FCC SAR TEST REPORT

Test File No : F690501/RF-SAR002218

Equipment Under Test	Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Smart Phone
Model No.	LGL25
Applicant	LG Electronics MobileComm U.S.A., Inc.
Address of Applicant	10101 Old Grove Road, San Diego, CA 92131
FCC ID	ZNFLGL25
Device Category	Portable Device
Exposure Category	General Population/Uncontrolled Exposure
Standards	FCC 47 CFR Part 2 (2.1093) IEEE 1528, 2003 ANSI/IEEE C95.1, C95.3
Date of Test(s)	2014-09-26 ~ 2014-10-28
Date of Issue	2014-10-30

In the configuration tested, the EUT complied with the standards specified above.

Remarks:

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.
This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS Korea Co., Ltd. or testing done by SGS Korea Co., Ltd. in connection with distribution or use of the product described in this report must be approved by SGS Korea Co., Ltd. in writing.

Report prepared by /
Minhyuk Han
Test Engineer

Approved by /
Nicky You
Technical Manager

Revision history

Revision	Date of issue	Revisions	Revised By
-	October 30, 2014	Initial issue	-

Contents

1. Testing Laboratory

Company Name	SGS Korea Co., Ltd. (Gunpo Laboratory)
Address	Wireless Div. 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, 435-040 Republic of Korea
Telephone	+82 +31 428 5700
FAX	+82 +31 427 2371
Homepage	All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx

2. Details of Manufacturer

Applicant	LG Electronics MobileComm U.S.A., Inc.
Address	10101 Old Grove Road, San Diego, CA 92131
Contact Person	Heeju An
Email	Heeju.an@lge.com
Phone No.	82-2-2033-1103

3. Description of EUT(s)

EUT Type	Cellular/PCS GSM/GPRS/EDGE /WCDMA/HSDPA/HSUPA Smart Phone
Model	LGL25
Serial Number	1FVAK
Mode of Operation	GSM850 / GSM1900 / WCDMA850 / WLAN / Bluetooth
Duty Cycle	8.3(GPRS 1Tx Slot), 4.15(GPRS 2Tx Slot), 2.77 (GPRS 3Tx Slot), 2.075 (GPRS 4Tx Slot), 1 (WCDMA, WLAN)
Body worn Accessory	None
Tx Frequency Range	GSM850 (824.20 MHz ~ 848.80 MHz) GSM1900 (1850.20 MHz ~ 1909.80 MHz) WCDMA 850 (826.40 MHz ~ 846.60 MHz) 802.11b/g/n WLAN 2.4 GHz (2412.0 MHz ~ 2462.0 MHz) 802.11a/n/ac WLAN 5.8 GHz (5745.0 MHz ~ 5825.0 MHz) 802.11a/n/ac WLAN 5.2 GHz (5180.0 MHz ~ 5240.0 MHz) 802.11a/n/ac WLAN 5.3 GHz (5260.0 MHz ~ 5320.0 MHz) 802.11a/n/ac WLAN 5.5 GHz (5500.0 MHz ~ 5700.0 MHz) Bluetooth (2402.0 MHz ~ 2480.0 MHz)

4. The Highest Reported SAR Values

Equipment Class	Band	Tx Frequency (MHz)	Reported 1g SAR (W/kg)		
			Head	Body-Worn	Hotspot
PCE	GSM/GPRS/EDGE850	824.2 ~ 848.8	1.00	0.78	1.29
PCE	GSM/GPRS/EDGE1900	1850.2 ~ 1909.8	0.26	0.63	1.26
PCE	WCDMA 850	1852.4 ~ 1907.6	0.89	1.02	1.02
DTS	2.4 GHz WLAN	2412.0 ~ 2462.0	0.68	0.17	0.17
DTS	5.8 GHz WLAN	5745.0 ~ 5825.0	0.10	0.09	0.09
NII	5.2 GHz WLAN	5180.0 ~ 5240.0	0.17	0.17	N/A
NII	5.3 GHz WLAN	5260.0 ~ 5320.0	0.19	0.21	N/A
NII	5.5 GHz WLAN	5500.0 ~ 5700.0	0.15	0.17	N/A
DSS	Bluetooth	2402.0 ~ 2480.0	N/A	N/A	N/A
Simultaneous SAR per KDB 690783 D01v01r03			1.52	1.23	1.46

5. Test Methodology

ANSI C95.1–1999: 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.

Test tests documented in this report were performed in accordance with IEEE Standard 1528-2003 & IEEE 1528a-2005 and the following published KDB procedures.

In additions;

☒	**KDB 865664 D01v01r03**	**SAR Measurement Requirements for 100 MHz to 6 GHz**
☒	**KDB 447498 D01v05r02**	**Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies**
☐	KDB 447498 D02v02	SAR Measurement Procedures for USB Dongle Transmitters
☒	**KDB 248227 D01v01r02**	**SAR Measurement Procedures for 802.11a,b,g Transmitters**
☐	KDB 615223 D01v01	802.16e/WiMax SAR Measurement Guidance
☐	KDB 616217 D04v01r01	SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers
☐	KDB 643646 D01v01r01	SAR Test Reduction Considerations for Occupational PTT Radios
☐	KDB 648474 D03v01r02	Evaluation and Approval Considerations for Handsets with Specific Wireless Charging Battery Covers
☒	**KDB 648474 D04v01r02**	**SAR Evaluation Considerations for Wireless Handsets**
☐	KDB 680106 D01v02	RF Exposure Considerations for Low Power Consumer Wireless Power Transfer Applications
☒	**KDB 941225 D01v03**	**3G SAR Measurement Procedures**
☐	KDB 941225 D05v02r03	SAR Evaluation Considerations for LTE Devices
☒	**KDB 941225 D06v02**	**SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities**
☐	KDB 941225 D07v01r01	SAR Evaluation Procedures for UMPC Mini-Tablet Devices

6. Testing Environment

Ambient temperature	18°C ~ 25°C
Relative humidity	30% ~ 70%
Liquid temperature of during the test	<± 2°C
Ambient noise & Reflection	< 0.012 W/kg

7. Specific Absorption Rate (SAR)

7.1 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

7.2 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:

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

SAR is expressed in units of Watts per kilogram (W/kg)

SAR measurement can be either related to the temperature elevation in tissue by

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

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

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

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

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

7.3 Test Standards and Limits

According to FCC 47CFR §2.1093(d) The limits to be used for evaluation are based generally on criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate ("SAR") in Section 4.2 of "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 ㎑ to 300 ㎓," ANSI/IEEE C95.3–2003, Copyright 2003 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in "Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields," NCRP Report No. 86, Section 17.4.5. Copyright NCRP, 1986, Bethesda, Maryland 20814. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards. The criteria to be used are specified in paragraphs (d)(1) and (d)(2) of this section and shall apply for portable devices transmitting in the frequency range from 100 ㎑ to 6 ㎓. Portable devices that transmit at frequencies above 6 ㎓ are to be evaluated in terms of the MPE limits specified in § 1.1310 of this chapter. Measurements and calculations to demonstrate compliance with MPE field strength or power density limits for devices operating above 6 ㎓ should be made at a minimum distance of 5 cm from the radiating source.

(1) Limits for Occupational/Controlled exposure: 0.4 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 8 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 20 W/kg, as averaged over an 10 grams of tissue (defined as a tissue volume in the shape of a cube). Occupational/Controlled limits apply when persons are exposed as a consequence of their employment provided these persons are fully aware of and exercise control over their exposure. Awareness of exposure can be accomplished by use of warning labels or by specific training or education through appropriate means, such as an RF safety program in a work environment.

(2) Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). General Population/Uncontrolled limits apply when the general public may be exposed, or when persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or do not exercise control over their exposure. Warning labels placed on consumer devices such as cellular telephones will not be sufficient reason to allow these devices to be evaluated subject to limits for occupational/controlled exposure in paragraph (d)(1) of this section.

Human Exposure	**Uncontrolled Environment General Population**	**Controlled Environment Occupational**
Partial Peak SAR (Partial)	1.60 m W/g	8.00 m W/g
Partial Average SAR (Whole Body)	0.08 m W/g	0.40 m W/g
Partial Peak SAR (Hands/Feet/Ankle/Wrist)	4.00 m W/g	20.00 m W/g

1. The spatial Peak value of the SAR averaged over any 1g gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
2. The spatial Average value of the SAR averaged over the whole body.
3. The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

8. The SAR Measurement System

A block diagram of the SAR measurement System is given in Fig. a. This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY 5 professional system). The model EX3DV4 field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ ($|Ei|^2$)/ ρ where σ and ρ are the conductivity and mass density of the tissue-simulant.

The DASY 5 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Staubli TX family) with controller, teach pendant and software. An arm extension is for accommodating the data acquisition electronics (DAE).
- A dosimeter probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- Data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

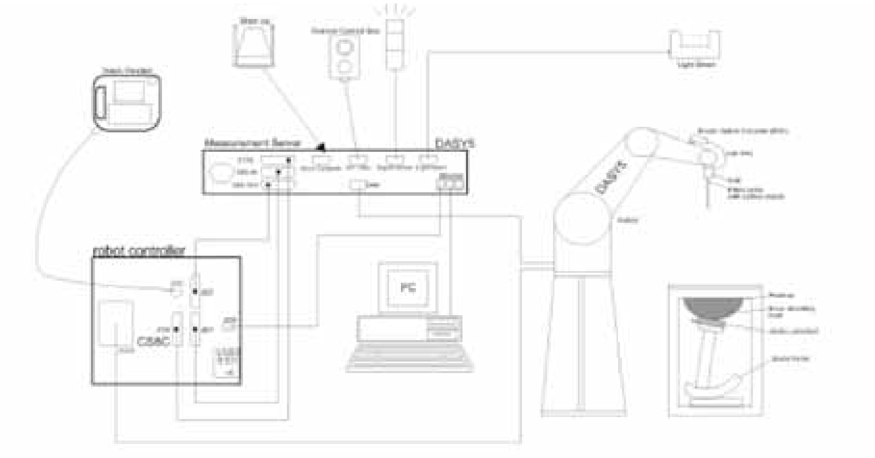


Fig a. The microwave circuit arrangement used for SAR system verification

- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows7
- DASY 5 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM phantom enabling testing left-hand and right-hand usage.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

9. System Components

9.1 Probe

EX3DV4 E-Field Probe

Construction : Symmetrical design with triangular core.
Built-in shielding against static charges.
PEEK enclosure material (resistant to organic solvents, e.g., DGBE)

Calibration : Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 835 and HSL1900.
Additional CF-Calibration for other liquids and frequencies upon request.

Frequency : 10 ㎒ to 6 ㎓; Linearity: ± 0.2 ㏈ (30 ㎒ to 6 ㎓)

Directivity : ± 0.3 ㏈ in HSL (rotation around probe axis)
± 0.5 ㏈ in tissue material (rotation normal to probe axis)

Dynamic Range : 10μW/g to > 100 m W/g;
Linearity: ± 0.2 ㏈(noise: typically < 1 μW/g)

Dimensions : Overall length: 337 ㎜ (Tip length: 20 ㎜)
Tip diameter: 2.5 ㎜ (Body diameter: 12 ㎜)
Distance from probe tip to dipole centers: 1 ㎜

Application : High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 ㎓ with precision of better 30%

Construction : Symmetrical design with triangular core.
Built-in shielding against static charges.
PEEK enclosure material (resistant to organic solvents, e.g., DGBE)

NOTE:

1. The Probe parameters have been calibrated by the SPEAG. Please reference "APPENDIX C" for the Calibration Certification Report.

9.2 SAM Phantom

SAM Phantom

Construction : The SAM Phantom is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90 % of all users. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot

Shell Thickness : 2.0 ㎜ ± 0.1 ㎜

Filling Volume : Approx. 25 liters

9.3 Device Holder

Construction: **:** In combination with the Twin SAM PhantomV4.0/V4.0C or Twin SAM, the Mounting Device (made from POM) enables the rotation of the mounted transmitter in spherical coordinates, whereby the rotation point is the ear opening. The devices can be easily and accurately positioned according to IEC, IEEE, CENELEC, FCC or other specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

Device Holder

10. SAR Measurement Procedures

10.1 Normal SAR Measurement Procedure

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The Minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2 ㎜. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties.

Step 2 and 3: Area Scan & Zoom Scan Procedures

The entire evaluation of the spatial peak values is performed within the Post-processing engine (SEMCAD). The system always gives the maximum values for the 1 g and 10 g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

1. The extraction of the measured data (grid and values) from the Zoom Scan.
2. The calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
3. The generation of a high-resolution mesh within the measured volume
4. The interpolation of all measured values from the measurement grid to the high-resolution grid
5. The extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
6. The calculation of the averaged SAR within masses of 1 g and 10 g.

Step 4: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

< Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01r03 >

<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 reported 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>

11. Definition of Reference

11.1 EAR Reference Point

Fig 2 shows the front, back and side views of the SAM Twin Phantom. The point “M” is the reference point for the center of the mouth, “LE” is the left ear reference point (ERP), and “RE” is the right ERP. The ERPs are 15mm posterior to the entrance to the ear canal (EEC) along the B-M line (Back-Mouth), as shown in Fig 3. The plane passing through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck-Front) is perpendicular to the reference plane and passing through the RE (or LE) is called the Reference Pivoting Line (see Fig 4). Line B-M is perpendicular to the N-F line. Both N-F and B-M lines are marked on the external phantom shell to facilitate handset positioning.

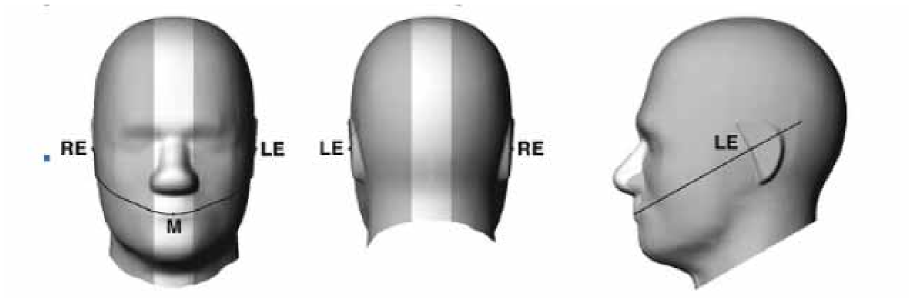


Fig 2 Front, back and side view of SAM Twin Phantom

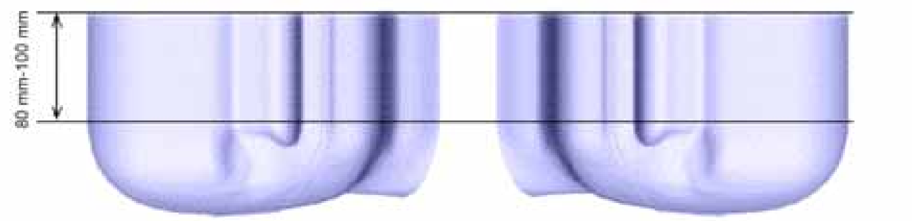


Fig 3 Sagittally bisected phantom with extended perimeter (shown placed on its side as used for device SAR tests)

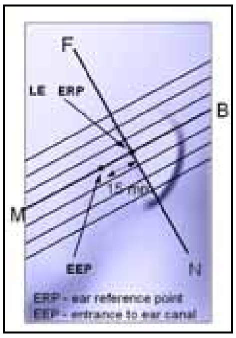


Fig 4 Close-up side view of ERP

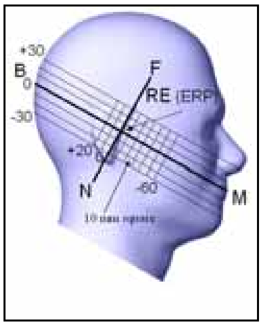


Fig 5 Side view of the phantom showing relevant markings

11.2 EUT constructions

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The test device was placed in a normal operating position with the "test device reference point" located along the "vertical centerline" on the front of the device aligned to the "ear reference point" (see Fig. 6). The "test device reference point" was than located at the same level as the center of the ear reference point. The test device was positioned so that the "vertical centerline" was bisecting the front surface of the handset at it's top and bottom edges, positioning the "ear reference point" on the outer surface of the both the left and right head phantoms on the ear reference point.

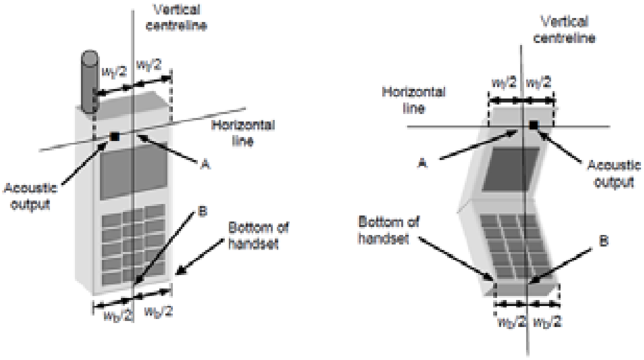


Fig 6 Handset Vertical Center & Horizontal Line Reference Points

11.3 Positioning for Touch

a) Position the device with the vertical centre line of the body of the device and the horizontal line crossing the centre of the ear piece in a plane parallel to the sagittal plane of the phantom (initial position). While maintaining the device in this plane, align the vertical centre line with the reference plane containing the three ear and mouth reference points (M, RE and LE) and align the centre of the ear piece with the line RE-LE;

b) Translate the handset towards the phantom along the line passing through RE and LE until the handset touches the ear.

c) While maintaining the device in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to MB-NF including the line MB (called the reference plane).

d) Rotate the phone around the vertical centerline until the phone (horizontal line) is ymmetrical with respect to the line NF.

e) While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the phone contact with the ear, rotate the handset about the line NF until any point on the handset is in contact with a phantom point below the pinna (cheek). (see Fig. 7) The physical angles of rotation should be

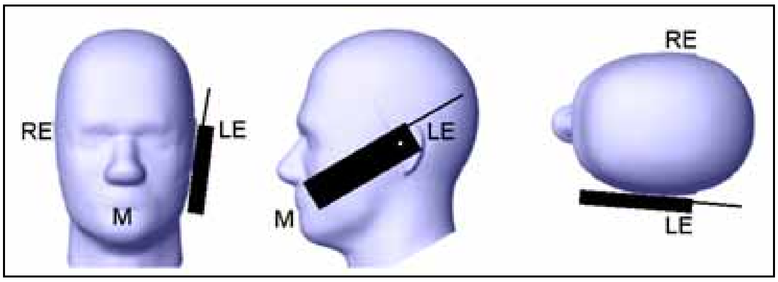


Fig 7 Cheek/Touch position of the wireless device on the left side of SAM

11.4 Positioning for Ear/15˚ Tilt

With the test device aligned in the "Cheek/Touch Position":

a) While maintain the device in the reference plane described above and pivoting against the ear, move it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost.

b) The phone was then rotated around the horizontal line by 15 degrees.

c) While maintaining the orientation of the phone, the phone was moved parallel to the reference plane until any part of the handset touched the head. (In this position, point A was located on the line RE-LE). The tilted position is obtained when the contact is on the pinna. If the contact was at any location other than the pinna, the angle of the phone would then be reduced. In this situation, the tilted position was obtained when any part of the phone was in contact of the ear as well as a second part of the phone was in contact with the head (see Fig 8).

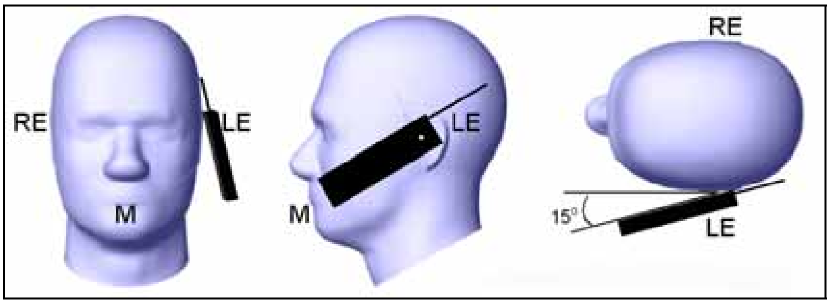


Fig 8 Ear/15˚ Tilt position of the wireless device on the left side of SAM

11.5 Body-Worn Accessory Configurations

Body-worn operation configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration. A device with a headset output is tested with a headset connected to the device.

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are supplied with the device, the device is tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

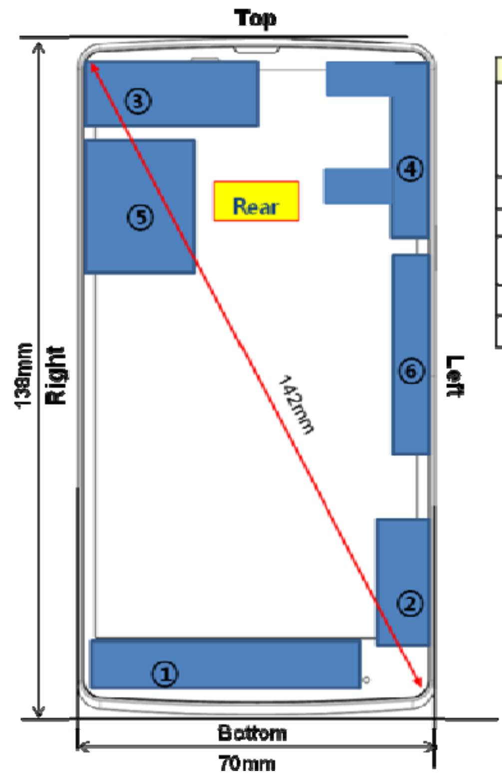
Body-worn accessories may not always be supplied of available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration where a separation distances between the back of the device and the flat phantom is used. Test position spacing was documented.

11.6 Wireless Router Configurations

Some battery-operated handsets have the capability to transmit and receive user data through simultaneous transmission of WLAN simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06 v02 where SAR test considerations for handsets (L x W $\geq$ 9 cm x 5 cm) are based on a composite test separation distance of 10 mm from the front, back and edges of the device containing transmitting antennas within 2.5 cm of their edges, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WLAN transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WLAN transmitter according to FCC KDB Publication 447498 D01v05r02 publication procedures. The “Portable Hotspot” feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

11.7 DUT Antenna Locations



Antenna	Mode	Band
①	GSM	GSM Quad Tx, Rx
	CDMA	BC0, BC6 Tx, Rx
	WCDMA	Band 1, 5 Tx, Rx
	LTE	Band 1, 3, 26 Tx, Rx
②	LTE	Band 11 Tx, Rx
③	Wi-Fi	2.4GHz/5GHz
④	LTE	B1, 11 Rx
	GPS	1.575Ghz
⑤	NFC	13.56MHz
⑥	LTE	B3, 26 Rx

11.8 Mobile Hotspot sides for SAR Testing configurations

Mode	Rear	Front	Left Edge	Right Edge	Bottom	Top
GPRS 850	Yes	Yes	Yes	Yes	Yes	No
GPRS 1900	Yes	Yes	Yes	Yes	Yes	No
WCDMA 850	Yes	Yes	Yes	Yes	Yes	No
WLAN 2.4 GHz	Yes	Yes	No	Yes	No	Yes
WLAN 5 GHz	Yes	Yes	No	Yes	No	Yes

Notes

Particular DUT edges were not required to be evaluated for Wireless Router SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC Publication 941225 D06v02 guidance, page 2 and FCC KDB 648474 D04v01r01. The antenna document shows the distances between the transmit antennas and the edges of the device.

12. SAR System Verification

The microwave circuit arrangement for system verification is sketched in Fig. 9. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. These tests were done at 835 MHz, 1900 MHz 2.4 GHz and 5 GHz. The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed in the table 1. (SAR values are normalized to 1W forward power delivered to the dipole). During the tests, the ambient temperature of the laboratory was in the range (22 ± 2) ° C, the relative humidity was in the range (55 ± 5) % R.H and the liquid depth above the ear reference points was ≥ 15 cm ± 5 mm (frequency ≤ 3 GHz) or ≥ 10 cm ± 5 mm (frequency > 3 G Hz)in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

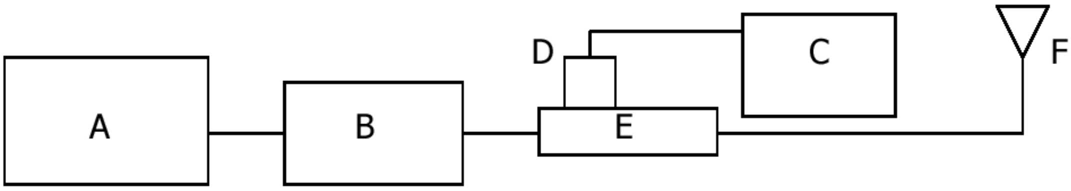


Fig 9. The microwave circuit arrangement used for SAR system verification

A. Agilent Model E8247C Signal Generator
B. EMPOWER Model 2001-BBS3Q7ECK Amplifier
C. Agilent Model E4419B Power Meter
D. Agilent Model 9300H Power Sensor
E. Agilent Model 86205A Directional RF Bridges
F. Reference dipole Antenna

Photo of the dipole Antenna

Verification Kit	Probe S/N	Tissue (MHz)	Target SAR 1 g from Standard (1 W)	Target SAR 10 g from Standard (1 W)	Normalized SAR 1 g (1 W)	Normalized SAR 10 g (1 W)	1g Deviation (%)	10g Deviation (%)	Date	Liquid Temp. (°C)
D835V2 SN:490	3986	835 Head	9.07	5.90	9.17	6.00	**1.10**	**1.69**	2014-09-26	21.8
D835V2 SN:490	3986	835 Body	9.49	6.20	9.36	6.24	**-1.37**	**0.65**	2014-09-26	21.7
D1900V2 SN:5d033	3986	1900 Head	40.3	21.1	41.8	21.7	**3.72**	**2.84**	2014-10-23	22.1
D1900V2 SN:5d033	3986	1900 Body	40.6	21.3	40.2	21.4	**-0.99**	**0.47**	2014-10-23	22.0
D2450V2 SN:734	3986	2450 Head	52.2	24.3	55.0	24.9	**5.36**	**2.47**	2014-10-24	22.1
D2450V2 SN:734	3986	2450 Body	49.8	23.2	50.7	23.5	**1.81**	**1.29**	2014-10-24	22.0
D5000V2 Sn:1130	3986	5200 Head	79.4	22.6	80.5	23.1	**1.39**	**2.21**	2014-10-27	21.4
D5000V2 Sn:1130	3986	5200 Body	76.1	21.1	74.5	21.5	**-2.10**	**1.90**	2014-10-27	21.8
D5000V2 Sn:1130	3986	5300 Head	84.7	24.3	86.3	24.4	**1.89**	**0.41**	2014-10-27	21.4
D5000V2 Sn:1130	3986	5300 Body	78.4	21.9	81.9	23.4	**4.46**	**6.85**	2014-10-27	21.8
D5000V2 Sn:1130	3986	5600 Head	85.6	24.3	84.3	23.9	**-1.52**	**-1.65**	2014-10-28	21.8
D5000V2 Sn:1130	3986	5600 Body	83.0	22.9	89.3	25.1	**7.59**	**9.61**	2014-10-28	21.4
D5000V2 Sn:1130	3986	5800 Head	81.0	23.0	82.8	23.4	**2.22**	**1.74**	2014-10-28	21.8
D5000V2 Sn:1130	3986	5800 Body	77.6	21.4	75.8	21.3	**-2.32**	**-0.47**	2014-10-28	21.4

Table1. Results system verification

13. Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this simulant fluid were measured by using the Speag Model DAK-3.5 Dielectric Probe in conjunction with Agilent E5071C Network Analyzer(300 ㎑ - 6 ㎓) by using a procedure detailed in Section V.

f (㎒)	Tissue type	Limits / Measured	Dielectric Parameters		
			Permittivity	**Conductivity**	**Simulated Tissue Temp(℃)**
835	Head	Measured, 09-26-2014	41.0	0.89	21.8
		Target Tissue Head	*41.5*	*0.90*	
		Deviation (%)	**-1.20**	**-1.11**	
835	Body	Measured, 09-26-2014	55.9	0.95	21.7
		Target Tissue Head	*55.2*	*0.97*	
		Deviation (%)	**1.27**	**-2.06**	
1900	Head	Measured, 10-23-2014	39.7	1.41	22.1
		Target Tissue Head	*40.0*	*1.40*	
		Deviation (%)	**-0.75**	**0.71**	
1900	Body	Measured, 10-23-2014	52.4	1.53	22.0
		Target Tissue Head	*53.3*	*1.52*	
		Deviation (%)	**-1.69**	**0.66**	
2450	Head	Measured, 10-24-2014	38.4	1.86	22.1
		Target Tissue Head	*39.2*	*1.8*	
		Deviation (%)	**-2.04**	**3.33**	
2450	Body	Measured, 10-24-2014	51.6	1.94	22.0
		Target Tissue Head	*52.7*	*1.95*	
		Deviation (%)	**-2.09**	**-0.51**	
5200	Head	Measured, 10-27-2014	37.1	4.81	21.4
		Target Tissue Head	*36.0*	*4.66*	
		Deviation (%)	**3.06**	**3.22**	
5200	Body	Measured, 10-27-2014	51.0	5.15	21.8
		Target Tissue Head	*49.0*	*5.30*	
		Deviation (%)	**4.08**	**-2.83**	
5300	Head	Measured, 10-27-2014	36.8	4.94	21.4
		Target Tissue Head	*35.9*	*4.76*	
		Deviation (%)	**2.51**	**3.78**	
5300	Body	Measured, 10-27-2014	50.7	5.31	21.8
		Target Tissue Head	*48.9*	*5.42*	
		Deviation (%)	**3.68**	**-2.03**	
5600	Head	Measured, 10-28-2014	36	5.15	21.8
		Target Tissue Head	*35.5*	*5.07*	
		Deviation (%)	**1.41**	**1.58**	
5600	Body	Measured, 10-28-2014	50.1	5.78	21.4
		Target Tissue Head	*48.5*	*5.77*	
		Deviation (%)	**3.30**	**0.17**	
5800	Head	Measured, 10-28-2014	35.4	5.40	21.8
		Target Tissue Head	*35.3*	*5.27*	
		Deviation (%)	**0.28**	**2.47**	
5800	Body	Measured, 10-28-2014	49.6	6.09	21.4
		Target Tissue Head	*48.2*	*6.00*	
		Deviation (%)	**2.90**	**1.50**	

The composition of the brain & muscle tissue simulating liquid

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

Salt: 99 $^{+}$% Pure Sodium Chloride

Sugar: 98 $^{+}$% Pure Sucrose

Water: De-ionized, 16 MΩ^{+} resistivity

HEC: Hydroxyethyl Cellulose

DGBE: 99 $^{+}$% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]

Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

Simulating Liquids for 5 GHz, Manufactured by SPEAG

Ingredients	(% by weight)
Water	78
Mineral Oil	11
Emulsifiers	9
Additives and Salt	2

14. Test System Validation

Per FCC KDB 865664 D01v01r03, SAR system validation status should be documented to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the require tissue-equivalent media for system validation, according to the procedures outlined in IEEE 1528-2003 and FCC KDB 865664 D01v01r03. Since frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media.

A tabulated summary of the system validation status including the validation date(s), measurement frequencies, SAR probe and tissue dielectric parameters has been included.

f (MHz)	Date	Probe S/N	Probe Cal point	Tissue Type	Dielectric Parameters		CW Validation			Modulated Validation		
					Permittivity	Conductivity	Sensitivity	Probe Linearity	Probe Isotropy	Mod. Type	Duty Factor	PAR
835	2014-06-18	3986	835	Head	41.7	0.89	PASS	PASS	PASS	GMSK	PASS	N/A
835	2014-06-18	3986	835	Body	56.9	0.96	PASS	PASS	PASS	GMSK	PASS	N/A
1900	2014-06-19	3986	1900	Head	39.2	1.40	PASS	PASS	PASS	GMSK	PASS	N/A
1900	2014-06-19	3986	1900	Body	53.8	1.51	PASS	PASS	PASS	GMSK	PASS	N/A
2450	2014-06-24	3986	2450	Head	37.7	1.79	PASS	PASS	PASS	OFDM	N/A	PASS
2450	2014-06-24	3986	2450	Body	51.9	1.89	PASS	PASS	PASS	OFDM	N/A	PASS
5200	2014-06-25	3986	5200	Head	36.9	4.69	PASS	PASS	PASS	OFDM	N/A	PASS
5200	2014-06-20	3986	5200	Body	49.4	5.39	PASS	PASS	PASS	OFDM	N/A	PASS
5300	2014-06-25	3986	5300	Head	36.6	4.82	PASS	PASS	PASS	OFDM	N/A	PASS
5300	2014-06-20	3986	5300	Body	49.09	5.55	PASS	PASS	PASS	OFDM	N/A	PASS
5600	2014-06-26	3986	5600	Head	37.1	5.11	PASS	PASS	PASS	OFDM	N/A	PASS
5600	2014-06-23	3986	5600	Body	47.78	5.74	PASS	PASS	PASS	OFDM	N/A	PASS
5800	2014-06-26	3986	5800	Head	36.6	5.36	PASS	PASS	PASS	OFDM	N/A	PASS
5800	2014-06-23	3986	5800	Body	47.2	6.02	PASS	PASS	PASS	OFDM	N/A	PASS

< SAR System Validation Summary>

Note

All measurement were performed using probes calibrated for CW signal only. Modulations in the table above represent test configurations for which the measurement system has been validated per FCC KDB Publication 865664 D01v01r03. SAR system were validated for modulated signals with a periodic duty cycle, such as GMSK, or with a high peak to average ratio (>5 dB), such as OFDM according to KDB 865664 D01v01r03.

15. Instruments List

Test Platform	SPEAG DASY5 Professional
Location	SGS Korea Co., Ltd. 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, E&E Lab
Manufacture	SPEAG
Description	SAR Test System (Frequency range 300 ㎒ - 6 ㎓)
Software Reference	DASY5: V5.7 (1137) SEMCAD: V14.6.10 (7164)

Hardware Reference

Equipment	Type	Serial Number	Cal Date	Cal Interval	Cal Due
Robot	TX90XL	F13/5S7KC1/A/01	N/A	N/A	N/A
Phantom	SAM Phantom	TP-1821	N/A	N/A	N/A
Phantom	SAM Phantom	TP-1843	N/A	N/A	N/A
835 MHz System Validation Dipole	D835V2	490	2014-05-16	Biennial	2016-05-16
1900 MHz System Validation Dipole	D1900V2	5d033	2014-05-19	Biennial	2016-05-19
2450 ㎒ System Validation Dipole	D2450V2	734	2014-05-20	Biennial	2016-05-20
5 ㎓ System Validation Dipole	D5GHzV2	1130	2014-05-22	Biennial	2016-05-22
Dosimetric E-Field Probe	EX3DV4	3986	2014-03-21	Annual	2015-03-21
Data acquisition Electronics	DAE4	1430	2014-03-24	Annual	2015-03-24
Network Analyzer	E5071C	MY46111535	2014-07-04	Annual	2015-07-04
Dielectric Assessment Kit	DAK-3.5	1107	2014-01-19	Annual	2015-01-19
Power Meter	E4419B	GB43311715	2014-06-25	Annual	2015-06-25
Power Sensor	E9300H	MY41495314	2014-07-02	Annual	2015-07-02
		MY41495307	2014-07-02	Annual	2015-07-02
Signal Generator	E8247C	MY43321024	2014-06-25	Annual	2015-06-25
Power Amplifier	2001-BBS3Q7ECK	1032 D/C 0336	2014-01-02	Annual	2015-01-02
Power Amplifier	2092-BBS5K8CAJ	1010	2014-06-27	Annual	2015-06-27
Directional RF Bridges	86205A	MY31402302	2014-07-03	Annual	2015-07-03
LP Filter	LA-15N	N/A	2014-07-01	Annual	2015-07-01
LP Filter	LA-30N	N/A	2014-07-01	Annual	2015-07-01
LP Filter	LA-60N	N/A	2014-07-01	Annual	2015-07-01
Attenuator	8491B	50566	2014-07-01	Annual	2015-07-01
Hygro- Thermometer	98585	130188	2014-06-30	Annual	2015-06-30
Digital Thermometer	DTM3000	3027	2014-07-02	Annual	2015-07-02
Spectrum Analyzer	E4445A	MY44020523	2014-06-25	Annual	2015-06-25
Communication Tester	MT8820C	6201074216	2014-02-28	Annual	2015-02-28

16. FCC Power Measurement Procedures

Power measurements were performed using a base station simulator under digital average power.

The handset was placed into a simulated call using a base station simulator in shielded chamber. SAR measurements were taken with a fully charged battery. In order to verify that the device was tested and maintained at full power, this was configured with the base station simulator. The SAR measurement Software calculates a reference point at the start and end of the test to check for power drifts. If conducted power deviations of more than 5 % occurred, the tests were repeated.

17. Measured and Reported SAR

Per FCC KDB Publication 447498 D01v05r02, When SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as reported SAR. Test highest reported SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r03.

18 Nominal and Maximum Output Power Specifications

This device operates using the following maximum and nominal output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v05r02.

Mode / Band		Burst Average GMSK (dBm)								
		Voice	GPRS Data (GMSK)				EDGE Data (8-PSK)			
		GSM	1 slot	2 slot	3 slot	4 slot	1 slot	2 slot	3 slot	4 slot
GSM850	**Maximum**	**33.2**	**33.2**	**30.7**	**29.2**	**28.2**	**27.0**	**26.5**	**25.5**	**24.5**
	Nominal	32.7	32.7	30.2	28.7	27.7	26.5	26.0	25.0	24.0
PCS1900	**Maximum**	**30.2**	**29.7**	**26.7**	**24.7**	**23.2**	**26.1**	**26.0**	**25.0**	**23.5**
	Nominal	29.7	30.2	27.2	25.2	23.7	25.6	25.5	24.5	23.0
Mode / Band		Frame Average GMSK (dBm)								
		Voice	GPRS Data (GMSK)				EDGE Data (8-PSK)			
		GSM	1 slot	2 slot	3 slot	4 slot	1 slot	2 slot	3 slot	4 slot
GSM850	**Maximum**	**24.17**	**24.17**	**24.68**	**24.94**	**25.19**	**17.97**	**20.48**	**21.24**	**21.49**
	Nominal	23.67	23.67	24.18	24.44	24.69	17.47	19.98	20.74	20.99
PCS1900	**Maximum**	**21.17**	**20.67**	**20.68**	**20.44**	**20.19**	**17.07**	**19.98**	**20.74**	**20.49**
	Nominal	20.67	21.17	21.18	20.94	20.69	16.57	19.48	20.24	19.99
Tune-up Tolerance: -1.5 dB / + 0.5 dB										

Mode / Band		Modulated Average (dBm)				
		3GPP WCDMA	3GPP HSDPA			
		Rel. 99	Rel. 5			
		RMC/AMR	Subtest 1	Subtest 2	Subtest 3	Subtest 4
WCDMA850	**Maximum**	**23.7**	**22.8**	**22.8**	**22.3**	**22.3**
	Nominal	23.2	22.3	22.3	21.8	21.8
Tune-up Tolerance: -1.5 dB / + 0.5 dB						

Note: This device supports HSUPA but the manufacturer only declares on the tune-up procedure that the HSUPA transmitter`s power will not exceed the R99 maximum transmit power in devices based on Qualcomm`s HSPA chipset solution.

Average power for Production (dBm)				
Mode	Nominal & Maximum	b	g	n
2.4 ㎓ WLAN	**Maximum**	**16.0**	**10.0**	**9.0**
	Nominal	15.0	9.0	8.0
Mode	Nominal & Maximum	a	n (20 MHz)	n (40 MHz)
5 ㎓ WLAN	**Maximum**	**13.0**	**12.0**	**12.0**
	Nominal	12.0	11.0	11.0

Mode	Nominal & Maximum	GFSK	DPSK	8DPSK	LE
Bluetooth	**Maximum**	**9.0**	**7.5**	**7.5**	**N/A**
	Nominal	8.0	6.5	6.5	N/A

19 RF Conducted Power Measurement

The device in GSM, WCDMA was controlled by using a Communication tester. The EUT was set to maximum power level during all tests. The DASY5 system measures power drift during SAR testing by comparing e-field in the same location at the beginning and at the end of measurement.

19.1 GSM Conducted Power

GSM	Channel	Frequency(㎒)	Burst -Conducted Average Power(㏈m)								
			Voice	GPRS Data (GMSK)				EDGE Data (8-PSK)			
			GSM	1 Slot	2 Slot	3 Slot	4 Slot	1 Slot	2 Slot	3 Slot	4 Slot
GSM 850	128	824.2	31.44	31.51	29.75	28.11	27.51	25.97	25.76	24.60	23.52
	190	836.6	31.93	31.91	29.98	28.38	28.05	26.18	25.99	24.86	23.79
	251	848.8	31.85	31.85	30.14	28.00	27.95	26.28	26.00	24.96	23.97
PCS 1900	512	1850.2	28.84	28.82	26.04	24.13	22.90	25.38	25.28	24.04	22.95
	661	1880.0	28.90	28.83	26.06	24.15	22.93	25.34	25.27	24.01	22.94
	810	1909.8	28.85	28.88	26.05	24.12	22.86	25.32	25.25	24.06	22.86

GSM	Channel	Frequency(㎒)	Frame-Conducted Average Power(㏈m)								
			Voice	GPRS Data (GMSK)				EDGE Data (8-PSK)			
			GSM	1 Slot	2 Slot	3 Slot	4 Slot	1 Slot	2 Slot	3 Slot	4 Slot
GSM 850	128	824.2	22.41	22.48	23.73	23.85	**24.50**	16.94	19.74	20.34	20.51
	190	836.6	22.90	22.88	23.96	24.12	**25.04**	17.15	19.97	20.60	20.78
	251	848.8	22.82	22.82	24.12	23.74	**24.94**	17.25	19.98	20.70	20.96
PCS 1900	512	1850.2	19.81	19.79	**20.02**	19.87	19.89	16.35	19.26	19.78	19.94
	661	1880.0	19.87	19.80	**20.04**	19.89	19.92	16.31	19.25	19.75	19.93
	810	1909.8	19.82	19.85	**20.03**	19.86	19.85	16.29	19.23	19.80	19.85

Note

1. Both burst-averaged and calculated frame-averaged powers are included. Frame-averaged power was calculated from the measured burst-averaged power by converting the slot powers into linear units and calculating the energy over 8 timeslots.
2. The source-based frame-averaged output power was evaluated for all GPRS slot configurations. The configuration with the highest target frame averaged output power was evaluated for wireless router SAR. When the maximum frame-averaged powers are equivalent across two or more slots (within 0.25 dB), the configuration with the most number of time slots war tested.
3. GPRS (GMSK) output powers were measured with coding scheme setting of 1 (CS1) on the base station simulator. CS1 was configured to measure GPRS output power measurements and SAR to ensure GMSK modulation in the signal. Our investigation has shown that CS1 – CS4 settings do not have any impact on the output levels or modulation in the GPRS modes.
4. EDGE (8-PSK) output powers were measured with MCS7 on the base station simulator. MCS7 coding scheme was used to measure the output powers for EDGE since investigation has shown that choosing MCS7 coding scheme will ensure 8-PSK modulation. It has been shown that MCS levels that produce 8PSK modulation do not have an impact on output power.

19.2 WCDMA

19.2.1 Output Power Verification

Maximum output power is measured on the High, Middle and Low channels for each applicable transmission band according to the general descriptions in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all "1s".

19.2.2 Head SAR Measurements

SAR for head exposure configurations is measured using the 12.2 kbps RMC with TPC bits configured to all "1s". SAR in AMR configurations is not required when the maximum average output of each RF channel for 12.2 kbps AMR is less than ¼ dB higher than that measured in 12.2 kbps RMC. Otherwise, SAR is measured on the maximum output channel in 12.2 AMR with a 3.4 kbps SRB (signaling radio bearer using the exposure configuration that results in the highest SAR for that RF channel in 12.2 RMC Mode.

19.2.3 Body SAR Measurements

SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits all "1s".

19.2.4 Procedures Used to Establish RF Signal for SAR HSDPA Data Devices

Body SAR is not required for handsets with HSDPA capabilities when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is ≤ 75 % of the SAR limit. Otherwise, SAR is Measured for HSDPA, using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, using the highest body SAR configuration in 12.2 kbps RMC without HSDPA, on the maximum output channel with the body exposure configuration that results in the highest SAR in 12.2 kbps RMC for that RF channel.

Table 1

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

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 8 ⇔ $A_{hs} = \beta_{hs}/\beta_c = 30/15$ ⇔ $\beta_{hs} = 30/15 * \beta_c$
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15.
Note 3: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

19.2.5 SAR Measurements for Conditions for HSUPA Data Devices

Body SAR is not required for handsets with HSPA capabilities when the maximum average output of each RF channel with HSUPA/HSDPA active is less than ¼ dB higher than that measured without HSUPA/HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is ≤ 75 % of the SAR limit. Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 with power control algorithm 2, according to the highest body SAR configuration in 12.1 kbps RMC without HSPA. When VOIP is applicable for head exposure, SAR is not required when the maximum output of each RF channel with HSPA is less than ¼ dB higher than that measured using 12.2 kbps RMC; otherwise, the same HSPA configuration used for body measurement should be used to test for head exposure.

Table 2

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	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	94/75	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	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (4)	15/15 (4)	64	15/15 (4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 8 ⇔ $A_{hs} = \beta_{hs}/\beta_c$ = 30/15 ⇔ β_{hs}= 30/15 *β_c.
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.
Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.
Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.
Note 6: β_{ed} cannot be set directly; it is set by Absolute Grant Value.

3GPP Release Version	Mode / Channel	3GPP 34.121 Subtest	Cellular Band (dBm)			3GPP MPR(dB)
			4132	4183	4233	
99	WCDMA	12.2 kbps RMC	23.00	23.05	22.87	-
5	HSDPA	Subtest 1	22.05	22.03	21.91	0
5		Subtest 2	22.21	22.08	21.92	0
5		Subtest 3	21.71	21.53	21.30	-0.5
5		Subtest 4	21.74	21.46	21.30	-0.5
6	HSUPA	Subtest 1	22.15	21.96	21.90	0
6		Subtest 2	21.68	21.45	21.37	-2
6		Subtest 3	22.18	22.01	21.82	-1
6		Subtest 4	22.08	21.92	21.98	-2
6		Subtest 5	22.25	21.98	22.00	0

Note

- WCDMA SAR was tested under RMC 12.2 kbps with HSPA inactive per KDB Publication 941225 D01v03. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg
- This device supports HSUPA but the manufacturer only declares on the tune-up procedure that the HSUPA transmitter`s power will not exceed the R99 maximum transmit power in devices based on Qualcomm`s HSPA chipset solution.

19.3 WLAN

19.3.1 General Device Setup

Normal Network operating configurations are not suitable for measuring the SAR of 802.11 a/b/g transmitters. 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 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 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.

19.3.2 Frequency Channel Configurations

802.11 a/b/g and 4.9 ㎓ operating modes are tested independently according to the service requirements in each frequency band. 802.11 b/g modes are tested on channel 1, 6, and 11. 802.11a is tested for UNII operations on channels 36 and 48 in the 5.15 ~ 5.25 ㎓ band, channels 52 and 64 in the 5.25 ~ 5.35 ㎓ band, channels 104, 116, 124 and 136 in the 5.470 ~ 5.725 ㎓ band, and channels 149 and 161 in the 5.8 ㎓ band. When 5.8 ㎓ §15.247 is also available, channels 149, 157 and 165 should be tested instead of the UNII channels. 802.11g mode was evaluated only if the output power was 0.25 ㏈ higher than the 802.11b mode.

Mode		GHz	Channel	Turbo Channel	"Default Test Channels" §15.247 802.11b	"Default Test Channels" §15.247 802.11g	"Default Test Channels" UNII	
802.11 b/g		2.412	1#		√	∇		
		2.437	6	6	√	∇		
		2.462	11#		√	∇		
802.11a	UNII	5.18	36	42 (5.21 GHz)			√	
		5.20	40					*
		5.22	44					*
		5.24	48	50 (5.25 GHz)			√	
		5.26	52				√	
		5.28	56	58 (5.29 GHz)				*
		5.30	60					*
		5.32	64				√	
		5.500	100	Unknown				*
		5.520	104				√	
		5.540	108					*
		5.560	112					*
		5.580	116				√	
		5.600	120					*
		5.620	124				√	
		5.640	128					*
		5.660	132					*
		5.680	136				√	
		5.700	140					*
	UNII or §15.247	5.745	149		√		√	
		5.765	153	152 (5.76 GHz)		*		*
		5.785	157		√			*
		5.805	161	160 (5.80 GHz)		*	√	
	§15.247	5.825	165		√			

- √ = "default test channels"
- * = possible 802.11a channels with maximum average output > the "default test channels"
- ∇ = possible 802.11g channels with maximum average output ¼ dB ≥ the "default test channels"
- # = when output power is reduced for channel 1 and/or 11 to meet restricted band requirements the highest output channels closest to each of these channels should be tested

19.3.3 WLAN Conducted Powers

IEEE 802.11b Average RF Power

Mode	Frequency	Channel	802.11b (2.4 GHz) Conducted Power (dBm)			
			Data Rate (Mbps)			
			1	2	5.5	11
802.11b	2412	1	15.22	15.29	15.35	15.43
	2437	6	15.20	15.27	15.32	15.44
	2462	11	**15.51**	15.58	15.64	15.73

IEEE 802.11g Average RF Power

Mode	Frequency	Channel	802.11g (2.4 GHz) Conducted Power (dBm)							
			Data Rate (Mbps)							
			6	9	12	18	24	36	48	54
802.11g	2412	1	8.82	8.83	8.84	8.85	8.86	8.90	8.93	8.89
	2437	6	8.84	8.86	8.88	8.91	8.93	8.97	9.00	8.88
	2462	11	9.08	9.11	9.13	9.16	9.20	9.24	9.26	9.06

IEEE 802.11n Average RF Power 20 MHz Bandwidth

Mode	Frequency	Channel	802.11n (2.4 GHz) Conducted Power (dBm)							
			Data Rate (Mbps)							
			MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
802.11n	2412	1	7.75	7.76	7.80	7.88	7.94	7.96	7.98	8.00
	2437	6	7.79	7.80	7.85	7.92	7.91	7.93	7.89	8.03
	2462	11	8.07	8.10	8.13	8.18	8.20	8.22	8.07	8.10

IEEE 802.11a Average RF Power

Mode	Frequency	Channel	802.11a (5 GHz) Conducted Power (dBm)							
			Data Rate (Mbps)							
			6	9	12	18	24	36	48	54
802.11a	5180	36	12.07	12.04	12.07	11.94	11.91	11.89	11.87	11.84
	5200	40	12.53	12.49	12.48	12.46	12.43	12.41	12.40	12.38
	5220	44	**12.98**	12.97	12.95	12.93	12.90	12.85	12.79	12.76
	5240	48	12.12	12.10	12.07	12.06	12.01	11.99	11.90	11.88
	5260	52	11.88	11.87	11.85	11.77	11.76	11.74	11.67	11.66
	5280	56	**12.73**	12.71	12.69	12.67	12.63	12.61	12.55	12.50
	5300	60	12.55	12.54	12.51	12.50	12.48	12.46	12.44	12.43
	5320	64	11.70	11.66	11.65	11.62	11.61	11.59	11.54	11.52
	5500	100	11.79	11.78	11.76	11.73	11.70	11.69	11.63	11.59
	5520	104	11.57	11.56	11.53	11.52	11.49	11.44	11.41	11.36
	5540	108	12.17	12.16	12.12	12.10	12.16	12.08	12.05	11.92
	5560	112	12.16	12.14	12.09	12.06	12.03	12.01	11.97	11.95
	5580	116	11.38	11.35	11.33	11.30	11.32	11.30	11.29	11.28
	5660	132	**12.23**	12.22	12.20	12.16	12.13	12.08	12.02	11.99
	5680	136	12.10	12.07	12.05	12.04	12.03	11.99	11.99	11.98
	5700	140	12.13	12.10	12.10	12.07	12.05	12.04	11.97	11.94
	5745	149	12.08	12.07	12.05	12.02	11.97	11.97	11.94	11.94
	5765	153	11.91	11.89	11.86	11.83	11.83	11.79	11.78	11.73
	5785	157	12.33	12.32	12.30	12.28	12.26	12.24	12.19	12.11
	5805	161	**12.56**	12.55	12.52	12.51	12.49	12.43	12.37	12.34
	5825	165	12.19	12.18	12.16	12.15	12.14	12.13	12.13	12.12

IEEE 802.11n Average RF Power 20 MHz Bandwidth

Mode	Frequency	Channel	802.11n (5 GHz) Conducted Power (dBm)							
			Data Rate (Mbps)							
			MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
802.11n	5180	36	10.98	10.96	10.96	10.95	10.93	10.91	10.90	10.89
	5200	40	11.96	11.94	11.91	11.90	11.88	11.84	11.67	11.57
	5220	44	11.90	11.89	11.88	11.86	11.86	11.81	11.78	11.65
	5240	48	11.00	10.98	10.97	10.96	10.94	10.87	10.80	10.74
	5260	52	10.94	10.93	10.90	10.89	10.85	10.82	10.77	10.71
	5280	56	11.68	11.67	11.65	11.62	11.60	11.56	11.50	11.46
	5300	60	11.63	11.59	11.57	11.56	11.54	11.47	11.44	11.43
	5320	64	10.88	10.85	10.84	10.84	10.83	10.81	10.83	10.72
	5500	100	11.16	11.15	11.13	11.11	11.01	10.97	10.91	10.83
	5520	104	10.88	10.88	10.87	10.86	10.85	10.80	10.70	10.61
	5540	108	10.80	10.78	10.76	10.75	10.74	10.71	10.69	10.66
	5560	112	11.19	11.16	11.14	11.14	11.13	11.10	11.03	10.96
	5580	116	10.87	10.85	10.84	10.83	10.81	10.80	10.75	10.64
	5660	132	11.28	11.26	11.24	11.23	11.20	11.18	11.16	11.12
	5680	136	11.24	11.23	11.20	11.17	11.14	11.12	11.11	11.10
	5700	140	11.22	11.19	11.17	11.16	11.12	11.08	11.00	10.98
	5745	149	11.36	11.33	11.31	11.27	11.24	11.20	11.15	11.07
	5765	153	11.20	11.19	11.16	11.15	11.12	11.09	11.02	10.95
	5785	157	11.12	11.11	11.11	11.10	11.10	11.10	11.09	11.09
	5805	161	11.65	11.64	11.63	11.61	11.61	11.60	11.56	11.42
	5825	165	11.43	11.40	11.39	11.39	11.37	11.28	11.25	11.23

IEEE 802.11n Average RF Power 40 MHz Bandwidth

Mode	Frequency	Channel	802.11n (5 GHz) Conducted Power (dBm)							
			Data Rate (Mbps)							
			MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
802.11n	5190	38	11.66	11.64	11.63	11.61	11.60	11.59	11.50	11.47
	5230	46	11.77	11.75	11.72	11.68	11.65	11.63	11.60	11.53
	5270	54	11.42	11.40	11.38	11.36	11.34	11.33	11.29	11.24
	5310	62	11.57	11.54	11.52	11.51	11.45	11.42	11.40	11.38
	5510	102	11.17	11.16	11.14	11.09	11.05	10.97	10.85	10.72
	5550	110	11.47	11.45	11.42	11.40	11.38	11.37	11.30	11.25
	5670	134	11.56	11.52	11.49	11.47	11.43	11.41	11.37	11.12
	5755	151	11.29	11.28	11.26	11.23	11.21	11.19	11.04	10.99
	5795	159	11.53	11.51	11.50	11.46	11.46	11.40	11.22	11.10

Bluetooth

Channel	Frequency (MHz)	GFSK (dBm)	PI/4DQPSK (dBm)	8DPSK (dBm)	LE (dBm)
Low	2402	7.00	5.55	5.57	N/A
Middle	2441	8.02	6.58	6.60	N/A
High	2480	8.49	7.01	7.02	N/A

20 SAR Test Exclusions Applied

Per FCC KDB 447498 D01v05r02, the SAR exclusion threshold for distances < 50 ㎜ is defined by the following equation:

$$\frac{\text{Max Power of Channel (mW)}}{\text{Test Separation Distance (mm)}} * \sqrt{\text{Frequency(GHz)}} \le 3.0$$

Mode	Frequency	Maximum Allowed Power	Separation Distance	≤ 3.0
	[MHz]	[mW]	[mm]	
Bluetooth	2480	8	5	2.52
			10	1.26

Based on the maximum tune-up tolerance limit of Bluetooth the antenna to use separation distance, Bluetooth SAR was not required [(8/5)*√2.480] = 2.52 < 3.0.

21 SAR Data Summary

21.1 Head SAR Data

GSM850 Head SAR

Head	EUT Position	Mode	Battery	Traffic Channel		Power(dBm)		1-g SAR (W/kg)		Plot No
				Frequency (MHz)	Channel	Measured Power	Tune-Up Limit	Measured SAR	Scaled SAR	
Right	Touch	GSM Voice	Standard	836.6	190	31.93	33.20	0.651	0.872	-
	Touch		Standard	824.2	128	31.44	33.20	0.476	0.714	-
	Touch		Standard	848.8	251	31.85	33.20	0.559	0.763	-
	Tilt		Standard	836.6	190	31.93	33.20	0.365	0.489	-
Left	Touch		Standard	836.6	190	31.93	33.20	0.574	0.769	-
	Tilt		Standard	836.6	190	31.93	33.20	0.347	0.465	-
Right	Touch	GPRS 4Tx	Standard	836.6	190	28.05	28.20	0.920	0.952	-
	Touch		Standard	824.2	128	27.51	28.20	0.793	0.930	-
	Touch		Standard	848.8	251	27.95	28.20	0.889	0.942	-
	Tilt		Standard	836.6	190	28.05	28.20	0.557	0.577	-
Left	Touch		Standard	836.6	190	28.05	28.20	0.783	0.811	-
	Touch		Standard	824.2	128	27.51	28.20	0.711	0.833	-
	Touch		Standard	848.8	251	27.95	28.20	0.825	0.874	-
	Tilt		Standard	836.6	190	28.05	28.20	0.437	0.452	-
Right	Touch		Standard	836.6	190	28.05	28.20	0.963	**0.997**	15
ANSI / IEEE C95.1 1992 – Safety Limit Spatial Peak Uncontrolled Exposure / General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram				

GSM1900 Head SAR

Head	EUT Position	Mode	Battery	Traffic Channel		Power(dBm)		1-g SAR (W/kg)		Plot No
				Frequency (MHz)	Channel	Measured Power	Tune-Up Limit	Measured SAR	Scaled SAR	
Right	Touch	GSM Voice	Standard	1880.0	661	28.90	30.20	0.099	0.134	-
	Tilt		Standard	1880.0	661	28.90	30.20	0.074	0.100	-
Left	Touch		Standard	1880.0	661	28.90	30.20	0.193	0.260	-
	Tilt		Standard	1880.0	661	28.90	30.20	0.088	0.119	-
Right	Touch	GPRS 2Tx	Standard	1880.0	661	26.06	27.20	0.106	0.138	-
	Tilt		Standard	1880.0	661	26.06	27.20	0.077	0.100	-
Left	Touch		Standard	1880.0	661	26.06	27.20	0.202	**0.263**	16
	Tilt		Standard	1880.0	661	26.06	27.20	0.090	0.117	-
ANSI / IEEE C95.1 1992 – Safety Limit Spatial Peak Uncontrolled Exposure / General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram				

WCDMA Band V Head SAR

Head	EUT Position	Mode	Battery	Traffic Channel		Power(dBm)		1-g SAR (W/kg)		Plot No
				Frequency (MHz)	Channel	Measured Power	Tune-Up Limit	Measured SAR	Scaled SAR	
Right	Touch	RMC	Standard	836.6	4183	23.05	23.70	0.768	**0.892**	17
	Touch		Standard	826.4	4132	23.00	23.70	0.681	0.800	-
	Touch		Standard	846.6	4233	22.87	23.70	0.715	0.866	-
	Tilt		Standard	836.6	4183	23.05	23.70	0.475	0.552	-
Left	Touch		Standard	836.6	4183	23.05	23.70	0.684	0.794	-
	Tilt		Standard	836.6	4183	23.05	23.70	0.438	0.509	-
ANSI / IEEE C95.1 1992 – Safety Limit Spatial Peak Uncontrolled Exposure / General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram				

WLAN 2.4 GHz Head SAR

Head	EUT Position	Mode	Battery	Traffic Channel		Power(dBm)		1-g SAR (W/kg)		Plot No
				Frequency (㎒)	Channel	Measured Power	Tune-Up Limit	Measured SAR	Scaled SAR	
Right	Touch	802.11b	Standard	2462.0	11	15.51	16.00	0.465	0.521	-
	Tilt		Standard	2462.0	11	15.51	16.00	0.403	0.451	-
Left	Touch		Standard	2462.0	11	15.51	16.00	0.607	**0.679**	18
	Tilt		Standard	2462.0	11	15.51	16.00	0.378	0.423	-
ANSI / IEEE C95.1 1992 – Safety Limit Spatial Peak Uncontrolled Exposure / General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram				

WLAN 5.2 GHz Head SAR

Head	EUT Position	Mode	Battery	Traffic Channel		Power(dBm)		1-g SAR (W/kg)		Plot No
				Frequency (㎒)	Channel	Measured Power	Tune-Up Limit	Measured SAR	Scaled SAR	
Right	Touch	802.11a	Standard	5220.0	44	12.98	13.00	0.071	0.071	-
	Tilt		Standard	5220.0	44	12.98	13.00	0.058	0.058	-
Left	Touch		Standard	5220.0	44	12.98	13.00	0.164	**0.165**	19
	Tilt		Standard	5220.0	44	12.98	13.00	0.112	0.113	-
ANSI / IEEE C95.1 1992 – Safety Limit Spatial Peak Uncontrolled Exposure / General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram				

WLAN 5.3 GHz Head SAR

Head	EUT Position	Mode	Battery	Traffic Channel		Power(dBm)		1-g SAR (W/kg)		Plot No
				Frequency (㎒)	Channel	Measured Power	Tune-Up Limit	Measured SAR	Scaled SAR	
Right	Touch	802.11a	Standard	5280.0	56	12.73	13.00	0.082	0.087	-
	Tilt		Standard	5280.0	56	12.73	13.00	0.073	0.078	-
Left	Touch		Standard	5280.0	56	12.73	13.00	0.181	**0.193**	20
	Tilt		Standard	5280.0	56	12.73	13.00	0.125	0.133	-
ANSI / IEEE C95.1 1992 – Safety Limit Spatial Peak Uncontrolled Exposure / General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram				

WLAN 5.6 GHz Head SAR

Head	EUT Position	Mode	Battery	Traffic Channel		Power(dBm)		1-g SAR (W/kg)		Plot No
				Frequency (㎒)	Channel	Measured Power	Tune-Up Limit	Measured SAR	Scaled SAR	
Right	Touch	802.11a	Standard	5660.0	132	12.23	13.00	0.088	0.105	-
	Tilt		Standard	5660.0	132	12.23	13.00	0.097	0.116	-
Left	Touch		Standard	5660.0	132	12.23	13.00	0.125	**0.149**	21
	Tilt		Standard	5660.0	132	12.23	13.00	0.091	0.109	-
ANSI / IEEE C95.1 1992 – Safety Limit Spatial Peak Uncontrolled Exposure / General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram				

WLAN 5.8 GHz Head SAR

Head	EUT Position	Mode	Battery	Traffic Channel		Power(dBm)		1-g SAR (W/kg)		Plot No
				Frequency (㎒)	Channel	Measured Power	Tune-Up Limit	Measured SAR	Scaled SAR	
Right	Touch	802.11a	Standard	5805.0	161	12.56	13.00	0.077	0.085	-
	Tilt		Standard	5805.0	161	12.56	13.00	0.075	0.083	-
Left	Touch		Standard	5805.0	161	12.56	13.00	0.086	**0.095**	22
	Tilt		Standard	5805.0	161	12.56	13.00	0.062	0.069	-
ANSI / IEEE C95.1 1992 – Safety Limit Spatial Peak Uncontrolled Exposure / General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram				

21.2 Body-Worn SAR Data

GSM/WCDMA Band Body-Worn SAR

EUT Position	Mode	Battery	Traffic Channel		Separation Distance (mm)	Power(dBm)		1-g SAR (W/kg)		Plot No
			Frequency (MHz)	Channel		Measured Power	Tune-Up Limit	Measured SAR	Scaled SAR	
Rear	GSM850	Standard	836.6	190	10	31.93	33.20	0.632	**0.783**	23
Rear	GSM1900	Standard	1880.0	661	10	28.90	30.20	0.507	**0.625**	24
Rear	WCDMA 850	Standard	836.6	4183	10	23.05	23.70	0.844	0.980	-
Rear	WCDMA 850	Standard	826.4	4132	10	23.00	23.70	0.826	0.970	-
Rear	WCDMA 850	Standard	846.6	4233	10	22.87	23.70	0.843	**1.021**	25
Rear	WCDMA 850	Standard	836.6	4183	10	23.05	23.70	0.861	1.000	-
ANSI / IEEE C95.1 1992 – Safety Limit Spatial Peak Uncontrolled Exposure / General Population					Body 1.6 W/kg (mW/g) Averaged over 1 gram					

WLAN Body-Worn SAR

EUT Position	Mode	Battery	Traffic Channel		Separation Distance (mm)	Power(dBm)		1-g SAR (W/kg)		Plot No
			Frequency (MHz)	Channel		Measured Power	Tune-Up Limit	Measured SAR	Scaled SAR	
Rear	802.11b 2.4 GHz	Standard	2462.0	11	10	15.51	16.00	0.151	**0.169**	26
Rear	802.11a 5.8 GHz	Standard	5805.0	161	10	12.56	13.00	0.080	**0.089**	27
Rear	802.11a 5.2 GHz	Standard	5220.0	44	10	12.98	13.00	0.165	**0.166**	28
Rear	802.11a 5.3 GHz	Standard	5280.0	56	10	12.73	13.00	0.195	**0.208**	29
Rear	802.11a 5.6 GHz	Standard	5660.0	132	10	12.23	13.00	0.143	**0.171**	30
ANSI / IEEE C95.1 1992 – Safety Limit Spatial Peak Uncontrolled Exposure / General Population					Body 1.6 W/kg (mW/g) Averaged over 1 gram					

21.3 Hotspot SAR Data

GSM850 Hotspot SAR

EUT Position	Mode	Battery	Traffic Channel		Separation Distance (mm)	Power(dBm)		1-g SAR (W/kg)		Plot No
			Frequency (MHz)	Channel		Measured Power	Tune-Up Limit	Measured SAR	Scaled SAR	
Front	GPRS 4Tx	Standard	836.6	190	10	28.05	28.20	1.08	1.118	-
Front		Standard	824.2	128	10	27.51	28.20	0.950	1.114	-
Front		Standard	848.8	251	10	27.95	28.20	0.967	1.024	-
Rear		Standard	836.6	190	10	28.05	28.20	1.150	1.190	-
Rear		Standard	824.2	128	10	27.51	28.20	1.100	**1.289**	31
Rear		Standard	848.8	251	10	27.95	28.20	1.070	1.133	-
Right Edge		Standard	836.6	190	10	28.05	28.20	0.839	0.868	-
Right Edge		Standard	824.2	128	10	27.51	28.20	0.808	0.947	-
Right Edge		Standard	848.8	251	10	27.95	28.20	0.790	0.837	-
Left Edge		Standard	836.6	190	10	28.05	28.20	0.821	0.850	-
Left Edge		Standard	824.2	128	10	27.51	28.20	0.832	0.975	-
Left Edge		Standard	848.8	251	10	27.95	28.20	0.787	0.834	-
Bottom		Standard	836.6	190	10	28.05	28.20	0.239	0.247	-
Rear		Standard	836.6	190	10	28.05	28.20	1.110	1.149	-
ANSI / IEEE C95.1 1992 – Safety Limit Spatial Peak Uncontrolled Exposure / General Population					Body 1.6 W/kg (mW/g) Averaged over 1 gram					

GSM1900 Hotspot SAR

EUT Position	Mode	Battery	Traffic Channel		Separation Distance (mm)	Power(dBm)		1-g SAR (W/kg)		Plot No
			Frequency (MHz)	Channel		Measured Power	Tune-Up Limit	Measured SAR	Scaled SAR	
Front	GPRS 2Tx	Standard	1880.0	661	10	26.06	27.20	0.292	0.380	-
Rear		Standard	1880.0	661	10	26.06	27.20	0.678	0.882	-
Rear		Standard	1850.2	512	10	26.04	27.20	0.609	0.795	-
Rear		Standard	1909.8	810	10	26.05	27.20	0.814	1.061	-
Right Edge		Standard	1880.0	661	10	26.06	27.20	0.156	0.203	-
Left Edge		Standard	1880.0	661	10	26.06	27.20	0.071	0.092	-
Bottom		Standard	1880.0	661	10	26.06	27.20	0.876	1.139	-
Bottom		Standard	1850.2	512	10	26.04	27.20	0.753	0.984	-
Bottom		Standard	1909.8	810	10	26.05	27.20	0.948	1.235	-
Bottom		Standard	1909.8	810	10	26.05	27.20	0.967	**1.260**	32
ANSI / IEEE C95.1 1992 – Safety Limit Spatial Peak Uncontrolled Exposure / General Population					Body 1.6 W/kg (mW/g) Averaged over 1 gram					

WCDMA Band V Hotspot SAR

EUT Position	Mode	Battery	Traffic Channel		Separation Distance (mm)	Power(dBm)		1-g SAR (W/kg)		Plot No
			Frequency (MHz)	Channel		Measured Power	Tune-Up Limit	Measured SAR	Scaled SAR	
Front	RMC	Standard	836.6	4183	10	23.05	23.70	0.809	0.940	-
Front		Standard	826.4	4132	10	23.00	23.70	0.782	0.919	-
Front		Standard	846.6	4233	10	22.87	23.70	0.784	0.949	-
Rear		Standard	836.6	4183	10	23.05	23.70	0.844	0.980	-
Rear		Standard	826.4	4132	10	23.00	23.70	0.826	0.970	-
Rear		Standard	846.6	4233	10	22.87	23.70	0.843	**1.021**	25
Right Edge		Standard	836.6	4183	10	23.05	23.70	0.695	0.807	-
Right Edge		Standard	826.4	4132	10	23.00	23.70	0.629	0.739	-
Right Edge		Standard	846.6	4233	10	22.87	23.70	0.713	0.863	-
Left Edge		Standard	836.6	4183	10	23.05	23.70	0.721	0.837	-
Left Edge		Standard	826.4	4132	10	23.00	23.70	0.691	0.812	-
Left Edge		Standard	846.6	4233	10	22.87	23.70	0.702	0.850	-
Bottom		Standard	836.6	4183	10	23.05	23.70	0.241	0.280	-
Rear		Standard	836.6	4183	10	23.05	23.70	0.861	1.000	
ANSI / IEEE C95.1 1992 – Safety Limit Spatial Peak Uncontrolled Exposure / General Population					Body 1.6 W/kg (mW/g) Averaged over 1 gram					

WLAN 2.4 GHz Hotspot SAR

EUT Position	Mode	Battery	Traffic Channel		Separation Distance (mm)	Power(dBm)		1-g SAR (W/kg)		Plot No
			Frequency (MHz)	Channel		Measured Power	Tune-Up Limit	Measured SAR	Scaled SAR	
Front	802.11b 2.4 GHz	Standard	2462.0	11	10	15.51	16.00	0.131	0.147	-
Rear	802.11b 2.4 GHz	Standard	2462.0	11	10	15.51	16.00	0.151	**0.169**	26
Right Edge	802.11b 2.4 GHz	Standard	2462.0	11	10	15.51	16.00	0.079	0.088	-
Top	802.11b 2.4 GHz	Standard	2462.0	11	10	15.51	16.00	0.135	0.151	-
ANSI / IEEE C95.1 1992 – Safety Limit Spatial Peak Uncontrolled Exposure / General Population					Body 1.6 W/kg (mW/g) Averaged over 1 gram					

WLAN 5.8 GHz Hotspot SAR

EUT Position	Mode	Battery	Traffic Channel		Separation Distance (mm)	Power(dBm)		1-g SAR (W/kg)		Plot No
			Frequency (MHz)	Channel		Measured Power	Tune-Up Limit	Measured SAR	Scaled SAR	
Front	802.11a 5.8 GHz	Standard	5805.0	161	10	12.56	13.00	0.024	0.027	-
Rear	802.11a 5.8 GHz	Standard	5805.0	161	10	12.56	13.00	0.080	**0.089**	27
Right Edge	802.11a 5.8 GHz	Standard	5805.0	161	10	12.56	13.00	0.043	0.048	-
Top	802.11a 5.8 GHz	Standard	5805.0	161	10	12.56	13.00	0.047	0.052	-
ANSI / IEEE C95.1 1992 – Safety Limit Spatial Peak Uncontrolled Exposure / General Population					Body 1.6 W/kg (mW/g) Averaged over 1 gram					

General Notes

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2003, FCC KDB Publication 865664 D01v02r03 and FCC KDB Publication 447498 D01v05r02.
2. All modes of operation were investigated, and worst-case results are reported.
3. The EUT is tested 2nd hot-spot peak, if it is less than 2 dB below the highest peak.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v05r02.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 10 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB Publication 648474 D04v01r02, body worn SAR was evaluated without a headset connected to the device. Since the standalone reported SAR was ≤1.2 W/kg, no additional body worn SAR evaluations using a headset cable were required.
8. Per FCC KDB Publication 865664 D01v01r03, variability SAR tests were performed when the measured SAR results for a frequency band were greater than 0.8 W/kg. Please see section 24 for variability analysis.

GSM Notes

1. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.
2. Justification for reduced test configurations per KDB Publication 941225 D01v03: The source-based time-averaged output power was evaluated for all multi-slot operations. The multi-slot configuration with the highest frame averaged output power was evaluated for SAR.
3. Per FCC KDB Publication 447498 D01v05r02, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > $^1/_2$ dB, instead of the middle channel, the highest output power channel must be used.

WCDMA Notes

1. WCDMA mode in Body SAR was tested under RMC 12.2 kbps with HSPA inactive per KDB Publication 941225 D01v03. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.
2. Per FCC KDB Publication 447498 D01v05r02, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > $^1/_2$ dB, instead of the middle channel, the highest output power channel must be used

WLAN Notes

1. For 2.4 GHz, justification for reduced test configuration for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012 FCC/TCB Meeting Notes for 2.4 GHz WIFI operations: Highest average RF output power channel for the lowest data rate were selected for SAR evaluation in 802.11b. Other IEEE 802.11 modes (including 802.11g/n) were not investigated since the average output powers were not greater than 0.25 ㏈ than that of the corresponding channel in the lowest data rate IEEE 802.11b modes.
2. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012 FCC/TCB Meeting Notes for 5 GHz WIFI operations: Highest average RF output power channel for the lowest data rate were selected for SAR evaluation in 802.11a. Other IEEE 802.11 modes (including 802.11n 20MHz and 40MHz bandwidths) were not investigated since the average output powers over all channels and data rates were not more than 0.25 ㏈ higher than the tested channel in the lowest data rate of IEEE 802.11a mode.
3. Since the maximum extrapolated peak SAR of the zoom scan for the maximum output channel was ≤ 1.6 W/kg and the reported 1g averaged SAR was < 0.8 W/kg, SAR testing on other default channels was not required.
4. WLAN transmission was verified using a spectrum analyzer.

22 SAR Measurement Variability

22.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01r03, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR Measurement Variability was assessed using the following procedures for each frequency band:

1. When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
2. A second repeated measurement was preformed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
3. A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.
4. **Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg**

EUT Position	Mode	Traffic Channel		Separation Distance (mm)	Measured 1g SAR (W/kg)	1st Repeated 1g SAR(W/kg)	Ratio	2st Repeated 1g SAR(W/kg)	Ratio	3st Repeated 1g SAR(W/kg)	Ratio
		Frequency (MHz)	Channel								
Right Touch	GPRS850 4TX	836.6	190	0	0.920	0.963	0.96	N/A	N/A	N/A	N/A
Rear	GPRS850 4TX	836.6	190	10	1.150	1.110	1.04	N/A	N/A	N/A	N/A
Rear	GPRS1900 2TX	1909.8	810	10	0.948	0.967	0.98	N/A	N/A	N/A	N/A
Rear	RMC	836.6	4183	10	0.844	0.861	0.98	N/A	N/A	N/A	N/A

22.2 Measurement Uncertainty

The measured SAR was < 1.5 W/kg for all frequency bands. Therefore, per KDB Publication 865664 D01v01r03, the extended measurement uncertainty analysis per IEEE 1528-2003 was not required.

23 FCC Multi-TX and Antenna SAR considerations

23.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D01v05r02 are applicable to handsets with built-in unlicensed transmitters such as 802.11a/b/g/n/ac and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

23.2 Simultaneous Transmission Procedures

This device contains transmitters that may operate simultaneously. Therefore simultaneous transmission analysis is required. Per FCC KDB 447498 D01v05r02 IV.C.1iii, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤ 1.6 W/kg. When standalone SAR is not required to be measured per FCC KDB 447498 D01v05r02 4.3.2.2), the following equation must be used to estimate the standalone 1g SAR for simultaneous transmission involving that transmitter.

$$\text{Estimated SAR} = \frac{\sqrt{f(GHz)}}{7.5} * \frac{\text{(Max Power of channel, mW)}}{\text{Min. Separation Distance, mm}}$$

Mode	Frequency	Maximum Allowed Power	Separation Distance	Estimated SAR
	[MHz]	[mW]	[mm]	[W/kg]
Bluetooth	2480	8	5	0.336
			10	0.168

22.3 Simultaneous Transmission Scenarios

No	Capable Transmit Configuration	Head	Body-Worn	Wireless Router
1	GSM 850 Voice + WLAN 2.4 GHz	Yes	Yes	N/A
2	GSM 1900 Voice + WLAN 2.4 GHz	Yes	Yes	N/A
3	GSM 850 Voice + WLAN 5 GHz	Yes	Yes	N/A
4	GSM 1900 Voice + WLAN 5 GHz	Yes	Yes	N/A
5	GSM 850 Voice + Bluetooth	Yes	Yes	N/A
6	GSM 1900 Voice + Bluetooth	Yes	Yes	N/A
7	GPRS/EDGE 850 + WLAN 2.4 GHz	Yes	Yes	Yes
8	GPRS/EDGE 1900 + WLAN 2.4 GHz	Yes	Yes	Yes
9	GPRS/EDGE 850 + WLAN 5 GHz	Yes	Yes	Yes
10	GPRS/EDGE 1900 + WLAN 5 GHz	Yes	Yes	Yes
11	GPRS/EDGE 850 + Bluetooth	Yes	Yes	N/A
12	GPRS/EDGE 1900 + Bluetooth	Yes	Yes	N/A
13	WCDMA 850 + WLAN 2.4 GHz	Yes	Yes	Yes
14	WCDMA 850 + WLAN 5 GHz	Yes	Yes	Yes
15	WCDMA 850 + Bluetooth	Yes	Yes	N/A

Notes

1. GSM/GPRS, WCDMA share the same antenna and cannot transmit simultaneously.

23.4 Head SAR Simultaneous Transmission Analysis

Simultaneous Transmission Summation Scenario with 2.4 GHz WLAN (Head to Ear)

Simultaneous TX	Configuration	GSM850 Band Scaled SAR(W/kg)	2.4 GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
Head	Right Touch	0.872	0.521	1.393
	Right Tilt	0.489	0.451	0.940
	Left Touch	0.769	0.679	1.448
	Left Tilt	0.465	0.423	0.888
	Configuration	GPRS850 Band Scaled SAR(W/kg)	2.4 GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
	Right Touch	0.997	0.521	1.518
	Right Tilt	0.577	0.451	1.028
	Left Touch	0.874	0.679	1.553
	Left Tilt	0.452	0.423	0.875
	Configuration	GSM1900 Band Scaled SAR(W/kg)	2.4 GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
	Right Touch	0.134	0.521	0.655
	Right Tilt	0.100	0.451	0.551
	Left Touch	0.260	0.679	0.939
	Left Tilt	0.119	0.423	0.542
	Configuration	GPRS1900 Band Scaled SAR(W/kg)	2.4 GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
	Right Touch	0.138	0.521	0.659
	Right Tilt	0.100	0.451	0.551
	Left Touch	0.263	0.679	0.942
	Left Tilt	0.117	0.423	0.540
	configuration	WCDMA Band V Scaled SAR(W/kg)	2.4 GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
	Right Touch	0.892	0.521	1.413
	Right Tilt	0.552	0.451	1.003
	Left Touch	0.794	0.679	1.473
	Left Tilt	0.509	0.423	0.932

Simultaneous Transmission Summation Scenario with 5 GHz WLAN (Head to Ear)

Simultaneous TX	Configuration	GSM850 Band Scaled SAR(W/kg)	5 GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
Head	Right Touch	0.872	0.105	0.977
	Right Tilt	0.489	0.116	0.605
	Left Touch	0.769	0.193	0.962
	Left Tilt	0.465	0.133	0.598
	Configuration	GPRS850 Band Scaled SAR(W/kg)	5 GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
	Right Touch	0.997	0.105	1.102
	Right Tilt	0.577	0.116	0.693
	Left Touch	0.874	0.193	1.067
	Left Tilt	0.452	0.133	0.585
	Configuration	GSM1900 Band Scaled SAR(W/kg)	5 GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
	Right Touch	0.134	0.105	0.239
	Right Tilt	0.100	0.116	0.216
	Left Touch	0.260	0.193	0.453
	Left Tilt	0.119	0.133	0.252
	Configuration	GPRS1900 Band Scaled SAR(W/kg)	5 GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
	Right Touch	0.138	0.105	0.243
	Right Tilt	0.100	0.116	0.216
	Left Touch	0.263	0.193	0.456
	Left Tilt	0.117	0.133	0.250
	configuration	WCDMA Band V Scaled SAR(W/kg)	5 GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
	Right Touch	0.892	0.105	0.997
	Right Tilt	0.552	0.116	0.668
	Left Touch	0.794	0.193	0.987
	Left Tilt	0.509	0.133	0.642

Simultaneous Transmission Summation Scenario with Bluetooth (Head to Ear)

Simultaneous TX	Configuration	GSM850 Band Scaled SAR(W/kg)	Bluetooth SAR (W/kg)	∑SAR (W/kg)
Head	Right Touch	0.872	0.336	1.208
	Right Tilt	0.489	0.336	0.825
	Left Touch	0.769	0.336	1.105
	Left Tilt	0.465	0.336	0.801
	Configuration	GPRS850 Band Scaled SAR(W/kg)	Bluetooth SAR (W/kg)	∑SAR (W/kg)
	Right Touch	0.997	0.336	1.333
	Right Tilt	0.577	0.336	0.913
	Left Touch	0.874	0.336	1.210
	Left Tilt	0.452	0.336	0.788
	Configuration	GSM1900 Band Scaled SAR(W/kg)	Bluetooth SAR (W/kg)	∑SAR (W/kg)
	Right Touch	0.134	0.336	0.470
	Right Tilt	0.100	0.336	0.436
	Left Touch	0.260	0.336	0.596
	Left Tilt	0.119	0.336	0.455
	Configuration	GPRS1900 Band Scaled SAR(W/kg)	Bluetooth SAR (W/kg)	∑SAR (W/kg)
	Right Touch	0.138	0.336	0.474
	Right Tilt	0.100	0.336	0.436
	Left Touch	0.263	0.336	0.599
	Left Tilt	0.117	0.336	0.453
	configuration	WCDMA Band V Scaled SAR(W/kg)	Bluetooth SAR (W/kg)	∑SAR (W/kg)
	Right Touch	0.892	0.336	1.228
	Right Tilt	0.552	0.336	0.888
	Left Touch	0.794	0.336	1.130
	Left Tilt	0.509	0.336	0.845

Note

Bluetooth SAR was not required to be measured pre FCC KDB 447498 D01v05r02. Estimated SAR results were used in the above table to determine simultaneous transmission SAR test exclusion.

23.5 Body-Won SAR Simultaneous Transmission Analysis

Simultaneous Transmission Summation Scenario with 2.4 GHz WLAN (Body-Worn at 10 mm)

Simultaneous TX	configuration	GSM850 Scaled SAR(W/kg)	2.4 GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
Body-Worn	Rear	0.783	0.169	0.952
	configuration	GSM1900 Scaled SAR(W/kg)	2.4 GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
	Rear	0.507	0.169	0.676
	configuration	WCDMA Band V Scaled SAR(W/kg)	2.4 GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
	Rear	1.021	0.169	1.190

Simultaneous Transmission Summation Scenario with 5 GHz WLAN (Body-Worn at 10 mm)

Simultaneous TX	configuration	GSM850 Scaled SAR(W/kg)	5 GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
Body-Worn	Rear	0.783	0.208	0.991
	configuration	GSM1900 Scaled SAR(W/kg)	5 GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
	Rear	0.507	0.208	0.715
	configuration	WCDMA Band V Scaled SAR(W/kg)	5 GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
	Rear	1.021	0.208	1.229

Simultaneous Transmission Summation Scenario with Bluetooth (Body-Worn at 10 mm)

Simultaneous TX	configuration	GSM850 Scaled SAR(W/kg)	Bluetooth SAR (W/kg)	∑SAR (W/kg)
Body-Worn	Rear	0.783	0.168	0.951
	configuration	GSM1900 Scaled SAR(W/kg)	Bluetooth SAR (W/kg)	∑SAR (W/kg)
	Rear	0.507	0.168	0.675
	configuration	WCDMA Band V Scaled SAR(W/kg)	Bluetooth SAR (W/kg)	∑SAR (W/kg)
	Rear	1.021	0.168	1.189

Note

Bluetooth SAR was not required to be measured pre FCC KDB 447498 D01v05r02. Estimated SAR results were used in the above table to determine simultaneous transmission SAR test exclusion.

23.6 Hotspot SAR Simultaneous Transmission Analysis

Simultaneous Transmission Summation Scenario with 2.4 GHz WLAN (Hotspot at 10 mm)

Simultaneous TX	configuration	GPRS850 Scaled SAR(W/kg)	2.4 GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
Hotspot	Front	1.118	0.147	1.265
	Rear	1.289	0.169	1.458
	Right Edge	0.947	0.088	1.035
	Left Edge	0.975		0.975
	Top		0.151	0.151
	Bottom	0.247		0.247
	configuration	GPRS1900 Scaled SAR(W/kg)	2.4 GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
	Front	0.380	0.147	0.527
	Rear	1.061	0.169	1.230
	Right Edge	0.203	0.088	0.291
	Left Edge	0.092		0.092
	Top		0.151	0.151
	Bottom	1.260		1.260
	configuration	WCDMA Band V Scaled SAR(W/kg)	2.4 GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
	Front	0.949	0.147	1.096
	Rear	1.021	0.169	1.190
	Right Edge	0.863	0.088	0.951
	Left Edge	0.851		0.851
	Top		0.151	0.151
	Bottom	0.280		0.280

Simultaneous Transmission Summation Scenario with 5 GHz WLAN (Hotspot at 10 mm)

Simultaneous TX	configuration	GPRS850 Scaled SAR(W/kg)	5GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
Hotspot	Front	1.118	0.027	1.145
	Rear	1.289	0.089	1.378
	Right Edge	0.947	0.048	0.995
	Left Edge	0.975		0.975
	Top		0.052	0.052
	Bottom	0.247		0.247
	configuration	GPRS1900 Scaled SAR(W/kg)	5GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
	Front	0.380	0.027	0.407
	Rear	1.061	0.089	1.150
	Right Edge	0.203	0.048	0.251
	Left Edge	0.092		0.092
	Top		0.052	0.052
	Bottom	1.260		1.260
	configuration	WCDMA Band V Scaled SAR(W/kg)	5GHz WLAN Scaled SAR (W/kg)	∑SAR (W/kg)
	Front	0.949	0.027	0.976
	Rear	1.021	0.089	1.110
	Right Edge	0.863	0.048	0.911
	Left Edge	0.851		0.851
	Top		0.052	0.052
	Bottom	0.280		0.280

Notes.

1. The above numerical summed SAR was below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. Therefore, no volumetric SAR summation is required since the numerical sums are below the limit.
2. Hotspot Mode Per FCC KDB Publication 941225 D06v02, the devices edges with antennas more than 2.5 ㎝ from edge are not required to be evaluated for SAR (“-”).

Appendixes List

Appendix A	A.1 Verification Test Plots for 835 MHz (Plots No 1,2) A.2 Verification Test Plots for 1900 MHz (Plots No 3,4) A.3 Verification Test Plots for 2450 MHz (Plots No 5,6) A.4 Verification Test Plots for 5200 MHz (Plots No 7,8) A.5 Verification Test Plots for 5300 MHz (Plots No 9,10) A.6 Verification Test Plots for 5600 MHz (Plots No 11,12) A.7 Verification Test Plots for 5800 MHz (Plots No 13,14) A.8 SAR Test Plots for GSM850 Band (Plots No 15, 23, 31) A.9 SAR Test Plots for GSM1900 Band (Plots No 16, 24, 32) A.10 SAR Test Plots for WCDMA850 Band (Plots No 17, 25) A.11 SAR Test Plots for WLAN 2.4 GHz (Plots No 18, 26) A.12 SAR Test Plots for WLAN 5.2 GHz (Plots No 19, 28) A.13 SAR Test Plots for WLAN 5.3 GHz (Plots No 20, 29) A.14 SAR Test Plots for WLAN 5.6 GHz (Plots No 21, 30) A.15 SAR Test Plots for WLAN 5.8 GHz (Plots No 22, 27)
Appendix B	B.1 Uncertainty Analysis
Appendix C	C.1 Calibration certificate for Probe C.2 Calibration certificate for DAE C.3 Calibration certificate for Dipole

Appendix A.1 Verification Test Plots for 835 MHz_Head

Date: 2014-09-26

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 835MHz Head Verification.da53:0

Input Power : 100 mW

Ambient Temp : 23.3℃ Tissue Temp : 21.8 ℃

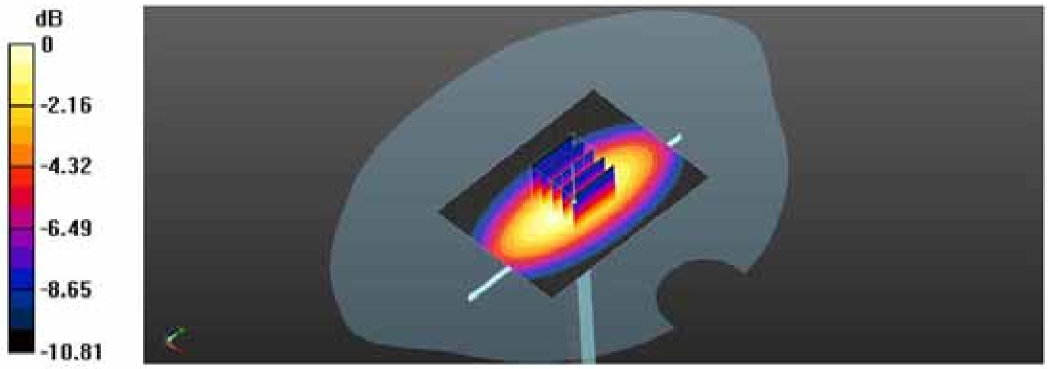
DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN:490

Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.894 S/m; ε_r = 41.022; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(10.24, 10.24, 10.24); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM Phantom TP-1821; Type: QD000P40CD; Serial: TP:1821
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Verification/835MHz Head Verification/Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.15 W/kg

Verification/835MHz Head Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 35.422 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.37 W/kg
SAR(1 g) = 0.917 W/kg; SAR(10 g) = 0.600 W/kg
Maximum value of SAR (measured) = 1.16 W/kg



0 dB = 1.16 W/kg = 0.64 dBW/kg

Appendix A.1 Verification Test Plots for 835 MHz_Body

Date: 2014-09-26

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 835MHz Body Verification.da53:0

Input Power : 100 mW

Ambient Temp : 23.3℃ Tissue Temp : 21.7 ℃

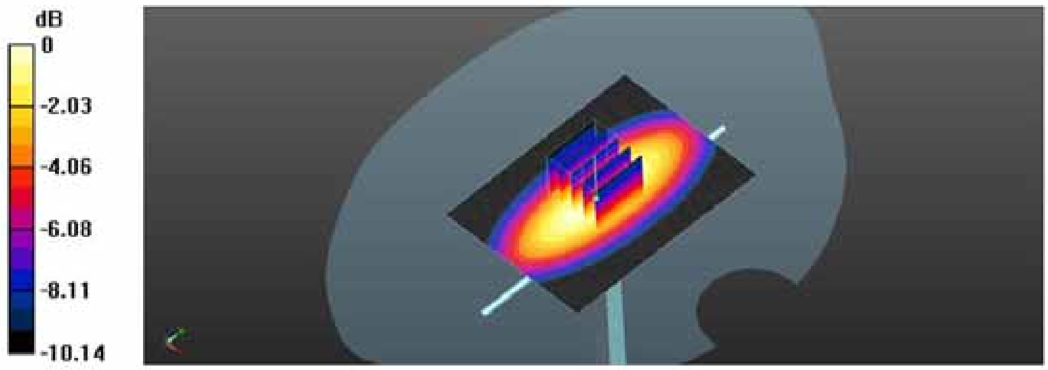
DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN:490

Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.95 S/m; ε_r = 55.85; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(10.26, 10.26, 10.26); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM phantom TP-1843; Type: QD000P40CD; Serial: TP:1843
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Verification/835MHz Body Verification/Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.17 W/kg

Verification/835MHz Body Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 35.886 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.35 W/kg
SAR(1 g) = 0.936 W/kg; SAR(10 g) = 0.624 W/kg
Maximum value of SAR (measured) = 1.16 W/kg



0 dB = 1.16 W/kg = 0.64 dBW/kg

Appendix A.2 Verification Test Plots for 1900 MHz_Head

Date: 2014-10-23

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 1900MHz Head Verification.da53:0

Input Power : 100 mW

Ambient Temp : 23.5℃ Tissue Temp : 22.1 ℃

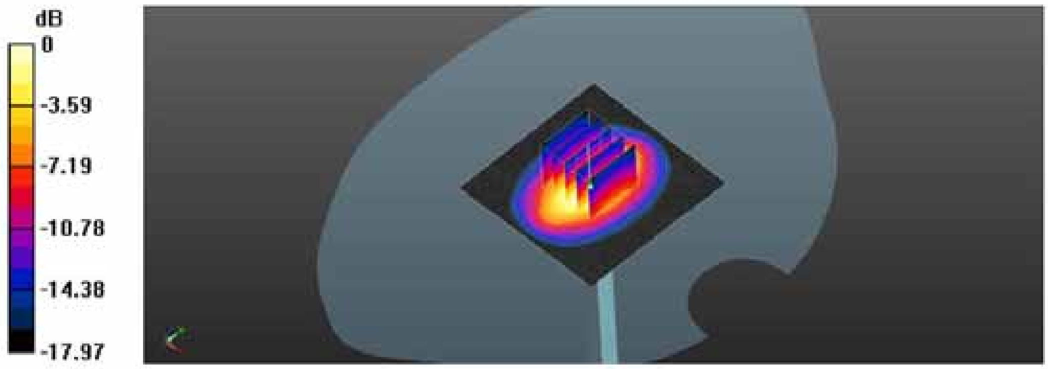
DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 - SN:5d033

Communication System: UID 0, CW (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.407 S/m; ε_r = 39.695; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(8.45, 8.45, 8.45); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM Phantom TP-1821; Type: QD000P40CD; Serial: TP:1821
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Verification/1900MHz Head Verification/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 6.13 W/kg

Verification/1900MHz Head Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 67.234 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 7.66 W/kg
SAR(1 g) = 4.18 W/kg; SAR(10 g) = 2.17 W/kg
Maximum value of SAR (measured) = 6.03 W/kg



0 dB = 6.03 W/kg = 7.80 dBW/kg

Appendix A.2 Verification Test Plots for 1900 MHz_Body

Date: 2014-10-23

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 1900MHz Body Verification.da53:0

Input Power : 100 mW

Ambient Temp : 23.5℃ Tissue Temp : 22.0 ℃

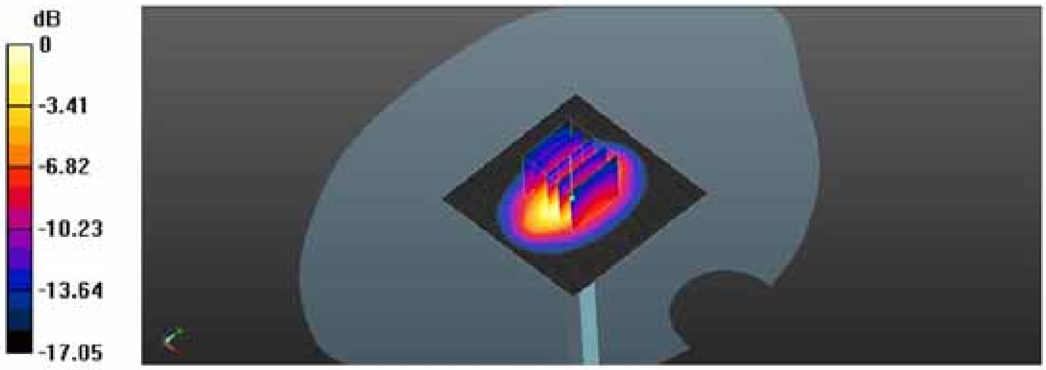
DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 - SN:5d033

Communication System: UID 0, CW (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.529 S/m; ε_r = 52.395; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(7.99, 7.99, 7.99); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM phantom TP-1843; Type: QD000P40CD; Serial: TP:1843
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Verification/1900MHz Body Verification/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 5.67 W/kg

Verification/1900MHz Body Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 62.322 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 6.87 W/kg
SAR(1 g) = 4.02 W/kg; SAR(10 g) = 2.14 W/kg
Maximum value of SAR (measured) = 5.62 W/kg



0 dB = 5.62 W/kg = 7.50 dBW/kg

Appendix A.3 Verification Test Plots for 2450 MHz_Head

Date: 2014-10-24

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 2450MHz Head Verification.da53:0

Input Power : 100 mW

Ambient Temp : 23.4℃ Tissue Temp : 22.1 ℃

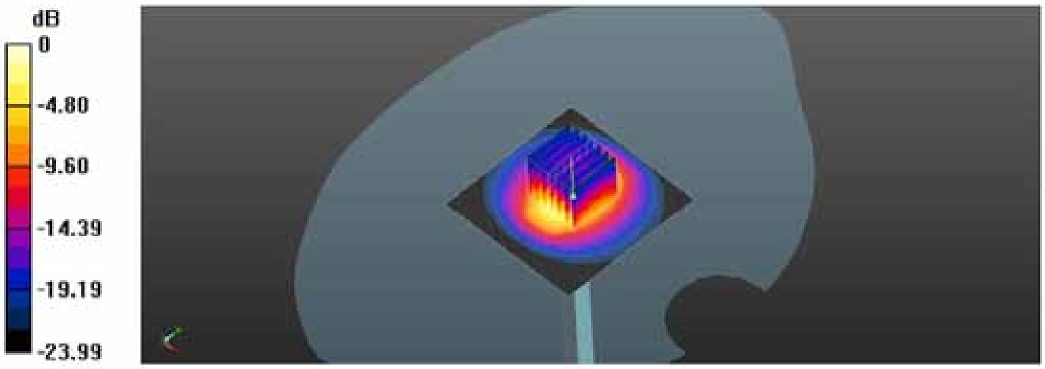
DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:734

Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.859 S/m; ε_r = 38.367; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(7.66, 7.66, 7.66); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM Phantom TP-1821; Type: QD000P40CD; Serial: TP:1821
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Verification/2450MHz Head Verification/Area Scan (71x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 8.56 W/kg

Verification/2450MHz Head Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.265 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 12.0 W/kg
SAR(1 g) = 5.5 W/kg; SAR(10 g) = 2.49 W/kg
Maximum value of SAR (measured) = 8.60 W/kg



0 dB = 8.60 W/kg = 9.34 dBW/kg

Appendix A.3 Verification Test Plots for 2450 MHz_Body

Date: 2014-10-24

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 2450MHz Body Verification.da53:0

Input Power : 100 mW

Ambient Temp : 23.4℃ Tissue Temp : 22.0 ℃

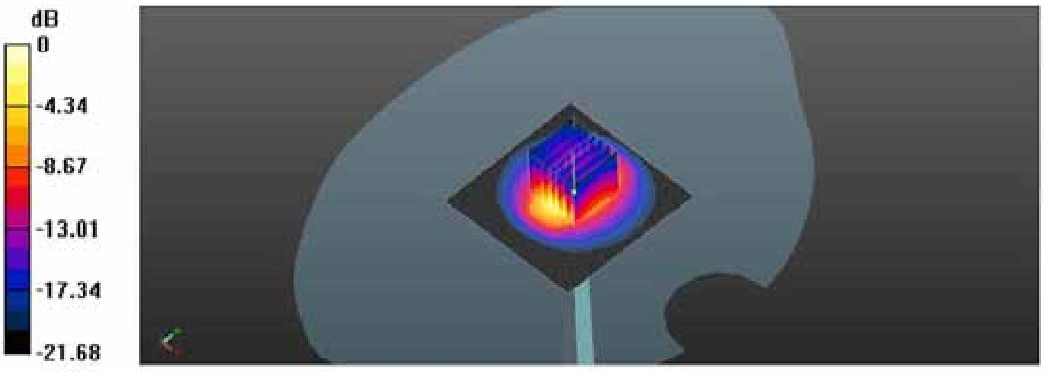
DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:734

Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.939 S/m; ε_r = 51.633; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(7.6, 7.6, 7.6); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM phantom TP-1843; Type: QD000P40CD; Serial: TP:1843
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Verification/2450MHz Body Verification/Area Scan (71x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 7.65 W/kg

Verification/2450MHz Body Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.057 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 10.4 W/kg
SAR(1 g) = 5.07 W/kg; SAR(10 g) = 2.35 W/kg
Maximum value of SAR (measured) = 7.77 W/kg



0 dB = 7.77 W/kg = 8.90 dBW/kg

Appendix A.4 Verification Test Plots for 5200 MHz_Head

Date: 2014-10-27

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 5.2GHz Head Verification.da53:0

Input Power : 100 mW

Ambient Temp : 23.0℃ Tissue Temp : 21.4 ℃

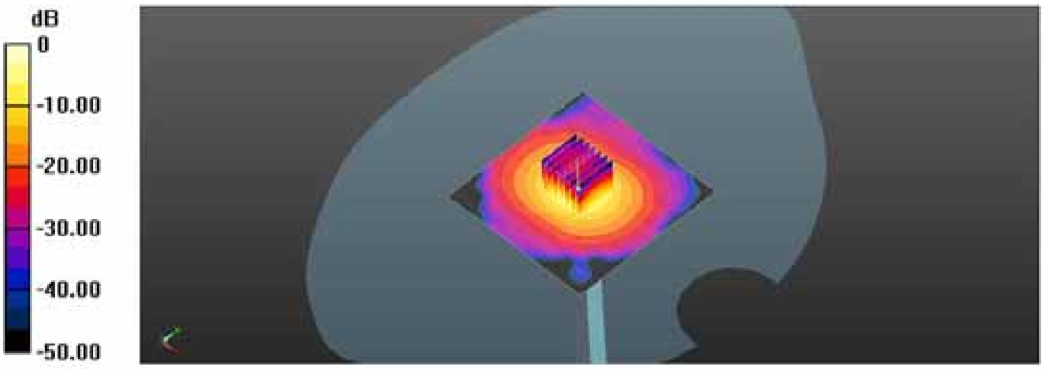
DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1130

Communication System: UID 0, CW (0); Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 4.81 S/m; ε_r = 37.118; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(5.15, 5.15, 5.15); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM Phantom TP-1821; Type: QD000P40CD; Serial: TP:1821
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Verification/5.2GHz Head Verification/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 15.8 W/kg

Verification/5.2GHz Head Verification/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 58.177 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 31.5 W/kg
SAR(1 g) = 8.05 W/kg; SAR(10 g) = 2.31 W/kg
Maximum value of SAR (measured) = 16.7 W/kg



0 dB = 16.7 W/kg = 12.23 dBW/kg

Appendix A.4 Verification Test Plots for 5200 MHz_Body

Date: 2014-10-27

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 5.2GHz Body Verification.da53:0

Input Power : 100 mW

Ambient Temp : 23.0℃ Tissue Temp : 21.8 ℃

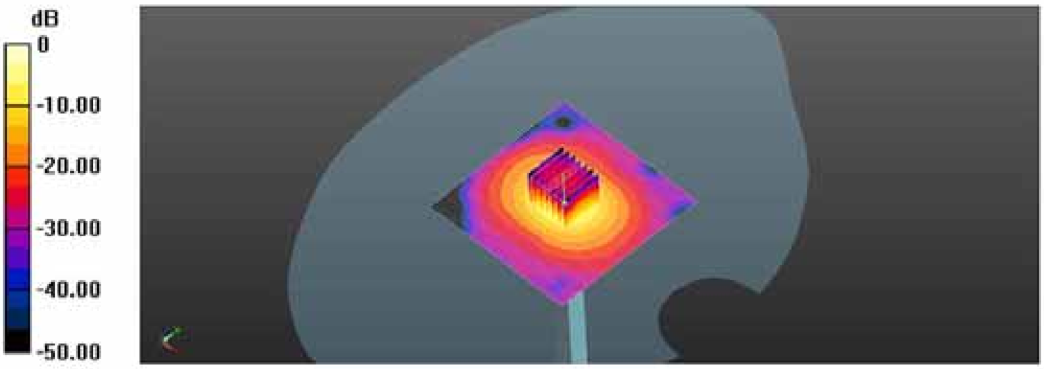
DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1130

Communication System: UID 0, CW (0); Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.148 S/m; ε_r = 50.955; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(4.83, 4.83, 4.83); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM phantom TP-1843; Type: QD000P40CD; Serial: TP:1843
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Verification/5.2GHz Body Verification/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 13.8 W/kg

Verification/5.2GHz Body Verification/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 57.791 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 27.9 W/kg
SAR(1 g) = 7.45 W/kg; SAR(10 g) = 2.15 W/kg
Maximum value of SAR (measured) = 15.1 W/kg



0 dB = 15.1 W/kg = 11.79 dBW/kg

Appendix A.5 Verification Test Plots for 5300 MHz_Head

Date: 2014-10-27

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 5.3GHz Head Verification.da53:0

Input Power : 100 mW

Ambient Temp : 23.0℃ Tissue Temp : 21.4 ℃

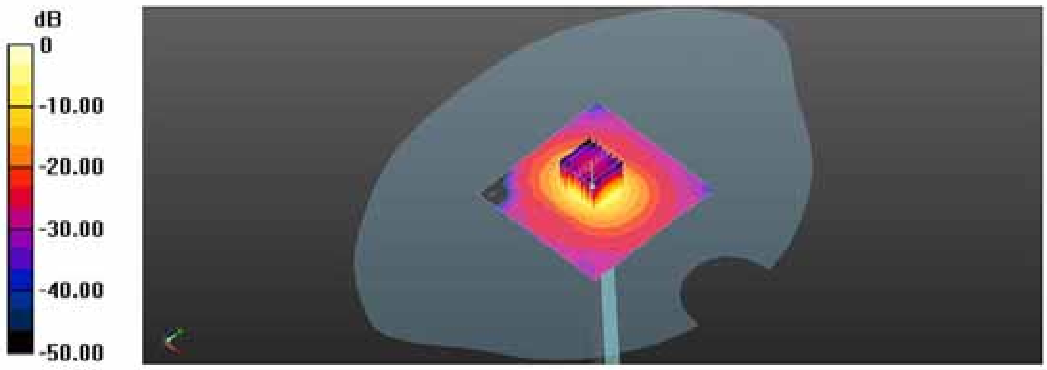
DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1130

Communication System: UID 0, CW (0); Frequency: 5300 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5300 MHz; σ = 4.941 S/m; ε_r = 36.847; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(4.88, 4.88, 4.88); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM Phantom TP-1821; Type: QD000P40CD; Serial: TP:1821
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Verification/5.3GHz Head Verification/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 17.2 W/kg

Verification/5.3GHz Head Verification/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 59.028 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 35.2 W/kg
SAR(1 g) = 8.63 W/kg; SAR(10 g) = 2.44 W/kg
Maximum value of SAR (measured) = 18.0 W/kg



0 dB = 18.0 W/kg = 12.55 dBW/kg

Appendix A.5 Verification Test Plots for 5300 MHz_Body

Date: 2014-10-27

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 5.3GHz Body Verification.da53:0

Input Power : 100 mW

Ambient Temp : 23.0℃ Tissue Temp : 21.8 ℃

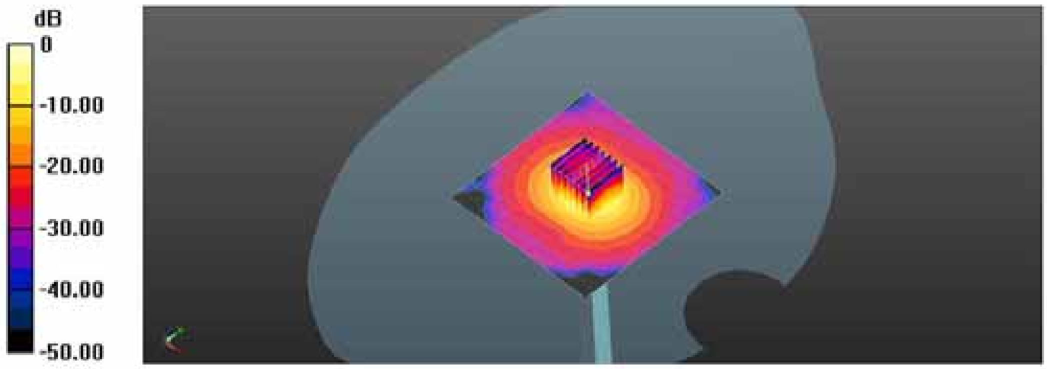
DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1130

Communication System: UID 0, CW (0); Frequency: 5300 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5300 MHz; σ = 5.305 S/m; ε_r = 50.743; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(4.49, 4.49, 4.49); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM phantom TP-1843; Type: QD000P40CD; Serial: TP:1843
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Verification/5.3GHz Body Verification/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 15.3 W/kg

Verification/5.3GHz Body Verification/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 59.758 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 30.6 W/kg
SAR(1 g) = 8.19 W/kg; SAR(10 g) = 2.34 W/kg
Maximum value of SAR (measured) = 16.8 W/kg



0 dB = 16.8 W/kg = 12.25 dBW/kg

Appendix A.6 Verification Test Plots for 5600 MHz_Head

Date: 2014-10-28

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 5.6GHz Head Verification.da53:0

Input Power : 100 mW

Ambient Temp : 23.1℃ Tissue Temp : 21.8 ℃

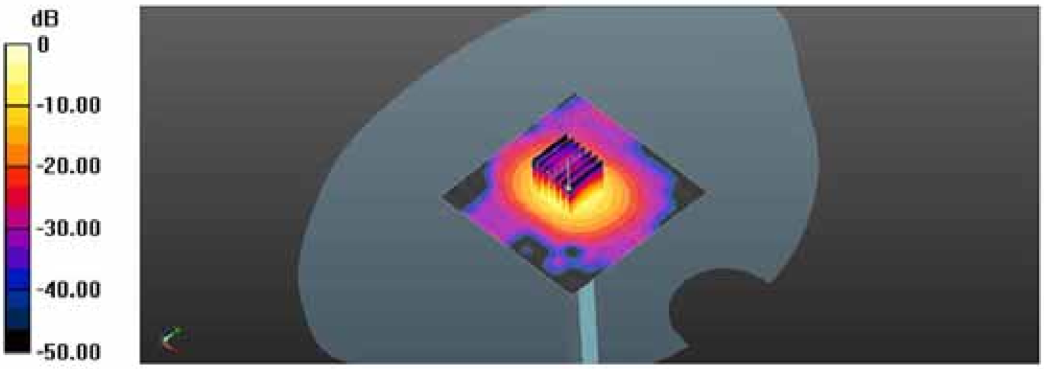
DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1130

Communication System: UID 0, CW (0); Frequency: 5600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 5.148 S/m; ε_r = 35.967; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(4.81, 4.81, 4.81); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM Phantom TP-1821; Type: QD000P40CD; Serial: TP:1821
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Verification/5.6GHz Head Verification/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 17.3 W/kg

Verification/5.6GHz Head Verification/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 57.493 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 36.5 W/kg
SAR(1 g) = 8.43 W/kg; SAR(10 g) = 2.39 W/kg
Maximum value of SAR (measured) = 17.7 W/kg



0 dB = 17.7 W/kg = 12.48 dBW/kg

Appendix A.6 Verification Test Plots for 5600 MHz_Body

Date: 2014-10-28

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 5.6GHz Body Verification.da53:0

Input Power : 100 mW

Ambient Temp : 23.1℃ Tissue Temp : 21.4 ℃

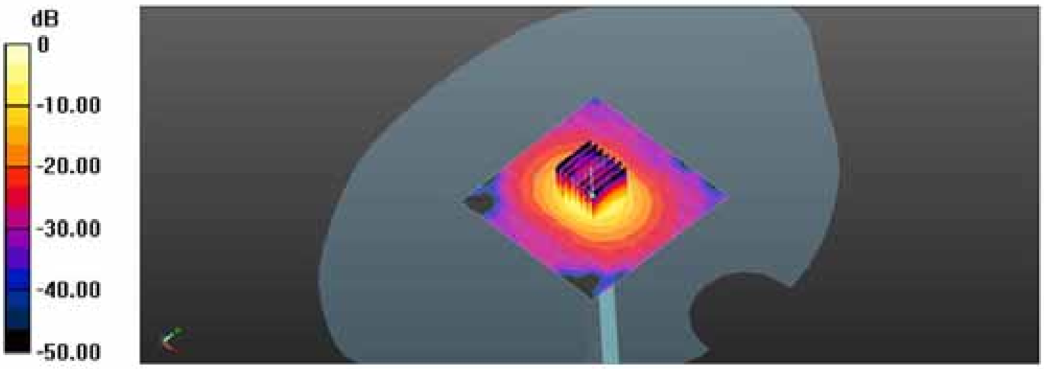
DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1130

Communication System: UID 0, CW (0); Frequency: 5600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 5.779 S/m; ε_r = 50.074; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(3.99, 3.99, 3.99); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM phantom TP-1843; Type: QD000P40CD; Serial: TP:1843
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Verification/5.6GHz Body Verification/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 17.3 W/kg

Verification/5.6GHz Body Verification/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 60.598 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 35.0 W/kg
SAR(1 g) = 8.93 W/kg; SAR(10 g) = 2.51 W/kg
Maximum value of SAR (measured) = 18.7 W/kg



0 dB = 18.7 W/kg = 12.72 dBW/kg

Appendix A.7 Verification Test Plots for 5800 MHz_Head

Date: 2014-10-28

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 5.8GHz Head Verification.da53:0

Input Power : 100 mW

Ambient Temp : 23.1℃ Tissue Temp : 21.8 ℃

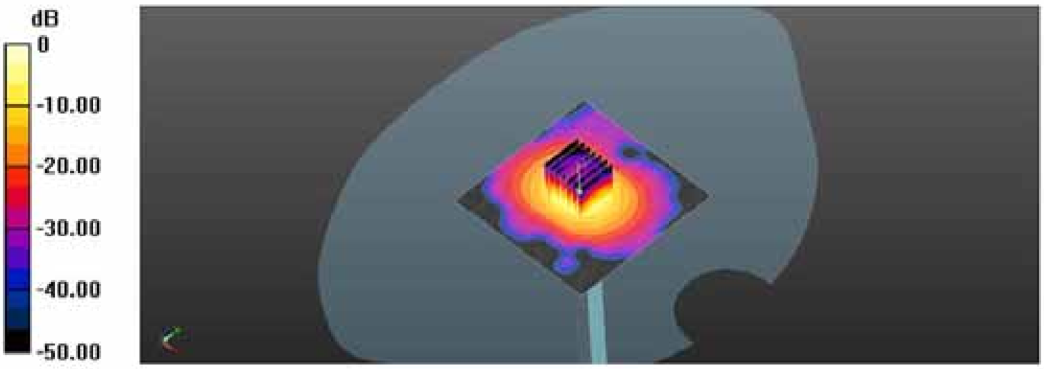
DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1130

Communication System: UID 0, CW (0); Frequency: 5800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 5.4 S/m; ε_r = 35.42; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(4.7, 4.7, 4.7); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM Phantom TP-1821; Type: QD000P40CD; Serial: TP:1821
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Verification/5.8GHz Head Verification/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 17.2 W/kg

Verification/5.8GHz Head Verification/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 56.555 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 36.6 W/kg
SAR(1 g) = 8.28 W/kg; SAR(10 g) = 2.34 W/kg
Maximum value of SAR (measured) = 17.5 W/kg



0 dB = 17.5 W/kg = 12.43 dBW/kg

Appendix A.7 Verification Test Plots for 5800 MHz_Body

Date: 2014-10-28

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 5.8GHz Body Verification.da53:0

Input Power : 100 mW

Ambient Temp : 23.1℃ Tissue Temp : 21.4 ℃

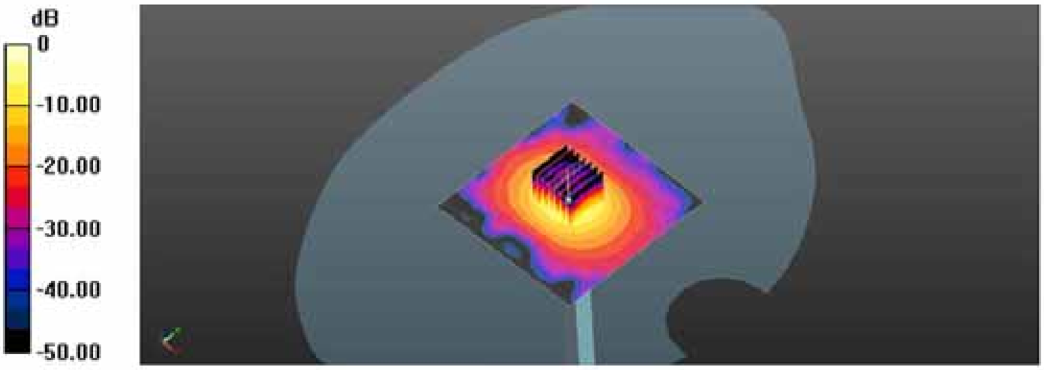
DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1130

Communication System: UID 0, CW (0); Frequency: 5800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 6.093 S/m; ε_r = 49.564; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(4.18, 4.18, 4.18); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM phantom TP-1843; Type: QD000P40CD; Serial: TP:1843
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Verification/5.8GHz Body Verification/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 15.0 W/kg

Verification/5.8GHz Body Verification/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 54.853 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 30.9 W/kg
SAR(1 g) = 7.58 W/kg; SAR(10 g) = 2.13 W/kg
Maximum value of SAR (measured) = 16.0 W/kg



0 dB = 16.0 W/kg = 12.04 dBW/kg

Appendix A.8 SAR Test Plots for GSM850 Band (Head SAR)

Date: 2014-09-26

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: GPRS850_Right Touch_4TX_CH190_First Repeat Test.da53:0

Ambient Temp : 23.3℃ Tissue Temp : 21.8 ℃

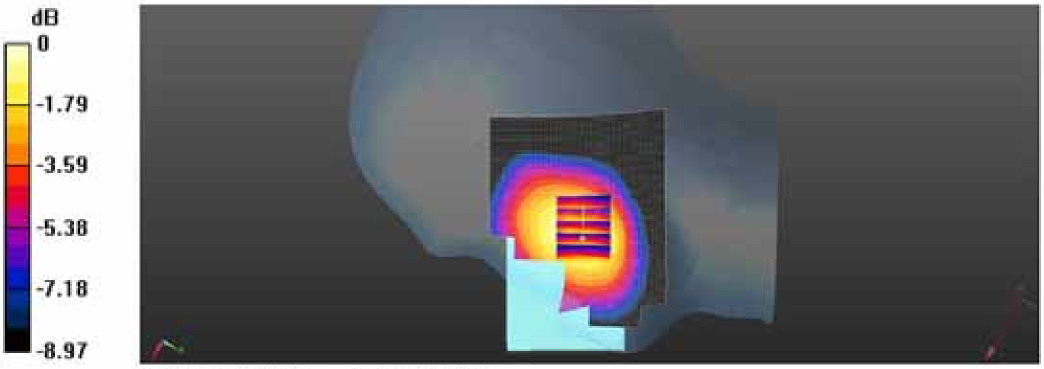
DUT: LGL25; Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Smart Phone; Serial: 1FVAK

Communication System: UID 0, GPRS850 4TX (0); Frequency: 836.6 MHz;Duty Cycle: 1:2.07491
Medium parameters used: f = 837 MHz; σ = 0.896 S/m; ε_r = 40.993; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(10.24, 10.24, 10.24); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM Phantom TP-1821; Type: QD000P40CD; Serial: TP:1821
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Head/GPRS850_Right Touch_4TX_CH190_First Repeat Test/Area Scan (71x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.08 W/kg

Head/GPRS850_Right Touch_4TX_CH190_First Repeat Test/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.710 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.30 W/kg
SAR(1 g) = 0.963 W/kg; SAR(10 g) = 0.739 W/kg
Maximum value of SAR (measured) = 1.13 W/kg



0 dB = 1.13 W/kg = 0.53 dBW/kg

Appendix A.8 SAR Test Plots for GSM850 Band (Body-Worn SAR)

Date: 2014-09-26

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: GSM850_Rear_CH190.da53:0

Ambient Temp : 23.3℃ Tissue Temp : 21.7 ℃

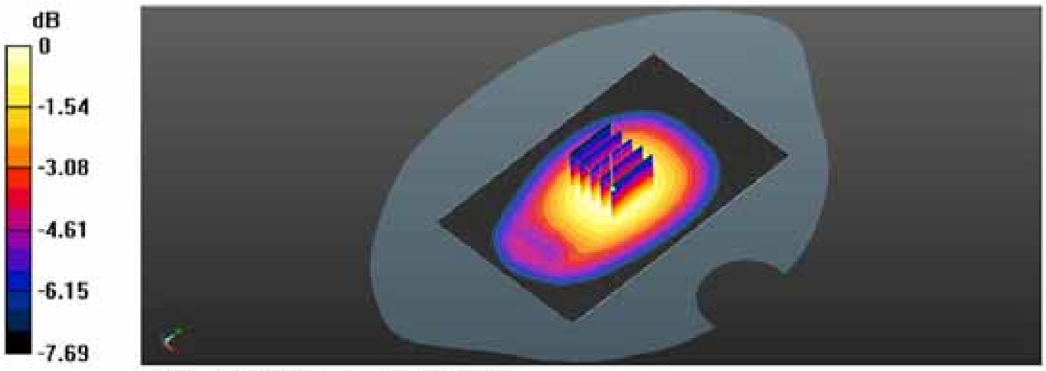
DUT: LGL25; Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Smart Phone; Serial: 1FVAK

Communication System: UID 0, GSM850 (0); Frequency: 836.6 MHz;Duty Cycle: 1:8.30042
Medium parameters used: f = 837 MHz; σ = 0.953 S/m; ε_r = 55.828; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(10.26, 10.26, 10.26); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM phantom TP-1843; Type: QD000P40CD; Serial: TP:1843
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Body/GSM850_Rear_CH190/Area Scan (71x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.724 W/kg

Body/GSM850_Rear_CH190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 28.140 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.779 W/kg
SAR(1 g) = 0.632 W/kg; SAR(10 g) = 0.485 W/kg
Maximum value of SAR (measured) = 0.718 W/kg



0 dB = 0.718 W/kg = -1.44 dBW/kg

Appendix A.8 SAR Test Plots for GSM850 Band (Hotspot SAR)

Date: 2014-09-26

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: GPRS850_Rear_4TX_CH190_First Repeat Test.da53:0

Ambient Temp : 23.3℃ Tissue Temp : 21.7 ℃

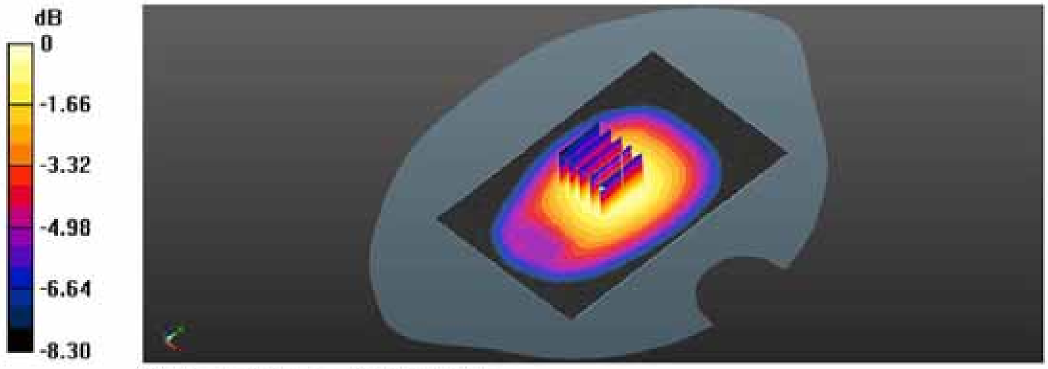
DUT: LGL25; Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Smart Phone; Serial: 1FVAK

Communication System: UID 0, GPRS850 4TX (0); Frequency: 836.6 MHz;Duty Cycle: 1:2.07491
Medium parameters used: f = 837 MHz; σ = 0.953 S/m; ε_r = 55.828; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(10.26, 10.26, 10.26); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM phantom TP-1843; Type: QD000P40CD; Serial: TP:1843
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Body/GPRS850_Rear_4TX_CH190_First Repeat Test/Area Scan (71x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.19 W/kg

Body/GPRS850_Rear_4TX_CH190_First Repeat Test/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 36.354 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.38 W/kg
SAR(1 g) = 1.11 W/kg; SAR(10 g) = 0.848 W/kg
Maximum value of SAR (measured) = 1.25 W/kg



0 dB = 1.25 W/kg = 0.97 dBW/kg

Appendix A.9 SAR Test Plots for GSM1900 Band (Head SAR)

Date: 2014-10-23

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: GPRS1900_Left Touch_2TX_CH661.da53:0

Ambient Temp : 23.5℃ Tissue Temp : 22.1 ℃

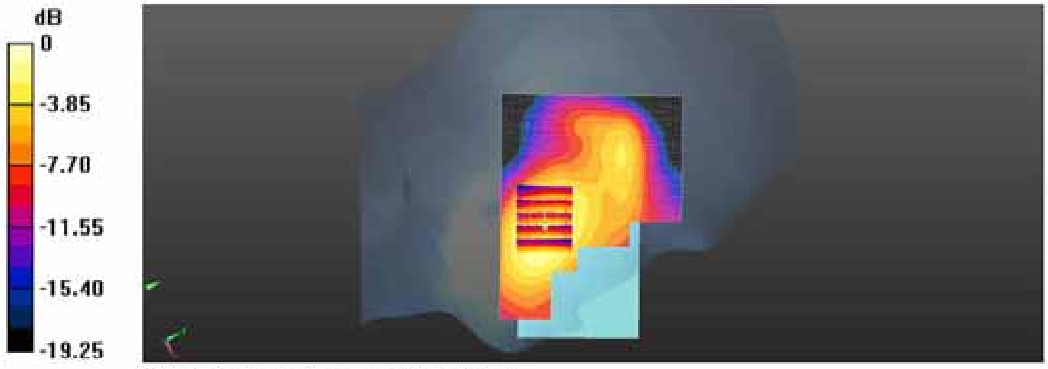
DUT: LGL25; Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Smart Phone; Serial: 1FVAK

Communication System: UID 0, GPRS1900 2TX (0); Frequency: 1880 MHz;Duty Cycle: 1:4.14954
Medium parameters used: f = 1880 MHz; σ = 1.385 S/m; ε_r = 39.769; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(8.45, 8.45, 8.45); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM Phantom TP-1821; Type: QD000P40CD; Serial: TP:1821
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Head/GPRS1900_Left Touch_2TX_CH661/Area Scan (71x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.254 W/kg

Head/GPRS1900_Left Touch_2TX_CH661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.877 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.318 W/kg
SAR(1 g) = 0.202 W/kg; SAR(10 g) = 0.123 W/kg
Maximum value of SAR (measured) = 0.261 W/kg



0 dB = 0.261 W/kg = -5.83 dBW/kg

Appendix A.9 SAR Test Plots for GSM1900 Band (Body-Worn)

Date: 2014-10-23

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: GSM1900_Rear_CH661.da53:0

Ambient Temp : 23.5℃ Tissue Temp : 22.0 ℃

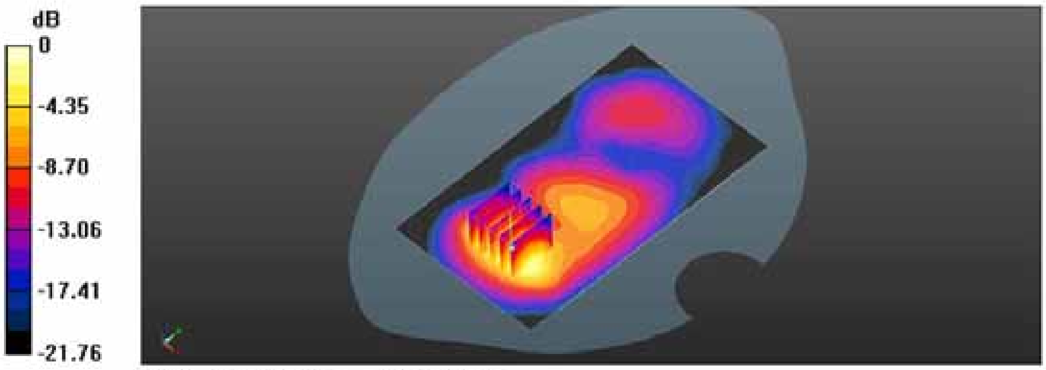
DUT: LGL25; Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Smart Phone; Serial: 1FVAK

Communication System: UID 0, GSM1900 (0); Frequency: 1880 MHz;Duty Cycle: 1:8.30042
Medium parameters used: f = 1880 MHz; $\sigma = 1.505$ S/m; $\varepsilon_r = 52.436$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(7.99, 7.99, 7.99); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM phantom TP-1843; Type: QD000P40CD; Serial: TP:1843
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Body/GSM1900_Rear_CH661/Area Scan (71x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.636 W/kg

Body/GSM1900_Rear_CH661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.404 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.827 W/kg
SAR(1 g) = 0.507 W/kg; SAR(10 g) = 0.276 W/kg
Maximum value of SAR (measured) = 0.665 W/kg



0 dB = 0.665 W/kg = -1.77 dBW/kg

Appendix A.9 SAR Test Plots for GSM1900 Band (Hotspot SAR)

Date: 2014-10-23

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: GPRS1900_Bottom_2TX_CH810_Repeat Test.da53:0

Ambient Temp : 23.5℃ Tissue Temp : 22.0 ℃

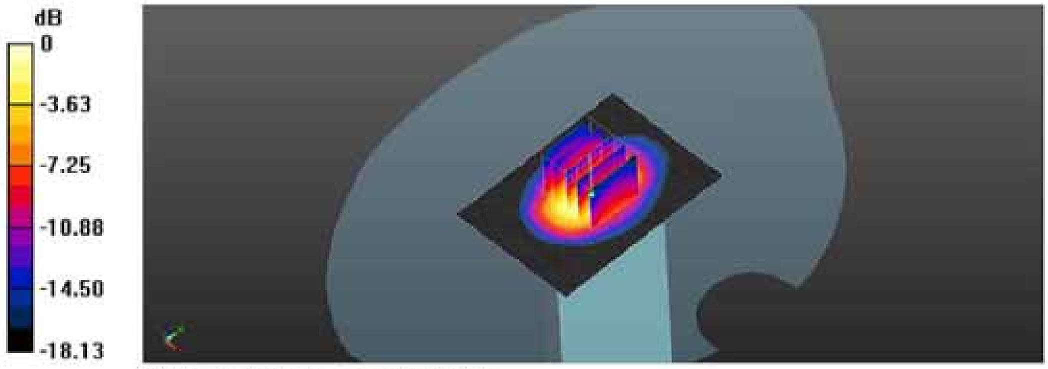
DUT: LGL25; Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Smart Phone; Serial: 1FVAK

Communication System: UID 0, GPRS1900 2TX (0); Frequency: 1909.8 MHz;Duty Cycle: 1:4.14954
Medium parameters used: f = 1910 MHz; σ = 1.54 S/m; ε_r = 52.377; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(7.99, 7.99, 7.99); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM phantom TP-1843; Type: QD000P40CD; Serial: TP:1843
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Body/GPRS1900_Bottom_2TX_CH810_Repeat Test/Area Scan (51x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.51 W/kg

Body/GPRS1900_Bottom_2TX_CH810_Repeat Test/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.334 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 1.59 W/kg
SAR(1 g) = 0.967 W/kg; SAR(10 g) = 0.522 W/kg
Maximum value of SAR (measured) = 1.31 W/kg



0 dB = 1.31 W/kg = 1.17 dBW/kg

Appendix A.10 SAR Test Plots for WCDMA850 Band (Head SAR)

Date: 2014-09-26

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: WCDMA FDD V_Right Touch_CH4183.da53:0

Ambient Temp : 23.3℃ Tissue Temp : 21.8 ℃

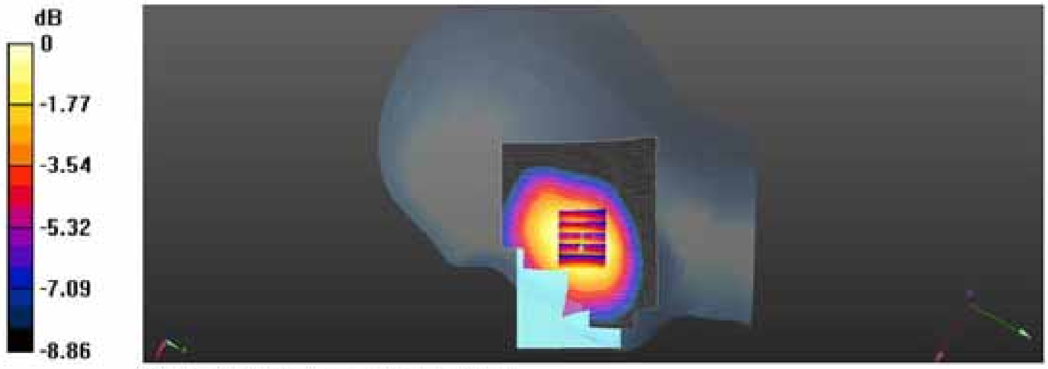
DUT: LGL25; Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Smart Phone; Serial: 1FVAK

Communication System: UID 0, WCDMA5 (0); Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 837 MHz; σ = 0.896 S/m; ε_r = 40.993; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(10.24, 10.24, 10.24); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM Phantom TP-1821; Type: QD000P40CD; Serial: TP:1821
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Head/WCDMA FDD VIII_Right Touch_CH4183/Area Scan (71x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.865 W/kg

Head/WCDMA FDD VIII_Right Touch_CH4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.412 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.954 W/kg
SAR(1 g) = 0.768 W/kg; SAR(10 g) = 0.584 W/kg
Maximum value of SAR (measured) = 0.872 W/kg



0 dB = 0.872 W/kg = -0.59 dBW/kg

Appendix A.10 SAR Test Plots for WCDMA850 Band (Body-Worn and Hotspot SAR)

Date: 2014-09-26

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: WCDMA FDD V_Rear_CH4233.da53:0

Ambient Temp : 23.3℃ Tissue Temp : 21.7 ℃

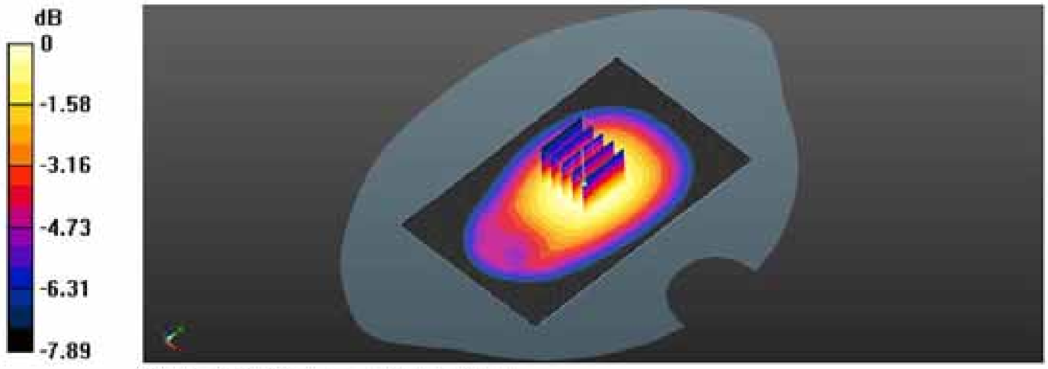
DUT: LGL25; Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Smart Phone; Serial: 1FVAK

Communication System: UID 0, WCDMA5 (0); Frequency: 846.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 847 MHz; σ = 0.963 S/m; ε_r = 55.728; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(10.26, 10.26, 10.26); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM phantom TP-1843; Type: QD000P40CD; Serial: TP:1843
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Body/WCDMA FDD V_Rear_CH4233/Area Scan (71x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.973 W/kg

Body/WCDMA FDD V_Rear_CH4233/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 32.195 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 1.04 W/kg
SAR(1 g) = 0.843 W/kg; SAR(10 g) = 0.646 W/kg
Maximum value of SAR (measured) = 0.958 W/kg



0 dB = 0.958 W/kg = -0.19 dBW/kg

Appendix A.11 SAR Test Plots for WLAN 2.4 GHz Band (Head SAR)

Date: 2014-10-24

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 2.45GHz_WLAN_802.11b_1Mbps_Left Touch_CH11.da53:0

Ambient Temp : 23.4℃ Tissue Temp : 22.1 ℃

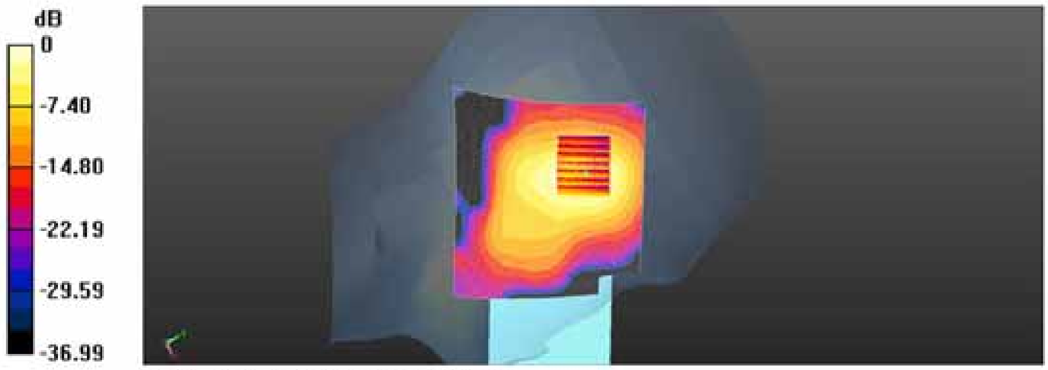
DUT: LGL25; Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Smart Phone; Serial: 1FVAK

Communication System: UID 0, WLAN 2.45GHz (0); Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2462 MHz; σ = 1.871 S/m; ε_r = 38.324; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(7.66, 7.66, 7.66); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM Phantom TP-1821; Type: QD000P40CD; Serial: TP:1821
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Head/2.45GHz_WLAN_802.11b_1Mbps_Left Touch_CH11/Area Scan (91x101x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.886 W/kg

Head/2.45GHz_WLAN_802.11b_1Mbps_Left Touch_CH11/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.945 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 1.17 W/kg
SAR(1 g) = 0.607 W/kg; SAR(10 g) = 0.299 W/kg
Maximum value of SAR (measured) = 0.889 W/kg



0 dB = 0.889 W/kg = -0.51 dBW/kg

Appendix A.11 SAR Test Plots for WLAN 2.4 GHz Band (Body-Worn and Hotspot SAR)

Date: 2014-10-24

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 2.45GHz_WLAN_802.11b_1Mbps_Rear_CH11.da53:0

Ambient Temp : 23.4℃ Tissue Temp : 22.0 ℃

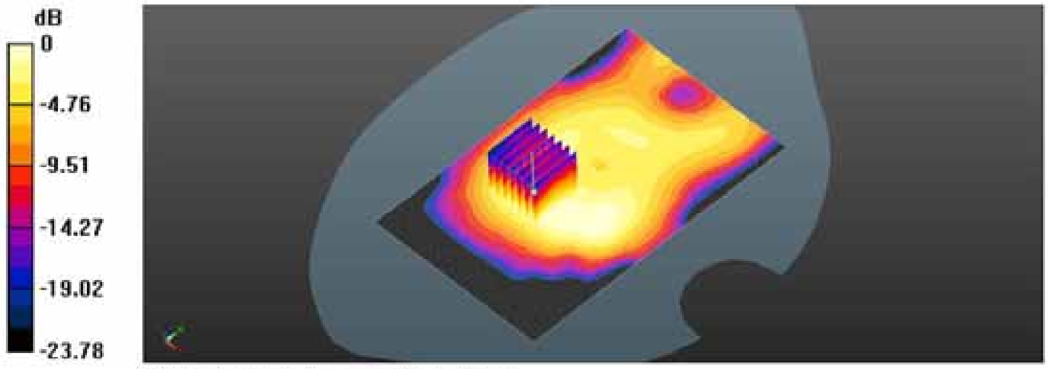
DUT: LGL25; Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Smart Phone; Serial: 1FVAK

Communication System: UID 0, WLAN 2.45GHz (0); Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2462 MHz; $\sigma = 1.954$ S/m; $\varepsilon_r = 51.592$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(7.6, 7.6, 7.6); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM phantom TP-1843; Type: QD000P40CD; Serial: TP:1843
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Body/2.45GHz_WLAN_802.11b_1Mbps_Rear_CH11/Area Scan (91x141x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.207 W/kg

Body/2.45GHz_WLAN_802.11b_1Mbps_Rear_CH11/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.078 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.273 W/kg
SAR(1 g) = 0.151 W/kg; SAR(10 g) = 0.085 W/kg
Maximum value of SAR (measured) = 0.209 W/kg



0 dB = 0.209 W/kg = -6.80 dBW/kg

Appendix A.12 SAR Test Plots for WLAN 5.2 GHz Band (Head SAR)

Date: 2014-10-27

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 5.2GHz_WLAN_802.11a_6Mbps_Left Touch_CH44.da53:0

Ambient Temp : 23.0℃ Tissue Temp : 21.4 ℃

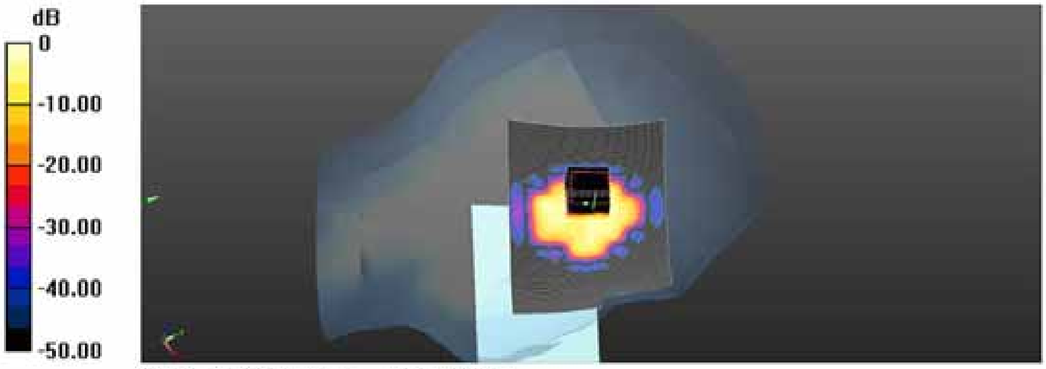
DUT: LGL25; Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Smart Phone; Serial: 1FVAK

Communication System: UID 0, 5GHz WLAN (0); Frequency: 5220 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5220 MHz; σ = 4.835 S/m; ε_r = 37.073; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(5.15, 5.15, 5.15); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM Phantom TP-1821; Type: QD000P40CD; Serial: TP:1821
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Head/5.2GHz_WLAN_802.11a_6Mbps_Left Touch_CH44/Area Scan (91x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.329 W/kg

Head/5.2GHz_WLAN_802.11a_6Mbps_Left Touch_CH44/Zoom Scan (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.894 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.613 W/kg
SAR(1 g) = 0.164 W/kg; SAR(10 g) = 0.042 W/kg
Maximum value of SAR (measured) = 0.342 W/kg



0 dB = 0.342 W/kg = -4.66 dBW/kg

Appendix A.12 SAR Test Plots for WLAN 5.2 GHz Band (Body-Worn)

Date: 2014-10-27

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 5.2GHz_WLAN_802.11a_6Mbps_Rear_CH44.da53:0

Ambient Temp : 23.0℃ Tissue Temp : 21.8 ℃

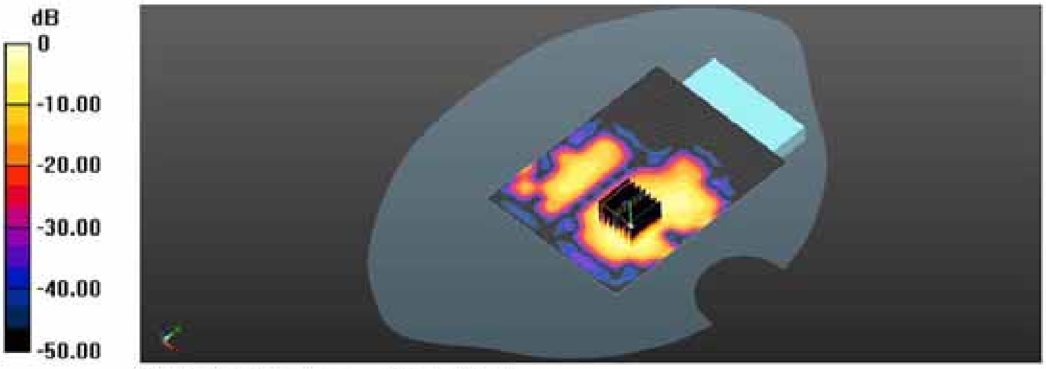
DUT: LGL25; Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Smart Phone; Serial: 1FVAK

Communication System: UID 0, 5GHz WLAN (0); Frequency: 5220 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5220 MHz; σ = 5.18 S/m; ε_r = 50.902; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(4.83, 4.83, 4.83); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM phantom TP-1843; Type: QD000P40CD; Serial: TP:1843
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Body/5.2GHz_WLAN_802.11a_6Mbps_Rear_CH44/Area Scan (101x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.338 W/kg

Body/5.2GHz_WLAN_802.11a_6Mbps_Rear_CH44/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.386 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.618 W/kg
SAR(1 g) = 0.165 W/kg; SAR(10 g) = 0.048 W/kg
Maximum value of SAR (measured) = 0.346 W/kg



0 dB = 0.346 W/kg = -4.61 dBW/kg

Appendix A.13 SAR Test Plots for WLAN 5.3 GHz Band (Head SAR)

Date: 2014-10-27

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 5.3GHz_WLAN_802.11a_6Mbps_Left Touch_CH56.da53:0

Ambient Temp : 23.0℃ Tissue Temp : 21.4 ℃

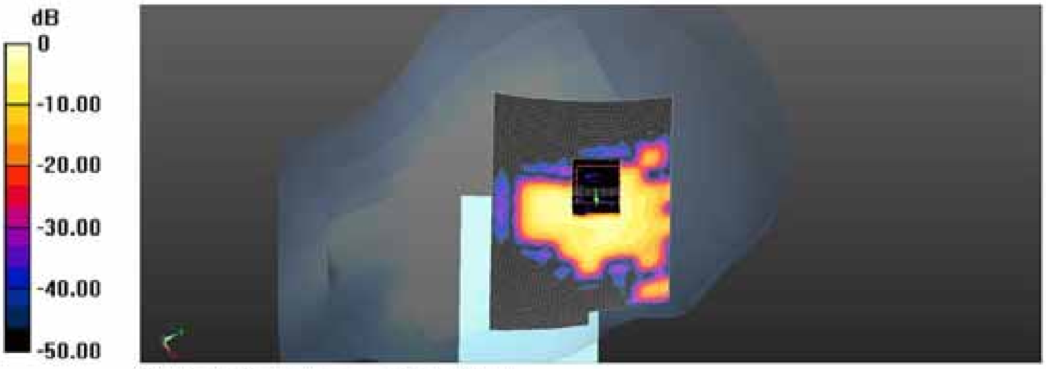
DUT: LGL25; Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Smart Phone; Serial: 1FVAK

Communication System: UID 0, 5GHz WLAN (0); Frequency: 5280 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5280 MHz; σ = 4.915 S/m; ε_r = 36.929; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(4.88, 4.88, 4.88); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM Phantom TP-1821; Type: QD000P40CD; Serial: TP:1821
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Head/5.3GHz_WLAN_802.11a_6Mbps_Left Touch_CH56/Area Scan (91x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.362 W/kg

Head/5.3GHz_WLAN_802.11a_6Mbps_Left Touch_CH56/Zoom Scan (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.989 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.680 W/kg
SAR(1 g) = 0.181 W/kg; SAR(10 g) = 0.053 W/kg
Maximum value of SAR (measured) = 0.376 W/kg



0 dB = 0.376 W/kg = -4.25 dBW/kg

Appendix A.13 SAR Test Plots for WLAN 5.3 GHz Band (Body-Worn)

Date: 2014-10-27

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 5.3GHz_WLAN_802.11a_6Mbps_Rear_CH56.da53:0

Ambient Temp : 23.0℃ Tissue Temp : 21.8 ℃

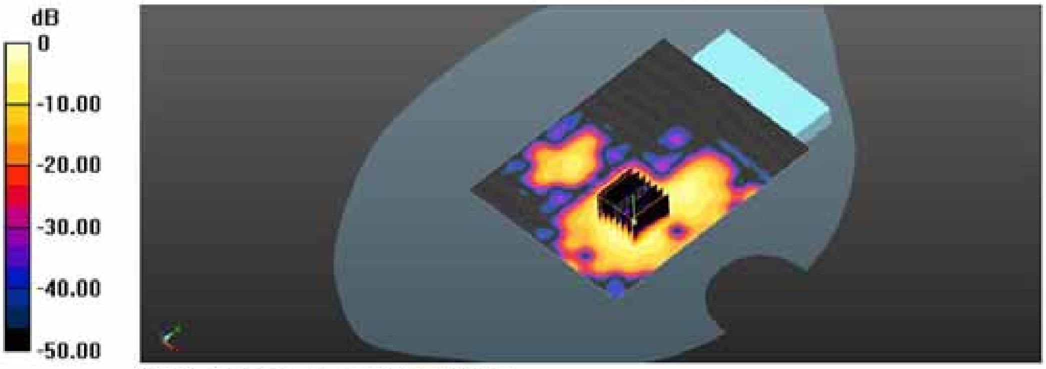
DUT: LGL25; Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Smart Phone; Serial: 1FVAK

Communication System: UID 0, 5GHz WLAN (0); Frequency: 5280 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5280 MHz; σ = 5.277 S/m; ε_r = 50.805; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(4.49, 4.49, 4.49); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM phantom TP-1843; Type: QD000P40CD; Serial: TP:1843
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Body/5.3GHz_WLAN_802.11a_6Mbps_Rear_CH56/Area Scan (101x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.389 W/kg

Body/5.3GHz_WLAN_802.11a_6Mbps_Rear_CH56/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.619 V/m; Power Drift = -0.20 dB
Peak SAR (extrapolated) = 0.785 W/kg
SAR(1 g) = 0.195 W/kg; SAR(10 g) = 0.054 W/kg
Maximum value of SAR (measured) = 0.399 W/kg



0 dB = 0.399 W/kg = -3.99 dBW/kg

Appendix A.14 SAR Test Plots for WLAN 5.6 GHz Band (Head SAR)

Date: 2014-10-28

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 5.6GHz_WLAN_802.11a_6Mbps_Left Touch_CH132.da53:0

Ambient Temp : 23.1℃ Tissue Temp : 21.8 ℃

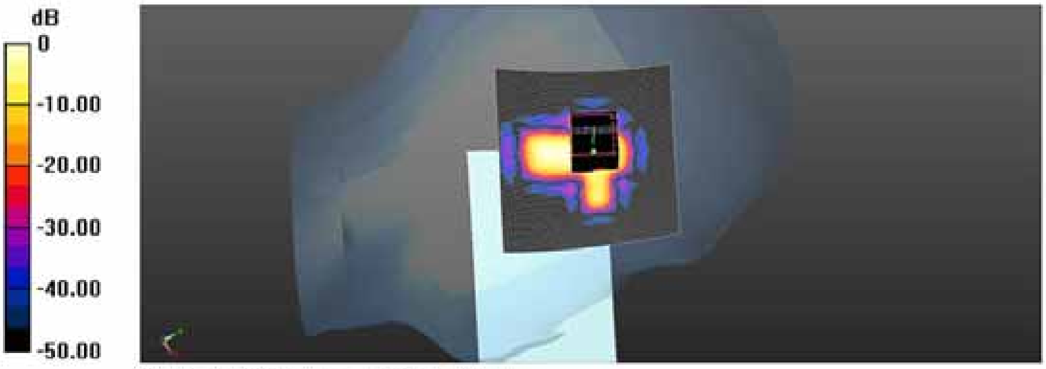
DUT: LGL25; Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Smart Phone; Serial: 1FVAK

Communication System: UID 0, 5GHz WLAN (0); Frequency: 5660 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5660 MHz; σ = 5.219 S/m; ε_r = 35.797; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(4.81, 4.81, 4.81); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM Phantom TP-1821; Type: QD000P40CD; Serial: TP:1821
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Head/5.6GHz_WLAN_802.11a_6Mbps_Left Touch_CH132/Area Scan (91x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.354 W/kg

Head/5.6GHz_WLAN_802.11a_6Mbps_Left Touch_CH132/Zoom Scan (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 4.494 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.551 W/kg
SAR(1 g) = 0.125 W/kg; SAR(10 g) = 0.035 W/kg
Maximum value of SAR (measured) = 0.292 W/kg



0 dB = 0.292 W/kg = -5.35 dBW/kg

Appendix A.14 SAR Test Plots for WLAN 5.6 GHz Band (Body-Worn)

Date: 2014-10-28

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 5.6GHz_WLAN_802.11a_6Mbps_Rear_CH132.da53:0

Ambient Temp : 23.1℃ Tissue Temp : 21.4 ℃

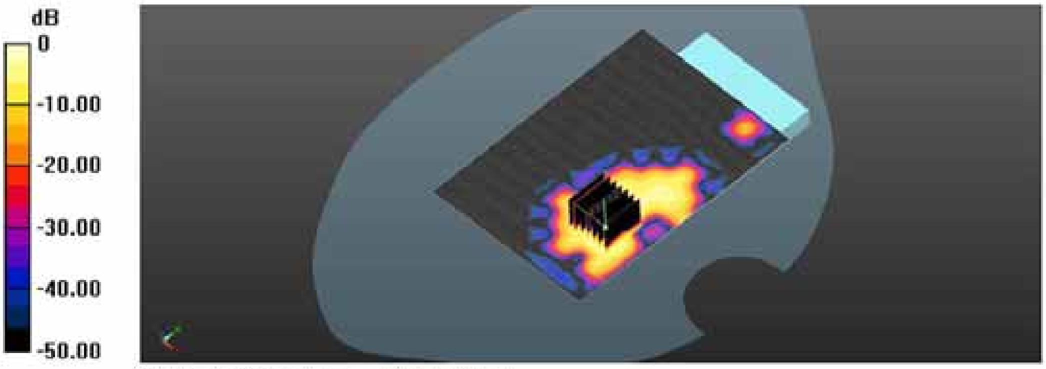
DUT: LGL25; Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Smart Phone; Serial: 1FVAK

Communication System: UID 0, 5GHz WLAN (0); Frequency: 5660 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5660 MHz; σ = 5.867 S/m; ε_r = 49.922; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(3.99, 3.99, 3.99); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM phantom TP-1843; Type: QD000P40CD; Serial: TP:1843
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Body/5.6GHz_WLAN_802.11a_6Mbps_Rear_CH132/Area Scan (101x141x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.368 W/kg

Body/5.6GHz_WLAN_802.11a_6Mbps_Rear_CH132/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.599 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.596 W/kg
SAR(1 g) = 0.143 W/kg; SAR(10 g) = 0.039 W/kg
Maximum value of SAR (measured) = 0.324 W/kg



0 dB = 0.324 W/kg = -4.89 dBW/kg

Appendix A.15 SAR Test Plots for WLAN 5.8 GHz Band (Head SAR)

Date: 2014-10-28

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 5.8GHz_WLAN_802.11a_6Mbps_Left Touch_CH161.da53:0

Ambient Temp : 23.1℃ Tissue Temp : 21.8 ℃

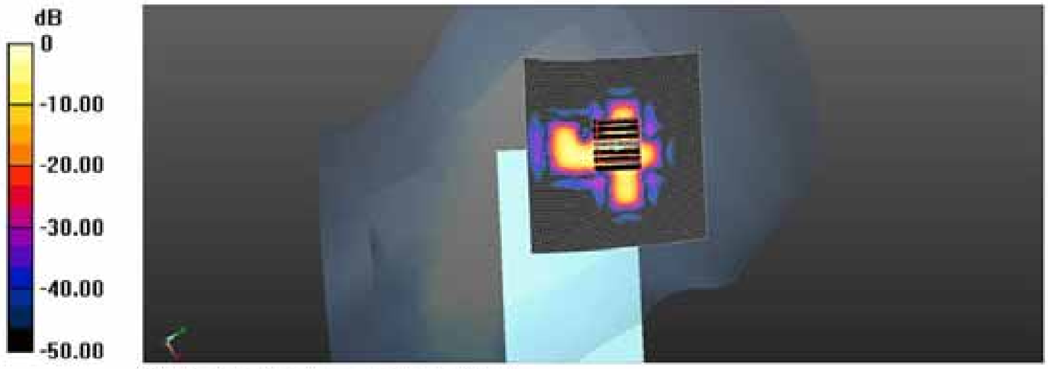
DUT: LGL25; Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Smart Phone; Serial: 1FVAK

Communication System: UID 0, 5GHz WLAN (0); Frequency: 5805 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5805 MHz; σ = 5.408 S/m; ε_r = 35.419; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(4.7, 4.7, 4.7); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM Phantom TP-1821; Type: QD000P40CD; Serial: TP:1821
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Head/5.8GHz_WLAN_802.11a_6Mbps_Left Touch_CH161/Area Scan (91x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.380 W/kg

Head/5.8GHz_WLAN_802.11a_6Mbps_Left Touch_CH161/Zoom Scan (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.974 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.572 W/kg
SAR(1 g) = 0.086 W/kg; SAR(10 g) = 0.026 W/kg
Maximum value of SAR (measured) = 0.230 W/kg



0 dB = 0.230 W/kg = -6.38 dBW/kg

Appendix A.15 SAR Test Plots for WLAN 5.8 GHz Band (Body-Worn and Hotspot SAR)

Date: 2014-10-28

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: 5.8GHz_WLAN_802.11a_6Mbps_Rear_CH161.da53:0

Ambient Temp : 23.1℃ Tissue Temp : 21.4 ℃

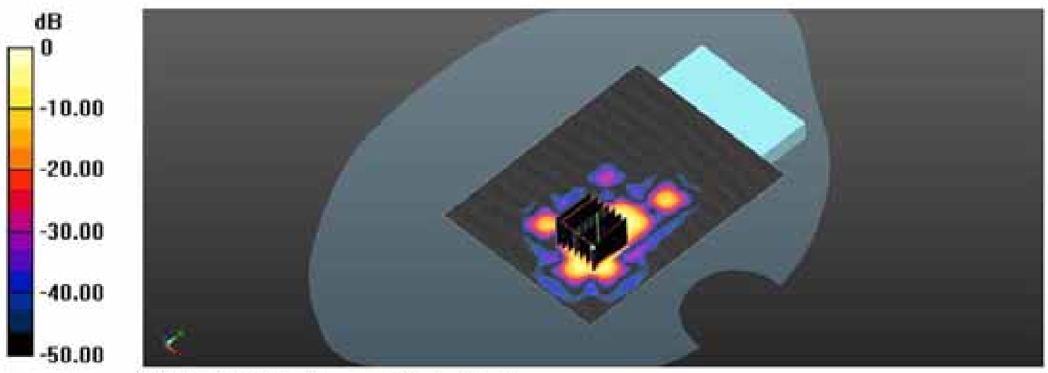
DUT: LGL25; Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Smart Phone; Serial: 1FVAK

Communication System: UID 0, 5GHz WLAN (0); Frequency: 5805 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5805 MHz; σ = 6.102 S/m; ε_r = 49.564; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY52 Configuration:
- Probe: EX3DV4 - SN3986; ConvF(4.18, 4.18, 4.18); Calibrated: 2014-03-21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1430; Calibrated: 2014-03-24
- Phantom: SAM phantom TP-1843; Type: QD000P40CD; Serial: TP:1843
- DASY52 52.8.7(1137)SEMCAD X 14.6.10(7164)

Body/5.8GHz_WLAN_802.11a_6Mbps_Rear_CH161/Area Scan (101x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.409 W/kg

Body/5.8GHz_WLAN_802.11a_6Mbps_Rear_CH161/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.261 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 0.435 W/kg
SAR(1 g) = 0.080 W/kg; SAR(10 g) = 0.026 W/kg
Maximum value of SAR (measured) = 0.209 W/kg



0 dB = 0.209 W/kg = -6.80 dBW/kg