

DELTA Test Report



Radio parameter test of B013 according to FCC and IC requirements

Performed for GN Hearing A/S

DANAK-1911143

Project no.: A506865-7

Page 1 of 63

06 December 2010

DELTA

Venlighedsvej 4
2970 Hørsholm
Denmark

Tel. +45 72 19 40 00

Fax +45 72 19 40 01

www.delta.dk

VAT No. 12275110

Title	Radio parameter test of BO13 according to FCC and IC requirements
Test object	BO13
Report no.	DANAK-1911143
Project no.	A506865-7
Test period	26 July to 30 September 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 IC standard RSS-210, Issue 7:2007 IC standard RSS-Gen, Issue 2:2007
Results	The test objects were found to be in compliance with the specifications, as listed in Section 1
Test personnel	Roa A. Salman Jan Askov Claus Momme Thomsen

Date 06 December 2010

Project Manager



Jan Askov
Senior Specialist, Wireless
DELTA

Responsible



Claus Rømer Andersen
Team Manager, Wireless
DELTA



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1. Summary of tests

Tests SRD	Test methods	Rule Section	Results
Peak to average correction factor (PACF)	FCC CFR 47 Part 15 IC RSS-Gen:2007	15.35(c) Gen, 4.5	N.A.
Antenna requirement	Visual inspection IC RSS-Gen:2007	15.203 Gen, 7.1.4	Passed
Measurement of radiated emission	ANSI C 63.4:2003 IC RSS-Gen:2007	15.209 210, 2.6 & A2.9	Passed
Measurement of band-edge compliance	FCC CFR 47 Part 15 ANSI C 63.4:2003 IC RSS-Gen:2007	15.215(c) & 15.209 210, 2.6 & A2.9	Passed
Measurement of field strength of fundamental	ANSI C 63.4:2003 IC RSS-Gen:2007	15.249(a) 210, A2.9	Passed
Measurement of occupied bandwidth	IC RSS-Gen:2007	Gen, 4.6.1	Passed
Measurement of radiated emission, receiver	EN 300 440-1 V1.5.1:2009	Gen, 7.2.3.2 210, 2.6	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
- IC Standard RSS-210 Issue 7:2007
- IC Standard RSS-Gen, Issue 2:2007.

The test results relate only to the objects tested.

2. Test objects and auxiliary equipment

2.1 Test objects

Test object 2.1.1

Name of test object	BO13
Model / type	BO13
Part no.	BO13
Serial no.	BO13-1
FCC ID	X26BO13
IC ID	6941C-BO13
Manufacturer	GN Hearing A/S
Supply voltage	1.3 VDC (Zinc Air battery)
Software version	Spurious emission firmware: Tx and Rx Deltatest:30.06.10
Cycle time	0.5 ms / 1.0 ms
Comments	Supplied by external power supply or battery

Test object 2.1.2

Name of test object	BO13
Model / type	BO13
Part no.	BO13
Serial no.	BO13-2
FCC ID	X26BO13
IC ID	6941C-BO13
Manufacturer	GN Hearing A/S
Supply voltage	1.3 VDC (Zinc Air battery)
Software version	Spurious emission firmware: Tx and Rx Deltatest:30.06.10
Cycle time	0.5 ms / 1.0 ms
Comments	Supplied by external power supply or battery



Test object 2.1.3

Name of test object	BO13
Model / type	BO13
Part no.	BO13
Serial no.	BO13-3
FCC ID	X26BO13
IC ID	6941C-BO13
Manufacturer	GN Hearing A/S
Supply voltage	1.3 VDC (Zinc Air battery)
Software version	Spurious emission firmware: Tx and Rx Deltatest:30.06.10
Cycle time	0.5 ms / 1.0 ms
Comments	Supplied by external power supply or battery

Test object 2.1.4

Name of test object	BO13
Model / type	BO13
Part no.	BO13
Serial no.	BO13-8
FCC ID	X26BO13
IC ID	6941C-BO13
Manufacturer	GN Hearing A/S
Supply voltage	1.3 VDC (Zinc Air battery)
Software version	Spurious emission firmware: Tx and Rx Deltatest:30.06.10
Cycle time	0.5 ms / 1.0 ms
Highest frequency generated or used	Antenna replaced by SMA connector and supplied by external power supply

3. General test conditions

3.1 Test setup during test

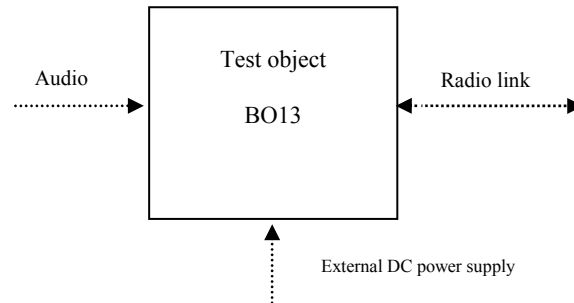


Figure 3.1.1 Block diagram of test object with external cables.

All test objects were running special test software.

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

Tests were performed at three frequencies

- Low frequency: 2404 MHz
- Middle frequency: 2440 MHz
- High frequency: 2478 MHz.

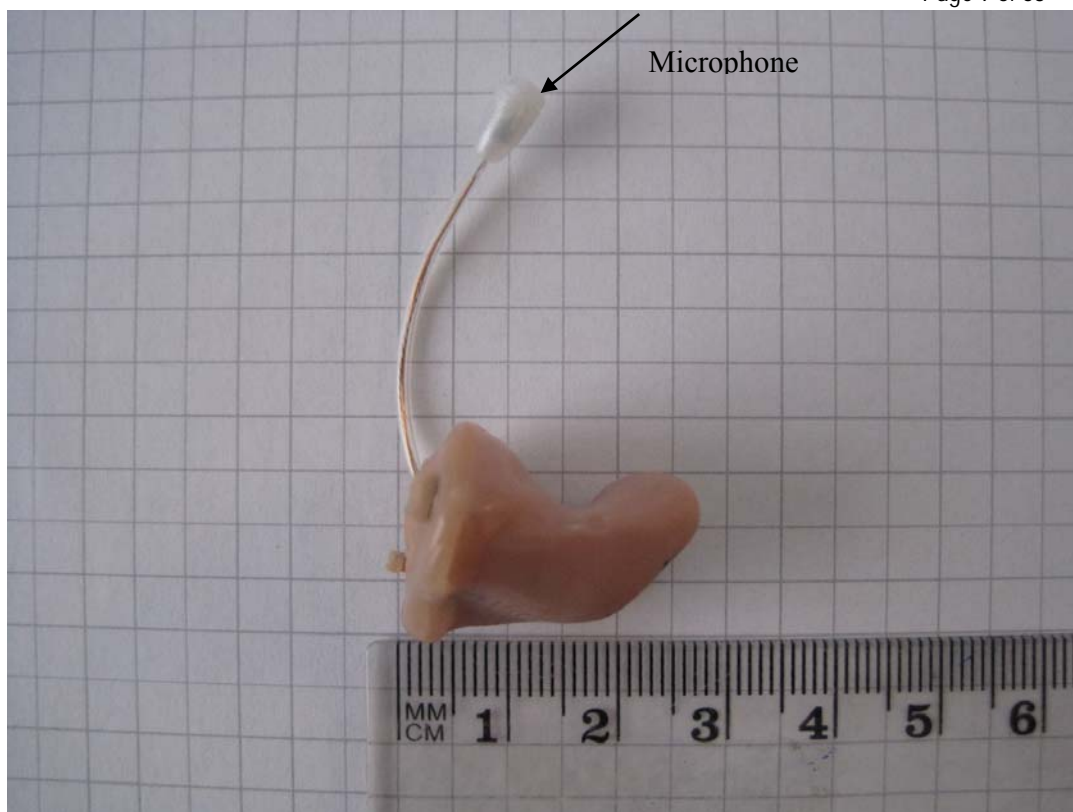
During relevant tests, the battery was replaced by an external DC power supply.
External power supply is not used under intended use.

Intended use

BO13 is a hearing aid used for alleviation of hearing loss. It can receive audio signals and be configured via the radio link.

Size of the test object:

The test object measures 28 x 15 x 20 mm without microphone



3.2 Test sequence

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

1. Measurement of radiated emission
2. Measurement of field strength of fundamental
3. Measurement of band edge compliance
4. Measurement of occupied bandwidth
5. Measurement of radiated emission, Rx.

4. Test results

4.1 Radio specifications, receiver and transmitter

Test object	BO13	Sheet	Radio-1
Type	BO13	Project no.	A506865-5
Serial no.	All	Date	
Client	GN Hearing A/S	Initials	JAS
Specification	FCC CFR 47 Part 15, Subpart C IC standard RSS-210, Issue 7:2007 IC standard RSS-Gen, Issue 2:2007		

The radio of the test object has the following specified RF parameters. The below information regarding the receiver and the transmitter is declared by the manufacturer:

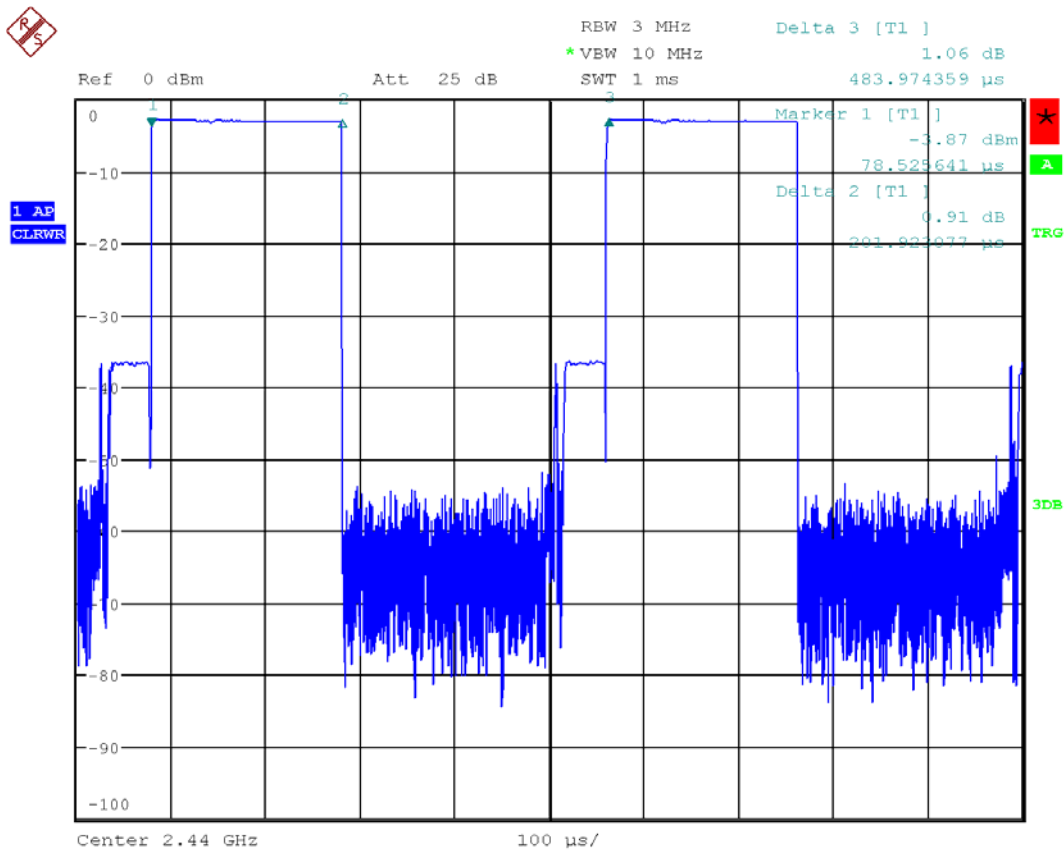
Type of equipment	:	Low power device (2400-2483.5 MHz)
Operating frequency range	:	2404 to 2478 MHz
Antenna	:	Permanently attached wire antenna,
Maximum gain	:	-0.4 dB
Transmit power, max	:	-2.7 dBm EIRP
Field Strength, max	:	92.5 dB μ V/m (42 mV) @ 3 meter
Power level	:	No
No of channels	:	20
Bandwidth (Specification)	:	2 MHz
Occupied bandwidth (99%)	:	2.5 MHz (Measured)
Necessary bandwidth	:	2.5 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 °C.
Emission Designator	:	3M43F7E
Max. TX spurious emission	:	53.0 (μ V/m) @ 3 meter (Field Strength)
Max. RX spurious emission	:	49.5 (μ V/m) @ 3 meter (Field Strength)

4.2 Peak to average correction factor (PACF)

Test object	BO13	Sheet	Block-1
Type	BO13	Project no.	A506865-5
Serial no.	BO13-8	Date	30 Sep. 2010
Client	GN Hearing A/S	Initials	JAS
Specification	FCC CFR 47 Part 15, Subpart C IC standard RSS-Gen, Issue 2:2007		

Test method	FCC CFR 47 Part 15, Subpart C, Section 15.35(c) IC standard RSS-Gen, Issue 2:2007, Section 4.5			
Characteristics	Temperature: 22 °C, Humidity: 45 % , Test voltage: External power supply at 1.3 VDC			
Test equipm.	29962 49321 49183			Uncertainty: 10 kHz
SA Settings	RBW:3 MHz VBW:10 MHz SPAN:Zero-1ms DET:Peak CF: 2440 Trace:CLRWR			
Operating frequency	Max Tx on time	Periode time	Duty Cycle	PACF
2440	201.92	483.97	41.7	7.6
MHz	μS	μS	%	dB
Note: PACF=-20 log (Duty Cycle[%]/100)				





Date: 30.SEP.2010 06:39:40

Test Port	Conducted - SMA connector
Test mode	Continuous Tx - normal modulation - hopping off
Comments	<p>This is according to FCC CFR 47 Part 15, Subpart C, Section 15.35(c) and IC standard RSS-Gen, Section 4.5 for one complete pulse train, including blanking intervals and the pulse train do not exceed 0.1 seconds.</p> <p>This PACF can be subtracted from the peak measurements to obtain the average values.</p>



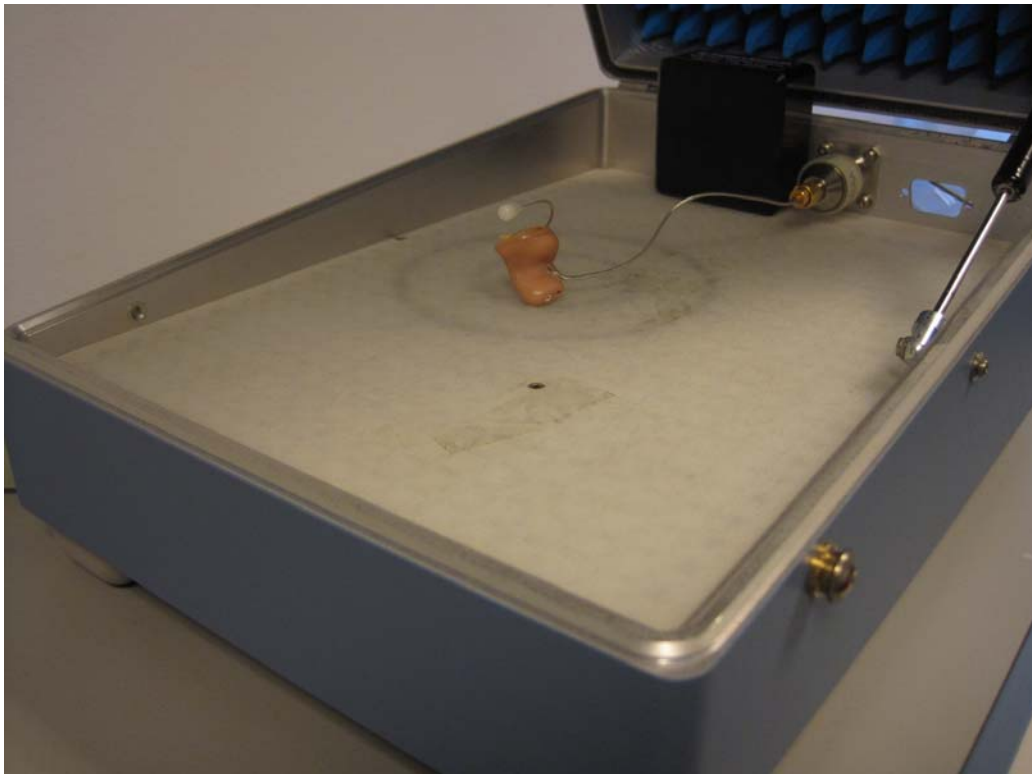


Photo 4.2.1 Test setup regarding measurement of peak to average correction factor (PACF).

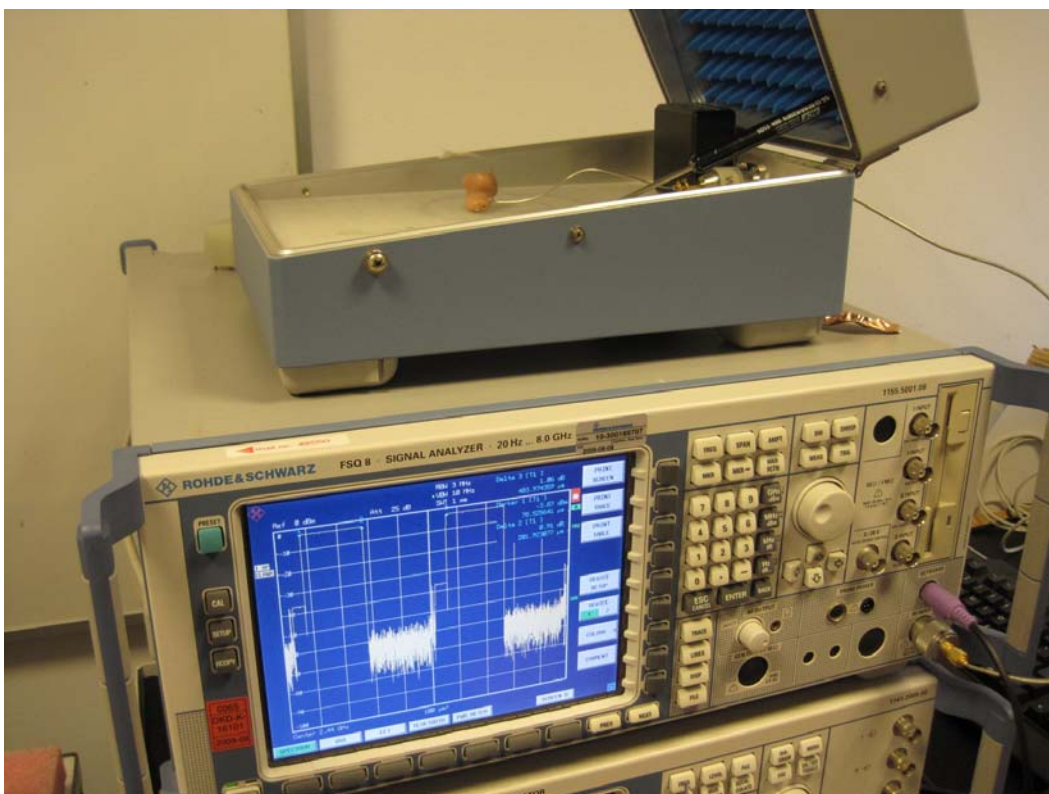


Photo 4.2.2 Test setup regarding measurement of peak to average correction factor (PACF).



4.3 Antenna requirement

Test object	BO13	Sheet	ANT-1
Type	BO13	Project no.	A506865-5
Serial no.	BO13-3	Date	30 Sep 2010
Client	GN Hearing A/S	Initials	JAS
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.203 RSS-Gen, Section 7.1.4		

Test method	Visual inspection
<p>Evaluation criteria</p> <p>Section 15.203 of the FCC rules and 7.1.4 of RSS-Gen state that the subject device must meet at least one of the following criteria:</p> <ul style="list-style-type: none"> (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>Evaluation result</p> <p>The BO13 has one permanently attached wire antenna.</p>	

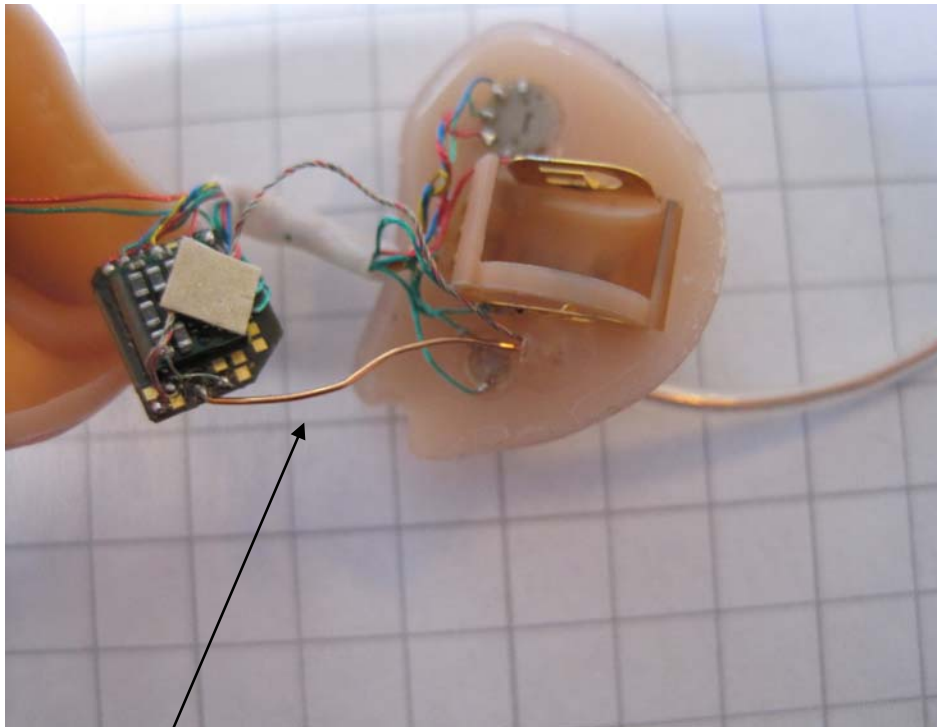


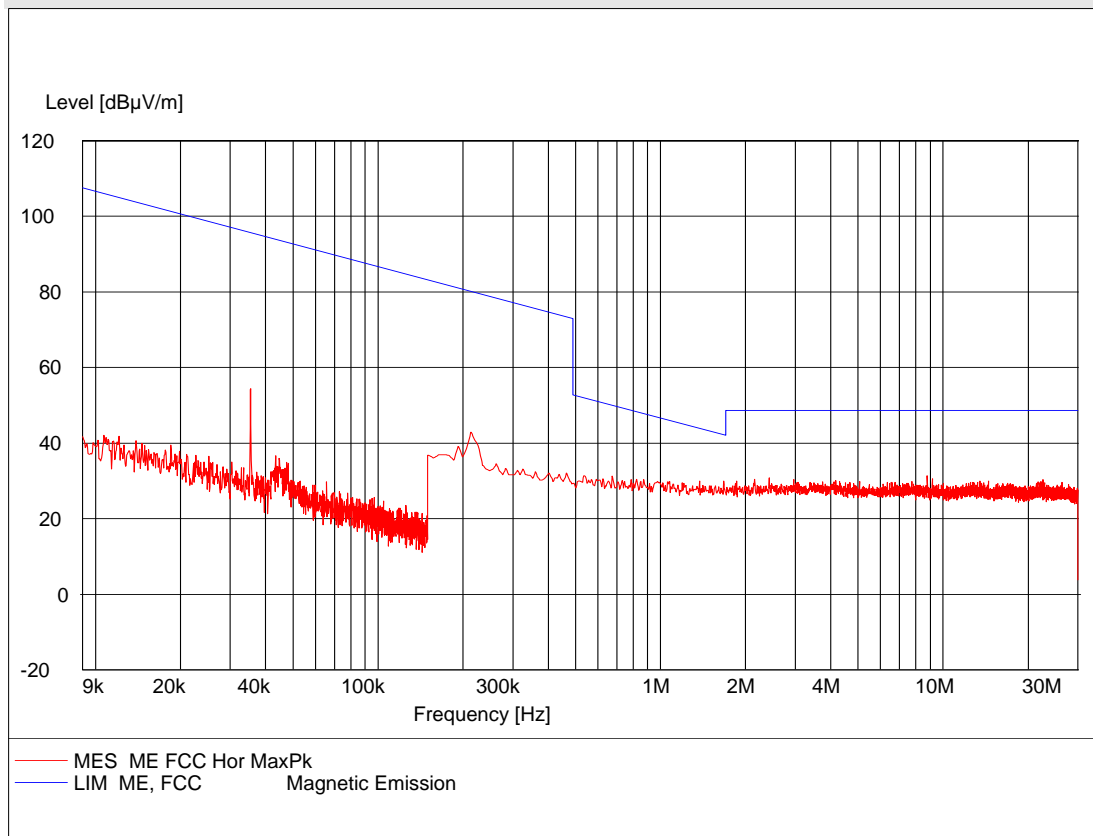
Photo 4.3.1 Test setup regarding Antenna requirement

Antenna

4.4 Measurement of radiated emission, 0.009 MHz - 30 MHz

Test object	BO13	Sheet	RE Loop-1
Type	BO13	Project no.	A506865-5
Serial no.	BO13-3	Date	09 Aug. 2010
Client	GN Hearing A/S	Initials	A-RAS
Specification	FCC CFR 47 Part 15, Subpart C IC standard RSS-210, Issue 7:2007 IC standard RSS-Gen, Issue 2:2007	Frequency	0.009-30MHz

Test method	ANSI C63.4:2003	Temperature	19 °C
Characteristics	Scan, Loop Antenna at 10m, 1m Height, Horizontal.	Humidity	56 % RH
Detector	Peak	Bandwidth	0.2/9 KHz
Test equipm.	EMI room Hørsholm 29332 29503 49600 29494	Uncertainty	4 dB

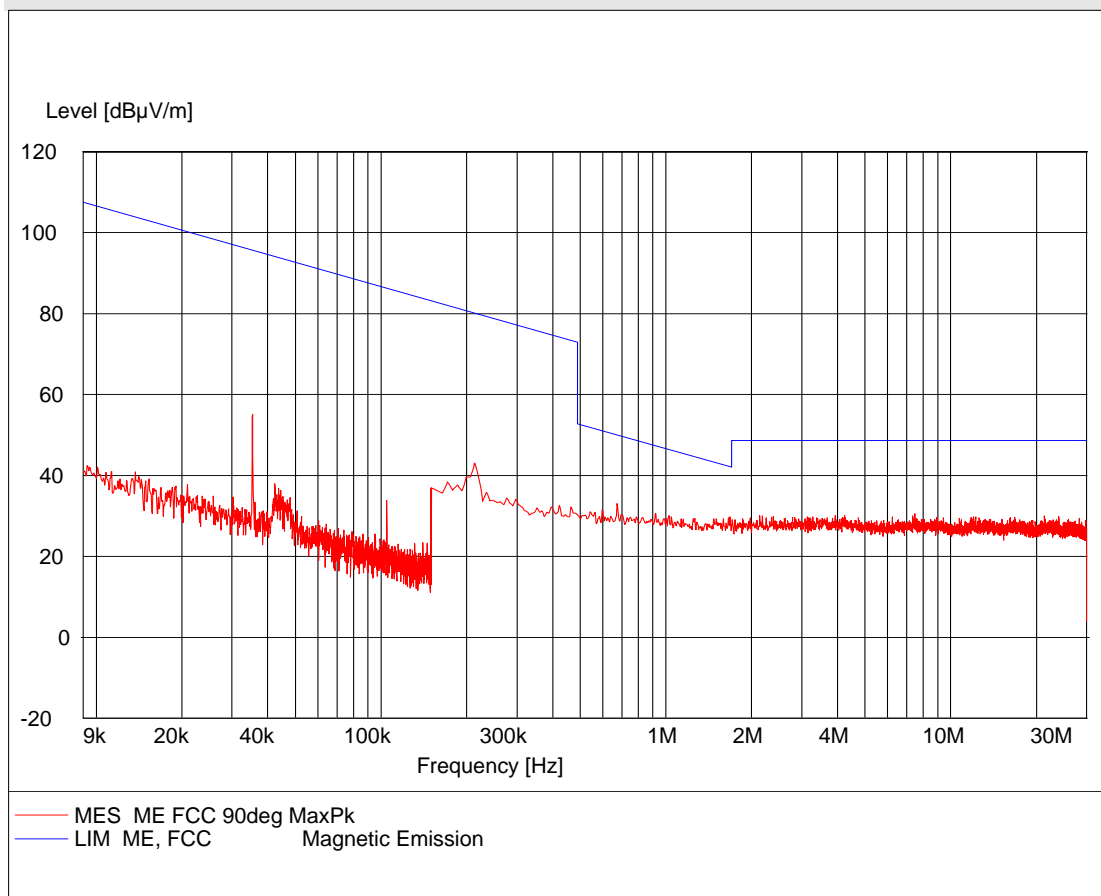


Comments

The limit has been extrapolated to 10 m using an extrapolation factor of 40 dB/decade as specified in § 15.31(f)(2). $L_2 = L_1 + 40 \log_{10} (D_1/D_2)$.

Test object	BO13	Sheet	RE Loop-2
Type	BO13	Project no.	A506865-5
Serial no.	BO13-3	Date	09 Aug. 2010
Client	GN Hearing A/S	Initials	A-RAS
Specification	FCC CFR 47 Part 15, Subpart C IC standard RSS-210, Issue 7:2007 IC standard RSS-Gen, Issue 2:2007	Frequency	0.009-30MHz

Test method	ANSI C63.4:2003	Temperature	19 °C
Characteristics	Scan, Loop Antenna at 10m, 1m Height, 90deg.	Humidity	56 % RH
Detector	Peak	Bandwidth	0.2/9 KHz
Test equipm.	EMI room Hørsholm 29332 29503 49600 29494	Uncertainty	4 dB

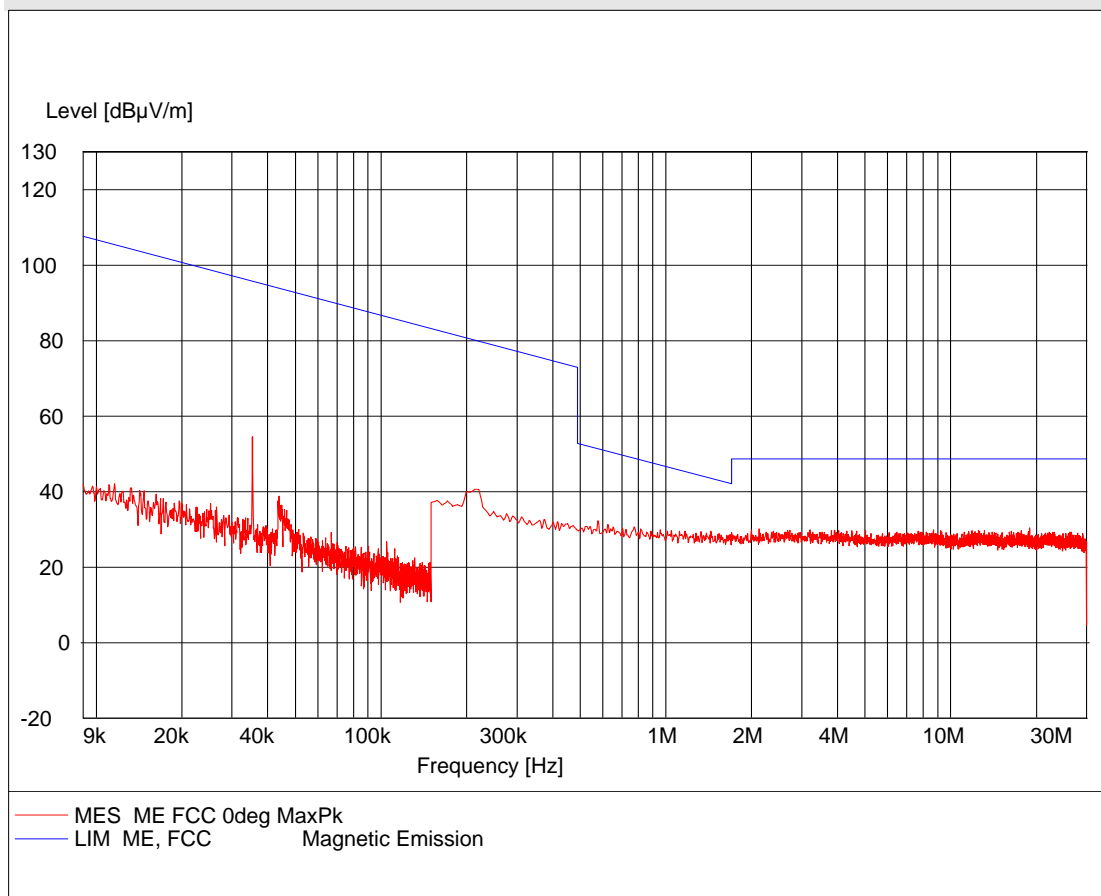


Comments

The limit has been extrapolated to 10 m using an extrapolation factor of 40 dB/decade as specified in § 15.31(f)(2). $L_2 = L_1 + 40 \log_{10} (D_1/D_2)$.

Test object	BO13	Sheet	RE Loop-3
Type	BO13	Project no.	A506865-5
Serial no.	BO13-3	Date	09 Aug. 2010
Client	GN Hearing A/S	Initials	A-RAS
Specification	FCC CFR 47 Part 15, Subpart C IC standard RSS-210, Issue 7:2007 IC standard RSS-Gen, Issue 2:2007	Frequency	0.009-30MHz

Test method	ANSI C63.4:2003	Temperature	19 °C
Characteristics	Scan, Loop Antenna at 10m, 1m Height, 0deg.	Humidity	56 % RH
Detector	Peak	Bandwidth	0.2/9 KHz
Test equipm.	EMI room Hørsholm 29332 29503 49600 29494	Uncertainty	4 dB



Comments

The limit has been extrapolated to 10 m using an extrapolation factor of 40 dB/decade as specified in § 15.31(f)(2). $L_2 = L_1 + 40 \log_{10} (D_1/D_2)$.



Test frequency	2440 MHz
Test mode	Continuous Tx - normal modulation - hopping off
Condition	Normal
Test result	The measured field strengths are more then 15 dB below the limit
Compliant	Yes
Comments	Measurement performed in a shielded room

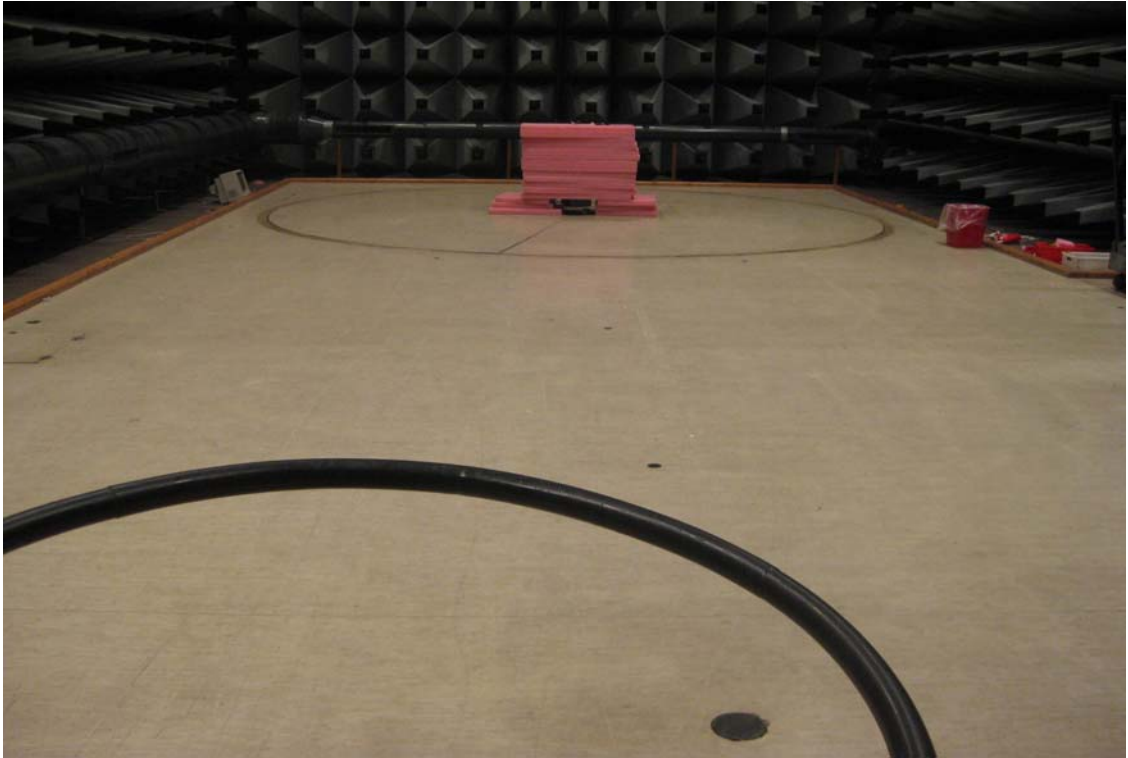


Photo 4.4.1 Test setup regarding measurement of radiated emission,
0.009 MHz - 30 MHz.



Photo 4.4.2 Test setup regarding measurement of radiated emission,
0.009 MHz - 30 MHz.

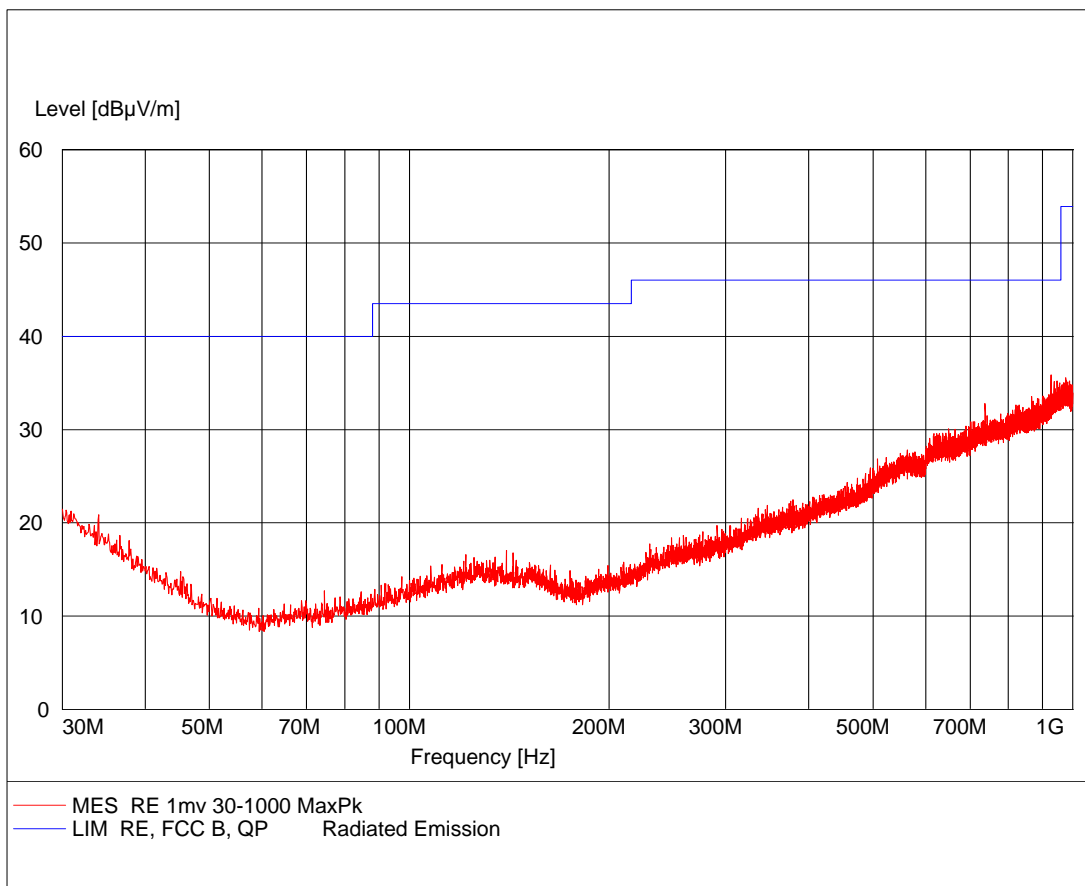


Photo 4.4.3 Test setup regarding measurement of radiated emission,
0.009 MHz - 30 MHz.

4.5 Measurement of radiated emission, 30 MHz to 1000 MHz

Test object	BO13	Sheet	RE_Spur-2
Type	BO13	Project no.	A506865-5
Serial no.	BO13-3	Date	26 Jul. 2010
Client	GN Hearing A/S	Initials	A-RAS
Specification	FCC CFR 47 Part 15, Subpart C IC standard RSS-210, Issue 7:2007 IC standard RSS-Gen, Issue 2:2007	Frequency	30-1000 MHz

Test method	ANSI C 63.4:2003	Temperature	21 °C
Characteristics	Pre-scan, Antenna at 3 m, 1 m height, vert. pol.	Humidity	45 % RH
Detector	Peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty	4.9 dB



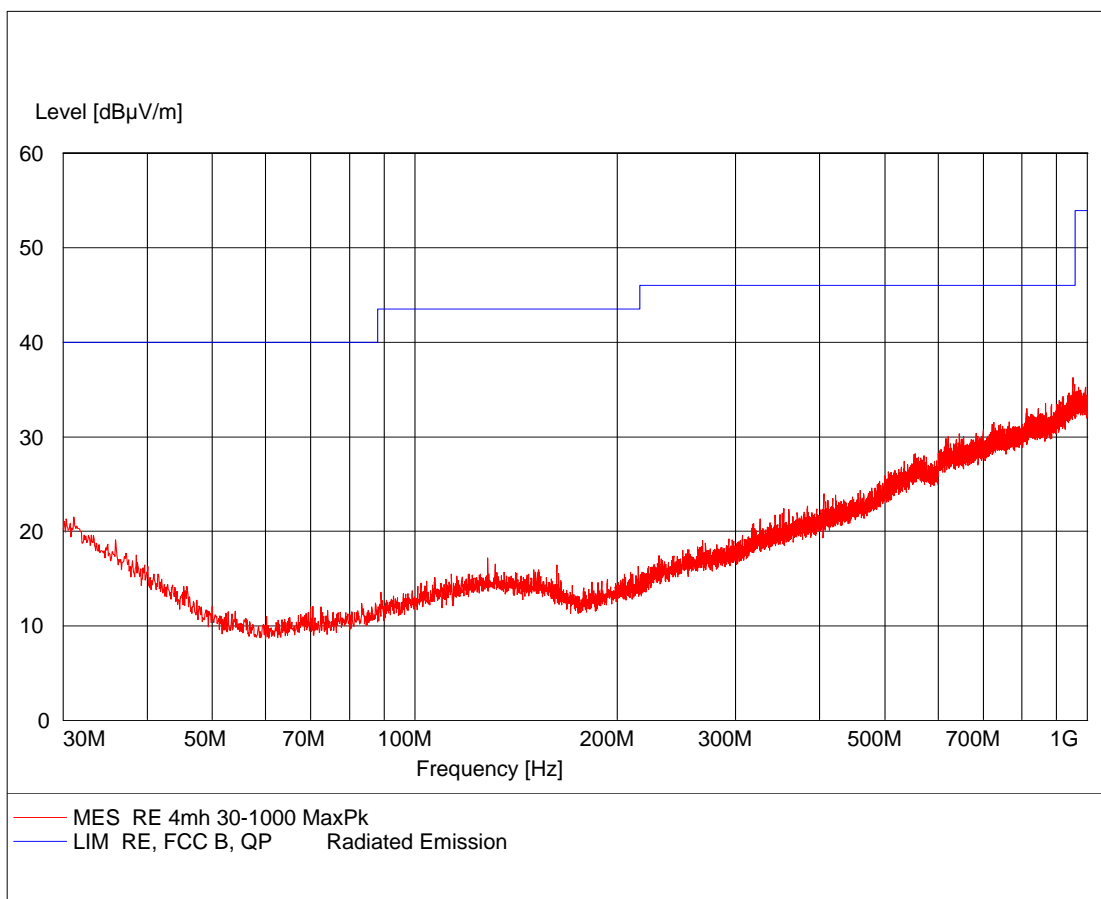
Comments

Continuous Tx - normal modulation - hopping off



Test object	BO13	Sheet	RE_Spur-3
Type	BO13	Project no.	A506865-5
Serial no.	BO13-3	Date	26 Jul. 2010
Client	GN Hearing A/S	Initials	A-RAS
Specification	FCC CFR 47 Part 15, Subpart C IC standard RSS-210, Issue 7:2007 IC standard RSS-Gen, Issue 2:2007	Frequency	30-1000 MHz

Test method	ANSI C 63.4:2003	Temperature	21 °C
Characteristics	Pre-scan, Antenna at 3 m, 4 m height, hor. pol.	Humidity	45 % RH
Detector	Peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty	4.9 dB



Comments

Continuous Tx - normal modulation - hopping off



Test object	BO13	Sheet	RE_Spur-4
Type	BO13	Project no.	A506865-5
Serial no.	BO13-3	Date	26 Jul. 2010
Client	GN Hearing A/S	Initials	A-RAS
Specification	FCC CFR 47 Part 15, Subpart C IC standard RSS-210, Issue 7:2007 IC standard RSS-Gen, Issue 2:2007	Frequency	30-1000 MHz

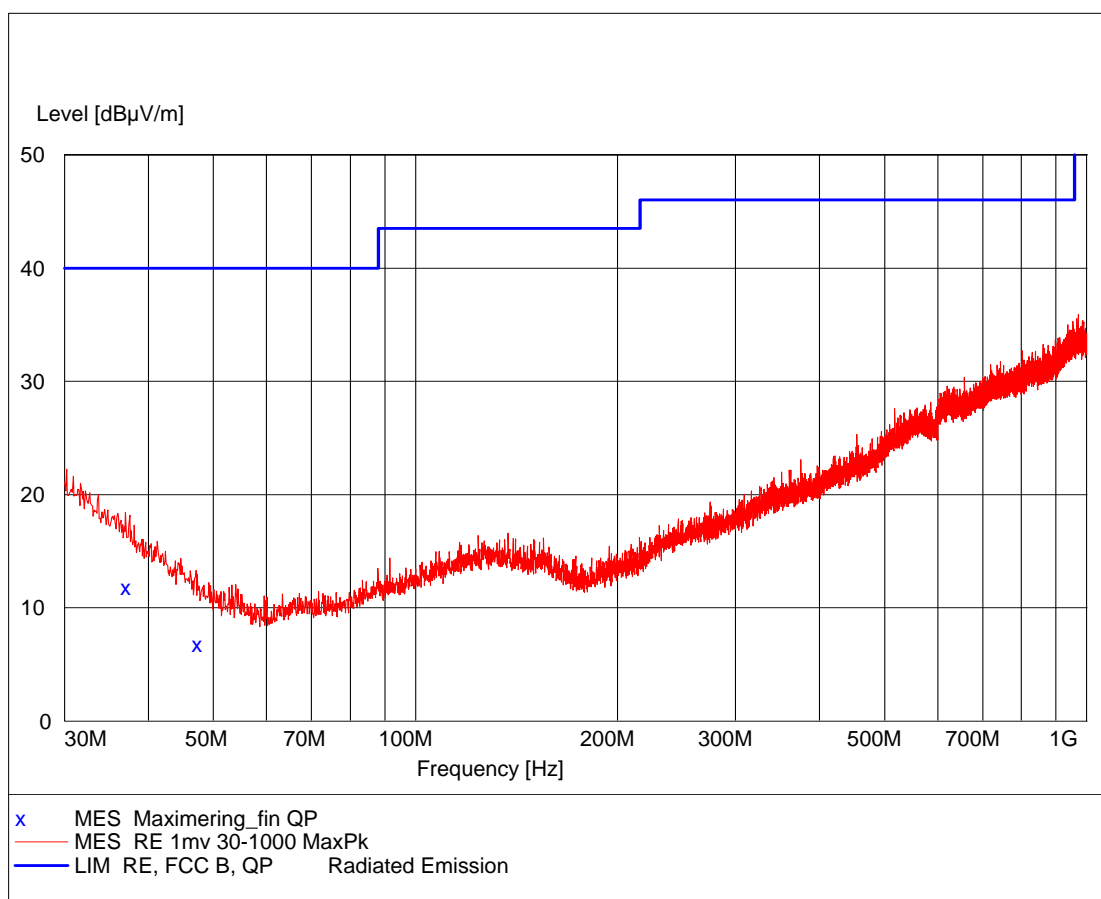
Test method	ANSI C 63.4:2003	Temperature	21 °C
Characteristics	Peak search ant. at 3 m, height: 1-4 m, v/h pol.	Humidity	45 % RH
Detector	Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty	4.9 dB

Test result	The measured field strengths are more then 14 dB below the limit
Test Port	Enclosure
Test frequency	2404 MHz Low
Test mode	Continuous Tx - normal modulation - hopping off
Condition	Normal
Compliant	Yes
Comments	Final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation.



Test object	BO13	Sheet	RE_Spur-5
Type	BO13	Project no.	A506865-5
Serial no.	BO13-2	Date	26 Jul. 2010
Client	GN Hearing A/S	Initials	A-RAS
Specification	FCC CFR 47 Part 15, Subpart C IC standard RSS-210, Issue 7:2007 IC standard RSS-Gen, Issue 2:2007	Frequency	30-1000 MHz

Test method	ANSI C 63.4:2003	Temperature	21 °C
Characteristics	Pre-scan, Antenna at 3 m, 1 m height, vert. pol.	Humidity	45 % RH
Detector	Peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty	4.9 dB

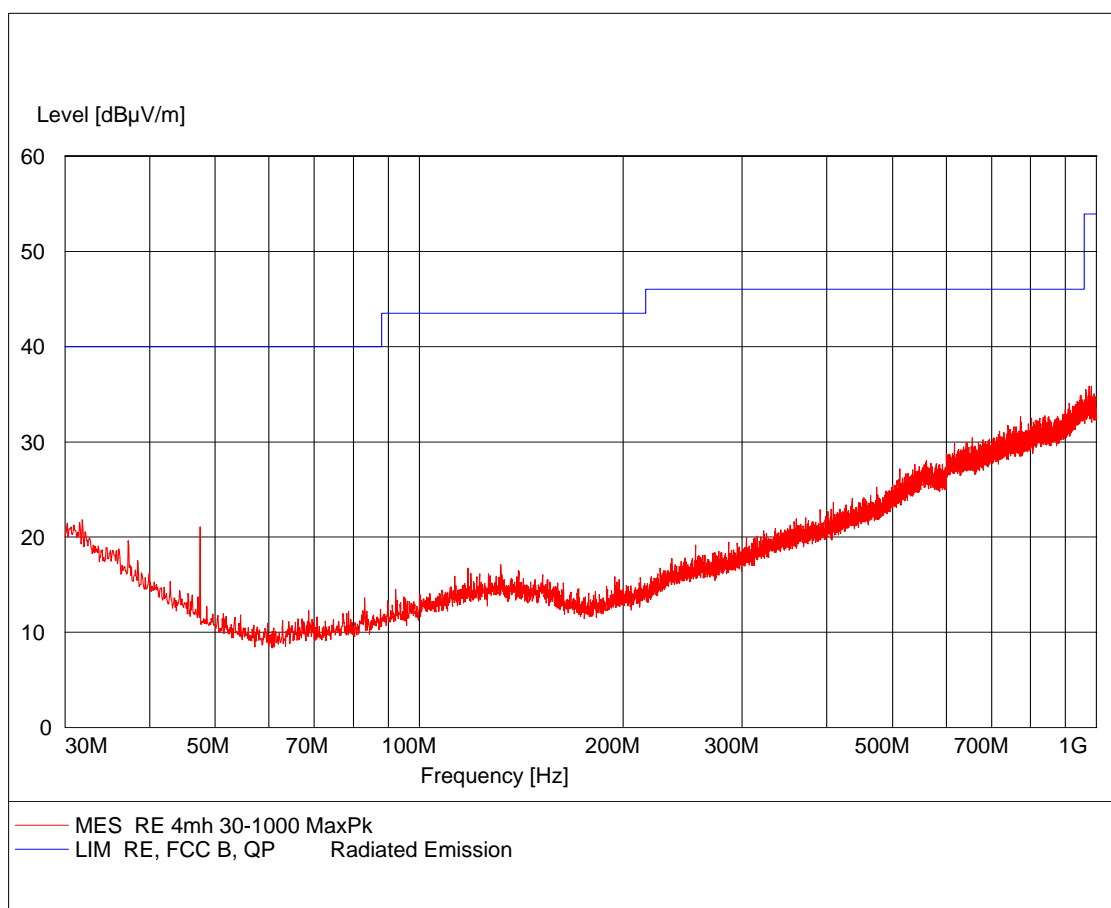


Comments

Continuous Tx - normal modulation - hopping off

Test object	BO13	Sheet	RE_Spur-6
Type	BO13	Project no.	A506865-5
Serial no.	BO13-2	Date	26 Jul. 2010
Client	GN Hearing A/S	Initials	A-RAS
Specification	FCC CFR 47 Part 15, Subpart C IC standard RSS-210, Issue 7:2007 IC standard RSS-Gen, Issue 2:2007	Frequency	30-1000 MHz

Test method	ANSI C 63.4:2003	Temperature	21 °C
Characteristics	Pre-scan, Antenna at 3 m, 4 m height, hor. pol.	Humidity	45 % RH
Detector	Peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty	4.9 dB



Comments

Continuous Tx - normal modulation - hopping off



Test object	BO13	Sheet	RE_Spur-7
Type	BO13	Project no.	A506865-5
Serial no.	BO13-2	Date	26 Aug. 2010
Client	GN Hearing A/S	Initials	A-RAS
Specification	FCC CFR 47 Part 15, Subpart C IC standard RSS-210, Issue 7:2007 IC standard RSS-Gen, Issue 2:2007	Frequency	30-1000 MHz

Test method	ANSI C 63.4:2003	Temperature	21 °C
Characteristics	Peak search ant. at 3 m, height: 1-4 m, v/h pol.	Humidity	45 % RH
Detector	Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty	4.9 dB

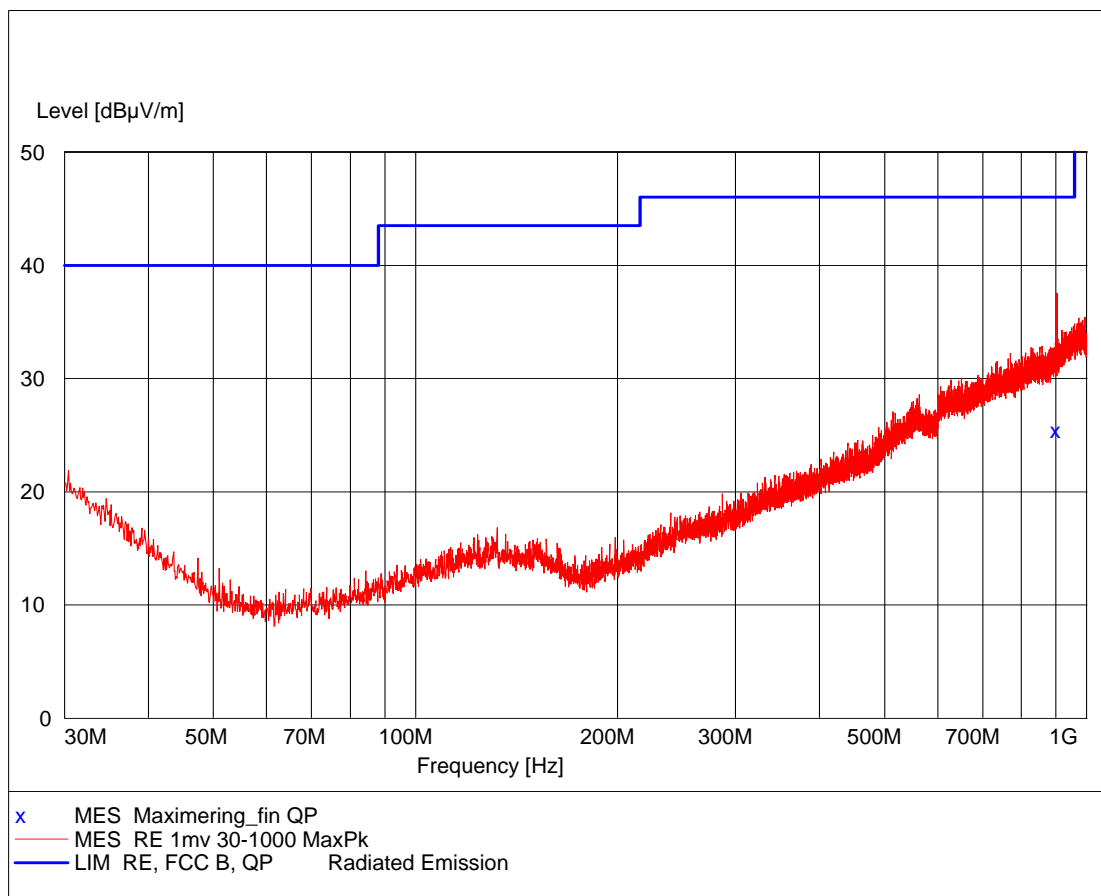
Frequency	Level	Transd	Limit	Margin	Height	Azimuth	Polarisation
MHz	dBµV/m	dB	dBµV/m	dB	cm	deg	
37.200000	11.80	14.3	30.0	18.2	132.0	234.00	VERTICAL
47.500000	6.80	9.6	30.0	23.2	118.0	175.00	VERTICAL

Test result	The measured field strengths are below the limit
Test Port	Enclosure
Test frequency	2440 MHz
Test mode	Continuous Tx - normal modulation - hopping off
Condition	Normal
Compliant	Yes
Comments	Final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation.



Test object	BO13	Sheet	RE_Spur-8
Type	BO13	Project no.	A506865-5
Serial no.	BO13-3	Date	26 Jul. 2010
Client	GN Hearing A/S	Initials	A-RAS
Specification	FCC CFR 47 Part 15, Subpart C IC standard RSS-210, Issue 7:2007 IC standard RSS-Gen, issue 2:2007	Frequency	30-1000 MHz

Test method	ANSI C 63.4:2003	Temperature	21 °C
Characteristics	Pre-scan, Antenna at 3 m, 1 m height, vert. pol.	Humidity	45 % RH
Detector	Peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty	4.9 dB

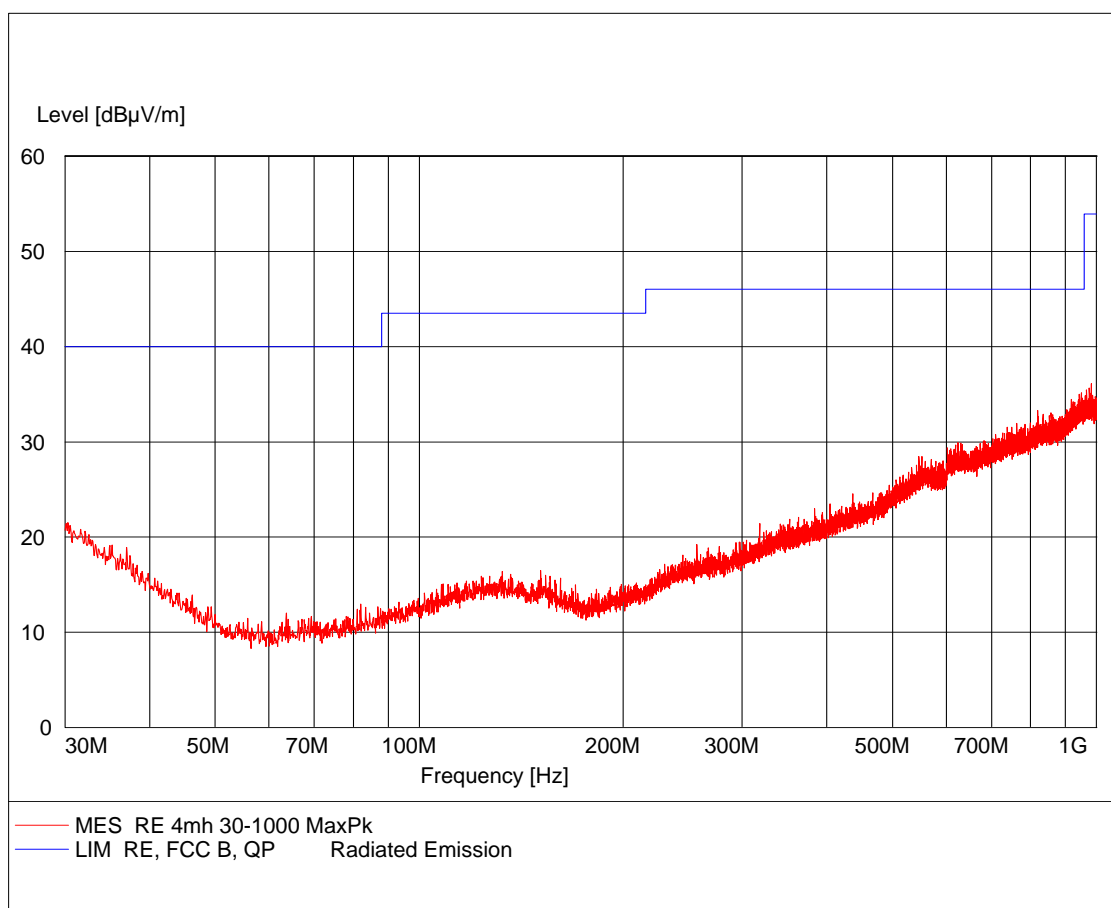


Comments

Continuous Tx - normal modulation - hopping off

Test object	BO13	Sheet	RE_Spur-9
Type	BO13	Project no.	A506865-5
Serial no.	BO13-3	Date	26 Jul. 2010
Client	GN Hearing A/S	Initials	A-RAS
Specification	FCC CFR 47 Part 15, Subpart C IC standard RSS-210, Issue 7:2007 IC standard RSS-Gen, Issue 2:2007	Frequency	30-1000 MHz

Test method	ANSI C 63.4:2003	Temperature	21 °C
Characteristics	Pre-scan, Antenna at 3 m, 4 m height, hor. pol.	Humidity	45 % RH
Detector	Peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty	4.9 dB



Comments

Continuous Tx - normal modulation - hopping off



Test object	BO13	Sheet	RE_Spur-10
Type	BO13	Project no.	A506865-5
Serial no.	BO13-3	Date	26 Jul. 2010
Client	GN Hearing A/S	Initials	A-RAS
Specification	FCC CFR 47 Part 15, Subpart C IC standard RSS-210, Issue 7:2007 IC standard RSS-Gen, Issue 2:2007	Frequency	30-1000 MHz

Test method	EN 300 440-1 V1.5.1:2009	Temperature	21 °C
Characteristics	Peak search ant. at 3 m, height: 1-4 m, v/h pol.	Humidity	45 % 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
903.000000	25.40	25.4	37.0	11.6	172.0	219.00	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 off
Condition	Normal
Compliant	Yes
Comments	Final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation.



Photo 4.5.1 Test setup regarding measurement of radiated emission, 30 MHz to 1000 MHz.

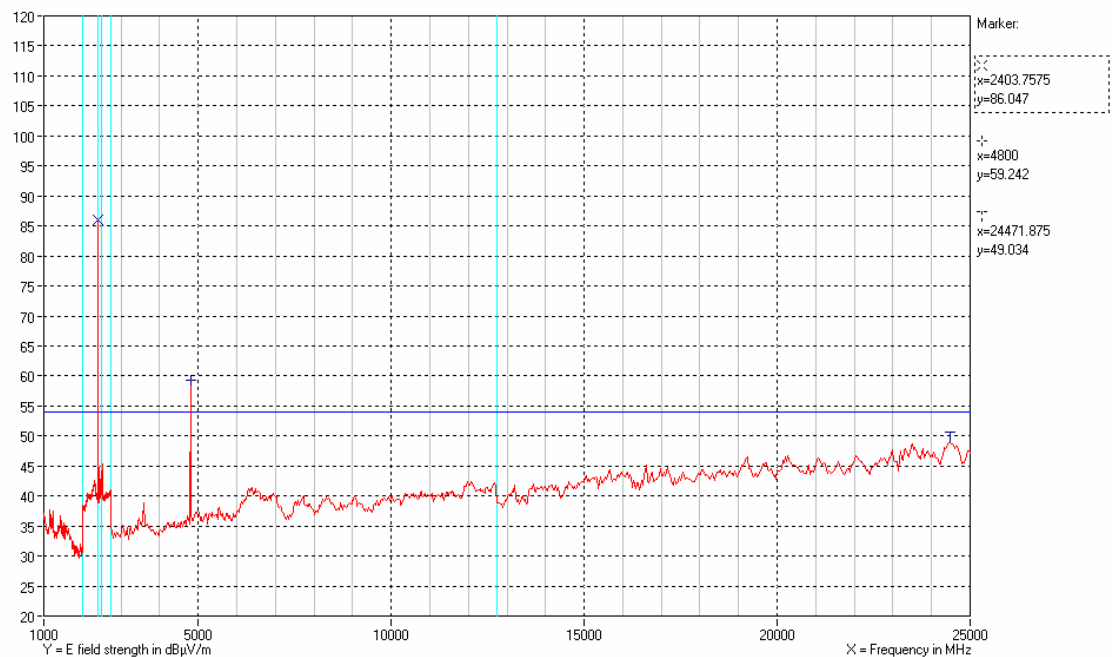


Photo 4.5.2 Test setup regarding measurement of radiated emission, 30 MHz to 1000 MHz.

4.6 Measurement of radiated emission, 1 GHz to 25 GHz

Test object	BO13	Sheet	RE_Spur-11
Type	BO13	Project no.	A506865-5
Serial no.	BO13-3	Date	02 Aug. 2010
Client	GN Hearing A/S	Initials	A-RAS
Specification	FCC CFR 47 Part 15, Subpart C IC standard RSS-210, Issue 7:2007 IC standard RSS-Gen, Issue 2:2007	Frequency	1 GHz–25GHz

Test method	ANSI C 63.4:2003	Temperature	21 °C
Characteristics	Complete search, Antenna distance 3 m.	Humidity	58 % RH
Detector	Peak for 1GHz to 25 GHz	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49600 49624 49625 49183 49299	Uncertainty	4.9 dB



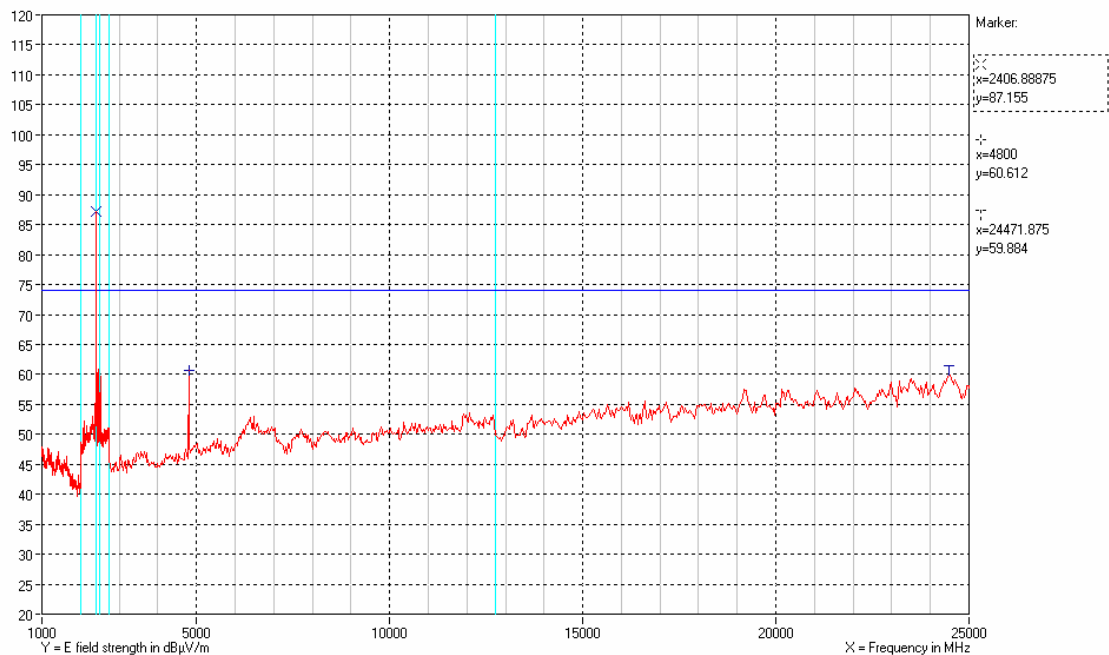
Polarization

Vertical and horizontal average measurements

Comments

Continuous Tx - normal modulation - hopping off





Polarization Vertical and horizontal peak measurements

Comments Continuous Tx - normal modulation - hopping off

Frequency	Peak Measurement	PACF	Corrected average	Limit	Comment
4800	60.6	7.6	53.0	54	Passed
MHz	dBµV/m	dB	dBµV/m	dBµV/m	

Test result The measured peak field strengths are below the peak limit (Peak limit = Average limit + 20 dB). The corrected average field strengths are below the average limit.
Corrected Average value = Peak value - PACF

Test Port Enclosure

Test frequency 2404 MHz

Test mode Continuous Tx - normal modulation - hopping off

Condition Normal

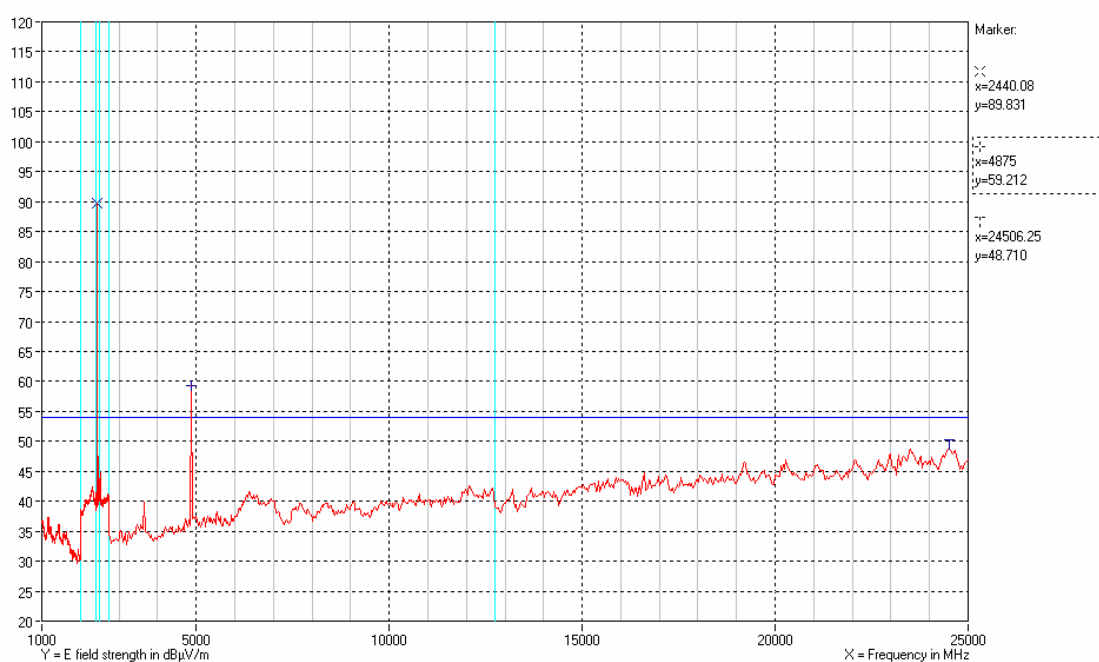
Compliant Yes

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



Test object	BO13	Sheet	RE_Spur-12
Type	BO13	Project no.	A506865-5
Serial no.	BO13-3	Date	03 Aug. 2010
Client	GN Hearing A/S	Initials	A-RAS
Specification	FCC CFR 47 Part 15, Subpart C IC standard RSS-210, Issue 7:2007 IC standard RSS-Gen, Issue 2:2007	Frequency	1 GHz–25GHz

Test method	ANSI C 63.4:2003	Temperature	20 °C
Characteristics	Complete search, Antenna distance 3 m.	Humidity	60 % RH
Detector	Peak for 1 GHz to 25 GHz	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49600 49624 49625 49183 49299	Uncertainty	4.9 dB



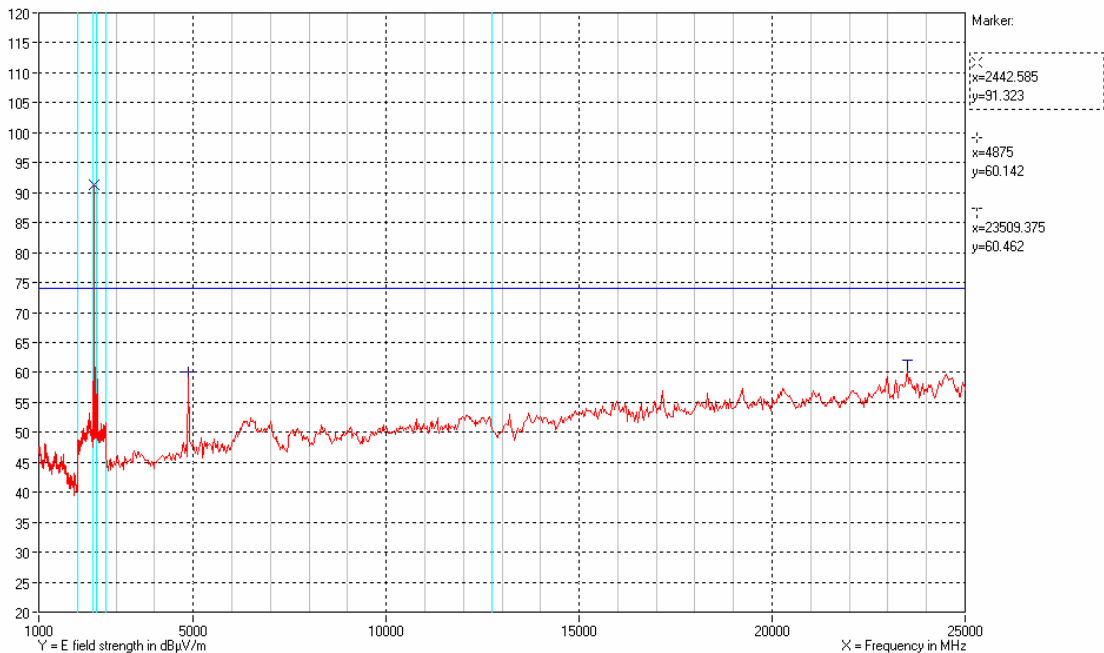
Polarization

Vertical and horizontal average measurements

Comments

Continuous Tx - normal modulation - hopping off





Polarization Vertical and horizontal peak measurements

Comments Continuous Tx - normal modulation - hopping off

Frequency	Peak Measurement	PACF	Corrected average	Limit	Comment
4875	60.1	7.6	52.5	54	Passed
MHz	dBμV/m	dB	dBμV/m	dBμV/m	

Test result The measured peak field strengths are below the peak limit (Peak limit = Average limit + 20 dB). The corrected average field strengths are below the average limit.
Corrected Average value = Peak value - PACF

Test Port Enclosure

Test frequency 2440 MHz

Test mode Continuous Tx - normal modulation - hopping off

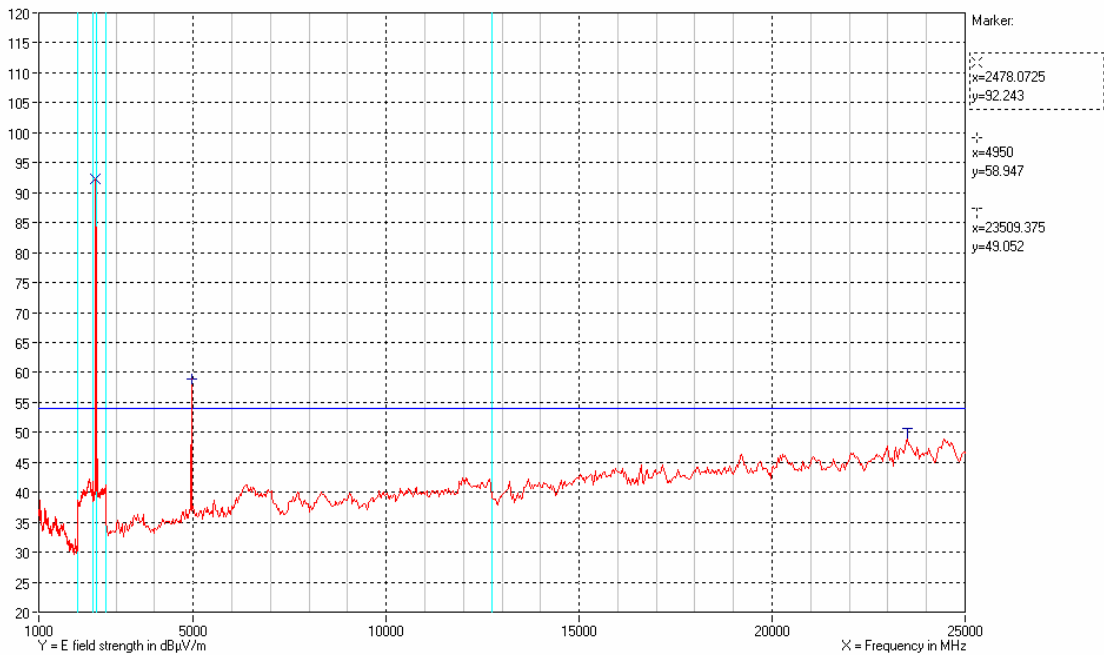
Condition Normal

Compliant Yes

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

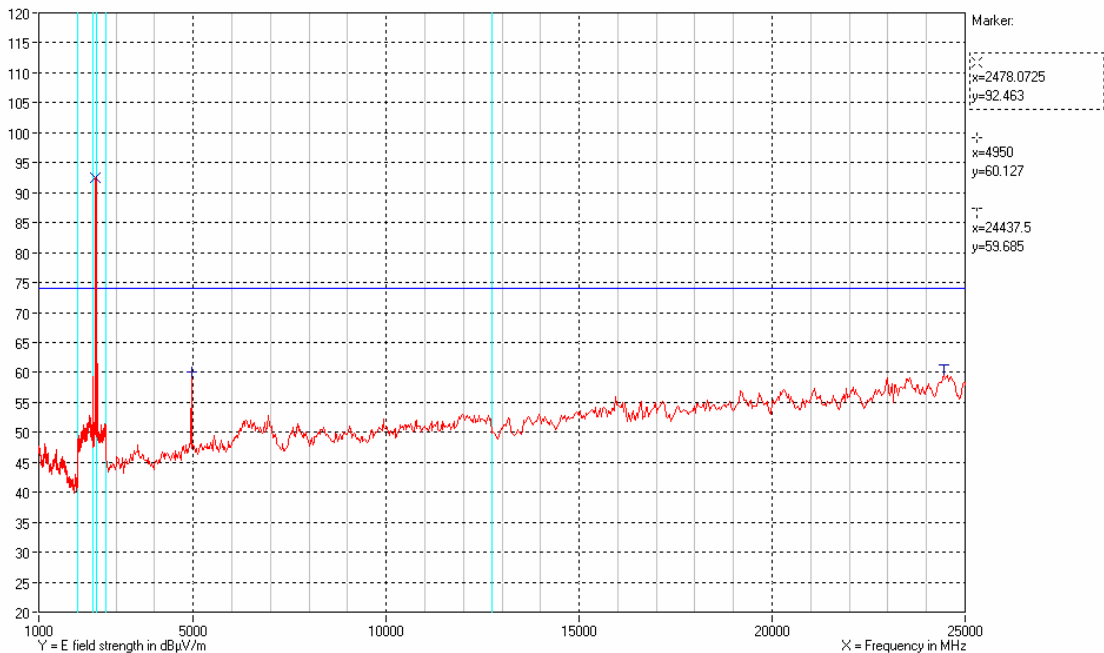


Test object	BO13	Sheet	RE_Spur-13
Type	BO13	Project no.	A506865-5
Serial no.	BO13-3	Date	03 Aug. 2010
Client	GN Hearing A/S	Initials	A-RAS
Specification	FCC CFR 47 Part 15, Subpart C IC standard RSS-210, Issue 7:2007 IC standard RSS-Gen, Issue 2:2007	Frequency	1GHz–25GHz
Test method	ANSI C 63.4:2003	Temperature	20 °C
Characteristics	Complete search, Antenna distance 3 m.	Humidity	60 % RH
Detector	Peak for 1 GHz to 25 GHz	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49600 49624 49625 49183 49299	Uncertainty	4.9 dB



Polarization	Vertical and horizontal average measurements
Comments	Continuous Tx - normal modulation - hopping off





Polarization Vertical and horizontal peak measurements

Comments Continuous Tx - normal modulation - hopping off

Frequency	Peak Measurement	PACF	Corrected average	Limit	Comment
4950	60.1	7.6	52.5	54	Passed
MHz	dBµV/m	dB	dBµV/m	dBµV/m	

Test result The measured peak field strengths are below the peak limit (Peak limit = Average limit + 20 dB). The corrected average field strengths are below the average limit.
Corrected Average value = Peak value - PACF

Test Port Enclosure

Test frequency 2478 MHz

Test mode Continuous Tx - normal modulation - hopping off

Condition Normal

Compliant Yes

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





Photo 4.6.1 Test setup regarding measurement of radiated emission, 1 GHz to 25 GHz.

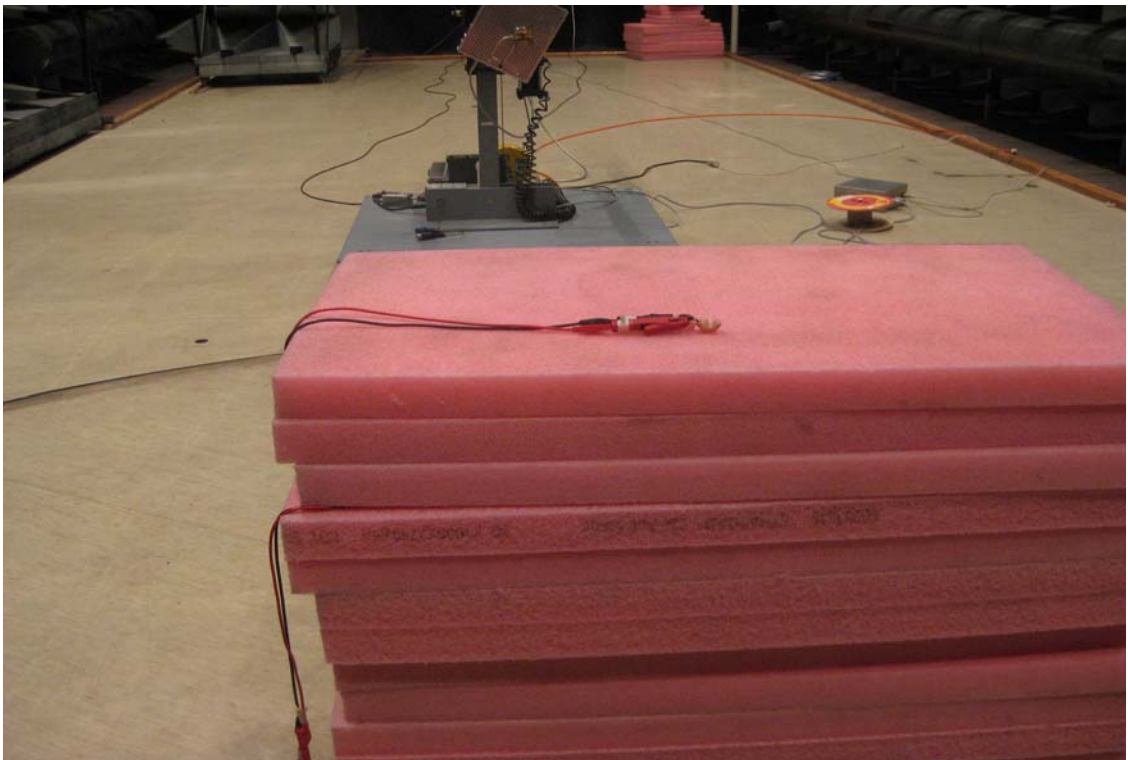


Photo 4.6.2 Test setup regarding measurement of radiated emission, 1 GHz to 25 GHz.



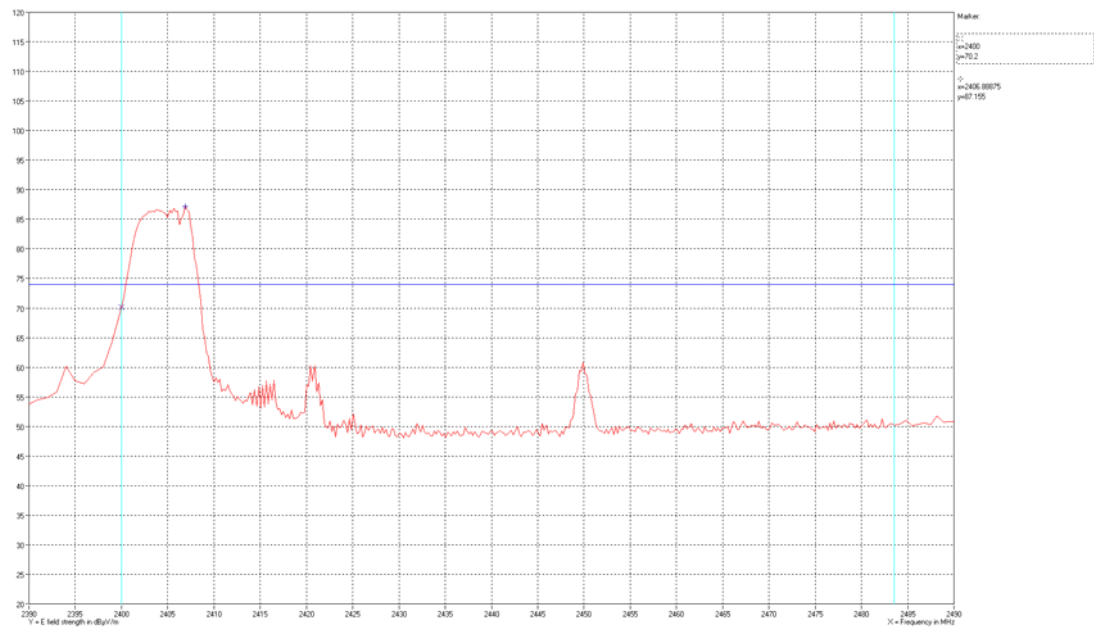
4.7 Measurement of field strength of fundamental

Test object	BO13	Sheet	Block-2
Type	BO13	Project no.	A506865-5
Serial no.	BO13-8	Date	02 Aug. 2010
Client	GN Hearing A/S	Initials	JAS
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.249(a) IC standard RSS-210, Issue 7:2007, Section A2.9		

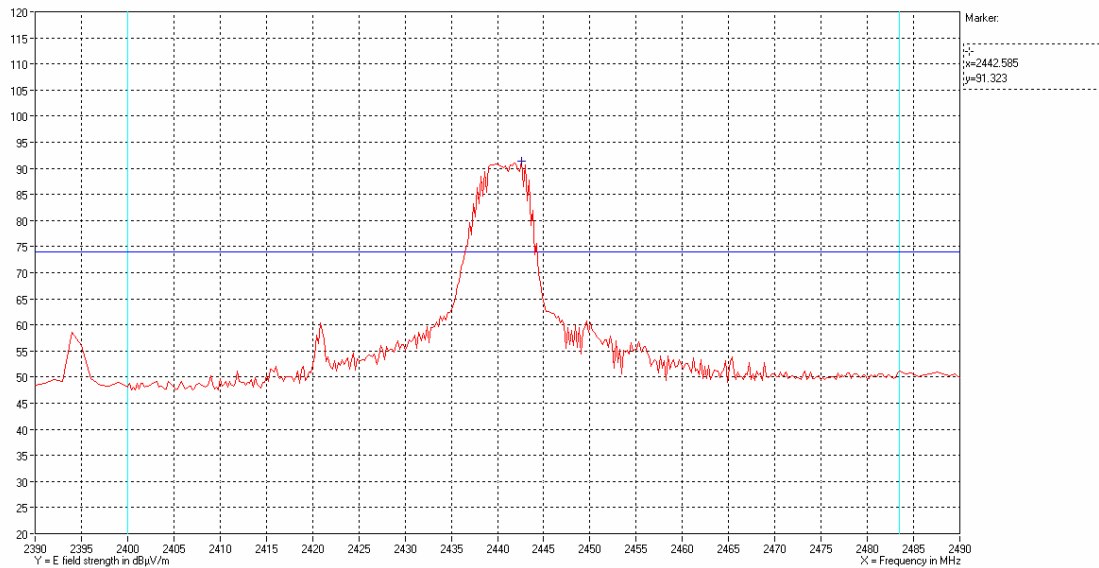
Test method	ANSI C 63.4:2003				
Characteristics	Temperature: 22°C. Test voltage: External power supply at 1.3 V DC				
Test equipm.	29962 49321 49183			Uncertainty: 4,9 dB	
SA Settings	RBW:30 kHz VBW:100 kHz SPAN:100 MHz DET:Peak CF:2440 MHz Trace:Max hold				
Operating frequency	Peak Measurement	PACF	Corrected average	Limit	Comment
2404	87.2	-	-	94	Passed
2440	91.3	-	-	94	Passed
2478	92.5	-	-	94	Passed
MHz	dBµV/m	dB	dBµV/m	dBµV/m	
Note:					

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



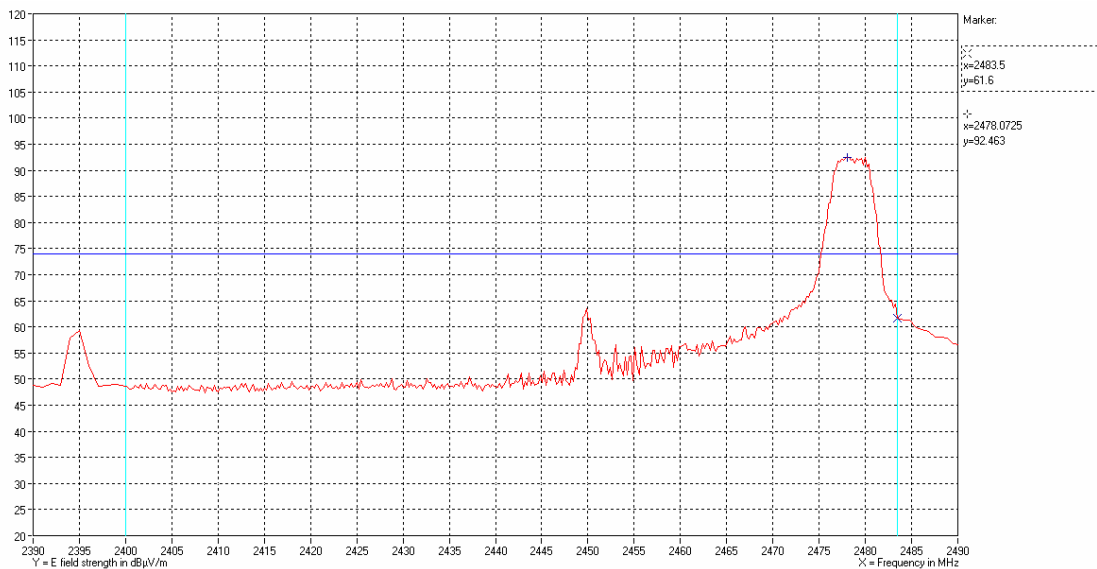


Comments 2404 MHz



Comments 2440 MHz





Comments

2478 MHz





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.

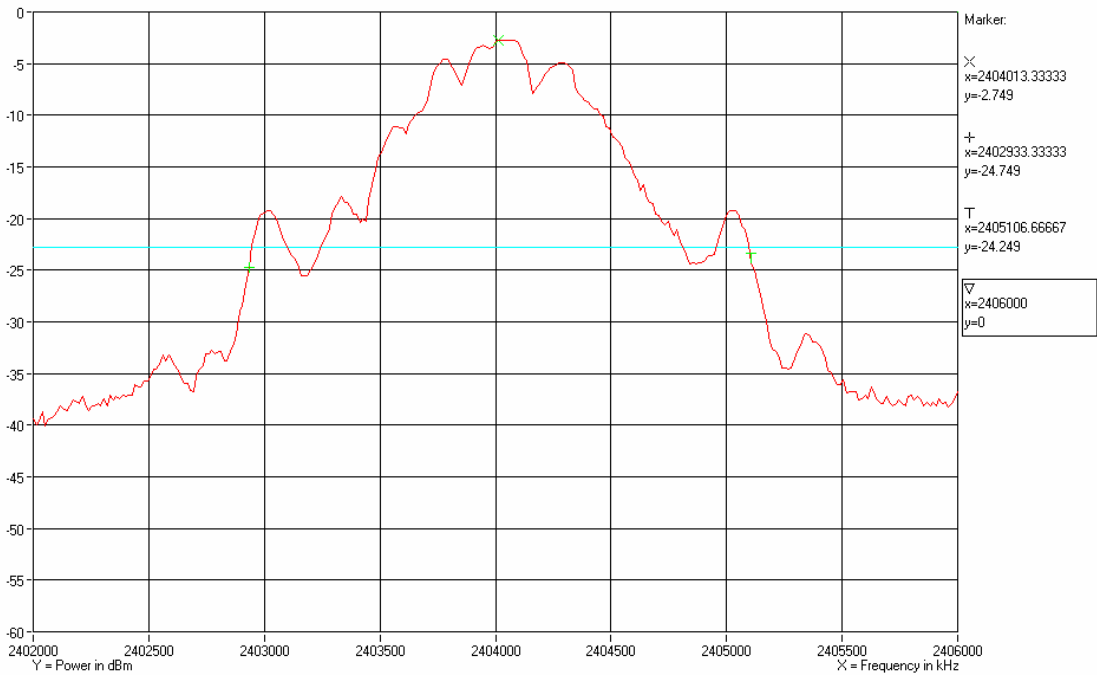
4.8 Measurement of band-edge compliance, conducted

Test object	BO13	Sheet	PROF-2
Type	BO13	Project no.	A506865-5
Serial no.	BO13-8	Date	13 Aug. 2010
Client	GN Hearing A/S	Initials	JAS
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.215(c) IC standard RSS-210, Issue 7:2007, Section 2.6 & A2.9		

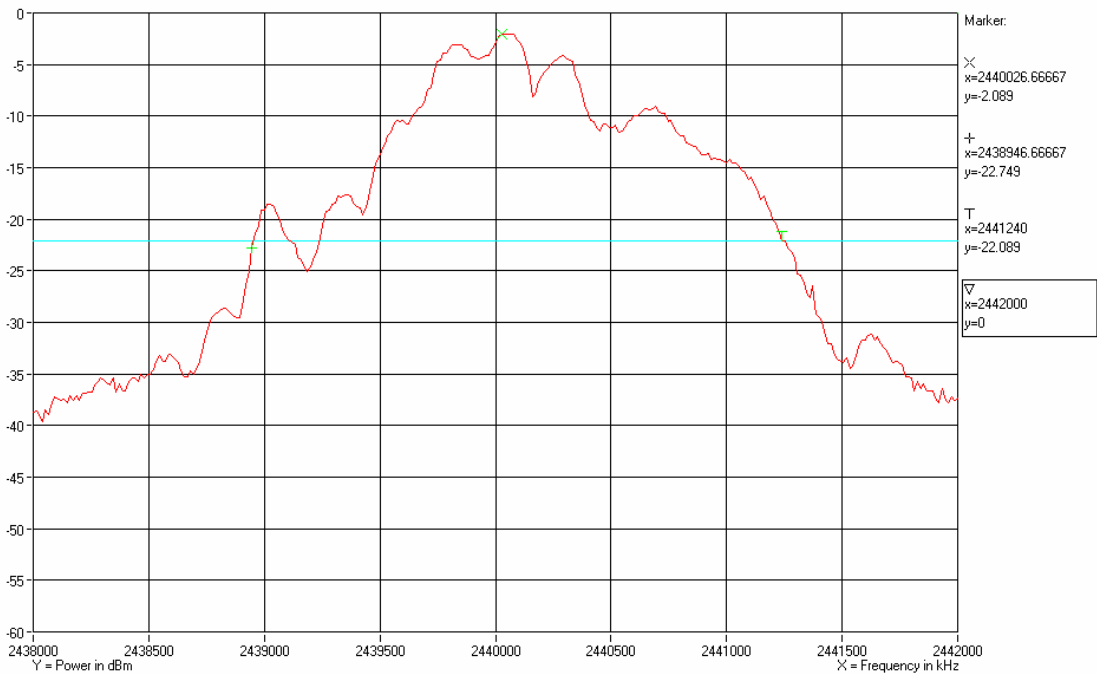
Test method	ANSI C 63.4:2003		
Characteristics	Temperature: 22.°C. Test voltage: External power supply at 1.3 VDC		
Test equipm.	29962 49321 49183		Uncertainty: 10 kHz
SA Settings	RBW:100 kHz VBW:300 kHz SPAN:4 MHz DET:Peak CF:Operating frequency Trace:Max hold		
Operating frequency	Low frequency	High frequency	Comment
2404	2402.933	2405.107	-
2440	2438.947	2441.240	-
2478	2476.933	2479.787	-
MHz	MHz	MHz	
	Measured	Limit	Comment
Lowest frequency	2402.933	2400.00	Passed
Highest frequency	2479.787	2483.50	Passed
	MHz	MHz	

Band edge criteria	20 dB bandwidth
Test result	The measured 20 dB bandwidth was within limit designated in 15.249(a) and IC RSS-210, 2.6 and A2.9
Compliant	Yes
Test Port	Conducted - SMA connector
Test mode	Continuous Tx - normal modulation - hopping on
Comments	None



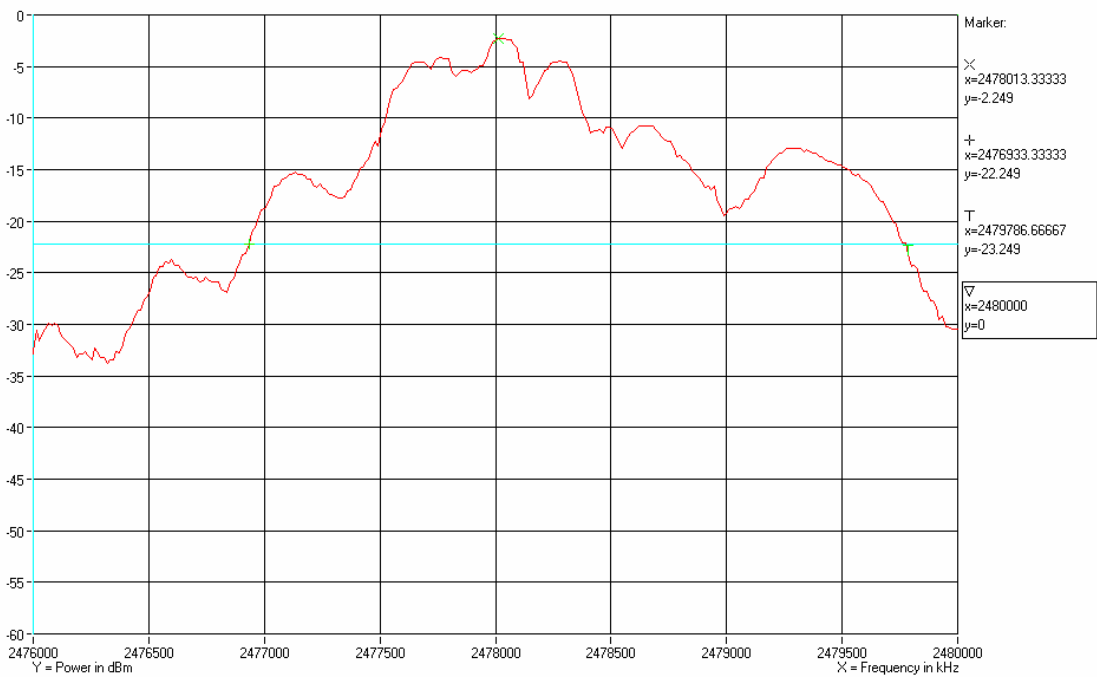


Comments 2404 MHz



Comments 2440 MHz





Comments 2478 MHz

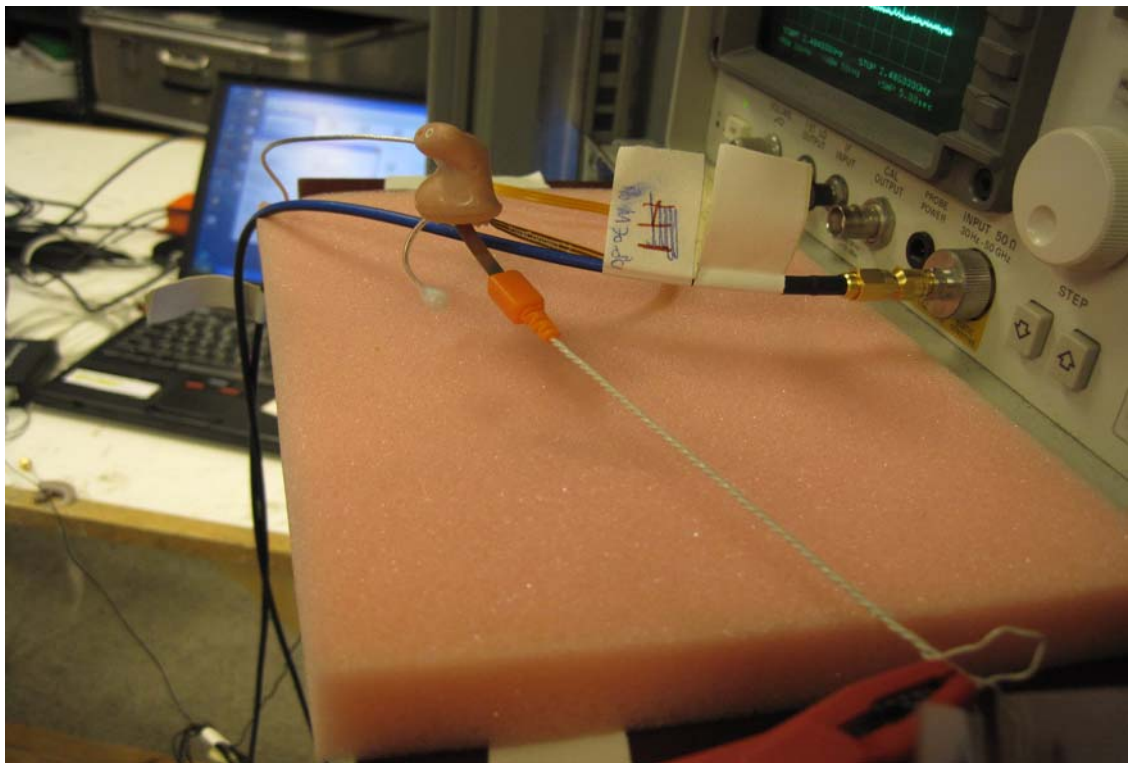


Photo 4.8.1 Test setup regarding measurement of band-edge compliance, conducted.



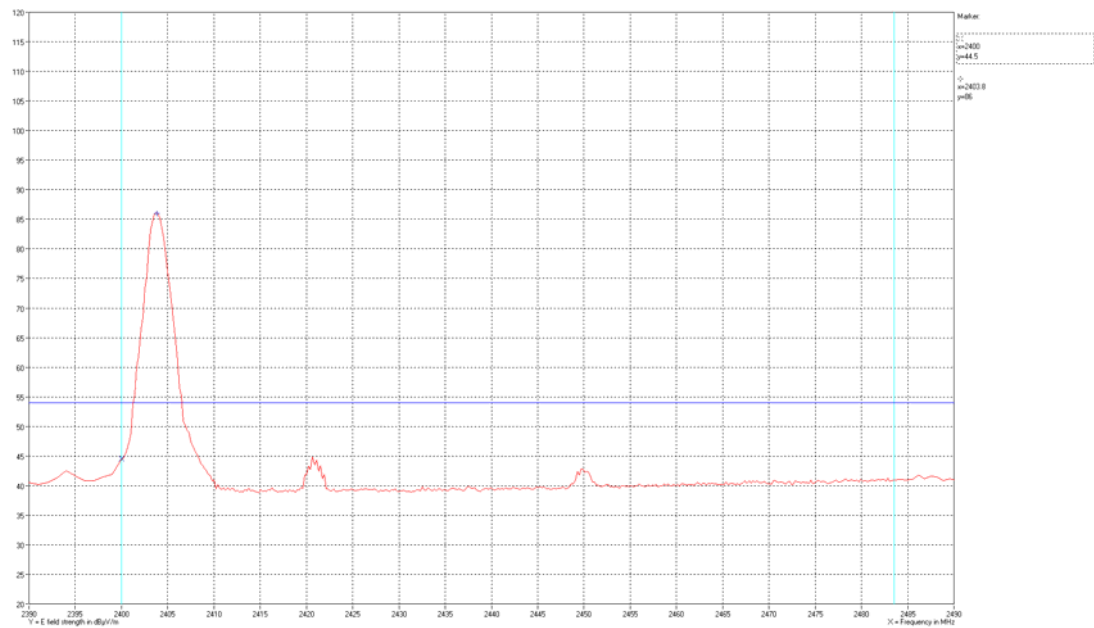
4.9 Measurement of band-edge compliance, radiated

Test object	BO13	Sheet	PROF-3
Type	BO13	Project no.	A506865-5
Serial no.	BO13-8	Date	02 Aug. 2010
Client	GN Hearing A/S	Initials	A-RAS
Specification	FCC CFR 47 Part 15, Subpart C, Section 15.209(a) IC standard RSS-210, Issue 7:2007, Section A2.9		

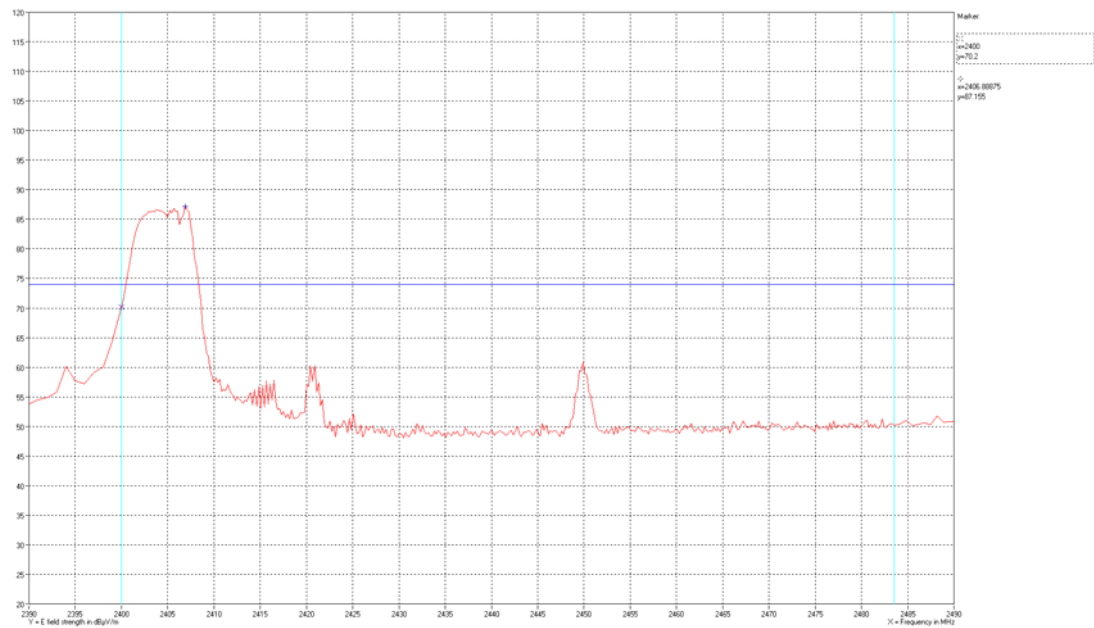
Test method	ANSI C 63.4:2003			
Test equipm.	29962 49321 49183		Uncertainty: 10 kHz	
SA Settings	RBW: 1 MHz VBW: 3 MHz SPAN: 100 MHz DET: Avg/Peak CF: 2440 Trace: Max hold			
Operating frequency	Measured	Limit	Average / Peak	Comment
2404	44.5	54	Average	Passed
2404	70.2	74	Peak	Passed
2478	41.2	54	Average	Passed
2478	61.6	74	Peak	Passed
MHz	dBμV/m	dBμV/m		

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



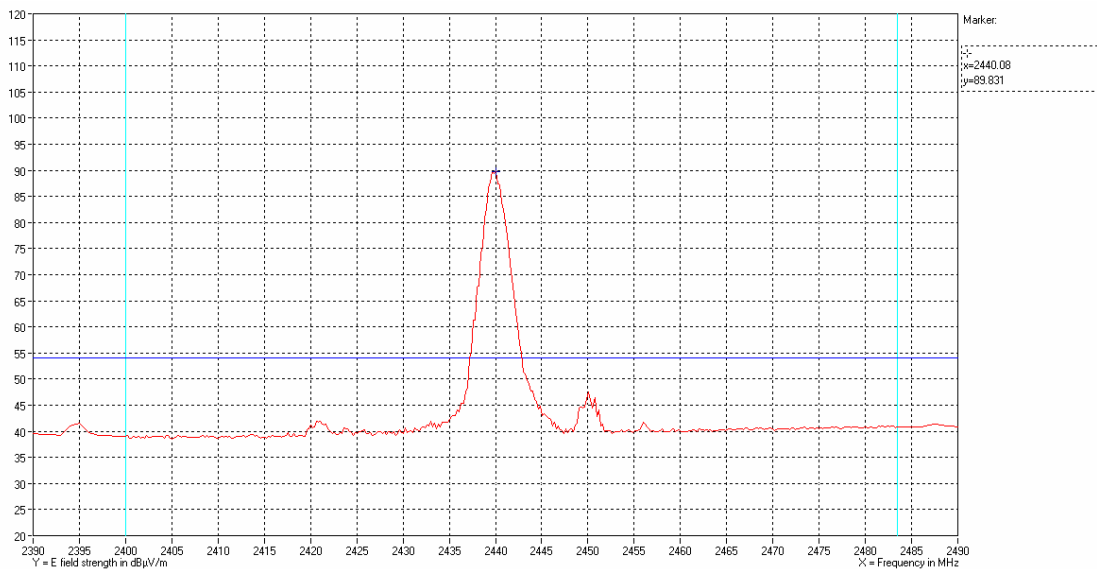


Comments 2404 MHz, Vertical and horizontal average measurements.

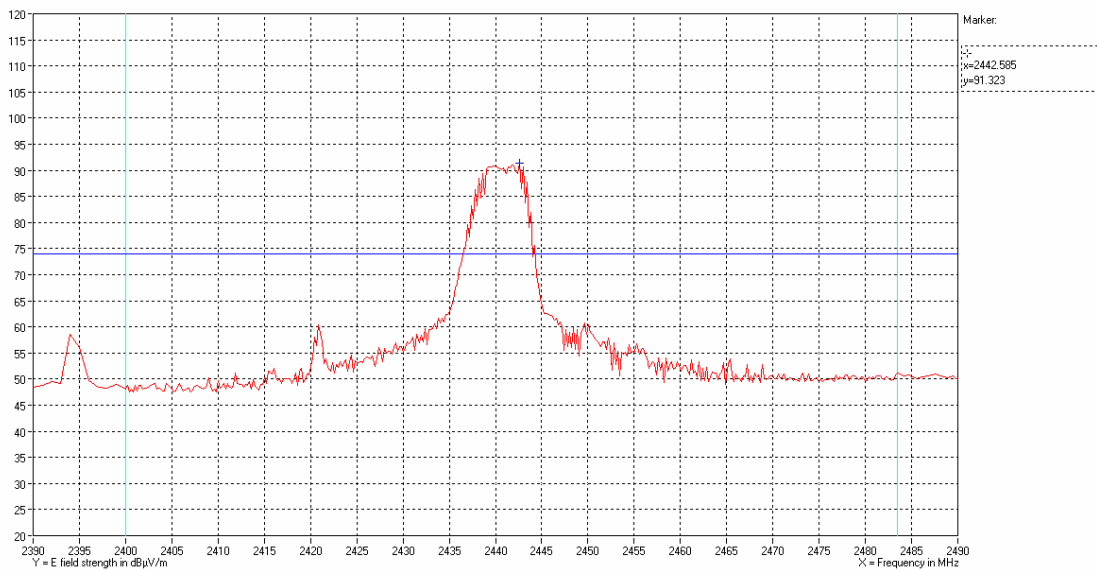


Comments 2404 MHz, Vertical and horizontal peak measurements.



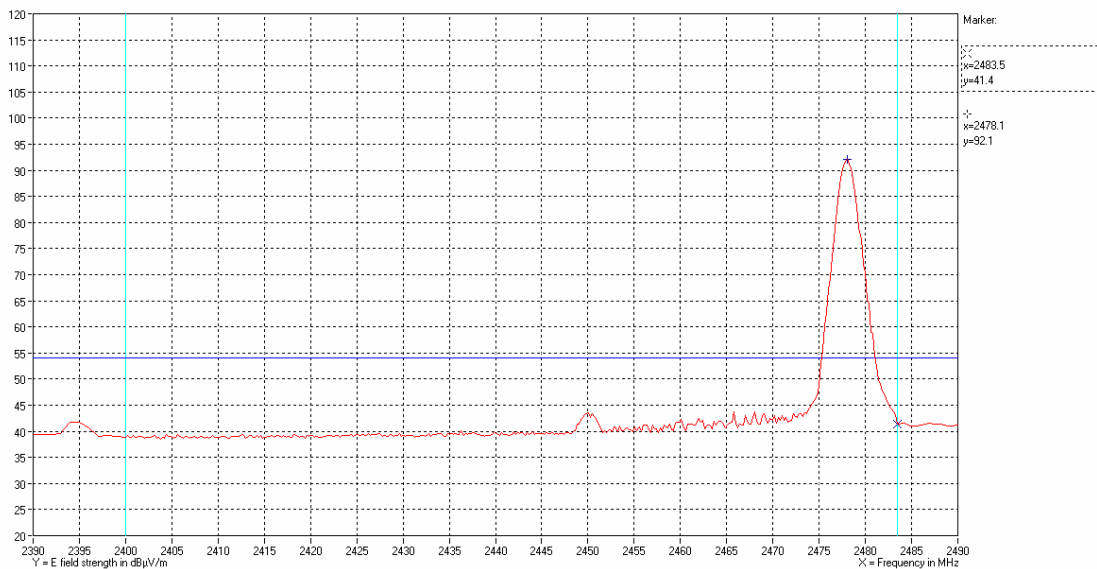


Comments 2440 MHz, Vertical and horizontal average measurements.

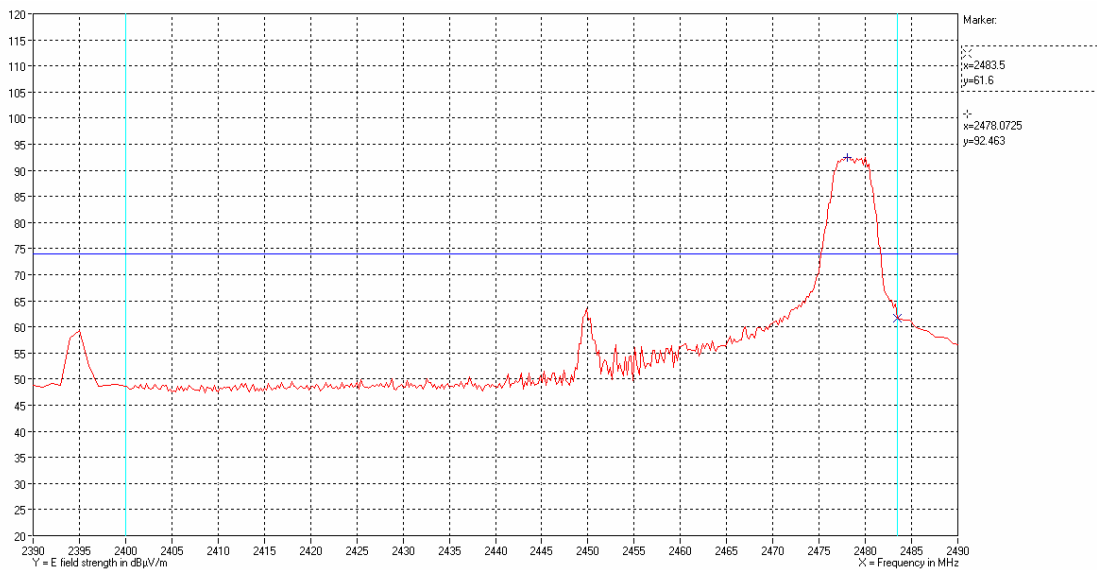


Comments 2440 MHz, Vertical and horizontal peak measurements.





Comments 2478 MHz, Vertical and horizontal average measurements



Comments 2478MHz, Vertical and horizontal peak measurements





Photo 4.9.1 Test setup regarding measurement of band-edge compliance, radiated.

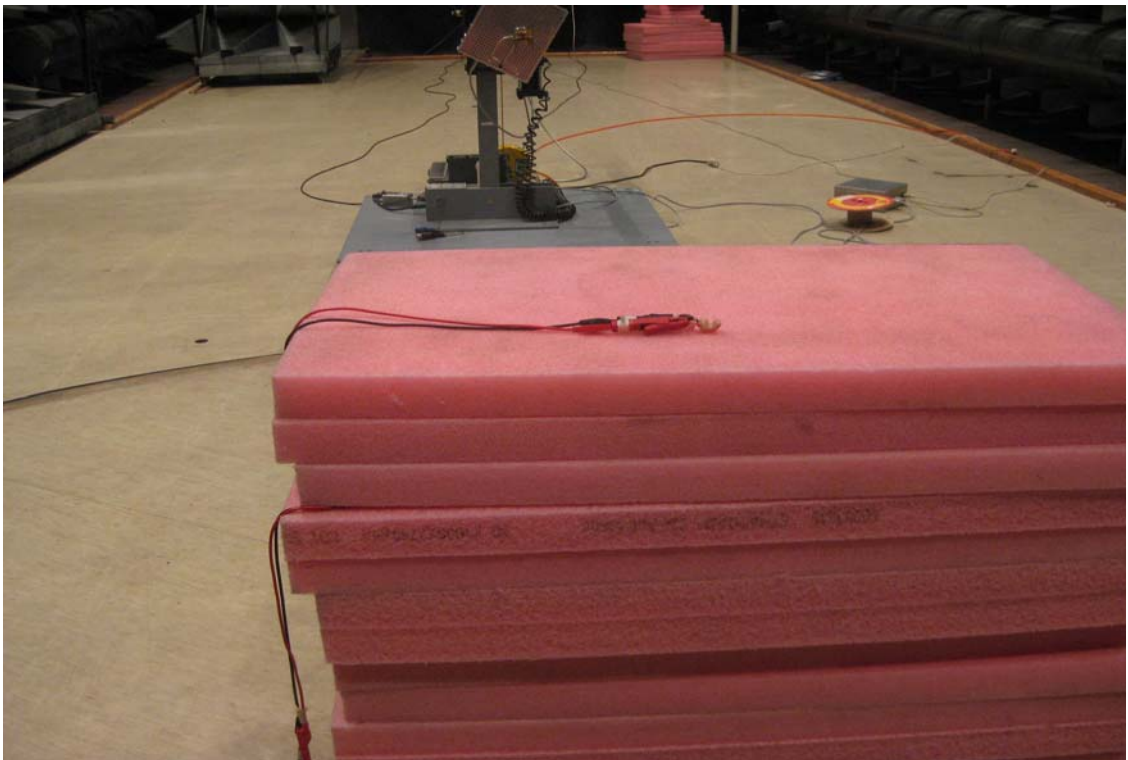


Photo 4.9.2 Test setup regarding measurement of band-edge compliance, radiated.

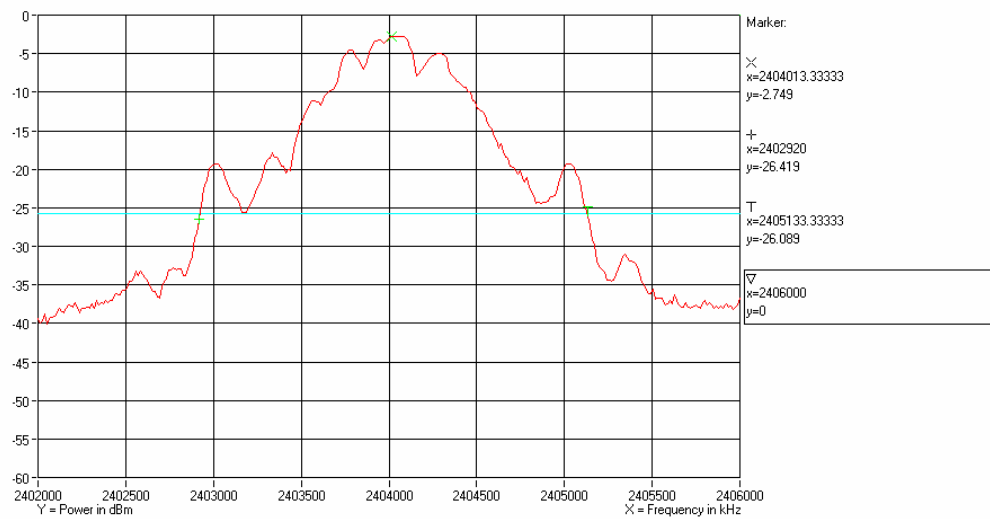


4.10 Measurement of occupied bandwidth

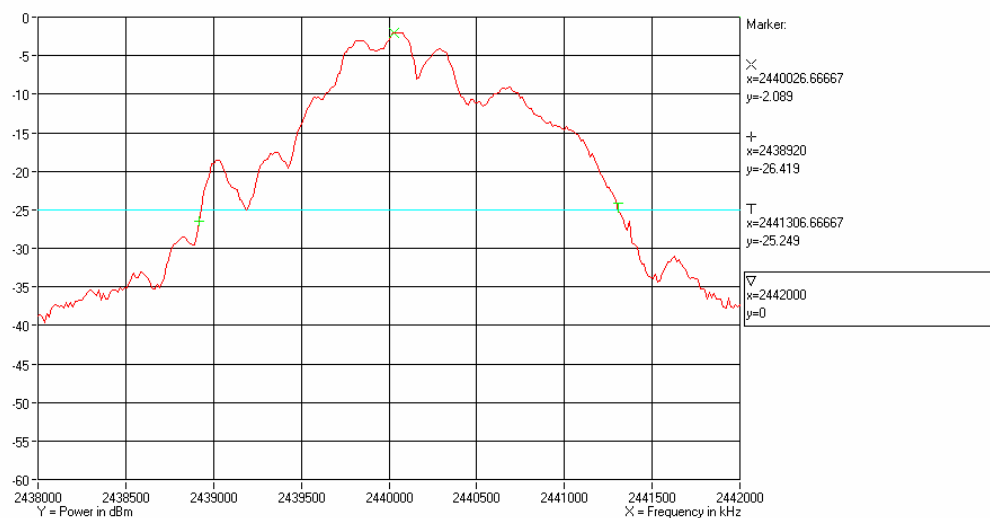
Test object	BO13	Sheet	Block-3
Type	BO13	Project no.	A506865-5
Serial no.	BO13-8	Date	13 Aug. 2010
Client	GN Hearing A/S	Initials	JAS
Specification	IC standard RSS-Gen, Issue 2:2007 - Section 4.6.1		

Test method	IC RSS-Gen:2007		
Characteristics	Temperature: 22 °C. Test voltage: External power supply at 1.3 VDC		
Test equipm.	29962 49321 49183		Uncertainty: 10 kHz
SA Settings	RBW:30 kHz VBW:100 kHz SPAN:4 MHz DET:Peak CF:Operating frequency Trace:Max hold		
Operating frequency	Low frequency	High frequency	Measured 99% emission bandwidth
2404	2402.920	2405.133	2.213
2440	2438.920	2441.307	2.387
2478	2476.533	2479.840	2.477
MHz	MHz	MHz	MHz
Note:			

Band edge criteria	Measured 99 % emission bandwidth
Test Port	Conducted - SMA connector
Test mode	Continuous Tx - normal modulation - hopping on
Comments	None

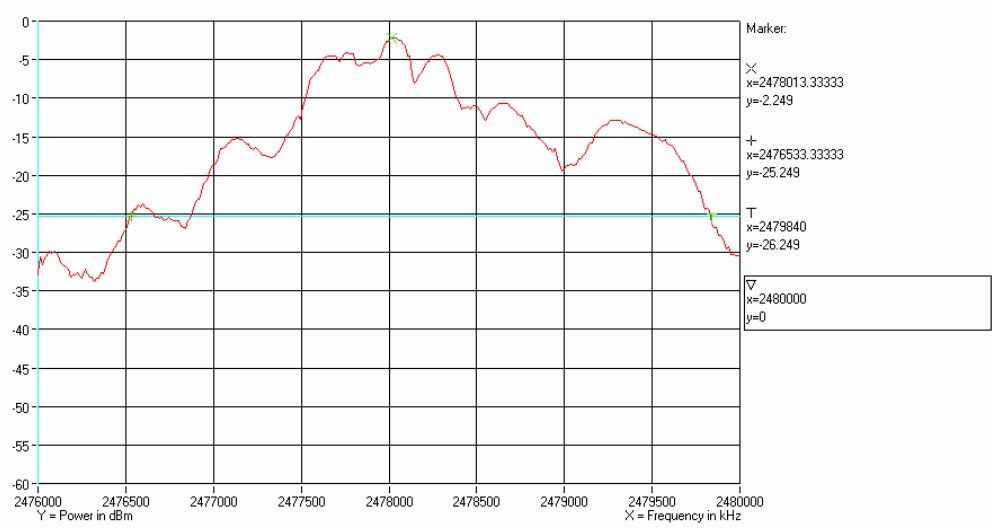


Comments 2404 MHz



Comments 2440 MHz





Comments 2478 MHz

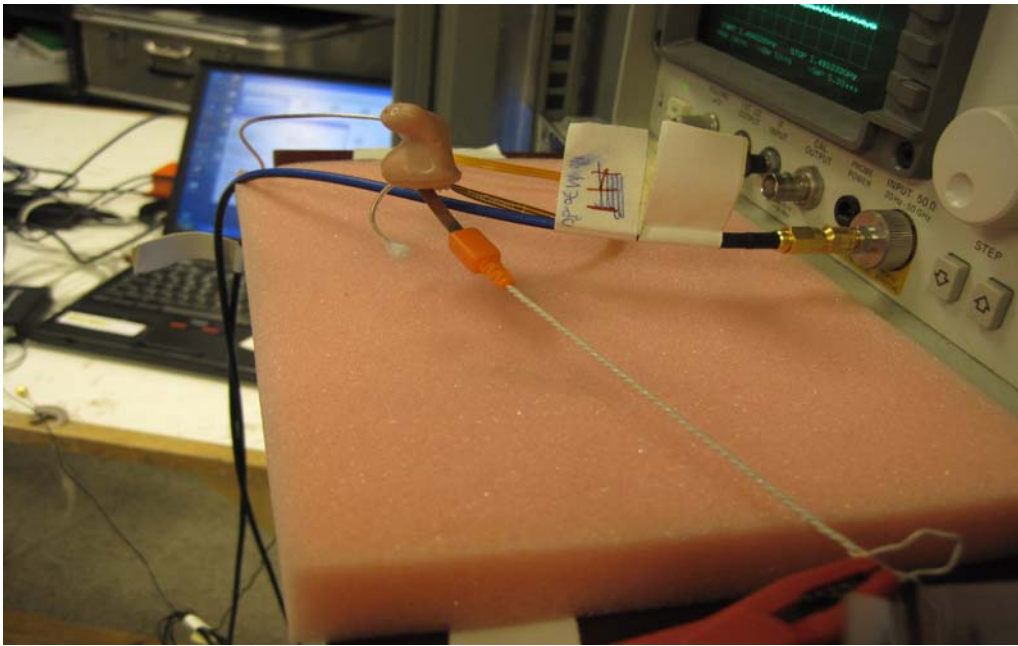
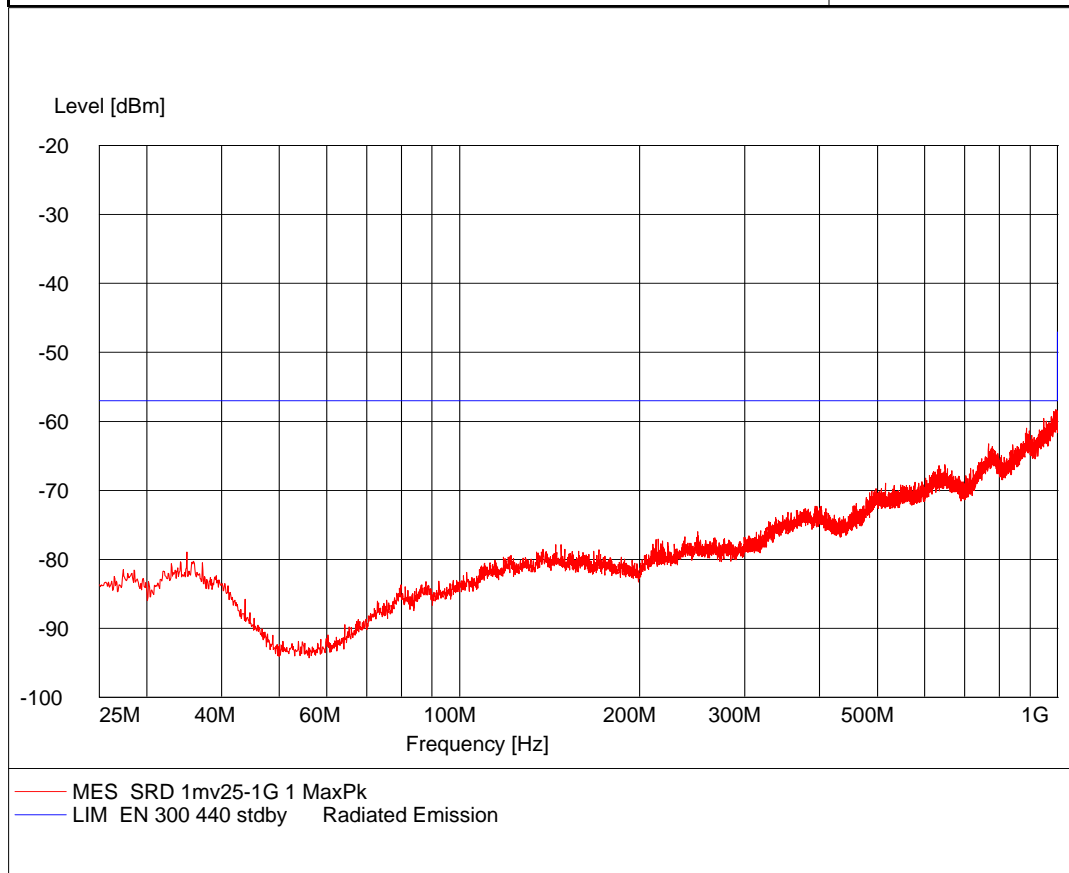


Photo 4.10.1 Test setup regarding measurement of occupied bandwidth.

4.11 Measurement of radiated emission, Rx, 30 MHz to 1000 MHz

Test object	Combination of 2.1.2: BO13 2.1.3: BO13	Sheet	RE_Spur-14
Type	See section 2	Project no.	A506865-5
Serial no.	See section 2	Date	27 Aug. 2010
Client	GN Hearing A/S	Initials	A-RAS
Specification	IC standard RSS-210, Issue 7:2007, 2,6 IC standard RSS-Gen, Issue 2:2007, Gen, 7.2.3.2	Frequency	25MHz-1GHz

Test method	EN 300 440-1 V1.5.1:2009	Temperature	20 °C
Characteristics	Pre-scan, Antenna at 3 m, 1 m height, vert. pol.	Humidity	58 % RH
Detector	Peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty	4.9 dB



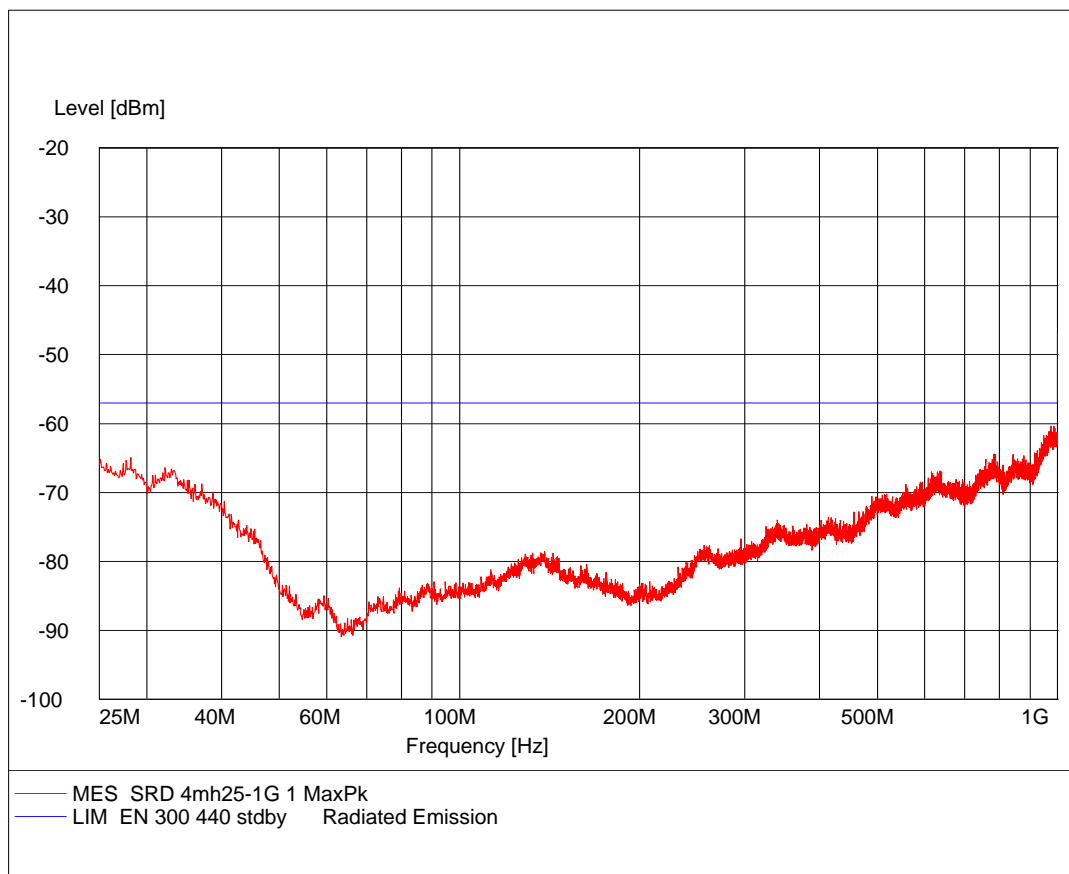
Comments

Continuous Rx & Tx standby - normal modulation -
hopping off



Test object	Combination of 2.1.2: BO13 2.1.3: BO13	Sheet	RE_Spur-15
Type	See section 2	Project no.	A506865-5
Serial no.	See section 2	Date	27 Aug. 2010
Client	GN Hearing A/S	Initials	A-RAS
Specification	IC standard RSS-210, Issue 7:2007, 2,6 IC standard RSS-Gen, Issue 2:2007, Gen, 7.2.3.2	Frequency	25MHz-1GHz

Test method	EN 300 440-1 V1.5.1:2009	Temperature	20 °C
Characteristics	Pre-scan, Antenna at 3 m, 4 m height, hor. pol.	Humidity	58 % RH
Detector	Peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty	4.9 dB



Comments

Continuous Rx & Tx standby - normal modulation -
hopping off

Test object	Combination of 2.1.2: BO13 2.1.3: BO13	Sheet	RE_Spur-16
Type	See section 2	Project no.	A506865-5
Serial no.	See section 2	Date	27 Aug. 2010
Client	GN Hearing A/S	Initials	A-RAS
Specification	IC standard RSS-210, Issue 7:2007, 2,6 IC standard RSS-Gen, Issue 2:2007, Gen, 7.2.3.2	Frequency	25MHz–1GHz

Test method	EN 300 440-1 V1.5.1:2009	Temperature	20 °C
Characteristics	Peak search ant. at 3 m, height: 1-4 m, v/h pol.	Humidity	58 % RH
Detector	Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797 29861 49183 49299	Uncertainty	4.9 dB

Test result	The measured field strengths are below the limit
Polarization	Horizontal and vertical
Test Port	Enclosure
Test frequency	2440 MHz
Test mode	Continuous Rx & Tx standby - normal modulation - hopping off
Condition	Normal
Compliant	Yes
Comments	Final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation. The radiated substitution test method of EN 300 440 was used to demonstrate compliance with the limits for RSS-Gen, Section 7.2.3

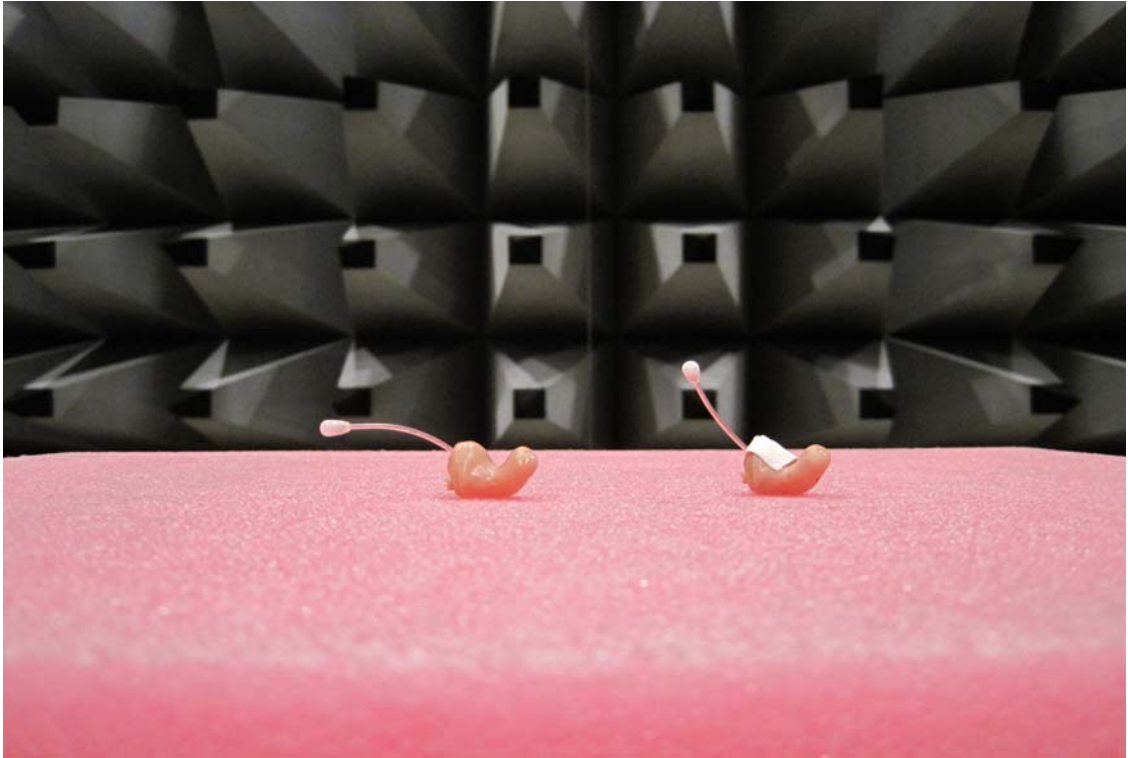


Photo 4.11.1 Test setup regarding measurement of radiated emission, Rx, 30 MHz to 1000 MHz.

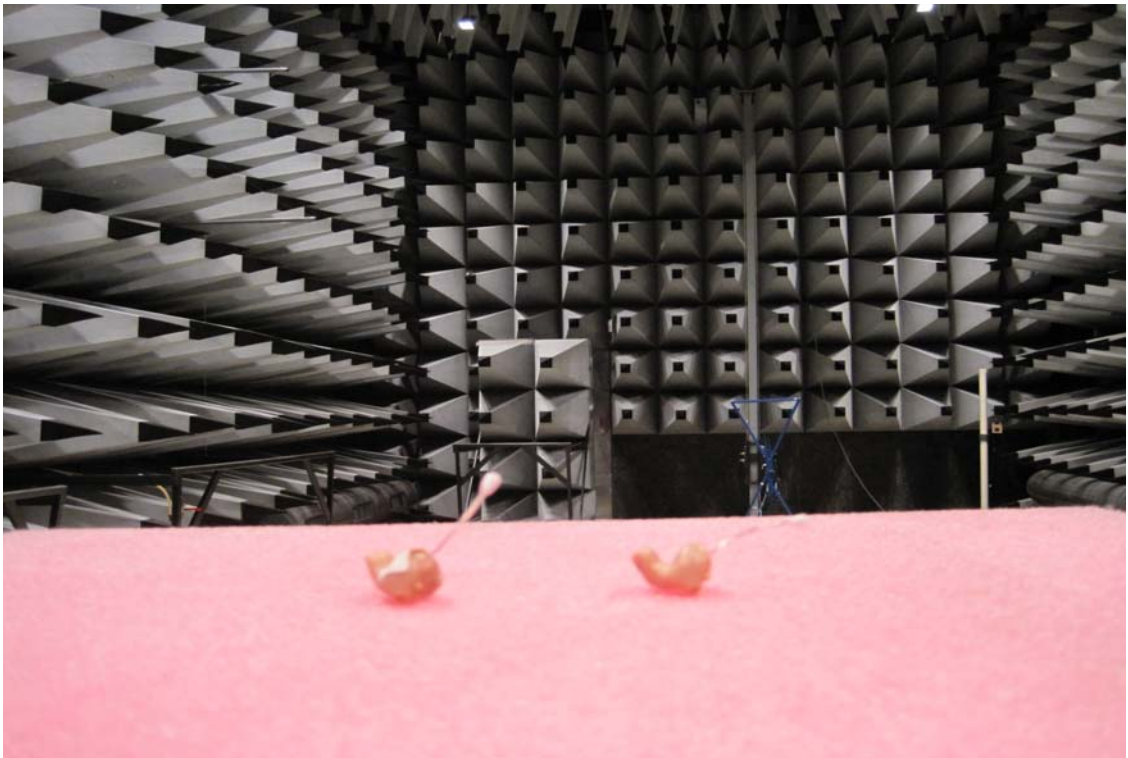
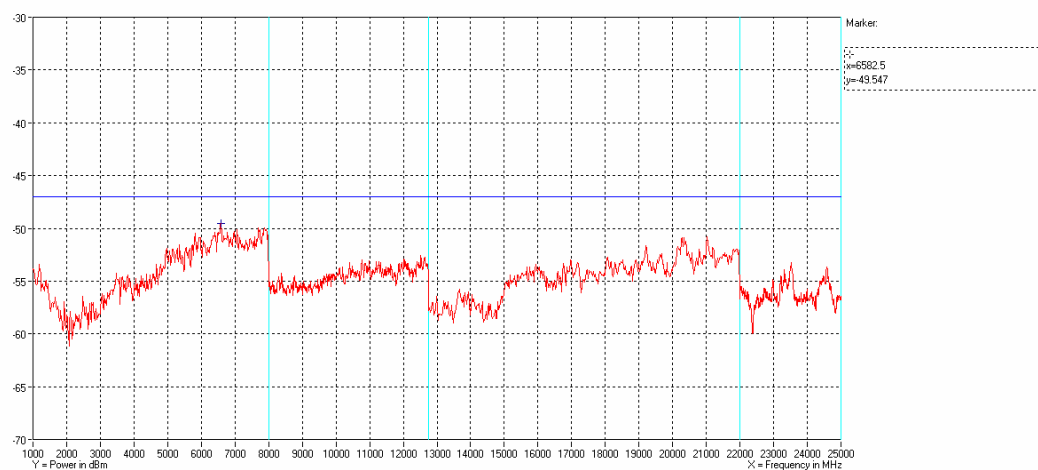


Photo 4.11.2 Test setup regarding measurement of RX radiated emission, Rx, 30 MHz to 1000 MHz.

4.12 Measurement of radiated emission, Rx, 1 GHz to 25 GHz

Test object	Combination of 2.1.2: BO13 2.1.3: BO13	Sheet	RE_Spur-17
Type	See section 2	Project no.	A506865-5
Serial no.	See section 2	Date	16 Aug. 2010
Client	GN Hearing A/S	Initials	A-RAS
Specification	IC standard RSS-210, Issue 7:2007, 2,6 IC standard RSS-Gen, issue 2:2007, Gen, 7.2.3.2	Frequency	1 GHz – 25GHz

Test method	EN 300 440-1 V1.5.1:2009	Temperature	21 °C
Characteristics	Complete search, Antenna distance 3 m.	Humidity	76 % RH
Detector	Peak for 1 GHz to 8 GHz	Bandwidth	1 MHz
Detector	Peak for 8 GHz to 12.75 GHz	Bandwidth	300 kHz
Detector	Peak for 12.75 GHz to 20 GHz	Bandwidth	100 kHz
Detector	Peak for 20 GHz to 25 GHz	Bandwidth	30 KHz
Test equipm.	EMI room Hørsholm 49600 49624 49625 49183 49299	Uncertainty	4.9 dB



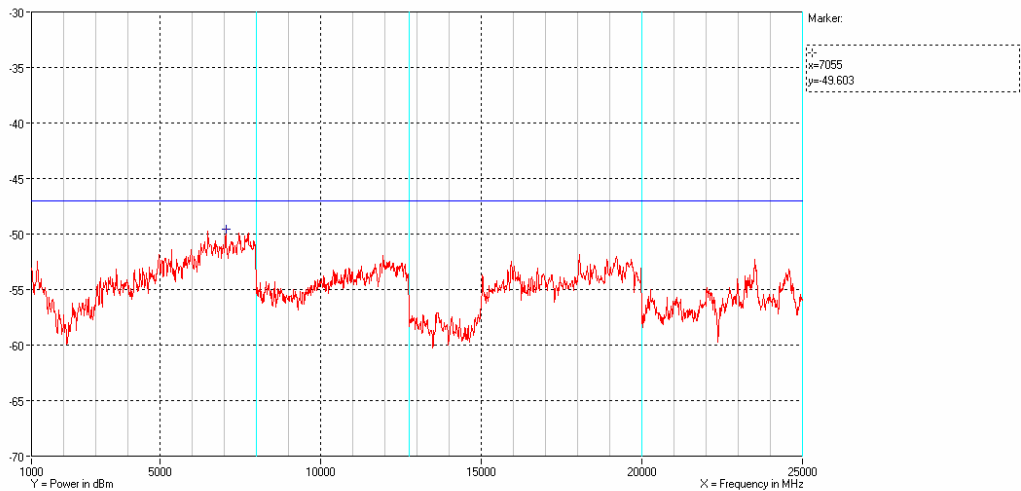
Polarization

Horizontal peak measurements

Comments

Continuous Rx & Tx standby - normal modulation - hopping off





Polarization	Vertical peak measurements
Comments	Continuous Rx & Tx standby - normal modulation - hopping off
Test result	The measured field strengths are below the limit
Test Port	Enclosure
Test frequency	2440 MHz
Test mode	Continuous Rx and Tx standby - normal modulation - hopping off
Condition	Normal
Compliant	Yes
Comments	Final maximal measurements by variation of turntable azimuth, antenna height and antenna polarization. The radiated substitution test method of EN 300 440 was used to demonstrate compliance with the limits for RSS-Gen, Section 7.2.3



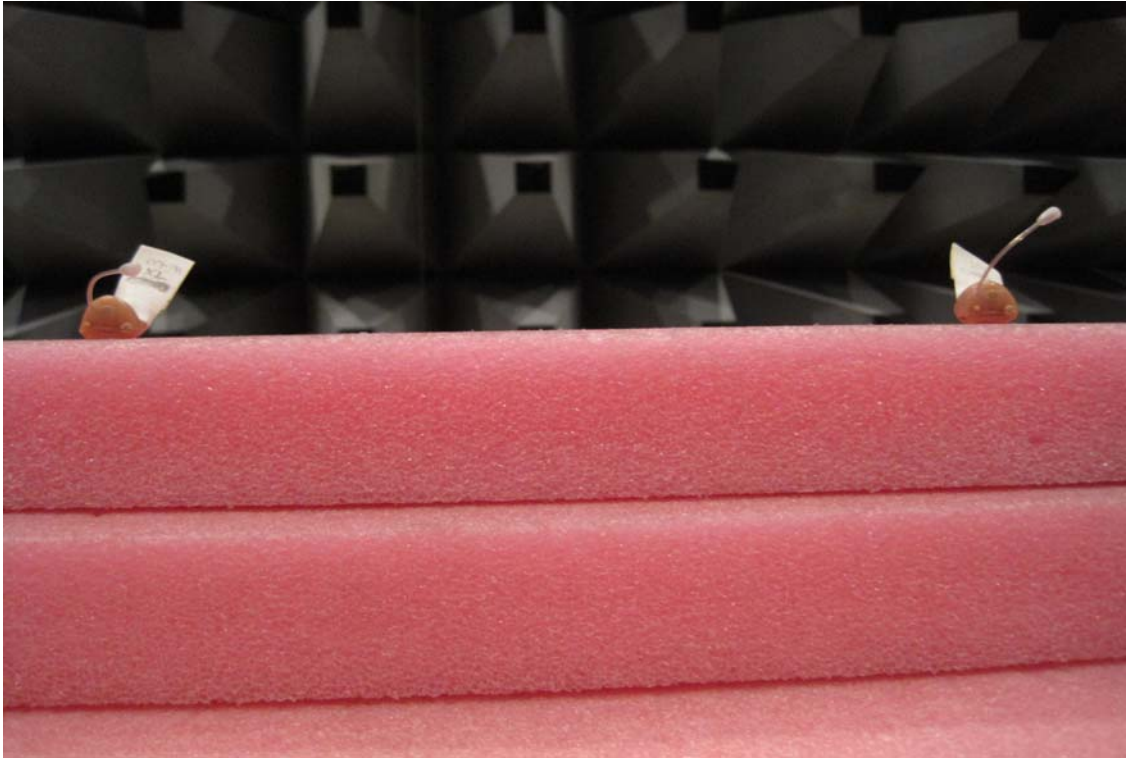


Photo 4.12.1 Test setup regarding measurement of radiated emission, Rx, 1 GHz to 25 GHz.

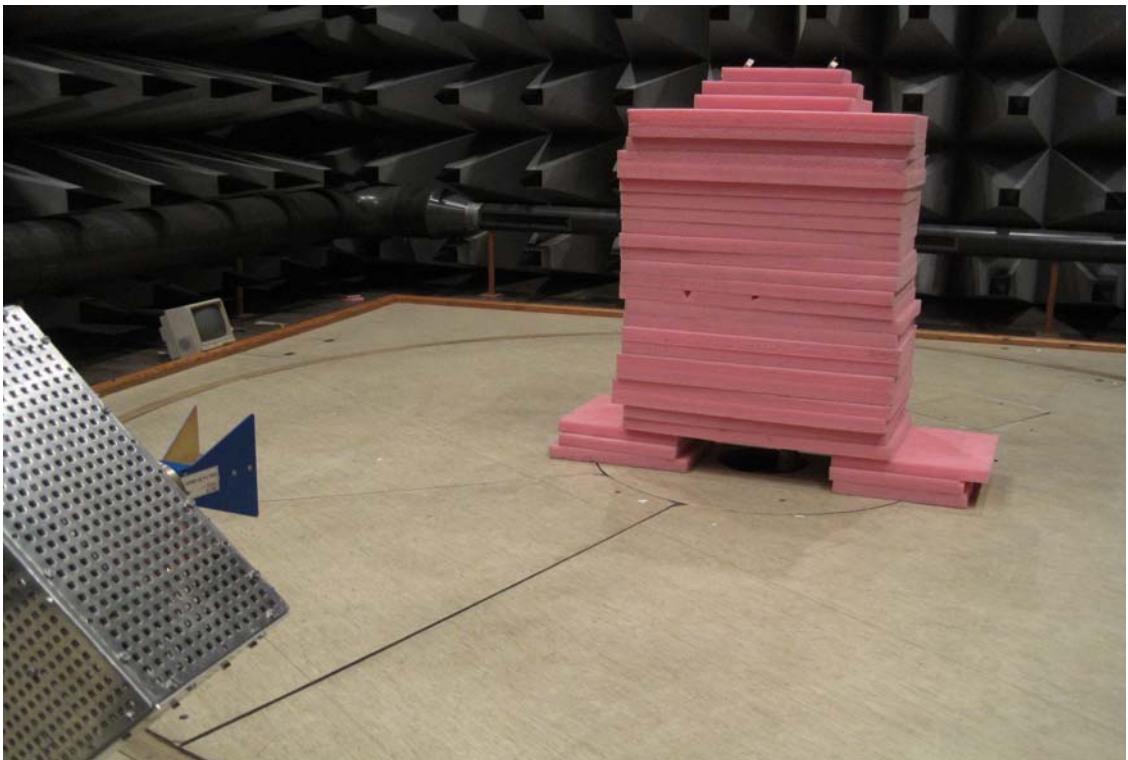


Photo 4.12.2 Test setup regarding measurement of radiated emission, Rx, 1 GHz to 25 GHz.

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.
29332	ACTIVE LOOP ANTENNA	ROHDE & SCHWARZ	HFH-Z2
29494	MICROWAVE CABLE, FIXED ROOM 1 CABLE	SUHNER	SUCOFLEX 104
29494,3	MICROWAVE CABLE, 1 M	SUHNER	SUCOFLEX 104
29503	LOOP ANTENNA CHECK GENERATOR	EC	PTJ
29797	BILOG ANTENNA, 30-2000 MHz	CHASE ELECTRICS LTD	CBL 6111A
29861	EMI-SOFTWARE VER. 1.60	ROHDE & SCHWARZ	ES-K1, PART: 1026.6790.02
29962	DIGITAL MULTIMETER, ROOM xx	FLUKE	77 SERIES III
49183	POWER SUPPLY	TTI	PL 320
49299	DIGITAL MULTIMETER	Fluke	87-4
49321	SPECTRUM ANALYZER, 50 GHz WITH OPTION 006	HEWLETT-PACKARD	8565E
49431	MICROWAVE CABLE, 2 M FIXED AT EMI ROOM	SUHNER	SUCOFLEX 104
49436	MICROWAVE CABLE, 1 M SMA-SMA	SUHNER	SUCOFLEX 104
49532	MICROWAVE CABLE, 1 M	SUHNER	SUCOFLEX 104
49600	SPECTRUM ANALYZER / MEASUREMENT RECEIVER	ROHDE & SCHWARZ	ESU40
49622	CABLE 3.25 M PC3.5 MALE-FEMALE SU-COFLEX 104	HUBER+SUHNER	
49623	CABLE 16 M PC3.5 MALE-MALE SU-COFLEX 104PB	HUBER+SUHNER	
49624	DUAL RIDGE HORN ANTENNA – 1 GHz – 26 GHz (2 GHz – 32 GHz)	SATIMO	SH2000
49625	SRD COAX SWITCH MATRIX USED IN 1 GHz TO 26 GHz SRD ANTENNASYSTEM	DELTA	COAX SWITCH MATRIX