

Area of Testing: Radio/Satellite Communications

Test standard/s

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 reader	-
Model name:	ACCU-CHEK Mobile - Model U1	
FCC ID:	VWI U1	Second second second
IC:	3100A-U1	
Frequency:	13.56 MHz	ACCD-CNA+
Power supply:	3.0 V DC by 2x AAA batteries / power supply	
Temperature range:	-20 °C to +55 °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 performed:

p.o.

Marco Bertolino Testing manager

Test report authorised:

Stefan Bös Senior testing manager



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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 electronic signatures, the public keys can be requested at the testing laboratory.

2.2 Application details

Date of receipt of order:	2010-12-07
Date of receipt of test item:	2011-06-07
Start of test:	2011-06-07
End of test:	2011-06-09
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 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} T _{max} T _{min}	 +24 °C during room temperature tests +55 °C during high temperature test -20 °C during low temperature test
Relative humidity content:		47 %
Air pressure:		not relevant for this kind of testing
Power supply:	V _{nom} V _{max} V _{min}	 3.0 V DC by 2x AAA batteries / power supply 3.3 V 2.7 V



5 Test item

Kind of test item		REID reader
Tune identification		
Type Identification	:	ACCU-CHEK MODILE - MODEL U1
C/N conicl mumber		U100005467
S/N serial humber	:	CAT No.: 05874092001
HW hardware status	:	PR1 (Pilot Run 1)
SW software status	:	3.05
Frequency [MHz]	:	13.56 MHz
Type of modulation	:	A1D
Number of channels	:	1
Antenna	:	Integrated antenna \rightarrow for more information, please take a look at the annex – internal photos of the EUT.
Power supply	:	3.0 V DC by 2x AAA batteries / power supply
Temperature range	:	-20 °C to +55 °C

6 Test laboratories sub-contracted

None



7 Summary of measurement results

\boxtimes	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	2011-06-20	-/-

Test Specification Clause	Test Case	Temperature Conditions	Power Source Voltages	Pass	Fail	NA	NP	Results (max.)
§ 15.35 (c)/ RSS-GEN Issue 2 Section 4.5	Timing of the transmitter (Duty cycle correction factor)	Nominal	Nominal					complies
§ 15.225 (a)/ RSS-210 Issue 8	Fieldstrength of Fundamental	Nominal	Nominal					complies
§ 15.209/ RSS-210 Issue 8	Fieldstrength of harmonics and spurious	Nominal	Nominal					complies
S 15 225 (a)/		Nominal	Extreme					
8 15.225 (e)/ RSS-210 Issue 8	Frequency tolerance	Extreme	Nominal					complies

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 C63.4-2009 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 C63-4-2009 clause 4.2.

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

Semi anechoic chamber





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 None

Configuration descriptions:

Occupied bandwidth:



Date: 8.JUN.2011 18:41:43

OBW = 180 Hz



8.3 RSP100 test report cover sheet / performance test data

Test Report Number	:	RFID reader
Equipment Model Number	:	ACCU-CHEK Mobile - Model U1
Certification Number	:	3100A-U1
Manufacturer (complete Address)	:	Roche Diagnostics GmbH Sandhofer Str. 116 68305 Mannheim / GERMANY
Tested to radio standards specification no.	:	RSS 210, Issue 8, Annex 2.A2.6
Open Area Test Site IC No.	:	IC 3462C-1
Frequency Range or fixed frequency	:	13.56 MHz
Field Strength [dBµV/m] (@ 10m)	:	-2.5
Occupied bandwidth (20 dB)	:	180 Hz
Type of modulation	:	ООК
Emission Designator (TRC-43)	:	180HA1D
Antenna Information	:	Integrated antenna
Transmitter Spurious (worst case) [dBµV/m @ 3m]	:	31.0 dBµV/m @ 1000 MHz (no harmonics found – level shows the noise floor of the analyzer @ 3m)
Receiver Spurious (worst case) [dBµV/m @ 3m]	:	No receiver mode integrated!

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:

2011-12-22 Date Marco Bertolino Name

M. Bortolino

Signature



9 Measurement results

9.1 Timing of the transmitter

Measurement:

Measurement parameter				
Detector:	Peak			
Sweep time:	Auto			
Resolution bandwidth:	100 kHz			
Video bandwidth:	100 kHz			
Span:	Zero span			
Trace-Mode:	View			

Limits:

FCC	IC
CFR Part SUBCLAUSE § 15.35 (c)	RSS-GEN Issue 2 Section 4.5
Timing of th	e transmitter
(c) Unless otherwise specified, e.g. Section 15.255(b) terms of the average value of the emission, and p strength shall be determined by averaging over one long as the pulse train does not exceed 0.1 seconds. A longer than 0.1 seconds) or in cases where the p strength shall be determined from the average absol the field strength is at its maximum value. The exact be submitted with any application for certification o equipment subject to notification or verification.), when the radiated emission limits are expressed in ulsed operation is employed, the measurement field complete pulse train, including blanking intervals, as As an alternative (provided the transmitter operates for ulse train exceeds 0.1 seconds, the measured field ute voltage during a 0.1 second interval during which method of calculating the average field strength shall r shall be retained in the measurement data file for



Result:

Plot 1: transmit train



Date: 8.JUN.2011 18:23:48



Plot 2: burst 1

Date: 8.JUN.2011 18:23:27



Plot 3: burst 2



Date: 8.JUN.2011 18:23:06

Burst No. 2 is longer than 100ms - not pulse averaging possible.



9.2 Fieldstrength of the fundamental

Measurement:

Measurement parameter				
Detector:	Quai Peak			
Resolution bandwidth:	200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz			
Video bandwidth:	≥ RBW			

Limits:

FCC			IC
CFR Part SUBCLAUSE § 15.225		RSS-210 Issue 8	
Fundamental Frequency (MHz)	Fieldstrength of Fundamental (µV/m)		Measurement distance (m)
	15848 µV/m (84 dBµV/m)	30
13.553 to 13.567	158489 μV/m (104 dBμV/m)		10 (Recalculated acc. to FCC part15.31 (f2))

Results:

TEST CONDITIONS		MAXIMUM POV	VER (dBµV/m)
Frequency		13.56 MHz	13.56 MHz
Mode		at 10 m distance	at 30 m distance
T _{nom}	V _{nom}	-2.5*)	-22.5*)
Measurement uncertainty		±60	1B

*) This measurement is performed in a measurement distance of 1m. The measurement value was corrected according Part 15.31(f)(2) to obtain the adequate measurement value related to a measurement distance of 10m/30m. For greater measurement distances the carrier is not detectable because the carrier falls below the noise floor.



9.3 Fieldstrength of the harmonics and spurious

Measurement:

Measurement parameter				
Detector:	Average / Quasi Peak / Peak (scan)			
Sweep time:	Auto			
Resolution bandwidth:	120 kHz			
Video bandwidth:	-/-			
Trace-Mode:	Max hold			

Limits:

FCC			IC
SUBCLAUSE § 15.209			
Fie	eldstrength of the ha	rmonics and spu	rious.
Frequency (MHz)	Fieldstreng	th (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 d	BµV/m)	3

<u>Results:</u>

EMISSION LIMITATIONS					
f [MHz]	Detector	Limit max. allowed [dBµV/m]	Amplitude of emission [dBµV/m]	Results	
No emissions detected!					



Plots of the measurements:

Plot 1: 9 kHz - 30 MHz; Part 15.209 magnetic, measurement distance 3m

Transmit frequency 13.56 MHz



The carrier signal is below the noise floor and consequently not detectable at a distance of 3 meters.



Plot 2: 30 MHz – 1000 MHz, spurious emissions

CETECOM ICT Services GmbH

Common Information

EUT: Serial Number: Test Description: Operating Conditions: Operator Name: Comment: Accu-Chek Mobile Model U1 U100005467 FCC part 15 class B @ 10 m RFID RX+TX testmode Hennemann battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Fiel	Electric Field (NOS)		
Level Unit:	dBµV/m			
Subrange	Detectors	IF Bandwidth	Meas. Time	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
32.478900	9.3	15000.000	120.000	200.0	Н	168.0	12.8	20.7	30.0	
40.101300	10.3	15000.000	120.000	393.0	V	138.0	13.4	19.7	30.0	
49.719300	9.8	15000.000	120.000	200.0	v	5.0	13.4	20.2	30.0	
685.156950	19.2	15000.000	120.000	200.0	v	32.0	22.1	16.8	36.0	
808.526100	20.9	15000.000	120.000	208.0	Н	276.0	23.9	15.1	36.0	
936.381300	22.2	15000.000	120.000	400.0	V	325.0	25.3	13.8	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 4.42
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: 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 8.10.00

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



min Date: 8.JUN.2011 19:02:19

This measurement is performed in a measurement distance of 1m. The offset was reduced according Part 15.31(f)(2) to obtain the adequate measurement value related to a measurement distance of 30m. For greater measurement distances the carrier is not detectable because the carrier falls below the noise floor.



9.4 Frequency tolerance

Measurement:

Measurement parameter				
Detector:	Peak			
Sweep time:	Auto			
Resolution bandwidth:	100 Hz			
Video bandwidth:	300 Hz			
Span:	5 kHz			
Trace-Mode:	Max hold			

Limits:

FCC	IC			
SUBCLAUSE § 15.225	RSS-210 Issue 8			
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.

Results:

Frequency tolerance								
Over temperature variation			Over voltage variation					
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	13.55990	Passed	2.7 V	No deviation!	Passed			
-10	13.56000	Passed	3.0 V	13.56002	Passed			
0	13.56001	Passed	3.3 V	No deviation!	Passed			
10	13.56002	Passed						
20	13.56002	Passed						
30	13.56002	Passed						
40	13.56002	Passed						
50	13.56003	Passed						
Measurement uncertainty				±	100 Hz			



9.5 AC line conducted

Not applicable!

The EUT is battery powered only!



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	Туре	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	ne		
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	05.01.2011	05.01.2013
5	n. a.	Analyzer- Reference- System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	k	31.07.2009	31.07.2011
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	10.01.2011	10.01.2013
12	n.a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
13	n.a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996		23.03.2009	
14	n. a.	Relais Matrix	PSU	R&S	890167/024	300001168	ne		
15	n. a.	TILE-Software Emission	Quantum Change, Modell TILE- ICS/FULL	EMCO	none	300003451	ne		
16	n. a.	PSA Spectrum Analyzer 3 Hz - 26.5 GHz	E4440A	Agilent Technologies	MY48250080	300003812	k	08.09.2010	08.09.2012
17	n. a.	RF Filter Section 9kHz - 1GHz	N9039A	Agilent Technologies	MY48260003	300003825	viKi!	08.09.2010	08.09.2012
18	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	viKi!	17.12.2008	17.12.2011
19	n. a.	Loop Antenna 9 KHz - 30 MHz	HFH2-Z2	R&S	891847-35	300001169	ne		
20	9	Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2010	06.01.2012
21	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/83761	300002326	Ve	28.05.2009	28.06.2011
22	n. a.	Spectrum Analyzer 9kHz to 30GHz - 140+30dBm	FSP30	R&S	100886	300003575	k	07.09.2010	07.09.2012
23	n. a.	DC Power Supply 0 – 32V	1108-32	Heiden	001802	300001383	Ve	23.06.2010	23.06.2013



Agenda: Kind of Calibration

- k calibration / calibrated
- ne not required (k, ev, izw, zw not required)
- ev periodic self verification
- Ve long-term stability recognized
- vlkl! Attention: extended calibration interval
- NK! Attention: not calibrated

- EK limited calibration
- zw cyclical maintenance (external cyclical maintenance)
- izw internal cyclical maintenance
- g blocked for accredited testing
- *) next calibration ordered / currently in progress



Annex A Photographs of the test setup

Photo documentation:

Photo 1: chamber C



Photo 2: chamber C





Photo 3: chamber C



Photo 4: chamber C





Photo 5: chamber C





Photo 6: chamber C



Photo 7: chamber C



Photo 8: open area site (measuring distance 1m)





Photo 9: chamber F



Photo 10: chamber F





Annex B External photographs of the EUT

Photo documentation:

Photo 1:



Photo 2:





Photo 3:



Photo 4:





Photo 5:













Photo 8:





Photo 9:



Photo 10:





Photo 11:



Photo 12:





Photo 13:



Photo 14:





Photo 15:





Annex C Internal photographs of the EUT

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:





Photo 13:



Photo 14:





Annex D Document history

Version	Applied changes	Date of release
1.0	Initial release	2011-06-20
-A	New phone number, SW version, HW version	2011-06-22
-В	Plot OBW-measurement added Editorial corrections at page 9 Information about measurement distance and harmonics added This test report replaces the test report with the number 1-2718-01- 03/10-A and dated 2011-06-22	2011-12-22

Annex E Further information

<u>Glossary</u>

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