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STS 024

Schweizerischer Prüfstellendienst
 Service suisse d'essai
 Swiss testing service



Report:	Electromagnetic compatibility and Radio spectrum Matters		Report no:	13-MO-0167.14A *
Product name:	Roger Pen (Bluetooth part)		Mandate no:	13-MO-0167
Serial no:	---	Model number:	---	
Customer:	Phonak Communications AG Länggasse 17 3280 Murten Switzerland		Date of test:	June 7 - 27, 2013 July 23 - 26, 2013

* Replaces report no 13-MO-0167.14

Standards		Result
47 CFR, Part 1	(Subpart C, Intentional radiators: §§ 207/209/247)	Pass
	(Subpart B, Intentional radiators: § 15.109)	Pass
Industry Canada	(RSS-210, Licence-exempt Radio Apparatus: Category I Equipment)	Pass

These tests have been performed without modifications.

Test performed by

Mr B. Itzcovich
 EMC Test Engineer



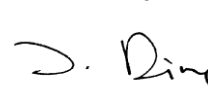
Report prepared by

Mr B. Itzcovich
 EMC Test Engineer



Report controlled and approved by

Mr J. Ding
 EMC Test Engineer



Rossens, October 18, 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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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	19
6.6 Maximum output power (conducted)	21
6.7 Band-edge emission (conducted)	23
6.8 Spurious emission (conducted – 15 MHz to 26.5 GHz)	25
6.9 Spurious emission transmit mode - radiated	28
6.9.1 30 MHz to 1 GHz	28
6.9.2 1 GHz to 18 GHz	31
6.9.3 18 GHz to 26.5 GHz	36
6.10 Spurious emission receive & standby mode - radiated	39
6.10.1 30 MHz to 1 GHz	39
6.10.2 1 GHz to 18 GHz	44
6.11 Conducted emission - Interference voltage	49
6.12 Designation of emission	54

1. Summary of test results

- ✓ Pass
- ✗ Fail
- Ø Not applicable to this product
- Not tested
- # No requirements / not required

§	Test Type	Result
6	Emission	CFR 47 Part 15 Industry Canada
6.1	Channel 20dB-bandwidth CFR 47 § 15.247 (a)(1) RSS-210 § A8.1 (b)	930 kHz
6.2	Carrier frequency separation CFR 47 § 15.247 (a)(1) RSS-210 § A8.1 (b)	✓
6.3	Number of hopping channels CFR 47 § 15.247 (a)(1)(iii) RSS-210 § A8.1 (d)	✓
6.4	Time of occupancy (dwell time) CFR 47 § 15.247 (a)(1)(iii) RSS-210 § A8.1 (d)	✓
6.5	Antenna gain & effective radiated power CFR 47 § 15.247 (b)(4) RSS-210 § A8.4 (1)	< -6.36 dBi
6.6	Maximum output power (conducted) CFR 47 § 15.247 (b)(1) RSS-210 § A8.4 (1)	✓
6.7	Band-edge emission (conducted) CFR 47 § 15.247 (d) RSS-210 § A8.5	✓
-	Band-edge emission (radiated) CFR 47 § 15.247 (d) CFR 47 § 15.205 RSS-210 § A8.5	#¹
6.8	Spurious emissions – conducted (transmitter) CFR 47 § 15.247 (d) RSS-210 § A8.5	✓
6.9	Spurious emissions – radiated (transmitter) CFR 47 § 15.247 (d) CFR 47 § 15.209 (a) CFR 47 § 15.205 RSS-210 § A8.5	✓
6.10	Radiated emission – receiver CFR 47 § 15.109 RSS-Gen	✓
6.11	Conducted emission CFR 47 § 15.207	✓
6	Emission	CFR 47 Part 2
6.12	Designation of emission FCC 47 §2.201 FCC 47 §2.202	866KFXD

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 Länggasse 17 3280 Murten Switzerland</i>
Contact Person	<i>Mr Josuah Wicht</i>
Telephone	<i>+41 26 672 92 78</i>
Fax	<i>+41 26 672 93 80</i>
E-mail	<i>Josuah.Wicht@phonak.com</i>
Mandate no	<i>13-MO-0167</i>

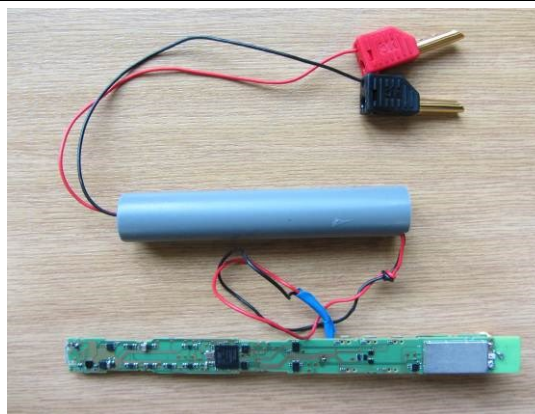
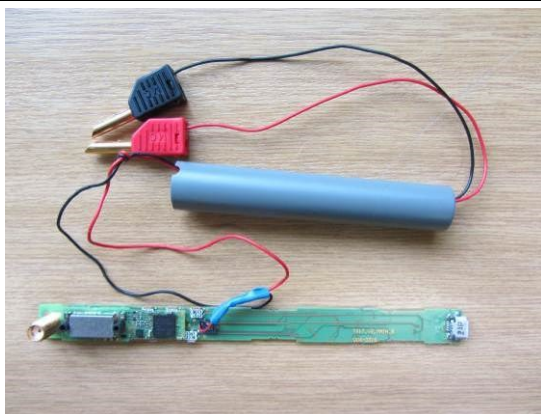
4. Equipment under test

4.1 Identification

Manufacturer name and address	<i>Phonak Communications AG Länggasse 17 3280 Murten Switzerland</i>
Production country	<i>Vietnam</i>
Brand name	<i>Phonak</i>
Product name	<i>Roger Pen (Bluetooth part)</i>
Product description	<i>Wireless microphone 2.4 GHz with Bluetooth Handsfree</i>
Model number	<i>- - -</i>
Serial no	<i>- - -</i>
FCC ID IC ID	<i>FCC: KWCTX17 IC: 2262A-TX17</i>
Software version	<i>SVN 2414</i>
Highest frequency	<i>38.4 MHz (DSP) / 2.48 GHz (transmitter)</i>
Supply	<i>$U = 3.7 V_{DC} / P_{max} = 0.25 W$ (Lithium Polymer Battery) or $U = 5 V_{DC} / P_{max} = 2 W$ (DC In USB) *</i>
Dimension / Weight	<i>~145 mm x Ø ~15 mm (l x d) / ~ 28 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_{DC} 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 & supply connectors



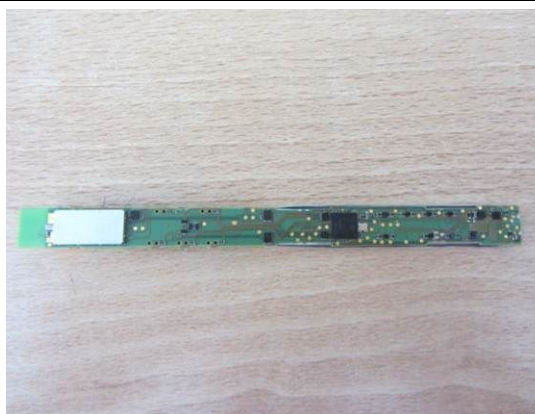
Front



Rear



Electronic board (with battery) : front



Electronic board : rear



EUT identification (on bottom of Cradle)



Connectors (USB + audio)

4.3 Classification

CFR 47 Part 15	☒ Unintentional radiator (Subpart B), Receive mode ☐ Class A digital device ☒ Class B digital device ☐ The highest frequency of the internal sources of the EUT is less than 108 MHz (measurement shall be made up to 1 GHz). ☐ 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). ☐ 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). ☐ 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). ☒ Intentional radiator (Subpart C), Transmit mode ☒ 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). ☐ 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). ☐ 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).
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Method of frequency generation	☒ Crystal ☐ Synthesizer ☐
Transmitter operating frequency range (OFR) The OFR is the total range of frequencies covered by one type, or by a family of equipment. 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)	1 MHz
Number of channels	79
Maximum rated output power	6.0 dBm (at transmitter RF output connector)
Variable carrier output	☒ Transmitter carrier output is not variable. RF output: $P_{OUT} = \dots mW$ ☐ Transmitter carrier output is variable. Max. RF output: $P_{OUT\ MAX} = \dots mW$ Min. RF output: $P_{OUT\ MIN} = \dots mW$ ☐ RF output continuously variable ☐ RF output stepped: dB per step
Modulation	☐ Amplitude ☐ Frequency: Deviation kHz ☐ Phase ☐ Pulse Pulse repetition frequency Duty cycle ☒ Other FHSS, GFSK
	☐ Transmitter can be operated without modulation ☒ Transmitter can only be operated with modulation

Receiver operating frequency range	2.402 GHz to 2.480 GHz
Channel separation (if applicable)	1 MHz
Number of channels	79

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 Montena EMC 1728 Rossens Switzerland	June 7 - 27, 2013 July 23 - 26, 2013	20 - 26 °C	1000 - 1040 hPa	35 - 60 %

5.2 Test facility and methodology

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

5.3 Attendant persons

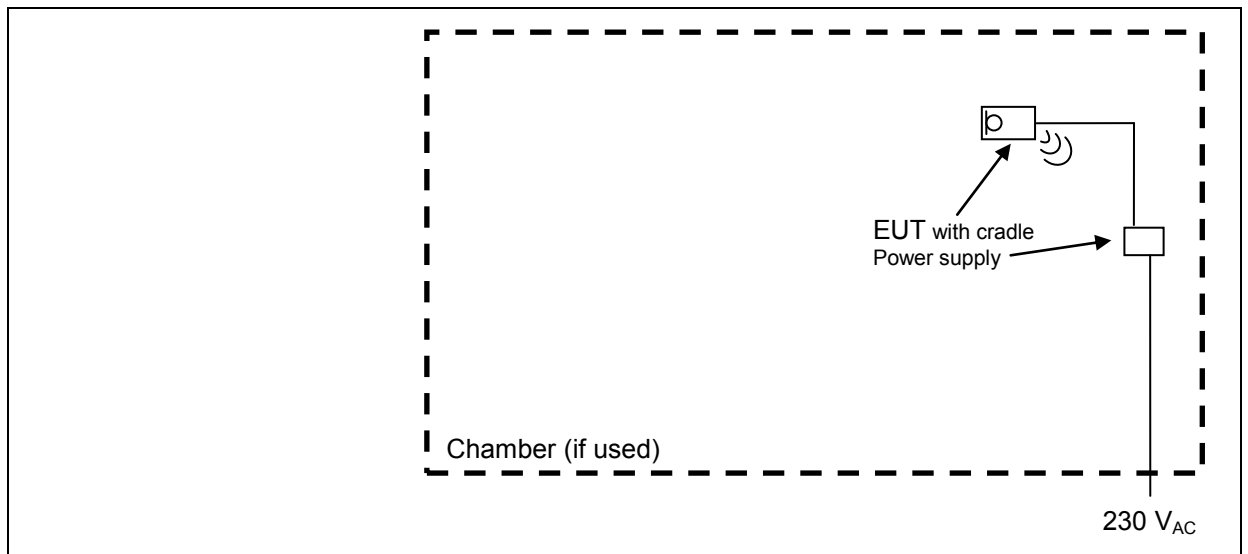
Test Engineer(s):

Mr B. Itzcovich
EMC Test Engineer

Other(s):

Name	Company
<i>Mr Josuah Wicht (partially)</i>	<i>Phonak Communications AG</i>
<i>Mr Stéphane Rochat (partially)</i>	<i>Phonak Communications AG</i>

5.4 Test configuration



5.5 Operating conditions

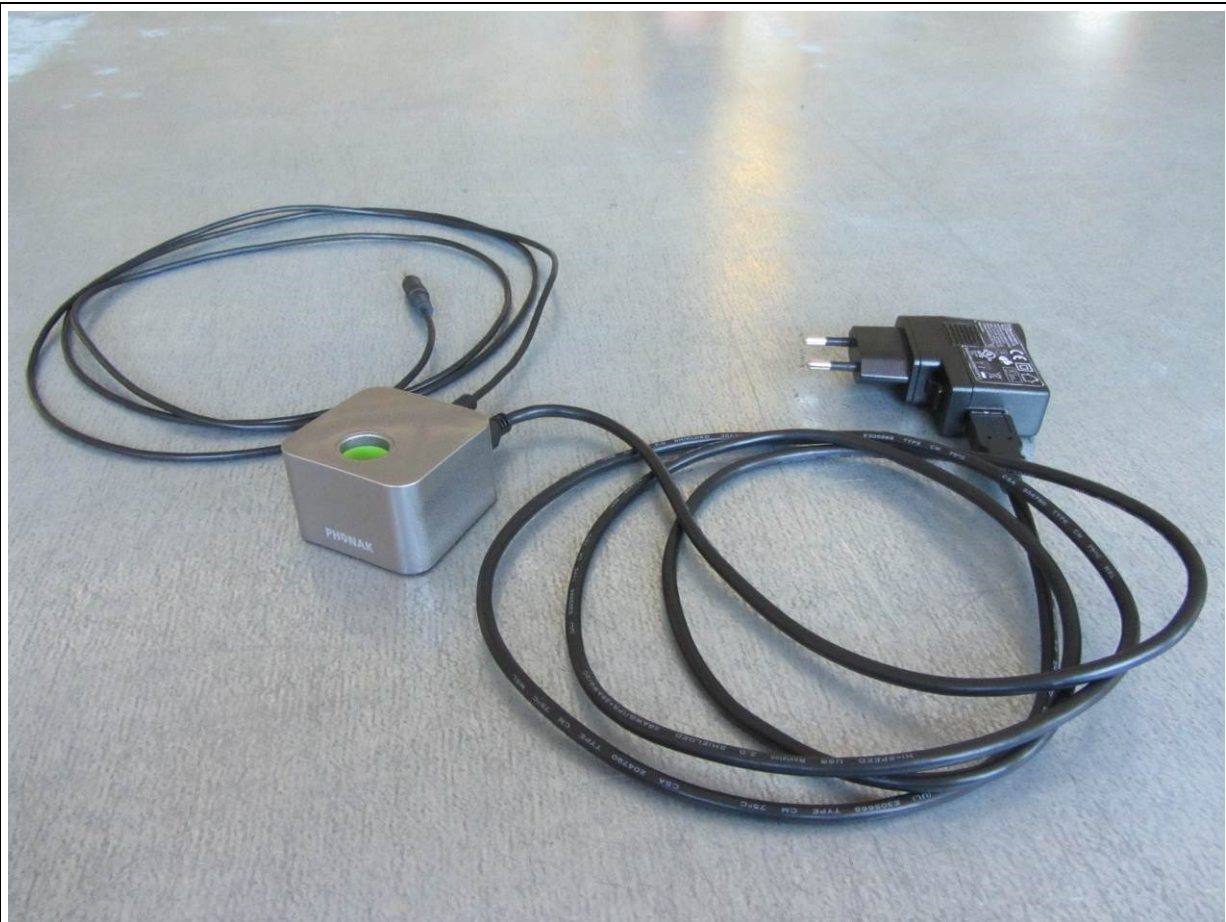
Power supply during tests if not stated otherwise in §6 : 5 V_{DC} (USB)

- *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*
- *Coexistence mode: DM and Bluetooth active and continuously transmitting*

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 Pen</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_{DC} 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: ± 1 dB
 3GHz – 6.7GHz: ± 2.1 dB
 6.7GHz – 13.2GHz: ± 2.6 dB
 13.2GHz – 19GHz: ± 2.8 dB
 19GHz – 26.5GHz: ± 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	☐ 88-14	☐ 94-24	☐ 02-06	☐ 03-45	☐ 05-39	☒ 07-53
Power supply	☒ 99-07	☐ 04-31				
Cables	☒ 11-45					

Results of the test

Client: *Phonak Communications AG*

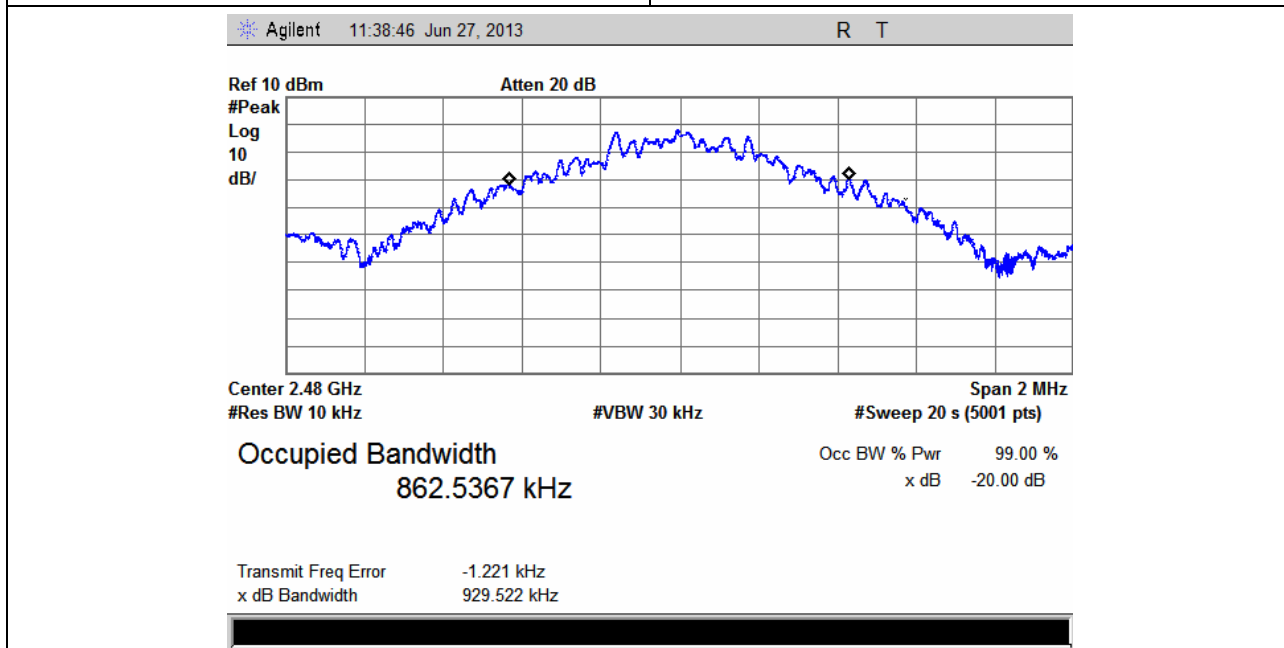
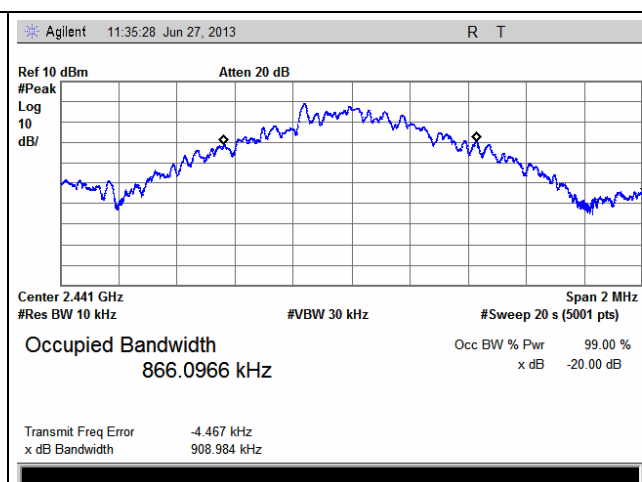
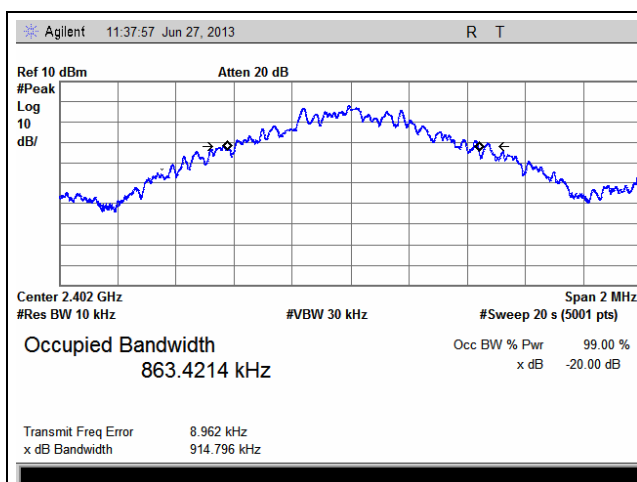
Apparatus: *Roger Pen (Bluetooth part)*

Operating mode: *Single frequencies (2.402, 2.441 and 2.480 GHz), modulated, Pmax*

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

Remarks: *Measured on temporary antenna connector*

frequency [GHz]	20 dB bandwidth [kHz]	Remarks
2.402	914.8	---
2.441	909.0	---
2.480	929.5	---



Place and date of test:
Operator:

Rossens, June 27, 2013
B. Itzcovich

6.2 Carrier frequency separation

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

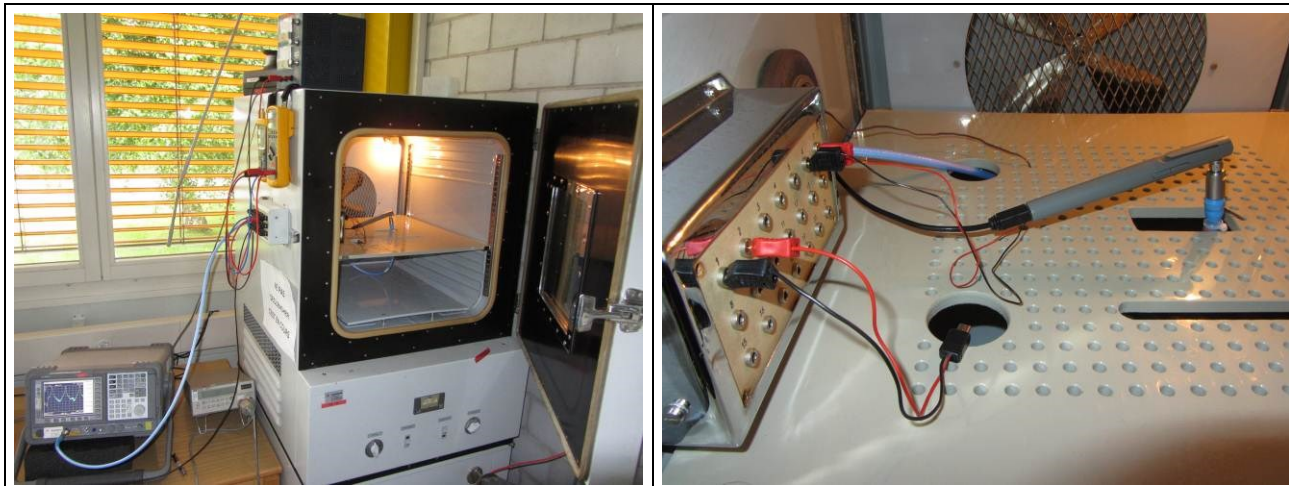
Test site: ☐ semi-anechoic chamber (foam) ☐ open test site
☐ semi-anechoic chamber (ferrites) ☒ laboratory

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	☐ 88-14	☐ 94-24	☐ 02-06	☐ 03-45	☐ 05-39	☒ 07-53
Power supply	☒ 99-07	☐ 04-31				
Cables	☒ 11-45					

Result:	☒ pass	☐ fail	☐ not applicable	☐ not tested
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Results of the test

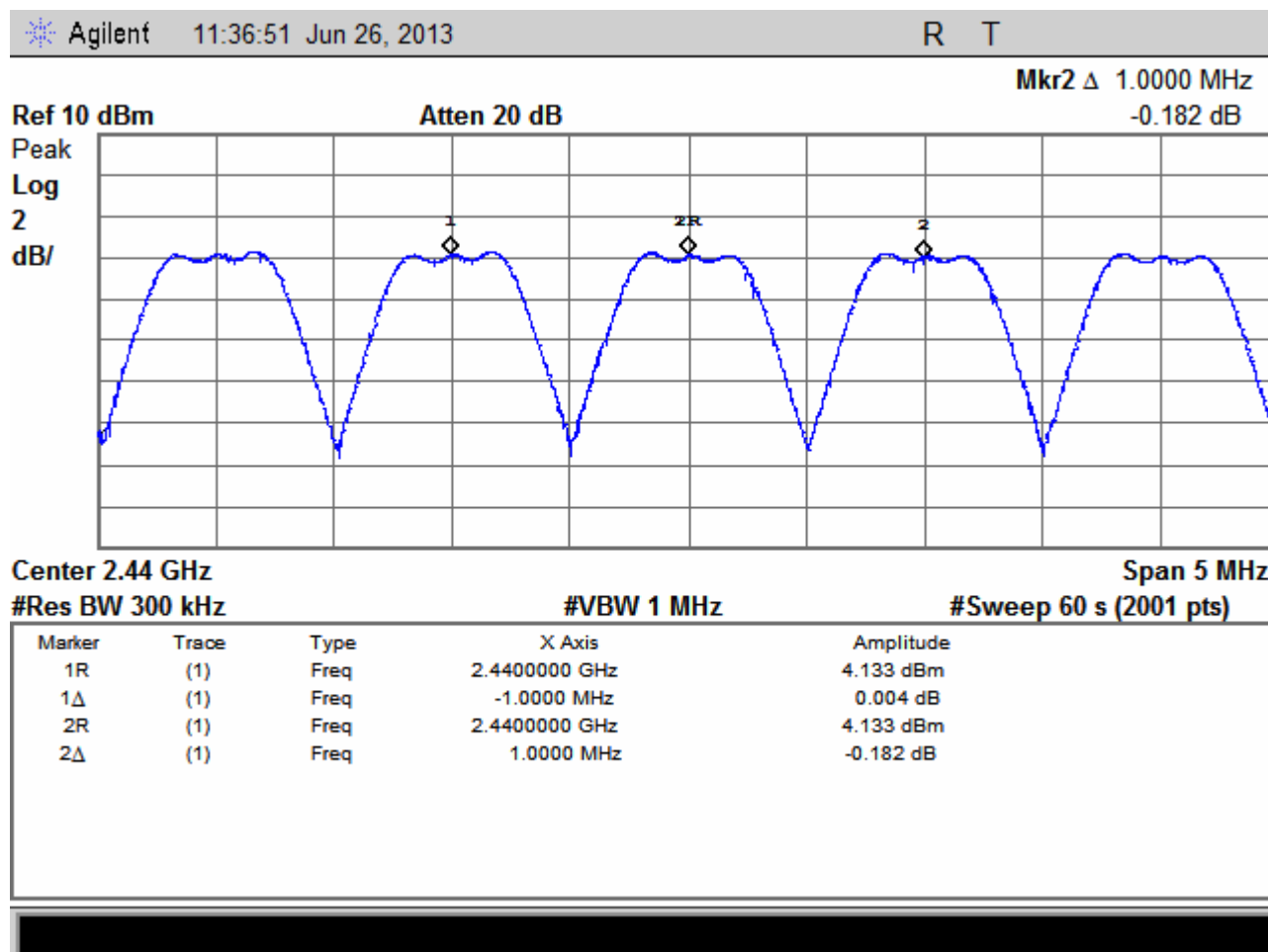
Client: *Phonak Communications AG*

Apparatus: *Roger Pen (Bluetooth part)*

Operating mode: *Continuously hopping*

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

Remarks: *Measured on temporary antenna connector*



Carrier frequency separation = 1.0 MHz

Place and date of test: *Rossens, June 26, 2013*
 Operator: *B. Itzcovich*

6.3 Number of hopping channels

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

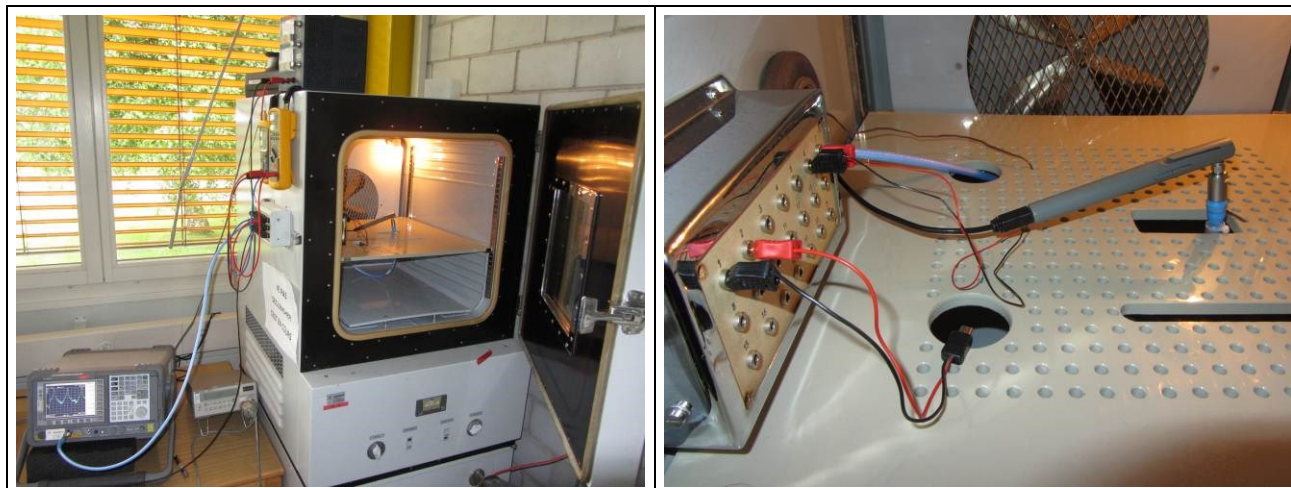
Test site: ☐ semi-anechoic chamber (foam) ☐ open test site
☐ semi-anechoic chamber (ferrites) ☒ laboratory

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: ---

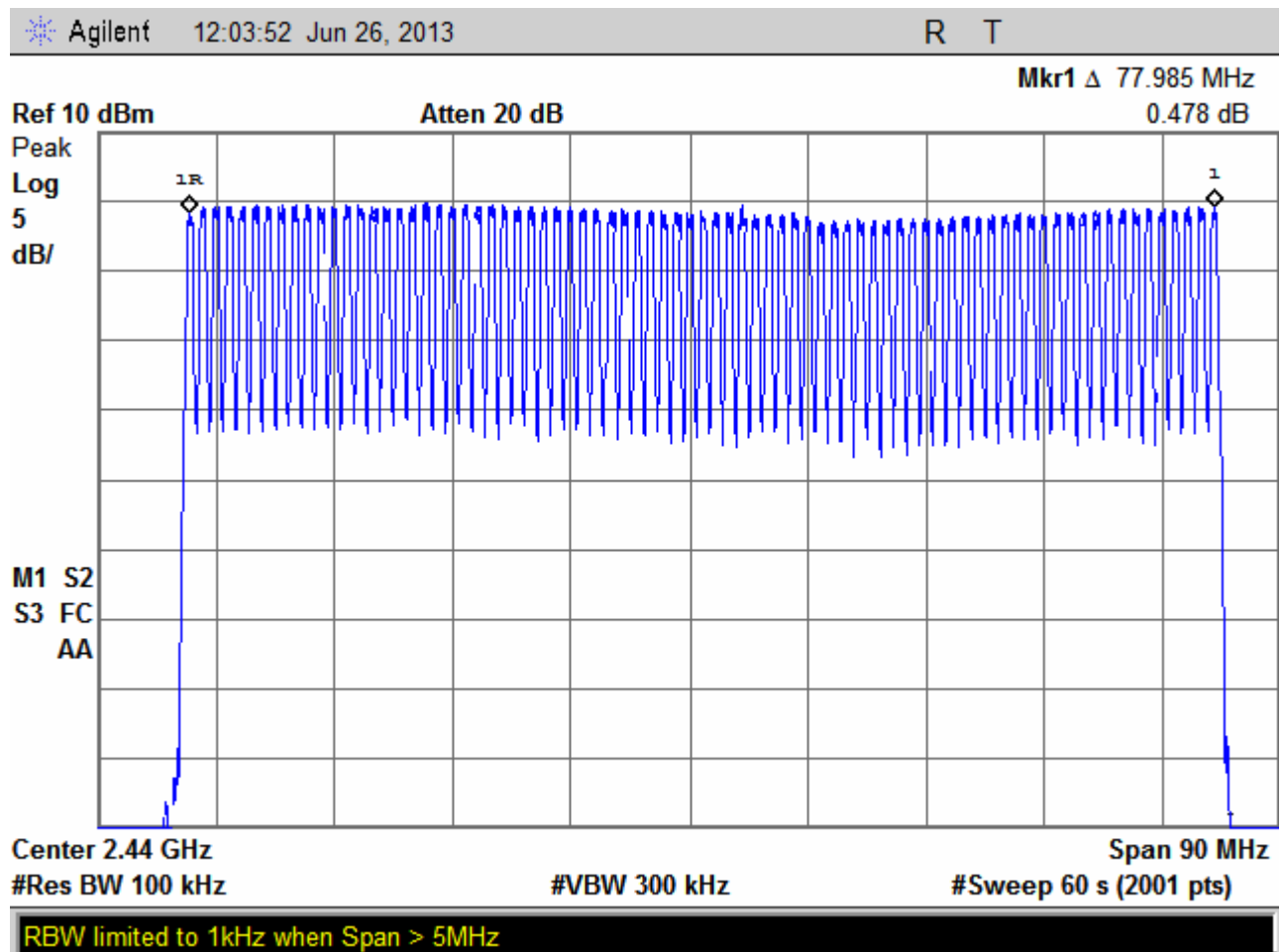
Test equipment:

Spectrum analyser	☐ 88-14	☐ 94-24	☐ 02-06	☐ 03-45	☐ 05-39	☒ 07-53
Power supply	☒ 99-07	☐ 04-31				
Cables	☒ 11-45					

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

Results of the test

Client: Phonak Communications AG
Apparatus: Roger Pen (Bluetooth part)
Operating mode: Continuously hopping
Cables connected to the EUT: Temporary supply & antenna cables
Remarks: Measured on temporary antenna connector

**Number of hopping channels = 79**

Place and date of test:
Operator:

Rossens, June 26, 2013
B. Itzcovich

6.4 Time of occupancy (dwell time)

- Introduction:** Average duration during which the system stays on one channel.
- 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.
- Calculation:** According to the Bluetooth core specification V 4.0, all Bluetooth devices comply to the following:
- Within a 31.6 second period (= number of hopping channels * 0.4 s = 79 * 0.4 s) in data mode, the dwell time of 0.4 s is independent from the packet type (packet length).
- The calculation for a 31.6 second period is as follows:
- $$\text{Dwell time} = \text{time slot length} * \text{hop rate} / \text{number of hopping channels} * 31.6 \text{ s}$$
- Example for a DH1 packet (with a maximum length of one time slot)
- $$\text{Dwell time} = 625 \mu\text{s} * 1600 \text{ s}^{-1} / 79 * 31.6 \text{ s} = 0.4\text{s (in a 31.6 s period)}$$
- For multi-slot packet the hopping is reduced according to the length of the packet.
- Example for a DH5 packet (with a maximum length of five time slots)
- $$\text{Dwell time} = 5 * 625 \mu\text{s} * 1600 * 1/5 * 1/\text{s} / 79 * 31.6 \text{ s} = 0.4 \text{ s (in a 31.6 s period)}$$
- Bluetooth devices comply with the FCC dwell time requirement in the data mode by definition.

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

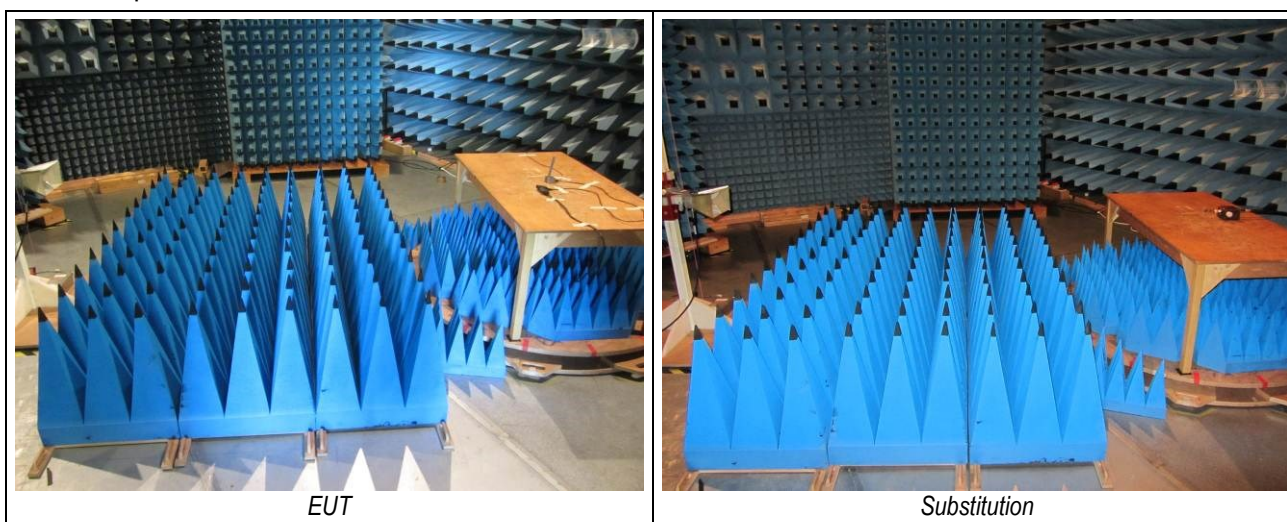
Position of EUT: 0.8 m (height of the equipment under test above floor)

Meas. uncertainty: ± 1.34 dB ($f < 300$ MHz) / ± 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	☐ 88-14	☐ 94-24	☒ 02-06	☐ 03-45	☐ 05-39	☐ 07-53
Receiver	☐ 85-04	☐ 90-43	☐ 94-35	☐ 04-29		
Preamplifier	☒ 11-29	☐ 95-86	☐ 05-56	☐ 05-59	☐ 05-62	☐ 05-87
Antenna (horn)	☒ 90-24	☐ 98-12	☐ 98-13	☐ 07-31		
HF-wattmeter	☐ 95-97	☐ 01-15	☐ 01-17	☒ 03-07	☐ 04-96	☐ 05-20
Thermocouple detector	☐ 92-03	☐ 05-74	☐ 05-88	☐ 07-03	☐ 10-27	☒ 09-03
Substitution antenna	☐ 89-01	☒ 00-52				
Oscilloscope	☐ 90-14	☐ 93-85	☐ 93-86	☐ 01-20	☐ 04-06	☐ 04-50
Multimeter	☐ 89-07	☐ 90-38	☐ 92-25	☐ 94-51	☐ 95-93	☐ 02-03
	☐ 03-22	☐ 04-47	☐ 04-104	☐ 04-105	☐ 06-51	☐ 06-52
Frequency generator	☐ 88-23	☐ 00-42	☐ 03-39	☒ 07-04	☐ 04-89	☐ 05-78
Cables	☒ 06-00	☐ 06-01	☒ 11-61	☒ SMK		
Attenuator 10dB	☒ 11-36					

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

Results of the test

Client: *Phonak Communications AG*

Apparatus: *Roger Pen (Bluetooth part)*

Operating mode: *Hopping f = 2.402 / 2.441 / 2.480 GHz, modulated, Pmax*

Cables connected to the EUT: *All (see § 4.6 and § 5.4)*

Remarks: *RBW = VBW = 1MHz; Peak detector*

f [GHz]	Measurement with EUT		Power at substitution ant.		Meas. with subst. ant.	Parameters of substitution ant.		Result			Remarks
	E [dBuV/m]	preamp [dB]	P [dBm]	factor [dB]	E [dBuV/m]	gain [dB]	att. Cable [dB]	corr. [dB]	P EIRP [dBm]	P EIRP [W]	
2.402	97.2	0.0	0	0	100.2	2.15	0	-98.06	-0.88	816.72 uW	Vertical
2.402	95.6	0.0	0	0	99.1	2.15	0	-96.97	-1.33	736.50 uW	Horizontal
2.441	95.8	0.0	0	0	99.1	2.15	0	-96.92	-1.15	768.03 uW	Vertical
2.441	94.2	0.0	0	0	99.3	2.15	0	-97.16	-2.95	507.55 uW	Horizontal
2.480	93.0	0.0	0	0	97.5	2.15	0	-95.34	-2.39	577.33 uW	Vertical
2.480	91.6	0.0	0	0	99.8	2.15	0	-97.64	-6.08	246.56 uW	Horizontal

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

frequency [GHz]	Conducted power [dBm]	Radiated power EIRP [dBm]	Antenna gain [dBi]	Remarks
2.402	5.48	-0.88	-6.36	---
2.441	5.61	-1.15	-6.76	---
2.480	5.45	-2.39	-7.84	---

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

6.6 Maximum output power (conducted)

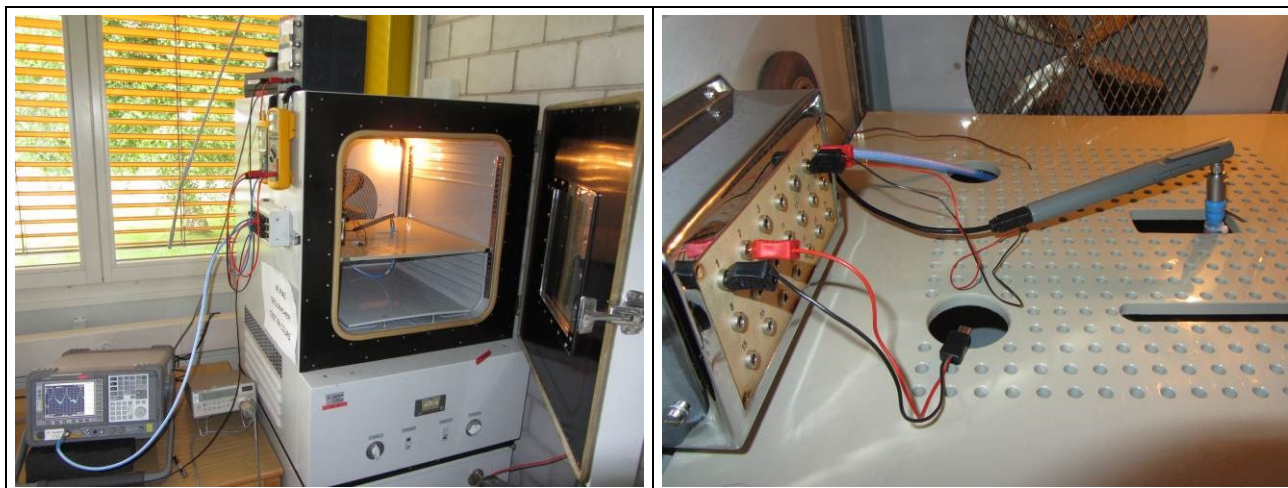
Test site: ☐ semi-anechoic chamber (foam) ☐ open test site
☐ semi-anechoic chamber (ferrites) ☒ laboratory

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

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

Limit: Maximum 1 Watt (= 30 dBm) for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and 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	☐ 88-14	☐ 94-24	☐ 02-06	☐ 03-45	☐ 05-39	☒ 07-53
Power supply	☒ 99-07	☐ 04-31				
Cables	☒ 11-45					

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

Results of the test

Client: *Phonak Communications AG*

Apparatus: *Roger Pen (Bluetooth part)*

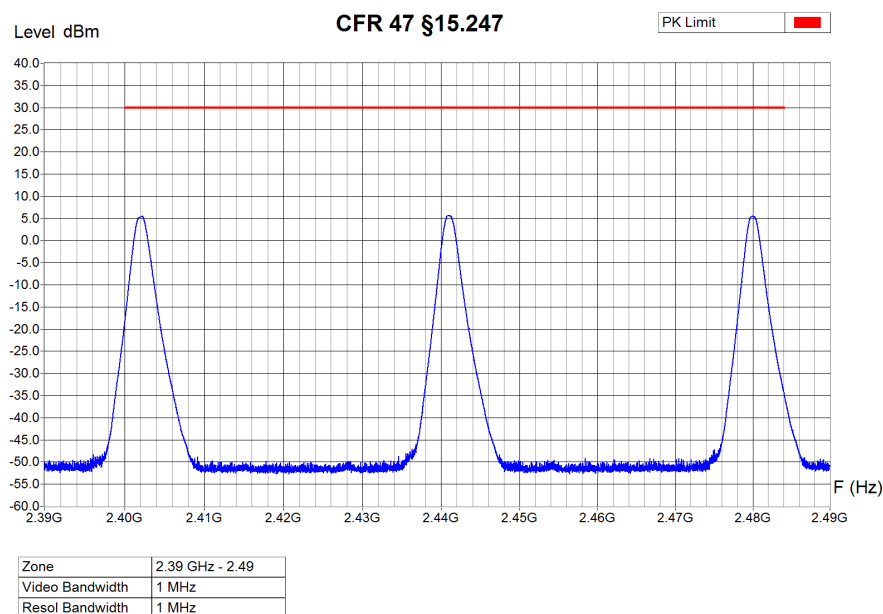
Operating mode: *Hopping f = 2.402 / 2.441 / 2.480 GHz, modulated, Pmax*

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

Remarks: *Measured on temporary antenna connector*

f normal [GHz]	Temp [°C]	U [V]	P [dBm]	Limit [dBm]	Remarks	Pass	
						Yes	No
2.402	23.9	3.7	5.48	30	---	☒	☐
2.441	23.9	3.7	5.61	30	---	☒	☐
2.480	23.9	3.7	5.45	30	---	☒	☐

Equipment Under Test : TX17 Roger Pen
 Set-Up : EUT with temporary supply & antenna connectors, see photos
 Operating Conditions : BT hopping emission (f = 2.402 / 2.440 / 2.480 GHz), modulated, Pmax
 Remarks : Peak detector sweep, ST = 30 s
 Supply = 3.70 VDC, Temp = 23.7 °C



Operator: B. Itzcovich
 Date/Time: 25.06.2013 11:42
 Filename:
 86_EIRP_Cond_BT_3V7_FCC.pn
 g/.txt

Place and date of test: *Rossens, June 25, 2013*
 Operator: *B. Itzcovich*

6.7 Band-edge emission (conducted)

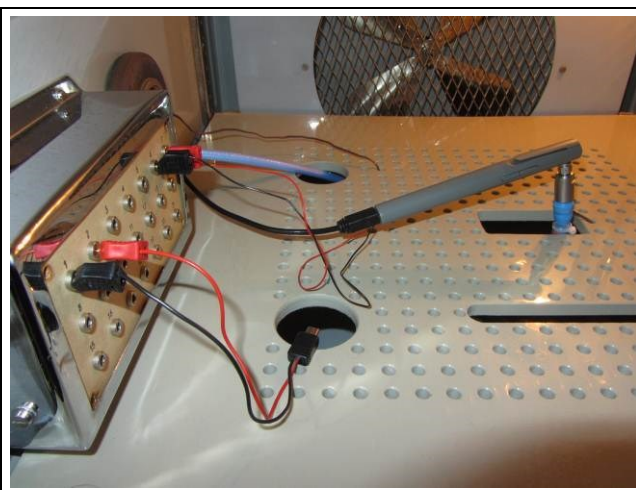
Test site: ☐ semi-anechoic chamber (foam) ☐ open test site
☐ semi-anechoic chamber (ferrites) ☒ laboratory

Meas. uncertainty: 9kHz – 3GHz: ± 1 dB
 3GHz – 6.7GHz: ± 2.1 dB
 6.7GHz – 13.2GHz: ± 2.6 dB
 13.2GHz – 19GHz: ± 2.8 dB
 19GHz – 26.5GHz: ± 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	☐ 88-14	☐ 94-24	☐ 02-06	☐ 03-45	☐ 05-39	☒ 07-53
Power supply	☒ 99-07	☐ 04-31				
Cables	☒ 11-45					

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

Results of the test

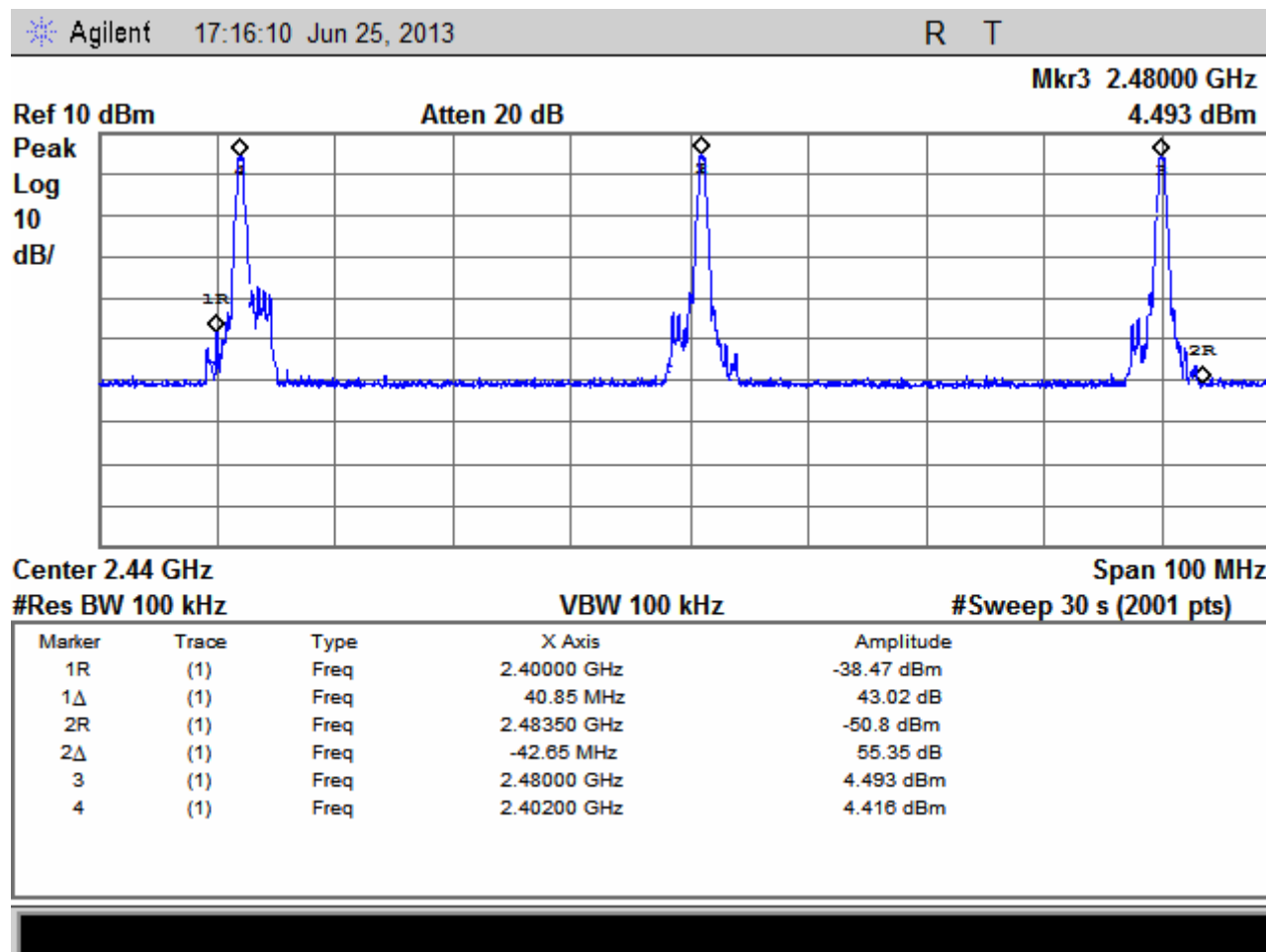
Client: *Phonak Communications AG*

Apparatus: *Roger Pen (Bluetooth part)*

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: *Rossens, June 25, 2013*
Operator: *B. Itzcovich*

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

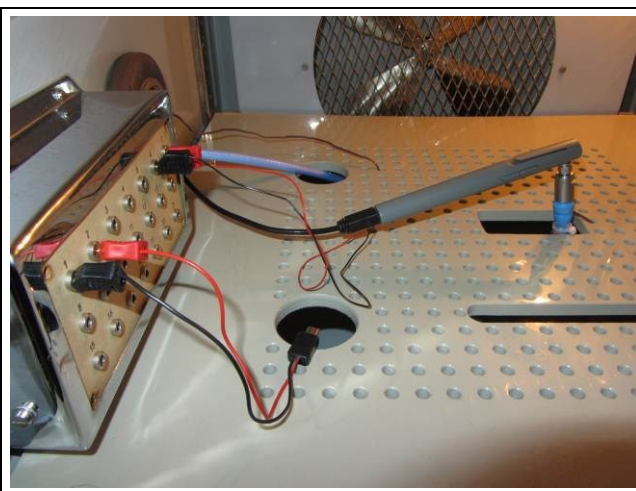
Test site: ☐ semi-anechoic chamber (foam) ☐ open test site
☐ semi-anechoic chamber (ferrites) ☒ laboratory

Meas. uncertainty: 9kHz – 3GHz: ± 1 dB
 3GHz – 6.7GHz: ± 2.1 dB
 6.7GHz – 13.2GHz: ± 2.6 dB
 13.2GHz – 19GHz: ± 2.8 dB
 19GHz – 26.5GHz: ± 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	☐ 88-14	☐ 94-24	☐ 02-06	☐ 03-45	☐ 05-39	☒ 07-53
Power supply	☒ 99-07	☐ 04-31				
Cables	☒ 11-45					

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

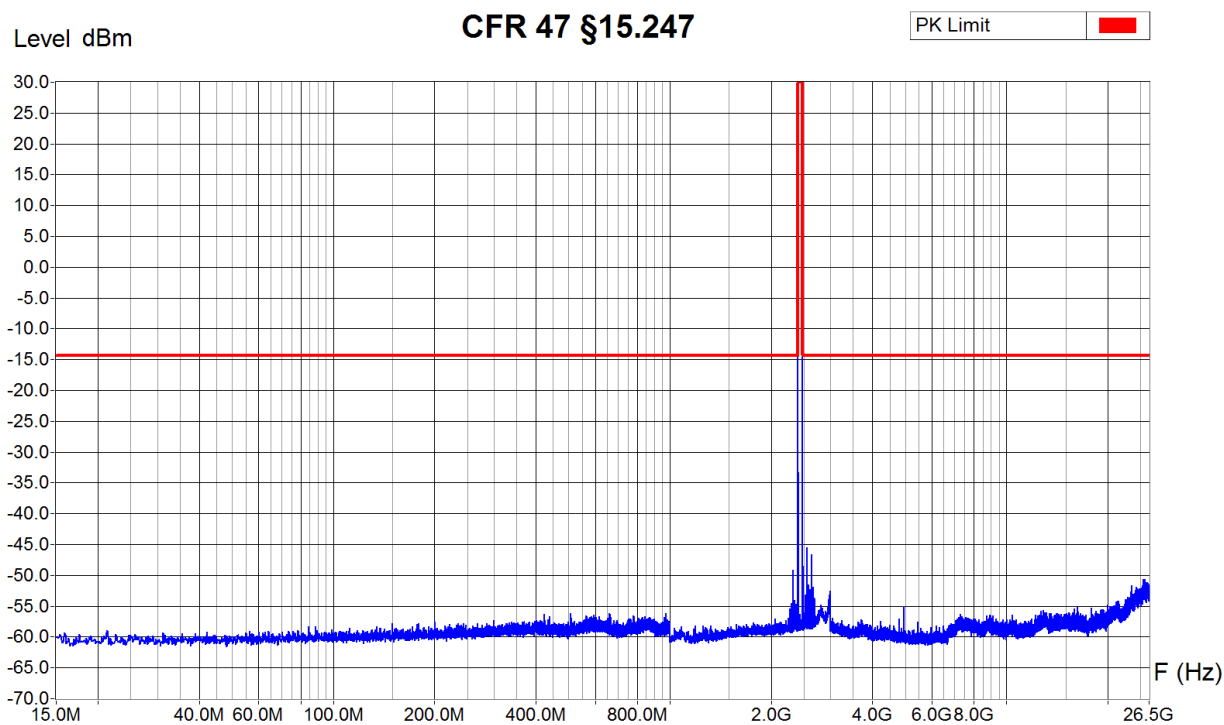
Equipment Under Test : TX17 Roger Pen

Set-Up : EUT with temporary supply & antenna connectors, see photos

Operating Conditions : BT hopping emission ($f = 2.402 / 2.480$ GHz), modulated, Pmax

Remarks : Supply = 3.70 VDC, Temp = 24.5 °C

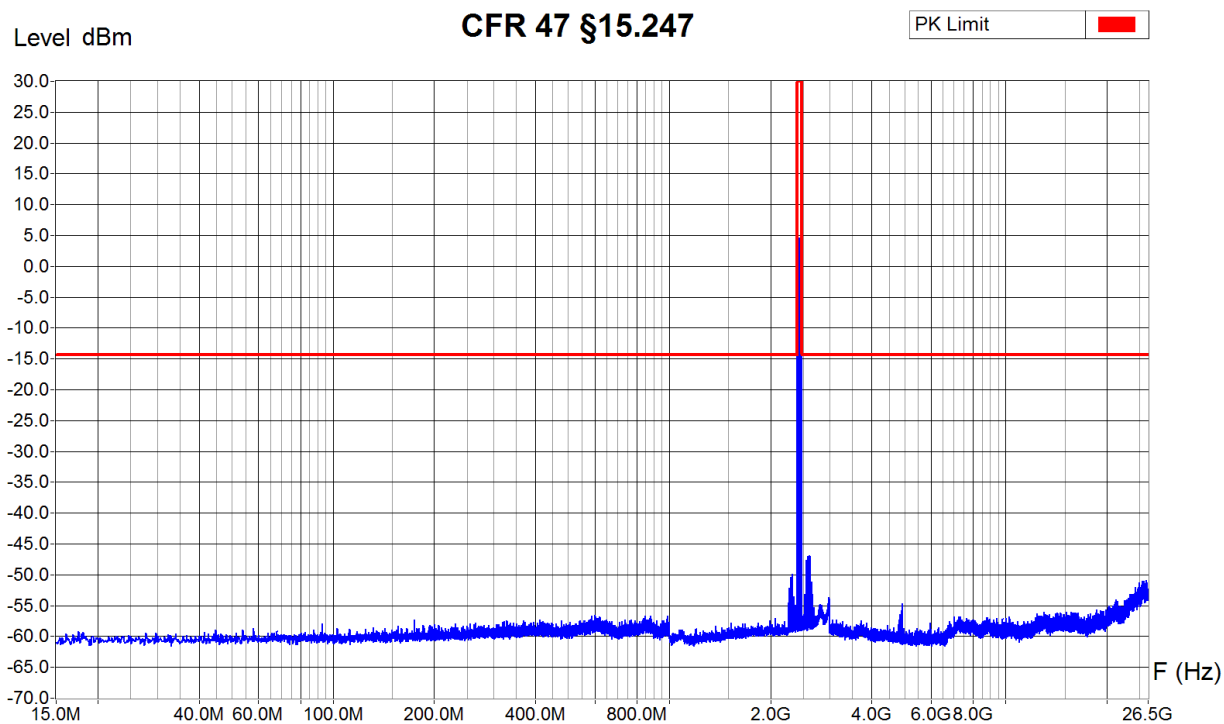
Peak detector sweep, ST = 60 s



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: 25.06.2013 17:58
 Filename:
 92_CE_15M-26G5_BT_TX2f.png/
 .txt

Equipment Under Test : TX17 Roger Pen
 Set-Up : EUT with temporary supply & antenna connectors, see photos
 Operating Conditions : BT continuously hopping, modulated, Pmax
 Remarks : Supply = 3.70 VDC, Temp = 24.5 °C
 Peak detector sweep, ST = 60 s



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: 25.06.2013 18:06
 Filename:
 93_CE_15M-
 26G5_BT_hopping.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) ☐

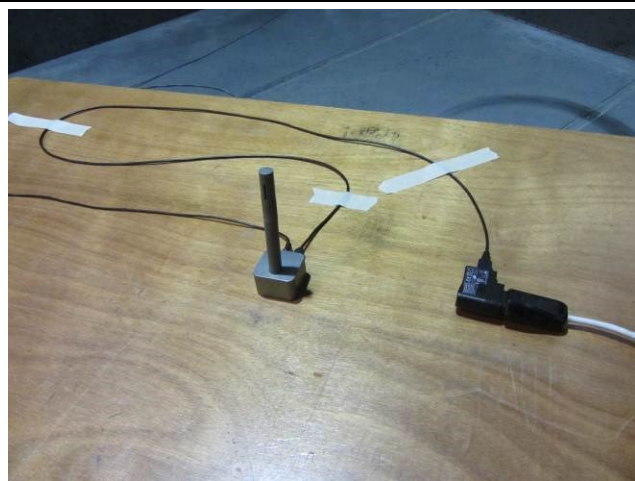
Distance: ☒ 3 m ☐ 10 m ☐ 30 m

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

Meas. uncertainty: ± 4.6 dB (30 - 300 MHz) / ± 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 μ V/m and transformed to a measuring distance of 3 m
(factor used = 20 dB/decade) if necessary
e.g.: for $f = 40$ MHz the limit is 100 μ 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	☐ 88-14	☐ 94-24	☐ 02-06	☐ 03-45	☐ 05-39	☒ 10-70
Receiver	☐ 85-04	☐ 90-43	☐ 94-35	☒ 10-70		
Preamplifier	☐ 90-01	☐ 95-86	☐ 05-56	☒ 05-59	☐ 05-62	
Antenna (bilog)	☒ 94-03	☐ 05-38				
Cables	☒ 06-01					

Result:

☒ pass

☐ fail

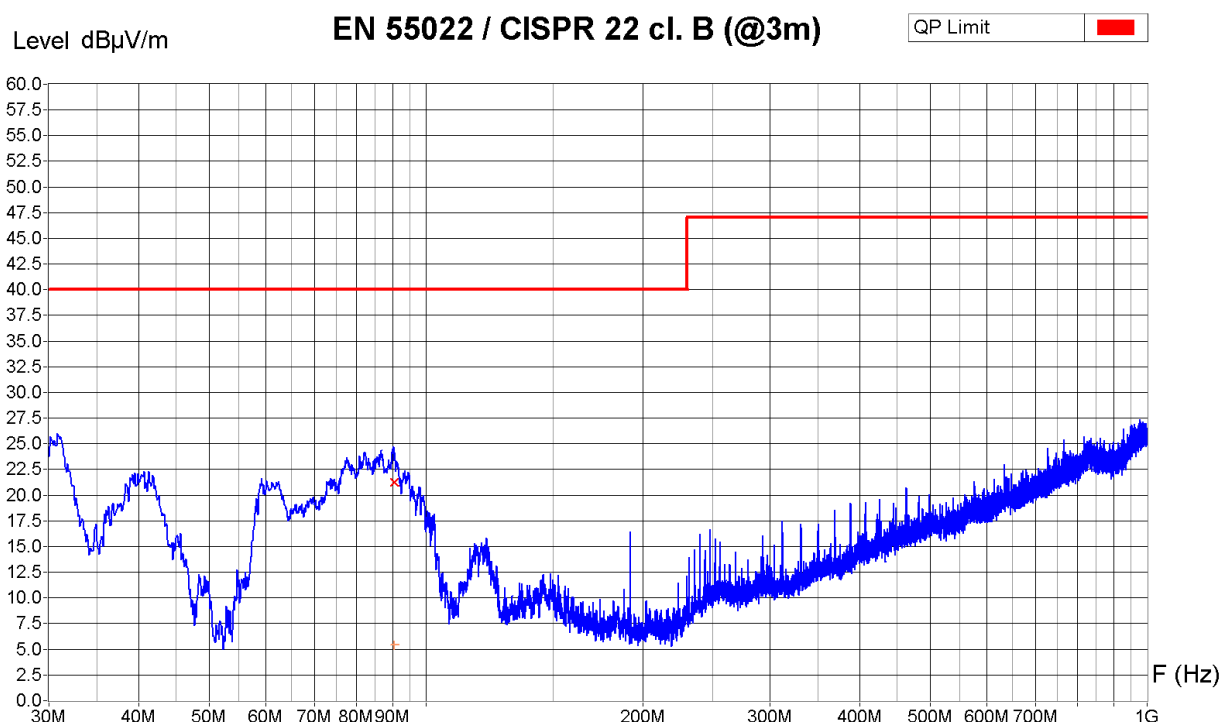
☐ not applicable

☐ not tested

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



Equipment Under Test : TX17 Roger Pen
Set-Up : With cradle, charger and audio cable connected
Operating Conditions : Bluetooth Hopping emission (f = 2.402, 2.440 and 2.480 GHz), modulated, Pmax
Remarks :
Cage 06-01



Zone	25 MHz - 1 GHz
Video Bandwidth	300 KHz
Resol Bandwidth	100 KHz

Receiver Measures

Frequency	Peak	QuasiPeak (x)	Average (+)	QP Margin
90.40 MHz	25.4 dB μ V/m	21.3 dB μ V/m	5.4 dB μ V/m	18.7 dB

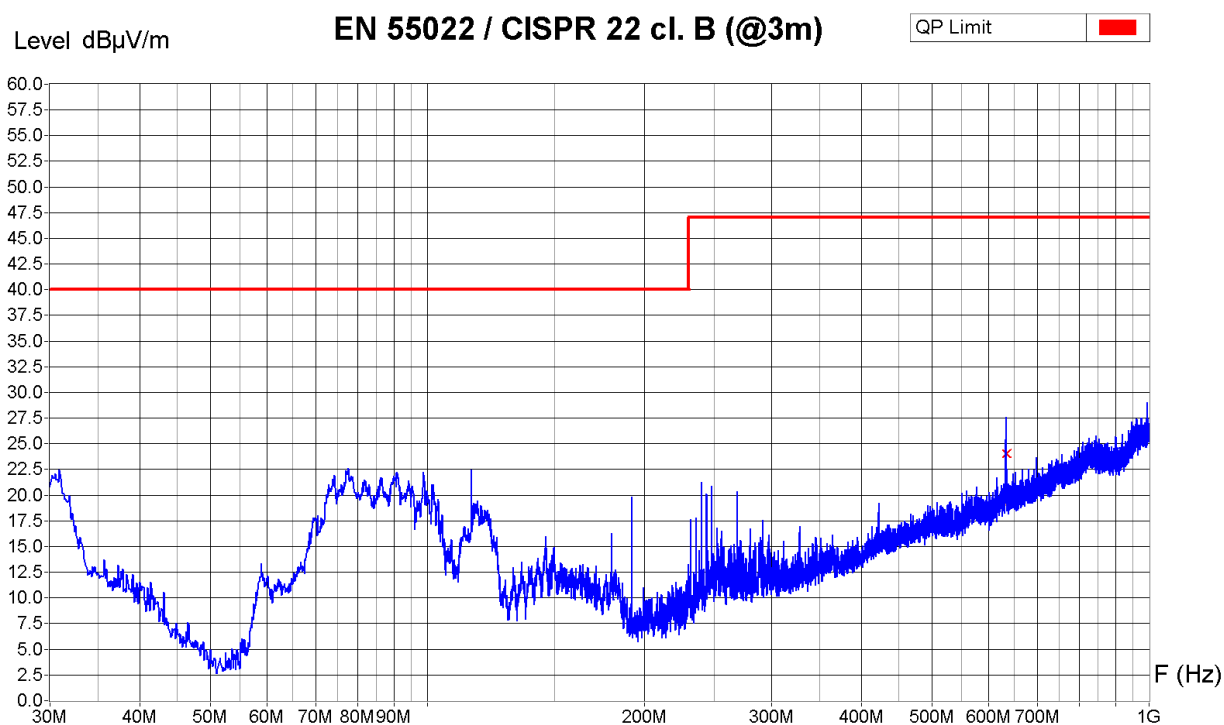
Operator: B. Itzcovich
Date/Time: 07.06.2013 10:12
Filename:
03_RE_25M-
1G_BTTX3f_V_C22.png/.txt

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



Equipment Under Test : TX17 Roger Pen
 Set-Up : With cradle, charger and audio cable connected
 Operating Conditions : Bluetooth Hopping emission (f = 2.402, 2.440 and 2.480 GHz), modulated, Pmax
 Remarks :

Cage 06-01



Zone	25 MHz - 1 GHz
Video Bandwidth	300 KHz
Resol Bandwidth	100 KHz

Receiver Measures

Frequency	Peak	QuasiPeak (x)	Average (+)	QP Margin
634.31 MHz	28.1 dB μ V/m	24.0 dB μ V/m	19.5 dB μ V/m	23.0 dB

Operator: B. Itzcovich
 Date/Time: 07.06.2013 10:27
 Filename:
 04_RE_25M-
 1G_BTTX3f_H_C22.png/.txt

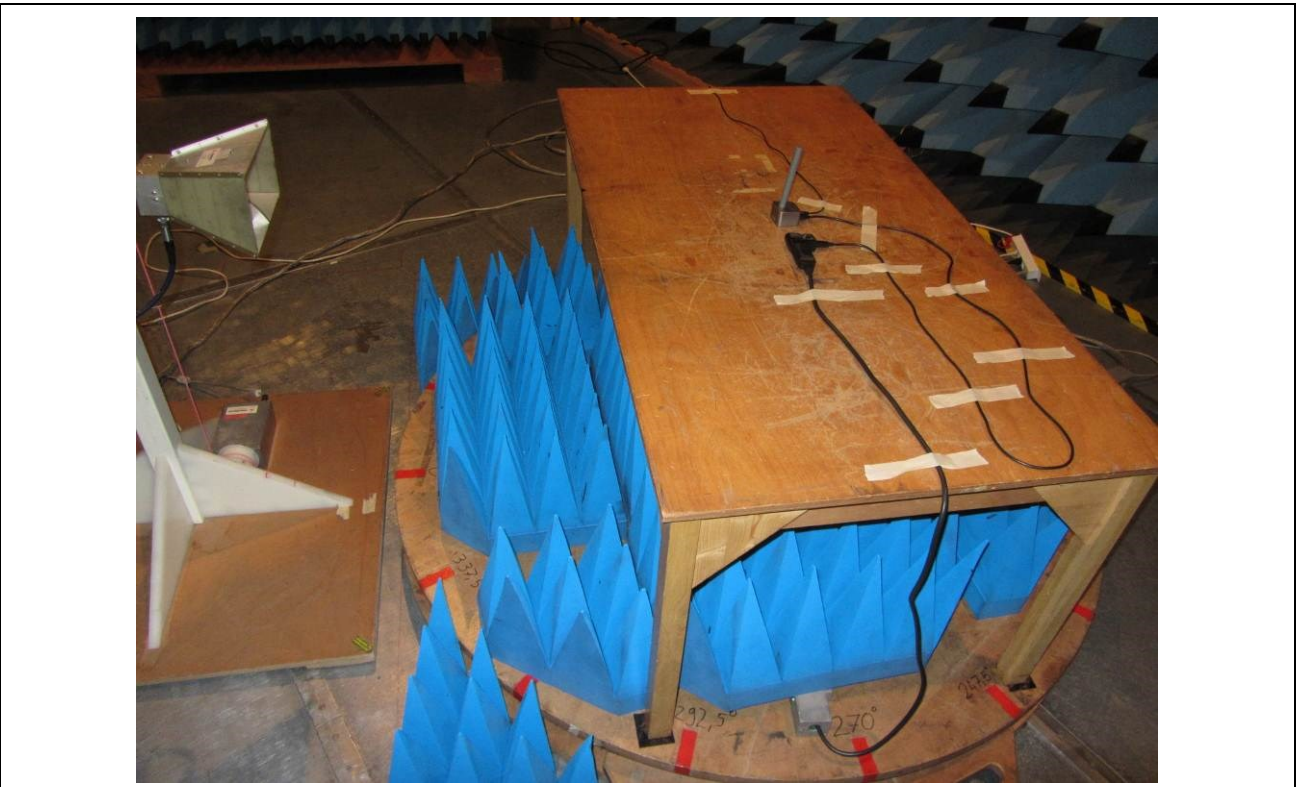
6.9.2 1 GHz to 18 GHzTest site: ☐ semi-anechoic chamber (ferrites) ☒ semi-anechoic chamber (foam)Distance: ☒ 1 m ☐ 3 m ☐ 10 m ☐ 30 m

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

Meas. uncertainty: ± 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 μ V/m and transformed to a measuring distance of 1 m (factor used = 20 dB/decade) if necessary
e.g.: for $f = 1$ GHz the limit is 500 μ V/m at 3 m;

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

Test equipment:

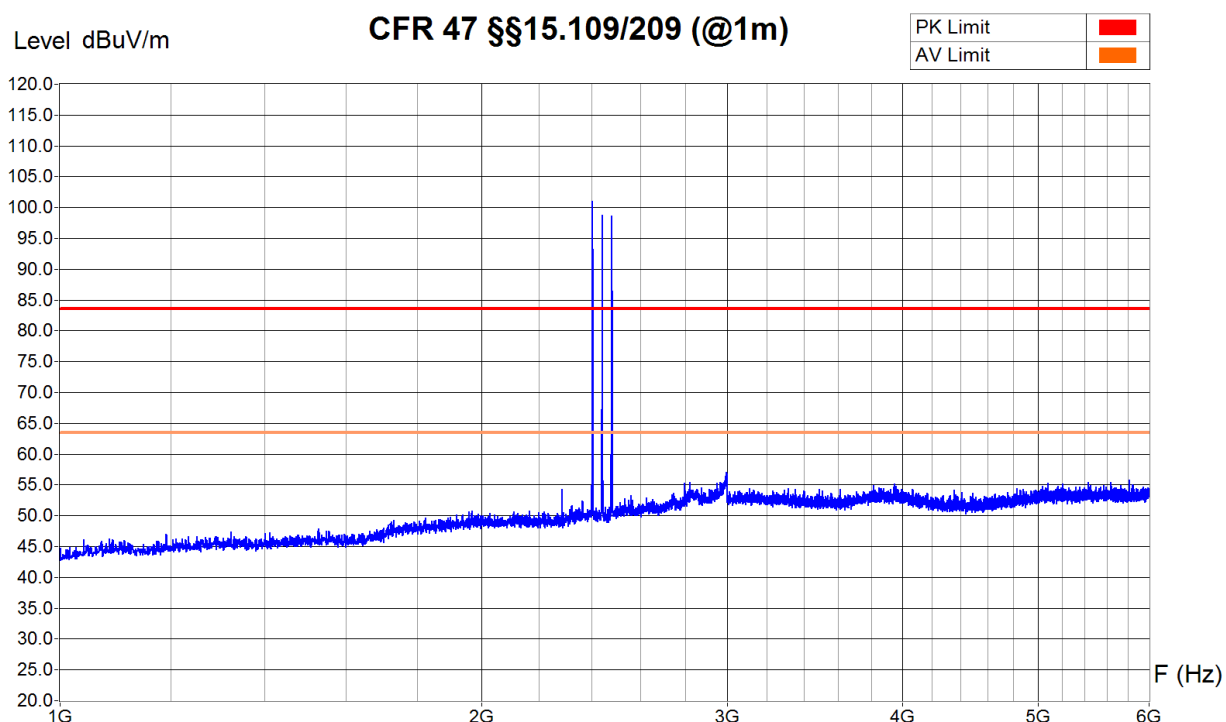
Spectrum analyser	☐ 88-14	☐ 94-24	☒ 02-06	☐ 03-45	☐ 05-39	☐ 07-53
Preamplifier	☐ 05-56	☐ 05-87	☒ 11-29			
Antenna (horn)	☒ 90-24	☐ 07-31				
Cables	☒ 10-75	☒ 11-61				
Filters	☐ 10-65	☐ 10-66	☐ 11-08	☒ 12-06		

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

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



Equipment Under Test : TX17 Roger Pen
Set-Up : With cradle, charger and audio cable connected. See photos
Operating Conditions : BT Hopping emission (f = 2.402, 2.440 and 2.480 GHz), modulated, Pmax
Remarks : Without filter, without preamp
Cage 06-00



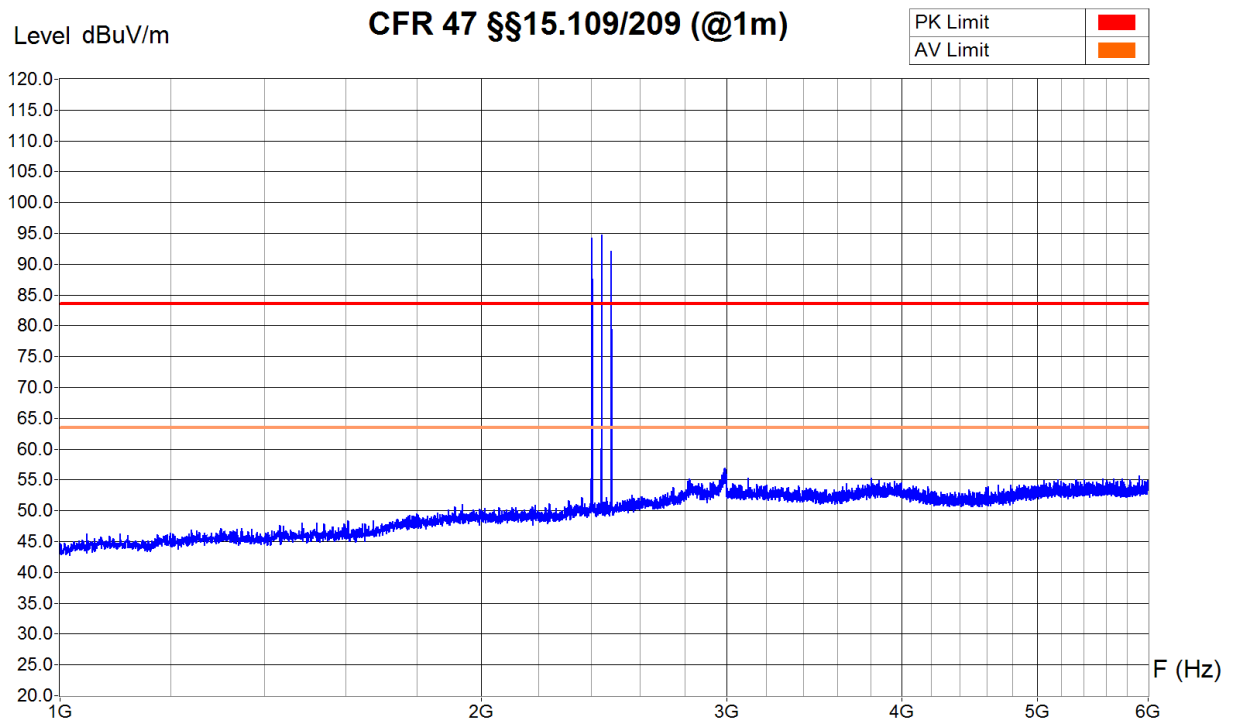
Zone	1 GHz - 6 GHz
Video Bandwidth	100 KHz
Resol Bandwidth	100 KHz

Operator: B. Itzcovich
Date/Time: 25.07.2013 12:38
Filename:
123_RE_1G-6G_BTXX3f_V.png/
.txt

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



Equipment Under Test : TX17 Roger Pen
Set-Up : With cradle, charger and audio cable connected. See photos
Operating Conditions : BT Hopping emission (f = 2.402, 2.440 and 2.480 GHz), modulated, Pmax
Remarks : Without filter, without preamp
Cage 06-00



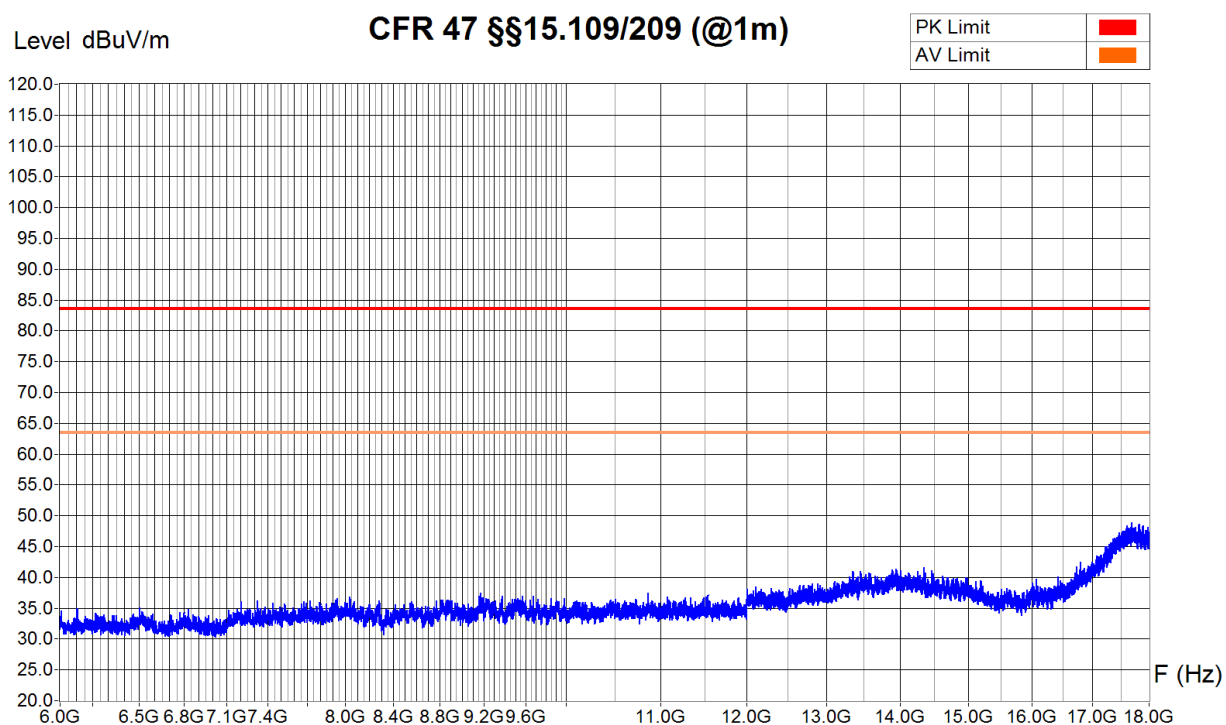
Zone	1 GHz - 6 GHz
Video Bandwidth	100 KHz
Resol Bandwidth	100 KHz

Operator: B. Itzcovich
Date/Time: 25.07.2013 12:42
Filename:
124_RE_1G-6G_BT TX3f_H.png/
.txt

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



Equipment Under Test : TX17 Roger Pen
Set-Up : With cradle, charger and audio cable connected. See photos
Operating Conditions : BT Hopping emission (f = 2.402, 2.440 and 2.480 GHz), modulated, Pmax
Remarks : With filter, with preamp
Cage 06-00



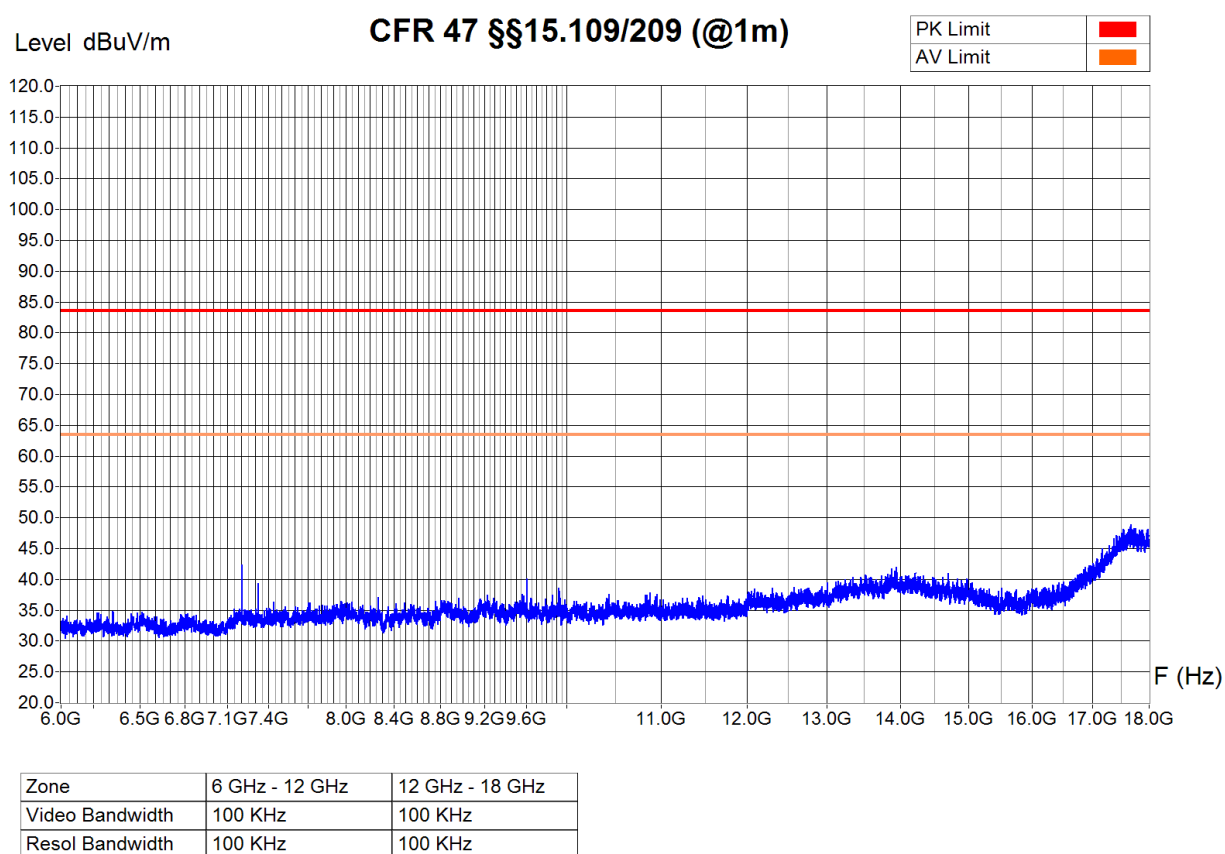
Zone	6 GHz - 12 GHz	12 GHz - 18 GHz
Video Bandwidth	100 KHz	100 KHz
Resol Bandwidth	100 KHz	100 KHz

Operator: B. Itzcovich
Date/Time: 25.07.2013 14:58
Filename:
127_RE_6G-18G_BTTX3f_V.png/
.txt

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



Equipment Under Test : TX17 Roger Pen
Set-Up : With cradle, charger and audio cable connected. See photos
Operating Conditions : BT 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 15:10
Filename:
128_RE_6G-18G_BTTX3f_H.png/
.txt

6.9.3 18 GHz to 26.5 GHz

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

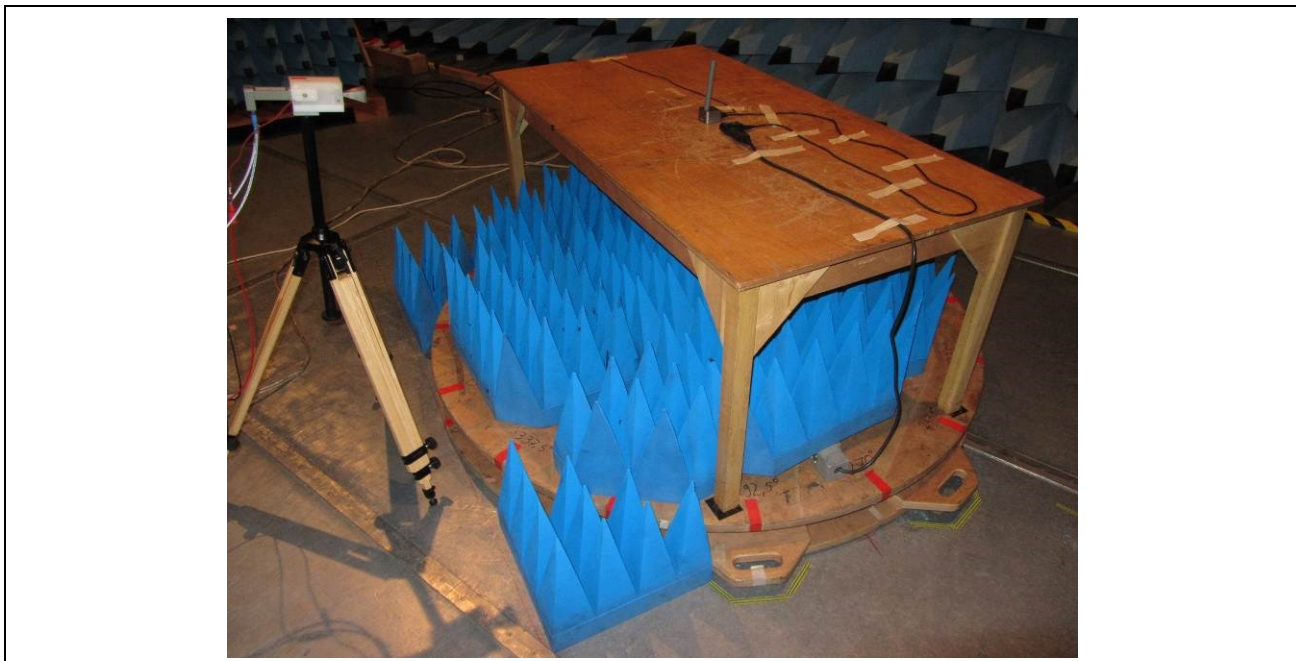
Distance: ☒ 1 m ☐ 3 m ☐ 10 m ☐ 30 m

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

Meas. uncertainty: ± 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 μ V/m and transformed to a measuring distance of 1 m (factor used = 20 dB/decade) if necessary

e.g.: for $f = 18$ GHz the limit is 500 μ V/m at 3 m;

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

Test equipment:

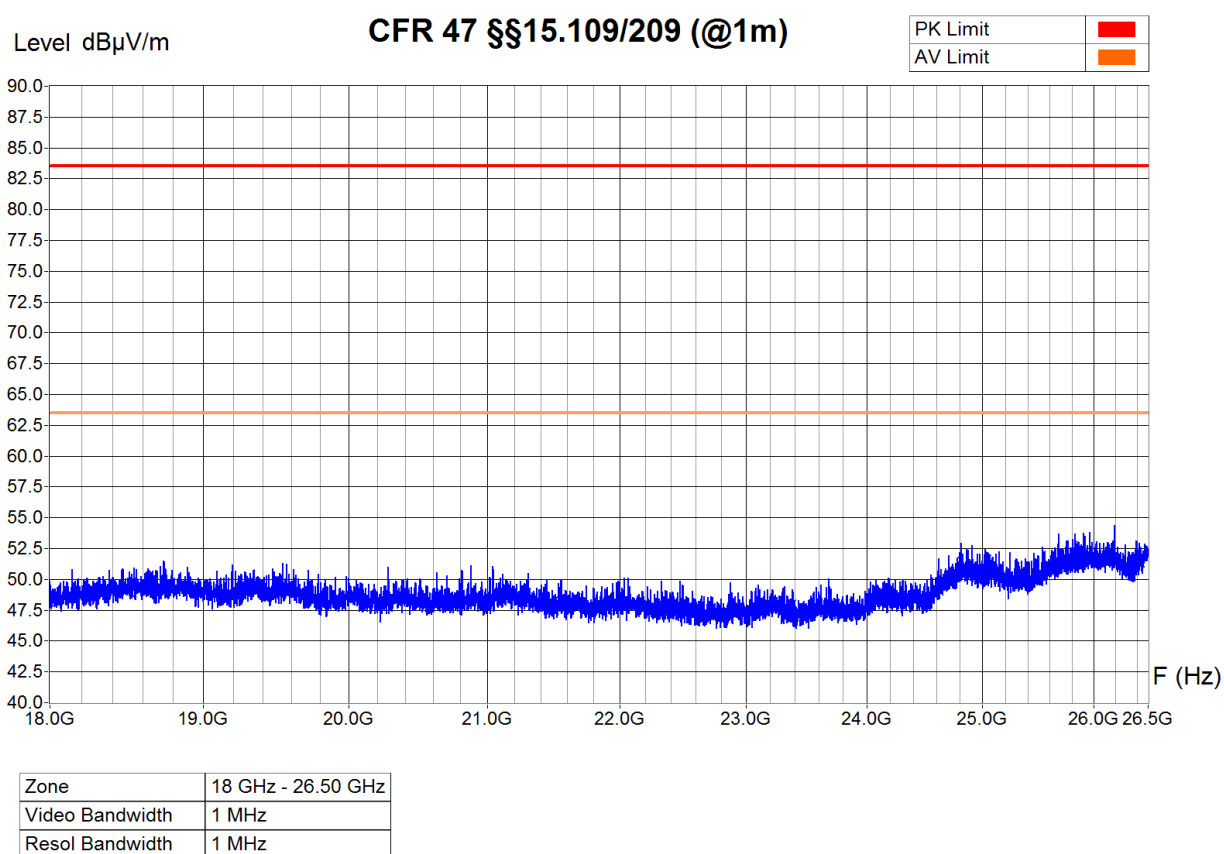
Spectrum analyser	☐ 88-14	☐ 94-24	☒ 02-06	☐ 03-45	☐ 05-39	☐ 07-53
Antenna with mixer & preamp.	☒ 98-12					
Cables	☒ 11-62	☒ 10-81				
Power supply	☒ 06-62					

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

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



Equipment Under Test : TX17 Roger Pen
Set-Up : With cradle, charger and audio cable connected. See photos
Operating Conditions : BT Hopping emission (f = 2.402, 2.440 and 2.480 GHz), modulated, Pmax
Remarks :
Cage 06-00



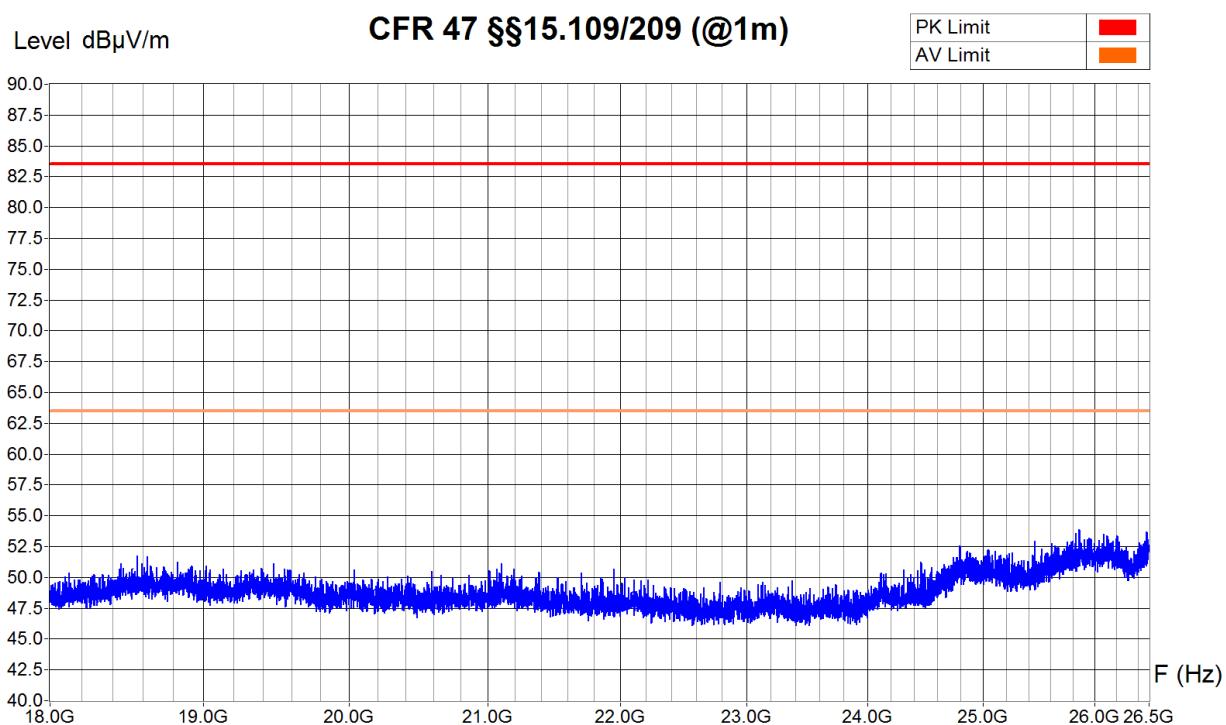
Operator: B. Itzcovich
Date/Time: 26.07.2013 10:53
Filename:
137_RE_18G-
26G5_BTXX3f_V.png/.txt

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



Equipment Under Test : TX17 Roger Pen
Set-Up : With cradle, charger and audio cable connected. See photos
Operating Conditions : BT Hopping emission (f = 2.402, 2.440 and 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 11:15
Filename:
138_RE_18G-
26G5_BTXX3f_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) ☐

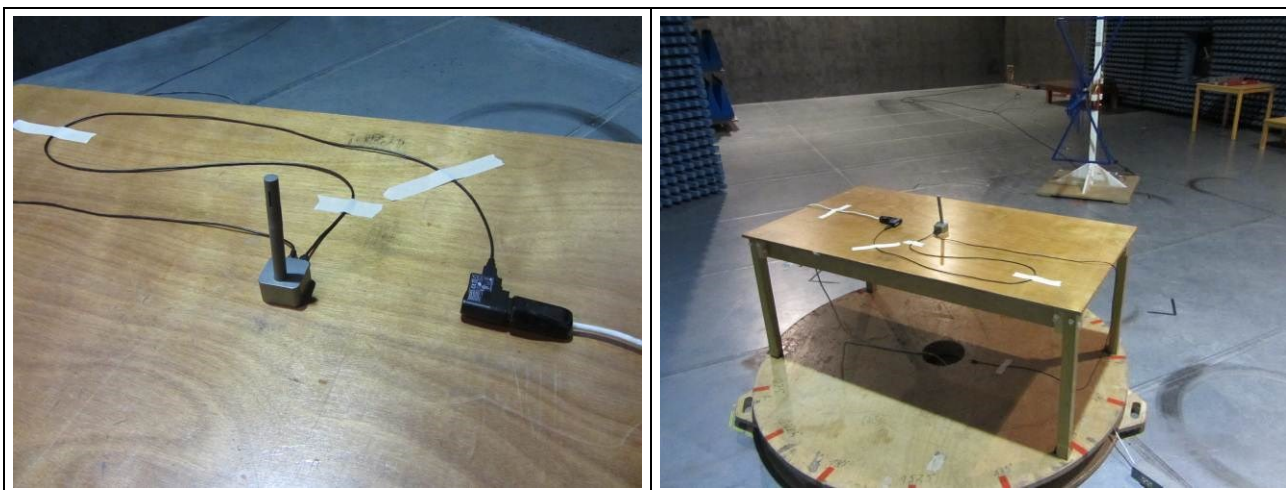
Distance: ☒ 3 m ☐ 10 m ☐ 30 m

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

Meas. uncertainty: ± 4.6 dB (30 - 300 MHz) / ± 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 μ V/m and transformed to a measuring distance of 3 m
 (factor used = 20 dB/decade) if necessary
 e.g.: for f = 40 MHz the limit is 100 μ 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	☐ 88-14	☐ 94-24	☐ 02-06	☐ 03-45	☐ 05-39	☒ 10-70
Receiver	☐ 85-04	☐ 90-43	☐ 94-35	☒ 10-70		
Preamplifier	☐ 90-01	☐ 95-86	☐ 05-56	☒ 05-59	☐ 05-62	
Antenna (bilog)	☒ 94-03	☐ 05-38				
Cables	☒ 06-01					

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

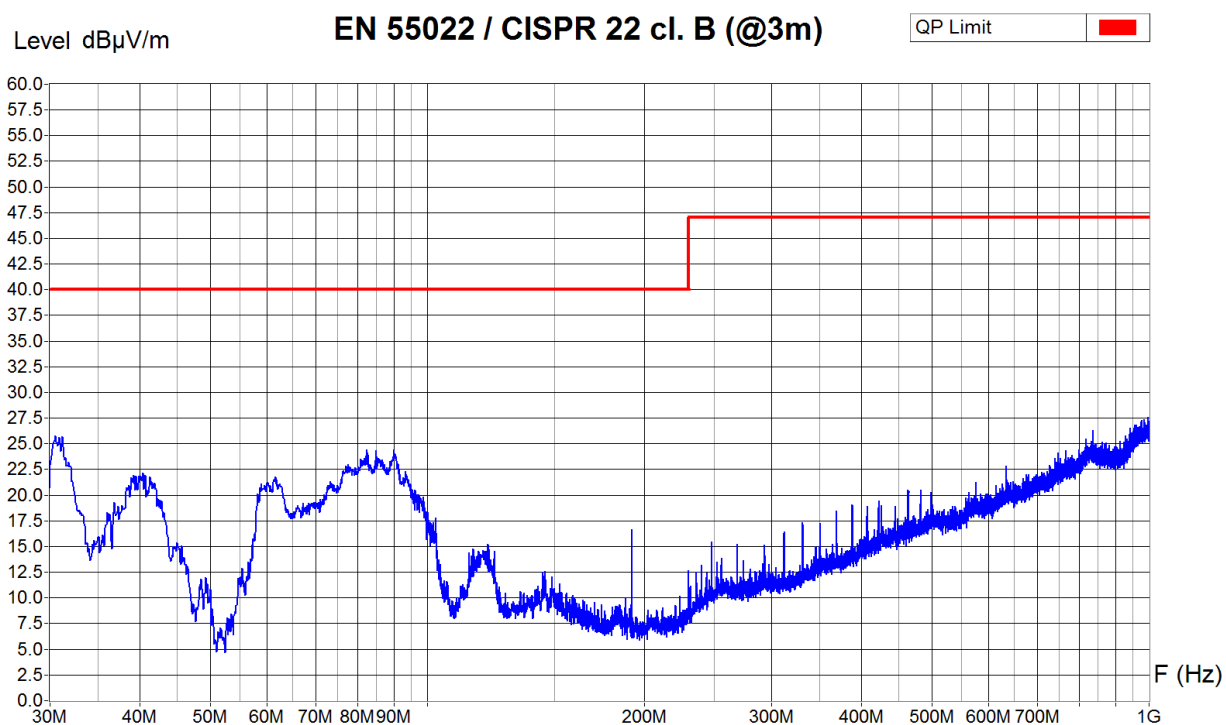
Measurement Type : Radiated Field
Polarisation : Vertical
Table Angle : 0 - 360°
Antenna Height : 1 - 4 m



Equipment Under Test : TX17 Roger Pen
Set-Up : With cradle, charger and audio cable connected
Operating Conditions : BT RX (f = 2.440 GHz)

Remarks :

Cage 06-01



Zone	25 MHz - 1 GHz
Video Bandwidth	300 KHz
Resol Bandwidth	100 KHz

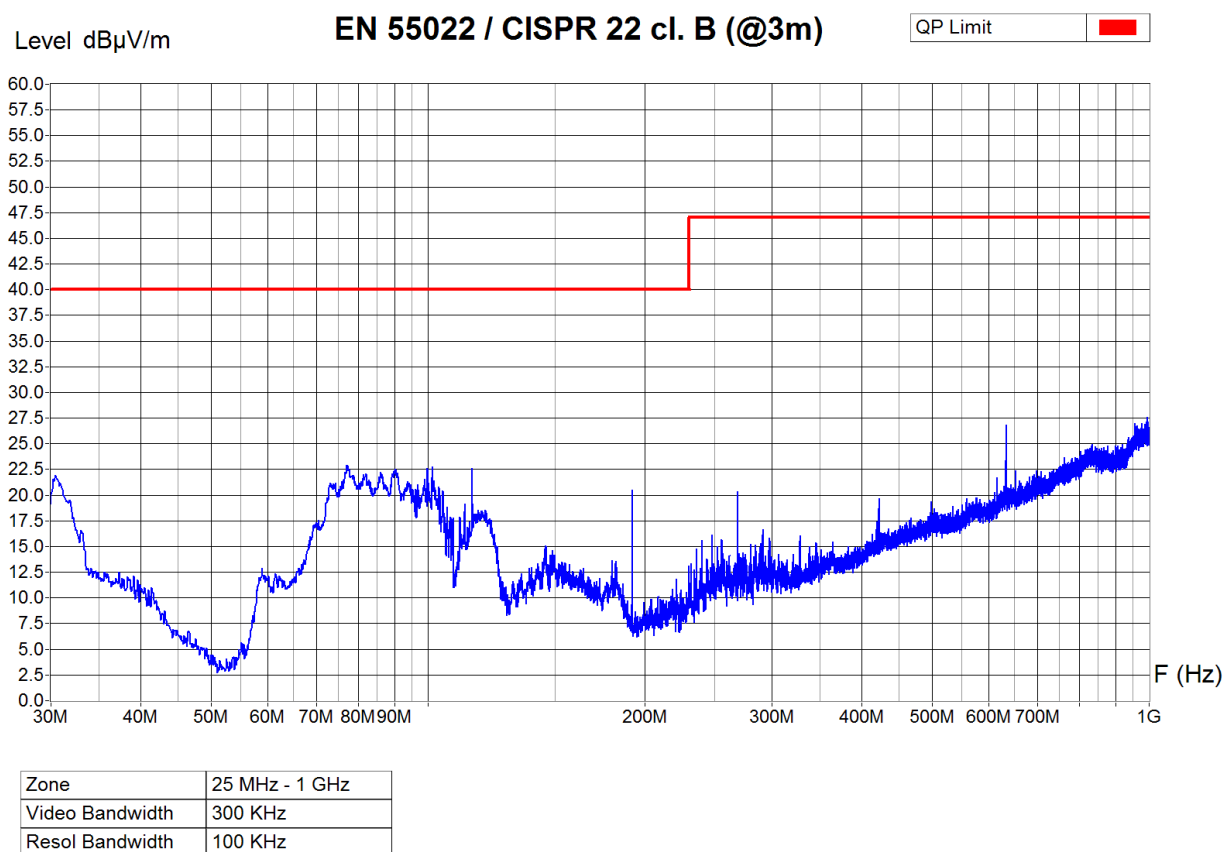
Operator: B. Itzcovich
Date/Time: 07.06.2013 09:11
Filename:
003_RE_25M-
1G_BTRX2440_V_C22.png/.txt

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



Equipment Under Test : TX17 Roger Pen
Set-Up : With cradle, charger and audio cable connected
Operating Conditions : BT RX (f = 2.440 GHz)
Remarks :

Cage 06-01



Operator: B. Itzcovich
Date/Time: 07.06.2013 09:20
Filename:
004_RE_25M-
1G_BTRX2440_H_C22.png/.txt

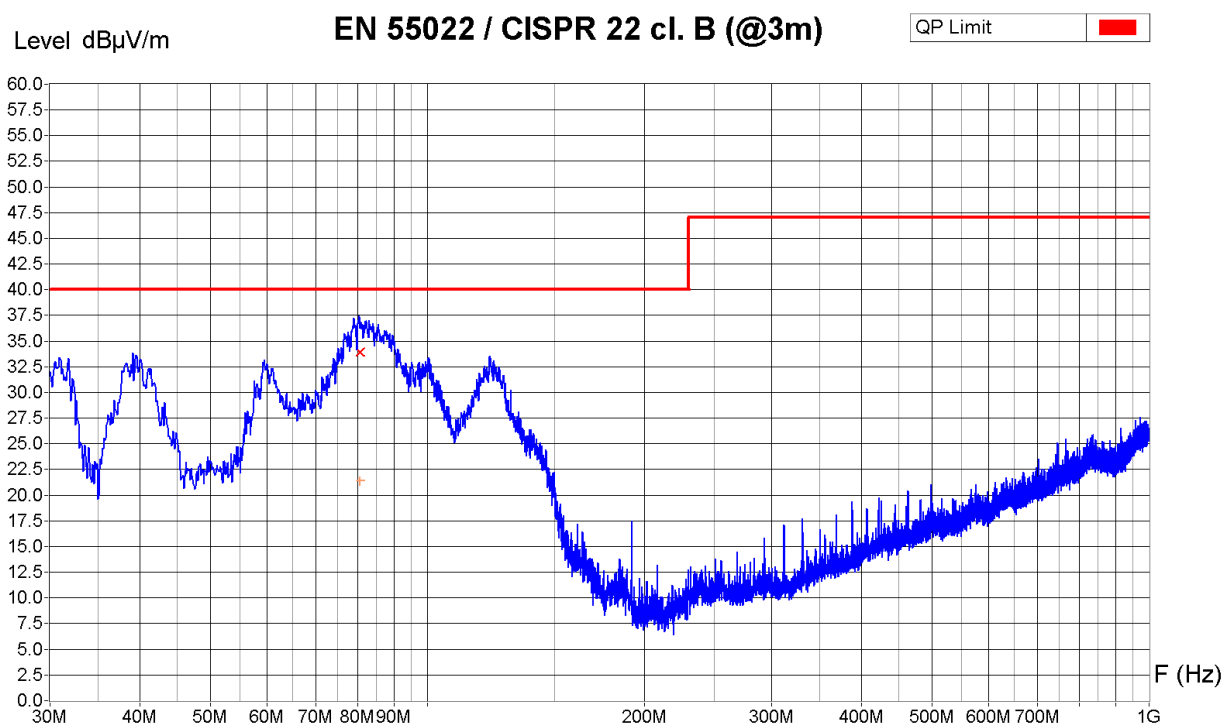
Measurement Type : Radiated Field
 Polarisation : Vertical
 Table Angle : 0 - 360°
 Antenna Height : 1 - 4 m



Equipment Under Test : TX17 Roger Pen
 Set-Up : With cradle, charger and audio cable connected
 Operating Conditions : Standby mode, charging

Remarks :

Cage 06-01



Zone	25 MHz - 1 GHz
Video Bandwidth	300 KHz
Resol Bandwidth	100 KHz

Receiver Measures

Frequency	Peak	QuasiPeak (x)	Average (+)	QP Margin
80.70 MHz	37.0 dB μ V/m	33.9 dB μ V/m	21.4 dB μ V/m	6.1 dB

Operator: B. Itzcovich
 Date/Time: 07.06.2013 10:44
 Filename:
 05_RE_25M-
 1G_Stby_V_C22.png/.txt

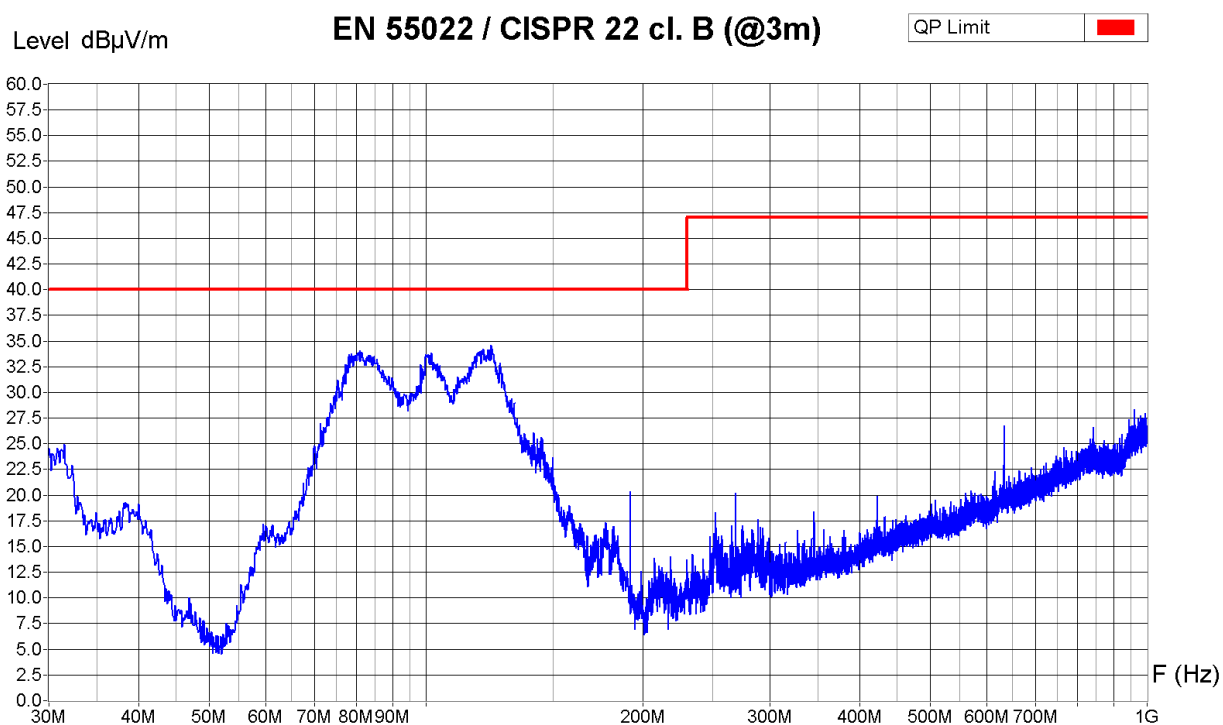
Measurement Type : Radiated Field
Polarisation : Horizontal
Table Angle : 0 - 360°
Antenna Height : 1 - 4 m



Equipment Under Test : TX17 Roger Pen
Set-Up : With cradle, charger and audio cable connected
Operating Conditions : Standby mode, charging

Remarks :

Cage 06-01



Zone	25 MHz - 1 GHz
Video Bandwidth	300 KHz
Resol Bandwidth	100 KHz

Operator: B. Itzcovich
Date/Time: 07.06.2013 10:58
Filename:
06_RE_25M-
1G_Stby_H_C22.png/.txt

6.10.2 1 GHz to 18 GHz

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

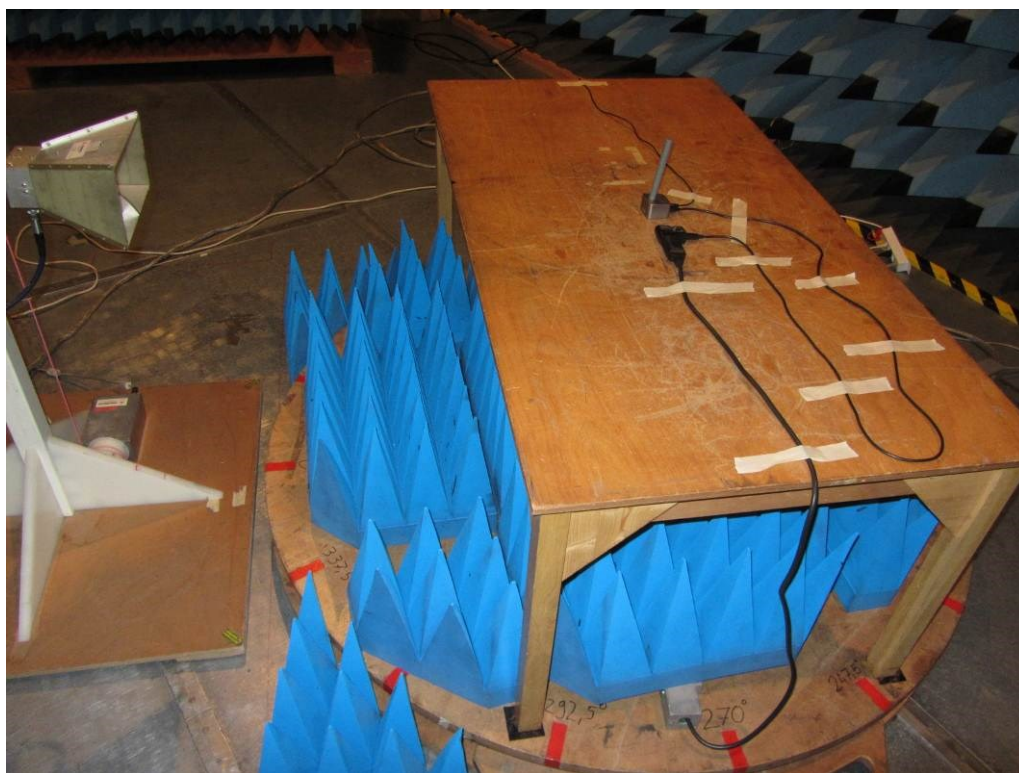
Distance: ☒ 1 m ☐ 3 m ☐ 10 m ☐ 30 m

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

Meas. uncertainty: ± 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 μ V/m and transformed to a measuring distance of 1 m
(factor used = 20 dB/decade) if necessary
e.g.: for $f = 1$ GHz the limit is 500 μ 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:

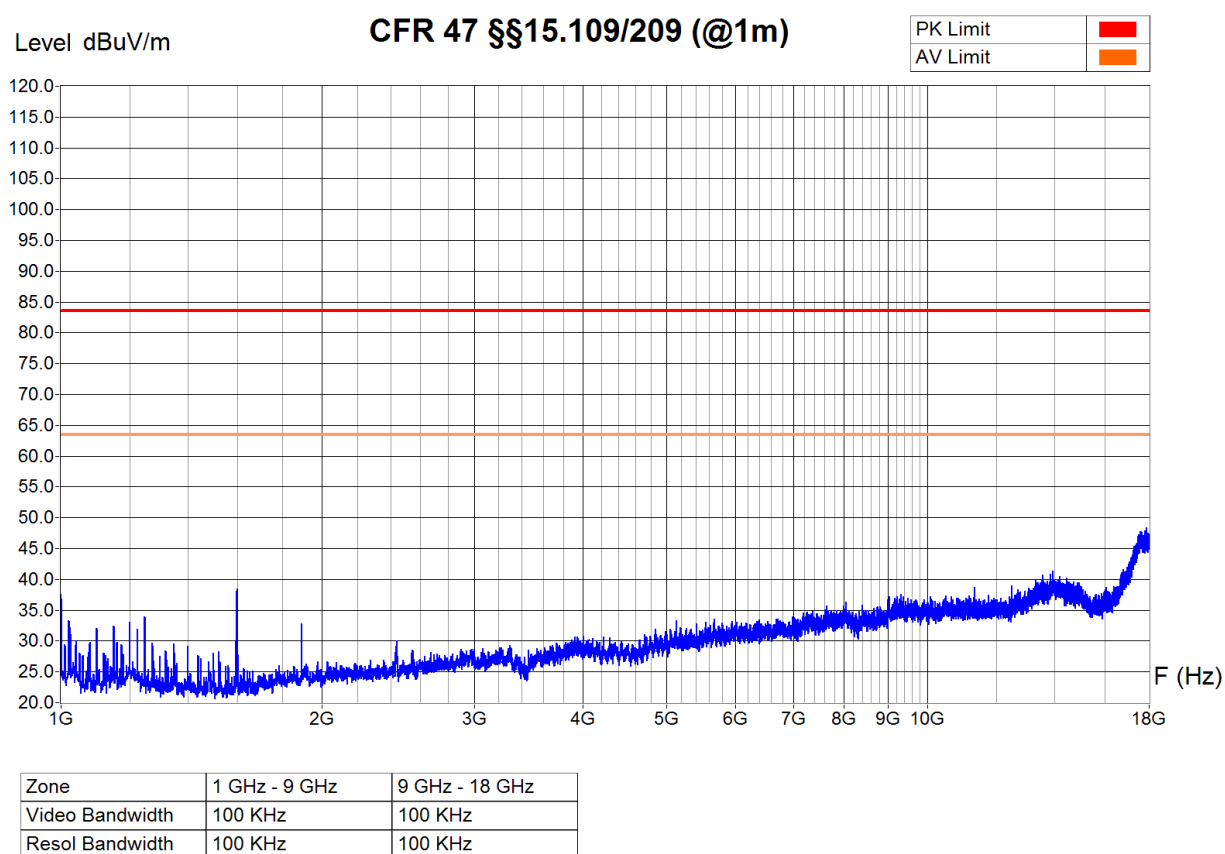
Spectrum analyser	☐ 88-14	☐ 94-24	☒ 02-06	☐ 03-45	☐ 05-39	☐ 07-53
Preamplifier	☐ 05-56	☐ 05-87	☒ 11-29			
Antenna (horn)	☒ 90-24	☐ 07-31				
Cables	☒ 10-75	☒ 11-61				

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

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



Equipment Under Test : TX17 Roger Pen
Set-Up : With cradle, charger and audio cable connected. See photos
Operating Conditions : BT RX (f = 2.440 GHz)
Remarks : Without filter, with preamp
Cage 06-00

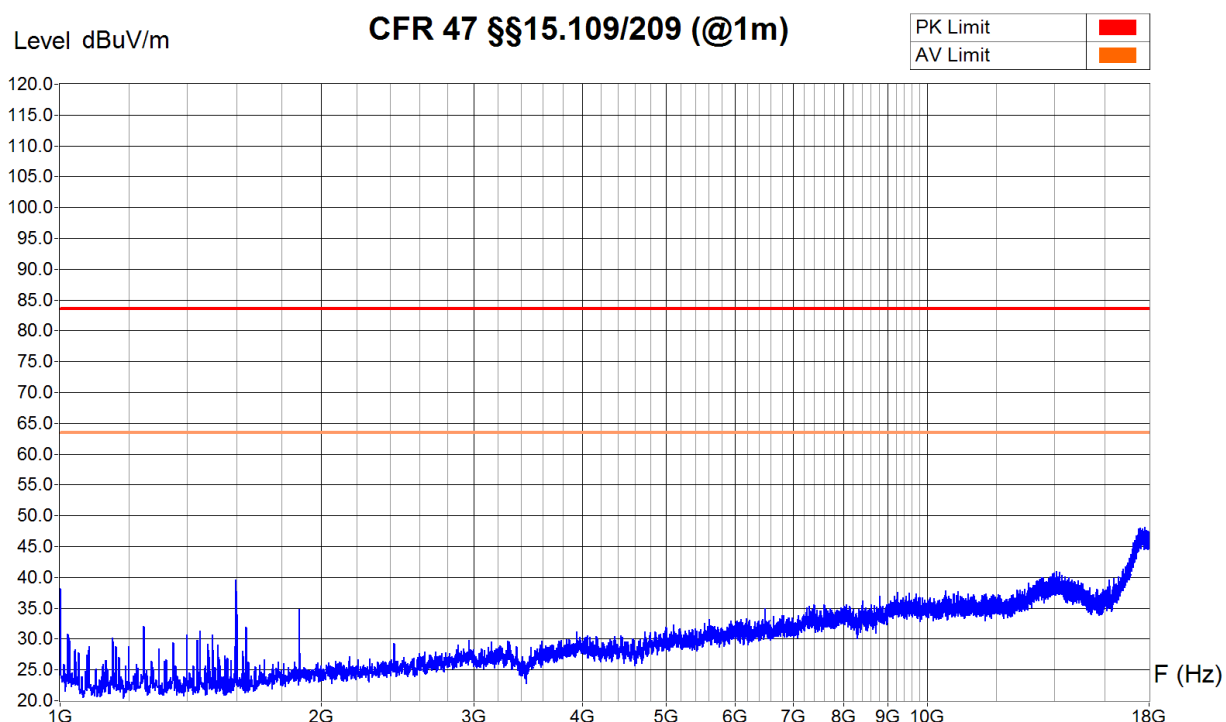


Operator: B. Itzcovich
Date/Time: 25.07.2013 15:52
Filename:
131_RE_1G-18G_BTRX_V.png/
.txt

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



Equipment Under Test : TX17 Roger Pen
 Set-Up : With cradle, charger and audio cable connected. See photos
 Operating Conditions : BT RX (f = 2.440 GHz)
 Remarks : Without filter, with preamp
 Cage 06-00



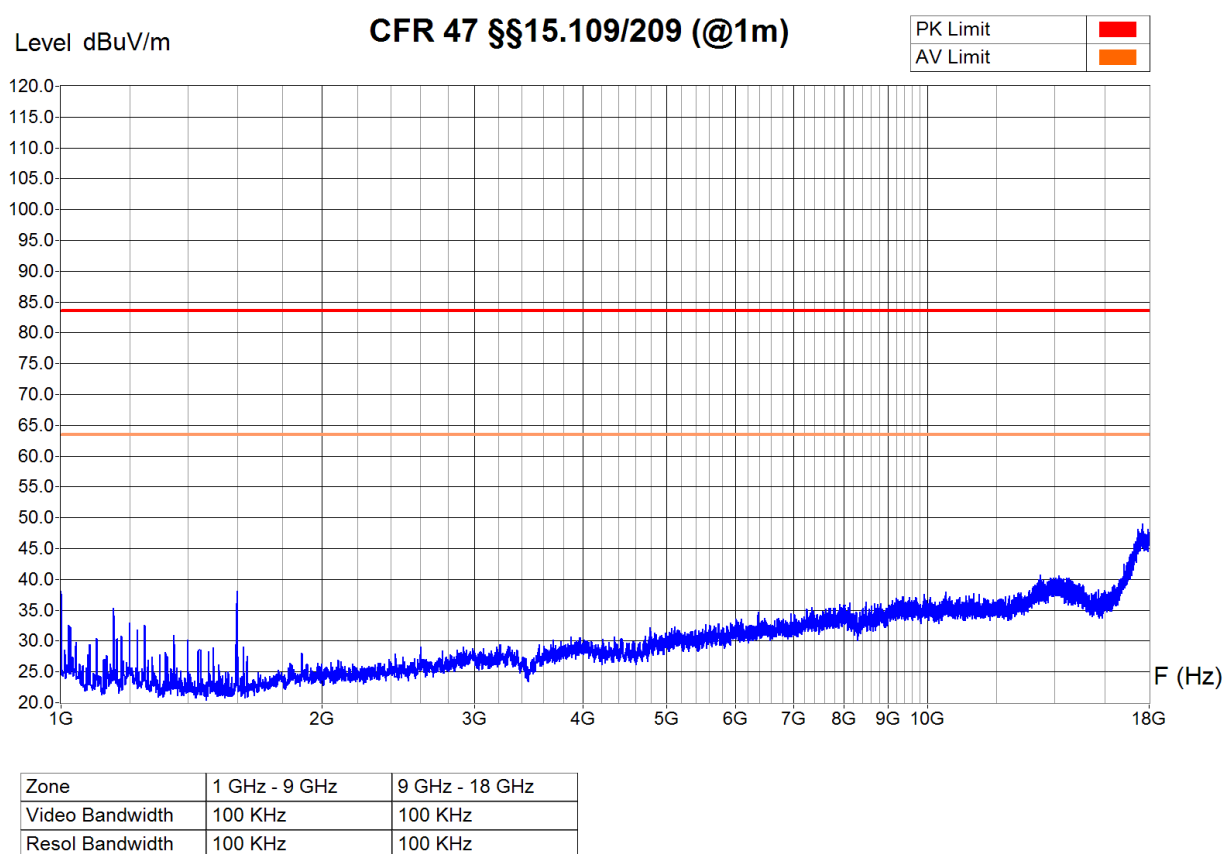
Zone	1 GHz - 9 GHz	9 GHz - 18 GHz
Video Bandwidth	100 KHz	100 KHz
Resol Bandwidth	100 KHz	100 KHz

Operator: B. Itzcovich
 Date/Time: 25.07.2013 15:58
 Filename:
 132_RE_1G-18G_BTRX_H.png/
 .txt

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



Equipment Under Test : TX17 Roger Pen
 Set-Up : With cradle, charger and audio cable connected. See photos
 Operating Conditions : Standby (DM and BT)
 Remarks : Without filter, with preamp
 Cage 06-00

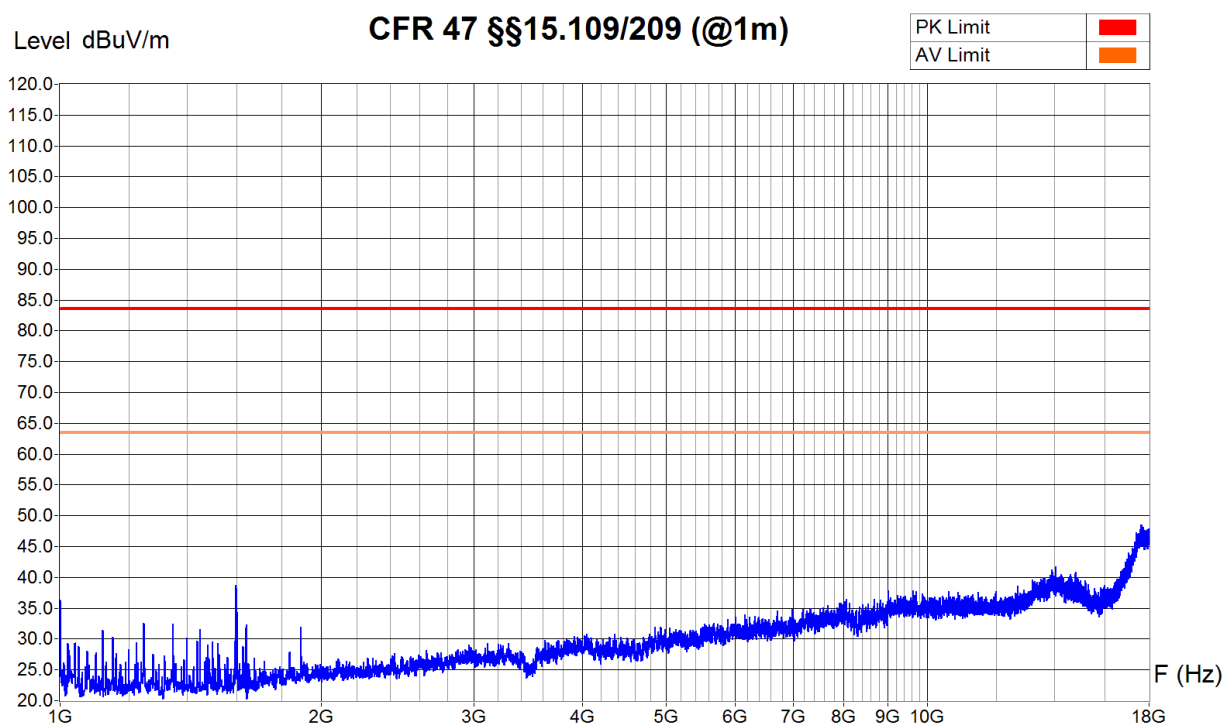


Operator: B. Itzcovich
 Date/Time: 25.07.2013 16:35
 Filename:
 133_RE_1G-18G_Stby_V.png/.txt

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



Equipment Under Test : TX17 Roger Pen
 Set-Up : With cradle, charger and audio cable connected. See photos
 Operating Conditions : Standby (DM and BT)
 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 16:26
 Filename:
 134_RE_1G-18G_Stby_H.png/.txt

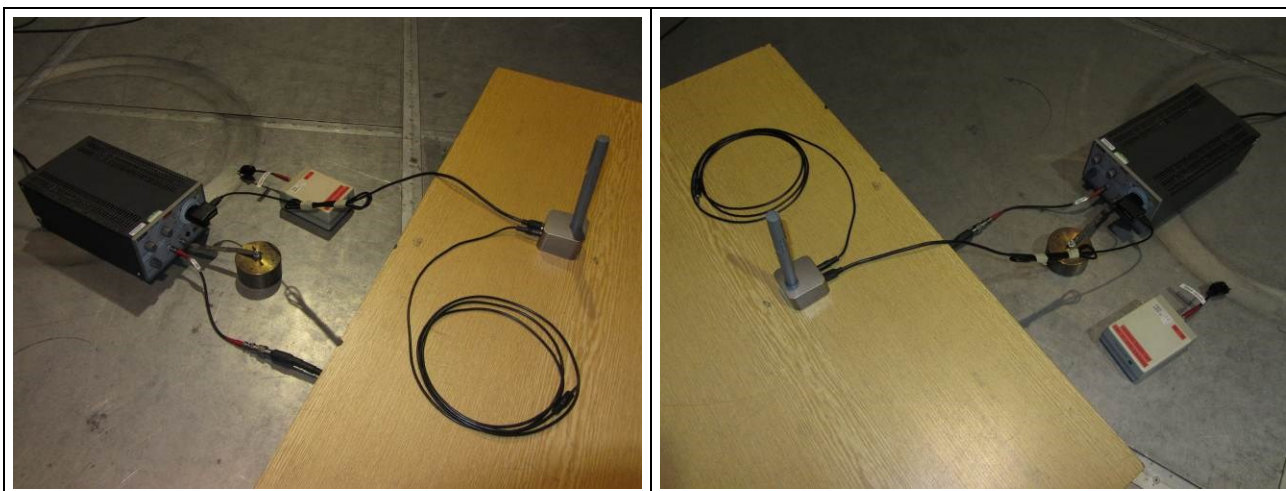
6.11 Conducted emission - Interference voltage

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

Meas. uncertainty: ± 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:

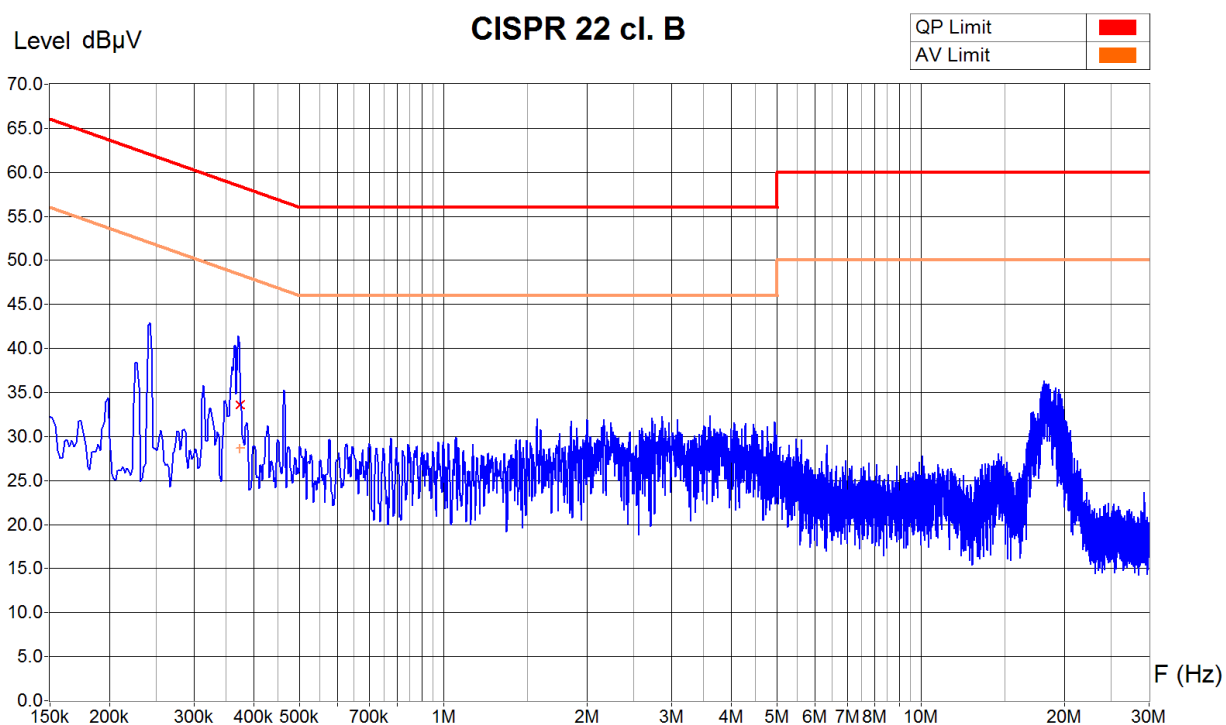
Spectrum analyser	☒ 10-70	☐ 94-24	☐ 02-06	☐ 03-45	☐ 05-39	☐ 07-53
Receiver	☒ 10-70	☐ 90-11	☐ 94-34	☐ 04-28	☐ 06-29	
LISN	☐ 85-13	☐ 90-08	☐ 94-36	☒ 94-40	☐ 95-12	☐ 00-43
Protection 10 dB	☐ 91-44 ☐ 96-38	☐ 91-45 ☒ included in LISN	☐ 95-30	☐ 95-33	☐ 95-35	☐ 95-36
Protection 20 dB	☐ 91-46	☐ 95-33	☐ 95-38	☐ included in LISN		
Cables	☒ 06-01	☒ 06-206				

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

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



Equipment Under Test : TX17 Roger Pen
 Set-Up : With cradle, charger and audio cable connected. See photos
 Operating Conditions : Coexistence mode, charging
 Remarks : cage 06-01



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

Receiver Measures

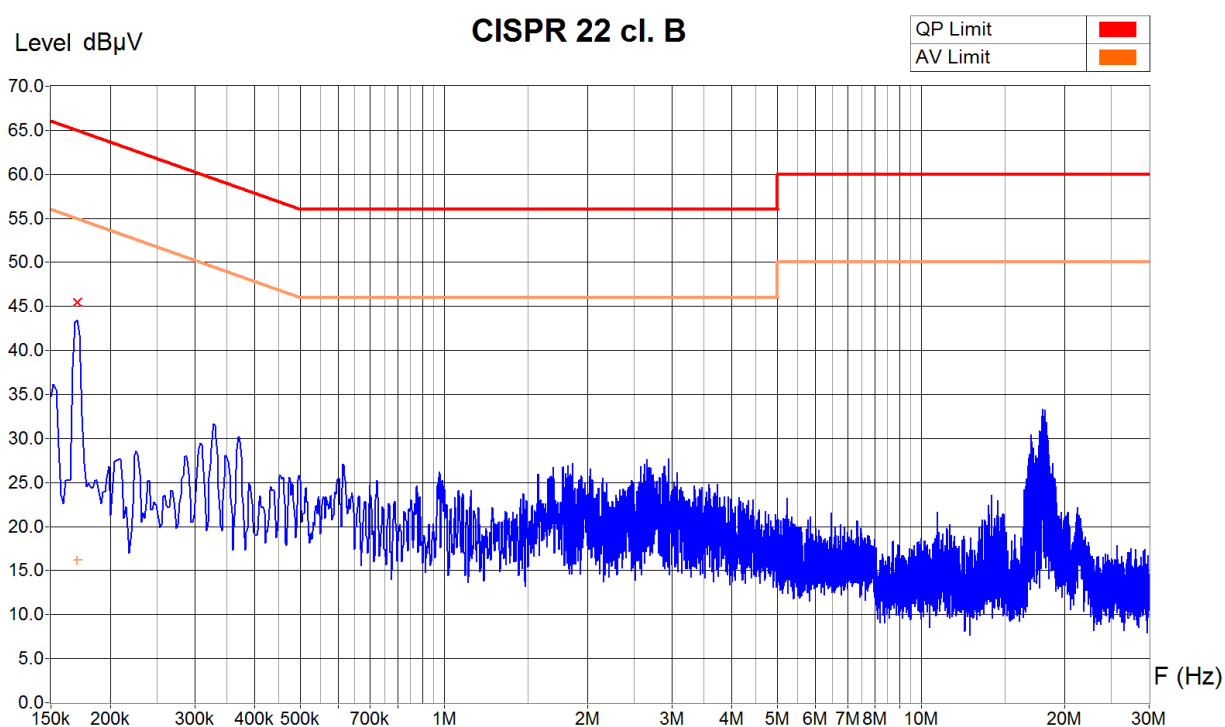
Frequency	Peak	QuasiPeak (x)	Average (+)	QP Margin
375 KHz	47.0 dB μ V	33.6 dB μ V	28.7 dB μ V	24.8 dB

Operator: B. Itzcovich
 Date/Time: 10.06.2013 11:45
 Filename:
 07_CV_150k-30M_L1_FCC.png/
 .txt

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



Equipment Under Test : TX17 Roger Pen
 Set-Up : With cradle, charger and audio cable connected. See photos
 Operating Conditions : Coexistence mode, charging
 Remarks :
 cage 06-01



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

Receiver Measures

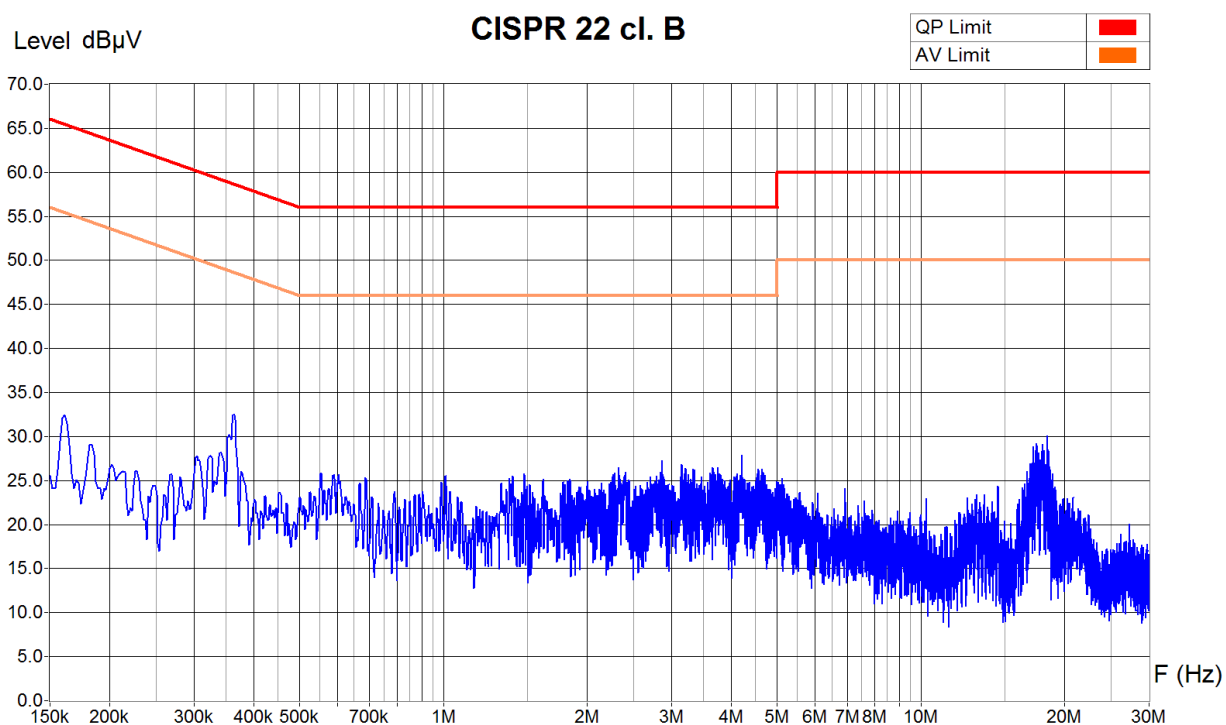
Frequency	Peak	QuasiPeak (x)	Average (+)	QP Margin
170.20 KHz	47.6 dB μ V	45.4 dB μ V	16.2 dB μ V	19.5 dB

Operator: B. Itzcovich
 Date/Time: 10.06.2013 11:55
 Filename:
 08_CV_150k-30M_N_FCC.png/
 .txt

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



Equipment Under Test : TX17 Roger Pen
 Set-Up : With cradle, charger and audio cable connected. See photos
 Operating Conditions : Coexistence mode, charging
 Remarks :
 cage 06-01



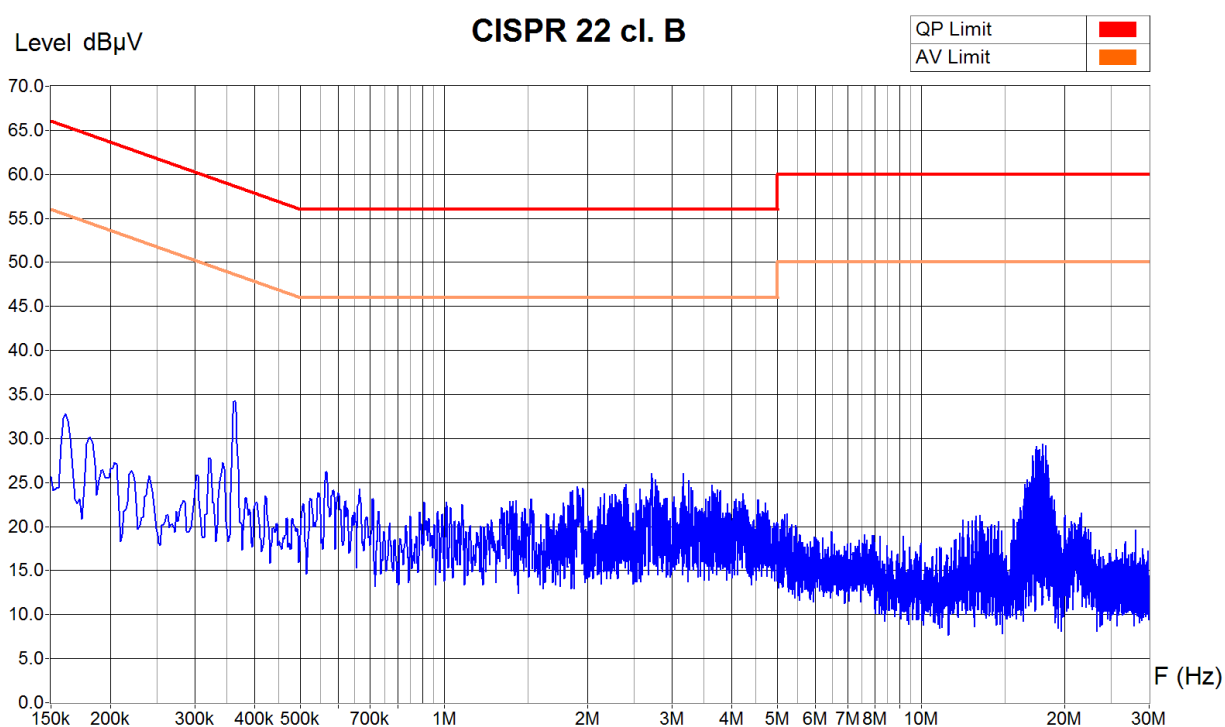
Zone	150 KHz - 30 MHz
Video Bandwidth	30 KHz
Resol Bandwidth	9 KHz

Operator: B. Itzcovich
 Date/Time: 10.06.2013 12:13
 Filename:
 09_CV_150k-
 30M_100V_L1_FCC.png/.txt

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



Equipment Under Test : TX17 Roger Pen
Set-Up : With cradle, charger and audio cable connected. See photos
Operating Conditions : Coexistence mode, charging
Remarks :
cage 06-01



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

Operator: B. Itzcovich
Date/Time: 10.06.2013 12:11
Filename:
10_CV_150k-
30M_100V_N_FCC.png/.txt

Standard:	United States: 47 CFR "Code of Federal Regulations" – Telecommunication ☒ FCC Part 2, Subpart C: Emission: §2.201 and §2.202
Introduction:	A system of designating emission, modulation and transmission characteristics shall be employed. (a) Emissions are designated according to their classification and their necessary bandwidth. (b) A minimum of three symbols are used to describe the basic characteristics of radio waves. (c) Four symbols are used to describe the necessary bandwidth.
Necessary bandwidth:	For a given class of emission, the minimum value of the occupied bandwidth sufficient to ensure the transmission of information at the rate and with the quality required for the system employed, under specified conditions. $B_n = 866 \text{ kHz}$ (occupied bandwidth)
Basic characteristics:	FXD F : frequency modulation X : Cases not otherwise covered D : data transmission

Agilent 11:37:57 Jun 27, 2013 R T

Ref 10 dBm
#Peak
Log
10
dB/

Atten 20 dB

Center 2.402 GHz
#Res BW 10 kHz

#VBW 30 kHz

#Sweep 20 s (5001 pts)

Span 2 MHz

Occupied Bandwidth
863.4214 kHz

Occ BW % Pwr 99.00 %
x dB -20.00 dB

Transmit Freq Error 8.962 kHz
x dB Bandwidth 914.796 kHz

Agilent 11:38:46 Jun 27, 2013 R T

Ref 10 dBm
#Peak
Log
10
dB/

Atten 20 dB

Center 2.48 GHz
#Res BW 10 kHz

#VBW 30 kHz

#Sweep 20 s (5001 pts)

Span 2 MHz

Occupied Bandwidth
862.5367 kHz

Occ BW % Pwr 99.00 %
x dB -20.00 dB

Transmit Freq Error -1.221 kHz
x dB Bandwidth 929.522 kHz

Agilent 11:35:28 Jun 27, 2013 R T

Ref 10 dBm
#Peak
Log
10
dB/

Atten 20 dB

Center 2.441 GHz
#Res BW 10 kHz

#VBW 30 kHz

#Sweep 20 s (5001 pts)

Span 2 MHz

Occupied Bandwidth
866.0966 kHz

Occ BW % Pwr 99.00 %
x dB -20.00 dB

Transmit Freq Error -4.467 kHz
x dB Bandwidth 908.984 kHz

Place and date of test: *Rossens, June 27, 2013*
Operator: *B. Itzcovich*