Nemko TEST REPORT

Date:	**ESPOO 28.12.2012**	Page:	**1 (34)**
		Appendices	–

Number: No. 1 / 1 **223827A**

Date of handing in: 08.11.2012

Tested by:

Pekka Kälviäinen, Test Engineer

Reviewed by:

Timo Hietala, Test Engineer

SORT OF EQUIPMENT: **Digital hearing aid system**

MARKETING NAME:

TYPE: ***DM90***

MANUFACTURER: ***Comfort Audio AB***

CLIENT: **Comfort Audio AB**

ADDRESS: **Box 154, SE-30105, Halmstad, Sweden**

TELEPHONE: **+46 35 260 16 00**

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

Nemko Oy • P.O.Box 19, FI-02601 Espoo, Finland
Street address: Perkkaantie 11, FI-02600 Espoo
Telephone +358 (0)424 5454 1 • Telefax +358 (0)9 5489 6371

Summary of performed tests and test results

Section in CFR 47	*Section in RSS-GEN or RSS-210*		*Result*
15.247 (b)(1)	A8.4 (2)	Conducted peak output power	PASS
15.247 (d)	A8.5	Band-edge compliance of RF emissions	PASS
15.247 (d)	A8.5	Spurious RF conducted emissions	PASS
15.247 (d) 15.209	A8.5	Spurious radiated emissions	PASS
15.207	7.2.2	AC power line conducted emissions	PASS
15.247 (a)(1)	A8.1 (a)	20 dB bandwidth	PASS
15.247 (a)(1)	A8.1 (b)	Carrier frequency separation	PASS
15.247 (a)(1)(iii)	A8.1 (d)	Number of hopping frequencies	PASS
15.247 (a)/1)(iii)	A8.1 (d)	Time of occupancy	PASS

CISPR 22		*Radiated emissions 30-1000 MHz*	PASS, class B
CISPR 22		AC power line conducted emissions	PASS, class B

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

1. EUT and Accessory Information

1.1 EUT description

Digital hearing aid system

1.2 EUT and accessories

	unit	*type*	*s/n*
EUT1	**Digital hearing aid system**	**DM90**	**P27**
	AC mains charger	**FW7600/05**	**1108B**
	External Microphone	**-**	**-**
	Neck Loop Cable (long)	**K0807**	**-**
EUT2	**Digital hearing aid system (with temporary antenna connector)**	**DM90**	**P28**

Operating voltages

EUT:

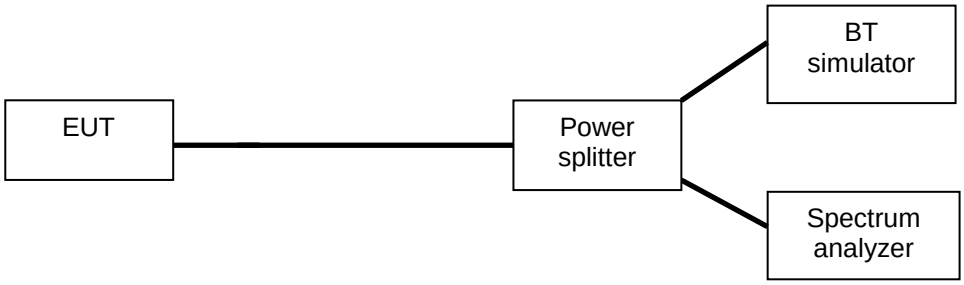
DM90: **internal re-chargeable Li-ion Battery, 3.7V 650mAh**
AC Charger: **115V 60Hz AC**

1.3 Additional information related to testing

Tested Technology:	**Frequency Hopping System, Bluetooth**	
Type of Unit	**Transmitter**	
Modulation:	**GFSK**	
Power Supply Requirement:	**Nominal**	**3.7V**
Transmit Frequency Range	**2400 MHz to 2483.5 MHz**	
Transmit Channels Tested:	**Channel Number**	**Channel Frequency (MHz)**
	2	**2402**
	40	**2442**
	78	**2480**

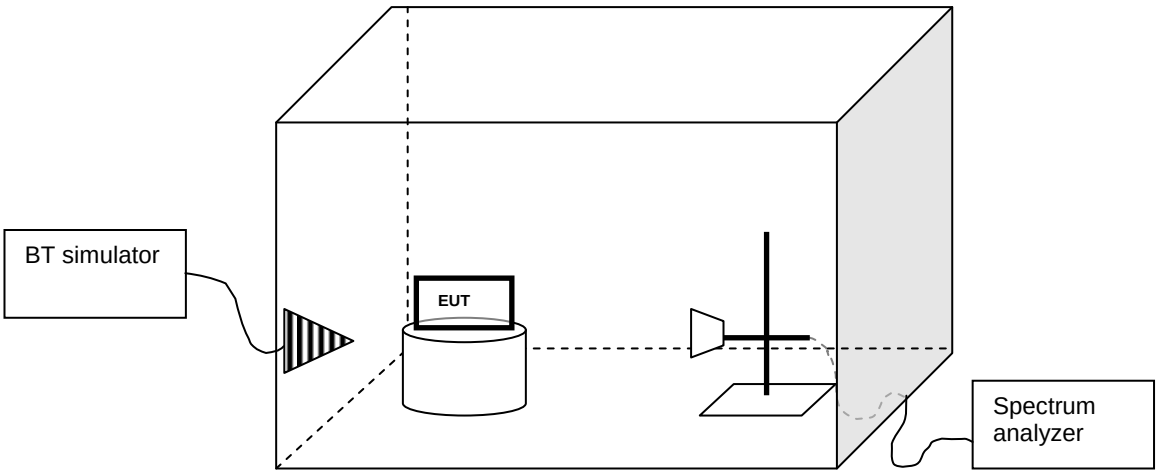
2. Test setups

Setup 1 (Conducted measurements)
The test was performed inside a shielded room. The Bluetooth simulator was used to control the EUT channel, number of EUT TX slots, enable/disable frequency hopping and modulate the TX signal with different bit patterns.



Setup 2 (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. In the corner of the chamber there was a communication antenna, which was connected to the BT simulator located outside the room. The tower and turn table were remotely controlled to turn the EUT and change the antenna polarization. The measured signal was routed from the measuring antenna to the spectrum analyzer. The Bluetooth simulator was used to control the EUT channel, number of EUT TX slots, enable/disable frequency hopping and modulate the TX signal with different bit patterns.



3. Standards and measurement methods

The test were performed in guidance of the CFR 47, FCC Rules Part 15 Subpart C, ANSI C63.4 (2003), CISPR 22 Ed. 6.0, Public notice DA 00-705, ANSI C63.10 (2009), IC standards RSS-GEN (Issue 3, December 2010) and RSS-210 (Issue 8, December 2010).

4. Test results

4.1 Conducted peak output power

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

EUT	**EUT2, setup 1**
Site name	**Nemko Oy / Perkkaa**
FCC rule part	**§ 15.247 (b)(1)**
Section in RSS-210	**A8.4 (2)**
Date of testing	**19.11.2012**
Test equipment	**566, 546, 383**
Test conditions	**22 °C, 31 % RH**

4.1.1 EUT operation mode

EUT operation mode	**Connection, static PRBS**
EUT channel	**0, 40 and 78**

4.1.2 Test method and limit

The measurement is made according to Public notice DA 00-705 and IC standard RSS-210.

Frequency range (MHz)	*Limit (W)*	*Limit (dBm)*
2400 – 2483.5	**≤ 1.0**	**≤ 30**

4.1.3 Test results

Channel / f (MHz)	*P (dBm)*	*Result*
0 / 2402	**-12.30**	**PASS**
40 / 2442	**-10.13**	**PASS**
78 / 2480	**-9.37**	**PASS**

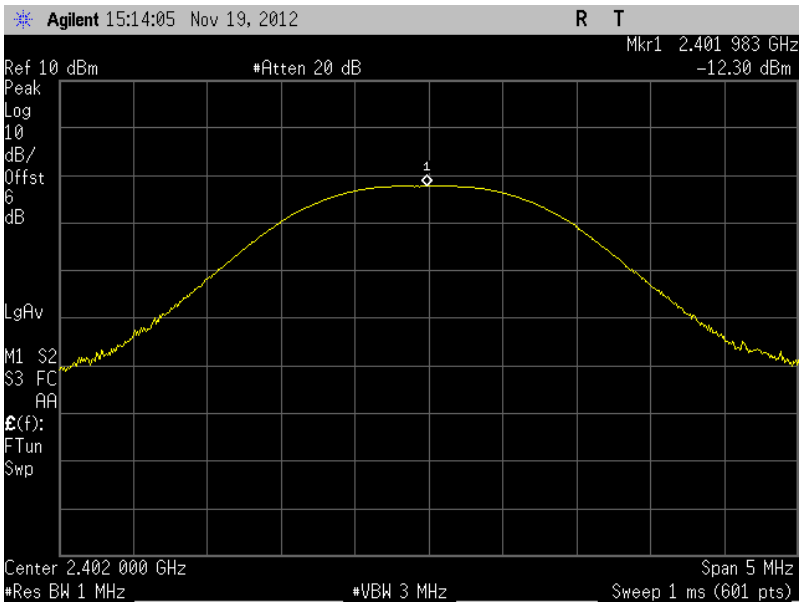


Figure 1. channel 0, conducted peak output power

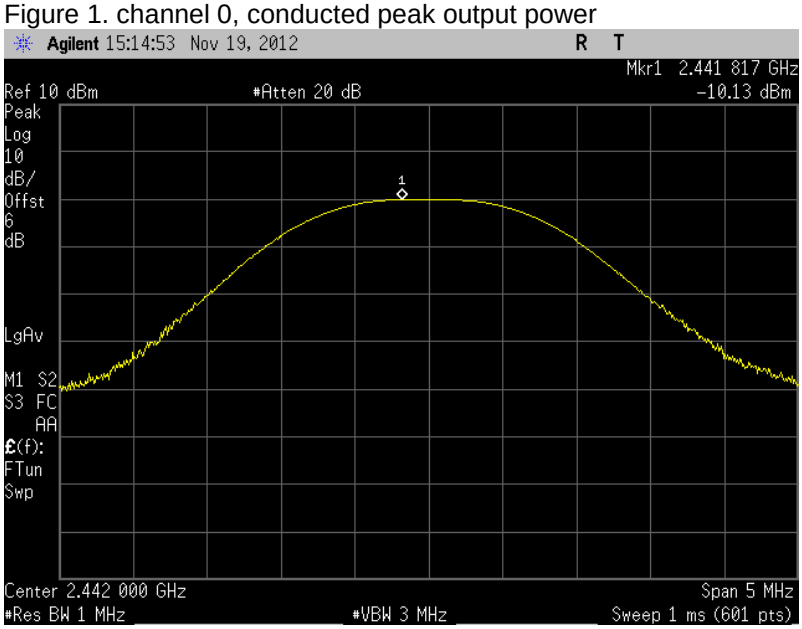


Figure 2. channel 40, conducted peak output power

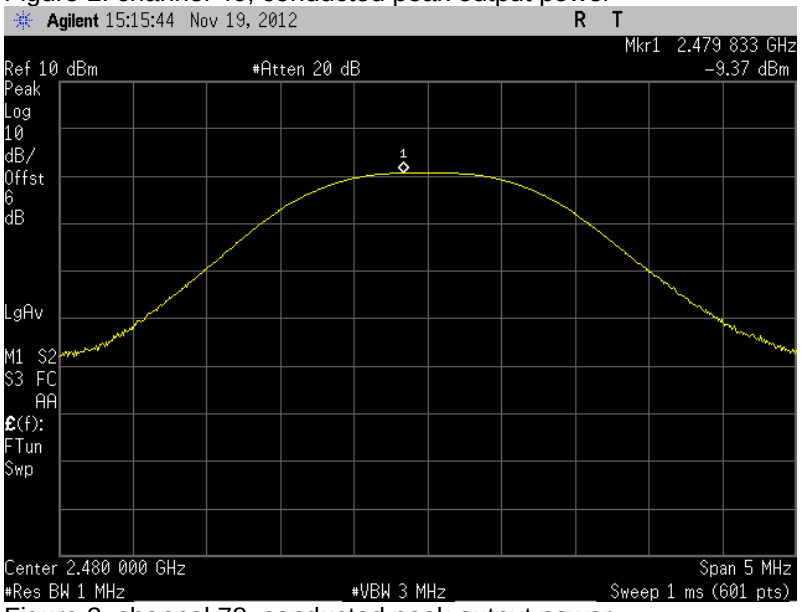


Figure 3. channel 78, conducted peak output power

4.2 Band-edge compliance of RF emissions

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

EUT	**EUT1, setup 2**
Site name	**Nemko Oy / Perkkaa**
FCC rule part	**§ 15.247 (d)**
Section in RSS-210	**A8.5**
Date of testing	**13.11.2012**
Test equipment	**566, 546, 525, 564, 350**
Test conditions	**22 °C, 30 % RH**
Test result	**PASS**

4.2.1 EUT operation mode

EUT operation mode	**Connection, static PRBS**
EUT channel	**Hopping, 0 and 78**

4.2.2 Test method and limit

The measurement is made according to Public notice DA 00-705 and IC standard RSS-210.

3m measurement distance

Frequency range (MHz)	*Limit Average (dBµV/m)*	*Limit Peak (dBµV/m)*
Below 2390 and above 2483.5	**≤ 54**	**≤ 74**

The measurement results were obtained as described below.

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

Where

U_{RX} receiver reading

A_{CABLE} attenuation of the cable

AF antenna factor

G_{PREAMP} gain of the preamplifier

Duty Cycle correction factor(dB) -30.67 dB was used. (RFon 2.927ms/100ms)

4.2.3 Test results

Hopping:

Below 2390 MHz:

Detector (RBW: 1MHz)	*E (dBµV/m)*	*Result*
Peak	**40.92**	**PASS**
Average	**10.25**	**PASS**

Hopping:

Above 2483.5 MHz:

Detector (RBW: 1MHz)	*E (dBµV/m)*	*Result*
Peak	**53.71**	**PASS**
Average	**23.04**	**PASS**

Channel 0:

Below 2390 MHz:

Detector (RBW: 1MHz)	*E (dBµV/m)*	*Result*
Peak	**38.76**	**PASS**
Average	**8.09**	**PASS**

Channel 78:

Above 2483.5 MHz:

Detector (RBW: 1MHz)	*E (dBµV/m)*	*Result*
Peak	**40.07**	**PASS**
Average	**9.40**	**PASS**

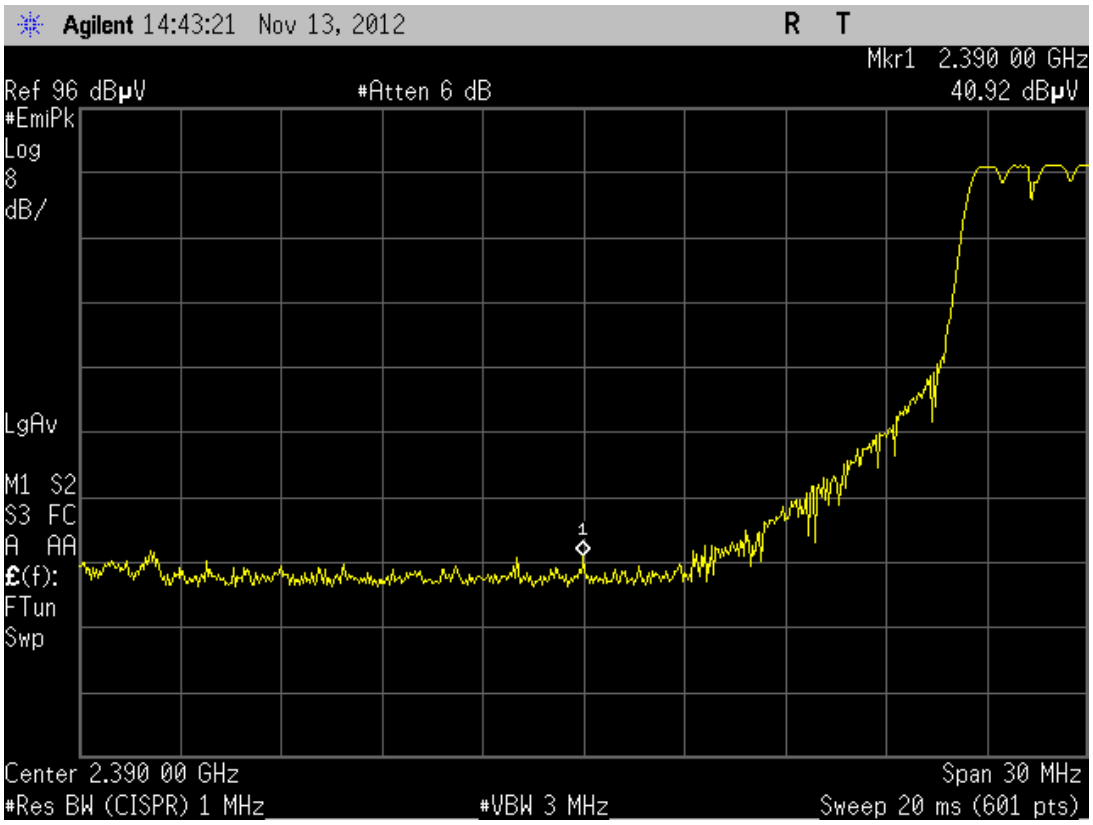


Figure 4. Hopping on, Band-edge compliance, low end

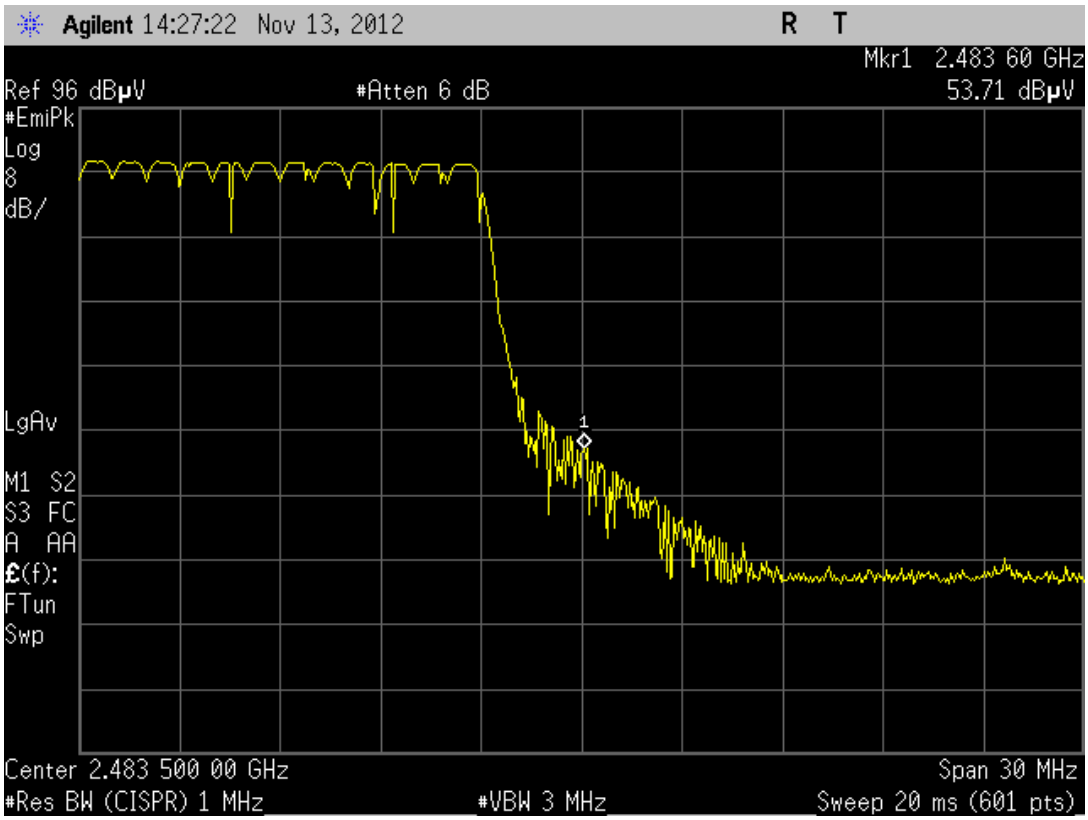


Figure 5. Hopping on, Band-edge compliance, high end

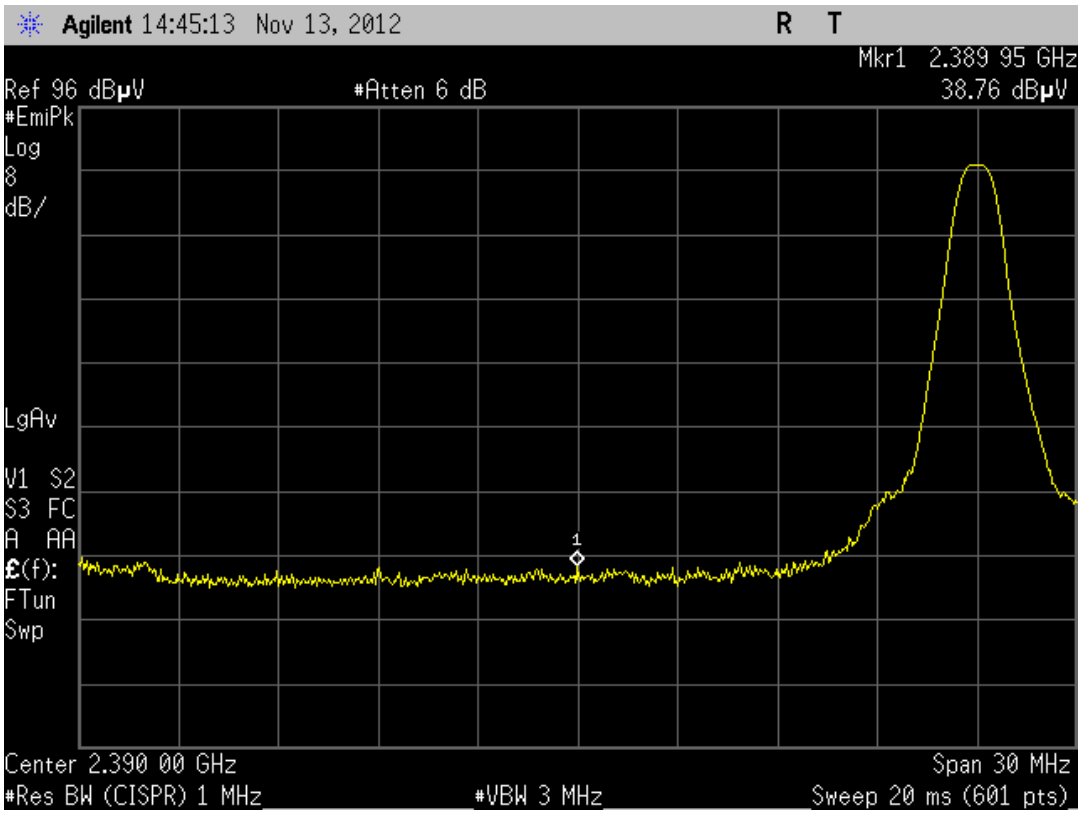


Figure 6. Hopping off, Channel 0, Band-edge compliance, low end

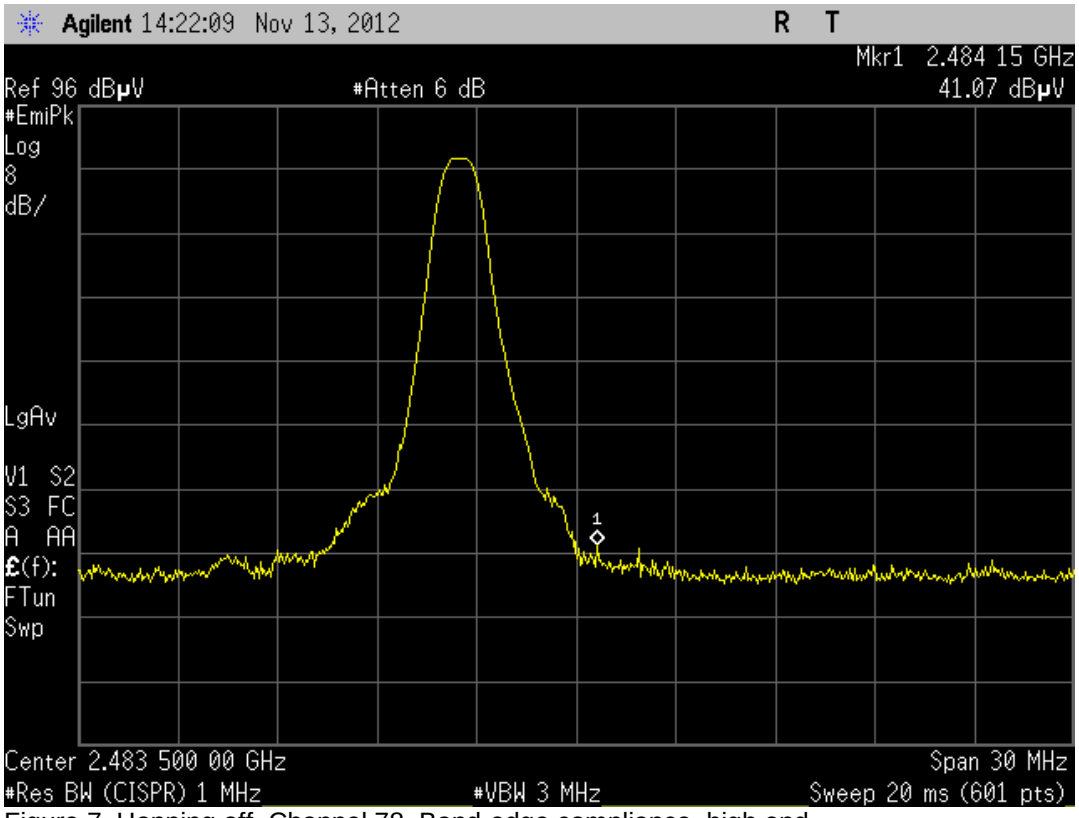


Figure 7. Hopping off, Channel 78, Band-edge compliance, high end

4.3 Spurious RF conducted emission

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

EUT	**EUT2, setup 1**
Site name	**Nemko Oy / Perkkaa**
FCC rule part	**§ 15.247 (d)**
Section in RSS-210	**6.2.2(o), e1**
Date of testing	**19.11.2012**
Test equipment	**566, 559, X1**
Test conditions	**22 °C, 31 % RH**

4.3.1 EUT operation mode

EUT operation mode	**Connection, static PRBS**
EUT channel	**0, 40 and 78**

4.3.2 Test method and limit

The measurement is made according to Public notice DA 00-705 and IC standard RSS-210.
The device was tested from 30 MHz to the tenth harmonic of the highest fundamental frequency.

Frequency range (MHz)	*Limit (dBc)*
≤ 25000	**≤ -20**

4.3.3 Test results

Channel 0 /2402 MHz

Frequency (GHz)	*P (dBc)*	*Result*
1.61	**-32.47**	**PASS**
4.80	**-38.11**	**PASS**

Channel 40 /2442 MHz

Frequency (GHz)	*P (dBc)*	*Result*
1.63	**-35.94**	**PASS**
4.87	**-35.72**	**PASS**

Channel 78 /2480 MHz

Frequency (GHz)	*P (dBc)*	*Result*
1.65	**-35.62**	**PASS**
4.94	**-40.55**	**PASS**

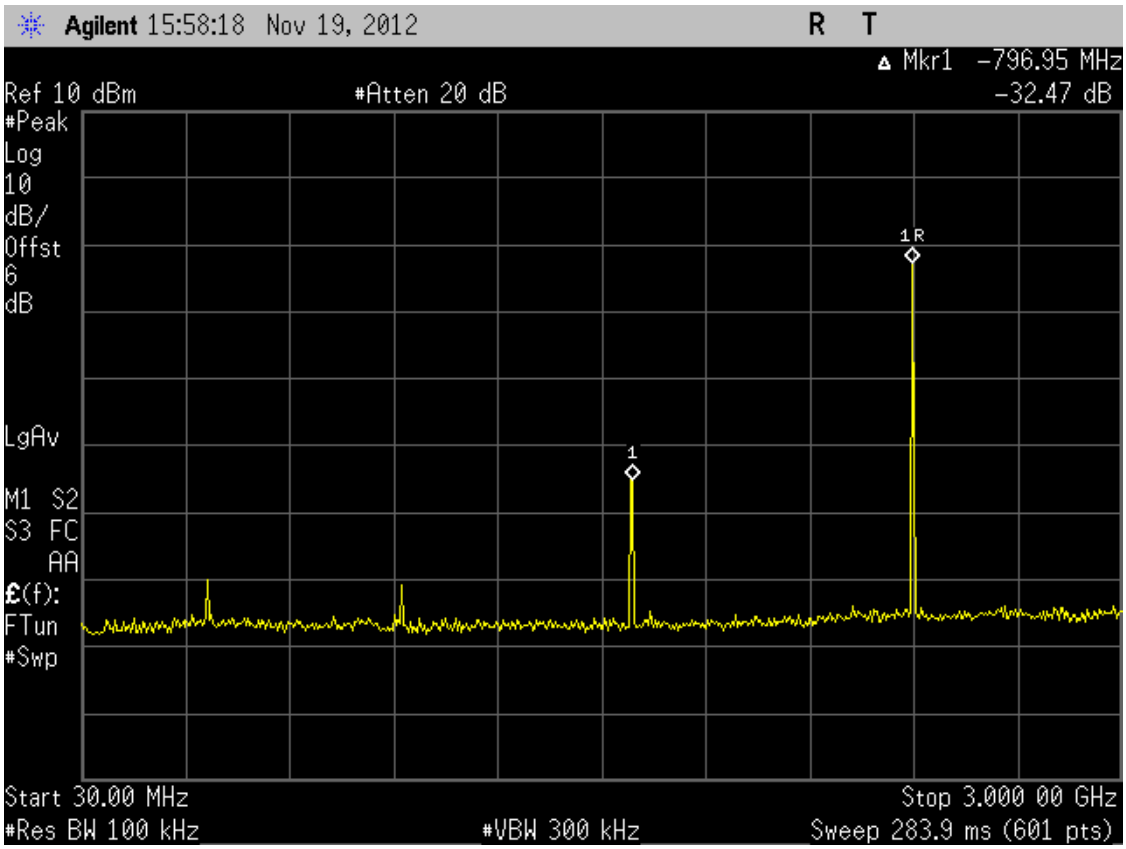


Figure 8. channel 0, spurious RF conducted emission

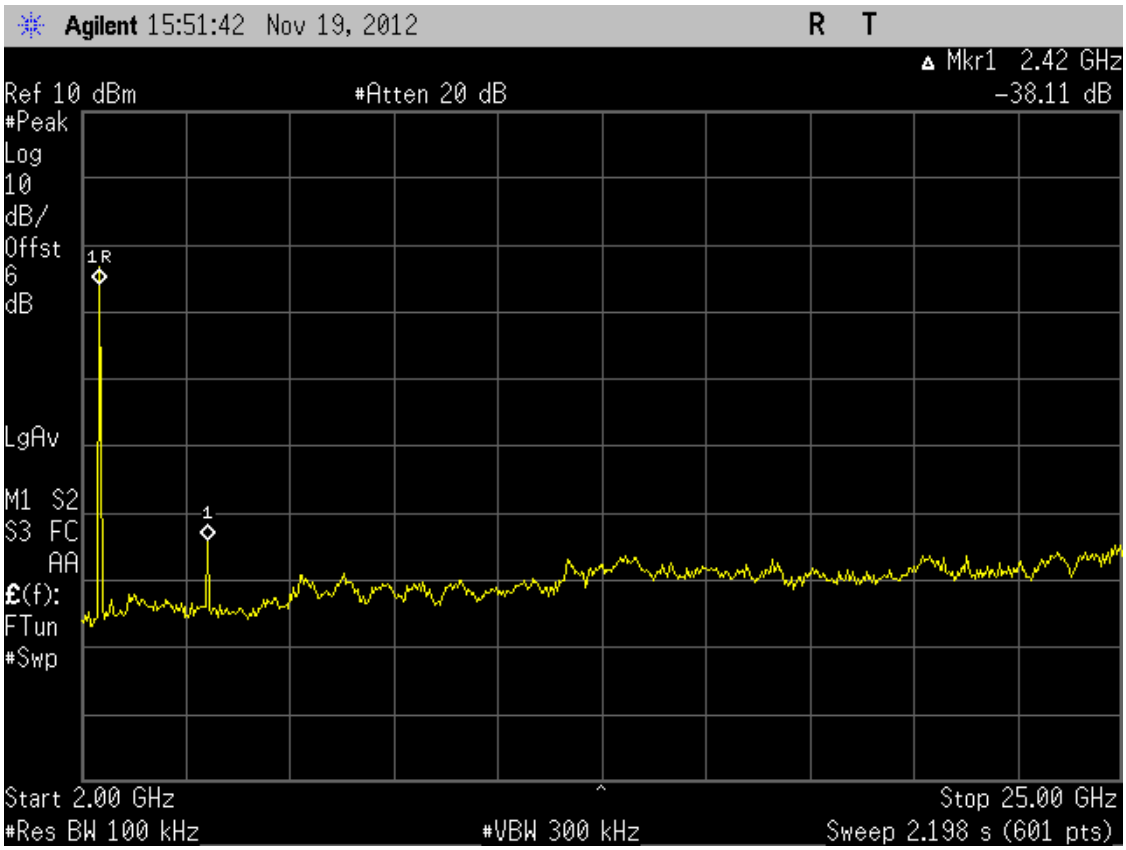


Figure 9. channel 0, spurious RF conducted emission

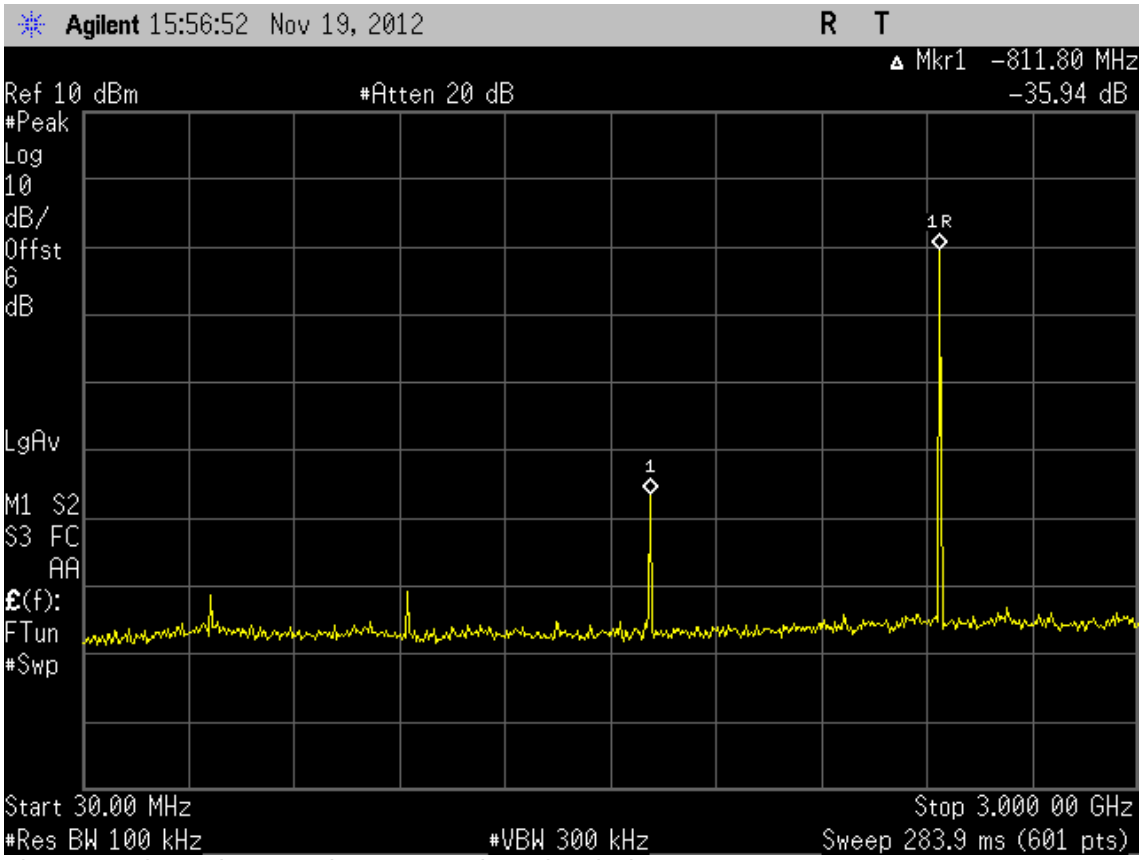


Figure 10. channel 40, spurious RF conducted emission

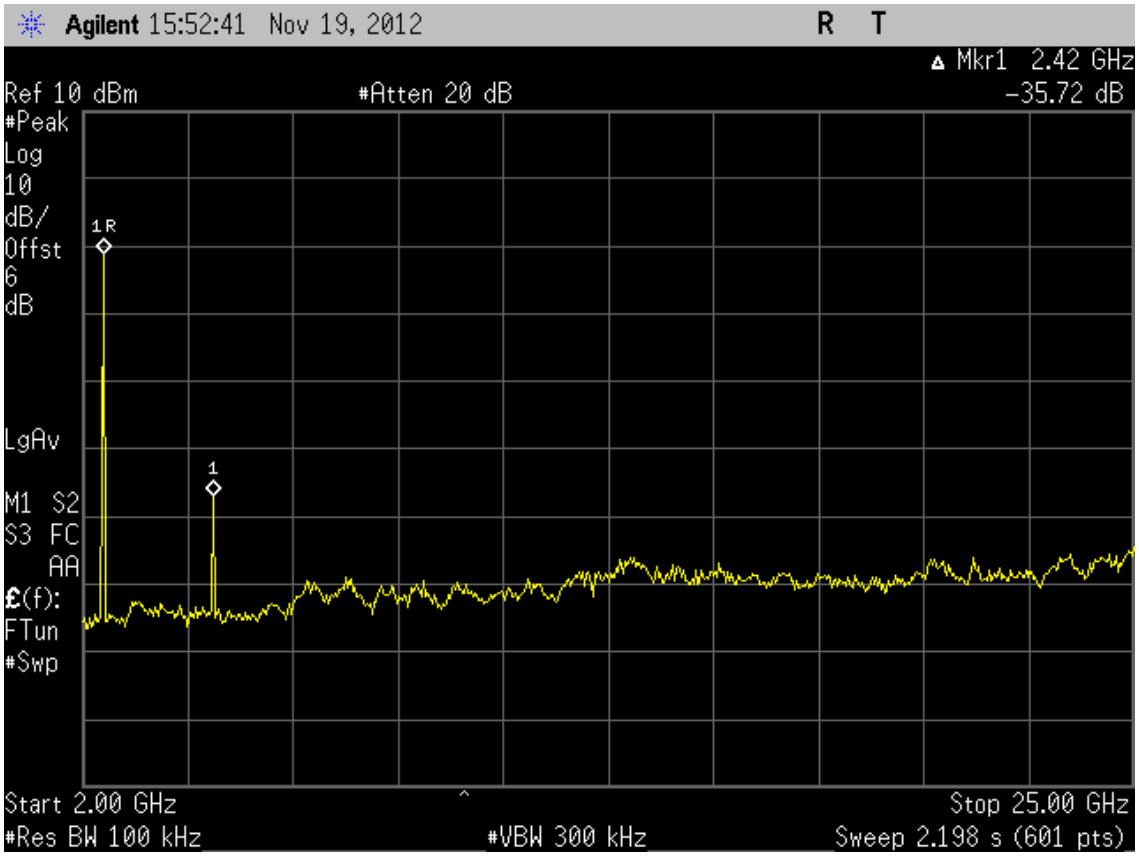


Figure 11. channel 40, spurious RF conducted emission

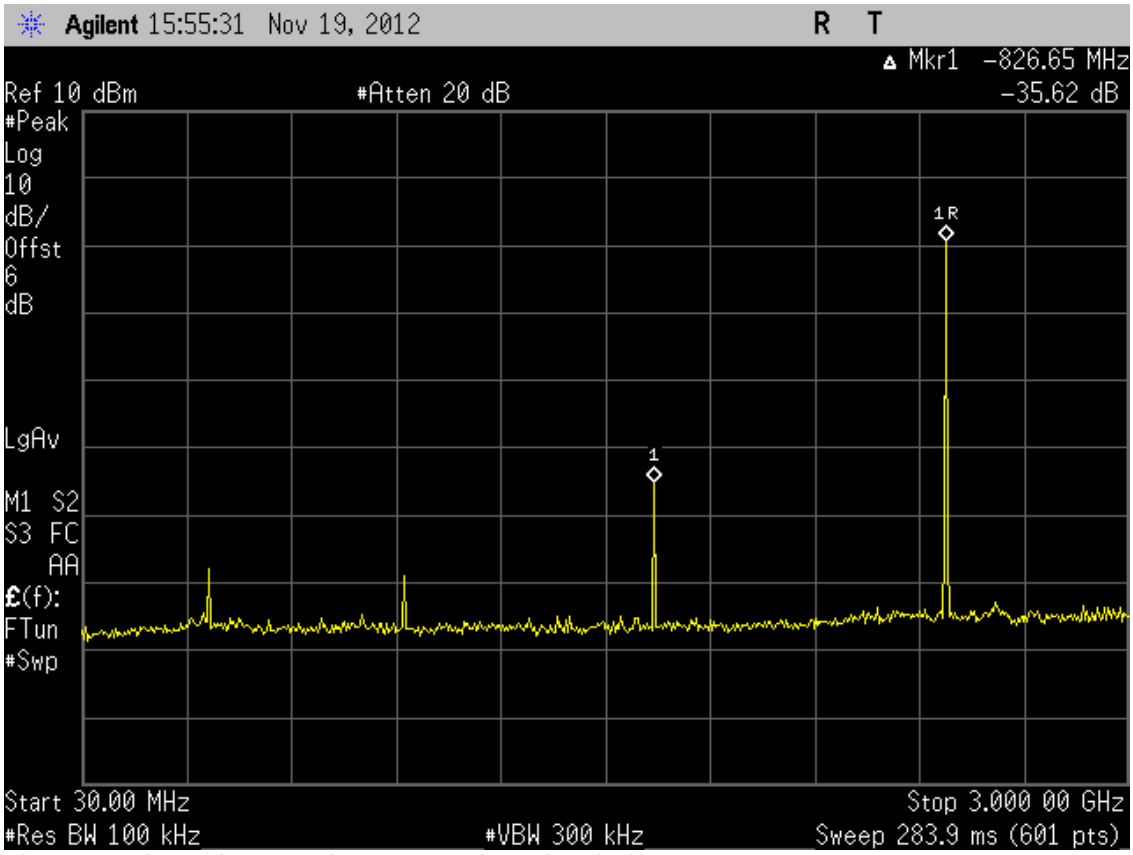


Figure 12. channel 78, spurious RF conducted emission

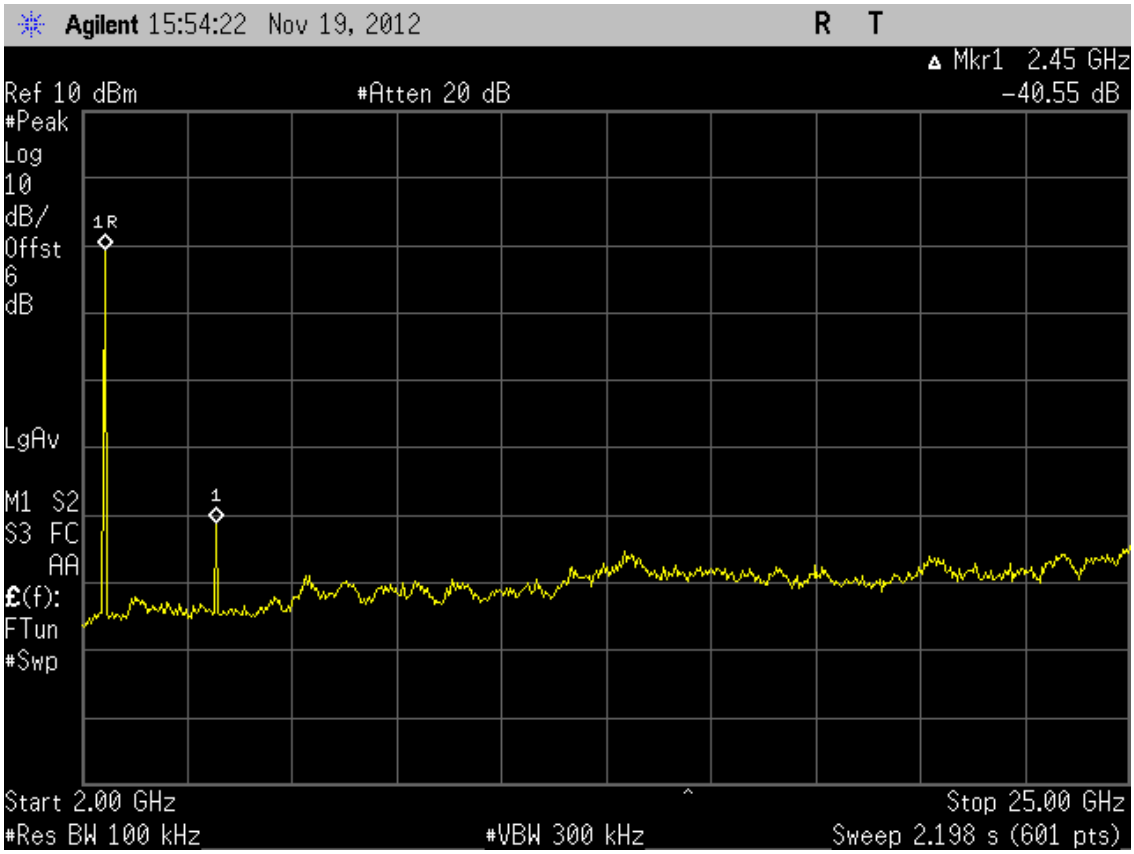


Figure 13. channel 78, spurious RF conducted emission

4.4 Spurious radiated emission

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

EUT	**EUT1, setup 2**
Site name	**Nemko Oy / Perkkaa**
FCC rule part	**§ 15.247 (d), § 15.209**
Section in RSS-210	**A8.5**
Date of testing	**13.11.2012 and 07.12.2012**
Test equipment	**566, 709, 564, 559, 525, 319, 546, ,544, 393, 350, 88, 710**
Test conditions	**22 °C, 31 % RH**

4.4.1 EUT operation mode

EUT operation mode	**Connection, static PRBS**
EUT channel	**Channel 0, 40 and 78**
EUT operation voltage	**115 V / 60 Hz**

4.4.2 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. During the test the distance from the EUT to the measuring antenna was 3 m. The excess length of the cables of the EUT were made into bundles 30-40 cm in length (see photograph 1). 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 polarizations.

Vertical and horizontal polarizations in the frequency range 30 – 1000 MHz was measured by using the peak detector. During the peak detector scan. the turntable was rotated from 0° to 360° with 30° step 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.

Vertical and horizontal polarizations in the frequency range 1000 – 25000 MHz was measured by using the peak detector. During the peak detector scan. the turntable was rotated from 0° to 360° with 15° step with the antenna heights 1.0 m, 1,5m, 2.0m, 2,5m and 3.0 m. The highest levels of the radiated interference field strength measured by using the average and peak detectors were recorded.

Minimum Standard: In any 100kHz bandwidth outside the frequency band in which the transmitter is operating, emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits:

Emissions falling in the restricted bands of 15.205 shall not exceed the limits shown in §15.209.
At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions.

3m measuring distance, FCC Part 15.209

Frequency band MHz	*limit, Quasi peak detector dB(µV/m)*
30 - 88	**40**
88 - 216	**43.5**
216 - 960	**46**
960 - 1000	**54**

Frequency band MHz	*limit, average detector dB(µV/m)*	*limit, peak detector dB(µV/m)*
1000 - 25000	**54**	**74**

3m measuring distance, CISPR 22, class B

Frequency band MHz	*limit, Quasi peak detector dB(µV/m)*
30 - 230	**40**
230 - 1000	**47**

The EUT was tested on three orthogonal axis.
The device was tested from 30 MHz to the tenth harmonic of the highest fundamental frequency per 15.33.
The device was tested on three channels per 15.31(l).

The CFR 47 Part 15. Subpart B. Class B limit of 500 µV/m has been calculated to correspond 54 dB(µV/m) as follows: [dB(µV/m)]=20log[µV/m].

The measurement results were obtained as described below.

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

Where

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

Duty Cycle correction factor(dB) -30.67 dB was used. (RFon 2.927ms/100ms)

4.4.3 Test results

Below 1GHz, Channel 40 (bw120kHz)

Frequency MHz	*Quasi peak dB(µV/m)*	*Limit dB(µV/m)*	*Margin dB*	*Result*
30.08	**33.7**	**40**	**6.3**	**PASS**
30.80	**35.2**	**40**	**4.8**	**PASS**
31.74	**34.0**	**40**	**6.0**	**PASS**
33.21	**32.3**	**40**	**7.7**	**PASS**
33.64	**35.0**	**40**	**5.0**	**PASS**
34.24	**33.6**	**40**	**6.4**	**PASS**

Above 1GHz. Channel 0

Frequency GHz	*Peak dB(µV/m)*	*Limit dB(µV/m)*	*Margin dB*	*Result*
4804	**60.06**	**74**	**13.94**	**PASS**

Above 1GHz. Channel 0

Frequency GHz	*Average dB(µV/m)*	*Limit dB(µV/m)*	*Margin dB*	*Result*
4804	**29.39**	**54**	**24.61**	**PASS**

Above 1GHz. Channel 40

Frequency GHz	*Peak dB(µV/m)*	*Limit dB(µV/m)*	*Margin dB*	*Result*
4884	**54.34**	**74**	**19.66**	**PASS**

Above 1GHz. Channel 40

Frequency GHz	*Average dB(µV/m)*	*Limit dB(µV/m)*	*Margin dB*	*Result*
4884	**23.67**	**54**	**30.33**	**PASS**

Above 1GHz. Channel 78

Frequency GHz	*Peak dB(µV/m)*	*Limit dB(µV/m)*	*Margin dB*	*Result*
4960	**56.50**	**74**	**17.50**	**PASS**

Above 1GHz. Channel 78

Frequency GHz	*Average dB(µV/m)*	*Limit dB(µV/m)*	*Margin dB*	*Result*
4960	**25.83**	**54**	**28.17**	**PASS**

.

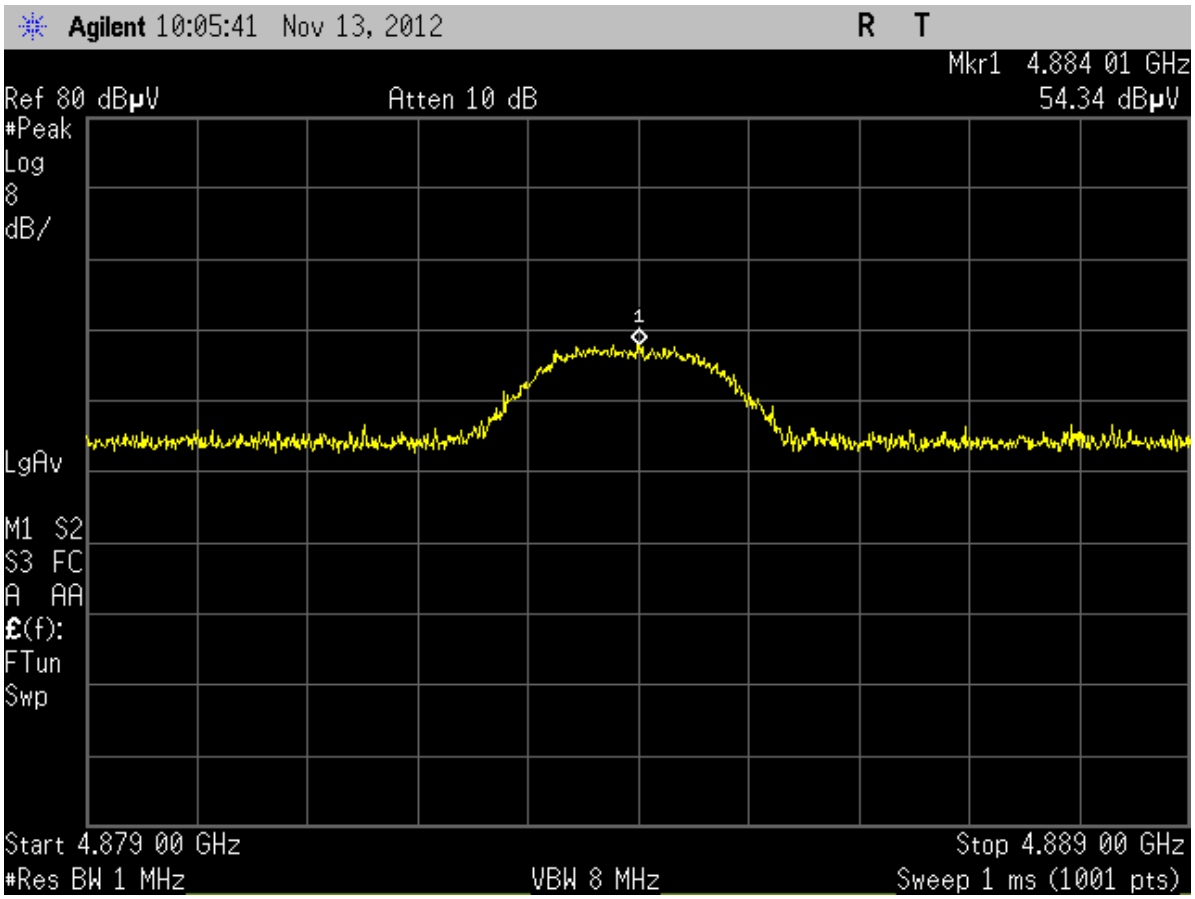


Figure 14. channel 40, spurious RF radiated emission

4.5 AC power line conducted emissions

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

EUT	**EUT1, setup 2**
Site name	**Nemko / Perkkaa**
FCC rule part	**§ 15.207 / CISPR 22**
Section in RSS-210	**7.2.2**
Date of testing	**07.12.2012**
Test equipment	**745, 348, 338, 546**
Test conditions	**22 °C, 30 % RH**
Test result	**PASS**

4.5.1 Test method and limit

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 standing on the reference ground plane (see photograph 2). The excess length 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 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.

CISPR 22, class B limits

Frequency band MHz	*Quasi-peak dB(µV)*	*Average limit dB(µV)*
0.15 – 0.5	**66 – 56**	**56 – 46**
0.5 – 5	**56**	**46**
5 - 30	**60**	**50**

4.5.2 EUT operation mode

EUT operation mode	**Connection, static PRBS**
EUT channel	**Hopping**
EUT operation voltage	**115 V / 60 Hz**

4.5.3 Test results

Line N

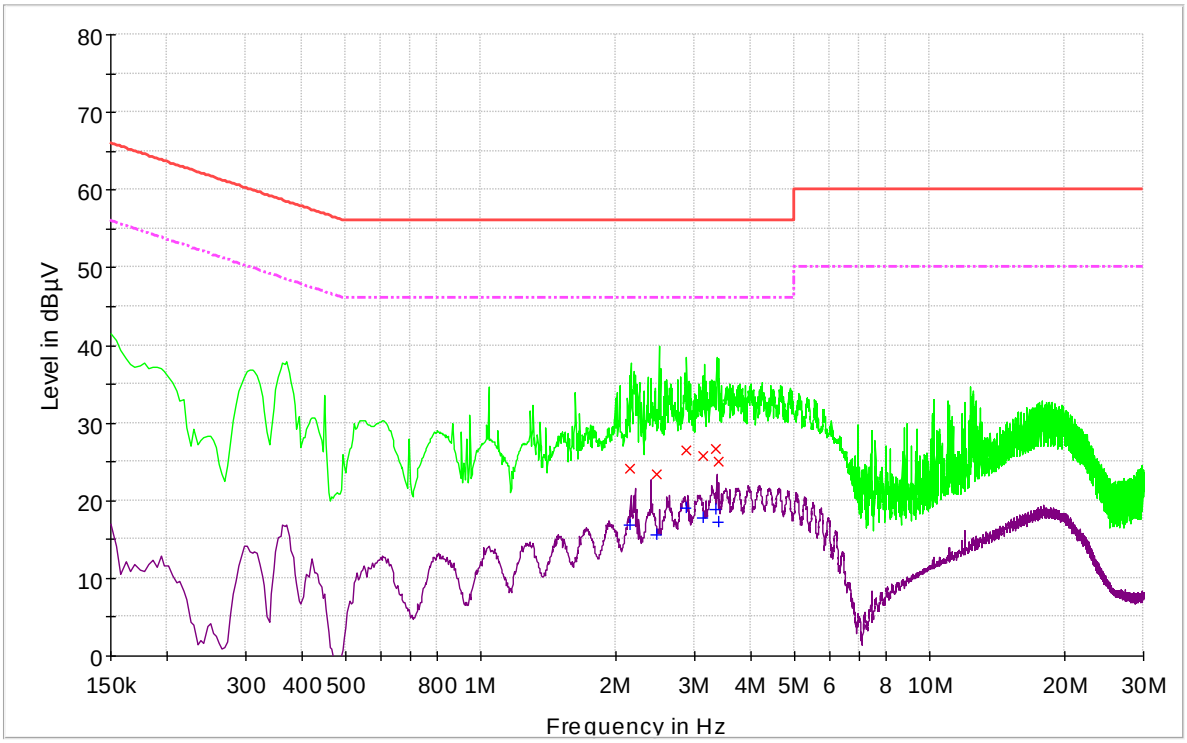


Figure 15. AC powerline emissions, Line N

Highest emissions (bw 10kHz):

Frequency MHz	*Quasi-peak dB(µV)*	*Limit value dB(µV)*	*Margin dB*	*Result*
2.150	**24.1**	**56.0**	**31.9**	**Pass**
2.474	**23.4**	**56.0**	**32.6**	**Pass**
2.867	**26.4**	**56.0**	**29.6**	**Pass**
3.140	**25.8**	**56.0**	**30.2**	**Pass**
3.348	**26.7**	**56.0**	**29.3**	**Pass**
3.394	**25.1**	**56.0**	**30.9**	**Pass**

Frequency MHz	*Average dB(µV)*	*Limit value dB(µV)*	*Margin dB*	*Result*
2.150	**16.9**	**46.0**	**29.1**	**Pass**
2.474	**15.6**	**46.0**	**30.4**	**Pass**
2.867	**19.0**	**46.0**	**27.0**	**Pass**
3.140	**17.8**	**46.0**	**28.2**	**Pass**
3.348	**18.9**	**46.0**	**27.1**	**Pass**
3.394	**17.3**	**46.0**	**28.7**	**Pass**

Line L

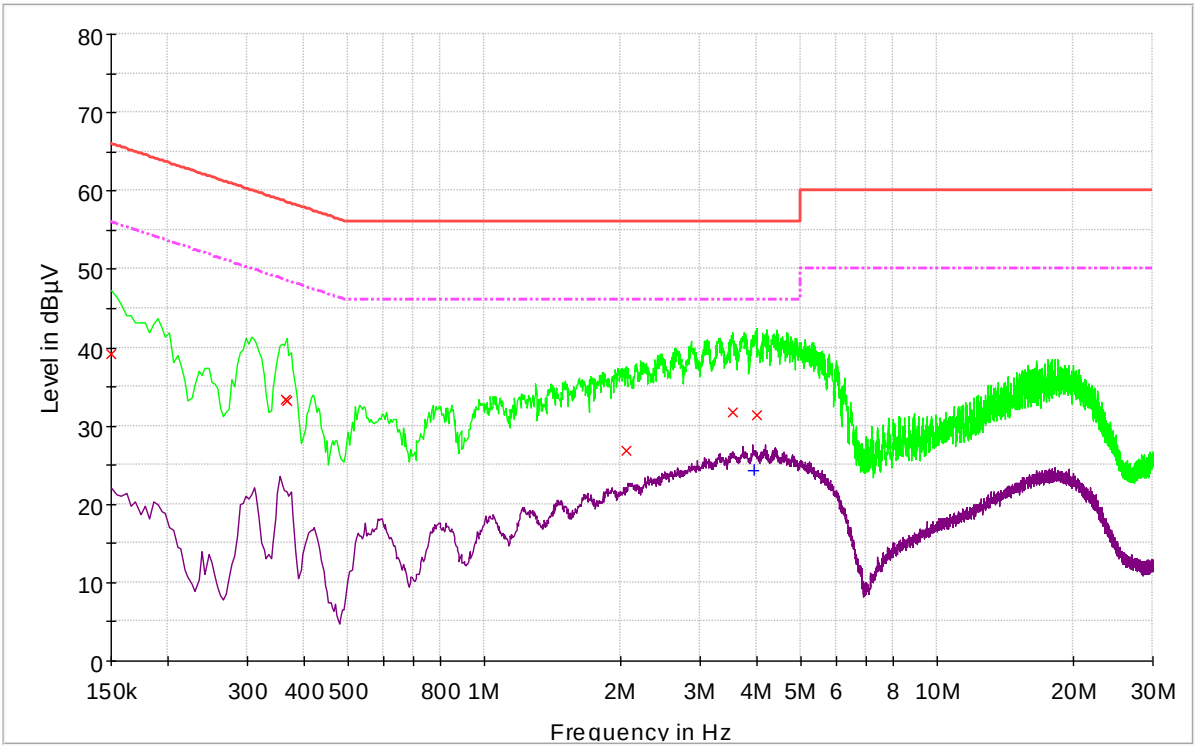


Figure 16. AC powerline emissions, Line L

Highest emissions (bw 10kHz):

Frequency MHz	*Quasi-peak dB(µV)*	*Limit value dB(µV)*	*Margin dB*	*Result*
0.150	**39.2**	**66.0**	**26.8**	**Pass**
0.365	**33.4**	**58.6**	**25.2**	**Pass**
0.368	**33.3**	**58.5**	**25.3**	**Pass**
2.060	**26.9**	**56.0**	**29.1**	**Pass**
3.536	**31.8**	**56.0**	**24.2**	**Pass**
4.018	**31.5**	**56.0**	**24.5**	**Pass**

Frequency MHz	*Average dB(µV)*	*Limit value dB(µV)*	*Margin dB*	*Result*
3.948	**24.4**	**46.0**	**21.6**	**Pass**

4.6 20 dB bandwidth

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

EUT	**EUT2, setup 1**
Site name	**Nemko Oy / Perkkaa**
FCC rule part	**§ 15.247 (a)(1)**
Section in RSS-210	**A8.1 (a)**
Date of testing	**19.11.2012**
Test equipment	**566, 546, 383**
Test conditions	**22 °C, 31 % RH**

4.6.1 EUT operation mode

EUT operation mode	**Connection, static PRBS**
EUT channel	**0, 40 and 78**

4.6.2 Test method and limit

The measurement is made according to Public notice DA 00-705 and IC standard RSS-210.

Limit (MHz)
N/A

4.6.3 Test results

EUT Channel / f (MHz)	*20 dB bandwidth (MHz)*
0 / 2402	**1.020**
40/ 2442	**0.954**
78 /2480	**0.939**

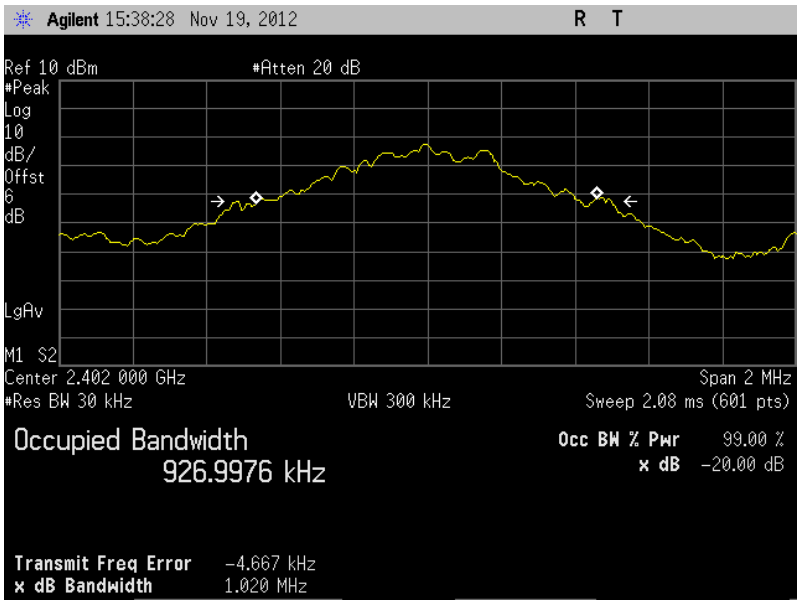


Figure 17. channel 0, 20 dB bandwidth

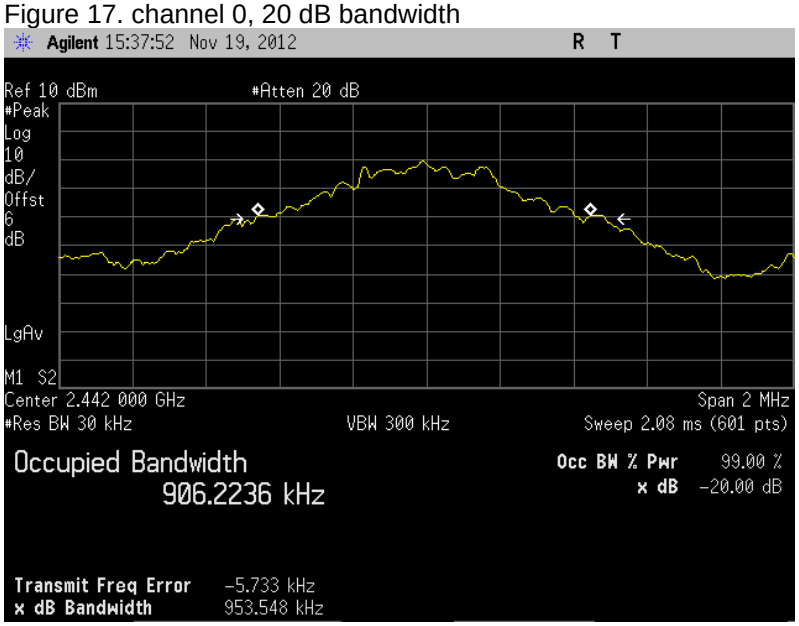


Figure 18.channel 40, 20 dB bandwidth

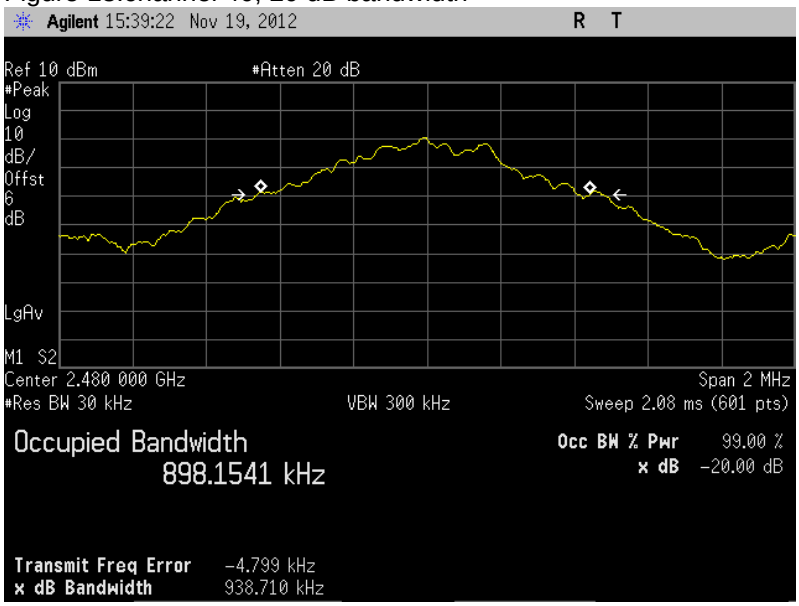


Figure 19. channel 78, 20 dB bandwidth

4.7 Carrier frequency separation

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

EUT	**EUT2, setup 1**
Site name	**Nemko Oy / Perkkaa**
FCC rule part	**§ 15.247 (a)(1)**
Section in RSS-210	**A8.1 (b)**
Date of testing	**19.11.2012**
Test equipment	**566, 546, 383**
Test conditions	**22 °C, 31 % RH**

4.7.1 EUT operation mode

EUT operation mode	**Connection, static PRBS**
EUT channel	**Hopping**

4.7.2 Test method and limit and test results

The measurement is made according to Public notice DA 00-705 and IC standard RSS-210.

Limit (MHz)
≥ 0.025 or 2/3 of the 20 dB BW

4.7.3 Test results

Carrier frequency separation (MHz)	*Result*
0.992	**PASS**

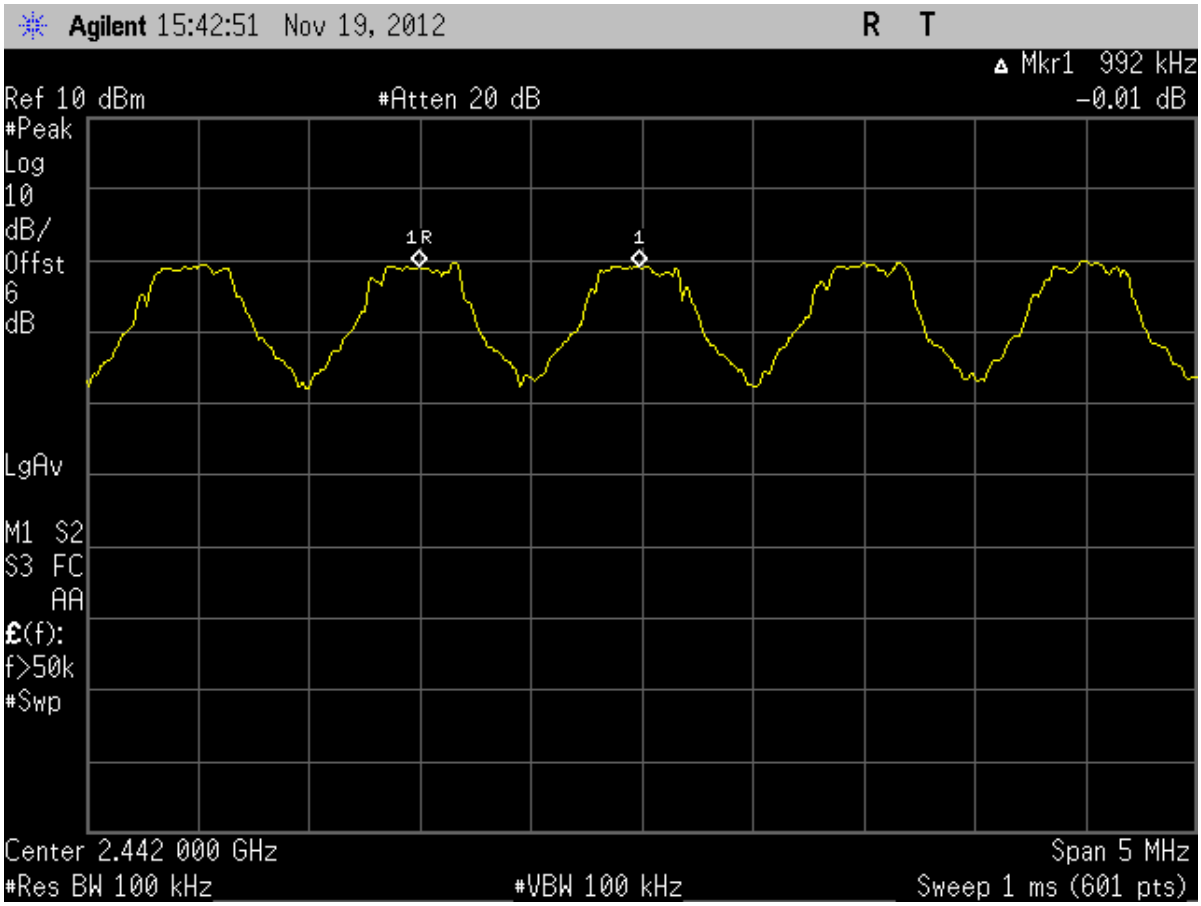


Figure 20. Hopping on, carrier frequency separation of channels 39 / 2441MHz and 40 / 2442MHz

4.8 Number of hopping frequencies

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

EUT	**EUT2, setup 1**
Site name	**Nemko Oy / Perkkaa**
FCC rule part	**§ 15.247, (a)(1)(iii)**
Section in RSS-210	**A8.1 (d)**
Date of testing	**19.12.2012**
Test equipment	**566, 546, 383**
Test conditions	**22 °C,31 % RH**

4.8.1 EUT operation mode

EUT operation mode	**Connection, static PRBS**
EUT channel	**Hopping**

4.8.2 Test method and limit

The measurement is made according to Public notice DA 00-705 and IC standard RSS-210.

limit (Number)
≥ 15

4.8.3 Test results

Number of hopping frequencies	*Result*
≥ 15	**PASS**

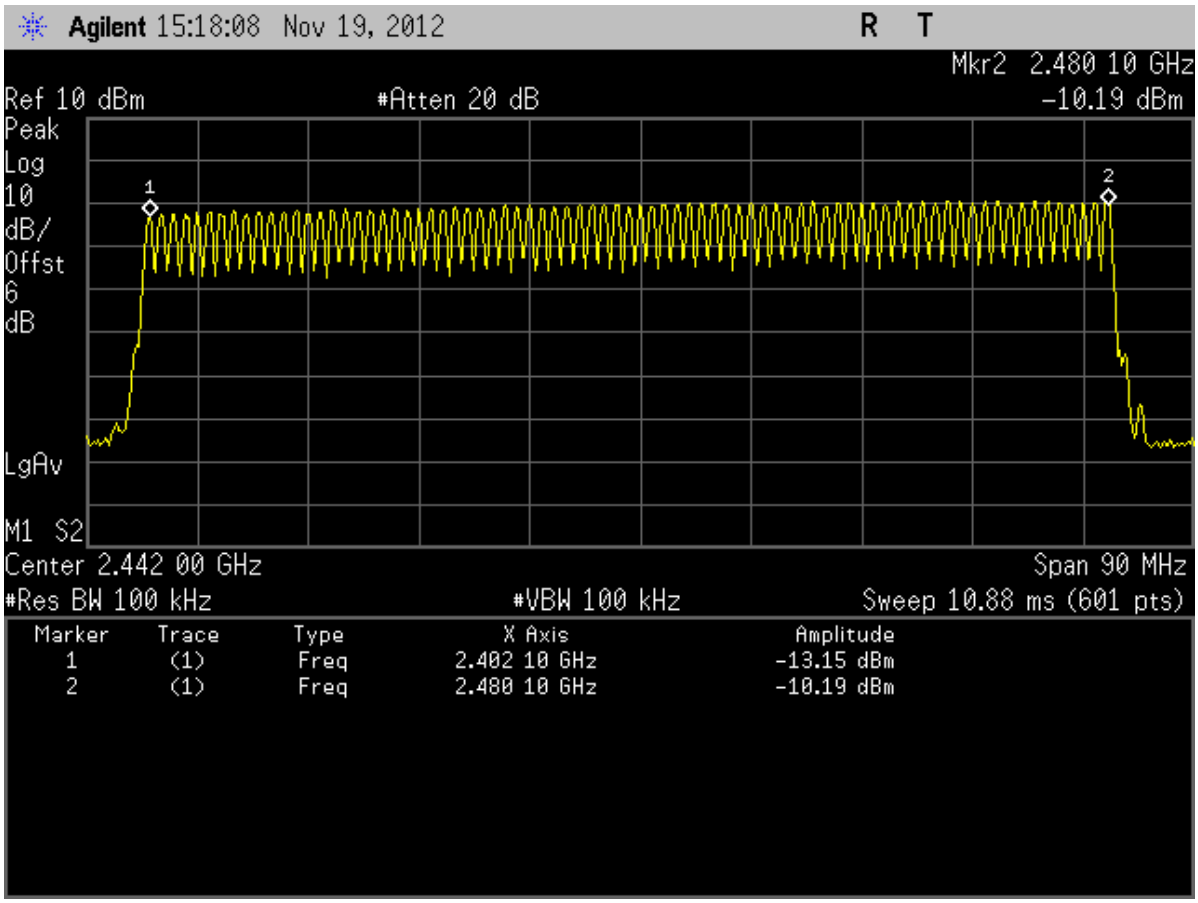


Figure 21. Hopping on, number of hopping frequencies

4.9 Time of occupancy

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

EUT	**EUT2, setup 1**
Site name	**Nemko Oy / Perkkaa**
FCC rule part	**§ 15.247 (a)(1)(iii)**
Section in RSS-210	**A8.1 (d)**
Date of testing	**19.11.2012**
Test equipment	**566, 546, 383**
Test conditions	**22 °C, 31 % RH**

4.9.1 EUT operation mode

EUT operation mode	**Connection, static PRBS**
EUT channel	**Hopping**

4.9.2 Test method and limit

The measurement is made according to Public notice DA 00-705 and IC standard RSS-210 as follows:

The total time of occupancy is obtained by multiplying the measured number of transmissions occurred during 31.6 second period with the duration of one transmission.

Limit (s)
≤ 0.4

4.9.3 Test results

Time of occupancy, t (s)	*Result*
0.290	**PASS**

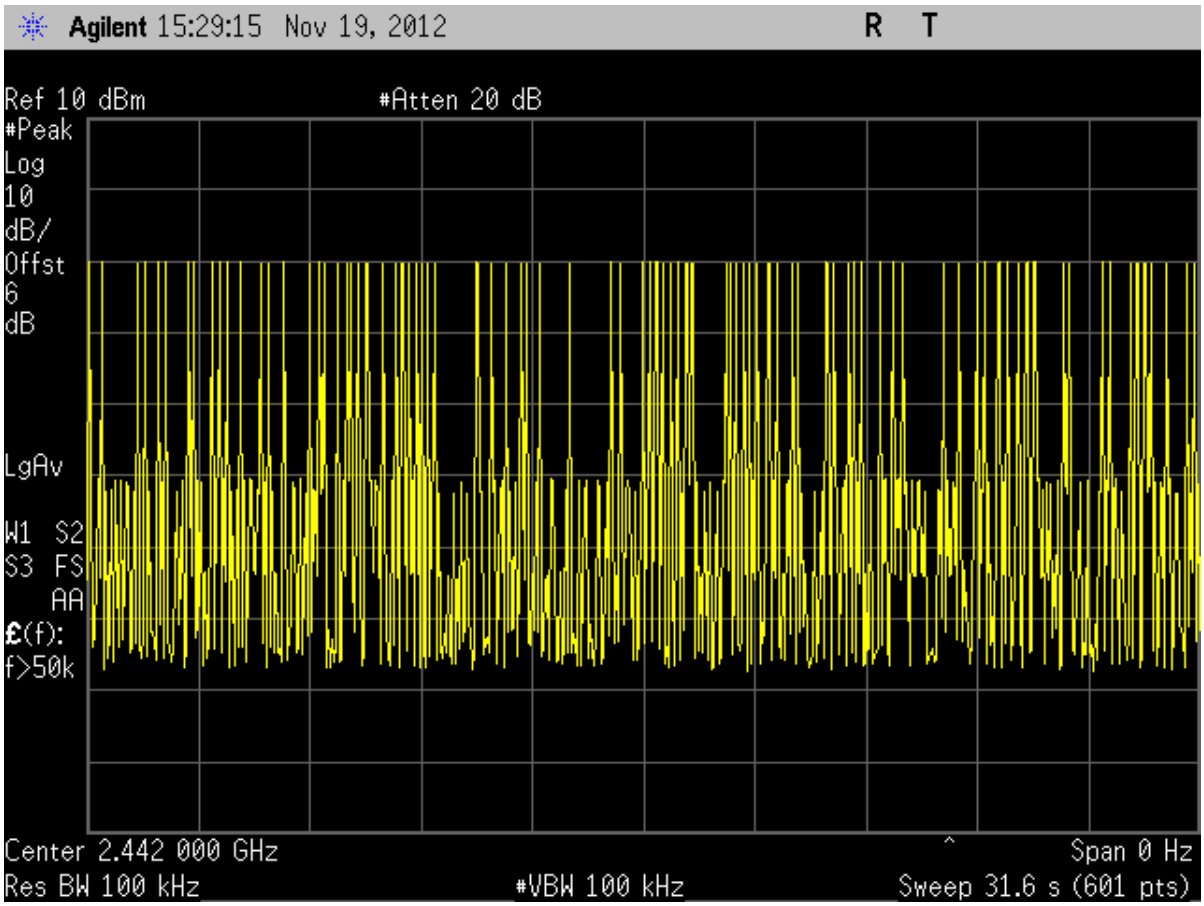


Figure 22. Hopping on, number of transmissions, channel 40 / 2442MHz, 99 transmissions

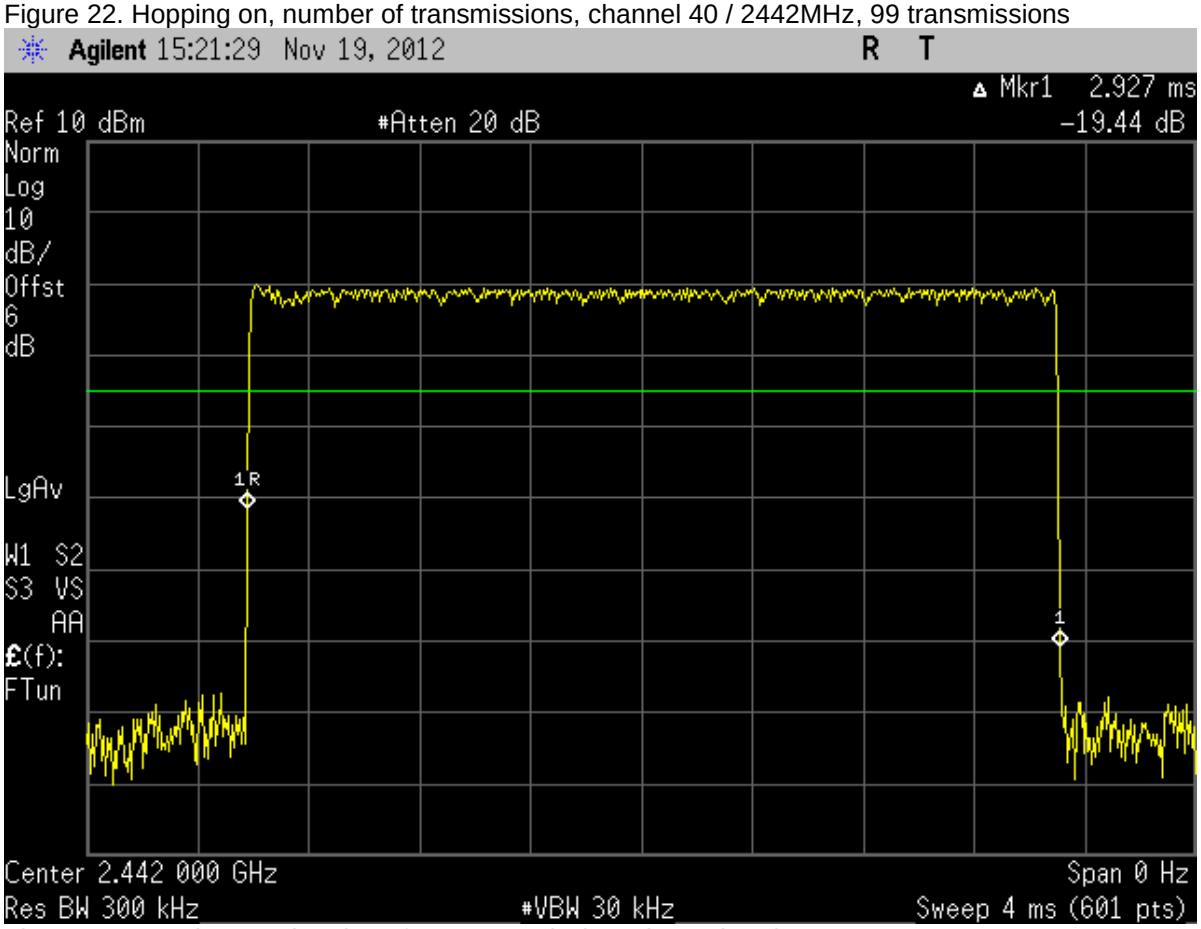


Figure 23. Hopping on, duration of one transmission, channel 40 / 2442MHz

4.10 Duty cycle correction factor, Transmit time in 100 ms

Spectrum analyzer with zero span was used to investigate spectrum.

15.35(c) Unless otherwise specified, e.g.§ 15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

4.10.2 Test data

Pulses/100ms=1
Length of one pulse = 2.927ms

*DutyCycleCorrectionFactor=20*log(Tocc/100)=20*log(1*2.927/100)=-30.67dB*

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
88	Antenna	638	Narda	8003
745	2-Line V-Network	ENV216	Rohde & Schwarz	101466
319	Antenna	CBL6112	Chase	2018
348	Shielded room	RFSD-100	Euroshield Oy	1320
350	Semianechoic shielded room	RFD-F-100	Euroshield Oy	1327
393	RF attenuator PAD	1A (10dB)	Weinschel	
519	RF High-Power Attenuator	765-20	Narda	
525	Double-Ridged Horn	3115	Emco	6691
542	Double-Ridged Horn	3115	Emco	00023905
544	RF-amplifier	ZFL-1000VH2	Mini-Circuits	QA0749010
546	Bluetooth Test Set	MT8850A	Anritsu	6K00000092
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
567	RF generator	E8257C	Agilent	MY43320736
338	Test receiver	ESS	Rohde & Schwarz	847151/009
694	EMI Test Receiver	ESPC	Rohde & Schwarz	842888/023
709	EMI test receiver	ESU8	Rohde & Schwarz	100297
710	RF amplifier	ALS1826-41-12	ALC Microwave Inc.	0011
377	RF attenuator PAD	757 C - 20 dB	Narda	
383	Hybrid	3033B	Narda	01727
X1	Dual directional coupler	11692D	Hewlett Packard	1212A01868

6. Photographs

See document "223827_test_setup_photographs"