

TEST REPORT

Test report no.: 1-6965/13-20-09



Deutsche
Akkreditierungsstelle
D-PL-12076-01-01

Testing Laboratory

CETECOM ICT Services GmbH

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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 Communications & EMC (RCE)

Applicant

Sony Mobile Communications AB

Nya Vattentorget

22188 Lund/SWEDEN

Phone: +46 46 19 30 00

Fax: -/-

Contact: Mikael Nilsson

e-mail: Micke.nilsson@sonymobile.com

Phone: +46 7 03 22 75 03

Manufacturer

Sony Mobile Communications AB

Nya Vattentorget

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

Kind of test item:

Smart Phone GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDD/III/V/VIII; LTE FDD2/3/4/7/13; CDMA 2K BC0/BC1; WLAN b/g/n/a/ac; BT 4.0; RFID; A-GPS

Model name:

PY7PM-0742

Frequency [MHz]:

-/-

Technology tested:

Computer periphery device

Antenna:

Integrated antenna

Power Supply:

4.2V DC by Li - polymer battery

Temperature Range:

-30°C to +50°C

This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Test report authorised:

cn=Stefan Boes, o=CETECOM ICT Services GmbH, ou=BOE-111011, email=Stefan.Boes@cetecom.com, c=DE 2014.06.11 14:12:35 +02'00'

Stefan Bös
Senior Testing Manager

Test performed:

cn=Marco Bertolino, o=CETECOM ICT Services GmbH, ou=BTL-100826, email=marco.bertolino@cetecom.com, c=DE 2014.06.11 16:07:33 +02'00'

Marco Bertolino
Testing Manager

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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.

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

2.2 Application details

Date of receipt of order:	2014-05-19
Date of receipt of test item:	2014-05-22
Start of test:	2014-06-02
End of test:	2014-06-03
Person(s) present during the test:	-/-

3 Test standard/s

Test Standard	Date	Test Standard Description
47 CFR Part 15	-/-	Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices

4 Test environment

Temperature:	T_{nom}	+22 °C during room temperature tests
	T_{max}	+50 °C during high temperature tests
	T_{min}	-30 °C during low temperature tests
Relative humidity:		47 %
Air pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	4.2 V DC by Li - polymer battery
	V_{max}	4.2 V
	V_{min}	3.3 V

5 Test item

Kind of test item :	Smart Phone GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDDI/III/V/VIII; LTE FDD2/3/4/7/13; CDMA 2K BC0/BC1; WLAN b/g/n/a/ac; BT 4.0; RFID; A-GPS
S/N serial number :	Radiated units: CB5A1Z1Y84;CB5A1Z1Y3T
HW hardware status :	RP3.0
SW software status :	23.0.E.0.21
Antenna :	Integrated antenna
Power Supply :	4.2 V DC by Li - polymer battery
Temperature Range :	-30°C to +50 °C

5.1 Additional information

Test setup- and EUT-photos are included in test report: 1-6965/13-20-01_AnnexA
1-6965/13-20-01_AnnexB
1-6965/13-20-01_AnnexG

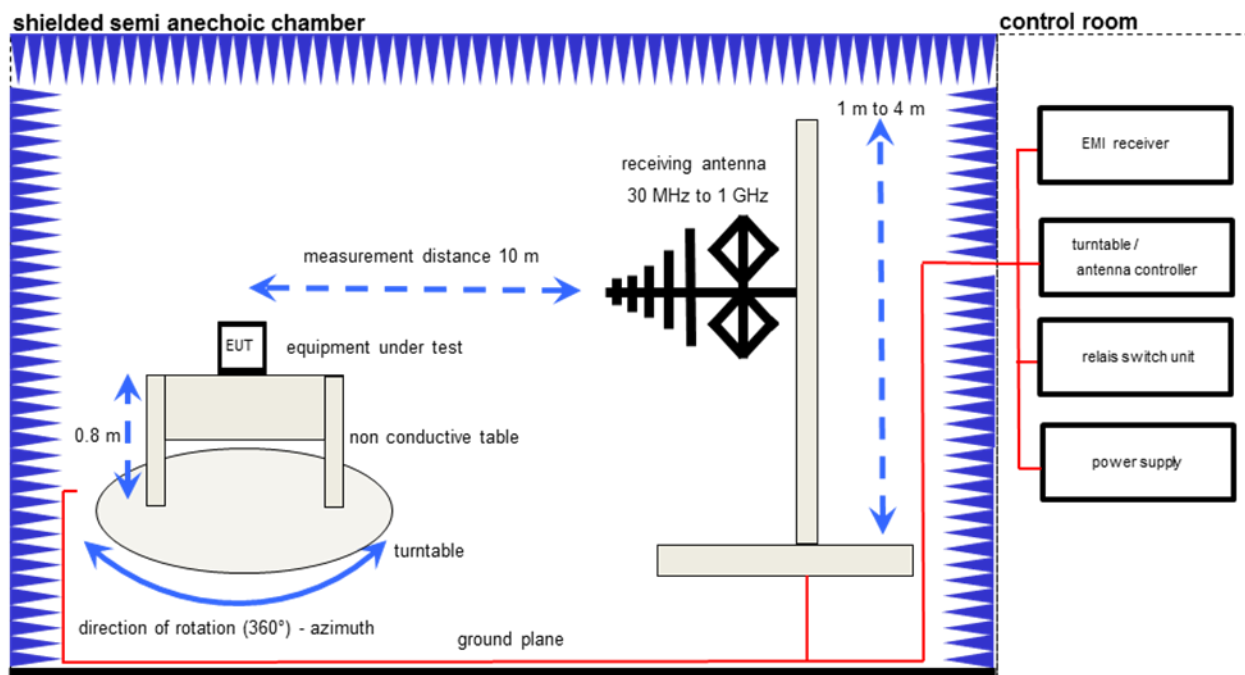
6 Test laboratories sub-contracted

None

7 Description of the test setup

7.1 Radiated measurements chamber F

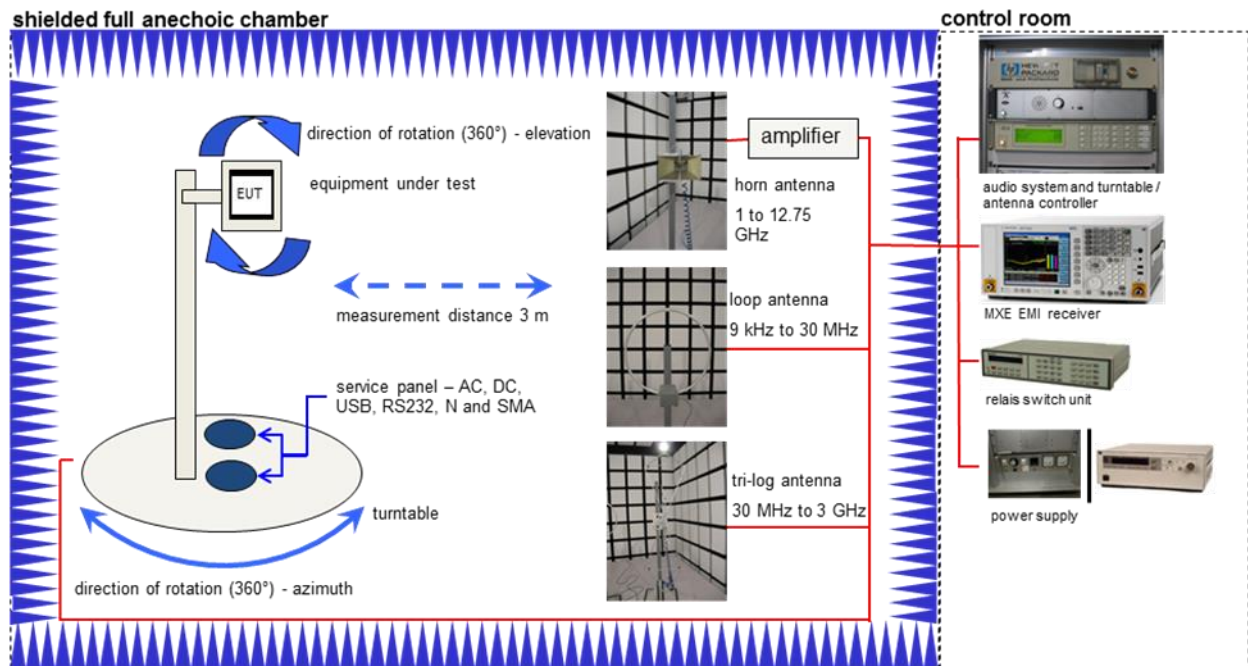
The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63. 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.



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368
DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580
EMI Test Receiver	ESCI 3	R&S	100083	300003312
Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379
Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745
Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746
Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747
TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787

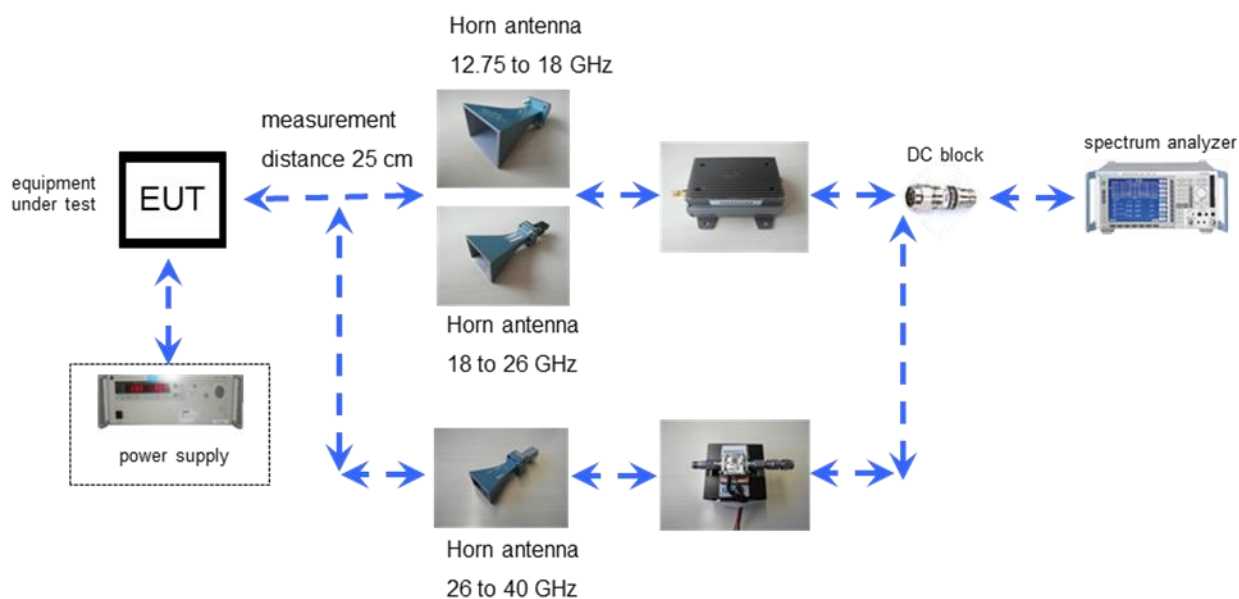
7.2 Radiated measurements chamber C



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405
TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854
Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351
Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789
Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032
Active Loop Antenna	6502	EMCO	8905-2342	300000256
Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996
Switch / Control Unit	3488A	HP Meßtechnik	*	300000199
Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156
Isolating Transformer	MPL IEC625 Bus Regeltrenntravo	Erfi	91350	300001155
Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997
Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143

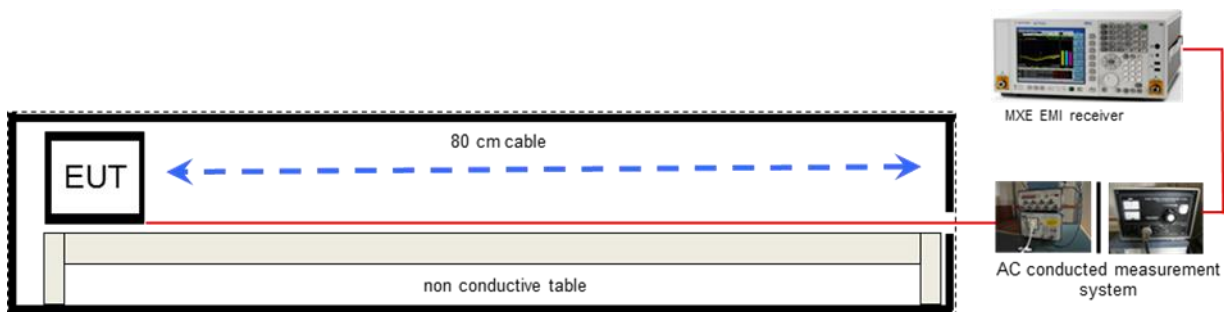
7.3 Radiated measurements 12.75 GHz to 40 GHz



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda	8402	300000787
Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	8205	300002442
Std. Gain Horn Antenna 26.5-40.0 GHz	637	Narda	GB42110541	300000510
Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268
Broadband Low Noise Amplifier 18-50 GHz	CBL18503070-XX	CERNEX	19338	300004273
Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443
Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517

7.4 AC conducted



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405
Isolating Transformer	MPL IEC625 Bus Regeltrenntravo	Erft	91350	300001155
Switch / Control Unit	3488A	HP Meßtechnik	*	300000199
Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001168
Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210

8 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 15.107, 15.109 ANSI C63.4, ICES-003 Issue 5	passed	2014-06-11	-/-

8.1 Receiver

Test case	temperature conditions	power source voltages	Pass	Fail	NA	NP	Remark
JBP spurious emissions conducted (AC)	Nominal	Nominal	☒	☐	☐	☐	-/-
JBP spurious emissions radiated	Nominal	Nominal	☒	☐	☐	☐	-/-

Note: NA = Not applicable; NP = Not performed

9 Measurement results

9.1 Spurious emissions conducted (AC)

Description:

Both power lines, phase and neutral line, are measured. Found peaks are remeasured with average and quasi peak detection to show compliance to the limits.

Measurement:

Measurement parameter	
Detector:	Peak - Quasi Peak / Average
Sweep time:	Auto
Video bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Resolution bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace-Mode:	Max Hold

Limits:

FCC		-/-
Spurious emissions conducted < 30 MHz		
Frequency (MHz)	Quasi-Peak (dBμV/m)	Average (dBμV/m)
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30.0	60	50

*Decreases with the logarithm of the frequency

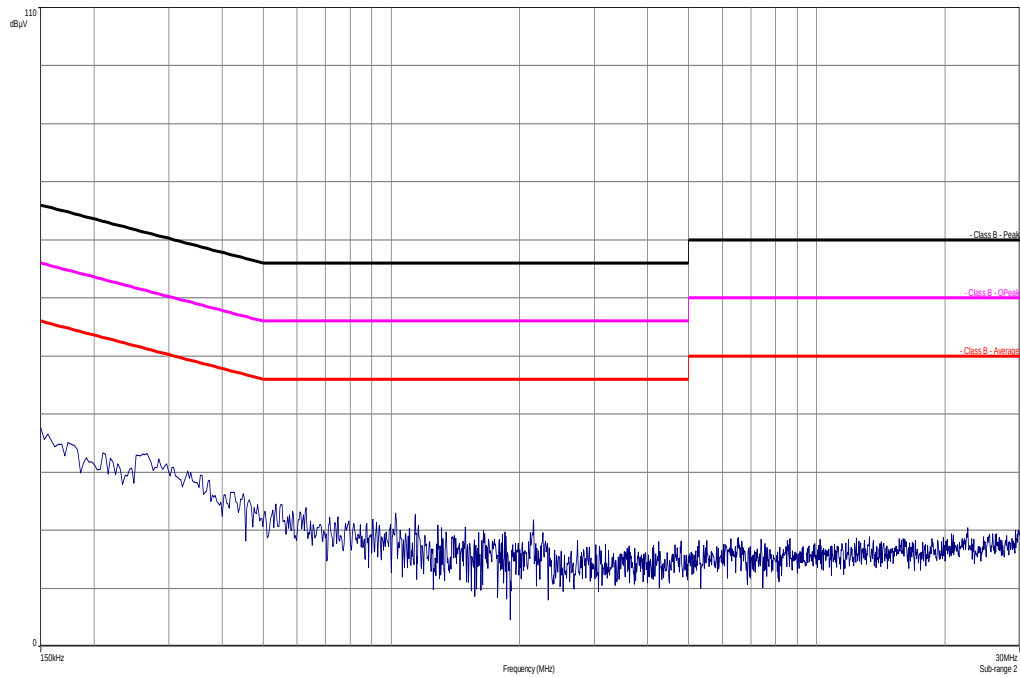
Result:

Spurious emissions conducted < 30 MHz [dBμV/m]		
F [MHz]	Detector	Level [dBμV/m]
No spurious emissions detected!		
Measurement uncertainty	± 3 dB	

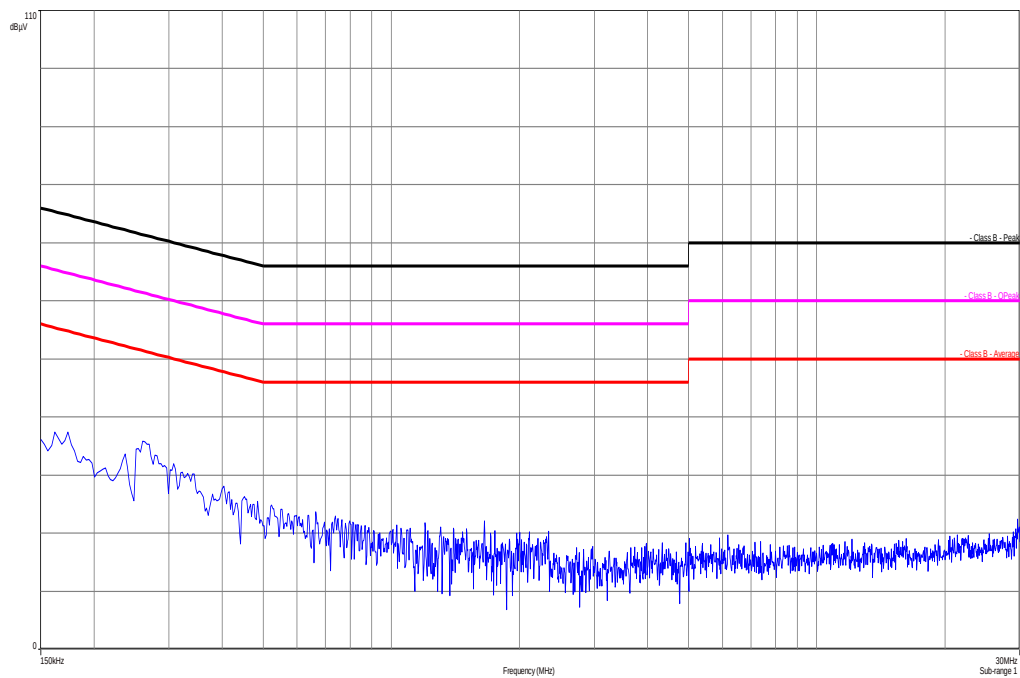
Result: Passed

Plots:

Plot 1: 150 kHz to 30 MHz, phase line



Plot 2: 150 kHz to 30 MHz, neutral line



9.2 Spurious emissions radiated

Description:

The measurement was performed in worst case. The EUT was not connected to the CMU 200. So the EUT performs a network search. In this mode all oscillators are active.

Measurement:

Measurement parameters	
Detector:	Below 1 GHz Peak / QuasiPeak Above 1 GHz Peak / Average
Sweep time:	2 sec
Video bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Resolution bandwidth:	1 MHz
Span:	100 MHz Steps
Trace-Mode:	Max Hold

Limits:

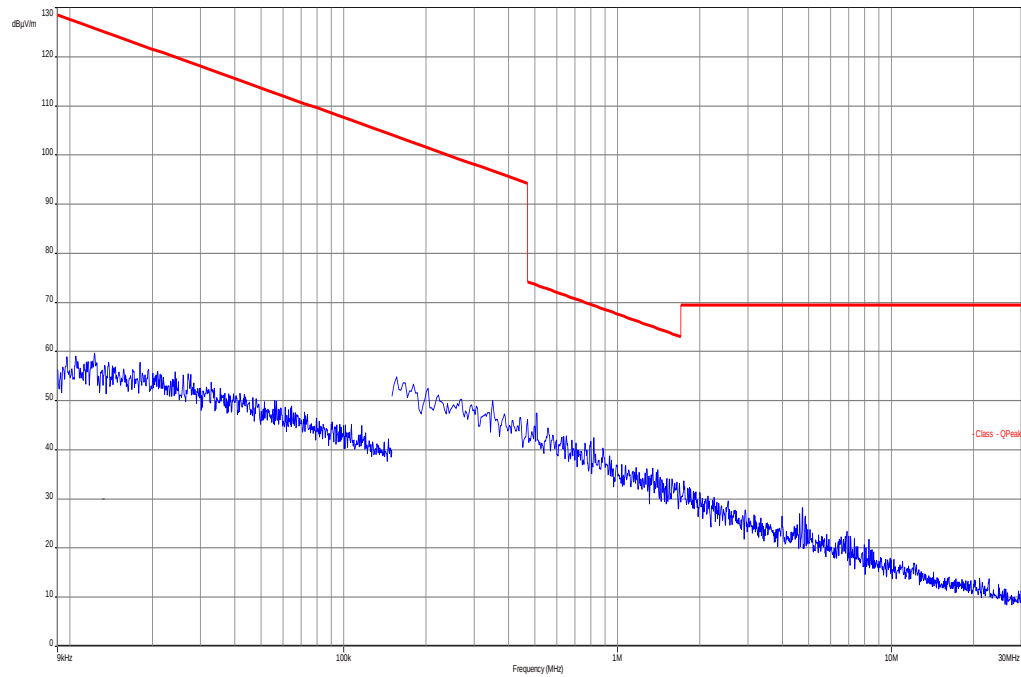
FCC		-/-
Spurious emissions radiated		
Frequency (MHz)	Field Strength (dB μ V/m)	Measurement distance (m)
30 – 88	30.0	10
88 - 216	33.5	10
216 – 960	36.0	10
Above 960	54.0	3

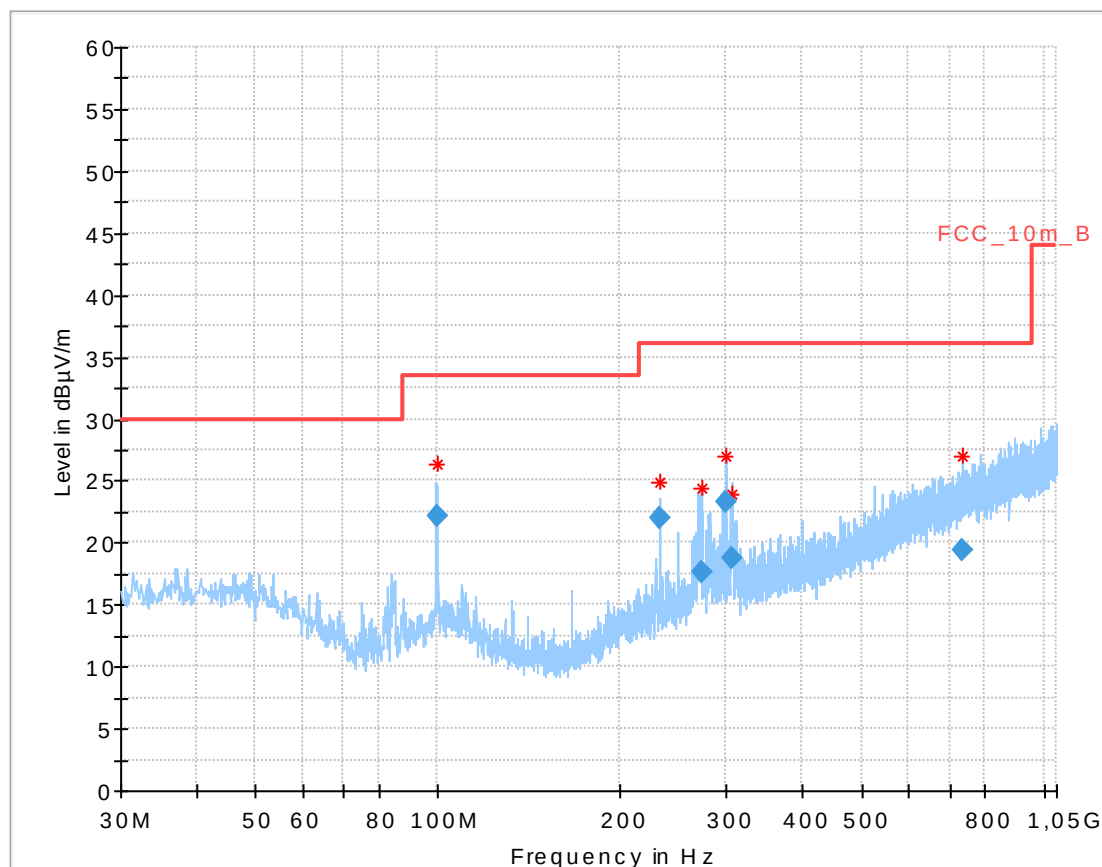
Results:

Spurious emission level (dB μ V/m)		
Frequency (MHz)	Detector	Level (dB μ V/m)
For emission below 1 GHz, please take a look at the table below the 1 GHz plot.		
All detected peak emissions are below the average limit!		
Measurement uncertainty		$\pm$ 3dB

Result: **Passed**

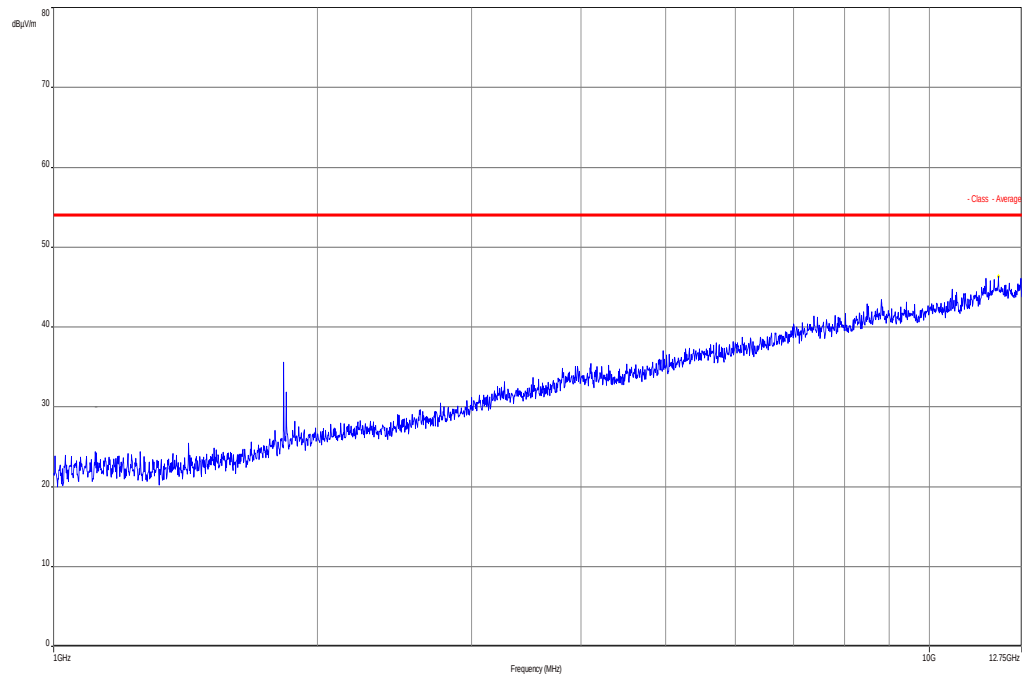
Note: The limit was recalculated with 20 dB / decade (Part 15.31) for all radiated spurious emissions 30 MHz to 1 GHz from 3 meter limit to a 10 meter distance. (40dB/decade for emissions < 30MHz)

Plots:**Plot 1:** Receiver mode up to 30 MHz

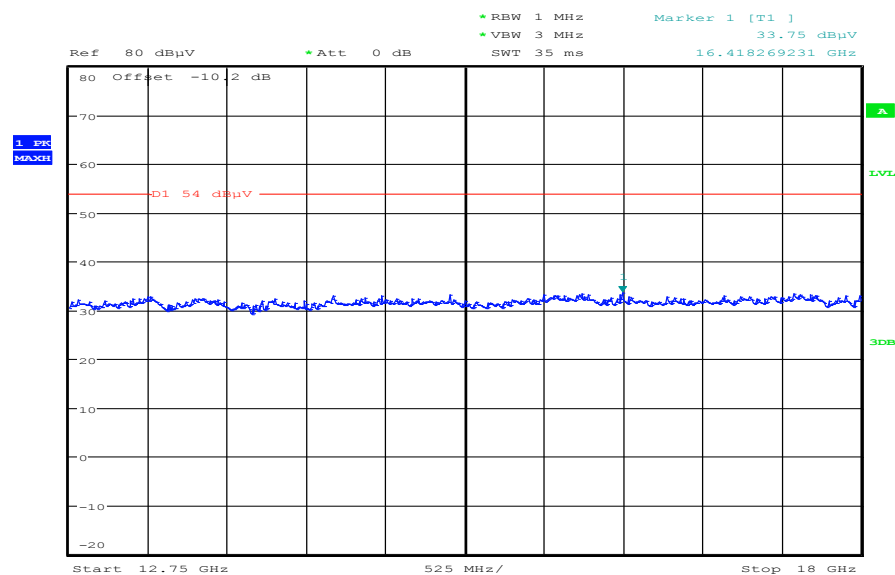
Plot 2: Receiver mode 30 MHz to 1 GHz**Final result:**

Frequency (MHz)	Quasi Peak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
99.675600	22.08	33.50	11.42	1000.0	120.000	115.0	V	190.0	12.1
232.799250	22.02	36.00	13.98	1000.0	120.000	170.0	V	178.0	12.8
272.083950	17.60	36.00	18.40	1000.0	120.000	98.0	V	183.0	13.9
299.295750	23.28	36.00	12.72	1000.0	120.000	101.0	V	170.0	14.4
304.756650	18.84	36.00	17.16	1000.0	120.000	101.0	V	100.0	14.6
734.738400	19.37	36.00	16.63	1000.0	120.000	170.0	V	183.0	22.3

Plot 3: Receiver mode 1 GHz to 12.75 GHz

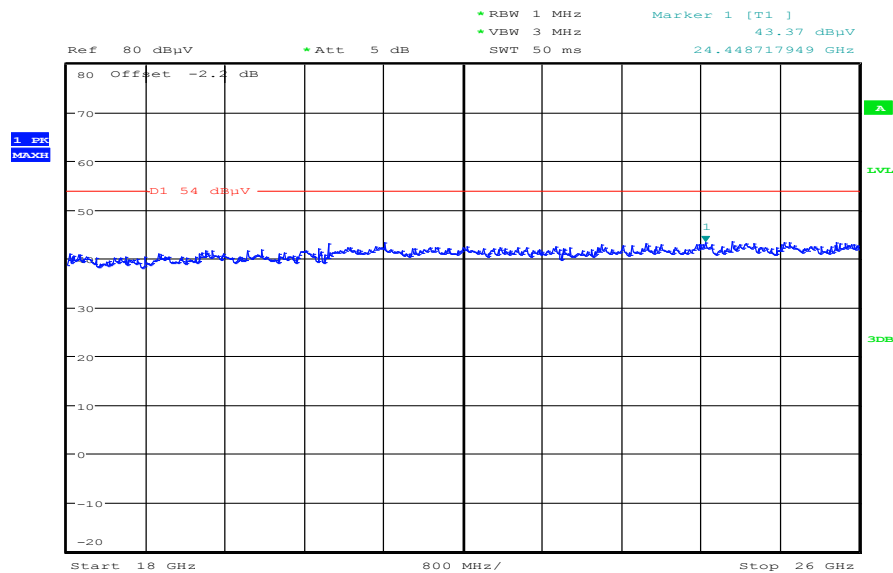


Plot 4: Receiver mode 12.75 GHz to 18 GHz



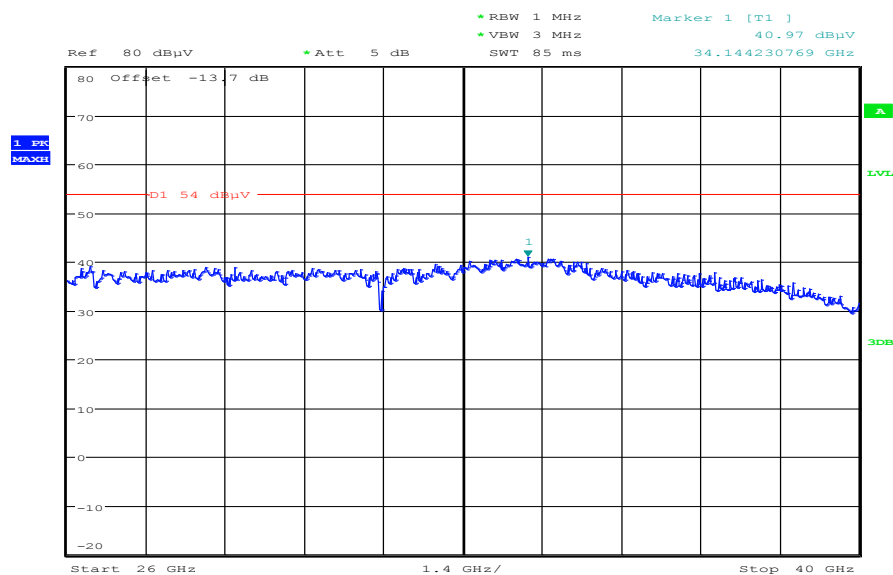
Date: 28.MAY.2014 12:03:00

Plot 5: Receiver mode 18 GHz to 26 GHz



Date: 28.MAY.2014 13:47:49

Plot 6: Receiver mode 26 GHz to 40 GHz



Date: 3.JUN.2014 07:22:06

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 (Lab/Item).

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
2	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	ne		
3	n. a.	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	27.01.2014	27.01.2015
4	n. a.	Funkstörmesse mpfänger 20Hz- 26,5GHz	ESU26	R&S	100037	300003555	k	28.02.2014	28.02.2015
5	n. a.	Antenna Tower	Model 2175	ETS- LINDGREN	64762	300003745	izw		
6	n. a.	Positioning Controller	Model 2090	ETS- LINDGREN	64672	300003746	izw		
7	n. a.	Turntable Interface-Box	Model 105637	ETS- LINDGREN	44583	300003747	izw		
8	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbe ck	295	300003787	k	22.04.2014	22.04.2016
9	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	12.01.2012	12.01.2015
10	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	08.05.2013	08.05.2015
11	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
12	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	*	300000199	ne		
13	9	Isolating Transformer	MPL IEC625 Bus Regeltrennt ravo	Erfi	91350	300001155	ne		
14	90	Active Loop Antenna 10 kHz to 30 MHz	6502	Kontron Psychotech	8905-2342	300000256	k	13.06.2013	13.06.2015
15	n. a.	Amplifier	js42- 00502650- 28-5a	Parzich GMBH	928979	300003143	ne		
16	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbe ck	371	300003854	vIKI!	14.10.2011	14.10.2014
17	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologi es	MY51210197	300004405	k	13.03.2014	13.03.2015
18	11b	Microwave System Amplifier, 0,5- 26,5 GHz	83017A	HP Meßtechnik	00419	300002268	ev		
19	A026	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda	8402	300000787	k	22.07.2013	22.07.2015
20	A029	Std. Gain Horn Antenna 18.0 to 26,5 GHz	638	Narda	8205	300002442	k	19.07.2013	19.07.2015
21	A031	Std. Gain Horn Antenna 26,5 to 40,0 GHz	637	Narda		300000510	k	19.07.2013	19.07.2015
22	n. a.	Spectrum	FSU50	R&S	200012	300003443	Ve	09.10.2012	09.10.2014

		Analyzer 20 Hz - 50 GHz							
23	n. a.	Broadband Low Noise Amplifier 18-50 GHz	CBL18503 070-XX	CERNEX	19338	300004273	ne		

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
vlk!	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.

Annex A Document history

Version	Applied changes	Date of release
	Initial release	2014-06-11

Annex B 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 C Accreditation Certificate

Front side of certificate

Back side of certificate



Deutsche Akkreditierungsstelle GmbH

Befehlens gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleG8V
Unterzeichnerin der Multilateralen Abkommen
von EA, ILAC und IAF zur gegenseitigen Anerkennung

Akkreditierung



Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

CETECOM ICT Services GmbH
Unterrichterstraße 6-10, 66117 Saarbrücken

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen:

Drahtgebundene Kommunikation einschließlich xDSL

VoIP und DECT

Akustik

Funk einschließlich WLAN

Short Range Devices (SRD)

RFID

WiMax und Richtfunk

Mobilfunk (GSM / DCS, Over the Air (OTA) Performance)

Elektromagnetische Verträglichkeit (EMV) einschließlich Automotive

Produktsicherheit

SAR und Hearing Aid Compatibility (HAC)

Umweltsimulation

Smart Card Terminals

Bluetooth

Wi-Fi Services

Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Bescheid vom 07.03.2014 mit der
Akkreditierungsnummer D-PL-12076-01 und ist gültig 17.01.2018. Sie besteht aus diesem Deckblatt, der
Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 77 Seiten.

Registrierungsnummer der Urkunde: D-PL-12076-01-00

Frankfurt am Main, 07.03.2014

Datei: 00000001-01-00000001

Im Auftrag D-PL-12076-01-00000001
Hilke Jäger
Hilke Jäger

Deutsche Akkreditierungsstelle GmbH

Standort Berlin
Spittelmarkt 10
10117 Berlin

Standort Frankfurt am Main
Gartenstraße 6
60504 Frankfurt am Main

Standort Braunschweig
Bundesallee 100
38116 Braunschweig

Die auszugsweise Veröffentlichung der Akkreditierungsurkunde bedarf der vorherigen schriftlichen
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Die Akkreditierung erfolgte gemäß des Gesetzes über die Akkreditierungsstelle (AkkStelleG) vom
31. Juli 2009 (BGBl. I S. 2675) sowie der Verordnung (EG) Nr. 765/2008 des Europäischen Parlaments
und des Rates vom 9. Juli 2008 über die Vorschriften für die Akkreditierung und Marktüberwachung
im Zusammenhang mit der Vermarktung von Produkten (AbL L 218 vom 9. Juli 2008, S. 30).
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der International Laboratory Accreditation Cooperation (ILAC). Die Unterzeichner dieser Abkommen
erkennen ihre Akkreditierungen gegenseitig an.

Der aktuelle Stand der Mitgliedschaft kann folgenden Webseiten entnommen werden:
EA: www.european-accreditation.org
ILAC: www.ilac.org
IAF: www.iaf.org

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/eu/de/cetecom-group/europa/deutschland-saarbruecken/akkreditierungen.html>