

# FCC SAR TEST REPORT

Client Name : SAGI MOBILE. S.A.S

Address : CALLE 13 NUMERO 15-03 PISO 3 BOGOTA D.C.  
COLOMBIA

Product Name : Mobile Phone


Date : Sept. 30, 2019

**Shenzhen Anbotek Compliance Laboratory Limited**

**Shenzhen Anbotek Compliance Laboratory Limited**

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# Contents

1. Statement of Compliance.....	6
2. General Information.....	7
2.1. Client Information.....	7
2.2. Testing Laboratory Information.....	7
2.3. Description of Equipment Under Test (EUT).....	7
2.4. Device Category and SAR Limits.....	10
2.5. Applied Standard.....	10
2.6. Environment of Test Site.....	10
2.7. Test Configuration.....	10
3. Specific Absorption Rate (SAR).....	11
3.1. Introduction.....	11
3.2. SAR Definition.....	11
4. SAR Measurement System.....	12
4.1. E-Field Probe.....	13
4.2. Data Acquisition Electronics (DAE).....	13
4.3. Robot.....	14
4.4. Measurement Server.....	14
4.5. Phantom.....	16
4.6. Device Holder.....	17
4.7. Data Storage and Evaluation.....	18
5. Test Equipment List.....	20
6. Tissue Simulating Liquids.....	21
7. System Verification Procedures.....	24
8. EUT Testing Position.....	26
8.1. Define two imaginary lines on the handset.....	26
8.2. Position for Cheek/Touch.....	27
8.3. Position for Ear / 15°Tilt.....	27
8.4. Body Worn Position.....	28
9. Measurement Procedures.....	29
9.1. Spatial Peak SAR Evaluation.....	29
9.2. Power Reference Measurement.....	30
9.3. Area Scan Procedures.....	30
9.4. Zoom Scan Procedures.....	31
9.5. Volume Scan Procedures.....	32
9.6. Power Drift Monitoring.....	32
10. Conducted Power.....	33
11. Antenna Location.....	65
12. SAR Test Results Summary.....	66
12.1. Head SAR Results.....	66

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12.2. Body SAR Results.....	68
13. Simultaneous Transmission Analysis.....	72
13.1. Simultaneous TX SAR Considerations.....	72
13.2. Evaluation of Simultaneous SAR.....	73
14. Measurement Uncertainty.....	79
Appendix A. SAR Test Setup Photos.....	80
Appendix B. Plots of SAR System Check.....	82
Appendix C. Plots of SAR Test Data.....	96
Appendix D. DASY System Calibration Certificate.....	114

# TEST REPORT

Applicant : SAGI MOBILE. S.A.S  
Manufacturer : Shenzhen Xing Chuang Sheng Tenchnology CO,Ltd  
Product Name : Mobile Phone  
Model No. : E5501  
Trade Mark : SAGI  
Rating(s) : DC 3.8V, 2700mAh Battery inside

**Test Standard(s) : IEEE 1528-2013; IEC 62209-2:2010;  
ANSI/IEEE C95.1:2005; FCC 47 CFR Part 2 (2.1093:2013);**

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the IEEE 1528-2013, IEC 62209-2:2010, ANSI/IEEE C95.1:2005 and FCC 47 CFR Part 2 (2.1093:2013) requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Receipt

Sept. 09, 2019

Date of Test

Sept. 09~30, 2019

Prepared By



*Bobby Wang*

(Engineer / Bobby Wang)

Reviewer

*Snowy Meng*

(Supervisor / Snowy Meng)

Approved & Authorized Signer

*sally zhang*

(Manager / Sally Zhang)


**Shenzhen Anbotek Compliance Laboratory Limited**

### Version

Version No.	Date	Description
01	Sept. 30, 2019	Original

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# 1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing are as follows.

Frequency Band	Highest Reported 1g-SAR(W/Kg)		SAR Test Limit (W/Kg)
	Head	Body	
GSM 850	0.088	0.305	1.6
PCS 1900	0.198	0.721	
WCDMA Band 2	0.200	0.503	
WCDMA Band 5	0.202	0.439	
LTE Band 4	0.287	0.483	
LTE Band 7	0.443	0.461	
WIFI 2.4G	0.455	0.493	
WIFI5.2G	0.462	0.438	
WIFI5.8G	0.307	0.368	
Simultaneous SAR	0.905	1.214	
Test Result	PASS		

## <Highest SAR Summary>

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-2005, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and IEC 62209-2:2010

## 2. General Information

### 2.1. Client Information

Applicant	:	SAGI MOBILE. S.A.S
Address	:	CALLE 13 NUMERO 15-03 PISO 3 BOGOTA D.C. COLOMBIA
Manufacturer	:	Shenzhen Xing Chuang Sheng Tenchnology CO,Ltd
Address	:	3rd Floor,West block,Meisheng huigu Science and technology innovation Park,83Dabao Road,Baoan District,Shenzhen City
Factory	:	Shenzhen Xing Chuang Sheng Tenchnology CO,Ltd
Address	:	3rd Floor,West block,Meisheng huigu Science and technology innovation Park,83Dabao Road,Baoan District,Shenzhen City

### 2.2. Testing Laboratory Information


Test Site:	:	Shenzhen Anbotek Compliance Laboratory Limited
Address:	:	1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102

### 2.3. Description of Equipment Under Test (EUT)

Product Name	:	Mobile Phone
Model No.	:	E5501
Trade Mark	:	SAGI
Test Power Supply	:	DC 3.8V Battery inside
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Normal Sample)
Product Description	:	Operation Frequency: BDR+EDR: 2402MHZ~2480MHZ 2.4G WIFI:2412~2462MHZ 5.2G WIFI:5150~5250MHZ 5.8G WIFI:5725~5850MHZ GSM/GPRS 850 TX:824.2~848.8 MHz; RX:869.2~893.8 MHz PCS/GPRS 1900 TX:1850.2~1909.8 MHz; RX:1930.2~1989.8

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	<p>MHz</p> <p>UMTS-FDD Band 5</p> <p>TX: 826.4 ~ 846.6 MHz; RX: 871.4 ~ 891.6 MHz</p> <p>UMTS-FDD Band 2</p> <p>TX:1852.4~1907.6 MHz; RX: 1932.4~1987.6 MHz</p> <p>MHz</p> <p>LTE-FDD Band 4</p> <p>TX:1710.0 ~ 1754.9 MHz; RX: 2110.0 ~ 2154.9 MHz</p> <p>MHz</p> <p>LTE-FDD Band 7</p> <p>TX:2502.5 ~ 2567.5 MHz; RX: 2625.5 ~ 2687.5 MHz</p>
Transfer Rate:	<p>BDR+EDR: 1/2/3 Mbits/s</p> <p>802.11b: 11/5.5/2/1Mbps</p> <p>802.11g: 54/48/36/24/18/12/9/6 Mbps</p> <p>802.11n: up to 150Mbps</p> <p>802.11a: 6,9,12,18,24,36,48,54 Mbps</p> <p>802.11ac(VHT20): NSS1, MCS0-MCS8</p> <p>802.11ac(VHT40): NSS1, MCS0-MCS9</p>
Number of Channel:	<p>BDR+EDR: 79 Channels</p> <p>802.11b/ g/ n(HT20): 11 Channels</p> <p>802.11n(HT40): 7 Channels</p> <p>4 Channels for 802.11ac(VHT20);</p> <p>2 Channels for 802.11n(HT40);</p> <p>2 Channels for 802.11ac(VHT40)</p>
GPRS Class:	8/10/12
Modulation Type:	<p>GSM/GPRS: GMSK</p> <p>WCDMA: BPSK, 16QAM</p> <p>LTE: QPSK, 16QAM</p> <p>BDR+EDR: GFSK, <math>\pi/4</math>-DQPSK, 8-DPSK</p> <p>2.4G WiFi: CCK, DQPSK, DBPSK for DSSS</p> <p>64QAM, 16QAM, QPSK, BPSK for OFDM</p> <p>5G WiFi: OFDM with BPSK / QPSK / 16QAM / 64QAM for 802.11a/n</p> <p>OFDM with BPSK / QPSK / 16QAM / 64QAM/256QAM for 802.11ac</p>
Antenna Type:	<p>GSM/GPRS: FPCB Antenna</p> <p>WCDMA: FPCB Antenna</p> <p>LTE: FPCB Antenna</p> <p>BDR+EDR: FPCB Antenna</p>

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		2.4G WiFi: FPCB Antenna 5G WiFi: FPCB Antenna
	Antenna Gain(Peak):	GSM 850: 0.4 dBi PCS 1900: 0.6 dBi UMTS-FDD Band 2: 0.6 dBi UMTS-FDD Band 5: 0.4 dBi LTE Band 4: 0.7 dBi LTE Band 7: 0.3 dBi BDR+EDR: 0.8 dBi 2.4G WiFi: 0.8 dBi 5G WIFI: 0.8dBi
	Hardware version	WW836-MB-V9.2
	Software version	SAGI_V1.8_2019081
<b>Remark:</b> 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.		

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## 2. 4. Device Category and SAR Limits

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

## 2. 5. Applied Standard

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

- IEEE 1528-2013
- FCC 47 CFR Part 2 (2.1093:2013)
- ANSI/IEEE C95.1:2005
- KDB 248227 D01
- KDB 447498 D01
- KDB 648474 D04
- KDB 865664 D01
- KDB 941225 D01
- KDB 941225 D05
- KDB 941225 D06

## 2. 6. Environment of Test Site

Items	Required	Actual
Temperature (°C)	18-25	22~23
Humidity (%RH)	30-70	55~65


## 2. 7. Test Configuration

The device was controlled by using a base station emulator. Communication between the device and the emulator was established by air link. The distance between the EUT and the antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller than the output power of EUT. The EUT was set from the emulator to radiate maximum output power during all tests.

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### 3. Specific Absorption Rate (SAR)

#### 3.1. Introduction

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

#### 3.2. SAR Definition

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

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

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

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

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

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

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


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

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

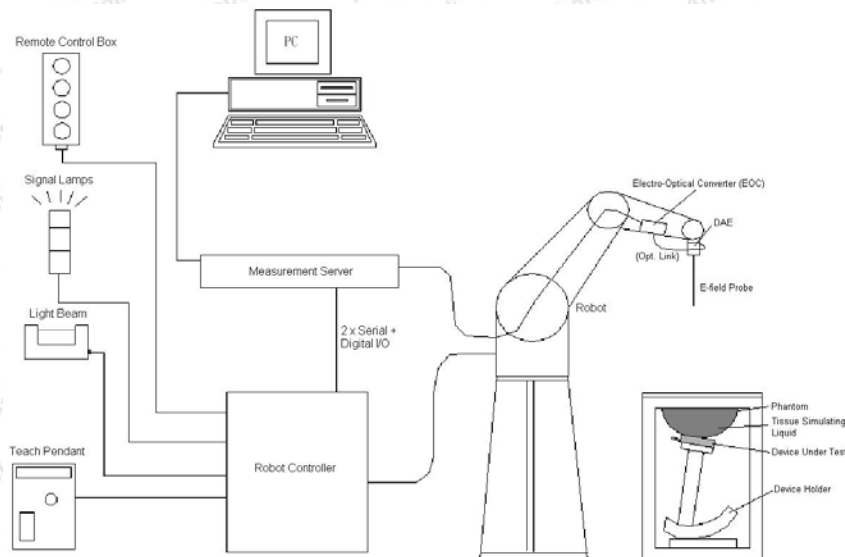
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## 4. SAR Measurement System



### DASY System Configurations

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

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

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

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#### 4. 1. E-Field Probe

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

##### ➤ E-Field Probe Specification

###### <EX3DV4 Probe>

<b>Construction</b>	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	 <p><b>Photo of EX3DV4</b></p>
<b>Frequency</b>	10 MHz to 6 GHz; Linearity: $\pm 0.2$ dB	
<b>Directivity</b>	$\pm 0.3$ dB in HSL (rotation around probe axis) $\pm 0.5$ dB in tissue material (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: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

##### ➤ E-Field Probe Calibration

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

#### 4. 2. Data Acquisition Electronics (DAE)

The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

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

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**Photo of DAE**

### 4. 3. Robot

The SPEAG DASY system uses the high precision robots (DASY5: TX60XL) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY5: CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:

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

**Photo of DASY5**


### 4. 4. Measurement Server

The measurement server is based on a PC/104 CPU board with CPU (DASY5: 400 MHz, Intel Celeron), chip disk (DASY5: 128 MB), RAM (DASY5: 128 MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical

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detection and digital I/O interface are contained on the DASY I/O board, which is directly connected to the PC/104 bus of the CPU board.

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



Photo of Server for DASY5


## 4. 5. Phantom

### <SAM Twin Phantom>

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

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

### <ELI4 Phantom>

<b>Shell Thickness</b>	2 ± 0.2 mm (sagging: <1%)	 <p><b>Photo of ELI4 Phantom</b></p>
<b>Filling Volume</b>	Approx. 30 liters	
<b>Dimensions</b>	Major ellipse axis: 600 mm Minor axis: 400 mm	

The ELI4 phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.



#### 4. 6. Device Holder

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

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

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



**Device Holder**

#### 4. 7. Data Storage and Evaluation

➤ Data Storage

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

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

➤ Data Evaluation

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

<b>Probe parameters:</b>	- Sensitivity	Norm <sub>i</sub> , a <sub>i0</sub> , a <sub>i1</sub> , a <sub>i2</sub>
	- Conversion factor	ConvF <sub>i</sub>
	- Diode compression point	dcp <sub>i</sub>
<b>Device parameters:</b>	- Frequency	f
	- Crest factor	cf
<b>Media parameters:</b>	- Conductivity	σ
	- Density	ρ

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

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

The formula for each channel can be given as:

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

with  $V_i$  = compensated signal of channel  $i$ , ( $i = x, y, z$ )

$U_i$  = input signal of channel  $i$ , ( $i = x, y, z$ )

$cf$  = crest factor of exciting field (DASY parameter)

$dcp_i$  = diode compression point (DASY parameter)

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

$$\text{E-field Probes: } E_i = \sqrt{\frac{V_i}{\text{Norm}_i \cdot \text{ConvF}}}$$

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

with  $V_i$  = compensated signal of channel  $i$ , ( $i = x, y, z$ )

$\text{Norm}_i$  = sensor sensitivity of channel  $i$ , ( $i = x, y, z$ ),  $\mu\text{V}/(\text{V}/\text{m})^2$  for E-field Probes

$\text{ConvF}$  = sensitivity enhancement in solution

$a_{ij}$  = sensor sensitivity factors for H-field probes

$f$  = carrier frequency [GHz]

$E_i$  = electric field strength of channel  $i$  in V/m

$H_i$  = magnetic field strength of channel  $i$  in A/m

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

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

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

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

with SAR = local specific absorption rate in mW/g

$E_{\text{tot}}$  = total field strength in V/m

$\sigma$  = conductivity in [mho/m] or [Siemens/m]

$\rho$  = equivalent tissue density in  $\text{g}/\text{cm}^3$

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

## 5. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	835MHz System Validation Kit	D835V2	4d154	Jun. 16,2018	Jun. 15,2021
SPEAG	1750MHz System Validation Kit	D1750V2	1021	Jul. 03, 2019	Jul. 02, 2022
SPEAG	1900MHz System Validation Kit	D1900V2	5d175	Jun. 15,2019	Jun. 14,2022
SPEAG	2450MHz System Validation Kit	D2450V2	910	Jun. 15,2018	Jun. 14,2021
SPEAG	2600MHz System Validation Kit	D2600V2	1058	Jun. 19,2018	Jun. 18,2021
SPEAG	5GHz System Validation Kit	D5GHzV2	1160	Oct. 02, 2018	Oct. 01, 2021
SPEAG	Data Acquisition Electronics	DAE4	387	Sept. 03, 2019	Sept. 02, 2019
SPEAG	Dosimetric E-Field Probe	EX3DV4	7396	May 06,2019	May 05,2020
R&S	UNIVERSAL RADIO COMMUNICATION TESTER	CMU 200	117888	Nov. 05, 2018	Nov. 04, 2019
Agilent	ENA Series Network Analyzer	E5071C	MY46317418	May 22, 2019	May 21, 2020
SPEAG	DAK	DAK-3.5	1226	NCR	NCR
SPEAG	SAM Twin Phantom	QD000P40CD	1802	NCR	NCR
AR	Amplifier	ZHL-42W	QA1118004	NCR	NCR
Agilent	Power Meter	N1914A	MY50001102	Dec. 06, 2018	Nov. 06, 2019
Agilent	Power Sensor	N8481H	MY51240001	Dec. 06, 2018	Nov. 06, 2019
R&S	Spectrum Analyzer	N9020A	MY51170037	May.22, 2019	May. 21, 2020
Agilent	Signal Generation	N5182A	MY48180656	May.22, 2019	May. 21, 2020
Worken	Directional Coupler	0110A056010-10	COM5BNW1A-2	May.22, 2019	May. 21, 2020

**Note:**

1. The calibration certificate of DASY can be referred to appendix C of this report.
2. The dipole calibration interval can be extended to 3 years with justification. The dipoles are also not physically damaged, or repaired during the interval.
3. The Insertion Loss calibration of Dual Directional Coupler and Attenuator were characterized via the network analyzer and compensated during system check.
4. The dielectric probe kit was calibrated via the network analyzer, with the specified procedure (calibrated in pure water) and calibration kit (standard) short circuit, before the dielectric measurement. The specific procedure and calibration kit are provided by Agilent.
5. In system check we need to monitor the level on the power meter, and adjust the power amplifier level to have precise power level to the dipole; the measured SAR will be normalized to 1W input power according to the ratio of 1W to the input power to the dipole. For system check, the calibration of the power amplifier is deemed not critically required for correct measurement; the power meter is critical and we do have calibration for it

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## 6. Tissue Simulating Liquids

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

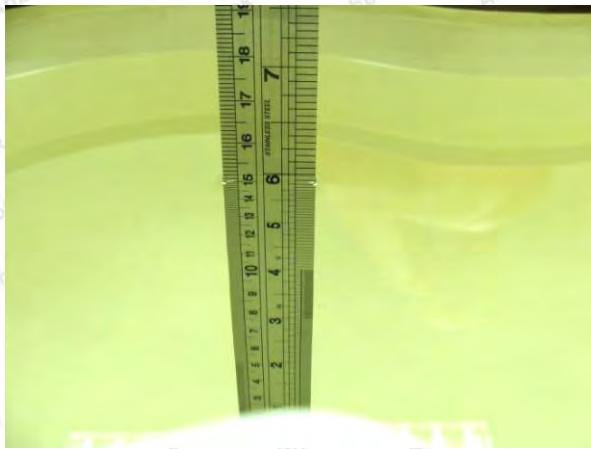


Photo of 900HSL Liquid Height for Head SAR



Photo of 900MSL Liquid Height for Body SAR



Photo of 1900HSL Liquid Height for Head SAR

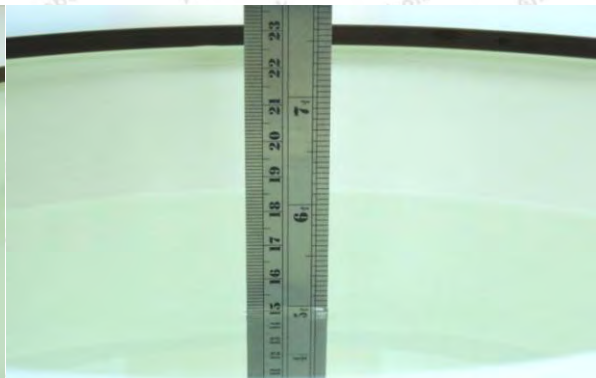


Photo of 1900MSL Liquid Height for Body SAR

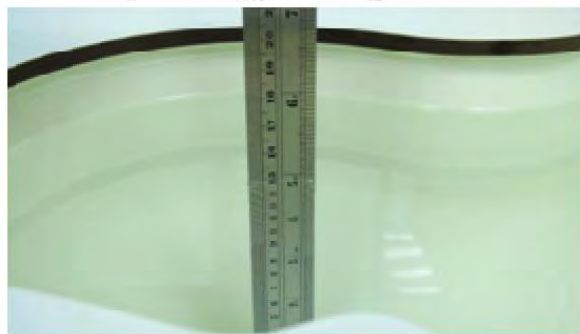


Photo of 2450HSL Liquid Height for Head SAR

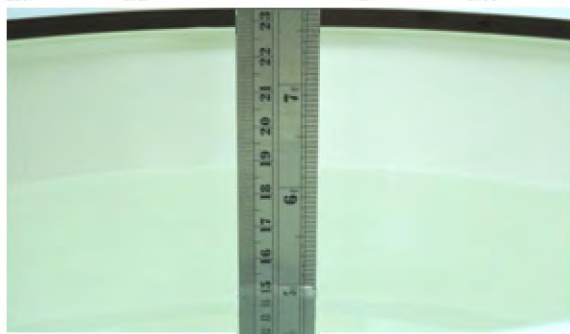


Photo of 2450MSL Liquid Height for Body SAR

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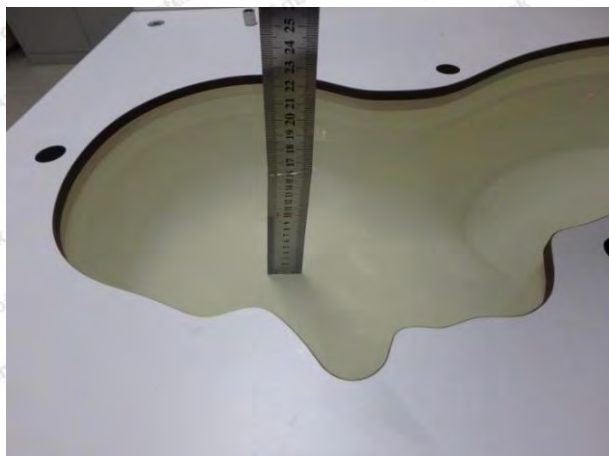


Photo of 2600HSL Liquid Height for Head SAR

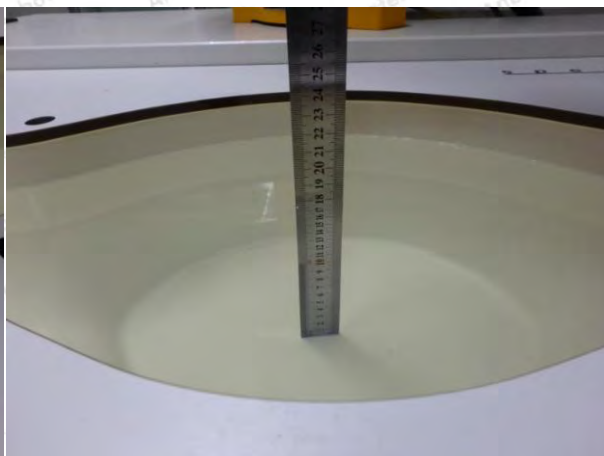


Photo of 2600MSL Liquid Height for Body SAR

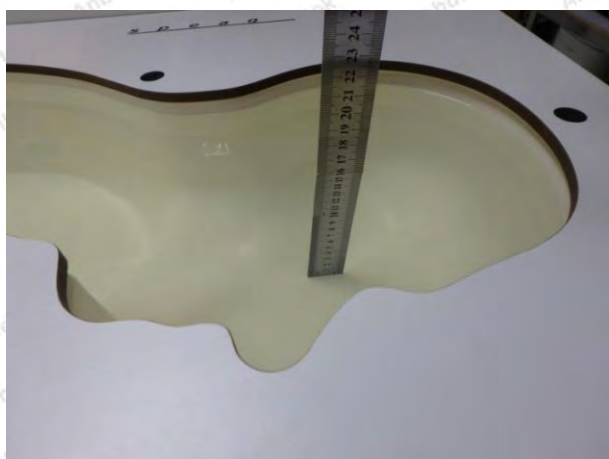


Photo of 5000HSL Liquid Height for Head SAR

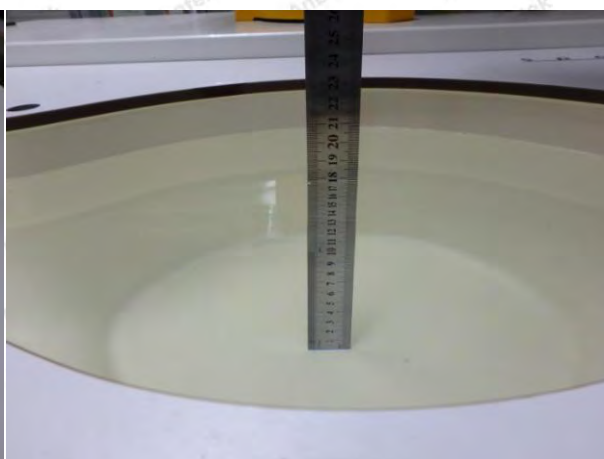


Photo of 5000MSL Liquid Height for Body SAR

The following table gives the recipes for tissue simulating liquid.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity ( $\sigma$ )	Permittivity ( $\epsilon_r$ )
<b>For Head</b>								
900	40.3	57.9	0.2	1.4	0.2	0	0.97	41.5
1750	55.2	0	0	0.3	0	44.5	1.37	40.1
1800,1900,2000	55.2	0	0	0.3	0	44.5	1.40	40.0
2450	55.0	0	0	0	0	45.0	1.80	39.2
2600	54.8	0	0	0.1	0	45.1	1.96	39.0
5000	65.5	0	17.2	0	17.3	0	6.00	48.2
<b>For Body</b>								

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900	50.8	48.2	0	0.9	0.1	0	0.97	55.2
1750	70.2	0	0	0.4	0	29.4	1.49	53.4
1800,1900,2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0	0	31.4	1.95	52.7
2600	68.1	0	0	0.1	0	31.8	2.16	52.5
5000	78.6	0	10.7	0	10.7	0	6.00	48.2


The following table shows the measuring results for simulating liquid.

Tissue Type	Measured Frequency (MHz)	Target Tissue		Measured Tissue				Liquid Temp.	Test Data
		$\epsilon_r$	$\sigma$	$\epsilon_r$	Dev. (%)	$\sigma$	Dev. (%)		
900HSL	850	41.50	0.97	41.83	0.80	0.95	-2.06	22.3	09/09/2019
900MSL	850	55.00	1.05	55.34	0.62	1.07	1.90	22.0	09/11/2019
1900HSL	1900	40.00	1.40	40.26	0.65	1.45	3.57	21.8	09/13/2019
1900MSL	1900	53.30	1.52	53.26	-0.08	1.51	-0.66	21.6	09/15/2019
2450HSL	2450	39.20	1.80	38.03	-2.98	1.79	-0.56	22.2	09/23/2019
2450MSL	2450	52.70	1.95	51.97	-1.39	1.89	-3.08	22.0	09/24/2019
1750HSL	1750	40.10	1.37	40.25	0.37	1.38	0.73	21.7	09/13/2019
1750MSL	1750	53.40	1.49	53.21	-0.36	1.51	1.34	21.9	09/15/2019
2600HSL	2600	39.0	1.96	38.63	-0.95	2.01	2.55	22.4	09/19/2019
2600MSL	2600	52.50	2.16	54.37	3.56	2.15	-0.46	22.1	09/20/2019
5000HSL	5200	36.40	4.57	35.46	-2.58	4.51	-1.31	22.6	09/25/2019
5000MSL	5200	47.90	5.38	48.53	1.32	5.35	-0.56	22.7	09/26/2019
5000HSL	5800	35.30	5.26	34.93	-1.05	5.31	0.95	21.9	09/29/2019
5000MSL	5800	48.20	6.00	48.58	0.68	5.95	-0.83	21.6	09/30/2019

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## 7. System Verification Procedures

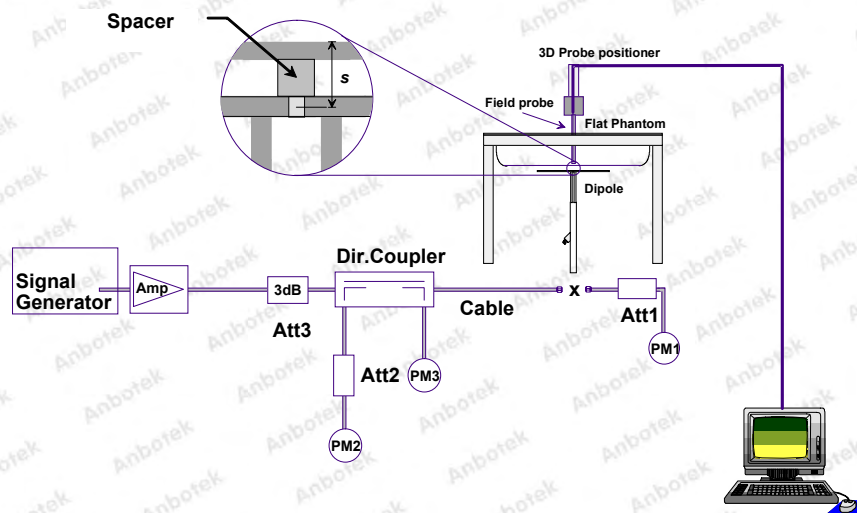
Each DASY system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY software, enable the user to conduct the system performance check and system validation. System validation kit includes a dipole, tripod holder to fix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

### ➤ Purpose of System Performance check

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

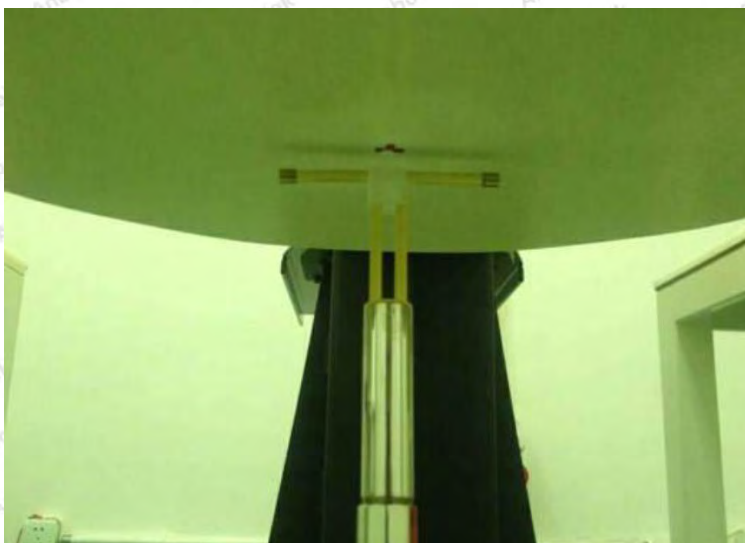
### ➤ System Setup

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



**System Setup for System Evaluation**





**Photo of Dipole Setup**

➤ **Validation Results**

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

Frequency (MHz)	Liquid Type	Power fed onto reference dipole (mW)	Targeted SAR (W/kg)	Measured SAR (W/kg)	Normalized SAR (W/kg)	Deviation (%)	Date
850	Head	250	9.50	2.31	9.24	-2.74	09/09/2019
850	Body	250	9.52	2.53	10.12	6.30	09/11/2019
1900	Head	250	39.70	9.99	39.96	0.65	09/13/2019
1900	Body	250	39.60	9.26	37.04	-6.46	09/15/2019
2450	Head	250	52.00	12.90	51.60	-0.77	09/23/2019
2450	Body	250	51.10	12.10	48.40	-5.28	09/24/2019
1750	Head	250	36.60	9.32	37.28	1.86	09/13/2019
1750	Body	250	36.70	9.06	36.24	-1.25	09/15/2019
2600	Head	250	56.80	14.80	59.20	4.23	09/19/2019
2600	Body	250	54.10	13.72	54.88	1.44	09/20/2019
5200	Head	100	80.70	7.85	78.50	-2.73	09/25/2019
5200	Body	100	77.8	8.25	82.50	6.04	09/26/2019
5800	Head	100	82.0	8.45	84.5	3.05	09/29/2019
5800	Body	100	78.3	7.57	75.7	-3.32	09/30/2019

**Target and Measurement SAR after Normalized**

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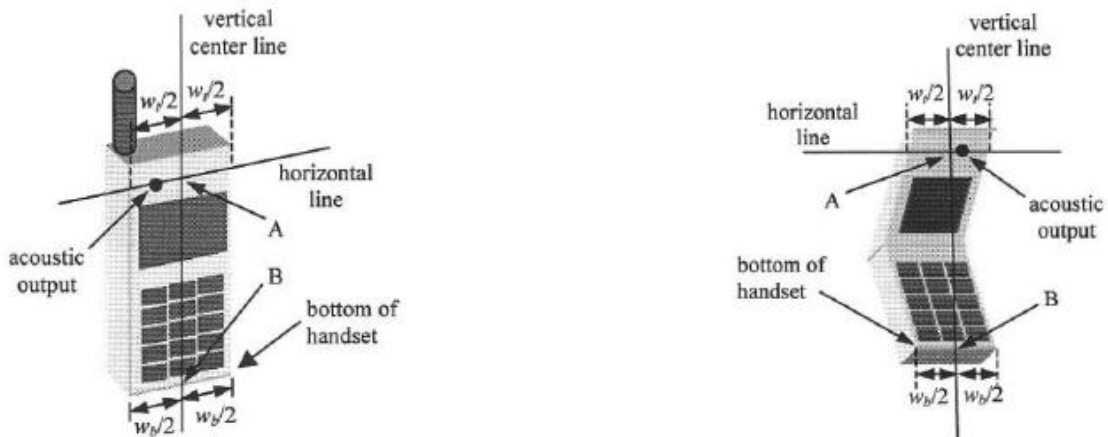
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## 8. EUT Testing Position

### 8.1. Define two imaginary lines on the handset

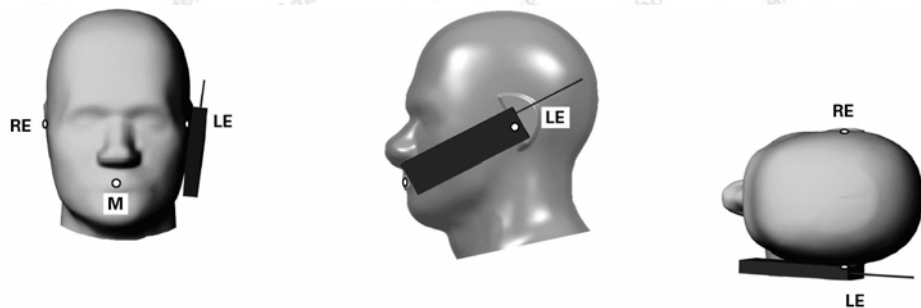
- The vertical centerline passes through two points on the front side of the handset - the midpoint of the width  $w_f$  of the handset at the level of the acoustic output, and the midpoint of the width  $w_b$  of the bottom of the handset.
- The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output. The horizontal line is also tangential to the face of the handset at point A.
- 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.



Handset Vertical and Horizontal Reference Lines

## 8. 2. Position for Cheek/Touch

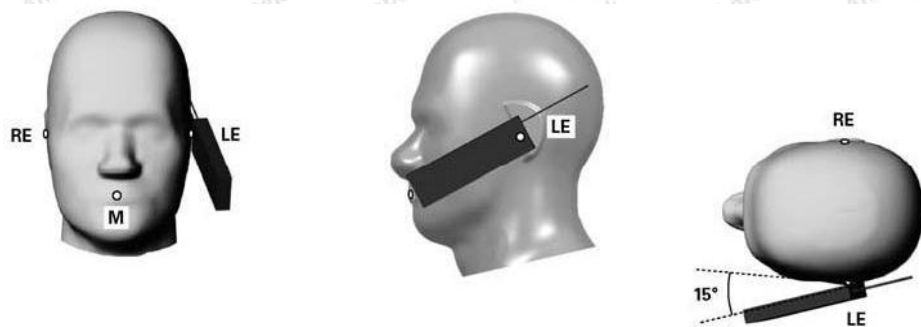
- (a) To position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing 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.



**Cheek Position**

## 8. 3. Position for Ear / 15°Tilt

- (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. 8.3).

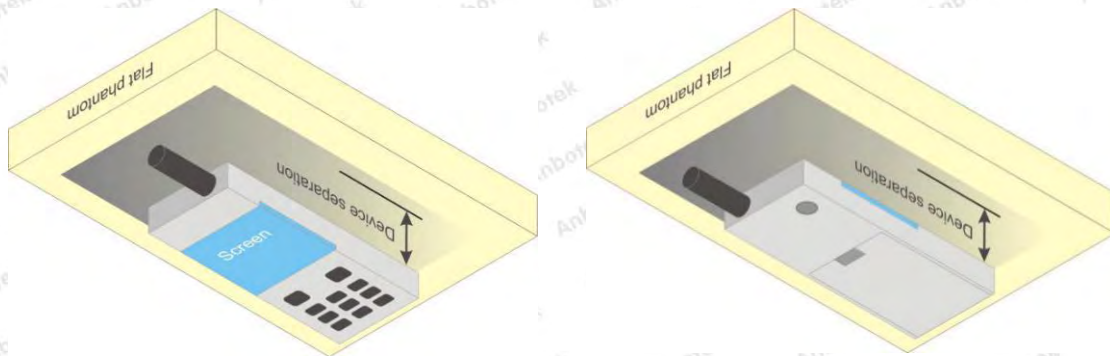


**Tilt Position**

#### 8. 4. Body Worn Position

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration. Per KDB 648474 D04, 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 FCC KDB 447498 D01 should be 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 applicable. When the reported SAR for body-worn accessory, measured without a headset connected to the handset is  $< 1.2$  W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a handset attached to the handset.

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



**Body Worn Position**

## 9. Measurement Procedures

The measurement procedures are as follows:

- (a) Use base station simulator (if applicable) or engineering software to transmit RF power continuously (continuous Tx) in the middle channel.
- (b) Keep EUT to radiate maximum output power or 100% duty factor (if applicable)
- (c) Measure output power through RF cable and power meter.
- (d) Place the EUT in the positions as setup photos demonstrates.
- (e) Set scan area, grid size and other setting on the DASY software.
- (f) Measure SAR transmitting at the middle channel for all applicable exposure positions.
- (g) Identify the exposure position and device configuration resulting the highest SAR
- (h) Measure SAR at the lowest and highest channels at the worst exposure position and device configuration if applicable.

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

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

### 9.1. Spatial Peak SAR Evaluation

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

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


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

- (a) Extraction of the measured data (grid and values) from the Zoom Scan
- (b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
- (c) Generation of a high-resolution mesh within the measured volume
- (d) Interpolation of all measured values 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

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- (f) Calculation of the averaged SAR within masses of 1g and 10g

## 9. 2. Power Reference Measurement

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

## 9. 3. Area Scan Procedures

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan), if only one zoom scan follows the area scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of zoom scans has to be increased accordingly.

Area scan parameters extracted from FCC KDB 865664 D01 SAR measurement 100 MHz to 6 GHz.

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: $\Delta x_{Area}$ , $\Delta y_{Area}$	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

## 9. 4. Zoom Scan Procedures

Zoom scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 gram and 10gram of simulated tissue. The zoom scan measures points (refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the zoom scan evaluates the averaged SAR for 1 gram and 10 gram and displays these values next to the job's label.

Zoom scan parameters extracted from FCC KDB 865664 D01 SAR measurement 100 MHz to 6 GHz.

			$\leq 3$ GHz	$> 3$ GHz
Maximum zoom scan spatial resolution: $\Delta x_{Zoom}, \Delta y_{Zoom}$			$\leq 2$ 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	uniform grid: $\Delta z_{Zoom}(n)$		$\leq 5$ mm	3 – 4 GHz: $\leq 4$ mm 4 – 5 GHz: $\leq 3$ mm 5 – 6 GHz: $\leq 2$ mm
	graded grid	$\Delta z_{Zoom}(1)$ : between 1 <sup>st</sup> two points closest to phantom surface	$\leq 4$ mm	3 – 4 GHz: $\leq 3$ mm 4 – 5 GHz: $\leq 2.5$ mm 5 – 6 GHz: $\leq 2$ mm
		$\Delta z_{Zoom}(n>1)$ : between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z	$\geq 30$ mm	3 – 4 GHz: $\geq 28$ mm 4 – 5 GHz: $\geq 25$ mm 5 – 6 GHz: $\geq 22$ mm	

Note:  $\delta$  is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

\* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 447498 is  $\leq 1.4$  W/kg,  $\leq 8$  mm,  $\leq 7$  mm and  $\leq 5$  mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

## 9. 5. Volume Scan Procedures

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

## 9. 6. Power Drift Monitoring

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



## 10. Conducted Power

### <GSM Conducted power>

Mode	Frequency (MHz)	Reference Power	Peak Power	Tolerance	Avg.Burst Power	Duty cycle Factor(dB)	Frame Power (dBm)	Peak to Average Ratio
GSM850	824.2	33	33.02	0.02	31.81	-9	22.81	1.21
	836.6	33	<b>33.22</b>	0.22	<b>32.01</b>	-9	23.01	1.21
	848.8	33	33.06	0.06	31.93	-9	22.93	1.13
GPRS850 (1 Slot)	824.2	33	32.93	-0.07	31.96	-9	22.96	0.97
	836.6	33	32.72	-0.28	31.49	-9	22.49	1.23
	848.8	33	32.96	-0.04	31.71	-9	22.71	1.25
GPRS850 (2 Slot)	824.2	30	30.33	0.33	29.13	-6	23.13	1.20
	836.6	30	30.72	0.72	29.42	-6	23.42	1.30
	848.8	30	30.90	0.90	29.66	-6	<b>23.66</b>	1.24
GPRS850 (3 Slot)	824.2	28.74	27.23	-1.51	25.93	-4.26	21.67	1.30
	836.6	28.74	27.19	-1.55	26.01	-4.26	21.75	1.18
	848.8	28.74	27.02	-1.72	25.94	-4.26	21.68	1.08
GPRS850 (4 Slot)	824.2	27	26.25	-0.75	24.74	-3	21.74	1.51
	836.6	27	26.21	-0.79	24.90	-3	21.90	1.32
	848.8	27	26.41	-0.59	25.22	-3	22.22	1.19
EGPRS850 (1 Slot)	824.2	27	26.33	-0.67	23.66	-9	14.66	2.67
	836.6	27	26.28	-0.72	23.96	-9	14.96	2.31
	848.8	27	26.65	-0.35	24.39	-9	15.39	2.27
EGPRS850 (2 Slot)	824.2	24	24.49	0.49	22.16	-6	16.16	2.33
	836.6	24	24.35	0.35	21.78	-6	15.78	2.57
	848.8	24	24.63	0.63	22.04	-6	16.04	2.59
EGPRS850 (3 Slot)	824.2	22.74	22.20	-0.54	19.22	-4.26	14.96	2.98
	836.6	22.74	22.29	-0.45	19.46	-4.26	15.20	2.83
	848.8	22.74	22.86	0.12	19.96	-4.26	15.70	2.90
EGPRS850 (4 Slot)	824.2	21	21.00	0.00	17.93	-3	14.93	3.07
	836.6	21	21.35	0.35	18.27	-3	15.27	<b>3.08</b>
	848.8	21	21.28	0.28	19.03	-3	16.03	2.25

Mode	Frequency (MHz)	Reference	Peak Power	Tolerance	Avg.Burst Power	Duty cycle Factor(dB)	Frame Power(dBm)	Peak to Average Ratio
GSM1900	1850.2	30	<b>29.40</b>	-0.60	27.98	-9	18.98	1.42
	1880	30	29.01	-0.99	27.95	-9	18.95	1.07
	1909.8	30	29.21	-0.79	<b>28.18</b>	-9	19.18	1.03
GPRS1900 (1 Slot)	1850.2	30	28.57	-1.43	27.58	-9	18.58	0.99
	1880	30	28.57	-1.43	27.35	-9	18.35	1.22
	1909.8	30	28.74	-1.26	27.60	-9	18.60	1.14
GPRS1900 (2 Slot)	1850.2	27	25.47	-1.53	24.21	-6	18.21	1.26
	1880	27	25.47	-1.53	24.25	-6	18.25	1.23
	1909.8	27	25.14	-1.86	24.23	-6	18.23	0.91
GPRS1900 (3 Slot)	1850.2	25.23	24.31	-0.92	23.32	-4.26	19.06	0.98
	1880	25.23	24.19	-1.04	22.97	-4.26	18.71	1.23
	1909.8	25.23	24.47	-0.76	23.08	-4.26	18.82	1.40
GPRS1900 (4 Slot)	1850.2	24	22.90	-1.10	21.76	-3	18.76	1.14
	1880	24	22.97	-1.03	21.77	-3	18.77	1.20
	1909.8	24	23.30	-0.70	22.07	-3	<b>19.07</b>	1.23
EGPRS1900 (1 Slot)	1850.2	27	27.58	0.58	24.74	-9	15.74	2.85
	1880	27	26.98	-0.02	24.18	-9	15.18	2.80
	1909.8	27	27.39	0.39	24.92	-9	15.92	2.47
EGPRS1900 (2 Slot)	1850.2	24	24.13	0.13	21.32	-6	15.32	2.81
	1880	24	24.55	0.55	21.94	-6	15.94	2.60
	1909.8	24	24.20	0.20	21.66	-6	15.66	2.54
EGPRS1900 (3 Slot)	1850.2	22.74	22.95	0.21	20.29	-4.26	16.03	2.67
	1880	22.74	23.07	0.33	20.71	-4.26	16.45	2.36
	1909.8	22.74	22.87	0.13	20.25	-4.26	15.99	2.62
EGPRS1900 (4 Slot)	1850.2	21	21.56	0.56	18.76	-3	15.76	2.80
	1880	21	21.14	0.14	18.06	-3	15.06	<b>3.08</b>
	1909.8	21	21.73	0.73	18.90	-3	15.90	2.83

**Note:**

1. Per KDB 447498 D01, the maximum output power channel is used for SAR testing and for further SAR test reduction
2. For Head SAR testing, GSM should be evaluated, therefore the EUT was set in GSM Voice for GSM850 and PCS1900.
3. For Body SAR testing, GPRS should be evaluated, therefore the EUT was set in GPRS 2 Tx slots for GSM850 and PCS1900 due to its highest frame-average power.

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## <WCDMA Conducted Power>

The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification. A summary of these settings are illustrated below:

### HSDPA Setup Configuration:

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

**Table C.10.1.4:  $\beta$  values for transmitter characteristics tests with HS-DPCCH**

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

Note 1:  $\Delta_{ACK}, \Delta_{NACK}$  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 DPDCCH, 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  $\beta_d = 15/15$ .

## Setup Configuration

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### HSUPA Setup Configuration:

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

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

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{HS}$ (Note 1)	$\beta_{ec}$	$\beta_{ed}$ (Note 5) (Note 6)	$\beta_{ed}$ (SF)	$\beta_{ed}$ (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCl
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed1}$ : 47/15 $\beta_{ed2}$ : 47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

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

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: For subtest 5 the  $\beta_c/\beta_d$  ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 14/15$  and  $\beta_d = 15/15$ .

Note 5: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

Note 6:  $\beta_{ed}$  can not be set directly, it is set by Absolute Grant Value.

### Setup Configuration

**<WCDMA Conducted Power>  
UMTS BAND II**

Mode	Frequency (MHz)	Reference power	Peak Power	Tolerance	Avg.Burst Power	Peak to Average Ratio
WCDMA1900 RMC	1852.4	24	24.20	0.20	<b>22.31</b>	1.89
	1880	24	23.14	-0.86	21.83	1.31
	1907.6	24	<b>24.61</b>	0.61	22.12	<b>2.49</b>
WCDMA1900 AMR	1852.4	24	24.18	0.18	22.16	2.02
	1880	24	22.92	-1.08	21.91	1.01
	1907.6	24	23.33	-0.67	21.81	1.52
HSDPA Subtest 1	1852.4	24	23.06	-0.94	21.33	1.73
	1880	24	21.93	-2.07	20.81	1.13
	1907.6	24	22.16	-1.84	20.90	1.26
HSDPA Subtest 2	1852.4	24	22.01	-1.99	20.04	1.97
	1880	24	22.41	-1.59	20.04	2.37
	1907.6	24	22.21	-1.79	20.77	1.44
HSDPA Subtest 3	1852.4	24	22.39	-1.61	20.07	2.31
	1880	24	22.05	-1.95	19.91	2.13
	1907.6	24	22.02	-1.98	20.27	1.74
HSDPA Subtest 4	1852.4	24	21.71	-2.29	20.21	1.50
	1880	24	22.67	-1.33	20.56	2.12
	1907.6	24	23.22	-0.78	20.81	2.41
HSUPA Subtest 1	1852.4	24	22.83	-1.17	20.41	2.42
	1880	24	22.37	-1.63	20.36	2.00
	1907.6	24	21.64	-2.36	20.35	1.29
HSUPA Subtest 2	1852.4	24	22.85	-1.15	21.62	1.22
	1880	24	23.50	-0.50	21.87	1.64
	1907.6	24	23.08	-0.92	21.17	1.91
HSUPA Subtest 3	1852.4	24	23.34	-0.66	21.21	2.13
	1880	24	23.10	-0.90	20.94	2.16
	1907.6	24	22.70	-1.30	21.32	1.37
HSUPA Subtest 4	1852.4	24	22.42	-1.58	21.05	1.38
	1880	24	24.01	0.01	22.00	2.01
	1907.6	24	24.27	0.27	22.24	2.04
HSUPA Subtest 5	1852.4	24	22.77	-1.23	21.05	1.72
	1880	24	23.33	-0.67	21.56	1.77
	1907.6	24	22.87	-1.13	21.84	1.02

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**UMTS BAND**

**V**

Mode	Frequency (MHz)	Reference power	Peak Power	Tolerance	Avg.Burst Power	Peak to Average Ratio
WCDMA850 RMC	826.4	24	<b>24.63</b>	0.63	<b>22.56</b>	2.07
	836.6	24	23.58	-0.42	22.02	1.56
	846.6	24	23.30	-0.70	22.26	1.04
WCDMA850 AMR	826.4	24	23.61	-0.39	21.98	1.63
	836.6	24	24.09	0.09	22.24	1.85
	846.6	24	23.00	-1.00	21.86	1.13
HSDPA Subtest 1	826.4	24	22.09	-1.91	21.05	1.04
	836.6	24	22.44	-1.56	21.09	1.36
	846.6	24	22.83	-1.17	20.98	1.85
HSDPA Subtest 2	826.4	24	21.63	-2.37	20.15	1.48
	836.6	24	21.14	-2.86	19.84	1.30
	846.6	24	22.67	-1.33	20.66	2.01
HSDPA Subtest 3	826.4	24	22.09	-1.91	19.92	2.17
	836.6	24	21.41	-2.59	20.10	1.31
	846.6	24	21.92	-2.08	20.10	1.82
HSDPA Subtest 4	826.4	24	21.35	-2.65	20.25	1.10
	836.6	24	22.53	-1.47	20.34	2.19
	846.6	24	22.74	-1.26	20.72	2.03
HSUPA Subtest 1	826.4	24	21.72	-2.28	20.57	1.14
	836.6	24	21.66	-2.34	20.53	1.13
	846.6	24	22.68	-1.32	20.58	2.09
HSUPA Subtest 2	826.4	24	23.78	-0.22	21.36	2.42
	836.6	24	23.38	-0.62	21.57	1.81
	846.6	24	22.98	-1.02	21.38	1.61
HSUPA Subtest 3	826.4	24	23.63	-0.37	21.16	<b>2.47</b>
	836.6	24	23.64	-0.36	21.22	2.42
	846.6	24	23.55	-0.45	21.28	2.27
HSUPA Subtest 4	826.4	24	22.45	-1.55	21.10	1.34
	836.6	24	23.83	-0.17	22.21	1.62
	846.6	24	24.56	0.56	22.36	2.20
HSUPA Subtest 5	826.4	24	22.14	-1.86	21.11	1.03
	836.6	24	23.92	-0.08	21.51	2.41
	846.6	24	23.63	-0.37	21.97	1.66

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**General Note**

1. Per KDB 941225 D01 v02, RMC 12.2kbps setting is used to evaluate SAR. If AMR 12.2kbps power is  $< 0.25\text{dB}$  higher than RMC 12.2kbps, SAR tests with AMR 12.2kbps can be excluded.
2. By design, AMR and HSDPA/HSUPA RF power will not be larger than RMC 12.2kbps, detailed information is included in Tune-up Procure exhibit.
3. It is expected by the manufacturer that MPR for some HSDPA/HSUPA subtests may differ from the specification of 3GPP, according to the chipset implementation in this model. The implementation and expected deviation are detailed in tune-up procedure exhibit.

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<LTE Conducted Power>

Band	Bandwidth	Modulation	Channel	RB Configuration	Result(dBm)	Verdict
Band 4	1.4MHz	QPSK	19957	1RB#0	23.05	PASS
Band 4	1.4MHz	QPSK	19957	1RB#2	23.13	PASS
Band 4	1.4MHz	QPSK	19957	1RB#5	23.01	PASS
Band 4	1.4MHz	QPSK	19957	3RB#1	23.08	PASS
Band 4	1.4MHz	QPSK	19957	3RB#0	23.11	PASS
Band 4	1.4MHz	QPSK	19957	3RB#3	23.11	PASS
Band 4	1.4MHz	QPSK	19957	6RB#0	22.10	PASS
Band 4	1.4MHz	QPSK	20175	1RB#5	23.16	PASS
Band 4	1.4MHz	QPSK	20175	1RB#0	23.19	PASS
Band 4	1.4MHz	QPSK	20175	1RB#2	23.33	PASS
Band 4	1.4MHz	QPSK	20175	3RB#0	23.28	PASS
Band 4	1.4MHz	QPSK	20175	3RB#1	23.28	PASS
Band 4	1.4MHz	QPSK	20175	3RB#3	23.27	PASS
Band 4	1.4MHz	QPSK	20175	6RB#0	22.24	PASS
Band 4	1.4MHz	QPSK	20393	1RB#2	23.17	PASS
Band 4	1.4MHz	QPSK	20393	1RB#0	23.09	PASS
Band 4	1.4MHz	QPSK	20393	1RB#5	23.07	PASS
Band 4	1.4MHz	QPSK	20393	3RB#1	23.16	PASS

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Band 4	1.4MHz	QPSK	20393	3RB#3	23.20	PASS
Band 4	1.4MHz	QPSK	20393	3RB#0	23.15	PASS
Band 4	1.4MHz	QPSK	20393	6RB#0	22.14	PASS
Band 4	1.4MHz	16QAM	19957	1RB#2	22.32	PASS
Band 4	1.4MHz	16QAM	19957	1RB#0	22.14	PASS
Band 4	1.4MHz	16QAM	19957	1RB#5	22.16	PASS
Band 4	1.4MHz	16QAM	19957	3RB#1	23.14	PASS
Band 4	1.4MHz	16QAM	19957	3RB#0	23.13	PASS
Band 4	1.4MHz	16QAM	19957	3RB#3	23.12	PASS
Band 4	1.4MHz	16QAM	19957	6RB#0	21.11	PASS
Band 4	1.4MHz	16QAM	20175	1RB#2	22.43	PASS
Band 4	1.4MHz	16QAM	20175	1RB#5	22.27	PASS
Band 4	1.4MHz	16QAM	20175	1RB#0	22.31	PASS
Band 4	1.4MHz	16QAM	20175	3RB#1	23.30	PASS
Band 4	1.4MHz	16QAM	20175	3RB#0	23.26	PASS
Band 4	1.4MHz	16QAM	20175	3RB#3	23.28	PASS
Band 4	1.4MHz	16QAM	20175	6RB#0	21.28	PASS
Band 4	1.4MHz	16QAM	20393	1RB#5	22.21	PASS
Band 4	1.4MHz	16QAM	20393	1RB#2	22.36	PASS
Band 4	1.4MHz	16QAM	20393	1RB#0	22.18	PASS

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Band 4	1.4MHz	16QAM	20393	3RB#3	23.21	PASS
Band 4	1.4MHz	16QAM	20393	3RB#0	23.14	PASS
Band 4	1.4MHz	16QAM	20393	3RB#1	23.15	PASS
Band 4	1.4MHz	16QAM	20393	6RB#0	21.03	PASS
Band 4	3MHz	QPSK	19965	1RB#0	23.07	PASS
Band 4	3MHz	QPSK	19965	1RB#8	23.11	PASS
Band 4	3MHz	QPSK	19965	1RB#14	23.12	PASS
Band 4	3MHz	QPSK	19965	8RB#4	22.25	PASS
Band 4	3MHz	QPSK	19965	8RB#7	22.22	PASS
Band 4	3MHz	QPSK	19965	8RB#0	22.31	PASS
Band 4	3MHz	QPSK	19965	15RB#0	22.06	PASS
Band 4	3MHz	QPSK	20175	1RB#14	23.25	PASS
Band 4	3MHz	QPSK	20175	1RB#8	23.28	PASS
Band 4	3MHz	QPSK	20175	1RB#0	23.26	PASS
Band 4	3MHz	QPSK	20175	8RB#0	22.16	PASS
Band 4	3MHz	QPSK	20175	8RB#7	22.15	PASS
Band 4	3MHz	QPSK	20175	8RB#4	22.15	PASS
Band 4	3MHz	QPSK	20175	15RB#0	22.22	PASS
Band 4	3MHz	QPSK	20385	1RB#8	23.10	PASS
Band 4	3MHz	QPSK	20385	1RB#14	23.11	PASS

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Band 4	3MHz	QPSK	20385	1RB#0	23.08	PASS
Band 4	3MHz	QPSK	20385	8RB#7	22.23	PASS
Band 4	3MHz	QPSK	20385	8RB#0	22.24	PASS
Band 4	3MHz	QPSK	20385	8RB#4	22.27	PASS
Band 4	3MHz	QPSK	20385	15RB#0	22.10	PASS
Band 4	3MHz	16QAM	19965	1RB#14	22.23	PASS
Band 4	3MHz	16QAM	19965	1RB#8	22.23	PASS
Band 4	3MHz	16QAM	19965	1RB#0	22.26	PASS
Band 4	3MHz	16QAM	19965	8RB#7	22.21	PASS
Band 4	3MHz	16QAM	19965	8RB#0	22.27	PASS
Band 4	3MHz	16QAM	19965	8RB#4	22.24	PASS
Band 4	3MHz	16QAM	19965	15RB#0	21.01	PASS
Band 4	3MHz	16QAM	20175	1RB#14	22.14	PASS
Band 4	3MHz	16QAM	20175	1RB#8	22.16	PASS
Band 4	3MHz	16QAM	20175	1RB#0	22.11	PASS
Band 4	3MHz	16QAM	20175	8RB#4	22.15	PASS
Band 4	3MHz	16QAM	20175	8RB#7	22.14	PASS
Band 4	3MHz	16QAM	20175	8RB#0	22.15	PASS
Band 4	3MHz	16QAM	20175	15RB#0	21.18	PASS
Band 4	3MHz	16QAM	20385	1RB#14	22.26	PASS

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Band 4	3MHz	16QAM	20385	1RB#0	22.27	PASS
Band 4	3MHz	16QAM	20385	1RB#8	22.26	PASS
Band 4	3MHz	16QAM	20385	8RB#4	22.24	PASS
Band 4	3MHz	16QAM	20385	8RB#0	22.25	PASS
Band 4	3MHz	16QAM	20385	8RB#7	22.24	PASS
Band 4	3MHz	16QAM	20385	15RB#0	21.11	PASS
Band 4	5MHz	QPSK	19975	1RB#24	23.08	PASS
Band 4	5MHz	QPSK	19975	1RB#0	23.08	PASS
Band 4	5MHz	QPSK	19975	1RB#12	23.19	PASS
Band 4	5MHz	QPSK	19975	12RB#13	22.11	PASS
Band 4	5MHz	QPSK	19975	12RB#6	22.09	PASS
Band 4	5MHz	QPSK	19975	12RB#0	22.07	PASS
Band 4	5MHz	QPSK	19975	25RB#0	22.11	PASS
Band 4	5MHz	QPSK	20175	1RB#24	23.15	PASS
Band 4	5MHz	QPSK	20175	1RB#12	23.30	PASS
Band 4	5MHz	QPSK	20175	1RB#0	23.19	PASS
Band 4	5MHz	QPSK	20175	12RB#0	22.23	PASS
Band 4	5MHz	QPSK	20175	12RB#13	22.21	PASS
Band 4	5MHz	QPSK	20175	12RB#6	22.26	PASS
Band 4	5MHz	QPSK	20175	25RB#0	22.27	PASS

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Band 4	5MHz	QPSK	20375	1RB#12	23.23	PASS
Band 4	5MHz	QPSK	20375	1RB#0	23.10	PASS
Band 4	5MHz	QPSK	20375	1RB#24	23.08	PASS
Band 4	5MHz	QPSK	20375	12RB#0	22.18	PASS
Band 4	5MHz	QPSK	20375	12RB#13	22.08	PASS
Band 4	5MHz	QPSK	20375	12RB#6	22.16	PASS
Band 4	5MHz	QPSK	20375	25RB#0	22.20	PASS
Band 4	5MHz	16QAM	19975	1RB#12	22.36	PASS
Band 4	5MHz	16QAM	19975	1RB#24	22.24	PASS
Band 4	5MHz	16QAM	19975	1RB#0	22.23	PASS
Band 4	5MHz	16QAM	19975	12RB#0	22.09	PASS
Band 4	5MHz	16QAM	19975	12RB#6	22.05	PASS
Band 4	5MHz	16QAM	19975	12RB#13	22.09	PASS
Band 4	5MHz	16QAM	19975	25RB#0	21.08	PASS
Band 4	5MHz	16QAM	20175	1RB#24	22.19	PASS
Band 4	5MHz	16QAM	20175	1RB#12	22.30	PASS
Band 4	5MHz	16QAM	20175	1RB#0	22.19	PASS
Band 4	5MHz	16QAM	20175	12RB#0	22.27	PASS
Band 4	5MHz	16QAM	20175	12RB#13	22.22	PASS
Band 4	5MHz	16QAM	20175	12RB#6	22.20	PASS

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Band 4	5MHz	16QAM	20175	25RB#0	21.24	PASS
Band 4	5MHz	16QAM	20375	1RB#12	22.41	PASS
Band 4	5MHz	16QAM	20375	1RB#24	22.32	PASS
Band 4	5MHz	16QAM	20375	1RB#0	22.25	PASS
Band 4	5MHz	16QAM	20375	12RB#13	22.17	PASS
Band 4	5MHz	16QAM	20375	12RB#0	22.16	PASS
Band 4	5MHz	16QAM	20375	12RB#6	22.16	PASS
Band 4	5MHz	16QAM	20375	25RB#0	21.17	PASS
Band 4	10MHz	QPSK	20000	1RB#0	23.08	PASS
Band 4	10MHz	QPSK	20000	1RB#24	23.20	PASS
Band 4	10MHz	QPSK	20000	1RB#49	23.17	PASS
Band 4	10MHz	QPSK	20000	25RB#0	22.18	PASS
Band 4	10MHz	QPSK	20000	25RB#25	22.26	PASS
Band 4	10MHz	QPSK	20000	25RB#12	22.18	PASS
Band 4	10MHz	QPSK	20000	50RB#0	22.21	PASS
Band 4	10MHz	QPSK	20175	1RB#24	23.39	PASS
Band 4	10MHz	QPSK	20175	1RB#0	23.24	PASS
Band 4	10MHz	QPSK	20175	1RB#49	23.15	PASS
Band 4	10MHz	QPSK	20175	25RB#25	22.30	PASS
Band 4	10MHz	QPSK	20175	25RB#12	22.34	PASS

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Band 4	10MHz	QPSK	20175	25RB#0	22.33	PASS
Band 4	10MHz	QPSK	20175	50RB#0	22.29	PASS
Band 4	10MHz	QPSK	20350	1RB#0	23.08	PASS
Band 4	10MHz	QPSK	20350	1RB#24	23.24	PASS
Band 4	10MHz	QPSK	20350	1RB#49	23.09	PASS
Band 4	10MHz	QPSK	20350	25RB#25	22.14	PASS
Band 4	10MHz	QPSK	20350	25RB#12	22.25	PASS
Band 4	10MHz	QPSK	20350	25RB#0	22.26	PASS
Band 4	10MHz	QPSK	20350	50RB#0	22.20	PASS
Band 4	10MHz	16QAM	20000	1RB#24	22.48	PASS
Band 4	10MHz	16QAM	20000	1RB#0	22.24	PASS
Band 4	10MHz	16QAM	20000	1RB#49	22.33	PASS
Band 4	10MHz	16QAM	20000	25RB#0	22.19	PASS
Band 4	10MHz	16QAM	20000	25RB#25	22.27	PASS
Band 4	10MHz	16QAM	20000	25RB#12	22.22	PASS
Band 4	10MHz	16QAM	20000	50RB#0	21.21	PASS
Band 4	10MHz	16QAM	20175	1RB#24	22.55	PASS
Band 4	10MHz	16QAM	20175	1RB#0	22.43	PASS
Band 4	10MHz	16QAM	20175	1RB#49	22.31	PASS
Band 4	10MHz	16QAM	20175	25RB#25	22.31	PASS

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Band 4	10MHz	16QAM	20175	25RB#12	22.34	PASS
Band 4	10MHz	16QAM	20175	25RB#0	22.33	PASS
Band 4	10MHz	16QAM	20175	50RB#0	21.29	PASS
Band 4	10MHz	16QAM	20350	1RB#0	22.25	PASS
Band 4	10MHz	16QAM	20350	1RB#24	22.35	PASS
Band 4	10MHz	16QAM	20350	1RB#49	22.16	PASS
Band 4	10MHz	16QAM	20350	25RB#0	22.23	PASS
Band 4	10MHz	16QAM	20350	25RB#12	22.26	PASS
Band 4	10MHz	16QAM	20350	25RB#25	22.17	PASS
Band 4	10MHz	16QAM	20350	50RB#0	21.16	PASS
Band 4	15MHz	QPSK	20025	1RB#0	23.03	PASS
Band 4	15MHz	QPSK	20025	1RB#38	23.22	PASS
Band 4	15MHz	QPSK	20025	1RB#74	23.23	PASS
Band 4	15MHz	QPSK	20025	38RB#37	22.49	PASS
Band 4	15MHz	QPSK	20025	38RB#18	22.44	PASS
Band 4	15MHz	QPSK	20025	38RB#0	22.26	PASS
Band 4	15MHz	QPSK	20025	75RB#0	22.34	PASS
Band 4	15MHz	QPSK	20175	1RB#0	23.13	PASS
Band 4	15MHz	QPSK	20175	1RB#74	22.98	PASS
Band 4	15MHz	QPSK	20175	1RB#38	23.21	PASS

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Band 4	15MHz	QPSK	20175	38RB#37	22.20	PASS
Band 4	15MHz	QPSK	20175	38RB#0	22.30	PASS
Band 4	15MHz	QPSK	20175	38RB#18	22.40	PASS
Band 4	15MHz	QPSK	20175	75RB#0	22.31	PASS
Band 4	15MHz	QPSK	20325	1RB#38	23.03	PASS
Band 4	15MHz	QPSK	20325	1RB#0	23.03	PASS
Band 4	15MHz	QPSK	20325	1RB#74	22.52	PASS
Band 4	15MHz	QPSK	20325	38RB#0	21.97	PASS
Band 4	15MHz	QPSK	20325	38RB#18	22.17	PASS
Band 4	15MHz	QPSK	20325	38RB#37	22.08	PASS
Band 4	15MHz	QPSK	20325	75RB#0	22.27	PASS
Band 4	15MHz	16QAM	20025	1RB#38	22.47	PASS
Band 4	15MHz	16QAM	20025	1RB#0	22.28	PASS
Band 4	15MHz	16QAM	20025	1RB#74	22.51	PASS
Band 4	15MHz	16QAM	20025	38RB#0	22.25	PASS
Band 4	15MHz	16QAM	20025	38RB#37	22.49	PASS
Band 4	15MHz	16QAM	20025	38RB#18	22.49	PASS
Band 4	15MHz	16QAM	20025	75RB#0	21.26	PASS
Band 4	15MHz	16QAM	20175	1RB#0	22.29	PASS
Band 4	15MHz	16QAM	20175	1RB#38	22.41	PASS

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Band 4	15MHz	16QAM	20175	1RB#74	22.17	PASS
Band 4	15MHz	16QAM	20175	38RB#18	22.41	PASS
Band 4	15MHz	16QAM	20175	38RB#0	22.23	PASS
Band 4	15MHz	16QAM	20175	38RB#37	22.14	PASS
Band 4	15MHz	16QAM	20175	75RB#0	21.25	PASS
Band 4	15MHz	16QAM	20325	1RB#0	22.24	PASS
Band 4	15MHz	16QAM	20325	1RB#38	22.33	PASS
Band 4	15MHz	16QAM	20325	1RB#74	21.79	PASS
Band 4	15MHz	16QAM	20325	38RB#0	22.10	PASS
Band 4	15MHz	16QAM	20325	38RB#18	22.35	PASS
Band 4	15MHz	16QAM	20325	38RB#37	21.84	PASS
Band 4	15MHz	16QAM	20325	75RB#0	21.18	PASS
Band 4	20MHz	QPSK	20050	1RB#0	22.91	PASS
Band 4	20MHz	QPSK	20050	1RB#49	<b>23.41</b>	PASS
Band 4	20MHz	QPSK	20050	1RB#99	23.17	PASS
Band 4	20MHz	QPSK	20050	50RB#25	22.20	PASS
Band 4	20MHz	QPSK	20050	50RB#0	22.17	PASS
Band 4	20MHz	QPSK	20050	50RB#50	<b>22.41</b>	PASS
Band 4	20MHz	QPSK	20050	100RB#0	22.31	PASS
Band 4	20MHz	QPSK	20175	1RB#99	22.70	PASS

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Band 4	20MHz	QPSK	20175	1RB#0	23.00	PASS
Band 4	20MHz	QPSK	20175	1RB#49	23.40	PASS
Band 4	20MHz	QPSK	20175	50RB#0	22.28	PASS
Band 4	20MHz	QPSK	20175	50RB#25	22.28	PASS
Band 4	20MHz	QPSK	20175	50RB#50	22.23	PASS
Band 4	20MHz	QPSK	20175	100RB#0	22.23	PASS
Band 4	20MHz	QPSK	20300	1RB#49	23.21	PASS
Band 4	20MHz	QPSK	20300	1RB#0	23.00	PASS
Band 4	20MHz	QPSK	20300	1RB#99	22.40	PASS
Band 4	20MHz	QPSK	20300	50RB#25	22.20	PASS
Band 4	20MHz	QPSK	20300	50RB#50	22.06	PASS
Band 4	20MHz	QPSK	20300	50RB#0	22.15	PASS
Band 4	20MHz	QPSK	20300	100RB#0	21.95	PASS
Band 4	20MHz	16QAM	20050	1RB#49	22.49	PASS
Band 4	20MHz	16QAM	20050	1RB#0	22.03	PASS
Band 4	20MHz	16QAM	20050	1RB#99	22.32	PASS
Band 4	20MHz	16QAM	20050	50RB#25	22.19	PASS
Band 4	20MHz	16QAM	20050	50RB#0	22.21	PASS
Band 4	20MHz	16QAM	20050	50RB#50	22.41	PASS
Band 4	20MHz	16QAM	20050	100RB#0	21.28	PASS

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Band 4	20MHz	16QAM	20175	1RB#49	22.41	PASS
Band 4	20MHz	16QAM	20175	1RB#99	21.83	PASS
Band 4	20MHz	16QAM	20175	1RB#0	22.02	PASS
Band 4	20MHz	16QAM	20175	50RB#25	22.32	PASS
Band 4	20MHz	16QAM	20175	50RB#0	22.27	PASS
Band 4	20MHz	16QAM	20175	50RB#50	22.24	PASS
Band 4	20MHz	16QAM	20175	100RB#0	21.22	PASS
Band 4	20MHz	16QAM	20300	1RB#99	21.55	PASS
Band 4	20MHz	16QAM	20300	1RB#49	22.12	PASS
Band 4	20MHz	16QAM	20300	1RB#0	21.74	PASS
Band 4	20MHz	16QAM	20300	50RB#50	21.93	PASS
Band 4	20MHz	16QAM	20300	50RB#0	22.14	PASS
Band 4	20MHz	16QAM	20300	50RB#25	22.22	PASS
Band 4	20MHz	16QAM	20300	100RB#0	21.12	PASS
Band 7	5MHz	QPSK	20775	1RB#0	22.60	PASS
Band 7	5MHz	QPSK	20775	1RB#12	22.68	PASS
Band 7	5MHz	QPSK	20775	1RB#24	22.62	PASS
Band 7	5MHz	QPSK	20775	12RB#6	21.62	PASS
Band 7	5MHz	QPSK	20775	12RB#13	21.65	PASS
Band 7	5MHz	QPSK	20775	12RB#0	21.63	PASS

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Band 7	5MHz	QPSK	20775	25RB#0	21.66	PASS
Band 7	5MHz	QPSK	21100	1RB#24	22.80	PASS
Band 7	5MHz	QPSK	21100	1RB#12	22.95	PASS
Band 7	5MHz	QPSK	21100	1RB#0	22.87	PASS
Band 7	5MHz	QPSK	21100	12RB#0	21.89	PASS
Band 7	5MHz	QPSK	21100	12RB#13	21.85	PASS
Band 7	5MHz	QPSK	21100	12RB#6	21.85	PASS
Band 7	5MHz	QPSK	21100	25RB#0	21.92	PASS
Band 7	5MHz	QPSK	21425	1RB#12	22.60	PASS
Band 7	5MHz	QPSK	21425	1RB#24	22.48	PASS
Band 7	5MHz	QPSK	21425	1RB#0	22.50	PASS
Band 7	5MHz	QPSK	21425	12RB#13	21.54	PASS
Band 7	5MHz	QPSK	21425	12RB#0	21.57	PASS
Band 7	5MHz	QPSK	21425	12RB#6	21.55	PASS
Band 7	5MHz	QPSK	21425	25RB#0	21.57	PASS
Band 7	5MHz	16QAM	20775	1RB#24	21.79	PASS
Band 7	5MHz	16QAM	20775	1RB#12	21.88	PASS
Band 7	5MHz	16QAM	20775	1RB#0	21.79	PASS
Band 7	5MHz	16QAM	20775	12RB#13	21.67	PASS
Band 7	5MHz	16QAM	20775	12RB#0	21.66	PASS

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Band 7	5MHz	16QAM	20775	12RB#6	21.63	PASS
Band 7	5MHz	16QAM	20775	25RB#0	20.66	PASS
Band 7	5MHz	16QAM	21100	1RB#24	21.83	PASS
Band 7	5MHz	16QAM	21100	1RB#12	21.94	PASS
Band 7	5MHz	16QAM	21100	1RB#0	21.88	PASS
Band 7	5MHz	16QAM	21100	12RB#6	21.94	PASS
Band 7	5MHz	16QAM	21100	12RB#13	21.83	PASS
Band 7	5MHz	16QAM	21100	12RB#0	21.92	PASS
Band 7	5MHz	16QAM	21100	25RB#0	20.97	PASS
Band 7	5MHz	16QAM	21425	1RB#24	21.50	PASS
Band 7	5MHz	16QAM	21425	1RB#0	21.52	PASS
Band 7	5MHz	16QAM	21425	1RB#12	21.62	PASS
Band 7	5MHz	16QAM	21425	12RB#6	21.56	PASS
Band 7	5MHz	16QAM	21425	12RB#0	21.57	PASS
Band 7	5MHz	16QAM	21425	12RB#13	21.55	PASS
Band 7	5MHz	16QAM	21425	25RB#0	20.57	PASS
Band 7	10MHz	QPSK	20800	1RB#49	22.66	PASS
Band 7	10MHz	QPSK	20800	1RB#0	22.60	PASS
Band 7	10MHz	QPSK	20800	1RB#24	22.80	PASS
Band 7	10MHz	QPSK	20800	25RB#25	21.77	PASS

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Band 7	10MHz	QPSK	20800	25RB#12	21.72	PASS
Band 7	10MHz	QPSK	20800	25RB#0	21.70	PASS
Band 7	10MHz	QPSK	20800	50RB#0	21.70	PASS
Band 7	10MHz	QPSK	21100	1RB#49	22.88	PASS
Band 7	10MHz	QPSK	21100	1RB#24	23.06	PASS
Band 7	10MHz	QPSK	21100	1RB#0	22.91	PASS
Band 7	10MHz	QPSK	21100	25RB#0	21.97	PASS
Band 7	10MHz	QPSK	21100	25RB#25	21.95	PASS
Band 7	10MHz	QPSK	21100	25RB#12	21.98	PASS
Band 7	10MHz	QPSK	21100	50RB#0	21.95	PASS
Band 7	10MHz	QPSK	21400	1RB#24	22.54	PASS
Band 7	10MHz	QPSK	21400	1RB#0	22.46	PASS
Band 7	10MHz	QPSK	21400	1RB#49	22.44	PASS
Band 7	10MHz	QPSK	21400	25RB#0	21.63	PASS
Band 7	10MHz	QPSK	21400	25RB#25	21.64	PASS
Band 7	10MHz	QPSK	21400	25RB#12	21.63	PASS
Band 7	10MHz	QPSK	21400	50RB#0	21.63	PASS
Band 7	10MHz	16QAM	20800	1RB#0	21.79	PASS
Band 7	10MHz	16QAM	20800	1RB#49	21.80	PASS
Band 7	10MHz	16QAM	20800	1RB#24	21.94	PASS

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Band 7	10MHz	16QAM	20800	25RB#0	21.69	PASS
Band 7	10MHz	16QAM	20800	25RB#12	21.71	PASS
Band 7	10MHz	16QAM	20800	25RB#25	21.79	PASS
Band 7	10MHz	16QAM	20800	50RB#0	20.71	PASS
Band 7	10MHz	16QAM	21100	1RB#49	21.73	PASS
Band 7	10MHz	16QAM	21100	1RB#24	21.92	PASS
Band 7	10MHz	16QAM	21100	1RB#0	21.84	PASS
Band 7	10MHz	16QAM	21100	25RB#0	22.00	PASS
Band 7	10MHz	16QAM	21100	25RB#25	21.91	PASS
Band 7	10MHz	16QAM	21100	25RB#12	22.00	PASS
Band 7	10MHz	16QAM	21100	50RB#0	20.91	PASS
Band 7	10MHz	16QAM	21400	1RB#24	21.81	PASS
Band 7	10MHz	16QAM	21400	1RB#49	21.68	PASS
Band 7	10MHz	16QAM	21400	1RB#0	21.69	PASS
Band 7	10MHz	16QAM	21400	25RB#25	21.64	PASS
Band 7	10MHz	16QAM	21400	25RB#0	21.61	PASS
Band 7	10MHz	16QAM	21400	25RB#12	21.64	PASS
Band 7	10MHz	16QAM	21400	50RB#0	20.63	PASS
Band 7	15MHz	QPSK	20825	1RB#0	22.56	PASS
Band 7	15MHz	QPSK	20825	1RB#38	22.71	PASS

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Band 7	15MHz	QPSK	20825	1RB#74	22.55	PASS
Band 7	15MHz	QPSK	20825	38RB#0	21.84	PASS
Band 7	15MHz	QPSK	20825	38RB#37	21.82	PASS
Band 7	15MHz	QPSK	20825	38RB#18	21.92	PASS
Band 7	15MHz	QPSK	20825	75RB#0	21.80	PASS
Band 7	15MHz	QPSK	21100	1RB#38	22.92	PASS
Band 7	15MHz	QPSK	21100	1RB#0	22.90	PASS
Band 7	15MHz	QPSK	21100	1RB#74	22.76	PASS
Band 7	15MHz	QPSK	21100	38RB#37	21.66	PASS
Band 7	15MHz	QPSK	21100	38RB#18	21.78	PASS
Band 7	15MHz	QPSK	21100	38RB#0	21.76	PASS
Band 7	15MHz	QPSK	21100	75RB#0	21.99	PASS
Band 7	15MHz	QPSK	21375	1RB#0	22.43	PASS
Band 7	15MHz	QPSK	21375	1RB#38	22.50	PASS
Band 7	15MHz	QPSK	21375	1RB#74	22.38	PASS
Band 7	15MHz	QPSK	21375	38RB#37	21.59	PASS
Band 7	15MHz	QPSK	21375	38RB#18	21.74	PASS
Band 7	15MHz	QPSK	21375	38RB#0	21.64	PASS
Band 7	15MHz	QPSK	21375	75RB#0	21.64	PASS
Band 7	15MHz	16QAM	20825	1RB#38	21.95	PASS

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Band 7	15MHz	16QAM	20825	1RB#0	21.84	PASS
Band 7	15MHz	16QAM	20825	1RB#74	21.87	PASS
Band 7	15MHz	16QAM	20825	38RB#0	21.85	PASS
Band 7	15MHz	16QAM	20825	38RB#37	21.88	PASS
Band 7	15MHz	16QAM	20825	38RB#18	21.94	PASS
Band 7	15MHz	16QAM	20825	75RB#0	20.76	PASS
Band 7	15MHz	16QAM	21100	1RB#38	21.81	PASS
Band 7	15MHz	16QAM	21100	1RB#0	21.80	PASS
Band 7	15MHz	16QAM	21100	1RB#74	21.67	PASS
Band 7	15MHz	16QAM	21100	38RB#37	21.62	PASS
Band 7	15MHz	16QAM	21100	38RB#18	21.84	PASS
Band 7	15MHz	16QAM	21100	38RB#0	21.77	PASS
Band 7	15MHz	16QAM	21100	75RB#0	20.91	PASS
Band 7	15MHz	16QAM	21375	1RB#0	21.64	PASS
Band 7	15MHz	16QAM	21375	1RB#38	21.74	PASS
Band 7	15MHz	16QAM	21375	1RB#74	21.58	PASS
Band 7	15MHz	16QAM	21375	38RB#0	21.67	PASS
Band 7	15MHz	16QAM	21375	38RB#18	21.72	PASS
Band 7	15MHz	16QAM	21375	38RB#37	21.58	PASS
Band 7	15MHz	16QAM	21375	75RB#0	20.58	PASS

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Band 7	20MHz	QPSK	20850	1RB#0	22.57	PASS
Band 7	20MHz	QPSK	20850	1RB#49	<b>22.95</b>	PASS
Band 7	20MHz	QPSK	20850	1RB#99	22.63	PASS
Band 7	20MHz	QPSK	20850	50RB#50	21.83	PASS
Band 7	20MHz	QPSK	20850	50RB#25	21.72	PASS
Band 7	20MHz	QPSK	20850	50RB#0	21.79	PASS
Band 7	20MHz	QPSK	20850	100RB#0	21.75	PASS
Band 7	20MHz	QPSK	21100	1RB#0	22.59	PASS
Band 7	20MHz	QPSK	21100	1RB#99	22.44	PASS
Band 7	20MHz	QPSK	21100	1RB#49	22.82	PASS
Band 7	20MHz	QPSK	21100	50RB#50	21.87	PASS
Band 7	20MHz	QPSK	21100	50RB#0	21.87	PASS
Band 7	20MHz	QPSK	21100	50RB#25	21.86	PASS
Band 7	20MHz	QPSK	21100	100RB#0	21.90	PASS
Band 7	20MHz	QPSK	21350	1RB#49	22.70	PASS
Band 7	20MHz	QPSK	21350	1RB#0	22.36	PASS
Band 7	20MHz	QPSK	21350	1RB#99	22.32	PASS
Band 7	20MHz	QPSK	21350	50RB#0	21.66	PASS
Band 7	20MHz	QPSK	21350	50RB#25	21.66	PASS
Band 7	20MHz	QPSK	21350	50RB#50	21.60	PASS

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Band 7	20MHz	QPSK	21350	100RB#0	21.59	PASS
Band 7	20MHz	16QAM	20850	1RB#49	22.05	PASS
Band 7	20MHz	16QAM	20850	1RB#0	21.68	PASS
Band 7	20MHz	16QAM	20850	1RB#99	21.84	PASS
Band 7	20MHz	16QAM	20850	50RB#0	21.76	PASS
Band 7	20MHz	16QAM	20850	50RB#50	21.85	PASS
Band 7	20MHz	16QAM	20850	50RB#25	21.76	PASS
Band 7	20MHz	16QAM	20850	100RB#0	20.73	PASS
Band 7	20MHz	16QAM	21100	1RB#0	21.71	PASS
Band 7	20MHz	16QAM	21100	1RB#49	21.99	PASS
Band 7	20MHz	16QAM	21100	1RB#99	21.57	PASS
Band 7	20MHz	16QAM	21100	50RB#25	21.92	PASS
Band 7	20MHz	16QAM	21100	50RB#0	21.89	PASS
Band 7	20MHz	16QAM	21100	50RB#50	21.87	PASS
Band 7	20MHz	16QAM	21100	100RB#0	20.84	PASS
Band 7	20MHz	16QAM	21350	1RB#0	21.37	PASS
Band 7	20MHz	16QAM	21350	1RB#49	21.75	PASS
Band 7	20MHz	16QAM	21350	1RB#99	21.29	PASS
Band 7	20MHz	16QAM	21350	50RB#0	21.61	PASS
Band 7	20MHz	16QAM	21350	50RB#25	21.62	PASS

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Band 7	20MHz	16QAM	21350	50RB#50	21.58	PASS
Band 7	20MHz	16QAM	21350	100RB#0	20.57	PASS

**<WIFI 2.4GHz Conducted Power>**

Mode	Channel	Frequency (MHz)	Conducted Average Power (dBm)	Test Rate Data
802.11b	1	2412	15.716	1 Mbps
	6	2437	15.497	1 Mbps
	11	2462	<b>15.939</b>	1 Mbps
802.11g	1	2412	11.879	6 Mbps
	6	2437	13.490	6 Mbps
	11	2462	<b>13.896</b>	6 Mbps
802.11n(20MHz)	1	2412	12.018	MCS0
	6	2437	13.597	MCS0
	11	2462	13.875	MCS0
802.11n(40MHz)	3	2422	12.980	MCS0
	6	2437	13.027	MCS0
	9	2452	13.607	MCS0

**Note:**

1. Per KDB 447498 D01, the 1-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR, where}$$

f(GHz) is the RF channel transmit frequency in GHz

Power and distance are rounded to the nearest mW and mm before calculation

The result is rounded to one decimal place for comparison

Mode	Frequency (GHz)	Tune-up Power (dBm)	Max. Power (mW)	Test distance (mm)	Result	exclusion thresholds for 1-g SAR
802.11b	2.462	15.939	39.26	5	12.32	3.0
802.11g	2.462	13.896	24.52	5	7.70	3.0

2. Base on the result of note1, RF exposure evaluation of 802.11 b and g modes are required.

3. Per KDB 248227 D01, choose the highest output power channel to test SAR and determine further SAR exclusion.

4. Per KDB 248227 D01, In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements. SAR is not required for the following 2.4 GHz OFDM conditions:

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

5. According to chapter 12 of this report, the max report SAR of 802.11b mode is 0.521 W/Kg, and

$$0.521\text{W/Kg} \times \frac{24.52}{39.26} = 0.325\text{W/Kg}$$

which is smaller than 1.2W/Kg, so SAR evaluation of 802.11g mode

is not required. And the same for 802.11n.

### <WIFI 5GHz Conducted Power>

Mode	Channel	Frequency (MHz)	Conducted Power (dBm)	Test Rate Data
WIFI 5.2G 802.11 a	36	5180	11.001	MCS0
	40	5200	11.142	MCS0
	48	5240	<b>11.214</b>	MCS0
WIFI 5.2G 802.11 n20	36	5180	<b>11.219</b>	MCS0
	40	5200	10.716	MCS0
	48	5240	11.208	MCS0
WIFI 5.2G 802.11 n40	38	5190	10.738	MCS0
	46	5230	<b>11.309</b>	MCS0
WIFI 5.8G 802.11 a	149	5745	14.847	MCS0
	157	5785	14.202	MCS0
	165	5825	<b>15.101</b>	MCS0
WIFI 5.8G 802.11 n20	149	5745	<b>14.761</b>	MCS0
	157	5785	14.301	MCS0
	165	5825	14.589	MCS0
WIFI 5.8G 802.11 n40	151	5755	<b>14.955</b>	MCS0
	159	5795	14.590	MCS0

1. Per KDB 447498 D01, the 1-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances*  $\leq 50$  mm are determined by:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR, where}$$

$f(\text{GHz})$  is the RF channel transmit frequency in GHz

Power and distance are rounded to the nearest mW and mm before calculation

The result is rounded to one decimal place for comparison

Mode	Frequency (GHz)	Tune-up Power (dBm)	Max. Power (mW)	Test distance (mm)	Result	exclusion thresholds for 1-g SAR
WIFI 5.2G	5.240	11.219	13.24	5	6.06	3.0
WIFI 5.8G	5.825	15.101	32.37	5	15.62	3.0

2. Base on the result of note1, RF exposure evaluation of WIFI 5.2G and 5.8G mode are required.

<Bluetooth Conducted Power>

Mode	Channel	Frequency (MHz)	Conducted peak Power (dBm)
GFSK	00	2402	6.450
	39	2441	3.269
	78	2480	3.797
π/4DQPSK	00	2402	5.693
	39	2441	2.633
	78	2480	3.031
8DPSK	00	2402	5.794
	39	2441	2.786
	78	2480	3.188
BLE	00	2402	1.723
	19	2440	-2.456
	39	2480	-0.967

**Note:**

- Per KDB 447498 D01Chapter 4.3.1, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$  for 1-g SAR and  $\leq 7.5$  for 10-g extremity SAR

f(GHz) is the RF channel transmit frequency in GHz

Power and distance are rounded to the nearest mW and mm before calculation

The result is rounded to one decimal place for comparison

Bluetooth Max Power (dBm)	Separation Distance (mm)	Frequency (GHz)	exclusion thresholds
6.450	0	2.402	1.369

- Per KDB 447498 D01Chapter 4.3.1, when the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion. The test exclusion threshold is 1.369 which is ≤ 3, SAR test for BT mode is not required.
- Per KDB 447498 D01Chapter 4.3.2b), When an antenna qualifies for the standalone SAR test exclusion of 4.3.1 and also transmits simultaneously with other antennas, the standalone SAR value must be estimated according to the following to determine the simultaneous transmission SAR test exclusion criteria:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})/x}] \text{ W/kg}$ , for test separation distances ≤ 50 mm;

where x = 7.5 for 1-g SAR and x = 18.75 for 10-g SAR.

0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distance is > 50 mm.

Test position	Bluetooth Max Power (dBm)	Separation Distance (mm)	Frequency (GHz)	Scaled SAR value (W/kg)
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Head	6.450	5	2.402	<b>0.182</b>
Body	6.450	5	2.402	<b>0.182</b>

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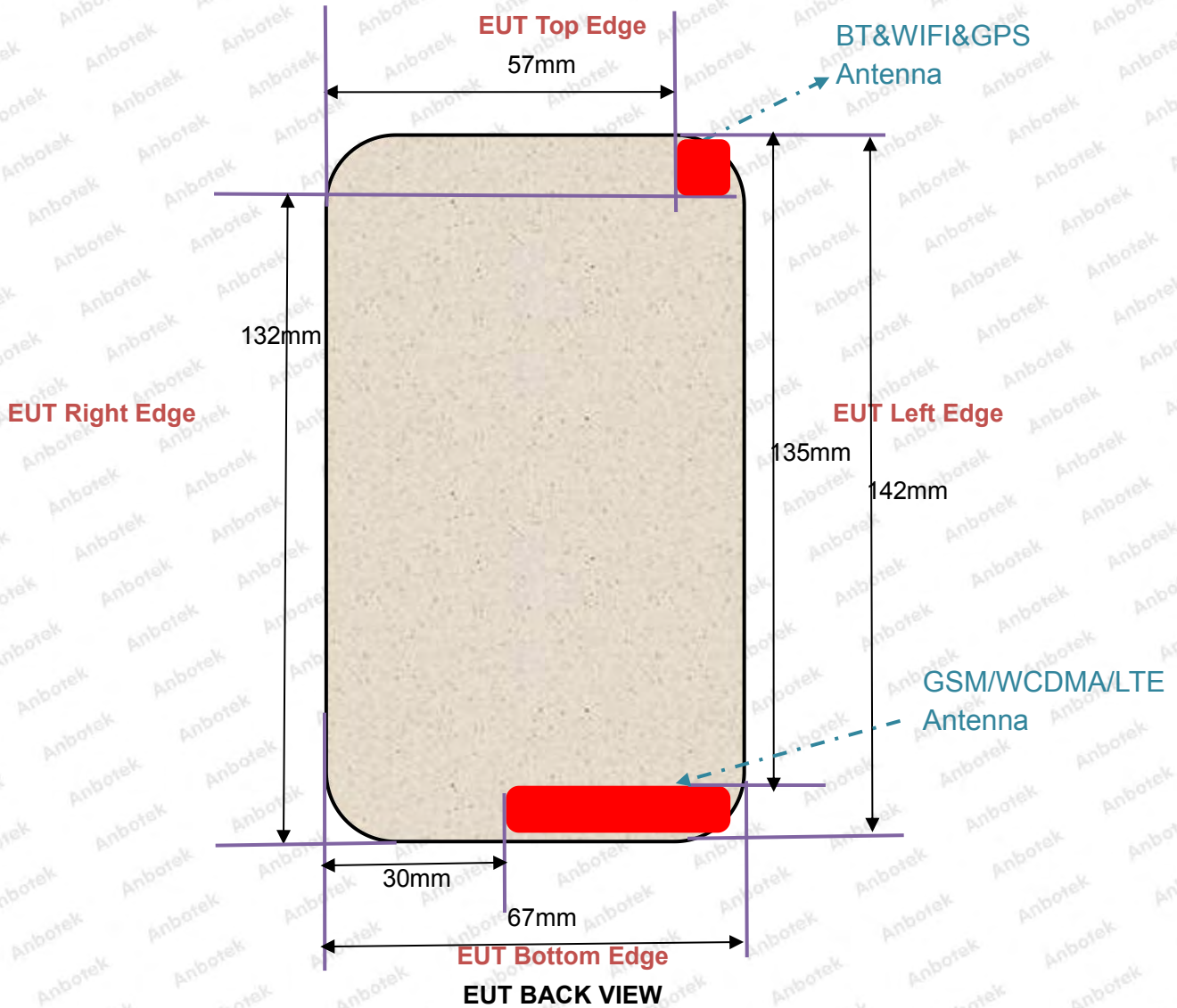
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## 11. Antenna Location



**Distance of The Antenna to the EUT surface and edge**

Antennas	Front	Back	Top Side	Bottom Side	Left Side	Right Side
WWAN	/	/	>25mm	<25mm	<25mm	>25mm
WIFI/BT	/	/	<25mm	>25mm	<25mm	>25mm

**General Note:**

Referring to KDB 941225 D06, When the overall device length and width are  $\geq 9\text{cm} \times 5\text{cm}$ , the test distance is 10mm, SAR must be measured for all sides and surfaces with a transmitting antenna located with 25mm from that surface or edge.

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## 12. SAR Test Results Summary

General Note:

- Per KDB 447498 D01v05r01, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.

*Scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.*

*Reported SAR(W/kg)= Measured SAR(W/kg)\* Scaling Factor*

- Per KDB 447498 D01v05r01, for each exposure position, if the highest output channel reported SAR≤0.8W/kg, other channels SAR testing are not necessary

### 12.1. Head SAR Results

<GSM>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR <sub>1g</sub> (W/kg)	Reported SAR <sub>1g</sub> (W/kg)
#1	GSM850	GSM Voice	Right Cheek	0	190	836.6	32.01	32.10	1.02	0.00	0.086	<b>0.088</b>
	GSM850	GSM Voice	Right Tilt	0	190	836.6	32.01	32.10	1.02	0.04	0.043	0.044
	GSM850	GSM Voice	Left Cheek	0	190	836.6	32.01	32.10	1.02	-0.09	0.072	0.074
	GSM850	GSM Voice	Left Tilt	0	190	836.6	32.01	32.10	1.02	-0.04	0.039	0.040
#2	PCS1900	GSM Voice	Right Cheek	0	885	1909.8	28.18	28.20	1.00	0.09	0.197	<b>0.198</b>
	PCS1900	GSM Voice	Right Tilt	0	885	1909.8	28.18	28.20	1.00	-0.04	0.127	0.128
	PCS1900	GSM Voice	Left Cheek	0	885	1909.8	28.18	28.20	1.00	-0.01	0.183	0.184
	PCS1900	GSM Voice	Left Tilt	0	885	1909.8	28.18	28.20	1.00	0.03	0.114	0.115

<WCDMA>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR <sub>1g</sub> (W/kg)	Reported SAR <sub>1g</sub> (W/kg)
#3	WCDMA Band2	RMC12.2K	Right Cheek	0	9262	1852.4	22.31	22.40	1.02	-0.07	0.196	<b>0.200</b>
	WCDMA Band2	RMC12.2K	Right Tilt	0	9262	1852.4	22.31	22.40	1.02	-0.04	0.163	0.166
	WCDMA Band2	RMC12.2K	Left Cheek	0	9262	1852.4	22.31	22.40	1.02	0.09	0.185	0.189
	WCDMA Band2	RMC12.2K	Left Tilt	0	9262	1852.4	22.31	22.40	1.02	0.06	0.138	0.141

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#	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR <sub>1g</sub> (W/kg)	Reported SAR <sub>1g</sub> (W/kg)
#4	WCDMA Band5	RMC12.2K	Right Cheek	0	4132	826.4	22.56	22.60	1.01	-0.05	0.200	<b>0.202</b>
	WCDMA Band5	RMC12.2K	Right Tilt	0	4132	826.4	22.56	22.60	1.01	0.02	0.135	0.136
	WCDMA Band5	RMC12.2K	Left Cheek	0	4132	826.4	22.56	22.60	1.01	-0.03	0.183	0.185
	WCDMA Band5	RMC12.2K	Left Tilt	0	4132	826.4	22.56	22.60	1.01	-0.05	0.121	0.122

<LTE>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR <sub>1g</sub> (W/kg)	Reported SAR <sub>1g</sub> (W/kg)
#5	LTE Band 4	1RB	Right Cheek	0	20050	1720.0	23.41	23.50	1.02	0.12	0.281	<b>0.287</b>
	LTE Band 4	1RB	Right Tilt	0	20050	1720.0	23.41	23.50	1.02	0.11	0.223	0.228
	LTE Band 4	1RB	Left Cheek	0	20050	1720.0	23.41	23.50	1.02	0.06	0.256	0.261
	LTE Band 4	1RB	Left Tilt	0	20050	1720.0	23.41	23.50	1.02	0.09	0.204	0.208
	LTE Band 4	50RB	Right Cheek	0	20050	1720.0	22.41	23.50	1.29	0.03	0.215	0.276
	LTE Band 4	50RB	Right Tilt	0	20050	1720.0	22.41	23.50	1.29	-0.06	0.154	0.198
	LTE Band 4	50RB	Left Cheek	0	20050	1720.0	22.41	23.50	1.29	0.05	0.193	0.248
	LTE Band 4	50RB	Left Tilt	0	20050	1720.0	22.41	23.50	1.29	0.11	0.141	0.181
#6	LTE Band 7	1RB	Right Cheek	0	20850	2510.0	22.95	24.00	1.27	-0.14	0.348	<b>0.443</b>
	LTE Band 7	1RB	Right Tilt	0	20850	2510.0	22.95	24.00	1.27	0.03	0.235	0.299
	LTE Band 7	1RB	Left Cheek	0	20850	2510.0	22.95	24.00	1.27	0.01	0.326	0.415
	LTE Band 7	1RB	Left Tilt	0	20850	2510.0	22.95	24.00	1.27	-0.04	0.214	0.273
	LTE Band 7	50RB	Right Cheek	0	20850	2510.0	21.83	24.00	1.65	0.05	0.256	0.422
	LTE Band 7	50RB	Right Tilt	0	20850	2510.0	21.83	24.00	1.65	0.08	0.171	0.282
	LTE Band 7	50RB	Left Cheek	0	20850	2510.0	21.83	24.00	1.65	-0.09	0.243	0.401
	LTE Band 7	50RB	Left Tilt	0	20850	2510.0	21.83	24.00	1.65	-0.07	0.164	0.270

<WIFI 2.4GHz>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR <sub>1g</sub> (W/kg)	Reported SAR <sub>1g</sub> (W/kg)
#7	WIFI2.4G	802.11b	Right Cheek	0	11	2462	15.94	16.00	1.01	-0.07	0.449	<b>0.455</b>
	WIFI2.4G	802.11b	Right Tilt	0	11	2462	15.94	16.00	1.01	0.11	0.212	0.215
	WIFI2.4G	802.11b	Left Cheek	0	11	2462	15.94	16.00	1.01	0.04	0.394	0.399

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WIFI2.4G	802.11b	Left Tilt	0	11	2462	15.94	16.00	1.01	-0.03	0.203	0.206
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<WIFI 5GHz>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR <sub>1g</sub> (W/kg)	Reported SAR <sub>1g</sub> (W/kg)
	WIFI 5.2GHz	802.11a	Right Cheek	0	48	5240	11.22	11.50	1.07	-0.05	0.432	<b>0.462</b>
#8	WIFI 5.2GHz	802.11a	Right Tilt	0	48	5240	11.22	11.50	1.07	0.03	0.385	0.412
	WIFI 5.2GHz	802.11a	Left Cheek	0	48	5240	11.22	11.50	1.07	-0.03	0.421	0.450
	WIFI 5.2GHz	802.11a	Left Tilt	0	48	5240	11.22	11.50	1.07	-0.06	0.369	0.394
#9	WIFI5.8GHz	802.11a	Right Cheek	0	165	5825	15.10	15.50	1.10	0.07	0.280	<b>0.307</b>
	WIFI5.8GHz	802.11a	Right Tilt	0	165	5825	15.10	15.50	1.10	-0.06	0.196	0.215
	WIFI5.8GHz	802.11a	Left Cheek	0	165	5825	15.10	15.50	1.10	0.09	0.254	0.279
	WIFI5.8GHz	802.11a	Left Tilt	0	165	5825	15.10	15.50	1.10	-0.03	0.188	0.206

Per KDB865664 D01, for each frequency band, repeated SAR measurement is required only when the measured SAR is  $\geq 0.8W/Kg$ ; if the deviation among the repeated measurement is  $\leq 20\%$ , and the measured SAR  $< 1.45W/Kg$ , only one repeated measurement is required.

## 12. 2. Body SAR Results

<GSM>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR <sub>1g</sub> (W/kg)	Reported SAR <sub>1g</sub> (W/kg)
	GSM850	GPRS(2 Tx slots)	Front	0.5	251	848.8	29.66	29.70	1.01	0.03	0.249	0.251
#10	GSM850	GPRS(2 Tx slots)	Back	0.5	251	848.8	29.66	29.70	1.01	-0.13	0.302	<b>0.305</b>
	GSM850	GPRS(2 Tx slots)	Left Side	0.5	251	848.8	29.66	29.70	1.01	-0.04	0.232	0.234
	GSM850	GPRS(2 Tx slots)	Right Side	0.5	251	848.8	29.66	29.70	1.01	N/A	N/A	N/A
	GSM850	GPRS(2 Tx slots)	Top Side	0.5	251	848.8	29.66	29.70	1.01	N/A	N/A	N/A
	GSM850	GPRS(2 Tx slots)	Bottom Side	0.5	251	848.8	29.66	29.70	1.01	-0.06	0.246	0.248
	PCS1900	GPRS(4 Tx)	Front	0.5	885	1909.8	22.07	22.10	1.01	0.03	0.593	0.597

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		slots)										
#11	PCS1900	GPRS(4 Tx slots)	Back	0.5	885	1909.8	22.07	22.10	1.01	-0.14	0.716	<b>0.721</b>
	PCS1900	GPRS(4 Tx slots)	Left Side	0.5	885	1909.8	22.07	22.10	1.01	-0.05	0.521	0.525
	PCS1900	GPRS(4 Tx slots)	Right Side	0.5	885	1909.8	22.07	22.10	1.01	N/A	N/A	N/A
	PCS1900	GPRS(4 Tx slots)	Top Side	0.5	885	1909.8	22.07	22.10	1.01	N/A	N/A	N/A
	PCS1900	GPRS(4 Tx slots)	Bottom Side	0.5	885	1909.8	22.07	22.10	1.01	0.11	0.532	0.536

**<WCDMA>**

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR <sub>1g</sub> (W/kg)	Reported SAR <sub>1g</sub> (W/kg)
	WCDMA Band 2	RMC 12.2K	Front	0.5	9262	1852.4	22.31	22.40	1.02	0.03	0.392	0.400
#12	WCDMA Band 2	RMC 12.2K	Back	0.5	9262	1852.4	22.31	22.40	1.02	-0.11	0.493	<b>0.503</b>
	WCDMA Band 2	RMC 12.2K	Left Side	0.5	9262	1852.4	22.31	22.40	1.02	0.06	0.381	0.389
	WCDMA Band 2	RMC 12.2K	Right Side	0.5	9262	1852.4	22.31	22.40	1.02	N/A	N/A	N/A
	WCDMA Band 2	RMC 12.2K	Top Side	0.5	9262	1852.4	22.31	22.40	1.02	N/A	N/A	N/A
	WCDMA Band 2	RMC 12.2K	Bottom Side	0.5	9262	1852.4	22.31	22.40	1.02	0.05	0.313	0.320
	WCDMA Band 5	RMC 12.2K	Front	0.5	4132	826.4	22.56	22.60	1.01	0.02	0.256	0.258
#13	WCDMA Band 5	RMC 12.2K	Back	0.5	4132	826.4	22.56	22.60	1.01	-0.03	0.435	<b>0.439</b>
	WCDMA Band 5	RMC 12.2K	Left Side	0.5	4132	826.4	22.56	22.60	1.01	-0.04	0.231	0.233
	WCDMA Band 5	RMC 12.2K	Right Side	0.5	4132	826.4	22.56	22.60	1.01	N/A	N/A	N/A
	WCDMA Band 5	RMC 12.2K	Top Side	0.5	4132	826.4	22.56	22.60	1.01	N/A	N/A	N/A
	WCDMA Band 5	RMC 12.2K	Bottom Side	0.5	4132	826.4	22.56	22.60	1.01	0.06	0.249	0.251

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Band 5		Side										
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<LTE>

	LTE Band 4	20MHz/1RB	Front	0.5	20050	1720.0	23.41	23.50	1.02	0.13	0.343	0.350
#14	LTE Band 4	20MHz/1RB	Back	0.5	20050	1720.0	23.41	23.50	1.02	-0.06	0.473	<b>0.483</b>
	LTE Band 4	20MHz/1RB	Left Side	0.5	20050	1720.0	23.41	23.50	1.02	0.07	0.385	0.393
	LTE Band 4	20MHz/1RB	Right Side	0.5	20050	1720.0	23.41	23.50	1.02	N/A	N/A	N/A
	LTE Band 4	20MHz/1RB	Top Side	0.5	20050	1720.0	23.41	23.50	1.02	N/A	N/A	N/A
	LTE Band 4	20MHz/1RB	Bottom Side	0.5	20050	1720.0	23.41	23.50	1.02	0.02	0.337	0.344
	LTE Band 7	20MHz/1RB	Front	0.5	20850	2510.0	22.95	24.00	1.27	-0.08	0.213	0.271
#15	LTE Band 7	20MHz/1RB	Back	0.5	20850	2510.0	22.95	24.00	1.27	-0.04	0.362	<b>0.461</b>
	LTE Band 7	20MHz/1RB	Left Side	0.5	20850	2510.0	22.95	24.00	1.27	0.06	0.225	0.287
	LTE Band 7	20MHz/1RB	Right Side	0.5	20850	2510.0	22.95	24.00	1.27	N/A	N/A	N/A
	LTE Band 7	20MHz/1RB	Top Side	0.5	20850	2510.0	22.95	24.00	1.27	N/A	N/A	N/A
	LTE Band 7	20MHz/1RB	Bottom Side	0.5	20850	2510.0	22.95	24.00	1.27	0.01	0.208	0.265

<WIFI 2.4GHz>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR <sub>1g</sub> (W/kg)	Reported SAR <sub>1g</sub> (W/kg)
	WIFI 2.4GHz	802.11b	Front	0.5	11	2462	15.94	16.00	1.01	-0.09	0.411	0.417
#16	WIFI 2.4GHz	802.11b	Back	0.5	11	2462	15.94	16.00	1.01	-0.06	0.486	<b>0.493</b>
	WIFI 2.4GHz	802.11b	Left Side	0.5	11	2462	15.94	16.00	1.01	0.03	0.405	0.411
	WIFI 2.4GHz	802.11b	Right Side	0.5	11	2462	15.94	16.00	1.01	N/A	N/A	N/A
	WIFI 2.4GHz	802.11b	Top Side	0.5	11	2462	15.94	16.00	1.01	0.11	0.392	0.397
	WIFI 2.4GHz	802.11b	Bottom Side	0.5	11	2462	15.94	16.00	1.01	N/A	N/A	N/A

<WIFI 5GHz>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR <sub>1g</sub> (W/kg)	Reported SAR <sub>1g</sub> (W/kg)
	WIFI 5.2GHz	802.11a	Front	0.5	48	5240	11.22	11.50	1.07	0.06	0.328	0.351
#17	WIFI 5.2GHz	802.11a	Back	0.5	48	5240	11.22	11.50	1.07	-0.05	0.409	<b>0.438</b>

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	WIFI 5.2GHz	802.11a	Left Side	0.5	48	5240	11.22	11.50	1.07	-0.03	0.333	0.357
	WIFI 5.2GHz	802.11a	Right Side	0.5	48	5240	11.22	11.50	1.07	N/A	N/A	N/A
	WIFI 5.2GHz	802.11a	Top Side	0.5	48	5240	11.22	11.50	1.07	0.08	0.302	0.323
	WIFI 5.2GHz	802.11a	Bottom Side	0.5	48	5240	11.22	11.50	1.07	N/A	N/A	N/A
	WIFI 5.8GHz	802.11a	Front	0.5	165	5825	15.10	15.50	1.10	-0.03	0.254	0.279
#18	WIFI 5.8GHz	802.11a	Back	0.5	165	5825	15.10	15.50	1.10	0.04	0.336	<b>0.368</b>
	WIFI 5.8GHz	802.11a	Left Side	0.5	165	5825	15.10	15.50	1.10	0.07	0.241	0.264
	WIFI 5.8GHz	802.11a	Right Side	0.5	165	5825	15.10	15.50	1.10	N/A	N/A	N/A
	WIFI 5.8GHz	802.11a	Top Side	0.5	165	5825	15.10	15.50	1.10	-0.02	0.265	0.291
	WIFI 5.8GHz	802.11a	Bottom Side	0.5	165	5825	15.10	15.50	1.10	N/A	N/A	N/A

**Note:**

- Per KDB865664 D01, for each frequency band, repeated SAR measurement is required only when the measured SAR is  $\geq 0.8W/Kg$ ; if the deviation among the repeated measurement is  $\leq 20\%$ , and the measured SAR  $< 1.45W/Kg$ , only one repeated measurement is required.

## 13. Simultaneous Transmission Analysis

### 13.1. Simultaneous TX SAR Considerations

No.	Applicable Simultaneous Transmission
1.	GSM+WIFI 2.4GHZ
2.	WCDMA+WIFI2.4GHZ
3.	LTE+WIFI2.4G
4.	GSM+WIFI 5.2GHZ
5.	WCDMA+WIFI5.2GHZ
6.	LTE+WIFI5.2G
7.	GSM+BT
8.	WCDMA+BT
9.	LTE+BT
10.	GSM+WIFI 5.8GHZ
11.	WCDMA+WIFI5.8GHZ
12.	LTE+WIFI5.8G

**Note:**

1. WIFI and Bluetooth share the same antenna, and can not transmit simultaneously.
2. For that SAR for WIFI5.2G is bigger than that of WIFI5.8GHZ, so only Simultaneous Transmission of WIFI5.2GHz is evaluated.



## 13. 2. Evaluation of Simultaneous SAR

### < Head Exposure Conditions >

Simultaneous transmission SAR for WIFI2.4G and GSM

Test Position	GSM850 SAR <sub>1-g</sub> (W/Kg)	GSM1900 SAR <sub>1-g</sub> (W/Kg)	WIFI2.4G SAR <sub>1-g</sub> (W/Kg)	MAX. ΣSAR <sub>1-g</sub> (W/Kg)	SAR <sub>1-g</sub> Limit (W/Kg)	Simut. Meas. Required
Right Cheek	0.088	0.198	0.455	0.653	1.6	NO
Right Tilt	0.044	0.128	0.215	0.343	1.6	NO
Left Cheek	0.074	0.184	0.399	0.583	1.6	NO
Left Tilt	0.040	0.115	0.206	0.321	1.6	NO

Simultaneous transmission SAR for WIFI2.4G and WCDMA

Test Position	WCDMA Band2 SAR <sub>1-g</sub> (W/Kg)	WCDMA Band5 SAR <sub>1-g</sub> (W/Kg)	WIFI2.4G SAR <sub>1-g</sub> (W/Kg)	MAX. ΣSAR <sub>1-g</sub> (W/Kg)	SAR <sub>1-g</sub> Limit (W/Kg)	Simut. Meas. Required
Right Cheek	0.200	0.202	0.455	0.657	1.6	NO
Right Tilt	0.166	0.136	0.215	0.381	1.6	NO
Left Cheek	0.189	0.185	0.399	0.588	1.6	NO
Left Tilt	0.141	0.122	0.206	0.347	1.6	NO

Simultaneous transmission SAR for WIFI2.4G and LTE


Test Position	LTE Band4 SAR <sub>1-g</sub> (W/Kg)	LTE Band7 SAR <sub>1-g</sub> (W/Kg)	WIFI2.4G SAR <sub>1-g</sub> (W/Kg)	MAX. ΣSAR <sub>1-g</sub> (W/Kg)	SAR <sub>1-g</sub> Limit (W/Kg)	Simut. Meas. Required
Right Cheek	0.287	0.443	0.455	0.898	1.6	NO
Right Tilt	0.228	0.299	0.215	0.514	1.6	NO
Left Cheek	0.261	0.415	0.399	0.814	1.6	NO
Left Tilt	0.208	0.273	0.206	0.479	1.6	NO

Simultaneous transmission SAR for WIFI5.2G and GSM

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Test Position	GSM850 SAR <sub>1-g</sub> (W/Kg)	GSM1900 SAR <sub>1-g</sub> (W/Kg)	WIFI5.2G SAR <sub>1-g</sub> (W/Kg)	MAX. ΣSAR <sub>1-g</sub> (W/Kg)	SAR <sub>1-g</sub> Limit (W/Kg)	Simult. Meas. Required
Right Cheek	0.088	0.198	0.462	0.660	1.6	NO
Right Tilt	0.044	0.128	0.412	0.540	1.6	NO
Left Cheek	0.074	0.184	0.450	0.634	1.6	NO
Left Tilt	0.040	0.115	0.394	0.509	1.6	NO

Simultaneous transmission SAR for WIFI5.2G and WCDMA

Test Position	WCDMA Band2 SAR <sub>1-g</sub> (W/Kg)	WCDMA Band5 SAR <sub>1-g</sub> (W/Kg)	WIFI5.2G SAR <sub>1-g</sub> (W/Kg)	MAX. ΣSAR <sub>1-g</sub> (W/Kg)	SAR <sub>1-g</sub> Limit (W/Kg)	Simult. Meas. Required
Right Cheek	0.200	0.202	0.462	0.664	1.6	NO
Right Tilt	0.166	0.136	0.412	0.578	1.6	NO
Left Cheek	0.189	0.185	0.450	0.639	1.6	NO
Left Tilt	0.141	0.122	0.394	0.535	1.6	NO

Simultaneous transmission SAR for WIFI5.2G and LTE

Test Position	LTE Band4 SAR <sub>1-g</sub> (W/Kg)	LTE Band7 SAR <sub>1-g</sub> (W/Kg)	WIFI5.2G SAR <sub>1-g</sub> (W/Kg)	MAX. ΣSAR <sub>1-g</sub> (W/Kg)	SAR <sub>1-g</sub> Limit (W/Kg)	Simult. Meas. Required
Right Cheek	0.287	0.443	0.462	0.905	1.6	NO
Right Tilt	0.228	0.299	0.412	0.711	1.6	NO
Left Cheek	0.261	0.415	0.450	0.865	1.6	NO
Left Tilt	0.208	0.273	0.394	0.667	1.6	NO

Simultaneous transmission SAR for BT and GSM

Test Position	GSM850 SAR <sub>1-g</sub> (W/Kg)	GSM1900 SAR <sub>1-g</sub> (W/Kg)	BT SAR <sub>1-g</sub> (W/Kg)	MAX. ΣSAR <sub>1-g</sub> (W/Kg)	SAR <sub>1-g</sub> Limit (W/Kg)	Simult. Meas. Required
Right Cheek	0.088	0.198	0.462	0.660	1.6	NO
Right Tilt	0.044	0.128	0.412	0.540	1.6	NO
Left Cheek	0.074	0.184	0.450	0.634	1.6	NO
Left Tilt	0.040	0.115	0.394	0.509	1.6	NO

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Right Cheek	<b>0.088</b>	<b>0.198</b>	<b>0.182</b>	<b>0.380</b>	1.6	NO
Right Tilt	0.044	0.128	<b>0.182</b>	0.310	1.6	NO
Left Cheek	0.074	0.184	<b>0.182</b>	0.366	1.6	NO
Left Tilt	0.040	0.115	<b>0.182</b>	0.297	1.6	NO

Simultaneous transmission SAR for BT and WCDMA

Test Position	WCDMA Band2 SAR <sub>1-g</sub> (W/Kg)	WCDMA Band5 SAR <sub>1-g</sub> (W/Kg)	BT SAR <sub>1-g</sub> (W/Kg)	MAX. ΣSAR <sub>1-g</sub> (W/Kg)	SAR <sub>1-g</sub> Limit (W/Kg)	Simut. Meas. Required
Right Cheek	<b>0.200</b>	<b>0.202</b>	<b>0.182</b>	<b>0.384</b>	1.6	NO
Right Tilt	0.166	0.136	<b>0.182</b>	0.348	1.6	NO
Left Cheek	0.189	0.185	<b>0.182</b>	0.371	1.6	NO
Left Tilt	0.141	0.122	<b>0.182</b>	0.323	1.6	NO

Simultaneous transmission SAR for BT and LTE

Test Position	LTE Band4 SAR <sub>1-g</sub> (W/Kg)	LTE Band7 SAR <sub>1-g</sub> (W/Kg)	BT SAR <sub>1-g</sub> (W/Kg)	MAX. ΣSAR <sub>1-g</sub> (W/Kg)	SAR <sub>1-g</sub> Limit (W/Kg)	Simut. Meas. Required
Right Cheek	<b>0.287</b>	<b>0.443</b>	<b>0.182</b>	<b>0.625</b>	1.6	NO
Right Tilt	0.228	0.299	<b>0.182</b>	0.481	1.6	NO
Left Cheek	0.261	0.415	<b>0.182</b>	0.597	1.6	NO
Left Tilt	0.208	0.273	<b>0.182</b>	0.455	1.6	NO

<Body Exposure Conditions>

Simultaneous transmission SAR for WIFI2.4G and GSM

Test Position	GSM850 SAR <sub>1-g</sub> (W/Kg)	GSM1900 SAR <sub>1-g</sub> (W/Kg)	WIFI2.4G SAR <sub>1-g</sub> (W/Kg)	MAX. ΣSAR <sub>1-g</sub> (W/Kg)	SAR <sub>1-g</sub> Limit (W/Kg)	Simut. Meas. Required
Front	0.251	0.597	0.417	1.014	1.6	NO
Back	<b>0.305</b>	<b>0.721</b>	<b>0.493</b>	<b>1.214</b>	1.6	NO
Left Side	0.234	0.525	0.411	0.936	1.6	NO
Right Side	N/A	N/A	N/A	N/A	1.6	NO
Top Side	N/A	N/A	0.397	N/A	1.6	NO
Bottom Side	0.248	0.536	N/A	N/A	1.6	NO

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Simultaneous transmission SAR for WIFI2.4G and WCDMA

Test Position	WCDMA Band2 SAR <sub>1-g</sub> (W/Kg)	WCDMA Band5 SAR <sub>1-g</sub> (W/Kg)	WIFI2.4G SAR <sub>1-g</sub> (W/Kg)	MAX. ΣSAR <sub>1-g</sub> (W/Kg)	SAR <sub>1-g</sub> Limit (W/Kg)	Simut. Meas. Required
Front	0.400	0.258	0.417	0.817	1.6	NO
Back	<b>0.503</b>	<b>0.439</b>	<b>0.493</b>	<b>0.996</b>	1.6	NO
Left Side	0.389	0.233	0.411	0.800	1.6	NO
Right Side	N/A	N/A	N/A	N/A	1.6	NO
Top Side	N/A	N/A	0.397	N/A	1.6	NO
Bottom Side	0.320	0.251	N/A	N/A	1.6	NO

Simultaneous transmission SAR for WIFI2.4G and LTE

Test Position	LTE Band4 SAR <sub>1-g</sub> (W/Kg)	LTE Band7 SAR <sub>1-g</sub> (W/Kg)	WIFI2.4G SAR <sub>1-g</sub> (W/Kg)	MAX. ΣSAR <sub>1-g</sub> (W/Kg)	SAR <sub>1-g</sub> Limit (W/Kg)	Simut. Meas. Required
Front	0.350	0.271	0.417	0.767	1.6	NO
Back	<b>0.483</b>	<b>0.461</b>	<b>0.493</b>	<b>0.976</b>	1.6	NO
Left Side	0.393	0.287	0.411	0.804	1.6	NO
Right Side	N/A	N/A	N/A	N/A	1.6	NO
Top Side	N/A	N/A	0.397	N/A	1.6	NO
Bottom Side	0.344	0.265	N/A	N/A	1.6	NO

Simultaneous transmission SAR for WIFI5.2G and GSM

Test Position	GSM850 SAR <sub>1-g</sub> (W/Kg)	GSM1900 SAR <sub>1-g</sub> (W/Kg)	WIFI5.2G SAR <sub>1-g</sub> (W/Kg)	MAX. ΣSAR <sub>1-g</sub> (W/Kg)	SAR <sub>1-g</sub> Limit (W/Kg)	Simut. Meas. Required
Front	0.251	0.597	0.351	0.948	1.6	NO
Back	<b>0.305</b>	<b>0.721</b>	<b>0.438</b>	<b>1.159</b>	1.6	NO
Left Side	0.234	0.525	0.357	0.882	1.6	NO
Right Side	N/A	N/A	N/A	N/A	1.6	NO
Top Side	N/A	N/A	0.323	N/A	1.6	NO
Bottom Side	0.248	0.536	N/A	N/A	1.6	NO

Simultaneous transmission SAR for WIFI5.2G and WCDMA

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Test Position	WCDMA Band2 SAR <sub>1-g</sub> (W/Kg)	WCDMA Band5 SAR <sub>1-g</sub> (W/Kg)	WIFI5.2G SAR <sub>1-g</sub> (W/Kg)	MAX. ΣSAR <sub>1-g</sub> (W/Kg)	SAR <sub>1-g</sub> Limit (W/Kg)	Simult. Meas. Required
Front	0.400	0.258	0.351	0.609	1.6	NO
Back	<b>0.503</b>	<b>0.439</b>	<b>0.438</b>	<b>0.877</b>	1.6	NO
Left Side	0.389	0.233	0.357	0.590	1.6	NO
Right Side	N/A	N/A	N/A	N/A	1.6	NO
Top Side	N/A	N/A	0.323	N/A	1.6	NO
Bottom Side	0.320	0.251	N/A	N/A	1.6	NO

Simultaneous transmission SAR for WIFI5.2G and LTE

Test Position	LTE Band4 SAR <sub>1-g</sub> (W/Kg)	LTE Band7 SAR <sub>1-g</sub> (W/Kg)	WIFI5.2G SAR <sub>1-g</sub> (W/Kg)	MAX. ΣSAR <sub>1-g</sub> (W/Kg)	SAR <sub>1-g</sub> Limit (W/Kg)	Simult. Meas. Required
Front	0.350	0.271	0.351	0.701	1.6	NO
Back	<b>0.483</b>	<b>0.461</b>	<b>0.438</b>	<b>0.921</b>	1.6	NO
Left Side	0.393	0.287	0.357	0.750	1.6	NO
Right Side	N/A	N/A	N/A	N/A	1.6	NO
Top Side	N/A	N/A	0.323	N/A	1.6	NO
Bottom Side	0.344	0.265	N/A	N/A	1.6	NO

Simultaneous transmission SAR for BT and GSM

Test Position	GSM850 SAR <sub>1-g</sub> (W/Kg)	GSM1900 SAR <sub>1-g</sub> (W/Kg)	BT SAR <sub>1-g</sub> (W/Kg)	MAX. ΣSAR <sub>1-g</sub> (W/Kg)	SAR <sub>1-g</sub> Limit (W/Kg)	Simult. Meas. Required
Front	0.251	0.597	<b>0.182</b>	0.779	1.6	NO
Back	<b>0.305</b>	<b>0.721</b>	<b>0.182</b>	<b>0.903</b>	1.6	NO
Left Side	0.234	0.525	<b>0.182</b>	0.707	1.6	NO
Right Side	N/A	N/A	<b>0.182</b>	N/A	1.6	NO
Top Side	N/A	N/A	<b>0.182</b>	N/A	1.6	NO
Bottom Side	0.248	0.536	<b>0.182</b>	0.718	1.6	NO

Simultaneous transmission SAR for BT and WCDMA

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Test Position	WCDMA Band2 SAR <sub>1-g</sub> (W/Kg)	WCDMA Band5 SAR <sub>1-g</sub> (W/Kg)	BT SAR <sub>1-g</sub> (W/Kg)	MAX. ΣSAR <sub>1-g</sub> (W/Kg)	SAR <sub>1-g</sub> Limit (W/Kg)	Simut. Meas. Required
Front	0.400	0.258	<b>0.182</b>	0.582	1.6	NO
Back	<b>0.503</b>	<b>0.439</b>	<b>0.182</b>	<b>0.685</b>	1.6	NO
Left Side	0.389	0.233	<b>0.182</b>	0.571	1.6	NO
Right Side	N/A	N/A	<b>0.182</b>	N/A	1.6	NO
Top Side	N/A	N/A	<b>0.182</b>	N/A	1.6	NO
Bottom Side	0.320	0.251	<b>0.182</b>	0.502	1.6	NO

Simultaneous transmission SAR for BT and LTE

Test Position	LTE Band4 SAR <sub>1-g</sub> (W/Kg)	LTE Band7 SAR <sub>1-g</sub> (W/Kg)	BT SAR <sub>1-g</sub> (W/Kg)	MAX. ΣSAR <sub>1-g</sub> (W/Kg)	SAR <sub>1-g</sub> Limit (W/Kg)	Simut. Meas. Required
Front	0.350	0.271	<b>0.182</b>	0.532	1.6	NO
Back	<b>0.483</b>	<b>0.461</b>	<b>0.182</b>	<b>0.665</b>	1.6	NO
Left Side	0.393	0.287	<b>0.182</b>	0.575	1.6	NO
Right Side	N/A	N/A	<b>0.182</b>	N/A	1.6	NO
Top Side	N/A	N/A	<b>0.182</b>	N/A	1.6	NO
Bottom Side	0.344	0.265	<b>0.182</b>	0.526	1.6	NO

## 14. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is  $< 1.5$  W/Kg, the extensive SAR measurement uncertainty analysis described in IEC 62209-2:2010 is not required in SAR reports submitted for equipment approval.

## Appendix A. SAR Test Setup Photos



Left Cheek



Left Tilt 15°



Right Cheek



Right Tilt 15°



Body Front(5mm)

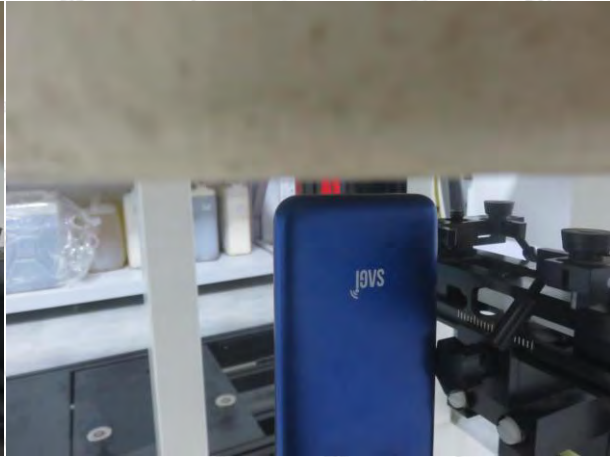


Body Back(5mm)





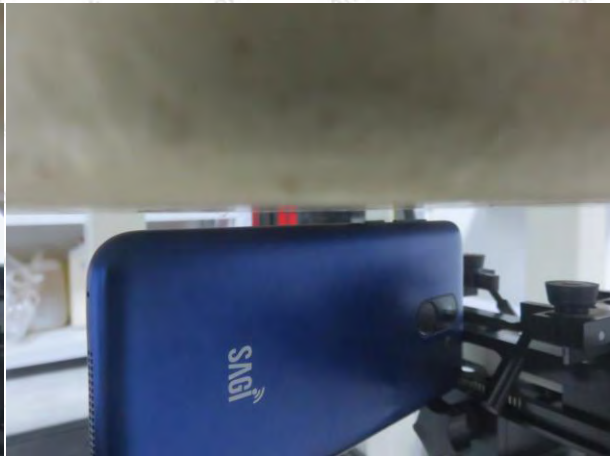
**Top Side(5mm)**



**Bottom Side(5mm)**



**Left Side(5mm)**



**Right Side(5mm)**

## Appendix B. Plots of SAR System Check

Date: 09/09/2019

### 835MHz Head System Check

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d154**

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.96$  S/m;  $\epsilon_r = 41.68$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(9.71, 9.71, 9.71); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**Configuration/Pin=250mW/Area Scan (7x7x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 2.80 W/kg

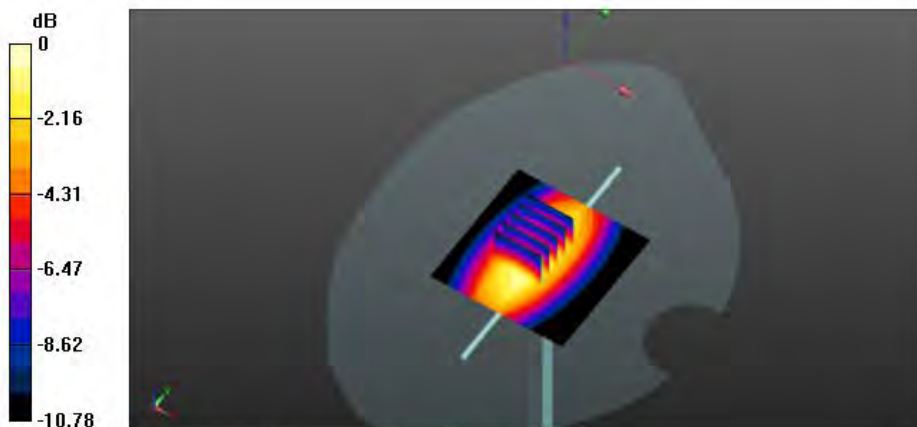
**Configuration/Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 56.553 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.39 W/kg

**SAR(1 g) = 2.31 W/kg; SAR(10 g) = 1.62 W/kg**

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



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

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**835MHz Body System Check****DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d154**

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 835$  MHz;  $\sigma = 1.06$  S/m;  $\epsilon_r = 55.26$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(9.88, 9.88, 9.88); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**Configuration/Pin=250mW/Area Scan (7x7x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 2.97 W/kg

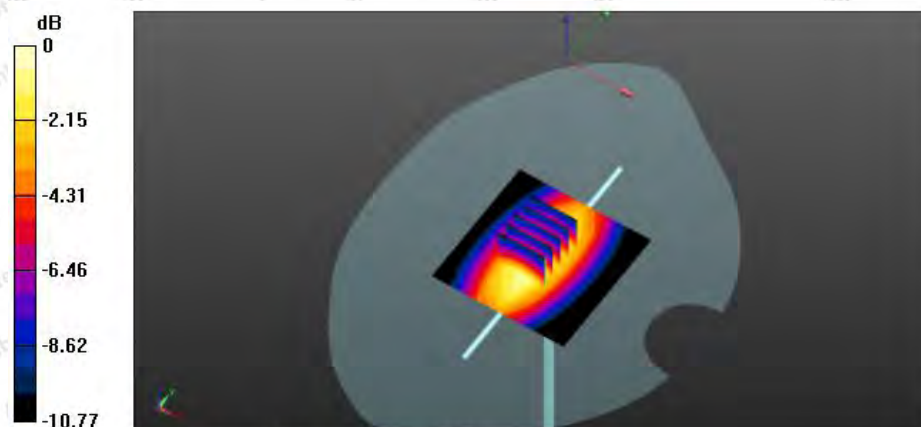
**Configuration/Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 60.007 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 4.02 W/kg

**SAR(1 g) = 2.53 W/kg; SAR(10 g) = 1.75 W/kg**

Maximum value of SAR (measured) = 3.58 W/kg



0 dB = 3.01 W/kg = 4.79 dBW/kg

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Date: 09/13/2019

**1900MHz Head System Check**

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d175**

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.45$  S/m;  $\epsilon_r = 40.26$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY5 Configuration:**

- Probe: EX3DV4 – SN7396; ConvF(8.13, 8.13, 8.13); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM1; Type: QD00P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**Configuration/Pin=250mW/Area Scan (71x71x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 11.3 W/kg

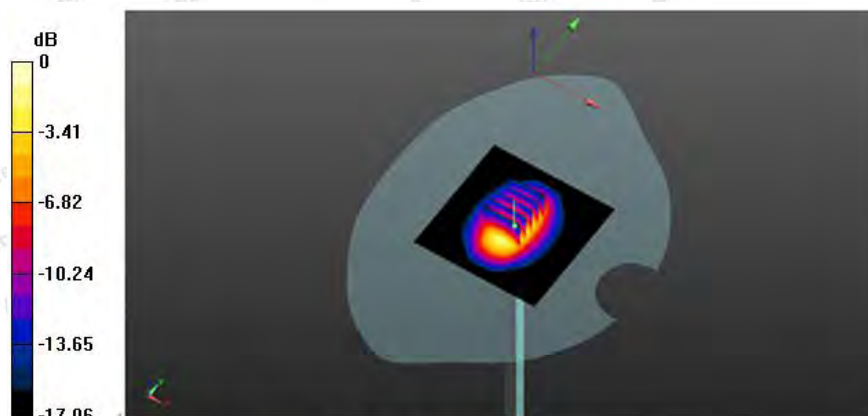
**Configuration/Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 100.5 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 18.0 W/kg

**SAR(1 g) = 9.99 W/kg; SAR(10 g) = 5.12 W/kg**

Maximum value of SAR (measured) = 15.3 W/kg



0 dB = 15.3 W/kg = 11.85 dBW/kg

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Date: 09/15/2019

**1900MHz Body System Check**

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d175**

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.51$  S/m;  $\epsilon_r = 53.26$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY5 Configuration:**

- Probe: EX3DV4 – SN7396; ConvF(7.97, 7.97, 7.97); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**Configuration/Pin=250mW/Area Scan (7x7x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 10.7 W/kg

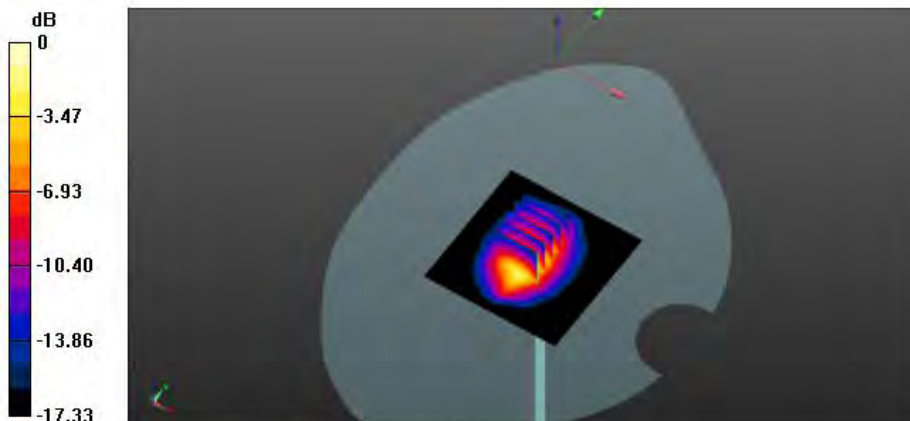
**Configuration/Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 86.92 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 17.0 W/kg

**SAR(1 g) = 9.26 W/kg; SAR(10 g) = 4.84 W/kg**

Maximum value of SAR (measured) = 10.4 W/kg



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### 2450MHz Head System Check

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:910**

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.79$  S/m;  $\epsilon_r = 38.03$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(7.57, 7.57, 7.57); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**Configuration/Pin=250mW/Area Scan (71x71x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 15.4W/kg

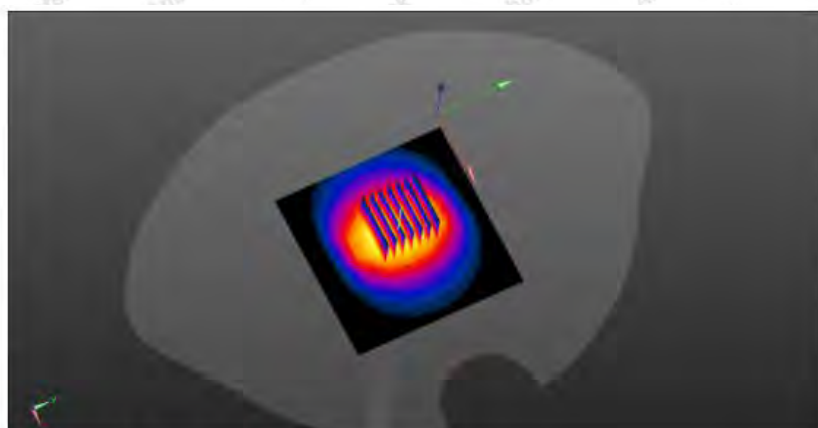
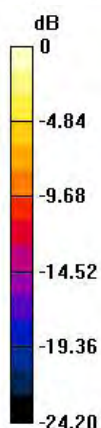
**Configuration/Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 98.380 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 28.8 W/kg

**SAR(1 g) = 12.9W/kg; SAR(10 g) = 5.8 W/kg**

Maximum value of SAR (measured) = 20.5 W/kg



0 dB = 20.5 W/kg = 13.12 dBW/kg

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Date:09/24/2019

**2450MHz Body System Check**

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:910**

Communication System: UID 0, CW; Frequency: 2450 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.89$  S/m;  $\epsilon_r = 51.97$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(7.53, 7.53, 7.53); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**Configuration/Pin=250mW/Area Scan (81x81x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 17.2 W/kg

**Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 82.205 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 24.5 W/kg

**SAR(1 g) = 12.1 W/kg; SAR(10 g) = 5.68 W/kg**

Maximum value of SAR (measured) = 18.3 W/kg



0 dB = 18.3 W/kg = 12.62 dBW/kg

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## 1750MHz Head System Check

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1021**

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.38$  S/m;  $\epsilon_r = 40.25$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(8.61, 8.61, 8.61); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**Configuration/Pin=250mW/Area Scan (71x71x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 14.6 W/kg

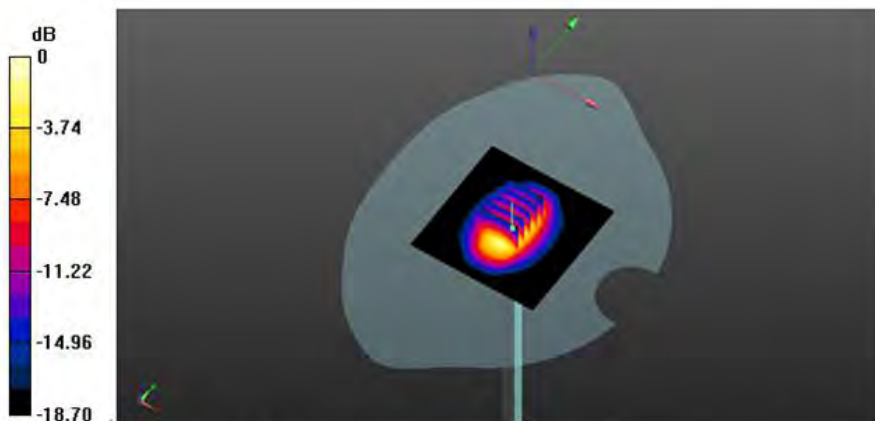
**Configuration/Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 101.1 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 17.9 W/kg

**SAR(1 g) = 9.32 W/kg; SAR(10 g) = 4.26 W/kg**

Maximum value of SAR (measured) = 14.9 W/kg



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**1750MHz Body System Check****DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1021**

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.51$  S/m;  $\epsilon_r = 53.21$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(8.24, 8.24, 8.24); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Maximum value of SAR (interpolated) = 10.9 W/kg

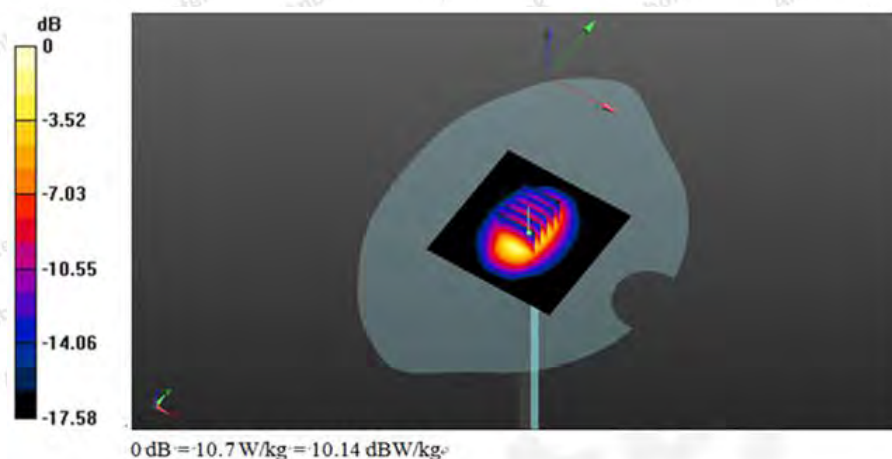
**Configuration/Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 87.593 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 17.9 W/kg


**SAR(1 g) = 9.06 W/kg; SAR(10 g) = 4.75 W/kg**

Maximum value of SAR (measured) = 10.7 W/kg

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**2600MHz Head System Check****DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN:1058**

Communication System: UID 0, CW (0); Frequency: 2600 MHz

Medium parameters used:  $f = 2600$  MHz;  $\sigma = 2.01$  S/m;  $\epsilon_r = 38.63$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

## DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(7.38, 7.38, 7.38); Calibrated: 6.5.2019;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM ; Type: QD000P40CD; Serial: TP: 1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**Configuration/Pin=250mW/Area Scan (71x71x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 19.6 W/kg

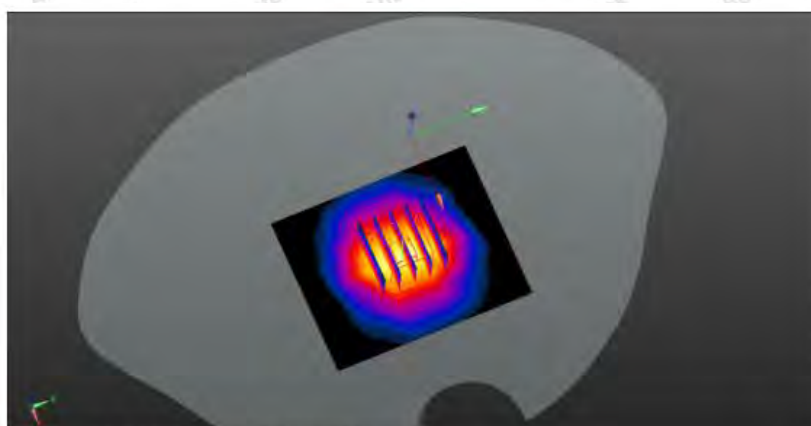
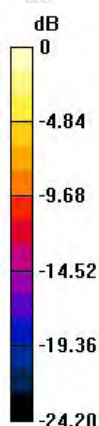
**Configuration/Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 107.0 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 31.5 W/kg

**SAR(1 g) = 14.8 W/kg; SAR(10 g) = 6.64 W/kg**

Maximum value of SAR (measured) = 25.2 W/kg




0 dB = 25.2 W/kg = 14.01 dBW/kg

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**2600MHz Body System Check****DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN:1058**

Communication System: UID 0, CW (0); Frequency: 2600 MHz

Medium parameters used:  $f = 2600$  MHz;  $\sigma = 2.15$  S/m;  $\epsilon_r = 54.37$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

## DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(7.38, 7.38, 7.38); Calibrated: 6.5.2019;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM ; Type: QD000P40CD; Serial: TP: 1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**Configuration/Pin=250mW/Area Scan (71x71x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) =23.2 W/kg

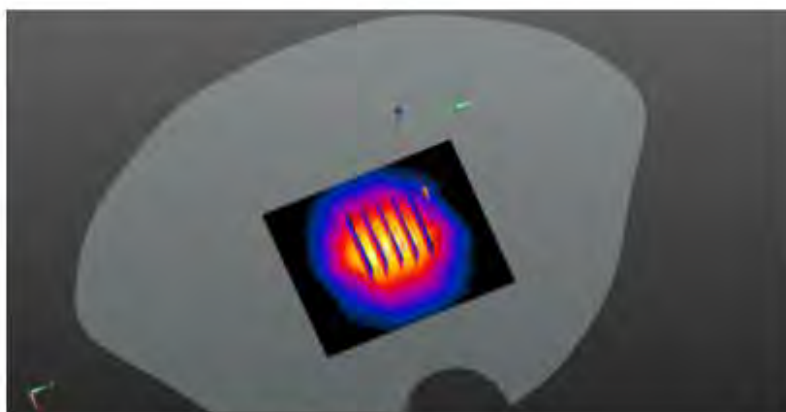
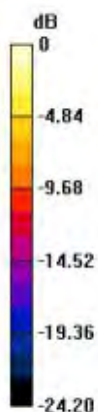
**Configuration/Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 97.87 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 28.3 W/kg

**SAR(1 g) = 13.72 W/kg; SAR(10 g) = 6.22 W/kg**

Maximum value of SAR (measured) = 22.4 W/kg




0 dB = 22.4 W/kg = 11.12 dBW/kg

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Date: 09/25/2019

**5200MHz Head System Check**

**DUT: Dipole 5000 MHz; Type: D5GHzV2; Serial: D5GHzV2 - SN:1160**

Communication System: UID 0, CW; Frequency: 5200 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 5200$  MHz;  $\sigma = 4.51$  S/m;  $\epsilon_r = 35.46$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(5.33, 5.33, 5.33); Calibrated: 6.5.2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 3.9.2019
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**Configuration/Pin=100mW/Area Scan (71x71x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 18.6 W/kg

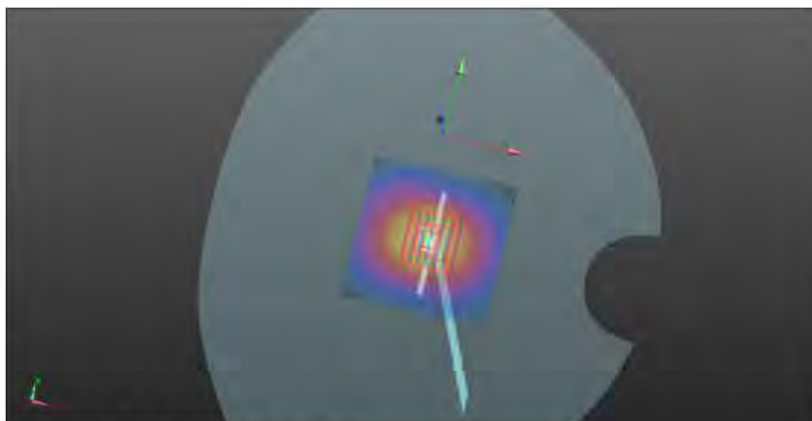
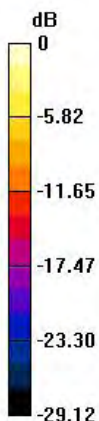
**Configuration/Pin=100mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 56.080 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 31.7 W/kg

**SAR(1 g) = 7.85 W/kg; SAR(10 g) = 2.17 W/kg**

Maximum value of SAR (measured) = 19.5 W/kg



0 dB = 18.6 W/kg = 12.70 dBW/kg

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Date: 09/26/2019

**5200MHz Body System Check**

**DUT: Dipole 5000 MHz; Type: D5GHzV2; Serial: D5GHzV2 - SN:1160**

Communication System: UID 0, CW; Frequency: 5200 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 5200$  MHz;  $\sigma = 5.35$  S/m;  $\epsilon_r = 48.53$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(4.93, 4.93, 4.93); Calibrated: 6.5.2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 3.9.2019
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**Configuration/Pin=100mW/Area Scan (8x8x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 12.9 W/kg

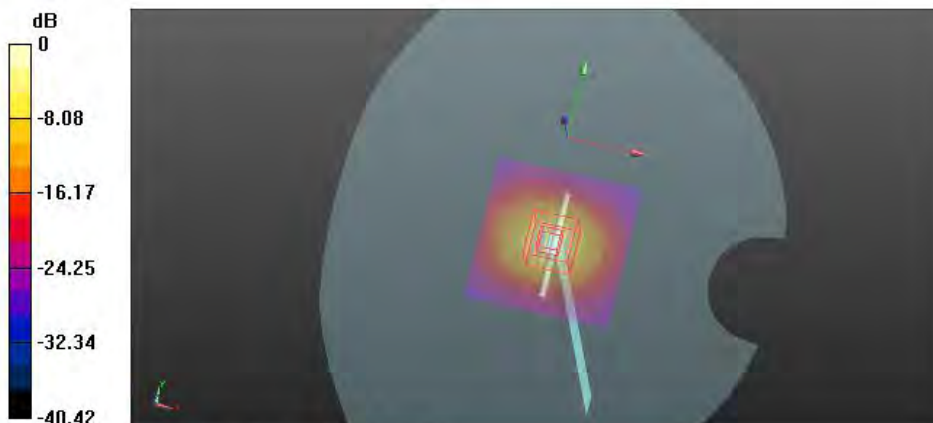
**Configuration/Pin=100mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 57.100 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 33.4 W/kg

**SAR(1 g) = 8.25 W/kg; SAR(10 g) = 2.3 W/kg**

Maximum value of SAR (measured) = 20.0 W/kg



0 dB = 20.0 W/kg = 13.01 dBW/kg

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Date: 09/29/2019

### 5800MHz Head System Check

**DUT: Dipole 5000 MHz; Type: D5GHzV2; Serial: D5GHzV2 - SN:1160**

Communication System: UID 0, CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 5800 \text{ MHz}$ ;  $\sigma = 5.31 \text{ S/m}$ ;  $\epsilon_r = 34.93$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(4.92, 4.92, 4.92); Calibrated: 6.5.2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 3.9.2019
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**Configuration/Pin=100mW/Area Scan (8x8x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 13.1 W/kg

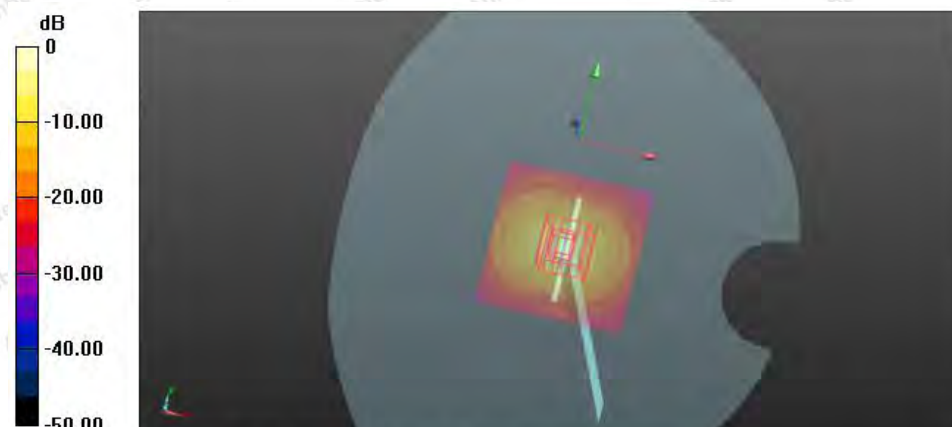
**Configuration/Pin=100mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 58.388 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 33.7 W/kg

**SAR(1 g) = 8.45 W/kg; SAR(10 g) = 2.32 W/kg**

Maximum value of SAR (measured) = 20.9 W/kg



0 dB = 20.9 W/kg = 13.20 dBW/kg

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Date: 09/30/2019

**5800MHz Body System Check**

**DUT: Dipole 5000 MHz; Type: D5GHzV2; Serial: D5GHzV2 - SN:1160**

Communication System: UID 0, CW; Frequency: 5200 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 5800$  MHz;  $\sigma = 5.95$  S/m;  $\epsilon_r = 48.58$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(4.52, 4.52, 4.52); Calibrated: 6.5.2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 3.9.2019
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**Configuration/Pin=100mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 46.751 V/m; Power Drift = 0.09 dB

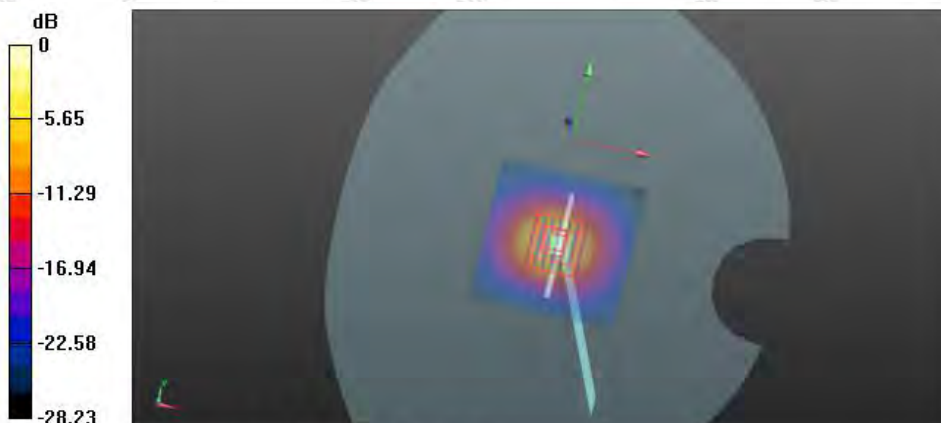
Peak SAR (extrapolated) = 28.9 W/kg

**SAR(1 g) = 7.57 W/kg; SAR(10 g) = 1.96 W/kg**

Maximum value of SAR (measured) = 17.7 W/kg

**Configuration/Pin=100mW/Area Scan (71x71x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 16.8 W/kg



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## Appendix C. Plots of SAR Test Data

#1

Date: 09/09/2019

### GSM850\_GSM Voice\_Right Cheek\_Ch190

Communication System: UID 0, CW; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 836.6$  MHz;  $\sigma = 0.96$  S/m;  $\epsilon_r = 41.68$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(9.71, 9.71, 9.71); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**RIGHT HEAD/R-C/Area Scan (8x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.0961 W/kg

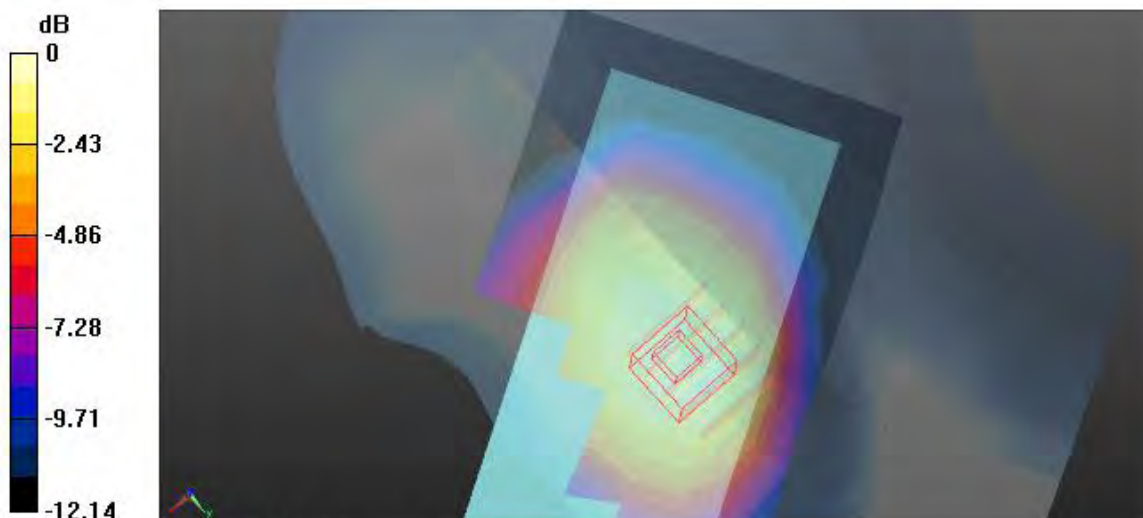
**RIGHT HEAD/R-C/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.510 V/m; Power Drift = 0.0 dB

Peak SAR (extrapolated) = 0.114 W/kg

**SAR(1 g) = 0.086 W/kg; SAR(10 g) = 0.061 W/kg**

Maximum value of SAR (measured) = 0.101 W/kg



0 dB = 0.101 W/kg = -9.96 dBW/kg

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## PCS1900\_GSM Voice\_Right Cheek\_Ch885

Communication System: UID 0, CW; Frequency: 1909.8 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1909.8$  MHz;  $\sigma = 1.43$  S/m;  $\epsilon_r = 40.19$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

### DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(8.13, 8.13, 8.13); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**RIGHT HEAD/R-C/Area Scan (8x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.244 W/kg

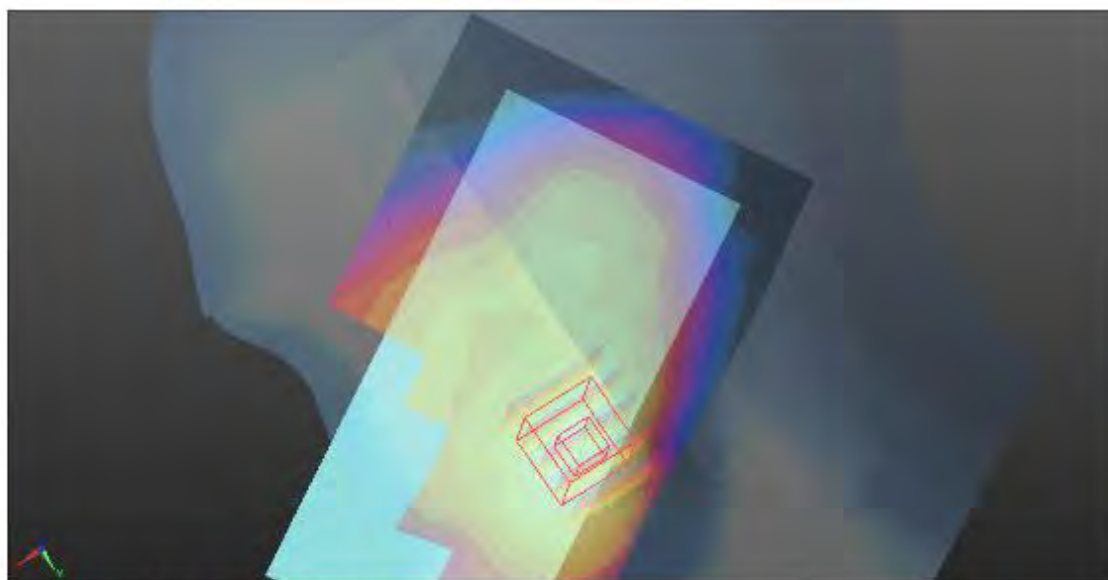
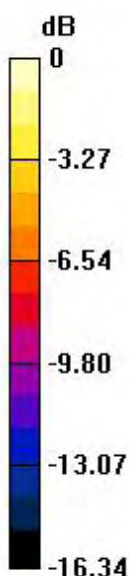
**RIGHT HEAD/R-C/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.778 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.305 W/kg

**SAR(1 g) = 0.197 W/kg; SAR(10 g) = 0.120 W/kg**

Maximum value of SAR (measured) = 0.258 W/kg



0 dB = 0.258 W/kg = -5.88 dBW/kg

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#3

Date: 09/13/2019

## WCDMA 1900\_RMC 12.2K\_Right Cheek\_Ch9262

Communication System: UID 0, Generic WCDMA (0); Frequency: 1852.4 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1852.4$  MHz;  $\sigma = 1.388$  S/m;  $\epsilon_r = 39.717$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(8.13, 8.13, 8.13); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**RIGHT HEAD/R-C/Area Scan (8x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.241 W/kg

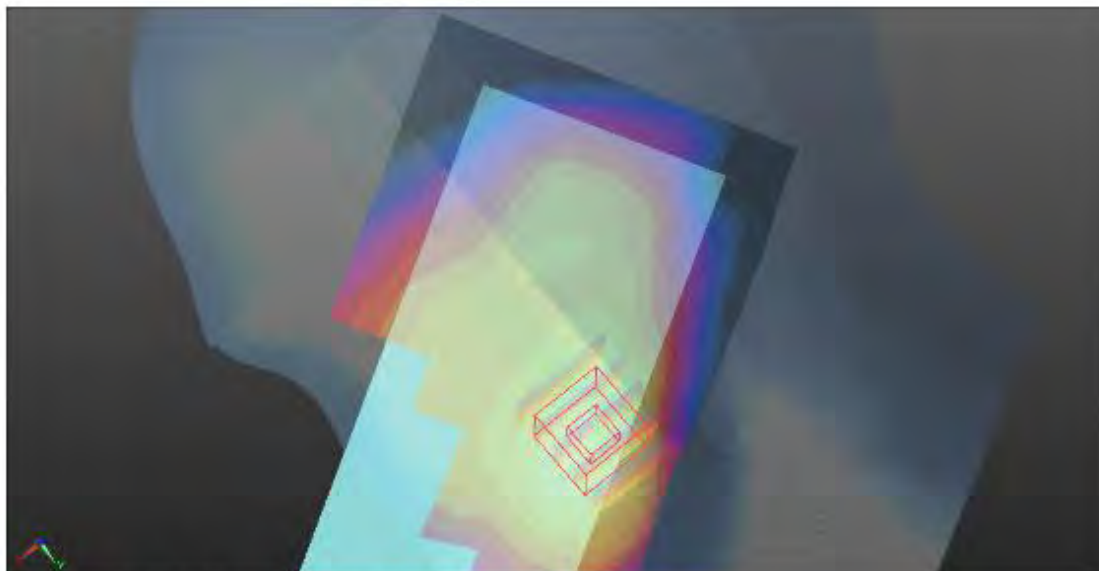
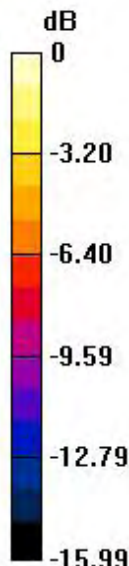
**RIGHT HEAD/R-C/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.878 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.305 W/kg

**SAR(1 g) = 0.196 W/kg; SAR(10 g) = 0.118 W/kg**

Maximum value of SAR (measured) = 0.258 W/kg



0 dB = 0.258 W/kg = -5.88 dBW/kg

#4

Date: 09/09/2019

## WCDMA 850\_RMC 12.2K\_Right Cheek\_Ch4132

Communication System: UID 0, Generic WCDMA (0); Frequency: 826.4 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 826.4$  MHz;  $\sigma = 0.927$  S/m;  $\epsilon_r = 41.682$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(9.71, 9.71, 9.71); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**RIGHT HEAD/R-C/Area Scan (8x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.229 W/kg

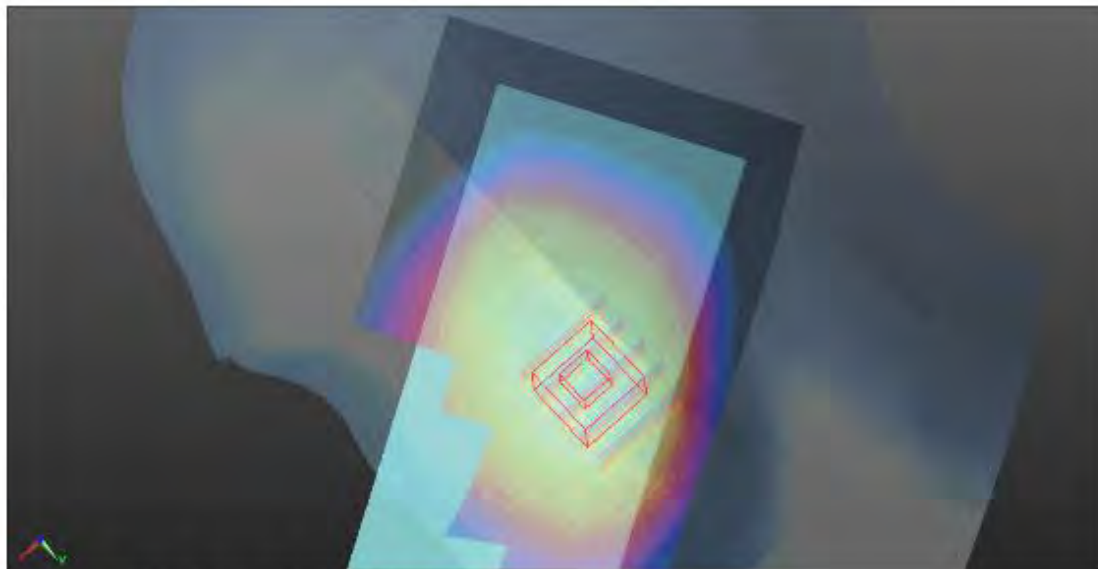
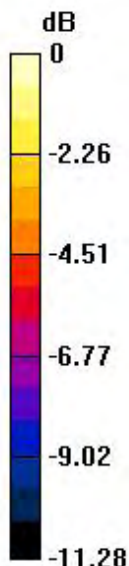
**RIGHT HEAD/R-C/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.850 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.257 W/kg

**SAR(1 g) = 0.200 W/kg; SAR(10 g) = 0.146 W/kg**

Maximum value of SAR (measured) = 0.235 W/kg



0 dB = 0.235 W/kg = -6.29 dBW/kg

#5

Date: 09/13/2019

## LTE Band4\_1RB\_Right Cheek\_Ch20050

Communication System: UID 0, Generic LTE (0); Frequency: 1720.0 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1720.0$  MHz;  $\sigma = 1.363$  S/m;  $\epsilon_r = 40.136$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(8.61, 8.61, 8.61); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**RIGHT HEAD/R-C/Area Scan (8x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.310 W/kg

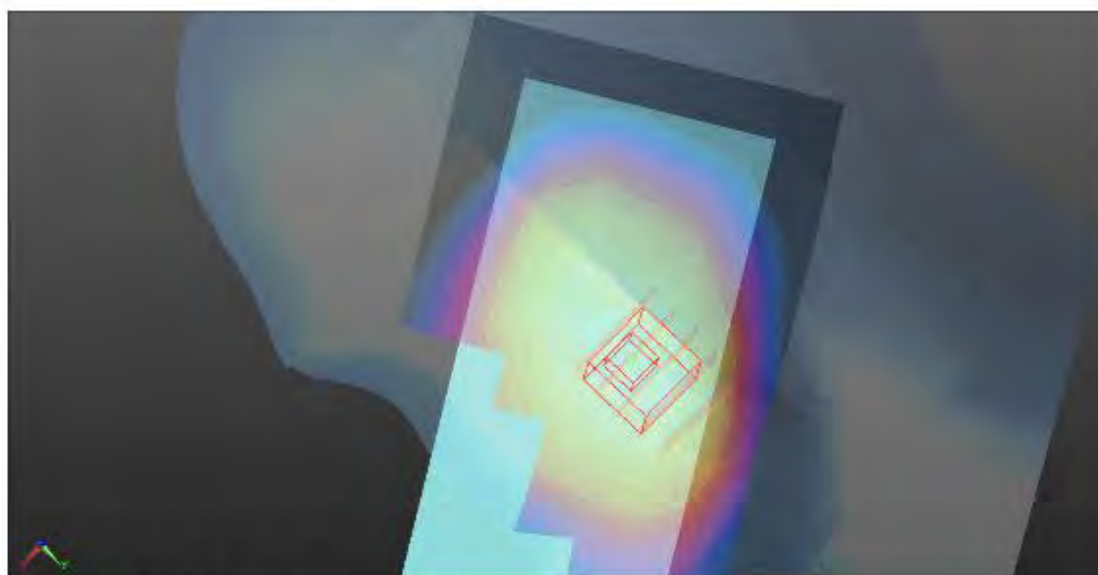
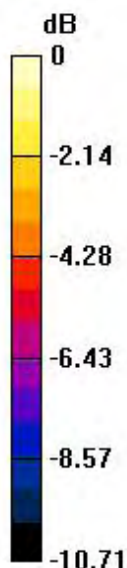
**RIGHT HEAD/R-C/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.068 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 0.359 W/kg

**SAR(1 g) = 0.281 W/kg; SAR(10 g) = 0.207 W/kg**

Maximum value of SAR (measured) = 0.329 W/kg



0 dB = 0.329 W/kg = -4.83 dBW/kg

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#6

Date: 09/19/2019

## LTE Band7\_1RB\_Right Cheek\_Ch20850

Communication System: UID 0, Generic LTE (0); Frequency: 2510.0 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2510.0$  MHz;  $\sigma = 1.978$  S/m;  $\epsilon_r = 38.613$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(7.38, 7.38, 7.38); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**RIGHT HEAD/R-C/Area Scan (8x13x1):** Measurement grid: dx=15mm, dy=15mm

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

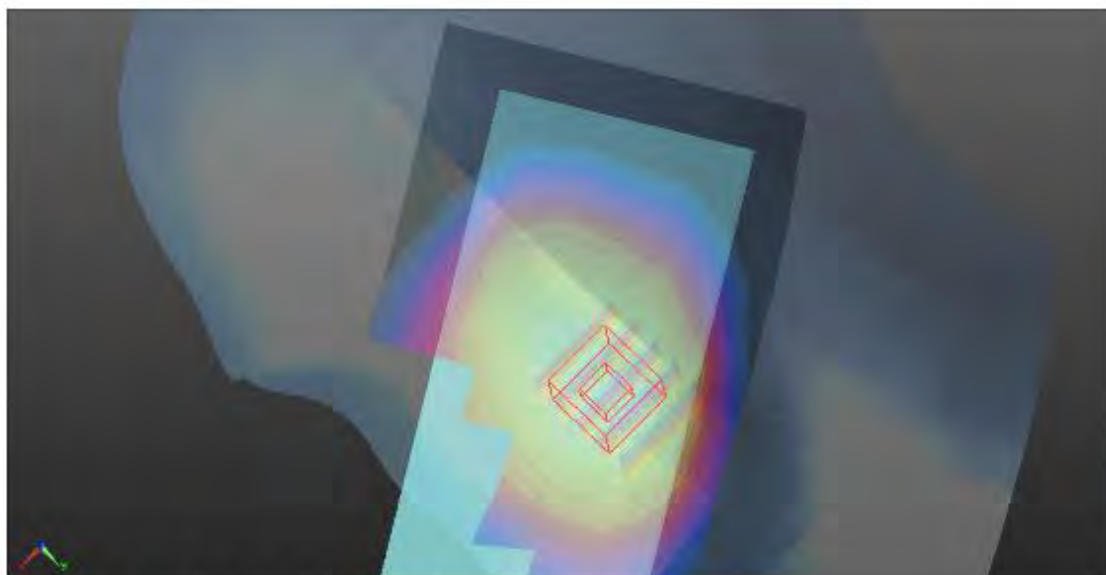
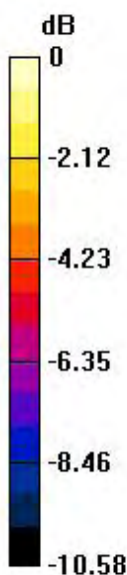
**RIGHT HEAD/R-C/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.251 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 0.449 W/kg

**SAR(1 g) = 0.348 W/kg; SAR(10 g) = 0.255 W/kg**

Maximum value of SAR (measured) = 0.401 W/kg



0 dB = 0.401 W/kg = -3.97 dBW/kg

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#7

Date: 09/23/2019

## WiFi 2.4G\_Right Cheek\_Ch11

Communication System: UID 0, wifi (fcc) (0); Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 2462$  MHz;  $\sigma = 1.963$  S/m;  $\epsilon_r = 52.013$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(7.57, 7.57, 7.57); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**RIGHT HEAD/R-C/Area Scan (12x19x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.550 W/kg

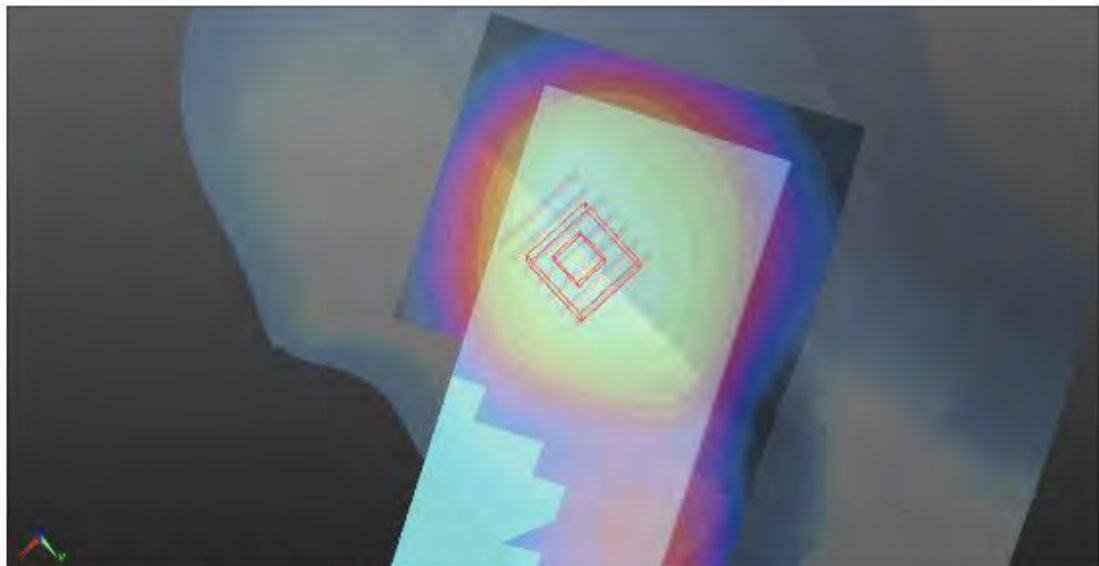
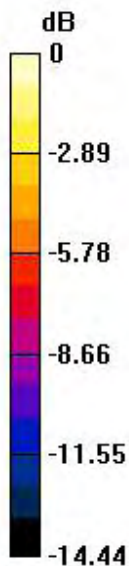
**RIGHT HEAD/R-C/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 11.507 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.675 W/kg

**SAR(1 g) = 0.449 W/kg; SAR(10 g) = 0.283 W/kg**

Maximum value of SAR (measured) = 0.575 W/kg



0 dB = 0.575 W/kg = -2.40 dBW/kg

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#8

Date: 09/25/2019

## WiFi 5.2G\_Right Cheek\_Ch48

Communication System: UID 0, 802.11a (0); Frequency: 5240 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 5240$  MHz;  $\sigma = 4.573$  S/m;  $\epsilon_r = 35.993$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(5.33, 5.33, 5.33); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**RIGHT HEAD/R-C/Area Scan (12x19x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.672 W/kg

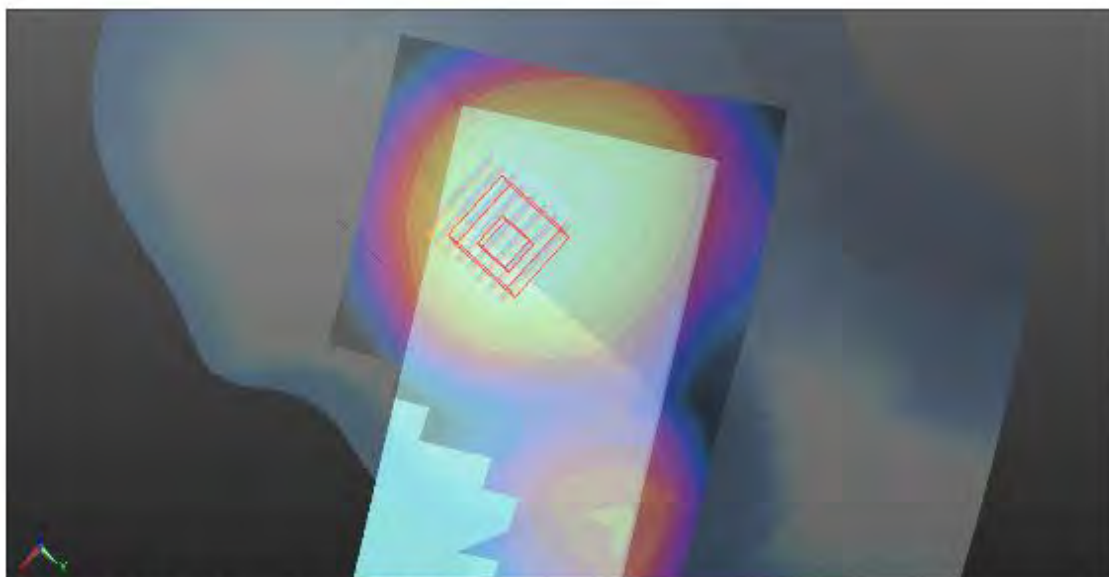
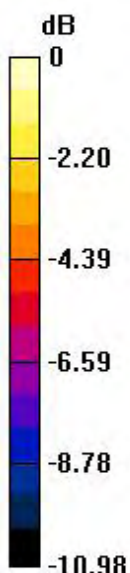
**RIGHT HEAD/R-C/Zoom Scan (8x8x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 10.760 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.729 W/kg

**SAR(1 g) = 0.432 W/kg; SAR(10 g) = 0.353 W/kg**

Maximum value of SAR (measured) = 0.678 W/kg



0 dB = 0.678 W/kg = -1.69 dBW/kg

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#9

Date: 09/29/2019

## WiFi 5.8G\_Right Cheek\_Ch165

Communication System: UID 0, 802.11a (0); Frequency: 5825 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 5825$  MHz;  $\sigma = 5.273$  S/m;  $\epsilon_r = 34.943$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(4.92, 4.92, 4.92); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**RIGHT HEAD/R-C/Area Scan (12x19x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.300 W/kg

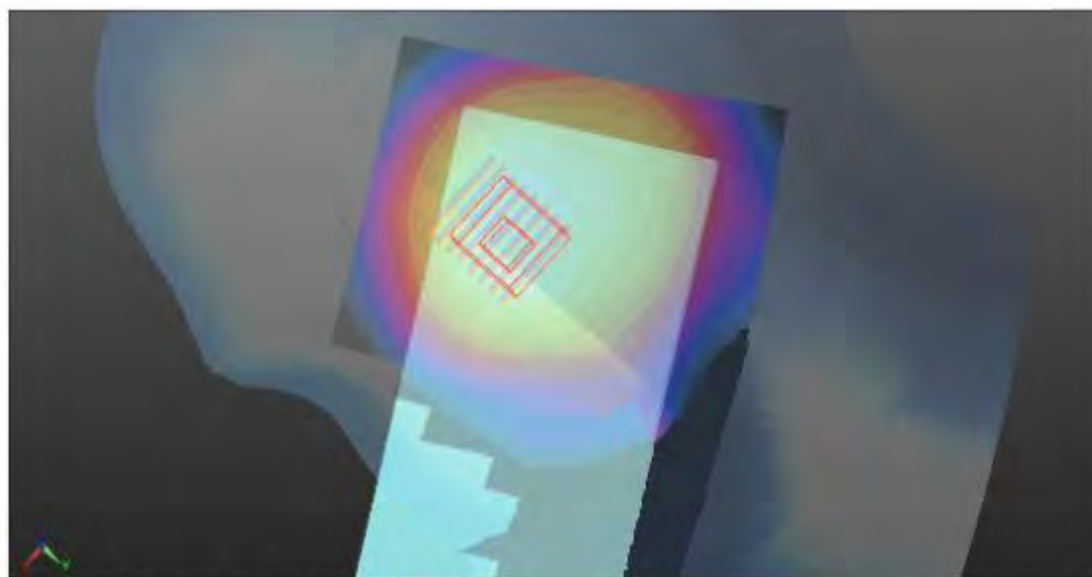
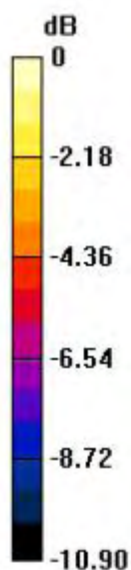
**RIGHT HEAD/R-C/Zoom Scan (8x8x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 3.674 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.357 W/kg

**SAR(1 g) = 0.280 W/kg; SAR(10 g) = 0.205 W/kg**

Maximum value of SAR (measured) = 0.322 W/kg



0 dB = 0.322 W/kg = -4.92 dBW/kg



#10

Date: 09/11/2019

## GSM850\_GPRS\_2TX\_Body Back\_Ch251

Communication System: UID 0, GPRS(2 Tx slots) (0); Frequency: 848.8 MHz; Duty Cycle: 1:1.99986

Medium parameters used (interpolated):  $f = 848.8$  MHz;  $\sigma = 0.96$  S/m;  $\epsilon_r = 55.858$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(9.88, 9.88, 9.88); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**BODY/2ST-BACK/Area Scan (8x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.390 W/kg

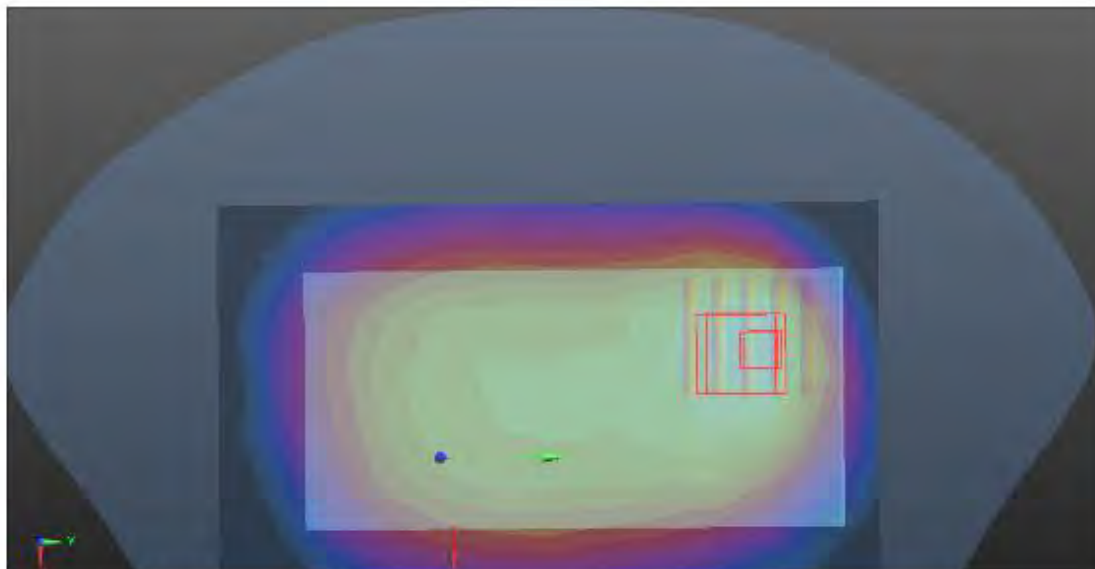
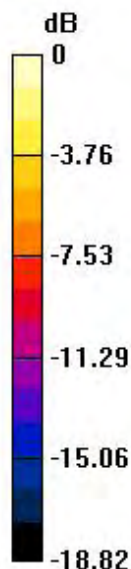
**BODY/2ST-BACK/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.810 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 0.546 W/kg

**SAR(1 g) = 0.302 W/kg; SAR(10 g) = 0.175 W/kg**

Maximum value of SAR (measured) = 0.396 W/kg



0 dB = 0.396 W/kg = -4.02 dBW/kg

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#11

Date: 09/15/2019

## GSM1900\_GPRS\_4TX\_Body Back\_Ch885

Communication System: UID 0, GPRS(4 Tx slots) (0); Frequency: 1909.8 MHz; Duty Cycle: 1:1.99986

Medium parameters used:  $f = 1909.8$  MHz;  $\sigma = 1.57$  S/m;  $\epsilon_r = 51.14$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(7.97, 7.97, 7.97); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**BODY/4ST-BACK/Area Scan (8x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.05 W/kg

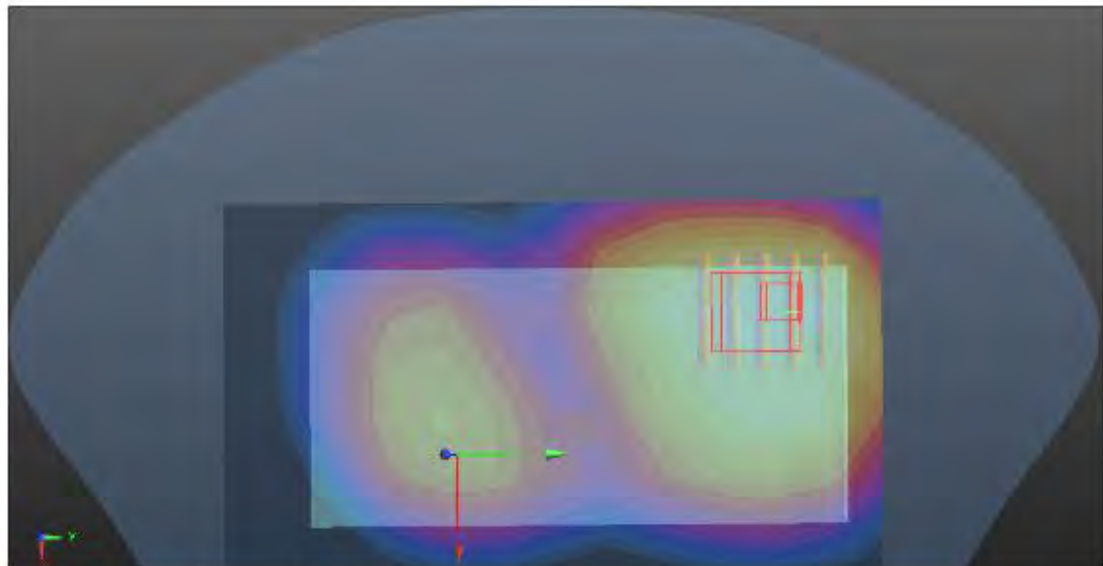
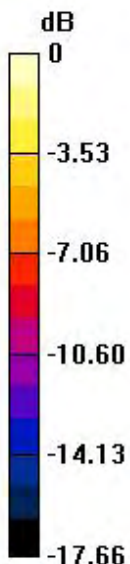
**BODY/4ST-BACK/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.931 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 1.31 W/kg

**SAR(1 g) = 0.716 W/kg; SAR(10 g) = 0.460 W/kg**

Maximum value of SAR (measured) = 1.03 W/kg



0 dB = 1.03 W/kg = 0.13 dBW/kg

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#12

Date: 09/15/2019

## WCDMA 1900\_RMC 12.2K\_Body Back\_Ch9262

Communication System: UID 0, Generic WCDMA (0); Frequency: 1852.4 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1852.4$  MHz;  $\sigma = 1.57$  S/m;  $\epsilon_r = 51.14$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(7.97, 7.97, 7.97); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**BODY/BODY BACK/Area Scan (8x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.637 W/kg

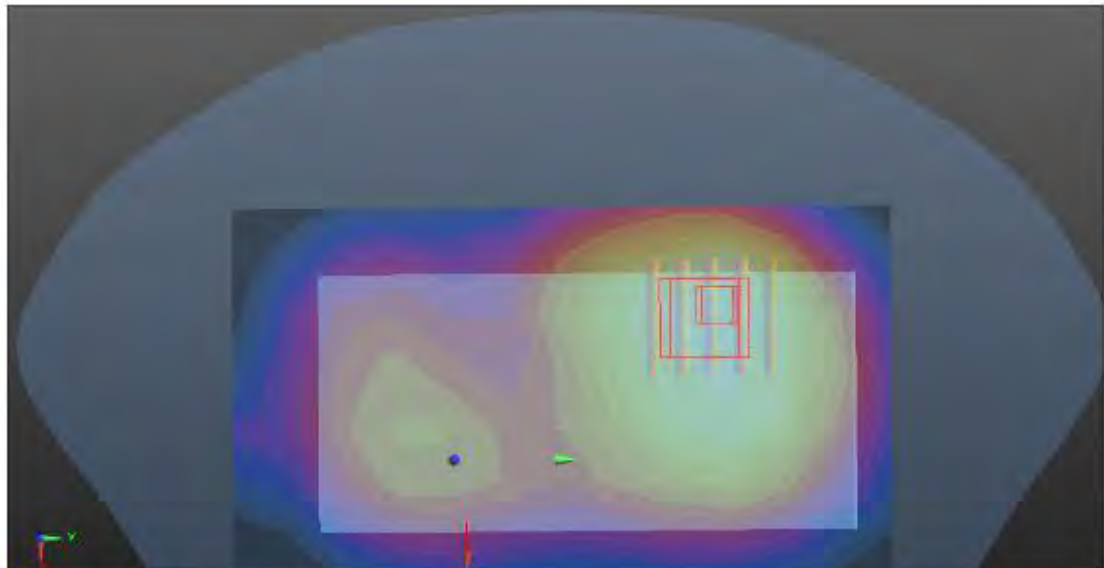
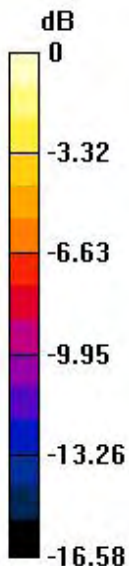
**BODY/BODY BACK/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.463 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 0.846 W/kg

**SAR(1 g) = 0.493 W/kg; SAR(10 g) = 0.293 W/kg**

Maximum value of SAR (measured) = 0.640 W/kg



0 dB = 0.640 W/kg = -1.94 dBW/kg

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#13

Date: 09/11/2019

## WCDMA 850\_RMC 12.2K\_Body Back\_Ch4132

Communication System: UID 0, Generic WCDMA (0); Frequency: 826.4 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 826.4$  MHz;  $\sigma = 0.96$  S/m;  $\epsilon_r = 55.858$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(9.88, 9.88, 9.88); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**BODY/BACK/Area Scan (8x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.610 W/kg

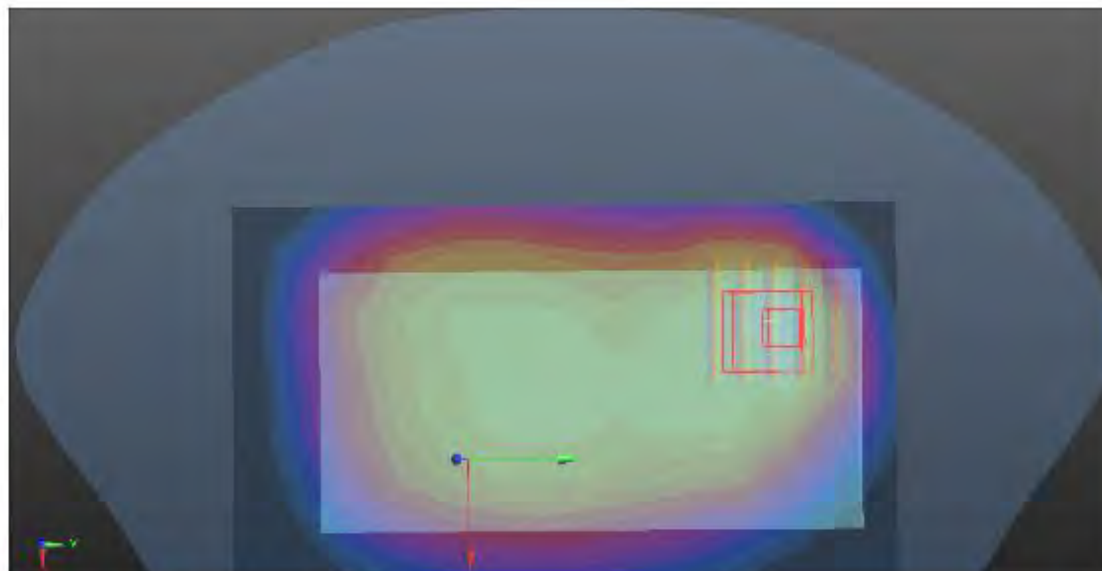
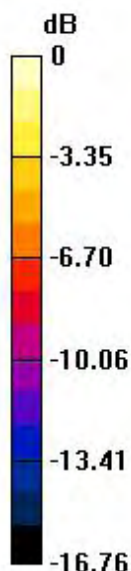
**BODY/BACK/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 17.686 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.775 W/kg

**SAR(1 g) = 0.435 W/kg; SAR(10 g) = 0.246 W/kg**

Maximum value of SAR (measured) = 0.572 W/kg



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#14

Date: 09/15/2019

## LTE Band4\_1RB\_Body Back\_Ch20050

Communication System: UID 0, Generic LTE (0); Frequency: 1720.0 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1720.0$  MHz;  $\sigma = 1.459$  S/m;  $\epsilon_r = 53.239$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(8.24, 8.24, 8.24); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**BODY/BACK/Area Scan (8x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.642 W/kg

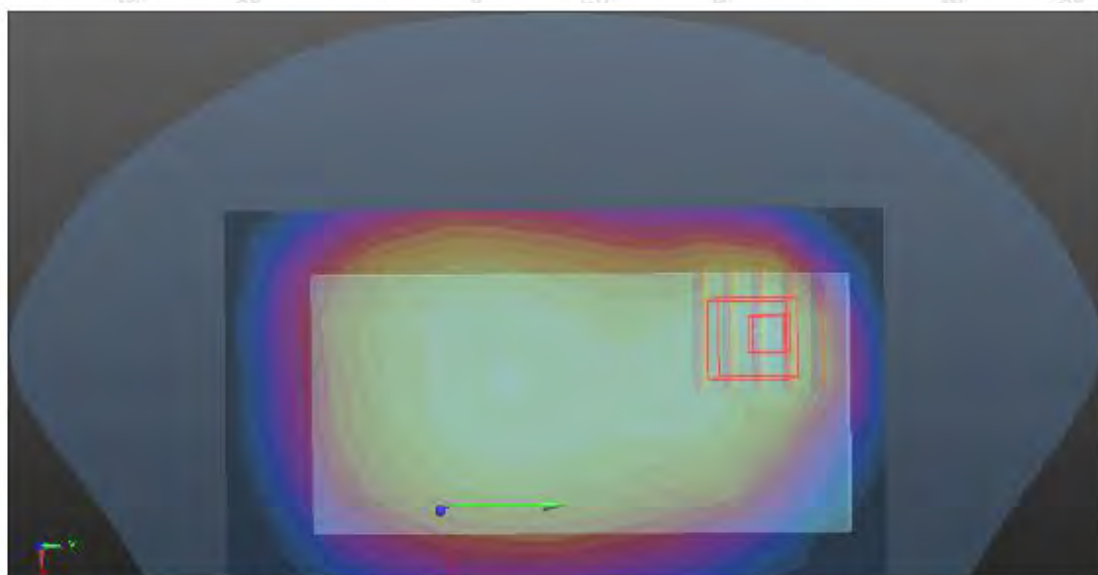
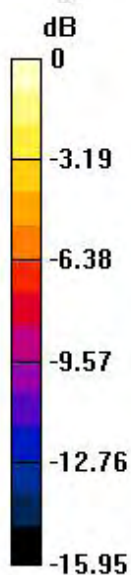
**BODY/BACK/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.211 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.814 W/kg

**SAR(1 g) = 0.473 W/kg; SAR(10 g) = 0.275 W/kg**

Maximum value of SAR (measured) = 0.632 W/kg



0 dB = 0.632 W/kg = -1.99 dBW/kg

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#15

Date: 09/20/2019

## LTE Band7\_1RB\_Body Back\_Ch20850

Communication System: UID 0, Generic LTE (0); Frequency: 2510.0 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2510.0$  MHz;  $\sigma = 2.125$  S/m;  $\epsilon_r = 52.655$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(7.38, 7.38, 7.38); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**BODY/BACK/Area Scan (8x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.514 W/kg

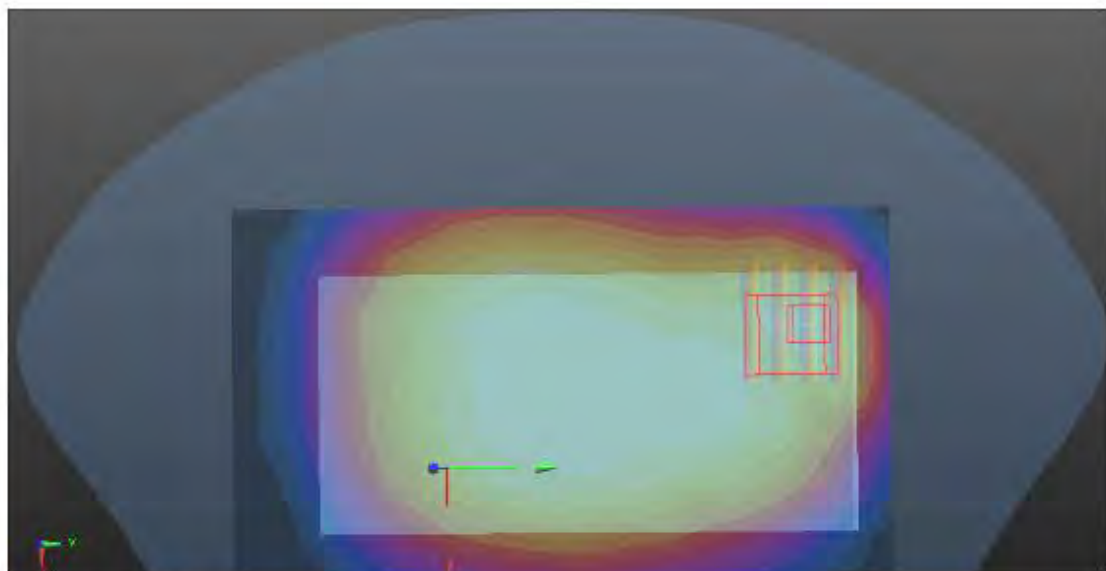
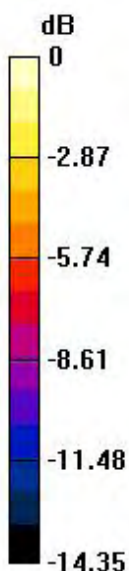
**BODY/BACK/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.696 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.582 W/kg

**SAR(1 g) = 0.362 W/kg; SAR(10 g) = 0.220 W/kg**

Maximum value of SAR (measured) = 0.475 W/kg



0 dB = 0.475 W/kg = -3.23 dBW/kg

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#16

Date: 09/24/2019

### WIFI 2.4G\_Body Back\_Ch11

Communication System: UID 0, wifi (fcc) (0); Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 2462$  MHz;  $\sigma = 1.963$  S/m;  $\epsilon_r = 52.013$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(7.53, 7.53, 7.53); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**BODY/BACK/Area Scan (12x19x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.618 W/kg

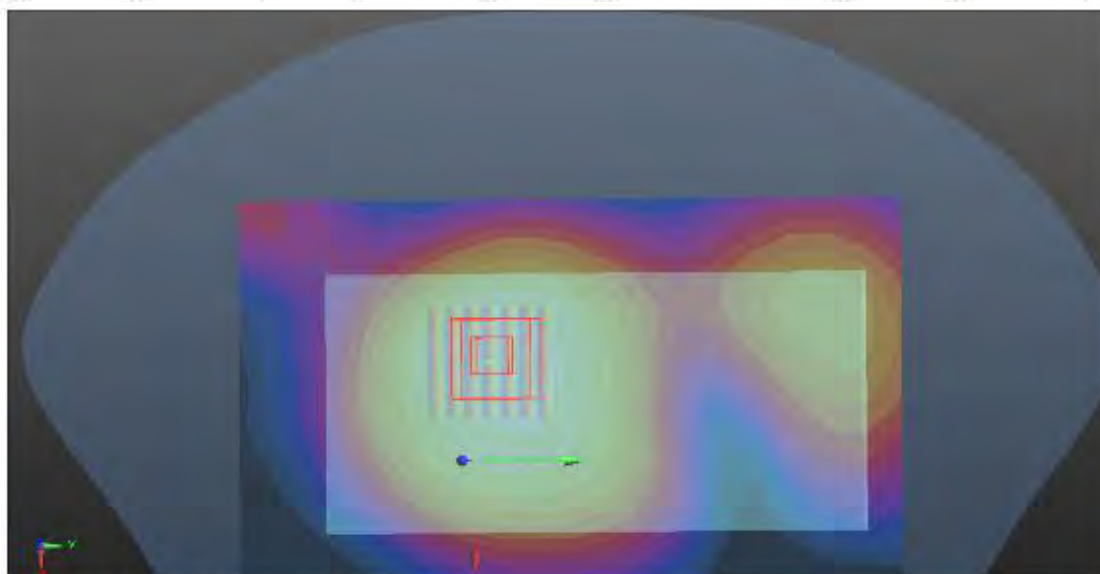
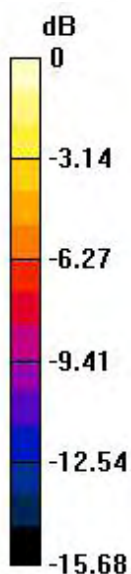
**BODY/BACK/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 15.319 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.763 W/kg

**SAR(1 g) = 0.486 W/kg; SAR(10 g) = 0.302 W/kg**

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



0 dB = 0.630 W/kg = -2.01 dBW/kg

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#17

Date: 09/26/2019

### WIFI 5.2G\_Body Back\_Ch48

Communication System: UID 0, 802.11a (0); Frequency: 5240 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 5240$  MHz;  $\sigma = 5.373$  S/m;  $\epsilon_r = 48.593$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(4.93, 4.93, 4.93); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**BODY/BACK/Area Scan (12x19x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.650 W/kg

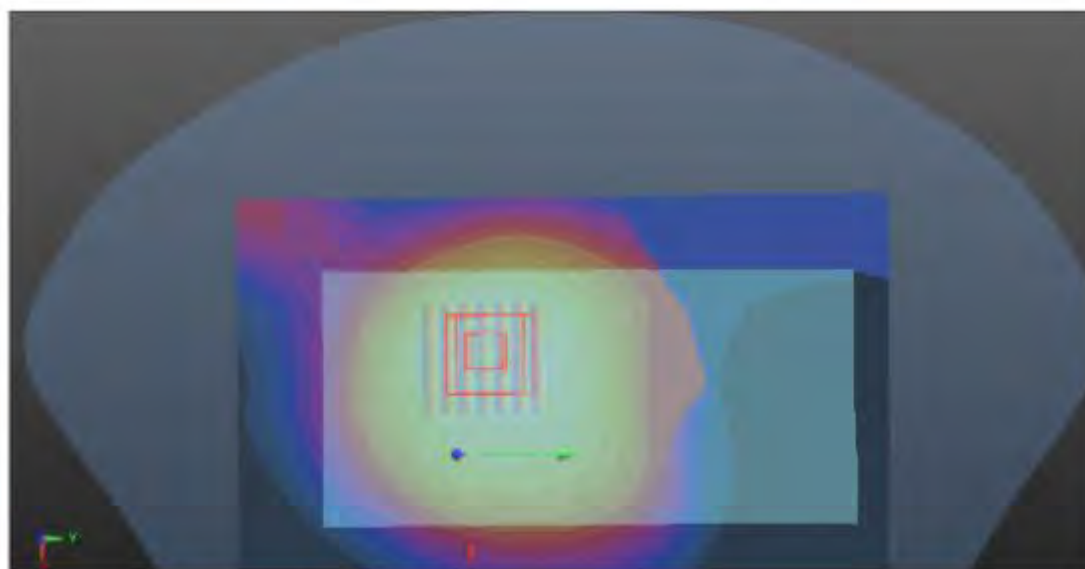
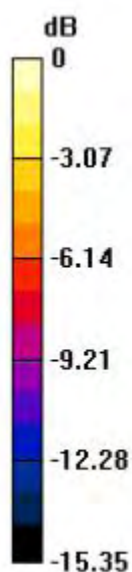
**BODY/BACK/Zoom Scan (8x8x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 15.540 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.801 W/kg

**SAR(1 g) = 0.409 W/kg; SAR(10 g) = 0.319 W/kg**

Maximum value of SAR (measured) = 0.669 W/kg



0 dB = 0.669 W/kg = -1.75 dBW/kg

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#18

Date: 09/30/2019

### WIFI 5.8G\_Body Back\_Ch165

Communication System: UID 0, 802.11a (0); Frequency: 5825 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 5825$  MHz;  $\sigma = 5.971$  S/m;  $\epsilon_r = 48.593$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(4.52, 4.52, 4.52); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

**BODY/BACK/Area Scan (12x19x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.311 W/kg

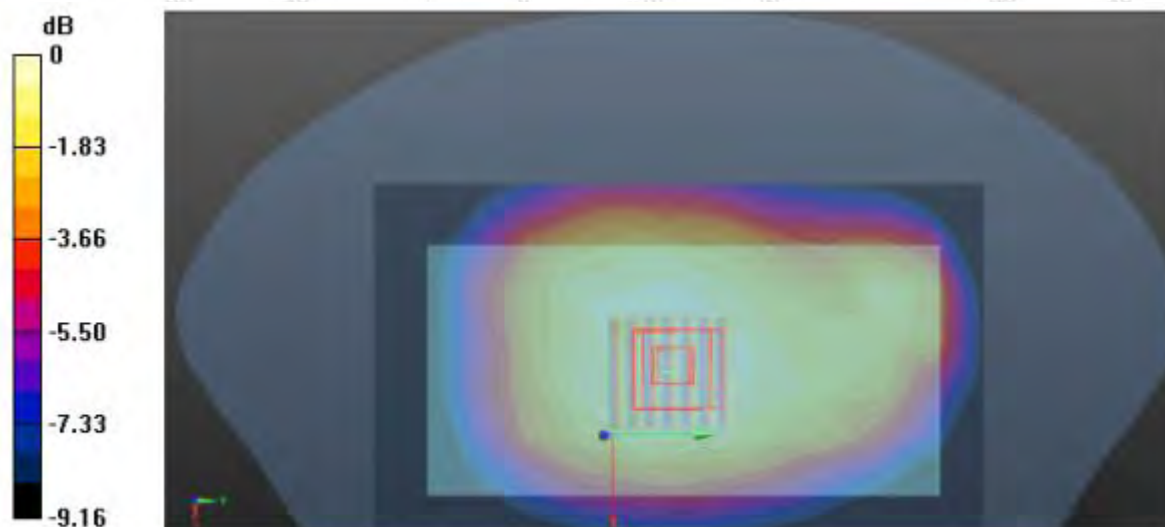
**BODY/BACK/Zoom Scan (8x8x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 19.134 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.522 W/kg

**SAR(1 g) = 0.336 W/kg; SAR(10 g) = 0.137 W/kg**

Maximum value of SAR (measured) = 0.479 W/kg




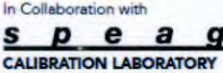


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## Appendix D. DASYS System Calibration Certificate


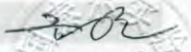
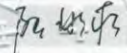





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Client: Anbotek (Auden) Certificate No: Z18-97089

CALIBRATION CERTIFICATE			
Object	D835V2 - SN: 4d154		
Calibration Procedure(s)	FD-Z11-2-003-01 Calibration Procedures for dipole validation kits		
Calibration date:	Jun 16, 2018		
<p>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.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)°C and humidity&lt;70%.</p> <p>Calibration Equipment used (M&amp;TE critical for calibration)</p>			
Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	01-Jul-17 (CTTL, No.J17X04256)	Jun-18
Power sensor NRP-Z91	101547	01-Jul-17 (CTTL, No.J17X04256)	Jun-18
Reference Probe EX3DV4	SN 7307	19-Feb-18(SPEAG,No.EX3-7307_Feb18)	Feb-19
DAE4	SN 771	02-Feb-18(CTTL-SPEAG,No.Z18-97011)	Feb-19
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-18 (CTTL, No.J18X00893)	Jan-19
Network Analyzer E5071C	MY46110673	26-Jan-18 (CTTL, No.J18X00894)	Jan-19
Calibrated by:	Name Zhao Jing	Function SAR Test Engineer	Signature 
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	
Issued: Jun 17, 2018			
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			

Certificate No: Z18-97089 Page 1 of 8



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**Glossary:**

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
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, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, 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%.



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### Measurement Conditions

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

DASY Version	DASY52	52.8.8.1258
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.0 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

### SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.30 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.24 mW / g ± 20.8 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.50 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.02 mW / g ± 20.4 % (k=2)

### Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.4 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

### SAR result with Body TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.43 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.57 mW / g ± 20.8 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.61 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	6.36 mW / g ± 20.4 % (k=2)

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E-mail: cttl@chinattl.com Http://www.chinattl.cn**Appendix****Antenna Parameters with Head TSL**

Impedance, transformed to feed point	49.2Ω- 3.11jΩ
Return Loss	- 29.8dB

**Antenna Parameters with Body TSL**

Impedance, transformed to feed point	46.6Ω- 2.33jΩ
Return Loss	- 27.4dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.508 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: 06.16.2018

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d154**

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.891 \text{ S/m}$ ;  $\epsilon_r = 40.97$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(10.01, 10.01,10.01); Calibrated: 2/19/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2018-02-02
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

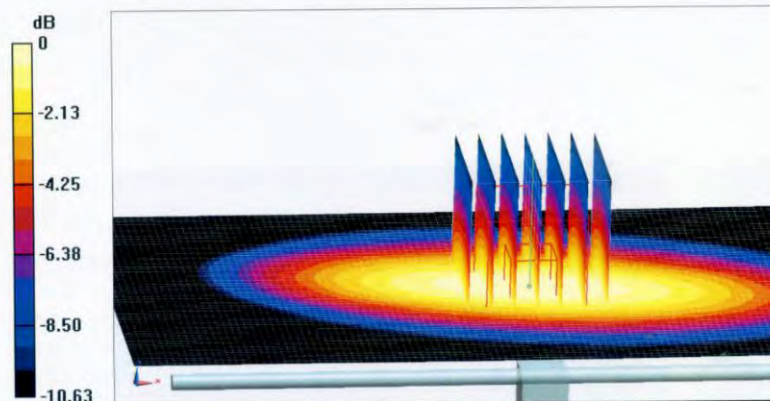
**Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

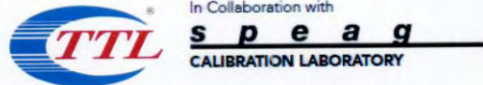
Reference Value = 58.14V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 3.41 W/kg

**SAR(1 g) = 2.3 W/kg; SAR(10 g) = 1.5 W/kg**

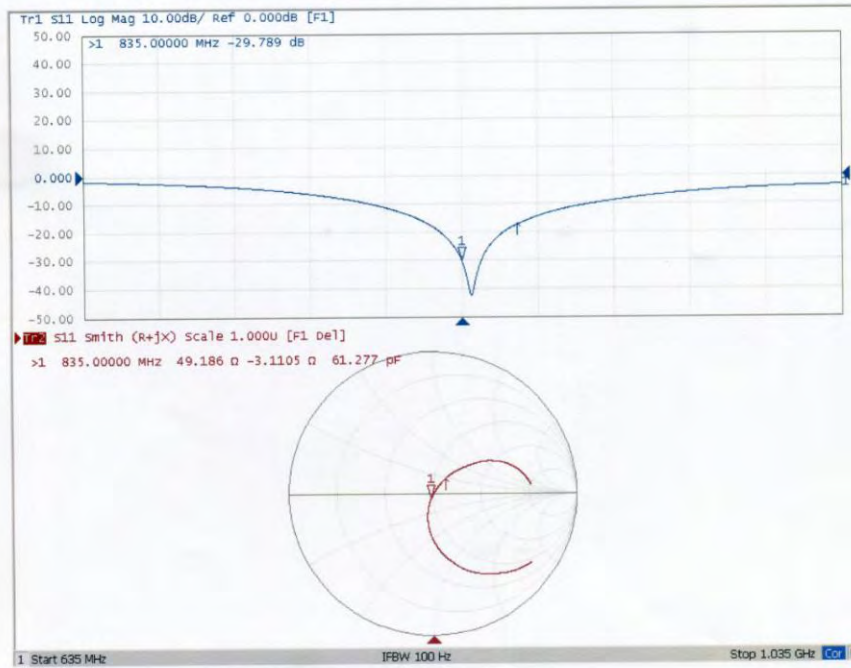
Maximum value of SAR (measured) = 2.91 W/kg





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**Impedance Measurement Plot for Head TSL**





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### DASY5 Validation Report for Body TSL

Date: 06.16.2018

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d154**

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.991 \text{ S/m}$ ;  $\epsilon_r = 55.41$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(9.83,9.83, 9.83); Calibrated: 2/19/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2018-02-02
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

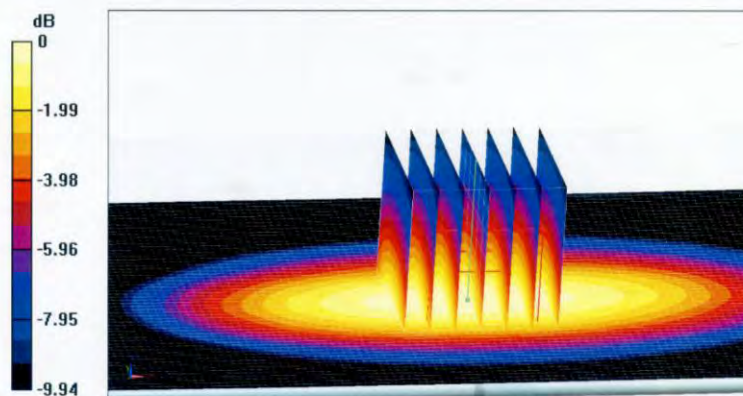
**Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.01 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.53 W/kg

**SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.61 W/kg**

Maximum value of SAR (measured) = 3.04 W/kg



Certificate No: Z18-97089

Page 7 of 8

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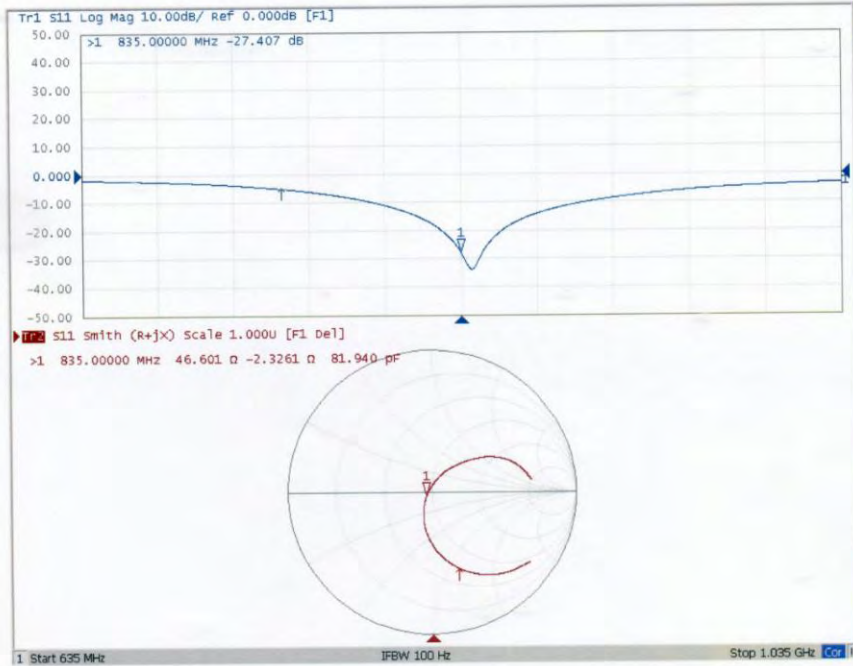




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**Impedance Measurement Plot for Body TSL**

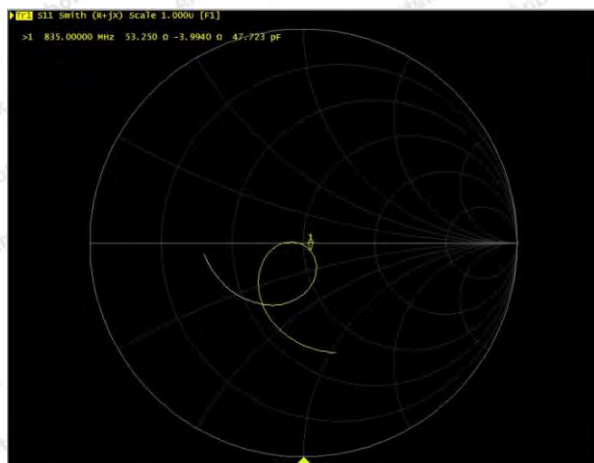


**Justification of the extended calibration of Dipole D835V2 SN: 4d154**

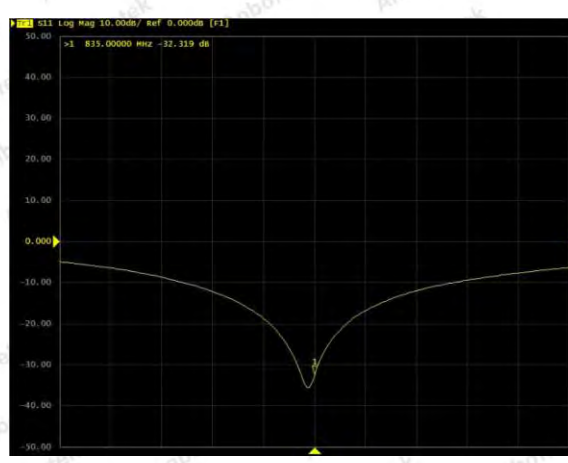
Per KDB 865664, we have Measured the Impedance and Return Loss as below, and the return loss is  $< -20\text{dB}$ , with 20% of prior calibration; the real or imaginary parts of the impedance is with 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

Dipole 835 Head TST	Target Value	Measured Value	Difference
Impedance transformed to feed point	49.20Ω-3.11jΩ	53.25Ω-3.99jΩ	R=4.05Ω,X=-0.88Ω
Return Loss	-29.80dB	-32.32dB	8.46%
Dipole 835 Body TST	Target Value	Measured Value	Difference
Impedance transformed to feed point	46.60Ω-2.33jΩ	47.04Ω-1.83jΩ	R=0.44Ω,X=0.50Ω
Return Loss	-27.4dB	-29.58dB	7.96%
Measured Date	2018-06-16	2019-06-14	-----

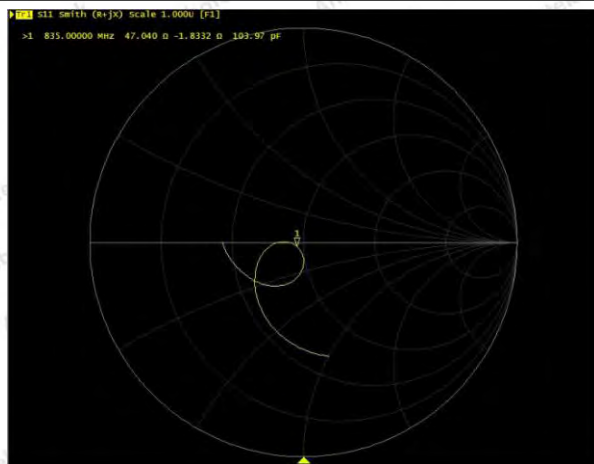
**Impedance Test-Head**



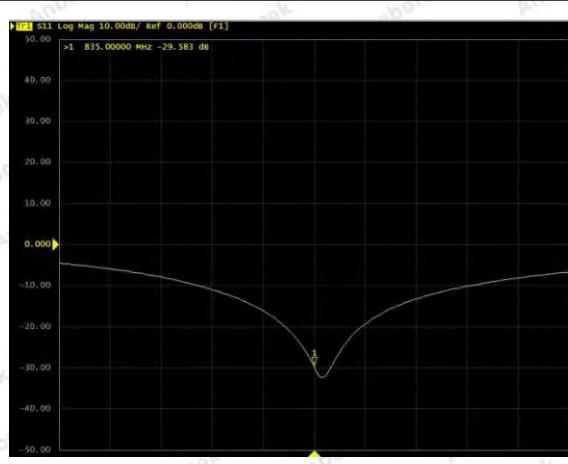
**Return Loss Test-Head**



**Impedance Test-Body**



**Return Loss Test- Body**



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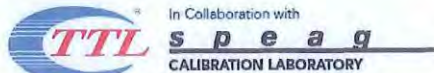
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Client **Anbotek (Auden)**

Certificate No: **Z19-97103**

CALIBRATION CERTIFICATE			
Object	D1750V2 - SN: 1021		
Calibration Procedure(s)	FD-Z11-2-003-01 Calibration Procedures for dipole validation kits		
Calibration date:	July 3, 2019		
<p>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.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)°C and humidity&lt;70%.</p> <p>Calibration Equipment used (M&amp;TE critical for calibration)</p>			
Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	27-Jun-19 (CTTL, No.J19X04777)	Jun-20
Power sensor NRP-Z91	101547	27-Jun-19 (CTTL, No.J19X04777)	Jun-20
Reference Probe EX3DV4	SN 7307	19-Feb-19(SPEAG,No.EX3-7307_Feb19)	Feb-20
DAE4	SN 771	02-Feb-19(CTTL-SPEAG,No.Z19-97011)	Feb-20
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-19 (CTTL, No.J19X00893)	Jan-20
Network Analyzer E5071C	MY46110673	26-Jan-19 (CTTL, No.J19X00894)	Jan-20
Calibrated by:	Name Zhao Jing	Function SAR Test Engineer	Signature 
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	
Issued: July 4, 2019			
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**Glossary:**

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
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, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, 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%.



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**Measurement Conditions**

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

DASY Version	DASY52	52.8.8.1258
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

**Head TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.5 ± 6 %	1.36 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

**SAR result with Head TSL**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.17 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	36.9 mW / g ± 20.8 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	4.94 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	19.8 mW / g ± 20.4 % (k=2)

**Body TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.1 ± 6 %	1.51 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

**SAR result with Body TSL**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.25 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	36.7 mW / g ± 20.8 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	4.94 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	19.7 mW / g ± 20.4 % (k=2)



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**Appendix**

**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	48.6Ω- 1.40jΩ
Return Loss	- 33.9dB

**Antenna Parameters with Body TSL**

Impedance, transformed to feed point	46.0Ω+ 0.61jΩ
Return Loss	- 27.5dB

**General Antenna Parameters and Design**

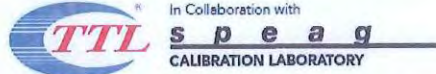
Electrical Delay (one direction)	1.318 ns
----------------------------------	----------

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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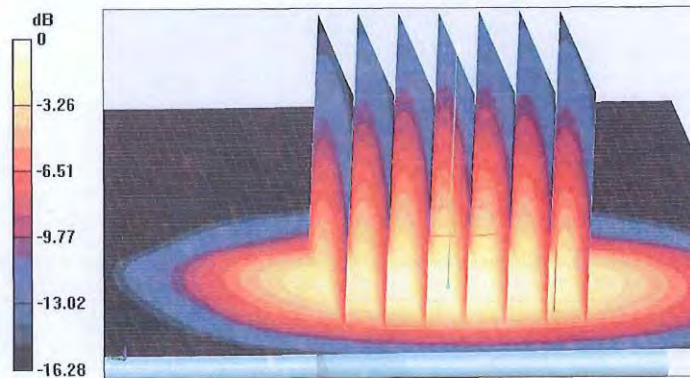
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**DASY5 Validation Report for Head TSL** Date: 07.01.2019

Test Laboratory: CTTL, Beijing, China  
**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1021**  
 Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1  
 Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.362$  S/m;  $\epsilon_r = 40.49$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: Center Section  
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)  
 DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(8.37, 8.37, 8.37); Calibrated: 2/19/2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2019
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

**System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid:  
 dx=5mm, dy=5mm, dz=5mm  
 Reference Value = 47.11V/m; Power Drift = 0.03 dB  
 Peak SAR (extrapolated) = 16.4W/kg  
**SAR(1 g) = 9.17 W/kg; SAR(10 g) = 4.94 W/kg**  
 Maximum value of SAR (measured) = 13.0 W/kg

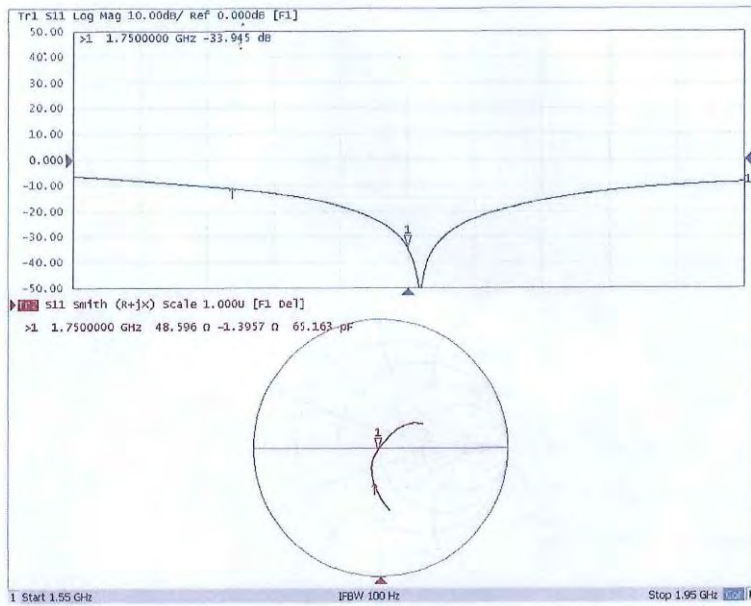


0 dB = 13.0 W/kg = 11.14 dBW/kg

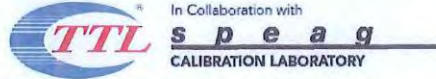


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**Impedance Measurement Plot for Head TSL**







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**DASY5 Validation Report for Body TSL**

Date: 07.01.2019

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1021**

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.505$  S/m;  $\epsilon_r = 53.06$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(8.18, 8.18, 8.18); Calibrated: 2/19/2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2019
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

**System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:**

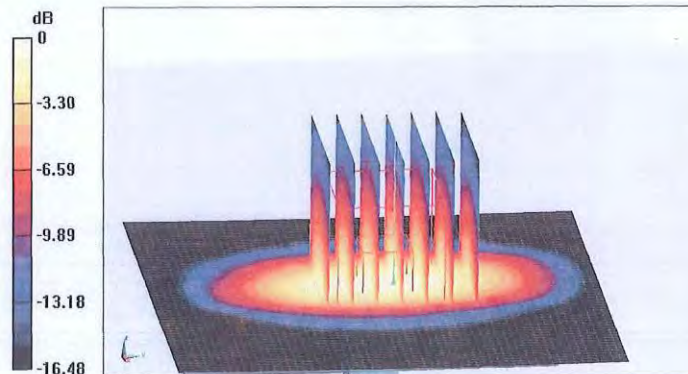
$dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 94.11 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 16.4 W/kg

SAR(1 g) = 9.25 W/kg; SAR(10 g) = 4.94 W/kg

Maximum value of SAR (measured) = 13.1 W/kg

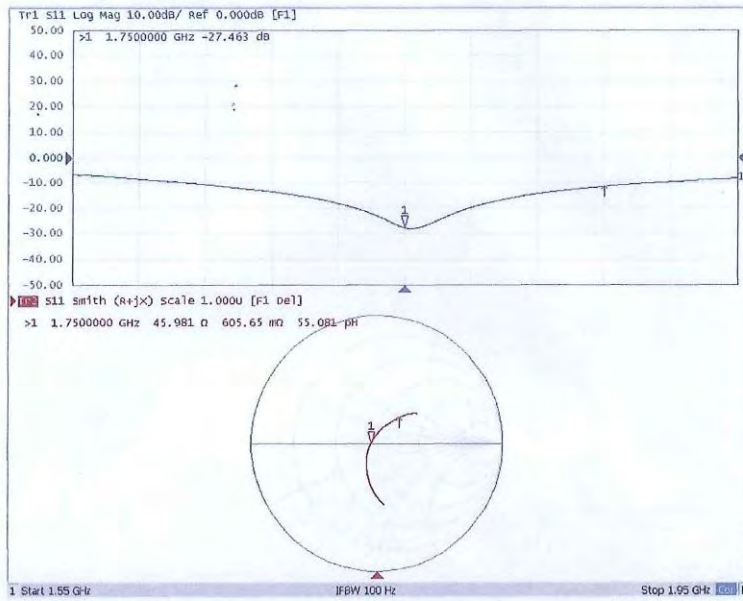


0 dB = 13.1 W/kg = 11.17 dBW/kg



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**Impedance Measurement Plot for Body TSL**





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Client **Anbotek (Auden)**

Certificate No: **Z19-97090**

**CALIBRATION CERTIFICATE**

Object: D1900V2 - SN: 5d175  
Calibration Procedure(s): FD-Z11-2-003-01  
Calibration Procedures for dipole validation kits  
Calibration date: Jun 15, 2019

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	01-Jul-18 (CTTL, No.J18X04256)	Jun-19
Power sensor NRP-Z91	101547	01-Jul-18 (CTTL, No.J18X04256)	Jun-19
Reference Probe EX3DV4	SN 7307	19-Feb-19(SPEAG,No.EX3-7307_Feb19)	Feb-20
D4E4	SN 771	02-Feb-19(CTTL-SPEAG,No.Z19-97011)	Feb-20

Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-19 (CTTL, No.J19X00893)	Jan-20
Network Analyzer E5071C	MY46110673	26-Jan-19 (CTTL, No.J19X00894)	Jan-20

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: Jun 17, 2019

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

Certificate No: Z19-97090

Page 1 of 8

**Shenzhen Anbotek Compliance Laboratory Limited**

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**Glossary:**

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,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, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, 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%.



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**Measurement Conditions**

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

DASY Version	DASY52	52.8.8.1258
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

**Head TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.3 ± 6 %	1.38 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

**SAR result with Head TSL**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.99 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	40.4 mW /g ± 20.8 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.28 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	21.3 mW /g ± 20.4 % (k=2)

**Body TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.3 ± 6 %	1.54 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

**SAR result with Body TSL**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.1 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	40.1 mW /g ± 20.8 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.39 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	21.5 mW /g ± 20.4 % (k=2)



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**Appendix**

**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	53.2Ω+ 5.44jΩ
Return Loss	- 24.3dB

**Antenna Parameters with Body TSL**

Impedance, transformed to feed point	48.9Ω+ 5.75jΩ
Return Loss	- 24.6dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.304 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**

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**DASY5 Validation Report for Head TSL**

Date: 06.15.2019

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d175**

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.381$  S/m;  $\epsilon_r = 40.33$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(8.1, 8.1, 8.1); Calibrated: 2/19/2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2019
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

**System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:**

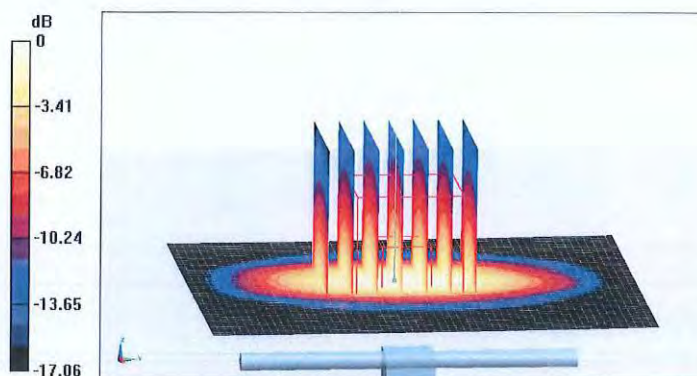
$dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 103.5V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 18.0W/kg

SAR(1 g) = 9.99 W/kg; SAR(10 g) = 5.28 W/kg

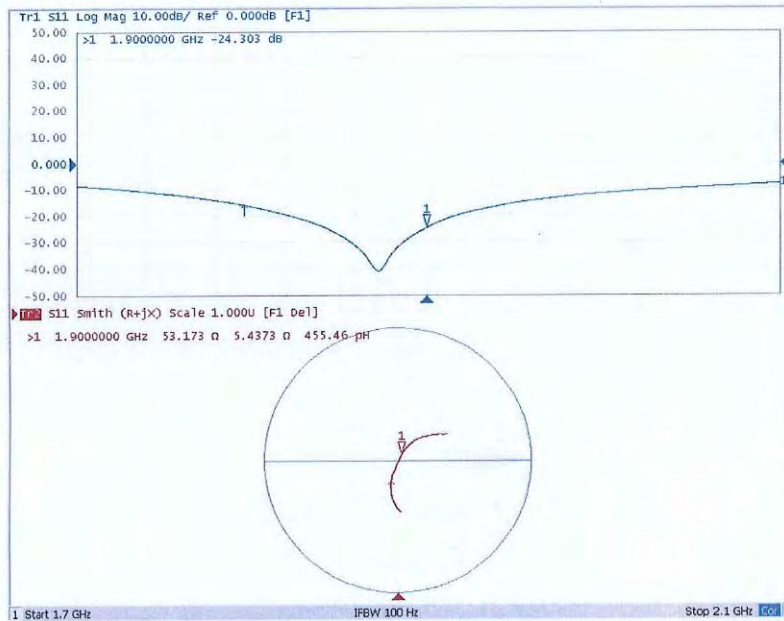
Maximum value of SAR (measured) = 14.1 W/kg





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**Impedance Measurement Plot for Head TSL**







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### DASY5 Validation Report for Body TSL

Date: 06.15.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d175

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.537$  S/m;  $\epsilon_r = 53.34$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(7.67, 7.67, 7.67); Calibrated: 2/19/2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2019
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

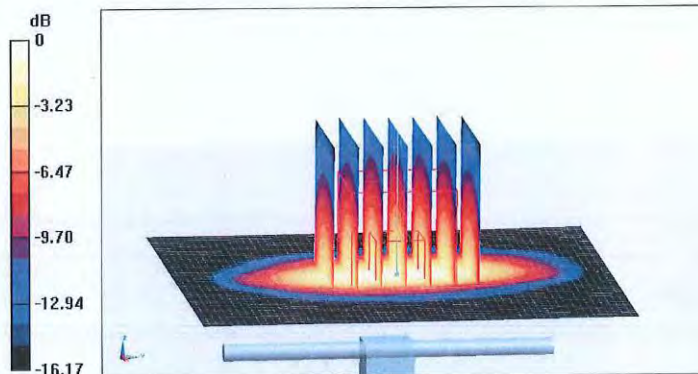
$dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 96.11 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 17.8 W/kg

SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.39 W/kg

Maximum value of SAR (measured) = 14.3 W/kg



Certificate No: Z19-97090

Page 7 of 8



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**Impedance Measurement Plot for Body TSL**

