

# DELTA Test Report



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## Radio parameter test of RC-1

### Performed for GN Hearing A/S

DANAK-1910856, Rev. C

Project no.: A506404-4

Page 1 of 52

15 April 2010

#### DELTA

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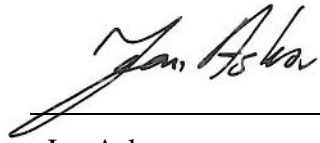
[www.delta.dk](http://www.delta.dk)

VAT No. 12275110

Title	Radio parameter test of RC-1
Test object	RC-1
Report no.	DANAK-1910856, Rev. C
Project no.	A506404-4
Test period	22 December 2009 to 13 April 2010
Client	GN Hearing A/S Lautrupbjerg 7 2750 Ballerup Denmark Tel.: +45 45 75 11 11
Contact person	Vinnie Nørager E-mail: vnoerager@gnresound.dk
Manufacturer	GN Hearing A/S
Specifications	FCC CFR 47 Part 15, Subpart C
Results	The test objects were found to be in compliance with the specifications, as listed in Section 1
Test personnel	Claus Momme Thomsen Jan Askov

Date 15 April 2010

Project Manager



Jan Askov  
Senior Specialist, Wireless  
DELTA

Responsible



Claus Rømer Andersen  
Team Manager, Wireless  
DELTA

This report is a revision of the test report A506404-4 Rev. B dated 14 April 2010.

The revision has been made due to the following:

Added tabular values for band edge measurements on page 32, 36 and 40.

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## 1. Summary of tests

Tests	Test methods	Rule Section	Results
Peak to Average Correction Factor (PACF)		15.35(c)	N.A.
Antenna requirement	Visual inspection	15.203	Passed
Measurements of radiated emission	ANSI C63.4:2003	15.209	Passed
Measurement of band edge compliance	ANSI C63.4:2003	15.215(c)	Passed
Measurement of field strength of fundamental	ANSI C63.4:2003	15.249	Passed

The given result is based on a shared risk principle with respect to the measurement uncertainty.

### Conclusion

The test objects mentioned in this report meet the requirements of the standard stated below.

- FCC CFR 47 Part 15, Subpart C  
Specific rule part 15.249.

The test results relate only to the objects tested.

## 2. Test objects

### 2.1 Test objects

#### Test object 2.1.1

Name of test object	RC-1
Model / type	RC-1
Part no.	RC-001
Serial no.	EMC 3-Spurious Emissions
FCC ID	X26RC-1
Manufacturer	GN Hearing A/S
Supply voltage	3 VDC (2 pcs. AAA battery)
Software version	Spurious emission test firmware for RC-1
Cycle time	0.5 ms / 1.0 ms
Comments	-

#### Test object 2.1.2

Name of test object	RC-1
Model / type	RC-1
Part no.	RC2402
Serial no.	EMC 3-Conducted
FCC ID	X26RC-1
Manufacturer	GN Hearing A/S
Supply voltage	3 VDC (2 pcs. AAA battery)
Software version	Spurious emission test firmware for RC-1
Cycle time	0.5 ms / 1.0 ms
Comments	Antenna replaced by SMA connector and supplied by external power supply



### 3. General test conditions

#### 3.1 Test setup during test

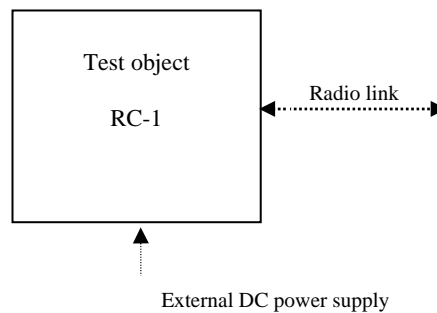


Figure 3.1.1 Block diagram of test object.

All test objects were running special test software.

During test, the test objects were in continuous TX mode. (Normal modulation, normal data packets with optimized repetition rate)

Tests were performed at three frequencies

- Low frequency: 2404 MHz
- Middle frequency: 2441 MHz
- High frequency: 2478 MHz.

During relevant tests, the battery was replaced by an external DC power supply.

##### **Intended use**

RC-1 is used as a remote control for hearing aids.

##### **Size of the test object**

The test object measures 90 x 40 x 15 mm.



### 3.2 Description of radio link

The radio of the test object has the following specified RF parameters:

Antenna	:	PCB antenna
Operating frequency range	:	2402 to 2478 MHz
Transmit power	:	0 dBm
Power level	:	No
No of channels	:	20
Bandwidth (Specification)	:	2 MHz
Channel separation	:	2 MHz
Modulation	:	GFSK
Data rate	:	2 Mbits
Duty cycle	:	10 % during normal mode
Transmit mode	:	Yes
Receive mode	:	Yes
Standby mode	:	Yes
Power supply	:	3 V DC AAA battery Specified min voltage: 2.55 V DC Specified max voltage: 3.0V DC
Temperature category	:	-20 to +55 °C.





### 3.3 Test sequence

The tests described in this test report were performed in the following sequence:

1. Measurement of spurious emission
2. Measurement of Peak to Average Correction Factor (PACF)
3. Measurement of band edge compliance
4. Antenna requirement
5. Measurement of spurious emission.
6. Measurement of radiated emission, 0.009-30 MHz



## 4. Test results

### 4.1 Peak to Average Correction Factor (PACF)

Test object	RC-1	Sheet	PACF-1
Type	RC-1	Project no.	A506404-4
Serial no.	EMC 3-Conducted	Date	22 Dec. 2009
Client	GN Hearing A/S	Initials	JAS
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.35(c)		
Characteristics	Temperature: 24 °C. Test voltage: 3.0 V DC		
Test equipm.	49550 49183 49299 Uncertainty: 1•10 <sup>-7</sup>		
SA Settings	RBW: 3 MHz VBW: 10 MHz SPAN: Zero-2ms DET: Peak CF: 2441 MHz Trace: Max Hold		

The measured value for the duty cycle (DC):

Max. Tx on time: 205.1 µs – Delta 3 (T1)

Period: 1176.3µs – Delta 2 (T1).

The calculated duty cycle is:

DC:  $(205.1 \mu\text{s} / 1176.3 \mu\text{s}) \cdot 100\% = 17.4 \%$ .

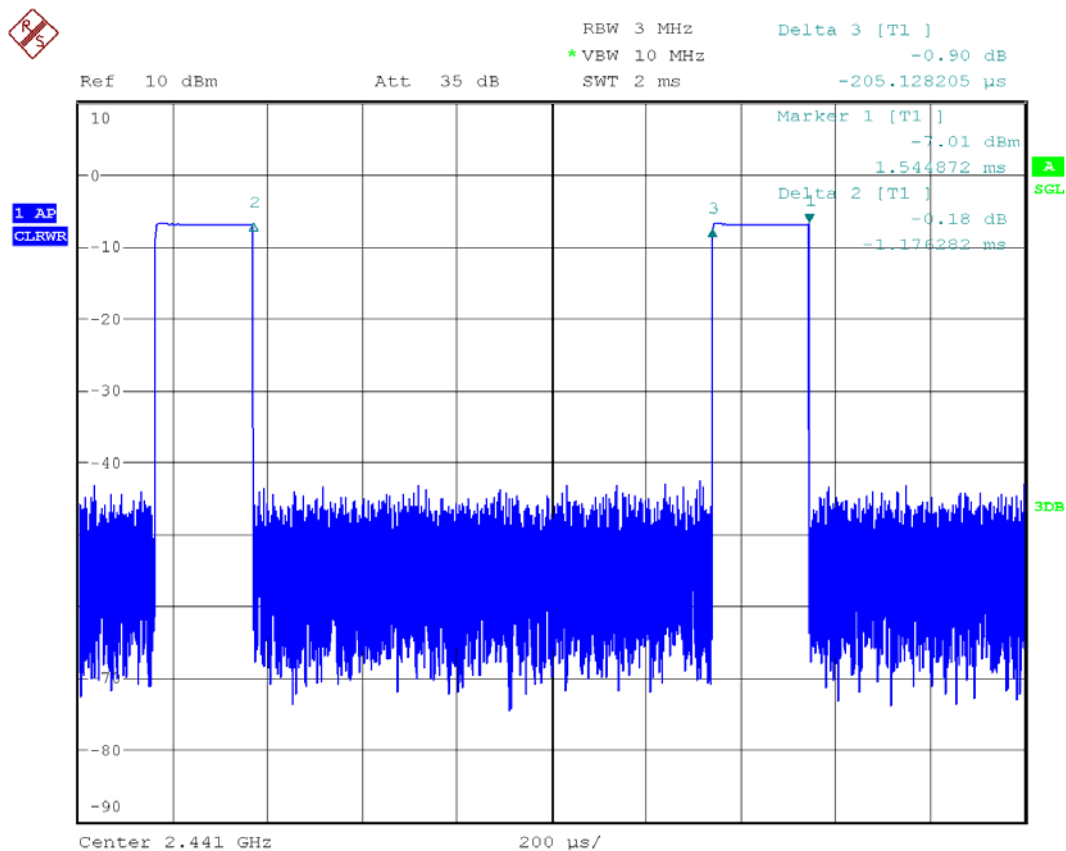
This corresponds to a Peak to Average Correction Factor of:

PACF:  $20 \log (0.174) = 15.2 \text{ dB}$ .

This is according to FCC CFR 47 Part 15, Subpart C, Section 15.35(c) for one complete pulse train, including blanking intervals and the pulse train do not exceed 0.1 seconds.

This PACF can be subtracted from the peak measurements to obtain the average values.





Date: 22.DEC.2009 12:02:47

Comments

Operating frequency is 2441 MHz, measured conducted



## 4.2 Antenna requirement

Test object	RC-1	Sheet	ANT-1
Type	RC-1	Project no.	A506404-4
Serial no.	EMC 3-Spurious Emissions	Date	25 Mar. 2010
Client	GN Hearing A/S	Initials	JAS
Specification	FCC CFR 47 Part 15, Subpart C Section 15.203		

Test method	Visual inspection
<p><b>Evaluation criteria</b>          Section 15.203 of the rules states that the subject device must meet at least one of the following criteria:          (a) Antenna must be permanently attached to the unit.          (b) Antenna must use a unique type of connector to attach to the unit.          (c) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.</p> <p><b>Evaluation result</b>          The RC-1 has a PCB antenna.</p>	

Evaluation result                      The test object meets evaluation criterion (a)

Compliant                                Yes

Comments                                None



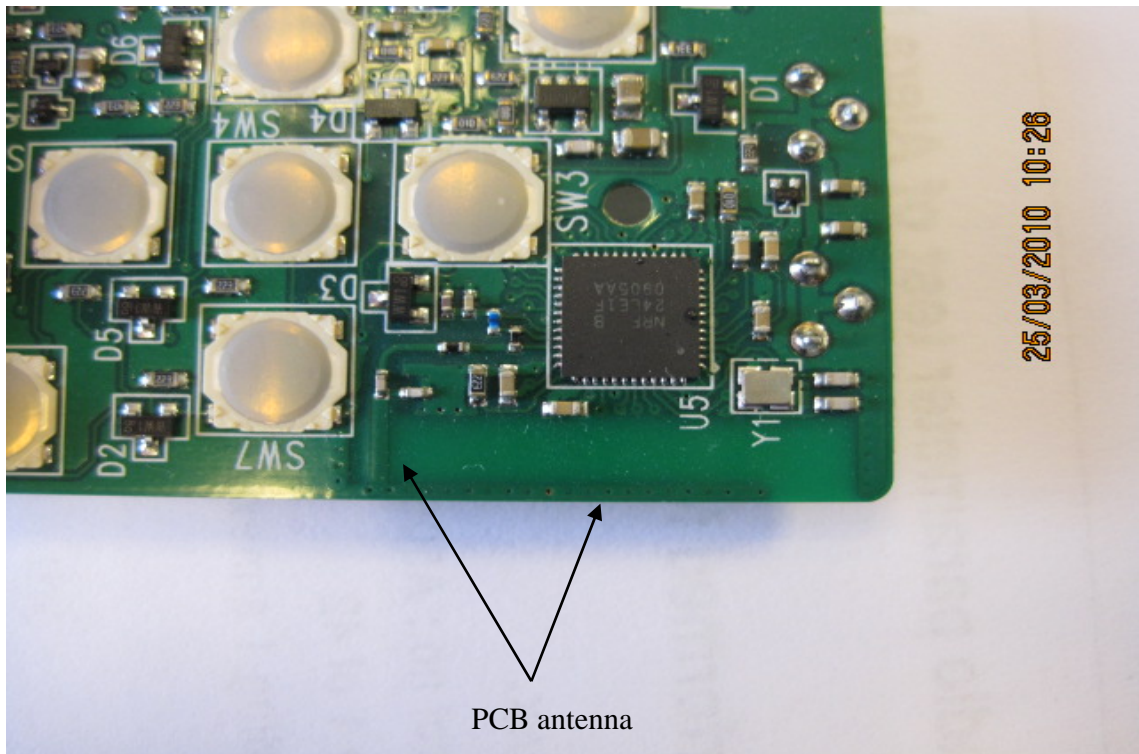


Photo 4.2.1 Test setup regarding measurement of Antenna requirement.

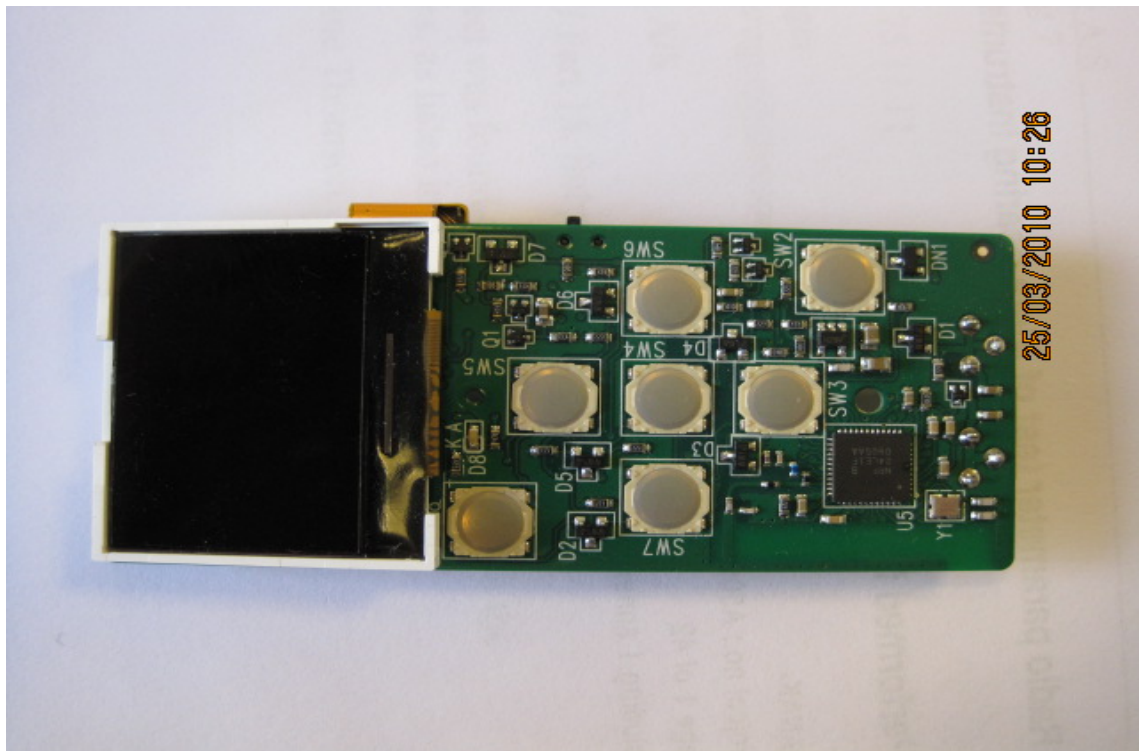
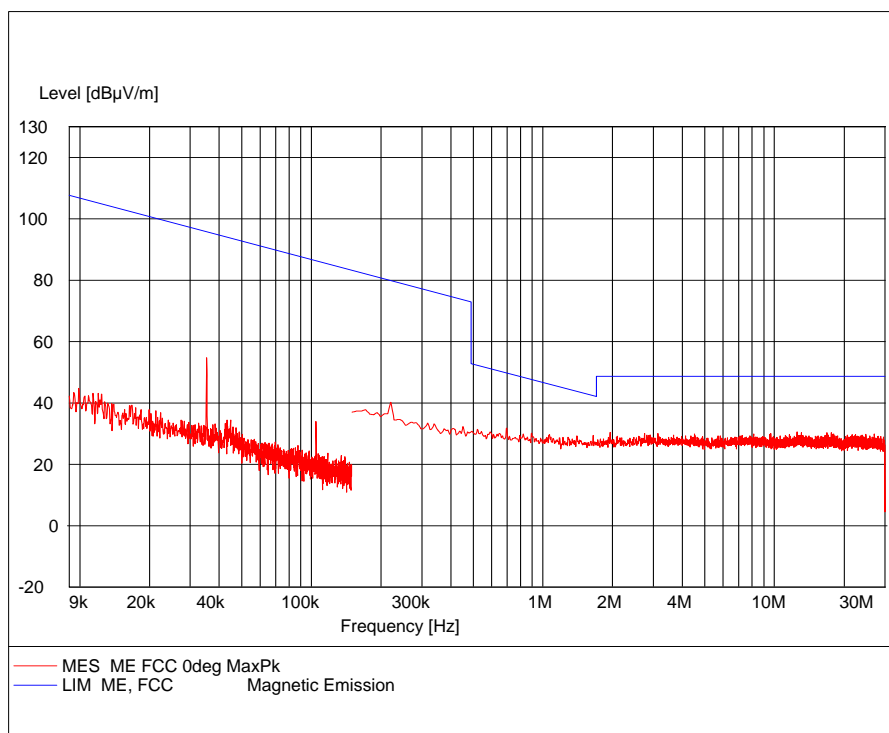


Photo 4.2.2 Test setup regarding measurement of Antenna requirement

### 4.3 Measurement of radiated emission, 0.009-30 MHz

Test object	RC-1	Sheet	ME-1
Type	RC-1	Project no.	A506404-1
Serial no.	EMC 3-Spurious Emissions	Date	13 Apr. 2010
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	0.009-30 MHz

Test method	ANSI C63.4:2003	Temperature	22 °C
Characteristics	Loop antenna pos. X. Antenna distance 10 m.	Humidity	29 % RH
Detector	Peak	Bandwidth	200 Hz / 9 kHz
Test equipm.	EMI room Hørsholm 49600 29332	Uncertainty	4 dB



Test result

The measured field strengths are below the limit

Compliant

Yes

Comments

Test frequency: 2441 MHz.

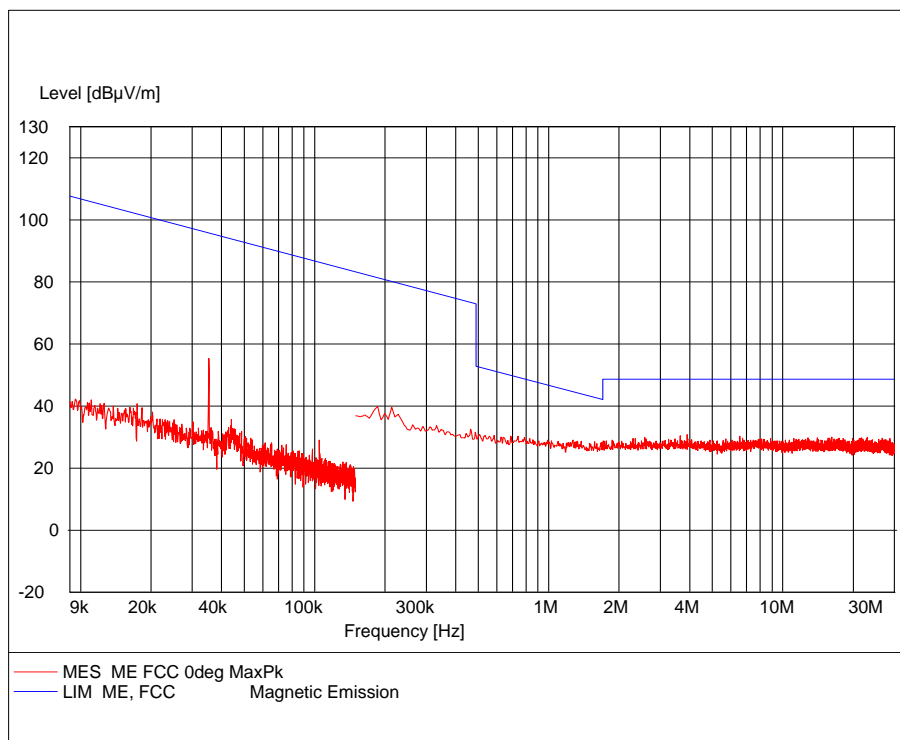
The limit has been extrapolated to 10 m using an extrapolation factor of 40 dB / decade as specified in §15.31(f)(2):

$$L_2 = L_1 + 40 \cdot \log_{10}(D_1/D_2)$$



Test object	RC-1	Sheet	ME-2
Type	RC-1	Project no.	A506404-1
Serial no.	EMC 3-Spurious Emissions	Date	13 Apr. 2010
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	0.009-30 MHz

Test method	ANSI C63.4:2003	Temperature	22 °C
Characteristics	Loop antenna pos. Y. Antenna distance 10 m.	Humidity	29 % RH
Detector	Peak	Bandwidth	200 Hz / 9 kHz
Test equipm.	EMI room Hørsholm 49600 29332	Uncertainty	4 dB

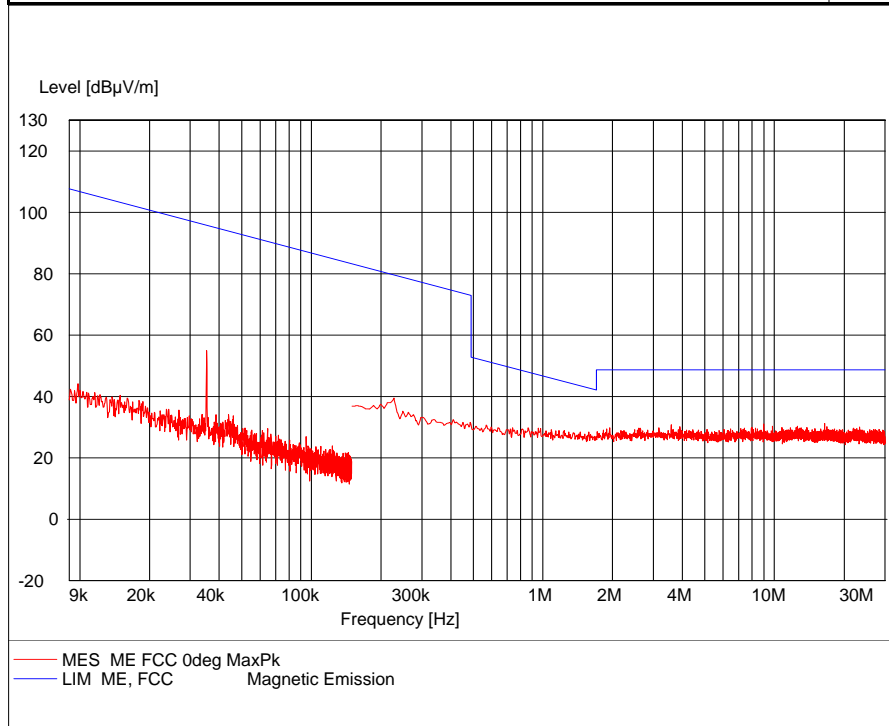


Test result	The measured field strengths are below the limit
Compliant	Yes
Comments	Test frequency: 2441 MHz. The limit has been extrapolated to 10 m using an extrapolation factor of 40 dB / decade as specified in §15.31(f)(2): $L_2 = L_1 + 40 \cdot \log_{10}(D_1/D_2)$



Test object	RC-1	Sheet	ME-3
Type	RC-1	Project no.	A506404-1
Serial no.	EMC 3-Spurious Emissions	Date	13 Apr. 2010
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	0.009-30 MHz

Test method	ANSI C63.4:2003	Temperature	22 °C
Characteristics	Loop antenna pos. Z. Antenna distance 10 m.	Humidity	29 % RH
Detector	Peak	Bandwidth	200 Hz / 9 kHz
Test equipm.	EMI room Hørsholm 49600 29332	Uncertainty	4 dB



Test result                      The measured field strengths are below the limit

Compliant                      Yes

Comments                      Test frequency: 2441 MHz.  
The limit has been extrapolated to 10 m using an extrapolation factor of 40 dB / decade as specified in §15.31(f)(2):  

$$L_2 = L_1 + 40 \cdot \log_{10}(D_1/D_2)$$



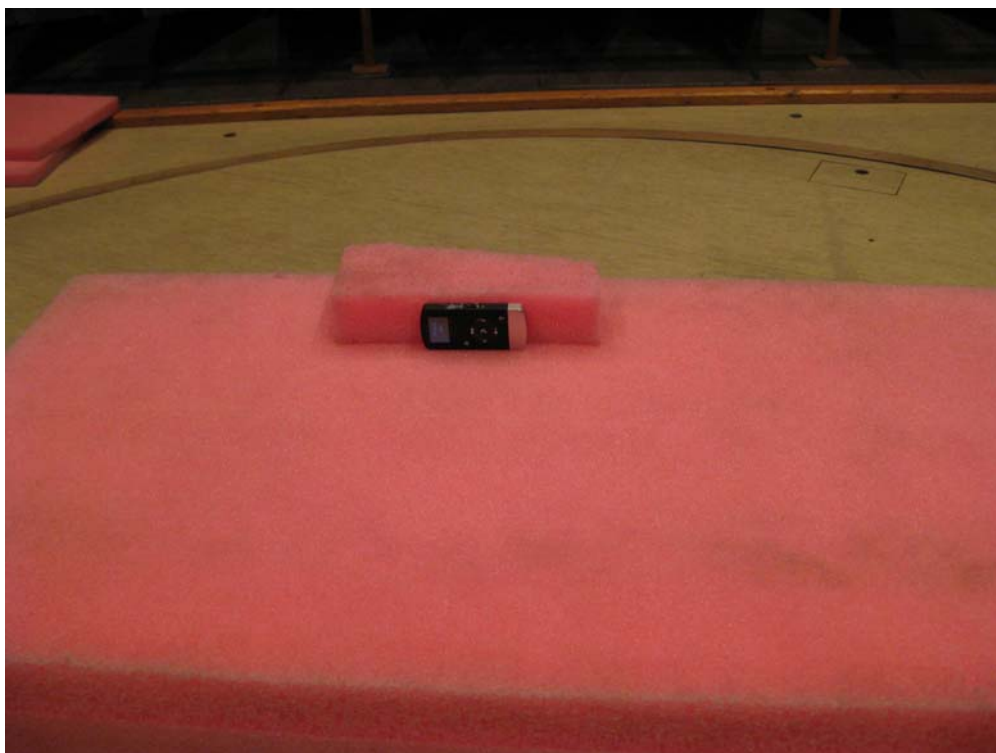


Photo 4.3.1 Test setup regarding measurement of radiated emission, 0.009-30 MHz.

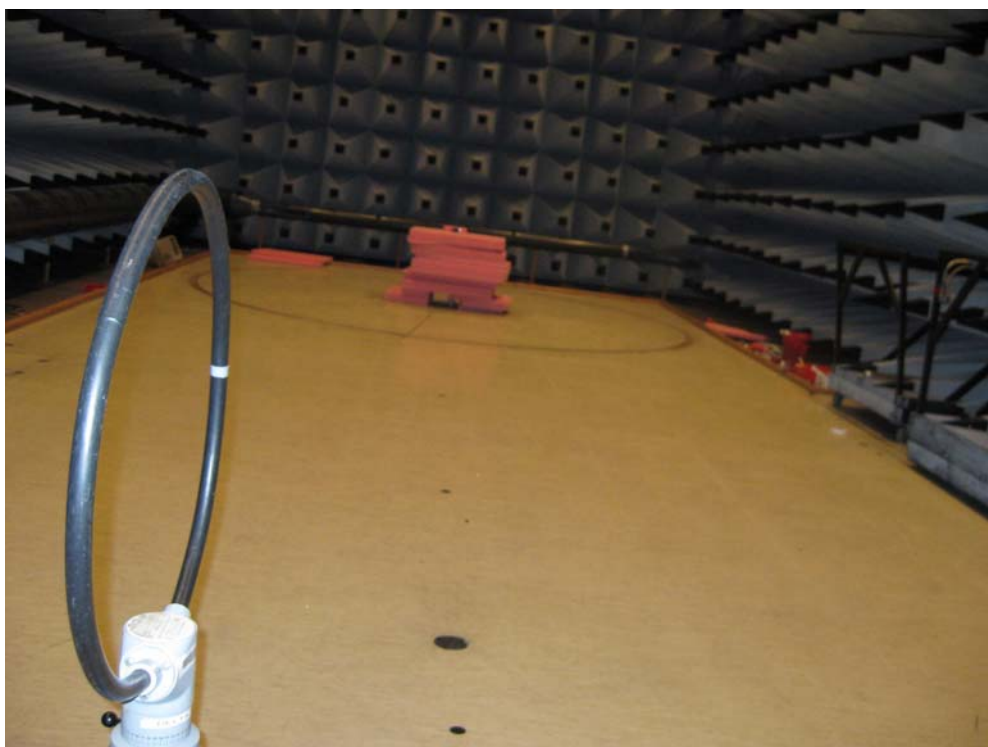


Photo 4.3.2 Test setup regarding measurement of radiated emission, 0.009-30 MHz.

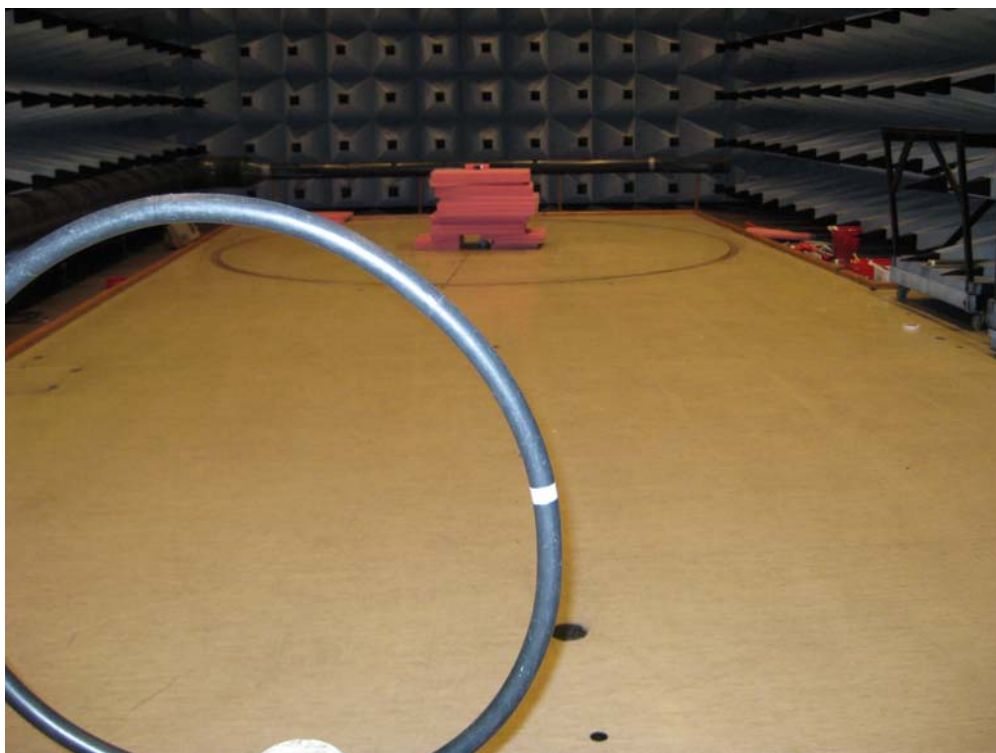


Photo 4.3.3 Test setup regarding measurement of radiated emission, 0.009-30 MHz.



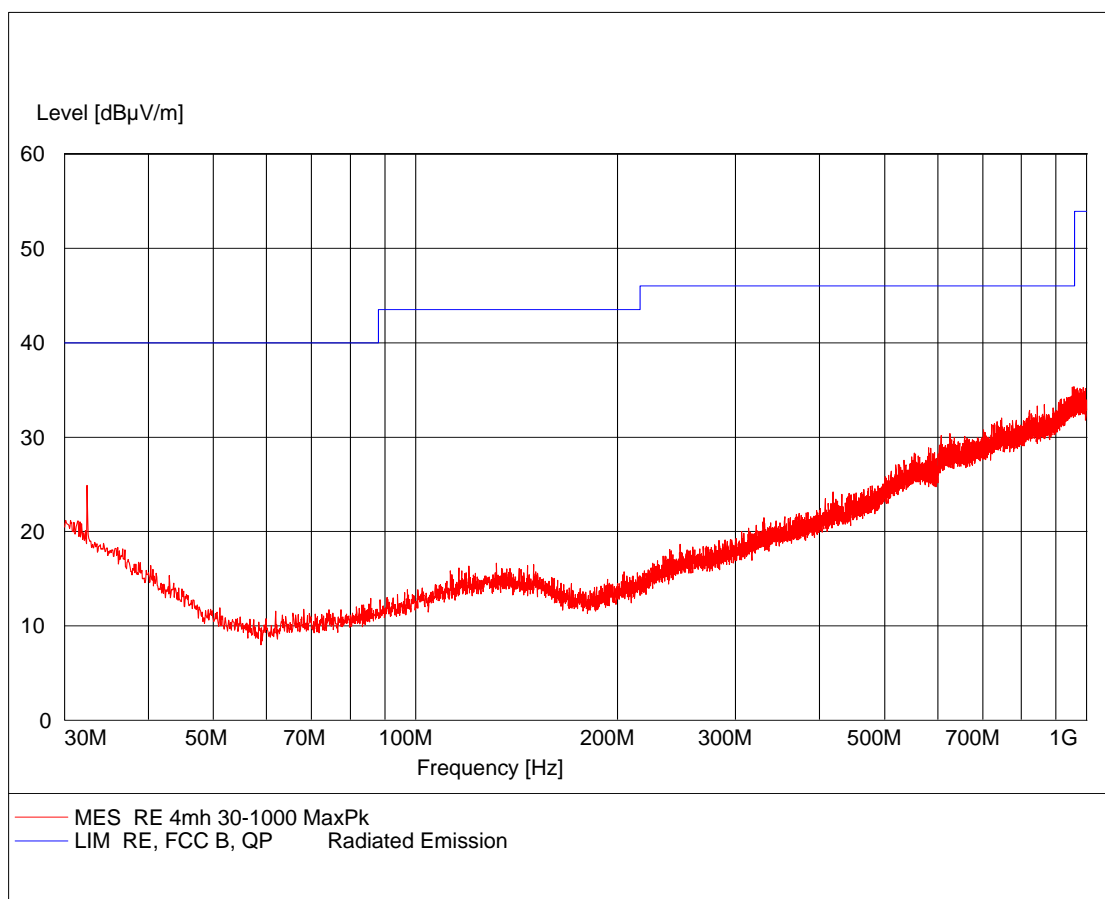
Photo 4.3.4 Test setup regarding measurement of radiated emission, 0.009-30 MHz.



#### 4.4 Measurement of radiated emission, 30 MHz to 1000 MHz

Test object	RC-1	Sheet	RE_Spur-1
Type	RC-1	Project no.	A506404-4
Serial no.	EMC 3-Spurious Emissions	Date	1 Dec. 2009
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	30-1000 MHz

Test method	ANSI C63.4:2003	Temperature	22 °C
Characteristics	Pre-scan, Antenna at 3 m, 4 m height, hor. pol.	Humidity	31 % RH
Detector	Peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty	4.9 dB



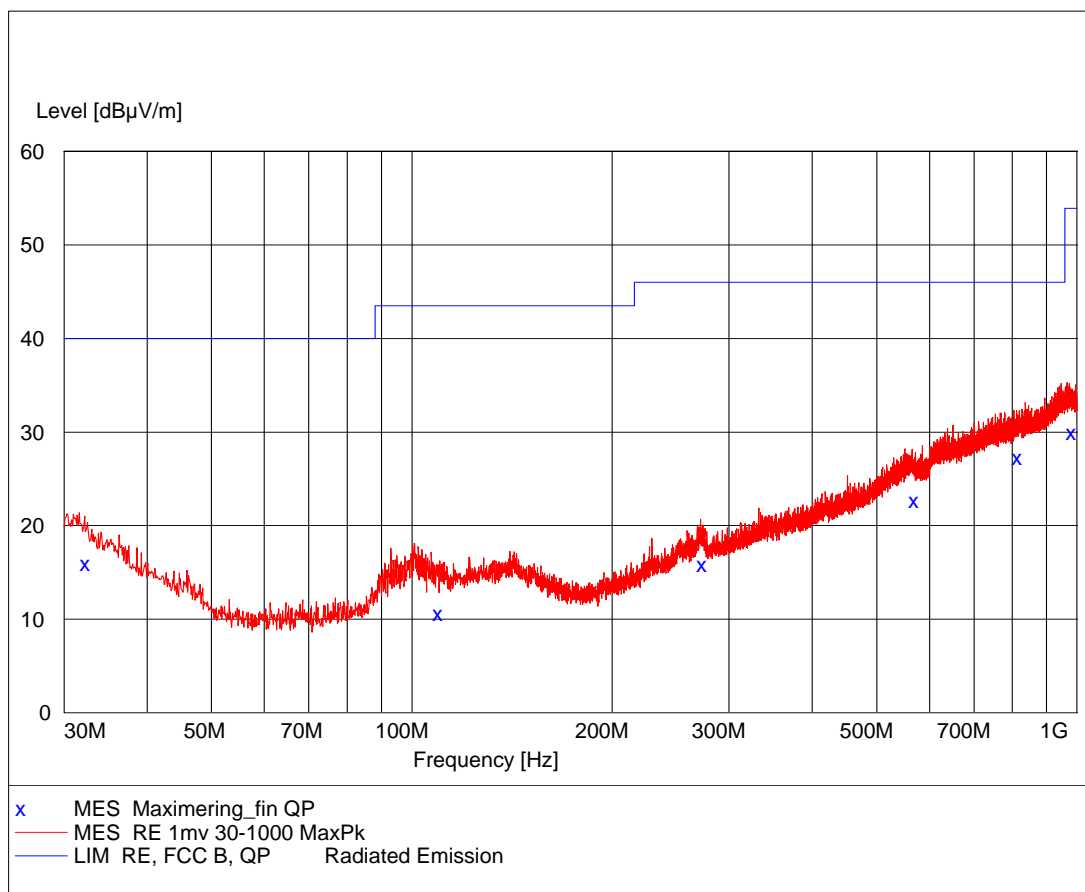
Comments

Operating frequency 2402 MHz



Test object	RC-1	Sheet	RE_Spur-2
Type	RC-1	Project no.	A506404-4
Serial no.	EMC 3-Spurious Emissions	Date	1 Dec. 2009
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	30-1000 MHz

Test method	ANSI C63.4:2003	Temperature	22 °C
Characteristics	Pre-scan, Antenna at 3 m, 1 m height, vert. pol.	Humidity	31 % RH
Detector	Peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 2979729861 49183 49299	Uncertainty	4.9 dB



## Comments

Operating frequency 2402 MHz

Test object	RC-1	Sheet	RE_Spur-3
Type	RC-1	Project no.	A506404-4
Serial no.	EMC 3-Spurious Emissions	Date	1 Dec. 2009
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	30-1000 MHz

Test method	ANSI C63.4:2003	Temperature	22 °C
Characteristics	Peak search ant. at 3 m, height: 1-4 m, v/h pol.	Humidity	31 % RH
Detector	Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797      29861      49183 49299	Uncertainty	4.9 dB

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
32.400000	16.00	17.8	40.0	24.0	167.0	101.00	VERTICAL
109.900000	10.60	12.4	43.5	32.9	117.0	267.00	VERTICAL
274.300000	15.80	15.5	46.0	30.2	103.0	77.00	VERTICAL
571.500000	22.70	23.5	46.0	23.3	244.0	22.00	HORIZONTAL
817.800000	27.30	26.9	46.0	18.7	385.0	317.00	HORIZONTAL
985.600000	30.00	29.6	53.9	23.9	218.0	5.00	VERTICAL

Test result                      The measured field strengths are below the limit

Test Port                        Enclosure

Test frequency                2402 MHz

Test mode                      Continuous Tx - normal modulation - hopping on

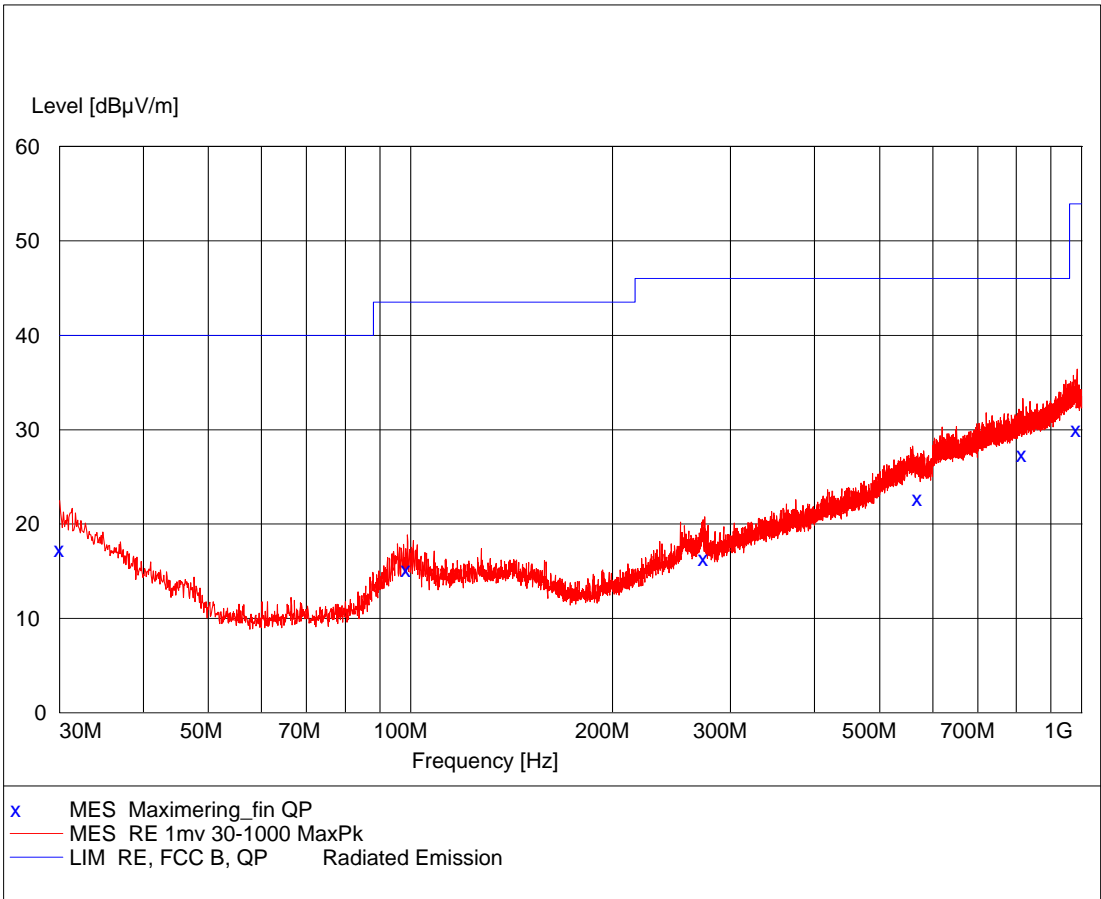
Condition                       Normal

Compliant                      Yes

Comments                      Final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation

Test object	RC-1	Sheet	RE_Spur-4
Type	RC-1	Project no.	A506404-4
Serial no.	EMC 3-Spurious Emissions	Date	30 Nov. 2009
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	30-1000 MHz

Test method	ANSI C63.4:2003	Temperature	22 °C
Characteristics	Pre-scan, Antenna at 3 m, 1 m height, vert. pol.	Humidity	27 % RH
Detector	Peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty	4.9 dB

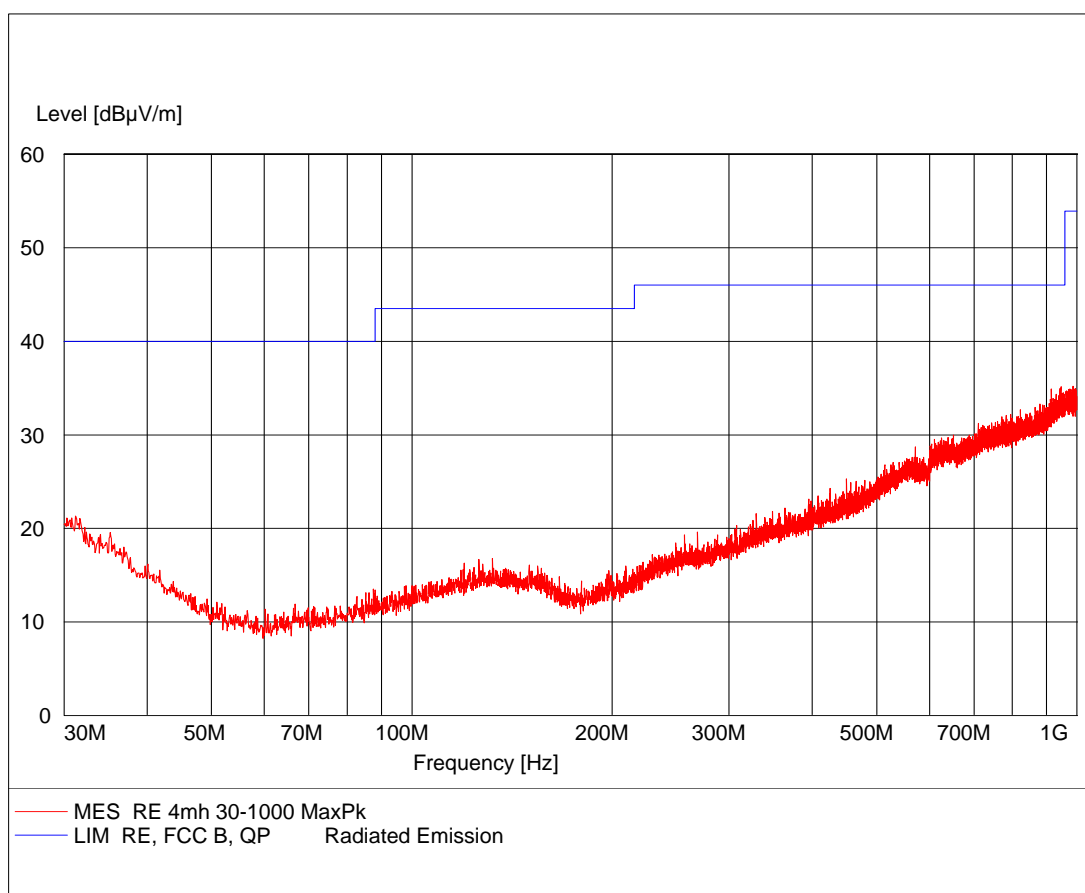


Comments Operating frequency 2441 MHz



Test object	RC-1	Sheet	RE_Spur-5
Type	RC-1	Project no.	A506404-4
Serial no.	EMC 3-Spurious Emissions	Date	30 Nov. 2009
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	30-1000 MHz

Test method	ANSI C63.4:2003	Temperature	22 °C
Characteristics	Pre-scan, Antenna at 3 m, 4 m height, hor. pol.	Humidity	27 % RH
Detector	Peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 2979 29861 49183 49299	Uncertainty	4.9 dB



## Comments

Operating frequency 2441 MHz

Test object	RC-1	Sheet	RE_Spur-6
Type	RC-1	Project no.	A506404-4
Serial no.	EMC 3-Spurious Emissions	Date	30 Nov. 2009
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	30-1000 MHz

Test method	ANSI C63.4:2003	Temperature	22 °C
Characteristics	Peak search ant. at 3 m, height: 1-4 m, v/h pol.	Humidity	27 % RH
Detector	Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty	4.9 dB

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
30.100000	17.30	19.1	40.0	22.7	126.0	194.00	VERTICAL
99.000000	15.20	11.5	43.5	28.3	109.0	168.00	VERTICAL
274.300000	16.40	15.5	46.0	29.6	104.0	72.00	VERTICAL
571.500000	22.70	23.5	46.0	23.3	371.0	139.00	VERTICAL
817.800000	27.40	26.9	46.0	18.6	234.0	292.00	VERTICAL
985.600000	30.00	29.6	53.9	23.9	318.0	284.00	VERTICAL

Test result                      The measured field strengths are below the limit

Test Port                        Enclosure

Test frequency                2441MHz

Test mode                      Continuous Tx - normal modulation - hopping on

Condition                       Normal

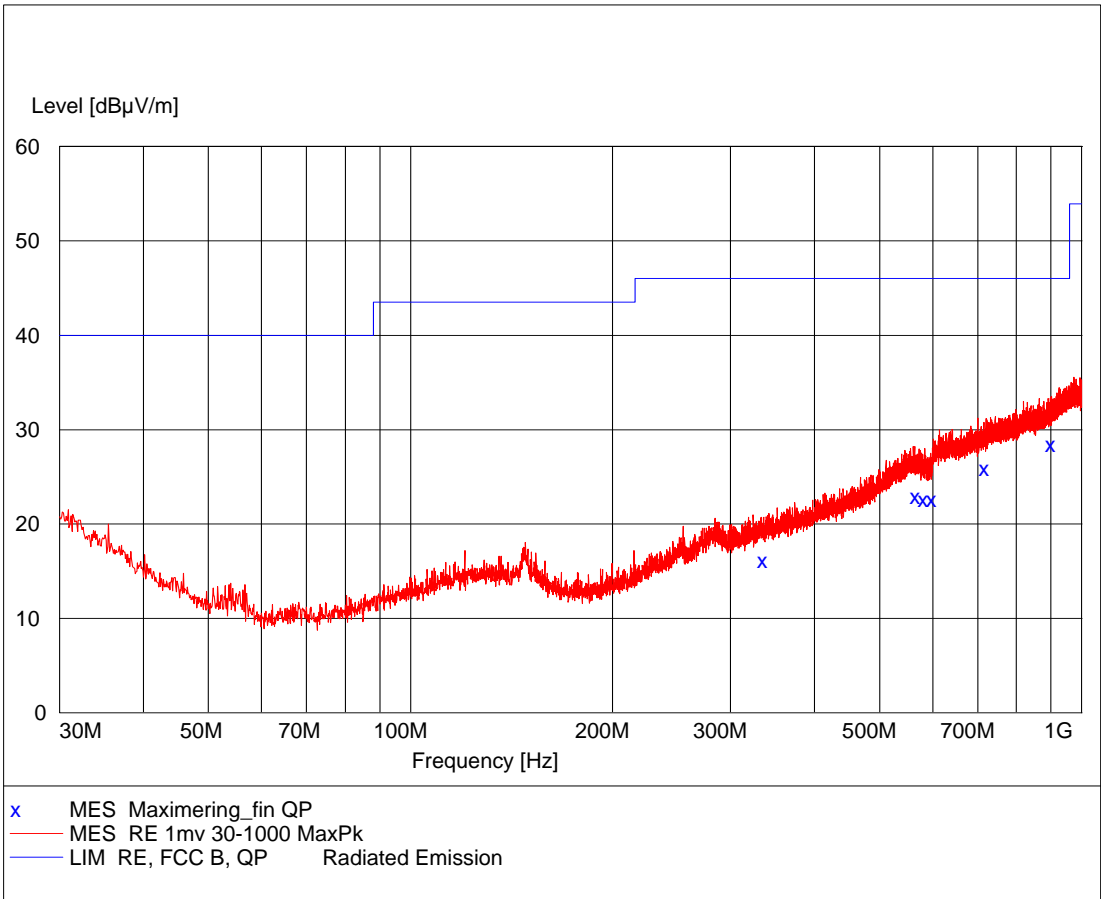
Compliant                      Yes

Comments                      Final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation



Test object	RC-1	Sheet	RE_Spur-7
Type	RC-1	Project no.	A506404-4
Serial no.	EMC 3-Spurus Emissions	Date	27 Nov. 2009
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	30-1000 MHz

Test method	ANSI C63.4:2003	Temperature	24 °C
Characteristics	Pre-scan, Antenna at 3 m, 1 m height, hor. pol.	Humidity	29 % RH
Detector	Peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty	4.9 dB

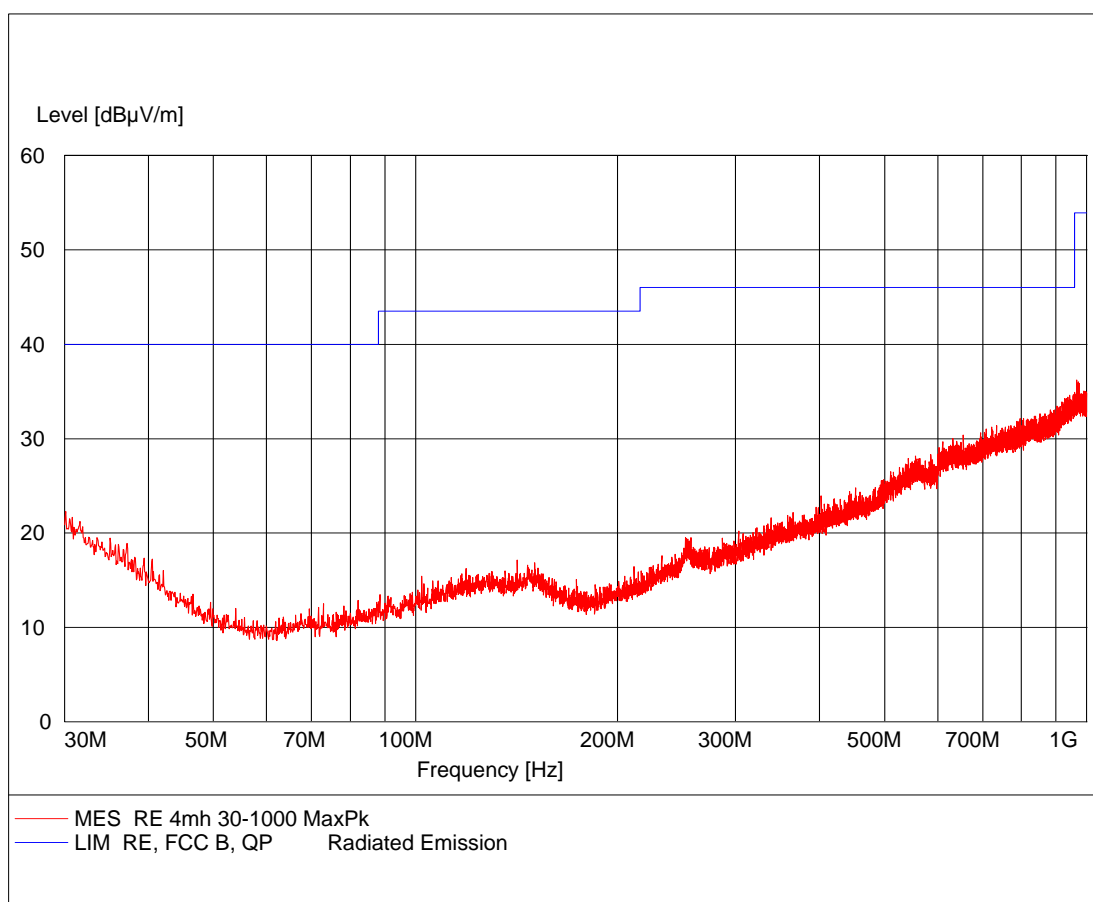


Comments Operating frequency 2478 MHz



Test object	RC-1	Sheet	RE_Spur-8
Type	RC-1	Project no.	A506404-4
Serial no.	EMC 3-Spurious Emissions	Date	27 Nov. 2009
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	30-1000 MHz

Test method	ANSI C63.4:2003	Temperature	24 °C
Characteristics	Pre-scan, Antenna at 3 m, 4 m height, hor. pol.	Humidity	29 % RH
Detector	Peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty	4.9 dB



## Comments

Operating frequency 2478 MHz

Test object	RC-1	Sheet	RE_Spur-9
Type	RC-1	Project no.	A506404-4
Serial no.	EMC 3-Spurious Emissions	Date	27 Nov. 2009
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	30-1000 MHz

Test method	ANSI C63.4:2003	Temperature	24 °C
Characteristics	Peak search ant. at 3 m, height: 1-4 m, v/h pol.	Humidity	29 % RH
Detector	Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty	4.9 dB

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
336.000000	16.10	17.2	46.0	29.9	109.0	165.00	VERTICAL
568.000000	22.90	23.6	46.0	23.1	375.0	0.00	VERTICAL
584.000000	22.60	23.2	46.0	23.4	311.0	191.00	VERTICAL
600.000000	22.60	23.2	46.0	23.4	277.0	135.00	HORIZONTAL
720.000000	25.90	25.4	46.0	20.1	129.0	68.00	HORIZONTAL
904.000000	28.40	27.9	46.0	17.6	400.0	98.00	VERTICAL

Test result	The measured field strengths are below the limit
Test Port	Enclosure
Test frequency	2478 MHz
Test mode	Continuous Tx - normal modulation - hopping on
Condition	Normal
Compliant	Yes
Comments	Final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation



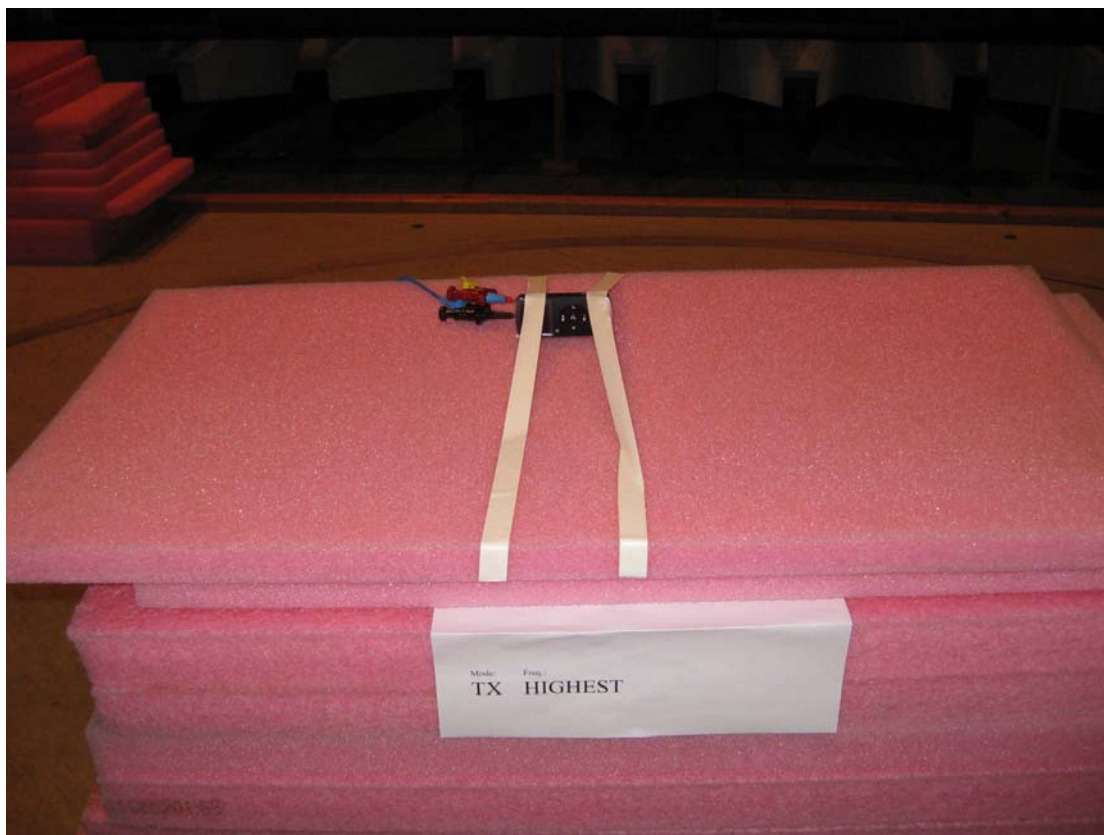


Photo 4.4.1 Test setup regarding measurement of radiated emission.

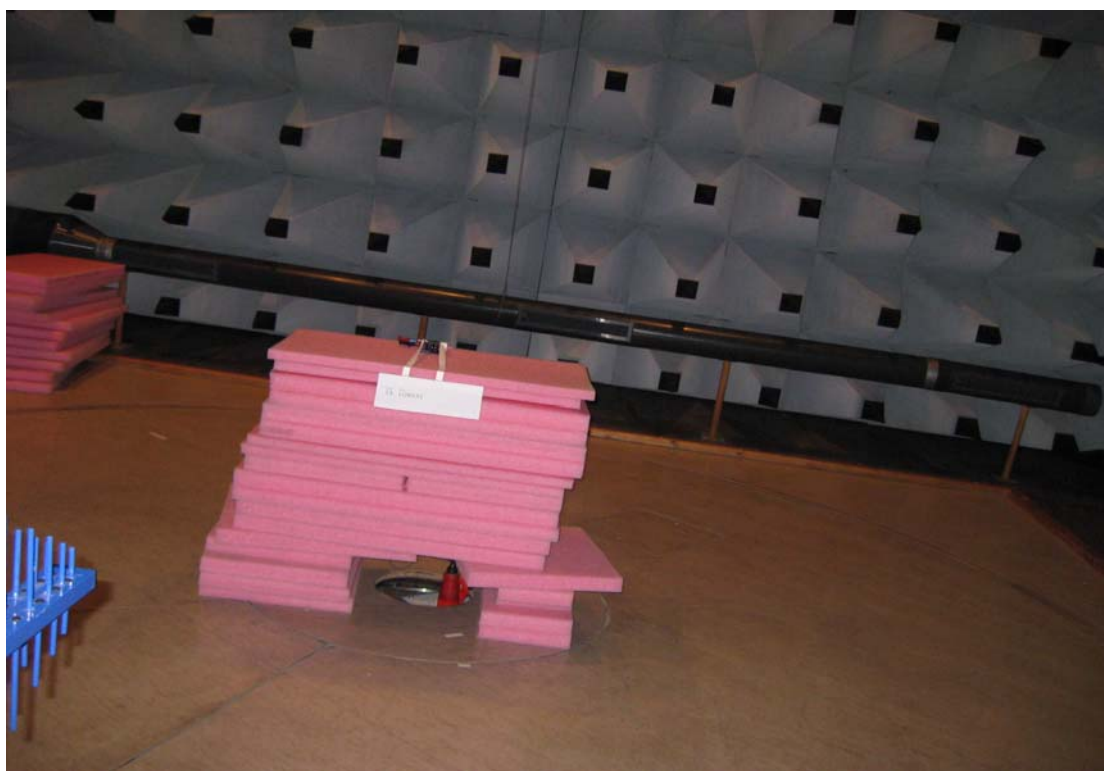


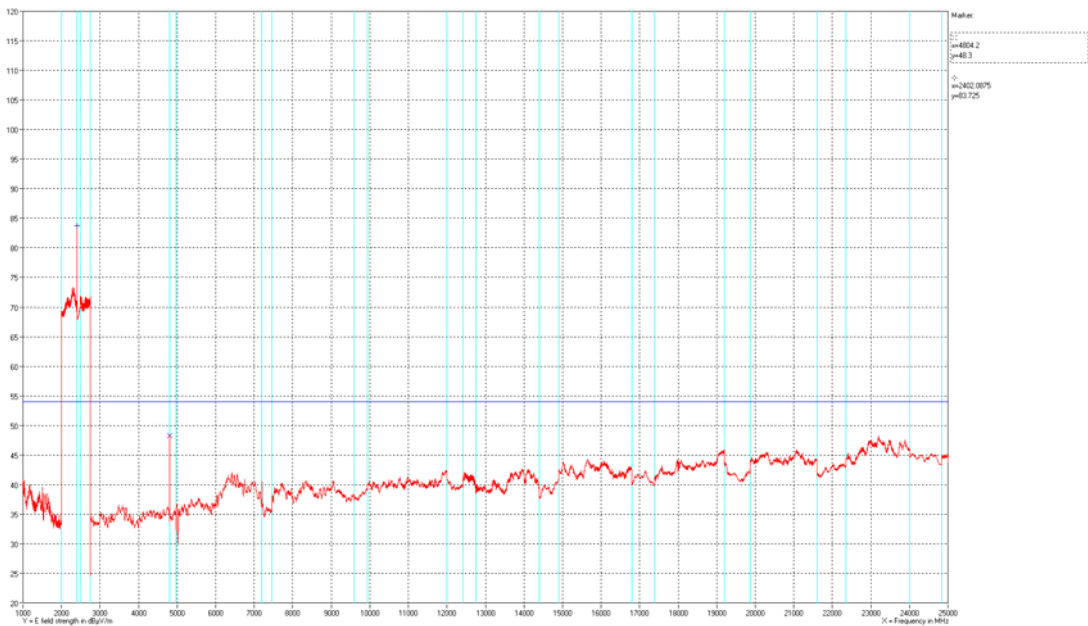
Photo 4.4.2 Test setup regarding measurement of radiated emission.

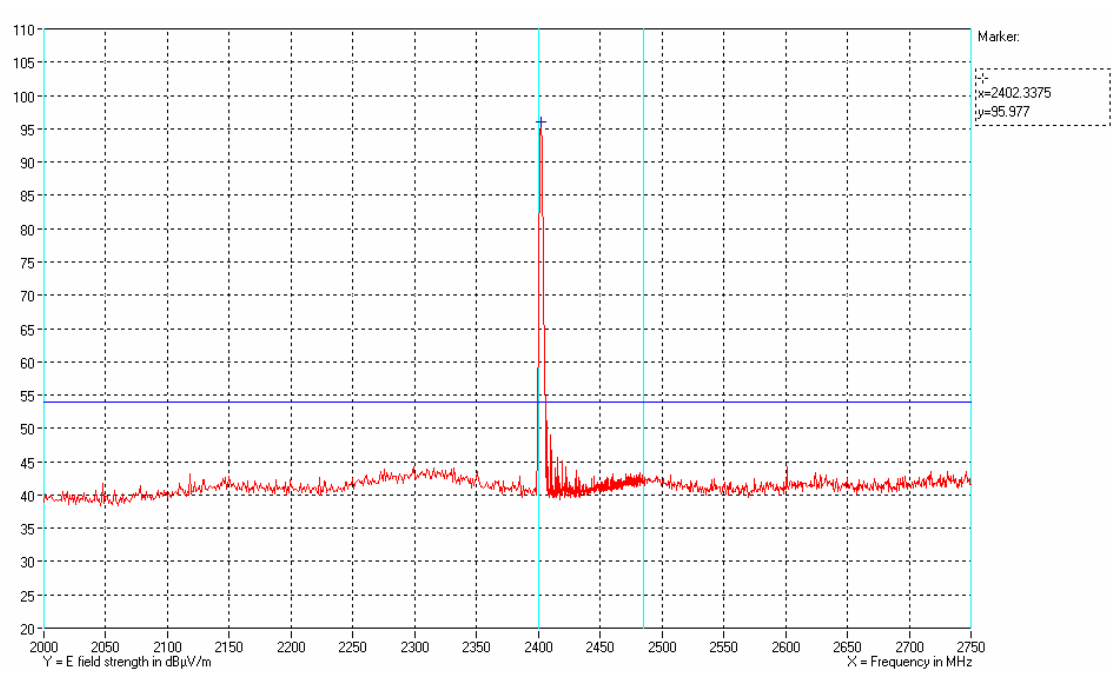


4.5 Measurement of radiated emission, 1 GHz to 25 GHz

Test object	RC-1	Sheet	RE_Spur-10
Type	RC-1	Project no.	A506404-4
Serial no.	EMC 3-Spurious Emissions	Date	6 Nov. 2009
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	1-25 GHz

Test method	ANSI C63.4:2003	Temperature	22 °C
Characteristics	Complete search, Antenna distance 3 m.	Humidity	25 % RH
Detector	Peak and average for 1 GHz to 25 GHz	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49600 49624 49625 49183 49299	Uncertainty	4.9 dB

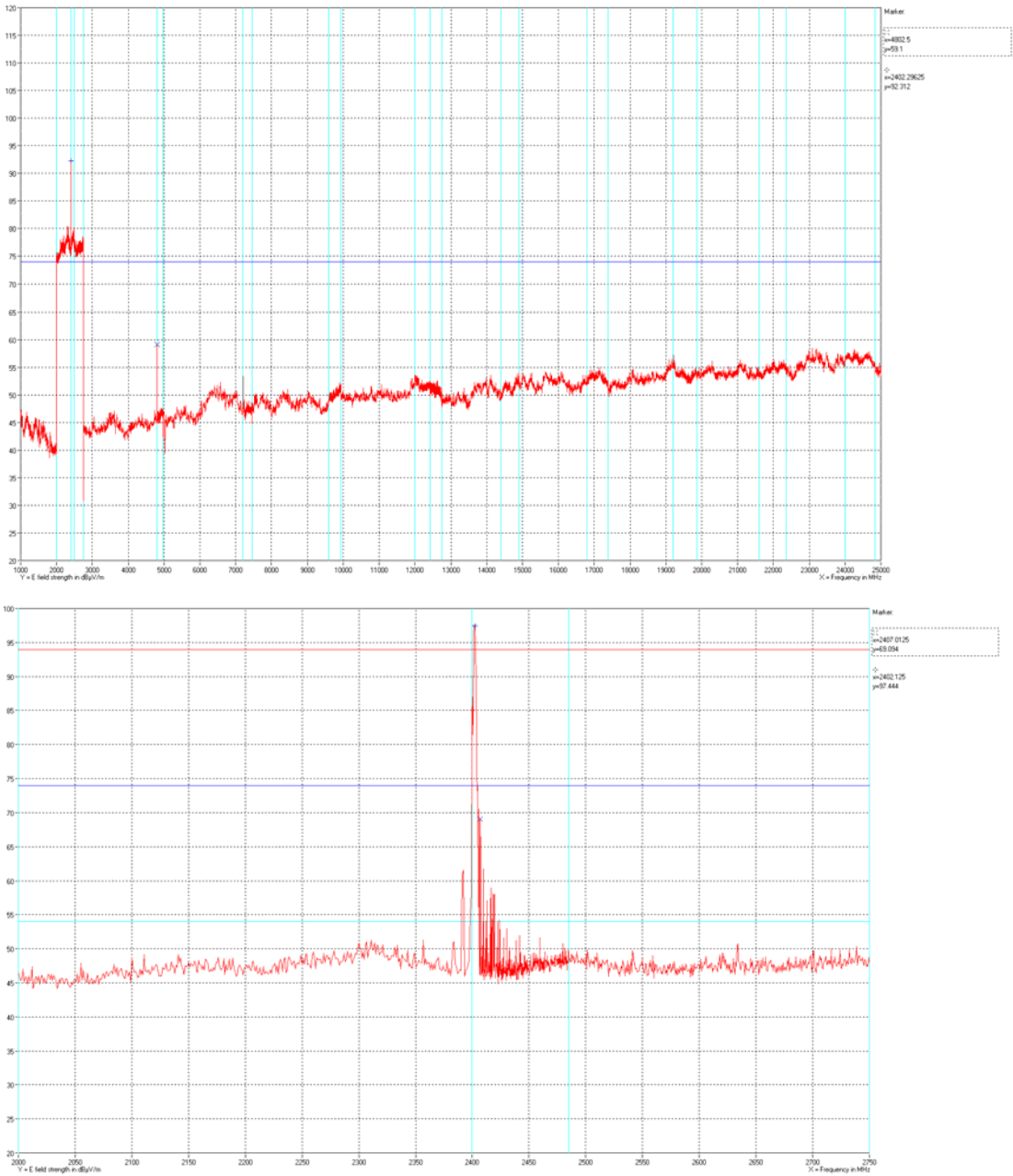




Polarization                      Horizontal and vertical

Comments                      Average





Polarization

Horizontal and vertical

Comments

Peak



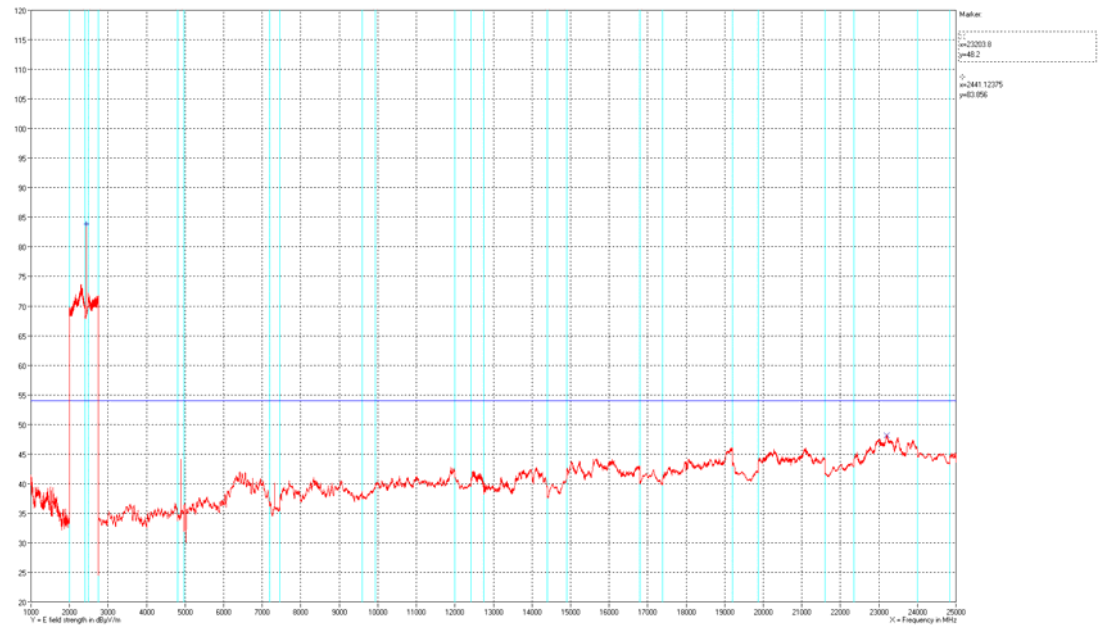
Test result	The measured peak field strengths are below the peak limit (Peak limit = Average limit + 20 dB). The average field strengths are below the average limit. The limits are met at the upper and the lower band edge.		
Test Port	Enclosure		
Test frequency	2402MHz		
Test mode	Continuous Tx - normal modulation - hopping on		
Condition	Normal		
Compliant	Yes		
Comments (Avg/Pk)	Final maximal measurements by variation of turntable azimuth, antenna height and antenna polarization. Measured level at band edge		
	Band edge	2400 MHz	2483.5 MHz
	Average	53.7 dBµV/m	42.0 dBµV/m
	Peak	69.0 dBµV/m	48.3 dBµV/m

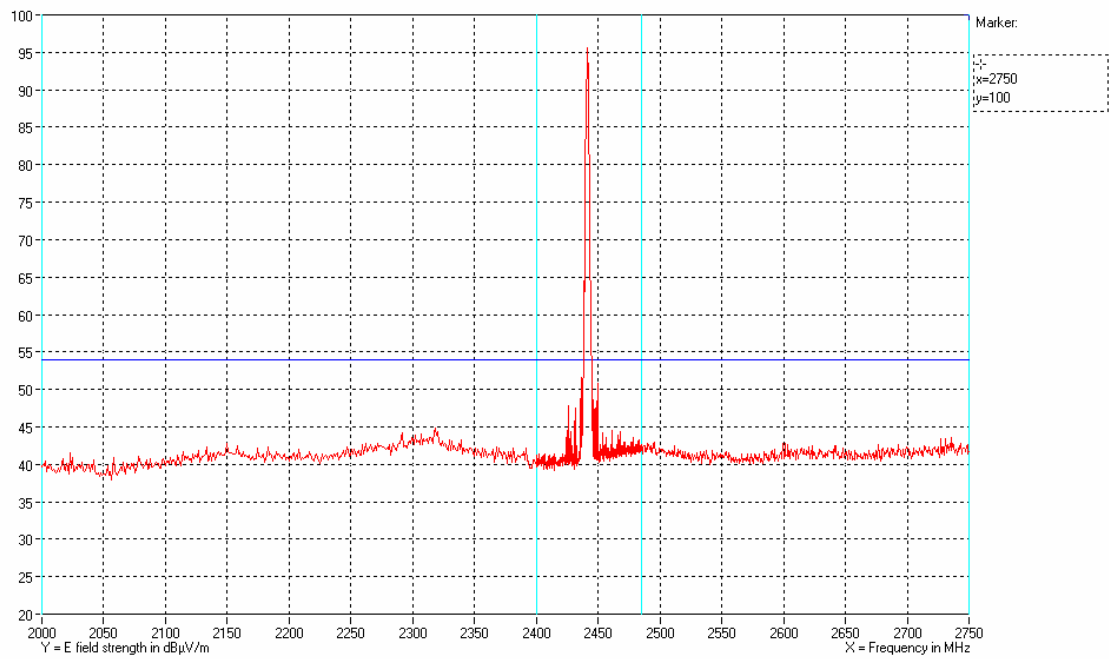




Test object	RC-1	Sheet	RE_Spur-11
Type	RC-1	Project no.	A506404-4
Serial no.	EMC 3-Spurious Emissions	Date	8 Nov. 2009
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	1-25 GHz

Test method	ANSI C63.4:2003	Temperature	22 °C
Characteristics	Complete search, Antenna distance 3 m.	Humidity	25 % RH
Detector	Peak and average for 1 GHz to 25 GHz	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49600 49624 49625 49183 49299	Uncertainty	4.9 dB





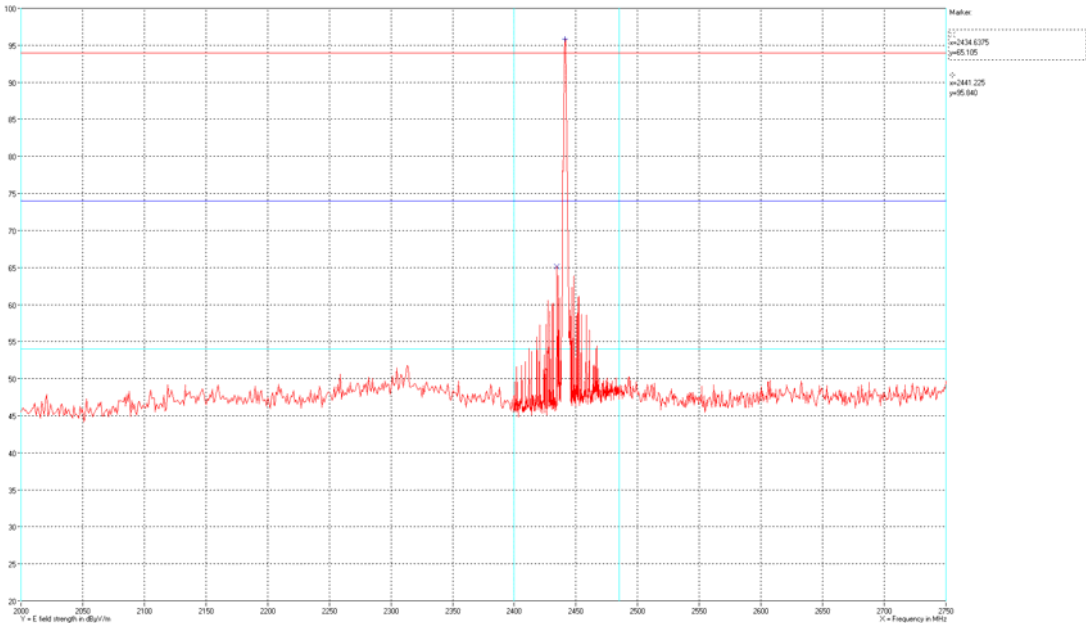
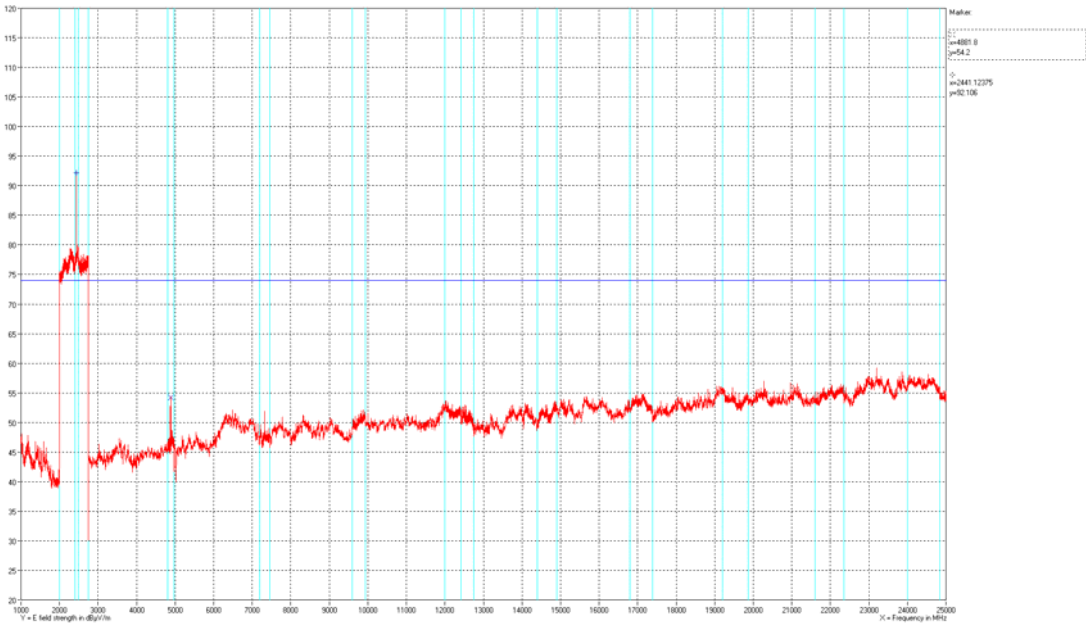
Polarization

Horizontal and vertical

Comments

Average





Polarization	Horizontal and vertical
Comments	Peak

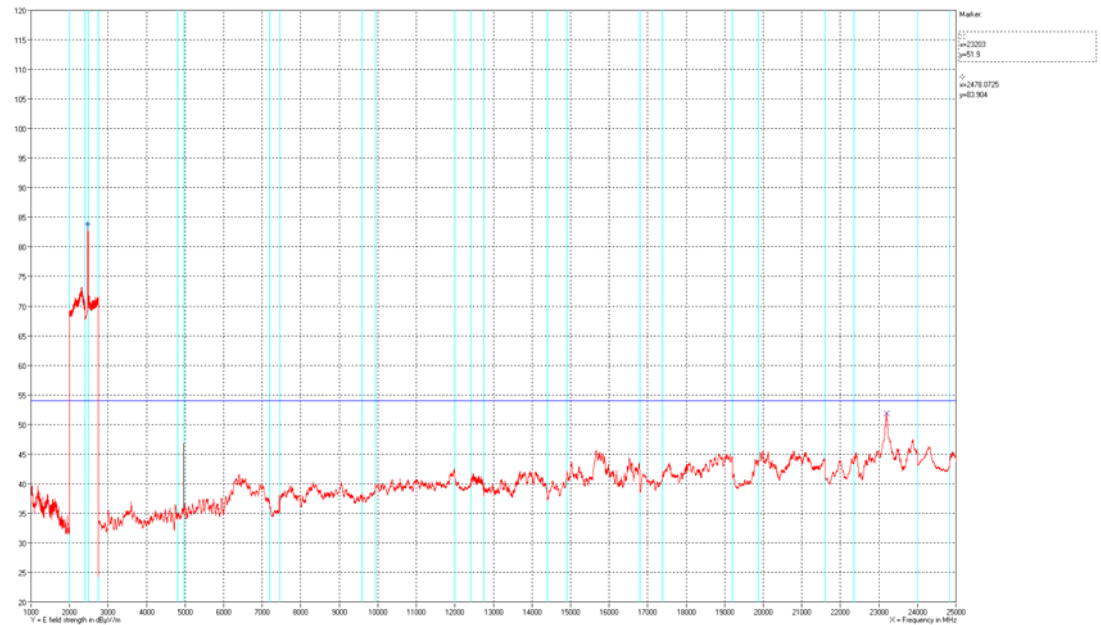


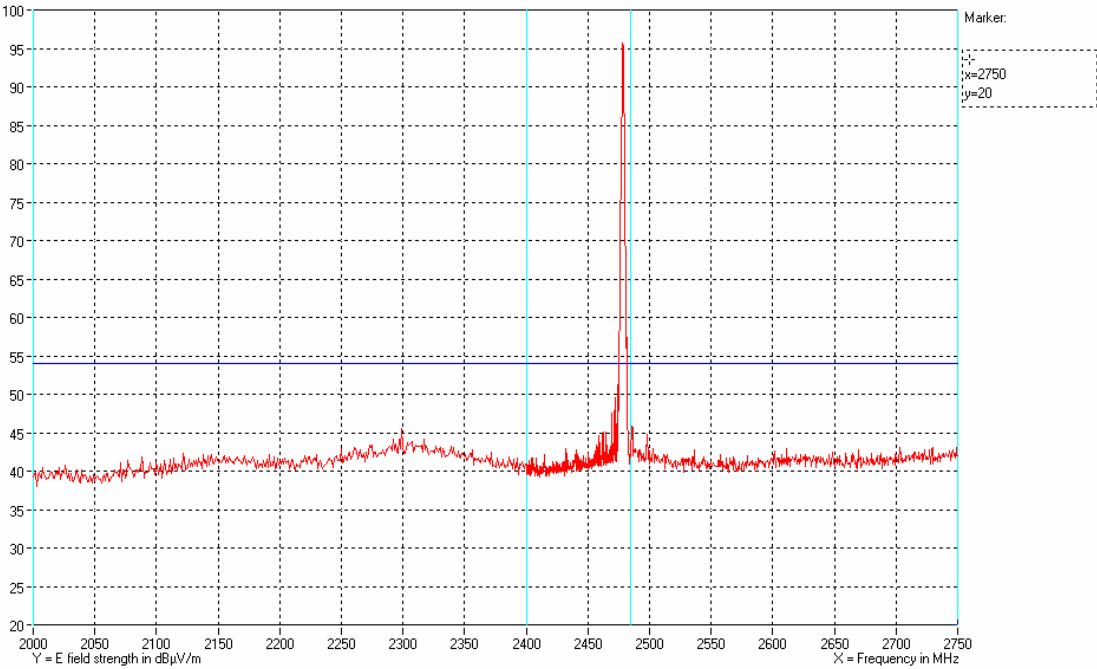
Test result	The measured average field strengths are below the average limit. The measured peak field strengths are below the peak limit (Peak limit = Average limit + 20 dB). The average field strengths are below the average limit. The limits are met at the upper and the lower band edge.											
Test Port	Enclosure											
Test frequency	2441 MHz											
Test mode	Continuous Tx - normal modulation - hopping on											
Condition	Normal											
Compliant	Yes											
Comments (Avg/Pk)	Final maximal measurements by variation of turntable azimuth, antenna height and antenna polarization. Measured level at band edge <table><tr><td>Band edge</td><td>2400 MHz</td><td>2483.5 MHz</td></tr><tr><td>Average</td><td>40.4 dBμV/m</td><td>42.1 dBμV/m</td></tr><tr><td>Peak</td><td>45.9 dBμV/m</td><td>48.4 dBμV/m</td></tr></table>			Band edge	2400 MHz	2483.5 MHz	Average	40.4 dBμV/m	42.1 dBμV/m	Peak	45.9 dBμV/m	48.4 dBμV/m
Band edge	2400 MHz	2483.5 MHz										
Average	40.4 dBμV/m	42.1 dBμV/m										
Peak	45.9 dBμV/m	48.4 dBμV/m										



Test object	RC-1	Sheet	RE_Spur-12
Type	RC-1	Project no.	A506404-4
Serial no.	EMC 3-Spurious Emissions	Date	25 Mar. 2010
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	1-25 GHz

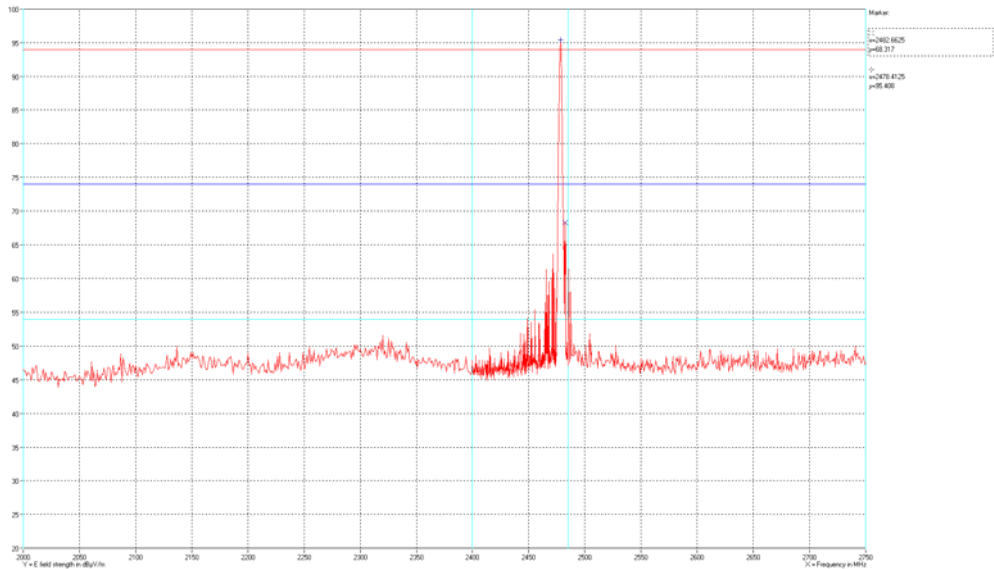
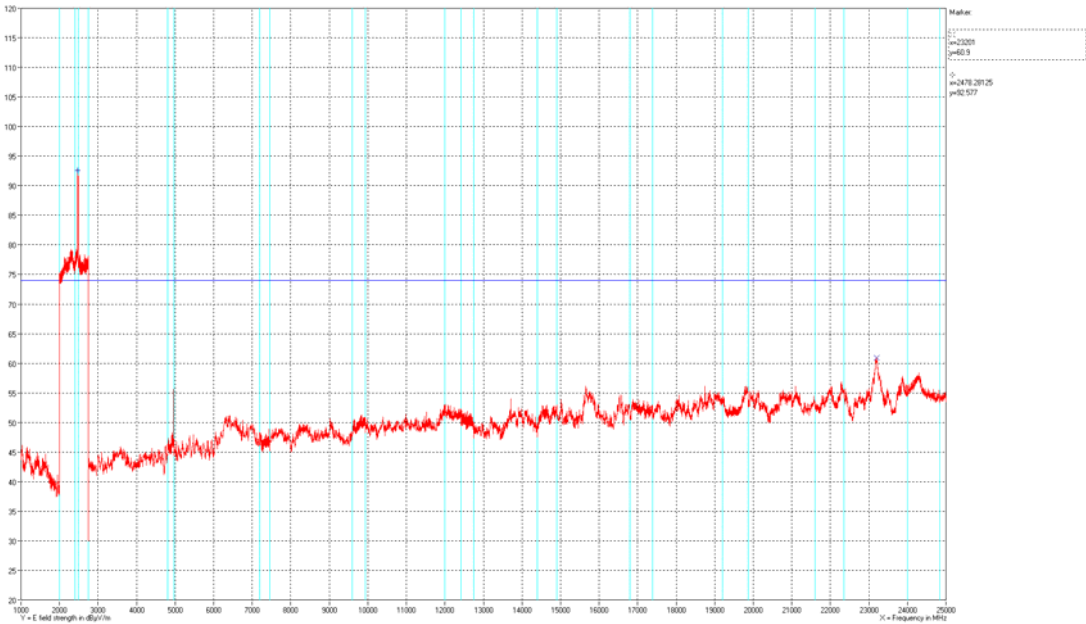
Test method	ANSI C63.4:2003	Temperature	22 °C
Characteristics	Complete search, Antenna distance 3 m.	Humidity	25 % RH
Detector	Peak and average for 1 GHz to 25 GHz	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49624 49625 49600 49183 49299	Uncertainty	4.9 dB





Polarization	Horizontal and vertical
Comments	Average





Polarization	Horizontal and vertical
Comments	Peak



Test result	The measured average field strengths are below the average limit. The measured peak field strengths are below the peak limit (Peak limit = Average limit + 20 dB). The average field strengths are below the average limit. The limits are met at the upper and the lower band edge.		
Test Port	Enclosure		
Test frequency	2478 MHz		
Test mode	Continuous Tx - normal modulation - hopping on		
Condition	Normal		
Compliant	Yes		
Comments (Avg/Pk)	Final maximal measurements by variation of turntable azimuth, antenna height and antenna polarization. Measured level at band edge		
	Band edge	2400 MHz	2483.5 MHz
	Average	40.4 dBμ V/m	41.8 dBμ V/m
	Peak	47.9 dBμ V/m	48.0 dBμ V/m





Photo 4.5.1 Test setup regarding measurement of radiated emission.



Photo 4.5.2 Test setup regarding measurement of radiated emission.



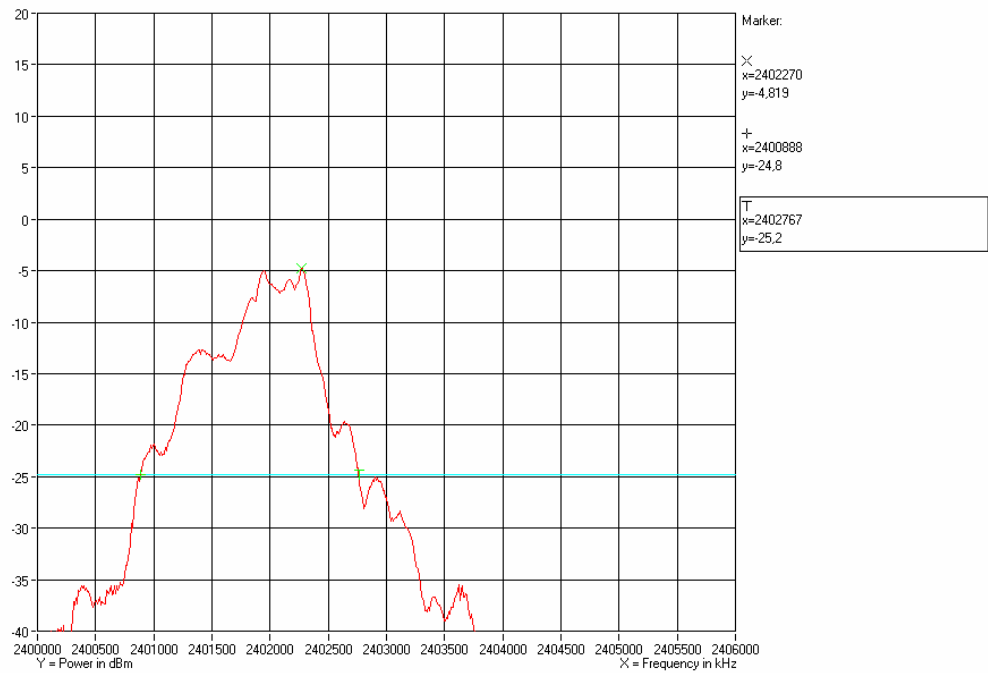
#### 4.6 Measurement of band edge compliance

Test object	RC-1	Sheet	PROF-1
Type	RC-1	Project no.	A506404-4
Serial no.	EMC 3-Conducted	Date	18 Mar. 2010
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.215(c)		

Test method	ANSI C63.4:2003		
Characteristics	Temperature: 22 °C. Test voltage: 3.0 V DC		
Test equipm.	49321 49183 49299 Uncertainty: 1•10 <sup>-7</sup>		
SA Settings	RBW: 100 KHz VBW: 300 kHz SPAN: 4 MHz DET: Peak CF: 2403 MHz, 2441 MHz, 2478 MHz Trace: Max Hold		
	Measured	Limit	Comment
Operating frequency:	2402 MHz		
Lowest frequency	2400.888MHz	2400.0 MHz	Ok
Highest frequency	2402.767 MHz	2483.5 MHz	Ok
Operating frequency:	2441 MHz		
Lowest frequency	2439.949 MHz	2400.0 MHz	Ok
Highest frequency	2441.811 MHz	2483.5 MHz	Ok
Operating frequency:	2478 MHz		
Lowest frequency	2476.952 MHz	2400.0 MHz	Ok
Highest frequency	2478.803 MHz	2483.5 MHz	Ok
Note 1:			

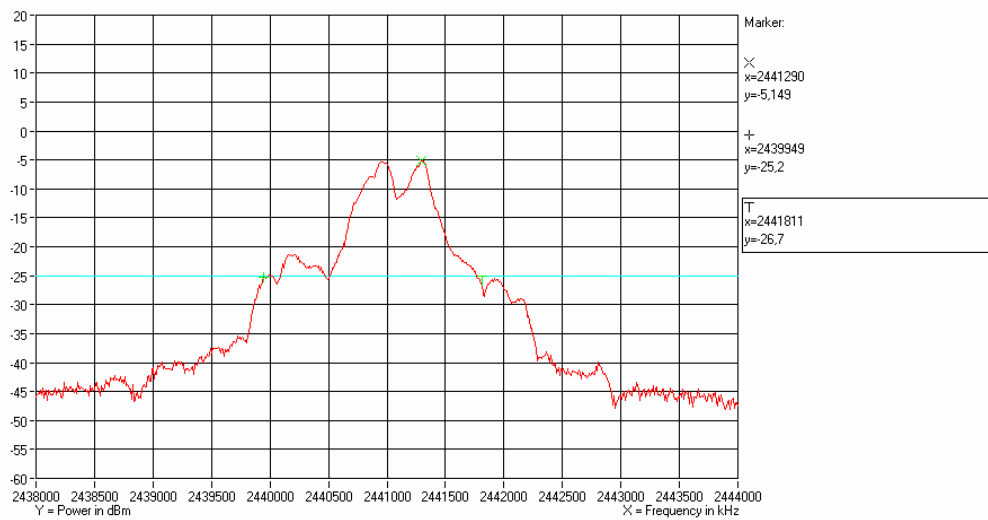
Band edge criteria	20 dB bandwidth
Test result	The measured 20 dB bandwidth was within the frequency band designated in 15.249.
Test modulation	Continuous Tx - normal modulation - hopping on
Compliant	Yes
Comments	Conducted measurement





Test frequency

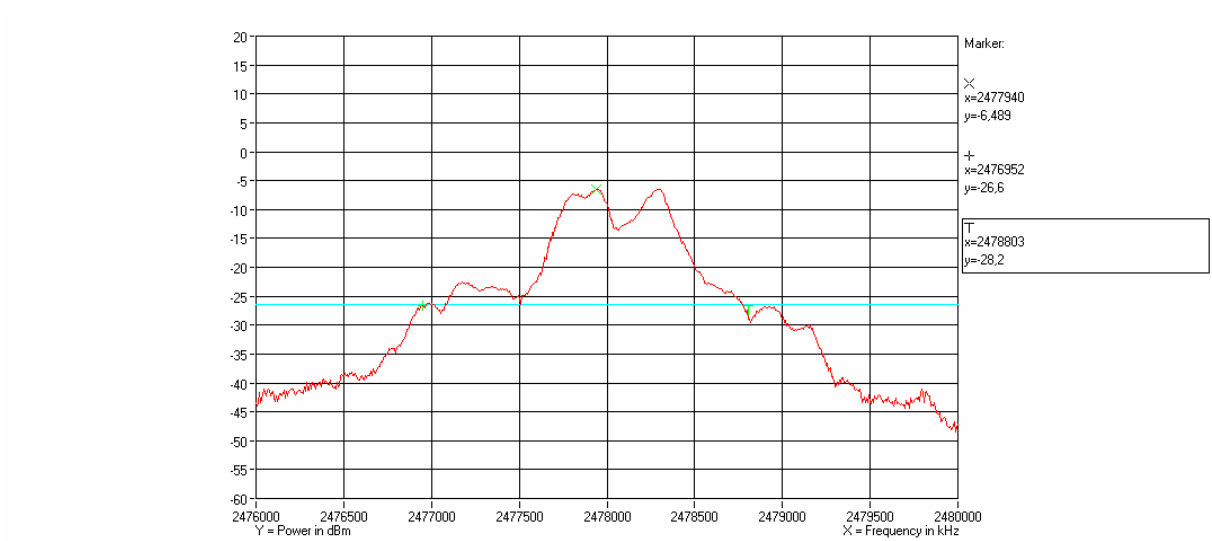
2402 MHz



Test frequency

2441 MHz





Test frequency	2478 MHz
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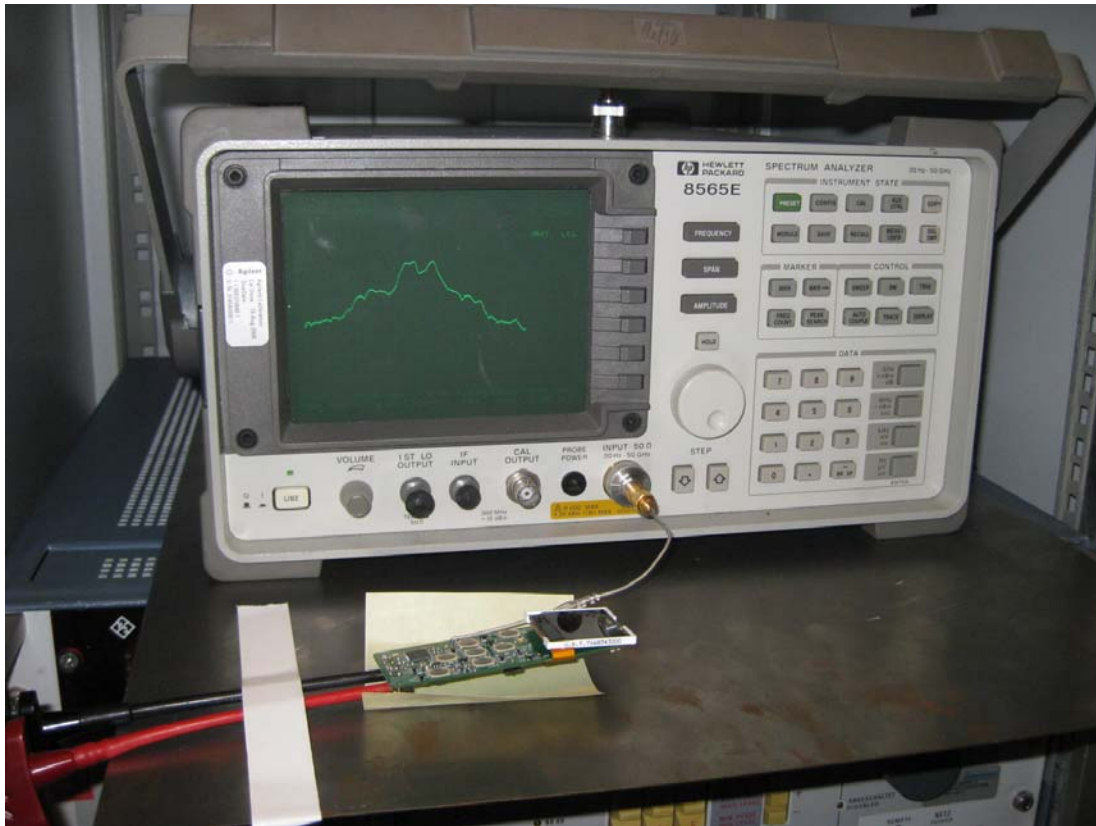


Photo 4.6.1 Test setup regarding measurement of band edge compliance.

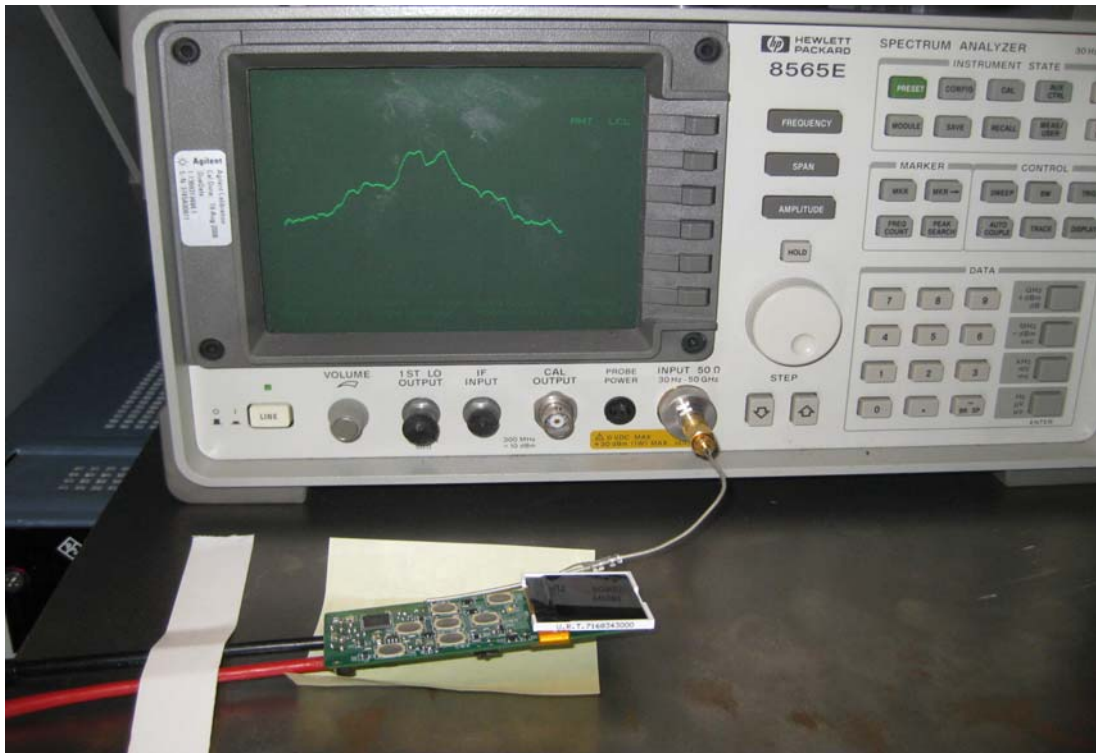


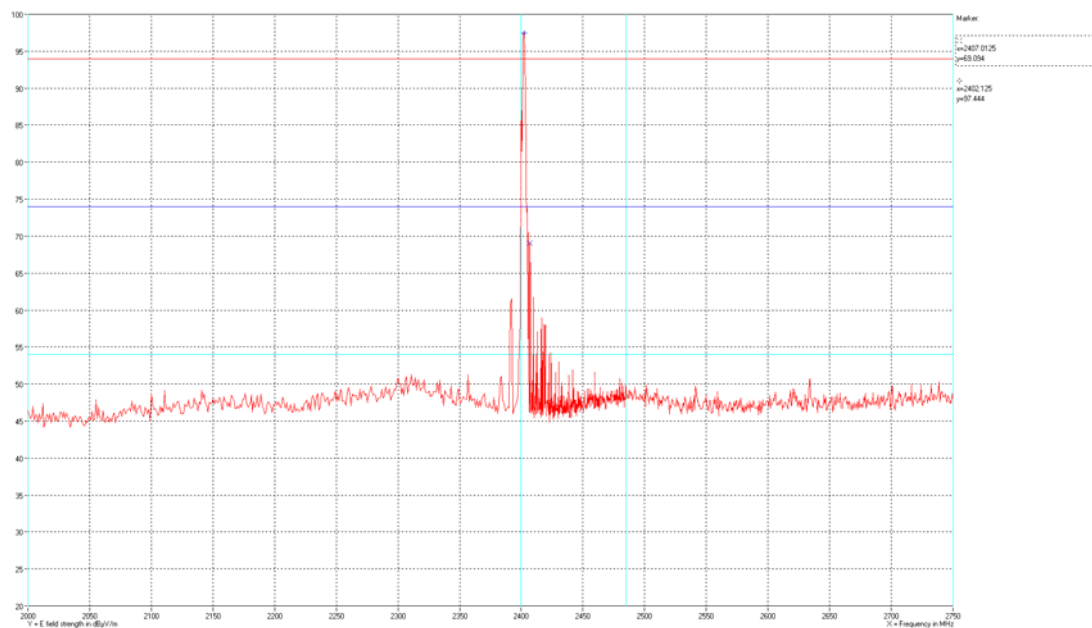
Photo 4.6.2 Test setup regarding measurement of band edge compliance.



#### 4.7 Measurement of field strength of fundamental

Test object	RC-1	Sheet	RE_Spur-1
Type	RC-1	Project no.	A506404-4
Serial no.	EMC 3-Spurious Emissions	Date	12 Mar. 2010
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.249(a)	Frequency	2400-2483.5 MHz

Test method	ANSI C63.4:2003	Temperature	22 °C
Characteristics	Complete search, Antenna distance 3 m.	Humidity	29 % RH
Detector	Peak for 2000 MHz to 2750 MHz	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49600 49624 49625 49183 49299	Uncertainty	4.9 dB

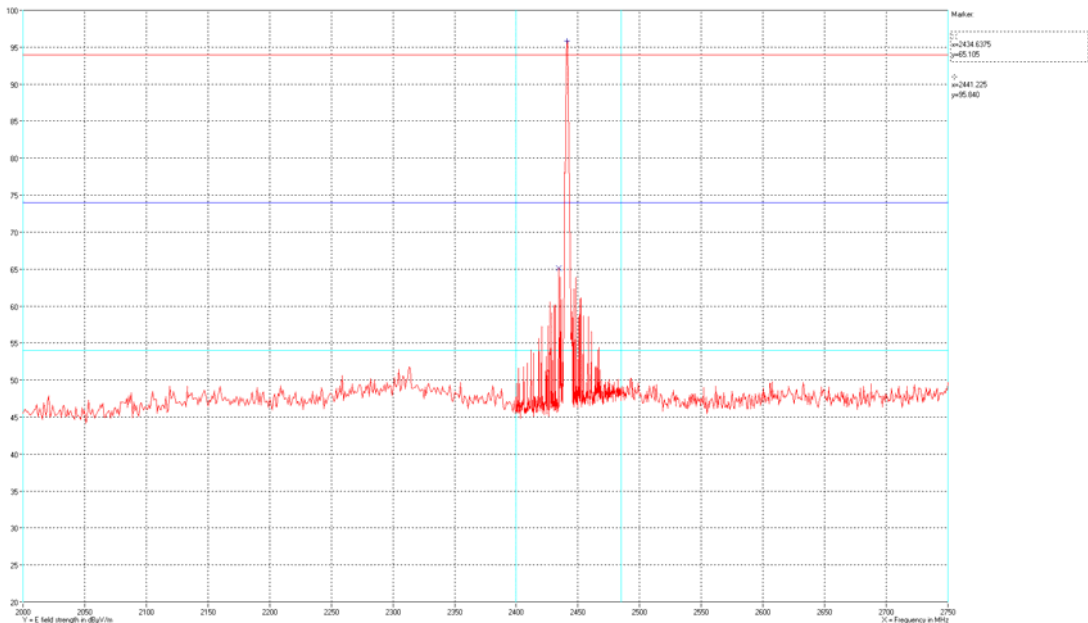


Test frequency 2402 MHZ

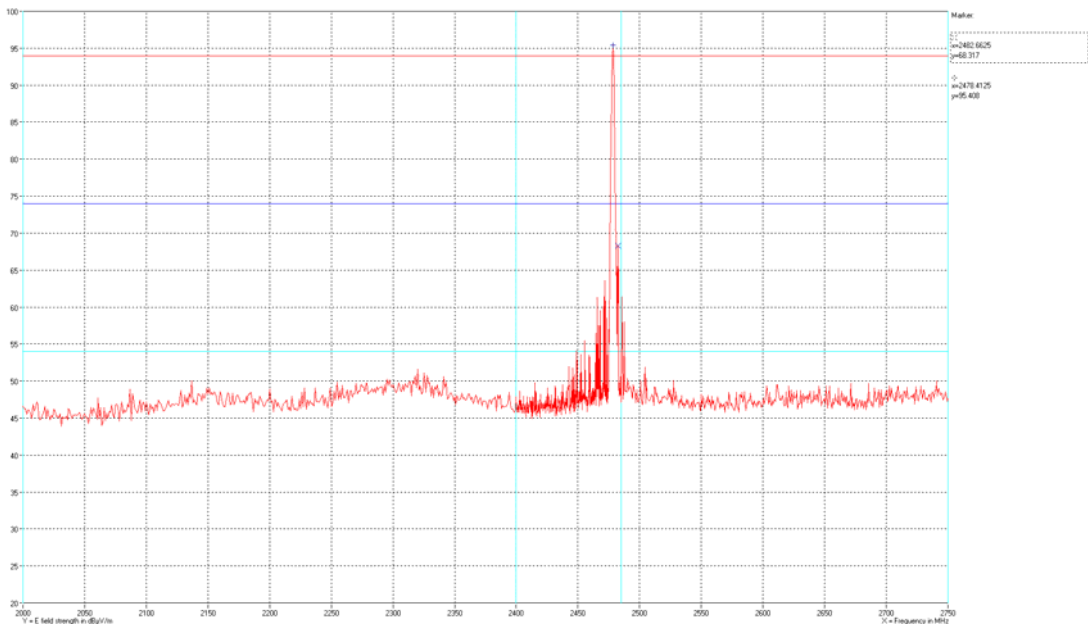
Comments Peak  
Horizontal and vertical







Test frequency	2441 MHz
Comments	Peak Horizontal and vertical



Test frequency	2478 MHz
Comments	Peak Horizontal and vertical



Frequency	Peak	PACF	Corrected Average	Limit
2402 MHz	97.4 dB $\mu$ V/m	15.2 dB	82.2 dB $\mu$ V/m	94 dB $\mu$ V/m
2441 MHz	95.8 dB $\mu$ V/m	15.2 dB	80.6 dB $\mu$ V/m	94 dB $\mu$ V/m
2478 MHz	95.4 dB $\mu$ V/m	15.2 dB	80.2 dB $\mu$ V/m	94 dB $\mu$ V/m
Test result	The corrected average field strengths are below the average limit. Corrected Average value = Peak value – PACF			
Test Port	Enclosure			
Test mode	Continuous Tx - normal modulation, hopping on			
Condition	Normal			
Compliant	Yes			
Comments	Final maximal measurements by variation of turntable azimuth, antenna height and antenna polarization			







Photo 4.7.1 Test setup regarding measurement of field strength of fundamental.



Photo 4.7.2 Test setup regarding measurement of field strength of fundamental.



## 5. National registrations and accreditations

### 5.1 DANAK Accreditation

**Organization:** Danish Accreditation and Metrology Fund - DANAK, see [www.danak.dk](http://www.danak.dk) and [www.ilac.org](http://www.ilac.org)

**Registration Number:** 19

**Area Number:** C

DANAK is part of ILAC (International Laboratory Accreditation Cooperation) including its MRA (Mutual Recognition Arrangement). The MRA includes the Australian NATA and Canadian SCC.

CISPR 22 is equivalent to AS/NZS CISPR 22, and therefore this report can be used for applying the **Australian C-Tick mark** for IT equipment, when this test has been passed.

CISPR 22:2002 is equivalent to ICES-003:2004, and therefore this report can be used for approval in Canada for IT equipment, when this test has been passed.

### 5.2 FCC Registrations

**Organization:** Federal Communications Commission, USA

**Registration Number:** 90529

**Facilities:** OATS Hørsholm (EMC-0)  
EMC room 2 Hørsholm (EMC-2)  
EMC room 3 Hørsholm (EMC-3)  
EMC room 4 Hørsholm (EMC-4)  
EMI room Hørsholm (EMC-5)



### 5.3 VCCI Registrations

**Organization:** Voluntary Control Council for Interference by Information Technology, Japan

**Member Number:** 910

**Facilities:**

OATS Hørsholm (EMC-0):	R-691
EMC room 2 Hørsholm (EMC-2):	C-707, T-246 and T-1547
EMC room 3 Hørsholm (EMC-3):	C-2532, T-247 and T-1548
EMC room 4 Hørsholm (EMC-4):	C-2533, T-248 and T-1549
EMI room Hørsholm (EMC-5):	R-1180, C-706, T-249 and T-1550

### 5.4 IC Registrations

**Organization:** Industry Canada, Certification and Engineering Bureau

**Registration Number:** IC4187A-5

**Facilities:** EMI room Hørsholm (EMC-5)



## 6. List of instruments

No.	Description	Manufacturer	Type No.	Cal date	Cal interval
29797	BILOG ANTENNA, 30-2000 MHz	CHASE ELEC- TRICS LTD	CBL 6111A	16-07-2008	2 years
29861	EMI-SOFTWARE VER. 1.60	ROHDE & SCHWARZ	ES-K1, PART: 1026.6790. 02	-	-
49183	POWER SUPPLY	TTI	PL 320	-	-
49299	MULTIMETER	FLUKE	87-4	03-03-2010	1 year
49321	SPECTRUM ANA- LYZER, 50 GHz WITH OPTION 006	HEWLETT- PACKARD	8565E	13-10-2009	1 year
49550	SIGNAL ANALYZER	ROHDE & SCHWARZ	FSQ8	07-08-2009	1 year
49600	SPECTRUM ANA- LYZER / MEAS- UREMENT RE- CEIVER	ROHDE & SCHWARZ	ESU40	18-03-2010	1 year
49622	CABLE 3.25 M PC3.5 MALE- FEMALE SU- COFLEX 104	HUBER+SUHNE R		07-02-2010	1 year
49623	CABLE 16 M PC3.5 MALE- MALE SUCOFLEX 104PB	HUBER+SUHNE R		07-02-2010	1 year
49624	DUAL RIDGE HORN ANTENNA – 1GHz – 26 GHz (2 GHz – 32 GHz)	SATIMO	SH2000	08-11-2009	2 years
49625	SRD COAX SWITCH MATRIX USED IN 1GHz – 26 GHz SRD AN- TENNASYSTEM	DELTA	COAX SWITCH MATRIX	07-02-2010	1 year
29332	ACTIVE LOOP ANTENNA	ROHDE & SCHWARZ	HFH-Z2	08-05-2008	2 years

