

TEST REPORT

Test report no.: 1-4254/12-16-16



Testing laboratory

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Accredited Testing Laboratory:

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS). The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01
Area of Testing: Radio/Satellite Communications

Applicant

Sony Mobile Communications AB
Nya Vattentorget
22188 Lund / SWEDEN
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Fax: +46 46 19 32 95
Contact: Håkan Sjöberg
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Phone: +46 46 19 35 59

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
RSS - 210 Issue 8	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

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

Test Item

Kind of test item:	GSM Mobile Phone GPRS/EGPRS 850/900/1800/1900; UMTS FDDI/FDDII/FDDIV/FDDV; HSPA; LTE Band 2/4/5/17; BT3.1; WLAN a/b/g/n; AGPS; RFID, FM Rx
Model name:	PM-0140-BV
FCC ID:	PY7PM-0140
IC:	4170B-PM0140
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 +50 °C

Test report authorised:


2012-07-03 Stefan Bös
Senior Testing Manager

Test performed:


2012-07-03 Andreas Luckenbill

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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.

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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:	2012-03-14
Date of receipt of test item:	2012-06-25
Start of test:	2012-06-26
End of test:	2012-07-02
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	2010-10	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices
RSS - 210 Issue 8	2010-12	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

4 Test environment

Temperature:	T_{nom}	+22 °C during room temperature tests
	T_{max}	+50 °C during high temperature tests
	T_{min}	-20 °C during low temperature tests
Relative humidity content:		60 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	3.7 V DC by Li-polymer battery
	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 FDDI/FDDII/FDDIV/FDDV; HSPA; LTE Band 2/4/5/17; BT3.1; WLAN a/b/g/n; AGPS; RFID, FM Rx
Type identification	:	PM-0140-BV
S/N serial number	:	Rad. CB511Z7M5P, CB511Z7M5B
HW hardware status	:	AP1.2
SW software status	:	7.0.A.1.68, 7.0.B.0.102
Frequency band [MHz]	:	13.56 MHz
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 +50 °C

6 Test laboratories sub-contracted

None

7 Summary of measurement results

- No deviations from the technical specifications were ascertained**
- There were deviations from the technical specifications ascertained

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15 RSS 210, Issue 8, Annex 2.6	Passed	2012-07-04	-/-

Test Specification Clause	Test Case	Temperature Conditions	Power Source Voltages	Pass	Fail	NA	NP	Results (max.)
§ 15.35 (c)/ RSS-GEN Issue 2 Section 4.5	Timing of the transmitter (Duty cycle correction factor)	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§ 15.225 (a)/ RSS-210 Issue 8 Annex 2.6	Fieldstrength of Fundamental	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§ 15.209/ RSS-210 Issue 8 Annex 2.6	Fieldstrength of harmonics and spurious	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§ 15.225 (e)/ RSS-210 Issue 8 Annex 2.6	Frequency tolerance	Nominal	Extreme	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
		Extreme	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Note: NA = Not Applicable; NP = Not Performed

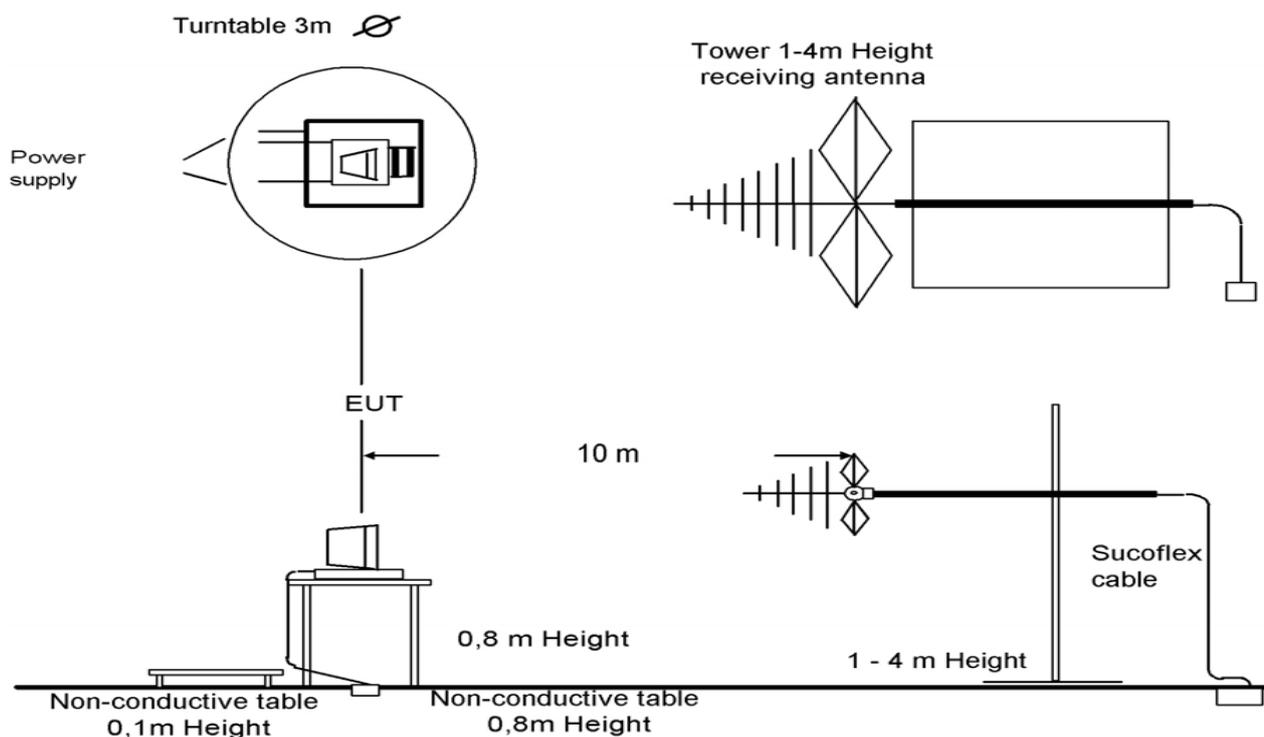
8 RF measurements

8.1 Description of test setup

8.1.1 Radiated measurements

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2009 clause 4.1.5. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63-4-2009 clause 4.2. Antennas are confirmed with ANSI C63.2-1996 item 15.

Semi anechoic chamber



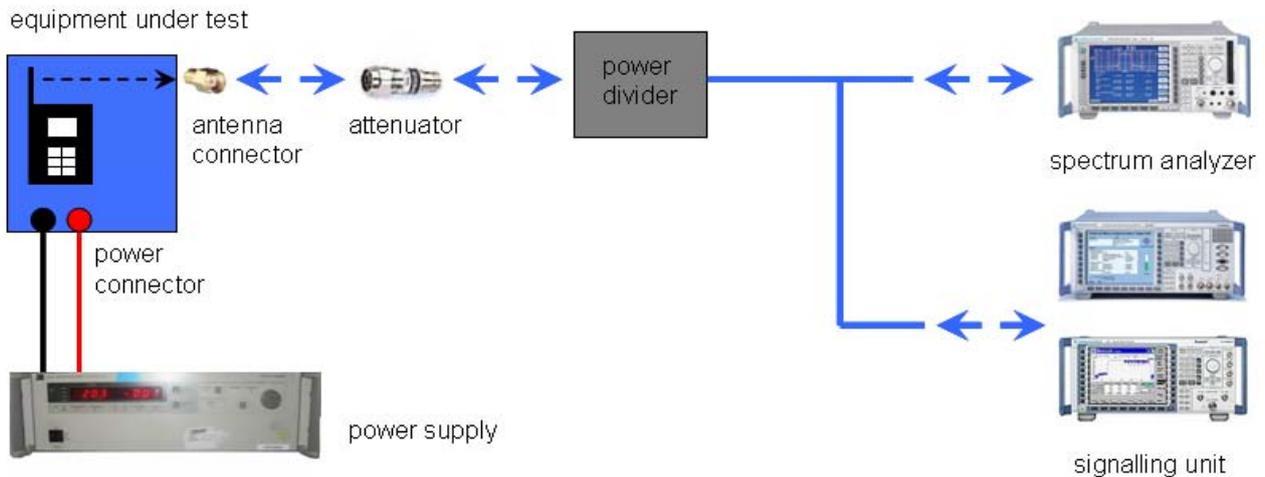
Picture 1: Diagram radiated measurements

9 kHz - 30 MHz:	active loop antenna
30 MHz – 1 GHz:	tri-log antenna
> 1 GHz:	horn antenna

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

8.1.2 Conducted measurements

The EUT's RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The signal is first 10dB attenuated before it is power divided (~6dB loss per branch). One of the signal paths is connected to the communication base Station (CMU200 or other), the other one is connected to the spectrum analyzer. The specific losses for both signal paths are first checked within a calibration. The measurement readings on the signalling unit/spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, signalling unit and the spectrum analyzer are impedance matched on 50 Ohm.



Picture 2: Diagram conducted measurements

8.2 Additional comments

Reference documents: None

Special test descriptions: None

Configuration descriptions: None

8.3 RSP100 test report cover sheet / performance test data

Test Report Number	:	1-4254/12-16-16
Equipment Model Number	:	PM-0140-BV
Certification Number	:	4170B-PM0140
Manufacturer (complete Address)	:	Sony Mobile Communications AB Nya Vattentorget 22188 Lund / SWEDEN
Tested to radio standards specification no.	:	RSS 210, Issue 8, Annex 8
Open Area Test Site IC No.	:	IC 3462C-1
Frequency Range or fixed frequency	:	13.56 MHz
Field Strength [dB μ V/m] (at which distance)	:	45 dB μ V/m @ 10 m
Occupied bandwidth (99%-BW) [Hz]	:	22 Hz
Type of modulation	:	N0N
Emission Designator (TRC-43)	:	22H0N0N
Antenna Information	:	Integrated antenna
Transmitter Spurious (worst case) [dB μ V/m @ 3m]	:	31.4 dB μ V/m @ 294 MHz
Receiver Spurious (worst case) [dB μ V/m @ 3m]	:	no receiver mode!

ATTESTATION:

DECLARATION OF COMPLIANCE:

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

Laboratory Manager:

2012-07-03

Date

Andreas Luckenbill

Name



Signature

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)	RSS-GEN Issue 2 Section 4.5
Timing of the transmitter	
<p>(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.</p>	

Duty cycle: 100%

Result: Passed

9.2 Field strength of the fundamental

Measurement:

Measurement parameter	
Detector:	Quai 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 § 15.225 (b)		RSS-210 Issue 8 Section A1.1.2 / 2.7 Table 4	
Fundamental Frequency (MHz)	Field strength of Fundamental (µV/m)	Measurement distance (m)	
13.553 to 13.567	15848 µV/m (84 dBµV/m)	30	
	158489 µV/m (104 dBµV/m)	10 (Recalculated acc. to FCC part15.31 (f2))	

Result:

TEST CONDITIONS		MAXIMUM POWER (dBµV/m)	
Frequency		13.56 MHz	13.56 MHz
Mode		at 10 m distance	at 30 m distance
T _{nom}	V _{nom}	45	25*
Measurement uncertainty		±3dB	

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

Result: Passed

9.3 Field strength of the harmonics and spurious

Measurement:

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

Limits:

FCC		IC
SUBCLAUSE § 15.209		
Field strength of the harmonics and spurious.		
Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30 (29.5 dBµV/m)	30
30 – 88	100 (40 dBµV/m)	3
88 – 216	150 (43.5 dBµV/m)	3
216 – 960	200 (46 dBµV/m)	3

Result:

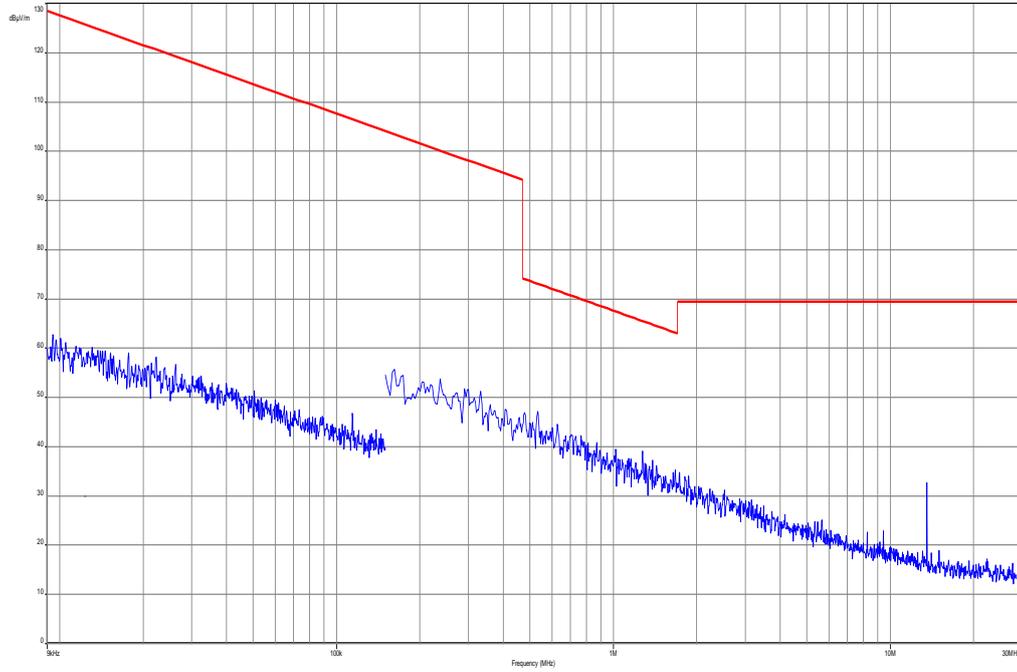
EMISSION LIMITATIONS				
f [MHz]	Detector	Limit max. allowed [dBµV/m]	Amplitude of emission [dBµV/m]	Results
see plots!				

Result: Passed

Plots of the measurements

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

Transmit frequency 13.56 MHz



Plot 2: 30 MHz – 1000 MHz

Transmit frequency 13.56 MHz

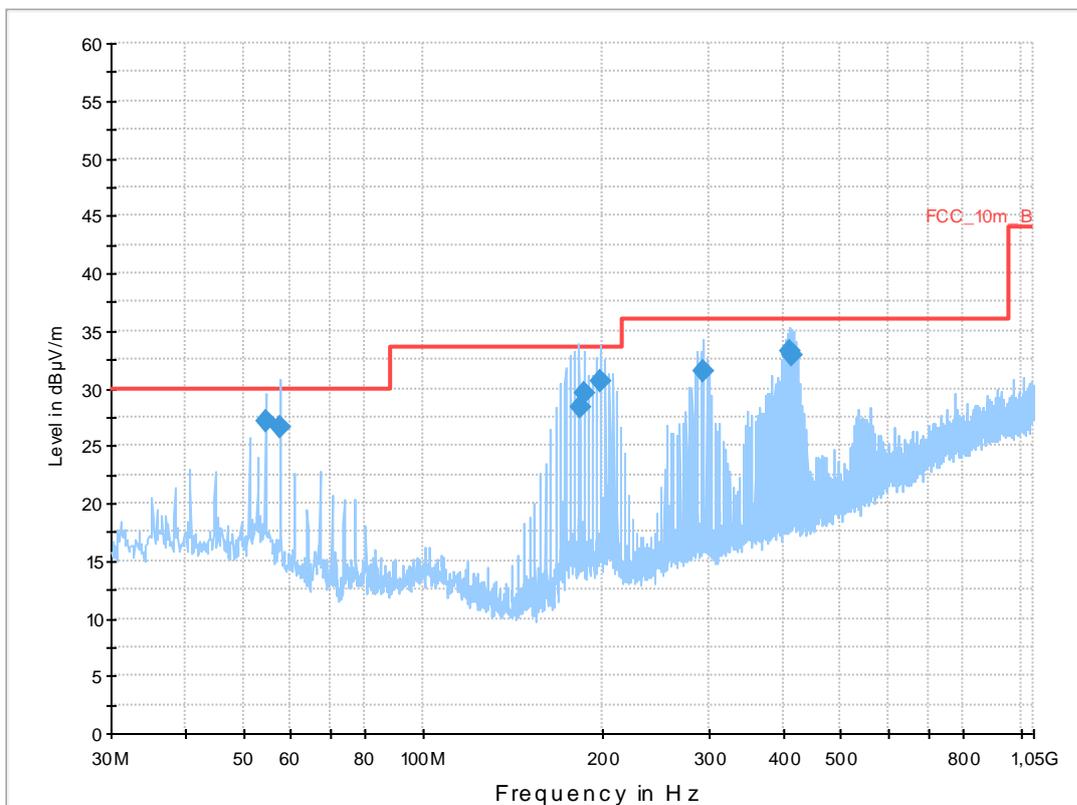
Common Information

EUT: PM-0140-BV
 Serial Number: CB511Z7M5B; IMEI 004402450239409
 Test Description: FCC part 15 C class B@10m
 Operating Conditions: RF ID cont TX + charging
 Operator Name: Wolsdorfer
 Comment: AC 115V/60Hz

Scan Setup: STAN_Fin [EMI radiated]

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

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



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
54.403950	27.1	1000.0	120.000	200.0	V	229.0	12.9	2.9	30.0	
57.610650	26.6	1000.0	120.000	200.0	V	242.0	12.2	3.4	30.0	
182.375700	28.4	1000.0	120.000	100.0	V	250.0	10.6	5.1	33.5	
185.592750	29.5	1000.0	120.000	100.0	V	281.0	10.8	4.0	33.5	
198.400350	30.5	1000.0	120.000	100.0	V	255.0	11.6	3.0	33.5	
294.393900	31.4	1000.0	120.000	100.0	V	242.0	14.4	4.6	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)

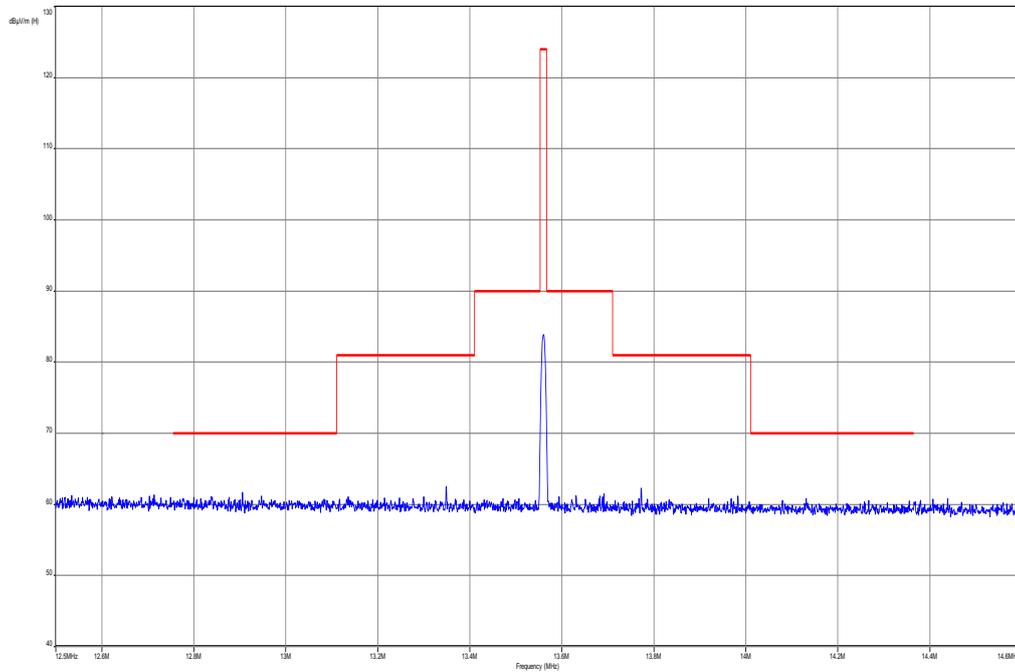
Antenna Tower: Tower [EMCO 2090 Antenna Tower]
@ GPIB0 (ADR 8), FW REV 3.12

Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.52

Plot 3: Spectrum mask part 15.225 (a, b, c, d)

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



RBW /VBW 9 kHz

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

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	RSS-210 Issue 8 Annex 2.6
<p>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.</p>	

Result: Passed

Frequency tolerance							
Over temperature variation			Over voltage variation				
Limit is +/- 1.356 kHz			Limit is +/- 1.356 kHz				
T (°C)]	Frequency [MHz]	result	Power voltage	Frequency [MHz]	result		
-20°	13.559 804	Pass	3.3 V	13.559 800	Pass		
-10°	13.559 862	Pass	3.4 V	13.559 821	Pass		
0°	13.559 860	Pass	3.5 V	13.559 770	Pass		
10°	13.559 850	Pass	3.6 V	13.559 798	Pass		
20°	13.559 800	Pass	3.7 V	13.559 800	Pass		
30°	13.559 796	Pass	3.8 V	13.559 811	Pass		
40°	13.559 788	Pass	3.9 V	13.559 870	Pass		
50°	13.559 770	Pass	4.0 V	13.559 781	Pass		
			4.1 V	13.559 800	Pass		
Measurement uncertainty			±100 Hz				

9.5 AC line conducted

Measurement:

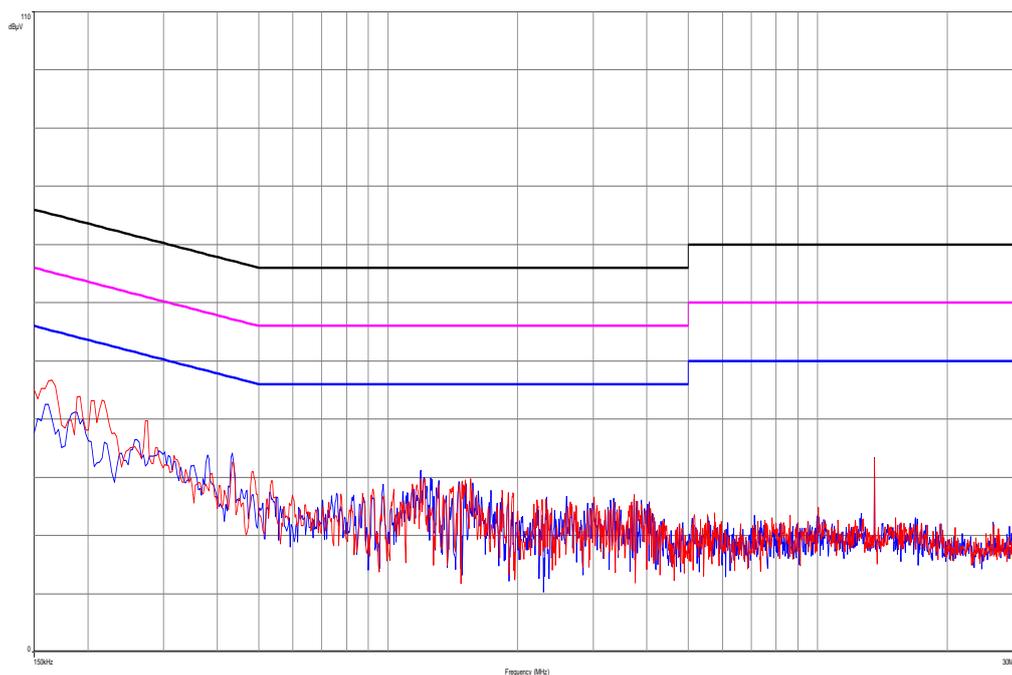
Measurement parameter	
Detector:	Peak / AVG / Quasi-Peak
Sweep time:	Auto
Resolution bandwidth:	120 kHz
Video bandwidth:	300 kHz
Span:	Steps
Trace-Mode:	Max-Hold

Limits:

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

Result: Passed

Plot:



10 Test equipment and ancillaries used for tests

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Labor/Item).

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	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	16.08.2011	16.08.2012
4	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/83761	300002326	Ve	20.09.2011	20.09.2013
5	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	11.05.2011	11.05.2013
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	9	Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2012	06.01.2014
9	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne		
10	n. a.	Relais Matrix	PSU	R&S	890167/024	300001168	ne		
11	n. a.	Isolating Transformer	RT5A	Grundig	9242	300001263	ne		
12	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
13	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
14	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
15	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vIKI!	14.10.2011	14.10.2014
16	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	19.12.2011	19.12.2012
17	n. a.	DC Power Supply 0 – 32V	1108-32	Heiden	001802	300001383	Ve	23.06.2010	23.06.2013

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
vIKI!	Attention: extended calibration interval	*)	next calibration ordered / currently in progress
NK!	Attention: not calibrated		

11 Observations

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

Annex D Document history

Version	Applied changes	Date of release
1.0	Initial release	2012-07-04

Annex E Further information**Glossary**

AVG	-	Average
DUT	-	Device under test
EMC	-	Electromagnetic Compatibility
EN	-	European Standard
EUT	-	Equipment under test
ETSI	-	European Telecommunications Standard Institute
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	Not applicable
PP	-	Positive peak
QP	-	Quasi peak
S/N	-	Serial number
SW	-	Software

Annex F Accreditation Certificate



Deutsche Akkreditierungsstelle GmbH
German Accreditation Body

Entrusted according to Section 8 subsection 1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV
Signatory to the Multilateral Agreements of EA, ILAC and IAF for Mutual Recognition

Accreditation



The Deutsche Akkreditierungsstelle GmbH (German Accreditation Body) attests that the testing laboratory

CETECOM ICT Services GmbH
Untertürkheimer Straße 6-10
66117 Saarbrücken

is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out tests in the following fields:

- Wired communications and DECT
- Acoustic
- Radio
- Shirt Range Devices (SRD)
- RFID
- WiMax and Richtfunk
- Mobile radio (GSM / DCS), Over the Air (OTA) Performance
- Electromagnetic Compatibility (EMC) incl. Automotive
- Product safety
- SAR and Hearing Aid Compatibility (HAC)
- Environmental simulation
- Smart Card Terminals
- Bluetooth
- Wi-Fi-Services

The accreditation certificate shall only apply in connection with the notice of accreditation of 13.04.2011 with the accreditation number D-PL-12076-01 and is valid until 03.09.2014. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 82 pages.

Registration number of the certificate: **D-PL-12076-01-01**

Frankfurt am Main, 13.04.2011

Dipl.-Ing. (FH) Ralf Eger
Head of Division 2

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

Front side of certificate

Deutsche Akkreditierungsstelle GmbH

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60594 Frankfurt am Main

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http://www.cetecom.com/fileadmin/de/CETECOM_D_Saarbruecken/accreditations_Jan_2010/DAKKS_Akkredi_Urk_EN17025-En_incl_Annex.pdf