Nemko TEST REPORT

Date:	**ESPOO 03.06.2011**	Page:	**1 (14)**
		Appendices	–

Number: No. 1 / 1

172029A

Date of handing in: 06.08.2010

Tested by:

Jonas Dahlgren, Test Engineer

Reviewed by:

Timo Leismala, Test Manager

SORT OF EQUIPMENT:	**Double wireless charging transmitter and receiver**
MARKETING NAME:	***Double Heart white***
TYPE:	***2.1***
MANUFACTURER:	***Powerkiss Oy, Finland***
SERIAL NUMBER:	**-**
CLIENT:	**Powerkiss Oy, Finland**
ADDRESS:	**Betonimiehenkuja 3, FI – 02150 ESPOO, FINLAND**
TELEPHONE:	**+358 44 059 3365**
TEST LABORATORY:	**Nemko Oy**
FCC REG. NO.	**ID 359859 November 26, 2008**
IC FILE NO.	**2040F-1 December 1, 2010**

SUMMARY:

In regard to the performed tests the EUT fulfils the requirements defined in the test specification, see page 2 for details.

Nemko Oy • P.O.Box 19, FI – 02601 Espoo, Finland
Street address: Perkkaantie 11, FI – 02600 Espoo
Telephone +358 424 5454 1 • Telefax +358 9 5489 6371

Summary of performed tests and test results

Section in CFR 47, Part 15C	*Section in RSS-210 Issue 7 and RSS-Gen Issue 2*	*Test*	*Result*
15.209	*RSS-Gen 6*	*Radiated disturbance 9 kHz – 30 MHz*	**PASS**, margin 6.8 dB
15.209	*RSS-Gen 6*	*Radiated disturbance 30 MHz – 1000 MHz*	**PASS**, margin 4.8 dB
15.207	*RSS-Gen 7.2.2*	*Conducted emissions at mains ports*	**PASS**, margin 5.6 dB

Explanations:

PASS The EUT passed that particular test.
FAIL The EUT failed that particular test.

Contents

1. General

The equipment under test (EUT) was a Double wireless charging transmitter. The purpose of the performed tests was to see if in regard to these tests the EUT fulfils the radiated emission requirements defined in CFR 47 Part 15, Subpart C. The test was performed in guidance of the CFR 47 Part 15, Subpart C and ANSI C63.4.

2. System Configuration

2.1 Test set-up

Equipment under test (EUT):

- Double wireless charging transmitter, type: 2.1, S/N: -, Material code: 22T0101
- Two wireless charging receivers:
  - Ring Nokia white, Material code: 11R0101 (number 2)
  - Ring Nokia Black, Material code: 11R0102 -||-
  - Ring uUSB white, Material code: 11R0201 (number 1)
  - Ring uUSB black, Material code: 11R0202 -||-

Auxiliary Equipment:

- Phihong Switching Power Supply, type: PSM36W-120TW2-R, P/N: 1000-500200-000, SP/N: A036R001L

Cables:

From	To	Type	Length [m]
EUT DC Power input	Split cable with ferrites	DC cable, unshielded with two ferrites, type: KG SFC-3	1.0
Split cable with ferrites	Power Supply (12 V)	DC cable, unshielded (Phihong with a permanent ferrite B29 RH10.5x20x5.6)	2.0 and 1.0
Power Supply (12 V)	Mains network	Two conductor power cable, unshielded	2.0

Operating voltage of the EUT:

- 12 ± 0.2 VDC 2.0 A 24 W (two Single Heart transmitters, number 1 and 2, paralleled)
- AC/DC adapter: 115 VAC 60 Hz

2.2 Operating conditions and monitoring of the EUT

The EUT was tested in normal charging operation mode: the receivers (Ring) was placed approx. 2 cm on top of the EUT Power coils (Heart). The right position was indicated in the Rings by a red LED and in the Hearts by a blue LED. The receivers were connected to 10 Ω resistive loads, which were drawing maximum amount of current, simulating the normal operation or charging process.

3. Test procedures

3.1 Emission tests

3.1.1 Radiated disturbance emission test 9 kHz – 30 MHz

The test was performed as a compliance test. The test parameters concerned were as follows:

Parameter	Specification
Test specification	CFR 47 / 15.209
Frequency range	9 kHz – 30 MHz
Site name	Nemko Oy / Perkkaa, Finland
Date of testing	19.05.2011
Test equipment	98, 709, 350, 680
Test uncertainty U95	± 4.6 dB
Test conditions	21 °C, 31 % RH

The test was performed in a semi-anechoic shielded room. For the duration of the test the EUT was placed on a non-conductive support 0.8 m high standing on the turntable. During the test the distance from the EUT to the measuring antenna was 3 meters. The final measurement result has been converted to correspond to the measurement result with the defined measurement distance (300 m or 30 m) by using 40 dB / decade rule. In order to find the maximum levels of the disturbance radiation the angle of the turntable and the lay-out of the EUT cables were varied during the tests.

3.1.2 Radiated disturbance emission test 30 MHz – 1000 MHz

The test was performed as a compliance test. The test parameters concerned were as follows:

Parameter	Specification
Test method	CISPR 22
Frequency range	30 – 1000 MHz
Site name	Nemko Oy / Perkkaa
Date of testing	13.08.2010
Test equipment	319, 338, 350, 544, 680
Test uncertainty U95	±4.6 dB
Test conditions	23 °C, 65 % RH

The test was performed in a semi-anechoic shielded room. For the duration of the test the EUT was placed on non-conductive support 0.8 m above the metallic ground plane. During the test the distance from the EUT to the measuring antenna was 10 meters. In order to find the maximum levels of the disturbance radiation the angle of the turntable, the height of the measuring antenna and the lay-out of the EUT cables were varied during the tests. The test was performed with the measuring antenna being both in horizontal and vertical polarisations.

3.1.3 Conducted disturbance at mains ports emission test

The test was performed as a compliance test. The test parameters concerned were as follows:

Parameter	Specification
Test method	CISPR 22
Frequency range	0.150 – 30 MHz
Site name	Nemko Oy / Perkkaa
Date of testing	30.08.2010
Test equipment	338, 343, 350, 680
Test uncertainty U95	+2.4 dB / -3.0 dB
Test conditions	21 °C, 45 % RH

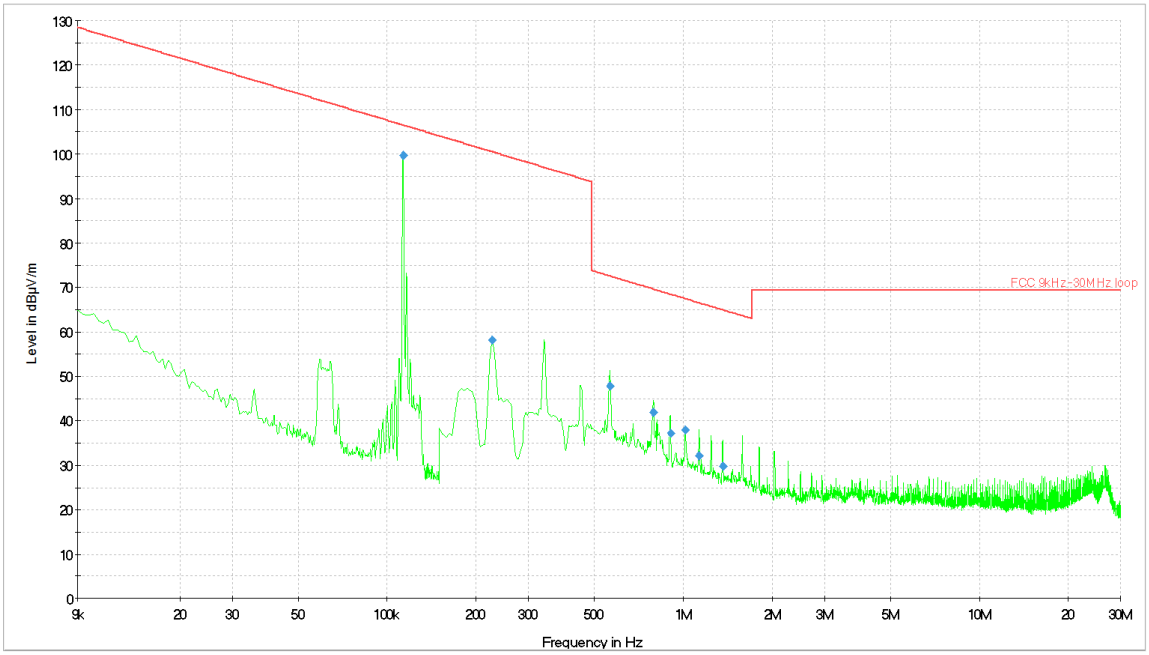
The test was performed inside a semi-anechoic shielded room where the floor comprised the reference ground plane (RGP). For the duration of the test the EUT was placed on a non-conductive table 0.4 m above the metallic ground plane. The AC power input cable of the EUT was connected to an artificial mains network. The test was performed separately on the phase and also on the neutral wire.

The disturbances were first examined by performing a spectrum scan by using a peak detector. The general procedure in the conducted disturbance emission test is that no further measurements are necessary if the disturbance levels measured by using the peak detector are below the limit value defined for the measurement performed by using an average detector. If not, then at the test frequencies concerned the measurement is performed also by using a quasi-peak detector. If the disturbance levels measured by using the quasi-peak detector are below the limit value defined for the measurement performed by using an average detector, then measurements by using the average detector are not necessary.

4. Test results

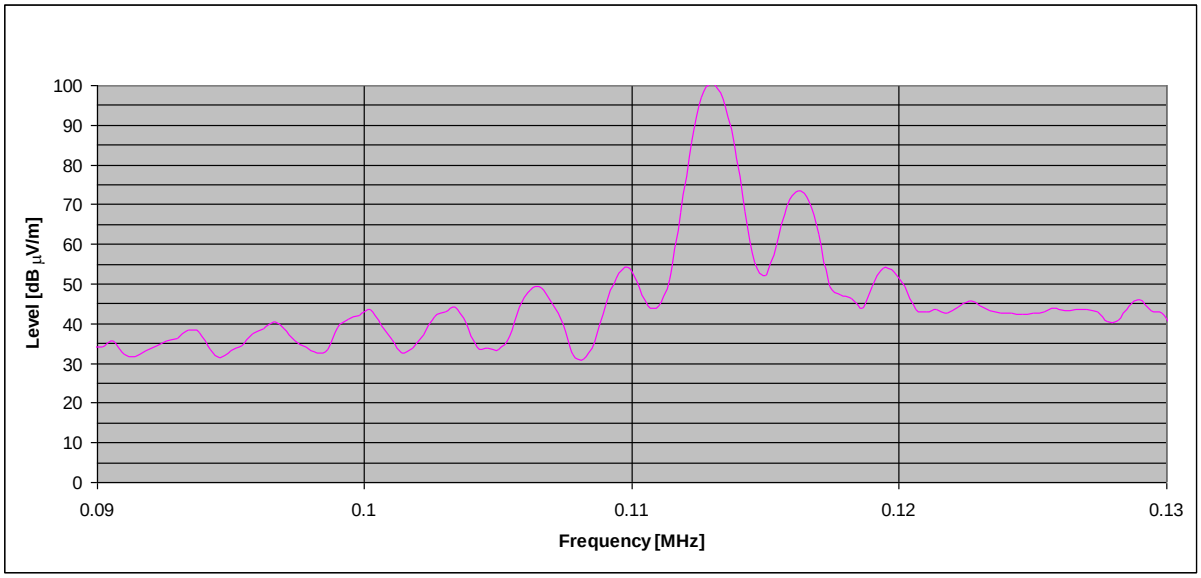
4.1 Emission tests

4.1.1 Radiated Emission test 9 kHz – 30 MHz



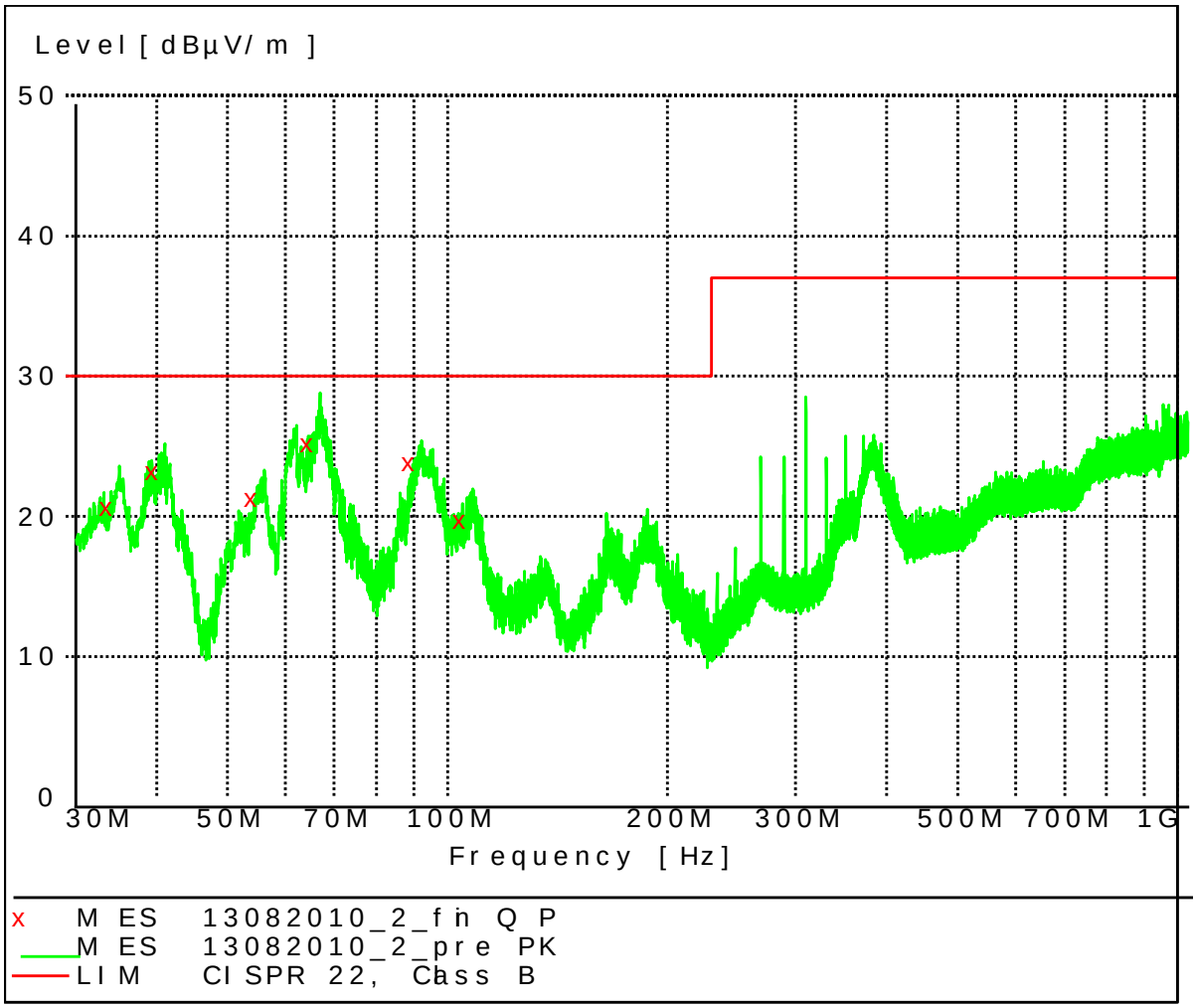
Measurement results Electric field (Quasi-peak):

Frequency MHz	Level dBµV/m	Limit dBµV/m	Margin dB	Distance m	Exceed
0.1130	99.72	106.5	6.8	3	–
0.2260	58.10	100.5	42.4	3	–
0.5660	47.93	72.6	24.6	3	–
0.7900	41.94	69.7	27.7	3	–
0.9060	37.16	68.5	31.3	3	–
1.0180	37.99	67.5	29.5	3	–
1.1300	32.17	66.6	34.4	3	–
1.3580	29.88	65.0	35.1	3	–



90 kHz – 110 kHz restricted band measured with the peak detector at 3 m measuring distance.

4.1.2 Radiated Emission test 30 MHz – 1000 MHz



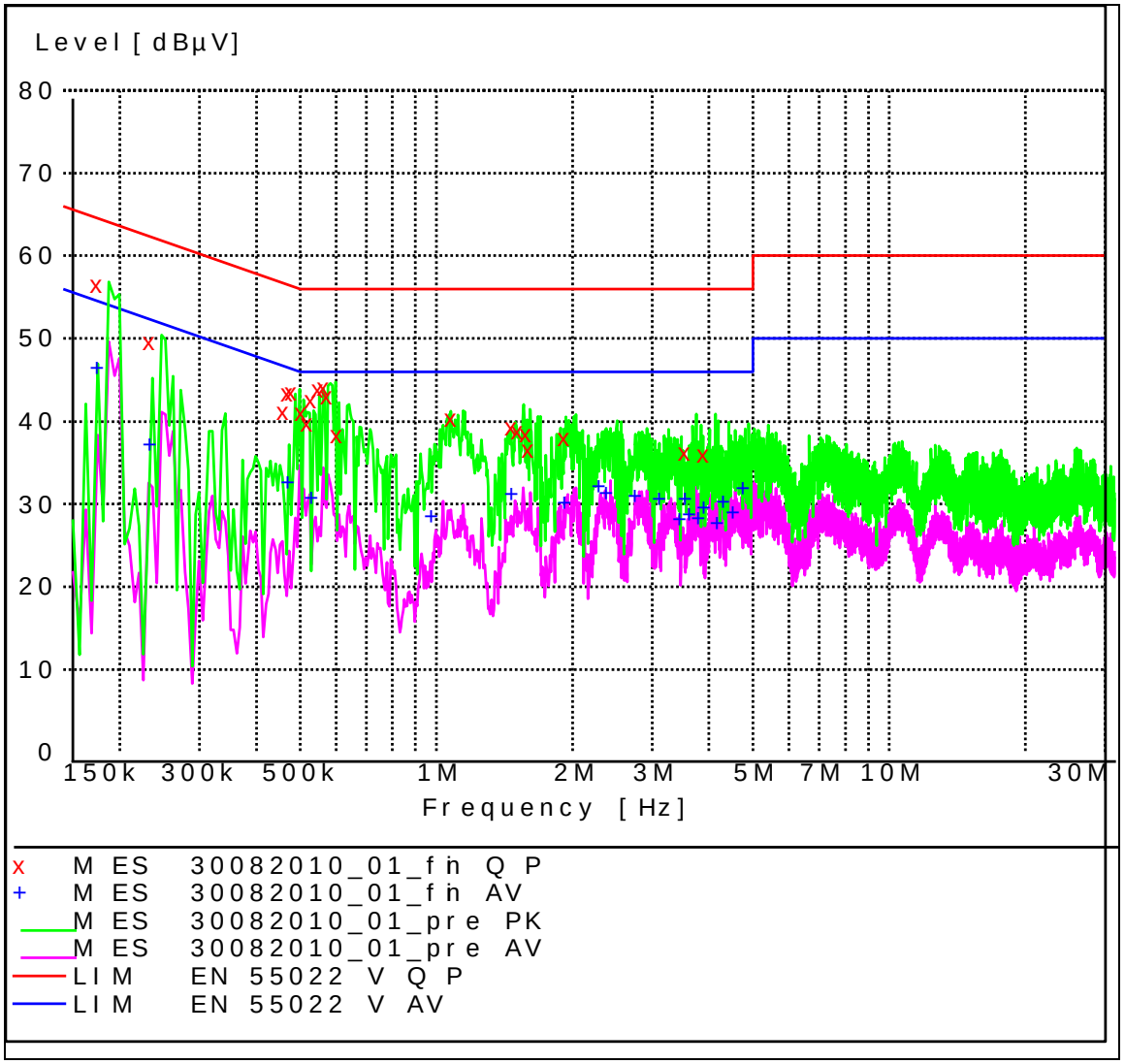
Horizontal and vertical polarizations in the frequency range 30 - 1000 MHz measured by using the peak detector. During the peak detector scan, the turntable was rotated from 0° to 360° with 30° steps with the antenna heights 1.0 m and 3.0 m. The highest levels of the radiated interference field strength measured by using the quasi-peak detector were recorded.

Measurement results (QP):

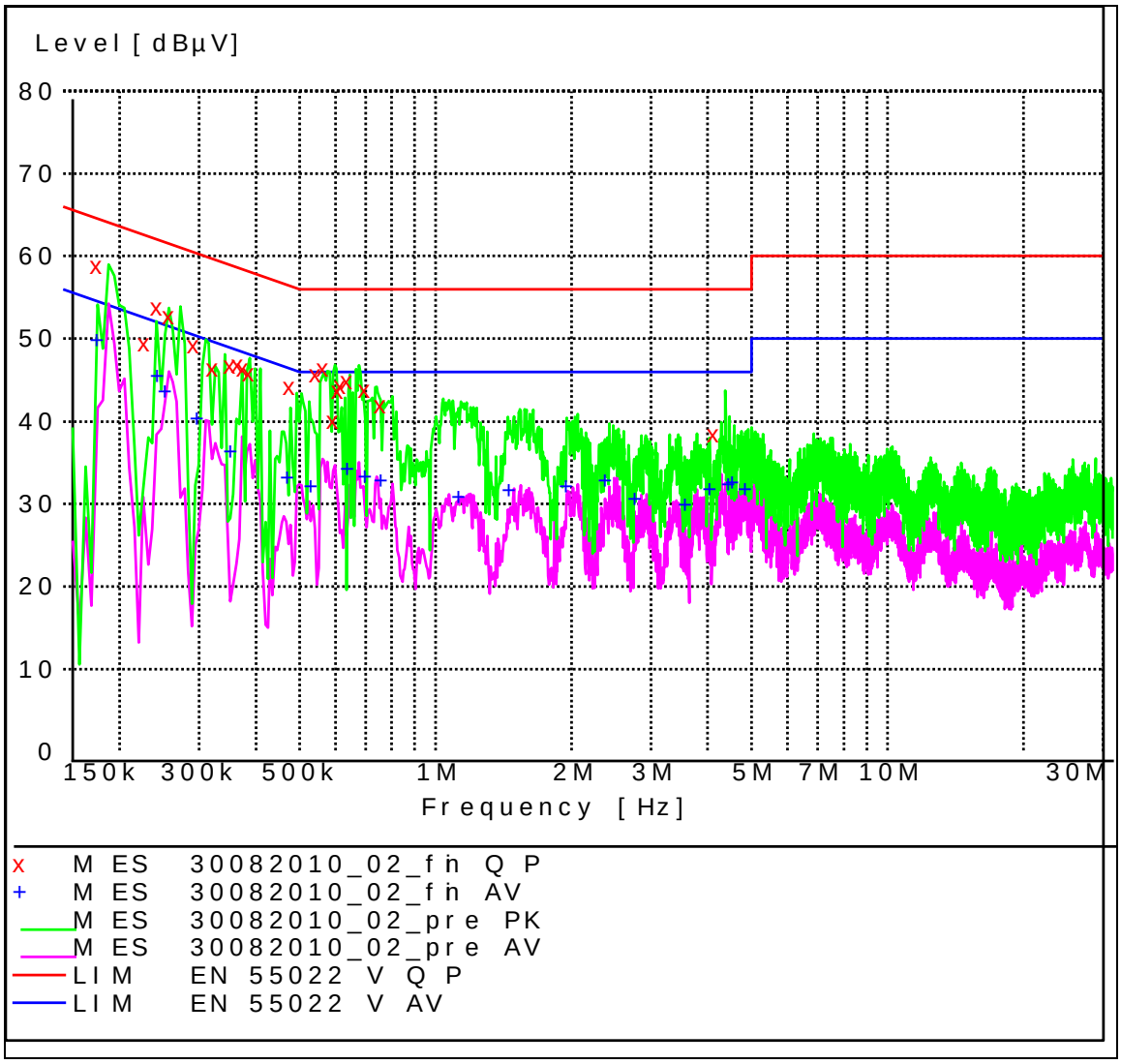
Frequency MHz	Level dBµV/m	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
34.440	20.6	30.0	9.4	249	104	Vertical
39.680	23.2	30.0	6.8	131	27	Vertical
54.400	21.3	30.0	8.7	102	355	Vertical
64.840	25.2	30.0	4.8	224	67	Vertical
89.200	23.8	30.0	6.2	193	161	Vertical
104.92	19.8	30.0	10.2	120	285	Vertical

4.1.3 Conducted disturbance at mains ports emission test

AC/DC power: Phihong, Neutral line:



AC/DC power: Phihong, Phase line:



MEASUREMENT RESULTS (QP):

Frequency MHz	Phase	Limit value dBµV	Result QP (dBµV)	Conclusion Pass/Fail
0.180	N	64.5	56.5	Pass
0.235	N	62.3	49.6	Pass
0.465	N	56.6	41.2	Pass
0.475	N	56.4	43.4	Pass
0.485	N	56.3	43.5	Pass
0.510	N	56	41.1	Pass
0.525	N	56	39.8	Pass
0.535	N	56	42.6	Pass
0.555	N	56	43.9	Pass
0.570	N	56	44.1	Pass
0.580	N	56	43.0	Pass
0.610	N	56	38.3	Pass
1.090	N	56	40.4	Pass
1.485	N	56	39.3	Pass
1.530	N	56	38.9	Pass
1.600	N	56	38.5	Pass
1.615	N	56	36.6	Pass
1.940	N	56	38.0	Pass
3.575	N	56	36.3	Pass
3.945	N	56	36.0	Pass
0.180	L	64.5	58.9	Pass
0.230	L	62.4	49.4	Pass
0.245	L	61.9	53.8	Pass
0.260	L	61.4	52.7	Pass
0.295	L	60.4	49.2	Pass
0.325	L	59.6	46.5	Pass
0.355	L	58.8	46.8	Pass
0.370	L	58.5	46.9	Pass
0.380	L	58.3	46.5	Pass
0.390	L	58.1	45.8	Pass
0.480	L	56.3	44.1	Pass
0.550	L	56	45.7	Pass
0.570	L	56	46.4	Pass
0.600	L	56	40.1	Pass
0.615	L	56	43.7	Pass
0.625	L	56	44.3	Pass
0.645	L	56	44.9	Pass
0.705	L	56	43.8	Pass
0.765	L	56	42.0	Pass
4.175	L	56	38.5	Pass

MEASUREMENT RESULTS (AV):

Frequency MHz	Phase	Limit value dBµV	Result AV (dBµV)	Conclusion Pass/Fail
0.180	N	54.5	46.4	Pass
0.235	N	52.3	37.2	Pass
0.475	N	46.4	32.6	Pass
0.535	N	46	30.7	Pass
0.985	N	46	28.5	Pass
1.480	N	46	31.2	Pass
1.940	N	46	30.2	Pass
2.310	N	46	32.1	Pass
2.400	N	46	31.4	Pass
2.780	N	46	31.0	Pass
3.140	N	46	30.6	Pass
3.485	N	46	28.1	Pass
3.575	N	46	30.6	Pass
3.655	N	46	28.8	Pass
3.825	N	46	28.3	Pass
3.945	N	46	29.6	Pass
4.215	N	46	27.7	Pass
4.355	N	46	30.3	Pass
4.570	N	46	29.0	Pass
4.810	N	46	31.9	Pass
0.180	L	54.5	49.8	Pass
0.245	L	51.9	45.5	Pass
0.255	L	51.6	43.6	Pass
0.300	L	50.2	40.3	Pass
0.355	L	48.8	36.4	Pass
0.475	L	46.4	33.2	Pass
0.535	L	46	32.1	Pass
0.645	L	46	34.2	Pass
0.705	L	46	33.3	Pass
0.765	L	46	32.8	Pass
1.140	L	46	30.8	Pass
1.470	L	46	31.7	Pass
1.965	L	46	32.1	Pass
2.400	L	46	32.8	Pass
2.795	L	46	30.6	Pass
3.605	L	46	29.9	Pass
4.085	L	46	31.8	Pass
4.495	L	46	32.3	Pass
4.585	L	46	32.6	Pass
4.895	L	46	31.8	Pass

5. List of test equipment

No.	Equipment	Type	Manufacturer	Serial Number
709	Test receiver	ESU8	Rohde & Schwarz	100297
338	Test receiver	ESS	Rohde & Schwarz	847151/009
98	Antenna, loop	HFH2	Rohde & Schwarz	871336/45
319	Antenna	CBL6112	Chase	2018
680	Temp. & humidity measurement network	1Wire	Nemko Oy	-
544	RF amplifier	ZFL-1000VH2	Mini-Circuits	D01080
343	LISN	NSLK 8128	Schwartzbeck	-
350	Semi-anechoic shielded room	RFD-F-100	Euroshield Oy	1327