

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.	:	1-0977-01-05/08 B
Applicant	:	Martin Lehmann GmbH & Co.KG
Type	:	TXRF24B2 TXRF24B4
Test Standard	:	FCC Part 15 RSS210 Issue 7
FCC ID	:	W2YTXRF24B4
Certification No. IC	:	8141A-TXRF24B4

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1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 3.1.1. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations 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.

Test laboratory manager:

2009-09-17 Marco Bertolino

Date

Name

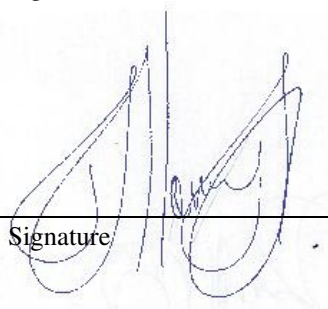


Signature

2009-09-17 Daniel Muyunga

Date

Name




Signature

Technical responsibility for area of testing:

2009-09-17 Stefan Bös

Date

Name



Signature

1.2 Testing laboratory

CETECOM ICT Services GmbH

Untertürkheimer Straße 6 - 10
66117 Saarbrücken
Germany

Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
e-mail: info@ICT.cetecom.de
Internet: http://www.cetecom-ict.de

State of accreditation: The test laboratory (area of testing) is accredited according to
DIN EN ISO/IEC 17025
DAR registration number: DAT-P-176/94-D1

Accredited by: Federal Motor Transport Authority (KBA)
DAR registration number: KBA-P 00070-97

Testing location, if different from CETECOM ICT Services GmbH:

Name :
Street :
Town :
Country :
Phone :
Fax :

1.3 Details of applicant

Name:	Martin Lehmann GmbH & Co.KG
Street:	Am Kohlgraben 6-10
Town:	32429 Minden
Country:	Germany
Telephone:	+49 (0) 571 50 46-0
Fax:	+49 (0) 571 50 599 853
Contact:	Mr. Klaus Märtens
E-mail:	klaus.maertens@lehmann-locks.com
Telephone:	49 (0) 571 50 460

1.4 Application details

Date of receipt of order:	2009-01-06
Date of receipt of test item:	2009-01-19
Date of start test:	2009-01-19
Date of end test:	2009-01-20
Persons(s) who have been present during the test:	-/-

2 Test standard/s:

47 CFR Part 15

2007-09

**Title 47 of the Code of Federal Regulations; Chapter I-
Federal Communications Commission
subchapter A - general, Part 15-Radio frequency devices**

RSS - 210 Issue 7

2007-06

**Spectrum Management and Telecommunications - Radio
Standards Specification
Low-power Licence-exempt Radiocommunication Devices (All
Frequency Bands): Category I Equipment**

3 Technical tests

3.1 Details of manufacturer

Name:	Martin Lehmann GmbH & Co.KG
Street:	Am Kohlgraben 6-10
Town:	32429 Minden
Country:	Germany

3.2 Test item

Kind of test item	:	Remote control
Type identification	:	TXRF24B2 TXRF24B4
S/N serial number	:	-/-
HW hardware status	:	V03231208Z 2009
SW software status	:	-/-
Frequency Band [MHz]	:	ISM band 2400 – 2483.5
Type of Modulation	:	GFSK
Number of channels	:	1 channel
Antenna	:	Wire antenna – for more information please take a look at sub clause 10 (Photos of the EUT)
Power Supply	:	3 V DC by lithium battery CR2032
Temperature Range	:	-25 °C to +70 °C

FCC ID:

W2YTXRF24B4

IC:

8141A-TXRF24B4

3.3 Additional EUT information For IC Canada (appendix 2)

IC Registration Number:	8141A-TXRF24B4
Model Name:	TXRF24B2 TXRF24B4
Manufacturer (complete Address):	Martin Lehmann GmbH & Co.KG Am Kohlgraben 6-10 32429 Minden Germany
Tested to Radio Standards Specification (RSS) No.:	RSS210 Issue 7
Open Area Test Site Industry Canada Number:	IC 3462C-1
Frequency Range (or fixed frequency) [MHz]:	2424.5
Antenna Type:	Wire antenna – for more information please take a look at sub clause 10 (Photos of the EUT)
Field Strength [dBμV/m in 3m]:	87.52
Occupied Bandwidth (99% BW) [kHz]:	603.707 kHz
Type of Modulation:	GFSK
Emission Designator (TRC-43):	604KF1D
Transmitter Spurious (worst case) [dBμV/m in 3 m]:	49.82 (4850.96 MHz)
Receiver Spurious (worst case) [dBμV/m in 3m]:	N/A (Transmitter only)

ATTESTATION:

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

Signature:



Test engineer: Marco Bertolino

Date: 2009-09-17

Signature:



Test engineer: Daniel Muyunga

Date: 2009-09-17

3.4 EUT operating modes

EUT operating mode no. *)	Description of operating modes	Additional information
Op. 0	normal mode	normal temperature and power source conditions
Op. 1		low temperature, low power source conditions
Op. 2		low temperature, high power source conditions
Op. 3		high temperature, low power source conditions
Op. 4		high temperature, high power source conditions

*) EUT operating mode no. is used to simplify the test plan

3.5 Extreme conditions testing values

Description	Shortcut	Unit	Value
Nominal Temperature	T _{nom}	°C	20
Nominal Humidity	H _{nom}	%	44
Nominal Power Source	V _{nom}	V	3

Type of power source: **DC by lithium battery CR2032**

Deviations from these values are reported in chapter 2

3.6 Reference documents

None

4 Statement of Compliance

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

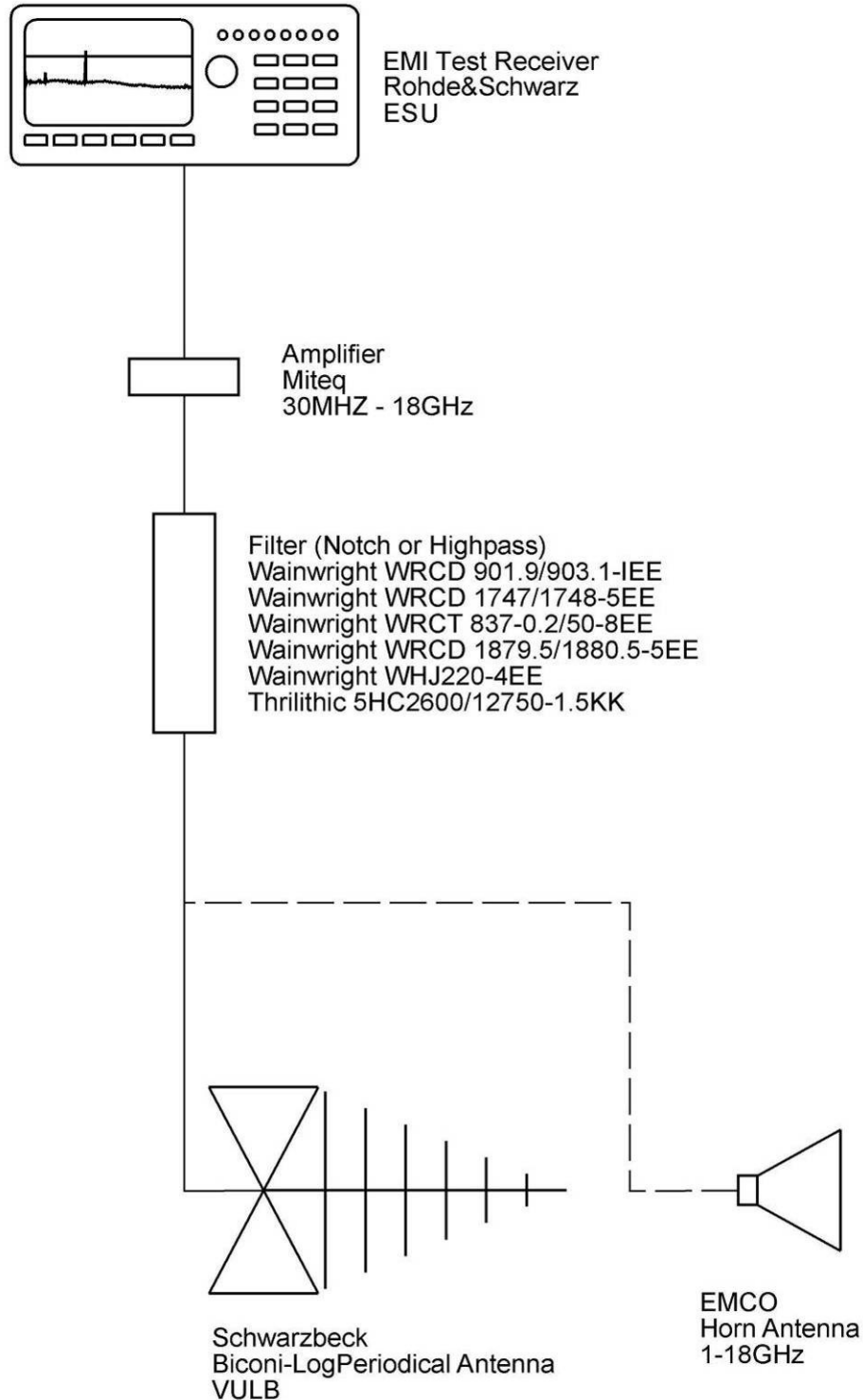
4.1 Summary of Measurement Results

4.1.1 CFR 47 Part 15 Radio frequency devices

Section in this Report	Test Name / Section FCC Part 15	Test Name / Section RSS 210 Issue 7	Measurement applicable	Verdict
6.1	§ 15.35 (c) Timing of the transmitter	6.5 Pulsed Operation	YES	passed
6.2	§ 15.249 (a) FIELDSTRENGTH OF FUNDAMENTAL	Annex A2.9	YES	passed
6.3	§ 15.249 (a) (d) FIELDSTRENGTH OF HARMONICS and SPURIOUS	Annex A2.9	YES	passed
6.4	20 dB Spectrum bandwidth	RSS GEN 4.6	YES	passed

5 Measurement system

Anechoic chamber A:



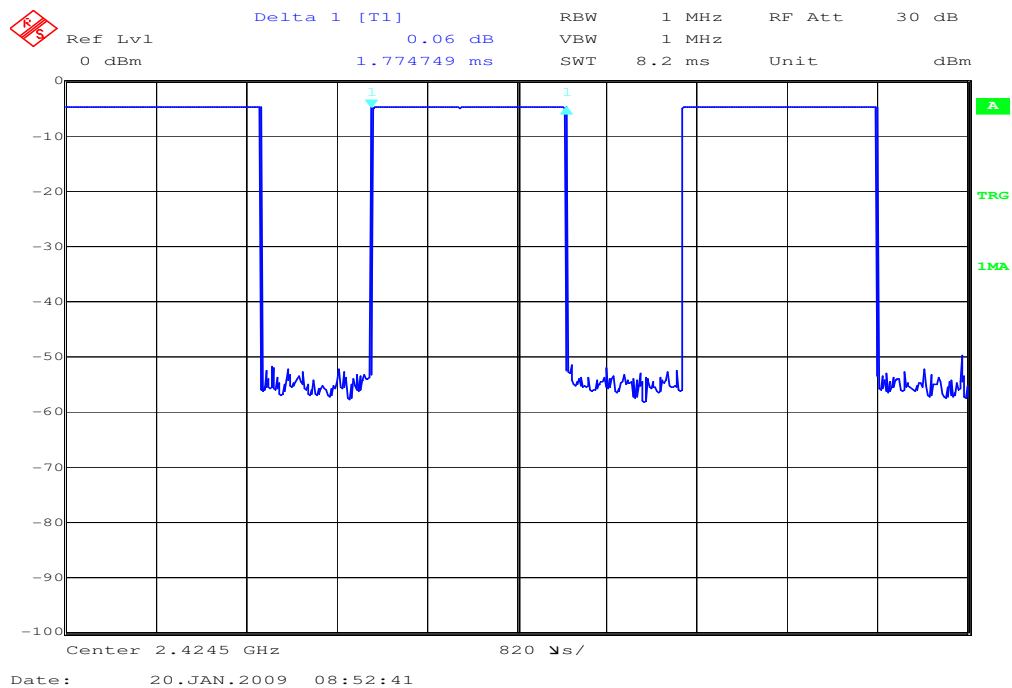
6 FCC Part 15 Subpart C

6.1 Timing of the transmitter

Reference

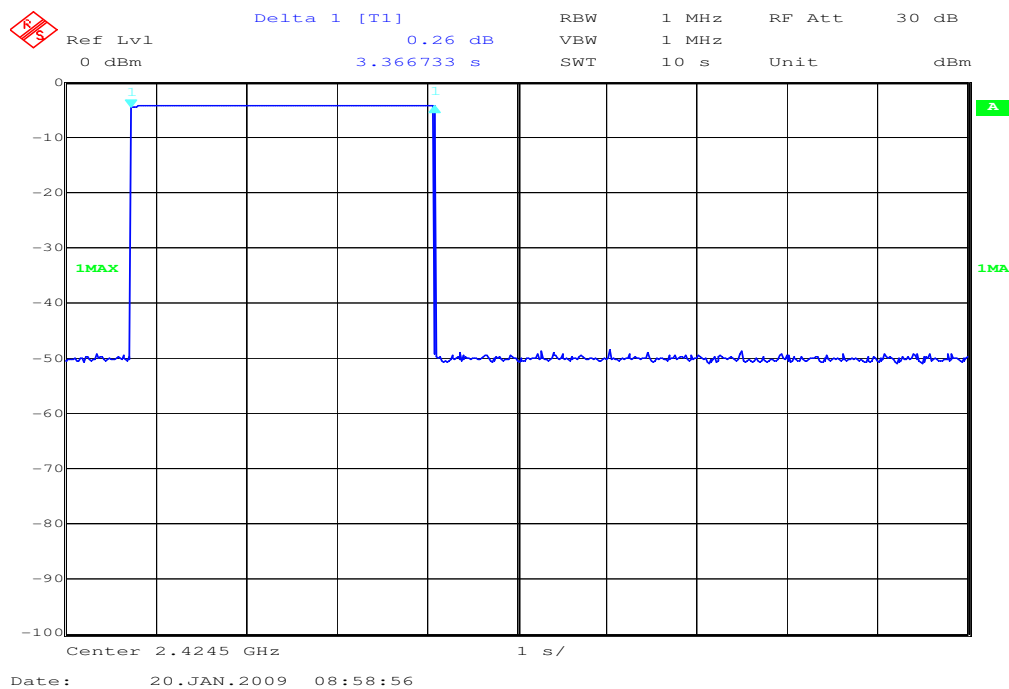
FCC:	CFR Part SUBCLAUSE § 15.35 (c)
IC:	RSS 210, ISSUE 7 6.5 Pulsed operation

Plot 1: One burst



All detected bursts show the same behavior with a pulse time of 1.77 ms.

Plot 2: Pulse train



Puls train duration: 3.367 s

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.

6.2 Field Strength of the Fundamental

Reference

FCC:	CFR Part SUBCLAUSE § 15.249 (a)
IC:	RSS 210, Annex A2.9

MAXIMUM OUTPUT POWER (RADIATED)

TEST CONDITIONS		MAXIMUM POWER (dB μ V/m)		
Frequency		2424.5 MHz	--	--
T _{nom} 23 °C	V _{nom} 3 V DC	87.52	--	--
Measurement uncertainty		±3dB		

RBW/VBW: 1 MHz

Limits

SUBCLAUSE § 15.249 (a)

Fundamental Frequency (MHz)	Field strength of Fundamental (mV/m)	Field strength of Harmonics (V/m)
902-928	50 (94 dB μ V/m)	500 (54 dB μ V/m)
2400-2483.5	50 (94 dB μ V/m)	500 (54 dB μ V/m)
5725-5875	50 (94 dB μ V/m)	500 (54 dB μ V/m)
24.0-24.25 GHz	250 (108 dB μ V/m)	2500 (68 dB μ V/m)

6.3 Field Strength of the Harmonics and Spurious

Reference

FCC:	CFR Part SUBCLAUSE § 15.249 (a)(d)
IC:	RSS 210, Annex A2.9

EMISSION LIMITATIONS					
f (MHz)		amplitude of emission (dBµV/m) Average/QP	limit max. allowed emission power	actual attenuation below frequency of operation (dB)	results
		87.52	94BµV/m		Operating frequency
			50dBc or 54 dBµV/m @ 3 m		Complies
4850.96		49.82 @ 3 m			
5284.38		41.82 @ 3 m			
7274.04		46.03 @ 3 m			
9697.12		43.33 @ 3 m			
Measurement uncertainty			± 3dB		

Limits

SUBCLAUSE § 15.249 (a)

Fundamental Frequency (MHz)	Field strength of Fundamental (mV/m)	Field strength of Fundamental (µV/m)
902-928	50 (94 dBµV/m)	500 (54 dBµV/m)
2400-2483.5	50 (94 dBµV/m)	500 (54 dBµV/m)
5725-5875	50 (94 dBµV/m)	500 (54 dBµV/m)
24.0-24.25 GHz	250 (108 dBµV/m)	2500 (68 dBµV/m)

Limits

SUBCLAUSE § 15.249 (d)

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Plot 1: Transmitter, 30 MHz – 1 GHz, TX mode

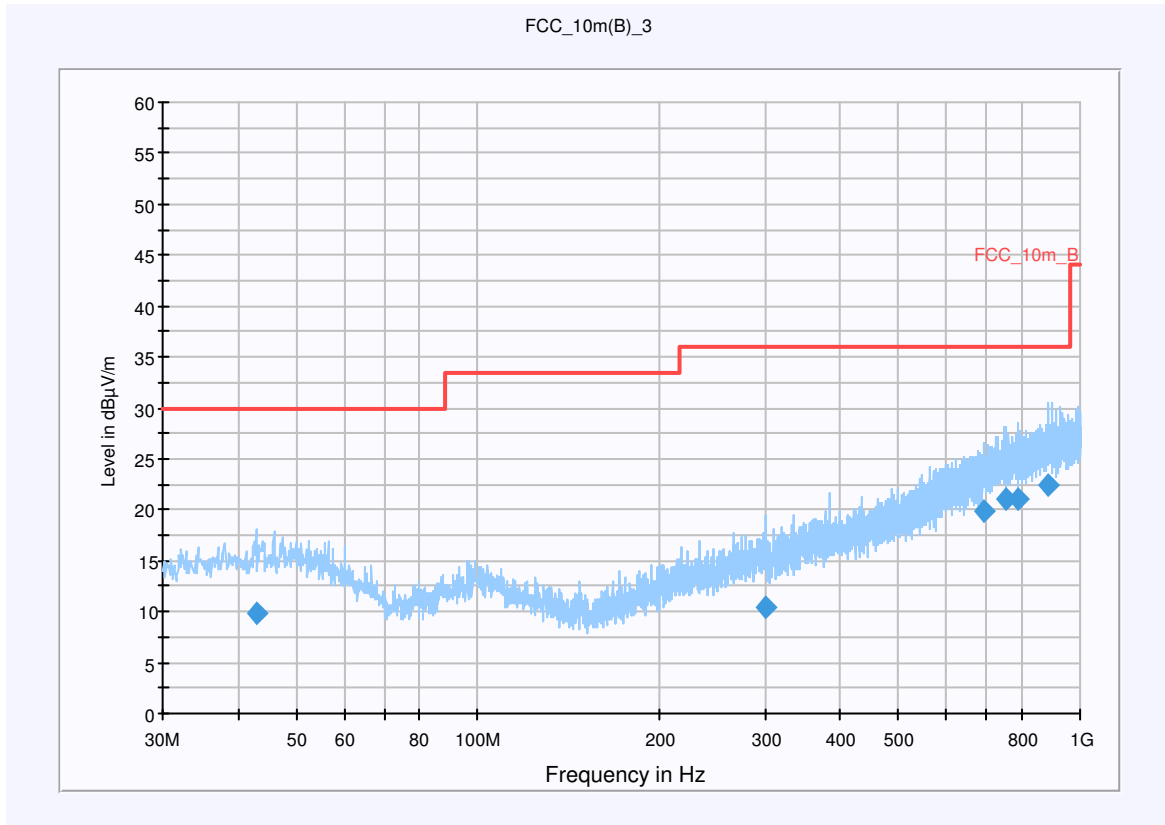
Common Information

EUT: Hand-Transmitter
 Serial Number: LHS24A4-50
 Test Description: FCC Part 15 class B @ 10 m
 Operating Conditions: cont. Tx
 Operator Name: COA
 Comment: Bat powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Level Unit:

30 MHz - 1 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
43.084100	9.8	15000.000	120.000	120.0	V	143.0	13.5	20.2	30.0	
300.696750	10.5	15000.000	120.000	112.0	V	54.0	14.8	25.5	36.0	
694.220900	19.8	15000.000	120.000	220.0	V	49.0	22.8	16.2	36.0	
754.438300	21.0	15000.000	120.000	207.0	H	236.0	24.2	15.0	36.0	
786.452700	21.0	15000.000	120.000	174.0	V	323.0	24.3	15.0	36.0	
881.347050	22.5	15000.000	120.000	220.0	H	189.0	25.5	13.5	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 (0109)
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

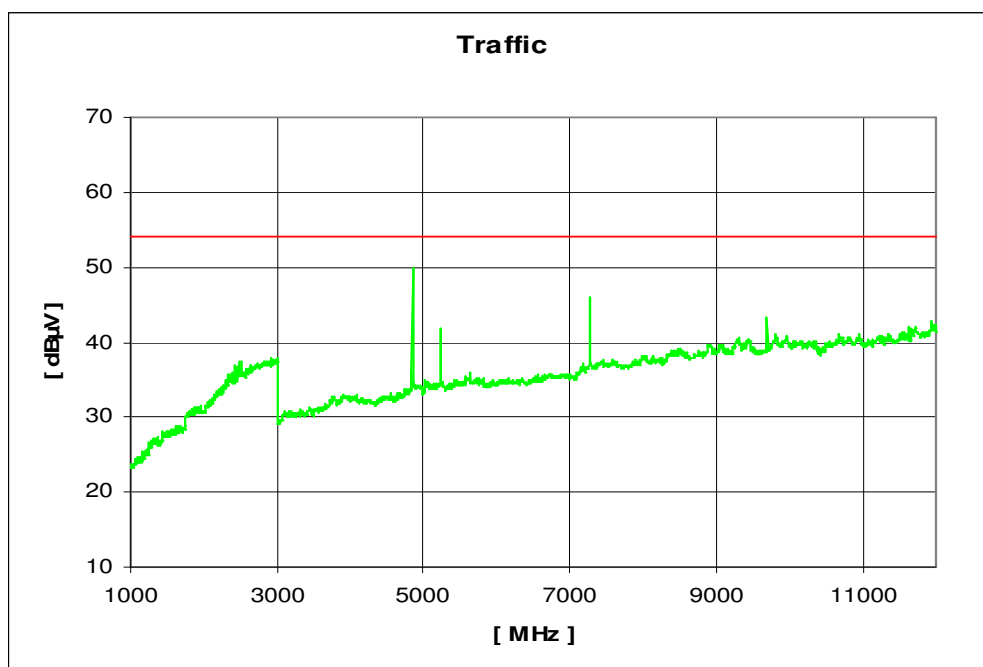
Plot 2: Transmitter, 1 GHz – 12 GHz, TX mode

CETECOM ICT Services GmbH

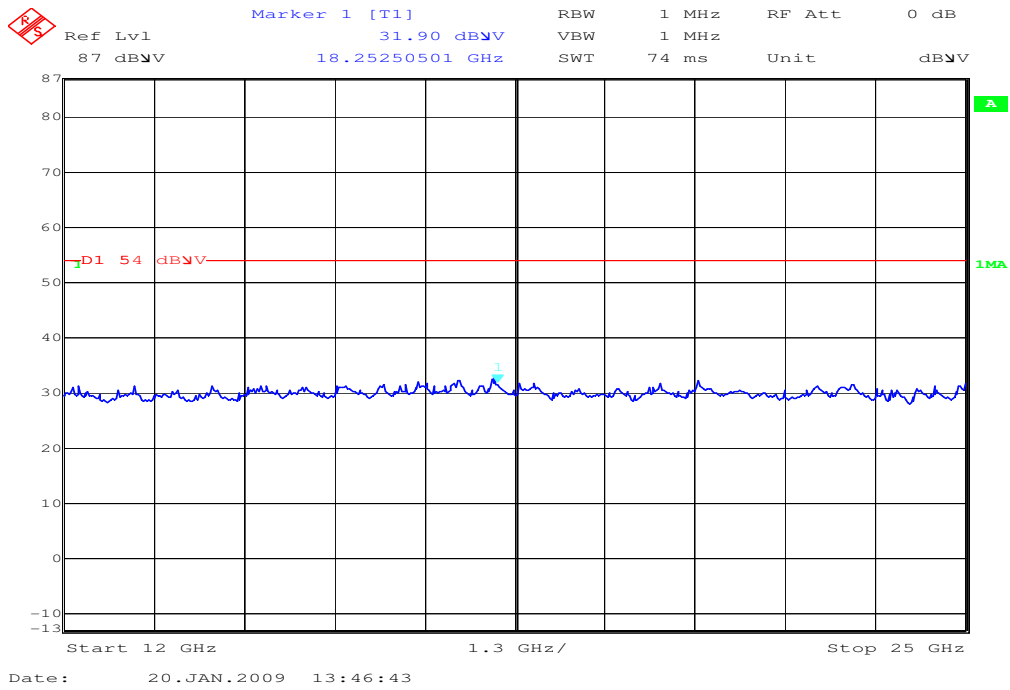
Projekt- Nr.:1-0977-1-2_08

EUT:	Funksteuerung	Polarisation:	Vertikal
Manufacturer:	Möbelschloß	Battery:	Real Battery
IMEI:	M Lehmann GmbH	HW:	
Operator:	MUY	SW:	
Start of Test :	20.01.2009 07:16:09	Vmin:	
Standard:	FCC_15_407_2400	Vnom:	3
Signalling Unit:	CMU200	Vmax:	
Transducer-File:	C:\Spurious_neu\Messparameter\FCC_15_407_2400\Transducer_FCC_15_407_2400.xls		

Start Freq. [MHz]: 1000 Stop Freq. [MHz] 12000



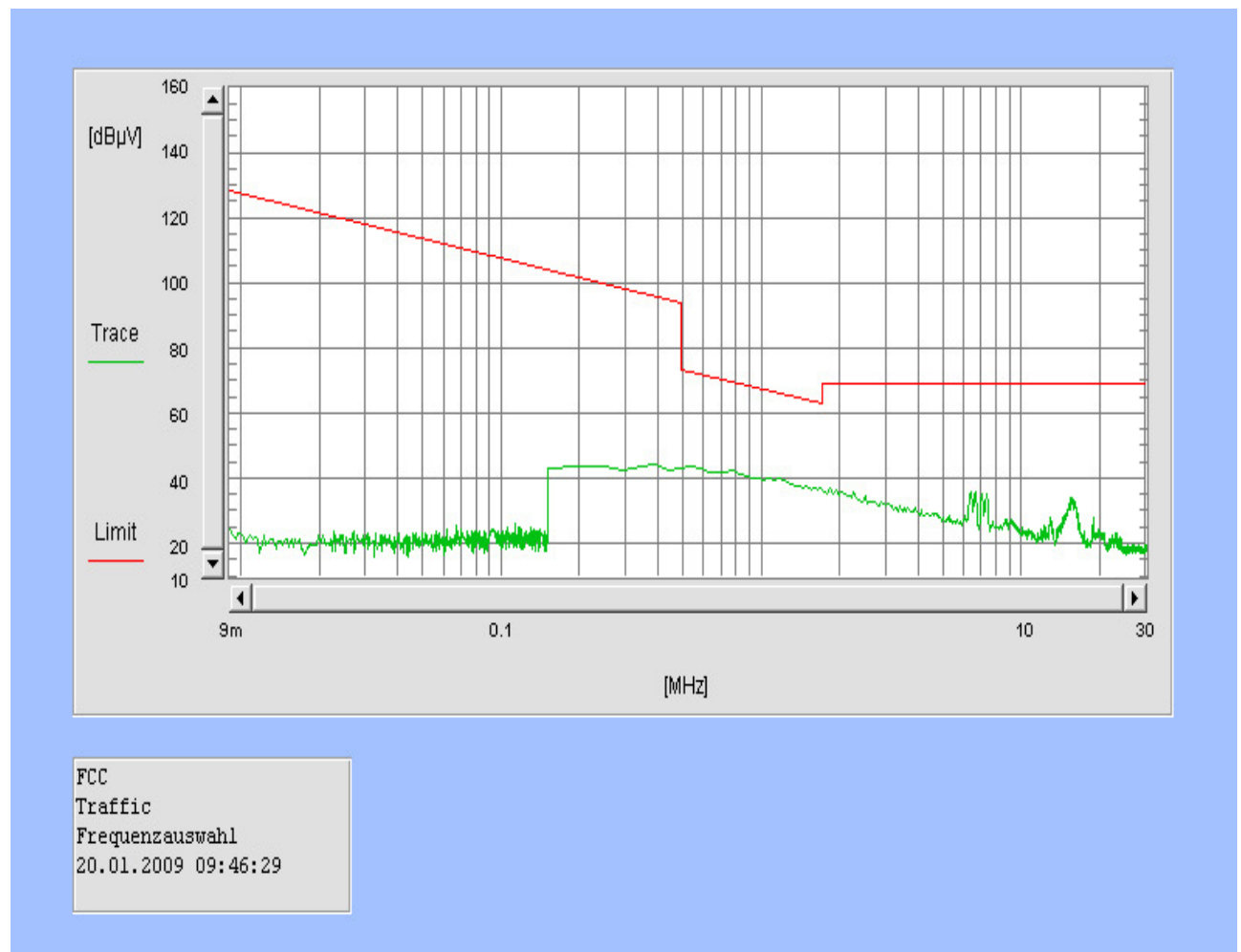
Plot 3: Transmitter, 12 GHz – 25 GHz, TX mode



Part 15.109 Magnetics

(to convert the measuring distance from 3m to 30m and 30 to 300m a correction factor from 40 dB/decade was used.)

Plot 1: Transmitter TX mode



Measurement distance 3m

This measurement was done in 2 polarisation's, the plot shows the worst case.

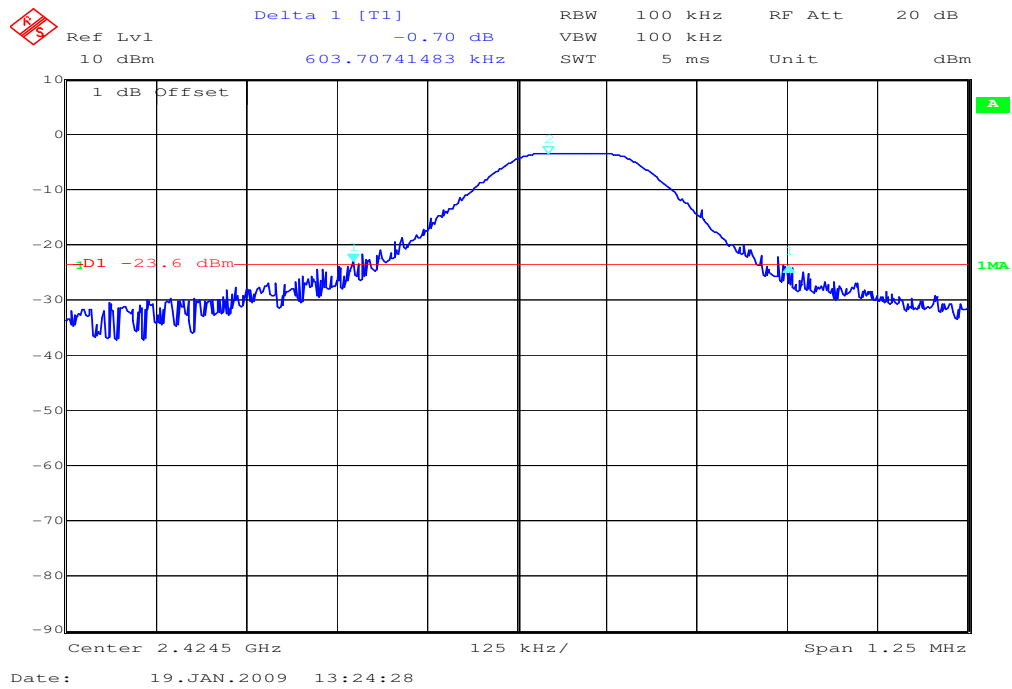
Limits

SUBCLAUSE § 15.209

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.0009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

6.4 Spectrum bandwidth

Plot 1: 20 dB bandwidth



7 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 it is possible to establish a calibration interval for the FSP unit of 24 month, if the device has an external 10 MHz reference.

Anechoic chamber A:

No.	Instrument/Ancillary	Manufacturer	Type	Serial-No.	Internal identification
Radiated emission in chamber A					
A-1	Spectrum Analyzer	Rohde & Schwarz	ESU26	100037	300003555
A-2	Signal Generator	Rohde & Schwarz	SMR20B11	1104.0002.20	300003593
A-3	RF System Panel	Rohde & Schwarz	TS RSP	---	300003556
A-4	Relais Matrix	Rohde & Schwarz	PSN	860673/009	300001385
A-5	Horn Antenna	EMCO	3115	9709-5290	300000212
A-6	Bilog.-Log. Antenna	Schwarzbeck	VULB 9163	02/00	300003696
A-7	Kanal Notch Filter GSM 900	Wainwright	WRCD 901.9/903.1EE	9	---
A-8	Kanal Notch Filter GSM 1800	Wainwright	WRCD 1747/1748-5EE	1	---
A-9	Kanal Notch Filter GSM 1900	Wainwright	WRCB 1879.5/1880.5EE	9	---
A-10	Kanal Notch Filter GSM 850	Wainwright	WRCT 837-0.2/50-8EE	1	---
A-11	Kanal Notch Filter UMTS	Wainwright	WRCD 1800/2000-0.2/40-5EEK	2	---
A-12	Kanal Notch Filter DECT	Wainwright	WRCD 1887,82/1889,55-5EE	---	---
A-13	Band Notch Filter GSM 850	Wainwright	WRCG 824/849-810/863-60/9SS	6	---
A-14	Band Notch Filter GSM 1900 + UMTS Bd. II	Wainwright	WRCG 1850/1910-1835/1925-40/8SS	23	---
A-15	Band Notch Filter UMTS Bd. IV	Wainwright	WRCG 1710/1755-1690/1775-90/14SS	7	---
A-16	Notch Filter ISM 2400	Wainwright	WRCG 2400/2483-2375/2505-50/10SS	26	---
A-17	High Pass Filter 1.1 GHz	Wainwright	WHK 1.1/15G-10SS	---	---
A-18	High Pass Filter 2.6 GHz	Wainwright	WHKX 2.6/18G-12SS	---	---
A-19	High Pass Filter 7 GHz	Wainwright	WHKX 7.0/18G-8SS	---	---
A-20	Amplifier	Miteq	AFS4-00201800-15-10P-6	US42-0050 2650-28-5A	300003204
A-21	Controller	Inn co	CO 2000	2020507	---
A-22	DC Power Supply	Hewlet Packard	HP6632A	---	300000924
A-23	Computer	F+W	---	---	300003303

Test report no.: 1-0977-01-02/08

Date: 2009-01-20

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System Rack Room 005 :

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	FSP 30	R&S	100886	300003575	25.08.2008	24	25.08.2010
2	CBT	R&S	100313	300003516	03.09.2008	24	03.09.2010
3	Switch Matrix	HP		300000929	n.a.		
4	Power Supply	HP	3041A00544	300002270	13.05.2007	36	13.05.2010
5	Signal Generator	R&S	836206/0092	300002680	30.05.2007	36	30.05.2010

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

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	9163-295	-/-	-/-	30.04.2008	24	30.04.2010
3	Amplifier - 0518C-138	Veritech Micro-wave Inc.	-/-	-/-	-/-	-/-	-/-
4	Switch - 3488A	HP		300000368	-/-	-/-	-/-
5	EMI Test receiver - ESCI	R&S	100083	300003312	31.01.2007	24	31.01.2009
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	-/-	-/-	-/-	-/-

8 Annex B: Photographs of Test site

Photo documentation:

Photo 1 (Radiated Emissions):

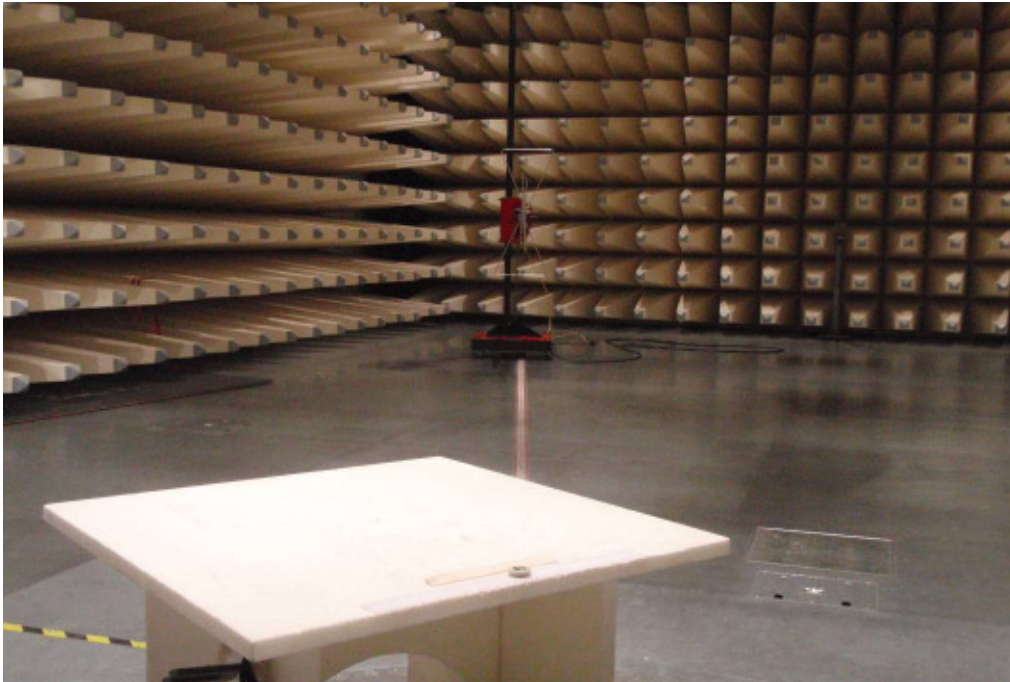
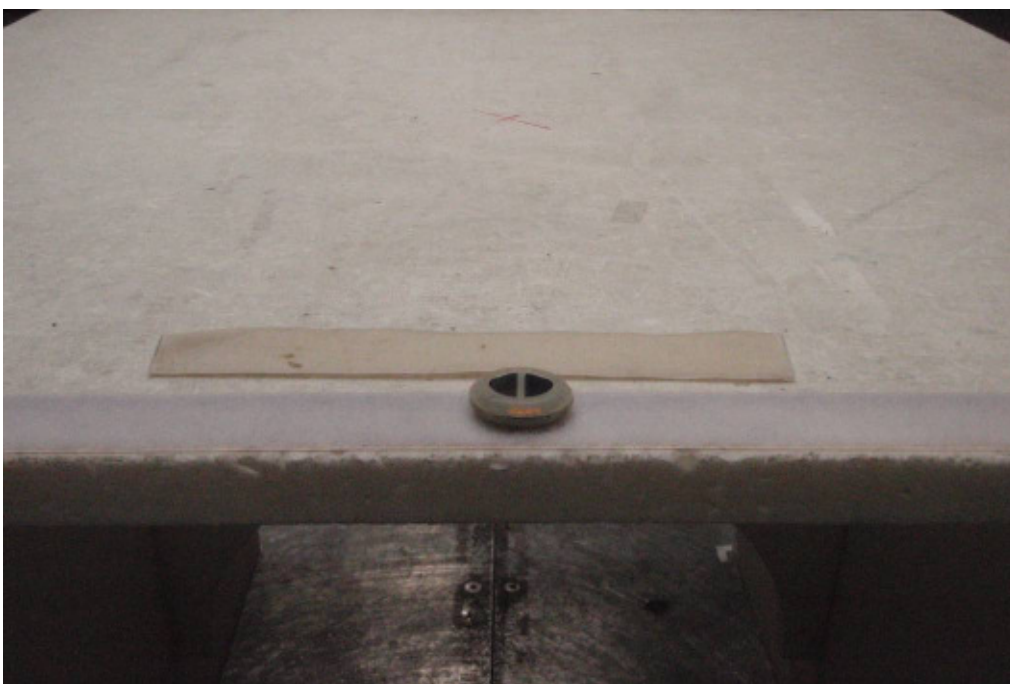


Photo 2 (Radiated Emissions):



9 Annex C: External Photographs of the Equipment

Photo documentation:

Photo 1: Transmitter

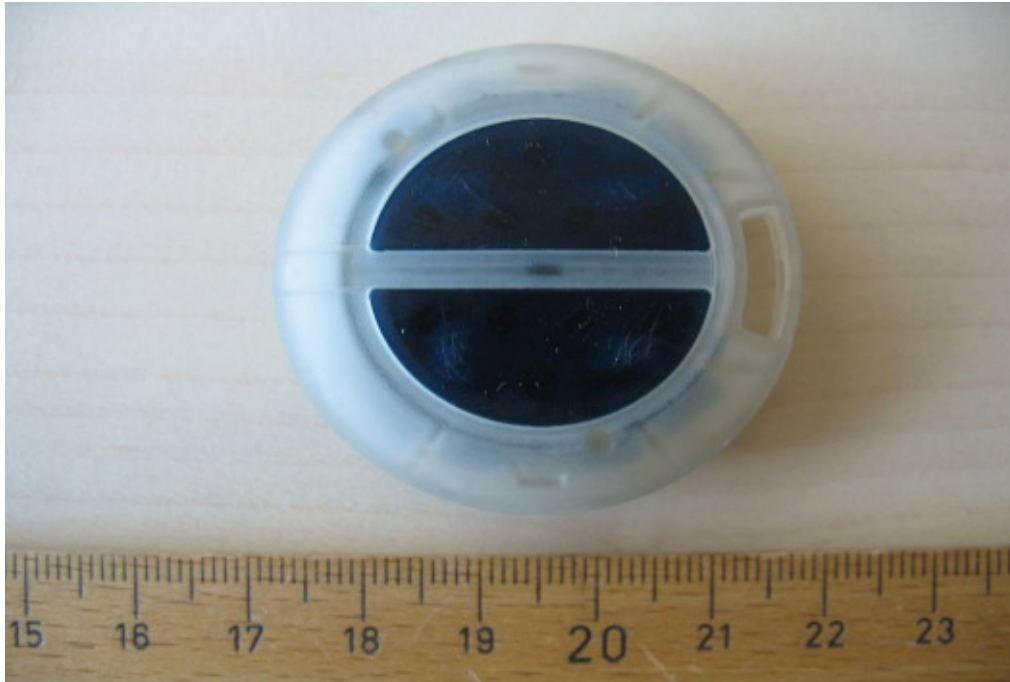
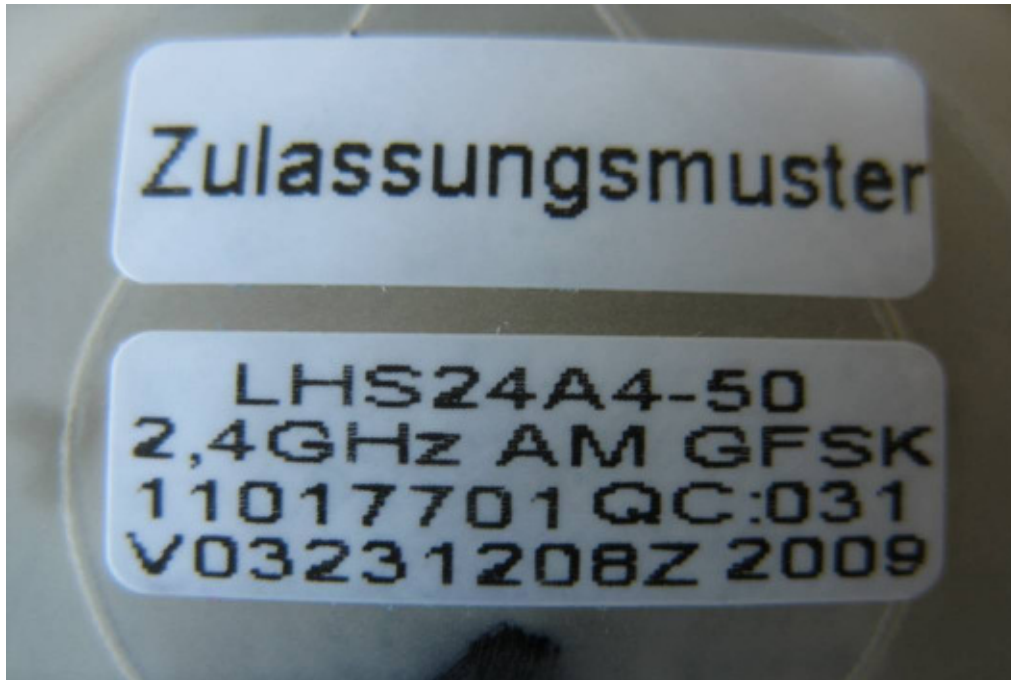


Photo 2: Transmitter



Photo 3: Transmitter



10 Annex D: INTERNAL PHOTOGRAPHS OF THE EQUIPMENT

Photo documentation:

Photo 1: Transmitter



Photo 2: Transmitter

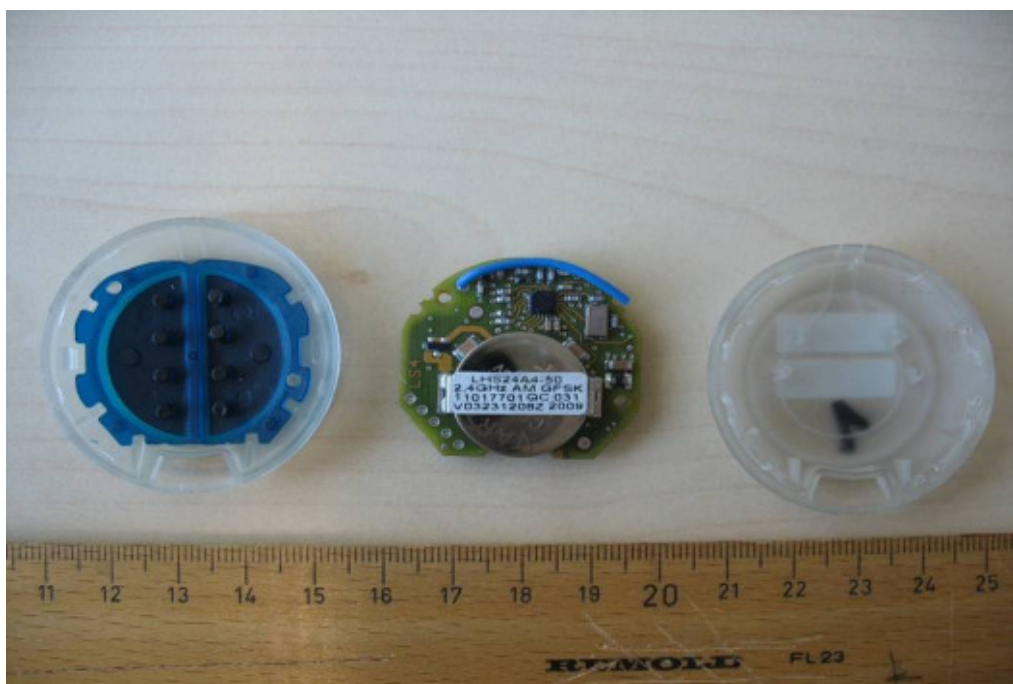


Photo 3: Transmitter

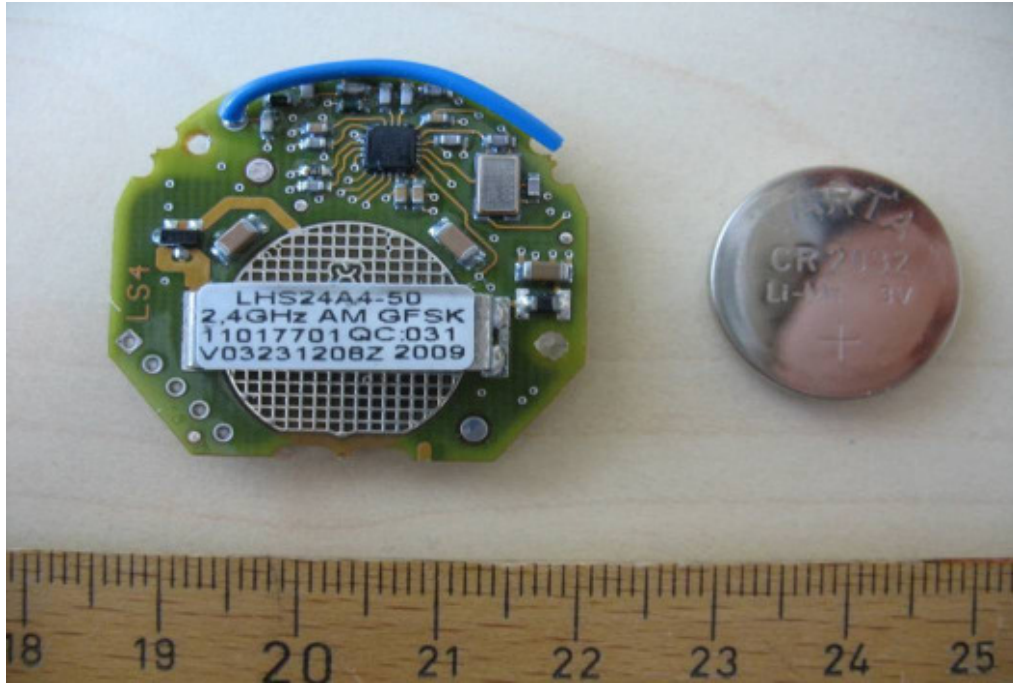


Photo 4: Transmitter

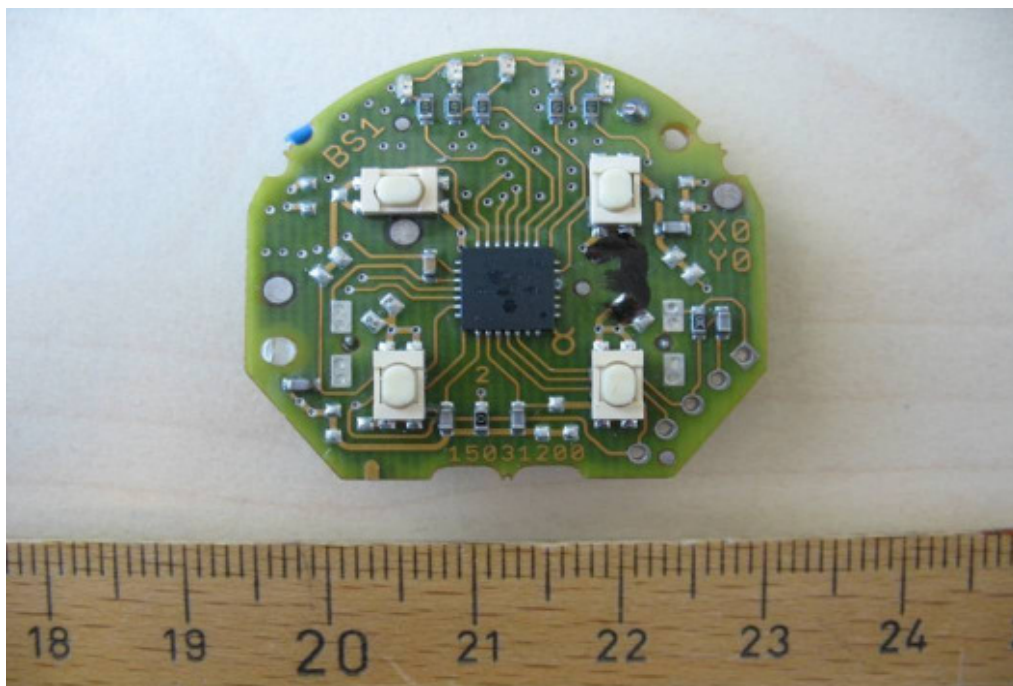


Photo 5: Transmitter

