

<b>Prüfbericht-Nr.:</b> <i>Test report no.:</i>	<b>CN24SXE8 001</b>	<b>Auftrags-Nr.:</b> <i>Order no.:</i>	<b>326063152</b>	<b>Seite 1 von 18</b> <i>Page 1 of 18</i>
<b>Kunden-Referenz-Nr.:</b> <i>Client reference no.:</i>	<b>1288983</b>	<b>Auftragsdatum:</b> <i>Order date:</i>	<b>2024-11-14</b>	
<b>Auftraggeber:</b> <i>Client:</i>	<b>IKEA of Sweden AB</b> Box 702, SE-343 81, Älmhult, Sweden			
<b>Prüfgegenstand:</b> <i>Test item:</i>	<b>Water Leakage Sensor</b>			
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type no.:</i>	<b>E2493</b>			
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	<b>TÜV Rheinland EMC service</b>			
<b>Prüfgrundlage:</b> <i>Test specification:</i>	<b>FCC 47 CFR Part 15, Subpart B:2023 Class B</b> <b>ICES-003:2020</b>			
<b>Wareneingangsdatum:</b> <i>Date of sample receipt:</i>	<b>2024-11-15</b>	Refer to the EUT photos file		
<b>Prüfmuster-Nr.:</b> <i>Test sample no.:</i>	<b>A003864150-011~012</b>			
<b>Prüfzeitraum:</b> <i>Testing period:</i>	<b>Refer to test report</b>			
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	<b>Refer to clause 1.1</b>			
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	<b>TÜV Rheinland (Shanghai) Co., Ltd.</b>			
<b>Prüfergebnis*:</b> <i>Test result*:</i>	<b>Pass</b>			
<b>geprüft von:</b> <i>tested by:</i>	<b>genehmigt von:</b> <i>authorized by:</i>			
<b>Datum:</b> <i>Date:</i> 2025-01-22	<i>Xuelan Zhang</i>		<b>Ausstellungsdatum:</b> <i>Issue date:</i> 2025-01-22	<i>Jacky Chen</i>
<b>Stellung / Position:</b>	<b>Project engineer</b>	<b>Stellung / Position:</b>	<b>Authorizer</b>	
<b>Sonstiges /</b> <i>Other:</i>	FCC ID: FHO-E2493 IC: 10912A-E2493 Test Firm Name: TUV Rheinland (Shanghai) Co., Ltd. Designation Number: CN1396 Test Firm Registration Number: 930979			
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>	<b>Prüfmuster vollständig und unbeschädigt</b> <i>Test item complete and undamaged</i>			
* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
* Legend:	P(ass) = passed a.m. test specification(s)	F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested
<b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b> <i>This test report only relates to the above mentioned test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

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**Anmerkungen**  
Remarks

1	<p>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben. Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</p> <p><i>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system.</i></p> <p><i>Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i></p>
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3	<p>Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.</p> <p><i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.</i></p> <p><i>Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i></p>
4	<p>Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019.</p> <p><i>The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</i></p>

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**Revision history of test report:**

<b>Report number</b>	<b>Issue date</b>	<b>Contents and reason for change if appropriate</b>
CN24SXE8 001	2025-01-22	Initial release.

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## **1 Test Sites**

### **1.1 Test Facilities**

**Laboratory: TÜV Rheinland (Shanghai) Co., Ltd.**

**Address: Workshop14, North Half of Workshop 10 and Workshop 16, Pingqian (Taicang) Modern Industrial Park, No.525, Yuewang Lingang South Road, Shaxi, Taicang, Jiangsu, China**

The used test equipment is in accordance with CISPR 16-1 series standards for measurement of radio interference.

Refer to Clause 6 for test and measurement instruments.

## **2 General Product Information**

### **2.1 Product Function and Intended Use**

The EUT (equipment under test) is water leakage sensor. For the further information, refer to the user's manual.

### **2.2 Ratings and System Details**

Rated input : 2xAAA  
Protection class : III

### **2.3 Independent Operation Modess**

The basic operation mode is water leakage mode by 2.4 GHz wireless connection.

### **2.4 Description of interconnecting cables**

None.

### **2.5 Noise Generating and Noise Suppressing Parts**

Refer to the circuit diagram for further information.

### **2.6 Highest frequency generated or used in the device or on which the device operates or tunes**

The highest frequency used in the EUT is 2.4 GHz.

### **2.7 Submitted Documents**

Circuit diagram, PCB layout and rating label.

### 3 Test Set-up and Operation Modes

#### 3.1 Principle of Configuration Selection

**Emission:** The equipment under test (EUT) was configured to measure its highest possible emission level. The test conditions were adapted accordingly in reference to the instructions for use.

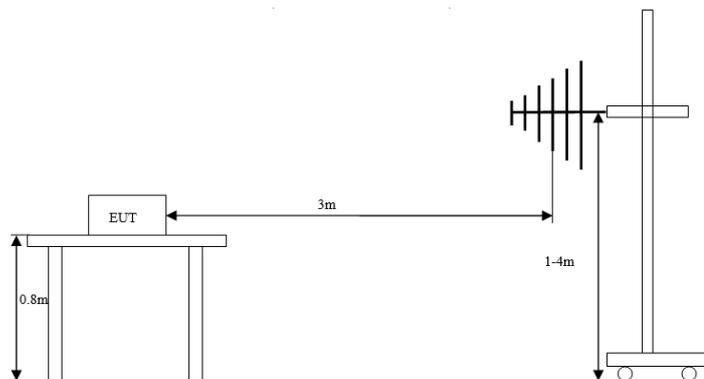
Refer to the related paragraph of this report.

The sequence of testing:

1. Radiated emission tests were performed on 2024-12-17.

#### 3.2 Equipment and cable arrangement

Block diagram for radiated emission tests is as follows:



(Radiated emission)

Also refer to photographs on attachment 1 for test setups for radiated emission test.

#### 3.3 Test Software

During the tests, the app HOMEsmart was used.

#### 3.4 Special Accessories and Auxiliary Equipment

During the tests, the below equipment were used.

No.	Equipment	Model	Manufacturer
1	Mobile phone	iPhone 15	Apple
2	Loudspeaker	HomePod mini	Apple
3	DIRIGERA hub	OB5E3D	IKEA
4	Wifi router	B311B-853	HUAWEI

### **3.5 Countermeasures to achieve EMC Compliance**

No other special measure is employed to achieve the requirement.

## **4 Conformity Decision Rule**

For all EMI tests included in this report, as measurement uncertainties are less than the values  $U_{\text{CISPR}}$  given in CISPR 16-4-2, compliance with the limits is determined by comparing measurement results directly with corresponding limits without taking into consideration of measurement uncertainties.

## 5 Test Results EMISSION

### 5.1 Emission in the Frequency Range above 30 MHz

#### 5.1.1 Radiated emission (30 MHz - 1 GHz)

<b>Result:</b>	<b>Passed</b>
----------------	---------------

Date of testing	: 2024-12-17
Test procedure	: FCC 47 CFR Part 15, Subpart B:2023, ICES-003:2020, ANSI C63.4-2014 and CISPR 16-2-3
Frequency range	: 30 – 1000 MHz
Limits	: Quasi-peak limits (3 m distance): 30 – 88 MHz, 40 dB $\mu$ V/m; 88 – 216 MHz, 43.5 dB $\mu$ V/m; 216 – 1000 MHz, 46 dB $\mu$ V/m (see Note 1)
Bandwidth of EMI receiver for final measurement	: 120 kHz
Measurement time for final measurement	: 1 s
Kind of test site	: Semi-anechoic chamber
Operational mode	: Mode as defined in clause 2.3.
Input voltage	: 2xAAA
Ambient condition	: Temperature: 20.2 °C; Relative humidity: 44.8 %
Expanded measurement uncertainty ( $k=2$ )	: 5.4 dB The minimum margin to the limit is 11.7 dB at 33.758750 MHz. The margin is higher than expanded measurement uncertainty.

The radiated disturbance test was carried out in a semi-anechoic chamber. The test distance from the receiving antenna to the EUT is 3 m. The normalized site attenuation of the semi-anechoic chamber is regularly calibrated to ensure the radiated disturbance test results are valid. During the test, the EUT was placed on a 0.8 m high wooden table above the reference ground plane. The wooden table was rotated 360° around and the height of the antenna was varied from 1 m to 4 m to find the maximum disturbance. The test was performed with the antenna both in its horizontal and vertical polarizations.

The following figures and tables were those measured by an automatic measurement system. A preview test was firstly performed with peak detector. The final test was performed with quasi-peak at those critical frequencies during the preview test. In the following spectral diagram, “x” means quasi-peak test results.

Notes on following tables of radiated emission results and conversions:

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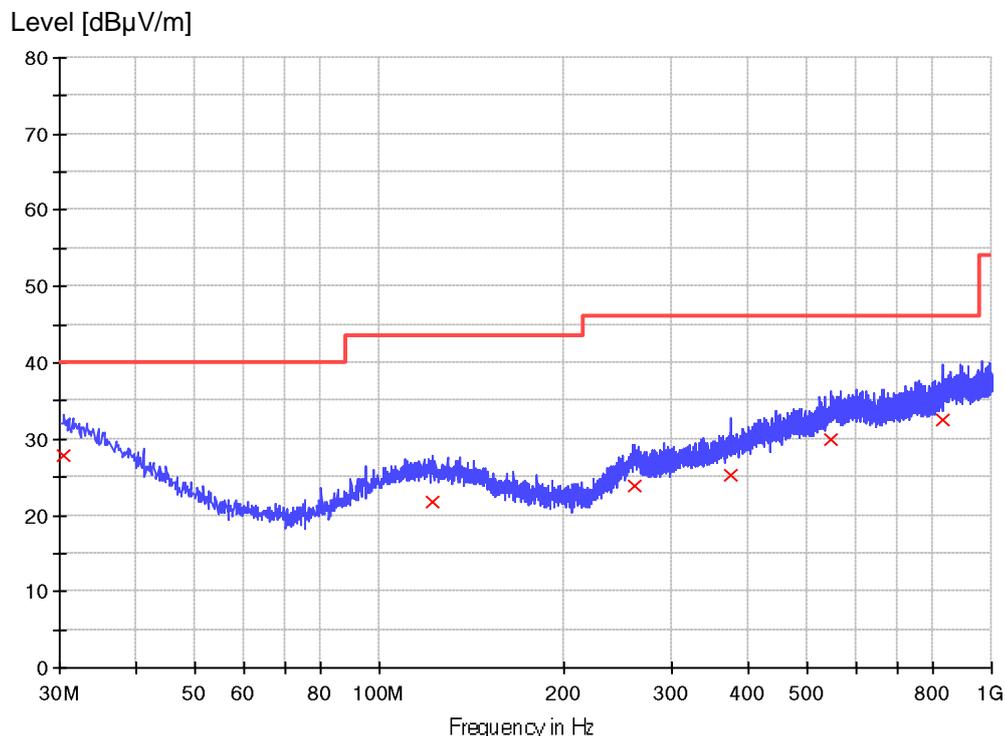
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QuasiPeak (dB $\mu$ V/m): final measurement results by using quasi-peak detector

Corr. (dB): correction factor including: antenna factor, cable loss, and gain of pre-amplifier (if used)

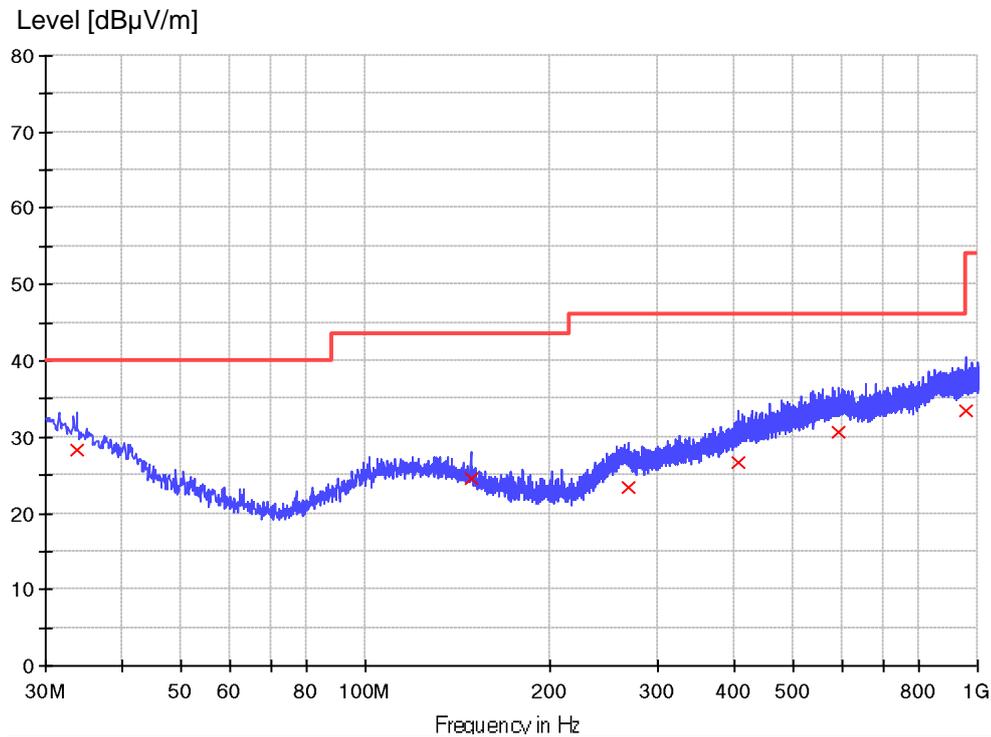
Margin: Limit (dB $\mu$ V/m) - QuasiPeak (dB $\mu$ V/m)

**Figure 1: Spectral Diagrams and measurement results, horizontal polarization (30 MHz to 1 GHz)**



Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµ/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµ/m)
30.485000	27.8	120.000	130	H	-9	24.6	12.2	40.0
122.392500	21.8	120.000	110	H	-127	18.8	21.7	43.5
260.496250	23.9	120.000	100	H	-81	20.8	22.1	46.0
373.865000	25.4	120.000	150	H	11	22.2	20.7	46.0
546.161250	30.0	120.000	120	H	69	26.6	16.0	46.0
832.917500	32.6	120.000	150	H	-74	28.6	13.4	46.0

**Figure 2: Spectral Diagrams and measurement results, vertical polarization (30 MHz to 1 GHz)**

**Final Quasi-peak measurement result:**

Frequency (MHz)	QuasiPeak (dBµ/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµ/m)
33.758750	28.3	120.000	100	V	87	23.1	11.7	40.0
148.340000	24.6	120.000	110	V	104	17.7	18.9	43.5
268.862500	23.3	120.000	140	V	7	20.2	22.7	46.0
407.572500	26.7	120.000	150	V	-58	23.4	19.4	46.0
594.176250	30.6	120.000	120	V	140	26.8	15.4	46.0
953.561250	33.5	120.000	110	V	63	29.4	12.5	46.0

### 5.1.2 Radiated emission (Above 1 GHz)

<b>Result:</b>	<b>Passed</b>
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Date of testing	: 2024-12-17
Port	: Enclosure
Test procedure	: FCC 47 CFR Part 15, Subpart B:2023, ANSI C63.4-2014 and CISPR 16-2-3 ICES-003:2020
Limit	: Above 1 GHz, Peak limit: 74 dB $\mu$ V/m; Average limit: 54 dB $\mu$ V/m
Frequency range	: 1-18 GHz Note: The highest frequency in the EUT is 2.4 GHz. According to FCC Part 15 subpart B §15.33 (b) (1), the upper frequency for radiated emission measurement is 12 GHz. The actual test frequency is up to 18 GHz.
Bandwidth of EMI receiver for final measurement	: 1000 kHz
Measurement time for final measurement	: 1 s
Test distance	: 3 m
Kind of test site	: Semi-anechoic chamber
Operational mode	: Mode as defined in clause 2.3.
Input voltage	: 2xAAA
Earthing	: No earthing
Ambient condition	: Temperature: 20.2 °C; Relative humidity: 44.8 %
Expanded measurement uncertainty ( $k=2$ )	: 5.08 dB (1-6 GHz) 5.21 dB (6-18 GHz) The minimum margin to the limit is 7.6 dB at 17974.500000 MHz. The margin is higher than expanded measurement uncertainty.

The radiated disturbance test was carried out in a semi-anechoic chamber. The test distance from the receiving antenna to the EUT is 3 m. The normalized site attenuation of the semi-anechoic chamber is regularly calibrated to ensure the radiated disturbance test results are valid. During the test, the EUT was placed on a poly table, which is 0.8 m high. The wooden table was rotated 360° around and the antenna was varied from 1 m to 4 m to find the maximum disturbance. The test was performed with the antenna both in its horizontal and vertical polarizations.

The following figures and tables were those measured by an automatic measurement system. The final test was performed with peak detector and average detector at those critical frequencies during the preview test. In the following figure, “x(red)” means measurement results with peak detector and “+ (blue)” means measurement results with average detector.

Notes on following tables of radiated emission results and conversions:

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Peak (dB $\mu$ V/m): final measurement results by using peak detector

Average (dB $\mu$ V/m): final measurement results by using average detector

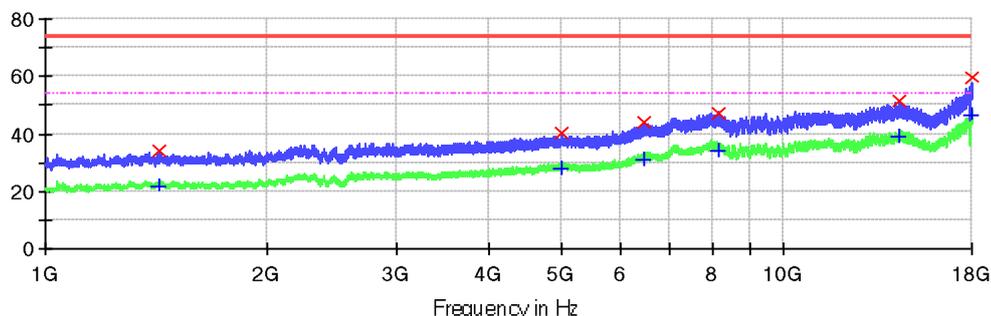
Corr. (dB): correction factor including: antenna factor, cable loss, and gain of pre-amplifier (if used)

Margin: Limit PK (dB $\mu$ V/m) - Peak (dB $\mu$ V/m)

Limit CAV (dB $\mu$ V/m) – Average (dB $\mu$ V/m)

Figure 3: Spectral Diagrams and measurement results, 1-18 GHz, horizontal polarization

Level [dBμV/m]



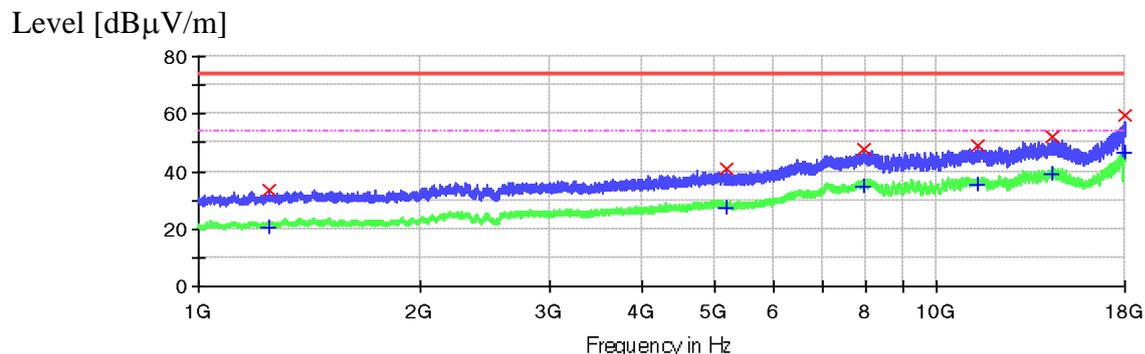
Final Peak measurement results:

Frequency (MHz)	MaxPeak (dBμ/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBμ/m)
1429.781250	34.0	1000.000	100.0	H	-179.0	-18.6	40.0	74.0
5008.281250	40.5	1000.000	100.0	H	-179.0	-11.0	33.5	74.0
6488.343750	44.1	1000.000	100.0	H	-179.0	-7.7	29.9	74.0
8180.375000	47.2	1000.000	100.0	H	-179.0	-4.6	26.8	74.0
14384.312500	51.7	1000.000	100.0	H	-179.0	2.3	22.3	74.0
17970.781250	59.4	1000.000	100.0	H	-179.0	11.9	14.6	74.0

Final Average measurement results:

Frequency (MHz)	Average (dBμ/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBμ/m)
1429.781250	21.5	1000.000	100.0	H	-179.0	-18.6	32.5	54.0
5008.281250	27.7	1000.000	100.0	H	-179.0	-11.0	26.3	54.0
6488.343750	31.1	1000.000	100.0	H	-179.0	-7.7	22.9	54.0
8180.375000	34.2	1000.000	100.0	H	-179.0	-4.6	19.9	54.0
14384.312500	39.1	1000.000	100.0	H	-179.0	2.3	14.9	54.0
17970.781250	46.3	1000.000	100.0	H	-179.0	11.9	7.7	54.0

**Figure 4: Spectral Diagrams and measurement results, 1-18 GHz, vertical polarization**



**Final Peak measurement results:**

Frequency (MHz)	MaxPeak (dBµV/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
1244.906250	33.5	1000.000	100.0	V	179.0	-19.4	40.5	74.0
5201.656250	40.7	1000.000	100.0	V	179.0	-11.4	33.3	74.0
7971.593750	48.0	1000.000	100.0	V	179.0	-3.6	26.0	74.0
11372.125000	48.8	1000.000	100.0	V	179.0	-2.4	25.2	74.0
14354.031250	52.0	1000.000	100.0	V	179.0	2.2	22.0	74.0
17974.500000	59.4	1000.000	100.0	V	179.0	11.9	14.7	74.0

**Final Average measurement results:**

Frequency (MHz)	Average (dBµV/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
1244.906250	20.8	1000.000	100.0	V	179.0	-19.4	33.2	54.0
5201.656250	27.3	1000.000	100.0	V	179.0	-11.4	26.7	54.0
7971.593750	35.0	1000.000	100.0	V	179.0	-3.6	19.0	54.0
11372.125000	35.6	1000.000	100.0	V	179.0	-2.4	18.4	54.0
14354.031250	38.9	1000.000	100.0	V	179.0	2.2	15.2	54.0
17974.500000	46.4	1000.000	100.0	V	179.0	11.9	7.6	54.0

## 6 List of Test and Measurement Instruments

Equip.	Description	Model	Manufacturer	Last Date DD.MM.YYYY	Due Date DD.MM.YYYY
G1811378	3m semi-anechoic chamber	SAC3	Frankonia	03.12.2023	03.12.2026
G1811391	EMI test receiver	ESCI	Rohde&Schwarz	17.10.2024	17.10.2025
G1811425	Bilog antenna	CBL 6112D	Teseq	20.04.2023	20.04.2026
9062745	EMI measurement software	EMC32-MEB (10.60.20)	Rohde&Schwarz	N/A	N/A
9042162	EMI test receiver	ESR7	Rohde&Schwarz	05.02.2024	05.02.2025
9053499	Signal conditioning unit	SCU18F	Rohde & Schwarz	11.10.2024	11.10.2025
G1822702	Spectrum analyser	FSV40	Rohde&Schwarz	15.07.2024	15.07.2025
G1825371	Preamplifier	EMC051845SE	Taiwan EMCI	24.07.2024	24.07.2025
G1822694	Double ridged broadband horn antenna	BBHA 9120 D	Schwarzbeck	24.03.2021	24.03.2026

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**End of test report**