

Prüfbericht-Nr.: Test Report No.:	CN21ID4D 001	Auftrags-Nr.: Order No.:	244312940	Seite 1 von 31 Page 1 of 31
Kunden-Referenz-Nr.: Client Reference No.:	1288983	Auftragsdatum: Order date.:	2021-02-08	
Auftraggeber: Client:	IKEA of Sweden AB Box 702, SE-343 81, Älmhult, Sweden			
Prüfgegenstand: Test item:	VAPPEBY Lamp BT speaker outdoor			
Bezeichnung / Typ-Nr.: Identification / Type No.:	E2004			
Auftrags-Inhalt: Order content:	TÜV Rheinland EMC service			
Prüfgrundlage: Test specification:	FCC 47 CFR Part 15, Subpart B:2020 Class B ICES-003:2020, ICES-005:2018			
Wareneingangsdatum: Date of receipt:	2021-02-23			
Prüfmuster-Nr.: Test sample No.:	A003067834-001			
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: Xuelan Zhang		genehmigt von: / authorized by: Jiayi Zhou		
Datum: / Date: 2021-08-18 <i>Xuelan Zhang</i>		Datum: / Date: 2021-08-18 <i>Jiayi Zhou</i>		
Stellung: / Position: Senior project manager		Stellung: / Position: Senior manager		
Sonstiges / Other:				
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 specifications(s) F(ail) = failed a.m. test specifications(s) N/A = not applicable N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

V05

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TEST SUMMARY

5.1.1 MAINS TERMINAL CONTINUOUS DISTURBANCE VOLTAGE

Result:

Passed

5.2.1 RADIATED EMISSION (30 MHz - 1 GHz)

Result:

Passed

5.2.2 RADIATED EMISSION (1-6 GHz)

Result:

Passed

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1 Test Sites

1.1 Test Facilities

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

Address: No.177, 178, Lane 777 West Guangzhong Road, Jing'an District, Shanghai, 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 a VAPPEBY lamp BT speaker outdoor. For the further information, refer to the user's manual.

2.2 Ratings and System Details

Rated input	: DC 5 V, 2 A
Battery pack	: DC 7.2 V, 23.76Wh Type C; Rechargeable 18650 Li-ion Battery
Output	: Audio 10 W, Lighting 1.5 W
Capacity	: 3300 mAh
Protection class	: II

2.3 Independent Operation Modess

The basic operation modes are the below,

1. Continuously playing 1kHz audio signal and lighting on with different light output level with AC input by bluetooth
2. Continuously playing 1kHz audio signal and lighting on with different light output level with DC input by bluetooth
3. Continuously playing 1kHz audio signal and lighting on with different light output level with battery by bluetooth

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 996 MHz.

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.

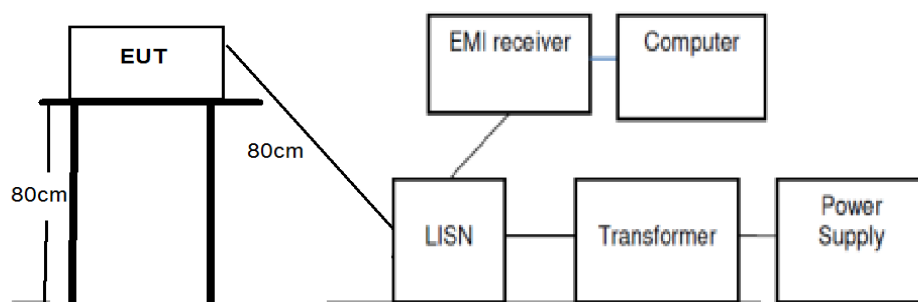
Refer to the related paragraph of this report.

The sequence of testing:

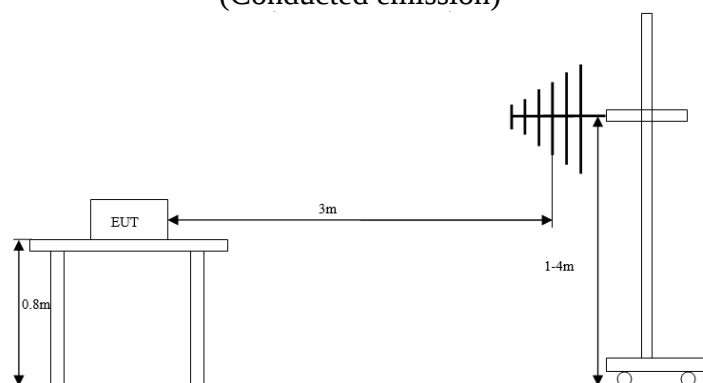
1. Radiated emission tests were performed on 2021-06-28, 2021-06-30 and 2021-07-19;
2. Conducted emission tests were performed on 2021-07-01.

3.2 Equipment and cable arrangement

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



(Conducted emission)



(Radiated emission)

Also refer to photographs on clause 6 for test setups for both conducted emission test and 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 was used.

No.	Equipment	Model	Manufacturer
1	Cell phone	EML-AL100	Huawei
2	Adapter	HW-100400C00	Huawei
3	Laptop	ThinkPad T14 Gen 1	Lenovo

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 Mains Terminal Continuous Disturbance Voltage

Result:		Passed
Date of testing	: 2021-07-01	
Test procedure	: FCC 47 CFR Part 15, Subpart B:2020, ICES-003:2020, ICES-005:2018, ANSI C63.4-2014 and CISPR 16-1 series standards	
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 (powered by AC-DC adapter) DC 5 V (powered by laptop) DC 7.2 V (powered by internal battery)	
Operational mode	: Mode 1 as defined in clause 2.3	
Ambient condition	: Temperature: 23.4 °C; Relative humidity: 53.1 %	
Expanded measurement uncertainty ($k=2$)	: 3.39 dB	

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.

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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.

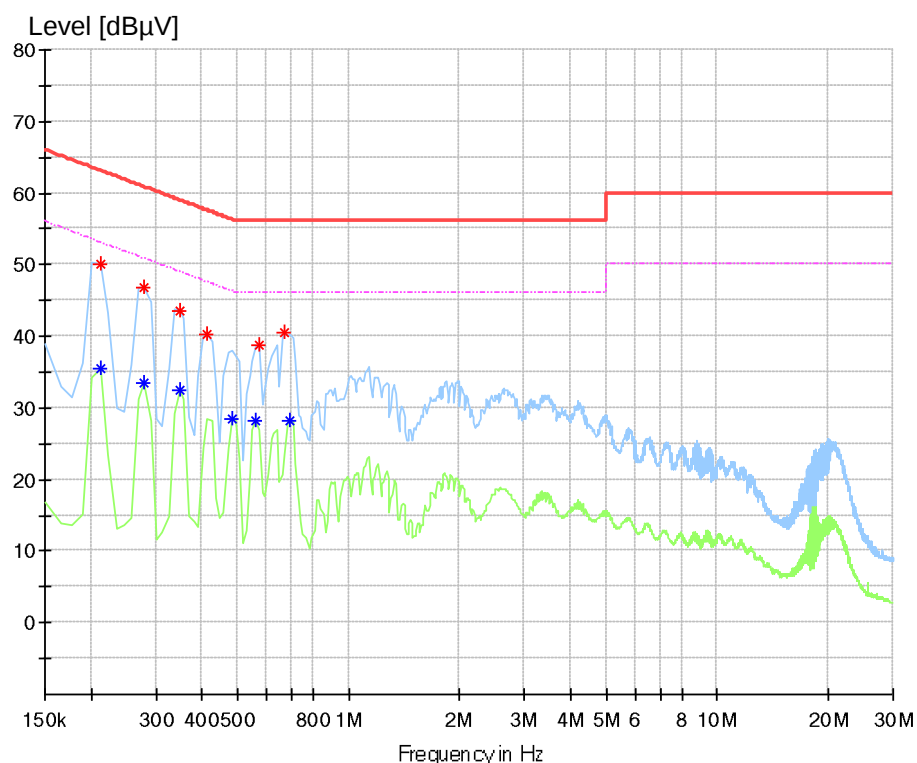
Notes on following tables of conducted emission results and conversions:

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



Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBμV)	Limit (dBμV)	Margin (dB)	Line	Filter
0.211875	50.00	63.13	13.13	L1	ON
0.279375	46.77	60.83	14.06	L1	ON
0.346875	43.62	59.04	15.42	L1	ON
0.414375	40.23	57.56	17.33	L1	ON
0.571875	38.74	56.00	17.26	L1	ON
0.673125	40.58	56.00	15.42	L1	ON

Final Average measurement result:

Frequency (MHz)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Filter
0.560625	28.15	46.00	17.85	L1	ON
0.695625	28.33	46.00	17.67	L1	ON
0.481875	28.56	46.31	17.75	L1	ON
0.346875	32.50	49.04	16.54	L1	ON
0.279375	33.57	50.83	17.27	L1	ON
0.211875	35.63	53.13	17.51	L1	ON

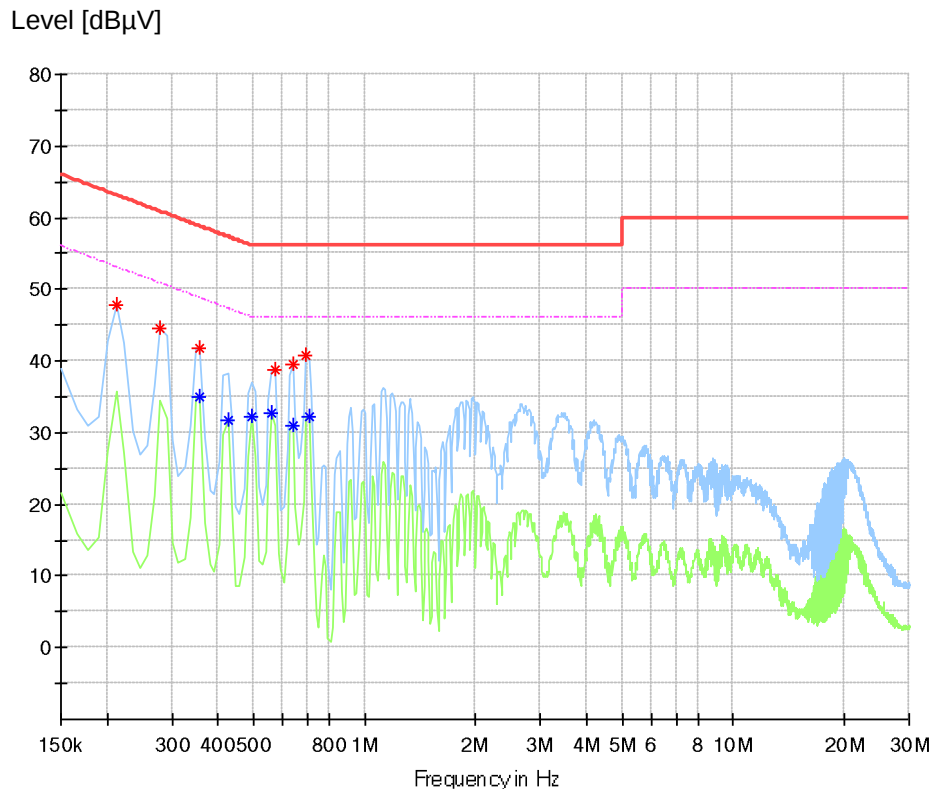
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Figure 2: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, N



Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.211875	47.90	63.13	15.23	N
0.279375	44.56	60.83	16.27	N
0.358125	41.76	58.77	17.01	N
0.571875	38.84	56.00	17.16	N
0.639375	39.54	56.00	16.46	N
0.695625	40.68	56.00	15.32	N

Final Average measurement result:

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.639375	31.08	46.00	14.92	N
0.425625	31.79	47.34	15.55	N
0.493125	32.16	46.12	13.96	N
0.706875	32.28	46.00	13.72	N
0.560625	32.75	46.00	13.25	N
0.358125	34.88	48.77	13.89	N

5.2 Emission in the Frequency Range above 30 MHz

5.2.1 Radiated emission (30 MHz - 1 GHz)

Result:	Passed
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Date of testing	: 2021-06-30, 2021-07-19
Test procedure	: FCC 47 CFR Part 15, Subpart B:2020, ICES-003:2020, ICES-005:2018, ANSI C63.4-2014 and CISPR 16-1 series standards
Frequency range	: 30 – 1000 MHz
Limits	: Quasi-peak limits (3 m distance): 30 – 88 MHz, 40 dB μ V/m; 88 – 216 MHz, 43.5 dB μ V/m; 216 – 1000 MHz, 46 dB μ V/m (see Note 1)
Bandwidth of EMI receiver for final measurement	: 120 kHz
Measurement time for final measurement	: 1 s
Kind of test site	: Semi-anechoic chamber
Operational mode	: Modes 1, 2 and 3 as defined in clause 2.3
Ambient condition	: Temperature: 22.9 °C; Relative humidity: 53.8 %
Expanded measurement uncertainty ($k=2$)	: 5.49 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.

Note 1: The Class B limits in ICES-005:2018 Table 4 are more stringent than those in FCC Part 15 subpart B §15.109 (a) and Class B limits in ICES-003:2020 Table 2. Therefore, the former are used in following figures and tables.

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)

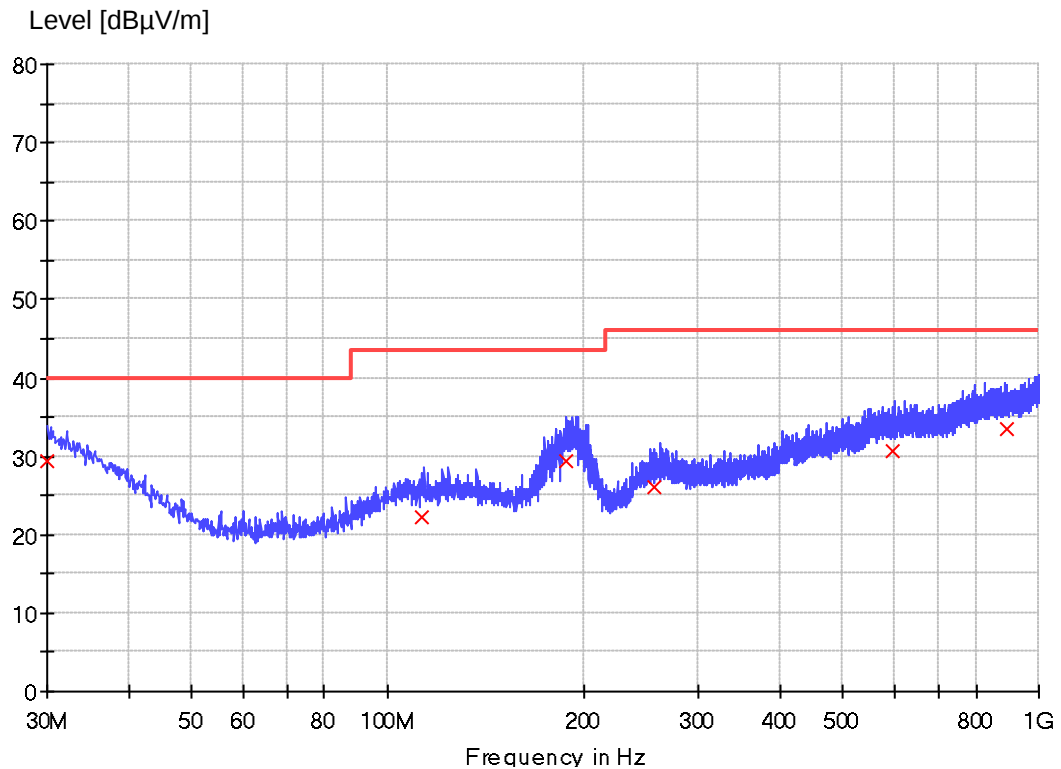
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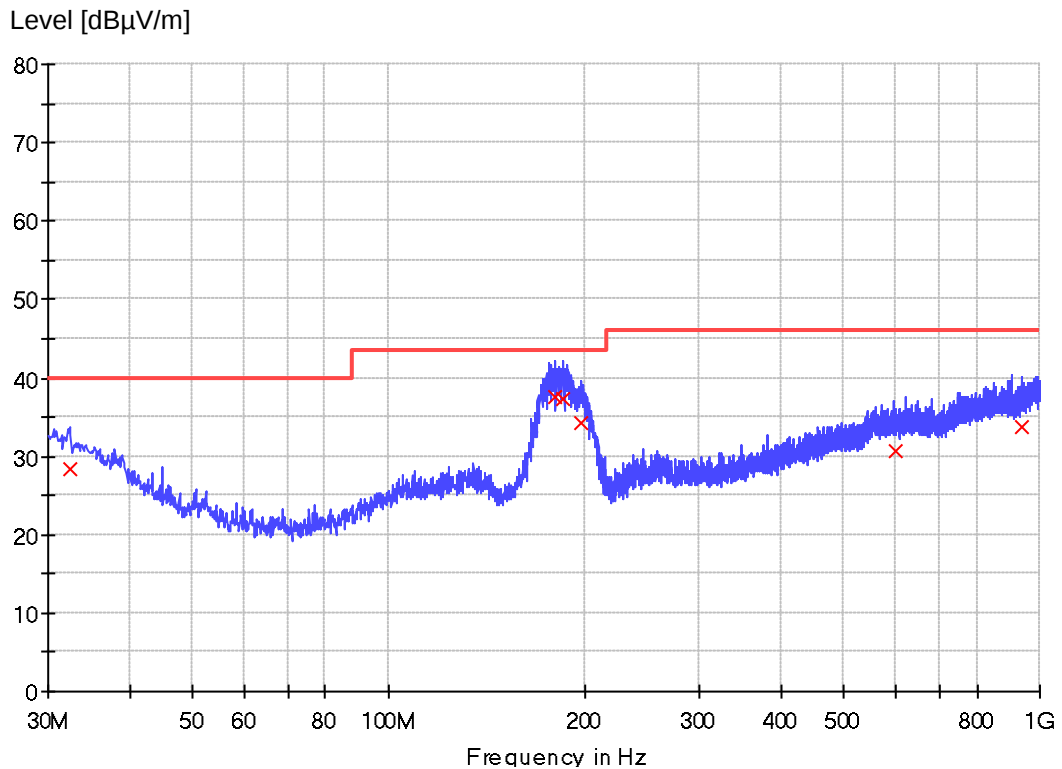
Figure 3: Spectral Diagrams and measurement results, horizontal polarization (30 MHz to 1 GHz), mode 1



Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
30.000000	29.3	1000.0	120.000	120.0	H	12.0	25.4	10.7	40.0
112.692500	22.3	1000.0	120.000	130.0	H	3.0	18.6	21.2	43.5
187.867500	29.3	1000.0	120.000	130.0	H	75.0	15.8	14.2	43.5
256.010000	26.0	1000.0	120.000	100.0	H	120.0	20.1	20.0	46.0
598.056250	30.6	1000.0	120.000	110.0	H	55.0	26.2	15.4	46.0
892.451250	33.6	1000.0	120.000	150.0	H	180.0	28.2	12.4	46.0

Figure 4: Spectral Diagrams and measurement results, vertical polarization (30 MHz to 1 GHz), mode 1



Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
32.425000	28.3	1000.0	120.000	100.0	V	23.0	24.2	11.7	40.0
180.107500	37.6	1000.0	120.000	100.0	V	5.0	15.9	5.9	43.5
185.442500	37.4	1000.0	120.000	100.0	V	0.0	15.8	6.1	43.5
197.203750	34.2	1000.0	120.000	110.0	V	0.0	16.1	9.3	43.5
599.268750	30.7	1000.0	120.000	102.0	V	15.0	26.2	15.3	46.0
941.315000	33.6	1000.0	120.000	105.0	V	130.0	28.2	12.4	46.0

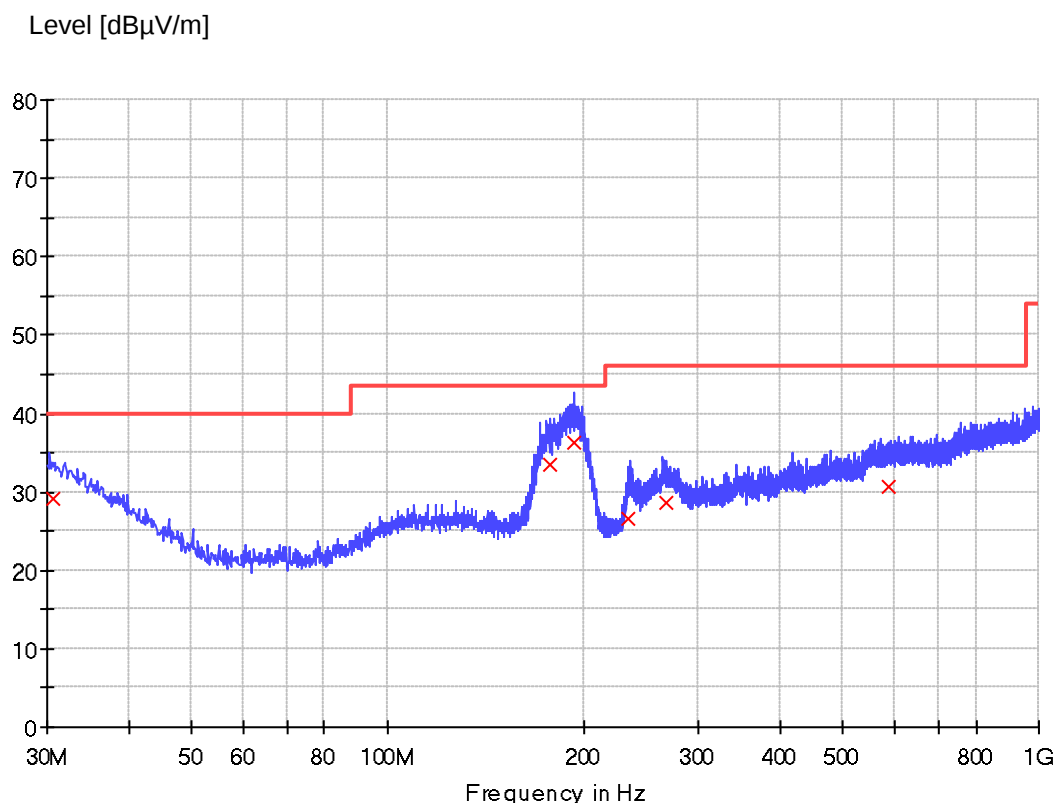
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Figure 5: Spectral Diagrams and measurement results, horizontal polarization (30 MHz to 1 GHz), mode 2



Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
30.606250	29.2	1000.0	120.000	100.0	H	3.0	25.1	10.8	40.0
177.803750	33.6	1000.0	120.000	130.0	H	12.0	16.0	9.9	43.5
193.687500	36.2	1000.0	120.000	150.0	H	77.0	16.0	7.3	43.5
233.578750	26.7	1000.0	120.000	140.0	H	69.0	17.3	19.3	46.0
267.771250	28.6	1000.0	120.000	160.0	H	15.0	20.1	17.4	46.0
588.356250	30.7	1000.0	120.000	100.0	H	33.0	26.2	15.3	46.0

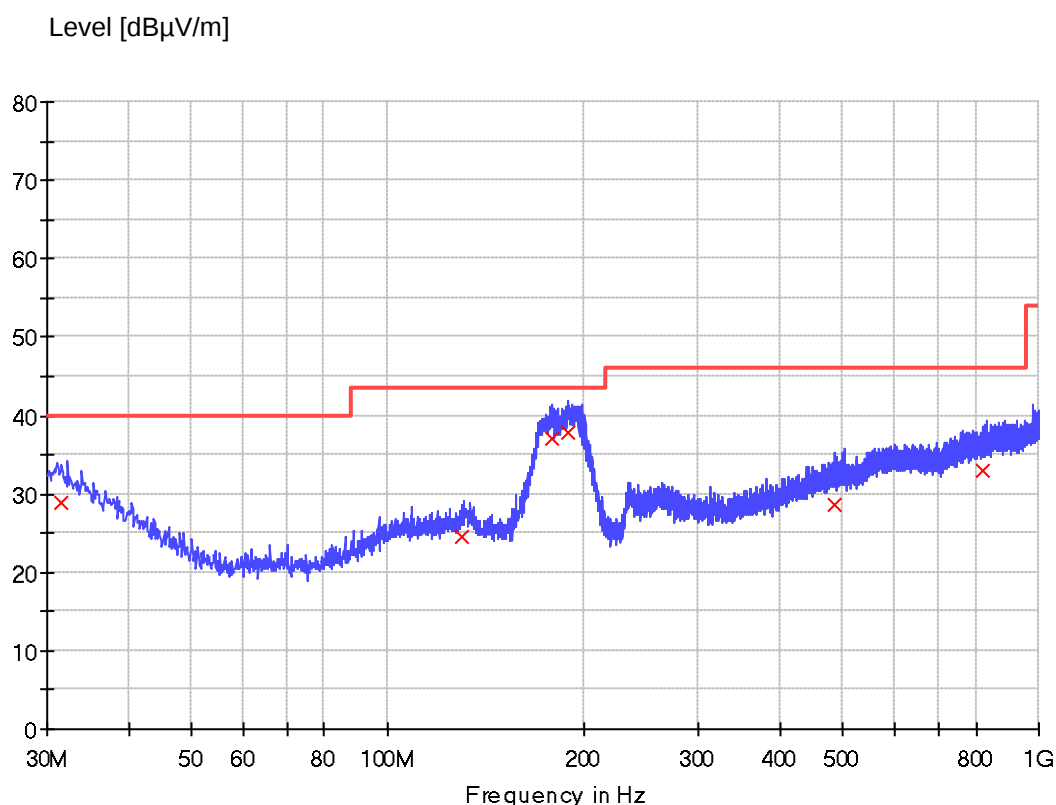
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Figure 6: Spectral Diagrams and measurement results, vertical polarization (30 MHz to 1 GHz), mode 2



Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dB μ V/m)
31.576250	28.8	1000.0	120.000	100.0	V	12.0	24.7	11.2	40.0
129.667500	24.5	1000.0	120.000	100.0	V	0.0	18.7	19.0	43.5
178.895000	37.1	1000.0	120.000	100.0	V	36.0	16.0	6.4	43.5
188.595000	37.8	1000.0	120.000	100.0	V	69.0	15.8	5.7	43.5
486.142500	28.6	1000.0	120.000	102.0	V	36.0	24.8	17.4	46.0
821.398750	32.9	1000.0	120.000	110.0	V	126.0	27.5	13.1	46.0

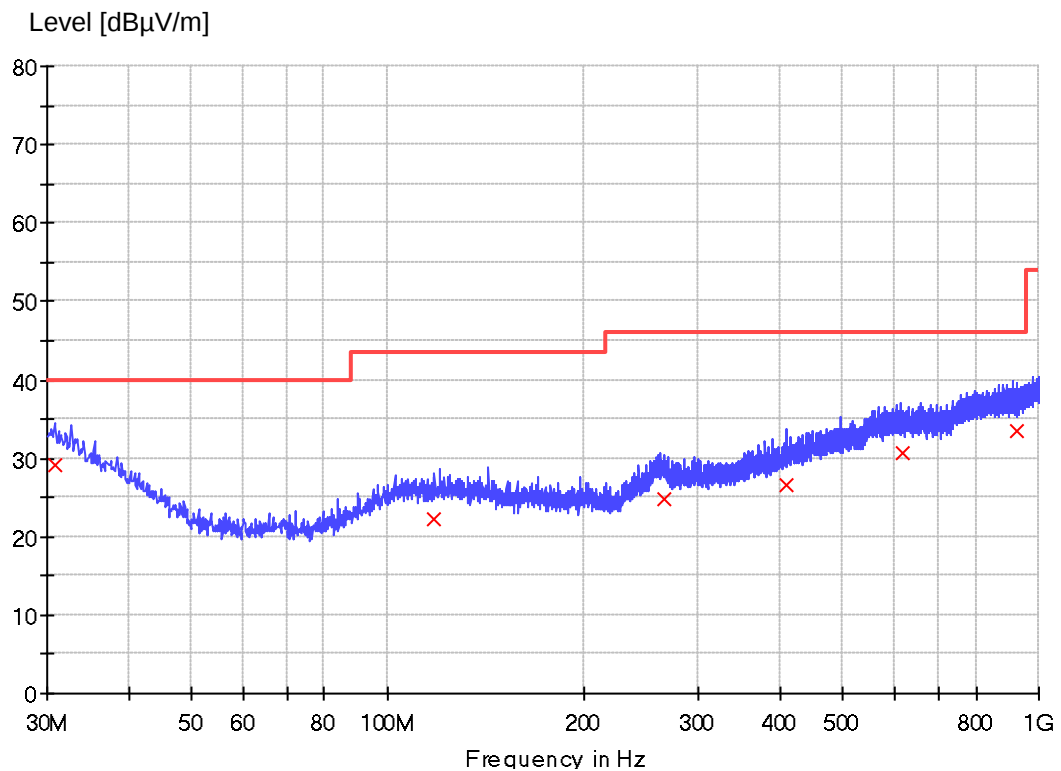
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Figure 7: Spectral Diagrams and measurement results, horizontal polarization (30 MHz to 1 GHz), mode 3



Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
30.970000	29.0	1000.0	120.000	100.0	H	0.0	24.9	11.0	40.0
117.542500	22.2	1000.0	120.000	100.0	H	0.0	18.5	21.3	43.5
266.195000	24.8	1000.0	120.000	100.0	H	0.0	20.5	21.2	46.0
410.846250	26.6	1000.0	120.000	100.0	H	0.0	23.1	19.4	46.0
619.881250	30.7	1000.0	120.000	100.0	H	0.0	26.2	15.3	46.0
927.007500	33.5	1000.0	120.000	100.0	H	0.0	28.1	12.5	46.0

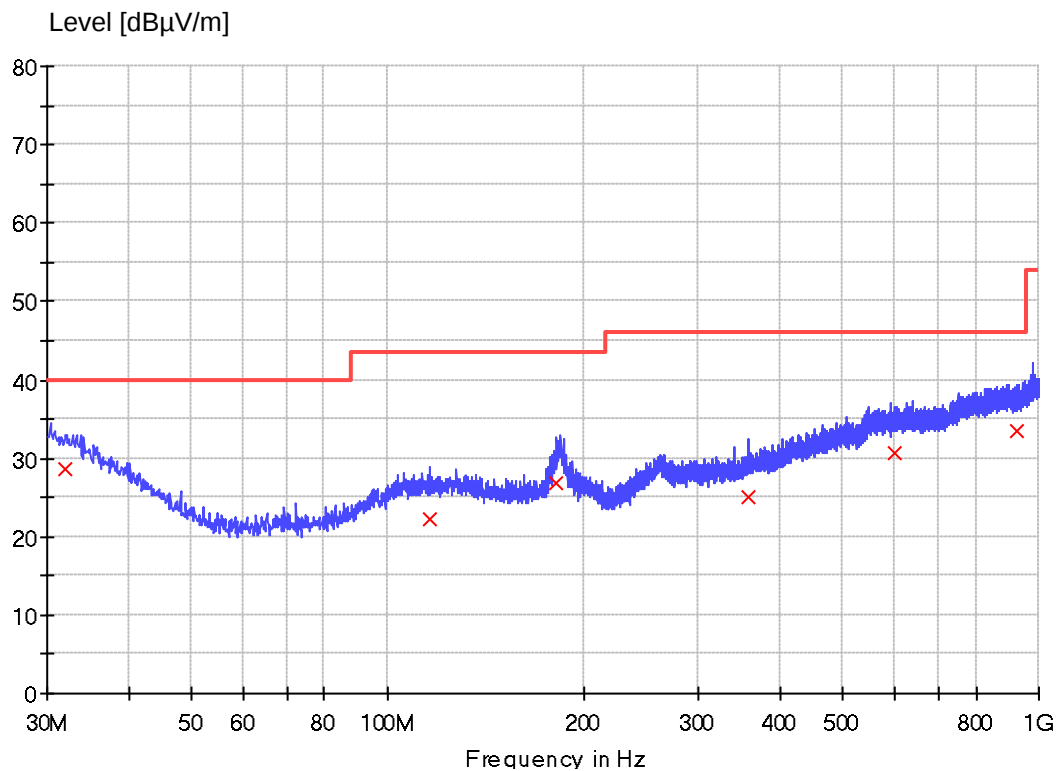
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Figure 8: Spectral Diagrams and measurement results, vertical polarization (30 MHz to 1 GHz), mode 3



Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
32.061250	28.5	1000.0	120.000	100.0	V	0.0	24.5	11.5	40.0
115.845000	22.2	1000.0	120.000	100.0	V	0.0	18.6	21.3	43.5
181.926250	26.8	1000.0	120.000	100.0	V	0.0	15.9	16.7	43.5
358.223750	25.0	1000.0	120.000	100.0	V	0.0	21.7	21.0	46.0
600.238750	30.8	1000.0	120.000	100.0	V	0.0	26.2	15.2	46.0
927.977500	33.4	1000.0	120.000	100.0	V	0.0	28.1	12.6	46.0

5.2.2 Radiated emission (1-6 GHz)

Result:	Passed
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Date of testing	: 2021-06-28
Port	: Enclosure
Test procedure	: FCC 47 CFR Part 15, Subpart B:2020, ANSI C63.4-2014 and CISPR 16-1 series standards, ICES-003:2020
Limit	: 1-12 GHz, Peak limit: 74 dB μ V/m; Average limit: 54 dB μ V/m
Frequency range	: 1-12 GHz (see Note)
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	: Modes 1, 2 and 3 as defined in clause 2.3
Input voltage	: AC 120 V; 60 Hz (powered by AC-DC adapter) DC 5 V (powered by laptop) DC 7.2 V (powered by internal battery)
Earthing	: No earthing
Ambient condition	: Temperature: 22.9 °C; Relative humidity: 53.8 %

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 wooden 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, “× (red)” means measurement results with peak detector and “+ (blue)” means measurement results with average detector.

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.

Notes on following tables of radiated emission results and conversions:

Peak (dB μ V/m): final measurement results by using peak detector

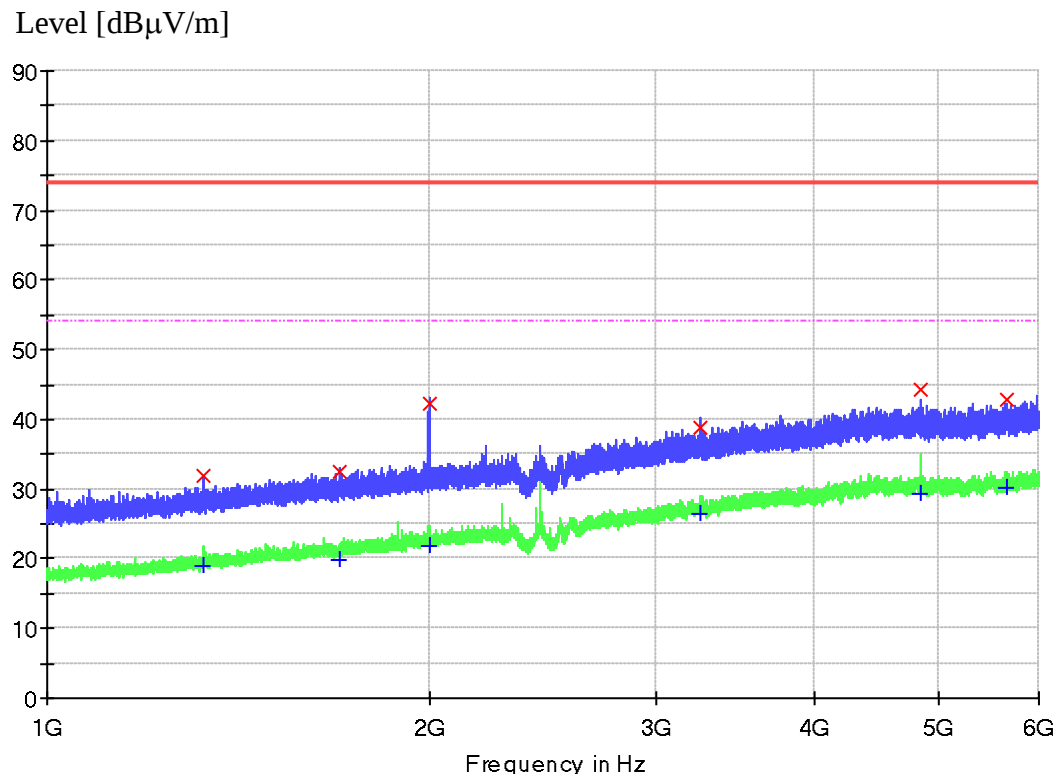
Average (dB μ V/m): final measurement results by using average detector

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

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

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

Figure 9: Spectral Diagrams and measurement results, 1-12 GHz, horizontal polarization, mode 1



Final Peak measurement results:

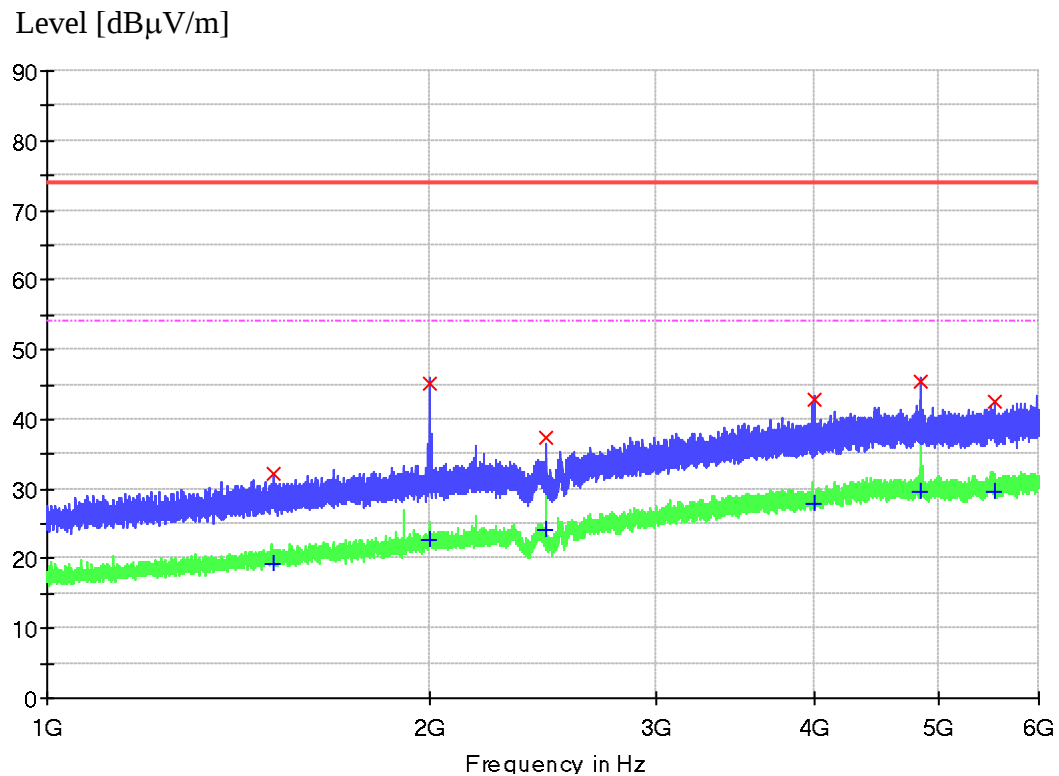
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBμV/m)
1327.812500	32.0	1000.0	1000.000	135.0	H	0.0	-20.2	42.0	74.0
1698.437500	32.5	1000.0	1000.000	135.0	H	0.0	-17.8	41.5	74.0
1993.750000	42.3	1000.0	1000.000	135.0	H	0.0	-16.3	31.7	74.0
3257.343750	39.0	1000.0	1000.000	135.0	H	0.0	-10.5	35.0	74.0
4851.406250	44.3	1000.0	1000.000	135.0	H	0.0	-6.5	29.7	74.0
5664.687500	42.8	1000.0	1000.000	135.0	H	0.0	-5.6	31.2	74.0

Final Average measurement results:

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
1327.812500	19.0	1000.0	1000.000	135.0	H	0.0	-20.2	35.0	54.0
1698.437500	20.0	1000.0	1000.000	135.0	H	0.0	-17.8	34.0	54.0
1993.750000	21.7	1000.0	1000.000	135.0	H	0.0	-16.3	32.3	54.0
3257.343750	26.4	1000.0	1000.000	135.0	H	0.0	-10.5	27.6	54.0
4851.406250	29.3	1000.0	1000.000	135.0	H	0.0	-6.5	24.7	54.0
5664.687500	30.1	1000.0	1000.000	135.0	H	0.0	-5.6	23.9	54.0

Note: The peak and average measurement results for frequency range 6-12 GHz are far less than the corresponding limits.

Figure 10: Spectral Diagrams and measurement results, 1-12 GHz, vertical polarization, mode 1



Final Peak measurement results:

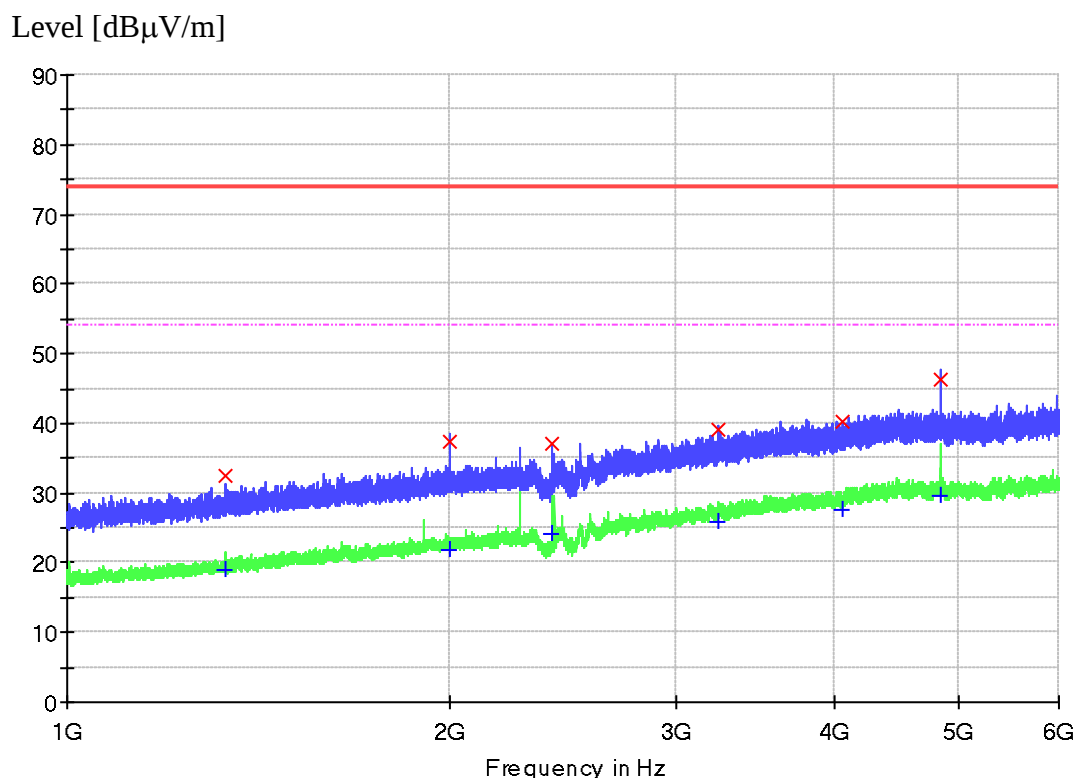
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBμV/m)
1504.531250	32.1	1000.0	1000.000	135.0	V	0.0	-18.8	41.9	74.0
1999.218750	45.1	1000.0	1000.000	135.0	V	0.0	-16.2	28.9	74.0
2460.781250	37.3	1000.0	1000.000	135.0	V	0.0	-14.3	36.7	74.0
3995.625000	42.7	1000.0	1000.000	135.0	V	0.0	-8.4	31.3	74.0
4850.781250	45.4	1000.0	1000.000	135.0	V	0.0	-6.5	28.6	74.0
5535.000000	42.6	1000.0	1000.000	135.0	V	0.0	-5.7	31.4	74.0

Final Average measurement results:

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
1504.531250	19.4	1000.0	1000.000	135.0	V	0.0	-18.8	34.6	54.0
1999.218750	22.8	1000.0	1000.000	135.0	V	0.0	-16.2	31.2	54.0
2460.781250	24.1	1000.0	1000.000	135.0	V	0.0	-14.3	29.9	54.0
3995.625000	27.9	1000.0	1000.000	135.0	V	0.0	-8.4	26.1	54.0
4850.781250	29.6	1000.0	1000.000	135.0	V	0.0	-6.5	24.4	54.0
5535.000000	29.6	1000.0	1000.000	135.0	V	0.0	-5.7	24.4	54.0

Note: The peak and average measurement results for frequency range 6-12 GHz are far less than the corresponding limits.

Figure 11: Spectral Diagrams and measurement results, 1-12 GHz, horizontal polarization, mode 2



Final Peak measurement results:

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBμV/m)
1332.500000	32.5	1000.0	1000.000	135.0	H	0.0	-20.2	41.5	74.0
1997.968750	37.3	1000.0	1000.000	135.0	H	0.0	-16.2	36.7	74.0
2402.656250	37.2	1000.0	1000.000	135.0	H	0.0	-14.4	36.8	74.0
3239.687500	39.0	1000.0	1000.000	135.0	H	0.0	-10.6	35.0	74.0
4059.218750	40.3	1000.0	1000.000	135.0	H	0.0	-8.1	33.7	74.0
4853.750000	46.3	1000.0	1000.000	135.0	H	0.0	-6.5	27.7	74.0

Final Average measurement results:

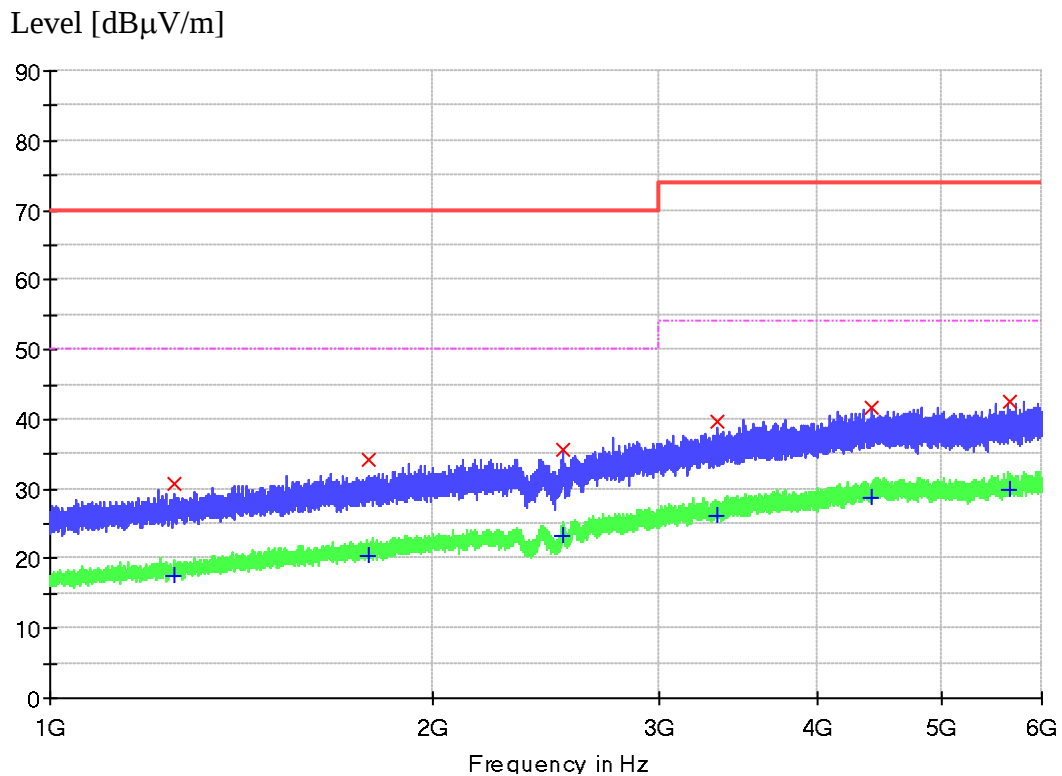
Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
1332.500000	18.9	1000.0	1000.000	135.0	H	0.0	-20.2	35.1	54.0
1997.968750	21.7	1000.0	1000.000	135.0	H	0.0	-16.2	32.3	54.0
2402.656250	24.2	1000.0	1000.000	135.0	H	0.0	-14.4	29.8	54.0
3239.687500	26.0	1000.0	1000.000	135.0	H	0.0	-10.6	28.0	54.0
4059.218750	27.6	1000.0	1000.000	135.0	H	0.0	-8.1	26.4	54.0
4853.750000	29.6	1000.0	1000.000	135.0	H	0.0	-6.5	24.4	54.0

Note: The peak and average measurement results for frequency range 6-12 GHz are far less than the corresponding limits.

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Figure 12: Spectral Diagrams and measurement results, 1-12 GHz, vertical polarization, mode 2



Final Peak measurement results:

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBμV/m)
1252.968750	30.7	1000.0	1000.000	135.0	V	0.0	-20.8	39.3	70.0
1780.468750	34.4	1000.0	1000.000	135.0	V	0.0	-17.5	35.7	70.0
2527.656250	35.6	1000.0	1000.000	135.0	V	0.0	-14.0	34.4	70.0
3340.156250	39.8	1000.0	1000.000	135.0	V	0.0	-10.2	34.2	74.0
4405.468750	41.7	1000.0	1000.000	135.0	V	0.0	-6.6	32.3	74.0
5667.500000	42.7	1000.0	1000.000	135.0	V	0.0	-5.6	31.3	74.0

Final Average measurement results:

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
1252.968750	17.6	1000.0	1000.000	135.0	V	0.0	-20.8	32.4	50.0
1780.468750	20.4	1000.0	1000.000	135.0	V	0.0	-17.5	29.6	50.0
2527.656250	23.4	1000.0	1000.000	135.0	V	0.0	-14.0	26.6	50.0
3340.156250	26.2	1000.0	1000.000	135.0	V	0.0	-10.2	27.8	54.0
4405.468750	28.7	1000.0	1000.000	135.0	V	0.0	-6.6	25.3	54.0
5667.500000	30.0	1000.0	1000.000	135.0	V	0.0	-5.6	24.0	54.0

Note: The peak and average measurement results for frequency range 6-12 GHz are far less than the corresponding limits.

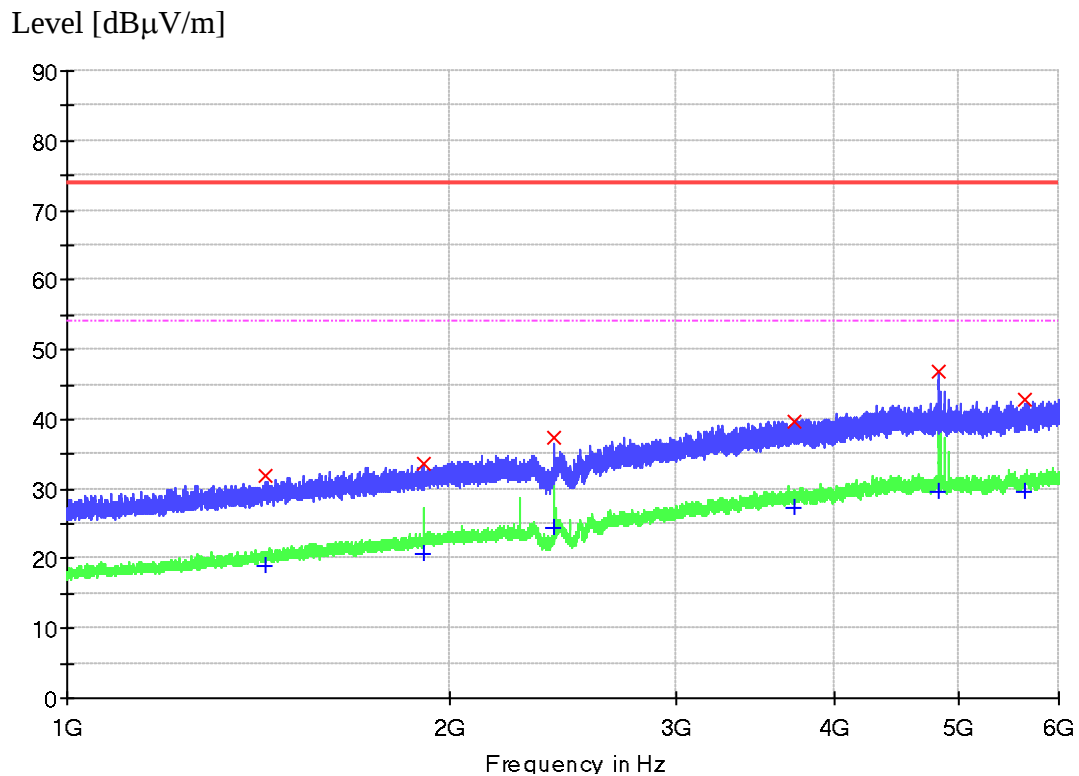
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Figure 13: Spectral Diagrams and measurement results, 1-12 GHz, horizontal polarization, mode 3



Final Peak measurement results:

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBμV/m)
1432.968750	31.9	1000.0	1000.000	135.0	H	180.0	-19.4	42.1	74.0
1905.625000	33.7	1000.0	1000.000	135.0	H	180.0	-16.8	40.3	74.0
2410.781250	37.5	1000.0	1000.000	135.0	H	180.0	-14.4	36.5	74.0
3719.687500	39.8	1000.0	1000.000	135.0	H	180.0	-8.8	34.2	74.0
4824.687500	46.9	1000.0	1000.000	135.0	H	180.0	-6.5	27.1	74.0
5640.937500	43.0	1000.0	1000.000	135.0	H	180.0	-5.6	31.0	74.0

Final Average measurement results:

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
1432.968750	18.8	1000.0	1000.000	135.0	H	180.0	-19.4	35.2	54.0
1905.625000	20.8	1000.0	1000.000	135.0	H	180.0	-16.8	33.2	54.0
2410.781250	24.4	1000.0	1000.000	135.0	H	180.0	-14.4	29.6	54.0
3719.687500	27.2	1000.0	1000.000	135.0	H	180.0	-8.8	26.8	54.0
4824.687500	29.6	1000.0	1000.000	135.0	H	180.0	-6.5	24.4	54.0
5640.937500	29.7	1000.0	1000.000	135.0	H	180.0	-5.6	24.3	54.0

Note: The peak and average measurement results for frequency range 6-12 GHz are far less than the corresponding limits.

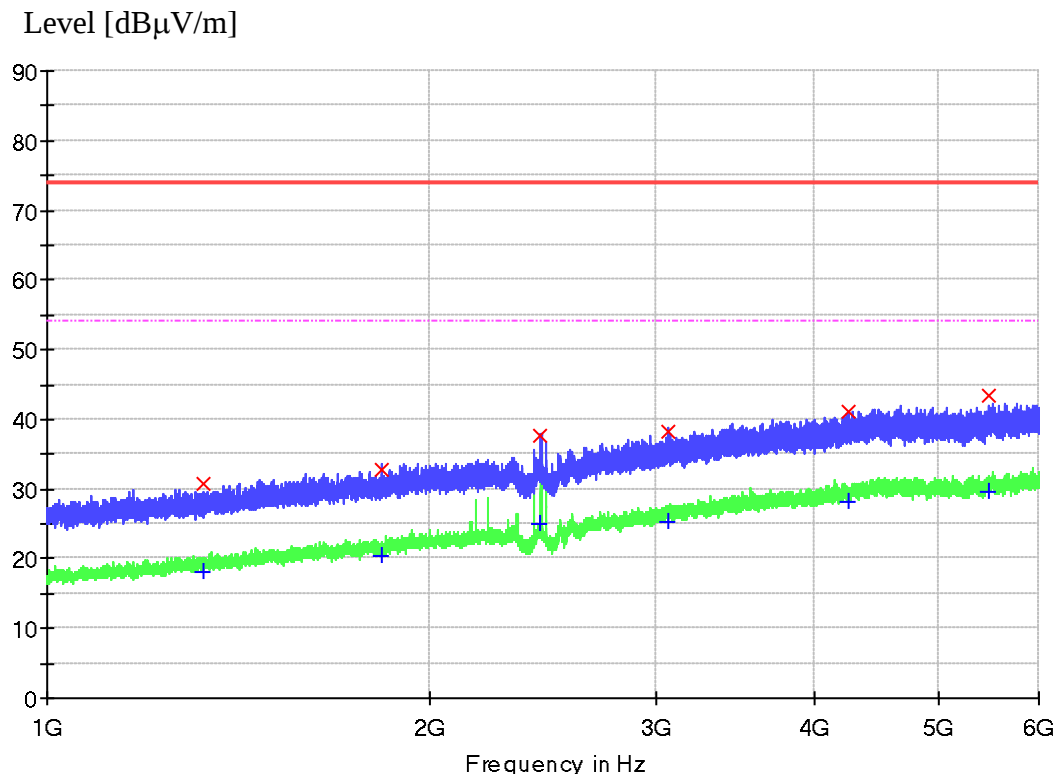
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Figure 14: Spectral Diagrams and measurement results, 1-12 GHz, vertical polarization, mode 3



Final Peak measurement results:

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBμV/m)
1326.250000	30.9	1000.0	1000.000	135.0	V	0.0	-20.3	43.1	74.0
1830.937500	32.8	1000.0	1000.000	135.0	V	0.0	-17.2	41.2	74.0
2440.625000	37.7	1000.0	1000.000	135.0	V	0.0	-14.3	36.3	74.0
3074.687500	38.2	1000.0	1000.000	135.0	V	0.0	-11.4	35.8	74.0
4247.187500	41.1	1000.0	1000.000	135.0	V	0.0	-7.3	32.9	74.0
5478.281250	43.4	1000.0	1000.000	135.0	V	0.0	-5.8	30.6	74.0

Final Average measurement results:

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
1326.250000	18.1	1000.0	1000.000	135.0	V	0.0	-20.3	35.9	54.0
1830.937500	20.3	1000.0	1000.000	135.0	V	0.0	-17.2	33.7	54.0
2440.625000	25.1	1000.0	1000.000	135.0	V	0.0	-14.3	28.9	54.0
3074.687500	25.4	1000.0	1000.000	135.0	V	0.0	-11.4	28.6	54.0
4247.187500	28.2	1000.0	1000.000	135.0	V	0.0	-7.3	25.8	54.0
5478.281250	29.6	1000.0	1000.000	135.0	V	0.0	-5.8	24.4	54.0

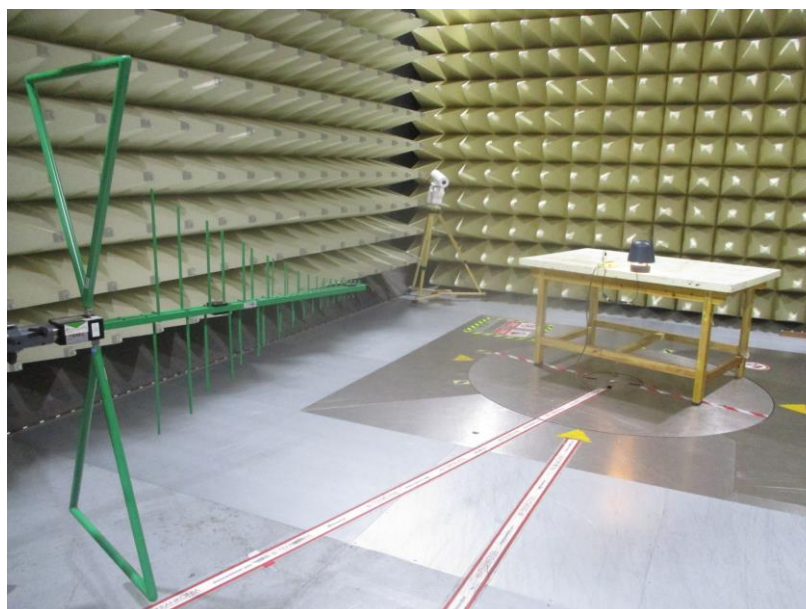
Note: The peak and average measurement results for frequency range 6-12 GHz are far less than the corresponding limits.

6 Photographs of the Test Set-Up

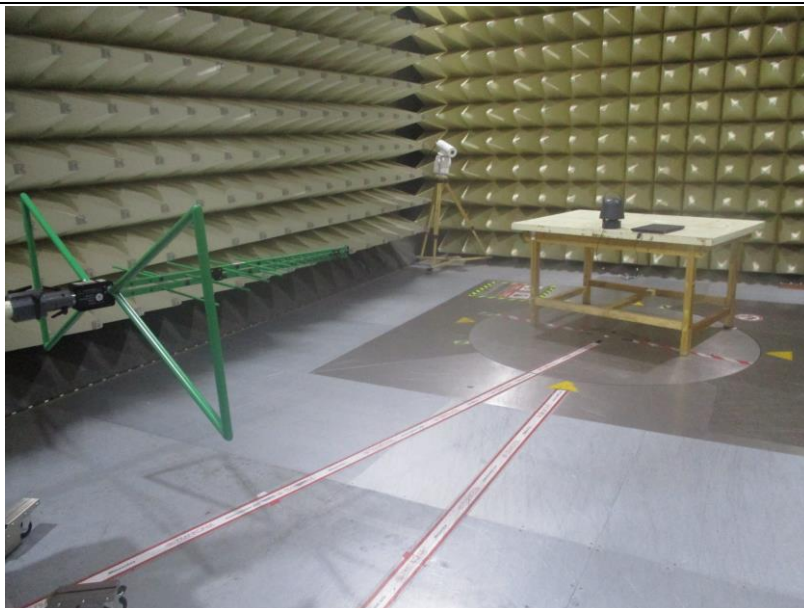
Photograph 1: Set-up for measurement of disturbance voltage



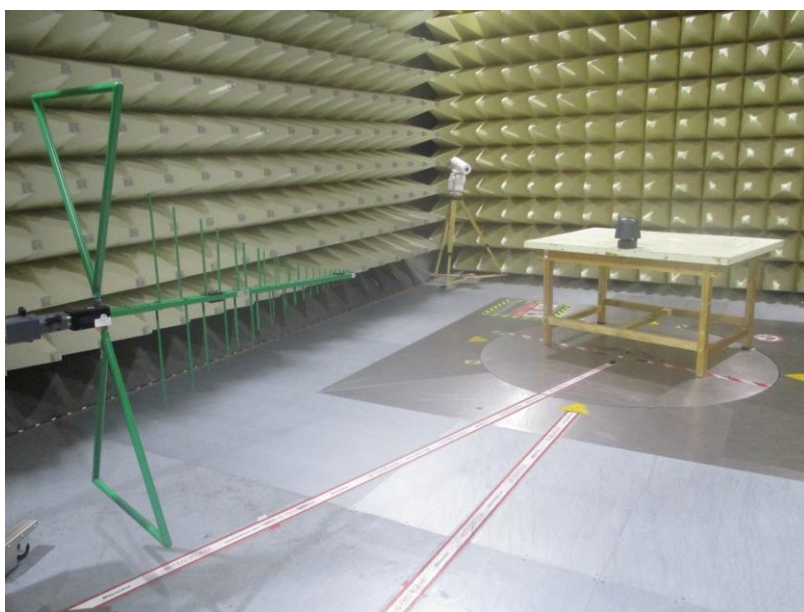
Photograph 2: Set-up for measurement of radiated emission



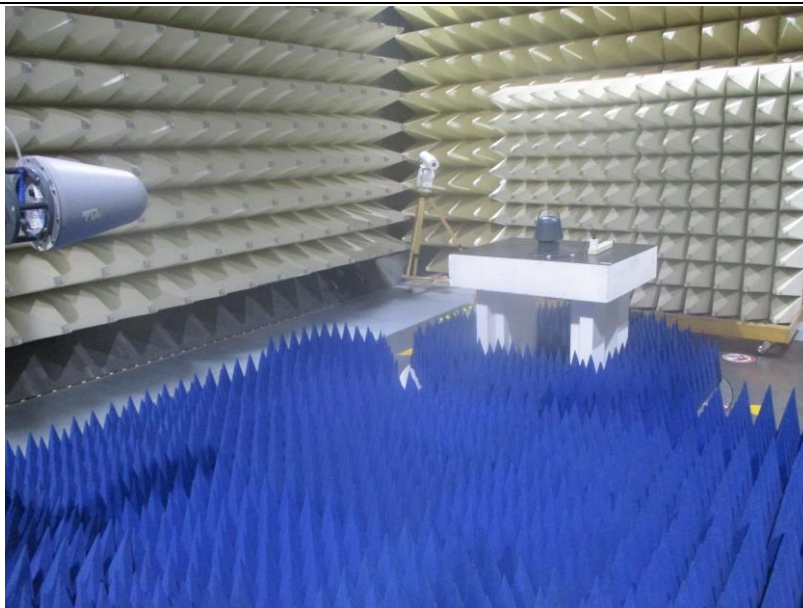
30 MHz-1 GHz, mode 1



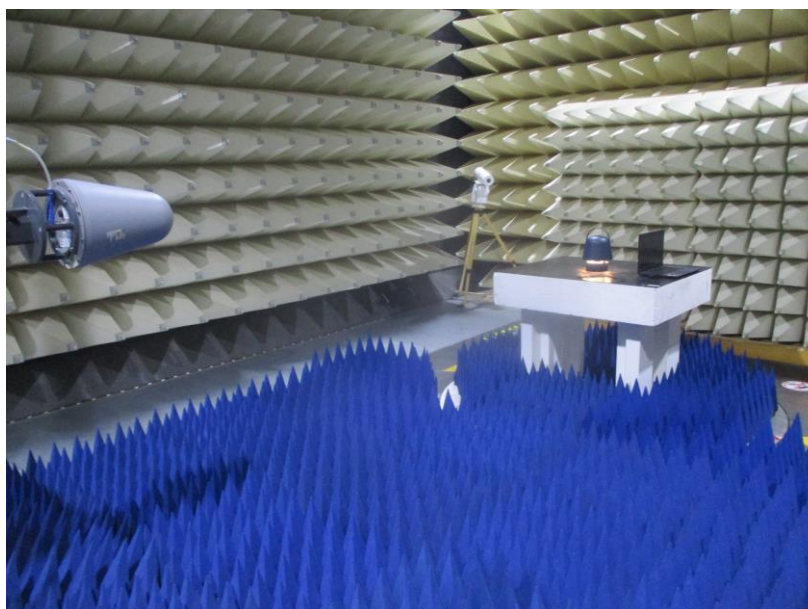
30 MHz-1 GHz, mode 2



30 MHz-1 GHz, mode 3



Above 1 GHz, mode 1



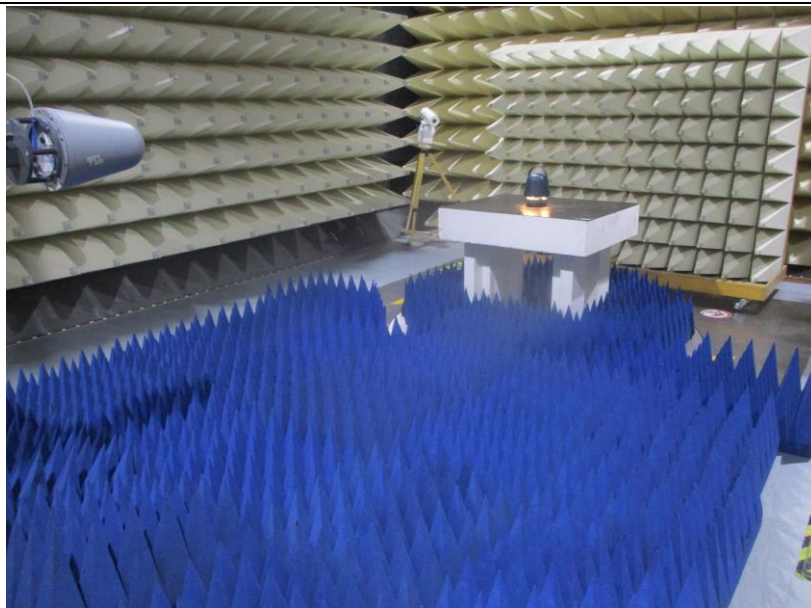
Above 1 GHz, mode 2

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Above 1 GHz, mode 3

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7 List of Test and Measurement Instruments

Equip.	Description	Model	Manufacturer	Last Date DD.MM.YYYY	Due Date DD.MM.YYYY
9023229	EMI test receiver	ESR3	Rohde&Schwarz	22.03.2021	22.03.2022
G1811403	Artificial mains network	ENV216	Rohde&Schwarz	23.11.2020	23.11.2021
G1824248	Dual display multimeter	F45	Fluke	18.09.2020	18.09.2022
G1811378	3m modified semi-anechoic chamber	SAC3	Frankonia	27.06.2019	27.06.2022
G1811402	EMI test receiver	ESCI	Rohde&Schwarz	18.09.2020	18.09.2021
G1811425	Bilog antenna	CBL 6112D	Teseq	10.03.2020	10.03.2023
G1811417	Log periodic antenna	HL050	Rohde&Schwarz	10.03.2020	10.03.2023
G1822702	Spectrum analyser	FSV40	Rohde&Schwarz	01.11.2019	01.11.2021
G1825371	Preamplifier	EMC051845SE	Taiwan EMCI	14.05.2021	14.05.2023

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End of test report