Untertürkheimer Straße 6-10. **RSC-Laboratory** 

D-66117 Saarbrücken

Phone: +49 (0) 681-598-0 Fax:-9075



# **Accredited testing-laboratory**

DAR registration number: DAT-P-176/94-D1

Federal Motor Transport Authority (KBA) DAR registration number: KBA-P 00070-97

**Recognized by the Federal Communications Commission** Anechoic chamber registration no.: 90462 (FCC) Anechoic chamber registration no.: 3463A-1 (IC) **Certification ID: DE 0001 Accreditation ID: DE 0002** 

Accredited Bluetooth® Test Facility (BQTF)
The Bluetooth word mark and logos are owned by the Bluetooth SIG,

Inc. and any use of such marks by Cetecom ICT is under license

Test report no. : 4-2380-24-10/07 Type identification: EC2007P

: SAGEM Communication Applicant

FCC ID : M9HEC2007P

IC Certification No: -.-

Test standards : 47 CFR Part 15

**RSS - 210 Issue 7** 

2007-07-18 Page 1 of 47

Test report no.: 4-2380-24-10/07

# **Table of contents**

1	Gene	General information			
	1.1 N	Notes			
		Sesting laboratory			
		Details of applicant			
	1.4	Application details			
2	Test	standard/s:	5		
3	Tech	nical tests	6		
•		Details of manufacturer			
	3.1.1	Test item			
	3.1.2	Additional EUT information For IC Canada (appendix 2)			
	3.1.3	EUT operating modes			
	3.1.4	Extreme conditions testing values			
4	Sum	mary of Measurement Results and list of all performed test cases			
5		neasurement testing			
		Description of test set-up			
	5.1.1	Radiated measurements			
	5.1.2 5.2 I	Conducted measurements			
		Referenced documents			
		Antenna gain			
		Carrier frequency separation §15.247(a)(1)			
		Number of hopping channels §15.247(a)(1)			
		Time of occupancy (dwell time) §15.247(a)(1)(iii)			
		Power Spectral density (Hybrid system in Inquiry mode/Page scan) §15.247(e)			
		Spectrum Bandwidth of a FHSS System / 20dB Bandwidth §15.247(a)(1)	17		
	5.10	Maximum output power (conducted) § 15.247 (b)(1)			
	5.11	Max. peak output power (radiated) § 15.247 (b)(1)			
	5.12	Band-edge compliance of conducted emissions §15.247 (d)			
	5.13	Band-edge compliance of radiated emissions §15.205			
	5.14	Spurious Emissions - conducted (Transmitter) § 15.247 (c)(1)			
	5.15 5.16	Spurious Emissions > 30 MHz- radiated (Transmitter) § 15.247 (c)(1)			
	5.17	Spurious Emissions < 30 MHz - Transmitter radiated § 15.209			
	5.17	Conducted Emissions < 30 MHz § 15.107/207			
6		equipment and ancillaries used for tests			
7		ographs of the Test Set-up			
, e		ographs of the FUT	41		

Test report no.: 4-2380-24-10/07

### 1 General information

#### 1.1 Notes

The test results of this test report relate exclusively to the test item specified in 1.5. The 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 the CETECOM ICT Services GmbH.

Test laboratory manager:				
2007-07-18	Jakob Reschke			
Date	Name	Signature		
Technical respon	nsibility for area of testing:			
2007-07-18	Michael Berg			
Date	Name	Signature		

2007-07-18 Page 3 of 47

Test report no.: 4-2380-24-10/07

#### 1.2 Testing laboratory

#### **CETECOM ICT Services GmbH**

Untertürkheimer Straße 6 - 10

66117 Saarbrücken

Germany

Phone: + 49 681 5 98 - 0

Fax: + 49 681 5 98 - 9075

e-mail: info@ICT.cetecom.de

Internet: http://www.cetecom-ict.de

State of accreditation: The test laboratory (area of testing) is accredited according to

**DIN EN ISO/IEC 17025** 

DAR registration number: DAT-P-176/94-D1

Accredited by: Federal Motor Transport Authority (KBA)

DAR registration number: KBA-P 00070-97

Testing location, if different from CETECOM ICT Services GmbH:

Name : Street : Town : Country : Phone : Fax :

#### 1.3 Details of applicant

Name: SAGEM Communication

FR 0448018158

Street: 2 rue du Petit Albi

Town: 95801 Cergy Pontoise Cedex

**Country:** France

Telephone: +33-1-40 70 63 63 Fax: +33-1-5811 14 11 Contact: Jean Marquet

E-mail: jean.marquet@sagem.com

**Telephone:** +33-1-5811 91 72

#### 1.4 Application details

Date of receipt of order: 2007-07-07

Date of receipt of test item: 2007-07-12

Date of start test: 2007-07-12

Date of end test 2007-07-18

Persons(s) who have been present during the test:

2007-07-18 Page 4 of 47

Test report no.: 4-2380-24-10/07

### 2 Test standard/s:

47 CFR Part 15 2006-08 Title 47 of the Code of Federal Regulations; Chapter I-

**Federal Communications Commission** 

subchapter A - general, Part 15-Radio frequency devices

RSS - 210 Issue 7 2007-06 Spectrum Management and Telecommunications - Radio

**Standards Specification** 

Low-power Licence-exempt Radiocommunication Devices (All

Frequency Bands): Category I Equipment

2007-07-18 Page 5 of 47

Test report no.: 4-2380-24-10/07

### 3 Technical tests

### 3.1 Details of manufacturer

Name:	SAGEM Communication FR 0448018158
Street:	2 rue du Petit Albi
Town:	95801 Cergy Pontoise Cedex
Country:	France

#### 3.1.1 Test item

Kind of test item	:	GSM mobile phone
Type identification	:	EC2007P
S/N serial number	:	Radiated sample; IMEI: 35493101501525
		Conducted sample; IMEI: 354931019501582
HW hardware status :		V0x
SW software status :		E N, UE
Frequency Band [MHz]	:	ISM 2.400 - 2.483,5
Type of Modulation	:	FHSS
Number of channels	:	79
Antenna :		Integrated antenna
Power Supply	:	3.9 V DC by Li-Ion Battery
Temperature Range	:	°C to °C

Max. power radiated: -0.72 dBm Max. power conducted: 3.51 dBm

FCC ID: M9HEC2007P

IC: -.-

2007-07-18 Page 6 of 47

Test report no.: 4-2380-24-10/07

3.1.2

#### Additional EUT information For IC Canada (appendix 2)

IC Registration Number:	
Model Name:	EC2007P
Manufacturer (complete Adress):	SAGEM Communication
	2 rue du Petit Albi
	95801 Cergy Pontoise Cedex
	France
Tested to Radio Standards Specification (RSS) No.:	RSS-210 Issue 7
Open Area Test Site Industry Canada Number:	IC 3463A-1
Frequency Range (or fixed frequency) [MHz]:	2400 – 2483.5 MHz
RF: Power [W] (max):	Rad. EIRP: 0.85 mW
	Conducted: 2.24 mW
Antenna Type:	Integrated antenna
Occupied Bandwidth (99% BW) [kHz]:	878
Type of Modulation:	FSK
Emission Designator (TRC-43):	IM00FXD / 79M0FXD (FHSS)
Transmitter Spurious (worst case) [µV/m in 3m]:	Nothing found
Receiver Spurious (worst case) [µV/m in 3m]:	Nothing found

ATTESTATION: I attest that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned departmental standard(s), and that the radio equipment identified in this application has been subject to all applicable test conditions specified in the departmental standards and all of the requirements of the standards have been met.

Signature:

Date: 2007-07-18

Test engineer: Jakob Reschke

2007-07-18 Page 7 of 47

Test report no.: 4-2380-24-10/07

### 3.1.3 EUT operating modes

EUT operating mode no.*)	Description of operating modes	Additional information
Op. 0 Normal mode		Normal temperature and power source conditions
Op. 1		low temperature, low power source conditions
Op. 2		low temperature, high power source conditions
Op. 3		high temperature, low power source conditions
Op. 4		high temperature, high power source conditions

<sup>\*)</sup> EUT operating mode no. is used to simplify the test plan

### 3.1.4 Extreme conditions testing values

Description	Shortcut	Unit	Value
Nominal Temperature	$T_{nom}$	°C	23
Nominal Humidity	$H_{nom}$	%	49
Nominal Power Source	V <sub>nom</sub>	V	3.9

Type of power source: DC by Li-Ion Battery

Deviations from these values are reported in chapter 2

2007-07-18 Page 8 of 47

Test report no.: 4-2380-24-10/07

# 4 Summary of Measurement Results and list of all performed test cases

$\boxtimes$	No deviations from the technical specifications were ascertained
	There were deviations from the technical specifications ascertained

TC identifier	Description	verdict	date	Remark
RF-Testing	FCC Part 15 §15.247 - CANADA RSS-210	PASS	2007-07-17	PASS

Test Specification Clause	Test Case	Pass	Fail	Not applicable	Not performed
None	Antenna Gain	Yes			
§15.247(a1)	Carrier frequency separation	Yes			
§15.247(a1)	Number of hopping channels	Yes			
§15.247(a)(1)(iii)	Time of occupancy (dwell time)	Yes			
§15.247(e)	Power Spectral density (Hybrid system in Inquiry mode/Page scan)			Yes	
§15.247(a)(1)	Spectrum Bandwidth of a FHSS System / 20dB Bandwith	Yes			
§ 15.247 (b)(1)	Maximum output power (conducted)	Yes			
§ 15.247 (b)(1)	Max. peak output power (radiated)	Yes			
§ 15.247 (d)	Band-edge compliance of conducted emissions	Yes			
§ 15.205	Band-edge compliance of radiated emissions	Yes			
§ 15.247 (d)	Spurious Emission - conducted (Transmitter)	Yes			
§ 15.247 (d)	Spurious Emission - radiated (Transmitter) >30 MHz	Yes			
§ 15.109	Spurious Emissions - radiated (Receiver)	Yes			
§ 15.209	Spurious Emissions - radiated (Transmitter) <30 MHz	Yes			
§ 15.107/207	Conducted Emissions <30 MHz	Yes			

2007-07-18 Page 9 of 47

### 5 RF measurement testing

#### 5.1 Description of test set-up

#### 5.1.1 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.

9 kHz - 150 kHz: Quasi Peak measurement, 200 Hz Bandwidth, passive loop antenna.

150 kHz - 30 MHz: Quasi Peak measurement, 9 kHz Bandwidth, passive loop antenna.

30 MHz - 200 MHz: Quasi Peak measurement, 120 kHz Bandwidth, biconical antenna

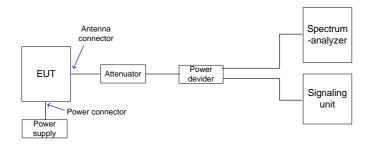
200MHz - 1GHz: Quasi Peak measurement, 120 kHz Bandwidth, log periodic antenna

>1GHz: Average, RBW 1MHz, VBW 10 Hz, waveguide horn

All measurements are done in accordance with the Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems DA 00-705 and Appendix A "BLUETOOTH APPROVALS" 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.

#### 5.1.2 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 path 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.



2007-07-18 Page 10 of 47

Test report no.: 4-2380-24-10/07

### 5.2 Referenced documents

None

#### 5.3 Additional comments

--

### 5.4 Antenna gain

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.

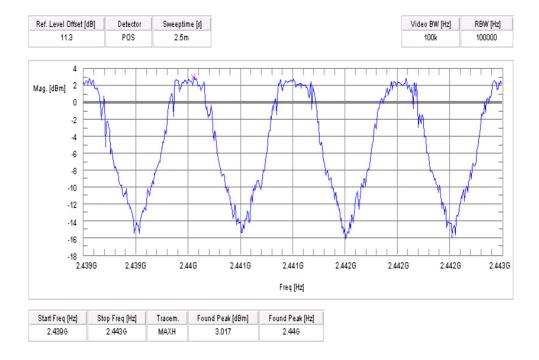
	low channel	mid channel	high channel
Conducted power [dBm]	3.18	3.51	3.50
Radiated power [dBm]	-2.05	-0.72	-1.92
Gain [dBi]	-5.23	-4.23	-5.42

2007-07-18 Page 11 of 47

Test report no.: 4-2380-24-10/07

### 5.5 Carrier frequency separation §15.247(a)(1)

Plot 1 of 1:



Result: Channel separation is: ~ 1 MHz

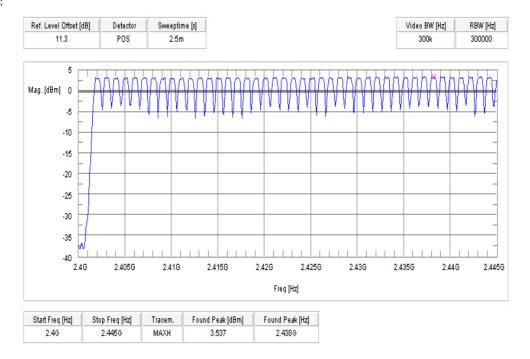
Limits:

Under normal test conditions only	Minimum 25 kHz or 20 dB Bandwidth of the hopping
	system

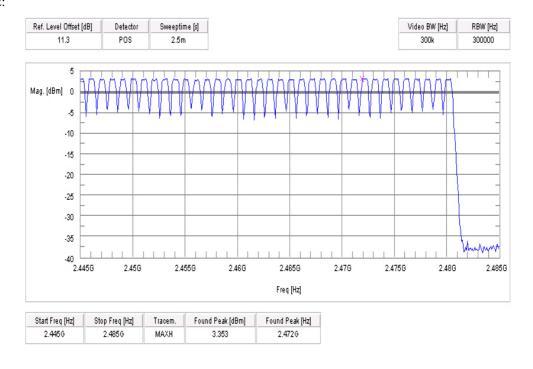
2007-07-18 Page 12 of 47

### 5.6 Number of hopping channels §15.247(a)(1)

Plot 1 of 2:



Plot 2 of 2:



Result: The number of hopping channels is: 79

Limits:

Under normal test conditions only	at least 15 non-overlapping channels
-----------------------------------	--------------------------------------

2007-07-18 Page 13 of 47

# CETECOM ICT Services GmbH Test report no.: 4-2380-24-10/07

2007-07-18 Page 14 of 47

Test report no.: 4-2380-24-10/07

#### 5.7 Time of occupancy (dwell time) §15.247(a)(1)(iii)

#### For Bluetooth devices:

The dwell time of 0.4 s within a 31.6 second period in data mode is independent from the packet type (packet length). The calculation for a 31.6 second period is a follows:

Dwell time = time slot length \* hop rate / number of hopping channels \*31.6 s

Example for a DH1 packet (with a maximum length of one time slot) Dwell time =  $625 \mu s * 1600 1/s / 79 * 31.6 s = 0.4 s$  (in a 31.6 s period)

For multi-slot packet the hopping is reduced according to the length of the packet. Example for a DH5 packet (with a maximum length of five time slots) Dwell time =  $5*625 \mu s*1600*1/5*1/s/79*31.6 s=0.4 s$  (in a 31.6 s period)

This is according the Bluetooth Core Specification V 1.1 & V 1.2 (+ critical errata) for all Bluetooth devices.

Therefore, all Bluetooth devices comply with the FCC dwell time requirement in the data mode.

This was checked during the Bluetooth Qualification tests.

The Dwell time in hybrid mode is approximately 2.6 ms (in a 12.8s period)

2007-07-18 Page 15 of 47

Test report no.: 4-2380-24-10/07

5.8 Power Spectral density (Hybrid system in Inquiry mode/Page scan) §15.247(e)

### not applicable

Result: Power density: -dBm/Hz = -dBm/3 kHz

Correction factor from dBm/Hz to dBm / 3 kHz is +34,8 dB

Limits:

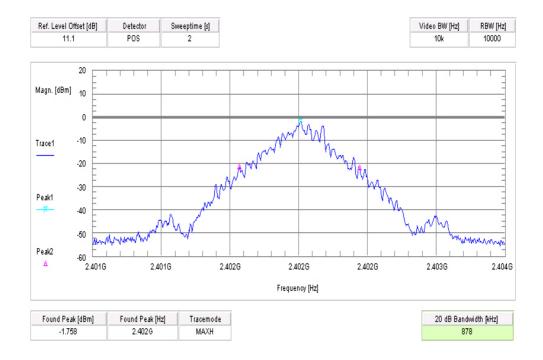
Under normal test conditions only

For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission

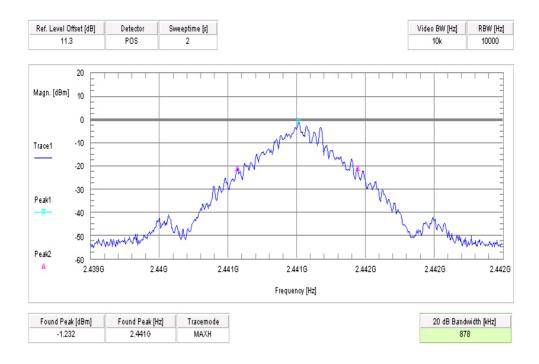
2007-07-18 Page 16 of 47

### 5.9 Spectrum Bandwidth of a FHSS System / 20dB Bandwidth §15.247(a)(1)

Plot 1 of 3



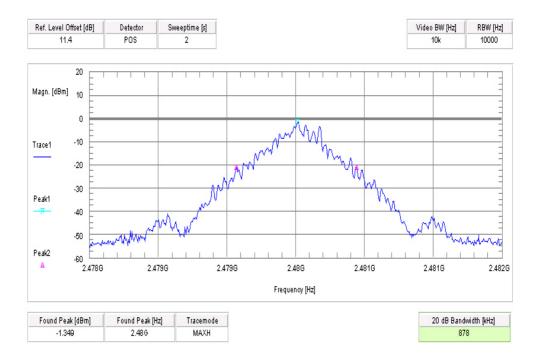
Plot 2 of 3



2007-07-18 Page 17 of 47

Test report no.: 4-2380-24-10/07

#### Plot 3 of 3



#### **RESULTS:**

Test co	nditions	20 dB BANDWIDTH [kHz]		Hz]
Frequency [MHz]		2402	2441	2480
T <sub>nom</sub>	V <sub>nom</sub>	878	878	878
Measuremen	t uncertainty	±1kHz		

RBW / VBW as provided in the "Measurement Guidelines" (DA 00-705, March 30, 2000) RBW:  $10\ kHz\ / VBW\ 10\ kHz$ 

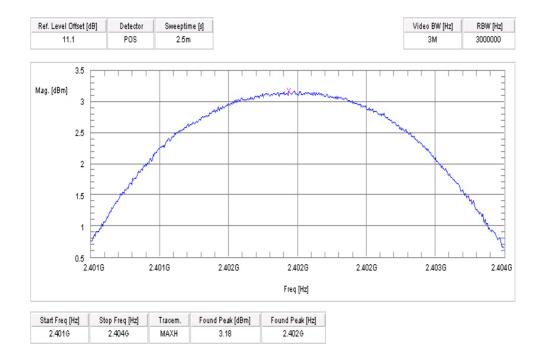
#### Limits:

Under normal test conditions only	< 1000 kHz
-----------------------------------	------------

2007-07-18 Page 18 of 47

### 5.10 Maximum output power (conducted) § 15.247 (b)(1)

Plot 1 of 3



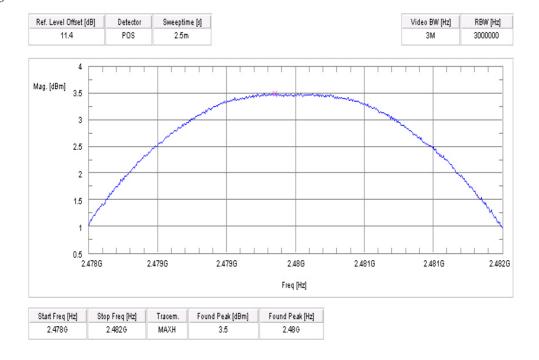
Plot 2 of 3



2007-07-18 Page 19 of 47

Test report no.: 4-2380-24-10/07

Plot 3 of 3



#### Results:

Test co	nditions		Max	. peak o	output power [d	Bm]	
Frequenc	ey [MHz]	2402 2442 2480		2480			
T <sub>nom</sub>	V <sub>nom</sub>	PK	3.18	PK	3.59	PK	3.50
Measuremen	t uncertainty	±3dB					

RBW / VBW: 3 MHz

#### Limits:

Under normal test conditions only, for frequency range 2400-2483.5 MHz	Max. 1.0 Watt
--	---------------

2007-07-18 Page 20 of 47

Test report no.: 4-2380-24-10/07

### 5.11 Max. peak output power (radiated) § 15.247 (b)(1)

#### Results:

Test conditions		Max. pe	eak output power EIRF	P[dBm]
Frequenc	cy [MHz]	2402	2442	2480
T <sub>nom</sub>	V <sub>nom</sub>	-2.05	-0.72	-1.92
Measurement uncertainty			±3dB	

RBW / VBW: 3 MHz

Measured at a distance of 3m

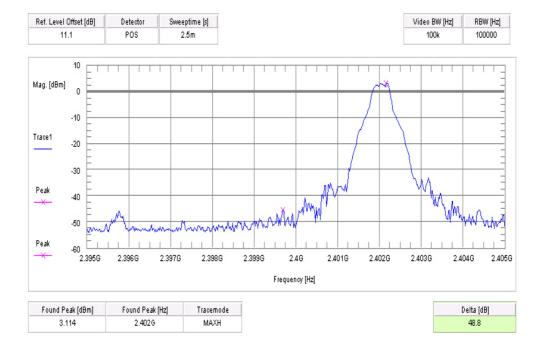
#### Limits:

Under normal test conditions only, for frequency	Max. 1.0 Watt
range 2400-2483.5 MHz	

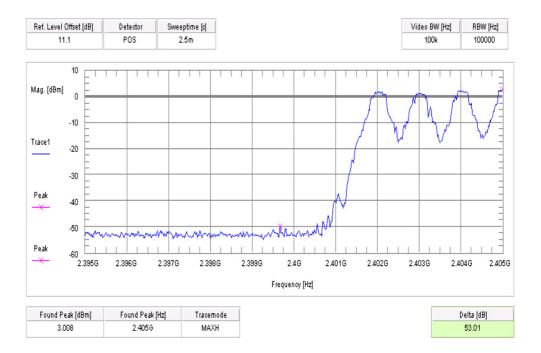
2007-07-18 Page 21 of 47

### 5.12 Band-edge compliance of conducted emissions §15.247 (d)

Plot 1 of 4 (hopping off, lowest frequency):



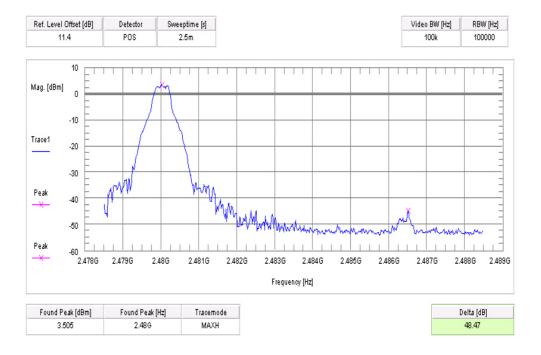
Plot 2 of 4 (hopping on, lowest frequency):



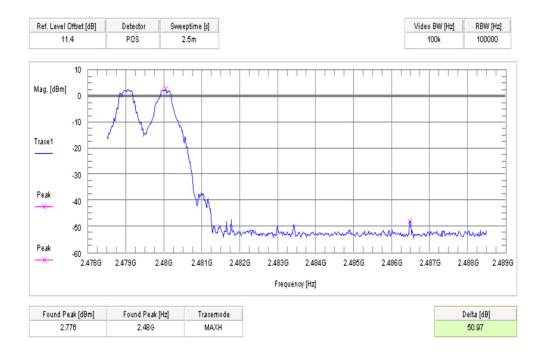
2007-07-18 Page 22 of 47

Test report no.: 4-2380-24-10/07

Plot 3 of 4 (hopping off, highest frequency):



#### Plot 4 of 4 (hopping on, highest frequency):



2007-07-18 Page 23 of 47

Test report no.: 4-2380-24-10/07

#### Results:

SZENARIO	DELTA VALUE [DB]
hopping off, lowest frequency	> 20 dB
hopping on, lowest frequency	> 20 dB
hopping off, highest frequency	> 20 dB
hopping on, highest frequency	> 20 dB
Measurement uncertainty	±1,5dB

#### Limits:

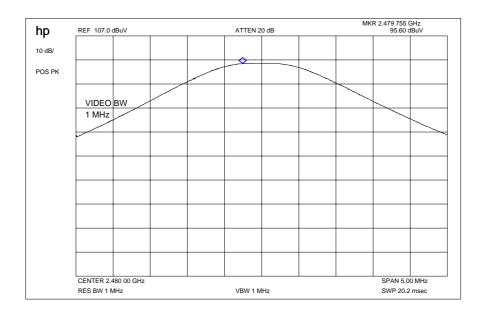
Under norma	ıl	tes
conditions of	on	ıly

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).

2007-07-18 Page 24 of 47

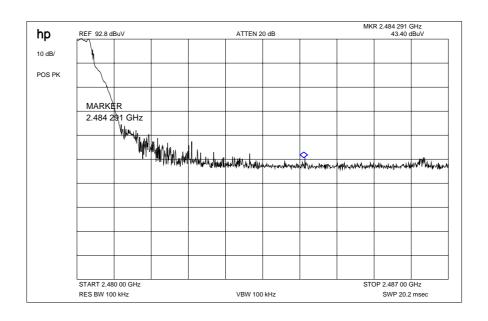
### 5.13 Band-edge compliance of radiated emissions §15.205

Plot 1: Max field strength in 3m distance (single frequency)



Result:  $95.60 \ dB\mu V/m$ 

Plot 2: Marker-Delta Method (single carrier)



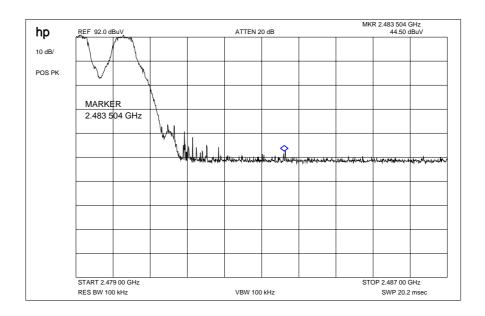
Marker-Delta-Value: 49.40 dB

2007-07-18 Page 25 of 47

Test report no.: 4-2380-24-10/07

This measurement was made to show that the behaviour of the system is conform to FCC 15.205 (restricted bands)

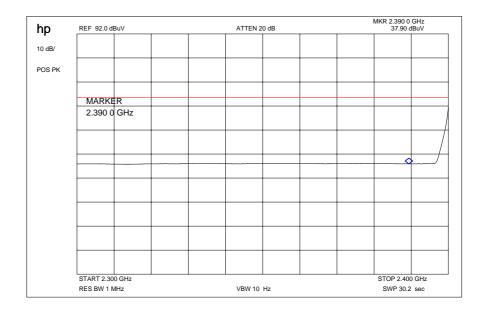
Plot 3: Marker-Delta Method (hopping)



Marker-Delta-Value: 47.50 dB

This measurement was made to show that the behaviour of the system is conform to FCC 15.205 (restricted bands)

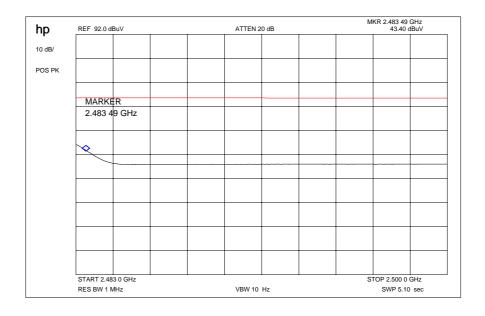
Plot 4: Restricted Bands low



2007-07-18 Page 26 of 47

Test report no.: 4-2380-24-10/07

Plot 5: Restricted Bands high



#### Results & Limits:

#### Radiated field strength

The field strength was measured with an EMI measuring receiver and 1 MHz RBW / VBW for peak and with 1MHz RBW / 10Hz VBW for average at a distance of 3m.

high channel	setup	measured value (3m)	correction factor (3m)	calculated value (3m)
Max. peak value	1 MHz RBW 1 MHz VBW	95.60 dBμV/m	-3.20	$92.40~dB\mu V/m$
Max. average value	Calculated with duty cycle correction factor	92.40 dBµV/m peak	-1,07dB duty cycle correction factor (worst case DH5)	91.33 dBμV/m
Delta value	Peak 100 kHz RBW/VBW	49.40 dB (single carrier) 47.50 dB (hopping mode)	-	-
Value at band edge	limit 54 dBµV/m			41.93 dBµV/m (single carrier) 43.83 dBµV/m (hopping mode)
Statement:				Complies

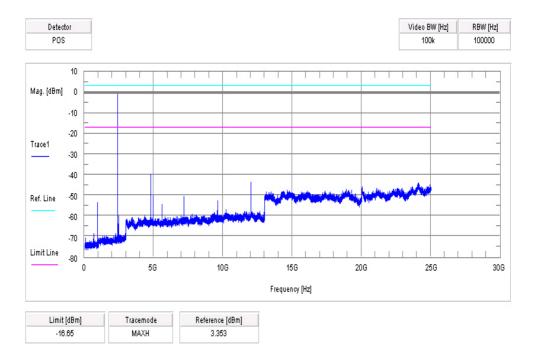
2007-07-18 Page 27 of 47

#### 5.14 Spurious Emissions - conducted (Transmitter) § 15.247 (c)(1)

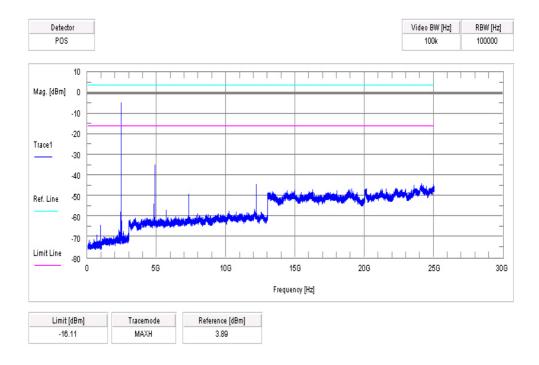
The whole spurious conducted measurement were performed using a 100kHz RBW filter. Found spurious above 1GHz are re-measured by using a RBW of 1 MHz.

The values of the re-measurement are shown in the table below.

Plot 1 of 3: lowest channel



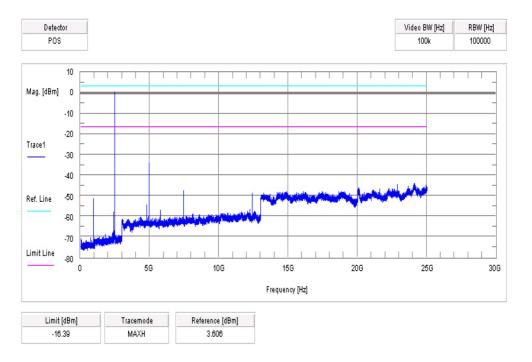
Plot 2 of 3: middle channel



2007-07-18 Page 28 of 47

Test report no.: 4-2380-24-10/07

Plot 3 of 3: highest channel



#### Result & Limits:

Emission Limitation	on			
f [MHz]	amplitude of emission [dBm]	limit max. allowed emmision power	actual attenuation below frequency of operation [dB]	results
2402	3.35	30 dBm		Operating frequency
No criti	ical peaks found	-20 dBc		
2441	3.89	30 dBm		Operating frequency
No criti	cal peaks found	-20 dBc		
2480	3.60	30 dBm		Operating frequency
No criti	ical peaks found	-20 dBc		
Measurement unce	ertainty ± 3dB			<u> </u>

RBW: 100 kHz VBW: 100 MHz

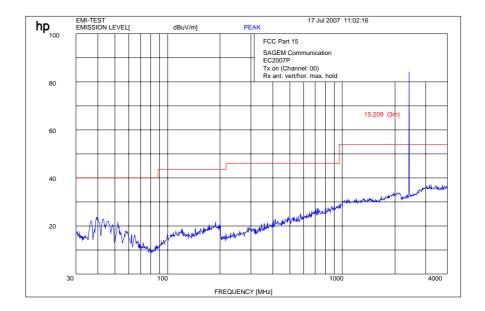
conditions only	In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in \$15.205(a), must also comply with the radiated emission limits specified in \$15.209(a) (see \$15.205(c)).
-----------------	---

Note: For emissions that fall into restricted bands you find the radiated emissions later in the report.

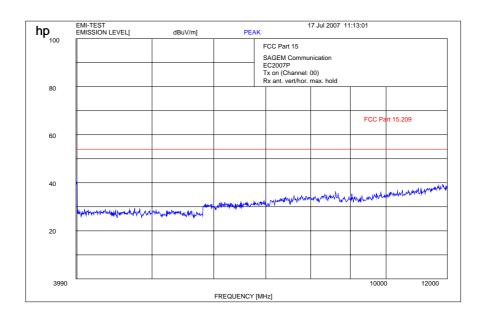
2007-07-18 Page 29 of 47

### 5.15 Spurious Emissions > 30 MHz- radiated (Transmitter) § 15.247 (c)(1)

Plot: 0.03 - 4 GHz vertical worst case (lowest channel)



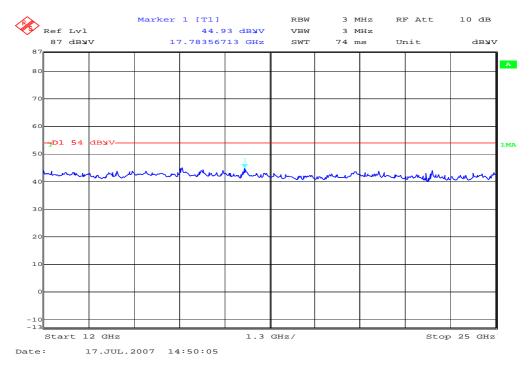
Plot: 4- 12 GHz vertical worst case (lowest channel)



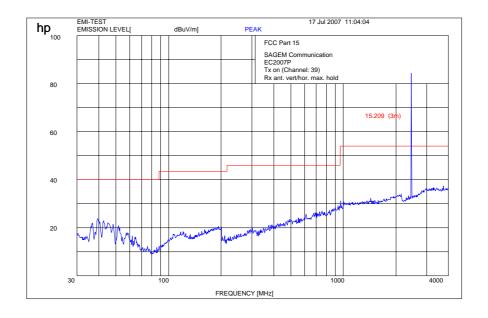
2007-07-18 Page 30 of 47

Test report no.: 4-2380-24-10/07

Plot: 12- 25 GHz vertical/horizontal (valid for all channels)



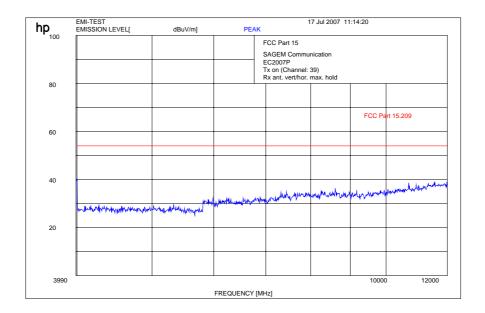
Plot: 0.03 - 4 GHz vertical/horizontal (middle channel)



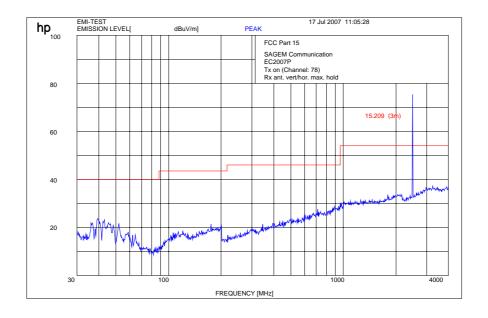
2007-07-18 Page 31 of 47

Test report no.: 4-2380-24-10/07

Plot: 4- 12 GHz vertical/horizontal (middle channel)



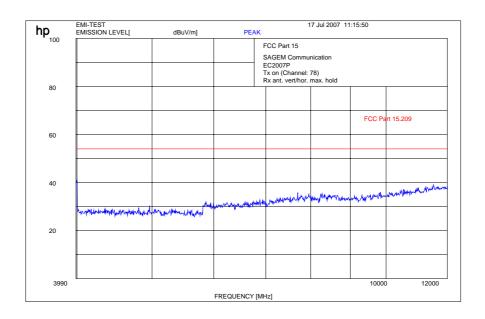
Plot: 0.03 - 4 GHz vertical/horizontal (highest channel)



2007-07-18 Page 32 of 47

Test report no.: 4-2380-24-10/07

Plot: 4- 12 GHz vertical/horizontal (highest channel)



#### Results:

SPURIOUS EMISSIONS LEVEL (dBµV/m)									
2402 MHz			2441 MHz			2480 MHz			
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	
No critical peaks found		No critical peaks found		No critical peaks found					
Measurement uncertainty			±3 dB						

f < 1 GHz: RBW/VBW: 100 kHz  $f \ge 1 \text{GHz}: RBW/VBW: 1 \text{ MHz}$ 

Limits: § 15.247 (c)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

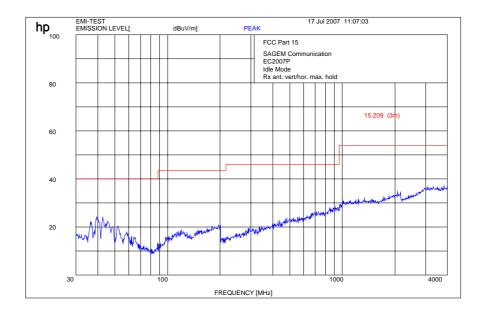
Limits: § 15.209

Frequency [MHz]	Field strength [μV/m]	Measurement distance (m)
30 - 88	100 (40 dBμV/m)	3
88 - 216	150 (43.5 dBμV/m)	3
216 - 960	200 (46 dBμV/m)	3
above 960	500 (54 dBμV/m)	3

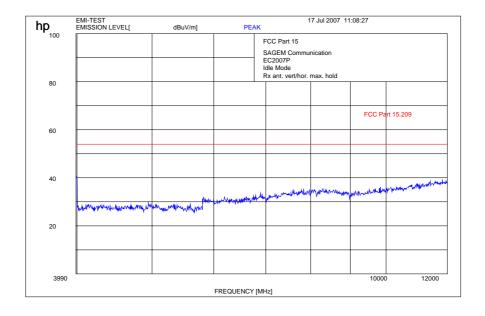
2007-07-18 Page 33 of 47

### 5.16 Spurious Emissions - radiated (Receiver) § 15.109

Plot: 0.03 - 4 GHz vertical/horizontal (receiver)



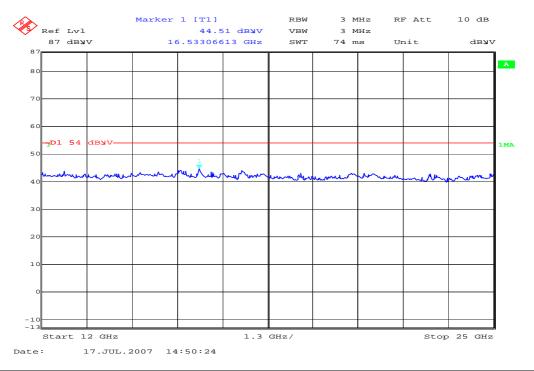
Plot: 4- 12 GHz vertical/horizontal (receiver)



2007-07-18 Page 34 of 47

Test report no.: 4-2380-24-10/07

Plot: 12- 25 GHz vertical/horizontal (receiver)



	Spurious Emissisons level [dBµV/m]								
f[MHz]	Detecto	or	Level [dBµV/m]						
	No critical peaks found								
Measurement uncertainty		±3 dB							

f < 1 GHz: RBW/VBW: 100 kHz

 $f \ge 1GHz : RBW/VBW: 1 MHz$ 

See above plots

Measurement distance see table

Limits: § 15.109

Frequency (MHz)	Field strength (μV/m)	Measurement distance (m)
30 - 88	100 (40 dBμV/m)	3
88 - 216	150 (43.5 dBμV/m)	3
216 - 960	200 (46 dBμV/m)	3
above 960	500 (54 dBµV/m)	3

2007-07-18 Page 35 of 47

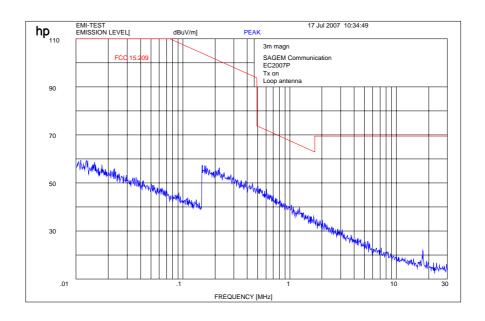
Test report no.: 4-2380-24-10/07

### 5.17 Spurious Emissions < 30 MHz - Transmitter radiated § 15.209

Measured at 10 m distance.

Values recalculated with 40 dB/decade according to FCC rules.

#### Plot 1:



#### Limits:

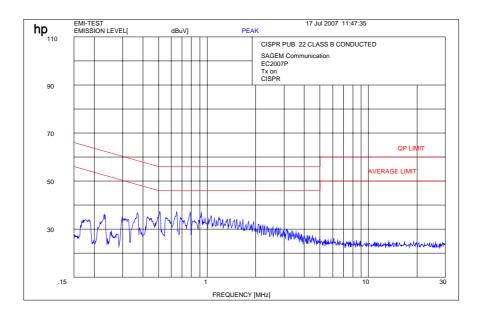
Frequency (MHz)	Field strength (μV/m)	Measurement distance (m)	
0.009 - 0.490	2400/F(kHz)	300	
0.490 - 1.705	24000/F(kHz)	30	
1.705 – 30.0	30 / 29.5 dBμV/m	30	

2007-07-18 Page 36 of 47

Test report no.: 4-2380-24-10/07

### 5.18 Conducted Emissions < 30 MHz § 15.107/207

#### Plot 1:



#### Limits:

Under normal test conditions only	See plots
-----------------------------------	-----------

2007-07-18 Page 37 of 47

Test report no.: 4-2380-24-10/07

# 6 Test equipment and ancillaries used for tests

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

#### Anechoic chamber C:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration	
1	Anechoic chamber	MWB	87400/02	300000996	Monthly verification		•	
2	System-Rack 85900	HP I.V.	*	300000222	n.a.			
3	Measurement System 1							
4	Spektrum Analyzer 8566B	HP	2747A05306	300001000	05.10.2006	24	05.10.2008	
	Spektrum Analyzer Display 85662A	HP	2816A16541	300002297	05.10.2006	24	05.10.2008	
6	Quasi-Peak-Adapter 85650A	HP	2811A01131	300000999	05.10.2006	24	05.10.2008	
7	RF-Preselector 85685A	HP	2837A00779	300000218	08.11.2006	24	08.11.2008	
8	PC Vectra VL	HP		300001688	n.a.			
9	Software EMI	HP		300000983	n.a.			
10	Measurement System 2							
11	FSP 30	R&S	100623	ICT 300003464	26.10.2006	12	26.10.2007	
12	PC	F+W			n.a.			
13	TILE	TILE			n.a.			
14	Biconical antenna	EMCO	S/N: 860 942/003		Monthly verification (System cal.)			
15	Log. Period. Antenna 3146	EMCO	2130	300001603	Monthly verifi	Monthly verification (System cal.)		
16	Double Ridged Antenna HP 3115P	EMCO	3088	300001032	Monthly verification (System cal.)			
17	Active Loop Antenna 6502	EMCO	2210	300001015	Monthly verifi	cation (System	cal.)	
18	Power Supply 6032A	HP	2818A03450	300001040	12.05.2007	36	12.05.2010	
19	Busisolator	Kontron		300001056	n.a.			
20	Leitungsteiler 11850C	HP		300000997	Monthly verification (System cal.)			
21	Power attenuator 8325	Byrd	1530	300001595	Monthly verification (System cal.)			
22	Band reject filter WRCG1855/1910	Wainwrig ht	7	300003350	Monthly verification (System cal.)			
23	Band reject filter WRCG2400/2483	Wainwrig ht	11	300003351	Monthly verification (System cal.)			

#### Bluetooth Rack:

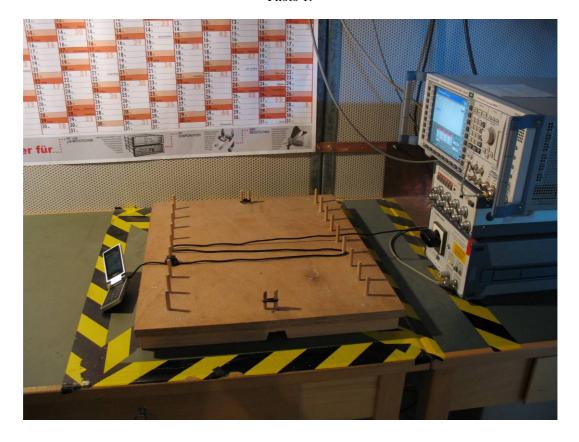
No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom		Frequency	Next
					Calibration	(months)	Calibration
1	FSP 30	R&S		300003575	02.04.2007	24	02.04.2009
2	CBT	R&S	100313	300003516	24.10.2006	24	24.10.2008
3	Switch Matrix	HP		300000929	n.a.		
4	Power Supply	HP	3041A00544	300002270	13.05.2007	36	13.05.2010
5	Signal Generator	R&S	836206/0092	300002680	30.05.2007	36	30.05.2010

2007-07-18 Page 38 of 47

# 7 Photographs of the Test Set-up

Photo documentation

Photo 1:



2007-07-18 Page 39 of 47

Photo 2:

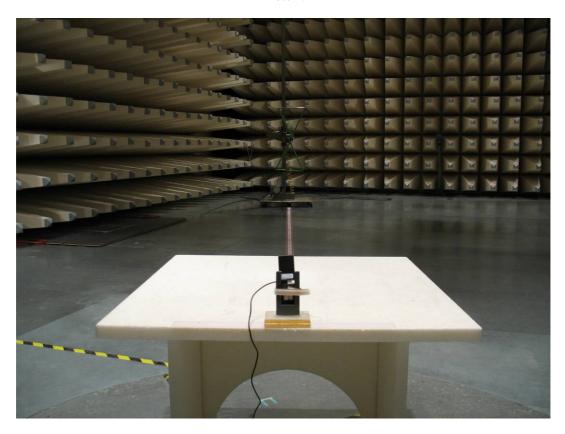
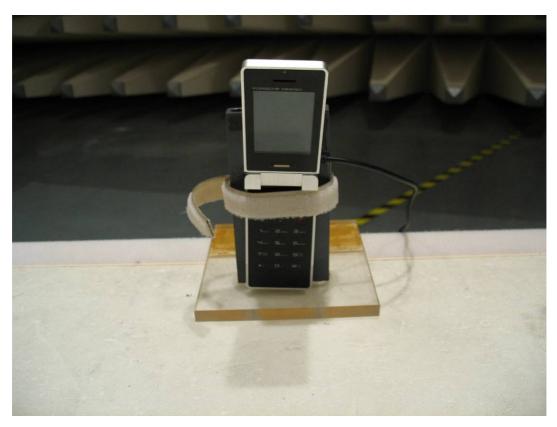


Photo 3:



2007-07-18 Page 40 of 47

# 8 Photographs of the EUT

Photo documentation

Photo 4:



2007-07-18 Page 41 of 47

Photo 5:



Photo 6:



2007-07-18 Page 42 of 47

Photo 7:



Photo 8:

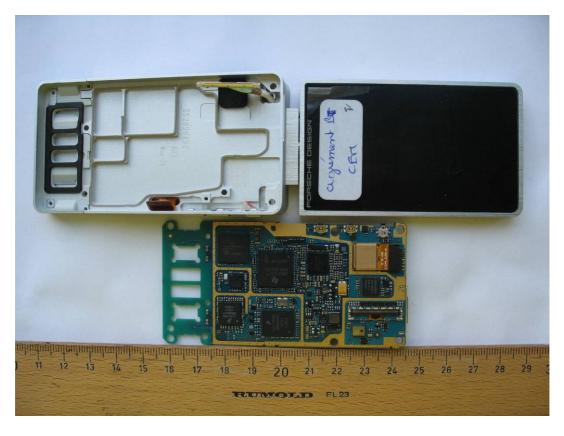


2007-07-18 Page 43 of 47

Photo 9:



Photo 10:



2007-07-18 Page 44 of 47

Photo 11:

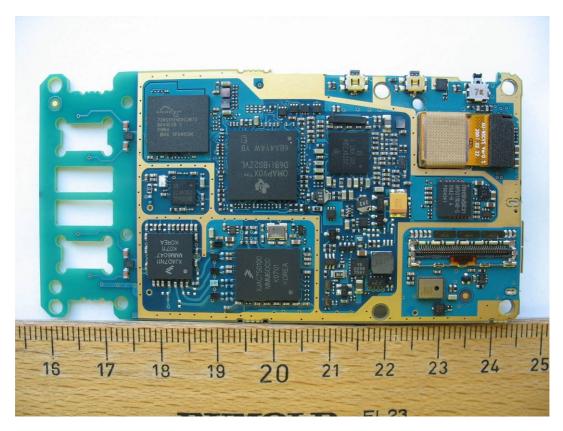


Photo 12:



2007-07-18 Page 45 of 47

Photo 13:



Photo 14:



2007-07-18 Page 46 of 47

Photo 15:

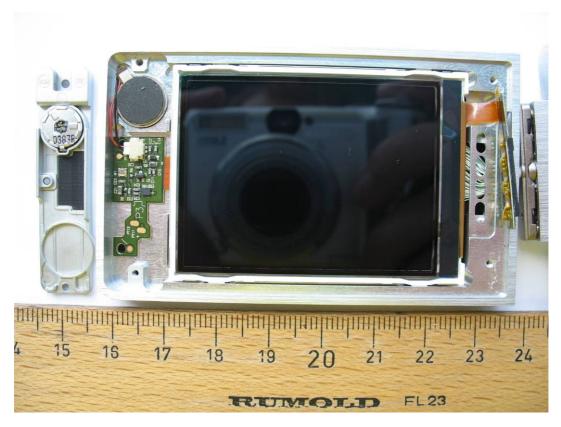
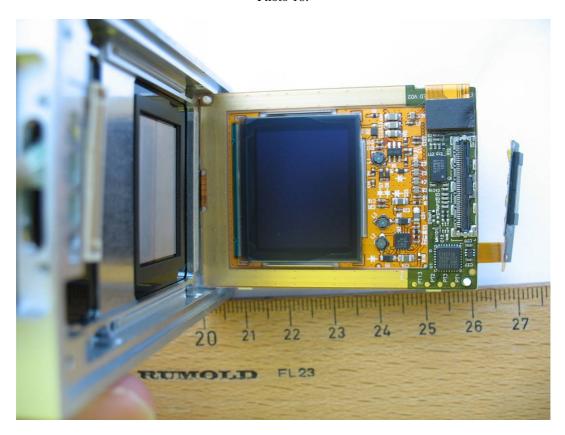


Photo 16:



2007-07-18 Page 47 of 47