

Prüfbericht-Nr.: Test report no.:	CN22C0H8 001	Auftrags-Nr.: Order no.:	244459279	Seite 1 von 30 Page 1 of 30
Kunden-Referenz-Nr.: Client reference no.:	1288983	Auftragsdatum: Order date:	2022-11-03	
Auftraggeber: Client:	IKEA of Sweden AB Box 702, SE-343 81 Älmhult, Sweden			
Prüfgegenstand: Test item:	Cordless Drill			
Bezeichnung / Typ-Nr.: Identification / Type no.:	P2202 TRIXIG			
Auftrags-Inhalt: Order content:	TÜV Rheinland EMC service			
Prüfgrundlage: Test specification:	FCC 47 CFR Part 15, Subpart B:2021 Class B ICES-003:2020			
Wareneingangsdatum: Date of sample receipt:	2022-10-30~2023-02-06	Refer to the EUT photos file		
Prüfmuster-Nr.: Test sample no:	A003362538-001 A003366654-011 A003409310-005 A003409310-006			
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: 2023-06-30	<i>Jessie Xu</i>		Ausstellungsdatum: Issue date: 2023-06-30	<i>Jiayi Zhou</i>
Stellung / Position:	Sachverständige(r)/Expert		Stellung / Position:	Sachverständige(r)/Expert
Sonstiges / Other:	FCC ID: FHO-P2202 Test Firm Registration Number: 958801			
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				
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Prüfbericht-Nr.: CN22C0H8 001
Test report no.:

Seite 2 von 30
Page 2 of 30

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>

Prüfbericht - Nr.: CN22C0H8 001

Test Report No.:

Seite 3 von 30

Page 3 of 30

TEST SUMMARY

5.1.1 RADIATED EMISSION (30-1000 MHz)

Result:

Passed

Contents

1	TEST SITES	5
1.1	TEST FACILITIES.....	5
2	GENERAL PRODUCT INFORMATION	6
2.1	PRODUCT FUNCTION AND INTENDED USE	6
2.2	RATINGS AND SYSTEM DETAILS.....	6
2.3	INDEPENDENT OPERATION MODES.....	6
2.4	DESCRIPTION OF INTERCONNECTING CABLES	6
2.5	NOISE GENERATING AND NOISE SUPPRESSING PARTS	6
2.6	HIGHEST FREQUENCY GENERATED OR USED IN THE DEVICE OR ON WHICH THE DEVICE OPERATES OR TUNES.....	6
2.7	SUBMITTED DOCUMENTS.....	6
3	TEST SET-UP AND OPERATION MODES.....	7
3.1	PRINCIPLE OF CONFIGURATION SELECTION	7
3.2	EQUIPMENT AND CABLE ARRANGEMENT.....	7
3.3	TEST SOFTWARE	8
3.4	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	8
3.5	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE	8
4	CONFORMITY DECISION RULE.....	9
5	TEST RESULTS EMISSION	10
5.1	EMISSION IN THE FREQUENCY RANGE ABOVE 30 MHz.....	10
5.1.1	Radiated Emission (30-1000 MHz).....	10
6	PHOTOGRAPHS OF THE TEST SET-UP.....	28
7	LIST OF TEST AND MEASUREMENT INSTRUMENTS	29
8	LIST OF FIGURES.....	30

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 an ordinary cordless drill for household and similar use. For the further information, refer to the user's manual.

2.2 Ratings and System Details

Rated input voltage : DC 12 V

Protection class : III

Identities and difference: Above model has two kinds of battery packs, and each battery pack has two configurations. Therefore, the EMC tests were performed on the sample 1#, sample 2#, sample 3# and sample 4#.

2.3 Independent Operation Modes

The basic operation modes are: "On" and "Off".

2.4 Description of interconnecting cables

N/A

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 16 MHz.

2.7 Submitted Documents

Circuit diagrams, user's manuals and labels.

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.

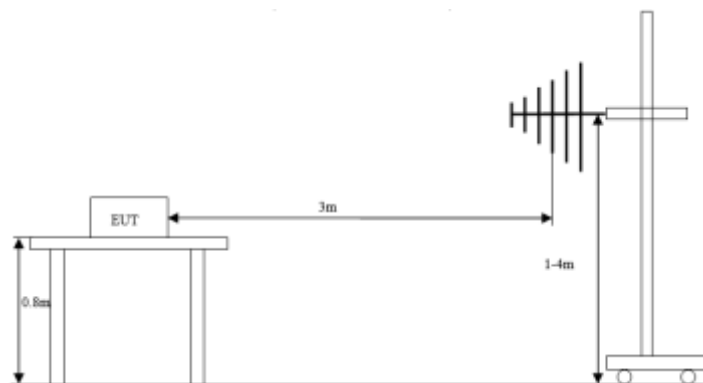
Refer to the related paragraph of this report.

The sequence of testing:

Radiated emission tests were performed on 2022-11-22~2023-02-13;

3.2 Equipment and cable arrangement

Block diagram for radiated emission test is as follows:



(Radiated emission 30-1000 MHz)

Also refer to photograph on clause 6 for test setups for radiated emission test.

3.3 Test Software

Refer to the related paragraph of this report. No software was used.

3.4 Special Accessories and Auxiliary Equipment

None.

3.5 Countermeasures to achieve EMC Compliance

No other special measure is employed to achieve the requirement.

4 Conformity Decision Rule

For all EMI tests included in this report, as measurement uncertainties are less than the values U_{CISPR} given in CISPR 16-4-2, compliance with the limits is determined by comparing measurement results directly with corresponding limits without taking into consideration of measurement uncertainties.

5 Test Results EMISSION

5.1 Emission in the Frequency Range above 30 MHz

5.1.1 Radiated Emission (30-1000 MHz)

Result:		Passed
Date of testing	: 2022-11-22~2023-02-13	
Test procedure	: FCC 47 CFR Part 15, Subpart B:2021, ICES-003:2020, 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) (See Note 1) 30 – 88 MHz, 40 dB μ V/m; 88 – 216 MHz, 43.5 dB μ V/m; 216 – 960 MHz, 46 dB μ V/m; Above 960 MHz, 54 dB μ V/m.	
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	: DC 12 V	
Operational mode	: Mode 1: Continuously working in forward direction Mode 2: Continuously working in backward direction	
Ambient condition	: Temperature: 21.8 °C~24.2 °C; Relative humidity: 42.1 %~51.2 %	
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 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, “×” means quasi-peak test results.

Prüfbericht - Nr.: CN22C0H8 001

Test Report No.:

Seite 11 von 30

Page 11 of 30

Note 1: The class B limits of FCC 47 CFR Part 15, Subpart B:2021 is stricter than those ICES-003:2020 Table 2 for 3 m test distance. Therefore, the former limits are used in following figures and tables.

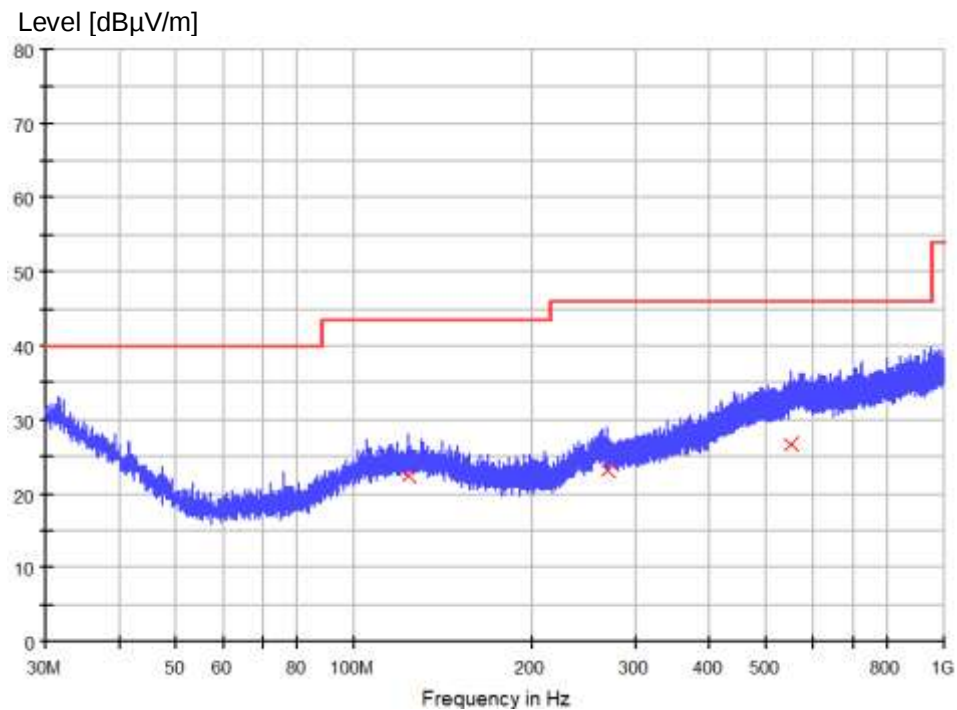
Notes on following tables of radiated emission results and conversions:

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)

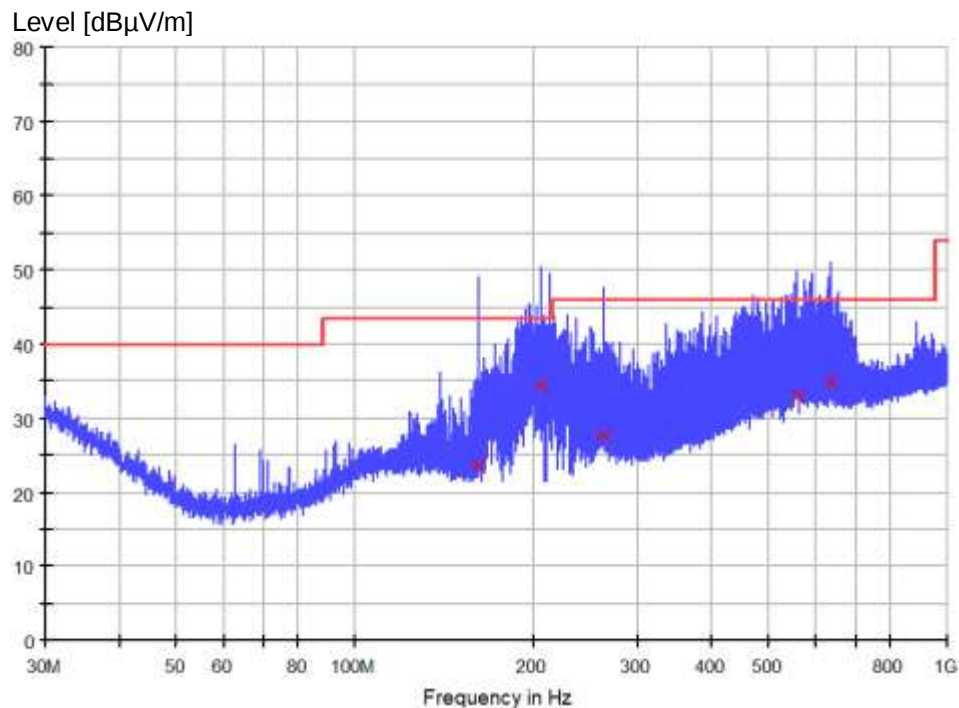
Figure 1: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 1 with sample 1#



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)
123.831333	22.6	120.000	100.0	H	120.0	18.7	21.0	43.5
268.523000	23.2	120.000	100.0	H	-50.0	20.0	22.8	46.0
551.116333	26.6	120.000	100.0	H	10.0	26.3	19.5	46.0

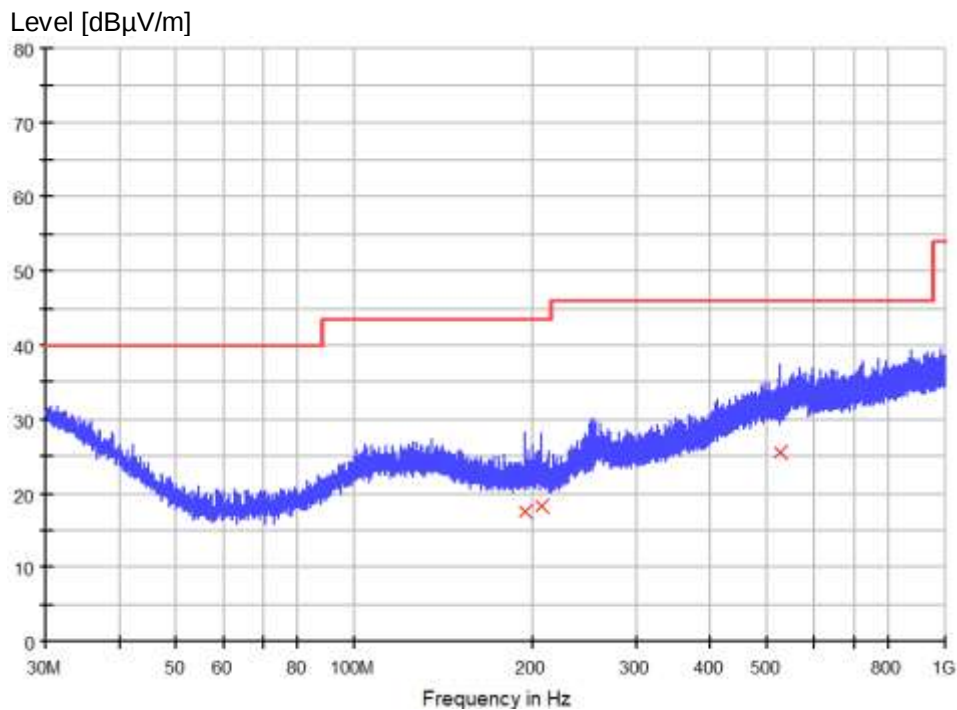
Figure 2: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 1 with sample 1#



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)
161.952333	23.7	120.000	100.0	V	-50.0	16.7	19.8	43.5
161.952333	23.7	120.000	100.0	V	10.0	16.7	19.8	43.5
205.440667	34.5	120.000	100.0	V	110.0	16.2	9.1	43.5
263.317333	27.5	120.000	100.0	V	-80.0	20.7	18.5	46.0
559.070333	32.9	120.000	100.0	V	-70.0	26.3	13.1	46.0
638.545667	34.9	120.000	100.0	V	50.0	26.4	11.1	46.0

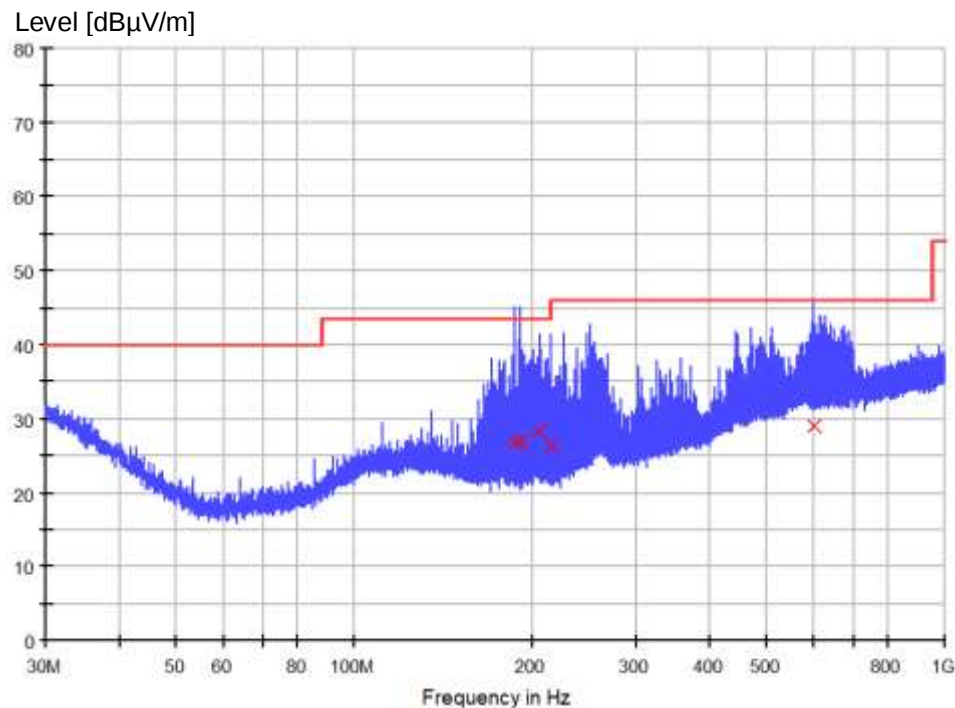
Figure 3: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 2 with sample 1#



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)
194.738333	17.6	120.000	100.0	H	110.0	16.1	26.0	43.5
207.025000	18.2	120.000	100.0	H	-50.0	16.1	25.3	43.5
525.993333	25.4	120.000	100.0	H	40.0	25.0	20.6	46.0

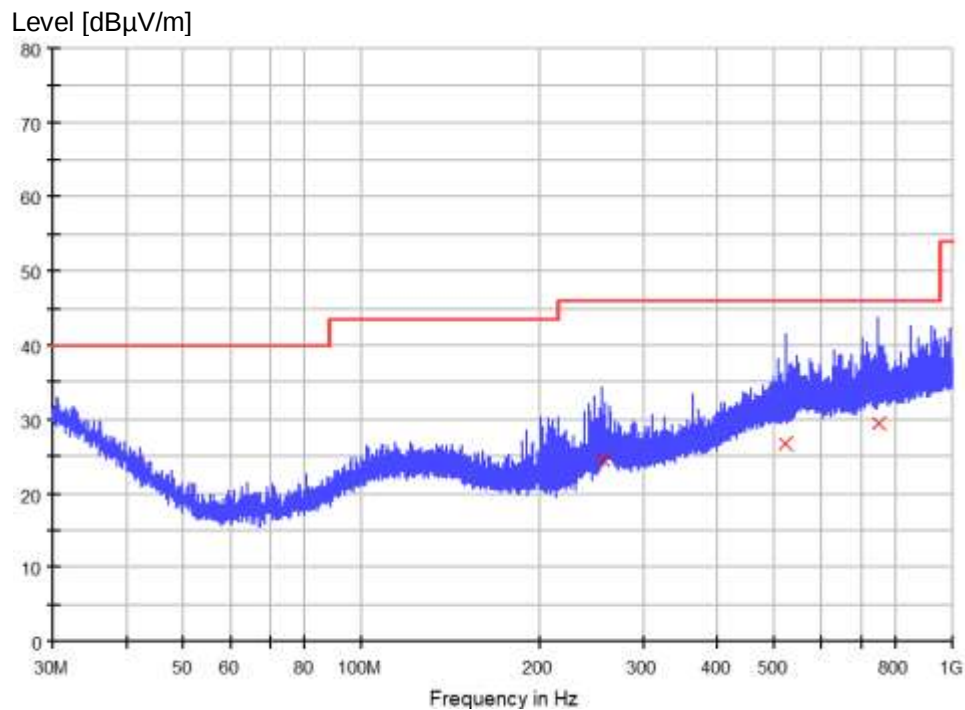
Figure 4: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 2 with sample 1#



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)
187.172333	26.6	120.000	100.0	V	120.0	15.8	16.9	43.5
190.858333	26.9	120.000	100.0	V	-50.0	15.9	16.6	43.5
206.184333	28.2	120.000	100.0	V	110.0	16.2	15.3	43.5
215.852000	26.3	120.000	100.0	V	-90.0	15.7	17.3	43.5
601.071333	29.0	120.000	100.0	V	10.0	26.2	17.0	46.0

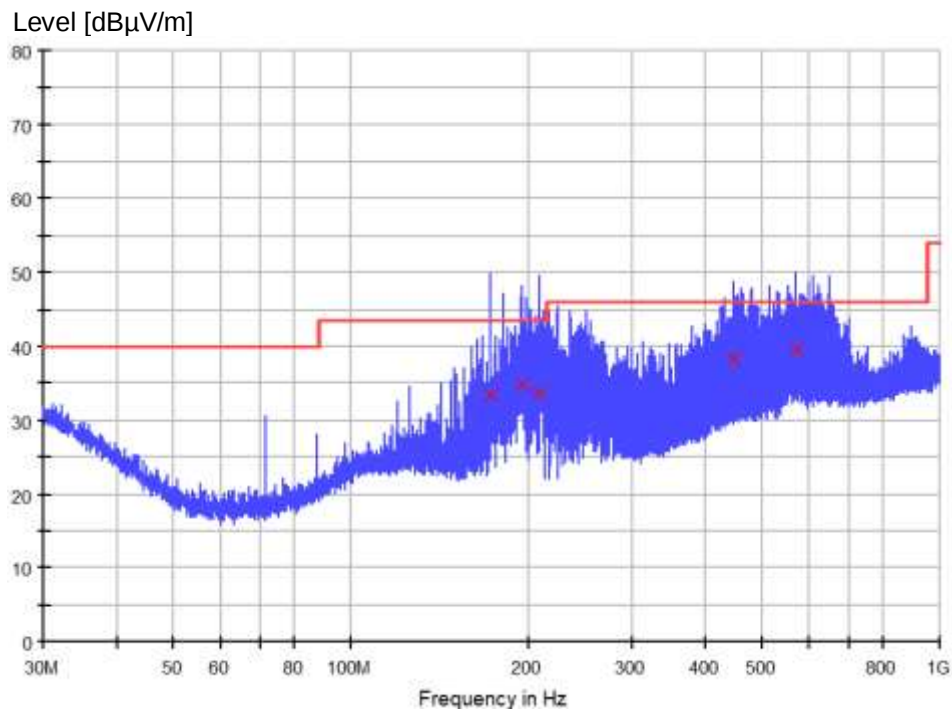
Figure 5: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 1 with sample 2#



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)
255.816000	24.6	120.000	100.0	H	-50.0	20.1	21.4	46.0
521.466667	26.6	120.000	100.0	H	110.0	24.9	19.5	46.0
751.421333	29.6	120.000	100.0	H	120.0	27.2	16.5	46.0

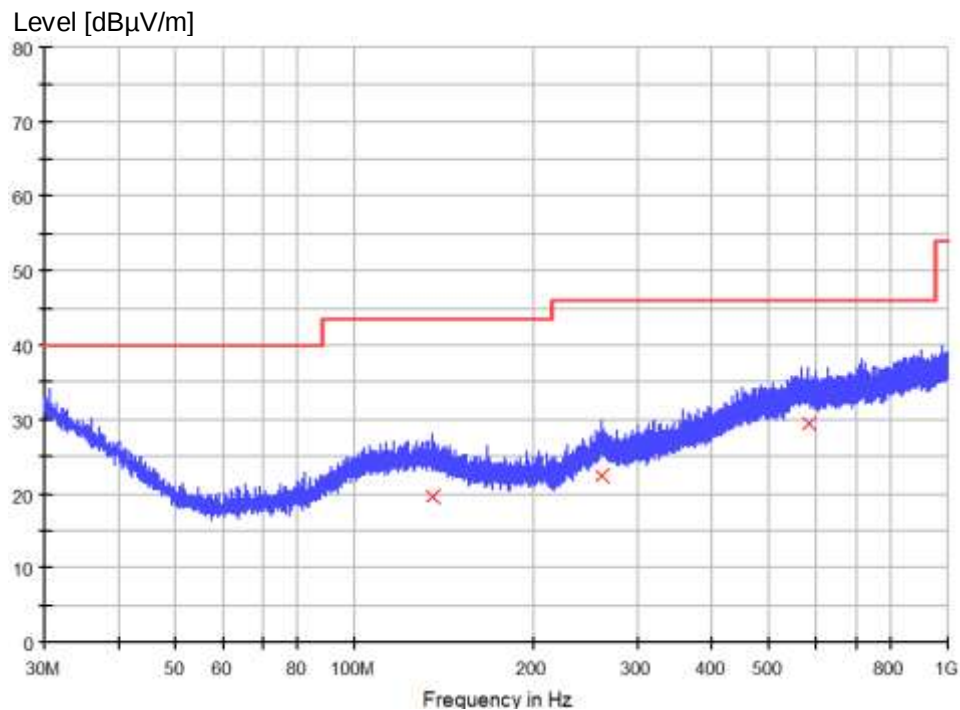
Figure 6: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 1 with sample 2#



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)
172.687000	33.6	120.000	100.0	V	-55.0	16.2	10.0	43.5
195.676000	34.8	120.000	100.0	V	62.0	16.1	8.7	43.5
209.644000	33.7	120.000	100.0	V	76.0	16.1	9.8	43.5
446.065333	38.5	120.000	100.0	V	-103.0	24.0	7.5	46.0
569.675667	39.6	120.000	100.0	V	120.0	26.2	6.5	46.0

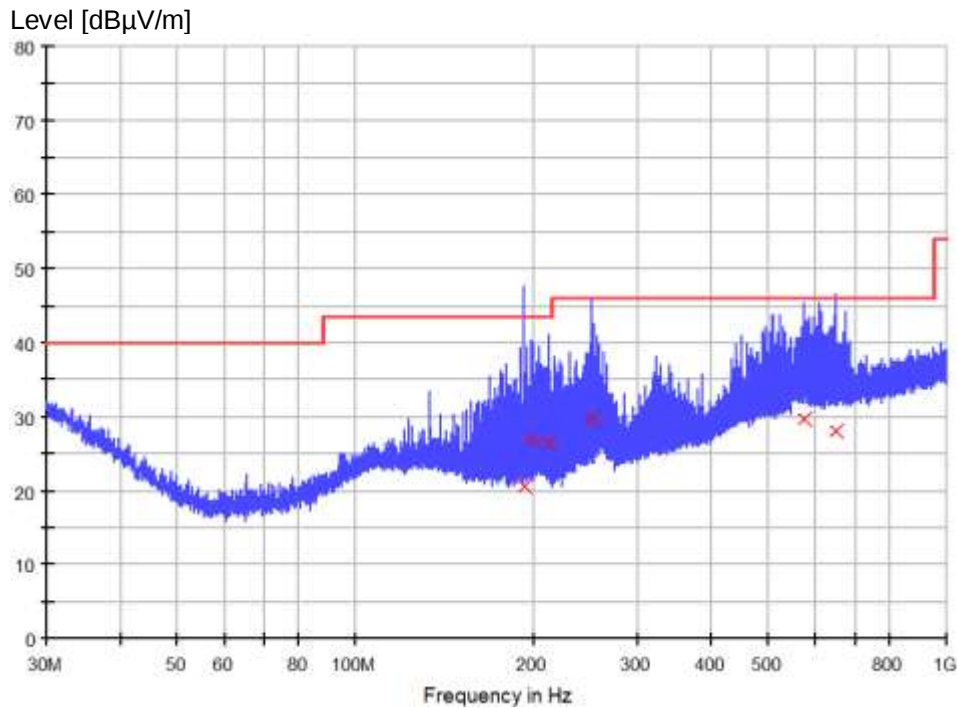
Figure 7: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 2 with sample 2#



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)
135.051000	19.6	120.000	100.0	H	-50.0	18.4	24.0	43.5
260.051667	22.5	120.000	100.0	H	120.0	20.7	23.6	46.0
582.641333	29.5	120.000	100.0	H	-80.0	26.1	16.5	46.0

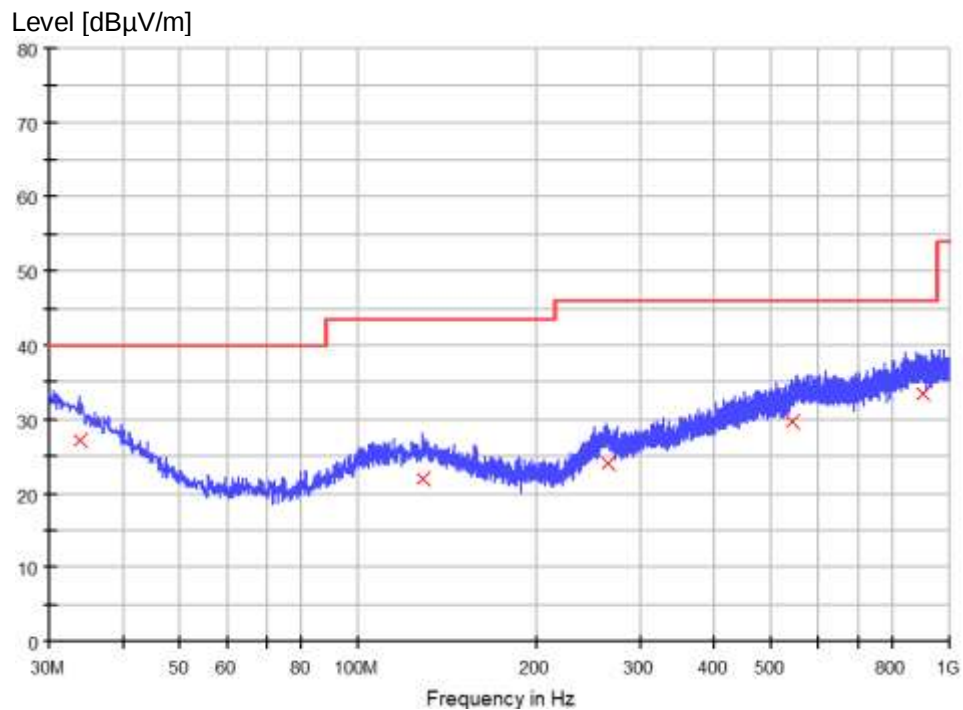
Figure 8: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 2 with sample 2#



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)
192.766000	20.5	120.000	100.0	V	120.0	15.9	23.0	43.5
198.036333	26.9	120.000	100.0	V	-90.0	16.2	16.6	43.5
212.812667	26.5	120.000	100.0	V	110.0	15.8	17.0	43.5
251.030667	29.8	120.000	100.0	V	20.0	19.4	16.2	46.0
574.816667	29.8	120.000	100.0	V	-50.0	26.0	16.3	46.0
651.543667	28.2	120.000	100.0	V	-60.0	26.3	17.8	46.0

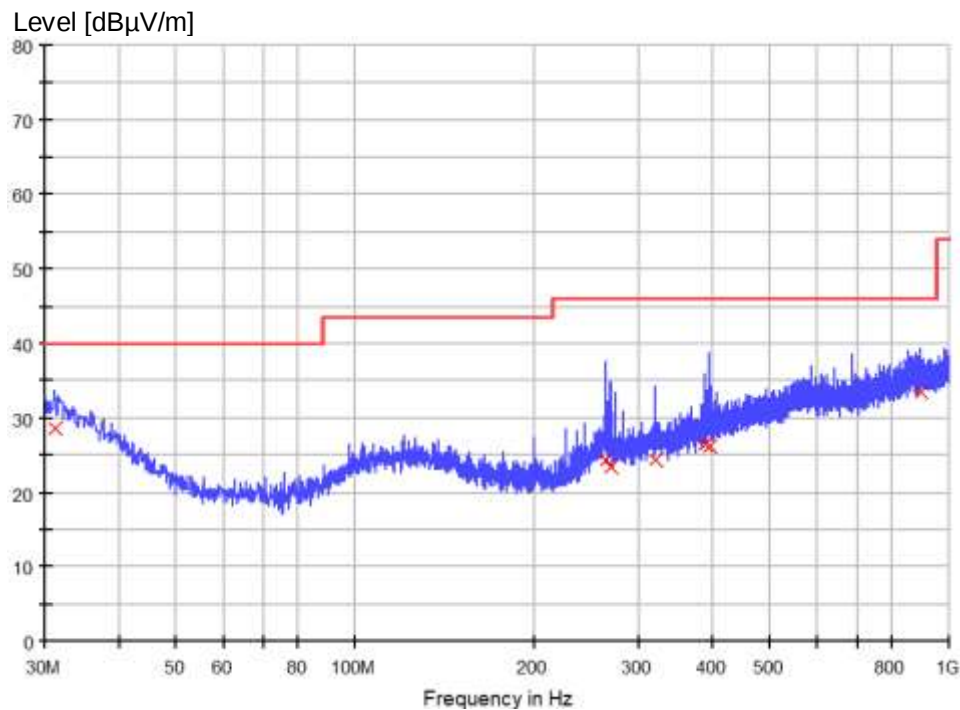
Figure 9: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 1 with sample 3#



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)
33.637500	27.1	120.000	120.0	H	-180.0	23.5	12.9	40.0
128.697500	22.0	120.000	160.0	H	-166.0	18.7	21.5	43.5
265.346250	24.0	120.000	150.0	H	180.0	20.6	22.0	46.0
543.493750	29.7	120.000	135.0	H	-123.0	25.8	16.3	46.0
900.332500	33.4	120.000	110.0	H	-180.0	28.2	12.6	46.0

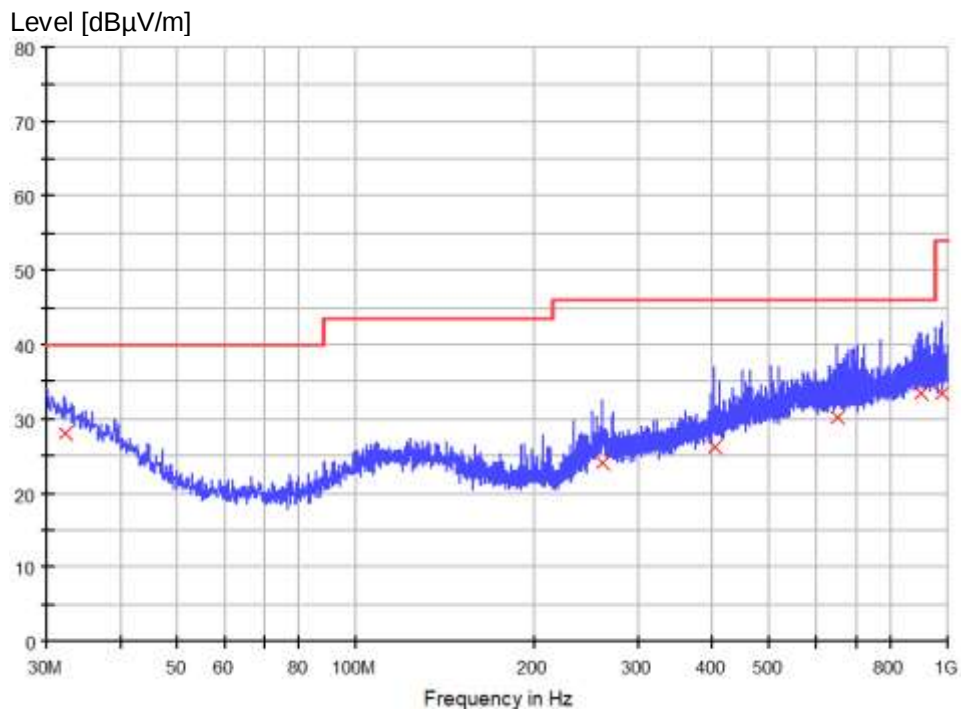
Figure 10: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 1 with sample 3#



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)
31.091250	28.6	120.000	130.0	V	-34.0	24.9	11.4	40.0
264.255000	24.4	120.000	100.0	V	-180.0	20.7	21.6	46.0
269.711250	23.3	120.000	150.0	V	128.0	19.8	22.7	46.0
320.757500	24.2	120.000	100.0	V	180.0	20.6	21.8	46.0
387.445000	26.5	120.000	135.0	V	-163.0	22.0	19.5	46.0
394.962500	26.3	120.000	180.0	V	24.0	22.3	19.7	46.0
897.058750	33.5	120.000	110.0	V	-146.0	28.4	12.5	46.0

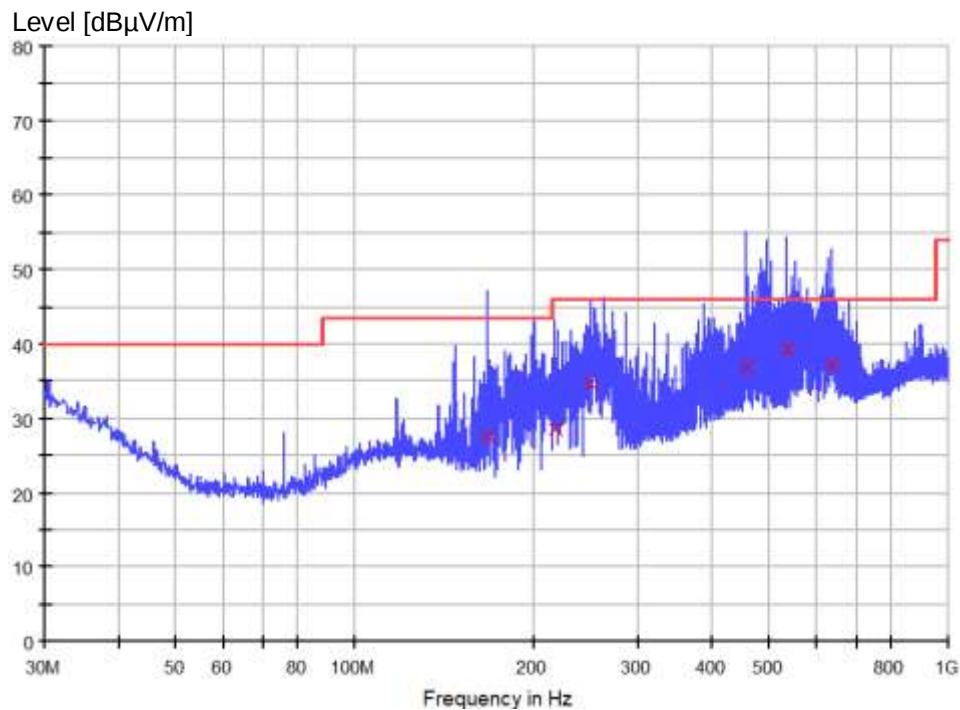
Figure 11: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 2 with sample 3#



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)
32.303750	28.0	120.000	100.0	H	180.0	24.3	12.0	40.0
260.617500	24.0	120.000	130.0	H	-95.0	20.7	22.0	46.0
404.541250	26.3	120.000	160.0	H	-180.0	22.8	19.7	46.0
652.133750	30.2	120.000	150.0	H	151.0	26.2	15.8	46.0
899.362500	33.3	120.000	110.0	H	-118.0	28.3	12.7	46.0
980.963750	33.5	120.000	120.0	H	26.0	28.8	20.5	54.0

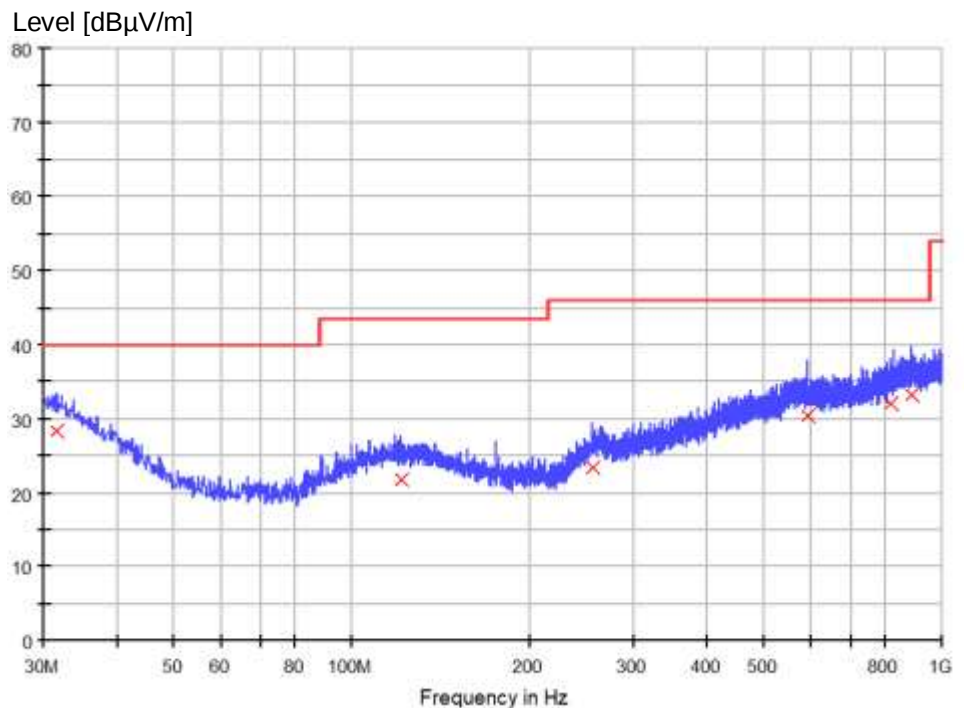
Figure 12: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 2 with sample 3#



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)
167.618750	27.6	120.000	150.0	V	180.0	16.4	16.0	43.5
217.088750	28.5	120.000	120.0	V	-20.0	15.8	17.5	46.0
249.583750	34.7	120.000	100.0	V	-180.0	19.2	11.3	46.0
456.800000	37.0	120.000	165.0	V	167.0	24.3	9.0	46.0
533.793750	39.3	120.000	130.0	V	-180.0	25.1	6.7	46.0
636.977500	37.1	120.000	110.0	V	180.0	26.4	8.9	46.0

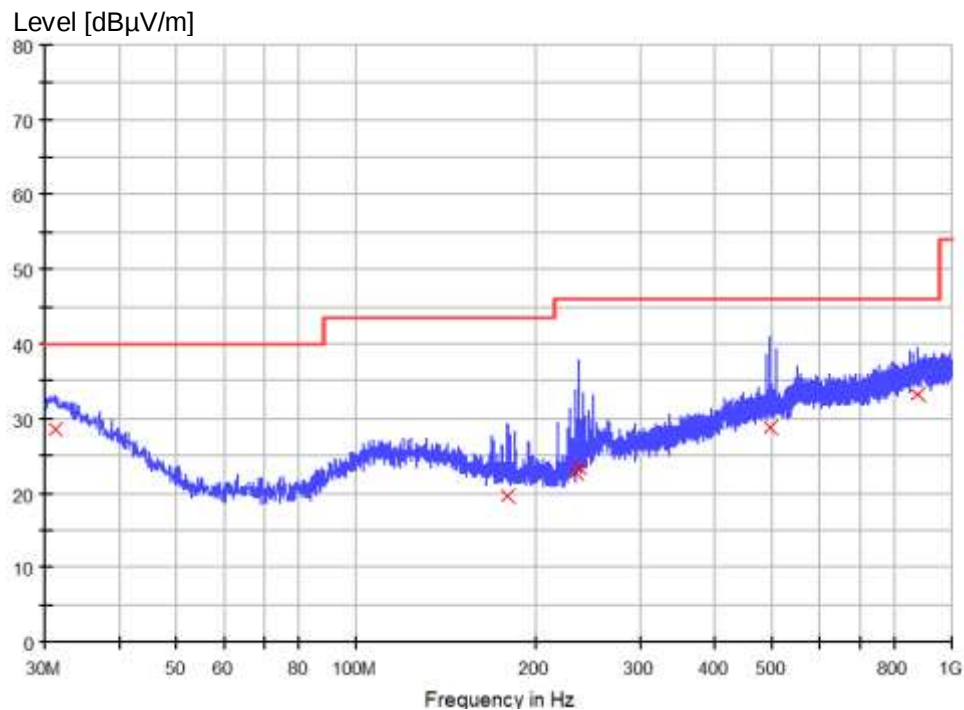
Figure 13: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 1 with sample 4#



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)
31.697500	28.3	120.000	150.0	H	-53.0	24.6	11.7	40.0
120.816250	21.8	120.000	100.0	H	124.0	18.5	21.7	43.5
255.040000	23.3	120.000	130.0	H	-16.0	20.0	22.7	46.0
591.508750	30.5	120.000	165.0	H	-180.0	26.3	15.5	46.0
819.822500	32.0	120.000	110.0	H	118.0	27.5	14.0	46.0
889.056250	33.2	120.000	100.0	H	39.0	28.0	12.8	46.0

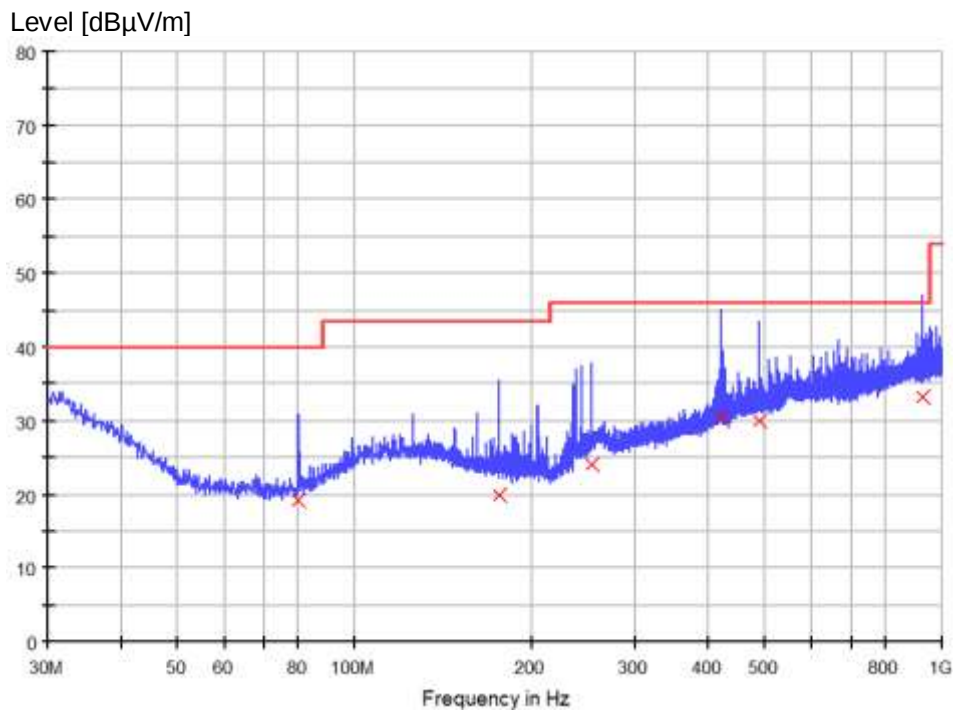
Figure 14: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 1 with sample 4#



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)
31.212500	28.6	120.000	100.0	V	111.0	24.8	11.4	40.0
179.622500	19.6	120.000	160.0	V	180.0	15.9	23.9	43.5
233.700000	22.7	120.000	110.0	V	-141.0	17.4	23.3	46.0
236.488750	23.5	120.000	150.0	V	-180.0	17.7	22.5	46.0
495.842500	28.8	120.000	110.0	V	79.0	24.9	17.2	46.0
875.961250	33.2	120.000	135.0	V	133.0	28.0	12.8	46.0

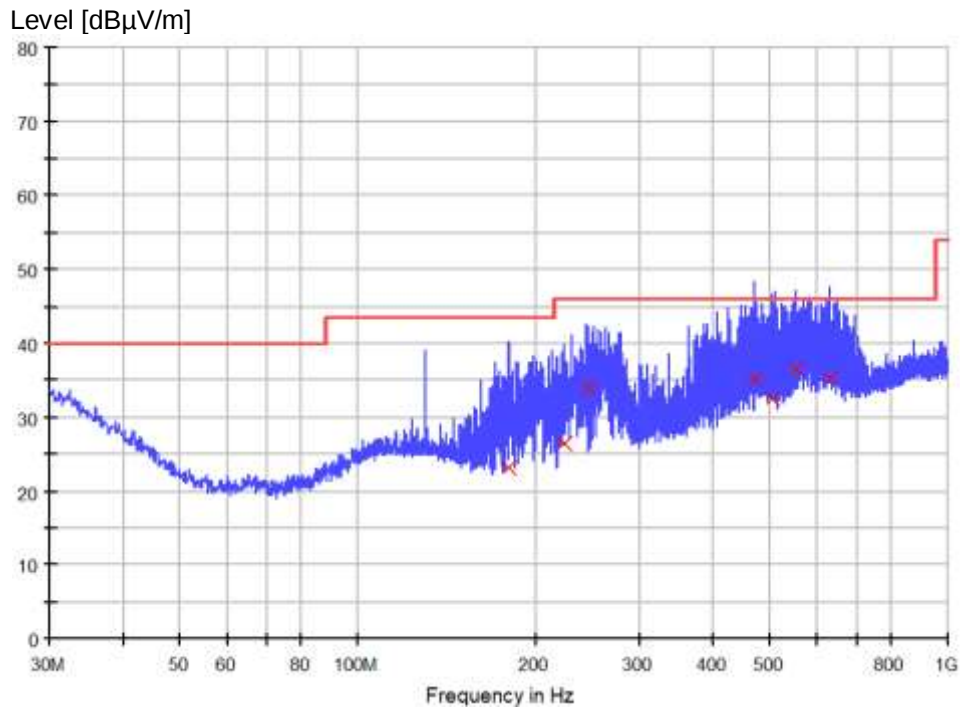
Figure 15: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 2 with sample 4#



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)
80.318750	19.1	120.000	150.0	H	-124.0	13.7	20.9	40.0
176.833750	19.9	120.000	110.0	H	52.0	16.0	23.6	43.5
252.857500	24.0	120.000	135.0	H	105.0	19.7	22.0	46.0
421.880000	30.4	120.000	160.0	H	152.0	23.4	15.6	46.0
488.203750	29.9	120.000	150.0	H	-180.0	24.8	16.1	46.0
931.251250	33.2	120.000	120.0	H	180.0	28.1	12.8	46.0

Figure 16: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 2 with sample 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)
180.956250	23.3	120.000	100.0	V	-180.0	15.9	20.2	43.5
223.030000	26.5	120.000	130.0	V	180.0	16.2	19.5	46.0
245.582500	34.0	120.000	150.0	V	-165.0	18.7	12.0	46.0
469.895000	35.1	120.000	165.0	V	118.0	24.4	11.0	46.0
502.632500	32.6	120.000	120.0	V	90.0	24.9	13.4	46.0
552.708750	36.4	120.000	100.0	V	-114.0	26.4	9.6	46.0
630.915000	35.4	120.000	135.0	V	152.0	26.4	10.6	46.0

Prüfbericht - Nr.: CN22C0H8 001
Test Report No.:

Seite 28 von 30
Page 28 of 30

6 Photographs of the Test Set-Up

Refer to the test setup file.

Prüfbericht - Nr.: CN22C0H8 001

Test Report No.:

Seite 29 von 30

Page 29 of 30

7 List of Test and Measurement Instruments

Equip.	Description	Model	Manufacturer	Last Date	Due Date
				DD.MM.YYYY	DD.MM.YYYY
G1811378	3m modified semi-anechoic chamber	SAC3	Frankonia	10.06.2021	10.06.2024
9042162	EMI test receiver	ESR7	Rohde&Schwarz	02.03.2022	02.03.2023
G1811425	Bilog antenna	CBL 6112D	Teseq	10.03.2020	10.03.2023

8 List of Figures

Figure 1: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 1 with sample 1#.....	12
Figure 2: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 1 with sample 1#.....	13
Figure 3: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 2 with sample 1#.....	14
Figure 4: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 2 with sample 1#.....	15
Figure 5: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 1 with sample 2#.....	16
Figure 6: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 1 with sample 2#.....	17
Figure 7: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 2 with sample 2#.....	18
Figure 8: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 2 with sample 2#.....	19
Figure 9: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 1 with sample 3#.....	20
Figure 10: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 1 with sample 3#.....	21
Figure 11: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 2 with sample 3#.....	22
Figure 12: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 2 with sample 3#.....	23
Figure 13: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 1 with sample 4#.....	24
Figure 14: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 1 with sample 4#.....	25
Figure 15: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 2 with sample 4#.....	26
Figure 16: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 2 with sample 4#.....	27

End of test report