



## TEST REPORT

No. I20D00025-SAR01

*For*

Client: ClearCellular, Limited.

Production: Smart Phone

Model Name: ClearPHONE 420

Brand Name: ClearCellular

FCC ID: 2AVSK-420

Hardware Version: K6307Q-01

Software Version: K6307QACL.FHDJ.P0.ANASAPA9DATJDFTL.  
0225\_1140.V2.02

Issued date: 2020-04-24

## NOTE

1. The test results in this test report relate only to the devices specified in this report.
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3. KDB has not been approved by A2LA.
4. It has been confirmed with the customer that the Tune-up Power information provided by the customer may affect the validity of the measurement results in this report, and the impact and consequences will be borne by the customer.
5. For the test results, the uncertainty of measurement is not taken into account when judging the compliance with specification, and the results of measurement or the average value of measurement results are taken as the criterion of the compliance with specification directly.

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**Revision Version**

<b>Report Number</b>	<b>Revision</b>	<b>Date</b>	<b>Memo</b>
I20D00025-SAR01	00	2020-03-25	Initial creation of test report
I20D00025-SAR01	01	2020-04-24	Second creation of test report

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## 1. Test Laboratory

### 1.1. Testing Location

Company Name	East China Institute of Telecommunications
Address	Building 4, No.766, Jingang Road, Pudong, Shanghai, China
Postal Code	201206
Telephone	+86 21 63843300
Fax	+86 21 63843301

### 1.2. Testing Environment

Normal Temperature	18°C-25°C
Relative Humidity	25%-75%

### 1.3. Project Data

Project Leader	Zhang Heng
Testing Start Date	2020-03-11
Testing End Date	2020-03-17
Note: The test period is for SAR test only.	

### 1.4. Signature



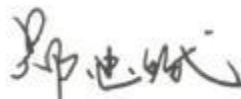
Wang Yubin

(Prepared this test report)



Yan Hang

(Reviewed this test report)



Zheng Zhongbin

(Approved this test report)

## 2. Client Information

### 2.1. Applicant Information

Company Name	ClearCellular, Limited.
Address	4764/24B Moorefield Rd Johnsonville Wellington 6037-227 New Zealand
Telephone	+1.801.361.6453
Postcode	N/A

### 2.2. Manufacturer Information

Company Name	COOSEA GROUP (HK) COMPANY LIMITED
Address	UNIT 5-6 16F MULTIFIELD PLAZA 3-7A PRAT AVENUE TSIM SHA TSUI KL HONGKONG
Telephone	+86-0755-3397 1000
Postcode	N/A



### 3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

#### 3.1. About EUT

Description:	Smart Phone
Model Name:	ClearPHONE 420
Operation Model(s):	GSM850 /GSM1900 WCDMA Band II/Band IV/Band V LTE 2/4/5/7/12/13/17; BT4.2;WiFi GPS;GLONASS;
Tx Frequency:	824.2-848.8MHz(GSM850) 1850.2-1909.8MHz ( GSM1900 ) 1852.4-1907.6 MHz (WCDMA Band II) 1712.4-1752.6 MHz (WCDMA Band IV) 826.4-846.6MHz (WCDMA Band V) 1850.7 -1909.3 MHz (LTE Band 2) 1710.7 -1754.3 MHz (LTE Band 4) 824.7 -848.3 MHz (LTE Band 5) 2502.5 – 2567.5 MHz (LTE Band 7) 699.7 -715.3 MHz (LTE Band 12) 779.7 -784.5 MHz (LTE Band 13) 706.5 -713.5 MHz (LTE Band 17) 2412- 2462 MHz (WiFi) 2402 – 2480 MHz (BT)
Test device Production Information:	Production unit
GPRS/EGPRS Class Mode:	B
GPRS/ EGPRS Multislot Class:	12
Release Version:	WCDMA: R99 LTE: R10
WLAN Mode:	WLAN 2.4GHz 802.11b/g/n HT20/n HT40
Device Type:	Portable device
Antenna Type:	Embedded antenna
Accessories/Body-worn Configurations:	Battery
Dimensions:	157*75*8.65MM
Hotspot Mode:	Support
Note:	The EUT SAR Test without the charging battery cover is not applicable since no way to have this

battery cover removed and replaced by normal battery cover.  
Photographs of EUT are shown in ANNEX C of this test report.

### 3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
N04	869899033450995	K6307Q-01	K6307QACL.FHDJ.P0.ANA SAPA9DATJDFTL.0225_11 40.V2.02	2020-03-09

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

Note: The product has two SIM cards, SIM 1 and SIM 2 does not support simultaneous work, only supports a single transmitter; When SIM 1 is working, SIM 2 will be suspended until SIM 2 is selected. When stop using the SIM 1, SIM 2 would work. SIM1 is the worst case.

### 3.3. Internal Identification of AE used during the test

AE ID*	Description	Type	Manufacturer
--	Battery	--	Dongguan Nanyu Xincheng Electronic Technology CO.,Ltd

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

## 4. Reference Documents

### 4.1. Documents supplied by applicant

All technical documents are supplied by the client or manufacturer, which is the basis of testing.

### 4.2. Reference Documents

The following documents listed in this section are referred for testing.

Reference	Title	Version
<b>ANSI C95.1</b>	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.	<b>1999</b>
<b>IEEE 1528</b>	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques.	<b>2013</b>
<b>KDB648474</b>	Handset SAR	<b>D04 v01r03</b>
<b>KDB648474</b>	Wireless Chargers Battery Cover	<b>D03 v01r04</b>
<b>KDB248227</b>	802 11 WiFi SAR	<b>D01 v02r02</b>
<b>KDB447498</b>	General RF Exposure Guidance	<b>D01 v06</b>
<b>KDB865664</b>	SAR Measurement 100 MHz to 6 GHz	<b>D01 v01r04</b>
<b>KDB865664</b>	RF Exposure Reporting	<b>D02 v01r02</b>
<b>KDB941225</b>	3G SAR Procedures	<b>D01 v03r01</b>
<b>KDB941225</b>	SAR for LTE Devices	<b>D05 v02r05</b>
<b>KDB941225</b>	Hotspot SAR	<b>D06 v02r01</b>
<b>KDB616217</b>	SAR for laptop and tablets	<b>D04 v01r02</b>

### 4.3. Criterion

At frequencies between 100 kHz and 6 GHz, the MPE (Maximum Permissible Exposure) in population/uncontrolled environments for electromagnetic field strengths may be exceeded if

- a) The exposure conditions can be shown by appropriate techniques to produce SARs below 0.08W/kg, as averaged over the whole body, and spatial peak SAR values not exceeding 1.6 W/kg, as averaged over any 1g of tissue (defined as a tissue volume in the shape of a cube), except for the hands, wrists, feet, and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10g of tissue (defined as a tissue volume in the shape of a cube); and
- b) The induced currents in the body conform with the MPE in table 2, Part B in ANSI C95.1-1999.

## 5. Test Summary and Statement of Compliance

### 5.1. Test Summary

The maximum results of Specific Absorption Rate (SAR) in standalone mode are as follows.

**Table 5.1: Standalone Max. Reported SAR**

Band	SAR 1g(w/kg)		
	Head	Body	
		Hotspot(10mm)	Body-worn(10mm)
GSM850	<b>0.284</b>	0.323	0.314
GSM1900	0.057	0.326	0.214
WCDMA Band2	0.161	0.457	0.212
WCDMA Band4	0.085	0.390	0.164
WCDMA Band5	0.277	0.246	0.235
LTE Band2	0.160	<b>0.504</b>	<b>0.237</b>
LTE Band4	0.099	0.342	0.153
LTE Band5	0.249	0.213	0.21
LTE Band7	0.178	0.307	0.301
LTE Band12	0.043	0.053	0.053
LTE Band13	0.153	0.193	0.193
WiFi 2.4G	0.282	0.122	0.122

The maximum results of Specific Absorption Rate (SAR) in simultaneous mode are as follows.

**Table 5.2: Simultaneous Transmission SAR**

Highest SAR 10g(W/kg)		
Mode	Position	Results
GSM850&WIFI 2.4G	Head	0.566
LTE B2&WIFI 2.4G	Hotspot (10mm)	0.626

Note: BT SAR result is evaluated by calculation in section 13.4 instead of by testing

## 5.2. Statement of Compliance

The **Smart Phone, ClearPHONE 420** manufactured by **ClearCellular** is a parent model for testing.

ECIT has verified that the compliance of the tested device specified in section 3 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 4 of this test report.

For body worn operation mode, this device with any accessory that contained in this report has been tested and the values meet FCC RF exposure guidelines. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.

## 6. Specific Absorption Rate (SAR)

### 6.1. Introduction

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

### 6.2. SAR Definition

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

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

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

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

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

Where:  $c$  is the specific heat capacity,  $\delta T$  is the temperature rise and  $\delta t$  is the exposure duration, or related to the electrical field in the tissue by

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

Where:

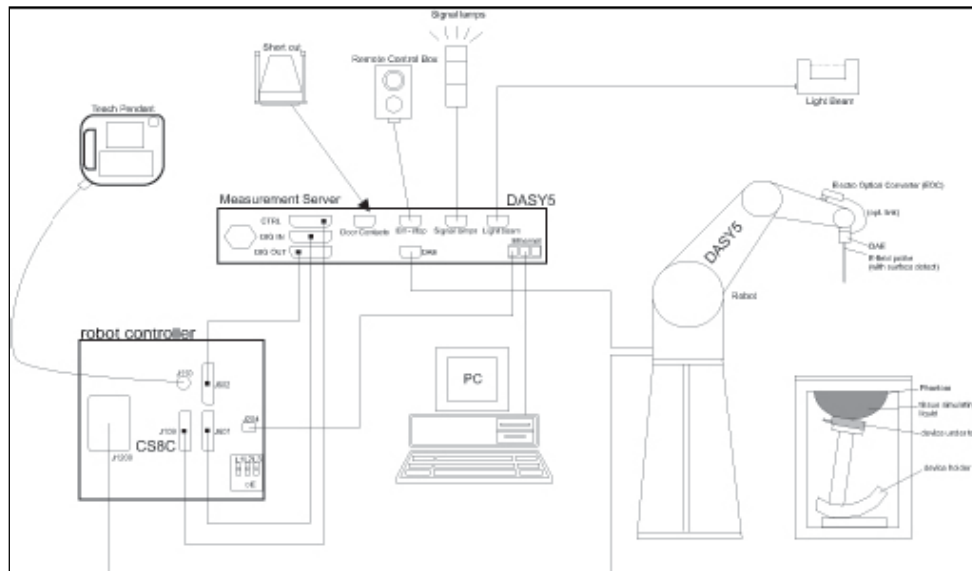
- $\sigma$  is the conductivity of the tissue
- $\rho$  is the mass density of tissue, which is normally set to 1g/cm<sup>3</sup>
- $E$  is the RMS electrical field strength

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

## 7. SAR Measurement System Introduction

### 7.1. Measurement Set-up

The DASY5 system for performing compliance tests is illustrated above graphically. This system consists of the following items:



**Picture 7-1 SAR Measurement Set-up**

- A standard high precision 6-axis robot (Stäubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A 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.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted 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.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.



## 7.2. E-field Probe System

The SAR measurements were conducted with the dosimetric probe designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multi-fiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY5 software reads the reflection during a software approach and looks for the maximum using 2<sup>nd</sup> ord curve fitting. The approach is stopped at reaching the maximum.

Probe Specifications:	
Model:	ES3DV3,EX3DV4
Frequency Range:	10MHz — 6GHz(EX3DV4)
	10MHz — 4GHz(ES3DV3)
Calibration:	In head and body simulating tissue at frequency from 650MHz to 5900MHz
Linearity:	± 0.2 dB(30 MHz to 4 GHz) for ES3DV3 ± 0.2 dB(30 MHz to 6 GHz) for EX3DV4
Dynamic Range:	10 mW/kg — 100 W/kg
Probe Length:	330 mm
Probe Tip Length:	20 mm
Body Diameter:	12 mm
Tip Diameter:	2.5 mm (3.9 mm for ES3DV3)
Tip-Center:	1 mm (2.0mm for ES3DV3)
Application:	SAR Dosimetry Testing Compliance tests of mobile phones Dosimetry in strong gradient fields



Picture 7-2 Detail of Probe



Picture 7-3 E-field Probe

## 7.3. E-field Probe Calibration

Each E-Probe/Probe Amplifier combination has unique calibration parameters. A TEM cell calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm<sup>2</sup>) using an RF Signal generator, TEM cell, and RF Power Meter.

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and inn a waveguide or other methodologies

above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1 mW/cm<sup>2</sup>.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The E-field in the medium correlates with the temperature rise in the dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C \frac{\Delta T}{\Delta t}$$

Where:

$\Delta t$  = Exposure time (30 seconds),

C = Heat capacity of tissue (brain or muscle),

$\Delta T$  = Temperature increase due to RF exposure.

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

Where:

$\sigma$  = Simulated tissue conductivity,

$\rho$  = Tissue density (kg/m<sup>3</sup>).

## 7.4. Other Test Equipment

### 7.4.1. Data Acquisition Electronics (DAE)

The data acquisition electronics consist 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 with a 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 mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

The input impedance of the DAE is 200M Ohm; the inputs are symmetrical and floating. Common mode rejection is above 80dB.



**Picture 7-4: DAE**

### 7.4.2. Robot

The SPEAG DASY system uses the high precision robots (DASY5: TX90) type from Stäubli SA (France).

For the 6-axis controller system, the robot controller version from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability 0.02mm)
- High reliability (industrial design)
- Low maintenance costs (virtually maintenance free due to direct drive gears; no belt drives)
- Jerk-free straight movements (brushless synchronal motors; no stepper motors)
- Low ELF interference (motor control fields shielded via the closed metallic construction shields)



**Picture 7-5: DASY 5**

### 7.4.3. Measurement Server

The Measurement server is based on a PC/104 CPU board with CPU (DASY5: 400 MHz, Intel Celeron), chip disk (DASY5: 128MB), RAM (DASY5: 128MB). 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.



**Picture 7-6: Server for DASY 5**

The measurement server performs all real-time data evaluation of field measurements and surface detection, controls robot movements and handles safety operation. The PC operating system cannot interfere with these time critical processes. All connections are supervised by a watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program-controlled robot movements. Furthermore, the measurement server is equipped with an expansion port which is reserved for future applications. Please note that this expansion port does not have a standardized pinout, and therefore only devices provided by SPEAG can be connected. Devices from any other supplier could seriously damage the measurement server.

#### 7.4.4. Device Holder for 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 5mm distance, a positioning uncertainty of  $\pm 0.5\text{mm}$  would produce a SAR uncertainty of  $\pm 20\%$ . 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 the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

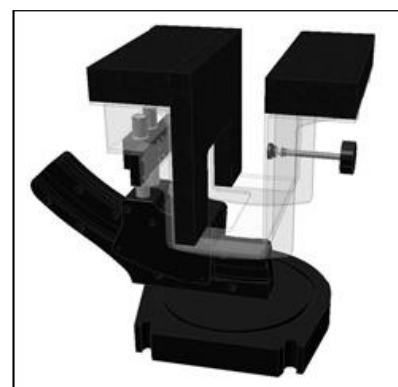
The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity  $\epsilon = 3$  and loss tangent  $\delta = 0.02$ . The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested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



Picture 7-7: Device Holder

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin-SAM and ELI phantoms.

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity  $\epsilon = 3$  and loss tangent  $\delta = 0.02$ . 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.




Picture 7-8: Laptop Extension Kit

#### 7.4.5. Phantom

The SAM Twin Phantom V4.0 is constructed of a fiberglass shell integrated in a table. The shape of the shell is based on data from an anatomical study designed to represent the 90<sup>th</sup> percentile of the

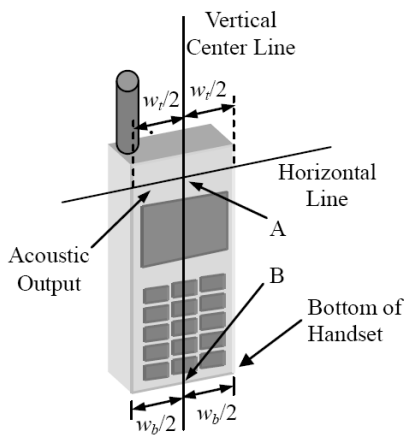
population. The phantom enables the dissymmetric evaluation of SAR for both left and right handed handset usage, as well as body-worn usage using the flat phantom region. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. The shell phantom has a 2mm shell thickness (except the ear region where shell thickness increases to 6 mm).

Shell Thickness:	2 ± 0.2 mm	 <p><b>Picture 7-9: SAM Twin Phantom</b></p>
Available:	Special	
Filling Volume:	Approx. 25 liters	
Dimensions:	810 x 1000 x 500 mm (H x L x W)	

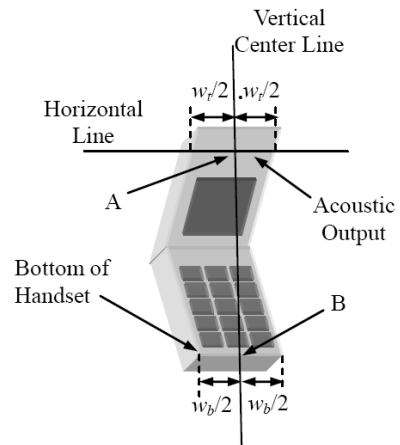
## 8. Test Position in Relation to the Phantom

### 8.1. General considerations

This standard specifies two handset test positions against the head phantom – the “cheek” position and the “tilt” position.

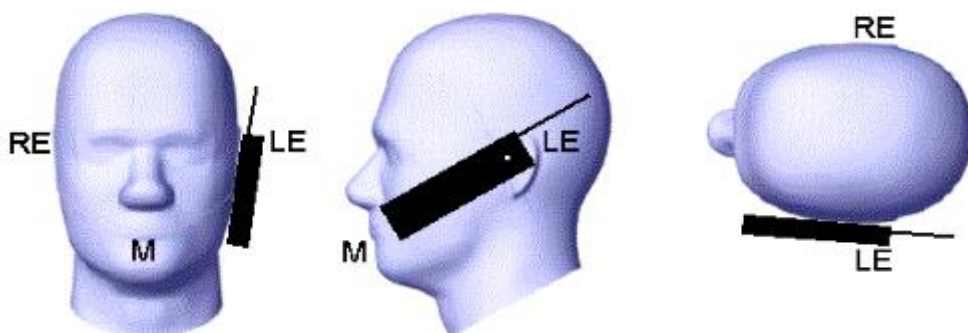


Picture 8-1 Typical “fixed” case handset

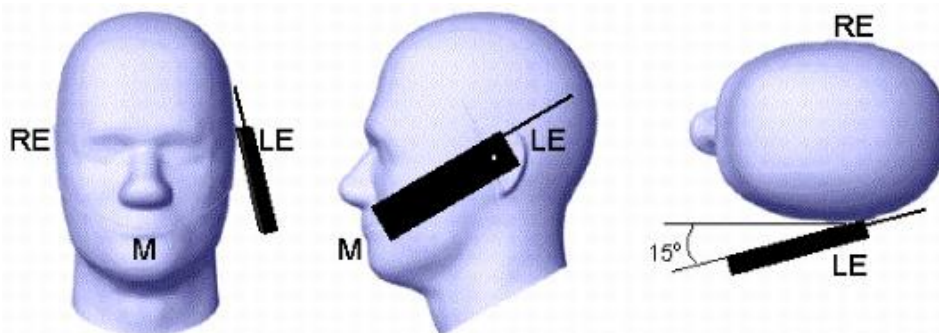


Picture 8-2 Typical “clam-shell” case handset

$w_t$	Width of the handset at the level of the acoustic
$w_b$	Width of the bottom of the handset
A	Midpoint of the width $w_t$ of the handset at the level of the acoustic output
B	Midpoint of the width $w_b$ of the bottom of the handset



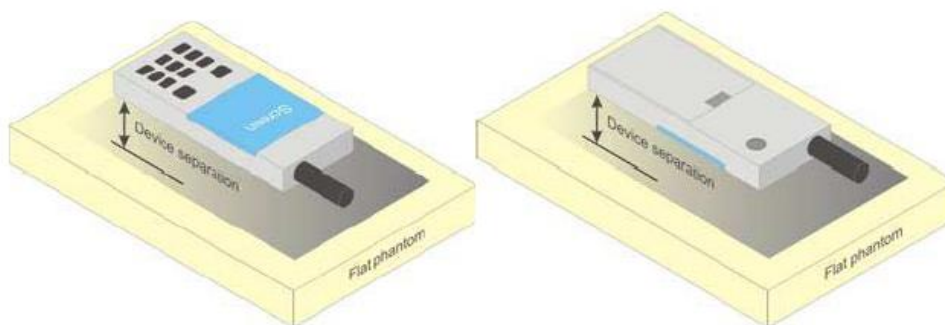
Picture 8-3 Cheek position of the wireless device on the left side of SAM



**Picture 8-4 Tilt position of the wireless device on the left side of SAM**

### 8.2. Body-worn device

A typical example of a body-worn device is a mobile phone, wireless enabled PDA (personal digital assistant) or other battery operated wireless device with the ability to transmit while mounted on a person’s body using a carry accessory approved by the wireless device manufacturer.



**Picture 8-5 Test positions for body-worn devices**

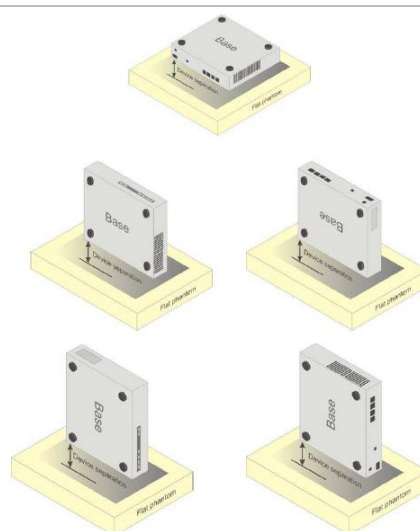
### 8.3. Desktop device

A typical example of a desktop device is a wireless enabled desktop computer placed on a table or desk when used.

The DUT shall be positioned at the distance and in the orientation to the phantom that corresponds to the intended use as specified by the manufacturer in the user instructions. For devices that employ an external antenna with variable positions.

Tests shall be performed for all antenna positions specified.

Picture 8-6 shows positions for desktop device SAR tests. If the intended use is not specified, the device shall be tested directly against the flat phantom.



**Picture 8-6 Test positions for desktop devices**

## 9. Tissue Simulating Liquids

### 9.1. Equivalent Tissues Composition

The liquid used for the frequency range of 650-6000 MHz consisted of water, sugar, salt, preventol, glycol monobutyl and Cellulose. The liquid has been previously proven to be suited for worst-case. The Table 9.1 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528 and IEC 62209.

**Table 9.1: Composition of the Head Tissue Equivalent Matter**

Frequency (MHz)	835	900	1800	1950	2300	2450	2600	5800
Ingredients (% by weight)								
Water	41.45	40.92	55.242	54.89	56.34	58.79	58.79	65.53
Sugar	56.0	56.5	/	/	/	/	/	
Salt	1.45	1.48	0.306	0.18	0.14	0.06	0.06	
Preventol	0.1	0.1	/	/	/	/	/	
Cellulose	1.0	1.0	/	/	/	/	/	
GlycolMonobutyl	/	/	44.452	44.93	43.52	41.15	41.15	
Diethylenglycol momohexylether	/	/	/	/	/	/	/	17.24
Triton X-100	/	/	/	/	/	/	/	17.23
Dielectric Parameters Target Value	$\epsilon=41.5$ $\sigma=0.90$	$\epsilon=41.5$ $\sigma=0.97$	$\epsilon=40.0$ $\sigma=1.40$	$\epsilon=40.0$ $\sigma=1.40$	$\epsilon=39.5$ $\sigma=1.67$	$\epsilon=39.2$ $\sigma=1.80$	$\epsilon=39.0$ $\sigma=1.96$	$\epsilon=35.3$ $\sigma=5.27$

**Table 9.2: Targets for tissue simulating liquid**

Frequency (MHz)	Liquid Type	Conductivity ( $\sigma$ )	$\pm 5\%$ Range	Permittivity ( $\epsilon$ )	$\pm 5\%$ Range
835	Head	0.90	0.874~0.97	41.5	39.4~43.6
900	Head	0.97	0.92~1.02	41.5	39.4~43.6
1800	Head	1.40	1.33~1.47	40.0	38.0~42.0
1950	Head	1.40	1.33~1.47	40.0	38.0~42.0
2300	Head	1.67	1.59~1.75	39.5	37.5~41.4
2450	Head	1.80	1.71~1.89	39.2	37.2~41.2
2600	Head	1.96	1.86~2.06	39.0	37.5~40.95
5200	Head	4.66	4.43~4.89	35.99	34.19~37.79
5300	Head	4.76	4.52~4.99	35.87	34.08~37.66
5500	Head	4.96	4.71~5.2	35.6	33.82~37.38
5600	Head	5.07	4.82~5.32	35.53	33.75~37.30
5800	Head	5.27	5.01~5.53	35.3	33.54~37.05

Note: Effective February 19, 2019, FCC has permitted the use of single head-tissue simulating liquid specified in IEC 62209-1 for all SAR tests.



## 9.2. Dielectric Performance of TSL

**Table 9.3: Dielectric Performance of Head Tissue Simulating Liquid**

Tissue Simulating Liquid								
Frequency (MHz)	Head(Standard)		Temperature	Date	Test Result		Deviation (%)	
	Permittivity $\epsilon$	Conductivity $\sigma$			Permittivity $\epsilon$	Conductivity $\sigma$	Permittivity $\epsilon$	Conductivity $\sigma$
750	41.90	0.89	22.5°C	2020/03/11	41.57	0.88	-0.79%	-1.12%
835	41.50	0.90	22.5°C	2020/03/12	41.04	0.93	-1.11%	3.33%
1750	40.10	1.37	22.5°C	2020/03/13	41.81	1.39	4.26%	1.46%
1900	40.00	1.40	22.5°C	2020/03/16	39.44	1.37	-1.40%	-2.14%
2450	39.20	1.80	22.5°C	2020/03/17	38.9	1.887	-0.77%	4.83%
2600	39.00	1.96	22.5°C	2020/03/17	38.28	2.05	-1.85%	4.59%

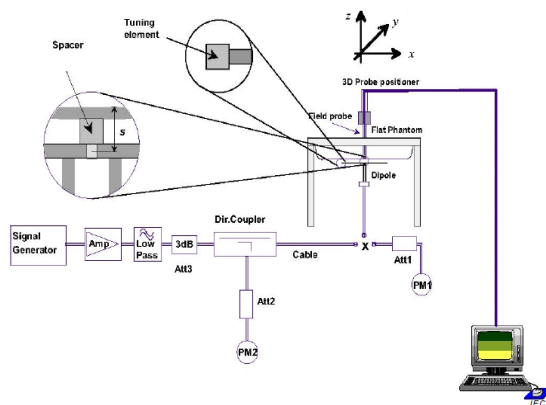
## 10. System Validation

### 10.1. System Validation

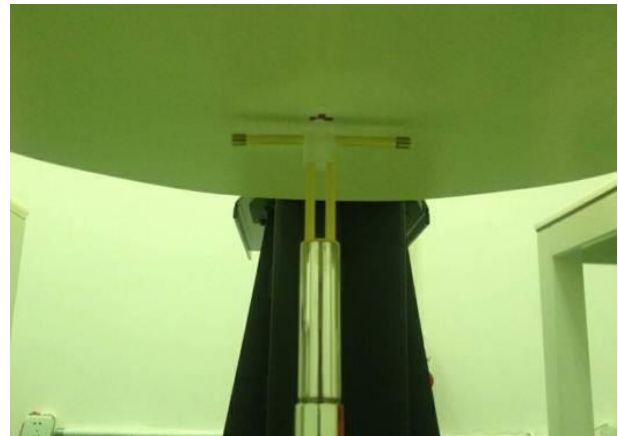
Each DASY system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY software, enable the user to conduct the system performance check and system validation. System validation kit includes a dipole, tripod holder to fix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

### 10.2. System Setup

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



Picture 10-1 Setup for System Evaluation



Picture 10-2. Setup for Dipole

### 10.3. System Validation Result

**Table 10.1: System Validation Result of SAR**

SAR System Validation								
Frequency (MHz)	Average Target Value (w/kg)		Temperature	Date	Test Result (w/kg)		Deviation (%)	
	10g	1g			10g	1g	10g	1g
750	5.59	8.5	22.5℃	2020/03/11	5.72	8.44	2.33%	-0.71%
835	6.25	9.63	22.5℃	2020/03/12	6.12	9.24	-2.08%	-4.05%
1750	19.4	36.5	22.5℃	2020/03/13	20.08	36.92	3.51%	1.15%
1900	20.6	39.6	22.5℃	2020/03/16	20.64	39.44	0.19%	-0.40%
2450	24.4	52.4	22.5℃	2020/03/17	24.12	52	-1.15%	-0.76%
2600	25.4	57.2	22.5℃	2020/03/17	25.04	55.6	-1.42%	-2.80%

Note: The input power level is equivalent to 1w

## 11. Measurement Procedures

### 11.1. Test Steps

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

#### (a) Power reference measurement

The reference and drift jobs are useful for monitoring the power drift of the device under test in the batch process. Both jobs measure the electric field strength at a specified reference position, at a selectable distance from the phantom surface. The reference position can be either the selected section's grid reference point or a user point in this section. The reference job projects the selected point onto the phantom surface, orients the probe perpendicularly to the surface, and approaches the surface using the selected detection method.

#### (b) Area scan

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a finer measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum locations even in relatively coarse grids. The scan area is defined by an editable grid. This grid is anchored at the grid reference point of the selected section in the phantom. When the area scan's property sheet is brought up, grid was at to 15mm \* 15mm and can be edited by users.

#### (c) Zoom scan

Zoom scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1g and 10g of simulated tissue. The default zoom scan measures 5 \* 5 \* 7 points within a cube whose base faces are centered around the maximum found in a preceding area scan job within the same procedure. If the preceding Area Scan job indicates more than one maximum, the number of Zoom Scans has to be enlarged accordingly.

#### (d) Power drift measurement

The drift job measures the field at the same location as the most recent reference job within the same procedure, and with the same setting. The drift measurement gives the field difference in dB from the reading conducted within the last reference measurement. Several drift measurements are possible for one reference measurement. This allows a user to monitor the power drift of the device under within a batch process. In the properties of the drift job, the user can specify a limit for the drift and have DASY software stop the measurements if this limit is exceeded. This ensures that the power drift during one measurement is within 5%.

The SAR measurement procedures for each of test conditions are as follows:

- (a) Make EUT to transmit it maximum output power
- (b) Measure conducted output power through RF cable
- (c) Place the EUT in the specific position of phantom
- (d) Measure SAR results for Middle channel or the highest power channel on each testing position
- (e) 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
- (f) Record the SAR value

## 11.2. Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the IEEE1529 standard. It can be conducted for 1g and 10g.

The DASY system allows evaluations that combine measured data and robot positions, such as:

### a) Maximum Search

During a maximum search, global and local maximum searches are automatically performed in 2D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard's method. The algorithm will find the global maximum and all local maxima within -2dB of the global maxima for all SAR distributions.

### b) Extrapolation

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. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3D space. They are used in the Cube Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard's method for extrapolation. For a grid using 5\*5\*5 measurement points with 5mm resolution amounting to 343 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1g and 10 cubes.

### c) Boundary effect

For measurements in the immediate vicinity of a phantom surface, the field coupling effects between the probe and the boundary influence the probe characteristics. Boundary effect errors of different dosi-metric probe types have been analyzed by measurements and using a numerical probe model. As expected, both methods showed an enhanced sensitivity in the immediate vicinity of the boundary. The effect strongly depends on the probe dimensions and disappears with increasing distance from the boundary. The sensitivity can be approximately given as:

$$S \approx S_0 + S_b * \exp\left(-\frac{z}{a}\right) * \cos\left(\pi \frac{z}{\lambda}\right)$$

Since the decay of the boundary effect dominates for small probe ( $a \ll \lambda$ ), the cos-term can be omitted. Factors  $S_b$  (parameter Alpha in the DASY software) and  $a$  (parameter Delta in the DASY software) are assessed during probe calibration and used for numerical compensation of the boundary effect. Several simulations and measurements have confirmed that the compensation is valid for different field and boundary configurations.

This simple compensation procedure can largely reduce the probe uncertainty near boundaries. It works well as long as:

- The boundary curvature is small
- The probe axis is angled less than 30° to the boundary normal
- The distance between probe and boundary is larger than 25% of the probe diameter
- The probe is symmetric (all sensors have the same offset from the probe tip)

Since all of these requirements are fulfilled in a DASY system, the correction of the probe boundary effect in the vicinity of the phantom surface is performed in a fully automated manner via the measurement data extraction during post processing.

### 11.3. General Measurement Procedure

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements and fully documented in SAR reports to qualify for TCB approval. Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std 1528-2013. The results should be documented as part of the system validation records and may be requested to support test results when all the measurement parameters in the following table are not satisfied.

**Table 11.1: Test Resolution Requirement**

Items		≤3GHz	>3GHz	
Maximum Distance		5mm ±1mm	$\frac{1}{2} * \delta * \ln(2)$ mm ±0.5mm	
Maximum probe angle		30±1°	20±1°	
Maximum Area Scan spatial resolution: $\Delta x_{Area}$ , $\Delta y_{Area}$		≤2GHz: ≤15mm	3-4GHz: ≤12mm	
		2-3GHz: ≤12mm	4-6GHz: ≤10mm	
		when the x or y dimension of the device , in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the device with at least one measurement point on the device		
Maximum Zoom Scan spatial resolution: $\Delta x_{Zoom}$ , $\Delta y_{Zoom}$		≤2GHz: ≤8mm	3-4GHz: ≤5mm	
		2-3GHz: ≤5mm	4-6GHz: ≤4mm	
maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	≤5mm	3-4GHz: ≤4mm 4-5GHz: ≤3mm 5-6GHz: ≤2mm	
	graded grid	$\Delta z_{Zoom}(1)$ : between 1 <sup>st</sup> two points closest to phantom surface	≤4mm	3-4GHz: ≤3mm 4-5GHz: ≤2.5mm 5-6GHz: ≤2mm
		$\Delta z_{Zoom}(n > 1)$ between subsequent points	≤1.5*	
minimum zoom scan volume	x, y, z	≥30mm	3-4GHz: ≥28mm 4-5GHz: ≥25mm 5-6GHz: ≥22mm	

Notes:

$\delta$  is the penetration depth of a plane-wave at normal incidence to the tissue medium in IEEE 1528-2013.

When Zoom Scan is required and reported SAR from the Area Scan based 1-g SAR estimation procedure of KDB publication 447498 is ≤1.4 W/kg, ≤8mm for 2GHz-3GHz, ≤7mm for 3GHz-4GHz, ≤5mm for 4GHz-6GHz Zoom Scan resolution may be applied.

## 11.4. WCDMA Measurement Procedures

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

**Table 11.2: HSDPA setting for Release 5**

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c / \beta_d$	$\beta_{hs}$	CM (dB)	MPR (dB)
1	2/15	15/15	64	2/15	4/15	1.5	0.5
2	12/15	15/15	64	12/15	24/25	2.0	1
3	15/15	8/15	64	15/8	30/15	2.0	1
4	15/15	4/15	64	15/4	30/15	2.0	1

**Table 11.3: HSUPA setting for Release 6**

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

**Note:**

A KDB inquiry is required to address test and approval requirements when the maximum output power measured in HS-DPCCH Sub-test 2 – 4 is higher than Sub-test 1.

A KDB inquiry is required to determine test and approval requirements when the maximum output power measured in E-DCH Sub-test 2 – 4 is higher than Sub-test 5.

## 11.5. LTE Measurement Procedure

SAR tests for LTE are performed with a base station simulator. Closed loop power control was used so the UE transmits with maximum output power during SAR testing.

1. Per KDB 941225 D05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
2. 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are  $\leq 0.8$  W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is  $> 1.45$  W/kg, the remaining required test channels must also be tested.
4. 16QAM/64QAM output power for each RB allocation configuration is  $>$  not  $\frac{1}{2}$ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is  $\leq 1.45$  W/kg; 16QAM/64QAM SAR testing is not required.
5. Smaller bandwidth output power for each RB allocation configuration is  $>$  not  $\frac{1}{2}$ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is  $\leq 1.45$  W/kg; smaller bandwidth SAR testing is not required.
6. For LTE B12 / B26 the maximum bandwidth does not support three non-overlapping channels, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.
7. LTE band 17 / 2 / 5 / 38 / 4 SAR test was covered by Band 12 / 25 / 26 / 41 / 66; according to TCB workshop, SAR test for overlapping LTE bands can be reduced if
  - a. The maximum output power, including tolerance, for the smaller band is  $\leq$  the larger band to qualify for the SAR test exclusion.
  - b. The channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band.

### LTE Carrier Aggregation Conducted Power (Downlink)

According to KDB941225 D05A v01r02, Uplink maximum output power measurement with downlink carrier aggregation active should be measured, using the highest output channel measured without downlink carrier aggregation, to confirm that uplink maximum output power with downlink carrier aggregation active remains within the specified tune-up tolerance limits and not more than  $\frac{1}{4}$  dB higher than the maximum output measured without downlink carrier aggregation active.

### LTE TDD Considerations

According to KDB 941225 D05 SAR for LTE Devices, for Time-Division Duplex (TDD) systems, SAR must be tested using a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by the defined 3GPP LTE TDD configurations.

SAR was tested with the highest transmission duty factor (63.33%) using Uplink-downlink configuration 0 and Special sub-frame configuration 7.

LTE TDD Band 41 supports 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations and Table 4.2-1 for Special sub-frame configurations.



**Table 11.4 Calculated Duty Cycle for LTE TDD**

Uplink-Downlink Configuration		Sub-frame Number										Calculated
0	Periodicity	1	2	3	4	5	6	7	8	9	10	Duty Cycle (%)
0	5 ms	D	S	U	U	U	D	S	U	U	U	63.33
1	5 ms	D	S	U	U	D	D	S	U	U	D	43.33
2	5 ms	D	S	U	D	D	D	S	U	D	D	23.33
3	10 ms	D	S	U	U	U	D	D	D	D	D	31.67
4	10 ms	D	S	U	U	D	D	D	D	D	D	21.67
5	10 ms	D	S	U	D	D	D	D	D	D	D	11.67
6	5 ms	D	S	U	U	U	D	S	U	U	D	53.33

Example for Calculated Duty Cycle for Uplink-Downlink Configuration 0:

$$\text{Calculated Duty Cycle} = (5120 \times T_s \times 2 + 6 \text{ ms}) / 10\text{ms} = 63.33\%$$

Where

$$T_s = 1/(15000 \times 2048) \text{ seconds}$$

## 11.6. Bluetooth & WiFi Measurement Procedures

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

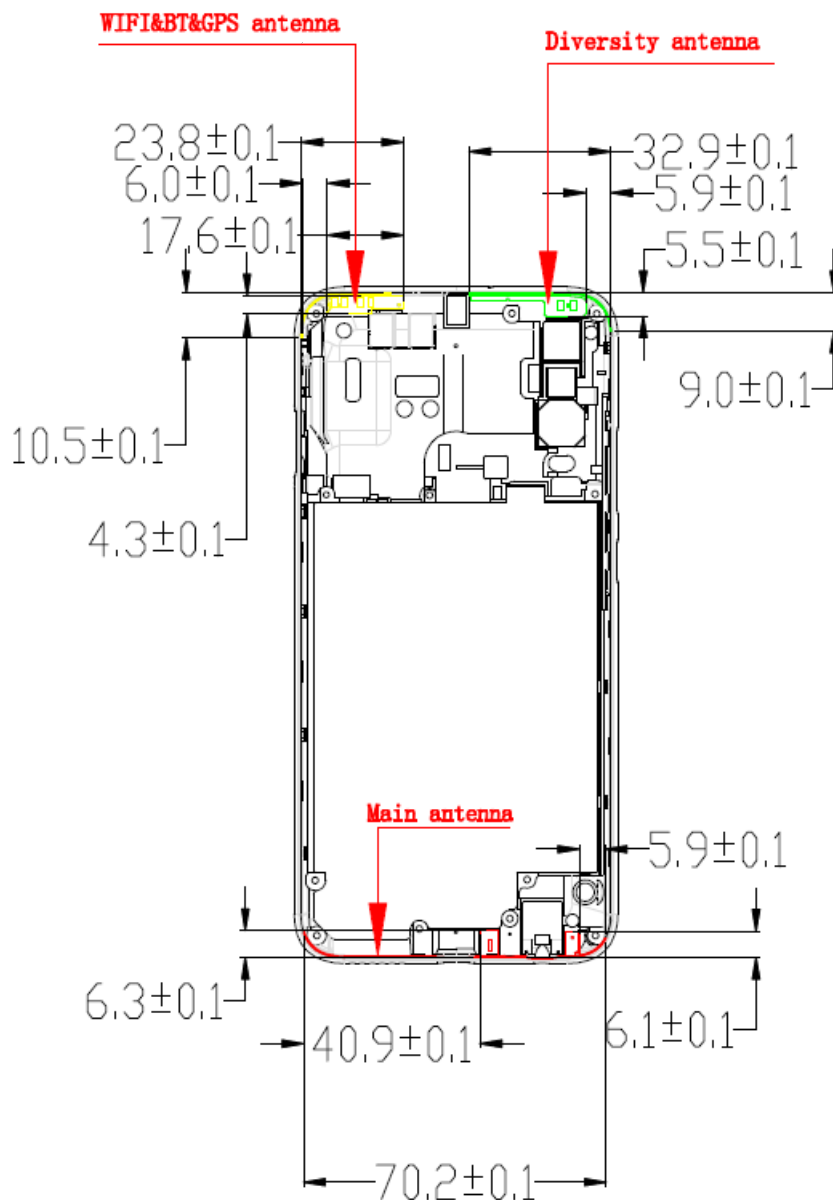
Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in a test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other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

## 12. Simultaneous Transmission SAR Considerations

### 12.1. Reference Document

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

### 12.2. Antenna Separation Distances



Picture 12-1 Antenna Locations

### 12.3. SAR Measurement Positions

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

**Table 12.1: SAR measurement Positions**

Antenna Mode	Front	Back	Left	Right	Top	Bottom
2/3/4G	Yes	Yes	Yes	Yes	No	Yes
BT/WiFi	Yes	Yes	No	Yes	Yes	No

### 12.4. Low Power Transmitters SAR Consideration

Standalone 1-g head or body SAR evaluation by measurement or numerical simulation for low power transmitters is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

The 1-g SAR test exclusion threshold for 100 MHz to 6 GHz at test separation distances  $\leq 50$  mm are determined by:

$$\frac{(\text{max. power of channel, including tune-up tolerance, mW})}{(\text{min. test separation distance, mm})} * \sqrt{\text{Frequency (GHz)}} \leq 3.0$$

Where

- Frequency(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

According to the KDB447498 appendix A, the SAR test exclusion threshold for 2450MHz at 5mm test separation distances is 10mW. That means the transmitters with tune-up power below 10mW are excluded for SAR measurement.

### 12.5. Simultaneous Transmission Analysis

KDB 447498 D01 General RF Exposure Guidance introduces a new formula for calculating the SPLSR (SAR to Peak Location Ratio) between pairs of simultaneously transmitting antennas:

$$\text{SPLSR} = \sqrt{(\text{SAR1} + \text{SAR2})^3 / R_i}$$

Where

- SAR1 is the highest measured or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition.
- SAR2 is the highest measured or estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first.
- Ri is the separation distance between the pair of simultaneous transmitting antennas. When the SAR is measured, for both antennas in the pair, it is determined by the actual x, y and z coordinates in the 1-g SAR for each SAR peak location, based on the extrapolated and interpolated result in the zoom scan measurement, using the formula of

$$(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2$$

In order for a pair of simultaneous transmitting antennas with the sum of 1-g SAR > 1.6 W/kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:

$$\sqrt{(SAR1 + SAR2)^3/Ri} < 0.04$$

## 12.6. Simultaneous Transmission Table

**Table 12.2: Simultaneous Transmission Configurations**

Items	Capable Transmit Configurations
1	GSM/EGPRS/EDGE + BT
2	GSM/EGPRS/EDGE + WiFi
3	WCDMA + BT
4	WCDMA+ WiFi
5	LTE + BT
6	LTE + WiFi

## 13. Conducted Output Power

### 13.1. GSM Measurement result

**Table 13.1: The conducted power measurement results for GSM850**

GSM			GSM850							
Model	Modulation	Time Slot	Tune up (dBm)	Measure Power(dBm)			Devison Factor(dB)	Average Power(dBm)		
				128	190	251		128	190	251
GSM	GMSK	1 Tx	33	31.63	31.61	31.59	-9.03	22.6	22.58	22.56
GPRS	GMSK	1 Tx	33	31.72	31.7	31.67	-9.03	22.69	22.67	22.64
		2 Tx	32	30.64	31.63	30.65	-6.02	24.62	<b>25.61</b>	24.63
		3 Tx	30	28.63	28.55	28.54	-4.26	24.37	24.29	24.28
		4 Tx	29	27.4	27.42	27.44	-3.01	24.39	24.41	24.43
EGPRS	8PSK	1 Tx	26	24.71	24.73	24.61	-9.03	15.68	15.7	15.58
		2 Tx	24.5	23.85	23.68	23.54	-6.02	17.83	17.66	17.52
		3 Tx	22.5	21.83	21.51	21.24	-4.26	17.57	17.25	16.98
		4 Tx	21	20.42	20.21	20.01	-3.01	17.41	17.2	17

**Table 13.2: The conducted power measurement results for GSM1900**

GSM			GSM1900							
Model	Modulation	Time Slot	Tune up (dBm)	Measure Power(dBm)			Devision Factor(dB)	Average Power(dBm)		
				512	661	810		512	661	810
GSM	GMSK	1 Tx	27.5	26.72	26.96	27.15	-9.03	17.69	17.93	18.12
GPRS	GMSK	1 Tx	27.5	26.7	26.94	27.12	-9.03	17.67	17.91	18.09
		2 Tx	27	25.69	25.9	26.08	-6.02	19.67	19.88	20.06
		3 Tx	24.5	23.72	23.9	24.02	-4.26	19.46	19.64	19.76
		4 Tx	23.5	22.59	22.72	22.87	-3.01	19.58	19.71	19.86
EGPRS	8PSK	1 Tx	23	22.28	22.17	22.25	-9.03	13.25	13.14	13.22
		2 Tx	22	21.67	21.27	21.31	-6.02	15.65	15.25	15.29
		3 Tx	20.5	19.81	19.47	19.4	-4.26	15.55	15.21	15.14
		4 Tx	19	18.72	18.36	18.45	-3.01	15.71	15.35	15.44

**NOTES:**

## 1) Division Factors

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

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

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

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

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

**According to the conducted power as above, the body measurements are performed with 2Txslots for GSM850 and 2Txslots for GSM1900.**

## 13.2. WCDMA Measurement result

**Table 13.3: The conducted Power for WCDMA Band2**

WCDMA		WCDMA B2			
Mode	Test Mode	Tune up	Channel		
			9262	9400	9538
WCDMA	RMC	23	21.62	21.64	21.64
HSDPA	Subtest1	23	21.48	21.43	21.34
	Subtest2	22	21.26	21.27	21.21
	Subtest3	21.5	21.09	21.07	20.96
	Subtest4	21.5	20.91	20.89	20.75
HSUPA	Subtest1	21	20.73	20.70	20.53
	Subtest2	21	20.55	20.52	20.32
	Subtest3	21	20.37	20.33	20.10
	Subtest4	21	20.19	20.15	19.89
	Subtest5	21	20.01	19.96	19.67

**Table 13.4: The conducted Power for WCDMA Band4**

WCDMA		WCDMA B4			
Mode	Test Mode	Tune up	Channel		
			1312	1413	1513
WCDMA	RMC	23	21.74	21.9	21.45
HSDPA	Subtest1	22	21.52	21.67	21.23
	Subtest2	22	21.34	21.56	21.33
	Subtest3	22	21.13	21.37	21.21
	Subtest4	21.5	20.93	21.2	21.15
HSUPA	Subtest1	21.5	20.73	21.03	21.09
	Subtest2	21.5	20.53	20.86	21.03
	Subtest3	21.5	20.33	20.69	20.97
	Subtest4	21.5	20.13	20.52	20.91
	Subtest5	21.5	19.93	20.35	20.85

**Table 13.5: The conducted Power for WCDMA Band5**

WCDMA		WCDMA B5			
Mode	Test Mode	Tune up	Channel		
			4132	4183	4233
WCDMA	RMC	24	23.5	23.32	23.34
HSDPA	Subtest1	23.5	23.2	22.98	23.12
	Subtest2	23.5	23.08	23.12	23.2
	Subtest3	23.5	22.84	22.94	23.08
	Subtest4	23.5	22.63	22.84	23.01
HSUPA	Subtest1	23.5	22.42	22.74	22.94
	Subtest2	23.5	22.21	22.64	22.87
	Subtest3	23.5	22	22.54	22.8
	Subtest4	23.5	21.79	22.44	22.73
	Subtest5	23.5	21.58	22.34	22.66

### 13.3. LTE Measurement result

**Table 13.6: The conducted Power for LTE Band 2/4/5/7/12/13/17**

LTE			LTE B2			
Modulation	RB	RB Offset	Tune up	1.4MHz		
				18607	18900	19193
QPSK	1	Low	21.5	20.71	20.66	20.74
		Middle		20.85	20.80	20.90
		High		20.74	20.67	20.75
	50%	Low	21.5	20.82	20.77	20.86
		Middle		20.86	20.84	20.92
		High		20.82	20.78	20.87
100%	/	20.5	19.84	19.80	19.88	
16QAM	1	Low	20.5	20.05	19.92	19.99
		Middle		20.20	20.05	20.14
		High		20.03	19.92	20.00
	50%	Low	20.5	19.87	19.78	19.84
		Middle		19.92	19.85	19.92
		High		19.84	19.78	19.84
100%	/	19.5	18.98	18.90	18.96	
Modulation	RB	RB Offset	Tune up	3MHz		
				18615	18900	19185
QPSK	1	Low	21.5	20.76	20.71	20.79



	50%	Middle	21.5	20.89	20.88	20.98	
		High		20.76	20.71	20.83	
		Low		19.78	19.75	19.89	
	Middle	19.82		19.78	19.91		
	High	19.76		19.76	19.87		
	100%	/		20.5	19.77	19.76	19.87
16QAM	1	Low	20.5	20.06	19.90	19.99	
		Middle		20.23	20.07	20.18	
		High		20.06	19.92	20.05	
	50%	Low		20.5	18.88	18.80	18.93
		Middle			18.91	18.82	18.93
		High			18.85	18.78	18.89
100%	/	19.5	18.81		18.77	18.87	
Modulation	RB	RB Offset	Tune up		5MHz		
					18625	18900	19175
QPSK	1	Low	21.5	20.70	20.64	20.68	
		Middle		20.94	20.89	20.98	
		High		20.66	20.61	20.74	
	50%	Low		21.5	19.80	19.81	19.91
		Middle			19.86	19.81	19.93
		High			19.84	19.74	19.85
100%	/	20.5	19.82		19.80	19.91	
16QAM	1	Low	20.5		19.95	19.76	19.86
		Middle			20.17	20.04	20.25
		High		19.92	19.80	19.98	
	50%	Low		20.5	18.75	18.71	18.82
		Middle			18.80	18.74	18.87
		High			18.79	18.65	18.79
100%	/	19.5	18.79		18.71	18.83	
Modulation	RB	RB Offset	Tune up		10MHz		
					18650	18900	19150
QPSK	1	Low	21.5	20.77	20.70	20.70	
		Middle		20.86	20.81	20.84	
		High		20.67	20.63	20.76	
	50%	Low		21.5	19.78	19.86	19.99
		Middle			19.83	19.81	19.88
		High			19.89	19.74	19.78
100%	/	20.5	19.85		19.81	19.89	
16QAM	1	Low	20.5		20.07	19.78	19.77
		Middle			20.14	19.98	20.03
		High		19.89	19.87	20.00	
	50%	Low		20.5	18.79	18.81	18.89
		Middle			18.83	18.77	18.82

		High		18.85	18.70	18.74	
				100%	/	19.5	18.86
Modulation	RB	RB Offset	Tune up	15MHz			
				18675	18900	19125	
QPSK	1	Low	21.5	20.74	20.72	20.67	
		Middle		20.77	20.72	20.74	
		High		20.57	20.63	20.73	
	50%	Low	21.5	19.77	19.84	19.83	
		Middle		19.80	19.82	19.86	
		High		19.83	19.76	19.78	
	100%	/	20.5	19.78	19.80	19.81	
	16QAM	1	Low	20.5	20.11	19.78	19.82
			Middle		20.13	19.96	19.83
High			19.77		19.94	19.98	
50%		Low	20.5	18.79	18.80	18.74	
		Middle		18.84	18.79	18.76	
		High		18.84	18.75	18.72	
100%		/	19.5	18.83	18.78	18.73	
Modulation		RB	RB Offset	Tune up	20MHz		
					18700	18900	19100
QPSK	1	Low	21.5	20.80	20.72	20.75	
		Middle		20.87	20.81	20.86	
		High		20.55	20.64	20.72	
	50%	Low	21.5	19.76	19.99	19.84	
		Middle		19.90	19.88	19.90	
		High		19.87	19.84	19.67	
	100%	/	20.5	19.79	19.87	19.76	
	16QAM	1	Low	20.5	20.08	19.80	20.01
			Middle		20.09	20.04	19.93
High			19.63		19.94	20.01	
50%		Low	20.5	18.74	18.91	18.81	
		Middle		18.85	18.83	18.83	
		High		18.83	18.81	18.64	
100%		/	19.5	18.73	18.81	18.69	

LTE			LTE B4			
Modulation	RB	RB Offset	Tune up	1.4MHz		
				19957	20175	20393
QPSK	1	Low	22.5	21.66	21.58	21.43
		Middle		21.78	21.71	21.56
		High		21.67	21.61	21.43
	50%	Low	22.5	21.77	21.70	21.53
		Middle		21.82	21.74	21.57

		High		21.78	21.70	21.54
	100%	/	21.5	20.76	20.71	20.55
16QAM	1	Low	21.5	20.92	20.87	20.68
		Middle		21.04	20.96	20.78
		High		20.91	20.87	20.65
	50%	Low	21.5	20.74	20.66	20.49
		Middle		20.79	20.73	20.54
		High		20.74	20.66	20.49
100%	/	20.5	19.83	19.77	19.61	
Modulation	RB	RB Offset	Tune up	3MHz		
				19965	20175	20385
QPSK	1	Low	22.5	21.76	21.69	21.50
		Middle		21.90	21.82	21.66
		High		21.78	21.64	21.47
	50%	Low	22.5	20.78	20.73	20.54
		Middle		20.83	20.75	20.59
		High		20.79	20.70	20.54
100%	/	21.5	20.78	20.71	20.54	
16QAM	1	Low	21.5	21.06	21.02	20.82
		Middle		21.20	21.14	20.96
		High		21.06	20.97	20.77
	50%	Low	21.5	19.85	19.84	19.65
		Middle		19.89	19.85	19.67
		High		19.87	19.79	19.64
100%	/	20.5	19.80	19.76	19.60	
Modulation	RB	RB Offset	Tune up	5MHz		
				19975	20175	20375
QPSK	1	Low	22.5	21.69	21.64	21.45
		Middle		21.98	21.91	21.68
		High		21.68	21.59	21.37
	50%	Low	22.5	20.77	20.81	20.53
		Middle		20.87	20.82	20.63
		High		20.87	20.68	20.57
100%	/	21.5	20.81	20.76	20.61	
16QAM	1	Low	21.5	20.96	20.92	20.74
		Middle		21.25	21.16	20.98
		High		20.96	20.87	20.67
	50%	Low	21.5	19.74	19.80	19.56
		Middle		19.86	19.83	19.64
		High		19.86	19.68	19.59
100%	/	20.5	19.82	19.78	19.62	
Modulation	RB	RB Offset	Tune up	10MHz		
				20000	20175	20350

QPSK	1	Low	22.5	21.79	21.71	21.62
		Middle		21.91	21.82	21.71
		High		21.66	21.62	21.47
	50%	Low	22.5	20.77	20.89	20.72
		Middle		20.89	20.80	20.66
		High		20.93	20.67	20.68
	100%	/	21.5	20.87	20.81	20.70
16QAM	1	Low	21.5	21.08	20.98	20.87
		Middle		21.19	21.08	20.98
		High		20.91	20.91	20.75
	50%	Low	21.5	19.79	19.89	19.73
		Middle		19.89	19.81	19.68
		High		19.93	19.69	19.68
	100%	/	20.5	19.88	19.81	19.72
Modulation	RB	RB Offset	Tune up	15MHz		
				20025	20175	20325
QPSK	1	Low	22.5	21.77	21.69	21.62
		Middle		21.79	21.71	21.62
		High		21.58	21.54	21.42
	50%	Low	22.5	20.81	20.84	20.72
		Middle		20.85	20.79	20.69
		High		20.85	20.65	20.66
	100%	/	21.5	20.80	20.77	20.69
16QAM	1	Low	21.5	21.08	20.96	20.95
		Middle		21.07	21.03	20.95
		High		20.85	20.87	20.71
	50%	Low	21.5	19.80	19.84	19.72
		Middle		19.83	19.79	19.69
		High		19.82	19.67	19.66
	100%	/	20.5	19.82	19.80	19.69
Modulation	RB	RB Offset	Tune up	20MHz		
				20050	20175	20300
QPSK	1	Low	22.5	21.78	21.72	21.68
		Middle		21.87	21.81	21.71
		High		21.56	21.49	21.38
	50%	Low	22.5	20.71	20.92	20.89
		Middle		20.88	20.84	20.71
		High		20.81	20.56	20.70
	100%	/	21.5	20.75	20.76	20.78
16QAM	1	Low	21.5	21.12	20.99	21.01
		Middle		21.15	21.15	21.07
		High		20.89	20.84	20.69
	50%	Low	21.5	19.73	19.95	19.94

		Middle		19.90	19.88	19.77
		High		19.85	19.60	19.75
	100%	/	20.5	19.78	19.82	19.81

LTE			LTE B5				
Modulation	RB	RB Offset	Tune up	1.4MHz			
				20407	20525	20643	
QPSK	1	Low	24	23.49	23.41	23.39	
		Middle		23.60	23.55	23.53	
		High		23.49	23.41	23.42	
	50%	Low	24	23.60	23.52	23.51	
		Middle		23.67	23.58	23.58	
		High		23.60	23.54	23.53	
100%	/	23	22.63	22.55	22.56		
16QAM	1	Low	23	22.61	22.66	22.57	
		Middle		22.71	22.72	22.70	
		High		22.61	22.62	22.56	
	50%	Low	23	22.48	22.49	22.47	
		Middle		22.54	22.55	22.50	
		High		22.51	22.48	22.43	
	100%	/	22	21.66	21.62	21.60	
	Modulation	RB	RB Offset	Tune up	3MHz		
					20415	20525	20635
QPSK	1	Low	24	23.53	23.48	23.42	
		Middle		23.67	23.59	23.58	
		High		23.52	23.45	23.43	
	50%	Low	24	22.57	22.52	22.47	
		Middle		22.60	22.54	22.54	
		High		22.55	22.51	22.48	
100%	/	23	22.60	22.53	22.52		
16QAM	1	Low	23	22.65	22.72	22.62	
		Middle		22.84	22.83	22.81	
		High		22.68	22.65	22.58	
	50%	Low	23	21.59	21.58	21.55	
		Middle		21.62	21.59	21.60	
		High		21.58	21.57	21.56	
	100%	/	22	21.57	21.53	21.53	
	Modulation	RB	RB Offset	Tune up	5MHz		
					20425	20525	20625
QPSK	1	Low	24	23.45	23.42	23.36	
		Middle		23.70	23.65	23.59	
		High		23.43	23.35	23.34	
	50%	Low	24	22.62	22.52	22.58	

		Middle		22.65	22.59	22.55
		High		22.53	22.57	22.53
	100%	/	23	22.60	22.58	22.57
16QAM	1	Low	23	22.56	22.68	22.53
		Middle		22.87	22.87	22.80
		High		22.69	22.52	22.51
	50%	Low	23	21.57	21.50	21.56
		Middle		21.62	21.56	21.55
		High		21.49	21.55	21.54
100%	/	22	21.57	21.56	21.55	
Modulation	RB	RB Offset	Tune up	10MHz		
				20450	20525	20600
QPSK	1	Low	24	23.51	23.51	23.50
		Middle		23.58	23.58	23.54
		High		23.49	23.43	23.44
	50%	Low	24	22.61	22.51	22.73
		Middle		22.74	22.59	22.62
		High		22.56	22.63	22.53
100%	/	23	22.67	22.58	22.66	
16QAM	1	Low	23	22.60	22.76	22.58
		Middle		22.80	22.73	22.62
		High		22.74	22.51	22.56
	50%	Low	23	21.67	21.48	21.62
		Middle		21.58	21.52	21.53
		High		21.54	21.59	21.44
100%	/	22	21.63	21.52	21.59	

LTE			LTE B7			
Modulation	RB	RB Offset	Tune up	5MHz		
				20775	21100	21425
QPSK	1	Low	22.5	21.68	21.56	21.41
		Middle		22.01	21.81	21.74
		High		21.67	21.54	21.42
	50%	Low	21.5	20.79	20.70	20.58
		Middle		20.87	20.78	20.66
		High		20.87	20.74	20.61
100%	/	21.5	20.87	20.74	20.62	
16QAM	1	Low	21.5	20.78	20.70	20.60
		Middle		21.05	20.99	20.93
		High		20.75	20.69	20.62
	50%	Low	20.5	19.79	19.72	19.61
		Middle		19.89	19.80	19.69
		High		19.86	19.74	19.65

	100%	/	20.5	19.84	19.73	19.67
Modulation	RB	RB Offset	Tune up	10MHz		
				20800	21100	21400
QPSK	1	Low	22.5	21.68	21.57	21.23
		Middle		21.81	21.67	21.44
		High		21.70	21.55	21.43
	50%	Low	21.5	20.78	20.63	20.56
		Middle		20.84	20.71	20.55
		High		20.85	20.74	20.61
	100%	/	21.5	20.84	20.71	20.59
16QAM	1	Low	21.5	20.85	20.75	20.54
		Middle		20.91	20.87	20.41
		High		20.82	20.74	20.64
	50%	Low	20.5	19.79	19.67	19.61
		Middle		19.87	19.75	19.62
		High		19.85	19.79	19.68
	100%	/	20.5	19.85	19.75	19.64
Modulation	RB	RB Offset	Tune up	15MHz		
				20825	21100	21375
QPSK	1	Low	22.5	21.65	21.46	21.09
		Middle		21.73	21.59	21.26
		High		21.62	21.48	21.39
	50%	Low	21.5	20.79	20.65	20.52
		Middle		20.83	20.70	20.57
		High		20.84	20.71	20.60
	100%	/	21.5	20.82	20.68	20.57
16QAM	1	Low	21.5	20.85	20.75	20.54
		Middle		20.91	20.84	20.71
		High		20.83	20.75	20.65
	50%	Low	20.5	19.83	19.73	19.60
		Middle		19.89	19.78	19.65
		High		19.88	19.79	19.68
	100%	/	20.5	19.87	19.77	19.65
Modulation	RB	RB Offset	Tune up	20MHz		
				20850	21100	21350
QPSK	1	Low	22.5	21.66	21.48	21.40
		Middle		21.88	21.73	21.59
		High		21.63	21.49	21.40
	50%	Low	21.5	20.87	20.70	20.69
		Middle		20.91	20.80	20.68
		High		20.86	20.79	20.66
	100%	/	21.5	20.82	20.74	20.68
16QAM	1	Low	21.5	20.83	20.73	20.56

		Middle		21.02	20.96	20.81
		High		20.87	20.71	20.68
	50%	Low	20.5	19.88	19.77	19.77
		Middle		19.94	19.86	19.75
		High		19.89	19.86	19.74
	100%	/	20.5	19.83	19.79	19.72

LTE			LTE B12			
Modulation	RB	RB Offset	Tune up	1.4MHz		
				23017	23095	23173
QPSK	1	Low	25.5	24.77	24.86	24.85
		Middle		24.90	25.00	24.99
		High		24.84	24.87	24.88
	50%	Low	25.5	24.88	24.97	24.97
		Middle		24.98	25.02	25.06
		High		24.93	24.97	25.00
100%	/	24.5	23.95	24.01	24.02	
16QAM	1	Low	24.5	23.95	24.10	23.96
		Middle		24.13	24.22	24.07
		High		24.04	24.13	23.97
	50%	Low	24.5	23.81	23.93	23.84
		Middle		23.91	23.97	23.90
		High		23.87	23.95	23.84
100%	/	23.5	23.01	23.08	23.05	
Modulation	RB	RB Offset	Tune up	3MHz		
				23025	23095	23165
QPSK	1	Low	25.5	24.77	24.86	24.85
		Middle		25.01	25.03	25.05
		High		24.85	24.88	24.89
	50%	Low	25.5	23.85	23.93	23.93
		Middle		23.94	23.97	23.95
		High		23.92	23.94	23.92
100%	/	24.5	23.92	23.96	23.96	
16QAM	1	Low	24.5	23.98	24.08	23.99
		Middle		24.20	24.26	24.12
		High		24.05	24.11	24.00
	50%	Low	24.5	22.92	23.00	22.96
		Middle		22.99	23.05	22.97
		High		22.97	23.01	22.93
100%	/	23.5	22.93	22.97	22.93	
Modulation	RB	RB Offset	Tune up	5MHz		
				23035	23095	23155
QPSK	1	Low	25.5	24.68	24.71	24.75



	50%	Middle	25.5	25.00	25.01	25.02
		High		24.76	24.78	24.78
		Low		23.84	23.93	23.90
	100%	Middle	24.5	23.95	23.99	23.95
		High		23.88	23.99	23.90
		/		23.90	23.97	23.94
16QAM	1	Low	24.5	23.88	23.95	23.92
		Middle		24.22	24.23	24.13
		High		23.98	24.04	23.89
	50%	Low	24.5	22.83	22.92	22.85
		Middle		22.93	22.99	22.90
		High		22.88	22.99	22.84
100%	/	23.5	22.89	22.97	22.90	
Modulation	RB	RB Offset	Tune up	10MHz		
				23060	23095	23130
QPSK	1	Low	25.5	24.77	24.78	24.82
		Middle		24.94	24.97	24.98
		High		24.88	24.89	24.91
	50%	Low	25.5	23.90	24.02	23.93
		Middle		23.98	24.00	24.01
		High		23.99	24.08	23.97
100%	/	24.5	23.96	24.06	23.99	
16QAM	1	Low	24.5	23.97	23.98	24.06
		Middle		24.15	24.20	24.18
		High		24.13	24.09	24.00
	50%	Low	24.5	22.89	23.02	22.94
		Middle		22.95	22.99	22.99
		High		22.97	23.05	22.94
100%	/	23.5	22.95	23.04	22.97	

LTE			LTE B13			
Modulation	RB	RB Offset	Tune up	5MHz		
				23205	23230	23255
QPSK	1	Low	25.5	24.53	24.51	24.50
		Middle		24.82	24.79	24.85
		High		24.52	24.48	24.52
	50%	Low	25	23.73	23.73	23.68
		Middle		23.81	23.77	23.79
		High		23.72	23.73	23.70
100%	/	25	23.76	23.77	23.75	
16QAM	1	Low	25	23.70	23.75	23.70
		Middle		23.99	24.02	23.97
		High		23.72	23.67	23.63

	50%	Low	24.5	22.69	22.68	22.62
		Middle		22.75	22.73	22.70
		High		22.68	22.69	22.62
	100%	/	24.5	22.73	22.72	22.68
Modulation	RB	RB Offset	Tune up	10MHz		
				23230	23230	23230
QPSK	1	Low	25.5	24.61	24.60	24.61
		Middle		23.72	23.73	23.73
		High		24.72	24.70	24.71
	50%	Low	25	23.90	23.90	23.91
		Middle		24.60	24.60	24.60
		High		23.78	23.79	23.78
	100%	/	25	23.82	23.82	23.82
	16QAM	1	Low	25	22.76	22.76
Middle			23.80		23.80	23.79
High			22.75		22.76	22.75
50%		Low	24.5	23.79	23.79	23.80
		Middle		22.74	22.75	22.74
		High		23.80	23.78	23.80
100%		/	24.5	22.75	22.75	22.75

LTE			LTE B17			
Modulation	RB	RB Offset	Tune up	5MHz		
				23755	23790	23825
QPSK	1	Low	25.5	24.47	24.49	24.49
		Middle		24.77	24.80	24.84
		High		24.53	24.56	24.56
	50%	Low	24.5	23.67	23.64	23.69
		Middle		23.70	23.73	23.75
		High		23.70	23.70	23.66
	100%	/	24.5	23.72	23.67	23.71
16QAM	1	Low	24.5	23.68	23.75	23.67
		Middle		24.00	23.97	23.87
		High		23.78	23.71	23.60
	5	Low	23.5	22.65	22.61	22.61
		Middle		22.68	22.68	22.66
		High		22.67	22.67	22.57
	100%	/	23.5	22.70	22.65	22.64
Modulation	RB	RB Offset	Tune up	10MHz		
				23780	23790	23800
QPSK	1	Low	25.5	24.48	24.47	24.52
		Middle		24.63	24.66	24.66
		High		24.59	24.56	24.60

	50%	Low	24.5	23.67	23.64	23.65
		Middle		23.68	23.69	23.73
		High		23.75	23.71	23.71
	100%	/	24.5	23.73	23.69	23.69
16QAM	1	Low	24.5	23.71	23.69	23.73
		Middle		23.89	23.87	23.81
		High		23.70	23.66	23.66
	50%	Low	23.5	22.66	22.61	22.62
		Middle		22.69	22.66	22.67
		High		22.73	22.66	22.65
	100%	/	23.5	22.71	22.65	22.66

### 13.4. BT Measurement result

**Table 13.7: The conducted power for Bluetooth**

BlueTooth		BT					
Mode	Channel	DH1		2DH1		3DH1	
		Tune up	Output Power	Tune up	Output Power	Tune up	Output Power
BT	0	9	7.97	9	7.38	9	7.42
	39	9	8.64	9	7.93	9	7.96
	78	9	8.27	9	7.47	9	7.53
BlueTooth		BLE					
Mode	Frequency	Tune up		Channel		Output Power	
BLE	0	5		0		2.86	
	19	5		19		4.05	
	39	5		39		4.13	

**NOTE:** According to KDB447498 D01 BT standalone SAR are not required, because maximum average output power is less than 10mW.

Evaluation=1.231 < 3.0

When the standalone SAR test exclusion is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to the following to determine simultaneous transmission SAR test exclusion:

$$SAR = \frac{P(\text{Max. Power of channel, including tuneup tolerance, mW})}{D(\text{Min. test separation distance, mm})} * \frac{\sqrt{\text{frequency(GHz)}}}{x}$$

Where

- D (Min, test separation distances, mm) is always set to 50 mm for Head SAR evaluation
- Frequency(GHz) is the center frequency in GHz
- where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR

Therefor

- SAR head value of BT is 0.331 W/Kg where D is set to 5mm
- SAR body value of BT is 0.165 W/Kg for 1g where D is set to 10mm

### 13.5. WiFi Measurement result

**Table 13.8: The average conducted power for WiFi**

WiFi			WIFI 2.4G	
Mode	BW	Channel	Tune up	Output Power
802.11b	20M	1	13	11.59
		6	14	12.44
		11	13	11.73
802.11g	20M	1	14	12.82
		6	14	13.52
		11	14	13.05
802.11n	20M	1	14	12.66
		6	14	13.3
		11	14	13.03
	40M	3	14	<b>13.59</b>
		6	14	13.23
		9	14	13.23

## 2.4 GHz 802.11g/n OFDM SAR Test Exclusion Requirements

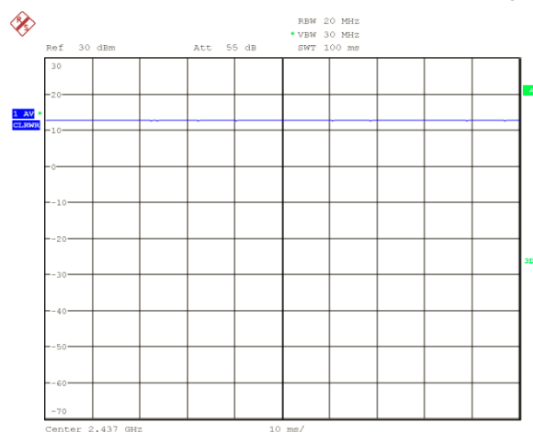
When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied. SAR is not required for the following 2.4 GHz OFDM conditions.

- a) When KDB Publication 447498 D01 SAR test exclusion applies to the OFDM configuration.
- b) When the highest *reported* SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is  $\leq 1.2$  W/kg.

### The default power measurement procedures are:

- a) Power must be measured at each transmit antenna port according to the DSSS and OFDM transmission configurations in each standalone and aggregated frequency band.
- b) Power measurement is required for the transmission mode configuration with the highest maximum output power specified for production units.
  - 1) When the same highest maximum output power specification applies to multiple transmission modes, the largest channel bandwidth configuration with the lowest order modulation and lowest data rate is measured.
  - 2) When the same highest maximum output power is specified for multiple largest channel bandwidth configurations with the same lowest order modulation or lowest order modulation and lowest data rate, power measurement is required for all equivalent 802.11 configurations with the same maximum output power.
- c) For each transmission mode configuration, power must be measured for the highest and lowest channels; and at the mid-band channel(s) when there are at least 3 channels. For configurations with multiple mid-band channels, due to an even number of channels, both channels should be measured.

During WiFi SAR testing EUT is configured with the WiFi continuous TX tool, and the transmission duty factor was monitored on the spectrum analyzer with zero-span setting, the duty cycle is 100%.



**Picture 13-1 WiFi 11b duty factor**

## 14. SAR Measurement Result

### 14.1. Standalone SAR Test Result

**Table 14.1: SAR Values for GSM850**

Test Position	Cover Type	Mode	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
								Measured SAR1g	Scaling Factor	Report SAR1g	
<b>Head SAR</b>											
Left Touch	Standard	GSM850	190	836.6	31.61	33	0.160	0.206	1.38	<b>0.284</b>	<b>1</b>
Left Tilt 15°	Standard	GSM850	190	836.6	31.61	33	0.050	0.103	1.38	0.142	/
Right Touch	Standard	GSM850	190	836.6	31.61	33	0.060	0.190	1.38	0.262	/
Right Tilt 15°	Standard	GSM850	190	836.6	31.61	33	-0.030	0.107	1.38	0.147	/
<b>Body SAR (HotSpot 10mm)</b>											
Front Side	Standard	GPRS 2TS	190	836.6	31.63	32	-0.020	0.283	1.09	0.308	/
Back Side	Standard	GPRS 2TS	190	836.6	31.63	32	0.090	0.288	1.09	0.314	/
Left Side	Standard	GPRS 2TS	190	836.6	31.63	32	0.020	0.297	1.09	<b>0.323</b>	<b>2</b>
Right Side	Standard	GPRS 2TS	190	836.6	31.63	32	0.040	0.206	1.09	0.224	/
Bottom Side	Standard	GPRS 2TS	190	836.6	31.63	32	-0.050	0.108	1.09	0.118	/

**Table 14.2: SAR Values for GSM1900**

Test Position	Cover Type	Mode	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
								Measured SAR1g	Scaling Factor	Report SAR1g	
<b>Head SAR</b>											
Left Touch	Standard	GSM1900	661	1880	26.96	27.5	0.030	0.029	1.13	0.033	/
Left Tilt 15°	Standard	GSM1900	661	1880	26.96	27.5	0.010	0.014	1.13	0.016	/
Right Touch	Standard	GSM1900	661	1880	26.96	27.5	0.080	0.050	1.13	<b>0.057</b>	<b>3</b>
Right Tilt 15°	Standard	GSM1900	661	1880	26.96	27.5	0.080	0.023	1.13	0.026	/
<b>Body SAR (HotSpot 10mm)</b>											
Front Side	Standard	GPRS 2TS	661	1880	25.69	27.5	0.080	0.107	1.52	0.162	/
Back Side	Standard	GPRS 2TS	661	1880	25.69	27.5	-0.120	0.141	1.52	0.214	/
Left Side	Standard	GPRS 2TS	661	1880	25.69	27.5	-0.060	0.030	1.52	0.046	/
Right Side	Standard	GPRS 2TS	661	1880	25.69	27.5	0.080	0.083	1.52	0.126	/
Bottom Side	Standard	GPRS 2TS	661	1880	25.69	27.5	0.000	0.215	1.52	<b>0.326</b>	<b>4</b>

**Table 14.3: SAR Values for WCDMA Band2**

Test Position	Cover Type	Mode	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
								Measured SAR1g	Scaling Factor	Report SAR1g	
<b>Head SAR</b>											
Left Touch	Standard	RMC12.2k	9400	1880	21.64	23	0.050	0.064	1.37	0.088	/
Left Tilt 15°	Standard	RMC12.2k	9400	1880	21.64	23	0.050	0.035	1.37	0.048	/
Right Touch	Standard	RMC12.2k	9400	1880	21.64	23	0.060	0.118	1.37	<b>0.161</b>	<b>5</b>
Right Tilt 15°	Standard	RMC12.2k	9400	1880	21.64	23	0.080	0.048	1.37	0.066	/
<b>Body SAR (HotSpot 10mm)</b>											
Front Side	Standard	RMC12.2k	9400	1880	21.64	23	0.070	0.148	1.37	0.202	/
Back Side	Standard	RMC12.2k	9400	1880	21.64	23	0.060	0.155	1.37	0.212	/
Left Side	Standard	RMC12.2k	9400	1880	21.64	23	0.060	0.049	1.37	0.067	/
Right Side	Standard	RMC12.2k	9400	1880	21.64	23	0.090	0.146	1.37	0.200	/
Bottom Side	Standard	RMC12.2k	9400	1880	21.64	23	-0.040	0.334	1.37	<b>0.457</b>	<b>6</b>

**Table 14.4: SAR Values for WCDMA Band4**

Test Position	Cover Type	Mode	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
								Measured SAR1g	Scaling Factor	Report SAR1g	
<b>Head SAR</b>											
Left Touch	Standard	RMC12.2k	1413	1732.6	21.9	23	-0.010	0.032	1.29	0.041	/
Left Tilt 15°	Standard	RMC12.2k	1413	1732.6	21.9	23	0.060	0.051	1.29	0.066	/
Right Touch	Standard	RMC12.2k	1413	1732.6	21.9	23	0.050	0.066	1.29	<b>0.085</b>	<b>7</b>
Right Tilt 15°	Standard	RMC12.2k	1413	1732.6	21.9	23	-0.030	0.029	1.29	0.037	/
<b>Body SAR (HotSpot 10mm)</b>											
Front Side	Standard	RMC12.2k	1413	1732.6	21.9	23	0.010	0.105	1.29	0.135	/
Back Side	Standard	RMC12.2k	1413	1732.6	21.9	23	0.050	0.127	1.29	0.164	/
Left Side	Standard	RMC12.2k	1413	1732.6	21.9	23	0.030	0.011	1.29	0.014	/
Right Side	Standard	RMC12.2k	1413	1732.6	21.9	23	0.080	0.091	1.29	0.117	/
Bottom Side	Standard	RMC12.2k	1413	1732.6	21.9	23	0.060	0.303	1.29	<b>0.390</b>	<b>8</b>

**Table 14.5: SAR Values for WCDMA Band5**

Test Position	Cover Type	Mode	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
								Measured SAR1g	Scaling Factor	Report SAR1g	
<b>Head SAR</b>											
Left Touch	Standard	RMC12.2k	4183	836.6	23.32	24	0.040	0.237	1.17	<b>0.277</b>	<b>9</b>
Left Tilt 15°	Standard	RMC12.2k	4183	836.6	23.32	24	0.020	0.129	1.17	0.151	/
Right Touch	Standard	RMC12.2k	4183	836.6	23.32	24	0.010	0.173	1.17	0.202	/
Right Tilt 15°	Standard	RMC12.2k	4183	836.6	23.32	24	-0.030	0.116	1.17	0.136	/
<b>Body SAR (HotSpot 10mm)</b>											
Front Side	Standard	RMC12.2k	4183	836.6	23.32	24	0.060	0.201	1.17	0.235	/
Back Side	Standard	RMC12.2k	4183	836.6	23.32	24	0.080	0.117	1.17	0.137	/
Left Side	Standard	RMC12.2k	4183	836.6	23.32	24	0.040	0.210	1.17	<b>0.246</b>	<b>10</b>
Right Side	Standard	RMC12.2k	4183	836.6	23.32	24	0.020	0.130	1.17	0.152	/
Bottom Side	Standard	RMC12.2k	4183	836.6	23.32	24	0.010	0.068	1.17	0.080	/



**Table 14.6: SAR Values for LTE Band2**

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
<b>Head SAR</b>														
Left Touch	Standard	QPSK	20	1	mid	18700	1860	20.87	21.5	-0.060	0.075	1.16	0.087	/
Left Tilt 15°	Standard	QPSK	20	1	mid	18700	1860	20.87	21.5	0.050	0.053	1.16	0.061	/
Right Touch	Standard	QPSK	20	1	mid	18700	1860	20.87	21.5	0.070	0.138	1.16	<b>0.160</b>	<b>11</b>
Right Tilt 15°	Standard	QPSK	20	1	mid	18700	1860	20.87	21.5	0.030	0.059	1.16	0.068	/
Left Touch	Standard	QPSK	20	50%	low	18900	1880	19.99	21.5	0.050	0.057	1.42	0.081	/
Left Tilt 15°	Standard	QPSK	20	50%	low	18900	1880	19.99	21.5	0.020	0.029	1.42	0.041	/
Right Touch	Standard	QPSK	20	50%	low	18900	1880	19.99	21.5	0.080	0.096	1.42	0.136	/
Right Tilt 15°	Standard	QPSK	20	50%	low	18900	1880	19.99	21.5	0.070	0.040	1.42	0.057	/
<b>Body SAR (HotSpot 10mm)</b>														
Front Side	Standard	QPSK	20	1	mid	18700	1860	20.87	21.5	0.020	0.190	1.16	0.220	/
Back Side	Standard	QPSK	20	1	mid	18700	1860	20.87	21.5	-0.010	0.205	1.16	0.237	/
Left Side	Standard	QPSK	20	1	mid	18700	1860	20.87	21.5	0.070	0.057	1.16	0.066	/
Right Side	Standard	QPSK	20	1	mid	18700	1860	20.87	21.5	0.100	0.143	1.16	0.165	/
Bottom Side	Standard	QPSK	20	1	mid	18700	1860	20.87	21.5	0.000	0.436	1.16	<b>0.504</b>	<b>12</b>
Front Side	Standard	QPSK	20	50%	low	18900	1880	19.99	21.5	0.030	0.139	1.42	0.197	/
Back Side	Standard	QPSK	20	50%	low	18900	1880	19.99	21.5	0.050	0.153	1.42	0.217	/
Left Side	Standard	QPSK	20	50%	low	18900	1880	19.99	21.5	0.040	0.042	1.42	0.059	/
Right Side	Standard	QPSK	20	50%	low	18900	1880	19.99	21.5	0.020	0.104	1.42	0.147	/
Bottom Side	Standard	QPSK	20	50%	low	18900	1880	19.99	21.5	-0.010	0.313	1.42	0.443	/

**Table 14.7: SAR Values for LTE Band4**

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
<b>Head SAR</b>														
Left Touch	Standard	QPSK	20	1	mid	20050	1720	21.87	22.5	0.020	0.028	1.16	0.032	/
Left Tilt 15°	Standard	QPSK	20	1	mid	20050	1720	21.87	22.5	0.050	0.028	1.16	0.032	/
Right Touch	Standard	QPSK	20	1	mid	20050	1720	21.87	22.5	0.010	0.069	1.16	0.080	/
Right Tilt 15°	Standard	QPSK	20	1	mid	20050	1720	21.87	22.5	0.060	0.031	1.16	0.036	/
Left Touch	Standard	QPSK	20	50%	low	20175	1732.5	20.92	22.5	0.070	0.026	1.44	0.037	/
Left Tilt 15°	Standard	QPSK	20	50%	low	20175	1732.5	20.92	22.5	0.060	0.027	1.44	0.039	/
Right Touch	Standard	QPSK	20	50%	low	20175	1732.5	20.92	22.5	0.020	0.069	1.44	<b>0.099</b>	<b>13</b>
Right Tilt 15°	Standard	QPSK	20	50%	low	20175	1732.5	20.92	22.5	0.030	0.029	1.44	0.042	/
<b>Body SAR (HotSpot 10mm)</b>														
Front Side	Standard	QPSK	20	1	mid	20050	1720	21.87	22.5	0.050	0.119	1.16	0.138	/
Back Side	Standard	QPSK	20	1	mid	20050	1720	21.87	22.5	0.050	0.100	1.16	0.116	/
Left Side	Standard	QPSK	20	1	mid	20050	1720	21.87	22.5	-0.090	0.012	1.16	0.014	/
Right Side	Standard	QPSK	20	1	mid	20050	1720	21.87	22.5	0.040	0.067	1.16	0.077	/
Bottom Side	Standard	QPSK	20	1	mid	20050	1720	21.87	22.5	0.020	0.296	1.16	0.342	/
Front Side	Standard	QPSK	20	50%	low	20175	1732.5	20.92	22.5	0.050	0.106	1.44	0.153	/
Back Side	Standard	QPSK	20	50%	low	20175	1732.5	20.92	22.5	-0.050	0.089	1.44	0.128	/
Left Side	Standard	QPSK	20	50%	low	20175	1732.5	20.92	22.5	0.030	0.011	1.44	0.016	/
Right Side	Standard	QPSK	20	50%	low	20175	1732.5	20.92	22.5	0.010	0.060	1.44	0.086	/
Bottom Side	Standard	QPSK	20	50%	low	20175	1732.5	20.92	22.5	0.030	0.270	1.44	<b>0.388</b>	<b>14</b>

**Table 14.8: SAR Values for LTE Band5**

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
<b>Head SAR</b>														
Left Touch	Standard	QPSK	10	1	mid	20450	829	23.58	24	0.030	0.226	1.10	<b>0.249</b>	<b>15</b>
Left Tilt 15°	Standard	QPSK	10	1	mid	20450	829	23.58	24	0.010	0.119	1.10	0.131	/
Right Touch	Standard	QPSK	10	1	mid	20450	829	23.58	24	0.020	0.196	1.10	0.216	/
Right Tilt 15°	Standard	QPSK	10	1	mid	20450	829	23.58	24	0.040	0.118	1.10	0.130	/
Left Touch	Standard	QPSK	10	50%	mid	20450	829	22.74	24	0.030	0.180	1.34	0.241	/
Left Tilt 15°	Standard	QPSK	10	50%	mid	20450	829	22.74	24	0.020	0.093	1.34	0.124	/
Right Touch	Standard	QPSK	10	50%	mid	20450	829	22.74	24	0.030	0.157	1.34	0.210	/
Right Tilt 15°	Standard	QPSK	10	50%	mid	20450	829	22.74	24	0.110	0.094	1.34	0.126	/
<b>Body SAR (HotSpot 10mm)</b>														
Front Side	Standard	QPSK	10	1	mid	20450	829	23.58	24	-0.030	0.191	1.10	0.210	/
Back Side	Standard	QPSK	10	1	mid	20450	829	23.58	24	0.040	0.193	1.10	<b>0.213</b>	<b>16</b>
Left Side	Standard	QPSK	10	1	mid	20450	829	23.58	24	0.020	0.134	1.10	0.148	/
Right Side	Standard	QPSK	10	1	mid	20450	829	23.58	24	0.080	0.189	1.10	0.208	/
Bottom Side	Standard	QPSK	10	1	mid	20450	829	23.58	24	0.040	0.095	1.10	0.105	/
Front Side	Standard	QPSK	10	50%	mid	20450	829	22.74	24	0.040	0.152	1.34	0.203	/
Back Side	Standard	QPSK	10	50%	mid	20450	829	22.74	24	0.040	0.154	1.34	0.206	/
Left Side	Standard	QPSK	10	50%	mid	20450	829	22.74	24	0.080	0.003	1.34	0.004	/
Right Side	Standard	QPSK	10	50%	mid	20450	829	22.74	24	-0.110	0.129	1.34	0.172	/
Bottom Side	Standard	QPSK	10	50%	mid	20450	829	22.74	24	0.040	0.075	1.34	0.100	/

**Table 14.9: SAR Values for LTE Band7**

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
<b>Head SAR</b>														
Left Touch	Standard	QPSK	20	1	mid	20850	2510	21.88	22.5	0.050	0.088	1.15	0.102	/
Left Tilt 15°	Standard	QPSK	20	1	mid	20850	2510	21.88	22.5	0.050	0.102	1.15	0.118	/
Right Touch	Standard	QPSK	20	1	mid	20850	2510	21.88	22.5	0.080	0.154	1.15	<b>0.178</b>	<b>17</b>
Right Tilt 15°	Standard	QPSK	20	1	mid	20850	2510	21.88	22.5	0.010	0.087	1.15	0.100	/
Left Touch	Standard	QPSK	20	50%	mid	20850	2510	20.91	22.5	0.030	0.066	1.44	0.095	/
Left Tilt 15°	Standard	QPSK	20	50%	mid	20850	2510	20.91	22.5	0.050	0.080	1.44	0.115	/
Right Touch	Standard	QPSK	20	50%	mid	20850	2510	20.91	22.5	0.020	0.122	1.44	0.176	/
Right Tilt 15°	Standard	QPSK	20	50%	mid	20850	2510	20.91	22.5	0.040	0.067	1.44	0.097	/
<b>Body SAR (HotSpot 10mm)</b>														
Front Side	Standard	QPSK	20	1	mid	20850	2510	21.88	22.5	0.110	0.224	1.15	0.258	/
Back Side	Standard	QPSK	20	1	mid	20850	2510	21.88	22.5	-0.020	0.258	1.15	0.298	/
Left Side	Standard	QPSK	20	1	mid	20850	2510	21.88	22.5	0.050	0.011	1.15	0.013	/
Right Side	Standard	QPSK	20	1	mid	20850	2510	21.88	22.5	0.010	0.237	1.15	0.273	/
Bottom Side	Standard	QPSK	20	1	mid	20850	2510	21.88	22.5	0.040	0.266	1.15	<b>0.307</b>	<b>18</b>
Front Side	Standard	QPSK	20	50%	mid	20850	2510	20.91	22.5	0.080	0.203	1.44	0.293	/
Back Side	Standard	QPSK	20	50%	mid	20850	2510	20.91	22.5	-0.060	0.209	1.44	0.301	/
Left Side	Standard	QPSK	20	50%	mid	20850	2510	20.91	22.5	0.090	0.012	1.44	0.017	/
Right Side	Standard	QPSK	20	50%	mid	20850	2510	20.91	22.5	0.080	0.188	1.44	0.271	/
Bottom Side	Standard	QPSK	20	50%	mid	20850	2510	20.91	22.5	-0.020	0.168	1.44	0.242	/

**Table 14.10: SAR Values for LTE Band12**

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
<b>Head SAR</b>														
Left Touch	Standard	QPSK	10	1	mid	23130	711	24.98	25.5	0.080	0.038	1.13	<b>0.043</b>	<b>19</b>
Left Tilt 15°	Standard	QPSK	10	1	mid	23130	711	24.98	25.5	-0.030	0.027	1.13	0.030	/
Right Touch	Standard	QPSK	10	1	mid	23130	711	24.98	25.5	0.040	0.037	1.13	0.042	/
Right Tilt 15°	Standard	QPSK	10	1	mid	23130	711	24.98	25.5	0.030	0.020	1.13	0.023	/
Left Touch	Standard	QPSK	10	50%	mid	23095	707.5	24.08	25.5	0.080	0.027	1.39	0.037	/
Left Tilt 15°	Standard	QPSK	10	50%	mid	23095	707.5	24.08	25.5	-0.090	0.014	1.39	0.019	/
Right Touch	Standard	QPSK	10	50%	mid	23095	707.5	24.08	25.5	0.040	0.027	1.39	0.037	/
Right Tilt 15°	Standard	QPSK	10	50%	mid	23095	707.5	24.08	25.5	0.030	0.018	1.39	0.025	/
<b>Body SAR (HotSpot 10mm)</b>														
Front Side	Standard	QPSK	10	1	mid	23130	711	24.98	25.5	-0.050	0.046	1.13	0.052	/
Back Side	Standard	QPSK	10	1	mid	23130	711	24.98	25.5	0.040	0.047	1.13	<b>0.053</b>	<b>20</b>
Left Side	Standard	QPSK	10	1	mid	23130	711	24.98	25.5	0.060	0.011	1.13	0.012	/
Right Side	Standard	QPSK	10	1	mid	23130	711	24.98	25.5	0.040	0.018	1.13	0.020	/
Bottom Side	Standard	QPSK	10	1	mid	23130	711	24.98	25.5	0.060	0.007	1.13	0.008	/
Front Side	Standard	QPSK	10	50%	mid	23095	707.5	24.08	25.5	0.050	0.036	1.39	0.050	/
Back Side	Standard	QPSK	10	50%	mid	23095	707.5	24.08	25.5	0.010	0.036	1.39	0.050	/
Left Side	Standard	QPSK	10	50%	mid	23095	707.5	24.08	25.5	0.020	0.016	1.39	0.022	/
Right Side	Standard	QPSK	10	50%	mid	23095	707.5	24.08	25.5	0.100	0.014	1.39	0.019	/
Bottom Side	Standard	QPSK	10	50%	mid	23095	707.5	24.08	25.5	0.040	0.005	1.39	0.007	/

**Table 14.11: SAR Values for LTE Band13**

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
<b>Head SAR</b>														
Left Touch	Standard	QPSK	10	1	high	23230	782	24.72	25.5	0.050	0.128	1.20	<b>0.153</b>	<b>21</b>
Left Tilt 15°	Standard	QPSK	10	1	high	23230	782	24.72	25.5	0.060	0.075	1.20	0.090	/
Right Touch	Standard	QPSK	10	1	high	23230	782	24.72	25.5	0.040	0.118	1.20	0.141	/
Right Tilt 15°	Standard	QPSK	10	1	high	23230	782	24.72	25.5	0.010	0.066	1.20	0.079	/
Left Touch	Standard	QPSK	10	50%	mid	23230	782	24.6	25.5	0.060	0.097	1.23	0.119	/
Left Tilt 15°	Standard	QPSK	10	50%	mid	23230	782	24.6	25.5	0.040	0.057	1.23	0.070	/
Right Touch	Standard	QPSK	10	50%	mid	23230	782	24.6	25.5	0.060	0.090	1.23	0.111	/
Right Tilt 15°	Standard	QPSK	10	50%	mid	23230	782	24.6	25.5	0.030	0.050	1.23	0.062	/
<b>Body SAR (HotSpot 10mm)</b>														
Front Side	Standard	QPSK	10	1	high	23230	782	24.72	25.5	0.030	0.149	1.20	0.178	/
Back Side	Standard	QPSK	10	1	high	23230	782	24.72	25.5	-0.120	0.161	1.20	<b>0.193</b>	<b>22</b>
Left Side	Standard	QPSK	10	1	high	23230	782	24.72	25.5	-0.010	0.158	1.20	0.189	/
Right Side	Standard	QPSK	10	1	high	23230	782	24.72	25.5	0.030	0.129	1.20	0.154	/
Bottom Side	Standard	QPSK	10	1	high	23230	782	24.72	25.5	0.060	0.027	1.20	0.032	/
Front Side	Standard	QPSK	10	50%	mid	23230	782	24.6	25.5	0.020	0.115	1.23	0.141	/
Back Side	Standard	QPSK	10	50%	mid	23230	782	24.6	25.5	-0.010	0.117	1.23	0.144	/
Left Side	Standard	QPSK	10	50%	mid	23230	782	24.6	25.5	0.040	0.120	1.23	0.148	/
Right Side	Standard	QPSK	10	50%	mid	23230	782	24.6	25.5	0.100	0.040	1.23	0.049	/
Bottom Side	Standard	QPSK	10	50%	mid	23230	782	24.6	25.5	0.080	0.019	1.23	0.023	/

**Table 14.12: SAR Values for WiFi 11b**

Test Position	Cover Type	Mode	BW(MHz)	Duty Cycle	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
										Measured SAR1g	Scaling Factor	Report SAR1g	
<b>Head SAR</b>													
Left Touch	Standard	802.11b	20	1:1	6	2437	12.44	14	0.030	0.075	1.43	0.107	/
Left Tilt 15°	Standard	802.11b	20	1:1	6	2437	12.44	14	0.050	0.082	1.43	0.117	/
Right Touch	Standard	802.11b	20	1:1	6	2437	12.44	14	0.060	0.174	1.43	0.249	/
Right Tilt 15°	Standard	802.11b	20	1:1	6	2437	12.44	14	0.070	0.197	1.43	<b>0.282</b>	<b>23</b>
<b>Body SAR (HotSpot 10mm)</b>													
Front Side	Standard	802.11b	20	1:1	6	2437	12.44	14	-0.030	0.051	1.43	0.073	/
Back Side	Standard	802.11b	20	1:1	6	2437	12.44	14	0.010	0.085	1.43	<b>0.122</b>	<b>24</b>
Left Side	Standard	802.11b	20	1:1	6	2437	12.44	14	0.120	0.058	1.43	0.083	/
Right Side	Standard	802.11b	20	1:1	6	2437	12.44	14	0.030	0.015	1.43	0.021	/
Bottom Side	Standard	802.11b	20	1:1	1	2412	12.44	14	0.050	0.041	1.43	0.059	/

## 14.2. Simultaneous SAR Evaluation

**Table 14.4 Simultaneous transmission SAR**

Simultaneous Transmission Table																	
FCC SAR Test		Cellular										Max. of Cellular	Non-Cellular		Simultaneous Transmission		
		G850	G1900	WB2	WB4	WB5	LB2	LB4	LB5	LB7	LB12		LB13	BT	WiFi2G Core0	Max(Cel.)+BT	Max(Cel.)+WiFi2G Core0+1
Head	Left Touch	0.28	0.03	0.09	0.04	0.28	0.09	0.04	0.25	0.10	0.04	0.15	0.28	0.33	0.11	0.61	0.39
	Left Tilt 15°	0.14	0.02	0.05	0.07	0.15	0.06	0.04	0.13	0.12	0.03	0.09	0.15	0.33	0.12	0.48	0.27
	Right Touch	0.26	0.06	0.16	0.09	0.20	0.16	0.10	0.22	0.18	0.04	0.14	0.26	0.33	0.25	0.59	0.51
	Right Tilt 15°	0.15	0.03	0.07	0.04	0.14	0.07	0.04	0.13	0.10	0.02	0.08	0.15	0.33	0.28	0.48	0.43
Hotspot (10mm)	Left	0.41	0.05	0.07	0.01	0.25	0.07	0.02	0.15	0.02	0.02	0.19	0.41	0.17	0.08	0.57	0.49
	Right	0.28	0.13	0.20	0.12	0.15	0.17	0.08	0.21	0.27	0.02	0.15	0.28	0.17	0.02	0.45	0.30
	Front	0.39	0.16	0.20	0.14	0.24	0.22	0.15	0.21	0.29	0.05	0.18	0.39	0.17	0.07	0.55	0.46
	Back	0.39	0.21	0.21	0.16	0.14	0.24	0.13	0.21	0.30	0.05	0.19	0.39	0.17	0.12	0.56	0.52
	Bottom	0.15	0.33	0.46	0.39	0.08	0.50	0.34	0.10	0.31	0.01	0.03	0.50	0.17	0.06	0.67	0.56

According to the conducted power measurement result, we can draw the conclusion that: stand-alone SAR for WiFi should be performed. Then, simultaneous transmission SAR for WiFi/BT is considered with measurement results of GSM/WCDMA/LTE and WiFi/BT. According to the above table, the sum of reported SAR values for GSM/WCDMA/LTE and BT < 1.6W/kg. So the simultaneous transmission SAR is not required for WiFi/BT transmitter.

### 14.3. SAR Measurement Variability

SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium.

The following procedures are applied to determine if repeated measurements are required.

- 1) Repeated measurement is not required when the original highest measured SAR is  $< 0.80$  W/kg; steps 2) through 4) do not apply.
- 2) When the original highest measured SAR is  $\geq 0.80$  W/kg, repeat that measurement once.
- 3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is  $> 1.20$  or when the original or repeated measurement is  $\geq 1.45$  W/kg ( $\sim 10\%$  from the 1-g SAR limit).
- 4) Perform a third repeated measurement only if the original, first or second repeated measurement is  $\geq 1.5$  W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is  $> 1.20$ .

## 15. Test Equipment Utilized

**Table 16.1 SAR Test System Equipment List**

Item	Instrument Name	Type	Serial Number	Manufacturer	Cal. Date	Cal. interval
1	Network analyzer	N5242A	MY51221755	Agilent	2019-12-11	1 year
2	Power meter	NRVD	102257	RS	2019-5-10	1 year
3	Power sensor	NRV-Z5	100241			
			100644			
4	Signal Generator	E4438C	MY49072044	Agilent	2019-5-10	1 Year
5	Amplifier	NTWPA-0086010F	12023024	rflight	No Calibration Requested	
6	Coupler	778D	MY4825551	Agilent	2019-5-10	1 year
7	BTS	E5515C	MY50266468	Agilent	2019-12-11	1 year
		MT8820C	6201240338	Anritsu	2019-12-11	1 year
8	E-field Probe	ES3DV3	3252	SPEAG	2020-1-3	1 year
9	DAE	SPEAG DAE4	1244	SPEAG	2019-12-17	1 year
10	Dipole Validation Kit	SPEAG D750V3	1144	SPEAG	2018-10-26	3 year
		SPEAG D835V2	4d112	SPEAG	2018-10-25	3 year
		SPEAG D1750V2	1044	SPEAG	2018-10-31	3 year
		SPEAG D1900V2	5d232	SPEAG	2020-02-12	3 year
		SPEAG D2300V2	1021	SPEAG	2018-11-1	3 year
		SPEAG D2450V2	858	SPEAG	2018-10-26	3 year
		SPEAG D2600V2	1031	SPEAG	2018-11-1	3 year

## 16. Measurement Uncertainty

**Table 17.1 Measurement Uncertainty Evaluation for SAR test**

Error Description	Uncert. Value	Prob. Dist.	Div.	(Ci)	(Ci)	Std. Unc.	Std. Unc.	(U <sub>i</sub> ) u <sub>eff</sub>
				1g	10g	(1g)	(10g)	
Measurement System								
Probe Calibration	12.1	N	2	1	1	6.05	6.05	∞
Axial Isotropy	4.7	R	$\sqrt{3}$	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	$\sqrt{3}$	0.7	0.7	3.88	3.88	∞
Boundary effects	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	4.7	R	$\sqrt{3}$	1	1	2.70	2.70	∞
System Detection Limits	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Readout Electronics	0.7	N	1	1	1	0.70	0.70	∞
Response Time	0.8	R	$\sqrt{3}$	1	1	0.50	0.50	∞
Integration Time	2.6	R	$\sqrt{3}$	1	1	1.50	1.50	∞
RF Ambient Noise	3	R	$\sqrt{3}$	1	1	1.70	1.70	∞
RF Ambient Noise	3	R	$\sqrt{3}$	1	1	1.70	1.70	∞
Probe Positioner	0.4	R	$\sqrt{3}$	1	1	0.20	0.20	∞
Probe Positioning	2.9	R	$\sqrt{3}$	1	1	1.70	1.70	∞
Post-processing	4	R	$\sqrt{3}$	1	1	2.30	2.30	∞
Test Sample Related								
Device Holder	2.42	N	1	1	1	2.42	2.42	71
Test sample Positioning	1.34	N	1	1	1	1.34	1.34	3
Power Drift	5	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and Setup								
Phantom Uncertainty	4	R	$\sqrt{3}$	1	1	2.3	2.3	∞
Liquid Conductivity (target)	5	R	$\sqrt{3}$	0.64	0.43	2.9	2.9	∞
Liquid Conductivity (meas.)	5	N	1	0.64	0.43	5	5	∞
Liquid Permittivity (target)	5	R	$\sqrt{3}$	0.6	0.49	2.9	2.9	∞
Liquid Permittivity (meas.)	5	N	1	0.6	0.49	5	5	∞
Combined Std. Uncertainty	$U_c' = \sqrt{\sum_{i=1}^{23} C_i^2 U_i^2}$					10.85	10.31	
Expanded STD Uncertainty	$U_c = 2U_c'$					21.70	20.62	



**Table 17.2 Measurement Uncertainty Evaluation for System Validation**

Error Description	Uncert. Value	Prob. Dist.	Div.	(Ci)	(Ci)	Std. Unc.	Std. Unc.	(U <sub>i</sub> ) u <sub>eff</sub>
				1g	10g	(1g)	(10g)	
Measurement System								
Probe Calibration	12.1	N	2	1	1	6.05	6.05	∞
Axial Isotropy	4.7	R	$\sqrt{3}$	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	$\sqrt{3}$	0.7	0.7	3.88	3.88	∞
Boundary effects	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	4.7	R	$\sqrt{3}$	1	1	2.70	2.70	∞
System Detection Limits	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Readout Electronics	0.7	N	1	1	1	0.70	0.70	∞
Response Time	0.8	R	$\sqrt{3}$	1	1	0.50	0.50	∞
Integration Time	2.6	R	$\sqrt{3}$	1	1	1.50	1.50	∞
RF Ambient Noise	3	R	$\sqrt{3}$	1	1	1.70	1.70	∞
RF Ambient Re	3	R	$\sqrt{3}$	1	1	1.70	1.70	∞
Probe Positioner	0.4	R	$\sqrt{3}$	1	1	0.20	0.20	∞
Probe Positioning	2.9	R	$\sqrt{3}$	1	1	1.70	1.70	∞
Post-processing	4	R	$\sqrt{3}$	1	1	2.30	2.30	∞
Test Sample Related								
Validation Dipole Positioning	2	N	1	1	1	2	2	71
Dipole Input Power	5	N	1	1	1	5	5	3
Power Drift	5	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and Setup								
Phantom Uncertainty	4	R	$\sqrt{3}$	1	1	2.3	2.3	∞
Liquid Conductivity (target)	5	R	$\sqrt{3}$	0.64	0.43	2.9	2.9	∞
Liquid Conductivity (meas.)	5	N	1	0.64	0.43	5	5	∞
Liquid Permittivity (target)	5	R	$\sqrt{3}$	0.6	0.49	2.9	2.9	∞
Liquid Permittivity (meas.)	5	N	1	0.6	0.49	5	5	∞
Combined Std. Uncertainty	$U_c = \sqrt{\sum_{i=1}^{23} C_i^2 U_i^2}$					11.79	11.30	
Expanded STD Uncertainty	$U_c = 2U_c'$					23.59	22.59	

\*\*\*END OF REPORT BODY\*\*\*

## ANNEX A. Graph Results

### Fig.1 GSM850 Left Cheek Middle

Date/Time: 2020/03/12

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.931$  S/m;  $\epsilon_r = 41.009$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature:22.5°C Liquid Temperature:22.5°C

Communication System: GSM Professional 850MHz; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Probe: ES3DV3 - SN3252ConvF(6.29, 6.29, 6.29); Calibrated: 1/3/2020

#### **GSM850 Left Cheek Middle/Area Scan (111x71x1):**

Measurement grid: dx=10 mm, dy=10 mm

Maximum value of SAR (Measurement) = 0.213 W/kg

#### **GSM850 Left Cheek Middle/Zoom Scan (7x7x7)/Cube 0:**

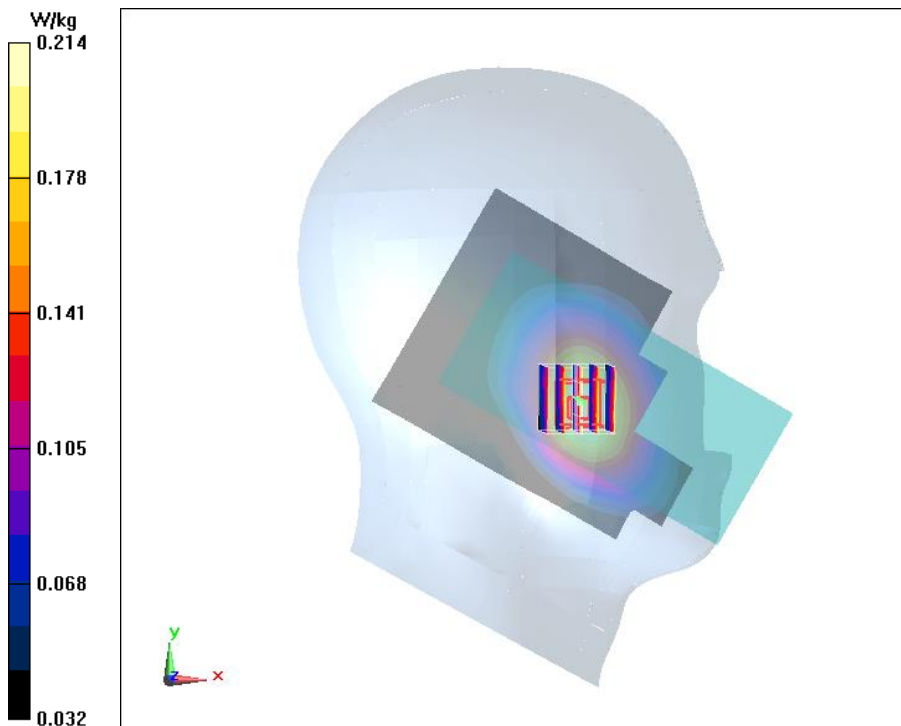
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.735 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 0.254 W/kg

SAR(1 g) = 0.206 W/kg; SAR(10 g) = 0.160 W/kg

Maximum value of SAR (measured) = 0.214 W/kg



## Fig.2 GSM850 2TS Left Mode Middle

Date/Time: 2020/03/12

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.931$  S/m;  $\epsilon_r = 41.009$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.5°C      Liquid Temperature: 22.5°C

Communication System: GSM 850MHz GPRS 2TS (0);      Frequency: 836.6 MHz; Duty Cycle: 1:4

Probe: ES3DV3 - SN3252ConvF(6.29, 6.29, 6.29); Calibrated: 1/3/2020

### GSM850 2TS Left Mode Middle/Area Scan (41x121x1):

Measurement grid:  $dx=10$  mm,  $dy=10$  mm

Maximum value of SAR (Measurement) = 0.315 W/kg

### GSM850 2TS Left Mode Middle/Zoom Scan (7x7x7)/Cube 0:

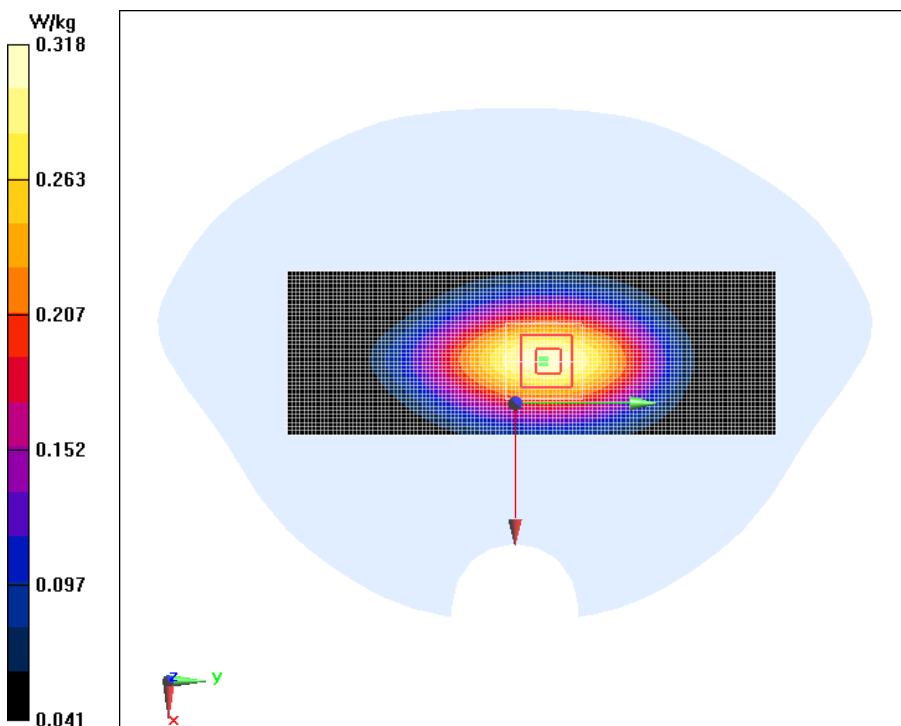
Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 18.15 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.400 W/kg

SAR(1 g) = 0.297 W/kg; SAR(10 g) = 0.209 W/kg

Maximum value of SAR (measured) = 0.318 W/kg



### Fig.3 GSM1900 Right Cheek Middle

Date/Time: 2020/03/16

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.347 \text{ S/m}$ ;  $\epsilon_r = 39.576$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature:  $22.5^\circ\text{C}$       Liquid Temperature:  $22.5^\circ\text{C}$

Communication System: GSM Professional 2000MHz;    Frequency: 1880 MHz; Duty Cycle: 1:8.3

Probe: ES3DV3 - SN3252ConvF(5.2, 5.2, 5.2); Calibrated: 1/3/2020

#### **GSM1900 Right Cheek Middle/Area Scan (101x61x1):**

Measurement grid:  $dx=10 \text{ mm}$ ,  $dy=10 \text{ mm}$

Maximum value of SAR (Measurement) =  $0.0542 \text{ W/kg}$

#### **GSM1900 Right Cheek Middle/Zoom Scan (7x7x7)/Cube 0:**

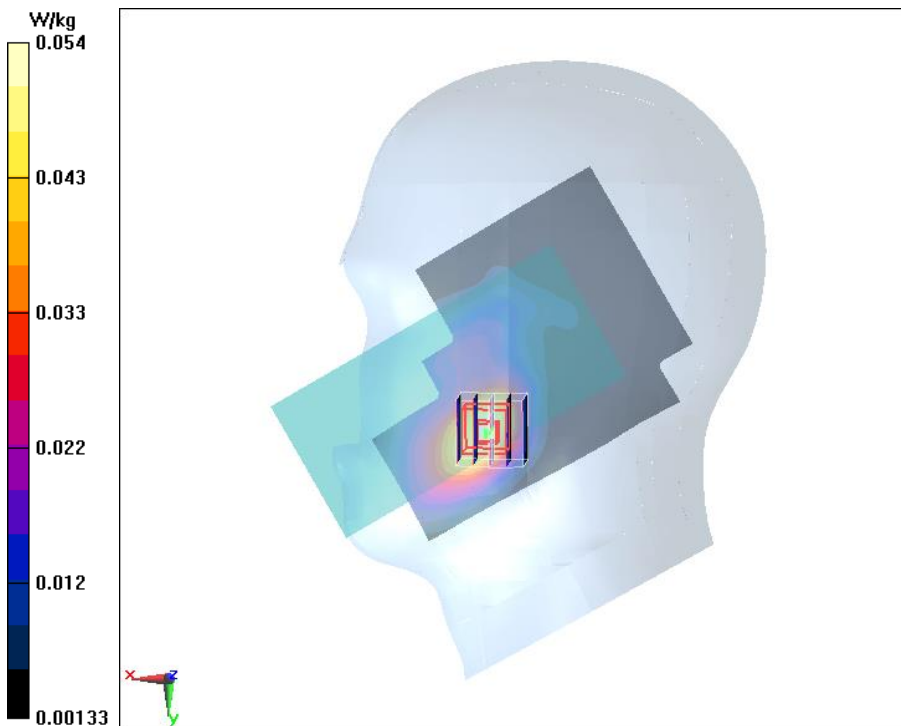
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $2.244 \text{ V/m}$ ; Power Drift =  $0.08 \text{ dB}$

Peak SAR (extrapolated) =  $0.0770 \text{ W/kg}$

SAR(1 g) =  $0.050 \text{ W/kg}$ ; SAR(10 g) =  $0.031 \text{ W/kg}$

Maximum value of SAR (measured) =  $0.0539 \text{ W/kg}$



### Fig.4 GSM1900 2TS Bottom Mode Middle

Date/Time: 2020/03/16

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.347 \text{ S/m}$ ;  $\epsilon_r = 39.576$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature:  $22.5^\circ\text{C}$     Liquid Temperature:  $22.5^\circ\text{C}$

Communication System: GSM 2000MHz GPRS 2TS (0); Frequency: 1880 MHz; Duty Cycle: 1:4

Probe: ES3DV3 - SN3252ConvF(5.2, 5.2, 5.2); Calibrated: 1/3/2020

#### GSM1900 2TS Bottom Mode Middle/Area Scan (41x71x1):

Measurement grid:  $dx=10 \text{ mm}$ ,  $dy=10 \text{ mm}$

Maximum value of SAR (Measurement) =  $0.256 \text{ W/kg}$

#### GSM1900 2TS Bottom Mode Middle/Zoom Scan (7x7x7)/Cube 0:

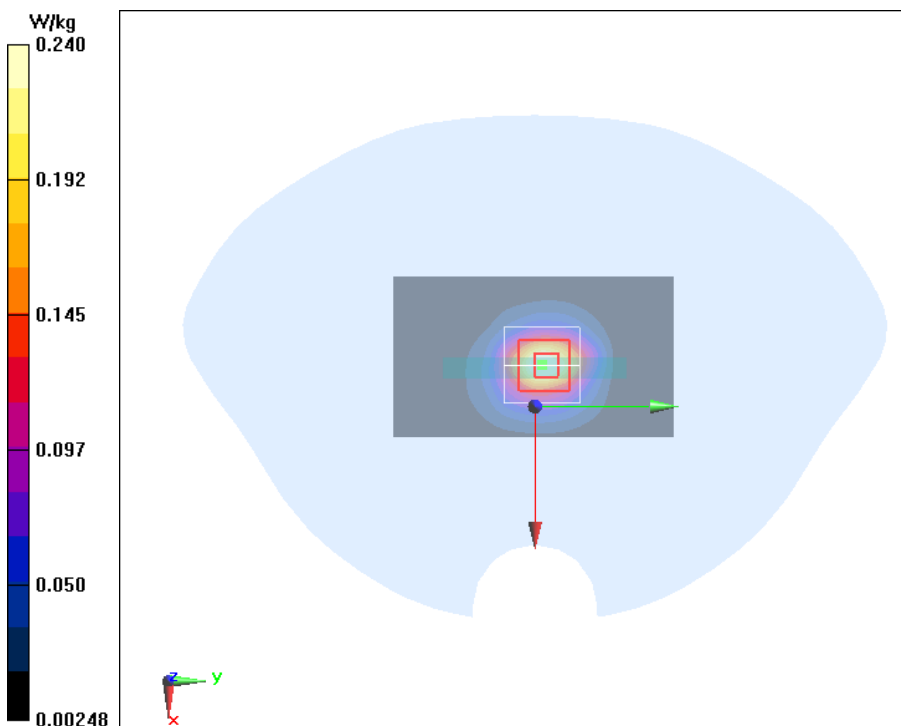
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $13.34 \text{ V/m}$ ; Power Drift =  $0.00 \text{ dB}$

Peak SAR (extrapolated) =  $0.404 \text{ W/kg}$

SAR(1 g) =  $0.215 \text{ W/kg}$ ; SAR(10 g) =  $0.112 \text{ W/kg}$

Maximum value of SAR (measured) =  $0.240 \text{ W/kg}$



### Fig.5 WCDMA Band 2 Right Cheek Middle

Date/Time: 2020/03/16

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.347$  S/m;  $\epsilon_r = 39.576$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature:22.5°C      Liquid Temperature:22.5°C

Communication System: WCDMA Professional 2000MHz;      Frequency: 1880 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(5.2, 5.2, 5.2); Calibrated: 1/3/2020

#### WCDMA Band 2 Right Cheek Middle/Area Scan (101x61x1):

Measurement grid: dx=10 mm, dy=10 mm

Maximum value of SAR (Measurement) = 0.132 W/kg

#### WCDMA Band 2 Right Cheek Middle/Zoom Scan (7x7x7)/Cube 0:

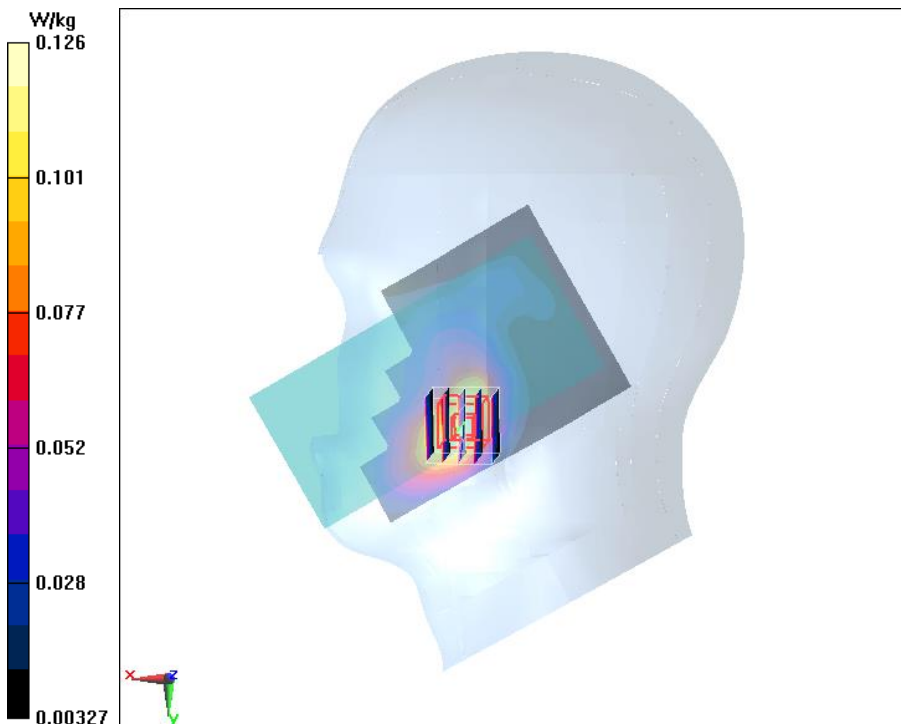
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.341 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.178 W/kg

SAR(1 g) = 0.118 W/kg; SAR(10 g) = 0.075 W/kg

Maximum value of SAR (measured) = 0.126 W/kg



## Fig.6 WCDMA Band 2 Bottom Mode Middle

Date/Time: 2020/03/16

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.347$  S/m;  $\epsilon_r = 39.576$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature:22.5°C Liquid Temperature:22.5°C

Communication System: WCDMA Professional 2000MHz; Frequency: 1880 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(5.2, 5.2, 5.2); Calibrated: 1/3/2020

### WCDMA Band 2 Bottom Mode Middle/Area Scan (31x71x1):

Measurement grid: dx=10 mm, dy=10 mm

Maximum value of SAR (Measurement) = 0.465 W/kg

### WCDMA Band 2 Bottom Mode Middle/Zoom Scan (7x7x7)/Cube 0:

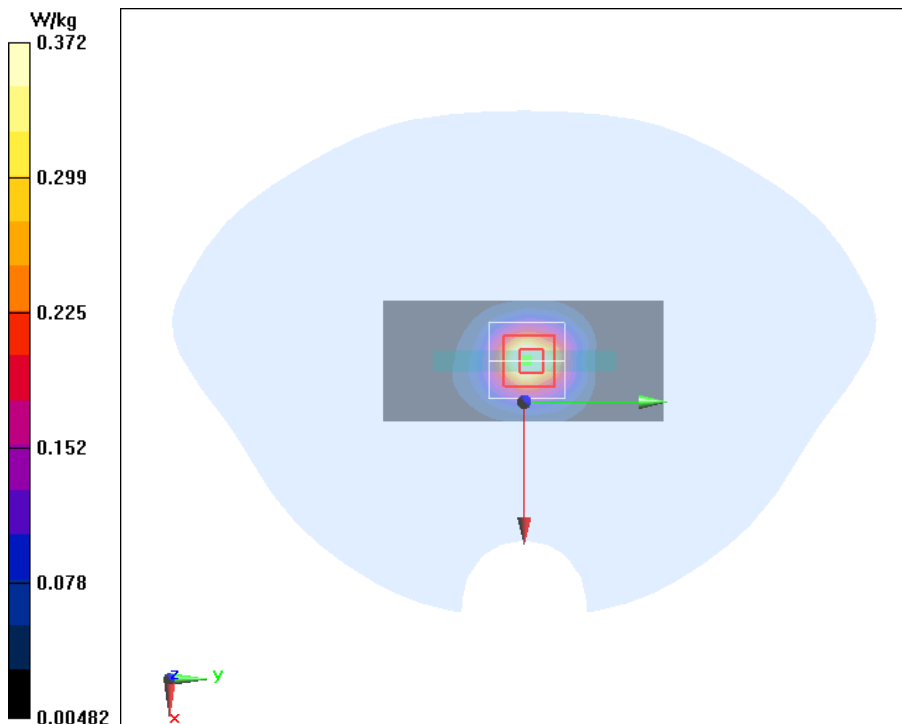
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.84 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.634 W/kg

SAR(1 g) = 0.334 W/kg; SAR(10 g) = 0.171 W/kg

Maximum value of SAR (measured) = 0.372 W/kg



## Fig.7 WCDMA Band 4 Right Cheek Middle

Date/Time: 2020/03/13

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 1733$  MHz;  $\sigma = 1.373$  S/m;  $\epsilon_r = 41.866$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature:22.5°C      Liquid Temperature:22.5°C

Communication System: WCDMA Professional 1800MHz;      Frequency: 1732.6 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(5.36, 5.36, 5.36); Calibrated: 1/3/2020

### WCDMA Band 4 Right Cheek Middle/Area Scan (101x61x1):

Measurement grid: dx=10 mm, dy=10 mm

Maximum value of SAR (Measurement) = 0.0793 W/kg

### WCDMA Band 4 Right Cheek Middle/Zoom Scan (7x7x7)/Cube 0:

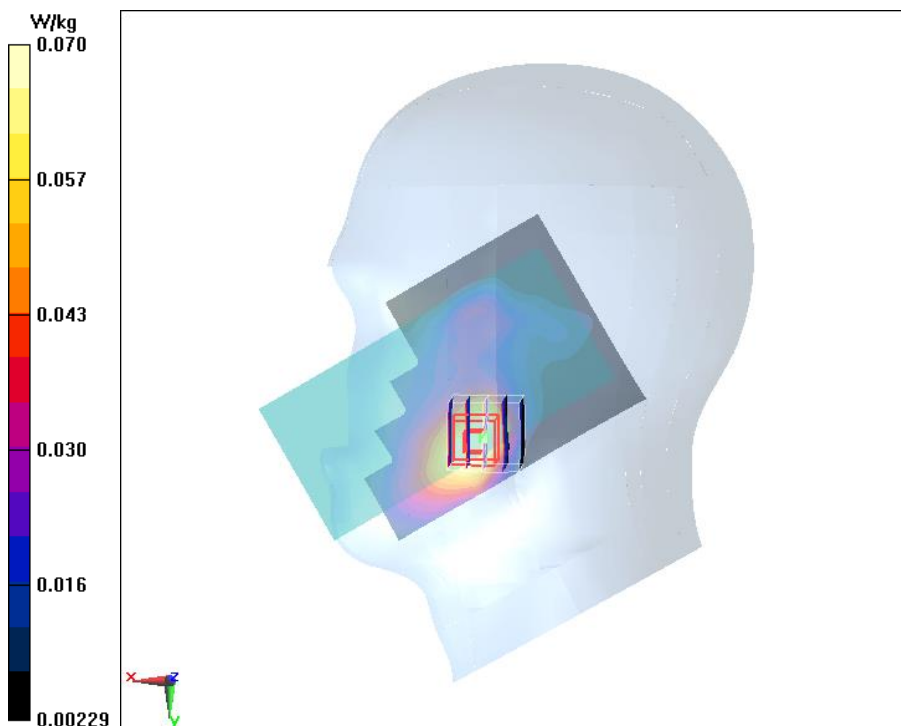
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.930 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.0920 W/kg

SAR(1 g) = 0.066 W/kg; SAR(10 g) = 0.045 W/kg

Maximum value of SAR (measured) = 0.0704 W/kg





## Fig.8 WCDMA Band 4 Bottom Mode Middle

Date/Time: 2020/03/13

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 1733$  MHz;  $\sigma = 1.373$  S/m;  $\epsilon_r = 41.866$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature:22.5°C      Liquid Temperature:22.5°C

Communication System: WCDMA Professional 1800MHz;    Frequency: 1732.6 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(5.36, 5.36, 5.36); Calibrated: 1/3/2020

### WCDMA Band 4 Bottom Mode Middle/Area Scan (31x71x1):

Measurement grid: dx=10 mm, dy=10 mm

Maximum value of SAR (Measurement) = 0.407 W/kg

### WCDMA Band 4 Bottom Mode Middle/Zoom Scan (7x7x7)/Cube 0:

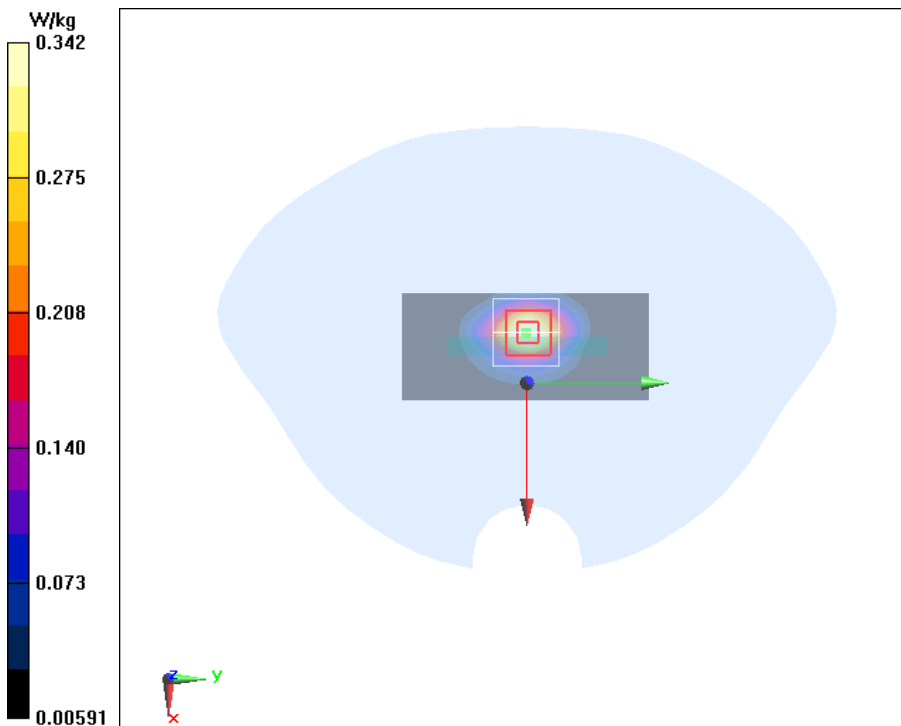
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.86 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.543 W/kg

SAR(1 g) = 0.303 W/kg; SAR(10 g) = 0.160 W/kg

Maximum value of SAR (measured) = 0.342 W/kg



## Fig.9 WCDMA Band 5 Left Cheek Middle

Date/Time: 2020/03/12

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.931$  S/m;  $\epsilon_r = 41.009$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.5°C      Liquid Temperature: 22.5°C

Communication System: WCDMA Professional Band V; Frequency: 836.6 MHz; Duty

Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(6.29, 6.29, 6.29); Calibrated: 1/3/2020

### WCDMA Band 5 Left Cheek Middle/Area Scan (111x71x1):

Measurement grid:  $dx=10$  mm,  $dy=10$  mm

Maximum value of SAR (Measurement) = 0.251 W/kg

### WCDMA Band 5 Left Cheek Middle/Zoom Scan (7x7x7)/Cube 0:

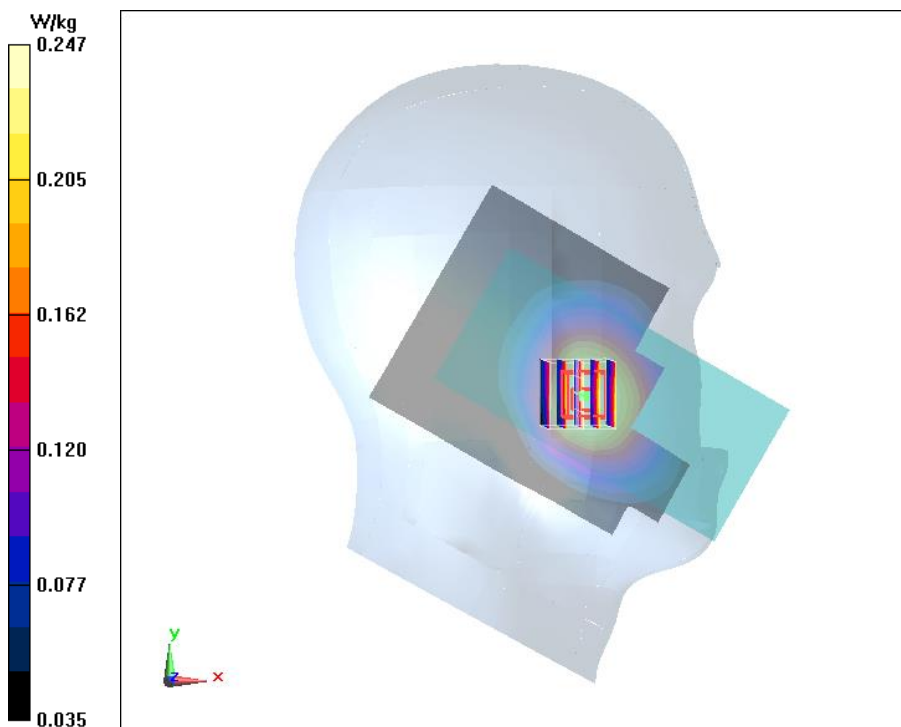
Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 5.400 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.290 W/kg

SAR(1 g) = 0.237 W/kg; SAR(10 g) = 0.186 W/kg

Maximum value of SAR (measured) = 0.247 W/kg



### Fig.10 WCDMA Band 5 Left Mode Middle

Date/Time: 2020/03/12

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 837 \text{ MHz}$ ;  $\sigma = 0.931 \text{ S/m}$ ;  $\epsilon_r = 41.009$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature:  $22.5^\circ\text{C}$       Liquid Temperature:  $22.5^\circ\text{C}$

Communication System: WCDMA Professional Band V; Frequency:  $836.6 \text{ MHz}$ ; Duty

Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(6.29, 6.29, 6.29); Calibrated: 1/3/2020

#### WCDMA Band 5 Left Mode Middle/Area Scan (41x111x1):

Measurement grid:  $dx=10 \text{ mm}$ ,  $dy=10 \text{ mm}$

Maximum value of SAR (Measurement) =  $0.223 \text{ W/kg}$

#### WCDMA Band 5 Left Mode Middle/Zoom Scan (7x7x7)/Cube 0:

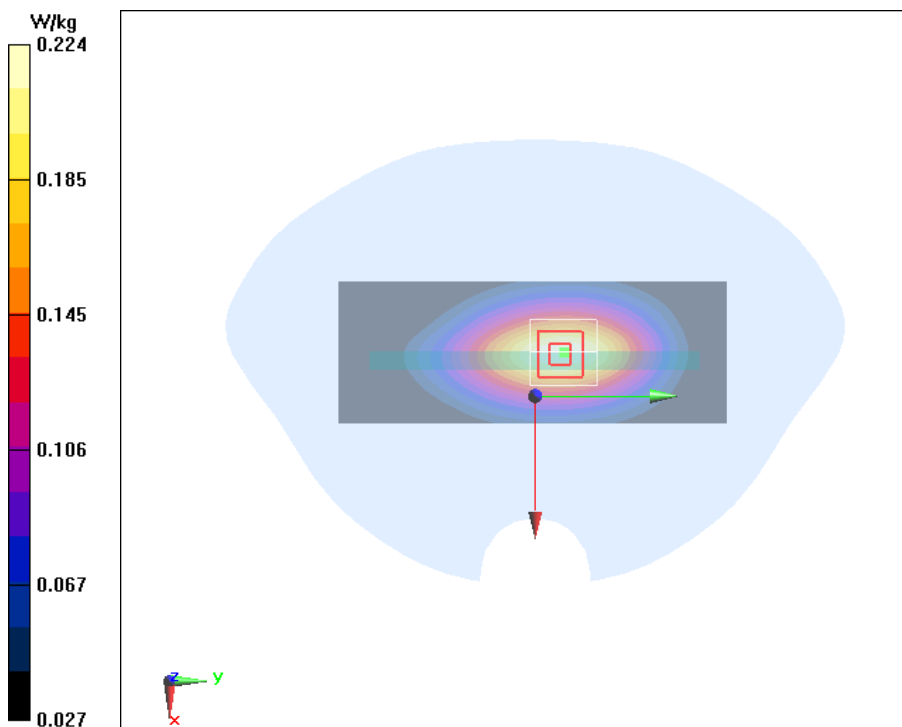
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $15.30 \text{ V/m}$ ; Power Drift =  $0.04 \text{ dB}$

Peak SAR (extrapolated) =  $0.285 \text{ W/kg}$

SAR(1 g) =  $0.210 \text{ W/kg}$ ; SAR(10 g) =  $0.147 \text{ W/kg}$

Maximum value of SAR (measured) =  $0.224 \text{ W/kg}$



### Fig.11 LTE B2 20M 1RB 50 offset Right Cheek Low

Date/Time: 2020/03/16

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 1860$  MHz;  $\sigma = 1.331$  S/m;  $\epsilon_r = 39.86$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature:22.5°C      Liquid Temperature:22.5°C

Communication System: LTE Band 2 Professional 2000MHz;    Frequency: 1860 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(5.2, 5.2, 5.2); Calibrated: 1/3/2020

#### LTE B2 20M 1RB 50 offset Right Cheek Low/Area Scan (101x51x1):

Measurement grid: dx=10 mm, dy=10 mm

Maximum value of SAR (Measurement) = 0.152 W/kg

#### LTE B2 20M 1RB 50 offset Right Cheek Low/Zoom Scan (7x7x7)/Cube 0:

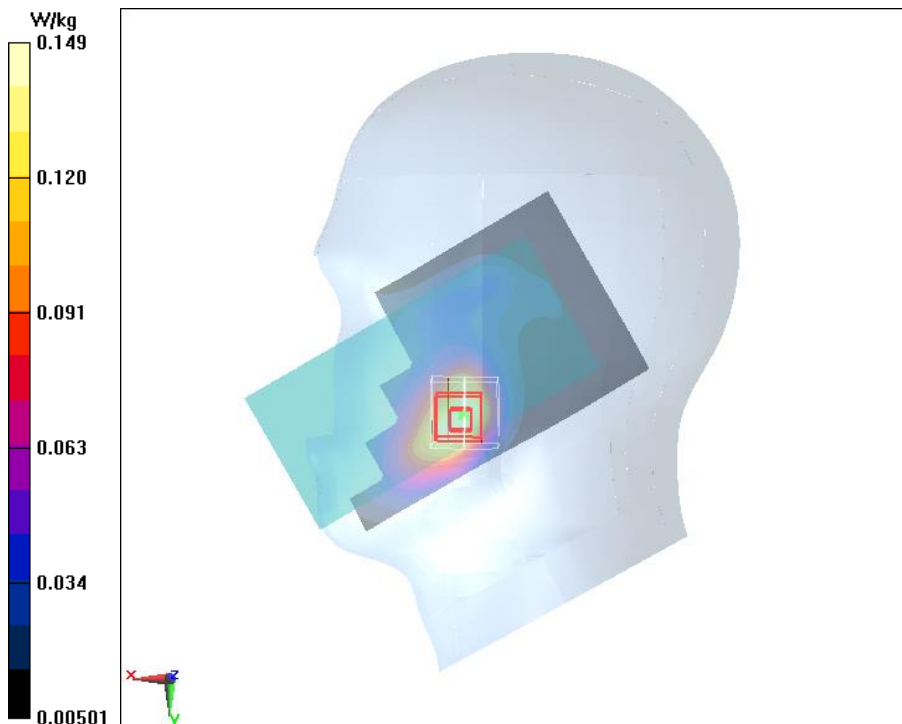
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.868 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.210 W/kg

SAR(1 g) = 0.138 W/kg; SAR(10 g) = 0.087 W/kg

Maximum value of SAR (measured) = 0.149 W/kg



### Fig.12 LTE B2 20M 1RB 50 offset Bottom Mode Low 10mm

Date/Time: 2020/03/16

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 1860$  MHz;  $\sigma = 1.331$  S/m;  $\epsilon_r = 39.86$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature:22.5°C      Liquid Temperature:22.5°C

Communication System: LTE Band 2 Professional 2000MHz;    Frequency: 1860 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(5.2, 5.2, 5.2); Calibrated: 1/3/2020

#### LTE B2 20M 1RB 50 offset Bottom Mode Low 10mm/Area Scan (51x71x1):

Measurement grid: dx=10 mm, dy=10 mm

Maximum value of SAR (Measurement) = 0.554 W/kg

#### LTE B2 20M 1RB 50 offset Bottom Mode Low 10mm/Zoom Scan (7x7x7)/Cube 0:

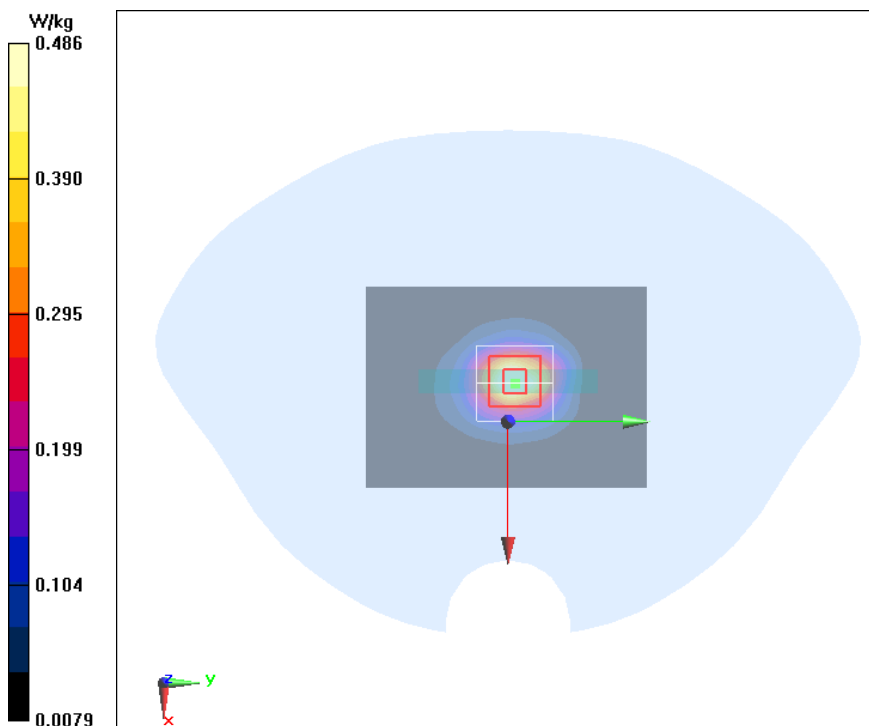
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 19.27 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.808 W/kg

SAR(1 g) = 0.436 W/kg; SAR(10 g) = 0.227 W/kg

Maximum value of SAR (measured) = 0.486 W/kg



### Fig.13 LTE B4 20Mhz 50RB 0offset Right Cheek Middle

Date/Time: 2020/03/13

Electronics: DAE4 Sn1244

Medium parameters used (interpolated):  $f = 1732.5$  MHz;  $\sigma = 1.372$  S/m;  $\epsilon_r = 41.868$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature:22.5°C      Liquid Temperature:22.5°C

Communication System: LTE Band 4 Professional 1800MHz; Frequency: 1732.5 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(5.36, 5.36, 5.36); Calibrated: 1/3/2020

#### LTE B4 20Mhz 50RB 0offset Right Cheek Middle/Area Scan (101x51x1):

Measurement grid: dx=10 mm, dy=10 mm

Maximum value of SAR (Measurement) = 0.0771 W/kg

#### LTE B4 20Mhz 50RB 0offset Right Cheek Middle/Zoom Scan (7x7x7)/Cube 0:

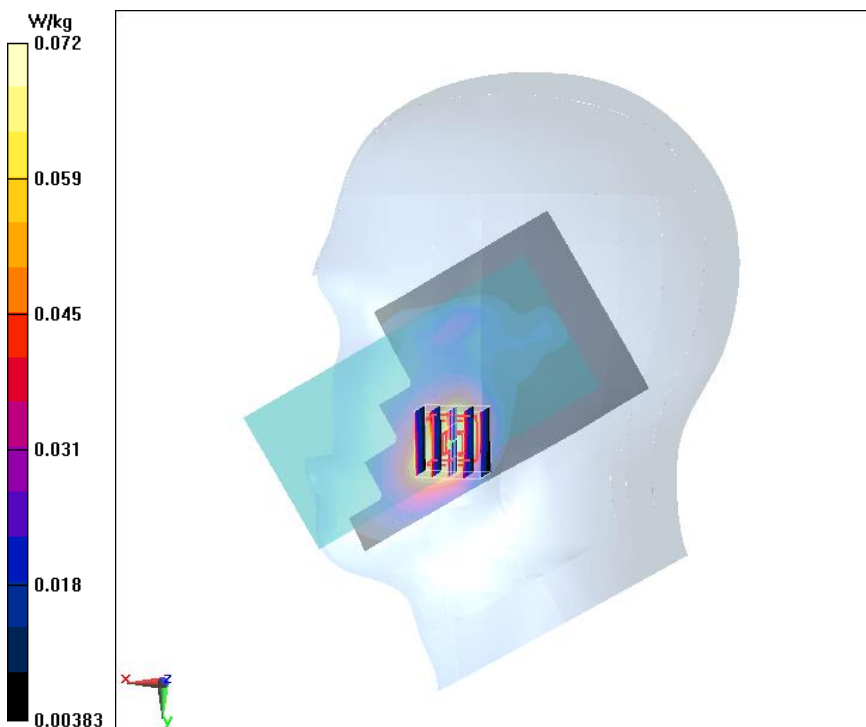
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.826 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.103 W/kg

SAR(1 g) = 0.068 W/kg; SAR(10 g) = 0.044 W/kg

Maximum value of SAR (measured) = 0.0725 W/kg



### Fig.14 LTE B4 20M 50RB 0 offset Bottom Mode Middle 10mm

Date/Time: 2020/03/13

Electronics: DAE4 Sn1244

Medium parameters used (interpolated):  $f = 1732.5$  MHz;  $\sigma = 1.372$  S/m;  $\epsilon_r = 41.868$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature:22.5°C      Liquid Temperature:22.5°C

Communication System: LTE Band 4 Professional 1800MHz; Frequency: 1732.5 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(5.36, 5.36, 5.36); Calibrated: 1/3/2020

#### LTE B4 20M 50RB 0 offset Bottom Mode Middle 10mm/Area Scan (81x81x1):

Measurement grid: dx=10 mm, dy=10 mm

Maximum value of SAR (Measurement) = 0.302 W/kg

#### LTE B4 20M 50RB 0 offset Bottom Mode Middle 10mm/Zoom Scan (7x7x7)/Cube 0:

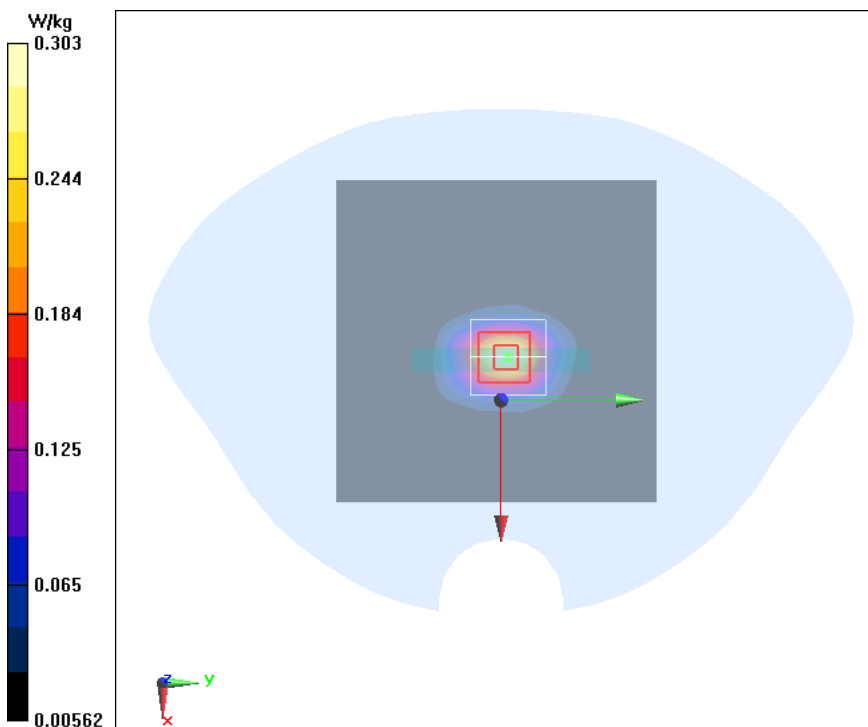
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 15.04 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.482 W/kg

SAR(1 g) = 0.270 W/kg; SAR(10 g) = 0.142 W/kg

Maximum value of SAR (measured) = 0.303 W/kg



### Fig.15 LTE B5 10Mhz 1RB 25offset Left Cheek Low

Date/Time: 2020/03/12

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 829 \text{ MHz}$ ;  $\sigma = 0.922 \text{ S/m}$ ;  $\epsilon_r = 41.138$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature:  $22.5^\circ\text{C}$       Liquid Temperature:  $22.5^\circ\text{C}$

Communication System: LTE Band 5 Professional 850MHz;      Frequency: 829 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(6.29, 6.29, 6.29); Calibrated: 1/3/2020

#### LTE B5 10Mhz 1RB 25offset Left Cheek Low/Area Scan (101x51x1):

Measurement grid:  $dx=10 \text{ mm}$ ,  $dy=10 \text{ mm}$

Maximum value of SAR (Measurement) =  $0.240 \text{ W/kg}$

#### LTE B5 10Mhz 1RB 25offset Left Cheek Low/Zoom Scan (7x7x7)/Cube 0:

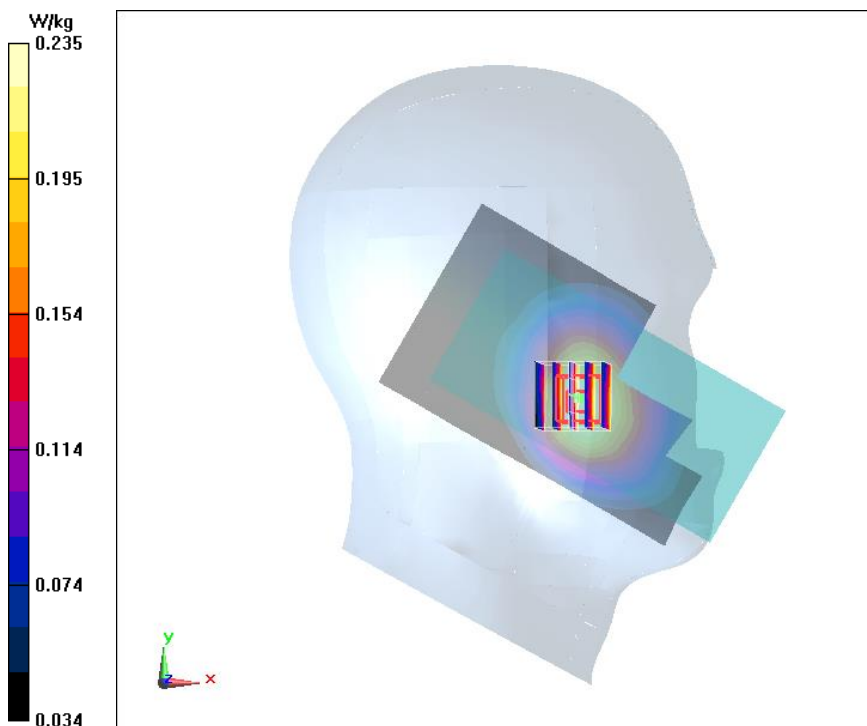
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $5.416 \text{ V/m}$ ; Power Drift =  $0.03 \text{ dB}$

Peak SAR (extrapolated) =  $0.275 \text{ W/kg}$

SAR(1 g) =  $0.226 \text{ W/kg}$ ; SAR(10 g) =  $0.178 \text{ W/kg}$

Maximum value of SAR (measured) =  $0.235 \text{ W/kg}$





### Fig.16 LTE B5 10Mhz 1RB 25offset Ground Mode Low

Date/Time: 2020/03/12

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 829 \text{ MHz}$ ;  $\sigma = 0.922 \text{ S/m}$ ;  $\epsilon_r = 41.138$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature:  $22.5^\circ\text{C}$       Liquid Temperature:  $22.5^\circ\text{C}$

Communication System: LTE Band 5 Professional 850MHz;      Frequency: 829 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(6.29, 6.29, 6.29); Calibrated: 1/3/2020

#### LTE B5 10Mhz 1RB 25offset Ground Mode Low/Area Scan (61x111x1):

Measurement grid:  $dx=10 \text{ mm}$ ,  $dy=10 \text{ mm}$

Maximum value of SAR (Measurement) =  $0.203 \text{ W/kg}$

#### LTE B5 10Mhz 1RB 25offset Ground Mode Low/Zoom Scan (7x7x7)/Cube 0:

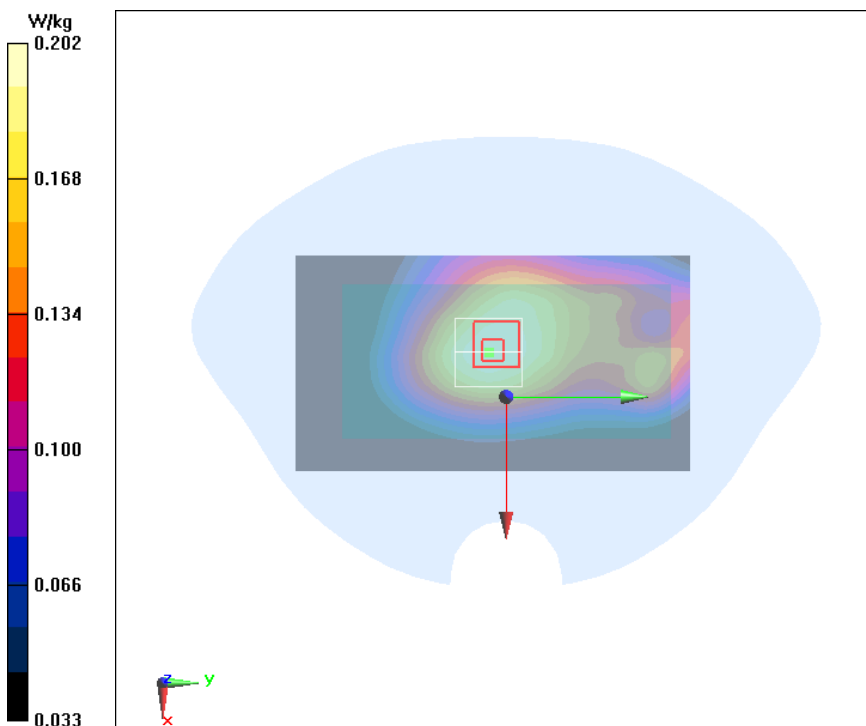
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $14.86 \text{ V/m}$ ; Power Drift =  $0.04 \text{ dB}$

Peak SAR (extrapolated) =  $0.238 \text{ W/kg}$

SAR(1 g) =  $0.193 \text{ W/kg}$ ; SAR(10 g) =  $0.150 \text{ W/kg}$

Maximum value of SAR (measured) =  $0.202 \text{ W/kg}$



### Fig.17 LTE B7 20Mhz 1RB 50offset Right Cheek Low

Date/Time: 2020/03/17

Electronics: DAE4 Sn1244

Medium: Head 2600MHz

Medium parameters used:  $f = 2510$  MHz;  $\sigma = 1.945$  S/m;  $\epsilon_r = 38.636$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.5°C      Liquid Temperature: 22.5°C

Communication System: LTE Band 7 Professional 2600MHz;    Frequency: 2510 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(4.75, 4.75, 4.75); Calibrated: 1/3/2020

#### LTE B7 20Mhz 1RB 50offset Right Cheek Low/Area Scan (101x51x1):

Measurement grid: dx=10 mm, dy=10 mm

Maximum value of SAR (Measurement) = 0.181 W/kg

#### LTE B7 20Mhz 1RB 50offset Right Cheek Low/Zoom Scan (7x7x7)/Cube 0:

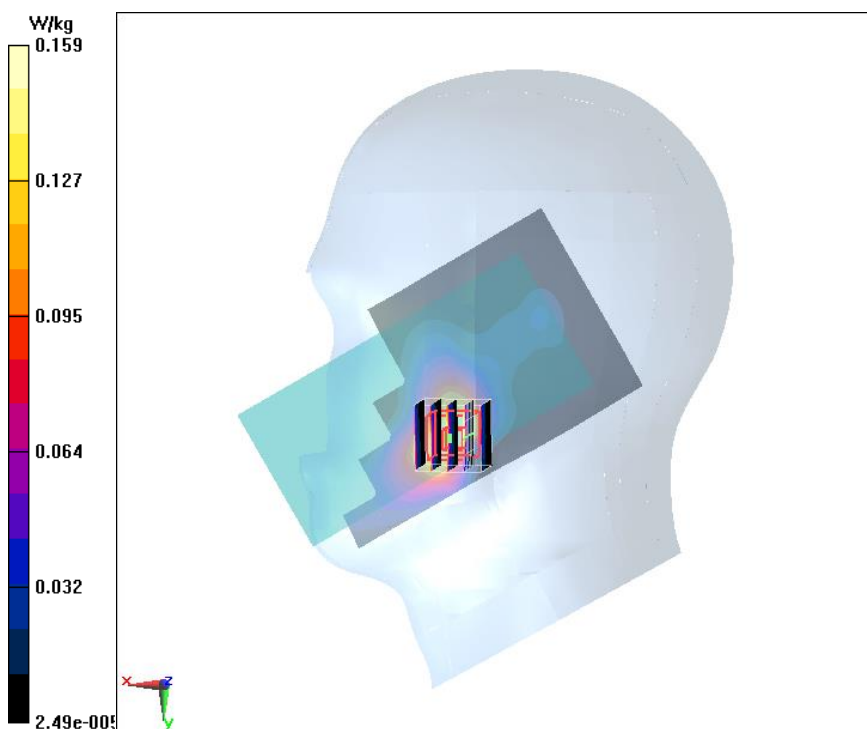
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.891 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 0.298 W/kg

SAR(1 g) = 0.154 W/kg; SAR(10 g) = 0.080 W/kg

Maximum value of SAR (measured) = 0.159 W/kg



### Fig.18 LTE B7 20Mhz 1RB 50offset Bottom Mode Low

Date/Time: 2020/03/17

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 2510$  MHz;  $\sigma = 1.945$  S/m;  $\epsilon_r = 38.636$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature:22.5°C Liquid Temperature:22.5°C

Communication System: LTE Band 7 Professional 2600MHz; Frequency: 2510 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(4.75, 4.75, 4.75); Calibrated: 1/3/2020

#### LTE B7 20Mhz 1RB 50offset Bottom Mode Low N04/Area Scan (41x71x1):

Measurement grid: dx=10 mm, dy=10 mm

Maximum value of SAR (Measurement) = 0.256 W/kg

#### LTE B7 20Mhz 1RB 50offset Bottom Mode Low N04/Zoom Scan (7x7x7)/Cube 0:

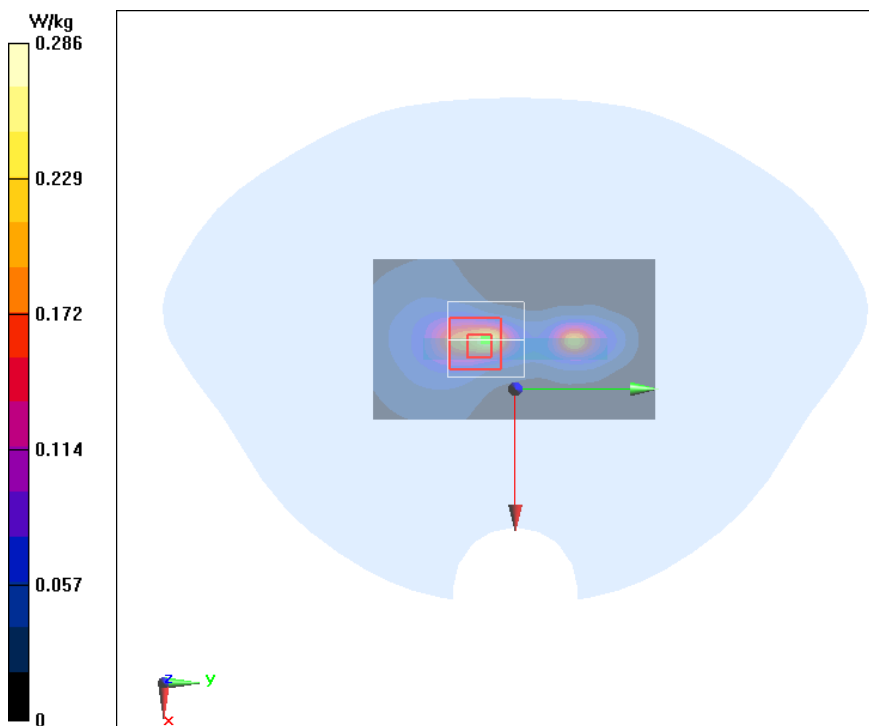
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.461 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.694 W/kg

SAR(1 g) = 0.266 W/kg; SAR(10 g) = 0.101 W/kg

Maximum value of SAR (measured) = 0.286 W/kg



### Fig.19 LTE B12 10Mhz 1RB 25offset Left Cheek High

Date/Time: 2020/03/11

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 711 \text{ MHz}$ ;  $\sigma = 0.842 \text{ S/m}$ ;  $\epsilon_r = 42.125$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature:  $22.5^\circ\text{C}$       Liquid Temperature:  $22.5^\circ\text{C}$

Communication System: LTE Band 12 Professional 750MHz;      Frequency: 711 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(6.46, 6.46, 6.46); Calibrated: 1/3/2020

#### LTE B12 10Mhz 1RB 25offset Left Cheek High/Area Scan (101x51x1):

Measurement grid:  $dx=10 \text{ mm}$ ,  $dy=10 \text{ mm}$

Maximum value of SAR (Measurement) = 0.0384 W/kg

#### LTE B12 10Mhz 1RB 25offset Left Cheek High/Zoom Scan (7x7x7)/Cube 0:

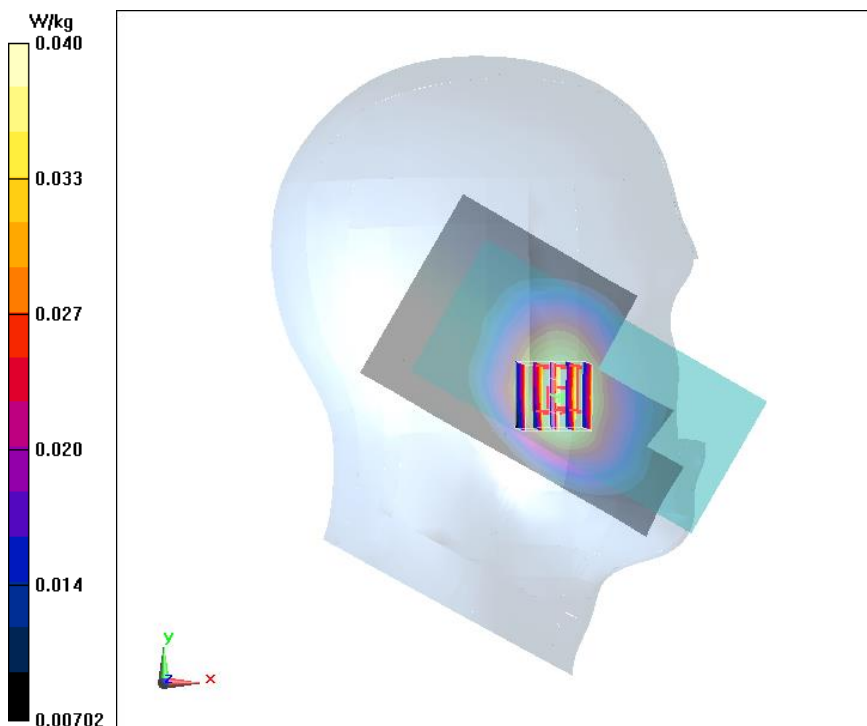
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 2.007 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 0.0450 W/kg

SAR(1 g) = 0.038 W/kg; SAR(10 g) = 0.031 W/kg

Maximum value of SAR (measured) = 0.0396 W/kg



## Fig.20 LTE B12 10Mhz 1RB 25offset Ground Mode High

Date/Time: 2020/03/11

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 711 \text{ MHz}$ ;  $\sigma = 0.842 \text{ S/m}$ ;  $\epsilon_r = 42.125$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature:  $22.5^\circ\text{C}$       Liquid Temperature:  $22.5^\circ\text{C}$

Communication System: LTE Band 12 Professional 750MHz;      Frequency: 711 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(6.46, 6.46, 6.46); Calibrated: 1/3/2020

### LTE B12 10Mhz 1RB 25offset Ground Mode High/Area Scan (61x111x1):

Measurement grid:  $dx=10 \text{ mm}$ ,  $dy=10 \text{ mm}$

Maximum value of SAR (Measurement) = 0.0487 W/kg

### LTE B12 10Mhz 1RB 25offset Ground Mode High/Zoom Scan (7x7x7)/Cube 0:

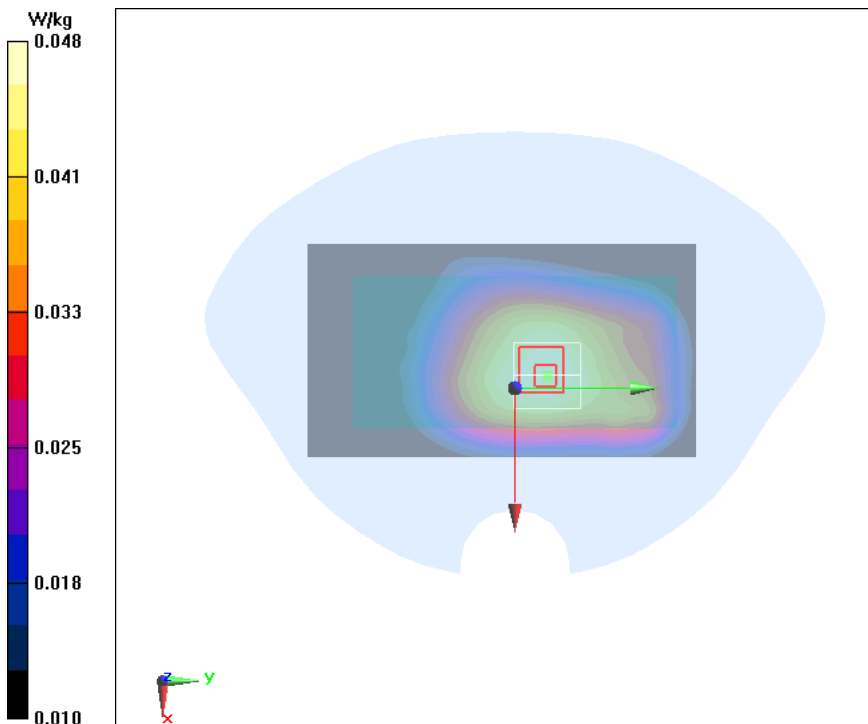
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 7.328 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.0560 W/kg

SAR(1 g) = 0.047 W/kg; SAR(10 g) = 0.038 W/kg

Maximum value of SAR (measured) = 0.0484 W/kg



## Fig.21 LTE B13 10Mhz 1RB 49offset Left Cheek

Date/Time: 2020/03/11

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 782 \text{ MHz}$ ;  $\sigma = 0.908 \text{ S/m}$ ;  $\epsilon_r = 41.103$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature:  $22.5^\circ\text{C}$       Liquid Temperature:  $22.5^\circ\text{C}$

Communication System: LTE Band 13 Professional 750MHz;      Frequency: 782 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(6.46, 6.46, 6.46); Calibrated: 1/3/2020

### LTE B13 10Mhz 1RB 49offset Left Cheek/Area Scan (101x51x1):

Measurement grid:  $dx=10 \text{ mm}$ ,  $dy=10 \text{ mm}$

Maximum value of SAR (Measurement) =  $0.134 \text{ W/kg}$

### LTE B13 10Mhz 1RB 49offset Left Cheek/Zoom Scan (7x7x7)/Cube 0:

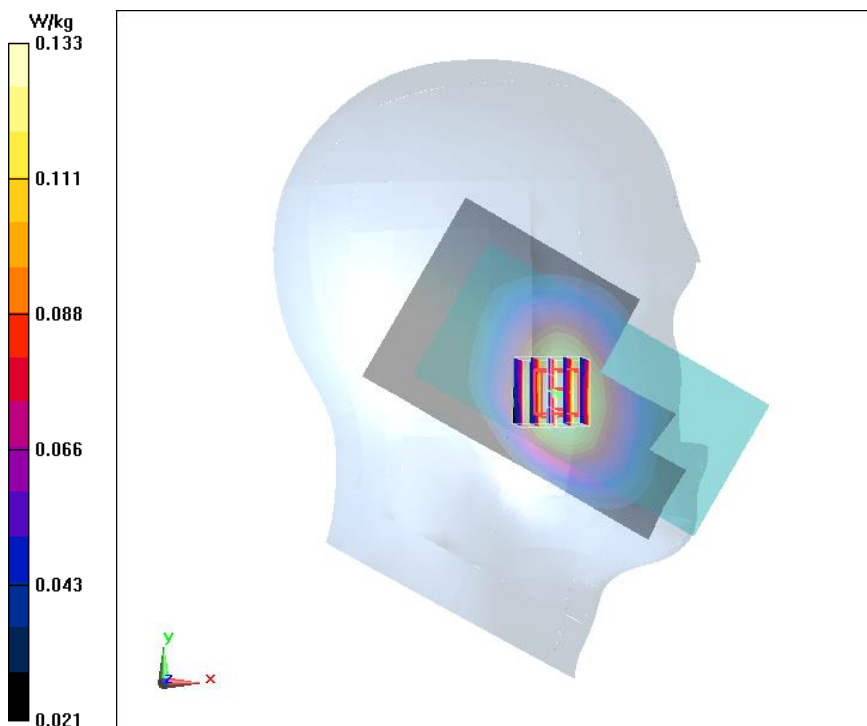
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $4.322 \text{ V/m}$ ; Power Drift =  $0.05 \text{ dB}$

Peak SAR (extrapolated) =  $0.156 \text{ W/kg}$

SAR(1 g) =  $0.128 \text{ W/kg}$ ; SAR(10 g) =  $0.101 \text{ W/kg}$

Maximum value of SAR (measured) =  $0.133 \text{ W/kg}$



## Fig.22 LTE B13 10Mhz 1RB 49offset Ground Mode

Date/Time: 2020/03/11

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 782 \text{ MHz}$ ;  $\sigma = 0.908 \text{ S/m}$ ;  $\epsilon_r = 41.103$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature:  $22.5^\circ\text{C}$       Liquid Temperature:  $22.5^\circ\text{C}$

Communication System: LTE Band 13 Professional 750MHz;      Frequency: 782 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(6.46, 6.46, 6.46); Calibrated: 1/3/2020

### LTE B13 10Mhz 1RB 49offset Ground Mode/Area Scan (61x111x1):

Measurement grid:  $dx=10 \text{ mm}$ ,  $dy=10 \text{ mm}$

Maximum value of SAR (Measurement) =  $0.169 \text{ W/kg}$

### LTE B13 10Mhz 1RB 49offset Ground Mode/Zoom Scan (7x7x7)/Cube 0:

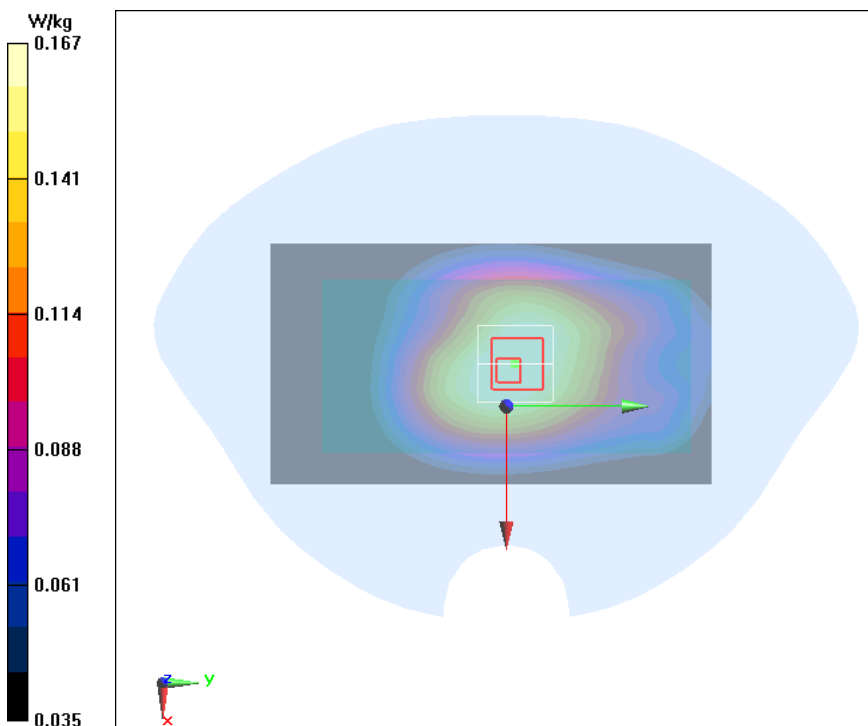
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $13.92 \text{ V/m}$ ; Power Drift =  $-0.12 \text{ dB}$

Peak SAR (extrapolated) =  $0.196 \text{ W/kg}$

SAR(1 g) =  $0.161 \text{ W/kg}$ ; SAR(10 g) =  $0.128 \text{ W/kg}$

Maximum value of SAR (measured) =  $0.167 \text{ W/kg}$



### Fig.23 WiFi 11b CH6 Right Tilt Middle

Date/Time: 2020/03/17

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.871$  S/m;  $\epsilon_r = 38.962$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature:22.5°C      Liquid Temperature:22.5°C

Communication System: Wifi 2450 2600MHz;      Frequency: 2437 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(4.75, 4.75, 4.75); Calibrated: 1/3/2020

#### WiFi 11b CH6 Right Tilt Middle 2/Area Scan (101x51x1):

Measurement grid: dx=10 mm, dy=10 mm

Maximum value of SAR (Measurement) = 0.216 W/kg

#### WiFi 11b CH6 Right Tilt Middle 2/Zoom Scan (7x7x7)/Cube 0:

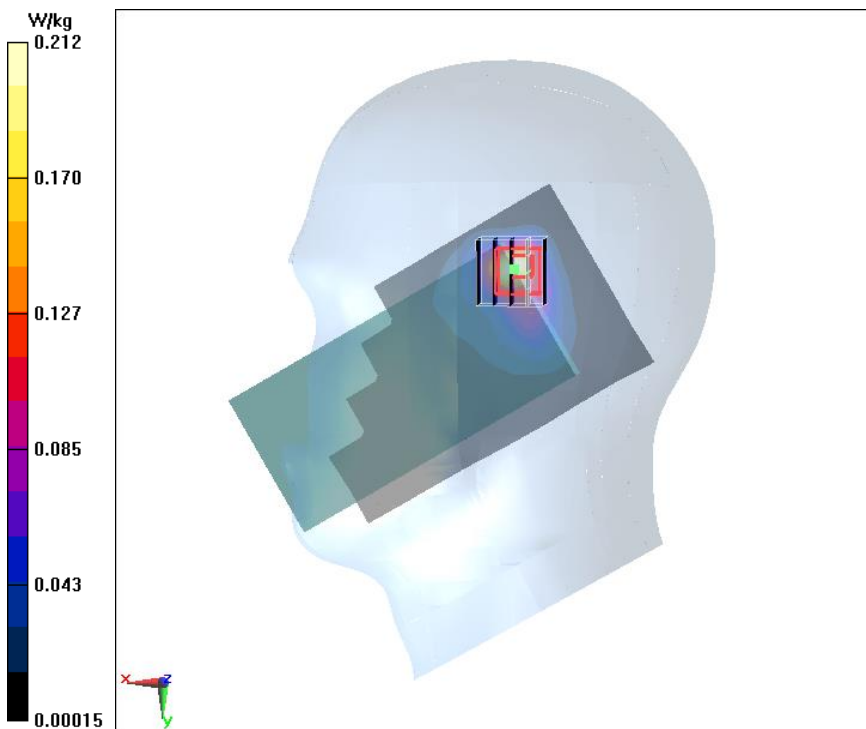
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.184 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.493 W/kg

SAR(1 g) = 0.197 W/kg; SAR(10 g) = 0.086 W/kg

Maximum value of SAR (measured) = 0.212 W/kg





## Fig.24 WiFi 11b CH6 Ground Mode Middle

Date/Time: 2020/03/17

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.871$  S/m;  $\epsilon_r = 38.962$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.5°C      Liquid Temperature: 22.5°C

Communication System: Wifi 2450 2600MHz;      Frequency: 2437 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(4.75, 4.75, 4.75); Calibrated: 1/3/2020

### WiFi 11b CH6 Ground Mode Middle/Area Scan (71x111x1):

Measurement grid:  $dx=10$  mm,  $dy=10$  mm

Maximum value of SAR (Measurement) = 0.0920 W/kg

### WiFi 11b CH6 Ground Mode Middle/Zoom Scan (7x7x7)/Cube 0:

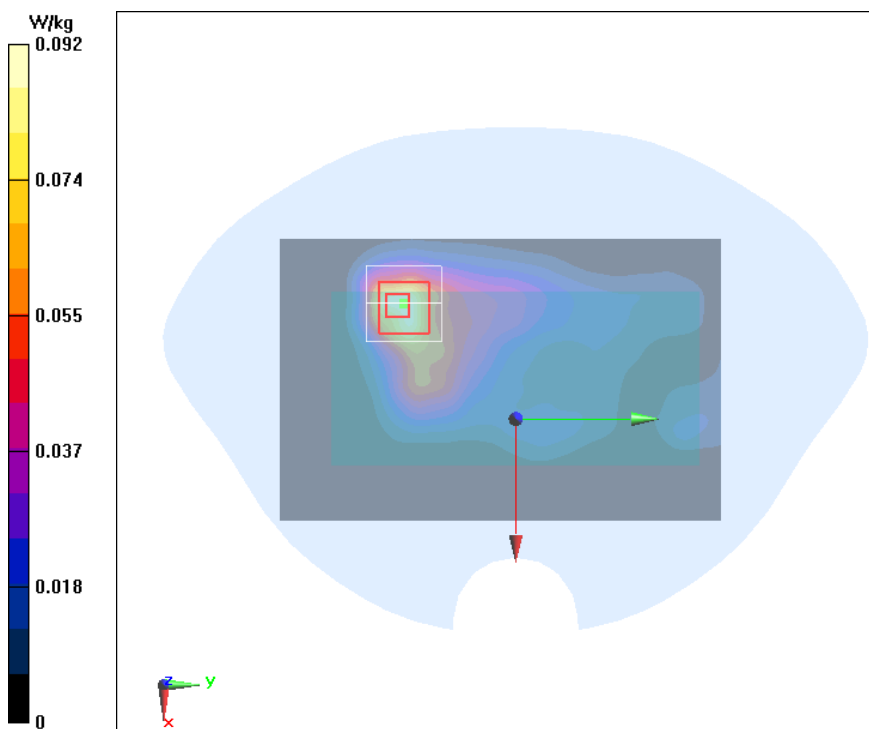
Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 3.022 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.202 W/kg

SAR(1 g) = 0.085 W/kg; SAR(10 g) = 0.040 W/kg

Maximum value of SAR (measured) = 0.0922 W/kg



## ANNEX B. System Validation Plot

### Head 750 System Validation

Date/Time: 2020/03/11

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 750 \text{ MHz}$ ;  $\sigma = 0.878 \text{ S/m}$ ;  $\epsilon_r = 41.57$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature:  $22.5^\circ\text{C}$       Liquid Temperature:  $22.5^\circ\text{C}$

Communication System: CW 750MHz;      Frequency: 750 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(6.46, 6.46, 6.46); Calibrated: 1/3/2020

#### System Validation/Area Scan (71x131x1):

Measurement grid:  $dx=10 \text{ mm}$ ,  $dy=10 \text{ mm}$

Maximum value of SAR (Measurement) =  $2.22 \text{ W/kg}$

#### System Validation/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

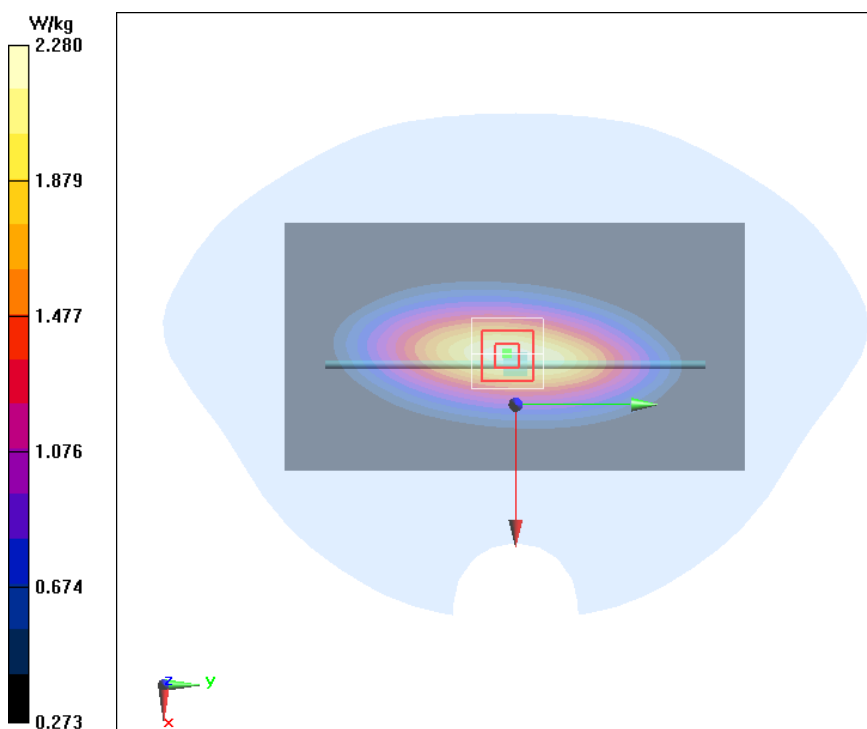
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $50.50 \text{ V/m}$ ; Power Drift =  $0.04 \text{ dB}$

Peak SAR (extrapolated) =  $3.05 \text{ W/kg}$

SAR(1 g) =  $2.11 \text{ W/kg}$ ; SAR(10 g) =  $1.43 \text{ W/kg}$

Maximum value of SAR (measured) =  $2.28 \text{ W/kg}$



## Head 835 System Validation

Date/Time: 2020/03/12

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.928 \text{ S/m}$ ;  $\epsilon_r = 41.04$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature:  $22.5^\circ\text{C}$       Liquid Temperature:  $22.5^\circ\text{C}$

Communication System: CW 850MHz;    Frequency: 835 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(6.29, 6.29, 6.29); Calibrated: 1/3/2020

### System Validation/Area Scan (61x131x1):

Measurement grid:  $dx=10 \text{ mm}$ ,  $dy=10 \text{ mm}$

Maximum value of SAR (Measurement) =  $2.50 \text{ W/kg}$

### System Validation/Zoom Scan (7x7x7)/Cube 0:

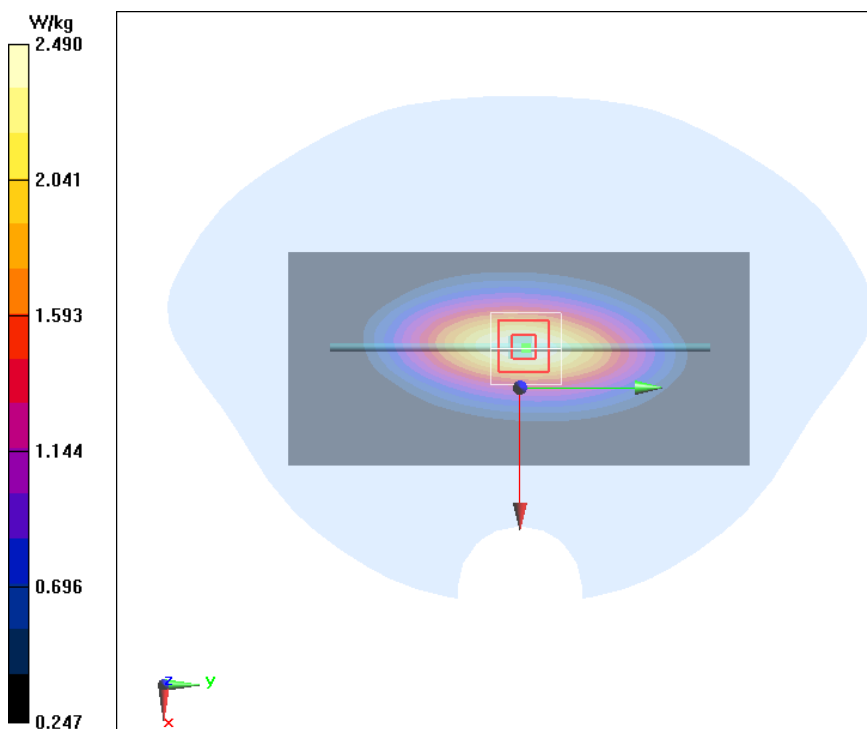
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $53.95 \text{ V/m}$ ; Power Drift =  $-0.04 \text{ dB}$

Peak SAR (extrapolated) =  $3.35 \text{ W/kg}$

SAR(1 g) =  $2.31 \text{ W/kg}$ ; SAR(10 g) =  $1.53 \text{ W/kg}$

Maximum value of SAR (measured) =  $2.49 \text{ W/kg}$



## Head 1750 System Validation

Date/Time: 2020/03/13

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 1750 \text{ MHz}$ ;  $\sigma = 1.389 \text{ S/m}$ ;  $\epsilon_r = 41.809$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature:  $22.5^\circ\text{C}$     Liquid Temperature:  $22.5^\circ\text{C}$

Communication System: CW 1800MHz;    Frequency: 1750 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(5.36, 5.36, 5.36); Calibrated: 1/3/2020

### Head 1750MHz/Area Scan (61x61x1):

Measurement grid:  $dx=10 \text{ mm}$ ,  $dy=10 \text{ mm}$

Maximum value of SAR (Measurement) =  $10.8 \text{ W/kg}$

### Head 1750MHz/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

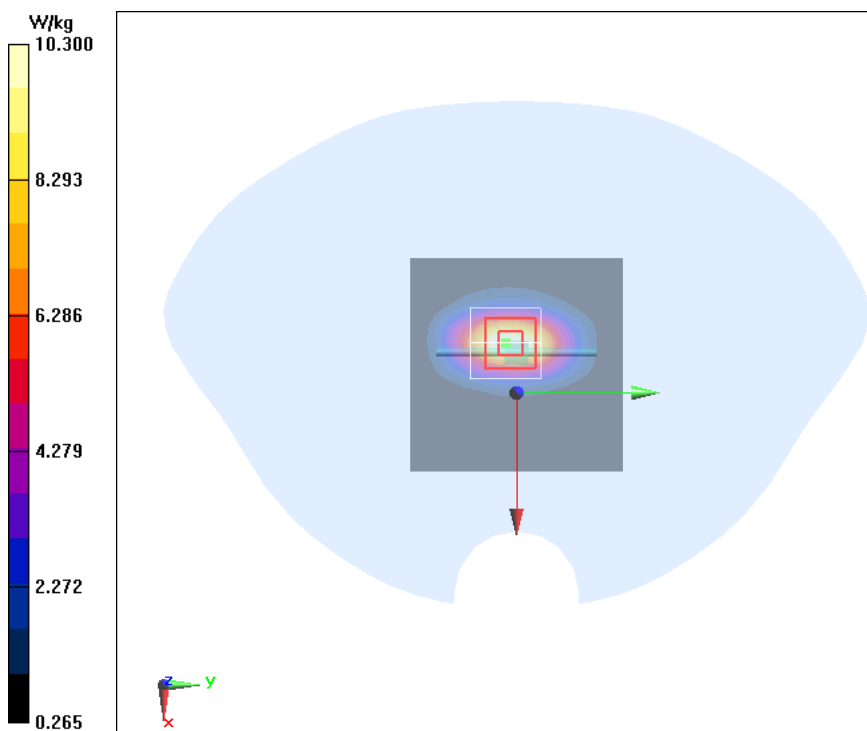
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $82.93 \text{ V/m}$ ; Power Drift =  $0.14 \text{ dB}$

Peak SAR (extrapolated) =  $16.1 \text{ W/kg}$

SAR(1 g) =  $9.23 \text{ W/kg}$ ; SAR(10 g) =  $5.02 \text{ W/kg}$

Maximum value of SAR (measured) =  $10.3 \text{ W/kg}$



## Head 1900 System Validation

Date/Time: 2020/03/16

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.365 \text{ S/m}$ ;  $\epsilon_r = 39.436$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature:  $22.5^\circ\text{C}$       Liquid Temperature:  $22.5^\circ\text{C}$

Communication System: CW 2000MHz;    Frequency: 1900 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(5.2, 5.2, 5.2); Calibrated: 1/3/2020

### System Validation 2/Area Scan (61x61x1):

Measurement grid:  $dx=10 \text{ mm}$ ,  $dy=10 \text{ mm}$

Maximum value of SAR (Measurement) =  $11.1 \text{ W/kg}$

### System Validation 2/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

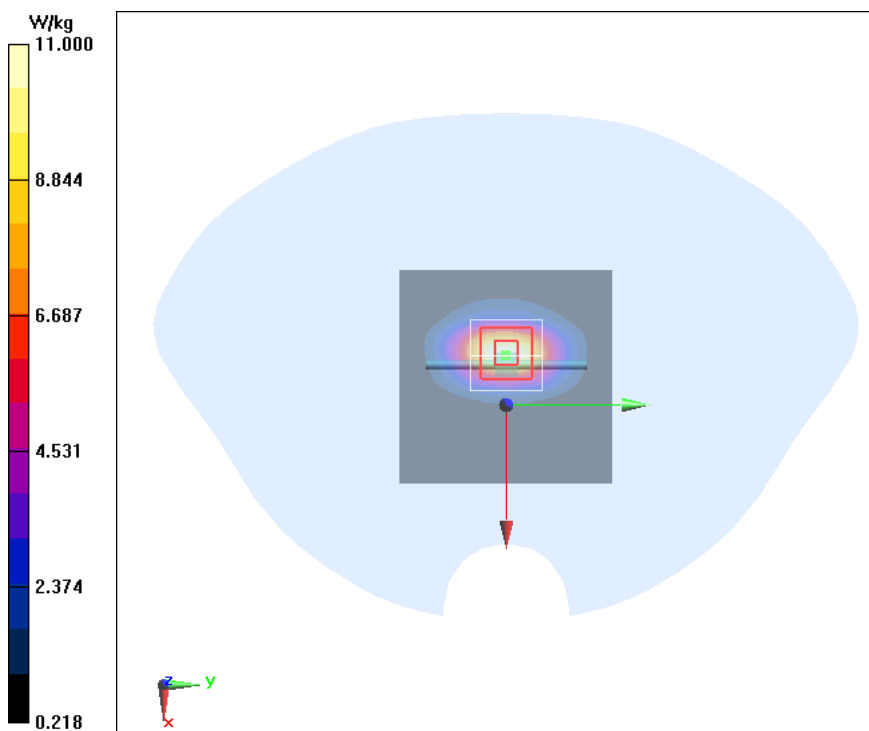
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $83.97 \text{ V/m}$ ; Power Drift =  $0.01 \text{ dB}$

Peak SAR (extrapolated) =  $18.1 \text{ W/kg}$

SAR(1 g) =  $9.86 \text{ W/kg}$ ; SAR(10 g) =  $5.16 \text{ W/kg}$

Maximum value of SAR (measured) =  $11.0 \text{ W/kg}$



## Head 2450 System Validation

Date/Time: 2020/03/17

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.885$  S/m;  $\epsilon_r = 38.903$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.5°C    Liquid Temperature: 22.5°C

Communication System: CW 2600MHz;    Frequency: 2450 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(4.75, 4.75, 4.75); Calibrated: 1/3/2020

### System Validation/Area Scan (61x71x1):

Measurement grid:  $dx=10$  mm,  $dy=10$  mm

Maximum value of SAR (Measurement) = 15.5 W/kg

### System Validation/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

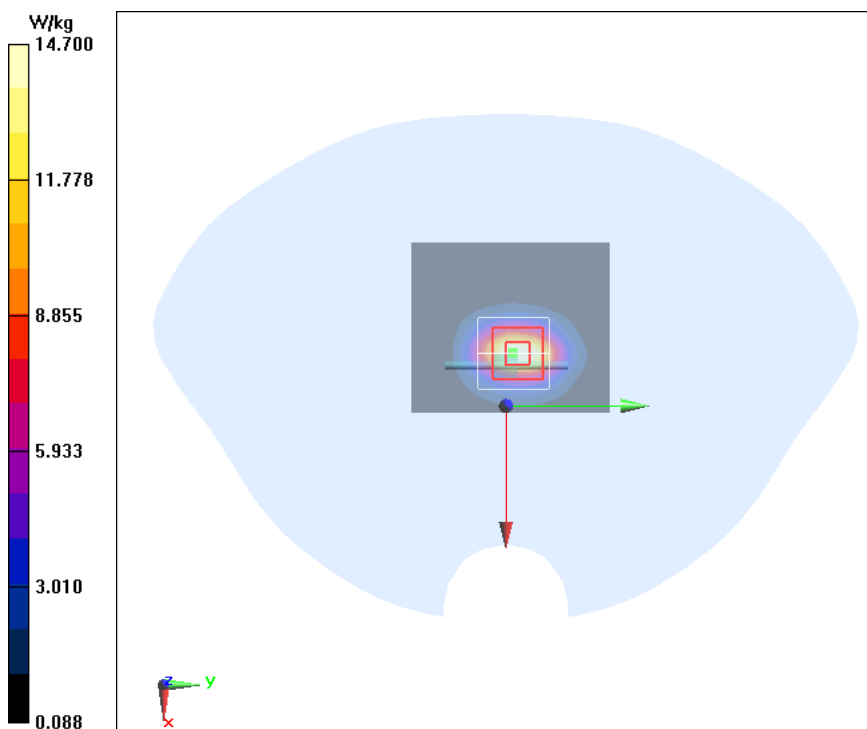
Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 77.38 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 27.4 W/kg

SAR(1 g) = 13 W/kg; SAR(10 g) = 6.03 W/kg

Maximum value of SAR (measured) = 14.7 W/kg



## Head 2600 System Validation

Date/Time: 2020/03/17

Electronics: DAE4 Sn1244

Medium parameters used:  $f = 2600$  MHz;  $\sigma = 2.035$  S/m;  $\epsilon_r = 38.28$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.5°C      Liquid Temperature: 22.5°C

Communication System: CW 2600MHz;      Frequency: 2600 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3252ConvF(4.52, 4.52, 4.52); Calibrated: 1/3/2020

### System Validation/Area Scan (81x71x1):

Measurement grid:  $dx=10$  mm,  $dy=10$  mm

Maximum value of SAR (Measurement) = 17.4 W/kg

### System Validation/Zoom Scan (7x7x7)/Cube 0:

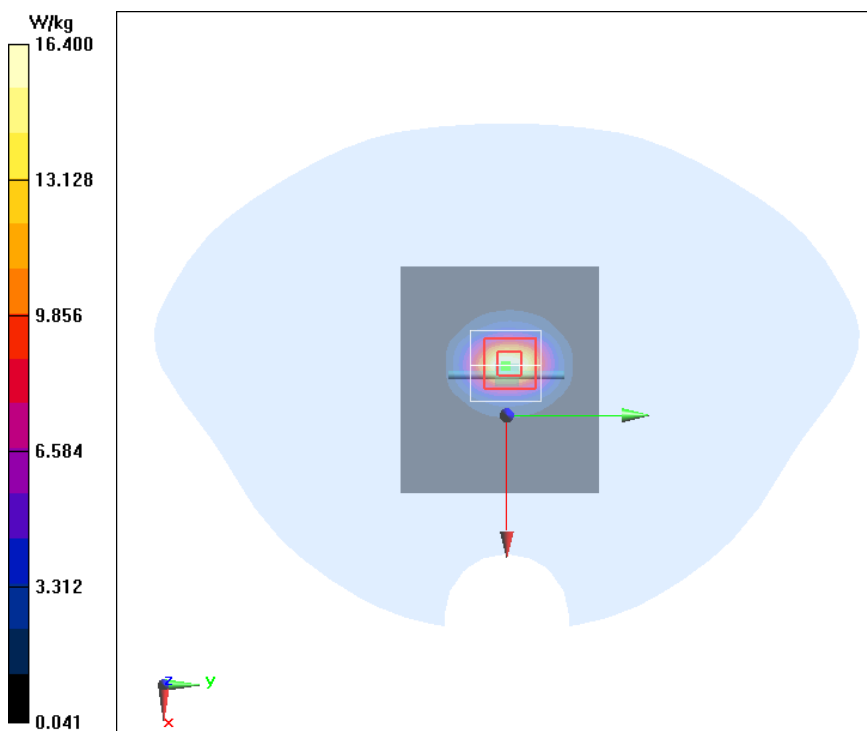
Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 83.54 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 34.0 W/kg

SAR(1 g) = 14.5 W/kg; SAR(10 g) = 6.23 W/kg

Maximum value of SAR (measured) = 16.4 W/kg



## ANNEX C. Calibration Certification



Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China  
 Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504  
 E-mail: cttl@chinattl.com [Http://www.chinattl.cn](http://www.chinattl.cn)



中国认可  
 国际互认  
 校准  
 CALIBRATION  
 CNAS L0570

 Client : **ECIT**

 Certificate No: **Z19-60489**

### CALIBRATION CERTIFICATE

Object: **DAE4 - SN: 1244**

Calibration Procedure(s): **FF-Z11-002-01**  
 Calibration Procedure for the Data Acquisition Electronics (DAEx)

Calibration date: **December 17, 2019**

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)°C and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Process Calibrator 753	1971018	24-Jun-19 (CTTL, No.J19X05126)	Jun-20

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: December 18, 2019

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.





Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China  
Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504  
E-mail: cttl@chinattl.com Http://www.chinattl.cn

**Glossary:**

DAE data acquisition electronics  
Connector angle information used in DASY system to align probe sensor X to the robot coordinate system.

**Methods Applied and Interpretation of Parameters:**

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle:* The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The report provide only calibration results for DAE, it does not contain other performance test results.



Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China  
 Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504  
 E-mail: cttl@chinattl.com Http://www.chinattl.cn

### DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1 $\mu$ V, full range = -100...+300 mV  
 Low Range: 1LSB = 61nV, full range = -1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	403.859 $\pm$ 0.15% (k=2)	403.595 $\pm$ 0.15% (k=2)	404.513 $\pm$ 0.15% (k=2)
Low Range	3.95597 $\pm$ 0.7% (k=2)	3.97332 $\pm$ 0.7% (k=2)	3.98293 $\pm$ 0.7% (k=2)

### Connector Angle

Connector Angle to be used in DASY system	23.5 $^{\circ}$ $\pm$ 1 $^{\circ}$
-------------------------------------------	------------------------------------