





# PARTIAL TEST REPORT

No.: 2-20789055c/10

According to:  
**FCC Regulations**  
 FCC Part 22/24  
 &  
**IC Regulations**  
 RSS-132, Issue 2  
 RSS-133, Issue 5  
 RSS-Gen, Issue 2

for  
 Everon Oy/AB

GSM/GPRS/GPS Watch helping device URG-BRA-002  
 + Battery pack URG-BAT-002  
 FCC ID: YLO201001  
 IC: 9150A-201001

Laboratory Accreditation and Listings			
 Deutscher Akkreditierungs Rat DGA-PL-176/94-03	 Reg. No.: 99538 MRA US-EU 0003	 Industry Canada Reg. No.: 3462D-1 3462D-2	 Reg. No.: R-2665, R-2666 C-2914, T-339
accredited according to DIN EN ISO/IEC 17025			
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## 1. Summary of test results

The presented GSM/GPRS/GPS watch helping device, type URG-BRA-002, incorporates a already FCC/IC certified GSM/GPRS module from Telit company with FCC-ID RI7GE864. Therefore only radiated tests have been re-performed to show compliance against radiated FCC22/24 limits.

The test results apply exclusively to the test samples as presented in chapter 3.1. 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.

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 47 Rules and RSS-132 and RSS-133 of IC rules.

### 1.1. TESTS OVERVIEW FCC Part 15/22/24 and Canada IC Standards (RSS)

TEST CASES	PORT	REFERENCES & LIMITS			EUT set-up	EUT operating mode	Result
		FCC Standard	RSS Section	TEST LIMIT			
TX-Mode							
RF POWER (conducted)	Antenna terminal (conducted)	§2.1046	--	N/A	--	--	Not performed, Remark 1
RF-POWER radiated (ERP/EIRP)	Cabinet	§2.1046 §22.913(a)(2)  §24.232(c)	RSS-132: 4.4 SRSP-503: 5.1.3  RSS-133:4.1/6.4 SRSP-510: 5.1.2	< 7 Watt (ERP)  < 2 Watt (EIRP)	2	1+2	Passed
SPURIOUS EMISSIONS (conducted)	Antenna terminal (conducted)	§2.1051 §22.917(a)(b) §24.238(a)(b)	RSS-132: 4.5.1 RSS-133: 6.5.1	43+10log(P) dBc	--	--	Not performed, Remark 1
99% OCCUPIED BANDWIDTH	Antenna terminal (conducted)	§2.202 §2.1049 §22.917(a) §24.238(a)	RSS-Gen:4.4.1	99% Power	--	--	Not performed, Remark 1
SPURIOUS EMISSIONS (radiated)	Cabinet + Interconnecting cables (radiated)	§15.209(a)	RSS-Gen: 4.11 RSS-210: Table 3 RSS-310: Table 4	2400/F(kHz) μV/m 24000/F(kHz) μV/m 30 μV/m	--	--	Not performed, Remark 1
		§2.1053(a) §22.917(a)(b) §24.238(a)(b)	RSS-132: 4.5.1 RSS-133: 6.5.1	43+10log(P) dBc	1+2	1+2	Passed
FREQUENCY STABILITY	Antenna terminal (conducted)	§22.355, table C-1 §24.235 §2.1055	RSS-132: 4.3 RSS-133: 6.3	< 2.5ppm  <0.1 ppm	--	--	Not performed, Remark 1

RX Mode							
AC-Power Lines Conducted Emissions	AC-Power lines	§15.107 §15.207	RSS-Gen, Issue 2: Chapter 7.2.2	FCC §15.107 class B limits §15.207 limits  IC: Table 2, Chapter 7.2.2	--	--	Passed Remark 2
RECEIVER Radiated emissions	Cabinet + Interconnecting cables (radiated)	§15.109 §15.33 §15.35	RSS-132, Issue 2: Chapter 4.6 RSS-Gen, Issue 2: Chapter 6(a)  RSS-133, Issue 5: Chapter 6.6	FCC 15.109 class B limits  IC-limits: Table 1, Chapter 6	--	--	Passed Remark 2
RECEIVER Conducted emissions	Antenna terminal (conducted)	§2.1051 §15.111	RSS-Gen: 6(b) RSS-132: 4.6 RSS-133: 6.7(b)	43+10log(P) dBc IC: < 2 nW/4kHz (30<f<1000MHz) < 5nW/4kHz (f> 1GHz)	--	--	Not applicable

**Remarks:**

- 1.) see initial Part 22/24 test report for GSM modules certification
- 2.) see separate test report 2\_20789055d\_10 and corresponding annexes A1/A2 for measurements according Part 15.107/15.109, Subpart B

**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.



.....  
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.....  
Dipl.-Ing. C. 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
Laboratory accreditations/Listings:	DAR-Registration No. DGA-PL-176/94-03 FCC-Registration No. 99538, MRA US-EU 0003 IC-Registration No. 3462D-1, 3462D-2 VCCI Registration No. R-2665,R-2666,C-2914,T-339
Responsible for testing laboratory:	Dipl.-Ing. W. Richter
Deputies:	Dipl.-Ing. J.Schmitt

### 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

Order No.:	20789055
Responsible for test report and project leader:	Dipl.-Ing. C. Lorenz
Receipt of EUT:	2010-07-05
Date(s) of test:	2010-07-05, 2010-07-09
Date of report:	2010-08-11
-----	
Version of template:	09.06 _All.Dotm

### 2.4. Applicant's details

Applicant's name:	Everon Oy/AB
Address:	Vakiotie 9  21420 Lieto Finland
Contact person:	Mr. Alain Moisan

### 2.5. Manufacturer's details

Manufacturer's name:	Varitron Technologies Inc.
Address:	4811 Chemin de la Savane St-Hubert, Quebec  Canada J3Y 9G1

### 3. Equipment under test (EUT)

#### 3.1. Additional declaration and description of main EUT

Main function	GSM/GPRS/GPS watch helping device		
Type	URG-BRA-002		
GSM Frequency range (US/Canada -bands)	GSM 850: 824 – 849MHz (Uplink), 869-894MHz (Downlink) GSM1900: 1850-1910MHz (Uplink), 1930-1990MHz (Downlink)		
ISM Band frequency range	ISM Band 924.1 MHz transmitter, one channel, bandwidth>500kHz		
Type of modulation	GSM operating mode: GMSK 924.1MHz TX operating mode: FSK		
Number of channels (USA/Canada -bands)	GSM 850: 128 – 251, 125 channels GSM1900: 512 – 810, 300 channels		
EMISSION DESIGNATOR(S)	300KGXW (GSM) 1M0F1DAN (TX at 921.4MHz)		
GSM Antenna	Integrated, no other information available		
921.4MHz TX antenna	Integrated, no other information available		
GPS antenna	Integrated, no other information available		
MAX PEAK Output Power: GSM 850 Radiated	17.86 dBm		
GSM1900	26.51 dBm		
MAX PEAK Output Power: GSM 1900 Conducted	Not tested, see initial certification/test report of the GSM/GPRS module		
EDGE1900	FCC-ID: RI7GE864		
FCC-ID	YLO201001		
IC	9150A-YLO201001		
Installed option	<input checked="" type="checkbox"/> GSM900 and GSM1800 Bands <input checked="" type="checkbox"/> battery charging option <input checked="" type="checkbox"/> GPS receiver		
Power supply	1. Over integrated Li-Io battery 2. Operates while connected to a AC/DC adaptor		
Special EMI components	--		
EUT sample type	<input type="checkbox"/> Production	<input checked="" type="checkbox"/> Pre-Production	<input type="checkbox"/> Engineering

#### 3.2. Configuration of cables used for testing

Cable number	Item	Type	S/N serial number	HW hardware status	Cable length
Cable 1	Charging cable	unshielded	--	--	1.86 m

Remarks: tests performed with AC/DC adaptor in order to maintain the battery voltage constant during TX tests

### 3.3. 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	GSM/GPRS/GPS Watch helping device	URG-BRA-002	S/N: 10-25-05-F1-01004609  IMEI: 357023007187264	05	1205
EUT B	Battery Pack modified**	URG-BAT-002	--	--	--

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

\*\*\*) Modified chase in order not to influence the emissions

### 3.4. 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	AC/DC adaptor	SCP06012008	--	--	--

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

### 3.5.EUT set-ups

EUT set-up no. *)	Combination of EUT and AE	Remarks
Set. 1	EUT A + EUT B + AE 1	For practical reasons tests were performed with AC/DC adaptor connected to the EUT over EUT B. Only critical sweeps were performed in set-up 2.
Set. 2	EUT A	Battery powered with full battery, approx. 4.2V

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

### 3.6. EUT operating modes

EUT operating mode no. *)	Description of operating modes	Additional information
op. 1	GSM 850 TCH mode TCH=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). 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	GSM 1900 TCH mode TCH=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). 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

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



### 3.7. Parameter Settings on mobile phone and base station CMU200

Following settings apply to the MS during the measurements in **GSM/(E)GPRS**-Mode only:

Parameter	Traffic Mode	Idle Mode
Traffic Channels mobile station (EUT)	GSM 850 TCH <sub>MS</sub> = 128/ 192 /251 GSM 1900 TCH <sub>MS</sub> = 512 / 681 / 810	--
maximum power level (PCL)	GSM 850: PCL = 5 (2 Watt) GSM 1900: PCL = 0 (1 Watt)	--
Modulation	GSM: GMSK-Modulation Scheme EDGE: 8-PSK Modulation Scheme	--
DTX	off	--
Bitstream	PRBS 2E9-1 (pseudo-random-sequence) – CCITT 0.153	
Timeslot	3	
Hopping	off	
Timeslot (slot mode)	GSM-Mode: single GPRS-Mode: maximum allowed uplink slots no. according MS class	
MS slot class	Class 10	
Maximum data transmission rate, single time slot	GSM: 17,6 kBit/s Slot EDGE: 59,2 kBit/s Slot	
Speech transcoding (Traffic Mode)	Full rate Version 1	
Mode	BCCH and TCH	
BCCH – base station (CMU,CMD)	GSM 850: 182 GSM 1900: 651	
TCH – base station (CMD, CMU)	auto	
Power level TCH – base station (used timeslot level)	- 70 dBm	
Power level BCCH – base station (control channel level)	- 80 dBm	
External attenuation RF/AF-Input/Output	Accord. calibration prior to measurements	
Mobile Country Code	310	310
BS_AG_BLK_RES	Not applicable	0
Paging reorganisation		Off (0)
Signalling channel		SDCCH
Location Update		Auto
Cell access		Disabled (barred)

#### Settings for CMU (general)

Repetition	Continuous
Stop condition	None
Display mode	Max./Min
Statistic Count	1000 Bursts
Decoder	Standard

Additional settings on the base stations CMU200 for frequency stability measurements

## 4. DESCRIPTION OF TEST SET-UP's

### 4.1. Test set-up for radiated measurements

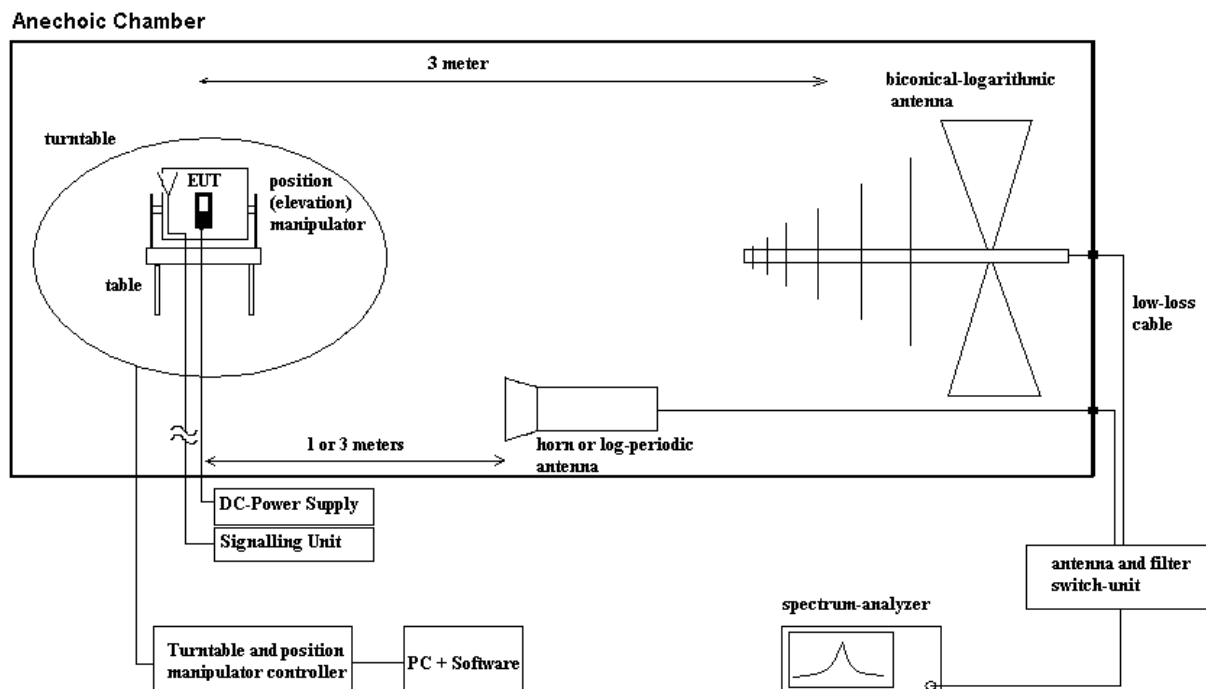
Pls. see above description and schematic for the radiated measurements set-up.

The EUT and accessories are placed on a non-conducting tipping table of 0.8 meter height (semi-anechoic chamber) or 1.55m height (fully-anechoic chamber) which is situated in the middle of the turntable. The turntable can rotate the device under test 360 degree, the tipping table can rotate the device from laid to standing position. This way the device under test can be rotated in all three orthogonal planes in order to maximize the detected emissions. The turn- and tipping table are controlled by a controller unit. All positions manipulations are software controlled from a operator PC.

The measurements are performed for both receiving antenna polarisations: vertical and horizontal.

Up to 18GHz a measurement distance of 3 meters is used, above 18GHz the distance is 1 meter. A biconic-logarithmic antenna up to 1 GHz and a logarithmic-periodic antenna for frequencies above 1 GHz up to 26.5GHz is used. For frequencies above 26.5GHz a horn antenna is used, pls. compare the equipment list for more details.

The EUT is powered either by a external DC-supply with nominal voltage or a AC/DC power supply as accessory. The communication signalling (if necessary for operation) is performed from outside the chamber with a communication test simulator (CMU200 from Rohde&Schwarz) and a signalling antenna placed near the EUT.



Schematic: radiated measurements test set-up

## **5. Measurements**

### **5.1. RF power output (Conducted and Radiated)**

#### **REFERENCES**

*FCC: §2.1046 (conducted), §22.913(a)(2), § 24.232(c)*

*IC: RSS-132:4.4 + SRSP 503:5.1.3 for GSM 850; RSS-133:6.4 + SRSP-510:5.1.2 for GSM 1900*

- Maximum Power Output of the mobile phone should be determined while measured conducted and radiated way.

#### **MOBILE PHONE SETTINGS**

- according 3.7

#### **BASE STATION SETTING**

- according 3.7

#### **RESULTS (CONDUCTED)**

Not performed, see initial certification of the GSM module.

PAR factor for GSM Modulation is approx 0.1 to max. 0.2 far away from the limit of 13dB as stated in the rules.

### 5.1.1. Radiated RF-Power

#### TEST METHOD

The measurements were made at the upper, center, and lower carrier traffic frequencies of each of the supported operating band. Choosing three TX-carrier frequencies of the mobile phone, should be sufficient to demonstrate compliance.

The measurements were performed by using the **substitution method** (ANSI/TIA/EIA 603) with a spectrum-analyzer. This method can be described like follows:

- 1.) choosing of suitable spectrum-analyzer settings for performing the measurements. This settings of the spectrum analyzer must be maintained for both stages of the measurements: EUT emission measurements and also for measurements of the substituted level.

Parameter	Setting for GSM measurements	Settings for UTRA/FDD measurements
RBW <sub>3dB</sub>	1 MHz	10 MHz
VBW	10 MHz	10 MHz
Span	8 MHz	8 MHz
Detector Mode	Positive max-hold	Positive max-hold
Average	off	off
Sweep Time	coupled	coupled

- 2.) The maximum level of the peak power was recorded, while the emissions were maximized by rotating the EUT in three orthogonal axes, which was situated on a non-conductive turntable of 1.55 m height ( $P_{MEAS,1}$ ). This was performed for both measuring antenna polarisations (vertical/horizontal), the maximum of both values is used for further measurements and final substitution ( $P_{MEAS,1,MAX}$ ).
- 3.) As the maximum emission is recorded, the EUT is replaced by a frequency dependant suitable antenna, which is connected to a RF-signal generator, which is transmitting on the determined worst-case frequency as determined in step 2.
- 4.) The RF-signal level of the signal generator is adjusted as long the same worst-case level determined first step is measured at the spectrum analyzer ( $P_{SMHU}=P_{MEAS,1,MAX}$ )
- 5.) Than the RF-signal cable is disconnected from the antenna and connected to a power-level meter. The level is determined ( $P_{MEAS,2}$ ).
- 6.) The final result is calculated by adding the ERP/EIRP gain of the antenna which substitutes the EUT.  

$$P_{EUT,SUBST} = P_{MEAS,2} + G_{Antenna}$$

#### GSM RESULTS (RADIATED)

Channel/ Frequency (MHz)		Peak Output Power (dBm)			Antenna Polarisation for maximum Power	Verdict
		PK	AV			
GSM 850	Channel 128/ 824.2 MHz	17.86	1.)	ERP-Value	V/H	Passed
	Channel 192/ 836.6 MHz	17.58				
	Channel 251/ 848.8 MHz	16.22				
EGPRS 850	Channel 128/ 824.2 MHz	Not supported mode		ERP-Value	V/H	Not applicable
	Channel 192/ 837.0 MHz					
	Channel 251/ 848.8 MHz					

Remark: 1.) PAR Value should be taken from initial GSM modules test report, typical values for GMSK modulation: 0.1 to 0.2dB

Channel/ Frequency (MHz)		Peak Output Power (dBm)			Antenna Polarisation for maximum Power	Verdict
		PK	AV			
GSM 1900	Channel 512/ 1850.2 MHz	26.51	1.)	EIRP-Value	V/H	Passed
	Channel 661/ 1880.0 MHz	24.97				
	Channel 810/ 1909.8 MHz	23.42				
EGPRS 1900	Channel 512/ 1850.2 MHz	Not supported mode	1.)	EIRP-Value	V/H	Not applicable
	Channel 661/ 1880.0 MHz					
	Channel 810/ 1909.8 MHz					

Remark: 1.) PAR Value should be taken from initial GSM modules test report, typical values for GMSK modulation: 0.1 to 0.2dB

### AMBIENT ENVIRONMENTAL CONDITIONS

Temperature	23.3 °C
Relative Humidity	33.5 %
Air pressure	1011 hPa

### TEST EQUIPMENT

Used equipment (see reference in the annex)
016, 439, 264, 443, 460, 549

## 5.2. Occupied bandwidth

### REFERENCES

*FCC: §2.1049; §22.917(a), §24.238(a)*

*IC:RSS-Gen:4.6.1*

„the **occupied bandwidth** is the frequency bandwidth, such that, below it lower and above it upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated.

### RESULTS

Not performed, see initial certification of the GSM module.

### 5.3. Emission limits (Spurious emission conducted/radiated) $f > 30$ MHz

#### REFERENCES

FCC: §2.1051-conducted, §15.111-conducted antenna terminal, §2.1053(a)-radiated, §22.917(a)(b); §24.238(a)(b), §2.1057(1)

IC: RSS-132:4.5.1, RSS-133:6.5.1 - TX-mode

RSS-132:4.6, RSS-133: 6.7(b) – RX-mode

„the power of emissions shall be attenuated below the transmitter output power ( $p$ ) by at least least  $43 + 10 \log(P)$  dB“

#### FREQUENCY RANGE

**TX:** The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The detector used was Peak.

**RX:** The spectrum was scanned from 30 MHz to the 5GHz according §15.33(b)(1). The detector used was Peak.

**Limit TX:** The specification that all emissions shall be attenuated below the transmitter power ( $P$ ) by at least  $43 + 10 \log(P)$  dB, translates in the relevant power range of the mobile phone (1 to 0.001 W) to a constant limit of -13 dBm.

**Limit RX:** 2nW according §15.111

#### DESCRIPTION OF SET-UP

- see conducted set-up in chapter 4.1
- see radiated set-up in chapter 4.2

#### SETTINGS ON MOBILE PHONE

- The measurements in TX-mode were made at the upper, middle, and lower carrier frequencies of the operating band. Choosing three representative TX-carrier frequencies of the mobile phone within each operable GSM band, should be sufficient to demonstrate compliance with the emissions limits outside and adjacent to the frequency blocks.
- The measurements in RX-Mode were made at the middle tuning range of the receiver.
- The individual settings on base station and mobile phone were made according chapter 3.7

#### TEST METHOD RADIATED:

By rotating the EUT in three orthogonal planes, the emissions were recorded with Peak-Detector and Hold-Max function of the spectrum-analyzer. If the harmonic could not be detected above the noise floor, the ambient level was recorded. Measurement distance is 3m for frequencies up to 18GHz and 1m for frequencies greater than 18GHz. The readings on the spectrum analyzer are corrected with annually performed chamber path calibration values (see chapter 7), 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.

#### SETTINGS OF SPECTRUM-ANALYSER

Frequency range	RBW (resolution bandwidth)	VBW (video bandwidth)
<b>BAND-EDGE compliance:</b> 1MHz immediately adjacent to the frequency blocks	1% from applicants stated/measured emission bandwidth	3..10 times the RBW
More than 1 MHz outside and adjacent the frequency blocks	1 MHz	3..10 MHz

## RESULTS (CONDUCTED)

Not performed, see initial certification of the GSM module.

## RESULTS (RADIATED)

### 5.3.1. GSM 850 Mode: Set-up 1/2, Op. Mode 1

#### Lowest channel: 128

Transmitting channel/ frequency: TX = 824.2 MHz							
Sweep frequency range: [MHz]	Diagram number (H/V)	Frequency of emission [MHz]	Worst-Level Polarisation	Transducer factor [dB]	Result [dBm]	Limit [dBm]	Verdict
Sweep 1 <sup>2.)</sup>	8.151 8.152	1.)	H V	--	< -28.51 < -28.01	-13	Passed <sup>2.)</sup>
Sweep 2 <sup>4.)</sup>	8.157 8.158	4.)	H V	--	< -29.97 < -36.30		Passed
Sweep 4	8.161 8.162	2684.6 1.)	H V	--	-21.22 < -21.60		Passed
Sweep 5	8.167	3298.0 11189	H	--	-39.60 -29.30		Passed
	8.168.	1.)	V	--	< -28.80		Passed

Remarks: see diagrams enclosed in annex A1, only worst-case polarisation mentioned

1.) only results near 20dB to the limit are referenced or noise level

2.) TX-carrier on the diagram

4.) Band-Block Edge compliance



**Middle channel: 192**

Transmitting channel/ frequency: TX = 837 MHz							
Sweep frequency range: [MHz]	Diagram number (H/V)	Frequency of emission [MHz]	Worst-Level Polarisation	Transducer factor [dB]	Result [dBm]	Limit [dBm]	Verdict
Sweep 1 <sup>2.)</sup>	8.153	1.)	H	--	< -28.80	-13	Passed <sup>2.)</sup>
	8.154	1.)	V	--	< -28.72		
Sweep 4	8.163	1.)	H	--	< -21.77		Passed
	8.164	1.)	V	--	< -21.88		
Sweep 5	8.169	3334.0 11557.0	H	--	-40.2 -29.15		Passed
	8.170	11.538	V	--	-29.88		Passed

Remarks: see diagrams enclosed in annex A1, only worst-case polarisation mentioned

1.) only results near 20dB to the limit are referenced or noise level

2.) TX-carrier on the diagram

**Highest channel: 251**

Transmitting channel/ frequency: TX = 849.8 MHz							
Sweep frequency range: [MHz]	Diagram number (H/V)	Frequency of emission [MHz]	Worst-Level Polarisation	Transducer factor [dB]	Result [dBm]	Limit [dBm]	Verdict
Sweep 1	8.155	1.)	H	--	< -29.08	-13	Passed <sup>2.)</sup>
	8.156	1.)	V	--	< -28.63		
Sweep 3 <sup>4.)</sup>	8.159	849.02	H	--	-32.50		Passed <sup>4.)</sup>
	8.160	849.02	V	--	-35.00		
Sweep 4	8.165	2681.0	H	--	< -22.04		Passed
	8.166	2684.5	V	--	< -22.03		
Sweep 5	8.171	11742	H	--	< -29.16		Passed
	8.172	11649	V	--	< -29.04		Passed

Remarks: see diagrams enclosed in annex A1, only worst-case polarisation mentioned

1.) only results near 20dB to the limit are referenced or noise level

2.) TX-carrier on the diagram

4.) Band-Block Edge compliance

### 5.3.0.1. GSM 1900 Mode: Set-up 1/2, Op. Mode 2

#### Lowest channel: 512

Transmitting channel/ frequency: TX = 1850,2 MHz							
Sweep frequency range: [MHz]	Diagram number (H/V)	Frequency of emission [MHz]	Worst-Level Polarisation	Transducer factor [dB]	Result [dBm]	Limit [dBm]	Verdict
Sweep 1	8.123 8.124	1.) 1.)	H V	--	< -30.42 < -30.47	-13	Passed
Sweep 2	8.129 8.130	1.) 2659.2	V H	--	< -19.81 -20.12		Passed <sup>2.)</sup>
Sweep 3 <sup>4.)</sup>	8.135 8.136	4.) 4.)	H V	--	-32.97 -34.41		Passed <sup>4.)</sup>
Sweep 5	8.139	3685 5547 7408	H	--	-20.2 -30.5 -38.0		Passed
	8.139a	3685 5547			-25.1 -30.7		Passed <sup>6.)</sup>
	8.140	3685 5547	V	--	-22.3 -28.5		Passed
Sweep 6	8.145 8.146	16088 15763	H V	--	< -23.8 < -24.49		Passed
Sweep 7 <sup>5.)</sup>	--	--	--	--	5.)		Passed <sup>5.)</sup>

Remark: see diagrams in annex 1 for more details, only worst-case polarisation mentioned

- 1.) only results near 20dB to the limit are referenced or noise level
- 2.) TX-carrier on diagram
- 4.) Band-Block Edge compliance
- 5.) not performed, noise level only
- 6.) re-test on set-up 2

#### Middle channel: 661

Transmitting channel/ frequency: TX = 1880,0 MHz							
Sweep frequency range: [MHz]	Diagram number (H/V)	Frequency of emission [MHz]	Worst-Level Polarisation	Transducer factor [dB]	Result [dBm]	Limit [dBm]	Verdict
Sweep 1	8.125 8.126	951.27 962.83	H V	--	<-30.91 <-30.80	-13	Passed
Sweep 2 <sup>2.)</sup>	8.131 8.132	2709.8 1.)	H V	--	-19.66 <-19.82		Passed <sup>2.)</sup>
Sweep 5	8.141	3759 5639 7519 9400	H	--	-21.5 -30.9 -36.0 -38.5		Passed
	8.142	3757 5639 11926	V	--	-24.3 -30.4 -34.1		
Sweep 6	8.147 8.148	17844 17808	H V	--	-23.85 <-23.44		Passed
Sweep 7	--	--	--	--	5.)		Passed <sup>5.)</sup>

Remark: see diagrams in annex 1 for more details, only worst-case polarisation mentioned

- 1.) only results near 20dB to the limit are referenced or noise level
- 2.) TX-carrier on diagram
- 5.) not performed, noise level only

**Highest channel: 810**

Transmitting channel/ frequency: TX = 1908,8 MHz							
Sweep frequency range: [MHz]	Diagram number (H/V)	Frequency of emission [MHz]	Worst-Level Polarisation	Transducer factor [dB]	Result [dBm]	Limit [dBm]	Verdict
Sweep 1	8.127 8.128	1.) 1.)	H V	--	< -30.76 < -31.07	-13	Passed
Sweep 2 <sup>2.)</sup>	8.133 8.134	1.) 1.)	H V	--	< -20.01 < -20.13		Passed <sup>2.)</sup>
Sweep 4 <sup>4.)</sup>	8.137 8.138	4.) 4.)	H V	--	-34.78 -35.06		Passed <sup>4.)</sup>
Sweep 5	8.143	3814 5729 7649 11243	H	--	-23.5 -31.8 -37.4 -35.2		Passed
	8.144	3813 5727 7649	V	--	-20.2 -28.6 -32.1		Passed <sup>6.)</sup>
	8.144a	3814 5731			-35.7 -39.4		
Sweep 6	8.149 8.150	15210 1.)	H V	--	-24.10 <-23.70		Passed
Sweep 7 <sup>5.)</sup>	--	--	--	--	5.)		Passed <sup>5.)</sup>

Remark: see diagrams in annex 1 for more details, only worst-case polarisation mentioned

- 1.) only results near 20dB to the limit are referenced or noise level
- 2.) TX-carrier on diagram
- 4.) Band-Block Edge compliance
- 5.) not performed, noise level only
- 6.) re-test on set-up 2

**AMBIENT ENVIRONMENTAL CONDITIONS**

Temperature	27 °C
Relative Humidity	44 %
Air pressure	1000 hPa

**TEST EQUIPMENT**

Used equipment (see reference in the annex)
264, 439, 443, 460, 484, 549

## 5.4. Frequency stability on temperature and voltage variations

### REFERENCES

FCC: §2.1055, §22.355, §24.235

IC: RSS-Gen:4.7, RSS-132:4.3, RSS-133:4.2+6.3

#### §22.355 Table C-1; § 24.235

*“The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block”*

#### § 2.1055

*(d) The frequency stability shall be measured with variation of primary supply voltage as follows:*

*(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.*

*(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.*

### Frequency shift of carrier against a voltage range at constant nominal temperature of 20° Celsius

- 1.) determine the carrier frequency for the lowest and highest channel at room temperature and nominal voltage [20°C]
- 2.) The voltage was reduced in 0.1V steps to the lower end point, where the mobile phone stops working. (this shall be specified by the manufacturer) Record the carrier frequency shift within 2 minutes after powering on the mobile phone, to prevent for self heating effects.
- 3.) The voltage was increased in 0.1V steps to the upper declared voltage of the battery. Record the carrier frequency shift within 2 minutes after powering on the mobile phone, to prevent for self heating effects.

### RESULTS

Not performed, see initial certification of the GSM module.

### Frequency shift of carrier against temperature at constant power supply voltage

- 1.) determine the carrier frequency for the lowest, middle and highest channel at room temperature and nominal voltage [20°C]
- 2.) expose the mobile station to -30°C, wait sufficient time to have constant temperature.
- 3.) Perform the carrier frequencies measurements in 10°C increments from -30°C to +60°C. For about half hour at the specified temperature the mobile was powered-off. After powering-on, the measurements were made within 2 minute for the channel lower channel, in order to prevent self-warming of the mobile.

### RESULTS

Not performed, see initial certification of the GSM module.

## 6. Calibration method of anechoic chamber

For non-critical frequencies a pre-calibration method was used for determining the relevant radiated field-strength of radiated spurious in the anechoic chamber.

Generally the measured value is influenced by the characteristics of the used cables, filters, antenna, but also by the characteristic of the anechoic chamber.

By defining a **transducer** value, which include all characteristics of the signal propagation path (used equipment, cables, properties of anechoic chamber, etc..) from the source of radiation to the final reading equipment (spectrum-analyzer), the measured value can be corrected in order to get the real value of the device under test.

The method resumes as follows:

- 1.) determination of the path-loss of all cables used on the TX- and RX-side, which are used for the radiated measurement in the specific set-up for 1 meter and 3 meter distance.
- 2.) connection of the cables to the relevant antennas used for calibration.
- 3.) determination of the **space attenuation loss** ( $G$ ) in the anechoic-chamber for both horizontal and vertical antenna polarisations:

A signal generator connected to the TX-antenna sweeps the frequency range of interest (30 MHz to 19.5 GHz) with a level of  $-30\text{dBm}$  - the readings on the RX-side on the spectrum analyzer gives the **space attenuation loss**. The distance between RX- and TX-antenna is 3 meter for frequencies below 18 GHz, and 1 meter for frequencies above 18 GHz.

- 4.) Mathematical determination of the frequency dependant transducer values ( $TD_{H/V}$ ):

$$TD_{H/V} = G_{H/V} + B_{H/V} - 10 \cdot \log_{10}(1,64) + D + E - F$$

### Abbreviations:

$TD_{H/V} = \lambda/2$  transducer values for horizontal /vertical antenna polarisations

$G_{H/V}$  = space attenuation loss horizontal/ vertical

$B_{H/V}$  = Gain of TX-antenna

$10 \cdot \log_{10}(1,64)$  = Gain in dB of  $\lambda/2$  Dipole relative to isotropic radiator

D = insertion losses of RX cable

E = Loss of filters in signal path (not used for FCC measurements)

F = Gain of pre-amplifiers in signal path

- 5.) The transducer values are recorded for horizontal and vertical polarisations in two reference distances to the measurement antenna (1 meter and 3 meter). EIRP can be calculated from ERP by adding the gain of the  $\lambda/2$  dipole  $EIRP = ERP + 2,14 \text{ dB}$
- 6.) The specific transducer tables are loaded in the spectrum analyzer after each measurement. The readings on the spectrum-analyzer are automatically corrected by this values and can directly be compared with the limits as given in the relevant standards. The loaded values are displayed in each diagram and can be compared to internal calibration documents annually performed.

Used equipment for calibration (3 meter distance)

Used equipment (see reference)
264, 133, 020, 140, 484, 490

Used equipment for calibration (1 meter distance)

Used equipment (see reference)
302, 303, 140, 264

## 7. 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 it's contribution to the overall uncertainty according it's statistical distribution calculated.

Following table shows expectable uncertainties for each measurement type performed.

Measurement	Frequency range	Calculated uncertainty based on a confidence level of 95%	Remarks:
RF-Power Output conducted	9 kHz .. 20 GHz	1.0 dB	--
RF-Power Output radiated	30 MHz .. 4 GHz	3.17 dB	Substitution method
Conducted RF-emissions on antenna ports	9 kHz .. 20 GHz	1.0 dB	--
Radiated RF-emissions enclosure	150 kHz .. 30 MHz	5.0 dB	Magnetic field
	30 MHz .. 1 GHz	4.2 dB	E-Field
	1 GHz .. 18GHz	4.8 dB	E-Field
	1 GHz .. 20 GHz	3.17 dB	Substitution method
Occupied bandwidth	9 kHz .. 4 GHz	0.1272 ppm (Delta Marker method)	Frequency error
		1 dB	Power
Emission bandwidth	9 kHz .. 4 GHz	0.1272 ppm (Delta Marker method)	Frequency error
		1 dB	Power
Frequency stability	9 kHz .. 20 GHz	0.0636 ppm	--
Conducted emissions on AC-mains port (U <sub>CISPR</sub> )	9 kHz .. 150 kHz	4.0 dB	--
	150 kHz .. 30 MHz	3.6 dB	

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

## 8. Instruments and Ancillary

### 8.1. Used equipment “CTC”

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

#### 8.1.1. 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	Communication Tester	CMD 60 M	844365/014	Firmware = V 3.52 .22.01.99, DECT Firmware D2.87
053	audio analyzer	UPA3	860612/022	Firm. V 4.3
119	RT harmonics analyser/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,
298	Radio Communication Tester	CMU 200	832221/091	R&S Test Firmware =3.53 /3.54 (current Testsoftw. f.
323	Communication 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	System-CTC-EMS-Conducted	System EMS Conducted	-	EMS-K1 Immunity Test-Software 1.20SR10
340	Communication 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 V4.6.1 + SW-Option K55
377	emi test receiver	ESCS 30	100160	Firm.= 2.30, OTP= 02.01, GRA= 02.36
378	broadband RF field monitor	RadiSense III	03D00013SNO-08	Firm.= V.03D13
383	signal generator	SME 03	842 828 /034	Firm.= 4.61
389	digital multimeter	Keithley 2000	0583926	Firm. = A13 (Mainboard) A02 (Display)
392	Radio Communication Tester	MT8820A	6K00000788	Firm.= 4.50 #005, IPL=4.01#001,OS=4.02#001,
441	System CTC-SAR-EMI Cable Loss	System EMI field (SAR)	-	EMC 32 Version 8.10,10
442	System CTC-SAR-EMS	System EMS field (SAR)	-	EMS-K1 Immunity-Software 1.20SR10
443	System CTC-FAR-EMI-Spuri	System CTC-FAR-EMI-	-	Spuri 7.2.5
444	System CTC FAR-EMS	System EMS-Field (FAR)	-	EMS-K1 Immunity-Software 1.20SR10
460	Radio Communication Tester	CMU 200	108901	R&S Test Firmware Base=5.14/Messsoftware=
489	emi test receiver	ESU40	1000-30	Firmware=4.33, Bios=V5.1-16-3, Specification=01.00
491	ESD Simulator dito	ESD dito	dito307022	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

### 8.1.2. 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	-	31.03.2011
005	AC - LISN (50 Ohm/50µH, test site 1)	ESH2-Z5	861741/005	Rohde & Schwarz	12 M	-	31.03.2011
007	DC - LISN (50 Ohm/5µH)	ESH3-Z6	892563/002	Rohde & Schwarz	12 M	-	31.03.2011
009	power meter (EMS-radiated)	NRV	863056/017	Rohde & Schwarz	12 M	-	31.03.2011
012	signal generator (EMS-cond.)	SMY 01	839069/027	Rohde & Schwarz	36/12 M	-	31.03.2011
013	power meter (EMS cond.)	NRVD	839111/003	Rohde & Schwarz	24 M	-	31.03.2011
014	insertion unit (EMS cond.)	URV5-Z2	838519/029	Rohde & Schwarz	24 M	-	31.03.2011
015	insertion unit (EMS cond.)	URV5-Z4	838570/024	Rohde & Schwarz	24 M	-	31.03.2011
016	line impedance simulating network	Op. 24-D	B6366	Spitzenberger+Spies	36 M	-	31.03.2013
017	Communication Tester	CMD 60 M	844365/014	Rohde & Schwarz	12 M	-	31.03.2011
021	loop antenna (H-Field)	6502	9206-2770	EMCO	36 M	-	31.03.2013
022	audio measurement amplifier	2636C	1537643	Brüel & Kjaer	12 M	-	31.03.2011
030	loop antenna (H-field)	HFH-Z2	879604/026	Rohde & Schwarz	36 M	-	31.03.2012
031	absorbing clamp	MDS-21	863325/015	Rohde & Schwarz	24 M	-	31.03.2011
033	RF-current probe (100kHz-30MHz)	ESH2-Z1	879581/18	Rohde & Schwarz	24 M	-	31.03.2011
048	bicon. - log. antenna (SAR)	3143	1108	EMCO	36/12 M	-	30.04.2011
049	current clamp (injection)	F-120-2	48	FCC	12 M	-	31.03.2011
050	3-ph coupling-decoupling-netw. (Burst)	CDN 300	176	Schaffner	12 M	-	31.03.2011
051	VHF-current probe 20-300 MHz	ESV-Z1	872421	Rohde & Schwarz	36 M	-	31.03.2012
052	notch filter DECT	WRCB 1887,82/1889,55SS	12	Wainwright Industries	pre-m	-	
053	audio analyzer	UPA3	860612/022	Rohde & Schwarz	36 M	-	31.03.2011
057	relay-switch-unit (EMS system)	RSU	494440/002	Rohde & Schwarz	-	1a	30.05.2011
058	capacitive clamp (Burst)	IP 4	99	Hafely	-	4	
060	power amplifier (DC-2kHz)	PAS 5000	B6363	Spitzenberger+Spies	-	3	
063	log.-per. antenna (Subst 1)	3146	860941/007	EMCO	36/12 M	-	31.10.2010
067	coupling decoupling-network	CDN801-M2/M3	272	Lüthi	12 M	-	31.03.2011
068	coupling decoupling-network	CDN 801-M5	95226	Lüthi	12 M	-	31.03.2011
069	EM - clamp	EM101	9535159	Lüthi	36 M	-	31.03.2013
071	biconical antenna (Subst 1)	HUF-Z2	863.029/010	Rohde & Schwarz	36/12 M	-	31.10.2010
072	coupling decoupling-network	CDN801-M2/M3	276	Lüthi	12 M	-	31.03.2011
083	AC - power supply, 0-10 A	EAC/MT 27010	910502096	EURO TEST	pre-m	2	
084	AC - power supply, 0-5 A	ELABO-8-34214	-	ELABO	pre-m	2	
085	AC - power supply, 0-10 A	R250	-	Schunterm.&Benningh.	pre-m	2	
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	-	-	RWTÜV	pre-m	4	
091	USB-LWL-Converter	OLS-1	007/2006	Ing. Büro Scheiba	-	4	
094	artificial head (No.1)	4905	1566990	Brüel & Kjaer	pre-m	2	
099	passive voltage probe	ESH2-Z3	299.7810.52	Rohde & Schwarz	36 M	-	31.03.2012
100	passive voltage probe	Probe TK 9416	without	Schwarzbeck	36 M	-	31.03.2012
110	USB-LWL-Converter	OLS-1	-	Extreme USB	-	4	
119	RT harmonics analyser/dig. flickermeter	B10	G60547	BOCONSULT	36 M	-	31.03.2013
123	biconical antenna (Subst 2)	HUF-Z2,	860941/007	Rohde & Schwarz	36/12 M	-	30.09.2010
131	RF-Current Probe	F-52	19	FCC	12 M	-	31.03.2011
132	log.-per. antenna (Subst 2)	HUF-Z3	860862/014	Rohde & Schwarz	36/12 M	-	31.10.2010
134	horn antenna 18 GHz (Subst 2)	3115	9005-3414	EMCO	12 M	-	31.03.2011
136	adjustable dipole antenna (Dipole 1)	3121C-DB4	9105-0697	EMCO	12 M	-	31.03.2012
140	signal generator	SMHU	831314/006	Rohde & Schwarz	24 M	-	31.03.2012
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	24/12 M	-	31.03.2012
262	power meter	NRV-S	825770/0010	Rohde & Schwarz	24 M	-	31.03.2012
263	signal generator	SMP 04	826190/0007	Rohde & Schwarz	36 M	-	31.03.2013
264	spectrum analyzer	FSEK 30	826939/005	Rohde & Schwarz	12 M	-	31.03.2011
265	peak power sensor	NRV-Z33, Model 04	840414/009	Rohde & Schwarz	24 M	-	31.03.2012
266	peak power sensor	NRV-Z31, Model 04	843383/016	Rohde & Schwarz	24 M	-	31.03.2012
268	AC/DC power supply	EA 3050-A	9823636	-	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)	LF855	Weinschel	pre-m	2	
284	coupling decoupling network	CDN 801-M1	1661	Lüthi	12 M	-	31.03.2011



285	coupling decoupling network	CDN 801-S1	1642	Lüthi	12 M	-	31.03.2011
287	pre-amplifier 25MHz - 4GHz	AMF-2D-100M4G-35-10P	379418	Miteq	12 M	-	31.03.2011
289	bicon. - log. antenna (OATS)	CBL 6141	4107	Schaffner Chase	36/12 M	-	31.10.2010
295	Racal Digital Radio Test Set	6103	1572	Racal	24 M	3	30.11.2010
296	audio measurement amplifier	2636C	R=316568/004	Brüel & Kjaer	18 M	-	31.03.2011
298	Radio Communication Tester	CMU 200	832221/091	Rohde & Schwarz	12 M	-	31.03.2011
299	audio microphone	I34	-	Brüel & Kjaer	pre-m	2	
300	AC LISN (50 Ohm/50uH, 1-phase)	ESH3-Z5	892 239/020	Rohde & Schwarz	12 M	-	31.03.2011
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	-	31.03.2011
303	horn antenna 40 GHz (Subst 1)	BBHA9170	156	Schwarzbeck	36 M	-	31.03.2011
304	fix dipole antenna 1,6 GHz	EMCO 3125-307	9907-1001	ETS	24/12 M	-	31.03.2011
305	fix dipole antenna 1,8-2,0 GHz	EMCO 3125-306	9907-1001	ETS	24/12 M	-	31.03.2011
306	fix dipole antenna 2,45 GHz	EMCO 3125-308	9907-1001	ETS	24/12 M	-	31.03.2011
307	fix dipole antenna 3 GHz	EMCO 3125-309	9907-1001	ETS	24/12 M	-	31.03.2011
317	1000 Hz calibrator 94 dB SPL	4230 94dB	1542286	Brüel & Kjaer	12 M	-	31.03.2011
323	Communication Tester	CMD 55	825878/0034	Rohde & Schwarz	12 M	-	31.03.2011
331	climatic test chamber -40/+80 Grad	HC 4055	43146	Heraeus Vötsch	24 M	-	31.10.2010
340	Communication Tester	CMD 55	849709/037	Rohde & Schwarz	12 M	-	31.03.2011
341	digital multimeter	Fluke 112	81650455	Fluke	24 M	-	31.03.2012
342	digital multimeter	Voltcraft M-4660A	IB 255466	Voltcraft	24 M	-	31.03.2011
344	adaptor 150/50 Ohm	150/50	-	Krohne	12 M	-	31.03.2011
345	adaptor 150/50 Ohm	150/50	-	Krohne	12 M	-	31.03.2011
347	laboratory site	radio lab.	-	-	-	3	
348	laboratory site	EMI conducted	-	-	-	3	
349	car battery 12 V	car battery 12 V	without	-	-	3	
350	car battery 12 V	car battery 12 V	without	-	-	3	
354	DC - power supply 40A	NGPE 40/40	448	Rohde & Schwarz	pre-m	-	
355	power meter	URV 5	891310/027	Rohde & Schwarz	12 M	-	31.03.2011
356	power sensor	NRV-Z1	882322/014	Rohde & Schwarz	24 M	-	31.03.2011
357	power sensor	NRV-Z1	861761/002	Rohde & Schwarz	24 M	-	31.03.2011
358	Power Amplifier 10 kHz-220MHz	AR75A220M1	15860	Amplifier Research	12 M	1b	30.04.2011
362	TOSM Calibration Kit 50 Ohm	ZV-Z21/ZV-Z11	without	Rohde & Schwarz	12 M	-	31.03.2011
365	10V Insertion Unit 50 Ohm	URV5-Z2	100880	Rohde & Schwarz	24 M	-	31.03.2012
366	Ultra Compact Simulator	UCS 500 M4	V0531100594	EM-Test	12 M	-	31.03.2011
367	audio measurement amplifier	2636	316832/001	Brüel & Kjaer	12 M	-	31.03.2011
369	insertion unit (SAR-EMS, Ch. A)	URV5-Z2	100301	Rohde & Schwarz	24 M	-	31.03.2011
370	insertion unit (SAR-EMS, Ch. B)	URV5-Z2	100302	Rohde & Schwarz	24 M	-	31.03.2011
371	Bluetooth Tester	CBT32	100153	R&S	12 M	-	31.03.2011
373	V-Network 5uH/50 Ohm	ESH3-Z6	100535	Rohde & Schwarz	12 M	-	31.03.2011
374	power amplifier 0,8-3 GHz	60S1G3	306528	Amplifier Research	-	1a	30.05.2011
375	directional coupler	DC7144M1	306498	Amplifier Research	-	1a	30.05.2011
376	horn antenna 6 GHz	BBHA9120 E	BBHA 9120 E 179	Schwarzbeck	12 M	-	31.03.2011
377	emi test receiver	ESCS 30	100160	Rohde & Schwarz	12 M	-	31.03.2011
378	broadband RF field monitor	RadiSense III	03D00013SNO-08	DARE B.V.	12 M	-	31.03.2011
383	signal generator	SME 03	842 828 /034	Rohde & Schwarz	36 M	-	31.03.2013
386	coupling decoupling network	CDN USB/p	19397	Schaffner	12 M	-	31.03.2011
387	coupling decoupling network	CDN L-801 M2	2051	Lüthi	12 M	-	31.03.2011
388	coupling decoupling network	CDN L-801 T2	1929	Lüthi	12 M	-	31.03.2011
389	digital multimeter	Keithley 2000	0583926	Keithley	24 M	-	31.03.2011
390	Industry Acoustic System	MO 2000 Set	2127100123	Sennheiser	-	4	
392	Radio Communication Tester	MT8820A	6K00000788	Anritsu	12 M	-	31.03.2011
394	power amplifier 80-1000 MHz	BLWA 0810-250/200	045610	Bonn-Elektronik	-	1a	30.05.2011
399	Sound Calibrator	Sound Calibrator 4231	2665101	Brüel & Kjaer	12 M	-	31.03.2011
400	ferrite tube (>15 dB, EN 55022)	FTC 40 X 15 E	5559	Lüthi	36 M	-	31.03.2012
401	ferrite tube (>15 dB, EN 55022)	FTC 40 X 15 E	5560	Lüthi	36 M	-	31.03.2012
431	Model 7405	Near-Field Probe Set	9305-2457	EMCO	-	4	
439	UltraLog-Antenna	HL 562	100248	Rohde & Schwarz	12 M	-	30.04.2011
440	CDN for Datacable	CDN-UTP	CDN-UTP 029	EMC Partner AG,	24 M	-	31.03.2012
441	System CTC-SAR-EMI Cable Loss	System EMI field (SAR)	-	ETS	12 M	5	31.08.2010
443	System CTC-FAR-EMI-Spuri	System CTC-FAR-EMI-	-	ETS-Lindgren/Cetecom	12 M	5	30.03.2011
444	System CTC FAR-EMS	System EMS-Field (FAR)	-	ETS Lindgren/Cetecom	12 M	5	30.05.2011
454	Oscilloscope	HM 205-3	9210 P 29661	Hameg	-	4	
455	Oscilloscope	HP 54602B	US 350 336 45	Hawlett Packard	-	4	
456	DC-Power supply 0-5A	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	Radio Communication Tester	CMU 200	108901	Rohde & Schwarz	12 M	-	31.03.2011
462	AF-Generator	MX-2020	-	Conrad	-	4	
463	Universal source	HP3245A	2831A03472	Agilent	-	4	
466	digital multimeter	Fluke 112	89210157	Fluke USA	24 M	-	31.03.2012
467	digital multimeter	Fluke 112	89680306	Fluke USA	24 M	-	31.03.2012
468	digital multimeter	Fluke 112	90090455	Fluke USA	24 M	-	31.03.2012
477	ReRadiating GPS-System	AS-47	-	Automotive Cons. Fink	-	3	
480	power meter (Fula)	NRVS	838392/031	Rohde & Schwarz	24 M	31	
482	filtermatrix	FilterMatrix SAR 1	-	CETECOM (Brl)	-	1d	
484	Pre-amplifier	AMF-5D-02501800-25-	-	Miteq	12M	1c	31.03.2011
487	System CTC NSA-Verification SAR-EMI	System EMI field (SAR)	-	ETS	12 M	-	31.10.2010
489	emi test receiver	ESU40	1000-30	Rohde & Schwarz	12 M	-	31.03.2011
491	ESD Simulator dito	ESD dito	ditto307022	EM-Test	24 M	-	31.03.2011
498	Power Supply	NGPE 40/40	402	Rohde & Schwarz	-	2	
500	industry Acoustic System	MO 2000 Set	100048	Sennheiser	-	4	
502	band reject filter	WRCG 1709/1786-	SN 9	Wainwright	-	2	
503	band reject filter	WRCG 824/849-814/859-	SN 5	Wainwright	-	2	
517	relais swite matrix	HF Relais Box Keithley	SE 04	-	2		

523	Digitalmultimeter	L4411A	MY46000154	Agilent	24 M	-	31.03.2011
524	Voltage Drop Simulator	VDS 200	0196-16	EM Test	24 M	-	31.03.2011
525	Koppelnetzwerk	CNA 200	1196-01	EM Test	24 M	-	31.03.2011
526	Burst Generator	EFT 200 A	0496-06	EM Test	24 M	-	31.03.2011
527	Micro Pulse Generator	MPG 200 B	0496-05	EM Test	24 M	-	31.03.2011
528	Load Dump Simulator	LD 200B	0496-06	EM Test	24 M	-	31.03.2011
529	6 dB Broadband resistive power divider	Model 1515	LH 855	Weinschel	-	2	
530	10 dB Broadband resistive power divider	R 416110000	LOT 9828	-	pre-m	2	
531	H-field system	Lackman System	without	Lackmann	-	2	
533	Impedance Stabilization Network	ISN T200A	25706	Teseq	12 M	-	31.03.2011
534	Impedance Stabilization Network	ISN T400A	24881	Teseq	12 M	-	31.03.2011
535	Impedance Stabilization Network	ISN T800	26321	Teseq	12 M	-	31.03.2011
536	Impedance Stabilization Network	ISN ST08	25867	Teseq	12 M	-	31.03.2011
541	Impedance Stabilization Network	ISN T8-Cat6	26373	Teseq Berlin	12 M	-	31.03.2011
549	Log-Per. Antenna	HL025	100060	Rohde & Schwarz	36/12M	-	10.03.2012
558	System CTC FAR S-VSWR	System CTC FAR S-	-	12 M	-	-	31.08.2010

### 8.1.3. 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-spurious emission (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