

Date: ESPOO 11.03.2013Page: 1 (24)Appendices -Number:
No. 1 / 1**225530**

Date of handing in: 20.12.2012

Tested by:



Timo Hietala, Test Engineer

Reviewed by:



Timo Leismala, Test Manager

SORT OF EQUIPMENT:

Time and attendance terminal

MARKETING NAME:

TT1100-PRX

TYPE:

TT1100-PRX

MANUFACTURER:

Kaba GmbH

CLIENT:

Kaba GmbH , Germany

ADDRESS:

Mollenbachstr. 19, 71229 Leonberg, Germany

TELEPHONE:

+49 (0) 7152 939 790/ Michailoglou, Tasso

TEST LABORATORY:

Nemko Oy

FCC REG. NO.

359859 October 20, 2011

IC FILE NO.

2040F-1 November 22, 2012**SUMMARY:**

In regard to the performed tests the equipment under test fulfils the requirements defined in the test specifications, 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</i>		<i>Result</i>
15.209	Peak output power	PASS
15.209	Spurious radiated emissions	PASS
15.207	AC power line conducted emissions	PASS

<i>Section in RSS Gen</i>		<i>Result</i>
7.2.5	Peak output power	PASS
7.2.5	Spurious radiated emissions	PASS
7.2.4	AC power line conducted emissions	PASS
4.6.1	99% Bandwidth	PASS

Explanations:

- PASS The EUT passed that particular test.
FAIL The EUT failed that particular test.
X The measurement was done, but there is no applicable performance criteria.

Contents

Summary of performed tests and test results	2
1. EUT and Accessory Information	4
1.1 EUT description	4
1.2 EUT and accessories.....	4
2. Test setups.....	6
3. Standards and measurement methods.....	7
4. Test results.....	7
4.1 Fundamental output power	7
4.1.1 EUT operation mode.....	7
4.1.2 Test method and limit	7
4.1.3 Test results	8
4.2 Spurious radiated emission	9
4.2.1 EUT operation mode.....	9
4.2.2 Test method and limit	9
4.2.3 Test results	10
4.2.4 Conducted disturbance at mains ports emission test.....	12
4.2.5 Test results	13
4.3 Spurious radiated emission	15
4.3.1 EUT operation mode.....	15
4.3.2 Test method and limit	15
4.3.3 Test results	16
4.3.4 Conducted disturbance at mains ports emission test.....	18
4.3.5 Test results	19
4.1 99% Bandwidth	21
4.1.1 EUT operation mode.....	21
4.1.2 Test data	21
5. List of test equipment.....	22
6. Photographs.....	23

1. EUT and Accessory Information

1.1 EUT description

The EUT is a Time and attendance terminal with RF ID reader 125kHz.

Alignment range: **125.1 kHz**

Channels: **1**

Operating Voltage: **12 VDC**

Antenna: integral

1.2 EUT and accessories

Equipment under test (EUT), configuration 1:

- Time and attendance terminal , type TT1100-PRX , S/N: -, with RFID-Module: "HID-Prox" (125kHz)

Peripherals:

AC/DC adapter: SYS1308-2412-W2, S/N: G101007063425

RFID tag: 125.1kHz HID-prox

Cables:

From	To	Type	Length [m]
AC/DC adapter	EUT	DC cable, unshielded	1.9
USB memory	EUT	USB extension cable, shielded	2.0
RS-485, terminated	EUT	Signal cable, shielded	2.0
CDN, shield grounded	EUT	Ethernet cable RJ45, shielded	3.0

Operating voltage of the EUT during the tests:

- Power supply: 115 V AC, 60 Hz (rated: 100-240V~1.0A MAX, 50 - 60Hz)
- EUT: 12V DC

Equipment under test (EUT), configuration 2:

- Time and attendance terminal , type TT1100-PRX , S/N: -, with RFID-Module: "HID-Prox" (125kHz)

Peripherals:

RFID tag: 125.1kHz HID-prox

Bar code reader: Symbol technologies P/N:LS2208-SR20007R, S/N: YA6YWH

Ethernet hub with power over ethernet: Allnet ALL8084, S/N: 0835A2A34754

Switching power supply: DSA-0421S-50 1

Cables:

From	To	Type	Length [m]
AC mains	Power supply:	Mains cable, unshielded	1.8
Power supply	EUT	DC cable, unshielded	1.8
Bar code reader	EUT	USB cable, shielded	2.0
RS-485, terminated	EUT	Signal cable, shielded	2.0
Ethernet hub	EUT	Ethernet cable RJ45, shielded	3.0

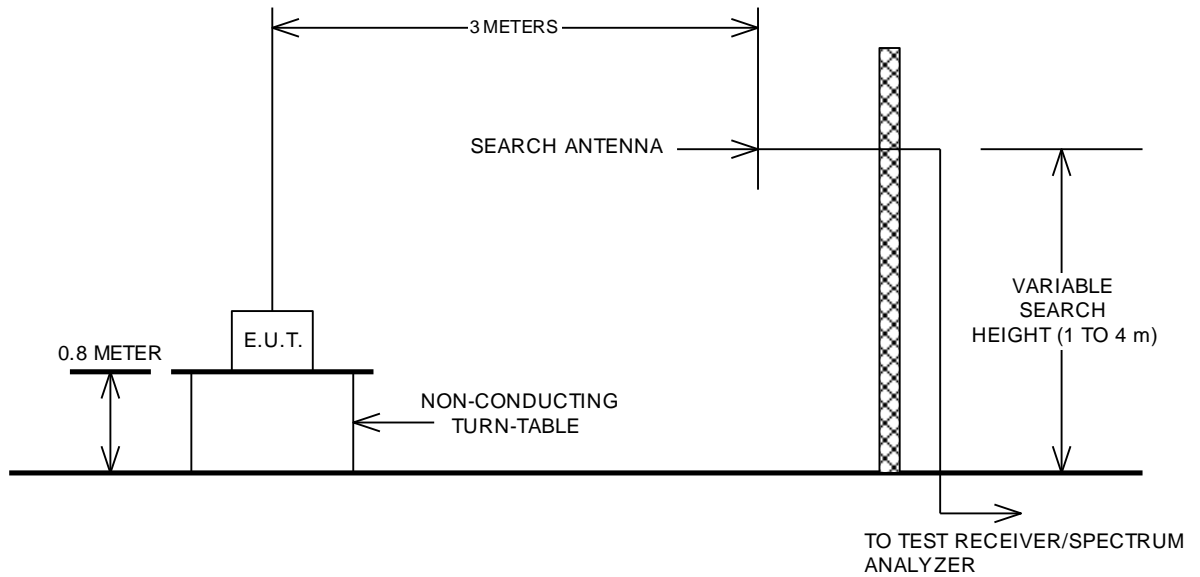
Operating voltage of the EUT during the tests:

- Power supply: 115 V AC, 60 Hz (rated: 100-240V~1.2A 80VA, 50/60Hz)
- EUT: 48V DC power over ethernet

2. Test setups

Setup 1 (Radiated measurements)

The test was performed inside 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. The tower and turn table were remotely controlled to turn the EUT and change the antenna polarization and height. The measured signal was routed from the measuring antenna to the spectrum analyzer.



3. Standards and measurement methods

The test were performed in guidance of the CFR 47 Part 15, SUBPART B, Paragraph 15.209 (2010), ANSI C63.4 (2003), CISPR 22, RSS-210 Issue 8 and RSS-Gen Issue 3.

4. Test results

4.1 Fundamental output power

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

<i>Site name</i>	Nemko Oy / Perkaa
<i>FCC rule part</i>	§ 15.209
<i>IC</i>	RSS Gen 7.25
<i>Date of testing</i>	23.1.2013
<i>Test equipment</i>	709, 98, 350
<i>Test conditions</i>	22 °C, 30 % RH
<i>Test result</i>	PASS

4.1.1 EUT operation mode

<i>EUT operation mode</i>	TX on, configuration 1
<i>EUT channel</i>	125.1 kHz
<i>EUT TX power level</i>	Nominal

4.1.2 Test method and limit

The test was performed in a semi-anechoic shielded room. The EUT was placed on a non-conductive 0.8 m high table standing on the turntable (see photograph 1). During the test distance from the EUT to the measuring antenna was 3.0 m. Measurements were made using a magnetic loop antenna and a receiver with a peak detector and a 3kHz bandwidth.

The CFR 47 Part 15.209 limit of $(2400/F[\text{kHz}])$ has been calculated to correspond 25.67 dB($\mu\text{V}/\text{m}$) as follows:

The 300 meter limit $(2400/F)@125\text{kHz}$ of 19.2 uV/m has been converted to 25.67 dBuV/m $[\text{dB}(\mu\text{V}/\text{m})]=20*\log[\mu\text{V}/\text{m}]$ and this limit has been extrapolated by 80 dB's as 300 meter to 3 meter is 2 decades.

As allowed by section 15.31(f)(2) measurements were made at 3 meter with the 300 meter limit being extrapolated by a factor of 40 dB per decade.

Limit (3m measuring distance)

<i>Frequency band kHz</i>	<i>Peak dB($\mu\text{V}/\text{m}$)</i>
125.1	105.7

4.1.3 Test results

The measurement results were obtained as described below.

$$E \text{ [dB}(\mu\text{V/m)}] = U_{RX} + A_{CABLE} + AF$$

Where

U_{RX} receiver reading

A_{CABLE} attenuation of the cable

AF antenna factor

TX on

Frequency kHz	Result PK dB(μ V/m)	Limit dB(μ V/m)	Margin dB
125.1	62.92	105.67	42.75

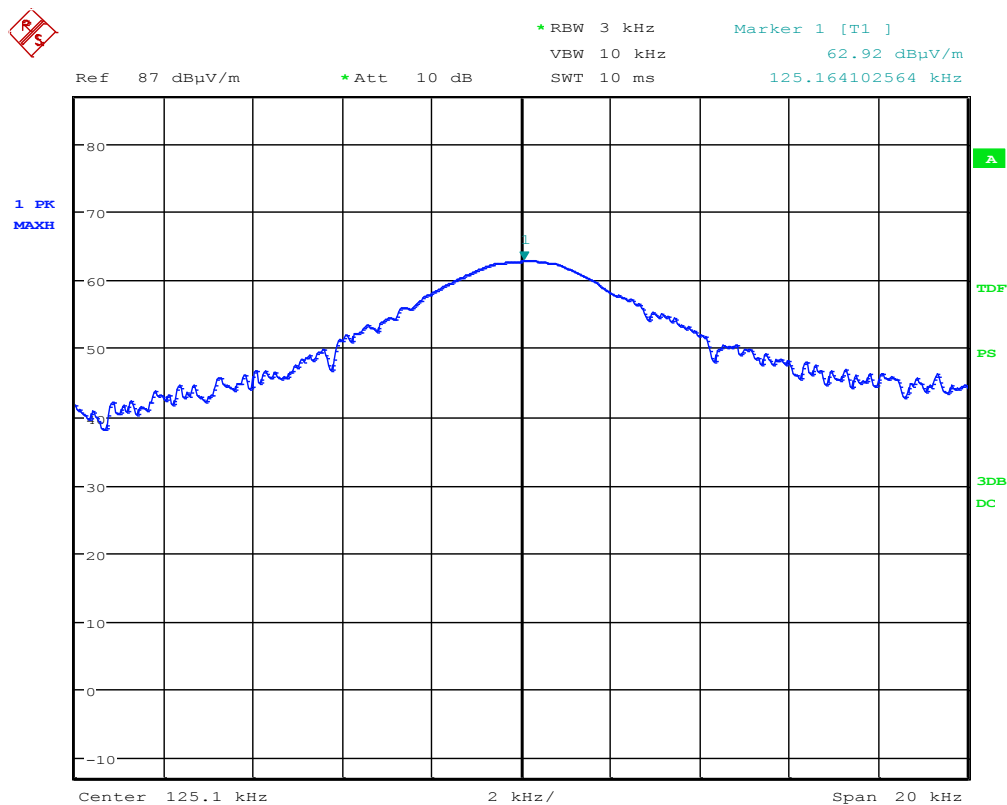


Figure 1. Fundamental output power, peak detector, channel 125.1kHz

4.2 Spurious radiated emission

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

<i>Site name</i>	Nemko Oy / Perkaa
<i>FCC rule part</i>	§ 15.209
<i>IC</i>	RSS Gen 7.25
<i>Date of testing</i>	23.1.2013-09.3.2013
<i>Test equipment</i>	98, 319, 544, 709, 350
<i>Test conditions</i>	22-25 °C, 30-35 % RH
<i>Test result</i>	PASS

4.2.1 EUT operation mode

<i>EUT operation mode</i>	TX on, configuration 1
<i>EUT TX power level</i>	Nominal

4.2.2 Test method and limit

The test was performed in a semi-anechoic shielded room. The EUT was placed on a non-conductive 0.8 m high table standing on the turntable (see photograph 1). During the test in the frequency range 9kHz-30 MHz the distance from the EUT to the measuring antenna was 3 m and measurements were made using a magnetic loop antenna and a receiver with a 200 Hz bandwidth (9-150kHz) and a 9 kHz bandwidth (0.15-30MHz). During the test in the frequency range 30-1000 MHz the distance from the EUT to the measuring antenna was 10 m. 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 separately with the measuring antenna being both in horizontal and vertical polarizations.

As allowed by section 15.31(f)(2) measurements were made at 3 meter with the 300 meter limit 9-490kHz being extrapolated by a factor of 80 dB (40dB per decade) and 0.490-30MHz with the 30 meter limit being extrapolated by a factor of 40 dB. At 30-1000 MHz the 3m limit was converted to 10m measuring distance using 20dB decade rule.

The CFR 47 Part 15.209 limit of 500 $\mu\text{V/m}$ has been calculated to correspond 54 dB($\mu\text{V/m}$) as follows: $[\text{dB}(\mu\text{V/m})]=20\log[\mu\text{V/m}]$.

FCC Part 15.209 Limit values

<i>Frequency band MHz</i>	<i>Quasi-peak $\mu\text{V/m}$</i>	<i>Quasi-peak dB($\mu\text{V/m}$) @3m</i>	<i>Quasi-peak dB($\mu\text{V/m}$) @10m</i>
0.009–0.490	2400/F (kHz)@300m	128.5-93.8@3m	-
0.490–1.705	24000/F (kHz)@30m	73.8-63.0@3m	-
1.705–30	30@30m	69.5@3m	-
30 - 88	100@3m	40.0@3m	29.5@10m
88 - 216	150@3m	43.5@3m	33.0@10m
216-960	200@3m	46.0@3m	35.5@10m
960-1000	500@3m	54.0@3m	43.5@10m

For the frequency bands 9–90kHz and 110–490 kHz the radiated emission limits are based on measurements employing an average detector.

4.2.3 Test results

The measurement results were obtained as described below.

$$E \text{ [dB}(\mu\text{V/m)}] = U_{RX} + A_{CABLE} + AF - G_{PREAMP}$$

Where

U_{RX}	receiver reading
A_{CABLE}	attenuation of the cable
AF	antenna factor
G_{PREAMP}	gain of the preamplifier

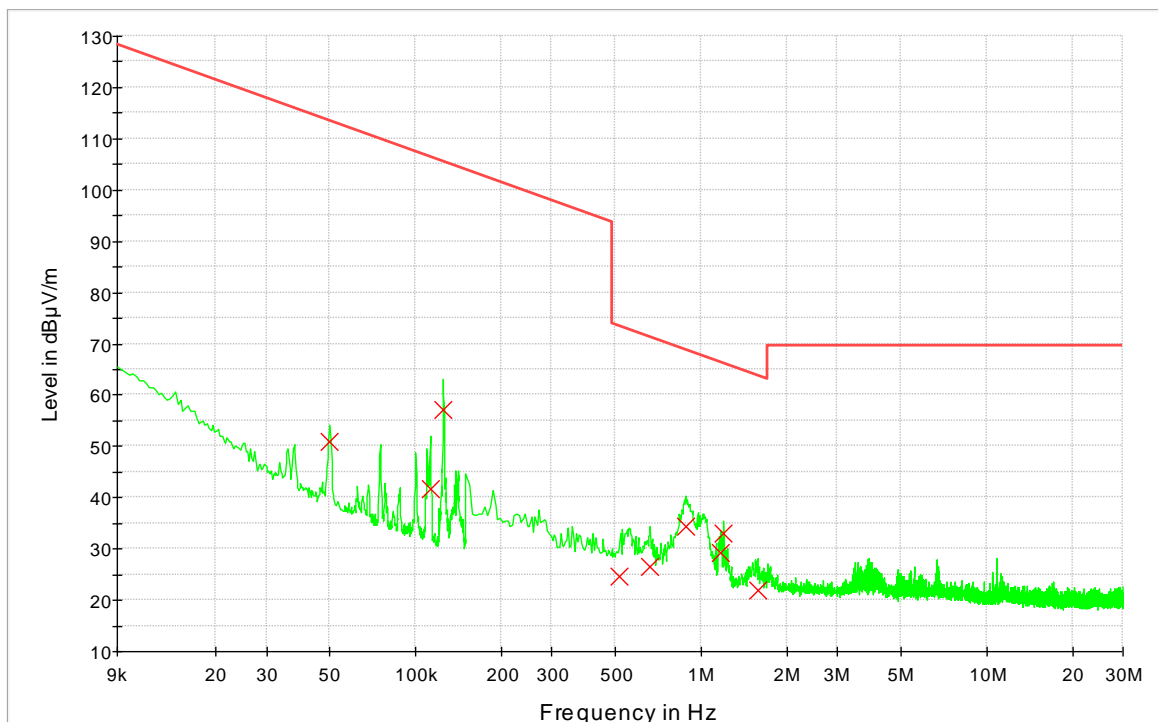


Figure 2. Spurious emissions, 9 kHz-30 MHz

Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Limit (dBμV/m)	Margin (dB)	Polarization	Azimuth (deg)
0.0500	50.8	0.2	113.6	62.8	H	0
0.1125	41.8	0.2	106.5	64.7	H	0
0.1251	57.2	0.2	105.6	48.4	H	0
0.5180	24.6	9	73.3	48.8	H	17
0.6620	26.6	9	71.2	44.6	H	98
0.8820	34.3	9	68.7	34.4	H	80
1.1740	29.2	9	66.2	37.1	H	210
1.2020	33.0	9	66.0	33.0	H	210
1.5740	21.8	9	63.7	41.9	H	54

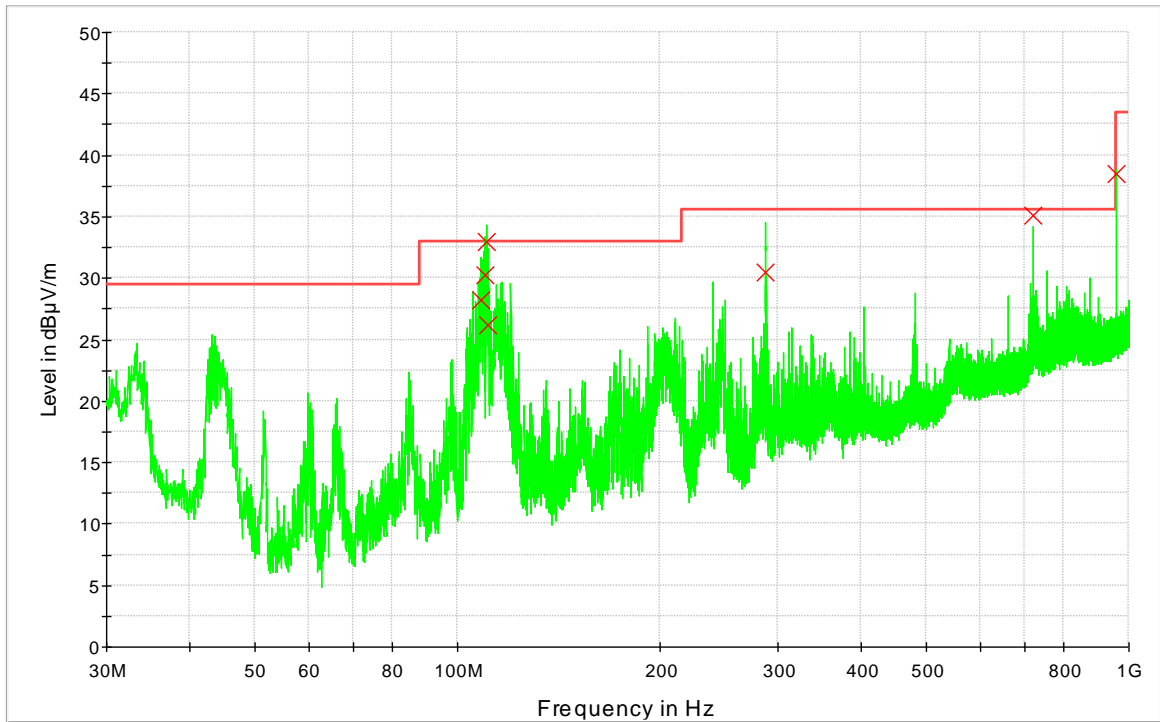


Figure 3. Spurious emissions, 30-1000 MHz

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Polarization	Azimuth (deg)
108.620	28.2	33.0	4.8	144	V	285
109.750	30.2	33.0	2.8	167	V	319
110.230	32.9	33.0	0.1	142	V	237
111.140	26.2	33.0	6.8	250	V	83
288.020	30.5	35.5	5.0	250	H	106
720.040	35.1	35.5	0.4	137	H	335
960.058	38.5	43.5	5.0	310	H	325

4.2.4 Conducted disturbance at mains ports emission test

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

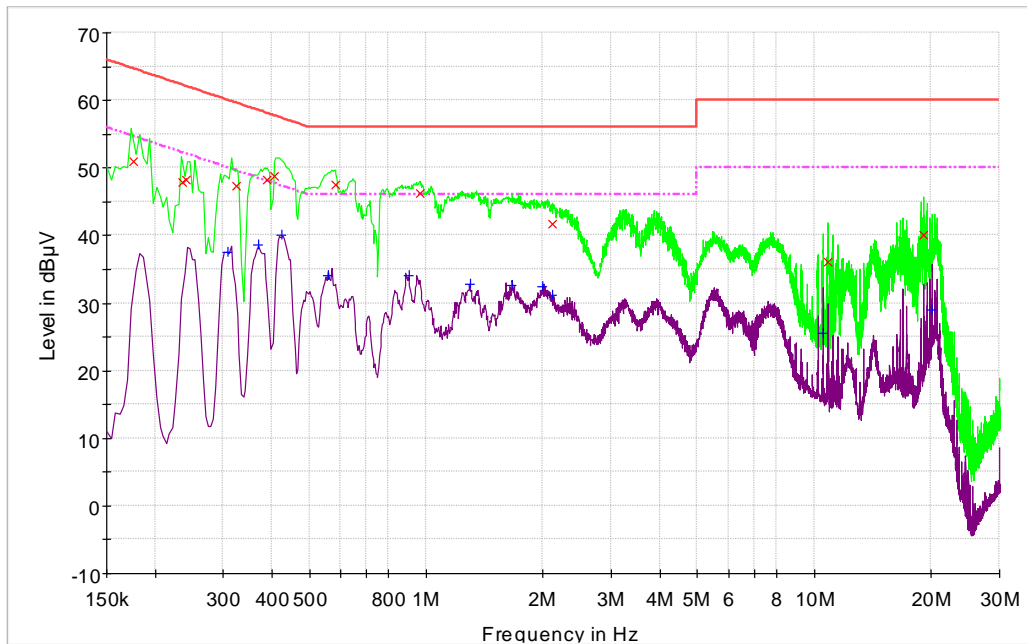
Parameter	Specification
Frequency range	0.150 – 30 MHz
Site name	Nemko Oy / Perkkaa
FCC rule part	§ 15.207
IC	RSS Gen 7.25
Date of testing	24.1.2013-8.3.2013
Test equipment	745, 338, 348
Test uncertainty U95	±3.5dB
Test conditions	22-25 °C, 30-35 % RH

The test was performed inside a shielded room where the floor and one of the walls of the test site comprised the reference ground plane (RGP). For the duration of the test the EUT was placed on a non-conductive table 0.8 m high 0.4 m apart from the vertical RGP (see photograph 2). The excess lengths of the cables of the EUT were made into bundles 30-40 cm in length. The power input cable of the EUT was connected to an artificial mains network. The test was performed separately on each 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.

4.2.5 Test results

TX on, configuration 1
Line L



The graphs of the disturbances measured by using a peak and average detectors in the frequency range of 0.150 - 30 MHz.

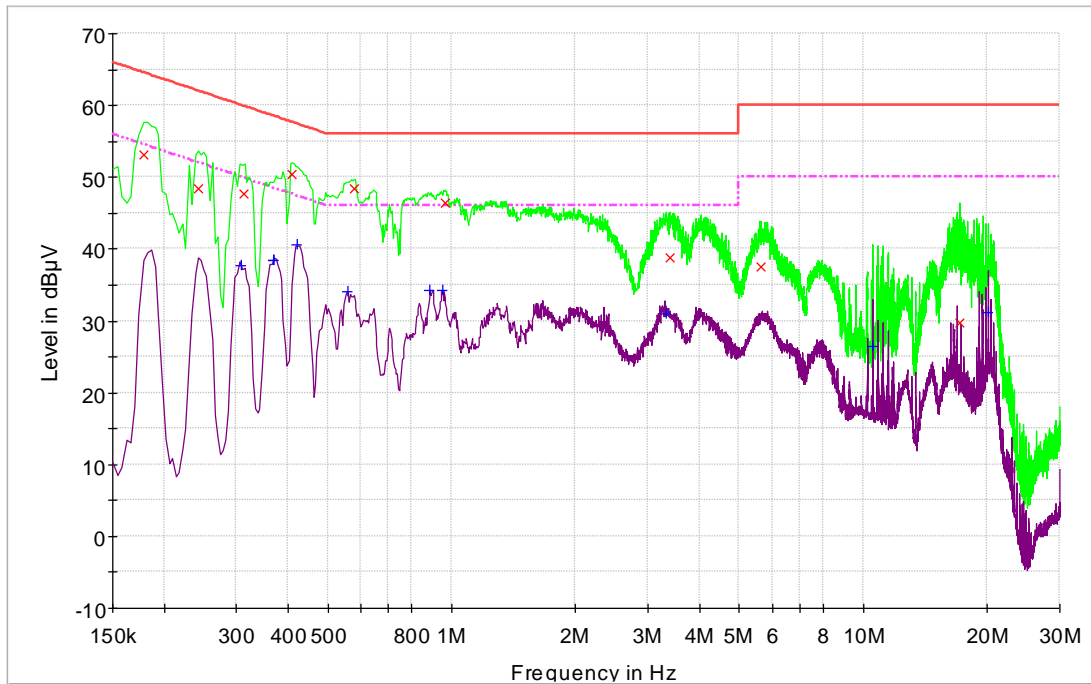
Measurement results (QP):

Frequency MHz	Level dB μ V	Limit dB μ V	Margin dB	Line	Conclusion Pass/Fail
0.176	50.9	64.7	13.7	L	Pass
0.236	47.8	62.2	14.4	L	Pass
0.240	48.2	62.1	13.9	L	Pass
0.324	47.4	59.6	12.2	L	Pass
0.389	48.2	58.1	9.8	L	Pass
0.407	48.8	57.7	8.9	L	Pass
0.582	47.5	56.0	8.5	L	Pass
0.962	46.2	56.0	9.8	L	Pass
2.114	41.7	56.0	14.3	L	Pass
10.839	36.0	60.0	24.0	L	Pass
19.156	40.1	60.0	19.9	L	Pass

Measurement results (Average):

Frequency MHz	Level dB μ V	Limit dB μ V	Margin dB	Line	Conclusion Pass/Fail
0.309	37.6	50.0	12.4	L	Pass
0.370	38.5	48.5	10.0	L	Pass
0.423	40.1	47.4	7.3	L	Pass
0.557	34.1	46.0	11.9	L	Pass
0.900	34.1	46.0	11.9	L	Pass
1.295	32.9	46.0	13.1	L	Pass
1.667	32.6	46.0	13.4	L	Pass
1.996	32.5	46.0	13.5	L	Pass
2.118	31.3	46.0	14.7	L	Pass
10.520	25.5	50.0	24.5	L	Pass
20.107	29.1	50.0	20.9	L	Pass

Line N



The graphs of the disturbances measured by using a peak and average detectors in the frequency range of 0.150 - 30 MHz.

Measurement results (QP):

Frequency MHz	Level dB μ V	Limit dB μ V	Margin dB	Line	Conclusion Pass/Fail
0.179	53.2	64.5	64.5	N	Pass
0.242	48.5	62.0	62.0	N	Pass
0.312	47.7	59.9	59.9	N	Pass
0.410	50.4	57.7	57.7	N	Pass
0.580	48.5	56.0	56.0	N	Pass
0.962	46.3	56.0	56.0	N	Pass
3.388	38.8	56.0	56.0	N	Pass
5.642	37.4	60.0	60.0	N	Pass
17.178	29.8	60.0	60.0	N	Pass

Measurement results (Average):

Frequency MHz	Level dB μ V	Limit dB μ V	Margin dB	Line	Conclusion Pass/Fail
0.309	37.7	50.0	50.0	N	Pass
0.369	38.5	48.5	48.5	N	Pass
0.37	38.5	48.5	48.5	N	Pass
0.421	40.6	47.4	47.4	N	Pass
0.558	34.2	46.0	46.0	N	Pass
0.886	34.2	46.0	46.0	N	Pass
0.949	34.3	46.0	46.0	N	Pass
3.306	30.9	46.0	46.0	N	Pass
10.523	26.5	50.0	50.0	N	Pass
20.102	31.2	50.0	50.0	N	Pass

4.3 Spurious radiated emission

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

<i>Site name</i>	Nemko Oy / Perkaa
<i>FCC rule part</i>	§ 15.209
<i>IC</i>	RSS Gen 7.25
<i>Date of testing</i>	8-9.3.2013
<i>Test equipment</i>	98, 319, 544, 709, 350
<i>Test conditions</i>	22 °C, 30 % RH
<i>Test result</i>	PASS

4.3.1 EUT operation mode

<i>EUT operation mode</i>	TX on, configuration 2
<i>EUT TX power level</i>	Nominal

4.3.2 Test method and limit

The test was performed in a semi-anechoic shielded room. The EUT was placed on a non-conductive 0.8 m high table standing on the turntable (see photograph 2). During the test in the frequency range 9kHz-30 MHz the distance from the EUT to the measuring antenna was 3 m and measurements were made using a magnetic loop antenna and a receiver with a 200 Hz bandwidth (9-150kHz) and a 9 kHz bandwidth (0.15-30MHz). During the test in the frequency range 30-1000 MHz the distance from the EUT to the measuring antenna was 10 m. 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 separately with the measuring antenna being both in horizontal and vertical polarizations.

As allowed by section 15.31(f)(2) measurements were made at 3 meter with the 300 meter limit 9-490kHz being extrapolated by a factor of 80 dB (40dB per decade) and 0.490-30MHz with the 30 meter limit being extrapolated by a factor of 40 dB. At 30-1000 MHz the 3m limit was converted to 10m measuring distance using 20dB decade rule.

The CFR 47 Part 15.209 limit of 500 $\mu\text{V/m}$ has been calculated to correspond 54 dB($\mu\text{V/m}$) as follows: $[\text{dB}(\mu\text{V/m})]=20\log[\mu\text{V/m}]$.

FCC Part 15.209 Limit values

<i>Frequency band MHz</i>	<i>Quasi-peak $\mu\text{V/m}$</i>	<i>Quasi-peak dB($\mu\text{V/m}$) @3m</i>	<i>Quasi-peak dB($\mu\text{V/m}$) @10m</i>
0.009–0.490	2400/F (kHz)@300m	128.5-93.8@3m	-
0.490–1.705	24000/F (kHz)@30m	73.8-63.0@3m	-
1.705–30	30@30m	69.5@3m	-
30 - 88	100@3m	40.0@3m	29.5@10m
88 - 216	150@3m	43.5@3m	33.0@10m
216-960	200@3m	46.0@3m	35.5@10m
960-1000	500@3m	54.0@3m	43.5@10m

For the frequency bands 9–90kHz and 110–490 kHz the radiated emission limits are based on measurements employing an average detector.

4.3.3 Test results

The measurement results were obtained as described below.

$$E [dB(\mu V/m)] = U_{RX} + A_{CABLE} + AF - G_{PREAMP}$$

Where

- U_{RX} receiver reading
- A_{CABLE} attenuation of the cable
- AF antenna factor
- G_{PREAMP} gain of the preamplifier

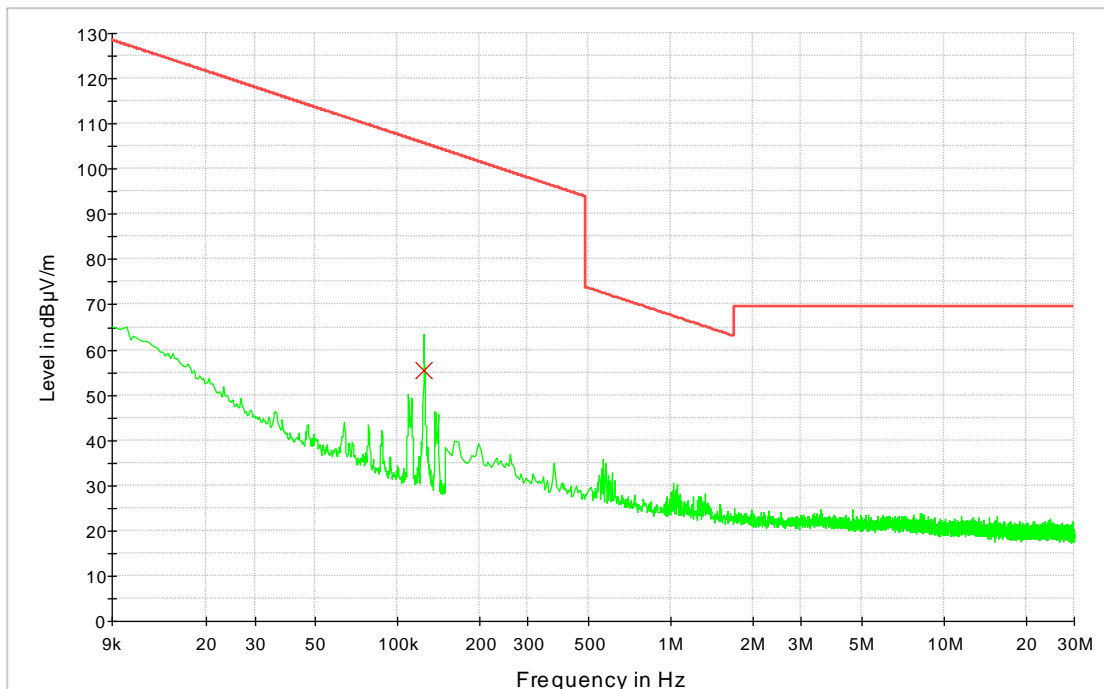


Figure 4. Spurious emissions, 9 kHz-30 MHz

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Limit (dBµV/m)	Margin (dB)	Polarization	Azimuth (deg)
0.1251	55.4	0.2	105.6	50.2	H	165

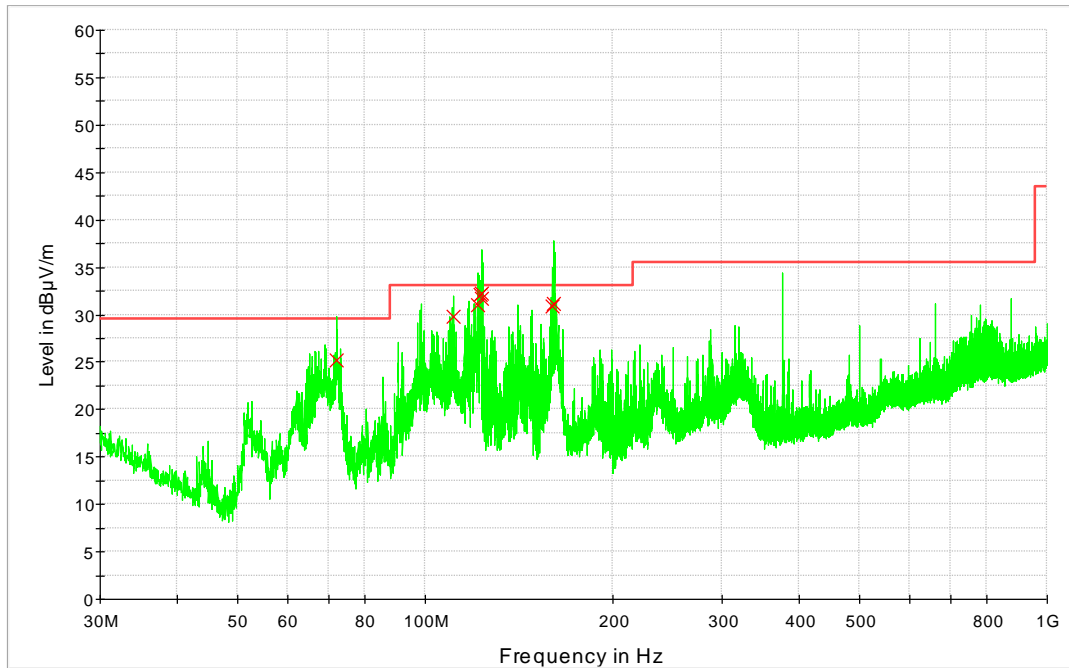


Figure 5. Spurious emissions, 30-1000 MHz

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Polarization	Azimuth (deg)
72.010	25.2	29.5	4.3	190	V	302
110.830	29.8	33.0	3.2	203	V	317
121.670	31.0	33.0	2.0	142	V	248
122.410	32.1	33.0	0.9	166	V	267
123.400	32.2	33.0	0.8	147	V	245
123.400	31.7	33.0	1.3	250	V	278
160.160	30.9	33.0	2.1	136	V	350
161.200	31.1	33.0	1.9	214	V	229

4.3.4 Conducted disturbance at mains ports emission test

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

Parameter	Specification
Frequency range	0.150 – 30 MHz
Site name	Nemko Oy / Perkkaa
FCC rule part	§ 15.207
IC	RSS Gen 7.25
Date of testing	8.3.2013
Test equipment	745, 694, 348
Test uncertainty U95	±3.5dB
Test conditions	24 °C, 30 % RH

The test was performed inside a shielded room where the floor and one of the walls of the test site comprised the reference ground plane (RGP). For the duration of the test the EUT was placed on a non-conductive table 0.8 m high 0.4 m apart from the vertical RGP (see photograph 4). The excess lengths of the cables of the EUT were made into bundles 30-40 cm in length. The power input cable of the EUT was connected to an artificial mains network. The test was performed separately on each 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.

4.3.5 Test results

Line L

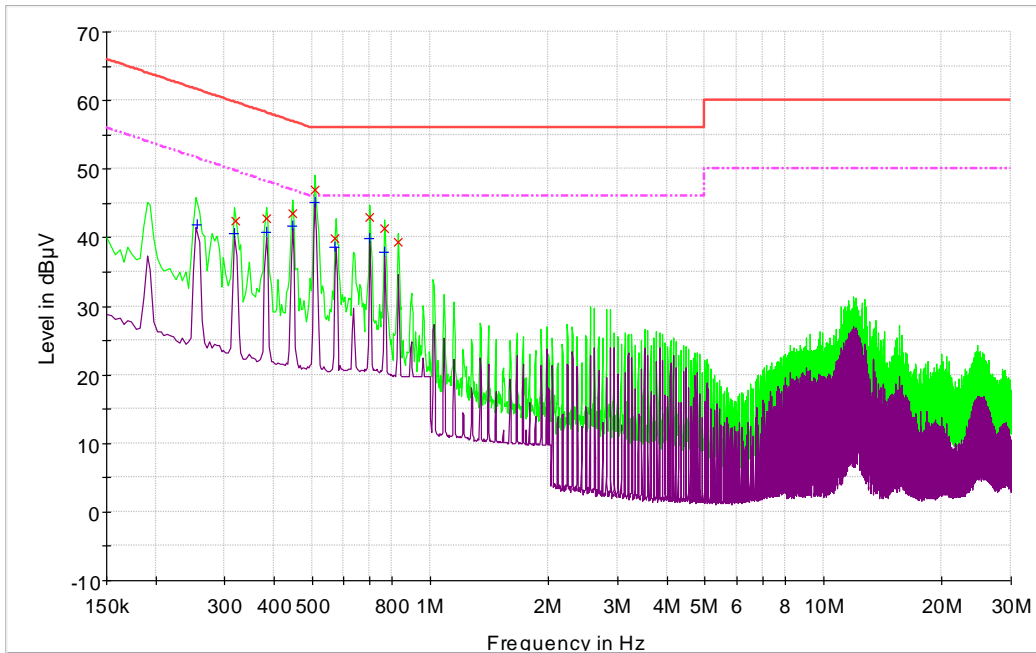


Figure 6.

The graphs of the disturbances measured by using a peak and average detectors in the frequency range of 0.150 - 30 MHz.

Measurement results (QP):

Frequency MHz	Level dB μ V	Limit dB μ V	Margin dB	Line	Conclusion Pass/Fail
0.319	42.5	59.7	17.2	L	Pass
0.382	42.7	58.2	15.5	L	Pass
0.445	43.6	57.0	13.4	L	Pass
0.510	46.9	56.0	9.1	L	Pass
0.571	39.9	56.0	16.1	L	Pass
0.699	43.0	56.0	13.0	L	Pass
0.763	41.4	56.0	14.6	L	Pass
0.827	39.3	56.0	16.7	L	Pass

Measurement results (Average):

Frequency MHz	Level dB μ V	Limit dB μ V	Margin dB	Line	Conclusion Pass/Fail
0.255	41.9	51.6	9.7	L	Pass
0.318	40.5	49.8	9.2	L	Pass
0.382	40.8	48.2	7.5	L	Pass
0.445	41.6	47.0	5.3	L	Pass
0.509	45.2	46.0	0.8	L	Pass
0.573	38.7	46.0	7.3	L	Pass
0.701	39.9	46.0	6.1	L	Pass
0.764	37.8	46.0	8.2	L	Pass
0.255	41.9	51.6	9.7	L	Pass

Line N

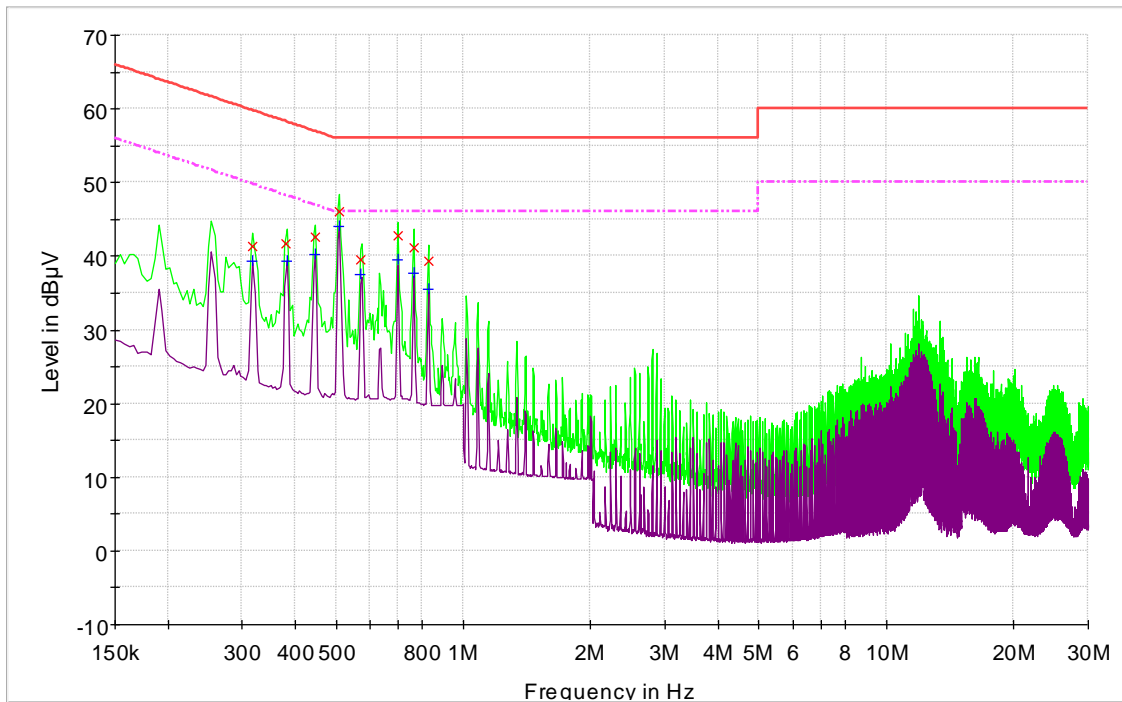


Figure 7.

The graphs of the disturbances measured by using a peak and average detectors in the frequency range of 0.150 - 30 MHz.

Measurement results (QP):

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Line	Conclusion Pass/Fail
0.317	41.4	59.8	18.4	N	Pass
0.381	41.7	58.3	16.5	N	Pass
0.445	42.6	57.0	14.4	N	Pass
0.508	46.0	56.0	10.0	N	Pass
0.573	39.5	56.0	16.5	N	Pass
0.700	42.8	56.0	13.2	N	Pass
0.762	41.1	56.0	14.9	N	Pass
0.827	39.4	56.0	16.6	N	Pass

Measurement results (Average):

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Line	Conclusion Pass/Fail
0.318	39.3	49.8	10.4	N	Pass
0.382	39.4	48.2	8.8	N	Pass
0.445	40.3	47.0	6.7	N	Pass
0.509	44.1	46.0	1.9	N	Pass
0.573	37.5	46.0	8.5	N	Pass
0.700	39.5	46.0	6.5	N	Pass
0.763	37.7	46.0	8.3	N	Pass
0.827	35.5	46.0	10.5	N	Pass

4.1 99% Bandwidth

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

Site name	Nemko Oy / Perkaa
FCC rule part	-
Section in RSS Gen	4.6.1
Date of testing	20.12.2012
Test equipment	709, 98
Test conditions	22 °C, 30 % RH
Test result	PASS

4.1.1 EUT operation mode

EUT operation mode	Transmitting
EUT TX power level	Nominal

4.1.2 Test data

EUT frequency (kHz)	Measured value (kHz)
125.1	0.67

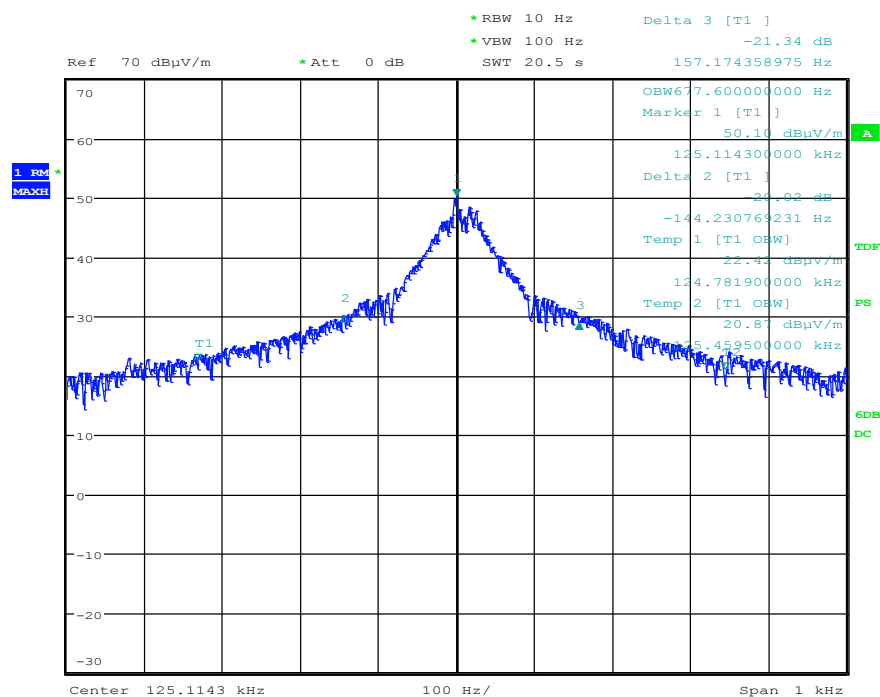


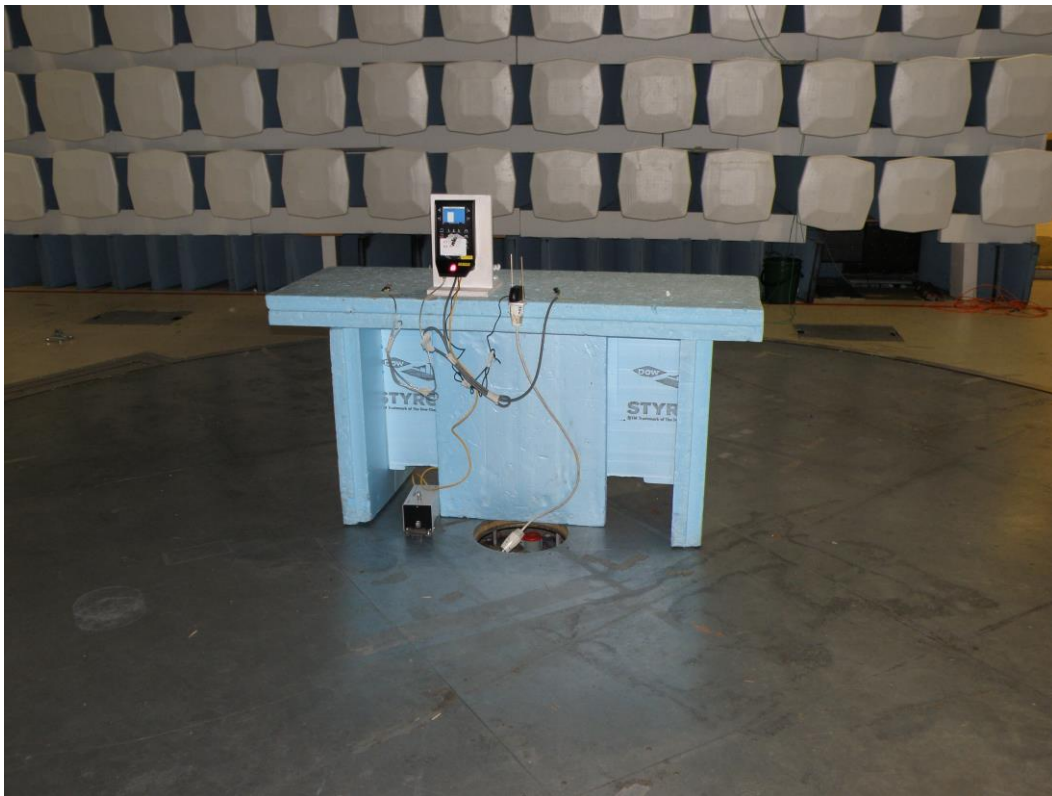
Figure 8. 99% bandwidth

5. List of test equipment

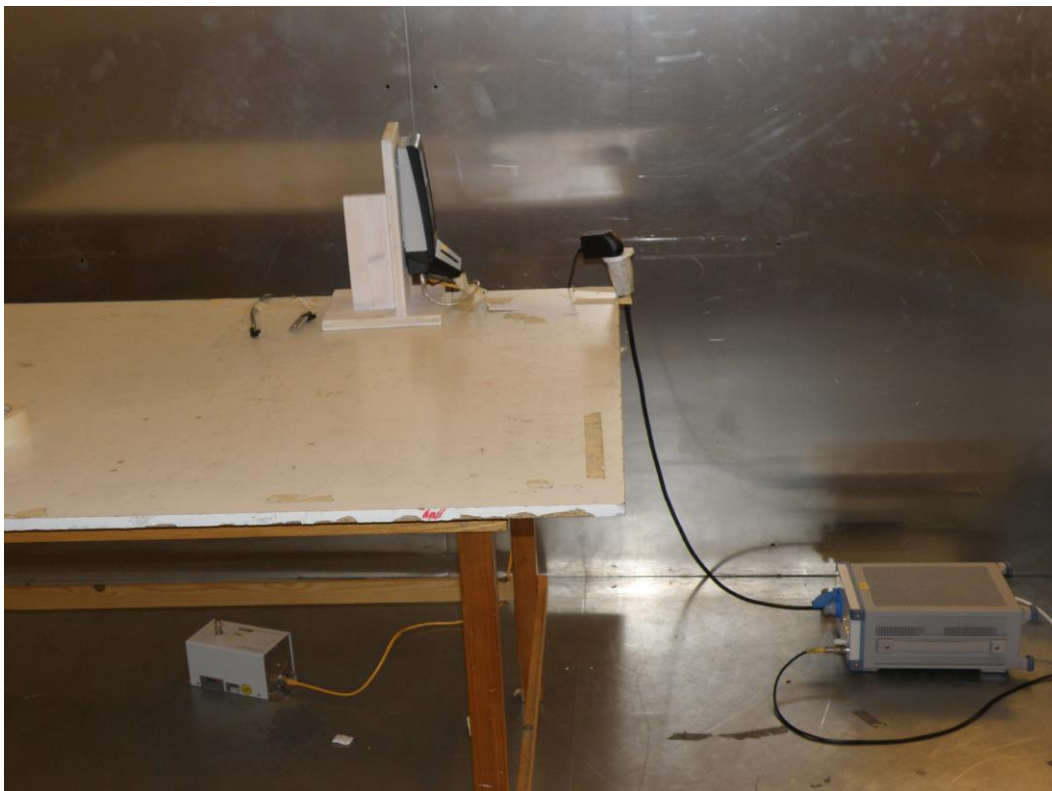
Each active test equipment is calibrated once a year, antennas every 18 months and other passive equipment every 24 months.

Nr.	Equipment	Type	Manufacturer	Serial number
338	Test receiver	ESS	Rohde & Schwarz	847151/009
98	Antenna	HFH2	Rohde & Schwarz	871336/45
319	Antenna	CBL6112	Chase	2018
348	Shielded room	RFSD-100	Euroshield Oy	1320
350	Semianechoic shielded room	RFD-F-100	Euroshield Oy	1327
542	Double-Ridged Horn	3115	Emco	00023905
544	RF-amplifier	ZFL-2000VH2	Mini-Circuits	QA0749010
559	Highpass Filter	WHKX3.0/18G-10SS	Wainwright Instruments	1
572	High Pass Filter	WHKX1.5/15G-12SS	Wainwright Instruments	4
564	RF-amplifier	CA018-4010	CIAO Wireless	132
566	Spectrum analyzer	E4448A	Agilent	US42510236
709	EMI test receiver	ESU8	Rohde & Schwarz	100297
710	RF amplifier	ALS1826-41-12	ALC Microwave Inc.	0011
745	2-Line V-Network	ENV216	Rohde & Schwarz	101466

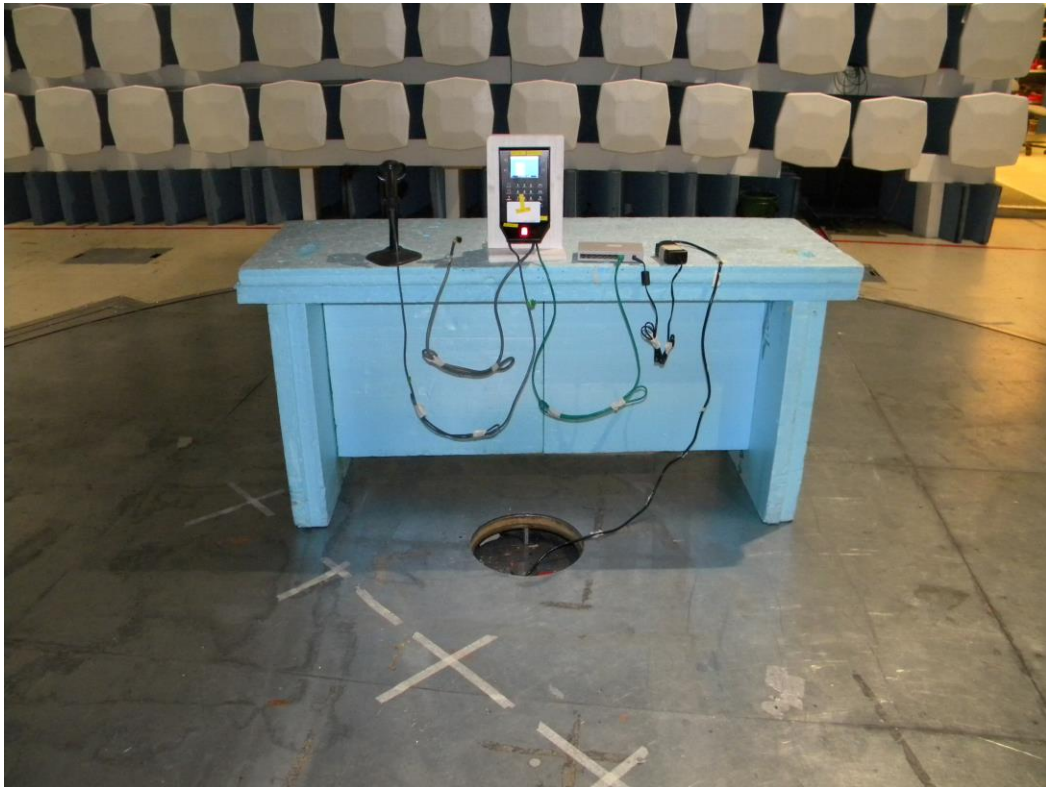
6. Photographs



Photograph 1, Radiated emissions test, configuration 1



Photograph 2, AC mains conducted emissions test, configuration 1



Photograph 3, Radiated emissions test, configuration 2



Photograph 4, AC mains conducted emissions test, configuration 2