CETECOM ICT Services GmbH
Untertürkheimer Str. 6-10, 66117 Saarbruecken Phone: +49 (0) 681 598-0 Fax: -9075
RSC-Laboratory Phone: +49 (0) 681 598-8412 Fax: -8484

Recognized by the
Federal Communications Commission
Anechoic chamber registration no.: 90462 (FCC)
Anechoic chamber registration no.: IC 3462C-1
TCB ID: DE 0001

Accredited by the
German Accreditation Council
DAR–Registration Number
DAT-P-176/94-D1

Accredited Bluetooth® Test Facility (BQTF)

Test report no.	**:**	**1-1117-01-13/09**
Applicant	**:**	**Hansaton Akustik GmbH**
Type	**:**	**VELVET Slim**
Test Standard	**:**	**47 CFR Part15** **RSS-210 Issue 7**
FCC ID	**:**	**WU7-WL002SLIM**
Certification No. IC	**:**	**-**

Table of contents

1. Administrative data

1.1. Administrative data of the test facility

1.1.1 Identification of the testing laboratory

Company name:	Cetecom ICT Services GmbH
Address:	Untertürkheimerstr. 6-10 D-66117 Saarbruecken Germany
Laboratory accreditation:	DAR-Registration No. DAT-P-176/94-D1 Bluetooth Qualification Test Facility (BQTF)
Responsible for testing laboratory:	Dipl.-Ing. (FH) Stefan Bös Phone: +49 681 598 0 Fax: +49 681 598 9075 email: info@ict.cetecom.de

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Responsible for testing laboratory
(Dipl.-Ing. (FH) Stefan Bös)

1.1.2 Organizational items

Reference No.:	1-1117-01-13/09
Order No.:	-/-
Receipt of EUT:	2009-12-10
Date(s) of test:	2009-12-14 to 2009-12-16
Date of report:	2009-12-16
Number of report pages:	23
Number of pages (annex):	13
Version of template: 1.8	

.....
Responsible for testing
(Dipl.-Ing. (FH) Marco Bertolino)

Note:

The test results of this test report relate exclusively to the item tested as specified in this report. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM ICT Services GmbH.

During the test no hardware and software changes are allowed to be performed at the EUT.

1.1.3 Applicant´s details

Name:	**Hansaton Akustik GmbH**
Street:	**Stückenstraße 48**
Town:	**22081 Hamburg**
Country:	**Germany**
Telephone:	**+49 40 298011-0**
Fax:	**+49 40 298011-28**
Contact:	**Martin Seidel**
E-mail:	**m.seidel@hansaton.de**
Telephone:	**+49 40 298011-62**

1.2 Administrative data of manufacturer / member

Name:	**Hansaton Akustik GmbH**
Street:	**Stückenstraße 48**
Town:	**22081 Hamburg**
Country:	**Germany**
Telephone:	**+49-40 29 80 11 0**
Fax:	**+49 40 298011-28**
Contact:	**Martin Seidel**
E-mail:	**m.seidel@hansaton.de**
Telephone:	**+49 40 298011-62**

1.3 Description of the Equipment under test (EUT)

1.3.1 EUT: Type, S/N etc.

Type of equipment	:	Hearing Aid
Model name	:	VELVET Slim
Manufacturer	:	Hansaton Akustik GmbH
Address	:	Stückenstraße 48
City	:	22081 Hamburg
Country	:	Germany
Tested to Radio Standards Specification(RSS) No.	:	210 Issue 7
Open Area Test Site Industry Canada Number	:	IC 3462C
Frequency Range (or fixed frequency)	:	3.28 MHz
Field Strength	:	-15 dBµV/m @ 30 m
Occupied Bandwidth (99% BW)	:	205.41 kHz
Type of Modulation	:	A1D
Antenna Information	:	Integrated antenna
Emission Designator	:	205KA1D
Transmitter Spurious (worst case)	:	23.3 dBµV/m @ 10m (noise floor)
Receiver Spurious (worst case)	:	23.3 dBµV/m @ 10m (noise floor)
IC no.	:	-
FCC ID	:	WU7-WL002SLIM

ATTESTATION:

DECLARATION OF COMPLIANCE:

I declare that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned Industry Canada standard(s); and that the equipment identified in this application has been subjected to all the applicable test conditions specified in the Industry Canada standards and all of the requirements of the standard have been met.

Laboratory Manager:

2009-12-16	Marco Bertolino	M. Bertolino
Date	Name	Signature

1.3.2 RF Technical Brief Cover Sheet acc. To RSS-102

All Fields must be completed with the requested information or the following codes: N/A for Not Applicable, N/P for Not Performed or N/V for Not Available. Where applicable, check appropriate box.

1. COMPANY NUMBER:	-/-
2. MODEL NUMBER:	-/-
3. MANUFACTURER:	Hansaton Akustik GmbH
4. TYPE OF EVALUATION:	N/A

Declaration of RF Exposure Compliance

ATTESTATION: I attest that the information provided in this test report is correct; that a Technical Brief was prepared and the information it contains is correct; that the device evaluation was performed or supervised by me; that applicable measurement methods and evaluation methodologies have been followed and that the device meets the SAR and/or RF exposure limits of RSS-102.

Name:	Dipl.-Ing. (FH) Marco Bertolino
Company titel:	Expert
Company:	Cetecom ICT Services GmbH

2009-12-16 

Date Signature

1.4 Test Setup

Hardware	:	No information available!
Software	:	No information available!

1.5 Test Specifications

FCC:	CFR Part 15.209, CFR Part 15.223
IC:	RSS 210, Issue 7

2 Statement of Compliance

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

2.1 Summary of Measurement Results

2.1.1 CFR 47 Part 15 Radio frequency devices

Section in this Report	Test Name / Section FCC Part 15	Test Name / Section RSS 210 Issue 7	applicable	Verdict
4.1	§ 15.35 (c) Timing of the transmitter	-/-	YES	Passed
4.2	§ 15.209 (a) FIELDSTRENGTH OF FUNDAMENTAL	2.6	YES	Passed
4.3	§ 15.209 (a) FIELDSTRENGTH OF HARMONICS and SPURIOUS	2.6	YES	Passed
4.4	§ 15.109 Receiver spurious emissions (radiated)	2.6	YES	Passed
4.5	§ 15.107 / 15.207 Conducted Limits	-/-	NO	-/-

3 Measurements and results

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 20 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber.
The receiving antennas are conform with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2003 clause 4.1.5. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test set-ups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received.
The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.4-2003 clause 4.2.
Antennas are conform with ANSI C63.2-1996 item 15.

9kHz - 30 MHz: Quasi Peak measurement, 9kHz Bandwidth, active loop antenna.
30 MHz - 200 MHz: Quasi Peak measurement, 120kHz Bandwidth, trilog antenna
200MHz - 1GHz: Quasi Peak measurement, 120kHz Bandwidth, trilog antenna
>1GHz: Average, RBW 1MHz, VBW 10 Hz, wave guide horn

All measurement settings are according to FCC 15.209 and 15.207

4 FCC Part 15 Subpart C

4.1 Timing of the transmitter

Reference

FCC:	CFR Part SUBCLAUSE § 15.35 (c)
IC:	-/-

The duty cycle of the transmitter is up to 100 % (test mode).

Limits: § 15.35 (c)

(c) Unless otherwise specified, e.g. Section 15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

4.2 Field strength of the fundamental / bandwidth § 15.209 (a)

Reference

FCC:	CFR Part SUBCLAUSE § 15.223
IC:	RSS 210, Issue 7, 2.3

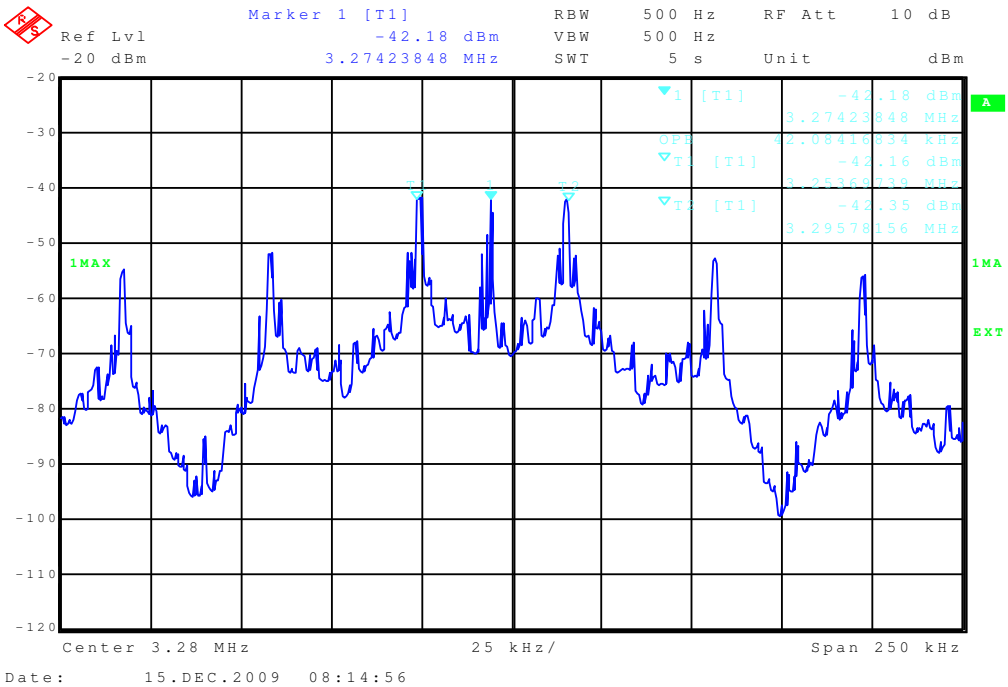
Sample #000362

Results:

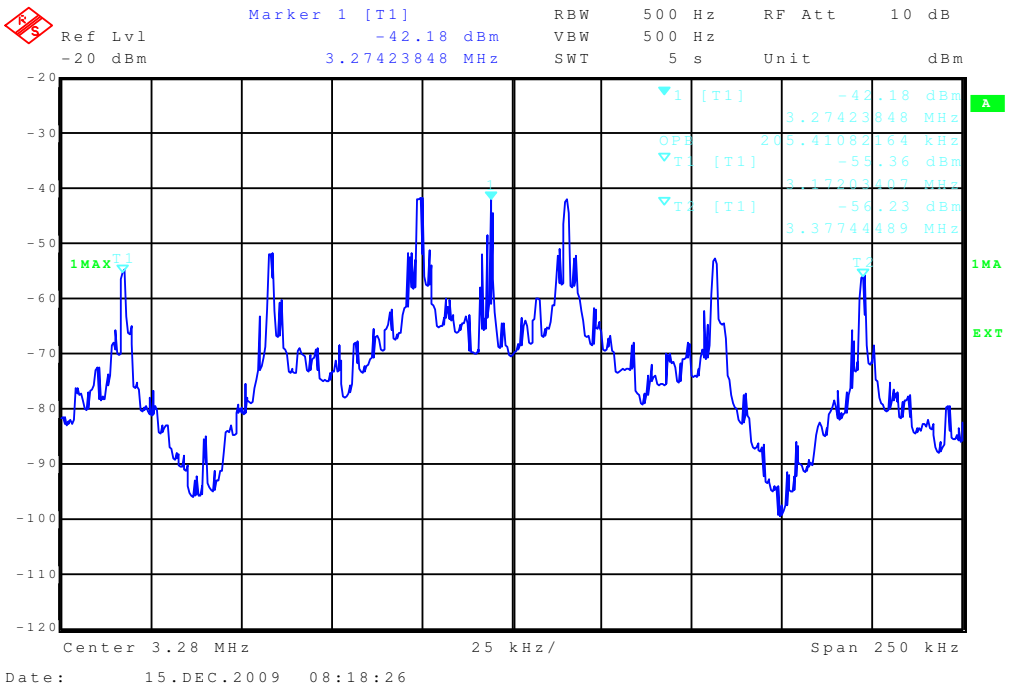
	Occupied Bandwidth (kHz)
75 %	42.08
99 %	205.41
99.5 %	206.41

Measured with the integrated OBW-function of the spectrum analyser Rohde & Schwarz FSIQ26 (measurement criteria is the integrated power in %).

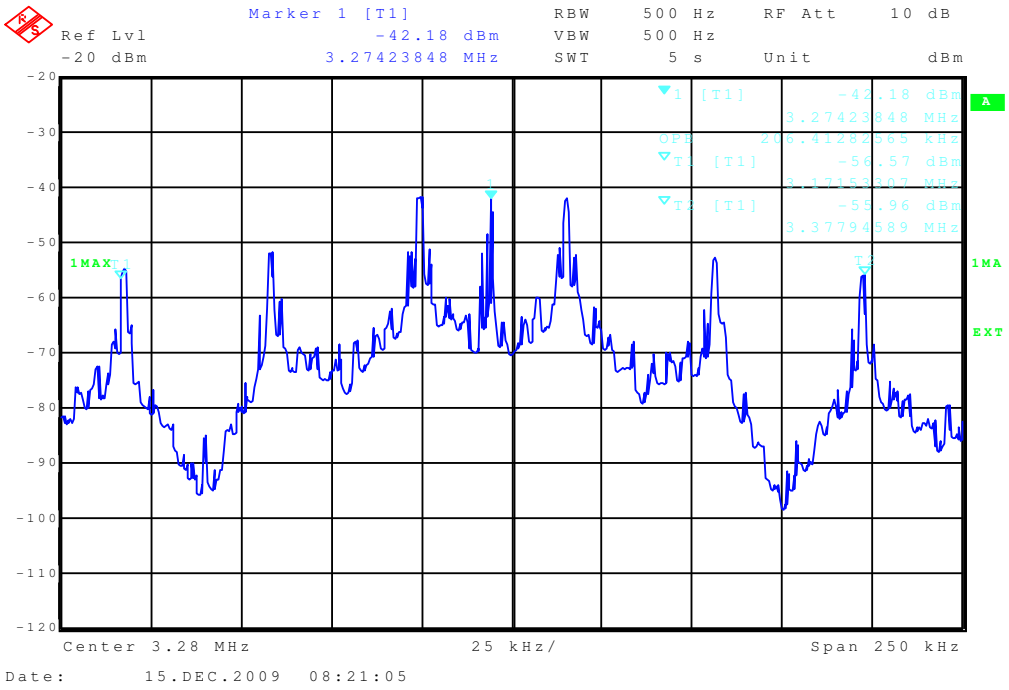
Plot 1: 75%



Plot 2: 99 %



Plot 3: 99.5 %



4.3 Maximum output power (quasi peak) – (radiated)

Reference

FCC:	CFR Part SUBCLAUSE § 15.223
IC:	RSS 210, Issue 7, 2.3

Sample #000362

Power measured

TEST CONDITIONS		Maximum field strength (dBµV/m)	
Frequency		3.28 MHz	
Distance		@ 1 m	@ 30 m
T_{nom}	V_{nom}	45.0 (Noise floor)	**-15** (Noise floor)
Measurement uncertainty		±3dB	

***Calculation:**

Measured maximum field strength @ 1 m: 45.0 dBµV/m

Correction factor from 1m to 10m: -40 dB (40 dB/decade)
45 dBµV/m @ 1 meters - 40 dB = 5 dBµV/m @ 10 meters

Correction factor from 1m to 30m: -60 dB (40 dB/decade)
45 dBµV/m @ 1 meters - 60 dB = -15 dBµV/m @ 30 meters

Limits SUBCLAUSE § 15.223

Fundamental Frequency (MHz)	Field strength of Fundamental (µV/m)	Measurement Distance (meters)
1.705 – 10.0	[15] or [6dB-BW(kHz)/F(MHz)] whichever is higher	30

For measuring equipment calibrated in dBµV/m, the reading should be reduced by 51,5dB to be converted to dBµA/m.

4.4 Field strength of the harmonics and the spurious

Reference:

FCC:	CFR Part SUBCLAUSE § 15.209 (a)
IC:	RSS Gen 4.9, RSS 210, Issue 7, 2.2

Results:

EMISSION LIMITATIONS					
f (MHz)		amplitude of emission (dBµV/m) Average/QP	limit max. allowed emission power **at 3m**	actual attenuation below frequency of operation (dB)	results
No critical peaks detected. All emissions are below the limit.					
Measurement uncertainty		± 3dB			

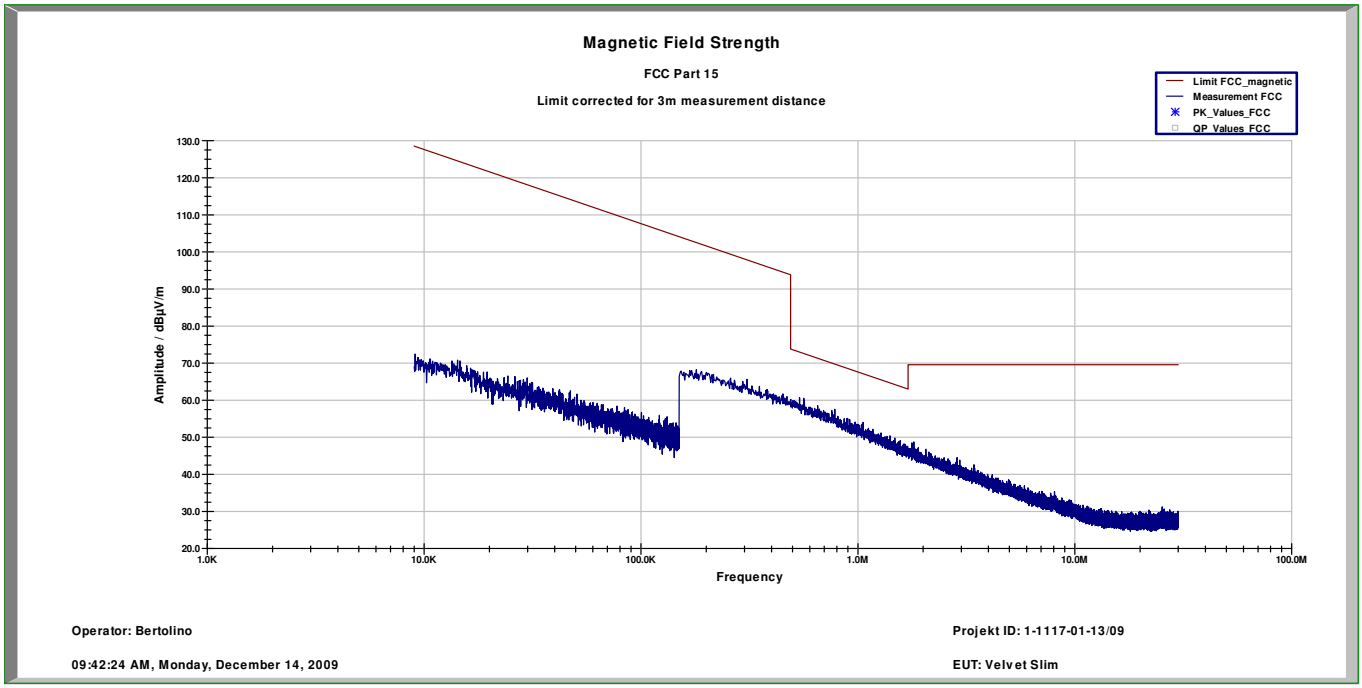
RBW/VBW: 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

Limits **SUBCLAUSE § 15.209 (a)**

Fundamental Frequency (MHz)	Field strength of Fundamental (µV/m)	Measurement Distance (meters)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30.0 – 88.0	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

4.4.1 Plots of measurements

Plot 1: TX mode, 9 kHz – 30 MHz



No critical peaks detected (noise floor).

(To convert the measuring distance from 10m to 30m and 30 to 300m a correction factor from 40 dB/decade was used. Here we use 80 dB to recalculate from 3m to 300m)

Measurement distance 3 m
This measurement was done in 3 planes; the plot shows the worst case.

The values may have some errors because of the small distance between measuring antenna and sample.
Therefore we re-measured all found peaks at 10m.

Plot 2: TX mode, 30 MHz – 1 GHz

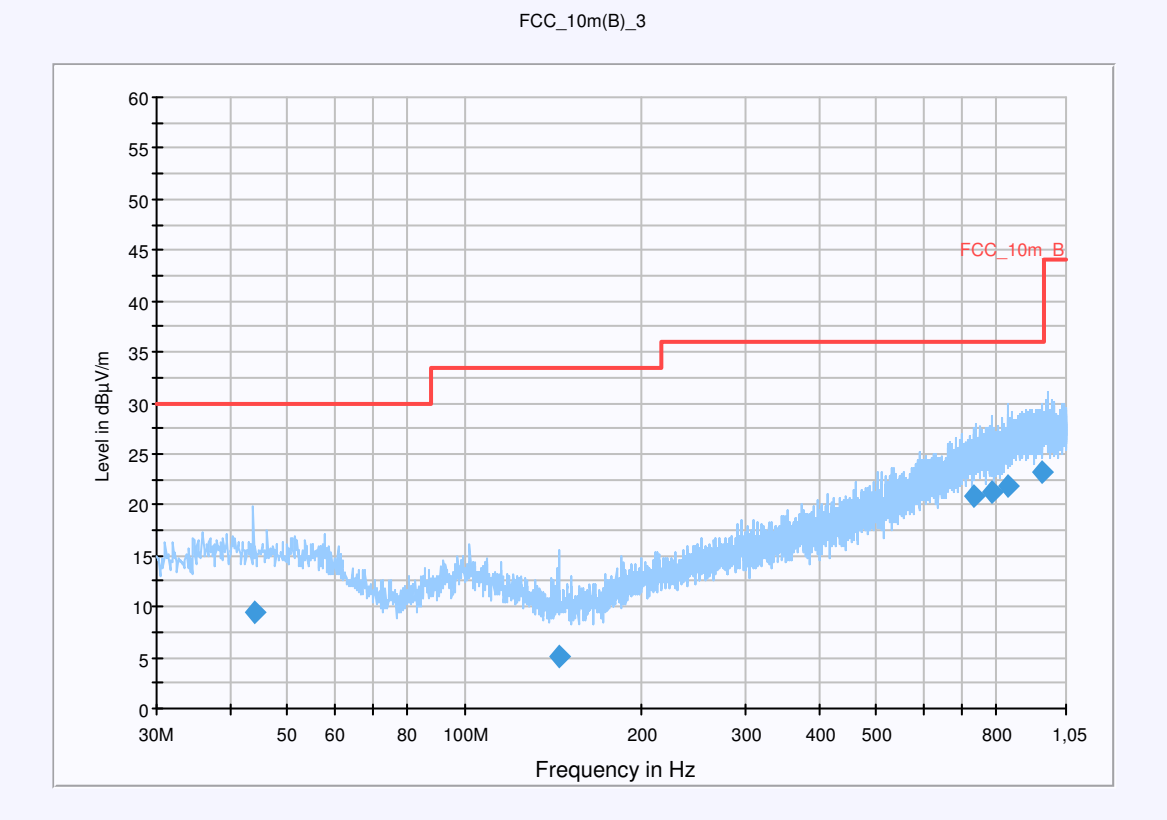
Common Information

EUT:	VELVET Slim
Serial Number:	KZ81248
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	TX @ 3,28 MHz
Operator Name:	Hennemann
Comment:	battery powered (1,4 V)

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Level Unit:	dBµV/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
44.203950	9.4	15000.000	120.000	172.0	V	324.0	13.4	20.6	30.0	
144.449850	5.2	15000.000	120.000	220.0	H	23.0	9.0	28.3	33.5	
731.677350	20.9	15000.000	120.000	113.0	V	2.0	23.7	15.1	36.0	
784.498800	21.3	15000.000	120.000	220.0	V	151.0	24.3	14.7	36.0	
836.632200	21.9	15000.000	120.000	220.0	H	92.0	24.9	14.1	36.0	
955.784550	23.3	15000.000	120.000	98.0	V	230.0	25.9	12.7	36.0	

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (0909)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.10.00

4.5 Receiver spurious emission (radiated)

Reference:

FCC:	CFR Part SUBCLAUSE § 15.109
IC:	RSS Gen 4.10/6, RSS 210, Issue 7, Section 2.6

Results:

SPURIOUS EMISSIONS LEVEL (µV/m)								
Receiver mode								
F [MHz]	Detector	Level [µV/m]	F [MHz]	Detector	Level [µV/m]	F [MHz]	Detector	Level [µV/m]
No critical peaks detected. All emissions are below the limit.								
Measurement uncertainty			±3 dB					

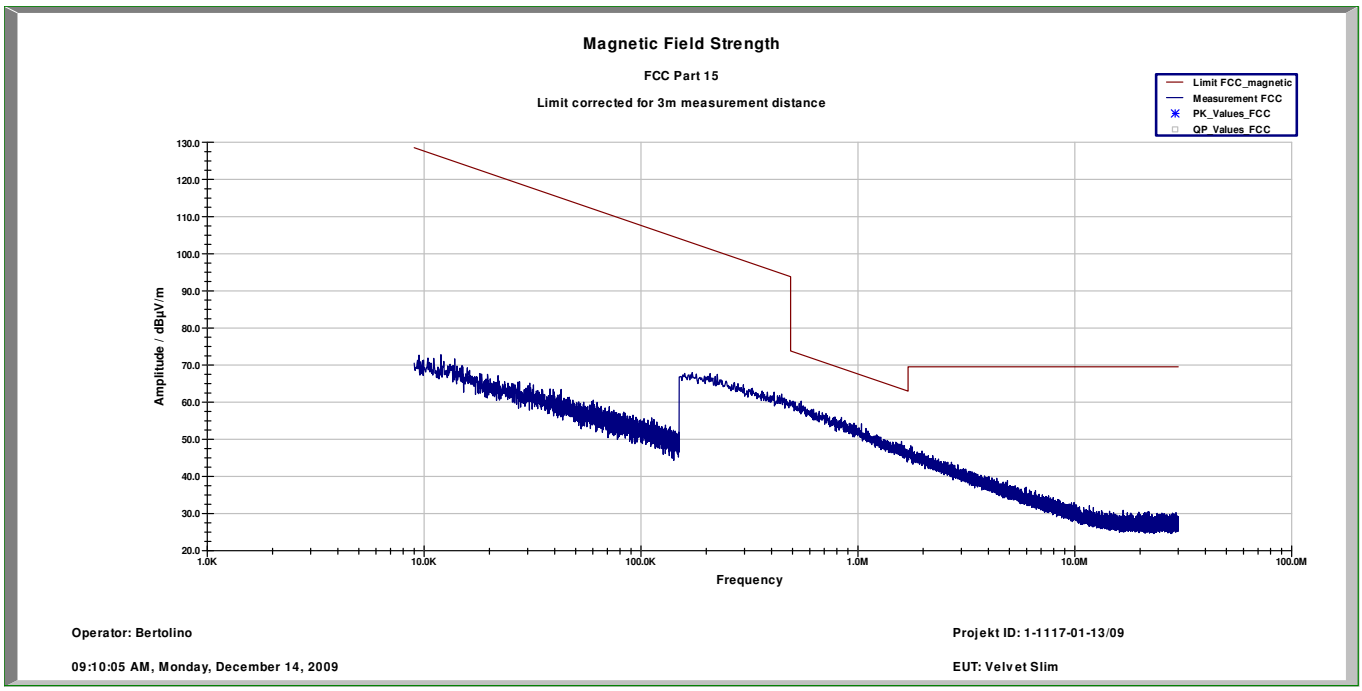
f < 1 GHz : RBW/VBW: 100 kHz f ≥ 1GHz : RBW/VBW: 1 MHz

Limits **SUBCLAUSE § 15.109**

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

4.5.1 Plots of measurements

Plot 1: TX mode, 9 kHz – 30 MHz



No critical peaks detected (noise floor).

(To convert the measuring distance from 10m to 30m and 30 to 300m a correction factor from 40 dB/decade was used. Here we use 80 dB to recalculate from 3m to 300m)

Measurement distance 3 m
This measurement was done in 3 planes; the plot shows the worst case.

The values may have some errors because of the small distance between measuring antenna and sample.
Therefore we re-measured all found peaks at 10m.

Plot 2: TX mode, 30 MHz – 1 GHz

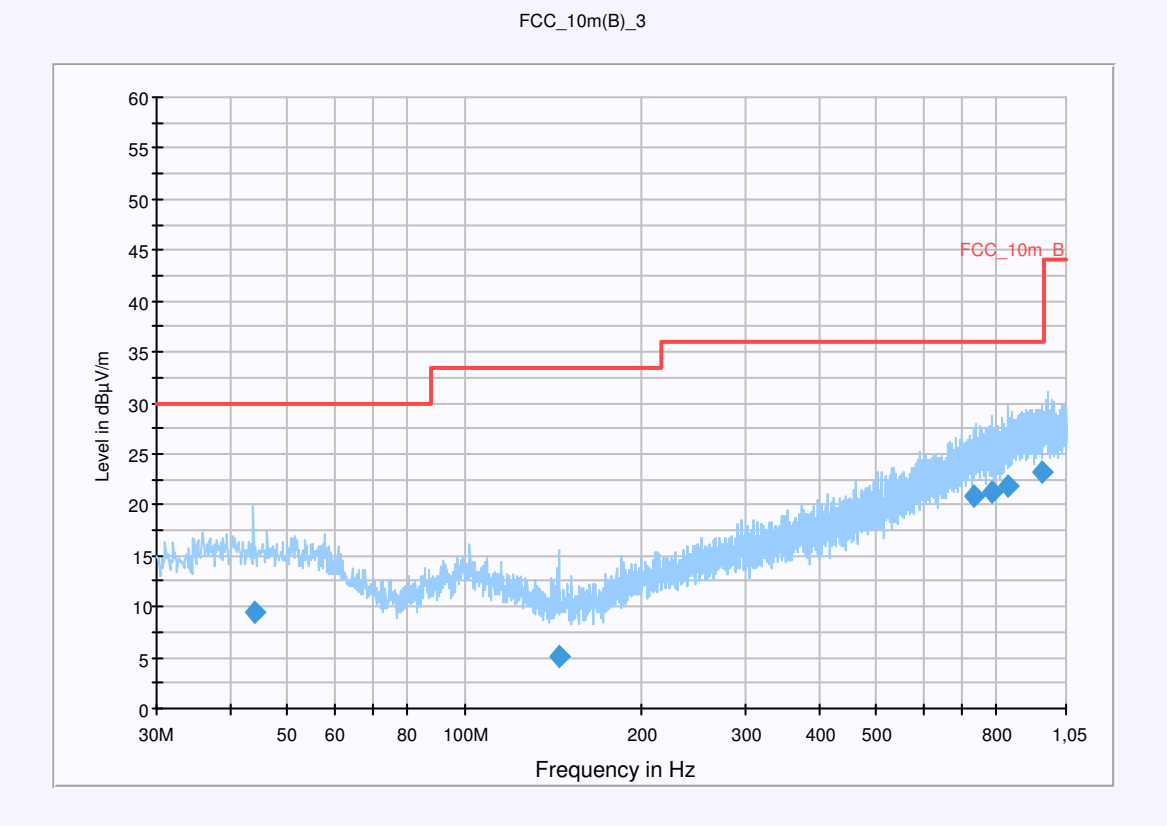
Common Information

EUT:	VELVET Slim
Serial Number:	KZ81248
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	TX @ 3,28 MHz
Operator Name:	Hennemann
Comment:	battery powered (1,4 V)

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Level Unit:	dBµV/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
44.203970	9.4	15000.000	120.000	172.0	V	324.0	13.4	20.6	30.0	
144.449850	5.2	15000.000	120.000	220.0	H	23.0	9.0	28.3	33.5	
731.677340	20.9	15000.000	120.000	113.0	V	2.0	23.7	15.1	36.0	
784.498810	21.3	15000.000	120.000	220.0	V	151.0	24.3	14.7	36.0	
836.632210	21.9	15000.000	120.000	220.0	H	92.0	24.9	14.1	36.0	
955.784540	23.3	15000.000	120.000	98.0	V	230.0	25.9	12.7	36.0	

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (0909)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

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4.6 Conducted Limits

Reference:

FCC:	CFR Part 15.207, 15.107
IC:	-/-

Not applicable!

The EUT is powered by zinc air batteries only!

Limits: § 15.107 / 15.207

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency

5 Used Test equipment

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

All reported calibration intervals are calibrations according to the EN/ISO/IEC 17025 standard. These calibrations were performed from an accredited external calibration laboratory.
Additional to these calibrations the laboratory performed comparison measurements with other calibrated systems and performed a weekly chamber inspection.
All used devices are connected with a 10 MHz external reference.
According to the manufacturers' instruction is it possible to establish a calibration interval for the FSP unit of 24 month, if the device has an external 10 MHz reference.

Anechoic chamber F:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Control Computer	F+W	FW0502032	300003303	-/-	-/-	-/-
2	Trilog Antenna VULB 9163	Schwarzbeck	295	300003787	01.04.2008	24	01.04.2010
3	Amplifier - 0518C-138	Veritech Micro-wave Inc.	-/-	-/-	-/-	-/-	-/-
4	Switch - 3488A	HP		300000368	-/-	-/-	-/-
5	EMI Test receiver - ESCI	R&S	100083	300003312	01.06.2009	24	01.06.2011
6	Turntable Controller - 1061 3M	EMCO	1218	300000661	-/-	-/-	-/-
7	Tower Controller 1051 Controller	EMCO	1262	300000625	-/-	-/-	-/-
8	Tower - 1051	EMCO	1262	300000625	-/-	-/-	-/-
10	Ultra Notch-Filter Rejected band Ch. 62	WRCD	9	-/-	-/-	-/-	-/-

SRD Laboratory Room 005:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Spektrum Analyzer 8566B	HP	2747A05275	300000219	18.01.2008	24	18.01.2010
2	Spektrum Analyzer Display 85662A	HP	2816A16497	300001690	23.01.2008	24	23.01.2010
3	Quasi-Peak-Adapter 85650A	HP	2811A01135	300000216	23.01.2008	24	23.01.2010
4	Power Supply	Heiden	003202	300001187	12.05.2007	36	12.05.2010
5	Power Supply	Heiden	1701	300001392	12.05.2007	36	12.05.2010

Field strength measurement equipment:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Test Receiver ESH2	R&S	871921/095	300002505	23.05.2007	36	23.05.2010
2	Loop Antenna HFH2-Z2	R&S	872096/61	300001824	18.11.2009	24	18.11.2011

6 Annex A: Photographs of Test site

Photo documentation:

Photo 1 (Radiated Emissions):

Photo 2 (Radiated Emissions):

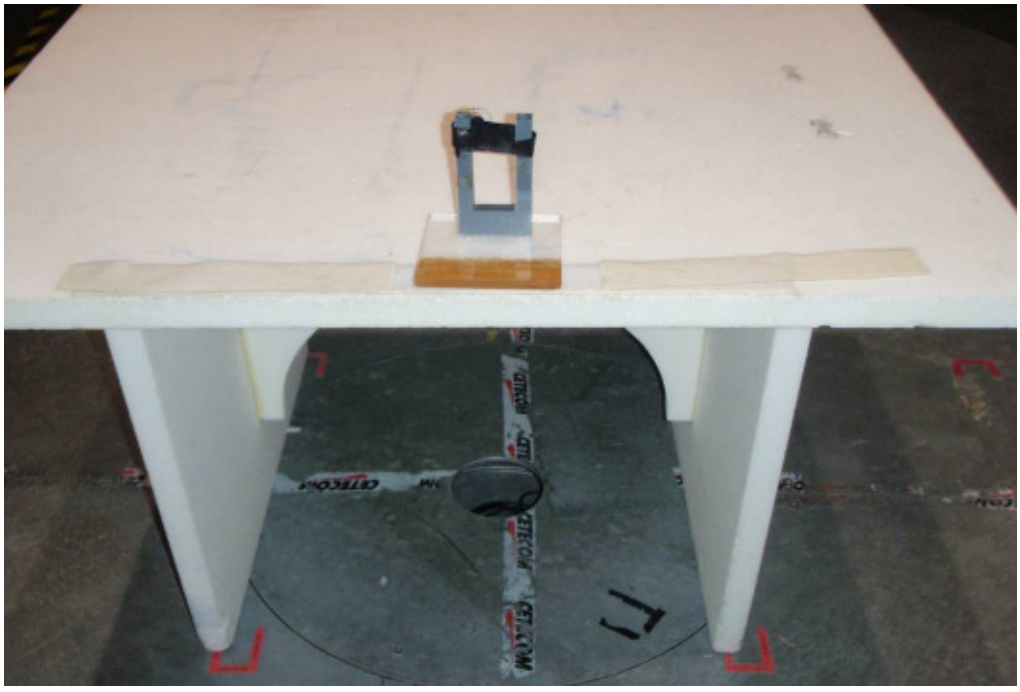
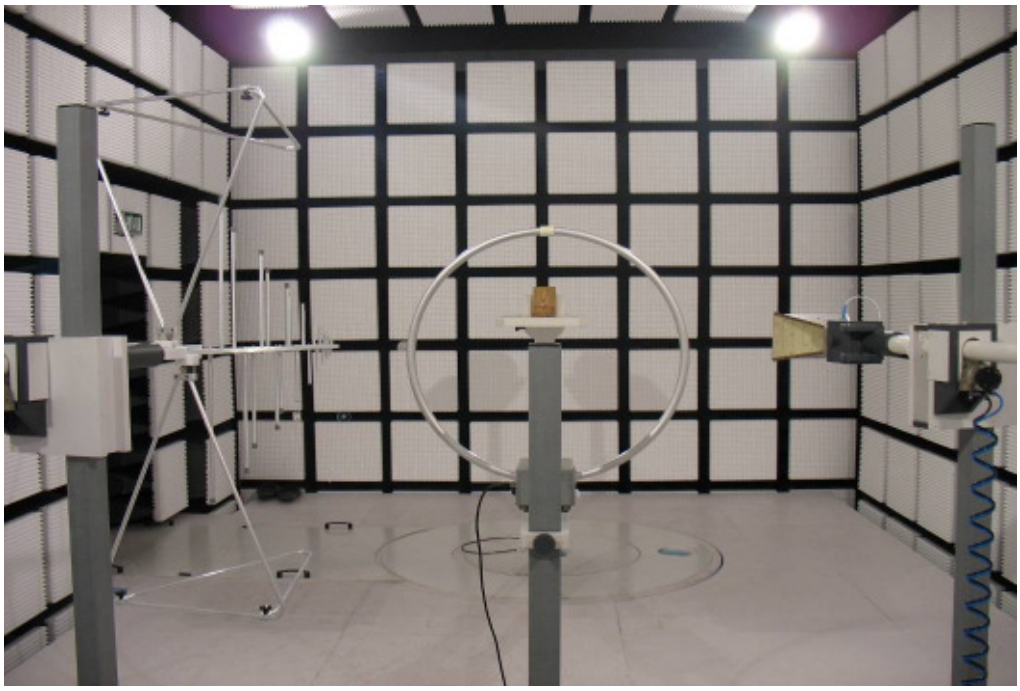


Photo 3 (Radiated Emissions):



7 Annex B: Photographs of the Equipment

Photo documentation: External photos

Photo 1:

Photo 2:

Photo 3:

Photo 4:

Photo 5:

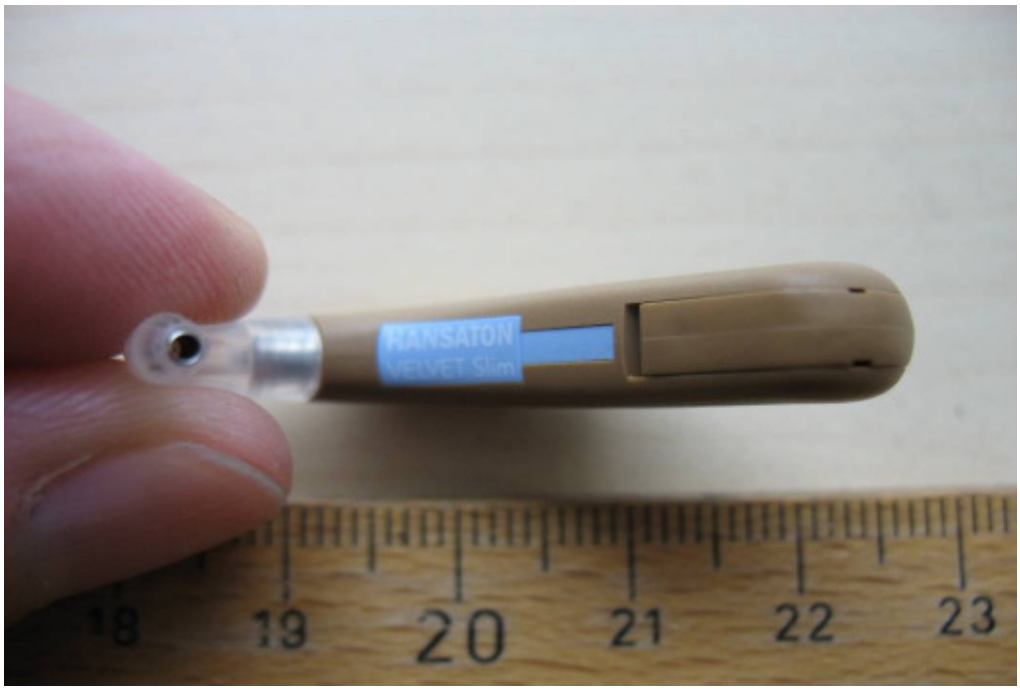


Photo 6:

Photo 7:

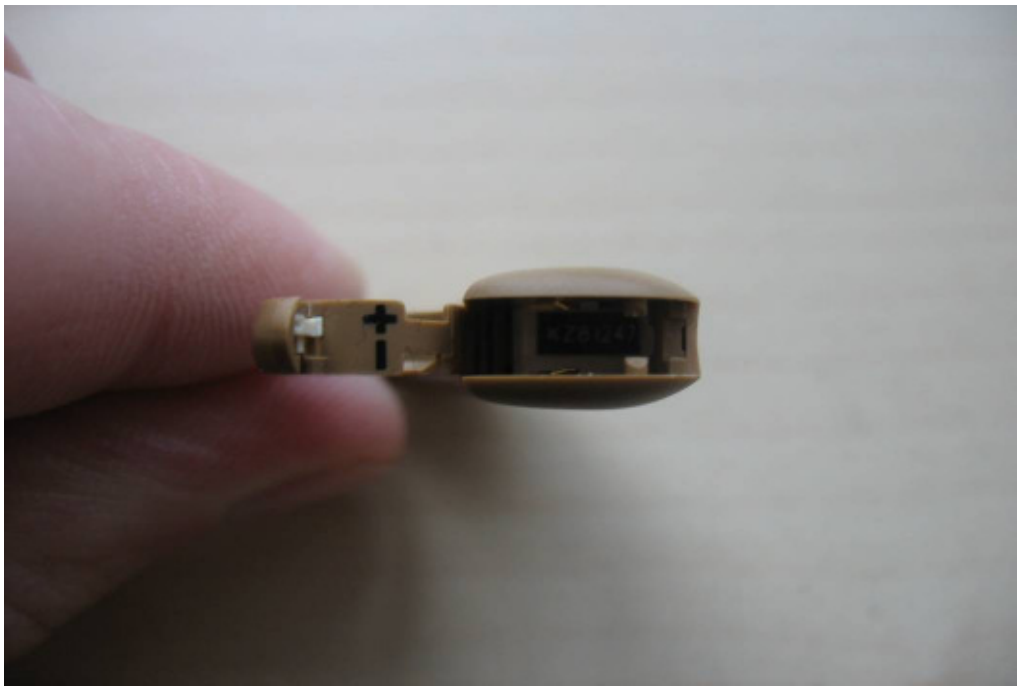


Photo 8:

Photo 9:

Photo documentation: Internal photos

Photo 1:

Photo 2:

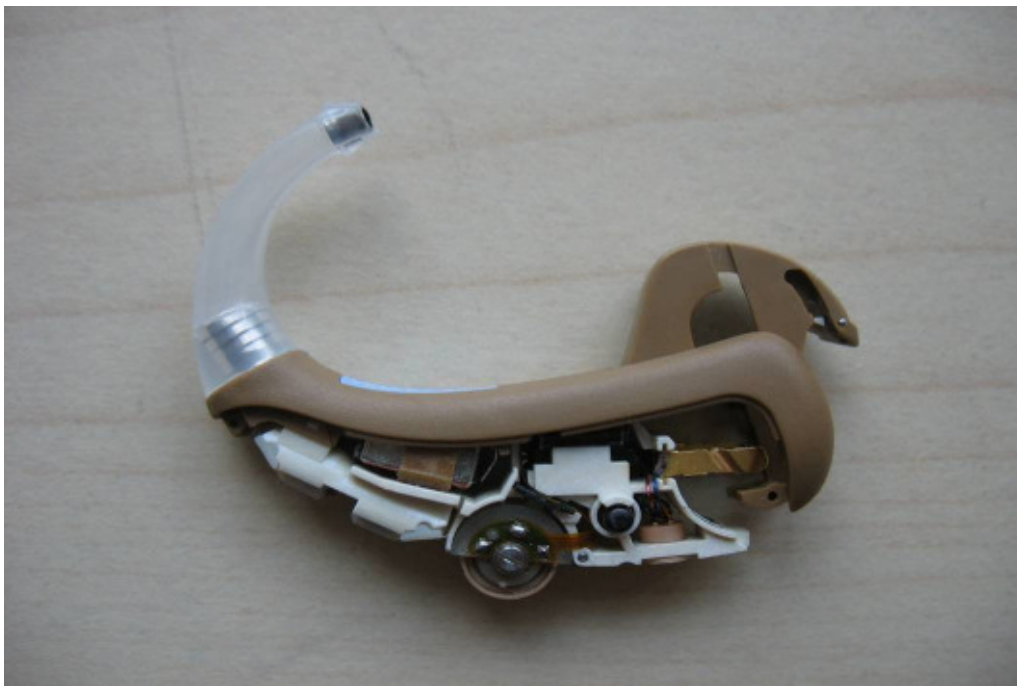
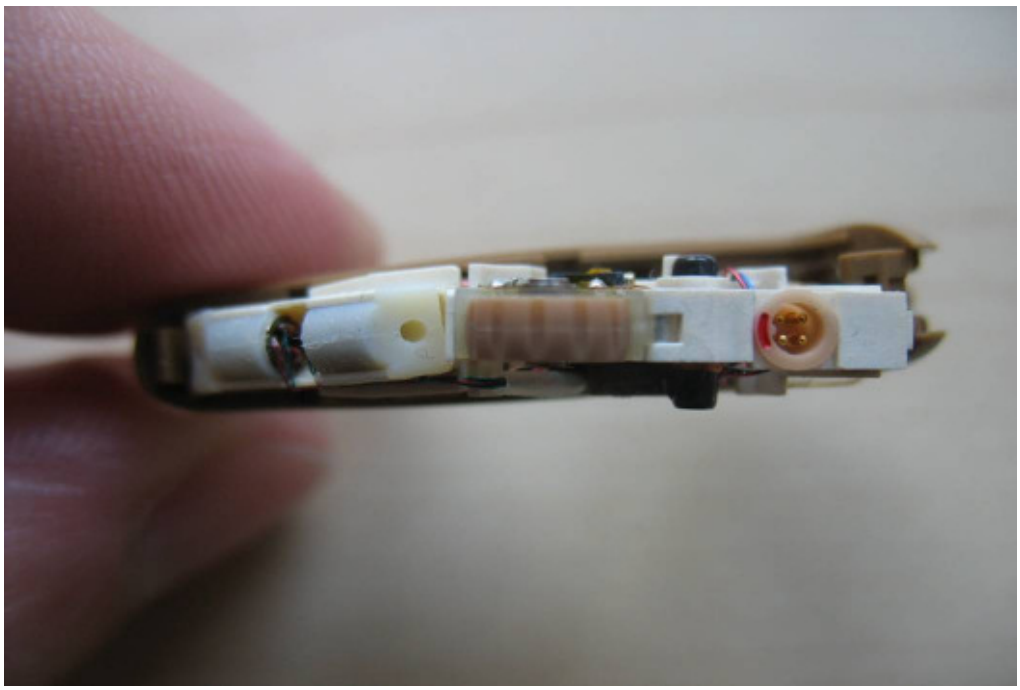


Photo 3:

Photo 4:



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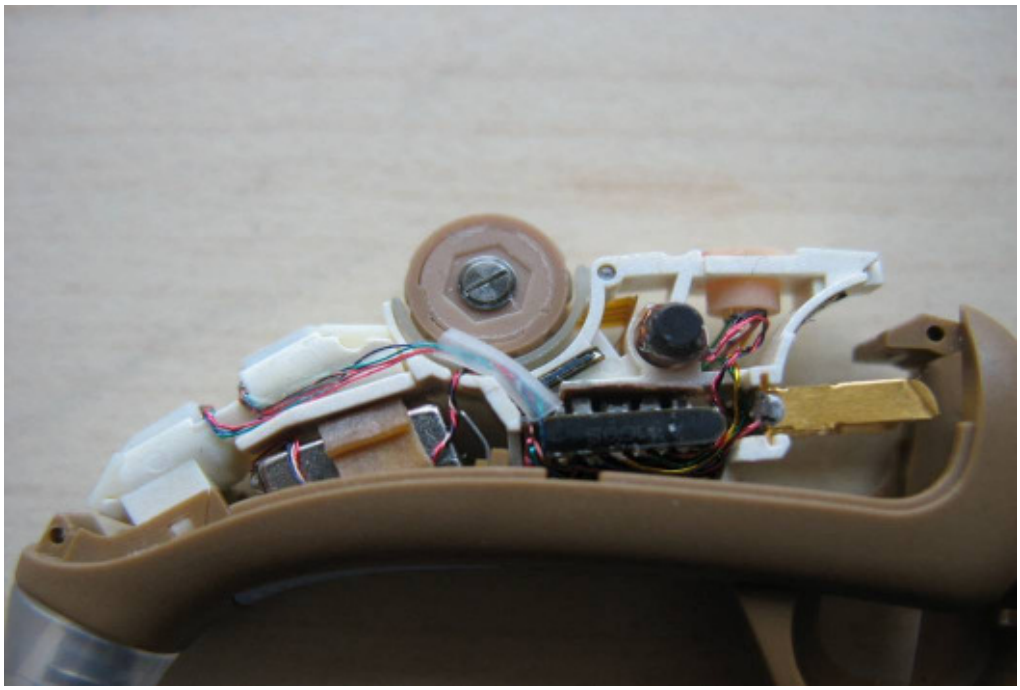

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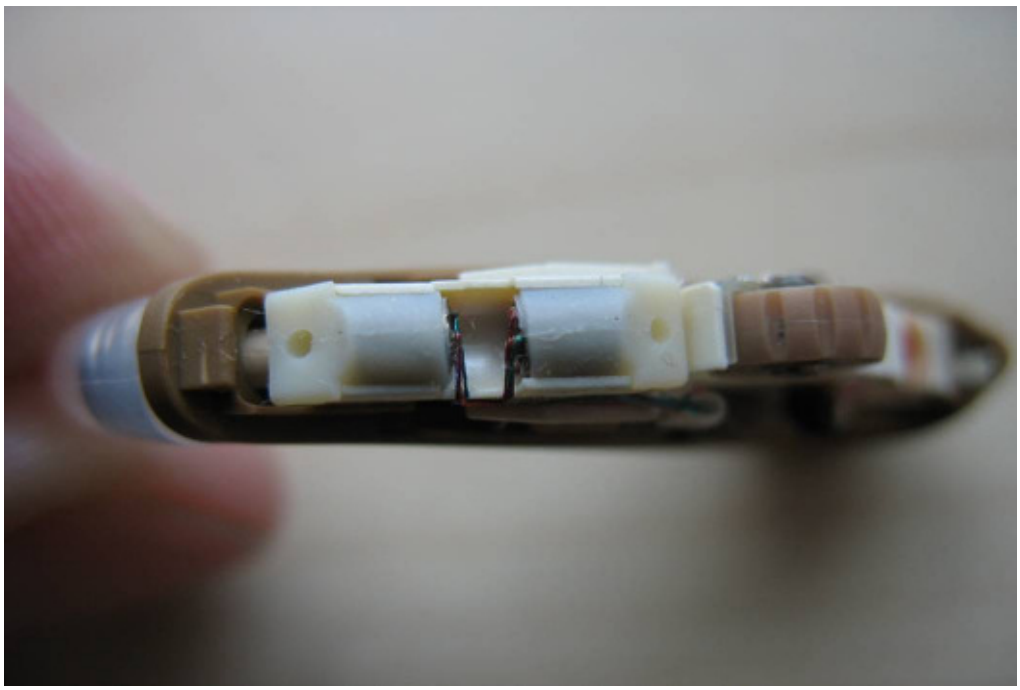

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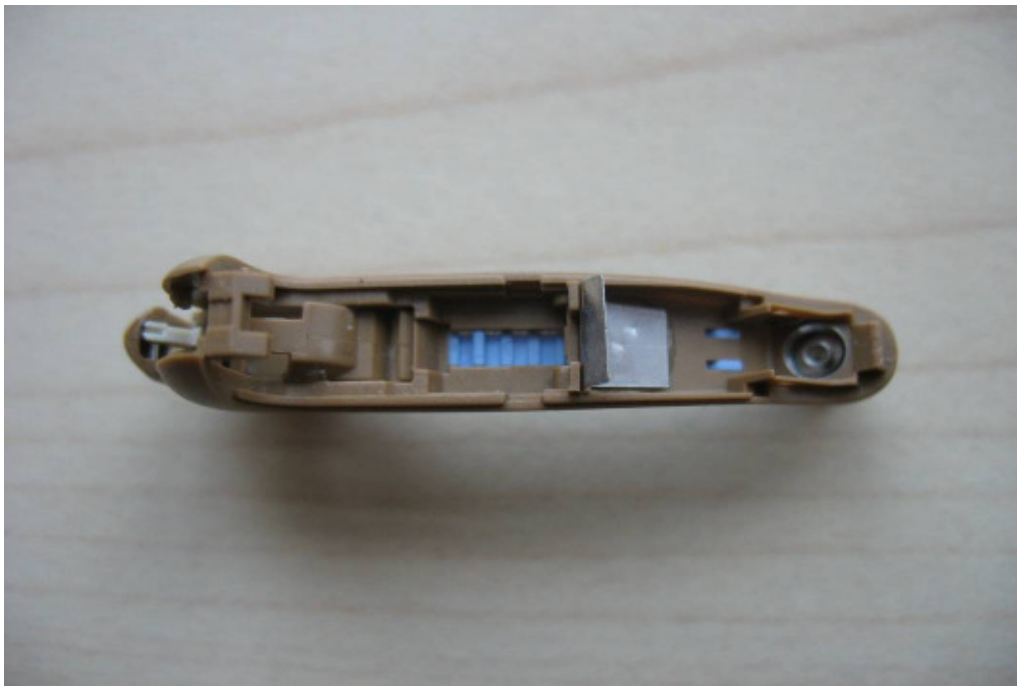

Photo 8:

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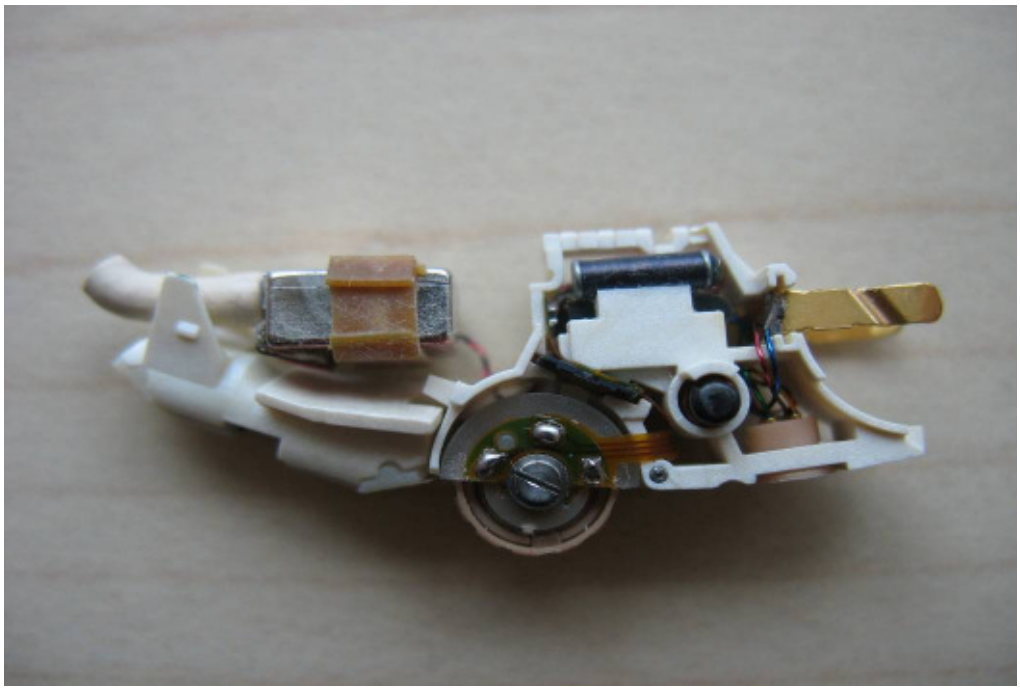

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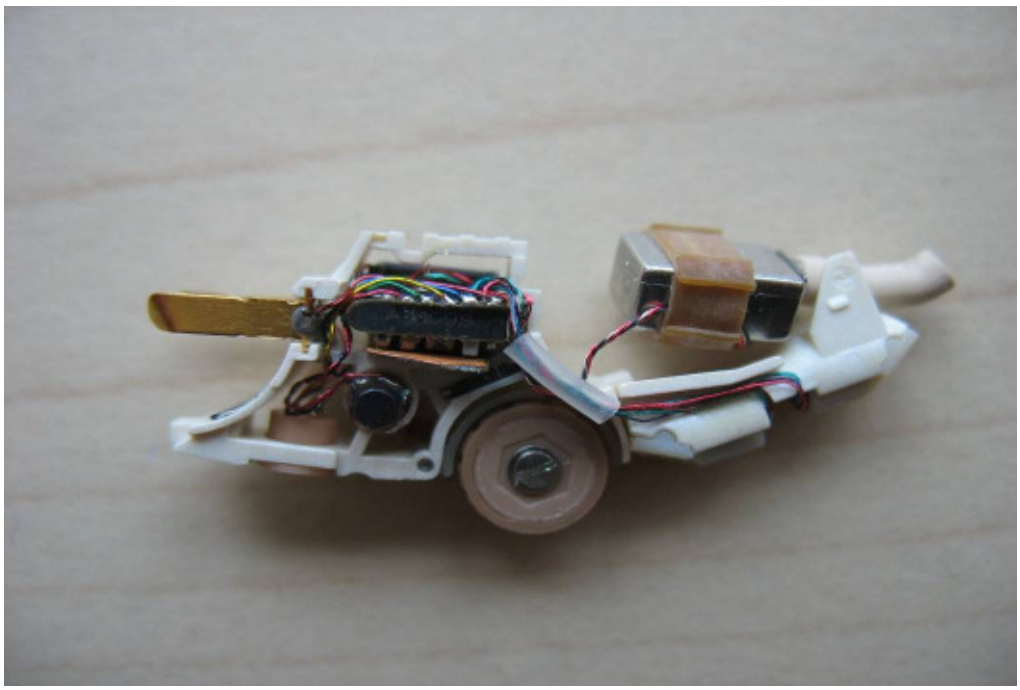

Photo 11: