CETECOM™

CETECOM ICT Services
consulting - testing - certification

TEST REPORT

Test report no.: 1-4254/12-04-13

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

Testing laboratory

CETECOM ICT Services GmbH
Untertuerkheimer Strasse 6 – 10
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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

Sony Ericsson Mobile Communications AB
Nya Vattentornet
22188 Lund / SWEDEN
Phone: +46 46 19 30 00
Fax: +46 46 19 32 95
Contact: Håkan Sjöberg
e-mail: hakan.sjoberg@sonyericsson.com
Phone: +46 46 19 35 59

Manufacturer

Sony Ericsson Mobile Communications AB
Nya Vattentornet
22188 Lund / SWEDEN

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:	**GSM Mobile Phone 850/900/1800/1900; GPRS/EGPRS; UMTS FDDI/FDDII/FDDV; HSPA; LTE Band 4/17; BT EDR; WLAN b/g/n; ANT+; GPS; HDMI; RFID**
Model name:	**AAL-8880001-BV**
FCC ID:	**PY7A8880001**
IC:	**4170B-A8880001**
Frequency [MHz]:	13.56 MHz
Technology tested:	RFID
Antenna:	Integrated antenna
Power Supply:	3.7 V DC by Li-polymer battery
Temperature Range:	-20°C to +50 °C

Test report authorised:

2012-02-02 Stefan Bös
Senior Testing Manager

Test performed:

2012-02-02 Andreas Luckenbill

1 Table of contents

1 Table of contents 2

2 General information 3

2.1 Notes and disclaimer 3
2.2 Application details 3

3 Test standard/s 3

4 Test environment 4

5 Test item 4

6 Test laboratories sub-contracted 4

7 Summary of measurement results 5

8 RF measurements 6

8.1 Description of test setup 6
8.1.1 Radiated measurements 6
8.1.2 Conducted measurements 7
8.2 Additional comments 7
8.3 RSP100 test report cover sheet / performance test data 8

9 Measurement results 9

9.1 Field strength of the fundamental 9
9.2 Field strength of the harmonics and spurious 10
9.3 Frequency tolerance 14
9.4 AC line conducted 15

10 Test equipment and ancillaries used for tests 17

11 Observations 17

Annex A Photographs of the test setup 18

Annex B External photographs of the EUT 19

Annex C Internal photographs of the EUT 24

Annex D Document history 32

Annex E Further information 32

Annex F Accreditation Certificate 33

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

2.2 Application details

Date of receipt of order:	2012-01-10
Date of receipt of test item:	2012-01-12
Start of test:	2012-01-30
End of test:	2012-01-31
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:		35 %	
Barometric pressure:		not relevant for this kind of testing	
Power supply:	V_{nom}	3.7 V	DC by Li-polymer battery
	V_{max}	V	
	V_{min}	V	

5 Test item

Kind of test item	**:**	**GSM Mobile Phone 850/900/1800/1900; GPRS/EGPRS; UMTS FDDI/FDDII/FDDV; HSPA; LTE Band 4/17; BT EDR; WLAN b/g/n; ANT+; GPS; HDMI; RFID**
Type identification	**:**	**AAL-8880001-BV**
S/N serial number	**:**	**Rad. CB5A1JE2NC, CB5A1JD5GQ**
HW hardware status	**:**	**AP2**
SW software status	**:**	**6.0.C.0.257, 6.0.C.0.243** **s_atp_aoba_0_0_22**
Frequency band [MHz]	**:**	**13.56 MHz**
Type of modulation	**:**	**N0N**
Number of channels	**:**	**1**
Antenna	**:**	**Integrated antenna**
Power supply	**:**	**3.7 V DC by Li-polymer battery**
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	2012-02-02	-/-

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 Annex 2.6	Fieldstrength of Fundamental	Nominal	Nominal	☒	☐	☐	☐	complies
§ 15.209/ RSS-210 Issue 8 Annex 2.6	Fieldstrength of harmonics and spurious	Nominal	Nominal	☒	☐	☐	☐	complies
§ 15.225 (e)/ RSS-210 Issue 8 Annex 2.6	Frequency tolerance	Nominal	Extreme	☒	☐	☐	☐	complies
		Extreme	Nominal	☒	☐	☐	☐	

Note: NA = Not Applicable; NP = Not Performed

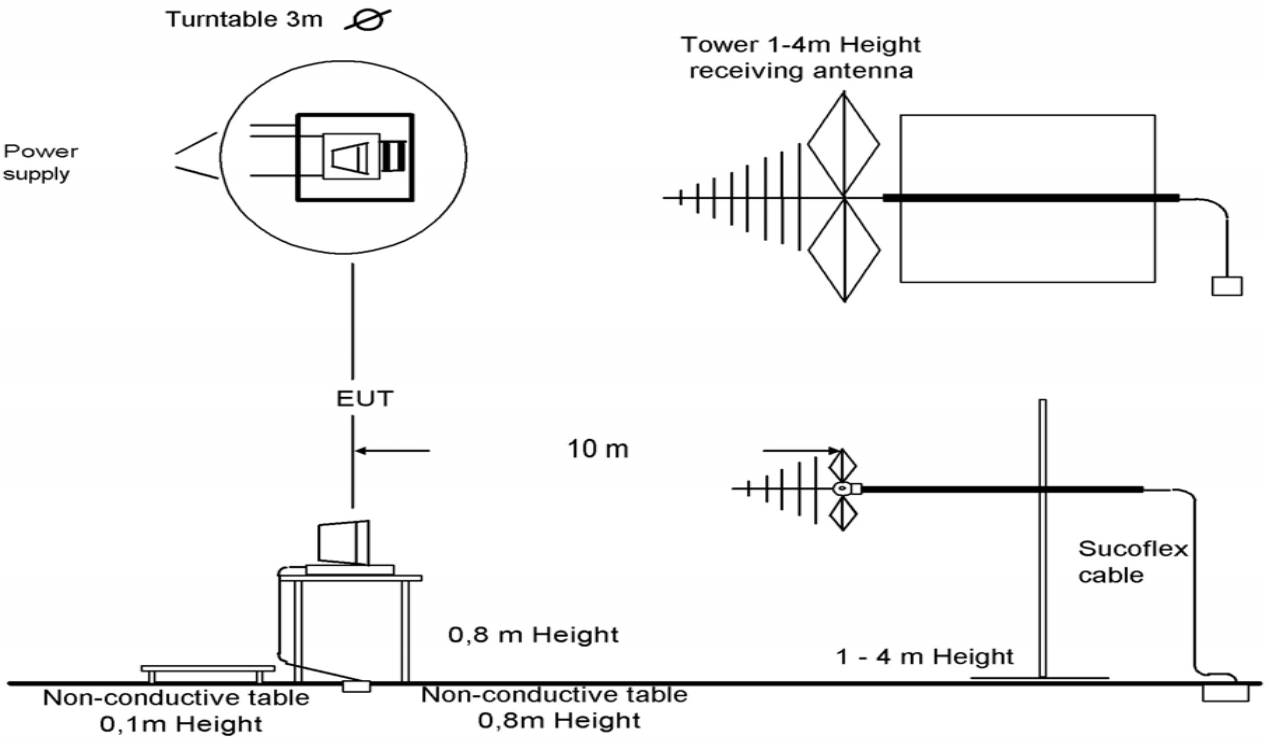
8 RF measurements

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



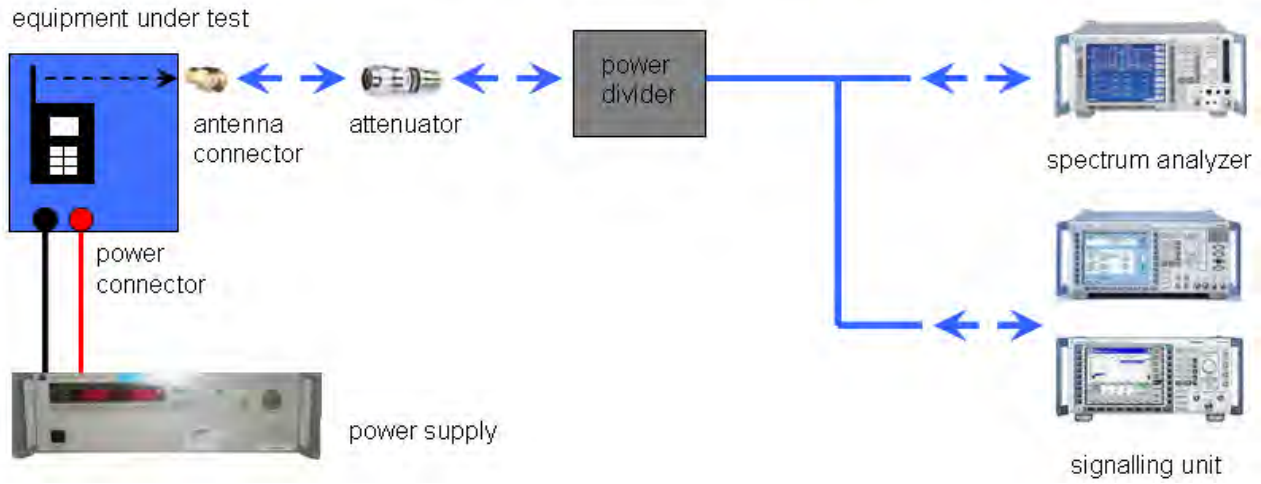
Picture 1: Diagram radiated measurements

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

8.3 RSP100 test report cover sheet / performance test data

Test Report Number	:	**1-4254/12-04-13**
Equipment Model Number	:	**AAL-8880001-BV**
Certification Number	:	**4170B-A8880001**
Manufacturer (complete Address)	:	**Sony Ericsson Mobile Communications AB Nya Vattentornet 22188 Lund / SWEDEN**
Tested to radio standards specification no.	:	**RSS 210, Issue 8, Annex 8**
Open Area Test Site IC No.	:	**IC 3462C-1**
Frequency Range or fixed frequency	:	**13.56 MHz**
Field Strength [dBµV/m] (at which distance)	:	**37 dBµV/m @ 10m 17 dBµV/m @ 30m**
Occupied bandwidth (99%-BW) [Hz]	:	**25.6 Hz**
Type of modulation	:	**N0N**
Emission Designator (TRC-43)	:	**25H6N0N**
Antenna Information	:	**Integrated antenna**
Transmitter Spurious (worst case) [dBµV/m @ 3m]	:	**30 dBµV/m @ 1 GHz (noise floor)**
Receiver Spurious (worst case) [µV/m @ 3m]	:	**no receiver mode!**

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:

2012-02-02	Andreas Luckenbill	
Date	Name	Signature

9 Measurement results

9.1 Field strength 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
Trace-Mode:	Max Hold

Limits:

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

Result:

TEST CONDITIONS		MAXIMUM POWER (dBµV/m)	
Frequency		13.56 MHz	13.56 MHz
Mode		at 10 m distance	at 30 m distance
T_{nom}	V_{nom}	37	17*
Measurement uncertainty		±3dB	

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

9.2 Field strength of the 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		
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

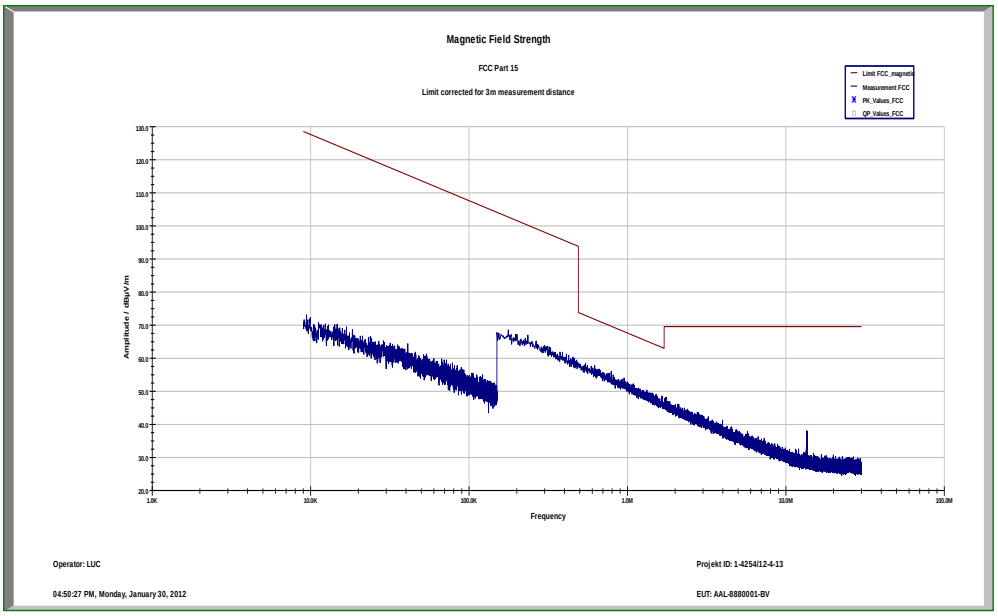
Result:

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

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

Plots of the measurements

Plot 1: 9 kHz – 30 MHz;
Part 15.209 Magnetics, Measurement distance 3m



Plot 2: 30 MHz – 1000 MHz

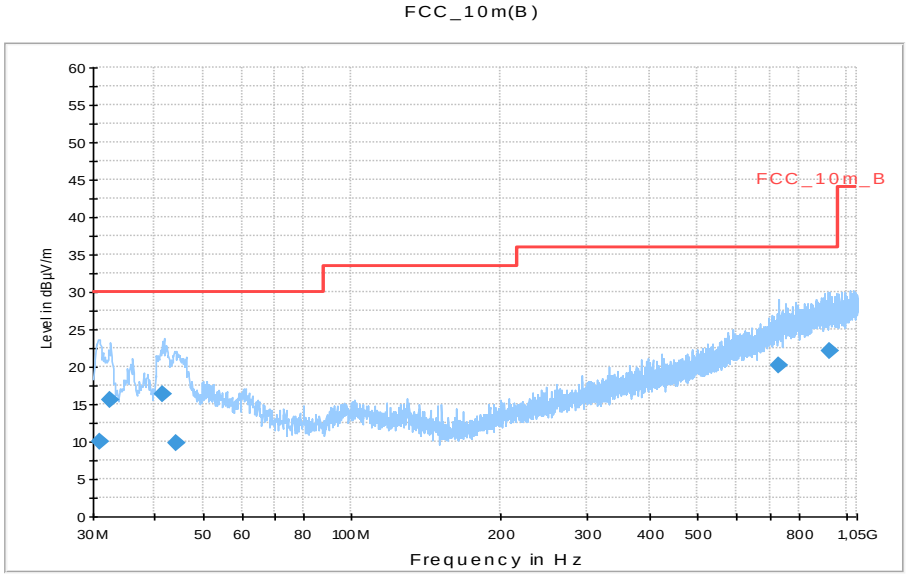
Common Information

EUT:	AAL-8880001-BV
Serial Number:	CB5A1JE2NC + CB5A1J5GQ
Test Description:	FCC part 15 B class B @ 10 m
Operating Conditions:	active NFC connection between two phones + charging one device
Operator Name:	Hennemann
Comment:	AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Receiver:	[ESCI 3]
Level Unit:	dBµV/m

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB

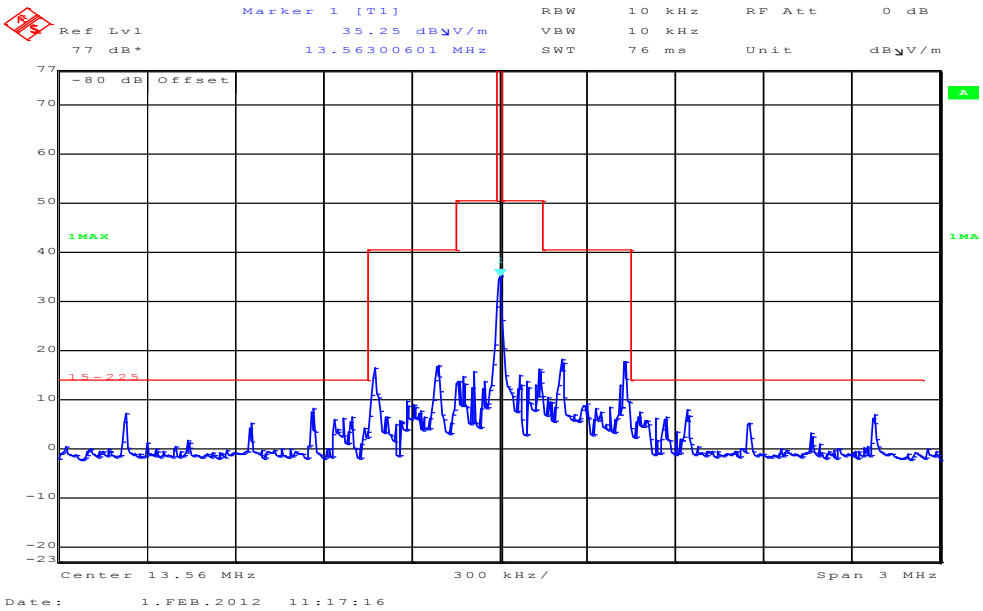


Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
30.866850	10.0	1000.0	120.000	105.0	V	4.0	12.6	20.0	30.0	
32.343150	15.6	1000.0	120.000	155.0	V	40.0	12.8	14.4	30.0	
41.587200	16.4	1000.0	120.000	113.0	V	209.0	13.4	13.6	30.0	
44.333100	9.8	1000.0	120.000	113.0	V	192.0	13.3	20.2	30.0	
728.986650	20.1	1000.0	120.000	320.0	V	48.0	23.2	15.9	36.0	
924.820950	22.1	1000.0	120.000	98.0	H	190.0	25.3	13.9	36.0	

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

Limits recalculated from 30m to 3m with 40 dB/decade according to FCC 15.31 (f2)



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

9.3 Frequency tolerance

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 Hz
Video bandwidth:	300 Hz
Span:	500 kHz
Trace-Mode:	Max Hold

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.	

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

Frequency tolerance								
Over temperature variation			Over voltage variation					
Limit is +/- 1.356 kHz			Not applicable			MHz		
T (°C)]	Frequency	result	Power voltage	Frequency	result	F [MHz]	Detector	Level [µV/m]
-20°	13.55989	Pass						
-10°	13.55988	Pass						
0°	13.55988	Pass						
10°	13.55986	Pass						
20°	13.55982	Pass						
30°	13.55980	Pass						
40°	13.55976	Pass						
50°	13.55971	Pass						
Measurement uncertainty			±100 Hz					

9.4 AC line conducted

Measurement:

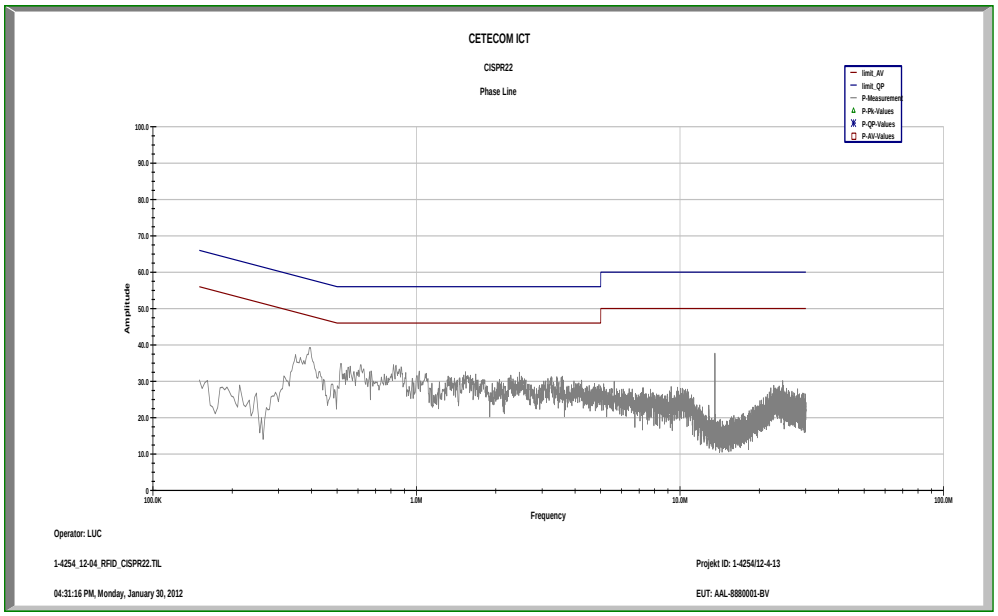
Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	9 kHz
Video bandwidth:	9 kHz
Span:	1 MHz Steps
Trace-Mode:	Max Hold

Limits:

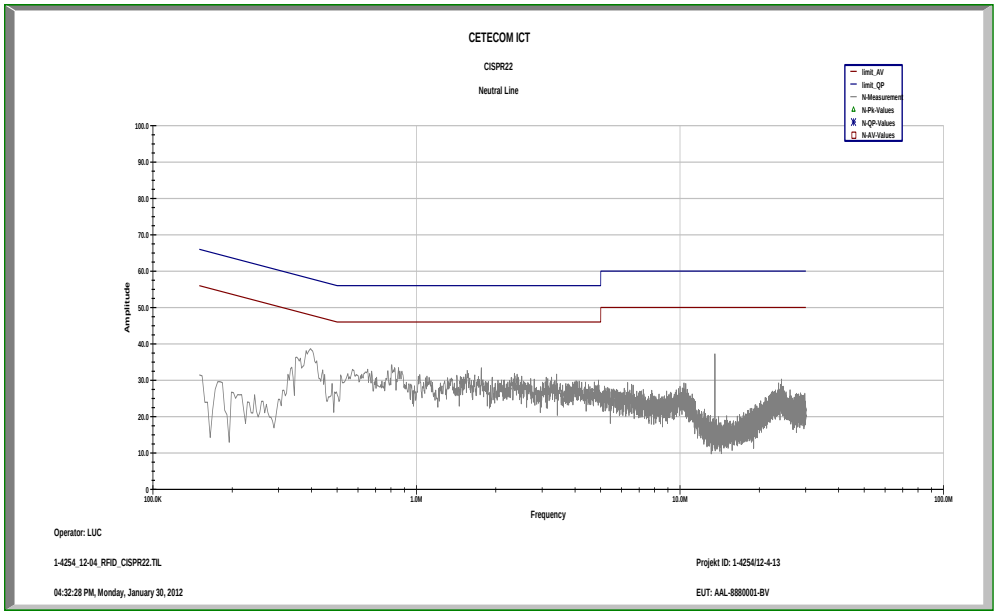
FCC	IC	
SUBCLAUSE § 15.107 / 15.207	**RSS-210 Issue 8 Section 6.6, 7.4**	
Frequency of Emission (MHz)	**Conducted Limit (dBµV)**	
	Quasi-peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 - 30	60	50

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

Plot 1: Phase Line



Plot 2: 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.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
2	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996		23.03.2009	
3	9	Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2012	06.01.2014
4	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne		
5	n. a.	Relais Matrix	PSU	R&S	890167/024	300001168	ne		
6	n. a.	Isolating Transformer	RT5A	Grundig	9242	300001263	ne		
7	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
8	n. a.	TILE-Software Emission	Quantum Change, Modell TILE-ICS/FULL	EMCO	none	300003451	ne		
9	n. a.	PSA Spectrum Analyzer 3 Hz - 26.5 GHz	E4440A	Agilent Technologies	MY48250080	300003812	k	08.09.2010	08.09.2012
10	n. a.	RF Filter Section 9kHz - 1GHz	N9039A	Agilent Technologies	MY48260003	300003825	vlKl!	08.09.2010	08.09.2012
11	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/83761	300002326	Ve	20.09.2011	20.09.2013
12	n. a.	Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443	ve	01.07.2010	01.07.2012

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

11 Observations

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

Annex D Document history

Version	Applied changes	Date of release
1.0	Initial release	2012-02-02

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

DAkkS Deutsche Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH
German Accreditation Body

Entrusted according to Section 8 subsection1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV
Signatory to the Multilateral Agreements of
EA, ILAC 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
Shirt 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. (FH) Rolf Egner
Head of Division 2

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

See notes overleaf.

Front side of certificate

Deutsche Akkreditierungsstelle GmbH

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Spittelmarkt 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

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_Akkredi_Urk_EN17025-En_incl_Annex.pdf