77	1000.0	213.0	H	279.0	-54.8
4687.576667	-58.08	-41.3	16.78	1000.0	309.0	V	178.0	-53.3
4937.548611	-51.32	-41.3	10.02	1000.0	154.0	H	241.0	-52.0

Radiated emissions from 10600 MHz to 18000 MHz



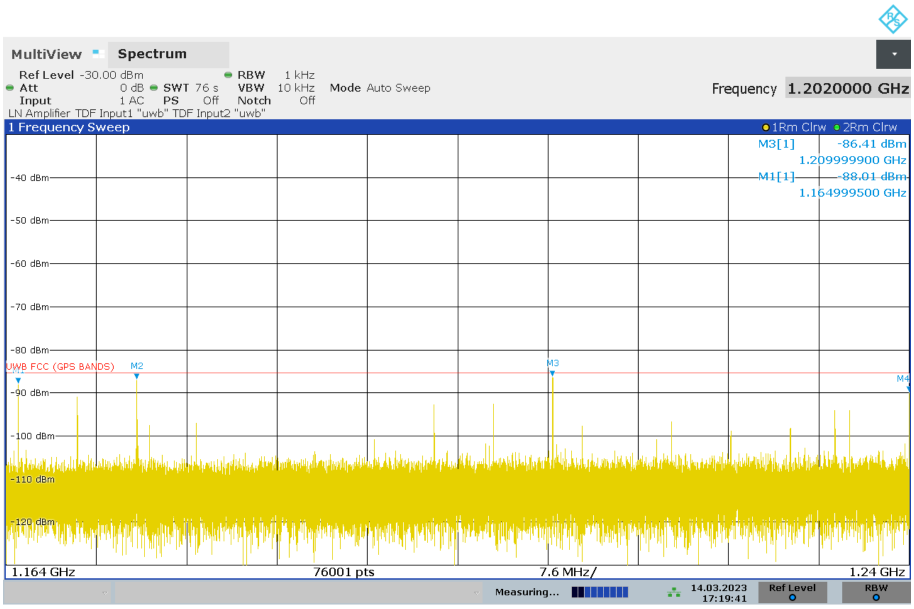
EUT: MW 55 Option Bales and Boxes **FCC ID: 2AAX7MW55BB** **FCC Title 47 CFR Part 15** **Date of issue: 2023-09-19**

Radiated emissions from 18000 MHz to 40000 MHz



Radiated emissions above 960 MHz (Section 15.517 (d))

Radiated emissions from 1164 MHz to 1240 MHz

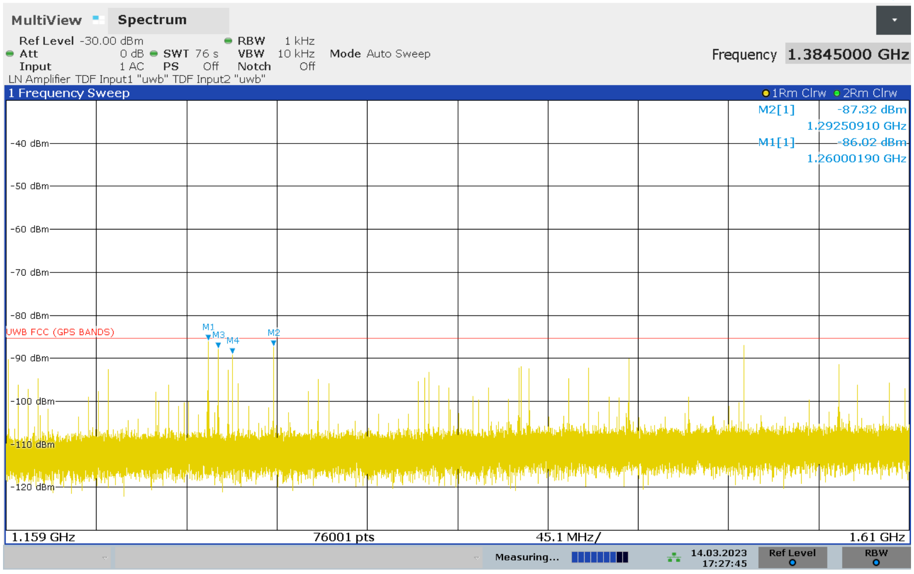


17:19:42 14.03.2023

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1165.00	-87.88	-85.3	2.58	1.0	172.0	H	244.0	37.75
1175.01	-88.51	-85.3	3.21	1.0	172.0	H	244.0	37.95
1210.00	-86.47	-85.3	1.17	1.0	172.0	H	244.0	38.50
1240.00	-89.95	-85.3	4.65	1.0	172.0	H	244.0	38.50

EUT: MW 55 Option Bales and Boxes **FCC ID: 2AAX7MW55BB** **FCC Title 47 CFR Part 15** **Date of issue: 2023-09-19**

Radiated emissions from 1559 MHz to 1610 MHz



17:27:46 14.03.2023

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1260.000	-86.02	-85.3	0.72	1.0	166.0	H	203.0	38.90
1264.233	-87.40	-85.3	2.10	1.0	166.0	H	203.0	38.90
1271.750	-88.75	-85.3	2.02	1.0	166.0	H	203.0	38.88
1292.509	-87.32	-85.3	3.45	1.0	166.0	H	203.0	38.74

Measurement uncertainty < ± 4 dB

The equipment passed the performed tests	☒ **Yes**	☐ **No**	☐ **N.t.x**
Test setup photos / test results are attached	☒ **Yes**	☐ **No**	Annexe no.: 6

8.6 UWB Bandwidth requirement (-10 dB)

8.6.1 Regulation

For the purpose of this subpart, the UWB 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. The upper boundary is designated fH and the lower boundary is designated fL. The frequency at which the highest radiated emission occurs is designated fM.

8.6.2 Test procedure

When occupied bandwidth measurements on an intentional radiator are required, the following procedures of this subclause should be used.

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or the first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical. Once the reference level is established, the equipment is conditioned with typical modulating signals to produce the worst-case (i.e., the widest) bandwidth. If no bandwidth requirement is specified by the procuring or regulatory agency, measure the bandwidth at –26 dB with respect to the reference level.
In order to measure the modulated signal properly, a resolution bandwidth that is small compared with the bandwidth required by the procuring or regulatory agency shall be used on the measuring instrument. However, the resolution bandwidth of the measuring instrument shall be set to a value within 1% to 5% of the signal bandwidth requirements.

8.6.3 Result

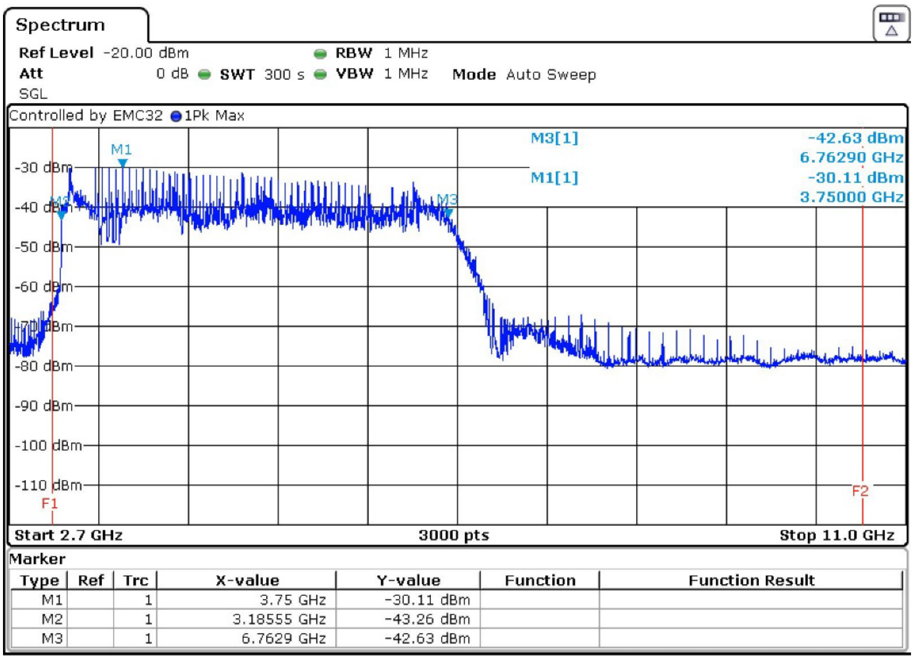
Test location and equipment

Test site	☐ 660 Semi Anechoic Chamber ☐ 667 ☐ 668 ☐ 669
Receiver	☐ 665 ☐ 666 ☒ 502
Antenna	☐ 406 ☐ 442 ☒ 445a ☐ 169
Additional equipment	
Cable	☒ K190 ☐ K193 ☐ K195

Environmental conditions and operating mode during the test

Environmental conditions	Temperature [°C]	Air pressure [hPa]	Rel. humidity [%]
	22	995	33

Measurement results



EUT is set to a start frequency of 3.5 GHz and a stop frequency of 6 GHz

f_H (GHz)	f_L (GHz)	f high (GHz)	f_C(GHz)	-10 dB Bandwidth (GHz)	fractional Bandwidth
3.75	3.19	6.77	4.98	3.58	0.72

The maximum measured -10 dB bandwidth is: 3.58 MHz

Measurement uncertainty < ± 4 dB
Remarks:

The equipment passed the performed tests	☒ **Yes**	☐ **No**	☐ **N.t.[x]**

Test setup photos / test results are attached	☐ **Yes**	☒ **No**	Annexe no.:

TÜV NORD Hochfrequenztechnik GmbH & Co. KG
LESKANPARK, Gebäude 10, Waltherstr. 49-51, 51069 Köln, Germany
Tel.: +49 221 8888950
hf@tuev-nord.de

8.7 Peak Power within a 50 MHz bandwidth

8.7.1 Regulation

There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, f . That limit is 0 dBm EIRP. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in § 15.521.

8.7.2 Test procedure

When a peak measurement is required, it is acceptable to use a resolution bandwidth other than the 50 MHz specified in this subpart. This resolution bandwidth shall not be lower than 1 MHz or greater than 50 MHz, and the measurement shall be centered on the frequency at which the highest radiated emission occurs, f . If a resolution bandwidth other than 50 MHz is employed, the peak EIRP limit shall be 20 log (RBW/50) dBm where RBW is the resolution bandwidth in megahertz that is employed. This may be converted to a peak field strength level at 3 meters using E(dBuV/m) = P(dBm EIRP) + 95.2. If RBW is greater than 3 MHz, the application for certification filed with the Commission must contain a detailed description of the test procedure, calibration of the test setup, and the instrumentation employed in the testing.

8.7.3 Result

Test location and equipment

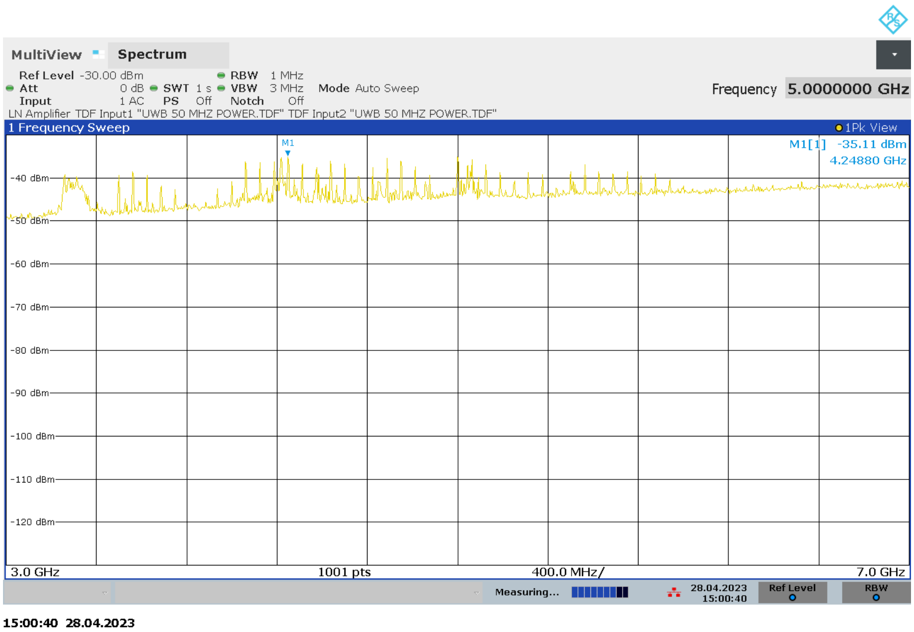
Test site	☒ 660 Semi Anechoic Chamber ☒ 667	 ☒ 668	 ☒ 669	
Receiver	☒ 665	☐ 666		
Antenna	☐ 406	☐ 442	☒ 445a	☐ 169
Additional equipment				
Cable	☒ K189	☒ K191	☒ K194	

Environmental conditions and operating mode during the test

Environmental conditions	Temperature [°C]	Air pressure [hPa]	Rel. humidity [%]
	24	1005	27

Measurement results

Peak Power within a 50 MHz bandwidth



Frequency (MHz)	Raw Peak (dBm)	50 MHz Correction (dB)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
4248.8	-35.11	+34	-1.11	0.0	1.11	1000	150	V	170

Measurement uncertainty < ± 4 dB
Remarks:

The equipment passed the performed tests	☒ Yes	☐ No	☐ N.t.[x]

Test setup photos / test results are attached	☒ Yes	☐ No	Annexe no.: 6

TÜV NORD Hochfrequenztechnik GmbH & Co. KG
LESKANPARK, Gebäude 10, Waltherstr. 49-51, 51069 Köln, Germany
Tel.: +49 221 8888950
hf@tuev-nord.de

9. Additional information to the test report

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

TÜV NORD Hochfrequenztechnik GmbH & Co. KG
LESKANPARK, Gebäude 10, Waltherstr. 49-51, 51069 Köln, Germany
Tel.: +49 221 8888950
hf@tuev-nord.de

10. List of test equipment

State Apr. 25, 2023					
Marking	Manufacturer	SW/Type/Serial-No.	Last Cal./Val.	Next Cal. /Val. (± 1 month)	No.
1 Measuring Instruments					
Attenuator	Radiall	---	Nov 22	Nov 25	62
Attenuator 3dB	Suhner	6803/17	Nov 22	Nov 25	137
Attenuator 3dB / 18 GHz	Suhner	3dB/18GHz	Nov 22	Nov 25	299
Attenuator 6dB / 18 GHz	Suhner	6dB/18GHz	Nov 22	Nov 25	344
Attenuator 20dB / 20GHz	Parzich	40AH-20	Nov 22	Nov 25	354
Terminator	KDI	T173CS	Nov 22	Nov 25	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	Jan 23	Jan 25	156
Absorbing Clamp MDS 30MHz – 1GHz	Lüthi GmbH	MDS-21	Jan 23	Jan 26	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

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	Jan 23	Jan 26	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	Nov 22	Nov 25	374
Fixed Coaxial Attenuator - DC – 18 GHz	Weinschel	23-6-34	Mar 23	Mar 26	375
Attenuator 60 dB (10 MHz – 8 GHz)	---	---	Mar 23	Mar 26	376
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	---	---	Jan 23	Jan 26	493
Terminating resistor 50Ω SMA	---	SC 60-601-0000-31	Jan 23	Jan 26	497
Fixed Attenuator –0 – 40 GHz	Anritsu	41KC-10	Jan 23	Jan 26	504
Fixed Attenuator – 0 – 40 GHz	Anritsu	41KC-10	Jan 23	Jan 26	505
Fixed Attenuator – 0 – 40 GHz	Anritsu	41KC-6	Val. before use	Val. before use	506
Fixed Attenuator – 0 – 40 GHz	Anritsu	41KC-3	Jan 23	Jan 26	507
Electric Dummy Load	RA-NAV Lab.	DA-75U	---	---	526
Power Splitter / Combiner	Mini Circuits	ZESC-2-11	Nov 22	Nov 25	527
3 Way Power Splitter / Combiner	Mini Circuits	ZFSC-3-1	Mar 23	Mar 26	529
3 Way Power Splitter / Combiner	Mini Circuits	ZFSC-3-1	Mar 23	Mar 26	530
RF-Attenuator - 6 dB	Haefely	---	Mar 23	Mar 26	540
RF-Attenuator - 1– 120 MHz | 12 dB	Haefely	---	Mar 23	Mar 26	541
RF-Attenuator - 1– 120 MHz | 39 dB	Haefely	---	Mar 23	Mar 26	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 22	Nov 25	594
Step Attenuator - DC-18 GHz | 0 to 11 dB	Hewlett-Packard	8494B	Nov 22	Nov 25	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 23	Apr 25	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	Jan 22	Jan 24	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

TÜV NORD Hochfrequenztechnik GmbH & Co. KG
LESKANPARK, Gebäude 10, Waltherstr. 49-51, 51069 Köln, Germany
Tel.: +49 221 8888950
hf@tuev-nord.de

2 Generators					
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
Biconical Ant. 20-300 MHz	Schwarzbeck	VHBB 9124 / BBA9106	Jan 23 Factory cal.	Jan 25	692
Biconical Ant. 20-300 MHz	Schwarzbeck	VHBB 9124 / BBA9106	Jan 23 Factory cal.	Jan 25	693
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
Log Per Antenna 0.2 – 3.5 GHz	Schwarzbeck	VUSLP 9111B	Jan 23 Factory cal.	Jan 25	694
Log Per Antenna 0.2 – 3.5 GHz	Schwarzbeck	VUSLP 9111B	Jan 23 Factory cal.	Jan 25	695
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
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	Val. before use	Val. before use	432
Temperature test cabinet	Heraeus Vötsch	VMT04/35	---	---	102a
Temperature test cabinet	Brabender	TTE 32/40 H	---	---	87
Digital-Hygro-Thermometer	Greisinger	GFTH95	Feb 23	Feb 25	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
Spectrum Analyzer - 9 kHz – 18 GHz	Rohde & Schwarz	FSL18	Cal. before use	Cal. before use	171a
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	Jan 22	Jan 25	558
Digital Storage Oscilloscope	Tektronix	TDS 2012C	Nov 22	Nov 24	568
Miniature Flat, Zero-Biased Schottky Detector –0.1– 18 GHz	Narda	4503A-03	Val. before use	Val. before use	613
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

TÜV NORD Hochfrequenztechnik GmbH & Co. KG
LESKANPARK, Gebäude 10, Waltherstr. 49-51, 51069 Köln, Germany
Tel.: +49 221 8888950
hf@tuev-nord.de

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	---	---	---

TÜV NORD Hochfrequenztechnik GmbH & Co. KG
LESKANPARK, Gebäude 10, Waltherstr. 49-51, 51069 Köln, Germany
Tel.: +49 221 8888950
hf@tuev-nord.de

11. 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
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

Internal Cable Number	Connector Type	Frequency Range (MHz)	Cable Length (m)	Manufacturer
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	---

TÜV NORD Hochfrequenztechnik GmbH & Co. KG
LESKANPARK, Gebäude 10, Waltherstr. 49-51, 51069 Köln, Germany
Tel.: +49 221 8888950
hf@tuev-nord.de

End of test report

TÜV NORD Hochfrequenztechnik GmbH & Co. KG
LESKANPARK, Gebäude 10, Waltherstr. 49-51, 51069 Köln, Germany
Tel.: +49 221 8888950
hf@tuev-nord.de