

# RADIO TEST REPORT

No. 1116425-2 ed. 2

## RF Performance

### EQUIPMENT UNDER TEST

Equipment: 4020527 Antenna  
Heru 3.0 Main Unit  
Type / model: XT952 (Antenna)  
XT934A (Heru 3.0)  
Manufacturer: AB C.A. ÖSTBERG  
Tested by request of: AB C.A. ÖSTBERG

### SUMMARY

All selected test cases specified in this report comply with the requirements according to the following standard:

FCC, Part 15 (2011), Subpart B and C

RSS-GEN, Issue 3 (Dec 2010)  
RSS-210, Issue 8 (Dec 2010)

Industry Canada listed test facility No. IC 2042G-2

Date of issue: 2011-12-22

Tested by:



Approved by:



Stefan Andersson

Niklas Boström

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**Revision History**

<b>Edition</b>	<b>Date</b>	<b>Description</b>
<b>1</b>	<b>2011-09-30</b>	<b>First release</b>
<b>2</b>	<b>2011-12-22</b>	<b>References and 99% bandwidth measurement for Industry Canada added</b>

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## 1. CLIENT INFORMATION

The EUT has been tested by request of

Company: AB C.A. Östberg  
Industrigatan 2  
774 35 Avesta  
Sweden

Name of contact: Jirry Svedlund

## 2. EQUIPMENT UNDER TEST (EUT)

### 2.1 Identification of the EUT according to the manufacturer/client declaration

Equipment: 4020527 Antenna  
Heru 3.0 Main Unit

Type / Model: XT952 (Antenna)  
XT934A (Heru 3.0)

Manufacturer: AB C.A. Östberg

Rating/Supplying voltage: 115 V AC 60 Hz

External antenna connector: No

Frequency Band: 902 – 928 MHz

Number of channels: 1 (904.8 MHz)

### 3. TEST SPECIFICATIONS

#### 3.1 Standards

FCC 47 CFR part 15 (2011) Subpart B – Unintentional radiators, class B

FCC 47 CFR part 15 (2011) Subpart C – Intentional radiators

RSS-GEN, Issue 3 (Dec 2010)

RSS-210, Issue 8 (Dec 2010)

Measurements methods according to ANSI C63.4-2009 and ANSI C63.10-2009

#### 3.2 Additions, deviations and exclusions from standards

No additions, deviations or exclusions have been made from standard.

#### 3.3 Test set-up

Measurement set-up for all tests is described in the radiated spurious emissions section.

#### 3.4 Test conditions

If not additionally specified, the tests were performed under the following environmental conditions:

Parameter	Normal
Supplying voltage, V	115 V AC 60Hz
Air temperature, °C	20-24°C

#### 4. TEST SUMMARY

The results in this report apply only to the sample tested.

Test	FCC Reference	IC Reference	Result
Radiated output power	15.249	RSS-210, A2.9	Pass*
Band Edge Compliance	15.249	RSS-210, A2.9	Pass
Out of band spurious emission, radiated	15.249	RSS-210, A2.9	Pass
Conducted disturbance, AC Mains	15.207	RSS-GEN	Pass
99% Bandwidth	-	RSS-GEN	Pass

NT = Not Tested

NA = Not Applicable

\*The measured result is below the limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95 % level of confidence. However, the result indicates that compliance is more probable than non-compliance with the specification limit.

## 5. RADIATED SPURIOUS EMISSIONS

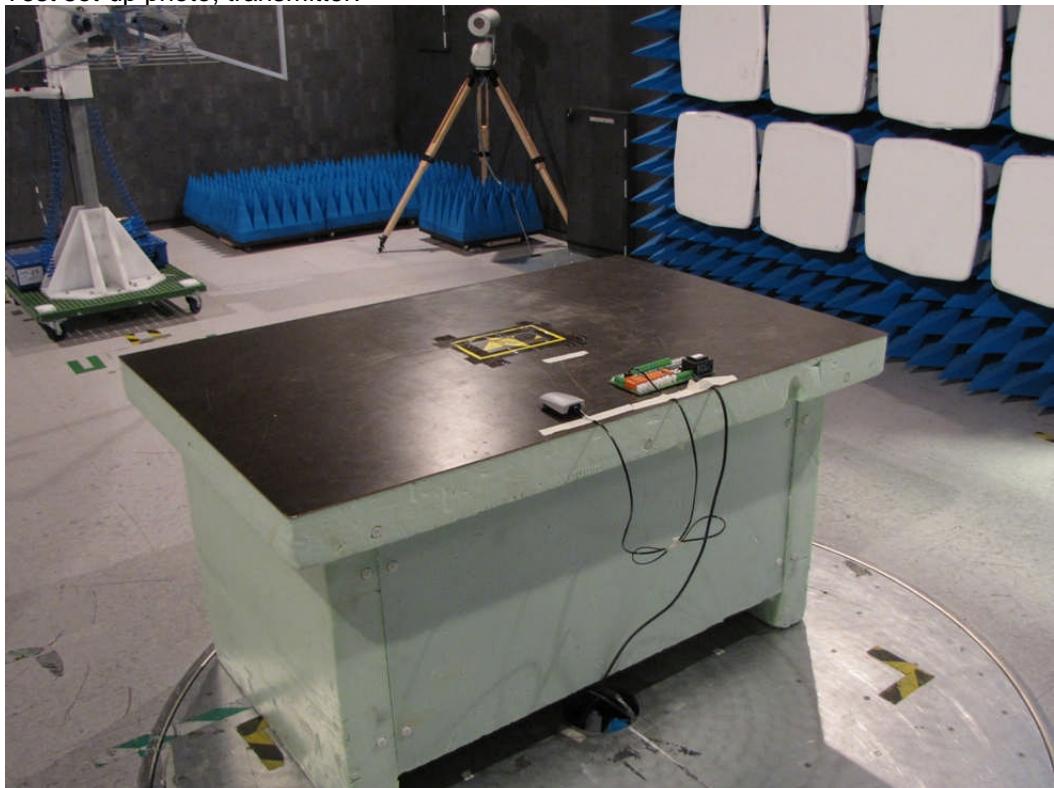
### 5.1 Measurement set-up

#### Test site: Small anechoic shielded chamber (30 – 1000 MHz)

In the Small anechoic shielded chamber the EUT was placed on a non-metallic table, 1,5 m above the floor. The radiated power was measured at a distance of 3 m. An overview sweep with peak detection was performed with the measurement receiver in max-hold and with the antenna placed 1.5 m above the floor. The polarisation was horizontal and vertical. The measurements were repeated with the EUT rotated in 90-degree steps. The specified test mode was enabled.

At the frequencies where high disturbance levels were found a search for max disturbance level was performed. With the EUT and antenna in the worst-case configuration new peak measurements were carried out.

Test set-up photo, transmitter:

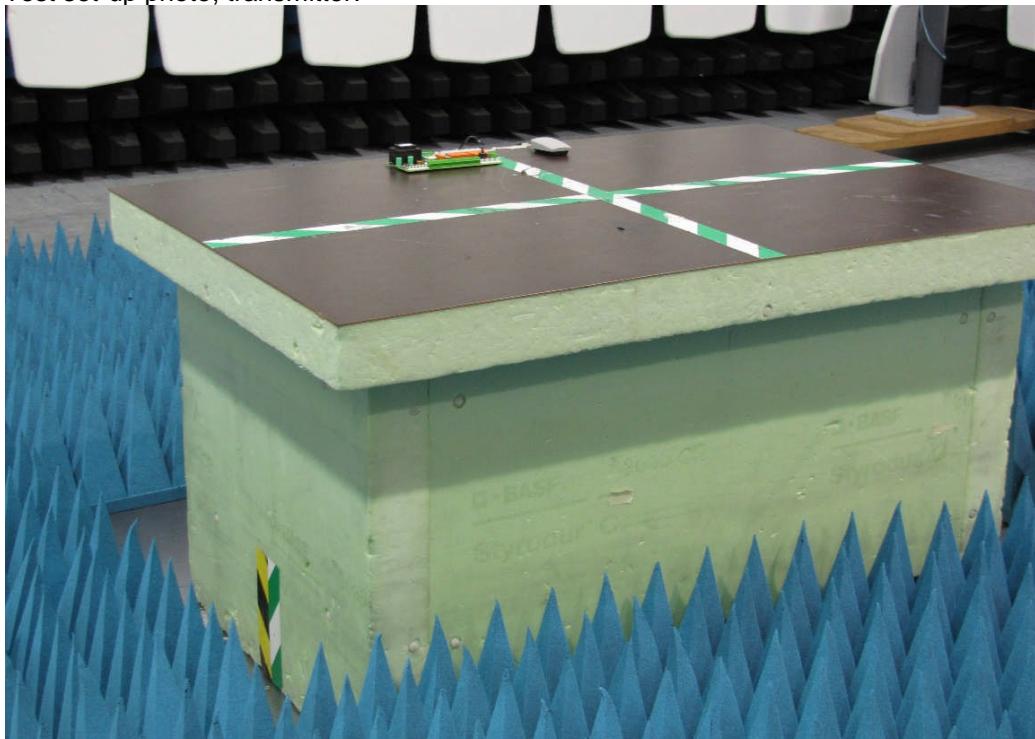


Test site: Big anechoic shielded chamber (1 – 10 GHz)

In the Radio anechoic shielded chamber the EUT was placed on a non-metallic table, 1,5 m above the floor. The radiated power was measured at a distance of 3 m. An overview sweep with peak detection was performed with the measurement receiver in max-hold and with the antenna placed 1.5 m above the floor. The polarisation was horizontal and vertical. The measurements were repeated with the EUT rotated in 90-degree steps. The specified test mode was enabled.

At the frequencies where high disturbance levels were found a search for max disturbance level was performed. With the EUT and antenna in the worst-case configuration new peak measurements were carried out.

Test set-up photo, transmitter:



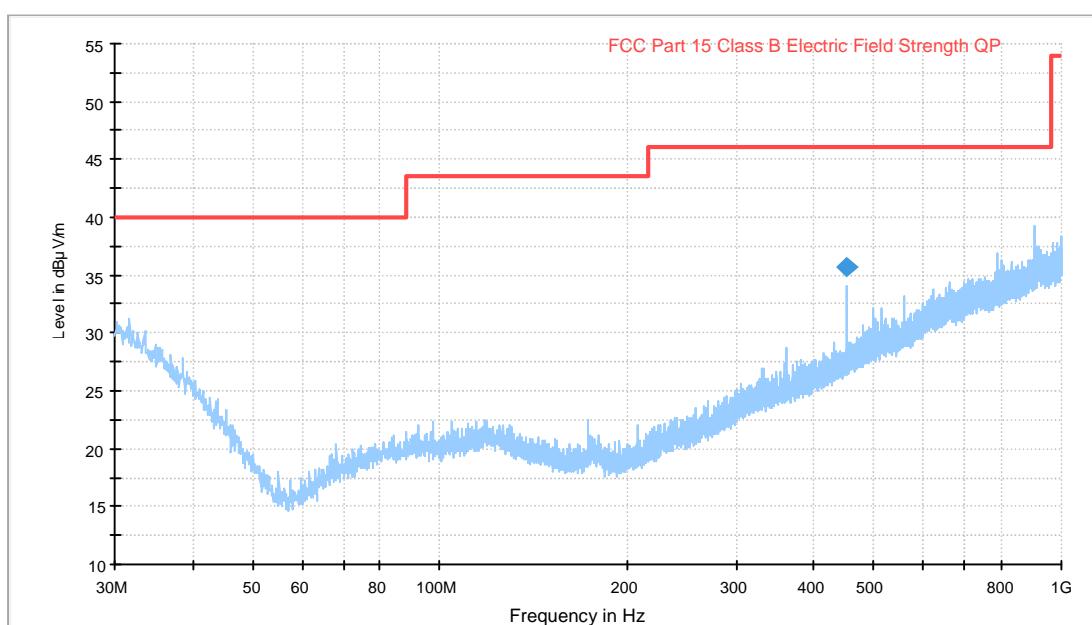
## 5.2 Test protocol

### Small anechoic shielded chamber

Date of test: 2011-09-17

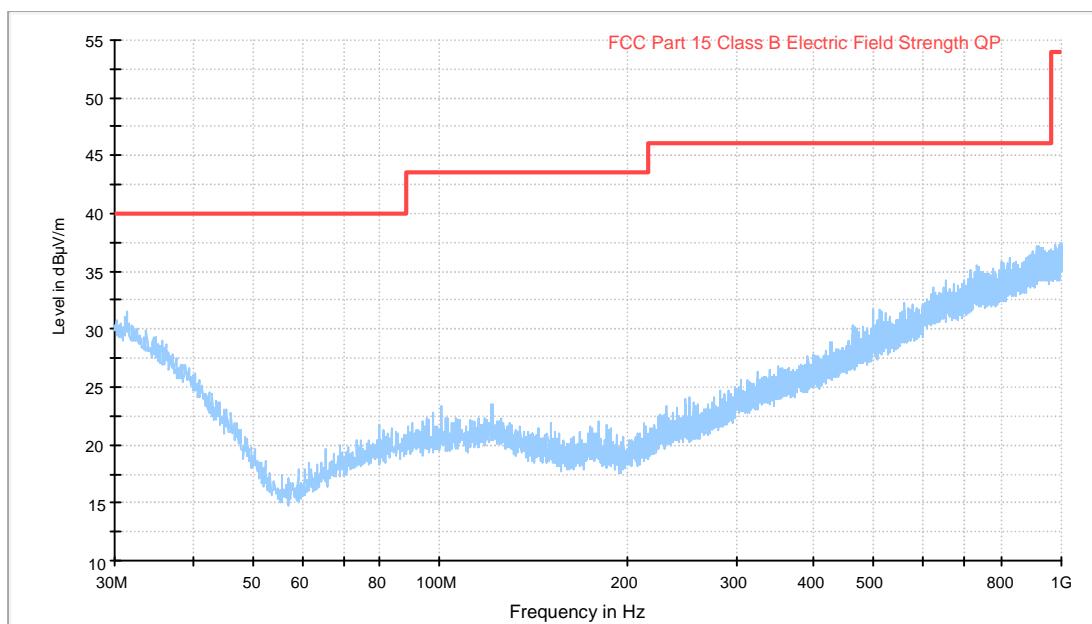
30 – 1000 MHz, quasi peak at a distance of 3 m, TX, tunable band reject filter set to 904.8 MHz, peak at 904,8 MHz is the carrier

FCC Part 15B Class B



30 – 1000 MHz, quasi peak at a distance of 3 m, RX

FCC Part 15B Class B

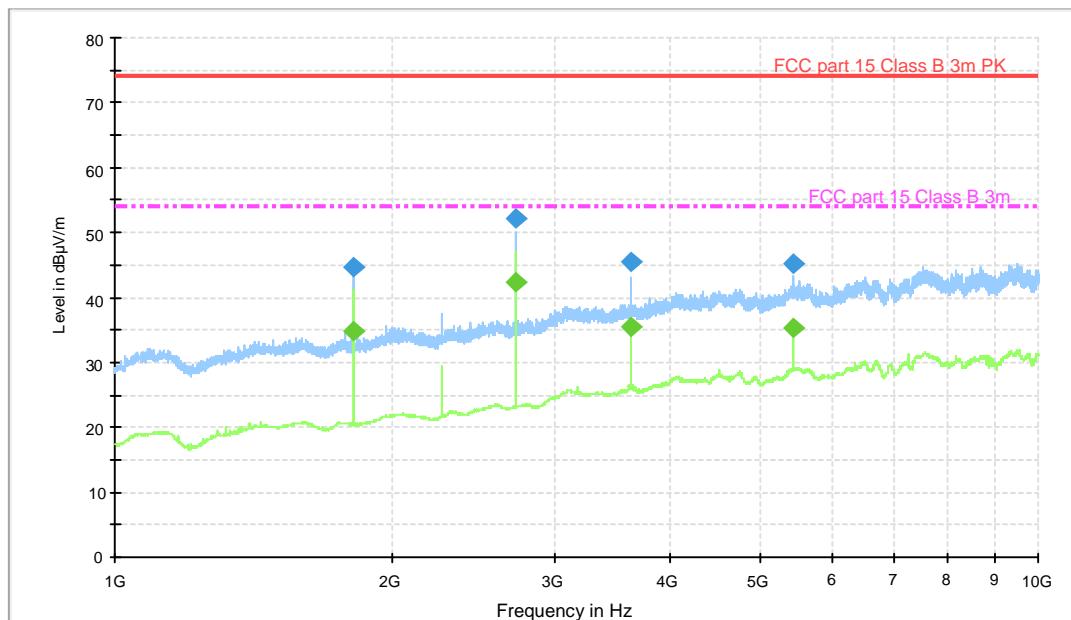


Big anechoic shielded chamber

Date of test: 2011-09-14

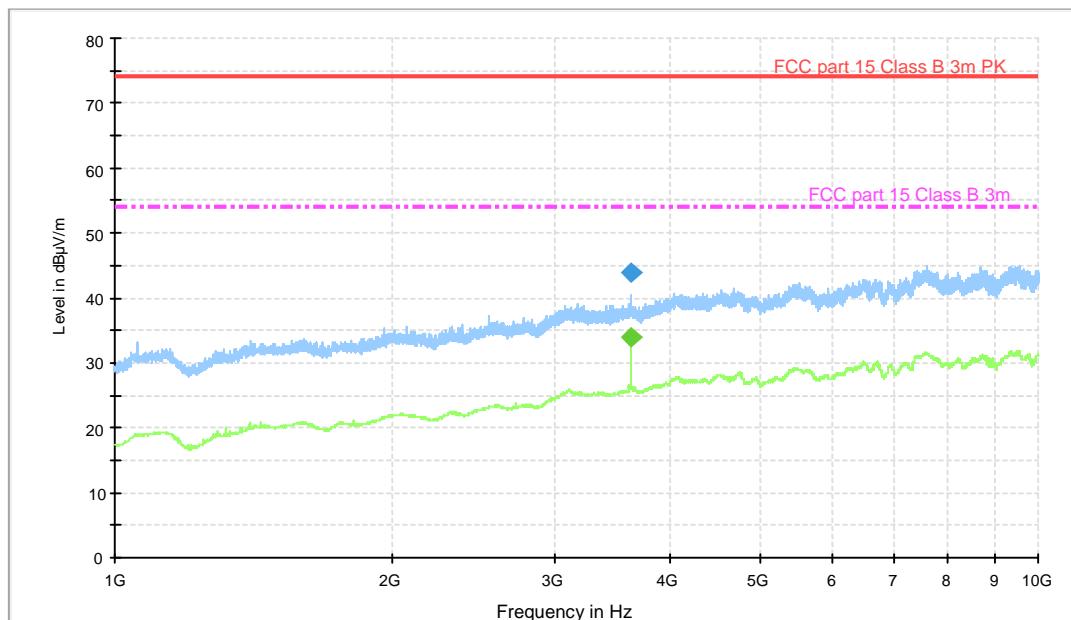
1 – 10 GHz, max peak and average at a distance of 3 m, TX, 1 GHz high pass filter

PJE2 of FCC 1G - 18 G class B 3m ESU40



1 – 10 GHz, max peak and average at a distance of 3 m, RX

PJE2 of FCC 1G - 18 G class B 3m ESU40



Data summary

Spurious emissions, TX 30 - 1000 MHz					
Frequency [GHz]	Measured level		Limit	Note	Comment
	QuasiPeak [dBuV/m]	QuasiPeak [dBuV/m]	QuasiPeak [dBuV/m]		
452.513	35.6		46.0		

Spurious emissions, TX 1 – 10 GHz						
Frequency [MHz]	Measured level		Limit		Note	Comment
	Average [dBuV/m]	Peak [dBuV/m]	Average [dBuV/m]	Peak [dBuV/m]		
1810.20	34.6	44.6	54	74		
2715.00	42.2	52.2	54	74		
3620.40	35.6	45.6	54	74		
5429.80	35.2	45.2	54	74		

Spurious emissions, RX						
Frequency [GHz]	Measured level		Limit		Note	Comment
	Average [dBuV/m]	Peak [dBuV/m]	Average [dBuV/m]	Peak [dBuV/m]		
3623.40	34.0	44.0	54	74		

No other significant peaks above the noise floor were found.

Measurement results are corrected for attenuation in the set-up configuration.

Example calculation:

Measured level [dBuV/m] = Analyser reading [dBuV/m] + cable loss [dB] + attenuator loss [dB]

Fulfil requirements: Yes

## 6. RADIATED OUTPUT POWER

### 6.1 Test protocol

Date of test: 2011-09-17

Detector	Equivalent Isotropic Radiated Power, [dBuV/m]
QuasiPeak	90.5*

\* The measured result is below the limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95 % level of confidence. However, the result indicates that compliance is more probable than non-compliance with the specification limit.

Measurement results are corrected for attenuation in the set-up configuration.

Example calculation:

Measured level [dBuV/m] = Analyser reading [dBuV/m] + cable loss [dB] + attenuator loss [dB]

### 6.2 Limit

The equivalent isotropic radiated power shall be equal to or below 94.0 dBuV/m QuasiPeak.

Fulfil requirements: Yes

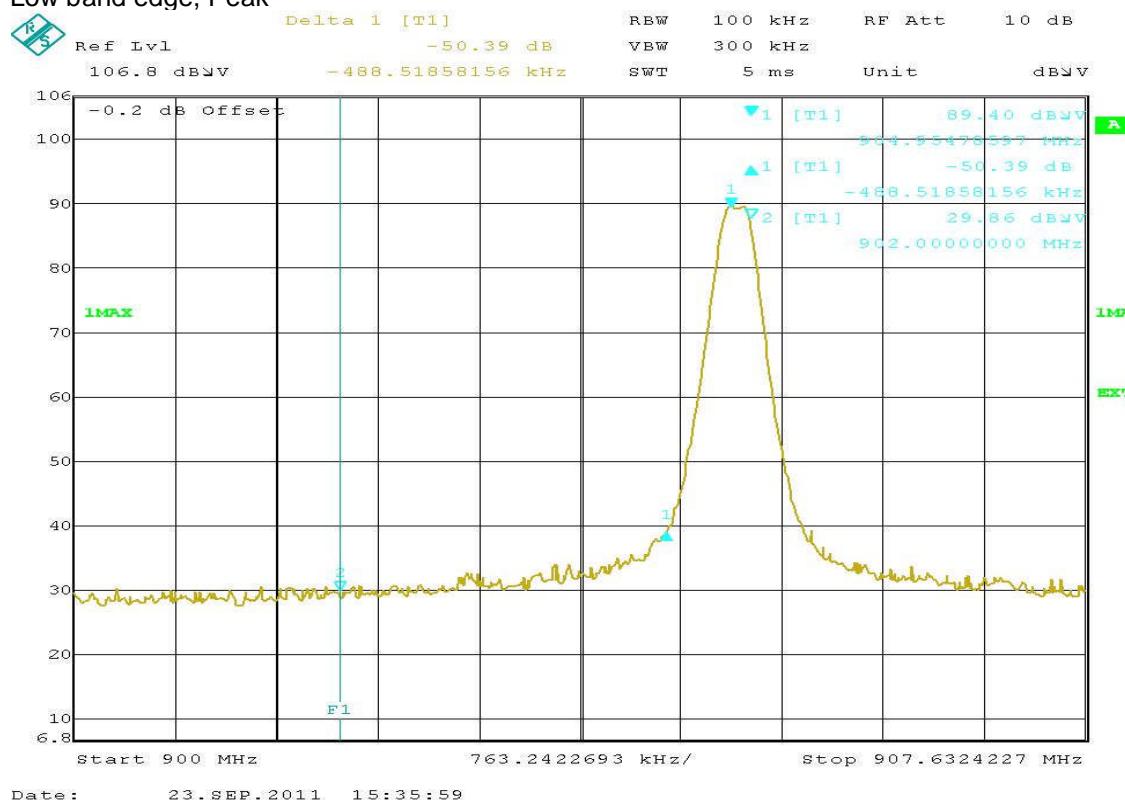
## 7. BAND EDGE COMPLIANCE

### 7.1 Test protocol

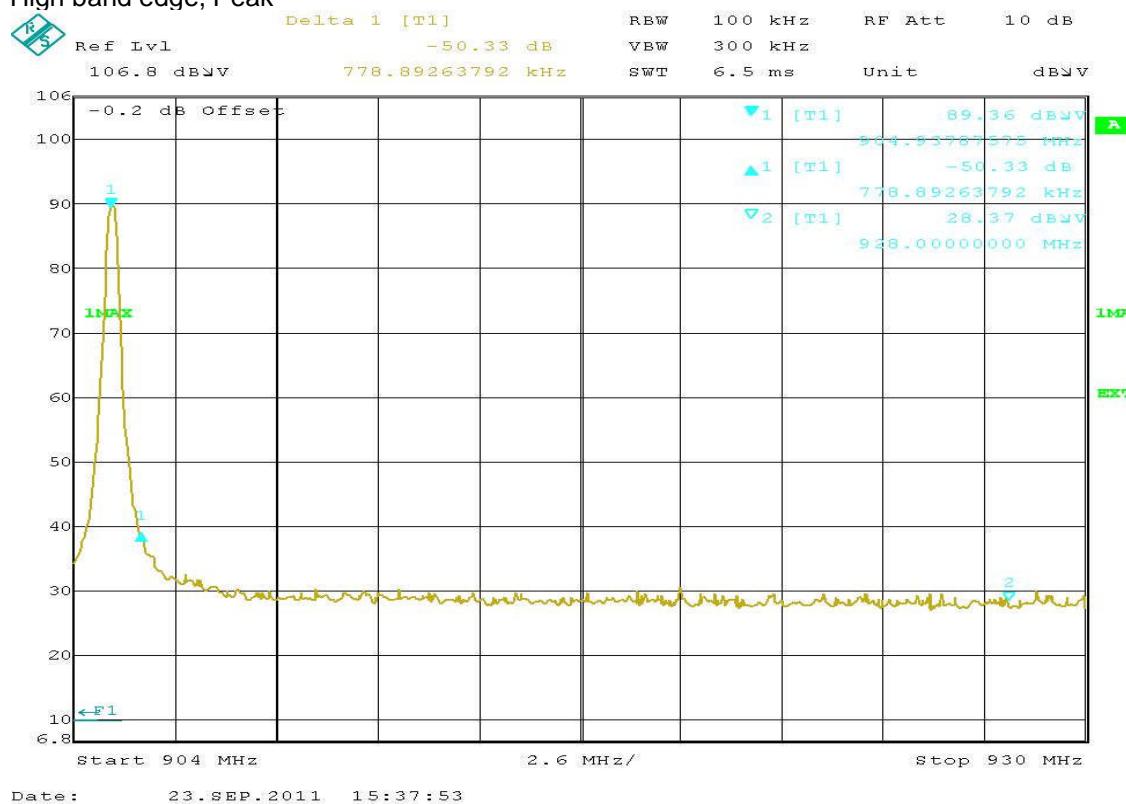
Date of test: 2011-09-23

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated at least 50 dB below the level of the fundamental or to the general radiated emission limits in 15.209, whichever is the lesser attenuation.

#### Low band edge, Peak



## High band edge, Peak



Fulfil requirements: Yes

## 8. CONDUCTED EMISSION FROM AC MAINS

### 8.1 Measurement set-up

EUT was placed on a non-metallic table, 0,8 m above the reference ground plane and 0,4 m from conductive wall. EUT was connected to a PC and PC mains were connected to a LISN.

The RF part of the EUT was terminated with a terminator with equal impedance as the antenna to avoid radiated coupling to the AC cable from the computer.

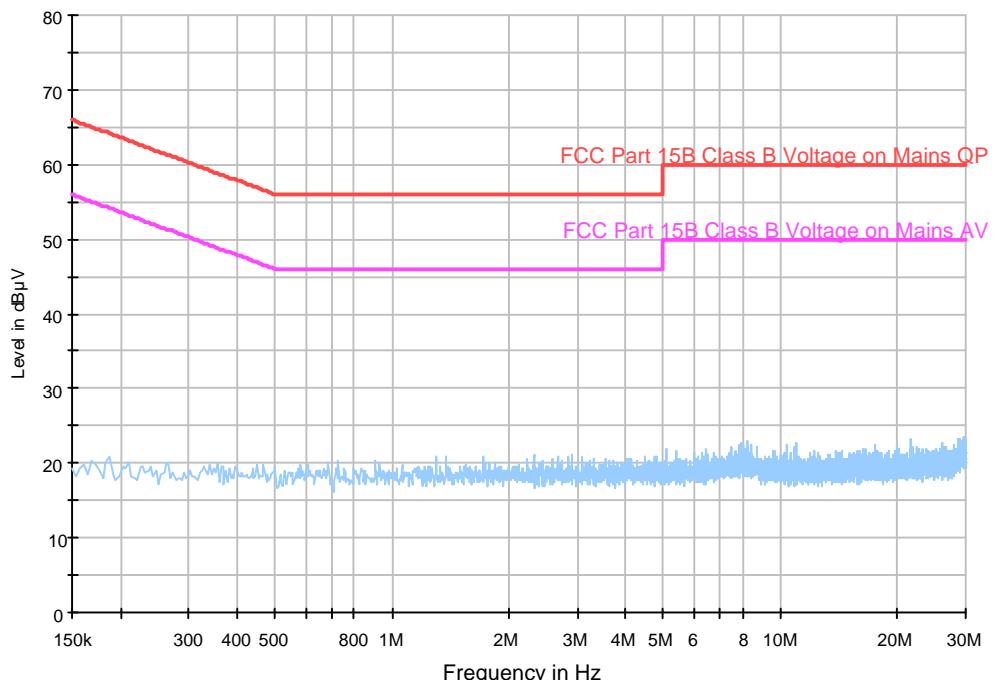
An overview sweep with peak and average detection of the disturbance voltage was performed with the measurement receiver in max-hold. Both line and neutral were measured.

At the frequencies where high disturbance levels were found a final measurement was made with quasi peak and average detectors.

Test setup photo



## 8.2 Test protocol



### Data summary

Conducted emission						
Frequency [MHz]	Measured level		Limit		Note	Comment
	Average [dB $\mu$ V/m]	Peak [dB $\mu$ V/m]	Average [dB $\mu$ V/m]	Peak [dB $\mu$ V/m]		
0.150 – 30	-	-	-	-	1	

1. No peaks above the noise floor were found.

## 8. 99% BANDWIDTH

### 8.1 Test protocol

Date of test: 2011-12-22

Spectrum analyzer settings:

Span: 830 kHz

RBW: 5 kHz

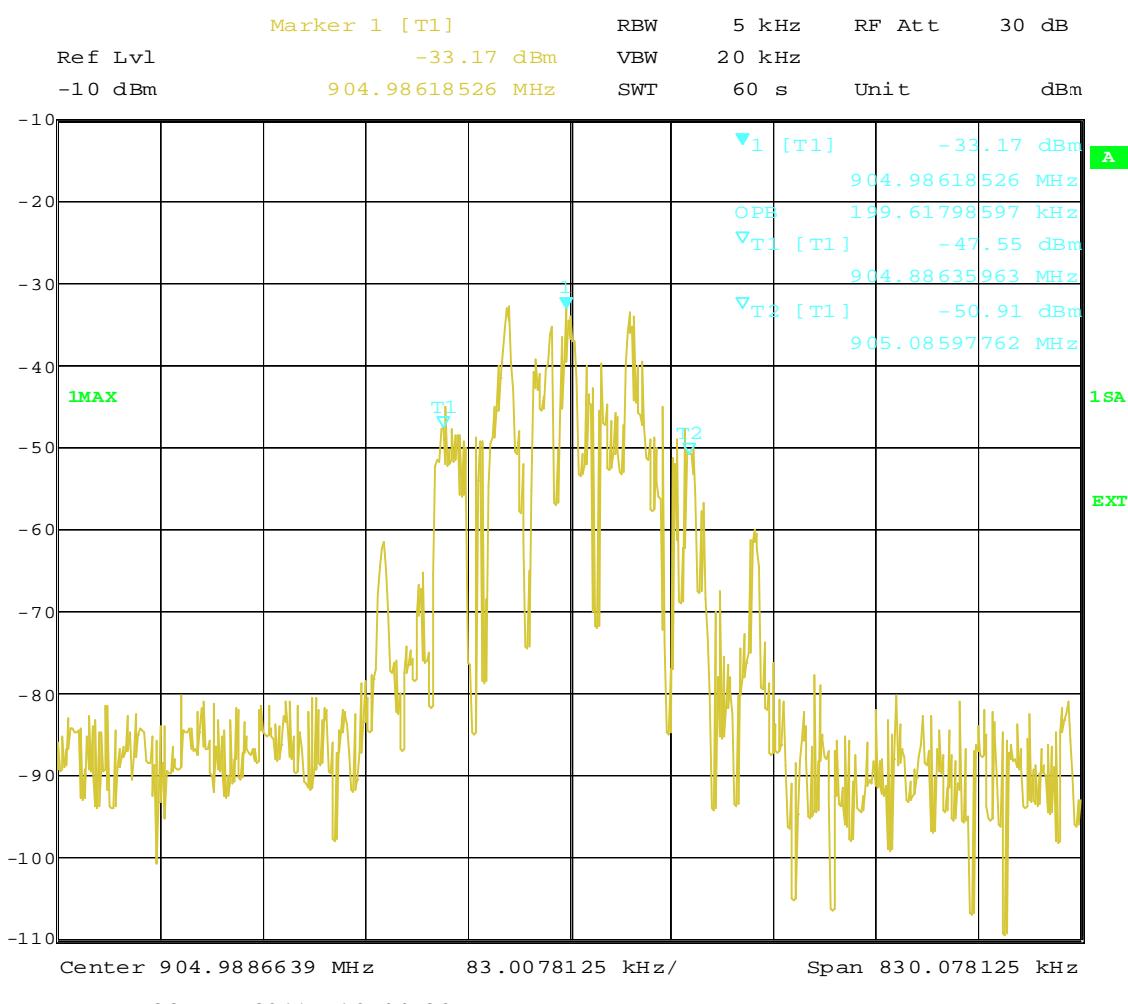
VBW: 20 kHz

Sweep time: 60s

Detector: Sample

Trace: Max Hold

Measured value	Limit value
kHz	kHz
200	-



**9. INSTRUMENTATION LIST**

Equipment	Manufacturer	Type	SEMKO No.	Last calibration /Next calibration
Measurement receiver	Rohde & Schwarz	ESCI	12798	2011-07-07 /2012-07-07
Antenna, Ultralog	Rohde & Schwarz	HL-562	30711	2009-10-23 /2012-10-23
Measurement receiver	Rohde & Schwarz	ESU40	13178	2011-07-04 /2012-07-04
Preamplifier	BONN	BLMA 0118-M	31246	2011-07-11 /2012-07-11
Antenna horn	Rohde & Schwarz	HF907	31245	2010-11-19 /2013-11-19
Band reject filter	K&L Microwave INC	-	7078	2011-09-17 /*
Measurement receiver	Rohde & Schwarz	ESCI	31686	2011-07-05 /2012-07-05
Artificial mains network	Rohde & Schwarz	ESH3-Z5	8768	2010-07-06 /2013-07-06
High pass filter	Microwave Circuits INC	H1G013G1	13142	2011-07-12 /2012-07-12

\* Shall be calibrated at each occasion of use.

## APPENDIX I – UNCERTAINTIES SUMMARY

The measurement uncertainty describes the overall uncertainty of the given measured value during operation of the EUT. Measurement uncertainty is calculated in accordance with EA-4/02-1997. All uncertainties are given with a level of confidence of approximately 95% (k=2).

Measurement uncertainty for radiated disturbance, 30 - 1000 MHz  $\pm 4,8$  dB

Measurement uncertainty for radiated disturbance, 1 - 10 GHz  $\pm 5.2$  dB

**APPENDIX II – PHOTO OF THE EUT**