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Datum/Date
2003-10-07

Beteckning/Reference
F312564-F95

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Equipment Authorization measurements on FRS Transceiver Unit with FCC ID: NUVMT53H74 (7 enclosures)

Test object

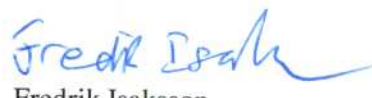
Peltor Power Com, art no. MT53H7*46** ***** 4, no serial no, marked with "sample #1".

Summary

Standard	Compliant	Enclosure	Remarks
FCC CFR 47			
2.1046 RF Power output	Yes	2	
2.1047 Modulation characteristics	Yes	3	
2.1049 Occupied bandwidth	Yes	4	
2.1053 Field strength of spurious radiation	Yes	5	
2.1055 Frequency stability	Yes	6	

**SP - Swedish National Testing and Research Institute
Electronics - EMC**


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SP, Swedish National Testing and Research Institute, Box 857, S-501 15 BORÅS, SWEDEN, Telephone + 46 33 16 50 00, Telefax + 46 33 13 55 02, E-mail info@sp.se, Reg.No 556464-6874

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FCC ID: NUVMT53H74

Test object-Technical description

Description - Equipment Under Test (EUT)

Equipment: FRS Transceiver
Tx Frequency range: 462.5625 – 467.7125 MHz
Emission type: F3E
Emission bandwidth: 12.5 kHz

Tested Channels:
Ch. 1 462.5625 MHz
Ch. 7 462.7125 MHz
Ch. 14 467.7125 MHz

Article number: MT53H7*46** ***** 4
Serial number: -

The EUT had the following settings during the tests:

Surround 3
Volume 3
Vox 3
Squelch 1
Subchannel off

The power mode was set to high power, which was deemed to be the worst case.

A temporary antenna connector was used in some measurements.

Manufacturer's representative:

Technical Lars Carlborg, Peltor AB
Certification Mike Cimino

Purpose of test

The purpose of the tests is to verify compliance with the performance characteristics specified in FCC CFR47.

Reservation

The test results in this report apply only to the particular Equipment Under Test (EUT) as declared in the report.

Delivery of test object

The test object was delivered: 2003-09-30.

RF Power output measurements according to 47CFR 2.1046

Date 2003-10-02	Temperature 22 °C ± 3 °C	Humidity 40 % ± 5 %
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Test set-up and Procedure

The measurements were made per 47CFR 95.639. The Effective Radiated Power (ERP) measurements were made in a fully anechoic chamber. Substitution measurement according to TIA-603-B was performed. Measurements were performed at ch.1 and ch.14. Measurements were done at 3 m distance.

The measurement was also repeated with the temporary antenna connector to verify the RF power without the internal antenna. The measurement with the temporary antenna connector was performed with an external power supply.

Measurement equipment	Calibration Due	SP number
Anechoic chamber, Hertz	-	15:116
R&S ESI 26	2004-06	503 292
Chase bilog antenna CBL 6121A	2004-05	502 460
Schwarzbeck Precision dipole UHAP	2004-07	500 592
R&S Signal generator SMHU	2004-10	503 254
Artificial head	-	503 538
Fluke 83 DMM	2004-10	501 521
Boonton RF peak power meter 4500A	2004-01	503 144
Boonton RF peak power sensor 56518-S/4	2004-01	503 145
HP DC power supply E3632A	-	503 170
Testo 610 Temperature and humidity meter	2004-12	502 658

The test set-up during the RF power output measurements can be seen in the picture below.



Results

ERP (radiated)

Polarisation of the measurements for the largest power level: Vertical

Test conditions		ERP (dBm)	
		Channel 1	Channel 14
T_{nom} 22 °C	V_{nom} 3.0 V DC	17.6	17.6
Measurement uncertainty		3,2 dB	

RF output power, conducted

Test conditions		RF output power (dBm)	
		Channel 1	Channel 14
T_{nom} 22 °C	V_{nom} 3.0 V DC	21.3	20.6
Measurement uncertainty		0,7 dB	

Limit

According to 47CFR 95.639(d), no FRS unit shall exceed 0.5 W (27 dBm) ERP.

Complies?	Yes
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Modulation characteristics measurements according to 47CFR 2.1047

Date	Temperature	Humidity
2003-10-03	21 °C ± 3 °C	36 % ± 5 %
2003-10-06	22 °C ± 3 °C	37 % ± 5 %

Test set-up and Procedure

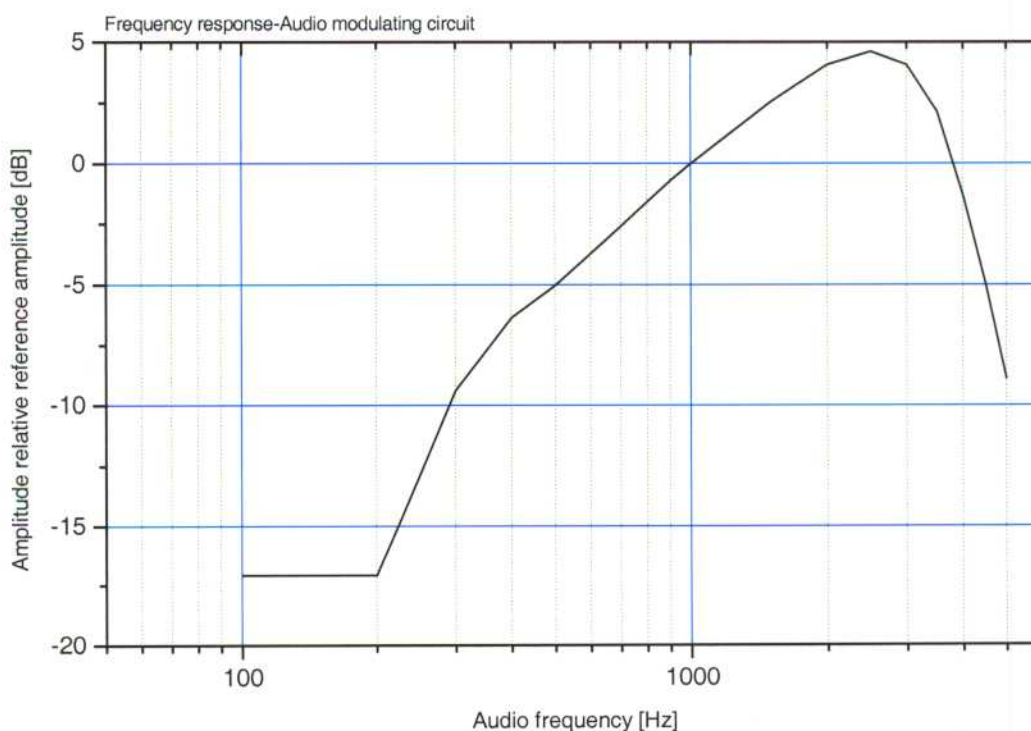
The measurements were made per 47CFR 95.637 and TIA-603-B. A temporary antenna connector was used during the measurement. The EUT was set to channel 7. An external 10 MHz reference was connected to the radiocommunication analyser during the test.

Measurement equipment	Calibration Due	SP number
R&S CMTA 54 Radiocommunication analyser	2004-04	502 173
Fluke 83 DMM	2004-10	501 521
Testo 610 Temperature and humidity meter	2004-12	502 658

Results

Audio frequency response:

Constant Input Test Method according to TIA-603-B was used.





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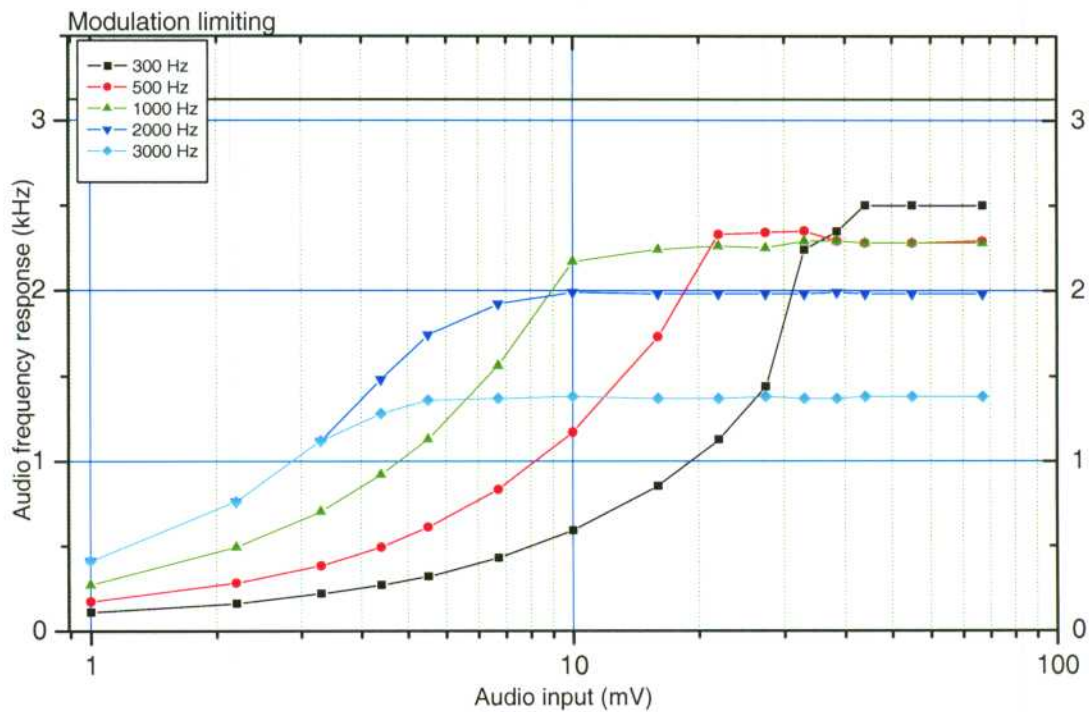
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Modulating limiting:

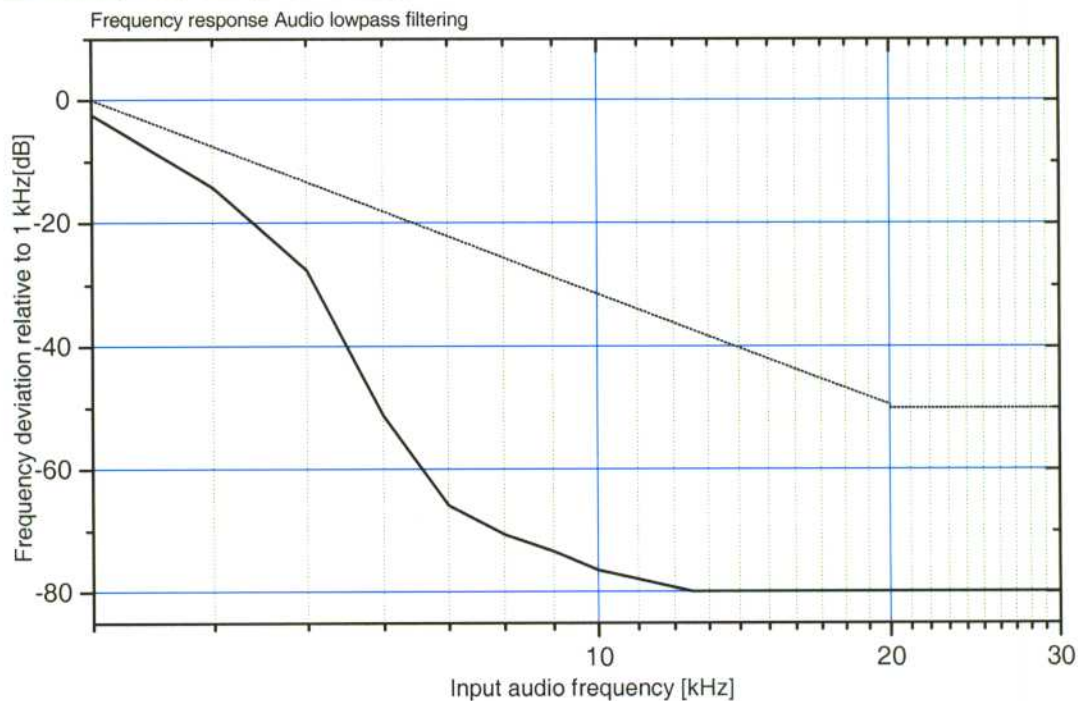
The audio frequency was varied between 300 Hz to 3000 Hz according to TIA-603-B.



Limit

According to 47CFR 95.637(a), the audio frequency response must not exceed 3.125 kHz.

Audio frequency low pass filtering:



Limits

According to 47CFR 95.637(b), at any frequency (f in kHz) between 3 and 20 kHz, the filter must have an attenuation of at least $60 \log(f/3)$ dB greater than the attenuation at 1 kHz. Above 20 kHz, it must have an attenuation of at least 50 dB greater than the attenuation at 1 kHz.

Complies?	Yes
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Occupied bandwidth measurements according to 47CFR 2.1049

Date 2003-10-07	Temperature 22 °C ± 3 °C	Humidity 39 % ± 5 %
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Test set-up and Procedure

The measurements were made per 47CFR 95.635 and TIA-603-B. A temporary antenna connector was used during the measurement. Measurements were performed at ch.1 and ch.14. An external 10 MHz reference was connected to the signal analyser during the test.

Measurement equipment	Calibration Due	SP number
R&S FSIQ	2004-03	502 738
Fluke 83 DMM	2004-10	501 521
Testo 610 Temperature and humidity meter	2004-12	502 658

Measurement uncertainty: 2.9 dB

Results

- Diagram 1 Ch 1 Reference level, unmodulated carrier
Diagram 2 Ch 1 Audio frequency=2.5 kHz, 16 dB greater than that necessary to produce 50% of rated system deviation (2.5 kHz)

Diagram 3 Ch 14 Reference level, unmodulated carrier
Diagram 4 Ch 14 Audio frequency=2.5 kHz, 16 dB greater than that necessary to produce 50% of rated system deviation (2.5 kHz)

Limits

According to 47CFR 95.635(1)(3)(7).

Complies?	Yes
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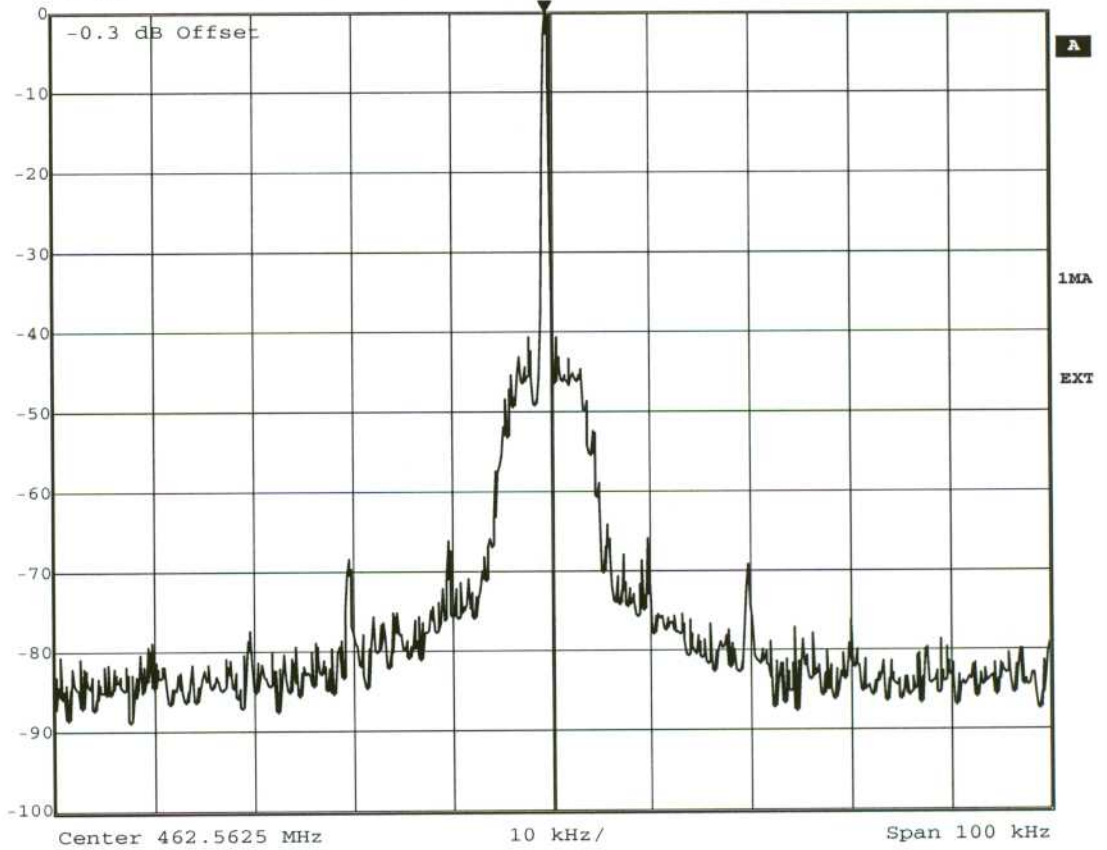
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Diagram 1 (4)
Encl. 4.1



Marker 1 [T1] RBW 300 Hz RF Att 20 dB
Ref Lvl -0.05 dBm VBW 5 kHz
0 dBm 462.56219940 MHz 1 SWT 5.6 s Unit dBm



Date: 7.OCT.2003 09:14:23



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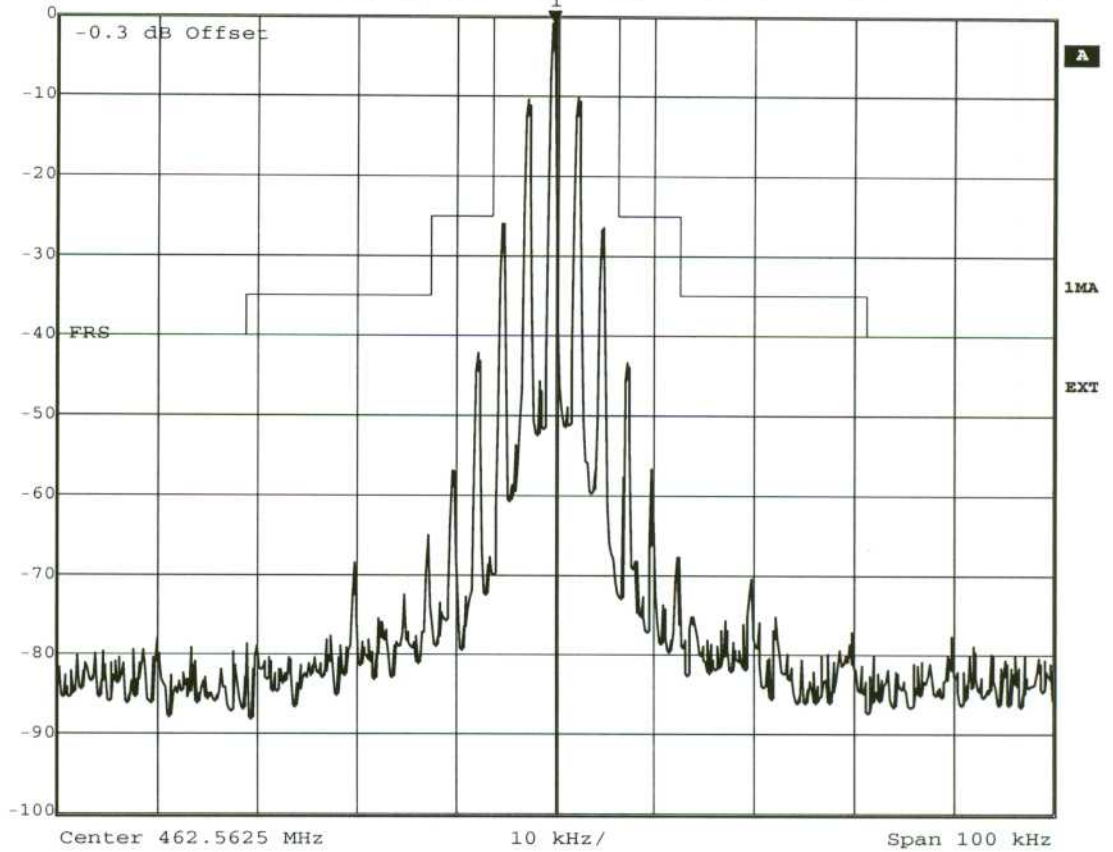
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Diagram 2 (4)
Encl. 4.1



Marker 1 [T1] RBW 300 Hz RF Att 20 dB
Ref Lvl -0.98 dBm VBW 5 kHz
0 dBm 462.56239980 MHz SWT 5.6 s Unit dBm



Date: 7.OCT.2003 09:28:43



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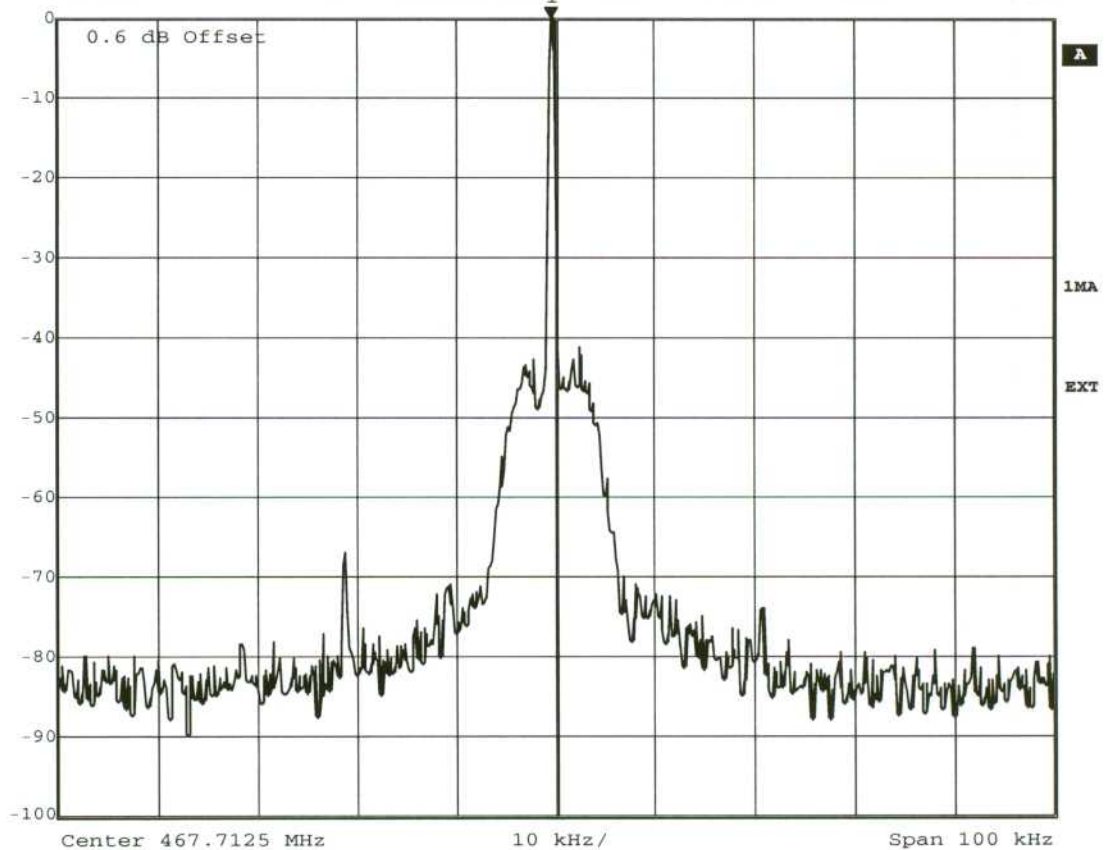
Datum/Date
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Diagram 3 (4)
Encl. 4.1



Marker 1 [T1] RBW 300 Hz RF Att 20 dB
Ref Lvl 0.03 dBm VBW 5 kHz
0 dBm 467.71219940 MHz 1 SWT 5.6 s Unit dBm



Date: 7.OCT.2003 10:15:08

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Datum/Date
2003-10-07

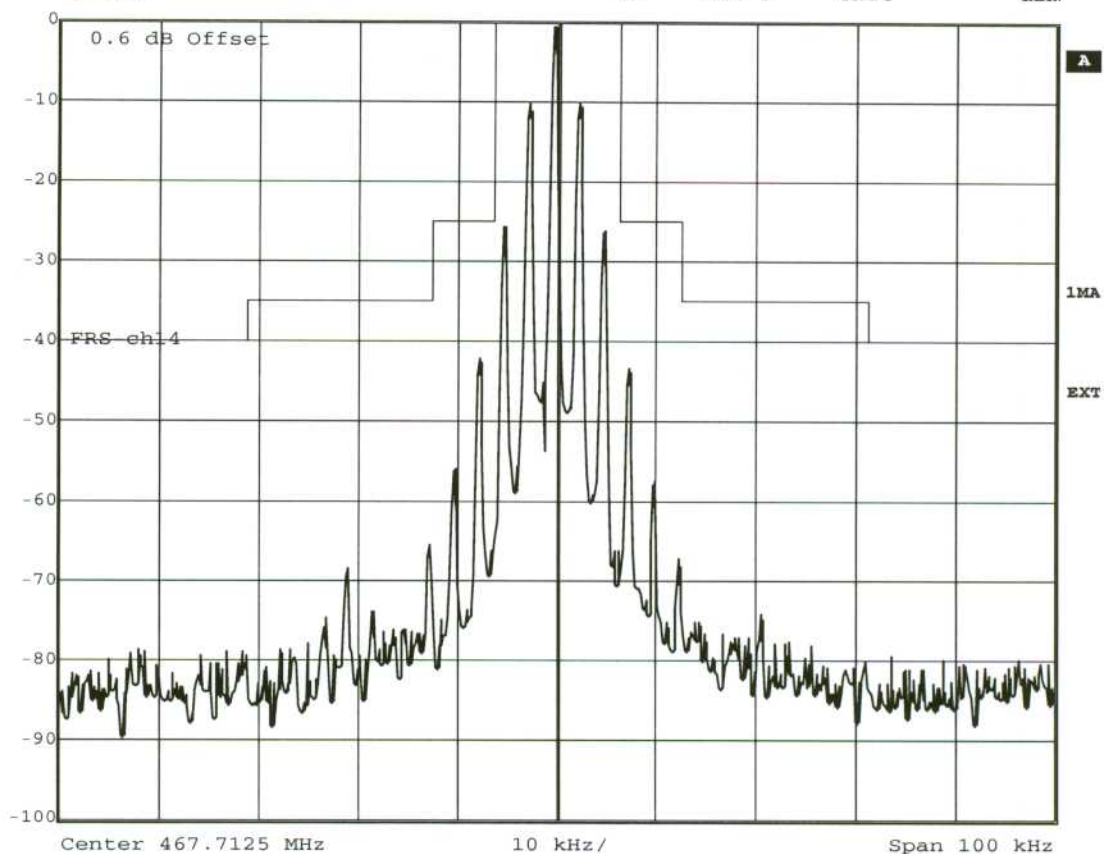
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Diagram 4 (4)
Encl. 4.1



Ref Lvl
0 dBm

RBW 300 Hz RF Att 20 dB
VBW 5 kHz
SWT 5.6 s Unit dBm



Date: 7.OCT.2003 10:16:40

Field strength of spurious radiation measurements according to 47CFR 2.1053

Date 2003-10-02	Temperature 22 °C ± 3 °C	Humidity 40 % ± 5 %
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Test set-up and Procedure

The measurements were made per 47CFR 95.635. The field strength of spurious radiation measurements were made in a fully anechoic chamber. Substitution measurement according to TIA-603-B was performed. Measurements were performed at ch.1 and ch.14. The tests were performed both with and without the connection of the external attachment cable. Measurements were done at 3 m distance.

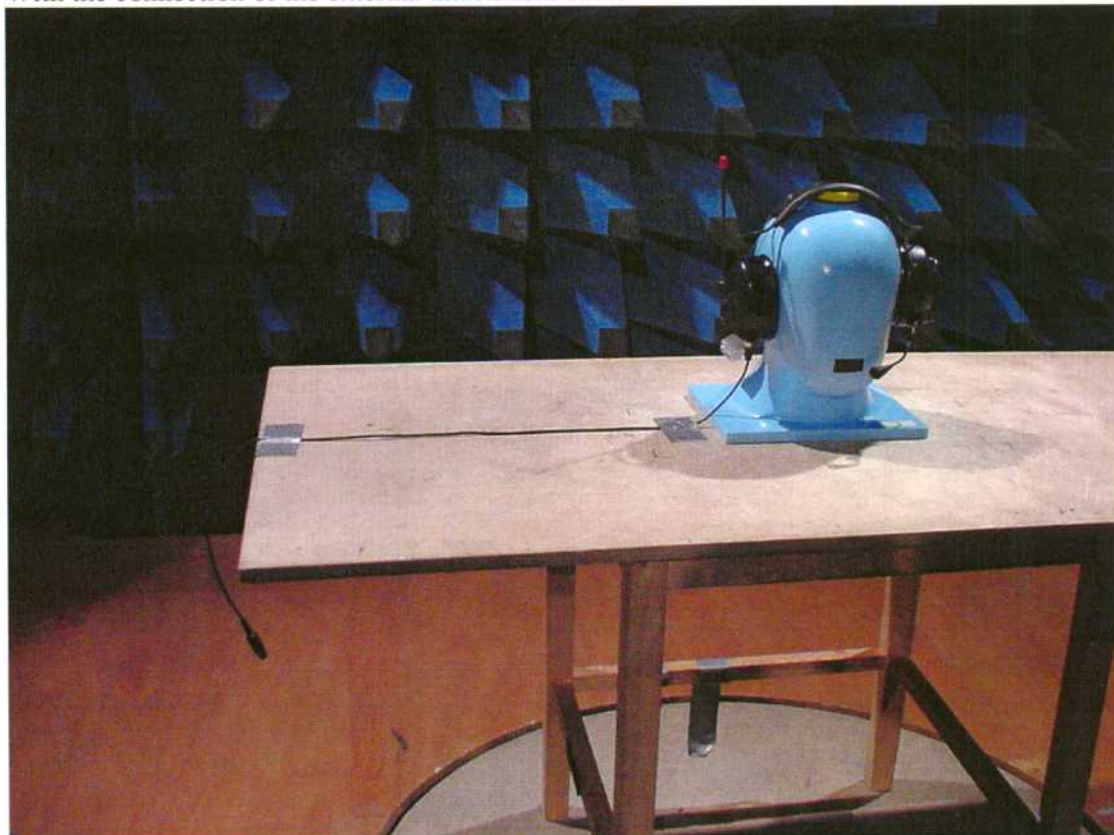
Measurement equipment	Calibration Due	SP number
Anechoic chamber, Hertz	-	15:116
R&S ESI 26	2004-06	503 292
Chase bilog antenna CBL 6121A	2004-05	502 460
Chase bilog antenna CBL 6111A	2004-07	502 181
EMCO Horn Antenna 3115	2004-11	502 175
EMCO Horn Antenna 3115	2005-04	501 548
R&S Vector Network Analyzer ZVK	2004-09	503 687
Artificial head	-	503 538
Testo 610 Temperature and humidity meter	2004-12	502 658

The test set-up during the spurious radiation measurements can be seen in the pictures on page 2.

Without the connection of the external attachment cable:



With the connection of the external attachment cable:



Results

Without the connection of the external attachment cable:

Ch. 1 Frequency (MHz)	Spurious emission level (dBm)	
	Vertical	Horizontal
925.12	-28.6	-27.5
1 378.69	—	-32.1
3 237.94	-29.0	-21.7
30-5 000	All other emission > 20 dB below limit	All other emission > 20 dB below limit
Measurement uncertainty		3.2 dB

Ch. 14 Frequency (MHz)	Spurious emission level (dBm)	
	Vertical	Horizontal
935.42	-29.8	-30.2
3 273.99	—	-27.1
30-5 000	All other emission > 20 dB below limit	All other emission > 20 dB below limit
Measurement uncertainty		3.2 dB

With the connection of the external attachment cable:

Ch. 1 Frequency (MHz)	Spurious emission level (dBm)	
	Vertical	Horizontal
3 237.94	-30.2	-23.6
30-5 000	All other emission > 20 dB below limit	All other emission > 20 dB below limit
Measurement uncertainty		3.2 dB

Ch. 14 Frequency (MHz)	Spurious emission level (dBm)	
	Vertical	Horizontal
3 273.99	—	-28.1
30-5 000	All other emission > 20 dB below limit	All other emission > 20 dB below limit
Measurement uncertainty		3.2 dB

Limits

The power of any emission outside the frequency band shall be attenuated below the transmitter power (P) by at least $43 + 10 \log P$ dB.

Complies?	Yes
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Frequency stability measurements according to 47CFR 2.1055

Date	Temperature	Humidity
2003-10-07	21 °C ± 3 °C	38 % ± 5 %
2003-10-08	21 °C ± 3 °C	36 % ± 5 %

Test set-up and Procedure

The measurements were made per 47CFR 95.627 and TIA-603-B. A temporary antenna connector was used during the measurement. The EUT was set to channel 7. An external 10 MHz reference was connected to the radiocommunication analyser during the test.

Measurement equipment	Calibration Due	SP number
R&S CMTA 54 Radiocommunication analyser	2004-04	502 173
Climate chamber	2004-10	500 082
Fluke 83 DMM	2004-10	501 521
Testo 610 Temperature and humidity meter	2004-12	502 658

Results

Test conditions		Frequency error (kHz)
Supply voltage DC (V)	T (°C)	Channel 7 462.7125 MHz
3.45	+20	-0.25
3.0	+20	-0.22
2.55	+20	-0.25
2.0	+20	-0.25
3.0	+30	-0.30
3.0	+40	-0.53
3.0	+50	-0.51
3.0	+10	+0.12
3.0	0	+0.34
3.0	-10	+0.41
3.0	-20	+0.21
3.0	-30	-0.03
Maximum freq. error (kHz)		-0.53
Measurement uncertainty		< ± 1 x 10 ⁻⁸

Limits

According to 47CFR 95.627(b), each FRS unit must be maintained within a frequency tolerance of 0.00025% (1.2 kHz).

Complies?	Yes
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Sign: 

Photos

EUT



EUT, identity



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FCC identity

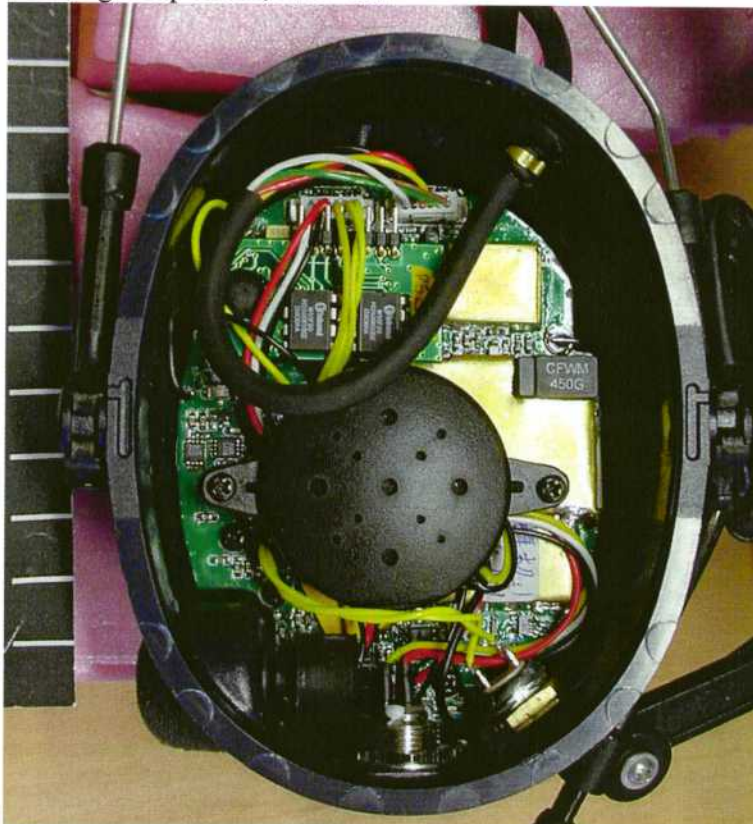
FCC ID: NUVMT53H74

EUT, right cap

EUT, left cap



EUT, right cap inside, over-view



EUT, right cap inside, close-up (speaker dismounted)



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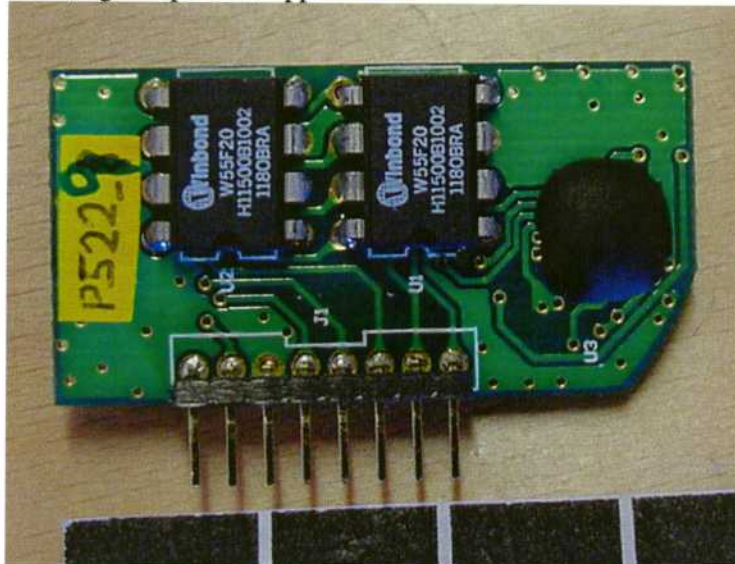
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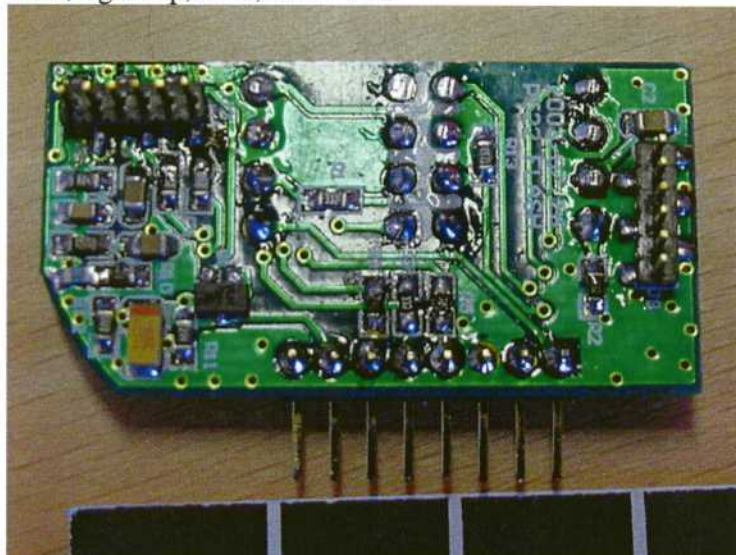
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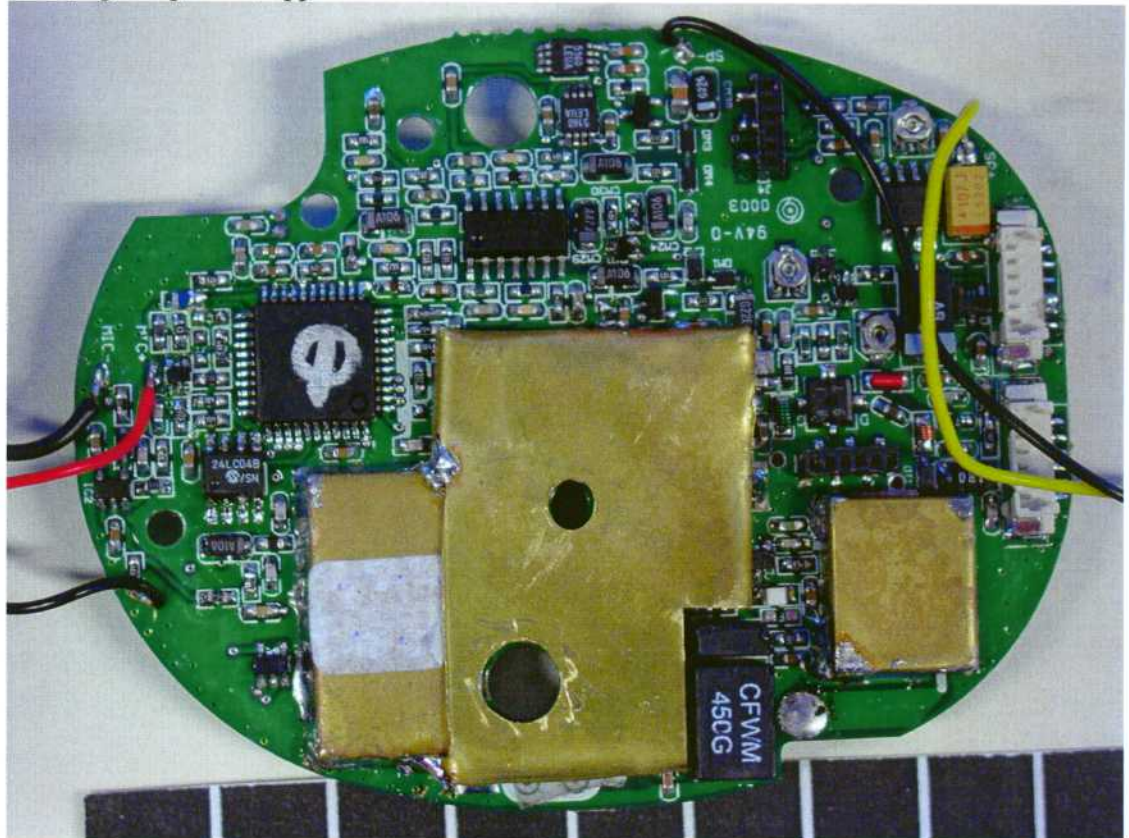
EUT, right cap, PCB, upper side



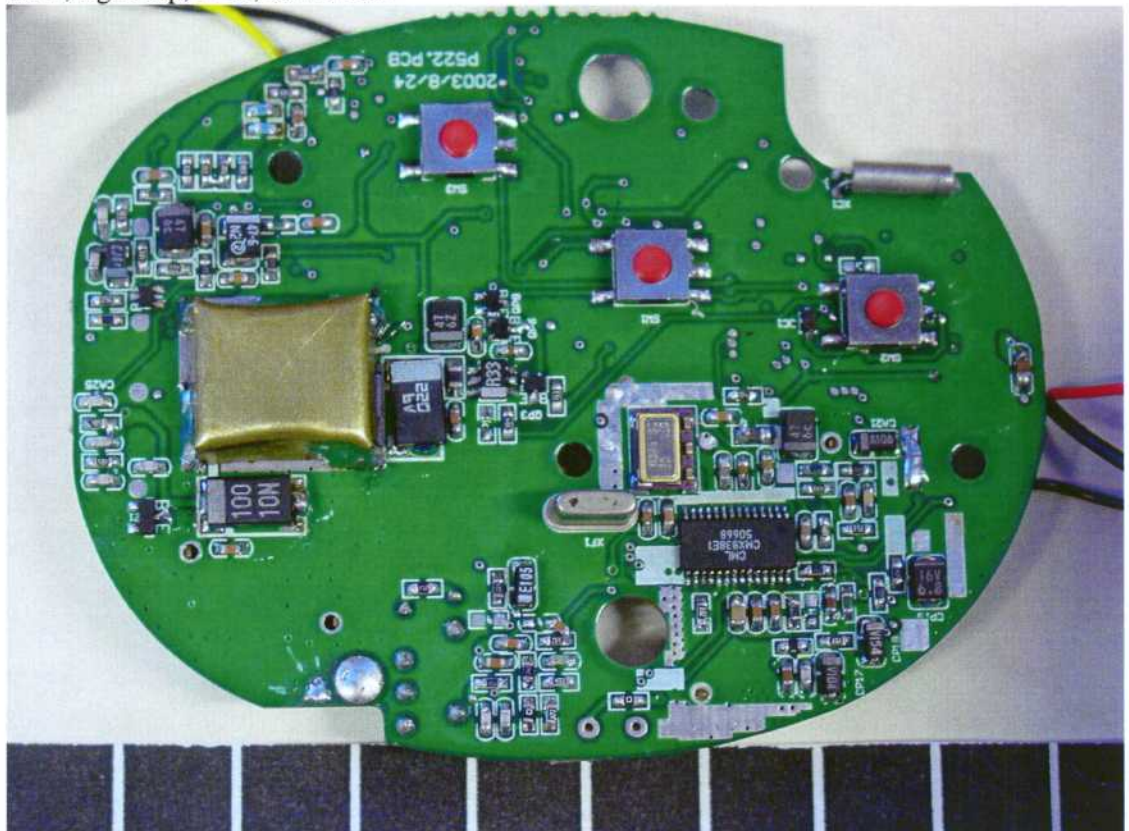
EUT, right cap, PCB, lower side



EUT, right cap, PCB, upper side



EUT, right cap, PCB, lower side



EUT, left cap inside, over-view



EUT, left cap inside, close-up (speaker dismantled)

