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# DELTA Test Report



TEST Reg. no. 19

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## Radio parameter test of RC-2 according to FCC and IC specifications

### Performed for GN Hearing A/S

DANAK-19/13096

Project no.: T205690-1

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including 1 annex

23 May 2013

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<b>Title</b>	Radio parameter test of RC-2 according to FCC and IC specifications
<b>Test object</b>	RC-2
<b>Report no.</b>	DANAK-19/13096
<b>Project no.</b>	T205690-1
<b>Test period</b>	24 to 29 April 2013
<b>Client</b>	GN Hearing A/S Lautrupbjerg 7 DK-2750 Ballerup Denmark Tel.: +45 45 75 11 11
<b>Contact person</b>	Vinnie Nørager E-mail: vnoerager@gnresound.dk
<b>Manufacturer</b>	GN Hearing A/S
<b>Specifications</b>	See Section 1, Summary of tests
<b>Results</b>	The test objects were found to be in compliance with the specifications, as listed in Section 1
<b>Test personnel</b>	Claus Momme Thomsen Henrik Egeberg Nielsen
<b>Test site(s)</b>	DELTA, Venlighedsvej 4, 2970 Hørsholm, Denmark



**Date** 23 May 2013

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## 1. Summary of tests

The authorization procedures are:

- Declaration of Conformity by FCC Part 15 B, Class B (residential use).
- Certification by FCC Part 15 C.

Tests	Test methods	Rule Section	Results
Measurement of radio frequency voltage on mains	ANSI C63.10:2009	47 CFR Part 15.107 47 CFR Part 15.207 RSS-Gen, 4.10	Passed
Measurement of radiated emission	ANSI C63.10:2009	FCC: 47 CFR Part 15.109 FCC: 47 CFR Part 15.209 FCC: 47 CFR Part 15.249(a)(d)(e) IC: RSS-210, 2.5 & A2.9	Passed
Measurement of field strength of fundamental	ANSI C63.10:2009	FCC: 47 CFR Part 15.249(a)(e) IC: RSS-210, 2.5 & A2.9	Passed
Measurement of band edge compliance	ANSI C63.10:2009	FCC: 47 CFR Part 15.209(a) FCC: 47 CFR Part 15.249(d)(e) IC: RSS-210, 2.5 & A2.9	Passed
Measurement of 20 dB bandwidth	ANSI C63.10:2009	FCC: 47 CFR Part 15.215(c)	Passed
Measurement of occupied bandwidth	RSS-Gen, Issue 3:2010	IC: RSS-Gen, 4.6.1	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 standards stated below.

#### USA (FCC)

- 47 CFR Part 15, Subpart C (Specific rule part §15.249)

#### Canada (IC)

- Standard RSS-210, Issue 8:2010
- Standard RSS-Gen, Issue 3:2010.

The test results relate only to the objects tested.



2. Test object and auxiliary equipment



Photo 2.1.1 Test object and auxiliary equipment.

2.1 Test objects

Test object 2.1.1

Name of test object	RC-2
Model / type	RC-2
Part no.	RC-2
Serial no.	B5-019
FCC ID	X26RC-2
IC ID	6941C-RC2
Manufacturer	GN Hearing A/S
Supply voltage	3.7 VDC internal rechargeable battery (Li 240mAh)
Software version	001
Hardware version	001
Cycle time	9 ms / 20 ms
Highest frequency generated or used	2483.5 MHz
Comment	-



### Test object 2.1.2

Name of test object	RC-2
Model / type	RC-2
Part no.	RC-2
Serial no.	B5-010
FCC ID	X26RC-2
IC ID	6941C-RC2
Manufacturer	GN Hearing A/S
Supply voltage	3.7 VDC internal rechargeable battery (Li 240mAh)
Software version	001
Hardware version	001
Cycle time	9ms / 20 ms
Highest frequency generated or used	2483.5 MHz
Comment	Antenna replaced by SMA connector and supplied by external power supply

## 2.2 Auxiliary equipment

### Auxiliary equipment 2.2.1

Name of auxiliary equipment	AC/DC Adaptor for RC-2
Model / type	FW7713
Part no.	-
Serial no.	-
FCC ID	-
Manufacturer	I.T.E power supply
Supply voltage	100-240 VAC
Comment	-



### 3. General test conditions

#### 3.1 Test setup during test

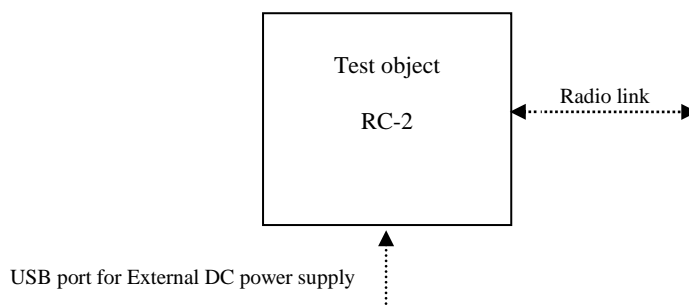


Figure 3.1.1 Block diagram of test object with cables and auxiliary equipment.

##### 3.1.1 Description and intended use of test object

Remote Control 2 (RC-2) is intended to let the user control a ReSound wireless hearing instrument remotely. The essential performance of the Remote Control 2 is to transfer signals to a ReSound wireless hearing instrument for adjustment of volume and program.

##### 3.1.2 Test modes during tests

All test objects were running special test software

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

Tests were performed at three frequencies for the GN radio:

- Low frequency: 2402 MHz
- Middle frequency: 2441 MHz
- High frequency: 2478 MHz.

During relevant tests, the external DC power supply was used.



### 3.2 Radio specifications, receiver and transmitter, GN radio

Test object	RC-2	Sheet	Radio-1
Type	RC-2	Project no.	T205690-1
Serial no.	See Section 2	Date	29 April 2013
Client	GN Hearing A/S		
Specification	See Section 1 Summary of tests		

The radio of the test object has the following specified RF parameters. The below mentioned 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	:	2402 to 2478 MHz
Antenna	:	Permanently attached PCB antenna
Maximum gain	:	3 dBi
Transmit power, max peak	:	1.0 dBm peak EIRP
Field Strength, max avg.	:	77.9 dB $\mu$ V/m avg (2.4mV/m) @ 3 meter
Field Strength, max pk.	:	96.2 dB $\mu$ V/m pk (65 mV/m) @ 3 meter
Conducted power, max avg.:	:	-11.2 dBm
Conducted power, max pk. :	:	-2 dBm
Power level	:	No
No of channels	:	20
Bandwidth	:	
Occupied bandwidths (99%)	:	2.25 MHz (Measured)
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	:	Li-Ion battery, 3.7 VDC or 5 VDC through a USB port
Specified min voltage	:	3.15 VDC
Specified max voltage	:	4.26 VDC
Temperature category	:	-20 to +55 °C.
Emission Designator	:	2M25F7E
Max. TX spurious emission, average	:	298 ( $\mu$ V/m) @ 3 meter (Field Strength)
Max. TX spurious emission, peak	:	36 ( $\mu$ V/m) @ 3 meter (Field Strength)



## 4. Test results

### 4.1 Duty cycle correction factor ( $\delta$ )

Test object	RC-2	Sheet	ANT-1
Type	RC-2	Project no.	T205690-1
Serial no.	B5-019	Date	29 April 2013
Client	GN Hearing A/S	Initials	CMT
Specification	-		

Test method	ANSI C63.10:2009	Temperature	23 °C
Characteristics	Test voltage: 5 VDC from AC/DC adaptor	Humidity	32 % RH
Test equipm.	SRD lab Hørsholm 49550 49183 49299	Uncertainty	1 dB
SA Settings	RBW: 1 MHz VBW: 1 MHz SPAN: Zero DET: Peak CF: 2.44 GHz Trace: Max Hold		

The duty cycle correction factor ( $\delta$ ) can be applied to the peak pulse amplitude to find the average emission. This is valid for one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

The duty cycle correction factor is determined as follows:

The measured value for the duty cycle (D) is:

$$\text{Max. Tx on time: } 0.519 + 0.524 \mu\text{s} - (1:\text{Delta } 3 (T1) + 2:\text{Delta } 2 (T1))$$

$$\text{Period: } 8601 \mu\text{s} - (1:\text{Delta } 2 (T1))$$

The calculated duty cycle expressed in % is:

$$D(\%) = ((\text{Max. Tx on time}) \mu\text{s} / (\text{period}) \mu\text{s}) \cdot 100\% = 12.1 \%$$

The calculated duty cycle correction factor expressed in dB is:

$$\delta(\text{dB}): 20 \log (\text{Max. Tx on time } (\mu\text{s}) / \text{period } (\mu\text{s})) = -18.3 \text{ dB.}$$

According to ANSI C63.10.2009 (Section 4.2.3.2.4), FCC CFR 47 Part 15 Subpart C (Section 15.35(c)) and RSS-Gen (Section 4.5) this correction factor can be applied for all emissions including the fundamental and harmonics above 1 GHz.

The corrected average is:  $P_{\text{Average}}(\text{resulting}) = P_{\text{peak}} + \text{DCCF } (\delta)$ .

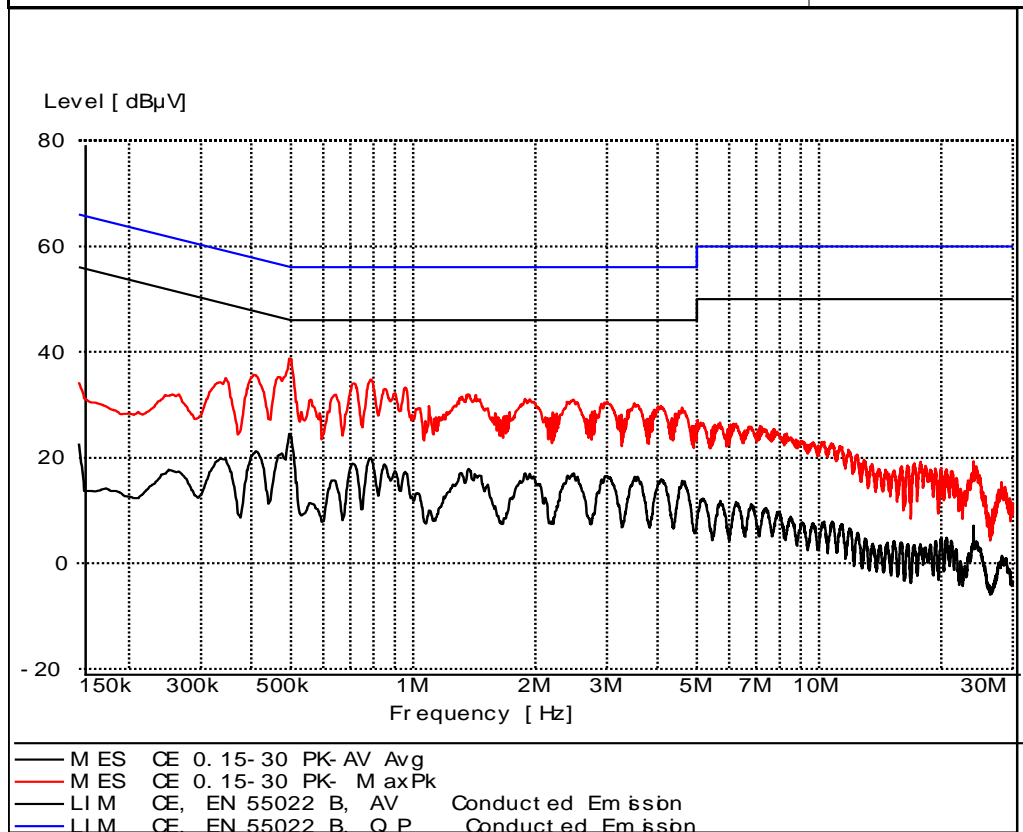




## 4.2 Measurement of radio frequency voltage on mains

Test object	RC-2	Sheet	CE-1
Type	RC-2	Project no.	T205690-1
Serial no.	B5-019	Date	24 Apr. 2013
Client	GN Hearing A/S	Initials	HEN
Specification	See Section 1 Summary of tests	Frequency	0.15-30 MHz

Test method	ANSI C63.10:2009	Temperature	23 °C
Characteristics	Artificial mains network: 50 $\Omega$ , 50 $\mu$ H	Humidity	32 % RH
Detector	Peak and Average	Bandwidth	10 kHz
Test equipm.	EMI room Hørsholm 29461 49421 49600 29861	Uncertainty	2.7 dB



Line under test Neutral

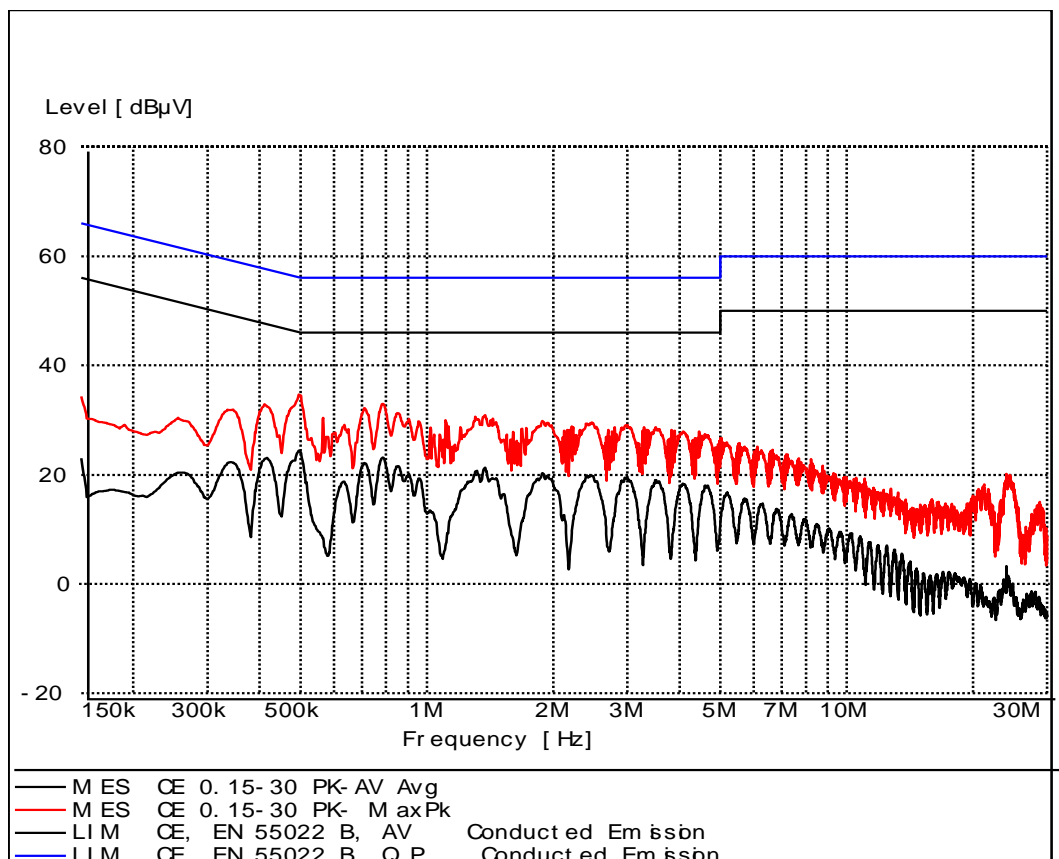
Test result The measured voltages were below the limit

Comments Mains voltage: 120 VAC



Test object	RC-2	Sheet	CE-2
Type	RC-2	Project no.	T205690-1
Serial no.	B5-019	Date	24 Apr. 2013
Client	GN Hearing A/S	Initials	HEN
Specification	See Section 1 Summary of tests	Frequency	0.15-30 MHz

Test method	ANSI C63.10:2009	Temperature	23 °C
Characteristics	Artificial mains network: 50 $\Omega$ , 50 $\mu$ H	Humidity	32 % RH
Detector	Peak and Average	Bandwidth	10 kHz
Test equipm.	EMI room Hørsholm 29461 49421 49600 29861	Uncertainty	2.7 dB



Line under test	Line
Test result	The measured voltages were below the limit
Compliant	Yes
Comments	Mains voltage: 120 VAC



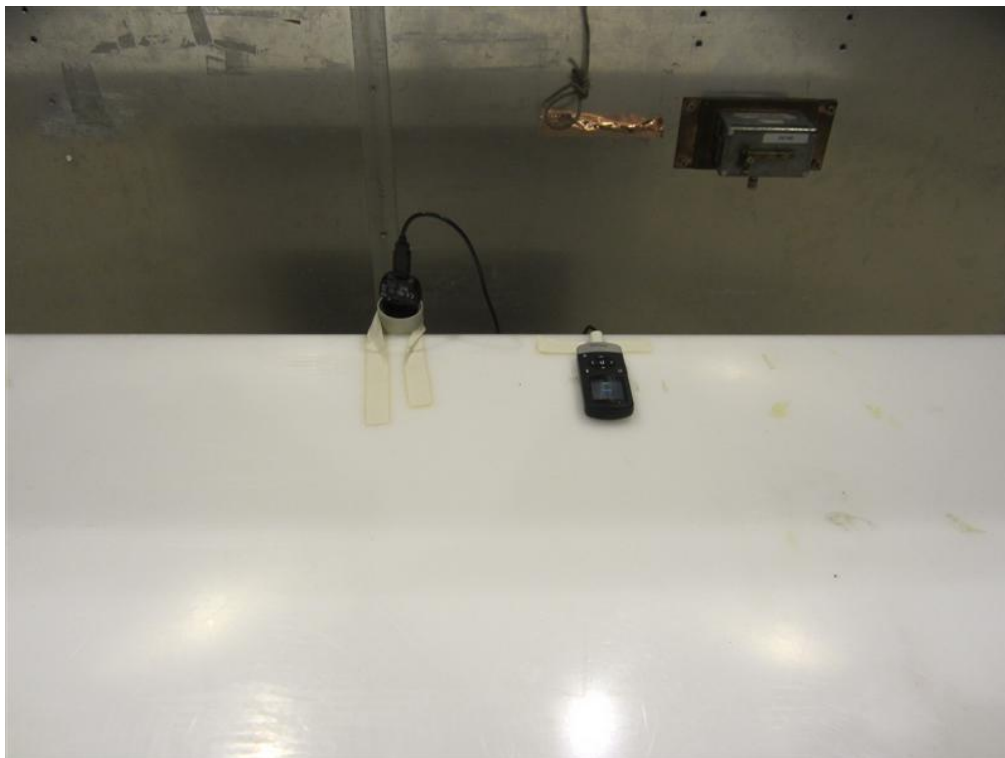


Photo 4.2.1 Test setup regarding measurement of radio frequency voltage on mains.



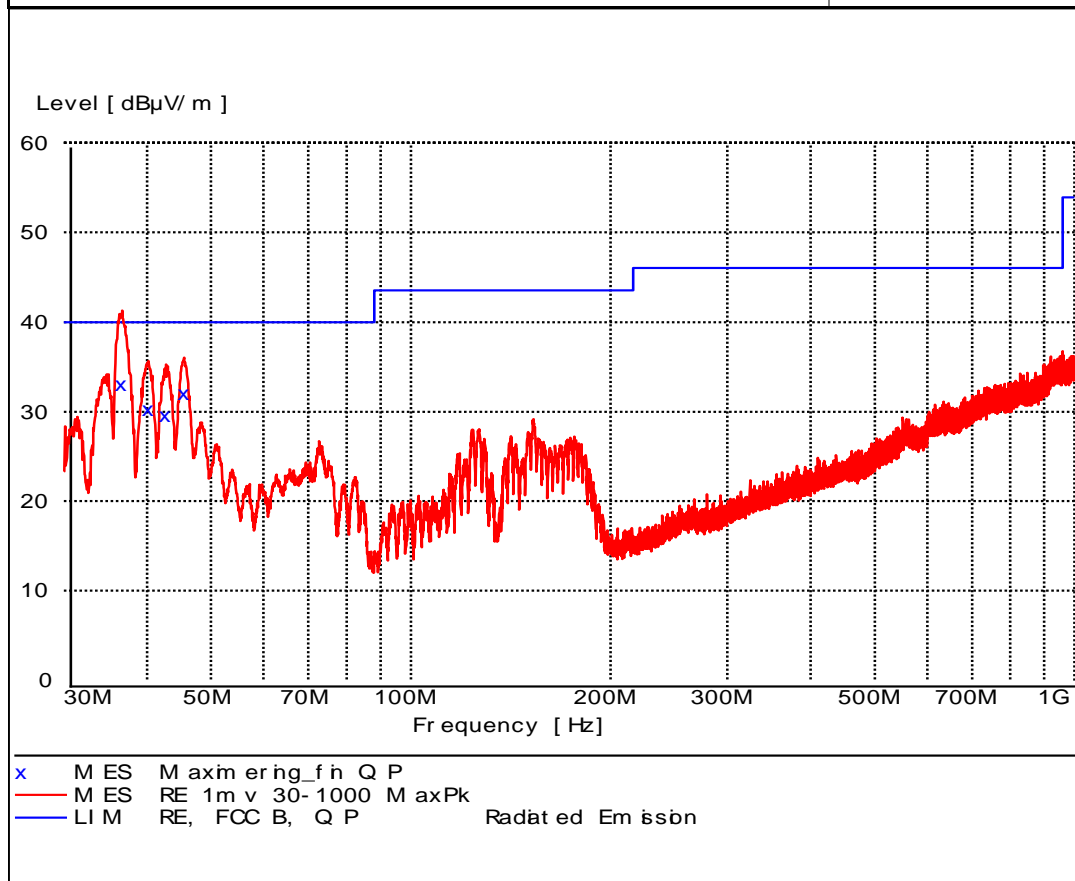
Photo 4.2.2 Test setup regarding measurement of radio frequency voltage on mains.



#### 4.3 Measurement of radiated emission below 1 GHz

Test object	RC-2	Sheet	RE_Spur-1
Type	RC-2	Project no.	T205690-1
Serial no.	B5-019	Date	24 Apr. 2013
Client	GN Hearing A/S	Initials	HEN
Specification	See Section 1 Summary of tests	Frequency	30-1000 MHz

Test method	ANSI C63.10:2009	Temperature	23 °C
Characteristics	Pre-scan, antenna at 3 m, 1 m height, vert. pol.	Humidity	32 % RH
Detector	Peak and Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797	Uncertainty	4.9 dB

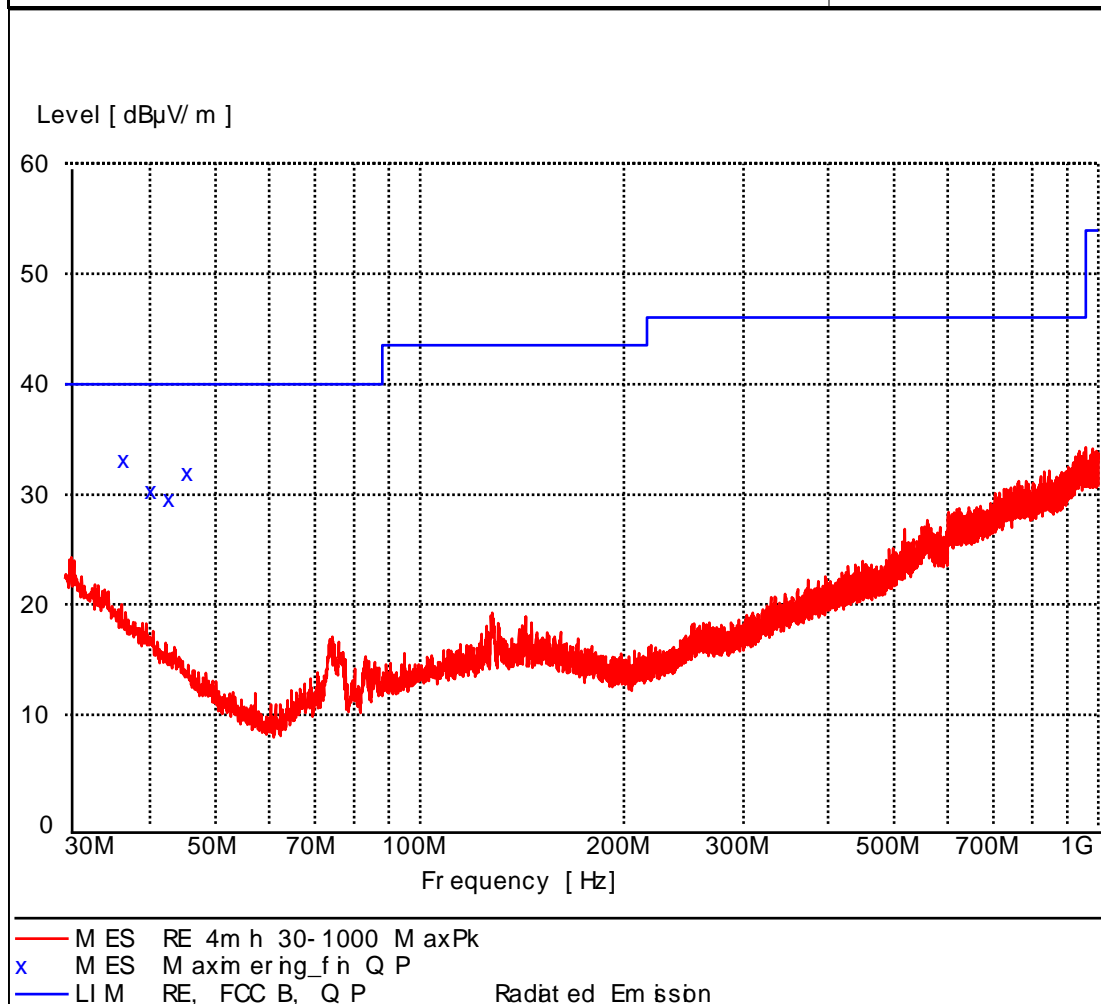


Comments

Continuous Tx - GFSK modulation - hopping between low, mid and high operating freq.

Test object	RC-2	Sheet	RE_Spur-2
Type	RC-2	Project no.	T205690-1
Serial no.	B5-019	Date	24 Apr. 2013
Client	GN Hearing A/S	Initials	HEN
Specification	See Section 1 Summary of tests	Frequency	30-1000 MHz

Test method	ANSI C63.10:2009	Temperature	23 °C
Characteristics	Pre-scan, antenna at 3 m, 4 m height, hor. pol.	Humidity	32 % RH
Detector	Peak and Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797	Uncertainty	4.9 dB



Comments

Continuous Tx - GFSK modulation - hopping between low, mid and high operating freq.





Test object	RC-2	Sheet	RE_Spur-3
Type	RC-2	Project no.	T205690-1
Serial no.	B5-019	Date	24 Apr. 2013
Client	GN Hearing A/S	Initials	HEN
Specification	See Section 1 Summary of tests	Frequency	30-1000 MHz

Test method	ANSI C63.10:2009	Temperature	23 °C
Characteristics	Peak search, ant. at 3 m, height: 1-4 m, v/h pol.	Humidity	32 % RH
Detector	Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797	Uncertainty	4.9 dB

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
36.720000	33.10	17.2	40.0	6.9	105.0	346.00	VERTICAL
40.260000	30.30	15.2	40.0	9.7	101.0	358.00	VERTICAL
42.720000	29.60	14.0	40.0	10.4	104.0	154.00	VERTICAL
45.540000	32.00	12.6	40.0	8.0	105.0	158.00	VERTICAL

Test result	The measured field strengths were below the limit
Test Port	Enclosure
Test frequency	2402, 2441 & 2478 MHz
Test mode	Continuous Tx - GFSK modulation - hopping between low, mid and high operating freq.
Condition	Normal
Compliant	Yes





Photo 4.3.1 Test setup regarding measurement of radiated emission below 1 GHz.



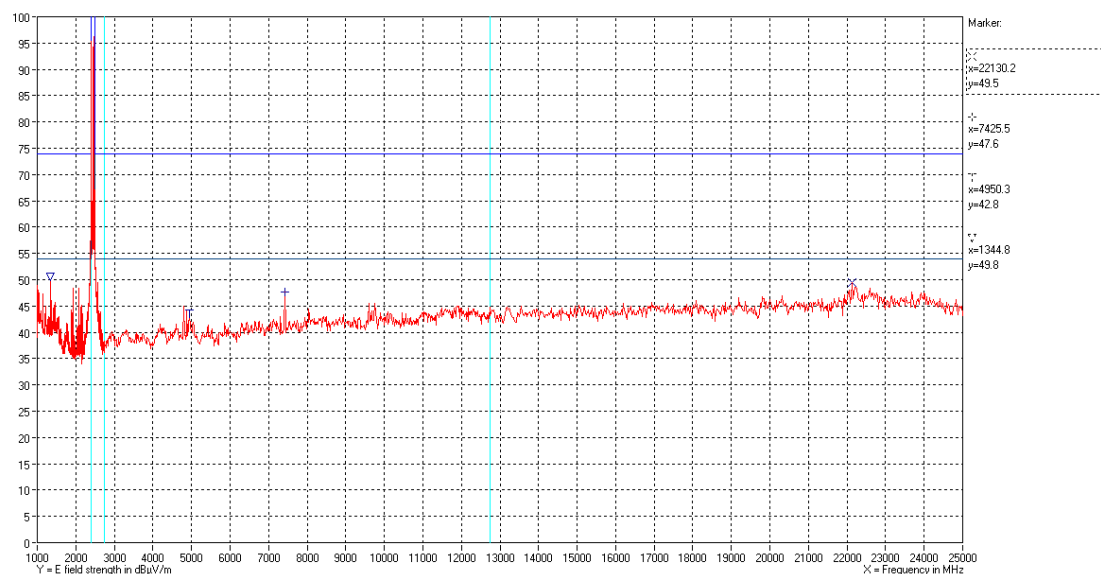
Photo 4.3.2 Test setup regarding measurement of radiated emission below 1 GHz.



#### 4.4 Measurement of radiated emission above 1 GHz

Test object	RC-2	Sheet	RE_Spur-4
Type	RC-2	Project no.	T205690-1
Serial no.	B5-019	Date	29 Apr. 2013
Client	GN Hearing A/S	Initials	CMT
Specification	See Section 1 Summary of tests	Frequency	1-25 GHz

Test method	ANSI C63.10:2009	Temperature	24 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	36 % RH
Detector	Peak for 1 GHz to 25 GHz	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49086 49600 49624 49625	Uncertainty	4.9 dB



Polarization

Vertical and horizontal peak measurements

Comments

Continuous Tx - GFSK modulation - hopping between low, mid and high operating freq.



Test object	RC-2	Sheet	RE_Spur-5
Type	RC-2	Project no.	T205690-1
Serial no.	B5-019	Date	29 Apr. 2013
Client	GN Hearing A/S	Initials	CMT
Specification	See Section 1 Summary of tests	Frequency	1-25 GHz

Test method	ANSI C63.10:2009	Temperature	24 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	36 % RH
Detector	Peak for 1 GHz to 25 GHz	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49086 49600 49624 49625	Uncertainty	4.9 dB

Test result	The out of band measured peak and average field strengths are below the peak and average limit
Test Port	Enclosure
Test frequency	2402 MHz, 2441 MHz & 2478 MHz
Test mode	Continuous Tx - GFSK modulation - hopping between low, mid and high operating freq.
Condition	Normal
Compliant	Yes

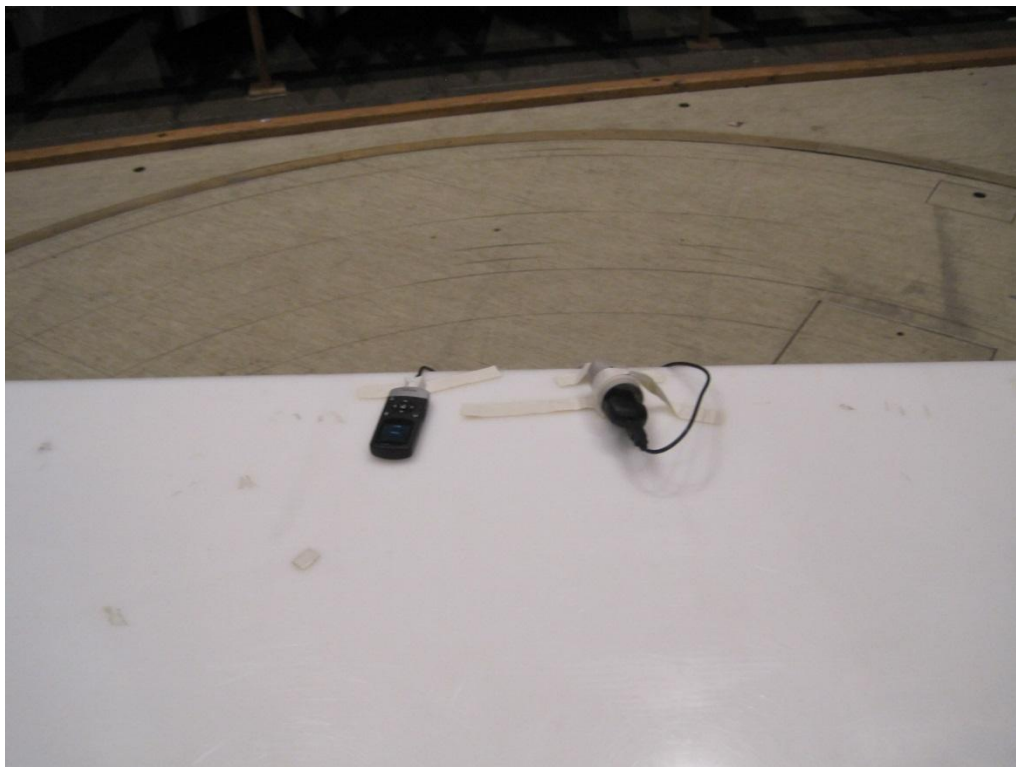


Photo 4.4.1 Test setup regarding measurement of radiated emission above 1 GHz.

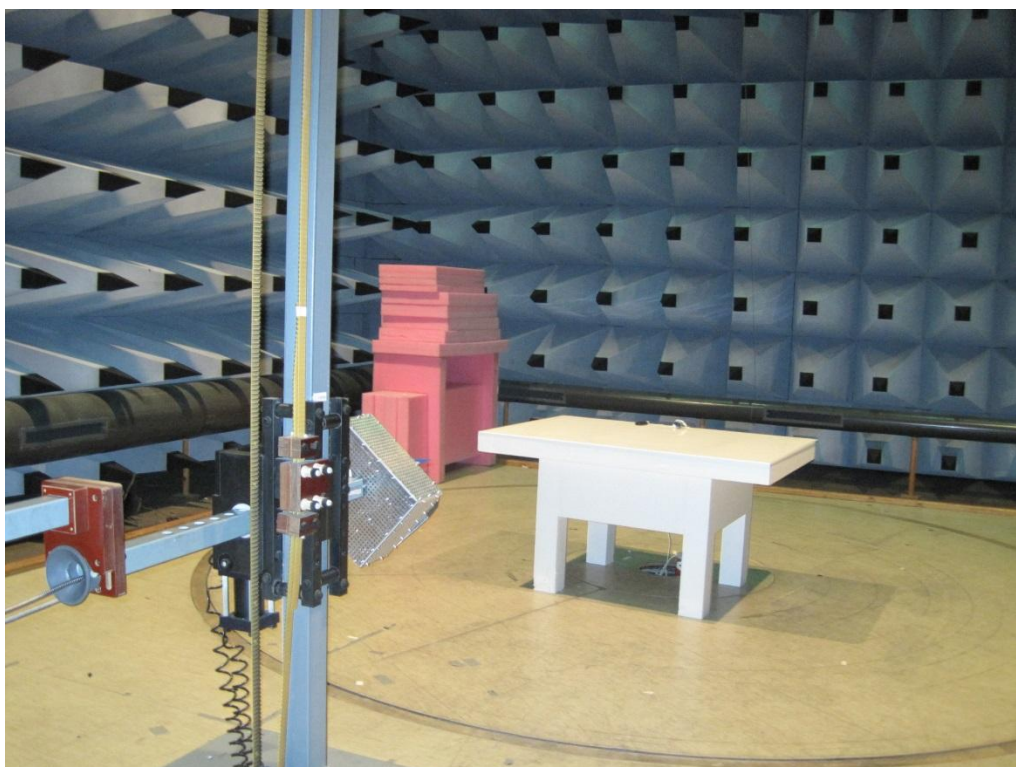


Photo 4.4.2 Test setup regarding measurement of radiated emission above 1 GHz.





#### 4.5 Measurement of field strength of fundamental

Test object	RC-2	Sheet	RE_Spur-6
Type	RC-2	Project no.	T205690-1
Serial no.	B5-019	Date	29 Apr. 2013
Client	GN Hearing A/S	Initials	CMT
Specification	See Section 1 Summary of tests	Frequency	2400 to 2483.5 MHz

Test method	ANSI C63.10:2009					Temperature	24 °C
Characteristics	Complete search, antenna distance 3 m					Humidity	36 % RH
Detector	Peak and Average					Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49086 49600 49624 49625					Uncertainty	4.9 dB
Frequency [MHz]	Peak measurement [dBμV/m]	Peak limit [dBμV/m]	DCCF (δ) [dB]	Corrected average measurement [dBμV/m]	Average limit [dBμV/m]	Remarks	
2402	95.3	114	-	-	-	Passed	
2402	95.3	-	-18.3	77.0	94	Passed	
2441	94.3	114	-	-	-	Passed	
2441	94.3	-	-18.3	76.0	94	Passed	
2478	96.2	114	-	-	-	Passed	
2478	96.2	-	-18.3	77.9	94	Passed	

Test result                      The measured peak field strengths were below the peak limit.  
    The measured peak field strengths corrected with the DCCF (δ) are below the average limit.  
    Corrected average:  $P_{Average}(resulting) = P_{peak} + DCCF(\delta)$ .

Test Port                        Enclosure

Test frequency                2402, 2441 & 2478 MHz

Test mode                      Continuous Tx - GFSK modulation - hopping between low, mid and high operating freq.

Condition                      Normal

Compliant                      Yes

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



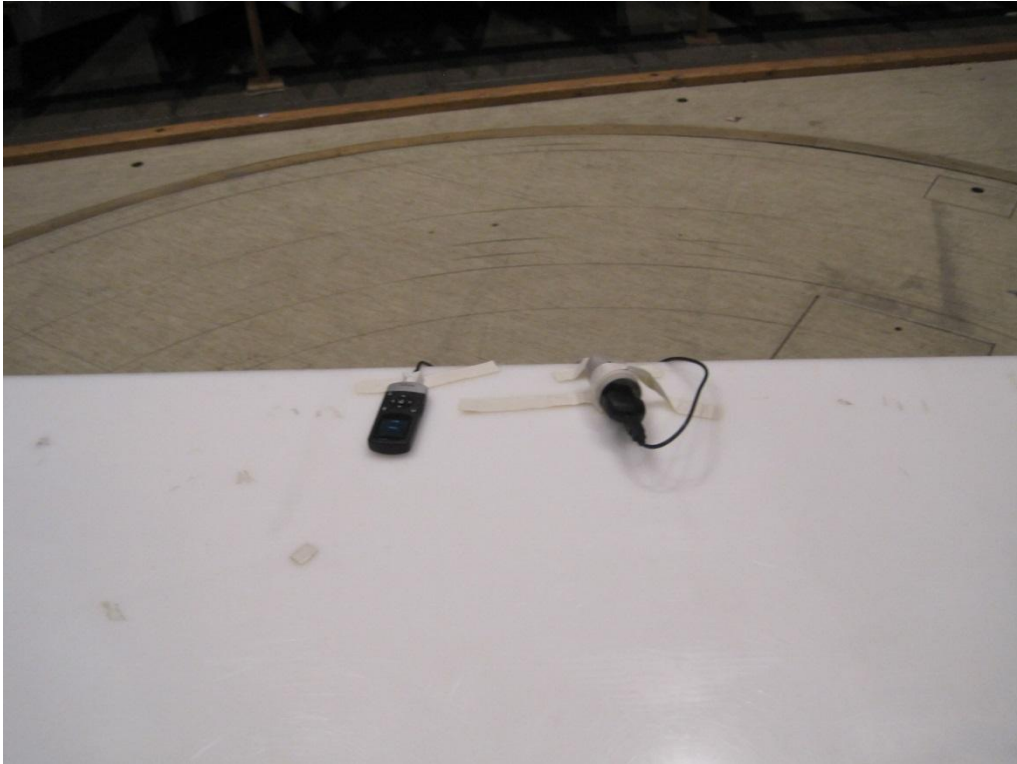


Photo 4.5.1 Test setup regarding measurement of field strength of fundamental.

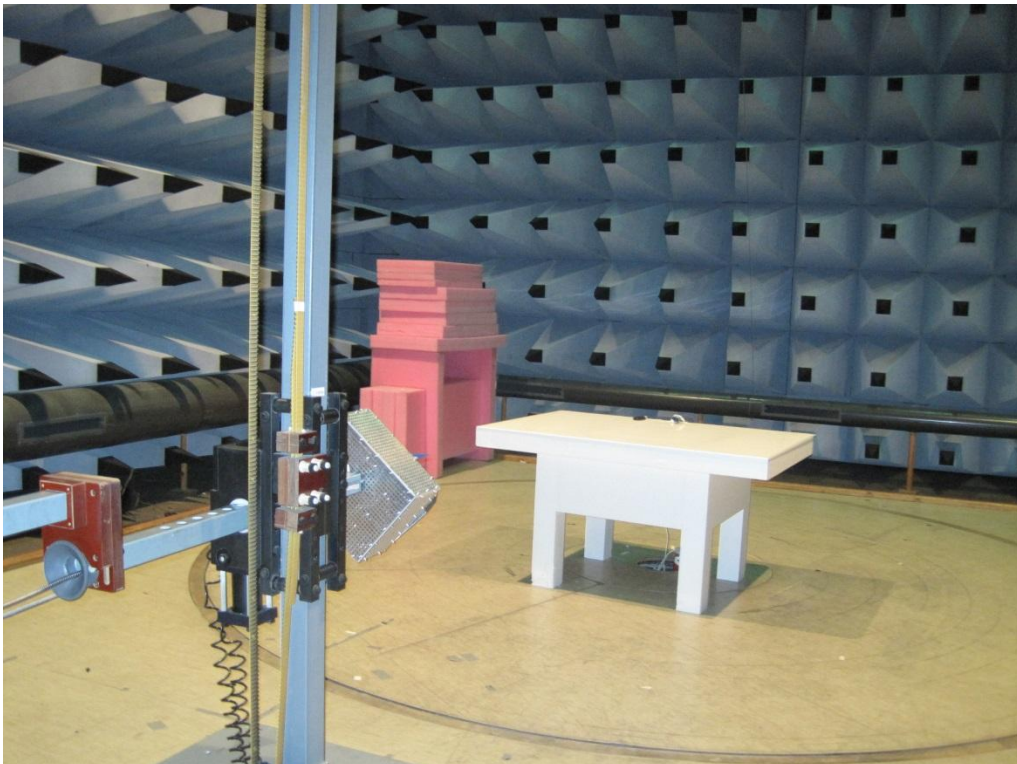


Photo 4.5.2 Test setup regarding measurement of field strength of fundamental.



#### 4.6 Measurement of band edge compliance

Test object	RC-2	Sheet	RE_Spur-7
Type	RC-2	Project no.	T205690-1
Serial no.	B5-019	Date	29 Apr. 2013
Client	GN Hearing A/S	Initials	CMT
Specification	See Section 1 Summary of tests	Frequency	2400 to 2483.5 MHz

Test method	ANSI C63.10:2009	Temperature	24 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	36 % RH
Detector	Peak and average	Bandwidth	100 kHz
Test equipm.	EMI room Hørsholm 49086 49600 49624 49625	Uncertainty	4.9 dB

Band Edge frequency [MHz]	Operating frequency [MHz]	Average / Peak	Fundamental field strengths [dBμV/m]	Marker-delta method [dB]	Corrected [dBμV/m]	Limit at Band Edge [dBμV/m]	Remarks
2400	2402	Average	75.3	38.8	36.5	54	-
2400	2402	Peak	95.3	38.8	56.5	74	-
2483.5	2478	Average	76.2	46.2	30	54	-
2483.5	2478	Peak	96.2	46.2	50	74	-

Test result      The measured and corrected peak and average field strengths at the band edge were below the limit

Test Port      Enclosure

Test frequency      2402 MHz & 2478 MHz

Test mode      Continuous Tx - GFSK modulation - hopping between low, mid and high operating freq.

Condition      Normal

Compliant      Yes

Comments      Final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation.  
Marker-delta method for band-edge measurements was used to correct the measurements for the peak and average field strengths at band edge according to ANSI C63.10:2009 Section 6.9.3.





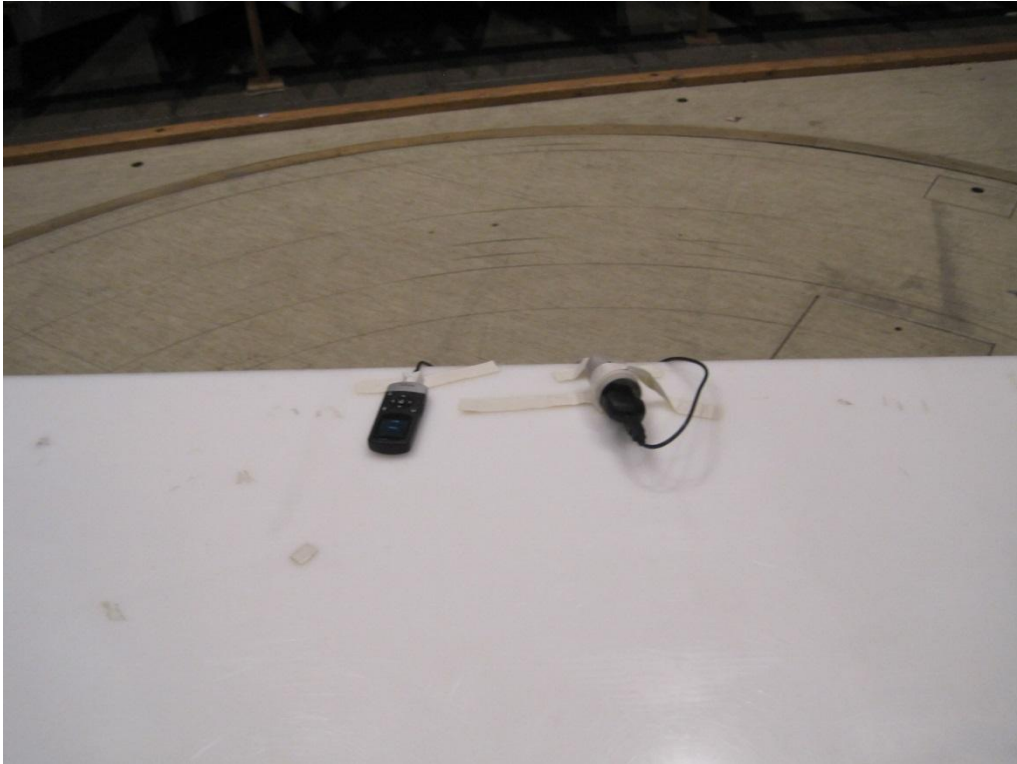


Photo 4.6.1 Test setup regarding measurement of band edge compliance.

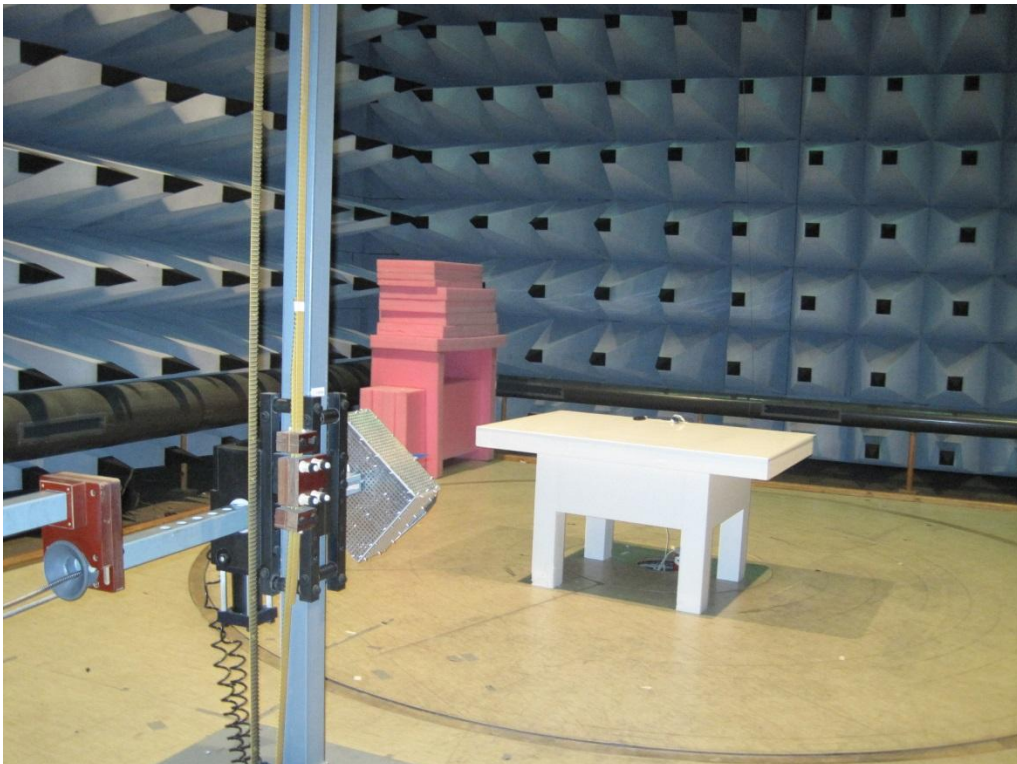


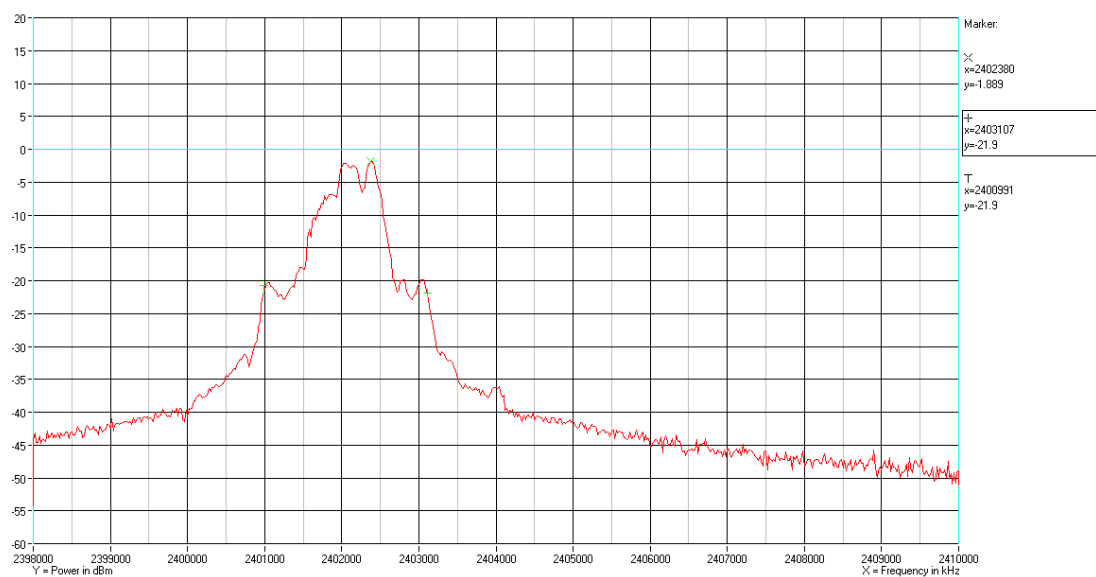
Photo 4.6.2 Test setup regarding measurement of band edge compliance.



#### 4.7 Measurement of 20 dB bandwidth

Test object	RC-2	Sheet	PROF-1
Type	RC-2	Project no.	T205690-1
Serial no.	B5-010	Date	24 Apr. 2013
Client	GN Hearing A/S	Initials	CMT
Specification	See Section 1 Summary of tests		

Test method	ANSI C63.10:2009	Temperature	25 °C
Characteristics	Test voltage: External power supply at 3.7 VDC	Humidity	40 % RH
Test equipm.	EVFGT-17 49321 49663	Uncertainty	1.1 dB
SA Settings	RBW: 100 kHz VBW: 300 kHz SPAN: 12 MHz DET: Peak CF: Operating freq. Trace: Max. hold		

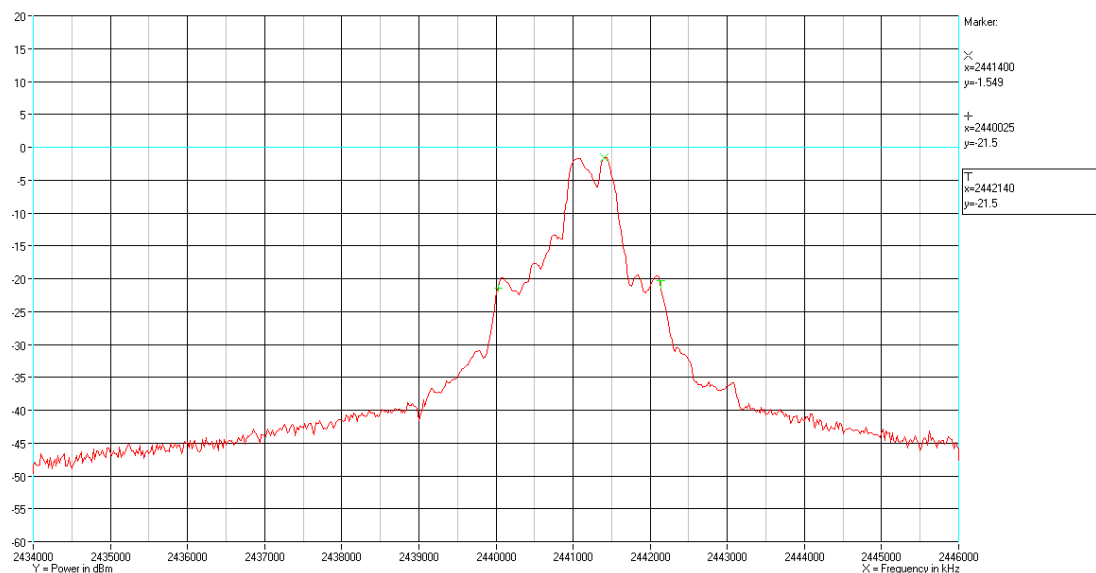


Comments

Operating frequency: 2402 MHz

Test object	RC-2	Sheet	PROF-2
Type	RC-2	Project no.	T205690-1
Serial no.	B5-010	Date	24 Apr. 2013
Client	GN Hearing A/S	Initials	CMT
Specification	See Section 1 Summary of tests		

Test method	ANSI C63.10:2009	Temperature	25 °C
Characteristics	Test voltage: External power supply at 3.7 VDC	Humidity	40 % RH
Test equipm.	EVFGT-17 49321 49663	Uncertainty	1.1 dB
SA Settings	RBW: 100 kHz VBW: 300 kHz SPAN: 12 MHz DET: Peak CF: Operating freq. Trace: Max. hold		



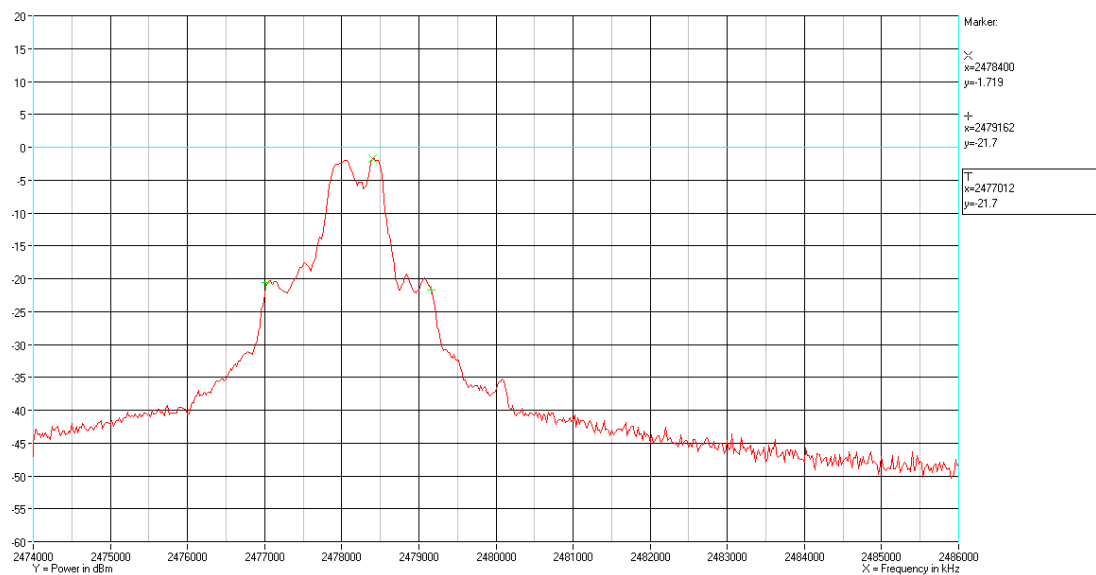
Comments

Operating frequency: 2441 MHz



Test object	RC-2	Sheet	PROF-1
Type	RC-2	Project no.	T205690-1
Serial no.	B5-010	Date	24 Apr. 2013
Client	GN Hearing A/S	Initials	CMT
Specification	See Section 1 Summary of tests		

Test method	ANSI C63.10:2009	Temperature	25 °C
Characteristics	Test voltage: External power supply at 3.7 VDC	Humidity	40 % RH
Test equipm.	EVFGT-17 49321 49663	Uncertainty	1.1 dB
SA Settings	RBW: 100 kHz VBW: 300 kHz SPAN: 12 MHz DET: Peak CF: Operating freq. Trace: Max. hold		



Comments

Operating frequency: 2478 MHz

Test object	RC-2	Sheet	PROF-3
Type	RC-2	Project no.	T205690-1
Serial no.	B5-010	Date	24 Apr. 2013
Client	GN Hearing A/S	Initials	CMT
Specification	See Section 1 Summary of tests		

Test method	ANSI C63.10:2009	Temperature	25 °C
Characteristics	Test voltage: External power supply at 3.7 VDC	Humidity	40 % RH
Test equipm.	EVFGT-17 49321 49663	Uncertainty	1.1 dB
SA Settings	RBW: 100 kHz VBW: 300 kHz SPAN: 12 MHz DET: Peak CF: Operating freq. Trace: Max. hold		

Operating frequency [MHz]	Conducted peak measurement [dBc]	Low frequency [MHz]	High frequency [MHz]	20 dB BW [MHz]
2402	20	2400.991	2403.107	2.116
2441	20	2440.025	2442.140	-2.115
2478	20	2477.012	2479.162	2.150
Note 1:				

Operating frequency [MHz]	Measured [MHz]	Limit [MHz]	Remarks
Lowest frequency	2400.991	2400.00	Passed
Highest frequency	2479.162	2483.50	Passed

Band edge criteria	20 dB bandwidth
Test result	The measured 20 dB bandwidth were within limit designated in 15.215(c)
Test port	Antenna replaced by SMA connector
Test frequency	2402 MHz, 2441 MHz & 2478 MHz
Test mode	Continuous Tx - GFSK modulation - hopping between low, mid and high operating freq.
Condition	Normal
Compliant	Yes





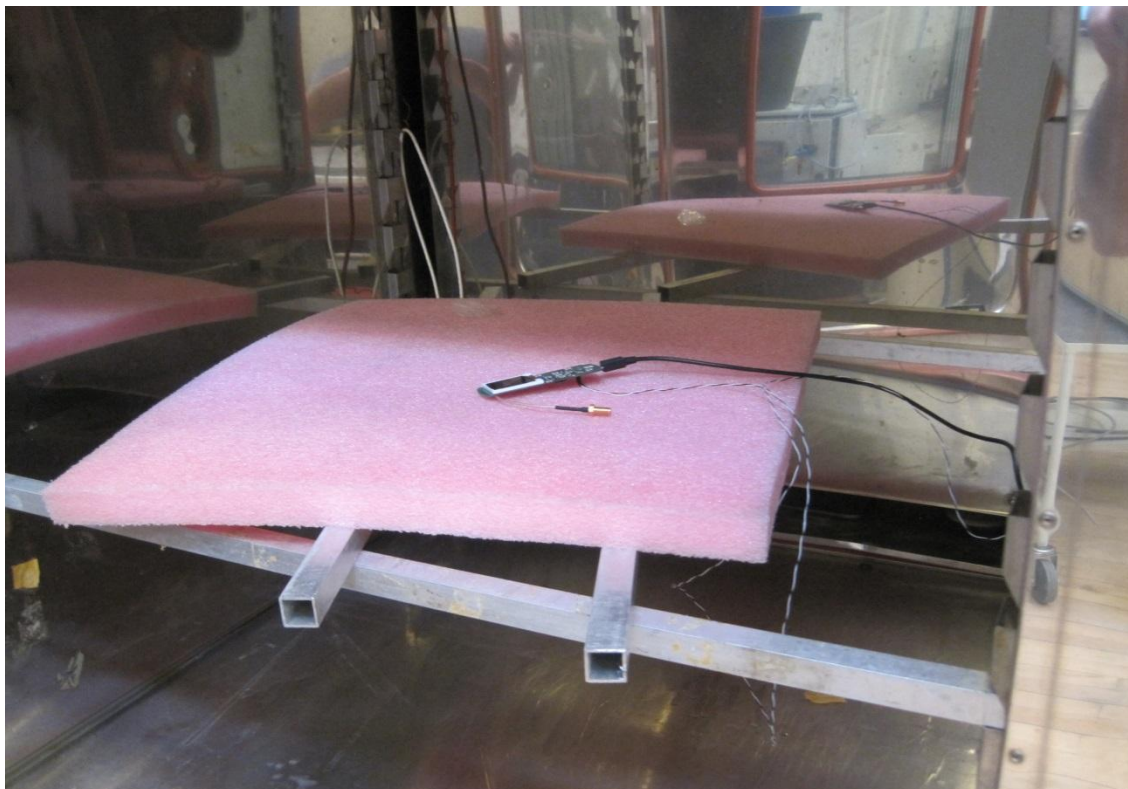


Photo 4.7.1 Test setup regarding measurement of 20 dB bandwidth.

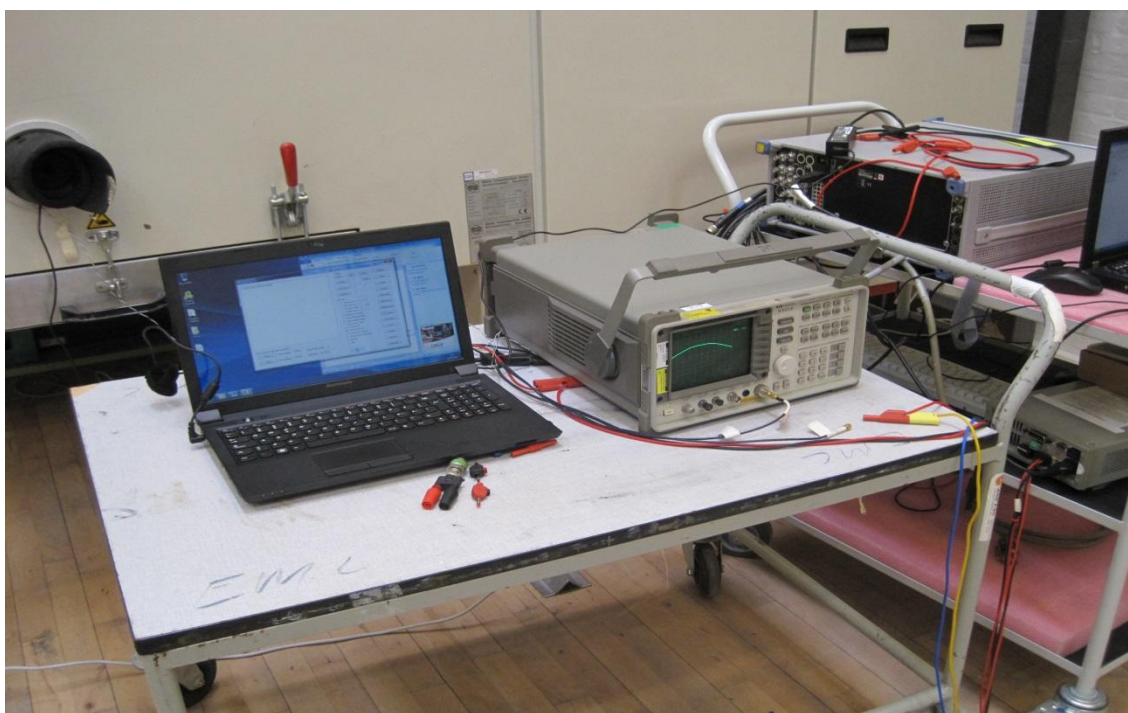
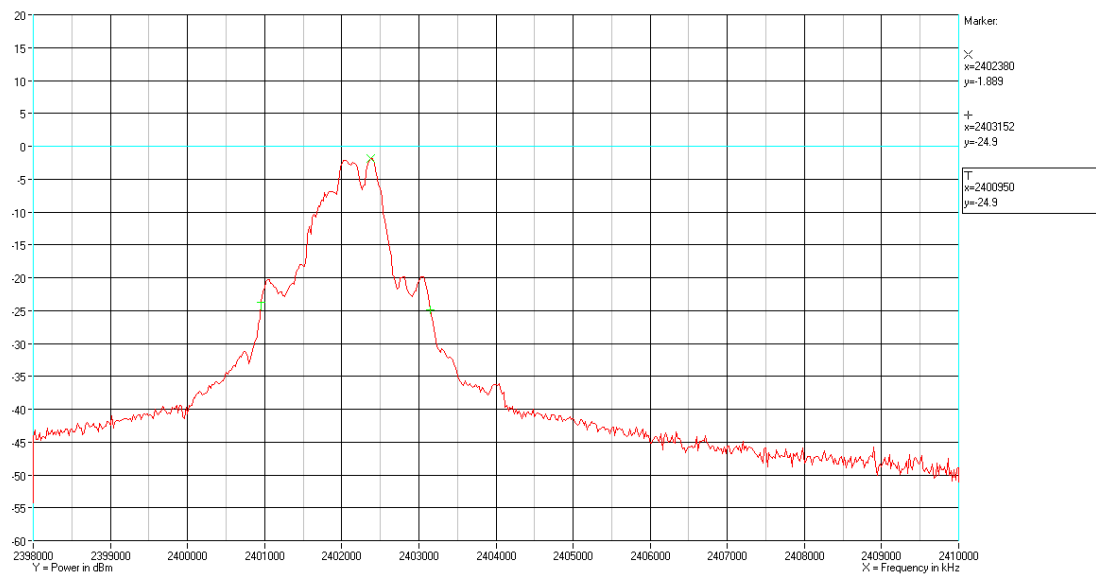


Photo 4.7.2 Test setup regarding measurement of 20 dB bandwidth.

#### 4.8 Measurement of occupied bandwidth, IC

Test object	RC-2	Sheet	PROF-4
Type	RC-2	Project no.	T205690-1
Serial no.	B5-010	Date	24 Apr. 2013
Client	GN Hearing A/S	Initials	CMT
Specification	See Section 1 Summary of tests		

Test method	ANSI C63.10:2009	Temperature	25 °C
Characteristics	Test voltage: External power supply at 3.7 VDC	Humidity	40 % RH
Test equipm.	EVFGT-17 49321 49663	Uncertainty	1.1 dB
SA Settings	RBW: 100 kHz VBW: 300 kHz SPAN: 12 MHz DET: Peak CF: Operating freq. Trace: Max. hold		

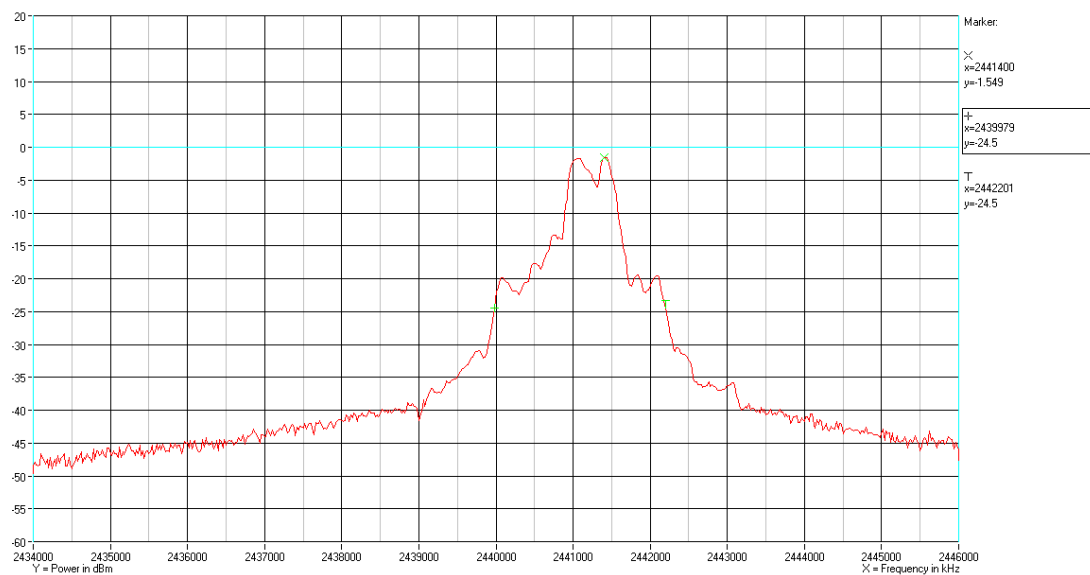


Comments

Operating frequency: 2402 MHz

Test object	RC-2	Sheet	PROF-5
Type	RC-2	Project no.	T205690-1
Serial no.	B5-010	Date	24 Apr. 2013
Client	GN Hearing A/S	Initials	CMT
Specification	See Section 1 Summary of tests		

Test method	ANSI C63.10:2009	Temperature	25 °C
Characteristics	Test voltage: External power supply at 3.7 VDC	Humidity	40 % RH
Test equipm.	EVFGT-17 49321 49663	Uncertainty	1.1 dB
SA Settings	RBW: 100 kHz VBW: 300 kHz SPAN: 12 MHz DET: Peak CF: Operating freq. Trace: Max. hold		



Comments

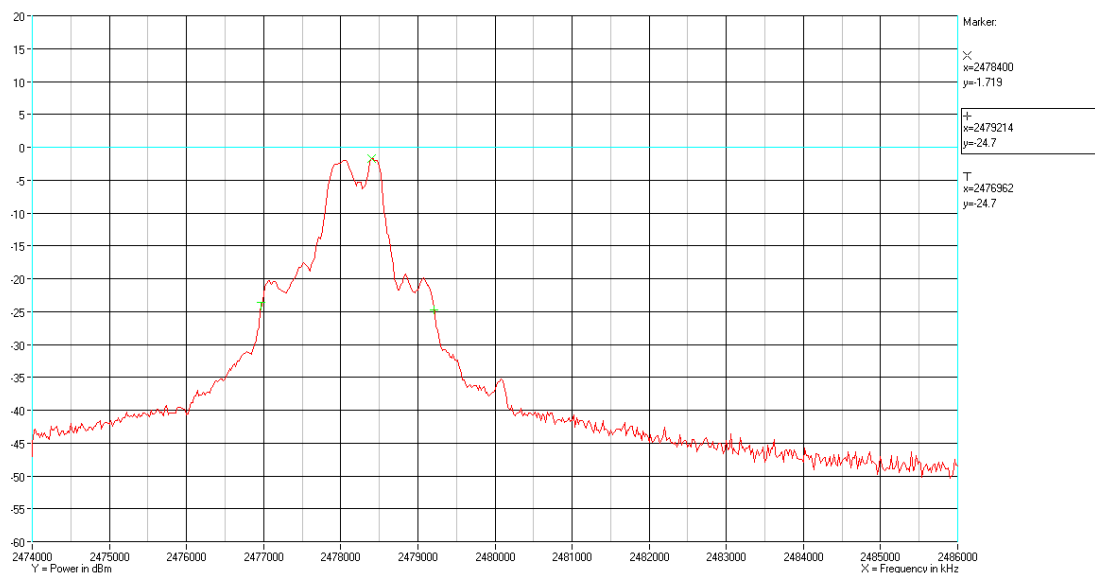
Operating frequency: 2441 MHz





Test object	RC-2	Sheet	PROF-2
Type	RC-2	Project no.	T205690-1
Serial no.	B5-010	Date	24 Apr. 2013
Client	GN Hearing A/S	Initials	CMT
Specification	See Section 1 Summary of tests		

Test method	ANSI C63.10:2009	Temperature	25 °C
Characteristics	Test voltage: External power supply at 3.7 VDC	Humidity	40 % RH
Test equipm.	EVFGT-17 49321 49663	Uncertainty	1.1 dB
SA Settings	RBW: 100 kHz VBW: 300 kHz SPAN: 12 MHz DET: Peak CF: Operating freq. Trace: Max. hold		



Comments

Operating frequency: 2478 MHz



Test object	RC-2	Sheet	PROF-6
Type	RC-2	Project no.	T205690-1
Serial no.	B5-010	Date	24 Apr. 2013
Client	GN Hearing A/S	Initials	CMT
Specification	See Section 1 Summary of tests		

Test method	ANSI C63.10:2009	Temperature	25 °C
Characteristics	Test voltage: External power supply at 3.7 VDC	Humidity	40 % RH
Test equipm.	EVFGT-17 49321 49663	Uncertainty	1.1 dB
SA Settings	RBW: 100 kHz VBW: 300 kHz SPAN: 12 MHz DET: Peak CF: Operating freq. Trace: Max. hold		

Operating frequency [MHz]	Low frequency [MHz]	High frequency [MHz]	Measured 99% emission bandwidth [MHz]	Remarks
2402	2400.950	2403.152	2.202	-
2441	2439.979	2442.201	2.222	-
2478	2476.962	2479.214	2.252	-

Note 1:

Operating frequency [MHz]	Measured [MHz]	Limit [MHz]	Remarks
Lowest frequency	2400.950	2400.00	-
Highest frequency	2479.214	2483.50	-

Test result	The measured 23 dB emission bandwidth (23 dBc)
Test port	Antenna replaced by SMA connector
Test frequency	2402, 2441 & 2478 MHz
Test mode	Continuous Tx - GFSK modulation - hopping between low, mid and high operating freq.
Condition	Normal
Compliant	Yes



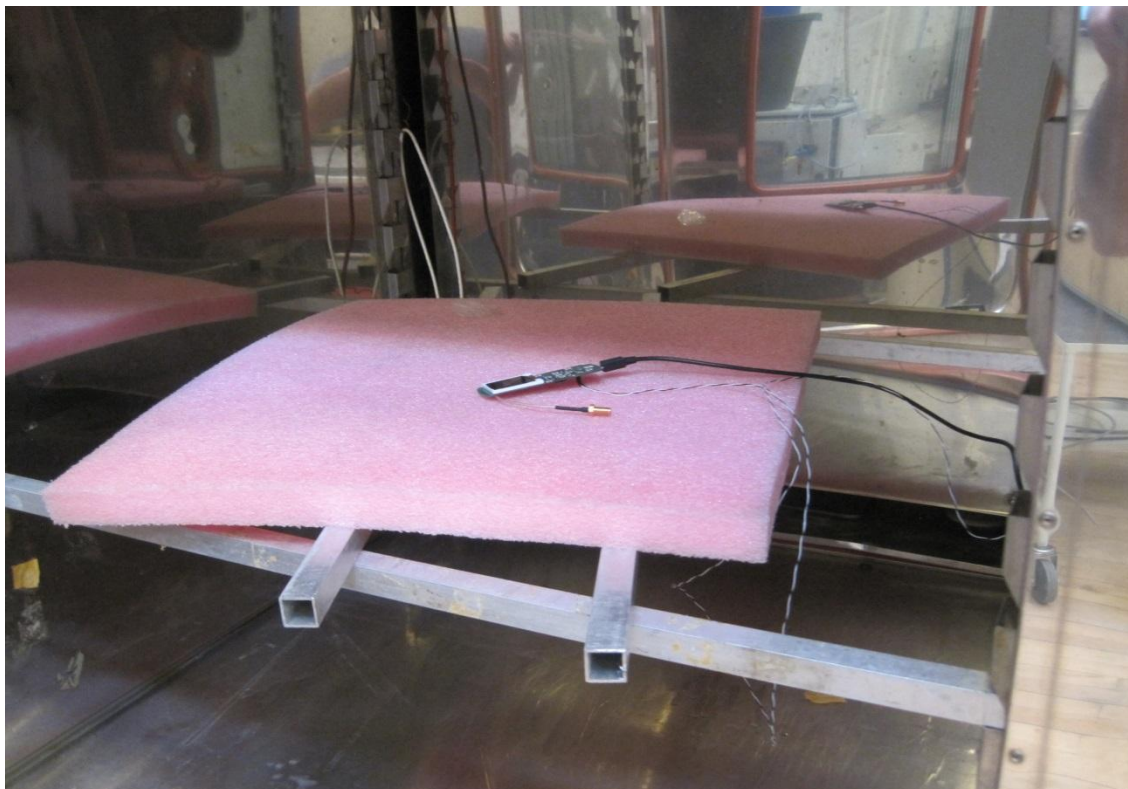


Photo 4.8.1 Test setup regarding measurement of occupied bandwidth, IC.

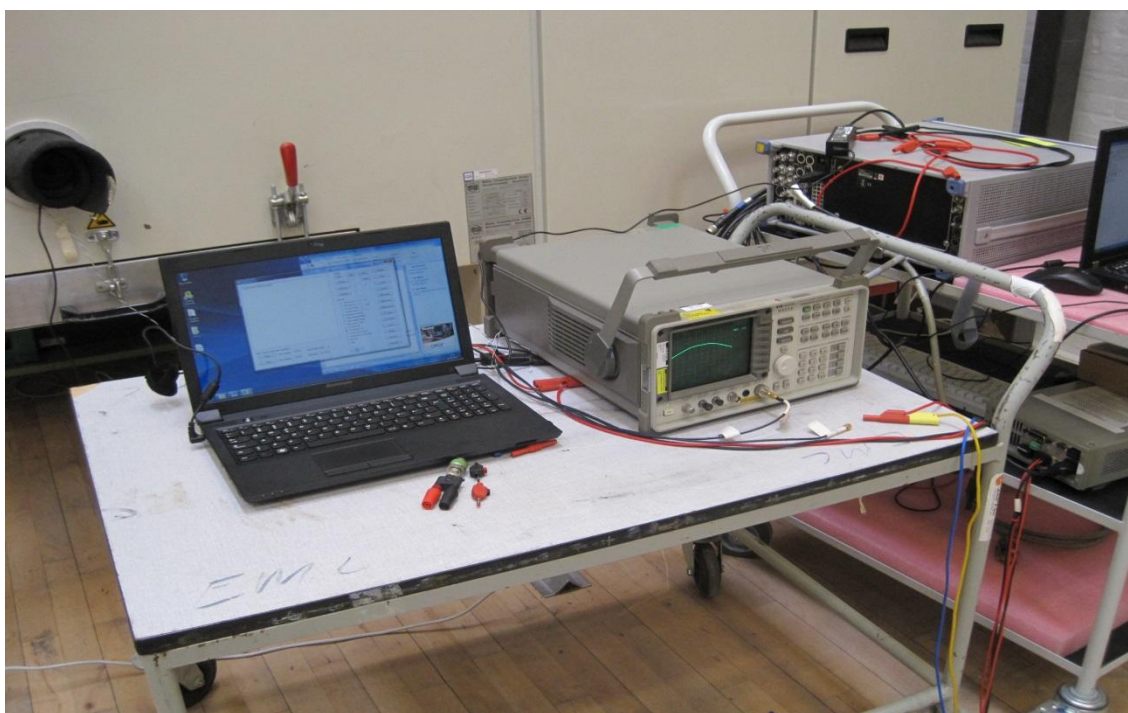


Photo 4.8.2 Test setup regarding measurement of occupied bandwidth, IC.

## 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 22:2008 is equivalent to CAN/CSA CISPR 22-10 specified in ICES-003:2012, 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:** 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:** EMC room 2 Hørsholm (EMC-2): C-707 and T-1547  
EMC room 3 Hørsholm (EMC-3): C-2532 and T-1548  
EMC room 4 Hørsholm (EMC-4): C-2533 and T-1549  
EMI room Hørsholm (EMC-5): R-1180, C-706, T-1550 and G-470

### 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. exp.
29797	BILOG ANTENNA, 30-2000 MHz	CHASE ELECTRICS LTD	CBL 6111A	26-10-2012	26-10-2014
29861	EMI-SOFTWARE VER. 1.60	ROHDE & SCHWARZ	ES-K1, PART: 1026.6790.02	-	-
49086	REMI EMISSION SOFTWARE PACKAGE v. 2.133, ROOM 5	NeWeTec	REMI	-	-
49321	SPECTRUM ANALYZER, 50 GHz WITH OPTION 006	HEWLETT-PACKARD	8565E	20-06-2012	20-06-2013
49600	SPECTRUM ANALYZER / MEASUREMENT RECEIVER	ROHDE & SCHWARZ	ESU40	08-01-2013	08-01-2014
49624	DUAL RIDGE HORN ANTENNA – 1GHz - 26GHz (2 GHz – 32 GHz)	SATIMO	SH2000	19-09-2011	19-09-2014
49625	SRD COAX SWITCH MATRIX USED IN 1GHZ TO 26 GHz SRD ANTENNASYSTEM	DELTA	COAX SWITCH MATRIX	11-05-2012	11-05-2013
49663	DC POWER SUPPLY	Agilent	66319D	26-11-2012	26-11-2013
EVFG T-17	CLAIMATIC AND ENVIRONMRNTAL TEST CHAMBER	WEISS	WT 11 600	15-10-2013	15-10-2014



## **Annex 1**

### **Transmitter out-of-band emission table**



Project No.	T205690-1									
Client	GN Hearing									
Product	RC-2									
Specification:	FCC CFR 47 Part 15, Subpart C, §15.249 RSS-210, Issue 8:2010, A8.5									
Requirement:	All out-of-band emission shall be below the general limit (54 dBuV/m)									
The table below lists all out-of-band emissions exceeding the general emission limit of 500 uV/m (54 dBuV/m) as well as the measured in-band emissions for reference. The data is an extract of the measurement results reported in chapter 4 of the main report.										
Meas. Ref. No.	Frequency [MHz]	Reading [dBuV, AV] (BW: 1 MHz)	Transducer Factor [dB] (Cables and Amplifiers)	Antenna Correction Factor [dB]	Result [dBuV/m, AV] (Reading - TF + AF)	Limit [dBuV/m, AV] (Max. in-band emission - 30 dB)	Margin [dB] (Limit - Result)	Pass/Fail	Note	
56	2402	73,8	29,3	32,5	77,0	In-band	-	-	Tx @ 2404 MHz, Fundamental, Pk	
56	4796,5	57,6	68,2	37,0	26,4	54,0	27,6	PASS	Tx @ 2404 MHz, 2nd harmonic	
56	7206	*	*	*	*	*	*	-	Tx @ 2404 MHz, 3rd harmonic	
56	9608	*	*	*	*	*	*	-	Tx @ 2404 MHz, 4th harmonic	
54	2441	72,0	29,1	33,1	76,0	In-band	-	-	Tx @ 2440 MHz, Fundamental, Pk	
54	4879,8	56,9	68,2	37,0	25,7	54,0	28,3	PASS	Tx @ 2440 MHz, 2nd harmonic	
54	7323	*	*	*	*	*	*	-	Tx @ 2440 MHz, 3rd harmonic	
54	9764	*	*	*	*	*	*	-	Tx @ 2440 MHz, 4th harmonic	
52	2478	72,6	29,1	34,4	77,9	In-band	-	-	Tx @ 2478 MHz, Fundamental, Pk	
52	4950,3	56,0	68,2	37,0	24,8	54,0	29,2	PASS	Tx @ 2478 MHz, 2nd harmonic	
52	7434	60,5	68,2	37,0	29,3	54,0	24,7	PASS	Tx @ 2478 MHz, 3rd harmonic	
52	9912	*	*	*	*	*	*	-	Tx @ 2478 MHz, 4th harmonic	
*: The result is below the general limit (54 dBuV/m)										
Max. in-band emission: 77,9 dBuV/m, AV @ 3 m										
Test result:	All out-of-band emission is below the general limit (54 dBuV/m)									
Compliant:	Yes.									