SAR TEST REPORT

No. I16Z40561-SEM01

For

Huawei Technologies Co.,Ltd.

Smart Phone

Model name: NEM-L22

With

Hardware Version: HL2NEMM

Software Version: NEM-L22C900B049

FCC ID: QISNEM-L22

Issued Date: 2016-5-6

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

Test Laboratory:

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REPORT HISTORY

Report Number	Revision	Issue Date	Description
I16Z40561-SEM01	Rev.0	2016-5-6	Initial creation of test report

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1 Test Laboratory

1.1 Testing Location

Company Name:	CTTL(Shouxiang)
Address:	No. 51 Shouxiang Science Building, Xueyuan Road, Haidian District, Beijing, P. R. China100191

1.2 Testing Environment

Temperature:	18°C~25 °C,
Relative humidity:	30%~ 70%
Ground system resistance:	< 0.5 Ω
Ambient noise & Reflection:	< 0.012 W/kg

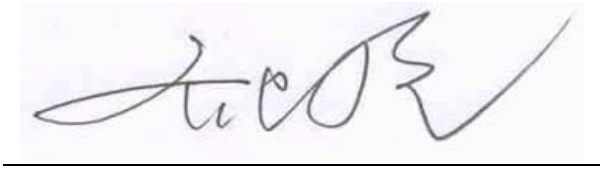
1.3 Project Data

Project Leader:	Qi Dianyuan
Test Engineer:	Lin Xiaojun
Testing Start Date:	April 5, 2016
Testing End Date:	April 9, 2016

1.4 Signature

Lin Xiaojun

(Prepared this test report)



Qi Dianyuan

(Reviewed this test report)

Xiao Li

Deputy Director of the laboratory

(Approved this test report)

2 Statement of Compliance

The maximum results of SAR found during testing for Huawei Technologies Co.,Ltd. Smart Phone NEM-L22 are as follows:

Table 2.1: Highest Reported SAR (1g) Div Antenna

Exposure Configuration	Technology Band	Highest Reported SAR 1g (W/Kg)	Equipment Class
Head (Separation Distance 0mm)	GSM 850	0.77	PCE
	PCS 1900	0.88	
	UMTS FDD 5	0.76	
	LTE Band 5	0.55	
	LTE Band 7	0.78	
	WLAN 2.4 GHz	**1.26**	DTS
Hotspot (Separation Distance 10mm)	GSM 850	0.14	PCE
	PCS 1900	0.12	
	UMTS FDD 5	0.17	
	LTE Band 5	0.16	
	LTE Band 7	0.14	
	WLAN 2.4 GHz	0.13	DTS
Body-worn (Separation Distance 15mm)	GSM 850	0.11	PCE
	PCS 1900	0.06	
	UMTS FDD 5	0.12	
	LTE Band 5	0.11	
	LTE Band 7	0.07	
	WLAN 2.4 GHz	0.09	DTS

Table 2.2: Highest Reported SAR (1g) Main Antenna

Exposure Configuration	Technology Band	Highest Reported SAR 1g (W/Kg)	Equipment Class
Head (Separation Distance 0mm)	GSM 850	0.31	PCE
	PCS 1900	0.24	
	UMTS FDD 5	0.38	
	LTE Band 5	0.32	
	LTE Band 7	0.42	
	WLAN 2.4 GHz	**1.26**	DTS
Hotspot (Separation Distance 10mm)	GSM 850	0.51	PCE
	PCS 1900	0.32	
	UMTS FDD 5	0.47	
	LTE Band 5	0.34	
	LTE Band 7	0.89	
	WLAN 2.4 GHz	0.13	DTS
Body-worn (Separation Distance 15mm)	GSM 850	0.42	PCE
	PCS 1900	0.14	
	UMTS FDD 5	0.40	
	LTE Band 5	0.27	
	LTE Band 7	0.43	
	WLAN 2.4 GHz	0.09	DTS

The SAR values found for the Mobile Phone are below the maximum recommended levels of **1.6** W/Kg as averaged over any 1g tissue according to the ANSI C95.1-1992.

For body worn operation, this device has been tested and meets FCC RF exposure guidelines when used with any accessory that contains no metal and which provides a minimum separation distance of 10 mm for hotspot on and 15mm for hotspot off and speech between this device and the body of the user. Use of other accessories may not ensure compliance with FCC RF exposure guidelines. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output.

The measurement together with the test system set-up is described in annex C of this test report. A detailed description of the equipment under test can be found in chapter 4 of this test report.

The highest reported SAR value is obtained at the case of **(Table 2.1),** and the values are**: 1.26 W/kg (1g).**

A fixed level power reduction is applied for Wi-Fi band when simultaneously transmitting with the 2G/3G/4G antenna in simultaneous transmission conditions. The standalone SAR compliance still uses the standalone SAR results tested at the maximum output power level without any power reduction.

The following tables summarize the key power reduction information. The detailed full power and reduced tune-up specifications and conducted power measurement results are provided in Section 11 of this report.

2G&3G&4G antenna + WiFi antenna simultaneous transmission		
Band	**Power Reduction Amount (dB)**	
	Main Antenna + WiFi	**Second Antenna + WiFi**
WIFI 2.4G 802.11b	3.5	3.5
WIFI 2.4G 802.11g	3	3
WIFI 2.4G 802.11n(20M)	2	2
WIFI 2.4G 802.11n(40M)	1.5	1.5

Div Antenna

Table 2.3: The sum of reported SAR values for main antenna and WLAN

	Position	**Main antenna**	**WLAN**	**Sum**
Maximum reported SAR value for Head	Left hand, Touch cheek	0.66	0.47	**1.13**
	Right hand, Touch cheek	0.88	0.19	**1.07**
Maximum reported SAR value for Body	Front 10mm	0.17	0.13	**0.30**

Note: The test of body WLAN used the normal conducted power, not the reduced power.

Table 2.4: The sum of reported SAR values for main antenna and Bluetooth

	Position	**Main antenna**	**BT***	**Sum**
Highest reported SAR value for Body	Front 10mm	0.17	0.21	**0.38**

BT* - Estimated SAR for Bluetooth (see the table 13.3)

Main Antenna

Table 2.5: The sum of reported SAR values for main antenna and WLAN

	Position	Main antenna	WLAN	Sum
Maximum reported SAR value for Head	Left hand, Touch cheek	0.31	0.47	**0.78**
	Right hand, Touch cheek	0.42	0.19	**0.61**
Maximum reported SAR value for Body	Front 10mm	0.89	0.13	**1.11**

Note: The test of body WLAN used the normal conducted power, not the reduced power.

Table 2.6: The sum of reported SAR values for main antenna and Bluetooth

	Position	Main antenna	BT*	Sum
Highest reported SAR value for Body	Front 10mm	0.89	0.21	**1.10**

BT* - Estimated SAR for Bluetooth (see the table 13.3)

* - Maximum possible output power declared by manufacturer

According to the above tables, the highest sum of reported SAR values is **1.13 W/kg (1g)**. The detail for simultaneous transmission consideration is described in chapter 13.

3 Client Information

3.1 Applicant Information

Company Name:	Huawei Technologies Co.,Ltd.
Address /Post:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District Shenzhen China
City:	Shenzhen
Country:	China
Contact Person:	Zhang Yahui
Email:	andy.zhangyahui@huawei.com
Telephone:	15191448101

3.2 Manufacturer Information

Company Name:	Huawei Technologies Co.,Ltd .
Address /Post:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District Shenzhen China
City:	Shenzhen
Country:	China
Contact Person:	Zhang Yahui
Email:	andy.zhangyahui@huawei.com
Telephone:	15191448101

4 Equipment Under Test (EUT) and Ancillary Equipment (AE)

4.1 About EUT

Description:	Smart Phone
Model name:	NEM-L22
Operating mode(s):	GSM 850/1900, WCDMA 850,BT, Wi-Fi, LTE Band 5/7
Tested Tx Frequency:	825 – 848.8 MHz (GSM 850)
	1850.2 – 1910 MHz (GSM 1900)
	826.4–846.6 MHz (WCDMA850 Band V)
	824.7 – 848.3 MHz (LTE Band 5)
	2510-2560 MHz(LTE Band 7)
	2412 – 2462 MHz (Wi-Fi 2.4G)
	2402 – 2480 MHz (Bluetooth)
Tested Rx Frequency:	869.2 – 891.8 MHz (GSM 850)
	1930.2 – 1989.8 MHz (GSM 1900)
	871.4 – 891.6 MHz (WCDMA850 Band V)
	869.7 – 893.3 MHz (LTE Band 5)
	2630 – 2680(LTE Band 7)
	2412 – 2462 MHz (Wi-Fi 2.4G)
	2402 – 2480 MHz (Bluetooth)
GPRS/EGPRS Multislot Class:	12
GPRS capability Class:	B
WCDMA Category	HSDPA:24
	HSUPA:6
	HSPA+:14
	DC-HSDPA:24
Release Version	GSM: R99
	GPRS: R99
	UMTS: Rel 8
Test device Production information:	Production unit
Device type:	Portable device
Antenna type:	Integrated antenna
Hotspot mode:	Support

4.2 Internal Identification of EUT used during the test

EUT ID*	IMEI	HW	SW Version
EUT1	860902030007534 860902030010736	HL2NEMM	NEM-L22C900B049
EUT2	860902030008847 860902030012047	HL2NEMM	NEM-L22C900B049
EUT3	860902030010553 860902030007351	HL2NEMM	NEM-L22C900B049
EUT4	860902030011312 860902030008110	HL2NEMM	NEM-L22C900B049
EUT5	860902030009456 860902030006254	HL2NEMM	NEM-L22C900B049
EUT6	860902030008912 860902030012112	HL2NEMM	NEM-L22C900B049
EUT7	860902030012195 860902030008995	HL2NEMM	NEM-L22C900B049
EUT8	860902030008862 860902030012062	HL2NEMM	NEM-L22C900B049
EUT9	860902030008763 860902030011965	HL2NEMM	NEM-L22C900B049
EUT10	860902030008425 860902030011627	HL2NEMM	NEM-L22C900B049
EUT11	860902030006304 860902030009506	HL2NEMM	NEM-L22C900B049

*EUT ID: is used to identify the test sample in the lab internally.

Note: It is performed to test SAR with the EUT1&2&3&4&5&6&7&8&9&10 and conducted power with the EUT11.

4.3 Internal Identification of AE used during the test

AE ID*	Description	Model	SN	Manufacturer
AE1	Battery	HB366481ECW	/	Sunwoda Electronics Co.,Ltd
AE2	Battery	HB366481ECW	/	SCUD(FUJIAN) Electronics Co.,Ltd
AE3	Battery	HB366481ECW	/	Desay
AE4	Headset	1293#+3283# 3.5MM-150	/	BOLUO COUNTY QUANCHENG ELECTRONIC CO.,LTD
AE5	Headset	HA1-3	/	GoerTek
AE6	Headset	MEMD1532B528000	/	Jiangxi Lianchuang Hongsheng Electronic Co.,LTD

*AE ID: is used to identify the test sample in the lab internally.

5 TEST METHODOLOGY

5.1 Applicable Limit Regulations

ANSI C95.1–1992: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

It specifies the maximum exposure limit of **1.6 W/kg** as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

5.2 Applicable Measurement Standards

IEEE 1528–2013: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.

KDB447498 D01: General RF Exposure Guidance v06: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

KDB648474 D04 Handset SAR v01r03: SAR Evaluation Considerations for Wireless Handsets.

KDB941225 D01 SAR test for 3G devices v03r01: SAR Measurement Procedures for 3G Devices

KDB941225 D05 SAR for LTE Devices v02r05: SAR Evaluation Considerations for LTE Devices

KDB941225 D06 Hotspot Mode SAR v02r01: SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities

KDB248227 D01 802.11 Wi-Fi SAR v02r02: SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS

KDB865664 D01SAR measurement 100 MHz to 6 GHz v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz.

KDB865664 D02 RF Exposure Reporting v01r02: RF Exposure Compliance Reporting and Documentation Considerations

6 Specific Absorption Rate (SAR)

6.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

6.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ) . The equation description is as below:

$$SAR = \frac{d}{dt}\left(\frac{dW}{dm}\right) = \frac{d}{dt}\left(\frac{dW}{\rho dv}\right)$$

SAR is expressed in units of Watts per kilogram (W/kg)
SAR measurement can be either related to the temperature elevation in tissue by

$$SAR = c\left(\frac{\delta T}{\delta t}\right)$$

Where: C is the specific head capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

$$SAR = \frac{\sigma |E|^2}{\rho}$$

Where: σ is the conductivity of the tissue, ρ is the mass density of tissue and E is the RMS electrical field strength.

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

7 Tissue Simulating Liquids

7.1 Targets for tissue simulating liquid

Table 7.1: Targets for tissue simulating liquid

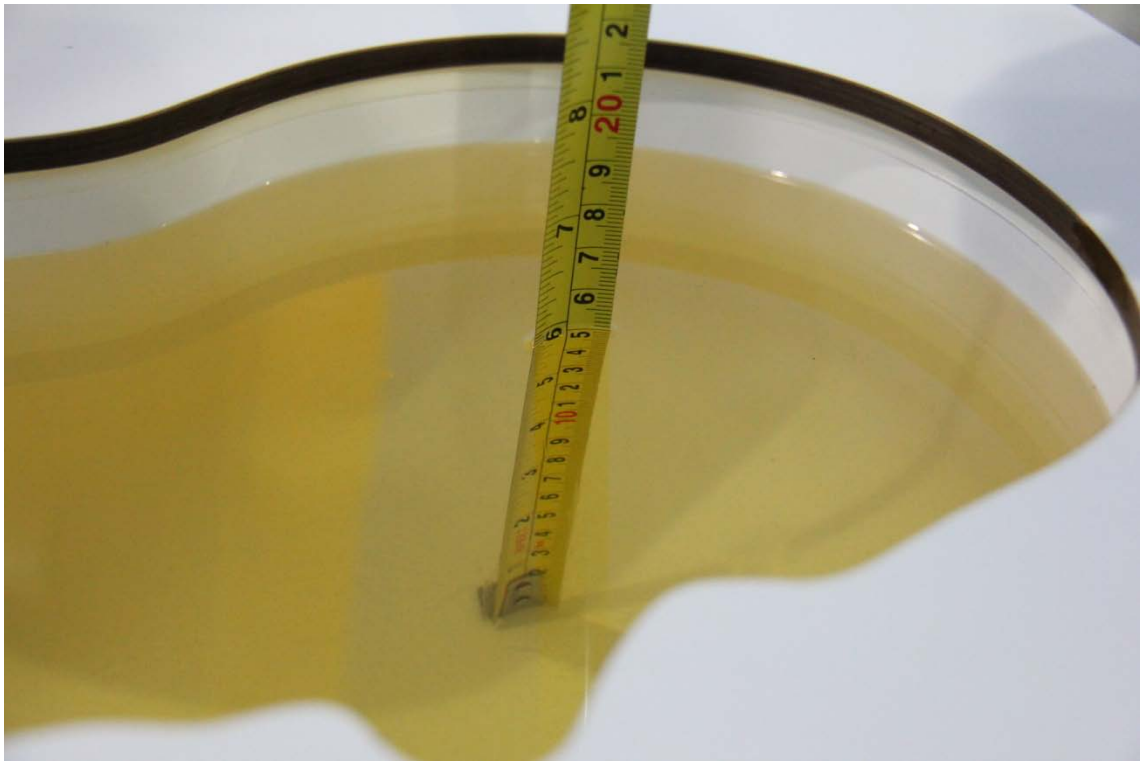
Frequency(MHz)	Liquid Type	Conductivity(σ)	± 5% Range	Permittivity(ε)	± 5% Range
835	Head	0.90	0.86～0.95	41.5	39.4～43.6
835	Body	0.97	0.92～1.02	55.2	52.4～58.0
1900	Head	1.40	1.33～1.47	40.0	38.0～42.0
1900	Body	1.52	1.44～1.60	53.3	50.6～56.0
2450	Head	1.80	1.71～1.89	39.2	37.2～41.2
2450	Body	1.95	1.85～2.05	52.7	50.1～55.3
2600	Head	1.96	1.86～2.06	39.01	37.06～40.96
2600	Body	2.16	2.05～2.27	52.5	49.9～55.1

7.2 Dielectric Performance

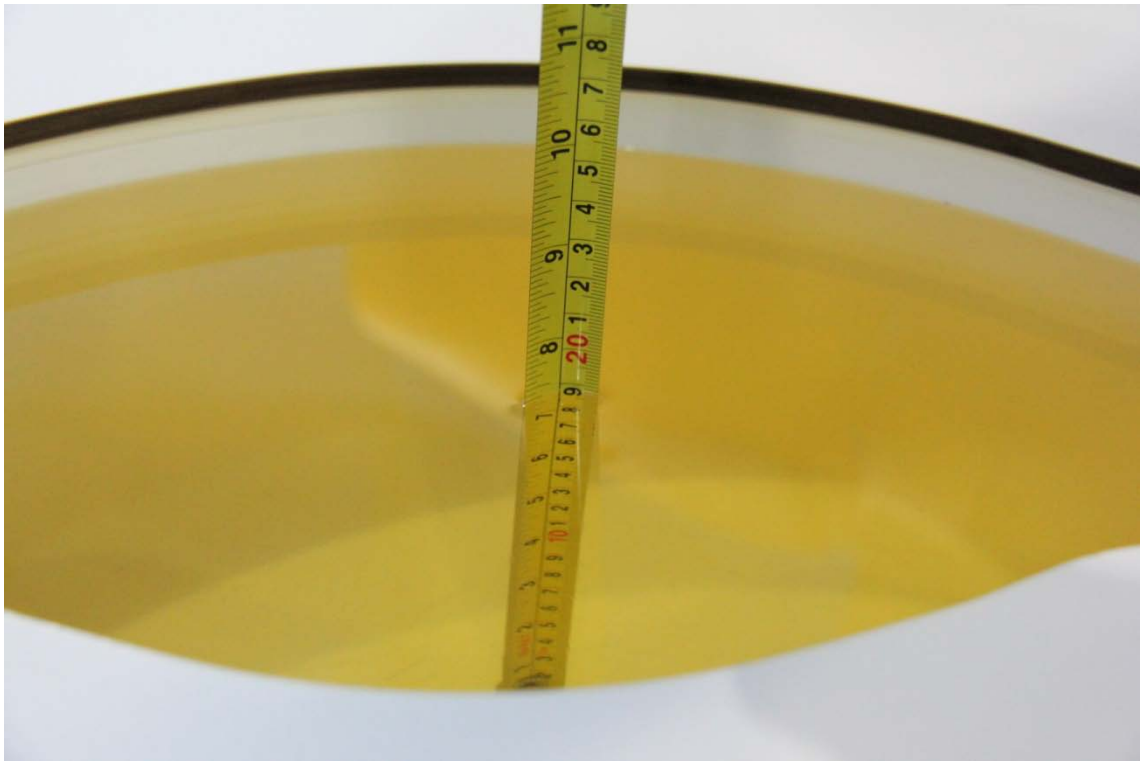
Table 7.2: Dielectric Performance of Tissue Simulating Liquid

Measurement Date (yyyy-mm-dd)	Type	Frequency	Permittivity ε	Drift (%)	Conductivity σ (S/m)	Drift (%)
2016-4-5	Head	835 MHz	41.76	0.63	0.876	-2.67
	Body	835 MHz	55.01	-0.34	0.966	-0.41
2016-4-6	Head	1900 MHz	40.18	0.45	1.421	1.50
	Body	1900 MHz	53.96	1.24	1.538	1.18
2016-4-7	Head	2450 MHz	39.18	-0.05	1.816	0.89
	Body	2450 MHz	54.11	2.68	1.926	-1.23
2016-4-8	Head	2600 MHz	38.98	-0.08	1.998	1.94
	Body	2600 MHz	51.28	-2.32	2.199	1.81
2016-4-9	Head	835 MHz	41.78	0.67	0.878	-2.44
	Body	835 MHz	55.11	-0.16	0.976	0.62

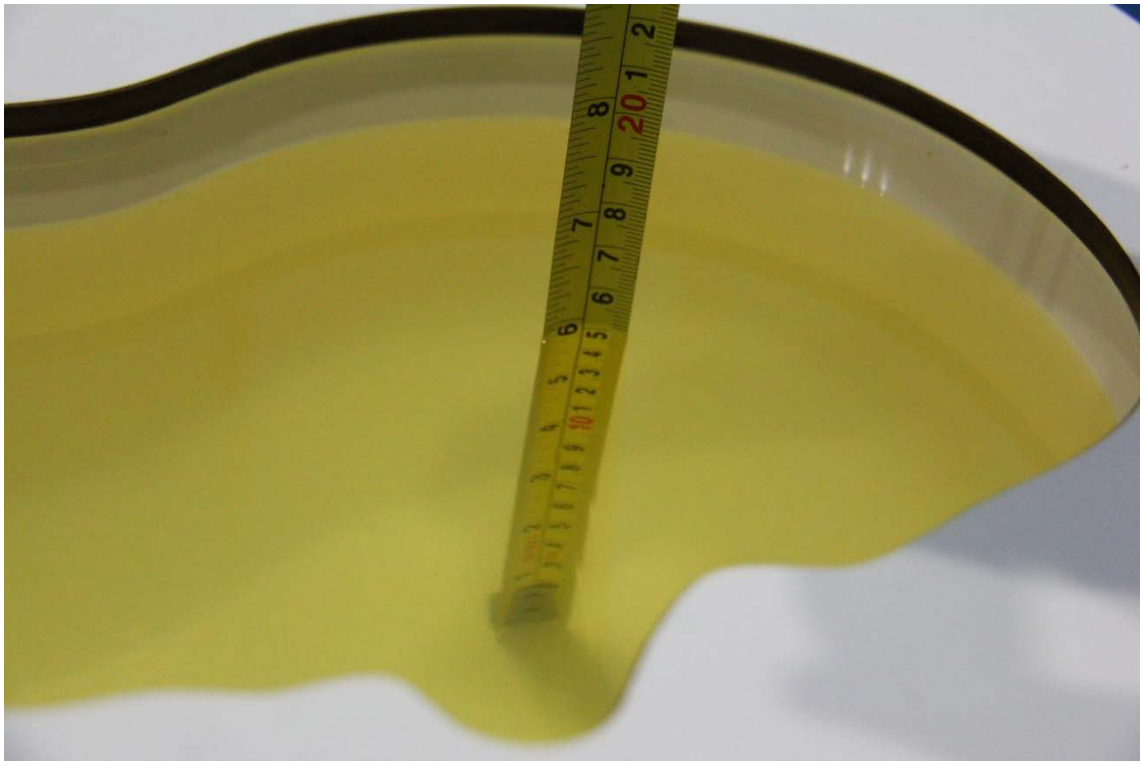
Note: The liquid temperature is 22.0 °C



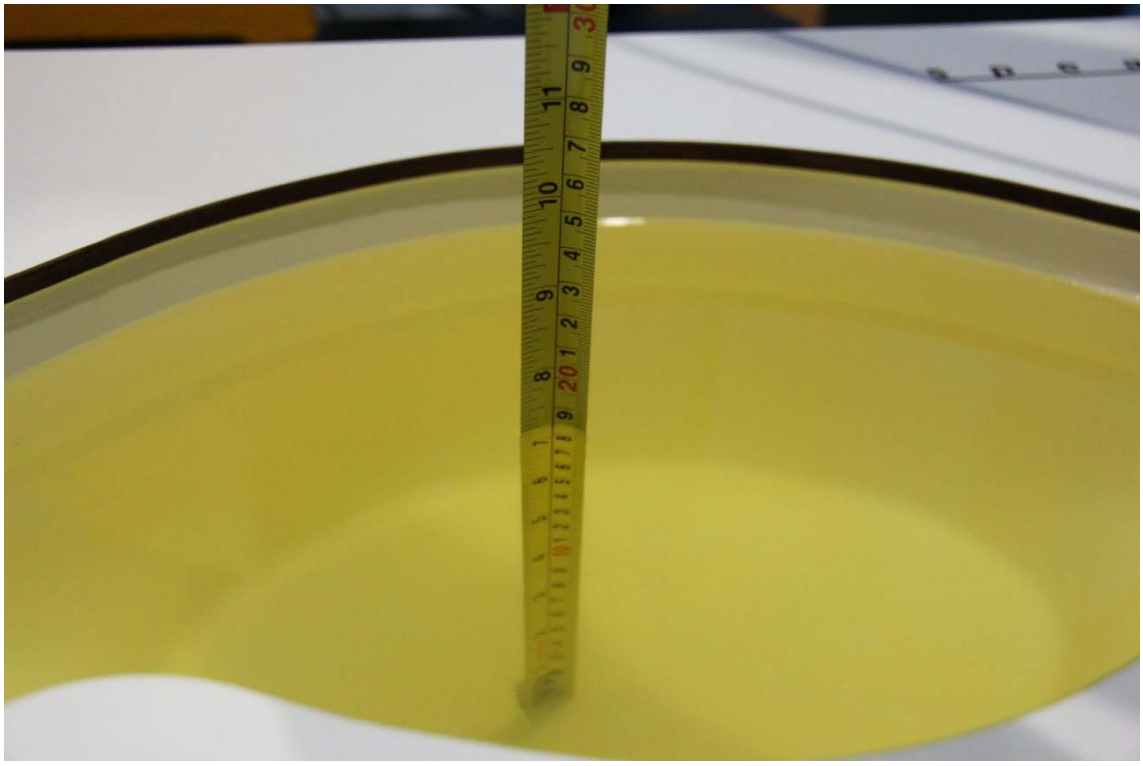
Picture 7-1: Liquid depth in the Head Phantom (835 MHz)



Picture 7-2: Liquid depth in the Flat Phantom (835 MHz)

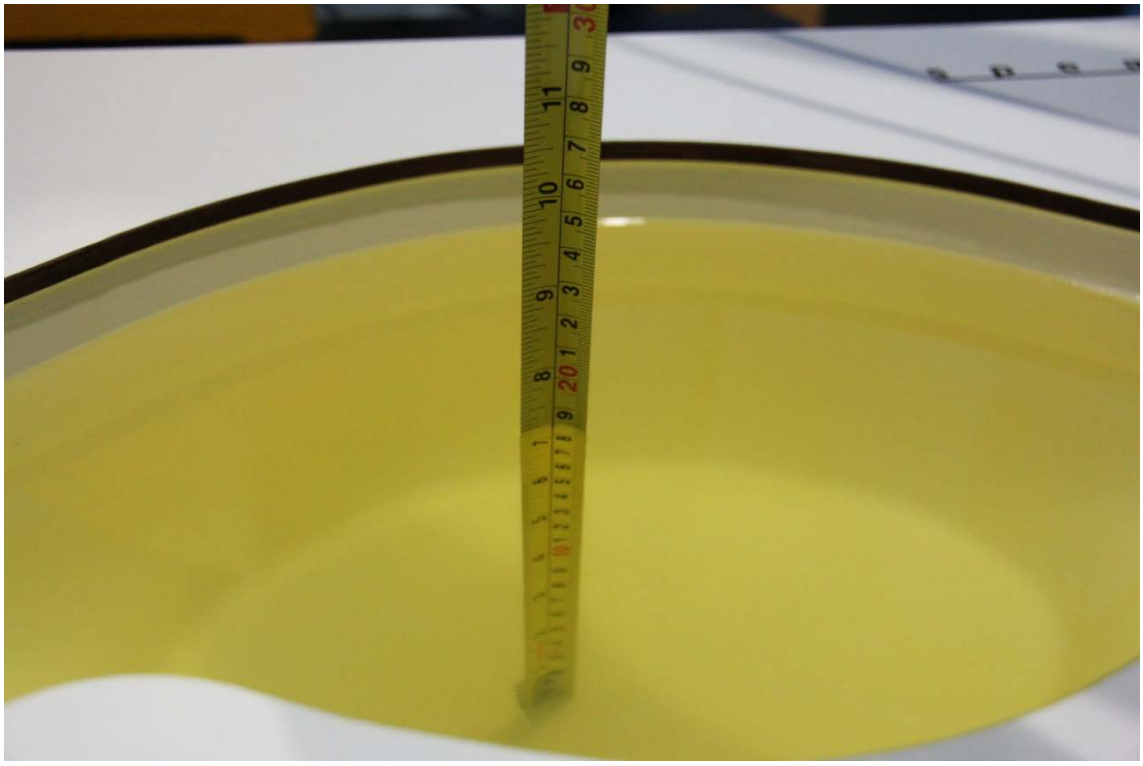


Picture 7-3: Liquid depth in the Head Phantom (1900 MHz)

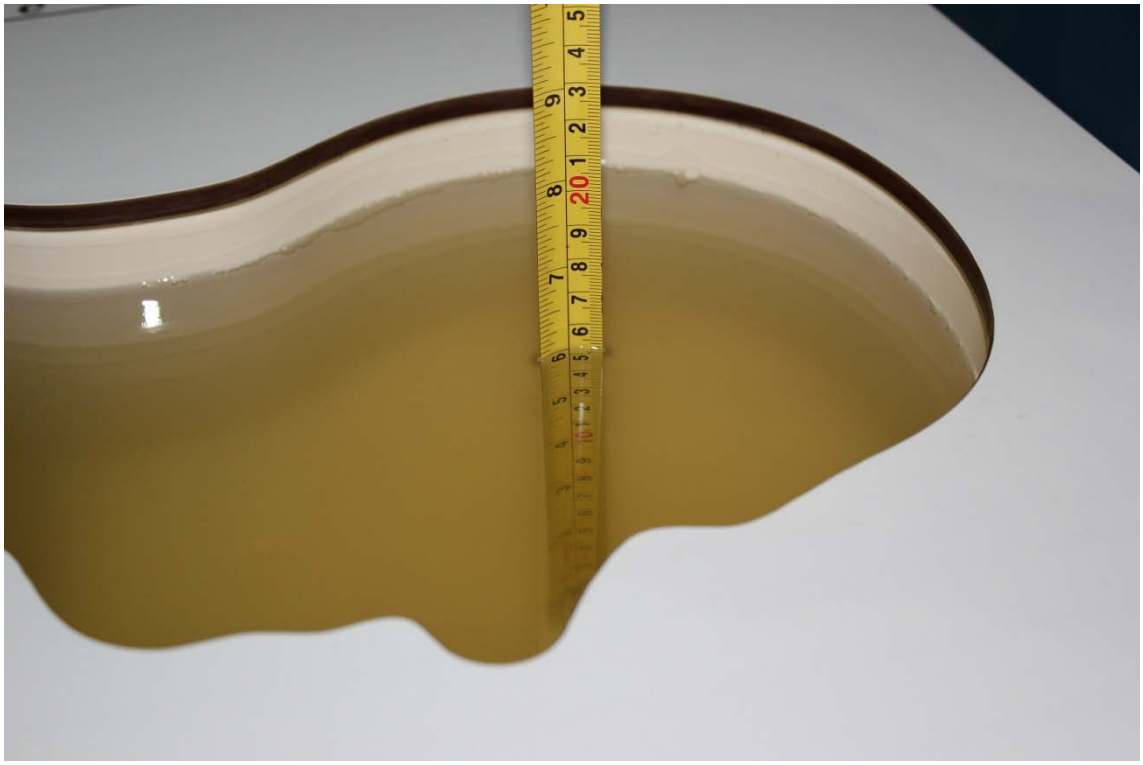


Picture 7-4 Liquid depth in the Flat Phantom (1900MHz)

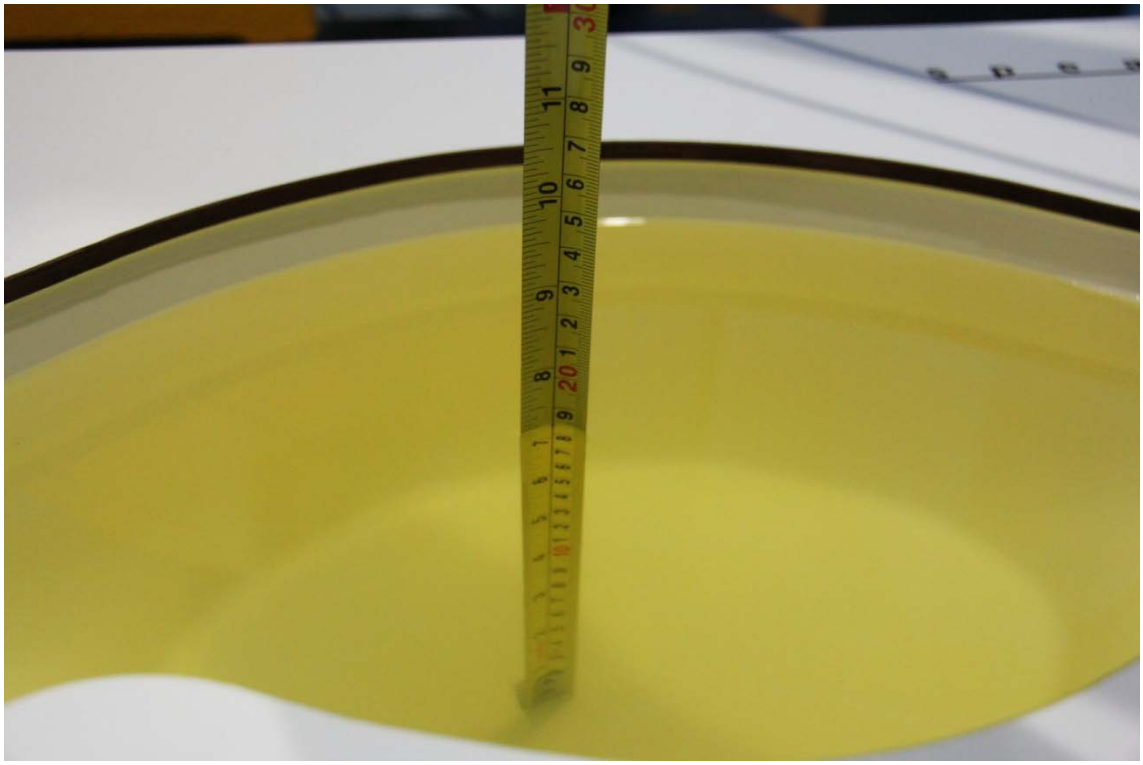
Picture 7-5 Liquid depth in the Head Phantom (2450MHz)



Picture 7-6 Liquid depth in the Flat Phantom (2450MHz)



Picture 7-7 Liquid depth in the Head Phantom (2600 MHz Head)

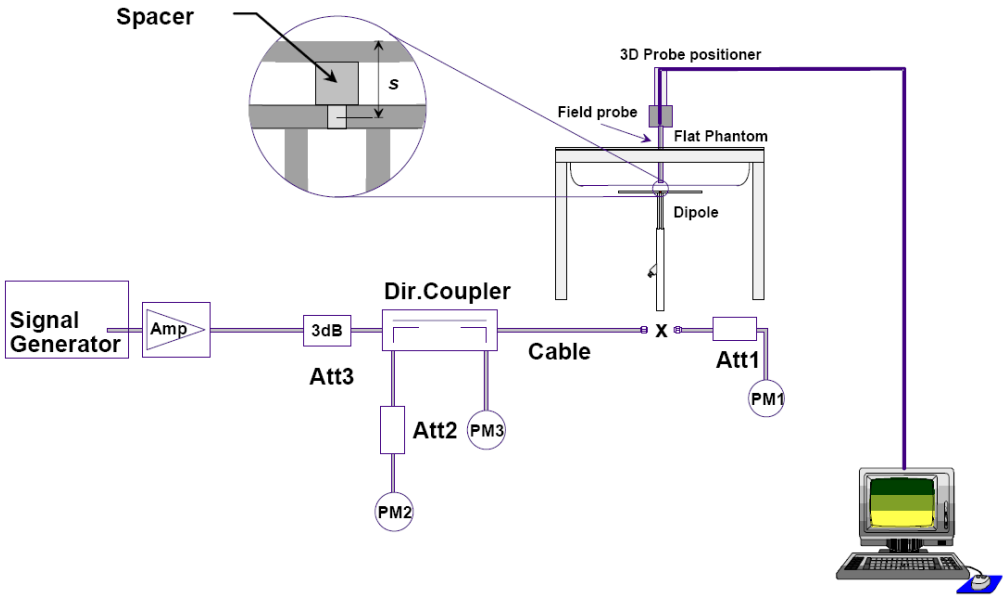


Picture 7-8 Liquid depth in the Flat Phantom (2600MHz)

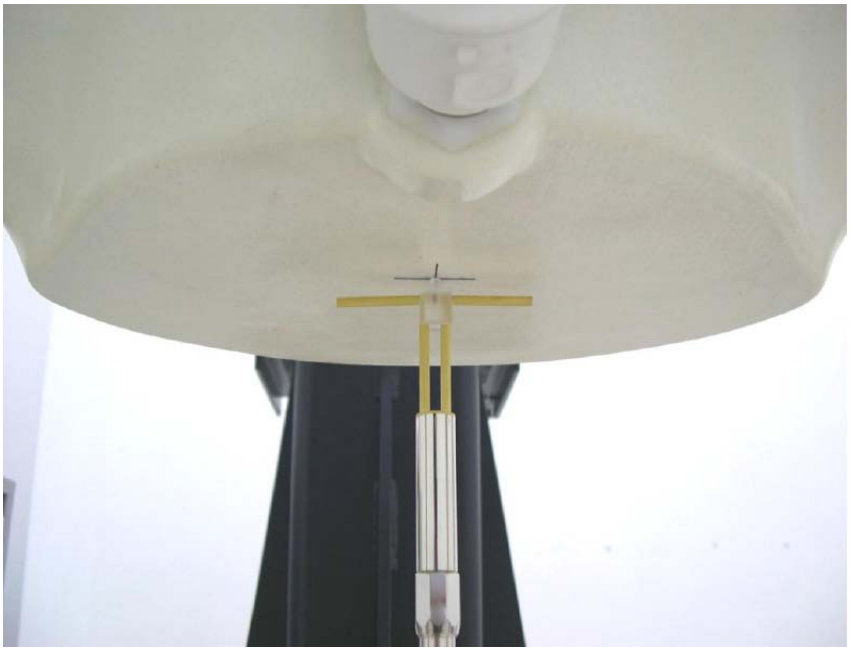
8 System verification

8.1 System Setup

In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:



Picture 8.1 System Setup for System Evaluation



Picture 8.2 Photo of Dipole Setup

8.2 System Verification

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The system verification results are required that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR. The details are presented in annex B.

Table 8.1: System Verification of Head

Measurement Date (yyyy-mm-dd)	Frequency	Target value (W/kg)		Measured value (W/kg)		Deviation	
		10 g Average	1 g Average	10 g Average	1 g Average	10 g Average	1 g Average
2016-4-5	835 MHz	5.86	9.01	5.84	8.92	-1.35%	-2.19%
2016-4-6	1900 MHz	21.5	40.7	21.36	41.36	0.00%	2.38%
2016-4-7	2450 MHz	24.5	52.5	24.80	53.32	1.22%	1.56%
2016-4-8	2600 MHz	26.0	57.1	25.68	57.32	-1.23%	0.39%
2016-4-9	835 MHz	5.86	9.01	5.80	8.88	-2.03%	-2.63%

Table 8.2: System Verification of Body

Measurement Date (yyyy-mm-dd)	Frequency	Target value (W/kg)		Measured value (W/kg)		Deviation	
		10 g Average	1 g Average	10 g Average	1 g Average	10 g Average	1 g Average
2016-4-5	835 MHz	6.12	9.29	6.00	9.12	-3.85%	-4.20%
2016-4-6	1900 MHz	21.7	40.4	21.48	40.52	-1.83%	-0.69%
2016-4-7	2450 MHz	24.4	52.1	23.88	50.48	-2.13%	-3.11%
2016-4-8	2600 MHz	25.4	56.4	25.44	57.64	0.16%	2.20%
2016-4-9	835 MHz	6.12	9.29	6.04	9.16	-3.21%	-3.78%

9 Measurement Procedures

9.1 Tests to be performed

In order to determine the highest value of the peak spatial-average SAR of a handset, all device positions, configurations and operational modes shall be tested for each frequency band according to steps 1 to 3 below. A flowchart of the test process is shown in picture 9.1.

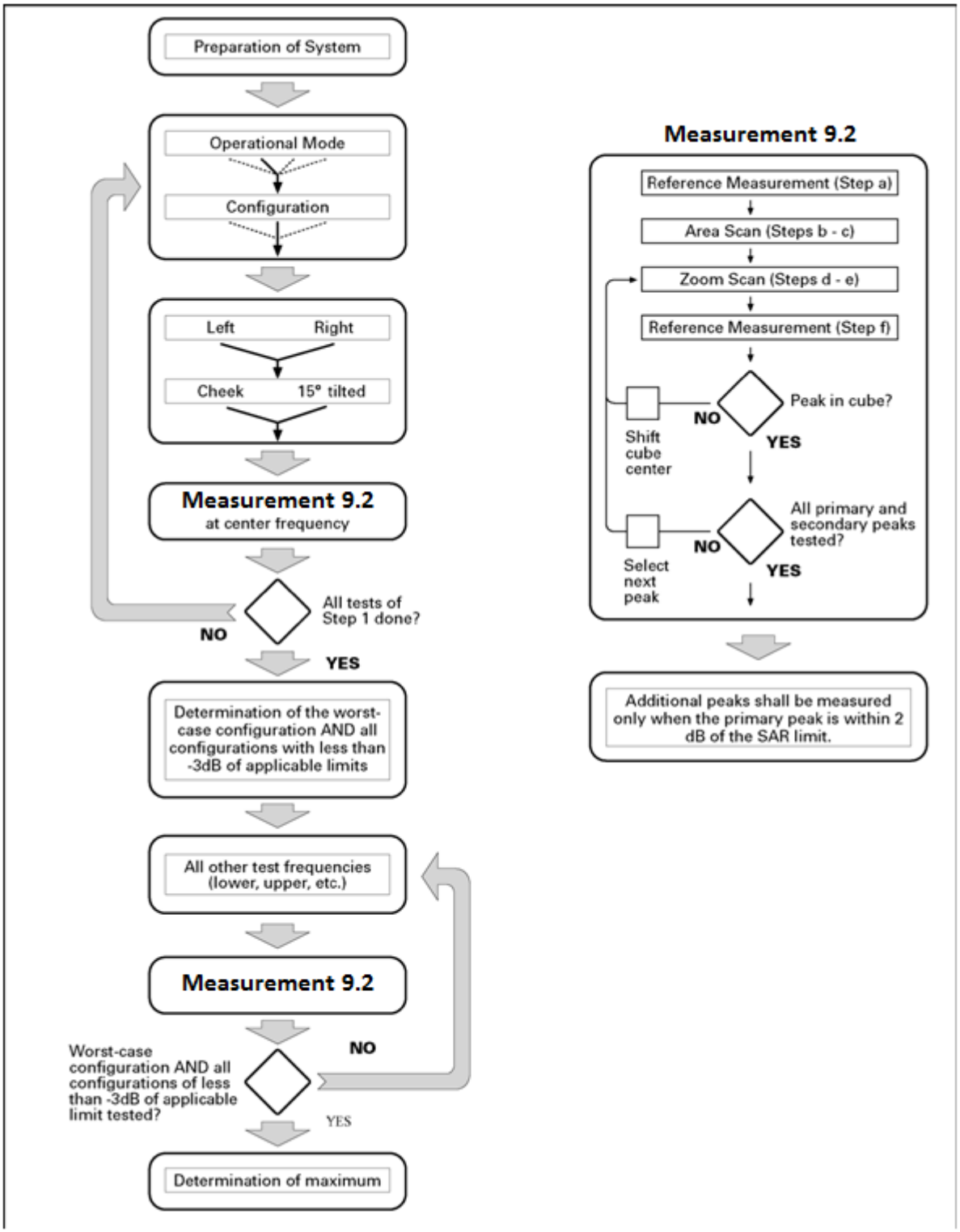
Step 1: The tests described in 9.2 shall be performed at the channel that is closest to the centre of the transmit frequency band (f_c) for:

a) all device positions (cheek and tilt, for both left and right sides of the SAM phantom, as described in annex D),
b) all configurations for each device position in a), e.g., antenna extended and retracted, and
c) all operational modes, e.g., analogue and digital, for each device position in a) and configuration in b) in each frequency band.

If more than three frequencies need to be tested according to 11.1 (i.e., N_c > 3), then all frequencies, configurations and modes shall be tested for all of the above test conditions.

Step 2: For the condition providing highest peak spatial-average SAR determined in Step 1, perform all tests described in 9.2 at all other test frequencies, i.e., lowest and highest frequencies. In addition, for all other conditions (device position, configuration and operational mode) where the peak spatial-average SAR value determined in Step 1 is within 3 dB of the applicable SAR limit, it is recommended that all other test frequencies shall be tested as well.

Step 3: Examine all data to determine the highest value of the peak spatial-average SAR found in Steps 1 to 2.



Picture 9.1 Block diagram of the tests to be performed

9.2 General Measurement Procedure

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements and fully documented in SAR reports to qualify for TCB approval. Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std 1528-2003. The results should be documented as part of the system validation records and may be requested to support test results when all the measurement parameters in the following table are not satisfied.

<table>
<tr><td colspan="3"></td><td>≤ 3 GHz</td><td>> 3 GHz</td></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>½·δ·ln(2) ± 0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3 – 4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤ 4 mm</td><td>3 – 4 GHz: ≤ 3 mm
4 – 5 GHz: ≤ 2.5 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">≤ 1.5·$\Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 – 4 GHz: ≥ 28 mm
4 – 5 GHz: ≥ 25 mm
5 – 6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the <u>reported</u> SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

9.3 WCDMA Measurement Procedures for SAR

The following procedures are applicable to WCDMA handsets operating under 3GPP Release99, Release 5 and Release 6. The default test configuration is to measure SAR with an established radio link between the DUT and a communication test set using a 12.2kbps RMC (reference measurement channel) configured in Test Loop Mode 1. SAR is selectively confirmed for other physical channel configurations (DPCCH & $DPDCH_n$), HSDPA and HSPA (HSUPA/HSDPA) modes according to output power, exposure conditions and device operating capabilities. Both uplink and downlink should be configured with the same RMC or AMR, when required. SAR for Release 5 HSDPA and Release 6 HSPA are measured using the applicable FRC (fixed reference channel) and E-DCH reference channel configurations. Maximum output power is verified according to applicable versions of 3GPP TS 34.121 and SAR must be measured according to these maximum output conditions. When Maximum Power Reduction (MPR) is not implemented according to Cubic Metric (CM) requirements for Release 6 HSPA, the following procedures do not apply.

For Release 5 HSDPA Data Devices:

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs}	CM/dB
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15	15/15	64	12/15	24/25	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

For Release 6 HSPA Data Devices

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs}	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (dB)	MPR (dB)	AG Index	E-TFCI
1	11/15	15/15	64	11/15	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	12/15	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}:47/15 β_{ed2}:47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	4/15	56/75	4	1	3.0	2.0	17	71
5	15/15	15/15	64	15/15	24/15	30/15	134/15	4	1	1.0	0.0	21	81

For Release 8

SAR is required for Rel. 8 DC-HSDPA when SAR is required for Rel. 5 HSDPA; otherwise, the 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode. Power is measured for DC-HSDPA according to the H-Set 12, FRC configuration in Table C.8.1.12 of 3GPP TS 34.121-1 to determine SAR test reduction. A primary and a secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to be acceptable.

9.4 SAR Measurement for LTE

SAR tests for LTE are performed with a base station simulator, Rohde & Rchwarz CMW500. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. All powers were measured with the CMW 500.
It is performed for conducted power and SAR based on the KDB941225 D05.
SAR is evaluated separately according to the following procedures for the different test positions in each exposure condition – head, body, body-worn accessories and other use conditions. The procedures in the following subsections are applied separately to test each LTE frequency band.

1) QPSK with 1 RB allocation
   Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.
2) QPSK with 50% RB allocation
   The procedures required for 1 RB allocation in 1) are applied to measure the SAR for QPSK with 50% RB allocation.
3) QPSK with 100% RB allocation
   For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation in 1) and 2) are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
4) Higher order modulations
   For each modulation besides QPSK; *e.g.,* 16-QAM, 64-QAM, apply the QPSK procedures in 5.2.1, 5.2.2, and 5.2.3 to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the *reported* SAR for the QPSK configuration is > 1.45 W/kg.
5) **Other channel bandwidth standalone SAR test requirements**
   For the other channel bandwidths used by the device in a frequency band, apply all the procedures required for the largest channel bandwidth in 5.2 to determine the channels and RB configurations that need SAR testing, then only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration, or the *reported* SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg. The equivalent channel configuration for the RB allocation, RB offset and modulation, etc., is determined for the smaller channel bandwidth according to the same number of RB allocated in the largest channel bandwidth. For example, 50 RB in 10 MHz channel bandwidth does not apply to 5 MHz channel bandwidth; therefore, this cannot be tested in the smaller

channel bandwidth. However, 50% RB allocation in 10 MHz channel bandwidth is equivalent to 100% RB allocation in 5 MHz channel bandwidth; therefore, these are the equivalent configurations to be compared to determine the specific channel and configuration in the smaller channel bandwidth that need SAR testing.

9.5 Bluetooth & Wi-Fi Measurement Procedures for SAR

Normal network operating configurations are not suitable for measuring the SAR of 802.11 transmitters in general. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure that the results are consistent and reliable.

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in a test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

9.6 Power Drift

To control the output power stability during the SAR test, DASY5 system calculates the power drift by measuring the E-field at the same location at the beginning and at the end of the measurement for each test position. These drift values can be found in section 14 labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 5%.

10 Area Scan Based 1-g SAR

10.1 Requirement of KDB

According to the KDB447498 D01 v05, when the implementation is based the specific polynomial fit algorithm as presented at the 29th Bioelectromagnetics Society meeting (2007) and the estimated 1-g SAR is $\leqslant$ 1.2 W/kg, a zoom scan measurement is not required provided it is also not needed for any other purpose; for example, if the peak SAR location required for simultaneous transmission SAR test exclusion can be determined accurately by the SAR system or manually to discriminate between distinctive peaks and scattered noisy SAR distributions from area scans.

There must not be any warning or alert messages due to various measurement concerns identified by the SAR system; for example, noise in measurements, peaks too close to scan boundary, peaks are too sharp, spatial resolution and uncertainty issues etc. The SAR system verification must also demonstrate that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR (See Annex B). When all the SAR results for each exposure condition in a frequency band and wireless mode are based on estimated 1-g SAR, the 1-g SAR for the highest SAR configuration must be

determined by a zoom scan.

10.2 Fast SAR Algorithms

The approach is based on the area scan measurement applying a frequency dependent attenuation parameter. This attenuation parameter was empirically determined by analyzing a large number of phones. The MOTOROLA FAST SAR was developed and validated by the MOTOROLA Research Group in Ft. Lauderdale.

In the initial study, an approximation algorithm based on Linear fit was developed. The accuracy of the algorithm has been demonstrated across a broad frequency range (136-2450 MHz) and for both 1- and 10-g averaged SAR using a sample of 264 SAR measurements from 55 wireless handsets. For the sample size studied, the root-mean-squared errors of the algorithm are 1.2% and 5.8% for 1- and 10-g averaged SAR, respectively. The paper describing the algorithm in detail is expected to be published in August 2004 within the Special Issue of Transactions on MTT.

In the second step, the same research group optimized the fitting algorithm to an Polynomial fit whereby the frequency validity was extended to cover the range 30-6000MHz. Details of this study can be found in the BEMS 2007 Proceedings.

Both algorithms are implemented in DASY software.

11 Conducted Output Power

11.1 Manufacturing tolerance

Table 11.1: GSM Speech

GSM 850			
Channel	Channel 251	Channel 190	Channel 128
Target (dBm)	32.5	32.5	32.5
Tune-up (dBm)	33.5	33.5	33.5
GSM 1900			
Channel	Channel 810	Channel 661	Channel 512
Target (dBm)	29.5	29.5	29.5
Tune-up (dBm)	30.5	30.5	30.5

Table 11.2: GPRS and EGPRS

GSM 850 GPRS (GMSK)				
Channel		**251**	**190**	**128**
1 Txslot	Target (dBm)	32.5	32.5	32.5
	Tune-up (dBm)	33.5	33.5	33.5
2 Txslots	Target (dBm)	30.5	30.5	30.5
	Tune-up (dBm)	31.5	31.5	31.5
3 Txslots	Target (dBm)	28.5	28.5	28.5
	Tune-up (dBm)	29.5	29.5	29.5
4 Txslots	Target (dBm)	26.5	26.5	26.5
	Tune-up (dBm)	27.5	27.5	27.5
GSM 850 EGPRS (GMSK)				
Channel		**251**	**190**	**128**
1 Txslot	Target (dBm)	32.5	32.5	32.5
	Tune-up (dBm)	33.5	33.5	33.5
2 Txslots	Target (dBm)	30.5	30.5	30.5
	Tune-up (dBm)	31.5	31.5	31.5
3 Txslots	Target (dBm)	28.5	28.5	28.5
	Tune-up (dBm)	29.5	29.5	29.5
4 Txslots	Target (dBm)	26.5	26.5	26.5
	Tune-up (dBm)	27.5	27.5	27.5
GSM 850 EGPRS (8PSK)				
Channel		**251**	**190**	**128**
1 Txslot	Target (dBm)	26	26	26
	Tune-up (dBm)	27	27	27
2 Txslots	Target (dBm)	24	24	24
	Tune-up (dBm)	25	25	25
3 Txslots	Target (dBm)	22	22	22
	Tune-up (dBm)	23	23	23

4 Txslots	Target (dBm)	20	20	20
	Tune-up (dBm)	21	21	21
GSM 1900 GPRS (GMSK)				
Channel		**810**	**661**	**512**
1 Txslot	Target (dBm)	29.5	29.5	29.5
	Tune-up (dBm)	30.5	30.5	30.5
2 Txslots	Target (dBm)	27.5	27.5	27.5
	Tune-up (dBm)	28.5	28.5	28.5
3 Txslots	Target (dBm)	25.5	25.5	25.5
	Tune-up (dBm)	26.5	26.5	26.5
4 Txslots	Target (dBm)	23.5	23.5	23.5
	Tune-up (dBm)	24.5	24.5	24.5
GSM 1900 EGPRS (GMSK)				
Channel		**810**	**661**	**512**
1 Txslot	Target (dBm)	29.5	29.5	29.5
	Tune-up (dBm)	30.5	30.5	30.5
2 Txslots	Target (dBm)	27.5	27.5	27.5
	Tune-up (dBm)	28.5	28.5	28.5
3 Txslots	Target (dBm)	25.5	25.5	25.5
	Tune-up (dBm)	26.5	26.5	26.5
4 Txslots	Target (dBm)	23.5	23.5	23.5
	Tune-up (dBm)	24.5	24.5	24.5
GSM 1900 GPRS (8PSK)				
Channel		**810**	**661**	**512**
1 Txslot	Target (dBm)	25	25	25
	Tune-up (dBm)	26	26	26
2 Txslots	Target (dBm)	23	23	23
	Tune-up (dBm)	24	24	24
3 Txslots	Target (dBm)	21	21	21
	Tune-up (dBm)	22	22	22
4 Txslots	Target (dBm)	19	19	19
	Tune-up (dBm)	20	20	20

Table 11.3: WCDMA

WCDMA 850 CS			
Channel	Channel 4233	Channel 4182	Channel 4132
Target (dBm)	23.5	23.5	23.5
Tune-up (dBm)	24.5	24.5	24.5
HSDPA (sub-test 1~2)			
Channel	Channel 4233	Channel 4182	Channel 4132
Target (dBm)	23.5	23.5	23.5
Tune-up (dBm)	24.5	24.5	24.5

HSDPA (sub-test 3~4)			
Channel	Channel 4233	Channel 4182	Channel 4132
Target (dBm)	23	23	23
Tune-up (dBm)	24	24	24
HSUPA (sub-test 1/5)			
Channel	Channel 4233	Channel 4182	Channel 4132
Target (dBm)	23.5	23.5	23.5
Tune-up (dBm)	24.5	24.5	24.5
HSUPA (sub-test 2/4)			
Channel	Channel 4233	Channel 4182	Channel 4132
Target (dBm)	21	21	21
Tune-up (dBm)	22	22	22
HSUPA (sub-test 3)			
Channel	Channel 4233	Channel 4182	Channel 4132
Target (dBm)	22	22	22
Tune-up (dBm)	23	23	23
DC-HSDPA (sub-test 1~2)			
Channel	Channel 4233	Channel 4182	Channel 4132
Target (dBm)	23.5	23.5	23.5
Tune-up (dBm)	24.5	24.5	24.5
DC-HSDPA (sub-test 3~4)			
Channel	Channel 4233	Channel 4182	Channel 4132
Target (dBm)	23	23	23
Tune-up (dBm)	24	24	24

Table 11.4: LTE

LTE Band V					
Frequency (MHz)	BW(MHz)	Modulation	RB Size	Target power	Tune up
Uplink:824~849 Downlink:869~894	1.4	QPSK	≤5	23	24
		16-QAM	≤5	22	23
		QPSK	>5	22	23
		16-QAM	>5	21.5	22.5
Uplink:824~849 Downlink:869~894	3	QPSK	≤4	23	24
		16-QAM	≤4	22	23
		QPSK	>4	22	23
		16-QAM	>4	21.5	22.5
Uplink:824~849 Downlink:869~894	5	QPSK	≤8	23	24
		16-QAM	≤8	22	23
		QPSK	>8	22	23
		16-QAM	>8	21.5	22.5
Uplink:824~849 Downlink:869~894	10	QPSK	≤12	23	24
		16-QAM	≤12	22	23
		QPSK	>12	22	23
		16-QAM	>12	21.5	22.5

LTE Band VII					
Frequency (MHz)	BW(MHz)	Modulation	RB Size	Target power	Tune up
Uplink:2500~2570 Downlink:2620~2690	5	QPSK	≤8	23	24
		16-QAM	≤8	22	23
		QPSK	>8	22	23
		16-QAM	>8	22	23
Uplink:2500~2570 Downlink:2620~2690	10	QPSK	≤12	23	24
		16-QAM	≤12	22	23
		QPSK	>12	22	23
		16-QAM	>12	22	23
Uplink:2500~2570 Downlink:2620~2690	15	QPSK	≤16	23	24
		16-QAM	≤16	22	23
		QPSK	>16	22	23
		16-QAM	>16	22	23
Uplink:2500~2570 Downlink:2620~2690	20	QPSK	≤18	23	24
		16-QAM	≤18	22	23
		QPSK	>18	22	23
		16-QAM	>18	22	23

Table 11.5: Bluetooth

EDR			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	9	9	9
Tune-up (dBm)	10	10	10
BLE			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	5	5	5
Tune-up (dBm)	7	7	7

Table 11.6: WiFi

802.11b

Channel \ rate	1Mbps	
	dBm	±
1	15.5	1
6	15.5	1
11	15.5	1

802.11g

Channel\ rate	6Mbps	
	dBm	±
1	14.5	1
6	14.5	1
11	14.5	1

802.11n-20M

Channel\ rate	MCS0	
	dBm	±
1	13.5	1
6	13.5	1
11	13.5	1

802.11n-40M

Channel\ rate	MCS0	
	dBm	±
1	13.0	1
6	13.0	1
11	13.0	1

A fixed level power reduction is applied for Wi-Fi band when simultaneously transmitting with the 2G/3G/4G antenna in simultaneous transmission conditions.

802.11b

Channel \ rate	1Mbps	
	dBm	±
1	12	1
6	12	1
11	12	1

802.11g

Channel\ rate	6Mbps	
	dBm	±
1	11.5	1
6	11.5	1
11	11.5	1

802.11n-20M

Channel\ rate	MCS0	
	dBm	±
1	11.5	1
6	11.5	1
11	11.5	1

802.11n-40M

Channel\ rate	MCS0	
	dBm	±
1	11.5	1
6	11.5	1
11	11.5	1

11.2 GSM Measurement result

During the process of testing, the EUT was controlled via Agilent Digital Radio Communication tester (E5515C) to ensure the maximum power transmission and proper modulation. This result contains conducted output power for the EUT. In all cases, the measured peak output power should be greater and within 5% than EMI measurement.

Div Antenna

Table 11.7: The conducted power measurement results for GSM850/1900

GSM 850MHz	Conducted Power (dBm)		
	Channel 251(848.8MHz)	Channel 190(836.6MHz)	Channel 128(824.2MHz)
	33.13	33.14	33.17
GSM 1900MHz	Conducted Power (dBm)		
	Channel 810(1909.8MHz)	Channel 661(1880MHz)	Channel 512(1850.2MHz)
	30.16	30.18	30.18

Table 11.8: The conducted power measurement results for GPRS and EGPRS

GSM 850 GPRS (GMSK)	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	251	**190**	**128**		**251**	**190**	**128**
1 Txslot	33.13	33.14	33.17	-9.03	24.10	24.11	24.14
2 Txslots	31.30	31.29	31.28	-6.02	**25.28**	**25.27**	**25.26**
3Txslots	29.32	29.33	29.32	-4.26	25.06	25.07	25.06
4 Txslots	27.33	27.34	27.33	-3.01	24.32	24.33	24.32
GSM 850 EGPRS (GMSK)	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	251	**190**	**128**		**251**	**190**	**128**
1 Txslot	33.13	33.14	33.17	-9.03	24.10	24.11	24.14
2 Txslots	31.30	31.29	31.27	-6.02	**25.28**	**25.27**	**25.25**
3Txslots	29.32	29.32	29.31	-4.26	25.06	25.06	25.05
4 Txslots	27.33	27.33	27.32	-3.01	24.32	24.32	24.31
GSM 850 EGPRS (8PSK)	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	251	**190**	**128**		**251**	**190**	**128**
1 Txslot	26.71	26.61	26.59	-9.03	17.68	17.58	17.56
2 Txslots	24.68	24.59	24.58	-6.02	**18.66**	**18.57**	**18.56**
3Txslots	22.70	22.42	22.32	-4.26	18.44	18.16	18.06
4 Txslots	20.52	20.47	20.34	-3.01	17.51	17.46	17.33
PCS1900 GPRS (GMSK)	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	810	**661**	**512**		**810**	**661**	**512**
1 Txslot	30.16	30.18	30.18	-9.03	21.13	21.15	21.15
2 Txslots	28.19	28.21	28.21	-6.02	**22.17**	**22.19**	**22.19**
3Txslots	26.25	26.27	26.24	-4.26	21.99	22.01	21.98
4 Txslots	24.21	24.26	24.24	-3.01	21.20	21.25	21.23

PCS1900 EGPRS (GMSK)	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	810	**661**	**512**		**810**	**661**	**512**
1 Txslot	30.16	30.18	30.18	-9.03	21.13	21.15	21.15
2 Txslots	28.19	28.21	28.21	-6.02	**22.17**	**22.19**	**22.19**
3Txslots	26.24	26.27	26.24	-4.26	21.98	22.01	21.98
4 Txslots	24.20	24.25	24.24	-3.01	21.19	21.24	21.23
GSM 1900 EGPRS (8PSK)	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	810	**661**	**512**		**810**	**661**	**512**
1 Txslot	25.72	25.82	25.88	-9.03	16.69	16.79	16.85
2 Txslots	23.48	23.57	23.64	-6.02	**17.46**	**17.55**	**17.62**
3Txslots	21.44	21.54	21.59	-4.26	17.18	17.28	17.33
4 Txslots	19.15	19.25	19.30	-3.01	16.14	16.24	16.29

NOTES:

1) Division Factors

To average the power, the division factor is as follows:

1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

According to the conducted power as above, the body measurements are performed with 2Txslot for GSM850 and GSM 1900.

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Table 11.9: The conducted power measurement results for GSM850/1900

GSM 850MHz	Conducted Power (dBm)		
	Channel 251(848.8MHz)	Channel 190(836.6MHz)	Channel 128(824.2MHz)
	33.45	33.43	33.42
GSM 1900MHz	Conducted Power (dBm)		
	Channel 810(1909.8MHz)	Channel 661(1880MHz)	Channel 512(1850.2MHz)
	30.33	30.38	30.45

Table 11.10: The conducted power measurement results for GPRS and EGPRS

GSM 850 GPRS (GMSK)	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	251	**190**	**128**		**251**	**190**	**128**
1 Txslot	33.45	33.43	33.42	-9.03	24.42	24.40	24.39
2 Txslots	31.48	31.44	31.41	-6.02	**25.46**	**25.42**	**25.39**
3Txslots	29.44	29.42	29.40	-4.26	25.18	25.16	25.14
4 Txslots	27.39	27.38	27.35	-3.01	24.38	24.37	24.34
GSM 850 EGPRS (GMSK)	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	251	**190**	**128**		**251**	**190**	**128**
1 Txslot	33.45	33.43	33.42	-9.03	24.42	24.40	24.39
2 Txslots	31.47	31.44	31.41	-6.02	**25.45**	**25.42**	**25.39**
3Txslots	29.44	29.42	29.40	-4.26	25.18	25.16	25.14
4 Txslots	27.39	27.38	27.35	-3.01	24.38	24.37	24.34

GSM 850 EGPRS (8PSK)	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	251	**190**	**128**		**251**	**190**	**128**
1 Txslot	26.72	26.61	26.48	-9.03	17.69	17.58	17.45
2 Txslots	24.66	24.58	24.44	-6.02	**18.64**	**18.56**	**18.42**
3Txslots	22.67	22.31	22.13	-4.26	18.41	18.05	17.87
4 Txslots	20.48	20.33	20.16	-3.01	17.47	17.32	17.15
PCS1900 GPRS (GMSK)	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	810	**661**	**512**		**810**	**661**	**512**
1 Txslot	30.33	30.38	30.45	-9.03	21.30	21.35	21.42
2 Txslots	28.49	28.49	28.45	-6.02	**22.47**	**22.47**	**22.43**
3Txslots	26.39	26.38	26.32	-4.26	22.13	22.12	22.06
4 Txslots	24.45	24.41	24.33	-3.01	21.44	21.40	21.32
PCS1900 EGPRS (GMSK)	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	810	**661**	**512**		**810**	**661**	**512**
1 Txslot	30.33	30.38	30.45	-9.03	21.30	21.35	21.42
2 Txslots	28.49	28.49	28.44	-6.02	**22.47**	**22.47**	**22.42**
3Txslots	26.38	26.38	26.32	-4.26	22.12	22.12	22.06
4 Txslots	24.44	24.41	24.32	-3.01	21.43	21.40	21.31
GSM 1900 EGPRS (8PSK)	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	810	**661**	**512**		**810**	**661**	**512**
1 Txslot	25.83	25.88	25.75	-9.03	16.80	16.85	16.72
2 Txslots	23.54	23.56	23.41	-6.02	**17.52**	**17.54**	**17.39**
3Txslots	21.51	21.52	21.38	-4.26	17.25	17.26	17.12
4 Txslots	19.06	19.07	19.01	-3.01	16.05	16.06	16.00

NOTES:

1) Division Factors

To average the power, the division factor is as follows:

1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

According to the conducted power as above, the body measurements are performed with 2Txslot for GSM850 and GSM 1900.

11.3 WCDMA Measurement result

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Table 11.11: The conducted Power for WCDMA

Item	band	FDDV result		
	ARFCN	4233 (846.6MHz)	4182 (836.4MHz)	4132 (826.4MHz)
WCDMA	\	23.70	23.86	23.82
HSDPA	1	23.89	23.97	24.04
	2	23.89	23.90	24.03
	3	23.34	23.45	23.58
	4	23.35	23.45	23.57
HSUPA	1	23.19	23.21	23.15
	2	21.22	21.47	21.38
	3	21.98	22.14	22.15
	4	21.42	21.46	21.48
	5	23.91	24.05	24.00
DC-HSDPA	1	23.52	23.55	23.57
	2	23.55	23.54	23.55
	3	23.54	23.54	23.55
	4	23.52	23.51	23.53

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Table 11.12: The conducted Power for WCDMA

Item	band	FDDV result		
	ARFCN	4233 (846.6MHz)	4182 (836.4MHz)	4132 (826.4MHz)
WCDMA	\	23.98	23.81	23.97
HSDPA	1	23.84	23.99	24.00
	2	24.00	24.00	23.99
	3	23.44	23.39	23.35
	4	23.44	23.39	23.36
HSUPA	1	23.25	23.49	23.37
	2	21.28	21.57	21.58
	3	22.04	22.34	22.41
	4	21.63	21.59	21.59
	5	24.10	24.04	24.10
DC-HSDPA	1	23.69	23.59	23.75
	2	23.67	23.58	23.74
	3	23.66	23.56	23.72
	4	23.67	23.62	23.73

11.4 LTE Measurement result

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Table 11.13: The conducted Power for LTE

Band 5						
Bandwidth (MHz)	RB allocation RB offset (Start RB)	Frequency (MHz)	QPSK		16QAM	
			Actual output power (dBm)	Tune up	Actual output power (dBm)	Tune up
1.4 MHz	1RB High (5)	848.3	23.23	24.00	22.18	23.00
		836.5	23.40	24.00	22.36	23.00
		824.7	23.50	24.00	22.57	23.00
	1RB Middle (3)	848.3	23.35	24.00	22.32	23.00
		836.5	23.46	24.00	22.41	23.00
		824.7	23.52	24.00	22.49	23.00
	1RB Low (0)	848.3	23.42	24.00	22.38	23.00
		836.5	23.45	24.00	22.35	23.00
		824.7	23.49	24.00	22.41	23.00
	3RB High (3)	848.3	23.26	24.00	22.17	23.00
		836.5	23.33	24.00	22.30	23.00
		824.7	23.39	24.00	22.31	23.00
	3RB Middle (1)	848.3	23.39	24.00	22.33	23.00
		836.5	23.28	24.00	22.23	23.00
		824.7	23.45	24.00	22.34	23.00
	3RB Low (0)	848.3	23.41	24.00	22.35	23.00
		836.5	23.36	24.00	22.28	23.00
		824.7	23.38	24.00	22.23	23.00
	6RB (0)	848.3	22.34	23.00	21.19	22.50
		836.5	22.26	23.00	21.28	22.50
		824.7	22.28	23.00	21.21	22.50
3 MHz	1RB High (14)	847.5	23.10	24.00	22.15	23.00
		836.5	23.20	24.00	22.20	23.00
		825.5	23.23	24.00	22.21	23.00
	1RB Middle (7)	847.5	23.50	24.00	22.20	23.00
		836.5	23.40	24.00	22.36	23.00
		825.5	23.52	24.00	22.41	23.00
	1RB Low (0)	847.5	23.40	24.00	22.16	23.00
		836.5	23.27	24.00	22.26	23.00
		825.5	23.34	24.00	22.31	23.00
	8RB High (7)	847.5	22.30	23.00	21.24	22.50
		836.5	22.31	23.00	21.11	22.50
		825.5	22.22	23.00	21.16	22.50

	8RB Middle (4)	847.5	22.35	23.00	21.33	22.50
		836.5	22.23	23.00	21.15	22.50
		825.5	22.37	23.00	21.34	22.50
	8RB Low (0)	847.5	22.41	23.00	21.35	22.50
		836.5	22.19	23.00	21.08	22.50
		825.5	22.30	23.00	21.32	22.50
	15RB (0)	847.5	22.37	23.00	21.26	22.50
		836.5	22.23	23.00	21.17	22.50
		825.5	22.30	23.00	21.31	22.50
5 MHz	1RB High (24)	846.5	23.46	24.00	22.34	23.00
		836.5	23.55	24.00	22.41	23.00
		826.5	23.78	24.00	22.48	23.00
	1RB Middle (12)	846.5	23.86	24.00	22.94	23.00
		836.5	23.81	24.00	22.53	23.00
		826.5	23.94	24.00	22.67	23.00
	1RB Low (0)	846.5	23.84	24.00	22.74	23.00
		836.5	23.70	24.00	22.44	23.00
		826.5	23.77	24.00	22.42	23.00
	12RB High (13)	846.5	22.71	23.00	21.61	22.50
		836.5	22.72	23.00	21.49	22.50
		826.5	22.94	23.00	21.70	22.50
	12RB Middle (6)	846.5	22.94	23.00	21.84	22.50
		836.5	22.80	23.00	21.68	22.50
		826.5	22.97	23.00	21.78	22.50
	12RB Low (0)	846.5	22.92	23.00	21.76	22.50
		836.5	22.78	23.00	21.64	22.50
		826.5	22.85	23.00	21.66	22.50
	25RB (0)	846.5	22.86	23.00	21.74	22.50
		836.5	22.77	23.00	21.67	22.50
		826.5	22.91	23.00	21.69	22.50
10 MHz	1RB High (49)	844.0	23.38	24.00	22.32	23.00
		836.5	23.42	24.00	22.30	23.00
		829.0	23.34	24.00	22.15	23.00
	1RB Middle (24)	844.0	23.92	24.00	22.99	23.00
		836.5	23.80	24.00	22.69	23.00
		829.0	23.90	24.00	22.92	23.00
	1RB Low (0)	844.0	23.55	24.00	22.38	23.00
		836.5	23.59	24.00	22.48	23.00
		829.0	23.54	24.00	22.30	23.00
	25RB High (25)	844.0	22.71	23.00	21.45	22.50
		836.5	22.54	23.00	21.39	22.50
		829.0	22.69	23.00	21.56	22.50

	25RB Middle (12)	844.0	22.76	23.00	21.60	22.50
		836.5	22.79	23.00	21.65	22.50
		829.0	22.96	23.00	21.80	22.50
	25RB Low (0)	844.0	22.73	23.00	21.54	22.50
		836.5	22.75	23.00	21.56	22.50
		829.0	22.77	23.00	21.61	22.50
	50RB (0)	844.0	22.72	23.00	21.49	22.50
		836.5	22.73	23.00	21.57	22.50
		829.0	22.80	23.00	21.64	22.50
Band 7						
Bandwidth (MHz)	RB allocation RB offset (Start RB)	Frequency (MHz)	QPSK		16QAM	
			Actual output power (dBm)	Tune up	Actual output power (dBm)	Tune up
5 MHz	1RB High (24)	2567.5	23.37	24.00	22.34	23.00
		2535	23.42	24.00	22.28	23.00
		2502.5	23.25	24.00	22.13	23.00
	1RB Middle (12)	2567.5	23.72	24.00	22.73	23.00
		2535	23.58	24.00	22.52	23.00
		2502.5	23.50	24.00	22.40	23.00
	1RB Low (0)	2567.5	23.71	24.00	22.69	23.00
		2535	23.49	24.00	22.43	23.00
		2502.5	23.36	24.00	22.27	23.00
	12RB High (13)	2567.5	22.67	23.00	21.68	23.00
		2535	22.60	23.00	21.61	23.00
		2502.5	22.48	23.00	21.60	23.00
	12RB Middle (6)	2567.5	22.89	23.00	21.90	23.00
		2535	22.75	23.00	21.77	23.00
		2502.5	22.61	23.00	21.73	23.00
	12RB Low (0)	2567.5	22.92	23.00	21.92	23.00
		2535	22.79	23.00	21.80	23.00
		2502.5	22.60	23.00	21.72	23.00
	25RB (0)	2567.5	22.82	23.00	21.82	23.00
		2535	22.73	23.00	21.76	23.00
		2502.5	22.53	23.00	21.55	23.00
10 MHz	1RB High (49)	2565	23.37	24.00	22.23	23.00
		2535	23.56	24.00	22.68	23.00
		2505	23.43	24.00	22.53	23.00
	1RB Middle (24)	2565	23.77	24.00	22.63	23.00
		2535	23.68	24.00	22.84	23.00
		2505	23.57	24.00	22.76	23.00

	1RB Low (0)	2565	23.62	24.00	22.49	23.00
		2535	23.47	24.00	22.62	23.00
		2505	23.28	24.00	22.46	23.00
	25RB High (25)	2565	22.76	23.00	21.71	23.00
		2535	22.68	23.00	21.67	23.00
		2505	22.56	23.00	21.57	23.00
	25RB Middle (12)	2565	22.86	23.00	21.84	23.00
		2535	22.72	23.00	21.71	23.00
		2505	22.62	23.00	21.64	23.00
	25RB Low (0)	2565	22.83	23.00	21.82	23.00
		2535	22.75	23.00	21.74	23.00
		2505	22.61	23.00	21.63	23.00
	50RB (0)	2565	22.86	23.00	21.80	23.00
		2535	22.75	23.00	21.73	23.00
		2505	22.57	23.00	21.60	23.00
15 MHz	1RB High (75)	2562.5	23.29	24.00	22.11	23.00
		2535	23.41	24.00	22.46	23.00
		2507.5	23.48	24.00	22.52	23.00
	1RB Middle (38)	2562.5	23.70	24.00	22.55	23.00
		2535	23.63	24.00	22.71	23.00
		2507.5	23.66	24.00	22.81	23.00
	1RB Low (0)	2562.5	23.53	24.00	22.36	23.00
		2535	23.32	24.00	22.37	23.00
		2507.5	23.20	24.00	22.34	23.00
	36RB High (38)	2562.5	22.71	23.00	21.71	23.00
		2535	22.70	23.00	21.68	23.00
		2507.5	22.73	23.00	21.76	23.00
	36RB Middle (19)	2562.5	22.83	23.00	21.82	23.00
		2535	22.77	23.00	21.78	23.00
		2507.5	22.76	23.00	21.75	23.00
	36RB Low (0)	2562.5	22.86	23.00	21.84	23.00
		2535	22.68	23.00	21.65	23.00
		2507.5	22.57	23.00	21.56	23.00
	75RB (0)	2562.5	22.80	23.00	21.76	23.00
		2535	22.76	23.00	21.75	23.00
		2507.5	22.63	23.00	21.64	23.00
20 MHz	1RB High (99)	2560	23.37	24.00	22.62	23.00
		2535	23.49	24.00	22.56	23.00
		2510	23.53	24.00	22.58	23.00
	1RB Middle (50)	2560	23.43	24.00	22.80	23.00
		2535	23.45	24.00	22.46	23.00
		2510	23.44	24.00	22.51	23.00

	1RB Low (0)	2560	23.63	24.00	22.95	23.00
		2535	23.56	24.00	22.57	23.00
		2510	23.30	24.00	22.38	23.00
	50RB High (50)	2560	22.39	23.00	21.37	23.00
		2535	22.28	23.00	21.32	23.00
		2510	22.44	23.00	21.53	23.00
	50RB Middle (25)	2560	22.54	23.00	21.49	23.00
		2535	22.48	23.00	21.52	23.00
		2510	22.52	23.00	21.62	23.00
	50RB Low (0)	2560	22.53	23.00	21.48	23.00
		2535	22.43	23.00	21.51	23.00
		2510	22.35	23.00	21.42	23.00
	100RB (0)	2560	22.50	23.00	21.48	23.00
		2535	22.42	23.00	21.45	23.00
		2510	22.43	23.00	21.49	23.00

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Table 11.14: The conducted Power for LTE

Band 5						
Bandwidth (MHz)	RB allocation RB offset (Start RB)	Frequency (MHz)	QPSK		16QAM	
			Actual output power (dBm)	Tune up	Actual output power (dBm)	Tune up
1.4 MHz	1RB High (5)	848.3	23.15	24.00	22.00	22.00
		836.5	23.16	24.00	22.18	23.00
		824.7	23.29	24.00	22.31	23.00
	1RB Middle (3)	848.3	23.28	24.00	22.11	23.00
		836.5	23.26	24.00	22.34	23.00
		824.7	23.32	24.00	22.35	23.00
	1RB Low (0)	848.3	23.32	24.00	22.14	23.00
		836.5	23.27	24.00	22.37	23.00
		824.7	23.18	24.00	22.21	23.00
	3RB High (3)	848.3	23.17	24.00	22.03	23.00
		836.5	23.11	24.00	22.20	23.00
		824.7	23.23	24.00	22.24	23.00
	3RB Middle (1)	848.3	23.20	24.00	22.05	23.00
		836.5	23.16	24.00	22.25	23.00
		824.7	23.21	24.00	22.19	23.00

	3RB Low (0)	848.3	23.25	24.00	22.12	23.00
		836.5	23.15	24.00	22.23	23.00
		824.7	23.19	24.00	22.18	23.00
	6RB (0)	848.3	22.21	23.00	21.20	22.50
		836.5	22.26	23.00	21.08	22.50
		824.7	22.20	23.00	21.06	22.50
3 MHz	1RB High (14)	847.5	23.08	24.00	21.97	23.00
		836.5	23.03	24.00	22.08	23.00
		825.5	23.06	24.00	22.07	23.00
	1RB Middle (7)	847.5	23.40	24.00	22.25	23.00
		836.5	23.22	24.00	22.37	23.00
		825.5	23.34	24.00	22.31	23.00
	1RB Low (0)	847.5	23.28	24.00	22.10	23.00
		836.5	23.13	24.00	22.18	23.00
		825.5	23.11	24.00	22.10	23.00
	8RB High (7)	847.5	22.14	23.00	22.14	22.50
		836.5	22.17	23.00	22.10	22.50
		825.5	22.15	23.00	22.09	22.50
	8RB Middle (4)	847.5	22.34	23.00	21.33	22.50
		836.5	22.26	23.00	21.13	22.50
		825.5	22.20	23.00	21.18	22.50
	8RB Low (0)	847.5	22.37	23.00	21.29	22.50
		836.5	22.23	23.00	21.11	22.50
		825.5	22.24	23.00	21.20	22.50
	15RB (0)	847.5	22.32	23.00	21.18	22.50
		836.5	22.25	23.00	21.08	22.50
		825.5	22.19	23.00	21.11	22.50
5 MHz	1RB High (24)	846.5	23.30	24.00	22.16	23.00
		836.5	23.41	24.00	22.39	23.00
		826.5	23.51	24.00	22.38	23.00
	1RB Middle (12)	846.5	23.94	24.00	22.87	23.00
		836.5	23.63	24.00	22.77	23.00
		826.5	23.88	24.00	22.80	23.00
	1RB Low (0)	846.5	23.73	24.00	22.60	23.00
		836.5	23.46	24.00	22.58	23.00
		826.5	23.57	24.00	22.49	23.00
	12RB High (13)	846.5	22.68	23.00	21.69	22.50
		836.5	22.58	23.00	21.45	22.50
		826.5	22.67	23.00	21.58	22.50
	12RB Middle (6)	846.5	22.89	23.00	21.83	22.50
		836.5	22.75	23.00	21.54	22.50
		826.5	22.82	23.00	21.71	22.50

	12RB Low (0)	846.5	22.87	23.00	21.72	22.50
		836.5	22.66	23.00	21.57	22.50
		826.5	22.71	23.00	21.59	22.50
	25RB (0)	846.5	22.80	23.00	21.72	22.50
		836.5	22.75	23.00	21.52	22.50
		826.5	22.76	23.00	21.60	22.50
10 MHz	1RB High (49)	844.0	23.14	24.00	22.00	23.00
		836.5	23.57	24.00	22.50	23.00
		829.0	23.06	24.00	22.11	23.00
	1RB Middle (24)	844.0	23.94	24.00	22.83	23.00
		836.5	23.76	24.00	22.81	23.00
		829.0	23.79	24.00	22.87	23.00
	1RB Low (0)	844.0	23.64	24.00	22.53	23.00
		836.5	23.33	24.00	22.37	23.00
		829.0	23.52	24.00	22.46	23.00
	25RB High (25)	844.0	22.58	23.00	21.51	22.50
		836.5	22.64	23.00	21.48	22.50
		829.0	22.52	23.00	21.31	22.50
	25RB Middle (12)	844.0	22.77	23.00	21.64	22.50
		836.5	22.85	23.00	21.62	22.50
		829.0	22.74	23.00	21.56	22.50
	25RB Low (0)	844.0	22.76	23.00	21.61	22.50
		836.5	22.61	23.00	21.43	22.50
		829.0	22.75	23.00	21.58	22.50
	50RB (0)	844.0	22.72	23.00	21.61	22.50
		836.5	22.70	23.00	21.54	22.50
		829.0	22.68	23.00	21.53	22.50
Band 7						
Bandwidth (MHz)	RB allocation RB offset (Start RB)	Frequency (MHz)	QPSK		16QAM	
			Actual output power (dBm)	Tune up	Actual output power (dBm)	Tune up
5 MHz	1RB High (24)	2567.5	23.08	24.00	22.12	23.00
		2535	23.29	24.00	22.36	23.00
		2502.5	22.74	24.00	21.74	23.00
	1RB Middle (12)	2567.5	23.56	24.00	22.58	23.00
		2535	23.58	24.00	22.65	23.00
		2502.5	23.11	24.00	22.15	23.00
	1RB Low (0)	2567.5	23.54	24.00	22.54	23.00
		2535	23.36	24.00	22.48	23.00
		2502.5	23.02	24.00	22.07	23.00
	12RB High (13)	2567.5	22.50	23.00	22.40	23.00
		2535	22.51	23.00	22.48	23.00
		2502.5	22.01	23.00	22.00	23.00

	12RB Middle (6)	2567.5	22.76	23.00	22.67	23.00
		2535	22.60	23.00	22.57	23.00
		2502.5	22.19	23.00	22.17	23.00
	12RB Low (0)	2567.5	22.75	23.00	22.65	23.00
		2535	22.57	23.00	22.54	23.00
		2502.5	22.23	23.00	22.21	23.00
	25RB (0)	2567.5	22.62	23.00	22.52	23.00
		2535	22.56	23.00	22.50	23.00
		2502.5	22.10	23.00	22.05	23.00
10 MHz	1RB High (49)	2565	23.20	24.00	22.08	23.00
		2535	23.21	24.00	22.47	23.00
		2505	22.91	24.00	22.06	23.00
	1RB Middle (24)	2565	23.64	24.00	22.55	23.00
		2535	23.63	24.00	22.86	23.00
		2505	23.19	24.00	22.33	23.00
	1RB Low (0)	2565	23.33	24.00	22.23	23.00
		2535	23.36	24.00	22.62	23.00
		2505	22.94	24.00	22.19	23.00
	25RB High (25)	2565	22.57	23.00	22.45	23.00
		2535	22.53	23.00	22.46	23.00
		2505	22.09	23.00	22.05	23.00
	25RB Middle (12)	2565	22.66	23.00	22.59	23.00
		2535	22.52	23.00	22.45	23.00
		2505	22.12	23.00	22.08	23.00
	25RB Low (0)	2565	22.64	23.00	22.58	23.00
		2535	22.49	23.00	22.43	23.00
		2505	22.20	23.00	22.15	23.00
	50RB (0)	2565	22.55	23.00	22.48	23.00
		2535	22.53	23.00	22.46	23.00
		2505	22.06	23.00	22.01	23.00
15 MHz	1RB High (75)	2562.5	23.11	24.00	21.92	23.00
		2535	22.78	24.00	22.07	23.00
		2507.5	22.80	24.00	22.06	23.00
	1RB Middle (38)	2562.5	23.57	24.00	22.46	23.00
		2535	23.54	24.00	22.78	23.00
		2507.5	23.18	24.00	22.40	23.00
	1RB Low (0)	2562.5	23.09	24.00	21.90	23.00
		2535	23.13	24.00	22.38	23.00
		2507.5	22.75	24.00	22.07	23.00
	36RB High (38)	2562.5	22.45	23.00	22.41	23.00
		2535	22.44	23.00	22.38	23.00
		2507.5	22.17	23.00	22.15	23.00

	36RB Middle (19)	2562.5	22.60	23.00	22.52	23.00
		2535	22.54	23.00	22.46	23.00
		2507.5	22.30	23.00	22.24	23.00
	36RB Low (0)	2562.5	22.38	23.00	22.32	23.00
		2535	22.43	23.00	22.37	23.00
		2507.5	22.11	23.00	22.03	23.00
	75RB (0)	2562.5	22.48	23.00	22.40	23.00
		2535	22.49	23.00	22.41	23.00
		2507.5	22.10	23.00	22.07	23.00
20 MHz	1RB High (99)	2560	23.18	24.00	22.27	23.00
		2535	22.81	24.00	22.14	23.00
		2510	23.21	24.00	22.20	23.00
	1RB Middle (50)	2560	23.05	24.00	22.16	23.00
		2535	22.98	24.00	22.25	23.00
		2510	22.83	24.00	21.92	23.00
	1RB Low (0)	2560	23.20	24.00	22.32	23.00
		2535	23.37	24.00	22.53	23.00
		2510	22.85	24.00	21.96	23.00
	50RB High (50)	2560	22.06	23.00	21.98	23.00
		2535	21.85	23.00	21.83	23.00
		2510	21.91	23.00	21.92	23.00
	50RB Middle (25)	2560	22.18	23.00	22.10	23.00
		2535	22.10	23.00	22.06	23.00
		2510	21.94	23.00	21.93	23.00
	50RB Low (0)	2560	22.20	23.00	22.08	23.00
		2535	22.09	23.00	22.05	23.00
		2510	21.77	23.00	21.76	23.00
	100RB (0)	2560	22.07	23.00	22.01	23.00
		2535	21.93	23.00	21.91	23.00
		2510	21.82	23.00	21.79	23.00

11.5 Wi-Fi and BT Measurement result

The output power of BT antenna is as following:

Mode	Test Results (dBm)		
	2402MHz	2441 MHz	2480 MHz
	(Ch0)	(Ch39)	(Ch78)
GFSK	8.33	8.86	9.17
π /4DQPSK	8.16	9.14	9.37
8DPSK	8.48	9.53	9.55

Mode	Test Results (dBm)		
	2402MHz	2440 MHz	2480 MHz
	(Ch0)	(Ch19)	(39)
BLE	5.76	5.83	6.68

The average conducted power for Wi-Fi is as following:

802.11b (dBm)

Channel\data rate	1Mbps
1	16.00
6	15.80
11	15.90

802.11g (dBm)

Channel\data rate	6Mbps
1	14.43
6	13.60
11	14.41

802.11n (dBm) - HT20 (2.4G)

Channel\data rate	MCS0
1	13.16
6	12.75
11	13.13

802.11n (dBm) – HT40 (2.4G)

Channel\data rate	MCS0
3	12.06
6	12.91
9	12.05

A fixed level power reduction is applied for Wi-Fi band when simultaneously transmitting with the 2G/3G/4G antenna in simultaneous transmission conditions.

The reduced conducted power for Wi-Fi is as following:

802.11b (dBm)

Channel\data rate	1Mbps
1	12.50
6	12.12
11	12.31

802.11g (dBm)

Channel\data rate	6Mbps
1	11.80
6	11.36
11	12.36

802.11n (dBm) - HT20 (2.4G)

Channel\data rate	MCS0
1	10.95
6	10.55
11	11.05

802.11n (dBm) – HT40 (2.4G)

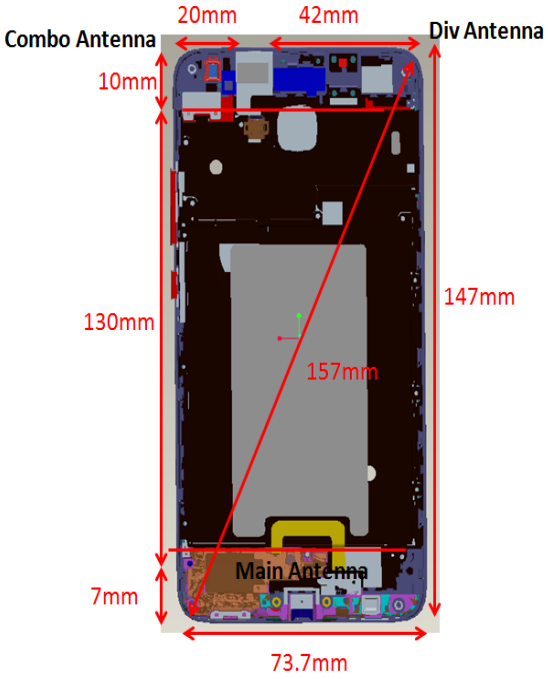
Channel\data rate	MCS0
3	10.71
6	11.12
9	10.61

12 Simultaneous TX SAR Considerations

12.1 Introduction

The following procedures adopted from “FCC SAR Considerations for Cell Phones with Multiple Transmitters” are applicable to handsets with built-in unlicensed transmitters such as 802.11 a/b/g and Bluetooth devices which may simultaneously transmit with the licensed transmitter.
For this device, the BT and Wi-Fi can transmit simultaneous with other transmitters.

12.2 Transmit Antenna Separation Distances



Picture 12.1 Antenna Locations

Note：
The device has two 2G/3G/4G Tx antennas:Main Antenna and Second Antenna(Div ant). It can transmit from either Main Antenna or Second Antenna, but they can not transmit simultaneously. The combo antenna is the BT/Wi-Fi antenna.
SAR test procedure for dynamic antenna switching is as below:
The Main Antenna and Second Antenna are set to the MAX transmit power level respectively and test the SAR respectively in all applicable RF exposure conditions. Some AT commands are supplied to fix the operation state and choose the antenna so that only one TX antenna is chosen and tested at a time. All independent antennas will be completely covered by the appropriate SAR measurements and all simultaneous transmission possibilities will be fully considered to ensure SAR compliance.

12.3 SAR Measurement Positions

According to the KDB941225 D06 Hot Spot SAR v01, the edges with less than 2.5 cm distance to the antennas need to be tested for SAR.

SAR measurement positions						
Mode	Front	Rear	Left edge	Right edge	Top edge	Bottom edge
Div antenna	Yes	Yes	Yes	No	Yes	No
Main antenna	Yes	Yes	Yes	Yes	No	Yes
WLAN antenna	Yes	Yes	No	Yes	Yes	No

12.4 Standalone SAR Test Exclusion Considerations

Standalone 1-g head or body SAR evaluation by measurement or numerical simulation is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.
The 1-g SAR test exclusion threshold for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR, where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

Table 12.1: Standalone SAR test exclusion considerations

Band/Mode	F(GHz)	Position	SAR test exclusion threshold (mW)	RF output power		SAR test exclusion
				dBm	mW	
Bluetooth	2.441	Body	19.20	10	10	Yes
2.4GHz WLAN 802.11 b	2.45	Head	9.58	16.5	44.67	No
		Body	19.17	16.5	44.67	No

Note: Held to ear configurations are not applicable to Bluetooth and therefore were not considered for simultaneous transmission. The Hotspot is not supported by Bluetooth.

13 Evaluation of Simultaneous

Div Antenna

Table 13.1: The sum of reported SAR values for main antenna and WLAN

	Position	Main antenna	WLAN	Sum
Maximum reported SAR value for Head	Left hand, Touch cheek	0.66	0.47	**1.13**
	Right hand, Touch cheek	0.88	0.19	**1.07**
Maximum reported SAR value for Body	Front 10mm	0.17	0.13	**0.30**

Table 13.2: The sum of reported SAR values for main antenna and Bluetooth

	Position	Main antenna	BT*	Sum
Highest reported SAR value for Body	Front 10mm	0.17	0.21	**0.38**

BT* - Estimated SAR for Bluetooth (see the table 13.3)

Table 13.3: Estimated SAR for Bluetooth

Position	F (GHz)	Distance (mm)	Upper limit of power *		Estimated$_{1g}$ (W/kg)
			dBm	mW	
Body	2.441	10	10	10	0.21

* - Maximum possible output power declared by manufacturer

Main Antenna

Table 13.4: The sum of reported SAR values for main antenna and WLAN

	Position	Main antenna	WLAN	Sum
Maximum reported SAR value for Head	Left hand, Touch cheek	0.31	0.47	**0.78**
	Right hand, Touch cheek	0.42	0.19	**0.61**
Maximum reported SAR value for Body	Front 10mm	0.89	0.13	**1.11**

Table 13.5: The sum of reported SAR values for main antenna and Bluetooth

	Position	Main antenna	BT*	Sum
Highest reported SAR value for Body	Front 10mm	0.89	0.21	**1.10**

BT* - Estimated SAR for Bluetooth (see the table 13.3)

Table 13.6: Estimated SAR for Bluetooth

Position	F (GHz)	Distance (mm)	Upper limit of power *		Estimated$_{1g}$ (W/kg)
			dBm	mW	
Body	2.441	10	10	10	0.21

* - Maximum possible output power declared by manufacturer

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:
(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance,mm)]·[√f(GHz)/x] W/kg for test separation distances ≤ 50 mm;
where x = 7.5 for 1-g SAR.
When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

Conclusion:
According to the above tables, the sum of reported SAR values is < 1.6W/kg So the simultaneous transmission SAR with volume scans is not required.

14 SAR Test Result

We'll perform the head measurement in all bands with the primary battery depending on the evaluation of multi-batteries and multi-slots and retest on highest value point with other batteries and slots. Then, repeat the measurement in the Body test.

Table 14.1: The evaluation of multi-batteries for Head Test

Frequency		Side	Test Position	Battery Type	SAR(1g) (W/kg)	Power Drift(dB)	Battery
MHz	Ch.						
836.6	190	Right	Touch	HB366481ECW (Sunwoda electronic Co., Ltd.)	0.708	0.01	Battery1
836.6	190	Right	Touch	HB366481ECW (Desay)	0.698	0.01	Battery2
836.6	190	Right	Touch	HB366481ECW (SCUD(FUJIAN) Electronics Co.,Ltd)	0.646	0.04	Battery3

Note: According to the values in the above table, the **battery1**, is the primary battery. We'll perform the head measurement with this battery and retest on highest value point with others.

Table 14.2: The evaluation of multi-batteries for Body Test

Frequency		Test Position	Spacing (mm)	Battery Type	SAR(1g) (W/kg)	Power Drift(dB)	Battery
MHz	Ch.						
836.6	190	Front	10	HB366481ECW (Sunwoda electronic Co., Ltd.)	0.114	0.00	Battery1
836.6	190	Front	10	HB366481ECW (Desay)	0.110	0.03	Battery2
836.6	190	Front	10	HB366481ECW (SCUD(FUJIAN) Electronics Co.,Ltd)	0.118	0.03	Batery3

Note: According to the values in the above table, the **batter3**,is the primary battery. We'll perform the body measurement with this battery and retest on highest value point with others.

Table 14.3: The evaluation of multi-SIM for Head Test

Frequency		Side	Test Position	Battery Type	SAR(1g) (W/kg)	Power Drift(dB)	Card Slot
MHz	Ch.						
836.6	190	Right	Touch	HB366481ECW (Sunwoda electronic Co., Ltd.)	0.692	0.05	SIM1
836.6	190	Right	Touch	HB366481ECW (Sunwoda electronic Co., Ltd.)	0.708	0.01	SIM2

Note: According to the values in the above table, the **SIM2**, is the primary card slot. We'll perform the head measurement with this slot and retest on highest value point with others.

Table 14.2: The evaluation of multi-SIM for Body Test

Frequency		Test Position	Spacing (mm)	Battery Type	SAR(1g) (W/kg)	Power Drift(dB)	Card Slot
MHz	Ch.						
836.6	190	Front	10	HB366481ECW (SCUD(FUJIAN) Electronics Co.,Ltd)	0.111	0.02	SIM1
836.6	190	Front	10	HB366481ECW (SCUD(FUJIAN) Electronics Co.,Ltd)	0.118	0.03	SIM2

Note: According to the values in the above table, the **SIM2**, is the primary card slot. We'll perform the body measurement with this slot and retest on highest value point with others.

It is determined by user manual for the distance between the EUT and the phantom bottom. The distance is 10mm and just applied to the condition of body worn accessory.
It is performed for all SAR measurements with area scan based 1-g SAR estimation (Fast SAR). A zoom scan measurement is added when the estimated 1-gSAR is the highest measured SAR in each exposure configuration, wireless mode and frequency band combination or >1.2W/kg.

The calculated SAR is obtained by the following formula:

$$\text{Reported SAR} = \text{Measured SAR} \times 10^{(P_{Target} - P_{Measured})/10}$$

Where P_{Target} is the power of manufacturing upper limit;
$P_{Measured}$ is the measured power in chapter 11.

Table 14.3: Duty Cycle

Duty Cycle	
Speech for GSM850/1900	1:8.3
GPRS&EGPRS 850	1:4
GPRS&EGPRS 1900	1:4
WCDMA & LTE	1:1

14.1 SAR results for Fast SAR

Note:

1. For body test: the distance between the EUT and the phantom bottom is 10mm.

2. For body-worn test: the distance between the EUT and the phantom bottom is 15mm.

Div Antenna:

Table 14.1-1: SAR Values (GSM 850 MHz Band - Head)

Ambient Temperature: 23.0 °C Liquid Temperature: 22.5°C											
Frequency		Side	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
836.6	190	Left	Touch	/	33.14	33.5	0.217	0.24	0.542	0.59	0.06
836.6	190	Left	Tilt	/	33.14	33.5	0.270	0.29	0.412	0.45	0.07
848.8	251	Right	Touch	/	33.13	33.5	0.383	0.42	0.690	0.75	-0.10
836.6	**190**	**Right**	**Touch**	**Fig.1**	**33.14**	**33.5**	**0.398**	**0.43**	**0.708**	**0.77**	**0.01**
824.2	128	Right	Touch	/	33.17	33.5	0.445	0.48	0.668	0.72	0.06
836.6	190	Right	Tilt	/	33.14	33.5	0.336	0.37	0.576	0.63	0.11
836.6	190	Right	Touch	**Note1**	33.14	33.5	0.453	0.49	0.695	0.76	-0.01
836.6	190	Right	Touch	**Note2**	33.14	33.5	0.392	0.43	0.647	0.70	0.02
836.6	190	Right	Touch	**Note3**	33.14	33.5	0.410	0.45	0.645	0.70	0.06

Note1: SAR Values For Battery (HB366481ECW (Desay))

Note2: SAR Values For Battery (HB366481ECW (SCUD(FUJIAN) Electronics Co.,Ltd))

Note3: SAR Values For SIM1

Table 14.1-2: SAR Values (GSM 850 MHz Band - Body) 10mm

Ambient Temperature: 23.0 °C Liquid Temperature: 22.5°C											
Frequency		Mode (number of timeslots)	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
848.8	**251**	**GPRS (2)**	**Front**	**Fig.2**	**31.3**	**31.5**	**0.093**	**0.10**	**0.133**	**0.14**	**0.00**
836.6	190	GPRS (2)	Front	/	31.29	31.5	0.078	0.08	0.118	0.12	0.03
824.2	128	GPRS (2)	Front	/	31.28	31.5	0.067	0.07	0.098	0.10	0.05
836.6	190	GPRS (2)	Rear	/	31.29	31.5	0.058	0.06	0.084	0.09	0.13
836.6	190	GPRS (2)	Left	/	31.28	31.5	0.020	0.02	0.028	0.03	-0.04
836.6	190	GPRS (2)	Top	/	31.28	31.5	0.028	0.03	0.041	0.04	0.13
848.8	251	EGPRS (2)	Front	/	31.3	31.5	0.090	0.09	0.132	0.14	0.07
848.8	251	GPRS (2)	Front	**Note1**	31.3	31.5	0.089	0.09	0.130	0.14	0.05
848.8	251	GPRS (2)	Front	**Note2**	31.3	31.5	0.089	0.09	0.131	0.14	-0.01
848.8	251	GPRS (2)	Front	**Note3**	31.3	31.5	0.085	0.09	0.125	0.13	-0.01

Note1: SAR Values For Battery (HB366481ECW (Desay))
Note2: SAR Values For Battery (HB366481ECW (Sunwoda electronic Co., Ltd.))
Note3: SAR Values For SIM1

Table 14.1-3: SAR Values (GSM 850 MHz Band – Body worn) 15mm

Ambient Temperature: 23.0 °C Liquid Temperature: 22.5°C											
Frequency		Mode (number of timeslots)	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
848.8	**251**	**GPRS (2)**	**Front**	**Fig.3**	**31.3**	**31.5**	**0.078**	**0.08**	**0.101**	**0.11**	**-0.03**
836.6	190	GPRS (2)	Front	/	31.29	31.5	0.048	0.05	0.068	0.07	-0.04
824.2	128	GPRS (2)	Front	/	31.28	31.5	0.039	0.04	0.057	0.06	0.15
836.6	190	GPRS (2)	Rear	/	31.29	31.5	0.040	0.04	0.039	0.04	0.03
836.6	190	EGPRS (2)	Front	/	31.3	31.5	0.059	0.06	0.085	0.09	0.07
836.6	190	GPRS (2)	Front	**Note1**	31.3	31.5	0.060	0.06	0.085	0.09	0.05
848.8	251	GPRS (2)	Front	**Note2**	31.3	31.5	0.063	0.07	0.091	0.10	0.15
848.8	251	GPRS (2)	Front	**Note3**	31.3	31.5	0.061	0.06	0.087	0.09	0.03

Note1: SAR Values For Battery (HB366481ECW (Desay))
Note2: SAR Values For Battery (HB366481ECW (Sunwoda electronic Co., Ltd.))
Note3: SAR Values For SIM1

Table 14.1-4: SAR Values (GSM 1900 MHz Band - Head)

Ambient Temperature: 23.0℃ Liquid Temperature: 22.5℃											
Frequency		Side	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
1880	661	Left	Touch	/	30.18	30.5	0.193	0.21	0.330	0.36	-0.14
1880	661	Left	Tilt	/	30.18	30.5	0.131	0.14	0.221	0.24	0.11
1909.8	**810**	**Right**	**Touch**	**Fig.4**	**30.16**	**30.5**	**0.425**	**0.46**	**0.812**	**0.88**	**0.05**
1880	661	Right	Touch	/	30.18	30.5	0.332	0.36	0.606	0.65	0.17
1850.2	512	Right	Touch	/	30.18	30.5	0.295	0.32	0.546	0.59	0.09
1880	661	Right	Tilt	/	30.18	30.5	0.188	0.20	0.336	0.36	-0.11
1909.8	810	Right	Touch	**Note1**	30.16	30.5	0.368	0.40	0.693	0.75	-0.01
1909.8	810	Right	Touch	**Note2**	30.16	30.5	0.348	0.38	0.636	0.69	0.13
1909.8	810	Right	Touch	**Note3**	30.16	30.5	0.316	0.34	0.581	0.63	0.12

Note1: SAR Values For Battery (HB366481ECW (Desay))

Note2: SAR Values For Battery (HB366481ECW (SCUD(FUJIAN) Electronics Co.,Ltd))

Note3: SAR Values For SIM1

Table 14.1-5: SAR Values (GSM 1900 MHz Band - Body) 10mm

Ambient Temperature: 23.0 °C Liquid Temperature: 22.5°C											
Frequency		Mode (number of timeslots)	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
1909.8	**810**	**GPRS (2)**	**Front**	**Fig.5**	**28.19**	**28.5**	**0.065**	**0.07**	**0.109**	**0.12**	**-0.04**
1880	661	GPRS (2)	Front	/	28.21	28.5	0.058	0.06	0.101	0.11	0.07
1850.2	512	GPRS (2)	Front	/	28.21	28.5	0.062	0.07	0.108	0.12	0.15
1880	661	GPRS (2)	Rear	/	28.21	28.5	0.042	0.05	0.069	0.07	-0.13
1880	661	GPRS (2)	Left	/	28.21	28.5	0.038	0.04	0.068	0.07	0.13
1880	661	GPRS (2)	Top	/	28.21	28.5	0.022	0.02	0.044	0.05	-0.05
1909.8	810	EGPRS (2)	Front	/	28.19	28.5	0.055	0.06	0.097	0.10	-0.18
1909.8	810	GPRS (2)	Front	**Note1**	28.19	28.5	0.054	0.06	0.095	0.10	-0.05
1909.8	810	GPRS (2)	Front	**Note2**	28.19	28.5	0.053	0.06	0.093	0.10	-0.09
1909.8	810	GPRS (2)	Front	**Note3**	28.19	28.5	0.058	0.06	0.106	0.11	-0.01

Note1: SAR Values For Battery (HB366481ECW (Desay))
Note2: SAR Values For Battery (HB366481ECW (Sunwoda electronic Co., Ltd.))
Note3: SAR Values For SIM1

Table 14.1-6: SAR Values (GSM 1900 MHz Band – Body worn) 15mm

Ambient Temperature: 23.0 °C Liquid Temperature: 22.5°C											
Frequency		Mode (number of timeslots)	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
1909.8	**810**	**GPRS (2)**	**Front**	**Fig.6**	**28.19**	**28.5**	**0.033**	**0.04**	**0.053**	**0.06**	**-0.06**
1880	661	GPRS (2)	Front	/	28.21	28.5	0.019	0.02	0.032	0.03	-0.09
1850.2	512	GPRS (2)	Front	/	28.21	28.5	0.031	0.03	0.050	0.05	0.09
1880	661	GPRS (2)	Rear	/	28.21	28.5	0.026	0.03	0.043	0.05	0.03
1909.8	810	EGPRS (2)	Front	/	28.19	28.5	0.031	0.03	0.053	0.06	-0.15
1909.8	810	GPRS (2)	Front	**Note1**	28.19	28.5	0.030	0.03	0.051	0.06	0.05
1909.8	810	GPRS (2)	Front	**Note2**	28.19	28.5	0.030	0.03	0.050	0.05	0.17
1909.8	810	GPRS (2)	Front	**Note3**	28.19	28.5	0.030	0.03	0.052	0.06	0.07

Note1: SAR Values For Battery (HB366481ECW (Desay))
Note2: SAR Values For Battery (HB366481ECW (Sunwoda electronic Co., Ltd.))
Note3: SAR Values For SIM1

Table 14.1-7: SAR Values (WCDMA 850 MHz Band - Head)

Ambient Temperature: 23.0 °C					Liquid Temperature: 22.5°C						
Frequency		Side	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
836.4	4182	Left	Touch	/	23.86	24.5	0.232	0.27	0.571	0.66	0.04
836.4	4182	Left	Tilt	/	23.86	24.5	0.227	0.26	0.350	0.41	0.04
846.6	4233	Right	Touch	/	23.7	24.5	0.327	0.39	0.603	0.72	-0.12
836.4	**4182**	**Right**	**Touch**	**Fig.7**	**23.86**	**24.5**	**0.363**	**0.42**	**0.659**	**0.76**	**-0.07**
826.4	4132	Right	Touch	/	23.82	24.5	0.349	0.41	0.602	0.70	0.02
836.4	4182	Right	Tilt	/	23.86	24.5	0.289	0.33	0.489	0.57	0.05
836.4	4182	Right	Touch	**Note1**	23.86	24.5	0.347	0.40	0.610	0.71	0.08
836.4	4182	Right	Touch	**Note2**	23.86	24.5	0.355	0.41	0.566	0.66	0.05
836.4	4182	Right	Touch	**Note3**	23.86	24.5	0.349	0.40	0.629	0.73	0.05

Note1: SAR Values For Battery (HB366481ECW (Desay))

Note2: SAR Values For Battery (HB366481ECW (SCUD(FUJIAN) Electronics Co.,Ltd))

Note3: SAR Values For SIM1

Table 14.1-8: SAR Values (WCDMA 850 MHz Band - Body) 10mm

Ambient Temperature: 23.0 °C		Liquid Temperature: 22.5°C								
Frequency		Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.									
846.6	4233	Front	/	23.7	24.5	0.095	0.11	0.134	0.16	0.04
836.4	4182	Front	/	23.86	24.5	0.098	0.11	0.138	0.16	-0.02
826.4	**4132**	**Front**	**Fig.8**	**23.82**	**24.5**	**0.104**	**0.12**	**0.142**	**0.17**	**-0.14**
836.4	4182	Rear	/	23.86	24.5	0.067	0.08	0.095	0.11	0.03
836.4	4182	Left	/	23.86	24.5	0.038	0.04	0.055	0.06	-0.04
836.4	4182	Top	/	23.86	24.5	0.028	0.03	0.041	0.05	0.07
826.4	4132	Front	**Note1**	23.82	24.5	0.085	0.10	0.119	0.14	0.05
826.4	4132	Front	**Note2**	23.82	24.5	0.100	0.12	0.141	0.16	-0.15
826.4	4132	Front	**Note3**	23.82	24.5	0.103	0.12	0.141	0.16	0.06

Note1: SAR Values For Battery (HB366481ECW (Desay))
Note2: SAR Values For Battery (HB366481ECW (Sunwoda electronic Co., Ltd.))
Note3: SAR Values For SIM1

Table 14.1-9: SAR Values (WCDMA 850 MHz Band – Body worn) 15mm

Ambient Temperature: 23.0 °C		Liquid Temperature: 22.5°C								
Frequency		Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.									
846.6	4233	Front	/	23.7	24.5	0.064	0.08	0.090	0.11	0.03
836.4	4182	Front	/	23.86	24.5	0.068	0.08	0.094	0.11	0.07
826.4	**4132**	**Front**	**Fig.9**	**23.82**	**24.5**	**0.076**	**0.09**	**0.100**	**0.12**	**0.07**
836.4	4182	Rear	/	23.86	24.5	0.053	0.06	0.073	0.08	0.01
826.4	4132	Front	**Note1**	23.82	24.5	0.054	0.06	0.076	0.09	0.05
826.4	4132	Front	**Note2**	23.82	24.5	0.067	0.08	0.095	0.11	0.08
826.4	4132	Front	**Note3**	23.82	24.5	0.076	0.09	0.099	0.12	0.02

Note1: SAR Values For Battery (HB366481ECW (Desay))
Note2: SAR Values For Battery (HB366481ECW (Sunwoda electronic Co., Ltd.))
Note3: SAR Values For SIM1

Table 14.1-10: SAR Values (LTE Band5 - Head)

Ambient Temperature: 23.0 °C												
Frequency		Mode	Side	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.											
844	**20600**	**1RB_Mid**	**Left**	**Touch**	**Fig.10**	**23.92**	**24**	**0.346**	**0.35**	**0.543**	**0.55**	**-0.03**
844	20600	1RB_Mid	Left	Tilt	/	23.92	24	0.256	0.26	0.421	0.43	0.02
844	20600	1RB_Mid	Right	Touch	/	23.92	24	0.351	0.36	0.527	0.54	-0.05
844	20600	1RB_Mid	Right	Tilt	/	23.92	24	0.238	0.24	0.381	0.39	-0.01
829	20450	25RB_Mid	Left	Touch	/	22.96	23	0.187	0.19	0.450	0.45	-0.03
829	20450	25RB_Mid	Left	Tilt	/	22.96	23	0.202	0.20	0.332	0.34	0.01
829	20450	25RB_Mid	Right	Touch	/	22.96	23	0.285	0.29	0.431	0.43	0.07
829	20450	25RB_Mid	Right	Tilt	/	22.96	23	0.191	0.19	0.305	0.31	0.03
844	20600	1RB_Mid	Right	Touch	**Note1**	23.92	24	0.325	0.33	0.510	0.52	-0.02
844	20600	1RB_Mid	Right	Touch	**Note2**	23.92	24	0.345	0.35	0.541	0.55	0.02
844	20600	1RB_Mid	Right	Touch	**Note3**	23.92	24	0.291	0.30	0.454	0.46	0.01

Note1: SAR Values For Battery (HB366481ECW (Desay))

Note2: SAR Values For Battery (HB366481ECW (SCUD(FUJIAN) Electronics Co.,Ltd))

Note3: SAR Values For SIM1

Table 14.1-11: SAR Values (LTE Band5 - Body) 10mm

Ambient Temperature: 23.0°C Liquid Temperature: 22.5°C											
Frequency		Mode	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g)(W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
844	**20600**	**1RB_Mid**	**Front**	**Fig.11**	**23.92**	**24**	**0.113**	**0.12**	**0.156**	**0.16**	**0.00**
844	20600	1RB_Mid	Rear	/	23.92	24	0.084	0.09	0.125	0.13	-0.01
844	20600	1RB_Mid	Left	/	23.92	24	0.017	0.02	0.025	0.03	0.01
844	20600	1RB_Mid	Top	/	23.92	24	0.057	0.06	0.095	0.10	0.01
829	20450	25RB_Mid	Front	/	22.96	23	0.084	0.09	0.135	0.14	-0.04
829	20450	25RB_Mid	Rear	/	22.96	23	0.074	0.07	0.100	0.10	0.06
829	20450	25RB_Mid	Left	/	22.96	23	0.013	0.01	0.021	0.02	0.02
829	20450	25RB_Mid	Top	/	22.96	23	0.049	0.05	0.090	0.09	-0.06
844	20600	1RB_Mid	Front	**Note1**	23.92	24	0.106	0.11	0.149	0.15	0.01
844	20600	1RB_Mid	Front	**Note2**	23.92	24	0.099	0.10	0.148	0.15	-0.10
844	20600	1RB_Mid	Front	**Note3**	23.92	24	0.104	0.11	0.150	0.15	-0.07

Note1: SAR Values For Battery (HB366481ECW (Desay))

Note2: SAR Values For Battery (HB366481ECW (Sunwoda electronic Co., Ltd.))

Note3: SAR Values For SIM1

Table 14.1-12: SAR Values (LTE Band5 – Body worn) 15mm

Ambient Temperature: 23.0°C Liquid Temperature: 22.5°C											
Frequency		Mode	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g)(W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
844	**20600**	**1RB_Mid**	**Front**	**Fig.12**	**23.92**	**24**	**0.080**	**0.08**	**0.104**	**0.11**	**0.08**
844	20600	1RB_Mid	Rear	/	23.92	24	0.084	0.09	0.100	0.10	0.12
829	20450	25RB_Mid	Front	/	22.96	23	0.068	0.07	0.093	0.09	0.02
829	20450	25RB_Mid	Rear	/	22.96	23	0.060	0.06	0.085	0.09	0.06
844	20600	1RB_Mid	Front	**Note1**	23.92	24	0.082	0.08	0.103	0.10	0.10
844	20600	1RB_Mid	Front	**Note2**	23.92	24	0.079	0.08	0.099	0.10	-0.01
844	20600	1RB_Mid	Front	**Note3**	23.92	24	0.081	0.08	0.103	0.10	0.03

Note1: SAR Values For Battery (HB366481ECW (Desay))

Note2: SAR Values For Battery (HB366481ECW (Sunwoda electronic Co., Ltd.))

Note3: SAR Values For SIM1

Table 14.1-13: SAR Values (LTE Band7 - Head)

Ambient Temperature: 23.0 °C						Liquid Temperature: 22.5 °C						
Frequency		Mode	Side	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.											
2560	21350	1RB_Low	Left	Touch	/	23.63	24	0.124	0.13	0.312	0.34	0.08
2560	21350	1RB_Low	Left	Tilt	/	23.63	24	0.135	0.15	0.350	0.38	0.02
2560	21350	1RB_Low	Right	Touch	/	23.63	24	0.247	0.27	0.571	0.62	0.11
2560	**21350**	**1RB_Low**	**Right**	**Tilt**	**Fig.13**	**23.63**	**24**	**0.274**	**0.30**	**0.719**	**0.78**	**0.11**
2560	21350	50RB_Mid	Left	Touch	/	22.54	23	0.109	0.12	0.275	0.31	0.16
2560	21350	50RB_Mid	Left	Tilt	/	22.54	23	0.120	0.13	0.309	0.34	0.01
2560	21350	50RB_Mid	Right	Touch	/	22.54	23	0.192	0.21	0.478	0.53	0.05
2560	21350	50RB_Mid	Right	Tilt	/	22.54	23	0.194	0.22	0.514	0.57	-0.01
2560	21350	1RB_Low	Right	Tilt	**Note1**	23.63	24	0.269	0.29	0.714	0.78	0.16
2560	21350	1RB_Low	Right	Tilt	**Note2**	23.63	24	0.280	0.30	0.696	0.76	0.06
2560	21350	1RB_Low	Right	Tilt	**Note3**	23.63	24	0.265	0.29	0.671	0.73	0.04

Note1: SAR Values For Battery (HB366481ECW (Desay))

Note2: SAR Values For Battery (HB366481ECW (SCUD(FUJIAN) Electronics Co.,Ltd))

Note3: SAR Values For SIM1

Table 14.1-14: SAR Values (LTE Band7 - Body) 10mm

Ambient Temperature: 23.0 °C Liquid Temperature: 22.5 °C											
Frequency		Mode	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g)(W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
2560	21350	1RB_Low	Front	/	23.63	24	0.053	0.06	0.123	0.13	0.02
2560	21350	1RB_Low	Rear	/	23.63	24	0.017	0.02	0.035	0.04	0.02
2560	21350	1RB_Low	Left	/	23.63	24	0.012	0.01	0.028	0.03	0.01
2560	**21350**	**1RB_Low**	**Top**	**Fig.14**	**23.63**	**24**	**0.059**	**0.06**	**0.131**	**0.14**	**0.07**
2560	21350	50RB_Mid	Front	/	22.54	23	0.048	0.05	0.109	0.12	0.03
2560	21350	50RB_Mid	Rear	/	22.54	23	0.013	0.01	0.026	0.03	-0.04
2560	21350	50RB_Mid	Left	/	22.54	23	0.011	0.01	0.021	0.02	0.06
2560	21350	50RB_Mid	Top	/	22.54	23	0.051	0.06	0.107	0.12	-0.01
2560	21350	1RB_Low	Top	**Note1**	23.63	24	0.061	0.07	0.118	0.13	-0.04
2560	21350	1RB_Low	Top	**Note2**	23.63	24	0.056	0.06	0.125	0.14	0.10
2560	21350	1RB_Low	Top	**Note3**	23.63	24	0.057	0.06	0.124	0.14	0.01

Note1: SAR Values For Battery (HB366481ECW (Desay))

Note2: SAR Values For Battery (HB366481ECW (Sunwoda electronic Co., Ltd.))

Note3: SAR Values For SIM1

Table 14.1-15: SAR Values (LTE Band7 – Body worn) 15mm

Ambient Temperature: 23.0 °C Liquid Temperature: 22.5 °C											
Frequency		Mode	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g)(W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
2560	**21350**	**1RB_Low**	**Front**	**Fig.15**	**23.63**	**24**	**0.029**	**0.03**	**0.061**	**0.07**	**0.04**
2560	21350	1RB_Low	Rear	/	23.63	24	0.008	0.01	0.017	0.02	0.02
2560	21350	50RB_Mid	Front	/	22.54	23	0.024	0.03	0.054	0.06	0.08
2560	21350	50RB_Mid	Rear	/	22.54	23	0.008	0.01	0.016	0.02	0.03
2560	21350	1RB_Low	Front	**Note1**	23.63	24	0.024	0.03	0.052	0.06	0.09
2560	21350	1RB_Low	Front	**Note2**	23.63	24	0.026	0.03	0.060	0.07	0.09
2560	21350	1RB_Low	Front	**Note3**	23.63	24	0.025	0.03	0.057	0.06	0.10

Note1: SAR Values For Battery (HB366481ECW (Desay))

Note2: SAR Values For Battery (HB366481ECW (Sunwoda electronic Co., Ltd.))

Note3: SAR Values For SIM1

Main Antenna

Table 14.1-16: SAR Values (GSM 850 MHz Band - Head)

Ambient Temperature: 23.0 °C					Liquid Temperature: 22.5°C						
Frequency		Side	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
836.6	190	Left	Touch	/	33.43	33.5	0.166	0.17	0.241	0.24	-0.04
836.6	190	Left	Tilt	/	33.43	33.5	0.105	0.11	0.151	0.15	0.01
848.8	**251**	**Right**	**Touch**	**Fig.16**	**33.45**	**33.5**	**0.238**	**0.24**	**0.311**	**0.31**	**0.07**
836.6	190	Right	Touch	/	33.43	33.5	0.220	0.22	0.287	0.29	-0.01
824.2	128	Right	Touch	/	33.42	33.5	0.192	0.20	0.279	0.28	-0.01
836.6	190	Right	Tilt	/	33.43	33.5	0.101	0.10	0.146	0.15	0.03
848.8	251	Right	Touch	**Note1**	33.45	33.5	0.203	0.21	0.295	0.30	0.15
848.8	251	Right	Touch	**Note2**	33.45	33.5	0.191	0.19	0.281	0.28	0.02
848.8	251	Right	Touch	**Note3**	33.45	33.5	0.187	0.19	0.272	0.28	0.06

Note1: SAR Values For Battery (HB366481ECW (Desay))

Note2: SAR Values For Battery (HB366481ECW (SCUD(FUJIAN) Electronics Co.,Ltd))

Note3: SAR Values For SIM1

Table 14.1-17: SAR Values (GSM 850 MHz Band - Body) 10mm

Ambient Temperature: 23.0 °C Liquid Temperature: 22.5°C											
Frequency		Mode (number of timeslots)	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
836.6	190	GPRS (2)	Front	/	31.44	31.5	0.266	0.27	0.375	0.38	0.02
836.6	190	GPRS (2)	Rear	/	31.44	31.5	0.273	0.28	0.385	0.39	0.03
836.6	190	GPRS (2)	Left	/	31.44	31.5	0.150	0.15	0.222	0.23	-0.06
848.8	251	GPRS (2)	Right	/	31.48	31.5	0.278	0.28	0.413	0.41	0.04
836.6	190	GPRS (2)	Right	/	31.44	31.5	0.305	0.31	0.451	0.46	0.03
824.2	**128**	**GPRS (2)**	**Right**	**Fig.17**	**31.41**	**31.5**	**0.348**	**0.36**	**0.498**	**0.51**	**-0.01**
836.6	190	GPRS (2)	Bottom	/	31.44	31.5	0.105	0.11	0.189	0.19	-0.03
824.2	128	EGPRS (2)	Right	/	31.41	31.5	0.334	0.34	0.493	0.50	-0.01
824.2	128	GPRS (2)	Right	**Note1**	31.41	31.5	0.297	0.30	0.438	0.45	-0.09
824.2	128	GPRS (2)	Right	**Note2**	31.41	31.5	0.298	0.30	0.442	0.45	0.02
824.2	128	GPRS (2)	Right	**Note3**	31.41	31.5	0.330	0.34	0.488	0.50	-0.10

Note1: SAR Values For Battery (HB366481ECW (Desay))

Note2: SAR Values For Battery (HB366481ECW (Sunwoda electronic Co., Ltd.))

Note3: SAR Values For SIM1

Table 14.1-18: SAR Values (GSM 850 MHz Band – Body worn) 15mm

Ambient Temperature: 23.0 °C Liquid Temperature: 22.5°C											
Frequency		Mode (number of timeslots)	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
836.6	190	GPRS (2)	Front	/	31.44	31.5	0.245	0.25	0.345	0.35	-0.02
848.8	251	GPRS (2)	Rear	/	31.48	31.5	0.253	0.25	0.360	0.36	-0.03
836.6	190	GPRS (2)	Rear	/	31.44	31.5	0.262	0.27	0.371	0.38	0.03
824.2	**128**	**GPRS (2)**	**Rear**	**Fig.18**	**31.41**	**31.5**	**0.318**	**0.32**	**0.413**	**0.42**	**-0.01**
824.2	128	EGPRS (2)	Rear	/	31.41	31.5	0.276	0.28	0.390	0.40	0.04
824.2	128	GPRS (2)	Rear	**Note1**	31.41	31.5	0.255	0.26	0.361	0.37	0.00
824.2	128	GPRS (2)	Rear	**Note2**	31.41	31.5	0.257	0.26	0.364	0.37	-0.03
824.2	128	GPRS (2)	Rear	**Note3**	31.41	31.5	0.276	0.28	0.391	0.40	-0.05

Note1: SAR Values For Battery (HB366481ECW (Desay))

Note2: SAR Values For Battery (HB366481ECW (Sunwoda electronic Co., Ltd.))

Note3: SAR Values For SIM1