FCC SAR Test Report

APPLICANT	:	Kodiak Networks Inc
EQUIPMENT	:	Carbonado Smart cover for Samsung S3
BRAND NAME	:	Carbonado
MODEL NAME	:	RTKS3C0
MARKETING NAME	:	Carbonado Smart cover for Samsung S3
FCC ID	:	RTKS3C0
STANDARD	:	FCC 47 CFR Part 2 (2.1093) ANSI/IEEE C95.1-1992 IEEE 1528-2003 FCC OET Bulletin 65 Supplement C (Edition 01-01)

This report should be valid together with the ATTS3 SAR report. The product was completely tested on Jun. 21, 2013. We, SPORTON INTERNATIONAL (SHENZHEN) INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL (SHENZHEN) INC., the test report shall not be reproduced except in full.

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Testing Laboratory
2353

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Table of Contents

1. Statement of Compliance 4
2. Administration Data 5
2.1 Testing Laboratory....5
2.2 Applicant 5
2.3 Manufacturer....5
2.4 Application Details....5
3. General Information 6
3.1 Description of Equipment Under Test (EUT) 6
3.2 Applied Standard....7
3.3 Device Category and SAR Limits....7
3.4 Test Conditions....7
4. Specific Absorption Rate (SAR)....8
4.1 Introduction 8
4.2 SAR Definition....8
5. SAR Measurement System....9
5.1 E-Field Probe 9
5.2 Data Acquisition Electronics (DAE) 10
5.3 Robot 11
5.4 Measurement Server....11
5.5 Phantom....12
5.6 Device Holder 12
5.7 Data Storage and Evaluation 13
5.8 Test Equipment List....15
6. Tissue Simulating Liquids....16
7. SAR System Verification 17
7.1 Purpose of System Performance check 17
7.2 System Setup....17
7.3 SAR System Verification Results 18
8. EUT Testing Position 19
9. Measurement Procedures 19
9.1 Spatial Peak SAR Evaluation....19
9.2 Power Reference Measurement....20
9.3 Area & Zoom Scan Procedures....20
9.4 Volume Scan Procedures....21
9.5 SAR Averaged Methods....21
9.6 Power Drift Monitoring....21
10. Conducted RF Output Power (Unit: dBm)....22
11. SAR Test Results 28
11.1 Test Records for Head SAR Test....29
11.2 Test Records for Hotspot SAR Test 29
11.3 Test Records for Body Worn SAR Test....29
12. Uncertainty Assessment 37
13. References....39
Appendix A. Plots of System Performance Check
Appendix B. Plots of SAR Measurement
Appendix C. DASY Calibration Certificate
Appendix D. Test Setup Photos

Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA330601	Rev. 01	Initial issue of report	Jul. 02, 2013

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Kodiak Networks Inc DUT: Carbonado Smart cover for Samsung S3, Brand Name: Carbonado, Model Name: RTKS3C0, Marketing Name: Carbonado Smart cover for Samsung S3** are as follows.

<Highest Measured Standalone SAR Summary>

Exposure Position	Frequency Band	Measured 1g-SAR (W/kg)	Equipment Class	Highest Measured 1g-SAR (W/kg)
Head	GSM1900	0.31	PCE	0.42
	WCDMA Band II	0.42		
	LTE Band 4	0.25		
Hotspot (1cm Gap)	GSM850	0.10	PCE	0.30
	GSM1900	0.28		
	WCDMA Band II	0.30		
	LTE Band 4	0.24		
	LTE Band 17	0.09		
Body-worn (1cm Gap)	GSM850	0.10	PCE	0.24
	GSM1900	0.24		
	WCDMA Band II	0.23		
	LTE Band 4	0.12		
	LTE Band 17	0.09		

<Highest Simultaneous Transmission SAR>

Exposure Position	Frequency Band	Equipment Class	Highest Simultaneous Transmission 1g-SAR (W/kg)
Head	WCDMA 1900	PCE	0.45
	WLAN 2.4GHz	DTS	
Head	WCDMA 1900	PCE	0.55
	WLAN 5GHz	NII	

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2003 and FCC OET Bulletin 65 Supplement C (Edition 01-01).

2. Administration Data

2.1 Testing Laboratory

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.
Test Site Location	No. 101, Complex Building C, Guanlong Village, Xili Town, Nanshan District, Shenzhen, Guangdong, P.R.C. TEL: +86-755-8637-9589 FAX: +86-755-8637-9595

2.2 Applicant

Company Name	Kodiak Networks Inc
Address	1501 10th St #130 Plano, TX 75074, United States

2.3 Manufacturer

Company Name	Shenzhen Power Idea Technology Limited
Address	1401A, Section B, Bin hai zhi Chuang tower, Wen xin 5 Road, Nan Shan, Shen Zhen city, PRC

2.4 Application Details

Date of Start during the Test	Jun. 20, 2013
Date of End during the Test	Jun. 21, 2013

3. General Information

3.1 Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT	Carbonado Smart cover for Samsung S3
Brand Name	Carbonado
Model Name	RTKS3C0
Marketing Name	Carbonado Smart cover for Samsung S3
FCC ID	RTKS3C0
TX Frequency	2402 MHz ~ 2480 MHz
Antenna Type	Ceramic Chip Antenna
HW Version	V2.0
SW Version	V2.0
Type of Modulation	Bluetooth BDR (1Mbps) : GFSK Bluetooth EDR (2Mbps) : π/4-DQPSK Bluetooth EDR (3Mbps) : 8-DPSK
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. It is indicated that this BT case only supports PTT operations for the Samsung S3 phone on AT&T networks. It can only works with AT&T Samsung S3 model SGH-I747 with FCC ID A3LSGHI747.
3. The BT S3 case cannot operate standalone by itself without the AT&T Samsung S3 phone; therefore, standalone SAR evaluation is not required for the BT S3 case. SAR is only considered with the BT S3 case attached to the AT&T S3(FCC ID: A3LSGHI747; Serial No:).
4. The AT&T S3 supports GSM/GPRS/EDGE 850/1900, WCDMA HSPA 850/ 1900, LTE Band 4/17, 2.4GHz WLAN, 5.8GHz WLAN, 5.2GHz WLAN, 5.3GHz WLAN, 5.5GHz WLAN, Bluetooth and NFC function.

3.2 Applied Standard

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards:

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2003
- FCC OET Bulletin 65 Supplement C (Edition 01-01)
- FCC KDB 447498 D01 v05r01
- FCC KDB 648474 D04 v01r01
- FCC KDB 941225 D01 v02
- FCC KDB 941225 D05 v02r02

3.3 Device Category and SAR Limits

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

3.4 Test Conditions

3.4.1 Ambient Condition

Ambient Temperature	20 to 24 ℃
Humidity	< 60 %

3.4.2 Test Configuration

For WWAN SAR testing, the device was controlled by using a base station emulator. Communication between the device and the emulator was established by air link. The distance between the EUT and the antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller than the output power of EUT.

4. Specific Absorption Rate (SAR)

4.1 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.

4.2 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:

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

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

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

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

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

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

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.

5. SAR Measurement System

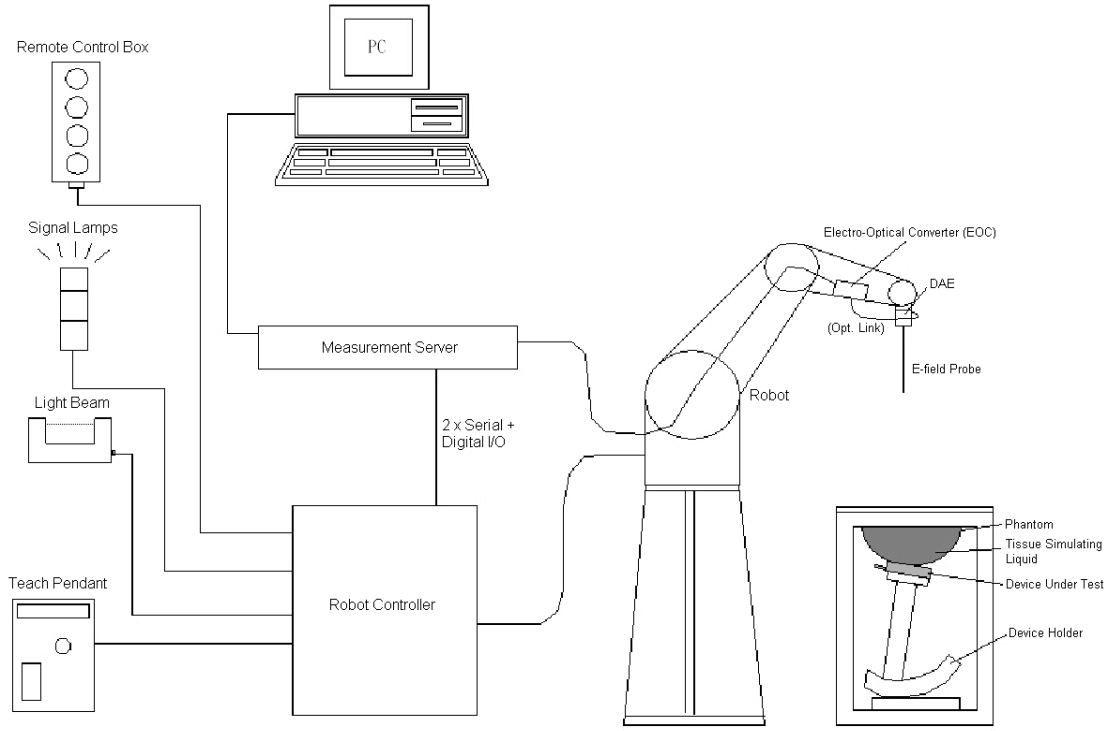


Fig 5.1 SPEAG DASY System Configurations

The DASY system for performance compliance tests is illustrated above graphically. This system consists of the following items:

- A standard high precision 6-axis robot with controller, a teach pendant and software
- A data acquisition electronic (DAE) attached to the robot arm extension
- A dosimetric probe equipped with an optical surface detector system
- The electro-optical converter (EOC) performs the conversion between optical and electrical signals
- A measurement server performs the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the accuracy of the probe positioning
- A computer operating Windows XP
- DASY software
- Remove control with teach pendant and additional circuitry for robot safety such as warming lamps, etc.
- The SAM twin phantom
- A device holder
- Tissue simulating liquid
- Dipole for evaluating the proper functioning of the system

Component details are described in in the following sub-sections.

5.1 E-Field Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by SPEAG).The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. This probe has a built in optical surface detection system to prevent from collision with phantom.

5.1.1 E-Field Probe Specification

<EX3DV4 Probe>

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Frequency	10 MHz to 6 GHz; Linearity: ± 0.2 dB
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 µW/g to 100 mW/g; Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm

Fig 5.2 Photo of EX3DV4

5.1.2 E-Field Probe Calibration

Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy shall be evaluated and within ± 0.25dB. The sensitivity parameters (NormX, NormY, and NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested. The calibration data can be referred to appendix C of this report.

5.2 Data Acquisition Electronics (DAE)

The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.
The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig 5.3 Photo of DAE

5.3 Robot

The SPEAG DASY system uses the high precision robots (DASY5: TX90XL) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY5: CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability ±0.035 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)

Fig 5.4 Photo of DASY5

5.4 Measurement Server

The measurement server is based on a PC/104 CPU board with CPU (DASY5: 400 MHz, Intel Celeron), chipdisk (DASY5: 128 MB), RAM (DASY5: 128 MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all the real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operations.

Fig 5.5 Photo of Server for DASY5

5.5 Phantom

<SAM Twin Phantom>

Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Hand, Right Hand, Flat Phantom

Fig 5.6 Photo of SAM Phantom

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

5.6 Device Holder

<Device Holder for SAM Twin Phantom>

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of ± 0.5 mm would produce a SAR uncertainty of ± 20 %. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity ε = 3 and loss tangent δ = 0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

Fig 5.7 Device Holder

5.7 Data Storage and Evaluation

5.7.1 Data Storage

The DASY software stores the assessed data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all the necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files. The post-processing software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of erroneous parameter settings. For example, if a measurement has been performed with an incorrect crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be reevaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type (e.g., [V/m], [A/m], [mW/g]). Some of these units are not available in certain situations or give meaningless results, e.g., a SAR-output in a non-lose media, will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

5.7.2 Data Evaluation

The DASY post-processing software (SEMCAD) automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software：

Probe parameters：	- Sensitivity	$Norm_i$, a_{i0}, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	dcp_i
Device parameters：	- Frequency	f
	- Crest factor	cf
Media parameters：	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multi-meter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power.

The formula for each channel can be given as：

$$\mathbf{V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}}$$

with V_i = compensated signal of channel i, (i = x, y, z)
U_i = input signal of channel i, (i = x, y, z)
cf = crest factor of exciting field (DASY parameter)
dcp_i = diode compression point (DASY parameter)

From the compensated input signals, the primary field data for each channel can be evaluated：

E-field Probes：$\mathbf{E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}}$

H-field Probes：$\mathbf{H_i = \sqrt{V_i} \cdot \frac{a_{i0}+a_{i1}f+a_{i2}f^2}{f}}$

with V_i = compensated signal of channel i, (i = x, y, z)
$Norm_i$ = sensor sensitivity of channel i, (i = x, y, z), μV/(V/m)^2 for E-field Probes
ConvF = sensitivity enhancement in solution
a_{ij} = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
E_i = electric field strength of channel i in V/m
H_i = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude)：

$$\mathbf{E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}}$$

The primary field data are used to calculate the derived field units.

$$\mathbf{SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1000}}$$

with SAR = local specific absorption rate in mW/g
E_{tot} = total field strength in V/m
σ = conductivity in [mho/m] or [Siemens/m]
ρ = equivalent tissue density in g/cm^3

Note that the density is set to 1, to account for actual head tissue density rather than the density of the tissue simulating liquid.

5.8 Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	735MHz System Validation Kit	D750V3	1065	Jul. 12, 2012	Jul. 11, 2013
SPEAG	835MHz System Validation Kit	D835V2	4d091	Nov. 18, 2011	Nov. 16, 2013
SPEAG	1800MHz System Validation Kit	D1800V2	2d177	Nov. 21, 2011	Nov. 16, 2013
SPEAG	1900MHz System Validation Kit	D1900V2	5d118	Nov. 21, 2011	Nov. 16, 2013
SPEAG	Data Acquisition Electronics	DAE4	1303	Nov. 22, 2012	Nov. 21, 2013
SPEAG	Dosimetric E-Field Probe	EX3DV4	3819	Nov. 26, 2012	Nov. 25, 2013
SPEAG	SAM Twin Phantom	QD 000 P40 CD	TP-1670	NCR	NCR
SPEAG	SAM Twin Phantom	QD 000 P40 CD	TP-1671	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Anritsu	Radio Communication Analyzer	MT8820C	6201091028	Jun. 10, 2013	Jun. 09, 2014
Agilent	Base Station	E5515C	MY50267224	Dec. 29, 2012	Dec. 28, 2013
Agilent	ENA Series Network Analyzer	E5071C	MY46106933	Aug. 31, 2012	Aug. 30, 2013
Agilent	Dielectric Probe Kit	85070E	MY44300475	NCR	NCR
R&S	Spectrum Analyzer	FSP30	100818	Aug. 22, 2012	Aug. 21, 2013
AR	Amplifier	551G4	333096	NCR	NCR
Anritsu	Power Meter	ML2495A	1218010	Mar. 28, 2013	Mar. 27, 2014
Anritsu	Power Sensor	MA2411B	1207253	Mar. 28, 2013	Mar. 27, 2014
ARRA	Power Divider	A3200-2	N/A	NA	NA
MCL	Attenuation	BW-S10W5	N/A	NA	NA
Woken	Attenuator 1	WK0602-XX	N/A	Note 4	
PE	Attenuator 2	PE7005-10	N/A	Note 4	
PE	Attenuator 3	PE7005- 3	N/A	Note 4	
Agilent	Dual Directional Coupler	778D	50422	Note 4	
Agilent	Dielectric Probe Kit	85070D	US01440205	Note 5	
AR	Power Amplifier	5S1G4M2	0328767	Note 6	
R&S	Spectrum Analyzer	FSP30	101362	Oct. 11, 2012	Oct. 10, 2013

Table 5.1 Test Equipment List

Note:

1. The calibration certificate of DASY can be referred to appendix C of this report.
2. Referring to KDB 865664 D01v01, the dipole calibration interval can be extended to 3 years with justification. The dipoles are also not physically damaged, or repaired during the interval.
3. The justification data of dipole D835V2, SN: 4d091, D1800V2, SN: 2d117 and D1900V2, SN: 5d118 can be found in appendix C. The return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration.
4. The Insertion Loss calibration of Dual Directional Coupler and Attenuator were characterized via the network analyzer and compensated during system check.
5. The dielectric probe kit was calibrated via the network analyzer, with the specified procedure (calibrated in pure water) and calibration kit (standard) short circuit, before the dielectric measurement. The specific procedure and calibration kit are provided by Agilent.
6. In system check we need to monitor the level on the power meter, and adjust the power amplifier level to have precise power level to the dipole; the measured SAR will be normalized to 1W input power according to the ratio of 1W to the input power to the dipole. For system check, the calibration of the power amplifier is deemed not critically required for correct measurement; the power meter is critical and we do have calibration for it
7. Attenuator 1 insertion loss is calibrated by the network Analyzer, which the calibration is valid, before system check.

6. Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 6.1. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 6.2.

Fig 6.1 Photo of Liquid Height for Head SAR

Fig 6.2 Photo of Liquid Height for Body SAR

The following table gives the recipes for tissue simulating liquid.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (ε_r)
For Head								
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.40	40.0
For Body								
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3

Table 6.1 Recipes of Tissue Simulating Liquid

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an Agilent 85070D Dielectric Probe Kit and an Agilent Network Analyzer.

The following table shows the measuring results for simulating liquid.

Frequency (MHz)	Liquid Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
1800	Head	21.3	1.438	39.635	1.40	40.0	2.71	-0.91	±5	Jun. 21, 2013
1900	Head	21.9	1.453	39.107	1.40	40.0	3.79	-2.23	±5	Jun. 21, 2013
750	Body	21.9	0.961	53.931	0.96	55.5	0.10	-2.83	±5	Jun. 20, 2013
835	Body	21.5	0.975	54.314	0.97	55.2	0.52	-1.61	±5	Jun. 20, 2013
1800	Body	21.6	1.579	54.828	1.52	53.3	3.88	2.87	±5	Jun. 20, 2013
1900	Body	21.7	1.528	54.867	1.52	53.3	0.53	2.94	±5	Jun. 20, 2013

Table 6.2 Measuring Results for Simulating Liquid

7. SAR System Verification

Each DASY system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY software, enable the user to conduct the system performance check and system validation. System validation kit includes a dipole, tripod holder to fix it underneath the flat phantom and a corresponding distance holder.

7.1 Purpose of System Performance check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

7.2 System Setup

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

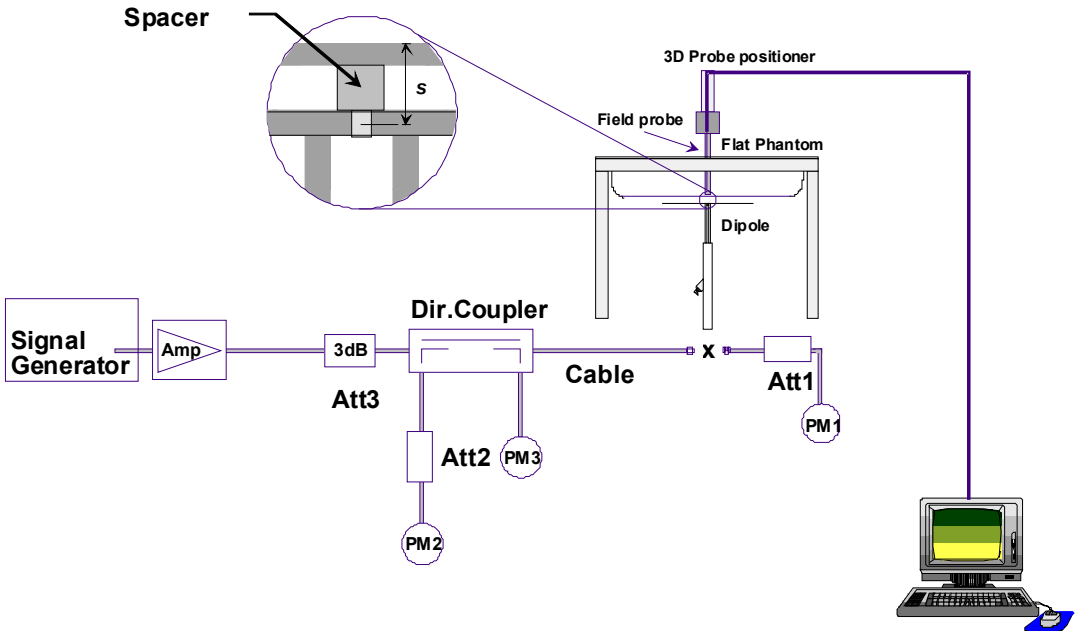


Fig 7.1 System Setup for System Evaluation

1. Signal Generator
2. Amplifier
3. Directional Coupler
4. Power Meter
5. Calibrated Dipole

Fig 7.2 Photo of Dipole Setup

7.3 SAR System Verification Results

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10 %. Table 7.1 shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

Date	Frequency (MHz)	Liquid Type	Power fed onto reference dipole (mW)	Target SAR_{1g} (W/kg)	Measured SAR_{1g} (W/kg)	Normalized SAR_{1g} (W/kg)	Deviation (%)
Jun. 21, 2013	1800	Head	250	38	9.78	39.12	2.95
Jun. 21, 2013	1900	Head	250	40.3	10.78	43.12	7.00
Jun. 20, 2013	750	Body	250	8.71	2.3	9.2	5.63
Jun. 20, 2013	835	Body	250	9.42	2.43	9.72	3.18
Jun. 20, 2013	1800	Body	250	39.2	9.63	38.52	-1.73
Jun. 20, 2013	1900	Body	250	41.8	10.5	42	0.48

Table 7.1 Target and Measurement SAR after Normalized

8. EUT Testing Position

This EUT was tested in three different positions. They are left cheek for Head, Front/Back of the EUT with phantom 1 cm gap, as illustrated below, please refer to Appendix D for the test setup photos.

9. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

(a) For WWAN power measurement, use base station simulator to configure EUT WWAN transmission in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.
(b) Read the WWAN RF power level from the base station simulator.
(c) For WLAN/BT power measurement, use engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power in each supported wireless interface and frequency band
(d) Connect EUT RF port through RF cable to the power meter, and measure WLAN/BT output power

<SAR measurement>

(a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power, in the highest power channel.
(b) Place the EUT in the positions as Appendix D demonstrates.
(c) Set scan area, grid size and other setting on the DASY software.
(d) Measure SAR results for the highest power channel on each testing position.
(e) Find out the largest SAR result on these testing positions of each band
(f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

(a) Power reference measurement
(b) Area scan
(c) Zoom scan
(d) Power drift measurement

9.1 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

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 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

(a) Extraction of the measured data (grid and values) from the Zoom Scan
(b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
(c) Generation of a high-resolution mesh within the measured volume
(d) Interpolation of all measured values form the measurement grid to the high-resolution grid
(e) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
(f) Calculation of the averaged SAR within masses of 1g and 10g

9.2 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. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

9.3 Area & Zoom Scan Procedures

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. Area scan and zoom scan resolution setting follows KDB 865664 D01v01 quoted below.

For any secondary peaks found in the area scan which are within 2 dB of the maximum peak and are not within this zoom scan, the zoom scan should be repeated

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			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.	
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

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.

9.4 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

9.5 SAR Averaged Methods

In DASY, the interpolation and extrapolation are both based on the modified Quadratic Shepard's method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5 mm.

9.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASY measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drifts more than 5%, the SAR will be retested.

10. Conducted RF Output Power (Unit: dBm)

<GSM Conducted Power for AT&T S3 phone >

Band: GSM850	Burst Average Power (dBm)			Frame-Average Power (dBm)		
Channel	128	189	251	128	189	251
Frequency (MHz)	824.2	836.4	848.8	824.2	836.4	848.8
GSM (GMSK, 1 Tx slot)	33.17	33.07	33.14	24.17	24.07	24.14
GPRS (GMSK, 1 Tx slot) – CS1	33.00	33.03	33.01	24.00	24.03	24.01
GPRS (GMSK, 2 Tx slots) – CS1	31.36	31.64	31.70	25.36	25.64	25.70
GPRS (GMSK, 3 Tx slots) – CS1	26.44	26.48	26.72	17.44	17.48	17.72
GPRS (GMSK, 4 Tx slots) – CS1	26.35	26.40	26.64	20.35	20.40	20.64

Remark: The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots.
The calculated method are shown as below:
Frame-averaged power = Maximum burst averaged power (1 Tx Slot) - 9 dB
Frame-averaged power = Maximum burst averaged power (2 Tx Slots) - 6 dB
Frame-averaged power = Maximum burst averaged power (3 Tx Slots) - 4.26 dB
Frame-averaged power = Maximum burst averaged power (4 Tx Slots) - 3 dB

Band: GSM1900	Burst Average Power (dBm)			Frame-Average Power (dBm)		
Channel	512	661	810	512	661	810
Frequency (MHz)	1850.2	1880.0	1909.8	1850.2	1880.0	1909.8
GSM (GMSK, 1 Tx slot)	29.63	29.57	29.72	20.63	20.57	20.72
GPRS (GMSK, 1 Tx slot) – CS1	29.69	29.51	29.70	20.69	20.51	20.70
GPRS (GMSK, 2 Tx slots) – CS1	27.70	27.80	28.20	21.70	21.80	22.20
GPRS (GMSK, 3 Tx slots) – CS1	25.37	25.45	25.62	16.37	16.45	16.62
GPRS (GMSK, 4 Tx slots) – CS1	25.19	25.27	25.47	19.19	19.27	19.47

Remark: The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots.
The calculated method are shown as below:
Frame-averaged power = Maximum burst averaged power (1 Tx Slot) - 9 dB
Frame-averaged power = Maximum burst averaged power (2 Tx Slots) - 6 dB
Frame-averaged power = Maximum burst averaged power (3 Tx Slots) - 4.26 dB
Frame-averaged power = Maximum burst averaged power (4 Tx Slots) - 3 dB

<WCDMA Conducted Power for AT&T S3 phone >

The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification.

A summary of these settings are illustrated below:

HSDPA Setup Configuration:

a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting:
   i. Set Gain Factors (β_c and β_d) and parameters were set according to each
   ii. Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
   iii. Set RMC 12.2Kbps + HSDPA mode.
   iv. Set Cell Power = -86 dBm
   v. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
   vi. Select HSDPA Uplink Parameters
   vii. Set Delta ACK, Delta NACK and Delta CQI = 8
   viii. Set Ack-Nack Repetition Factor to 3
   ix. Set CQI Feedback Cycle (k) to 4 ms
   x. Set CQI Repetition Factor to 2
   xi. Power Ctrl Mode = All Up bits
d. The transmitted maximum output power was recorded.

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c.

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and Δ_{NACK} = 30/15 with β_{hs} = 30/15 * β_c, and Δ_{CQI} = 24/15 with β_{hs} = 24/15 * β_c.

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: 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 signalled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

Setup Configuration

HSUPA Setup Configuration:

a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting * :
   i. Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
   ii. Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121
   iii. Set Cell Power = -86 dBm
   iv. Set Channel Type = 12.2k + HSPA
   v. Set UE Target Power
   vi. Power Ctrl Mode= Alternating bits
   vii. Set and observe the E-TFCI
   viii. Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI
d. The transmitted maximum output power was recorded.

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (Note 5) (Note 6)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	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	$\beta_{ed}1$: 47/15 $\beta_{ed}2$: 47/15	4 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 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with 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 signalled 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 signalled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.
Note 5: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.
Note 6: β_{ed} can not be set directly, it is set by Absolute Grant Value.

Setup Configuration

Band		WCDMA Band V			WCDMA Band II		
Tx Channel		4132	4182	4233	9262	9400	9538
Rx Channel		4357	4407	4458	9662	9800	9938
Frequency (MHz)		826.4	836.4	846.6	1852.4	1880	1907.6
3GPP Rel 99	AMR 12.2Kbps	23.11	23.01	22.81	22.90	22.37	22.96
3GPP Rel 99	RMC 12.2Kbps	23.13	23.02	22.82	22.91	22.39	22.97
3GPP Rel 6	HSDPA Subtest-1	22.09	21.98	21.79	21.45	20.92	21.51
3GPP Rel 6	HSDPA Subtest-2	22.14	22.05	21.87	21.51	20.98	21.56
3GPP Rel 6	HSDPA Subtest-3	22.14	22.03	21.82	21.41	20.90	21.47
3GPP Rel 6	HSDPA Subtest-4	22.12	22.02	21.81	21.41	20.89	21.48
3GPP Rel 6	HSUPA Subtest-1	20.83	20.72	20.53	20.65	20.95	20.76
3GPP Rel 6	HSUPA Subtest-2	20.06	19.53	19.71	19.33	19.30	19.01
3GPP Rel 6	HSUPA Subtest-3	21.04	20.95	20.74	20.18	20.06	20.24
3GPP Rel 6	HSUPA Subtest-4	21.02	20.91	20.71	20.50	19.99	20.55
3GPP Rel 6	HSUPA Subtest-5	20.72	20.60	20.42	20.62	20.10	20.67
3GPP MPR specification	MPR result	WCDMA Band V			WCDMA Band II		
0	HSDPA Subtest-1	0.00	0.00	0.00	0.00	0.00	0.00
0	HSDPA Subtest-2	-0.05	-0.07	-0.08	-0.06	-0.06	-0.05
≦0.5	HSDPA Subtest-3	-0.05	-0.05	-0.03	0.04	0.02	0.04
≦0.5	HSDPA Subtest-4	-0.03	-0.04	-0.02	0.04	0.03	0.03
≦0	HSUPA Subtest-1	-0.11	-0.12	-0.11	-0.03	-0.85	-0.09
≦2	HSUPA Subtest-2	0.66	1.07	0.71	1.29	0.80	1.66
≦1	HSUPA Subtest-3	-0.32	-0.35	-0.32	0.44	0.04	0.43
≦2	HSUPA Subtest-4	-0.30	-0.31	-0.29	0.12	0.11	0.12
≦0	HSUPA Subtest-5	0.00	0.00	0.00	0.00	0.00	0.00

<LTE Conducted Power for AT&T S3 phone >

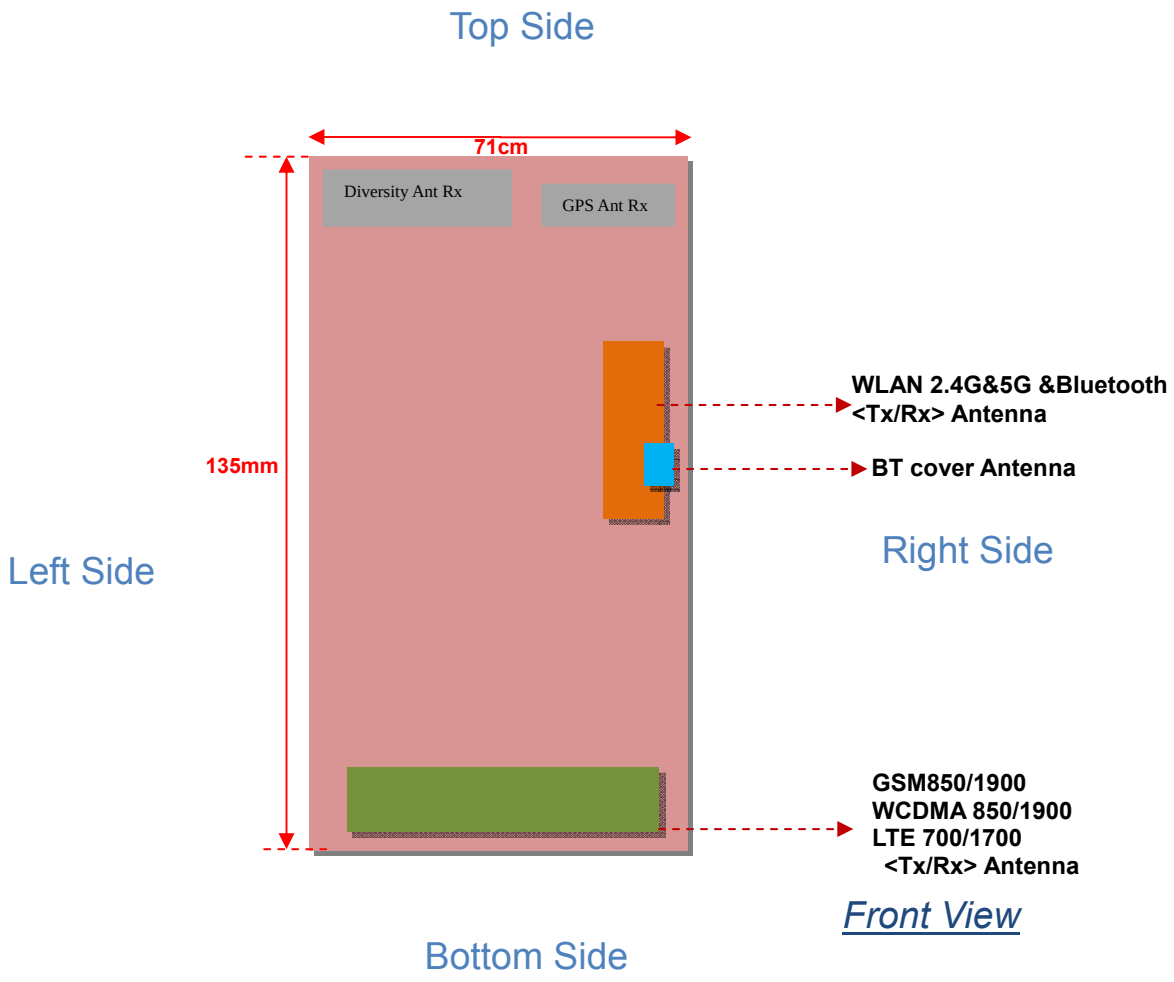
		LTE Band 4						
BW [MHz]	Mod / RB (Size - Offset)	Average Power. (dBm)			3GPP MPR	MPR Result (dB)		
		Low Ch	Mid Ch	High Ch		Low Ch	Mid Ch	High Ch
Channel		20050	20175	20300		20050	20175	20300
Frequency (MHz)		1720	1732.5	1745		1720	1732.5	1745
20	QPSK 1-0	23.43	23.15	23.55	0	0.05	0.13	0.00
20	QPSK 1-99	23.48	22.92	23.33		0.00	0.36	0.22
20	QPSK 50-24	22.31	22.27	22.83	≤ 1	1.17	1.01	0.72
20	QPSK 100-0	22.30	22.30	22.60		1.18	0.98	0.95
20	16QAM 1-0	22.87	22.90	22.64	≤ 1	0.61	0.38	0.91
20	16QAM 1-99	22.95	22.13	22.30		0.53	1.15	1.25
20	16QAM 50-24	21.41	21.42	21.57	≤ 2	2.07	1.86	1.98
20	16QAM 100-0	21.30	21.37	21.63		2.18	1.91	1.92
Channel		20025	20175	20325		20025	20175	20325
Frequency (MHz)		1717.5	1732.5	1747.5		1717.5	1732.5	1747.5
15	QPSK 1-0	23.09	22.82	**23.69**	0	0.00	0.23	0.00
15	QPSK 1-74	22.91	22.93	23.37		0.18	0.12	0.32
15	QPSK 36-18	22.29	22.39	22.75	≤ 1	0.80	0.66	0.94
15	QPSK 75-0	22.21	22.33	22.59		0.88	0.72	1.10
15	16QAM 1-0	22.67	22.41	22.66	≤ 1	0.42	0.64	1.03
15	16QAM 1-74	22.49	22.36	22.49		0.60	0.69	1.20
15	16QAM 36-18	21.40	21.34	21.61	≤ 2	1.69	1.71	2.08
15	16QAM 75-0	21.22	21.26	21.61		1.87	1.79	2.08
Channel		20000	20175	20350		20000	20175	20350
Frequency (MHz)		1715	1732.5	1750		1715	1732.5	1750
10	QPSK 1-0	22.88	23.27	23.11	0	0.14	0.00	0.06
10	QPSK 1-49	22.85	22.73	23.04		0.17	0.54	0.13
10	QPSK 25-12	22.37	22.30	22.32	≤ 1	0.65	0.97	0.85
10	QPSK 50-0	22.22	22.21	22.07		0.80	1.06	1.10
10	16QAM 1-0	22.20	22.05	22.81	≤ 1	0.82	1.22	0.36
10	16QAM 1-49	22.09	22.16	21.86		0.93	1.11	1.31
10	16QAM 25-12	21.44	21.46	21.96	≤ 2	1.58	1.81	1.21
10	16QAM 50-0	21.42	21.24	21.73		1.60	2.03	1.44
Channel		19975	20175	20375		19975	20175	20375
Frequency (MHz)		1712.5	1732.5	1752.5		1712.5	1732.5	1752.5
5	QPSK 1-0	23.05	23.07	23.51	0	0.12	0.10	0.00
5	QPSK 1-24	22.96	22.89	23.32		0.21	0.28	0.19
5	QPSK 12-6	22.36	22.36	22.31	≤ 1	0.81	0.81	1.20
5	QPSK 25-0	22.33	22.23	21.94		0.84	0.94	1.57
5	16QAM 1-0	22.65	22.47	22.38	≤ 1	0.52	0.70	1.13
5	16QAM 1-24	22.04	22.11	21.97		1.13	1.06	1.54
5	16QAM 12-6	21.41	21.47	21.03	≤ 2	1.76	1.70	2.48
5	16QAM 25-0	21.37	21.46	20.94		1.80	1.71	2.57

LTE Band 17								
Channel		23780	23790	23800		23780	23790	23800
Frequency (MHz)		709	710	711		709	710	711
10	QPSK 1-0	23.43	23.40	23.29	0	0.04	0.36	0.33
10	QPSK 1-49	23.47	23.27	23.30		0.00	0.49	0.32
10	QPSK 25-13	22.10	22.92	22.51	≤ 1	1.37	0.84	1.11
10	QPSK 50-0	22.02	22.97	22.84		1.45	0.79	0.78
10	16QAM 1-0	22.27	22.19	22.14	≤ 1	1.20	1.57	1.48
10	16QAM 1-49	21.90	22.42	22.19		1.57	1.34	1.43
10	16QAM 25-13	21.29	21.70	21.75	≤ 2	2.18	2.06	1.87
10	16QAM 50-0	21.07	22.03	21.91		2.40	1.73	1.71
Channel		23755	23790	23825		23755	23790	23825
Frequency (MHz)		706.5	710	713.5		706.5	710	713.5
5	QPSK 1-0	22.86	23.40	23.25	0	0.09	0.38	0.14
5	QPSK 1-24	22.91	23.43	23.05		0.04	0.35	0.34
5	QPSK 12-6	22.26	22.51	22.11	≤ 1	0.69	1.27	1.28
5	QPSK 25-0	22.10	23.02	22.52		0.85	0.76	0.87
5	16QAM 1-0	22.32	22.41	22.09	≤ 1	0.63	1.37	1.30
5	16QAM 1-24	22.09	22.42	22.25		0.86	1.36	1.14
5	16QAM 12-6	21.29	21.34	20.96	≤ 2	1.66	2.44	2.43
5	16QAM 25-0	21.22	21.77	21.87		1.73	2.01	1.52

<Bluetooth Conducted Power for BT S3 case>

Bluetooth Average Power (dBm)										
Channel	Frequency (MHz)	Data Rate								
		DH1	DH3	DH5	2DH1	2DH3	2DH5	3DH1	3DH3	3DH5
CH 00	2402	1.63	1.59	1.42	1.57	1.01	0.90	1.72	1.08	0.79
CH 39	2441	1.43	1.61	1.55	1.47	1.03	1.03	1.69	1.22	1.11
CH 78	2480	1.25	1.15	0.96	1.04	0.55	0.33	1.16	0.65	0.50

11. Antenna Location



12. SAR Test Results

Note:

When the BT S3 case is not transmitting, with BT S3 attached to AT&T S3, test SAR according to the highest SAR reported in the original Samsung SAR report filed under FCC ID A3ISGHI747, for each combination of wireless mode, frequency band and exposure configuration (head, body-worn accessory and hotspot mode etc. where all positions in each exposure configuration are considered as one exposure configuration):

12.1 Test Records for Head SAR Test

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB Offset	Test Position	Ch.	Freq. (MHz)	Power Drift (dB)	Measured SAR_{1g} (W/kg)
#09	GSM1900	-	GSM	-	-	Left Cheek	661	1880	-0.04	0.312
#10	WCDMA Band II	-	RMC12.2	-	-	Left Cheek	9400	1880	-0.11	0.421
#11	LTE band 4	20	QPSK	1	0	Left Cheek	20175	1732.5	-0.06	0.249

12.2 Test Records for Hotspot SAR Test

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB Offset	Test Position	Gap	Ch.	Freq. (MHz)	Power Drift (dB)	Measured SAR_{1g} (W/kg)
#08	GSM850	-	GPRS(2 Tx slots)	-	-	Back	1	190	836.6	-0.04	0.096
#01	GSM1900	-	GPRS(2 Tx slots)	-	-	Front	1	661	1880	0.12	0.279
#02	WCDMA Band II	-	RMC12.2	-	-	Front	1	9400	1880	-0.06	0.295
#05	LTE band 4	20	QPSK	1	0	Front	1	20175	1732.5	-0.06	0.237
#07	LTE band 17	10	QPSK	1	49	Back	1	23790	710	-0.06	0.093

12.3 Test Records for Body Worn SAR Test

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB Offset	Test Position	Gap	Ch.	Freq. (MHz)	Power Drift (dB)	Measured SAR_{1g} (W/kg)
#08	GSM850	-	GPRS(2 Tx slots)	-	-	Back	1	190	836.6	-0.04	0.096
#04	GSM1900	-	GPRS(2 Tx slots)	-	-	Back	1	661	1880	-0.15	0.242
#03	WCDMA Band II	-	RMC12.2	-	-	Back	1	9400	1880	-0.09	0.234
#06	LTE band 4	20	QPSK	1	0	Back	1	20175	1732.5	-0.05	0.121
#07	LTE band 17	10	QPSK	1	49	Back	1	23790	710	-0.06	0.093

12.4 Highest SAR Plot

#08 GSM850_GPRS(2 Tx slots)_Back_1cm_Ch190

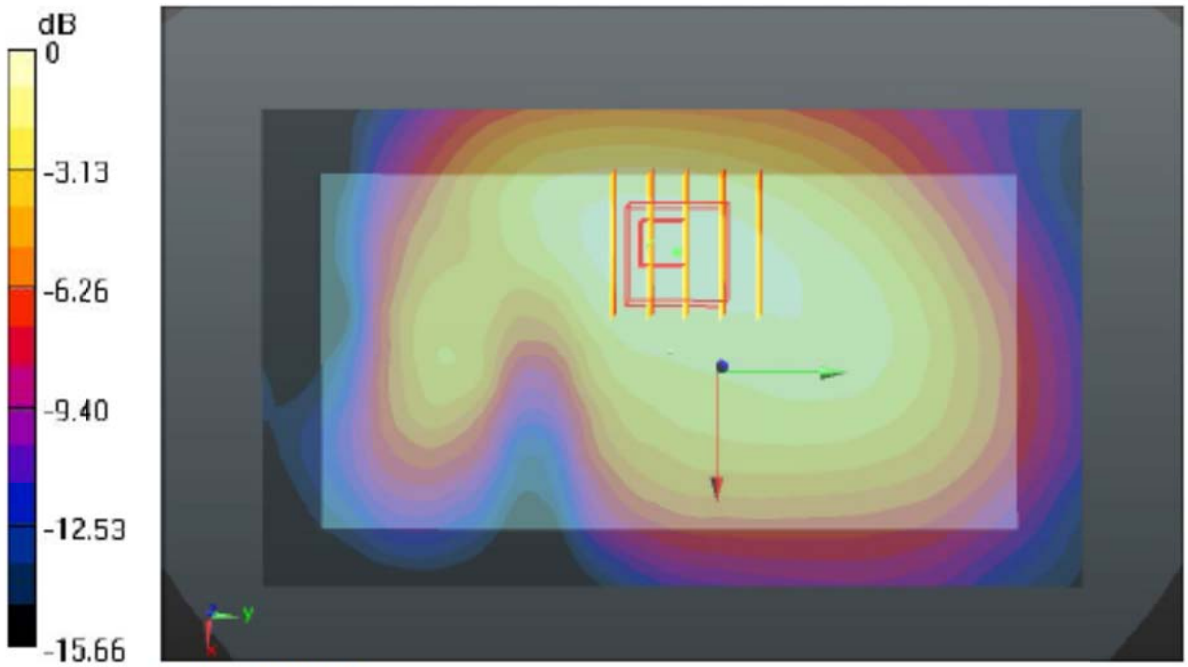
DUT: 330601

Communication System: GPRS/EDGE10; Frequency: 836.6 MHz;Duty Cycle: 1:4
Medium: MSL_835_130620 Medium parameters used: f = 837 MHz; σ = 0.977 mho/m; ε_r = 54.295; ρ = 1000 kg/m^3
Ambient Temperature : 23.5 ℃; Liquid Temperature : 21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(9.5, 9.5, 9.5); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM2; Type: QD000P40CD; Serial: TP:1671
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Ch190/Area Scan (71x121x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.103 W/kg

Ch190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.822 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.122 mW/g
SAR(1 g) = 0.096 mW/g; SAR(10 g) = 0.072 mW/g
Maximum value of SAR (measured) = 0.111 W/kg



0 dB = 0.111 W/kg

#09 GSM1900_GSM Voice_Left Cheek_Ch661

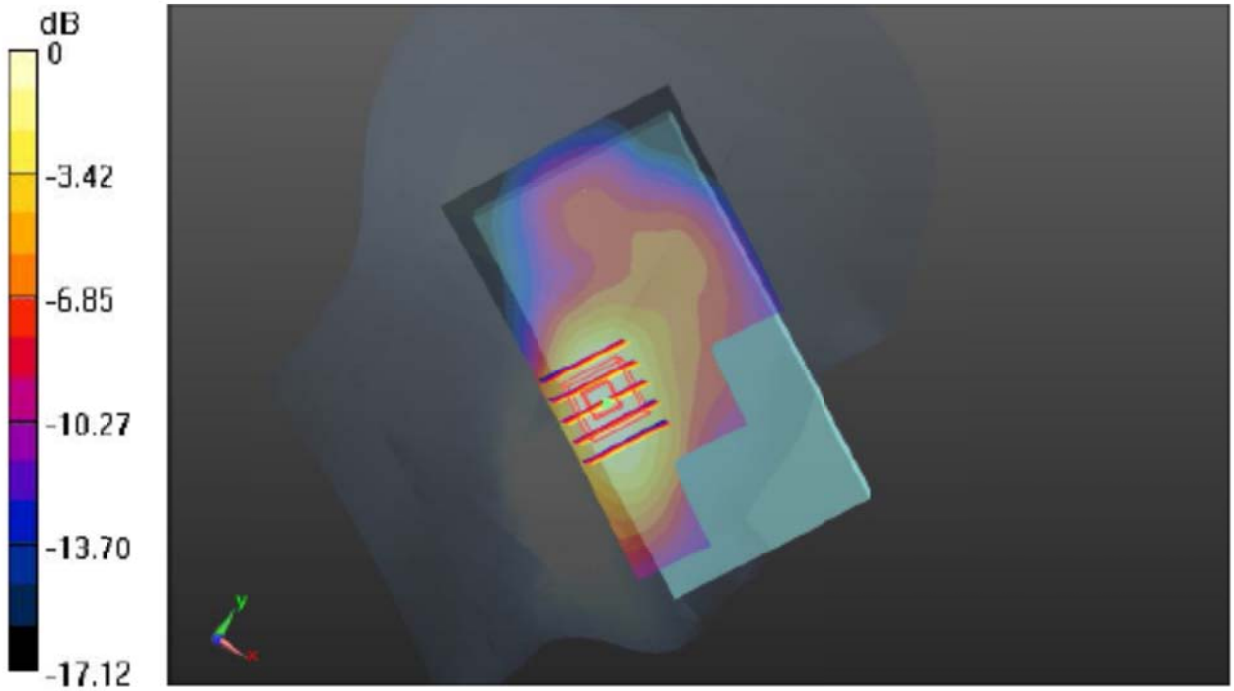
DUT: 330601

Communication System: Generic GSM; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL_1900_130621 Medium parameters used: f = 1880 MHz; σ = 1.432 mho/m; ε_r = 39.176; ρ = 1000 kg/m^3
Ambient Temperature：23.9 ℃; Liquid Temperature：21.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(7.84, 7.84, 7.84); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Ch661/Area Scan (61x121x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.404 W/kg

Ch661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.905 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.473 mW/g
SAR(1 g) = 0.312 mW/g; SAR(10 g) = 0.192 mW/g
Maximum value of SAR (measured) = 0.388 W/kg



0 dB = 0.388 W/kg

#10 WCDMA Band II_RMC12.2K_Left Cheek_Ch9400

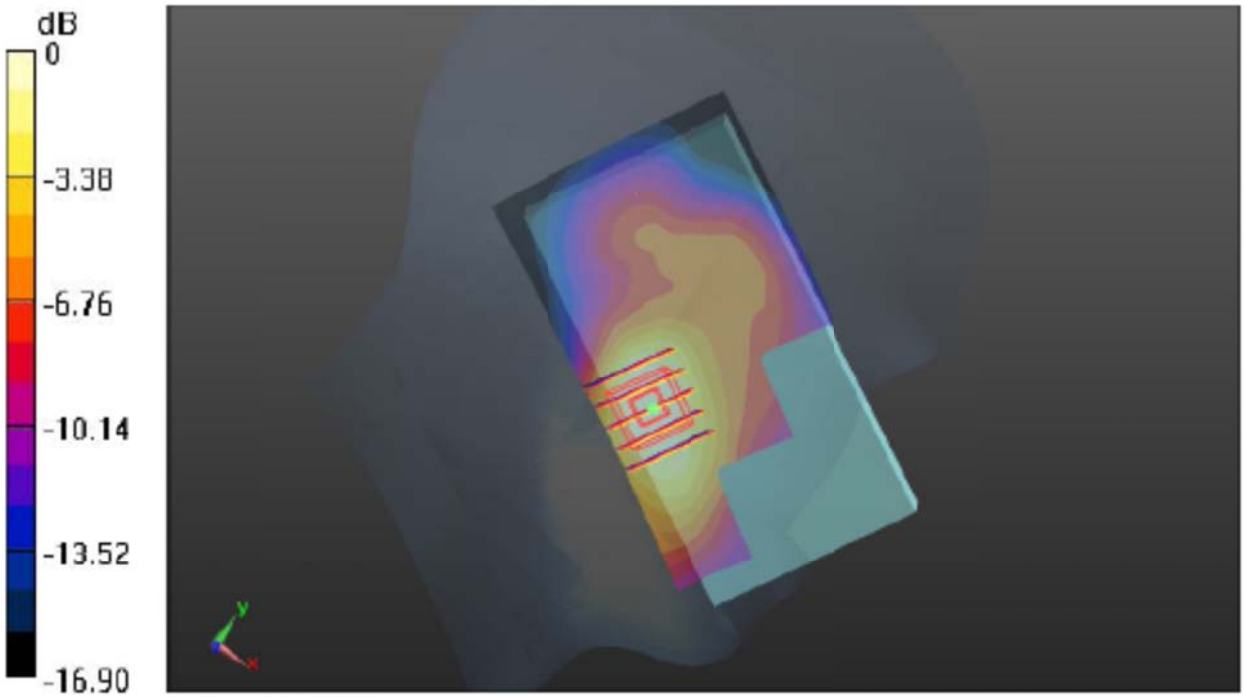
DUT: 330601

Communication System: UMTS; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: HSL_1900_130621 Medium parameters used: f = 1880 MHz; σ = 1.432 mho/m; ε_r = 39.176; ρ = 1000 kg/m^3
Ambient Temperature：23.9 ℃; Liquid Temperature：21.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(7.84, 7.84, 7.84); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Ch9400/Area Scan (61x121x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.557 W/kg

Ch9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.760 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.641 mW/g
SAR(1 g) = 0.421 mW/g; SAR(10 g) = 0.258 mW/g
Maximum value of SAR (measured) = 0.526 W/kg



0 dB = 0.526 W/kg

#11 LTE Band 4_20M_QPSK 1RB 0offset_Left Cheek_Ch20175

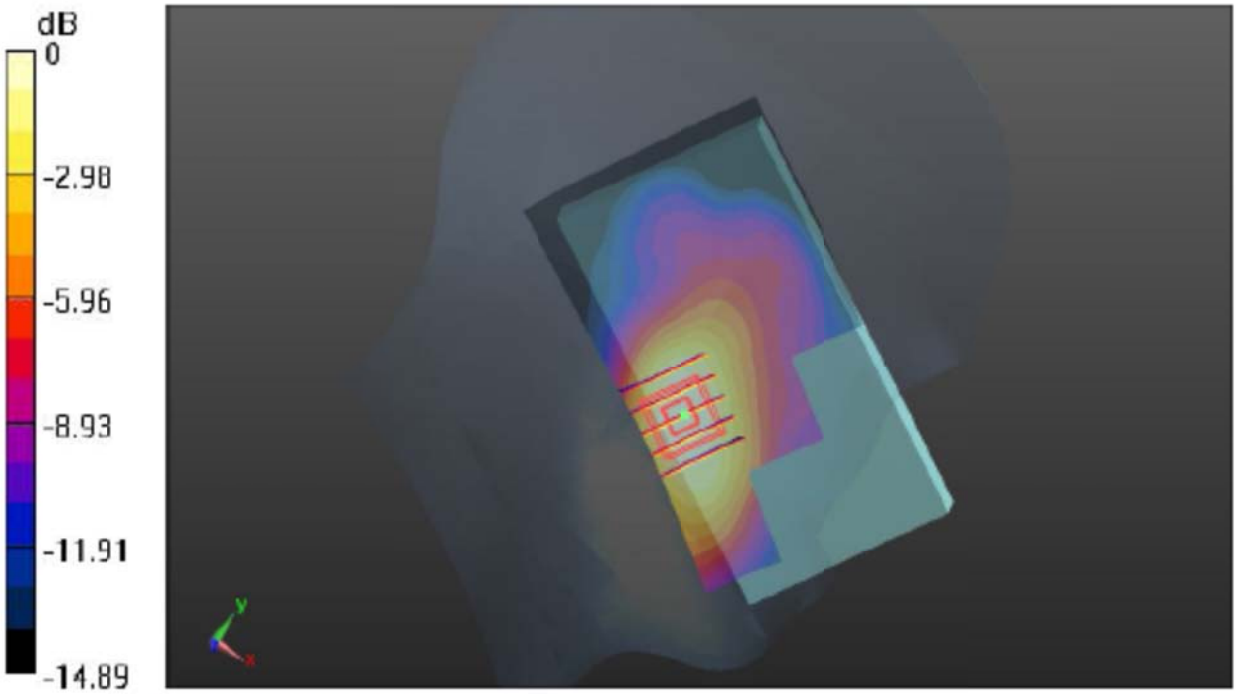
DUT: 330601

Communication System: LTE; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium: HSL_1800_130621 Medium parameters used: f = 1732.5 MHz; σ = 1.368 mho/m; ε_r = 39.916; ρ = 1000 kg/m^3
Ambient Temperature：23.4 ℃; Liquid Temperature：21.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(8.2, 8.2, 8.2); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Ch20175/Area Scan (61x121x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.322 W/kg

Ch20175/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.124 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.367 mW/g
SAR(1 g) = 0.249 mW/g; SAR(10 g) = 0.160 mW/g
Maximum value of SAR (measured) = 0.304 W/kg



0 dB = 0.304 W/kg

#07 LTE Band 17_10M_QPSK 1RB 49offset_Back_1cm_Ch23790

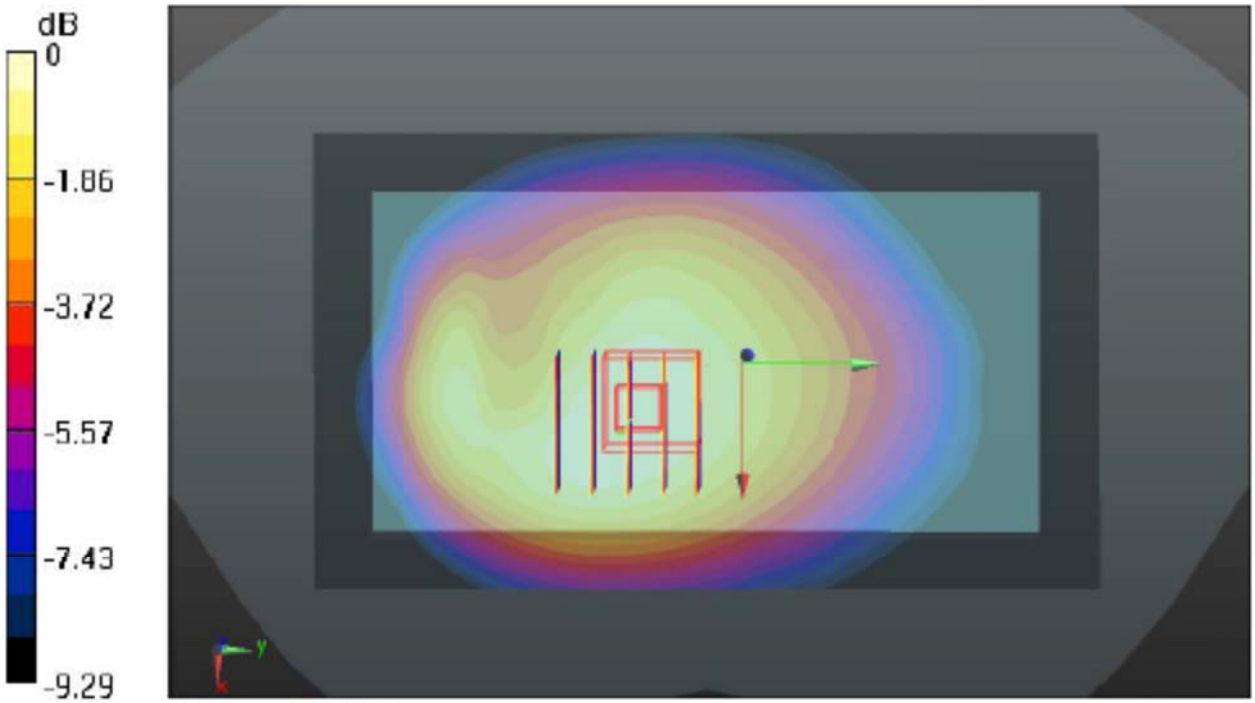
DUT: 330601

Communication System: LTE; Frequency: 710 MHz;Duty Cycle: 1:1
Medium: MSL_750_130620 Medium parameters used: f = 710 MHz; σ = 0.934 mho/m; ε_r = 54.866; ρ = 1000 kg/m^3
Ambient Temperature：23.8 ℃; Liquid Temperature：21.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(9.72, 9.72, 9.72); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM2; Type: QD000P40CD; Serial: TP:1671
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Ch23790/Area Scan (71x121x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.109 W/kg

Ch23790/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.970 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.120 mW/g
SAR(1 g) = 0.093 mW/g; SAR(10 g) = 0.071 mW/g
Maximum value of SAR (measured) = 0.107 W/kg



0 dB = 0.107 W/kg

13. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Phone				Note
		Head	Body-worn	Hotspot	PTT	
1.	GSM(Voice) + WLAN2.4GHz(data)/ WLAN5GHz(data)	Yes	Yes	–		5GHz,Clinet Only
2.	WCDMA(Voice) + WLAN2.4GHz(data) / WLAN5GHz(data)	Yes	Yes	–		5GHz,Clinet Only
3.	LTE(Data) + WLAN2.4GHz(data)	Yes	Yes	Yes		–
4.	LTE(Data) + WLAN5GHz(data)	Yes	Yes	–		5GHz,Clinet Only
5.	GPRS/EDGE(Data) + WLAN2.4GHz(data)	–	–	Yes		2.4GHz Hotspot
6.	WCDMA(Data) + WLAN2.4GHz(data)	Yes	Yes	Yes		2.4GHz Hotspot
7.	GSM(Voice) + Bluetooth PTT+BTS3				Yes	
8.	WCDMA((Voice/data) + Bluetooth PTT+BTS3				Yes	
9.	LTE(Data) + Bluetooth PTT+BTS3				Yes	VOIP

Note:

1. WLAN and Bluetooth (S3) share the same antenna, and cannot transmit simultaneously.
2. EUT will choose either GSM or WCDMA or LTE according to the network signal condition; therefore, they will not transmit simultaneously.
3. The SAR summation is calculated based on the same configuration and test position.
4. For simultaneous transmission SAR, repeat the simultaneous transmission SAR test exclusion analysis in the SAR report for A3LSGHI747 by substituting any measured SAR with BT S3 case attached to AT&T S3.
5. For simultaneous transmission analysis, WLAN 2.4G and WLAN 5G SAR value is refer the SAR report FCC ID: A3LSGHI747.
6. Per KDB 447498 D01v05r01, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:
   [(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] ·[$\sqrt{f(GHz)}$] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
   - f(GHz) is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest mW and mm before calculation
   - The result is rounded to one decimal place for comparison
   - PTT test distance is 25mm

Bluetooth Max Power (dBm)	mW	Test Distance (mm)	Frequency (GHz)	exclusion thresholds
3	2.0	25	2.48	0.13

7. Per KDB 447498 D01 v05r01 exclusion thresholds is 0.13 < 3, RF exposure evaluation is not required.
8. BT S3 case is attached to an AT&T S3, when the BT S3 case is actively operating in PTT mode and transmitting, as long as PTT is supported by a mechanical PTT button only and BT S3 case maximum output power at 25 mm (PTT test distance) qualifies for the standalone SAR test exclusion in KDB 447498, simultaneous transmission SAR test exclusion analysis is not required.

13.1 Head Exposure Conditions

Position	WWAN			WLAN 2.4G	WLAN 5G	WWAN+WLAN 2.4G Summed SAR (W/kg)	WWAN+WLAN 5G Summed SAR (W/kg)
	WWAN Band	Plot No	SAR (W/kg)	SAR (W/kg)	SAR (W/kg)		
Left Cheek	GSM1900	9	0.312	0.028	0.126	**0.34**	**0.44**
	WCDMA 1900	10	0.421	0.028	0.126	**0.45**	**0.55**
	LTE band 4	11	0.249	0.028	0.126	**0.28**	**0.38**

13.2 Hotspot Exposure Conditions

Position	WWAN			WLAN 2.4G	WWAN+WLAN 2.4G Summed SAR (W/kg)
	WWAN Band	Plot No	SAR (W/kg)	SAR (W/kg)	
Back	GSM850	8	0.096	0.087	**0.18**
	GSM1900	1	0.279	0.087	**0.37**
	WCDMA 1900	2	0.295	0.087	**0.38**
	LTE band 4	5	0.237	0.087	**0.32**
	LTE band 17	7	0.093	0.087	**0.18**

13.3 Body Exposure Conditions

Position	WWAN			WLAN 2.4G	WLAN 5G	WWAN+WLAN 2.4G Summed SAR (W/kg)	WWAN+WLAN 5G Summed SAR (W/kg)
	WWAN Band	Plot No	SAR (W/kg)	SAR (W/kg)	SAR (W/kg)		
Back	GSM850	8	0.096	0.087	0.272	**0.18**	**0.37**
	GSM1900	4	0.242	0.087	0.272	**0.33**	**0.51**
	WCDMA 1900	3	0.234	0.087	0.272	**0.32**	**0.51**
	LTE band 4	6	0.121	0.087	0.272	**0.21**	**0.39**
	LTE band 17	7	0.093	0.087	0.272	**0.18**	**0.37**

Test Engineer： Kat Yin

14. Uncertainty Assessment

The component of uncertainly may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainly by the statistical analysis of a series of observations is termed a Type An evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance.

A Type A evaluation of standard uncertainty may be based on any valid statistical method for treating data. This includes calculating the standard deviation of the mean of a series of independent observations; using the method of least squares to fit a curve to the data in order to estimate the parameter of the curve and their standard deviations; or carrying out an analysis of variance in order to identify and quantify random effects in certain kinds of measurement.

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience, and knowledge of the behavior and properties of relevant materials and instruments, manufacture's specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in Table 12.1

Uncertainty Distributions	Normal	Rectangular	Triangular	U-Shape
Multi-plying Factor[(a)]	1/k[(b)]	1/√3	1/√6	1/√2

(a) standard uncertainty is determined as the product of the multiplying factor and the estimated range of variations in the measured quantity

(b) κ is the coverage factor

Table 13.1 Standard Uncertainty for Assumed Distribution

The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type B evaluation using the usual "root-sum-squares" (RSS) methods of combining standard deviations by taking the positive square root of the estimated variances.

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %. The DASY uncertainty Budget is shown in the following tables.

Error Description	Uncertainty Value (±%)	Probability Distribution	Divisor	Ci (1g)	Ci (10g)	Standard Uncertainty (1g)	Standard Uncertainty (10g)
Measurement System							
Probe Calibration	6.0	Normal	1	1	1	± 6.0 %	± 6.0 %
Axial Isotropy	4.7	Rectangular	√3	0.7	0.7	± 1.9 %	± 1.9 %
Hemispherical Isotropy	9.6	Rectangular	√3	0.7	0.7	± 3.9 %	± 3.9 %
Boundary Effects	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Linearity	4.7	Rectangular	√3	1	1	± 2.7 %	± 2.7 %
System Detection Limits	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Readout Electronics	0.3	Normal	1	1	1	± 0.3 %	± 0.3 %
Response Time	0.8	Rectangular	√3	1	1	± 0.5 %	± 0.5 %
Integration Time	2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %
RF Ambient Noise	3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
RF Ambient Reflections	3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
Probe Positioner	0.4	Rectangular	√3	1	1	± 0.2 %	± 0.2 %
Probe Positioning	2.9	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
Max. SAR Eval.	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Test Sample Related							
Device Positioning	2.9	Normal	1	1	1	± 2.9 %	± 2.9 %
Device Holder	3.6	Normal	1	1	1	± 3.6 %	± 3.6 %
Power Drift	5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %
Phantom and Setup							
Phantom Uncertainty	4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %
Liquid Conductivity (Target)	5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %
Liquid Conductivity (Meas.)	2.5	Normal	1	0.64	0.43	± 1.6 %	± 1.1 %
Liquid Permittivity (Target)	5.0	Rectangular	√3	0.6	0.49	± 1.7 %	± 1.4 %
Liquid Permittivity (Meas.)	2.5	Normal	1	0.6	0.49	± 1.5 %	± 1.2 %
Combined Standard Uncertainty						± 11.0 %	± 10.8 %
Coverage Factor for 95 %						K=2	
Expanded Uncertainty						**± 22.0 %**	**± 21.5 %**

Table 13.2 Uncertainty Budget for frequency range 300 MHz to 3 GHz

15. References

[1] FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”

[2] ANSI/IEEE Std. C95.1-1992, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”, September 1992

[3] IEEE Std. 1528-2003, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, December 2003

[4] FCC OET Bulletin 65 (Edition 97-01) Supplement C (Edition 01-01), “Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields”, June 2001

[5] SPEAG DASY System Handbook

[6] FCC KDB 447498 D01 v05r01, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, May 2013

[7] FCC KDB 648474 D04 v01r01, “SAR Evaluation Considerations for Wireless Handsets”, May 2013

[8] FCC KDB 941225 D01 v02, “SAR Measurement Procedures for 3G Devices – CDMA 2000 / Ev-Do / WCDMA / HSDPA / HSPA”, October 2007

[9] FCC KDB 941225 D05 v02r02, “SAR Evaluation Considerations for LTE Devices”, May 2013

Appendix A. Plots of System Performance Check

The plots are shown as follows.

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 21.06.2013

System Check_Head_1800MHz_130621

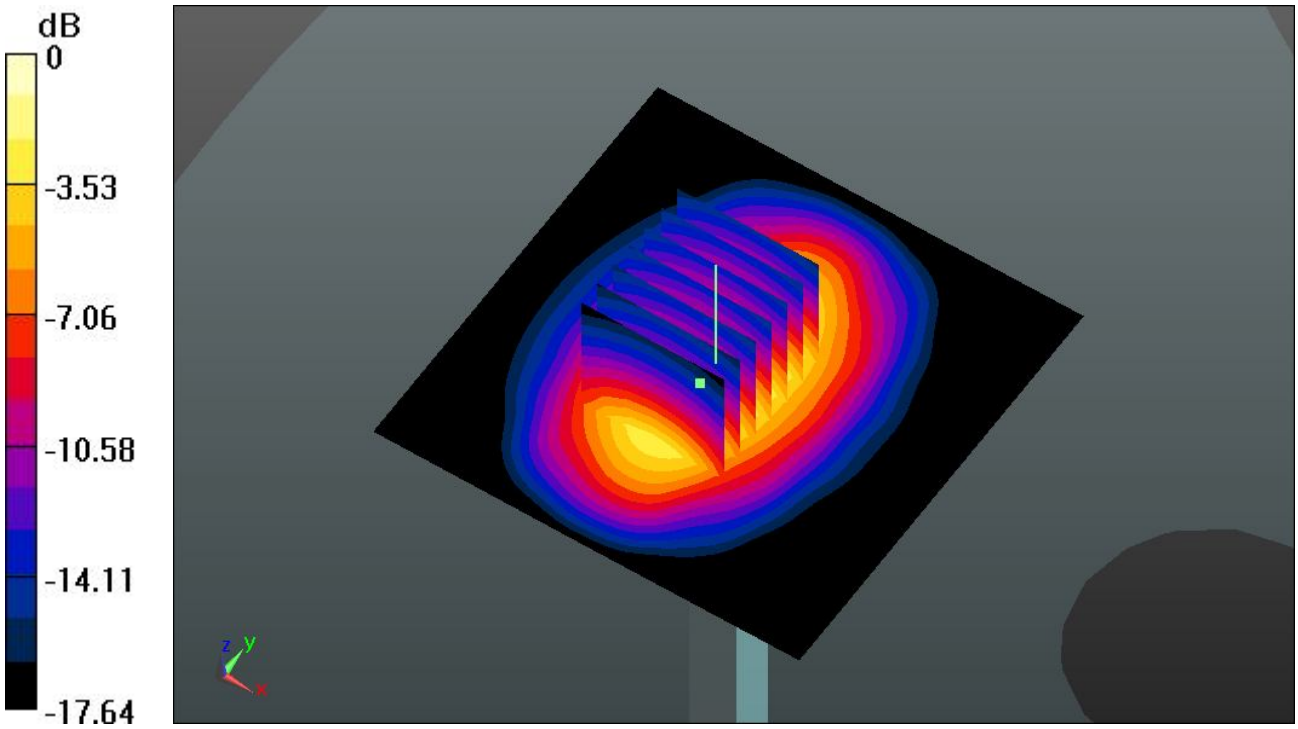
DUT: D1800V2 - SN: 2d177

Communication System: CW; Frequency: 1800 MHz;Duty Cycle: 1:1
Medium: HSL_1800_130621 Medium parameters used: f = 1800 MHz; σ = 1.438 mho/m; ε_r = 39.635; ρ = 1000 kg/m^3
Ambient Temperature：23.4 ℃; Liquid Temperature：21.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(8.2, 8.2, 8.2); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 11.2 W/kg

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 86.805 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 18.376 mW/g
SAR(1 g) = 9.78 mW/g; SAR(10 g) = 5.1 mW/g
Maximum value of SAR (measured) = 10.9 W/kg



0 dB = 10.9 W/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 21.06.2013

System Check_Head_1900MHz_130621

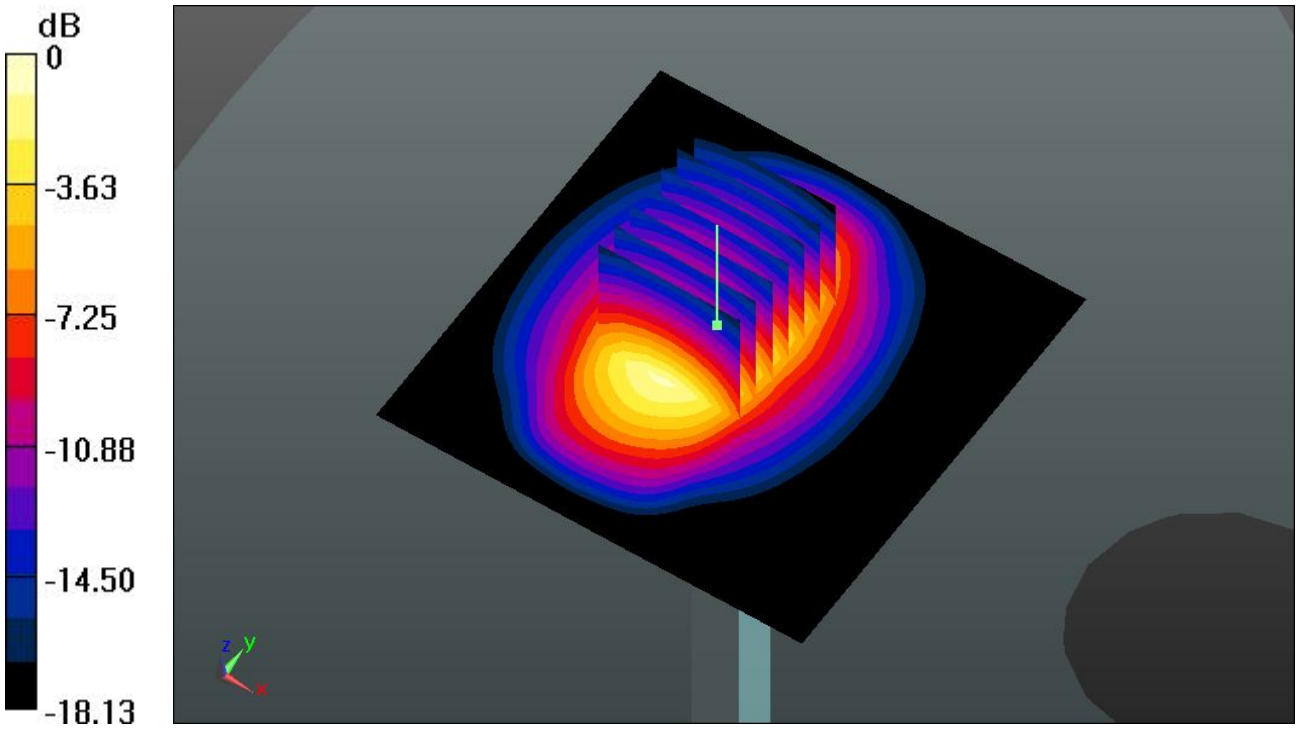
DUT: D1900V2 - SN: 5d118

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL_1900_130621 Medium parameters used: f = 1900 MHz; σ = 1.453 mho/m; ε_r = 39.107; ρ = 1000 kg/m^3
Ambient Temperature：23.9 ℃; Liquid Temperature：21.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(7.84, 7.84, 7.84); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 13.1 W/kg

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 80.938 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 20.855 mW/g
SAR(1 g) = 10.78 mW/g; SAR(10 g) = 5.53 mW/g
Maximum value of SAR (measured) = 12.4 W/kg



0 dB = 12.4 W/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 20.06.2013

System Check_Body_750MHz_130620

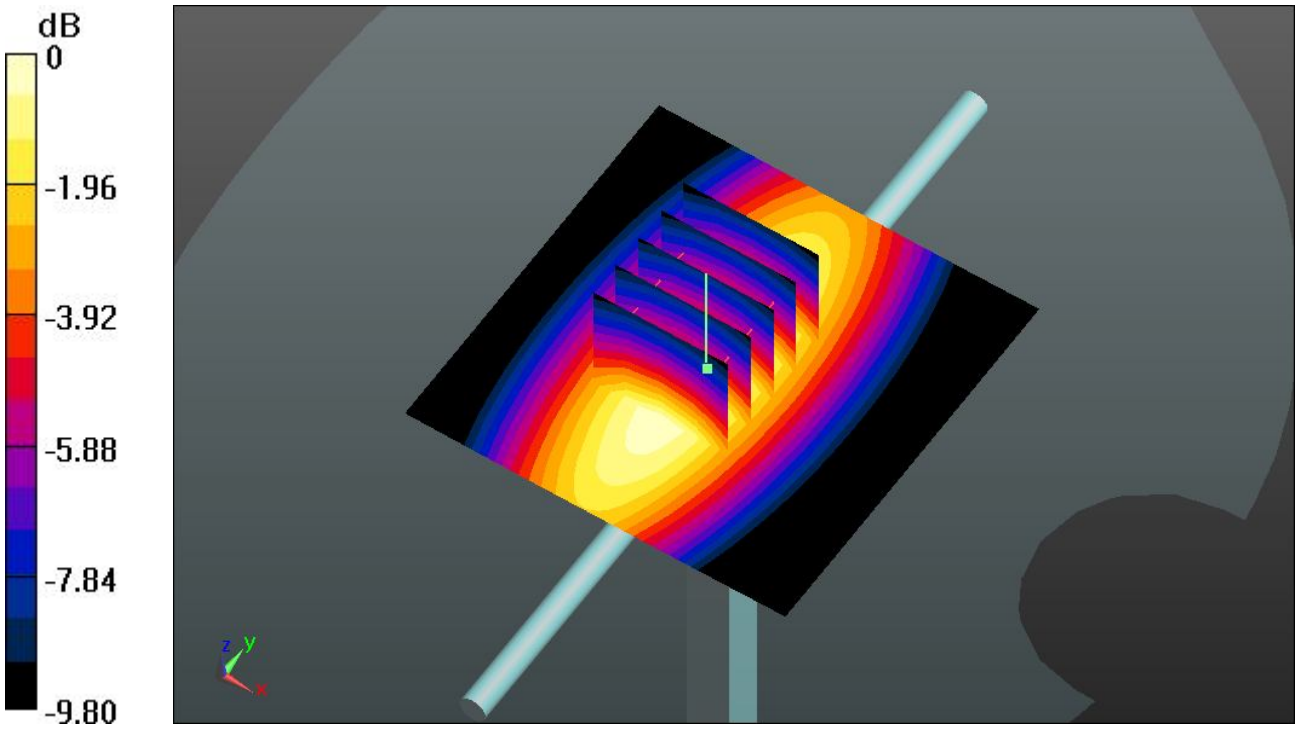
DUT: D750V2 - SN: 1065

Communication System: CW; Frequency: 750 MHz;Duty Cycle: 1:1
Medium: MSL_750_130620 Medium parameters used: f = 750 MHz; σ = 0.961 mho/m; ε_r = 53.931; ρ = 1000 kg/m^3
Ambient Temperature：23.8 ℃; Liquid Temperature：21.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(9.72, 9.72, 9.72); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM2; Type: QD000P40CD; Serial: TP:1671
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.86 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 50.436 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.322 mW/g
SAR(1 g) = 2.3 mW/g; SAR(10 g) = 1.54 mW/g
Maximum value of SAR (measured) = 2.87 W/kg



0 dB = 2.87 W/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 20.06.2013

System Check_Body_835MHz_130620

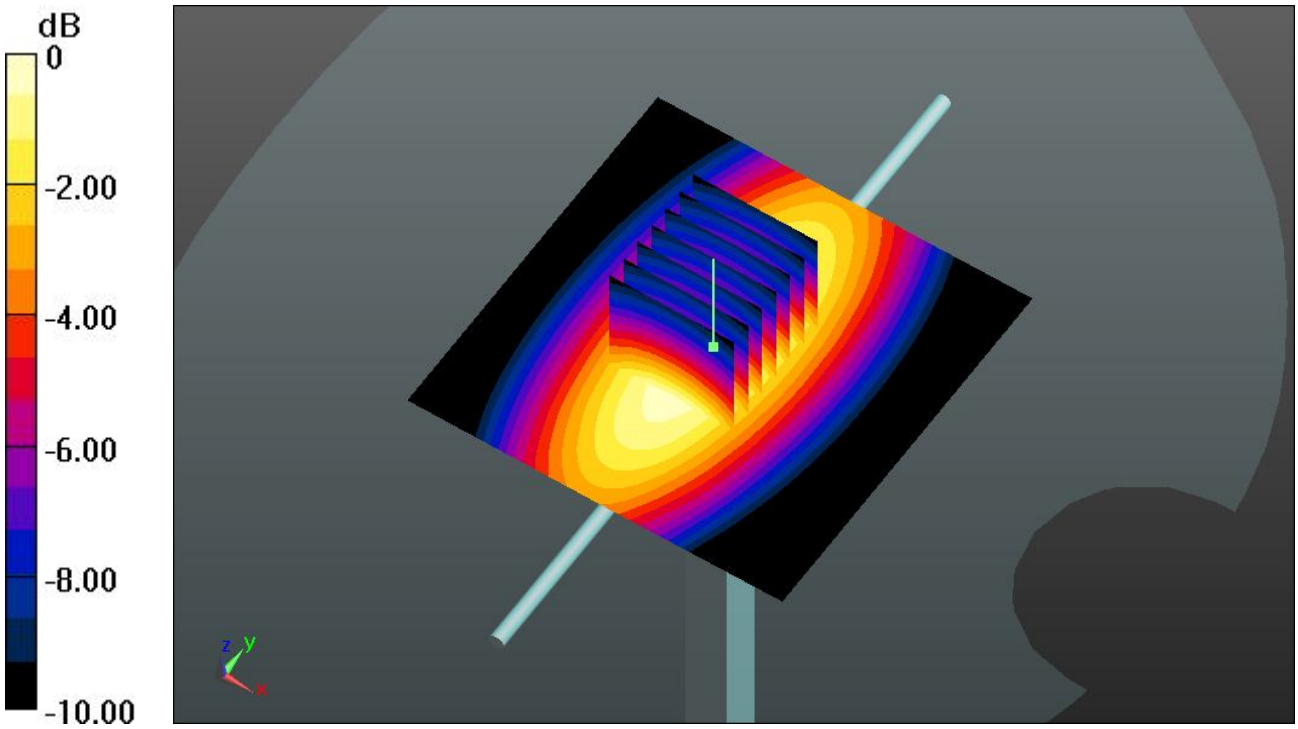
DUT: D835V2 - SN: 4d091

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: MSL_835_130620 Medium parameters used: f = 835 MHz; σ = 0.975 mho/m; ε_r = 54.314; ρ = 1000 kg/m^3
Ambient Temperature：23.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(9.5, 9.5, 9.5); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM2; Type: QD000P40CD; Serial: TP:1671
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.64 W/kg

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.176 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 3.571 mW/g
SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.6 mW/g
Maximum value of SAR (measured) = 2.62 W/kg



0 dB = 2.62 W/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 20.06.2013

System Check_Body_1800MHz_130620

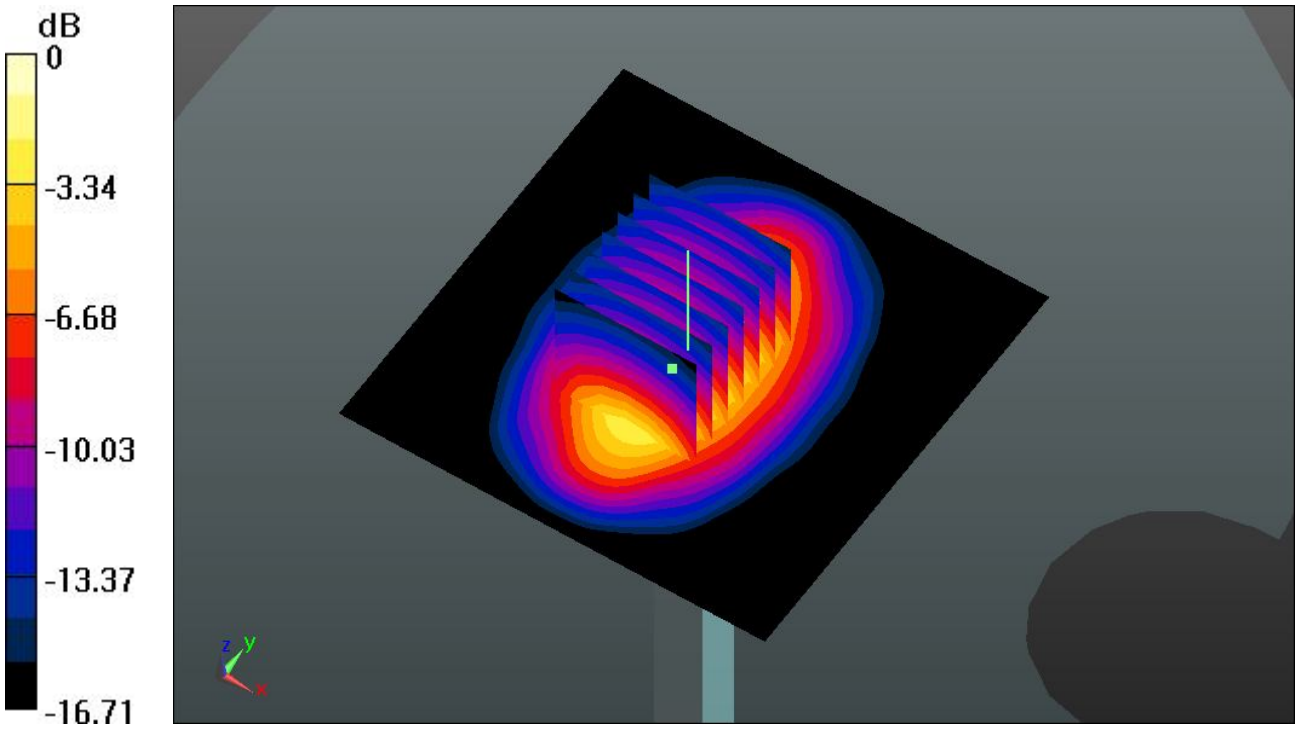
DUT: D1800V2 - SN: 2d177

Communication System: CW; Frequency: 1800 MHz;Duty Cycle: 1:1
Medium: MSL_1800_130620 Medium parameters used: f = 1800 MHz; σ = 1.579 mho/m; ε_r = 54.828; ρ = 1000 kg/m^3
Ambient Temperature：23.6 ℃; Liquid Temperature：21.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(8, 8, 8); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 11.0 W/kg

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 83.053 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 17.332 mW/g
SAR(1 g) = 9.63 mW/g; SAR(10 g) = 5.08 mW/g
Maximum value of SAR (measured) = 10.8 W/kg



0 dB = 10.8 W/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 20.06.2013

System Check_Body_1900MHz_130620

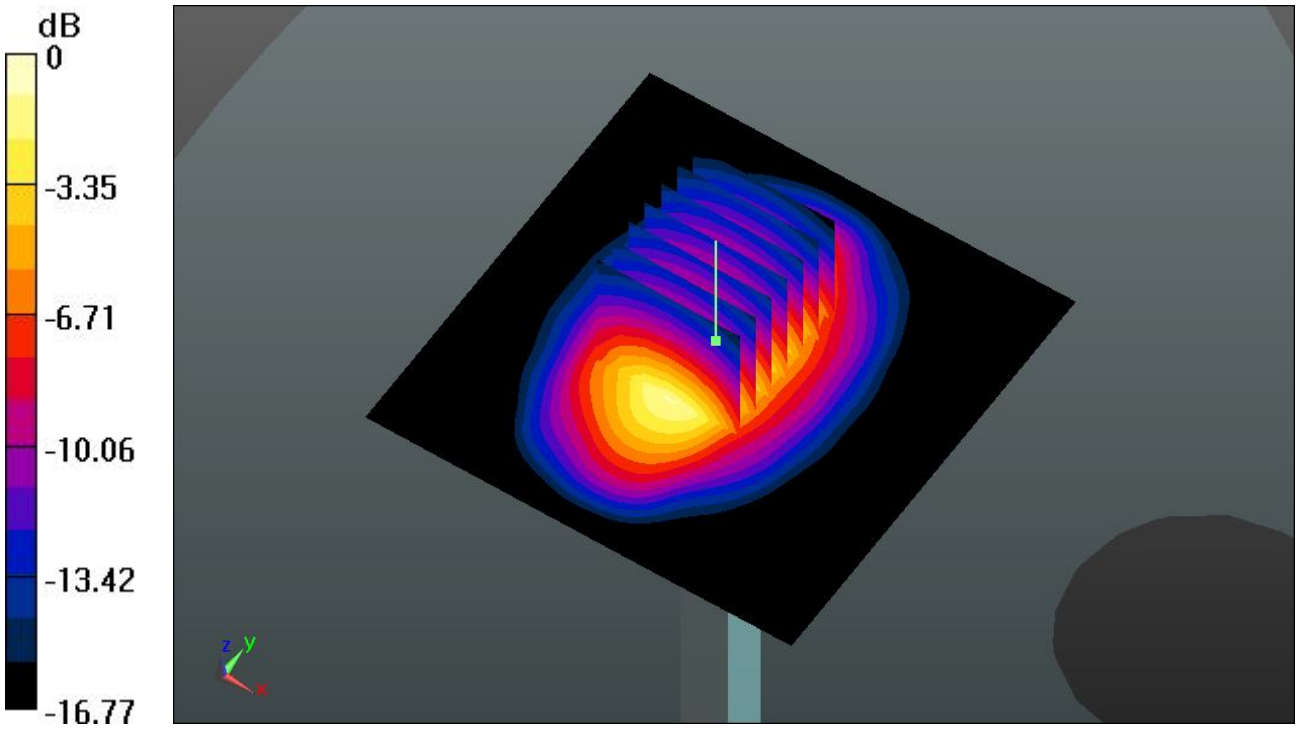
DUT: D1900V2 - SN: 5d118

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: MSL_1900_130620 Medium parameters used: f = 1900 MHz; σ = 1.528 mho/m; ε_r = 54.867; ρ = 1000 kg/m^3
Ambient Temperature：23.5 ℃; Liquid Temperature：21.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(7.67, 7.67, 7.67); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 12.0 W/kg

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 86.505 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 18.870 mW/g
SAR(1 g) = 10.5 mW/g; SAR(10 g) = 5.49 mW/g
Maximum value of SAR (measured) = 11.8 W/kg



0 dB = 11.8 W/kg

Appendix B. Plots of SAR Measurement

The plots are shown as follows.

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 21.06.2013

#09 GSM1900_GSM Voice_Left Cheek_Ch661

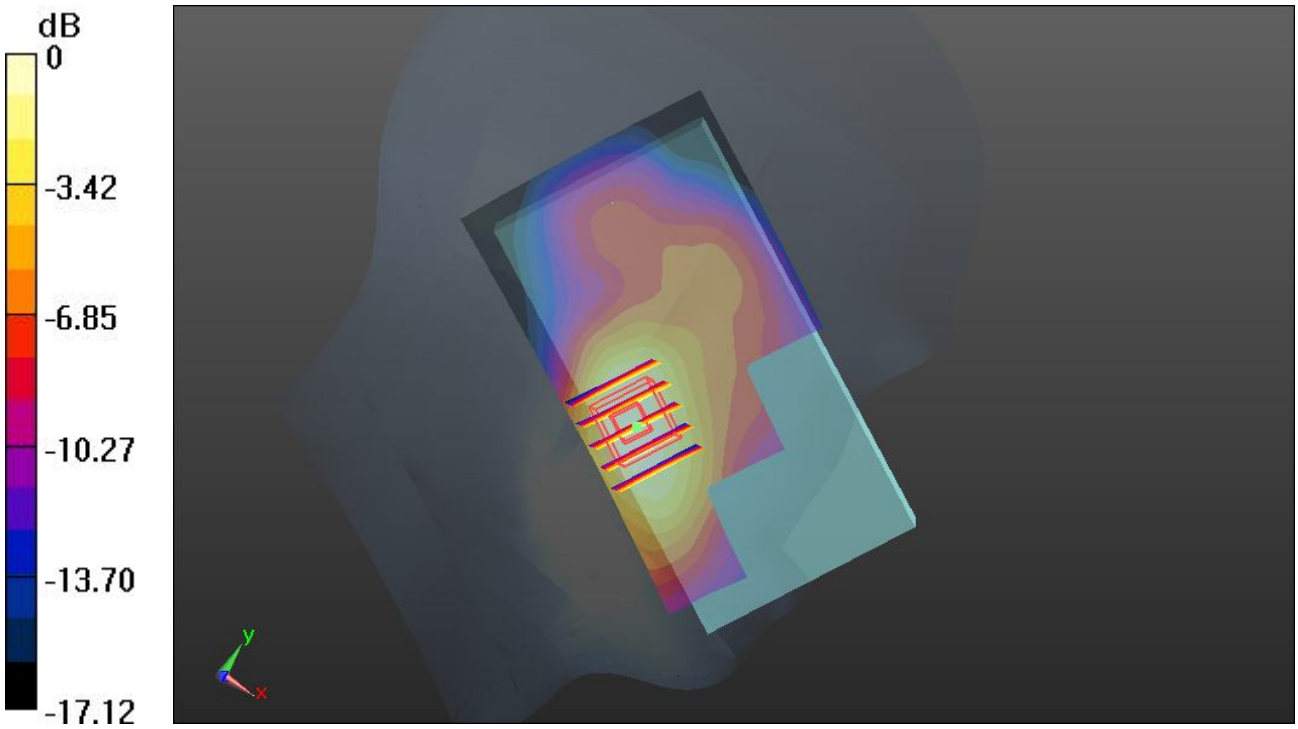
DUT: 330601

Communication System: Generic GSM; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL_1900_130621 Medium parameters used: f = 1880 MHz; σ = 1.432 mho/m; ε_r = 39.176; ρ = 1000 kg/m^3
Ambient Temperature：23.9 ℃; Liquid Temperature：21.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(7.84, 7.84, 7.84); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Ch661/Area Scan (61x121x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.404 W/kg

Ch661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.905 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.473 mW/g
SAR(1 g) = 0.312 mW/g; SAR(10 g) = 0.192 mW/g
Maximum value of SAR (measured) = 0.388 W/kg



0 dB = 0.388 W/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 21.06.2013

#10 WCDMA Band II_RMC12.2K_Left Cheek_Ch9400

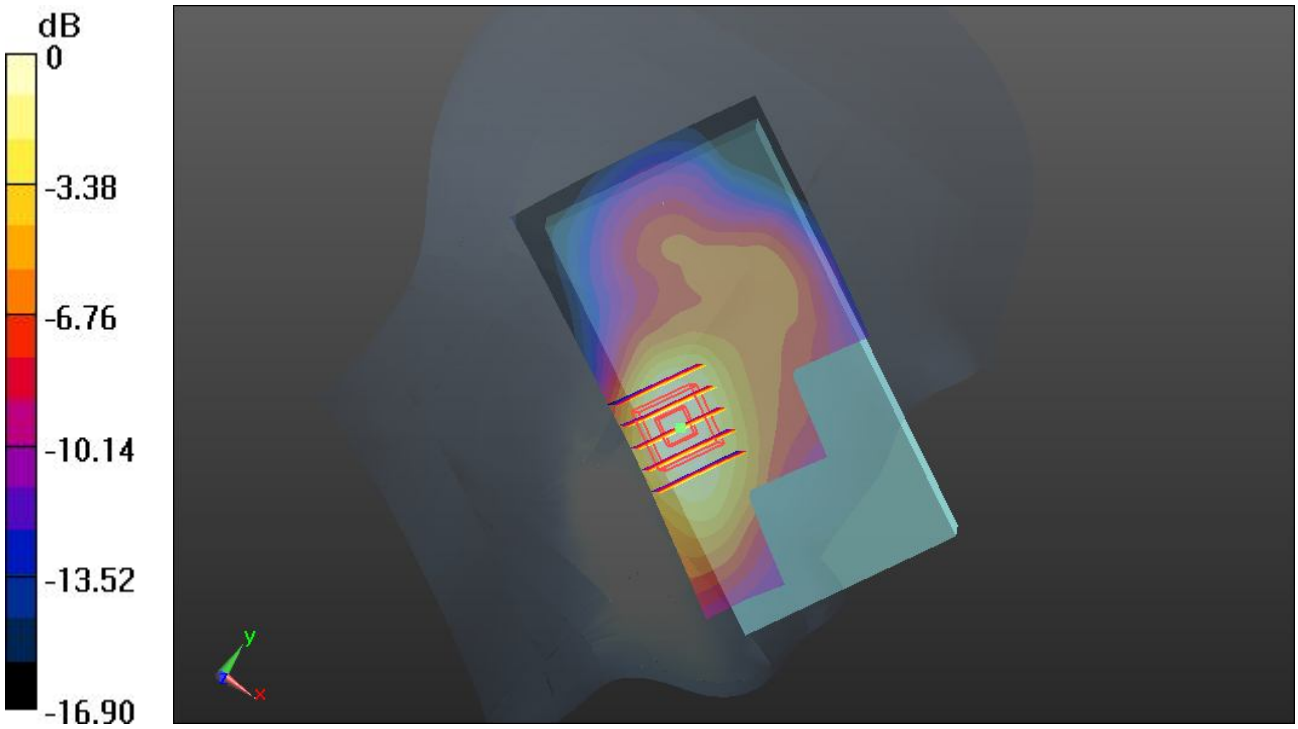
DUT: 330601

Communication System: UMTS; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: HSL_1900_130621 Medium parameters used: f = 1880 MHz; σ = 1.432 mho/m; ε_r = 39.176; ρ = 1000 kg/m^3
Ambient Temperature：23.9 ℃; Liquid Temperature：21.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(7.84, 7.84, 7.84); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Ch9400/Area Scan (61x121x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.557 W/kg

Ch9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.760 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.641 mW/g
SAR(1 g) = 0.421 mW/g; SAR(10 g) = 0.258 mW/g
Maximum value of SAR (measured) = 0.526 W/kg



0 dB = 0.526 W/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 21.06.2013

#11 LTE Band 4_20M_QPSK 1RB 0offset_Left Cheek_Ch20175

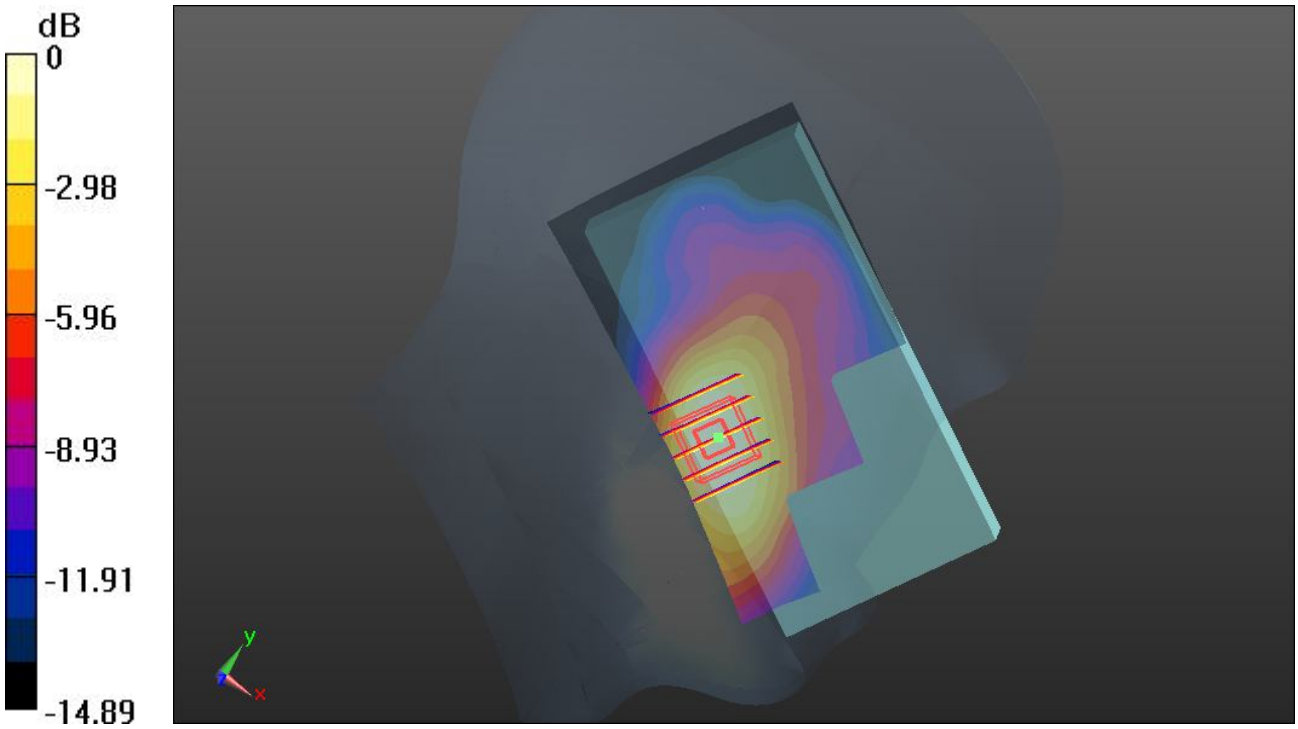
DUT: 330601

Communication System: LTE; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium: HSL_1800_130621 Medium parameters used: f = 1732.5 MHz; σ = 1.368 mho/m; ε_r = 39.916; ρ = 1000 kg/m^3
Ambient Temperature：23.4 ℃; Liquid Temperature：21.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(8.2, 8.2, 8.2); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Ch20175/Area Scan (61x121x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.322 W/kg

Ch20175/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.124 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.367 mW/g
SAR(1 g) = 0.249 mW/g; SAR(10 g) = 0.160 mW/g
Maximum value of SAR (measured) = 0.304 W/kg



0 dB = 0.304 W/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 20.06.2013

#08 GSM850_GPRS(2 Tx slots)_Back_1cm_Ch190

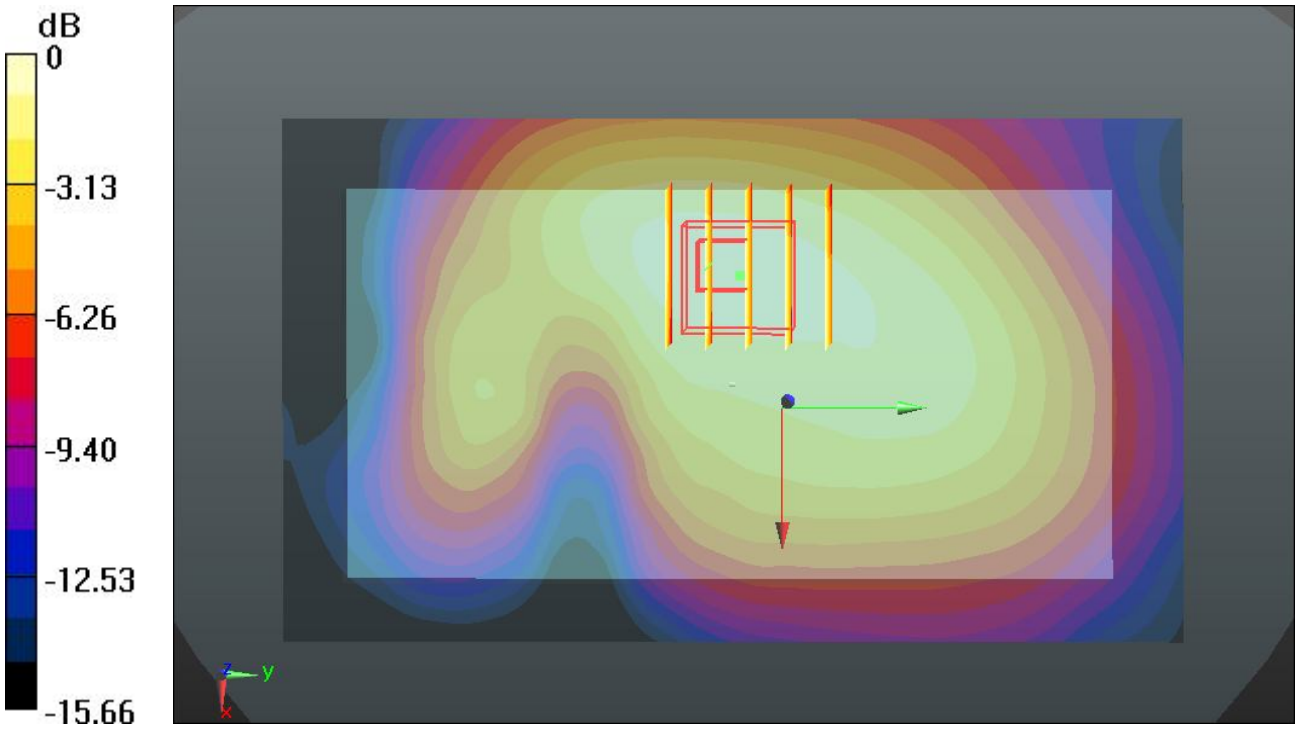
DUT: 330601

Communication System: GPRS/EDGE10; Frequency: 836.6 MHz;Duty Cycle: 1:4
Medium: MSL_835_130620 Medium parameters used: f = 837 MHz; σ = 0.977 mho/m; ε_r = 54.295; ρ = 1000 kg/m^3
Ambient Temperature：23.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(9.5, 9.5, 9.5); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM2; Type: QD000P40CD; Serial: TP:1671
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Ch190/Area Scan (71x121x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.103 W/kg

Ch190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.822 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.122 mW/g
SAR(1 g) = 0.096 mW/g; SAR(10 g) = 0.072 mW/g
Maximum value of SAR (measured) = 0.111 W/kg



0 dB = 0.111 W/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 20.06.2013

#01 GSM1900_GPRS(2 Tx slots)_Front_1cm_Ch661

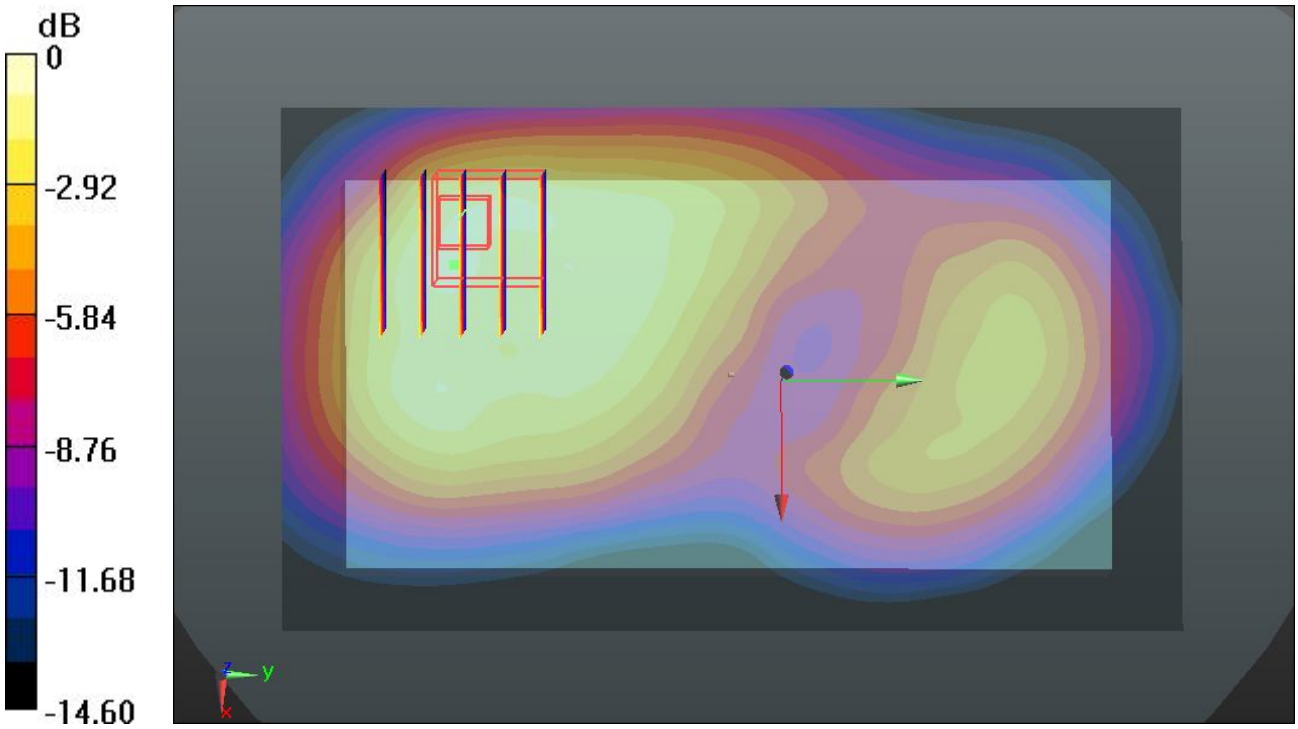
DUT: 330601

Communication System: GPRS/EDGE10; Frequency: 1880 MHz;Duty Cycle: 1:4
Medium: MSL_1900_130620 Medium parameters used: f = 1880 MHz; σ = 1.506 mho/m; ε_r = 54.9; ρ = 1000 kg/m^3
Ambient Temperature：23.5 ℃; Liquid Temperature：21.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(7.67, 7.67, 7.67); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Ch661/Area Scan (71x121x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.338 W/kg

Ch661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.184 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.475 mW/g
SAR(1 g) = 0.279 mW/g; SAR(10 g) = 0.164 mW/g
Maximum value of SAR (measured) = 0.382 W/kg



0 dB = 0.382 W/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 20.06.2013

#02 WCDMA Band II_RMC12.2K_Front_1cm_Ch9400

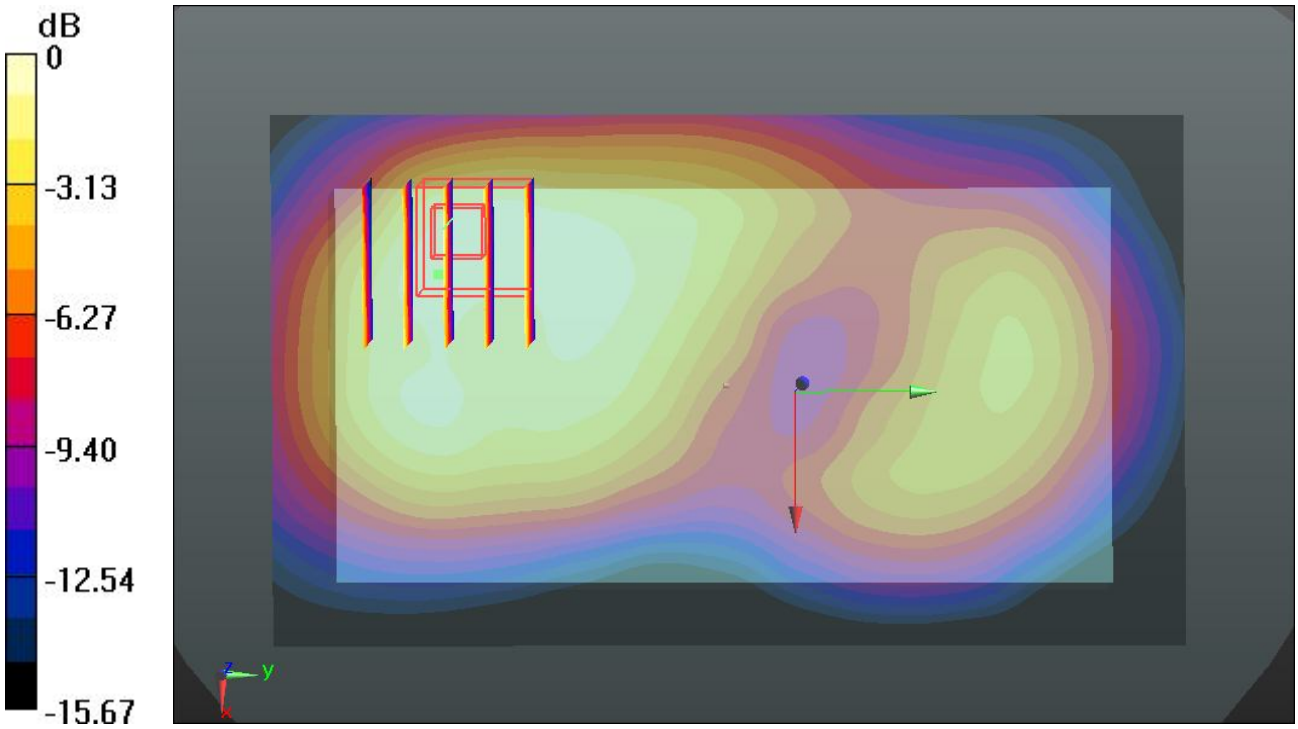
DUT: 330601

Communication System: UMTS; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: MSL_1900_130620 Medium parameters used: f = 1880 MHz; σ = 1.506 mho/m; ε_r = 54.9; ρ = 1000 kg/m^3
Ambient Temperature：23.5 ℃; Liquid Temperature：21.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(7.67, 7.67, 7.67); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Ch9400/Area Scan (71x121x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.388 W/kg

Ch9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.966 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.507 mW/g
SAR(1 g) = 0.295 mW/g; SAR(10 g) = 0.172 mW/g
Maximum value of SAR (measured) = 0.404 W/kg



0 dB = 0.404 W/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 20.06.2013

#05 LTE Band 4_20M_QPSK 1RB 0offset_Front_1cm_Ch20175

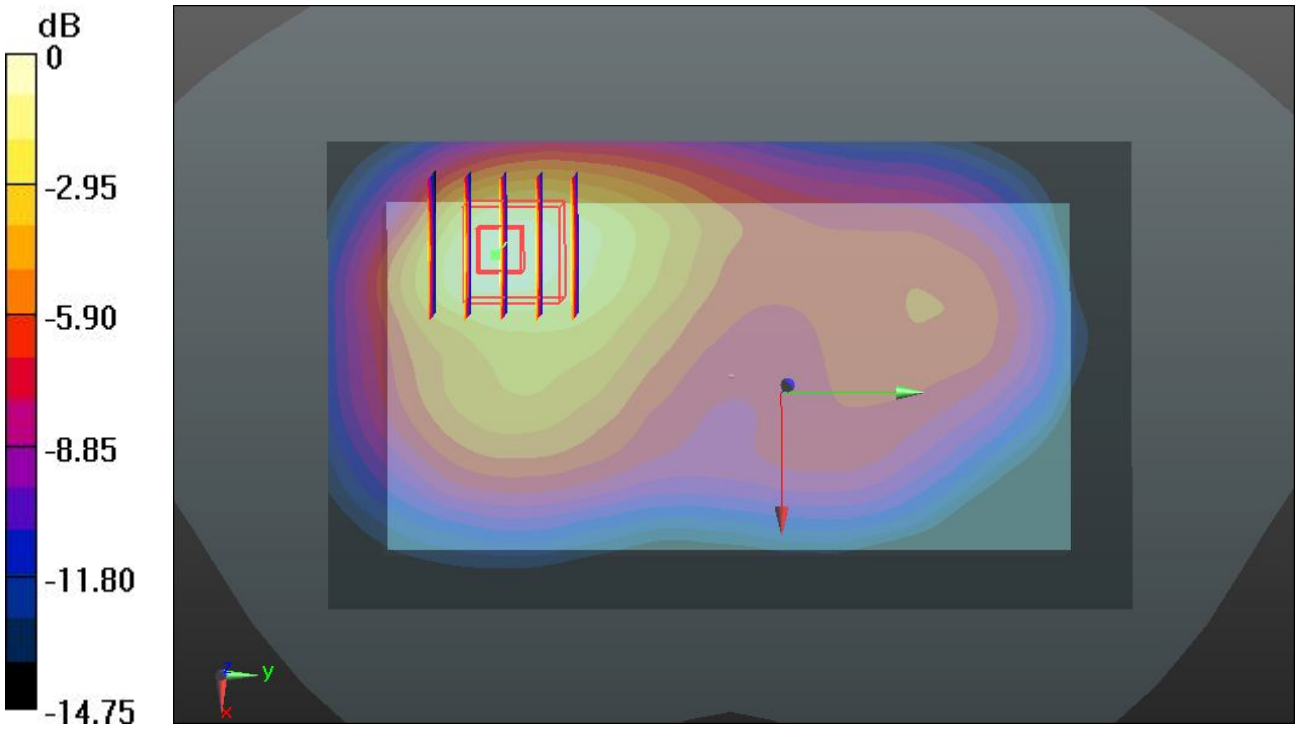
DUT: 330601

Communication System: LTE; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium: MSL_1800_130620 Medium parameters used: f = 1732.5 MHz; σ = 1.499 mho/m; ε_r = 54.965; ρ = 1000 kg/m^3
Ambient Temperature：23.6 ℃; Liquid Temperature：21.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(8, 8, 8); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Ch20175/Area Scan (71x121x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.299 W/kg

Ch20175/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.739 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.381 mW/g
SAR(1 g) = 0.237 mW/g; SAR(10 g) = 0.140 mW/g
Maximum value of SAR (measured) = 0.316 W/kg



0 dB = 0.316 W/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 20.06.2013

#07 LTE Band 17_10M_QPSK 1RB 49offset_Back_1cm_Ch23790

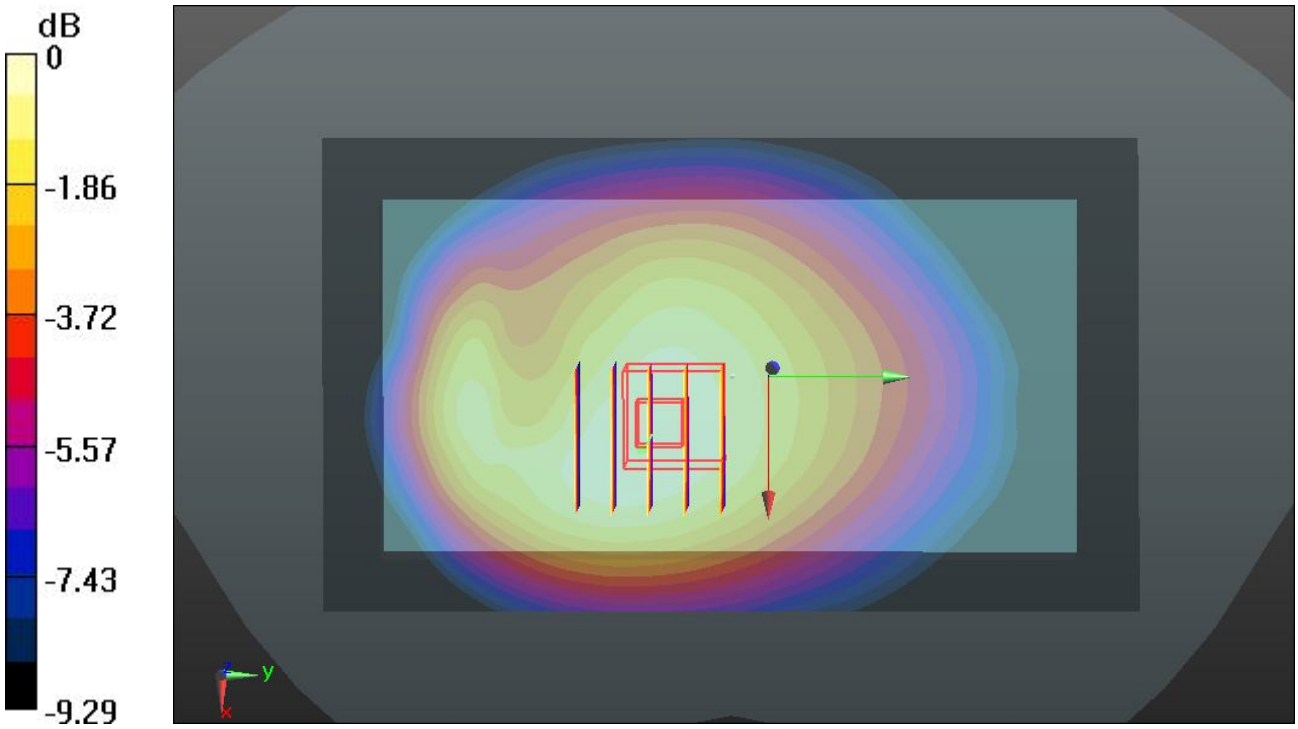
DUT: 330601

Communication System: LTE; Frequency: 710 MHz;Duty Cycle: 1:1
Medium: MSL_750_130620 Medium parameters used: f = 710 MHz; σ = 0.934 mho/m; ε_r = 54.866; ρ = 1000 kg/m^3
Ambient Temperature：23.8 ℃; Liquid Temperature：21.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(9.72, 9.72, 9.72); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM2; Type: QD000P40CD; Serial: TP:1671
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Ch23790/Area Scan (71x121x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.109 W/kg

Ch23790/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.970 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.120 mW/g
SAR(1 g) = 0.093 mW/g; SAR(10 g) = 0.071 mW/g
Maximum value of SAR (measured) = 0.107 W/kg



0 dB = 0.107 W/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 20.06.2013

#04 GSM1900_GPRS(2 Tx slots)_Back_1cm_Ch661

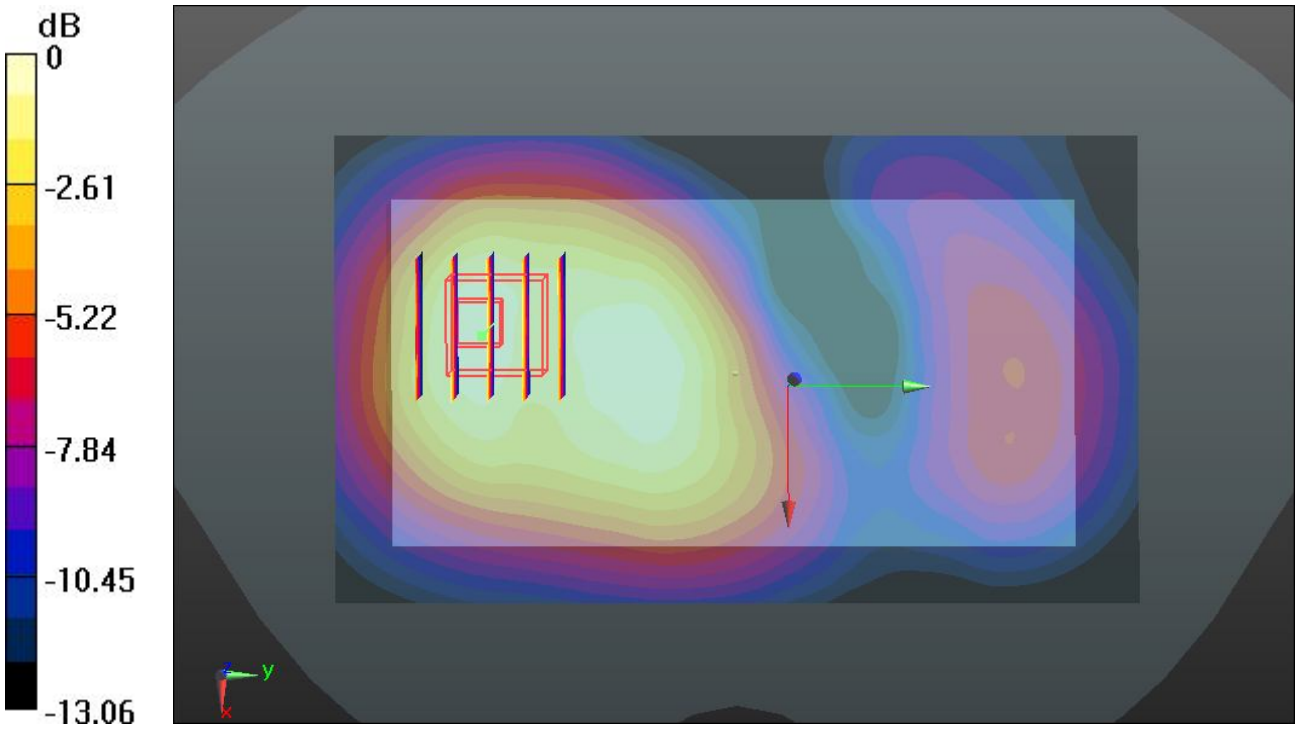
DUT: 330601

Communication System: GPRS/EDGE10; Frequency: 1880 MHz;Duty Cycle: 1:4
Medium: MSL_1900_130620 Medium parameters used: f = 1880 MHz; σ = 1.506 mho/m; ε_r = 54.9; ρ = 1000 kg/m^3
Ambient Temperature：23.5 ℃; Liquid Temperature：21.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(7.67, 7.67, 7.67); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Ch661/Area Scan (71x121x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.310 W/kg

Ch661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.285 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.362 mW/g
SAR(1 g) = 0.242 mW/g; SAR(10 g) = 0.149 mW/g
Maximum value of SAR (measured) = 0.299 W/kg



0 dB = 0.299 W/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 20.06.2013

#03 WCDMA Band II_RMC12.2K_Back_1cm_Ch9400

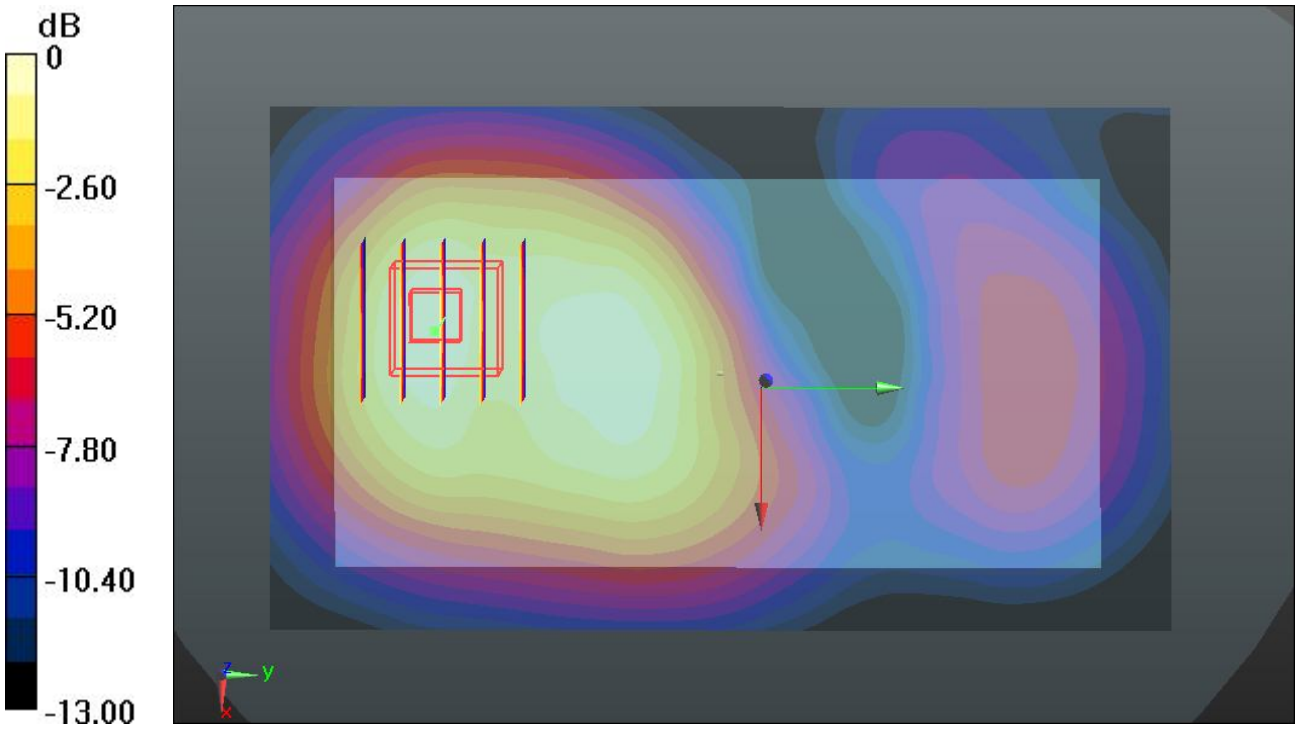
DUT: 330601

Communication System: UMTS; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: MSL_1900_130620 Medium parameters used: f = 1880 MHz; σ = 1.506 mho/m; ε_r = 54.9; ρ = 1000 kg/m^3
Ambient Temperature：23.5 ℃; Liquid Temperature：21.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(7.67, 7.67, 7.67); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Ch9400/Area Scan (71x121x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.309 W/kg

Ch9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.107 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.345 mW/g
SAR(1 g) = 0.234 mW/g; SAR(10 g) = 0.146 mW/g
Maximum value of SAR (measured) = 0.296 W/kg



0 dB = 0.296 W/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 20.06.2013

#06 LTE Band 4_20M_QPSK 1RB 0offset_Back_1cm_Ch20175

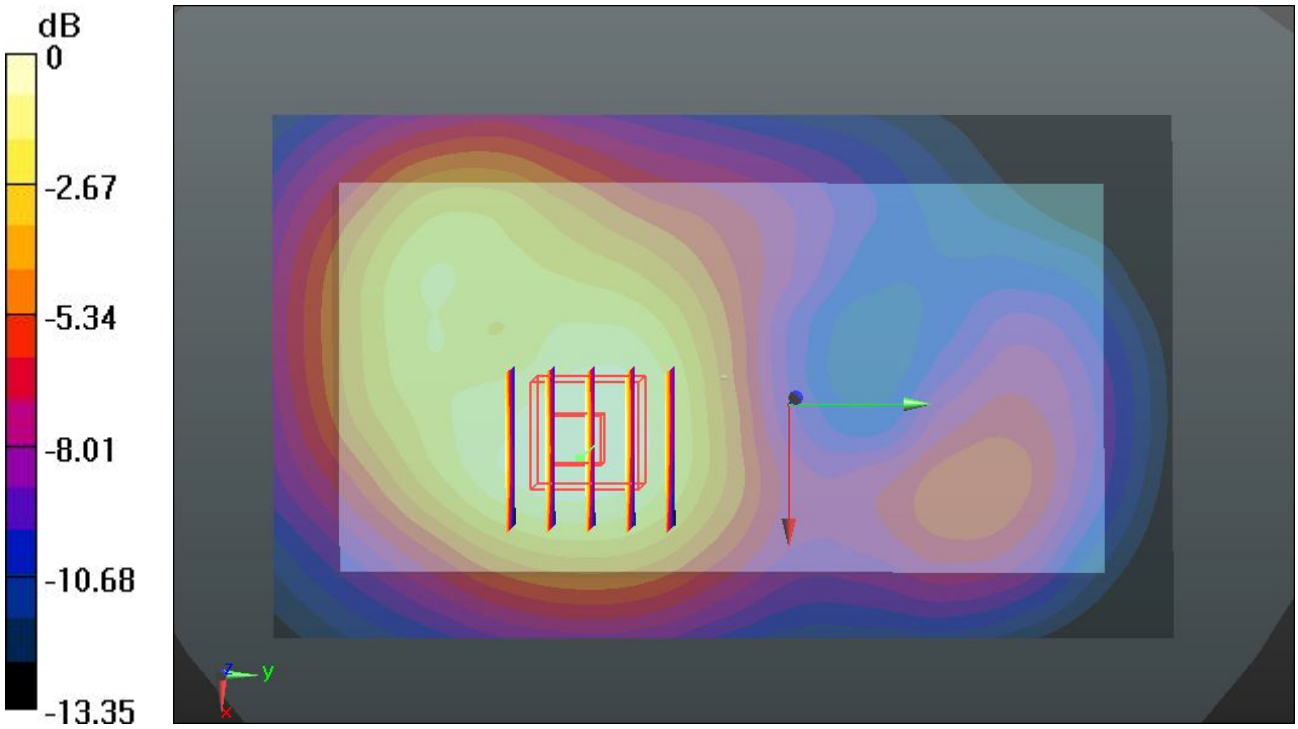
DUT: 330601

Communication System: LTE; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium: MSL_1800_130620 Medium parameters used: f = 1732.5 MHz; σ = 1.499 mho/m; ε_r = 54.965; ρ = 1000 kg/m^3
Ambient Temperature：23.6 ℃; Liquid Temperature：21.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(8, 8, 8); Calibrated: 26.11.2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 22.11.2012
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Ch20175/Area Scan (71x121x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.148 W/kg

Ch20175/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.029 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.173 mW/g
SAR(1 g) = 0.121 mW/g; SAR(10 g) = 0.080 mW/g
Maximum value of SAR (measured) = 0.147 W/kg



0 dB = 0.147 W/kg