

Prüfbericht-Nr.: <i>Test report no.:</i>	CN251MER 001	Auftrags-Nr.: <i>Order no.:</i>	326069310	Seite 1 von 41 <i>Page 1 of 41</i>
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	1288983	Auftragsdatum: <i>Order date:</i>	2024-12-18	
Auftraggeber: <i>Client:</i>	IKEA of Sweden AB Box 702, SE-343 81 Älmhult, Sweden			
Prüfgegenstand: <i>Test item:</i>	Self-ballasted LED lamps			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	LED2407G8NA			
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-005:2018			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2025-03-06	Refer to the EUT photos file		
Prüfmuster-Nr.: <i>Test sample no:</i>	A003951539-003			
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>	Ausstellungsdatum: <i>Issue date:</i>			
Stellung / Position:	Project engineer	Stellung / Position:	Authorizer	
Sonstiges / <i>Other:</i>	FCC ID: FHO-LED2407G8NA 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: <i>* Legend:</i>	P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet			
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 | <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. 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>
<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
CN251MER 001	2025-05-11	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 test equipment used 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, 79 mA
Rated power	: 8.1 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.

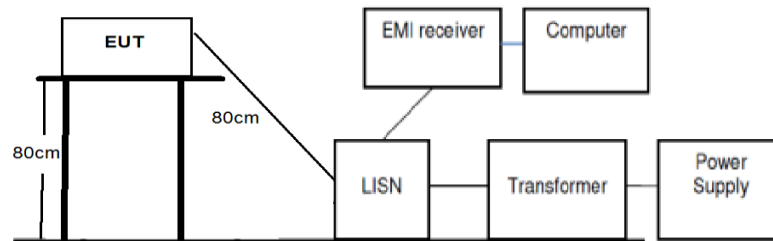
Refer to the related paragraph of this report.

The sequence of testing:

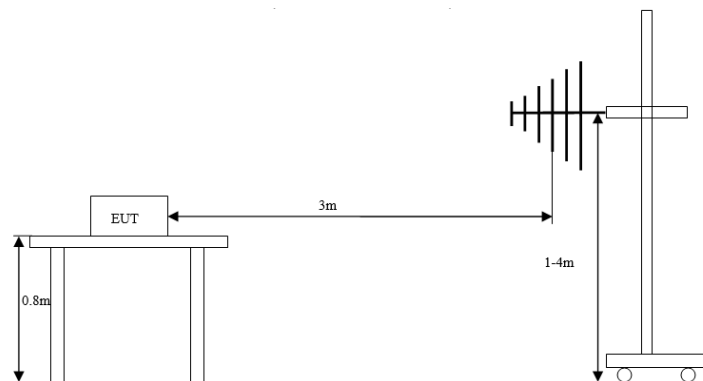
1. Conducted emission tests were performed on 2025-04-11.
2. Radiated emission tests were performed on 2025-04-10~2025-04-14.

3.2 Equipment and cable arrangement

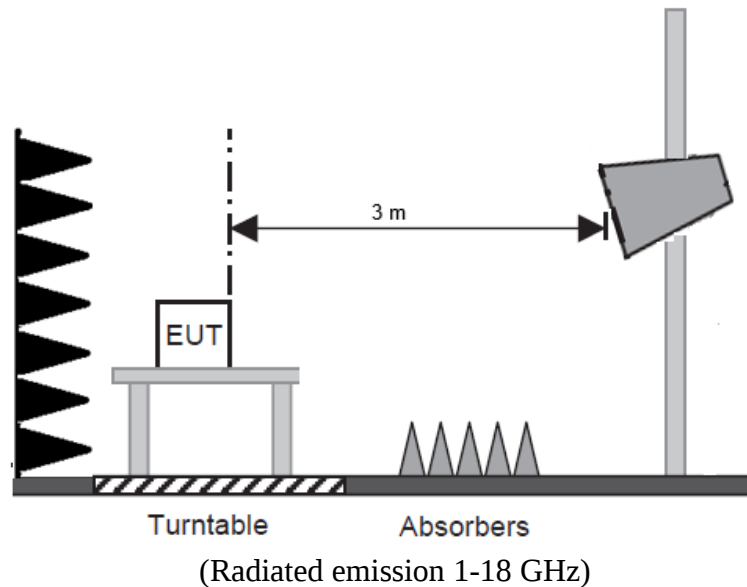
Block diagram for both conducted emission and radiated emission tests is as follows:



(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

During the tests, no special countermeasure was 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	: 2025-04-11	
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: 20.1 °C; Relative humidity: 49.5 %	
Expanded measurement uncertainty (k=2)	: 2.33 dB The minimum margin to the limit is 4.88 dB at 0.179250 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 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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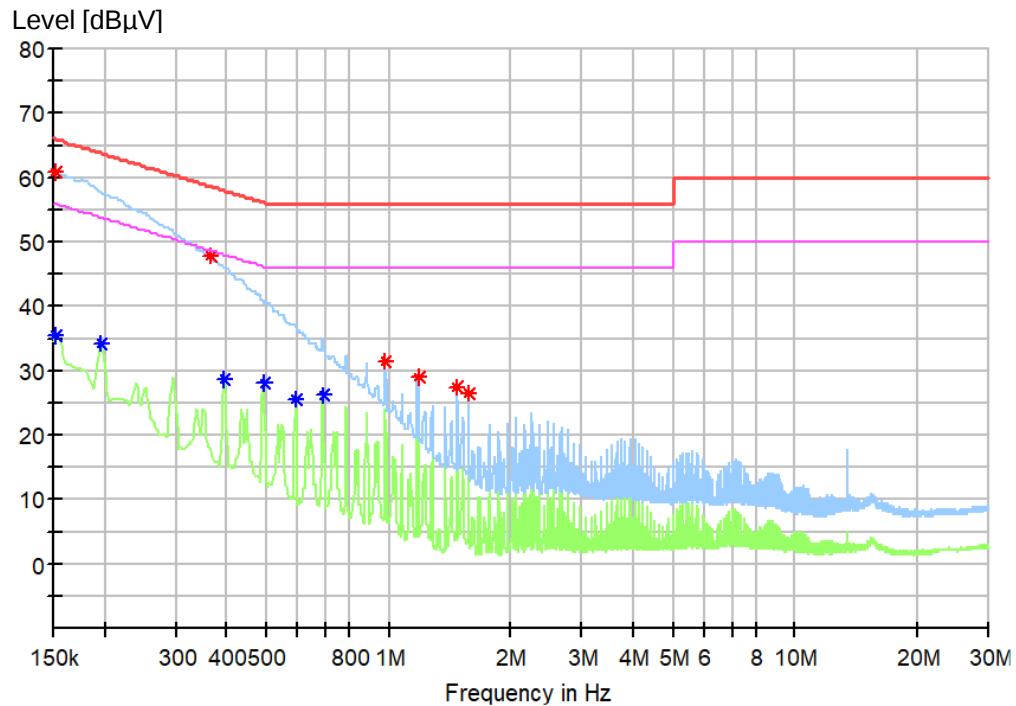
Notes on following tables of conducted emission results and conversions:

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



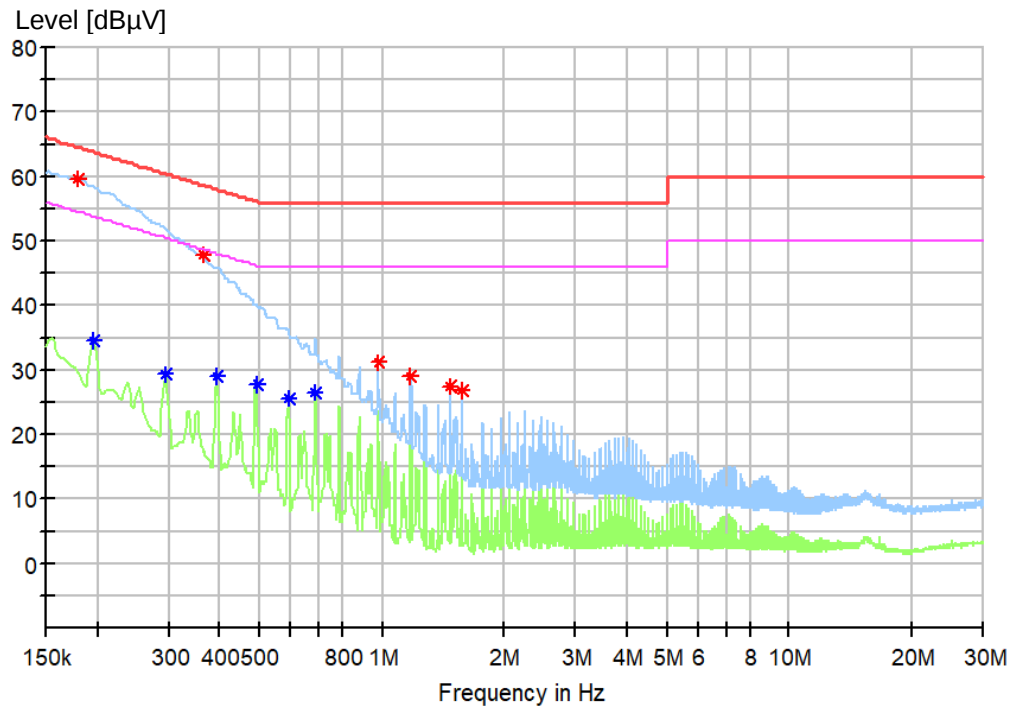
Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.152250	60.89	65.88	4.98	L1
0.363750	47.86	58.64	10.78	L1
0.984750	31.46	56.00	24.54	L1
1.182750	29.00	56.00	27.00	L1
1.477500	27.36	56.00	28.64	L1
1.576500	26.55	56.00	29.45	L1

Final average measurement result:

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.152250	35.54	55.88	20.34	L1
0.197250	34.11	53.73	19.62	L1
0.393000	28.72	48.00	19.28	L1
0.492000	27.96	46.13	18.17	L1
0.591000	25.69	46.00	20.31	L1
0.690000	26.29	46.00	19.71	L1

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



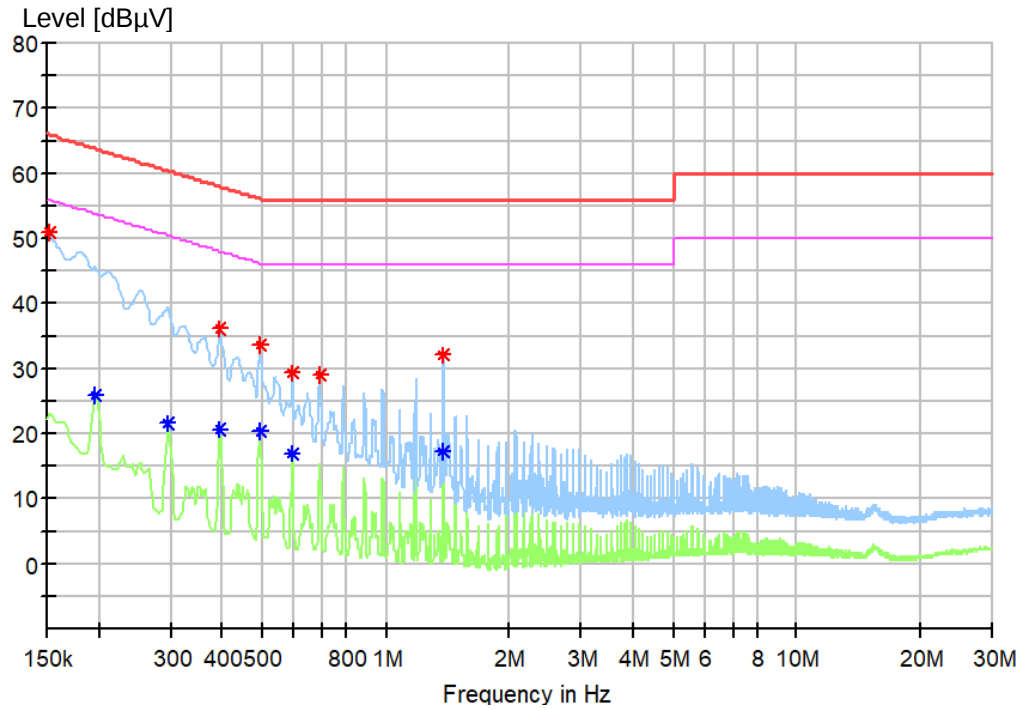
Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.179250	59.64	64.52	4.88	N
0.363750	47.68	58.64	10.96	N
0.982500	31.03	56.00	24.97	N
1.180500	29.02	56.00	26.98	N
1.475250	27.30	56.00	28.70	N
1.572000	26.80	56.00	29.20	N

Final average measurement result:

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.197250	34.58	53.73	19.15	N
0.294000	29.17	50.41	21.24	N
0.393000	28.89	48.00	19.11	N
0.492000	27.77	46.13	18.36	N
0.588750	25.44	46.00	20.56	N
0.687750	26.53	46.00	19.47	N

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



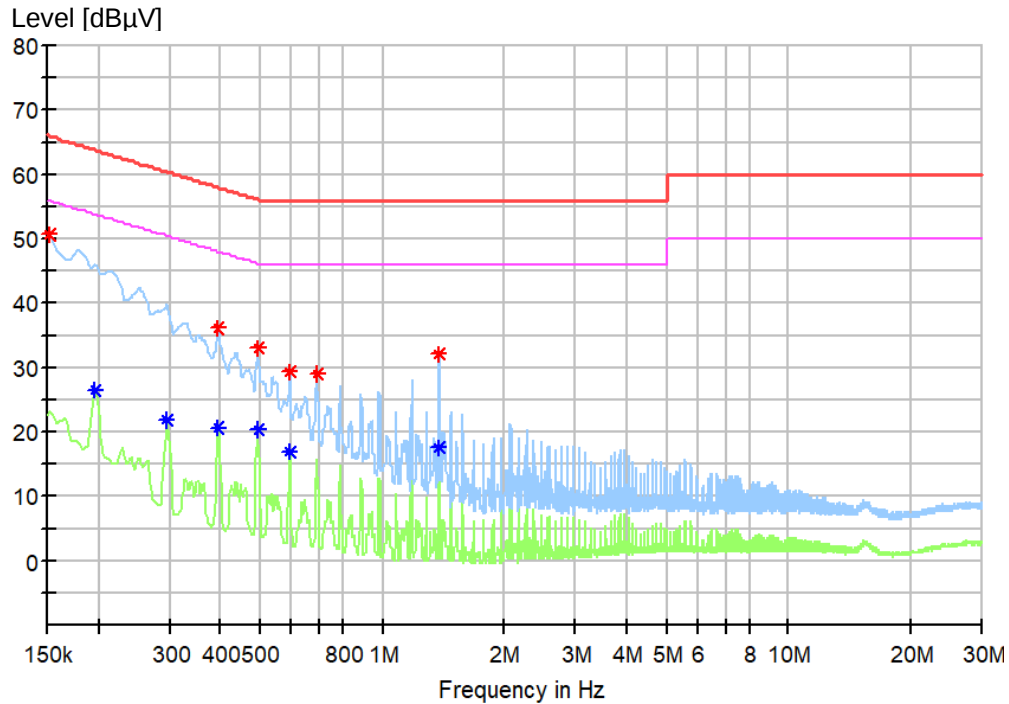
Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.152250	50.93	65.88	14.95	L1
0.395250	35.95	57.95	22.01	L1
0.494250	33.49	56.10	22.60	L1
0.593250	29.15	56.00	26.85	L1
0.690000	29.11	56.00	26.89	L1
1.383000	32.00	56.00	24.00	L1

Final average measurement result:

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.197250	25.91	53.73	27.82	L1
0.296250	21.40	50.35	28.95	L1
0.395250	20.47	47.95	27.48	L1
0.494250	20.28	46.10	25.82	L1
0.593250	16.77	46.00	29.23	L1
1.383000	17.32	46.00	28.68	L1

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



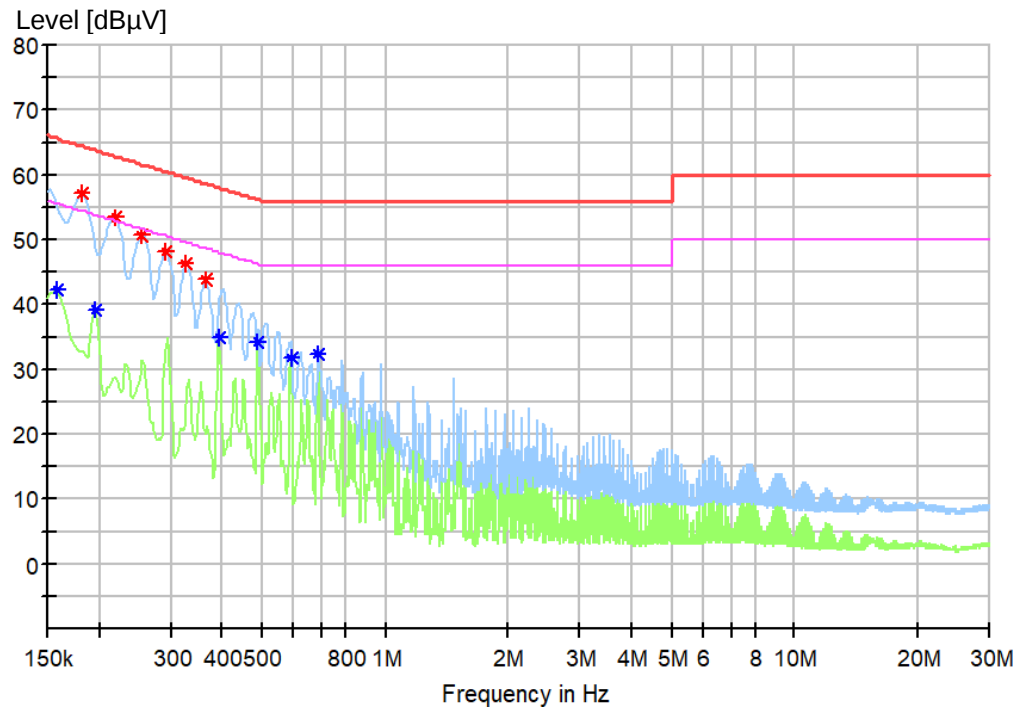
Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.152250	50.58	65.88	15.30	N
0.395250	36.09	57.95	21.87	N
0.494250	33.05	56.10	23.05	N
0.593250	29.39	56.00	26.61	N
0.690000	28.84	56.00	27.16	N
1.383000	32.06	56.00	23.94	N

Final average measurement result:

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.197250	26.57	53.73	27.15	N
0.296250	21.75	50.35	28.60	N
0.395250	20.62	47.95	27.33	N
0.494250	20.20	46.10	25.90	N
0.593250	16.84	46.00	29.16	N
1.383000	17.39	46.00	28.61	N

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



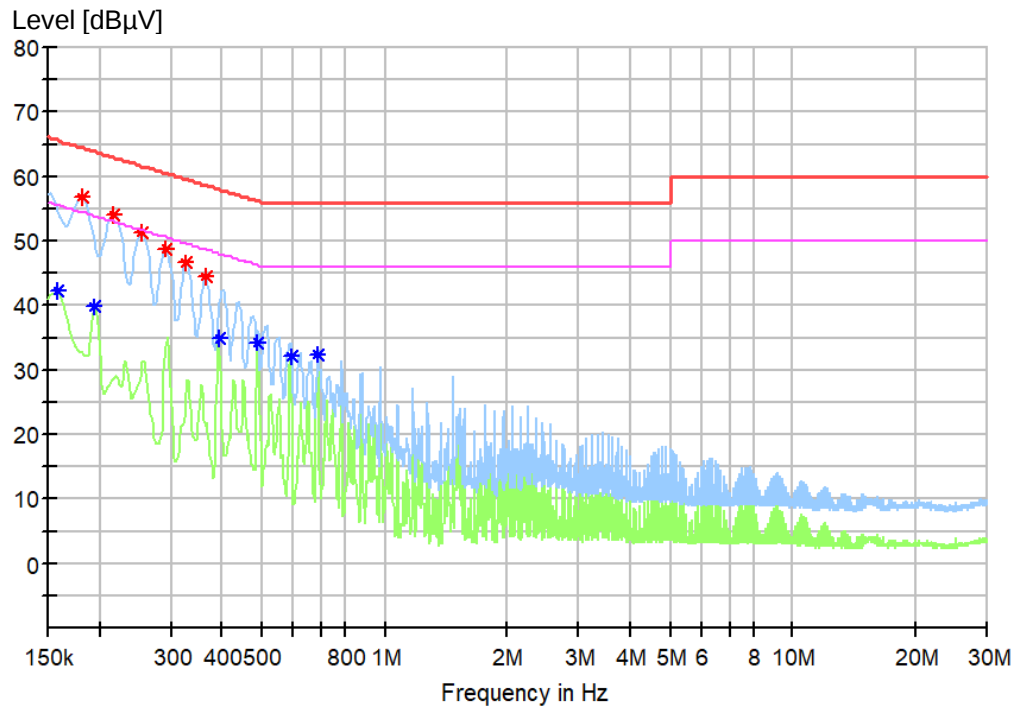
Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.181500	56.97	64.42	7.44	L1
0.219750	53.33	62.83	9.50	L1
0.255750	50.71	61.57	10.86	L1
0.291750	48.07	60.47	12.41	L1
0.327750	46.23	59.51	13.28	L1
0.366000	43.93	58.59	14.66	L1

Final average measurement result:

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.159000	42.18	55.52	13.34	L1
0.197250	39.19	53.73	14.54	L1
0.393000	34.79	48.00	13.21	L1
0.489750	34.10	46.17	12.07	L1
0.588750	31.81	46.00	14.19	L1
0.687750	32.28	46.00	13.72	L1

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



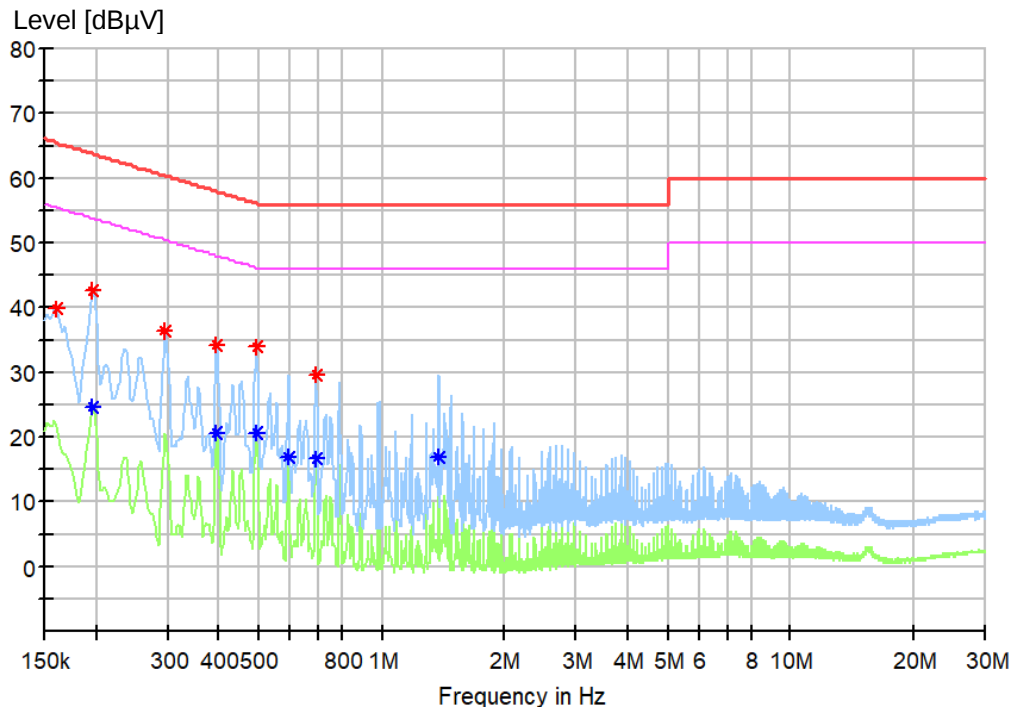
Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.181500	56.82	64.42	7.60	N
0.217500	54.09	62.91	8.83	N
0.255750	51.13	61.57	10.43	N
0.291750	48.72	60.47	11.75	N
0.327750	46.52	59.51	12.99	N
0.366000	44.44	58.59	14.15	N

Final average measurement result:

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.159000	42.12	55.52	13.40	N
0.195000	39.87	53.82	13.95	N
0.393000	34.83	48.00	13.17	N
0.489750	34.31	46.17	11.86	N
0.588750	31.93	46.00	14.07	N
0.685500	32.44	46.00	13.56	N

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



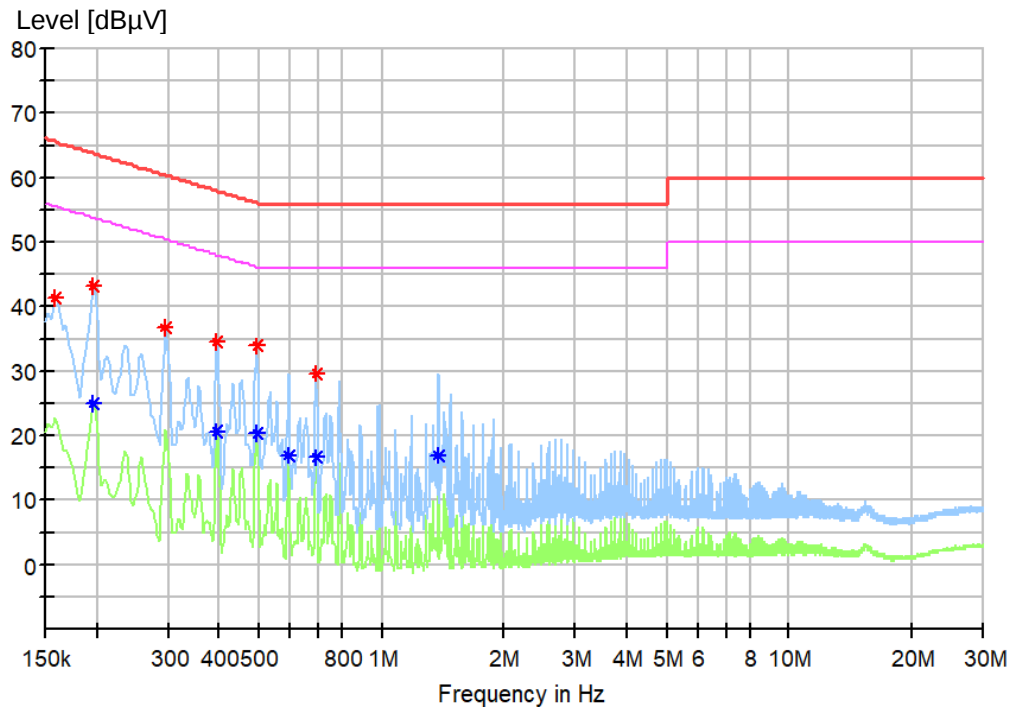
Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.161250	39.84	65.40	25.56	L1
0.197250	42.59	63.73	21.14	L1
0.296250	36.30	60.35	24.05	L1
0.395250	34.35	57.95	23.60	L1
0.494250	34.04	56.10	22.05	L1
0.692250	29.59	56.00	26.41	L1

Final average measurement result:

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.197250	24.58	53.73	29.15	L1
0.395250	20.49	47.95	27.46	L1
0.494250	20.65	46.10	25.45	L1
0.593250	16.96	46.00	29.04	L1
0.692250	16.68	46.00	29.32	L1
1.383000	16.82	46.00	29.18	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
0.159000	41.20	65.52	24.32	N
0.197250	43.10	63.73	20.62	N
0.296250	36.55	60.35	23.80	N
0.395250	34.41	57.95	23.54	N
0.494250	33.90	56.10	22.19	N
0.692250	29.72	56.00	26.28	N

Final average measurement result:

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.197250	25.05	53.73	28.67	N
0.395250	20.51	47.95	27.44	N
0.494250	20.46	46.10	25.64	N
0.593250	16.99	46.00	29.01	N
0.692250	16.75	46.00	29.25	N
1.383000	16.76	46.00	29.24	N

5.2 Emission in the Frequency Range above 30 MHz

5.2.1 Radiated emission (30-1000 MHz)

Result:	Passed
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Date of testing	: 2025-04-14
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: 19.2 °C; Relative humidity: 51.3 %
Expanded measurement uncertainty (k=2)	: 5.40 dB The minimum margin to the limit is 18.5 dB at 55.341250 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 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 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:

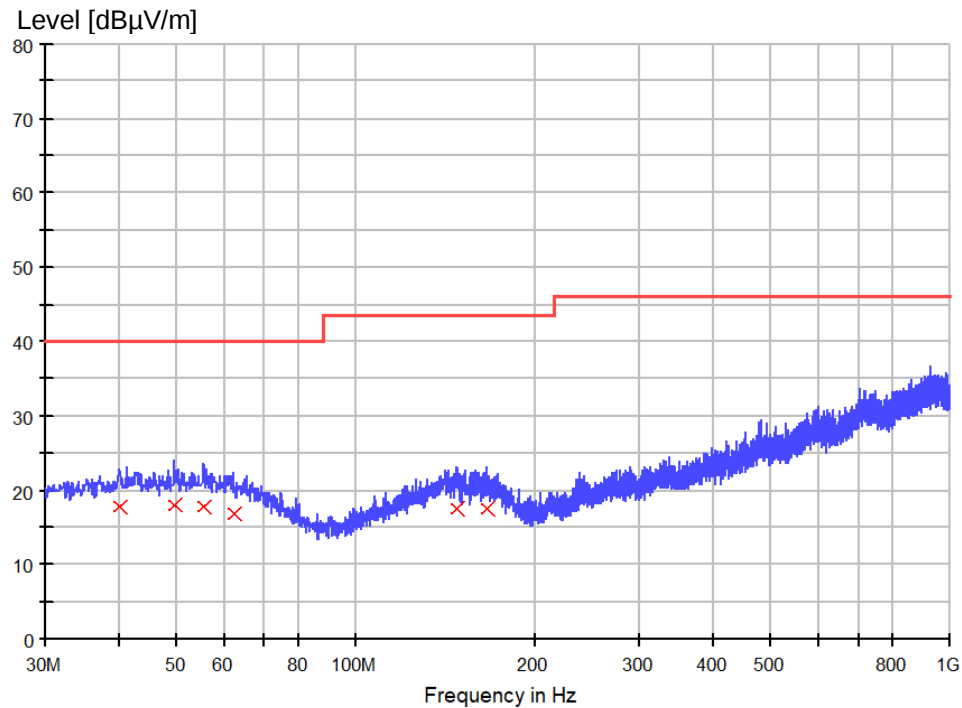
QuasiPeak (dB μ V/m): final measurement results by using quasi-peak detector

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.

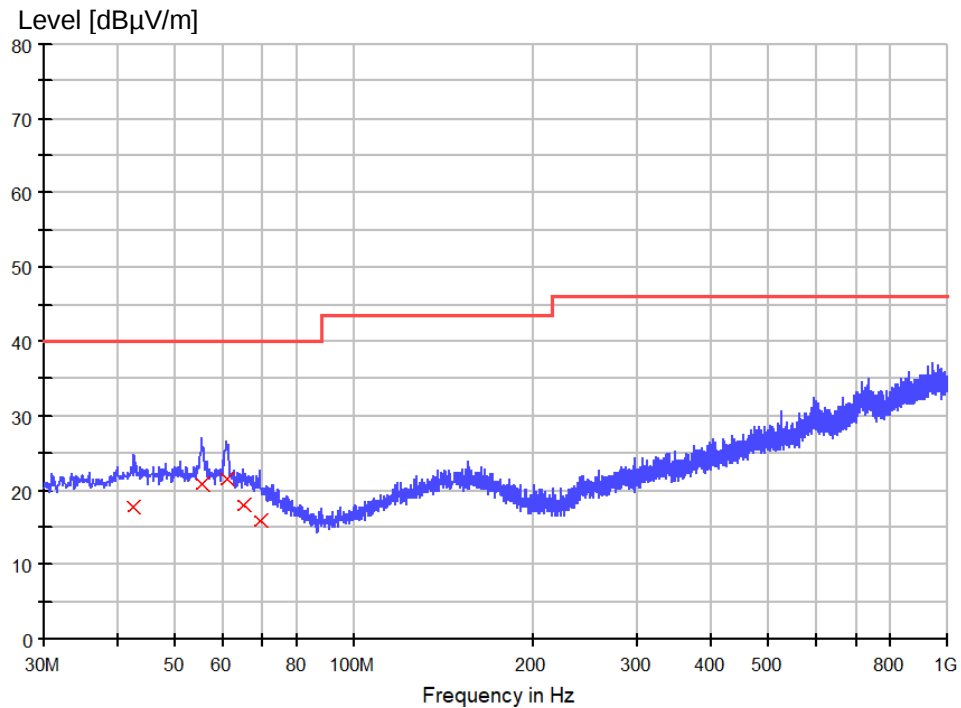
Figure 9: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 1



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)
39.942500	17.8	120.000	200.0	H	-33.0	13.9	22.2	40.0
49.521250	17.9	120.000	100.0	H	4.0	14.3	22.1	40.0
55.462500	17.8	120.000	150.0	H	6.0	14.1	22.2	40.0
62.131250	16.8	120.000	200.0	H	-141.0	13.4	23.2	40.0
148.218750	17.6	120.000	150.0	H	-65.0	14.2	26.0	43.5
166.285000	17.6	120.000	200.0	H	-135.0	14.0	25.9	43.5

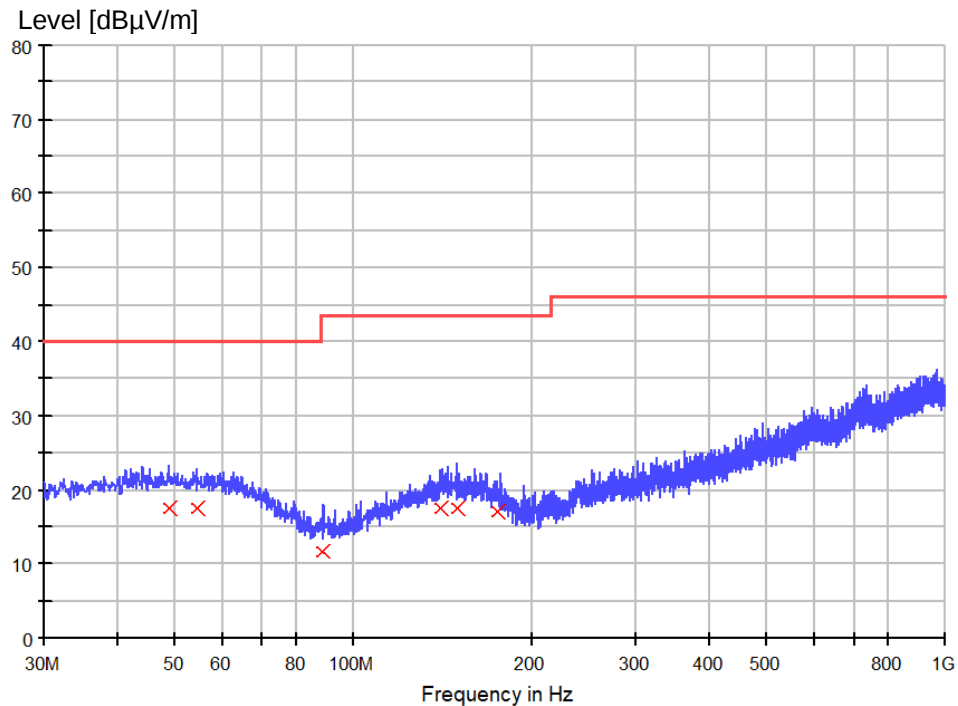
Figure 10: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 1



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)
42.488750	17.8	120.000	200.0	V	-53.0	14.2	22.2	40.0
55.341250	20.9	120.000	100.0	V	157.0	14.1	19.1	40.0
60.918750	21.5	120.000	100.0	V	-44.0	13.6	18.5	40.0
65.041250	18.1	120.000	100.0	V	167.0	13.1	21.9	40.0
69.527500	16.0	120.000	200.0	V	-109.0	12.5	24.0	40.0

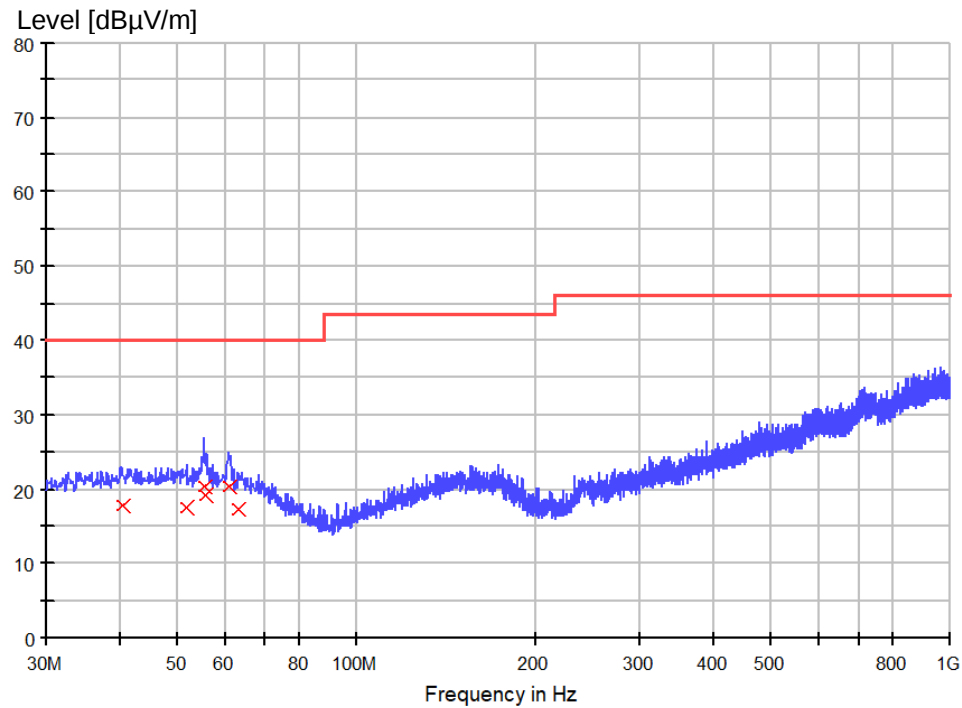
Figure 11: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 2



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)
48.672500	17.6	120.000	200.0	H	-110.0	14.2	22.4	40.0
54.492500	17.5	120.000	100.0	H	-72.0	14.2	22.5	40.0
89.048750	11.7	120.000	150.0	H	-159.0	8.7	31.8	43.5
140.580000	17.5	120.000	200.0	H	-10.0	13.7	26.0	43.5
149.552500	17.6	120.000	200.0	H	0.0	14.3	26.0	43.5
174.651250	17.1	120.000	200.0	H	71.0	13.4	26.4	43.5

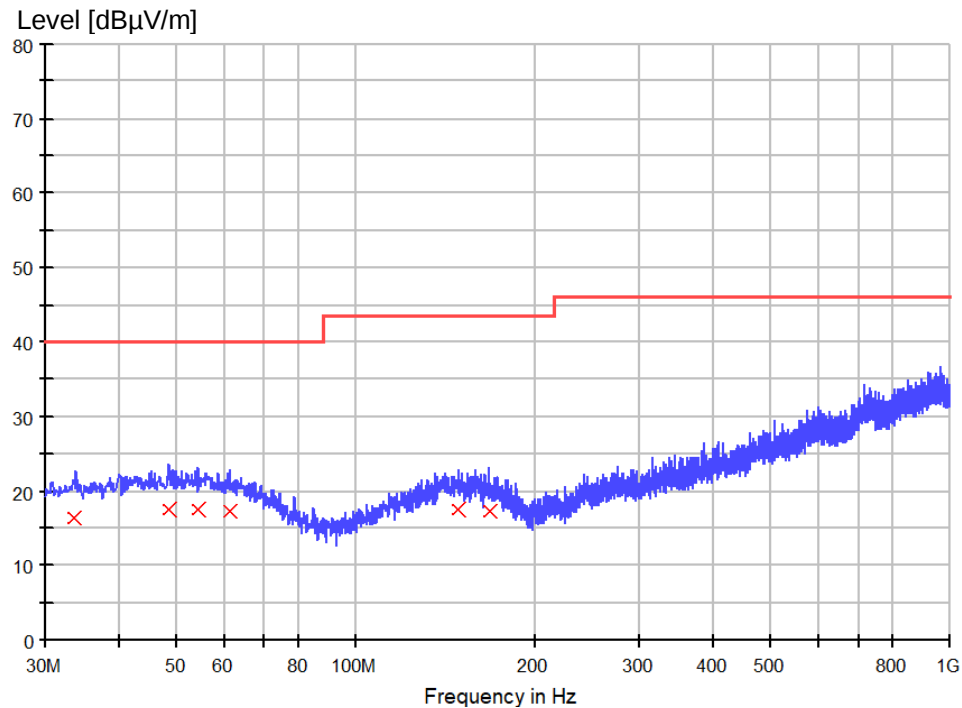
Figure 12: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 2



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)
40.185000	17.8	120.000	200.0	V	-160.0	13.9	22.2	40.0
51.703750	17.6	120.000	150.0	V	97.0	14.3	22.4	40.0
55.341250	20.4	120.000	100.0	V	-16.0	14.1	19.6	40.0
55.947500	19.1	120.000	200.0	V	110.0	14.1	20.9	40.0
60.918750	20.4	120.000	150.0	V	-167.0	13.6	19.6	40.0
63.465000	17.4	120.000	150.0	V	157.0	13.3	22.6	40.0

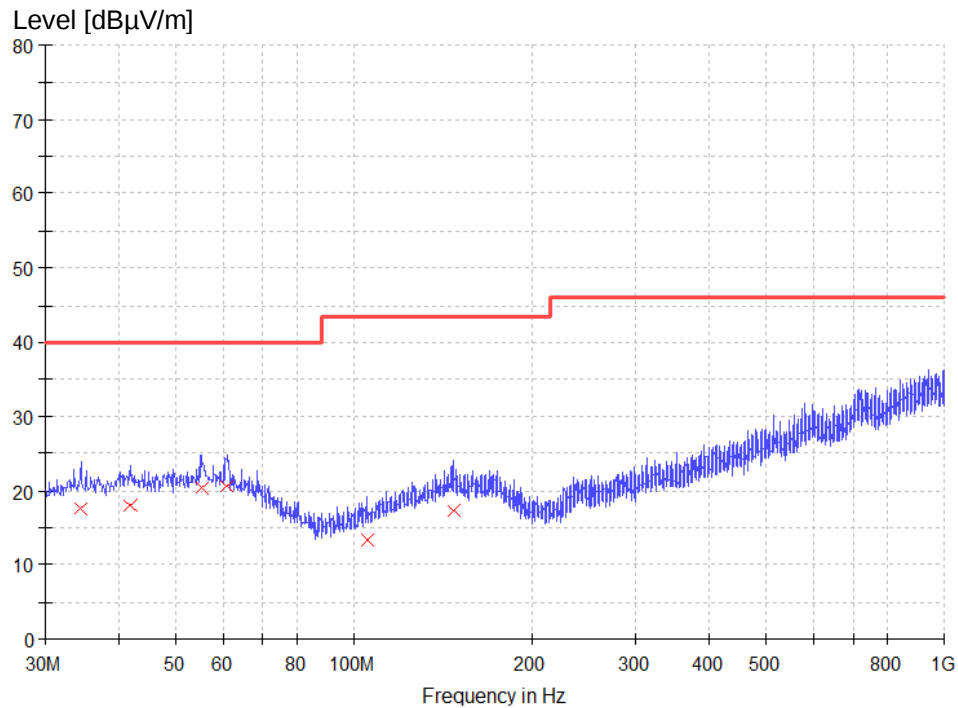
Figure 13: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 3



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)
33.516250	16.5	120.000	150.0	H	18.0	13.2	23.5	40.0
48.551250	17.6	120.000	200.0	H	117.0	14.2	22.4	40.0
54.250000	17.5	120.000	200.0	H	168.0	14.2	22.5	40.0
61.282500	17.3	120.000	150.0	H	-95.0	13.5	22.8	40.0
148.946250	17.6	120.000	100.0	H	117.0	14.2	25.9	43.5
167.861250	17.3	120.000	150.0	H	56.0	13.9	26.2	43.5

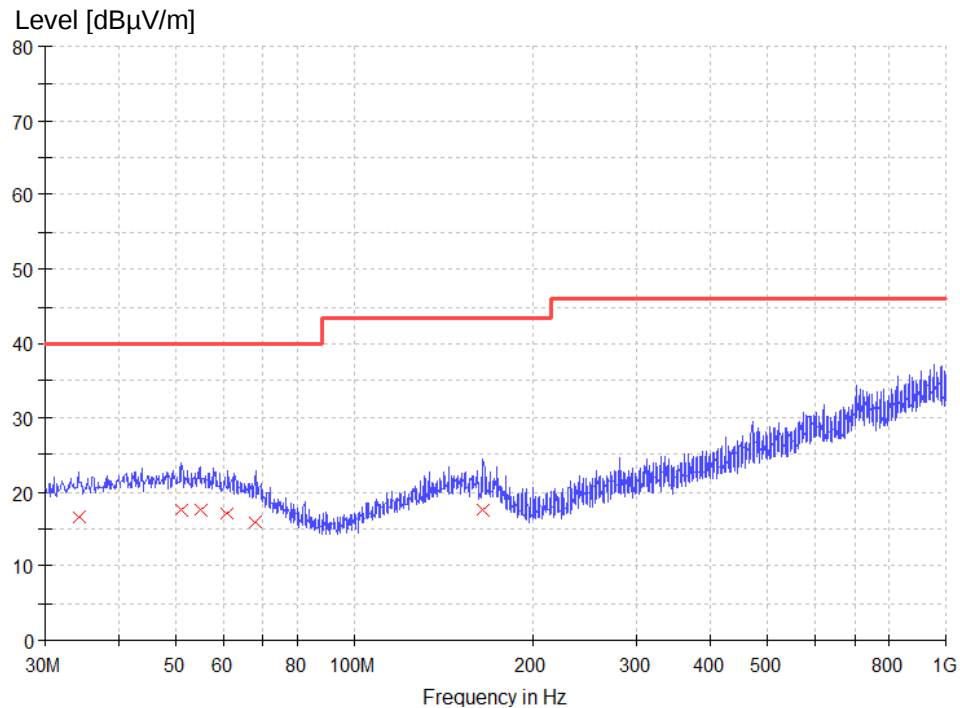
Figure 14: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 3



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)
34.486250	17.5	120.000	150.0	V	-92.0	13.4	22.5	40.0
41.761250	18.0	120.000	150.0	V	177.0	14.1	22.0	40.0
55.341250	20.4	120.000	150.0	V	-122.0	14.1	19.6	40.0
61.040000	20.7	120.000	200.0	V	65.0	13.5	19.3	40.0
105.296250	13.3	120.000	100.0	V	-19.0	10.2	30.2	43.5
147.370000	17.2	120.000	150.0	V	18.0	14.1	26.3	43.5

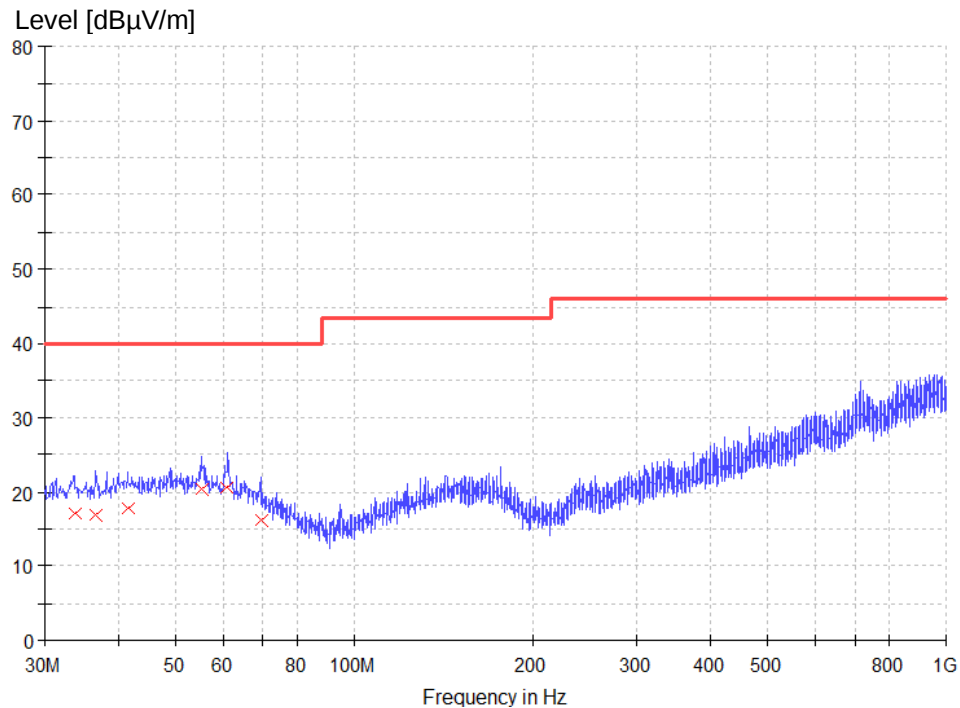
Figure 15: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 4



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)
34.243750	16.7	120.000	200.0	H	-110.0	13.3	23.3	40.0
51.218750	17.5	120.000	200.0	H	-45.0	14.3	22.5	40.0
54.856250	17.5	120.000	100.0	H	35.0	14.2	22.5	40.0
61.161250	17.2	120.000	200.0	H	-143.0	13.5	22.8	40.0
67.830000	15.9	120.000	200.0	H	22.0	12.7	24.1	40.0
165.678750	17.6	120.000	200.0	H	160.0	14.0	26.0	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)
33.758750	17.2	120.000	150.0	V	110.0	13.3	22.8	40.0
36.668750	16.9	120.000	200.0	V	154.0	13.6	23.2	40.0
41.518750	17.7	120.000	200.0	V	57.0	14.1	22.3	40.0
55.341250	20.5	120.000	100.0	V	171.0	14.1	19.6	40.0
61.161250	20.5	120.000	150.0	V	-107.0	13.5	19.5	40.0
69.406250	16.1	120.000	150.0	V	36.0	12.5	23.9	40.0

5.2.2 Radiated Emission (1-18 GHz)

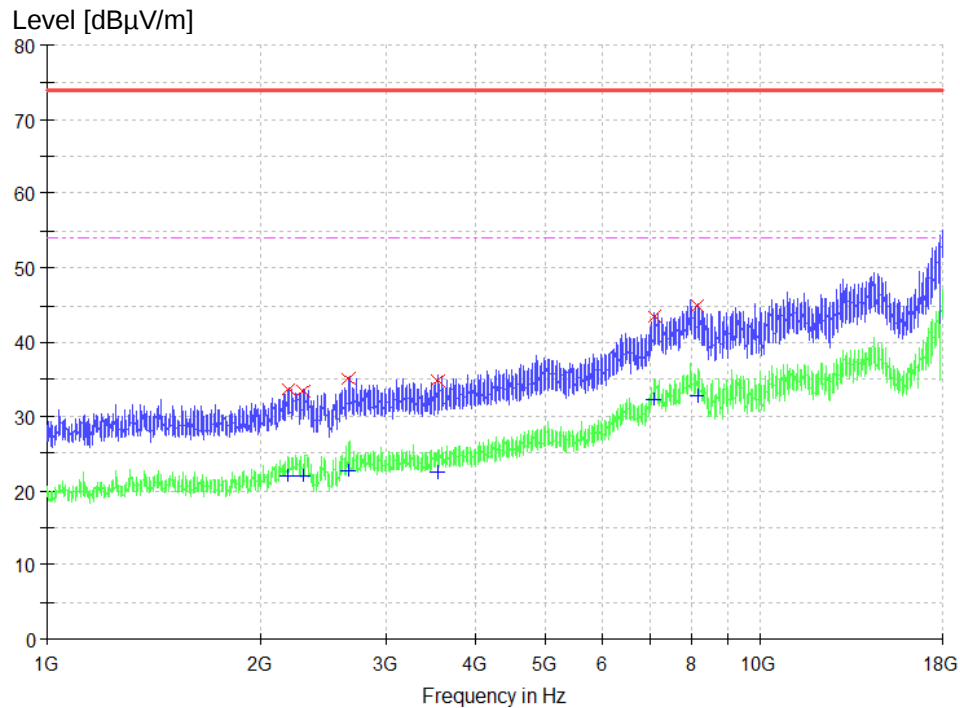
Result:
Passed

Date of testing	: 2025-04-10
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 dB μ V/m Average limits (3 m distance): 1 – 18 GHz, 54 dB μ V/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: 19.2 °C; Relative humidity: 51.3 %
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 16.7 dB at 14418.312500 MHz. The margin is higher than the 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, “×” 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.

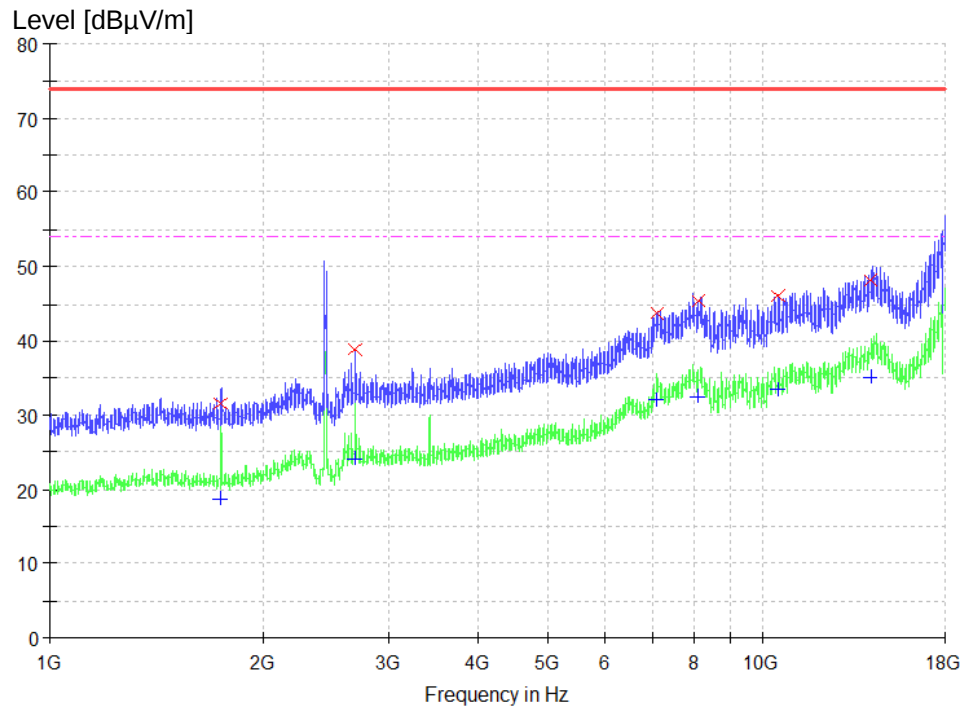
Figure 17: Spectral Diagrams and measurement results, 1 GHz – 18 GHz, Horizontal polarization on mode 1

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)
2176.187500	33.7	1000.0	1000.000	100.0	H	-124.0	-16.0	40.3	74.0
2292.531250	33.5	1000.0	1000.000	150.0	H	24.0	-15.8	40.5	74.0
2650.062500	35.0	1000.0	1000.000	150.0	H	-96.0	-15.6	39.0	74.0
3536.718750	34.8	1000.0	1000.000	100.0	H	-136.0	-14.3	39.2	74.0
7110.437500	43.5	1000.0	1000.000	200.0	H	22.0	-5.2	30.5	74.0
8152.750000	44.9	1000.0	1000.000	200.0	H	-70.0	-4.4	29.1	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)
2176.187500	21.9	1000.0	1000.000	100.0	H	-124.0	-16.0	32.1	54.0
2292.531250	22.1	1000.0	1000.000	150.0	H	24.0	-15.8	31.9	54.0
2650.062500	22.8	1000.0	1000.000	150.0	H	-96.0	-15.6	31.2	54.0
3536.718750	22.5	1000.0	1000.000	100.0	H	-136.0	-14.3	31.5	54.0
7110.437500	32.3	1000.0	1000.000	200.0	H	22.0	-5.2	21.7	54.0
8152.750000	32.7	1000.0	1000.000	200.0	H	-70.0	-4.4	21.3	54.0

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

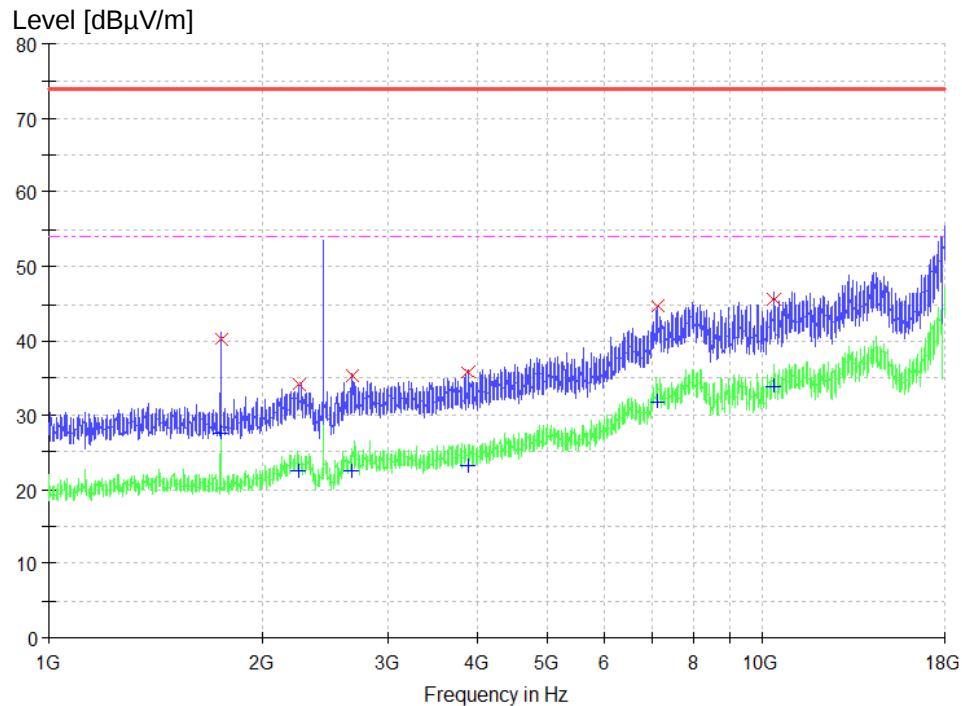


Final peak measurement result:

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)
1736.312500	31.6	1000.0	1000.000	200.0	V	-15.0	-18.8	42.4	74.0
2686.187500	38.7	1000.0	1000.000	200.0	V	-83.0	-15.4	35.3	74.0
7108.843750	43.7	1000.0	1000.000	150.0	V	-48.0	-5.2	30.3	74.0
8139.468750	45.3	1000.0	1000.000	100.0	V	160.0	-4.3	28.7	74.0
10531.156250	46.1	1000.0	1000.000	100.0	V	16.0	-2.3	28.0	74.0
14164.375000	48.2	1000.0	1000.000	200.0	V	-137.0	1.2	25.9	74.0

Final average measurement result:

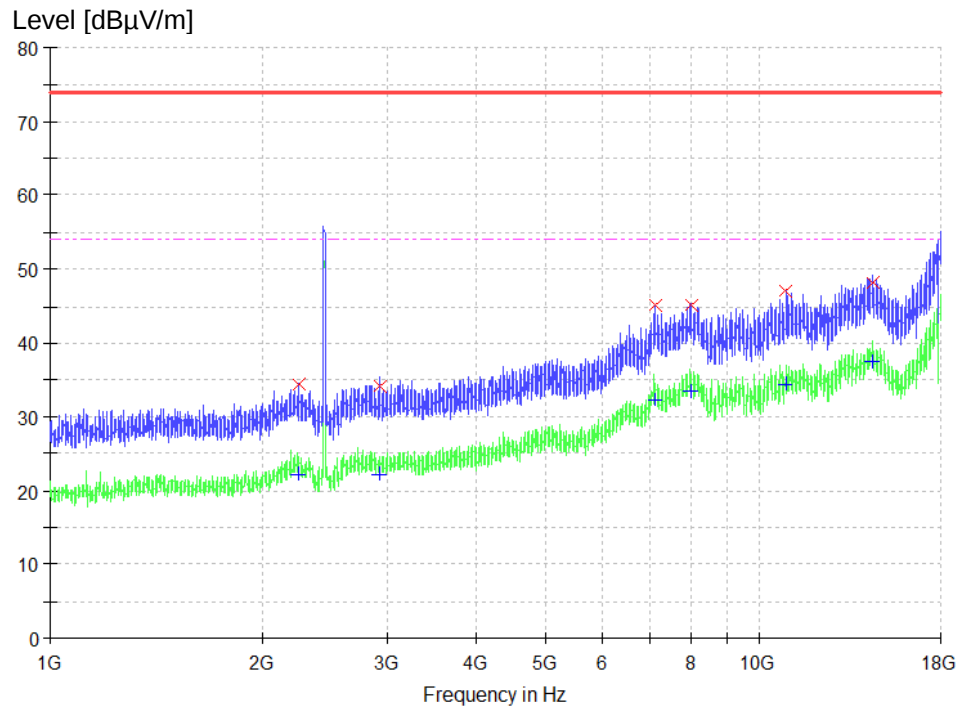
Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
1736.312500	18.8	1000.0	1000.000	200.0	V	-15.0	-18.8	35.2	54.0
2686.187500	24.1	1000.0	1000.000	200.0	V	-83.0	-15.4	29.9	54.0
7108.843750	32.1	1000.0	1000.000	150.0	V	-48.0	-5.2	21.9	54.0
8139.468750	32.4	1000.0	1000.000	100.0	V	160.0	-4.3	21.6	54.0
10531.156250	33.5	1000.0	1000.000	100.0	V	16.0	-2.3	20.5	54.0
14164.375000	35.2	1000.0	1000.000	200.0	V	-137.0	1.2	18.8	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)
1744.812500	40.2	1000.0	1000.000	100.0	H	25.0	-18.8	33.8	74.0
2242.593750	34.1	1000.0	1000.000	200.0	H	-72.0	-15.6	39.9	74.0
2671.843750	35.3	1000.0	1000.000	150.0	H	-101.0	-15.5	38.7	74.0
3870.343750	35.7	1000.0	1000.000	100.0	H	-117.0	-13.7	38.3	74.0
7140.187500	44.7	1000.0	1000.000	150.0	H	58.0	-5.4	29.3	74.0
10373.906250	45.6	1000.0	1000.000	200.0	H	-106.0	-2.7	28.4	74.0

Final average measurement result:

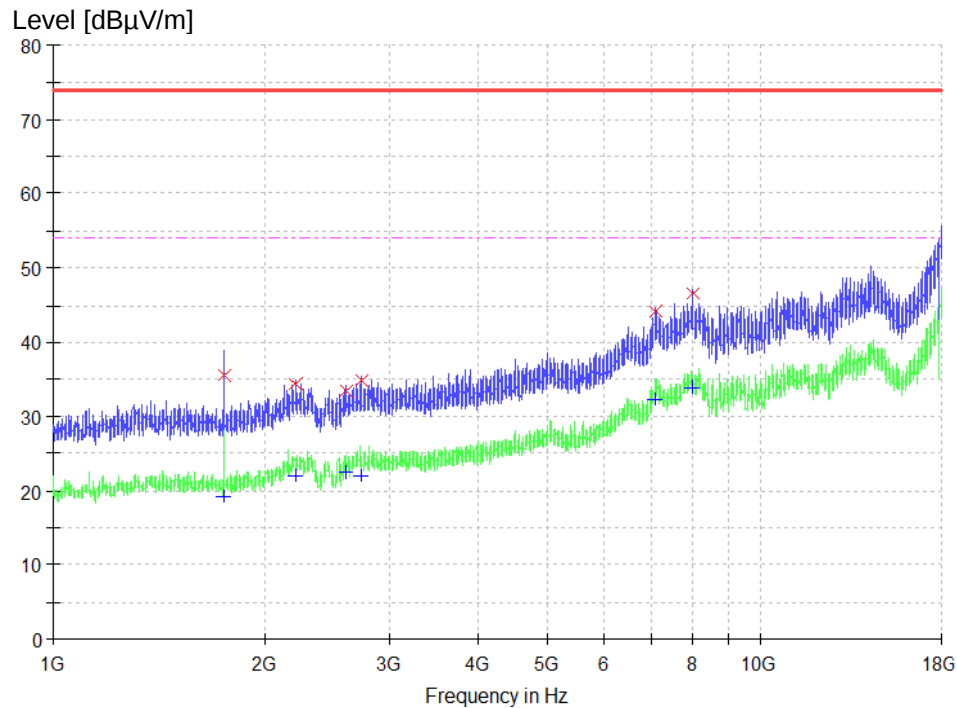
Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
1744.812500	27.7	1000.0	1000.000	100.0	H	25.0	-18.8	26.3	54.0
2242.593750	22.4	1000.0	1000.000	200.0	H	-72.0	-15.6	31.6	54.0
2671.843750	22.4	1000.0	1000.000	150.0	H	-101.0	-15.5	31.6	54.0
3870.343750	23.2	1000.0	1000.000	100.0	H	-117.0	-13.7	30.8	54.0
7140.187500	31.9	1000.0	1000.000	150.0	H	58.0	-5.4	22.2	54.0
10373.906250	34.0	1000.0	1000.000	200.0	H	-106.0	-2.7	20.1	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)
2246.312500	34.5	1000.0	1000.000	200.0	V	-153.0	-15.6	39.5	74.0
2919.937500	34.1	1000.0	1000.000	200.0	V	-80.0	-15.1	39.9	74.0
7124.781250	45.1	1000.0	1000.000	150.0	V	-121.0	-5.3	28.9	74.0
8043.843750	45.2	1000.0	1000.000	200.0	V	72.0	-3.7	28.8	74.0
10914.187500	47.1	1000.0	1000.000	150.0	V	-34.0	-2.1	26.9	74.0
14418.312500	48.2	1000.0	1000.000	200.0	V	151.0	2.4	25.8	74.0

Final average measurement result:

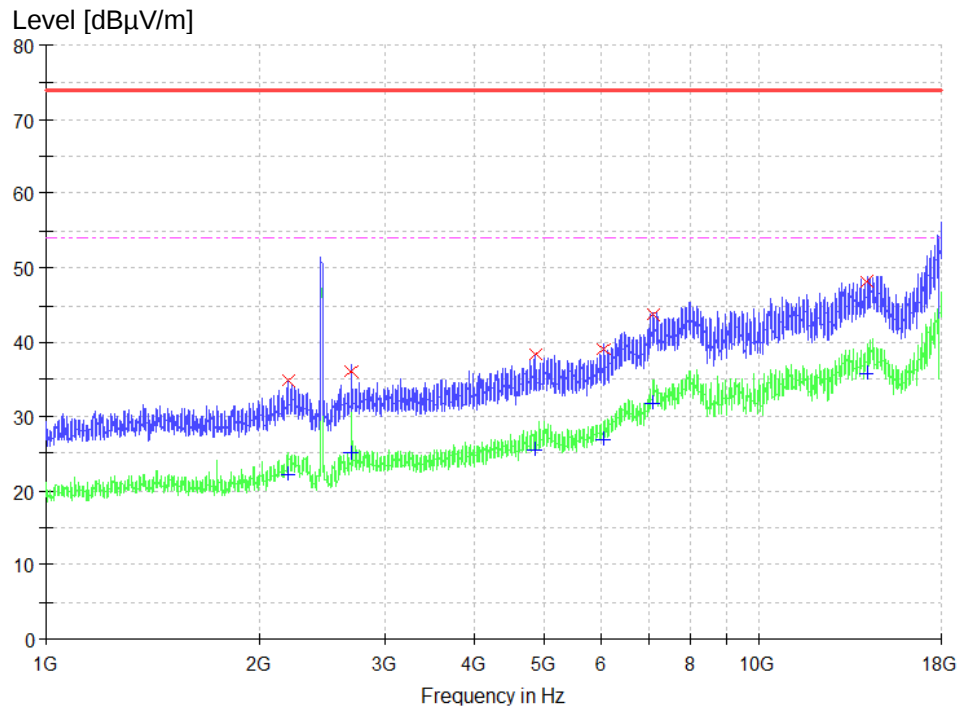
Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
2246.312500	22.3	1000.0	1000.000	200.0	H	-153.0	-15.6	31.7	54.0
2919.937500	22.2	1000.0	1000.000	200.0	H	-80.0	-15.1	31.8	54.0
7124.781250	32.2	1000.0	1000.000	150.0	H	-121.0	-5.3	21.8	54.0
8043.843750	33.4	1000.0	1000.000	200.0	H	72.0	-3.7	20.6	54.0
10914.187500	34.3	1000.0	1000.000	150.0	H	-34.0	-2.1	19.7	54.0
14418.312500	37.3	1000.0	1000.000	200.0	H	151.0	2.4	16.7	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)
1745.875000	35.5	1000.0	1000.000	150.0	H	-3.0	-18.8	38.5	74.0
2199.031250	34.5	1000.0	1000.000	200.0	H	12.0	-15.8	39.5	74.0
2596.937500	33.5	1000.0	1000.000	100.0	H	-42.0	-15.8	40.5	74.0
2725.500000	35.0	1000.0	1000.000	150.0	H	-115.0	-15.3	39.0	74.0
7115.750000	44.3	1000.0	1000.000	100.0	H	165.0	-5.2	29.7	74.0
8001.875000	46.5	1000.0	1000.000	200.0	H	175.0	-3.5	27.5	74.0

Final average measurement result:

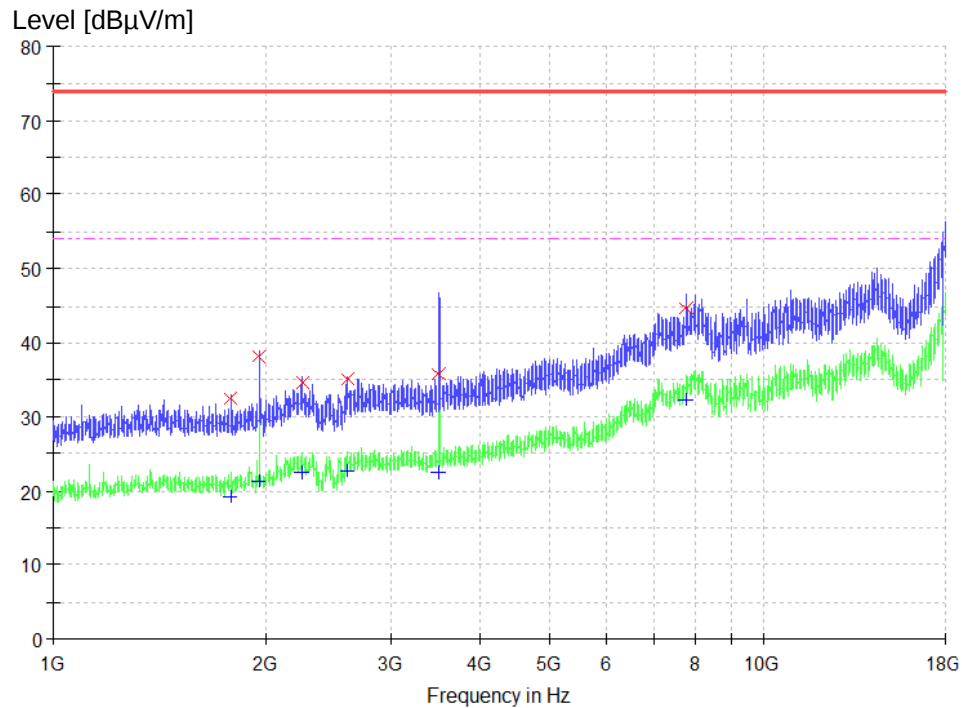
Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
1745.875000	19.3	1000.0	1000.000	150.0	H	-3.0	-18.8	34.8	54.0
2199.031250	22.0	1000.0	1000.000	200.0	H	12.0	-15.8	32.0	54.0
2596.937500	22.4	1000.0	1000.000	100.0	H	-42.0	-15.8	31.6	54.0
2725.500000	21.9	1000.0	1000.000	150.0	H	-115.0	-15.3	32.1	54.0
7115.750000	32.3	1000.0	1000.000	100.0	H	165.0	-5.2	21.8	54.0
8001.875000	33.9	1000.0	1000.000	200.0	H	175.0	-3.5	20.1	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)
2194.250000	34.8	1000.0	1000.000	100.0	V	-22.0	-15.8	39.2	74.0
2686.718750	36.1	1000.0	1000.000	150.0	V	-171.0	-15.4	37.9	74.0
4852.093750	38.4	1000.0	1000.000	150.0	V	156.0	-11.3	35.6	74.0
6057.500000	39.2	1000.0	1000.000	100.0	V	-93.0	-10.6	34.8	74.0
7100.343750	43.7	1000.0	1000.000	100.0	V	-20.0	-5.3	30.3	74.0
14150.031250	48.2	1000.0	1000.000	150.0	V	127.0	1.0	25.8	74.0

Final average measurement result:

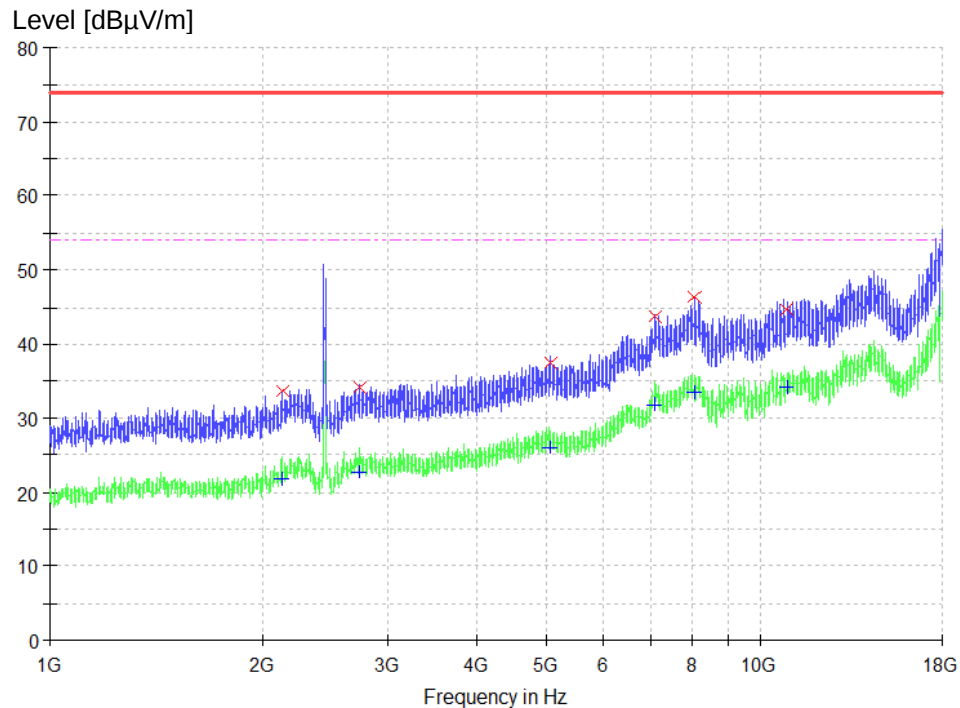
Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
2194.250000	22.2	1000.0	1000.000	100.0	V	-22.0	-15.8	31.8	54.0
2686.718750	25.0	1000.0	1000.000	150.0	V	-171.0	-15.4	29.1	54.0
4852.093750	25.4	1000.0	1000.000	150.0	V	156.0	-11.3	28.6	54.0
6057.500000	26.9	1000.0	1000.000	100.0	V	-93.0	-10.6	27.1	54.0
7100.343750	31.7	1000.0	1000.000	100.0	V	-20.0	-5.3	22.3	54.0
14150.031250	35.7	1000.0	1000.000	150.0	V	127.0	1.0	18.3	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)
1776.687500	32.5	1000.0	1000.000	150.0	H	61.0	-18.8	41.6	74.0
1950.937500	38.1	1000.0	1000.000	200.0	H	8.0	-18.1	35.9	74.0
2241.531250	34.6	1000.0	1000.000	150.0	H	88.0	-15.6	39.4	74.0
2600.125000	35.1	1000.0	1000.000	200.0	H	-152.0	-15.8	38.9	74.0
3497.937500	35.7	1000.0	1000.000	100.0	H	58.0	-14.4	38.3	74.0
7792.562500	44.8	1000.0	1000.000	200.0	H	87.0	-5.0	29.2	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)
1776.687500	19.3	1000.0	1000.000	150.0	H	61.0	-18.8	34.7	54.0
1950.937500	21.2	1000.0	1000.000	200.0	H	8.0	-18.1	32.8	54.0
2241.531250	22.3	1000.0	1000.000	150.0	H	88.0	-15.6	31.7	54.0
2600.125000	22.7	1000.0	1000.000	200.0	H	-152.0	-15.8	31.3	54.0
3497.937500	22.5	1000.0	1000.000	100.0	H	58.0	-14.4	31.5	54.0
7792.562500	32.3	1000.0	1000.000	200.0	H	87.0	-5.0	21.7	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)
2117.750000	33.8	1000.0	1000.000	150.0	V	-68.0	-16.7	40.2	74.0
2729.750000	34.1	1000.0	1000.000	150.0	V	-112.0	-15.3	39.9	74.0
5070.437500	37.4	1000.0	1000.000	150.0	V	-143.0	-11.0	36.6	74.0
7103.000000	43.7	1000.0	1000.000	100.0	V	-52.0	-5.3	30.3	74.0
8058.718750	46.2	1000.0	1000.000	200.0	V	31.0	-3.8	27.8	74.0
10898.250000	44.7	1000.0	1000.000	100.0	V	121.0	-2.2	29.3	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)
2117.750000	21.8	1000.0	1000.000	150.0	V	-68.0	-16.7	32.2	54.0
2729.750000	22.6	1000.0	1000.000	150.0	V	-112.0	-15.3	31.4	54.0
5070.437500	25.9	1000.0	1000.000	150.0	V	-143.0	-11.0	28.1	54.0
7103.000000	31.9	1000.0	1000.000	100.0	V	-52.0	-5.3	22.1	54.0
8058.718750	33.5	1000.0	1000.000	200.0	V	31.0	-3.8	20.5	54.0
10898.250000	34.2	1000.0	1000.000	100.0	V	121.0	-2.2	19.8	54.0

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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-S-028	EMI measurement software	EMC32-E+ (10.60.20)	100150	Rohde & Schwarz	N/A	N/A
EMC-C-366	Thermohygrometer	608-H1	2485149174	testo	2024-07-26	2025-07-26
EMC-C-195	EMI test receiver	ESR3	102794	Rohde & Schwarz	2024-08-03	2025-08-03
EMC-C-190	Artificial mains network	ENV432	101514	Rohde & Schwarz	2024-10-11	2025-10-11
EMC-C-121	Thermohygrometer	608-H1	1241320265	testo	2024-06-25	2025-06-25
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-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
EMC-C-019	Double ridged horn antenna	BBHA 9120 D	9120D-433	Schwarzbeck	2025-02-28	2026-02-28

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End of test report