







CETECOM ICT Services

consulting - testing - certification >>>

TEST REPORT

Test report no.: 1-4254/12-50-17-A



Testing laboratory

CETECOM ICT Services GmbH

Untertuerkheimer Strasse 6 - 10 66117 Saarbruecken / Germany Phone: + 49 681 5 98 - 0

+ 49 681 5 98 - 9075 Fax: Internet: http://www.cetecom.com e-mail: ict@cetecom.com

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 Mobile Communications AB

Nya Vattentornet

22188 Lund / SWEDEN +46 46 19 30 00 Phone: Fax: +46 46 19 32 95

Contact: Håkan Sjöberg

hakan.sjoberg@sonymobile.com e-mail:

+46 46 19 35 59 Phone:

Manufacturer

Sony 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

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

Test Item

GSM Mobile Phone GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDDI/V/VIII; LTE FDD Kind of test item:

1/3/5/7/20; WLAN a/b/g/n; BT 3.1; RFID; FM Rx; A-GPS

Model name: PM-0060-BV

FCC ID: PY7PM-0060 IC:

Frequency: 13.56 MHz Technology tested: **RFID**

Antenna: Integrated antenna

Power Supply: 3.7 V DC by Li-polymer battery

Temperature Range: -20°C to +55 °C

Test report authorised:

2012-10-01 Stefan Bös

Senior Testing Manager

Test performed:

Marco Bertolino 2012-10-01

Testing Manager



Table of contents

1	Table	of contents	2
2	Gene	ral information	3
	2.1	Notes and disclaimer	3
	2.2	Application details	3
3	Test s	standard/s	3
4	Test e	environment	2
5	Test i	tem	2
6	Test I	aboratories sub-contracted	2
7	Sumn	nary of measurement results	5
8	RF me	easurements	6
	_	Description of test setup	6
9	Meas	urement results	8
	9.1 9.2 9.3 9.4 9.5	Timing of the transmitter	9 10
10	T	est equipment and ancillaries used for tests	17
11	0	bservations	17
Anı	nex A	Photographs of the test setup	18
Anı	nex B	External photographs of the EUT	23
Anı	nex C	Internal photographs of the EUT	28
Anı	nex D	Document history	35
Anı	nex E	Further information	35
Anı	nex F	Accreditation Certificate	36



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.

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.

The testing service provided by CETECOM ICT Services GmbH has been rendered under the current "General Terms and Conditions for CETECOM ICT Services GmbH".

CETECOM ICT Services GmbH will not be liable for any loss or damage resulting from false, inaccurate, inappropriate or incomplete product information provided by the customer.

Under no circumstances does the CETECOM ICT Services GmbH test report include any endorsement or warranty regarding the functionality, quality or performance of any other product or service provided.

Under no circumstances does the CETECOM ICT Services GmbH test report include or imply any product or service warranties from CETECOM ICT Services GmbH, including, without limitation, any implied warranties of merchantability, fitness for purpose, or non-infringement, all of which are expressly disclaimed by CETECOM ICT Services GmbH.

All rights and remedies regarding vendor's products and services for which CETECOM ICT Services GmbH has prepared this test report shall be provided by the party offering such products or services and not by CETECOM ICT Services GmbH.

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

2.2 Application details

Date of receipt of order: 2012-09-05
Date of receipt of test item: 2012-09-10
Start of test: 2012-09-18
End of test: 2012-09-18

Person(s) present during the test: -/-

3 Test standard/s

rest standard	Date	rest standard description
47 CFR Part 15	2010-10	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices

2012-10-01 Page 3 of 36



4 Test environment

T_{nom} +22 °C during room temperature tests

Temperature: T_{max} +55 °C during high temperature tests

T_{min} -20 °C during low temperature tests

Relative humidity content: 60 %

Barometric pressure: not relevant for this kind of testing

 V_{nom} 3.7 V DC by Li-polymer battery

Power supply: V_{max} 4.1 V

 V_{min} 3.3 V

5 Test item

Kind of test item	:	GSM Mobile Phone GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDDI/V/VIII; LTE FDD 1/3/5/7/20; WLAN a/b/g/n; BT 3.1; RFID; FM Rx; A-GPS		
Type identification	:	PM-0060-BV		
S/N serial number	:	Rad. CB5A1KT6B7, CB5A1KT68M		
HW hardware status	:	AP1.1		
SW software status	:	9.0.D.0.164, s_atp_tsubasa_2_0_s		
Frequency band [MHz] :		13.56		
Type of modulation	:	Modulated carrier		
Number of channels	:	1		
Antenna	:	Integrated antenna		
Power supply	:	3.7 V DC by Li-polymer battery		
Temperature range	:	-20°C to +55 °C		

6 Test laboratories sub-contracted

None

2012-10-01 Page 4 of 36



7	Summary of m	easurement 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	Passed	2012-10-01	-/-	

Test Specification Clause	Test Case	Temperature Conditions	Power Source Voltages	Pass	Fail	NA	NP	Results (max.)
§ 15.35 (c)	Timing of the transmitter (Duty cycle correction factor)	Nominal	Nominal	\boxtimes				complies
§ 15.225 (a)	Fieldstrength of Fundamental	Nominal	Nominal	\boxtimes				complies
§ 15.209	Fieldstrength of harmonics and spurious	Nominal	Nominal	\boxtimes				complies
	_	Nominal	Extreme	\boxtimes				
§ 15.225 (e)	Frequency tolerance	Extreme	Nominal	\boxtimes				complies

Note: NA = Not Applicable; NP = Not Performed

2012-10-01 Page 5 of 36



8 RF measurements

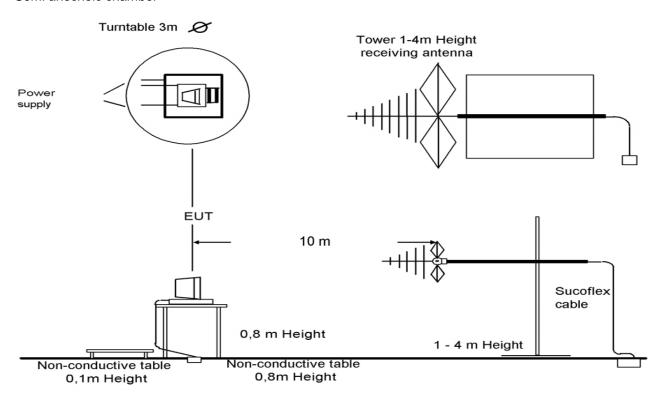
8.1 Description of test setup

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

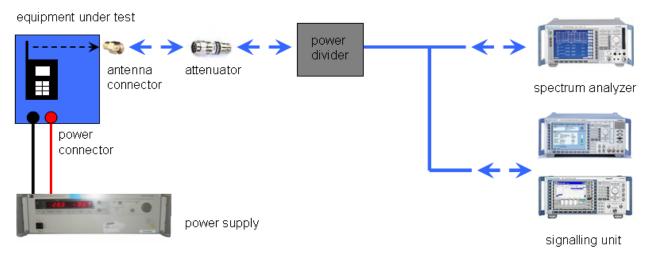
The EUT is powered by an external power supply with nominal voltage. The signalling is performed from outside the chamber with a signalling unit (CMU200 or other) by air link using signalling antenna.

2012-10-01 Page 6 of 36



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

2012-10-01 Page 7 of 36



9 Measurement results

9.1 Timing of the transmitter

Measurement:

Measurement parameter			
Detector:	Positive Peak		
Sweep time:	100 ms		
Resolution bandwidth:	100 kHz		
Video bandwidth:	300 kHz		
Span:	Zero Span		
Trace-Mode:	Clear Write / Single Sweep		

Limits:

FCC	IC		
CFR Part SUBCLAUSE § 15.35 (c)	-/-		

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

2012-10-01 Page 8 of 36



9.2 Field strength of the fundamental

Measurement:

Measurement parameter				
Detector:	Quasi 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:	≥ RBW			
Trace-Mode:	Max Hold			

Limits:

FCC		IC		
CFR Part SUBCLAUSE § 2	15.225 (b)	-/-		
Fundamental Frequency (MHz) Field strength of (μV/r		I IVIDACIII AMANT RISTANCA I		
15848 μV/m (8		84 dBµV/m)	30	
13.553 to 13.567	158489 μV/m (104 dBμV/m)		10 (Recalculated acc. to FCC part15.31 (f2))	

Result:

TEST CO	ONDITIONS	MAXIMUM POWER (dBμV/m)		
Fred	quency	13.56 MHz	13.56 MHz	
M	ode	at 10 m distance	at 30 m distance	
T _{nom} V _{nom}		42 22*		
Measureme	ent uncertainty	±30	dB	

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

Result: Passed

2012-10-01 Page 9 of 36



9.3 Field strength of the harmonics and spurious

Measurement:

Measurement parameter			
Detector:	Quasi Peak / Average		
Sweep time:	Auto		
Resolution bandwidth:			
Video bandwidth:			
Span:			
Trace-Mode:			

Limits:

FCC		IC		
SUBCLAUSE § 15.	.209	-/-		
Fie	eld strength of the ha	rmonics and spu	urious.	
Frequency (MHz)	Field streng	jth (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 c	BµV/m)	30	
30 – 88	100 (40 d	BμV/m)	3	
88 – 216	150 (43.5	dBµV/m)	3	
216 – 960	200 (46 d	BμV/m)	3	

Result:

	EMISSION LIMITATIONS							
f [MHz]	Detector	Limit max. allowed [dBµV/m]	Amplitude of emission [dBµV/m]	Results				
			See plots!					

Result: Passed

2012-10-01 Page 10 of 36

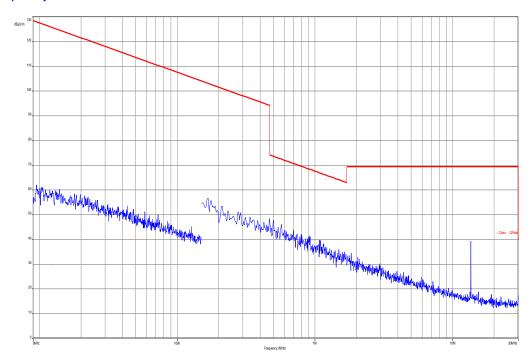


Plots of the measurements

Plot 1: 9 kHz – 30 MHz;

Part 15.209 Magnetics, Measurement distance 3m

Transmit frequency 13.56 MHz



2012-10-01 Page 11 of 36



Plot 2: 30 MHz – 1000 MHz

Transmit frequency 13.56 MHz

Common Information

EUT: PM-0060-BV Serial Number: CB5A1KT68M

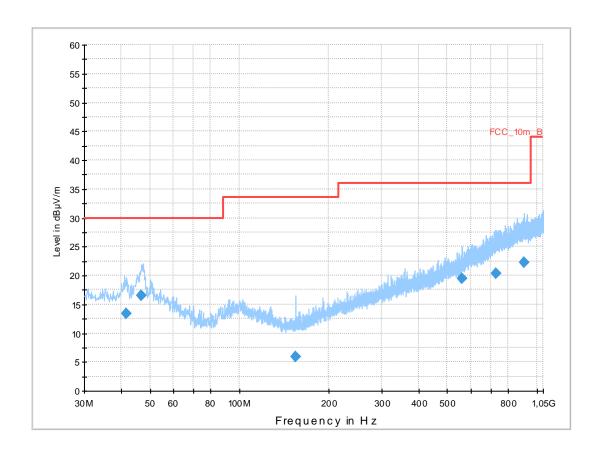
Test Description: FCC part 15 C class B @ 10 m Operating Conditions: cont. NFC polling + charging

Operator Name: Wolsdorfer Comment: AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)

Receiver: [ESCI 3] Level Unit: dBµV/m



2012-10-01 Page 12 of 36



Final Result 1

Frequency MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Po lari zat ion	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
41.497950	13.3	1000.0	120.000	145.0	V	25.0	13.4	16.7	30.0	
46.745250	16.5	1000.0	120.000	234.0	V	61.0	13.3	13.5	30.0	
154.482750	5.8	1000.0	120.000	192.0	V	120.0	9.0	27.7	33.5	
559.991550	19.5	1000.0	120.000	265.0	Н	34.0	19.7	16.5	36.0	
729.088650	20.3	1000.0	120.000	200.0	V	35.0	23.2	15.7	36.0	
904.233900	22.2	1000.0	120.000	200.0	V	4.0	25.2	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 (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

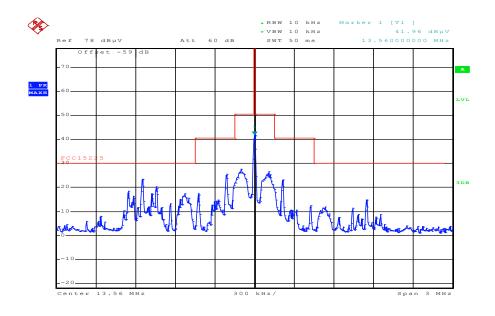
EMC 32 Version 8.52

2012-10-01 Page 13 of 36



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)



Date: 18.SEP.2012 08:36:39

RBW /VBW 10 kHz

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

2012-10-01 Page 14 of 36



9.4 Frequency tolerance

Measurement:

Measurement parameter					
Detector:	Positive Peak				
Sweep time:	Auto				
Resolution bandwidth:	10 Hz				
Video bandwidth:	1 MHz				
Span:	1 kHz				
Trace-Mode:	Clear-Write				

Limits:

FCC	IC
SUBCLAUSE § 15.225	-/-

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: Passed

	Frequency tolerance								
Over	temperature v	ariation	Ove	er voltage varia	ation				
Lir	nit is +/- 1.356	kHz	Limit is +/- 1.356 kHz				MHz		
T (°C)]	Frequency	result	Power voltage	Frequency	Frequency result		Detector	Level [µV/m]	
-20°	13.56014	Pass	3.3 V	13.56010	Pass				
-10°	13.56016	Pass	3.4 V	13.56010	Pass				
0°	13.56014	Pass	3.5 V	13.56010	Pass				
10°	13.56011	Pass	3.6 V	13.56010	Pass				
20°	13.56010	Pass	3.7 V	13.56010	Pass				
30°	13.56002	Pass	3.8 V	13.56010	Pass				
40°	13.55999	Pass	3.9 V	13.56009	Pass				
50°	13.56000	Pass	4.0 V	13.56009	Pass				
			4.1 V	13.56009	Pass				
Measure	Measurement uncertainty ±100 Hz								

2012-10-01 Page 15 of 36



9.5 AC line conducted

Measurement:

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

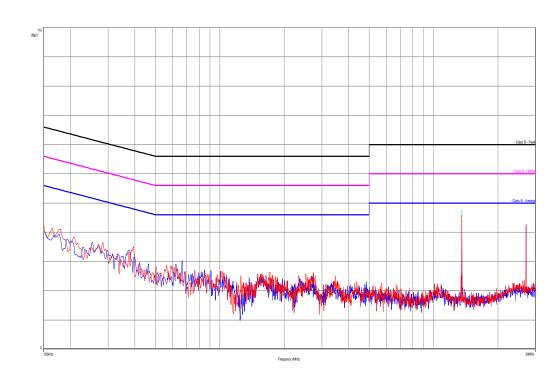
Limits:

FCC	IC
SUBCLAUSE § 15.107 / 15.207	-/-

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: passed

Plot:



2012-10-01 Page 16 of 36



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	n.a.	Test Receiver	ESH2	R&S	871921/095	300002505	Ve	12.01.2012	12.01.2014
2	n. a.	Loop Antenna 9 KHz - 30 MHz	HFH2-Z2	R&S	872096/61	300001824	vIKI!	09.03.2012	09.03.2015
3	n. a.	EMI Test Receiver 9 kHz - 3 GHz incl. Preselector	ESPI3	R&S	101713	300004059	k	22.08.2012	22.08.2013
4	n. a.	DC Power Supply 0 – 32V	1108-32	Heiden	001802	300001383	Ve	23.06.2010	23.06.2013
5	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/83761	300002326	Ve	20.09.2011	20.09.2013
6	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
7	n.a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
8	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
9	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
10	n. a.	Amplifier	js42- 00502650- 28-5a	Parzich GMBH	928979	300003143	ne		
11	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbe ck	371	300003854	vIKI!	14.10.2011	14.10.2014
12	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologi es	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.

2012-10-01 Page 17 of 36



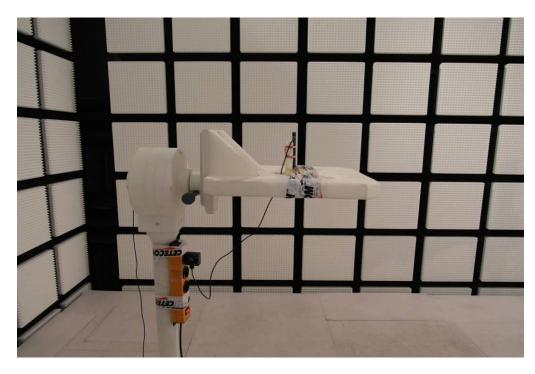
Annex A Photographs of the test setup

Photo documentation:

Photo 1:



Photo 2:



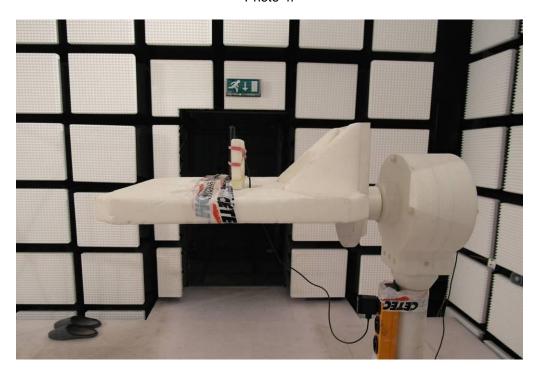
2012-10-01 Page 18 of 36



Photo 3:



Photo 4:



2012-10-01 Page 19 of 36



Photo 5:

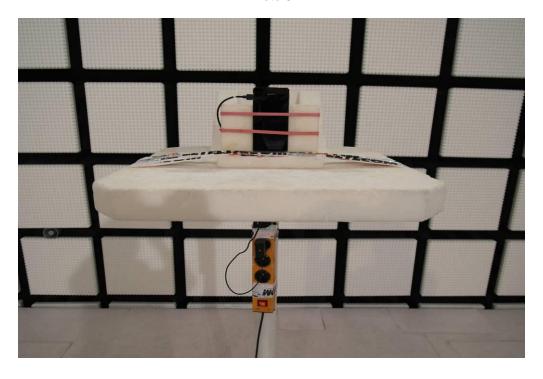


Photo 6:



2012-10-01 Page 20 of 36



Photo 7:



Photo 8:



2012-10-01 Page 21 of 36



Photo 9:



2012-10-01 Page 22 of 36



Annex B External photographs of the EUT

Photo documentation:

Photo 1:



Photo 2:



2012-10-01 Page 23 of 36



Photo 3:

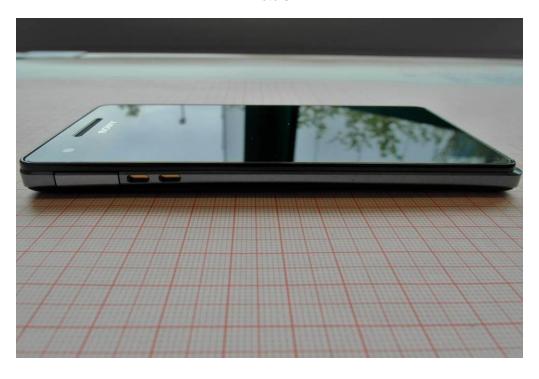
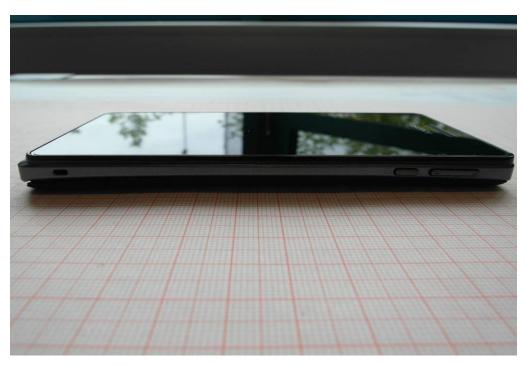


Photo 4:



2012-10-01 Page 24 of 36



Photo 5:

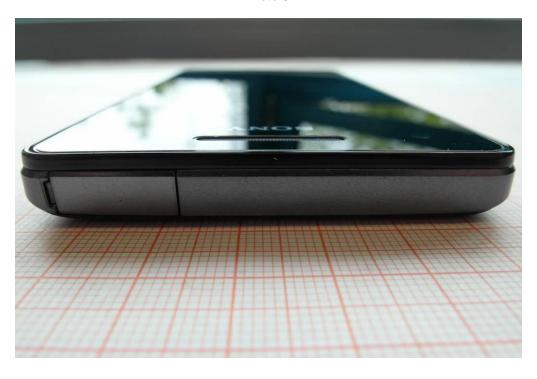


Photo 6:



2012-10-01 Page 25 of 36



Photo 7:



Photo 8:



2012-10-01 Page 26 of 36



Photo 9:



2012-10-01 Page 27 of 36



Annex C Internal photographs of the EUT

Photo documentation:

Photo 1:

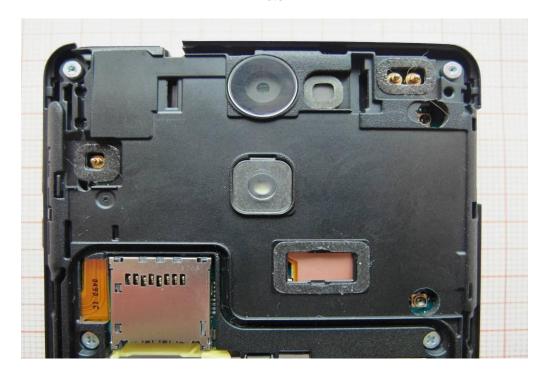


Photo 2:



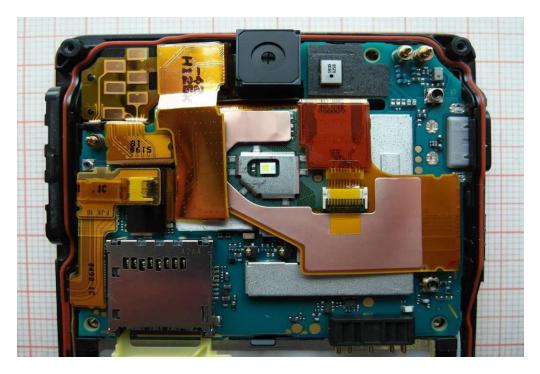
2012-10-01 Page 28 of 36



Photo 3:



Photo 4:



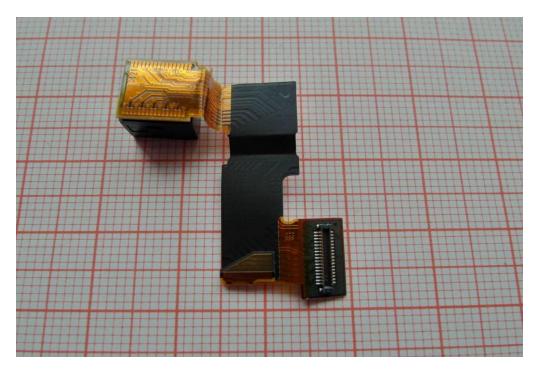
2012-10-01 Page 29 of 36



Photo 5:



Photo 6:



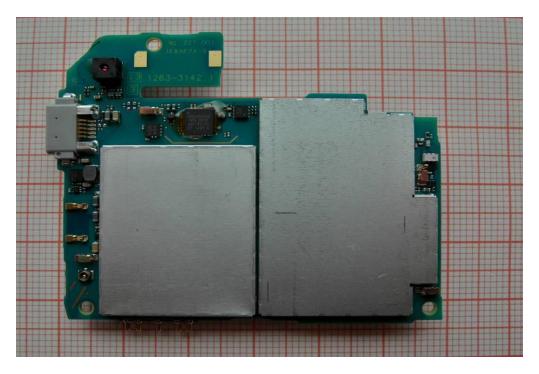
2012-10-01 Page 30 of 36



Photo 7:



Photo 8:



2012-10-01 Page 31 of 36



Photo 9:

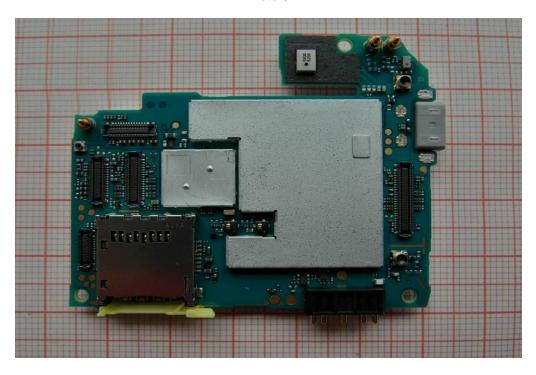
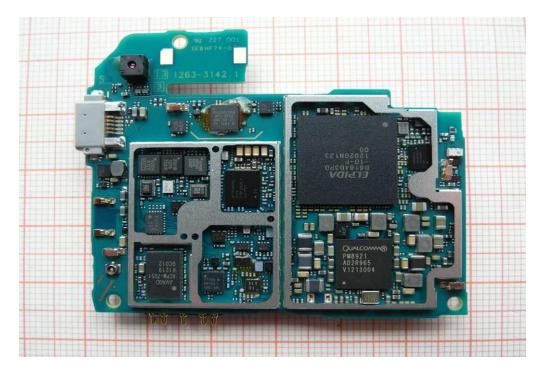


Photo 10:



2012-10-01 Page 32 of 36



Photo 11:

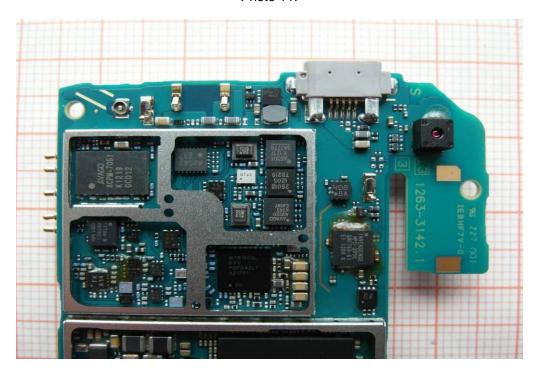
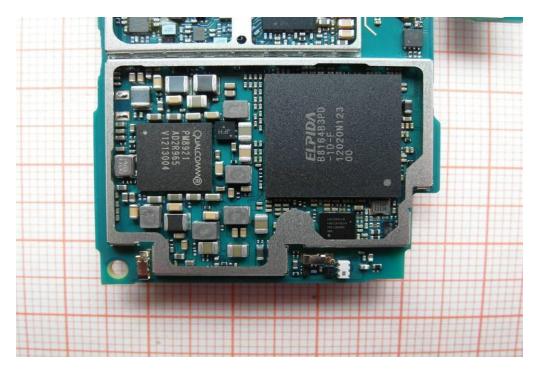


Photo 12:



2012-10-01 Page 33 of 36



Photo 13:



2012-10-01 Page 34 of 36



Annex D Document history

Version	Applied changes	Date of release
1.0	Initial release	2012-09-24
-A	Canada is removed	2012-09-28

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

Serial number

HW - Hardware
IC - Industry Canada
Inv. No. - Inventory number
N/A - Not applicable
PP - Positive peak
QP - Quasi peak

SW - Software

S/N

2012-10-01 Page 35 of 36



Annex F Accreditation Certificate



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 Akkredi Urk_EN17025-En_incl_Annex.pdf

2012-10-01 Page 36 of 36