

CETECOM™

CETECOM ICT Services
consulting - testing - certification >>>

TEST REPORT

Test report no.: 1-5144/12-01-02



DAkkS
Deutsche
Akkreditierungsstelle
D-PL-12076-01-01

Testing laboratory

CETECOM ICT Services GmbH
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Accredited Testing Laboratory:

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS). The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01
Area of Testing: Radio/Satellite Communications

Applicant

REINER SCT Kartengeraete GmbH
Goethestr. 14
78120 Furtwangen / GERMANY
Fax: +49 7723 657499
Contact: Thomas Weeber
e-mail: TWeeber@reiner-sct.com
Phone: +49 7723 5056-554

Manufacturer

REINER SCT Kartengeraete GmbH
Goethestr. 14
78120 Furtwangen / GERMANY

47 CFR Part 15

Title 47 of the Code of Federal Regulations; Chapter I
Part 15 - Radio frequency devices

RSS - 210 Issue 8

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: **RFID chipcard reader**
Model name: **cyber Jack RFID universal/komfort**
FCC ID: **AB1C2345678**
IC: **Q4K-2718800**
Frequency: 13.56 MHz
Technology tested: RFID
Antenna: Integrated coil antenna
Power Supply: 5.0 V DC by USB
Temperature Range: -20°C to +50 °C



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

Test report authorised:

Marco Bertolino
Testing Manager

Test performed:

Tobias Wittenmeier

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2 General information

2.1 Notes and disclaimer

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 generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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In no case this test report can be considered as a Letter of Approval.

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

2.2 Application details

Date of receipt of order:	2012-07-26
Date of receipt of test item:	2012-10-05
Start of test:	2012-10-05
End of test:	2012-10-08
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	2010-10	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices
RSS - 210 Issue 8	2010-12	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} +50 °C during high temperature tests T_{min} -20 °C during low temperature tests
Relative humidity content:	55 %
Barometric pressure:	not relevant for this kind of testing
Power supply:	V_{nom} 5.0 V DC by USB V_{max} 5.75 V V_{min} 4.25 V

5 Test item

Kind of test item	:	RFID chipcard reader
Type identification	:	cyber Jack RFID universal/komfort
S/N serial number	:	2718700-0040839
HW hardware status	:	Unknown
SW software status	:	Unknown
Frequency band	:	13.56 MHz
Type of radio transmission	:	
Use of frequency spectrum	:	single carrier
Type of modulation	:	Modulated carrier
Number of channels	:	1
Antenna	:	Integrated coil antenna
Power supply	:	5.0 V DC by USB
Temperature range	:	-20°C to +50 °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 8, Annex 2.6	Passed	2012-10-10	-/-

Test Specification Clause	Test Case	Temperature Conditions	Power Source Voltages	Pass	Fail	NA	NP	Remark
§ 15.35 (c)/ RSS-GEN Issue 2 Section 4.5	Timing of the transmitter (Duty cycle correction factor)	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§ 15.225 (a)/ RSS-210 Issue 8 Annex 2.6	Fieldstrength of Fundamental	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§ 15.209/ RSS-210 Issue 8 Annex 2.6	Fieldstrength of harmonics and spurious	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§ 15.225 (e)/ RSS-210 Issue 8 Annex 2.6	Frequency tolerance	Nominal	Extreme	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
		Extreme	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Note: NA = Not Applicable; NP = Not Performed

8 RF measurements

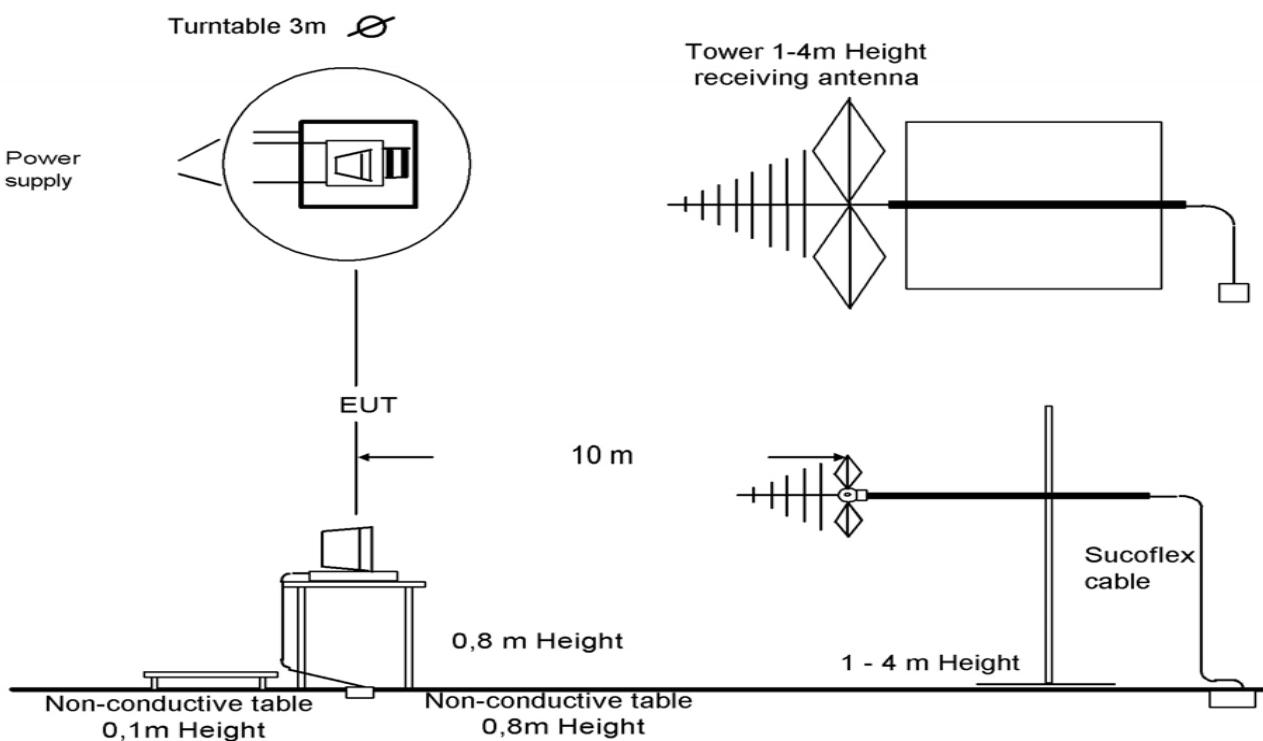
8.1 Description of test setup

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 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 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 C63.4-2003 clause 4.2.

Antennas are confirmed with ANSI C63.2-1996 item 15.

Semi anechoic chamber



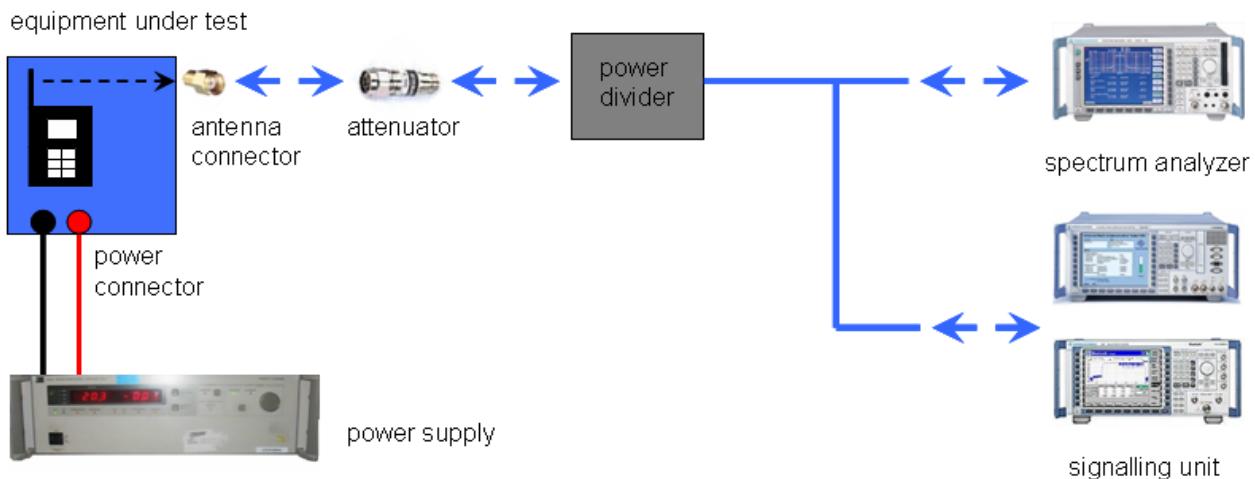
Picture 1: Diagram radiated measurements

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 is performed from outside the chamber with a signalling unit (CMU200 or other) 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). One of the signal paths is connected to the communication base Station (CMU200 or other), the other one is connected to the spectrum analyzer. The specific losses for both signal paths are first checked within a calibration. The measurement readings on the signalling unit/spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, signalling unit 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

9 Measurement results

9.1 Timing of the transmitter

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	10 ms
Resolution bandwidth:	100 kHz
Video bandwidth:	100 kHz
Span:	Zero
Trace-Mode:	Single sweep

Limits:

FCC	IC
CFR Part SUBCLAUSE § 15.35 (c)	RSS-GEN Issue 2 Section 4.5
Timing of the transmitter	
(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.	

Duty cycle: 100%

Result: **passed**

9.2 Field strength of the fundamental

Measurement:

Measurement parameter	
Detector:	Quai Peak
Sweep time:	Auto
Resolution bandwidth:	200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz
Video bandwidth:	\geq RBW
Trace-Mode:	Max Hold

Limits:

FCC	IC	
CFR Part SUBCLAUSE § 15.225 (b)	RSS-210 Issue 8 Section A1.1.2 / 2.7 Table 4	
Fundamental Frequency (MHz)	Field strength of Fundamental (μ V/m)	Measurement distance (m)
13.553 to 13.567	15848 μ V/m (84 dB μ V/m)	30
	158489 μ V/m (104 dB μ V/m)	10 (Recalculated acc. to FCC part15.31 (f2))

Result:

TEST CONDITIONS		MAXIMUM POWER (dB μ V/m)	
Frequency		13.56 MHz	13.56 MHz
Mode		at 10 m distance	at 30 m distance
T _{nom}	V _{nom}	72.0	52
Measurement uncertainty		\pm 3dB	

* Limits recalculated from 10m to 30m with 40 dB/decade according to FCC 15.31 (f2).

Result: **passed**

9.3 Field strength of the harmonics and spurious

Measurement:

Measurement parameter	
Detector:	Quasi Peak / Average
Sweep time:	Auto
Resolution bandwidth:	120 kHz / 1 MHz
Video bandwidth:	300 kHz / 1 MHz
Span:	See plots
Trace-Mode:	Max Hold

Limits:

FCC	IC	
SUBCLAUSE § 15.209		
Field strength of the harmonics and spurious.		
Frequency (MHz)	Field strength (μ V/m)	Measurement distance (m)
0.0009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30 (29.5 dB μ V/m)	30
30 – 88	100 (40 dB μ V/m)	3
88 – 216	150 (43.5 dB μ V/m)	3
216 – 960	200 (46 dB μ V/m)	3

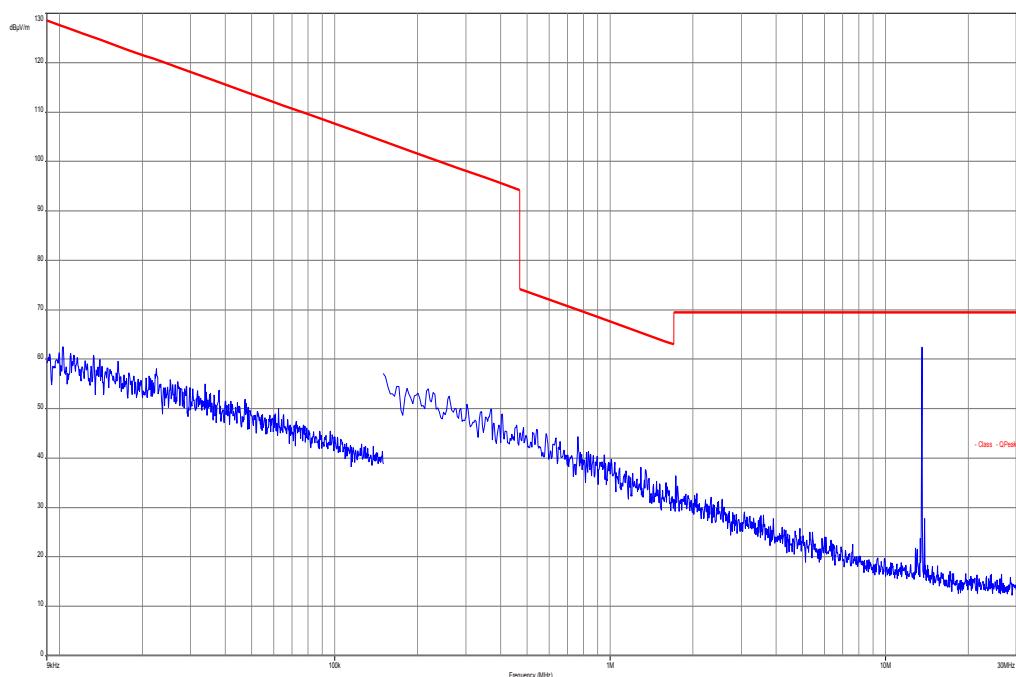
Result:

EMISSION LIMITATIONS				
f [MHz]	Detector	Limit max. allowed [dB μ V/m]	Amplitude of emission [dB μ V/m]	Results
See plot 2				

Result: **passed**

Plots of the measurements

Plot 1: 9 kHz – 30 MHz;



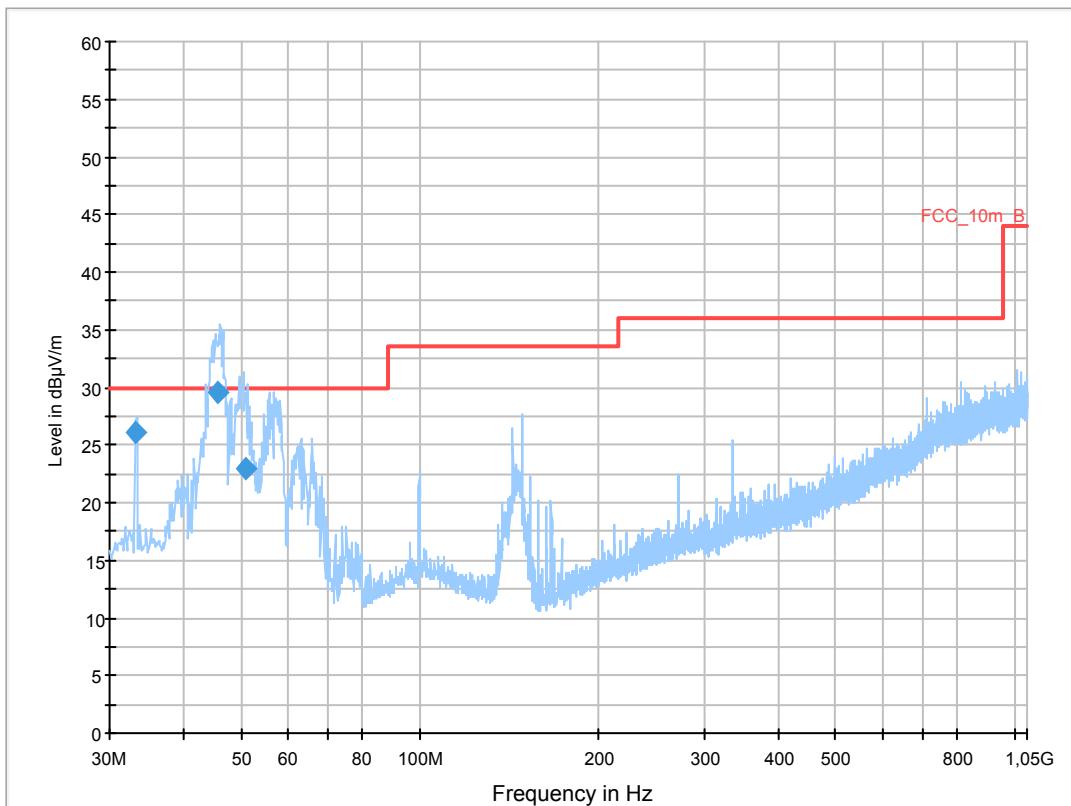
Plot 2: 30 MHz – 1000 MHz

Common Information

EUT: RFID chipcard reader
 Serial Number:
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: Card detached
 Operator Name: Wolsdorfer
 Comment: USB powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)				
Receiver:	[ESCI 3]				
Level Unit:	dB μ V/m				
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamplifier
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
33.311400	26.1	1000.0	120.000	137.0	V	238.0	12.9	3.9	30.0	
45.487350	29.6	1000.0	120.000	100.0	V	95.0	13.3	0.4	30.0	
50.705250	23.0	1000.0	120.000	100.0	V	351.0	13.3	7.0	30.0	

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 4.42

Signal Path: without Notch
FW 1.0

Antenna: VULB 9163
SN 9163-295, FW ---
Correction Table (vertical): VULP6113
Correction Table (horizontal): VULP6113
Correction Table (vertical): Cable_EN_1GHz (1005)
Correction Table (horizontal): Cable_EN_1GHz (1005)

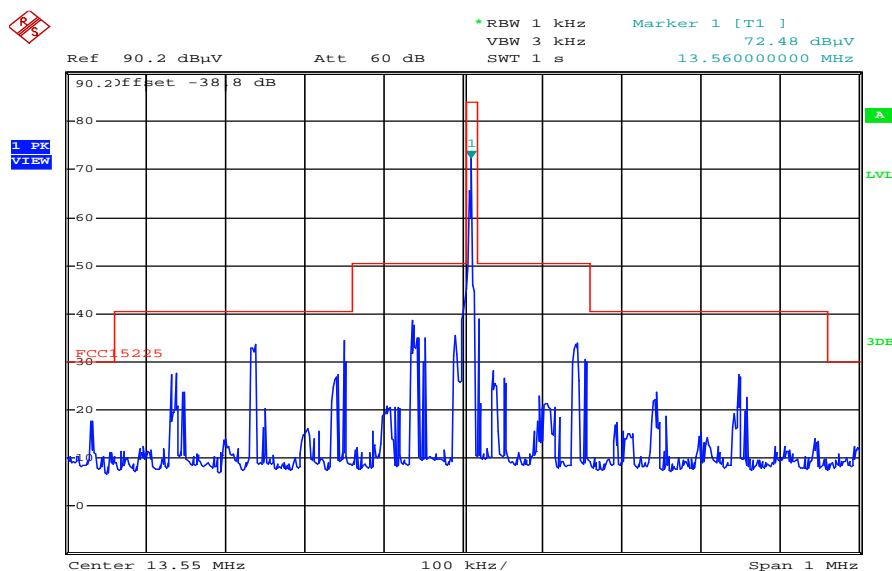
Antenna Tower: Tower [EMCO 2090 Antenna Tower]
@ GPIB0 (ADR 8), FW REV 3.12

Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.52

Plot 3: Spectrum mask part15.225 (a, b, c, d)

Limits recalculated from 30m to 10m with 40 dB/decade according to FCC 15.31 (f2)



Date: 8.OCT.2012 11:12:51

The transmitter holds the requirements of FCC 15.225 (a, b, c and d)

9.4 Frequency tolerance

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	10 Hz
Video bandwidth:	1 MHz
Trace-Mode:	Single Sweep

Limits:

FCC	IC
SUBCLAUSE § 15.225	RSS-210 Issue 8 Annex 2.6
The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.	

Frequency tolerance								
Over temperature variation			Over voltage variation			MHz		
Limit is +/- 1.356 kHz			Limit is +/- 1.356 kHz			MHz		
T (°C)]	Frequency	result	Power voltage	Frequency	result	F [MHz]	Detector	Level [μV/m]
-20°	13.560008	Pass	4.25V	13.559870	Pass			
-10°	13.560000	Pass	4.35V	13.559880	Pass			
0°	13.559969	Pass	4.45V	13.559880	Pass			
10°	13.559930	Pass	4.55V	13.559880	Pass			
20°	13.559869	Pass	4.65V	13.559880	Pass			
30°	13.559851	Pass	4.75V	13.559880	Pass			
40°	13.559846	Pass	4.85V	13.559880	Pass			
50°	13.559848	Pass	4.95V	13.559880	Pass			
			5.05V	13.559880	Pass			
			5.15V	13.559880	Pass			
			5.25V	13.559880	Pass			
			5.35V	13.559887	Pass			
			5.45V	13.559887	Pass			
			5.55V	13.559886	Pass			
			5.65V	13.559886	Pass			
			5.75V	13.559886	Pass			
Measurement uncertainty			±100 Hz					

Result: passed

9.5 AC line conducted

Measurement:

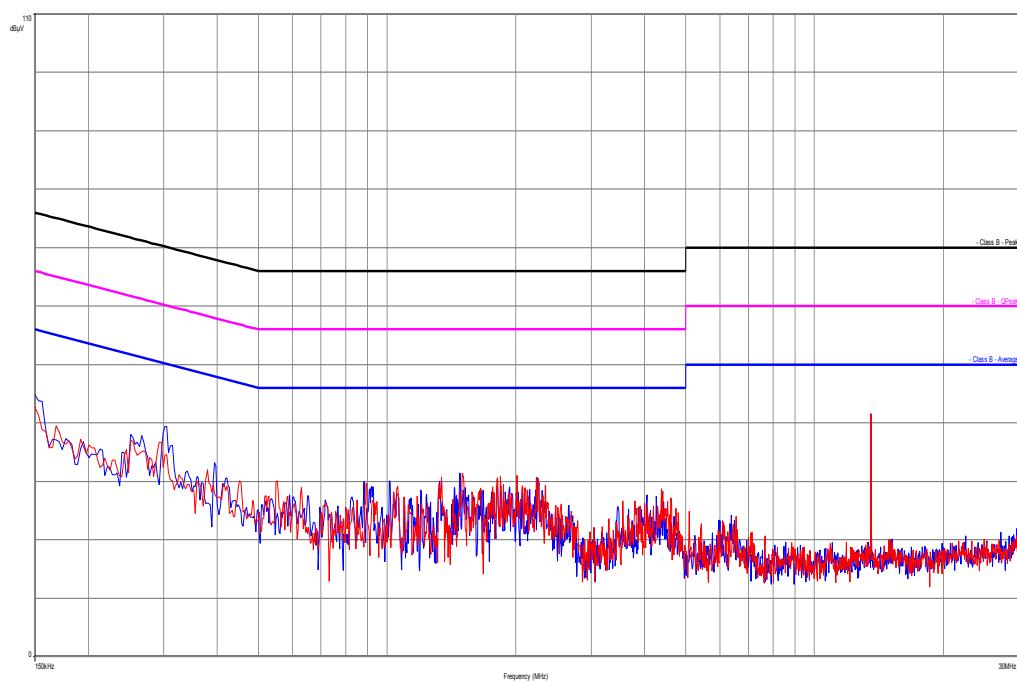
Measurement parameter	
Detector:	Peak / Quasi-Peak / RMS
Sweep time:	Auto
Resolution bandwidth:	120 kHz
Video bandwidth:	300 kHz
Span:	30 MHz
Trace-Mode:	Max Hold

Limits:

FCC	IC	
SUBCLAUSE § 15.107 / 15.207	RSS-210 Issue 8 Section 6.6, 7.4	
Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 - 30	60	50

Result: **passed**

Plot:



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.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	ECT-0002	Temperature and Climatic Test Chamber	VUK04/150 0	Heraeus Voetsch	31098	300001507	ev	20.09.2011	20.09.2013
2	n. a.	EMI Test Receiver 9 kHz - 3 GHz incl. Preselector	ESPI3	R&S	101713	300004059	k	22.08.2012	22.08.2013
3	n. a.	Power Supply	LA30/5GA	Zentro Elektronik	2046	300000711	NK!		
4	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	12.01.2012	12.01.2015
5	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
6	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
7	Spec.A. 2_2e	System rack for EMI measurement solution	85900	HP I.V.	*	300000222	ne		
8	9	Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2012	06.01.2014
9	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne		
10	n. a.	Relais Matrix	PSU	R&S	890167/024	300001168	ne		
11	n. a.	Isolating Transformer	RT5A	Grundig	9242	300001263	ne		
12	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
13	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
14	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
15	n. a.	Band Reject filter	WRCG185 5/1910-1835/1925-40/8SS	Wainwright	7	300003350	ev		
16	n. a.	Band Reject filter	WRCG240 0/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
17	n. a.	Highpass Filter	WPKX2.9/1 8G-12SS	Wainwright	1	300003492	ev		
18	n. a.	Highpass Filter	WPK1.1/15 G-10SS	Wainwright	3	300003255	ev		
19	n. a.	Highpass Filter	WPKX7.0/1 8G-8SS	Wainwright	18	300003789	ne		
20	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	viKI!	14.10.2011	14.10.2014
21	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	19.12.2011	19.12.2012

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

11 Observations

No observations exceeding those reported with the single test cases have been made.

Annex A Photographs of the test setup

Photo documentation:

Photo 1:



Photo 2:



Photo 3:



Photo 4:



Photo 5:

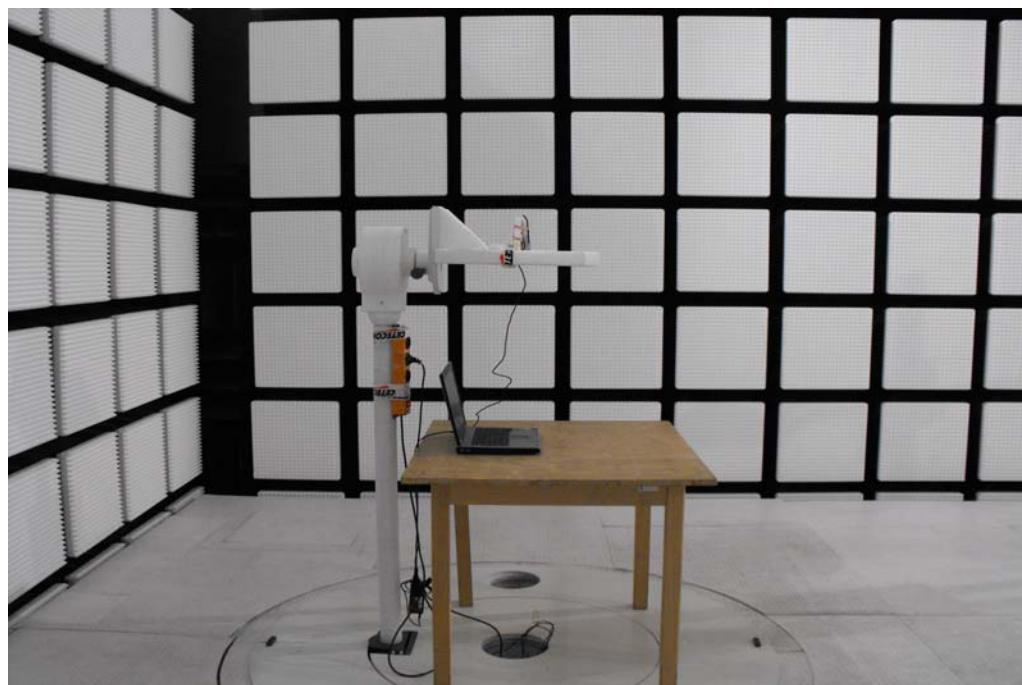


Photo 6:

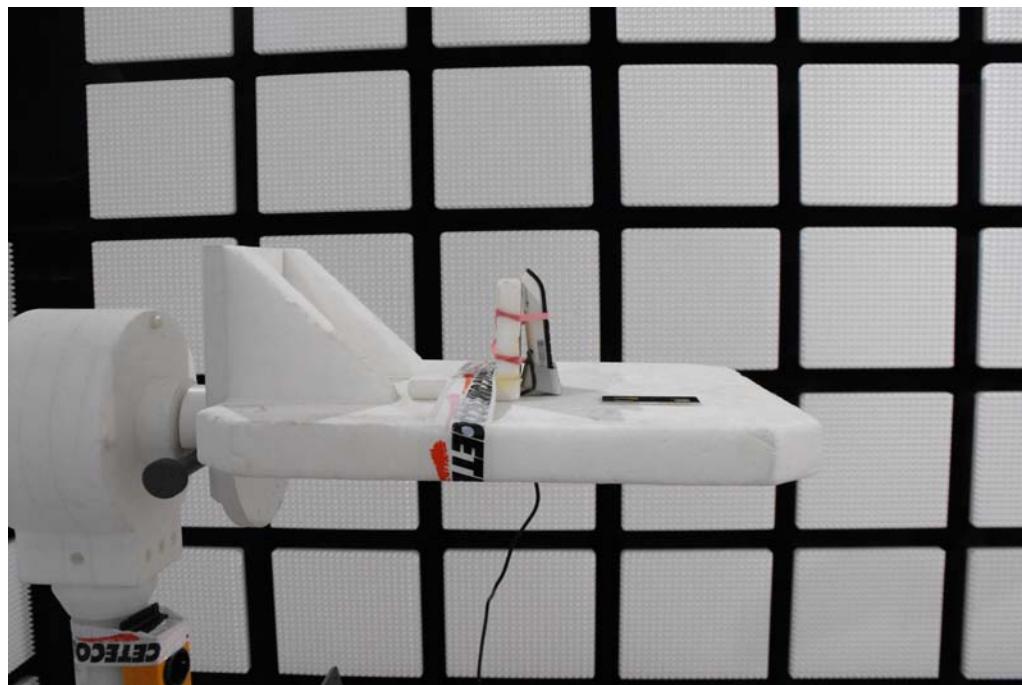


Photo 7:

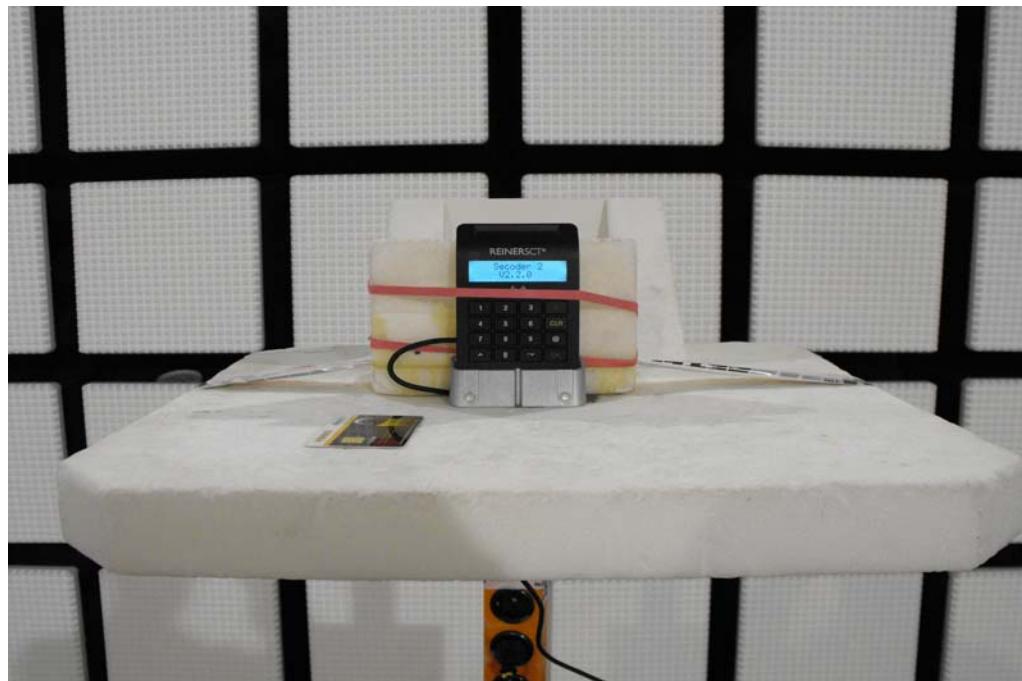


Photo 8:

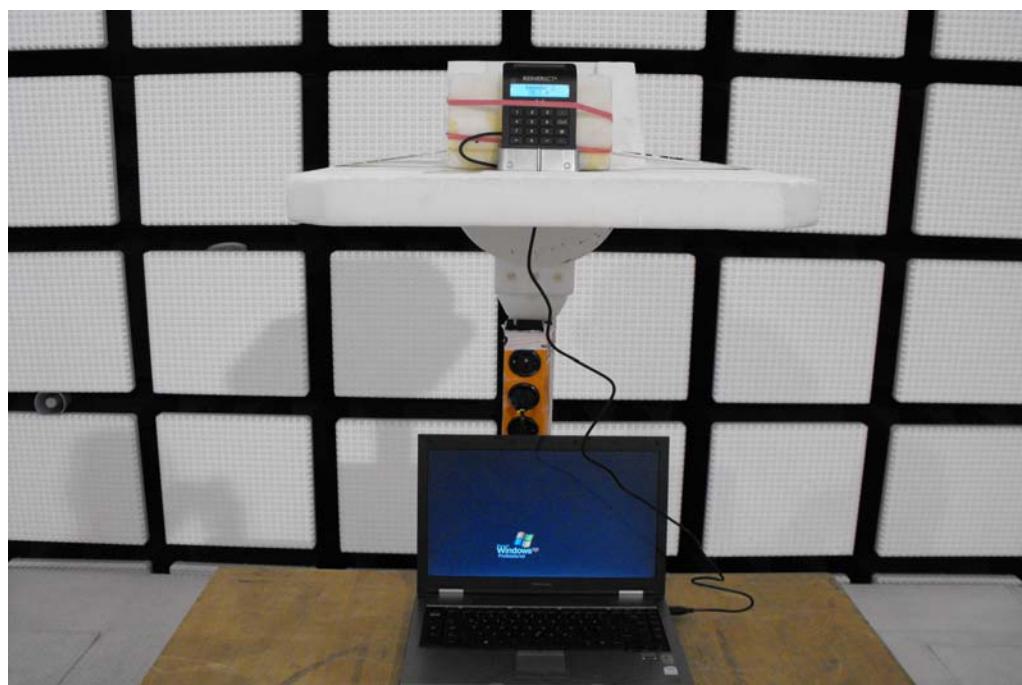


Photo 9:

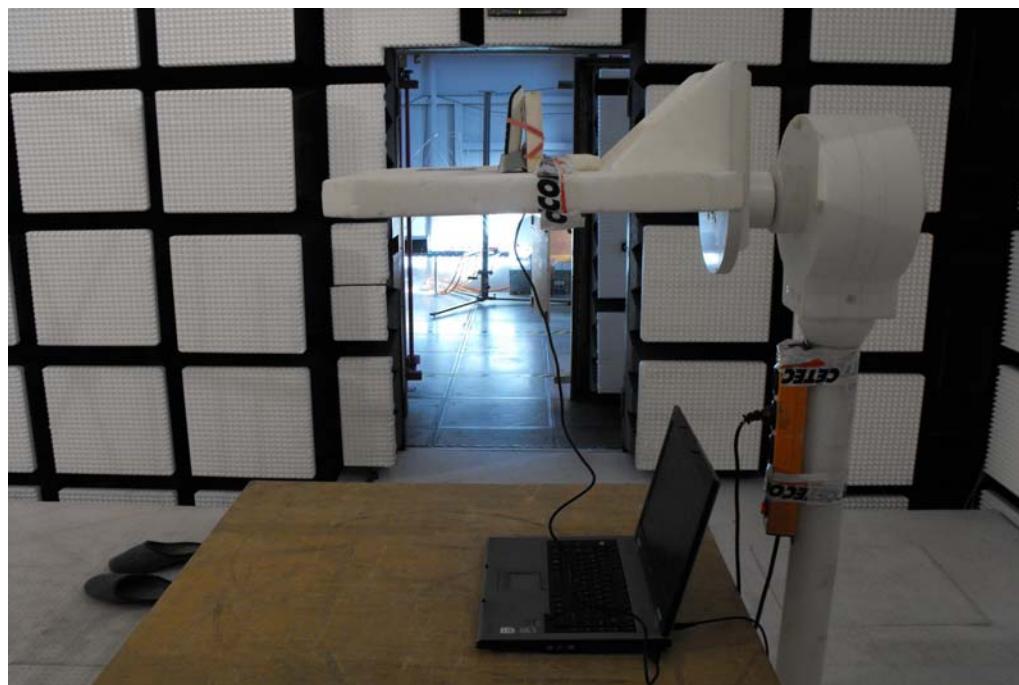


Photo 10:



Photo 11:

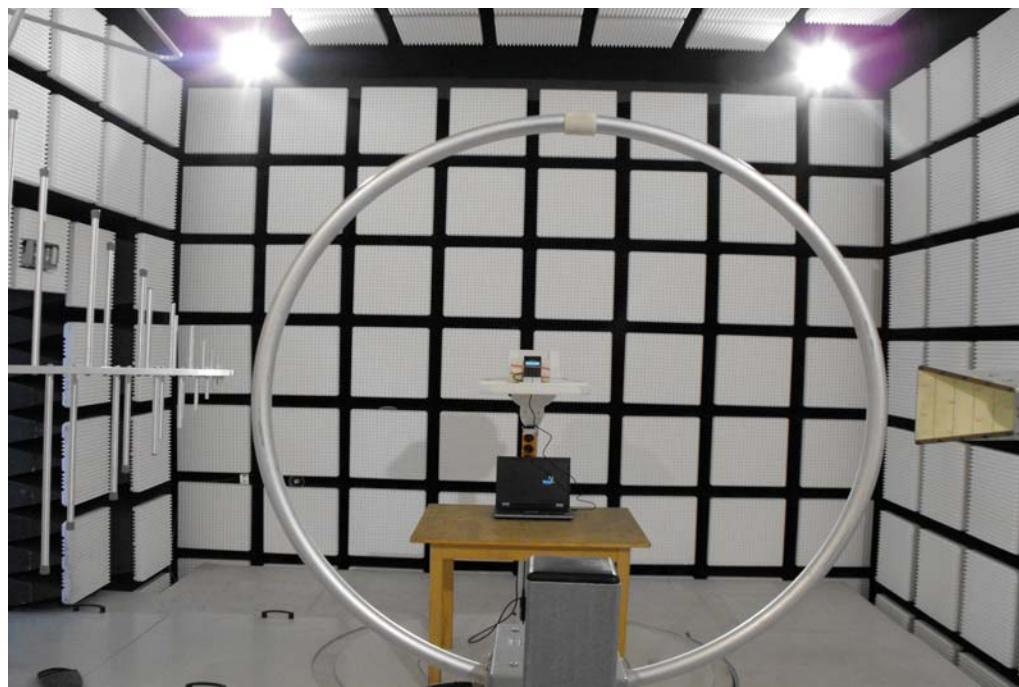


Photo 12:



Annex B External photographs of the EUT

Photo documentation:

Photo 1:



Photo 2:



Photo 3:



Photo 4:



Photo 5:



Photo 6:



Photo 7:



Photo 8:



Annex C Internal photographs of the EUT

Photo documentation:

Photo 1:



Photo 2:

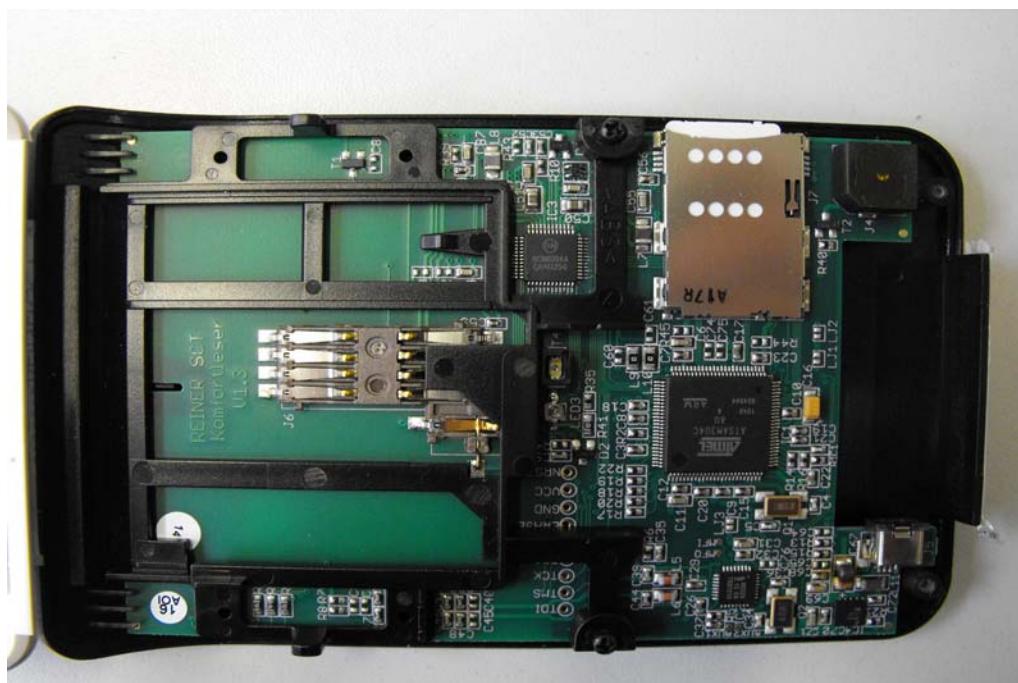


Photo 3:

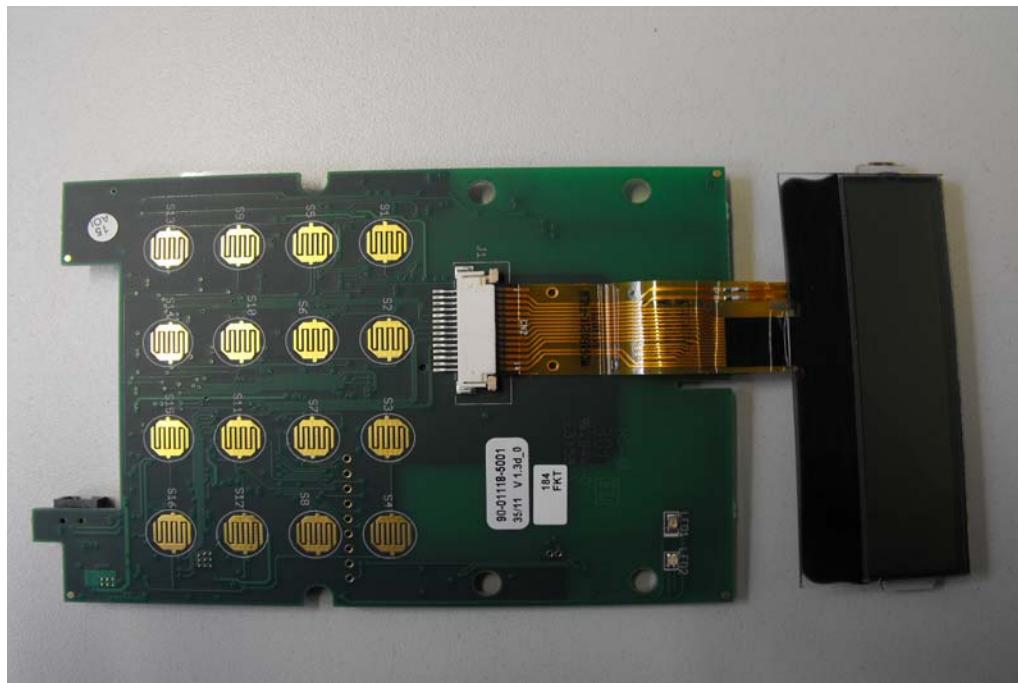
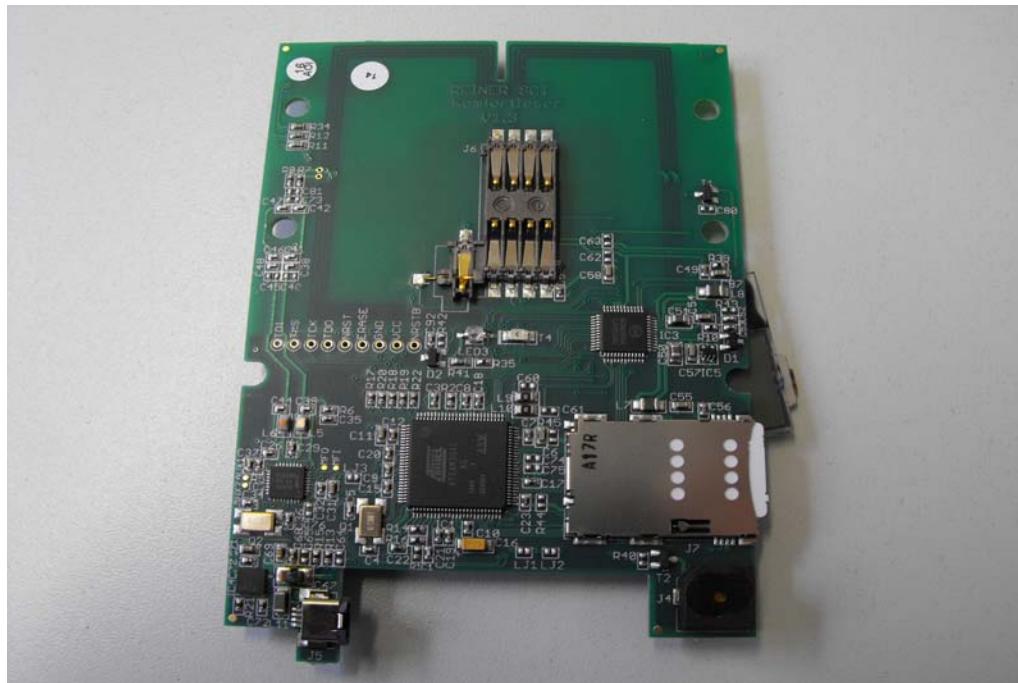


Photo 4:



Annex D Document history

Version	Applied changes	Date of release
1.0	Initial release	2012-10-10

Annex E Further information

Glossary

AVG	-	Average
DUT	-	Device under test
EMC	-	Electromagnetic Compatibility
EN	-	European Standard
EUT	-	Equipment under test
ETSI	-	European Telecommunications Standard Institute
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	Not applicable
PP	-	Positive peak
QP	-	Quasi peak
S/N	-	Serial number
SW	-	Software

Annex F Accreditation Certificate



Deutsche Akkreditierungsstelle GmbH
German Accreditation Body

Entrusted according to Section 8 subsection 1 AkkStelleG in connection with Section 1
subsection 1 AkkStelleGBV
Signatory to the Multilateral Agreements of
EA, IAC and IAF for Mutual Recognition

Accreditation



The Deutsche Akkreditierungsstelle GmbH (German Accreditation Body) attests that the testing laboratory

CETECOM ICT Services GmbH
Untertürkheimer Straße 6-10
66117 Saarbrücken

is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out tests in the following fields:

Wired communications and DECT
Acoustic
Radio
Short Range Devices (SRD)
RFID
WiMax and Richtfunk
Mobile radio (GSM / DCS), Over the Air (OTA) Performance
Electromagnetic Compatibility (EMC) incl. Automotive
Product safety
SAR and Hearing Aid Compatibility (HAC)
Environmental simulation
Smart Card Terminals
Bluetooth
Wi-Fi-Services

The accreditation certificate shall only apply in connection with the notice of accreditation of 13.04.2011 with the accreditation number D-PL-12076-01 and is valid until 03.09.2014. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 82 pages.

Registration number of the certificate: D-PL-12076-01-01

Frankfurt am Main, 13.04.2011


Dipl.-Ing. Michael Eger
Head of Division 2

This document is a translation. The definitive version is the original German accreditation certificate.

See notes overleaf.

Deutsche Akkreditierungsstelle GmbH

Office Berlin
Spiritedmarkt 10
10117 Berlin

Office Frankfurt am Main
Gartenstraße 6
60594 Frankfurt am Main

Office Braunschweig
Bundesallee 100
38116 Braunschweig

The publication of extracts of the accreditation certificate is subject to the prior written approval by Deutsche Akkreditierungsstelle GmbH (DAKKS). Exempted is the unchanged form of separate disseminations of the cover sheet by the conformity assessment body mentioned overleaf.

No impression shall be made that the accreditation also extends to fields beyond the scope of accreditation attested by DAKKS.

The accreditation was granted pursuant to the Act on the Accreditation Body (AkkStelleG) of 31 July 2009 (Federal Law Gazette I p. 2625) and the Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products (Official Journal of the European Union L 218 of 9 July 2008, p. 30). DAKKS is a signatory to the Multilateral Agreements for Mutual Recognition of the European co-operation for Accreditation (EA), International Accreditation Forum (IAF) and International Laboratory Accreditation Cooperation (ILAC). The signatories to these agreements recognise each other's accreditations.

The up-to-date state of membership can be retrieved from the following websites:
EA: www.european-accreditation.org
ILAC: www.ilac.org
IAF: www.iaf.nu

Front side of certificate

Back side of certificate

Note:

The current certificate including annex is published on our website (see link below) or may be received from CETECOM ICT Services on request.

http://www.cetecom.com/fileadmin/de/CETECOM_D_Saarbruecken/accreditations_Jan_2010/DAKKS_Akkreditierung_URK_EN17025-En_incl_Annex.pdf