





TEST REPORT

Test Report No.: 1-3296-01-03/11



Testing Laboratory

CETECOM ICT Services GmbH

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Accredited Test Laboratory:

The test laboratory is accredited according to:

DIN EN ISO/IEC 17025

DAkkS registration number: D-PL-12076-01-01

The area of testing is recognized by the FCC and IC.

Anechoic chamber registration no.: 90462 (FCC)

Anechoic chamber registration no.: 3462C-1 (IC)

Certification ID: DE 0001 (FCC)

Accreditation ID: DE 0002 (IC)

Applicant

Sagemcom

250, route de l Empereur

92848 Rueil-Malmaison cedex/FRANCE

Phone: +33 15 76 10 Contact: Bruno Pellet

e-mail: bruno.pellet@sagemcom.com

Manufacturer

Same as Applicant

Test Standard/s

47CFR15 2009-10 Subpart B - Unintentional Radiators

ICES-003, Issue 4 2004-02 Interference-Causing Equipment Standard Digital Apparatus

Test Item

Kind of test item:WiMax SystemModel name:SX682FCC ID:TVU-SX682

S/N serial number: S30853-S920-R301-9

HW hardware status: unknown SW software status: unknown

Power Supply: AC 115 V / 60 Hz



This test report is electronically signed and valid without handwritten signature. The public keys can be requested at the test laboratory to verify the electronic signatures.

Test performed:	Test Report authorised:

Jörg Langer

Uli Kraus



2011-07-14 Page 1 of 28



1 Table of contents

1	Table	of contents	2
2	Gene	ral information	3
	2.1	Notes	3
	2.2	Application details	3
3	Test	standard/s:	3
4	Test	Environment	3
5	Test	Laboratories sub-contracted	3
6	Inform	nation about Test Conditions	4
	6.1	Test Item	
	6.2 6.3	EUT: Type, S/N etc. and Short Descriptions Used in this Test Report	
	6.1	set-up(s)set-up(s) set-up(s) .	
	6.2	EUT operating modes	
7	Sumr	nary of Test Results	6
	7.1	Emission	
	7.2 7.3	Measurement and Test Set-up Measurement uncertainty	
8	_	led test results - Emission	
0			
	8.1 8.2	Conducted Emission Electromagnetic Radiated Emissions (Distance 10 m)	
9	Test	equipment and ancillaries used for tests	18
10	c	Observations	20
Anı	nex A:	Photographs of the test set-up	21
Anı	nex B:	Photographs of the EUT	24
Anı	nex C:	Document history	28
Anı	nex D:	Further information	28



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.

2.2 Application details

Date of receipt of order: 2011-04-11
Date of receipt of test item: 2011-07-12
Start of test: 2011-07-12
End of test: 2011-07-13

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

3 Test standard/s:

Test StandardVersionTest Standard Description47CFR152009-10Subpart B - Unintentional RadiatorsICES-003, Issue 42004-022Interference-Causing Equipment Standard Digital Apparatus

4 Test Environment

5 Test Laboratories sub-contracted

2011-07-14 Page 3 of 28



6 Information about Test Conditions

6.1 Test Item

Kind of test item :	WiMax System						
Type identification :	SX682	SX682					
Equipment classification:	Equipment for fixed use						
Environment classification:	Residential, commercial and	light industry					
Supply voltage :	AC 115 V/ 60 Hz						
Ports :	Description	Direction	Length				
(maximum cable lengths	AC power port Input > 3m						
declared by manufacturer)	Phone port	In / output	> 3m				
	Ethernet port	Ethernet port In / output > 3m					
Is mounting position / usual operating position defined? tabletop							
Additional information:							
The device contains radio parts	(FCC ID: TVU-SX682) which a	re not part of this test					

6.2 EUT: Type, S/N etc. and Short Descriptions Used in this Test Report

short descrip- tion*)	EUT	Туре	S/N serial number	HW hardware status	SW software status
EUT A	EUT A WiMax System		S30853-S920-R301-9	unknown	unknown
EUT B	EUT B Switching power supply		A002	unknown	unknown

^{*)} EUT short description is used to simplify the identification of the EUT in this test report.

2011-07-14 Page 4 of 28



6.3 Auxiliary Equipment (AE): Type, S/N etc. and Short Descriptions

AE descrip -tion*)	Auxiliary equipment	Туре	S/N serial number	HW hardware status	SW software status
AE A	Notebook	Sony Personal Computer PCG-382	28206051 5002204	C3LPH13M	Microsoft Windows Vista Home Premium
AE B	Ethernet switch	ProCurve switch 408	CN643RAoSD	-/-	-/-
AE C	Ethernet switch	POE FS108P	1DL16B330081E	-/-	-/-

^{*)} AE short description is used to simplify the identification of the auxiliary equipment in this test report.

6.1 set-up(s)

EUT set-up no.*)	Combination of EUT and AE	Remarks
Set. 1	EUT A+ EUT B + AE A + AE C	Test setup of conducted emission on mains
Set. 2	EUT A+ EUT B + AE A + AE B	Test setup of radiated emission

6.2 EUT operating modes

EUT operating mode no.*)	Description of operating modes	Additional information
op. 1	Data transfer	Data transfer 100 MBit/s and antenna port terminated with load

^{*)} EUT operating mode no. is used to simplify the test report.

2011-07-14 Page 5 of 28



7 Summary of	Test	Results
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No deviations from the technical specifications were ascertained
There were deviations from the technical specifications ascertained

7.1 Emission

7.1.1 Enclosure

EMI Phenomenon	Frequency range	Basic standard	Result
Radiated Interference Field Strength	30 - 1000 MHz	FCC Part 15 Class B	passed
Radiated Interference Field Strength	> 1 GHz	FCC Part 15 Class B	passed

7.1.2 AC Mains Power Input/Output Ports

EMI Phenomenon	Frequency range	Basic standard	Result	
Conducted interference voltage	0,15– 30 MHz	FCC Part 15 Class B	passed	

Remarks:

NA1	Not tested because not required by used standard
NA2	Test not applicable because port does not exists
NA3	Test not applicable because port only for services
NA4	Test not applicable because port lengths not longer than 3m
NA5	Not tested because not required by customer
NA6	Not tested because used frequency < 108 MHz

2011-07-14 Page 6 of 28



7.2 Measurement and Test Set-up

Note: The test configuration is in accordance with the requirements given in the standards in point 3

7.3 Measurement uncertainty

The uncertainty of the measurement equipment fulfils CISPR 16 and the related European and national standards.

The semi anechoic chamber fulfils the requirements of CISPR 16-1 (ANSI C63.4) for a test volume of 3m \varnothing .

Measurement uncertainty calculations are on file and available from the test laboratory upon request.

2011-07-14 Page 7 of 28



8 Detailed test results - Emission

8.1 Conducted Emission

8.1.1 Instrumentation for Test (see equipment list)

G 1	G 2	F 21									
-----	-----	------	--	--	--	--	--	--	--	--	--

8.1.2 Test Plan

EUT set-up	Set.1		
Operating mode	Port / Line	Limit	Result
Op.1	AC power line	FCC part 15 B Class B	passed

Remark: Powered by external power supply (115V / 60Hz)

8.1.3 Conducted Limits (Power-Line)

	FCC part 15	5 B Class B	FCC part 15 B Class A		
Frequency- range	Quasi-Peak (dBµV)	Average (dBµV)	Quasi-Peak (dBµV)	Average (dBµV)	
0,15 MHz – 0,5 MHz	66-56	56-46	79	66	
0,5 MHz -5 MHz	56	46	73	60	
5 MHz -30 MHz	60	50	73	60	

8.1.4 Calibration Information

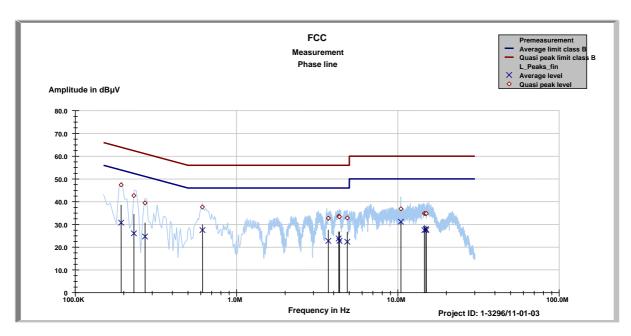
Device	Serial number	ICT Number	Calibration valid until	Calibration interval
HP 8542 EMI Receiver	3617A00170	300000568	01 / 2012	12 month
with RF Filter Unit				
VISN ESH 3-Z5	892475/017	300002209	01 / 2012	24 month

Remarks: All emission components and the shielded room were checked weekly Cable loss: 0.6 to 2.4 dB (150kHz to 30 MHz)

2011-07-14 Page 8 of 28



8.1.5 Test Results of Main



FCC Phase line tbl

Project ID: 1-3296/11-01-03

05:17:45 PM, Tuesday, July 12, 2011

Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dΒμV	dΒμV	dΒμV	dΒμV
0.19263	47.39	16.53	30.78	24.01
0.23102	42.67	19.74	26.06	27.62
0.27095	39.44	21.65	24.71	27.83
0.61501	37.66	18.34	27.51	18.49
3.7077	32.72	23.28	22.73	23.27
4.3015	33.63	22.37	23.79	22.21
4.3456	33.36	22.64	22.77	23.23
4.8589	32.86	23.14	22.37	23.63
10.4429	36.88	23.12	31.18	18.82
14.603	34.84	25.16	27.50	22.50
14.913	34.74	25.26	27.98	22.02
14.994	34.82	25.18	27.46	22.54

Project ID - 1-3296/11-01-03

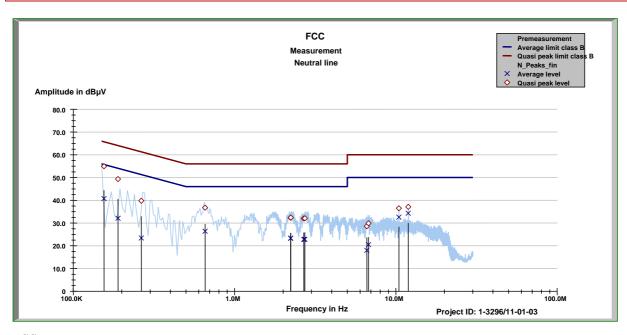
EUT - Sagem.com SX682 + switching power supply S018BU1200100

Serial Number - S30853-S920-R301-9 + R012167E-U (A002)

Operating mode - Data traffic 100 MBit/, analog phone port connected, Wi-max 50 R terminated

2011-07-14 Page 9 of 28





FCC Neutral line tbl

Project ID: 1-3296/11-01-03

05:17:45 PM, Tuesday, July 12, 2011

Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dΒμV	dΒμV	dΒμV	dΒμV
0.15518	54.95	10.77	40.73	15.12
0.18959	49.34	14.71	32.06	22.81
0.2644	39.76	21.53	23.40	29.33
0.65703	36.73	19.27	26.40	19.60
2.2261	32.32	23.68	23.27	22.73
2.2301	32.39	23.61	23.36	22.64
2.6872	31.97	24.03	22.80	23.20
2.7271	32.09	23.91	22.83	23.17
6.606	28.58	31.42	17.98	32.02
6.7676	29.89	30.11	20.48	29.52
10.442	36.50	23.50	32.56	17.44
11.9339	37.12	22.88	34.31	15.69

Project ID - 1-3296/11-01-03

EUT - Sagem.com SX682 + switching power supply S018BU1200100

 ${\tt Serial \ Number - S30853-S920-R301-9 + R012167E-U \ (A002)}$

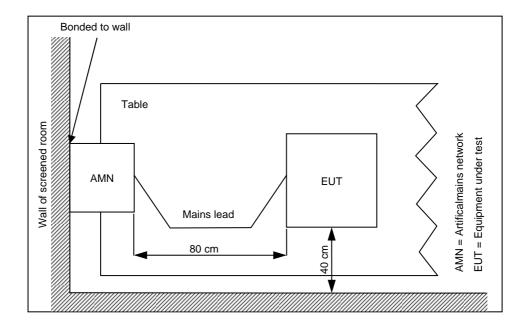
Operating mode - Data traffic 100MBit/, analog phone port connected, Wi-max 50R terminated

2011-07-14 Page 10 of 28



8.1.6 Test Set-up

According to EMC basic standard ANSI 63.4



2011-07-14 Page 11 of 28



8.2 Electromagnetic Radiated Emissions (Distance 10 m)

8.2.1 Instrumentation for Test (see equipment list)

F	1	F 2	F 4b	F 5	F6	F 7	F8	F 21		

8.2.2 Test Plan

EUT set-up	Set.2		
Operating mode	Application	Limit	Result
Op.1	Enclosure	FCC part 15 B Class B	passed

Remarks: Powered by external power supply (115V / 60Hz)

8.2.3 Radiated Limits

Frequency- range	FCC part 15 B Class B	FCC part 15 B Class A
30 MHz – 88 MHz	30 dBµV/m	39,1 dBµV/m
88 MHz – 216 MHz	33,5 dBµV/m	43,5 dBµV/m
216 MHz – 960 MHz	36 dBµV/m	46,4 dBµV/m
960 MHz – 40000 MHz	44 dBμV/m	49,5 dBµV/m
	* This values are recalculated from the	•
	class B limits at 3 m antenna distance in	
	§15.109 (g 2) of the FCC rules	

8.2.4 Calibration Information

Device	Serial number	ICT Number	Calibration valid until	Calibration interval	
ESCI 3 Receiver	100083/003	300003312	03/2012	12 month	
Trilog Antenna	9163-295	300003787	04/2012	24 month	

Remarks:

System check of all relevant devices and the chamber (weekly)

Cable loss: 0.5 to 4.2 dB (30 MHz to 2 GHz); the cable and connectors loss is re-measured every 3 month

2011-07-14 Page 12 of 28



8.2.5 Test Results

CETECOM ICT Services GmbH

Common Information

EUT: Sagemcom SX682 + switching power supply S018BU1200100

Serial Number: S30853-S920-R301-9 + R012167E-U (A002)

Test Description: FCC part 15b @ 10m < 1GHz

Operating Conditions: Data traffic 100MBit/s, analog phone port connected, Wi-max 50R

Operator Name: Langer

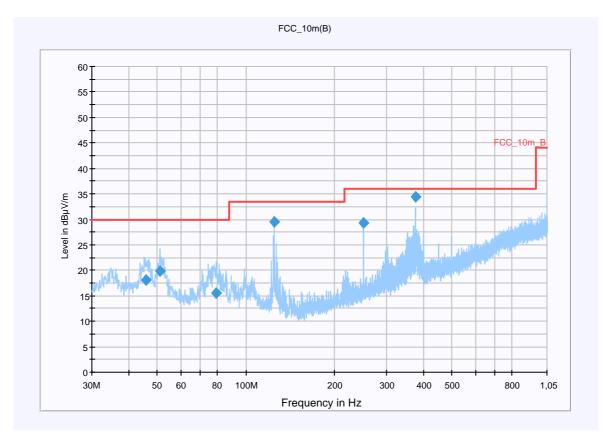
Comment: 115VAC/60Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)

Level Unit: dBµV/m

SubrangeDetectorsIF BandwidthMeas. TimeReceiver30 MHz - 2 GHzQuasiPeak120 kHz15 sReceiver



Final Result 1

i illai ives	uit i									
Frequency	QuasiPeak	Meas.	Bandwidth	Antenna	Polarity	Turntable	Corr.	Margin	Limit	Comment
(MHz)	(dBµV/m)	Time	(kHz)	height		position	(dB)	(dB)	(dBµV/m)	
		(ms)		(cm)		(deg)				
45.708300	18.0	15000.000	120.000	198.0	٧	46.0	13.3	12.0	30.0	
51.018900	20.0	15000.000	120.000	98.0	V	314.0	13.3	10.0	30.0	
79.244100	15.5	15000.000	120.000	237.0	V	183.0	9.1	14.5	30.0	
125.030700	29.5	15000.000	120.000	135.0	٧	219.0	9.8	4.0	33.5	
250.016400	29.4	15000.000	120.000	98.0	V	176.0	13.3	6.6	36.0	
375.008100	34.3	15000.000	120.000	98.0	V	151.0	16.5	1.7	36.0	

2011-07-14 Page 13 of 28



8.2.6 Hardware Set-up

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]

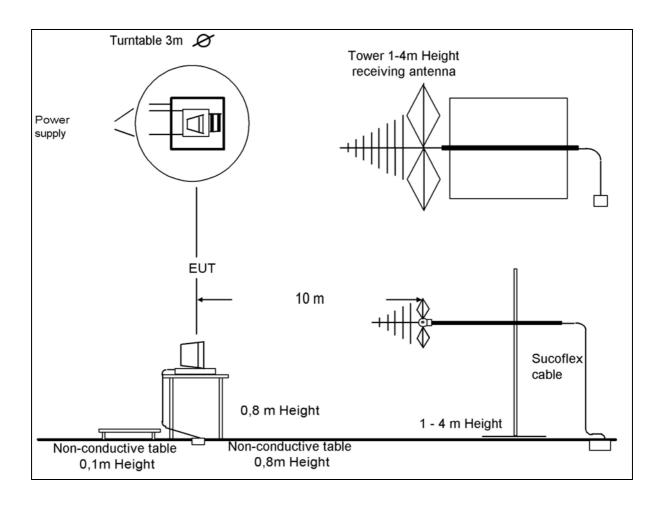
@ GPIB0 (ADR 8), FW REV 3.12

Turntable: Turntable [EMCO Turntable]

@ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.10.00

8.2.7 Test Set-up



2011-07-14 Page 14 of 28



8.2.8 Electromagnetic Radiated Emissions (Distance 5 m)

8.2.8.1 Instrumentation for Test (see equipment list)

|--|

8.2.8.2 Test Plan

EUT set-up	Set.2					
Operating mode	Application	Limit	Result			
Op.1	Enclosure	FCC part 15 B Class B	passed			

Remarks:	The measured values are recalculated from 5m to 3m distance
	Powered by external power supply (115V / 60Hz)

8.2.8.3 Radiated Limits

Frequency- range	47CFR15: (FCC part 15 B) Class B	47CFR15: (FCC part 15 B) Class A *
30 MHz – 88 MHz	40 dBμV/m	49,1 dBµV/m
88 MHz – 216 MHz	43,5 dBµV/m	53,5 dBµV/m
216 MHz – 960 MHz	46 dBµV/m	56,4 dBµV/m
960 MHz – 18000 MHz	54 dBµV/m	59,5 dBμV/m
		* This values are recalculated from the
		class A limits at 10 m antenna distance in
		§15.109 (g 2) of the FCC rules.

8.2.8.4 Calibration Information

Device	Serial number	ICT Number	Calibration valid until	Calibration interval
FSU 26	200809	300003874	01/2012	12 month
Horn Antenna	9120B188	300003896	04/2012	24 month

Remarks:

System check of all relevant devices and the chamber (weekly)

Cable loss: 0.5 to 4.2 dB (30 MHz to 2 GHz); the cable and connectors loss is re-measured every 3 month

2011-07-14 Page 15 of 28



8.2.8.5 Test Results

CETECOM ICT Services GmbH

Common Information

EUT: Sagemcom SX682 + switching power supply S018BU1200100

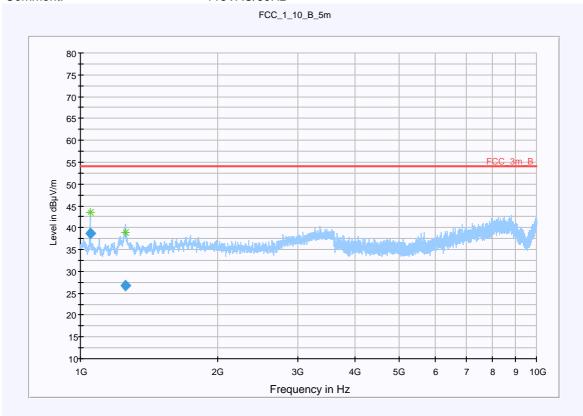
Serial Number: S30853-S920-R301-9 + R012167E-U (A002)

Test Description: FCC part 15b @ 5m > 1GHz

Operating Conditions: Data traffic 100MBit/, analog phone port connected, Wi-max 50R

Operator Name: Langer

Comment: 115VAC/60Hz



Final Result 1

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
1050.000659	38.8	100.000	1000.000	100.0	Н	274.0	-5.2	15.2	54.0	
1252.806507	26.8	100.000	1000.000	100.0	٧	185.0	-2.4	27.2	54.0	

2011-07-14 Page 16 of 28



8.2.8.6 Hardware Set-up

Subrange 1

Frequency Range: 1 GHz - 10 GHz

Receiver: ESU [ESU 26]

@ GPIB0 (ADR 17), SN 100037/026, FW 4.43

Signal Path: 1_6_EN

FW 1.0

Correction Table: 3_5m

Correction Table: LNA_EN (matix)

Antenna: BBHA 9120 B

Correction Table (vertical): BBHA9120 Correction Table (horizontal): BBHA9120 Correction Table: Cable_Horn_EN (1103)

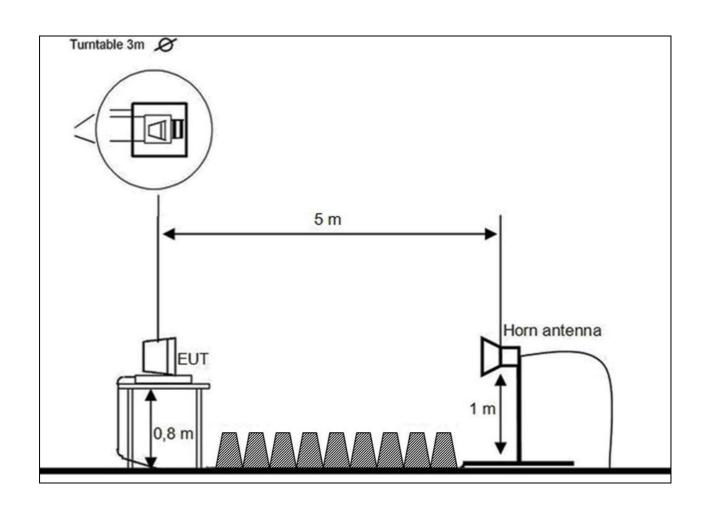
Antenna Tower: Generic Tripod [Generic Tripod]

@ GPIB0 (ADR 19), SN?

Turntable: Turntable [EMCO Turntable]

@ GPIB0 (ADR 9), FW REV 3.12

8.2.8.7 Test Set-up



2011-07-14 Page 17 of 28



9 Test equipment and ancillaries used for tests

To simplify the identification of the test equipment and/or ancillaries which were used, the reporting of the relevant test cases only refer to the test item number as specified in the table below.

No.	Instrument/Ancillary Manufacturer Type		Serial-No.	Internal identification			
	Radiated emission in chamber F						
F-1	Control Computer	F+W	FW0502032		300003303		
F-2	Trilog-Antenna	Schwarzbeck	VULB 9163	9163-295			
F-3a	Amplifier	Veritech Microwave Inc.	0518C-138	-/-	-/-		
F-4b	Switch	HP	3488A	-/-	300000368		
F-5	EMI Test receiver	R&S	ESCI	100083	300003312		
F-6	Turntable Interface-Box	EMCO / ETS- LINDGREN	Model 105637	44583	300003747		
F-7	Tower/Turntable Controller	EMCO / ETS- LINDGREN	Model 2090	64672	300003746		
F-8	Tower	EMCO / ETS- LINDGREN	Model 2175	64762	300003745		
F-9	Ultra Notch-Filter Rejected band Ch. 62	WRCD		9			
	Radiated immunity in c	hamber F					
F-10	Control Computer	F+W		FW0502032	300003303		
F-11	Signal Generator	R&S	SML 03	102519	300003407		
F-12	RF-Amplifier	ar	100W1000 M1	12951	300000529		
F-13	Directional Coupler	ar	DC 3010	12708	300001428		
F-14	Stacked Logper Antenna	Schwarzbeck	STLP9128 E	9128 E 013	300003408		
F-15	RF-Amplifier	ar	60S1G3	313649	300003410		
F-15b	RF-Amplifier 0.8 – 4 GHz	BONN	BLMA 0840-2000/100D	076820B	300003783		
F-16	Directional Coupler	ar	DC7144A	312786	300003411		
F-17	Horn Antenna	ar	AT 4002	19739	300000633		
F-18	Power Meter	R&S	NRV	860327/024	F033		
F-19	Power sensor	R&S	URV5-Z2	839080/005	300002844.02		
F-20	Power sensor	R&S	URV5-Z2	830755/057	F032		
	Harmonics and flicker i	n front of chambe	<u>r F</u>				
F-21	Flicker and Harmonics Test System	Spitzenberger & Spies	PHE4500/B I PHE4500/B II	B5983 B5984	300000210		
F-28	Power Supply	Hewlett Packard	6032 A	2920 A 04466	300000580		
	Radiated emission in chamber F > 1GHz						
F-29	Horn antenna	Schwarzbeck	BBHA 9120 B 9120B18		300003896		
F-30	Amplifier	ProNova	0518C-138	005	F 024		
F-31	Amplifier	Miteq	42-00502650-28-5A	1103782	300003379		
F-32	Horn antenna	Emco	3115	9709-5289	300000213		
F-33	Spectrum Analyzer	ectrum Analyzer R&S ESU26		100037	300003555		
F-34	Loop antenna	EMCO	6502	8905-2342	300000256		

2011-07-14 Page 18 of 28



No.	Instrument/Ancillary	Manufacturer	Туре	Serial-No.	Internal identification
	Conducted emission in	chamber G			
G-1	EMI Receiver	Hewlett Packard	8542 E	3617A0017 0	300000568
G-2	V-ISN	Rohde & Schwarz	ESH 3-Z5	892475/017	300002209
G-2a	V-ISN	Rohde & Schwarz	ESH 2-Z5	892602/024	300000587
G-3	2-Wire ISN	Schaffner	ISN T200	19075	300003422
G-4	4-Wire ISN	Schaffner	ISN T400	22325	300003423
G-5	Shielded wire ISN	Schaffner	ISN ST08	22583	300003433
G-6	Unshielded 8 wire ISN	Teseq	ISN T800	26113	300003833
G-7	Unshielded 8 wire ISN	Teseq	ISN T8-Cat. 6	26374	300003851
G-8	RF Current probe	FCC	F-33-4	46	300003257
G-9	V-ISN	Schaffner	ISN PLC-150	21579	300003318
G-10	V-ISN	Schaffner	ISN PLC-25-30	21584	300003319
G	PLC Filter	TESEQ	Filter PLC	23436	300003598
10a		·			
G 10b	Coupling unit 75 Ohm	Fiedler	AC		300003272.04
	Conducted immunity in	chamber G			
G-11	Signal generator	R&S	SMG	8610647025	300000204.01
G-12	RF-Amplifier	BONN	BSA 0125-75	066502-01	300003545
G-13	Power Meter	R&S	URV 5	837723/025	300002844.01
G-14	Power Sensor	R&S	URV 5-Z2	832874/021	300002239
G-15	Directional coupler	emv	DC 2000	9401-1677	300000592
G-16	Attenuator 6dB	Alan	50HP6-100 N	121048 0348	300003148
G-17	EM-Injection Clamp	FCC	203i	232	300000626
G-18	CDN	FCC	FCC-801-M3-16	237	300000627
G-19	CDN	FCC	FCC-801-T2	78	300000629
G-20	CDN	FCC	FCC-801-AF 2	62	300000630
G-21	CDN	FCC	FCC-801-AF 4	61	300000631
G-22	CDN	FCC	FCC-801-M1	2027	300002761
G-23	CDN	Lüthi	CDN 801-M2/M3	9350105	300000534
G-24	Transformator for 50Hz Loop Antenna	EM-Test	MC2630	0200-10	300002659.01
G-25	50Hz Loop Antenna	EM-Test	MS 100	none	300002659
	Surge, Burst, Dips and I				
G-26	Hybrid-Generator	EM-Test	UCS 500M6	0399-07	300002599
G-27	Motor Variac	EM-Test	MV 2616	0600-01	300002658
G-28	Capacitive Coupling Clamp	MWB	KKS 100		300000589
G-29	Coupling Decoupling Network	EMC-Partner	CDN-UTP	00014	300003226
	ESD in chamber G	Ta	Tuga (==	Taba	T
G-30	ESD generator	Schaffner	NSG 435	308	300002249
G-31	Emission on bench in ch Absorbing Clamp	namber G R&S	MDS-21	832 231/006	300000527
G-91	Absoluting Claimp	ιλαδ	ואוטט-ע ו	032 23 1/000	300000321

2011-07-14 Page 19 of 28



10 Observations

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

2011-07-14 Page 20 of 28

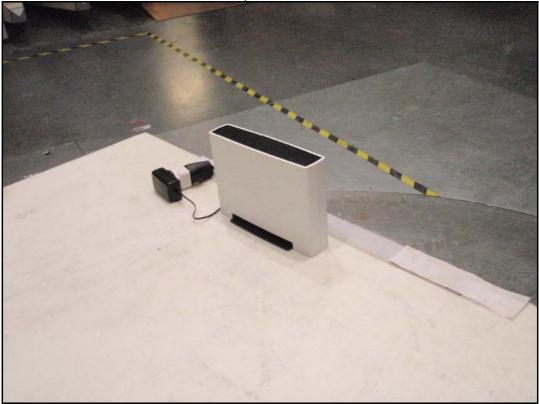


Annex A: Photographs of the test set-up



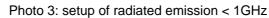


Photo 2: setup of radiated emission



2011-07-14 Page 21 of 28





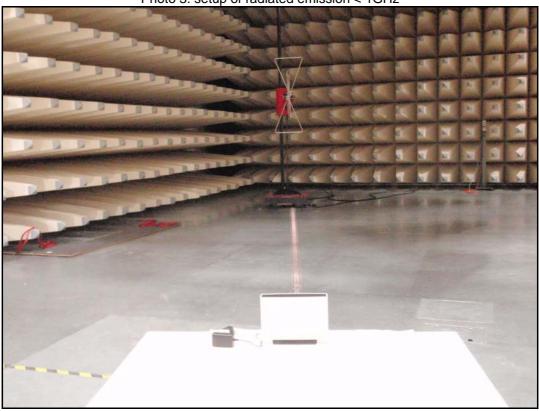


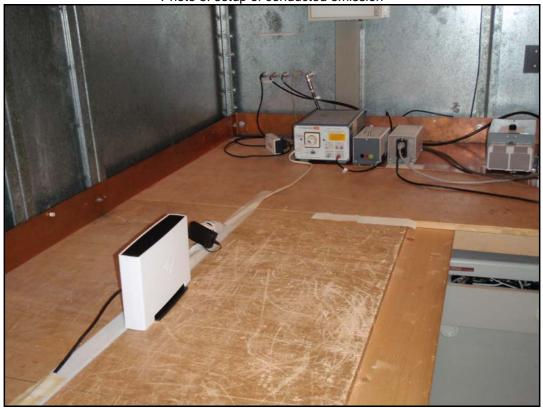
Photo 4: setup of radiated emission > 1 GHz



2011-07-14 Page 22 of 28



Photo 5: setup of conducted emission







2011-07-14 Page 23 of 28

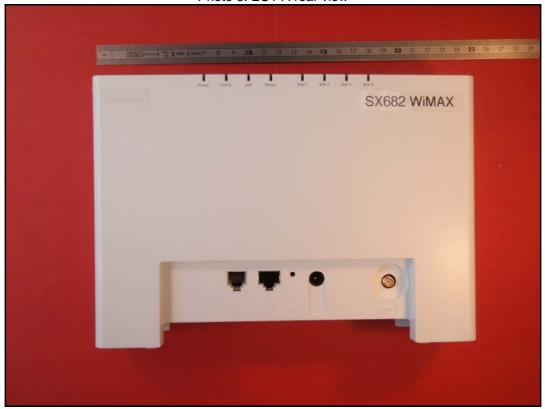


Annex B: Photographs of the EUT





Photo 8: EUT A rear view



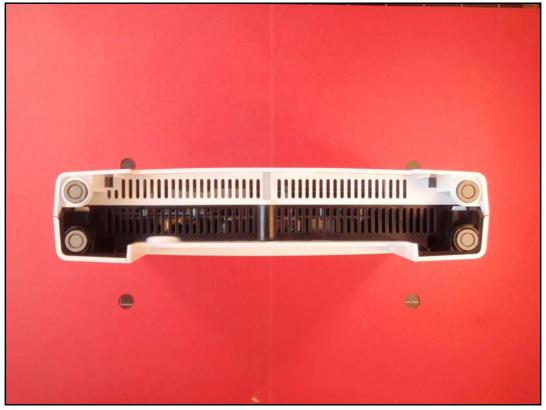
2011-07-14 Page 24 of 28



Photo 9: EUT A top view



Photo 10: EUT A bottom view



2011-07-14 Page 25 of 28





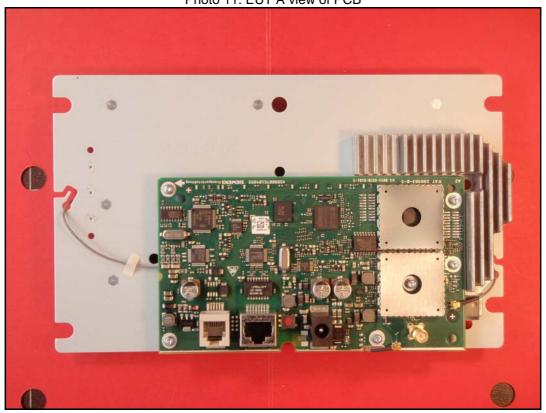
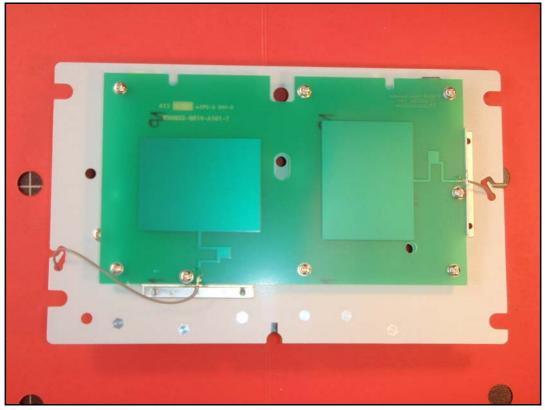


Photo 12: EUT A view of PCB



2011-07-14 Page 26 of 28



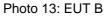




Photo 14: detail view of label



2011-07-14 Page 27 of 28



Annex C: Document history

Version	Applied changes	Date of release
	Initial release	2011-07-14

Annex D: Further information

Glossary

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

2011-07-14 Page 28 of 28