

TRaC Wireless Test Report: TTR002705WUS4

Applicant: Widex A/S

Apparatus : S4-VS

Specification(s) : CFR47 Part 15 October 2008

Purpose of Test : Certification

FCCID : TTY-S4VS

IC ID : 5676B-S4VS

Authorised by

:Radio Product Manager

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Section 1: Introduction

1.1 General

This report contains an assessment of an apparatus against Electromagnetic Compatibility Standards based upon tests carried out on samples submitted to the Laboratory.

Test performed by: TRaC Telecoms & Radio

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K 9 anderson

1.2 Tests Requested By

This testing in this report was requested by:

Widex A/S Nymoellevej 6 DK-3540 Lynge Denmark

1.3 Manufacturer

Widex A/S Nymoellevej 6 DK-3540 Lynge Denmark

1.4 Apparatus Assessed

The following apparatus was assessed between: 25/10/10 and 27/10/10

S4-VS

The above equipment was an hearing aid containing radio circuitry operating at 10.6 MHz.

In addition, S2-VS and S3-VS model variants exist, which are de-featured variants of the product tested (see Appendix D for details). No testing was performed on these variants.

1.5 Test Result Summary

Full details of test results are contained within Appendix A. The following table summarises the results of the assessment.

The statements relating to compliance with the standards below apply ONLY as qualified in the notes and deviations stated in sections 1.6 to 1.7 of this test report.

Full details of test results are contained within Appendix A. The following table summarises the results of the assessment.

| Test Type | Regulation | Measurement standard | Result |
|---|--|----------------------|--------|
| Spurious Emissions Radiated <1000MHz | Title 47 of the CFR: Part 15 Subpart (c) 15.209 | ANSI C63.10 | Pass |
| Spurious Emissions Radiated >1000MHz | Title 47 of the CFR: Part 15 Subpart (c) | ANSI C63.10 | N/A |
| AC Power conducted emissions | Title 47 of the CFR: Part 15 Subpart (c) 15.207 | ANSI C63.10 | N/A |
| Intentional Emission Frequency | Title 47 of the CFR: Part 15 Subpart (c) 15.209 | ANSI C63.10 | Pass |
| Intentional Emission Field Strength: | Title 47 of the CFR: Part 15 Subpart (c) 15. 209 | ANSI C63.10 | Pass |
| Intentional Emission Band Occupancy | Title 47 of the CFR: Part 15 Subpart (c) 15.215 | ANSI C63.10 | Pass |
| Intentional Emission ERP (mW) | Title 47 of the CFR: Part 15 Subpart (c) | ANSI C63.10 | N/A |
| Unintentional Radiated Spurious Emissions | Title 47 of the CFR: Part 15 Subpart (b) 15.109 | ANSI C63.10 | Pass |
| Antenna Arrangements Integral: | Title 47 of the CFR: Part 15 Subpart (c) 15.203 | - | Pass |
| Antenna Arrangements External Connector | Title 47 of the CFR: Part 15 Subpart (c) 15.204 | - | - |
| Restricted Bands | Title 47 of the CFR: Part 15 Subpart (c) 15.205 | - | - |
| Maximum Frequency Of Search | Title 47 of the CFR: Part 15 Subpart (c) 15.33 | - | - |
| Extrapolation Factor | Title 47 of the CFR: Part 15 Subpart (c) 15.31(f) | - | - |

Abbreviations used in the above table:

CFR : Code of Federal Regulations ANSI : American National Standards Institution REFE : Radiated Electric Field Emissions PLCE : Power Line Conducted Emissions

1.6 Notes Relating To The Assessment

With regard to this assessment, the following points should be noted:

The results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

The apparatus was set up and exercised using the configurations, modes of operation and arrangements defined in this report only.

Particular operating modes, apparatus monitoring methods and performance criteria required by the standards tested to have been performed except where identified in Section 1.7 of this test report (Deviations from Test Standards).

For emissions testing, throughout this test report, "Pass" indicates that the results for the sample as tested were below the specified limit (refer also to Section 2, Measurement Uncertainty).

Where relevant, the apparatus was only assessed using the monitoring methods and susceptibility criteria defined in this report.

All testing with the exception of testing at the Open Area Test Site was performed under the

following environmental conditions:

Temperature : 17 to 23 °C Humidity : 45 to 75 % Barometric Pressure : 86 to 106 kPa

All dates used in this report are in the format dd/mm/yy.

This assessment has been performed in accordance with the requirements of ISO/IEC 17025.

1.7 Deviations from Test Standards

There were no deviations from the standards tested to.

Section 2:

Measurement Uncertainty

2.1 Measurement Uncertainty Values

For test data recorded in accordance with note (iii) of Section 2.1 the following measurement uncertainty was calculated:

Radiated Electric Field Emissions

| Quantity Range | Quantity | Expanded Uncertainty |
|-----------------------------|--------------------|----------------------|
| 9kHz to 150 kHz | Amplitude dB(μV/m) | ±1.6dB |
| 150 kHz to 30 MHz | Amplitude dB(μV/m) | ±2.1dB |
| 30MHz to 300MHz Horizontal | Amplitude dB(μV/m) | ±5.1dB |
| 30MHz to 300MHz Vertical | Amplitude dB(μV/m) | ±5.2dB |
| 300MHz to 1GHz Horizontal | Amplitude dB(μV/m) | ±5.4dB |
| 300MHz to 1GHz Vertical | Amplitude dB(μV/m) | ±5.2dB |
| 1GHz to 18GHz Horizontal | Amplitude dB(μV/m) | ±4.4dB |
| 1GHz to 18GHz Vertical | Amplitude dB(μV/m) | ±4.4dB |
| 18GHz to 26.5GHz Horizontal | Amplitude dB(μV/m) | ±4.2dB |
| 18GHz to 26.5GHz Vertical | Amplitude dB(μV/m) | ±4.2dB |
| 26.5GHz to 40GHz Horizontal | Amplitude dB(μV/m) | ±4.3dB |
| 26.5GHz to 40GHz Vertical | Amplitude dB(μV/m) | ±4.3dB |

Section 3: Modifications

3.1 Modifications Performed During Assessment

No modifications were performed during the assessment

Appendix A:

Formal Emission Test Results

Abbreviations used in the tables in this appendix:

Spec : Specification ALSR : Absorber Lined Screened Room

Mod : Modification OATS : Open Area Test Site ATS : Alternative Test Site

EUT : Equipment Under Test
SE : Support Equipment Ref : Reference
Freq : Frequency

L : Live Power Line
N : Neutral Power Line
MD : Measurement Distance

E : Earth Power Line SD : Spec Distance

Pk : Peak Detector Pol : Polarisation
QP : Quasi-Peak Detector H : Horizontal Polarisation

Av : Average Detector V : Vertical Polarisation

CDN : Coupling & decoupling network

A1 Transmitter Intentional Emission Radiated

| Carrier power was verified with the EUT transmitting Test Details: | | | |
|--|--|--|--|
| Regulation | Title 47 of the CFR: Part15 Subpart (c) 15.209(b)(1) | | |
| Measurement standard | ANSI C63.10:2009 | | |
| EUT sample number | S08 | | |
| Modification state | 0 | | |
| SE in test environment | None | | |
| SE isolated from EUT | None | | |
| EUT set up | Refer to Appendix C | | |
| Photographs (Appendix F) | Photograph 1 | | |

| FREQ. (MHz) | MEASUREMENT DISTANCE Meters | MEASUREMENT Rx. READING (dBµV/m) | FAC | RAP. TOR B) | FIELD STRENGTH (µV/m) |
|--------------------------|-----------------------------------|--|---------|-------------------|-----------------------------|
| 10.820 | 1 | 43.0 | 59.1 | | 0.02 |
| Limit va | Limit value @ fc | | 30 μV/m | | |
| Band occupancy @ -20 dBc | | f lower | | | f higher |
| | | 10.277 MH | Z | 10 |).987 MHz |
| | | | 710 k | Hz | |

Notes:

- 1 Results quoted are extrapolated as indicated
- 2 Receiver detector @ fc = Quasi Peak 10 kHz
- 3 When battery powered the EUT was powered with new batteries
- 4 Extrapolation 1 30 Meters 40 dB as per 15.31(f)
- 5 Due to the low level of the signal measurements at a distance greater than 1 meter could not be made.

Test Method:

- 1 As per Radio Noise Emissions, ANSI C63.10
- 2 Measuring distances 1m
- 3 EUT 0.8 metre above ground plane
- 4 Emissions maximised by rotation of EUT, on an automatic turntable. Raising and lowering the receiver antenna between 1m & 4m. Horizontal and vertical polarisations, of the receive antenna.

EUT orientation in three orthagonal planes.

Maximum results recorded

A2 Radiated Electric Field Emissions

Preliminary scans were performed using a peak detector with the RBW = 100kHz. The radiated electric filed emission test applies to all spurious emissions and harmonics emissions. The maximum permitted field strength is listed in Section 15.209. The EUT was set to transmit as required.

The following test site was used for final measurements as specified by the standard tested to:

| 3m open area test site : | 3m alternative test site : | X |
|--------------------------|----------------------------|---|

The effect of the EUT set-up on the measurements is summarised in note (c) below.

| Test Details: | | | |
|--------------------------|--|--|--|
| Regulation | Title 47 of the CFR, Part 15 Subpart (c) Clause 15.209 | | |
| Measurement standard | ANSI C63.10:2009 | | |
| Frequency range | 9kHz – 1000MHz | | |
| EUT sample number | S08 | | |
| Modification state | 0 | | |
| SE in test environment | None | | |
| SE isolated from EUT | None | | |
| EUT set up | Refer to Appendix C | | |
| Photographs (Appendix F) | Photographs 1 and 2 | | |

The worst case radiated emission measurements for spurious emissions and harmonics that fall within the restricted bands are listed below:

| Ref No. | FREQ. (MHz) | MEAS Rx (dBμV) | CABLE LOSS (dB) | ANT FACT. (dB/m) | PRE AMP (dB) | FIELD ST'GH (dBµV/m) | EXTRAP FACT (dB) | FIELD ST'GH (μV/m) | LIMIT (µV/m) |
|---------|----------------|----------------------|-----------------------|---------------------|-----------------|----------------------------|------------------------|-----------------------|-----------------|
| 1. | | | | No Significant | Emissions With | in 20 dB of the | limit | | |

Notes:

- Any testing performed below 30 MHz was performed using a magnetic loop antenna in accordance with ANSI C63.10: section 4.5, Table 1. For emissions below 30MHz the cable losses are assumed to be negligible.
- In accordance with 15.35(b), above 1 GHz, emissions measured using a peak detector shall not exceed a level 20 dB above the average limit.
- 3 Testing was performed with the EUT orientated in three orthogonal planes and the maximum emissions level recorded. In addition, the EUT antenna was varied within its range of motion in order to maximise emissions.
- For Frequencies below 1 GHz, RBW= 120 kHz, testing was performed with CISPR16 compliant test receiver with QP detector. Above 1 GHz tests were performed using a spectrum analyser using the following settings:

Peak RBW=VBW= 1MHz Average RBW=VBW= 1MHz

The upper and lower frequency of the measurement range was decided according to 47 CFR Part 15:2008 Clause 15.33(a) and 15.33(a)(1).

Radiated emission limits 47 CFR Part 15: Clause 15.209 for all emissions:

| Frequency of emission (MHz) | Field strength µV/m | Measurement Distance m | Field strength dB _µ V/m |
|-----------------------------|---------------------|------------------------|------------------------------------|
| 0.009-0.490 | 2400/F(kHz) | 300 | 67.6/F (kHz) |
| 0.490-1.705 | 24000/F(kHz) | 30 | 87.6/F (kHz |
| 1.705-30 | 30 | 30 | 29.5 |
| 30-88 | 100 | 3 | 40.0 |
| 88-216 | 150 | 3 | 43.5 |
| 216-960 | 200 | 3 | 46.0 |
| Above 960 | 500 | 3 | 54.0 |

(a) Where results have been measured at one distance, and a signal level displayed at another, the results have been extrapolated using the following formula:

Extrapolation (dB) =
$$20 \log_{10} \left(\frac{\text{measurement distance}}{\text{specification distance}} \right)$$

(b) The levels may have been rounded for display purposes.

The following table summarises the effect of the EUT operating mode, internal configuration and arrangement of cables / samples on the measured emission levels

| | See (i) | See (ii) | See (iii) | See (iv) | |
|---|---------|----------|-----------|----------|--|
| Effect of EUT operating mode on emission levels | | ✓ | | | |
| Effect of EUT internal configuration on emission levels | | ✓ | | | |
| Effect of Position of EUT cables & samples on emission levels | | | | | |
| (i) Parameter defined by standard and / or single possible, refer to Appendix D | | | | | |

- Parameter defined by client and / or single possible, refer to Appendix D
- Parameter had a negligible effect on emission levels, refer to Appendix D Worst case determined by initial measurement, refer to Appendix D (iii)
- (iv)

A3 Unintentional Radiated Emissions

Preliminary scans were performed using a peak detector with the RBW = 100kHz. The radiated electric filed emission test applies to all spurious emissions on directly related to the transmitter. The maximum permitted field strength is listed in Section 15.109. The EUT was set to operate in a transmit standby / receive mode.

The following test site was used for final measurements as specified by the standard tested to:

| 3m open area test site : | 3m alternative test site : | X |
|--------------------------|----------------------------|---|
| <u> </u> | | |

The effect of the EUT set-up on the measurements is summarised in note (c) below.

| Test Details: | | | |
|--------------------------|--|--|--|
| Regulation | Title 47 of the CFR, Part 15 Subpart (c) Clause 15.109 | | |
| Measurement standard | ANSI C63.10:2009 | | |
| Frequency range | 9kHz – 1000MHz | | |
| EUT sample number | S02 | | |
| Modification state | 0 | | |
| SE in test environment | None | | |
| SE isolated from EUT | None | | |
| EUT set up | Refer to Appendix C | | |
| Photographs (Appendix F) | Photographs 1 and 2 | | |

The worst case radiated emission measurements for spurious emissions are listed below:

| Ref No. | FREQ. (MHz) | MEAS Rx (dBµV) | CABLE LOSS (dB) | ANT FACT. (dB/m) | PRE AMP (dB) | FIELD ST'GH (dBµV/m) | EXTRAP FACT (dB) | FIELD ST'GH (μV/m) | LIMIT (µV/m) |
|---------|----------------|----------------------|-----------------------|---------------------|-----------------|----------------------------|------------------------|-----------------------|-----------------|
| 1 | | | | No Significant | Emissions With | in 20 dB of the | limit | | |

Notes:

- 1 Any testing performed below 30 MHz was performed using a magnetic loop antenna in accordance with ANSI C63.10: section 4.5, Table 1. For emissions below 30MHz the cable losses are assumed to be negligible.
- 2 In accordance with 15.35(b), above 1 GHz, emissions measured using a peak detector shall not exceed a level 20 dB above the average limit.
- 3 Testing was performed with the EUT orientated in three orthogonal planes and the maximum emissions level recorded. In addition, the EUT antenna was varied within its range of motion in order to maximise emissions.
- 4 For Frequencies below 1 GHz, RBW = 120 kHz, testing was performed with CISPR16 compliant test receiver with QP detector. Above 1 GHz tests were performed using a spectrum analyser using the following settings:

Peak RBW=VBW= 1MHz Average RBW=VBW= 1MHz

The upper and lower frequency of the measurement range was decided according to 47 CFR Part 15:2008 Clause 15.33(a) and 15.33(a)(1).

Radiated emission limits 47 CFR Part 15: Clause 15.109 for all emissions:

| Frequency of emission (MHz) | Field strength µV/m | Measurement Distance m | Field strength dB _µ V/m |
|-----------------------------|---------------------|------------------------|------------------------------------|
| 30-88 | 100 | 3 | 40.0 |
| 88-216 | 150 | 3 | 43.5 |
| 216-960 | 200 | 3 | 46.0 |
| Above 960 | 500 | 3 | 54.0 |

(a) Where results have been measured at one distance, and a signal level displayed at another, the results have been extrapolated using the following formula:

Extrapolation (dB) =
$$20 \log_{10} \left(\frac{\text{measurement distance}}{\text{specification distance}} \right)$$

(b) The levels may have been rounded for display purposes.

The following table summarises the effect of the EUT operating mode, internal (c) configuration and arrangement of cables / samples on the measured emission levels.

| | See (i) | See (ii) | See (iii) | See (iv) |
|---|---------|----------|-----------|----------|
| Effect of EUT operating mode on emission levels | | ✓ | | |
| Effect of EUT internal configuration on emission levels | | ✓ | | |
| Effect of Position of EUT cables & samples on emission levels | ✓ | | | |

- Parameter defined by standard and / or single possible, refer to Appendix D
- (i) (ii) Parameter defined by client and / or single possible, refer to Appendix D
- (iii) Parameter had a negligible effect on emission levels, refer to Appendix D
- (iv) Worst case determined by initial measurement, refer to Appendix D

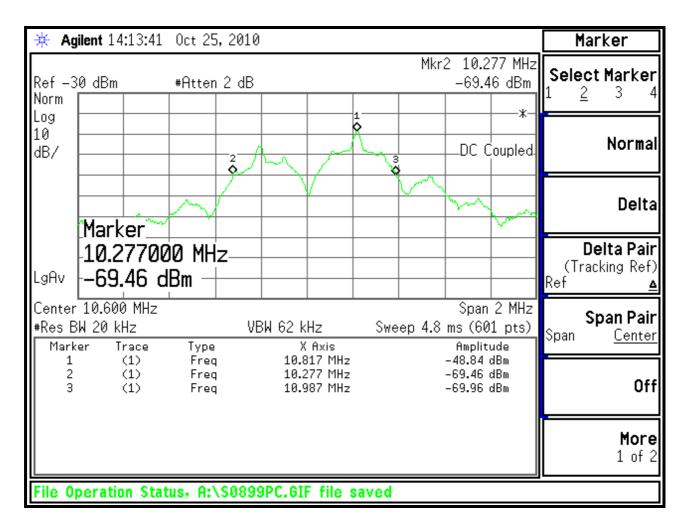
Appendix B:

Supporting Graphical Data

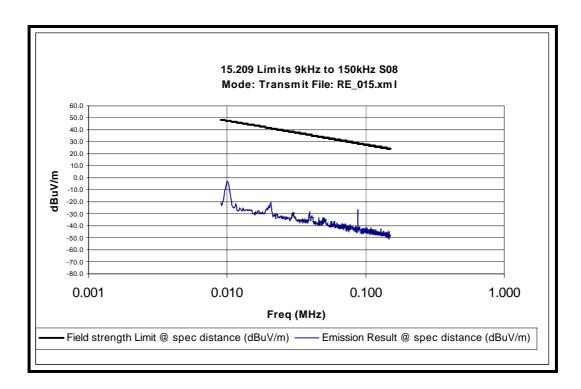
This appendix contains graphical data obtained during testing.

Notes:

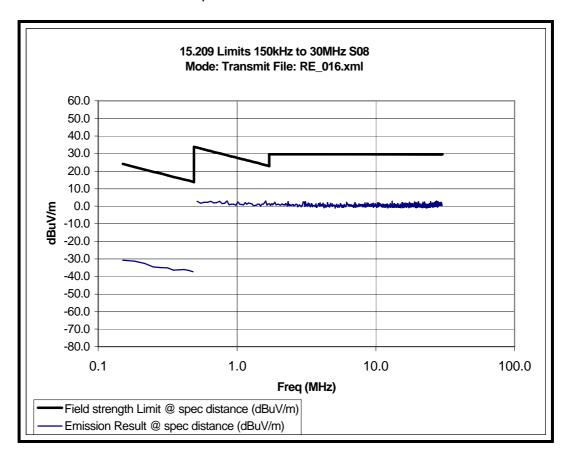
- (a) The radiated electric field emissions and conducted emissions graphical data in this appendix is preview data. For details of formal results, refer to Appendix A and Appendix B.
- (b) The time and date on the plots do not necessarily equate to the time of the test.
- (c) Where relevant, on power line conducted emission plots, the limit displayed is the average limit, which is stricter than the quasi peak limit.
- (d) Appendix C details the numbering system used to identify the sample and its modification state.
- (e) The plots presented in this appendix may not be a complete record of the measurements performed, but are a representative sample, relative to the final assessment.



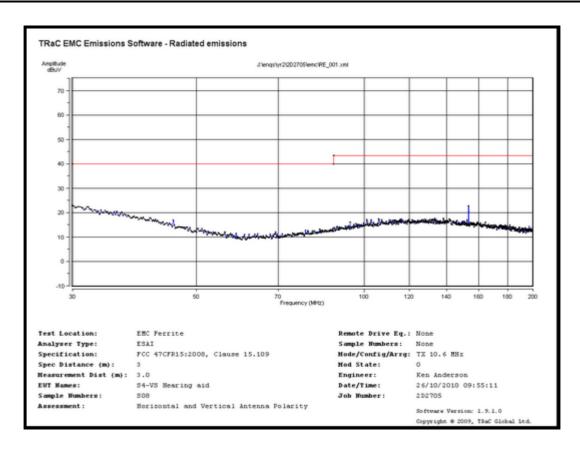
20dB Bandwidth



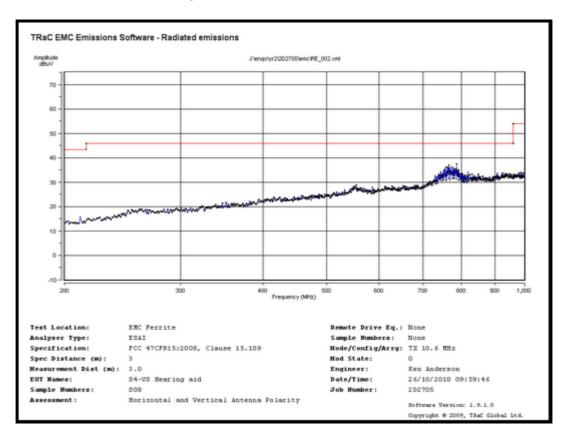
Radiated spurious emissions 9kHz to 150kHz



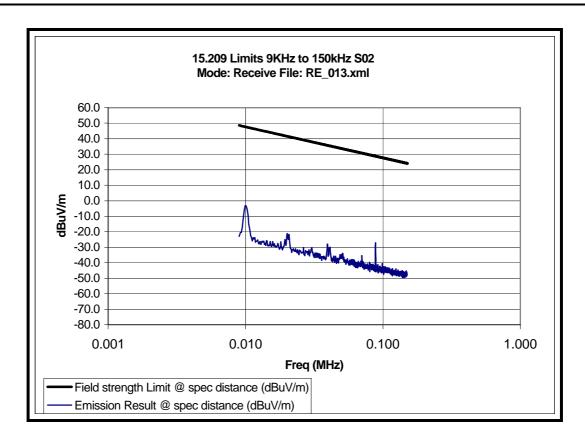
Radiated spurious emissions 150kHz to 30MHz



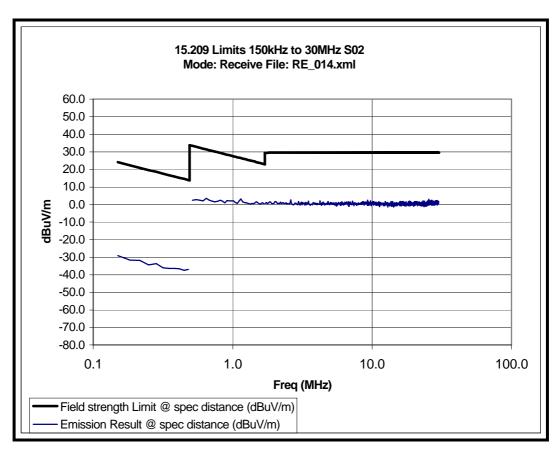
Radiated spurious emissions 30MHz to 200MHz



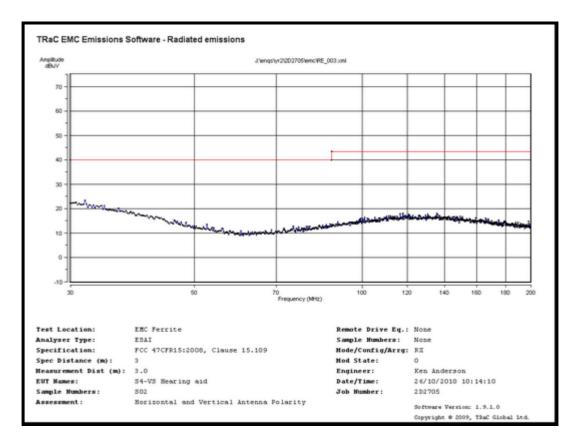
Radiated spurious emissions 200MHz to 1GHz



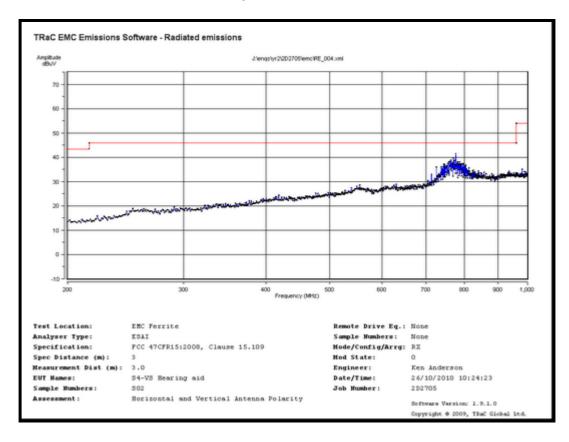
Unintentional Radiated spurious emissions 9kHz to 150kHz



Unintentional Radiated spurious emissions 150kHz to 30MHz



Unintentional Radiated spurious emissions 30MHz to 200MHz



Unintentional Radiated spurious emissions 200MHz to 1GHz

Appendix C: Additional Test and Sample Details

This appendix contains details of:

- 1. The samples submitted for testing.
- 2. Details of EUT operating mode(s)
- 3. Details of EUT configuration(s) (see below).
- 4. EUT arrangement (see below).

Throughout testing, the following numbering system is used to identify the sample and it's modification state:

Sample No: Sxx Mod w

where:

xx = sample number eg. S01 w = modification number eg. Mod 2

The following terminology is used throughout the test report:

Support Equipment (SE) is any additional equipment required to exercise the EUT in the applicable operating mode. Where relevant SE is divided into two categories:

SE in test environment: The SE is positioned in the test environment and is not isolated from the EUT (e.g. on the table top during REFE testing).

SE isolated from the EUT: The SE is isolated via filtering from the EUT. (e.g. equipment placed externally to the ALSR during REFE testing).

EUT configuration refers to the internal set-up of the EUT. It may include for example:

Positioning of cards in a chassis.

Setting of any internal switches.

Circuit board jumper settings.

Alternative internal power supplies.

Where no change in EUT configuration is **possible**, the configuration is described as "single possible configuration".

EUT arrangement refers to the termination of EUT ports / connection of support equipment, and where relevant, the relative positioning of samples (EUT and SE) in the test environment.

For further details of the test procedures and general test set ups used during testing please refer to the related document "EMC Test Methods - An Overview", which can be supplied by TRaC Telecoms & Radio upon request.

C1) Test samples

The following samples of the apparatus were submitted by the client for testing:

| Sample No. | Description | Identification |
|------------|--|----------------|
| S02 | Hearing Aid (Normal sample) | None |
| S08 | Hearing Aid (Constant transmit sample) | None |

The following samples of apparatus were submitted by the client as host, support or drive equipment (auxiliary equipment):

| Sample No. | Description | Identification |
|------------|-------------|----------------|
| NONE | | |
| | | |
| | | |

The following samples of apparatus were supplied by TRaC Telecoms & Radio as support or drive equipment (auxiliary equipment):

| Identification | Description |
|----------------|-------------|
| NONE | |
| | |
| | |

C2) EUT Operating Mode During Testing.

During testing, the EUT was exercised as described in the following tables:

| Test | Description of Operating Mode: Transmit |
|---|--|
| REFE: Radiated E-Field (Transmitter carrier output levels dBuV/m) | |
| REFE: Radiated Spurious emissions E- Field at frequencies below 30MHz (dBuV/m) (15.209) | The EUT was transmitting continuously on maximum power using FSK (center frequency 10.6MHz / Deviation ±200kHz) modulation and powered by a new battery. |
| Radiated Spurious emissions (E-Field) at frequencies ≥ 30MHz (15.209) | |
| 20dB Bandwidth of Emissions | |

| Test | Description of Operating Mode: Receive mode |
|--|--|
| REFE: 15.109 Radiated Spurious emissions E-field below 30MHz (Receive) | The EUT was placed in receive mode (non-transmitting) Mode during the test. Powered by a |
| REFE: 15.109 Radiated Spurious emissions (E-Field) frequencies ≥ 30MHz (Receive) | new battery. |

C3) EUT Configuration Information.

The EUT was submitted for testing in one single possible configuration.

C4) List of EUT Ports

The tables below describe the termination of EUT ports:

Sample : S02 & S08

Tests : Radiated E-Field, (Carrier power), 20dB Bandwidth of Emissions, REFE

| Port | Description of Cable Attached | Cable length | Equipment Connected |
|---------------|-------------------------------|--------------|----------------------------------|
| dc power port | None | N/A | PR44 Zinc-Air 1.25Vdc Battery |
| Antenna port | None | N/A | Integral |

.

C5 Details of Equipment Used

For Radiated Electric Field Emissions 9 kHz to 30 MHz

| RFG No | Type | Description | Manufacturer | Date Calibrated. |
|--------|--------|---------------------------------|--------------|------------------|
| 274 | ATS | Ferrite Lined Chamber | TRaC | 10/06/10 |
| 023 | HFH-Z2 | Mag Loop Antenna 9kHz-30MHz | R&S | 26/05/09 |
| 214 | ESAI | Spec Analyser/Test Rxer (LF/HF) | R&S | 22/03/10 |
| 246 | N-type | RF coaxial cable (Lab 10) | TRaC | 17/09/10 |
| 270 | N-type | RF coaxial cable (Lab 10) | TRaC | 17/09/10 |

For Radiated Electric Field Emissions 30MHz to 1GHz

| RFG No | Type | Description | Manufacturer | Date Calibrated. |
|--------|---------|----------------------------------|--------------|------------------|
| 274 | ATS | Ferrite Lined Chamber | TRaC | 10/06/10 |
| 231 | CBL6111 | Blue Bilog Antenna (0.03 - 1GHz) | Chase | 12/08/08 |
| 214 | ESAI | Spec Analyser/Test Rxer (LF/HF) | R&S | 22/03/10 |
| 246 | N-type | RF coaxial cable (Lab 10) | TRaC | 17/09/10 |
| 270 | N-type | RF coaxial cable (Lab 10) | TRaC | 17/09/10 |

For 20dB Bandwidth measurement

| RFG No | Type | Description | Manufacturer | Date Calibrated |
|--------|--------|-------------------|--------------|-----------------|
| REF837 | E4440A | Spectrum analyser | Agilent | 13/01/10 |

Appendix D:

Additional Information

Additional Information regarding product family



Widex A/S Nymoellevej 6 DK-3540 Lynge Denmark

Tel.: (+45) 44 35 56 00 Fax: (+45) 44 35 56 01 widex@widex.com http://www.widex.com CVR. Nr. 1577 1100

To whom it may concern

Re: Family relationship between hearing aid models

Widex A/S hereby declares that the Widex hearing aid models

- S4-VS
- S3-VS
- S2-VS

only differ from each other by different levels of hearing aid functionality.

Model S4-VS has the highest level of functionality while models S3-VS and S2-VS have various audiological features disabled or restricted.

The 3 above mentioned models are identical in all other aspects, hereunder same mechanic design, electronic circuit, schematics and parts lists and therefore have identical electrical/electronic characteristics including EMC, Electrical safety and Radio performance.

Sincerely Widex A/S

Signature:

Name:

Lars Baekgaard Jensen

Position:

Product Program Manager

Date:

18 October, 2010

Appendix E:

Calculation of the duty cycle correction factor

No average detector measurements were made during testing, therefore this calculation is not required

Appendix F:

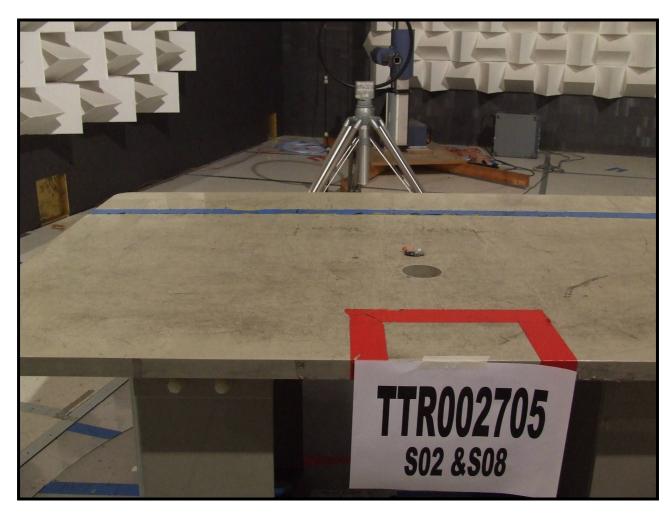
Photographs and Figures

The following photographs were taken of the test samples:

- 1. Radiated electric field emissions arrangement: < 30 MHz front view.
- 2. Radiated electric field emissions arrangement: < 30 MHz rear view.
- 3. Radiated electric field emissions arrangement: > 30 MHz front view.
- 4. Radiated electric field emissions arrangement: > 30 MHz rear view.



Photograph 1



Photograph 2



Photograph 3



Photograph 4

Appendix G: MPE Calculation

OET Bulletin No. 65, Supplement C 01-01

47 CFR §§1.1307 and 2.1091

2.1091 Radio frequency radiation exposure evaluation: mobile devices.

For purposes of these requirements mobile devices are defined by the FCC as transmitters designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimetres is normally maintained between radiating structures and the body of the user or nearby persons. These devices are normally evaluated for exposure potential with relation to the MPE limits. As the 20cm separation specified under FCC rules may not be achievable under normal operation of the EUT, an RF exposure calculation is needed to show the minimum distance required to be less than 1mW/cm² power density limit, as required under FCC rules.

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{EIRP}{4 \pi R^2}$$
 re - arranged $R = \sqrt{\frac{EIRP}{S 4 \pi}}$

where:

S = power density

R = distance to the centre of radiation of the antenna

EIRP = EUT Maximum power

Note:

The EIRP value was determined using the peak E Field measurement.

Result

| Prediction Frequency (MHz) | Maximum EIRP (mW) | Power density limit (S) (mW/cm ²) | Distance (R) cm required to be less than 1mW/cm² |
|----------------------------------|----------------------|--|--|
| 10.8 | 1.2x10 ⁻⁶ | 1 | 3.1 x 10 ⁻⁴ |

Appendix H:

Cross Reference FCC Part 15c to IC RSS 210

The testing of the C4-9 was carried out to FCC 47CFR Part 15c and the results for this testing can be found in Appendix A of this report.

All measurements were carried out in accordance with ANSI C63.4, 'Methods of Measurements of RF Emissions from low voltage Electrical and Electronic Equipment in the Range 9kHz to 40GHz.

The table below shows the applicable RSS-210 parts and the corresponding FCC 47CFR Part 15 rules:

| RSS-210 | FCC 47CFR Part 15 |
|---------|-------------------|
| 2.6 | Part 15.109 |
| 2.6 | Part 15.209 |

In addition below is a plot of the 99% emissions bandwidth, as stipulated in Section 4.4.1 of RSS-Gen.

