

Test Report



DANAK
Reg. no. 19

Emission tests to FCC requirements of RC3

Performed for Widex A/S

DANAK-197980

Project no.: A502939-3

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4 annexes

16 June 2005

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Title Emission tests to FCC requirements of RC3

Test object RC3

Report no. DANAK-197980

Project no. A502939-3

Test period 27 April and 27 May 2005

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Manufacturer Widex A/S

Specifications FCC:47 CFR Part 15, Subpart C - Intentional Radiators

Results The equipment under test is in compliance with the requirements.

Test personnel Henrik Egeberg Nielsen

Date 16 June 2005


Responsible 
Vagn Sylvest
Project Manager - EMC
DELTA

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1. Summaries

1.1 Technical report summary

The tests reported in this document have been performed to demonstrate compliance with the requirements of FCC Part 15, Section 15.207 "Conducted limits" and FCC Part 15, Section 15.209 "Radiated emission limits, general requirements".

This report contains measurement data from tests performed at DELTA, Hørsholm, Denmark, a DANAK accredited test laboratory with reference number 19.

The laboratory is listed by FCC under the registration number 90529.

1.1.1 Applicable test methods

The methods and procedures have been applied as specified in:

ANSI C63.4:2003 Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

1.2 Summary of test results

The results of the emission tests can be summarised as follows:

Tests of Intentional Radiator	Key references to requirement	Common FCC and IC status
Conducted emission, AC mains	FCC 15.207	N/A
Radiated electromagnetic field emission	FCC15.209	Passed
Emission in restricted bands	FCC15.205	Passed

Abbreviations

Passed	:	The requirements are met.
Failed	:	The requirements are not met.
Not done	:	No test was performed.
N/A	:	Not applicable.
Not relevant	:	The test was not relevant for the test object.

The test results relate only to the objects tested.

2. Test objects and auxiliary equipment

2.1 Test object – Control unit RC3

Category	SRD / Medical electrical equipment
Manufacturer	Widex A/S
Model / type	RC3
Part no.	-
Serial no.	Prototype
Supply voltage	Internal battery 3 VDC
Operational mode	TX

3. General test conditions

3.1 Test set-up



Unit under test.

The unit is a transmit-only device designed for one-hand operation.

When a key is pressed a 139.2 kHz carrier, FSK modulated ± 4.8 kHz is transmitted.

The unit is powered from internal 3 V battery.

4. Test and results

4.1 General field strength limits below 30 MHz

	Requirements	
Specification	FCC Rules and Regulations Part 15.209	
Test set-up	ANSI C63.4:2003	
Measuring distance	Below 490 kHz: 300m; above: 30 m *)	
Frequency range	9 kHz to 30 MHz	
Limits:	0.009-0.490 MHz 0.490-1.705 MHz 1.705-30 MHz	2400/F(kHz)μV/m 24000/F(kHz)μV/m 30 μV/m
Limit at Tx carrier freq. measured at a distance of 10 m. The limit has been scaled using the square of an inverse linear distance extrapolation factor (40 dB/decade).	139.2 MHz	83.8 dBμV/m
Measurement uncertainty (2 σ) <1 GHz		2.6 dB
Below 1 GHz the limits apply to measurements performed using a quasi-peak detector, except the bands 90-90 kHz and 110-490 kHz where the limits are based on measurements employing an average detector.		
Test set-up	Annex 2	
Test record sheets (Exploratory)	Annex 3	

*) For measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

Results

The emission was within the specified limits.

Note

An exploratory scan was made at a distance of 10 m in a semi anechoic chamber to see where there were spurious emissions to be measured. The measurement revealed no spurious emission of interest. Therefore spurious emission was measured on the harmonic frequencies of the carrier only on an OATS.

Spurious emission <30 MHz in tabular form. Measuring distance: 10 m							
Frequency	Measured dB μ V Peak	Antenna corr. factor dB	Measured dB μ V/m Peak	Limit @ 300 m dB μ V/m	Corr. factor 300 to 10 m dB	Corrected limit @ 10 m dB μ V/m	Margin to limit dB
268.6	32	19.4	51.4	19.0	59.1	78.1	26.7
402.9	30	19.4	49.4	15.5	59.1	74.6	25.2
Frequency	Measured dB μ V Peak	Antenna corr. factor dB	Measured dB μ V/m Peak	Limit @ 30 m dB μ V/m	Corr. factor 30 to 10 m dB	Corrected limit @ 10 m dB μ V/m	Margin to limit dB
537.2	26	19.4	45.4	33.0	19.1	52.1	6.7

No frequencies in restricted bands.

Correction of limits has been done by using the inverse linear distance extrapolation factor (40 dB/decade).

Maximum result obtained when Tx and Rx antennas were in line (--- ---) and when they were parallel (| |).

4.2 General field strength limits above 30 MHz

	Requirements
Specification	FCC Rules and Regulations Part 15, Subpart C
Test set-up	ANSI C63.4:2003
Measuring distance	3 m
Frequency range	30-1000 MHz
Limits: As specified in 15.209(a)	30-88 MHz: 40 dB μ V/m 88-216 MHz: 43.5 dB μ V/m 216-960 MHz: 46 dB μ V/m Above 960 MHz: 54 dB μ V/m
Measurement uncertainty (2 σ) <1 GHz	2.6 dB
Below 1 GHz the limits apply to measurements performed using a quasi-peak detector.	
Test set-up	<i>Annex 2</i>
Test record sheets	<i>Annex 4</i>

Results

The emission was within the specified limits.

Spurious emission 30 - 1000 MHz in tabular form:
(For spectral plots see *Annex 4*).

Spurious freq. MHz	Polarisation	QPeak dB μ V/m	dB below QP limit	Note
30,6	V	19.0	21	Background
32.4	V	19.8	21.3	Background
117.3 (R)	H	13.9	29.6	Background
126.1 (R)	H	13.9	29.6	Background
136.5 (R)	V	13.5	30.0	Background
706.6	V	22.9	23.1	Background

(R) means frequency in restricted band as defined in §15.205.

4.3 Occupied bandwidth

At carrier frequencies using the general requirements of 15.209 no bandwidth is specified. The carrier shall have a higher level than its harmonics.

Occupied bandwidth:

The EUT is in compliance with the requirement(s).

4.4 Peak output field strength

Maximum result obtained when Tx and Rx antennas were in line (--- ---) and when they were parallel (| |).

Tx frequency: 134.3 kHz Measuring distance: 10 m						
Measured dB μ V Peak	Antenna corr. factor dB	Measured dB μ V/m Peak	Limit @ 300 m dB μ V/m	Corr. factor 300->10 m dB	Corrected limit @ 10 m dB μ V/m	Margin to limit dB
34	19.4	53.4	25.0	59.1	84.1	30.7

Correction of limits has been done by using the inverse linear distance extrapolation factor (40 dB/decade).

Result

The EUT is in compliance with the requirement.

Comments

The transmitter carrier shall be in compliance with the general requirements to radiated emission. Measurements of the transmitter were performed on a 10 m OATS.

Annex 1

List of instruments

(1 page)

NO.	DESCRIPTION	MANUFACTURER	TYPE NO.	CAL. EXPIRES
29332	ACTIVE LOOP ANTENNA	ROHDE & SCHWARZ	HFH-Z2	2006-02-11
29337	ARTIFICIAL MAINS NETWORK	ROHDE & SCHWARZ	ESH2-Z5	2006-01-06
29460	MANUAL TEST RECEIVER 10 kHz-30 MHz	ROHDE & SCHWARZ	ESH2	2006-01-05
29680	IMPULSE VOLTAGE LIMITER	ROHDE & SCHWARZ	ESH3/Z2	2006-01-05
29797	BILOG ANTENNA, 30-1000 MHz	CHASE ELECTRICS LTD	CBL 6111A	2005-11-20
29861	EMI-SOFTWARE Ver. 1.60	ROHDE & SCHWARZ	ES-K1, PART: 1026.6790.02	ONLY CAL. IF REQUIRED
29916	AUTOMATIC TEST RECEIVER, 9 kHz-2.75 GHz	ROHDE & SCHWARZ	ESCS 30 1102.4500.30	2006-01-05

Annex 2

Photos

(1 page)



Photo 1 Spurious emission.



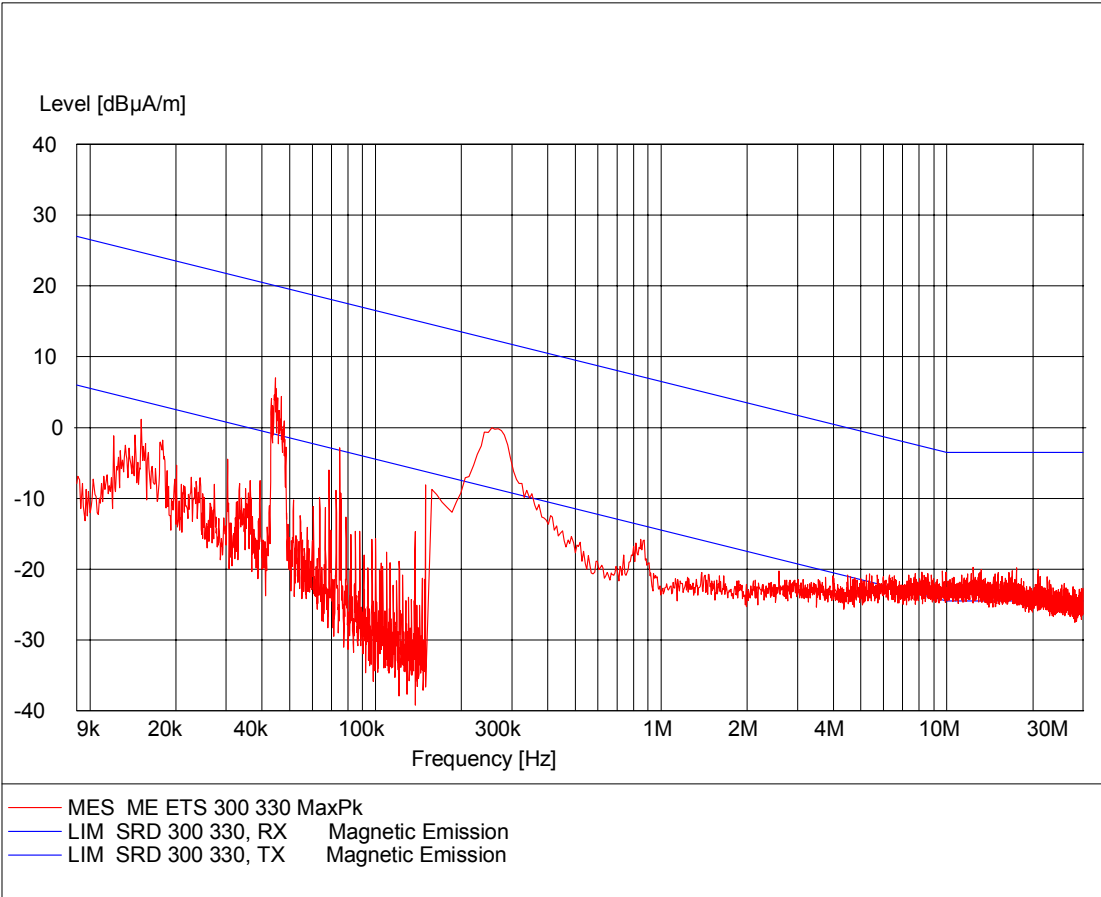
Photo 2 Measurement <30 MHz on OATS.

Annex 3

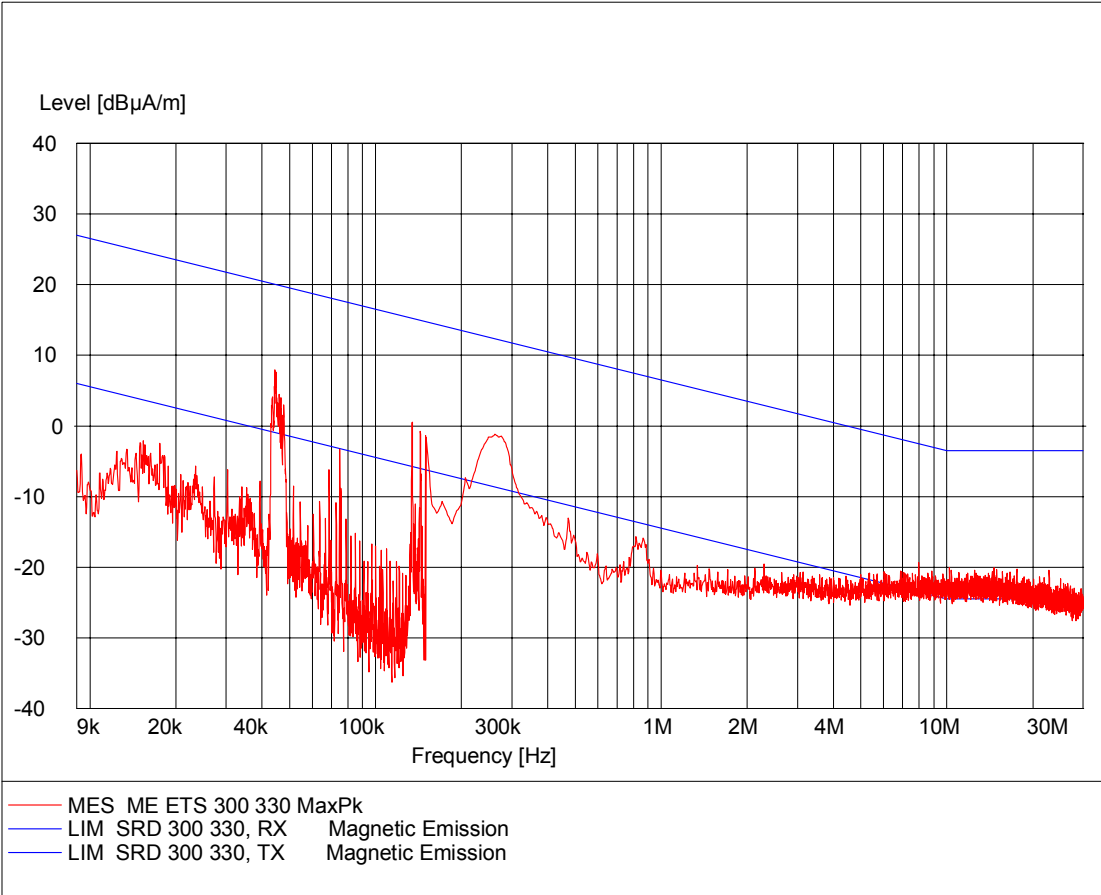
Plots of spurious emission <30 MHz

(3 pages)

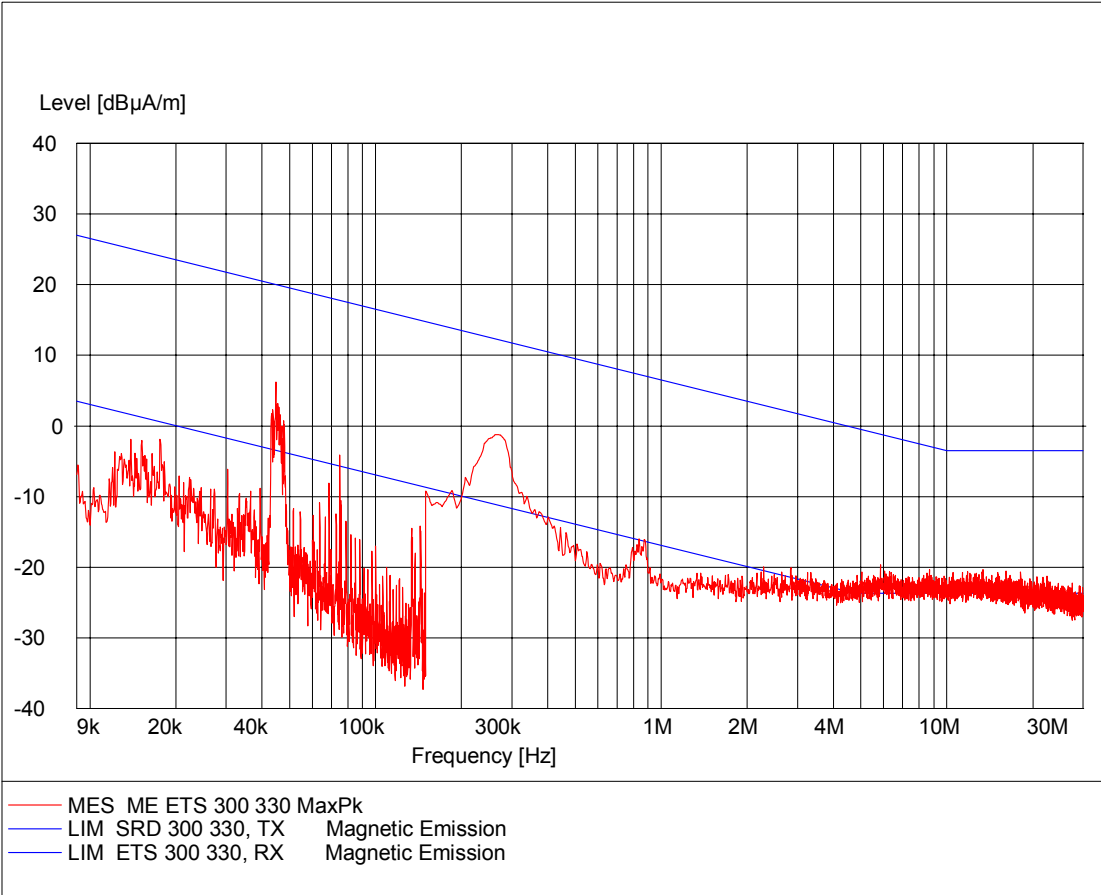
EUT: BACKGROUND
Manufacturer: Widex
Operating Condition: ant 0 deg. Distance 10 meter
Test Site: EMC-5
Operator: HEN - A502939
Test Specification: ETSI 300 330
Comment: Sheet 5
Start of Test: 2005-04-27



EUT: RC3
Manufacturer: Widex
Operating Condition: ant 0 deg. Distance 10 meter
Test Site: EMC-5
Operator: HEN - A502939
Test Specification: ETSI 300 330
Comment: Sheet 6
Start of Test: 2005-04-27



EUT: RC3
Manufacturer: Widex
Operating Condition: ant 90 deg. Distance 10 meter
Test Site: EMC-5
Operator: HEN - A502939
Test Specification: ETSI 300 330
Comment: Sheet 7
Start of Test: 2005-04-27

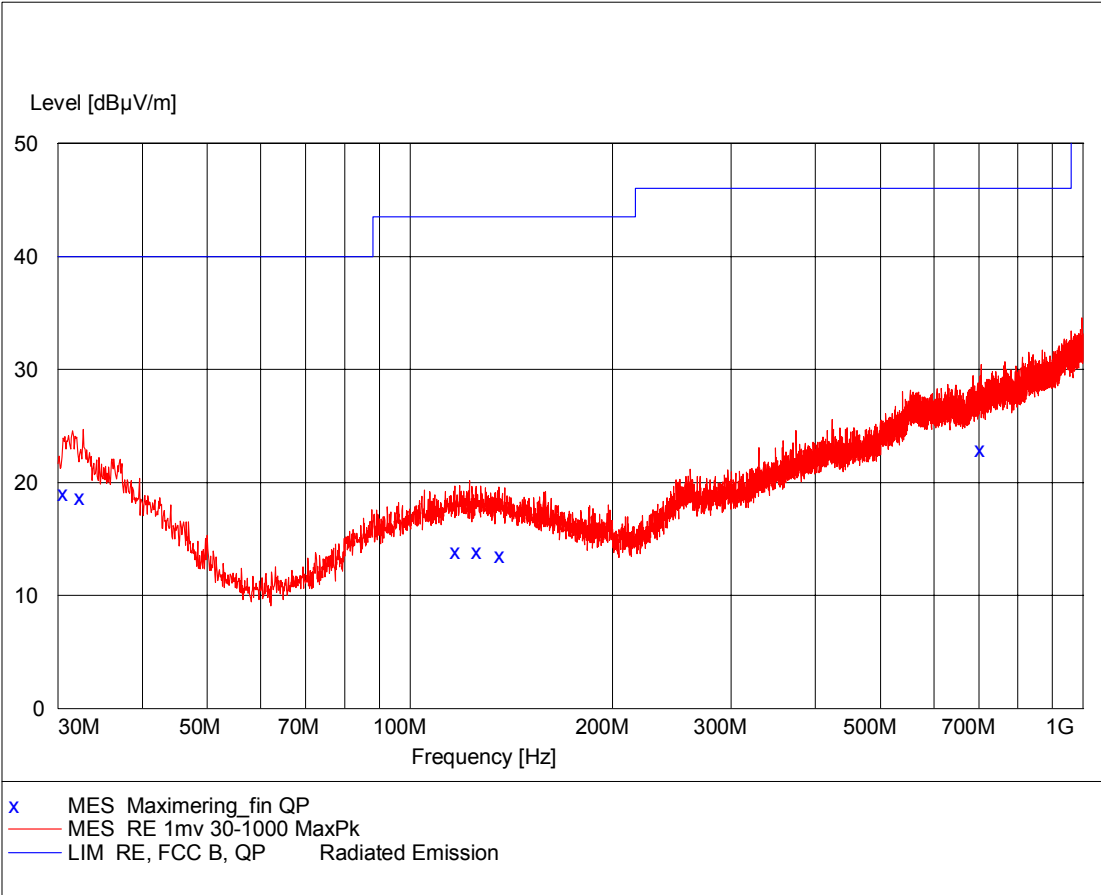


Annex 4

Plots of spurious emission 30-1000 MHz

(2 pages)

EUT: RC3
Manufacturer: Widex
Operating Condition: Ant. 1 m vertical
Test Site: EMC-5
Operator: HEN - A502939
Test Specification: FCC B
Comment: Sheet 8
Start of Test: 2005-05-27



MEASUREMENT RESULT: "Maximering_fin QP"
2005-05-27 10:48

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
30.600000	19.00	20.9	40.0	21.0	180.0	266.00	VERTICAL
32.400000	18.70	19.8	40.0	21.3	400.0	91.00	VERTICAL
117.300000	13.90	14.3	43.5	29.6	387.0	92.00	HORIZONTAL
126.100000	13.90	14.4	43.5	29.6	169.0	119.00	HORIZONTAL
136.500000	13.50	14.2	43.5	30.0	214.0	4.00	VERTICAL
706.600000	22.90	25.6	46.0	23.1	149.0	331.00	VERTICAL

EUT: RC3
Manufacturer: Widex
Operating Condition: Ant. 3 m horizontal
Test Site: EMC-5
Operator: HEN - A502939
Test Specification: FCC B
Comment: Sheet 9
Start of Test: 2005-05-27

