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No. 1 / 1**172029B**

Date of handing in: 06.08.2010

Tested by:



Jonas Dahlgren, Test Engineer

Reviewed by:



Timo Leismala, Test Manager

SORT OF EQUIPMENT:

Wireless charging transmitter and receiver

MARKETING NAME:

Single Heart white

TYPE:

2.1

MANUFACTURER:

Powerkiss Oy, Finland

SERIAL NUMBER:

-

CLIENT:

Powerkiss Oy, Finland

ADDRESS:

Betonimiehenkuja 3, FI – 02150 ESPOO, FINLAND

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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.

The test results are valid for the tested unit only. Without a written permission of Nemko Oy it is allowed to copy this report as a whole, but not partially.

Summary of performed tests and test results

<i>Section in CFR 47, Part 15C</i>	<i>Section in RSS-210 Issue 7 and RSS- Gen Issue 2</i>	<i>Test</i>	<i>Result</i>
15.209	RSS-Gen 6	<i>Radiated disturbance 9 kHz – 30 MHz</i>	PASS , margin 11.8 dB
15.209	RSS-Gen 6	<i>Radiated disturbance 30 MHz – 1000 MHz</i>	PASS , margin 2.8 dB
15.207	RSS-Gen 7.2.2	<i>Conducted emissions at mains ports</i>	PASS , margin 7.8 dB

Explanations:

PASS The EUT passed that particular test.

FAIL The EUT failed that particular test.

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1. General

The equipment under test (EUT) was a 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):

- Wireless charging transmitter Single Heart white, type: 2.1, S/N: -, Material code: 22T0101
- Wireless charging receiver:
 - Ring Nokia white, Material code: 11R0101
 - Ring Nokia Black, Material code: 11R0102
 - Ring uUSB white, Material code: 11R0201
 - Ring uUSB black, Material code: 11R0202

Auxiliary Equipment:

- FP Switching Power Supply, type: SAW-18-12.0-1500

Cables:

From	To	Type	Length [m]
EUT DC Power input	Power Supply (12 V)	Power cable, unshielded	1.8
Power Supply (12 V)	Mains network	Power cable, unshielded	2.0

Operating voltage of the EUT:

- 12 ± 0.2 VDC 1.0 A 12 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 receiver (Ring) was placed approx. 2 cm on top of the EUT Power coil (Heart). The right position was indicated in the Ring by a red LED and in the Heart by a blue LED. The receiver was connected to a 10 ohm resistive load, which was drawing maximum amount of current simulating the normal operation or charging process. The operation of the EUT was monitored visually by watching the LEDs with an eye.

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 / Perkkää, 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 / Perkkää
Date of testing	07.07.2010
Test equipment	319, 338, 350, 544, 680
Test uncertainty U95	±4.6 dB
Test conditions	24 °C, 55 % 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 / Perkkää
Date of testing	14.09.2010
Test equipment	338, 343, 348, 680
Test uncertainty U95	+2.4 dB / -3.0 dB
Test conditions	21 °C, 45 % RH

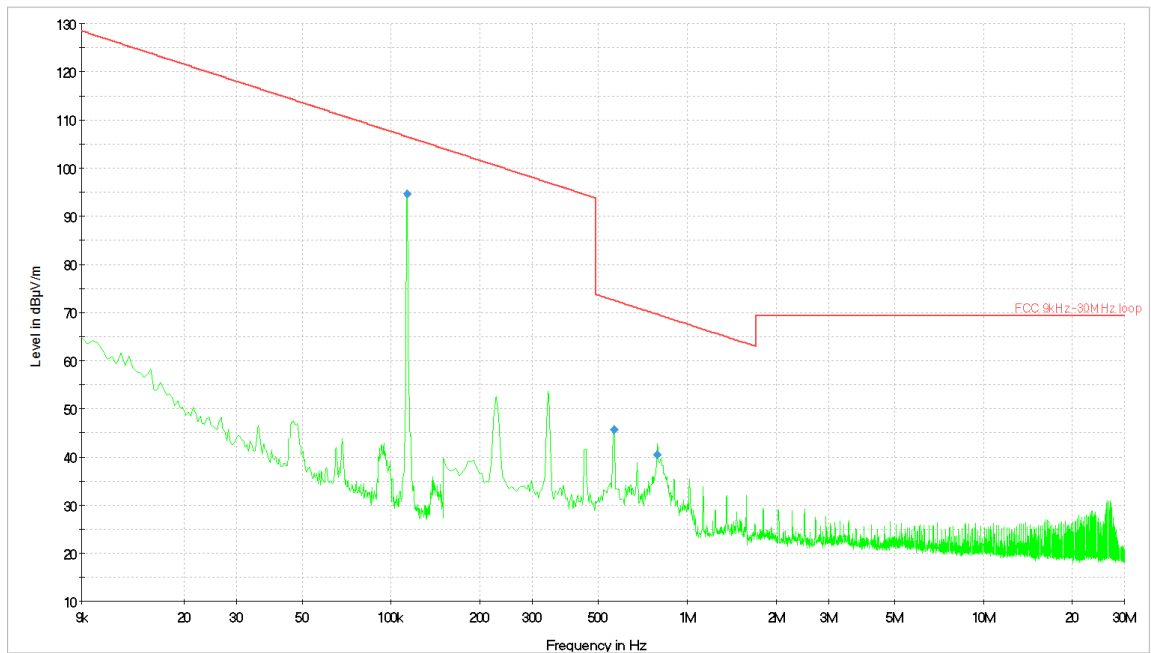
The test was performed inside a shielded room where one of the walls and the floor comprised the reference ground plane (RGP). For the duration of the test the EUT was placed on a non-conductive table 0.8 m above the metallic ground plane. The AC power input cable of the EUT was connected to an artificial 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

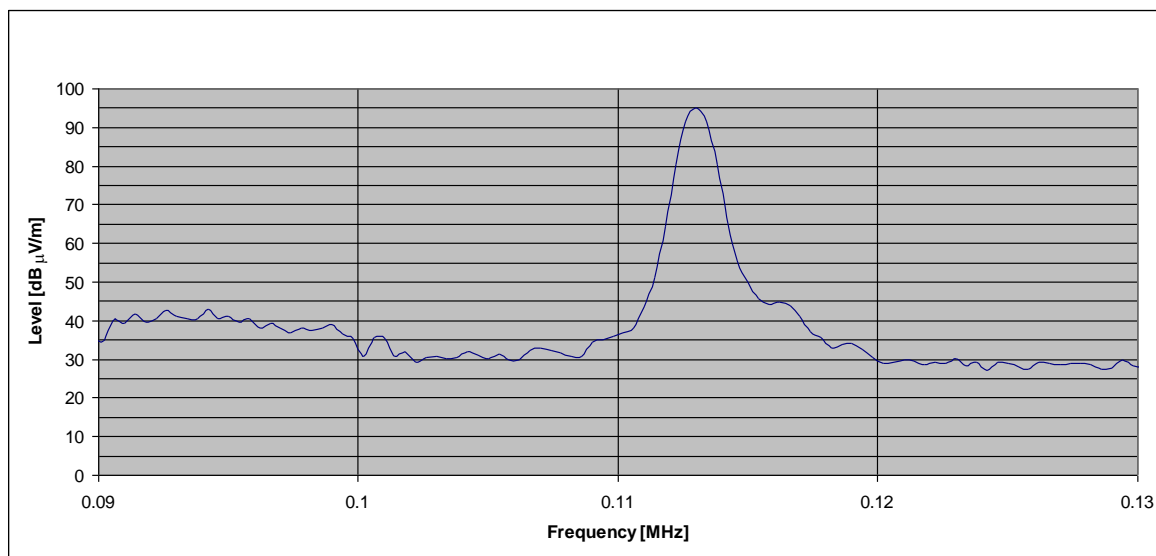
4.1 Emission tests

4.1.1 Radiated Emission test 9 kHz – 30 MHz



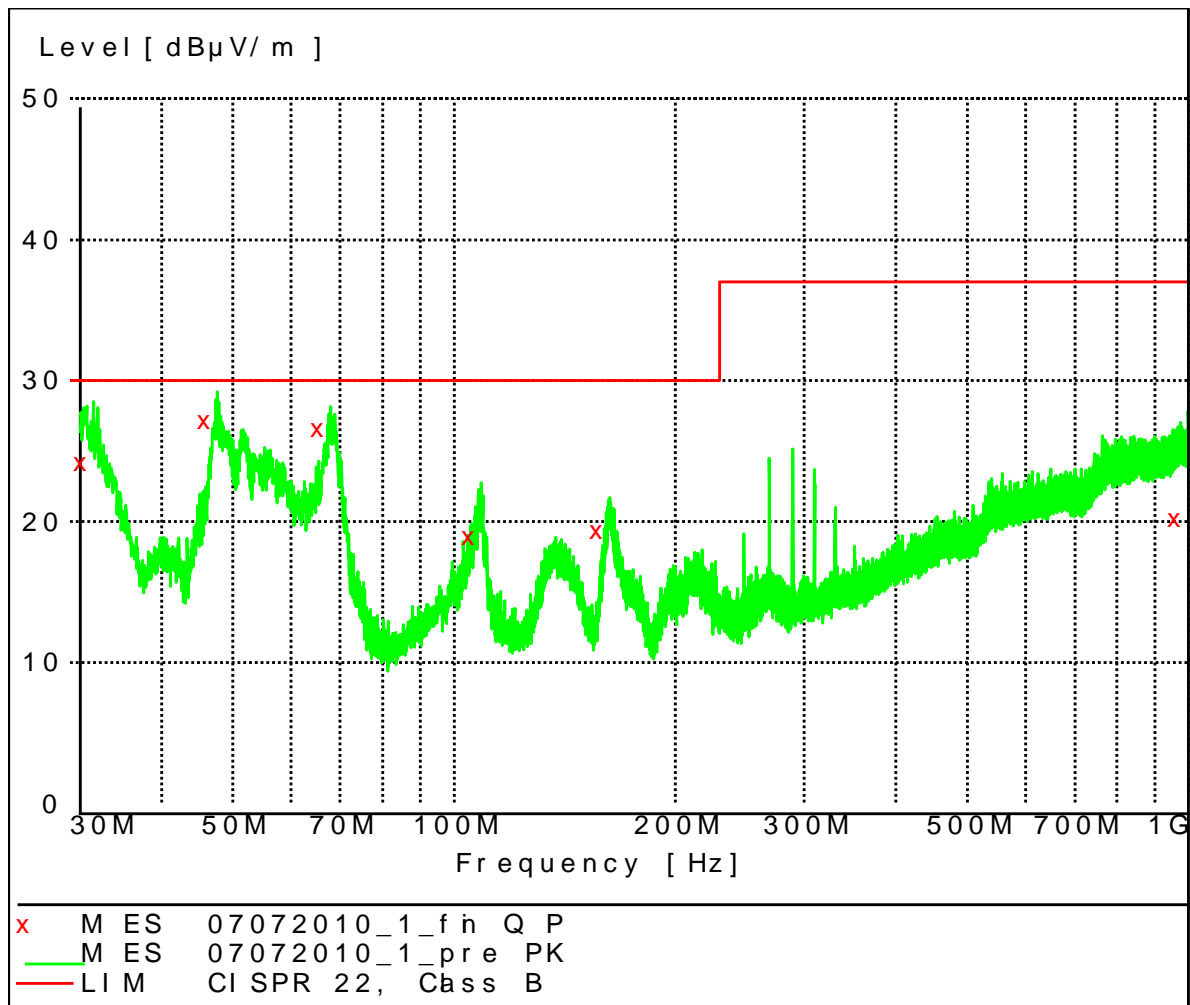
Measurement results Electric field (Quasi-peak):

Frequency MHz	Level dBμV/m	Limit dBμV/m	Margin dB	Distance m	Exceed
0.1130	94.68	106.5	11.8	3	—
0.5660	45.62	72.6	26.9	3	—
0.7900	40.43	69.7	29.2	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



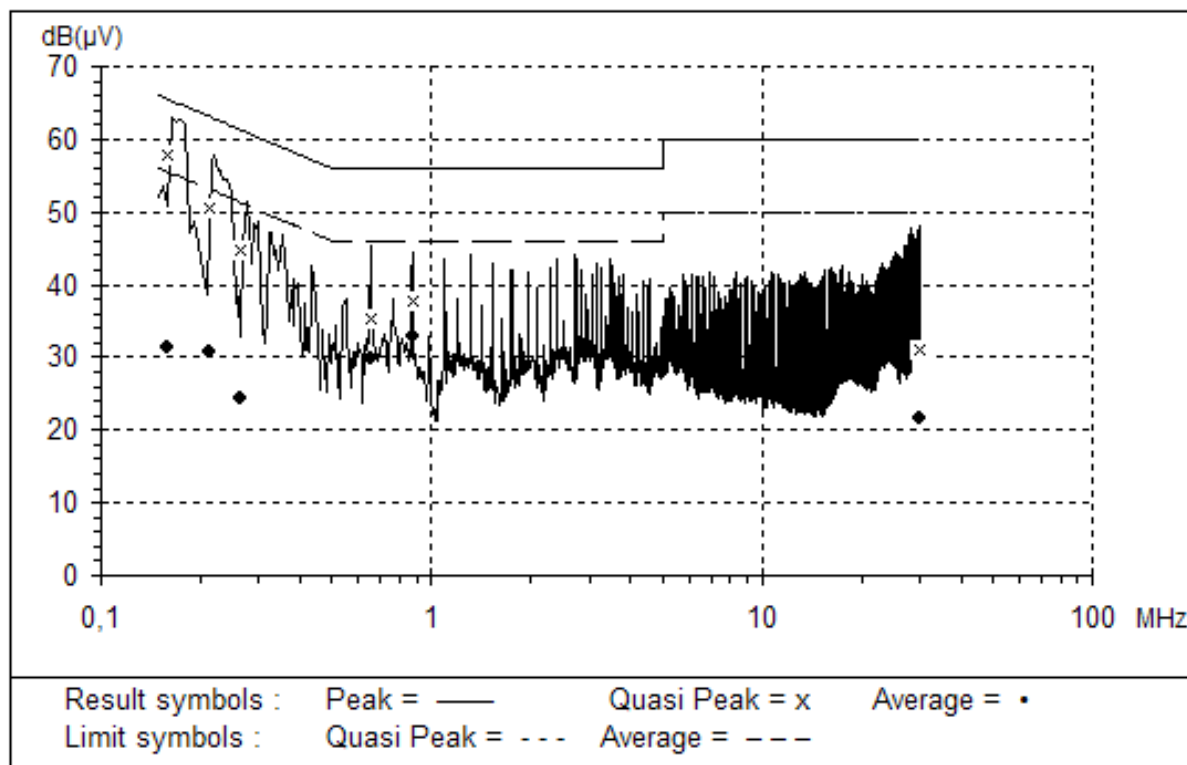
Horizontal and vertical polarizations in the frequency range 30 - 1000 MHz measured by using the peak detector. During the peak detector scan, the turntable was rotated from 0° to 360° with 30° steps with the antenna heights 1.0 m and 3.0 m. The highest levels of the radiated interference field strength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

Measurement results (QP):

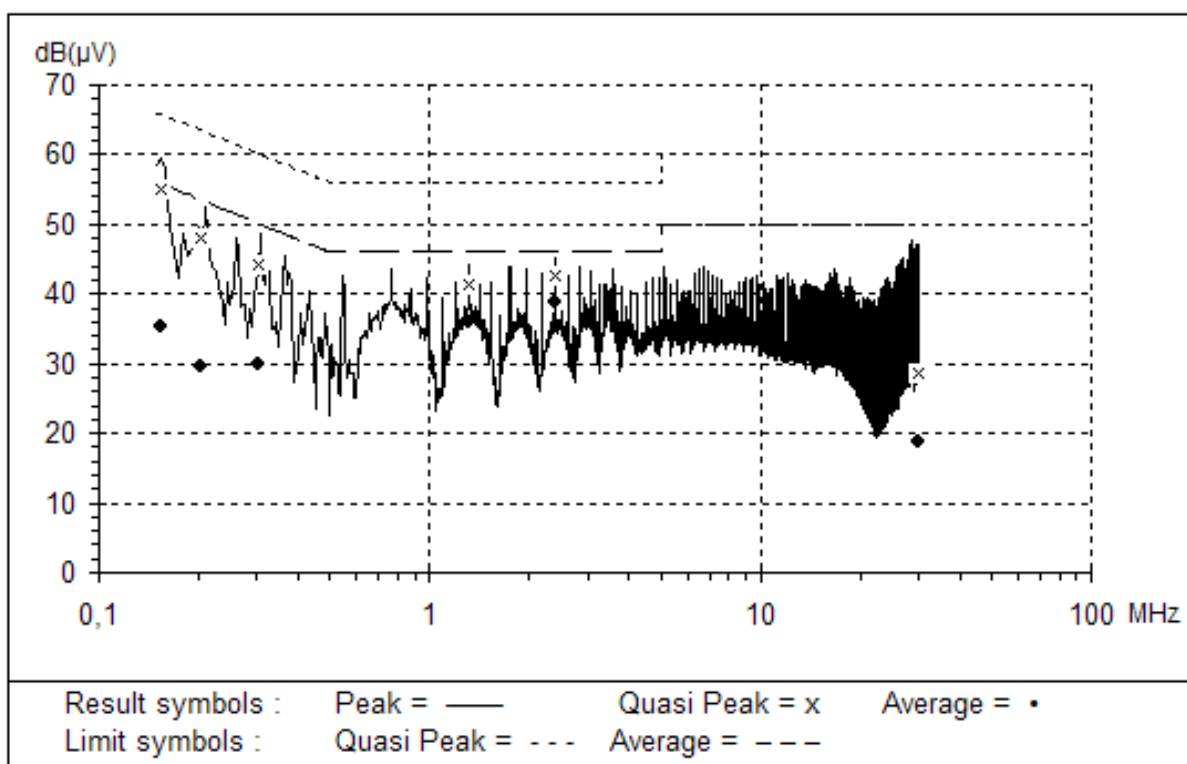
Frequency MHz	Level dBμV/m	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
31.240	24.20	30	5.8	100	355	VERTICAL
46.120	27.20	30	2.8	102	11	VERTICAL
65.800	26.60	30	3.4	295	299	VERTICAL
105.56	19.00	30	11.0	132	81	VERTICAL
157.84	19.40	30	10.6	112	79	VERTICAL
967.36	20.30	37	16.7	339	325	VERTICAL

4.1.3 Conducted disturbance at mains ports emission test

AC/DC power: FP Switching Power Supply, Neutral line:



AC/DC power: FP Switching Power Supply, Phase line:



MEASUREMENT RESULTS (QP):

Frequency MHz	Phase	Limit value dB μ V	Result QP (dB μ V)	Conclusion Pass/Fail
0.159	N	65.5	57.7	Pass
0.212	N	63.1	50.5	Pass
0.266	N	61.2	44.9	Pass
0.656	N	56.0	35.4	Pass
0.874	N	56.0	37.8	Pass
29.977	N	60.0	31.2	Pass
0.154	L	65.8	54.9	Pass
0.202	L	63.5	48.2	Pass
0.304	L	60.1	44.1	Pass
1.311	L	56.0	41.3	Pass
2.404	L	56.0	42.5	Pass
29.993	L	60.0	28.5	Pass

MEASUREMENT RESULTS (AV):

Frequency MHz	Phase	Limit value dB μ V	Result AV (dB μ V)	Conclusion Pass/Fail
0.159	N	55.5	31.3	Pass
0.212	N	53.1	30.8	Pass
0.266	N	51.2	24.3	Pass
0.656	N	46.0	29.9	Pass
0.874	N	46.0	32.8	Pass
29.977	N	50.0	21.6	Pass
0.154	L	55.8	35.3	Pass
0.202	L	53.5	29.7	Pass
0.304	L	50.1	29.8	Pass
1.311	L	46.0	35.9	Pass
2.404	L	46.0	38.7	Pass
29.993	L	50.0	18.9	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	-
348	Shielded room	RFSD-100	Euroshield Oy	1320
350	Semi-anechoic shielded room	RFD-F-100	Euroshield Oy	1327