

# TEST REPORT







No.: TR-15-1-0008101-02a

According to  
**FCC Regulations:**  
Part 22, Part 24

for  
peiker acustic GmbH & Co. KG

GSM/E-GPRS/W-CDMA Wireless Module  
V1140-103-1

FCC-ID: QWY-V1140-103

Laboratory Accreditation and Listings			
 <b>DAkkS</b> Deutsche Akkreditierungsstelle D-PL-12047-01-01	 FEDERAL COMMUNICATIONS COMMISSION USA MRA US-EU 0003	 Industry Canada Reg. No.: 3462D-1 Reg. No.: 3462D-2 Reg. No.: 3462D-3	 Voluntary Controls for Electromagnetic Emissions Reg. No.: R-2666 C-2914, T-1967, G-301
 WIFI ALLIANCE AUTHORIZED RF LABORATORY	 LAB CODE 20011130-00		
accredited according to DIN EN ISO/IEC 17025			
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The listed attachments are an integral part of this report.

## 1. Summary of test results

The test results apply exclusively to the test samples as presented in this Report. The CETECOM GmbH does not assume responsibility for any conclusions and generalizations taken in conjunction with other specimens or samples of the type of the item presented to tests.

Also we refer on special conditions which the applicant should fulfill according §2.927 to §2.948, special focus regarding modification of the equipment and availability of sample equipment for market surveillance tests.

The Equipment Under Test (in this report, hereinafter referred as EUT) supports radiofrequency technologies. This test report shows results for W-CDMA technologies only. Other implemented wireless technologies were not considered within this test report.

The presented EUT is a variant of already approved wireless module of type V1140-103 with FCC ID: QWY-V1140-103 and IC no. 6588A-V1140103. Pls. compare also official documents showing main differences. Delta tests apply in order to verify the compliance, however a new certification is intended.

Following tests have been performed to show compliance with applicable FCC Part 2, Part 22, Subpart H and Part 24, Subpart E (Broadband PCS of the FCC CFR Title 47 Rules, Edition 4<sup>th</sup> November 2015 and Canada RSS-132 Issue 3, RSS-133 Issue 6 and RSS-Gen Issue 4 standards.

### 1.1. Tests overview of US CFR Title 47 Part 22/24 and Canada IC (RSS) Standards

No. of Diagram group	Test case	Port	References & Limits			EUT set-up	EUT op-mode	Result
			FCC Standard	RSS Section	Test limit			
1	AC-Power Lines Emissions Conducted (0,15 - 30 MHz)	AC-Power lines (conducted)	§15.207	RSS-Gen, Issue 4: Chapter 8.8	§15.207 limits  IC: Table 3	--	--	Not performed Remark 1.)
2	General field strength emissions (9 kHz - 30 MHz)	Cabinet + inter-connecting cables  (radiated)	§15.209(a)	RSS-Gen, Issue 4: Chapter 8.9, Table 5	2400/F(kHz) $\mu$ V/m 24000/F(kHz) $\mu$ V/m 30 $\mu$ V/m	--	--	Not performed Remark 1.)
7	RF-Power (ERP/EIRP)		§2.1046 §22.913(a)(2) §24.232(c)	RSS-132: 5.4 SRSP-503: 5.1.3  RSS-133:4.1/6.4 SRSP-510: 5.1.2	< 7 Watt (ERP)  < 2 Watt (EIRP)	--	--	Calculations with stated antenna gain
8	Spurious emissions		§2.1053(a) §2.1057 §22.917(a)(b) §24.238(a)(b)	RSS-132: 5.5(i)(ii)  RSS-133: 6.5.1(i)(ii)  RSS-139: Issue 3 Chapt. 6.6 (i) (ii)	Required attenuation below P(dBW): 43+10log(P) dBc	1	1+2+3+4	passed
9	Band-Edge compliance			1		1+2+3+4	passed	


No. of Diagram group	Test case	Port	References & Limits			EUT set-up	EUT op-mode	Result
			FCC Standard	RSS Section	Test limit			
30	RF Power	Antenna terminal (conducted)	§2.1046	RSS-132, Issue 3: Chapter 5.4 SRSP-503: 5.1.3	< 7 Watt (ERP)	--	--	Not performed Remark 2.)
				RSS-133, Issue 6: Chapter 4.1/6.4 SRSP-510: 5.1.2	< 2 Watt (EIRP)			
34	26dB Emission bandwidth		§2.202 §2.1049(h) §22.917(a) §24.238(a)	RSS-Gen: 4.6.1	99% Power	--	--	Not performed Remark 2.)
35	99% Occupied bandwidth					--	--	Not performed Remark 2.)
36	Spurious emissions		§2.1051 §2.1057	RSS-132, Issue 3: 5.5(i)(ii)	Required attenuation below P(dBW): 43+10log(P) dBc	--	--	Not performed Remark 2.)
37	Band-Edge compliance		§22.917(a)(b) §24.238(a)(b)	RSS-133, Issue 6: 6.5.1(i)(ii)		--	--	Not performed Remark 2.)
38	Frequency stability		§2.1055(a)(2) §22.355	RSS-132: Chapter 5.3	FCC/IC: < ±2.5ppm	--	--	Not performed Remark 3.)
			§24.235 Table C-1	RSS-133: Chapter 6.3	FCC/IC: fundamental emissions stay within the authorized bands  IC: < ±2.5ppm			

Remarks:

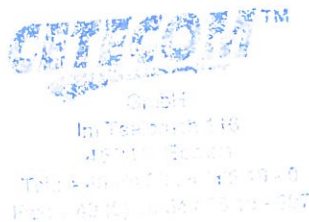
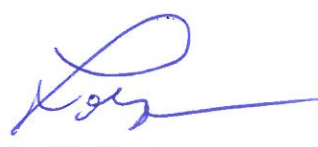
- 1.) EUT DC powered only, test to be performed on OEM side if applicable
- 2.) See test reports under FCC ID : QWY-V1140-103 , IC ID: 6588A-V1140103
- 3.) Not applicable

### 1.2. Attestation:

I declare that all measurements were performed by me or under my supervision and that all measurements have been performed and are correct to my best knowledge and belief to Industry Canada standards. All requirements as shown in above table are met in accordance with enumerated standards.



.....  
Dipl.-Ing. R. Acharkaoui  
Responsible for test section

.....  
Dipl.-Ing. Christian Lorenz  
Responsible for test report

## 2. Administrative Data

### 2.1. Identification of the testing laboratory

Company name:	CETECOM GmbH
Address:	Im Teelbruch 116 45219 Essen - Kettwig Germany
Responsible for testing laboratory:	Dipl.-Ing. R. Acharkaoui
Deputy:	Dipl.-Ing. Niels Jeß

### 2.2. Test location

#### 2.2.1. Test laboratory "CTC"

Company name:	see chapter 2.1. Identification of the testing laboratory
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### 2.3. Organizational items

Responsible for test report and project leader:	Dipl.-Ing. Christian Lorenz
Receipt of EUT:	2015-02-27
Date(s) of test:	2015-09-03 to 2015-09-15
Date of report:	2016-03-15
-----	
Version of template:	13.02

### 2.4. Applicant's details

Applicant's name:	peiker acoustic GmbH & Co. KG
Address:	Max-Planck-Straße 32, 61381 Friedrichsdorf  Germany
Contact person:	Mr. Martin Fleckenstein

### 2.5. Manufacturer's details

Manufacturer's name:	please see Applicant's details
Address:	please see Applicant's details

### 3. Equipment under test (EUT)

#### 3.1. TECHNICAL DATA OF MAIN EUT DECLARED BY APPLICANT

TX-frequency range	<input checked="" type="checkbox"/> GSM / GPRS / EGPRS Band 850: 824.2 – 848.8 MHz (Uplink), 869.2-1893.8 MHz (Downlink) <input checked="" type="checkbox"/> GSM / GPRS / EGPRS Band 1900: 1850.2 – 1909.8 MHz (Uplink), 1930.2-1989.8 MHz (Downlink) <input checked="" type="checkbox"/> UMTS Band II: 1852.4 – 1907.6 MHz (Uplink), 1932.4-1987.6 MHz (Downlink) <input checked="" type="checkbox"/> UMTS Band V: 826.4 – 846.6 MHz (Uplink), 871.4-891.6 MHz (Downlink)
Type of modulation	<input checked="" type="checkbox"/> GSM / GPRS / EGPRS Band 850: GMSK/8PSK <input checked="" type="checkbox"/> GSM / GPRS / EGPRS Band 1900: GMSK/8PSK <input checked="" type="checkbox"/> UMTS Band II: QPSK <input checked="" type="checkbox"/> UMTS Band V: QPSK
Number of channels	<input checked="" type="checkbox"/> GSM / GPRS / EGPRS Band 850: 128 – 192 – 251 <input checked="" type="checkbox"/> GSM / GPRS / EGPRS Band 1900: 512 – 661 – 810 <input checked="" type="checkbox"/> UMTS Band II: UARFCN range 9262 – 9400 – 9538 <input checked="" type="checkbox"/> UMTS Band V: UARFCN range 4132 – 4183 – 4233
UMTS-HSPA connectivity	<input checked="" type="checkbox"/> Uplink speed: 5.76 Mb/s (category 6)
Emission designator(s)	Values taken from certified module:  GSM / GPRS Band 850: 247KGXW E-GPRS Band 850: 245KG7W GSM / GPRS Band 1900: 245KGXW E-GPRS Band 1900: 245KG7W UMTS Band II: 4M17F9W UMTS Band V: 4M17F9W
Antenna Type	<input type="checkbox"/> Integrated (enclosure) <input type="checkbox"/> External - dedicated, no RF- connector <input checked="" type="checkbox"/> External Model no. 61450ECE-3G
Antenna Gain Tx (main)	<input checked="" type="checkbox"/> Values: (see data sheet for ModelNo. 64150 (ECE-3G)) GSM850/FDD V: 1.85 dBd (4.0dBi) GSM1900/FDD II: 3.4dBi
Antenna Gain Dx (diversity)	<input checked="" type="checkbox"/> Not applicable only RX-part <input type="checkbox"/> Value: (Data sheet) <input type="checkbox"/> No information from customer

MAX PEAK Output Power: Radiated	Values taken from certified module's test reports: (FCC ID: QWY-V1140-103 and IC 6588A-V1140103)		
GSM / GPRS Band 850	33.0 dBm (PK) + 1.85 dBd = 34.85 dBm (ERP)		
E-GPRS Band 850	30.1 dBm (PK) + 1.85 dBd = 31.95 dBm (ERP)		
GSM / GPRS Band 1900	29.9 dBm (PK) + 3.4dBi = 33.3dBm (EIRP)		
E-GPRS Band 1900	29.1 dBm (PK) + 3.4dBi = 32.5dBm (EIRP)		
UMTS_FDD Band II	27.0 dBm (PK) + 3.4dBi = 30.4dBm (EIRP)		
UMTS_FDD Band V	27.4 dBm (PK) + 1.85dBd = 29.25dBm (ERP)		
MAX PEAK Output Power: Conducted	Values taken from certified module/grant: (FCC ID: QWY-V1140-103 and IC 6588A-V1140103)		
GSM / GPRS Band 850	32.69 dBm		
E-GPRS Band 850	26.90 dBm		
GSM / GPRS Band 1900	29.59 dBm		
E-GPRS Band 1900	25.79 dBm		
UMTS_FDD Band II	27.0 dBm		
UMTS_FDD Band V	27.4 dBm		
Installed option	<input checked="" type="checkbox"/> GSM / GPRS / EGPRS Band 850 <input checked="" type="checkbox"/> GSM / GPRS / EGPRS Band 1900 <input checked="" type="checkbox"/> UMTS Band II <input checked="" type="checkbox"/> UMTS Band V		
Power supply	<input checked="" type="checkbox"/> DC power only: 12V over AE1		
Special EMI components	--		
Does EUT contain devices susceptible to magnetic fields, e.g. Hall elements, electrodynamic microphones, etc.?	<input type="checkbox"/> yes <input checked="" type="checkbox"/> no		
EUT sample type	<input type="checkbox"/> Production	<input checked="" type="checkbox"/> Pre-Production	<input type="checkbox"/> Engineering
FCC label attached	<input type="checkbox"/> yes	<input checked="" type="checkbox"/> no	

### 3.2. EUT: Type, S/N etc. and short descriptions used in this test report

Short description*)	EUT	Type	S/N serial number	HW hardware status	SW software status
EUT A	GPRS/E-GPRS/W-CDMA Wireless Module	V1140-103-1	IMEI: 353816-07-00000-7	V1140-103-1_Ver. 4	M9615A-CETWTDZM-6.3.100087
EUT B	Automotive Antenna 3G Roof-Pod	64150 (ECE-3G)	--	--	--

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

### 3.3. Auxiliary Equipment (AE): Type, S/N etc. and short descriptions

AE short description *)	Auxiliary Equipment	Type	S/N serial number	HW hardware status	SW software status
AE 1	LTE-NAD Evaluation Board	Testboard	LP1307-1	--	--
AE 2	Microphone	KL1/B	9263744	--	--
AE 3	Loudspeaker	KL1/B	#1	4Ω/6Watt	--
AE 4	Small Ground-Plane	For EUT B 30cm diameter	--	--	--
AE 5	DC power cable	For AE 1	--	1m long	--
AE 6	Notebook Dell	Lattitude D2120	#Test PC6	--	Windows 7
AE 7	USB cable	Mini-USB	--	1m long	--

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

### 3.4. EUT set-ups

EUT set-up no. *)	Combination of EUT and AE	Remarks
set. 1	EUT A + EUT B + AE 1 + AE 2 + AE 3 + AE 4 + AE 5 + AE6 + AE 7	Set-up for radiated RF-tests. AE6 + AE7 used only temporary for set-up of tests

\*) EUT set-up no. is used to simplify the identification of the EUT set-up in this test report.

### 3.5. EUT operating modes

EUT operating mode no. *)	Description of operating modes	Additional information
op. 1	GPRS 850 Data Traffic channels = 128/192/251	A communication link is established between the mobile station and the test simulator. The transmitter is operated at its maximum rated output power: 33 dBm (power class 4; power control level 5). USF_Duty CYCLE set to 100%, coding scheme CS-1 for GMSK modulation, slot 3 active, uplink gamma: 3 (33 dBm). The input signal to the receiver is modulated with normal test modulation. The wanted RF input signal level to the receiver of the mobile station is set to a level to provide a stable communication link.



op. 2	GPRS 1900 Data Traffic channels = 512/661/810	A communication link is established between the mobile station and the test simulator. The transmitter is operated at its maximum rated output power: 30 dBm (power class 1; power control level 0). USF_Duty CYCLE set to 100%, coding scheme CS-1 for GMSK modulation, slot 3 active, uplink gamma: 3 (30 dBm). The input signal to the receiver is modulated with normal test modulation. The wanted RF input signal level to the receiver of the mobile station is set to a level to provide a stable communication link
op. 3	UMTS FDD- Band II  12.2 kbps RMC	A communication link is established between the mobile station (UE) and the test simulator. The transmitter is operated on its maximum rated output power class: 21 dBm or 24dBm nominal. The input signal to the receiver is modulated with normal test modulation. The wanted RF input signal level to the receiver of the mobile station is set to a level to provide a stable communication link according Table E5.1/Table E5.1A as described in 3GPP TS34.121, Annex E. The description of the settings performed can be found in chapter 3.5
op. 4	UMTS FDD- Band V  12.2 kbps RMC	A communication link is established between the mobile station (UE) and the test simulator. The transmitter is operated on its maximum rated output power class: 21 dBm or 24dBm nominal. The input signal to the receiver is modulated with normal test modulation. The wanted RF input signal level to the receiver of the mobile station is set to a level to provide a stable communication link according Table E5.1/Table E5.1A as described in 3GPP TS34.121, Annex E. The description of the settings performed can be found in chapter 3.5

\*) EUT operating mode no. is used to simplify the test report.

### 3.6. RMC99 SETTINGS

### 3.7. Additional declaration and description of EUT

(Applicant's declaration,  = not selected,  = selected)

EUT A	<input type="checkbox"/> table-top <input type="checkbox"/> floor-standing <input type="checkbox"/> wall-mounted <input checked="" type="checkbox"/> not defined	typical use <input type="checkbox"/> portable use <input checked="" type="checkbox"/> fixed use <input type="checkbox"/> vehicular use <input type="checkbox"/> general	typical operating cycle of EUT. <input checked="" type="checkbox"/> < 0,5 sec. <input type="checkbox"/> :
Place of use	<input type="checkbox"/> Residential, commercial and light industry <input type="checkbox"/> Industrial environment <input type="checkbox"/> vehicular use <input checked="" type="checkbox"/> general		
Highest frequency generated or used in the device or on which the device operates or tunes	<input type="checkbox"/> below 1.705 MHz -> up to 30 MHz <input type="checkbox"/> 1.705 MHz – 108 MHz -> up to 1 GHz <input type="checkbox"/> 108 MHz -500 MHz -> up to 2 GHz <input checked="" type="checkbox"/> 500MHz 1000 MHz -> up to 5 GHz <input checked="" type="checkbox"/> Above 1000 MHz -> 5 <sup>th</sup> harmonic or 40 GHz		
<b>Power line:</b>	EUT-grounding:		
<input type="checkbox"/> AC <input type="checkbox"/> L1, <input type="checkbox"/> L2, <input type="checkbox"/> L3, <input type="checkbox"/> N _____ Hz <input type="checkbox"/> 12V, <input type="checkbox"/> 230V, <input type="checkbox"/> 400V <input checked="" type="checkbox"/> DC <input checked="" type="checkbox"/> 24 V DC over AE1	<input checked="" type="checkbox"/> none <input type="checkbox"/> with power supply <input type="checkbox"/> additional:		
(in case of deviation during tests the single details are described on chapter 4)			
<b>Other Ports</b> (description of interconnecting cables)	possible total cable length	shielding	connected during test
Connector			
4. DC-line	USB	<input checked="" type="checkbox"/> < 3m <input type="checkbox"/> > 3m <input type="checkbox"/> : other	<input checked="" type="checkbox"/> screened <input type="checkbox"/> unscreened
			<input checked="" type="checkbox"/> yes <input type="checkbox"/> no
Does EUT contain devices susceptible to magnetic fields, e.g. Hall elements, electrostatics, microphones, etc.?			<input type="checkbox"/> yes <input checked="" type="checkbox"/> no
Is mounting position / usual operating position defined?			<input type="checkbox"/> yes <input checked="" type="checkbox"/> no

### 3.8. Configuration of cables used for testing

Cable number	Item	Type	S/N serial number	HW hardware status	Cable length
Cable 1	DC Port	--	--	--	1 m
Cable 2	Louspeaker	--	--	--	2 m
Cable 3	TX Main	Shielded	--	--	1.1m
Cable 4	RX main	Shielded	--	--	1.1m
Cable 5	GPS	Shielded	--	--	1.1m

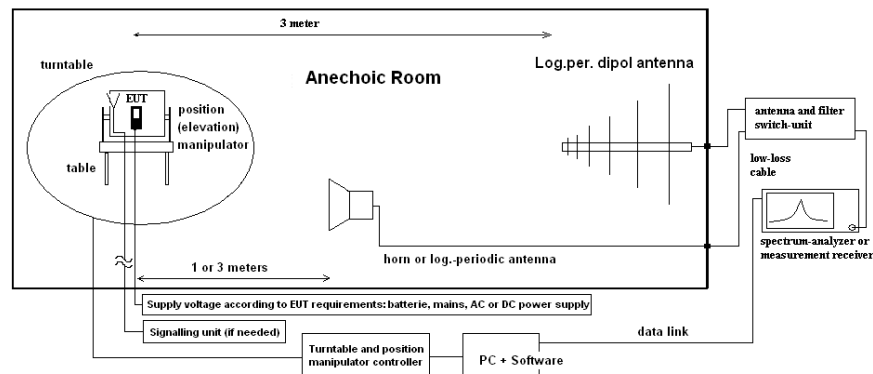
## 4. Description of test system set-up's

### 4.1. Test system set-up for radiated spurious emission measurements

**Specification:** ANSI C63.10-2013 chapter 6.6.3.3 & 6.6.4

**General Description:** Evaluating the emissions have to be done first by an exploratory emissions measurement and a final measurement for most critical frequencies. The tests are performed in a CISPR 16-1-4:2010 compliant fully anechoic room (FAR) recognized by the regulatory commission. The measurement distance was set to 3 meter for frequencies up to 18 GHz and 2 meter above 18 GHz. A logarithmic periodic antenna is used for the frequency range 30 MHz to 1 GHz. Horn antennas are used for frequency range 1 GHz to 40 GHz. The EUT is aligned within 3 dB beam width of the measurement antenna with three orthogonal axis measurements on the EUT.

**Schematic:**



**Testing method:**

#### Exploratory, preliminary measurements

The EUT and its associated accessories are placed on a non-conductive position manipulator (tipping device) of 1.50 m height which is placed on the turntable. By rotating the turntable (range 0° to 360°, step 45°) and the EUT itself on 3-orthogonal axis (the emission spectrum and its characteristics was recorded with an EMI-receiver, broadband antenna and software.

The measurements are performed in horizontal and vertical polarization of the measurement antennas. The results are documented in a diagram. Critical frequencies (low margin to limit) are saved within a table for further investigations. If various operating modes are supported, further investigations are made to find the worst-case of them. Also the interconnection cables and equipment position were varied in order to maximize the emissions.

#### Final measurement on critical frequencies

Based on the exploratory measurements, the most critical frequencies are re-measured by maintaining the EUT's worst-case operation mode, cable position, etc.

First a frequency zoom around the critical frequency is done to locate the frequency more precisely. After this step, for all identified critical frequencies, the maximum peak was determined. Following parameters were varied: the turntable angle continuously in the range 0 to 360 degree, the EUT itself over 3-orthogonal axis and the height for EUT with large dimensions.

On the determined worst-case position, a final measurement with necessary bandwidth and detector according standard has been carried out.

The readings on the spectrum analyzer are corrected with conversion value between field strength and E(I)RP, so the readings shown are equivalent to ERP/EIRP values. Critical measurements near the limit are re-measured with a substitution method accord. ANSI/TIA/EIA 603 C/D

**Formula:**

$$E_C = E_R + AF + C_L + D_F - G_A \quad (1)$$

$$E_{C_{E(I)RP}} = E_C - 95.2 \text{ dB}$$

$$M = L_T - E_{C_{E(I)RP}}$$

$E_C$  = Electrical field – corrected value

$E_R$  = Receiver reading

$M$  = Margin

$L_T$  = Limit

$AF$  = Antenna factor

$C_L$  = Cable loss

$D_F$  = Distance correction factor (if used)

$G_A$  = Gain of pre-amplifier (if used)

$E_{C_{E(I)RP}}$  = Electrical field corrected for E(I)RP

All units are dB-units, positive margin means value is below limit.

## 5. Measurement results

### 5.1. RF-Parameter - Radiated out of Band RF emissions and Band Edge

#### 5.1.1. Test location and equipments (for reference numbers please see chapter 'List of test equipment')

test location	<input checked="" type="checkbox"/> CETECOM Essen (Chapter. 2.2.1)	<input type="checkbox"/> Please see Chapter. 2.2.2	<input type="checkbox"/> Please see Chapter. 2.2.3
test site	<input type="checkbox"/> 441 EMI SAR	<input type="checkbox"/> 487 SAR NSA	<input checked="" type="checkbox"/> 443 FAR
receiver	<input type="checkbox"/> 377 ESCS30	<input type="checkbox"/> 001 ESS	<input type="checkbox"/> 489 ESU 40
spectr. analys.	<input type="checkbox"/> 584 FSU	<input type="checkbox"/> 120 FSEM	<input checked="" type="checkbox"/> 264 FSEK
antenna	<input checked="" type="checkbox"/> 439 HL 562	<input checked="" type="checkbox"/> 549 HL 025	<input type="checkbox"/> 302 BBHA9170
signaling	<input type="checkbox"/> 017 CMD 65	<input type="checkbox"/> 323 CMD 55	<input type="checkbox"/> 340 CMD 55
signaling	<input type="checkbox"/> 392 MT8820A	<input checked="" type="checkbox"/> 546 CMU200	<input type="checkbox"/> 547 CMU
power supply	<input checked="" type="checkbox"/> 611 E3636A	<input type="checkbox"/> 457 EA 3013A	<input type="checkbox"/> 459 EA 2032-50
otherwise	<input type="checkbox"/> 529 6dB divider	<input type="checkbox"/> 530 6dB Att.	<input type="checkbox"/> 110 USB LWL
line voltage	<input type="checkbox"/> 230 V 50 Hz via public mains	<input type="checkbox"/> 060 110 V/ 60 Hz via PAS 5000	<input type="checkbox"/> 268 EA- 3050
			<input type="checkbox"/> 494 AG6632A
			<input type="checkbox"/> 477 GPS
			<input type="checkbox"/> 498 NGPE 40

#### 5.1.2. Requirements and limits

<b>FCC</b>	General: §2.1053(a) , §2.1057(a) <input checked="" type="checkbox"/> FDD Band 5: Part 22: §22.917(a)(b) <input checked="" type="checkbox"/> FDD Band 2: Part 24: §24.238(a)(b) <input type="checkbox"/> FDD Band 4: Part 27: §27.53(h)
<b>IC</b>	<input checked="" type="checkbox"/> FDD Band 5: RSS-132, Issue 3: 5.5(i)(ii) <input checked="" type="checkbox"/> FDD Band 2: RSS-133, Issue 6: 6.5.1(i)(ii) <input type="checkbox"/> FDD Band 4: RSS-139, Issue 3: 6.6 (i)(ii)
<b>Limit</b>	„the power of emissions shall be attenuated below the transmitter output power (p) by at least 43+10Log(P) dB“ -> Resulting limits for all power levels of the Mobile Phone: -13dBm

#### 5.1.3. Test condition and test set-up

link to test system (if used):	<input checked="" type="checkbox"/> air link	<input type="checkbox"/> cable connection	<input type="checkbox"/>
EUT-grounding	<input checked="" type="checkbox"/> none	<input type="checkbox"/> with power supply	<input type="checkbox"/> additional connection
Equipment set up	<input checked="" type="checkbox"/> table top		<input type="checkbox"/> floor standing
Climatic conditions	Temperature: (22±3°C)		Rel. humidity: (40±20)%
Test system set-up	Please see chapter “Test system set-up for radiated spurious emission measurements up to 20 GHz”		
Measurement method	The spectrum was scanned from 9 kHz to the 10th harmonic of the highest frequency generated within the equipment. A PEAK detector was used except measurements near the Band-Edge where a AVERAGE detector applied for critical measurements.		
EUT settings	<p><b>FDD Band II / IV / V:</b> A call was established on highest power transmit conditions in RMC99 mode.</p> <p><b>GSM / GPRS / E-GPRS Band 850 &amp; 1900:</b> A call was established with settings according chapter “Parameter settings on mobile phone and base station CMU200”</p> <p>The measurements were made at the low, middle and high carrier frequencies of each of the supported operating band. Choosing three TX-carrier frequencies of the wireless device, should be sufficient to demonstrate compliance.</p>		

**Spectrum-analyzer settings for GSM/GPRS/E-GPRS 850 Mode**

	Start freq. MHz	Stop freq. MHz	R-BW MHz	V-BW MHz	Sweep time sec.	Att. [dB]	Detector
Sweep 1 (subrange 1)	30	1000	1	1	10	10	MaxH-PK
Sweep 2 (subrange 2)	1000	2800	1	1	15	10	MaxH-PK
Sweep 3 (subrange 3)	2800	9000	1	1	60	10	MaxH-PK
Sweep 4a (Block-Edge)	823	824	0.003	0.01	30	10	MaxH-PK
Sweep 4b (Block-Edge)	849	850	0.003	0.01	30	10	MaxH-PK

**Spectrum-analyzer settings for GSM/GPRS/E-GPRS 1900 Mode**

	Start freq. MHz	Stop freq. MHz	R-BW MHz	V-BW MHz	Sweep time sec.	Att.	Detector
Sweep 1 (subrange 1)	30	1000	1	1	10	10	MaxH-PK
Sweep 2 (subrange 2)	1000	2800	1	1	15	10	MaxH-PK
Sweep 3 (subrange 3)	2800	20000	1	1	160	10	MaxH-PK
Sweep 4a (Block-Edge)	1849	1850	0.003	0.01	30	10	MaxH-PK
Sweep 4b (Block-Edge)	1910	1911	0.003	0.01	30	10	MaxH-AV

**Spectrum-analyzer settings for FDD band II**

	Start freq. MHz	Stop freq. MHz	R-BW MHz	V-BW MHz	Sweep time sec.	Att. [dB]	Detector
Sweep 1 (subrange 1)	30	1000	1	1	10	10	MaxH-PK
Sweep 1 (subrange 2)	1000	2800	1	1	15	0	MaxH-PK
Sweep 1 (subrange 3)	2800	20000	1	1	60	10	MaxH-PK
Sweep 2a (Band-Edge)	1849	1850	0.05	0.5	30	35	MaxH-PK
Sweep 2b (Band-Edge)	1849	1850			30	35	MaxH-AV
Sweep 3a (Band-Edge)	1910	1911			30	35	MaxH-PK
Sweep 3b (Band-Edge)	1910	1911			30	35	MaxH-AV

**Spectrum-analyzer settings for FDD Band V**

	Start freq. MHz	Stop freq. MHz	R-BW MHz	V-BW MHz	Sweep time sec.	Att.	Detector
Sweep 1 (subrange 1)	30	1000	1	1	10	10	MaxH-PK
Sweep 1 (subrange 2)	1000	2800	1	1	15	0	MaxH-PK
Sweep 1 (subrange 3)	2800	12000	1	1	160	10	MaxH-PK
Sweep 2a (Band-Edge)	823	824	0.05	0.5	30	35	MaxH-PK
Sweep 2b (Band-Edge)	823	824			30	35	MaxH-AV
Sweep 3a (Band-Edge)	850	851			30	35	MaxH-PK
Sweep 3b (Band-Edge)	850	851			30	35	MaxH-AV

### 5.1.4. Results

The results are presented below in summary form only. For more information please see each diagram enclosed in annex 4

#### 5.1.4.1. GSM/ GPRS Band 850:

Diagram no.	Carrier Channel		Frequency range	OP-mode no.	Set-up	Remark	Used detector			Result
	Range	No.					PK	AV	QP	
--	Low	128	--	1	1	--	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	--
9.03	Low		823 – 824 MHz			Band Edge Compliance	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Pass
--	Middle	192	--			--	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	--
8.06	High	251	30 MHz – 9 GHz			Carrier on diagram, not relevant for results	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Pass
9.04	High		849 – 850 MHz			Band-Edge compliance	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Pass

Remarks: see final results enclosed in Annex 1

#### 5.1.4.2. GSM/ GPRS Band 1900:

Diagram no.	Carrier Channel		Frequency range	OP-mode no.	Set-up	Remark	Used detector			Result
	Range	No.					PK	AV	QP	
--	Low	512	--	2	1	--	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	--
9.07	Low		1849 – 1850 MHz			Band Edge Compliance	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Pass
8.14	Middle	661	30 MHz – 20 GHz			Carrier on diagram, not relevant for results	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Pass
--	High	810	--			--	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	--
9.08	High		1910 – 1911 MHz			Band-Edge compliance	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Pass

Remarks: see final results enclosed in Annex 1

**5.1.4.3. UMTS\_FDD Band II:**

Diagram no.	Carrier Channel		Frequency range	OP-mode no.	Set-up	Remark	Used detector			Result
	Range	No.					PK	AV	QP	
--	Low	9262	--	3	1	--	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	--
9.01	Low		1849 – 1850 MHz		1	Band Edge Compliance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pass
--	Middle	9400	--		1	--	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	--
8.02	High	9538	30 MHz to 19.5 GHz		1	Carrier visible on diagram. Not relevant for results	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Pass
9.02	High		1910 – 1911 MHz		1	Band-Edge compliance:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pass

Remark: see final results enclosed in Annex 1

**5.1.4.4. UMTS\_FDD Band V:**

Diagram no.	Carrier Channel		Frequency range	OP-mode no.	Set-up	Remark	Used detector			Result
	Range	No.					PK	AV	QP	
8.50	Low	4132	30 MHz to 9 GHz	7	1	Carrier visible on diagram. Not relevant for results	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pass
9.50	Low		823 – 824 MHz		1	Band Edge Compliance	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Pass
--	Middle	4183	--		1	--	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	--
--	High	4233	--		1	--	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	--
9.51	High		849 – 850 MHz		1	Band-Edge compliance	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Pass

Remark: no emission/harmonics detected

## 5.2. Measurement uncertainties

The reported uncertainties are calculated based on the standard uncertainty multiplied with the appropriate coverage factor **k**, such that a confidence level of approximately 95% is achieved.

For uncertainty determination, each component used in the concrete measurement set-up was taken in account and its contribution to the overall uncertainty according to its statistical distribution calculated.

Following table shows expectable uncertainties for each measurement type performed.

RF-Measurement	Reference	Frequency range	Calculated uncertainty based on a confidence level of 95%							Remarks
Conducted emissions ( $U_{CISPR}$ )	CISPR 16-2-1	9 kHz - 150 kHz	4.0 dB							-
		150 kHz - 30 MHz	3.6 dB							
Radiated emissions Enclosure	CISPR 16-2-3	30 MHz - 1 GHz	4.2 dB							E-Field
		1 GHz - 18 GHz	5.1 dB							
Disturbance power	CISPR 16-2-2	30 MHz - 300 MHz	-							-
Power Output radiated	-	30 MHz - 4 GHz	3.17 dB							Substitution method
Power Output conducted	-	Set-up No.	Cel-C1	Cel-C2	BT1	W1	W2			
		9 kHz - 12.75 GHz	N/A	0.60	--	--	--			
		12.75 - 26.5GHz	N/A	0.82	--	--	--			
Conducted emissions on RF-port	-	9 kHz - 2.8 GHz	0.70	N/A	--	--	--		N/A - not applicable	
		2.8 GHz - 12.75GHz	1.48	N/A	--	--	--			
		12.75 GHz - 18GHz	1.81	N/A	--	--	--			
		18 GHz - 26.5GHz	1.83	N/A	--	--	--			
Occupied bandwidth	-	9 kHz - 4 GHz	0.1272 ppm (Delta Marker)							Frequency error
			1.0 dB							Power
Emission bandwidth	-	9 kHz - 4 GHz	0.1272 ppm (Delta Marker)							Frequency error
			See above: 0.70 dB							Power
Frequency stability	-	9 kHz - 20 GHz	0.0636 ppm							-
Radiated emissions Enclosure	-	150 kHz - 30 MHz	5.0 dB							Magnetic field E-field Substitution
		30 MHz - 1 GHz	4.2 dB							
		1 GHz - 20 GHz	3.17 dB							

**Table: measurement uncertainties, valid for conducted/radiated measurements**



## 6. Abbreviations used in this report

The abbreviations	
ANSI	American National Standards Institute
AV , AVG, CAV	Average detector
EIRP	Equivalent isotropically radiated power, determined within a separate measurement
EGPRS	Enhanced General Packet Radio Service
EUT	Equipment Under Test
FCC	Federal Communications Commission, USA
IC	Industry Canada
n.a.	not applicable
Op-Mode	Operating mode of the equipment
PK	Peak
RBW	resolution bandwidth
RF	Radio frequency
RSS	Radio Standards Specification, Dokuments from Industry Canada
Rx	Receiver
TCH	Traffic channel
Tx	Transmitter
QP	Quasi peak detector
VBW	Video bandwidth
ERP	Effective radiated power

## 7. Accreditation details of CETECOM's laboratories and test sites

Ref.-No.	Accreditation Certificate	Valid for laboratory area or test site	Accreditation Body
-	D-PL-12047-01-01	All laboratories and test sites of CETECOM GmbH, Essen	DAkkS, Deutsche Akkreditierungsstelle GmbH
337 487 558 348 348	(MRA US-EU 0003)	Radiated Measurements 30 MHz to 1 GHz, 3 m / 10 m (OATS) Radiated Measurements 30 MHz to 1 GHz, 3 m (SAR) Radiated Measurements above 1 GHz, 3 m (FAR) Mains Ports Conducted Interference Measurements Telecommunication Ports Conducted Interference Measurment.	FCC, Federal Communications Commission Laboratory Division, USA
337 487 550 558	3462D-1 3462D-2 3462D-2 3462D-3	Radiated Measurements 30 MHz to 1 GHz, 3 m / 10 m (OATS) Radiated Measurements 30 MHz to 1 GHz, 3 m (SAR) Radiated Measurements 1 GHz to 6 GHz, 3 m (SAR) Radiated Measurements above 1 GHz, 3 m (FAR)	IC, Industry Canada Certification and Engineering Bureau
487 550 348 348	R-2666 G-301 C-2914 T-1967	Radiated Measurements 30 MHz to 1 GHz, 3 m (SAR) Radiated Measurements 1 GHz to 6 GHz, 3 m (SAR) Mains Ports Conducted Interference Measurements Telecommunication Ports Conducted Interference Measurment.	VCCI, Voluntary Control Council for Interference by Information Technology Equipment, Japan

OATS = Open Area Test Site, SAR = Semi Anechoic Room, FAR = Fully Anechoic Room

## 8. Instruments and Ancillary

The “Ref.-No” in the left column of the following tables allows the clear identification of the laboratory equipment.

### 8.0.1. Test software and firmware of equipment

Ref.-No.	Equipment	Type	Serial-No.	Version of Firmware or Software during the test
001	EMI Test Receiver	ESS	825132/017	Firm.= 1.21 , OTP=2.0, GRA=2.0
012	Signal Generator (EMS-cond.)	SMY 01	839069/027	Firm.= V 2.02
013	Power Meter (EMS cond.)	NRVD	839111/003	Firm.= V 1.51
017	Digital Radiocommunication Tester	CMD 60 M	844365/014	Firmware = V 3.52 .22.01.99, DECT = D2.87 13.01.99
053	Audio Analyzer	UPA3	860612/022	Firm. V 4.3
119	RT Harmonics Analyzer dig. Flickermeter	B10	G60547	Firm.= V 3.1DHG
140	Signal Generator	SMHU	831314/006	Firm.= 3.21
261	Thermal Power Sensor	NRV-Z55	825083/0008	EPROM-Datum 02.12.04, SE EE 1 B
262	Power Meter	NRV-S	825770/0010	Firm.= 2.6
263	Signal Generator	SMP 04	826190/0007	Firm.=3.21
264	Spectrum Analyzer	FSEK 30	826939/005	Bios=2.1, Analyzer= 3.20
295	Racal Digital Radio Test Set	6103	1572	UNIT Firmware= 4.04, SW-Main=4.04, SW-BBP=1.04, SW-DSP=1.02, Hardboot=1.02, Softboot=2.02
298	Univ. Radio Communication Tester	CMU 200	832221/091	R&S Test Firmware =3.53 /3.54 (current Testsoftw. f. all band used
323	Digital Radiocommunication Tester	CMD 55	825878/0034	Firm.= 3.52 .22.01.99
331	Climatic Test Chamber -40/+80 Grad	HC 4055	43146	TSI 1.53
335	CTC-EMS-Conducted	System EMS Conducted	-	EMC 32 V 8.52
340	Digital Radiocommunication Tester	CMD 55	849709/037	Firm.= 3.52 .22.01.99
355	Power Meter	URV 5	891310/027	Firm.= 1.31
365	10V Insertion Unit 50 Ohm	URV5-Z2	100880	Eprom Data = 31.03.08
366	Ultra Compact Simulator	UCS 500 M4	V0531100594	Firm. UCS 500=001925/3.06a02, rc=ISMIEC 4.10
371	Bluetooth Tester	CBT32	100153	CBT V5.30+ SW-Option K55, K57
377	EMI Test Receiver	ESCS 30	100160	Firm.= 2.30, OTP= 02.01, GRA= 02.36
378	Broadband RF Field Monitor	RadiSense III	03D00013SSNO-08	Firm.= V.03D13
389	Digital Multimeter	Keithley 2000	0583926	Firm. = A13 (Mainboard) A02 (Display) Firm.= 4.50 #005, IPL=4.01#001, OS=4.02#001, GSM=4.41#013, W-CDMA= 4.54#004, scenario= 4.52#002
392	Radio Communication Tester	MT8820A	6K00000788	
436	Univ. Radio Communication Tester	CMU 200	103083	R&S Test Firmware Base=5.14, Mess-Software= GSM:5.14 WCDMA:5.14 (current Testsoftw. F. all band
441	CTC-SAR-EMI Cable Loss	System EMI field (SAR)	-	EMC 32 Version 8.52
442	CTC-SAR-EMS	System EMS field (SAR)	-	EMC 32 Version 8.40
443	CTC-FAR-EMI-RSE	System CTC-FAR-EMI-RSE	-	EMC 32 Ver. 9.15.00
444	CTC-FAR-EMS field	System-EMS-Field (FAR)	-	EMC 32 Version 9.15.00
460	Univ. Radio Communication Tester	CMU 200	108901	R&S Test Firmware Base=5.14, GSM=5.14 WCDMA=5.14 (current Testsoftw.,f. all band to be used,
489	EMI Test Receiver	ESU40	1000-30	Firmware=4.43 SP3, Bios=V5.1-16-3, Spec. =01.00
491	ESD Simulator dito	ESD dito	dit0307022	V 2.30
524	Voltage Drop Simulator	VDS 200	0196-16	Software Nr: 000037 Version V4.20a01
526	Burst Generator	EFT 200 A	0496-06	Software Nr. 000034 Version V2.32
527	Micro Pulse Generator	MPG 200 B	0496-05	Software-Nr. 000030 Version V2.43
528	Load Dump Simulator	LD 200B	0496-06	Software-Nr. 000031 Version V2.35a01
546	Univ. Radio Communication Tester	CMU 200	106436	R&S Test Firmware Base=5.14, GSM=5.14 WCDMA=5.14 (current Testsoftw.,f. all band to be used
547	Univ. Radio Communication Tester	CMU 200	835390/014	R&S Test Firmware Base=V5.1403 (current Testsoftw., f. all band used, GSM = 5.14 WCDMA: = 5.14
584	Spectrum Analyzer	FSU 8	100248	2.82_SP3
597	Univ. Radio Communication Tester	CMU 200	100347	R&S Test Firmware Base=5.01, GSM=5.02 WCDMA= not installed, Mainboard= μP1=V.850
598	Spectrum Analyzer	FSEM 30 (Reserve)	831259/013	Firmware Bios 3.40 , Analyzer 3.40 Sp 2
620	EMI Test Receiver	ESU 26	100362	4.43_SP3
642	Wideband Radio Communication Tester	CMW 500	126089	Setup V03.26, Test programm component V03.02.20
692	Bluetooth Tester	CBT 32	100236	CBT V 5.40, FW: V.2.41 (FPGA Digital, V. 3.09 FPGA RF)

### 8.0.2. Single instruments and test systems

Ref.-No.	Equipment	Type	Serial-No.	Manufacturer	Interval of calibration	Remark	Cal due
001	EMI Test Receiver	ESS	825132/017	Rohde & Schwarz	12 M	-	30.04.2016
005	AC - LISN (50 Ohm/50µH, test site 1)	ESH2-Z5	861741/005	Rohde & Schwarz	12 M	-	30.04.2016
007	Single-Line V-Network (50 Ohm/5µH)	ESH3-Z6	892563/002	Rohde & Schwarz	12 M	-	30.04.2016
009	Power Meter (EMS-radiated)	NRV	863056/017	Rohde & Schwarz	24 M	-	30.04.2017
016	Line Impedance Simulating Network	Op. 24-D	B6366	Spitzenberger+Spies	36 M	-	31.03.2016
020	Horn Antenna 18 GHz (Subst 1)	3115	9107-3699	EMCO	36/12 M	-	31.03.2017
021	Loop Antenna (H-Field)	6502	9206-2770	EMCO	36 M	-	30.04.2018
030	Loop Antenna (H-field)	HFH-Z2	879604/026	Rohde & Schwarz	36 M	-	30.04.2018
033	RF-current probe (100kHz-30MHz)	ESH2-Z1	879581/18	Rohde & Schwarz	24 M	-	30.04.2017
057	relay-switch-unit (EMS system)	RSU	494440/002	Rohde & Schwarz	pre-m	1a	
060	power amplifier (DC-2kHz)	PAS 5000	B6363	Spitzenberger+Spies	-	3	
066	notch filter (WCDMA; FDD1)	WRCT 1900/2200-5/40-10EEK	5	Wainwright GmbH	12 M	1g	30.09.2016
086	DC - power supply, 0 -10 A	LNG 50-10	-	Heinzinger Electronic	pre-m	2	
087	DC - power supply, 0 -5 A	EA-3013 S	-	Elektro Automatik	pre-m	2	
090	Helmholtz coil: 2x10 coils in series	Helmholtz coil: 2x10 coils in	-	RWTÜV	24 M	4	31.03.2016
091	USB-LWL-Converter	OLS-1	007/2006	Ing. Büro Scheiba	-	4	
099	passive voltage probe	ESH2-Z3	299.7810.52	Rohde & Schwarz	36 M	-	30.04.2018
100	passive voltage probe	Probe TK 9416	without	Schwarzbeck	36 M	-	30.04.2018
110	USB-LWL-Converter	OLS-1	-	Ing. Büro Scheiba	-	4	
119	RT Harmonics Analyzer dig. Flickermeter	B10	G60547	BOCONSULT	36 M	-	31.03.2016
136	adjustable dipole antenna (Dipole 1)	3121C-DB4	9105-0697	EMCO	36 M	-	30.04.2018
140	Signal Generator	SMHU	831314/006	Rohde & Schwarz	24 M	-	31.03.2016
248	attenuator	SMA 6dB 2W	-	Radiall	pre-m	2	
249	attenuator	SMA 10dB 10W	-	Radiall	pre-m	2	
252	attenuator	N 6dB 12W	-	Radiall	pre-m	2	
256	attenuator	SMA 3dB 2W	-	Radiall	pre-m	2	
257	hybrid	4031C	04491	Narda	pre-m	2	
260	hybrid coupler	4032C	11342	Narda	pre-m	2	
261	Thermal Power Sensor	NRV-Z55	825083/0008	Rohde & Schwarz	24 M	-	31.03.2016
262	Power Meter	NRV-S	825770/0010	Rohde & Schwarz	24 M	-	31.03.2016
263	Signal Generator	SMP 04	826190/0007	Rohde & Schwarz	36 M	-	31.03.2016
264	Spectrum Analyzer	FSEK 30	826939/005	Rohde & Schwarz	12 M	-	30.04.2016
265	peak power sensor	NRV-Z33, Model 04	840414/009	Rohde & Schwarz	24 M	-	31.03.2016
266	Peak Power Sensor	NRV-Z31, Model 04	843383/016	Rohde & Schwarz	24 M	-	31.03.2016
267	notch filter GSM 850	WRCA 800/960-6EEK	9	Wainwright GmbH	pre-m	2	
270	termination	1418 N	BB6935	Weinschel	pre-m	2	
271	termination	1418 N	BE6384	Weinschel	pre-m	2	
272	attenuator (20 dB) 50 W	Model 47	BF6239	Weinschel	pre-m	2	
273	attenuator (10 dB) 100 W	Model 48	BF9229	Weinschel	pre-m	2	
274	attenuator (10 dB) 50 W	Model 47 (10 dB) 50 W	BG0321	Weinschel	pre-m	2	
275	DC-Block	Model 7003 (N)	C5129	Weinschel	pre-m	2	
276	DC-Block	Model 7006 (SMA)	C7061	Weinschel	pre-m	2	
279	power divider	1515 (SMA)	LH855	Weinschel	pre-m	2	
287	pre-amplifier 25MHz - 4GHz	AMF-2D-100M4G-35-10P	379418	Miteq	12 M	1c	30.09.2016
291	high pass filter GSM 850/900	WHJ 2200-4EE	14	Wainwright GmbH	12 M	1c	30.09.2016
298	Univ. Radio Communication Tester	CMU 200	832221/091	Rohde & Schwarz	pre-m	3	
300	AC LISN (50 Ohm/50µH, 1-phase)	ESH3-Z5	892 239/020	Rohde & Schwarz	12 M	-	30.04.2016
301	attenuator (20 dB) 50W, 18GHz	47-20-33	AW0272	Lucas Weinschel	pre-m	2	
302	horn antenna 40 GHz (Meas 1)	BBHA9170	155	Schwarzbeck	36 M	-	31.03.2017
303	horn antenna 40 GHz (Subst 1)	BBHA9170	156	Schwarzbeck	36 M	-	31.03.2017
331	Climatic Test Chamber -40/+80 Grad	HC 4055	43146	Heraeus Vötsch	24 M	-	30.12.2016
341	Digital Multimeter	Fluke 112	81650455	Fluke	24 M	-	31.03.2016
342	Digital Multimeter	Voltcraft M-4660A	IB 255466	Voltcraft	24 M	-	30.04.2017
347	laboratory site	radio lab.	-	-	-	5	
348	laboratory site	EMI conducted	-	-	-	5	
354	DC - Power Supply 40A	NGPE 40/40	448	Rohde & Schwarz	pre-m	2	
355	Power Meter	URV 5	891310/027	Rohde & Schwarz	24 M	-	31.03.2016
357	power sensor	NRV-Z1	861761/002	Rohde & Schwarz	24 M	-	30.04.2017
371	Bluetooth Tester	CBT32	100153	R&S	24 M	-	31.03.2016
373	Single-Line V-Network (50 Ohm/5µH)	ESH3-Z6	100535	Rohde & Schwarz	24 M	-	30.04.2017
377	EMI Test Receiver	ESCS 30	100160	Rohde & Schwarz	12 M	-	30.04.2016
389	Digital Multimeter	Keithley 2000	0583926	Keithley	24 M	-	30.04.2017
392	Radio Communication Tester	MT8820A	6K00000788	Anritsu	12 M	-	30.04.2016
431	Model 7405	Near-Field Probe Set	9305-2457	EMCO	-	4	
436	Univ. Radio Communication Tester	CMU 200	103083	Rohde & Schwarz	12 M	-	30.04.2016
439	UltraLog-Antenna	HL 562	100248	Rohde & Schwarz	36 M	-	31.03.2017
441	CTC-SAR-EMI Cable Loss	System EMI field (SAR) Cable	-	CETECOM	12 M	5	30.01.2016
443	CTC-FAR-EMI-RSE	System CTC-FAR-EMI-RSE	-	ETS-Lindgren / CETECOM	12 M	5	30.09.2016
448	notch filter WCDMA_FDD II	WRCT 1850.0/2170.0-	5	Wainwright Instruments	12 M	1c	30.09.2016

Ref.-No.	Equipment	Type	Serial-No.	Manufacturer	Interval of calibration	Remark	Cal due
		5/40-		GmbH			
449	notch filter WCDMA FDD V	WRCT 824.0/894.0-5/40-8SSK	1	Wainwright	12 M	1c	30.09.2016
454	Oscilloscope	HM 205-3	9210 P 29661	Hameg	-	4	
456	DC-Power supply 0-5 A	EA 3013 S	207810	Elektro Automatik	pre-m	2	
459	DC -Power supply 0-5 A , 0-32 V	EA-PS 2032-50	910722	Elektro Automatik	pre-m	2	
460	Univ. Radio Communication Tester	CMU 200	108901	Rohde & Schwarz	12 M	-	30.04.2016
463	Universal source	HP3245A	2831A03472	Agilent	-	4	
466	Digital Multimeter	Fluke 112	89210157	Fluke USA	24 M	-	31.03.2016
467	Digital Multimeter	Fluke 112	89680306	Fluke USA	36 M	-	30.04.2018
468	Digital Multimeter	Fluke 112	90090455	Fluke USA	36 M	-	30.04.2018
477	ReRadiating GPS-System	AS-47	-	Automotive Cons. Fink	-	3	
480	power meter (Fula)	NRVS	838392/031	Rohde & Schwarz	24 M	-	30.04.2017
482	filter matrix	Filter matrix SAR 1	-	CETECOM (Brl)	-	1d	
484	pre-amplifier 2,5 - 18 GHz	AMF-5D-02501800-25-10P	1244554	Miteq	12 M	-	30.09.2016
487	System CTC NSA-Verification SAR-EMI	System EMI field (SAR) NSA	-	ETS Lindgren / CETECOM	24 M	-	31.07.2017
489	EMI Test Receiver	ESU40	1000-30	Rohde & Schwarz	12 M	-	30.04.2016
502	band reject filter	WRCG 1709/1786-1699/1796-	SN 9	Wainwright	pre-m	2	
503	band reject filter	WRCG 824/849-814/859-	SN 5	Wainwright	pre-m	2	
512	notch filter GSM 850	WRCA 800/960-02/40-6EEK	SN 24	Wainwright	12 M	1c	30.09.2016
517	relais switch matrix	HF Relais Box Keithley	SE 04	Keithley	pre-m	2	
523	Digital Multimeter	L4411A	MY46000154	Agilent	24 M	-	30.04.2017
529	6 dB Broadband resistive power divider	Model 1515	LH 855	Weinschel	pre-m	2	
530	10 dB Broadband resistive power divider	R 416110000	LOT 9828	-	pre-m	2	
546	Univ. Radio Communication Tester	CMU 200	106436	R&S	12 M	-	30.04.2016
547	Univ. Radio Communication Tester	CMU 200	835390/014	Rohde & Schwarz	12 M	-	30.04.2016
548	Digital-Barometer	GBP 2300	without	Greisinger GmbH	-	-	
549	Log.Per-Antenna	HL025	1000060	Rohde & Schwarz	36 M	-	31.07.2018
552	high pass filter 2,8-18GHz	WHKX 2.8/18G-10SS	4	Wainwright	12 M	1c	30.09.2016
557	System CTC-OTA-2	R&S TS8991	-	Rohde & Schwarz	12 M	5	30.09.2016
574	Biconilog Hybrid Antenna	BTA-L	980026L	Frankonia	36/12 M	-	31.03.2016
584	Spectrum Analyzer	FSU 8	100248	Rohde & Schwarz	pre-m	-	
594	Wideband Radio Communication Tester	CMW 500	101757	Rohde & Schwarz	12 M	-	30.04.2016
597	Univ. Radio Communication Tester	CMU 200	100347	Rohde & Schwarz	36 M	-	31.03.2016
598	Spectrum Analyzer	FSEM 30 (Reserve)	831259/013	Rohde & Schwarz	24 M	-	30.04.2017
600	power meter	NRVD (Reserve)	834501/018	Rohde & Schwarz	24 M	-	30.04.2017
601	medium-sensitivity diode sensor	NRV-Z5 (Reserve)	8435323/003	Rohde & Schwarz	24 M	-	30.04.2017
602	peak power sensor	NRV-Z32 (Reserve)	835080	Rohde & Schwarz	24 M	-	
611	DC power supply	E3632A	KR 75305854	Agilent	pre-m	2	
612	DC power supply	E3632A	MY 40001321	Agilent	pre-m	2	
613	Attenuator	R416120000 20dB 10W	Lot. 9828	Radiall	pre-m	2	
616	Digitalmultimeter	Fluke 177	88900339	Fluke	24 M	-	31.03.2016
617	Power Splitter/Combiner	ZFSC-2-2-S+	S F987001108	Mini Circuits	-	2	
618	Power Splitter/Combiner	50PD-634	600994	JFW Industries USA	-	2	
619	Power Splitter/Combiner	50PD-634	600995	JFW Industries, USA	-	3	
621	Step Attenuator 0-139 dB	RSP	100017	Rohde & Schwarz	pre-m	2	
625	Generic Test Load USB	Generic Test Load USB	-	CETECOM	-	2	
627	data logger	OPUS 1	201.0999.9302.6.4.1.4 3	G. Lufft GmbH	24 M	-	30.04.2017
634	Spectrum Analyzer	FSM (HF-Unit)	826188/010	Rohde & Schwarz	pre-m	2	
637	High Speed HDMI with Ethernet 1m	HDMI cable with Ethernet 1m	-	Kogilink	-	2	
638	HDMI Kabel with Ethernet 1,5 m flach	HDMI cable with Ethernet	-	Reichelt	-	2	
640	HDMI cable 2m rund	HDMI cable 2m rund	-	Reichelt	-	2	
641	HDMI cable with Ethernet	Certified HDMI cable with	-	PureLink	-	2	
642	Wideband Radio Communication Tester	CMW 500	126089	Rohde&Schwarz	12 M	-	30.04.2016
644	Amplifier	ZX60-2534M+	SN865701299	Mini-Circuits	-	-	
670	Univ. Radio Communication Tester	CMU 200	106833	Rohde & Schwarz	24 M	-	31.03.2016
671	DC-power supply 0-5 A	EA-3013S	-	Elektro Automatik	pre-m	2	
678	Power Meter	NRP	101638	Rohde&Schwarz	pre-m	-	
683	Spectrum Analyzer	FSU 26	200571	Rohde & Schwarz	12 M	-	30.04.2016
686	Field Analyzer	EHP-200A	160WX30702	Narda Safety Test Solutions	24 M	-	30.04.2017
687	Signal Generator	SMF 100A	102073	Rohde&Schwarz	12 M	-	30.04.2016
688	Pre Amp	JS-18004000-40-8P	1750117	Miteq	pre-m	-	
692	Bluetooth Tester	CBT 32	100236	Rohde & Schwarz	24 M	-	31.03.2016
697	Power Splitter	ZN4PD-642W-S+	165001445	Mini-Circuits	-	2	

### 8.0.3. Legend

Note / remarks		Calibrated during system calibration:
	1a	System CTC-SAR-EMS (Ref.-No. 442)
	1b	System-CTC-EMS-Conducted (Ref.-No. 335)
	1c	System CTC-FAR-EMI-RSE (Ref.-No . 443)
	1d	System CTC-SAR-EMI (Ref.-No . 441)
	1e	System CTC-OATS (EMI radiated) (Ref.-No. 337)
	1 f	System CTC-CTIA-OTA (Ref.-No . 420)
	1 g	System CTC-FAR-EMS (Ref.-No . 444)
	2	Calibration or equipment check immediately before measurement
	3	Regulatory maintained equipment for functional check or support purpose
	4	Ancillary equipment without calibration e.g. mechanical equipment or monitoring equipment
	5	Test System

Interval of calibration	12 M	12 month
	24 M	24 month
	36 M	36 month
	24/12 M	Calibration every 24 months, between this every 12 months internal validation
	36/12 M	Calibration every 36 months, between this every 12 months internal validation
	Pre-m	Check before starting the measurement
	-	Without calibration

## 9. Versions of test reports (change history)

Version	Applied changes	Date of release
--	Initial release	2016-03-15
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