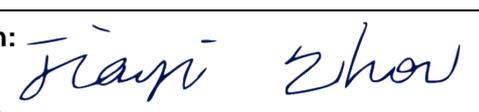


Prüfbericht-Nr.: <i>Test report no.:</i>	CN24TWNK 001	Auftrags-Nr.: <i>Order no.:</i>	326061214	Seite 1 von 18 <i>Page 1 of 18</i>
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	1288983	Auftragsdatum: <i>Order date:</i>	2024-11-04	
Auftraggeber: <i>Client:</i>	IKEA of Sweden AB Box 702, SE-343 81, Älmhult, Sweden			
Prüfgegenstand: <i>Test item:</i>	Door Window Sensor			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	E2492			
Auftrags-Inhalt: <i>Order content:</i>	TÜV Rheinland EMC service			
Prüfgrundlage: <i>Test specification:</i>	FCC 47 CFR Part 15, Subpart B:2023 Class B ICES-003:2020			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2024-11-04	Refer to the EUT photos file		
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003851692-003			
Prüfzeitraum: <i>Testing period:</i>	Refer to test report			
Ort der Prüfung: <i>Place of testing:</i>	Refer to clause 1.1			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shanghai) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i>	genehmigt von: <i>authorized by:</i>			
Datum: <i>Date:</i>	2025-01-22	Ausstellungsdatum: <i>Issue date:</i>	2025-01-22	
Stellung / Position:	Project engineer	Stellung / Position:	Authorizer	
Sonstiges / <i>Other:</i>	FCC ID: FHO-E2492 IC: 10912A-E2492 Test Firm Name: TÜV Rheinland (Shanghai) Co., Ltd. Designation Number: CN1396 Test Firm Registration Number: 930979			
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt Test item complete and undamaged			
* 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
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. <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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Test report no.:

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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:

Report number	Issue date	Contents and reason for change if appropriate
CN24TWNK 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 door window sensor. For the further information, refer to the user's manual.

2.2 Ratings and System Details

Rated input : 1xAAA
Protection class : III

2.3 Independent Operation Modess

The basic operation mode is on by 2.4 GHz by thread, Zigbee and BLE 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.

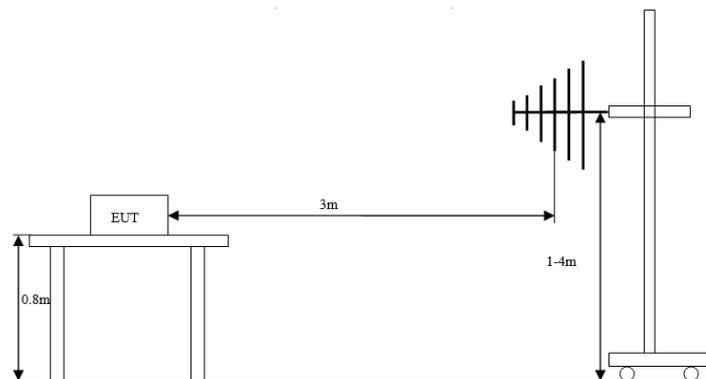
Refer to the related paragraph of this report.

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

No special test software was used during the tests.

3.4 Special Accessories and Auxiliary Equipment

During the tests, the below equipment were used.

No.	Equipment	Model	Manufacturer
1	LED lamp	KR722	-

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_{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)

Result:	Passed
----------------	---------------

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 μ V/m; 88 – 216 MHz, 43.5 dB μ V/m; 216 – 1000 MHz, 46 dB μ 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	: Power on with wireless connection
Input voltage	: 1xAAA
Ambient condition	: Temperature: 20.5 °C; Relative humidity: 45 %
Expanded measurement uncertainty ($k=2$)	: 5.4 dB The minimum margin to the limit is 12.0 dB at 30.121250 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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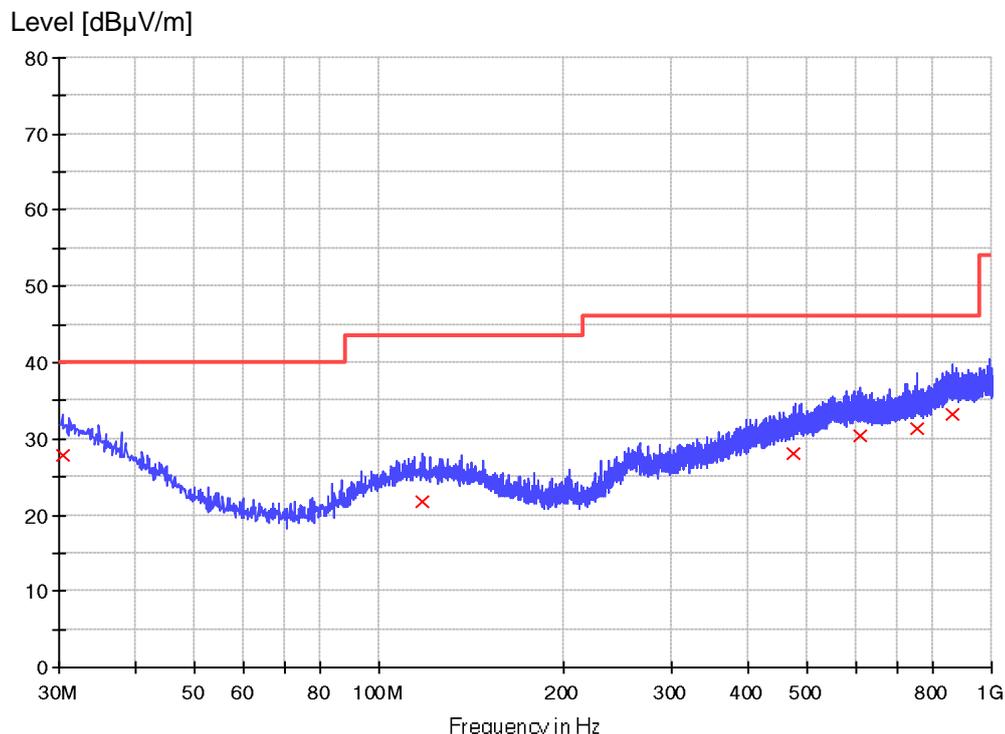
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QuasiPeak (dB μ V/m): final measurement results by using quasi-peak detector

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

Margin: Limit (dB μ V/m) - QuasiPeak (dB μ V/m)

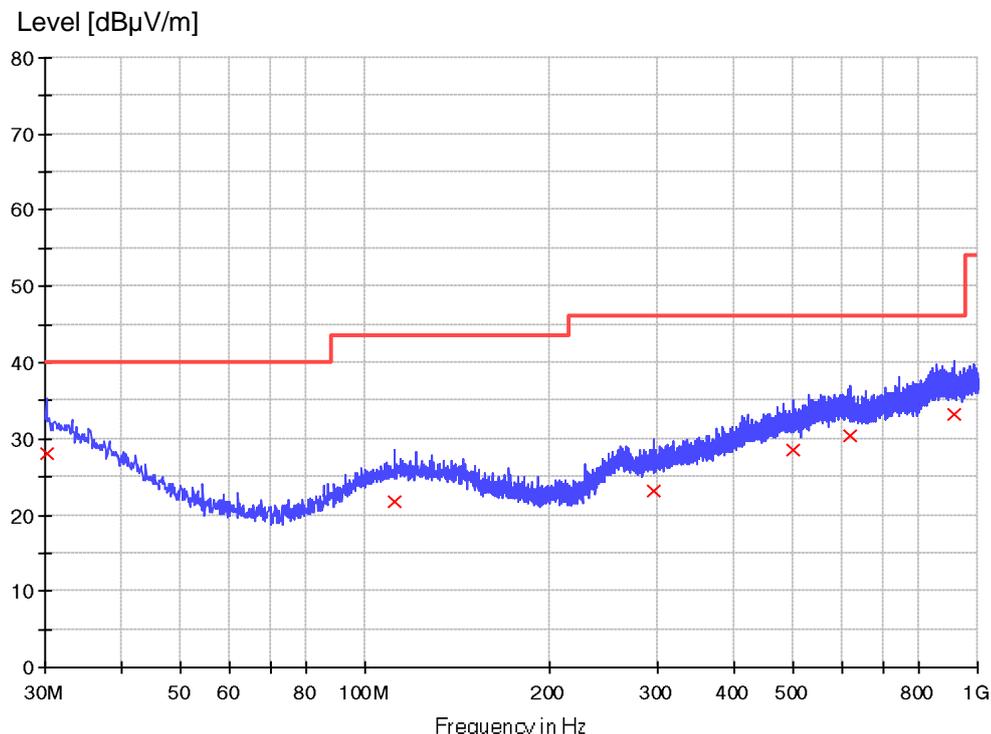
Figure 1: Spectral Diagrams and measurement results, horizontal polarization (30 MHz to 1 GHz)



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)
30.363750	27.9	120.000	150.0	H	-138.0	24.6	12.1	40.0
117.663750	21.8	120.000	110.0	H	91.0	18.9	21.7	43.5
473.290000	28.2	120.000	120.0	H	-114.0	24.9	17.8	46.0
610.423750	30.5	120.000	150.0	H	6.0	27.0	15.6	46.0
755.075000	31.4	120.000	140.0	H	16.0	27.9	14.6	46.0
864.806250	33.3	120.000	150.0	H	-73.0	28.8	12.7	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)
30.121250	28.0	120.000	130.0	V	-78.0	24.7	12.0	40.0
111.843750	21.7	120.000	110.0	V	103.0	18.7	21.8	43.5
295.295000	23.2	120.000	140.0	V	158.0	20.2	22.8	46.0
498.631250	28.5	120.000	140.0	V	38.0	25.2	17.5	46.0
620.366250	30.3	120.000	150.0	V	-19.0	26.9	15.7	46.0
916.216250	33.1	120.000	120.0	V	-43.0	28.7	12.9	46.0

5.1.2 Radiated emission (Above 1 GHz)

Result:	Passed
----------------	---------------

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 μ V/m; Average limit: 54 dB μ 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	: Power on with wireless connection
Input voltage	: 1xAAA
Earthing	: No earthing
Ambient condition	: Temperature: 20.5 °C; Relative humidity: 45 %
Expanded measurement uncertainty ($k=2$)	: 5.08 dB (1-6 GHz) 5.21 dB (6-18 GHz) The minimum margin to the limit is 7.9 dB at 17966.531250 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 μ V/m): final measurement results by using peak detector

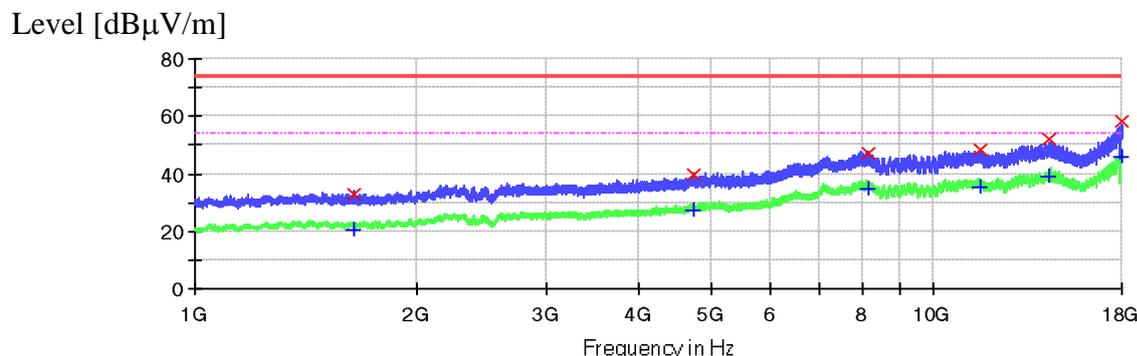
Average (dB μ V/m): final measurement results by using average detector

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

Margin: Limit PK (dB μ V/m) - Peak (dB μ V/m)

Limit CAV (dB μ V/m) – Average (dB μ V/m)

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



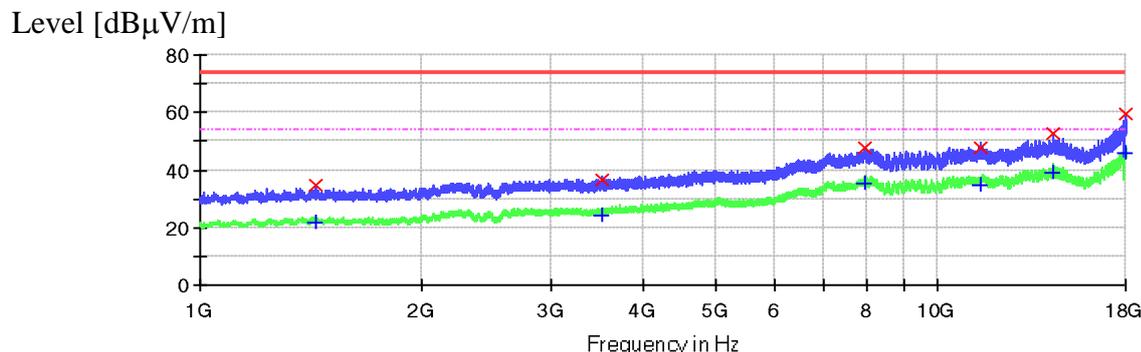
Final Peak measurement results:

Frequency (MHz)	MaxPeak (dBµ/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBµ/m)
1642.812500	33.0	1000.000	100.0	H	180.0	-19.0	41.0	74.0
4738.406250	39.6	1000.000	100.0	H	180.0	-11.5	34.4	74.0
8145.312500	47.4	1000.000	100.0	H	180.0	-4.4	26.7	74.0
11552.750000	48.5	1000.000	100.0	H	180.0	-1.8	25.5	74.0
14391.218750	51.9	1000.000	100.0	H	180.0	2.3	22.1	74.0
17960.156250	58.2	1000.000	100.0	H	180.0	11.7	15.8	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)
1642.812500	20.7	1000.000	100.0	H	180.0	-19.0	33.3	54.0
4738.406250	27.1	1000.000	100.0	H	180.0	-11.5	26.9	54.0
8145.312500	34.5	1000.000	100.0	H	180.0	-4.4	19.5	54.0
11552.750000	35.4	1000.000	100.0	H	180.0	-1.8	18.6	54.0
14391.218750	38.9	1000.000	100.0	H	180.0	2.3	15.1	54.0
17960.156250	45.7	1000.000	100.0	H	180.0	11.7	8.3	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)
1438.812500	34.5	1000.000	100.0	V	-179.0	-18.6	39.5	74.0
3501.125000	36.9	1000.000	100.0	V	-179.0	-14.4	37.1	74.0
7972.656250	48.0	1000.000	100.0	V	-179.0	-3.6	26.0	74.0
11475.718750	47.7	1000.000	100.0	V	-179.0	-1.9	26.3	74.0
14386.437500	52.6	1000.000	100.0	V	-179.0	2.3	21.4	74.0
17966.531250	59.2	1000.000	100.0	V	-179.0	11.8	14.8	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)
1438.812500	21.5	1000.000	100.0	V	-179.0	-18.6	32.5	54.0
3501.125000	24.3	1000.000	100.0	V	-179.0	-14.4	29.7	54.0
7972.656250	35.2	1000.000	100.0	V	-179.0	-3.6	18.8	54.0
11475.718750	34.7	1000.000	100.0	V	-179.0	-1.9	19.3	54.0
14386.437500	39.1	1000.000	100.0	V	-179.0	2.3	14.9	54.0
17966.531250	46.1	1000.000	100.0	V	-179.0	11.8	7.9	54.0

6 List of Test and Measurement Instruments

Equip.	Description	Model	Manufacturer	Last Date	Due Date
				DD.MM.YYYY	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