



Test laboratory accredited according to ISO 17025 by the Swiss Accreditation Service SAS  
Laboratoire d'essai accrédité selon ISO 17025 par le Service d'accréditation suisse SAS  
Prüflabor akkreditiert nach ISO 17025 durch die Schweizerische Akkreditierungsstelle SAS

Registration number  
Numéro d'accréditation  
Akkreditierungsnummer

**STS 024**

Schweizerischer Prüfstellendienst  
Service suisse d'essai  
Swiss testing service



Report: Rapport: Bericht:	<b>Electromagnetic compatibility and Radiocom</b>		Report no: Rapport no: Bericht Nr:	15'014
Product name: Nom du produit: Produktname	<b>RC Drebbel</b>		Mandate no: Mandat no: Auftrag Nr:	20077675
Serial no: No de série: Seriennummer:	<b>RC01 (normal) and RC02 (continuous sending 43 kHz)</b>	Model number: Numéro de modèle: Modellnummer:	---	
Customer: Client: Kunde:	<b>Phonak Communications AG Länggasse 17 CH-3280 Murten</b>	Date of test: Date de l'essai: Prüfdatum:	<b>July 13 &amp; 16, 2007</b>	

Standards / Normes / Normen	Result Résultat Ergebnis
<b>EN 301 489-3</b> (short-range devices / appareils à courte-portée / Geräte geringer Reichweite)	<b>Passed</b>
<b>EN 300 330-1/2</b> (radio communication / radiocommunication / Funk-Kommunikation)	<b>Passed</b>
<b>EN 60601-1-2</b> (medical device/ appareil médical / Medizinisches Gerät)	<b>s. p. 5</b>
<b>CFR 47, Part 15, Subpart C - Intentional radiator, § 15.209</b>	<b>Passed</b>

Test performed by  
Essai effectué par :  
Prüfer

Mr Jacques Ding

Rossens, July 31, 2007

Test report prepared by  
Rapport d'essai préparé par :  
Berichtersteller

Mr Jacques Ding

Test report controlled and approved by  
Rapport d'essai contrôlé et approuvé par :  
Prüfbericht kontrolliert und genehmigt durch

Mr R. Schneuwly

(Issue Date / Date d'édition / Ausstellungsdatum)

V2005Aug10

Main language / Langue principale / Hauptsprache : english / français / deutsch

The present document results from tests on a specimen and does not prejudice to the conformity of all the manufactured products. - Le présent document résulte d'essais sur un spécimen. Il ne préjuge pas de la conformité de l'ensemble des produits fabriqués à l'objet essayé. - Dieser Bericht beinhaltet die Prüfergebnisse eines Mustergerätes. Es kann daraus nicht auf die Übereinstimmung der Seriegeräte mit dem Mustergerät geschlossen werden.

q:\mandats\2007\20077675\_phonakcommunications\_rc drebbel\rap\_phonak\_15014\_emc-drebbel.doc

**montena emc sa**  
route de Montena 75  
CH-1728 Rossens  
Switzerland  
phone +41 26 411 93 33  
fax +41 26 411 93 30  
www.montena.com/emc/  
office.emc@montena.com

**montena emc ag**  
Technopark Blumenegg  
Blumeneggstrasse 50  
CH-9403 Goldach  
Switzerland  
phone +41 71 278 41 92  
fax +41 71 278 41 93

**montena emc ag**  
EMV-Labor Turgi  
Postfach 48  
CH-5300 Turgi  
Switzerland  
phone +41 56 299 36 36  
fax +41 56 299 25 08

## Contents / Table des matières / Inhaltsverzeichnis

*Page/Page/Seite*

1.	SUMMARY OF TEST RESULTS EMC / RÉSUMÉ DES RÉSULTATS D'ESSAIS CEM / ZUSAMMENFASSUNG DER PRÜFERGEBNISSE EMV .....	3
2.	SUMMARY OF TEST RESULTS (MEDICAL) / RÉSUMÉ DES RÉSULTATS D'ESSAIS (MÉDICAL) / ZUSAMMENFASSUNG DER PRÜFERGEBNISSE (MEDIZINISCH) .....	4
3.	SUMMARY OF TEST RESULTS FCC / RÉSUMÉ DES RÉSULTATS D'ESSAIS FCC / ZUSAMMENFASSUNG DER PRÜFERGEBNISSE FCC .....	5
4.	APPLIED STANDARDS / NORMES APPLIQUEES / VERWENDETE NORMEN .....	6
5.	CLIENT / CLIENT / KUNDE .....	6
6.	EQUIPMENT UNDER TEST / EQUIPEMENT A L'ESSAI / PRÜFLING .....	6
6.1	Identification / Identification / Identifikation .....	6
6.2	Pictures of the EUT / Photos de l'EST / Fotos des Prüflings .....	7
6.3	Classification / Classification / Klassierung .....	7
6.4	Connected cables / Câbles connectés / Angeschlossene Kabel .....	8
6.5	Modifications / Modifications / Angebrachte Änderungen .....	8
7.	TEST CONDITIONS / CONDITIONS D'ESSAI / TESTBEDINGUNGEN .....	8
7.1	Climatic conditions / conditions climatiques / klimatische Bedingungen .....	8
7.2	Location and Date / Lieu et date / Ort und Datum .....	8
7.3	Persons present / Personnes présentes / Anwesende Personen .....	8
7.4	Test configuration / Configuration d'essai / Prüfkfiguration .....	8
7.5	Operating conditions / Conditions de fonctionnement / Betriebszustand .....	8
7.6	Monitoring of the EUT / Surveillance de l'EST / Überwachung des Prüflings .....	8
7.7	Auxiliary equipment / Matériel auxiliaire / Zusatzgeräte .....	10
7.8	Performance criteria / Critères de performance / Bewertungskriterien .....	10
8.	EMISSION TESTS .....	11
8.1	Radiated electromagnetic field .....	12
9.	IMMUNITY TESTS .....	17
9.1	Immunity to electrostatic discharge (ESD) .....	18
9.2	Immunity to electromagnetic fields (antenna) .....	20
9.3	Immunity to magnetic field (industrial frequencies) .....	22
10.	TRANSMITTER AND RECEIVER CHARACTERISTICS .....	24
10.1	Classification / Classification / Klassierung .....	25
10.2	Transmitter technical characteristics .....	25
10.3	Transmitter RF carrier characteristics / Caractéristiques RF de l'émetteur / HF-Charakteristik des Senders .....	25
10.4	Power source / Alimentation / Versorgung .....	26
11.	TRANSMITTER PARAMETERS .....	27
11.1	Transmitter carrier output level - H-field radiated (EN 300 330-1 § 7.2.1) .....	28
11.2	Transmitter carrier output level – Extreme condition (EN 300 330-1 § 7.2.1) .....	30
11.3	Permitted frequency range of modulation bandwidth (EN 300 330-1 § 7.3) .....	32
11.4	Spurious emissions radiated – < 30MHz (EN 300 330-1 §7.4.3) .....	34
11.5	Spurious emissions radiated – > 30 MHz (EN 300 330-1 §7.4.4) .....	39
11.6	Duty cycle .....	44

## 1. Summary of test results EMC / Résumé des résultats d'essais CEM / Zusammenfassung der Prüfergebnisse EMV

✓ Pass / Réussi / Bestanden

✗ Fail / Echoué / Nicht bestanden

∅ Not applicable to this product / Pas applicable à ce produit / Nicht anwendbar für dieses Produkt

— Not tested / Pas testé / Nicht geprüft

■ No requirements / Pas d'exigence / Keine Anforderung

§	Test Type / Type d'essai / Art der Prüfung	Result / Résultat / Ergebnis
	<b>Emission / Emission / Störaussendung</b>	<b>EN 301 489-3 (mobile equipment)</b>
8.1	Radiated electromagnetic field Champ perturbateur Störfeldstärke CISPR 22 Cl A/B	✓
	<b>Immunity / Immunité / Störfestigkeit</b>	<b>EN 301 489-3 (mobile equipment)</b>
9.1	Electrostatic discharges Décharges d'électricité statique Entladungen statischer Elektrizität EN / IEC 61000-4-2	✓
9.2	Electromagnetic fields Champs électromagnétiques Elektromagnetische Felder EN / IEC 61000-4-3	✓
<b>11</b>	<b>Transmitter / Émetteur / Sender</b>	<b>EN 300 330-1 (Power class 1)</b>
11.1 11.2	Transmitter carrier output level - H-field radiated Niveau de sortie de l'émetteur – champ H rayonné Senderausgangsniveau – H-Feld gestrahlt	✓
11.3	Permitted frequency range of modulation bandwidth Plage de fréquences permises pour la modulation Erlaubter Bereich der Modulationsfrequenzen	✓
11.4 11.5	Spurious emissions Émissions parasites Nebenaussendung	✓
11.6	Duty cycle Rapport cyclique Einschaltdauer	✓
---	<b>Receiver / Récepteur / Empfänger</b>	<b>EN 300 330-1</b>
---	Adjacent channel selectivity-in band Sélectivité des canaux adjacents dans la bande Nebenanalselektivität im Band	∅ <sup>1</sup>
---	Blocking or desensitization Blocage de signaux parasites Filtern und Abblocken von Nebenaussendung	∅ <sup>1</sup>
---	Spurious emissions Émissions parasites Nebenaussendung	∅ <sup>1</sup>

1. No receiver included / Pas de récepteur inclu / Beinhaltet keinen Empfänger

## 2. Summary of test results (medical) / Résumé des résultats d'essais (médical) / Zusammenfassung der Prüfergebnisse (medizinisch)

✓ Pass / Réussi / Bestanden

✗ Fail / Echoué / Nicht bestanden

∅ Not applicable to this product / Pas applicable à ce produit / Nicht anwendbar für dieses Produkt

— Not tested / Pas testé / Nicht geprüft

■ No requirements / Pas d'exigence / Keine Anforderung

§	Test Type / Type d'essai / Art der Prüfung	Result / Résultat / Ergebnis
	<b>Emission / Emission / Störaussendung</b>	<b>EN 60601-1-2</b>
--	Interference voltage Tension perturbatrice Störspannung EN 55011: 1998 + A1 + A2 CISPR 11: 1997mod + A1 + A2	∅ <sup>1</sup>
8.1	Radiated electromagnetic field Champ perturbateur Störfeldstärke EN 55011: 1998 + A1 + A2 CISPR 11: 1997mod + A1 + A2	✓
--	Harmonics Harmoniques Oberschwingungen EN 61000-3-2: 2000 + A2 IEC 61000-3-2: 2000 + A1 + A2	∅ <sup>1</sup>
--	Voltage fluctuations (flicker) Fluctuations de tension Spannungsschwankungen EN 61000-3-3: 1995 + A1 + A2 IEC 61000-3-3: 1994 + A1 + A2	∅ <sup>1</sup>
<b>9</b>	<b>Immunity / Immunité / Störfestigkeit</b>	<b>EN 60601-1-2</b>
9.1	Electrostatic discharges Décharges d'électricité statique Entladungen statischer Elektrizität EN 61000-4-2: 1995 + A1 + A2 IEC 61000-4-2: 1995 + A1 + A2	✓
9.2	Electromagnetic fields Champs électromagnétiques Elektromagnetische Felder EN 61000-4-3: 2006 IEC 61000-4-3: 2006	✓
--	Fast electric transients (Burst) Transitoires électriques rapides Schnelle elektrische Transienten EN 61000-4-4: 2004 IEC 61000-4-4: 2004	∅ <sup>1</sup>
--	Surges Ondes de choc Stossspannungen EN 61000-4-5: 2005 IEC 61000-4-5: 2005	∅ <sup>1</sup>
--	Radio frequency common mode Fréquence radio en mode commun HF-Strom common mode EN 61000-4-6: 1996 + A1 IEC 61000-4-6: 1996 + A1	∅ <sup>1</sup>
--	Magnetic fields (industrial frequencies) Champs magnétiques (fréq. industrielles) Magnetfelder (Industriefrequenzen) EN 61000-4-8: 1993 + A1 IEC 61000-4-8: 1993 + A1	✓
--	Voltage dips and interruptions Creux et coupures de tension Spannungsein- und Unterbrüche EN 61000-4-11: 2004 IEC 61000-4-11: 2004	∅ <sup>1</sup>
--	Variations of power frequency Variations de la fréquence d'alimentation Änderungen der Versorgungsfrequenz IEC 60601-1 (10.2.2)	∅ <sup>1</sup>
	<b>Documentation / Documentation / Dokumentation</b>	<b>EN 60601-1-2</b>
--	Identification, marking and documents Identification, marquage et documents Identifikation, Markierung und Dokumente IEC 60601-1-2 (§ 6)	—

1 = EUT is supplied by battery and has no cables

### 3. Summary of test results FCC / Résumé des résultats d'essais FCC / Zusammenfassung der Prüfergebnisse FCC

✓ Pass / Réussi / Bestanden

✗ Fail / Echoué / Nicht bestanden

∅ Not applicable to this product / Pas applicable à ce produit / Nicht anwendbar für dieses Produkt

— Not tested / Pas testé / Nicht geprüft

§	Test Type / Type d'essai / Art der Prüfung	Result / Résultat / Ergebnis
	<b>Emission / Emission / Emissionen</b>	<b>CFR 47, intentional radiator</b>
--	Mains terminal interference voltage Tension perturbatrice aux bornes d'alimentation Störspannung auf den Energieversorgungsleitungen	∅ <sup>1</sup>
8.2	Radiated electromagnetic field Champ perturbateur Störfeldstärke	✓

1. Powered with internal battery

#### 4. Applied standards / Normes appliquées / Verwendete Normen

EN 301 489-3 : 2002	Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 40 GHz
ETSI EN 300 330-1:	Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz; Part 1: Technical characteristics and test methods
ETSI EN 300 330-2:	Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz; Part 2: Harmonized EN under article 3.2 of the R&TTE Directive
EN 60601-1-2: 2001 + A1: 2006	Medical electrical equipment - Part 1: General requirements for safety 2. Collateral Standard: Electromagnetic compatibility – Requirements and tests
IEC 60601-1-2: 2001 + A1: 2004	Appareils électromédicaux – Première partie : Règles générales de sécurité 2. Norme Collatérale : Compatibilité électromagnétique – Prescriptions et essais  Medizinische elektrische Geräte – Teil 1: Allgemeine Festlegungen an die Sicherheit 2. Ergänzungsnorm : Elektromagnetische Verträglichkeit – Anforderungen und Prüfungen
CFR 47 Part 15 Subpart C	Code of Federal Regulations - Telecommunication, FCC Part 15, Subpart C: "Intentional Radiators"

#### 5. Client / Client / Kunde

Client name and address Nom et adresse du client Name und Adresse des Kunden	Phonak Communications AG Länggasse 17 CH-3280 Murten
Contact Person / Responsable / Kontaktperson	Mr O. Hautier
Telephone / Téléphone / Telefon	++41 26 672 273
Fax / Télécopieur / Telefax	++41 26 672 96 77
E-mail / Courrier électronique / E-mail	Olivier.hautier@phonak.com
Mandate no / no mandat no / Auftragsnr.	20077675

#### 6. Equipment under test / Equipement à l'essai / Prüfling

##### 6.1 Identification / Identification / Identifikation

Manufacturer name and address Nom et adresse du fabricant Name und Adresse des Herstellers	Phonak Communications AG Länggasse 17 CH-3280 Murten
Production country / Pays de fabrication / Ursprungsland	Switzerland
Brand name / nom de marque / Verkaufsmarke	Unitron
Product name / Nom du produit / Produktname	RC Dreibbel
Product description / Description du produit / Produktbeschreibung	Wireless inductive remote control (43 kHz) for hearing aids
Model number / Numéro de modèle / Modellnummer	---

Serial no / No. de série / Seriennummer	RC01 (normal) and RC02 (continuous sending 43 kHz)
Software version / Version du logiciel / Softwareversion	V 2.6 (normal) and V 0.0 (continuous sending)
Highest frequency / Fréquence la plus élevée / Höchste Frequenz	43 kHz
Supply / Alimentation / Speisung	Battery AAA 1.2...1.5 V DC 20 mA (in antenna)
Technical documentation Documentation technique Technische Dokumentation	None. The equipment is completely identified by its serial no. according to ISO 9001.

## 6.2 Pictures of the EUT / Photos de l'EST / Fotos des Prüflings

	RC Drebbel
	RC Drebbel

## 6.3 Classification / Classification / Klassierung

<ul style="list-style-type: none"> <li>• Equipment for portable use (ETSI 301 489-1 § 5.5)</li> <li>• Class 2 of SRD equipment (Medium reliable SRD communication media; e.g. causing inconvenience to persons, which cannot simply be overcome by other means) (ETSI 301 489-3 § 6.1)</li> </ul>
---

**6.4 Connected cables / Câbles connectés / Angeschlossene Kabel**

Description / Description / Beschreibung	Access / Accès / Anschluss	Length / Longueur / Länge	Type / Type / Typ	Screened / Blindé / Geschirmt	Terminated / Terminé / Abgeschlossen	Remark / Remarque / Bemerkung
<i>none</i>	---	---	---	---	---	---

**6.5 Modifications / Modifications / Angebrachte Änderungen**

<i>None</i>
-------------

**7. Test conditions / Conditions d'essai / Testbedingungen****7.1 Climatic conditions / conditions climatiques / klimatische Bedingungen**

Temperature / Température / Temperatur:	23 -25	°C
Pressure / Pression / Druck:	1015 - 1020	hPa
Relative humidity / Humidité relative / Relative Luftfeuchtigkeit:	45 - 48	%

**7.2 Location and Date / Lieu et date / Ort und Datum**

Test period / Date des essais / Datum der Prüfungen:	<i>July 13 &amp; 16, 2007</i>
Location / Lieu / Ort:	<i>montena emc sa zone industrielle CH-1728 Rossens</i>

**7.3 Persons present / Personnes présentes / Anwesende Personen****Test Engineer(s) / Ingénieur(s) d'essai / Prüflingenieur(e) :**

<i>Mr Jacques Ding</i>
------------------------

**Other(s) / Autre(s) / Andere :**

Name / Nom / Name	Company / Société / Firma
<i>Mr O. Hautier</i>	<i>Phonak Communications AG</i>

**7.4 Test configuration / Configuration d'essai / Prüfkonfiguration**

See test results

**7.5 Operating conditions / Conditions de fonctionnement / Betriebszustand**

<i>A test software allows to send continuously a normal telegram (43 kHz)</i>
---

**7.6 Monitoring of the EUT / Surveillance de l'EST / Überwachung des Prüflings**

The performance of the EUT during the test was monitored as following / La surveillance de l'EST durant le test a été réalisée de la manière suivante / Die Überwachung des Prüflings während der Prüfung erfolgte folgendermassen:

<i>During immunity test to EM field the emitted signal was checked with an hearing aids Unitron</i>
<i>After ESD immunity test the communication is tested with an hearing aids Unitron</i>



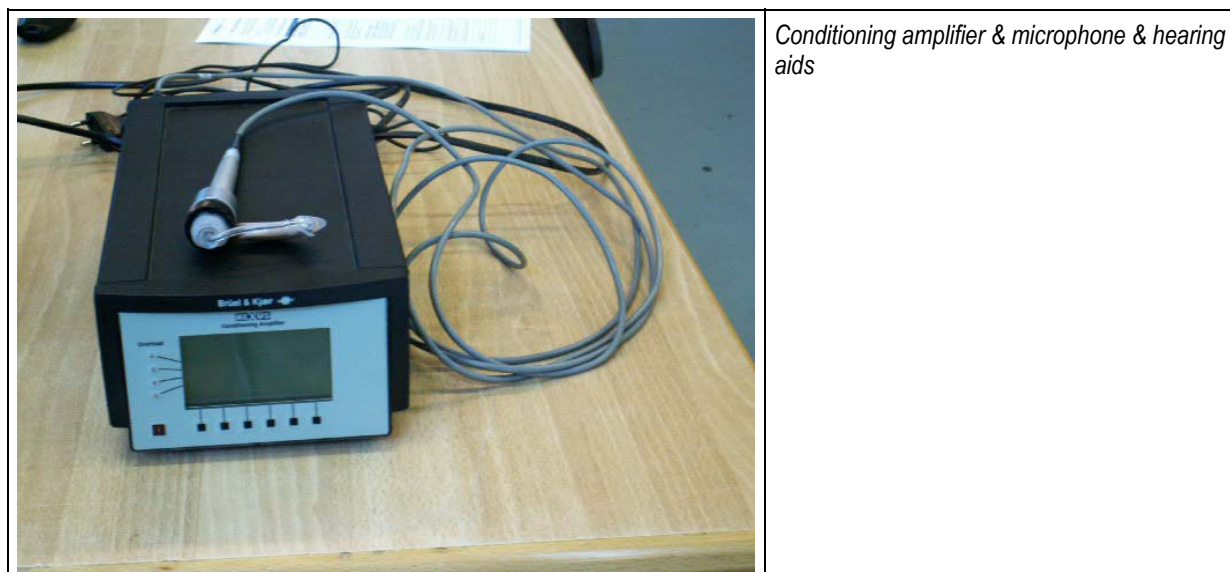
The following functions and parameters are observed during the test / Les fonctions et paramètres suivants ont été observés pendant l'essai / Folgende Funktionen und Parameter werden während der Prüfung überwacht:

*the correct transmission of the instruction to the hearing aids Unitron*

### 7.7 Auxiliary equipment / Matériel auxiliaire / Zusatzgeräte

The following pieces of equipment are used for the monitoring of the EUT or are necessary for the EUT but they are not tested with the EUT / Les équipements suivants servent à la surveillance de l'EST ou sont indispensables au fonctionnement de celui-ci mais ne font pas partie de l'essai / Folgende Geräte werden für die Überwachung des Prüflings gebraucht oder sind notwendig für die korrekte Funktion. Sie gehören jedoch nicht zum Prüfling.

Product / Produit / Produkt	Brand / Marque / Marke	Model No.	ID	Remark / Remarque / Bemerkung
Hearing aids	Unitron	Yuu P/ HP	7PT059 202 (R)	--
Conditioning amplifier and microphone 26 69	Brüel & Kjaer	--	S/N 2500138	Phonak



### 7.8 Performance criteria / Critères de performance / Bewertungskriterien

General requirements:	Requirements according to the EUT:
<b>Criteria A:</b>	
The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed.	<i>The RC Drebbel shall continue to operate as intended</i>
<b>Criteria B:</b>	
The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed.	<i>After the test the RC Drebbel shall continue to operate as intended</i>
<b>Criteria C:</b>	
Temporary loss of function is allowed, provided the function is self recoverable or can be restored by the operation of the controls.	

## 8. Emission tests

**8.1 Radiated electromagnetic field**

Test site:  anechoic chamber (foam)  open test site  
 anechoic chamber (ferrites)  .....

Distance:  30 m  10 m  3 m  .....

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

Meas. uncertainty: ± 6 dB (30 - 300 MHz) / ± 5.4 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: --

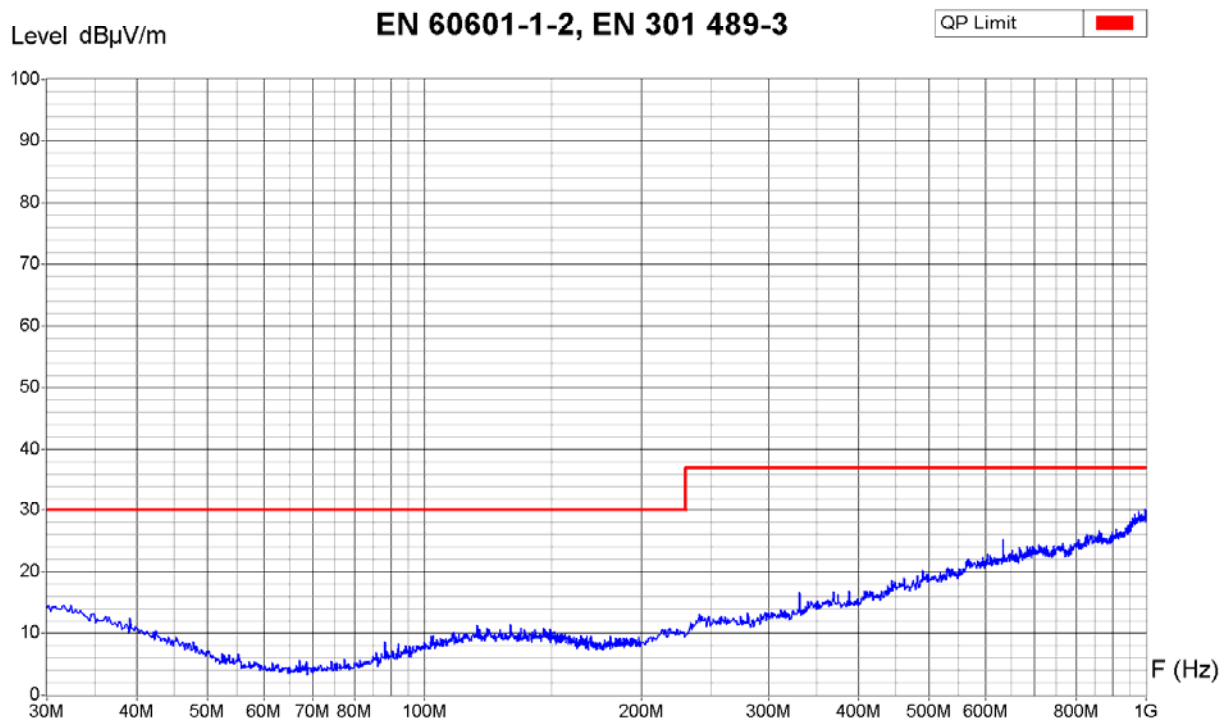
Test equipment:

Spectrum analyser	<input type="checkbox"/> 88-14	<input type="checkbox"/> 90-26	<input type="checkbox"/> 94-24	<input type="checkbox"/> 02-06	<input checked="" type="checkbox"/> 03-45	<input type="checkbox"/> 03-57
Receiver	<input type="checkbox"/> 85-04	<input type="checkbox"/> 90-43	<input checked="" type="checkbox"/> 94-35			
Preamplifier	<input type="checkbox"/> 88-05	<input type="checkbox"/> 90-01	<input type="checkbox"/> 90-42	<input checked="" type="checkbox"/> 05-59		
Antenna (biconical)	<input type="checkbox"/> 82-02	<input type="checkbox"/> 87-05	<input type="checkbox"/> 87-16	<input type="checkbox"/> 91-05	<input type="checkbox"/> 94-37	
Antenna (log-per)	<input type="checkbox"/> 88-20	<input type="checkbox"/> 90-30	<input type="checkbox"/> 91-35	<input type="checkbox"/> 94-64		
Antenna (bilog)	<input checked="" type="checkbox"/> 94-03	<input type="checkbox"/> 05-38	<input type="checkbox"/> .....			
Antenna (horn)	<input type="checkbox"/> 90-24	<input type="checkbox"/> 90-29	<input type="checkbox"/> 98-12	<input type="checkbox"/> 98-13	<input type="checkbox"/> .....	
Cables	<input checked="" type="checkbox"/> 06-01+A	<input checked="" type="checkbox"/> 117	<input checked="" type="checkbox"/> 130	<input type="checkbox"/>		

**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 : RC Drebbel  
 Set-Up : s. photo  
 Operating Conditions : Continuous sending 43 kHz  
 Remarks :

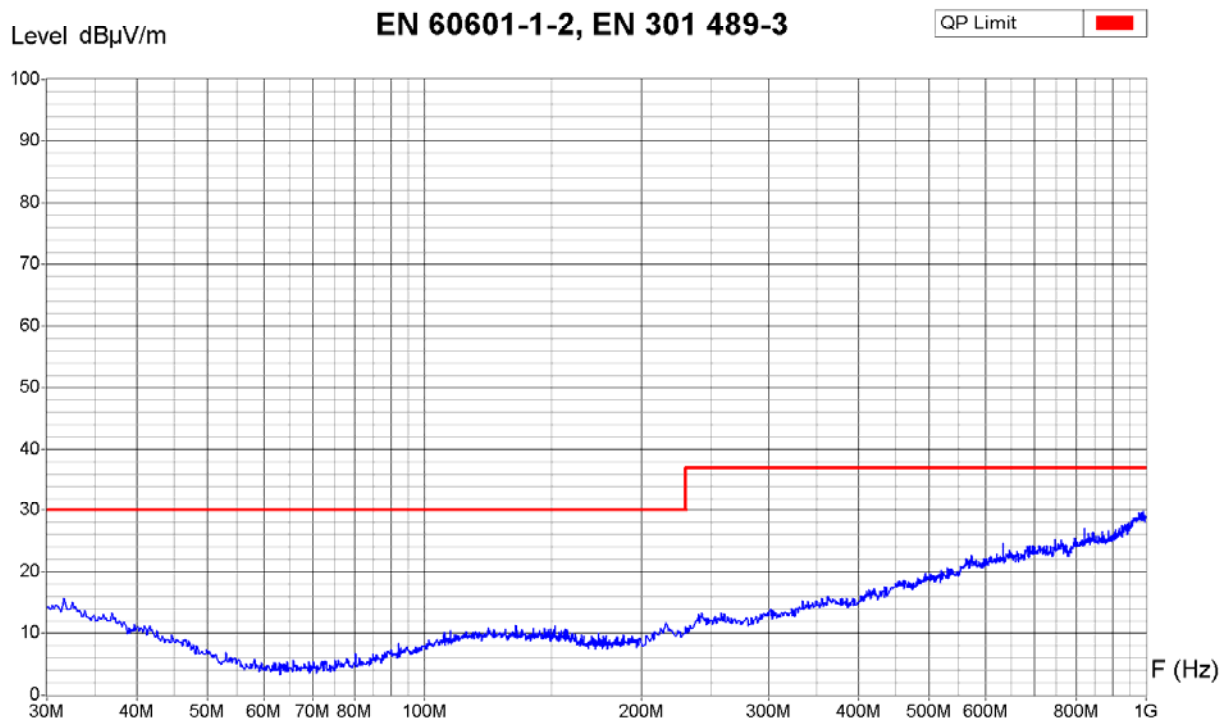


Zone	30 MHz - 199 MHz	199 MHz - 1 GHz
Video Bandwidth	100 KHz	100 KHz
Resol Bandwidth	100 KHz	100 KHz

Operator: Ding  
 Date/Time: 13.07.07 11:38  
 Filename:  
 Drebbel\_emc\_01.png/.txt

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

Equipment Under Test : RC Drebbel  
 Set-Up : s. photo  
 Operating Conditions : Continuous sending 43 kHz  
 Remarks :



Zone	30 MHz - 199 MHz	199 MHz - 1 GHz
Video Bandwidth	100 KHz	100 KHz
Resol Bandwidth	100 KHz	100 KHz

Operator: Ding  
 Date/Time: 13.07.07 11:51  
 Filename:  
 Drebbel\_emc\_02.png/.txt

Radiated magnetic Field FCC

- anechoic chamber (ferrites)       open test site

Test site:

- anechoic chamber (foam)       .....

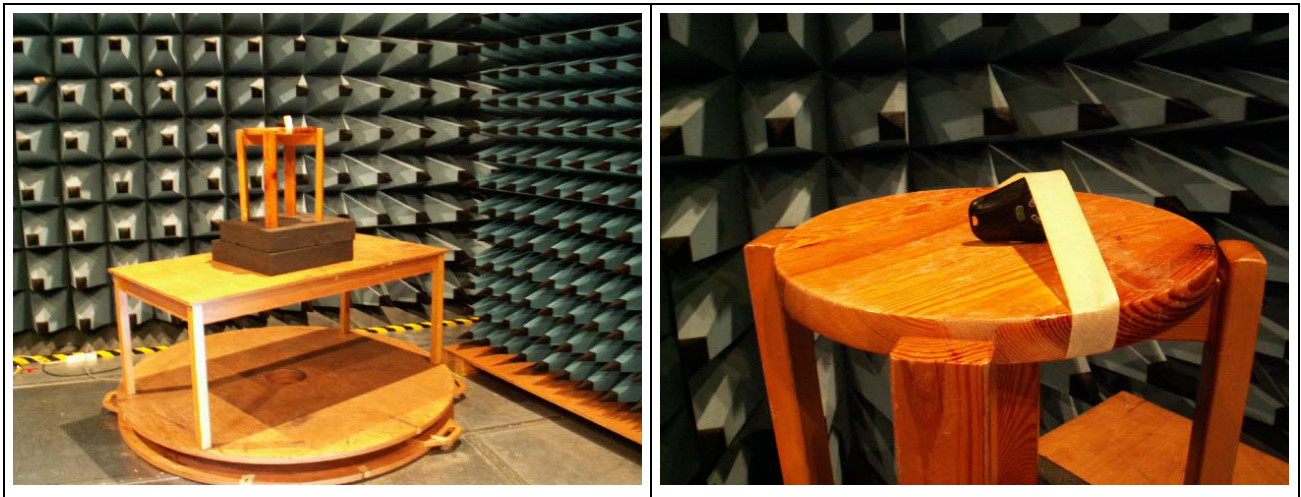
Meas. distance:     3 m       10 m       30 m       ..... m

Test precision:    ± 2.8 dB (10 m)

Position of EUT:    1.5 m (height above floor of equipment under test)

Measuring method: The magnetic disturbance radiated by the equipment under test is measured using a spectrum analyser and a wide band magnetic antenna. The bottom of the antenna is placed at 1 m of height, first in the direction of the apparatus under test and then at 90° to the apparatus. If possible the turning table is operated through 360° during the measurement. The recording is carried out taking into account the maximum value of the disturbance appearing during the functioning of the apparatus under test. The peak values are recorded continuously on a graph. The values exceeding the limits are remeasured using a measuring receiver.

Test set-up:



Remarks:                    ---

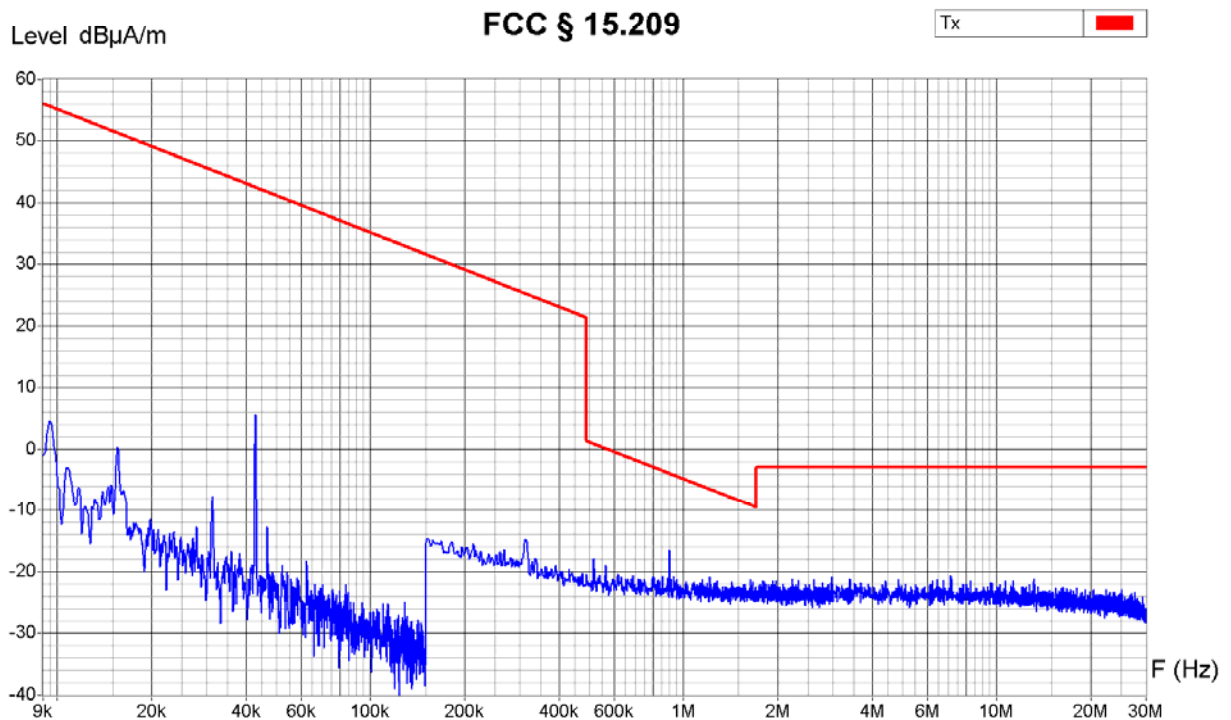
Test equipment:

Spectrum analyser	<input type="checkbox"/> 88-14	<input type="checkbox"/> 90-26	<input type="checkbox"/> 94-24	<input checked="" type="checkbox"/> 02-06	<input type="checkbox"/> 03-45	<input type="checkbox"/> 03-57
Receiver	<input type="checkbox"/> 85-12	<input type="checkbox"/> 90-11	<input type="checkbox"/> 94-34	<input type="checkbox"/> 04-28	<input type="checkbox"/> .....	
Preamplifier	<input type="checkbox"/> 88-05	<input type="checkbox"/> 90-01	<input type="checkbox"/> 90-42	<input checked="" type="checkbox"/> 05-62		
Antenna (typ: magnetic)	<input type="checkbox"/> 90-25	<input checked="" type="checkbox"/> 90-28	<input type="checkbox"/> 99-32	<input type="checkbox"/> .....		
Cables	<input checked="" type="checkbox"/> 06-00	<input checked="" type="checkbox"/> 147	<input checked="" type="checkbox"/> 148			

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

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

Equipment Under Test : RC Drebbel  
 Set-Up : s. photo  
 Operating Conditions : continous sending 43 kHz  
 Remarks :



Zone
Video Bandwidth
Resol Bandwidth

Operator: Ding
Date/Time: 13.07.07 15:53
Filename: FCC_15_209_H07bis.png/.txt



## 9. Immunity tests

9.1 Immunity to electrostatic discharge (ESD)

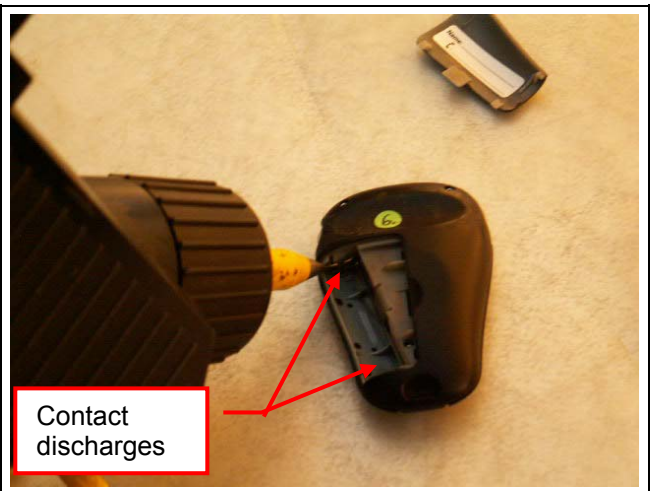
Introduction: The aim of this test is to determine the reaction of the material to electrostatic discharges (ESD) produced for example by walking on a carpet made of synthetic fibre. The humidity of the air has an influence on the discharge time and therefore on the severity of the discharge that could appear.

Coupling: [x] 150 pF / 330 Ohm [ ] 330 pF / 2000 Ohm [ ] 150 pF / 2000 Ohm [ ] .....

Meas. uncertainty: ± 10 %

Test method: All the points accessible to the operator are tested successively. The discharges are carried out first with a discharge in the air on the insulated surfaces. Next discharge by contact is tested and this only on the conducting surfaces or on the points where discharges are possible. Indirect discharges must also be tested. A minimum of 10 discharges for each voltage level and for each polarity are carried out at each test point.

Test set-up:



Remarks: - - -

Test equipment:

Test generator [ ] 84-05 [ ] 91-04 [ ] 93-61 [x] 99-36 [ ] 03-16 [ ] ..... [ ] .....

Result: [x] pass [ ] fail [ ] not applicable [ ] not tested

**Test results (Immunity to electrostatic discharge (ESD))**

Client: **Phonak Communications AG**

Equipment: *RC Dreibbel*

Operating mode: *Sleep mode*

Cables connected: ---

Observation of apparatus: *After the test sending a command to the hearing aids (increase volume +)*

Remarks: ---

Test site:  anechoic chamber (ferrites)  anechoic chamber (foam)  
 shielded room  open test site  
 laboratory  .....

Test set-up:  table-top equipment  floor-standing equipment

Level required

Discharge by air:  2 kV  4 kV  8 kV  15 kV  .....  
 Contact discharge:  2 kV  4 kV  6 kV  8 kV  .....  
 (medical)

Performance criterion:  A  B  C  .....  
 (medical)

Tested points	Level [kV]	Discharge		Remarks	Pass	
		air	cont		Yes	No
<i>Horizontal &amp; vertical coupling plane</i>	$\pm 2/4/6$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<i>No influence observed</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<i>Case, switches, keys and leds 2 screws</i>	$\pm 2/4/8$	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>No discharge and no influence observed</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<i>Battery contacts (remote control switched off)</i>	$\pm 2/4/6$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<i>10 Pulses for each polarity and each level -&gt; no influence observed</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Date of test: *July 16, 2007*  
 Operator: *J. Ding*

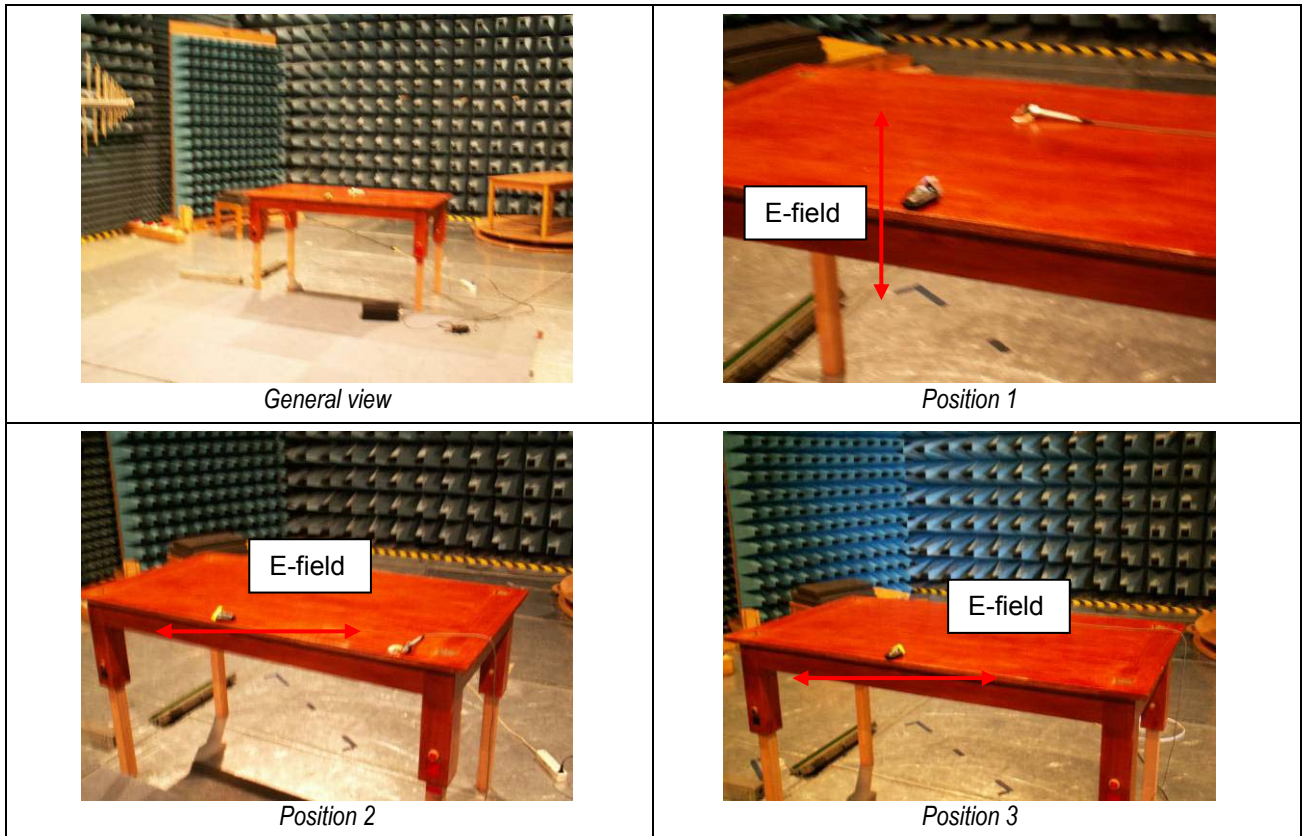
**9.2 Immunity to electromagnetic fields (antenna)**

**Introduction:** The aim of this test is to evaluate the performance of the equipment when in the presence of electromagnetic fields created by the transmission of radio or television, by the talkie-walkies or by any other system producing electromagnetic radiation in continuous waves.

**Meas. uncertainty:** ± 1.84 dB

**Test method:** The field is emitted from different antennas placed successively in vertical and then in horizontal polarisation. The field is calibrated without the EUT using an isotropic probe.

**Test set-up:**



**Test equipment:**

HF-generator	<input type="checkbox"/> 88-23	<input checked="" type="checkbox"/> 07-02	<input type="checkbox"/> 00-42	<input type="checkbox"/> 03-39	<input type="checkbox"/> 04-03	<input type="checkbox"/> 04-89
Amplifier	<input type="checkbox"/> 88-18	<input type="checkbox"/> 88-19	<input type="checkbox"/> 96-10	<input type="checkbox"/> 00-48	<input type="checkbox"/> 00-49	<input type="checkbox"/> 02-07
	<input type="checkbox"/> 02-08	<input type="checkbox"/> 02-09	<input type="checkbox"/> 02-10	<input checked="" type="checkbox"/> 03-40	<input checked="" type="checkbox"/> 05-79	<input type="checkbox"/> .....
Field probe	<input type="checkbox"/> 93-67	<input checked="" type="checkbox"/> 03-23	<input type="checkbox"/> .....			
Directional coupler	<input type="checkbox"/> 93-66	<input checked="" type="checkbox"/> 94-45	<input type="checkbox"/> 96-07	<input checked="" type="checkbox"/> 99-09 + 20dB	<input type="checkbox"/> 04-13	
HF-powermeter	<input type="checkbox"/> 95-97	<input type="checkbox"/> 01-15	<input type="checkbox"/> 01-17	<input type="checkbox"/> 03-12	<input type="checkbox"/> 04-96	<input checked="" type="checkbox"/> 05-20
HF-probe	<input type="checkbox"/> 92-03	<input checked="" type="checkbox"/> 07-03	<input type="checkbox"/> 03-14	<input type="checkbox"/> 03-63	<input type="checkbox"/> 04-01	<input type="checkbox"/> 04-97
Antenna	<input checked="" type="checkbox"/> 90-24	<input type="checkbox"/> 90-29	<input type="checkbox"/> 94-03	<input checked="" type="checkbox"/> 96-08	<input type="checkbox"/> 05-38	<input type="checkbox"/> .....
Cables	<input checked="" type="checkbox"/> 06-00	<input checked="" type="checkbox"/> 141	<input checked="" type="checkbox"/> 106	<input checked="" type="checkbox"/> 113	<input type="checkbox"/>	
Field calibration	<input checked="" type="checkbox"/> uniform	File: mm_10HF.vxm (f < 1 GHz)				
	<input checked="" type="checkbox"/> normal	File: 2m_1-2G.10H&V and; 2m_2-2G7.10H&V (f > 1 GHz)				

<b>Result:</b>	<input checked="" type="checkbox"/> pass	<input type="checkbox"/> fail	<input type="checkbox"/> not applicable	<input type="checkbox"/> not tested
----------------	--	-------------------------------	---	-------------------------------------

**Test results (Immunity to electromagnetic fields (antenna))**

Client: **Phonak Communications AG**

Apparatus: *RC Drebbel*

Operating mode: *Continuous sending (increase volume +)*

Cables connected: ---

Observation of apparatus: *The emitted signal is check with a prosthesis Unitron*

Remarks: ---

Test site:  anechoic chamber (ferrites)  anechoic chamber (foam)  
 TEM-cell  open test site

Test set-up:  table-top  floor-standing  1 m above floor

Distance:  1 m  3 m  1.8 m (f> 1 GHz)

Frequency step:  1 %  4 %  .....

Dwell time:  1 s  2 s  2.9 s (= 1.5 mDec/s)

Level required:  3 V/m  10 V/m  .....

Frequency band:  80 - 2700 MHz  80 - 1000 MHz  1400 – 2000 MHz  
 medical

Modulation:  AM, 1 kHz, 80 %  AM, 400 Hz, 80 %  none  
 Puls 200 Hz, 50 % duty cycle (900 MHz)  .....

Performance criterion:  A  B  C  .....

Frequency [MHz]	E [V/m]	Polarisation / Direction	Remarks	Pass	
				Yes	No
80 - 1000	4	Position 1	No influence observed	<input checked="" type="checkbox"/>	<input type="checkbox"/>
80 - 1000	4	Position 2	No influence observed	<input checked="" type="checkbox"/>	<input type="checkbox"/>
80 - 1000	4	Position 3	No influence observed	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1000 - 2700	10	Position 1	No influence observed	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1000 - 2700	10	Position 2	No influence observed	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1000 - 2700	10	Position 3	No influence observed	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Date of test: *July 16, 2007*  
 Operator: *J. Ding*

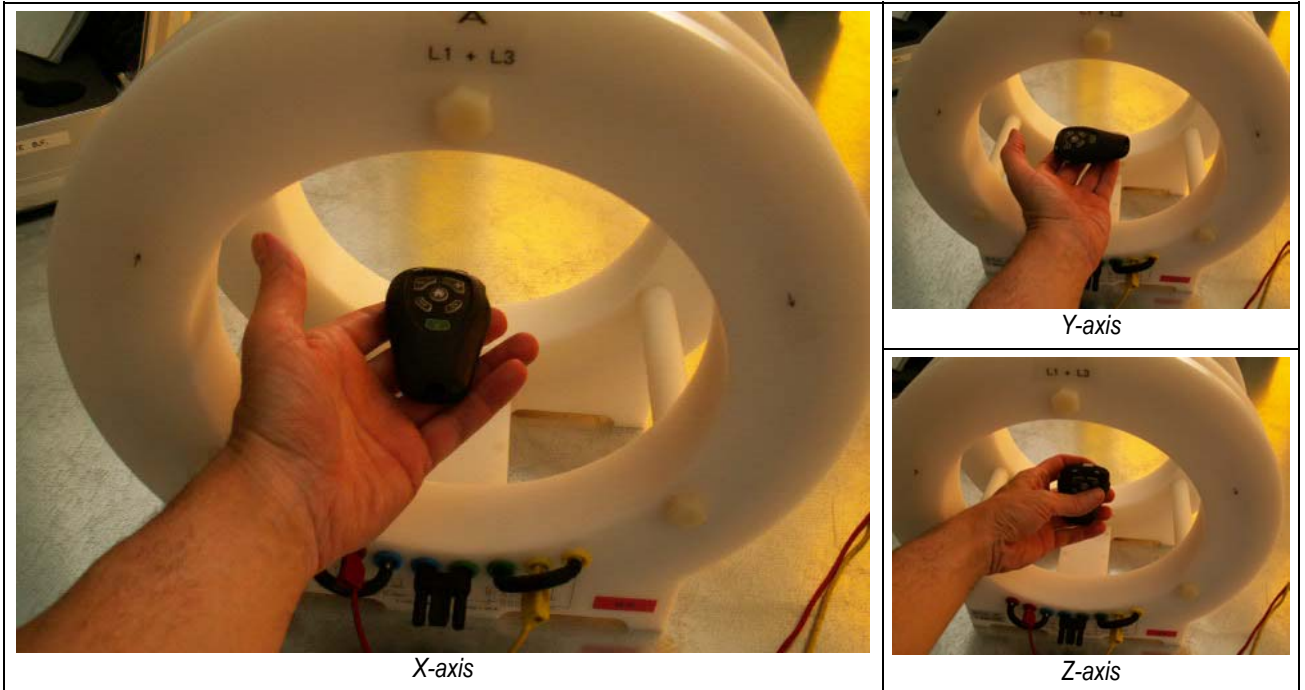
**9.3 Immunity to magnetic field (industrial frequencies)**

**Introduction:** The object of this test is to determine the immunity of equipment when subjected to power frequency magnetic fields generated by power frequency current in conductors or from other devices (e.g. leakage of transformers).

**Meas. uncertainty:** - 0.8 % / + 10.8 %

**Measuring method:** The apparatus is placed in Helmholtz's coil. The field is applied and the apparatus is observed for at least one minute. Three orthogonal axes are tested. The usual industrial frequencies are 16 2/3, 50, 60 or 400 Hz.

**Test set-up:**



**Remarks:** - - -

**Test equipment:**

Helmholtz's coil	<input type="checkbox"/> 90-22	<input type="checkbox"/> 97-07	<input checked="" type="checkbox"/> 05-60			
Power source	<input checked="" type="checkbox"/> 01-16	<input type="checkbox"/> .....				
Magnetic field meter	<input type="checkbox"/> 05-01	<input checked="" type="checkbox"/> 01-23				
Power transformer	<input type="checkbox"/> 64-02	<input type="checkbox"/> 64-02B	<input type="checkbox"/> 75-04	<input type="checkbox"/> 99-35	<input type="checkbox"/> 02-40	
Variable transformer	<input type="checkbox"/> 96-05	<input type="checkbox"/> 04-32				
Laboratory multimeter	<input type="checkbox"/> 91-40	<input type="checkbox"/> 06-42				
.....	.....	.....	.....	.....	.....	.....

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

**Test results**

Client: *Phonak Communications AG*

Apparatus: *RC Dreibbel*

Operating mode: *Increase volume +*

Cables connected: *None*

Observation of apparatus: *With hearing aid Unitron (R)*

Remarks: *--*

Test site:  laboratory  .....

Test level required:  3 A/m  30 A/m  ..... A/m

Frequencies:  DC  16<sup>2/3</sup> Hz  50 Hz  60 Hz  ..... Hz

Axes:  X  Y  Z

Performance criterion:  A  B  C  .....

Position / axe	Field [A/m]	Frequency [Hz]	Remarks	Pass	
				Yes	No
X	3	50	No influence	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Y	3	50	No influence	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Z	3	50	No influence	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Position / axe	Field [A/m]	Frequency [Hz]	Remarks	Pass	
				Yes	No
X	3	60	No influence	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Y	3	60	No influence	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Z	3	60	No influence	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Date of test: *July 16, 2007*  
 Operator: *J. Ding*

## 10. Transmitter and receiver characteristics



**10.1 Classification / Classification / Klassierung**

Extreme temperature range	<input type="checkbox"/> Category I (General) -20°C to +55°C <input checked="" type="checkbox"/> Category II (Portable) -10°C to +55 °C <input type="checkbox"/> Category III (Equipment for normal indoor use) 0°C to +55°C
Type of equipment	<input checked="" type="checkbox"/> Transmitter <input type="checkbox"/> Receiver <input type="checkbox"/> Transceiver
Transmitter power class (§ 1)	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Product class (§ 7.1.4)	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
Antenna implementation	<input checked="" type="checkbox"/> Integral antenna; antenna size $13 \cdot 10^{-6} \text{ m}^2$ <input type="checkbox"/> Temporary antenna connector <input type="checkbox"/> Permanent antenna connector

**10.2 Transmitter technical characteristics**

Method of frequency generation	<input type="checkbox"/> Crystal <input type="checkbox"/> Synthesizer <input checked="" type="checkbox"/> Ceramic resonator frequency (Xtal) @ 6866 kHz
Transmitter operating frequency range (OCR)	39 – 43 kHz (transmitter range) $f_c = 40.96 \text{ kHz}$ , $\Delta f = 1.92 \text{ kHz}$
Number of channels	1

**10.3 Transmitter RF carrier characteristics / Caractéristiques RF de l'émetteur / HF-Charakteristik des Senders**

Maximum field strength	$H = 7 \text{ dBuA/m@10 m}$
Variable carrier output / Sortie de porteuse variable / Variable Ausgangsleistung	<input checked="" type="checkbox"/> Transmitter carrier output is not variable <input type="checkbox"/> Transmitter carrier output is variable RF output max ..... RF output min .....  <input type="checkbox"/> RF output continuously variable <input type="checkbox"/> RF output stepped ..... dB per step
Modulation / Modulation / Modulation	<input type="checkbox"/> Amplitude <input type="checkbox"/> Frequency: Deviation ..... kHz <input type="checkbox"/> Phase <input type="checkbox"/> Pulse     Pulse repetition frequency ..... Duty cycle ..... <input checked="" type="checkbox"/> Other     CPFSK 1280 bit/s
	<input checked="" type="checkbox"/> Transmitter can be operated without modulation (for test only) <input type="checkbox"/> Transmitter can not be operated without modulation

**10.4 Power source / Alimentation / Versorgung**

Power source / Alimentation / Versorgung	<input type="checkbox"/> AC supply ..... VAC; ..... Hz <input type="checkbox"/> Single phase <input type="checkbox"/> Three phase  <input type="checkbox"/> ext. DC supply ..... VDC Extreme upper voltage ..... VDC Extreme lower voltage ..... VDC  <input checked="" type="checkbox"/> Battery 1.2 (rechargeable NiMH) or 1.5 (alkaline) VDC Extreme upper voltage 1.5 VDC Extreme lower voltage 1.1 VDC  <input type="checkbox"/> Nickel cadmium <input type="checkbox"/> Lead acid <input type="checkbox"/> Leclanche <input type="checkbox"/> Lithium-Ion
Automatic switch off / Arrêt automatique / Automatische Abschaltung	<input type="checkbox"/> Applies ..... V cut-off voltage <input checked="" type="checkbox"/> Does not apply

## 11. Transmitter parameters

**11.1 Transmitter carrier output level - H-field radiated (EN 300 330-1 § 7.2.1)**

Test site:  anechoic chamber (foam)  open test site  
 anechoic chamber (ferrites)  laboratory

Test method: The magnetic field radiated by the transmitter is measured using a spectrum analyser and a wide band magnetic antenna. The antenna high is varied from 1 m to 4 m. First the antenna is turned in the direction of the apparatus under test and then at 90° to the apparatus. If possible the turning table is operated through 360° during the measurement. The recording is carried out taking into account the maximum value of the field strength appearing during the functioning of the apparatus under test. The peak values are recorded continuously on a graph.

Test set-up:



Remarks: ---

Test equipment:

Spectrum analyser	<input type="checkbox"/> 88-14	<input type="checkbox"/> 90-26	<input type="checkbox"/> 94-24	<input checked="" type="checkbox"/> 02-06	<input type="checkbox"/> 03-45	<input type="checkbox"/> 03-57
Receiver	<input type="checkbox"/> 85-12	<input type="checkbox"/> 90-11	<input type="checkbox"/> 94-34	<input type="checkbox"/> 04-28	<input type="checkbox"/> .....	
Preamplifier	<input type="checkbox"/> 88-05	<input type="checkbox"/> 90-01	<input type="checkbox"/> 90-42	<input type="checkbox"/> 95-86		
Antenna (typ: magnetic)	<input type="checkbox"/> 90-25	<input checked="" type="checkbox"/> 90-28	<input type="checkbox"/> 99-32	<input type="checkbox"/> .....		
Cables	<input checked="" type="checkbox"/> 06-00	<input checked="" type="checkbox"/> 147	<input checked="" type="checkbox"/> 148			

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

**Results of the test (Transmitter carrier output level - H-field radiated (EN 300 330-1 § 7.2.1))**

Client: **Phonak Communications AG**

Apparatus: *RC Dreibel*

Operating mode: • *Continuous sending at 43 kHz*

Cables connected to the EUT: ---

Remarks: ---

Rated field strength (maximum expected) : **4 dB $\mu$ A/m** at 10 metres / Antenna size  $\approx 13 \cdot 10^{-6} \text{ m}^2$

Test conditions		Transmitter field strength (dB $\mu$ A/m)		
		CH 1	CH 2	CH 3
$T_{\text{nom}}(24 \text{ }^\circ\text{C})$	$V_{\text{nom}}(1.5 \text{ V})$	+ 6	---	---
Maximum deviation from rated output under normal test conditions (dB)		+ 2 dB	---	---
Measurement uncertainty		$\pm 3.9 \text{ dB}$		

**LIMIT SUB-CLAUSE 7.2.1.3**

**Power class 1:** max 7 dBuA/m @ 10 m

**Power classes 2 -5:**

Frequency range (MHz)	H-field field strength limit (Hf) dB $\mu$ A/m at 10 m
$0,009 \leq f < 0,03$	72
$0,03 \leq f < 0,07$ $0,119 \leq f < 0,135$	72 at 0,03 MHz descending 3 dB/oct
$0,05975 \leq f < 0.06025$ $0,07 \leq f < 0.119$	42
$0,135 \leq f < 1.00$	37.7 at 0,135 MHz descending 3 dB/oct
$1.0 \leq f < 4.642$	29 at 1.0 MHz descending 9 dB/oct
$4.642 \leq f < 30$	9
$6,765 \leq f \leq 6,795 \text{ (ISM)}$ $13,553 \leq f \leq 13,567 \text{ (ISM)}$ $26,957 \leq f \leq 27,283 \text{ (ISM)}$	42
For the frequency ranges 9 - 70 kHz and 119 - 135 kHz: - loop area $\geq 0.16 \text{ m}^2$ : table values - $0.16 \text{ m}^2 \geq \text{loop area} \geq 0.05 \text{ m}^2$ : table value + 10 x log (area / 0.16 m <sup>2</sup> ) - loop area $< 0.05 \text{ m}^2$ : table values - 10 dB	

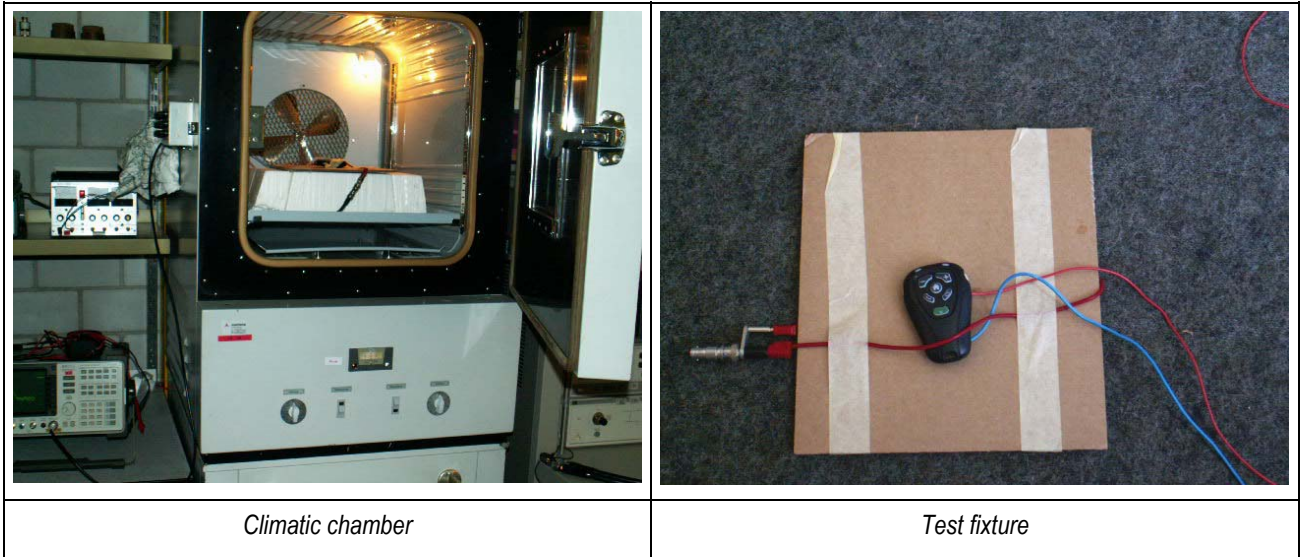
Date of test: *July 13, 2007*  
Operator: *J. Ding*

**11.2 Transmitter carrier output level – Extreme condition (EN 300 330-1 § 7.2.1)**

Test site:  anechoic chamber (foam)  open test site  
 anechoic chamber (ferrites)  laboratory

Test method: The EUT is placed in a climatic chamber. The conducted output level is measured on the antenna connector or by a test fixture.

Test set-up:



Remarks: ---

Test equipment:

Spectrum analyser	<input checked="" type="checkbox"/> 88-14	<input type="checkbox"/> 90-26	<input type="checkbox"/> 94-24	<input type="checkbox"/> 02-06	<input type="checkbox"/> 03-45	<input type="checkbox"/> 03-57
Temperature probe	<input type="checkbox"/> 91-11	<input type="checkbox"/> 03-05	<input type="checkbox"/> 05-34	<input checked="" type="checkbox"/> 99-34 + DiJ		
Multimeter	<input checked="" type="checkbox"/> 04-104					
Power supply	<input checked="" type="checkbox"/> 99-04 (unit left)					

Result:	<input checked="" type="checkbox"/> pass	<input type="checkbox"/> fail	<input type="checkbox"/> not applicable	<input type="checkbox"/> not tested
---------	--	-------------------------------	---	-------------------------------------

**Results of the test (Transmitter carrier output level – Extreme condition (EN 300 330-1 § 7.2.1))**

Client: **Phonak Communications AG**

Apparatus: *RC Dreibbel*

Operating mode: • *Continuous sending at 43 kHz*

Cables connected to the EUT: *For test only : supply 1.1...1.5 V DC*

Remarks: ---

Test conditions		Transmitter power		
		CH 1	CH 2	Note
$T_{nom}(24)^{\circ}C$	$V_{nom}(1.5)V$	<b>0 dB</b>		
$T_{min}(-10)^{\circ}C$	$V_{min}(1.1)V$	<b>+ 0.17 dB</b>		
	$V_{max}(1.5)V$	<b>+ 0 dB</b>		
$T_{max}(55)^{\circ}C$	$V_{min}(1.1)V$	<b>-0.32 dB</b>		
	$V_{max}(1.5)V$	<b>- 0.5 dB</b>		
Field strength under normal conditions:		<b>6 dBuA/m</b>		
Field strength under extreme conditions:		<b>5.5 dBuA/m</b>		
Maximum deviation from output power under extreme test conditions (dB)		<b>+ 1.5 dB</b>		<b>Referred to max expected of 4 dBuA/m</b>
Measurement uncertainty		$\pm 0.75$ dB		

**LIMIT SUB-CLAUSE 7.2.1.3****Power class 1:** max 7 dBuA/m @ 10 m**Power classes 2 -5:**

Frequency range (MHz)	H-field field strength limit (Hf) dB $\mu$ A/m at 10 m
$0,009 \leq f < 0,03$	72
$0,03 \leq f < 0,07$ $0,119 \leq f < 0,135$	72 at 0,03 MHz descending 3 dB/oct
$0,05975 \leq f < 0.06025$ $0,07 \leq f < 0.119$	42
$0,135 \leq f < 1.00$	37.7 at 0,135 MHz descending 3 dB/oct
$1.0 \leq f < 4.642$	29 at 1.0 MHz descending 9 dB/oct
$4.642 \leq f < 30$	9
$6,765 \leq f \leq 6,795$ (ISM) $13,553 \leq f \leq 13,567$ (ISM) $26,957 \leq f \leq 27,283$ (ISM)	42
For the frequency ranges 9 - 70 kHz and 119 – 135 kHz: - loop area $\geq 0.16$ m <sup>2</sup> : table values - $0.16$ m <sup>2</sup> $\geq$ loop area $\geq 0.05$ m <sup>2</sup> : table value + 10 x log (area / 0.16 m <sup>2</sup> ) - loop area $< 0.05$ m <sup>2</sup> : table values - 10 dB	

Date of test: *July 16, 2006*  
Operator: *J. Ding*

**11.3 Permitted frequency range of modulation bandwidth (EN 300 330-1 § 7.3)**

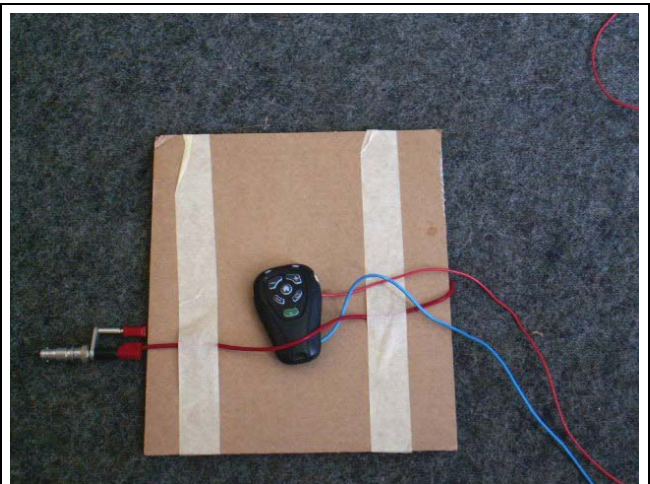
Test site:             anechoic chamber (foam)             open test site  
                           anechoic chamber (ferrites)             laboratory

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

Test set-up:



*Climatic chamber*



*Test fixture*

Remarks:            - - -

Test equipment:

Spectrum analyser	<input checked="" type="checkbox"/> 88-14	<input type="checkbox"/> 90-26	<input type="checkbox"/> 94-24	<input type="checkbox"/> 02-06	<input type="checkbox"/> 03-45	<input type="checkbox"/> 03-57
Temperature probe	<input type="checkbox"/> 91-11	<input type="checkbox"/> 03-05	<input type="checkbox"/> 05-34	<input checked="" type="checkbox"/> 99-34 + DiJ		
Multimeter	<input checked="" type="checkbox"/> 04-104					
Power supply	<input checked="" type="checkbox"/> 99-04					

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



**Results of the test (Permitted frequency range of modulation bandwidth (EN 300 330-1 § 7.3))**

Client: **Phonak Communications AG**

Apparatus: **RC Dreibbel**

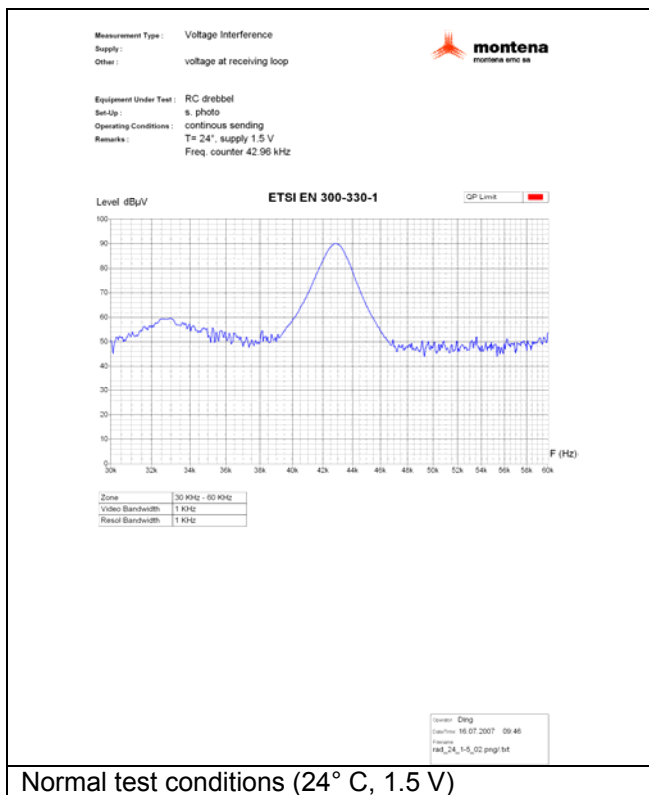
Operating mode: **• normal modulation**

Cables connected to the EUT: **Only for testing: supply 1.1....1.5 V DC**

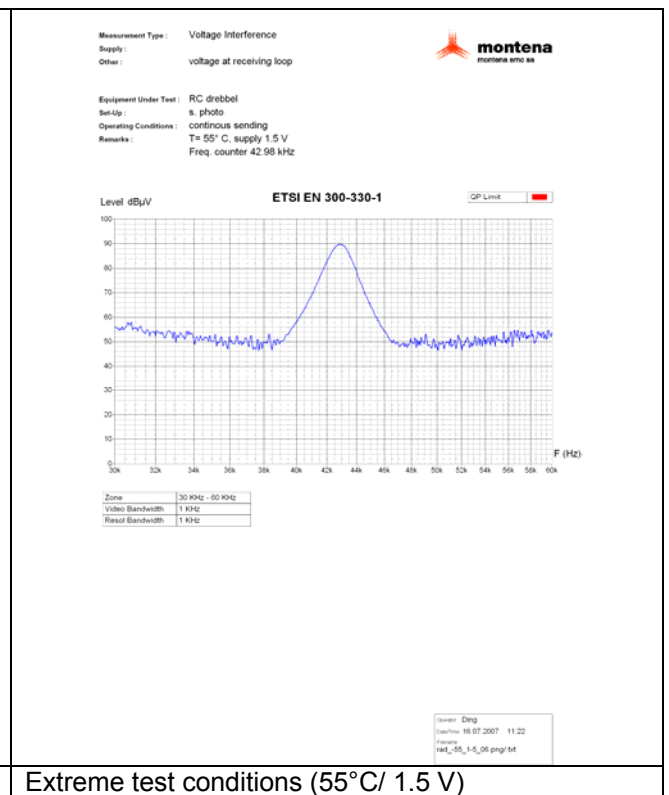
Remarks: ---

Applicants declared operating frequency band: ---

Temp [°C]	U [V]	Operating frequency [kHz]	f <sub>L</sub> [kHz]	f <sub>H</sub> [kHz]	Operating frequency range = f <sub>H</sub> - f <sub>L</sub> [MHz]	Remarks	Pass	
							Yes	No
24	1.5	42.96	---	---	---	Carrier below spurious limit	<input checked="" type="checkbox"/>	<input type="checkbox"/>
-10	1.5	42.94	---	---	---	Carrier below spurious limit	<input checked="" type="checkbox"/>	<input type="checkbox"/>
-10	1.1	42.94	---	---	---	Carrier below spurious limit	<input checked="" type="checkbox"/>	<input type="checkbox"/>
55	1.1	42.98	---	---	---	Carrier below spurious limit	<input checked="" type="checkbox"/>	<input type="checkbox"/>
55	1.5	42.98	---	---	---	Carrier below spurious limit	<input checked="" type="checkbox"/>	<input type="checkbox"/>



Normal test conditions (24° C, 1.5 V)



Extreme test conditions (55° C/ 1.5 V)

Date of test: **July 16, 2007**  
 Operator: **J. Ding**

**11.4 Spurious emissions radiated – < 30MHz (EN 300 330-1 §7.4.3)**

Test site:  anechoic chamber (foam)  open test site  
 anechoic chamber (ferrites)  .....

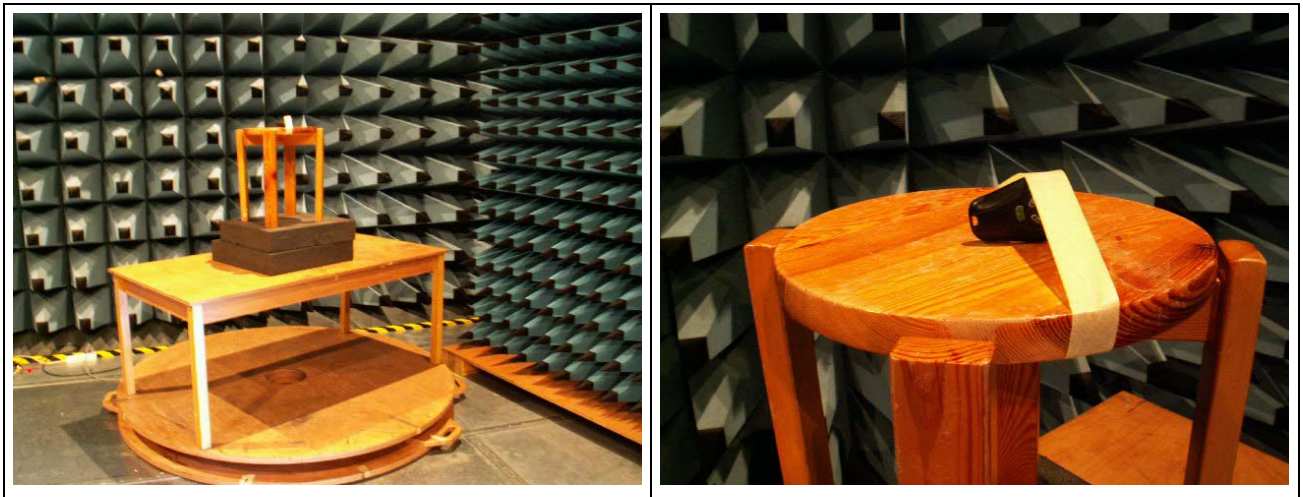
Distance:  30 m  10 m  3 m  .....

Position of EUT: 1.5 m (height of the equipment under test above floor)

Meas. uncertainty: ± 2.8 dB (10 m)

Test method: The magnetic field radiated by the EUT is measured using a spectrum analyser and a wide band magnetic antenna. The antenna high is varied from 1 m to 4 m. First the antenna is turned in the direction of the apparatus under test and then at 90° to the apparatus. The turning table is operated through 360° during the measurement. The recording is carried out taking into account the maximum value of the field strength appearing during the functioning of the apparatus under test. The peak values are recorded continuously on a graph.

Test set-up:



Remarks: ---

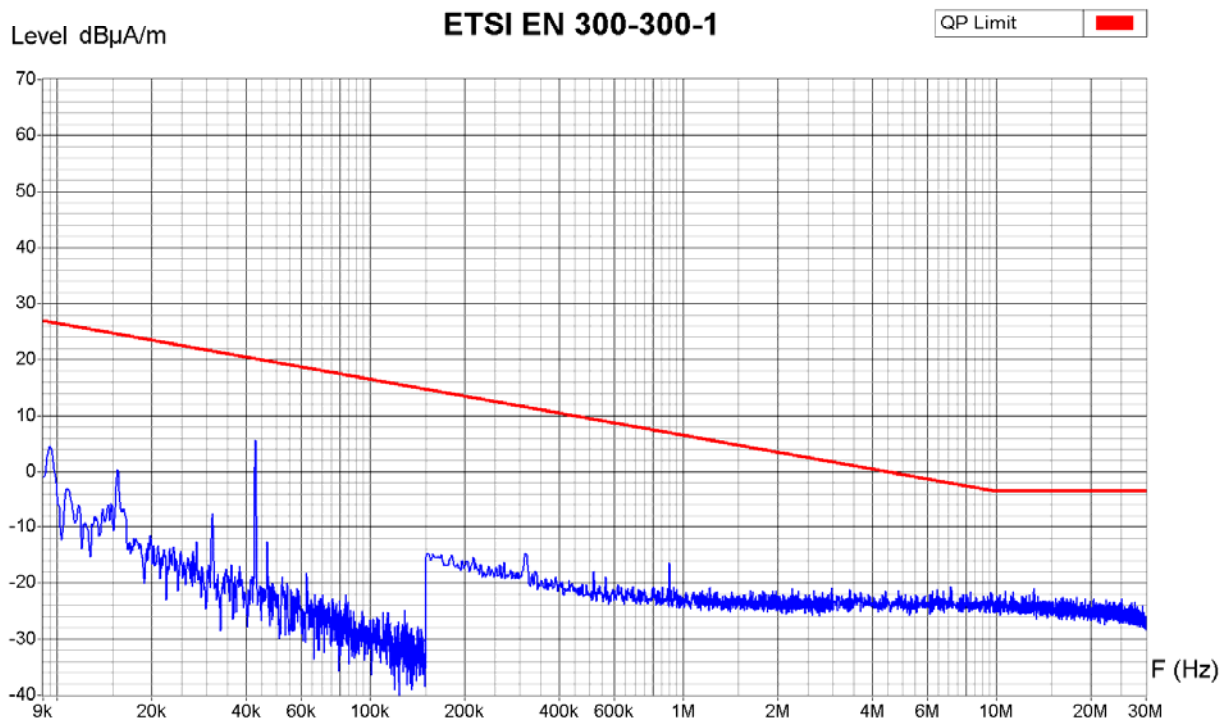
Test equipment:

Spectrum analyser	<input type="checkbox"/> 88-14	<input type="checkbox"/> 90-26	<input type="checkbox"/> 94-24	<input checked="" type="checkbox"/> 02-06	<input type="checkbox"/> 03-45	<input type="checkbox"/> 03-57
Receiver	<input type="checkbox"/> 85-12	<input type="checkbox"/> 90-11	<input type="checkbox"/> 94-34	<input type="checkbox"/> 04-28	<input type="checkbox"/> .....	
Preamplifier	<input type="checkbox"/> 88-05	<input type="checkbox"/> 90-01	<input type="checkbox"/> 90-42	<input checked="" type="checkbox"/> 05-62		
Antenna (typ: magnetic)	<input type="checkbox"/> 90-25	<input checked="" type="checkbox"/> 90-28	<input type="checkbox"/> 99-32	<input type="checkbox"/> .....		
Cables	<input checked="" type="checkbox"/> 06-00	<input checked="" type="checkbox"/> 147	<input checked="" type="checkbox"/> 148			

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

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

Equipment Under Test : RC Drebbel  
 Set-Up : s. photo  
 Operating Conditions : continous sending 43 kHz  
 Remarks :

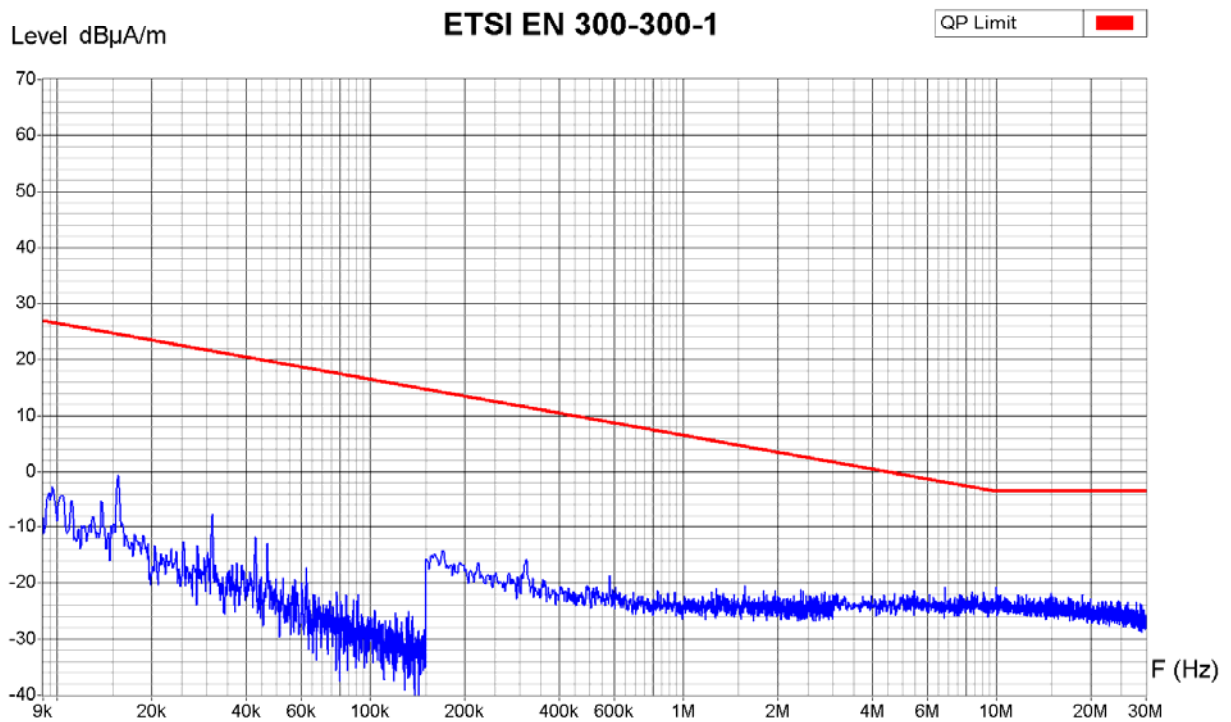


Zone	9 KHz - 150 KHz	150 KHz - 3 MHz	3 MHz - 30 MHz
Video Bandwidth	300 Hz	30 KHz	30 KHz
Resol Bandwidth	300 Hz	9 KHz	9 KHz

Operator: Ding  
 Date/Time: 13.07.07 15:53  
 Filename:  
 Drebbel\_rad\_H\_07.png/.txt

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

Equipment Under Test : RC Drebbel  
 Set-Up : s. photo  
 Operating Conditions : continuous sending 43 kHz  
 Remarks :



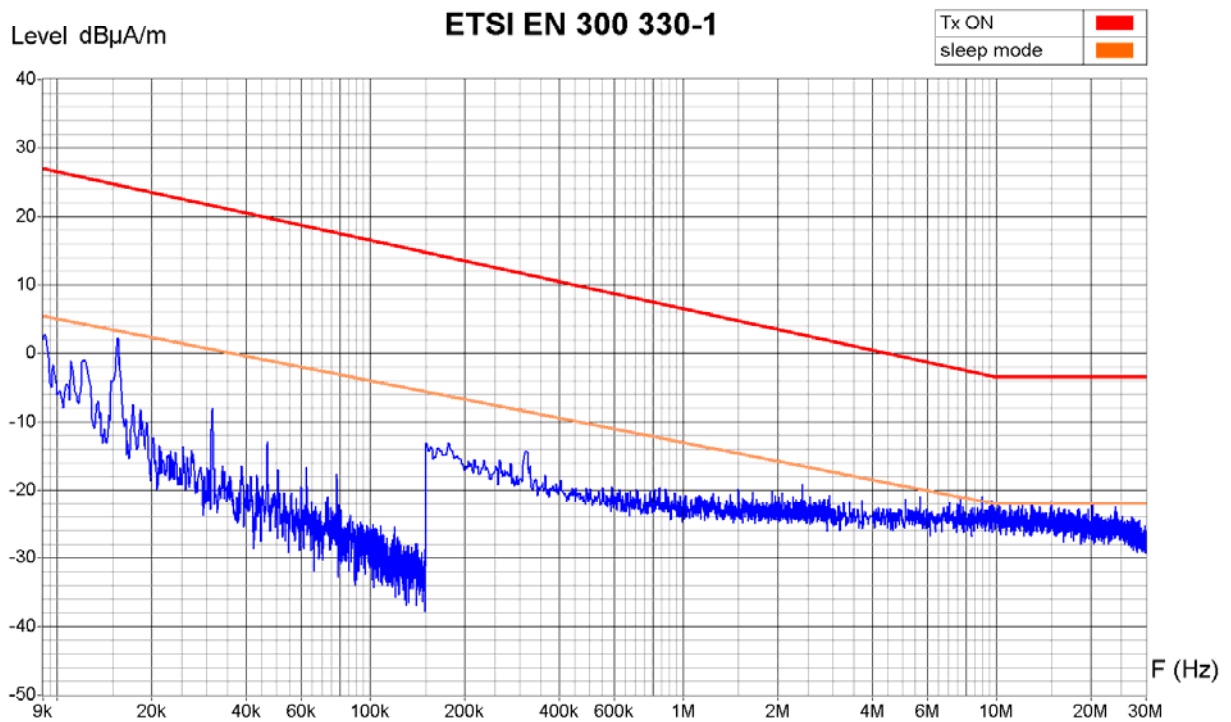
Zone	9 KHz - 150 KHz	150 KHz - 3 MHz	3 MHz - 30 MHz
Video Bandwidth	300 Hz	30 KHz	30 KHz
Resol Bandwidth	300 Hz	9 KHz	9 KHz

Operator: Ding  
 Date/Time: 13.07.07 16:02  
 Filename:  
 Drebbel\_rad\_H\_08.png/.txt

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



Equipment Under Test : Drebbel  
 Set-Up : s. photo  
 Operating Conditions : sleep mode  
 Remarks :



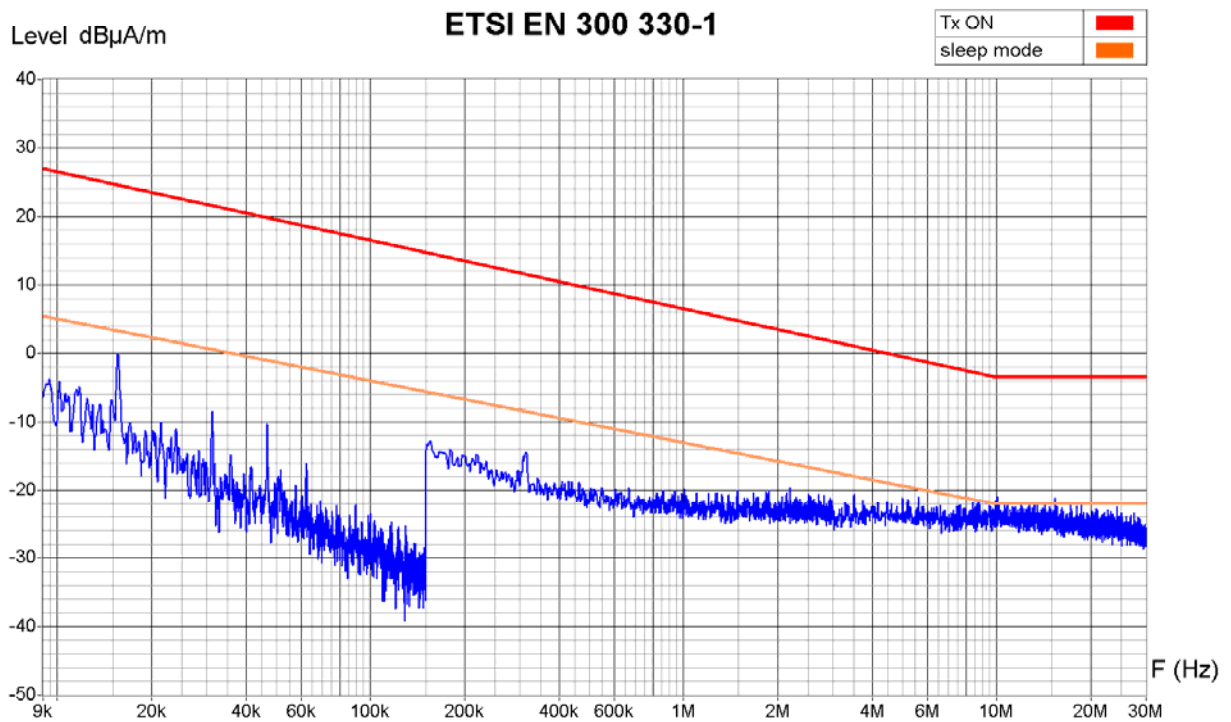
Zone	9 KHz - 150 KHz	150 KHz - 3 MHz	3 MHz - 30 MHz
Video Bandwidth	300 Hz	30 KHz	30 KHz
Resol Bandwidth	300 Hz	9 KHz	9 KHz

Operator: Ding  
 Date/Time: 13.07.07 15:01  
 Filename:  
 Drebbel\_rad\_H\_09.png/.txt

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



Equipment Under Test : Drebbel  
 Set-Up : s. photo  
 Operating Conditions : sleep mode  
 Remarks :



Zone	9 KHz - 150 KHz	150 KHz - 3 MHz	3 MHz - 30 MHz
Video Bandwidth	300 Hz	30 KHz	30 KHz
Resol Bandwidth	300 Hz	9 KHz	9 KHz

Operator: Ding  
 Date/Time: 13.07.07 15:10  
 Filename:  
 Drebbel\_rad\_H\_10.png/.txt

**11.5 Spurious emissions radiated – > 30 MHz (EN 300 330-1 §7.4.4)**

Test site:  anechoic chamber (foam)  open test site  
 anechoic chamber (ferrites)  .....

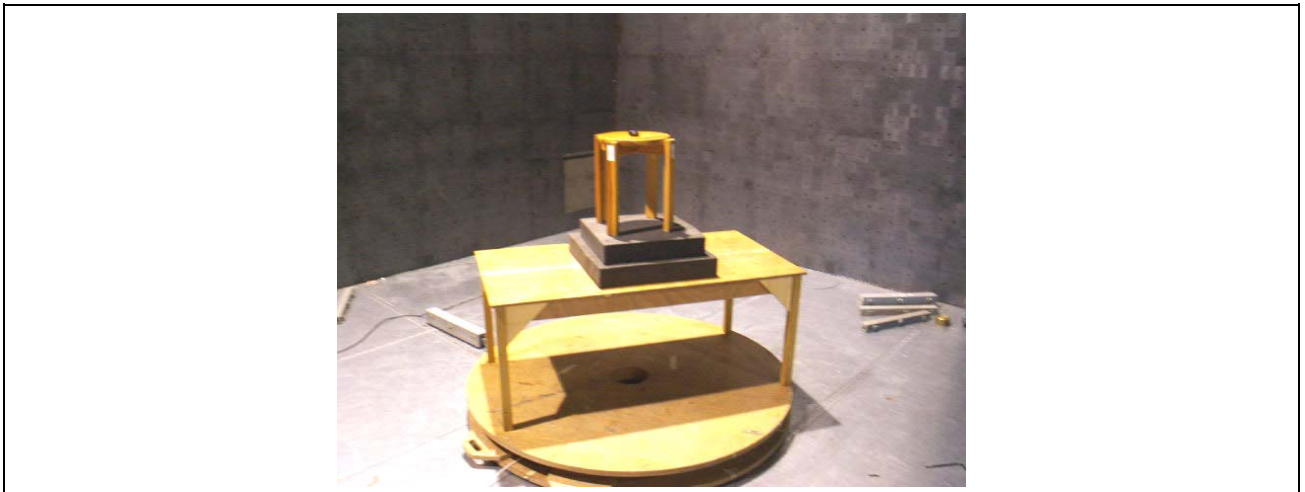
Distance:  30 m  10 m  3 m  .....

Position of EUT: 1.5 m (height of the equipment under test above floor)

Meas. uncertainty: ± 6 dB (30 - 300 MHz) / ± 5.4 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 disturbance appearing while the apparatus is under test. The peak values are recorded continuously on the graph.

Test set-up:



Remarks:

- Limits calculated with  $E_{[V/m]} = \frac{\sqrt{30 P_{[W EIRP]}}}{d_{[m]}}$

Test equipment:

Spectrum analyser	<input type="checkbox"/> 88-14	<input type="checkbox"/> 90-26	<input type="checkbox"/> 94-24	<input type="checkbox"/> 02-06	<input checked="" type="checkbox"/> 03-45	<input type="checkbox"/> 03-57
Receiver	<input type="checkbox"/> 85-04	<input type="checkbox"/> 90-43	<input checked="" type="checkbox"/> 94-35			
Preamplifier	<input type="checkbox"/> 88-05	<input type="checkbox"/> 90-01	<input type="checkbox"/> 90-42	<input checked="" type="checkbox"/> 05-59		
Antenna (biconical)	<input type="checkbox"/> 82-02	<input type="checkbox"/> 87-05	<input type="checkbox"/> 87-16	<input type="checkbox"/> 91-05	<input type="checkbox"/> 94-37	
Antenna (log-per)	<input type="checkbox"/> 88-20	<input type="checkbox"/> 90-30	<input type="checkbox"/> 91-35	<input type="checkbox"/> 94-64		
Antenna (bilog)	<input checked="" type="checkbox"/> 94-03	<input type="checkbox"/> 05-38	<input type="checkbox"/> .....			
Antenna (horn)	<input type="checkbox"/> 90-24	<input type="checkbox"/> 90-29	<input type="checkbox"/> 98-12	<input type="checkbox"/> 98-13	<input type="checkbox"/> .....	
Cables	<input checked="" type="checkbox"/> 06-01+A	<input checked="" type="checkbox"/> 117	<input checked="" type="checkbox"/> 130	<input type="checkbox"/>		

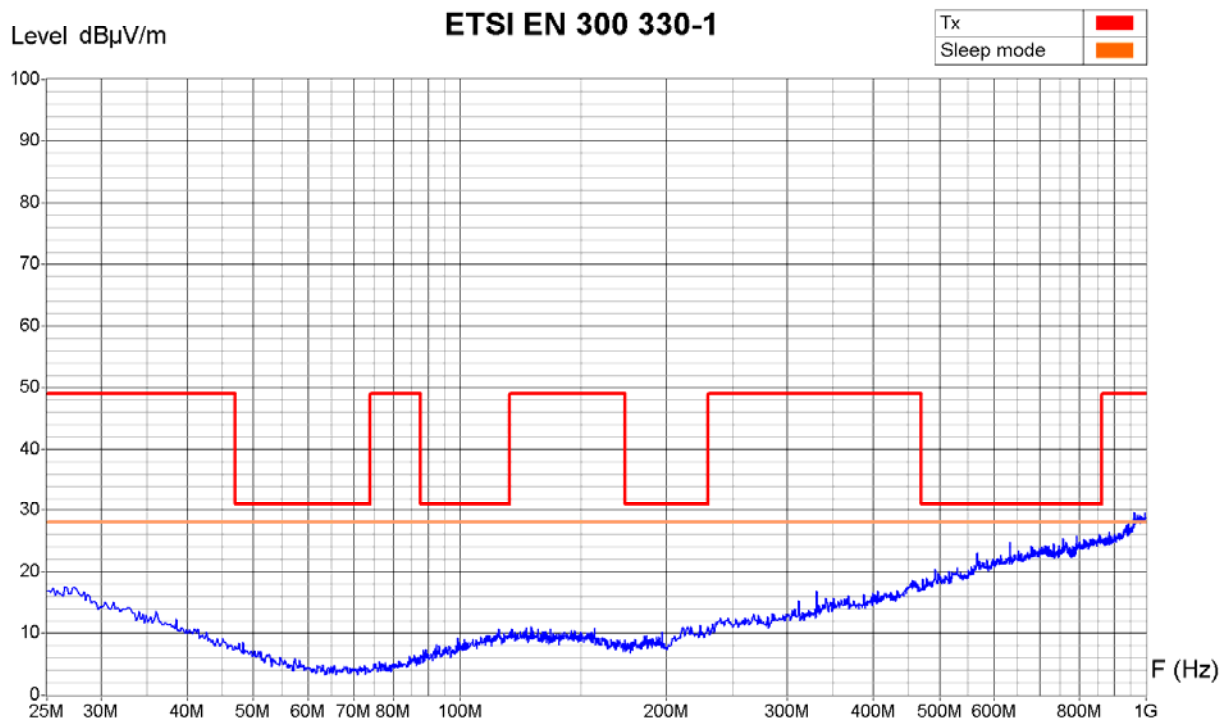
**Result:**  pass  fail  not applicable  not tested

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



Equipment Under Test : RC Drebbel  
 Set-Up : s. photo  
 Operating Conditions : sleep mode  
 Remarks :

Noise at 1 GHz is generated by measuring equipment and not by EUT



Zone	25 MHz - 199 MHz	199 MHz - 1 GHz
Video Bandwidth	100 KHz	100 KHz
Resol Bandwidth	100 KHz	100 KHz

Operator: Ding  
 Date/Time: 13.07.07 13:34  
 Filename:  
 Drebbel\_rad\_03.png/.txt

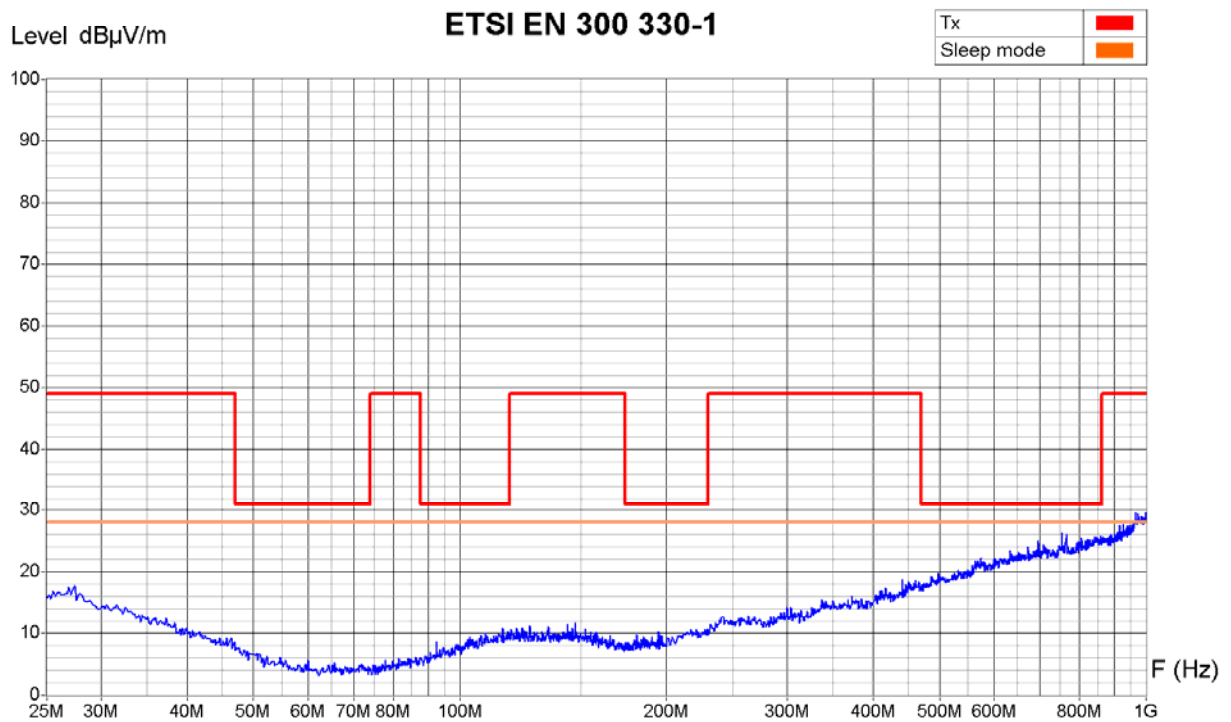


Measurement Type : Radiated Field  
 Polarisation : Horizontal  
 Table Angle : 0 - 360°  
 Antenna Height : 1 - 4 m



Equipment Under Test : RC Drebbel  
 Set-Up : s. photo  
 Operating Conditions : sleep mode  
 Remarks :

Noise at 1 GHz is generated by measuring equipment and not by EUT



Zone	25 MHz - 199 MHz	199 MHz - 1 GHz
Video Bandwidth	100 KHz	100 KHz
Resol Bandwidth	100 KHz	100 KHz

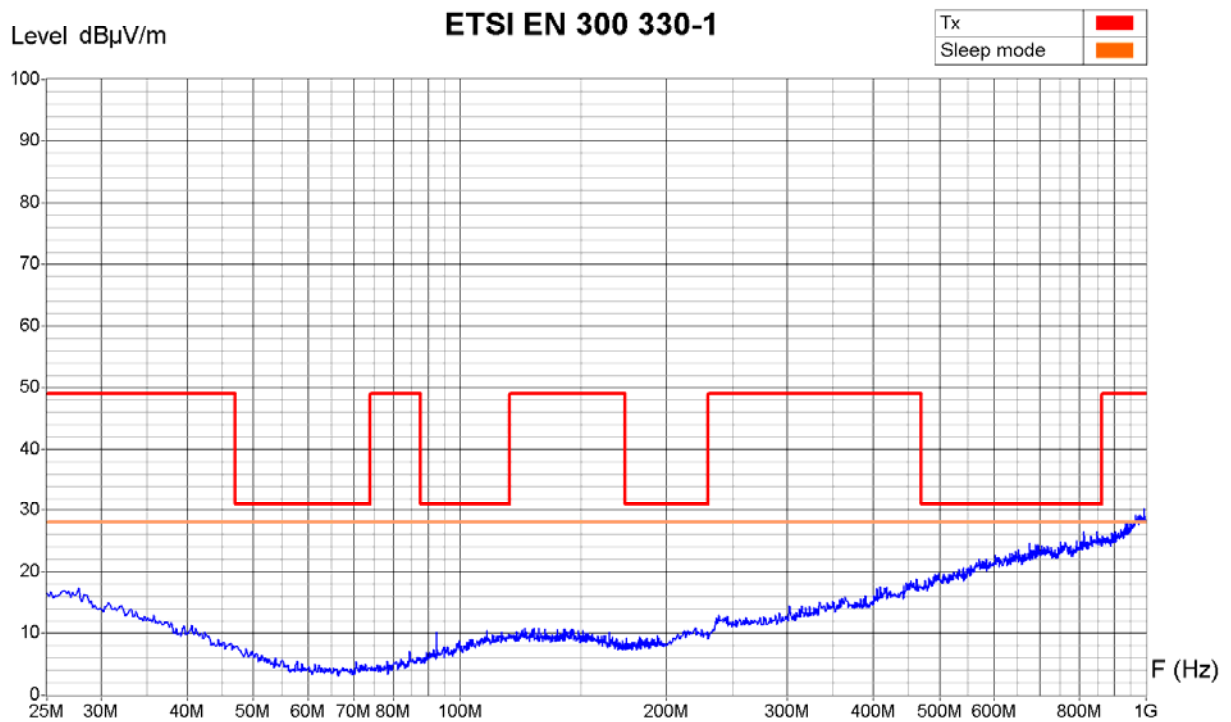
Operator: Ding  
 Date/Time: 13.07.07 13:41  
 Filename:  
 Drebbel\_rad\_04.png/.txt

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



Equipment Under Test : RC Drebbel  
 Set-Up : s. photo  
 Operating Conditions : Continuous sending (43 kHz)  
 Remarks :

Noise at 1 GHz is generated by measuring equipment and not by EUT  
 (check with receiver)



Zone	25 MHz - 199 MHz	199 MHz - 1 GHz
Video Bandwidth	100 KHz	100 KHz
Resol Bandwidth	100 KHz	100 KHz

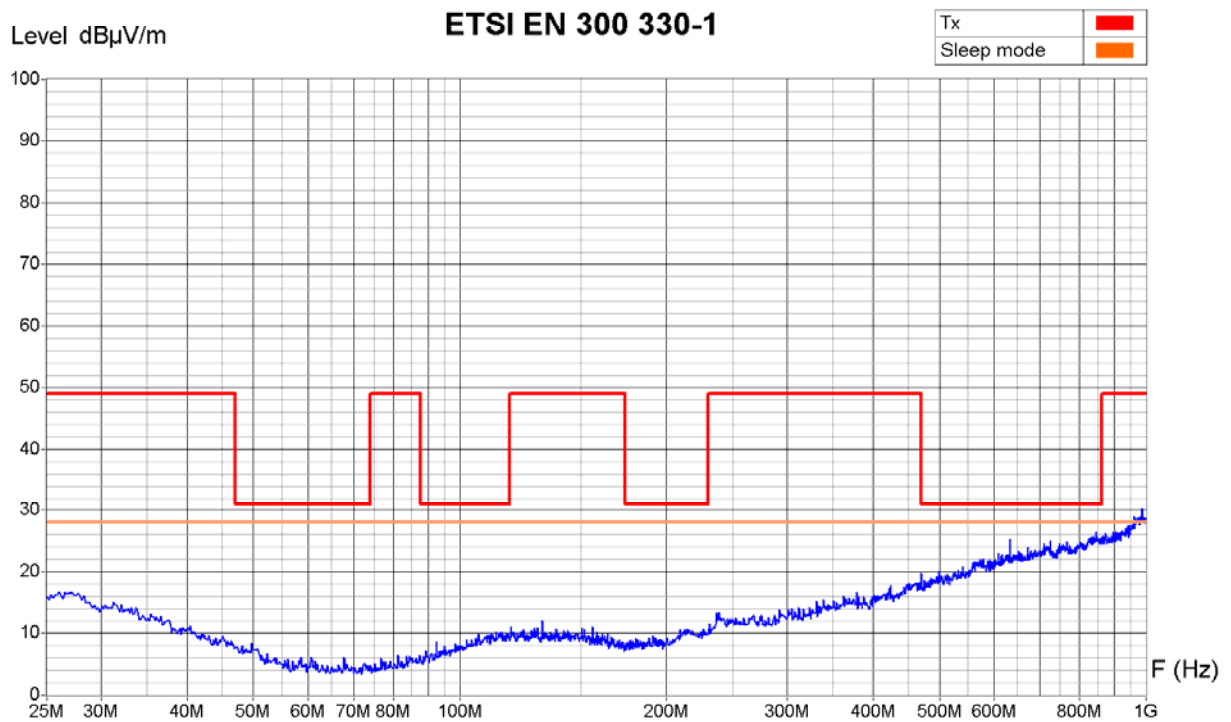
Operator: Ding  
 Date/Time: 13.07.07 13:46  
 Filename:  
 Drebbel\_rad\_05.png/.txt

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



Equipment Under Test : RC Drebbel  
 Set-Up : s. photo  
 Operating Conditions : Continous sending (43 kHz)  
 Remarks :

Noise at 1 GHz is generated by measuring equipment and not by EUT  
 (check with receiver)



Zone	25 MHz - 199 MHz	199 MHz - 1 GHz
Video Bandwidth	100 KHz	100 KHz
Resol Bandwidth	100 KHz	100 KHz

Operator: Ding  
 Date/Time: 13.07.07 13:55  
 Filename:  
 Drebbel\_rad\_06.png/.txt

**11.6 Duty cycle**

Client: **Phonak Communications AG**

Apparatus: *RC Drebbel*

Remarks: ---

Operated :  Software controlled  Manually or event

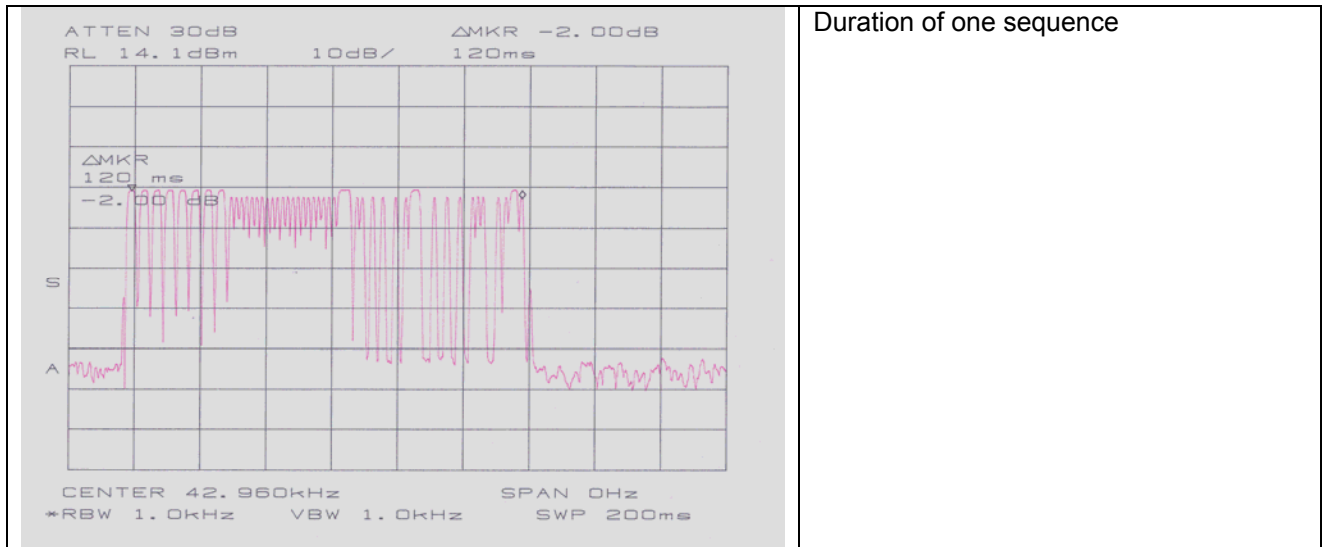
Description of application: *Remote control for different devices, i.e. hearing aids*

Usage pattern: Number of use per hour (value N) : 2

Duration (value A) : 0.120 s  pre-programmed cycle  
 constant manually triggered

Duty cycle:  $\frac{N \cdot A}{3600s}$

Duty cycle ratio	Duty cycle class
$2 \cdot 0.120 / 3600 < 0.1 \%$	1



Date of test: *July 16, 2007*  
 Operator: *J. Ding*