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# DELTA Test Report



TEST Reg. no. 19

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## Radio parameter test of Baha5 according to FCC and IC specifications

### Performed for Cochlear Bone Anchored Solutions AB

DANAK-19/14411

Project no.: T208340-3

Page 1 of 68

19 August 2014

#### DELTA

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<b>Title</b>	Radio parameter test of Baha5 according to FCC and IC specifications
<b>Test object</b>	Baha5
<b>Report no.</b>	DANAK-19/14411
<b>Project no.</b>	T208340-3
<b>Test period</b>	11 to 21 July 2014
<b>Client</b>	Cochlear Bone Anchored Solutions AB PO Box 82 435 22 Mölnlycke Sweden Tel.: +46 31 792 46 85
<b>Contact person</b>	Sören Nilsson E-mail: snilsson@cochlear.com
<b>Manufacturer</b>	Cochlear Bone Anchored Solutions AB
<b>Specifications</b>	47 CFR Part 15, Subpart B, Class B 47 CFR Part 15, Subpart C (Specific rule part §15.249) RSS-210, Issue 8:2010 RSS-Gen, Issue 3:2010
<b>Results</b>	The test objects were found to be in compliance with the specifications
<b>Test personnel</b>	Peter Wolf Frandsen
<b>Test site</b>	DELTA, Venlighedsvej 4, 2970 Hørsholm, Denmark

**Date** 19 August 2014

**Project Manager**



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Peter Wolf Frandsen  
Specialist, EMC & Wireless  
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**Responsible**



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## 1. Summary of tests

The FCC 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	ANCI C63.10:2009	47 CFR Part 15.107 47 CFR Part 15.207 RSS-Gen, 4.10	Passed
Measurement of radiated emission	ANCI C63.10:2009	47 CFR Part 15.109 47 CFR Part 15.209 47 CFR Part 15.249(a)(d)(e) RSS-210, 2.5, 2.10 & A2.9	Passed
Measurement of field strength of fundamental	ANCI C63.10:2009	47 CFR Part 15.249(a)(e) RSS-210, 2.5 & A2.9	Passed
Measurement of 20 dB bandwidth	ANCI C63.10:2009	47 CFR Part 15.215(c)	Passed
Measurement of band edge compliance	ANCI C63.10:2009	47 CFR Part 15.209(a) 47 CFR Part 15.249(d)(e) RSS-210, 2.5 & A2.9	Passed
Measurement of occupied bandwidth	RSS-Gen, Issue 3:2010	RSS-Gen, 4.6.1	Passed
Measurement of radiated emission, receiver	NOTICE 2012-DRS0126	RSS-Gen, 6 RSS-210, 2.5	Not Applicable

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.

- 47 CFR Part 15, Subpart B, Class B
- 47 CFR Part 15, Subpart C (Specific rule part §15.249)
- RSS-210, Issue 8:2010
- RSS-Gen, Issue 3:2010.

The test results relate only to the objects tested.



## 2. Test objects and auxiliary equipment

### 2.1 Test objects



Photo 2.1.1 Test objects.

#### Test object 2.1.1

Name of test object	Baha5
Model / type	Baha@5
Part no.	Baha5
Serial no.	JOE SP2 301013 000035P
FCC ID	QZ3BAHA5
IC	8039C-BAHA5
Manufacturer	Cochlear Bone Anchored Solutions AB
Supply voltage	1.45 VDC
Software version	001
Hardware version	001
Cycle time	4 ms
Highest frequency generated or used	2483.5 MHz
Comment	GN Radio Antenna replaced by SMA connector
Received	Date: 07 July 2014 Status: Test object sampled and provided by customer



### Test object 2.1.2

Name of test object	Baha5
Model / type	Baha®5
Part no.	Baha5
Serial no.	JOE SP2 301013 000038P
FCC ID	QZ3BAHA5
IC	8039C-BAHA5
Manufacturer	Cochlear Bone Anchored Solutions AB
Supply voltage	1.45 VDC
Software version	001
Hardware version	001
Cycle time	5 ms
Highest frequency generated or used	2483.5 MHz
Comment	BTLE radio Antenna replaced by SMA connector
Received	Date: 07 July 2014 Status: Test object sampled and provided by customer

### Test object 2.1.3

Name of test object	Baha5
Model / type	Baha®5
Part no.	Baha5
Serial no.	JOE SP2 301013 000020P
FCC ID	QZ3BAHA5
IC	8039C-BAHA5
Manufacturer	Cochlear Bone Anchored Solutions AB
Supply voltage	1.45 VDC
Software version	001
Hardware version	001
Cycle time	4 ms
Highest frequency generated or used	2483.5 MHz
Comment	No. 3 GN radio
Received	Date: 07 July 2014 Status: Test object sampled and provided by customer



#### Test object 2.1.4

Name of test object	Baha5
Model / type	Baha@5
Part no.	Baha5
Serial no.	JOE SP2 301013 000019P
FCC ID	QZ3BAHA5
IC	8039C-BAHA5
Manufacturer	Cochlear Bone Anchored Solutions AB
Supply voltage	1.45 VDC
Software version	001
Hardware version	001
Cycle time	5 ms
Highest frequency generated or used	2483.5 MHz
Comment	No. 4 BTLE radio
Received	Date: 07 July 2014 Status: Test object sampled and provided by customer

#### Test object 2.1.5

Name of test object	Baha5
Model / type	Baha@5
Part no.	Baha5
Serial no.	JOE SP2 301013 000050P
FCC ID	QZ3BAHA5
Manufacturer	Cochlear Bone Anchored Solutions AB
IC	8039C-BAHA5
Supply voltage	1.45 VDC
Software version	001
Hardware version	001
Cycle time	-
Highest frequency generated or used	2483.5 MHz
Comment	Flight mode
Received	Date: 07 July 2014 Status: Test object sampled and provided by customer





## 2.2 Auxiliary equipment

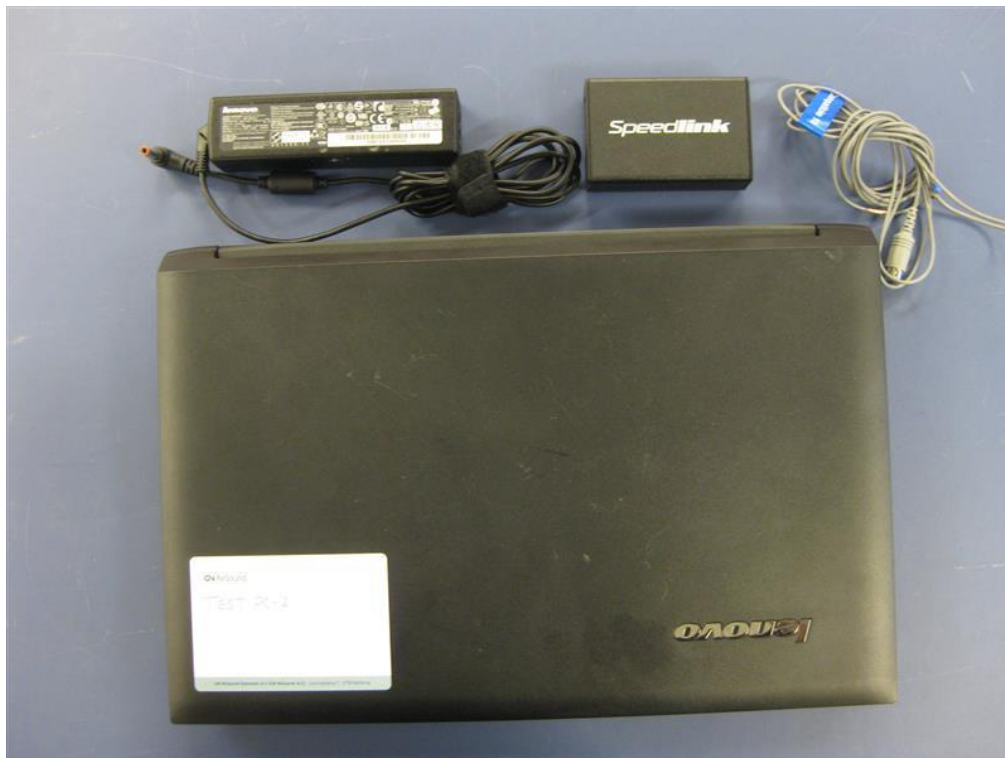


Photo 2.2.1 Auxiliary equipment.

### Auxiliary equipment 2.2.1

Name of auxiliary equipment	Laptop PC
Model / type	B570e
Part no.	-
Serial no.	WB07509560
FCC ID	-
Manufacturer	Lenovo
Supply voltage	20 VDC
Highest frequency generated or used	-
Comment	Auxiliary equipment supplied by DELTA, who also has the responsibility for its correct function and set up



### **Auxiliary equipment 2.2.2**

Name of auxiliary equipment	AC/DC Adapter
Model / type	ADP-65KH B
Part no.	-
Serial no.	091350-11
FCC ID	-
Manufacturer	Lenovo
Supply voltage	100-240 VAC
Highest frequency generated or used	-
Comment	Auxiliary equipment supplied by DELTA, who also has the responsibility for its correct function and set up

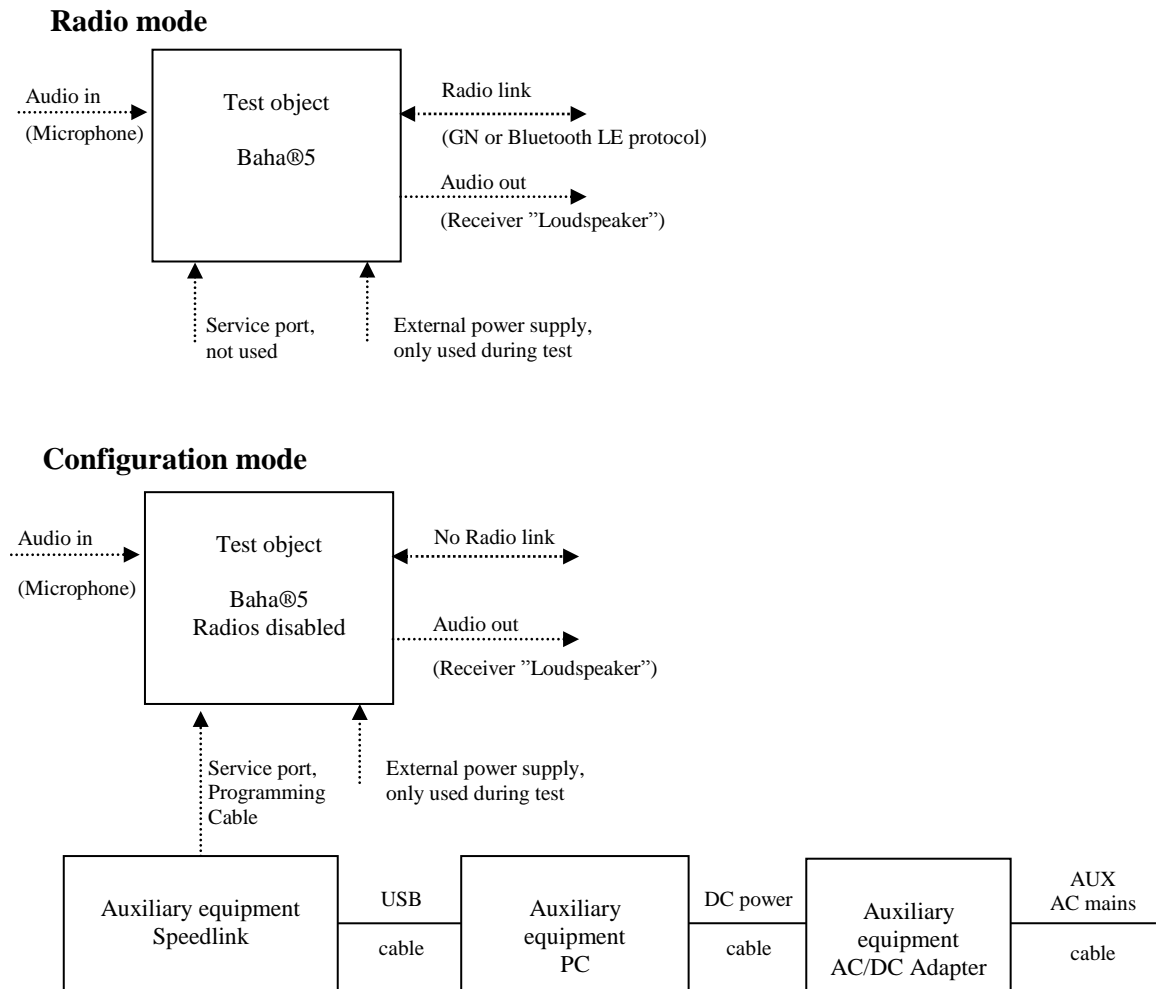
### **Auxiliary equipment 2.2.3**

Name of auxiliary equipment	Speedlink
Model / type	-
Part no.	15874200
Serial no.	16844
FCC ID	-
Manufacturer	GN ReSound A/S
Supply voltage	5 VDC through USB cable
Highest frequency generated or used	-
Comment	Auxiliary equipment supplied by DELTA, who also has the responsibility for its correct function and set up



### 3. General test conditions

#### 3.1 Test setup during test



Name	Cat.	Type	Max. Length
Programming cable	Cable	Shielded	< 3 m
AUX USB cable	Cable	Shielded	< 3 m
AUX AC mains cable	AC power	Unshielded	-
AUX DC power cable	DC power	Unshielded	-

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

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

The Cochlear™ Baha® 5 Sound Processor uses bone conduction to transmit sounds to the cochlea (inner ear). It works by combining a sound processor and a small titanium implant that is placed in the skull behind the ear. The skull bone integrates with the titanium implant through a process called osseointegration. This allows sound to be



conducted via the skull bone directly to the cochlea, which improves hearing performance.

Baha@5 is a sound processor used for alleviation of hearing loss for bone anchored conduction implants. It can receive audio signals and be configured via the radio link.

All sound processors are only powered from a zinc-air battery.

### 3.1.2 Test modes during tests

Two test modes were used during tests.

- Radio mode (BTLE or GN)
- Configuration mode (simulated).

#### **Radio mode**

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) and no attachment at the auxiliary port. The 2.4 GHz radio system is identical for the two protocols – The GN radio and the Bluetooth LE radio protocols.

The radio is disabled when the service port is activated.

#### **2.4 GHz Radio transceiver**

GN radio protocol:

Tests were performed at three frequencies for the GN radio at worst case power settings:

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

Bluetooth LE radio protocol:

Tests were performed at three frequencies for the Bluetooth LE radio at worst case power settings:

- Low frequency: 2402 MHz
- Middle frequency: 2440 MHz
- High frequency: 2480 MHz.

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

External power supply is not used under intended use.

#### **Configuration mode (simulated)**

Before test, the test object is connected to the Speedlink and the connection is controlled and monitored on the AUX PC monitor.

The radio is disabled when the service port is activated.



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

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	:	2404 to 2478 MHz
Antenna	:	One permanently internal attached PCB antenna
Maximum gain	:	-6.4 dBi
Transmit		
Field Strength, max avg.	:	55.8 dB $\mu$ V/m avg (0.6 mV/m) @ 3 meter
Field Strength, max pk.	:	82.8 dB $\mu$ V/m pk (13.8 mV/m) @ 3 meter
Conducted power, max pk.	:	-6.0 dBm
Power level	:	1
No of channels	:	20
Bandwidth	:	
Occupied bandwidths (99 %)	:	2.2 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	:	1.45 VDC Zinc-Air battery
Specified min voltage	:	1.16 VDC
Specified max voltage	:	1.45 VDC
Temperature category	:	-20 to +55 °C
Test port	:	Integrated antenna Integrated receiver (Loudspeaker) Integrated microphone Service port – Radio disabled, cable<3m.
Emission Designator	:	2M2F7E
Max. TX spurious emission	:	299 $\mu$ V/m @ 3 meter (Field Strength)



### 3.3 Radio specifications, receiver and transmitter, Bluetooth LE radio

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 2480 MHz
Antenna	:	One permanently internal attached PCB antenna
Maximum gain	:	-7.6 dBi
Transmit		
Field Strength, max avg.	:	61.1 dB $\mu$ V/m avg (1.1 mV/m) @ 3 meter
Field Strength, max pk.	:	82.0 dB $\mu$ V/m pk (12.6 mV/m) @ 3 meter
Conducted power, max pk.	:	-5.6 dBm
Power level	:	1
No of channels	:	40
Bandwidth	:	
Occupied bandwidths (99 %)	:	1.3 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	:	No
Power supply	:	1.45 VDC Zinc-Air battery
Specified min voltage	:	1.16 VDC
Specified max voltage	:	1.45 VDC
Temperature category	:	-20 to +55 °C
Test port	:	Integrated antenna Integrated receiver (Loudspeaker) Integrated microphone Service port – Radio disabled, cable<3m.
Emission Designator	:	1M3F7E
Max. TX spurious emission	:	275 $\mu$ V/m @ 3 meter (Field Strength)



## 4. Test results

### 4.1 Duty cycle correction factor ( $\delta$ ), GN radio

Test object	Baha5	Sheet	ANT-1
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000020P	Date	11 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	FCC CFR 47 Part 15 Subpart C (Section 15.35(c)) RSS-Gen (Section 4.5)		

Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Test voltage: External power supply at 1.4 VDC	Humidity	44 % RH
Test equipm.	SRD lab Hørsholm 49550	Uncertainty	0.01 dB
SA Settings	RBW: 1 MHz VBW: 3 MHz SPAN: Zero-1ms DET: Peak CF: 2440 MHz 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:

Max. Tx on time: 176  $\mu$ s – Delta 2 (T1)

Period: 3942  $\mu$ s – Delta 3 (T1).

The calculated duty cycle expressed in % is:

$D(\%) = ((\text{Max. Tx on time}) \mu\text{s} / (\text{period}) \mu\text{s}) \cdot 100\% = 4.46 \%$ .

The calculated duty cycle correction factor expressed in dB is:

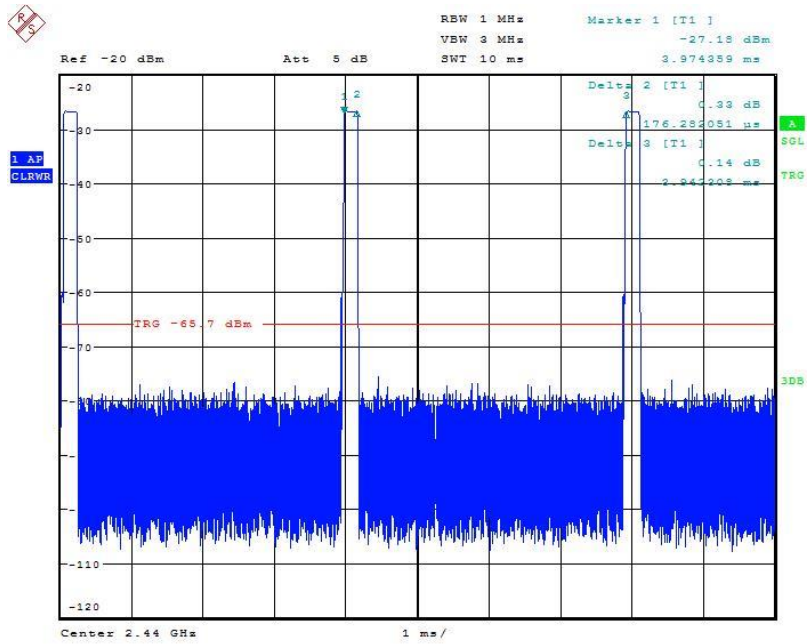
$\delta(\text{dB}) = 20 \log (\text{Max. Tx on time} (\mu\text{s}) / \text{period} (\mu\text{s})) = -27 \text{ dB} \Rightarrow -20 \text{ dB}$ .

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 peak emission is to be less than 20 dB above the average limit according to 47 CFR 15.35(b) and RSS-Gen (Section 7.2.3)

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





Date: 11.JUL.2014 10:54:12

Photo 4.1.1 Test setup regarding duty cycle correction factor ( $\delta$ ).





## 4.2 Duty cycle correction factor ( $\delta$ ), BTLE radio

Test object	Baha5	Sheet	ANT-2
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000019P	Date	11 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	FCC CFR 47 Part 15 Subpart C (Section 15.35(c)) RSS-Gen (Section 4.5)		

Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Test voltage: External power supply at 1.4 VDC	Humidity	44 % RH
Test equipm.	SRD lab Hørsholm 49550	Uncertainty	0.01 dB
SA Settings	RBW: 1 MHz VBW: 3 MHz SPAN: Zero-1ms DET: Peak CF: 2440 MHz 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:

Max. Tx on time: 417  $\mu$ s – Delta 2 (T1)

Period: 4647  $\mu$ s – Delta 3 (T1).

The calculated duty cycle expressed in % is:

$D(\%) = ((\text{Max. Tx on time}) \mu\text{s} / (\text{period}) \mu\text{s}) \cdot 100 \% = 8.97 \%$ .

The calculated duty cycle correction factor expressed in dB is:

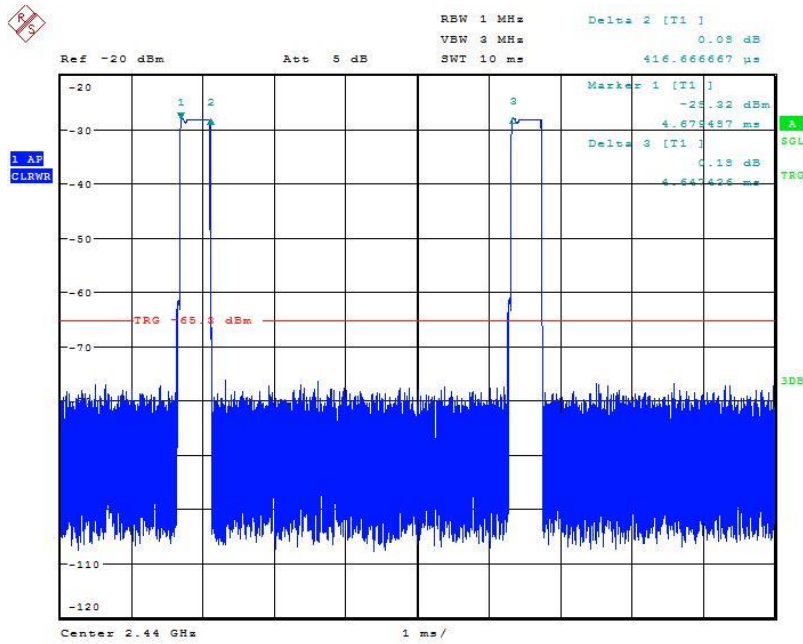
$\delta(\text{dB}) = 20 \log (\text{Max. Tx on time} (\mu\text{s}) / \text{period} (\mu\text{s})) = -20.9 \text{ dB} \Rightarrow -20 \text{ dB}$ .

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 peak emission is to be less than 20 dB above the average limit according to 47 CFR 15.35(b) and RSS-Gen (Section 7.2.3)

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





Date: 11.JUL.2014 11:19:55

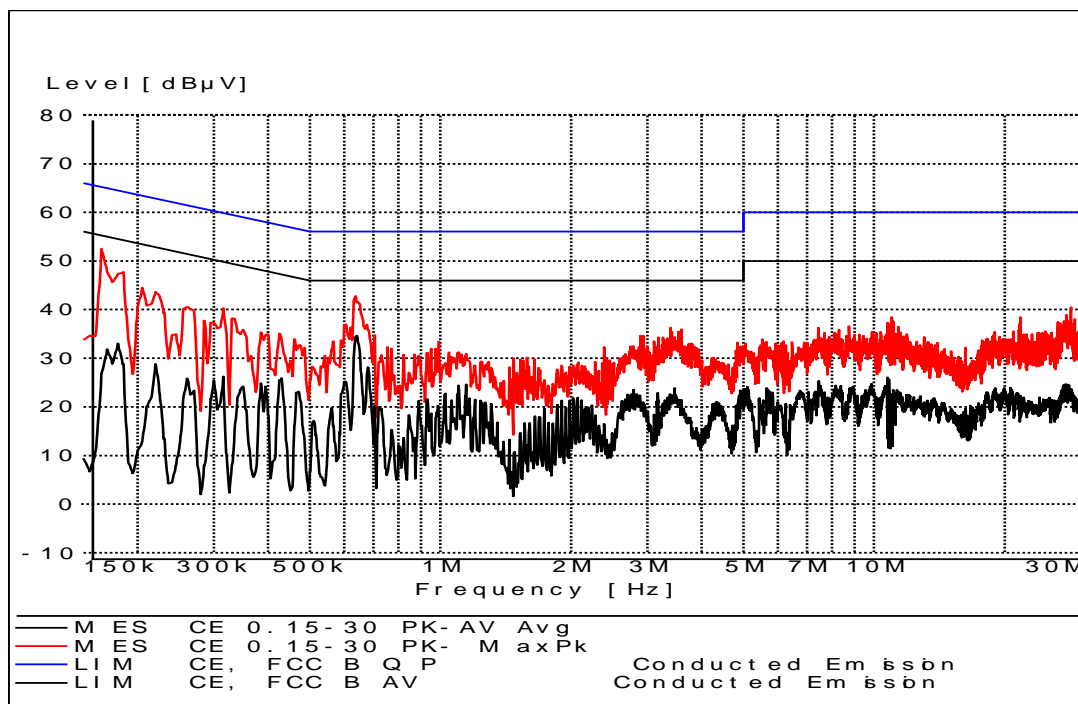
Photo 4.2.1 Test setup regarding duty cycle correction factor ( $\delta$ ).



### 4.3 Measurement of radio frequency voltage on mains, Configuration mode

Test object	Baha5	Sheet	CE-1
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000050P	Date	21 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests	Frequency	0.15-30 MHz

Test method	ANSI C63.10:2009	Temperature	21 °C
Characteristics	Artificial mains network: 50 Ω, 50 μH	Humidity	72 % RH
Detector	Peak and average	Bandwidth	10 kHz
Test equipm.	EMI room Hørsholm 49421 49600 29861	Uncertainty	2.7 dB

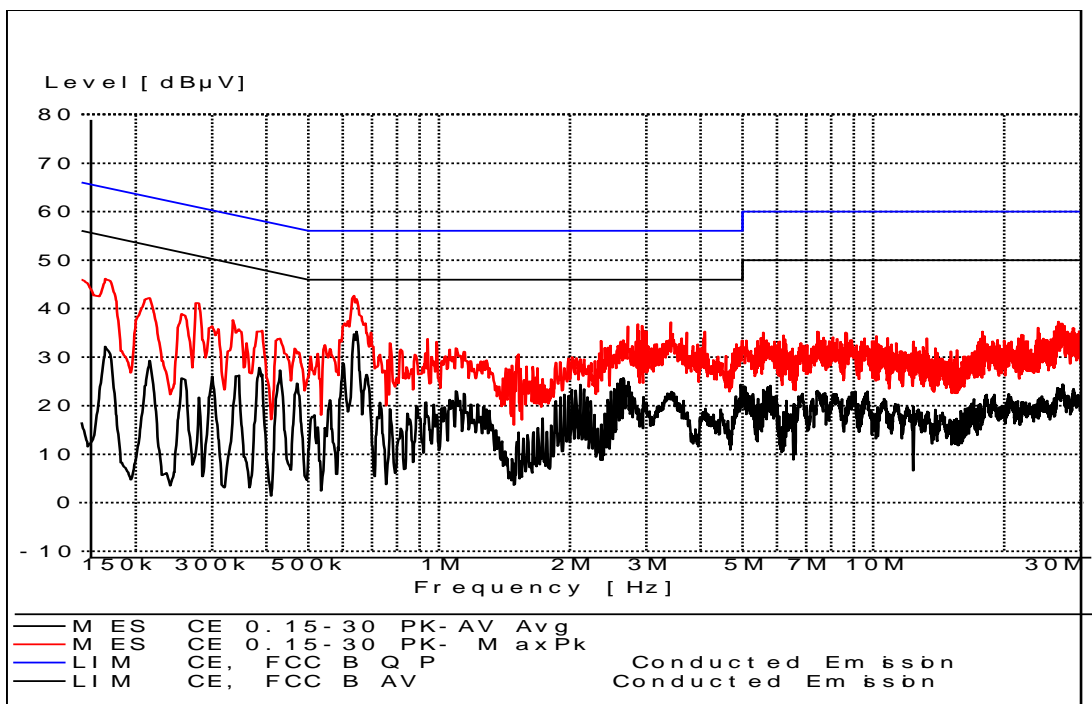


Line under test	Neutral
Test result	The measured voltages were below the limit
Test port	Enclosure
Test mode	Radio off
Comments	Mains voltage: 115 VAC Measurement performed on the AUX PC AC mains



Test object	Baha5	Sheet	CE-2
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000050P	Date	21 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests	Frequency	0.15-30 MHz

Test method	ANSI C63.10:2009	Temperature	21 °C
Characteristics	Artificial mains network: 50 Ω, 50 μH	Humidity	72 % RH
Detector	Peak and average	Bandwidth	10 kHz
Test equipm.	EMI room Hørsholm 49421 49600 29861	Uncertainty	2.7 dB



Line under test	Line
Test result	The measured voltages were below the limit
Test port	Enclosure
Test mode	Radio off
Compliant	Yes
Comments	Mains voltage: 115 VAC Measurement performed on the AUX PC AC mains





Photo 4.3.1 Test setup regarding measurement of radio frequency voltage on mains.

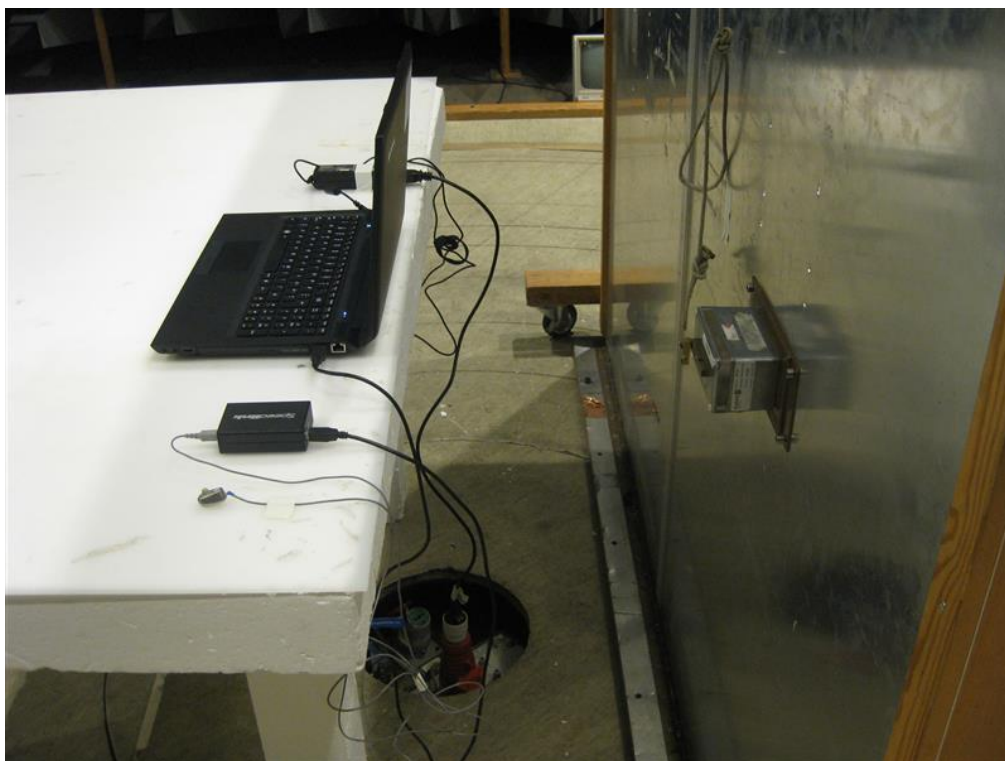


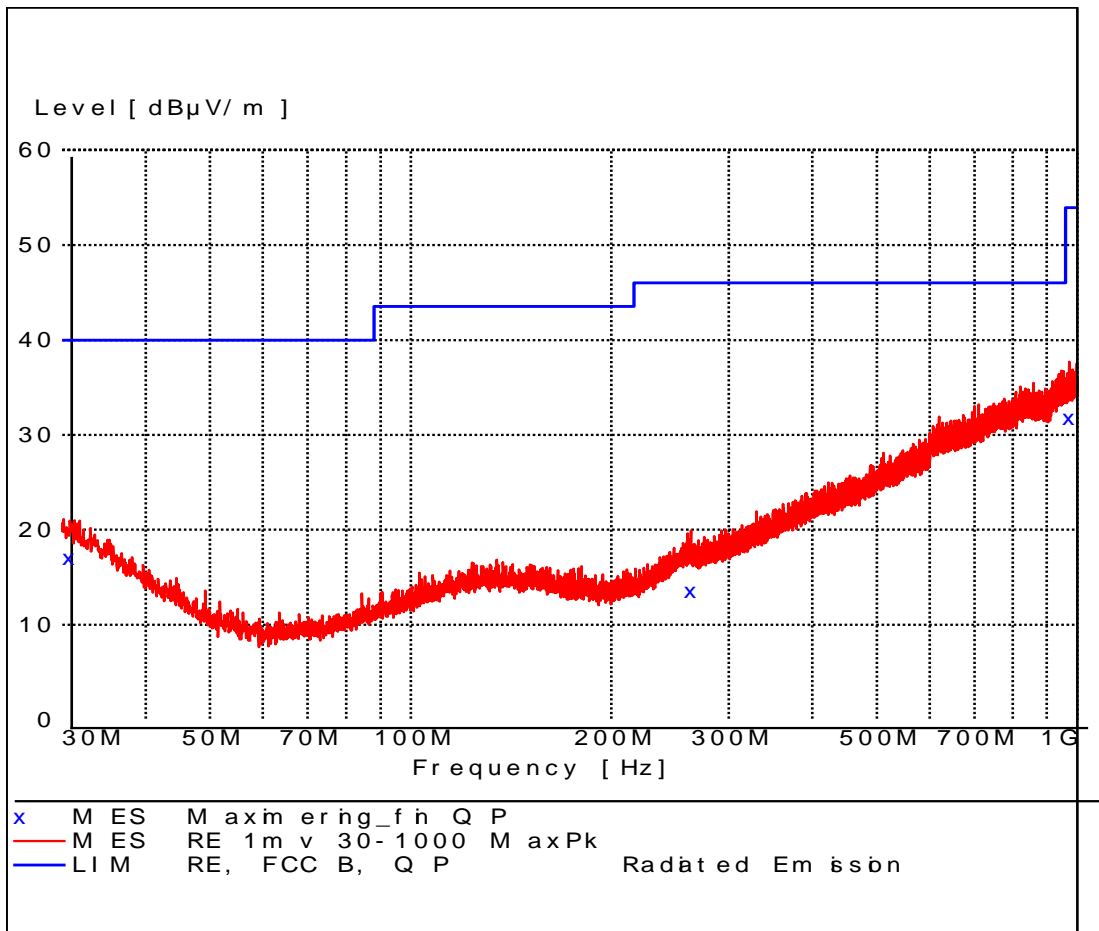
Photo 4.3.2 Test setup regarding measurement of radio frequency voltage on mains.



#### 4.4 Measurement of radiated emission (below 1 GHz), Tx hop, GN and BTLE radio

Test object	Combination of 2.1.3: Baha5 2.1.4: Baha5	Sheet	RE_Spur-1
Type	See Section 2	Project no.	T208340-3
Serial no.	See Section 2	Date	15 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests	Frequency	30-1000 MHz

Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Pre-scan, antenna at 3 m, 1 m height, vert. pol.	Humidity	70 % RH
Detector	Peak and quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 29861 49600 29797	Uncertainty	4.9 dB



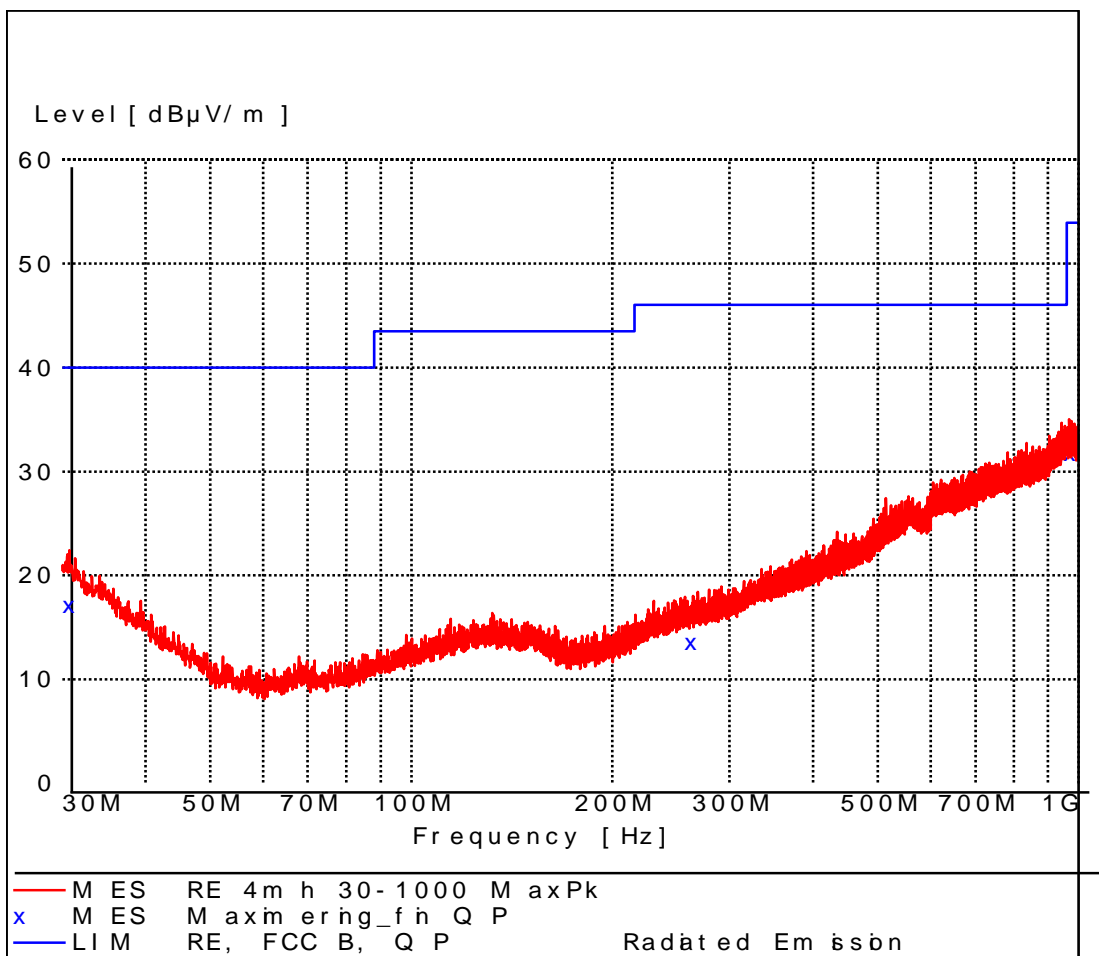
Comments

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



Test object	Combination of 2.1.3: Baha5 2.1.4: Baha5	Sheet	RE_Spur-2
Type	See Section 2	Project no.	T208340-3
Serial no.	See Section 2	Date	15 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests	Frequency	30-1000 MHz

Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Pre-scan, antenna at 3 m, 4 m height, hor. pol.	Humidity	70 % RH
Detector	Peak and quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 29861 49600 29797	Uncertainty	4.9 dB



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



Test object	Combination of 2.1.3: Baha5 2.1.4: Baha5	Sheet	RE_Spur-3
Type	See Section 2	Project no.	T208340-3
Serial no.	See Section 2	Date	15 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests	Frequency	30-1000 MHz

Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Peak search ant. at 3 m, height: 1-4 m, v/h pol.	Humidity	70 % RH
Detector	Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 29861 49600 29797	Uncertainty	4.9 dB

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
30.720000	17.10	19.0	40.0	22.9	146.0	1.00	VERTICAL
263.280000	13.60	15.9	46.0	32.4	101.0	38.00	HORIZONTAL
971.580000	31.80	31.5	53.9	22.1	101.0	188.00	HORIZONTAL

Test result	The measured field strengths are below the limit
Test Port	Enclosure
Test frequency	2402, 2404, 2440, 2478 and 2480 MHz
Test mode	Continuous Tx - normal 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.  Test voltage: External power supply at 1.45 VDC





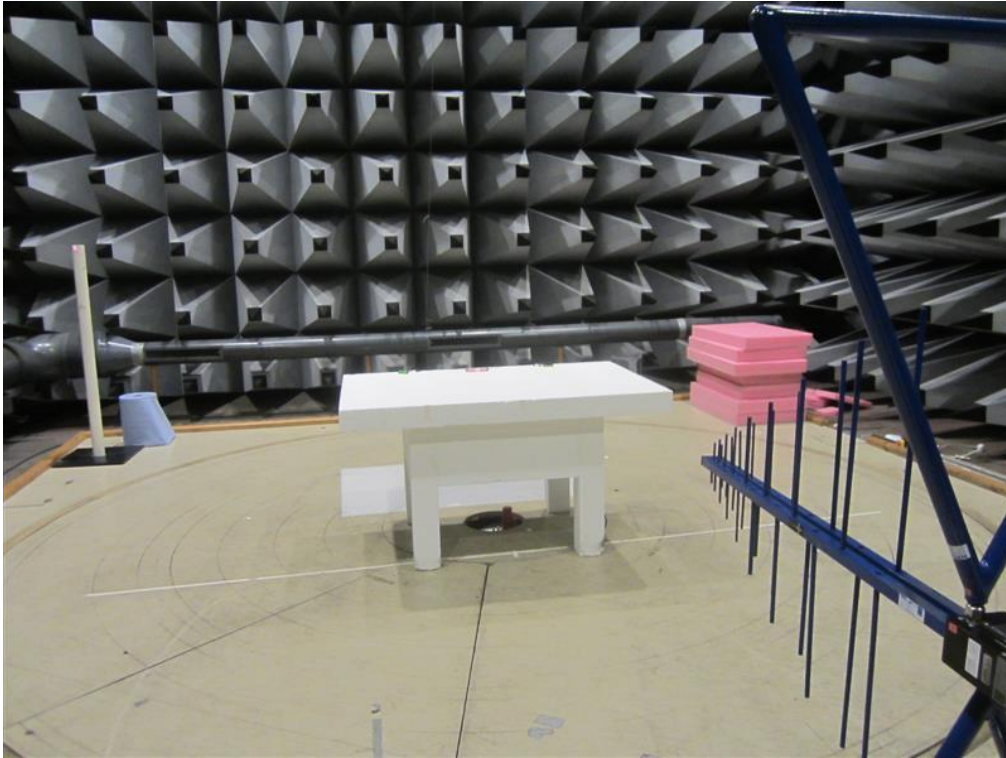


Photo 4.4.1 Test setup regarding measurement of radiated emission (below 1 GHz).

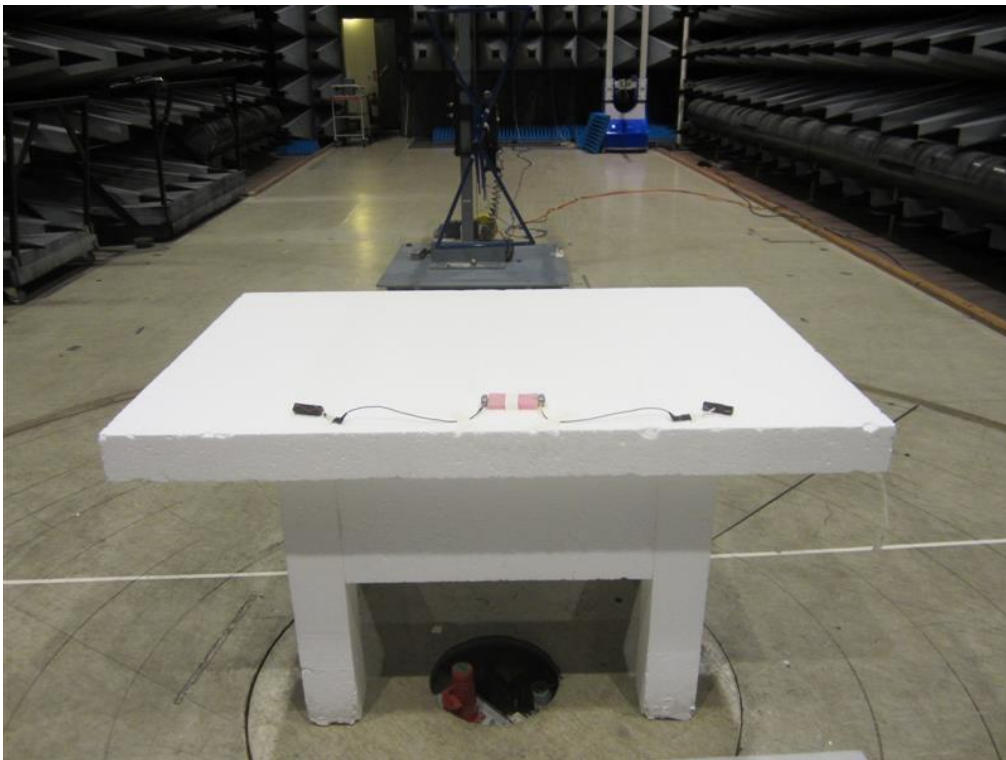


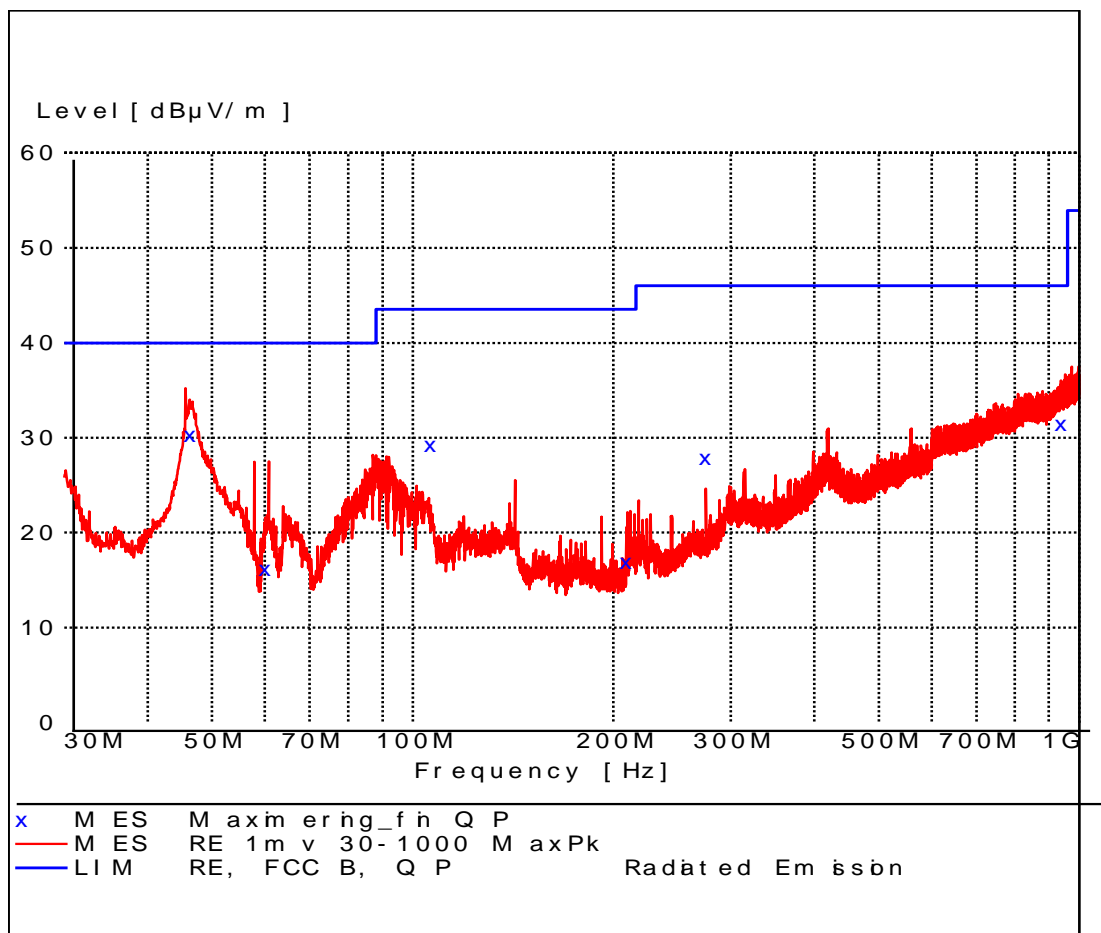
Photo 4.4.2 Test setup regarding measurement of radiated emission (below 1 GHz).



#### 4.5 Measurement of radiated emission (below 1 GHz), Configuration mode

Test object	Baha5	Sheet	RE_Spur-4
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000050P	Date	15 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests	Frequency	30-1000 MHz

Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Pre-scan, antenna at 3 m, 1 m height, vert. pol.	Humidity	70 % RH
Detector	Peak and quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 29861 49600 29797	Uncertainty	4.9 dB



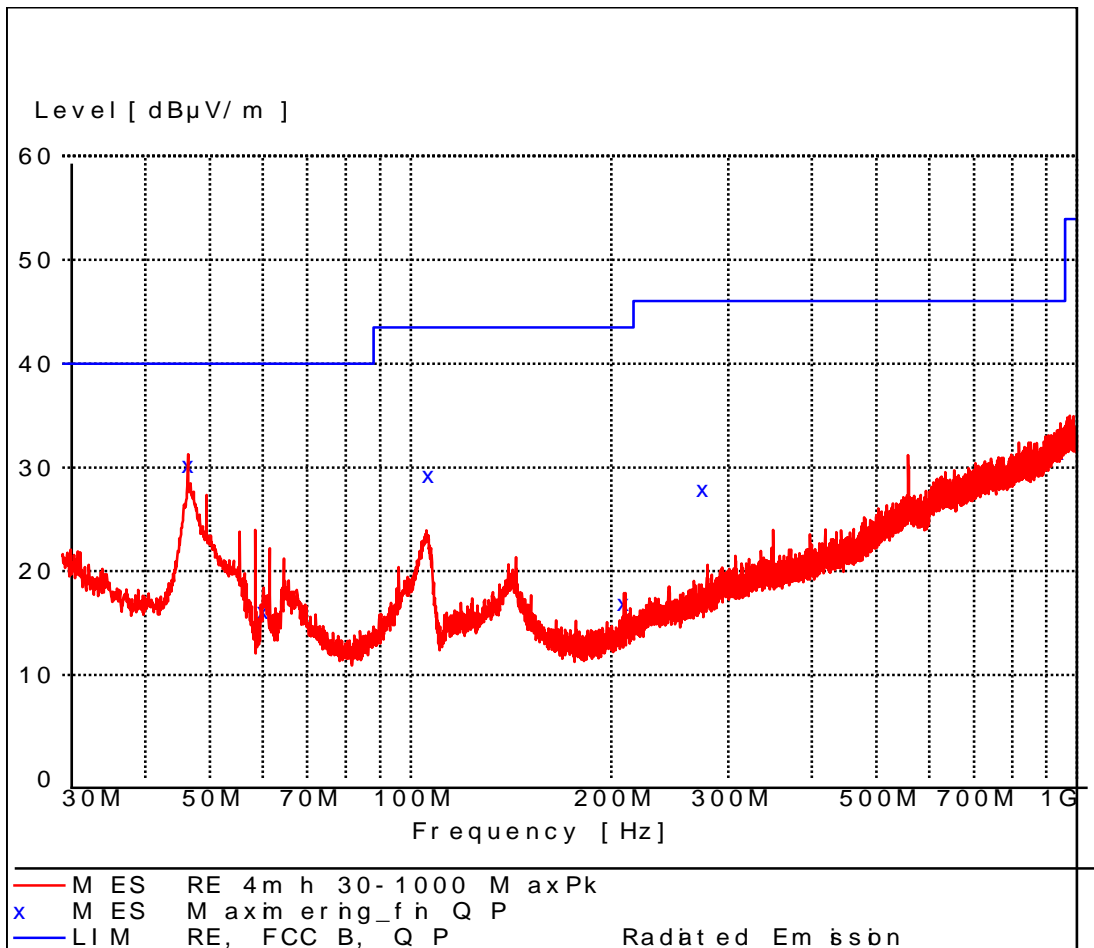
Comments

Radio off



Test object	Baha5	Sheet	RE_Spur-5
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000050P	Date	15 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests	Frequency	30-1000 MHz

Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Pre-scan, antenna at 3 m, 4 m height, hor. pol.	Humidity	70 % RH
Detector	Peak and quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 29861 49600 29797	Uncertainty	4.9 dB



Comments

Radio off



Test object	Baha5	Sheet	RE_Spur-6
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000050P	Date	15 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests	Frequency	30-1000 MHz

Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Peak search ant. at 3 m, height: 1-4 m, v/h pol.	Humidity	70 % RH
Detector	Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 29861 49600 29797	Uncertainty	4.9 dB

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
46.420000	30.30	11.3	40.0	9.7	104.0	1.00	VERTICAL
60.240000	16.20	8.2	40.0	23.8	101.0	253.00	VERTICAL
106.500000	29.20	12.4	43.5	14.3	119.0	253.00	VERTICAL
209.100000	16.90	12.7	43.5	26.6	101.0	177.00	VERTICAL
275.000000	27.90	16.1	46.0	18.1	175.0	1.00	VERTICAL
940.000000	31.50	30.9	46.0	14.5	123.0	241.00	HORIZONTAL

Test result                    The measured field strengths were below the limit

Test Port                      Enclosure

Test frequency               - MHz

Test mode                      Radio off

Condition                      Normal

Compliant                      Yes

Comments                      Final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation  
 Test voltage: internal power supply at 1.45 VDC



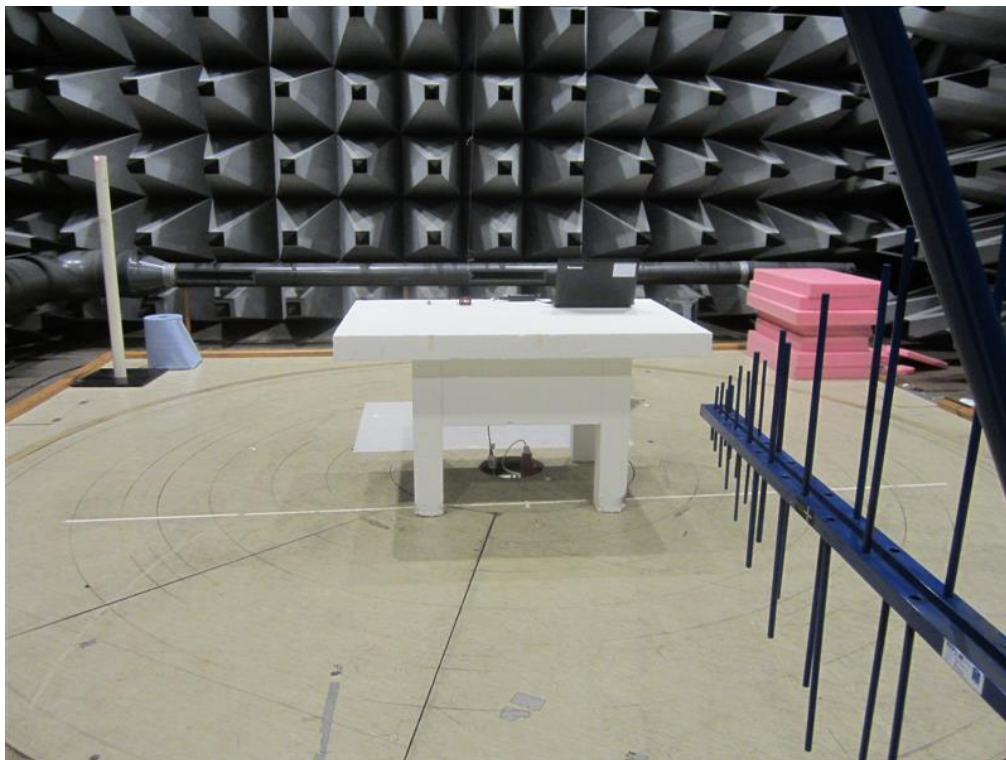


Photo 4.5.1 Test setup regarding measurement of radiated emission (below 1 GHz).

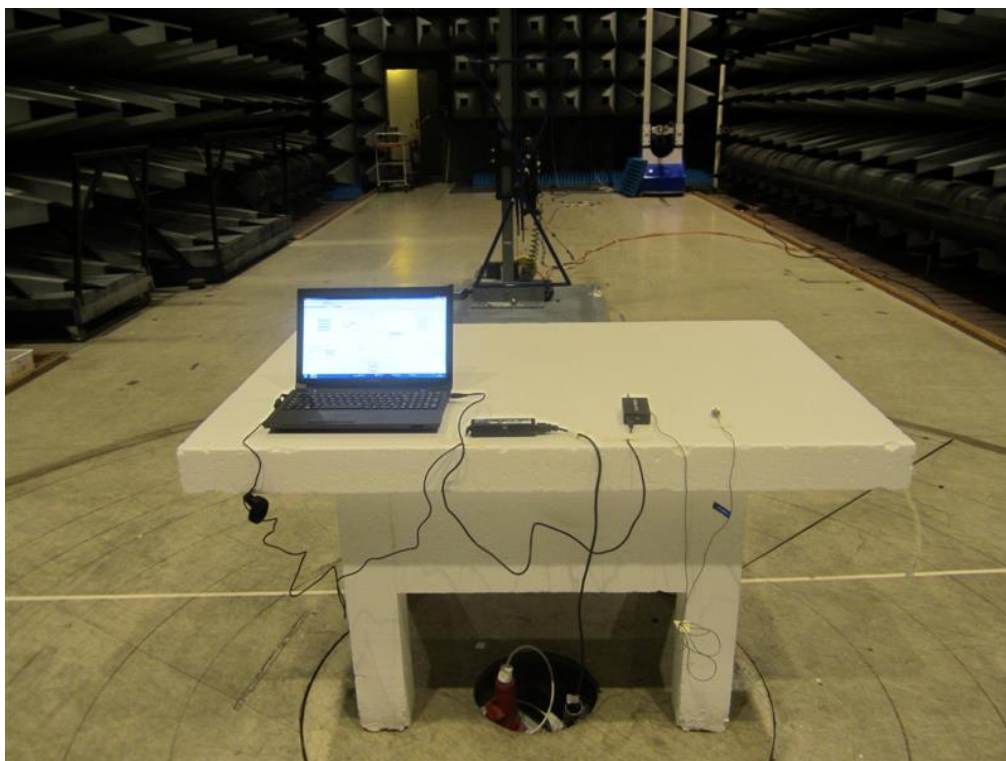


Photo 4.5.2 Test setup regarding measurement of radiated emission (below 1 GHz).

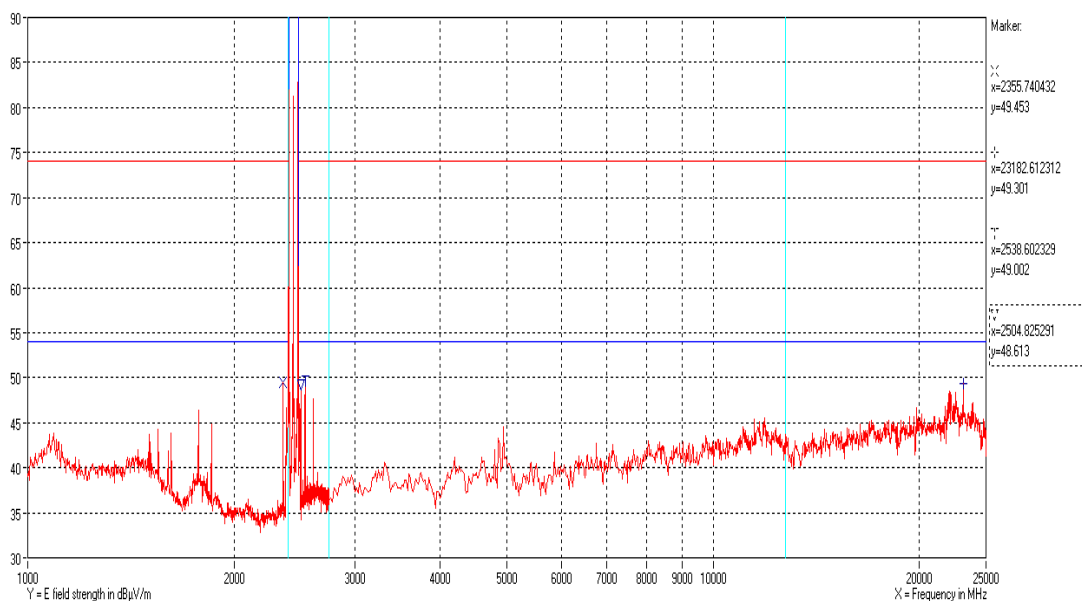




#### 4.6 Measurement of radiated emission (above 1 GHz), GN radio

Test object	Baha5	Sheet	RE_Spur-7
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000020P	Date	16 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests	Frequency	1-25 GHz

Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	70 % RH
Detector	Peak	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49086 49600 49712 49625	Uncertainty	4.9 dB



Polarization

Vertical and horizontal peak measurements

Comments

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



Test object	Baha5	Sheet	RE_Spur-8
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000020P	Date	16 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests	Frequency	1-25 GHz

Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	70 % RH
Detector	Peak	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49086 49600 49712 49625	Uncertainty	4.9 dB

Frequency [MHz]	Transducer factor [dB]	Peak measurement [dB $\mu$ V/m]	Peak limit [dB $\mu$ V/m]	DCCF ( $\delta$ ) [dB]	Corrected average measurement [dB $\mu$ V/m]	Average limit [dB $\mu$ V/m]	Remarks
2355.7	32.8	49.5	74	-	-	54	Passed
2504.8	34.1	48.6	74	-	-	54	Passed
2538.6	34.4	49.0	74	-	-	54	Passed
23182.6	43.7	49.3	74	-	-	54	Passed

Note 1: The measured peak field strength is not corrected with the DCCF ( $\delta$ )

Test result                    The measured peak field strengths were below the peak and average limits

Test Port                      Enclosure

Test frequency                2404, 2440 and 2478 MHz

Test mode                      Continuous Tx - normal 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.  
 Test voltage: External power supply at 1.45 VDC



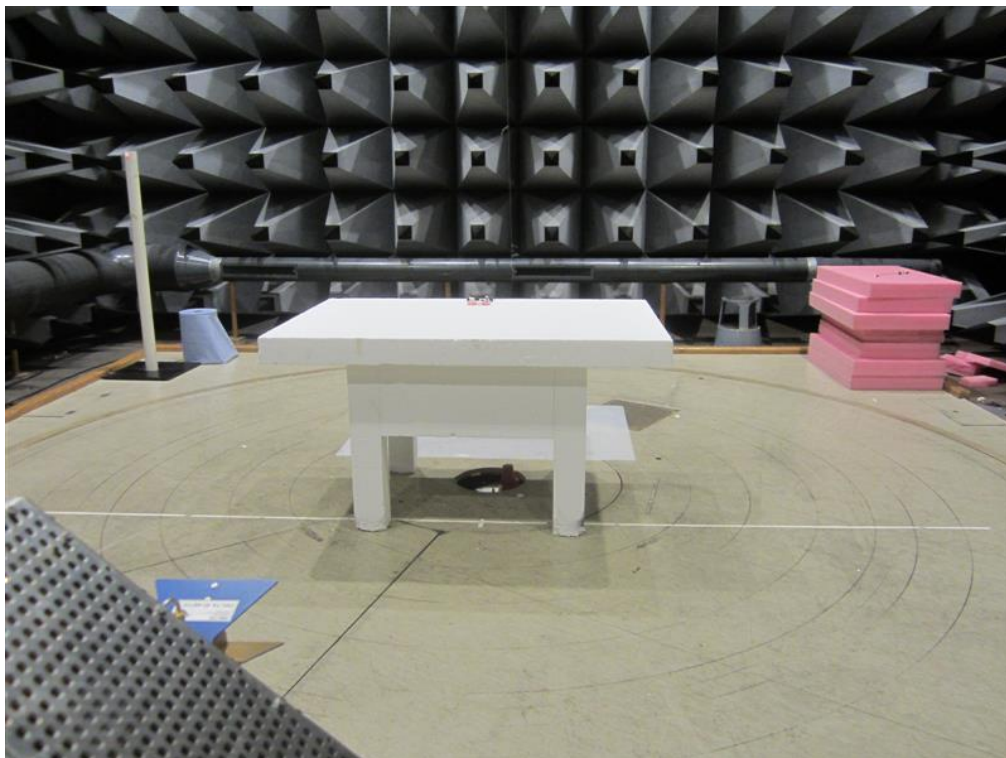


Photo 4.6.1 Test setup regarding measurement of radiated emission (above 1 GHz).

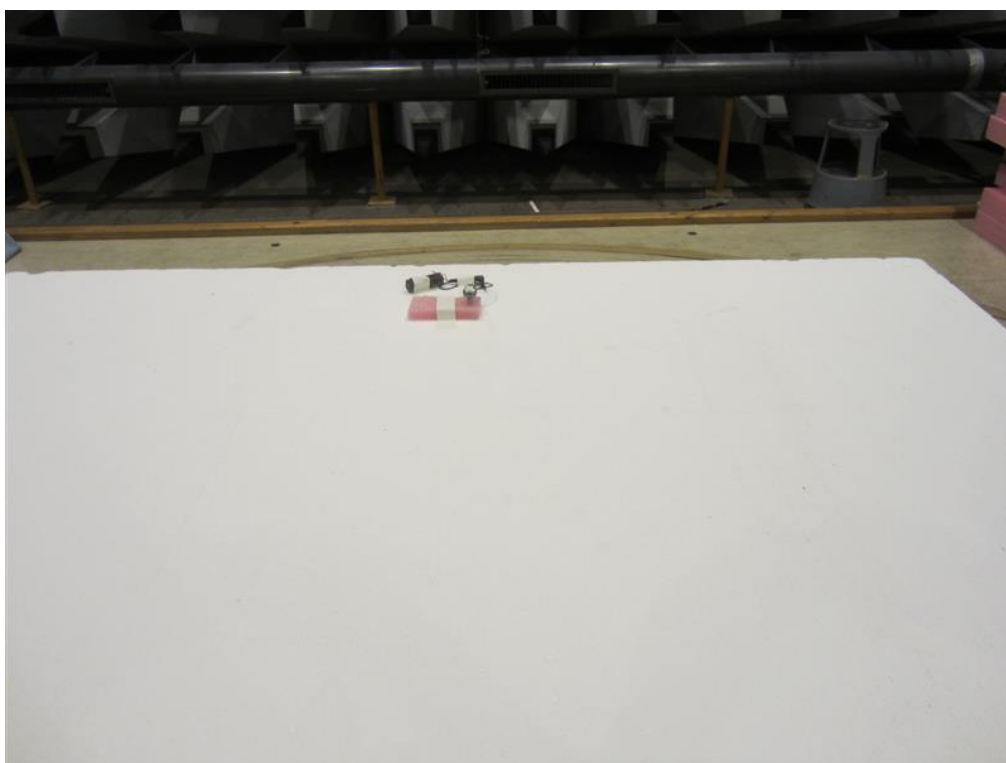


Photo 4.6.2 Test setup regarding measurement of radiated emission (above 1 GHz).

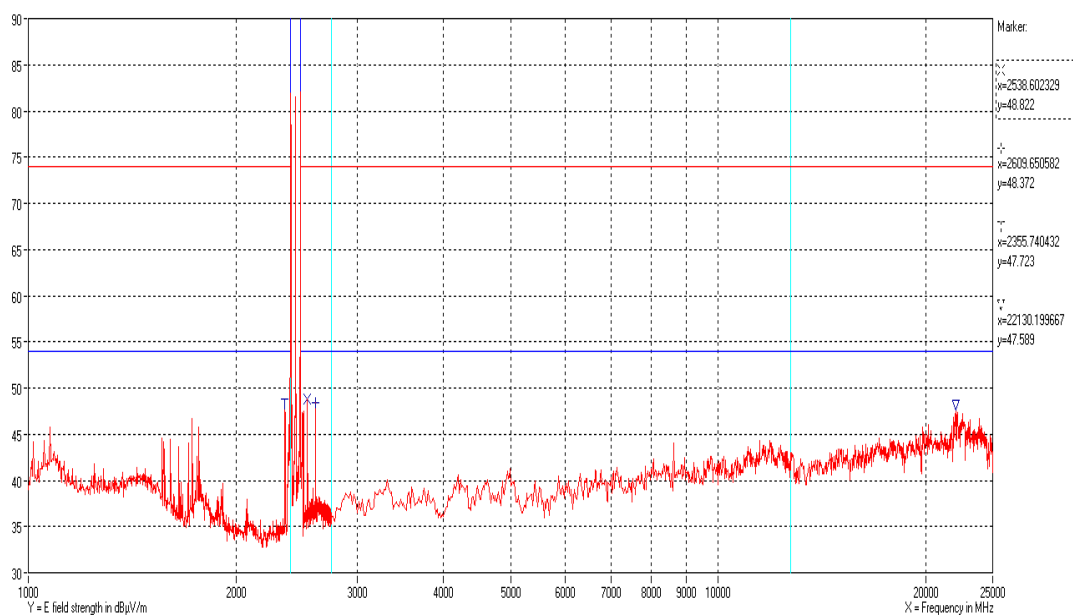




#### 4.7 Measurement of radiated emission (above 1 GHz), BTLE radio

Test object	Baha5	Sheet	RE_Spur-9
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000019P	Date	15 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests	Frequency	1-25 GHz

Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Complete search, antenna distance 3 m.	Humidity	70 % RH
Detector	Peak	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49086 49600 49712 49625	Uncertainty	4.9 dB



Polarization

Vertical and horizontal peak measurements

Comments

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



Test object	Baha5	Sheet	RE_Spur-10
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000019P	Date	15 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests	Frequency	1-25 GHz

Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	70 % RH
Detector	Peak	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49086 49600 49712 49625	Uncertainty	4.9 dB

Frequency [MHz]	Transducer factor [dB]	Peak measurement [dB $\mu$ V/m]	Peak limit [dB $\mu$ V/m]	DCCF ( $\delta$ ) [dB]	Corrected average measurement [dB $\mu$ V/m]	Average limit [dB $\mu$ V/m]	Remarks
2355.7	32.8	47.7	74	-	-	54	Passed
2538.6	34.1	48.8	74	-	-	54	Passed
2609.7	34.1	48.4	74	-	-	54	Passed
22130.2	43.3	47.6	74	-	-	54	Passed

Note 1: The measured peak field strengths is not corrected with the DCCF ( $\delta$ )

Test result	The measured peak field strengths were below the peak and average limits
Test Port	Enclosure
Test frequency	2402, 2440 and 2480 MHz
Test mode	Continuous Tx - normal 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 Test voltage: External power supply at 1.45 VDC



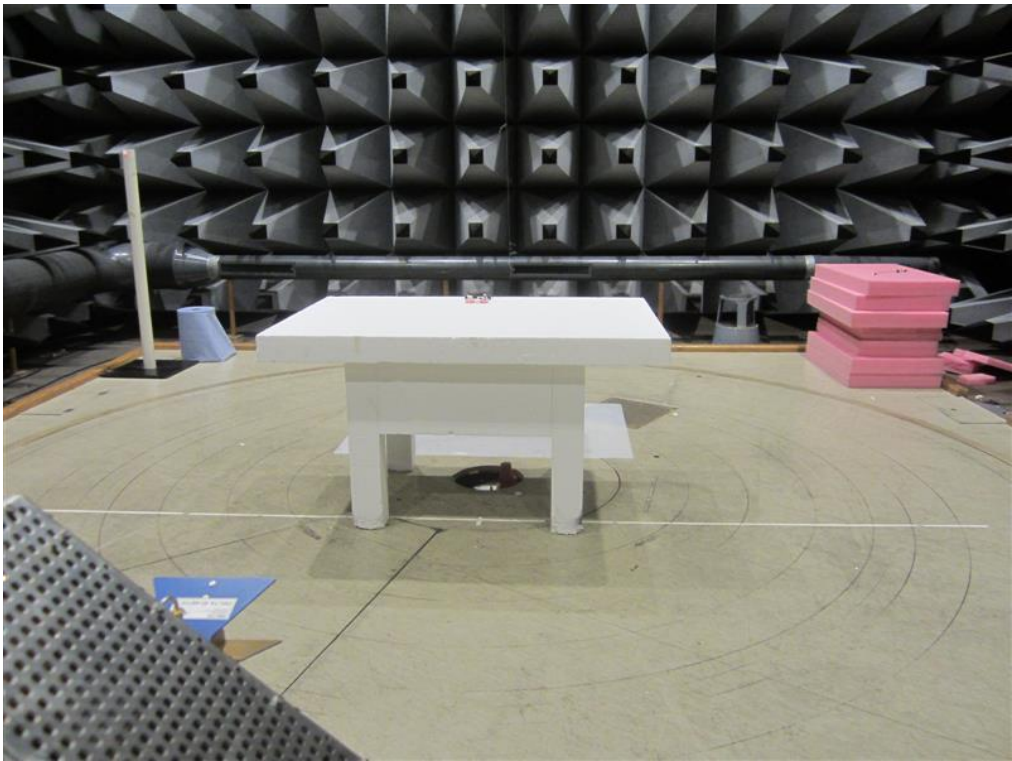


Photo 4.7.1 Test setup regarding measurement of radiated emission (above 1 GHz)

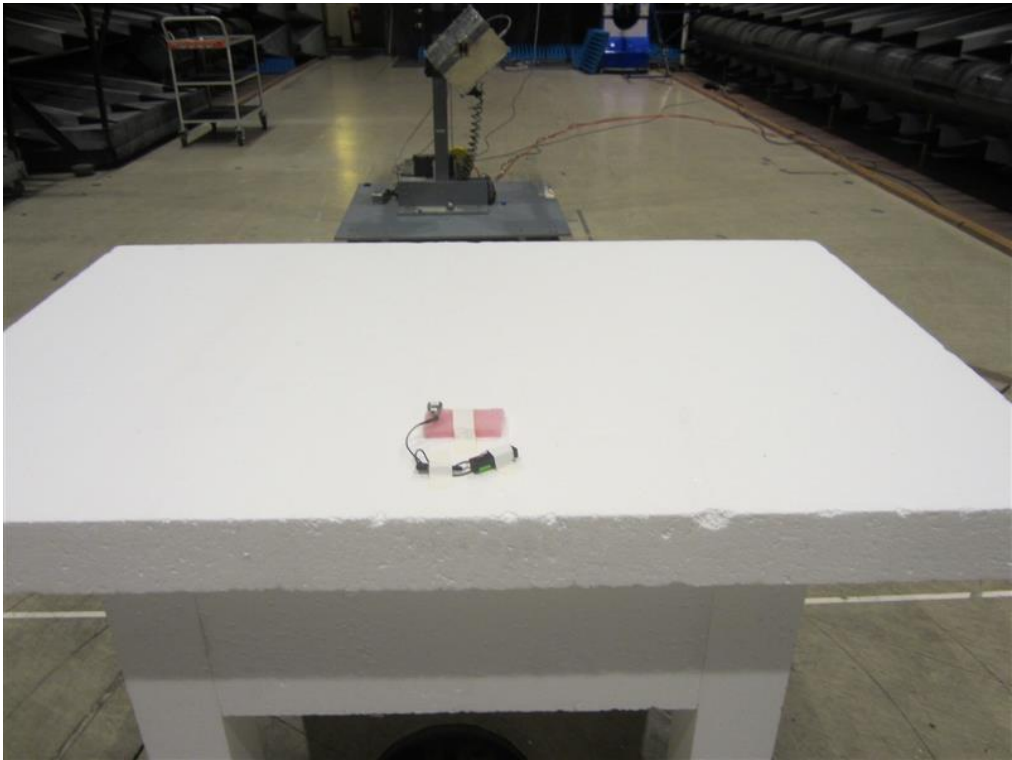


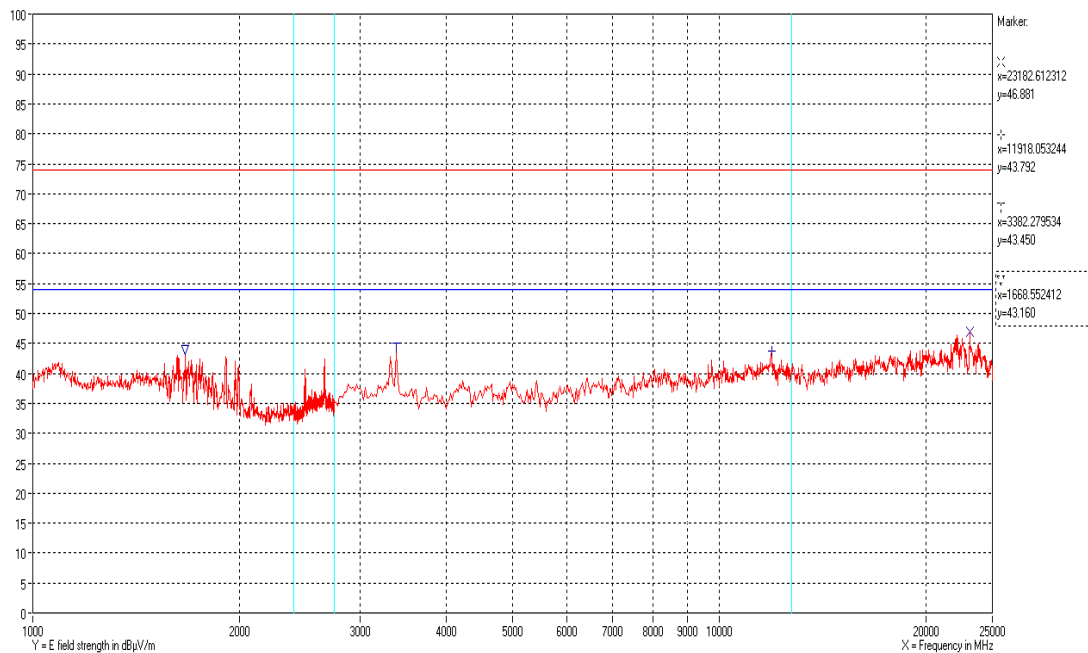
Photo 4.7.2 Test setup regarding measurement of radiated emission (above 1 GHz)



#### 4.8 Measurement of radiated emission (above 1 GHz), Configuration mode

Test object	Baha5	Sheet	RE_Spur-11
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000050P	Date	15 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests	Frequency	1-25 GHz

Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	70 % RH
Detector	Peak	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49086 49600 49712 49625	Uncertainty	4.9 dB



Polarization                      Vertical and horizontal peak measurements

Comments                          Radio off



Test object	Baha5	Sheet	RE_Spur-12
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000050P	Date	15 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests	Frequency	1-25 GHz

Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	70 % RH
Detector	Peak	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49086 49600 49712 49625	Uncertainty	4.9 dB

Frequency [MHz]	Transducer factor [dB]	Peak measurement [dB $\mu$ V/m]	Peak limit [dB $\mu$ V/m]	DCCF ( $\delta$ ) [dB]	Corrected average measurement [dB $\mu$ V/m]	Average limit [dB $\mu$ V/m]	Remarks
1668.6	37.0	43.2	74	-	-	54	Passed
3383.3	35.7	43.5	74	-	-	54	Passed
11918.0	41.1	43.8	74	-	-	54	Passed
23182.6	43.7	46.9	74	-	-	54	Passed
Note 1:							

Test result	The measured peak field strengths were below the peak and average limits
Test Port	Enclosure
Test mode	Radio off
Condition	Normal
Compliant	Yes
Comments	Final maximal measurements by variation of turntable azimuth, antenna height and antenna polarization  Test voltage: Internal power supply at 1.45 VDC



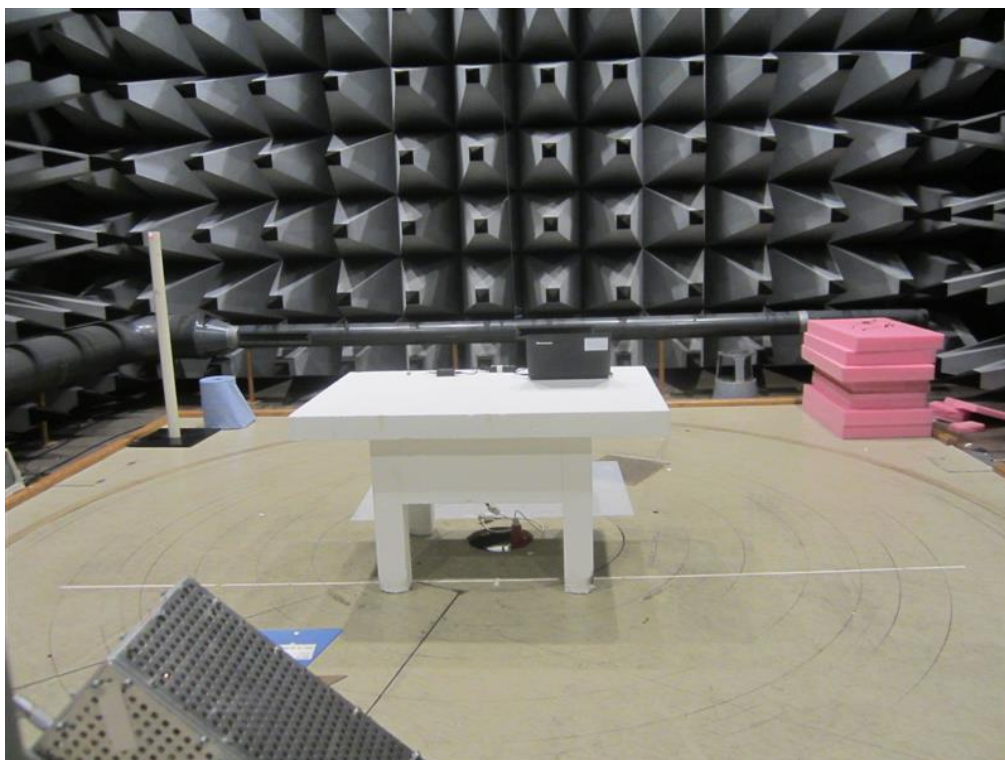


Photo 4.8.1 Test setup regarding measurement of radiated emission (above 1 GHz).

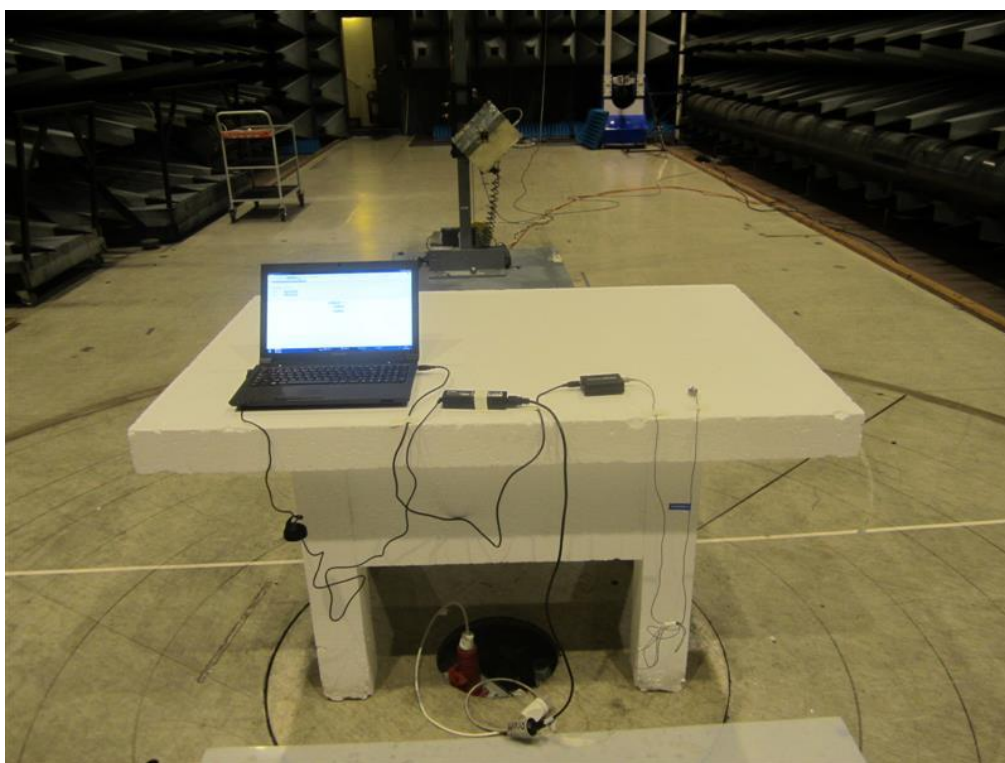


Photo 4.8.2 Test setup regarding measurement of radiated emission (above 1 GHz).





#### 4.9 Measurement of field strength of fundamental, GN radio

Test object	Baha5	Sheet	RE_Spur-13
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000020P	Date	11 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests	Frequency	1-25 GHz

Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	70 % RH
Detector	Peak for 1 GHz to 25 GHz	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49086 49600 49712 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
2404	82.0	114	-20	62.0	94	Passed
2440	81.2	114	-20	61.2	94	Passed
2478	82.8	114	-20	62.8	94	Passed

Test result	<p>The measured peak field strengths were below the peak and average limits</p> <p>The measured peak field strengths corrected with the DCCF (δ) are below the peak and average limits</p> <p>Corrected average: <math>P_{\text{Average(resulting)}} = P_{\text{peak}} + \text{DCCF}(\delta)</math>.</p>
Test Port	Enclosure
Test frequency	2404, 2440 and 2478 MHz
Test mode	Continuous Tx - normal modulation - hopping between low, mid and high operating freq.
Condition	Normal
Compliant	Yes
Comments	<p>Final maximal measurements by variation of turntable azimuth, antenna height and antenna polarization</p> <p>Test voltage: External power supply at 1.45 VDC</p>



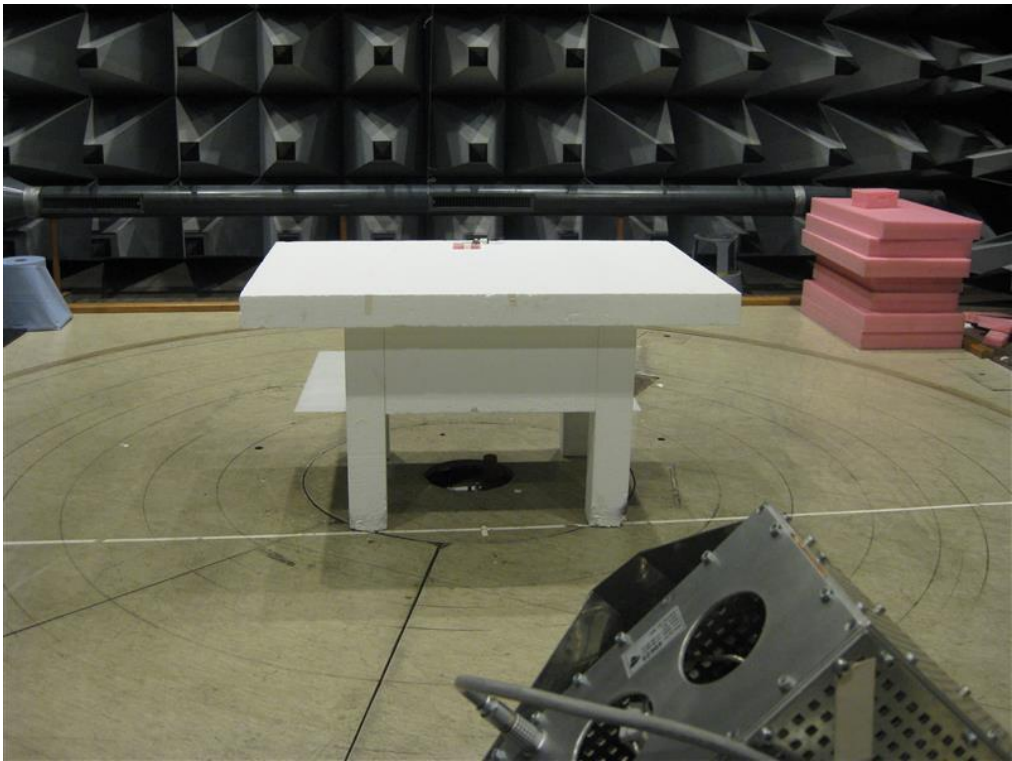


Photo 4.9.1 Test setup regarding measurement of field strength of fundamental .

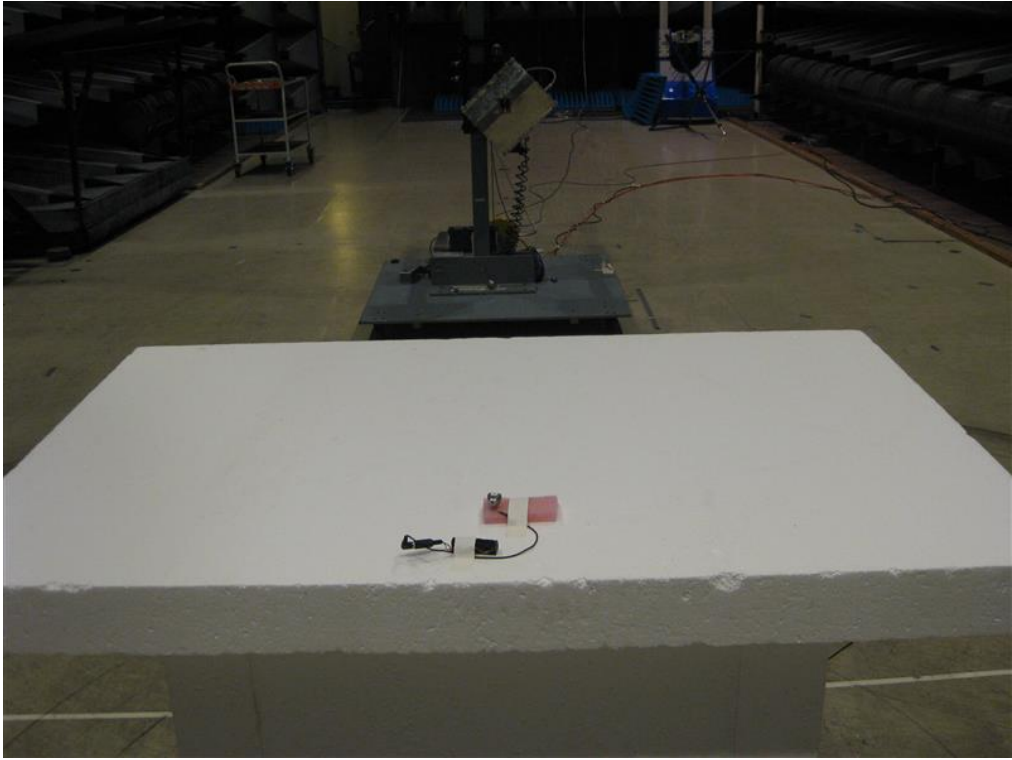


Photo 4.9.2 Test setup regarding measurement of field strength of fundamental .





#### 4.10 Measurement of field strength of fundamental, BTLE radio

Test object	Baha5	Sheet	RE_Spur-14
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000019P	Date	15 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests	Frequency	1-25 GHz

Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	70 % RH
Detector	Peak for 1 GHz to 25 GHz	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49086 49600 49712 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	82.0	114	-20	62.0	94	Passed
2440	81.4	114	-20	61.4	94	Passed
2480	82.0	114	-20	62.0	94	Passed

Test result	<p>The measured peak field strengths were below the peak and average limits</p> <p>The measured peak field strengths corrected with the DCCF (δ) are below the peak and average limits</p> <p>Corrected average: <math>P_{\text{Average(resulting)}} = P_{\text{peak}} + \text{DCCF}(\delta)</math>.</p>
Test Port	Enclosure
Test frequency	2402, 2440 and 2480 MHz
Test mode	Continuous Tx - normal modulation - hopping between low, mid and high operating freq.
Condition	Normal
Compliant	Yes
Comments	<p>Final maximal measurements by variation of turntable azimuth, antenna height and antenna polarization</p> <p>Test voltage: External power supply at 1.45 VDC</p>





Photo 4.10.1 Test setup regarding measurement of field strength of fundamental.

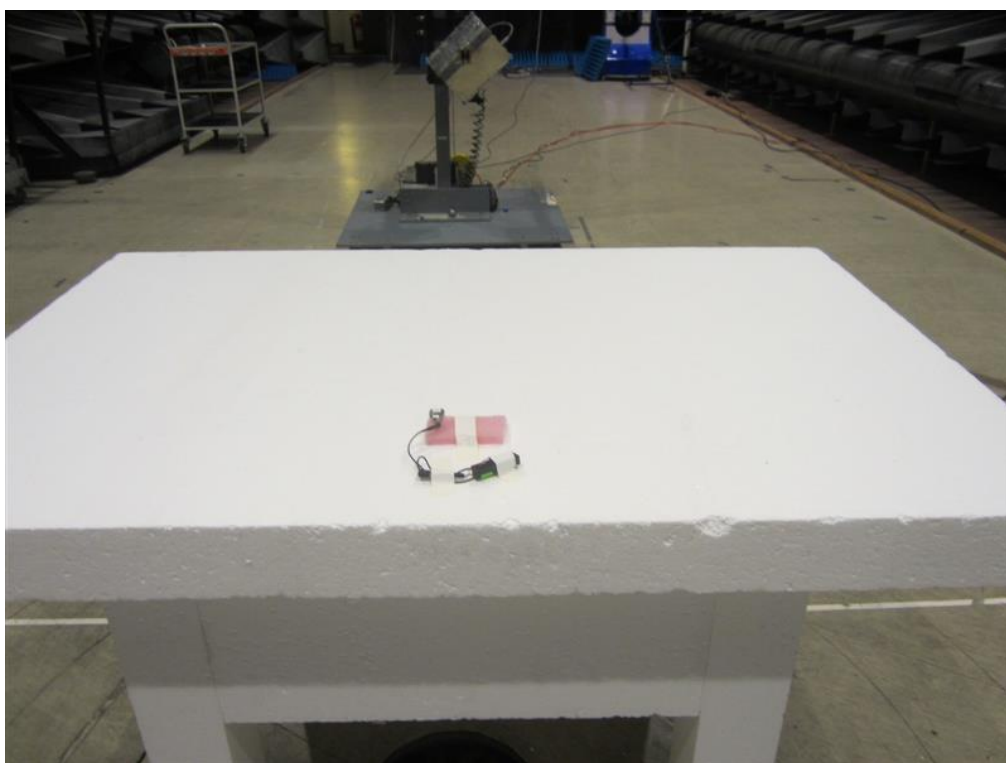
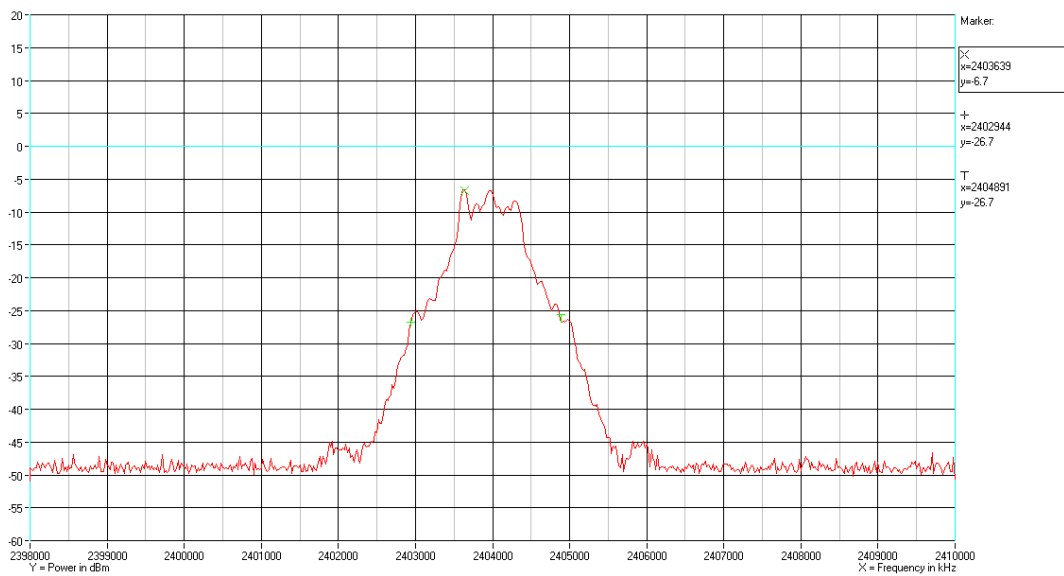


Photo 4.10.2 Test setup regarding measurement of field strength of fundamental.

#### 4.11 Measurement of 20 dB bandwidth, GN radio

Test object	Baha5	Sheet	PROF-1
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000035P	Date	11 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests		

Test method	ANSI C63.10:2009	Temperature	21 °C
Characteristics	Test voltage: External power supply at 1.45 VDC	Humidity	40 % RH
Test equipm.	SRD lab Hørsholm 49550 49663	Uncertainty	1.1 dB
SA Settings	RBW: 100 kHz VBW: 300 kHz SPAN: 12 MHz DET: Peak CF: Operating freq. Trace: Max. hold		



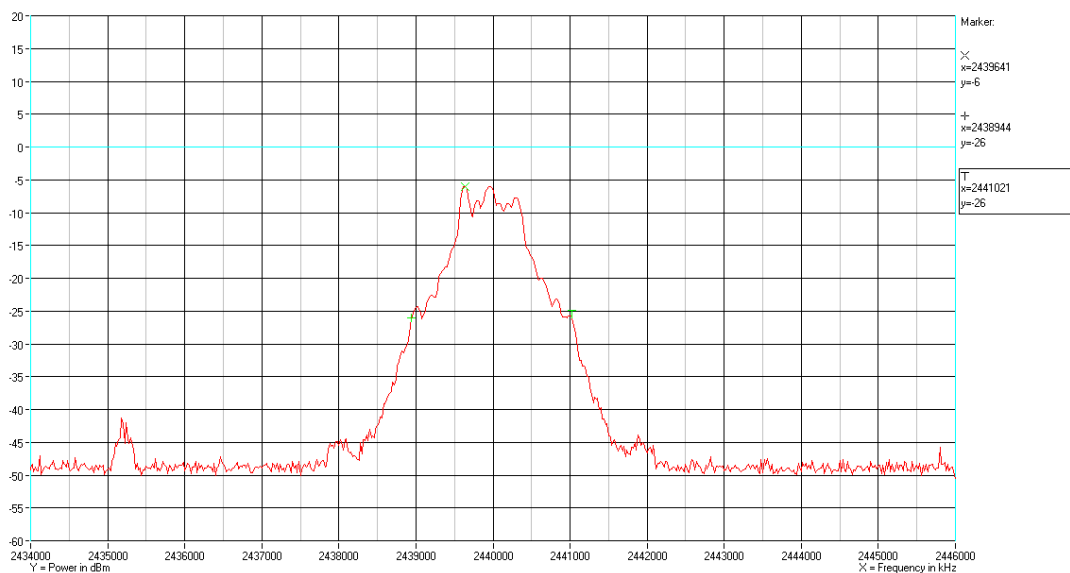
Comments

Operating frequency: 2404 MHz



Test object	Baha5	Sheet	PROF-2
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000035P	Date	11 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests		

Test method	ANSI C63.10:2009	Temperature	21 °C
Characteristics	Test voltage: External power supply at 1.45 VDC	Humidity	40 % RH
Test equipm.	SRD lab Hørsholm 49550 49663	Uncertainty	1.1 dB
SA Settings	RBW: 100 kHz VBW: 300 kHz SPAN: 12 MHz DET: Peak CF: Operating freq. Trace: Max. hold		



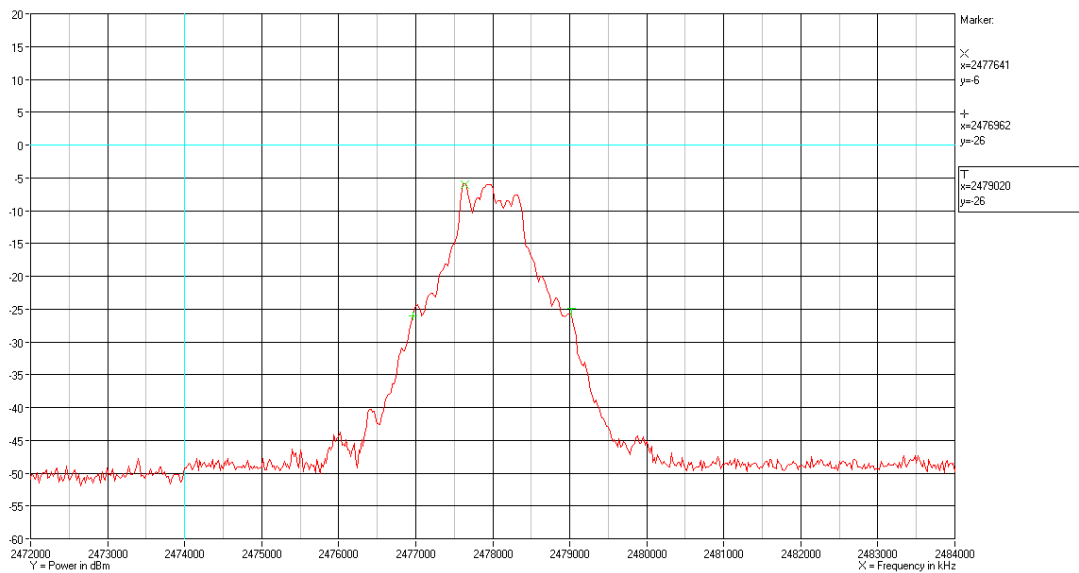
Comments

Operating frequency: 2440 MHz



Test object	Baha5	Sheet	PROF-3
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000035P	Date	11 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests		

Test method	ANSI C63.10:2009	Temperature	21 °C
Characteristics	Test voltage: External power supply at 1.45 VDC	Humidity	40 % RH
Test equipm.	SRD lab Hørsholm 49550 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	Baha5	Sheet	PROF-4
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000035P	Date	11 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests		

Test method	ANSI C63.10:2009	Temperature	21 °C
Characteristics	Test voltage: External power supply at 1.45 VDC	Humidity	40 % RH
Test equipm.	SRD lab Hørsholm 49550 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]	Remarks
2404	2402.9	2404.9	-
2440	2438.9	2441.0	-
2478	2477.0	2479.0	-

Note 1:

Operating frequency [MHz]	Measured [MHz]	Limit [MHz]	Remarks
Lowest frequency	2402.9	2400.00	Passed
Highest frequency	2479.0	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	2404, 2440 and 2478 MHz
Test mode	Continuous Tx - normal modulation - hopping between low, mid and high operating freq.
Condition	Normal
Compliant	Yes
Comments	Test voltage: External power supply at 1.45 VDC





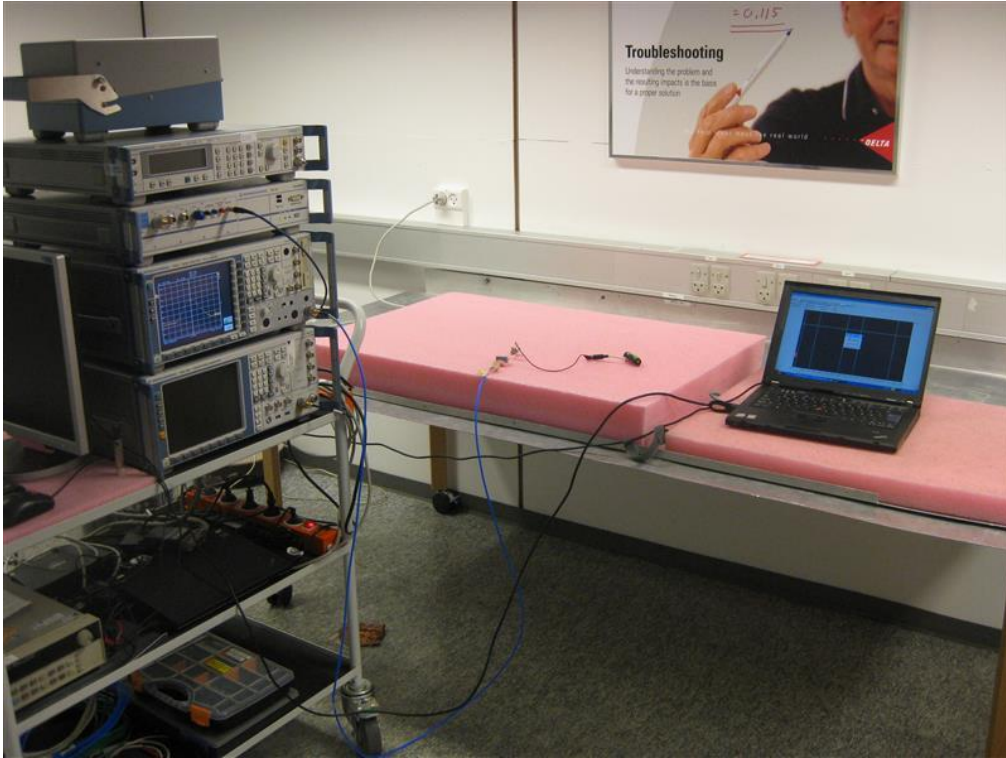


Photo 4.11.1 Test setup regarding measurement of 20 dB bandwidth.

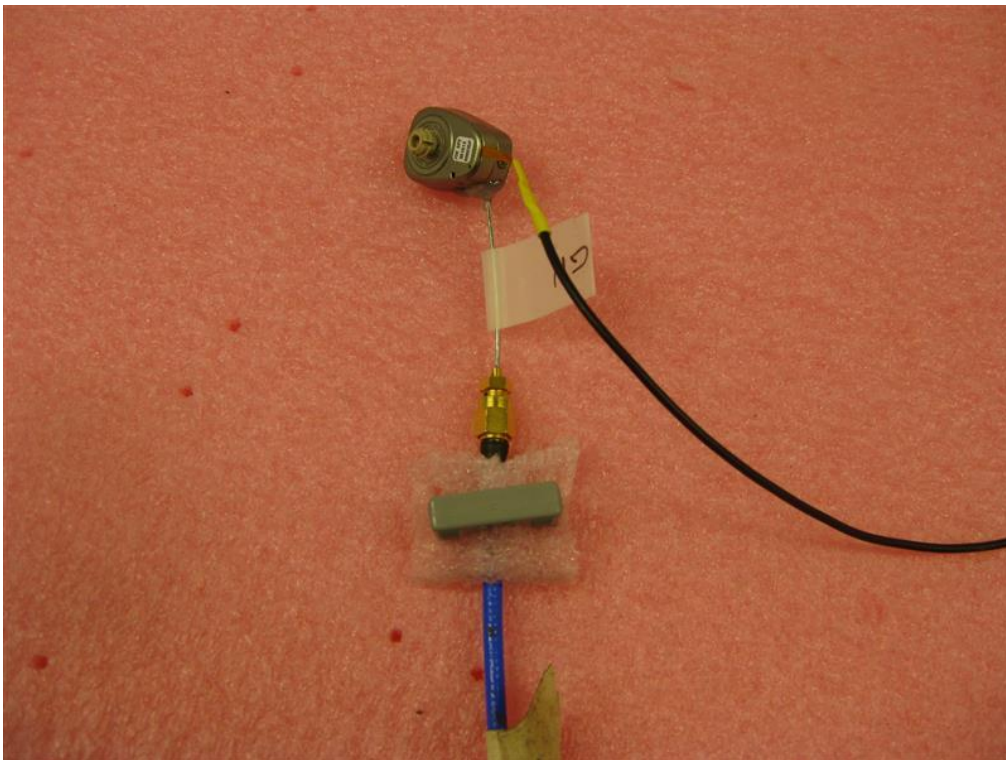


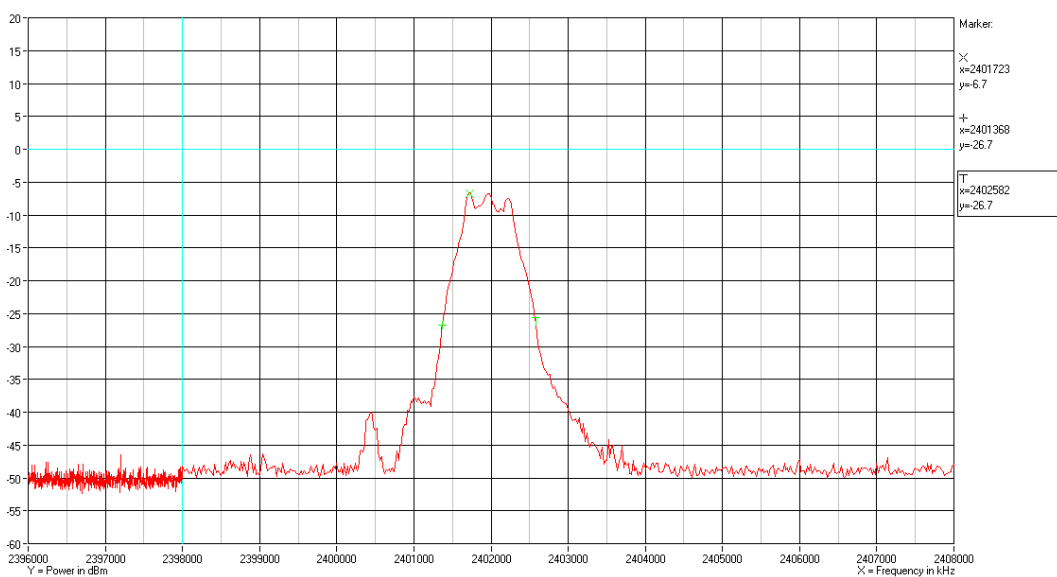
Photo 4.11.2 Test setup regarding measurement of 20 dB bandwidth.



#### 4.12 Measurement of 20 dB bandwidth, BTLE radio

Test object	Baha5	Sheet	PROF-5
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000038P	Date	11 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests		

Test method	ANSI C63.10:2009	Temperature	21 °C
Characteristics	Test voltage: External power supply at 1.45 VDC	Humidity	40 % RH
Test equipm.	SRD lab Hørsholm 49550	Uncertainty	1.1 dB
SA Settings	RBW: 100 kHz VBW: 300 kHz SPAN: 12 MHz DET: Peak CF: Operating freq. Trace: Max. hold		



Comments

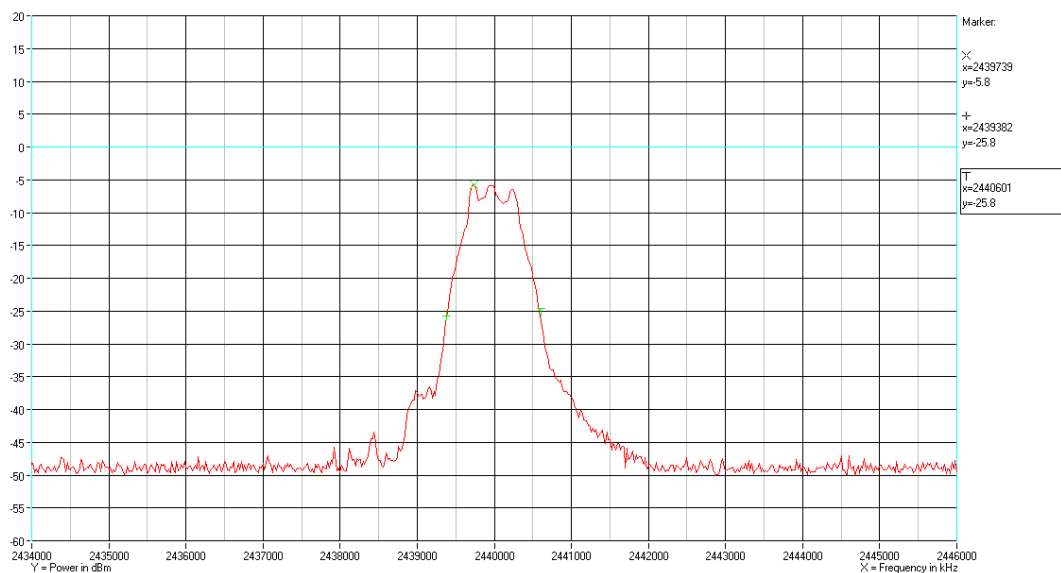
Operating frequency: 2402 MHz





Test object	Baha5	Sheet	PROF-6
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000038P	Date	11 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests		

Test method	ANSI C63.10:2009	Temperature	21 °C
Characteristics	Test voltage: External power supply at 1.45 VDC	Humidity	40 % RH
Test equipm.	SRD lab Hørsholm 49550 49663	Uncertainty	1.1 dB
SA Settings	RBW: 100 kHz VBW: 300 kHz SPAN: 12 MHz DET: Peak CF: Operating freq. Trace: Max. hold		



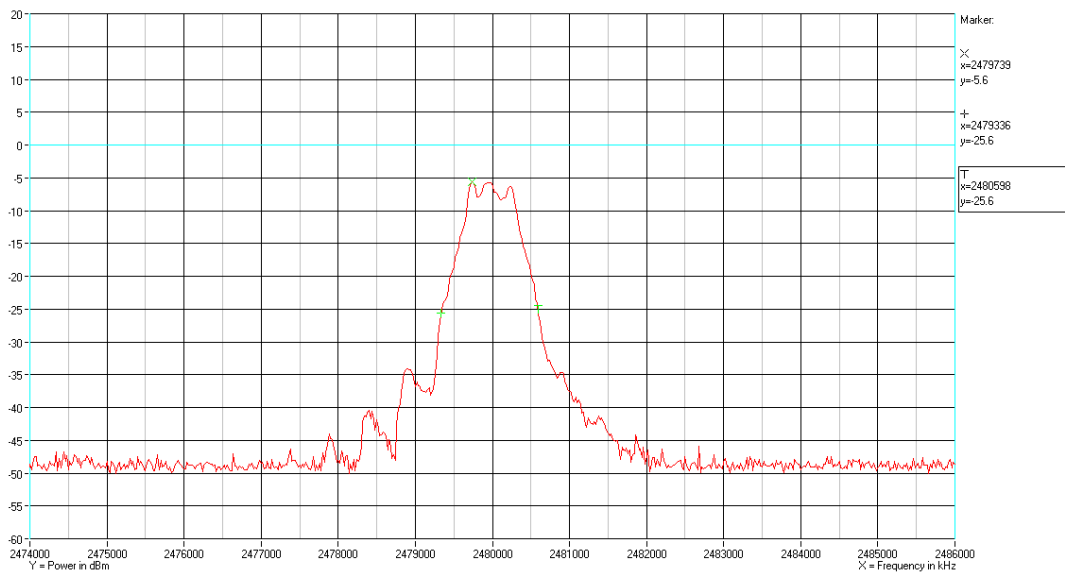
Comments

Operating frequency: 2440 MHz



Test object	Baha5	Sheet	PROF-7
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000038P	Date	11 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests		

Test method	ANSI C63.10:2009	Temperature	21 °C
Characteristics	Test voltage: External power supply at 1.45 VDC	Humidity	40 % RH
Test equipm.	SRD lab Hørsholm 49550 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: 2480 MHz



Test object	Baha5	Sheet	PROF-8
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000038P	Date	11 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests		

Test method	ANSI C63.10:2009	Temperature	21 °C
Characteristics	Test voltage: External power supply at 1.45 VDC	Humidity	40 % RH
Test equipm.	SRD lab Hørsholm 49550 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]	Remarks
2402	2401.4	2402.6	-
2440	2439.4	2440.6	-
2480	2479.3	2480.6	-

Note 1:

Operating frequency [MHz]	Measured [MHz]	Limit [MHz]	Remarks
Lowest frequency	2401.4	2400.00	Passed
Highest frequency	2480.6	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, 2440 and 2480 MHz
Test mode	Continuous Tx - normal modulation - hopping between low, mid and high operating freq.
Condition	Normal
Compliant	Yes
Comments	Test voltage: External power supply at 1.45 VDC



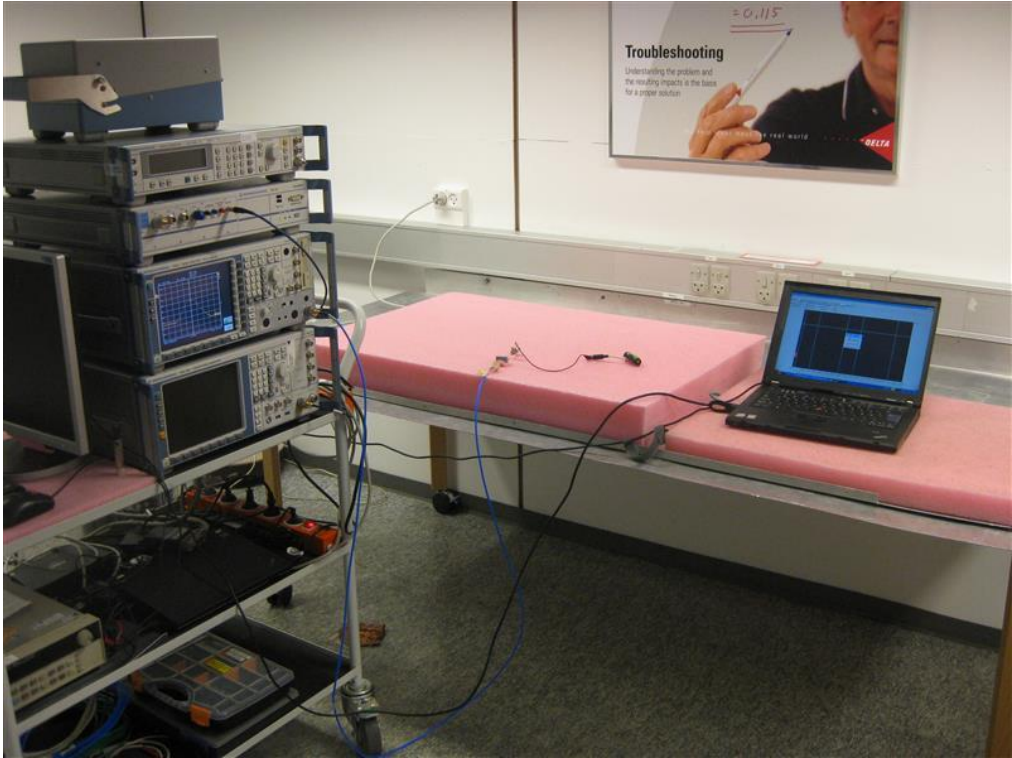


Photo 4.12.1 Test setup regarding measurement of 20 dB bandwidth.

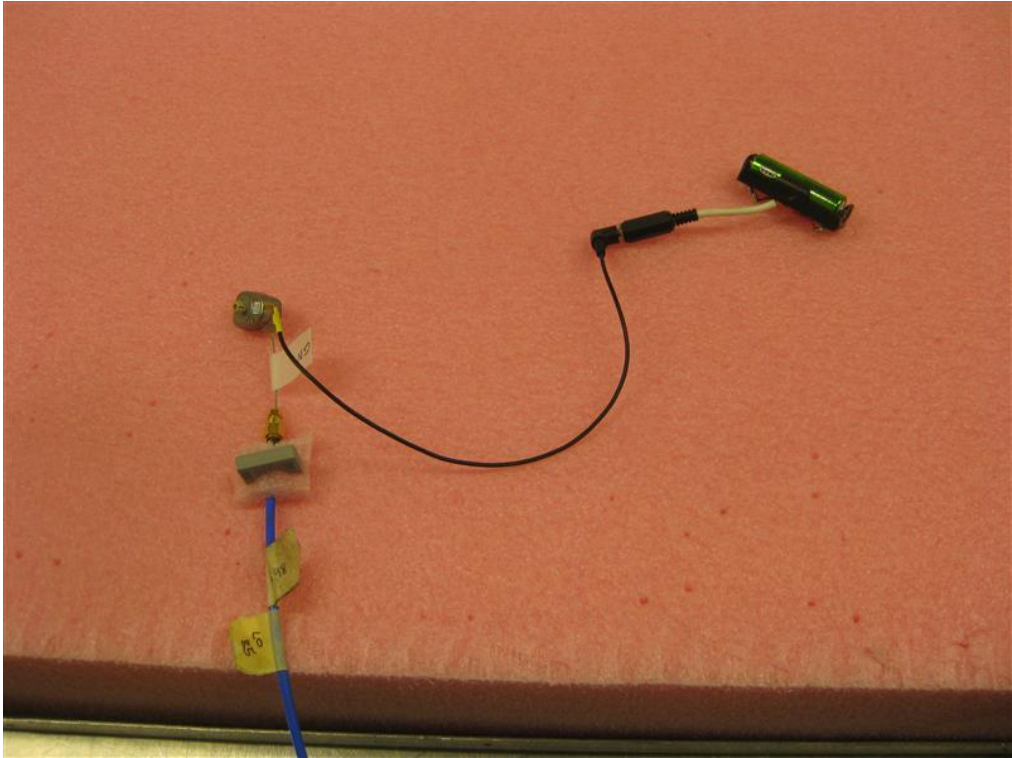


Photo 4.12.2 Test setup regarding measurement of 20 dB bandwidth.



#### 4.13 Measurement of band edge compliance, GN radio

Test object	Combination of 2.1.1: Baha5 and 2.1.3: Baha5	Sheet	PROF-9
Type	See Section 2	Project no.	T208340-3
Serial no.	See Section 2	Date	11 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests	Frequency	1-25 GHz

Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	70 % RH
Detector	Peak and average	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49086 49600 49712 49625	Uncertainty	4.9 dB

Band Edge frequency [MHz]	Operating frequency [MHz]	Average / Peak	Fundamental field strengths [dB $\mu$ V/m]	Marker-delta method [dB]	Corrected [dB $\mu$ V/m]	Limit at Band Edge [dB $\mu$ V/m]	Remarks
2400	2404	Average	62.0	32.9	29.1	54	Passed
2400	2404	Peak	82.0	32.9	49.1	74	Passed
2483.5	2478	Average	62.8	31.9	30.9	54	Passed
2483.5	2478	Peak	82.8	31.9	50.9	74	Passed

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

Test Port             Enclosure and Antenna connector

Test frequency      2404 and 2478 MHz

Test mode            Continuous Tx - normal 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.

Test voltage: External power supply at 1.45 VDC.



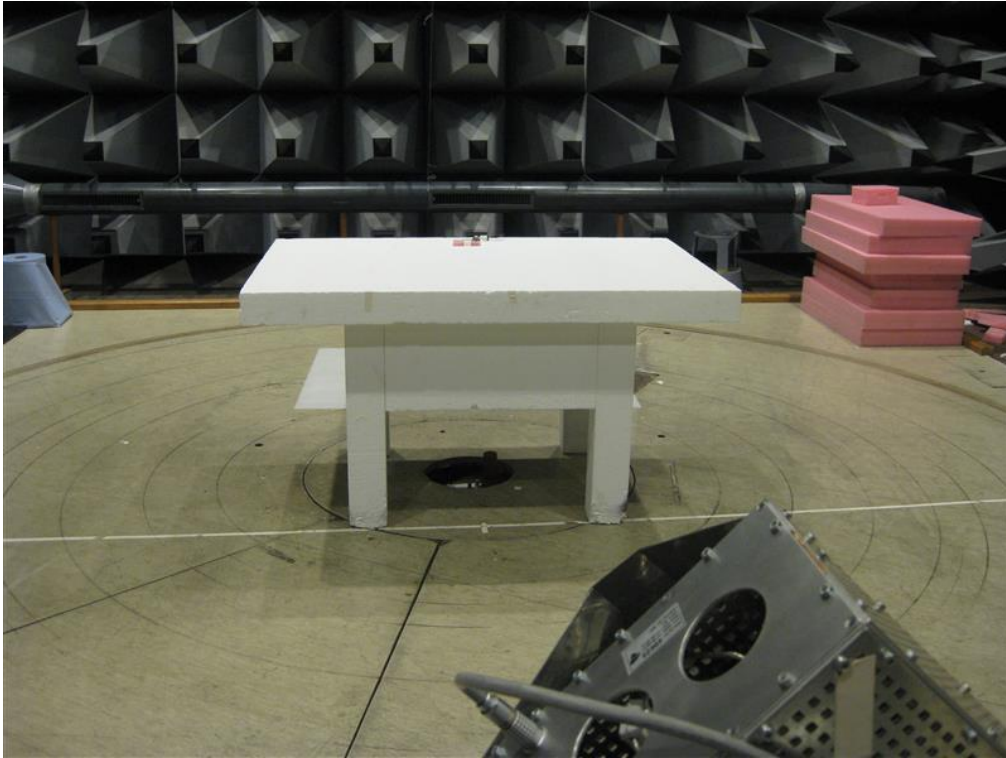


Photo 4.13.1 Test setup regarding measurement of band edge compliance.

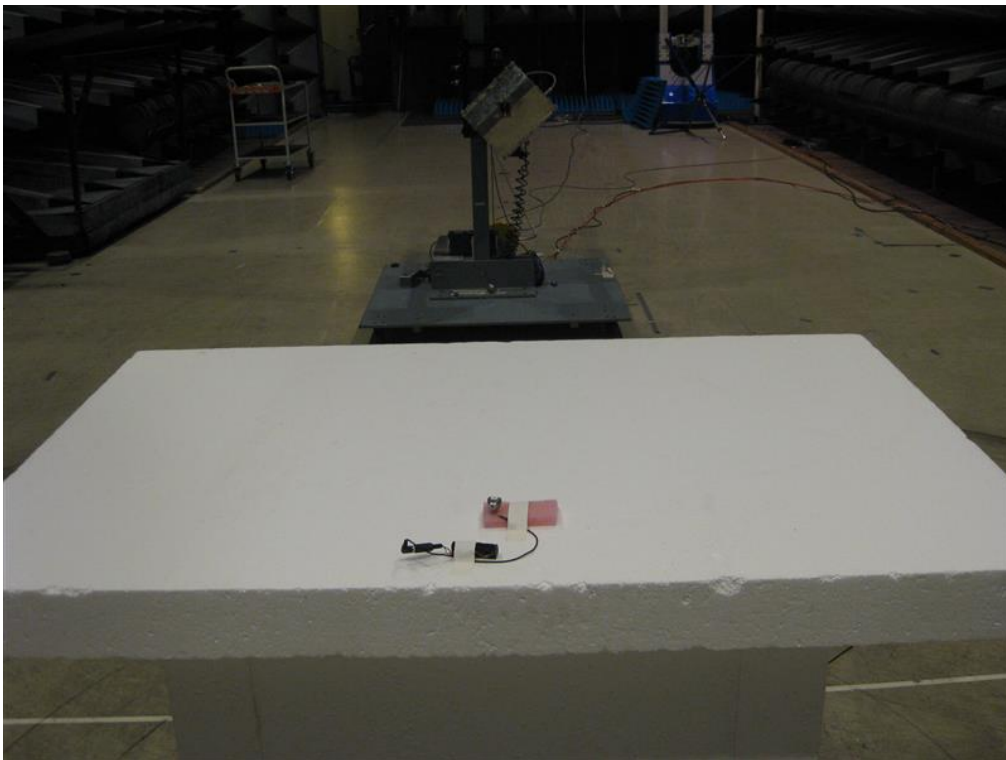


Photo 4.13.2 Test setup regarding measurement of band edge compliance.





#### 4.14 Measurement of band edge compliance, BTLE radio

Test object	Combination of 2.1.2: Baha5 and 2.1.4: Baha5	Sheet	PROF-10
Type	See Section 2	Project no.	T208340-3
Serial no.	See Section 2	Date	15 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests	Frequency	1-12.75 GHz

Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	70 % RH
Detector	Peak and average	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49086 49600 49712 49625	Uncertainty	4.9 dB

Band Edge frequency [MHz]	Operating frequency [MHz]	Average / Peak	Fundamental field strengths [dB $\mu$ V/m]	Marker-delta method [dB]	Corrected [dB $\mu$ V/m]	Limit at Band Edge [dB $\mu$ V/m]	Remarks
2400	2404	Average	61.1	21.7	39.4	54	Passed
2400	2404	Peak	82.0	21.7	60.3	74	Passed
2483.5	2478	Average	61.1	32.8	28.3	54	Passed
2483.5	2478	Peak	82.0	32.8	49.2	74	Passed

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

Test Port             Enclosure and Antenna connector

Test frequency      2402 and 2480 MHz

Test mode            Continuous Tx - normal 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.

Test voltage: External power supply at 1.45 VDC.



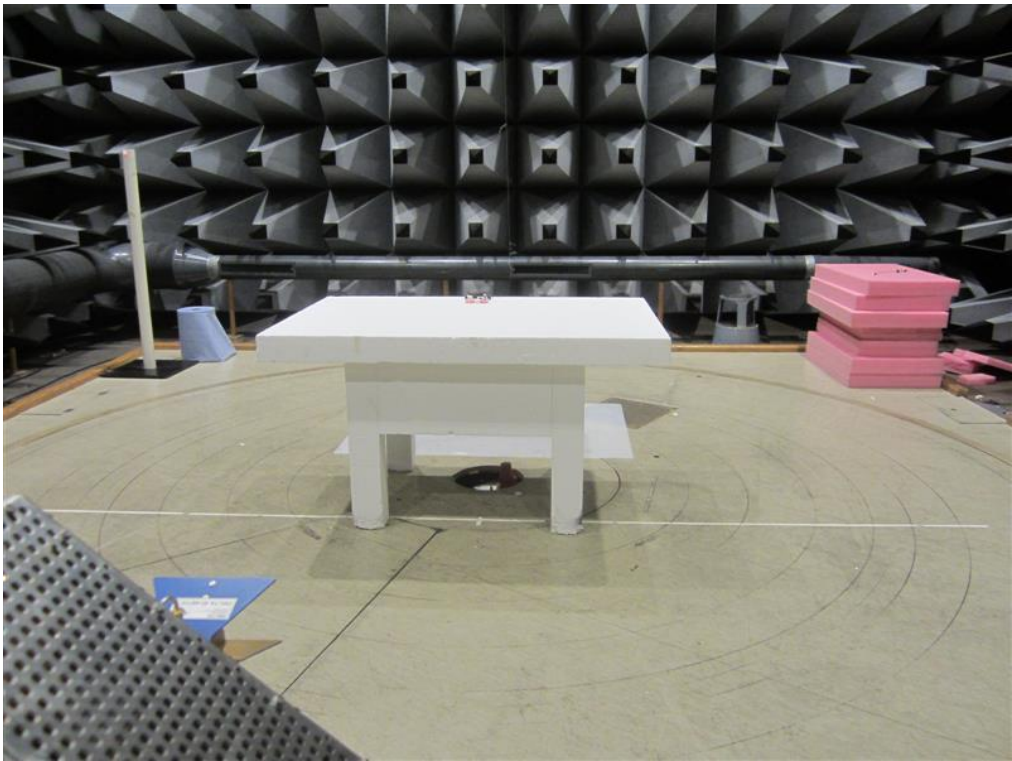


Photo 4.14.1 Test setup regarding measurement of band edge compliance.

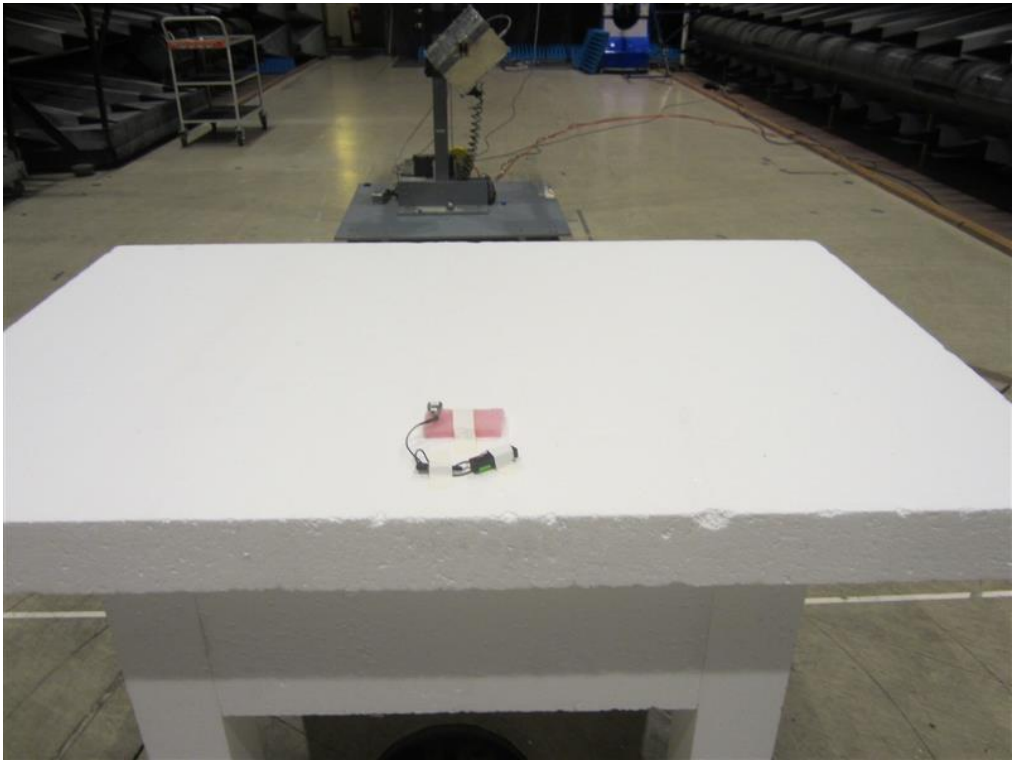


Photo 4.14.2 Test setup regarding measurement of band edge compliance.

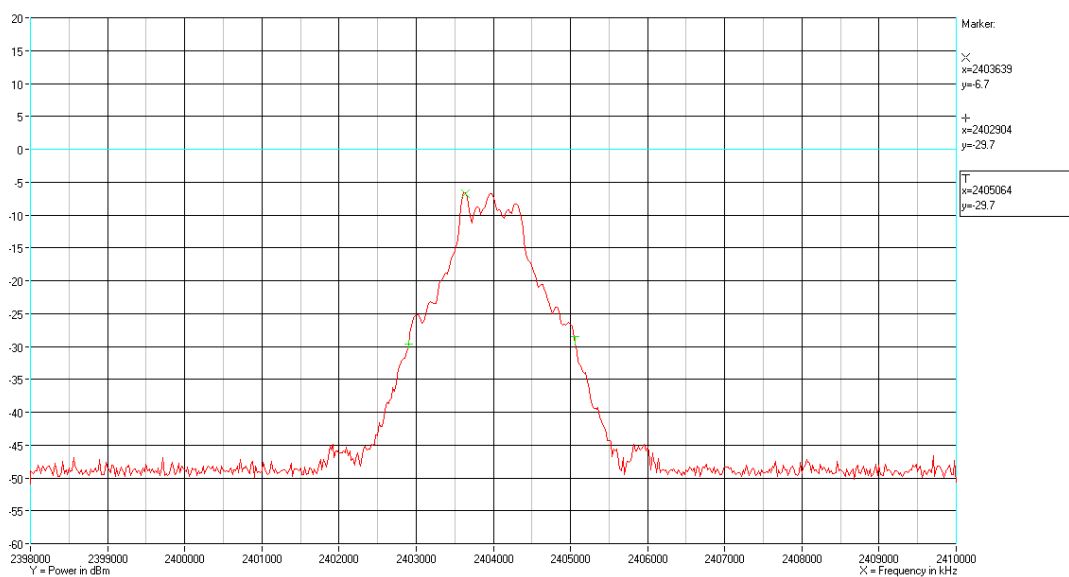




#### 4.15 Measurement of occupied bandwidth, IC, GN radio

Test object	Baha5	Sheet	PROF-11
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000035P	Date	11 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests		

Test method	IC Standard RSS-Gen, Issue 3:2010 - Section 4.6.1	Temperature	21 °C
Characteristics	Test voltage: External power supply at 1.45 VDC	Humidity	40 % RH
Test equipm.	SRD lab Hørsholm 49550	Uncertainty	1.1 dB
SA Settings	RBW: 100 kHz VBW: 300 kHz SPAN: 12 MHz DET: Peak CF: Operating freq. Trace: Max. hold		



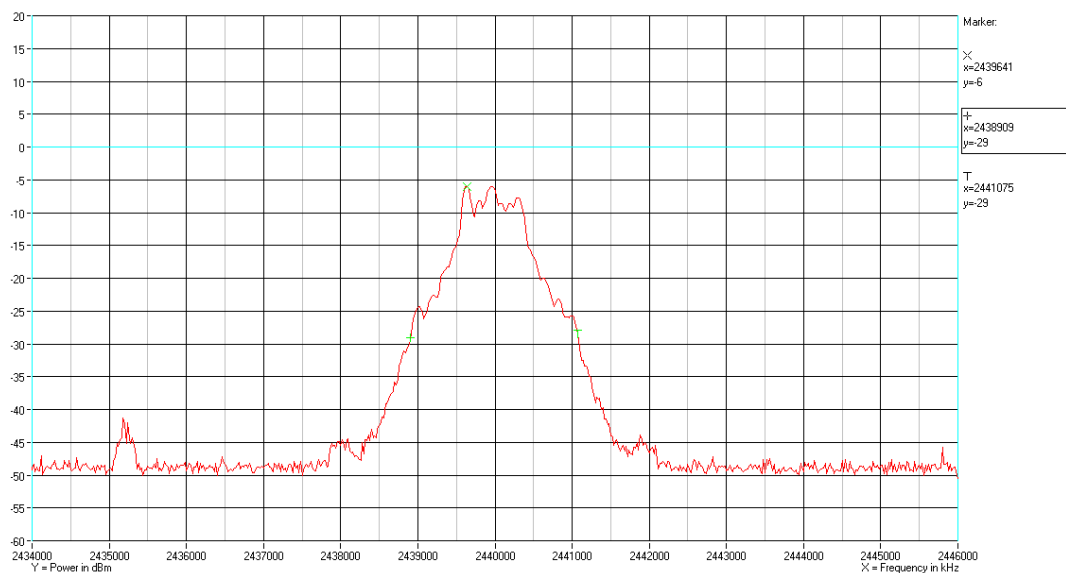
Comments

Operating frequency: 2404 MHz



Test object	Baha5	Sheet	PROF-12
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000035P	Date	11 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests		

Test method	IC Standard RSS-Gen, Issue 3:2010 - Section 4.6.1	Temperature	21 °C
Characteristics	Test voltage: External power supply at 1.45 VDC	Humidity	40 % RH
Test equipm.	SRD lab Hørsholm 49550	Uncertainty	1.1 dB
SA Settings	RBW: 100 kHz VBW: 300 kHz SPAN: 12 MHz DET: Peak CF: Operating freq. Trace: Max. hold		



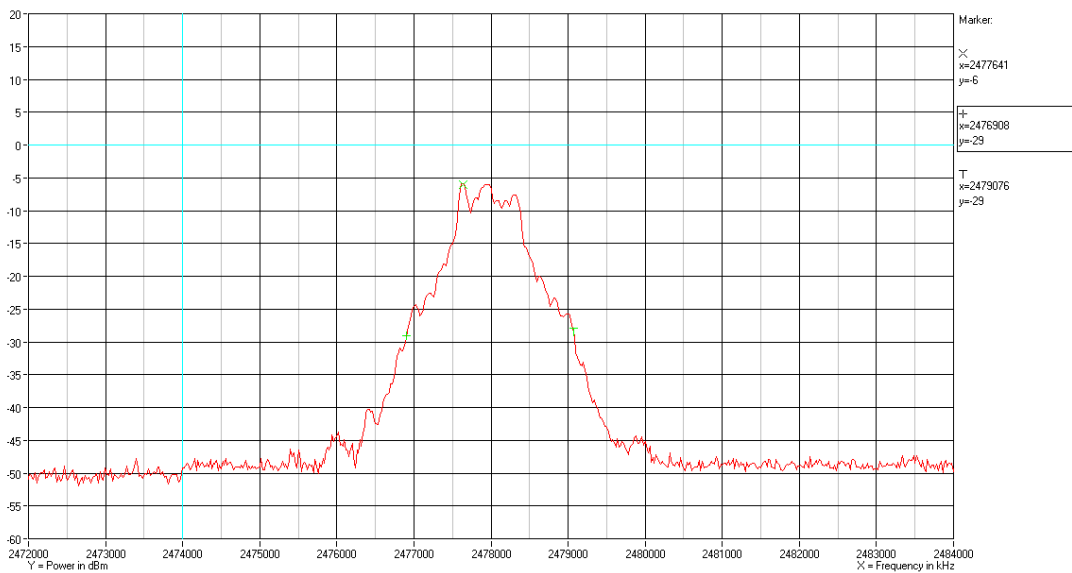
Comments

Operating frequency: 2440 MHz



Test object	Baha5	Sheet	PROF-13
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000035P	Date	11 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests		

Test method	IC Standard RSS-Gen, Issue 3:2010 - Section 4.6.1	Temperature	21 °C
Characteristics	Test voltage: External power supply at 1.45 VDC	Humidity	40 % RH
Test equipm.	SRD lab Hørsholm 49550	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	Baha5	Sheet	PROF-14
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000035P	Date	11 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests		

Test method	IC Standard RSS-Gen, Issue 3:2010 - Section 4.6.1	Temperature	21 °C
Characteristics	Test voltage: External power supply at 1.45 VDC	Humidity	40 % RH
Test equipm.	SRD lab Hørsholm 49550	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]
2404	2402.9	2405.1	2.2
2440	2438.9	2441.1	2.2
2478	2476.9	2479.1	2.2

Note 1:

Band edge criteria	Measured 99 % emission bandwidth (23 dBc)
Test port	Antenna replaced by SMA connector
Test frequency	2404, 2440 and 2478 MHz
Test mode	Continuous Tx - normal modulation - hopping between low, mid and high operating freq.
Condition	Normal
Comments	Test voltage: External power supply at 1.45 VDC



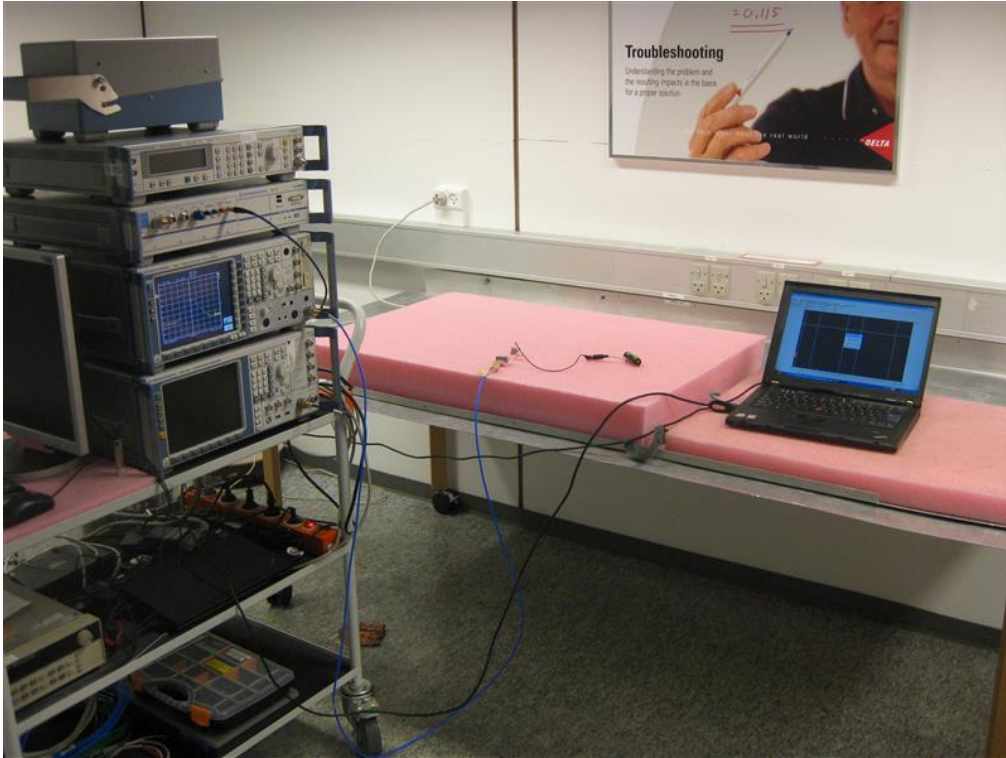


Photo 4.15.1 Test setup regarding measurement of occupied bandwidth, IC, GN radio.

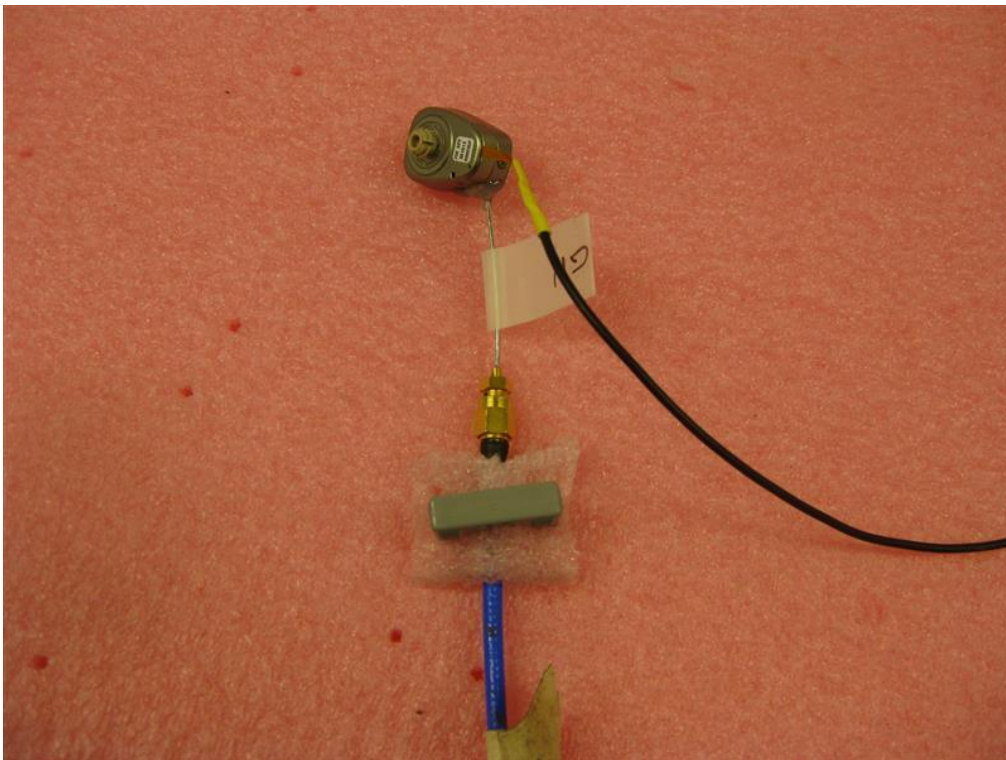


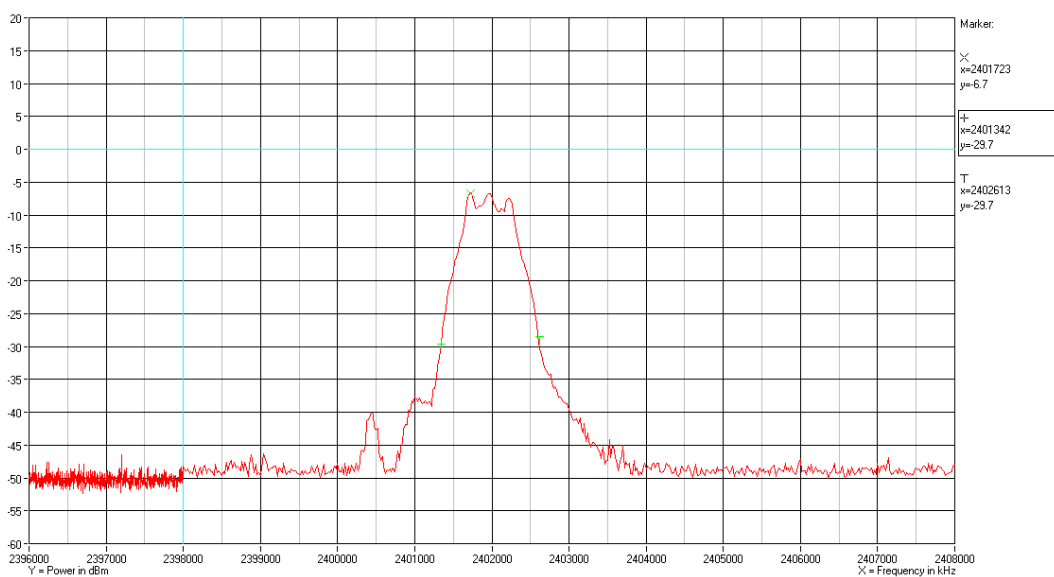
Photo 1.15.2 Test setup regarding measurement of occupied bandwidth, IC, GN radio.



#### 4.16 Measurement of occupied bandwidth, IC, BTLE radio

Test object	Baha5	Sheet	PROF-15
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000038P	Date	11 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests		

Test method	IC Standard RSS-Gen, Issue 3:2010 - Section 4.6.1	Temperature	21 °C
Characteristics	Test voltage: External power supply at 1.45 VDC	Humidity	40 % RH
Test equipm.	SRD lab Hørsholm 49550	Uncertainty	1.1 dB
SA Settings	RBW: 100 kHz VBW: 300 kHz SPAN: 12 MHz DET: Peak CF: Operating freq. Trace: Max. hold		



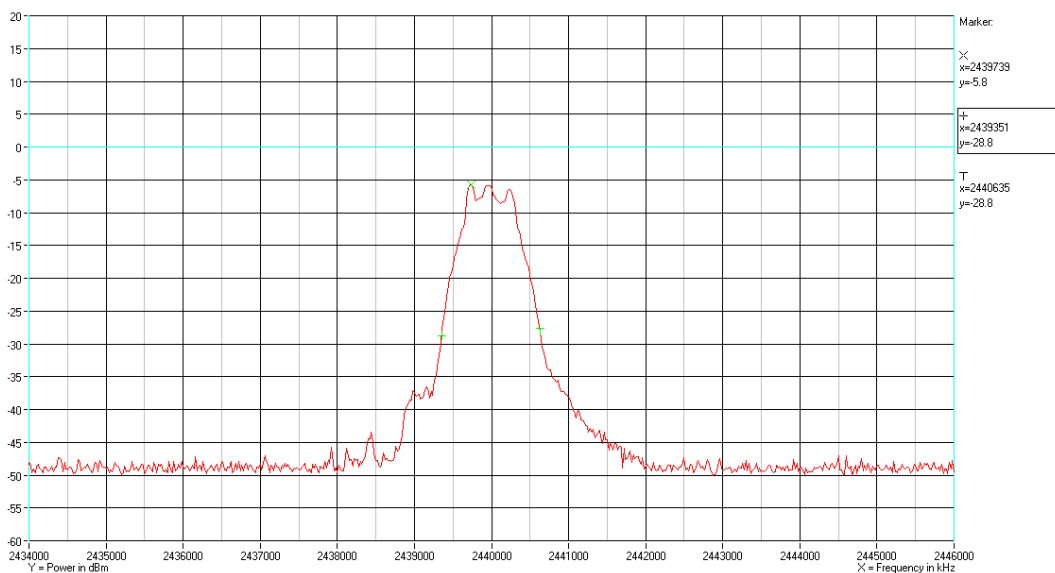
Comments

Operating frequency: 2402 MHz



Test object	Baha5	Sheet	PROF-16
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000038P	Date	11 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests		

Test method	IC Standard RSS-Gen, Issue 3:2010 - Section 4.6.1	Temperature	21 °C
Characteristics	Test voltage: External power supply at 1.45 VDC	Humidity	40 % RH
Test equipm.	SRD lab Hørsholm 49550	Uncertainty	1.1 dB
SA Settings	RBW: 100 kHz VBW: 300 kHz SPAN: 12 MHz DET: Peak CF: Operating freq. Trace: Max. hold		



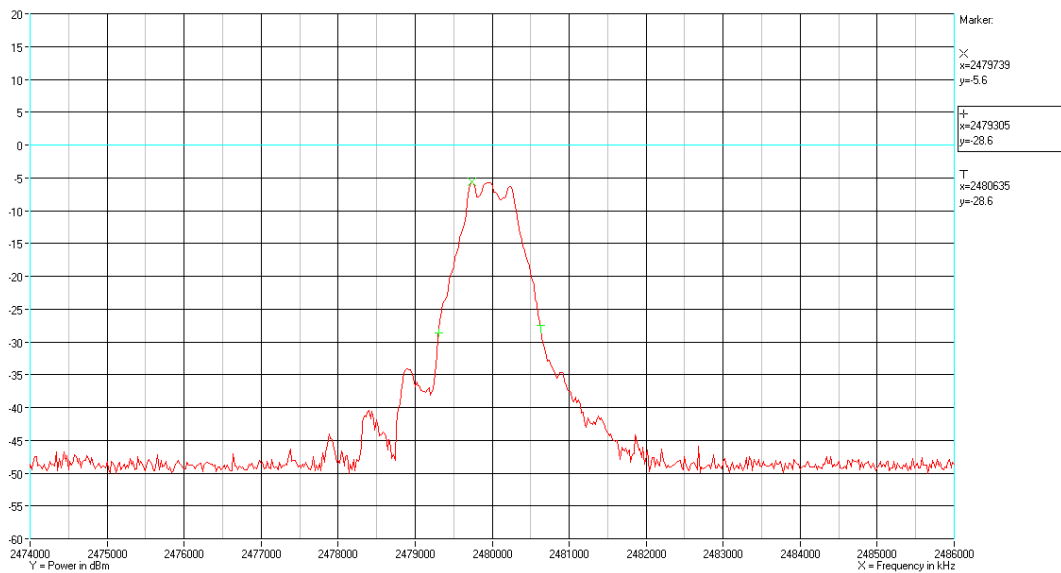
Comments

Operating frequency: 2440 MHz



Test object	Baha5	Sheet	PROF-17
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000038P	Date	11 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests		

Test method	IC Standard RSS-Gen, Issue 3:2010 - Section 4.6.1	Temperature	21 °C
Characteristics	Test voltage: External power supply at 1.45 VDC	Humidity	40 % RH
Test equipm.	SRD lab Hørsholm 49550	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: 2480 MHz





Test object	Baha5	Sheet	PROF-18
Type	Baha@5	Project no.	T208340-3
Serial no.	JOE SP2 301013 000038P	Date	11 July 2014
Client	Cochlear Bone Anchored Solutions AB	Initials	PWF
Specification	See Section 1 Summary of tests		

Test method	IC Standard RSS-Gen, Issue 3:2010 - Section 4.6.1	Temperature	21 °C
Characteristics	Test voltage: External power supply at 1.45 VDC	Humidity	40 % RH
Test equipm.	SRD lab Hørsholm 49550	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]
2402	2401.3	2402.6	1.3
2440	2439.4	2440.6	1.2
2480	2479.3	2480.6	1.3

Note 1:

Band edge criteria	Measured 99 % emission bandwidth (23 dBc)
Test port	Antenna replaced by SMA connector
Test frequency	2402, 2440 and 2480 MHz
Test mode	Continuous Tx - normal modulation - hopping between low, mid and high operating freq.
Condition	Normal
Comments	Test voltage: External power supply at 1.45 VDC



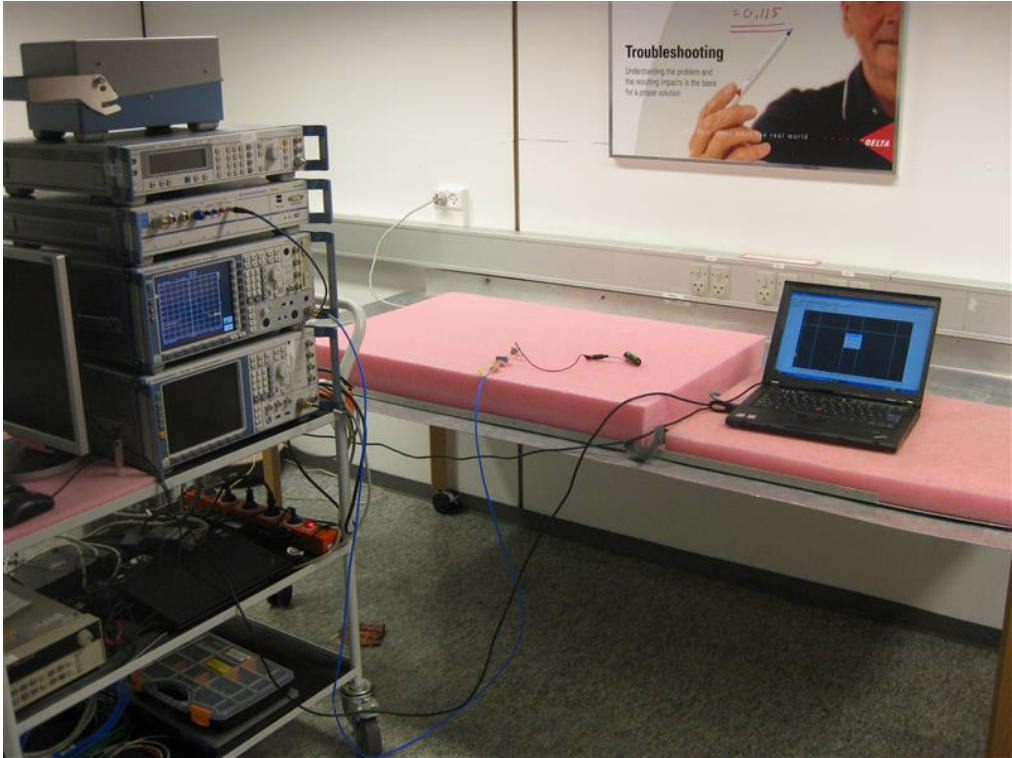


Photo 4.16.1 Test setup regarding measurement of occupied bandwidth, IC, BTLE radio.

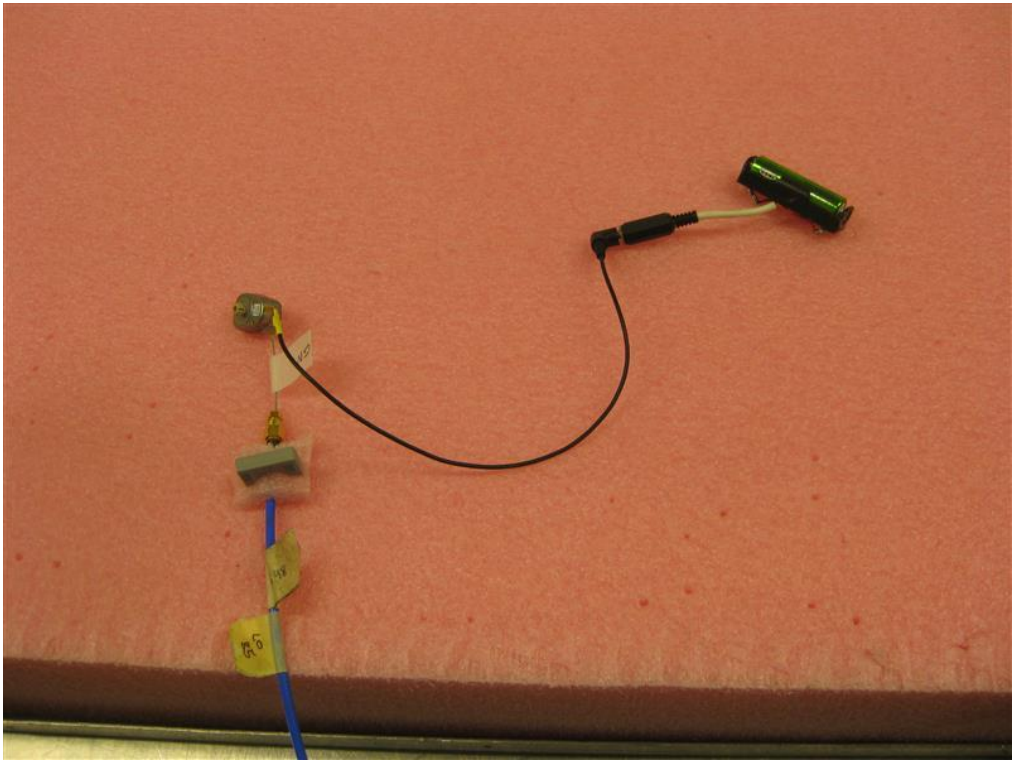


Photo 4.16.2 Test setup regarding measurement of occupied bandwidth, IC, BTLE radio.



## 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.

### 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	07-06-2013	07-06-2015
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	-	-
49421	IMPULSE VOLTAGE LIMITER (BNC)	ROHDE & SCHWARZ	ESH3/Z2	10-09-2013	10-09-2014
49550	SIGNAL ANALYZER	ROHDE & SCHWARZ	FSQ8	09-08-2013	09-08-2014
49600	SPECTRUM ANALYZER / MEASUREMENT RECEIVER	ROHDE & SCHWARZ	ESU40	22-01-2014	22-01-2015
49625	SRD COAX SWITCH MATRIX USED IN 1 GHz TO 26 GHz SRD ANTENNASYSTEM	DELTA	COAX SWITCH MATRIX	17-07-2013	17-07-2014
49663	DC POWER SUPPLY	Agilent	66319D	26-11-2013	26-11-2014
49712	DUAL RIDGE HORN ANTENNA – 1 GHz – 26 GHz (2 GHz – 32 GHz)	SATIMO	SH2000	19-09-2011	19-09-2014

