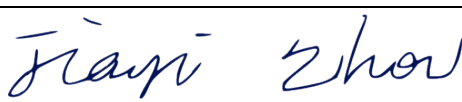


Prüfbericht-Nr.: Test report no.:	CN25KW1B 001	Auftrags-Nr.: Order no.:	326069011	Seite 1 von 41 Page 1 of 41
Kunden-Referenz-Nr.: Client reference no.:	1288983	Auftragsdatum: Order date:	2024-12-17	
Auftraggeber: Client:	IKEA of Sweden AB Box 702, SE-343 81 Älmhult, Sweden			
Prüfgegenstand: Test item:	Self-ballasted LED lamps			
Bezeichnung / Typ-Nr.: Identification / Type no.:	LED2401G5NA			
Auftrags-Inhalt: Order content:	TÜV Rheinland EMC service			
Prüfgrundlage: Test specification:	FCC 47 CFR Part 15, Subpart B:2023 Class B ICES-005:2018			
Wareneingangsdatum: Date of sample receipt:	2025-03-06	Refer to the EUT photos file		
Prüfmuster-Nr.: Test sample no:	A003939748-012			
Prüfzeitraum: Testing period:	Refer to test report			
Ort der Prüfung: Place of testing:	Refer to clause 1.1			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shanghai) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von: tested by:	genehmigt von: authorized by:			
Datum: Date:	2025-05-13		Ausstellungsdatum: Issue date: 2025-05-13	
Stellung / Position:	Project engineer		Stellung / Position: Authorizer	
Sonstiges / Other:	FCC ID: FHO-LED2401G5NA Test Firm Name: TÜV Rheinland (Shanghai) Co., Ltd. Designation Number: CN1396 Test Firm Registration Number: 930979			
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:	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. 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.				

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Test report no.:

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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. <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. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i>
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3	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. <i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.</i> <i>Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i>
4	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. <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>

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Revision history of test report:

Report number	Issue date	Contents and reason for change if appropriate
CN25KW1B 001	2025-05-13	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 7 for test and measurement instruments.

2 General Product Information

2.1 Product Function and Intended Use

The EUT (equipment under test) is an ordinary self-ballasted LED lamps with wireless dimming function for lighting and similar use. For further information, refer to the user's manual.

2.2 Ratings and System Details

Rated input	: AC 120 V, 60 Hz, 60 mA
Rated power	: 5.2 W
RF IC	: SiMG301

2.3 Independent Operation Modes

The basic operation modes are: "ON" and "OFF" with dimming.
The test modes are as follows:

- Mode 1: Warm lighting with the max. lighting output.
- Mode 2: Warm lighting with the min. lighting output.
- Mode 3: White lighting with the max. lighting output.
- Mode 4: White lighting with the min. lighting output.

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 2480 MHz for wireless module.

2.7 Submitted Documents

Circuit diagram, user's manual 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.

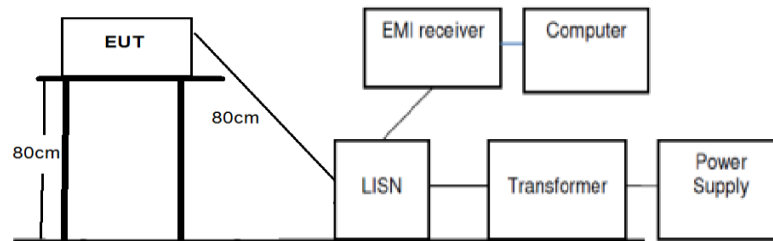
Refer to the related paragraph of this report.

The sequence of testing:

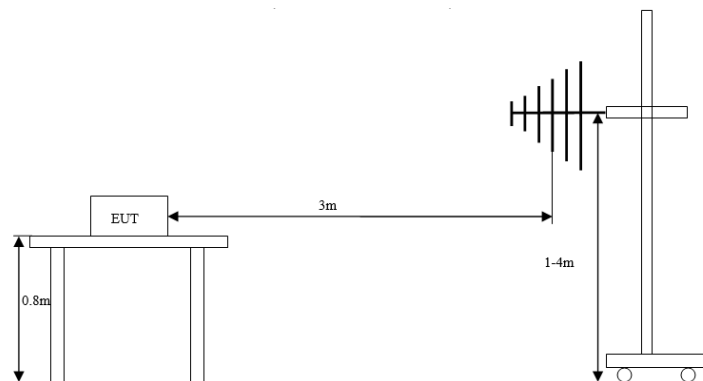
1. Conducted emission tests were performed on 2025-03-20.
2. Radiated emission tests were performed on 2025-03-20~2025-03-28.

3.2 Equipment and cable arrangement

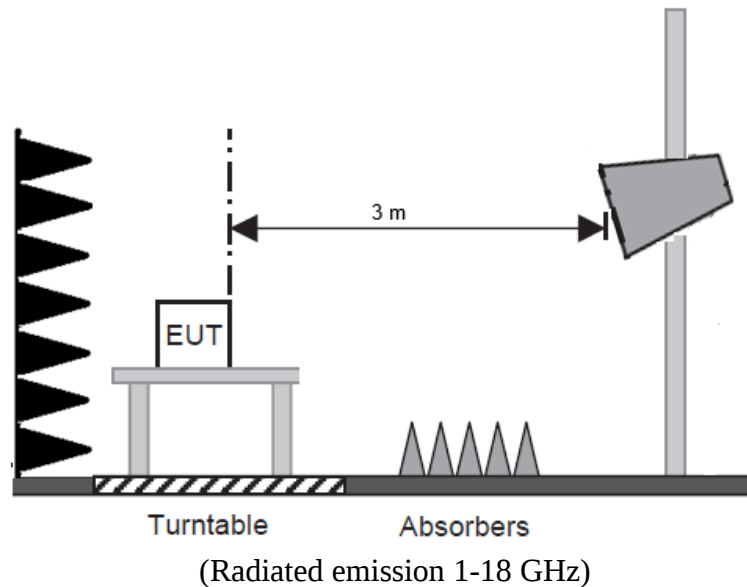
Block diagram for both conducted emission and radiated emission tests is as follows:



(Conducted emission)



(Radiated emission 30-1000 MHz)



Also refer to photographs on clause 6 for test setups for both conducted emission test and radiated emission tests.

3.3 Test Software

The “Home” APP for iPhone was used during the tests.

3.4 Special Accessories and Auxiliary Equipment

During the tests, the following auxiliary equipment were used.

No.	Product	Model	Brand
1	Mobile phone	iPhone 15	Apple
2	Loudspeaker	HomePod mini	Apple
3	Remote control	E2489	IKEA

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 up to 30 MHz

5.1.1 Conducted emission

Result:		Passed
Date of testing	: 2025-03-20	
Test procedure	: FCC 47 CFR Part 15, Subpart B:2023, ICES-005:2018, ANSI C63.4-2014 and CISPR 16-2-1	
Frequency range	: 0.15 – 30 MHz	
Limits	: Quasi-peak limit: 0.15 – 0.5 MHz, 66 to 56 dB μ V (decrease with the logarithm of frequency); 0.5 – 5 MHz, 56 dB μ V; 5 – 30 MHz, 60 dB μ V Average limit: 0.15 – 0.5 MHz, 56 to 46 dB μ V (decrease with the logarithm of frequency); 0.5 – 5 MHz, 46 dB μ V; 5 – 30 MHz, 50 dB μ V	
Bandwidth of EMI receiver for final measurement	: 9 kHz	
Measurement time for final measurement	: 1 s	
Kind of test site	: Shielded room	
Input voltage	: AC 120 V, 60 Hz	
Operational mode	: Modes 1, 2, 3, 4 defined in clause 2.3	
Ambient condition	: Temperature: 18.1 °C; Relative humidity: 52.1 %	
Expanded measurement uncertainty ($k=2$)	: 2.33 dB The minimum margin to the limit is 8.54 dB at 3.212250 MHz. The margin is higher than expanded measurement uncertainty.	

The measurement setup was made according to ANSI C63.4-2014 in a shielded room.

The measurement equipment like test receivers, quasi-peak detector and artificial mains network (AMN) are in compliance with CISPR 16-1 series standards.

The tested object was set-up on a wooden support. The EUT was set 0.8 m away from the AMN. The cord longer than necessary to be connected to the AMN was folded forth and back parallel so as to form a bundle with a length between 0.3 m and 0.4 m.

The disturbance voltage test was performed on the neutral line and phase line of the power supply of the EUT respectively.

The following figures and tables were those measured by an automatic measuring system. Both quasi-peak and average measurements were performed. In the following spectral diagram, “◆” means Quasi-Peak Value and “◆” means Average Value results.

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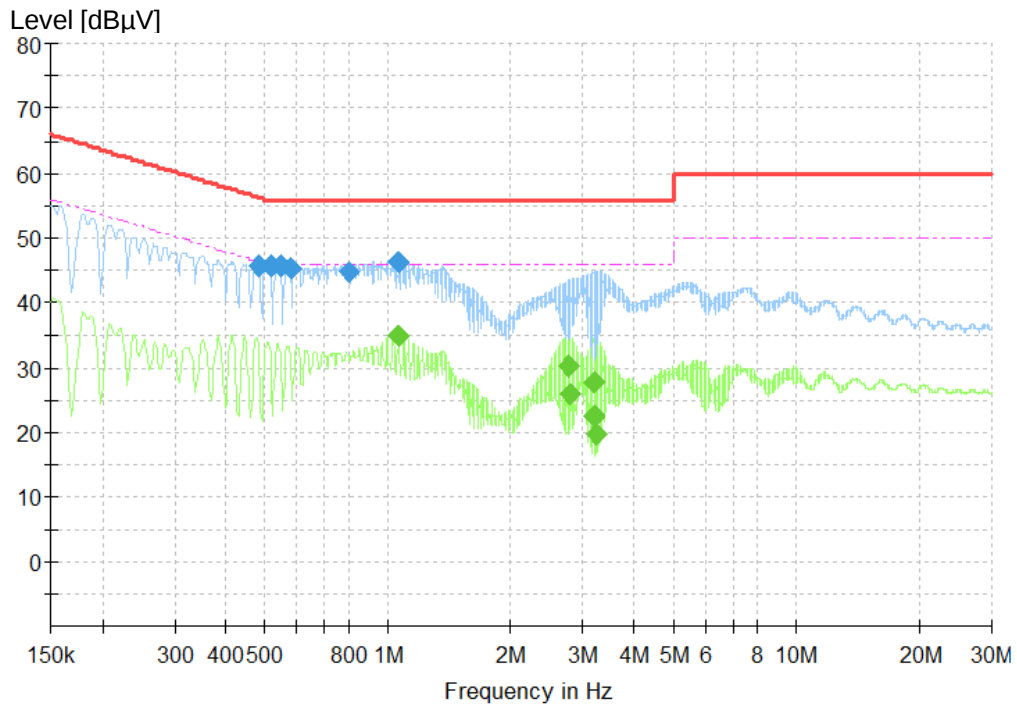
Notes on following tables of conducted emission results and conversions:

Level (dB μ V): final measurement results by using quasi-peak detector and average detector

Transd (dB): transducer factor including cable loss, insertion loss of artificial mains network and gain of pre-amplifier (if used)

Margin: Limit (dB μ V) - Level (dB μ V)

Figure 1: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, L on mode 1



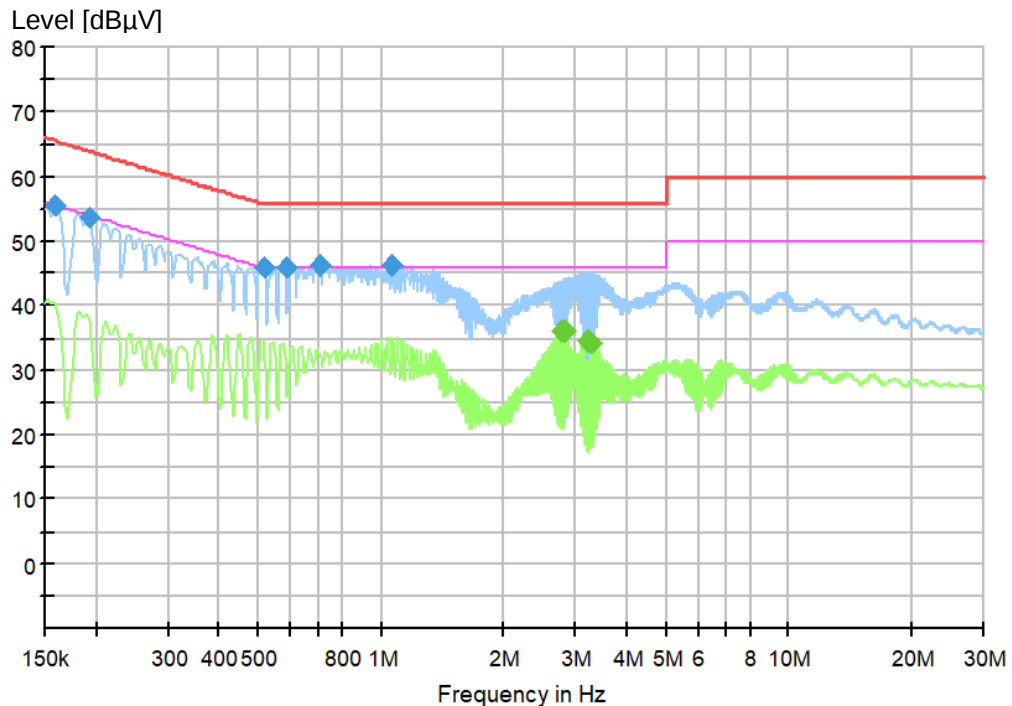
Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBμV)	Limit (dBμV)	Margin (dB)	Line
0.480750	45.76	56.33	10.57	L1
0.514500	45.82	56.00	10.18	L1
0.546000	45.67	56.00	10.33	L1
0.577500	45.45	56.00	10.55	L1
0.802500	44.85	56.00	11.15	L1
1.061250	46.34	56.00	9.66	L1

Final average measurement result:

Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Line
1.061250	34.90	46.00	11.10	L1
2.766750	30.33	46.00	15.67	L1
2.796000	25.79	46.00	20.21	L1
3.183000	27.84	46.00	18.16	L1
3.212250	22.53	46.00	23.47	L1
3.243750	19.82	46.00	26.18	L1

Figure 2: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, N on mode 1



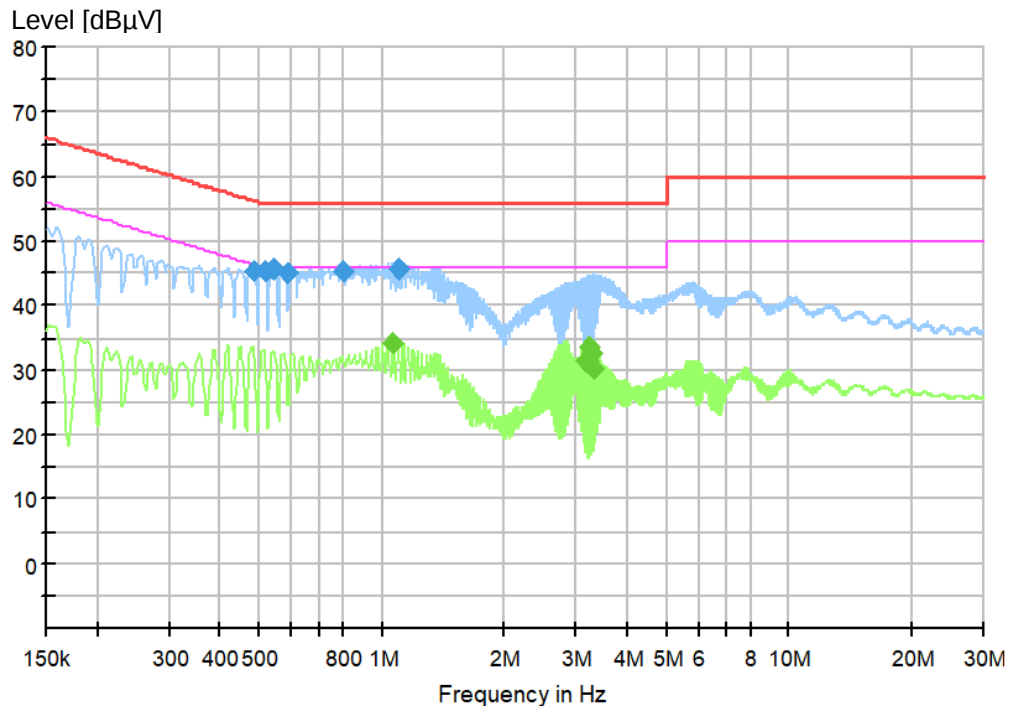
Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.159000	55.60	65.52	9.92	N
0.192750	53.84	63.92	10.08	N
0.516750	45.88	56.00	10.12	N
0.582000	46.00	56.00	10.00	N
0.710250	46.20	56.00	9.80	N
1.065750	46.34	56.00	9.66	N

Final average measurement result:

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line
2.753250	36.11	46.00	9.89	N
2.782500	36.04	46.00	9.96	N
2.814000	36.10	46.00	9.90	N
3.201000	34.52	46.00	11.48	N
3.232500	34.53	46.00	11.47	N
3.264000	34.33	46.00	11.67	N

Figure 3: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, L on mode 2



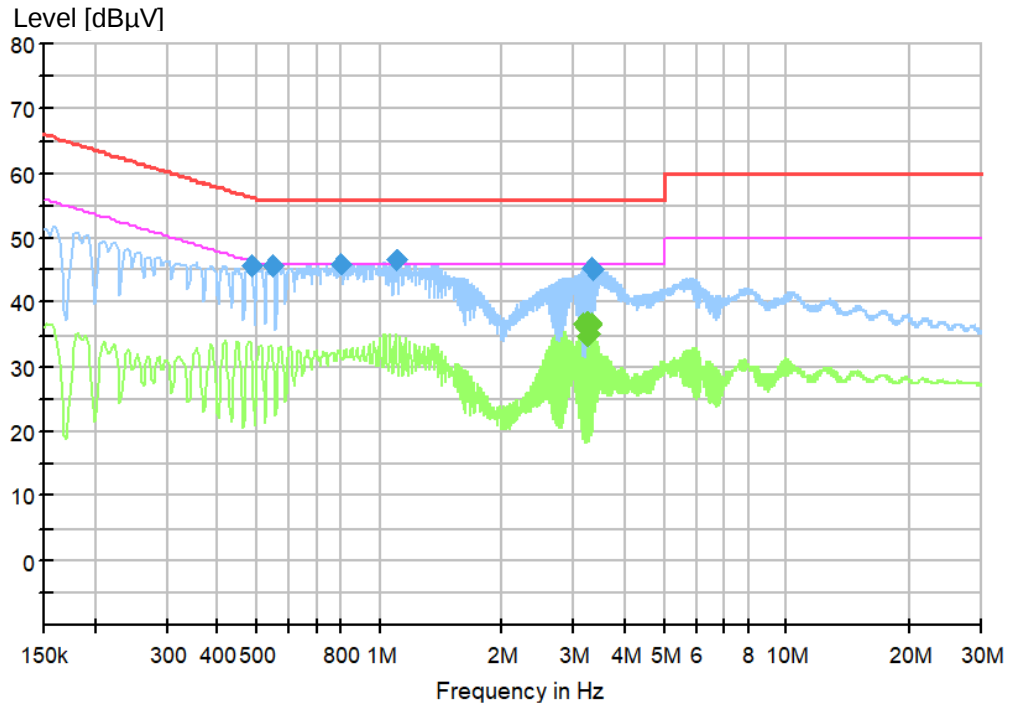
Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.485250	45.29	56.25	10.96	L1
0.516750	45.42	56.00	10.58	L1
0.543750	45.60	56.00	10.40	L1
0.582000	45.15	56.00	10.85	L1
0.800250	45.48	56.00	10.52	L1
1.099500	45.69	56.00	10.31	L1

Final average measurement result:

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line
1.068000	34.24	46.00	11.76	L1
3.169500	31.52	46.00	14.48	L1
3.201000	31.52	46.00	14.48	L1
3.232500	33.51	46.00	12.49	L1
3.264000	32.64	46.00	13.36	L1
3.295500	30.20	46.00	15.80	L1

Figure 4: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, N on mode 2



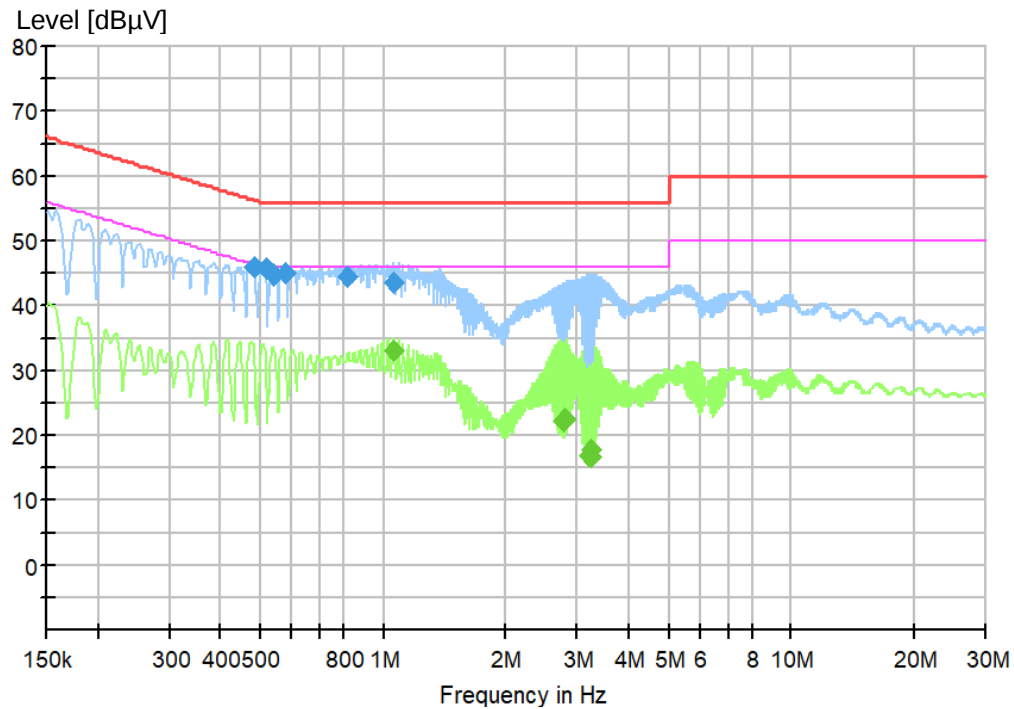
Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.483000	45.61	56.29	10.68	N
0.548250	45.52	56.00	10.48	N
0.804750	46.01	56.00	9.99	N
1.095000	46.59	56.00	9.41	N
3.315750	45.45	56.00	10.55	N
3.349500	45.13	56.00	10.87	N

Final average measurement result:

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line
3.160500	36.69	46.00	9.31	N
3.192000	36.02	46.00	9.98	N
3.223500	34.90	46.00	11.10	N
3.252750	36.87	46.00	9.13	N
3.284250	35.15	46.00	10.85	N
3.315750	36.56	46.00	9.44	N

Figure 5: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, L on mode 3



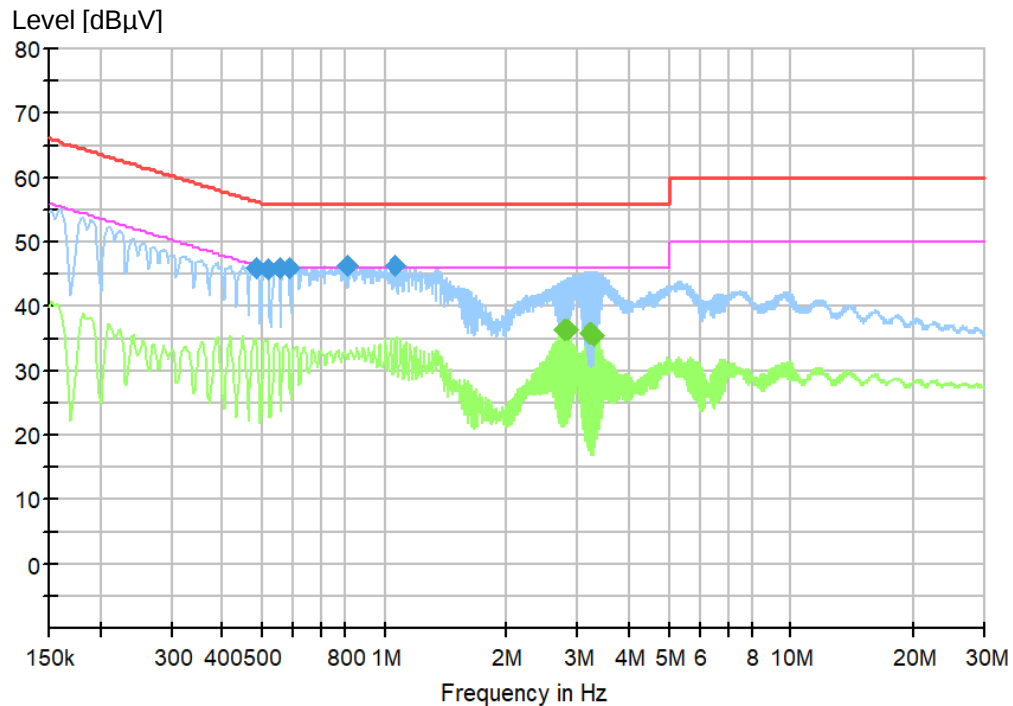
Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.483000	45.95	56.29	10.33	L1
0.514500	45.58	56.00	10.42	L1
0.541500	44.87	56.00	11.13	L1
0.577500	44.99	56.00	11.01	L1
0.820500	44.36	56.00	11.64	L1
1.061250	43.37	56.00	12.63	L1

Final average measurement result:

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line
1.061250	32.85	46.00	13.15	L1
2.769000	22.19	46.00	23.81	L1
2.800500	22.49	46.00	23.51	L1
3.185250	16.84	46.00	29.16	L1
3.216750	17.95	46.00	28.05	L1
3.248250	16.67	46.00	29.33	L1

Figure 6: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, N on mode 3



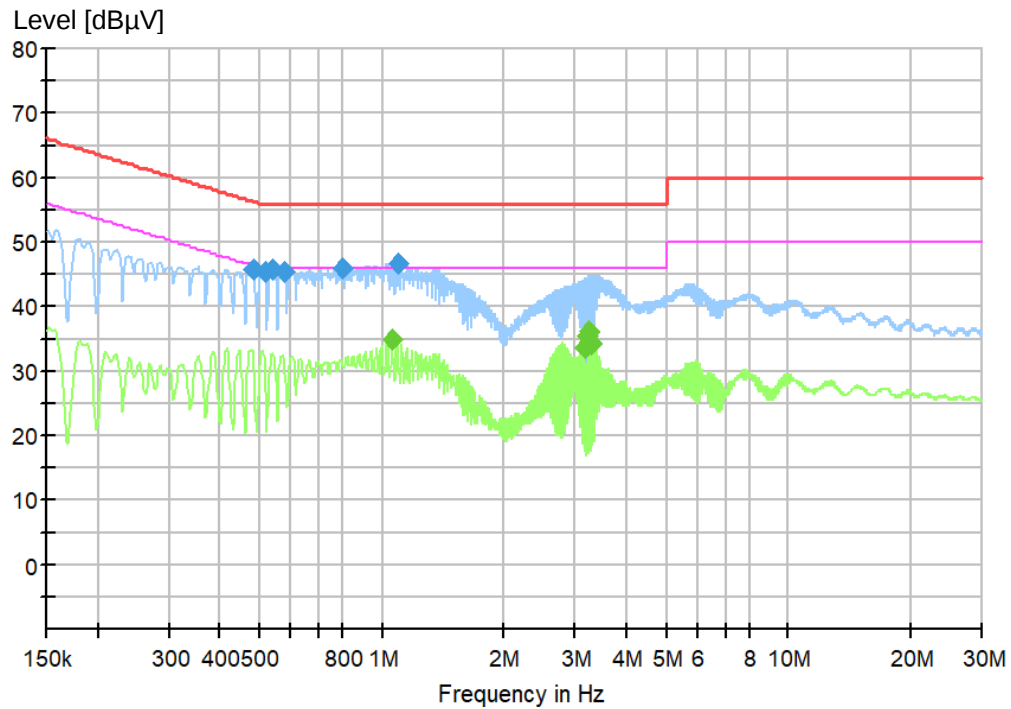
Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.485250	46.11	56.25	10.13	N
0.519000	45.81	56.00	10.19	N
0.550500	46.00	56.00	10.00	N
0.582000	46.10	56.00	9.90	N
0.809250	46.34	56.00	9.66	N
1.068000	46.27	56.00	9.73	N

Final average measurement result:

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line
2.757750	36.28	46.00	9.72	N
2.789250	36.43	46.00	9.57	N
2.818500	36.25	46.00	9.75	N
3.207750	35.86	46.00	10.14	N
3.239250	35.74	46.00	10.26	N
3.270750	35.34	46.00	10.66	N

Figure 7: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, L on mode 4



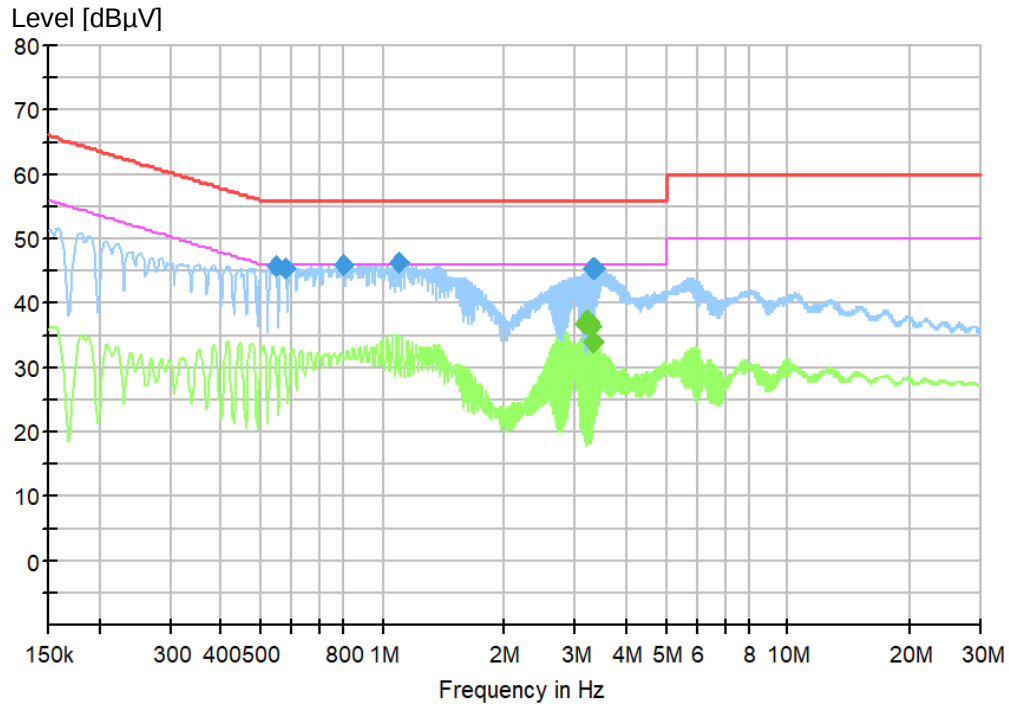
Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.483000	45.71	56.29	10.58	L1
0.514500	45.31	56.00	10.69	L1
0.541500	45.52	56.00	10.48	L1
0.579750	45.22	56.00	10.78	L1
0.804750	46.12	56.00	9.88	L1
1.095000	46.72	56.00	9.28	L1

Final average measurement result:

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line
1.063500	34.85	46.00	11.15	L1
3.158250	33.63	46.00	12.37	L1
3.189750	35.31	46.00	10.69	L1
3.219000	35.98	46.00	10.02	L1
3.250500	34.44	46.00	11.56	L1
3.282000	34.14	46.00	11.86	L1

Figure 8: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, N on mode 4



Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.546000	45.62	56.00	10.38	N
0.577500	45.40	56.00	10.60	N
0.802500	46.01	56.00	9.99	N
1.092750	46.24	56.00	9.76	N
3.306750	45.32	56.00	10.68	N
3.338250	45.38	56.00	10.62	N

Final average measurement result:

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line
3.151500	36.70	46.00	9.30	N
3.183000	37.21	46.00	8.79	N
3.212250	37.46	46.00	8.54	N
3.243750	36.99	46.00	9.01	N
3.275250	36.33	46.00	9.67	N
3.306750	34.05	46.00	11.95	N

5.2 Emission in the Frequency Range above 30 MHz

5.2.1 Radiated emission (30-1000 MHz)

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

Date of testing	: 2025-03-20~2025-03-24
Test procedure	: FCC 47 CFR Part 15, Subpart B:2023, ICES-005:2018, ANSI C63.4-2014 and CISPR 16-2-3
Product classification	: Class B
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
Input voltage	: AC 120 V, 60 Hz
Operational mode	: Modes 1, 2, 3, 4 defined in clause 2.3
Ambient condition	: Temperature: 17.3 °C; Relative humidity: 50.3 %
Expanded measurement uncertainty (k=2)	: 5.40 dB The minimum margin to the limit is 6.2 dB at 39.457500 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 an 80 cm wooden support above the reference ground plane. The wooden support 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.

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Notes on following tables of radiated emission results and conversions:

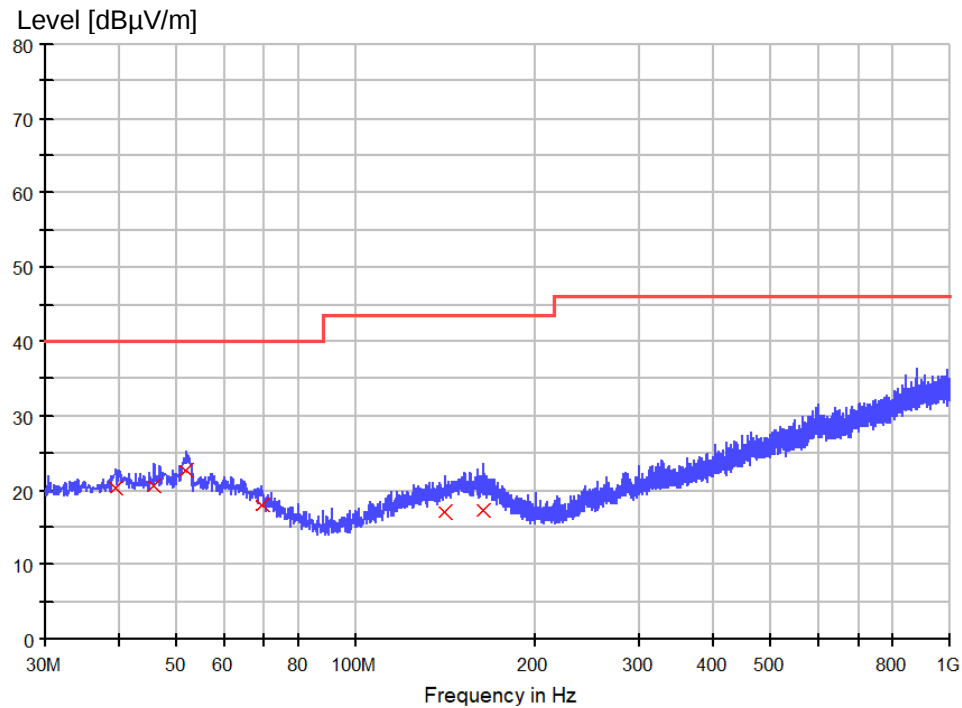
QuasiPeak (dB μ V/m): final measurement results by using quasi-peak detector

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)

Note 1: The class B limits of ICES-005:2018 is stricter than those FCC 47 CFR Part 15, Subpart B:2023 for 3 m test distance. Therefore, the former limits are used in following figures and tables.

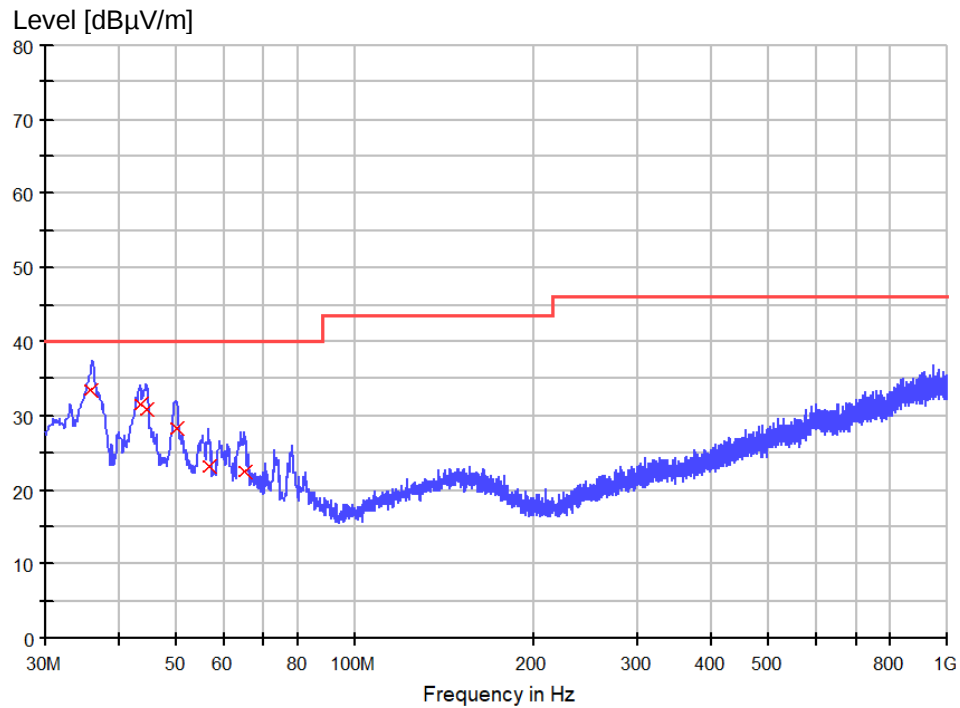
Figure 9: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 1



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
39.457500	20.4	120.000	150.0	H	81.0	13.8	19.6	40.0
45.762500	20.7	120.000	200.0	H	-138.0	14.2	19.3	40.0
51.703750	22.6	120.000	100.0	H	103.0	14.3	17.4	40.0
69.527500	17.9	120.000	150.0	H	92.0	12.4	22.1	40.0
141.550000	17.1	120.000	200.0	H	-95.0	13.9	26.4	43.5
163.981250	17.3	120.000	150.0	H	96.0	14.2	26.2	43.5

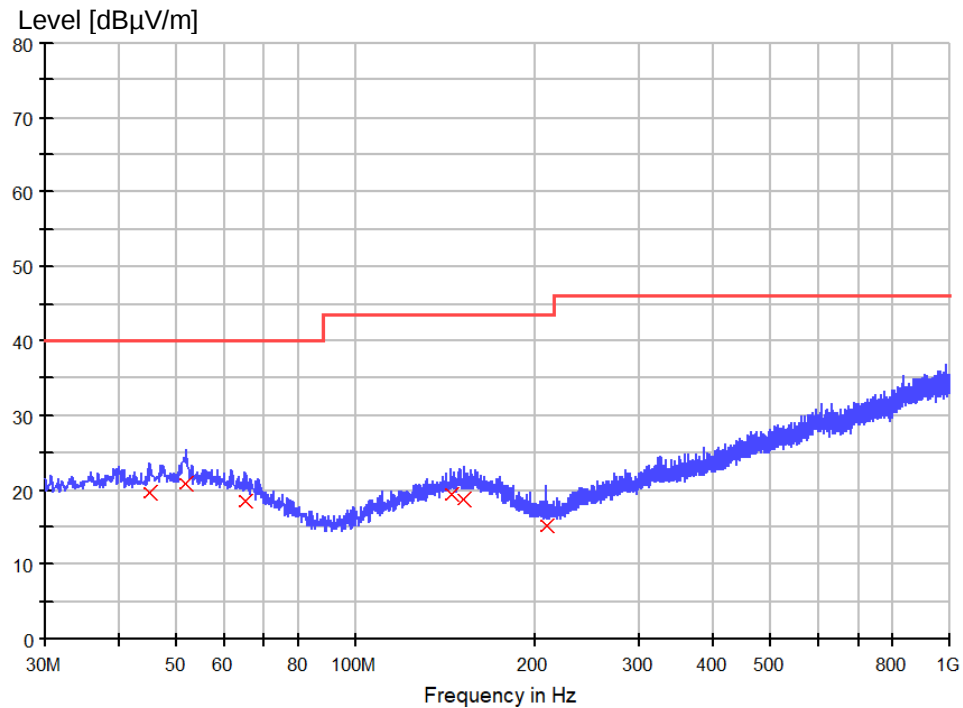
Figure 10: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 1



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
35.941250	33.4	120.000	200.0	V	45.0	13.7	6.6	40.0
43.337500	31.5	120.000	200.0	V	152.0	14.2	8.5	40.0
44.428750	30.9	120.000	100.0	V	157.0	14.2	9.1	40.0
50.006250	28.4	120.000	100.0	V	-49.0	14.3	11.6	40.0
56.675000	23.1	120.000	200.0	V	35.0	14.0	16.9	40.0
65.041250	22.5	120.000	200.0	V	-12.0	13.2	17.5	40.0

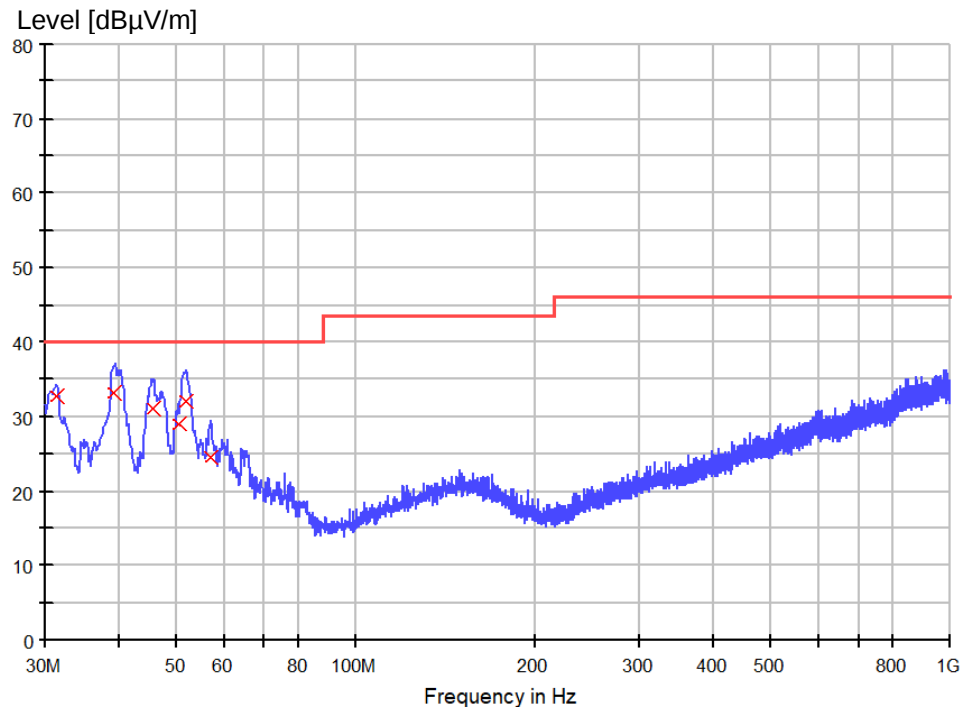
Figure 11: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 2



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
45.156250	19.8	120.000	200.0	H	-5.0	14.2	20.3	40.0
51.825000	20.9	120.000	150.0	H	-110.0	14.3	19.1	40.0
65.283750	18.4	120.000	100.0	H	-122.0	13.1	21.6	40.0
144.823750	19.4	120.000	150.0	H	141.0	14.0	24.1	43.5
152.220000	18.7	120.000	150.0	H	151.0	14.4	24.8	43.5
208.843750	15.1	120.000	100.0	H	134.0	10.7	28.4	43.5

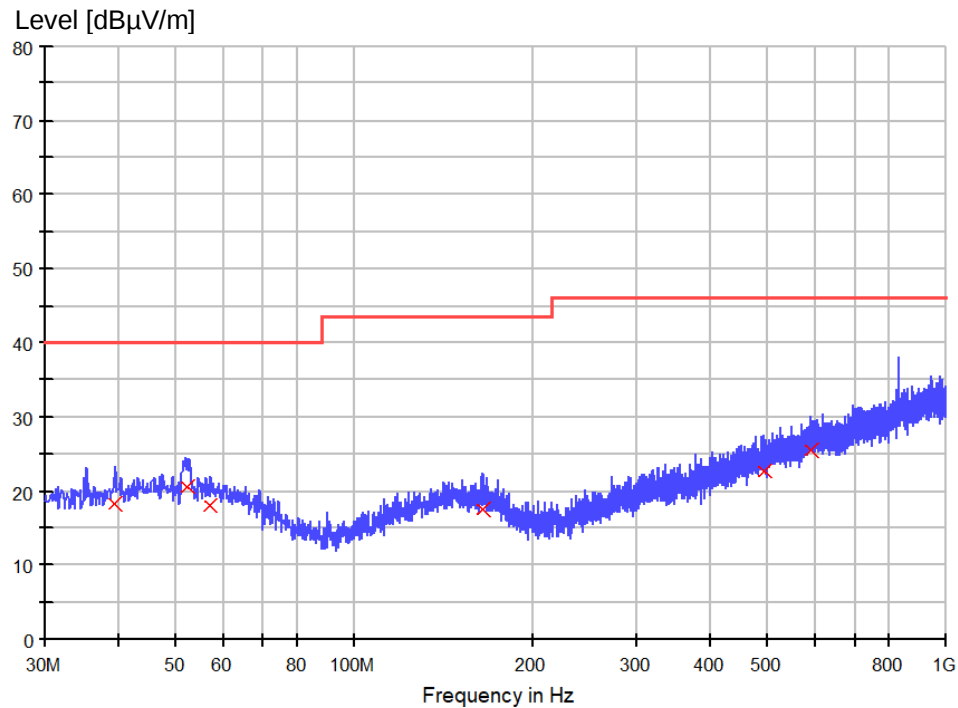
Figure 12: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 2



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
31.455000	32.8	120.000	150.0	V	-32.0	13.2	7.2	40.0
39.093750	33.1	120.000	200.0	V	-34.0	13.8	6.9	40.0
45.641250	31.1	120.000	200.0	V	2.0	14.2	8.9	40.0
50.127500	29.1	120.000	200.0	V	-126.0	14.3	10.9	40.0
51.703750	32.1	120.000	100.0	V	-33.0	14.3	7.9	40.0
56.917500	24.5	120.000	150.0	V	155.0	14.0	15.5	40.0

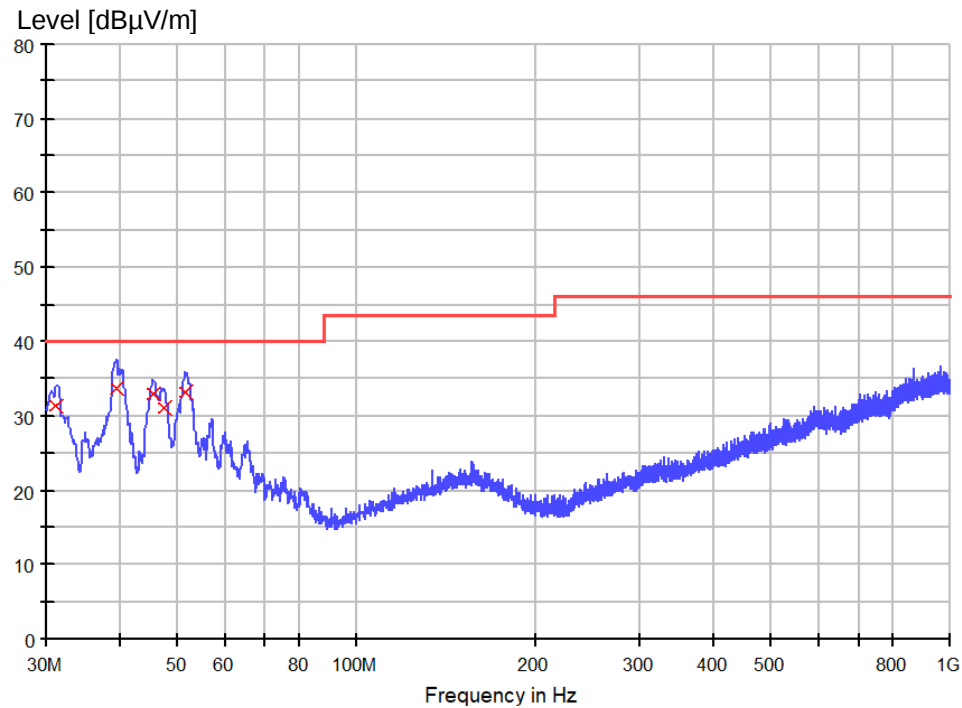
Figure 13: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 3



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
39.336250	18.4	120.000	100.0	H	-39.0	13.8	21.6	40.0
52.188750	20.5	120.000	150.0	H	-169.0	14.3	19.5	40.0
57.160000	18.1	120.000	200.0	H	-78.0	14.0	21.9	40.0
165.678750	17.5	120.000	200.0	H	-85.0	14.2	26.1	43.5
490.628750	22.7	120.000	150.0	H	159.0	19.3	23.3	46.0
591.266250	25.5	120.000	100.0	H	79.0	21.6	20.5	46.0

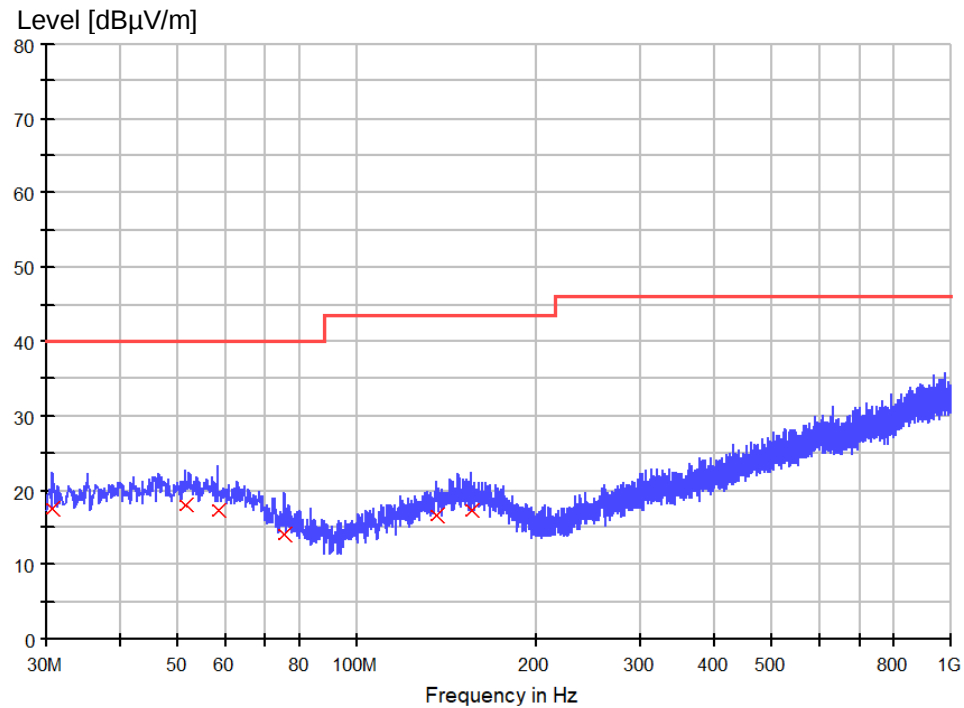
Figure 14: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 3



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
31.212500	31.4	120.000	100.0	V	101.0	13.1	8.6	40.0
39.457500	33.8	120.000	200.0	V	-63.0	13.8	6.2	40.0
45.520000	32.9	120.000	100.0	V	-168.0	14.2	7.1	40.0
47.581250	31.0	120.000	150.0	V	-121.0	14.3	9.0	40.0
51.461250	33.1	120.000	200.0	V	31.0	14.3	6.9	40.0

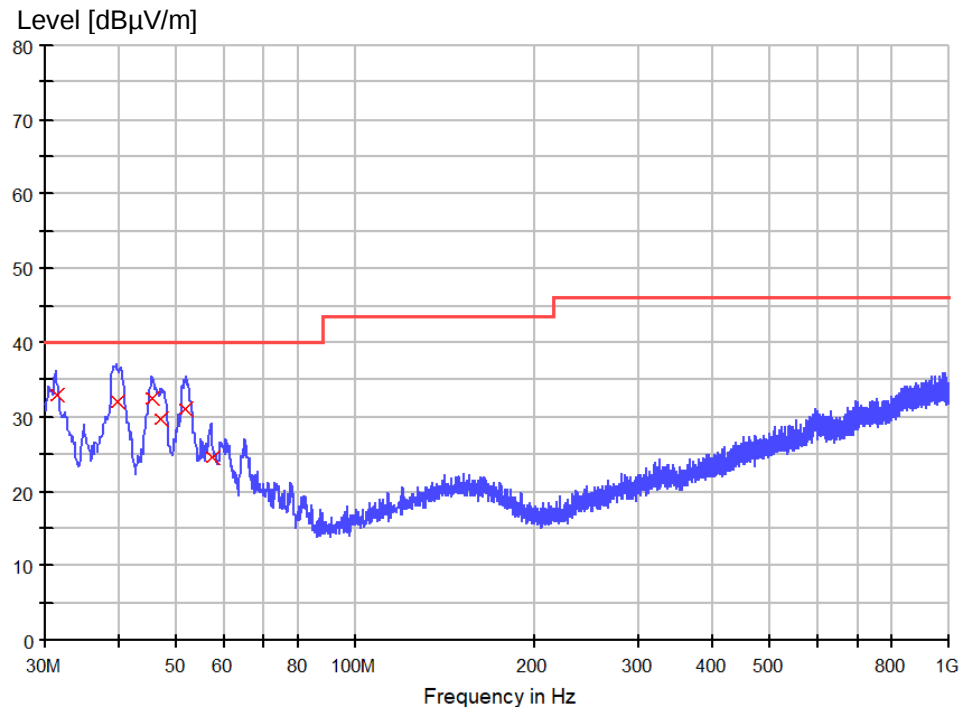
Figure 15: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 4



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
30.727500	17.5	120.000	200.0	H	-124.0	13.1	22.5	40.0
51.461250	18.1	120.000	100.0	H	-120.0	14.3	21.9	40.0
58.130000	17.4	120.000	200.0	H	-34.0	13.9	22.6	40.0
75.711250	14.2	120.000	150.0	H	-89.0	11.0	25.9	40.0
135.851250	16.5	120.000	100.0	H	84.0	13.5	27.0	43.5
155.978750	17.4	120.000	150.0	H	3.0	14.4	26.1	43.5

Figure 16: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 4



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
31.333750	33.0	120.000	150.0	V	34.0	13.2	7.0	40.0
39.700000	32.0	120.000	150.0	V	-131.0	13.9	8.0	40.0
45.520000	32.6	120.000	100.0	V	78.0	14.2	7.4	40.0
47.217500	29.6	120.000	150.0	V	166.0	14.2	10.4	40.0
51.825000	31.1	120.000	200.0	V	-133.0	14.3	8.9	40.0
57.281250	24.5	120.000	100.0	V	-180.0	14.0	15.5	40.0

5.2.2 Radiated Emission (1-18 GHz)

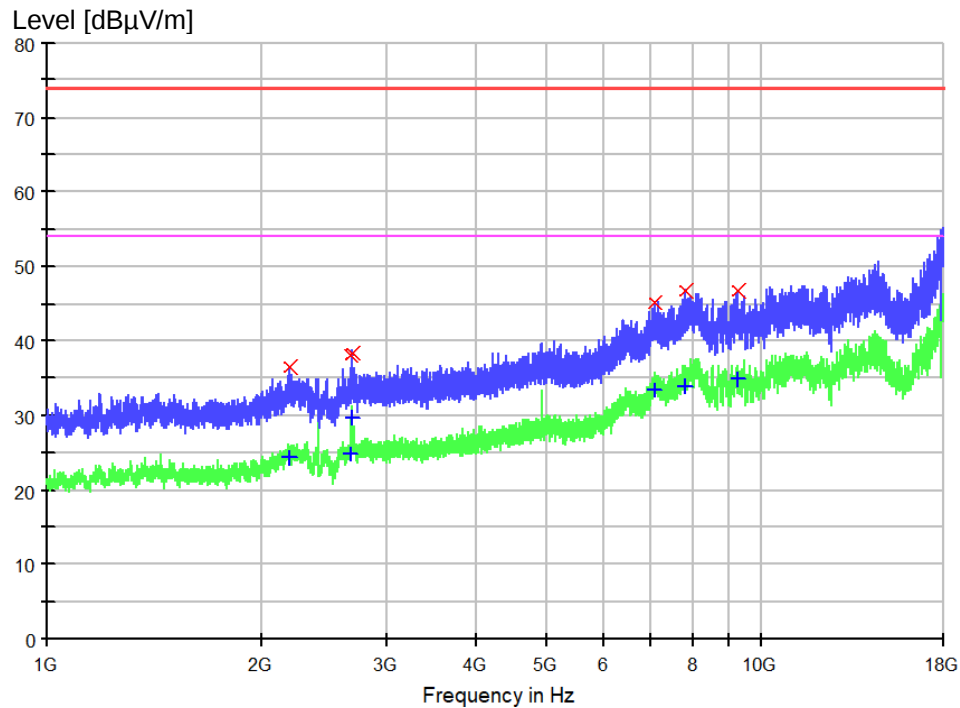
Result:	Passed
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Date of testing	: 2025-03-28
Port	: Enclosure
Test procedure	: FCC 47 CFR Part 15, Subpart B:2023, ICES-005:2018, ANSI C63.4-2014 and CISPR 16-2-3
Product classification	: Class B
Limit	: Peak limits (3 m distance): 1–18 GHz, 74 dBμV/m Average limits (3 m distance): 1–18 GHz, 54 dBμV/m
Frequency range	: 1 – 18 GHz (see Note 2)
Kind of test site	: Absorber-lined semi-anechoic chamber
Test distance	: 3 m
Test voltage	: AC 120 V, 60 Hz
Operational mode	: Modes 1, 2, 3, 4 defined in clause 2.3
Earthing	: No earth
Ambient condition	: Temperature: 21.8 °C; Relative humidity: 43.6 %
Expanded measurement uncertainty (k=2)	: 5.17 dB (1 GHz~6 GHz) 5.12 dB (6 GHz~18 GHz) The minimum margin to the limit is 7.1 dB at 9270.500000 MHz. The margin is higher than expanded measurement uncertainty.

The radiated disturbance test was carried out in an absorber-lined semi-anechoic chamber. The test distance from the receiving antenna to the EUT is 3 m. The site voltage standing wave ratio (S_{VSWR}) of the absorber-lined semi-anechoic chamber is regularly calibrated to ensure the radiated disturbance test results are valid. During the test, the EUT was placed on an 80 cm supporting table. And the supporting table was rotated 360° around, the receiving antenna was kept aiming at the EUT and its height 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” and “+” means measurement results with peak detector and average detector.

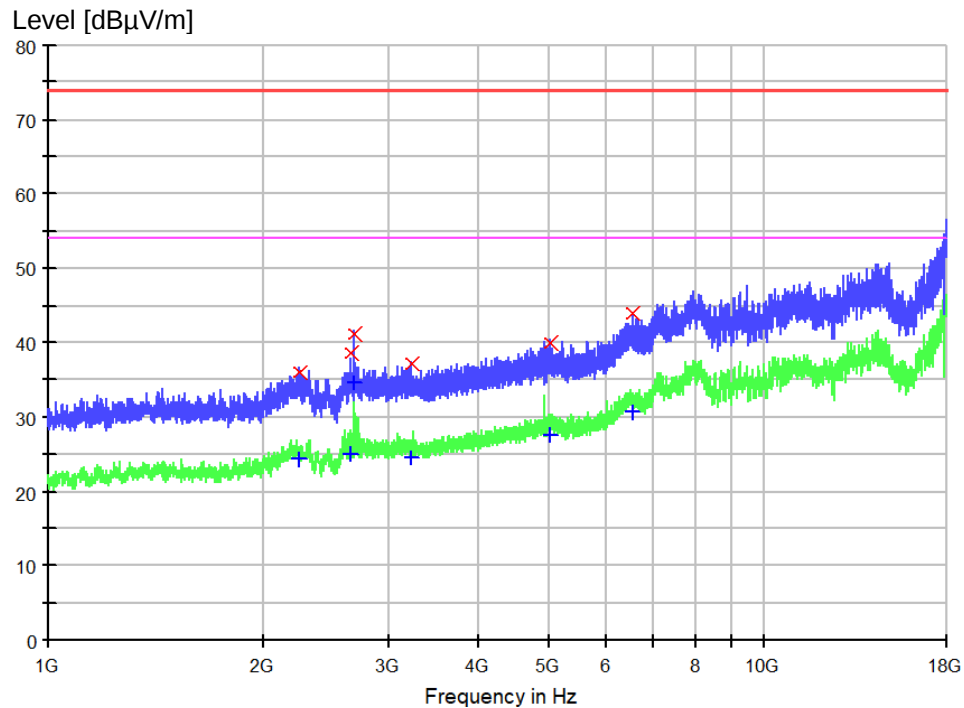
Note 2: The highest frequency in the EUT is 2480 MHz. According to FCC Part 15 subpart B §15.33 (b) (1), the upper frequency for radiated emission measurement is 18 GHz.

Figure 17: Spectral Diagrams and measurement results, 1 GHz – 18 GHz, Horizontal polarization on mode 1

Final peak measurement result:

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBμV/m)
2192.125000	36.5	1000.0	1000.000	100.0	H	-127.0	-15.8	37.5	74.0
2670.250000	38.1	1000.0	1000.000	150.0	H	-45.0	-15.5	35.9	74.0
2684.062500	38.4	1000.0	1000.000	200.0	H	-177.0	-15.4	35.6	74.0
7106.187500	45.1	1000.0	1000.000	100.0	H	35.0	-5.2	28.9	74.0
7840.375000	46.8	1000.0	1000.000	100.0	H	2.0	-4.7	27.2	74.0
9270.500000	46.9	1000.0	1000.000	100.0	H	-177.0	-4.3	27.1	74.0

Final average measurement result:

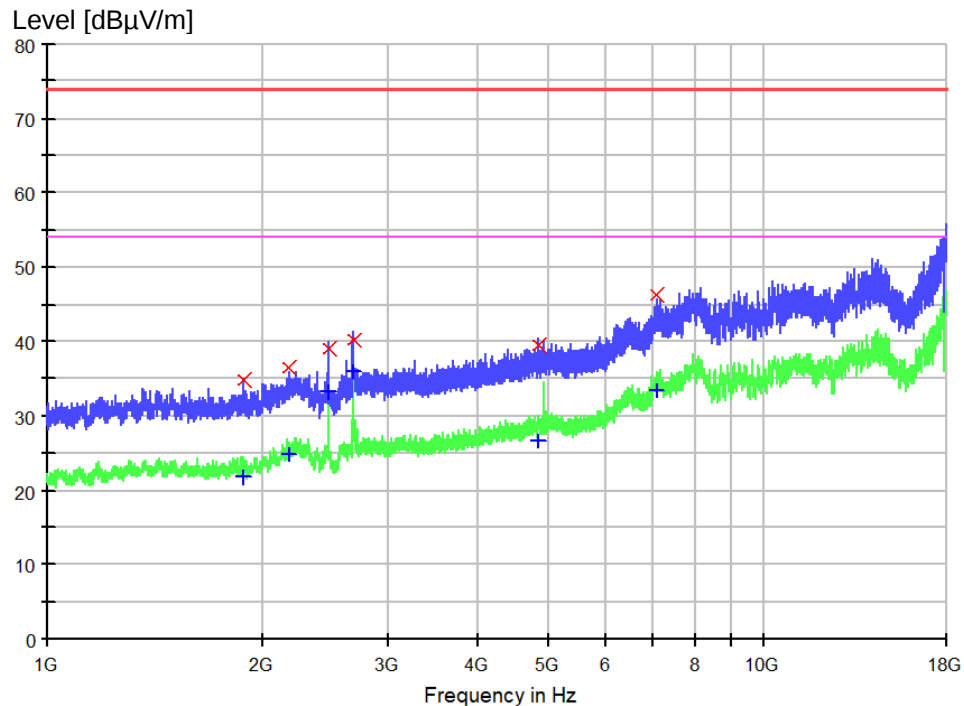
Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBμV/m)
2192.125000	24.3	1000.0	1000.000	100.0	H	-127.0	-15.8	17.5	54.0
2670.250000	24.8	1000.0	1000.000	150.0	H	-45.0	-15.5	15.9	54.0
2684.062500	29.8	1000.0	1000.000	200.0	H	-177.0	-15.4	15.6	54.0
7106.187500	33.6	1000.0	1000.000	100.0	H	35.0	-5.2	8.9	54.0
7840.375000	34.0	1000.0	1000.000	100.0	H	2.0	-4.7	7.2	54.0
9270.500000	34.8	1000.0	1000.000	100.0	H	-177.0	-4.3	7.1	54.0

Figure 18: Spectral Diagrams and measurement results, 1 GHz – 18 GHz, Vertical polarization on mode 1

Final peak measurement result:

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBμV/m)
2245.250000	36.1	1000.0	1000.000	100.0	V	70.0	-15.6	37.9	74.0
2654.312500	38.7	1000.0	1000.000	100.0	V	169.0	-15.6	35.3	74.0
2686.718750	41.3	1000.0	1000.000	200.0	V	67.0	-15.4	32.8	74.0
3214.250000	37.2	1000.0	1000.000	200.0	V	-143.0	-14.7	36.8	74.0
5028.468750	40.1	1000.0	1000.000	100.0	V	-1.0	-11.0	33.9	74.0
6563.250000	43.9	1000.0	1000.000	100.0	V	98.0	-7.6	30.1	74.0

Final average measurement result:

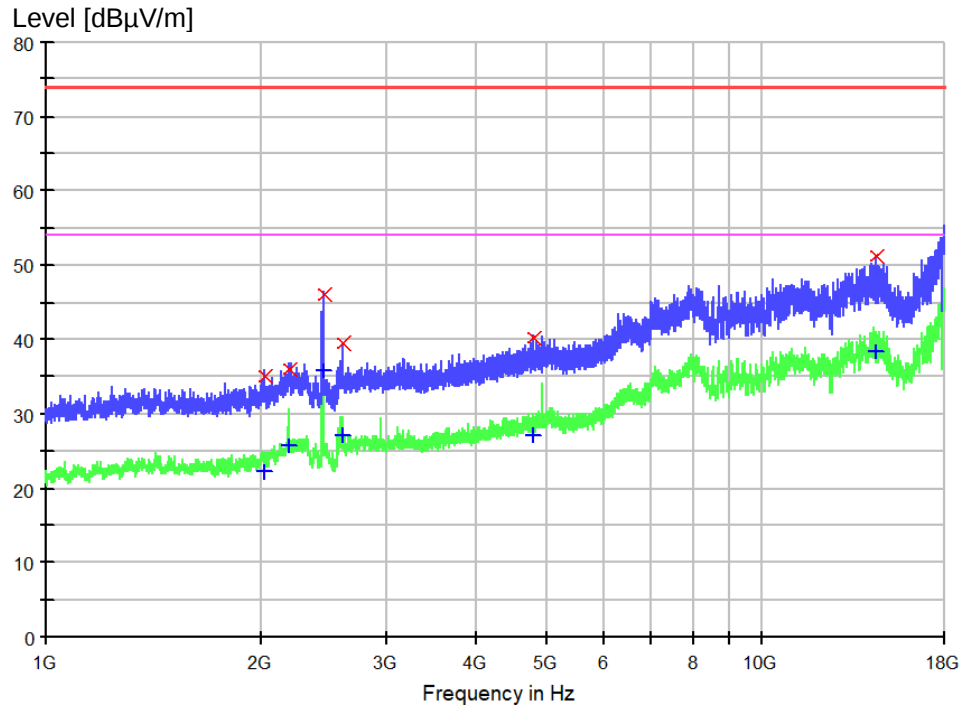
Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
2245.250000	24.3	1000.0	1000.000	100.0	V	70.0	-15.6	29.7	54.0
2654.312500	24.9	1000.0	1000.000	100.0	V	169.0	-15.6	29.1	54.0
2686.718750	34.5	1000.0	1000.000	200.0	V	67.0	-15.4	19.5	54.0
3214.250000	24.6	1000.0	1000.000	200.0	V	-143.0	-14.7	29.4	54.0
5028.468750	27.6	1000.0	1000.000	100.0	V	-1.0	-11.0	26.4	54.0
6563.250000	30.8	1000.0	1000.000	100.0	V	98.0	-7.6	23.2	54.0

Figure 19: Spectral Diagrams and measurement results, 1 GHz – 18 GHz, Horizontal polarization on mode 2

Final peak measurement result:

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBμV/m)
1883.468750	34.8	1000.0	1000.000	100.0	H	-48.0	-18.4	39.3	74.0
2175.656250	36.5	1000.0	1000.000	150.0	H	170.0	-16.0	37.5	74.0
2480.062500	39.1	1000.0	1000.000	150.0	H	-93.0	-16.2	34.9	74.0
2686.718750	40.3	1000.0	1000.000	100.0	H	116.0	-15.4	33.7	74.0
4840.406250	39.5	1000.0	1000.000	100.0	H	-91.0	-11.3	34.5	74.0
7103.000000	46.3	1000.0	1000.000	100.0	H	-137.0	-5.3	27.7	74.0

Final average measurement result:

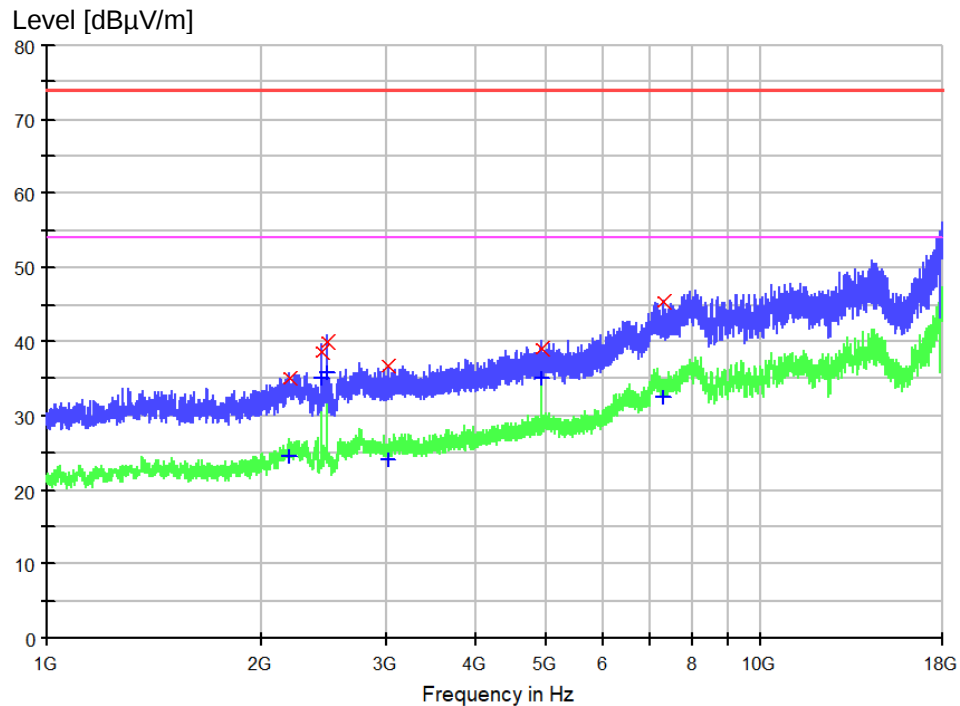
Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
1883.468750	21.8	1000.0	1000.000	100.0	H	-48.0	-18.4	32.3	54.0
2175.656250	24.8	1000.0	1000.000	150.0	H	170.0	-16.0	29.2	54.0
2480.062500	33.1	1000.0	1000.000	150.0	H	-93.0	-16.2	20.9	54.0
2686.718750	36.1	1000.0	1000.000	100.0	H	116.0	-15.4	17.9	54.0
4840.406250	26.8	1000.0	1000.000	100.0	H	-91.0	-11.3	27.2	54.0
7103.000000	33.4	1000.0	1000.000	100.0	H	-137.0	-5.3	20.6	54.0

Figure 20: Spectral Diagrams and measurement results, 1 GHz – 18 GHz, Vertical polarization on mode 2

Final peak measurement result:

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBμV/m)
2016.812500	35.1	1000.0	1000.000	100.0	V	-115.0	-17.7	38.9	74.0
2185.750000	36.1	1000.0	1000.000	150.0	V	35.0	-15.9	37.9	74.0
2439.687500	46.1	1000.0	1000.000	150.0	V	8.0	-16.2	27.9	74.0
2595.875000	39.5	1000.0	1000.000	100.0	V	55.0	-15.8	34.5	74.0
4792.593750	40.2	1000.0	1000.000	100.0	V	-1.0	-11.4	33.8	74.0
14413.000000	51.2	1000.0	1000.000	200.0	V	3.0	2.4	22.9	74.0

Final average measurement result:

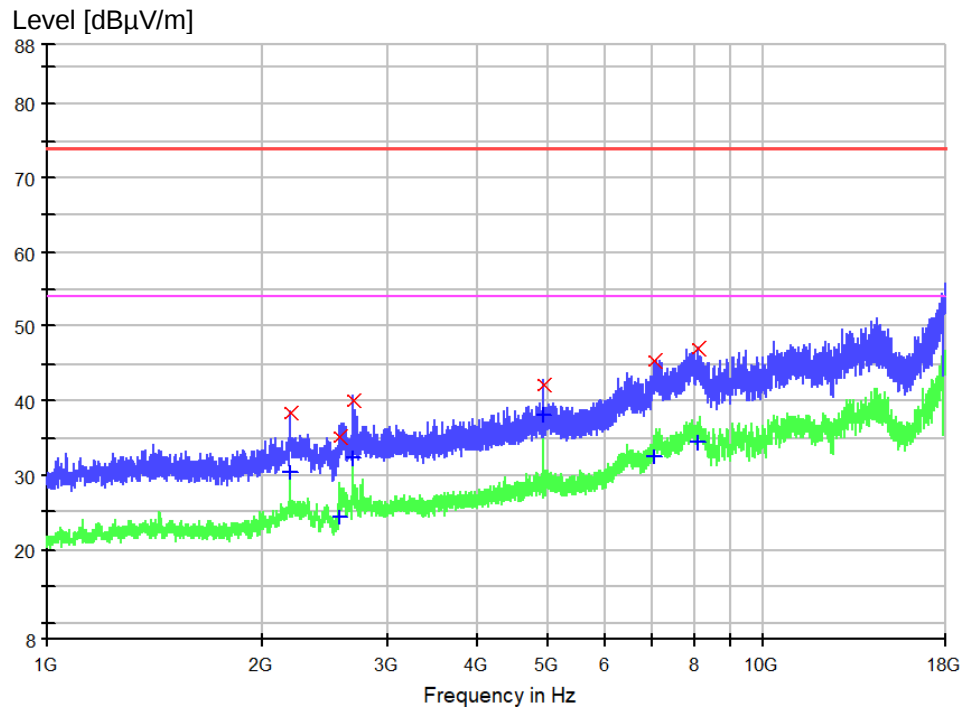
Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
2016.812500	22.3	1000.0	1000.000	100.0	V	-115.0	-17.7	31.7	54.0
2185.750000	25.8	1000.0	1000.000	150.0	V	35.0	-15.9	28.2	54.0
2439.687500	35.8	1000.0	1000.000	150.0	V	8.0	-16.2	18.2	54.0
2595.875000	27.1	1000.0	1000.000	100.0	V	55.0	-15.8	26.9	54.0
4792.593750	27.1	1000.0	1000.000	100.0	V	-1.0	-11.4	26.9	54.0
14413.000000	38.4	1000.0	1000.000	200.0	V	3.0	2.4	15.6	54.0

Figure 21: Spectral Diagrams and measurement results, 1 GHz – 18 GHz, Horizontal polarization on mode 3

Final peak measurement result:

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBμV/m)
2191.593750	35.1	1000.0	1000.000	150.0	H	98.0	-15.8	38.9	74.0
2426.406250	38.5	1000.0	1000.000	100.0	H	-79.0	-16.1	35.5	74.0
2480.062500	40.1	1000.0	1000.000	200.0	H	102.0	-16.2	33.9	74.0
3008.125000	36.8	1000.0	1000.000	150.0	H	70.0	-15.0	37.2	74.0
4952.500000	39.1	1000.0	1000.000	100.0	H	-164.0	-11.2	34.9	74.0
7326.125000	45.4	1000.0	1000.000	100.0	H	103.0	-6.5	28.6	74.0

Final average measurement result:

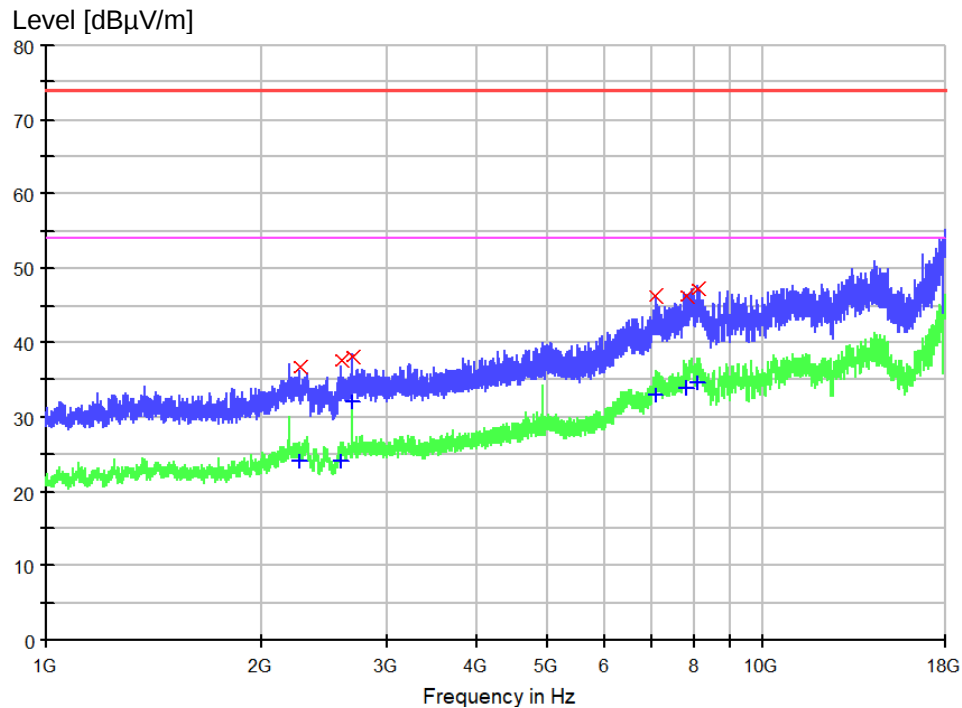
Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
2191.593750	24.5	1000.0	1000.000	150.0	H	98.0	-15.8	29.5	54.0
2426.406250	35.1	1000.0	1000.000	100.0	H	-79.0	-16.1	18.9	54.0
2480.062500	35.8	1000.0	1000.000	200.0	H	102.0	-16.2	18.2	54.0
3008.125000	24.0	1000.0	1000.000	150.0	H	70.0	-15.0	30.0	54.0
4952.500000	35.1	1000.0	1000.000	100.0	H	-164.0	-11.2	18.9	54.0
7326.125000	32.5	1000.0	1000.000	100.0	H	103.0	-6.5	21.5	54.0

Figure 22: Spectral Diagrams and measurement results, 1 GHz – 18 GHz, Vertical polarization on mode 3

Final peak measurement result:

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBμV/m)
2185.750000	38.5	1000.0	1000.000	150.0	V	86.0	-15.9	35.5	74.0
2567.718750	35.1	1000.0	1000.000	150.0	V	24.0	-16.0	38.9	74.0
2683.000000	40.1	1000.0	1000.000	100.0	V	127.0	-15.4	33.9	74.0
4952.500000	42.2	1000.0	1000.000	100.0	V	-65.0	-11.2	31.9	74.0
7059.437500	45.4	1000.0	1000.000	200.0	V	-65.0	-5.7	28.6	74.0
8141.062500	47.1	1000.0	1000.000	200.0	V	-18.0	-4.3	26.9	74.0

Final average measurement result:

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
2185.750000	30.5	1000.0	1000.000	150.0	V	86.0	-15.9	23.5	54.0
2567.718750	24.3	1000.0	1000.000	150.0	V	24.0	-16.0	29.7	54.0
2683.000000	32.4	1000.0	1000.000	100.0	V	127.0	-15.4	21.6	54.0
4952.500000	38.1	1000.0	1000.000	100.0	V	-65.0	-11.2	15.9	54.0
7059.437500	32.7	1000.0	1000.000	200.0	V	-65.0	-5.7	21.3	54.0
8141.062500	34.4	1000.0	1000.000	200.0	V	-18.0	-4.3	19.6	54.0

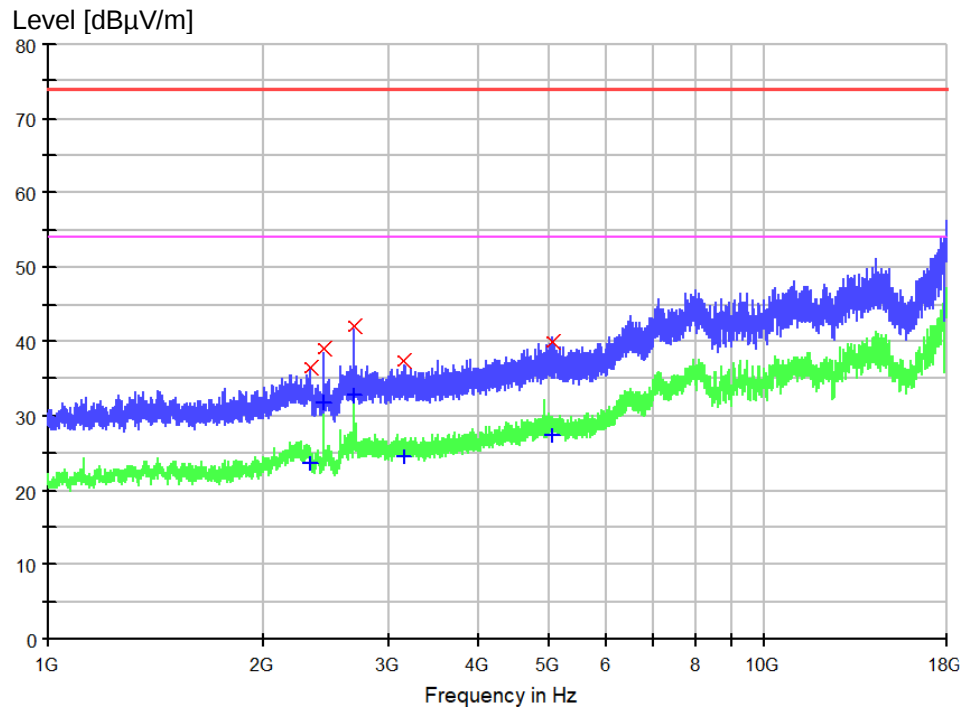
Figure 23: Spectral Diagrams and measurement results, 1 GHz – 18 GHz, Horizontal polarization on mode 4

Final peak measurement result:

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBμV/m)
2253.750000	36.7	1000.0	1000.000	100.0	H	-169.0	-15.6	37.3	74.0
2587.375000	37.8	1000.0	1000.000	200.0	H	-154.0	-15.9	36.2	74.0
2683.531250	38.1	1000.0	1000.000	100.0	H	23.0	-15.4	35.9	74.0
7092.906250	46.3	1000.0	1000.000	100.0	H	-157.0	-5.4	27.7	74.0
7826.562500	46.3	1000.0	1000.000	150.0	H	37.0	-4.8	27.7	74.0
8135.750000	47.2	1000.0	1000.000	150.0	H	77.0	-4.3	26.8	74.0

Final average measurement result:

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
2253.750000	24.1	1000.0	1000.000	100.0	H	-169.0	-15.6	29.9	54.0
2587.375000	24.2	1000.0	1000.000	200.0	H	-154.0	-15.9	29.9	54.0
2683.531250	32.1	1000.0	1000.000	100.0	H	23.0	-15.4	21.9	54.0
7092.906250	33.1	1000.0	1000.000	100.0	H	-157.0	-5.4	20.9	54.0
7826.562500	33.9	1000.0	1000.000	150.0	H	37.0	-4.8	20.1	54.0
8135.750000	34.6	1000.0	1000.000	150.0	H	77.0	-4.3	19.4	54.0

Figure 24: Spectral Diagrams and measurement results, 1 GHz – 18 GHz, Vertical polarization on mode 4



Final peak measurement result:

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBμV/m)
2328.125000	36.4	1000.0	1000.000	200.0	V	-122.0	-15.9	37.6	74.0
2426.406250	39.0	1000.0	1000.000	100.0	V	-16.0	-16.1	35.1	74.0
2686.718750	42.1	1000.0	1000.000	200.0	V	-45.0	-15.4	31.9	74.0
3136.687500	37.3	1000.0	1000.000	150.0	V	-40.0	-14.6	36.7	74.0
5071.500000	40.0	1000.0	1000.000	100.0	V	178.0	-11.0	34.0	74.0

Final average measurement result:

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
2328.125000	23.7	1000.0	1000.000	200.0	V	-122.0	-15.9	30.3	54.0
2426.406250	31.9	1000.0	1000.000	100.0	V	-16.0	-16.1	22.2	54.0
2686.718750	32.8	1000.0	1000.000	200.0	V	-45.0	-15.4	21.2	54.0
3136.687500	24.6	1000.0	1000.000	150.0	V	-40.0	-14.6	29.4	54.0
5071.500000	27.5	1000.0	1000.000	100.0	V	178.0	-11.0	26.5	54.0

6 Photographs of the Test Set-Up

Refer to the test setup file.

7 List of Test and Measurement Instruments

Equip. no.	Equipment name	Model	Serial no.	Manufacturer	Cal. date	Due date
EMC-C-195	EMI test receiver	ESR3	102794	Rohde & Schwarz	2024-08-03	2025-08-03
EMC-C-366	Thermohygrometer	608-H1	2485149174	testo	2024-07-26	2025-07-26
EMC-S-028	EMI measurement software	EMC32-E+ (10.60.20)	100150	Rohde & Schwarz	N/A	N/A
EMC-C-190	Artificial mains network	ENV432	101514	Rohde & Schwarz	2024-10-11	2025-10-11
EMC-C-066	EMI test receiver	ESCI	100280	Rohde & Schwarz	2024-10-17	2025-10-17
EMC-C-001	3 m semi-anechoic chamber	SAC3	FJ129002	Frankonia	2023-12-03	2026-12-03
EMC-S-032	EMI measurement software	EMC32-MEB (10.60.20)	100697	Rohde & Schwarz	N/A	N/A
EMC-C-373	Trilog broadband antenna	VULB 9168	1771	Schwarzbeck	2024-11-23	2025-11-23
EMC-C-121	Thermohygrometer	608-H1	1241320265	testo	2024-06-25	2025-06-25
EMC-C-176	Preamplifier	EMC184045SE	980596	EMCI Taiwan	2024-07-24	2025-07-24
EMC-C-019	Double ridged horn antenna	BBHA 9120 D	9120D-433	Schwarzbeck	2025-02-28	2026-02-28
EMC-C-175	Preamplifier	EMC051845SE	980612	EMCI Taiwan	2024-07-24	2025-07-24
EMC-C-161	Spectrum analyser	FSV40	101258	Rohde & Schwarz	2024-07-15	2025-07-15

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End of test report