

# SAR Test Report

**Report No.** : SF191211C18  
**Applicant** : Kyocera Corporation c/o Kyocera International, Inc.  
**Address** : 8611 Balboa Avenue, San Diego, CA 92123  
**Product** : Feature Phone  
**FCC ID** : V65E4810  
**Brand** : Kyocera  
**Model No.** : E4810, E4810NC  
**Standards** : FCC 47 CFR Part 2 (2.1093), IEEE C95.1:1992, IEEE Std 1528:2013  
 KDB 865664 D01 v01r04, KDB 865664 D02 v01r02, KDB 248227 D01 v02r02  
 KDB 447498 D01 v06, KDB 648474 D04 v01r03, KDB 941225 D01 v03r01  
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**CERTIFICATION:** The above equipment have been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch–Lin Kou Laboratories**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample’s SAR characteristics under the conditions specified in this report. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product certification, approval, or endorsement by TAF or any government agencies.

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**Table of Contents**

<b>Release Control Record .....</b>	<b>3</b>
<b>1. Summary of Maximum SAR Value .....</b>	<b>4</b>
<b>2. Description of Equipment Under Test .....</b>	<b>5</b>
<b>3. SAR Measurement System .....</b>	<b>6</b>
3.1 Definition of Specific Absorption Rate (SAR) .....	6
3.2 SPEAG DASY6 System .....	6
3.2.1 Robot .....	7
3.2.2 Probes .....	8
3.2.3 Data Acquisition Electronics (DAE) .....	8
3.2.4 Phantoms .....	8
3.2.5 Device Holder .....	9
3.2.6 System Validation Dipoles .....	10
3.2.7 Power Source .....	10
3.2.8 Tissue Simulating Liquids .....	11
3.3 SAR System Verification .....	13
3.4 SAR Measurement Procedure .....	14
3.4.1 Area Scan and Zoom Scan Procedure .....	14
3.4.2 Volume Scan Procedure .....	15
3.4.3 Power Drift Monitoring .....	16
3.4.4 Spatial Peak SAR Evaluation .....	16
3.4.5 SAR Averaged Methods .....	16
<b>4. SAR Measurement Evaluation .....</b>	<b>17</b>
4.1 EUT Configuration and Setting .....	17
4.2 EUT Testing Position .....	24
4.2.1 Head Exposure Conditions .....	24
4.2.2 Body-worn Accessory Exposure Conditions .....	26
4.2.3 Hotspot Mode Exposure Conditions .....	27
4.3 Tissue Verification .....	28
4.4 System Validation .....	28
4.5 System Verification .....	29
4.6 Maximum Output Power .....	30
4.6.1 Maximum Target Conducted Power .....	30
4.6.2 Measured Conducted Power Result .....	32
4.7 SAR Testing Results .....	39
4.7.1 SAR Test Reduction Considerations .....	39
4.7.2 SAR Results for Head Exposure Condition .....	41
4.7.3 SAR Results for Body-worn Exposure Condition (Test Separation Distance is 15 mm) .....	44
4.7.4 SAR Results for Hotspot Exposure Condition (Test Separation Distance is 10 mm) .....	46
4.7.5 SAR Measurement Variability .....	49
4.7.6 Simultaneous Multi-band Transmission Evaluation .....	50
<b>5. Calibration of Test Equipment .....</b>	<b>55</b>
<b>6. Measurement Uncertainty .....</b>	<b>56</b>
<b>7. Information of the Testing Laboratories .....</b>	<b>57</b>
<b>Appendix A. SAR Plots of System Verification</b>	
<b>Appendix B. SAR Plots of SAR Measurement</b>	
<b>Appendix C. Calibration Certificate for Probe and Dipole</b>	
<b>Appendix D. Photographs of EUT and Setup</b>	



# SAR Test Report

## 1. Summary of Maximum SAR Value

Equipment Class	Mode	Highest SAR-1g Head (W/kg)	Highest SAR-1g Body-worn Tested at 15 mm (W/kg)	Highest SAR-1g Hotspot Tested at 10 mm (W/kg)
PCE	WCDMA II	0.56	0.82	0.90
	WCDMA V	0.37	0.77	0.98
	LTE 2	0.49	0.74	0.93
	LTE 4	0.72	0.80	0.97
	LTE 5	0.37	0.66	0.86
	LTE 12	0.20	0.32	0.49
	LTE 13	0.32	0.45	0.66
DTS	2.4G WLAN	0.03	0.18	0.29
NII	5.3G WLAN	0.04	0.16	N/A
	5.6G WLAN	0.04	0.15	N/A
	5.8G WLAN	0.03	0.14	N/A
DSS	Bluetooth	0.00	0.00	N/A

Highest Simultaneous Transmission SAR	Highest SAR-1g Head (W/kg)	Highest SAR-1g Body-worn Tested at 15 mm (W/kg)	Highest SAR-1g Hotspot Tested at 10 mm (W/kg)
	0.76	1.00	1.27

**Note:**

- The SAR criteria (**Head & Body: SAR-1g 1.6 W/kg, and Extremity: SAR-10g 4.0 W/kg**) for general population/uncontrolled exposure is specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992.

# SAR Test Report

## 2. Description of Equipment Under Test

<b>EUT Type</b>	Feature Phone
<b>FCC ID</b>	V65E4810
<b>Brand Name</b>	Kyocera
<b>Model Name</b>	E4810, E4810NC
<b>Tx Frequency Bands (Unit: MHz)</b>	WCDMA Band II : 1852.4 ~ 1907.6 WCDMA Band V : 826.4 ~ 846.6 LTE Band 2 : 1850.7 ~ 1909.3 (BW: 1.4M, 3M, 5M, 10M, 15M, 20M) LTE Band 4 : 1710.7 ~ 1754.3 (BW: 1.4M, 3M, 5M, 10M, 15M, 20M) LTE Band 5 : 824.7 ~ 848.3 (BW: 1.4M, 3M, 5M, 10M) LTE Band 12 : 699.7 ~ 715.3 (BW: 1.4M, 3M, 5M, 10M) LTE Band 13 : 779.5 ~ 784.5 (BW: 5M, 10M) WLAN : 2412 ~ 2462, 5180 ~ 5240, 5260 ~ 5320, 5500 ~ 5700, 5745 ~ 5825 Bluetooth : 2402 ~ 2480
<b>Uplink Modulations</b>	WCDMA : QPSK LTE : QPSK, 16QAM 802.11b : DSSS 802.11a/g/n : OFDM Bluetooth : GFSK, $\pi/4$ -DQPSK, 8-DPSK
<b>Maximum Tune-up Conducted Power (Unit: dBm)</b>	Please refer to section 4.6.1 of this report
<b>Antenna Type</b>	Fixed Internal Antenna
<b>EUT Stage</b>	Identical Prototype

### Note:

- All models are listed as below.

Sample	Brand	Model	Description
1	Kyocera	E4810	With Camera function
2		E4810NC	Without Camera function

- The above EUT information is declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.

### List of Accessory:

<b>Battery</b>	<b>Brand Name</b>	Kyocera
	<b>Model Name</b>	SCP-73LBPS
	<b>Power Rating</b>	3.8Vdc, 1770mAh, 6.8 Wh
	<b>Type</b>	Li-ion

### **3. SAR Measurement System**

#### **3.1 Definition of Specific Absorption Rate (SAR)**

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.

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:

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

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

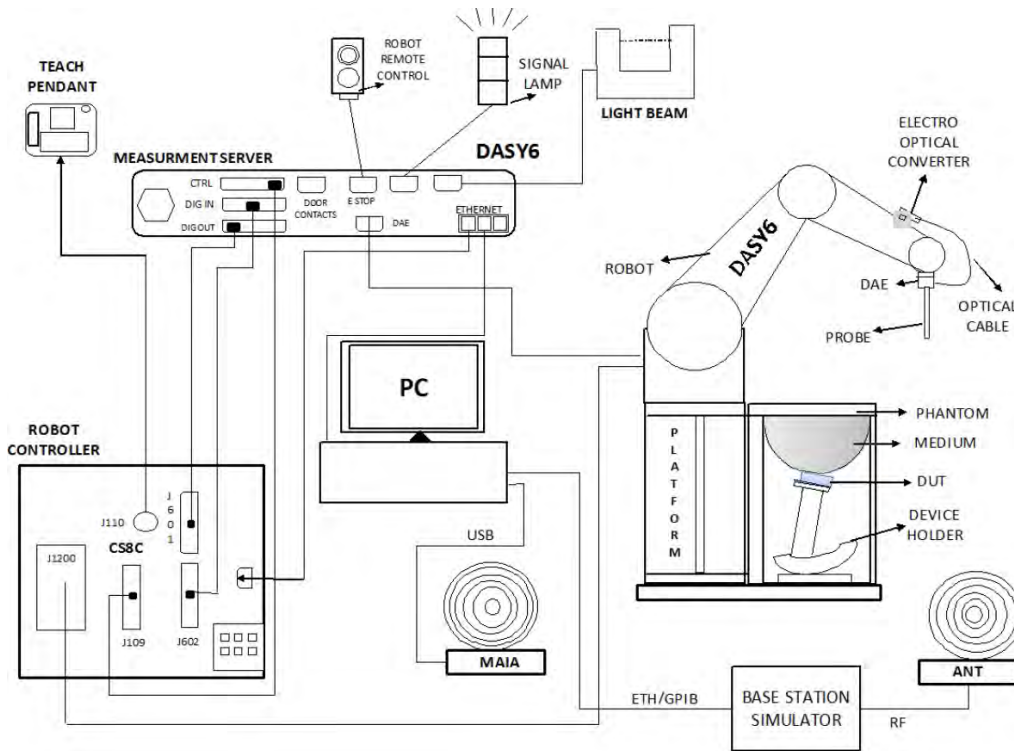
SAR measurement can be related to the electrical field in the tissue by

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

Where:  $\sigma$  is the conductivity of the tissue,  $\rho$  is the mass density of the tissue and E is the RMS electrical field strength.

#### **3.2 SPEAG DASY6 System**

DASY6 system consists of high precision robot, probe alignment sensor, phantom, robot controller, controlled measurement server and near-field probe. The robot includes six axes that can move to the precision position of the DASY6 software defined. The DASY6 software can define the area that is detected by the probe. The robot is connected to controlled box. Controlled measurement server is connected to the controlled robot box. The DAE includes amplifier, signal multiplexing, AD converter, offset measurement and surface detection. It is connected to the Electro-optical coupler (ECO). The ECO performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC.



**Fig-3.1 SPEAG DASY6 System Setup**

**3.2.1 Robot**

The DASY6 systems use the high precision robots from Stäubli SA (France). For the 6-axis controller system, the robot controller version of CS8c from Stäubli is used. The Stäubli robot series have many features that are important for our application:

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




**Fig-3.2 SPEAG DASY6 System**


## SAR Test Report

### 3.2.2 Probes


The SAR measurement is conducted with the dosimetric probe. The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency.

<b>Model</b>	EX3DV4	
<b>Construction</b>	Symmetrical design with triangular core. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE).	
<b>Frequency</b>	4 MHz to 10 GHz Linearity: $\pm 0.2$ dB	
<b>Directivity</b>	$\pm 0.1$ dB in TSL (rotation around probe axis) $\pm 0.3$ dB in TSL (rotation normal to probe axis)	
<b>Dynamic Range</b>	10 $\mu$ W/g to 100 mW/g Linearity: $\pm 0.2$ dB (noise: typically $< 1$ $\mu$ W/g)	
<b>Dimensions</b>	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

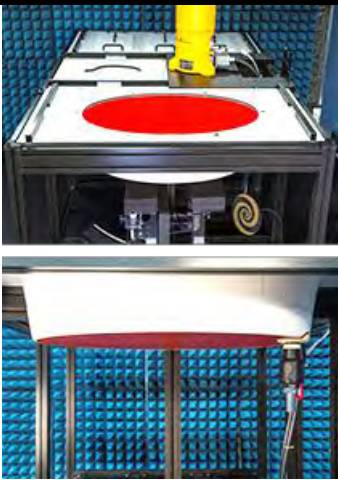
### 3.2.3 Data Acquisition Electronics (DAE)

<b>Model</b>	DAE3, DAE4	
<b>Construction</b>	Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop.	
<b>Measurement Range</b>	-100 to +300 mV (16 bit resolution and two range settings: 4mV, 400mV)	
<b>Input Offset Voltage</b>	$< 5\mu$ V (with auto zero)	
<b>Input Bias Current</b>	$< 50$ fA	
<b>Dimensions</b>	60 x 60 x 68 mm	


### 3.2.4 Phantoms


<b>Model</b>	SAM-Twin Phantom	
<b>Construction</b>	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE Std 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body-mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.	
<b>Material</b>	Vinylester, fiberglass reinforced (VE-GF)	
<b>Shell Thickness</b>	$2 \pm 0.2$ mm ( $6 \pm 0.2$ mm at ear point)	
<b>Dimensions</b>	Length: 1000 mm Width: 500 mm Height: adjustable feet	
<b>Filling Volume</b>	approx. 25 liters	




<b>Model</b>	ELI	
<b>Construction</b>	The ELI phantom is used for compliance testing of handheld and body-mounted wireless devices. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.	
<b>Material</b>	Vinylester, fiberglass reinforced (VE-GF)	
<b>Shell Thickness</b>	2.0 ± 0.2 mm (bottom plate)	
<b>Dimensions</b>	Major axis: 600 mm Minor axis: 400 mm	
<b>Filling Volume</b>	approx. 30 liters	


### 3.2.5 Device Holder

<b>Model</b>	MD4HHTV5 - Mounting Device for Hand-Held Transmitters	
<b>Construction</b>	In combination with the Twin SAM or ELI phantoms, the Mounting Device for Hand-Held Transmitters enables rotation of the mounted transmitter device to specified spherical coordinates. At the heads, the rotation axis is at the ear opening. Transmitter devices can be easily and accurately positioned according to IEC 62209-1, IEEE 1528, FCC, or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat).	
<b>Material</b>	Polyoxymethylene (POM)	


<b>Model</b>	MDA4WTV5 - Mounting Device Adaptor for Ultra Wide Transmitters	
<b>Construction</b>	An upgrade kit to Mounting Device to enable easy mounting of wider devices like big smart-phones, e-books, small tablets, etc. It holds devices with width up to 140 mm.	
<b>Material</b>	Polyoxymethylene (POM)	

<b>Model</b>	MDA4SPV6 - Mounting Device Adaptor for Smart Phones	
<b>Construction</b>	The solid low-density MDA4SPV6 adaptor assuring no impact on the DUT radiation performance and is conform with any DUT design and shape.	
<b>Material</b>	ROHACELL	


## SAR Test Report

<b>Model</b>	MD4LAPV5 - Mounting Device for Laptops and other Body-Worn Transmitters	
<b>Construction</b>	In combination with the Twin SAM or ELI phantoms, the Mounting Device (Body-Worn) enables testing of transmitter devices according to IEC 62209-2 specifications. The device holder can be locked for positioning at a flat phantom section.	
<b>Material</b>	Polyoxymethylene (POM), PET-G, Foam	

### 3.2.6 System Validation Dipoles

<b>Model</b>	D-Serial	
<b>Construction</b>	Symmetrical dipole with 1/4 balun. Enables measurement of feed point impedance with NWA. Matched for use near flat phantoms filled with tissue simulating solutions.	
<b>Frequency</b>	750 MHz to 5800 MHz	
<b>Return Loss</b>	> 20 dB	
<b>Power Capability</b>	> 100 W (f < 1GHz), > 40 W (f > 1GHz)	

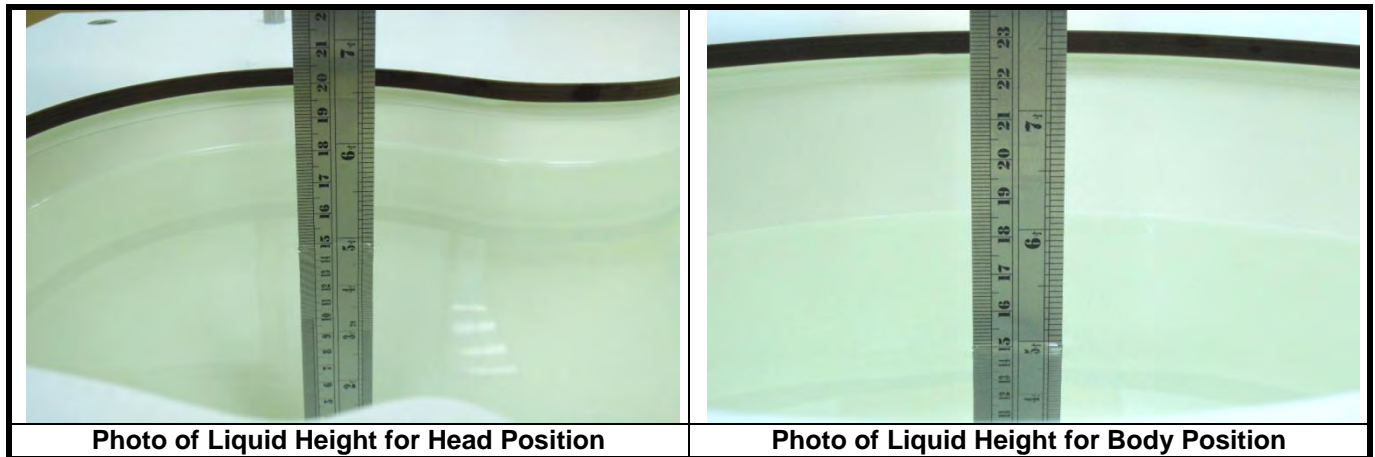
### 3.2.7 Power Source

<b>Model</b>	Powersource1	
<b>Signal Type</b>	Continuous Wave	
<b>Operating Frequencies</b>	600 MHz to 5850 MHz	
<b>Output Power</b>	-5.0 dBm to +17.0 dBm	
<b>Power Supply</b>	5V DC, via USB jack	
<b>Power Consumption</b>	<3 W	
<b>Applications</b>	System performance check and validation with a CW signal.	

# SAR Test Report

## 3.2.8 Tissue Simulating Liquids

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15 cm. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 10 % are listed in Table-3.1.



**Table-3.1 Targets of Tissue Simulating Liquid**

Frequency (MHz)	Target Permittivity	Range of $\pm 10\%$	Target Conductivity	Range of $\pm 10\%$
450	43.5	39.2 ~ 47.9	0.87	0.78 ~ 0.96
750	41.9	37.7 ~ 46.1	0.89	0.80 ~ 0.98
835	41.5	37.4 ~ 45.7	0.90	0.81 ~ 0.99
900	41.5	37.4 ~ 45.7	0.97	0.87 ~ 1.07
1450	40.5	36.5 ~ 44.6	1.20	1.08 ~ 1.32
1500	40.4	36.4 ~ 44.4	1.23	1.11 ~ 1.35
1640	40.2	36.2 ~ 44.2	1.31	1.18 ~ 1.44
1750	40.1	36.1 ~ 44.1	1.37	1.23 ~ 1.51
1800	40.0	36.0 ~ 44.0	1.40	1.26 ~ 1.54
1900	40.0	36.0 ~ 44.0	1.40	1.26 ~ 1.54
2000	40.0	36.0 ~ 44.0	1.40	1.26 ~ 1.54
2100	39.8	35.8 ~ 43.8	1.49	1.34 ~ 1.64
2300	39.5	35.6 ~ 43.5	1.67	1.50 ~ 1.84
2450	39.2	35.3 ~ 43.1	1.80	1.62 ~ 1.98
2600	39.0	35.1 ~ 42.9	1.96	1.76 ~ 2.16
3000	38.5	34.7 ~ 42.4	2.40	2.16 ~ 2.64
3500	37.9	34.1 ~ 41.7	2.91	2.62 ~ 3.20
4000	37.4	33.7 ~ 41.1	3.43	3.09 ~ 3.77
4500	36.8	33.1 ~ 40.5	3.94	3.55 ~ 4.33
5000	36.2	32.6 ~ 39.8	4.45	4.01 ~ 4.90
5200	36.0	32.4 ~ 39.6	4.66	4.19 ~ 5.13
5400	35.8	32.2 ~ 39.4	4.86	4.37 ~ 5.35
5600	35.5	32.0 ~ 39.1	5.07	4.56 ~ 5.58
5800	35.3	31.8 ~ 38.8	5.27	4.74 ~ 5.80
6000	35.1	31.6 ~ 38.6	5.48	4.93 ~ 6.03

## SAR Test Report

The dielectric properties of the tissue simulating liquids are defined in IEC 62209-1 and IEC 62209-2. The dielectric properties of the tissue simulating liquids were verified prior to the SAR evaluation using a dielectric assessment kit and a network analyzer.

Since the range of  $\pm 10\%$  of the required target values is used to measure relative permittivity and conductivity, the SAR correction procedure is applied to correct measured SAR for the deviations in permittivity and conductivity. Only positive correction has been used to scale up the measured SAR, and SAR result would not be corrected if the correction  $\Delta$  SAR has a negative sign.

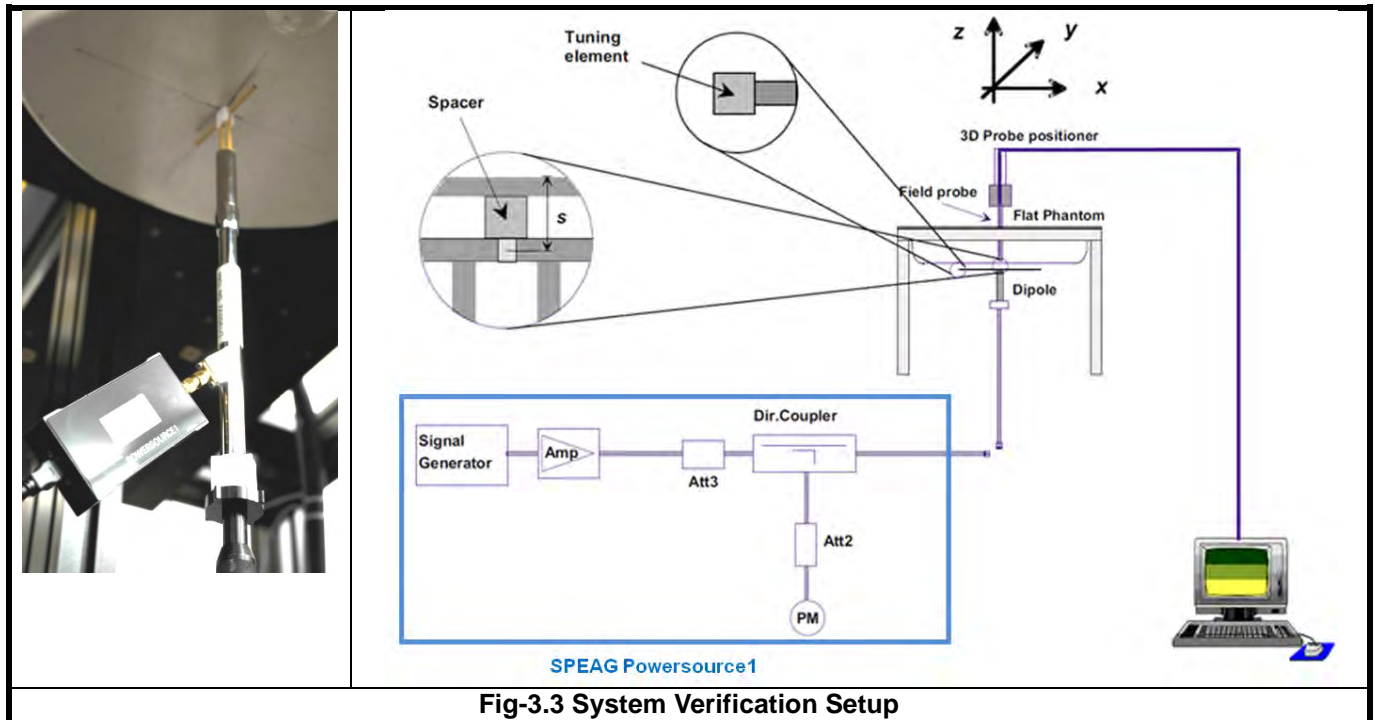
The following table gives the recipes for tissue simulating liquids.

**Table-3.2 Recipes of Tissue Simulating Liquid**

Tissue Type	Bactericide	DGBE	HEC	NaCl	Sucrose	Triton X-100	Water	Diethylene Glycol Mono-hexylether
H750	0.2	-	0.2	1.5	56.0	-	42.1	-
H835	0.2	-	0.2	1.5	57.0	-	41.1	-
H900	0.2	-	0.2	1.4	58.0	-	40.2	-
H1450	-	43.3	-	0.6	-	-	56.1	-
H1640	-	45.8	-	0.5	-	-	53.7	-
H1750	-	47.0	-	0.4	-	-	52.6	-
H1800	-	44.5	-	0.3	-	-	55.2	-
H1900	-	44.5	-	0.2	-	-	55.3	-
H2000	-	44.5	-	0.1	-	-	55.4	-
H2300	-	44.9	-	0.1	-	-	55.0	-
H2450	-	45.0	-	0.1	-	-	54.9	-
H2600	-	45.1	-	0.1	-	-	54.8	-
H3500	-	8.0	-	0.2	-	20.0	71.8	-
H5G	-	-	-	-	-	17.2	65.5	17.3

**3.3 SAR System Verification**

The system check verifies that the system operates within its specifications. It is performed daily or before every SAR measurement. The system check uses normal SAR measurements in the flat section of the phantom with a matched dipole at a specified distance. The system verification setup is shown as below.



**Fig-3.3 System Verification Setup**

The SPEAG Powersource1 is a portable and very stable RF source providing a continuous wave (CW) signal. It is designed for conducting SAR system checks and SAR system validation of DASY and is compatible with IEC 62209-1, IEC 62209-2 and IEEE Std 1528 standards. The Powersource1 has been calibrated by SPEAG's ISO/IEC 17025-accredited calibration center. When using Powersource1, the setup can be simplified, as shown in Fig-3.3. The signal purity is warranted by design. Since the Powersource1 is calibrated, no additional equipment is needed and the Powersource1 can directly be connected to the SMA connector of the dipole without a cable as all separate components (signal generator, amplifier, coupler and power meter) are built into the unit.

The validation dipole is placed beneath the flat phantom with the specific spacer in place. The distance spacer is touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The Powersource1 is adjusted for the desired forward power of 17 dBm at the dipole connector and the RF output power would be turned on. After system check testing, the SAR result will be normalized to 1W forward input power and compared with the reference SAR value derived from validation dipole certificate report. The deviation of system check should be within 10 %.

## 3.4 SAR Measurement Procedure

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
- (b) Area scan
- (c) Zoom scan
- (d) Power drift measurement

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

- (a) Make EUT to transmit maximum output power
- (b) Measure conducted output power through RF cable
- (c) Place the EUT in the specific position of phantom
- (d) Perform SAR testing steps on the DASY system
- (e) Record the SAR value

### 3.4.1 Area Scan and Zoom Scan Procedure

First area scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an area scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, zoom scan is required. The zoom scan is performed around the highest E-field value to determine the averaged SAR-distribution.

Measure the local SAR at a test point at 1.4 mm of the inner surface of the phantom recommended by SEPAG. The area scan (two-dimensional SAR distribution) is performed cover at least an area larger than the projection of the EUT or antenna. The measurement resolution and spatial resolution for interpolation shall be chosen to allow identification of the local peak locations to within one-half of the linear dimension of the corresponding side of the zoom scan volume. Following table provides the measurement parameters required for the area scan.

Parameter	$f \leq 3 \text{ GHz}$	$3 \text{ GHz} < f \leq 6 \text{ GHz}$
Maximum distance from closest measurement point to phantom surface	$5 \pm 1$	$\delta \ln(2)/2 \pm 0.5$
Maximum probe angle from probe axis to phantom surface normal at the measurement location	$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: $\Delta x_{\text{Area}}, \Delta y_{\text{Area}}$	$\leq 2 \text{ GHz: } \leq 15 \text{ mm}$ $2 - 3 \text{ GHz: } \leq 12 \text{ mm}$	$3 - 4 \text{ GHz: } \leq 12 \text{ mm}$ $4 - 6 \text{ GHz: } \leq 10 \text{ mm}$

From the scanned SAR distribution, identify the position of the maximum SAR value, in addition identify the positions of any local maxima with SAR values within 2 dB of the maximum value that will not be within the zoom scan of other peaks. Additional peaks shall be measured only when the primary peak is within 2 dB of the SAR compliance limit (e.g. 1 W/kg for 1.6 W/kg, 1 g limit; or 1.26 W/kg for 2 W/kg, 10 g limit).



The zoom scan (three-dimensional SAR distribution) is performed at the local maxima locations identified in previous area scan procedure. The zoom scan volume must be larger than the required minimum dimensions. When graded grids are used, which only applies in the direction normal to the phantom surface, the initial grid separation closest to the phantom surface and subsequent graded grid increment ratios must satisfy the required protocols. The 1-g SAR averaging volume must be fully contained within the zoom scan measurement volume boundaries; otherwise, the measurement must be repeated by shifting or expanding the zoom scan volume. The similar requirements also apply to 10-g SAR measurements. Following table provides the measurement parameters required for the zoom scan.

Parameter		$f \leq 3$ GHz	$3 \text{ GHz} < f \leq 6$ GHz
Maximum zoom scan spatial resolution: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$		$\leq 2$ GHz: $\leq 8$ mm 2 – 3 GHz: $\leq 5$ mm	3 – 4 GHz: $\leq 5$ mm 4 – 6 GHz: $\leq 4$ mm
Maximum zoom scan spatial resolution, normal to phantom surface	<i>uniform grid:</i> $\Delta z_{\text{Zoom}}(n)$	$\leq 5$ mm	3 – 4 GHz: $\leq 4$ mm 4 – 5 GHz: $\leq 3$ mm 5 – 6 GHz: $\leq 2$ mm
	<i>graded grids:</i> $\Delta z_{\text{Zoom}}(1)$	$\leq 4$ mm	3 – 4 GHz: $\leq 3.0$ mm 4 – 5 GHz: $\leq 2.5$ mm 5 – 6 GHz: $\leq 2.0$ mm
	$\Delta z_{\text{Zoom}}(n>1)$	$\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1)$ mm	
Minimum zoom scan volume (x, y, z)		$\geq 30$ mm	3 – 4 GHz: $\geq 28$ mm 4 – 5 GHz: $\geq 25$ mm 5 – 6 GHz: $\geq 22$ mm

Per IEC 62209-2 AMD1, the successively higher resolution zoom scan is required if the zoom scan measured as defined above complies with both of the following criteria, or if the peak spatial-average SAR is below 0.1 W/kg, no additional measurements are needed:

- (1) The smallest horizontal distance from the local SAR peaks to all points 3 dB below the SAR peak shall be larger than the horizontal grid steps in both x and y directions ( $\Delta x, \Delta y$ ). This shall be checked for the measured zoom scan plane conformal to the phantom at the distance  $z_{M1}$ .
- (2) The ratio of the SAR at the second measured point (M2) to the SAR at the closest measured point (M1) at the x-y location of the measured maximum SAR value shall be at least 30 %.

If one or both of the above criteria are not met, the zoom scan measurement shall be repeated using a finer resolution. New horizontal and vertical grid steps shall be determined from the measured SAR distribution so that the above criteria are met. Compliance with the above two criteria shall be demonstrated for the new measured zoom scan.

### 3.4.2 Volume Scan Procedure

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

### 3.4.3 Power Drift Monitoring

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

### 3.4.4 Spatial Peak SAR Evaluation

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

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

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

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

### 3.4.5 SAR Averaged Methods

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

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



## **4. SAR Measurement Evaluation**

### **4.1 EUT Configuration and Setting**

#### **<Connections between EUT and System Simulator>**

For WWAN SAR testing, the EUT was linked and controlled by base station emulator. Communication between the EUT and the emulator was established by air link. The distance between the EUT and the communicating antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller than the output power of EUT. The EUT was set from the emulator to radiate maximum output power during SAR testing.

#### **<Considerations Related to WCDMA for Setup and Testing>**

##### **WCDMA Handsets Head SAR**

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the primary mode.

##### **WCDMA Handsets Body-worn SAR**

SAR for body-worn configurations is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". The 3G SAR test reduction procedure is applied to other spreading codes and multiple DPDCH<sub>n</sub> configurations supported by the handset with 12.2 kbps RMC as the primary mode.

##### **Handsets with Release 5 HSDPA**

The 3G SAR test reduction procedure is applied to HSDPA body-worn configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSDPA using the HSDPA body SAR procedures in the "Release 5 HSDPA Data Devices", for the highest reported SAR body-worn exposure configuration in 12.2 kbps RMC. Handsets with both HSDPA and HSUPA are tested according to Release 6 HSPA test procedures.

##### **Handsets with Release 6 HSUPA**

The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) body-worn configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSPA using the HSPA body SAR procedures in the "Release 6 HSPA Data Devices", for the highest reported body-worn exposure SAR configuration in 12.2 kbps RMC. When VOIP is applicable for next to the ear head exposure in HSPA, the 3G SAR test reduction procedure is applied to HSPA with 12.2 kbps RMC as the primary mode; otherwise, the same HSPA configuration used for body-worn measurements is tested for next to the ear head exposure.

## SAR Test Report

### Release 5 HSDPA Data Devices

The 3G SAR test reduction procedure is applied to body SAR with 12.2 kbps RMC as the primary mode. Otherwise, body SAR for HSDPA is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, for the highest reported SAR configuration in 12.2 kbps RMC without HSDPA. HSDPA is configured according to the applicable UE category of a test device. The number of HS-DSCH/HS-PDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission conditions, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4 ms and a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors ( $\beta_c$ ,  $\beta_d$ ), and HS-DPCCH power offset parameters ( $\Delta_{ACK}$ ,  $\Delta_{NACK}$ ,  $\Delta_{CQI}$ ) are set according to values indicated in below. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{HS}^{(1)(2)}$	CM <sup>(3)</sup> (dB)	MPR <sup>(3)</sup> (dB)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 <sup>(4)</sup>	15/15 <sup>(4)</sup>	64	12/15 <sup>(4)</sup>	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1:  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  and  $\Delta_{CQI} = 30/15$  with  $\beta_{HS} = 30/15 * \beta_c$ .

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

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

Note 4: For subtest 2 the  $\beta_c/\beta_d$  ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 11/15$  and  $\beta_d = 15/15$ .

## SAR Test Report

### Release 6 HSUPA Data Devices

The 3G SAR test reduction procedure is applied to body SAR with 12.2 kbps RMC as the primary mode. Otherwise, body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 and power control algorithm 2, according to the highest reported body SAR configuration in 12.2 kbps RMC without HSPA. When VOIP applies to head exposure, the 3G SAR test reduction procedure is applied with 12.2 kbps RMC as the primary mode. Otherwise, the same HSPA configuration used for body SAR measurements are applied to head exposure testing. Due to inner loop power control requirements in HSPA, a communication test set is required for output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSPA are configured according to the  $\beta$  values indicated in below.

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_d/\beta_c$	$\beta_{HS}^{(1)}$	$\beta_{ec}$	$\beta_{ed}^{(4)(5)}$	$\beta_{ed}$ (SF)	$\beta_{ed}$ (Codes)	CM <sup>(2)</sup> (dB)	MPR <sup>(2)(6)</sup> (dB)	AG <sup>(5)</sup> Index	E-TFCI
1	11/15 <sup>(3)</sup>	15/15 <sup>(3)</sup>	64	11/15 <sup>(3)</sup>	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed1}: 47/15$ $\beta_{ed2}: 47/15$	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

Note 1: For sub-test 1 to 4,  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  and  $\Delta_{COI} = 30/15$  with  $\beta_{HS} = 30/15 * \beta_c$ . For sub-test 5,  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  and  $\Delta_{COI} = 5/15$  with  $\beta_{HS} = 5/15 * \beta_c$ .

Note 2: CM = 1 for  $\beta_c/\beta_d = 12/15$ ,  $\beta_{HS}/\beta_c = 24/15$ . For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the  $\beta_c/\beta_d$  ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 10/15$  and  $\beta_d = 15/15$ .

Note 4: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

Note 5:  $\beta_{ed}$  can not be set directly; it is set by Absolute Grant Value.

Note 6: For subtests 2, 3 and 4, UE may perform E-DPDCH power scaling at max power which could result in slightly smaller MPR values.

### <Considerations Related to LTE for Setup and Testing>

This device contains LTE transmitter which follows 3GPP standards, is category 3, supports both QPSK and QAM modulations, and supported LTE band and channel bandwidth is listed in below. The output power was tested per 3GPP TS 36.521-1 maximum transmit procedures for both QPSK and QAM modulation. The results please refer to section 4.6 of this report.

EUT Supported LTE Band and Channel Bandwidth						
LTE Band	BW 1.4 MHz	BW 3 MHz	BW 5 MHz	BW 10 MHz	BW 15 MHz	BW 20 MHz
2	V	V	V	V	V	V
4	V	V	V	V	V	V
5	V	V	V	V		
12	V	V	V	V		
13			V	V		

# SAR Test Report

The LTE maximum power reduction (MPR) in accordance with 3GPP TS 36.101 is active all times during LTE operation. The allowed MPR for the maximum output power is specified in below.

Modulation	Channel Bandwidth / RB Configurations						LTE MPR Setting (dB)
	BW 1.4 MHz	BW 3 MHz	BW 5 MHz	BW 10 MHz	BW 15 MHz	BW 20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	1
16QAM	<= 5	<= 4	<= 8	<= 12	<= 16	<= 18	1
16QAM	> 5	> 4	> 8	> 12	> 16	> 18	2

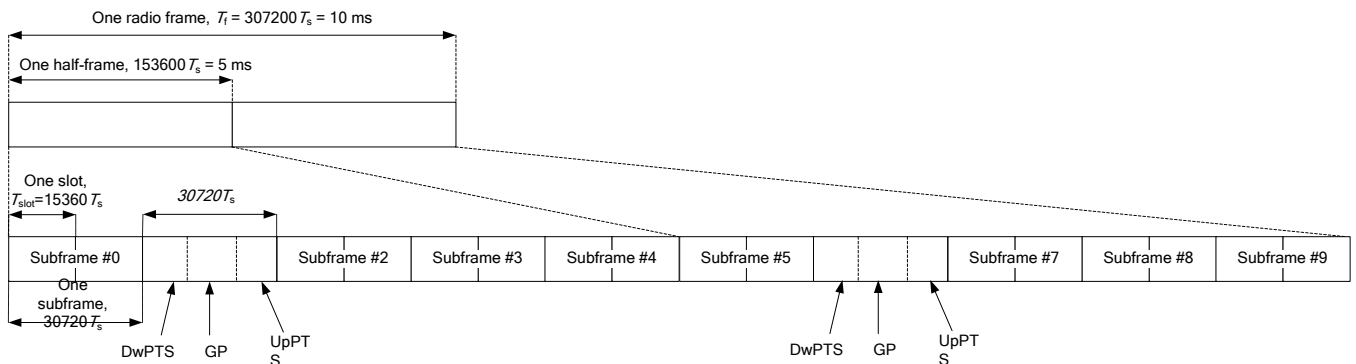
**Note:** MPR is according to the standard and implemented in the circuit (mandatory).

In addition, the device is compliant with additional maximum power reduction (A-MPR) requirements defined in 3GPP TS 36.101 section 6.2.4 that was disabled for all FCC compliance testing.

During LTE SAR testing, the related parameters of operating band, channel bandwidth, uplink channel number, modulation type, and RB was set in base station simulator. When the EUT has registered and communicated to base station simulator, the simulator set to make EUT transmitting the maximum radiated power.

## TDD-LTE Setup Configurations

According to KDB 941225 D05, SAR testing for TDD-LTE device 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 TDD-LTE configurations. The TDD-LTE of this device supports frame structure type 2 defined in 3GPP TS 36.211 section 4.2, and the frame structure configuration can be referred to below.



3GPP TS 36.211 Figure 4.2-1: Frame Structure Type 2

Special Subframe Configuration	Normal Cyclic Prefix in Downlink			Extended Cyclic Prefix in Downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal Cyclic Prefix in Uplink	Extended Cyclic Prefix in Uplink		Normal Cyclic Prefix in Uplink	Extended Cyclic Prefix in Uplink
0	6592 · Ts	2192 · Ts	2560 · Ts	7680 · Ts	2192 · Ts	2560 · Ts
1	19760 · Ts			20480 · Ts		
2	21952 · Ts			23040 · Ts		
3	24144 · Ts			25600 · Ts		
4	26336 · Ts			7680 · Ts		
5	6592 · Ts	4384 · Ts	5120 · Ts	20480 · Ts	4384 · Ts	5120 · Ts
6	19760 · Ts			23040 · Ts		
7	21952 · Ts			12800 · Ts		
8	24144 · Ts	-	-	-	-	-
9	13168 · Ts	-	-	-	-	-

3GPP TS 36.211 Table 4.2-1: Configuration of Special Subframe

Uplink-Downlink Configuration	Downlink-to-Uplink Switch-Point Periodicity	Subframe Number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

3GPP TS 36.211 Table 4.2-2: Uplink-Downlink Configurations

The variety of different TD-LTE uplink-downlink configurations allows a network operator to allocate the network's capacity between uplink and downlink traffic to meet the needs of the network. The uplink duty cycle of these seven configurations can readily be computed and shown in below.

UL-DL Configuration	0	1	2	3	4	5	6
Highest Duty-Cycle	63.33%	43.33%	23.33%	31.67%	21.67%	11.67%	53.33%

### <Considerations Related to WLAN for Setup and Testing>

In general, various vendor specific external test software and chipset based internal test modes are typically used for SAR measurement. These chipset based test mode utilities are generally hardware and manufacturer dependent, and often include substantial flexibility to reconfigure or reprogram a device. A Wi-Fi device must be configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools for SAR measurement. The test frequencies established using test mode must correspond to the actual channel frequencies. When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92 - 96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. In addition, a periodic transmission duty factor is required for current generation SAR systems to measure SAR correctly. The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

According to KDB 248227 D01, this device has installed WLAN engineering testing software which can provide continuous transmitting RF signal. During WLAN SAR testing, this device was operated to transmit continuously at the maximum transmission duty with specified transmission mode, operating frequency, lowest data rate, and maximum output power.

### Initial Test Configuration

An initial test configuration is determined for OFDM transmission modes in 2.4 GHz and 5 GHz bands according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band. When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band.

## SAR Test Report

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### Subsequent Test Configuration

SAR measurement requirements for the remaining 802.11 transmission mode configurations that have not been tested in the initial test configuration are determined separately for each standalone and aggregated frequency band, in each exposure condition, according to the maximum output power specified for production units. Additional power measurements may be required to determine if SAR measurements are required for subsequent highest output power channels in a subsequent test configuration. When the highest reported SAR for the initial test configuration according to the initial test position or fixed exposure position requirements, is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is  $\leq 1.2$  W/kg, SAR is not required for that subsequent test configuration.

### SAR Test Configuration and Channel Selection

When multiple channel bandwidth configurations in a frequency band have the same specified maximum output power, the initial test configuration is using largest channel bandwidth, lowest order modulation, lowest data rate, and lowest order 802.11 mode (i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n). After an initial test configuration is determined, if multiple test channels have the same measured maximum output power, the channel chosen for SAR measurement is determined according to the following.

- 1) The channel closest to mid-band frequency is selected for SAR measurement.
- 2) For channels with equal separation from mid-band frequency; for example, high and low channels or two mid-band channels, the higher frequency (number) channel is selected for SAR measurement.

### Test Reduction for U-NII-1 (5.2 GHz) and U-NII-2A (5.3 GHz) Bands

For devices that operate in both U-NII bands using the same transmitter and antenna(s), SAR test reduction is determined according to the following.

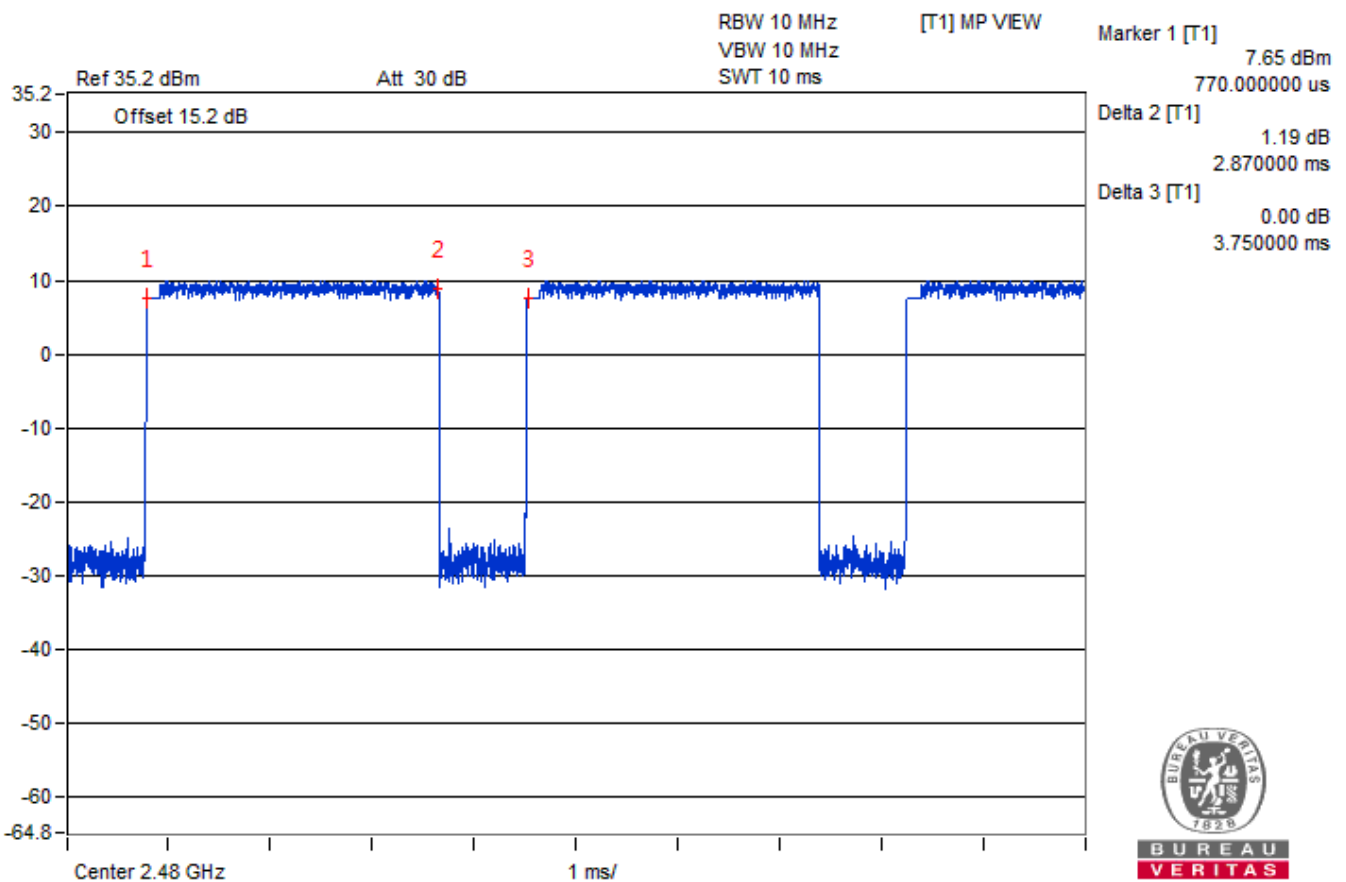
- 1) When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is  $\leq 1.2$  W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition).
- 2) When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is  $\leq 1.2$  W/kg, SAR is not required for the band with lower maximum output power in that test configuration.

# SAR Test Report

## <Considerations Related to Bluetooth for Setup and Testing>

This device has installed Bluetooth engineering testing software which can provide continuous transmitting RF signal. During Bluetooth SAR testing, this device was operated to transmit continuously at the maximum transmission duty with specified transmission mode, operating frequency, lowest data rate, and maximum output power.

The Bluetooth call box has been used during SAR measurement and the EUT was set to DH5 mode at the maximum output power. Its duty factor was calculated as below and the measured SAR for Bluetooth would be scaled to the 100% transmission duty factor to determine compliance.



**Time-domain plot for Bluetooth transmission signal**

The duty factor of Bluetooth signal has been calculated as following.

$$\text{Duty Factor} = \text{Pulse Width} / \text{Total Period} = 2.87 / 3.75 = 76.5 \%$$

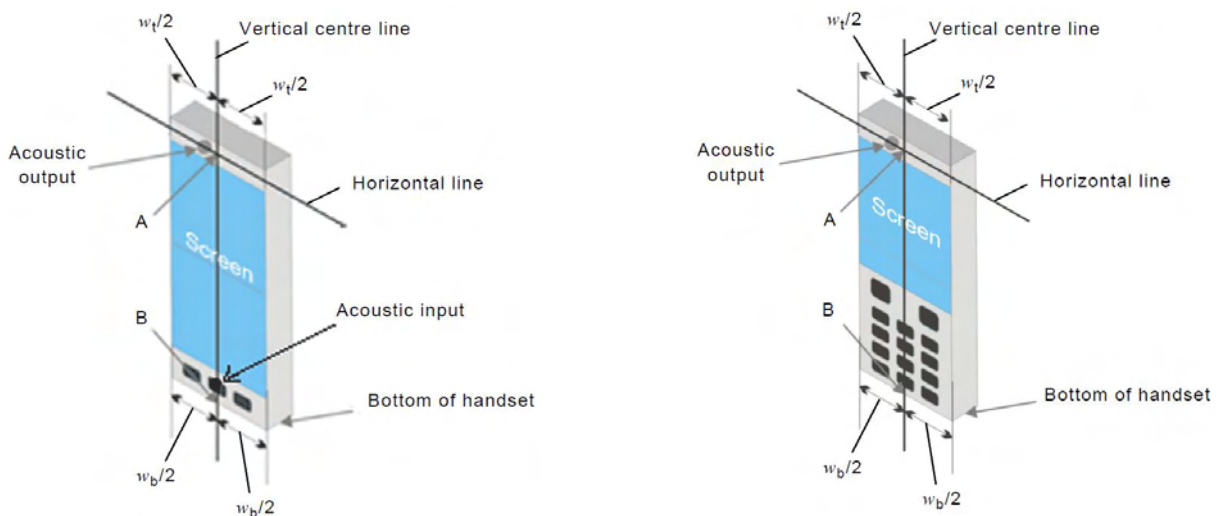
## 4.2 EUT Testing Position

According to KDB 648474 D04, handsets are tested for SAR compliance in head, body-worn accessory and other use configurations described in the following subsections.

### 4.2.1 Head Exposure Conditions

Head exposure is limited to next to the ear voice mode operations. Head SAR compliance is tested according to the test positions defined in IEEE Std 1528-2003 using the SAM phantom illustrated as below.

1. Define two imaginary lines on the handset
  - (a) The vertical centerline passes through two points on the front side of the handset - the midpoint of the width  $w_t$  of the handset at the level of the acoustic output, and the midpoint of the width  $w_b$  of the bottom of the handset.
  - (b) The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output. The horizontal line is also tangential to the face of the handset at point A.
  - (c) The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.



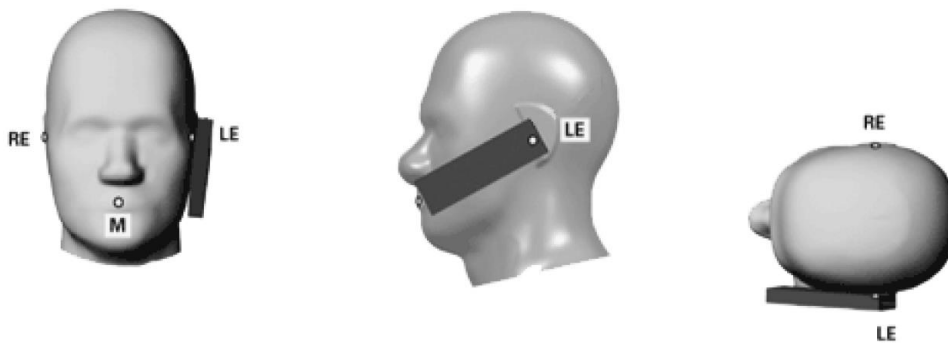
**Fig-4.1 Illustration for Handset Vertical and Horizontal Reference Lines**



## SAR Test Report

### 2. Cheek Position

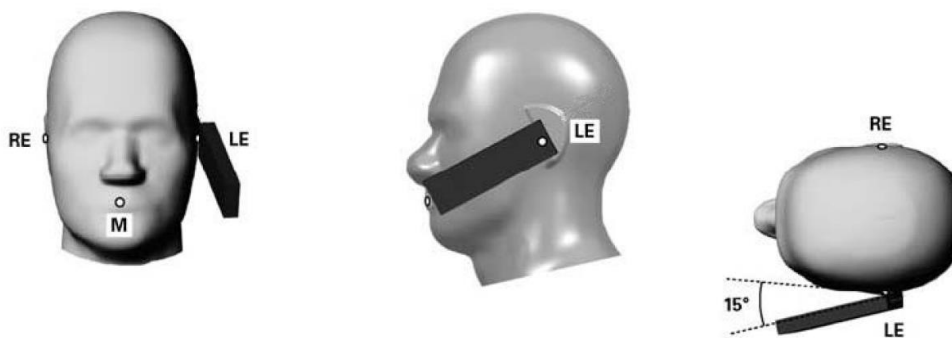
- (a) To position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the three ear and mouth reference point (M: Mouth, RE: Right Ear, and LE: Left Ear) and align the center of the ear piece with the line RE-LE.
- (b) To move the device towards the phantom with the ear piece aligned with the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the phone until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost (see Fig-4.2).



**Fig-4.2 Illustration for Cheek Position**

### 3. Tilted Position

- (a) To position the device in the "cheek" position described above.
- (b) While maintaining the device the reference plane described above and pivoting against the ear, moves it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost (see Fig-4.3).



**Fig-4.3 Illustration for Tilted Position**

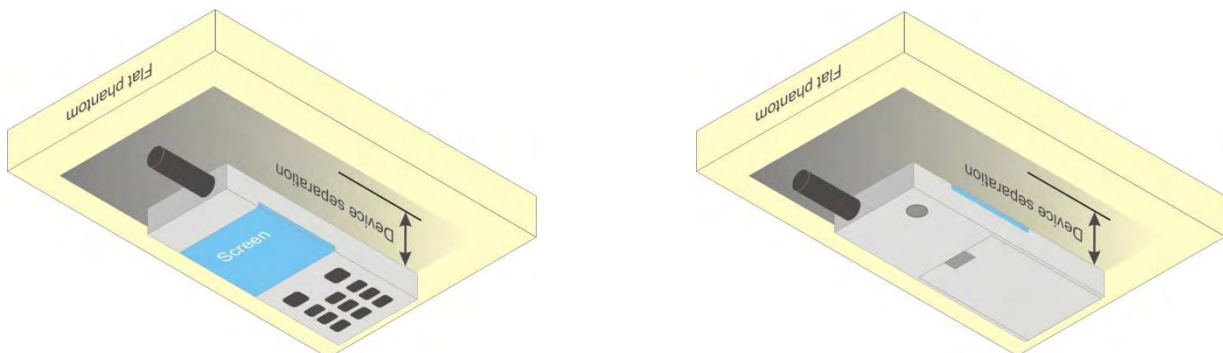
**4.2.2 Body-worn Accessory Exposure Conditions**

Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in KDB 447498 D01 are used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is  $> 1.2 \text{ W/kg}$ , the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

Body-worn accessories that do not contain metallic or conductive components may be tested according to worst-case exposure configurations, typically according to the smallest test separation distance required for the group of body-worn accessories with similar operating and exposure characteristics. All body-worn accessories containing metallic components are tested in conjunction with the host device.

Body-worn accessory SAR compliance is based on a single minimum test separation distance for all wireless and operating modes applicable to each body-worn accessory used by the host, and according to the relevant voice and/or data mode transmissions and operations. If a body-worn accessory supports voice only operations in its normal and expected use conditions, testing of data mode for body-worn compliance is not required.

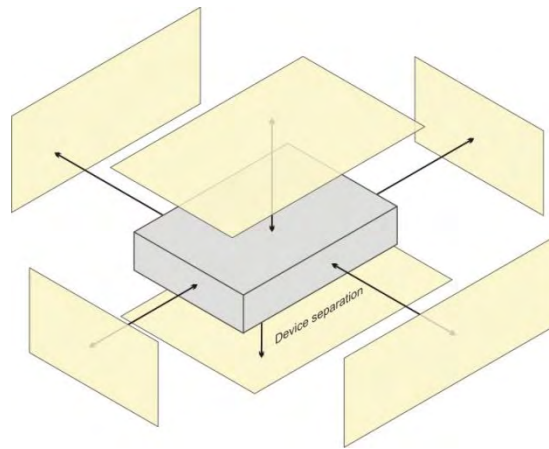
A conservative minimum test separation distance for supporting off-the-shelf body-worn accessories that may be acquired by users of consumer handsets is used to test for body-worn accessory SAR compliance. This distance is determined by the handset manufacturer, according to the requirements of Supplement C 01-01. Devices that are designed to operate on the body of users using lanyards and straps, or without requiring additional body-worn accessories, will be tested using a conservative minimum test separation distance  $\leq 5 \text{ mm}$  to support compliance.



**Fig-4.4 Illustration for Body Worn Position**

**4.2.3 Hotspot Mode Exposure Conditions**

For handsets that support hotspot mode operations, with wireless router capabilities and various web browsing functions, the relevant hand and body exposure conditions are tested according to the hotspot SAR procedures in KDB 941225 D06. A test separation distance of 10 mm is required between the phantom and all surfaces and edges with a transmitting antenna located within 25 mm from that surface or edge. When the form factor of a handset is smaller than 9 cm x 5 cm, a test separation distance of 5 mm (instead of 10 mm) is required for testing hotspot mode. When the separation distance required for body-worn accessory testing is larger than or equal to that tested for hotspot mode, in the same wireless mode and for the same surface of the phone, the hotspot mode SAR data may be used to support body-worn accessory SAR compliance for that particular configuration (surface).



Based on the antenna location shown on appendix D of this report, the SAR testing required for hotspot mode is listed as below.

Antenna	Front Face	Rear Face	Left Side	Right Side	Top Side	Bottom Side
WWAN	V	V	V	V		V
WLAN	V	V	V			V

## 4.3 Tissue Verification

The measuring results for tissue simulating liquid are shown as below.

Frequency (MHz)	Liquid Temp. (°C)	Measured Conductivity ( $\sigma$ )	Measured Permittivity ( $\epsilon_r$ )	Target Conductivity ( $\sigma$ )	Target Permittivity ( $\epsilon_r$ )	Conductivity Deviation (%)	Permittivity Deviation (%)	Test Date
750	23.3	0.9	42.167	0.89	41.9	1.12	0.64	Jan. 08, 2020
835	23.3	0.925	42.485	0.9	41.5	2.78	2.37	Jan. 08, 2020
835	23.3	0.937	43.169	0.9	41.5	4.11	4.02	Jan. 09, 2020
1750	23.3	1.323	41.001	1.37	40.1	-3.43	2.25	Jan. 08, 2020
1750	23.3	1.334	41.29	1.37	40.1	-2.63	2.97	Jan. 09, 2020
1900	23.3	1.454	40.457	1.4	40	3.86	1.14	Jan. 08, 2020
1900	23.3	1.461	40.973	1.4	40	4.36	2.43	Jan. 09, 2020
2450	23.3	1.86	38.7	1.8	39.2	3.33	-1.28	Jan. 09, 2020
2450	23.4	1.859	38.805	1.8	39.2	3.28	-1.01	Jan. 09, 2020
2450	23.2	1.875	38.898	1.8	39.2	4.17	-0.77	Jan. 16, 2020
5250	23.4	4.597	36.617	4.71	35.9	-2.40	2.00	Jan. 09, 2020
5600	23.2	4.966	35.967	5.07	35.5	-2.05	1.32	Jan. 16, 2020
5750	23.2	5.305	34.339	5.22	35.4	1.63	-3.00	Jan. 16, 2020

**Note:**

The dielectric properties of the tissue simulating liquid have been measured within 24 hours before the SAR testing and within  $\pm 10\%$  of the target values. Liquid temperature during the SAR testing has kept within  $\pm 2^\circ\text{C}$ .

## 4.4 System Validation

The SAR measurement system was validated according to procedures in KDB 865664 D01. The validation status in tabulated summary is as below.

Test Date	Probe S/N	Calibration Point	Measured Conductivity ( $\sigma$ )	Measured Permittivity ( $\epsilon_r$ )	Validation for CW			Validation for Modulation		
					Sensitivity Range	Probe Linearity	Probe Isotropy	Modulation Type	Duty Factor	PAR
Jan. 08, 2020	3971	750	0.9	42.167	Pass	Pass	Pass	N/A	N/A	N/A
Jan. 08, 2020	3971	835	0.925	42.485	Pass	Pass	Pass	N/A	N/A	N/A
Jan. 09, 2020	3971	835	0.937	43.169	Pass	Pass	Pass	N/A	N/A	N/A
Jan. 08, 2020	3971	1750	1.323	41.001	Pass	Pass	Pass	N/A	N/A	N/A
Jan. 09, 2020	3971	1750	1.334	41.29	Pass	Pass	Pass	N/A	N/A	N/A
Jan. 08, 2020	3971	1900	1.454	40.457	Pass	Pass	Pass	N/A	N/A	N/A
Jan. 09, 2020	3971	1900	1.461	40.973	Pass	Pass	Pass	N/A	N/A	N/A
Jan. 09, 2020	3971	2450	1.86	38.7	Pass	Pass	Pass	OFDM	N/A	Pass
Jan. 09, 2020	3650	2450	1.859	38.805	Pass	Pass	Pass	OFDM	N/A	Pass
Jan. 16, 2020	3820	2450	1.875	38.898	Pass	Pass	Pass	OFDM	N/A	Pass
Jan. 09, 2020	3650	5250	4.597	36.617	Pass	Pass	Pass	OFDM	N/A	Pass
Jan. 16, 2020	3820	5600	4.966	35.967	Pass	Pass	Pass	OFDM	N/A	Pass
Jan. 16, 2020	3820	5750	5.305	34.339	Pass	Pass	Pass	OFDM	N/A	Pass

# SAR Test Report

## 4.5 System Verification

The measuring result for system verification is tabulated as below.

Test Date	Frequency (MHz)	1W Target SAR-1g (W/kg)	Measured SAR-1g (W/kg)	Normalized to 1W SAR-1g (W/kg)	Deviation (%)	Dipole S/N	Probe S/N	DAE S/N
Jan. 08, 2020	750	8.56	0.397	7.94	-7.24	1013	3971	579
Jan. 08, 2020	835	9.61	0.473	9.46	-1.56	4d121	3971	579
Jan. 09, 2020	835	9.61	0.433	8.66	-9.89	4d121	3971	579
Jan. 08, 2020	1750	37.00	1.69	33.80	-8.65	1055	3971	579
Jan. 09, 2020	1750	37.00	1.7	34.00	-8.11	1055	3971	579
Jan. 08, 2020	1900	40.20	1.85	37.00	-7.96	5d036	3971	579
Jan. 09, 2020	1900	40.20	1.86	37.20	-7.46	5d036	3971	579
Jan. 09, 2020	2450	52.70	2.6	52.00	-1.33	737	3971	579
Jan. 09, 2020	2450	52.70	2.62	52.40	-0.57	737	3650	861
Jan. 16, 2020	2450	52.70	2.61	52.20	-0.95	737	3820	916
Jan. 09, 2020	5250	80.70	4.21	84.20	4.34	1019	3650	861
Jan. 16, 2020	5600	85.80	4.36	87.20	1.63	1019	3820	916
Jan. 16, 2020	5750	81.50	3.89	77.80	-4.54	1019	3820	916

**Note:**

Comparing to the reference SAR value provided by SPEAG in dipole calibration certificate, the deviation of system check results is within its specification of 10 %. The result indicates the system check can meet the variation criterion and the plots please refer to Appendix A of this report.

# SAR Test Report

## 4.6 Maximum Output Power

### 4.6.1 Maximum Target Conducted Power

The maximum conducted average power (Unit: dBm) including tune-up tolerance is shown as below.

Mode	WCDMA Band II (Head/Body-worn Mode)	WCDMA Band II (Hotspot Mode)
RMC 12.2K	24.9	23.4
HSDPA / HSUPA	23.9	22.4

Mode	WCDMA Band V
RMC 12.2K	24.9
HSDPA / HSUPA	23.9

Mode	LTE 2 (Head/Body-worn Mode)	LTE 2 (Hotspot Mode)
Maximum Target Power	24.9	23.4

Mode	LTE 4 (Head/Body-worn Mode)	LTE 4 (Hotspot Mode)
Maximum Target Power	24.9	23.4

Mode	LTE 5	LTE 12	LTE 13
Maximum Target Power	25.4	24.9	24.9

#### <WLAN 2.4G>

Mode	Channel	Frequency (MHz)	Tune up Power
802.11b	1	2412	19.2
	6	2437	19.2
	11	2462	19.2
802.11g	1	2412	14.2
	6	2437	17.2
	11	2462	14.2
802.11n (HT20)	1	2412	14.2
	6	2437	17.2
	11	2462	14.2

#### <WLAN 5.2G>

Mode	Channel	Frequency (MHz)	Tune up Power
802.11a	36	5180	14.2
	40	5200	15.7
	44	5220	15.7
	48	5240	15.7
802.11n (HT20)	36	5180	14.2
	40	5200	15.2
	44	5220	15.2
	48	5240	15.2
802.11n (HT40)	38	5190	11.2
	46	5230	15.2

# SAR Test Report

## <WLAN 5.3G>

Mode	Channel	Frequency (MHz)	Tune up Power
802.11a	52	5260	15.7
	56	5280	15.7
	60	5300	15.7
	64	5320	14.2
802.11n (HT20)	52	5260	15.2
	56	5280	15.2
	60	5300	15.2
	64	5320	14.2
802.11n (HT40)	54	5270	15.2
	62	5310	10.0

## <WLAN 5.6G>

Mode	Channel	Frequency (MHz)	Tune up Power
802.11a	100	5500	13.2
	116	5580	15.7
	120	5600	15.7
	124	5620	15.7
	132	5660	15.7
	140	5700	13.2
802.11n (HT20)	100	5500	13.2
	116	5580	15.2
	120	5600	15.2
	124	5620	15.2
	132	5660	15.2
	140	5700	13.2
802.11n (HT40)	102	5510	10.2
	110	5550	15.2
	118	5590	15.2
	126	5630	15.2
	134	5670	15.2

## <WLAN 5.8G>

Mode	Channel	Frequency (MHz)	Tune up Power
802.11a	149	5745	13.2
	153	5765	15.7
	157	5785	15.7
	161	5805	15.7
	165	5825	15.7
802.11n (HT20)	149	5745	13.2
	153	5765	15.2
	157	5785	15.2
	161	5805	15.2
	165	5825	15.2
802.11n (HT40)	151	5755	13.2
	159	5795	13.2

# SAR Test Report

## <Bluetooth>

Mode	Channel	Frequency (MHz)	Tune up Power
Bluetooth BDR	0	2402	10.4
	39	2441	10.4
	78	2480	9.7
Bluetooth LE	0	2402	5.5
	19	2440	5.5
	39	2480	5.5

### 4.6.2 Measured Conducted Power Result

The measuring conducted average power (Unit: dBm) is shown as below.

Band Channel Frequency (MHz)	WCDMA Band II			WCDMA Band V			3GPP MPR (dB)
	9262 1852.4	9400 1880.0	9538 1907.6	4132 826.4	4182 836.4	4233 846.6	
<b>EUT Head/Body-worn Mode</b>							
RMC 12.2K	<b>23.89</b>	23.66	23.60	23.74	23.88	<b>23.90</b>	-
HSDPA Subtest-1	23.00	22.77	22.71	23.74	23.88	<b>23.90</b>	0
HSDPA Subtest-2	22.99	22.77	22.61	22.73	22.87	22.90	0
HSDPA Subtest-3	22.50	22.27	22.50	22.63	22.77	22.80	0.5
HSDPA Subtest-4	22.44	22.27	22.20	22.23	22.37	22.40	0.5
HSUPA Subtest-1	23.02	22.79	22.73	22.73	22.87	22.90	0
HSUPA Subtest-2	21.02	20.79	20.73	20.55	20.69	20.72	2
HSUPA Subtest-3	21.92	21.69	21.63	21.53	21.67	21.70	1
HSUPA Subtest-4	20.83	20.60	20.54	20.41	20.55	20.58	2
HSUPA Subtest-5	23.12	22.89	22.83	22.76	22.90	22.93	0
<b>EUT Hotspot Mode</b>							
RMC 12.2K	<b>22.51</b>	22.28	22.27	-	-	-	-
HSDPA Subtest-1	21.22	20.99	20.98	-	-	-	-
HSDPA Subtest-2	21.22	20.99	20.98	-	-	-	-
HSDPA Subtest-3	20.72	20.49	20.48	-	-	-	-
HSDPA Subtest-4	20.72	20.49	20.48	-	-	-	-
HSUPA Subtest-1	21.35	21.12	21.11	-	-	-	-
HSUPA Subtest-2	19.35	19.12	19.11	-	-	-	-
HSUPA Subtest-3	20.35	20.12	20.11	-	-	-	-
HSUPA Subtest-4	19.35	19.12	19.11	-	-	-	-
HSUPA Subtest-5	21.55	21.32	21.31	-	-	-	-



LTE Band 2																	
EUT Head/Body-worn Mode																	
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)		
				Channel	18700	18900						19100	Channel	18675		18900	19125
				Frequency (MHz)	1860.0	1880.0						1900.0	Frequency (MHz)	1857.5		1880.0	1902.5
20M	QPSK	1	0	23.70	23.93	23.82	0	15M	QPSK	1	0	23.66	23.89	23.78	0		
		1	50	23.65	23.88	23.77	0			1	37	23.61	23.84	23.73	0		
		1	99	23.47	23.70	23.59	0			1	74	23.43	23.66	23.55	0		
		50	0	22.73	22.96	22.85	1			36	0	22.69	22.92	22.81	1		
		50	25	22.68	22.91	22.80	1			36	19	22.64	22.87	22.76	1		
		50	50	22.63	22.86	22.75	1			36	39	22.59	22.82	22.71	1		
	16QAM	100	0	22.79	23.02	22.91	1		75	0	22.75	22.98	22.87	1			
		1	0	22.45	22.68	22.57	1		1	0	22.41	22.64	22.53	1			
		1	50	22.32	22.55	22.44	1		1	37	22.28	22.51	22.40	1			
		1	99	22.11	22.03	21.92	1		1	74	22.09	21.99	22.04	1			
		50	0	22.14	22.37	22.26	2		36	0	22.10	22.33	22.22	2			
		50	25	21.93	22.16	22.05	2		36	19	21.89	22.12	22.01	2			
		50	50	21.77	22.00	21.89	2		36	39	21.73	21.96	21.85	2			
		100	0	21.67	21.90	21.79	2		75	0	21.63	21.86	21.75	2			

EUT Hotspot Mode																	
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)		
				Channel	18700	18900						19100	Channel	18675		18900	19125
				Frequency (MHz)	1860.0	1880.0						1900.0	Frequency (MHz)	1857.5		1880.0	1902.5
20M	QPSK	1	0	22.57	22.60	22.50	0	15M	QPSK	1	0	22.55	22.58	22.48	0		
		1	50	22.50	22.53	22.43	0			1	37	22.48	22.51	22.41	0		
		1	99	22.46	22.49	22.39	0			1	74	22.44	22.47	22.37	0		
		50	0	21.58	21.61	21.51	1			36	0	21.56	21.59	21.49	1		
		50	25	21.54	21.57	21.47	1			36	19	21.52	21.55	21.45	1		
		50	50	21.45	21.48	21.38	1			36	39	21.43	21.46	21.36	1		
	16QAM	100	0	21.47	21.50	21.40	1		75	0	21.45	21.48	21.38	1			
		1	0	21.25	21.28	21.18	1		1	0	21.23	21.26	21.16	1			
		1	50	21.18	21.21	21.11	1		1	37	21.16	21.19	21.09	1			
		1	99	21.08	21.11	21.01	1		1	74	21.06	21.09	20.99	1			
		50	0	20.61	20.64	20.54	2		36	0	20.59	20.62	20.52	2			
		50	25	20.53	20.56	20.46	2		36	19	20.51	20.54	20.44	2			
		50	50	20.42	20.45	20.35	2		36	39	20.40	20.43	20.33	2			
		100	0	20.57	20.60	20.50	2		75	0	20.55	20.58	20.48	2			

EUT Head/Body-worn Mode																	
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)		
				Channel	18650	18900						19150	Channel	18625		18900	19175
				Frequency (MHz)	1855.0	1880.0						1905.0	Frequency (MHz)	1852.5		1880.0	1907.5
10M	QPSK	1	0	23.64	23.87	23.76	0	5M	QPSK	1	0	23.61	23.84	23.73	0		
		1	24	23.59	23.82	23.71	0			1	12	23.56	23.79	23.68	0		
		1	49	23.41	23.64	23.53	0			1	24	23.38	23.61	23.50	0		
		25	0	22.67	22.90	22.79	1			12	0	22.64	22.87	22.76	1		
		25	12	22.62	22.85	22.74	1			12	6	22.59	22.82	22.71	1		
		25	25	22.57	22.80	22.69	1			12	13	22.54	22.77	22.66	1		
	16QAM	50	0	22.73	22.96	22.85	1		25	0	22.70	22.93	22.82	1			
		1	0	22.39	22.62	22.51	1		1	0	22.36	22.59	22.48	1			
		1	24	22.26	22.49	22.38	1		1	12	22.23	22.46	22.35	1			
		1	49	22.04	21.97	22.01	1		1	24	22.09	21.94	22.11	1			
		25	0	22.08	22.31	22.20	2		12	0	22.05	22.28	22.17	2			
		25	12	21.87	22.10	21.99	2		12	6	21.84	22.07	21.96	2			
		25	25	21.71	21.94	21.83	2		12	13	21.68	21.91	21.80	2			
		50	0	21.61	21.84	21.73	2		25	0	21.58	21.81	21.70	2			

EUT Hotspot Mode																	
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)		
				Channel	18650	18900						19150	Channel	18625		18900	19175
				Frequency (MHz)	1855.0	1880.0						1905.0	Frequency (MHz)	1852.5		1880.0	1907.5
10M	QPSK	1	0	22.51	22.54	22.44	0	5M	QPSK	1	0	22.48	22.51	22.41	0		
		1	24	22.44	22.47	22.37	0			1	12	22.41	22.44	22.34	0		
		1	49	22.40	22.43	22.33	0			1	24	22.37	22.40	22.30	0		
		25	0	21.52	21.55	21.45	1			12	0	21.49	21.52	21.42	1		
		25	12	21.48	21.51	21.41	1			12	6	21.45	21.48	21.38	1		
		25	25	21.39	21.42	21.32	1			12	13	21.36	21.39	21.29	1		
	16QAM	50	0	21.41	21.44	21.34	1		25	0	21.38	21.41	21.31	1			
		1	0	21.19	21.22	21.12	1		1	0	21.16	21.19	21.09	1			
		1	24	21.12	21.15	21.05	1		1	12	21.09	21.12	21.02	1			
		1	49	21.02	21.05	20.95	1		1	24	20.99	21.02	20.92	1			
		25	0	20.55	20.58	20.48	2		12	0	20.52	20.55	20.45	2			
		25	12	20.47	20.50	20.40	2		12	6	20.44	20.47	20.37	2			
		25	25	20.36	20.39	20.29	2		12	13	20.33	20.36	20.26	2			
		50	0	20.51	20.54	20.44	2		25	0	20.48	20.51	20.41	2			

# SAR Test Report

LTE Band 2															
EUT Head/Body-worn Mode															
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		18615	18900	19185				Channel		18607	18900	19193	
		Frequency (MHz)		1851.5	1880.0	1908.5				Frequency (MHz)		1850.7	1880.0	1909.3	
3M	QPSK	1	0	23.58	23.81	23.70	0	1.4M	QPSK	1	0	23.54	23.77	23.66	0
		1	7	23.53	23.76	23.65	0			1	2	23.49	23.72	23.61	0
		1	14	23.35	23.58	23.47	0			1	5	23.31	23.54	23.43	0
		8	0	22.61	22.84	22.73	1			3	0	23.51	23.74	23.63	0
		8	3	22.56	22.79	22.68	1			3	1	23.46	23.69	23.58	0
		8	7	22.51	22.74	22.63	1			3	3	23.28	23.51	23.40	0
	16QAM	15	0	22.67	22.90	22.79	1		6	0	22.63	22.86	22.75	1	
		1	0	22.33	22.56	22.45	1		16QAM	1	0	22.49	22.72	22.61	1
		1	7	22.20	22.43	22.32	1			1	2	22.44	22.67	22.56	1
		1	14	22.01	21.91	22.02	1			1	5	22.26	22.49	22.38	1
		8	0	22.02	22.25	22.14	2			3	0	22.46	22.69	22.58	1
		8	3	21.81	22.04	21.93	2			3	1	22.41	22.64	22.53	1
		8	7	21.65	21.88	21.77	2			3	3	22.23	22.46	22.35	1
		15	0	21.55	21.78	21.67	2			6	0	21.58	21.81	21.70	2

EUT Hotspot Mode															
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		18615	18900	19185				Channel		18607	18900	19193	
		Frequency (MHz)		1851.5	1880.0	1908.5				Frequency (MHz)		1850.7	1880.0	1909.3	
3M	QPSK	1	0	22.47	22.50	22.40	0	1.4M	QPSK	1	0	22.43	22.46	22.36	0
		1	7	22.40	22.43	22.33	0			1	2	22.36	22.39	22.29	0
		1	14	22.36	22.39	22.29	0			1	5	22.32	22.35	22.25	0
		8	0	21.48	21.51	21.41	1			3	0	22.40	22.43	22.33	0
		8	3	21.44	21.47	21.37	1			3	1	22.33	22.36	22.26	0
		8	7	21.35	21.38	21.28	1			3	3	22.29	22.32	22.22	0
	16QAM	15	0	21.37	21.40	21.30	1		6	0	21.33	21.36	21.26	1	
		1	0	21.15	21.18	21.08	1		16QAM	1	0	21.38	21.41	21.31	1
		1	7	21.08	21.11	21.01	1			1	2	21.31	21.34	21.24	1
		1	14	20.98	21.01	20.91	1			1	5	21.27	21.30	21.20	1
		8	0	20.51	20.54	20.44	2			3	0	21.35	21.38	21.28	1
		8	3	20.43	20.46	20.36	2			3	1	21.28	21.31	21.21	1
		8	7	20.32	20.35	20.25	2			3	3	21.24	21.27	21.17	1
		15	0	20.47	20.50	20.40	2			6	0	20.28	20.31	20.21	2

# SAR Test Report

LTE Band 4																	
EUT Head/Body-worn Mode																	
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)		
				Channel	20050	20175						20300	Channel	20025		20175	20325
				Frequency (MHz)	1720.0	1732.5						1745.0	Frequency (MHz)	1717.5		1732.5	1747.5
20M	QPSK	1	0	23.77	23.98	23.90	0	15M	QPSK	1	0	23.74	23.95	23.87	0		
		1	50	23.62	23.83	23.75	0			1	37	23.59	23.80	23.72	0		
		1	99	23.60	23.81	23.73	0			1	74	23.57	23.78	23.70	0		
		50	0	22.62	22.83	22.75	1			36	0	22.59	22.80	22.72	1		
		50	25	22.55	22.76	22.68	1			36	19	22.52	22.73	22.65	1		
		50	50	22.47	22.68	22.60	1			36	39	22.44	22.65	22.57	1		
		100	0	22.46	22.67	22.59	1			75	0	22.43	22.64	22.56	1		
	16QAM	1	0	22.90	23.11	23.03	1		16QAM	1	0	22.87	23.08	23.00	1		
		1	50	22.74	22.95	22.87	1			1	37	22.71	22.92	22.84	1		
		1	99	22.91	22.12	22.04	1			1	74	22.03	22.09	22.01	1		
		50	0	21.65	21.86	21.78	2			36	0	21.62	21.83	21.75	2		
		50	25	21.57	21.78	21.70	2			36	19	21.54	21.75	21.67	2		
		50	50	21.41	21.62	21.54	2			36	39	21.38	21.59	21.51	2		
		100	0	21.57	21.78	21.70	2			75	0	21.54	21.75	21.67	2		
EUT Hotspot Mode																	
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)		
				Channel	20050	20175						20300	Channel	20025		20175	20325
				Frequency (MHz)	1720.0	1732.5						1745.0	Frequency (MHz)	1717.5		1732.5	1747.5
20M	QPSK	1	0	22.70	22.93	22.66	0	15M	QPSK	1	0	22.67	22.90	22.63	0		
		1	50	22.23	22.46	22.19	0			1	37	22.20	22.43	22.16	0		
		1	99	22.11	22.34	22.07	0			1	74	22.08	22.31	22.04	0		
		50	0	21.11	21.34	21.07	1			36	0	21.08	21.31	21.04	1		
		50	25	21.09	21.32	21.05	1			36	19	21.06	21.29	21.02	1		
		50	50	21.02	21.25	20.98	1			36	39	20.99	21.22	20.95	1		
		100	0	20.95	21.18	20.91	1			75	0	20.92	21.15	20.88	1		
	16QAM	1	0	20.88	21.11	20.84	1		16QAM	1	0	20.85	21.08	20.81	1		
		1	50	20.87	21.10	20.83	1			1	37	20.84	21.07	20.80	1		
		1	99	20.79	21.02	20.75	1			1	74	20.76	20.99	20.72	1		
		50	0	20.17	20.40	20.13	2			36	0	20.14	20.37	20.10	2		
		50	25	20.16	20.39	20.12	2			36	19	20.13	20.36	20.09	2		
		50	50	20.04	20.27	20.00	2			36	39	20.01	20.24	19.97	2		
		100	0	19.96	20.19	19.92	2			75	0	19.93	20.16	19.89	2		
EUT Head/Body-worn Mode																	
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)		
				Channel	20000	20175						20350	Channel	19975		20175	20375
				Frequency (MHz)	1715.0	1732.5						1750.0	Frequency (MHz)	1712.5		1732.5	1752.5
10M	QPSK	1	0	23.71	23.92	23.84	0	5M	QPSK	1	0	23.69	23.90	23.82	0		
		1	24	23.56	23.77	23.69	0			1	12	23.54	23.75	23.67	0		
		1	49	23.54	23.75	23.67	0			1	24	23.52	23.73	23.65	0		
		25	0	22.56	22.77	22.69	1			12	0	22.54	22.75	22.67	1		
		25	12	22.49	22.70	22.62	1			12	6	22.47	22.68	22.60	1		
		25	25	22.41	22.62	22.54	1			12	13	22.39	22.60	22.52	1		
		50	0	22.40	22.61	22.53	1			25	0	22.38	22.59	22.51	1		
	16QAM	1	0	22.84	23.05	22.97	1		16QAM	1	0	22.82	23.03	22.95	1		
		1	24	22.68	22.89	22.81	1			1	12	22.66	22.87	22.79	1		
		1	49	22.03	22.06	21.98	1			1	24	22.02	22.04	21.96	1		
		25	0	21.59	21.80	21.72	2			12	0	21.57	21.78	21.70	2		
		25	12	21.51	21.72	21.64	2			12	6	21.49	21.70	21.62	2		
		25	25	21.35	21.56	21.48	2			12	13	21.33	21.54	21.46	2		
		50	0	21.51	21.72	21.64	2			25	0	21.49	21.70	21.62	2		
EUT Hotspot Mode																	
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)		
				Channel	20000	20175						20350	Channel	19975		20175	20375
				Frequency (MHz)	1715.0	1732.5						1750.0	Frequency (MHz)	1712.5		1732.5	1752.5
10M	QPSK	1	0	22.65	22.88	22.61	0	5M	QPSK	1	0	22.65	22.88	22.61	0		
		1	24	22.18	22.41	22.14	0			1	12	22.18	22.41	22.14	0		
		1	49	22.06	22.29	22.02	0			1	24	22.06	22.29	22.02	0		
		25	0	21.06	21.29	21.02	1			12	0	21.06	21.29	21.02	1		
		25	12	21.04	21.27	21.00	1			12	6	21.04	21.27	21.00	1		
		25	25	20.97	21.20	20.93	1			12	13	20.97	21.20	20.93	1		
		50	0	20.90	21.13	20.86	1			25	0	20.90	21.13	20.86	1		
	16QAM	1	0	20.83	21.06	20.79	1		16QAM	1	0	20.83	21.06	20.79	1		
		1	24	20.82	21.05	20.78	1			1	12	20.82	21.05	20.78	1		
		1	49	20.74	20.97	20.70	1			1	24	20.74	20.97	20.70	1		
		25	0	20.12	20.35	20.08	2			12	0	20.12	20.35	20.08	2		
		25	12	20.11	20.34	20.07	2			12	6	20.11	20.34	20.07	2		
		25	25	19.99	20.22	19.95	2			12	13	19.99	20.22	19.95	2		
		50	0	19.91	20.14	19.87	2			25	0	19.91	20.14	19.87	2		

# SAR Test Report

LTE Band 4															
EUT Head/Body-worn Mode															
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		19965	20175	20385				Channel		19957	20175	20393	
		Frequency (MHz)		1711.5	1732.5	1753.5				Frequency (MHz)		1710.7	1732.5	1754.3	
3M	QPSK	1	0	23.65	23.86	23.78	0	1.4M	QPSK	1	0	23.59	23.80	23.72	0
		1	7	23.50	23.71	23.63	0			1	2	23.44	23.65	23.57	0
		1	14	23.48	23.69	23.61	0			1	5	23.42	23.63	23.55	0
		8	0	22.50	22.71	22.63	1			3	0	23.57	23.78	23.70	0
		8	3	22.43	22.64	22.56	1			3	1	23.42	23.63	23.55	0
		8	7	22.35	22.56	22.48	1			3	3	23.40	23.61	23.53	0
	16QAM	15	0	22.34	22.55	22.47	1		6	0	22.28	22.49	22.41	1	
		1	0	22.78	22.99	22.91	1		16QAM	1	0	22.58	22.79	22.71	1
		1	7	22.62	22.83	22.75	1			1	2	22.43	22.64	22.56	1
		1	14	22.01	22.00	21.92	1			1	5	22.41	22.62	22.54	1
		8	0	21.53	21.74	21.66	2			3	0	22.56	22.77	22.69	1
		8	3	21.45	21.66	21.58	2			3	1	22.41	22.62	22.54	1
		8	7	21.29	21.50	21.42	2			3	3	22.39	22.60	22.52	1
		15	0	21.45	21.66	21.58	2			6	0	21.27	21.48	21.40	2

EUT Hotspot Mode															
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		19965	20175	20385				Channel		19957	20175	20393	
		Frequency (MHz)		1711.5	1732.5	1753.5				Frequency (MHz)		1710.7	1732.5	1754.3	
3M	QPSK	1	0	22.60	22.83	22.56	0	1.4M	QPSK	1	0	22.56	22.79	22.52	0
		1	7	22.13	22.36	22.09	0			1	2	22.09	22.32	22.05	0
		1	14	22.01	22.24	21.97	0			1	5	21.97	22.20	21.93	0
		8	0	21.01	21.24	20.97	1			3	0	22.51	22.74	22.47	0
		8	3	20.99	21.22	20.95	1			3	1	22.04	22.27	22.00	0
		8	7	20.92	21.15	20.88	1			3	3	21.92	22.15	21.88	0
	16QAM	15	0	20.85	21.08	20.81	1		6	0	20.81	21.04	20.77	1	
		1	0	20.78	21.01	20.74	1		16QAM	1	0	21.52	21.75	21.48	1
		1	7	20.77	21.00	20.73	1			1	2	21.05	21.28	21.01	1
		1	14	20.69	20.92	20.65	1			1	5	20.93	21.16	20.89	1
		8	0	20.07	20.30	20.03	2			3	0	21.47	21.70	21.43	1
		8	3	20.06	20.29	20.02	2			3	1	21.00	21.23	20.96	1
		8	7	19.94	20.17	19.90	2			3	3	20.88	21.11	20.84	1
		15	0	19.86	20.09	19.82	2			6	0	19.77	20.00	19.73	2

LTE Band 5															
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20450	20525	20600				Channel		20425	20525	20625	
		Frequency (MHz)		829.0	836.5	844.0				Frequency (MHz)		826.5	836.5	846.5	
10M	QPSK	1	0	24.30	24.51	24.42	0	5M	QPSK	1	0	24.27	24.48	24.39	0
		1	24	24.23	24.44	24.35	0			1	12	24.20	24.41	24.32	0
		1	49	24.29	24.50	24.41	0			1	24	24.26	24.47	24.38	0
		25	0	23.20	23.41	23.32	1			12	0	24.17	24.38	24.29	1
		25	12	23.07	23.28	23.19	1			12	6	23.04	23.25	23.16	1
		25	25	23.00	23.21	23.12	1			12	13	22.97	23.18	23.09	1
	16QAM	50	0	22.99	23.20	23.11	1		25	0	22.96	23.17	23.08	1	
		1	0	23.33	23.54	23.45	1		16QAM	1	0	23.30	23.51	23.42	1
		1	24	23.25	23.46	23.37	1			1	12	23.22	23.43	23.34	1
		1	49	22.90	23.11	23.02	1			1	24	22.87	23.08	22.99	1
		25	0	22.37	22.58	22.49	2			12	0	22.34	22.55	22.46	2
		25	12	22.02	22.23	22.14	2			12	6	21.99	22.20	22.11	2
		25	25	21.92	22.13	22.04	2			12	13	21.89	22.10	22.01	2
		50	0	22.18	22.39	22.30	2			25	0	22.15	22.36	22.27	2

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20415	20525	20635				Channel		20407	20525	20643	
		Frequency (MHz)		825.5	836.5	847.5				Frequency (MHz)		824.7	836.5	848.3	
3M	QPSK	1	0	24.23	24.44	24.35	0	1.4M	QPSK	1	0	24.21	24.42	24.33	0
		1	7	24.16	24.37	24.28	0			1	2	24.14	24.35	24.26	0
		1	14	24.22	24.43	24.34	0			1	5	24.20	24.41	24.32	0
		8	0	24.13	24.34	24.25	1			3	0	24.19	24.40	24.31	0
		8	3	23.00	23.21	23.12	1			3	1	24.12	24.33	24.24	0
		8	7	22.93	23.14	23.05	1			3	3	24.18	24.39	24.30	0
	16QAM	15	0	22.92	23.13	23.04	1		6	0	22.90	23.11	23.02	1	
		1	0	23.26	23.47	23.38	1		16QAM	1	0	23.17	23.38	23.29	1
		1	7	23.18	23.39	23.30	1			1	2	23.10	23.31	23.22	1
		1	14	22.83	23.04	22.95	1			1	5	23.16	23.37	23.28	1
		8	0	22.30	22.51	22.42	2			3	0	23.15	23.36	23.27	1
		8	3	21.95	22.16	22.07	2			3	1	23.08	23.29	23.20	1
		8	7	21.85	22.06	21.97	2			3	3	23.14	23.35	23.26	1
		15	0	22.11	22.32	22.23	2			6	0	21.86	22.07	21.98	2

# SAR Test Report

LTE Band 12															
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		23060	23095	23130				Channel		23035	23095	23155	
		Frequency (MHz)		704.0	707.5	711.0				Frequency (MHz)		701.5	707.5	713.5	
10M	QPSK	1	0	24.11	<b>24.25</b>	24.17	0	5M	QPSK	1	0	24.07	24.21	24.13	0
		1	24	24.03	24.17	24.09	0			1	12	23.99	24.13	24.05	0
		1	49	23.96	24.10	24.02	0			1	24	23.92	24.06	23.98	0
		25	0	22.95	23.09	23.01	1			12	0	22.91	23.05	22.97	1
		25	12	22.89	23.03	22.95	1			12	6	22.85	22.99	22.91	1
		25	25	22.79	22.93	22.85	1			12	13	22.75	22.89	22.81	1
	50	0	22.78	22.92	22.84	1	25		0	22.74	22.88	22.80	1		
	16QAM	1	0	22.71	22.85	22.77	1		16QAM	1	0	22.67	22.81	22.73	1
		1	24	22.67	22.81	22.73	1			1	12	22.63	22.77	22.69	1
		1	49	22.36	22.50	22.42	1			1	24	22.32	22.46	22.38	1
		25	0	22.10	22.24	22.16	2			12	0	22.06	22.20	22.12	2
		25	12	21.99	22.13	22.05	2			12	6	21.95	22.09	22.01	2
		25	25	21.86	22.00	21.92	2			12	13	21.82	21.96	21.88	2
		50	0	21.81	21.95	21.87	2			25	0	21.77	21.91	21.83	2

LTE Band 13															
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		23025	23095	23165				Channel		23017	23095	23173	
		Frequency (MHz)		700.5	707.5	714.5				Frequency (MHz)		699.7	707.5	715.3	
3M	QPSK	1	0	24.05	24.19	24.11	0	1.4M	QPSK	1	0	24.00	24.14	24.06	0
		1	7	23.97	24.11	24.03	0			1	2	23.92	24.06	23.98	0
		1	14	23.90	24.04	23.96	0			1	5	23.85	23.99	23.91	0
		8	0	22.89	23.03	22.95	1			3	0	23.97	24.11	24.03	0
		8	3	22.83	22.97	22.89	1			3	1	23.89	24.03	23.95	0
		8	7	22.73	22.87	22.79	1			3	3	23.82	23.96	23.88	0
	15	0	22.72	22.86	22.78	1	6		0	22.67	22.81	22.73	1		
	16QAM	1	0	22.65	22.79	22.71	1		16QAM	1	0	22.98	23.12	23.04	1
		1	7	22.61	22.75	22.67	1			1	2	22.90	23.04	22.96	1
		1	14	22.30	22.44	22.36	1			1	5	22.83	22.97	22.89	1
		8	0	22.04	22.18	22.10	2			3	0	22.95	23.09	23.01	1
		8	3	21.93	22.07	21.99	2			3	1	22.87	23.01	22.93	1
		8	7	21.80	21.94	21.86	2			3	3	22.80	22.94	22.86	1
		15	0	21.75	21.89	21.81	2			6	0	21.65	21.79	21.71	2

# SAR Test Report

## <WLAN 2.4G>

Mode	Channel	Frequency (MHz)	Average Power
802.11b	1	2412	18.90
	6	2437	18.92
	11	2462	18.80

## <WLAN 5.3G>

Mode	Channel	Frequency (MHz)	Average Power
802.11a	52	5260	15.58
	56	5280	15.50
	60	5300	15.62
	64	5320	14.07

## <WLAN 5.6G>

Mode	Channel	Frequency (MHz)	Average Power
802.11a	100	5500	12.99
	116	5580	15.62
	120	5600	15.54
	124	5620	15.50
	132	5660	15.51
	140	5700	13.14

## <WLAN 5.8G>

Mode	Channel	Frequency (MHz)	Average Power
802.11a	149	5745	13.12
	153	5765	15.46
	157	5785	15.58
	161	5805	15.60
	165	5825	15.65

## <Bluetooth>

Mode	Channel	Frequency (MHz)	Average Power
Bluetooth BDR	0	2402	9.92
	39	2441	9.61
	78	2480	9.08
Bluetooth LE	0	2402	4.79
	19	2440	4.49
	39	2480	3.95

### **4.7 SAR Testing Results**

#### **4.7.1 SAR Test Reduction Considerations**

##### **<KDB 447498 D01, General RF Exposure Guidance>**

Testing of other required channels within the operating mode of a frequency band is not required when the reported SAR for the mid-band or highest output power channel is:

- (1)  $\leq 0.8$  W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is  $\leq 100$  MHz
- (2)  $\leq 0.6$  W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
- (3)  $\leq 0.4$  W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is  $\geq 200$  MHz

When SAR is not measured at the maximum power level allowed for production units, the measured SAR will be scaled to the maximum tune-up tolerance limit to determine compliance. The scaling factor for the tune-up power is defined as maximum tune-up limit (mW) / measured conducted power (mW). The reported SAR would be calculated by measured SAR x tune-up power scaling factor.

The SAR has been measured with highest transmission duty factor supported by the test mode tools for WLAN and/or Bluetooth. When the transmission duty factor could not achieve 100%, the reported SAR will be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up power. The scaling factor for the duty factor is defined as 100% / transmission duty cycle (%). The reported SAR would be calculated by measured SAR x tune-up power scaling factor x duty cycle scaling factor.

##### **<KDB 941225 D01, 3G SAR Measurement Procedures>**

The mode tested for SAR is referred to as the primary mode. The equivalent modes considered for SAR test reduction are denoted as secondary modes. Both primary and secondary modes must be in the same frequency band. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is  $\leq 1/4$  dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is  $\leq 1.2$  W/kg, SAR measurement is not required for the secondary mode.

##### **<KDB 941225 D05, SAR Evaluation Considerations for LTE Devices>**

- (1) QPSK with 1 RB and 50% RB allocation

Start with the largest channel bandwidth and measure SAR, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is  $\leq 0.8$  W/kg, testing of the remaining RB offset configurations and required test channels is not required; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is  $> 1.45$  W/kg, SAR is required for all three RB offset configurations for that required test channel.

## SAR Test Report

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### (2) 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.

### (3) Higher order modulations

SAR is required only when the highest maximum output power for the configuration in the higher order modulation is  $>1/2$  dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is  $> 1.45$  W/kg.

### (4) Other channel bandwidth

SAR is required when the highest maximum output power of the smaller channel bandwidth is  $>1/2$  dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is  $> 1.45$  W/kg.

### <KDB 248227 D01, SAR Guidance for Wi-Fi Transmitters>

- (1) For handsets operating next to ear, hotspot mode or mini-tablet configurations, the initial test position procedures were applied. The test position with the highest extrapolated peak SAR will be used as the initial test position. When the reported SAR of initial test position is  $\leq 0.4$  W/kg, SAR testing for remaining test positions is not required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is  $\leq 0.8$  W/kg or all test positions are measured.
- (2) For WLAN 2.4 GHz, the highest measured maximum output power channel for DSSS was selected for SAR measurement. When the reported SAR is  $\leq 0.8$  W/kg, no further SAR testing is required. Otherwise, SAR is evaluated at the next highest measured output power channel. When any reported SAR is  $>1.2$  W/kg, SAR is required for the third channel. For OFDM modes (802.11g/n), SAR is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and it is  $\leq 1.2$  W/kg.
- (3) For WLAN 5GHz, the initial test configuration was selected according to the transmission mode with the highest maximum output power. When the reported SAR of initial test configuration is  $> 0.8$  W/kg, SAR is required for the subsequent highest measured output power channel until the reported SAR result is  $\leq 1.2$  W/kg or all required channels are measured. For other transmission modes, SAR is not required when the highest reported SAR for initial test configuration is adjusted by the ratio of subsequent test configuration to initial test configuration specified maximum output power and it is  $\leq 1.2$  W/kg.



# SAR Test Report

## 4.7.2 SAR Results for Head Exposure Condition

Plot No.	Band	Mode	Test Position	Ch.	Sample	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
	WCDMA II	RMC 12.2K	Right Cheek	9262	1	24.90	23.89	1.26	0.04	0.324	0.41
	WCDMA II	RMC 12.2K	Right Tilted	9262	1	24.90	23.89	1.26	0.02	0.133	0.17
	WCDMA II	RMC 12.2K	Left Cheek	9262	1	24.90	23.89	1.26	0.01	0.322	0.41
	WCDMA II	RMC 12.2K	Left Tilted	9262	1	24.90	23.89	1.26	0.06	0.132	0.17
	WCDMA II	RMC 12.2K	Right Cheek	9400	1	24.90	23.66	1.33	-0.06	0.342	0.45
01	WCDMA II	RMC 12.2K	Right Cheek	9538	1	24.90	23.60	1.35	-0.14	0.418	0.56
	WCDMA II	RMC 12.2K	Right Cheek	9538	2	24.90	23.60	1.35	0.04	0.403	0.54
02	WCDMA V	RMC 12.2K	Right Cheek	4233	1	24.90	23.90	1.26	-0.01	0.293	0.37
	WCDMA V	RMC 12.2K	Right Tilted	4233	1	24.90	23.90	1.26	0.02	0.137	0.17
	WCDMA V	RMC 12.2K	Left Cheek	4233	1	24.90	23.90	1.26	0.11	0.236	0.30
	WCDMA V	RMC 12.2K	Left Tilted	4233	1	24.90	23.90	1.26	0.16	0.167	0.21
	WCDMA V	RMC 12.2K	Right Cheek	4132	1	24.90	23.74	1.31	0.14	0.194	0.25
	WCDMA V	RMC 12.2K	Right Cheek	4182	1	24.90	23.88	1.26	-0.07	0.227	0.29
	WCDMA V	RMC 12.2K	Right Cheek	4233	2	24.90	23.90	1.26	0.06	0.195	0.25

Plot No.	Band	Mode	Test Position	Ch.	RB#	RB Offset	Sample	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
	LTE 2	QPSK20M	Right Cheek	18900	1	0	1	24.90	23.93	1.25	0.05	0.272	0.34
	LTE 2	QPSK20M	Right Tilted	18900	1	0	1	24.90	23.93	1.25	0.13	0.101	0.13
	LTE 2	QPSK20M	Left Cheek	18900	1	0	1	24.90	23.93	1.25	0.17	0.198	0.25
	LTE 2	QPSK20M	Left Tilted	18900	1	0	1	24.90	23.93	1.25	-0.04	0.077	0.10
	LTE 2	QPSK20M	Right Cheek	18900	50	0	1	23.90	22.96	1.24	0.02	0.202	0.25
	LTE 2	QPSK20M	Right Tilted	18900	50	0	1	23.90	22.96	1.24	0.09	0.095	0.12
	LTE 2	QPSK20M	Left Cheek	18900	50	0	1	23.90	22.96	1.24	0.04	0.164	0.20
	LTE 2	QPSK20M	Left Tilted	18900	50	0	1	23.90	22.96	1.24	-0.05	0.05	0.06
03	LTE 2	QPSK20M	Right Cheek	18700	1	0	1	24.90	23.70	1.32	-0.13	0.370	0.49
	LTE 2	QPSK20M	Right Cheek	19100	1	0	1	24.90	23.82	1.28	0.14	0.238	0.30
	LTE 2	QPSK20M	Right Cheek	18700	1	0	2	24.90	23.70	1.32	0.13	0.361	0.48
	LTE 4	QPSK20M	Right Cheek	20175	1	0	1	24.90	23.98	1.24	0.09	0.466	0.58
	LTE 4	QPSK20M	Right Tilted	20175	1	0	1	24.90	23.98	1.24	0.05	0.221	0.27
04	LTE 4	QPSK20M	Left Cheek	20175	1	0	1	24.90	23.98	1.24	-0.09	0.583	0.72
	LTE 4	QPSK20M	Left Tilted	20175	1	0	1	24.90	23.98	1.24	0.03	0.198	0.25
	LTE 4	QPSK20M	Right Cheek	20175	50	0	1	23.90	22.83	1.28	0.04	0.38	0.49
	LTE 4	QPSK20M	Right Tilted	20175	50	0	1	23.90	22.83	1.28	-0.09	0.231	0.30
	LTE 4	QPSK20M	Left Cheek	20175	50	0	1	23.90	22.83	1.28	0.11	0.452	0.58
	LTE 4	QPSK20M	Left Tilted	20175	50	0	1	23.90	22.83	1.28	0.04	0.131	0.17
	LTE 4	QPSK20M	Left Cheek	20050	1	0	1	24.90	23.77	1.30	0.03	0.503	0.65
	LTE 4	QPSK20M	Left Cheek	20300	1	0	1	24.90	23.90	1.26	0.05	0.565	0.71
	LTE 4	QPSK20M	Left Cheek	20175	1	0	2	24.90	23.98	1.24	0.07	0.576	0.71
	LTE 5	QPSK10M	Right Cheek	20525	1	0	1	25.40	24.51	1.23	-0.06	0.275	0.34
	LTE 5	QPSK10M	Right Tilted	20525	1	0	1	25.40	24.51	1.23	0.04	0.136	0.17
	LTE 5	QPSK10M	Left Cheek	20525	1	0	1	25.40	24.51	1.23	0.02	0.257	0.32
	LTE 5	QPSK10M	Left Tilted	20525	1	0	1	25.40	24.51	1.23	-0.14	0.176	0.22
	LTE 5	QPSK10M	Right Cheek	20525	25	0	1	24.40	23.41	1.26	0.06	0.231	0.29
	LTE 5	QPSK10M	Right Tilted	20525	25	0	1	24.40	23.41	1.26	0.04	0.115	0.14
	LTE 5	QPSK10M	Left Cheek	20525	25	0	1	24.40	23.41	1.26	0.06	0.208	0.26
	LTE 5	QPSK10M	Left Tilted	20525	25	0	1	24.40	23.41	1.26	0.02	0.151	0.19
	LTE 5	QPSK10M	Right Cheek	20450	1	0	1	25.40	24.30	1.29	0.01	0.226	0.29
05	LTE 5	QPSK10M	Right Cheek	20600	1	0	1	25.40	24.42	1.25	-0.02	0.298	0.37
	LTE 5	QPSK10M	Right Cheek	20600	1	0	2	25.40	24.42	1.25	0.02	0.256	0.32

# SAR Test Report

Plot No.	Band	Mode	Test Position	Ch.	RB#	RB Offset	Sample	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
06	LTE 12	QPSK10M	Right Cheek	23095	1	0	1	24.90	24.25	1.16	0.00	0.176	<b>0.20</b>
	LTE 12	QPSK10M	Right Tilted	23095	1	0	1	24.90	24.25	1.16	0.11	<0.001	0.00
	LTE 12	QPSK10M	Left Cheek	23095	1	0	1	24.90	24.25	1.16	0.04	0.169	0.20
	LTE 12	QPSK10M	Left Tilted	23095	1	0	1	24.90	24.25	1.16	0.03	<0.001	0.00
	LTE 12	QPSK10M	Right Cheek	23095	25	0	1	23.90	23.09	1.21	0.04	0.131	0.16
	LTE 12	QPSK10M	Right Tilted	23095	25	0	1	23.90	23.09	1.21	0.06	<0.001	0.00
	LTE 12	QPSK10M	Left Cheek	23095	25	0	1	23.90	23.09	1.21	0.02	0.149	0.18
	LTE 12	QPSK10M	Left Tilted	23095	25	0	1	23.90	23.09	1.21	0.06	<0.001	0.00
	LTE 12	QPSK10M	Right Cheek	23060	1	0	1	24.90	24.11	1.20	0.04	0.144	0.17
	LTE 12	QPSK10M	Right Cheek	23130	1	0	1	24.90	24.17	1.18	0.06	0.152	0.18
	LTE 12	QPSK10M	Right Cheek	23095	1	0	2	24.90	24.25	1.16	0.04	0.133	0.15
	07	LTE 13	QPSK10M	Right Cheek	23230	1	0	1	24.90	24.20	1.17	-0.06	0.270
LTE 13		QPSK10M	Right Tilted	23230	1	0	1	24.90	24.20	1.17	-0.06	0.146	0.17
LTE 13		QPSK10M	Left Cheek	23230	1	0	1	24.90	24.20	1.17	0.04	0.246	0.29
LTE 13		QPSK10M	Left Tilted	23230	1	0	1	24.90	24.20	1.17	0.02	0.162	0.19
LTE 13		QPSK10M	Right Cheek	23230	25	0	1	23.90	22.97	1.24	-0.14	0.215	0.27
LTE 13		QPSK10M	Right Tilted	23230	25	0	1	23.90	22.97	1.24	-0.09	0.122	0.15
LTE 13		QPSK10M	Left Cheek	23230	25	0	1	23.90	22.97	1.24	0.11	0.193	0.24
LTE 13		QPSK10M	Left Tilted	23230	25	0	1	23.90	22.97	1.24	0.04	0.118	0.15
LTE 13		QPSK10M	Right Cheek	23230	1	0	2	24.90	24.20	1.17	0.01	0.225	0.26

**Note:** The "< 0.001" means there is no SAR value or the SAR is too low to be measured.

# SAR Test Report

Plot No.	Band	Mode	Test Position	Ch.	Sample	Duty Cycle	Crest Factor	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
	WLAN2.4G	802.11b	Right Cheek	6	1	99.00	1.01	19.20	18.92	1.07	-0.06	0.022	0.02
	WLAN2.4G	802.11b	Right Tilted	6	1	99.00	1.01	19.20	18.92	1.07	0.04	<0.001	0.00
08	WLAN2.4G	802.11b	Left Cheek	6	1	99.00	1.01	19.20	18.92	1.07	0.13	0.027	0.03
	WLAN2.4G	802.11b	Left Tilted	6	1	99.00	1.01	19.20	18.92	1.07	-0.14	<0.001	0.00
	WLAN2.4G	802.11b	Left Cheek	1	1	99.00	1.01	19.20	18.90	1.07	-0.09	0.024	0.03
	WLAN2.4G	802.11b	Left Cheek	11	1	99.00	1.01	19.20	18.80	1.10	0.11	0.025	0.03
	WLAN2.4G	802.11b	Left Cheek	6	2	99.00	1.01	19.20	18.92	1.07	0.04	0.025	0.03
	WLAN5.3G	802.11a	Right Cheek	60	1	92.00	1.09	15.70	15.62	1.02	0.09	0.036	0.04
	WLAN5.3G	802.11a	Right Tilted	60	1	92.00	1.09	15.70	15.62	1.02	0.04	0.022	0.02
	WLAN5.3G	802.11a	Left Cheek	60	1	92.00	1.09	15.70	15.62	1.02	-0.05	0.035	0.04
	WLAN5.3G	802.11a	Left Tilted	60	1	92.00	1.09	15.70	15.62	1.02	-0.13	0.019	0.02
	WLAN5.3G	802.11a	Right Cheek	52	1	92.00	1.09	15.70	15.58	1.03	0.14	0.027	0.03
	WLAN5.3G	802.11a	Right Cheek	56	1	92.00	1.09	15.70	15.50	1.05	0.02	0.031	0.04
09	WLAN5.3G	802.11a	Right Cheek	64	1	92.00	1.09	14.20	14.07	1.03	0.11	0.038	0.04
	WLAN5.3G	802.11a	Right Cheek	64	2	92.00	1.09	14.20	14.07	1.03	0.07	0.034	0.04
	WLAN5.6G	802.11a	Right Cheek	116	1	92.00	1.09	15.70	15.62	1.02	-0.05	0.019	0.02
	WLAN5.6G	802.11a	Right Tilted	116	1	92.00	1.09	15.70	15.62	1.02	-0.13	0.016	0.02
	WLAN5.6G	802.11a	Left Cheek	116	1	92.00	1.09	15.70	15.62	1.02	0.07	0.017	0.02
	WLAN5.6G	802.11a	Left Tilted	116	1	92.00	1.09	15.70	15.62	1.02	-0.09	0.014	0.02
	WLAN5.6G	802.11a	Right Cheek	100	1	92.00	1.09	13.20	12.99	1.05	0.01	0.012	0.01
	WLAN5.6G	802.11a	Right Cheek	120	1	92.00	1.09	15.70	15.54	1.04	0.02	0.021	0.02
	WLAN5.6G	802.11a	Right Cheek	124	1	92.00	1.09	15.70	15.50	1.05	0.11	0.023	0.03
10	WLAN5.6G	802.11a	Right Cheek	132	1	92.00	1.09	15.70	15.51	1.04	0.03	0.038	0.04
	WLAN5.6G	802.11a	Right Cheek	140	1	92.00	1.09	13.20	13.14	1.01	-0.14	0.015	0.02
	WLAN5.6G	802.11a	Right Cheek	132	2	92.00	1.09	15.70	15.51	1.04	-0.09	0.037	0.04
11	WLAN5.8G	802.11a	Right Cheek	165	1	92.00	1.09	15.70	15.65	1.01	0.15	0.024	0.03
	WLAN5.8G	802.11a	Right Tilted	165	1	92.00	1.09	15.70	15.65	1.01	0.04	0.013	0.01
	WLAN5.8G	802.11a	Left Cheek	165	1	92.00	1.09	15.70	15.65	1.01	0.13	0.019	0.02
	WLAN5.8G	802.11a	Left Tilted	165	1	92.00	1.09	15.70	15.65	1.01	-0.14	0.00771	0.01
	WLAN5.8G	802.11a	Right Cheek	149	1	92.00	1.09	13.20	13.12	1.02	-0.09	0.00715	0.01
	WLAN5.8G	802.11a	Right Cheek	153	1	92.00	1.09	15.70	15.46	1.06	0.09	0.011	0.01
	WLAN5.8G	802.11a	Right Cheek	157	1	92.00	1.09	15.70	15.58	1.03	0.04	0.012	0.01
	WLAN5.8G	802.11a	Right Cheek	161	1	92.00	1.09	15.70	15.60	1.02	-0.05	0.012	0.01
	WLAN5.8G	802.11a	Right Cheek	165	2	92.00	1.09	15.70	15.65	1.01	-0.13	0.018	0.02
	BT	BDR	Right Cheek	0	1	76.50	1.31	10.40	9.92	1.12	0.00	<0.001	0.00
	BT	BDR	Right Tilted	0	1	76.50	1.31	10.40	9.92	1.12	0.00	<0.001	0.00
	BT	BDR	Left Cheek	0	1	76.50	1.31	10.40	9.92	1.12	0.00	<0.001	0.00
	BT	BDR	Left Tilted	0	1	76.50	1.31	10.40	9.92	1.12	0.00	<0.001	0.00
	BT	BDR	Left Cheek	39	1	76.50	1.31	10.40	9.61	1.20	0.00	<0.001	0.00
	BT	BDR	Left Cheek	78	1	76.50	1.31	9.70	9.08	1.15	0.00	<0.001	0.00
	BT	BDR	Left Cheek	0	2	76.50	1.31	10.40	9.92	1.12	0.00	<0.001	0.00

**Note:** The "< 0.001" means there is no SAR value or the SAR is too low to be measured.

# SAR Test Report

## 4.7.3 SAR Results for Body-worn Exposure Condition (Test Separation Distance is 15 mm)

Plot No.	Band	Mode	Test Position	Ch.	Sample	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
12	WCDMA II	RMC 12.2K	Front Face	9262	1	24.90	23.89	1.26	-0.09	0.186	0.23
	WCDMA II	RMC 12.2K	Rear Face	9262	1	24.90	23.89	1.26	-0.06	0.649	<b>0.82</b>
	WCDMA II	RMC 12.2K	Rear Face	9400	1	24.90	23.66	1.33	-0.13	0.599	0.80
	WCDMA II	RMC 12.2K	Rear Face	9538	1	24.90	23.60	1.35	0.07	0.606	0.82
	WCDMA II	RMC 12.2K	Rear Face	9262	2	24.90	23.89	1.26	-0.09	0.646	0.81
	WCDMA II	RMC 12.2K	Rear Face	9400	2	24.90	23.66	1.33	0.01	0.597	0.79
	WCDMA II	RMC 12.2K	Rear Face	9538	2	24.90	23.60	1.35	0.02	0.602	0.81
13	WCDMA V	RMC 12.2K	Front Face	4233	1	24.90	23.90	1.26	-0.05	0.249	0.31
	WCDMA V	RMC 12.2K	Rear Face	4233	1	24.90	23.90	1.26	-0.12	0.611	<b>0.77</b>
	WCDMA V	RMC 12.2K	Rear Face	4132	1	24.90	23.74	1.31	-0.14	0.551	0.72
	WCDMA V	RMC 12.2K	Rear Face	4182	1	24.90	23.88	1.26	-0.09	0.581	0.73
	WCDMA V	RMC 12.2K	Rear Face	4233	2	24.90	23.90	1.26	0.09	0.603	0.76

Plot No.	Band	Mode	Test Position	Ch.	RB#	RB Offset	Sample	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)	
14	LTE 2	QPSK20M	Front Face	18900	1	0	1	24.90	23.93	1.25	0.07	0.145	0.18	
	LTE 2	QPSK20M	Rear Face	18900	1	0	1	24.90	23.93	1.25	-0.09	0.552	0.69	
	LTE 2	QPSK20M	Front Face	18900	50	0	1	23.90	22.96	1.24	0.01	0.116	0.14	
	LTE 2	QPSK20M	Rear Face	18900	50	0	1	23.90	22.96	1.24	0.04	0.441	0.55	
	LTE 2	QPSK20M	Rear Face	18700	1	0	1	24.90	23.70	1.32	-0.02	0.563	<b>0.74</b>	
	LTE 2	QPSK20M	Rear Face	19100	1	0	1	24.90	23.82	1.28	0.07	0.528	0.68	
	LTE 2	QPSK20M	Rear Face	18700	1	0	2	24.90	23.70	1.32	0.06	0.553	0.73	
15	LTE 4	QPSK20M	Front Face	20175	1	0	1	24.9	23.98	1.24	-0.05	0.304	0.38	
	LTE 4	QPSK20M	Rear Face	20175	1	0	1	24.9	23.98	1.24	-0.12	0.634	0.79	
	LTE 4	QPSK20M	Front Face	20175	50	0	1	23.9	22.83	1.28	-0.14	0.228	0.29	
	LTE 4	QPSK20M	Rear Face	20175	50	0	1	23.9	22.83	1.28	-0.09	0.491	0.63	
	LTE 4	QPSK20M	Rear Face	20050	1	0	1	24.9	23.77	1.30	-0.09	0.609	0.79	
	LTE 4	QPSK20M	Rear Face	20300	1	0	1	24.9	23.90	1.26	-0.15	0.635	<b>0.80</b>	
	LTE 4	QPSK20M	Rear Face	20175	100	0	1	23.90	22.67	1.33	-0.12	0.485	0.65	
	LTE 4	QPSK20M	Rear Face	20300	1	0	2	24.9	23.90	1.26	-0.14	0.627	0.79	
	16	LTE 5	QPSK10M	Front Face	20525	1	0	1	25.4	24.51	1.23	0.13	0.216	0.27
		LTE 5	QPSK10M	Rear Face	20525	1	0	1	25.4	24.51	1.23	0.01	0.533	<b>0.66</b>
LTE 5		QPSK10M	Front Face	20525	25	0	1	24.4	23.41	1.26	0.15	0.171	0.22	
LTE 5		QPSK10M	Rear Face	20525	25	0	1	24.4	23.41	1.26	0.04	0.442	0.56	
LTE 5		QPSK10M	Rear Face	20450	1	0	1	25.4	24.30	1.29	0.13	0.498	0.64	
LTE 5		QPSK10M	Rear Face	20600	1	0	1	25.4	24.42	1.25	-0.14	0.492	0.62	
LTE 5		QPSK10M	Rear Face	20525	1	0	2	25.4	24.51	1.23	0.07	0.529	0.65	
LTE 12		QPSK10M	Front Face	23095	1	0	1	24.9	24.25	1.16	0.01	0.109	0.13	
17	LTE 12	QPSK10M	Rear Face	23095	1	0	1	24.9	24.25	1.16	0.06	0.268	0.31	
	LTE 12	QPSK10M	Front Face	23095	25	0	1	23.9	23.09	1.21	-0.14	0.097	0.12	
	LTE 12	QPSK10M	Rear Face	23095	25	0	1	23.9	23.09	1.21	0.13	0.232	0.28	
	LTE 12	QPSK10M	Rear Face	23060	1	0	1	24.9	24.11	1.20	0.12	0.258	0.31	
	LTE 12	QPSK10M	Rear Face	23130	1	0	1	24.9	24.17	1.18	-0.08	0.272	<b>0.32</b>	
	LTE 12	QPSK10M	Rear Face	23130	1	0	2	24.9	24.17	1.18	0.15	0.263	0.31	
	LTE 13	QPSK10M	Front Face	23230	1	0	1	24.9	24.20	1.17	0.09	0.178	0.21	
18	LTE 13	QPSK10M	Rear Face	23230	1	0	1	24.9	24.20	1.17	-0.11	0.384	<b>0.45</b>	
	LTE 13	QPSK10M	Front Face	23230	25	0	1	23.9	22.97	1.24	0.06	0.132	0.16	
	LTE 13	QPSK10M	Rear Face	23230	25	0	1	23.9	22.97	1.24	-0.14	0.311	0.39	
	LTE 13	QPSK10M	Rear Face	23230	1	0	2	24.9	24.20	1.17	0.13	0.379	0.44	

# SAR Test Report

Plot No.	Band	Mode	Test Position	Ch.	Sample	Duty Cycle	Crest Factor	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
	WLAN2.4G	802.11b	Front Face	6	1	99.00	1.01	19.20	18.92	1.07	0.01	0.040	0.04
	WLAN2.4G	802.11b	Rear Face	6	1	99.00	1.01	19.20	18.92	1.07	0.07	0.166	0.18
19	WLAN2.4G	802.11b	Rear Face	1	1	99.00	1.01	19.20	18.90	1.07	-0.03	0.170	0.18
	WLAN2.4G	802.11b	Rear Face	11	1	99.00	1.01	19.20	18.80	1.10	-0.14	0.148	0.16
	WLAN2.4G	802.11b	Rear Face	1	2	99.00	1.01	19.20	18.90	1.07	0.12	0.159	0.17
	WLAN5.3G	802.11a	Front Face	60	1	92.00	1.09	15.70	15.62	1.02	0.07	0.113	0.13
	WLAN5.3G	802.11a	Rear Face	60	1	92.00	1.09	15.70	15.62	1.02	-0.03	0.138	0.15
20	WLAN5.3G	802.11a	Rear Face	52	1	92.00	1.09	15.70	15.58	1.03	-0.12	0.145	0.16
	WLAN5.3G	802.11a	Rear Face	56	1	92.00	1.09	15.70	15.50	1.05	0.04	0.142	0.16
	WLAN5.3G	802.11a	Rear Face	64	1	92.00	1.09	14.20	14.07	1.03	0.01	0.129	0.14
	WLAN5.3G	802.11a	Rear Face	52	2	92.00	1.09	15.70	15.58	1.03	0.02	0.141	0.16
	WLAN5.6G	802.11a	Front Face	116	1	92.00	1.09	15.70	15.62	1.02	0.15	0.061	0.07
	WLAN5.6G	802.11a	Rear Face	116	1	92.00	1.09	15.70	15.62	1.02	0.04	0.108	0.12
	WLAN5.6G	802.11a	Rear Face	100	1	92.00	1.09	13.20	12.99	1.05	0.13	0.049	0.06
	WLAN5.6G	802.11a	Rear Face	120	1	92.00	1.09	15.70	15.54	1.04	-0.03	0.105	0.12
	WLAN5.6G	802.11a	Rear Face	124	1	92.00	1.09	15.70	15.50	1.05	-0.12	0.104	0.12
21	WLAN5.6G	802.11a	Rear Face	132	1	92.00	1.09	15.70	15.51	1.04	-0.02	0.129	0.15
	WLAN5.6G	802.11a	Rear Face	140	1	92.00	1.09	13.20	13.14	1.01	0.02	0.063	0.07
	WLAN5.6G	802.11a	Rear Face	132	2	92.00	1.09	15.70	15.51	1.04	-0.08	0.118	0.13
	WLAN5.8G	802.11a	Front Face	165	1	92.00	1.09	15.70	15.65	1.01	0.07	0.041	0.05
	WLAN5.8G	802.11a	Rear Face	165	1	92.00	1.09	15.70	15.65	1.01	-0.03	0.120	0.13
	WLAN5.8G	802.11a	Rear Face	149	1	92.00	1.09	13.20	13.12	1.02	-0.12	0.068	0.08
22	WLAN5.8G	802.11a	Rear Face	153	1	92.00	1.09	15.70	15.46	1.06	-0.06	0.124	0.14
	WLAN5.8G	802.11a	Rear Face	157	1	92.00	1.09	15.70	15.58	1.03	-0.02	0.118	0.13
	WLAN5.8G	802.11a	Rear Face	161	1	92.00	1.09	15.70	15.60	1.02	0.02	0.119	0.13
	WLAN5.8G	802.11a	Rear Face	153	2	92.00	1.09	15.70	15.46	1.06	0.04	0.099	0.11
	BT	BDR	Front Face	0	1	76.50	1.31	10.40	9.92	1.12	0.00	<0.001	0.00
	BT	BDR	Rear Face	0	1	76.50	1.31	10.40	9.92	1.12	0.00	<0.001	0.00
	BT	BDR	Rear Face	39	1	76.50	1.31	10.40	9.61	1.20	0.00	<0.001	0.00
	BT	BDR	Rear Face	78	1	76.50	1.31	9.70	9.08	1.15	0.00	<0.001	0.00
	BT	BDR	Rear Face	0	2	76.50	1.31	10.40	9.92	1.12	0.00	<0.001	0.00

**Note:** The “< 0.001” means there is no SAR value or the SAR is too low to be measured.

# SAR Test Report

## 4.7.4 SAR Results for Hotspot Exposure Condition (Test Separation Distance is 10 mm)

Plot No.	Band	Mode	Test Position	Ch.	Sample	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
23	WCDMA II	RMC 12.2K	Front Face	9262	1	23.40	22.51	1.23	0.02	0.202	0.25
	WCDMA II	RMC 12.2K	Rear Face	9262	1	23.40	22.51	1.23	-0.13	0.730	<b>0.90</b>
	WCDMA II	RMC 12.2K	Left Side	9262	1	23.40	22.51	1.23	0.06	0.319	0.39
	WCDMA II	RMC 12.2K	Right Side	9262	1	23.40	22.51	1.23	-0.14	0.082	0.10
	WCDMA II	RMC 12.2K	Bottom Side	9262	1	23.40	22.51	1.23	0.12	0.157	0.19
	WCDMA II	RMC 12.2K	Rear Face	9400	1	23.40	22.28	1.29	0.04	0.687	0.89
	WCDMA II	RMC 12.2K	Rear Face	9538	1	23.40	22.27	1.30	0.13	0.688	0.89
	WCDMA II	RMC 12.2K	Rear Face	9262	2	23.40	22.51	1.23	-0.03	0.719	0.88
	WCDMA II	RMC 12.2K	Rear Face	9400	2	23.40	22.28	1.29	-0.12	0.679	0.88
	WCDMA II	RMC 12.2K	Rear Face	9538	2	23.40	22.27	1.30	0.04	0.685	0.89
24	WCDMA V	RMC 12.2K	Front Face	4233	1	24.90	23.90	1.26	0.12	0.303	0.38
	WCDMA V	RMC 12.2K	Rear Face	4233	1	24.90	23.90	1.26	-0.09	0.781	<b>0.98</b>
	WCDMA V	RMC 12.2K	Left Side	4233	1	24.90	23.90	1.26	0.01	0.539	0.68
	WCDMA V	RMC 12.2K	Right Side	4233	1	24.90	23.90	1.26	-0.14	0.284	0.36
	WCDMA V	RMC 12.2K	Bottom Side	4233	1	24.90	23.90	1.26	0.12	0.079	0.10
	WCDMA V	RMC 12.2K	Rear Face	4132	1	24.90	23.74	1.31	-0.12	0.711	0.93
	WCDMA V	RMC 12.2K	Rear Face	4182	1	24.90	23.88	1.26	-0.06	0.744	0.94
	WCDMA V	RMC 12.2K	Rear Face	4233	2	24.90	23.90	1.26	0.02	0.765	0.96
	WCDMA V	RMC 12.2K	Rear Face	4132	2	24.90	23.74	1.31	0.01	0.714	0.94
	WCDMA V	RMC 12.2K	Rear Face	4182	2	24.90	23.88	1.26	0.08	0.758	0.96

Note: The "< 0.001" means there is no SAR value or the SAR is too low to be measured.

Plot No.	Band	Mode	Test Position	Ch.	RB#	RB Offset	Sample	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)	
	LTE 2	QPSK20M	Front Face	18900	1	0	1	23.40	22.60	1.20	0.09	0.173	0.21	
	LTE 2	QPSK20M	Rear Face	18900	1	0	1	23.40	22.60	1.20	-0.11	0.756	0.91	
	LTE 2	QPSK20M	Left Side	18900	1	0	1	23.40	22.60	1.20	0.06	0.363	0.44	
	LTE 2	QPSK20M	Right Side	18900	1	0	1	23.40	22.60	1.20	-0.14	0.078	0.09	
	LTE 2	QPSK20M	Bottom Side	18900	1	0	1	23.40	22.60	1.20	0.12	0.156	0.19	
	LTE 2	QPSK20M	Front Face	18900	50	0	1	22.40	21.61	1.20	0.04	0.125	0.15	
	LTE 2	QPSK20M	Rear Face	18900	50	0	1	22.40	21.61	1.20	0.13	0.624	0.75	
	LTE 2	QPSK20M	Left Side	18900	50	0	1	22.40	21.61	1.20	0.12	0.278	0.33	
	LTE 2	QPSK20M	Right Side	18900	50	0	1	22.40	21.61	1.20	-0.12	0.061	0.07	
	LTE 2	QPSK20M	Bottom Side	18900	50	0	1	22.40	21.61	1.20	0.04	0.132	0.16	
	25	LTE 2	QPSK20M	Rear Face	18700	1	0	1	23.40	22.57	1.21	-0.12	0.768	<b>0.93</b>
		LTE 2	QPSK20M	Rear Face	19100	1	0	1	23.40	22.50	1.23	-0.03	0.754	0.93
LTE 2		QPSK20M	Rear Face	18900	100	0	1	22.40	21.50	1.23	0.12	0.618	0.76	
LTE 2		QPSK20M	Rear Face	18700	1	0	2	23.40	22.57	1.21	0.04	0.763	0.92	
LTE 2		QPSK20M	Rear Face	18900	1	0	2	23.40	22.60	1.20	0.13	0.761	0.91	
LTE 2	QPSK20M	Rear Face	19100	1	0	2	23.40	22.50	1.23	-0.12	0.725	0.89		

# SAR Test Report

Plot No.	Band	Mode	Test Position	Ch.	RB#	RB Offset	Sample	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
	LTE 4	QPSK20M	Front Face	20175	1	0	1	23.40	22.93	1.11	0.13	0.343	0.38
	LTE 4	QPSK20M	Rear Face	20175	1	0	1	23.40	22.93	1.11	0.12	0.782	0.87
	LTE 4	QPSK20M	Left Side	20175	1	0	1	23.40	22.93	1.11	-0.12	0.484	0.54
	LTE 4	QPSK20M	Right Side	20175	1	0	1	23.40	22.93	1.11	-0.06	0.123	0.14
	LTE 4	QPSK20M	Bottom Side	20175	1	0	1	23.40	22.93	1.11	0.01	0.282	0.31
	LTE 4	QPSK20M	Front Face	20175	50	0	1	22.40	21.34	1.28	0.08	0.251	0.32
	LTE 4	QPSK20M	Rear Face	20175	50	0	1	22.40	21.34	1.28	0.12	0.648	0.83
	LTE 4	QPSK20M	Left Side	20175	50	0	1	22.40	21.34	1.28	-0.12	0.366	0.47
	LTE 4	QPSK20M	Right Side	20175	50	0	1	22.40	21.34	1.28	-0.12	0.098	0.13
	LTE 4	QPSK20M	Bottom Side	20175	50	0	1	22.40	21.34	1.28	-0.06	0.191	0.24
	LTE 4	QPSK20M	Rear Face	20050	1	0	1	23.40	22.70	1.17	0.02	0.812	0.95
26	LTE 4	QPSK20M	Rear Face	20300	1	0	1	23.40	22.66	1.19	-0.05	0.817	0.97
	LTE 4	QPSK20M	Rear Face	20050	50	0	1	22.40	21.11	1.35	-0.12	0.655	0.88
	LTE 4	QPSK20M	Rear Face	20300	50	0	1	22.40	21.07	1.36	-0.03	0.674	0.92
	LTE 4	QPSK20M	Rear Face	20175	100	0	1	22.40	21.18	1.32	-0.12	0.637	0.84
	LTE 4	QPSK20M	Rear Face	20300	1	0	2	23.40	22.66	1.19	0.04	0.806	0.96
	LTE 4	QPSK20M	Rear Face	20050	1	0	2	23.40	22.70	1.17	0.12	0.795	0.93
	LTE 4	QPSK20M	Rear Face	20175	1	0	2	23.40	22.93	1.11	0.06	0.776	0.86
	LTE 4	QPSK20M	Rear Face	20300	1	0	1	23.40	22.66	1.19	-0.07	0.805	0.96
	LTE 5	QPSK10M	Front Face	20525	1	0	1	25.40	24.51	1.23	0.07	0.244	0.30
27	LTE 5	QPSK10M	Rear Face	20525	1	0	1	25.40	24.51	1.23	-0.14	0.697	0.86
	LTE 5	QPSK10M	Left Side	20525	1	0	1	25.40	24.51	1.23	0.09	0.449	0.55
	LTE 5	QPSK10M	Right Side	20525	1	0	1	25.40	24.51	1.23	-0.11	0.229	0.28
	LTE 5	QPSK10M	Bottom Side	20525	1	0	1	25.40	24.51	1.23	-0.14	0.112	0.14
	LTE 5	QPSK10M	Front Face	20525	25	0	1	24.40	23.41	1.26	0.13	0.209	0.26
	LTE 5	QPSK10M	Rear Face	20525	25	0	1	24.40	23.41	1.26	0.12	0.551	0.69
	LTE 5	QPSK10M	Left Side	20525	25	0	1	24.40	23.41	1.26	0.04	0.347	0.44
	LTE 5	QPSK10M	Right Side	20525	25	0	1	24.40	23.41	1.26	0.13	0.171	0.22
	LTE 5	QPSK10M	Bottom Side	20525	25	0	1	24.40	23.41	1.26	-0.12	0.079	0.10
	LTE 5	QPSK10M	Rear Face	20450	1	0	1	25.40	24.30	1.29	0.12	0.664	0.86
	LTE 5	QPSK10M	Rear Face	20600	1	0	1	25.40	24.42	1.25	0.04	0.637	0.80
	LTE 5	QPSK10M	Rear Face	20525	50	0	1	24.40	23.20	1.32	0.13	0.538	0.71
	LTE 5	QPSK10M	Rear Face	20525	1	0	2	25.40	24.51	1.23	0.06	0.692	0.85
	LTE 5	QPSK10M	Rear Face	20450	1	0	2	25.40	24.30	1.29	-0.14	0.662	0.85
	LTE 5	QPSK10M	Rear Face	20600	1	0	2	25.40	24.42	1.25	0.13	0.647	0.81
	LTE 12	QPSK10M	Front Face	23095	1	0	1	24.90	24.25	1.16	0.12	0.164	0.19
	LTE 12	QPSK10M	Rear Face	23095	1	0	1	24.90	24.25	1.16	-0.09	0.408	0.47
	LTE 12	QPSK10M	Left Side	23095	1	0	1	24.90	24.25	1.16	0.01	0.232	0.27
	LTE 12	QPSK10M	Right Side	23095	1	0	1	24.90	24.25	1.16	-0.14	0.093	0.11
	LTE 12	QPSK10M	Bottom Side	23095	1	0	1	24.90	24.25	1.16	0.12	0.126	0.15
	LTE 12	QPSK10M	Front Face	23095	25	0	1	23.90	23.09	1.21	-0.12	0.134	0.16
	LTE 12	QPSK10M	Rear Face	23095	25	0	1	23.90	23.09	1.21	-0.06	0.334	0.40
	LTE 12	QPSK10M	Left Side	23095	25	0	1	23.90	23.09	1.21	0.02	0.021	0.03
	LTE 12	QPSK10M	Right Side	23095	25	0	1	23.90	23.09	1.21	0.12	0.079	0.10
	LTE 12	QPSK10M	Bottom Side	23095	25	0	1	23.90	23.09	1.21	0.13	0.102	0.12
	LTE 12	QPSK10M	Rear Face	23060	1	0	1	24.90	24.11	1.20	0.12	0.388	0.47
28	LTE 12	QPSK10M	Rear Face	23130	1	0	1	24.90	24.17	1.18	-0.15	0.416	0.49
	LTE 12	QPSK10M	Rear Face	23130	1	0	2	24.90	24.17	1.18	0.04	0.408	0.48

**Note:** The “< 0.001” means there is no SAR value or the SAR is too low to be measured.

# SAR Test Report

Plot No.	Band	Mode	Test Position	Ch.	RB#	RB Offset	Sample	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
	LTE 13	QPSK10M	Front Face	23230	1	0	1	24.90	24.20	1.17	0.05	0.233	0.27
29	LTE 13	QPSK10M	Rear Face	23230	1	0	1	24.90	24.20	1.17	0.04	0.563	0.66
	LTE 13	QPSK10M	Left Side	23230	1	0	1	24.90	24.20	1.17	0.06	0.339	0.40
	LTE 13	QPSK10M	Right Side	23230	1	0	1	24.90	24.20	1.17	-0.14	0.193	0.23
	LTE 13	QPSK10M	Bottom Side	23230	1	0	1	24.90	24.20	1.17	0.12	0.144	0.17
	LTE 13	QPSK10M	Front Face	23230	25	0	1	23.90	22.97	1.24	0.04	0.181	0.22
	LTE 13	QPSK10M	Rear Face	23230	25	0	1	23.90	22.97	1.24	0.13	0.458	0.57
	LTE 13	QPSK10M	Left Side	23230	25	0	1	23.90	22.97	1.24	0.12	0.263	0.33
	LTE 13	QPSK10M	Right Side	23230	25	0	1	23.90	22.97	1.24	0.13	0.151	0.19
	LTE 13	QPSK10M	Bottom Side	23230	25	0	1	23.90	22.97	1.24	-0.15	0.083	0.10
	LTE 13	QPSK10M	Rear Face	23230	1	0	2	24.90	24.20	1.17	0.13	0.559	0.65

**Note:** The “< 0.001” means there is no SAR value or the SAR is too low to be measured.

Plot No.	Band	Mode	Test Position	Ch.	Sample	Duty Cycle	Crest Factor	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
	WLAN2.4G	802.11b	Front Face	6	1	99.00	1.01	19.20	18.92	1.07	-0.14	0.047	0.05
	WLAN2.4G	802.11b	Rear Face	6	1	99.00	1.01	19.20	18.92	1.07	0.13	0.259	0.28
	WLAN2.4G	802.11b	Right Side	6	1	99.00	1.01	19.20	18.92	1.07	-0.12	0.115	0.12
	WLAN2.4G	802.11b	Bottom Side	6	1	99.00	1.01	19.20	18.92	1.07	0.01	0.024	0.03
30	WLAN2.4G	802.11b	Rear Face	1	1	99.00	1.01	19.20	18.90	1.07	-0.05	0.267	0.29
	WLAN2.4G	802.11b	Rear Face	11	1	99.00	1.01	19.20	18.80	1.10	-0.02	0.249	0.28
	WLAN2.4G	802.11b	Rear Face	1	2	99.00	1.01	19.20	18.90	1.07	-0.04	0.261	0.28



## 4.7.5 SAR Measurement Variability

According to KDB 865664 D01, SAR measurement variability was 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. Alternatively, if the highest measured SAR for both head and body tissue-equivalent media are  $\leq 1.45$  W/kg and the ratio of these highest SAR values, i.e., largest divided by smallest value, is  $\leq 1.10$ , the highest SAR configuration for either head or body tissue-equivalent medium maybe used to perform the repeated measurement. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR repeated measurement procedure:

1. When the highest measured SAR is  $< 0.80$  W/kg, repeated measurement is not required.
2. When the highest measured SAR is  $\geq 0.80$  W/kg, repeat that measurement once.
3. 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, perform a second repeated measurement.
4. If the ratio of largest to smallest SAR for the original, first and second repeated measurements is  $> 1.20$ , and the original, first or second repeated measurement is  $\geq 1.5$  W/kg, perform a third repeated measurement.

Band	Mode	Test Position	Ch.	Original Measured SAR-1g (W/kg)	1st Repeated SAR-1g (W/kg)	L/S Ratio	2nd Repeated SAR-1g (W/kg)	L/S Ratio	3rd Repeated SAR-1g (W/kg)	L/S Ratio
LTE 4	QPSK20M	Rear Face	20300	0.817	0.805	1.01	N/A	N/A	N/A	N/A

## 4.7.6 Simultaneous Multi-band Transmission Evaluation

### <Possibilities of Simultaneous Transmission>

The simultaneous transmission possibilities for this device are listed as below.

Simultaneous TX Combination	Capable Transmit Configurations	Head Exposure Condition	Body-worn Exposure Condition	Hotspot Exposure Condition
1	WWAN + WLAN2.4G	Yes	Yes	Yes
2	WWAN + WLAN5G	Yes	Yes	No
3	WWAN + BT	Yes	Yes	No
4	WLAN5G + BT	Yes	Yes	No
5	WWAN + WLAN5G + BT	Yes	Yes	No

### Note :

1. The WLAN 2.4G and WLAN 5G cannot transmit simultaneously.
2. Plot2 is covered by Plot5
3. Plot3 is covered by Plot5
4. Plot4 is covered by Plot5

### <SAR Summation Analysis>

Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneous transmitting antenna. When the sum of SAR<sub>1g</sub> of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit(SAR<sub>1g</sub> 1.6 W/kg), the simultaneous transmission SAR is not required. When the sum of SAR<sub>1g</sub> is greater than the SAR limit (SAR<sub>1g</sub> 1.6 W/kg), SAR test exclusion is determined by the SPLSR.

# SAR Test Report

## Head

Band	Position	A	5	8	12	A+5	A+8+12
		Max WWAN	WLAN 2.4GHz	WLAN 5GHz	BT	Summing result 1g SAR W/kg	Summing result 1g SAR W/kg
		1g SAR W/kg	1g SAR W/kg	1g SAR W/kg	1g SAR W/kg		
WCDMA II	Right Cheek	0.56	0.02	0.04	0.00	0.58	0.60
	Right Tilted	0.17	0.00	0.02	0.00	0.17	0.19
	Left Cheek	0.41	0.03	0.04	0.00	0.44	0.45
	Left Tilted	0.17	0.00	0.02	0.00	0.17	0.19
WCDMA V	Right Cheek	0.37	0.02	0.04	0.00	0.39	0.41
	Right Tilted	0.17	0.00	0.02	0.00	0.17	0.19
	Left Cheek	0.30	0.03	0.04	0.00	0.33	0.34
	Left Tilted	0.21	0.00	0.02	0.00	0.21	0.23
LTE 2	Right Cheek	0.49	0.02	0.04	0.00	0.51	0.53
	Right Tilted	0.13	0.00	0.02	0.00	0.13	0.15
	Left Cheek	0.25	0.03	0.04	0.00	0.28	0.29
	Left Tilted	0.10	0.00	0.02	0.00	0.10	0.12
LTE 4	Right Cheek	0.58	0.02	0.04	0.00	0.60	0.62
	Right Tilted	0.30	0.00	0.02	0.00	0.30	0.32
	Left Cheek	0.72	0.03	0.04	0.00	0.75	<b>0.76</b>
	Left Tilted	0.25	0.00	0.02	0.00	0.25	0.27
LTE 5	Right Cheek	0.37	0.02	0.04	0.00	0.39	0.41
	Right Tilted	0.17	0.00	0.02	0.00	0.17	0.19
	Left Cheek	0.32	0.03	0.04	0.00	0.35	0.36
	Left Tilted	0.22	0.00	0.02	0.00	0.22	0.24
LTE 12	Right Cheek	0.20	0.02	0.04	0.00	0.22	0.24
	Right Tilted	0.00	0.00	0.02	0.00	0.00	0.02
	Left Cheek	0.20	0.03	0.04	0.00	0.23	0.24
	Left Tilted	0.00	0.00	0.02	0.00	0.00	0.02
LTE 13	Right Cheek	0.32	0.02	0.04	0.00	0.34	0.36
	Right Tilted	0.15	0.00	0.02	0.00	0.15	0.17
	Left Cheek	0.29	0.03	0.04	0.00	0.32	0.33
	Left Tilted	0.19	0.00	0.02	0.00	0.19	0.21

# SAR Test Report

## Body-Worn

Band	Position	A	5	8	12	A+5	A+8+12
		Max WWAN	WLAN 2.4GHz	WLAN 5GHz	BT	Summing result 1g SAR W/kg	Summing result 1g SAR W/kg
		1g SAR W/kg	1g SAR W/kg	1g SAR W/kg	1g SAR W/kg		
WCDMA II	Front Face	0.23	0.04	0.13	0.00	0.27	0.36
	Rear Face	0.82	0.18	0.16	0.00	<b>1.00</b>	0.98
WCDMA V	Front Face	0.31	0.04	0.13	0.00	0.35	0.44
	Rear Face	0.77	0.18	0.16	0.00	0.95	0.93
LTE 2	Front Face	0.18	0.04	0.13	0.00	0.22	0.31
	Rear Face	0.74	0.18	0.16	0.00	0.92	0.90
LTE 4	Front Face	0.38	0.04	0.13	0.00	0.42	0.51
	Rear Face	0.80	0.18	0.16	0.00	0.98	0.96
LTE 5	Front Face	0.27	0.04	0.13	0.00	0.31	0.40
	Rear Face	0.66	0.18	0.16	0.00	0.84	0.82
LTE 12	Front Face	0.13	0.04	0.13	0.00	0.17	0.26
	Rear Face	0.32	0.18	0.16	0.00	0.50	0.48
LTE 13	Front Face	0.21	0.04	0.13	0.00	0.25	0.34
	Rear Face	0.45	0.18	0.16	0.00	0.63	0.61

# SAR Test Report

## Hotspot

Band	Position	A	5	A+5
		Max WWAN	WLAN 2.4GHz	Summing result 1g SAR W/kg
		1g SAR W/kg	1g SAR W/kg	
WCDMA II	Front Face	0.25	0.05	0.30
	Rear Face	0.90	0.29	1.19
	Left Side	0.39	0.00	0.39
	Right Side	0.10	0.12	0.22
	Top Side	0.00	0.00	0.00
	Bottom Side	0.19	0.03	0.22
WCDMA V	Front Face	0.38	0.05	0.43
	Rear Face	0.98	0.29	<b>1.27</b>
	Left Side	0.68	0.00	0.68
	Right Side	0.36	0.12	0.48
	Top Side	0.00	0.00	0.00
	Bottom Side	0.10	0.03	0.13
LTE 2	Front Face	0.21	0.05	0.26
	Rear Face	0.93	0.29	1.22
	Left Side	0.44	0.00	0.44
	Right Side	0.09	0.12	0.21
	Top Side	0.00	0.00	0.00
	Bottom Side	0.19	0.03	0.22
LTE 4	Front Face	0.38	0.05	0.43
	Rear Face	0.97	0.29	1.26
	Left Side	0.54	0.00	0.54
	Right Side	0.14	0.12	0.26
	Top Side	0.00	0.00	0.00
	Bottom Side	0.31	0.03	0.34
LTE 5	Front Face	0.30	0.05	0.35
	Rear Face	0.86	0.29	1.15
	Left Side	0.55	0.00	0.55
	Right Side	0.28	0.12	0.40
	Top Side	0.00	0.00	0.00
	Bottom Side	0.14	0.03	0.17

# SAR Test Report

Band	Position	A	5	A+5
		Max WWAN	WLAN 2.4GHz	Summing result 1g SAR W/kg
		1g SAR W/kg	1g SAR W/kg	
LTE 12	Front Face	0.19	0.05	0.24
	Rear Face	0.49	0.29	0.78
	Left Side	0.27	0.00	0.27
	Right Side	0.11	0.12	0.23
	Top Side	0.00	0.00	0.00
	Bottom Side	0.15	0.03	0.18
LTE 13	Front Face	0.27	0.05	0.32
	Rear Face	0.66	0.29	0.95
	Left Side	0.40	0.00	0.40
	Right Side	0.23	0.12	0.35
	Top Side	0.00	0.00	0.00
	Bottom Side	0.17	0.03	0.20

Test Engineer : Chienlun Huang, and James Chu

**5. Calibration of Test Equipment**

Equipment	Manufacturer	Model	SN	Cal. Date	Cal. Interval
System Validation Dipole	SPEAG	D750V3	1013	Aug. 23, 2019	1 Year
System Validation Dipole	SPEAG	D835V2	4d121	Aug. 23, 2019	1 Year
System Validation Dipole	SPEAG	D1750V2	1055	Aug. 23, 2019	1 Year
System Validation Dipole	SPEAG	D1900V2	5d036	Jan. 25, 2019	1 Year
System Validation Dipole	SPEAG	D2450V2	737	Aug. 26, 2019	1 Year
System Validation Dipole	SPEAG	D5GHzV2	1019	Mar. 21, 2019	1 Year
Dosimetric E-Field Probe	SPEAG	EX3DV4	3971	Mar. 29, 2019	1 Year
Dosimetric E-Field Probe	SPEAG	EX3DV4	3650	May. 20, 2019	1 Year
Dosimetric E-Field Probe	SPEAG	EX3DV4	3820	Jun. 25, 2019	1 Year
Data Acquisition Electronics	SPEAG	DAE3	579	Aug. 27, 2019	1 Year
Data Acquisition Electronics	SPEAG	DAE4	861	May. 08, 2019	1 Year
Data Acquisition Electronics	SPEAG	DAE4	916	Dec. 17, 2019	1 Year
Spectrum Analyzer	R&S	FSL6	102006	Mar. 26, 2019	1 Year
Radio Communication Analyzer	Anritsu	MT8821C	6201381727	Jun. 14, 2019	1 Year
Dielectric Assessment Kit	SPEAG	DAKS-3.5	1092	May. 07, 2019	1 Year
Dielectric Assessment Kit	SPEAG	DAKS_VNA R140	0010917	Aug. 20, 2019	1 Year
Powersource1	SPEAG	SE_UMS_160 BA	4010	Aug. 21, 2019	1 Year
Thermometer	YFE	YF-160A	130504591	Mar. 22, 2019	1 Year

## **6. Measurement Uncertainty**

According to KDB 865664 D01, SAR measurement uncertainty analysis is required in SAR reports only when the highest measured SAR in a frequency band is  $\geq 1.5$  W/kg for 1-g SAR, and  $\geq 3.75$  W/kg for 10-g SAR. The procedures described in IEEE Std 1528-2013 should be applied. The expanded SAR measurement uncertainty must be  $\leq 30\%$ , for a confidence interval of  $k = 2$ . When the highest measured SAR within a frequency band is  $< 1.5$  W/kg for 1-g and  $< 3.75$  W/kg for 10-g, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. Hence, the measurement uncertainty analysis is not required in this SAR report because the test result met the condition.



### 7. Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

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The road map of all our labs can be found in our web site also.

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## Appendix A. SAR Plots of System Verification

The plots for system verification with largest deviation for each SAR system combination are shown as follows.

### System Check\_H750\_200108

**DUT: Dipole 750 MHz; Type: D750V3; SN: 1013**

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

Medium: H06T09N1\_0108 Medium parameters used:  $f = 750$  MHz;  $\sigma = 0.9$  S/m;  $\epsilon_r = 42.167$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(10.75, 10.75, 10.75); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

**Pin=50mW/Area Scan (61x81x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.526 W/kg

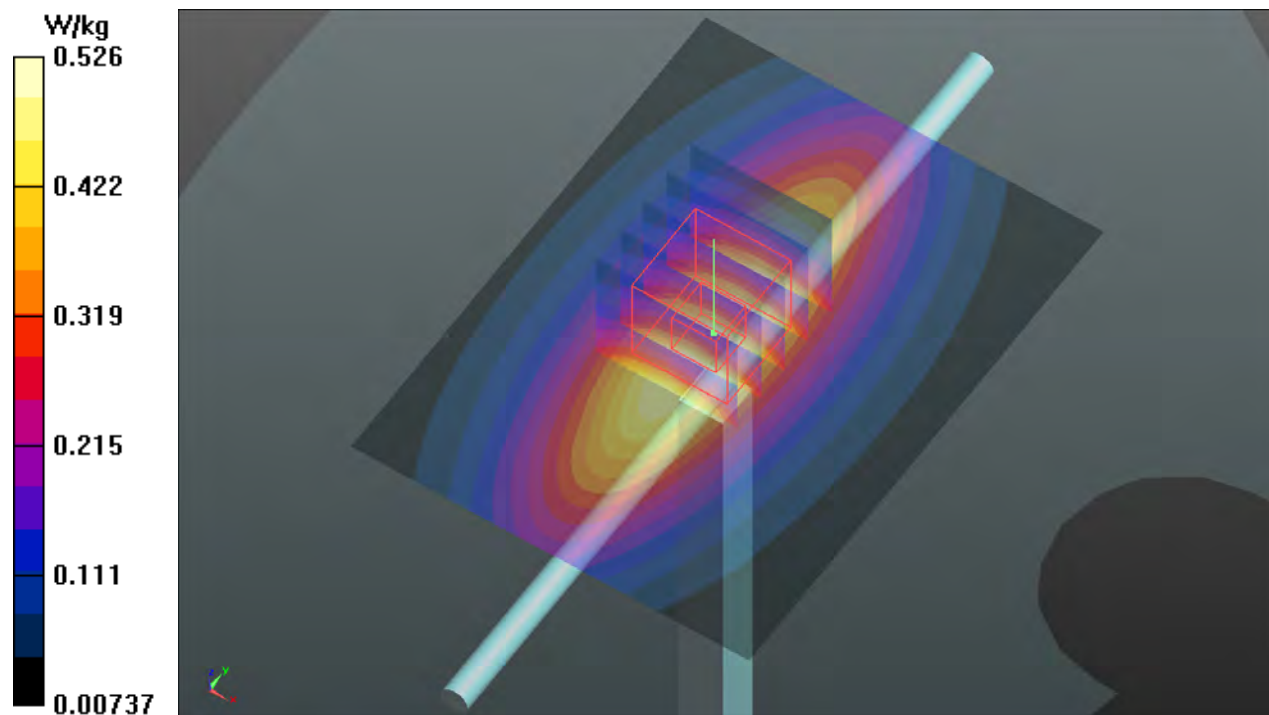
**Pin=50mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 25.17 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.604 W/kg

**SAR(1 g) = 0.397 W/kg; SAR(10 g) = 0.262 W/kg** (SAR corrected for target medium)

Maximum value of SAR (measured) = 0.534 W/kg



## System Check\_H835\_200109

**DUT: Dipole 835 MHz; Type: D835V2; SN: 4d121**

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

Medium: H07T10N1\_0109 Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.937$  S/m;  $\epsilon_r = 43.169$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(10.18, 10.18, 10.18); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

**Pin=50mW/Area Scan (61x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.587 W/kg

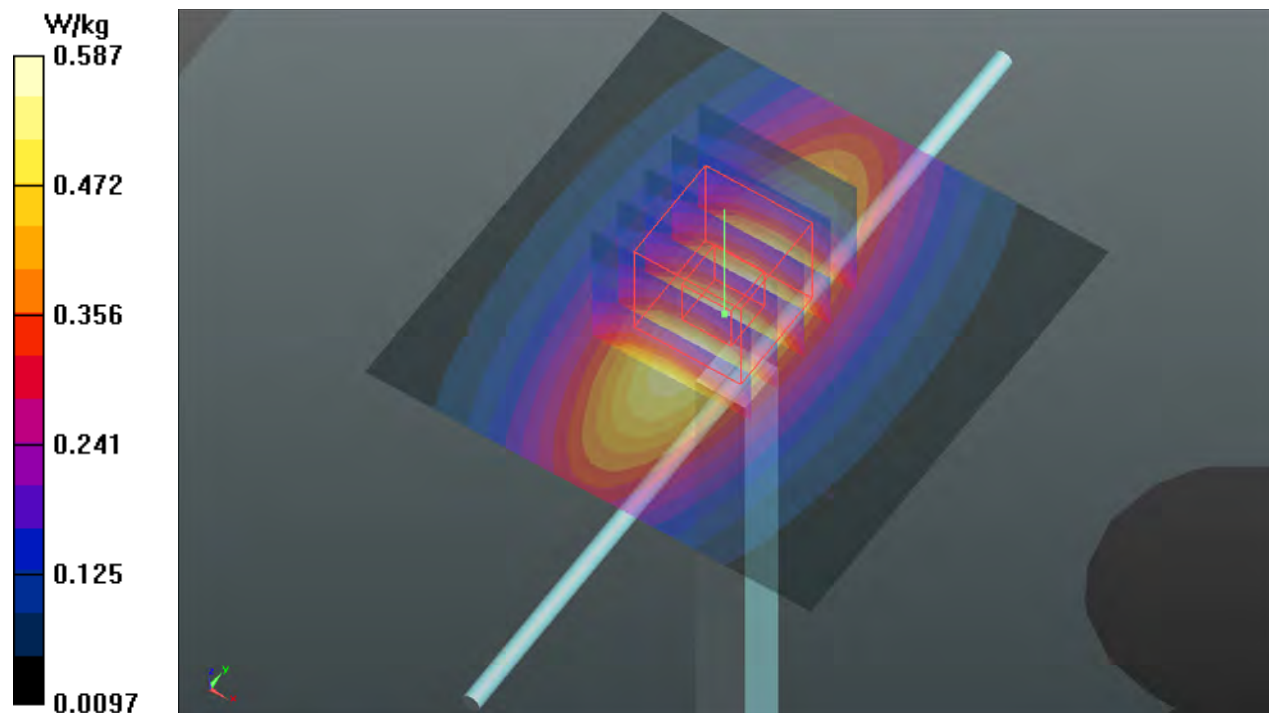
**Pin=50mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 25.90 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.664 W/kg

**SAR(1 g) = 0.433 W/kg; SAR(10 g) = 0.285 W/kg** (SAR corrected for target medium)

Maximum value of SAR (measured) = 0.588 W/kg



## System Check\_H1750\_200108

**DUT: Dipole 1750 MHz; Type: D1750V2; SN: 1055**

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

Medium: H16T20N1\_0108 Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.323$  S/m;  $\epsilon_r = 41.001$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(8.8, 8.8, 8.8); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

**Pin=50mW/Area Scan (61x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 2.52 W/kg

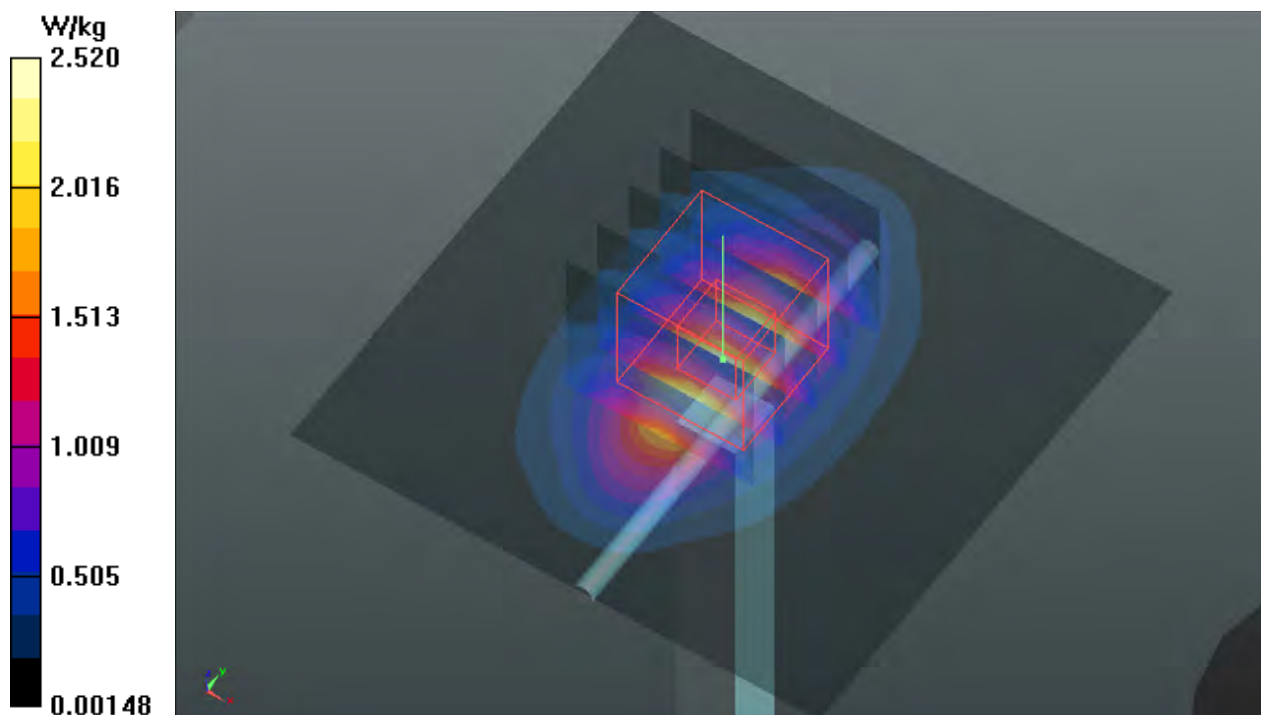
**Pin=50mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 44.80 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.07 W/kg

**SAR(1 g) = 1.69 W/kg; SAR(10 g) = 0.891 W/kg** (SAR corrected for target medium)

Maximum value of SAR (measured) = 2.57 W/kg



## System Check\_H1900\_200108

**DUT: Dipole 1900 MHz; Type: D1900V2; SN: 5d036**

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

Medium: H16T20N1\_0108 Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.454$  S/m;  $\epsilon_r = 40.457$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(8.47, 8.47, 8.47); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

**Pin=50mW/Area Scan (61x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 2.96 W/kg

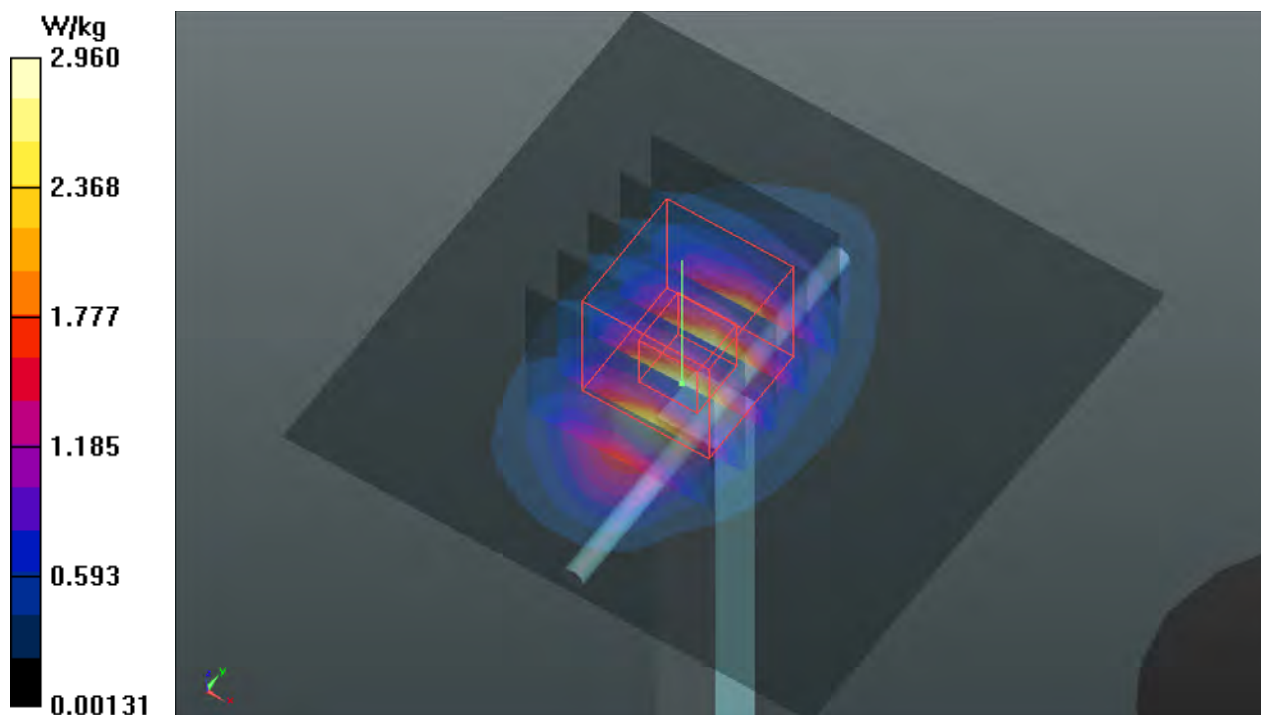
**Pin=50mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 43.45 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 3.58 W/kg

**SAR(1 g) = 1.85 W/kg; SAR(10 g) = 0.979 W/kg** (SAR corrected for target medium)

Maximum value of SAR (measured) = 2.93 W/kg



## System Check\_H2450\_200109

**DUT: Dipole 2450 MHz; Type: D2450V2; SN: 737**

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

Medium: H19T27N1\_0109 Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.86$  S/m;  $\epsilon_r = 38.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(7.65, 7.65, 7.65); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

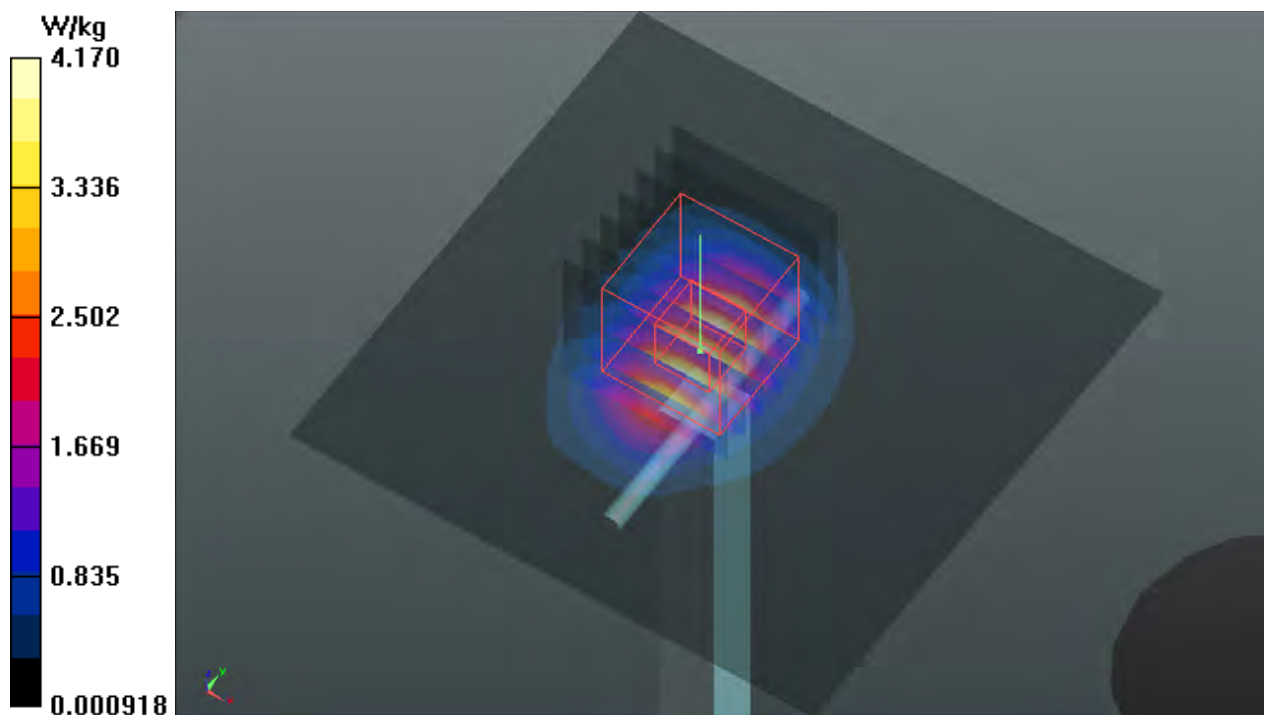
**Pin=50mW/Area Scan (81x81x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm  
 Maximum value of SAR (interpolated) = 4.17 W/kg

**Pin=50mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
 Reference Value = 42.33 V/m; Power Drift = 0.38 dB

Peak SAR (extrapolated) = 5.27 W/kg

**SAR(1 g) = 2.6 W/kg; SAR(10 g) = 1.24 W/kg** (SAR corrected for target medium)

Maximum value of SAR (measured) = 4.29 W/kg





## System Check\_H5250\_200109

**DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1019**

Communication System: CW; Frequency: 5250 MHz; Duty Cycle: 1:1

Medium: H34T60N1\_0109 Medium parameters used:  $f = 5250$  MHz;  $\sigma = 4.597$  S/m;  $\epsilon_r = 36.617$ ;  $\rho = 1000$  kg/m<sup>3</sup>

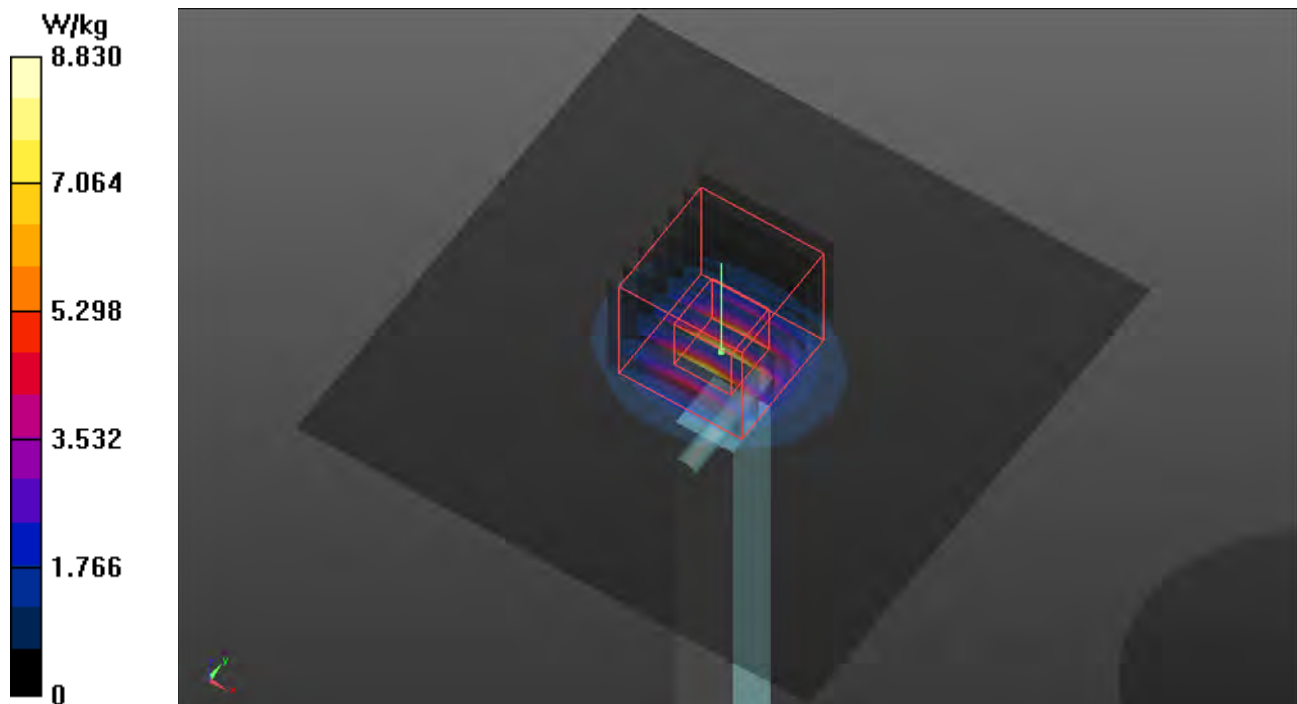
Ambient Temperature : 23.7 °C ; Liquid Temperature : 23.4 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3650; ConvF(5.4, 5.4, 5.4); Calibrated: 2019/05/20
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2019/05/08
- Phantom: SAM Phantom\_1982; Type: QD 000 P41 Ax; Serial: 1982
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

**Pin=50mW/Area Scan (91x91x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 8.83 W/kg

**Pin=50mW/Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm  
Reference Value = 50.02 V/m; Power Drift = -0.04 dB  
Peak SAR (extrapolated) = 15.0 W/kg  
**SAR(1 g) = 4.21 W/kg; SAR(10 g) = 1.14 W/kg** (SAR corrected for target medium)  
Maximum value of SAR (measured) = 9.53 W/kg





## System Check\_H5600\_200116

**DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1019**

Communication System: CW; Frequency: 5600 MHz; Duty Cycle: 1:1

Medium: H34T60N1\_0116 Medium parameters used:  $f = 5600$  MHz;  $\sigma = 4.966$  S/m;  $\epsilon_r = 35.967$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.5 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4.42, 4.42, 4.42); Calibrated: 2019/06/25
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn916; Calibrated: 2019/12/17
- Phantom: SAM Phantom\_1982; Type: QD 000 P41 Ax; Serial: 1982
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

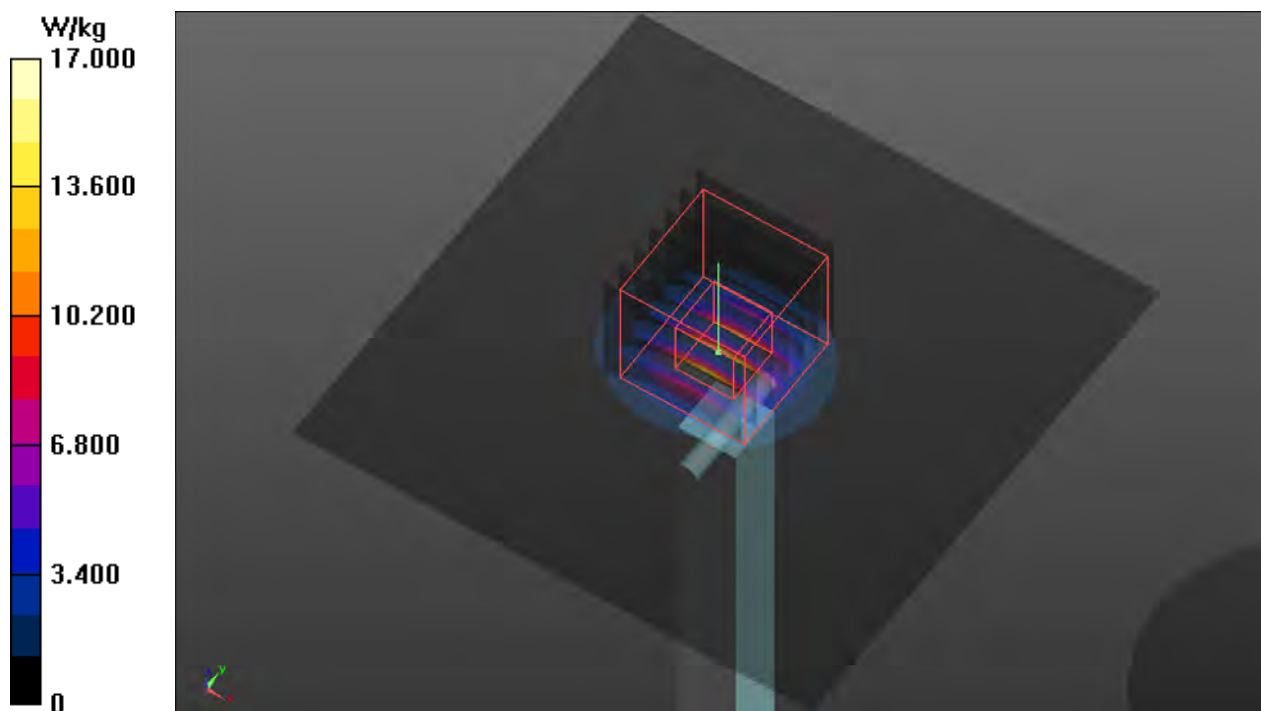
**Pin=50mW/Area Scan (91x91x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 17.0 W/kg

**Pin=50mW/Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm  
Reference Value = 64.12 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 29.4 W/kg

**SAR(1 g) = 4.36 W/kg; SAR(10 g) = 1.22 W/kg** (SAR corrected for target medium)

Maximum value of SAR (measured) = 16.5 W/kg



## System Check\_H5750\_200116

**DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1019**

Communication System: CW; Frequency: 5750 MHz; Duty Cycle: 1:1

Medium: H34T60N1\_0116 Medium parameters used:  $f = 5750$  MHz;  $\sigma = 5.305$  S/m;  $\epsilon_r = 34.339$ ;  $\rho = 1000$  kg/m<sup>3</sup>

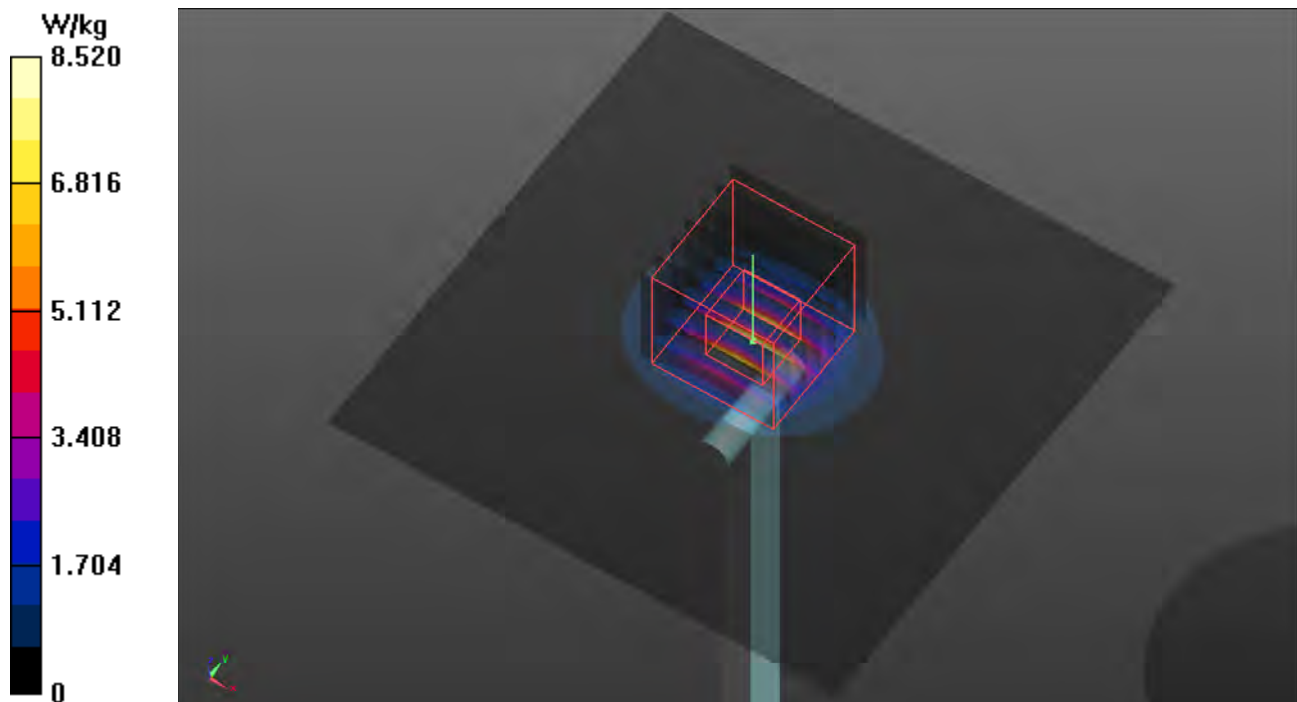
Ambient Temperature : 23.5 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4.41, 4.41, 4.41); Calibrated: 2019/06/25
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn916; Calibrated: 2019/12/17
- Phantom: SAM Phantom\_1982; Type: QD 000 P41 Ax; Serial: 1982
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

**Pin=50mW/Area Scan (91x91x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 8.52 W/kg

**Pin=50mW/Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm  
Reference Value = 44.73 V/m; Power Drift = -0.01 dB  
Peak SAR (extrapolated) = 16.6 W/kg  
**SAR(1 g) = 3.89 W/kg; SAR(10 g) = 1.12 W/kg** (SAR corrected for target medium)  
Maximum value of SAR (measured) = 9.53 W/kg



### Appendix B. SAR Plots of SAR Measurement

The SAR plots for highest measured SAR in each exposure configuration, wireless mode and frequency band combination, and measured SAR > 1.5 W/kg are shown as follows.

## P01 WCDMA II\_RMC12.2K\_Right Cheek\_Ch9538\_Sample1

### DUT: 191211C18

Communication System: UMTS-FDD (WCDMA); Frequency: 1907.6 MHz; Duty Cycle: 1:1.95  
Medium: H16T20N1\_0108 Medium parameters used:  $f = 1908$  MHz;  $\sigma = 1.462$  S/m;  $\epsilon_r = 40.43$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

#### DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(8.47, 8.47, 8.47); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x151x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 0.666 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 20.81 V/m; Power Drift = -0.14 dB

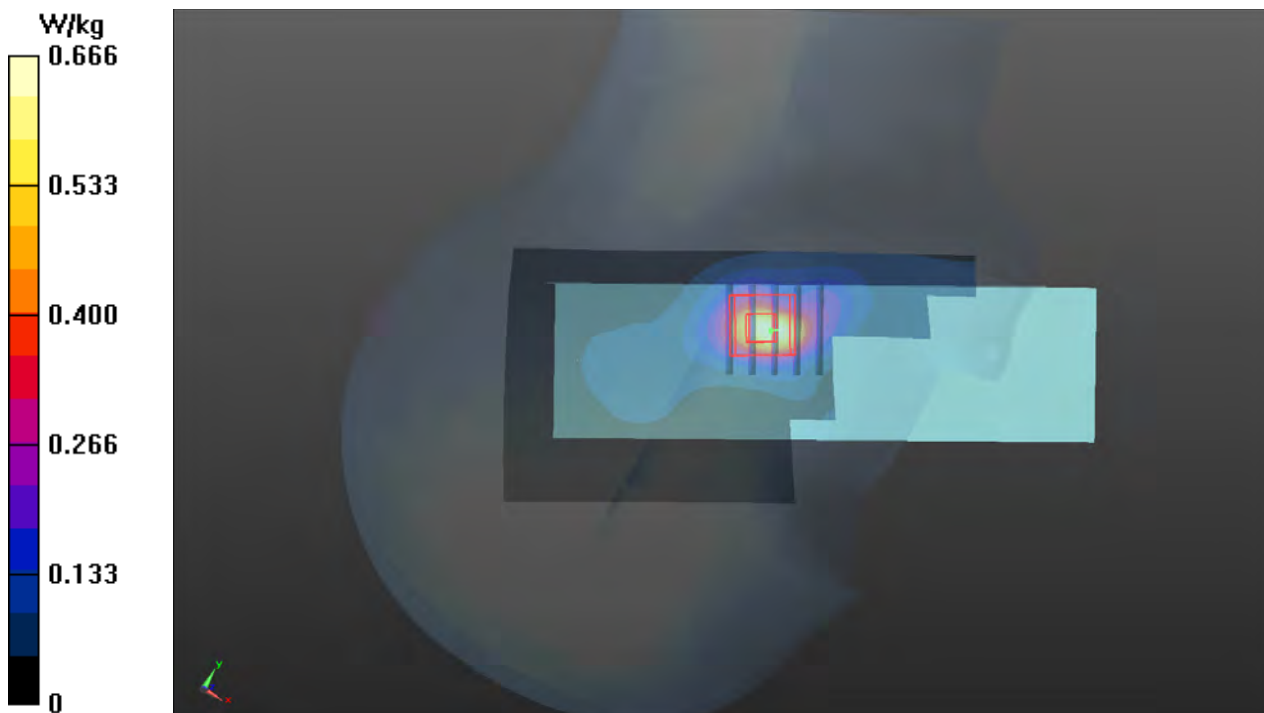
Peak SAR (extrapolated) = 0.749 W/kg

**SAR(1 g) = 0.418 W/kg; SAR(10 g) = 0.223 W/kg** (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 9.7 mm

Ratio of SAR at M2 to SAR at M1 = 55.6%

Maximum value of SAR (measured) = 0.630 W/kg



## P02 WCDMA V\_RMC12.2K\_Right Cheek\_Ch4233\_Sample1

### DUT: 191211C18

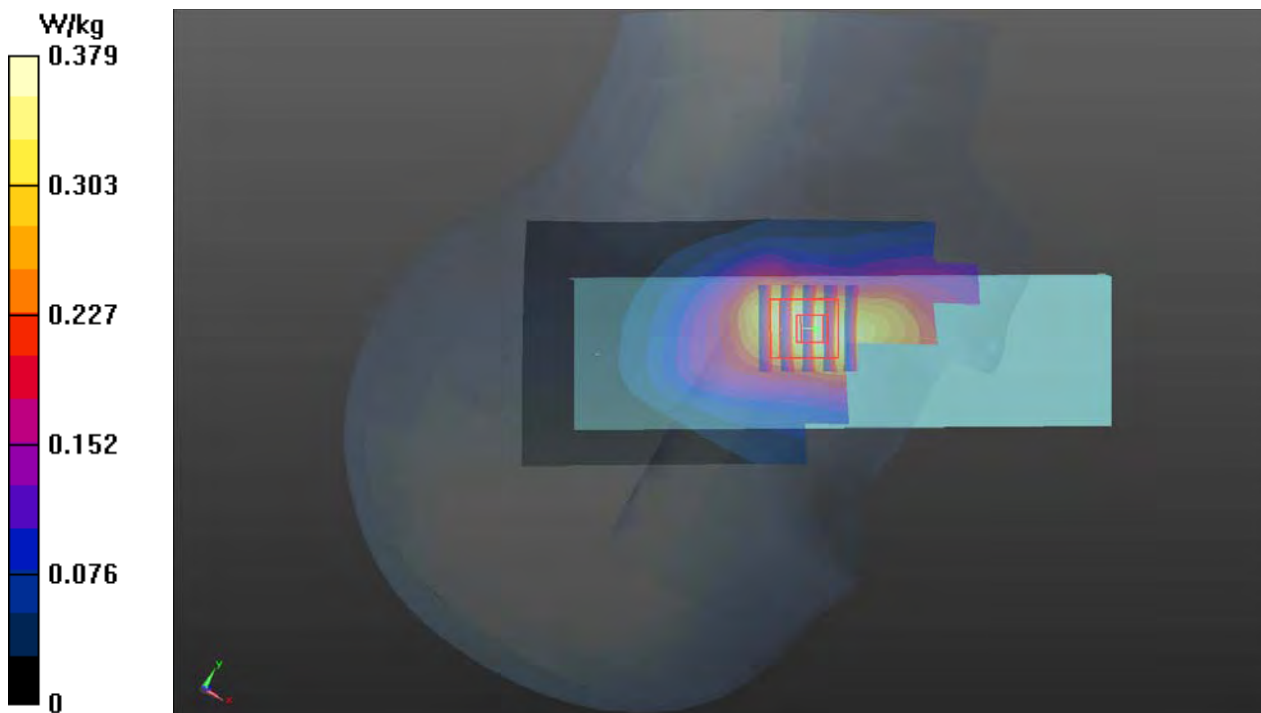
Communication System: UMTS-FDD (WCDMA); Frequency: 846.6 MHz; Duty Cycle: 1:1.95  
Medium: H07T10N1\_0108 Medium parameters used:  $f = 847$  MHz;  $\sigma = 0.973$  S/m;  $\epsilon_r = 41.457$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

#### DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(10.18, 10.18, 10.18); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x151x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 0.379 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 19.77 V/m; Power Drift = -0.01 dB  
Peak SAR (extrapolated) = 0.448 W/kg  
**SAR(1 g) = 0.293 W/kg; SAR(10 g) = 0.206 W/kg** (SAR corrected for target medium)  
Smallest distance from peaks to all points 3 dB below = 15.2 mm  
Ratio of SAR at M2 to SAR at M1 = 69.3%  
Maximum value of SAR (measured) = 0.400 W/kg



### P03 LTE 2\_QPSK20M\_Right Cheek\_Ch18700\_1RB\_OS0\_Sample1

**DUT: 191211C18**

Communication System: LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1860 MHz; Duty Cycle: 1:3.74

Medium: H16T20N1\_0108 Medium parameters used:  $f = 1860$  MHz;  $\sigma = 1.422$  S/m;  $\epsilon_r = 40.561$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(8.47, 8.47, 8.47); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x151x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 0.570 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.65 V/m; Power Drift = -0.13 dB

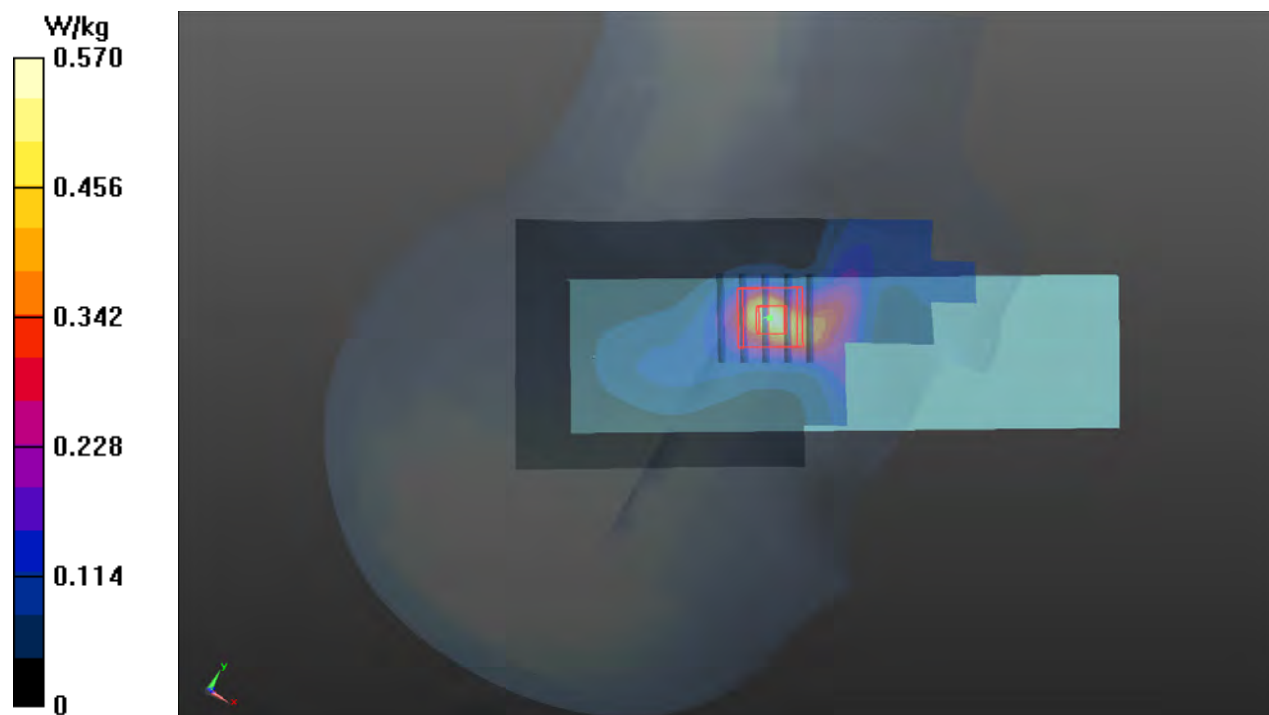
Peak SAR (extrapolated) = 0.688 W/kg

**SAR(1 g) = 0.370 W/kg; SAR(10 g) = 0.192 W/kg** (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 8.1 mm

Ratio of SAR at M2 to SAR at M1 = 64.2%

Maximum value of SAR (measured) = 0.534 W/kg



**P04 LTE 4\_QPSK20M\_Left Cheek\_Ch20175\_1RB\_OS0\_Sample1****DUT: 191211C18**

Communication System: LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1732.5 MHz; Duty Cycle: 1:3.74

Medium: H16T20N1\_0108 Medium parameters used:  $f = 1733$  MHz;  $\sigma = 1.307$  S/m;  $\epsilon_r = 41.06$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(8.8, 8.8, 8.8); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x151x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 0.799 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 26.99 V/m; Power Drift = -0.09 dB

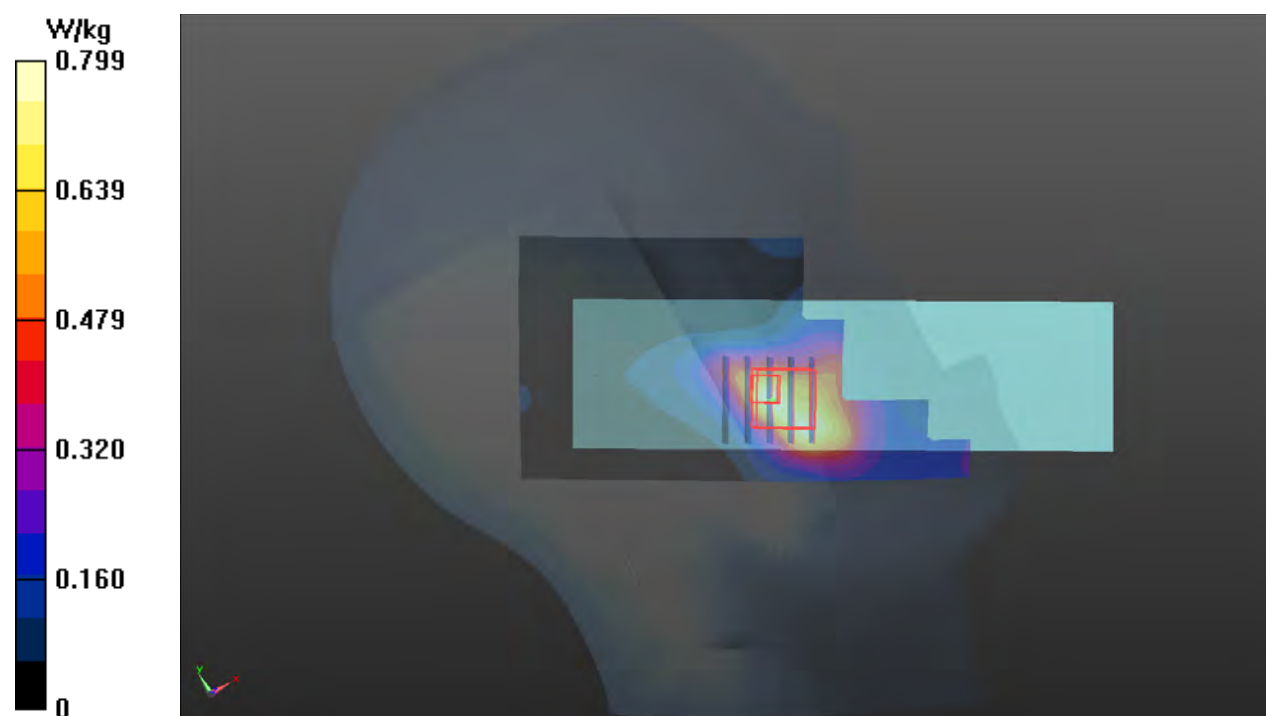
Peak SAR (extrapolated) = 1.09 W/kg

**SAR(1 g) = 0.583 W/kg; SAR(10 g) = 0.308 W/kg** (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 8.2 mm

Ratio of SAR at M2 to SAR at M1 = 51.3%

Maximum value of SAR (measured) = 0.878 W/kg





## P05 LTE 5\_QPSK10M\_Right Cheek\_Ch20600\_1RB\_OS0\_Sample1

**DUT: 191211C18**

Communication System: LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 844 MHz; Duty Cycle: 1:3.74

Medium: H07T10N1\_0108 Medium parameters used:  $f = 844$  MHz;  $\sigma = 0.933$  S/m;  $\epsilon_r = 42.377$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(10.18, 10.18, 10.18); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x151x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.393 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

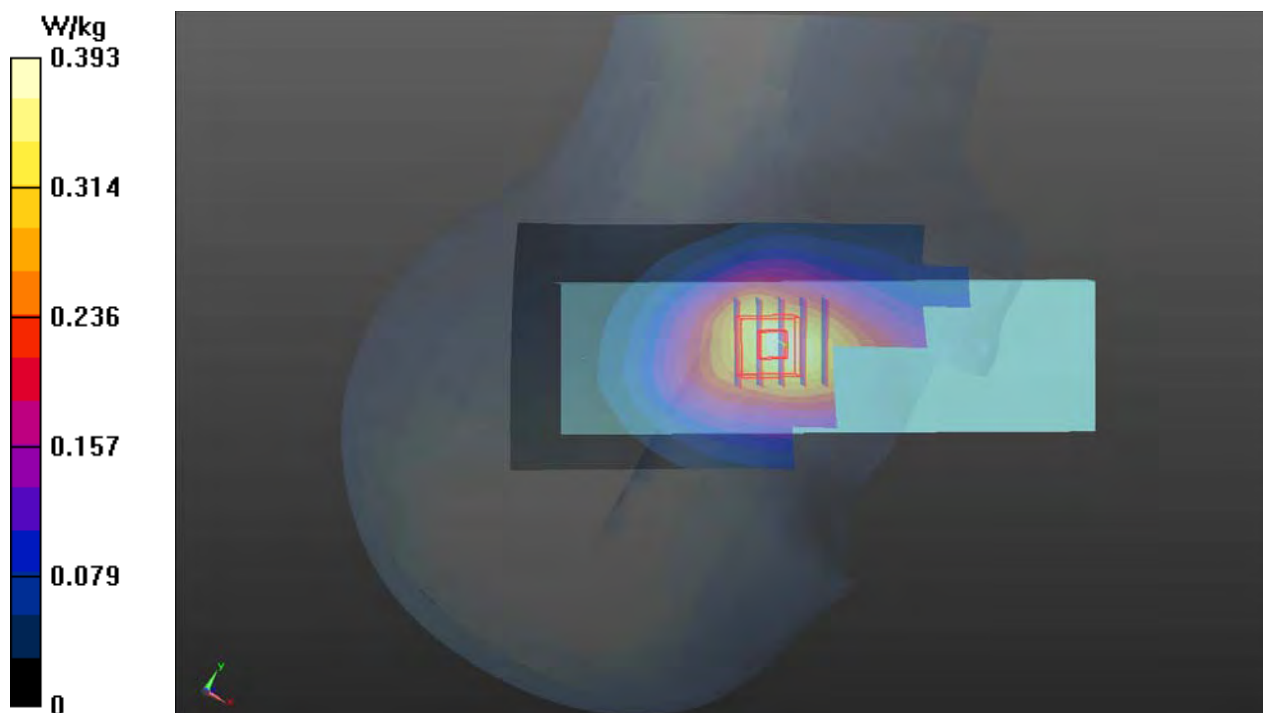
Reference Value = 21.04 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.436 W/kg

**SAR(1 g) = 0.298 W/kg; SAR(10 g) = 0.217 W/kg** (SAR corrected for target medium)

Ratio of SAR at M2 to SAR at M1 = 69%

Maximum value of SAR (measured) = 0.391 W/kg





### P06 LTE 12\_QPSK10M\_Right Cheek\_Ch23095\_1RB\_OS0\_Sample1

**DUT: 191211C18**

Communication System: LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 707.5 MHz; Duty Cycle: 1:3.74

Medium: H06T09N1\_0108 Medium parameters used:  $f = 707.5$  MHz;  $\sigma = 0.854$  S/m;  $\epsilon_r = 42.95$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(10.75, 10.75, 10.75); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x151x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 0.280 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.80 V/m; Power Drift = 0.00 dB

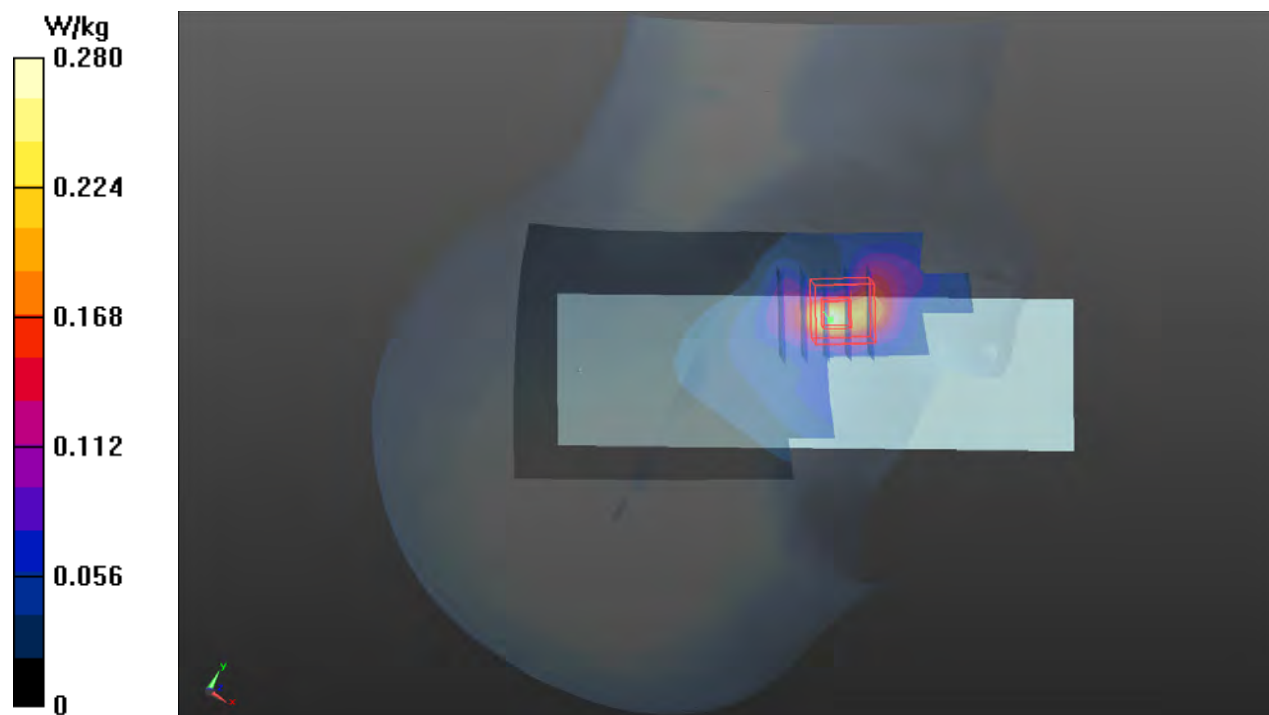
Peak SAR (extrapolated) = 0.300 W/kg

**SAR(1 g) = 0.176 W/kg; SAR(10 g) = 0.104 W/kg** (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 8.1 mm

Ratio of SAR at M2 to SAR at M1 = 58.8%

Maximum value of SAR (measured) = 0.255 W/kg



**P07 LTE 13\_QPSK10M\_Right Cheek\_Ch23230\_1RB\_OS0\_Sample1****DUT: 191211C18**

Communication System: LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 782 MHz; Duty Cycle: 1:3.74

Medium: H06T09N1\_0108 Medium parameters used:  $f = 782$  MHz;  $\sigma = 0.931$  S/m;  $\epsilon_r = 42.287$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(10.75, 10.75, 10.75); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x151x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 0.347 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

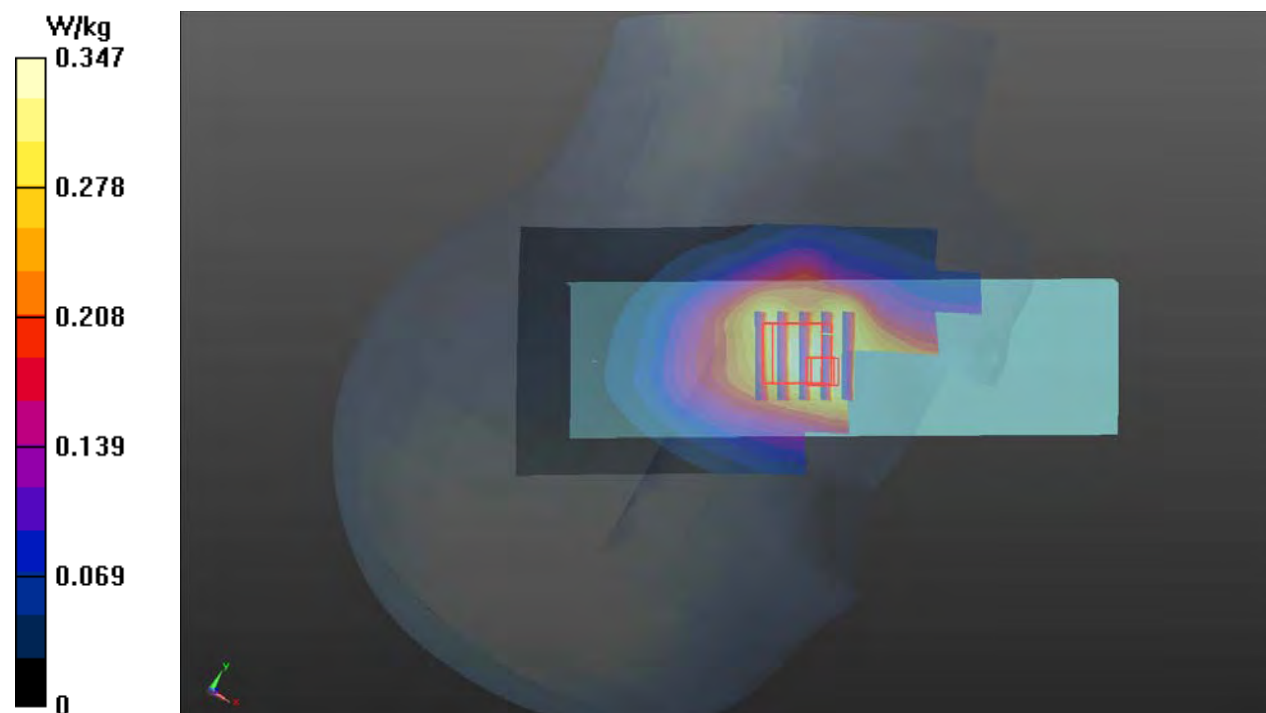
Reference Value = 19.67 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.404 W/kg

**SAR(1 g) = 0.270 W/kg; SAR(10 g) = 0.195 W/kg** (SAR corrected for target medium)

Ratio of SAR at M2 to SAR at M1 = 70.2%

Maximum value of SAR (measured) = 0.356 W/kg



## P08 WLAN2.4G\_802.11b\_Left Cheek\_Ch6\_Sample1

**DUT: 191211C18**

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle); Frequency: 2437 MHz; Duty Cycle: 1:1.01

Medium: H19T27N1\_0109 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.844$  S/m;  $\epsilon_r = 38.859$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.7 °C ; Liquid Temperature : 23.4 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3650; ConvF(7.63, 7.63, 7.63); Calibrated: 2019/05/20
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2019/05/08
- Phantom: SAM Phantom\_1982; Type: QD 000 P41 Ax; Serial: 1982
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (71x151x1)**: Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.0390 W/kg

- **Zoom Scan (7x7x7)/Cube 0**: Measurement grid: dx=5mm, dy=5mm, dz=5mm

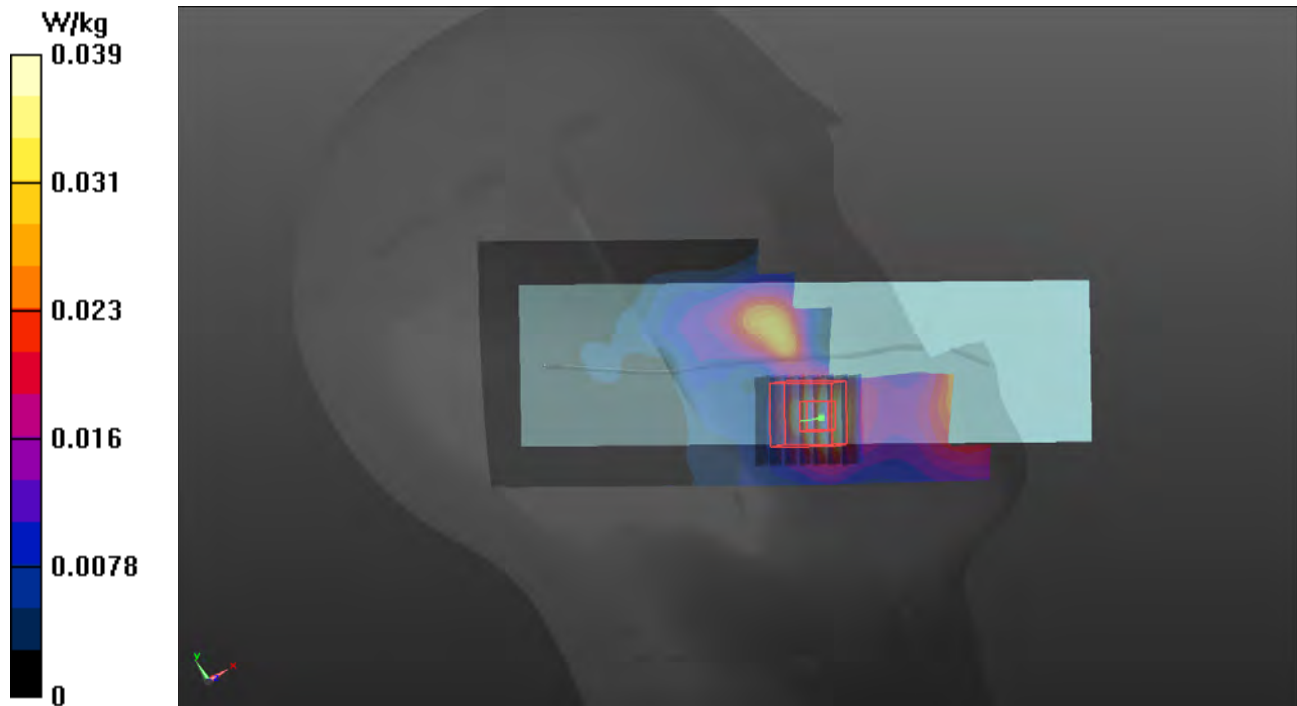
Reference Value = 4.399 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.0500 W/kg

**SAR(1 g) = 0.027 W/kg; SAR(10 g) = 0.012 W/kg** (SAR corrected for target medium)

Ratio of SAR at M2 to SAR at M1 = 57.4%

Maximum value of SAR (measured) = 0.0410 W/kg



## P09 WLAN5.3G\_802.11a\_Right Cheek\_Ch64\_Sample1

**DUT: 191211C18**

Communication System: IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle); Frequency: 5320 MHz; Duty Cycle: 1:1.09

Medium: H34T60N1\_0109 Medium parameters used:  $f = 5320$  MHz;  $\sigma = 4.68$  S/m;  $\epsilon_r = 36.522$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.7 °C ; Liquid Temperature : 23.4 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3650; ConvF(5.4, 5.4, 5.4); Calibrated: 2019/05/20
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2019/05/08
- Phantom: SAM Phantom\_1982; Type: QD 000 P41 Ax; Serial: 1982
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (101x181x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.478 W/kg

- **Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 1.996 V/m; Power Drift = 0.11 dB

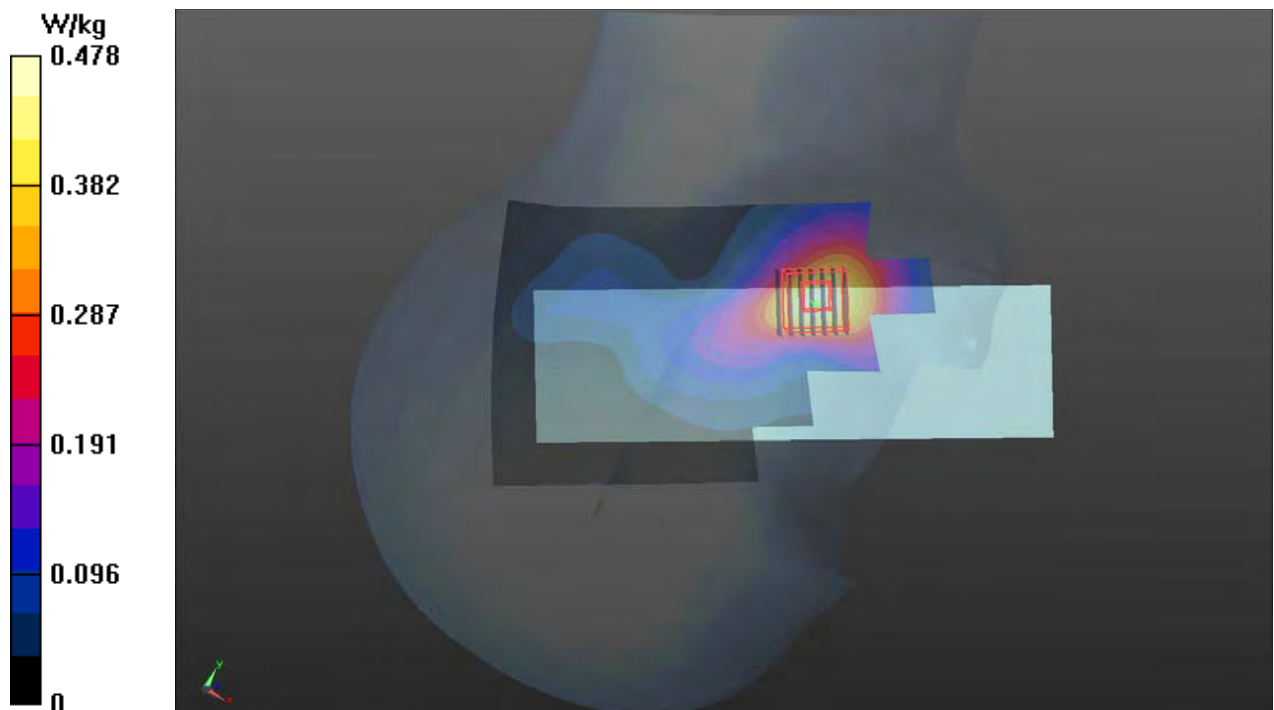
Peak SAR (extrapolated) = 0.436 W/kg

**SAR(1 g) = 0.038 W/kg; SAR(10 g) = 0.013 W/kg** (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 6.7 mm

Ratio of SAR at M2 to SAR at M1 = 52.6%

Maximum value of SAR (measured) = 0.0985 W/kg



## P10 WLAN5.6G\_802.11a\_Right Cheek\_Ch132\_Sample1

**DUT: 191211C18**

Communication System: IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle); Frequency: 5660 MHz; Duty Cycle: 1:1.09

Medium: H34T60N1\_0116 Medium parameters used:  $f = 5660$  MHz;  $\sigma = 4.874$  S/m;  $\epsilon_r = 35.927$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.5 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4.42, 4.42, 4.42); Calibrated: 2019/06/25
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn916; Calibrated: 2019/12/17
- Phantom: SAM Phantom\_1982; Type: QD 000 P41 Ax; Serial: 1982
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (101x241x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.158 W/kg

- **Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 2.856 V/m; Power Drift = 0.03 dB

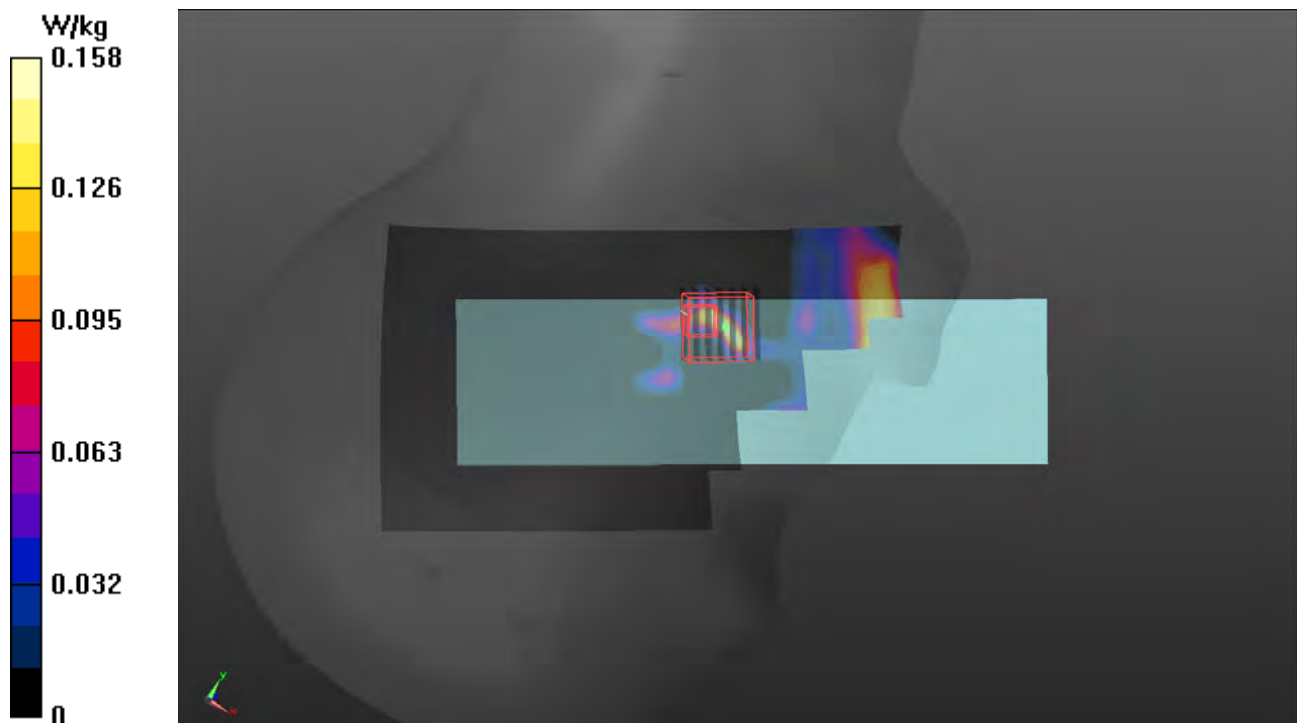
Peak SAR (extrapolated) = 0.281 W/kg

**SAR(1 g) = 0.038 W/kg; SAR(10 g) = 0.013 W/kg** (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 6.4 mm

Ratio of SAR at M2 to SAR at M1 = 55.4%

Maximum value of SAR (measured) = 0.113 W/kg



## P11 WLAN5.8G\_802.11a\_Right Cheek\_Ch165\_Sample1

**DUT: 191211C18**

Communication System: IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle); Frequency: 5825 MHz; Duty Cycle: 1:1.09

Medium: H34T60N1\_0116 Medium parameters used:  $f = 5825$  MHz;  $\sigma = 5.422$  S/m;  $\epsilon_r = 34.294$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.5 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4.41, 4.41, 4.41); Calibrated: 2019/06/25
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn916; Calibrated: 2019/12/17
- Phantom: SAM Phantom\_1982; Type: QD 000 P41 Ax; Serial: 1982
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (101x241x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.107 W/kg

- **Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

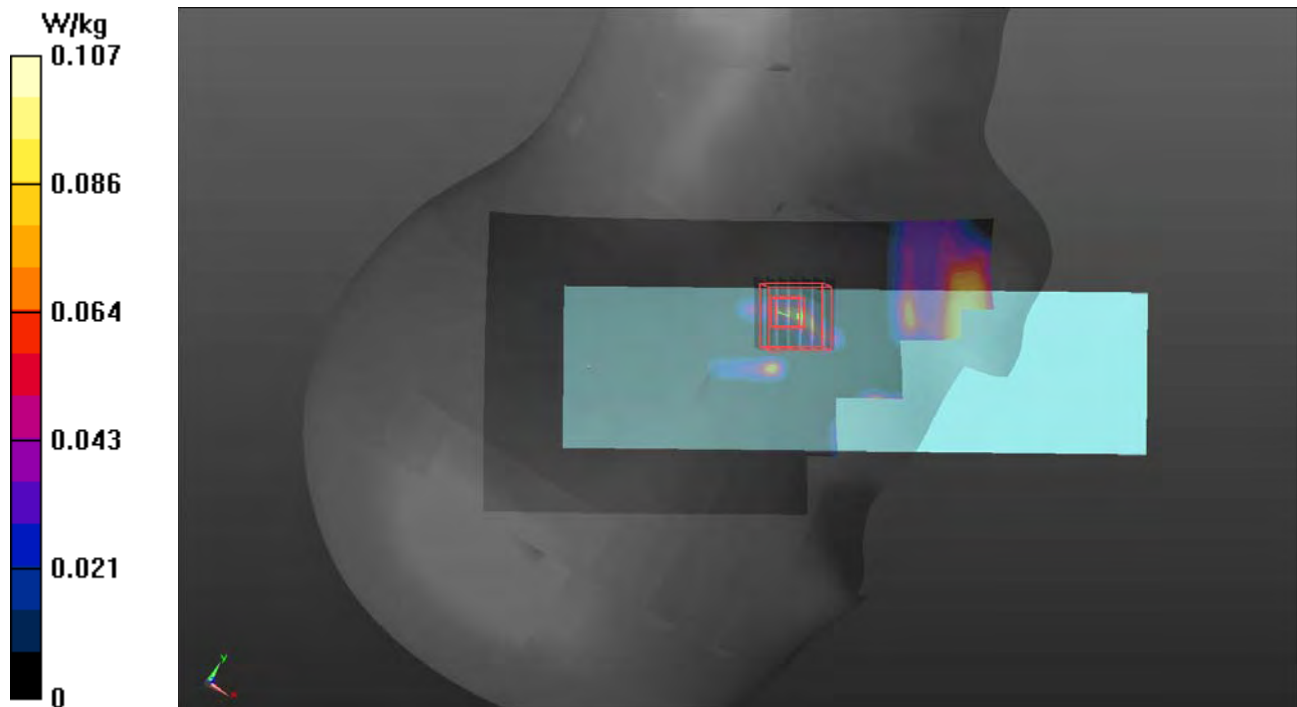
Reference Value = 2.611 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 0.192 W/kg

**SAR(1 g) = 0.024 W/kg; SAR(10 g) = 0.00744 W/kg** (SAR corrected for target medium)

Ratio of SAR at M2 to SAR at M1 = 58.8%

Maximum value of SAR (measured) = 0.0796 W/kg



## P12 WCDMA II\_RMC12.2K\_Rear Face\_15mm\_Ch9262\_Sample1

### DUT: 191211C18

Communication System: UMTS-FDD (WCDMA); Frequency: 1852.4 MHz; Duty Cycle: 1:1.95  
Medium: H16T20N1\_0108 Medium parameters used:  $f = 1852.4$  MHz;  $\sigma = 1.415$  S/m;  $\epsilon_r = 40.582$ ;  
 $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

#### DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(8.47, 8.47, 8.47); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x91x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 0.870 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 24.65 V/m; Power Drift = -0.06 dB

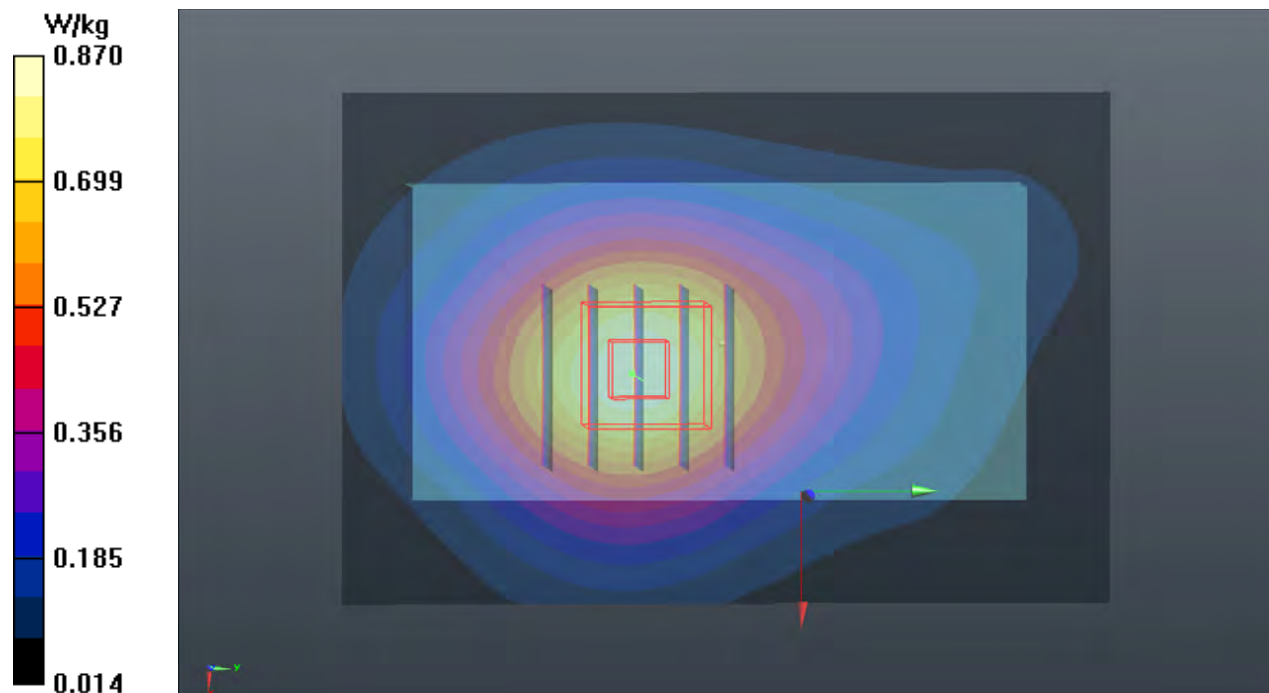
Peak SAR (extrapolated) = 1.03 W/kg

**SAR(1 g) = 0.649 W/kg; SAR(10 g) = 0.414 W/kg** (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 22.6 mm

Ratio of SAR at M2 to SAR at M1 = 63.2%

Maximum value of SAR (measured) = 0.891 W/kg





## P13 WCDMA V\_RMC12.2K\_Rear Face\_15mm\_Ch4233\_Sample1

### DUT: 191211C18

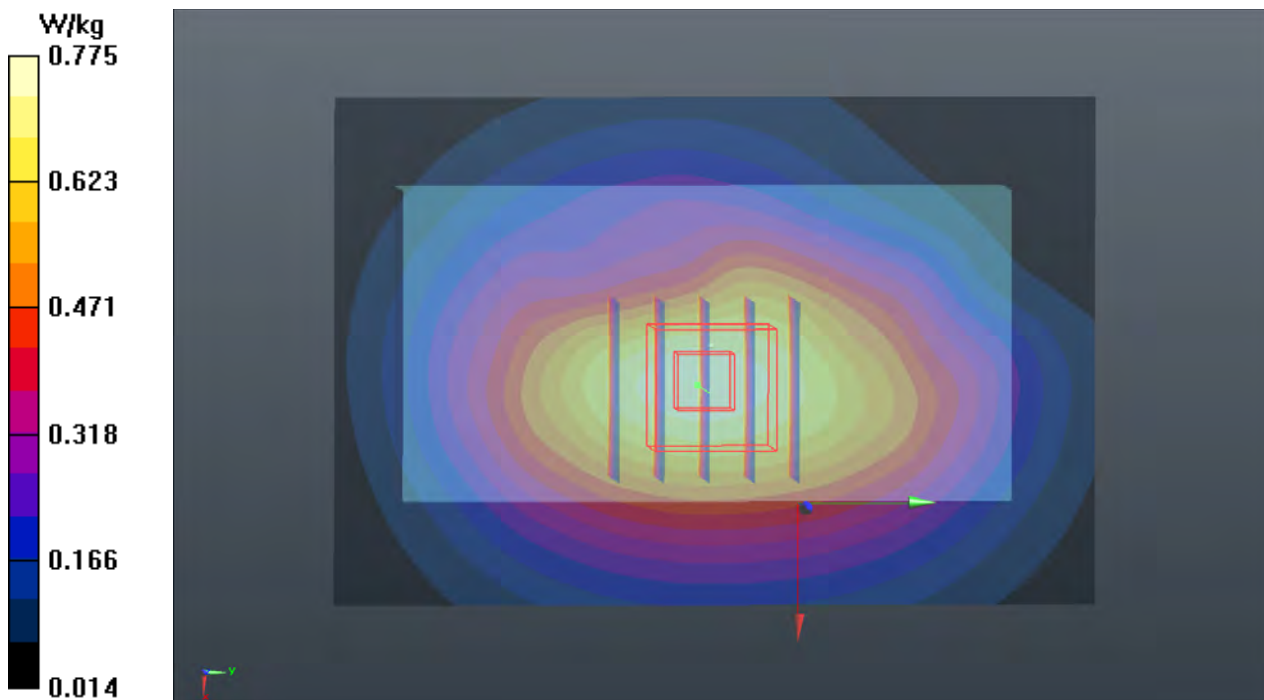
Communication System: UMTS-FDD (WCDMA); Frequency: 846.6 MHz; Duty Cycle: 1:1.95  
Medium: H07T10N1\_0108 Medium parameters used:  $f = 847$  MHz;  $\sigma = 0.937$  S/m;  $\epsilon_r = 42.342$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

#### DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(10.18, 10.18, 10.18); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x91x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 0.775 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 29.13 V/m; Power Drift = -0.12 dB  
Peak SAR (extrapolated) = 0.847 W/kg  
**SAR(1 g) = 0.611 W/kg; SAR(10 g) = 0.447 W/kg** (SAR corrected for target medium)  
Ratio of SAR at M2 to SAR at M1 = 73.4%  
Maximum value of SAR (measured) = 0.768 W/kg





# P14 LTE 2\_QPSK20M\_Rear Fcae\_15mm\_Ch18700\_1RB\_OS0\_Sample1

**DUT: 191211C18**

Communication System: LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1860 MHz; Duty Cycle: 1:3.74

Medium: H16T20N2\_0109 Medium parameters used:  $f = 1860$  MHz;  $\sigma = 1.434$  S/m;  $\epsilon_r = 40.898$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(8.47, 8.47, 8.47); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x91x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.773 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 23.15 V/m; Power Drift = -0.02 dB

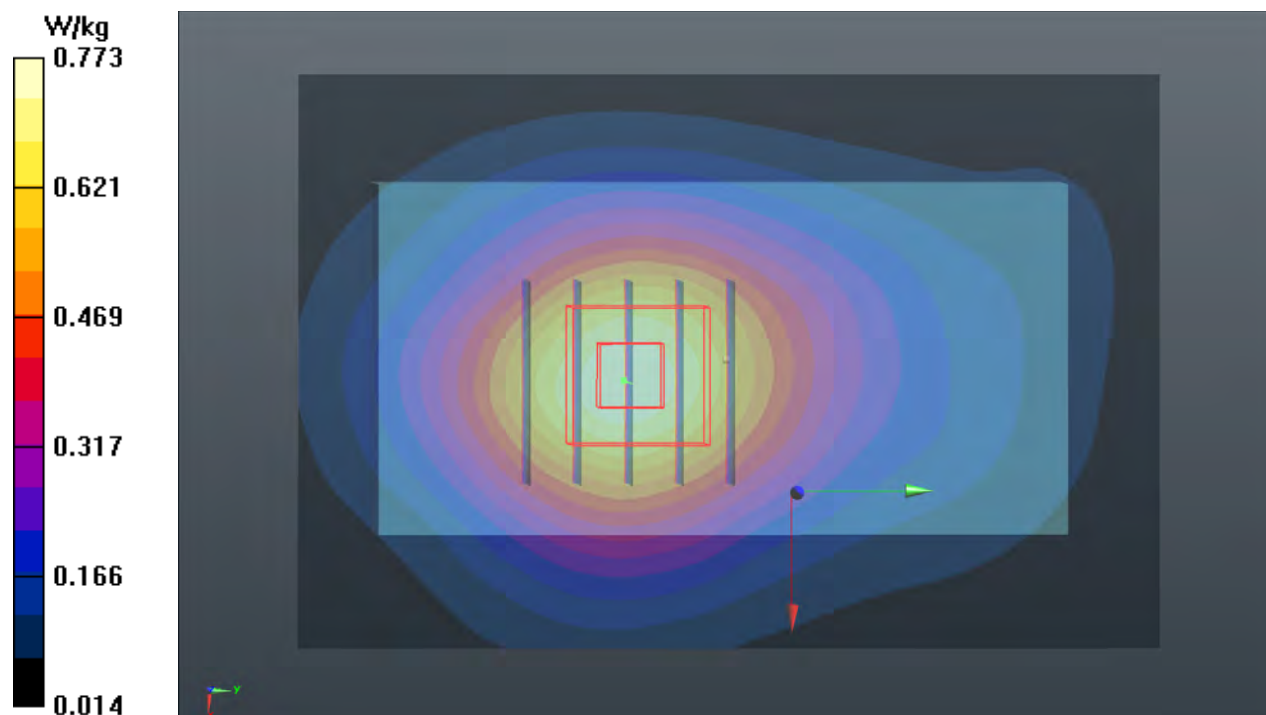
Peak SAR (extrapolated) = 0.910 W/kg

**SAR(1 g) = 0.563 W/kg; SAR(10 g) = 0.354 W/kg** (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 17.9 mm

Ratio of SAR at M2 to SAR at M1 = 63.8%

Maximum value of SAR (measured) = 0.786 W/kg



## P15 LTE 4\_QPSK20M\_Rear Fcae\_15mm\_Ch20300\_1RB\_OS0\_Sample1

**DUT: 191211C18**

Communication System: LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1745 MHz; Duty Cycle: 1:3.74

Medium: H16T20N2\_0109 Medium parameters used:  $f = 1745$  MHz;  $\sigma = 1.329$  S/m;  $\epsilon_r = 41.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(8.8, 8.8, 8.8); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x91x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.840 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 25.35 V/m; Power Drift = -0.15 dB

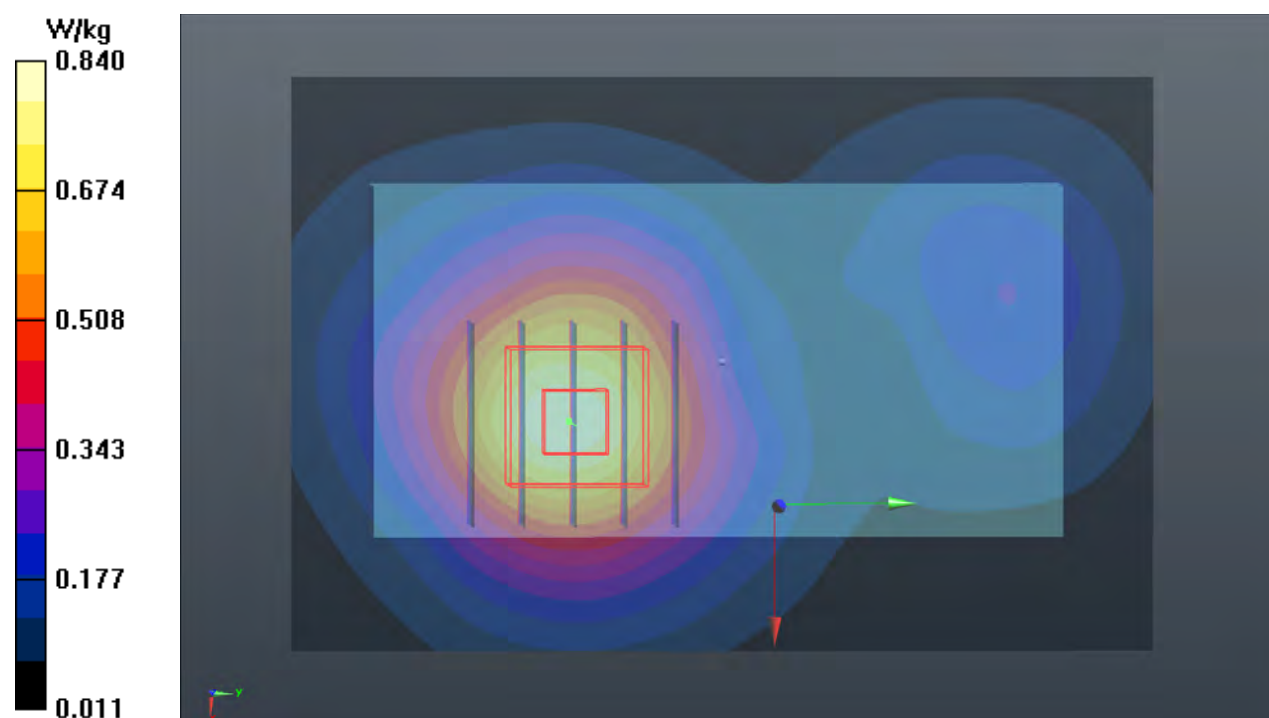
Peak SAR (extrapolated) = 0.993 W/kg

**SAR(1 g) = 0.635 W/kg; SAR(10 g) = 0.389 W/kg** (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 19.5 mm

Ratio of SAR at M2 to SAR at M1 = 63.2%

Maximum value of SAR (measured) = 0.858 W/kg



# P16 LTE 5\_QPSK10M\_Rear Fcae\_15mm\_Ch20525\_1RB\_OS0\_Sample1

**DUT: 191211C18**

Communication System: LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 836.5 MHz; Duty Cycle: 1:3.74

Medium: H07T10N1\_0109 Medium parameters used:  $f = 836.5$  MHz;  $\sigma = 0.938$  S/m;  $\epsilon_r = 43.151$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(10.18, 10.18, 10.18); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x91x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.690 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

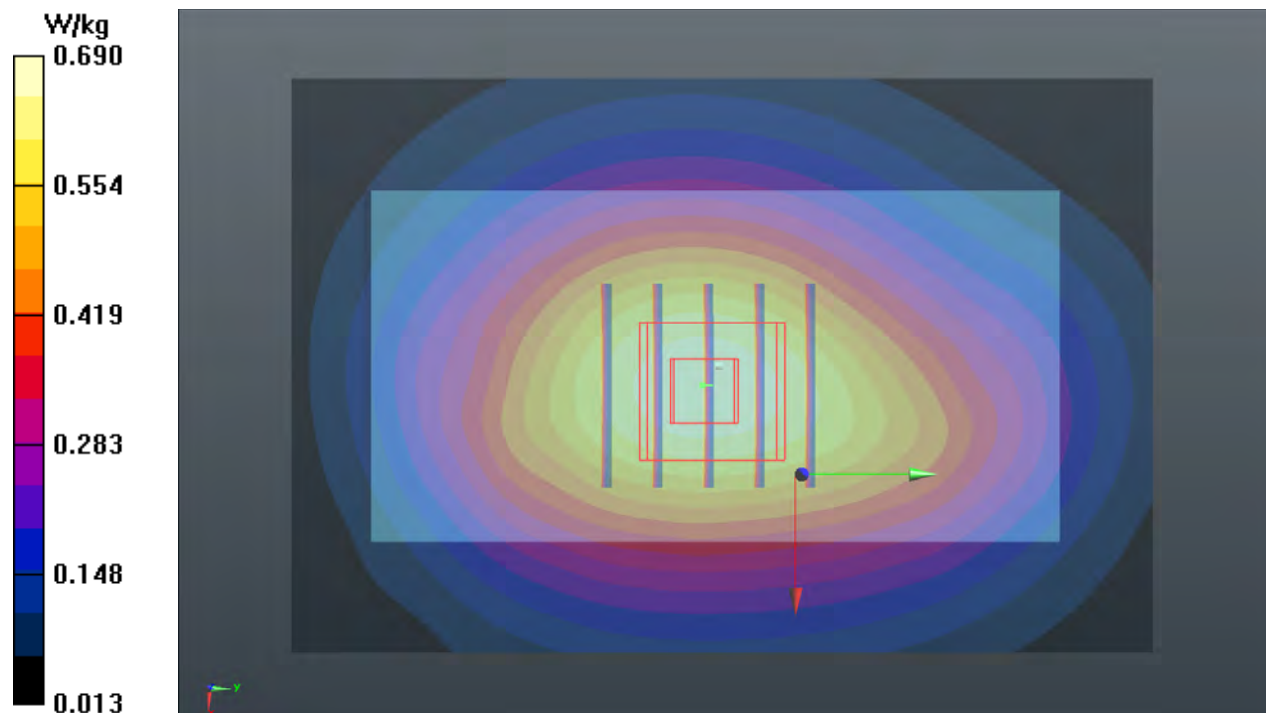
Reference Value = 27.30 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.751 W/kg

**SAR(1 g) = 0.533 W/kg; SAR(10 g) = 0.382 W/kg** (SAR corrected for target medium)

Ratio of SAR at M2 to SAR at M1 = 72.6%

Maximum value of SAR (measured) = 0.684 W/kg



## P17 LTE 12\_QPSK10M\_Rear Fcae\_15mm\_Ch23130\_1RB\_OS0\_Sample1

**DUT: 191211C18**

Communication System: LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 711 MHz; Duty Cycle: 1:3.74

Medium: H06T09N1\_0108 Medium parameters used:  $f = 711$  MHz;  $\sigma = 0.856$  S/m;  $\epsilon_r = 42.842$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(10.75, 10.75, 10.75); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x91x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.331 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

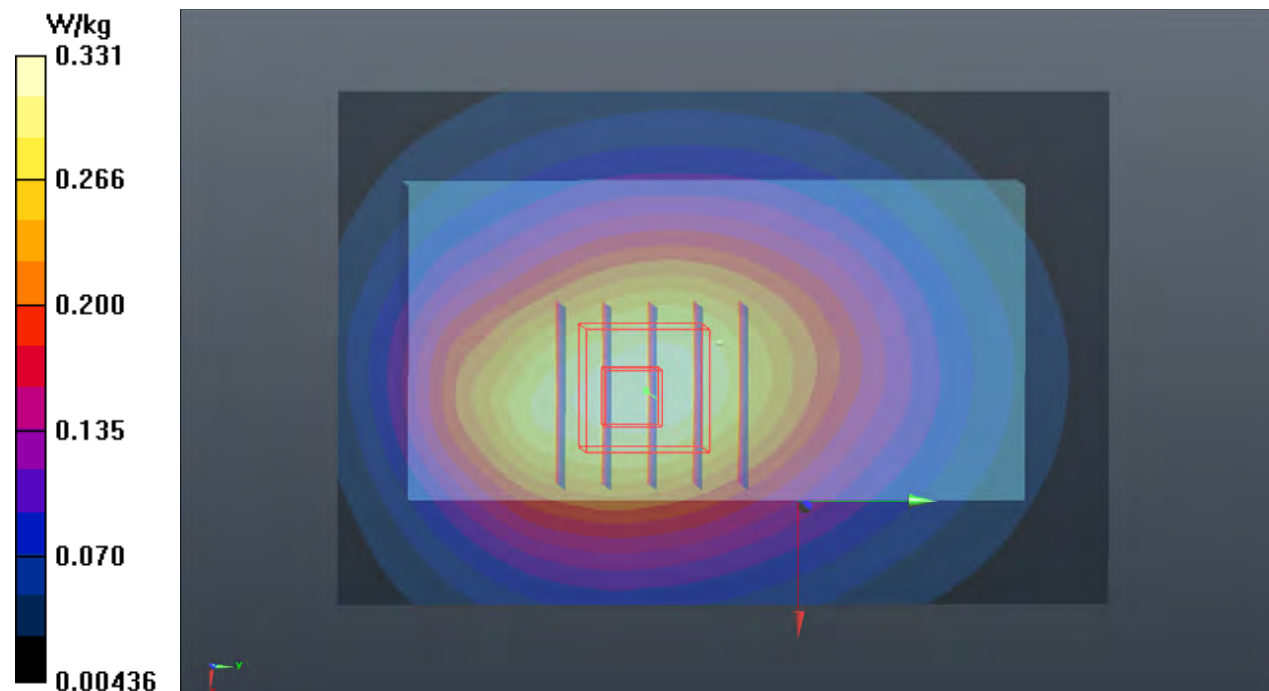
Reference Value = 19.61 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 0.373 W/kg

**SAR(1 g) = 0.272 W/kg; SAR(10 g) = 0.194 W/kg** (SAR corrected for target medium)

Ratio of SAR at M2 to SAR at M1 = 71.3%

Maximum value of SAR (measured) = 0.332 W/kg



# P18 LTE 13\_QPSK10M\_Rear Fcae\_15mm\_Ch23230\_1RB\_OS0\_Sample1

**DUT: 191211C18**

Communication System: LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 782 MHz; Duty Cycle: 1:3.74

Medium: H06T09N1\_0108 Medium parameters used:  $f = 782$  MHz;  $\sigma = 0.931$  S/m;  $\epsilon_r = 42.287$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(10.75, 10.75, 10.75); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x91x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.487 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

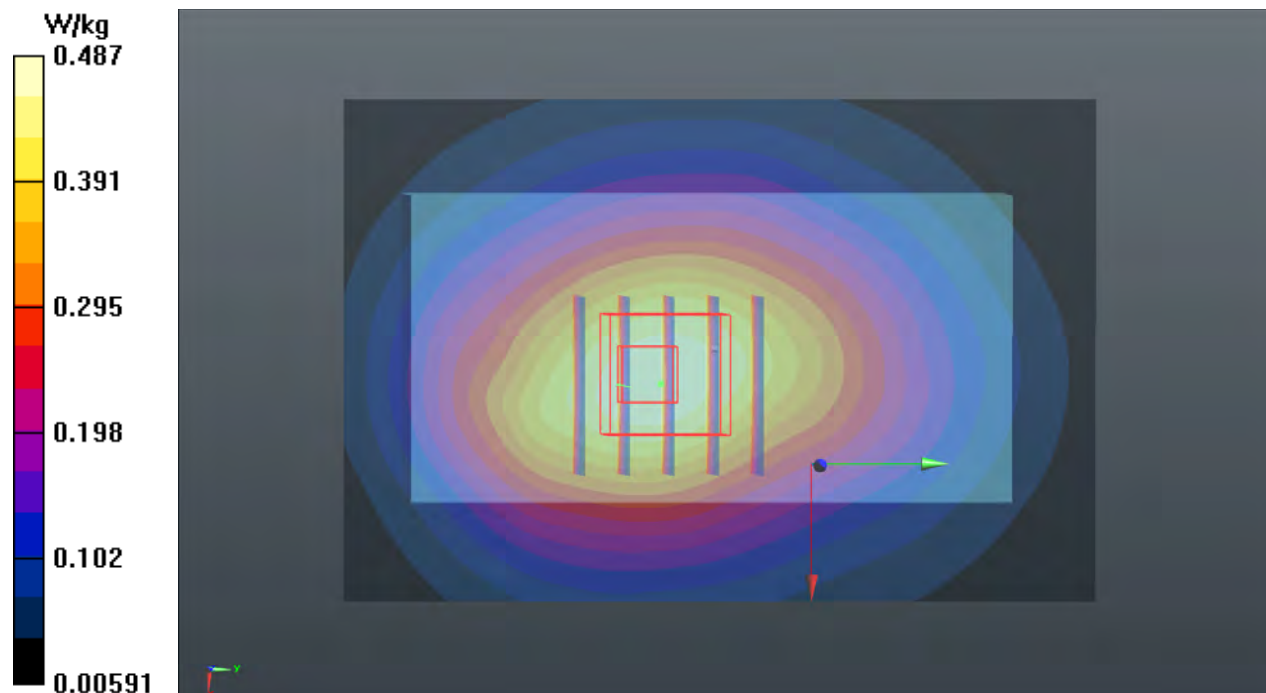
Reference Value = 24.00 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 0.557 W/kg

**SAR(1 g) = 0.384 W/kg; SAR(10 g) = 0.278 W/kg** (SAR corrected for target medium)

Ratio of SAR at M2 to SAR at M1 = 71.8%

Maximum value of SAR (measured) = 0.492 W/kg



## P19 WLAN2.4G\_802.11b\_Rear Face\_15mm\_Ch1\_Sample1

### DUT: 191211C18

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle);

Frequency: 2412 MHz; Duty Cycle: 1:1.01

Medium: H19T27N1\_0109 Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.824$  S/m;  $\epsilon_r = 38.877$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

#### DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(7.65, 7.65, 7.65); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (71x121x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.248 W/kg

- **Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 11.94 V/m; Power Drift = -0.03 dB

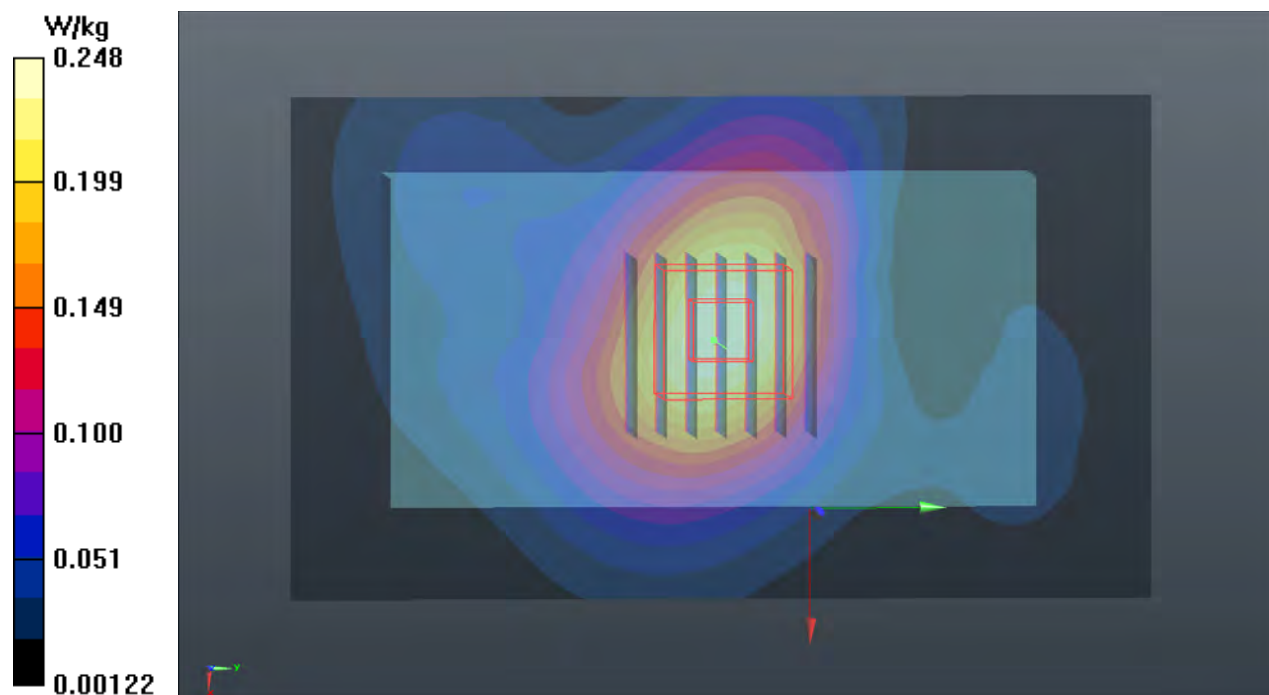
Peak SAR (extrapolated) = 0.292 W/kg

**SAR(1 g) = 0.170 W/kg; SAR(10 g) = 0.101 W/kg** (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 19.2 mm

Ratio of SAR at M2 to SAR at M1 = 57.8%

Maximum value of SAR (measured) = 0.246 W/kg





## P20 WLAN5.3G\_802.11a\_Rear Face\_15mm\_Ch52\_Sample1

**DUT: 191211C18**

Communication System: IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle); Frequency: 5260 MHz; Duty Cycle: 1:1.09

Medium: H34T60N1\_0109 Medium parameters used:  $f = 5260$  MHz;  $\sigma = 4.611$  S/m;  $\epsilon_r = 36.609$ ;  $\rho = 1000$  kg/m<sup>3</sup>

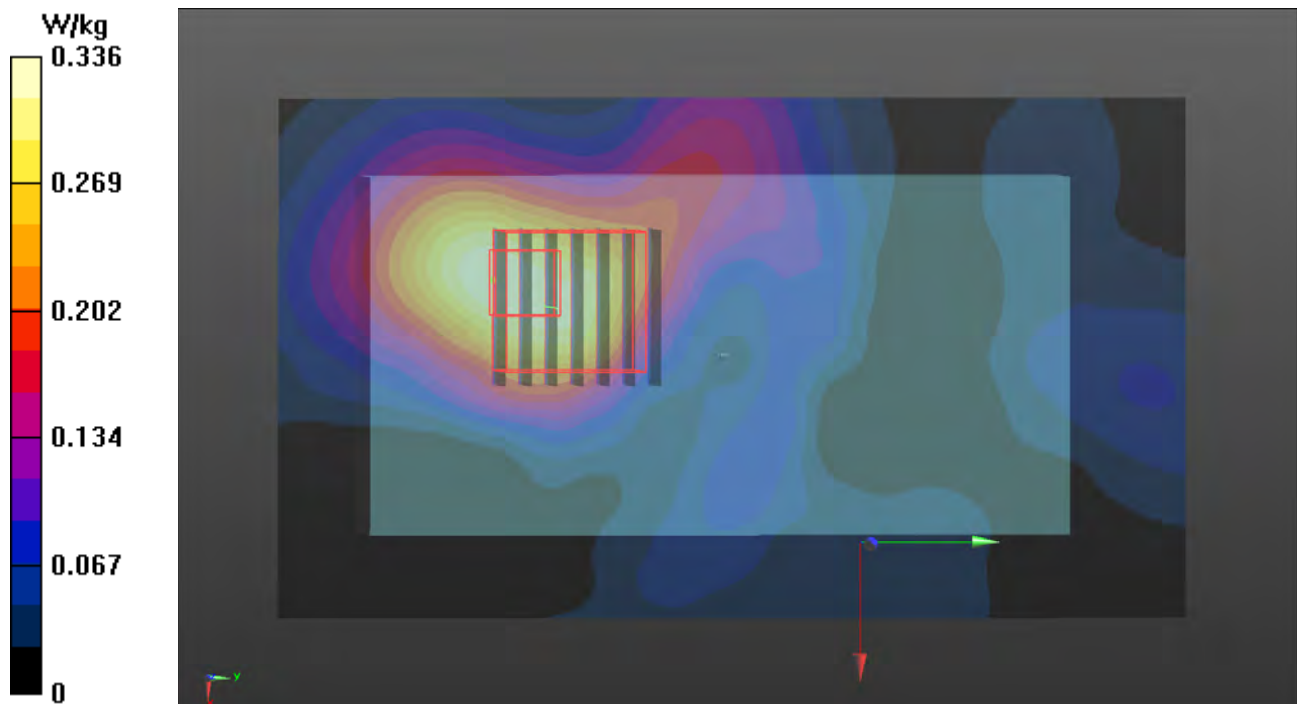
Ambient Temperature : 23.7 °C ; Liquid Temperature : 23.4 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3650; ConvF(5.4, 5.4, 5.4); Calibrated: 2019/05/20
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2019/05/08
- Phantom: SAM Phantom\_1982; Type: QD 000 P41 Ax; Serial: 1982
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (81x141x1)**: Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 0.336 W/kg

- **Zoom Scan (7x7x7)/Cube 0**: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
Reference Value = 9.226 V/m; Power Drift = -0.12 dB  
Peak SAR (extrapolated) = 0.478 W/kg  
**SAR(1 g) = 0.145 W/kg; SAR(10 g) = 0.057 W/kg** (SAR corrected for target medium)  
Smallest distance from peaks to all points 3 dB below = 16 mm  
Ratio of SAR at M2 to SAR at M1 = 65.6%  
Maximum value of SAR (measured) = 0.319 W/kg



## P21 WLAN5.6G\_802.11a\_Rear Face\_15mm\_Ch132\_Sample1

**DUT: 191211C18**

Communication System: IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle); Frequency: 5660 MHz; Duty Cycle: 1:1.09

Medium: H34T60N1\_0116 Medium parameters used:  $f = 5660$  MHz;  $\sigma = 4.874$  S/m;  $\epsilon_r = 35.927$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.5 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4.42, 4.42, 4.42); Calibrated: 2019/06/25
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn916; Calibrated: 2019/12/17
- Phantom: SAM Phantom\_1982; Type: QD 000 P41 Ax; Serial: 1982
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (81x141x1)**: Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 0.370 W/kg

- **Zoom Scan (7x7x7)/Cube 0**: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
Reference Value = 8.974 V/m; Power Drift = -0.02 dB

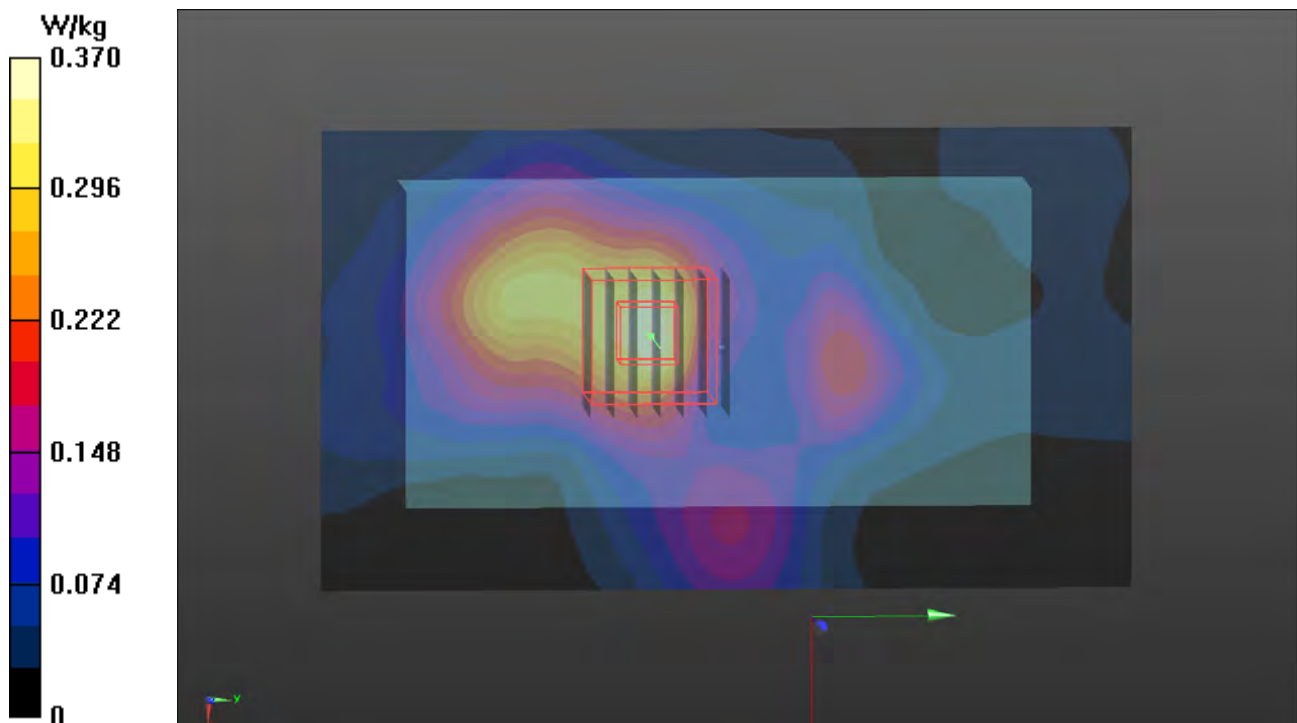
Peak SAR (extrapolated) = 0.737 W/kg

**SAR(1 g) = 0.129 W/kg; SAR(10 g) = 0.046 W/kg** (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 11.2 mm

Ratio of SAR at M2 to SAR at M1 = 63.8%

Maximum value of SAR (measured) = 0.367 W/kg





## P22 WLAN5.8G\_802.11a\_Rear Face\_15mm\_Ch153\_Sample1

**DUT: 191211C18**

Communication System: IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle); Frequency: 5765 MHz; Duty Cycle: 1:1.09

Medium: H34T60N1\_0116 Medium parameters used:  $f = 5765$  MHz;  $\sigma = 5.33$  S/m;  $\epsilon_r = 34.276$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.5 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4.41, 4.41, 4.41); Calibrated: 2019/06/25
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn916; Calibrated: 2019/12/17
- Phantom: SAM Phantom\_1982; Type: QD 000 P41 Ax; Serial: 1982
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (81x141x1)**: Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 0.364 W/kg

- **Zoom Scan (7x7x7)/Cube 0**: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
Reference Value = 8.979 V/m; Power Drift = -0.06 dB

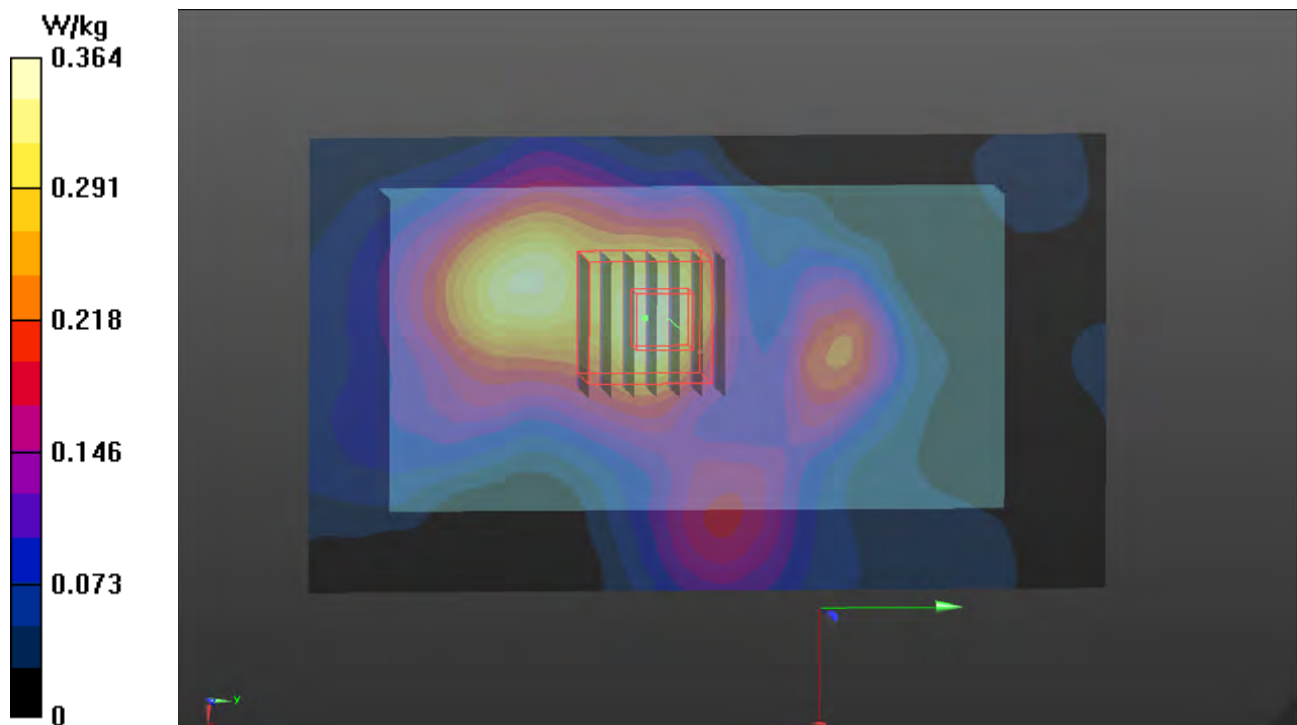
Peak SAR (extrapolated) = 0.583 W/kg

**SAR(1 g) = 0.124 W/kg; SAR(10 g) = 0.048 W/kg** (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 14.7 mm

Ratio of SAR at M2 to SAR at M1 = 61.5%

Maximum value of SAR (measured) = 0.365 W/kg



## P23 WCDMA II\_RMC12.2K\_Rear Face\_10mm\_Ch9262\_Sample1\_Reduction\_w

**DUT: 191211C18**

Communication System: UMTS-FDD (WCDMA); Frequency: 1852.4 MHz; Duty Cycle: 1:1.95  
Medium: H16T20N1\_0108 Medium parameters used:  $f = 1852.4$  MHz;  $\sigma = 1.415$  S/m;  $\epsilon_r = 40.582$ ;  
 $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(8.47, 8.47, 8.47); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x91x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 1.01 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 25.98 V/m; Power Drift = -0.13 dB

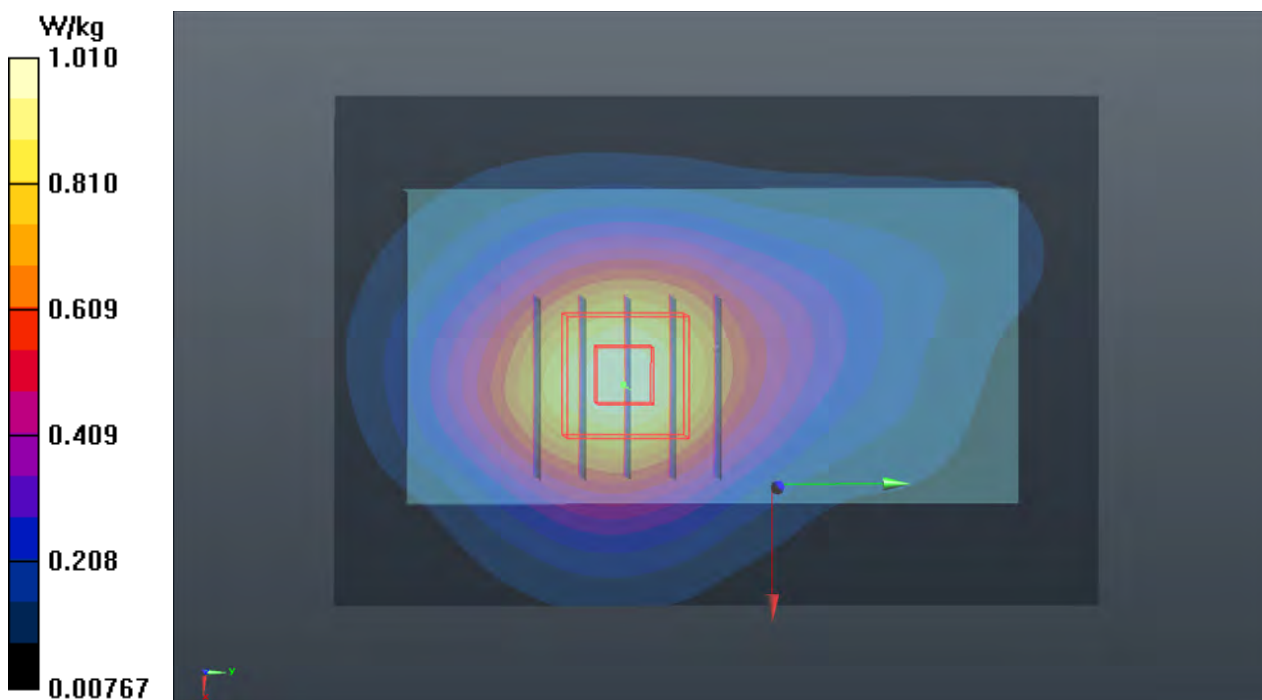
Peak SAR (extrapolated) = 1.16 W/kg

**SAR(1 g) = 0.730 W/kg; SAR(10 g) = 0.457 W/kg** (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 20 mm

Ratio of SAR at M2 to SAR at M1 = 63.5%

Maximum value of SAR (measured) = 1.00 W/kg



## P24 WCDMA V\_RMC12.2K\_Rear Face\_10mm\_Ch4233\_Sample1

### DUT: 191211C18

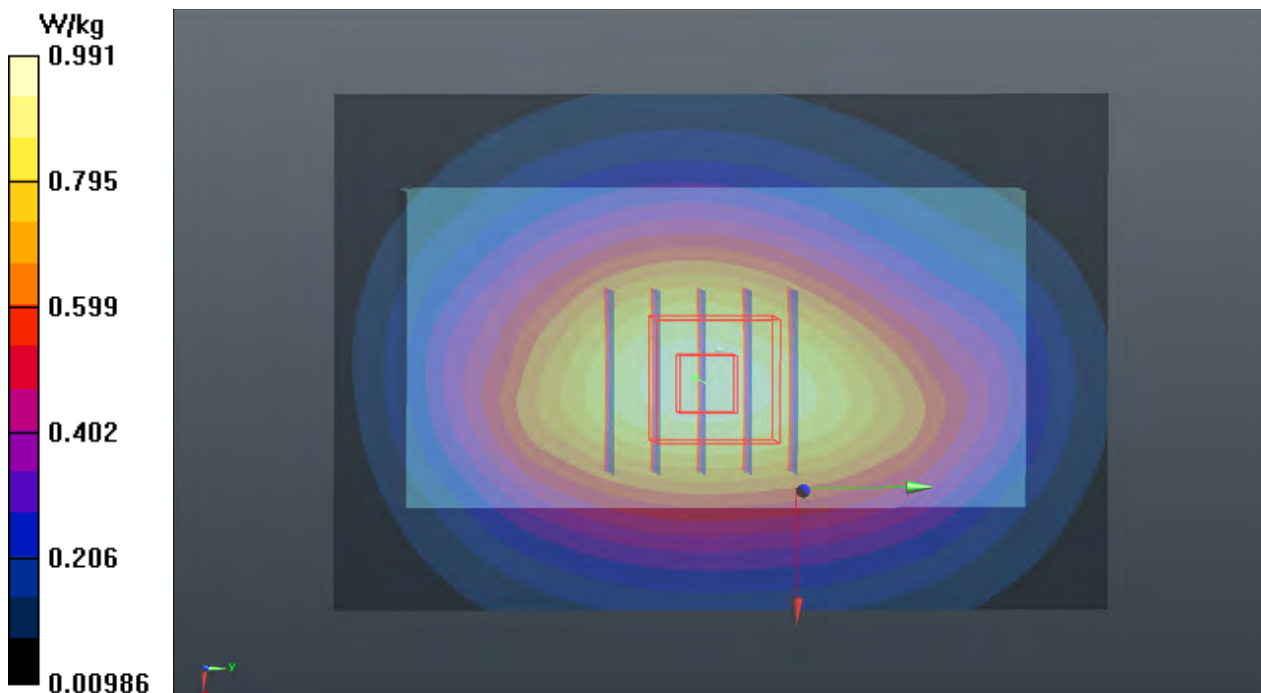
Communication System: UMTS-FDD (WCDMA); Frequency: 846.6 MHz; Duty Cycle: 1:1.95  
Medium: H07T10N1\_0108 Medium parameters used:  $f = 847$  MHz;  $\sigma = 0.937$  S/m;  $\epsilon_r = 42.342$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

#### DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(10.18, 10.18, 10.18); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x91x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 0.991 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 33.26 V/m; Power Drift = -0.09 dB  
Peak SAR (extrapolated) = 1.09 W/kg  
**SAR(1 g) = 0.781 W/kg; SAR(10 g) = 0.566 W/kg** (SAR corrected for target medium)  
Ratio of SAR at M2 to SAR at M1 = 72.9%  
Maximum value of SAR (measured) = 0.988 W/kg



### P25 LTE 2\_QPSK20M\_Rear Fcae\_10mm\_Ch18700\_1RB\_OS0\_Sample1\_Reduction\_w

**DUT: 191211C18**

Communication System: LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1860 MHz; Duty Cycle: 1:3.74

Medium: H16T20N2\_0109 Medium parameters used:  $f = 1860$  MHz;  $\sigma = 1.434$  S/m;  $\epsilon_r = 40.898$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(8.47, 8.47, 8.47); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x91x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 1.03 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 26.41 V/m; Power Drift = -0.12 dB

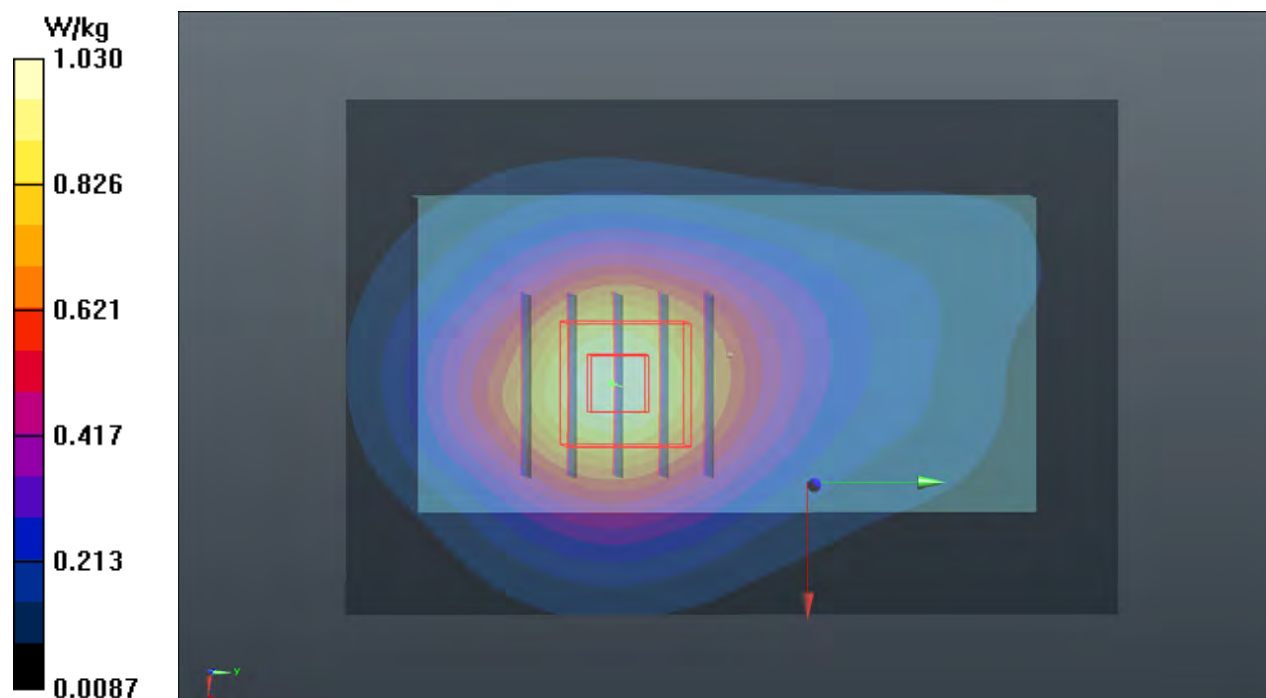
Peak SAR (extrapolated) = 1.25 W/kg

**SAR(1 g) = 0.768 W/kg; SAR(10 g) = 0.475 W/kg** (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 18.7 mm

Ratio of SAR at M2 to SAR at M1 = 63.5%

Maximum value of SAR (measured) = 1.08 W/kg



## P26 LTE 4\_QPSK20M\_Rear Fcae\_10mm\_Ch20300\_1RB\_OS0\_Sample1\_Reduction\_w

**DUT: 191211C18**

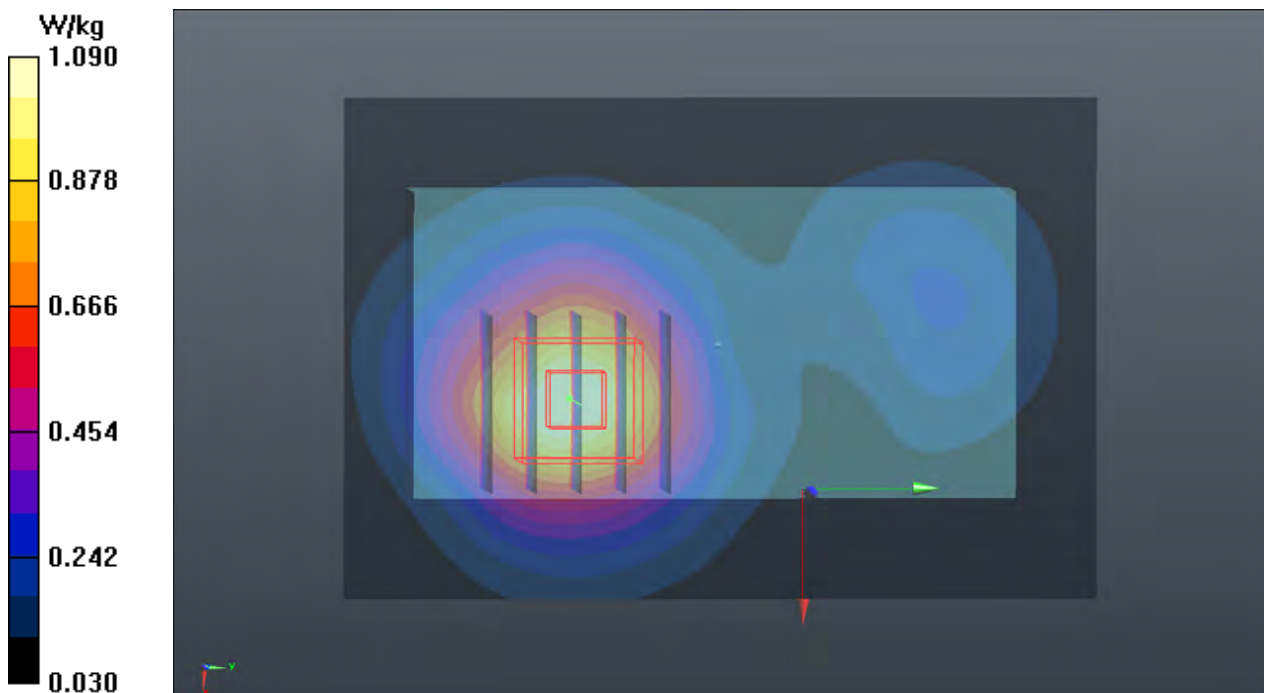
Communication System: LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1745 MHz; Duty Cycle: 1:3.74  
Medium: H16T20N2\_0109 Medium parameters used:  $f = 1745$  MHz;  $\sigma = 1.329$  S/m;  $\epsilon_r = 41.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(8.8, 8.8, 8.8); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x91x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 1.13 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 28.21 V/m; Power Drift = -0.05 dB  
Peak SAR (extrapolated) = 1.26 W/kg  
**SAR(1 g) = 0.817 W/kg; SAR(10 g) = 0.500 W/kg** (SAR corrected for target medium)  
Smallest distance from peaks to all points 3 dB below = 18.7 mm  
Ratio of SAR at M2 to SAR at M1 = 63.9%  
Maximum value of SAR (measured) = 1.09 W/kg



### P27 LTE 5\_QPSK10M\_Rear Fcae\_10mm\_Ch20525\_1RB\_OS0\_Sample1

**DUT: 191211C18**

Communication System: LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 836.5 MHz; Duty Cycle: 1:3.74

Medium: H07T10N1\_0109 Medium parameters used:  $f = 836.5$  MHz;  $\sigma = 0.938$  S/m;  $\epsilon_r = 43.151$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(10.18, 10.18, 10.18); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x91x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.926 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

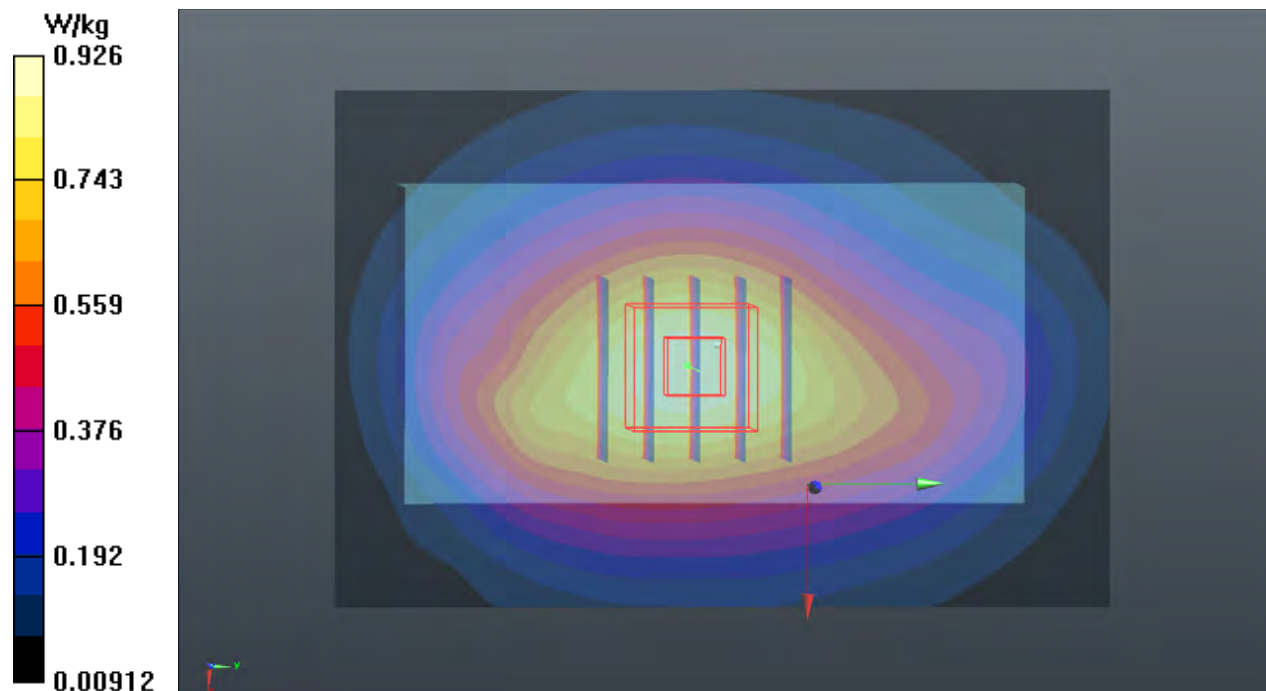
Reference Value = 32.35 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 0.981 W/kg

**SAR(1 g) = 0.697 W/kg; SAR(10 g) = 0.498 W/kg** (SAR corrected for target medium)

Ratio of SAR at M2 to SAR at M1 = 73.1%

Maximum value of SAR (measured) = 0.884 W/kg





# P28 LTE 12\_QPSK10M\_Rear Fcae\_10mm\_Ch23130\_1RB\_OS0\_Sample1

**DUT: 191211C18**

Communication System: LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 711 MHz; Duty Cycle: 1:3.74

Medium: H06T09N1\_0108 Medium parameters used:  $f = 711$  MHz;  $\sigma = 0.856$  S/m;  $\epsilon_r = 42.842$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(10.75, 10.75, 10.75); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x91x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.501 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

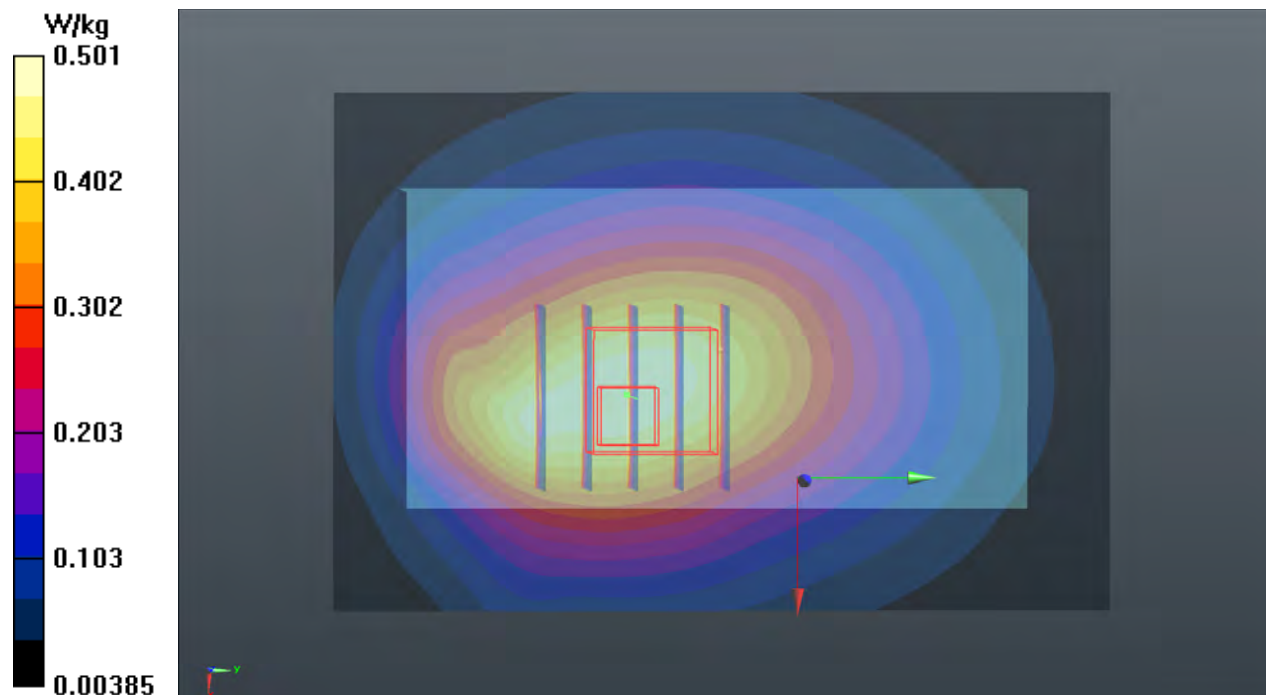
Reference Value = 24.44 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 0.558 W/kg

**SAR(1 g) = 0.416 W/kg; SAR(10 g) = 0.282 W/kg** (SAR corrected for target medium)

Ratio of SAR at M2 to SAR at M1 = 70.5%

Maximum value of SAR (measured) = 0.508 W/kg



## P29 LTE 13\_QPSK10M\_Rear Fcae\_10mm\_Ch23230\_1RB\_OS0\_Sample1

**DUT: 191211C18**

Communication System: LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 782 MHz; Duty Cycle: 1:3.74

Medium: H06T09N1\_0108 Medium parameters used:  $f = 782$  MHz;  $\sigma = 0.931$  S/m;  $\epsilon_r = 42.287$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(10.75, 10.75, 10.75); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (61x91x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.730 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

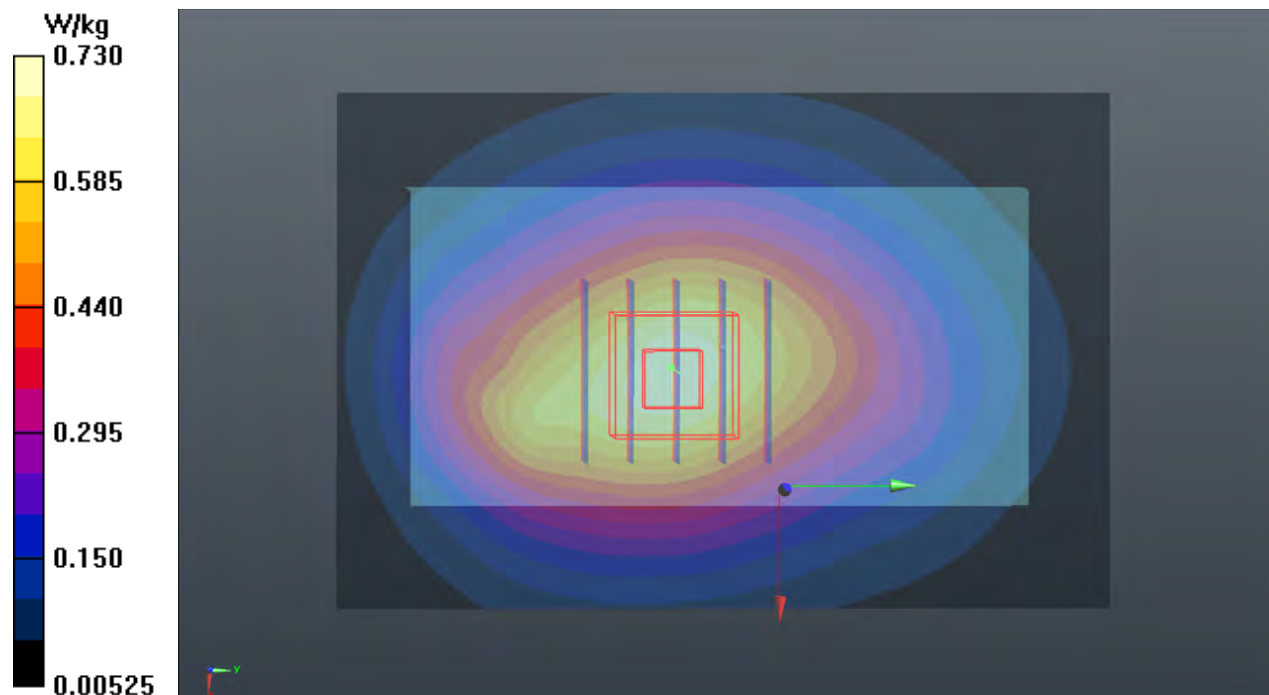
Reference Value = 28.46 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.833 W/kg

**SAR(1 g) = 0.563 W/kg; SAR(10 g) = 0.398 W/kg** (SAR corrected for target medium)

Ratio of SAR at M2 to SAR at M1 = 70.5%

Maximum value of SAR (measured) = 0.736 W/kg





### P30 WLAN2.4G\_802.11b\_Rear Face\_10mm\_Ch1\_Sample1

**DUT: 191211C18**

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle);

Frequency: 2412 MHz; Duty Cycle: 1:1.01

Medium: H19T27N1\_0109 Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.824$  S/m;  $\epsilon_r = 38.877$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3971; ConvF(7.65, 7.65, 7.65); Calibrated: 2019/03/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2019/08/27
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

- **Area Scan (71x121x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.374 W/kg

- **Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.92 V/m; Power Drift = -0.05 dB

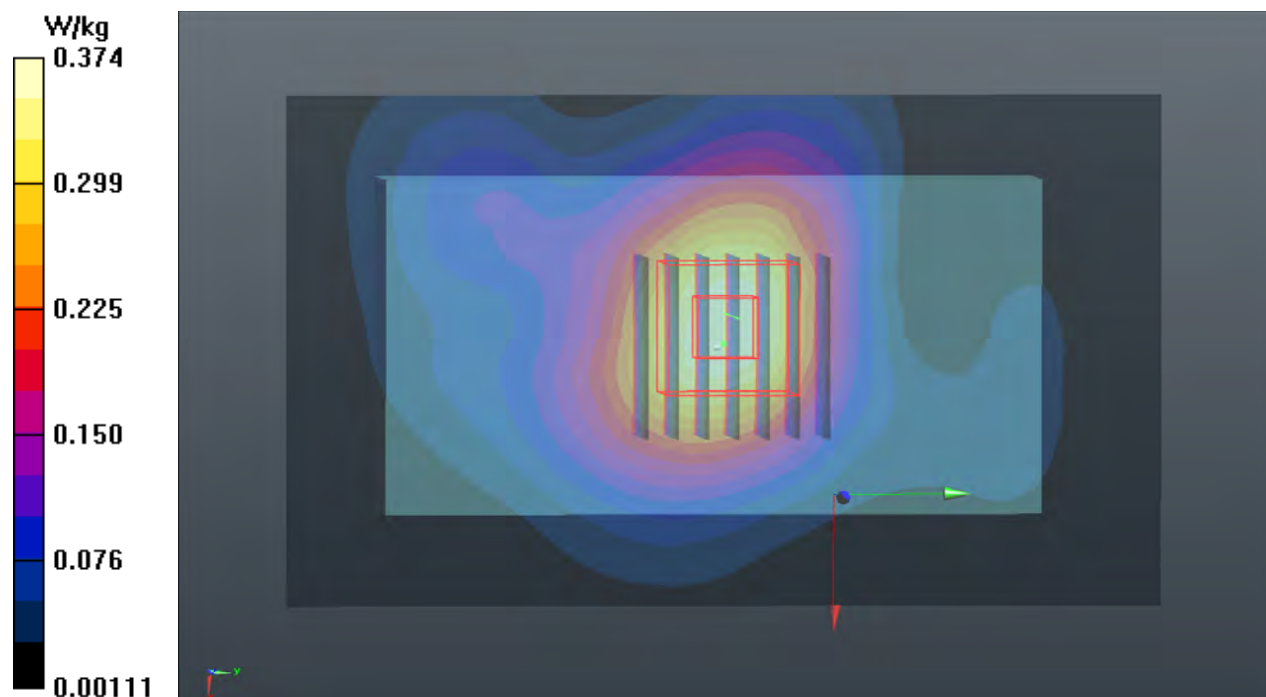
Peak SAR (extrapolated) = 0.453 W/kg

**SAR(1 g) = 0.267 W/kg; SAR(10 g) = 0.158 W/kg** (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 18.9 mm

Ratio of SAR at M2 to SAR at M1 = 58.5%

Maximum value of SAR (measured) = 0.381 W/kg



### Appendix C. Calibration Certificate for Probe and Dipole

The SPEAG calibration certificates are shown as follows.



Accredited by the Swiss Accreditation Service (SAS)  
The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **B.V. ADT (Auden)**

Certificate No: **D750V3-1013\_Aug19**

## CALIBRATION CERTIFICATE

Object **D750V3 - SN:1013**

Calibration procedure(s) **QA CAL-05.v11  
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz**

Calibration date: **August 23, 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 ( $22 \pm 3$ )°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-19 (No. 217-02894)	Apr-20
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-19 (No. 217-02895)	Apr-20
Reference Probe EX3DV4	SN: 7349	29-May-19 (No. EX3-7349_May19)	May-20
DAE4	SN: 601	30-Apr-19 (No. DAE4-601_Apr19)	Apr-20

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

Calibrated by: **Jeton Kastrati**      **Function**  
**Laboratory Technician**

Approved by: **Katja Pokovic**      **Technical Manager**

**Signature**

Issued: August 23, 2019

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



Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

### Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

### Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

<b>DASY Version</b>	DASY5	V52.10.2
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom	
<b>Distance Dipole Center - TSL</b>	15 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	750 MHz $\pm$ 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	41.9	0.89 mho/m
<b>Measured Head TSL parameters</b>	(22.0 $\pm$ 0.2) °C	42.7 $\pm$ 6 %	0.90 mho/m $\pm$ 6 %
<b>Head TSL temperature change during test</b>	< 0.5 °C	----	----

## SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	250 mW input power	2.15 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>8.56 W/kg <math>\pm</math> 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	1.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>5.62 W/kg <math>\pm</math> 16.5 % (k=2)</b>

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.7 $\Omega$ - 0.2 j $\Omega$
Return Loss	- 28.9 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.034 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

Manufactured by	SPEAG
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## DASY5 Validation Report for Head TSL

Date: 23.08.2019

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1013**

Communication System: UID 0 - CW; Frequency: 750 MHz

Medium parameters used:  $f = 750$  MHz;  $\sigma = 0.9$  S/m;  $\epsilon_r = 42.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.07, 10.07, 10.07) @ 750 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

**Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:**

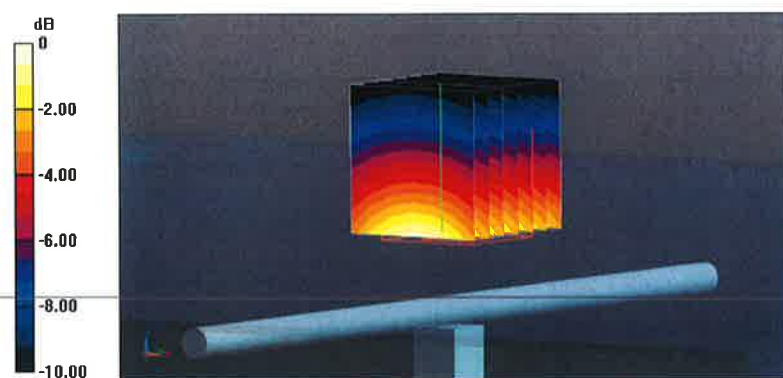
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 59.83 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 3.22 W/kg

**SAR(1 g) = 2.15 W/kg; SAR(10 g) = 1.41 W/kg**

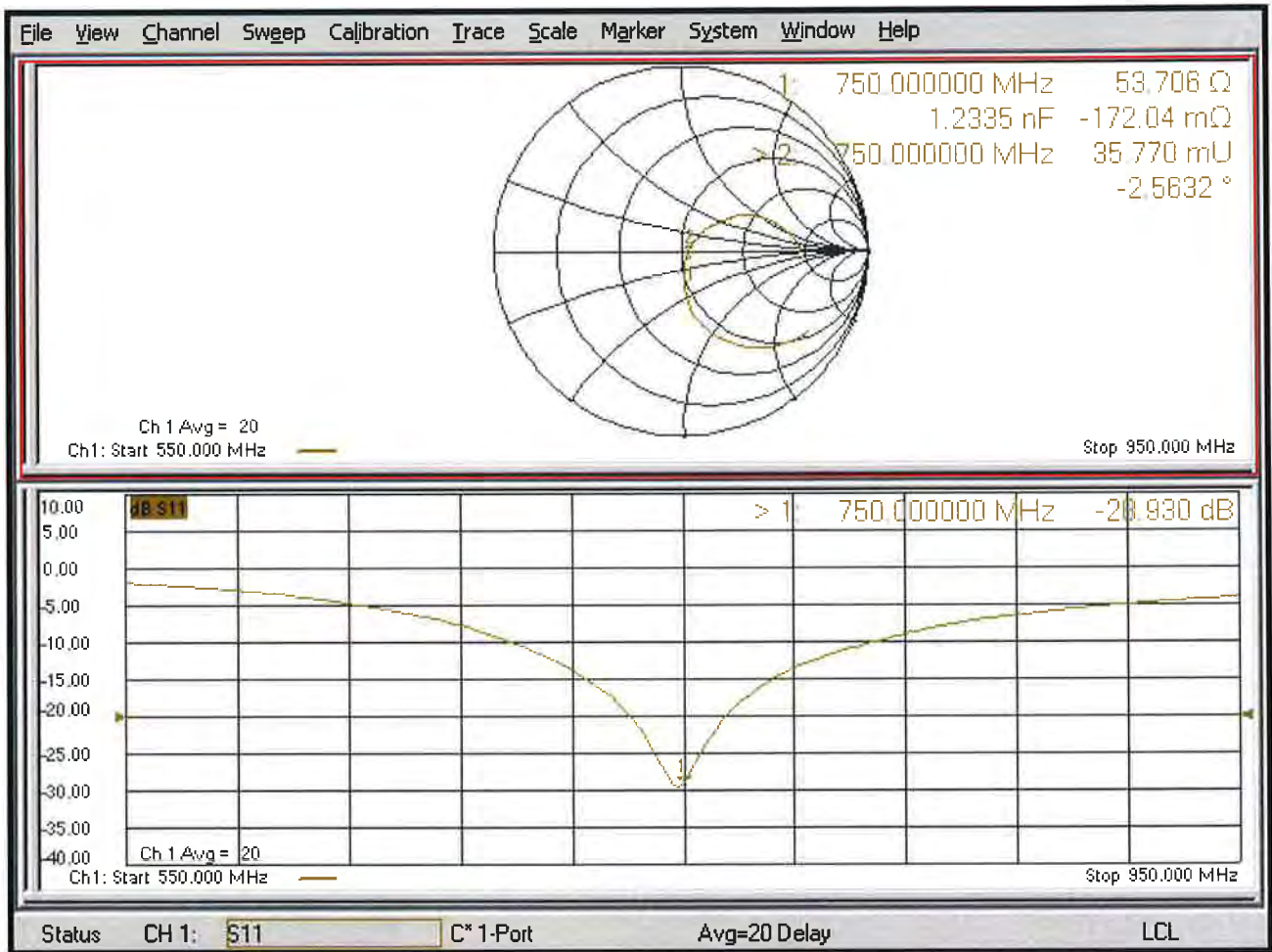
Maximum value of SAR (measured) = 2.86 W/kg



0 dB = 2.86 W/kg = 4.56 dBW/kg



# Impedance Measurement Plot for Head TSL







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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **B.V. ADT (Auden)**

Certificate No: **D835V2-4d121\_Aug19**

**CALIBRATION CERTIFICATE**

Object **D835V2 - SN:4d121**

Calibration procedure(s) **QA CAL-05.v11  
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz**

Calibration date: **August 23, 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 (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-19 (No. 217-02894)	Apr-20
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-19 (No. 217-02895)	Apr-20
Reference Probe EX3DV4	SN: 7349	29-May-19 (No. EX3-7349_May19)	May-20
DAE4	SN: 601	30-Apr-19 (No. DAE4-601_Apr19)	Apr-20
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

Calibrated by: **Jeton Kastrati** (Name) / **Laboratory Technician** (Function) / *[Signature]* (Signature)

Approved by: **Katja Pokovic** (Name) / **Technical Manager** (Function) / *[Signature]* (Signature)

Issued: August 23, 2019

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



Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

### Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

### Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

<b>DASY Version</b>	DASY5	V52.10.2
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom	
<b>Distance Dipole Center - TSL</b>	15 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	835 MHz ± 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	41.5	0.90 mho/m
<b>Measured Head TSL parameters</b>	(22.0 ± 0.2) °C	42.5 ± 6 %	0.92 mho/m ± 6 %
<b>Head TSL temperature change during test</b>	< 0.5 °C	----	----

## SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	250 mW input power	2.43 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>9.61 W/kg ± 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	1.57 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>6.22 W/kg ± 16.5 % (k=2)</b>

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.8 $\Omega$ - 2.7 $j\Omega$
Return Loss	- 31.0 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.395 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

Manufactured by	SPEAG
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# DASY5 Validation Report for Head TSL

Date: 23.08.2019

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d121**

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.92 \text{ S/m}$ ;  $\epsilon_r = 42.5$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.89, 9.89, 9.89) @ 835 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

## Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

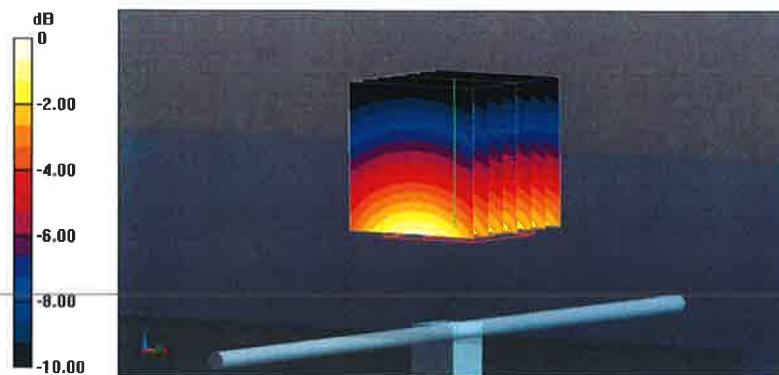
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 63.40 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 3.63 W/kg

**SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.57 W/kg**

Maximum value of SAR (measured) = 3.23 W/kg



0 dB = 3.23 W/kg = 5.09 dBW/kg



# Impedance Measurement Plot for Head TSL

