Prüfbericht-Nr.: *Test report no.*:	**CN24YJGW 001**	**Auftrags-Nr.:** *Order no.*:	**326016601**	**Seite 1 von 18** *Page 1 of 18*
Kunden-Referenz-Nr.: *Client reference no.*:	**1288983**	**Auftragsdatum:** *Order date:*	**2024-04-22**	
Auftraggeber: *Client*:	**IKEA of Sweden AB** Box 702, SE-343 81, Älmhult, Sweden			
Prüfgegenstand: *Test item*:	**TIMMERFLOTTE (Temperature and Humidity sensor)**			
Bezeichnung / Typ-Nr.: *Identification / Type no.*:	**E2314**			
Auftrags-Inhalt: *Order content*:	**TÜV Rheinland EMC service**			
Prüfgrundlage: *Test specification*:	**FCC 47 CFR Part 15, Subpart B:2022 Class B** **ICES-003:2020**			
Wareneingangsdatum: *Date of sample receipt*:	**2024-05-20**	**Please refer to Photo Document**		
Prüfmuster-Nr.: *Test sample no:*	**A003734218-001/002/003**			
Prüfzeitraum: *Testing period*:	**Refer to test report**			
Ort der Prüfung: *Place of testing*:	**Refer to clause 1.1**			
Prüflaboratorium: *Testing laboratory:*	**TÜV Rheinland (Suzhou) Co., Ltd.**			
Prüfergebnis*: *Test result*:*	**Pass**			

geprüft von:
tested by:

Datum:
Date: 2024-06-13

Xuelan Zhang

Stellung / Position: Project engineer

genehmigt von:
authorized by: Jiaqi Zhou

Ausstellungsdatum:
Issue date: 2024-06-13

Stellung / Position: Reviewer

Sonstiges / *Other*: FCC ID: FHO-E2314
IC: 10912A-E2314

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *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.
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.

Anmerkungen
Remarks

1	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. *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.* *Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.*
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TEST SUMMARY

5.1.1 RADIATED EMISSION （30 MHZ - 1 GHZ）
Result:
Passed
5.1.2 RADIATED EMISSION (ABOVE 1 GHZ)
Result:
Passed

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1 Test Sites

1.1 Test Facilities

Laboratory: TÜV Rheinland (Suzhou) Co., Ltd.
Address: No.14 building and north half of No.10 workshop building, No.525, Yuewang Lingang South Road, Pingqian (Taicang) Modern Industrial Park, Shaxi Town, Taicang City, Jiangsu Province, 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 TIMMERFLOTTE (Temperature and Humidity sensor). For the further information, refer to the user's manual.

2.2 Ratings and System Details

Rated input	:	3 Vdc, 2xAAA
Protection class	:	III

2.3 Independent Operation Modess

The basic operation mode is temperature and humidity measurement by 2.4 GHz Thread 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

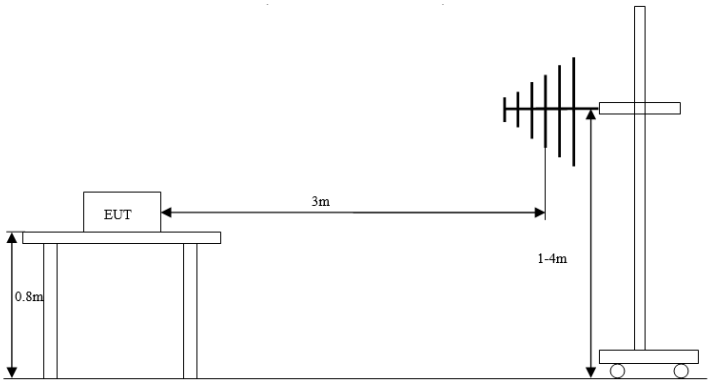
3.1 Principle of Configuration Selection

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 2024-06-07.

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	Laptop	T450	lenovo
2	Dongle-802.15.4-2314-V1.0	KT-01 E2314	-

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 E M I S S I O N

5.1 Emission in the Frequency Range above 30 MHz

5.1.1 Radiated emission （30 MHz - 1 GHz）

Result:	**Passed**

Date of testing	:	2024-06-07
Test procedure	:	FCC 47 CFR Part 15, Subpart B:2022, 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 dBμV/m; 88 – 216 MHz, 43.5 dBμV/m; 216 – 1000 MHz, 46 dBμV/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	:	3 Vdc, 2xAAA
Ambient condition	:	Temperature: 20.5 °C; Relative humidity: 45 %
Expanded measurement uncertainty (*k*=2)	:	5.4 dB

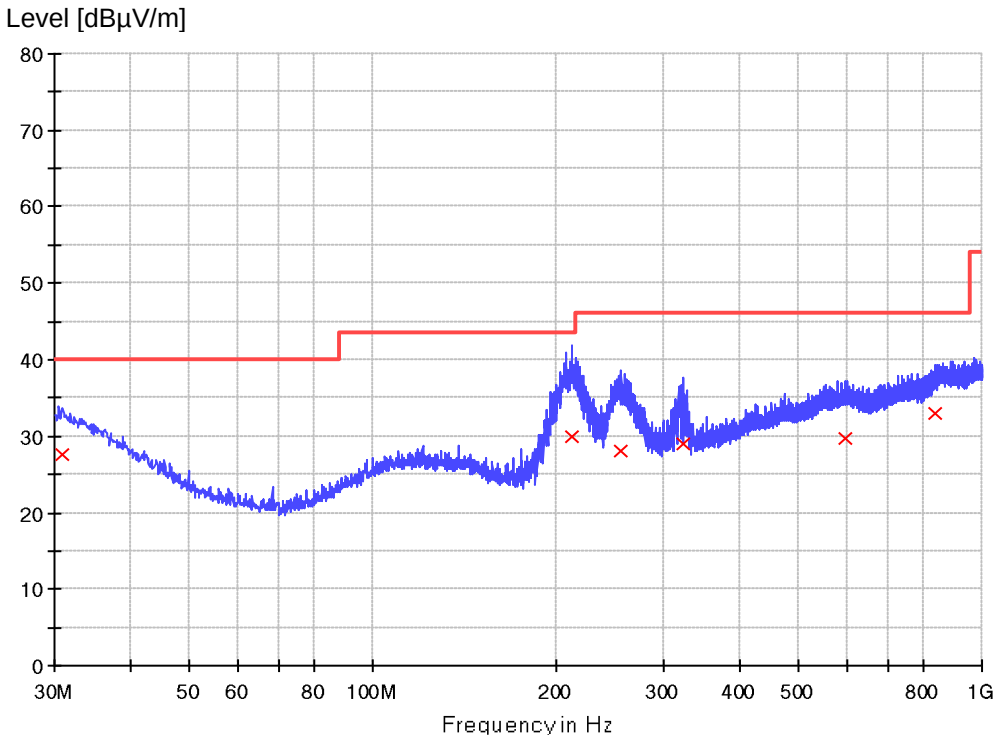
The radiated disturbance test was carried out in a semi-anechoic chamber. The test distance from the receiving antenna to the EUT is 3 m. The normalized site attenuation of the semi-anechoic chamber is regularly calibrated to ensure the radiated disturbance test results are valid. During the test, the 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, "×" means quasi-peak test results.

Notes on following tables of radiated emission results and conversions:

QuasiPeak (dBµV/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 (dBµV/m) - QuasiPeak (dBµV/m)

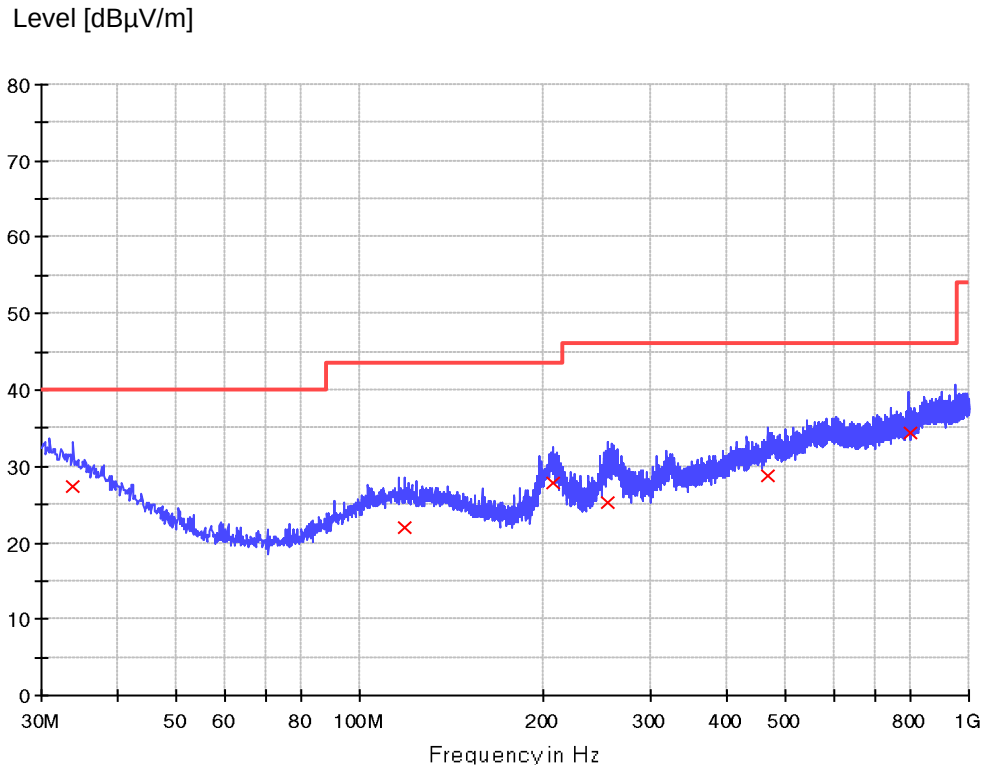
Figure 1: Spectral Diagrams and measurement results, horizontal polarization (30 MHz to 1 GHz)



Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
30.970000	27.6	120.000	130	H	4	24.4	12.4	40.0
211.632500	30.0	120.000	110	H	20	16.1	13.5	43.5
255.888750	28.1	120.000	120	H	100	20.2	17.9	46.0
322.333750	29.0	120.000	150	H	143	20.9	17.0	46.0
596.116250	29.7	120.000	150	H	-158	26.9	16.3	46.0
839.828750	32.9	120.000	130	H	-99	28.8	13.1	46.0

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



Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
33.880000	27.3	120.000	140	V	107	23.0	12.7	40.0
118.270000	22.0	120.000	140	V	33	18.9	21.5	43.5
207.873750	27.8	120.000	150	V	1	16.2	15.7	43.5
255.403750	25.3	120.000	120	V	159	20.2	20.7	46.0
468.925000	28.9	120.000	130	V	76	24.8	17.1	46.0
799.695000	34.5	120.000	130	V	-176	27.8	11.5	46.0

5.1.2 Radiated emission (Above 1 GHz)

Result:	**Passed**

Date of testing	:	2024-06-07
Port	:	Enclosure
Test procedure	:	FCC 47 CFR Part 15, Subpart B:2022, ANSI C63.4-2014 and CISPR 16-2-3 ICES-003:2020
Limit	:	Above 1 GHz, Peak limit: 74 dBµV/m; Average limit: 54 dBµV/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	:	3Vdc, 2xAAA
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 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.

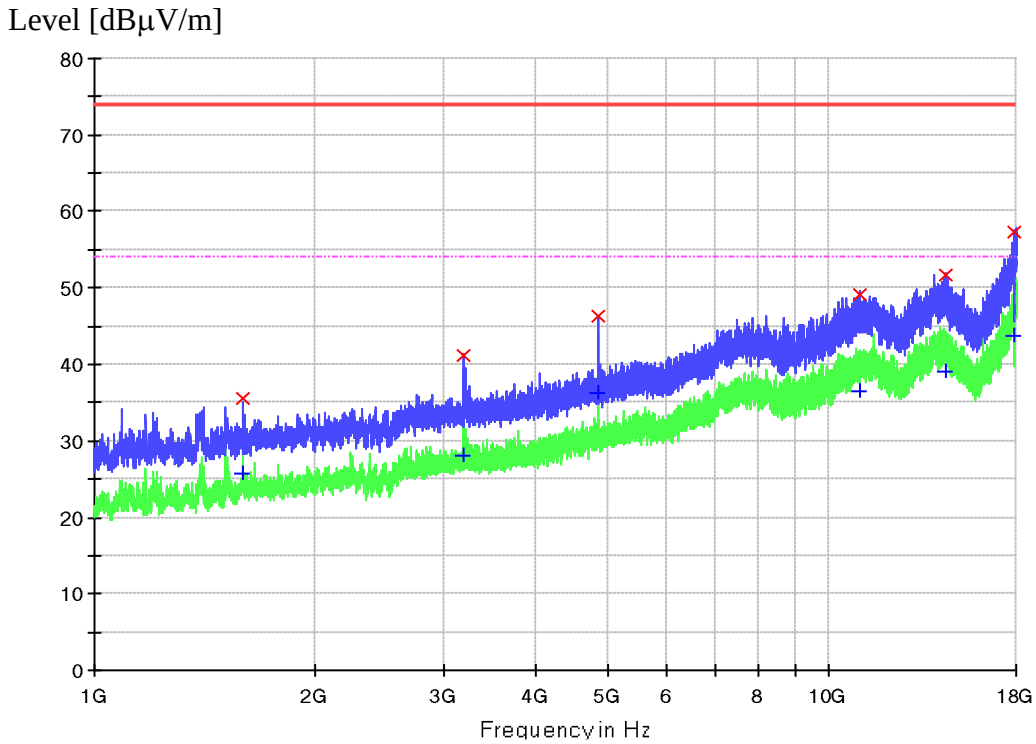
The following figures and tables were those measured by an automatic measurement system. The final test was performed with peak detector and average detector at those critical frequencies during the preview test. In the following figure, “x(red)” means measurement results with peak detector and “+ (blue)”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

Notes on following tables of radiated emission results and conversions:

Peak (dBµV/m): final measurement results by using peak detector
Average (dBµV/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 (dBµV/m) - Peak (dBµV/m)
Limit CAV (dBµV/m) – Average (dBµV/m)

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



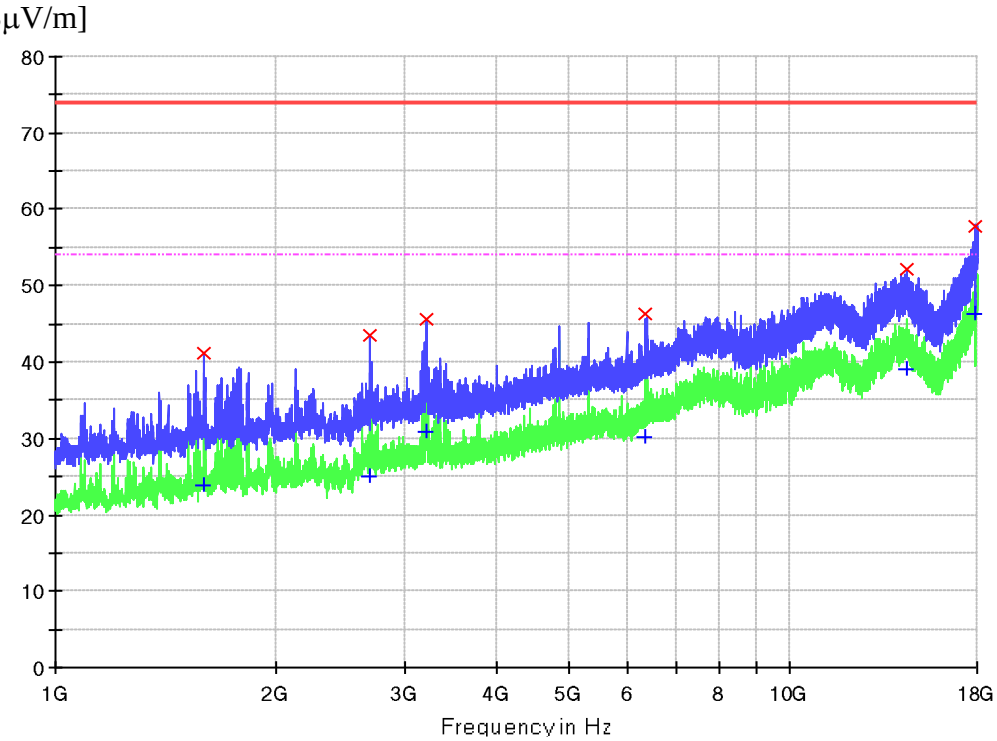
Final Peak measurement results:

Frequency (MHz)	MaxPeak (dBµV/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
1594.468750	35.5	1000.000	100.0	H	180.0	-18.5	38.5	74.0
3188.218750	41.1	1000.000	100.0	H	180.0	-13.8	32.9	74.0
4853.156250	46.3	1000.000	100.0	H	180.0	-10.0	27.7	74.0
11037.437500	49.2	1000.000	100.0	H	180.0	-0.1	24.8	74.0
14424.687500	51.7	1000.000	100.0	H	180.0	3.6	22.3	74.0
17883.656250	57.4	1000.000	100.0	H	180.0	11.5	16.6	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)
1594.468750	25.8	1000.000	100.0	H	180.0	-18.5	28.2	54.0
3188.218750	28.1	1000.000	100.0	H	180.0	-13.8	25.9	54.0
4853.156250	36.3	1000.000	100.0	H	180.0	-10.0	17.7	54.0
11037.437500	36.4	1000.000	100.0	H	180.0	-0.1	17.6	54.0
14424.687500	39.0	1000.000	100.0	H	180.0	3.6	15.0	54.0
17883.656250	43.7	1000.000	100.0	H	180.0	11.5	10.3	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)
1593.937500	41.1	1000.000	100.0	V	-180.0	-18.5	32.9	74.0
2683.531250	43.5	1000.000	100.0	V	-180.0	-14.9	30.5	74.0
3191.937500	45.6	1000.000	100.0	V	-180.0	-13.8	28.4	74.0
6369.875000	46.3	1000.000	100.0	V	-180.0	-8.1	27.7	74.0
14432.656250	52.2	1000.000	100.0	V	-180.0	3.6	21.8	74.0
17933.593750	57.8	1000.000	100.0	V	-180.0	12.5	16.2	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)
1593.937500	23.8	1000.000	100.0	V	-180.0	-18.5	30.2	54.0
2683.531250	25.0	1000.000	100.0	V	-180.0	-14.9	29.0	54.0
3191.937500	31.0	1000.000	100.0	V	-180.0	-13.8	23.0	54.0
6369.875000	30.1	1000.000	100.0	V	-180.0	-8.1	23.9	54.0
14432.656250	39.0	1000.000	100.0	V	-180.0	3.6	15.0	54.0
17933.593750	46.3	1000.000	100.0	V	-180.0	12.5	7.7	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	16.10.2023	16.10.2024
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	25.10.2023	25.10.2024
G1822702	Spectrum analyser	FSV40	Rohde&Schwarz	06.05.2023	06.05.2025
G1825371	Preamplifier	EMC051845SE	Taiwan EMCI	20.06.2023	20.06.2025
G1822694	Double ridged broadband horn antenna	BBHA 9120 D	Schwarzbeck	24.03.2021	24.03.2026

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End of test report