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 3463A-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.	**:**	**4-2783-01-04/07-B**
Applicant	**:**	**SIGMA Elektro GmbH**
Type	**:**	**STS-C-1**
Test Standard	**:**	**47 CFR FCC Part 15** **RSS-210 Issue 7**
FCC ID	**:**	**M5LCAD1STS**
Certification No. IC	**:**	**7580A-CAD1STS**

Table of contents

1 General information

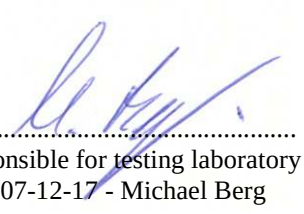
1.1. Administrative data of the test facility

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) Federal Communications Commission (FCC) Identification/Registration No : 90462
Responsible for testing laboratory:	Jakob Reschke Phone: +49 681 598 0 Fax: +49 681 598 9075 email: info@ict.cetecom.de

1.2. Notes

The test results of this test report relate exclusively to the test item specified in 1.5. 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.



.....
Responsible for testing laboratory
2007-12-17 - Michael Berg

.....
Responsible for test report
2007-12-17 - Jakob Reschke

1.3 Details of Applicant

Name	:	SIGMA Elektro GmbH
Address	:	Dr.-Julius-Leber-Straße 15
City	:	D-67433 Neustadt/Weinstraße
Country	:	Germany
Phone	:	+49 (0) 6321 91 20-0
Fax	:	+49 (0) 6321 91 20-34
Contact	:	Jochen Piesciek
Phone	:	+49 6321 9120 112
Fax	:	+49 6321 9120 9 112
e-mail	:	jochen.piesciek@sigmasport.com

1.4 Application Details

Date of receipt of application	:	2007-11-19
Date of receipt of test item	:	2007-12-13
Date(s) of test	:	2007-12-13 to 2007-12-14
Date of report	:	2007-12-17

1.5 Test Item

Type of equipment	:	Cyclometer
Model name	:	STS-C-1
Manufacturer	:	SIGMA Elektro GmbH
Address	:	Dr.-Julius-Leber-Straße 15
City	:	D-67433 Neustadt/Weinstraße
Country	:	Germany
Tested to Radio Standards Specification(RSS) No.	:	210 Issue 7
Open Area Test Site Industry Canada Number	:	IC 3463A-1
Frequency Range (or fixed frequency)	:	112 kHz
Field Strength (at what distance)	:	19.70 dBµV/m at 10 m
Type of Modulation	:	ASK
Antenna Information	:	Integrated antenna
Emission Designator (TRC-43)	:	12K0A1D
Transmitter Spurious (worst case)	:	Nothing found (noise floor)
Receiver Spurious (worst case)	:	Nothing found (noise floor)
Extreme Conditions (Temperature/Voltage)	:	21°C / 3 V DC by Battery
IC no.	:	7580A -CAD1STS
FCC ID	:	M5LCAD1STS

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 :

2007-12-17	Jakob Reschke	
Date	Name	Signature

1.6 Test Setup

Hardware : -.-
Software : -.-

1.7 Test Specifications

FCC:	**CFR Part 15.209**
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	Measurement applicable	Verdict
4.1	§ 15.209 Field Strength of the Fundamental	2.6	YES	PASS
4.2	§ 15.209 Field Strength of the Harmonics and Spurious	2.6	YES	PASS
4.3	§ 15.109 Spurious Magnetics	2.6	YES	PASS
4.4	§ 15.209 Spurious Emissions	2.6	YES	PASS

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.
150 kHz - 30 MHz: Quasi Peak measurement, 9kHz Bandwidth, passive loop antenna.

30 MHz - 200 MHz: Quasi Peak measurement, 120KHz Bandwidth, biconical antenna
200MHz - 1GHz: Quasi Peak measurement, 120KHz Bandwidth, log periodic antenna
>1GHz: Average, RBW 1MHz, VBW 10 Hz, wave guide horn

All measurement settings are according to FCC 15.109 and 15.209

4 FCC Part 15

4.1 Field Strength of the Fundamental

Reference

FCC:	CFR Part SUBCLAUSE § 15.209
IC:	RSS 210, Issue 7, 2.6

MAXIMUM OUTPUT POWER (RADIATED)

TEST CONDITIONS		**MAXIMUM POWER (dBµV/m) at 10 m**		
Frequency		**112 kHz**		
T_{nom} 21 °C	**V_{nom} 3.0V DC**	**19.70***		
Maximum deviation from output power under extreme test conditions (dBc)		**not applicable**		
Measurement uncertainty		**±3dB**		

RBW/VBW : 100 kHz

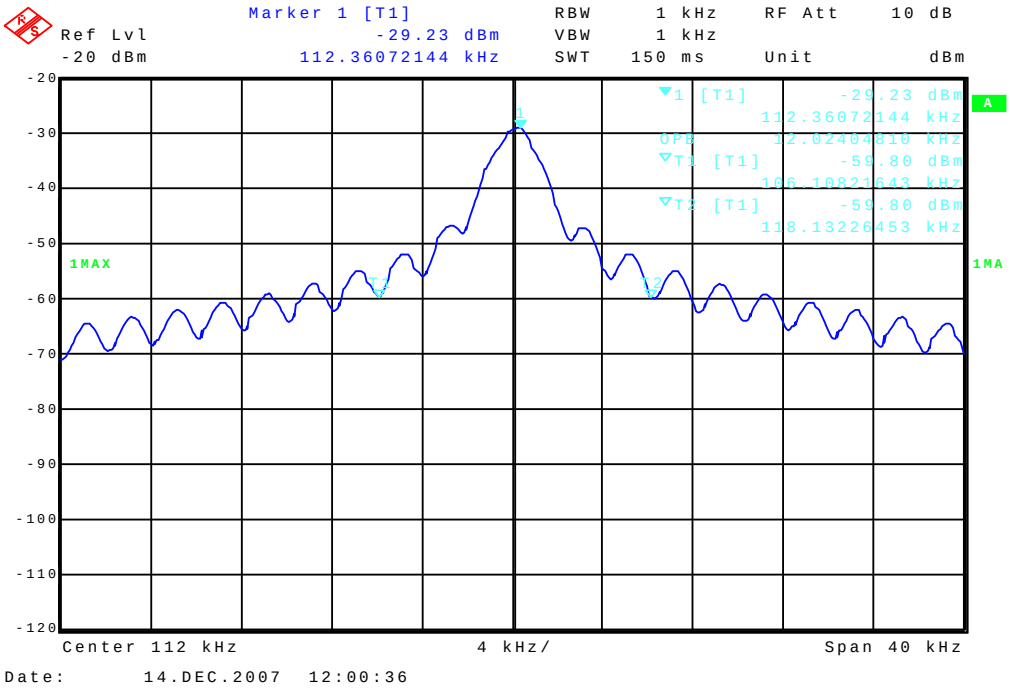
*measured at 1 m and calculated to 10 m as specified in §15.31

Limits **SUBCLAUSE § 15.209 (a)**

Frequency (MHz)	Field strength (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
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. Howerver, operation within these frequency bands is permitted under other sections of this Part, e.g., Section 15.231 and 15.241.

4.2 Occupied Bandwidth



4.3 Field Strength of the Harmonics and Spurious

Reference

FCC:	CFR Part SUBCLAUSE § 15.209
IC:	RSS 210, Issue 7, 2.6

EMISSION LIMITATIONS					
f (kHz)		**amplitude of emission (dBµV/m) Average/QP/PK**	**limit max. allowed emmision power**	**actual attenuation below frequency of operation (dB)**	**results**
112		19.70 (PK)	86.60 dBµV/m*		Operating frequency
No critical peaks found					
Measurement uncertainty			**± 3dB**		

*Limit recalculated from 300m to 10m with a correctionfactor of 60 dB.

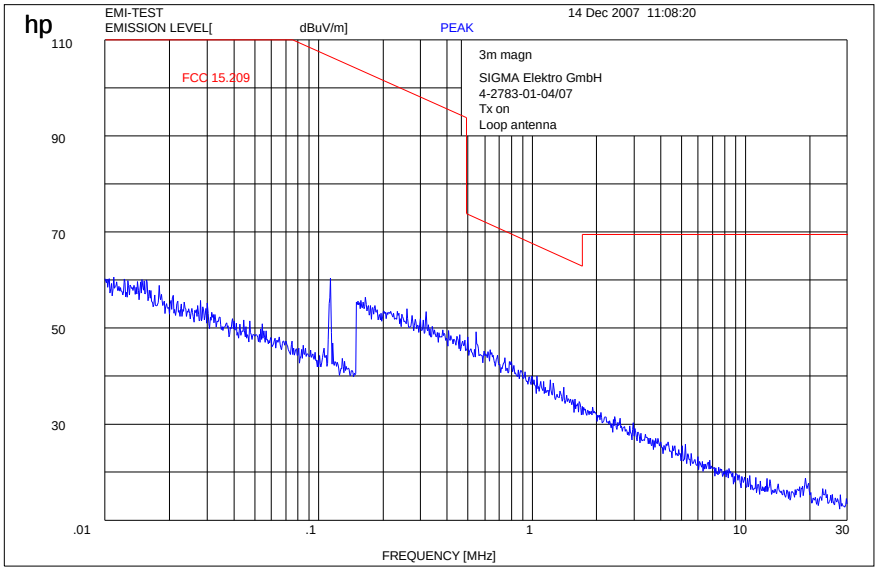
Limits **SUBCLAUSE § 15.209 (a)**

Frequency (MHz)	Field strength (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
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. Howerver, operation within these frequency bands is permitted under other sections of this Part, e.g., Section 15.231 and 15.241.

4.4 Part 15.109 Spurious Magnetics

Plot 1: Tx Magnetic
9 kHz – 30 MHz



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

Measurement distance 3m
This measurement was done in 3 polarisation's, the plot shows the worst case

Limits **SUBCLAUSE § 15.209 (a)**

Frequency (MHz)	Field strength (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
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. Howerver, operation within these frequency bands is permitted under other sections of this Part, e.g., Section 15.231 and 15.241.

4.5 Part 15.209 Spurious Emissions

Information

EUT:	SIGMA CAD TX + MOD5 RX
Serial Number:	TX: sample 1 RX: Sample 1
Test Description:	FCC Part 15.209
Operating Conditions:	transmitting-receiving mode
Operator Name:	Kraus
Comment:	testet with CDC (testbox)

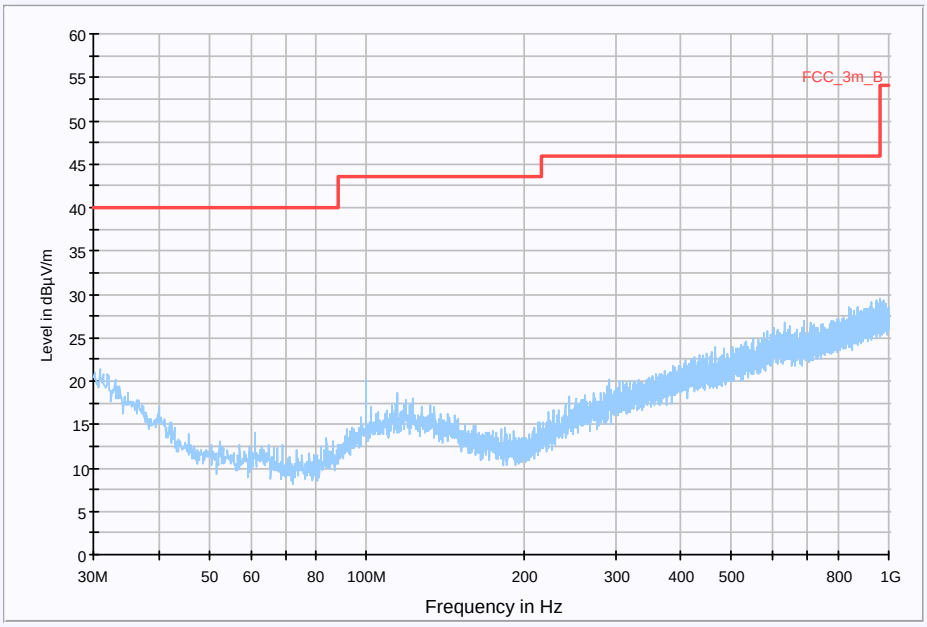
Scan Setup: STAN_Fin [EMI radiated]

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

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

Plot 2:
Tx : 30 MHz - 1 GHz

FCC_3m_Fast_1GHz (B)



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

Subrange 1

Frequency Range:	30MHz - 2GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 3.32, CAL 07.01.2009
Signal Path:	without Notch FW 1.0
Antenna:	Chase Broadband BiLog Antenna CBL 6112 SN 2110, FW A, CAL 07.01.2009 Correction Table (vertical): Chase Broadband BiLog Antenna CBL 6112 Correction Table (horizontal): Chase Broadband BiLog Antenna CBL 6112 Correction Table: Cabel with switch (1007)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9)

5 Testequipment

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.

Anechoic chamber C:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Anechoic chamber	MWB	87400/02	300000996	Monthly verification		
2	System-Rack 85900	HP I.V.	*	300000222	n.a.		
3	Measurement System 1						
4	Spektrum Analyzer 8566B	HP	2747A05306	300001000	05.10.2006	24	05.10.2008
5	Spektrum Analyzer Display 85662A	HP	2816A16541	300002297	05.10.2006	24	05.10.2008
6	Quasi-Peak-Adapter 85650A	HP	2811A01131	300000999	05.10.2006	24	05.10.2008
7	RF-Preselector 85685A	HP	2837A00779	300000218	08.11.2006	24	08.11.2008
8	PC Vectra VL	HP		300001688	n.a.		
9	Software EMI	HP		300000983	n.a.		
10	Measurement System 2						
11	FSP 30	R&S	100623	ICT 300003464	05.10.2007	24	15.10.2009
12	PC	F+W			n.a.		
13	TILE	TILE			n.a.		
14	Biconical antenna	EMCO	S/N: 860 942/003		Monthly verification (System cal.)		
15	Log. Period. Antenna 3146	EMCO	2130	300001603	Monthly verification (System cal.)		
16	Double Ridged Antenna HP 3115P	EMCO	3088	300001032	Monthly verification (System cal.)		
17	Active Loop Antenna 6502	EMCO	2210	300001015	Monthly verification (System cal.)		
18	Power Supply 6032A	HP	2818A03450	300001040	12.05.2007	36	12.05.2010
19	Busisolator	Kontron		300001056	n.a.		
20	Leitungsteiler 11850C	HP		300000997	Monthly verification (System cal.)		
21	Power attenuator 8325	Byrd	1530	300001595	Monthly verification (System cal.)		
22	Band reject filter WRCG1855/1910	Wainwright	7	300003350	Monthly verification (System cal.)		
23	Band reject filter WRCG2400/2483	Wainwright	11	300003351	Monthly verification (System cal.)		

Anechoic chamber F:

No.	Instrument/Ancillary	Manufacturer	Type	Serial-No.	Internal identification
	Radiated emission in chamber F				
F-1	Control Computer	F+W		FW0502032	300003303
F-2	Bilog antenna	Chase	CBL 6112A	2110	300000573
F-3a	Amplifier	Veritech Microwave Inc.	0518C-138	- / -	- / -
F-4b	Switch	HP	3488A	- / -	300000368
F-5	EMI Test receiver	R&S	ESCI	100083	300003312
F-6	Turntable Controller	EMCO	1061 3M	1218	300000661
F-7	Tower Controller	EMCO	1051 Controller	1262	300000625
F-8	Tower	EMCO	1051 Tower	1262	300000625
F-9	Ultra Notch-Filter Rejected band Ch. 62	WRCD		9	
	Radiated immunity in chamber F				
F-10	Control Computer	F+W		FW0502032	300003303
F-11	Signal Generator	R&S	SML 03	102519	300003407
F-12	RF-Amplifier	ar	50W1000	12932	300001438
F-13	Directional Coupler	ar	DC 3010	12708	300001428
F-14	Logper Antenna	R&S	HL023A1	323704/016	300001476
F-15	RF-Amplifier	ar	60S1G3	313649	300003410
F-16	Directional Coupler	ar	DC7144A	312786	300003411
F-17	Horn Antenna	ar	AT 4002	19739	300000633
F-18	Power Meter	R&S	NRV	860327/024	F033
F-19	Power sensor	R&S	URV5-Z2	839080/005	300002844.02
F-20	Power sensor	R&S	URV5-Z2	830755/057	F032
	Harmonics and flicker in front of chamber F				
F-21	Flicker and Harmonics Test System	Spitzenberger & Spies	PHE4500/B I PHE4500/B II	B5983 B5984	300000210
F-22	Control Unit	Spitzenberger & Spies	STE	B5980	300000210
F-23	Power Amplifier	Spitzenberger & Spies	EP 4500/B	B5976	300000210
F-24	Conect Panel	Spitzenberger & Spies	Conect panel	B5982	300000210
F-25	Power Supply	Spitzenberger & Spies	NT-EP 4500	B3977	300000210
F-26	Additional transformer	Spitzenberger & Spies	UT-EP 4500	B5978	300000210
F-27	Analyzer Reference System	Spitzenberger & Spies	ARS 16/1	A3509 07/0 0205	300003314
F-26	Power Supply	Hewlett Packard	6032 A	2920 A 04466	300000580

6 Annex B: Photographs of Test site

Photo 1 (Radiated Emissions):

Photo 2 (Radiated Emissions):

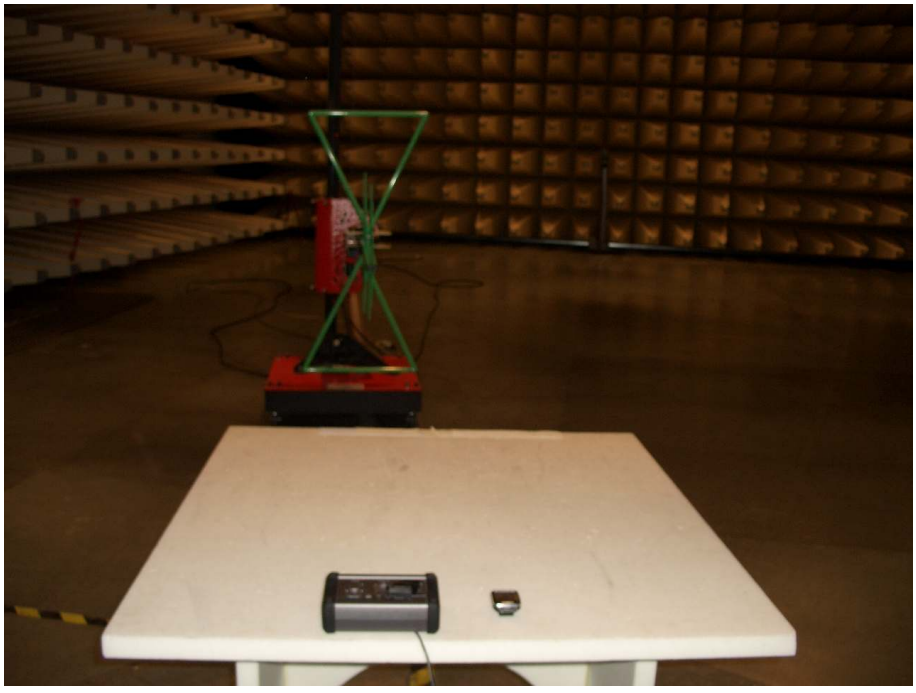
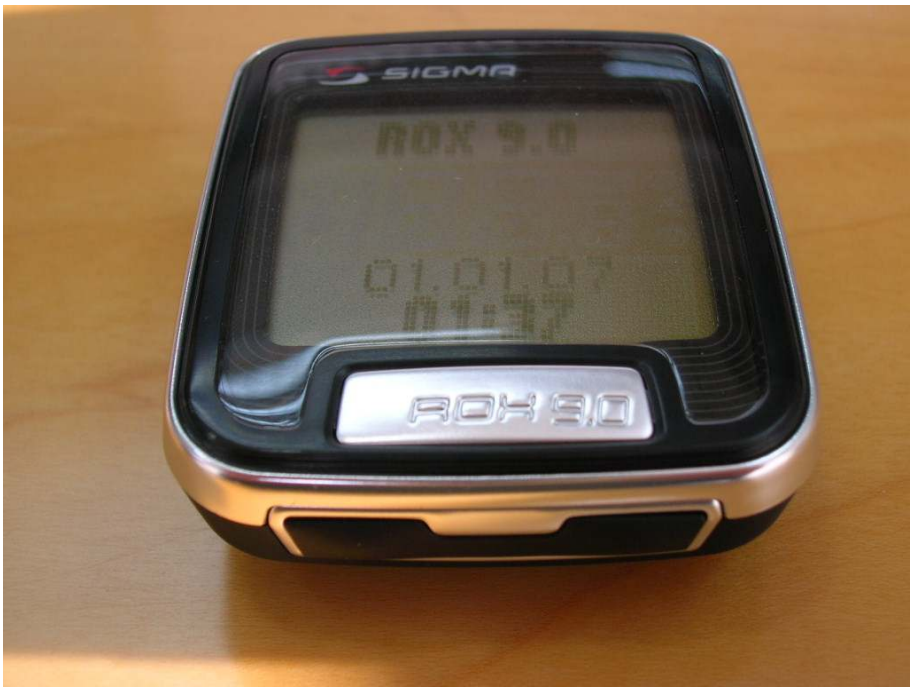


Photo 3 (Radiated Emissions):

7 Annex C: External Photographs of the Equipment

Photo 1:

Photo 2:



8 Annex D: INTERNAL PHOTOGRAPHS OF THE EQUIPMENT

Photo 3:

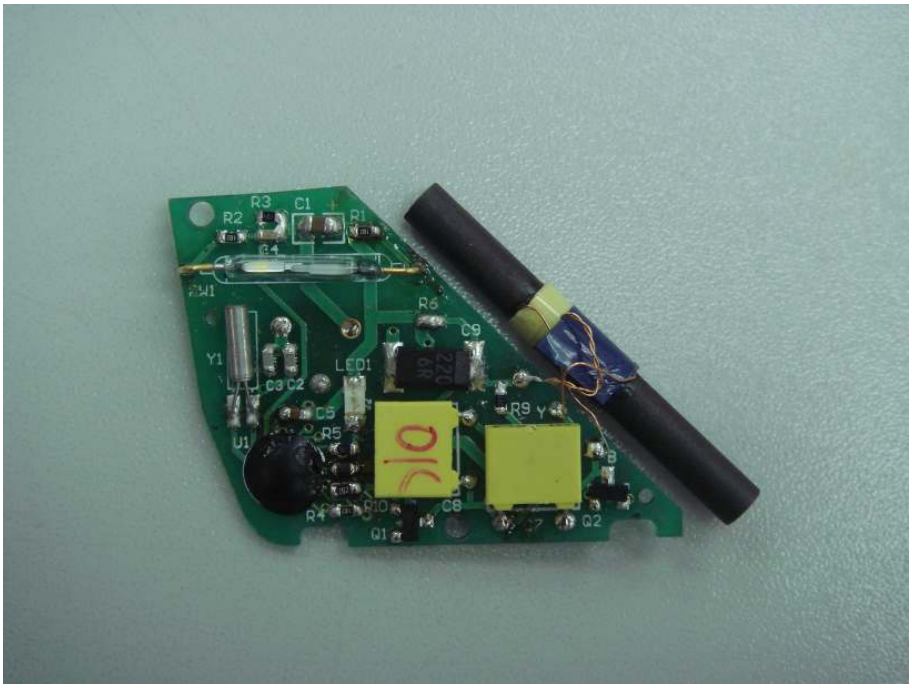


Photo 4:

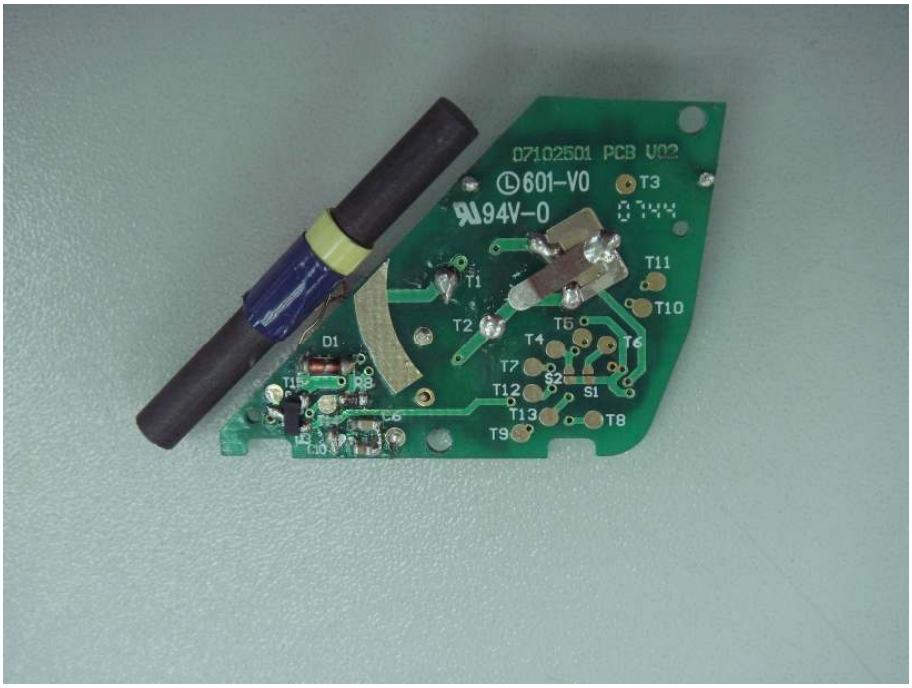


Photo 5:

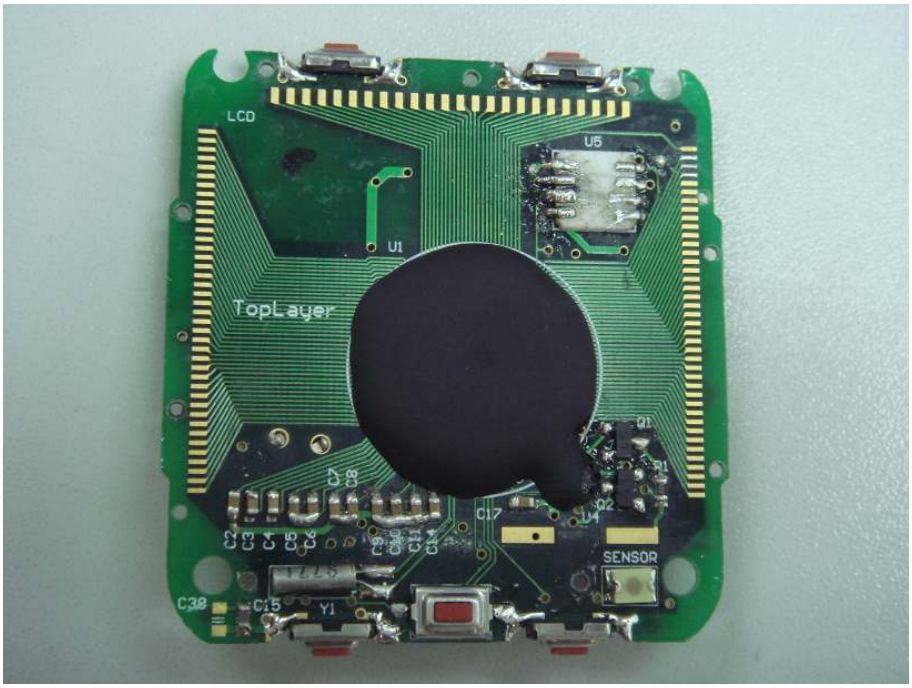


Photo 6: