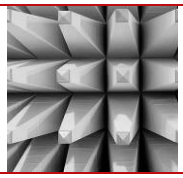




CETECOM™
CETECOM ICT Services
consulting - testing - certification

TEST REPORT

Deutscher Akkreditierungs Rat DAR

Test report no.: 1-1383-01-07/09-B

Testing laboratory

CETECOM ICT Services GmbH
Untertuerkheimer Straße 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.cetecom.com
e-mail: ict@cetecom.com

Accredited test laboratory:
The test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025
DAR registration number: DGA-PL-176/94-D1

Area of Testing: Radio/Satellite Communications

Applicant

SIEMENS Audiologische Technik GmbH
Basic Technology (AEBT)
Gebbertstrasse 125
91058 Erlangen / Germany
Fax: +49 (9131) 308-3207
Contact: Clemens Meythaler
e-mail: clemens.meythaler@siemens.com
Phone: +49 (9131) 308-3000

Manufacturer

SIEMENS Audiologische Technik GmbH
Basic Technology (AEBT)
Gebbertstrasse 125
91058 Erlangen / Germany

Test standard/s

47 CFR Part 15	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	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

For further applied test standards please refer to section 3 of this test report.

Test item

Kind of test item:	**MiniTEK**
Model name:	**MiniTEK / Mini Blu RCU**
FCC ID:	**SGI-WL500**
IC:	**267AB- WL500**
Frequency [MHz]:	**3.28 MHz**
Power supply:	**3.70V DC by Li-Ion Battery**
Temperature range:	**22°C**

This test report is electronically signed and valid without handwriting signature. For verification of the electronical signatures, the public keys can be requested at the testing laboratory.

Test performed:
cn=Jakob Reschke, o=CETECOM ICT Services GmbH, ou=RES-101109, email=Jakob.Reschke@cetecom.com, c=DE
2010.12.06 13:48:46 +01'00'
Jakob Reschke

Test report authorised:
cn=Stefan Boes, o=Cetecom ICT Services GmbH, ou=BOE-100817, email=Stefan.Boes@cetecom.com, c=DE
2010.12.06 14:01:23 +01'00'
Stefan Bös

1 Table of contents

2 General information

2.1 Notes

The test results of this test report relate exclusively to the test item specified in this test report. 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 CETECOM ICT Services GmbH.
This test report is electronically signed and valid without handwriting signature. For verification of the electronical signatures, the public keys can be requested at the testing laboratory.

2.2 Application details

Date of receipt of order:	2010-05-05
Date of receipt of test item:	2010-08-20
Start of test:	2010-08-20
End of test:	2010-08-20
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Version	Test standard description
47 CFR Part 15	2009-10	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

4 Test environment

Temperature:	T_{nom}	22	°C during room temperature tests
	T_{max}	-/-	°C during high temperature test
	T_{min}	-/-	°C during low temperature test
Relative humidity content:		52 %	
Air pressure:		not relevant for this kind of testing	
Power supply:	V_{nom}	3.70 V	DC by Li-Ion Battery
	V_{max}	-/- V	
	V_{min}	-/- V	

5 Test item

Kind of test item	:	**MiniTEK**
Type identification	:	**MiniTEK / Mini Blu RCU**
S/N serial number	:	**Rad. Proto B #2**
HW hardware status	:	**ProtoB**
SW software status	:	**Beta V5**
Frequency band [MHz]	:	**13.56 MHz**
Type of modulation	:	**A1D**
Number of channels	:	**1**
Antenna	:	**Integrated antenna**
Power supply	:	**3.70 V DC by Li-Ion Battery**
Temperature range	:	**22°C**

6 Test laboratories sub-contracted

None

7 Summary of measurement results

☒	**No deviations from the technical specifications were ascertained**
☐	There were deviations from the technical specifications ascertained

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15 RSS 210, Issue 7	Passed	2010-12-06	-/-

Test Specification Clause	Test Case	Temperature Conditions	Power Source Voltages	Pass	Fail	NA	NP	Results
§ 15.209 (a) / RSS-210 Issue 7	Fieldstrength of harmonics and spurious	Nominal	Nominal	☒	☐	☐	☐	complies
§ 15.109 (a) / RSS-210 Issue 7	Receiver spurious	Nominal	Nominal	☒	☐	☐	☐	complies

Note: NA = Not Applicable; NP = Not Performed

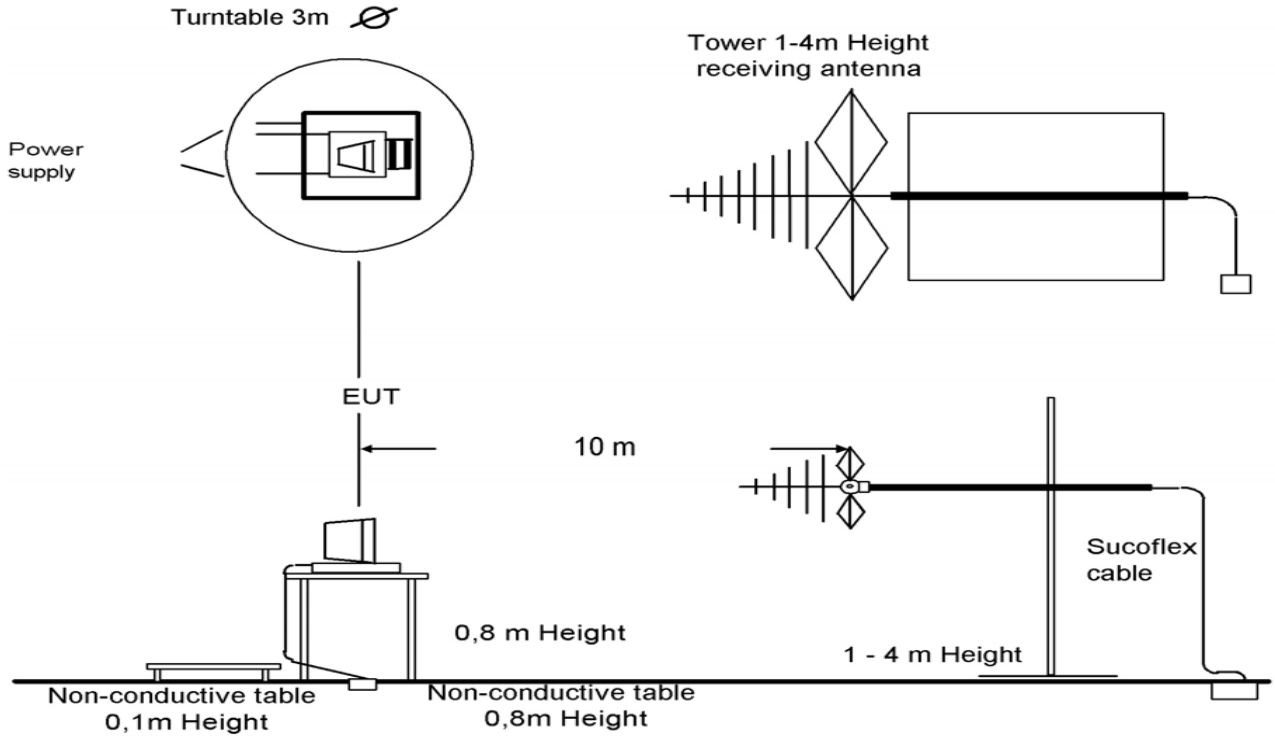
8 RF measurement testing

8.1 Description of test setup

8.1.1 Radiated measurements

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 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 confirmed with specifications ANSI C63.2-1996 and ANSI C63.4-2009. 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 setups 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 C63-4-2009.
Antennas are confirmed with ANSI C63.2-1996 item 15.

Semi anechoic chamber



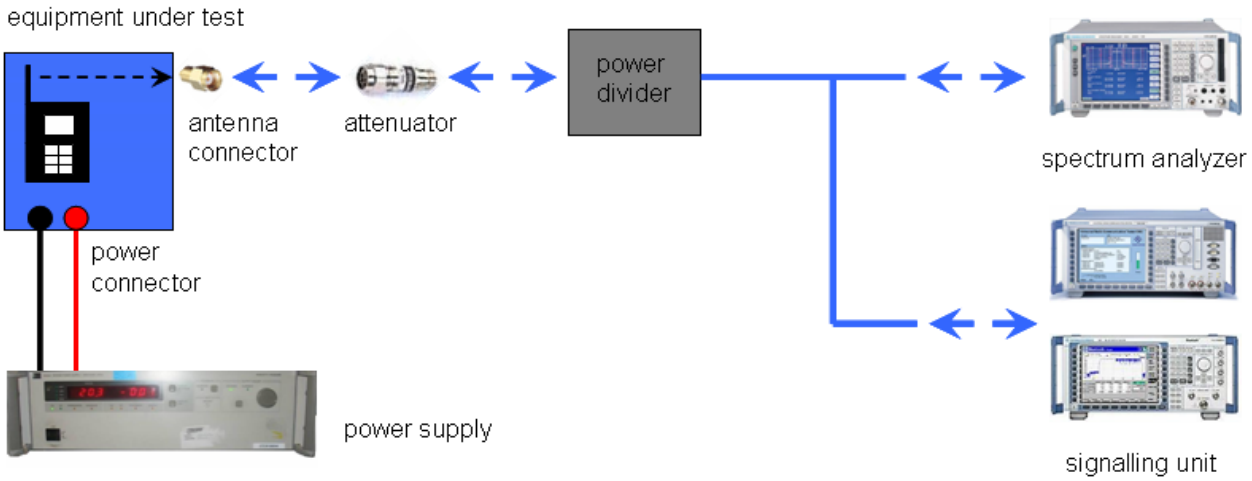
Picture 1: Diagram radiated measurements

9 kHz - 30 MHz:	active loop antenna
30 MHz – 1 GHz:	tri-log antenna
> 1 GHz:	horn antenna

The EUT is powered by an external power supply with nominal voltage. The signalling (if needed) is performed from outside the chamber with a signalling unit by air link using signalling antenna.

8.1.2 Conducted measurements

The EUT's RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The signal is first 10dB attenuated before it is power divided (~6dB loss per branch The measurement readings on the signalling unit/spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, and the spectrum analyzer are impedance matched on 50 Ohm.



Picture 2: Diagram conducted measurements

8.2 Additional comments

Reference documents: None

Special test descriptions: None

Configuration descriptions: None

8.3 RSP100 test report cover sheet / performance test data

Test Report Number	:	**1-1383-01-07/09-B**
Equipment Model Number	:	**MiniTEK / Mini Blu RCU**
Certification Number	:	**267AB- WL500**
Manufacturer (complete Address)	:	**SIEMENS Audiologische Technik GmbH Basic Technology (AEBT) Gebbertstrasse 125 91058 Erlangen / Germany**
Tested to radio standards specification no.	:	**RSS 210, Issue 7, Annex 8**
Open Area Test Site IC No.	:	**IC 3462C-1**
Frequency Range or fixed frequency	:	**3.28 MHz**
Field Strength [dBµV/m] (at which distance)	:	**48.50 @ 10 m**
Occupied bandwidth (99%-BW) [kHz]	:	**259.61**
Type of modulation	:	**ASK**
Emission Designator (TRC-43)	:	**260KA1D**
Antenna Information	:	**Integrated antenna**
Transmitter Spurious (worst case) [dBµV/m @ 3m]:		**19.3 @ 177 MHz**
Receiver Spurious (worst case) [dBµV/m @ 3m]:		**23.8**

ATTESTATION:
DECLARATION OF COMPLIANCE:

I attest 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:

Jakob Reschke
2010-11-04 Signature

9 Measurement results

9.1 Fieldstrength of the fundamental, harmonics and spurious

Measurement:

Measurement parameter	
Detector:	Average / Quasi Peak
Sweep time:	Auto
Resolution bandwidth:	9 kHz – 30 MHz : 9 kHz 30 MHz – 1 GHz: 120 kHz
Video bandwidth:	9 kHz – 30 MHz : 9 kHz 30 MHz – 1 GHz: 120 kHz
Trace-Mode:	Max Hold

Limits:

FCC		IC
SUBCLAUSE § 15.209 (a)		RSS-210 Issue 7
Field strength of the harmonics and spurious.		
Frequency (MHz)	**Field strength (µV/m)**	**Measurement distance (m)**
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30 (29.5 dBµV/m)	30
30 – 88	100 (40 dBµv/m)	3
88 – 216	150 (43.5 dBµV/m)	3
216 – 960	200 (46 dBµV/m)	3

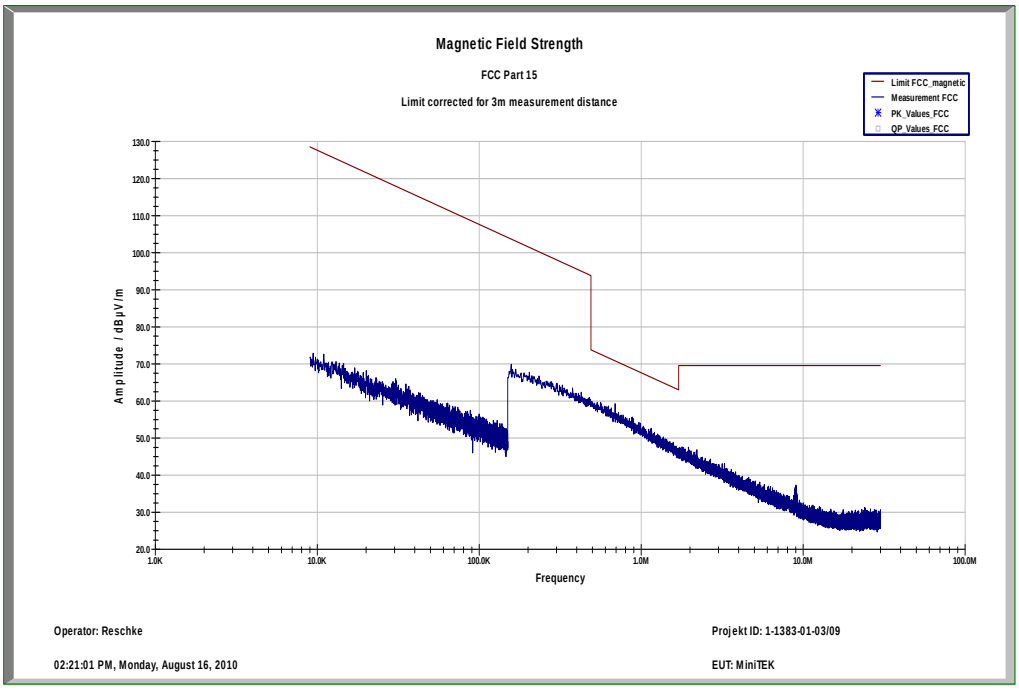
Result:

EMISSION LIMITATIONS				
f [MHz]	Detector	Limit max. allowed [dBµV/m]	Amplitude of emission [dBµV/m]	Results
No critical peaks found				
3.28 MHz Fundamental	Peak	29.54	48.50 @ 10 m Re-calculated according 15.31 with 40 dB / decade 28.50 @ 30 m	Pass

Result: **The result of the measurement is passed.**

Plots of the measurements

Plot 1: 9 kHz – 30 MHz



Plot 2: 30 MHz – 1000 MHz

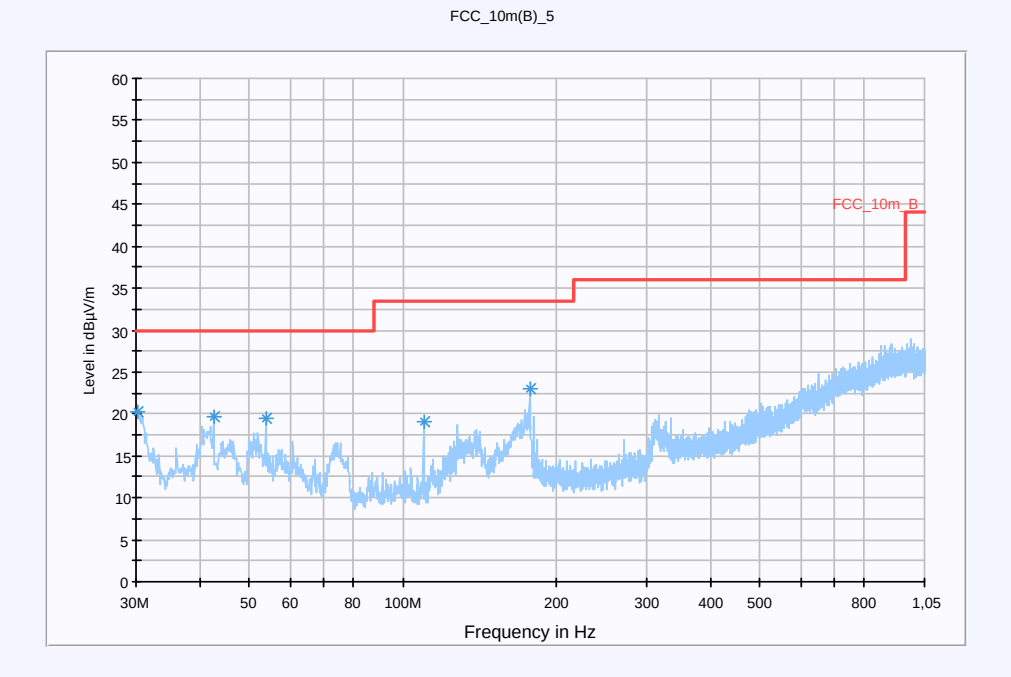
Common Information

EUT:	MiniTEK Remote + UE1W-050080SPC
Serial Number:	12345678901234 - Proto#3 + 080703
Test Description:	FCC part 15 B class B @ 10 m
Operating Conditions:	TX @ 3,28 MHz + charging
Operator Name:	Hennemann
Comment:	AC: 115 V / 60 Hz; same modification as Proto#1; premeasurement only

Scan Setup: STAN_Fin [EMI radiated]

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

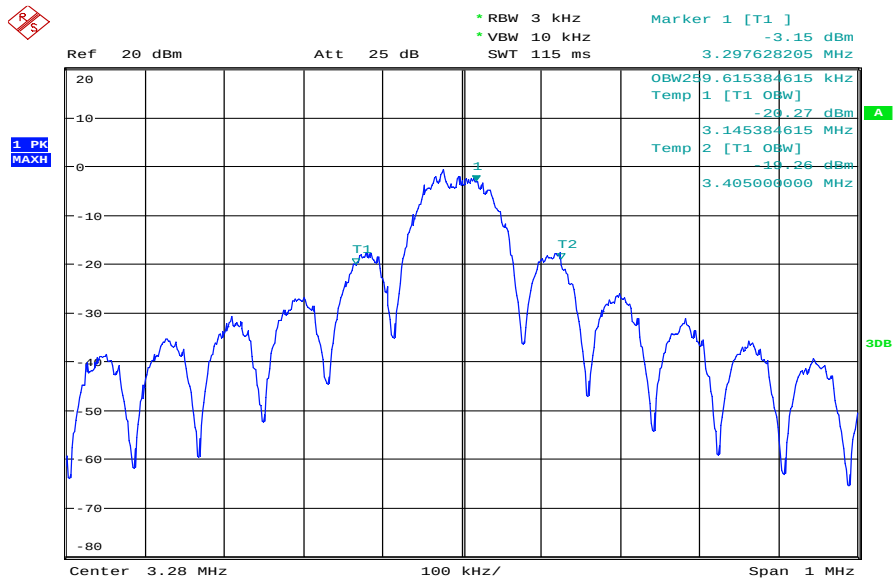
Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver



Data Reduction 1 [1]

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	MaxPeak-MaxHold (dBµV/m)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
30.120000	15.9	20.2	120.0	V	120.0	12.5	
42.600000	16.1	19.8	120.0	V	302.0	13.3	
53.880000	10.3	19.4	120.0	V	187.0	13.0	
109.680000	5.4	19.1	120.0	V	236.0	11.1	
177.000000	19.3	23.1	120.0	V	246.0	10.2	

Plot 3: Bandwidth



BW = 259.61 kHz

9.2 Receiver spurious emissions

Measurement:

Measurement parameter	
Detector:	Average / Quasi Peak
Sweep time:	Auto
Resolution bandwidth:	9 kHz – 30 MHz : 9 kHz 30 MHz – 1 GHz: 120 kHz
Video bandwidth:	9 kHz – 30 MHz : 9 kHz 30 MHz – 1 GHz: 120 kHz
Trace-Mode:	Max Hold

Limits:

FCC		IC
SUBCLAUSE § 15.109 (a)		RSS-210 Issue 7
Field strength of the harmonics and spurious.		
Frequency (MHz)	**Field strength (µV/m)**	**Measurement distance (m)**
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30 (29.5 dBµV/m)	30
30 – 88	100 (40 dBµv/m)	3
88 – 216	150 (43.5 dBµV/m)	3
216 – 960	200 (46 dBµV/m)	3

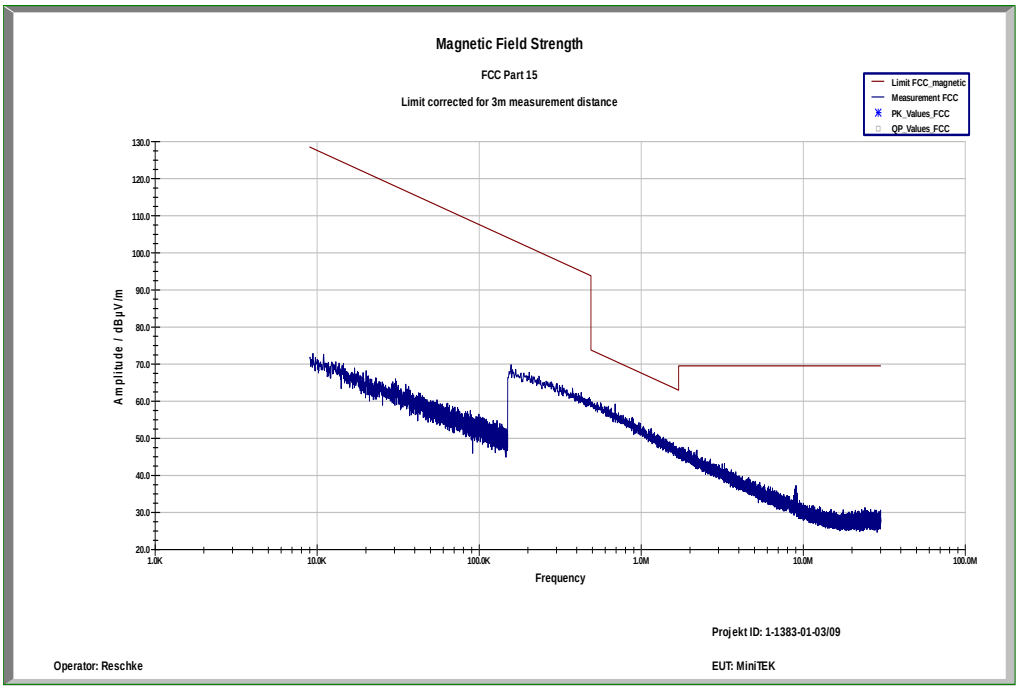
Result:

EMISSION LIMITATIONS				
f [MHz]	Detector	Limit max. allowed [dBµV/m]	Amplitude of emission [dBµV/m]	Results
No critical peaks found				

Result: **The result of the measurement is passed.**

Plots of the measurements

Plot 1: 9 kHz – 30 MHz



Plot 2: 30 MHz – 1000 MHz

CETECOM ICT Services GmbH

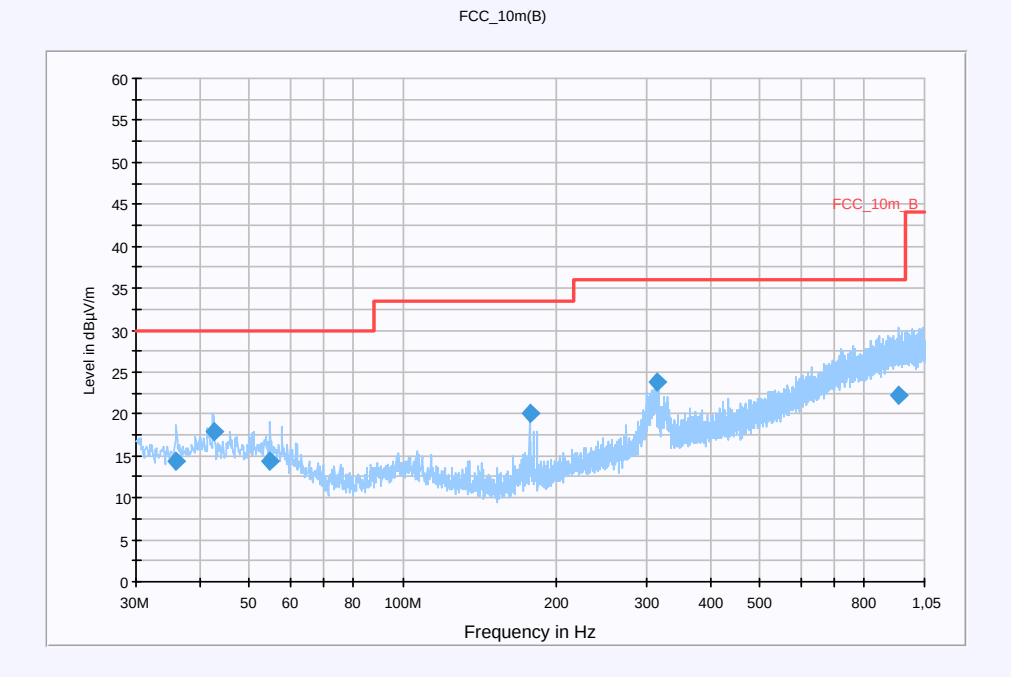
Common Information

EUT:	MiniTEK Remote + UE1W-050080SPC
Serial Number:	12345678901234 - Proto#1 + 080703
Test Description:	FCC part 15 B class B @ 10 m
Operating Conditions:	RX + charging
Operator Name:	Hennemann
Comment:	AC: 115 V / 60 Hz; 6th modification

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
36.037200	14.4	15000.000	120.000	98.0	V	170.0	13.1	15.6	30.0	
42.573600	17.8	15000.000	120.000	98.0	V	182.0	13.3	12.2	30.0	
54.982350	14.4	15000.000	120.000	221.0	V	139.0	12.9	15.6	30.0	
176.951550	20.0	15000.000	120.000	98.0	V	272.0	10.2	13.5	33.5	
314.584350	23.8	15000.000	120.000	250.0	H	292.0	15.0	12.2	36.0	
935.474700	22.2	15000.000	120.000	98.0	V	146.0	25.3	13.8	36.0	

9.3 TX Spurious Emissions Conducted < 30 MHz

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to single channel mode and the transmit channel is channel 39. This measurement is representative for all channels and modes. If critical peaks are found channel 00 and channel 78 will be measured too. The measurement is performed in the mode with the highest output power. Both power lines, phase and neutral line, are measured. Found peaks are remeasured with average and quasi peak detection to show compliance to the limits.

Measurement:

Measurement parameter	
Detector:	Peak - Quasi Peak / Average
Sweep time:	Auto
Video bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Resolution bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace-Mode:	Max Hold

Limits:

FCC		IC
CFR Part 15.107(a)		ICES-003, Issue 4
TX Spurious Emissions Conducted < 30 MHz		
Frequency (MHz)	Quasi-Peak (dBµV/m)	Average (dBµV/m)
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30.0	60	50

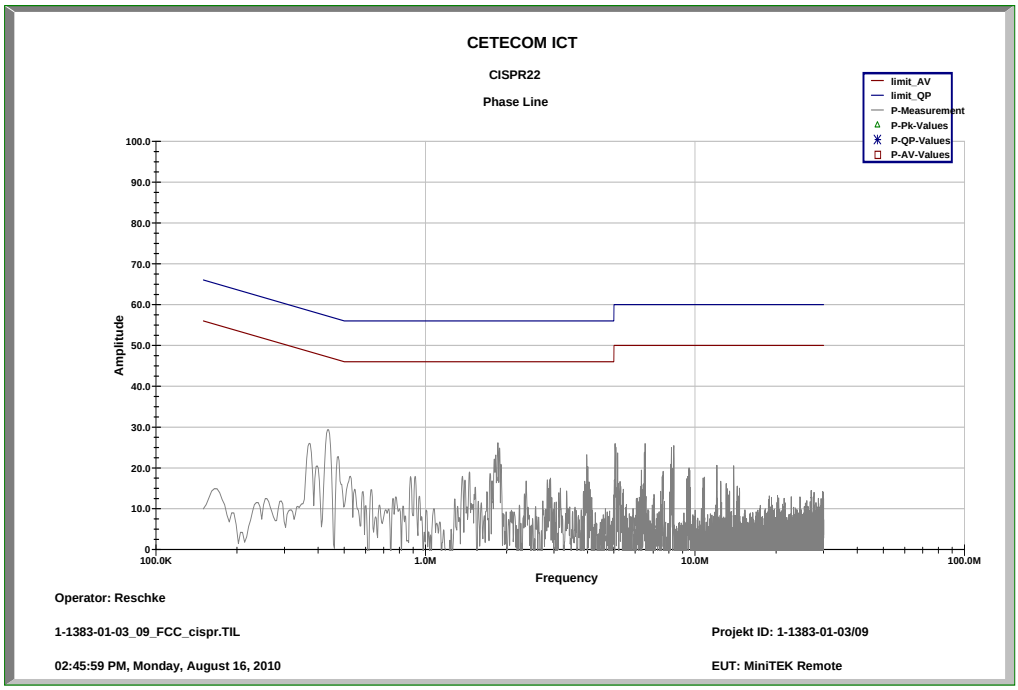
*Decreases with the logarithm of the frequency

Result: **Also see plots**

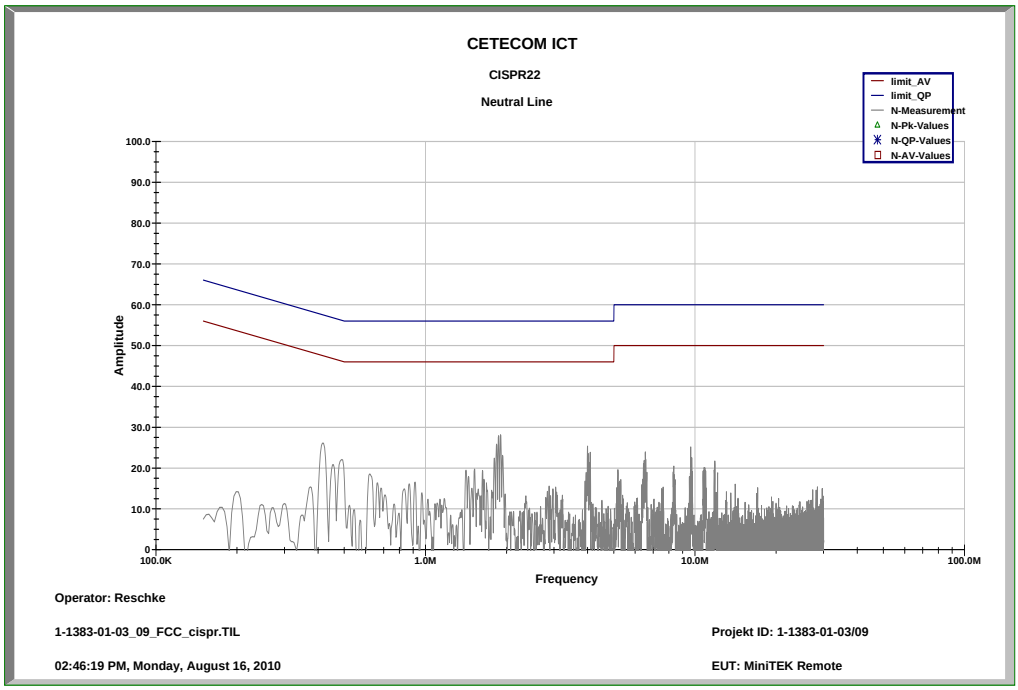
TX Spurious Emissions Conducted < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
No critical peaks found		
Measurement uncertainty	± 3 dB	

Result: **The result of the measurement is passed.**

Plot 1: 9 kHz to 30 MHz / Phase Line



Plot 2: 9 kHz to 30 MHz / Neutral Line



10 Test equipment and ancillaries used for tests

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Labor/Item).

No.	Labor / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
2	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	k	06.01.2009	06.01.2011
3	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081;B5979	300000210	ne		
4	n. a.	EMI Test Receiver	ESCI 1166.5950.03	R&S	100083	300003312	k	08.01.2010	08.01.2012
5	n. a.	Analyzer-Reference-System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	k	01.06.2009	01.06.2011
6	n. a.	Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379	ev		
7	n. a.	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		
8	n. a.	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
9	n. a.	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
10	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	01.04.2010	01.04.2012
11	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	08.01.2010	08.01.2012

Agenda: Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vlkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

Annex A Photographs of the test setup

Photo documentation

Photo 1:

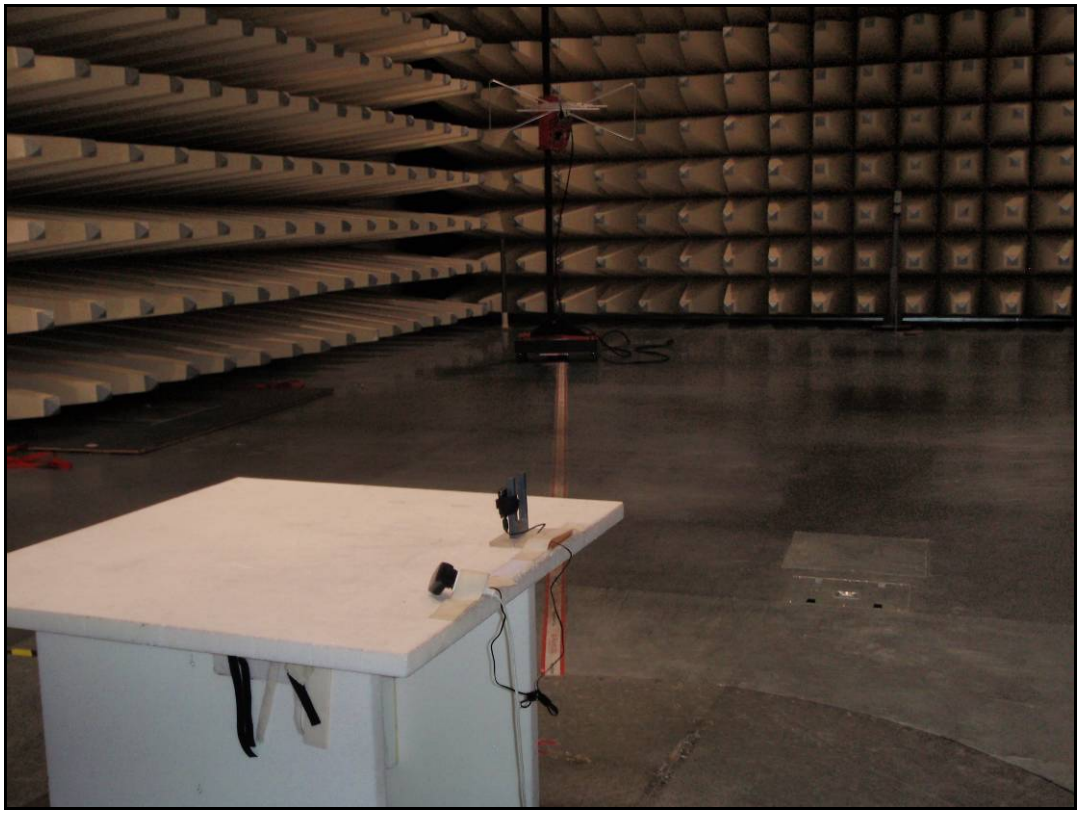
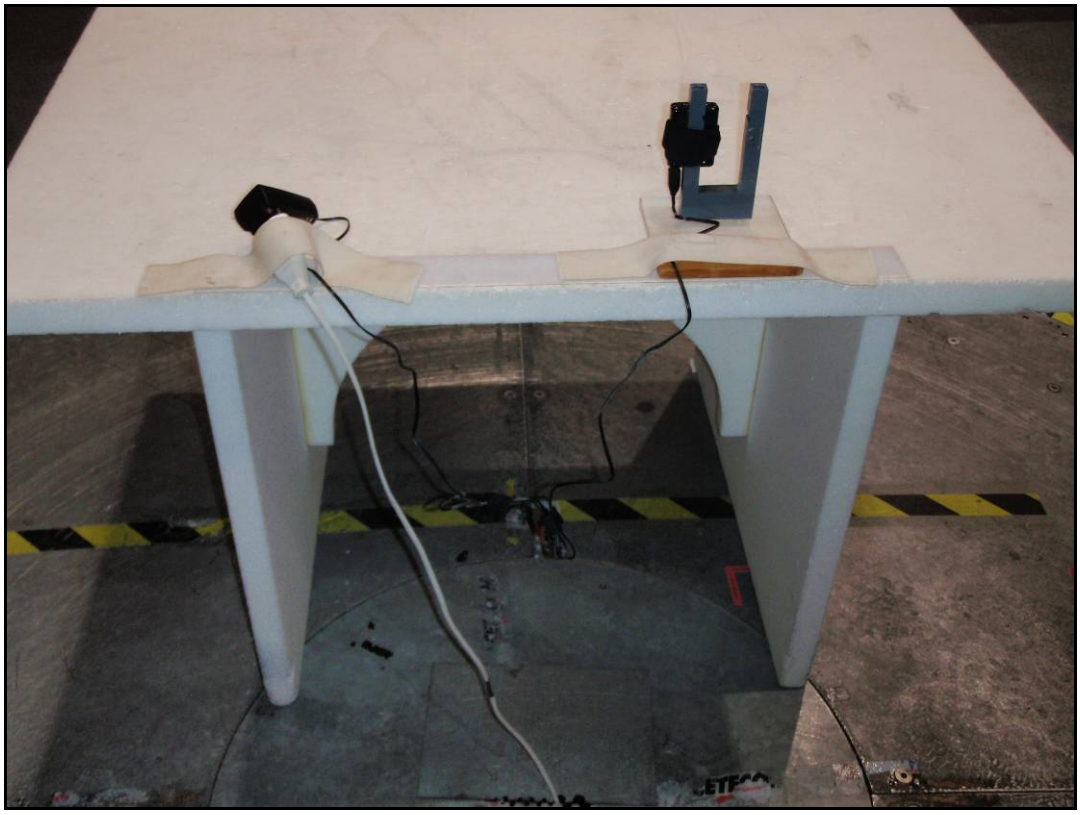


Photo 2:



Annex B External photographs of the EUT

Photo 3:

Photo 4:

Photo 5:

Photo 6:

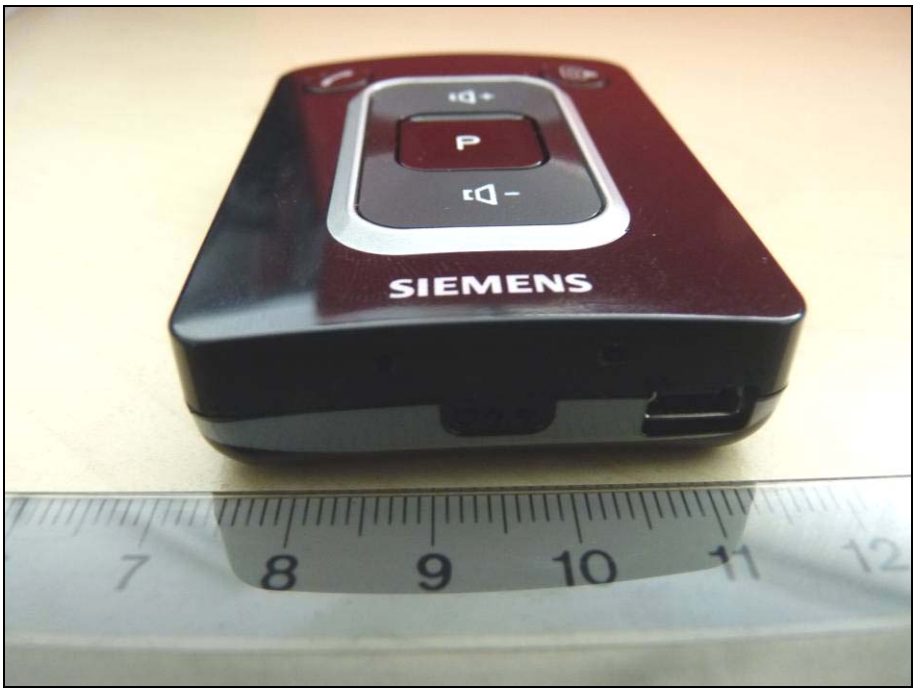


Photo 7:

Photo 8:

Annex C Internal photographs of the EUT

Photo 9:

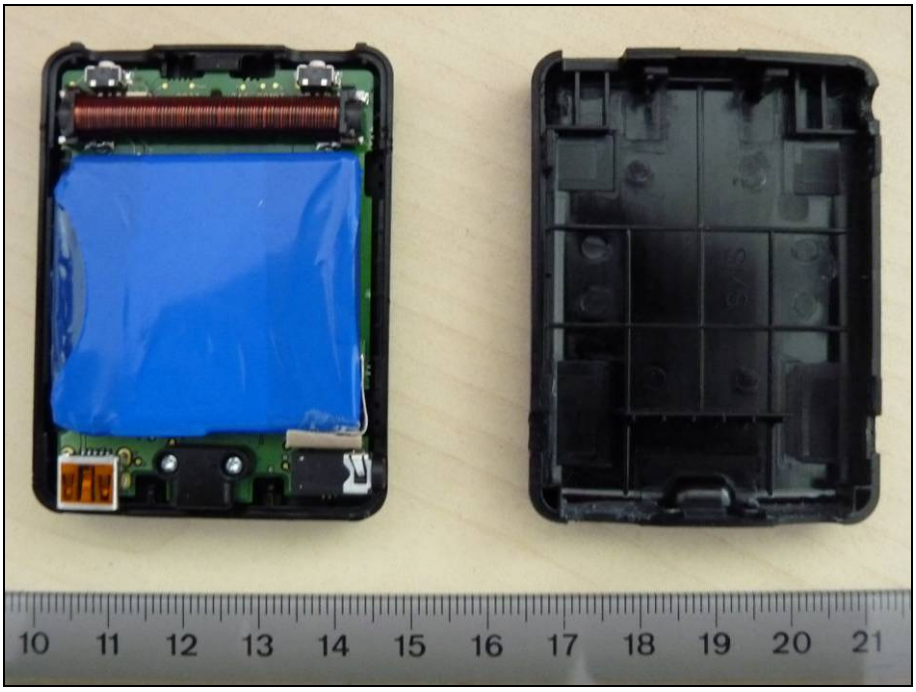


Photo 10:

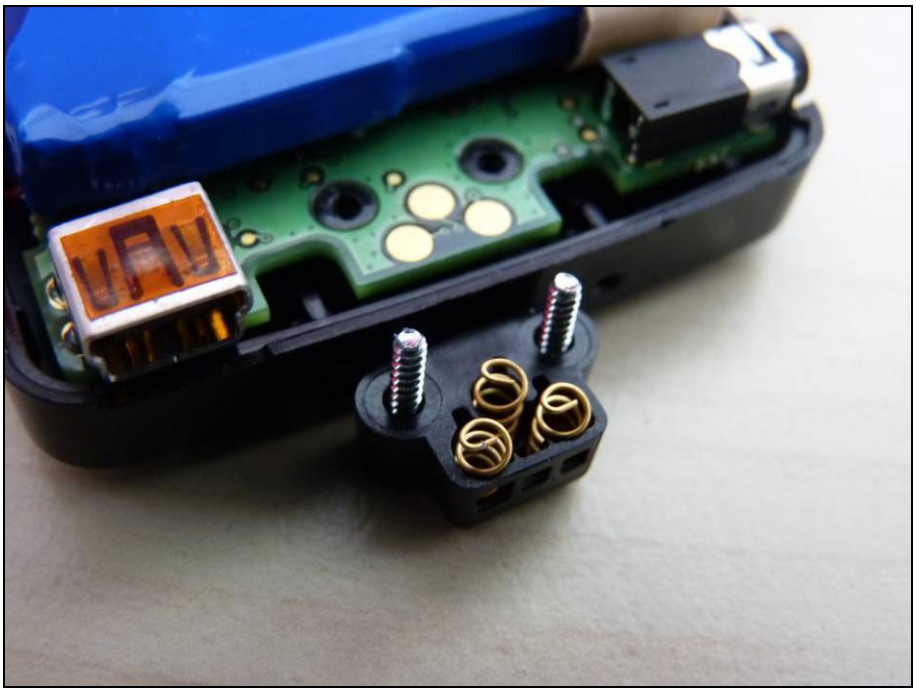
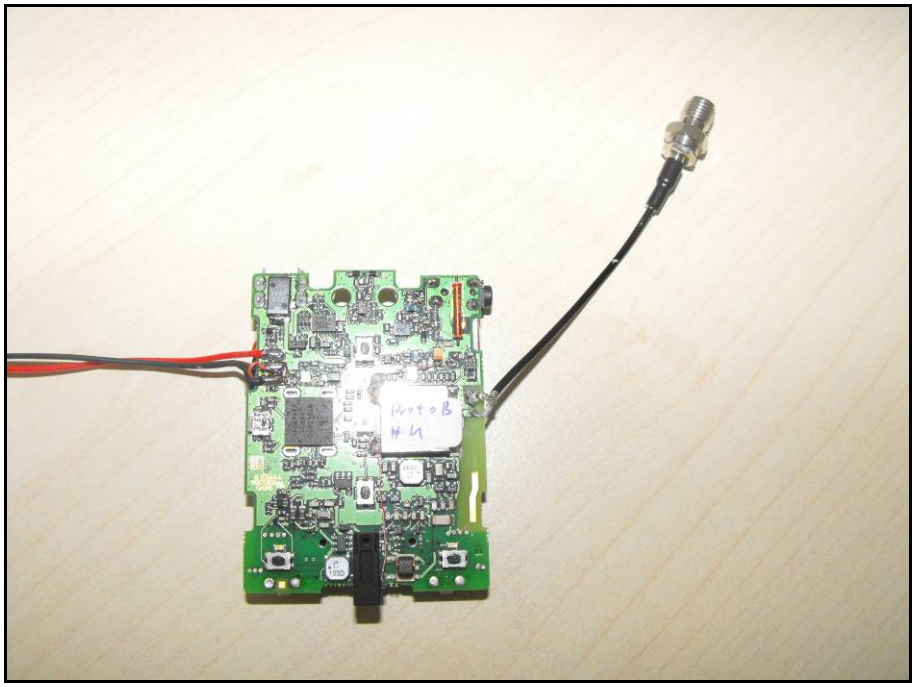


Photo 11:

Photo 12: (conducted sample)

Photo 13: (conducted sample)



Annex D Document history

Version	Applied changes	Date of release
1.0	Initial release	2010-09-27
A	BW Plot added	2010-11-04
B	Model name changed and AC conducted added	2010-12-06

Annex E Further information

Glossary

DUT - Device under Test
EMC - Electromagnetic Compatibility
EUT - Equipment under Test
FCC - Federal Communication Commission
FCC ID - Company Identifier at FCC
HW - Hardware
IC - Industry Canada
Inv. No. - Inventory number
N/A - not applicable
S/N - Serial Number
SW - Software