

Prüfbericht-Nr.: <i>Test Report No.:</i>	50345118 001	Auftrags-Nr.: <i>Order No.:</i>	244218072	Seite 1 von 18 <i>Page 1 of 18</i>
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	60051577	Auftragsdatum: <i>Order date.:</i>	19.02.2020	
Auftraggeber: <i>Client:</i>	IKEA of Sweden AB Box 702 SE-343 81 Älmhult Sweden			
Prüfgegenstand: <i>Test item:</i>	Semi-integrated LED lamp			
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	LED1938R3			
Auftrags-Inhalt: <i>Order content:</i>	EMC test			
Prüfgrundlage: <i>Test specification:</i>	FCC 47 CFR Part 15, Subpart B:2018 Class B ICES-005:2018 ANSI C63.4:2014			
Wareneingangsdatum: <i>Date of receipt:</i>	19.02.2020	Refer to the EUT photos file		
Prüfmuster-Nr.: <i>Test sample No.:</i>	A001048093-002			
Prüfzeitraum: <i>Testing period:</i>	Refer to test report			
Ort der Prüfung: <i>Place of testing:</i>	EMC laboratory			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shanghai) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von / tested by: <i>Jessie Xu</i> 04.03.2020 Jessie Xu/Senior project engineer		kontrolliert von / reviewed by: <i>Jiayi Zhou</i> 04.03.2020 Jiayi Zhou/Senior manager		
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>
Sonstiges / Other: FCC ID: FHO-LED1938R3 Test Firm Registration Number: 958801				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor 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>				

TEST SUMMARY

4.1.1 CONDUCTED EMISSION

Result:

Passed

4.2.1 RADIATED EMISSION

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 6 for test and measurement instruments.

2 General Product Information

2.1 Product Function and Intended Use

The EUT (equipment under test) is an ordinary Semi-integrated LED lamp for lighting and similar use. For the further information, refer to the user's manual.

2.2 Ratings and System Details

Product	:	Semi-integrated LED lamp	LED power supply
Model	:	LED1938R3	ICPSW24-7-2
Rated input	:	DC 24 V	AC 100-240 V, 50/60 Hz
Rated wattage	:	2.2 W	Max. 7 W
Rated current	:	100 mA	0.1 A

The semi-integrated LED lamp LED1938R3 can be integrated into table lamp (model: TYP B1609, manufacturer: IKEA of Sweden AB) and powered by above LED power supply (manufacturer: IKEA of Sweden AB). Therefore, the EMC tests were performed on the semi-integrated LED lamp LED1938R3 with the table lamps and LED power supply.

2.3 Independent Operation Modes

The basic operation mode is "On" or "Off".

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 less than 108 MHz.

2.7 Submitted Documents

PCB layout, circuit diagram and 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.

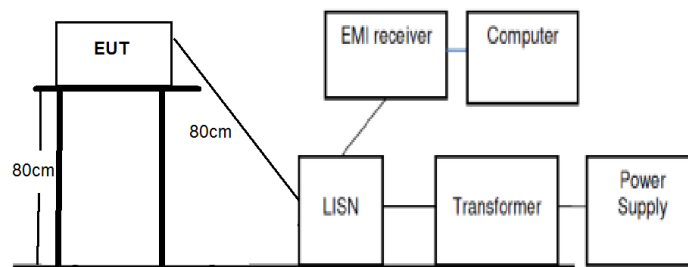
Refer to the related paragraph of this report.

The sequence of testing:

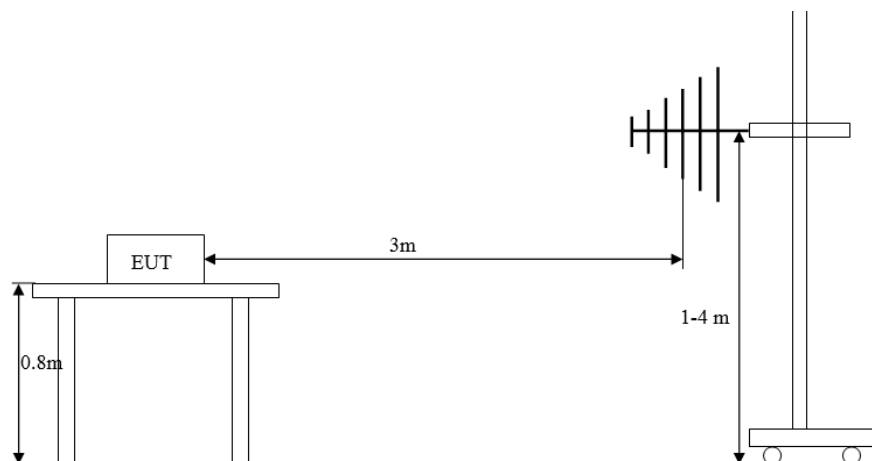
1. Radiated emission tests were performed on 26.02.2020;
2. Conducted emission tests were performed on 26.02.2020.

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 table lamp (model: TYP B1609, manufacturer: IKEA of Sweden AB) was used as the auxiliary equipment.

3.5 Countermeasures to achieve EMC Compliance

No special measure is employed to achieve the requirement.

4 Test Results EMISSION

4.1 Emission in the Frequency Range up to 30 MHz

4.1.1 Conducted emission

Result:		Passed
Date of testing	: 26.02.2020	
Test procedure	: FCC 47 CFR Part 15, Subpart B:2018, 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 for LED power supply	
Operational mode	: Power on	
Ambient condition	: Temperature: 21.7 °C; Relative humidity: 43.8 %	
Expanded measurement uncertainty ($k=2$)	: 3.39 dB (150 kHz – 30 MHz)	

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

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

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

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

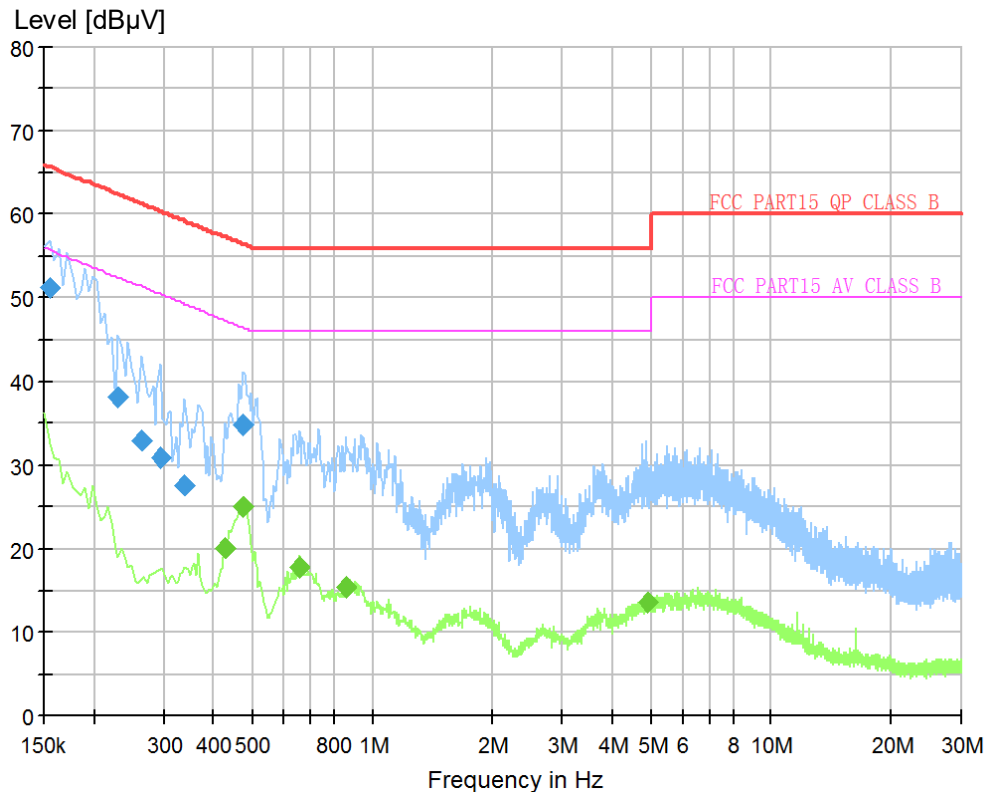
The following figures and tables were those measured by an automatic measuring system. Both quasi-peak and average measurements were performed. In the following spectral diagram, “◆” means quasi-peak test results and “◆” means average test results.

Notes on following tables of conducted emission results and conversions:

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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)

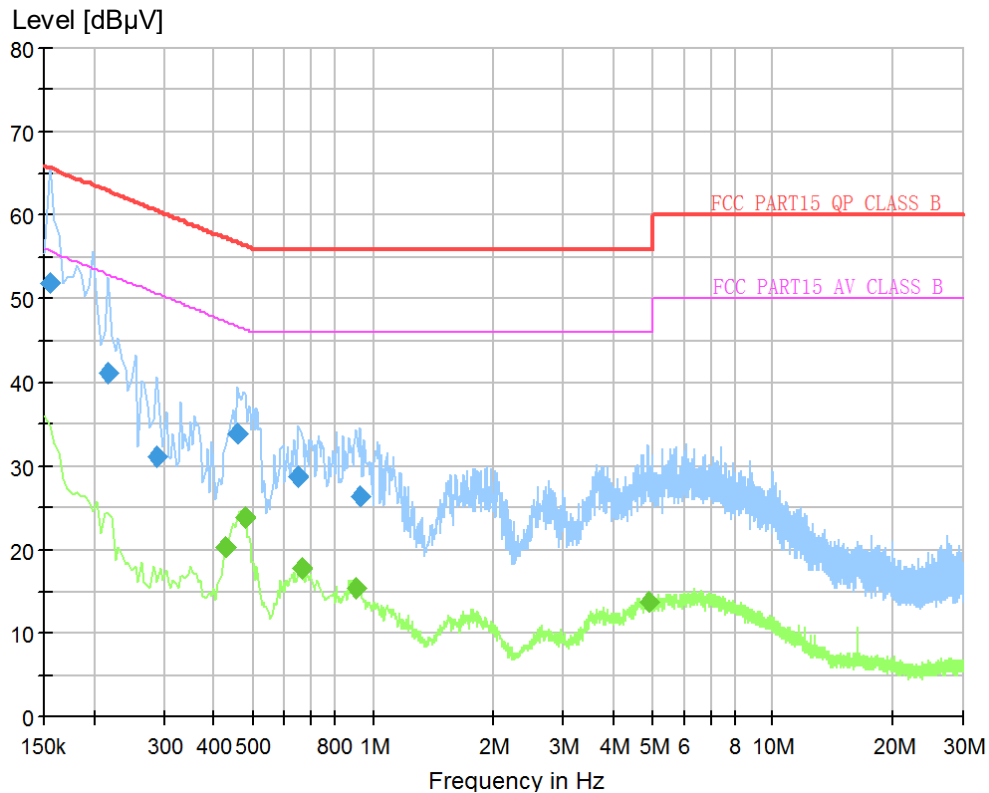
Margin: Limit (dB μ V) - Level (dB μ V)

Figure 1: Spectral diagram and measurement results, conducted emission, 150 kHz – 30 MHz, line L

Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.154500	51.22	65.75	14.54	1000.0	9.000	L1	9.5
0.231000	38.13	62.41	24.28	1000.0	9.000	L1	9.5
0.262500	33.03	61.35	28.32	1000.0	9.000	L1	9.5
0.294000	30.81	60.41	29.60	1000.0	9.000	L1	9.6
0.339000	27.57	59.23	31.66	1000.0	9.000	L1	9.6
0.474000	34.76	56.44	21.68	1000.0	9.000	L1	9.6

Final average measurement results:

Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.429000	20.06	47.27	27.21	1000.0	9.000	L1	9.6
0.474000	25.12	46.44	21.32	1000.0	9.000	L1	9.6
0.654000	17.88	46.00	28.12	1000.0	9.000	L1	9.6
0.861000	15.54	46.00	30.46	1000.0	9.000	L1	9.6
4.924500	13.66	46.00	32.34	1000.0	9.000	L1	9.7

Figure 2: Spectral diagram and measurement results, conducted emission, 150 kHz – 30 MHz, line N

Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.154500	51.87	65.75	13.89	1000.0	9.000	N	9.5
0.217500	41.08	62.91	21.83	1000.0	9.000	N	9.5
0.289500	31.19	60.54	29.34	1000.0	9.000	N	9.5
0.456000	33.89	56.77	22.87	1000.0	9.000	N	9.6
0.649500	28.85	56.00	27.15	1000.0	9.000	N	9.6
0.933000	26.40	56.00	29.60	1000.0	9.000	N	9.6

Final average measurement results:

Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.429000	20.35	47.27	26.93	1000.0	9.000	N	9.6
0.478500	23.83	46.37	22.53	1000.0	9.000	N	9.6
0.658500	17.83	46.00	28.17	1000.0	9.000	N	9.6
0.906000	15.52	46.00	30.48	1000.0	9.000	N	9.6
4.915500	13.72	46.00	32.28	1000.0	9.000	N	9.6

4.2 Emission in the Frequency Range above 30 MHz

4.2.1 Radiated emission

Result:		Passed
Date of testing	: 26.02.2020	
Test procedure	: FCC 47 CFR Part 15, Subpart B:2018, ICES-005:2018, ANSI C63.4-2014 and CISPR 16-1 series standards	
Frequency range	: 30 – 1000 MHz Note: The highest frequency in the EUT is less than 108 MHz. According to FCC Part 15 subpart B §15.33 (b) (1), the upper frequency for radiated emission measurement is 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 – 960 MHz, 46 dB μ V/m; Above 960 MHz, 54 dB μ V/m (for FCC 47 CFR Part 15, Subpart B:2018) Above 960 MHz, 46 dB μ V/m (for ICES-005:2018)	
Bandwidth of EMI receiver for final measurement	: 120 kHz	
Measurement time for final measurement	: 1 s	
Kind of test site	: Semi-anechoic chamber	
Operation modes	: Power on	
Ambient condition	: Temperature: 17.8 °C; Relative humidity: 54.2 %	
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 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, “ $\times$ ” means quasi-peak test results.

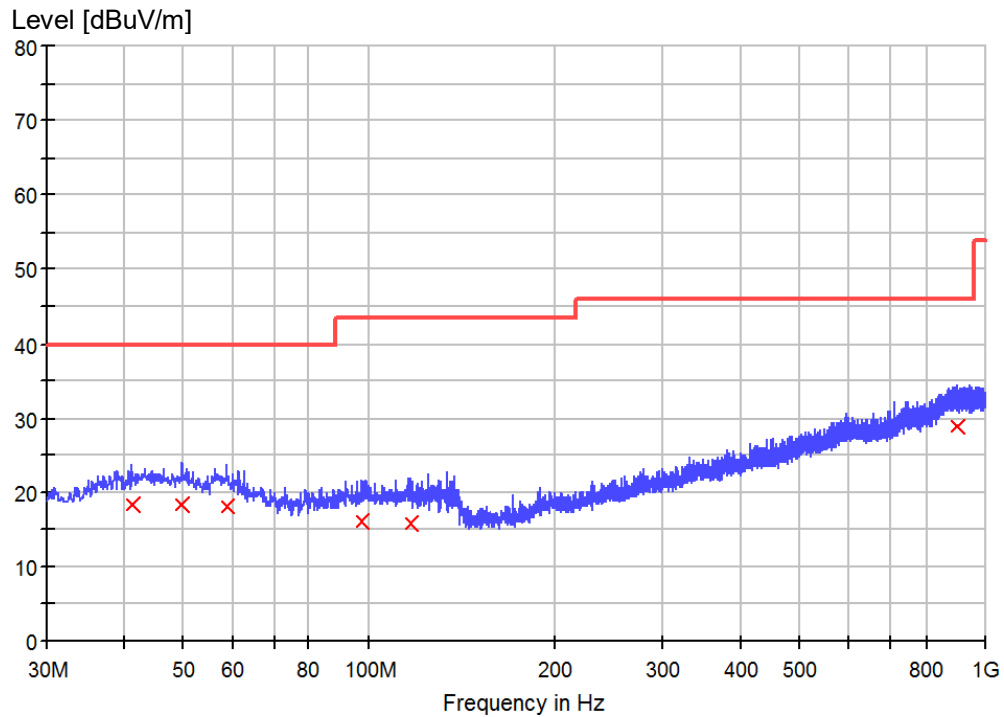
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Notes on following tables of radiated emission results and conversions:

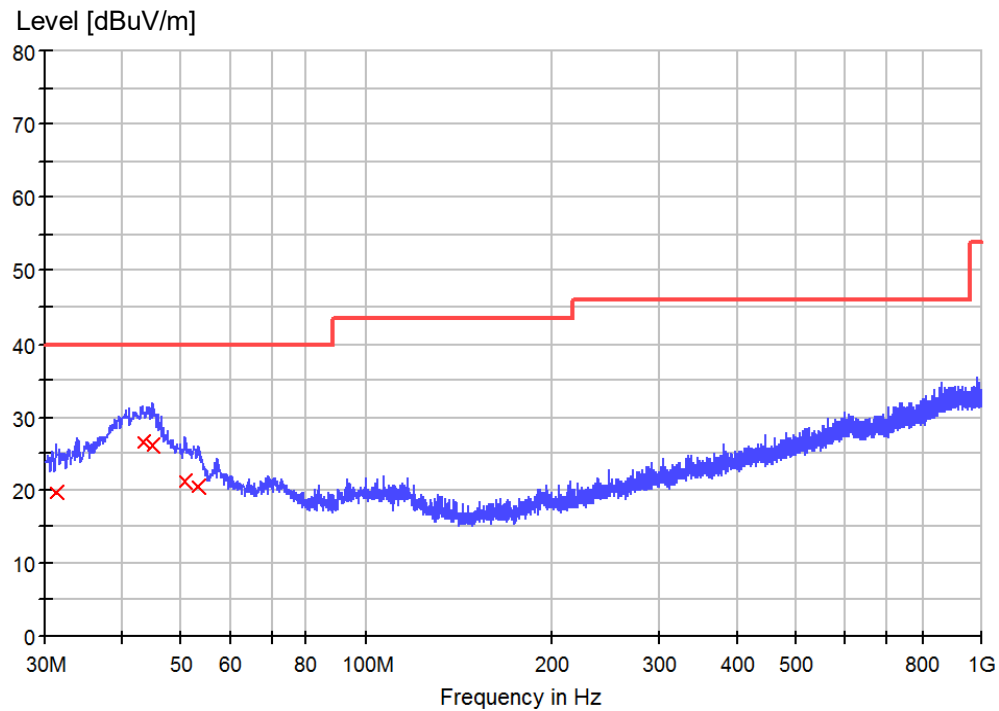
QuasiPeak (dB μ V/m): final measurement results by using quasi-peak detector

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)

Figure 3: Spectrum diagrams and measurement results, radiated emission, 30-1000 MHz, Horizontal polarization

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)
41.155000	18.4	1000.0	120.000	150.0	H	90.0	15.1	21.6	40.0
49.763750	18.4	1000.0	120.000	150.0	H	90.0	14.8	21.6	40.0
58.736250	18.0	1000.0	120.000	150.0	H	90.0	14.4	22.0	40.0
97.172500	16.1	1000.0	120.000	150.0	H	90.0	12.3	27.4	43.5
116.693750	15.9	1000.0	120.000	150.0	H	90.0	11.1	27.6	43.5
896.452500	28.9	1000.0	120.000	150.0	H	90.0	23.9	17.1	46.0

Figure 4: Spectrum diagrams and measurement results, radiated emission, 30-1000 MHz, Vertical polarization

Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
31.212500	19.7	1000.0	120.000	100.0	V	-90.0	12.1	20.3	40.0
43.216250	26.6	1000.0	120.000	100.0	V	-90.0	14.9	13.4	40.0
45.035000	26.1	1000.0	120.000	100.0	V	-90.0	15.2	13.9	40.0
50.733750	21.1	1000.0	120.000	100.0	V	-90.0	14.5	18.9	40.0
53.401250	20.5	1000.0	120.000	100.0	V	-90.0	14.0	19.5	40.0

5 Photographs of the Test Set-Up

Refer to the test setup file.

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6 List of Test and Measurement Instruments

Equip.	Description	Model	Manufacturer	Due Date DD.MM.YYYY	Cal. Interval
1811380	EMI test receiver	ESIB26	Rohde&Schwarz	19.04.2020	1 year
1811403	Artificial mains network	ENV216	Rohde&Schwarz	17.09.2020	1 year
1811378	3m modified semi-anechoic chamber	SAC3	Frankonia	14.05.2022	3 years
1811391	EMI test receiver	ESCI	Rohde&Schwarz	01.11.2020	1 year
1811425	Bilog antenna	CBL 6112D	Teseq	14.02.2020	3 years
1824845	EMC measurement software	EMC32 (Ver 10.20.01)	Rohde&Schwarz	N/A	N/A

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End of test report