



## TEST REPORT

Test report no.: 1-6965/13-06-08



### 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 Communications & Compatibility Testing (RCT)

### Applicant

**Sony Mobile Communications AB**  
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22188 Lund / SWEDEN  
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### Manufacturer

**Sony Mobile Communications AB**  
Nya Vattentorget  
22188 Lund / SWEDEN

### Test standard/s

47 CFR Part 22                      Title 47 of the Code of Federal Regulations; Chapter I; Part 22 - Public mobile services

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

### Test Item

**Kind of test item:** Tablet PC GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDDI/II/IV/V/VIII; LTE FDD1/2/3/4/5/7/8; WLAN b/g/n/a/ac; BT 4.0; RFID; A-GPS  
**Type name:** TM-0043-BV  
**FCC ID:** PY7TM-0043  
**Frequency:** LTE FDD 5: 824 MHz – 849 MHz  
**Technology tested:** LTE FDD 5  
**Antenna:** Integrated antenna  
**Power supply:** 3.7V DC by Li - polymer battery

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:



Stefan Bös  
Senior Testing Manager

### Test performed:



Andreas Luckenbill  
Expert

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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.

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

### 2.2 Application details

Date of receipt of order:	2013-12-17
Date of receipt of test item:	2013-12-17
Start of test:	2013-12-17
End of test:	2013-12-20
Person(s) present during the test:	-/-

## 3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 22		Title 47 of the Code of Federal Regulations; Chapter I; Part 22 - Public mobile services

#### 4 Test environment

Temperature:	$T_{nom}$	+22 °C during room temperature tests
	$T_{max}$	No tests under extreme conditions
	$T_{min}$	No tests under extreme conditions
Relative humidity content:		32 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	$V_{nom}$	3.7 V DC by Li - polymer battery
	$V_{max}$	No tests under extreme conditions
	$V_{min}$	No tests under extreme conditions

#### 5 Test item

Kind of test item	:	Tablet PC GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDD/III/IV/V/VIII; LTE FDD1/2/3/4/5/7/8; WLAN b/g/n/a/ac; BT 4.0; RFID; A-GPS
Type name	:	TM-0043-BV
S/N serial number	:	Rad. CB51267QHS, CB51267QLF
HW hardware status	:	AP1
SW software status	:	17.0.A.0.274
Frequency band [MHz]	:	LTE FDD 5: 824 MHz – 849 MHz
Type of modulation	:	QPSK, 16-QAM
Antenna	:	Integrated antenna
Power supply	:	3.7 V DC by Li - polymer battery
Temperature range	:	-30 °C to +60 °C

#### 5.1 Additional information

Test setup- and EUT-photos are included in test report: 1-6965/13-06-01\_AnnexA  
 1-6965/13-06-01\_AnnexB  
 1-6965/13-06-01\_AnnexC

Reference documents: Main test report: 1-6965/13-05-06-A / PY7TM-0040 (conducted values)

#### 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 22	passed	2014-01-23	Delta tests according to manufacturer test plan.

### 7.1 LTE band V

Test Case	temperature conditions	power source voltages	Pass	Fail	NA	NP	Remark
RF Output Power	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Frequency Stability	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Spurious Emissions Radiated	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Spurious Emissions Conducted	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Block Edge Compliance	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Occupied Bandwidth	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-

**Note:** NA = Not applicable; NP = Not performed

## 8 RF measurements

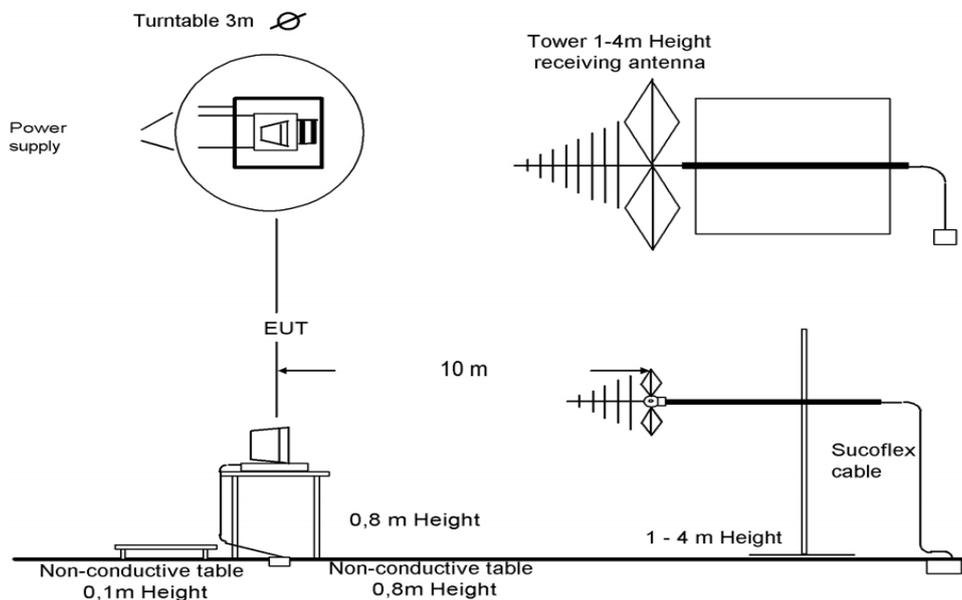
### 8.1 Description of test setup

For the spurious measurements we use the substitution method according TIA/EIA 603.

#### 8.1.1 Radiated measurements

The radiated emissions from the EUT are performed in a semi anechoic chamber. The EUT is placed on a conductive turntable and powered with nominal voltage. The signalling is performed either from outside the chamber with a signalling unit (AP or other) by air link using a signalling antenna or directly by special test software from the customer.

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

## 8.2 Results LTE band V

The EUT was set to transmit the maximum power.

### 8.2.1 RF output power

**Description:**

This paragraph contains average power, peak output power and ERP measurements for the mobile station. In all cases, the peak output power is within the required mask (this mask is specified in the JTC standards, TIA PN3389 Vol. 1 Chap 7, and is no FCC requirement).

**Measurement:**

The mobile was set up for the maximum output power with pseudo random data modulation.

To determine the Peak-To-Average Power Ratio (PAPR) the measurement was performed with the Power Complementary Cumulative Distribution Function (CCDF).

Measurement parameters
Measured with CMW500

**Limits:**

FCC
CFR Part 22.913 CFR Part 2.1046
Nominal Peak Output Power
+38.45 dBm In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

**Results:**

The output power was measured with the maximum number of resource blocks.

Output Power (radiated)			
Bandwidth (MHz)	Frequency (MHz)	Average Output Power (dBm)	Average Output Power (dBm)
		QPSK	16-QAM
1.4	824.7	19.0	18.2
	836.5	21.6	20.6
	848.3	21.8	20.9
3	825.5	19.0	18.1
	836.5	21.6	20.5
	847.5	22.0	20.8
5	826.5	19.0	18.0
	836.5	21.4	20.7
	846.5	21.9	20.7
10	829.0	18.9	18.1
	836.5	21.4	20.3
	844.0	22.2	21.1
Measurement uncertainty		± 3.0 dB	

**Result:** **Passed**

## 8.2.2 Spurious emissions radiated

### Description:

The following steps outline the procedure used to measure the radiated emissions from the mobile station. The site is constructed in accordance with ANSI C63.4:2009 requirements and is recognized by the FCC to be in compliance for a 3 and a 10 meter site. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 846.6 MHz. Measured up to 12.75 GHz. The resolution bandwidth is set as outlined in Part 22.917. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE band V.

The final open field emission (here 10m semi-anechoic chamber listed by FCC) test procedure is as follows:

- a) The test item was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna.
- b) The antenna output was terminated in a 50 ohm load (if possible).
- c) A double ridged wave guide antenna was placed on an adjustable height antenna mast 3 meters from the test item for emission measurements.
- d) Detected emissions were maximized at each frequency by rotating the test item and adjusting the receive antenna height and polarization. The maximum meter reading was recorded. The radiated emission measurements of the harmonics of the transmit frequency through the 10th harmonic were measured with peak detector and 1 MHz bandwidth. If the harmonic could not be detected above the noise floor, the ambient level was recorded. The equivalent power into a dipole antenna was calculated from the field intensity levels measured at 3 meters.
- e) Now each detected emissions were substituted by the substitution method, in accordance with the TIA/EIA 603.

### Measurement:

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

### Limits:

FCC	
CFR Part 22.917 CFR Part 2.1053	
Spurious Emissions Radiated	
Attenuation $\geq 43 + 10\log(P)$ (P, Power in Watts)	
-13 dBm	

**Results:**

Radiated emissions measurements were made only at the center carrier frequency of the LTE band V (836.5 MHz). It was decided that measurements at this carrier frequency would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the LTE band V into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

The final open field radiated levels are presented on the next pages. All measurements were done in horizontal and vertical polarization; the plots show the worst case. The plots show only the middle channel. If spurious were detected, the lowest and highest channel were checked too. The found values are stated in the table below.

As can be seen from this data, the emissions from the test item were within the specification limit.

**QPSK:**

Spurious Emission Level (dBm)								
Harmonic	Lowest channel Freq. (MHz)	Level [dBm]	Harmonic	Middle channel Freq. (MHz)	Level [dBm]	Harmonic	Highest channel Freq. (MHz)	Level [dBm]
2	1658.0	No spurious emissions detected.	2	1673.0	No spurious emissions detected.	2	1688.0	No spurious emissions detected.
3	2487.0		3	2509.5		3	2532.0	
4	3316.0		4	3346.0		4	3376.0	
5	4145.0		5	4182.5		5	4220.0	
6	4974.0		6	5019.0		6	5064.0	
7	5803.0		7	5855.5		7	5908.0	
8	6632.0		8	6692.0		8	6752.0	
9	7461.0		9	7528.5		9	7596.0	
10	8290.0		10	8365.0		10	8440.0	
Measurement uncertainty						± 3dB		

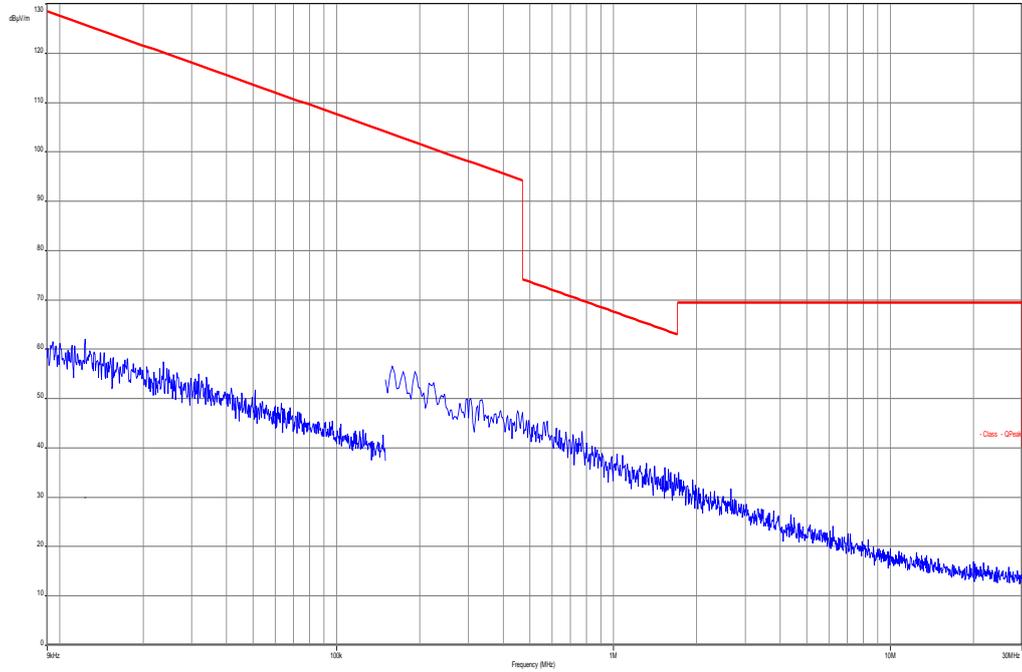
**16-QAM:**

Spurious Emission Level (dBm)								
Harmonic	Lowest channel Freq. (MHz)	Level [dBm]	Harmonic	Middle channel Freq. (MHz)	Level [dBm]	Harmonic	Highest channel Freq. (MHz)	Level [dBm]
2	1658.0	No spurious emissions detected.	2	1673.0	No spurious emissions detected.	2	1688.0	No spurious emissions detected.
3	2487.0		3	2509.5		3	2532.0	
4	3316.0		4	3346.0		4	3376.0	
5	4145.0		5	4182.5		5	4220.0	
6	4974.0		6	5019.0		6	5064.0	
7	5803.0		7	5855.5		7	5908.0	
8	6632.0		8	6692.0		8	6752.0	
9	7461.0		9	7528.5		9	7596.0	
10	8290.0		10	8365.0		10	8440.0	
Measurement uncertainty						± 3dB		

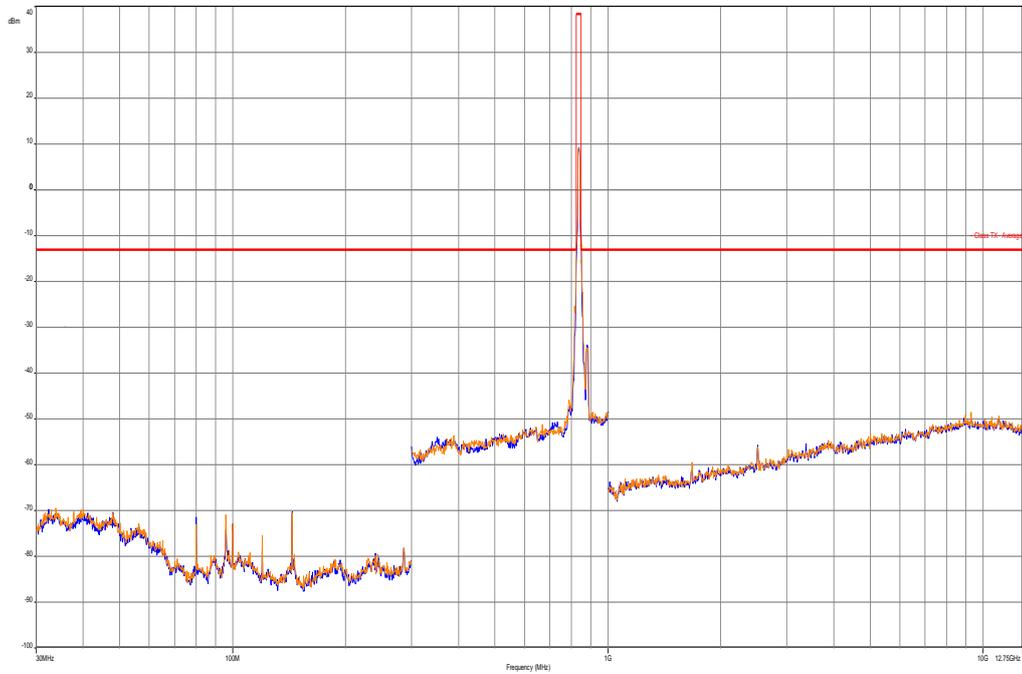
**Result: Passed**

**QPSK with 10 MHz channel bandwidth**

**Plot 1: Channel 20525 (Traffic mode up to 30 MHz)**

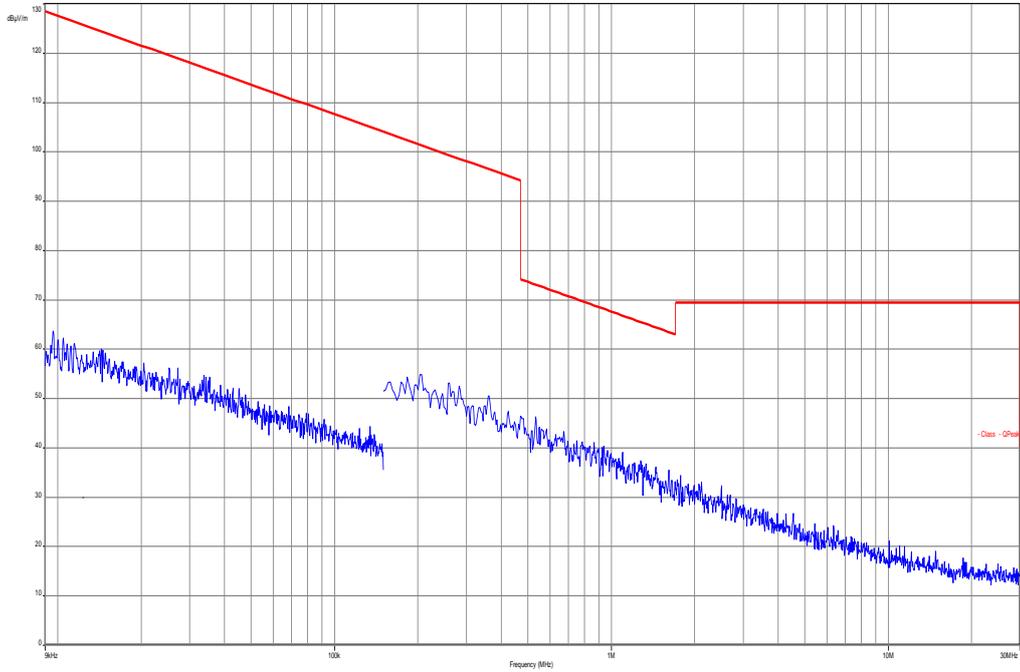


**Plot 2: Channel 20525 (30 MHz – 12.75 GHz)**

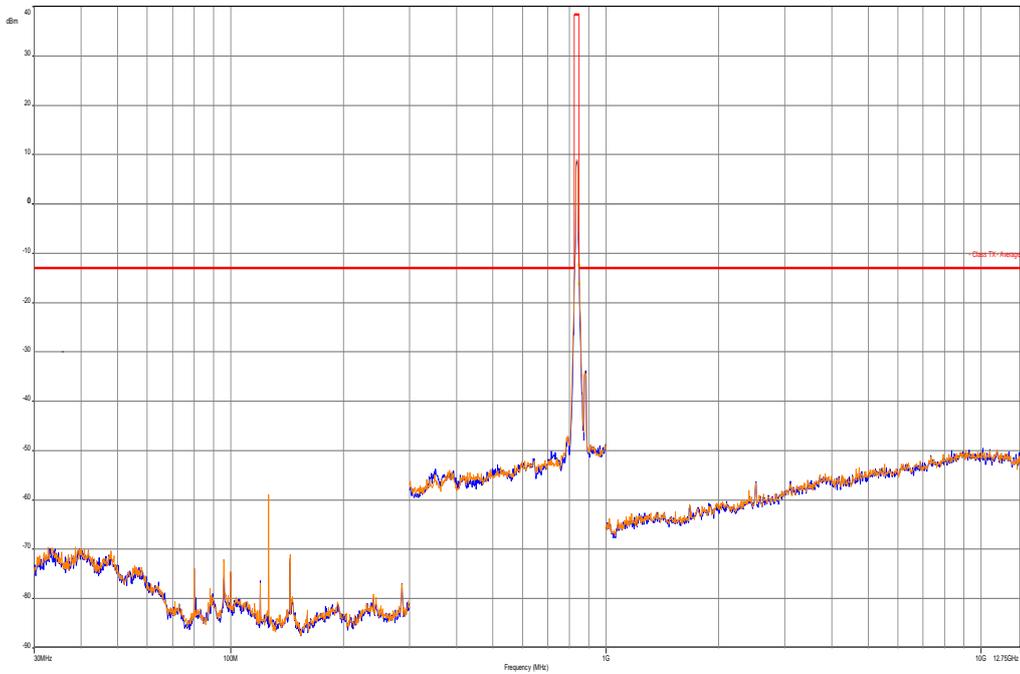


**16-QAM with 10 MHz channel bandwidth**

**Plot 3: Channel 20525 (Traffic mode up to 30 MHz)**



**Plot 4: Channel 20525 (30 MHz – 12.75 GHz)**



## 9 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.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vKl!	08.05.2013	08.05.2015
2	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
3	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	*	300000199	ne		
4	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156	ne		
5	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
6	90	Active Loop Antenna 10 kHz to 30 MHz	6502	Kontron Psychotech	8905-2342	300000256	k	13.06.2013	13.06.2015
7	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
8	n. a.	TRIOLOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vKl!	14.10.2011	14.10.2014
9	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	21.02.2013	21.02.2014

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

## 10 Observations

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

**Annex A Document history**

Version	Applied changes	Date of release
1.0	Initial release	2014-01-23

**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

**DAkKS**  
Deutsche  
Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH  
Befehlshaber gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV  
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**  
Untertürkheimer Straße 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
- WiFiMax 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 Akkreditierungskunde gilt nur in Verbindung mit dem Bescheid vom 18.01.2013 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 80 Seiten.

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

Frankfurt am Main, 18.01.2013

Im Auftrag  
Dirk Jürgens (Prüfungsleiter)  
Abteilungsleiter

Siehe Hinweise auf der Rückseite

Back side of certificate

Deutsche Akkreditierungsstelle GmbH

Standort Berlin Spittelmarkt 10 10117 Berlin	Standort Frankfurt am Main Gartenstraße 6 60594 Frankfurt am Main	Standort Braunschweig Rundeschaus 100 38116 Braunschweig
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Die Akkreditierung erfolgte gemäß des Gesetzes über die Akkreditierungsstelle (AkkStelleG) vom 31. Juli 2009 (BGBl. I S. 2626) 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 (Abt. L 218 vom 9. Juli 2008, S. 30). Die DAkKS ist Unterzeichnerin der Multilateralen Abkommen zur gegenseitigen Anerkennung der European co-operation for Accreditation (EA), des International Accreditation Forum (IAF) und 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](http://www.european-accreditation.org)  
ILAC: [www.ilac.org](http://www.ilac.org)  
IAF: [www.iaf.nu](http://www.iaf.nu)

**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>