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Registration number  
 Numéro d'accréditation  
 Akkreditierungsnummer

**STS 024**

Schweizerischer Prüfstellendienst  
 Service suisse d'essai  
 Swiss testing service



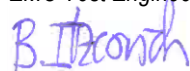
|               |                                                                                  |               |                                               |                         |
|---------------|----------------------------------------------------------------------------------|---------------|-----------------------------------------------|-------------------------|
| Report:       | <b>Electromagnetic compatibility and Radio spectrum Matters</b>                  |               | Report no:                                    | <b>13-MO-0087.12C *</b> |
| Product name: | <b>Roger Clip-on Mic</b>                                                         |               | Mandate no:                                   | <b>13-MO-0087</b>       |
| Serial no:    | <b>Proto 3.1 &amp; 4.1 (PCB V 2.1)</b>                                           | Model number: | ---                                           |                         |
| Customer:     | <b>Phonak Communications AG<br/>Länggasse 17<br/>3280 Murten<br/>Switzerland</b> | Date of test: | <b>May 3 - 8, 2013<br/>July 16 - 26, 2013</b> |                         |

\* Replaces report no 13-MO-0087.12B

| Standards              |                                                               | Result      |
|------------------------|---------------------------------------------------------------|-------------|
| <b>47 CFR, Part 15</b> | (Subpart C, Intentional radiators: §§ 15.207/209/247)         | <b>Pass</b> |
|                        | (Subpart B, Class B digital devices: § 15.109)                | <b>Pass</b> |
| <b>Industry Canada</b> | RSS-210, Licence-exempt Radio Apparatus: Category I Equipment | <b>Pass</b> |

These tests have been performed without modifications.

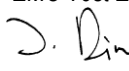
Test performed by  
 Mr B. Itzcovich  
 EMC Test Engineer



Report prepared by  
 Mr B. Itzcovich  
 EMC Test Engineer



Report controlled and approved by  
 Mr J. Ding  
 EMC Test Engineer



Rossens, October 22, 2013

(Issue Date)

REV20130422

Main language : English

The present document results from tests on one specimen and does not prejudice to the conformity of all the manufactured products.  
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**Electrosuisse**, SEV Association for Electrical Engineering, Power and Information Technologies

**Montena EMC**  
 route de Montena 75  
 1728 Rossens  
 Switzerland  
 phone +41 26 411 93 33  
 fax +41 26 411 93 30  
 www.montenaemc.ch  
 office@montenaemc.ch

**Montena EMC**  
 Technopark Blumenegg  
 Blumeneggstrasse 50  
 9403 Goldach  
 Switzerland  
 phone +41 71 278 41 92  
 fax +41 71 278 41 93

**Montena EMC**  
 Ringstrasse 10  
 5432 Neuenhof  
 Switzerland  
 phone +41 56 290 30 35  
 fax +41 56 290 38 33

**Montena EMC**  
 Postfach 1315  
 3072 Ostermundigen  
 Switzerland  
 phone +41 79 256 21 55

## Contents

|                                                                               | <i>Page</i> |
|-------------------------------------------------------------------------------|-------------|
| 1. SUMMARY OF TEST RESULTS .....                                              | 3           |
| 2. APPLIED STANDARDS .....                                                    | 4           |
| 3. CLIENT .....                                                               | 4           |
| 4. EQUIPMENT UNDER TEST .....                                                 | 4           |
| 4.1 Identification .....                                                      | 4           |
| 4.2 Pictures of the EUT .....                                                 | 5           |
| 4.3 Classification .....                                                      | 6           |
| 4.4 Transmitter characteristics (according to Phonak Communications AG) ..... | 7           |
| 4.5 Receiver characteristics (according to Phonak Communications AG) .....    | 7           |
| 4.6 Ports .....                                                               | 8           |
| 4.7 Modifications .....                                                       | 8           |
| 5. TEST CONDITIONS .....                                                      | 8           |
| 5.1 Climatic conditions, location and date .....                              | 8           |
| 5.2 Test facility and methodology .....                                       | 8           |
| 5.3 Attendant persons .....                                                   | 9           |
| 5.4 Test configuration .....                                                  | 9           |
| 5.5 Operating conditions .....                                                | 9           |
| 5.6 Auxiliary equipment .....                                                 | 10          |
| 6. TEST RESULTS .....                                                         | 11          |
| 6.1 Channel 20dB-bandwidth .....                                              | 12          |
| 6.2 Carrier frequency separation .....                                        | 14          |
| 6.3 Number of hopping channels .....                                          | 16          |
| 6.4 Time of occupancy (dwell time) .....                                      | 18          |
| 6.5 Antenna gain & effective isotropic radiated power .....                   | 20          |
| 6.6 Maximum output power (conducted) .....                                    | 22          |
| 6.7 Band-edge emission (conducted) .....                                      | 24          |
| 6.8 Spurious emission – conducted (transmitter – 15 MHz to 26.5 GHz) .....    | 26          |
| 6.9 Spurious emission transmit mode – radiated .....                          | 29          |
| 6.9.1 30 MHz to 1 GHz .....                                                   | 29          |
| 6.9.2 1 GHz to 18 GHz .....                                                   | 32          |
| 6.9.3 18 GHz to 26.5 GHz .....                                                | 37          |
| 6.10 Spurious emission receive & standby mode - radiated .....                | 40          |
| 6.10.1 30 MHz to 1 GHz .....                                                  | 40          |
| 6.10.2 1 GHz to 18 GHz .....                                                  | 45          |
| 6.11 Conducted emission - Interference voltage .....                          | 50          |
| 6.12 Designation of emission .....                                            | 55          |

## 1. Summary of test results

- ✓ Pass
- ✗ Fail
- ∅ Not applicable to this product
- Not tested
- # No requirements

| §        | Test Type                                                                                                                      | Result                                    |
|----------|--------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| <b>6</b> | <b>Emission</b>                                                                                                                | <b>CFR 47 Part 15<br/>Industry Canada</b> |
| 6.1      | Channel 20dB-bandwidth<br>CFR 47 § 15.247 (a)(1)<br>RSS-210 § A8.1 (b)                                                         | <b>2.01 MHz</b>                           |
| 6.2      | Carrier frequency separation<br>CFR 47 § 15.247 (a)(1)<br>RSS-210 § A8.1 (b)                                                   | ✓                                         |
| 6.3      | Number of hopping channels<br>CFR 47 § 15.247 (a)(1)(iii)<br>RSS-210 § A8.1 (d)                                                | ✓                                         |
| 6.4      | Time of occupancy (dwell time)<br>CFR 47 § 15.247 (a)(1)(iii)<br>RSS-210 § A8.1 (d)                                            | ✓                                         |
| 6.5      | Antenna gain & effective radiated power<br>CFR 47 § 15.247 (b)(4)<br>RSS-210 § A8.4 (1)                                        | <b>&lt; -1.06 dBi</b>                     |
| 6.6      | Maximum output power (conducted)<br>CFR 47 § 15.247 (b)(1)<br>RSS-210 § A8.4 (1)                                               | ✓                                         |
| 6.7      | Band-edge emission (conducted)<br>CFR 47 § 15.247 (d)<br>RSS-210 § A8.5                                                        | ✓                                         |
| -        | Band-edge emission (radiated)<br>CFR 47 § 15.247 (d)<br>CFR 47 § 15.205<br>RSS-210 § A8.5                                      | # <sup>1</sup>                            |
| 6.8      | Spurious emissions – conducted (transmitter)<br>CFR 47 § 15.247 (d)<br>RSS-210 § A8.5                                          | ✓                                         |
| 6.9      | Spurious emissions – radiated (transmitter)<br>CFR 47 § 15.247 (d)<br>CFR 47 § 15.209 (a)<br>CFR 47 § 15.205<br>RSS-210 § A8.5 | ✓                                         |
| 6.10     | Radiated emission – receiver<br>CFR 47 § 15.109<br>RSS-Gen Table 4                                                             | ✓                                         |
| 6.11     | Conducted emission<br>CFR 47 § 15.207                                                                                          | ✓                                         |
| <b>6</b> | <b>Emission</b>                                                                                                                | <b>CFR 47 Part 2</b>                      |
| 6.12     | Designation of emission<br>FCC 47 §2.201<br>FCC 47 §2.202                                                                      | <b>1M88FXD</b>                            |

1. Conducted tests could be successfully performed on the EUT

## 2. Applied standards

|                                |                                                                                                                                                          |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 47 CFR Part 15 Subpart C       | Code of Federal Regulations - Title 47 - Telecommunication, Part 15, Subpart C: "Intentional Radiators"                                                  |
| 47 CFR Part 15 Subpart B       | Code of Federal Regulations - Title 47 - Telecommunication, Part 15, Subpart B: "Unintentional Radiators"                                                |
| RSS-Gen issue 3, December 2010 | Spectrum Management and Telecommunications - Radio Standards Specification General Requirements and Information for the Certification of Radio Apparatus |
| RSS-210 issue 8, December 2010 | Spectrum Management and Telecommunications - Radio Standards Specification Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment    |

## 3. Client

|                         |                                                                                   |
|-------------------------|-----------------------------------------------------------------------------------|
| Client name and address | <i>Phonak Communications AG<br/>Länggasse 17<br/>3280 Murten<br/>Switzerland</i>  |
| Contact Person          | <i>Mr Olivier Hautier</i>                                                         |
| Telephone               | <i>+41 26 672 92 73</i>                                                           |
| Fax                     | <i>+41 26 672 93 80</i>                                                           |
| E-mail                  | <a href="mailto:Olivier.Hautier@phonak.com"><i>Olivier.Hautier@phonak.com</i></a> |
| Mandate no              | <i>13-MO-0087</i>                                                                 |

## 4. Equipment under test

### 4.1 Identification

|                               |                                                                                                                                                                                                                   |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Manufacturer name and address | <i>Phonak Communications AG<br/>Länggasse 17<br/>3280 Murten<br/>Switzerland</i>                                                                                                                                  |
| Production country            | <i>Vietnam</i>                                                                                                                                                                                                    |
| Brand name                    | <i>Phonak</i>                                                                                                                                                                                                     |
| Product name                  | <i>Roger Clip-on Mic</i>                                                                                                                                                                                          |
| Product description           | <i>Wireless microphone 2.4 GHz</i>                                                                                                                                                                                |
| Model number                  | <i>- - -</i>                                                                                                                                                                                                      |
| Serial no                     | <i>Proto 3.1 &amp; 4.1 (PCB V 2.1)</i>                                                                                                                                                                            |
| FCC ID<br>IC ID               | <i>FCC: KWCTX18<br/>IC: 2262A-TX18</i>                                                                                                                                                                            |
| Software version              | <i>SVN 2011</i>                                                                                                                                                                                                   |
| Lowest Frequency              | <i>16 MHz (microcontroller)</i>                                                                                                                                                                                   |
| Highest frequency             | <i>38.4 MHz (DSP) / 2.48 GHz (transmitter)</i>                                                                                                                                                                    |
| Supply                        | <i><math>U = 3.7 V_{DC} / P_{max} = 0.2 W</math> (Lithium Polymer Battery) or<br/><math>U = 5 V_{DC} / P_{max} = 1.2 W</math> (DC In USB) *</i>                                                                   |
| Dimension / Weight            | <i>~25 mm x ~20 mm x ~55 mm (l x w x h) / ~ 18 g</i>                                                                                                                                                              |
| Technical                     | <i>None. The equipment is completely identified by the above-mentioned information. Phonak Communications AG assures the traceability of the documentation and is responsible for the product identification.</i> |

\* When the external 5 V<sub>DC</sub> supply is connected to the EUT, the battery is disconnected from the RF module.

## 4.2 Pictures of the EUT



Electronic board with temporary antenna &amp; supply connectors



Portable Clip-on Mic : front



Portable Clip-on Mic : rear



Electronic board with battery : front



Electronic board with battery : rear



EUT identification (on bottom of Cradle)



Connectors (USB + audio)

### 4.3 Classification

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CFR 47 Part 15 | <p><input checked="" type="checkbox"/> Unintentional radiator (Subpart B), Receive mode</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Class A digital device</li> <li><input checked="" type="checkbox"/> Class B digital device</li> <li><input type="checkbox"/> The highest frequency of the internal sources of the EUT is less than 108 MHz (measurement shall be made up to 1 GHz).</li> <li><input type="checkbox"/> The highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz (measurement shall be made up to 2 GHz).</li> <li><input type="checkbox"/> The highest frequency of the internal sources of the EUT is between 500 MHz and 1 GHz (measurement shall be made up to 5 GHz).</li> <li><input checked="" type="checkbox"/> The highest frequency of the internal sources of the EUT is above 1 GHz (measurement shall be made up to 5 times the highest frequency or 40 GHz, whichever is lower).</li> </ul> <p><input checked="" type="checkbox"/> Intentional radiator (Subpart C), Transmit mode</p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> The highest fundamental frequency of the EUT is less than 10 GHz (measurement shall be made up to the tenth harmonic or 40 GHz, whichever is lower).</li> <li><input type="checkbox"/> The highest fundamental frequency of the EUT is between 10 GHz and 30 GHz (measurement shall be made up to the fifth harmonic or 100 GHz, whichever is lower).</li> <li><input type="checkbox"/> The highest fundamental frequency of the EUT is above 30 GHz (measurement shall be made up to the fifth harmonic or 200 GHz, whichever is lower).</li> </ul> |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

#### 4.4 Transmitter characteristics (according to Phonak Communications AG)

|                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Method of frequency generation                                                                                                                                                                                                                                                                       | <input checked="" type="checkbox"/> Crystal<br><input type="checkbox"/> Synthesizer<br><input type="checkbox"/> .....                                                                                                                                                                                                                                                                                                   |
| Transmitter operating frequency range (OFR)<br>The OFR is the total range of frequencies covered by one type, or by a family of equipment.<br>It is noted that a family of equipment may be capable of covering a wider frequency range than the alignment frequency range of one type of equipment. | 2.402 GHz to 2.480 GHz.                                                                                                                                                                                                                                                                                                                                                                                                 |
| Channel separation (if applicable)                                                                                                                                                                                                                                                                   | 2 MHz                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Number of channels                                                                                                                                                                                                                                                                                   | 40                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Maximum rated output power                                                                                                                                                                                                                                                                           | 11.0 dBm (at transmitter RF output connector)                                                                                                                                                                                                                                                                                                                                                                           |
| Variable carrier output                                                                                                                                                                                                                                                                              | <input type="checkbox"/> Transmitter carrier output is not variable.<br>RF output: $P_{OUT} = \dots mW$<br><input checked="" type="checkbox"/> Transmitter carrier output is variable.<br>Max. RF output: $P_{OUT\ MAX} = 9.5\ mW$<br>Min. RF output: $P_{OUT\ MIN} = 0.04\ mW$<br><input checked="" type="checkbox"/> RF output continuously variable<br><input type="checkbox"/> RF output stepped: ..... dB per step |
| Modulation                                                                                                                                                                                                                                                                                           | <input type="checkbox"/> Amplitude<br><input type="checkbox"/> Frequency: Deviation ..... kHz<br><input type="checkbox"/> Phase<br><input type="checkbox"/> Pulse      Pulse repetition frequency .....<br>Duty cycle .....<br><input checked="" type="checkbox"/> Other      FHSS, GFSK                                                                                                                                |
|                                                                                                                                                                                                                                                                                                      | <input type="checkbox"/> Transmitter can be operated without modulation<br><input checked="" type="checkbox"/> Transmitter can only be operated with modulation                                                                                                                                                                                                                                                         |

#### 4.5 Receiver characteristics (according to Phonak Communications AG)

|                                    |                        |
|------------------------------------|------------------------|
| Receiver operating frequency range | 2.402 GHz to 2.480 GHz |
| Channel separation (if applicable) | 2 MHz                  |
| Number of channels                 | 40                     |

#### 4.6 Ports

| Port                   | Cable           |                    |        | Remark                    |
|------------------------|-----------------|--------------------|--------|---------------------------|
|                        | Max. length     | Type               | Screen |                           |
| DC 5V in (USB charger) | 1.5 m ( ≤ 3 m ) | Micro USB          | Yes    | Connected to Power supply |
| Audio in               | ≤ 3 m           | Jack 3.5 mm stereo | Yes    | External audio input port |

#### 4.7 Modifications

|      |
|------|
| None |
|------|

### 5. Test conditions

#### 5.1 Climatic conditions, location and date

| Location                                                    | Date                                  | Temp.      | Pressure        | Rel. humidity |
|-------------------------------------------------------------|---------------------------------------|------------|-----------------|---------------|
| Electrosuisse<br>Montena EMC<br>1728 Rossens<br>Switzerland | May 3 - 8, 2013<br>July 16 - 26, 2013 | 20 - 26 °C | 1010 – 1040 hPa | 35-50 %       |

#### 5.2 Test facility and methodology

|                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>The alternate test site (ferrite chamber) is accepted by FCC (Reg. No. 90808) and by Industry Canada (Site number 3625A-2).</p> <p>Conducted and radiated measurements are performed according to the ANSI C63.4 (2003) procedure.</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### 5.3 Attendant persons

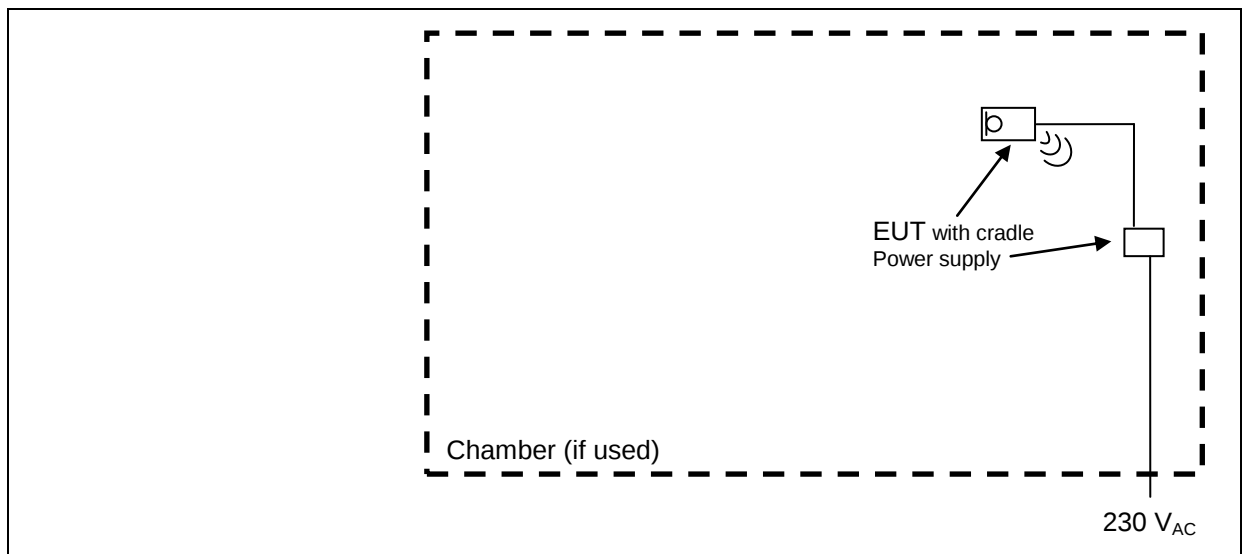
#### Test Engineer(s):

Mr B. Itzcovich  
EMC Test Engineer

#### Other(s):

| Name                           | Company                  |
|--------------------------------|--------------------------|
| Mr Olivier Hautier (partially) | Phonak Communications AG |

### 5.4 Test configuration



### 5.5 Operating conditions

Power supply during tests if not stated otherwise in §6 : 5 V<sub>DC</sub> (USB)

- Continuous transmission of random data with single frequencies (2.402, 2.440 and GHz and 2.480 GHz)
- Normal operation: transmission of random data with hopping sequence
- Standby: DSP & controller running, RF module disabled

## 5.6 Auxiliary equipment

The following pieces of equipment are used for the monitoring of the EUT or are necessary for the EUT but they are not part of the EUT

| Product             | Brand         | Model No.                | ID           | Remark                                      |
|---------------------|---------------|--------------------------|--------------|---------------------------------------------|
| <i>Cradle</i>       | <i>Phonak</i> | <i>Roger Clip-on Mic</i> | <i>- - -</i> | <i>Portable device holder</i>               |
| <i>Power supply</i> | <i>Phonak</i> | <i>GPE0538-050100-Z</i>  | <i>- - -</i> | <i>AC adapter (5 V<sub>DC</sub> output)</i> |



*Cradle with power supply & audio cable*

## 6. Test results

### 6.1 Channel 20dB-bandwidth

Introduction: Channel-bandwidth measured at -20 dBc.

Test site: ☐ semi-anechoic chamber (foam) ☐ open test site  
☐ semi-anechoic chamber (ferrites) ☒ laboratory

Meas. uncertainty: 9kHz – 3GHz:  $\pm 1$  dB  
 3GHz – 6.7GHz:  $\pm 2.1$  dB  
 6.7GHz – 13.2GHz:  $\pm 2.6$  dB  
 13.2GHz – 19GHz:  $\pm 2.8$  dB  
 19GHz – 26.5GHz:  $\pm 3$  dB

Method: Measurement of the conducted power on the antenna connector or a test fixture.

Limit: - - -

Test set-up:



Remarks: - - -

Test equipment:

|                   |                                           |                                |                                           |                                |                                |                                |
|-------------------|-------------------------------------------|--------------------------------|-------------------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Spectrum analyser | <input type="checkbox"/> 88-14            | <input type="checkbox"/> 94-24 | <input checked="" type="checkbox"/> 02-06 | <input type="checkbox"/> 03-45 | <input type="checkbox"/> 05-39 | <input type="checkbox"/> 07-53 |
| Power supply      | <input checked="" type="checkbox"/> 99-07 | <input type="checkbox"/> 04-31 |                                           |                                |                                |                                |
| Cables            | <input checked="" type="checkbox"/> 11-45 |                                |                                           |                                |                                |                                |

**Results of the test**

Client: *Phonak Communications AG*

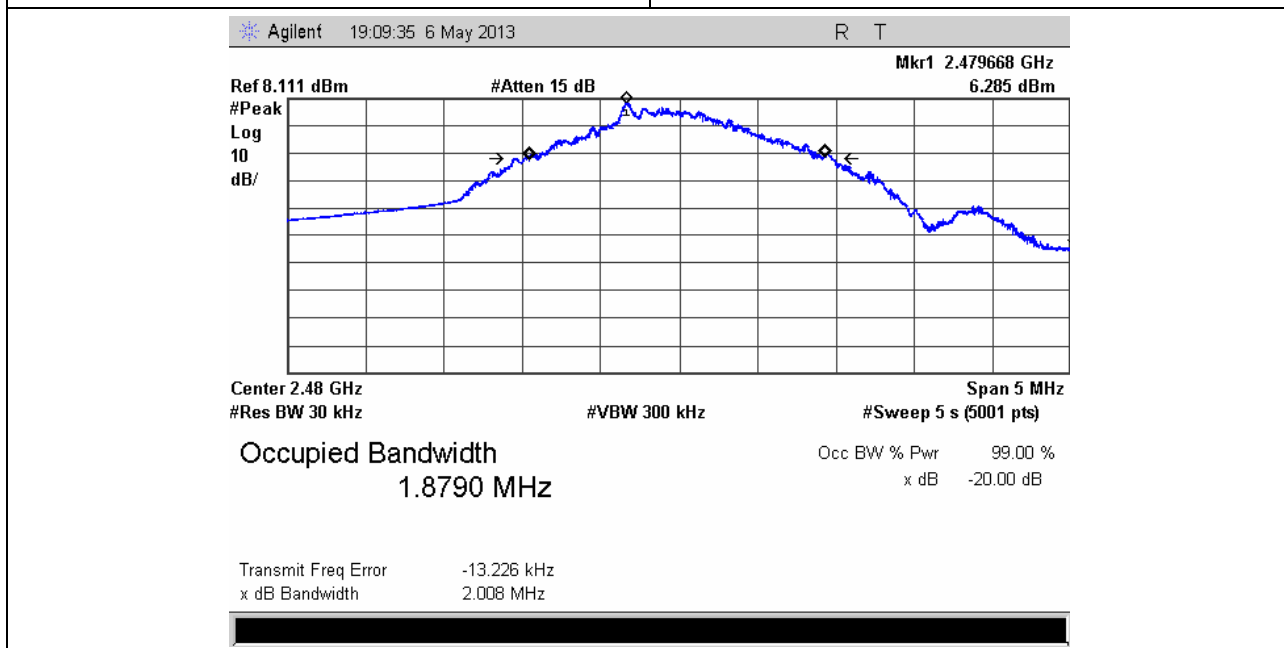
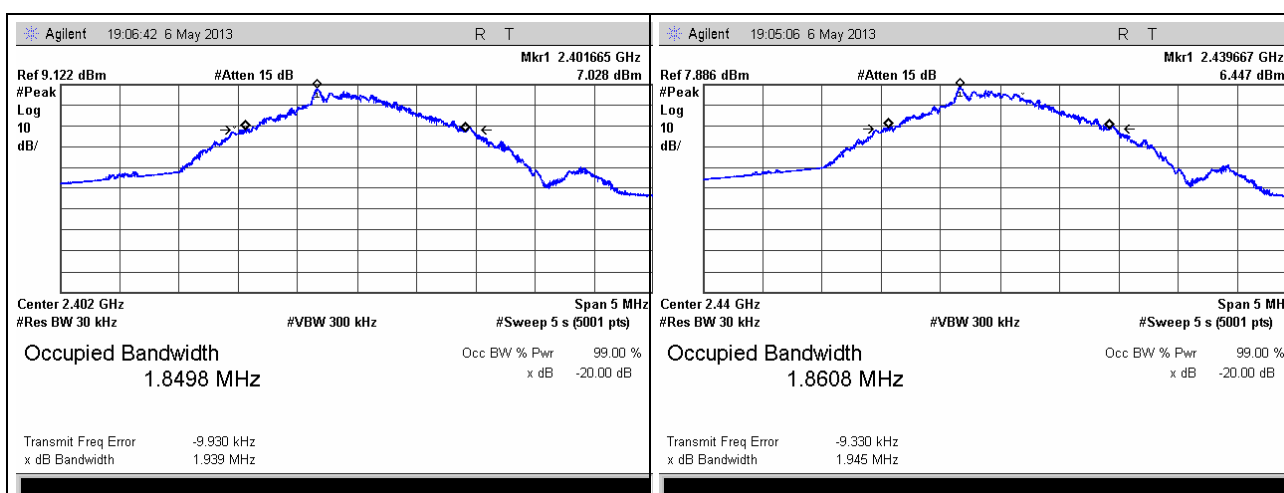
Apparatus: *Roger Clip-on Mic*

Operating mode: *Single frequencies (2.402, 2.440 and 2.480 GHz), modulated, Pmax*

Cables connected to the EUT: *Temporary supply & antenna cables*

Remarks: *Measured on temporary antenna connector*

| frequency<br>[GHz] | 20 dB bandwidth<br>[MHz] | Remarks |
|--------------------|--------------------------|---------|
| 2.402              | 1.939                    | ---     |
| 2.440              | 1.945                    | ---     |
| 2.480              | 2.008                    | ---     |



Place and date of test: *Rossens, May 6, 2013*

Operator: *B. Itzcovich*

## 6.2 Carrier frequency separation

Introduction: Determination of the frequency separation of two adjacent channels.

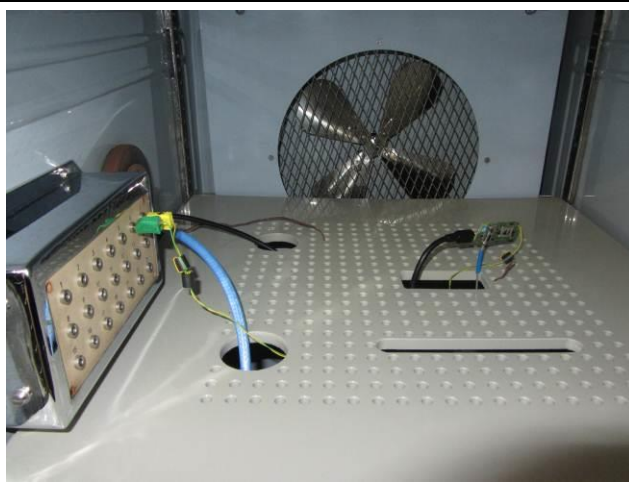
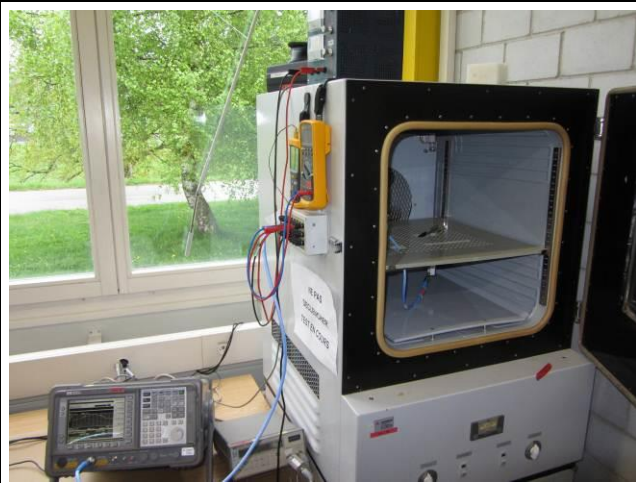
Test site: ☐ semi-anechoic chamber (foam) ☐ open test site  
☐ semi-anechoic chamber (ferrites) ☒ laboratory

Meas. uncertainty:  $\pm 2.6 \mu\text{Hz/Hz}$

Method: Measurement of the frequency separation on the antenna connector or a test fixture.

Limit: Minimum 25 kHz or 20 dB bandwidth of the hopping channel

### Test set-up:



Remarks: ---

### Test equipment:

|                   |                                           |                                |                                           |                                |                                |                                |
|-------------------|-------------------------------------------|--------------------------------|-------------------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Spectrum analyser | <input type="checkbox"/> 88-14            | <input type="checkbox"/> 94-24 | <input checked="" type="checkbox"/> 02-06 | <input type="checkbox"/> 03-45 | <input type="checkbox"/> 05-39 | <input type="checkbox"/> 07-53 |
| Power supply      | <input checked="" type="checkbox"/> 99-07 | <input type="checkbox"/> 04-31 |                                           |                                |                                |                                |
| Cables            | <input checked="" type="checkbox"/> 11-45 |                                |                                           |                                |                                |                                |

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

**Results of the test**

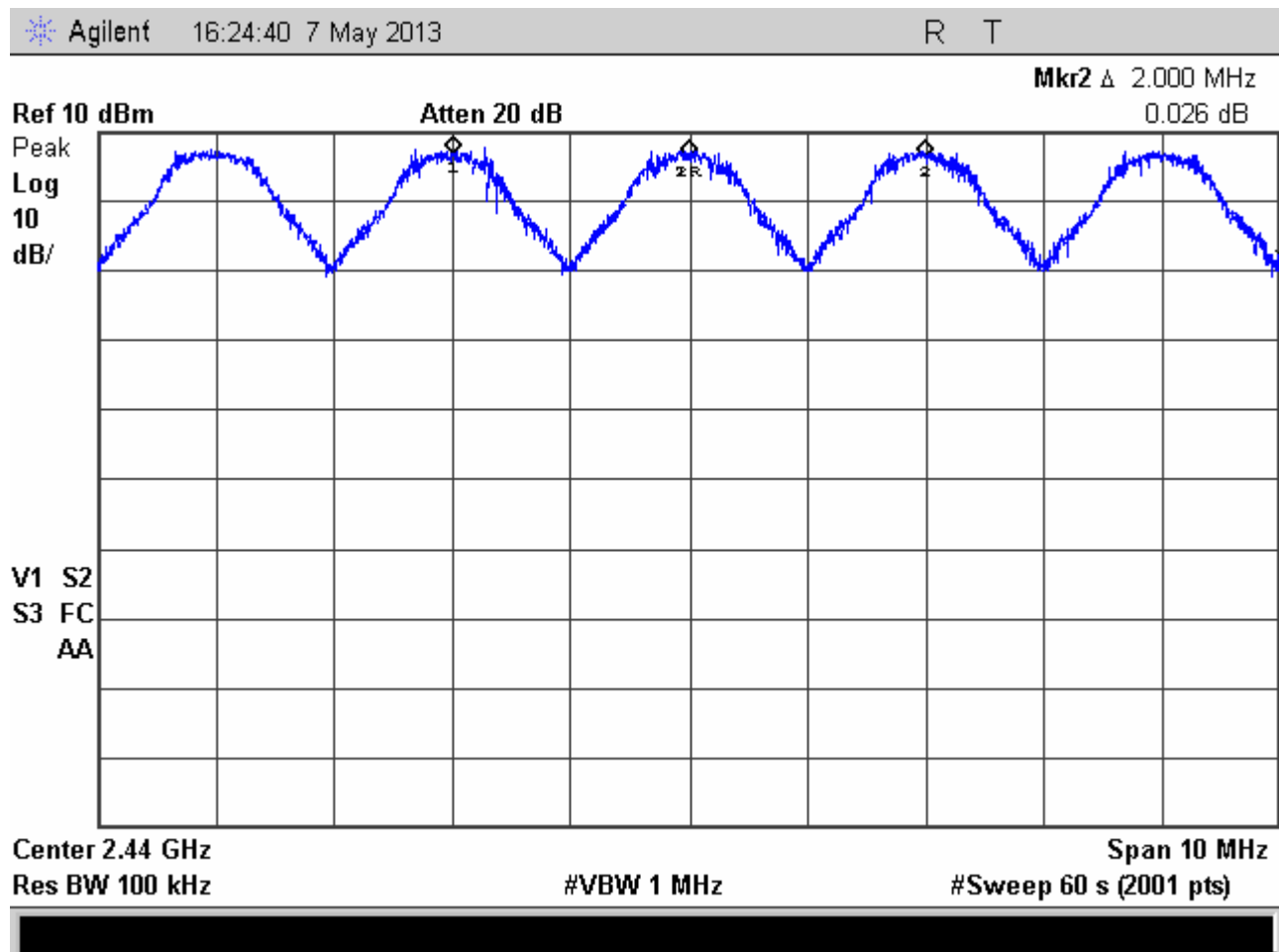
Client: *Phonak Communications AG*

Apparatus: *Roger Clip-on Mic*

Operating mode: *Continuously hopping*

Cables connected to the EUT: *Temporary supply & antenna cables*

Remarks: *Measured on temporary antenna connector*



**Carrier frequency separation = 2.0 MHz**

Place and date of test:  
Operator:

*Rossens, May 7, 2013*  
*B. Itzcovich*

### 6.3 Number of hopping channels

Introduction: Number of hopping channels used in the frequency hopping system.

Test site: ☐ semi-anechoic chamber (foam) ☐ open test site  
☐ semi-anechoic chamber (ferrites) ☒ laboratory

Meas. uncertainty:  $\pm 2.6 \mu\text{Hz/Hz}$

Method: Measurement of the frequency separation on the antenna connector or a test fixture.

Limit: At least 15 channels

#### Test set-up:



Remarks: ---

#### Test equipment:

|                   |                                           |                                |                                           |                                |                                |                                |
|-------------------|-------------------------------------------|--------------------------------|-------------------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Spectrum analyser | <input type="checkbox"/> 88-14            | <input type="checkbox"/> 94-24 | <input checked="" type="checkbox"/> 02-06 | <input type="checkbox"/> 03-45 | <input type="checkbox"/> 05-39 | <input type="checkbox"/> 07-53 |
| Power supply      | <input checked="" type="checkbox"/> 99-07 | <input type="checkbox"/> 04-31 |                                           |                                |                                |                                |
| Cables            | <input checked="" type="checkbox"/> 11-45 |                                |                                           |                                |                                |                                |

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

**Results of the test**

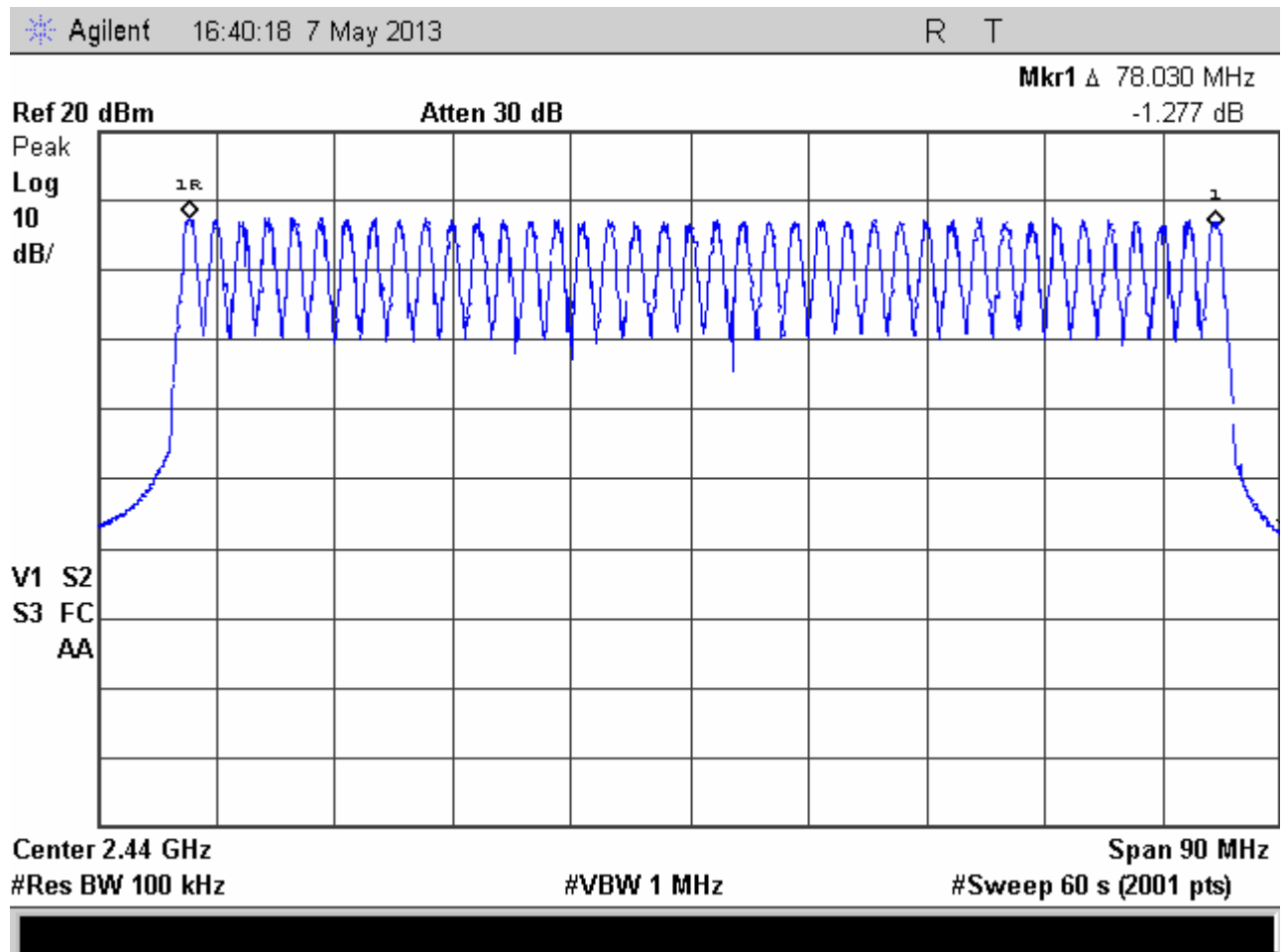
Client: *Phonak Communications AG*

Apparatus: *Roger Clip-on Mic*

Operating mode: *Continuously hopping*

Cables connected to the EUT: *Temporary supply & antenna cables*

Remarks: *Measured on temporary antenna connector*



Number of hopping channels = 40

Place and date of test:  
Operator:

*Rossens, May 7, 2013*  
*B. Itzcovich*

**6.4 Time of occupancy (dwell time)**

Introduction: Average duration during which the system stays on one channel.

Test site: ☐ semi-anechoic chamber (foam) ☐ open test site  
☐ semi-anechoic chamber (ferrites) ☒ laboratory

Meas. uncertainty:  $\pm 2.6 \mu\text{s/s}$

Method: Measurement on the antenna connector or a test fixture.

Limit: The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Test set-up:



Remarks: ---

Test equipment:

|                   |                                           |                                |                                           |                                |                                |                                |
|-------------------|-------------------------------------------|--------------------------------|-------------------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Spectrum analyser | <input type="checkbox"/> 88-14            | <input type="checkbox"/> 94-24 | <input checked="" type="checkbox"/> 02-06 | <input type="checkbox"/> 03-45 | <input type="checkbox"/> 05-39 | <input type="checkbox"/> 07-53 |
| Power supply      | <input checked="" type="checkbox"/> 99-07 | <input type="checkbox"/> 04-31 |                                           |                                |                                |                                |
| Cables            | <input checked="" type="checkbox"/> 11-45 |                                |                                           |                                |                                |                                |

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

**Results of the test**

Client: *Phonak Communications AG*

Apparatus: *Roger Clip-on Mic*

Operating mode: *Continuously hopping*

Cables connected to the EUT: *Temporary supply & antenna cables*

Remarks: *Measured on temporary antenna connector*

**Calculation based on information from Phonak Communications AG and measurement of the pulse duration**

Number of channels: 40

Period of observation:  $\text{Number of channels} \times 0.4 \text{ s} = 40 \times 0.4 \text{ s} = 16 \text{ s}$

Single occupancy time during one hop (measured): 149  $\mu\text{s}$

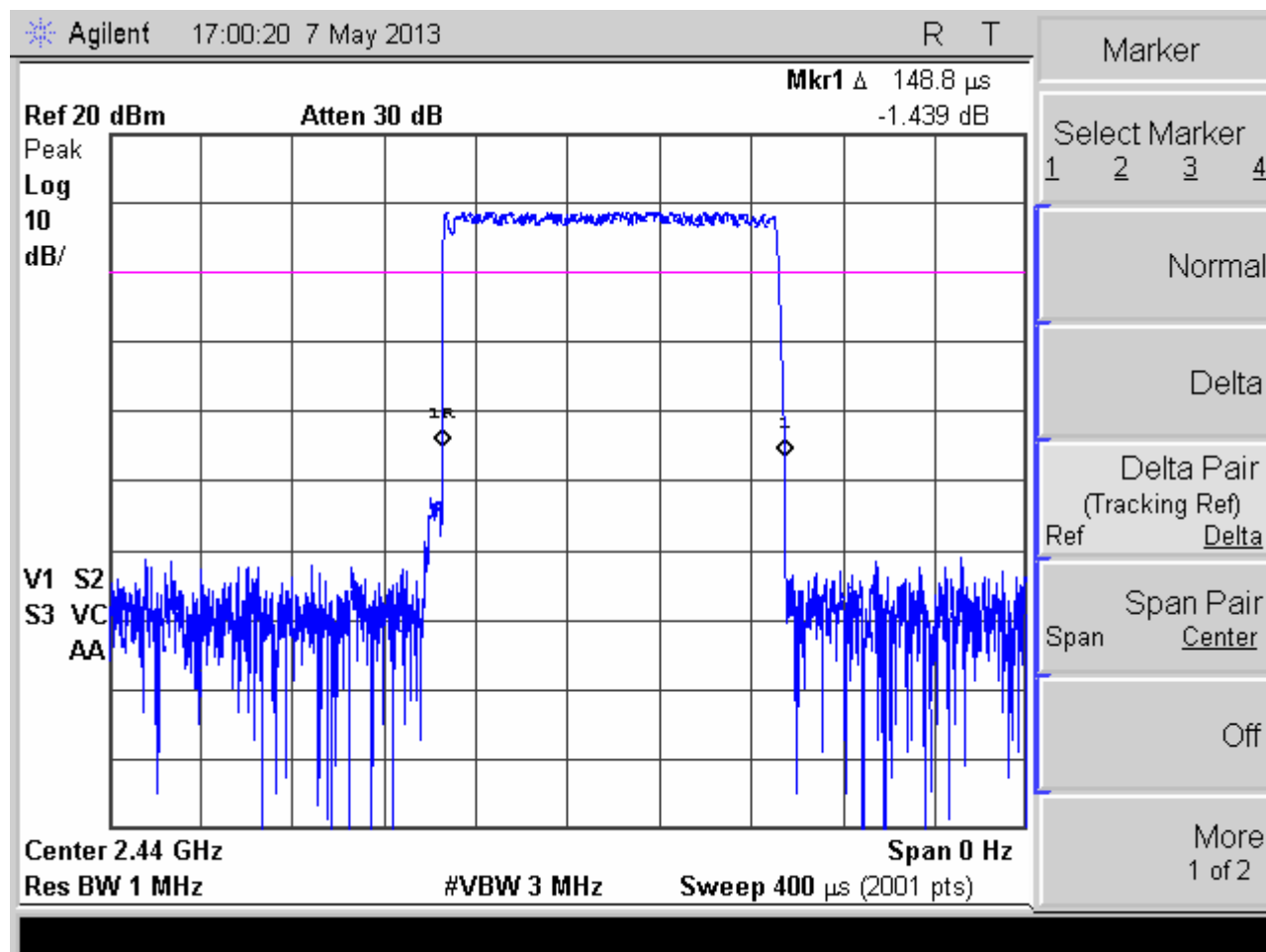
Pulses in 2.9h:  $2^{16} \times 40 \times 10 = 26214400$

Pulses in 16 s:  $(\text{Pulses in 2.9h} / 2.9) / 3600 \times 16 \text{ s} = 40175.3$

Pulse in 16 s of one channel:  $\text{Pulses in 16 s} / \text{Number of channels} = 1004.4$

Time of occupancy:  $\text{Pulse in 16 s of one channel} \times \text{occupancy time} = 1004.4 \times 149 \mu\text{s} = 0.150 \text{ s}$

**RESULT**  $0.150 \text{ s} < 0.4 \text{ s} \Rightarrow$  **Pass**

**Example of pulse duration at frequency 2.44 GHz**

Place and date of test:  
Operator:

Rossens, May 7, 2013  
B. Itzcovich

## 6.5 Antenna gain & effective isotropic radiated power

**Introduction:** The effective radiated power is the power radiated by the antenna of an interrogator in its direction of maximum gain under specified conditions of measurement.

**Test site:** ☐ semi-anechoic chamber (ferrites) ☒ semi-anechoic chamber (foam)

**Distance:** ☐ 1 m ☒ 3 m ☐ 10 m ☐ 30 m

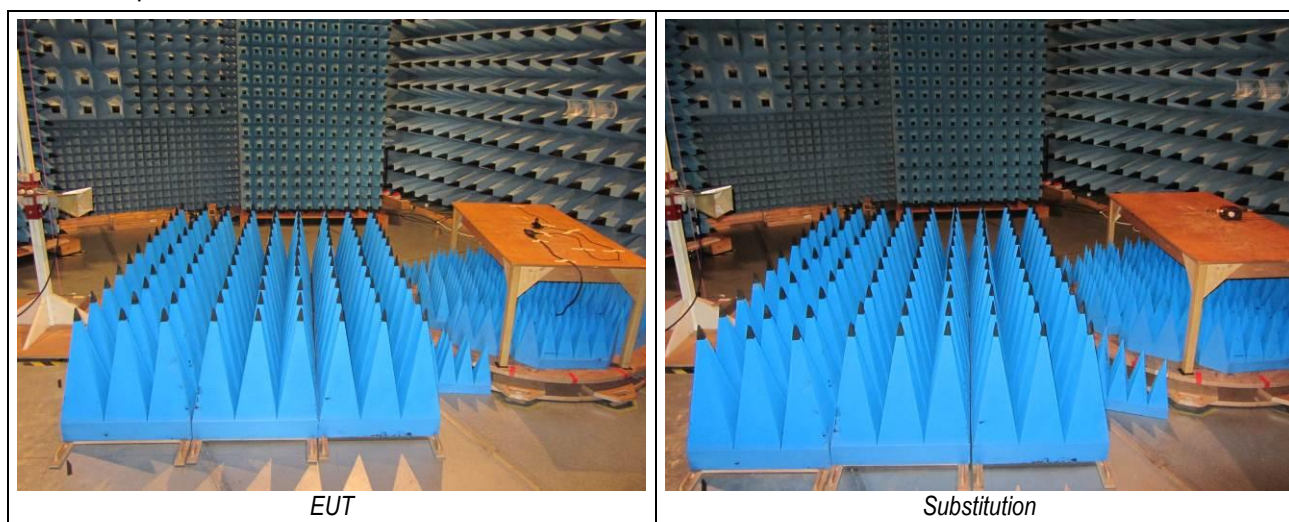
**Position of EUT:** 0.8 m (height of the equipment under test above floor)

**Meas. uncertainty:**  $\pm 1.34$  dB ( $f < 300$  MHz) /  $\pm 1.61$  dB ( $f > 300$  MHz)

**Test method:** The electromagnetic disturbance radiated by the equipment is measured using a spectrum analyser and a wide band antenna. The ERP / EIRP values are determined replacing the EUT by a substitution antenna (dipole or other). The limits on the plots represent the equivalent field levels for the required power limits.

**Limit:** Antenna gain 6dBi (for a maximum conducted power of 125 mW = 21 dBm). If antennas with directional gains exceeding 6 dBi are used, the maximum peak output power shall be reduced as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**Test set-up:**



**Remarks:** ---

**Test equipment:**

|                       |                                           |                                           |                                           |                                           |                                |                                           |
|-----------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|--------------------------------|-------------------------------------------|
| Spectrum analyser     | <input type="checkbox"/> 88-14            | <input type="checkbox"/> 94-24            | <input checked="" type="checkbox"/> 02-06 | <input type="checkbox"/> 03-45            | <input type="checkbox"/> 05-39 | <input type="checkbox"/> 07-53            |
| Receiver              | <input type="checkbox"/> 85-04            | <input type="checkbox"/> 90-43            | <input type="checkbox"/> 94-35            | <input type="checkbox"/> 04-29            |                                |                                           |
| Preamplifier          | <input checked="" type="checkbox"/> 11-29 | <input type="checkbox"/> 95-86            | <input type="checkbox"/> 05-56            | <input type="checkbox"/> 05-59            | <input type="checkbox"/> 05-62 | <input type="checkbox"/> 05-87            |
| Antenna (horn)        | <input checked="" type="checkbox"/> 90-24 | <input type="checkbox"/> 98-12            | <input type="checkbox"/> 98-13            | <input type="checkbox"/> 07-31            |                                |                                           |
| HF-wattmeter          | <input type="checkbox"/> 95-97            | <input type="checkbox"/> 01-15            | <input type="checkbox"/> 01-17            | <input checked="" type="checkbox"/> 03-07 | <input type="checkbox"/> 04-96 | <input type="checkbox"/> 05-20            |
| Thermocouple detector | <input type="checkbox"/> 92-03            | <input type="checkbox"/> 05-74            | <input type="checkbox"/> 05-88            | <input type="checkbox"/> 07-03            | <input type="checkbox"/> 10-27 | <input checked="" type="checkbox"/> 09-03 |
| Substitution antenna  | <input type="checkbox"/> 89-01            | <input checked="" type="checkbox"/> 00-52 |                                           |                                           |                                |                                           |
| Oscilloscope          | <input type="checkbox"/> 90-14            | <input type="checkbox"/> 93-85            | <input type="checkbox"/> 93-86            | <input type="checkbox"/> 01-20            | <input type="checkbox"/> 04-06 | <input type="checkbox"/> 04-50            |
| Multimeter            | <input type="checkbox"/> 89-07            | <input type="checkbox"/> 90-38            | <input type="checkbox"/> 92-25            | <input type="checkbox"/> 94-51            | <input type="checkbox"/> 95-93 | <input type="checkbox"/> 02-03            |
|                       | <input type="checkbox"/> 03-22            | <input type="checkbox"/> 04-47            | <input type="checkbox"/> 04-104           | <input type="checkbox"/> 04-105           | <input type="checkbox"/> 06-51 | <input type="checkbox"/> 06-52            |
| Frequency generator   | <input type="checkbox"/> 88-23            | <input type="checkbox"/> 00-42            | <input type="checkbox"/> 03-39            | <input checked="" type="checkbox"/> 07-04 | <input type="checkbox"/> 04-89 | <input type="checkbox"/> 05-78            |
| Cables                | <input checked="" type="checkbox"/> 06-00 | <input type="checkbox"/> 06-01            | <input checked="" type="checkbox"/> 11-61 | <input checked="" type="checkbox"/> SMK   |                                |                                           |
| Attenuator 10dB       | <input checked="" type="checkbox"/> 11-36 |                                           |                                           |                                           |                                |                                           |

**Result:** ☒ pass ☐ fail ☐ not applicable ☐ not tested

**Results of the test**Client: *Phonak Communications AG*Apparatus: *Roger Clip-on Mic*Operating mode: *Hopping f = 2.402/2.440/2.480 GHz, modulated, Pmax*Cables connected to the EUT: *All (see § 4.6 and § 5.4)*Remarks: *RBW = VBW = 1MHz; Peak detector*

| f<br>[GHz] | Measurement with EUT |                | Power at substitution ant. |                | Meas. with subst. ant. | Parameters of substitution ant. |                    | Result        |                 |               | Remarks    |
|------------|----------------------|----------------|----------------------------|----------------|------------------------|---------------------------------|--------------------|---------------|-----------------|---------------|------------|
|            | E<br>[dBuV/m]        | preamp<br>[dB] | P<br>[dBm]                 | factor<br>[dB] | E<br>[dBuV/m]          | gain<br>[dB]                    | att. Cable<br>[dB] | corr.<br>[dB] | P EIRP<br>[dBm] | P EIRP<br>[W] |            |
| 2.402      | 106.8                | 0.0            | 0                          | 0              | 100.2                  | 2.15                            | 0                  | -98.06        | 8.69            | 7.40 mW       | Vertical   |
| 2.402      | 96.3                 | 0.0            | 0                          | 0              | 99.1                   | 2.15                            | 0                  | -96.97        | -0.69           | 853.23 uW     | Horizontal |
| 2.440      | 105.1                | 0.0            | 0                          | 0              | 99.1                   | 2.15                            | 0                  | -96.92        | 8.17            | 6.56 mW       | Vertical   |
| 2.440      | 95.8                 | 0.0            | 0                          | 0              | 99.3                   | 2.15                            | 0                  | -97.16        | -1.38           | 727.39 uW     | Horizontal |
| 2.480      | 103.4                | 0.0            | 0                          | 0              | 97.5                   | 2.15                            | 0                  | -95.34        | 8.02            | 6.33 mW       | Vertical   |
| 2.480      | 94.7                 | 0.0            | 0                          | 0              | 99.8                   | 2.15                            | 0                  | -97.64        | -2.93           | 508.93 uW     | Horizontal |

The antenna gain is the difference (in dB) of the radiated EIRP power and the conducted power of § 6.6 :

| frequency<br>[GHz] | Conducted power<br>[dBm] | Radiated power<br>EIRP [dBm] | Antenna gain<br>[dBi] | Remarks |
|--------------------|--------------------------|------------------------------|-----------------------|---------|
| 2.402              | 9.75                     | 8.69                         | -1.06                 | ---     |
| 2.440              | 9.46                     | 8.17                         | -1.29                 | ---     |
| 2.480              | 9.61                     | 8.02                         | -1.59                 | ---     |

Place and date of test:  
Operator:*Rossens, July 23, 2013  
B. Itzcovich*

**6.6 Maximum output power (conducted)**

Test site: ☐ semi-anechoic chamber (foam) ☐ open test site  
☐ semi-anechoic chamber (ferrites) ☒ laboratory

Meas. uncertainty: 9kHz – 3GHz:  $\pm 1$  dB  
 3GHz – 6.7GHz:  $\pm 2.1$  dB  
 6.7GHz – 13.2GHz:  $\pm 2.6$  dB  
 13.2GHz – 19GHz:  $\pm 2.8$  dB  
 19GHz – 26.5GHz:  $\pm 3$  dB

Test method: Measurement of the conducted power on the antenna connector or a test fixture.

Limit: Maximum 0.125 Watt (= 21 dBm) for systems using antennas with directional gains that do not exceed 6 dBi. If antennas with directional gains exceeding 6 dBi are used, the maximum peak output power shall be reduced as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test set-up:



Remarks: - - -

Test equipment:

|                   |                                           |                                |                                           |                                |                                |                                |
|-------------------|-------------------------------------------|--------------------------------|-------------------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Spectrum analyser | <input type="checkbox"/> 88-14            | <input type="checkbox"/> 94-24 | <input checked="" type="checkbox"/> 02-06 | <input type="checkbox"/> 03-45 | <input type="checkbox"/> 05-39 | <input type="checkbox"/> 07-53 |
| Power supply      | <input checked="" type="checkbox"/> 99-07 | <input type="checkbox"/> 04-31 |                                           |                                |                                |                                |
| Cables            | <input checked="" type="checkbox"/> 11-45 |                                |                                           |                                |                                |                                |

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

**Results of the test**

Client: *Phonak Communications AG*

Apparatus: *Roger Clip-on Mic*

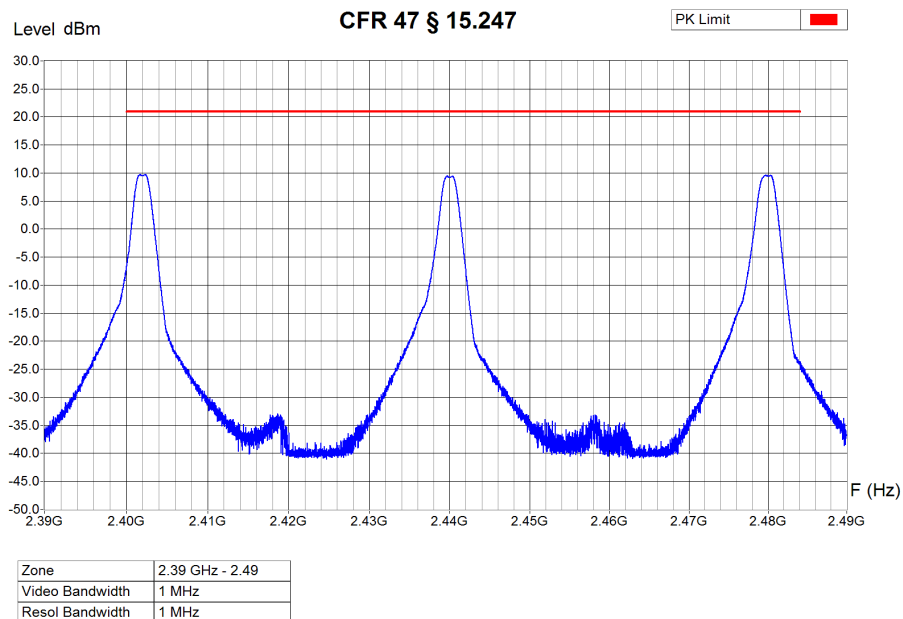
Operating mode: *Hopping f = 2.402/2.440/2.480 GHz, modulated, Pmax*

Cables connected to the EUT: *Temporary supply & antenna cables*

Remarks: *Measured on temporary antenna connector*

| f normal<br>[GHz] | Temp<br>[°C] | U<br>[V] | P<br>[dBm] | Limit<br>[dBm] | Remarks    | Pass<br>Yes                         | No                       |
|-------------------|--------------|----------|------------|----------------|------------|-------------------------------------|--------------------------|
| 2.402             | 23.9         | 3.8      | 9.75       | 21             | Worst case | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2.440             | 23.9         | 3.8      | 9.46       | 21             | - - -      | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2.480             | 23.9         | 3.8      | 9.61       | 21             | - - -      | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Equipment Under Test : Roger Clip-on Mic  
 Set-Up : Electronic board with temporary supply & antenna connectors, see photos  
 Operating Conditions : Hopping emission (f = 2.402 / 2.440 / 2.480 GHz), modulated, Pmax  
 Remarks : Peak detector sweep, ST = 30s (Ton = 184us, T = 400us)  
 Supply = 3.70 VDC, Temp = 24.2°C



Operator: B. Itzcovich  
 Date/Time: 06.05.2013 16:23  
 Filename:  
 81\_EIRP\_Cond\_3V7\_FCC.png/  
 .txt

Place and date of test: *Rossens, May 6, 2013*  
 Operator: *B. Itzcovich*

**6.7 Band-edge emission (conducted)**

Test site: ☐ semi-anechoic chamber (foam) ☐ open test site  
☐ semi-anechoic chamber (ferrites) ☒ laboratory

Meas. uncertainty: 9kHz – 3GHz:  $\pm 1$  dB  
 3GHz – 6.7GHz:  $\pm 2.1$  dB  
 6.7GHz – 13.2GHz:  $\pm 2.6$  dB  
 13.2GHz – 19GHz:  $\pm 2.8$  dB  
 19GHz – 26.5GHz:  $\pm 3$  dB

Test method: Measurement of the conducted power on the antenna connector or a test fixture.

Limit: In any 100 kHz bandwidth outside the frequency band, the radio frequency power shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. This requirement applies to hopping mode on and off.

Test set-up:



Remarks: - - -

Test equipment:

|                   |                                           |                                |                                           |                                |                                |                                |
|-------------------|-------------------------------------------|--------------------------------|-------------------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Spectrum analyser | <input type="checkbox"/> 88-14            | <input type="checkbox"/> 94-24 | <input checked="" type="checkbox"/> 02-06 | <input type="checkbox"/> 03-45 | <input type="checkbox"/> 05-39 | <input type="checkbox"/> 07-53 |
| Power supply      | <input checked="" type="checkbox"/> 99-07 | <input type="checkbox"/> 04-31 |                                           |                                |                                |                                |
| Cables            | <input checked="" type="checkbox"/> 11-45 |                                |                                           |                                |                                |                                |

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

**Results of the test**

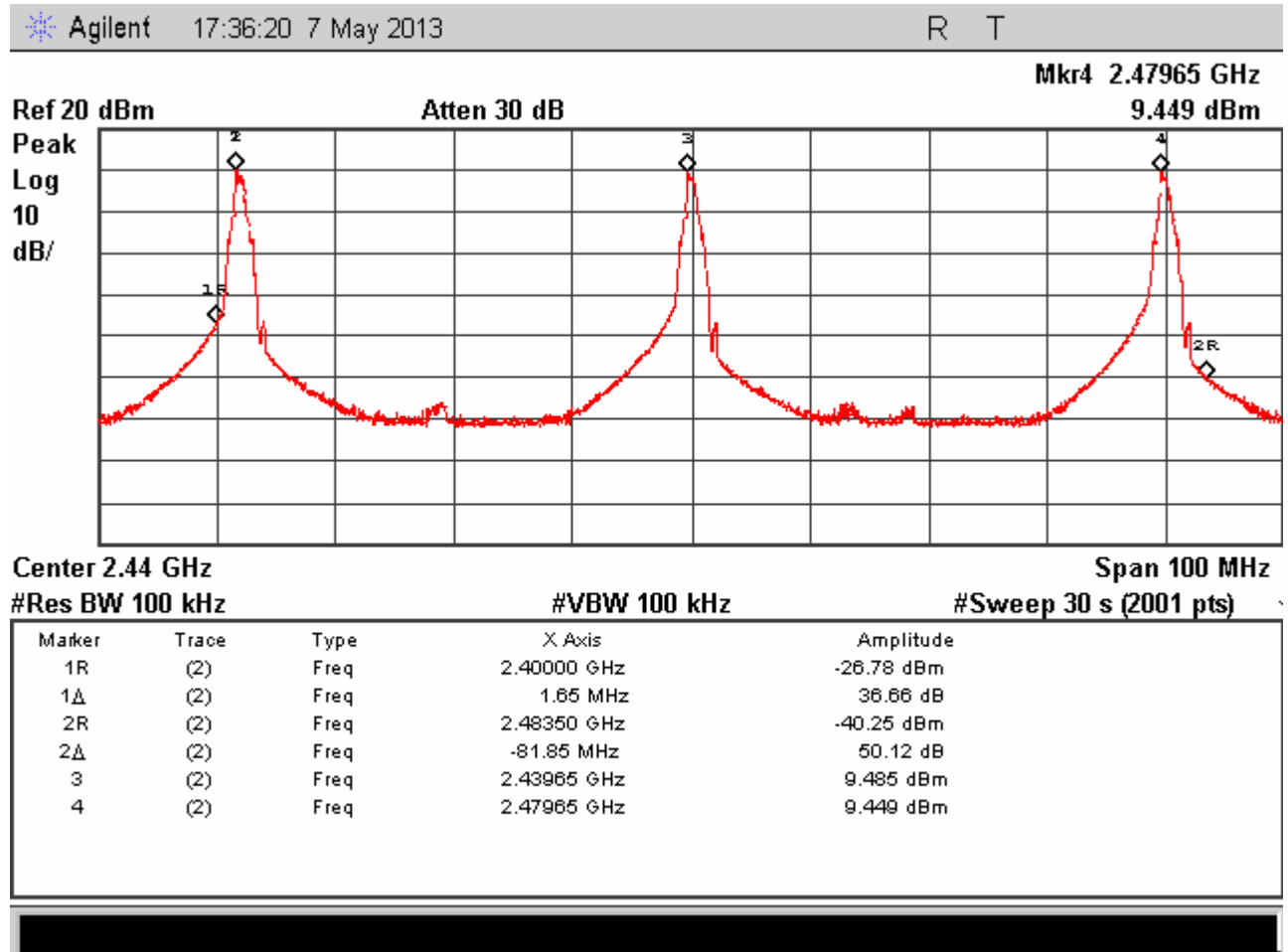
Client: *Phonak Communications AG*

Apparatus: *Roger Clip-on Mic*

Operating mode: *Hopping f = 2.402/2.440/2.480 GHz, modulated, Pmax*

Cables connected to the EUT: *Temporary supply & antenna cables*

Remarks: *Measured on temporary antenna connector*



Place and date of test:  
Operator:

*Rossens, May 7, 2013*  
*B. Itzcovich*

**6.8 Spurious emission – conducted (transmitter – 15 MHz to 26.5 GHz)**

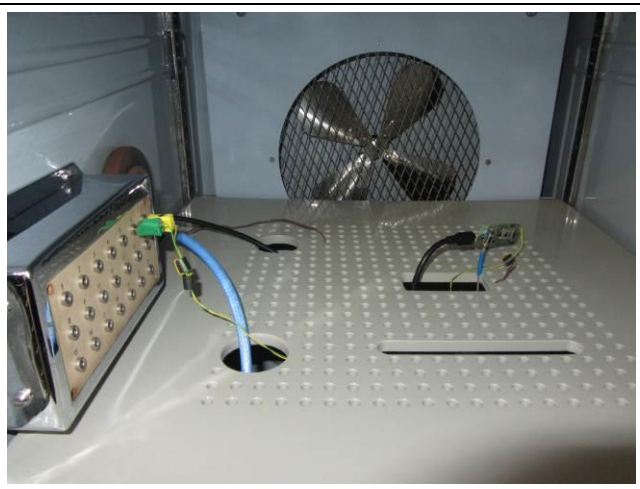
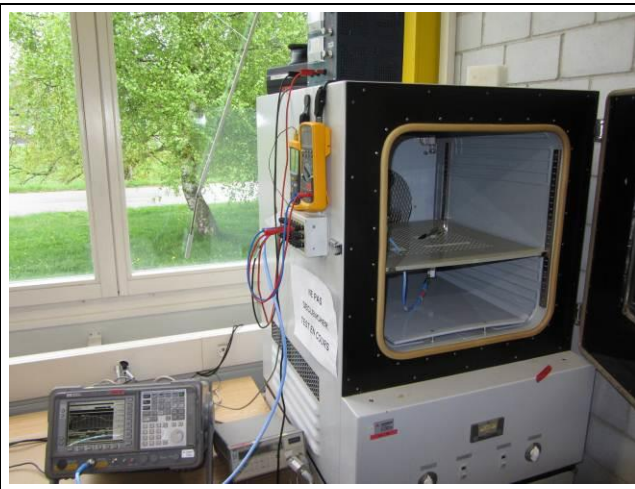
Test site: ☐ semi-anechoic chamber (foam) ☐ open test site  
☐ semi-anechoic chamber (ferrites) ☒ laboratory

Meas. uncertainty: 9kHz – 3GHz:  $\pm 1$  dB  
 3GHz – 6.7GHz:  $\pm 2.1$  dB  
 6.7GHz – 13.2GHz:  $\pm 2.6$  dB  
 13.2GHz – 19GHz:  $\pm 2.8$  dB  
 19GHz – 26.5GHz:  $\pm 3$  dB

Test method: Measurement of the conducted power on the antenna connector or a test fixture.

Limit: In any 100 kHz bandwidth outside the frequency band, the radio frequency power shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

Test set-up:



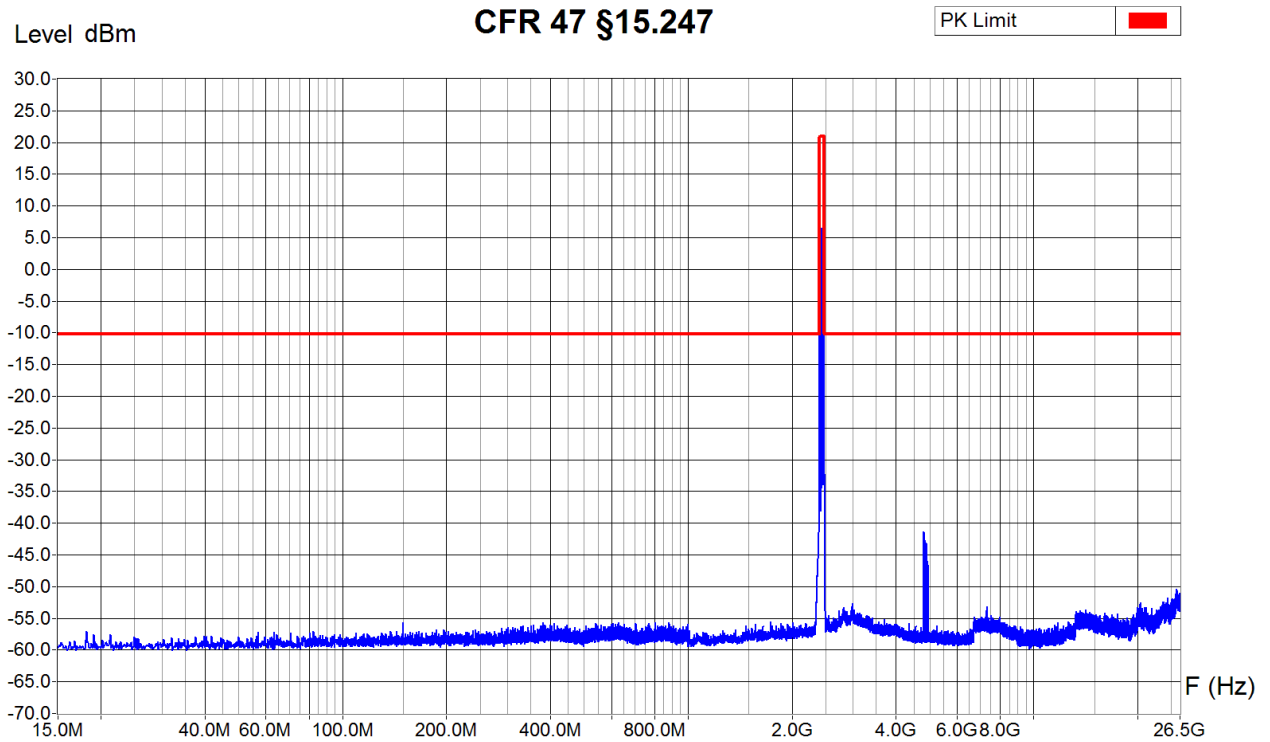
Remarks: ---

Test equipment:

|                   |                                           |                                |                                           |                                |                                |                                |
|-------------------|-------------------------------------------|--------------------------------|-------------------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Spectrum analyser | <input type="checkbox"/> 88-14            | <input type="checkbox"/> 94-24 | <input checked="" type="checkbox"/> 02-06 | <input type="checkbox"/> 03-45 | <input type="checkbox"/> 05-39 | <input type="checkbox"/> 07-53 |
| Power supply      | <input checked="" type="checkbox"/> 99-07 | <input type="checkbox"/> 04-31 |                                           |                                |                                |                                |
| Cables            | <input checked="" type="checkbox"/> 11-45 |                                |                                           |                                |                                |                                |

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

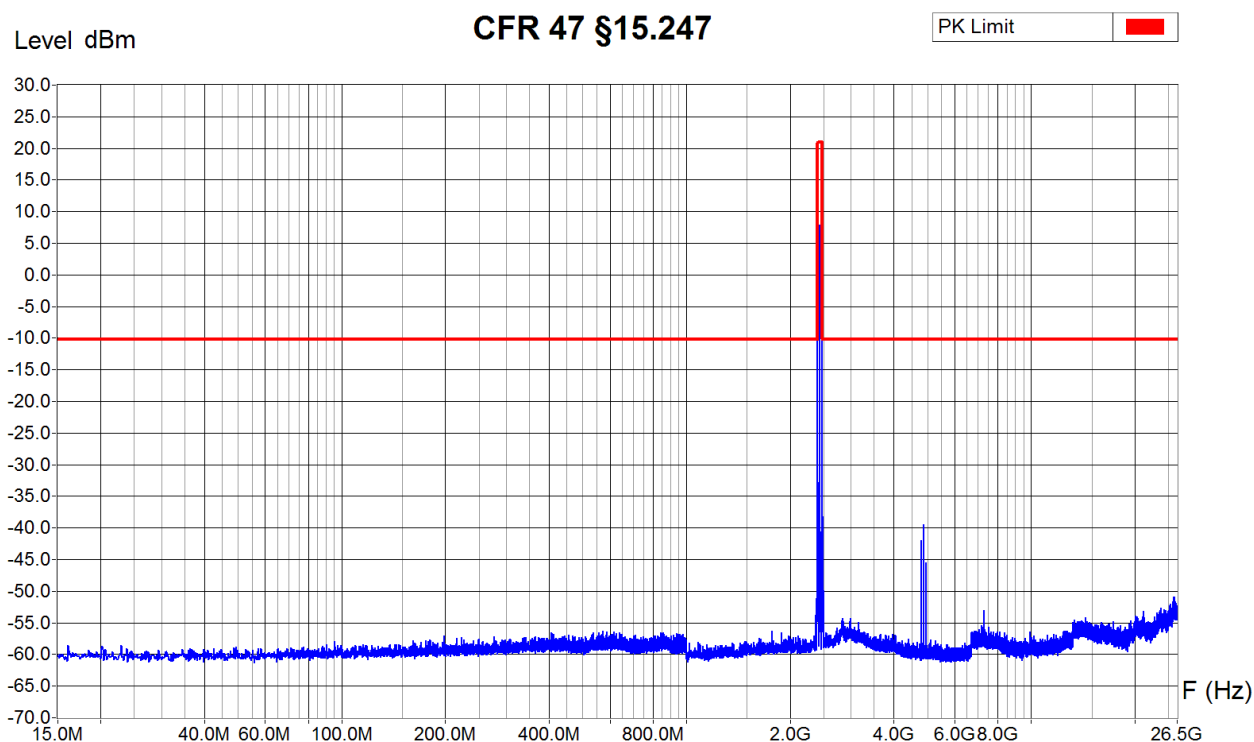
Equipment Under Test : Roger Clip-on Mic  
 Set-Up : Electronic board with temporary supply & antenna connectors, see photos  
 Operating Conditions : Continuously hopping, modulated, Pmax  
 Remarks : Supply = 3.70 VDC, Temp = 25 °C  
 Peak detector sweep, ST = 60s



| Zone            | 15 MHz - 1 GHz | 1 GHz - 9 GHz | 9 GHz - 18 GHz | 18 GHz - 26.50 GHz |
|-----------------|----------------|---------------|----------------|--------------------|
| Video Bandwidth | 100 KHz        | 100 KHz       | 100 KHz        | 100 KHz            |
| Resol Bandwidth | 100 KHz        | 100 KHz       | 100 KHz        | 100 KHz            |

Operator: B. Itzcovich  
 Date/Time: 08.05.2013 11:30  
 Filename:  
 85\_CE\_15M-26G5\_Hopping.png/  
 .txt

Equipment Under Test : Roger Clip-on Mic  
 Set-Up : Electronic board with temporary supply & antenna connectors, see photos  
 Operating Conditions : Hopping emission (f = 2.402 / 2.440 / 2.480 GHz), modulated, Pmax  
 Remarks : Supply = 3.70 VDC, Temp = 24.9 °C  
 Peak detector sweep, ST = 60s  
 Ton = 184us, T = 400us



| Zone            | 15 MHz - 1 GHz | 1 GHz - 9 GHz | 9 GHz - 18 GHz | 18 GHz - 26.50 GHz |
|-----------------|----------------|---------------|----------------|--------------------|
| Video Bandwidth | 100 KHz        | 100 KHz       | 100 KHz        | 100 KHz            |
| Resol Bandwidth | 100 KHz        | 100 KHz       | 100 KHz        | 100 KHz            |

Operator: B. Itzcovich  
 Date/Time: 08.05.2013 11:09  
 Filename:  
 84\_CE\_15M-26G5\_TX3F.png/.txt

## 6.9 Spurious emission transmit mode – radiated

### 6.9.1 30 MHz to 1 GHz

Test site: ☐ semi-anechoic chamber (foam) ☐ open test site  
☒ semi-anechoic chamber (ferrites) ☐ .....

Distance: ☒ 3 m ☐ 10 m ☐ 30 m

Position of EUT: 0.8 m (height of the equipment under test above floor)

Meas. uncertainty:  $\pm 4.6$  dB (30 - 300 MHz) /  $\pm 3.7$  dB (300 - 1000 MHz)

Test method: The electromagnetic disturbance radiated by the equipment is measured using a spectrum analyser and a wide band antenna. The antenna is moved from 1 to 4 m in height successively with horizontal and vertical polarisations. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value of all the disturbances appearing while the apparatus is under test. The peak values are recorded continuously on the graph. The values exceeding a limit are remeasured manually using a receiver.

Test set-up:



Remarks: Limit values expressed in dB $\mu$ V/m and transformed to a measuring distance of 3m  
 (factor used = 20 dB/decade) if necessary  
 e.g.: for  $f = 40$  MHz the limit is 100  $\mu$ V/m at 3 m;

$$20 \log \left( \frac{100 \frac{\mu V}{m}}{1 \frac{\mu V}{m}} \right) = 40 \frac{dB \mu V}{m} \text{ at } 3m$$

Test equipment:

|                   |                                           |                                |                                |                                           |                                |                                           |
|-------------------|-------------------------------------------|--------------------------------|--------------------------------|-------------------------------------------|--------------------------------|-------------------------------------------|
| Spectrum analyser | <input type="checkbox"/> 88-14            | <input type="checkbox"/> 94-24 | <input type="checkbox"/> 02-06 | <input type="checkbox"/> 03-45            | <input type="checkbox"/> 05-39 | <input checked="" type="checkbox"/> 10-70 |
| Receiver          | <input type="checkbox"/> 85-04            | <input type="checkbox"/> 90-43 | <input type="checkbox"/> 94-35 | <input checked="" type="checkbox"/> 10-70 |                                |                                           |
| Preamplifier      | <input type="checkbox"/> 90-01            | <input type="checkbox"/> 95-86 | <input type="checkbox"/> 05-56 | <input checked="" type="checkbox"/> 05-59 | <input type="checkbox"/> 05-62 |                                           |
| Antenna (bilog)   | <input checked="" type="checkbox"/> 94-03 | <input type="checkbox"/> 05-38 |                                |                                           |                                |                                           |
| Cables            | <input checked="" type="checkbox"/> 06-01 |                                |                                |                                           |                                |                                           |

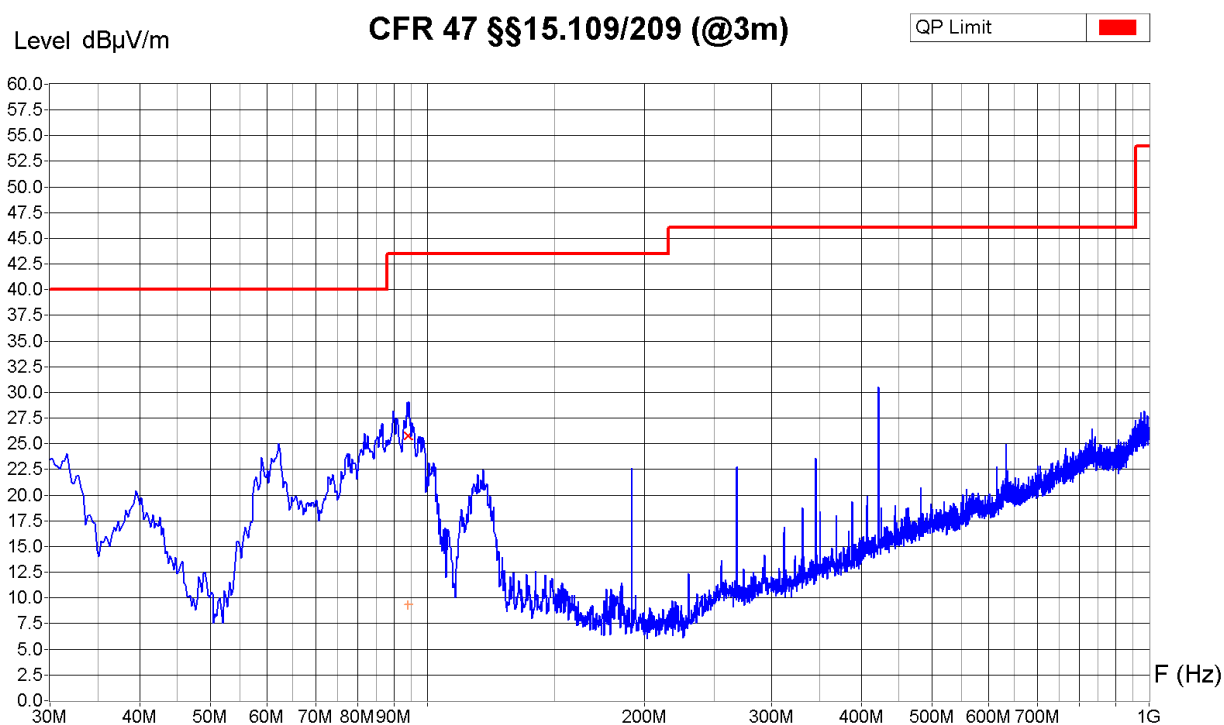
Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Measurement Type : Radiated Field  
 Polarisation : Vertical  
 Table Angle : 0 - 360°  
 Antenna Height : 1 - 4m



Equipment Under Test : Roger Clip-on Mic  
 Set-Up : With cradle, charger and audio cable connected, see photos  
 Operating Conditions : Hopping emission (f = 2.402, 2.44 and 2.480 GHz), modulated, Pmax  
 Remarks :

Cage 06-01



|                 |                |
|-----------------|----------------|
| Zone            | 30 MHz - 1 GHz |
| Video Bandwidth | 300 KHz        |
| Resol Bandwidth | 100 KHz        |

#### Receiver Measures

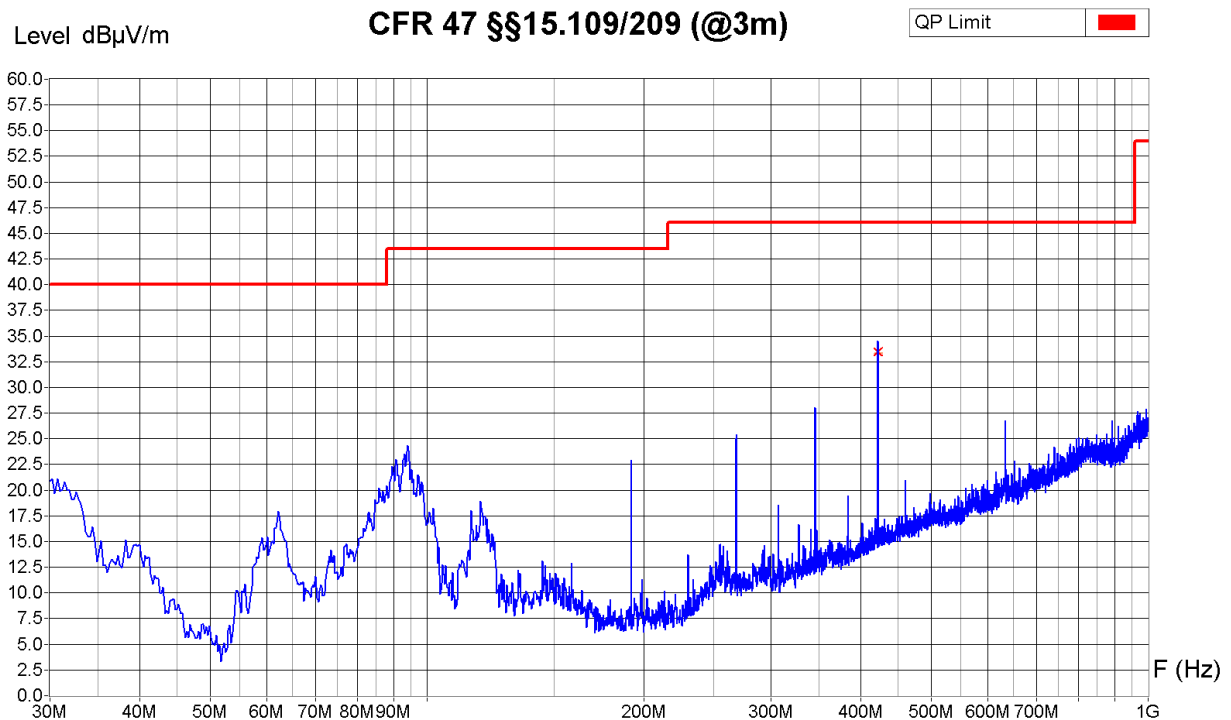
| Frequency | Peak        | QuasiPeak (x) | Average (+) | QP Margin |
|-----------|-------------|---------------|-------------|-----------|
| 94.05 MHz | 30.2 dBμV/m | 25.8 dBμV/m   | 9.4 dBμV/m  | 17.7 dB   |

Operator: B. Itzcovich  
 Date/Time: 16.07.2013 14:32  
 Filename:  
 107\_RE\_30M-  
 1G\_TX\_Hopping\_V\_FCC.png/.txt

Measurement Type : Radiated Field  
Polarisation : Horizontal  
Table Angle : 0 - 360°  
Antenna Height : 1 - 4m



Equipment Under Test : Roger Clip-on Mic  
Set-Up : With cradle, charger and audio cable connected, see photos  
Operating Conditions : Hopping emission (f = 2.402, 2.44 and 2.480 GHz), modulated, Pmax  
Remarks :  
Cage 06-01



|                 |                |
|-----------------|----------------|
| Zone            | 30 MHz - 1 GHz |
| Video Bandwidth | 300 KHz        |
| Resol Bandwidth | 100 KHz        |

## Receiver Measures

| Frequency  | Peak              | QuasiPeak (x)     | Average (+)       | QP Margin |
|------------|-------------------|-------------------|-------------------|-----------|
| 422.40 MHz | 34.4 dB $\mu$ V/m | 33.5 dB $\mu$ V/m | 33.3 dB $\mu$ V/m | 12.6 dB   |

Operator: B. Itzcovich  
Date/Time: 16.07.2013 14:40  
Filename:  
108\_RE\_30M-  
1G\_TX\_Hopping\_H\_FCC.png/.txt

**6.9.2 1 GHz to 18 GHz**

Test site: ☐ semi-anechoic chamber (ferrites) ☒ semi-anechoic chamber (foam)

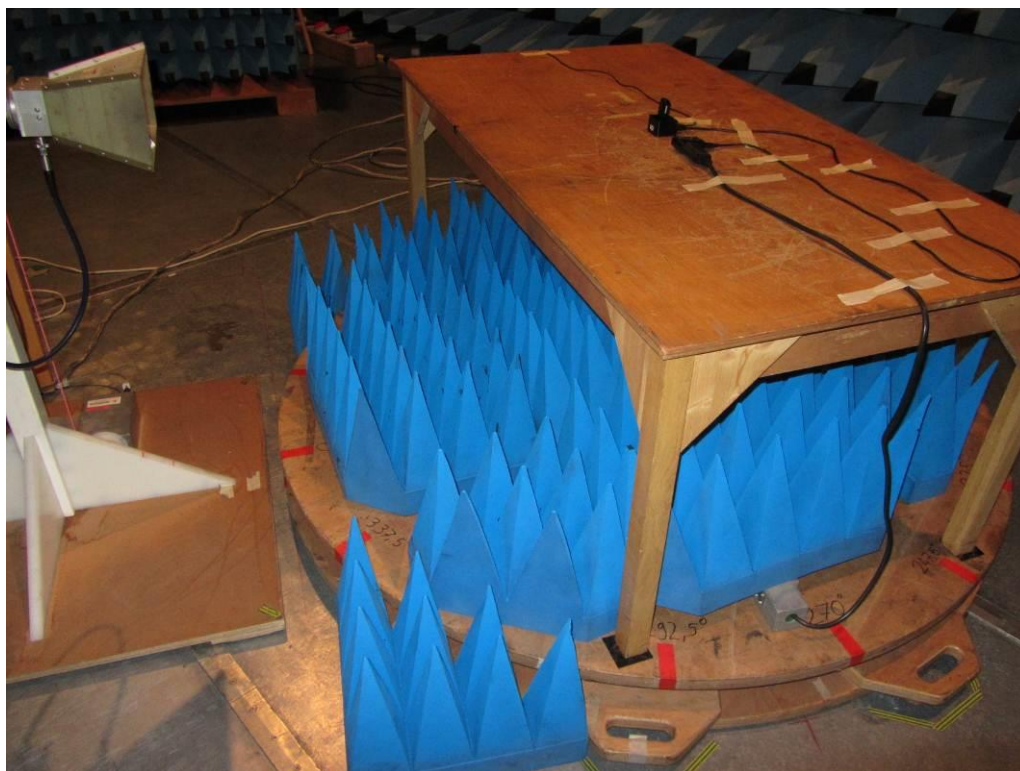
Distance: ☒ 1 m ☐ 3 m ☐ 10 m ☐ 30 m

Position of EUT: 0.8 m (height of the equipment under test above floor)

Meas. uncertainty:  $\pm 4.7$  dB

Test method: The electromagnetic disturbance radiated by the equipment is measured using a spectrum analyser and a wide band antenna. The antenna is placed at the same height as the EUT successively with horizontal and vertical polarisations. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value (peak) of all the disturbances appearing while the apparatus is under test.

Test set-up:



Remarks:

Limit values expressed in dB $\mu$ V/m and transformed to a measuring distance of 1m  
(factor used = 20 dB/decade) if necessary  
e.g.: for  $f = 1$  GHz the limit is 500  $\mu$ V/m at 3 m;

$$20 \log \left( \frac{500 \frac{\mu V}{m}}{1 \frac{\mu V}{m}} \right) + 20 \log \left( \frac{3m}{1m} \right) = 63.5 \frac{dB\mu V}{m} \text{ at } 1m$$

Test equipment:

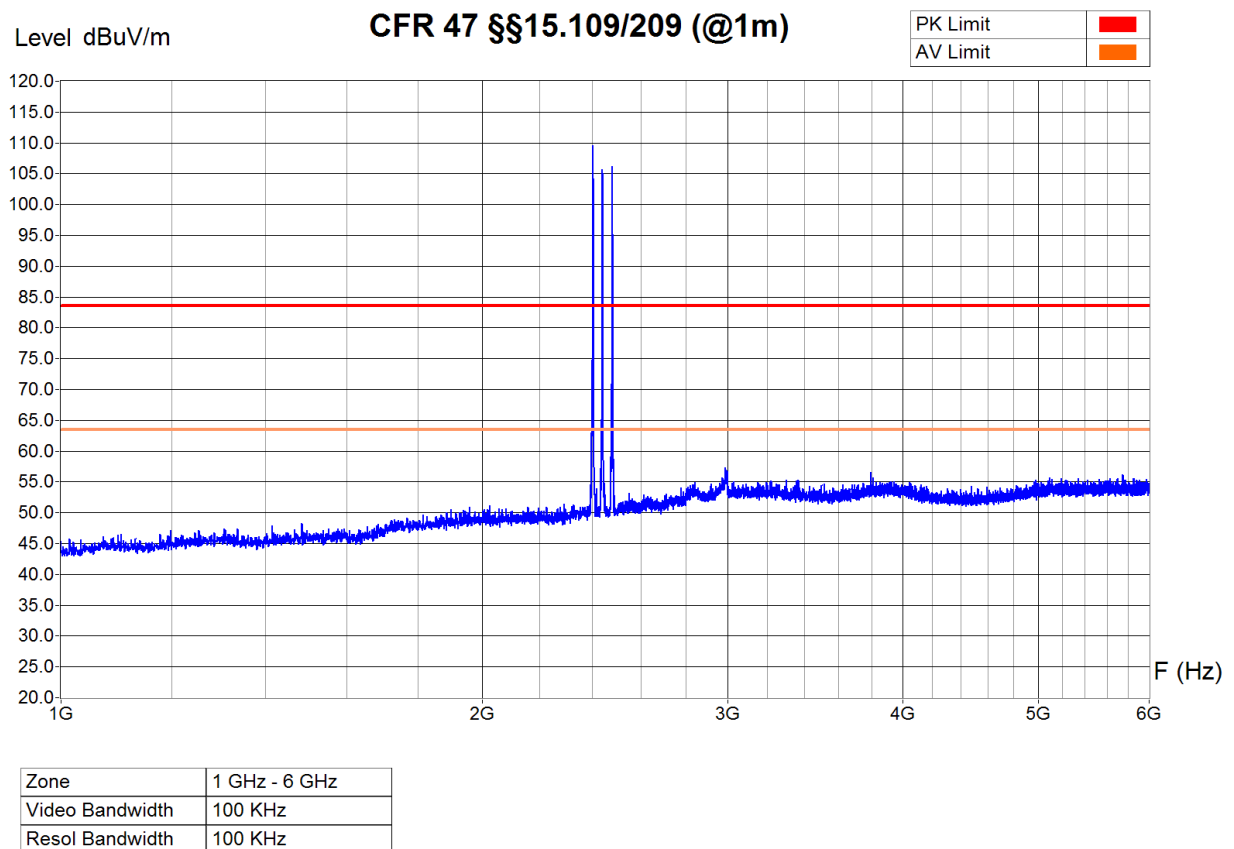
|                   |                                           |                                           |                                           |                                           |                                |                                |
|-------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|--------------------------------|--------------------------------|
| Spectrum analyser | <input type="checkbox"/> 88-14            | <input type="checkbox"/> 94-24            | <input checked="" type="checkbox"/> 02-06 | <input type="checkbox"/> 03-45            | <input type="checkbox"/> 05-39 | <input type="checkbox"/> 07-53 |
| Preamplifier      | <input type="checkbox"/> 05-56            | <input type="checkbox"/> 05-87            | <input checked="" type="checkbox"/> 11-29 |                                           |                                |                                |
| Antenna (horn)    | <input checked="" type="checkbox"/> 90-24 | <input type="checkbox"/> 07-31            |                                           |                                           |                                |                                |
| Cables            | <input checked="" type="checkbox"/> 10-75 | <input checked="" type="checkbox"/> 11-61 |                                           |                                           |                                |                                |
| Filters           | <input type="checkbox"/> 10-65            | <input type="checkbox"/> 10-66            | <input type="checkbox"/> 11-08            | <input checked="" type="checkbox"/> 12-06 |                                |                                |

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Measurement Type : Radiated Field  
Polarisation : Vertical  
Table Angle : 0° - 360°  
Antenna Height : 1m - 2m



Equipment Under Test : Roger Clip-on Mic  
Set-Up : With cradle, charger and audio cable connected. See photos  
Operating Conditions : Hopping emission (f = 2.402, 2.440 and 2.480 GHz), modulated, Pmax  
Remarks : Without filter, without preamp  
Cage 06-00



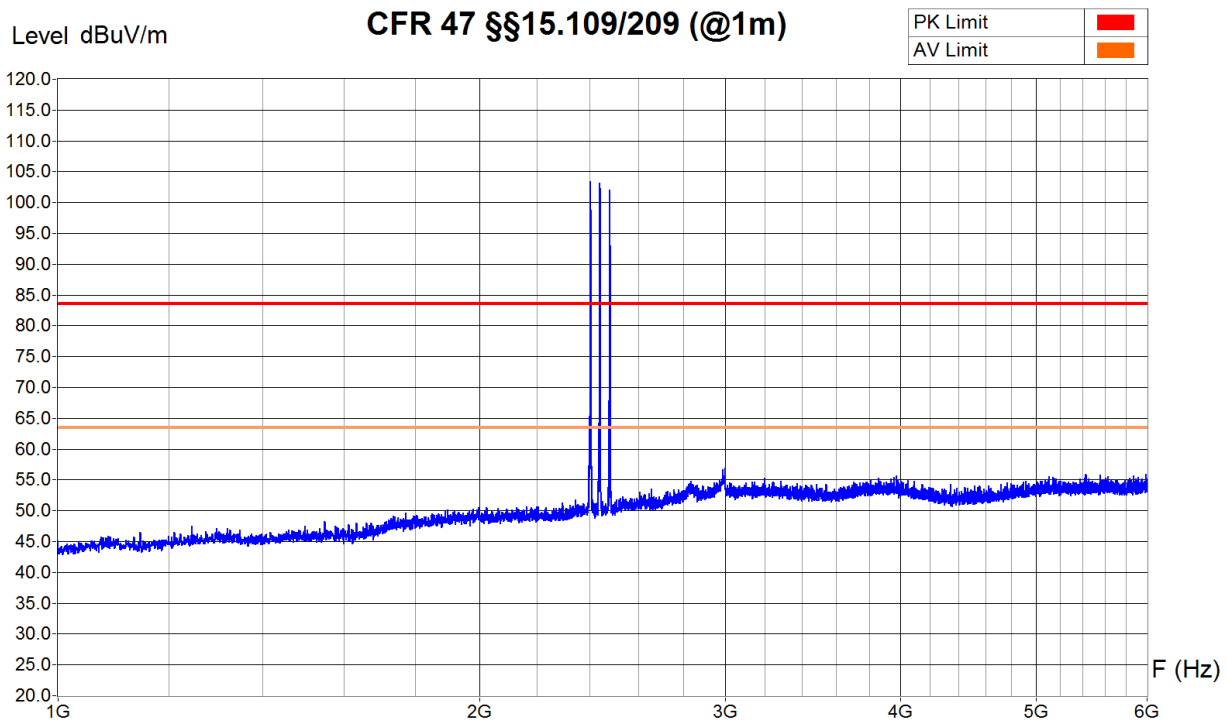
Operator: B. Itzcovich  
Date/Time: 25.07.2013 12:59  
Filename:  
115\_RE\_1G-6G\_TX3f\_V.png/.txt

Measurement Type : Radiated Field  
Polarisation : Horizontal  
Table Angle : 0° - 360°  
Antenna Height : 1m - 2m



**montena**  
montena emc sa

Equipment Under Test : Roger Clip-on Mic  
Set-Up : With cradle, charger and audio cable connected. See photos  
Operating Conditions : Hopping emission (f = 2.402, 2.440 and 2.480 GHz), modulated, Pmax  
Remarks : Without filter, without preamp  
Cage 06-00



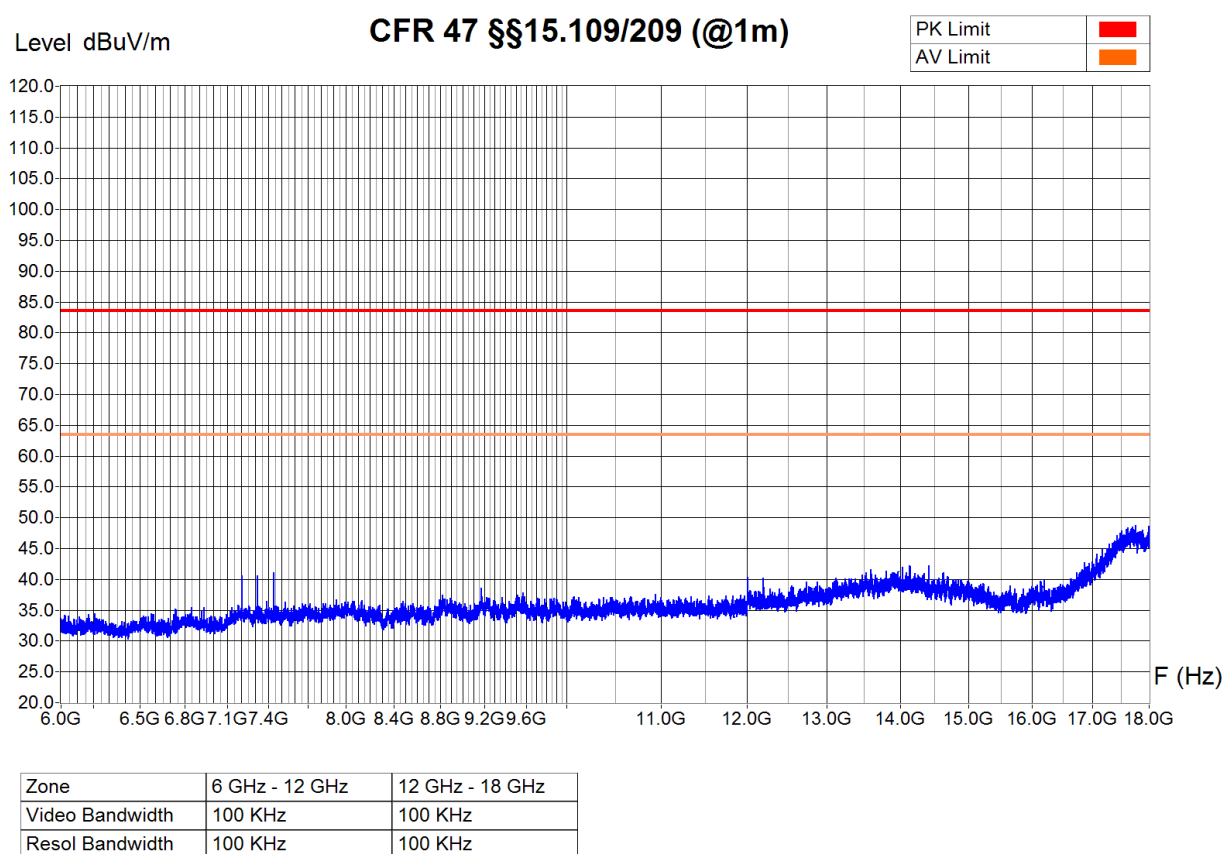
|                 |               |
|-----------------|---------------|
| Zone            | 1 GHz - 6 GHz |
| Video Bandwidth | 100 KHz       |
| Resol Bandwidth | 100 KHz       |

Operator: B. Itzcovich  
Date/Time: 25.07.2013 12:48  
Filename:  
116\_RE\_1G-6G\_TX3f\_H.png/.txt

Measurement Type : Radiated Field  
Polarisation : Vertical  
Table Angle : 0° - 360°  
Antenna Height : 1m - 2m



Equipment Under Test : Roger Clip-on Mic  
Set-Up : With cradle, charger and audio cable connected. See photos  
Operating Conditions : Hopping emission (f = 2.402, 2.440 and 2.480 GHz), modulated, Pmax  
Remarks : With filter, with preamp  
Cage 06-00

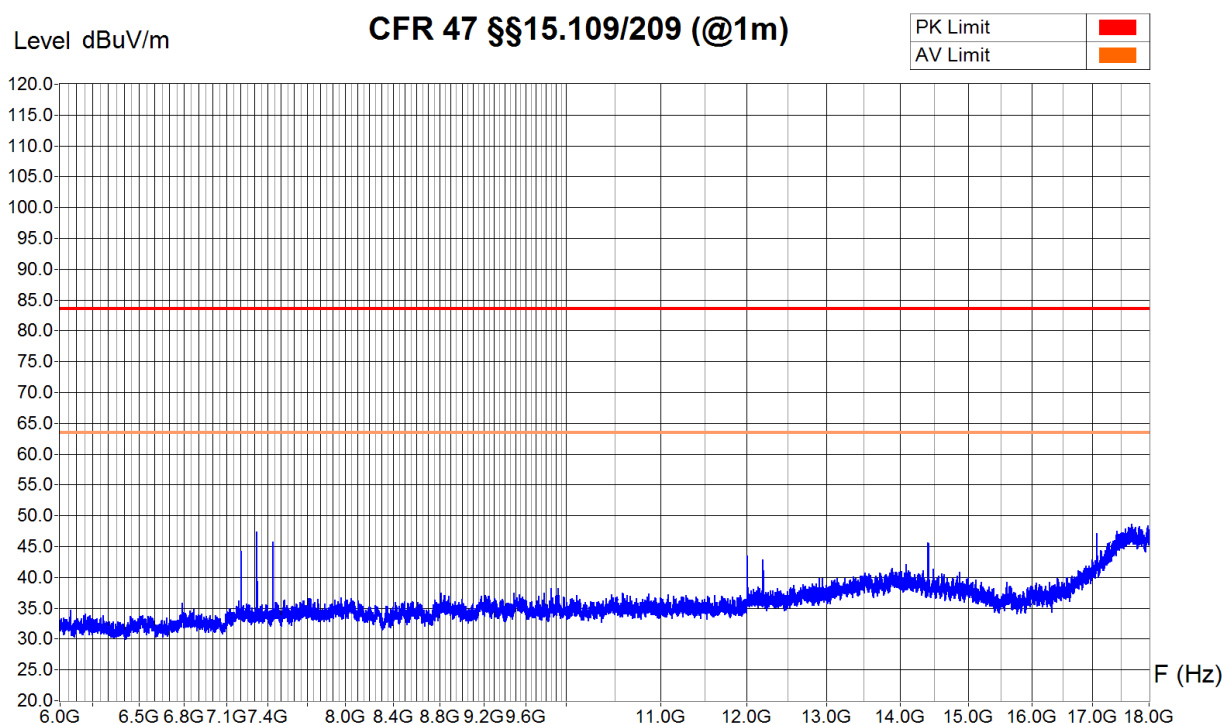


Operator: B. Itzcovich  
Date/Time: 25.07.2013 13:40  
Filename:  
117\_RE\_6G-18G\_TX3f\_V.png/.txt

Measurement Type : Radiated Field  
 Polarisation : Horizontal  
 Table Angle : 0° - 360°  
 Antenna Height : 1m - 2m



Equipment Under Test : Roger Clip-on Mic  
 Set-Up : With cradle, charger and audio cable connected. See photos  
 Operating Conditions : Hopping emission (f = 2.402, 2.440 and 2.480 GHz), modulated, Pmax  
 Remarks : With filter, with preamp  
 Cage 06-00



| Zone            | 6 GHz - 12 GHz | 12 GHz - 18 GHz |
|-----------------|----------------|-----------------|
| Video Bandwidth | 100 KHz        | 100 KHz         |
| Resol Bandwidth | 100 KHz        | 100 KHz         |

Operator: B. Itzcovich  
 Date/Time: 25.07.2013 13:49  
 Filename:  
 118\_RE\_6G-18G\_TX3f\_H.png/.txt

**6.9.3 18 GHz to 26.5 GHz**

Test site: ☒ semi-anechoic chamber (foam) ☐ semi-anechoic chamber (ferrites)

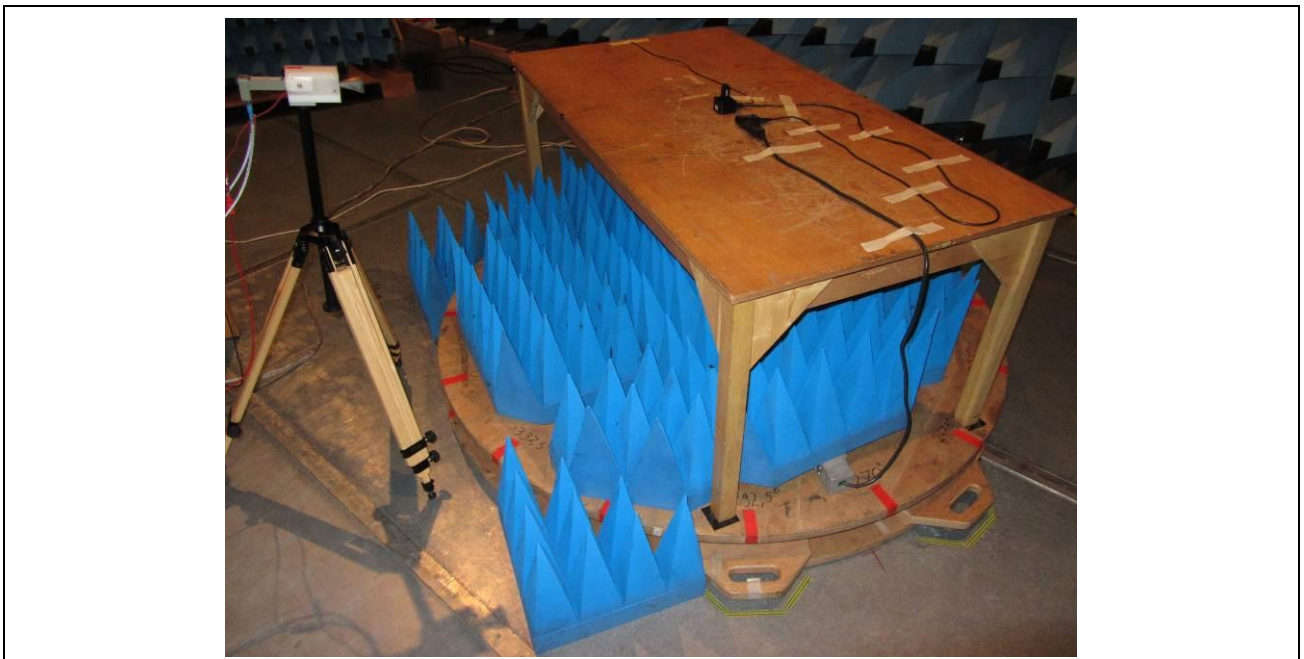
Distance: ☒ 1 m ☐ 3 m ☐ 10 m ☐ 30 m

Position of EUT: 0.8 m (height of the equipment under test above floor)

Meas. uncertainty:  $\pm 4.7$  dB

Test method: The electromagnetic disturbance radiated by the equipment is measured using a spectrum analyser and a wide band antenna. The antenna is placed at the same height as the EUT successively with horizontal and vertical polarisations. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value (peak) of all the disturbances appearing while the apparatus is under test.

Test set-up:



Remarks:

*Limit values expressed in dBμV/m and transformed to a measuring distance of 1m (factor used = 20 dB/decade) if necessary*

*e.g.: for f = 18 GHz the limit is 500 μV/m at 3 m;*

$$20 \log \left( \frac{500 \frac{\mu V}{m}}{1 \frac{\mu V}{m}} \right) + 20 \log \left( \frac{3m}{1m} \right) = 63.5 \frac{dB\mu V}{m} \text{ at } 1m$$

Test equipment:

|                              |                                           |                                           |                                           |                                |                                |                                |
|------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Spectrum analyser            | <input type="checkbox"/> 88-14            | <input type="checkbox"/> 94-24            | <input checked="" type="checkbox"/> 02-06 | <input type="checkbox"/> 03-45 | <input type="checkbox"/> 05-39 | <input type="checkbox"/> 07-53 |
| Antenna with mixer & preamp. | <input checked="" type="checkbox"/> 98-12 |                                           |                                           |                                |                                |                                |
| Cables                       | <input checked="" type="checkbox"/> 11-62 | <input checked="" type="checkbox"/> 10-81 |                                           |                                |                                |                                |
| Power supply                 | <input checked="" type="checkbox"/> 06-62 |                                           |                                           |                                |                                |                                |

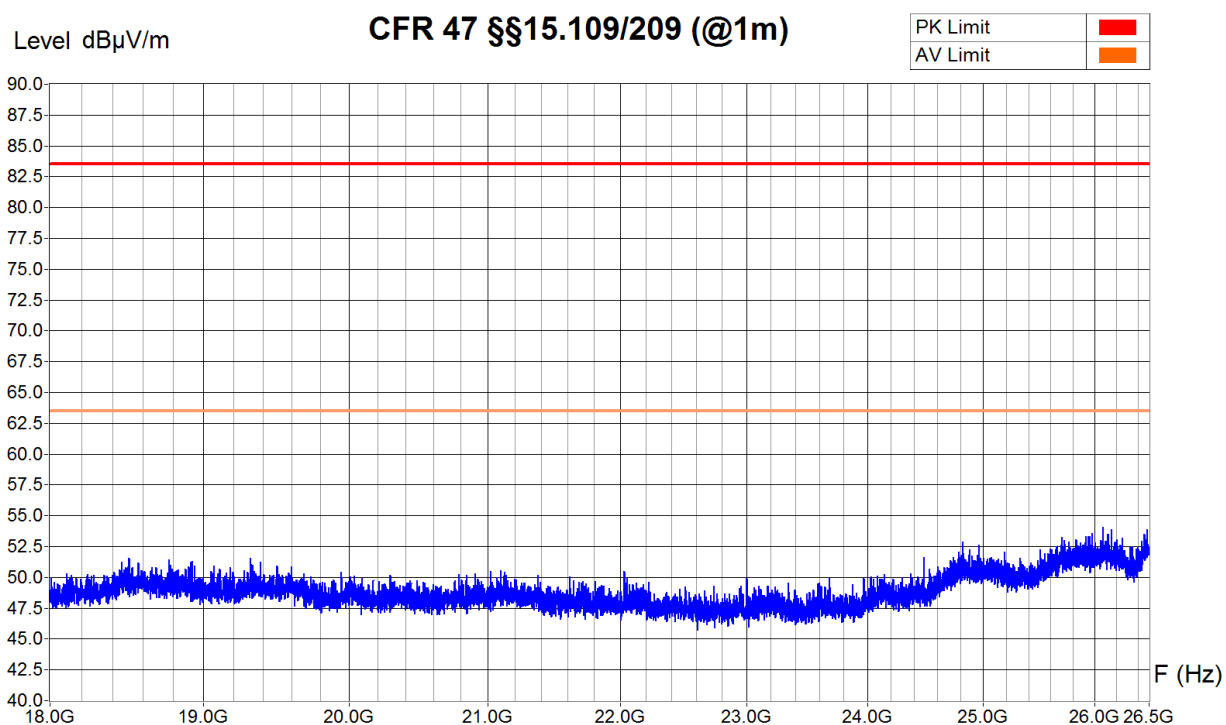
Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Measurement Type : Radiated Field  
Polarisation : Vertical  
Table Angle : 0° - 360°  
Antenna Height : 1 m



Equipment Under Test : Roger Clip-on Mic  
Set-Up : With cradle, charger and audio cable connected. See photos  
Operating Conditions : Hopping emission (f = 2.402 / 2.440 / 2.480 GHz), modulated, Pmax  
Remarks :

Cage 06-00



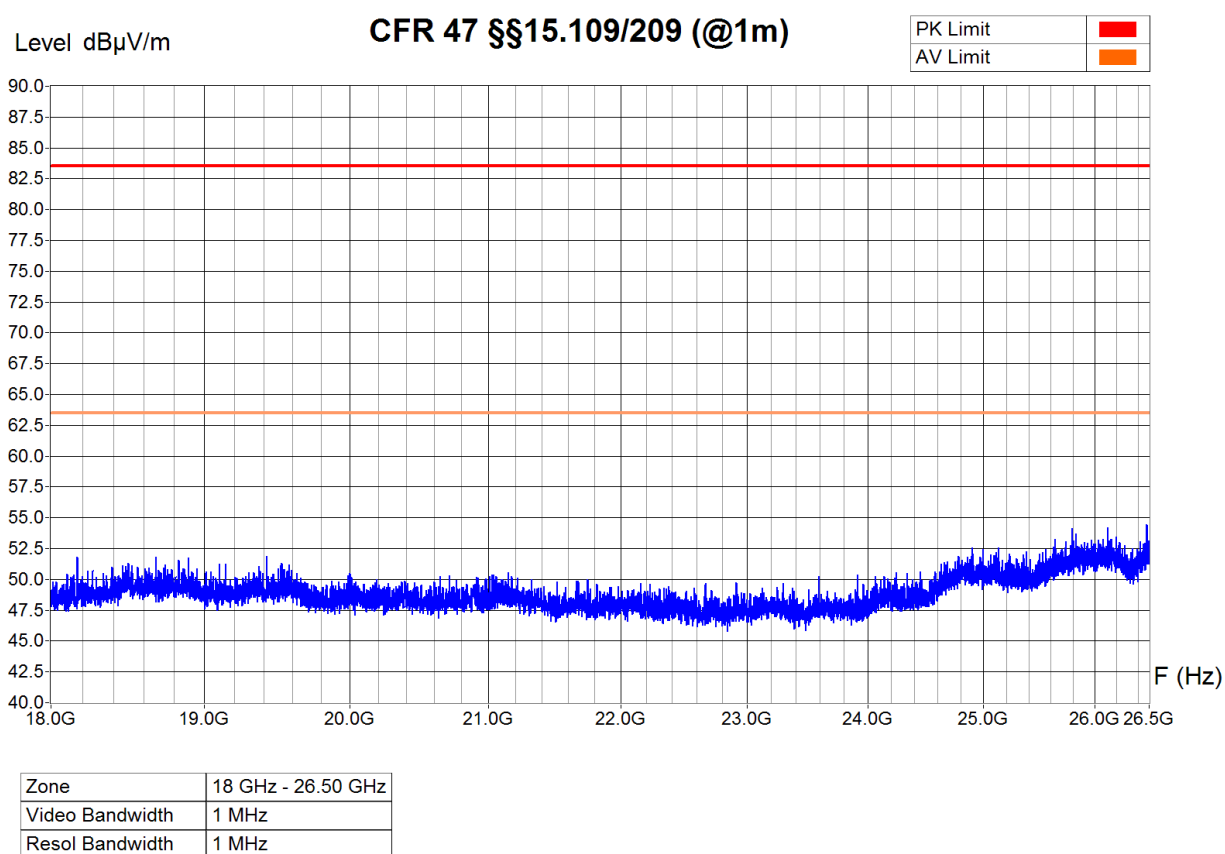
|                 |                    |
|-----------------|--------------------|
| Zone            | 18 GHz - 26.50 GHz |
| Video Bandwidth | 1 MHz              |
| Resol Bandwidth | 1 MHz              |

Operator: B. Itzcovich  
Date/Time: 26.07.2013 09:53  
Filename:  
123\_RE\_18G-26G5\_TX3f\_V.png/  
.txt

Measurement Type : Radiated Field  
Polarisation : Horizontal  
Table Angle : 0° - 360°  
Antenna Height : 1 m



Equipment Under Test : Roger Clip-on Mic  
Set-Up : With cradle, charger and audio cable connected. See photos  
Operating Conditions : Hopping emission (f = 2.402, 2.440 and 2.480 GHz), modulated, Pmax  
Remarks :  
Cage 06-00



Operator: B. Itzcovich  
Date/Time: 26.07.2013 11:31  
Filename:  
124\_RE\_18G-26G5\_TX3f\_H.png/  
.txt

**6.10 Spurious emission receive & standby mode - radiated****6.10.1 30 MHz to 1 GHz**Test site: ☐ semi-anechoic chamber (foam) ☐ open test site☒ semi-anechoic chamber (ferrites) ☐ .....Distance: ☒ 3 m ☐ 10 m ☐ 30 m

Position of EUT: 0.8 m (height of the equipment under test above floor)

Meas. uncertainty:  $\pm 4.6$  dB (30 - 300 MHz) /  $\pm 3.7$  dB (300 - 1000 MHz)

Test method: The electromagnetic disturbance radiated by the equipment is measured using a spectrum analyser and a wide band antenna. The antenna is moved from 1 to 4 m in height successively with horizontal and vertical polarisations. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value of all the disturbances appearing while the apparatus is under test. The peak values are recorded continuously on the graph. The values exceeding a limit are remeasured manually using a receiver.

Test set-up:



Remarks:

Limit values expressed in dB $\mu$ V/m and transformed to a measuring distance of 3m  
(factor used = 20 dB/decade) if necessary  
e.g.: for f = 40 MHz the limit is 100  $\mu$ V/m at 3 m;

$$20 \log \left( \frac{100 \frac{\mu V}{m}}{1 \frac{\mu V}{m}} \right) = 40 \frac{dB \mu V}{m} \text{ at } 3m$$

Test equipment:

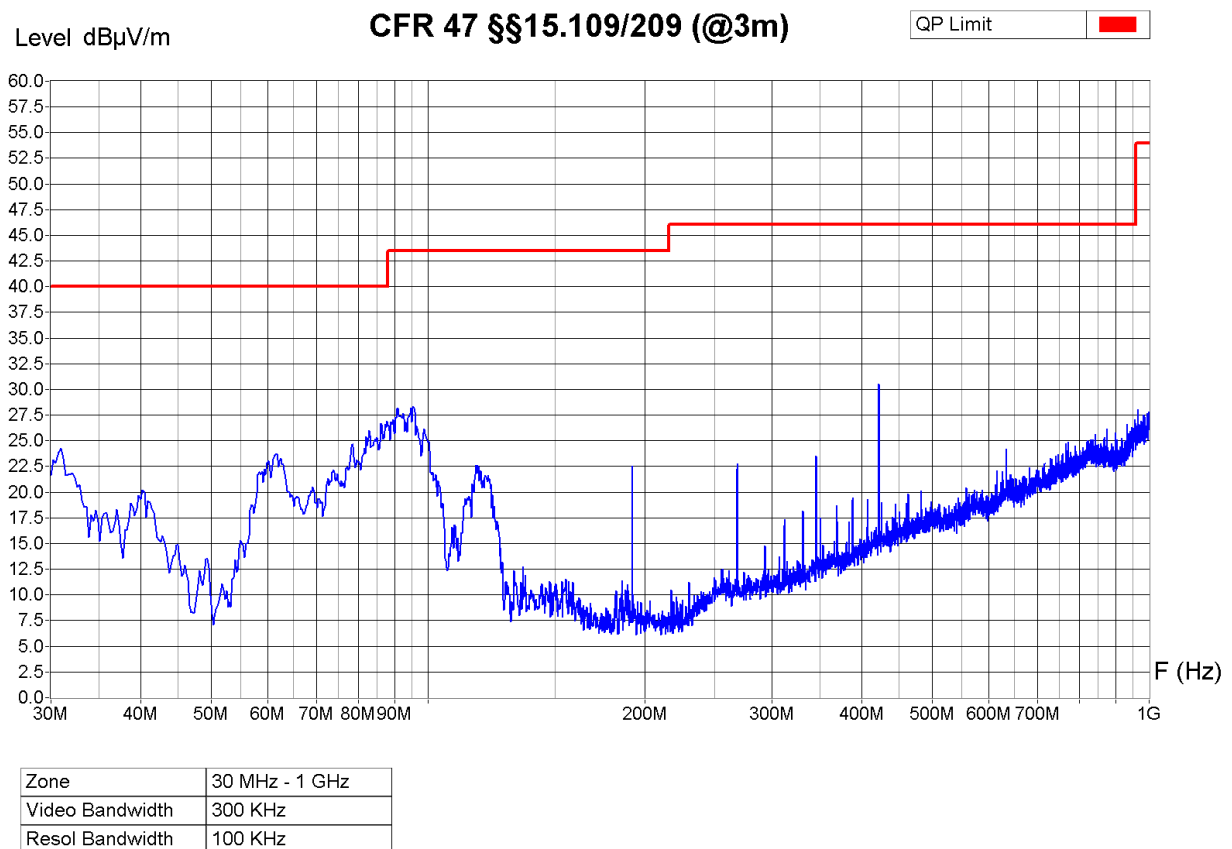
|                   |                                           |                                |                                |                                           |                                |                                           |
|-------------------|-------------------------------------------|--------------------------------|--------------------------------|-------------------------------------------|--------------------------------|-------------------------------------------|
| Spectrum analyser | <input type="checkbox"/> 88-14            | <input type="checkbox"/> 94-24 | <input type="checkbox"/> 02-06 | <input type="checkbox"/> 03-45            | <input type="checkbox"/> 05-39 | <input checked="" type="checkbox"/> 10-70 |
| Receiver          | <input type="checkbox"/> 85-04            | <input type="checkbox"/> 90-43 | <input type="checkbox"/> 94-35 | <input checked="" type="checkbox"/> 10-70 |                                |                                           |
| Preamplifier      | <input type="checkbox"/> 90-01            | <input type="checkbox"/> 95-86 | <input type="checkbox"/> 05-56 | <input checked="" type="checkbox"/> 05-59 | <input type="checkbox"/> 05-62 |                                           |
| Antenna (bilog)   | <input checked="" type="checkbox"/> 94-03 | <input type="checkbox"/> 05-38 |                                |                                           |                                |                                           |
| Cables            | <input checked="" type="checkbox"/> 06-01 |                                |                                |                                           |                                |                                           |

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Measurement Type : Radiated Field  
Polarisation : Vertical  
Table Angle : 0 - 360°  
Antenna Height : 1 - 4m



Equipment Under Test : Roger Clip-on Mic  
Set-Up : With cradle, charger and audio cable connected, see photos  
Operating Conditions : RX 2.440 GHz  
Remarks :  
Cage 06-01



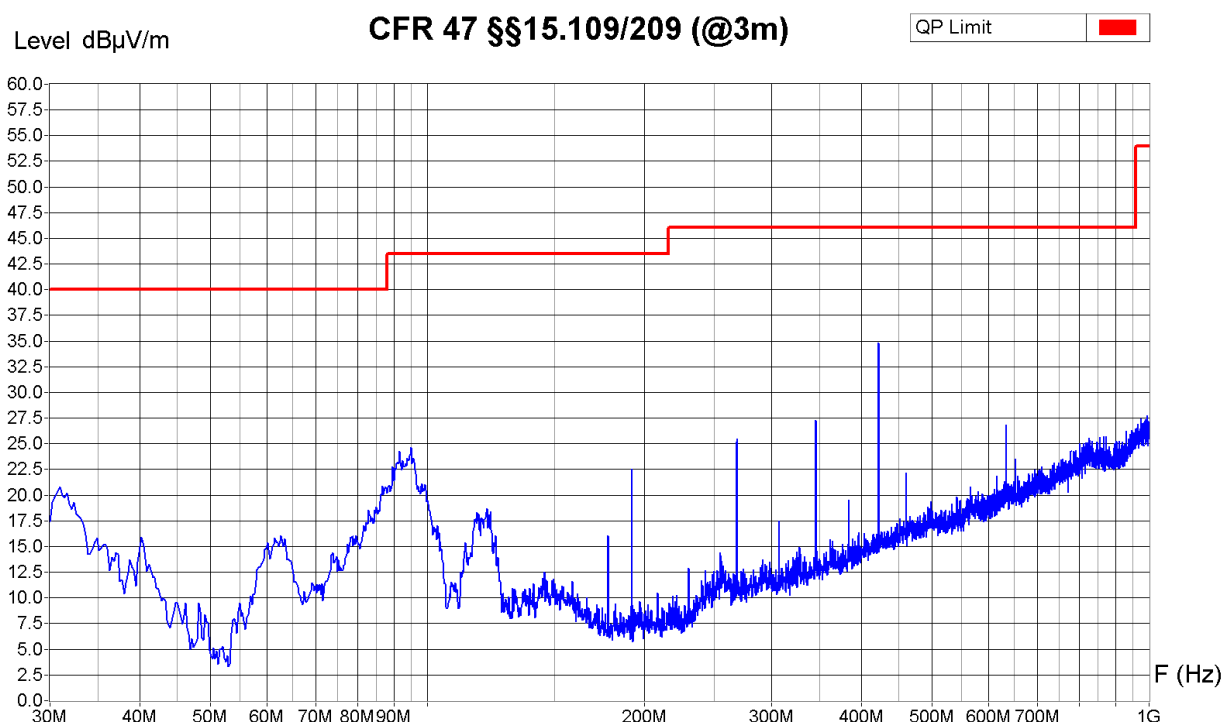
Operator: B. Itzcovich  
Date/Time: 16.07.2013 14:53  
Filename:  
109\_RE\_30M-  
1G\_RX\_V\_FCC.png/.txt

Measurement Type : Radiated Field  
 Polarisation : Horizontal  
 Table Angle : 0 - 360°  
 Antenna Height : 1 - 4m



Equipment Under Test : Roger Clip-on Mic  
 Set-Up : With cradle, charger and audio cable connected, see photos  
 Operating Conditions : RX 2.440 GHz  
 Remarks :

Cage 06-01



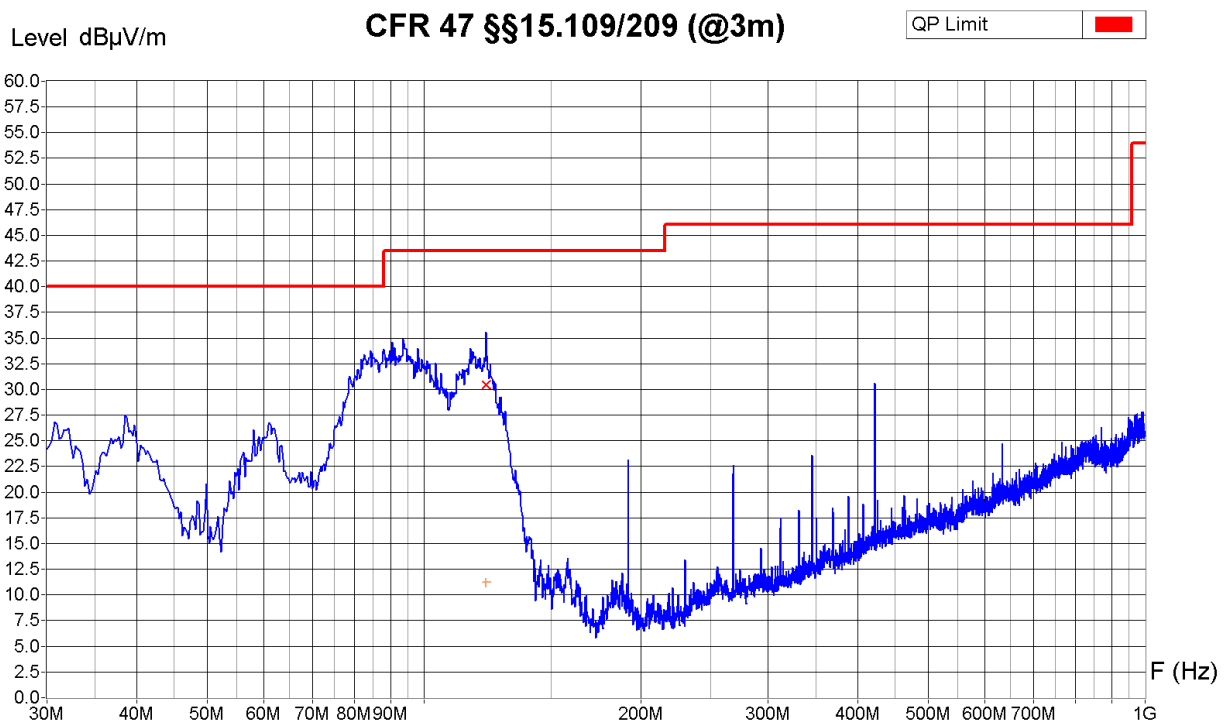
|                 |                |
|-----------------|----------------|
| Zone            | 30 MHz - 1 GHz |
| Video Bandwidth | 300 KHz        |
| Resol Bandwidth | 100 KHz        |

Operator: B. Itzcovich  
 Date/Time: 16.07.2013 14:59  
 Filename:  
 110\_RE\_30M-  
 1G\_RX\_H\_FCC.png/.txt

Measurement Type : Radiated Field  
Polarisation : Vertical  
Table Angle : 0 - 360°  
Antenna Height : 1 - 4m



Equipment Under Test : Roger Clip-on Mic  
Set-Up : With cradle, charger and audio cable connected, see photos  
Operating Conditions : Standby  
Remarks :  
Cage 06-01



|                 |                |
|-----------------|----------------|
| Zone            | 30 MHz - 1 GHz |
| Video Bandwidth | 300 KHz        |
| Resol Bandwidth | 100 KHz        |

## Receiver Measures

| Frequency  | Peak              | QuasiPeak (x)     | Average (+)       | QP Margin |
|------------|-------------------|-------------------|-------------------|-----------|
| 121.92 MHz | 38.9 dB $\mu$ V/m | 30.4 dB $\mu$ V/m | 11.2 dB $\mu$ V/m | 13.1 dB   |

Operator: B. Itzcovich  
Date/Time: 16.07.2013 15:21  
Filename:  
111\_RE\_30M-  
1G\_Stby\_V\_FCC.png/.txt

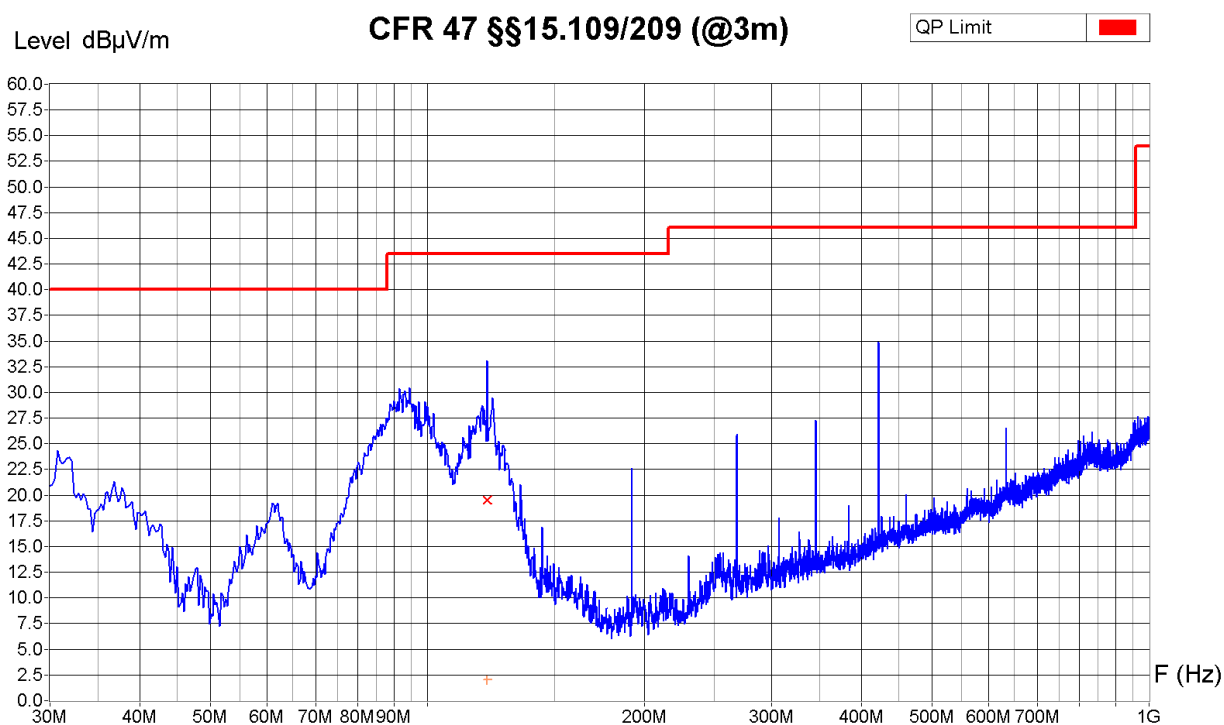
Measurement Type : Radiated Field  
Polarisation : Horizontal  
Table Angle : 0 - 360°  
Antenna Height : 1 - 4m



Equipment Under Test : Roger Clip-on Mic  
Set-Up : With cradle, charger and audio cable connected, see photos  
Operating Conditions : Standby

Remarks :

Cage 06-01



|                 |                |
|-----------------|----------------|
| Zone            | 30 MHz - 1 GHz |
| Video Bandwidth | 300 KHz        |
| Resol Bandwidth | 100 KHz        |

#### Receiver Measures

| Frequency | Peak              | QuasiPeak (x)     | Average (+)      | QP Margin |
|-----------|-------------------|-------------------|------------------|-----------|
| 121 MHz   | 33.9 dB $\mu$ V/m | 19.5 dB $\mu$ V/m | 2.0 dB $\mu$ V/m | 24.0 dB   |

Operator: B. Itzcovich  
Date/Time: 16.07.2013 15:26  
Filename:  
112\_RE\_30M-  
1G\_Stby\_H\_FCC.png/.txt

**6.10.2 1 GHz to 18 GHz**

Test site: ☐ semi-anechoic chamber (ferrites) ☒ semi-anechoic chamber (foam)

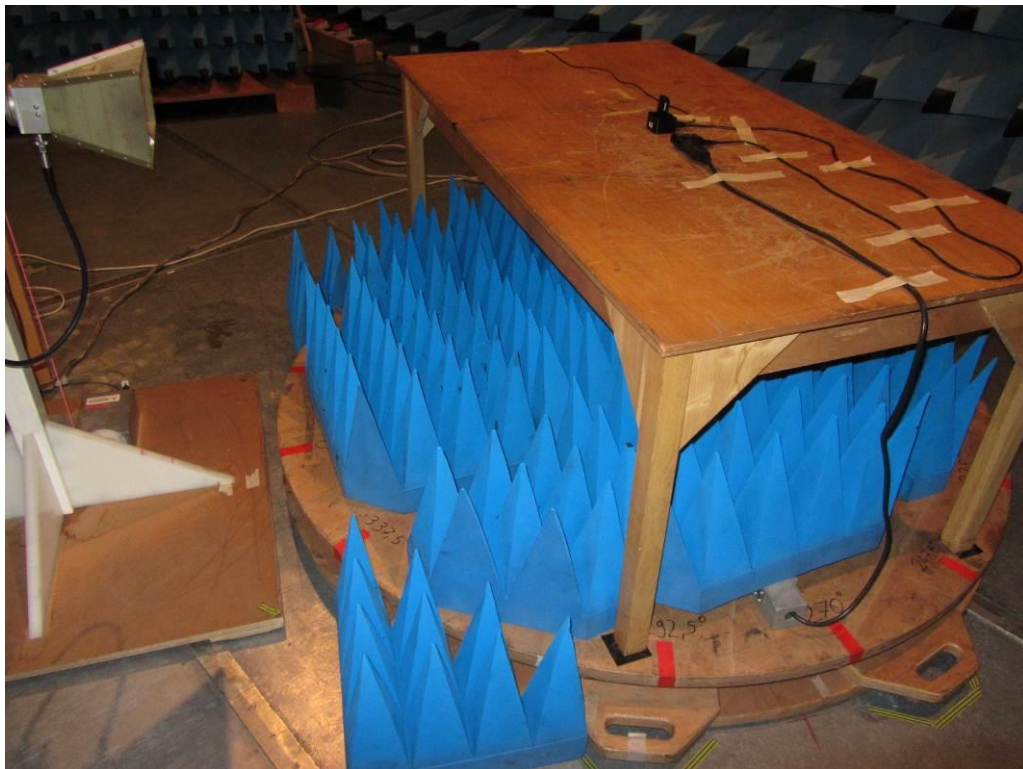
Distance: ☒ 1 m ☐ 3 m ☐ 10 m ☐ 30 m

Position of EUT: 0.8 m (height of the equipment under test above floor)

Meas. uncertainty:  $\pm 4.7$  dB

Test method: The electromagnetic disturbance radiated by the equipment is measured using a spectrum analyser and a wide band antenna. The antenna is placed at the same height as the EUT successively with horizontal and vertical polarisations. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value (peak) of all the disturbances appearing while the apparatus is under test.

Test set-up:



Remarks: Limit values expressed in dB $\mu$ V/m and transformed to a measuring distance of 1m  
(factor used = 20 dB/decade) if necessary  
e.g.: for f = 1 GHz the limit is 500  $\mu$ V/m at 3 m;

$$20 \log \left( \frac{500 \frac{\mu V}{m}}{1 \frac{\mu V}{m}} \right) + 20 \log \left( \frac{3m}{1m} \right) = 63.5 \frac{dB\mu V}{m} \text{ at } 1m$$

Test equipment:

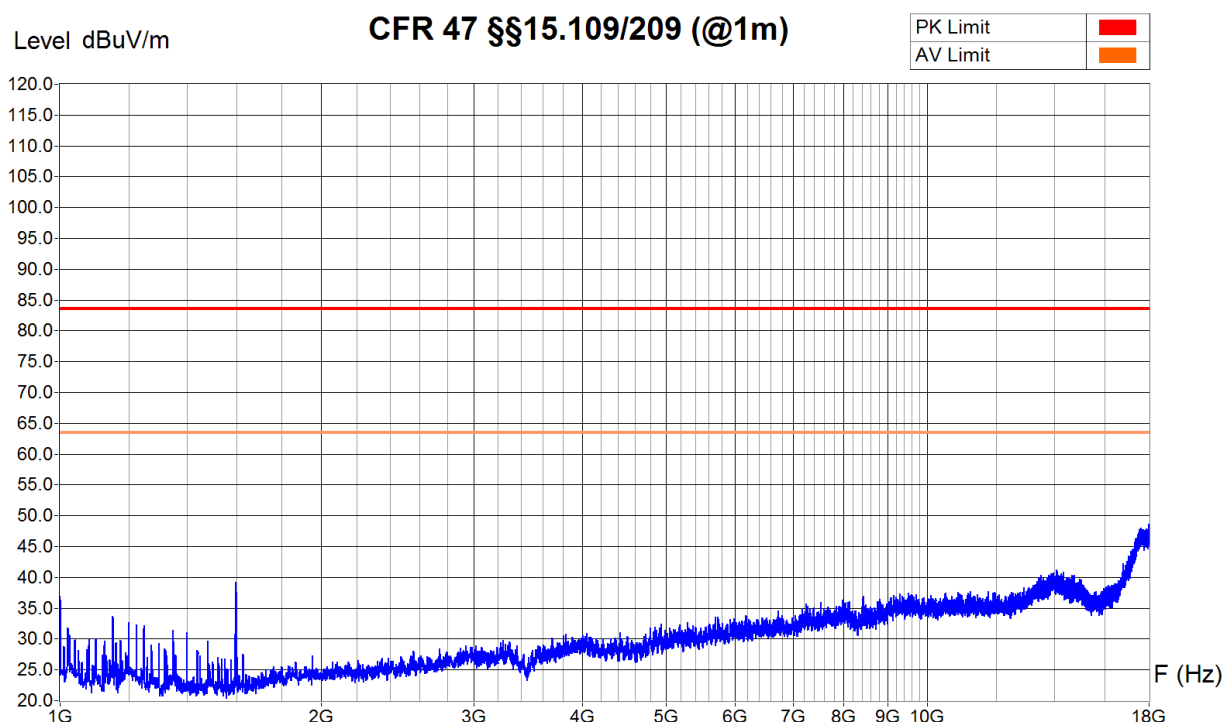
|                   |                                           |                                           |                                           |                                |                                |                                |
|-------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Spectrum analyser | <input type="checkbox"/> 88-14            | <input type="checkbox"/> 94-24            | <input checked="" type="checkbox"/> 02-06 | <input type="checkbox"/> 03-45 | <input type="checkbox"/> 05-39 | <input type="checkbox"/> 07-53 |
| Preamplifier      | <input type="checkbox"/> 05-56            | <input type="checkbox"/> 05-87            | <input checked="" type="checkbox"/> 11-29 |                                |                                |                                |
| Antenna (horn)    | <input checked="" type="checkbox"/> 90-24 | <input type="checkbox"/> 07-31            |                                           |                                |                                |                                |
| Cables            | <input checked="" type="checkbox"/> 10-75 | <input checked="" type="checkbox"/> 11-61 |                                           |                                |                                |                                |

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Measurement Type : Radiated Field  
 Polarisation : Vertical  
 Table Angle : 0° - 360°  
 Antenna Height : 1m - 2m



Equipment Under Test : Roger Clip-on Mic  
 Set-Up : With cradle, charger and audio cable connected. See photos  
 Operating Conditions : RX (f = 2.440 GHz)  
 Remarks : Without filter, with preamp  
 Cage 06-00



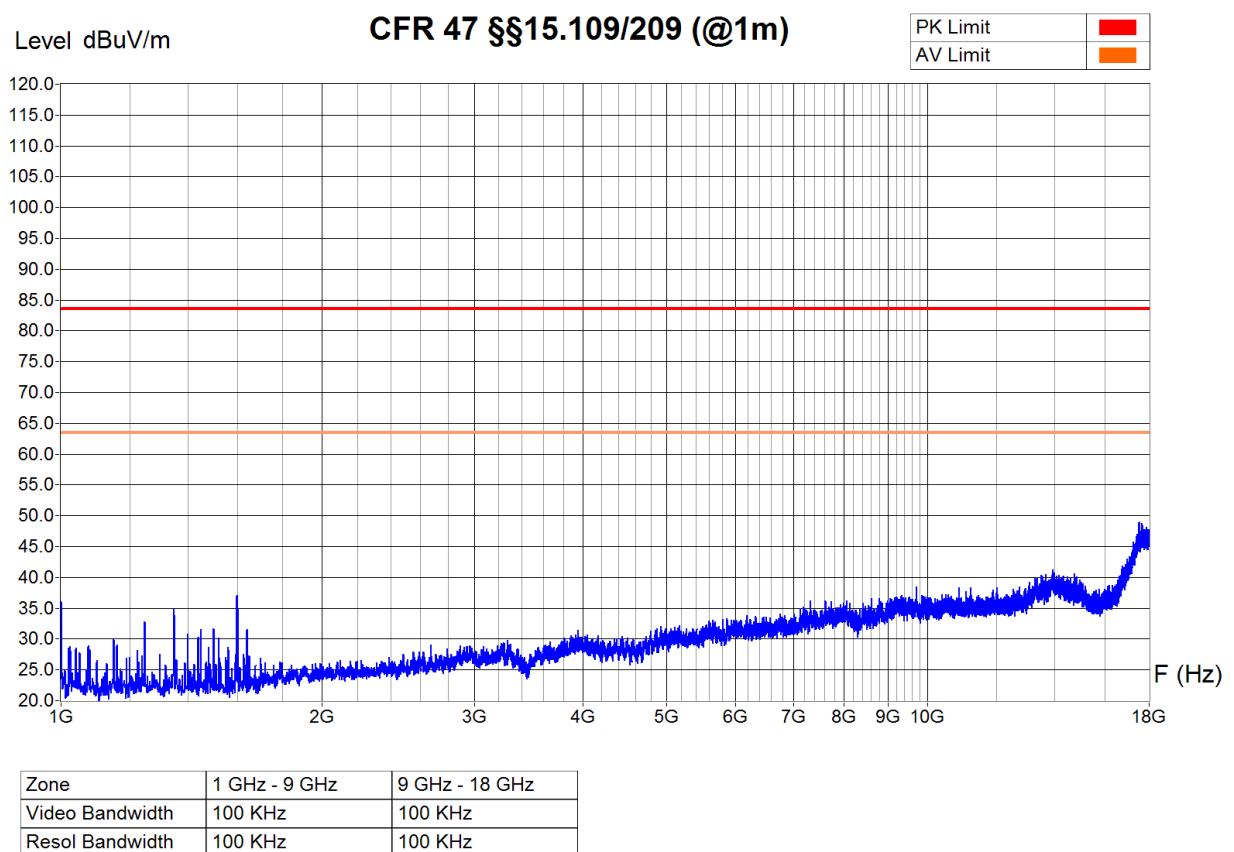
| Zone            | 1 GHz - 9 GHz | 9 GHz - 18 GHz |
|-----------------|---------------|----------------|
| Video Bandwidth | 100 KHz       | 100 KHz        |
| Resol Bandwidth | 100 KHz       | 100 KHz        |

Operator: B. Itzcovich  
 Date/Time: 25.07.2013 16:55  
 Filename:  
 119\_RE\_1G-18G\_RX\_V.png/.txt

Measurement Type : Radiated Field  
Polarisation : Horizontal  
Table Angle : 0° - 360°  
Antenna Height : 1m - 2m



Equipment Under Test : Roger Clip-on Mic  
Set-Up : With cradle, charger and audio cable connected. See photos  
Operating Conditions : RX (f = 2.440 GHz)  
Remarks : Without filter, with preamp  
Cage 06-00

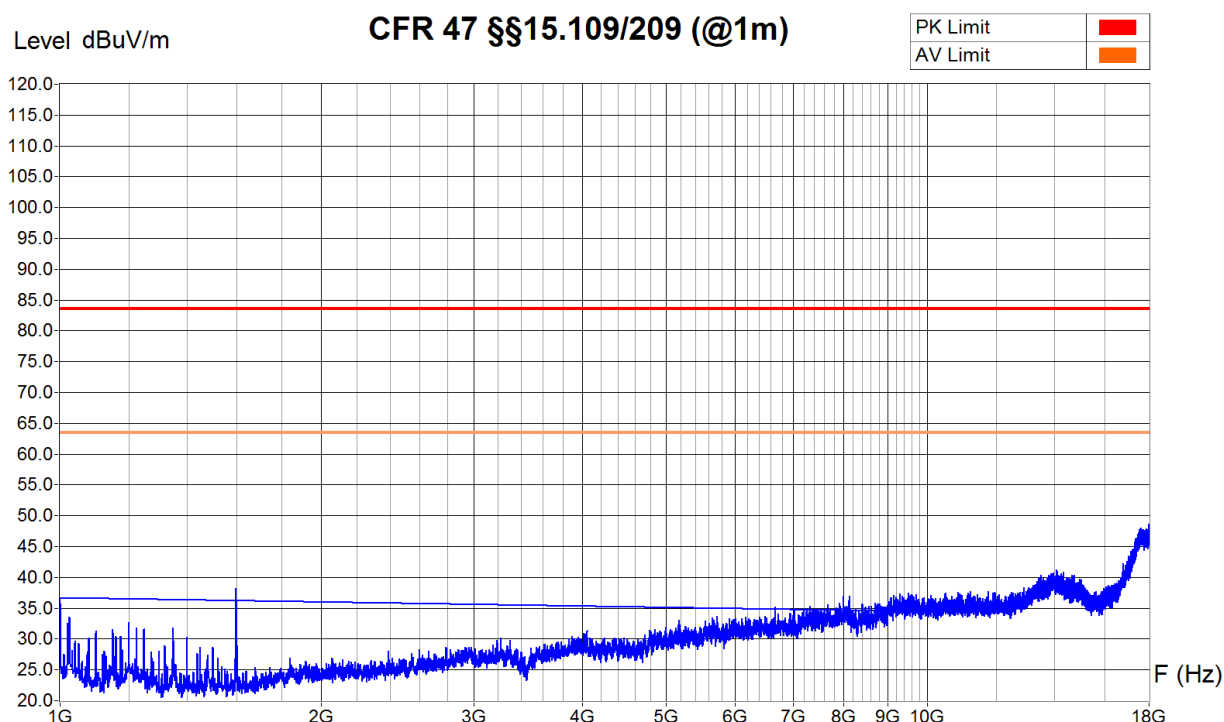


Operator: B. Itzcovich  
Date/Time: 25.07.2013 17:02  
Filename:  
120\_RE\_1G-18G\_RX\_H.png/.txt

Measurement Type : Radiated Field  
Polarisation : Vertical  
Table Angle : 0° - 360°  
Antenna Height : 1m - 2m



Equipment Under Test : Roger Clip-on Mic  
Set-Up : With cradle, charger and audio cable connected. See photos  
Operating Conditions : Standby  
Remarks : Without filter, with preamp  
Cage 06-00



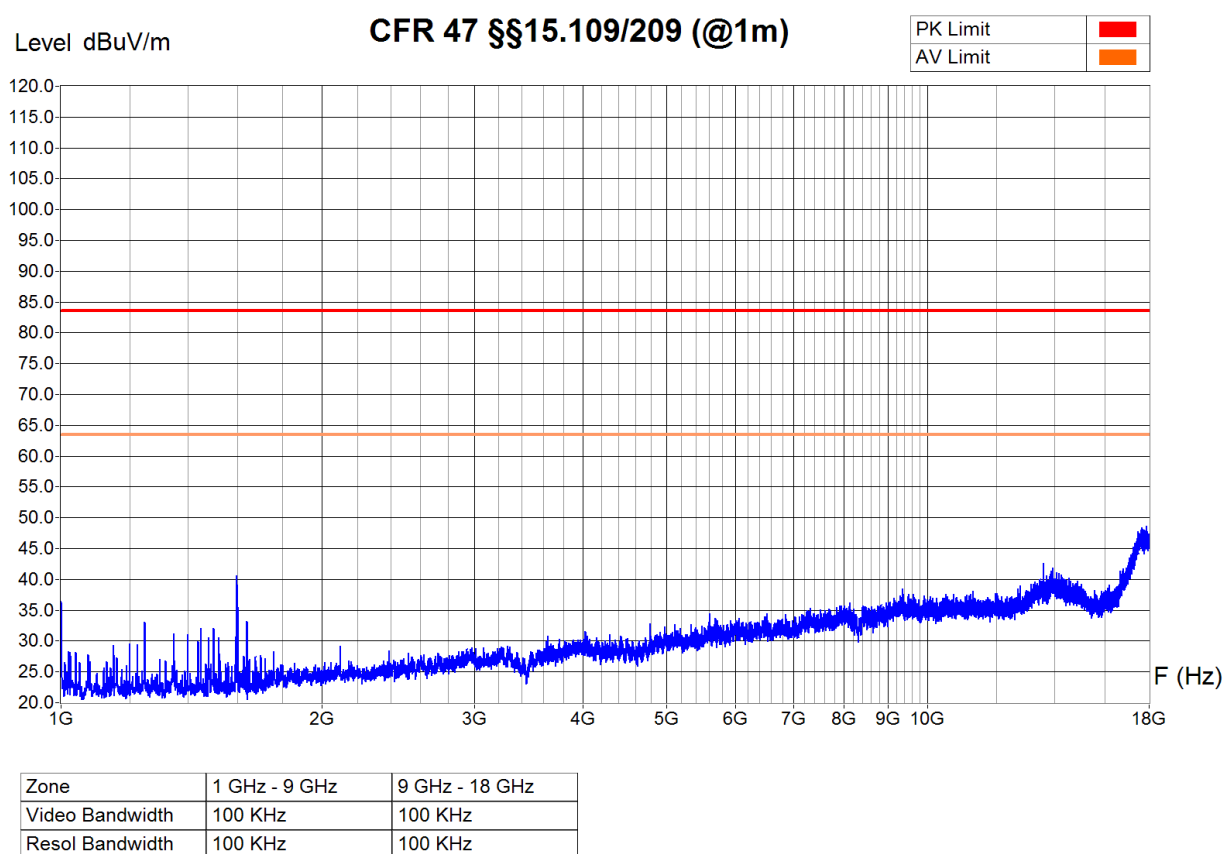
| Zone            | 1 GHz - 9 GHz | 9 GHz - 18 GHz |
|-----------------|---------------|----------------|
| Video Bandwidth | 100 KHz       | 100 KHz        |
| Resol Bandwidth | 100 KHz       | 100 KHz        |

Operator: B. Itzcovich  
Date/Time: 25.07.2013 17:09  
Filename:  
121\_RE\_1G-18G\_Stby\_V.png/.txt

Measurement Type : Radiated Field  
Polarisation : Horizontal  
Table Angle : 0° - 360°  
Antenna Height : 1m - 2m



Equipment Under Test : Roger Clip-on Mic  
Set-Up : With cradle, charger and audio cable connected. See photos  
Operating Conditions : Standby  
Remarks : Without filter, with preamp  
Cage 06-00



Operator: B. Itzcovich  
Date/Time: 25.07.2013 17:06  
Filename:  
122\_RE\_1G-18G\_Stby\_H.png/.txt

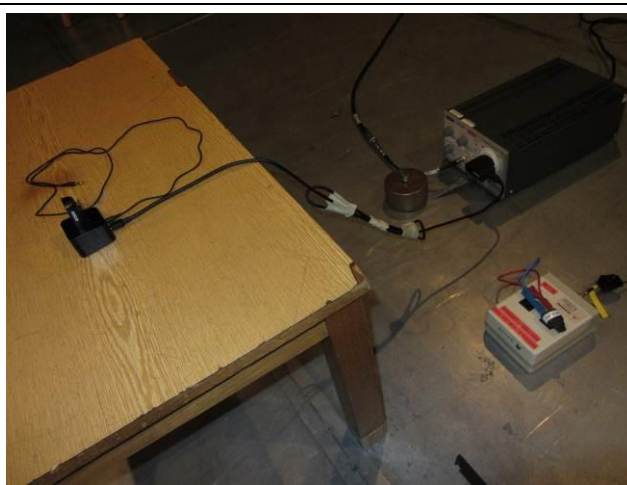
**6.11 Conducted emission - Interference voltage**

Test site: ☒ semi-anechoic chamber (foam) ☐ shielded room  
☐ Semi-anechoic chamber (ferrites) ☐ laboratory  
☐ open test site

Meas. uncertainty:  $\pm 3.6$  dB

Measuring method: The conducted disturbance is measured using a spectrum analyser and a line impedance substitution network (LISN). The measurement of the voltage against the earth is carried out successively. The peak values are recorded continuously on the graph. The values that exceed the limit are remeasured with a measuring receiver.

Test set-up:



Remarks: ---

Test equipment:

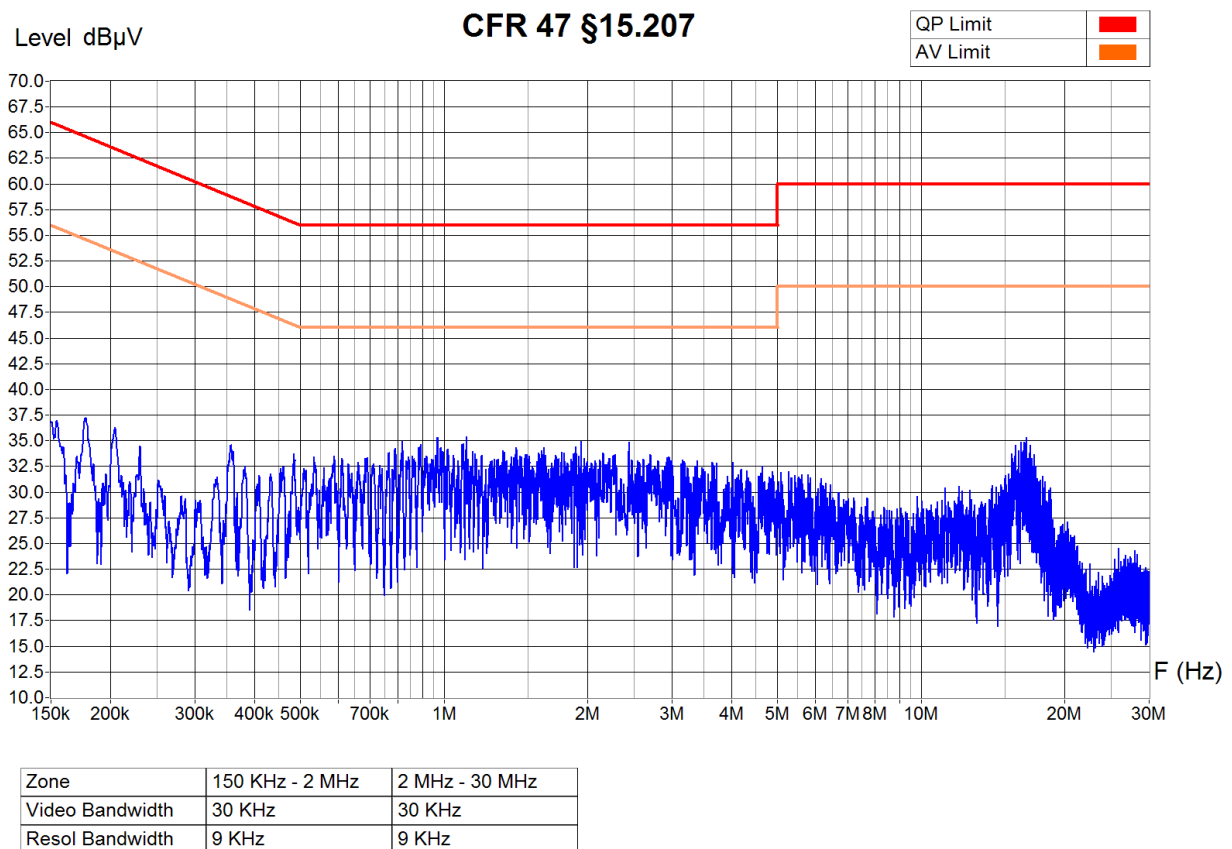
|                   |                                           |                                                      |                                           |                                           |                                |                                           |
|-------------------|-------------------------------------------|------------------------------------------------------|-------------------------------------------|-------------------------------------------|--------------------------------|-------------------------------------------|
| Spectrum analyser | <input type="checkbox"/> 88-14            | <input type="checkbox"/> 94-24                       | <input type="checkbox"/> 02-06            | <input type="checkbox"/> 03-45            | <input type="checkbox"/> 05-39 | <input checked="" type="checkbox"/> 07-53 |
| Receiver          | <input type="checkbox"/> 85-12            | <input type="checkbox"/> 90-11                       | <input checked="" type="checkbox"/> 94-34 | <input type="checkbox"/> 04-28            | <input type="checkbox"/> 06-29 |                                           |
| LISN              | <input type="checkbox"/> 85-13            | <input type="checkbox"/> 90-08                       | <input type="checkbox"/> 94-36            | <input checked="" type="checkbox"/> 94-40 | <input type="checkbox"/> 95-12 | <input type="checkbox"/> 00-43            |
| Protection 10 dB  | <input type="checkbox"/> 91-44            | <input type="checkbox"/> 91-45                       | <input type="checkbox"/> 95-30            | <input type="checkbox"/> 95-33            | <input type="checkbox"/> 95-35 | <input type="checkbox"/> 95-36            |
|                   | <input type="checkbox"/> 96-38            | <input checked="" type="checkbox"/> included in LISN |                                           |                                           |                                |                                           |
| Protection 20 dB  | <input type="checkbox"/> 91-46            | <input type="checkbox"/> 95-33                       | <input type="checkbox"/> 95-38            | <input type="checkbox"/> included in LISN |                                |                                           |
| Cables            | <input checked="" type="checkbox"/> 06-00 | <input checked="" type="checkbox"/> 161              |                                           |                                           |                                |                                           |

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Measurement Type : Voltage Interference  
 Supply : Line 1  
 Other : Powered with 230V / 50 Hz



Equipment Under Test : Roger Clip-on Mic  
 Set-Up : With cradle, charger and audio cable connected. See photos  
 Operating Conditions : Normal operation, charging  
 Remarks :  
 Cage 06-00



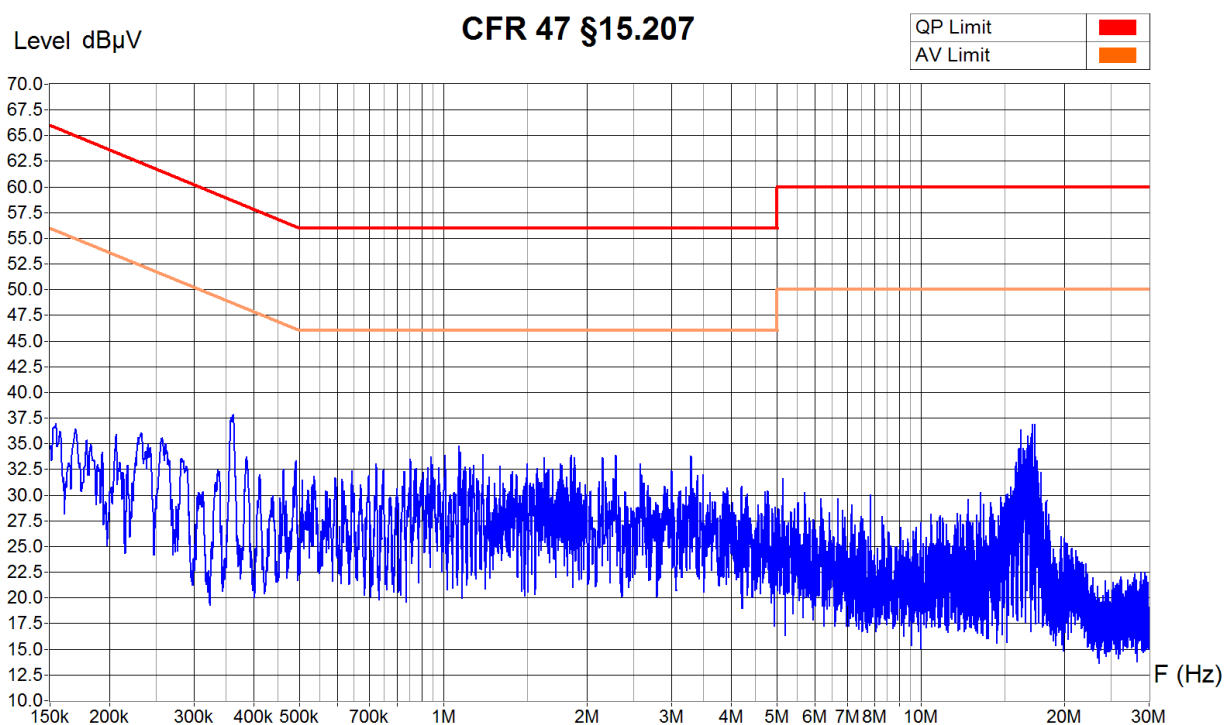
Operator: B. Itzcovich  
 Date/Time: 03.05.2013 14:25  
 Filename:  
 71\_CV\_230V\_L\_FCC.png/.txt

Measurement Type : Voltage Interference  
 Supply : Neutral  
 Other : Powered with 230V / 50 Hz



Equipment Under Test : Roger Clip-on Mic  
 Set-Up : With cradle, charger and audio cable cnnected. See photos  
 Operating Conditions : Normal operation, charging  
 Remarks :

Cage 06-00



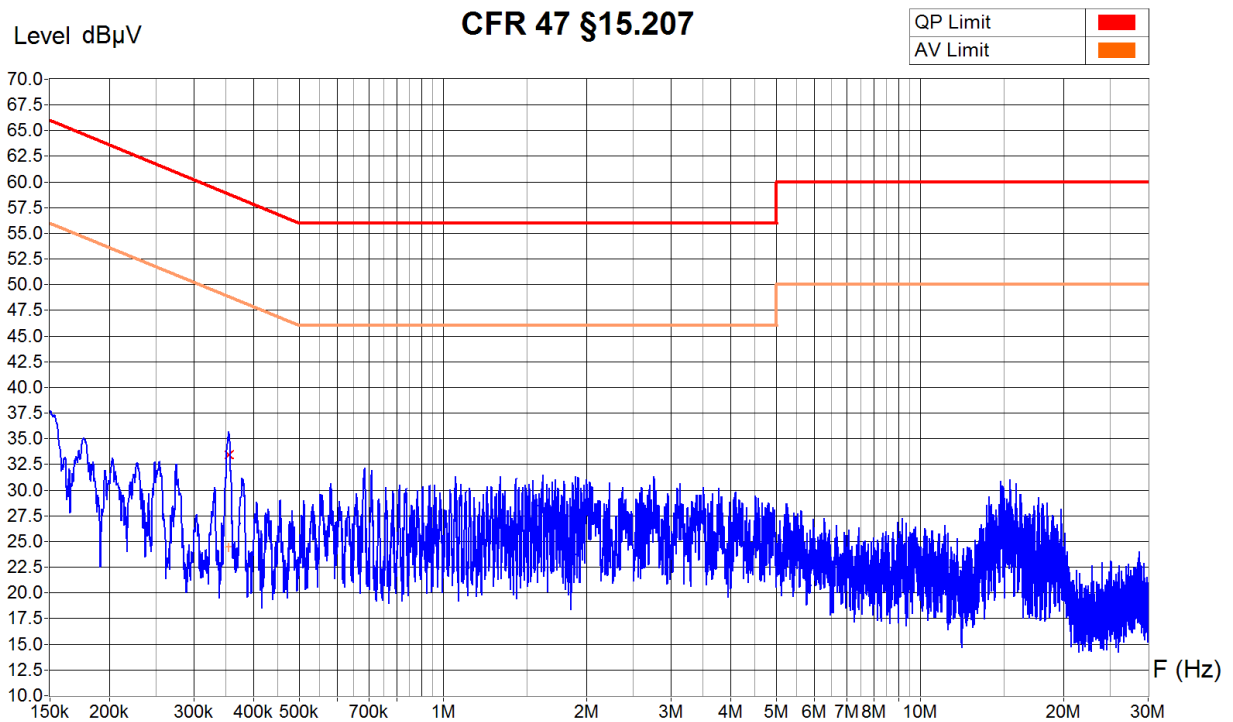
|                 |                 |                |
|-----------------|-----------------|----------------|
| Zone            | 150 KHz - 2 MHz | 2 MHz - 30 MHz |
| Video Bandwidth | 30 KHz          | 30 KHz         |
| Resol Bandwidth | 9 KHz           | 9 KHz          |

Operator: B. Itzcovich  
 Date/Time: 03.05.2013 14:31  
 Filename:  
 72\_CV\_230V\_N\_FCC.png/.txt

Measurement Type : Voltage Interference  
 Supply : Line 1  
 Other : Powered with 100V / 50 Hz



Equipment Under Test : Roger Clip-on Mic  
 Set-Up : With cradle, charger and audio cable connected. See photos  
 Operating Conditions : Normal operation, charging  
 Remarks :  
 Cage 06-00



|                 |                 |                |
|-----------------|-----------------|----------------|
| Zone            | 150 KHz - 2 MHz | 2 MHz - 30 MHz |
| Video Bandwidth | 30 KHz          | 30 KHz         |
| Resol Bandwidth | 9 KHz           | 9 KHz          |

## Receiver Measures

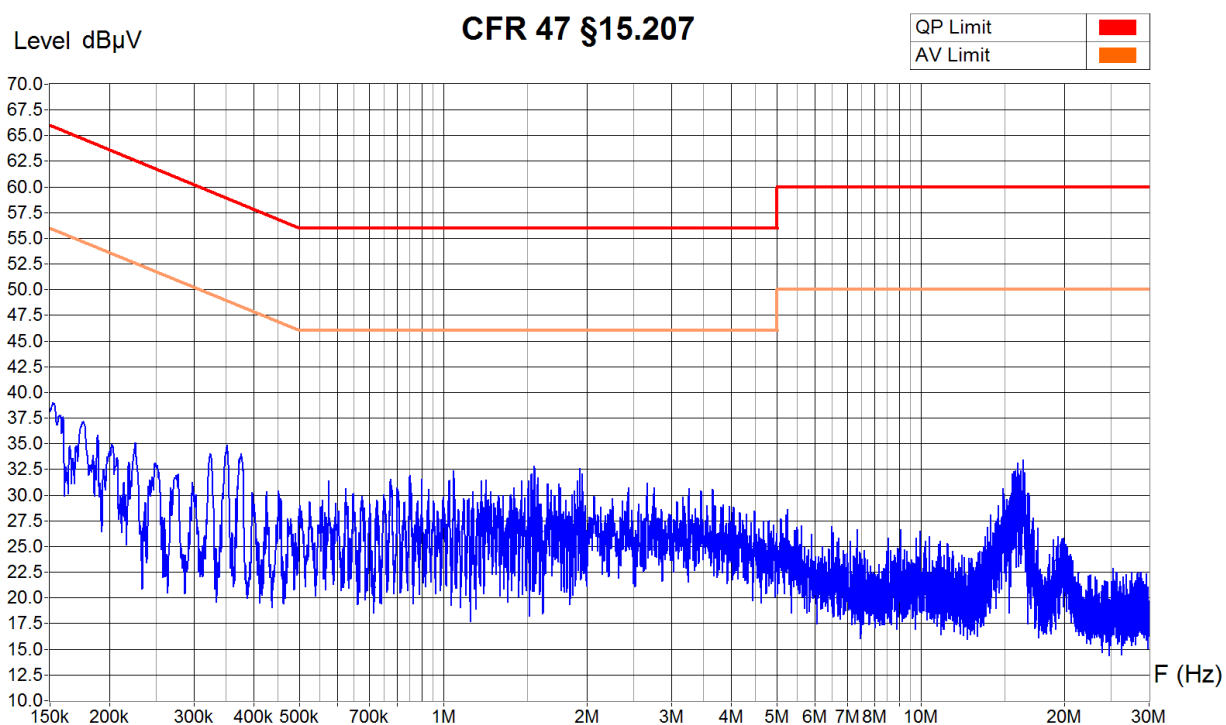
| Frequency | Peak            | QuasiPeak (x)   | Average (+)     | QP Margin |
|-----------|-----------------|-----------------|-----------------|-----------|
| 356 KHz   | 42.3 dB $\mu$ V | 33.5 dB $\mu$ V | 24.4 dB $\mu$ V | 25.4 dB   |

Operator: B. Itzcovich  
 Date/Time: 03.05.2013 14:41  
 Filename:  
 74\_CV\_100V\_L\_FCC.png/.txt

Measurement Type : Voltage Interference  
 Supply : Neutral  
 Other : Powered with 100V / 50 Hz



Equipment Under Test : Roger Clip-on Mic  
 Set-Up : With cradle, charger and audio cable cnnected. See photos  
 Operating Conditions : Normal operation, charging  
 Remarks :  
 Cage 06-00



| Zone            | 150 KHz - 2 MHz | 2 MHz - 30 MHz |
|-----------------|-----------------|----------------|
| Video Bandwidth | 30 KHz          | 30 KHz         |
| Resol Bandwidth | 9 KHz           | 9 KHz          |

Operator: B. Itzcovich  
 Date/Time: 03.05.2013 14:38  
 Filename:  
 73\_CV\_100V\_N\_FCC.png/.txt

