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DELTA Test Report

TEST Reg. no. 19

Radio parameter test of SY312 hearing instrument

Performed for GN Hearing A/S

DANAK-1910855, Rev. C
Project no.: A506404-3

15 April 2010

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Title	Radio parameter test of SY312 hearing instrument
Test object	SY312 hearing instrument
Report no.	DANAK-1910855, Rev. C
Project no.	A506404-3
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
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Responsible

Claus Rømer Andersen
Team Manager, Wireless
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This report is a revision of the test report A506404-3 Rev. B dated 14 April 2010.

The revision has been made due to the following:

Added tabular values for band edge measurements on page 30, 32 and 34.

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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	SY312
Model / type	SY312
Part no.	HI-V3
Serial no.	EMC 2-Spurius Emissions-302
FCC ID	X26SY312
Manufacturer	GN Hearing A/S
Supply voltage	1.3 VDC (Zinc Air battery)
Software version	Spurious emission firmware: Tx and Rx Deltatest090210
Cycle time	0.5 ms / 1.0 ms
Comments	Supplied by external power supply

Test object 2.1.2

Name of test object	SY312
Model / type	SY312
Part no.	HI-V3
Serial no.	EMC 3-Conducted sample-272
FCC ID	X26SY312
Manufacturer	GN Hearing A/S
Supply voltage	1.3 VDC (Zinc Air battery)
Software version	Spurious emission firmware: Tx and Rx Deltatest090210
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

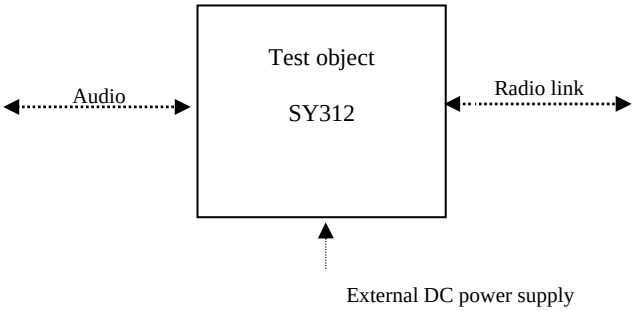


Figure 3.1.1 Block diagram of test object.

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.

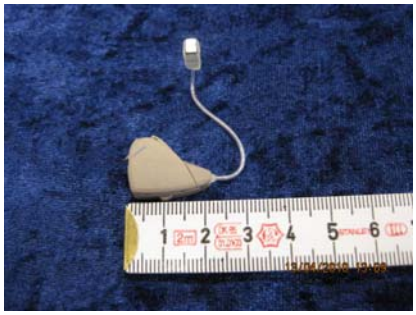
During some tests, the battery was replaced by an external DC power supply.

Intended use

SY312 is a hearing aid used for alleviation of hearing loss. It can receive audio signals and be fitted or configured via the radio link.

Size of the test object

The test object measures 20 x 15 x 7 mm.



3.2 Description of radio link

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

Antenna	:	Permanently attached PCB antenna
Operating frequency range	:	2404 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	:	1.3 V Zinc Air battery Specified min voltage: 1.19 V Specified max voltage: 1.4 V
Temperature category	:	-20 to +55 ºC.

3.3 Test sequence

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

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

4. Test results

4.1 Peak to Average Correction Factor (PACF)

Test object	SY312	Sheet	PACF-1
Type	SY312	Project no.	A506404-3
Serial no.	EMC 3-Conducted sample-272	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 ºC. Test voltage: 1.4 V		
Test equipm.	49550 49183 49299 Uncertainty: 1•10-7		
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: 195.5 µs – Delta 3 (T1)
Period: 1173.1µs – Delta 2 (T1).

The calculated duty cycle is:

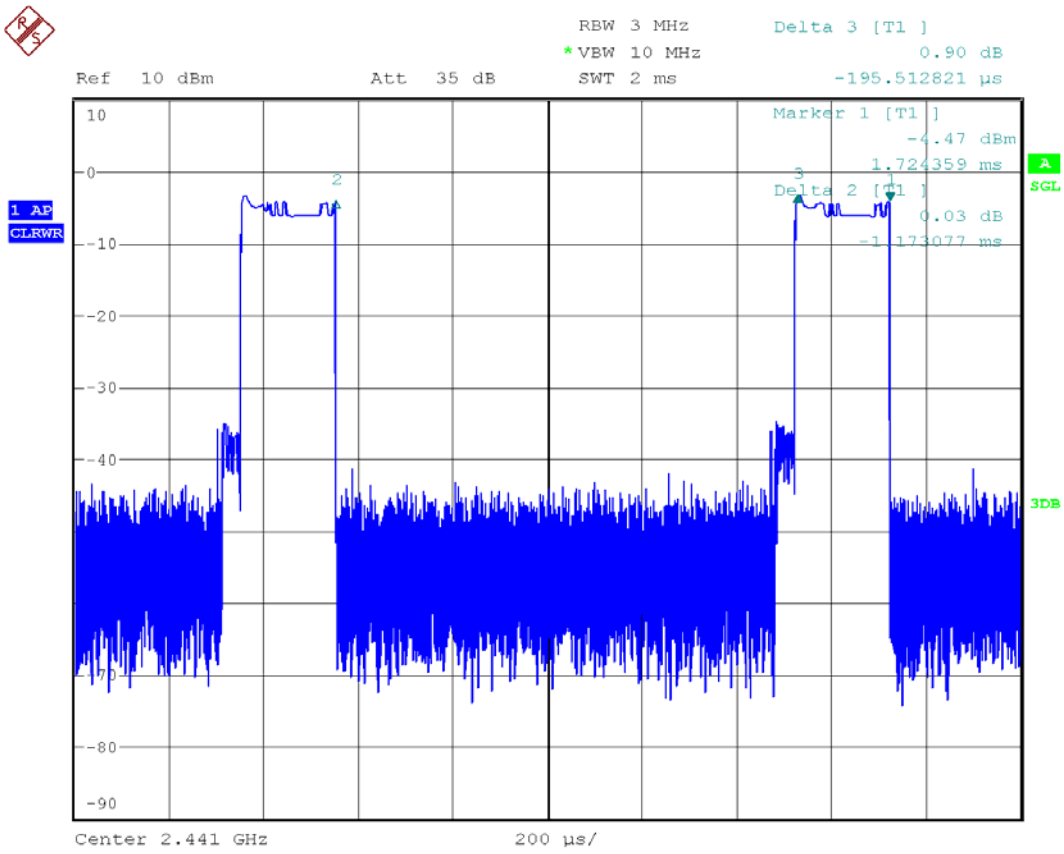
DC: (195.5 µs/1173.1 µs) • 100% = 16.7 %.

This corresponds to a Peak to Average Correction Factor of:

PACF: 20 log (0.167) = 15.6 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.



Comments Operating frequency is 2441 MHz, measured conducted.

4.2 Antenna requirement

Test object	SY312	Sheet	ANT-1
Type	SY312	Project no.	A506404-3
Serial no.	EMC 2-Spurius Emissions-302	Date	22 Mar. 2010
Client	GN Hearing A/S	Initials	JAS
Specification	FCC CFR 47 Part 15, Subpart C Section 15.203		

Test method	Visual inspection	

Evaluation criteria

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.

Evaluation result

The SY312 hearing instrument has a permanently attached PCB antenna.

Evaluation result	The test object meets evaluation criterion (a)
Compliant	Yes
Comments	None

Photo 4.2.1 Test setup regarding measurement of Antenna requirement.

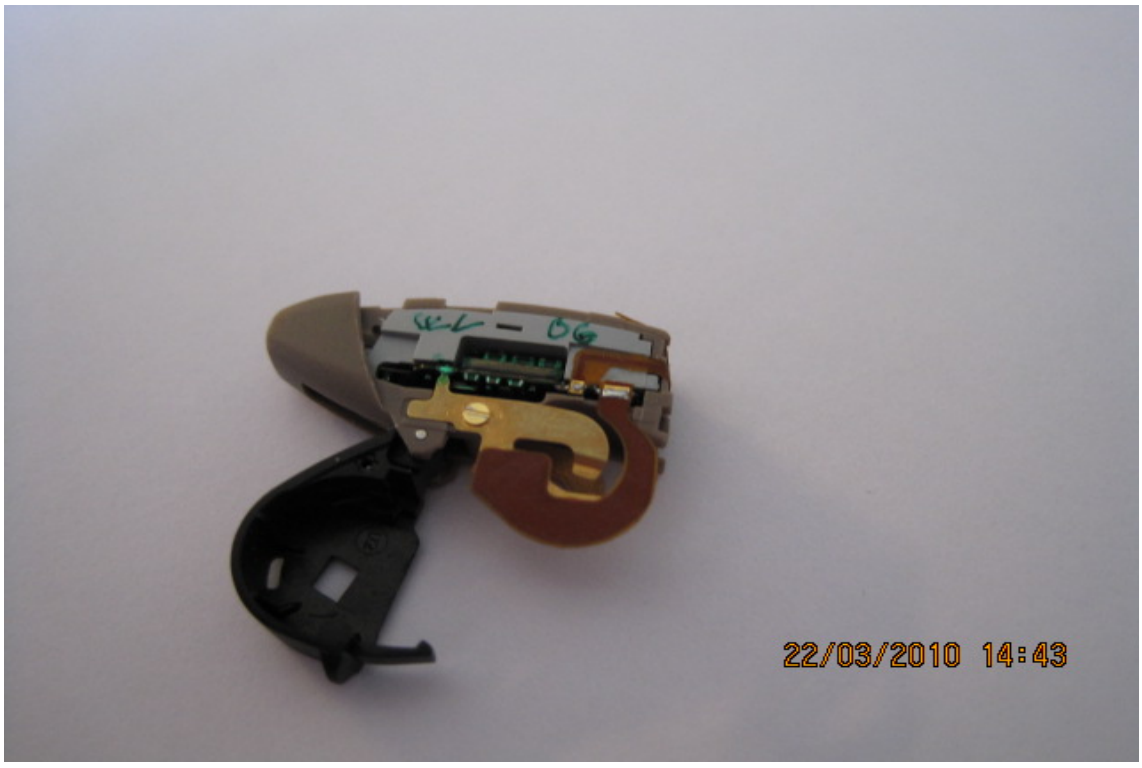
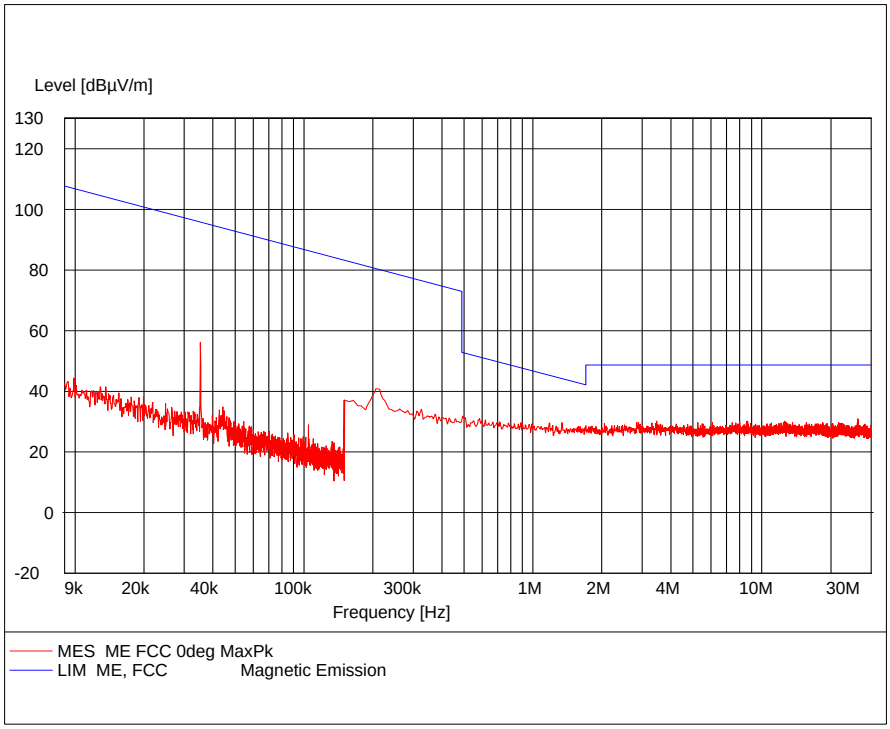


Photo 4.2.2 Test setup regarding measurement of Antenna requirement.

4.3 Measurement of radiated emission, 0.009-30 MHz

Test object	SY312	Sheet	ME-1
Type	SY312	Project no.	A506404-1
Serial no.	EMC 2-Spurius Emissions-302	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

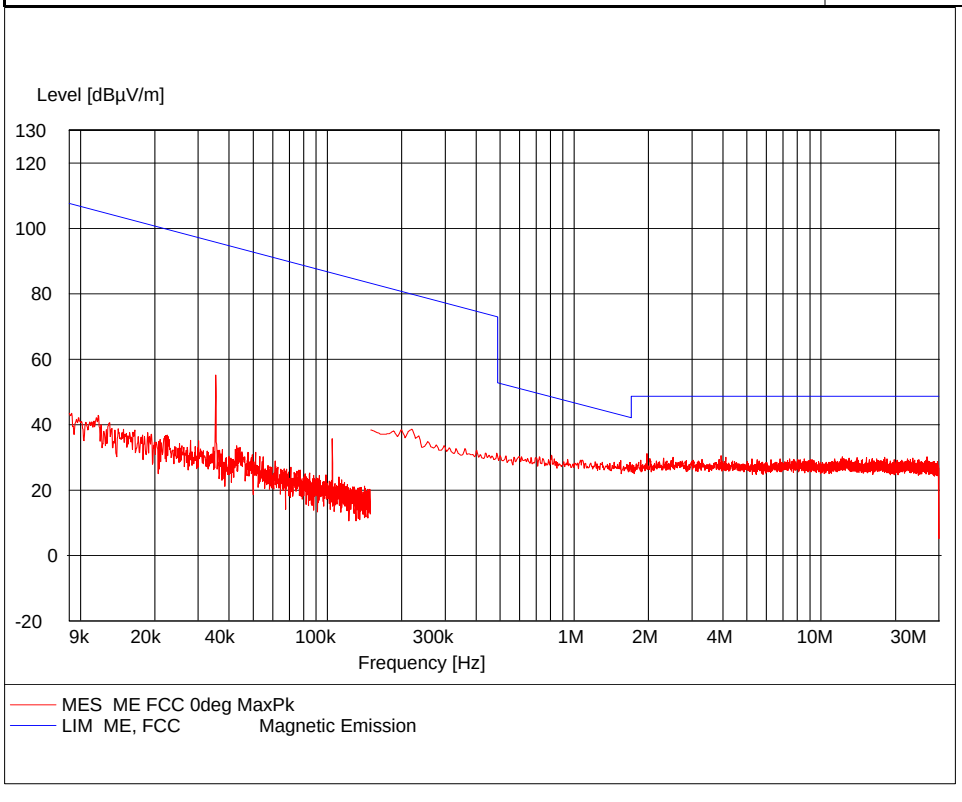
Test method Characteristics	ANSI C63.4:2003 Loop antenna pos. X. Antenna distance 10 m.	Temperature Humidity	22 °C 29 % RH
Detector	Peak	Bandwidth	200 Hz / 9 kHz
Test equipm.	EMI room Hørsholm 49600 29332	Uncertainty 4 dB	



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	SY312	Sheet	ME-2
Type	SY312	Project no.	A506404-1
Serial no.	EMC 2-Spurius Emissions-302	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

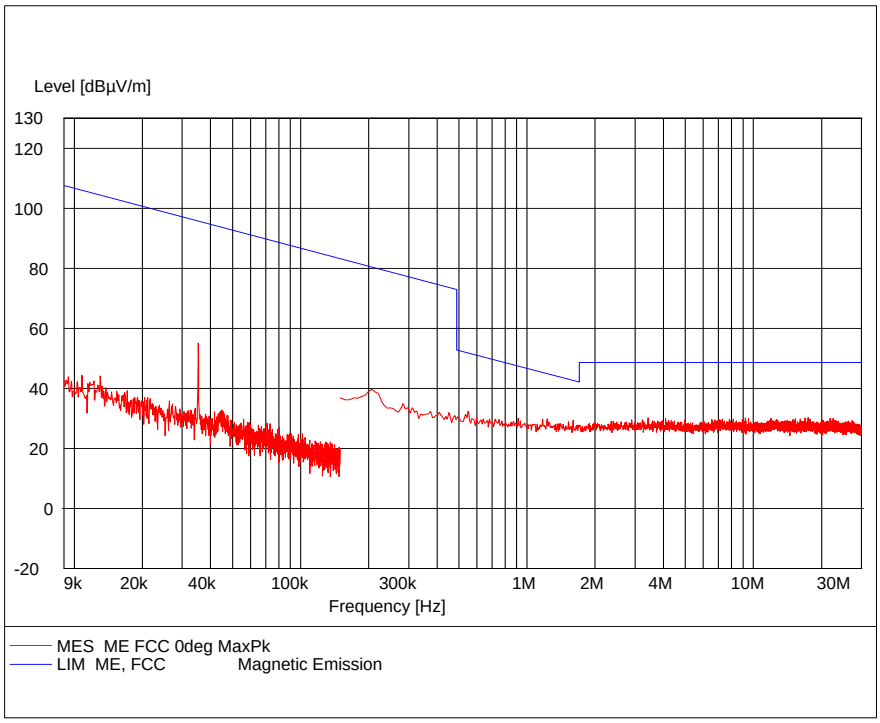
Test method Characteristics	ANSI C63.4:2003 Loop antenna pos. Y. Antenna distance 10 m.	Temperature Humidity	22 °C 29 % RH
Detector	Peak	Bandwidth	200 Hz / 9 kHz
Test equipm.	EMI room Hørsholm 49600 29332	Uncertainty 4 dB	



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	SY312	Sheet	ME-3
Type	SY312	Project no.	A506404-1
Serial no.	EMC 2-Spurius Emissions-302	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 Characteristics	ANSI C63.4:2003 Loop antenna pos. Z. Antenna distance 10 m.	Temperature Humidity	22 °C 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): $L_2 = L_1 + 40 \cdot \log_{10}(D_1/D_2)$

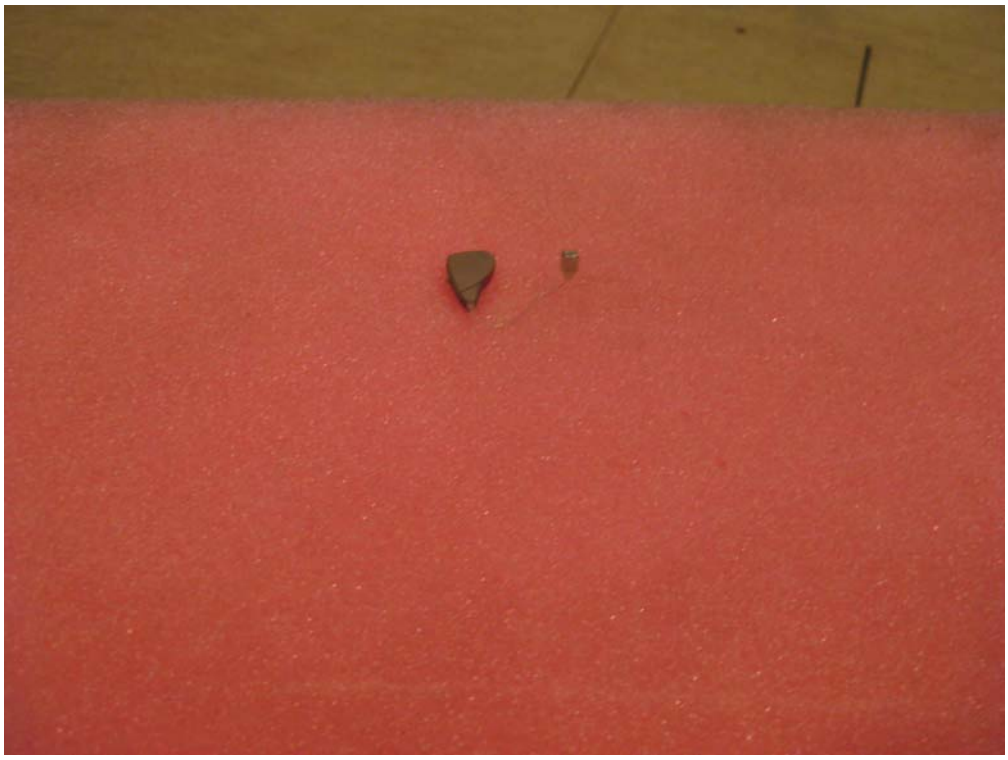


Photo 4.3.1 Test setup regarding measurement of radiated emission, 0.009-30 MHz.

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.

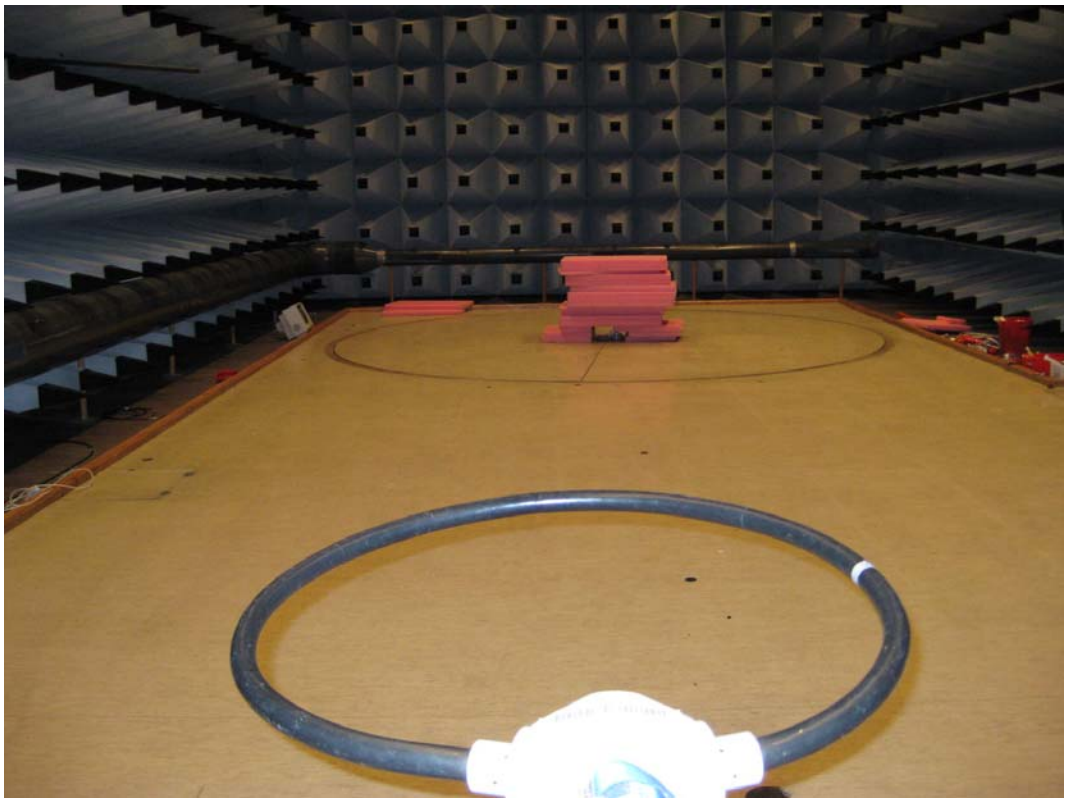
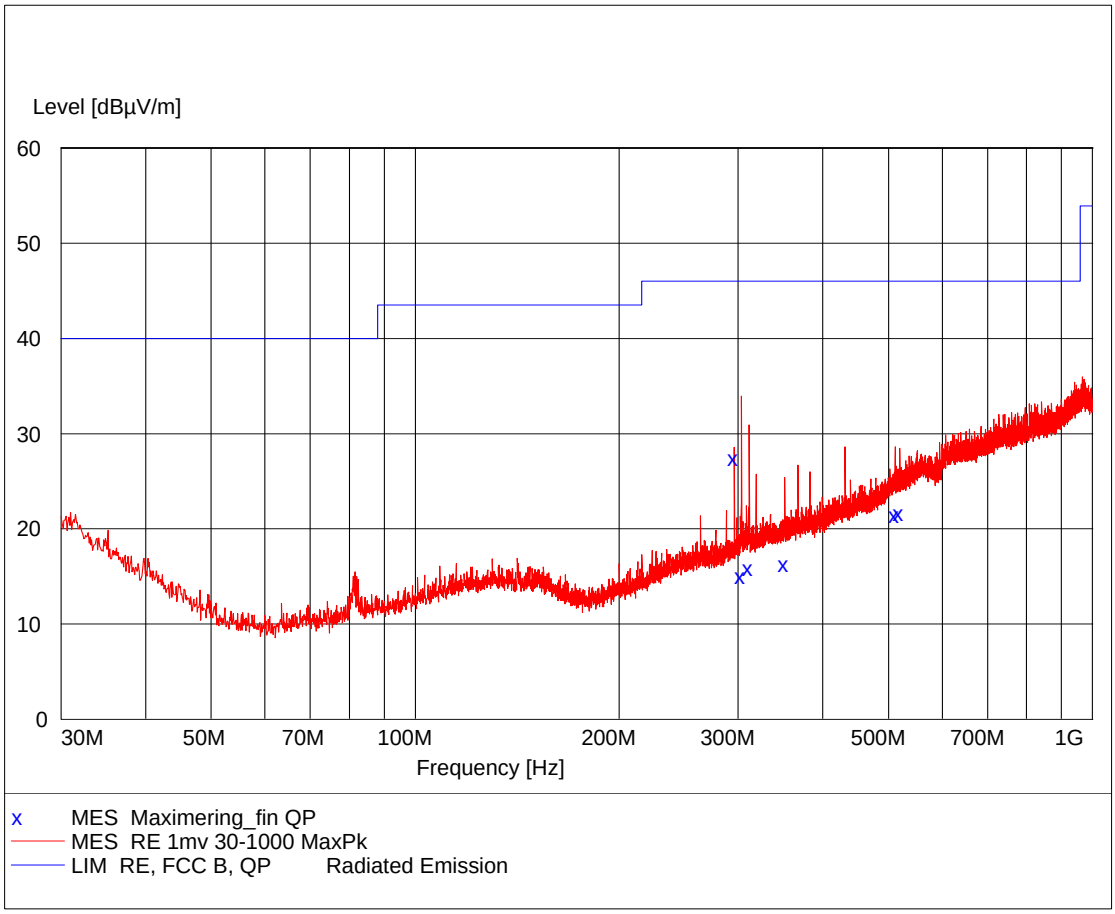


Photo 4.3.4 Test setup regarding measurement of radiated emission, 0.009-30 MHz.

4.4 Measurement of radiated emission, 30 MHz to 1000 MHz

Test object	SY312	Sheet	RE_Spur-1
Type	SY312	Project no.	A506404-3
Serial no.	EMC 2-Spurius Emissions-302	Date	11 Mar. 2010
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	30-1000 MHz

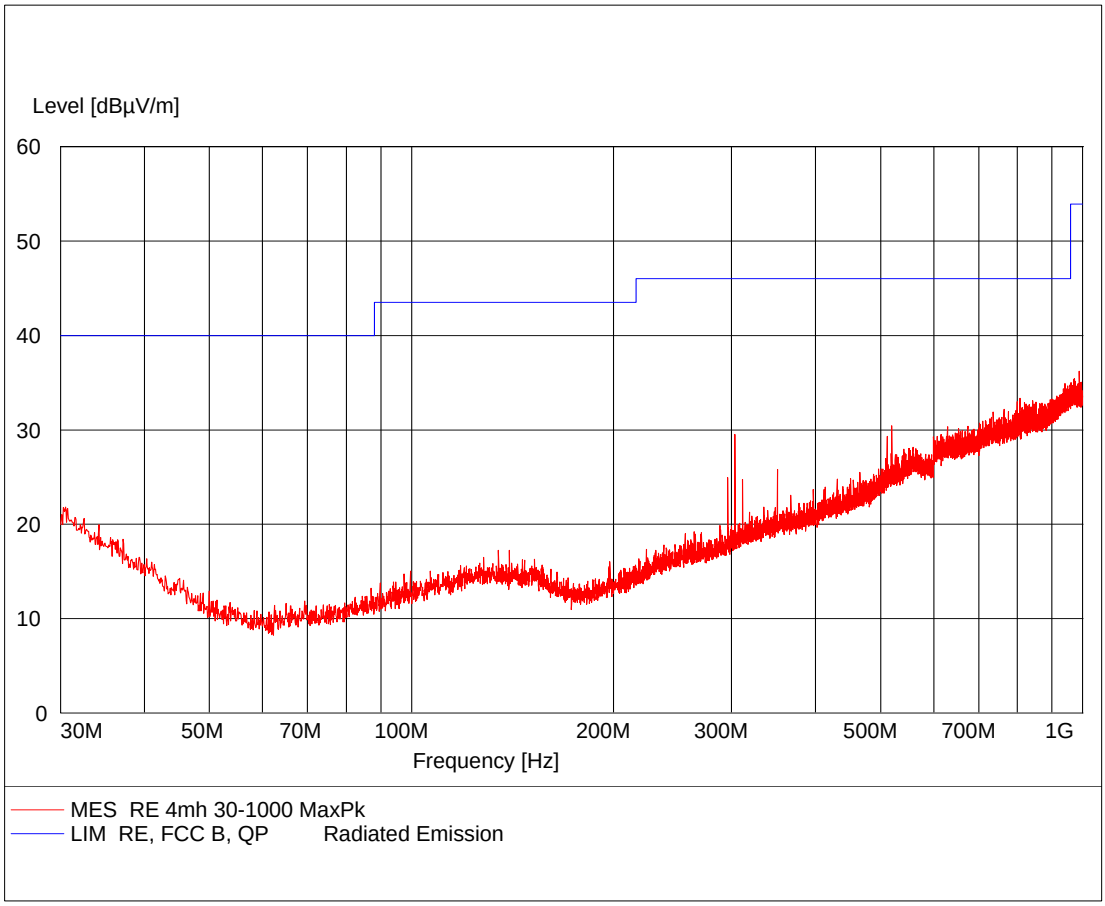
Test method	ANSI C63.4:2003	Temperature	22 °C
Characteristics	Pre-scan, Antenna at 3 m, 1 m height, hor. pol.	Humidity	32 % RH
Detector	Peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty 4.9 dB	



Comments Operating frequency 2404 MHz

Test object	SY312	Sheet	RE_Spur-2
Type	SY312	Project no.	A506404-3
Serial no.	EMC 2-Spurius Emissions-302	Date	11 Mar. 2010
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	30-1000 MHz

Test method Characteristics	ANSI C63.4:2003 Pre-scan, Antenna at 3 m, 4 m height, hor. pol.	Temperature Humidity	22 °C 32 % RH
Detector	Peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty 4.9 dB	



Comments Operating frequency 2404 MHz

Test object	SY312	Sheet	RE_Spur-3
Type	SY312	Project no.	A506404-3
Serial no.	EMC 2-Spurius Emissions-302	Date	12 Mar. 2010
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	30-1000 MHz

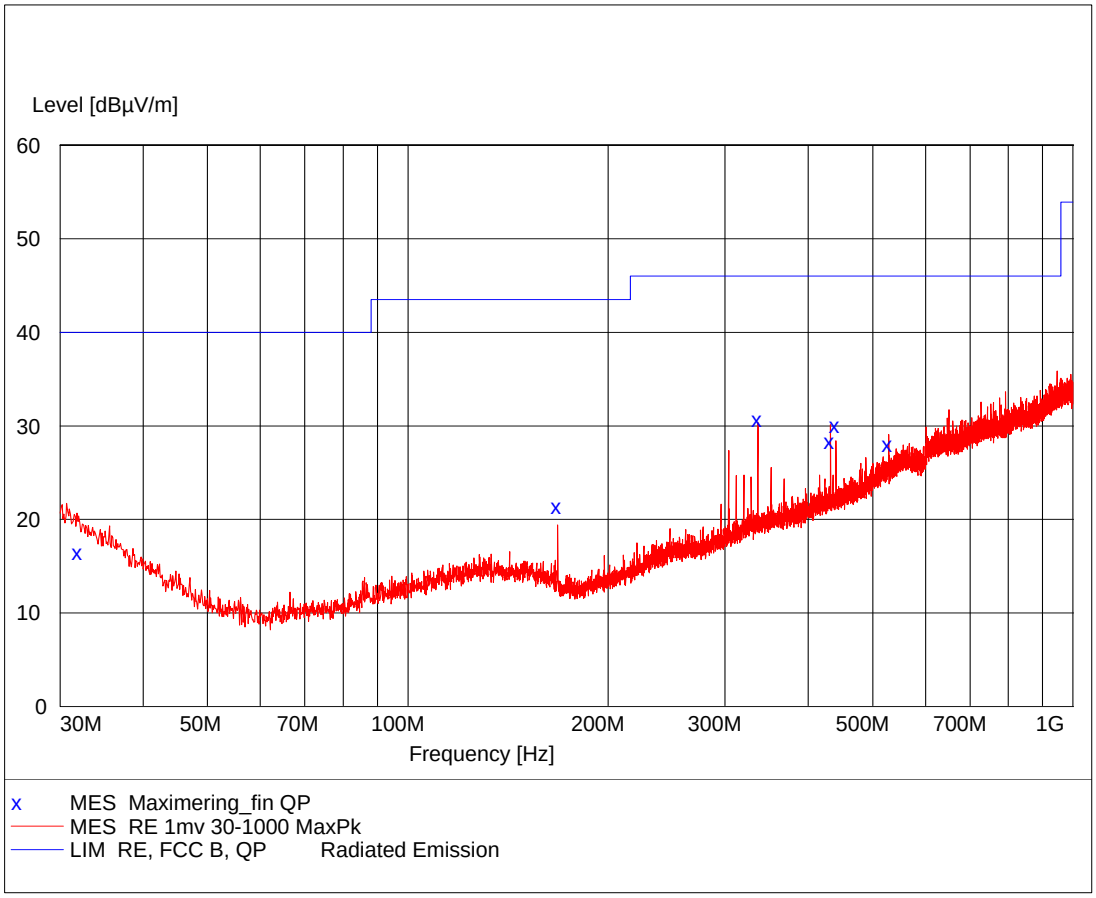
Test method Characteristics	ANSI C63.4:2003 Peak search ant. at 3 m, height: 1-4 m, v/h pol.	Temperature Humidity	22 °C 32 % RH
Detector	Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty 4.9 dB	

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
296.000000	27.40	16.0	46.0	18.6	101.0	322.00	VERTICAL
303.200000	15.00	16.1	46.0	31.0	101.0	357.00	VERTICAL
311.200000	15.80	16.3	46.0	30.2	101.0	140.00	HORIZONTAL
351.200000	16.30	17.6	46.0	29.7	400.0	242.00	HORIZONTAL
511.300000	21.40	22.2	46.0	24.6	108.0	138.00	HORIZONTAL
519.200000	21.60	22.5	46.0	24.4	129.0	18.00	VERTICAL

Test result	The measured field strengths are below the limit
Test Port	Enclosure
Test frequency	2404 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	SY312	Sheet	RE_Spur-4
Type	SY312	Project no.	A506404-3
Serial no.	EMC 2-Spurius Emissions-302	Date	12 Mar. 2010
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	30-1000 MHz

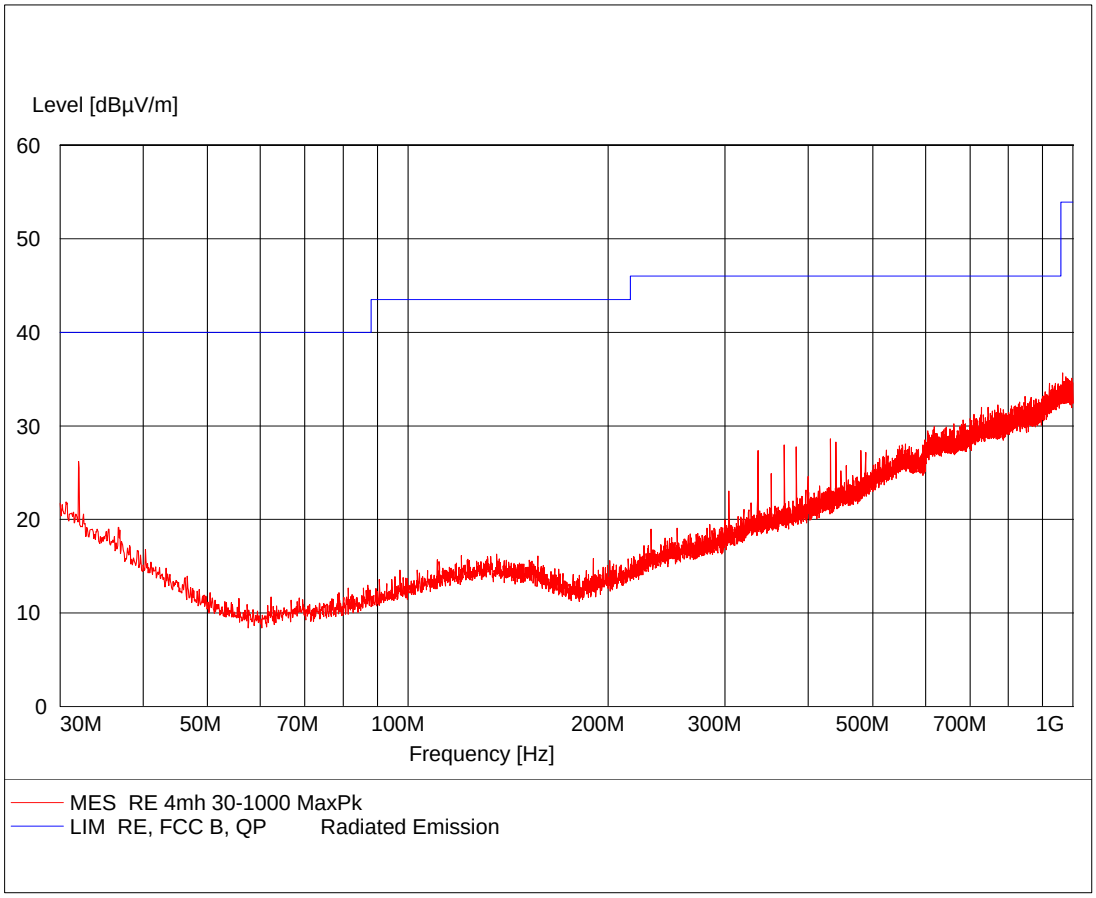
Test method Characteristics	ANSI C63.4:2003 Pre-scan, Antenna at 3 m, 1 m height, vert. pol.	Temperature Humidity	22 °C 29 % RH
Detector	Peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty 4.9 dB	



Comments Operating frequency 2441 MHz

Test object	SY312	Sheet	RE_Spur-5
Type	SY312	Project no.	A506404-3
Serial no.	EMC 2-Spurius Emissions-302	Date	12 Mar. 2010
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	30-1000 MHz

Test method Characteristics	ANSI C63.4:2003 Pre-scan, Antenna at 3 m, 4 m height, hor. pol.	Temperature Humidity	22 °C 29 % 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	SY312	Sheet	RE_Spur-6
Type	SY312	Project no.	A506404-3
Serial no.	EMC 2-Spurius Emissions-302	Date	12 Mar. 2010
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	30-1000 MHz

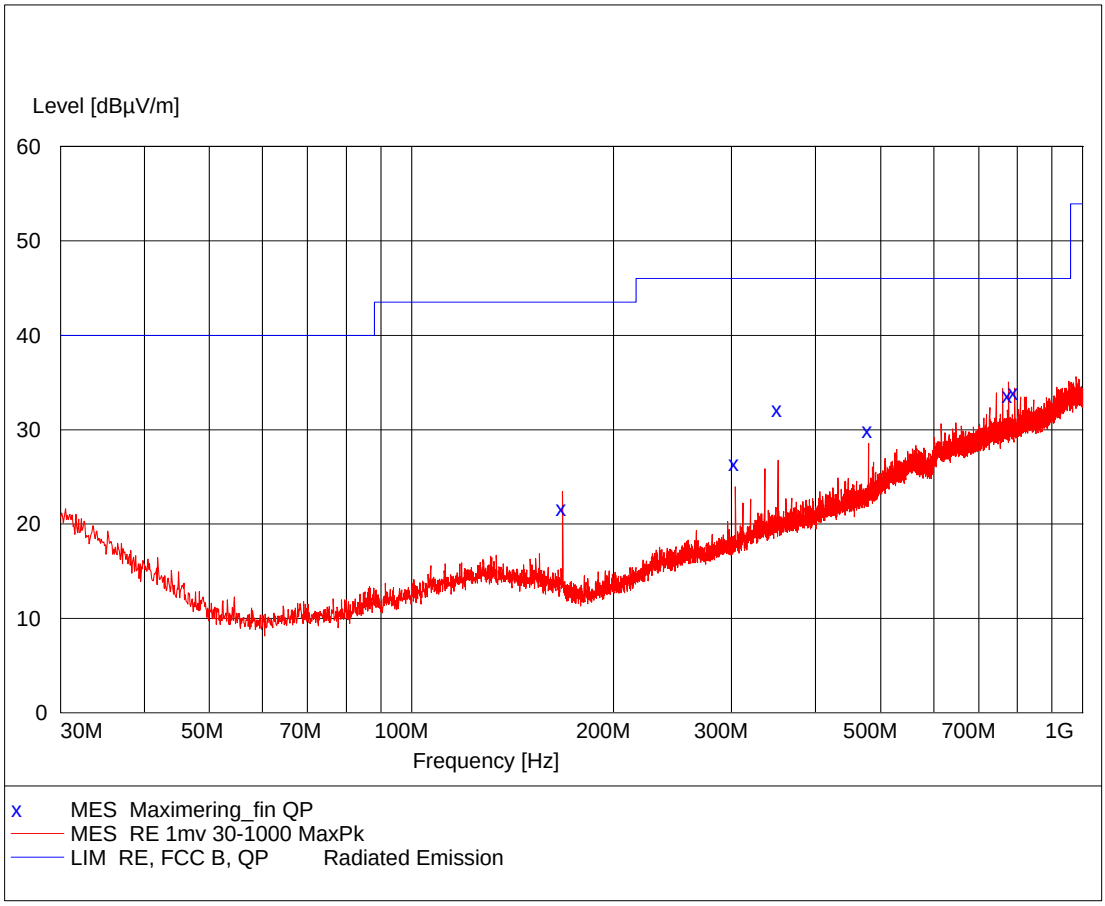
Test method Characteristics	ANSI C63.4:2003 Peak search ant. at 3 m, height: 1-4 m, v/h pol.	Temperature Humidity	22 °C 29 % RH
Detector	Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty 4.9 dB	

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
32.000000	16.50	18.1	40.0	23.5	117.0	1.00	VERTICAL
168.000000	21.40	11.0	43.5	22.1	150.0	36.00	VERTICAL
336.000000	30.70	17.2	46.0	15.3	157.0	293.00	VERTICAL
432.000000	28.30	19.8	46.0	17.7	231.0	318.00	HORIZONTAL
440.000000	30.10	19.9	46.0	15.9	217.0	195.00	HORIZONTAL
528.000000	28.00	22.7	46.0	18.0	113.0	2.00	HORIZONTAL

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	SY312	Sheet	RE_Spur-7
Type	SY312	Project no.	A506404-3
Serial no.	EMC 2-Spurius Emissions-302	Date	12 Mar. 2010
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	30-1000 MHz

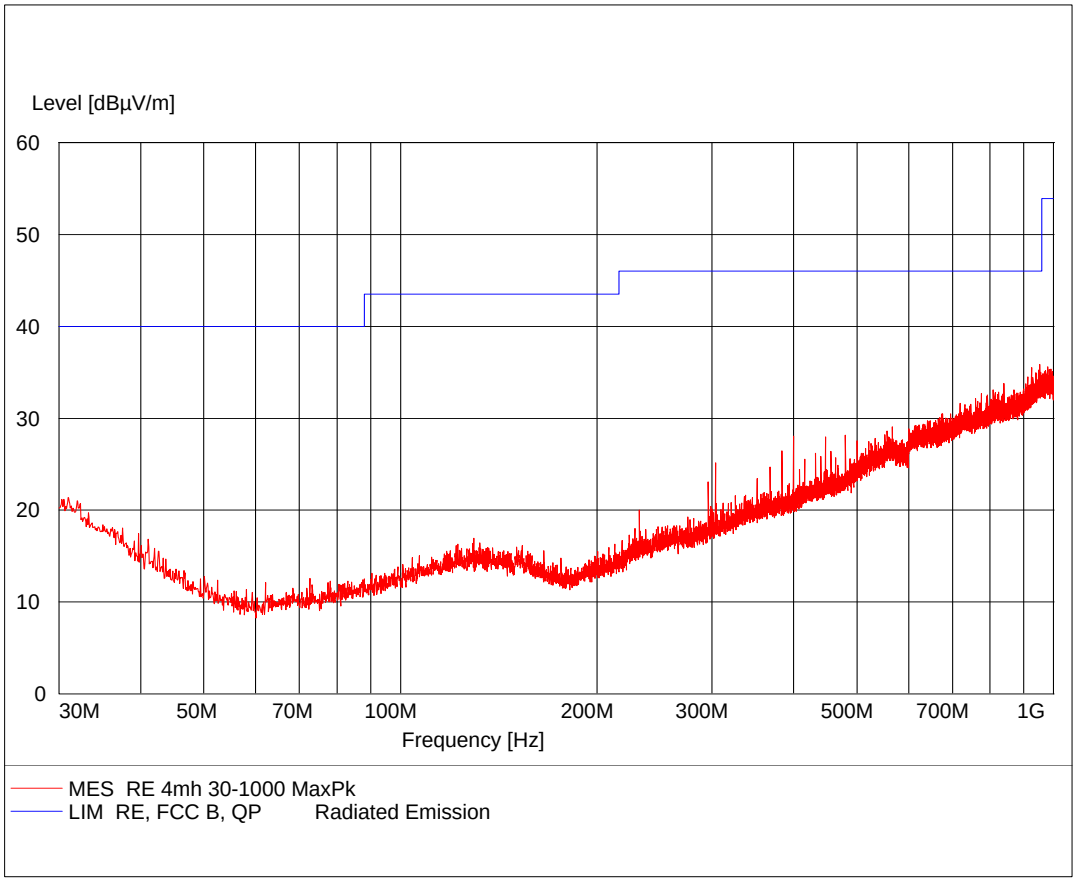
Test method Characteristics	ANSI C63.4:2003 Pre-scan, Antenna at 3 m, 1 m height, hor. pol.	Temperature Humidity	23 °C 29 % RH
Detector	Peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty 4.9 dB	



Comments Operating frequency 2478 MHz

Test object	SY312	Sheet	RE_Spur-8
Type	SY312	Project no.	A506404-3
Serial no.	EMC 2-Spurius Emissions-302	Date	12 Mar. 2010
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	30-1000 MHz

Test method Characteristics	ANSI C63.4:2003 Pre-scan, Antenna at 3 m, 4 m height, hor. pol.	Temperature Humidity	23 °C 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	SY312	Sheet	RE_Spur-9
Type	SY312	Project no.	A506404-3
Serial no.	EMC 2-Spurius Emissions-302	Date	12 Mar. 2010
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 209	Frequency	30-1000 MHz

Test method Characteristics	ANSI C63.4:2003 Peak search ant. at 3 m, height: 1-4 m, v/h pol.	Temperature Humidity	23 °C 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
168.000000	21.70	11.0	43.5	21.8	147.0	32.00	VERTICAL
304.000000	26.40	16.2	46.0	19.6	179.0	44.00	VERTICAL
352.000000	32.10	17.7	46.0	13.9	167.0	298.00	VERTICAL
480.000000	29.90	20.9	46.0	16.1	168.0	21.00	HORIZONTAL
776.000000	33.60	25.9	46.0	12.4	123.0	162.00	VERTICAL
792.000000	33.90	26.1	46.0	12.1	154.0	247.00	HORIZONTAL

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

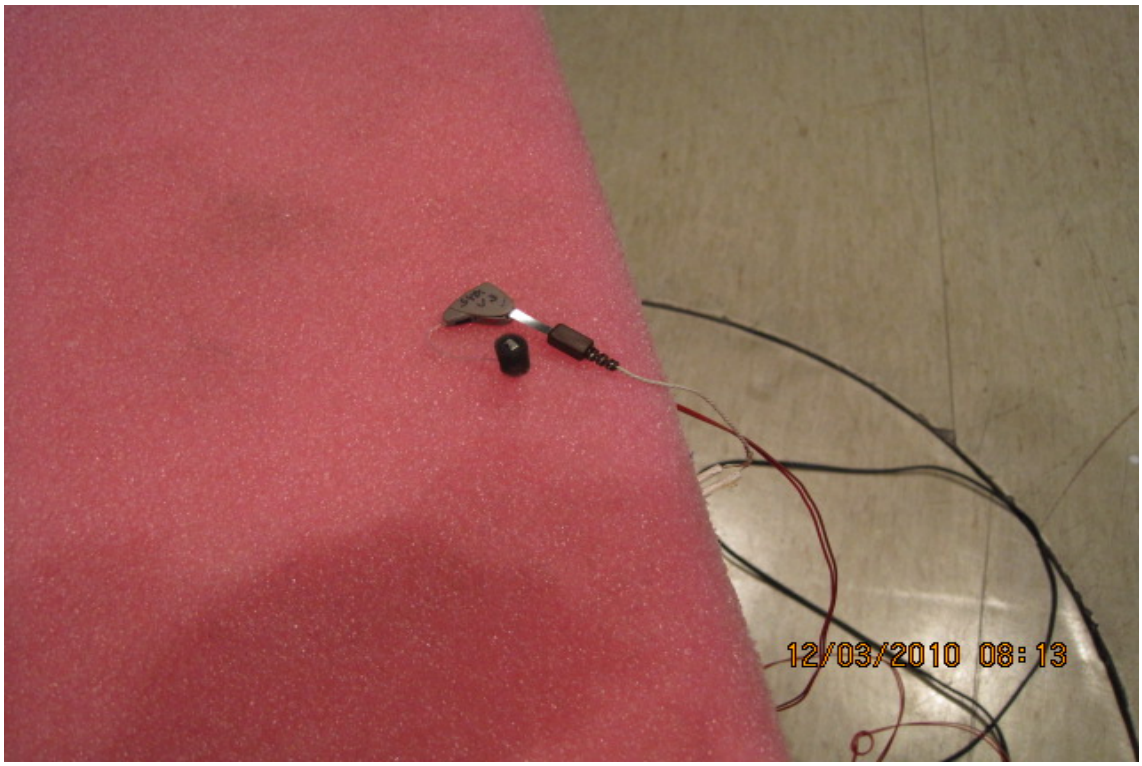


Photo 4.4.1 Test setup regarding measurement of radiated emission.

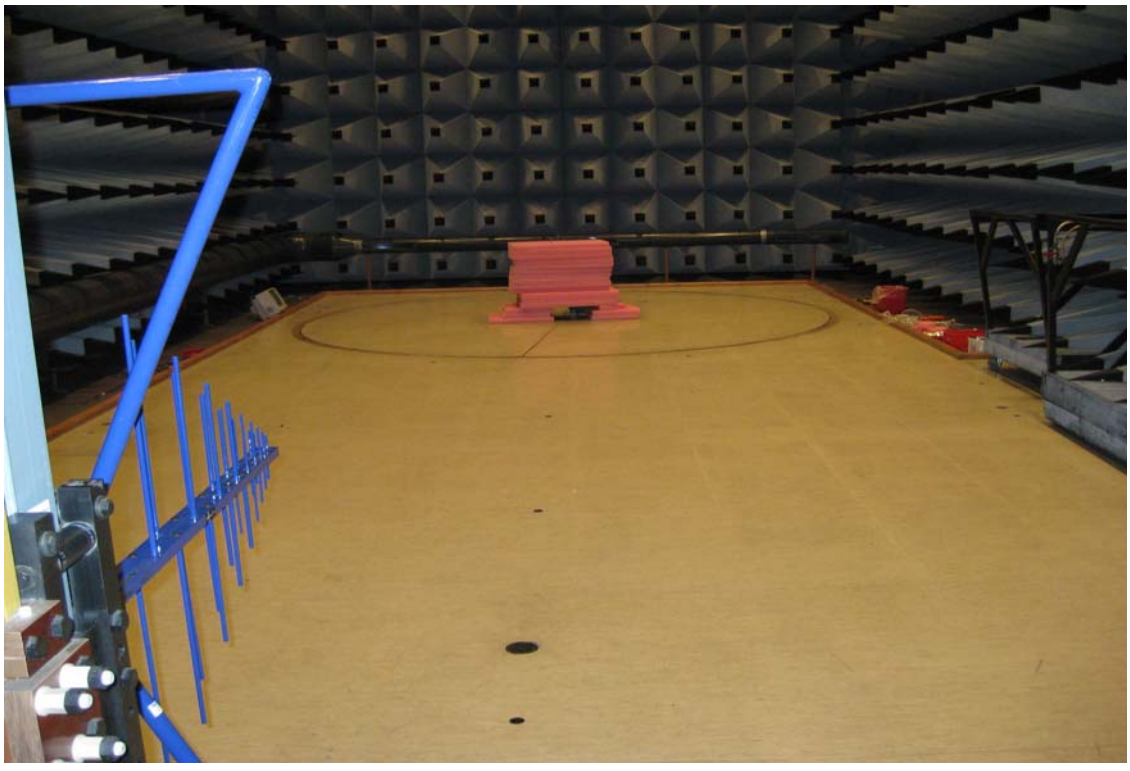
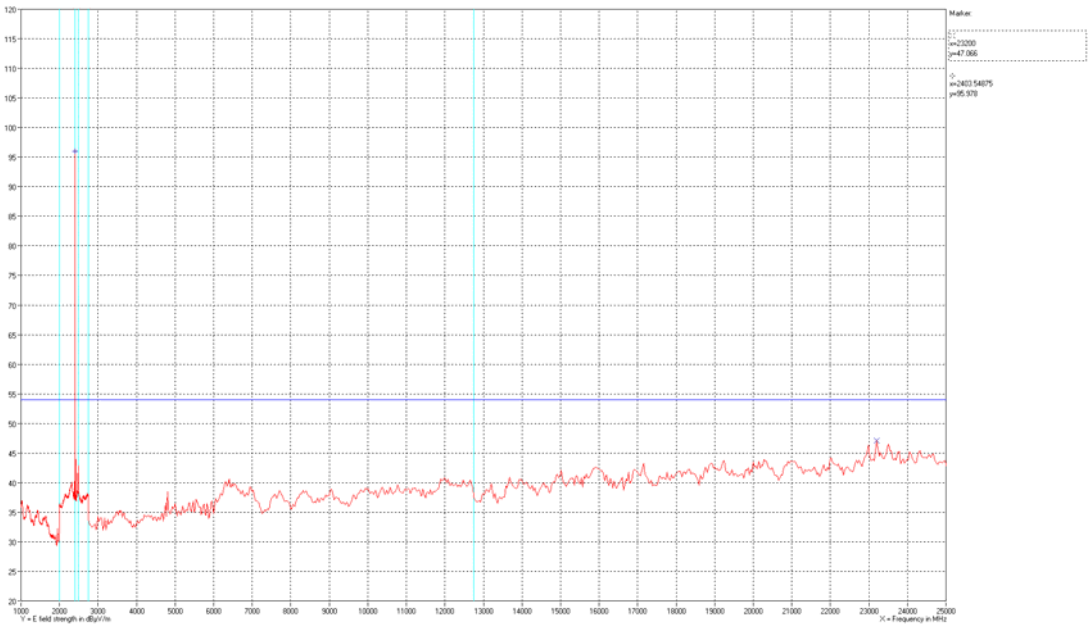


Photo 4.4.2 Test setup regarding measurement of radiated emission.

4.5 Measurement of radiated emission, 1 GHz to 25 GHz

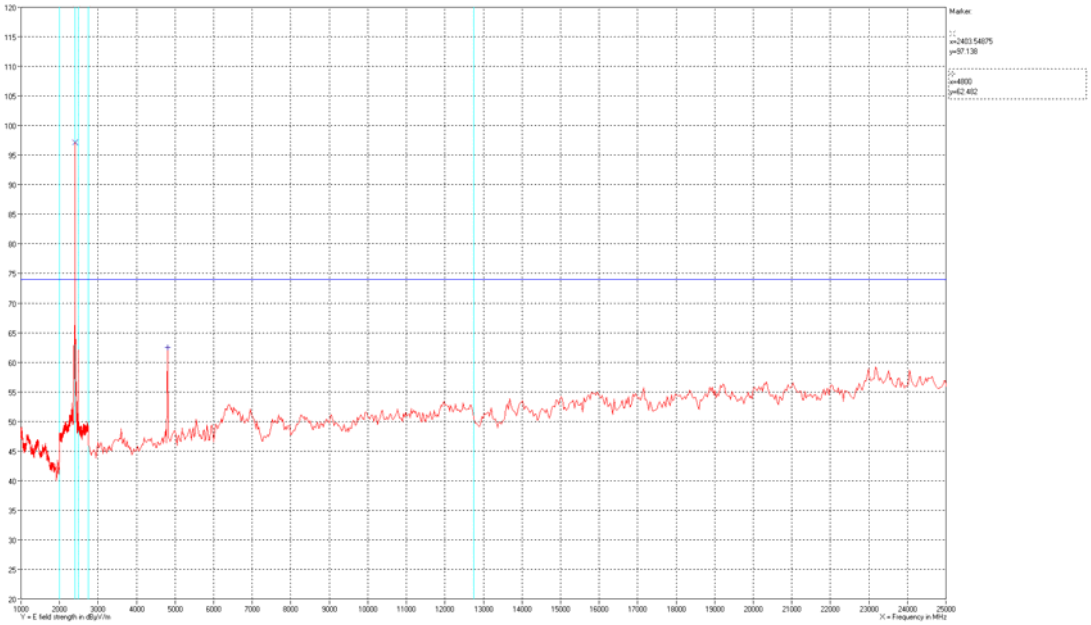
Test object	SY312	Sheet	RE_Spur-10
Type	SY312	Project no.	A506404-3
Serial no.	EMC 2-Spurius Emissions-302	Date	12 Mar. 2010
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 209	Frequency	1-25 GHz

Test method Characteristics	ANSI C63.4:2003 Complete search, Antenna distance 3 m.	Temperature Humidity	22 °C 29 % 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

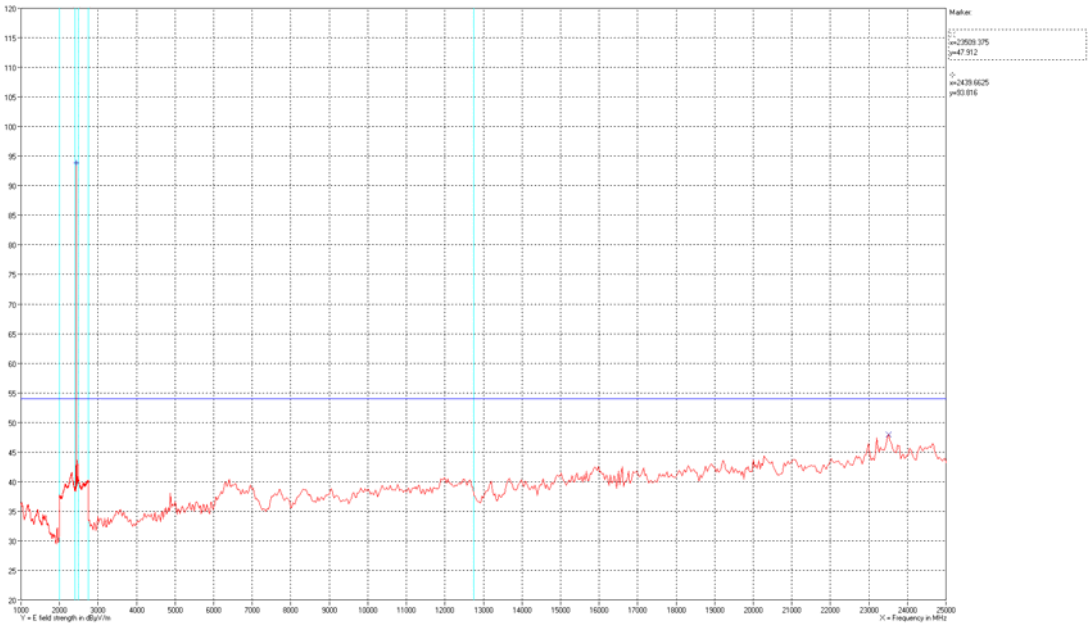


Polarization	Horizontal and vertical
Comments	Peak
Test result	The measured peak field strengths are below the peak limit (Peak limit = Average limit + 20 dB). The average field strengths are below the average limit. The limits are met at the upper and the lower band edge.
Test Port	Enclosure
Test frequency	2404 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	45.0 dBµV/m	38.8 dBµV/m
Peak	70.8 dBµV/m	59.9 dBµV/m

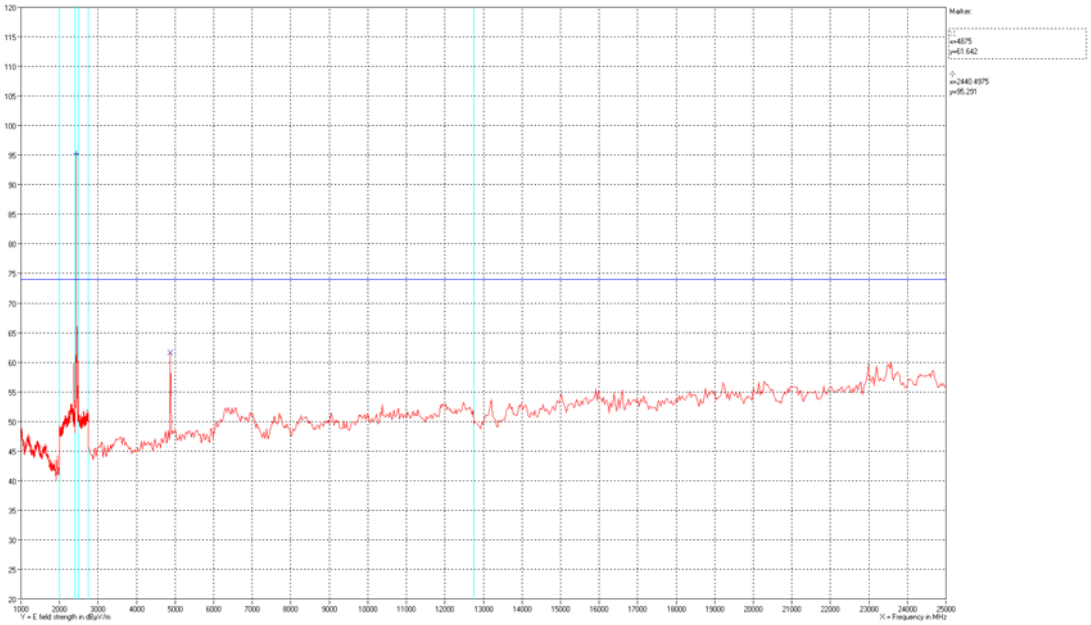
Test object	SY312	Sheet	RE_Spur-11
Type	SY312	Project no.	A506404-3
Serial no.	EMC 2-Spurius Emissions-302	Date	17 Mar. 2010
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	1-25 GHz

Test method Characteristics	ANSI C63.4:2003 Complete search, Antenna distance 3 m.	Temperature Humidity	22 °C 29 % 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

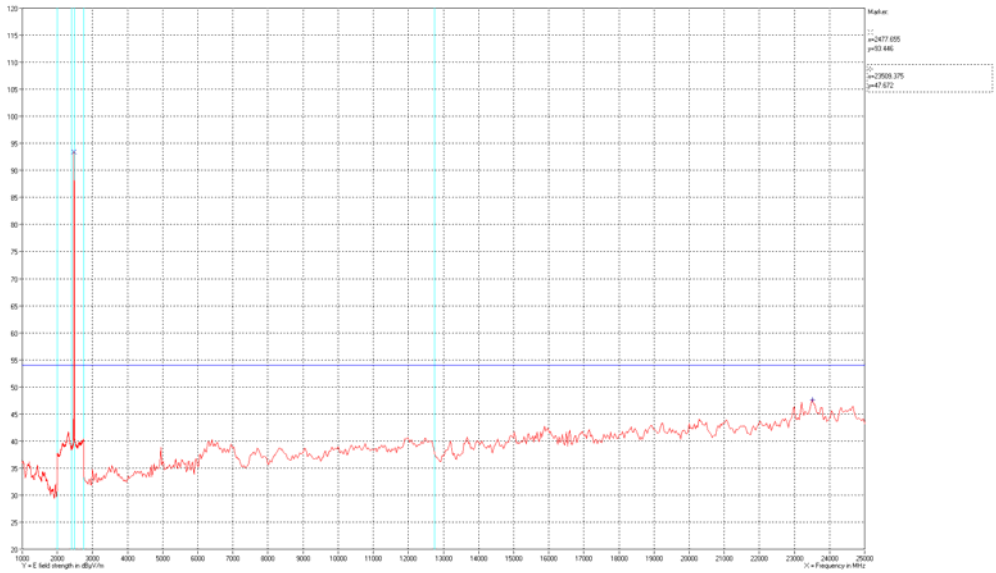


Polarization	Horizontal and vertical
Comments	Peak
Test result	The measured average field strengths are below the average limit. The measured peak field strengths are below the peak limit (Peak limit = Average limit + 20 dB). The average field strengths are below the average limit. The limits are met 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

Band edge	2400 MHz	2483.5 MHz
Average	38.8 dBµV/m	40.5 dBµV/m
Peak	49.4 dBµV/m	58.4 dBµV/m

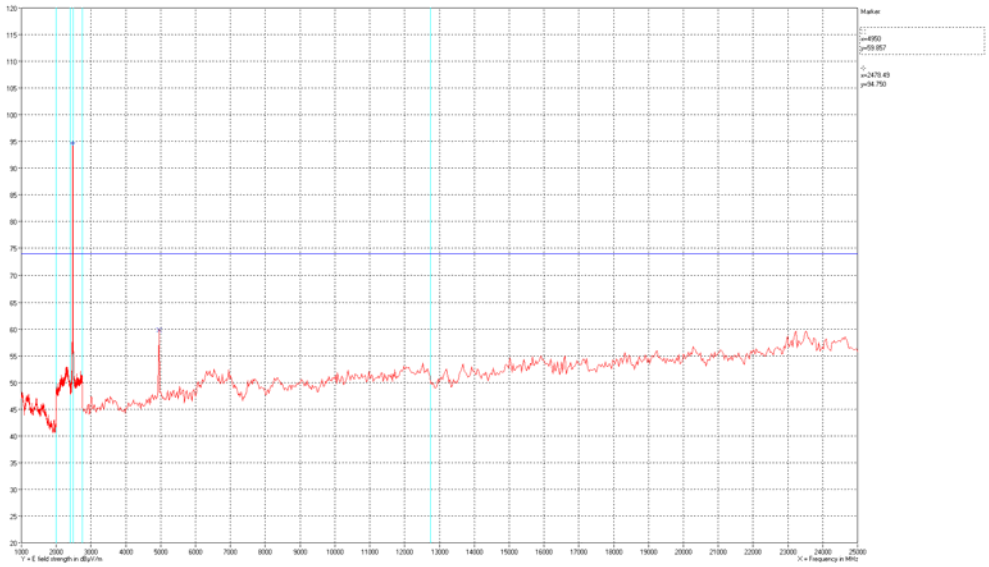
Test object	SY312	Sheet	RE_Spur-12
Type	SY312	Project no.	A506404-3
Serial no.	EMC 2-Spurius Emissions-302	Date	12 Mar. 2010
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209	Frequency	1-25 GHz

Test method Characteristics	ANSI C63.4:2003 Complete search, Antenna distance 3 m.	Temperature Humidity	22 °C 29 % 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	39.1 dBµV/m	41.1 dBµV/m
Peak	48.6 dBµV/m	64.6 dBµV/m

Photo 4.5.1 Test setup regarding measurement of radiated emission.

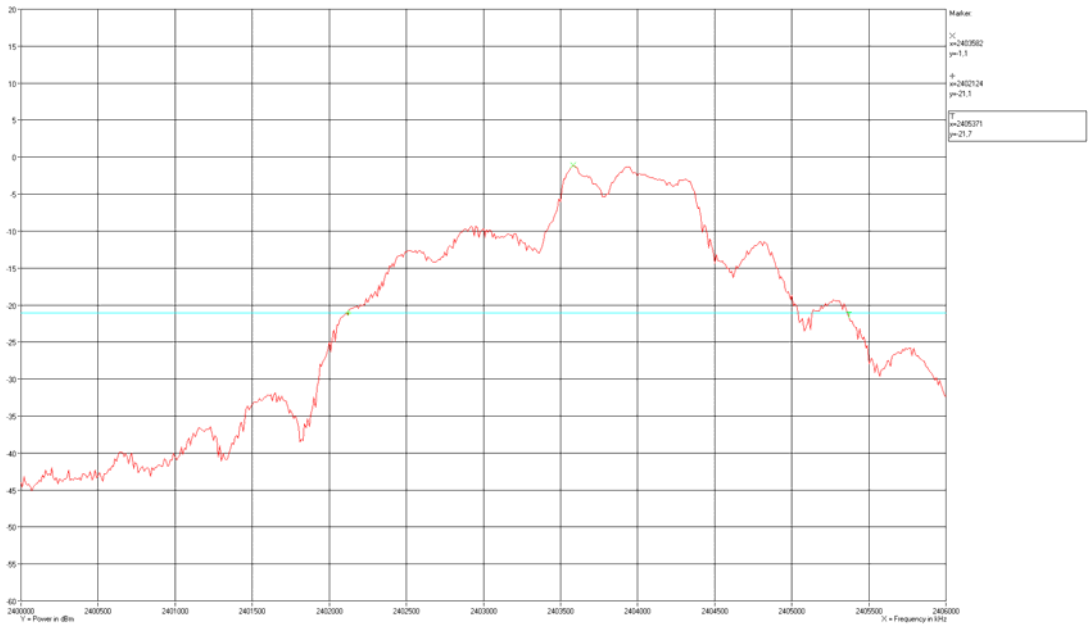
Photo 4.5.2 Test setup regarding measurement of radiated emission.

4.6 Measurement of band edge compliance

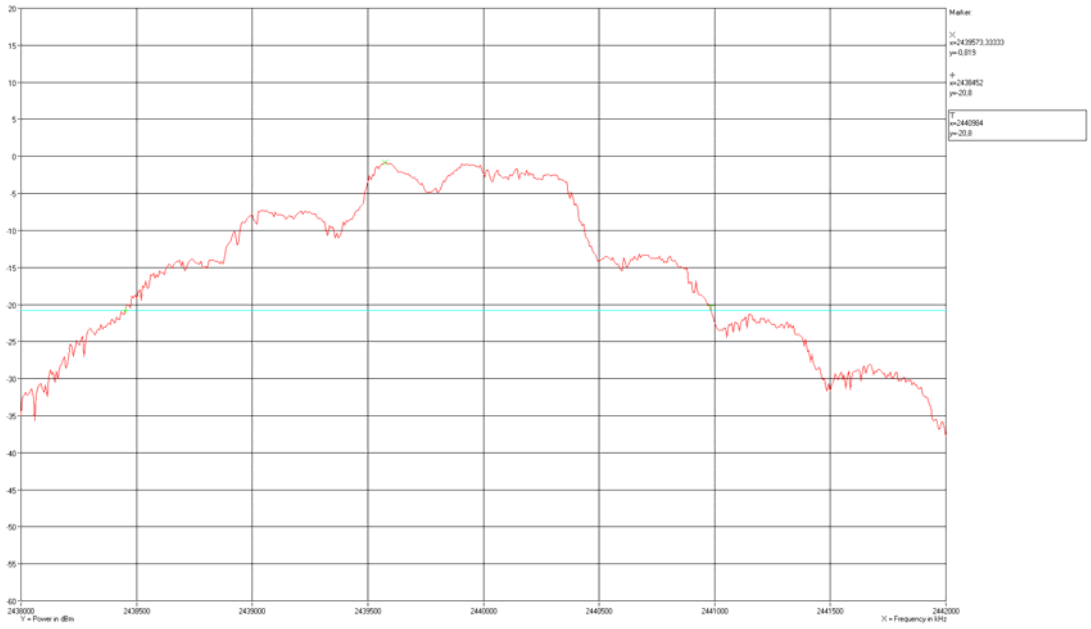
Test object	SY312	Sheet	PROF-2
Type	SY312	Project no.	A506404-1
Serial no.	EMC 3-Conducted sample-272	Date	18 Mar. 2010
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.215(c)		

Test method Characteristics	ANSI C63.4:2003 Temperature: 22ºC. Test voltage: 1.4 V		
Test equipm.	49321 49183 49299 Uncertainty: 1•10-7		
SA Settings	RBW: 100 KHz VBW: 300 kHz SPAN: 4 MHz DET: Peak CF: 2403 MHz, 2440 MHz, 2478 MHz Trace: Max Hold		
	Measured	Limit	Comment
Operating frequency:	2404 MHz		
Lowest frequency	2402.124MHz	2400.0 MHz	Ok
Highest frequency	2405.371 MHz	2483.5 MHz	Ok
Operating frequency:	2441 MHz		
Lowest frequency	2438.452 MHz	2400.0 MHz	Ok
Highest frequency	2439.573 MHz	2483.5 MHz	Ok
Operating frequency:	2478 MHz		
Lowest frequency	2476.835 MHz	2400.0 MHz	Ok
Highest frequency	2477.573 MHz	2483.5 MHz	Ok
Note 1:			

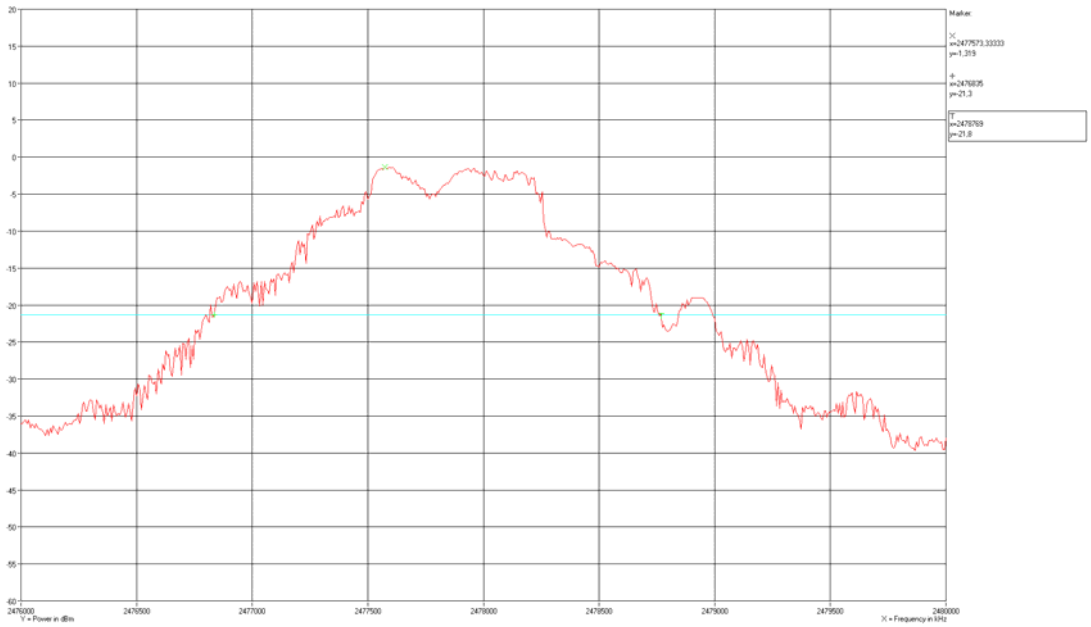
Band edge criteria	20 dB bandwidth
Test result	The measured 20 dB bandwidth was within the frequency band designated in 15.249.
Test modulation	Continuous Tx - normal modulation - hopping on
Compliant	Yes
Comments	Conducted measurement



Test frequency	2404 MHz



Test frequency	2441 MHz



Test frequency	2478 MHz

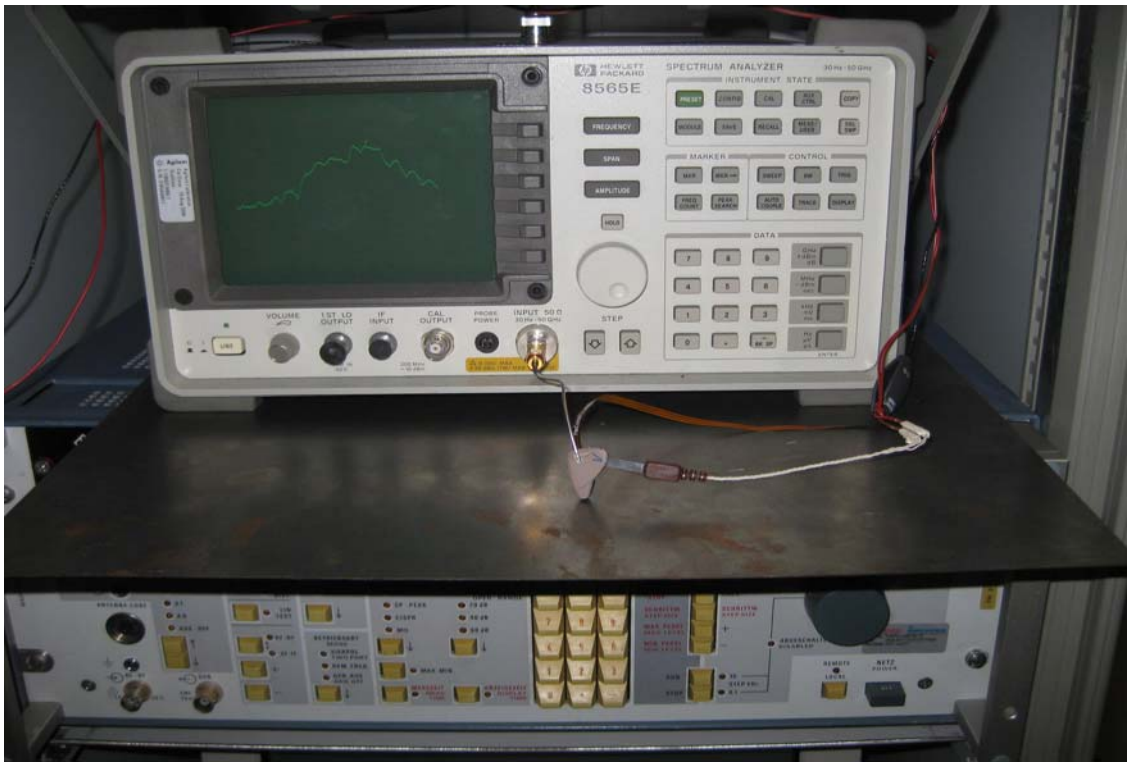


Photo 4.6.1 Test setup regarding measurement of band edge compliance.

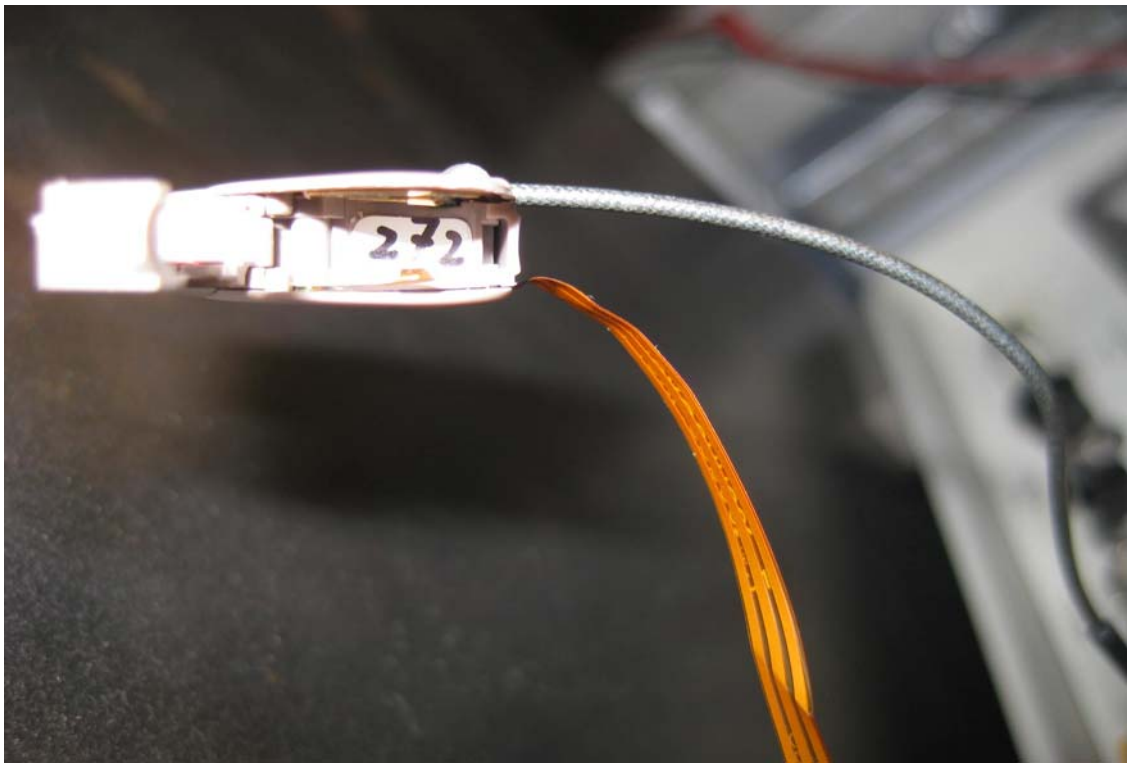
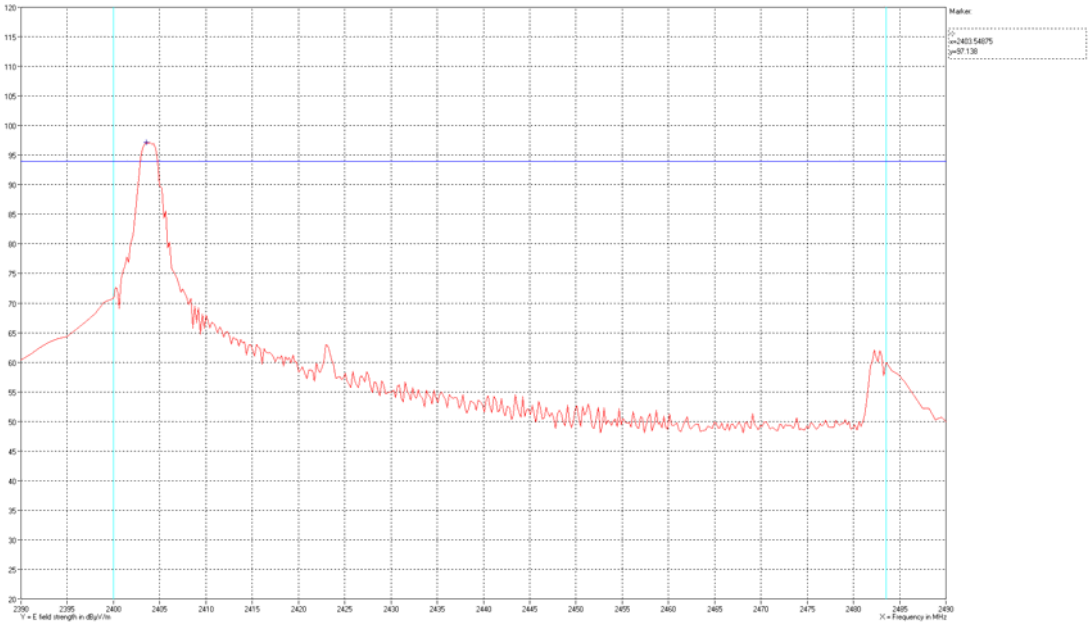


Photo 4.6.2 Test setup regarding measurement of band edge compliance.

4.7 Measurement of field strength of fundamental

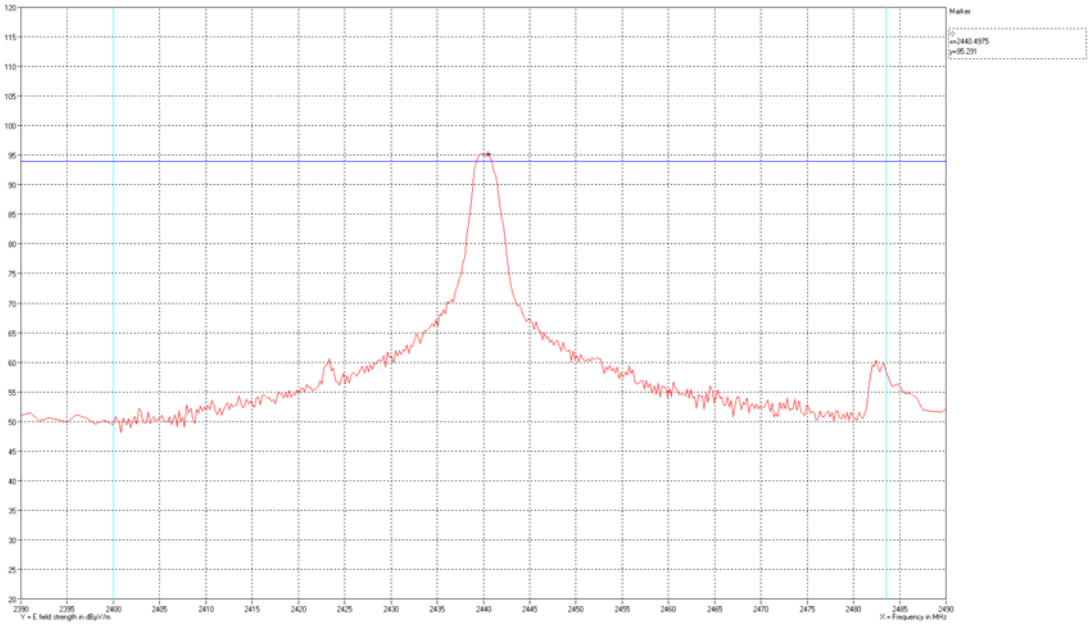
Test object	SY312	Sheet	RE_Spur-13
Type	SY312	Project no.	A506404-3
Serial no.	EMC 2-Spurius Emissions-302	Date	12 Mar. 2010
Client	GN Hearing A/S	Initials	CMT
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.249(a)	Frequency	2400-2483.5 MHz

Test method Characteristics	ANSI C63.4:2003 Complete search, Antenna distance 3 m.	Temperature Humidity	22 °C 29 % RH
Detector	Peak for 2390 MHz to 2490 MHz	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49600 49624 49625 49183 49299	Uncertainty 4.9 dB	

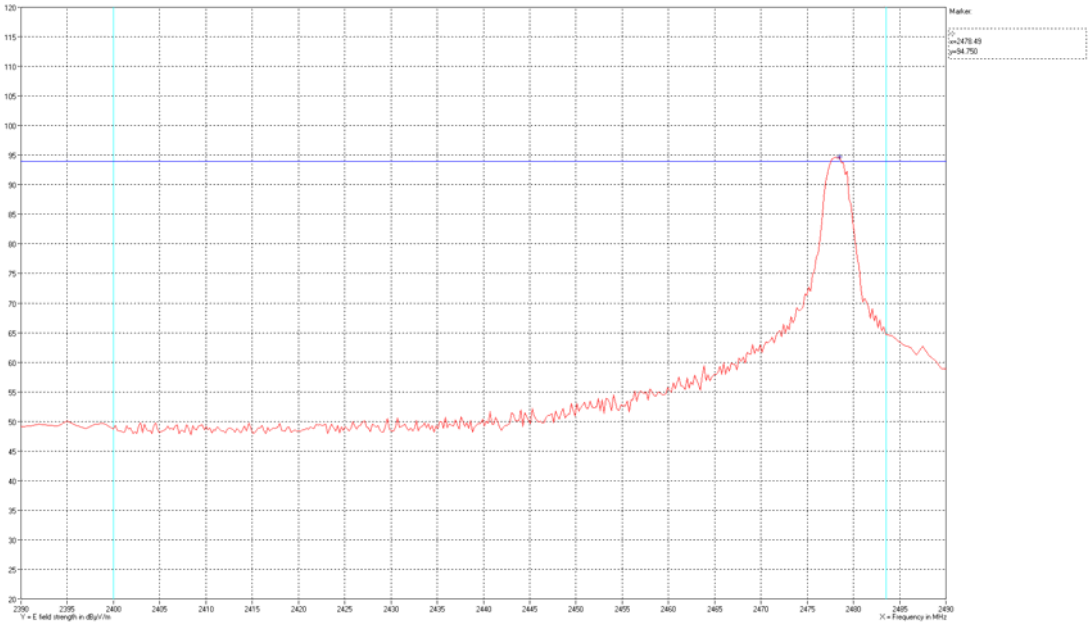


Test frequency 2404 MHZ

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
2404 MHz	97.1 dBµV/m	15.6 dB	81.5 dBµV/m	94 dBµV/m
2441 MHz	95.3 dBµV/m	15.6 dB	79.7 dBµV/m	94 dBµV/m
2478 MHz	94.8 dBµV/m	15.6 dB	79.2 dBµV/m	94 dBµV/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

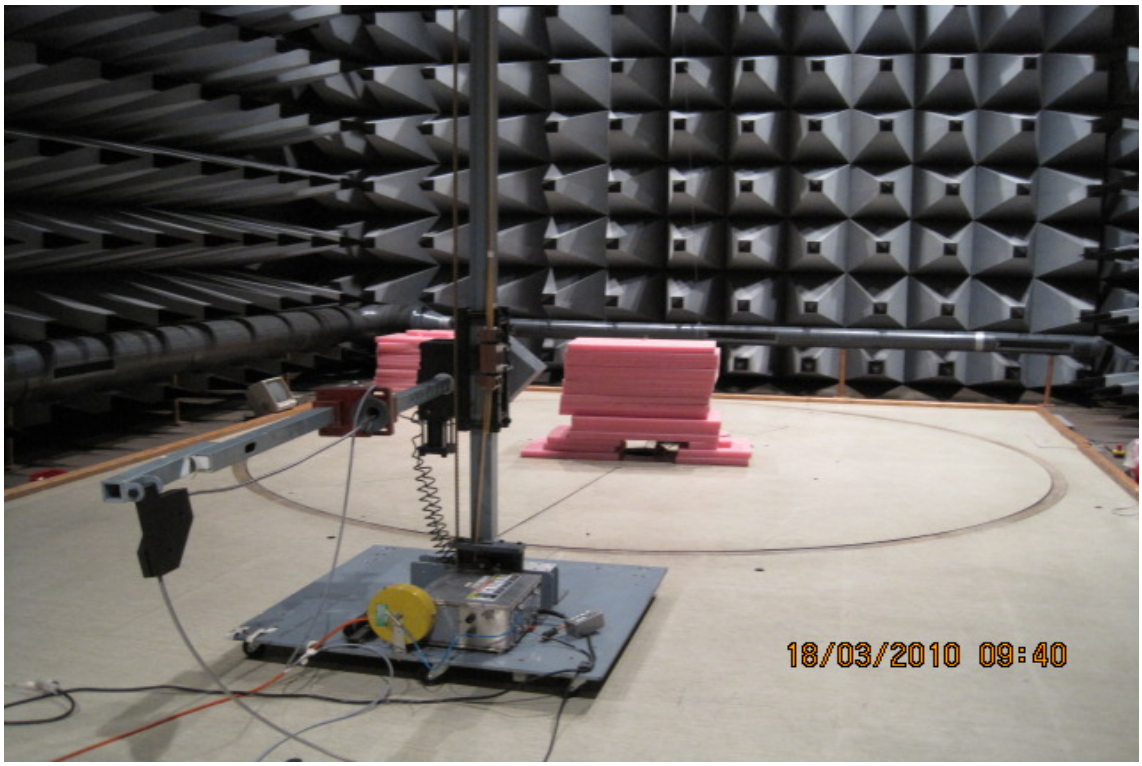


Photo 4.7.1 Test setup regarding measurement of field strength of fundamental.

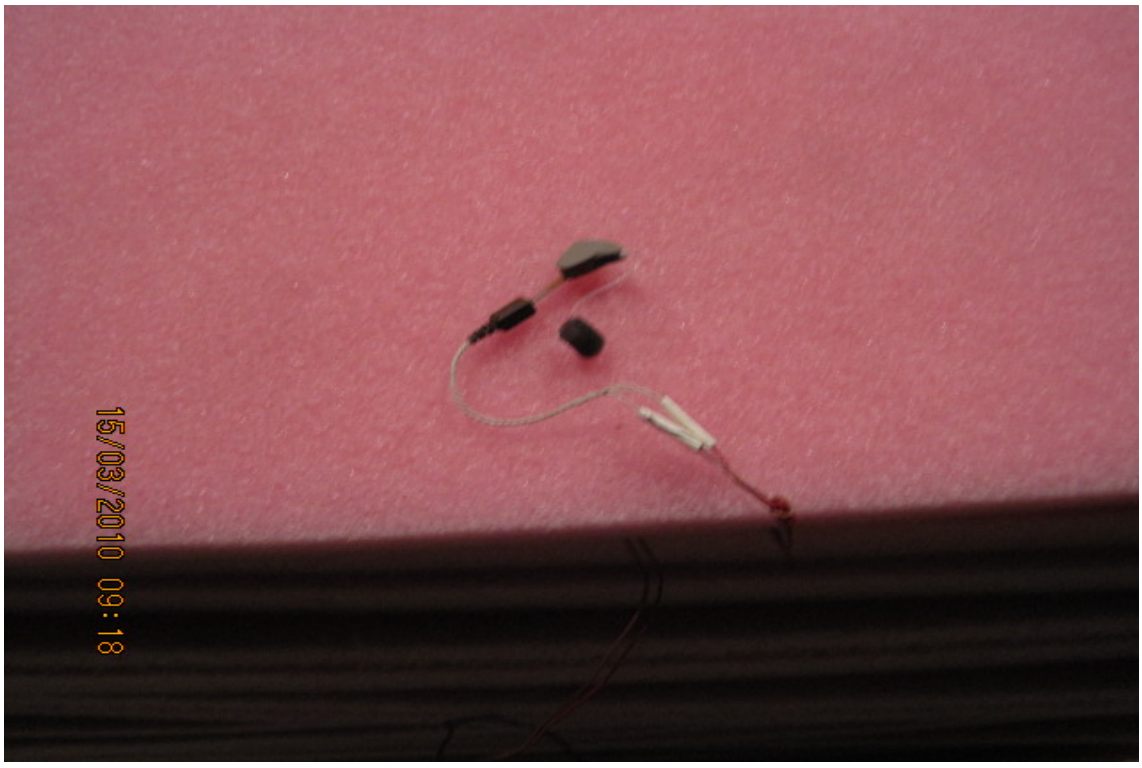


Photo 4.7.2 Test setup regarding measurement of field strength of fundamental.

5. National registrations and accreditations

5.1 DANAK Accreditation

Organization: Danish Accreditation and Metrology Fund - DANAK, see www.danak.dk and 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 T1549
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 ANLYZER	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