

# FCC SAR REPORT

**Applicant:** FAR WIDE TELECOMMUNICATIONS CO., LTD.

**Address of Applicant:** 10F, No.127, Anxing Rd, Xindian Dist., New Taipei City 23159 Taiwan.

**Equipment Under Test (EUT)**

Product Name: 4G VoLTE Feature Phone

Model No.: G799

Trade mark iTree

**FCC ID:** 2A3BAITREEG799

**Applicable standards:** FCC 47 CFR Part 2.1093

**Date of Test:** 02 Aug., 2022 ~ 07 Aug., 2022

**Test Result:** Maximum Reported 1-g SAR (W/kg)  
Head: 0.785      Body: 1.399

Authorized Signature:



Bruce Zhang  
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the JYT product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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**2 Version**

Version No.	Date	Description
00	22 Aug., 2022	Original

**Tested by:***Vieta Zhang***Date:***22 Aug., 2022*

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**Test Engineer****Reviewed by:***Janet. Wei***Date:***22 Aug., 2022*

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**Project Engineer**

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## 4 SAR Results Summary

The maximum results of Specific Absorption Rate (SAR) found during test as bellows:  
 <Highest Reported standalone SAR Summary>

Exposure Position	Frequency Band	Reported 1-g SAR (W/kg)	Equipment Class	Highest Reported 1-g SAR (W/kg)
Head	GSM 850	0.586	PCE	0.785
	GSM 1900	0.170		
	WCDMA Band II	0.248		
	WCDMA Band IV	0.119		
	WCDMA Band V	0.406		
	LTE Band 2	0.303		
	LTE Band 5	0.369		
	LTE Band 7	0.785		
	LTE Band 12 & LTE Band 17	0.228		
	LTE Band 13	0.250		
	LTE Band 66 & LTE Band 4	0.204		
	Bluetooth	<0.001	DSS	
Body (10 mm Gap)	GSM 850	1.212	PCE	1.399
	GSM 1900	0.605		
	WCDMA Band II	0.988		
	WCDMA Band IV	1.069		
	WCDMA Band V	0.671		
	LTE Band 2	1.096		
	LTE Band 5	0.639		
	LTE Band 7	1.045		
	LTE Band 12 & LTE Band 17	0.342		
	LTE Band 13	0.564		
	LTE Band 66 & LTE Band 4	1.399		
	Bluetooth	<0.001	DSS	

<Highest Reported simultaneous SAR Summary>

Exposure Position	Frequency Band	Reported 1-g SAR (W/kg)	Equipment Class	Highest Reported Simultaneous Transmission 1-g SAR (W/kg)
Back	WWAN	1.399	PCE	1.399
	BT	0.000	DSS	

**Note:**

1. The highest simultaneous transmission is scalar summation of Reported standalone SAR per FCC KDB 690783 D01 v01r03, and scalar SAR summation of all possible simultaneous transmission scenarios are < 1.6W/kg.
2. This device is 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.
3. For FDD-LTE Band 17 is full covered by FDD-LTE Band 12, so only FDD-LTE Band 12 was tested.
4. For FDD-LTE Band 4 is full covered by FDD-LTE Band 66, so only FDD-LTE Band 66 was tested.

## 5 General Information

### 5.1 Client Information

Applicant:	FAR WIDE TELECOMMUNICATIONS CO., LTD.
Address:	10F, No.127, Anxing Rd, Xindian Dist., New Taipei City 23159 Taiwan.
Manufacturer/Factory:	SHENZHEN TOPWELL TECHNOLOGY CO., LTD.
Address:	15/F, Building A1, Qiaode Science & Technology Park, No.7 Road, Hi-Tech Industry Park, Guangming new district, Shenzhen, China.

### 5.2 General Description of EUT

Product Name:	4G VoLTE Feature Phone		
Model No.:	G799		
Category of device	Portable device		
Operation Frequency:	2G :	GSM850: 824.2~848.8 MHz	PCS 1900: 1850.2~1909.8 MHz
	3G :	Band II: 1852.4~1907.6 MHz	Band V: 826.4~846.6 MHz
		Band IV: 1712.4~1752.6 MHz	
	4G :	Band 2 :1850MHz~1910MHz	Band 4 :1710MHz~1755MHz
		Band 5 :824MHz~849MHz	Band 7: 2500MHz~2570MHz
		Band 12: 699MHz~716MHz	Band 13: 777MHz~787MHz
Band 17: 704MHz~716MHz		Band 66 :1710MHz~1780MHz	
Bluetooth: 2402 MHz ~ 2480 MHz			
Modulation technology:	2G:	<input checked="" type="checkbox"/> Voice(GMSK)	<input checked="" type="checkbox"/> GPRS(GMSK) <input type="checkbox"/> EGPRS(GMSK, 8PSK)
	3G:	<input checked="" type="checkbox"/> RMC(QPSK)	<input checked="" type="checkbox"/> HSUPA(QPSK) <input checked="" type="checkbox"/> HSDPA(QPSK,16QAM)
	4G:	<input checked="" type="checkbox"/> QPSK	<input checked="" type="checkbox"/> 16QAM <input type="checkbox"/> 64QAM
	Bluetooth:	<input checked="" type="checkbox"/> BDR(GFSK)	<input checked="" type="checkbox"/> EDR( $\pi/4$ -DQPSK, 8DPSK) <input checked="" type="checkbox"/> LE(GFSK)
Antenna Type:	Internal Antenna		
Antenna Gain:	GSM 850: 0.77 dBi; PCS 1900:0.55 dBi WCDMA Band II: 0.55 dBi; WCDMA Band V: 0.77 dBi WCDMA Band IV: 0.63 dBi LTE Band 2:0.55 dBi; LTE Band 4: 0.63 dBi LTE Band 5: 0.77 dBi; LTE Band 7: 0.84 dBi LTE Band 12: 0.65 dBi; LTE Band 13: 0.63 dBi LTE Band 17: 0.65 dBi; LTE Band 66: 0.63 dBi Bluetooth: 1.21 dBi;		
GPRS Class:	GPRS Class: 12		
Dimensions (L*W*H):	137 mm (L)× 59 mm (W)× 9 mm (H)		
Accessories information:	Adapter: Model: GA050011 Input: AC100-240V, 50/60Hz, 300mA Output: DC 5.0V, 1.1A		Battery: Rechargeable Li-ion Battery 3.7V/2000mAh
			Headset: Support headset

**5.3 Maximum RF Output Power**

Mode	Average Power (dBm)	
	GSM 850	GSM 1900
GSM (Voice)	33.85	30.80
GPRS 1 Tx slot	33.96	30.80
GPRS 2 Tx slots	32.45	30.01
GPRS 3 Tx slots	32.44	28.05
GPRS 4 Tx slots	32.43	27.07

Mode	Average Power (dBm)		
	WCDMA Band II	WCDMA Band IV	WCDMA Band V
AMR 12.2 kbps	24.03	23.12	23.33
RMC 12.2 kbps	23.46	23.21	23.37
HSDPA Sub-test 1	23.45	23.28	23.37
HSDPA Sub-test 2	23.47	22.71	22.84
HSDPA Sub-test 3	21.98	22.73	22.86
HSDPA Sub-test 4	22.49	22.70	22.87
HSUPA Sub-test 1	22.98	21.23	21.39
HSUPA Sub-test 2	22.02	21.74	21.91
HSUPA Sub-test 3	23.95	22.25	22.39
HSUPA Sub-test 4	24.03	21.26	21.41
HSUPA Sub-test 5	23.46	23.25	23.41

Mode	Average Power (dBm)					
	LTE Band 2	LTE Band 5	LTE Band 7	LTE Band 12	LTE Band 13	LTE Band 66
BW/1.4 MHz	23.97	23.25	/	23.33	/	23.11
BW/3.0 MHz	23.98	23.17	/	23.32	/	22.98
BW/5.0 MHz	24.00	23.22	24.23	23.38	23.36	23.07
BW/10 MHz	24.03	23.27	23.94	23.41	23.27	23.06
BW/15 MHz	24.04	/	24.16	/	/	22.98
BW/20 MHz	24.23	/	24.14	/	/	23.12

Mode/Band	1 Mbps(GFSK)	2 Mbps( $\pi$ /4DQPSK)	3 Mbps (8DPSK)	BLE (1M)
Bluetooth	2.72	2.07	2.47	2.88

#### 5.4 Environment of Test Site

Temperature:	18°C ~25 °C
Humidity:	35%~75% RH
Atmospheric Pressure:	1010 mbar

#### 5.5 Test Sample Plan

Sample Number	Used for Test Items
1#	SAR
<i>Remark: JianYan Testing Group Shenzhen Co., Ltd. is only responsible for the test project data of the above samples, and will keep the above samples for a month.</i>	

#### 5.6 Test Location

JianYan Testing Group Shenzhen Co., Ltd.  
 No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street,  
 Bao'an District, Shenzhen, Guangdong, People's Republic of China.  
 Tel: +86-755-23118282, Fax: +86-755-23116366  
 Email: info-JYTee@lets.com, Website: <http://jyt.lets.com>



## 6 Introduction

### 6.1 Introduction

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

### 6.2 SAR Definition

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

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

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

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

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

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

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

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.

## 7 RF Exposure Limits

### 7.1 Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

### 7.2 Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

### 7.3 RF Exposure Limits

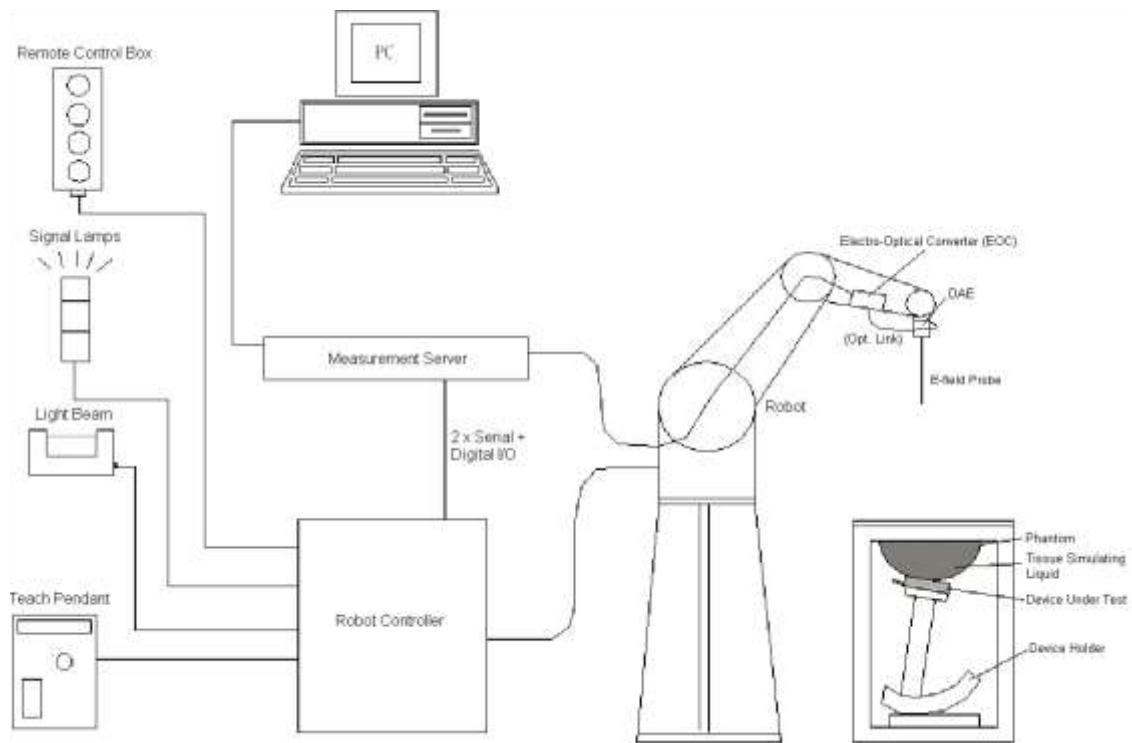
#### SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6

HUMAN EXPOSURE LIMITS		
	UNCONTROLLED ENVIRONMENT <i>General Population</i> (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT <i>Occupational</i> (W/kg) or (mW/g)
SPATIAL PEAK SAR Brain	1.6	8.0
SPATIAL AVERAGE SAR Whole Body	0.08	0.4
SPATIAL PEAK SAR Hands, Feet, Ankles, Wrists	4.0	20

**Note:**

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

## 8 SAR Measurement System



**Fig. 8.1 SPEAG DASY System Configurations**

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


- A standard high precision 6-axis robot with controller, a teach pendant and software
- A data acquisition electronic (DAE) attached to the robot arm extension
- A dosimetric probe equipped with an optical surface detector system
- The electro-optical converter (EOC) performs the conversion between optical and electrical signals
- A measurement server performs the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the accuracy of the probe positioning
- A computer operating Windows XP
- DASY software
- Remote 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

Component details are described in the following sub-sections.

### 8.1 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>Fig. 8.2 Photo of E-Field Probe</p>
<b>Frequency Directivity</b>	10 MHz to 6 GHz; Linearity: $\pm 0.2$ dB $\pm 0.3$ 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: 20mm) Tip diameter: 2.5 mm (Body: 12mm) 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 (Norm X, Norm Y and Norm Z), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested. The calibration data can be referred to appendix E of this report.

### 8.2 Data Acquisition Electronics (DAE)

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




Fig. 8.3 Photo of DAE

### 8.3 Robot

The SPEAG DASY system uses the high precision robots (DASY5: TX60L) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY5: CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability 0.02 mm)
- High reliability (industrial design)
- Low maintenance costs (virtually maintenance free due to direct drive gears; nobelt drives)
- Jerk-free straight movements
- Low ELF interference (motor control fields shielded via the closed metallic construction shields)



Fig. 8.4 Photo of Robot

### 8.4 Measurement Server

The measurement server is based on a PC/104 CPU board with CPU (DASY 5: 400MHz, 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 detection and digital I/O interface are contained on the DASY I/O board, which is directly connected to the PC/104 bus of the CPU board. The measurement server performs all the real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operations.



Fig. 8.5 Photo of Server for DASY5

### 8.5 Light Beam Unit


The light beam switch allows automatic "tooling" of the probe. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip. The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1 mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position.



Fig. 8.6 Photo of Light Beam

**8.6 Phantom**

**<SAM Twin Phantom>**

<b>Shell Thickness</b>	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm	 <p><b>Fig. 8.7 Photo of SAM Twin Phantom</b></p>
<b>Filling Volume Dimensions</b>	Approx. 25 liters Length: 1000mm; Width: 500mm; Height: adjustable feet	
<b>Measurement Areas</b>	Left Head, Right Head, Flat phantom	

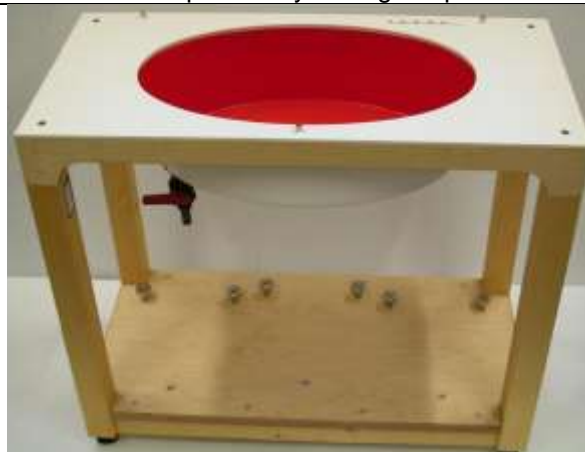
The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters.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

**<ELI4 Phantom >**

The ELI4 phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30MHz to 6 GHz. ELI4 is fully compatible with the latest draft of the standard IEC 62209-2 and all known tissue simulating liquids.

ELI4 has been optimized regarding its performance and can be integrated into a SPEAG standard phantom table. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom can be used with the following tissue simulating liquids:

- Water-sugar based liquids can be left permanently in the phantom. Always cover the liquid if the system is not in use; otherwise the parameters will change due to water evaporation.
- DGBE based liquids should be used with care. As DGBE is a softener for most plastics, the liquid should be taken out of the phantom and the phantom should be dried when the system is not in use (desirable at least once a week).
- Do not use other organic solvents without previously testing the phantom resistiveness



**Fig.8.8 Photo of ELI4 Phantom**

**8.7 Device Holder**

**<Device Holder for SAM Twin Phantom>**

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of  $\pm 0.5$  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-low 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.



**Fig. 8.9 Photo of Device Holder**

## 8.8 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 verifications 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], [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	ConvF <sub>i</sub>
	- Diode compression point	dcp <sub>i</sub>
<b>Device Parameters:</b>	- Frequency	f
	- Crest	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),  $\mu\text{V}/(\text{V/m})^2$   
 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):

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

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

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

With SAR = local specific absorption rate in mW/g  
 $E_{tot}$  = total field strength in V/m  
 $\sigma$  = conductivity in (mho/m) or (Siemens/m)  
 $\rho$  = equipment 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.

## 8.9 Test Equipment List

Manufacturer	Equipment Description	Model	Management Number	Cal. Information	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	WXJ023	05.28.2020	05.27.2023
SPEAG	835MHz System Validation Kit	D835V2	WXJ023-1	06.08.2022	06.07.2025
SPEAG	1750MHz System Validation Kit	D1750V2	WXJ023-6	02.10.2021	02.09.2024
SPEAG	1900MHz System Validation Kit	D1900V2	WXJ023-2	06.07.2022	06.06.2025
SPEAG	2450MHz System Validation Kit	D2450V2	WXJ023-3	06.06.2022	06.05.2025
SPEAG	2600MHz System Validation Kit	D2600V2	WXJ023-4	10.28.2021	10.27.2024
SPEAG	Data Acquisition Electronics	DAE4	WXJ021	06.06.2022	06.05.2023
SPEAG	Dosimetric E-Field Probe	EX3DV4	WXJ022-1	12.28.2021	12.27.2022
SPEAG	DASY 52 Measurement Software	DASY 52	Version 52.10.4.1527	N.C.R	N.C.R
SPEAG	DASY 52 File Conversion Software	SEMCAD X	Version 14.6.14 (7483)	N.C.R	N.C.R
SPEAG	Phantom	Twin Phantom	WXG008-3	N.C.R	N.C.R
SPEAG	Phantom	ELI V5.0	WXG008-4	N.C.R	N.C.R
SPEAG	Phone Positioner	N/A	WXG008-5	N.C.R	N.C.R
Stäubli	Robot	TX60L	WXG008-2	N.C.R	N.C.R
Anritsu	Universal Radio Communication Analyzer	MT8820C	WXJ008-5	03.03.2021	03.02.2023
R&S	Universal Radio Communication Tester	CMU200	WXJ008-2	03.30.2022	03.29.2024
KEYSIGHT	Network Analyzer	E5071C	WXJ091	03.30.2022	03.29.2023
KEYSIGHT	EPM Series Power Meter	N1914A	WXJ075	06.29.2022	06.28.2023
KEYSIGHT	E-Series Power Sensor	E9300H	WXJ075-1	06.29.2022	06.28.2023
KEYSIGHT	E-Series Power Sensor	E9300H	WXJ075-2	06.29.2022	06.28.2023
KEYSIGHT	Signal Generator	N5173B	WXJ006-3	06.29.2022	06.28.2023
Huber Suhner	RF Cable	SUCOFLEX	WXG008-13	See Note 3	
Huber Suhner	RF Cable	SUCOFLEX	WXG008-14	See Note 3	
Huber Suhner	RF Cable	SUCOFLEX	WXG008-15	See Note 3	
Weinschel	Attenuator	23-3-34	WXG008-16	See Note 3	
Anritsu	Directional Coupler	MP654A	WXG008-17	See Note 3	
SPEAG	Dielectric Assessment Kit	3.5 Probe	WXG008-7	See Note 4	
SPEAG	DAK Measurement Software	DAK	Version: DAK 3.5	N.C.R	
TXC	Broadband Amplifier	BBA018000	WXG008-11	See Note 5	

### Note:

- The calibration certificate of DASY can be referred to appendix C of this report.
- Referring to KDB 865664 D01v01r04, the dipole calibration interval can be extended to 3 years with justification. The dipoles are also not physically damaged, or repaired during the interval.
- The Insertion Loss calibration of Dual Directional Coupler and Attenuator were characterized via the network analyzer and compensated during system check.
- 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 Speag.
- In system check we need to monitor the level on the spectrum analyzer, and adjust the power amplifier level to have precise power level to the dipole; the measured SAR will be normalized to 1 W input power according to the ratio of 1 W 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 spectrum analyzer is critical and we do have calibration for it
- Attenuator insertion loss is calibrated by the network Analyzer, which the calibration is valid, before system check.
- N.C.R means No Calibration Requirement.

## 9 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. 9.1, for body SAR testing, the liquid height from the center of the flat phantom to liquid top surface is larger than 15 cm, which is shown in Fig. 9.2.



The relative permittivity and conductivity of the tissue material should be within  $\pm 5\%$  of the values given in the table below recommended by the FCC OET 65 supplement C and RSS 102 Issue 5.

Target Frequency (MHz)	$\epsilon_r$	$\sigma$ (S/m)
150	52.3	0.76
300	45.3	0.87
450	43.5	0.87
835	41.5	0.90
900	41.5	0.97
915	41.5	0.98
1450	40.5	1.20
1610	40.3	1.29
1800-2000	40.0	1.40
2450	39.2	1.80
3000	38.5	2.40
5800	35.3	5.27

(  $\epsilon_r$  = relative permittivity,  $\sigma$  = conductivity and  $\rho = 1000 \text{ kg/m}^3$  )

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

The following table shows the measuring results for simulating liquid.

Frequency (MHz)	Liquid Temp. (°C)	Conductivity ( $\sigma$ )	Permittivity ( $\epsilon_r$ )	Conductivity Target( $\sigma$ )	Permittivity Target( $\epsilon_r$ )	Delta ( $\sigma$ )%	Delta ( $\epsilon_r$ )%	Limit (%)	Date (mm/dd/yy)
750	22.4	0.90	40.48	0.89	41.90	1.12	-3.39	±5	08.02.2022
835	22.4	0.92	40.27	0.90	41.50	2.22	-2.96	±5	08.02.2022
1750	22.4	1.36	38.95	1.37	40.10	-0.73	-2.87	±5	08.05.2022
1900	22.4	1.37	38.77	1.40	40.00	-2.14	-3.07	±5	08.05.2022
2450	22.7	1.79	37.99	1.80	39.20	-0.56	-3.09	±5	08.07.2022
2600	22.7	1.91	37.61	1.96	39.00	-2.55	-3.56	±5	08.07.2022

## 10 SAR System Verification

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

### ➤ 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:

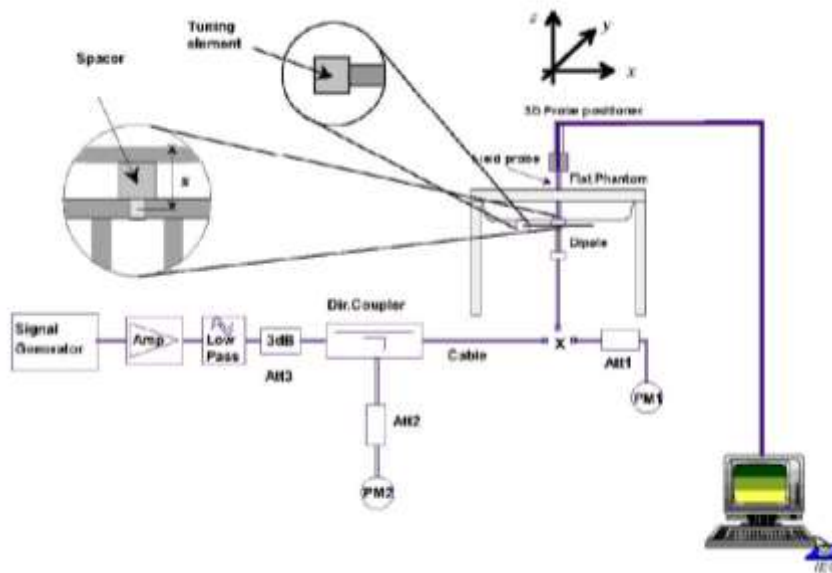


Fig.10.1 System Verification Setup Diagram

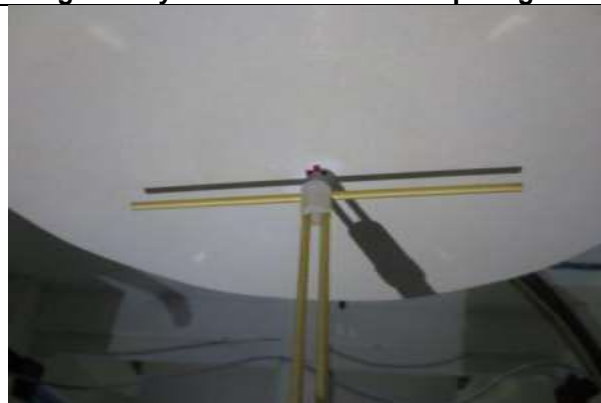


Fig.10.2 Photo of Dipole setup

➤

➤ **System Verification Results**

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10%. The table as below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix C of this report.

Date (mm/dd/yy)	Frequency (MHz)	Power fed onto dipole (mW)	Measured 1g SAR (W/kg)	Normalized to 1W 1g SAR (W/kg)	1W Target 1g SAR (W/kg)	Deviation (%)
08.02.2022	750	80	0.688	8.60	8.37	2.75
08.02.2022	835	80	0.775	9.69	9.49	2.11
08.05.2022	1750	40	1.490	37.25	36.4	2.34
08.05.2022	1900	40	1.620	40.50	39.4	2.79
08.07.2022	2450	40	2.170	54.25	52.6	3.14
08.07.2022	2600	40	2.310	57.75	56.3	2.58

## 11 EUT Testing Position

This EUT was tested in ten different positions. They are right cheek/right tilted/left cheek/left tilted for head, Front/Back/Right Side/Top Side/Bottom Side of the EUT with phantom 10 mm gap, as illustrated below, please refer to Appendix B for the test setup photos.

### 11.1 Handset Reference Points

- The vertical centreline passes through two points on the front side of the handset – the midpoint of the width  $w_t$  of the handset at the level of the acoustic output, and the midpoint of the width  $w_b$  of the bottom of the handset.
- The horizontal line is perpendicular to the vertical centreline and passes the center of the acoustic output. The horizontal line is also tangential to 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 centreline is not necessarily parallel to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.



Fig.11.1 Illustration for Front, Back and Side of SAM Phantom

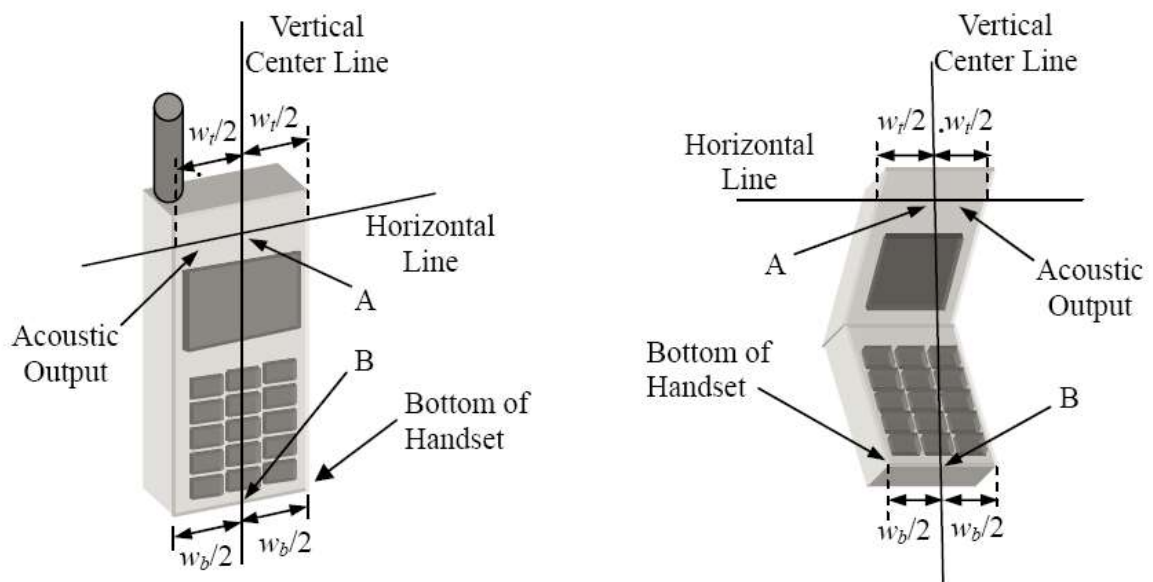


Fig. 11.2 Illustration for Handset Vertical and Horizontal Reference Lines

**11.2 Positioning for Cheek / Touch**

- 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.
- To move the device towards the phantom with the ear piece aligned with the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the phone until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost (see below figure)



Fig. 11.3 Illustration for Cheek Position

**11.3 Positioning for Ear / 15° Tilt**

- To position the device in the “cheek” position described above.
- 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 figure below).



Fig.11.4 Illustration for Tilted Position



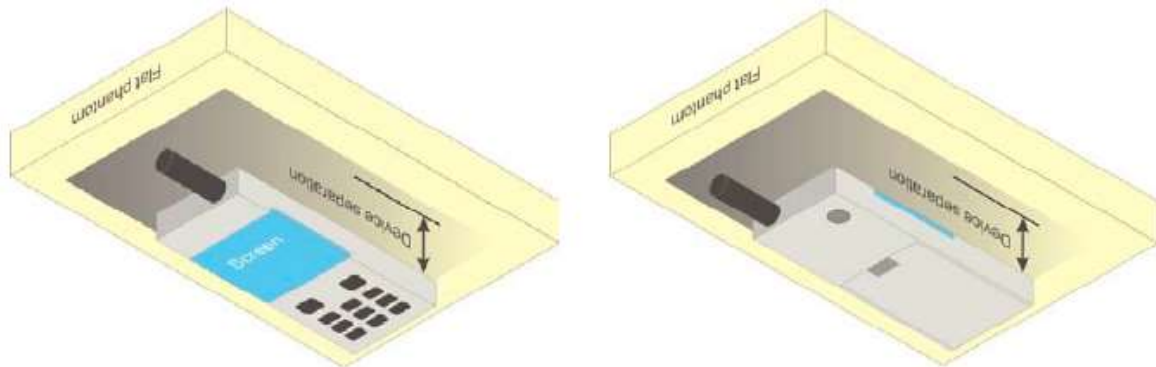
**11.4 SAR Evaluations near the Mouth/Jaw Regions of the SAM Phantom**

Antennas located near the bottom of a phone may require SAR measurements around the mouth and jaw regions of the SAM head phantom. This typically applies to clam-shell style phones that are generally longer in the unfolded normal use positions or to certain older style long rectangular phones.

Under these circumstances, the following procedures apply, adopted from the FCC guidance on SAR handsets document FCC KDB Publication 648474 D04v01r03. The SAR required in these regions of SAM should be measured using a flat phantom. The phone should be positioned with a separation distance of 4 mm between the ear reference point (ERP) and the outer surface of the flat phantom shell. While maintaining this distance at the ERP location, the low (bottom) edge of the phone should be lowered from the phantom to establish the same separation distance between the peak SAR locations identified by the truncated partial SAR distribution measured with the SAM phantom. The distance from the peak SAR location to the phone is determined by the straight line passing perpendicularly through the phantom surface. When it is not feasible to maintain 4 mm separation at the ERP while also establishing the required separation at the peak SAR location, the top edge of the phone will be allowed to touch the phantom with a separation < 4 mm at the ERP. The phone should not be tilted to the left or right while placed in this inclined position to the flat phantom.

**11.5 Body Worn Accessory Configurations**

- To position the device parallel to the phantom surface with either keypad up or down.
- To adjust the device parallel to the flat phantom.
- To adjust the distance between the device surface and the flat phantom to 10 mm or holster surface and the flat phantom to 0 mm.



**Fig.11.5 Illustration for Body Worn Position**

## 12 Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

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

<Conducted power measurement>

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

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

- Power reference measurement
- Area scan
- Zoom scan
- Power drift measurement

### 12.1 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 10 g 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 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

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

## 12.2 Power Reference Measurement

The Power Reference Measurement and Power Drift Measurement 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.

## 12.3 Area & Zoom Scan Procedures

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10g. Area scan and zoom scan resolution setting follows KDB 865664 D01v01r04 quoted below.

		$\leq 3$ GHz	$> 3$ GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		$5 \pm 1$ 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		$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: $\Delta x_{Area}$ , $\Delta y_{Area}$		$\leq 2$ GHz: $\leq 15$ mm 2 – 3 GHz: $\leq 12$ mm	3 – 4 GHz: $\leq 12$ mm 4 – 6 GHz: $\leq 10$ 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 $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: $\Delta x_{Zoom}$ , $\Delta y_{Zoom}$		$\leq 2$ 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
		$\Delta z_{Zoom}(n>1)$ : 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 <u>reported</u> SAR from the <u>area scan based 1-g SAR estimation</u> 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.			

## **12.4 Volume Scan Procedures**

The volume scan is used to 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 remains in the same test position for all measurements and all volume scans use the same spatial resolution and grid spacing. When all volume scans are completed, the software, SEMCAD post-processor scans combine and subsequently superpose these measurement data to calculate the multiband SAR.

## **12.5 SAR Averaged Methods**

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

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

## **12.6 Power Drift Monitoring**

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

### 13 Conducted RF Output Power

#### 13.1 GSM Conducted Power

Band: GSM 850 Channel	Burst Average Power (dBm)			Frame-Average Power(dBm)		
	128	190	251	128	190	251
Frequency (MHz)	824.2	836.6	848.8	824.2	836.6	848.8
GSM (GMSK, Voice)	33.49	33.65	<b>33.85</b>	24.46	24.62	24.82
GPRS (GMSK, 1 TX slot)	33.60	33.75	33.96	24.57	24.72	24.93
GPRS (GMSK, 2 TX slots)	32.02	32.16	32.45	26.00	26.14	26.43
GPRS (GMSK, 3 TX slots)	32.00	32.14	32.44	27.74	27.88	28.18
GPRS (GMSK, 4 TX slots)	32.00	32.14	<b>32.43</b>	28.99	29.13	<b>29.42</b>

**Remark:**

- The frame-averaged power is linearly reported the maximum burst averaged power over 8 time slots. The calculated method are shown as below:  
The duty cycle "x" of different time slots as below:  
1 TX slot is 1/8, 2 TX slots is 2/8, 3 TX slots is 3/8 and 4 TX slots is 4/8  
Based on the calculation formula:  
Frame-averaged power = Burst averaged power + 10 log (x)  
So,  
Frame-averaged power (1 TX slot) = Burst averaged power (1 TX slot)– 9.03  
Frame-averaged power (2 TX slots) = Burst averaged power (2 TX slots)– 6.02  
Frame-averaged power (3 TX slots) = Burst averaged power (3 TX slots)– 4.26  
Frame-averaged power (4 TX slots) = Burst averaged power (4 TX slots) – 3.01
- CS1 coding scheme was used in GPRS conducted power measurements and SAR testing, MCS5 coding scheme was used in EGPRS conducted power measurements and SAR testing (if necessary).

**Note:**

- For Head SAR testing, GSM Voice mode should be evaluated, therefore the EUT was set in GSM 850 Voice mode.
- For Body worn SAR testing and Hotspot mode SAR testing, GPRS and EGPRS mode should be evaluated, therefore the EUT was set in GPRS 4 TX slots mode due to the highest frame-averaged power.
- For GPRS multi time slots SAR measurement, when the measured maximum output power levels are within 0.25 dB of each other, test the configuration with the most number of time slots.
- Per KDB447498 D04v01, the maximum output power channel is used for SAR testing and for further SAR test reduction.

Band: PCS 1900	Burst Average Power (dBm)			Frame-Average Power(dBm)		
Channel	512	661	810	512	661	810
Frequency (MHz)	1850.2	1880.0	1909.8	1850.2	1880.0	1909.8
GSM (GMSK, Voice)	30.37	<b>30.80</b>	30.78	21.34	21.77	21.75
GPRS (GMSK, 1 TX slot)	30.39	30.80	30.75	21.36	21.77	21.72
GPRS (GMSK, 2 TX slots)	29.37	29.97	30.01	23.35	23.95	23.99
GPRS (GMSK, 3 TX slots)	27.22	28.01	28.05	22.96	23.75	23.79
GPRS (GMSK, 4 TX slots)	26.20	27.02	<b>27.07</b>	23.19	24.01	<b>24.06</b>

**Remark:**

- The frame-averaged power is linearly reported the maximum burst averaged power over 8 time slots. The calculated method are shown as below:  
 The duty cycle “x” of different time slots as below:  
 1 TX slot is 1/8, 2 TX slots is 2/8, 3 TX slots is 3/8 and 4 TX slots is 4/8  
 Based on the calculation formula:  
 Frame-averaged power = Burst averaged power + 10 log (x)  
 So,  
 Frame-averaged power (1 TX slot) = Burst averaged power (1 TX slot)– 9.03  
 Frame-averaged power (2 TX slots) = Burst averaged power (2 TX slots)– 6.02  
 Frame-averaged power (3 TX slots) = Burst averaged power (3 TX slots)– 4.26  
 Frame-averaged power (4 TX slots) = Burst averaged power (4 TX slots) – 3.01
- CS1 coding scheme was used in GPRS conducted power measurements and SAR testing, MCS5 coding scheme was used in EGPRS conducted power measurements and SAR testing (if necessary).

**Note:**

- For Head SAR testing, GSM Voice mode should be evaluated, therefore the EUT was set in GSM 1900 Voice mode.
- For Body worn SAR testing and Hotspot mode SAR testing, GPRS and EGPRS mode should be evaluated, therefore the EUT was set in GPRS 4 TX slots mode due to the highest frame-averaged power.
- Per KDB447498 D04v01, the maximum output power channel is used for SAR testing and for further SAR test reduction.

### 13.2 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 Rohde & Schwarz CMU200 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 1

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

Note 1:  $\Delta_{ACK}, \Delta_{NACK}$  and  $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$   
 Note 2: CM = 1 for  $\beta_c/\beta_d = 12/15, \beta_{hs}/\beta_c = 24/15$ .  
 Note 3: 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 signaled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 11/15$  and  $\beta_d = 15/15$ .

#### HSDPA Sub-test setup configuration

**HSUPA Setup Configuration:**

- a. The EUT was connected to Base Station Rohde & Schwarz CMU200 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-TFCI
  - viii. Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI
- d. The transmitted maximum output power was recorded.

**Table 2**

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{hs}^{(1)}$	$\beta_{ec}$	$\beta_{ed}$	$\beta_{ed}$ (SF)	$\beta_{ed}$ (codes)	CM <sup>(2)</sup> (dB)	MPR (dB)	AG <sup>(4)</sup> Index	E-TFCI
1	11/15 <sup>(3)</sup>	15/15 <sup>(3)</sup>	64	11/15 <sup>(3)</sup>	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed1}: 47/15$ $\beta_{ed2}: 47/15$	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 <sup>(4)</sup>	15/15 <sup>(4)</sup>	64	15/15 <sup>(4)</sup>	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1:  $\Delta_{ACK}, \Delta_{NACK}$  and  $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$ .

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 signaled 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 signaled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 14/15$  and  $\beta_d = 15/15$ .

Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.

Note 6:  $\beta_{ed}$  cannot be set directly; it is set by Absolute Grant Value.

**HSUPA Sub-test setup configuration**



**WCDMA Conducted Power:**

WCDMA Average power (dBm)			
Band	WCDMA Band II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
AMR 12.2 kbps	23.99	23.97	23.69
RMC 12.2 kbps	23.94	<b>23.99</b>	23.64
HSDPA Sub-test 1	23.99	24.03	23.73
HSDPA Sub-test 2	23.46	23.43	23.14
HSDPA Sub-test 3	23.45	23.45	23.15
HSDPA Sub-test 4	23.42	23.47	23.23
HSUPA Sub-test 1	21.95	21.98	21.66
HSUPA Sub-test 2	22.45	22.49	22.18
HSUPA Sub-test 3	22.98	22.98	22.70
HSUPA Sub-test 4	21.97	22.02	21.69
HSUPA Sub-test 5	23.93	23.95	23.68

WCDMA Average power (dBm)			
Band	WCDMA Band IV		
Channel	1312	1413	1513
Frequency (MHz)	1712.4	1732.6	1752.6
AMR 12.2 kbps	23.12	22.84	22.98
RMC 12.2 kbps	<b>23.21</b>	22.96	23.04
HSDPA Sub-test 1	23.28	22.77	22.98
HSDPA Sub-test 2	22.71	22.38	22.54
HSDPA Sub-test 3	22.73	22.43	22.59
HSDPA Sub-test 4	22.70	22.42	22.55
HSUPA Sub-test 1	21.23	20.96	21.05
HSUPA Sub-test 2	21.74	21.43	21.53
HSUPA Sub-test 3	22.25	21.93	22.03
HSUPA Sub-test 4	21.26	20.95	21.08
HSUPA Sub-test 5	23.25	22.97	23.05

WCDMA Average power (dBm)			
Band	WCDMA Band V		
Channel	4132	4183	4233
Frequency (MHz)	826.4	836.6	846.6
AMR 12.2 kbps	23.18	23.33	23.06
RMC 12.2 kbps	23.20	<b>23.37</b>	23.12
HSDPA Sub-test 1	23.32	23.37	23.19
HSDPA Sub-test 2	22.75	22.84	22.63
HSDPA Sub-test 3	22.83	22.86	22.67
HSDPA Sub-test 4	22.78	22.87	22.65
HSUPA Sub-test 1	21.26	21.39	21.17
HSUPA Sub-test 2	21.79	21.91	21.67
HSUPA Sub-test 3	22.28	22.39	22.21
HSUPA Sub-test 4	21.33	21.41	21.19
HSUPA Sub-test 5	23.30	23.41	23.21

**Note:**

1. Applying the subtest setup in Table C.11.1.3 of 3GPP TS 34.121-1
2. Per KDB 941225 D01, RMC 12.2kbps mode is used to evaluate SAR due the highest output power. If AMR 12.2 kbps power is < 0.25dB higher than RMC 12.2kbps, SAR tests with AMR 12.2 kbps can be excluded.
3. AMR, HSDPA RF power will not be larger than RMC 12.2kbps, detailed information is included in Tune-up Procure exhibit.

## 13.3 LTE Conducted Power

### 13.3.1 Largest channel bandwidth standalone SAR test requirements

#### QPSK with 1 RB allocation

Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is  $\leq 0.8$  W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel.<sup>8</sup> When the reported SAR of a required test channel is  $> 1.45$  W/kg, SAR is required for all three RB offset configurations for that required test channel.

#### QPSK with 50% RB allocation

The procedures required for 1 RB allocation in section 4.2.1 are applied to measure the SAR for QPSK with 50% RB allocation.<sup>9</sup>

#### QPSK with 100% RB allocation

For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation in sections 4.2.1 and 4.2.2 are  $\leq 0.8$  W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is  $> 1.45$  W/kg, the remaining required test channels must also be tested.

#### Higher order modulations

For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in sections 4.2.1, 5.2.2 and 4.2.3 to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is  $> \frac{1}{2}$  dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is  $> 1.45$  W/kg.

### 13.3.2 Other channel bandwidth standalone SAR test requirements

For the other channel bandwidths used by the device in a frequency band, apply all the procedures required for the largest channel bandwidth in section 4.2 to determine the channels and RB configurations that need SAR testing and only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is  $> \frac{1}{2}$  dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is  $> 1.45$  W/kg. The equivalent channel configuration for the RB allocation, RB offset and modulation etc. is determined for the smaller channel bandwidth according to the same number of RB allocated in the largest channel bandwidth. For example, 50 RB in 10 MHz channel bandwidth does not apply to 5 MHz channel bandwidth; therefore, this cannot be tested in the smaller channel bandwidth. However, 50% RB allocation in 10 MHz channel bandwidth is equivalent to 100% RB allocation in 5 MHz channel bandwidth; therefore, these are the equivalent configurations to be compared to determine the specific channel and configuration in the smaller channel bandwidth that need SAR testing.

### 13.3.3 TDD LTE configuration setup for SAR measurement

According to KDB 941225 D05v02r03 and April 2013 TCB workshop slides, SAR must be tested with a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by 3GPP.

- see 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations
- “special subframe S” contains both uplink and downlink transmissions and must be taken into consideration to determine the transmission duty factor
  - according to the worst case uplink and downlink cyclic prefix requirements for UpPTS to determine the highest SAR test duty factor

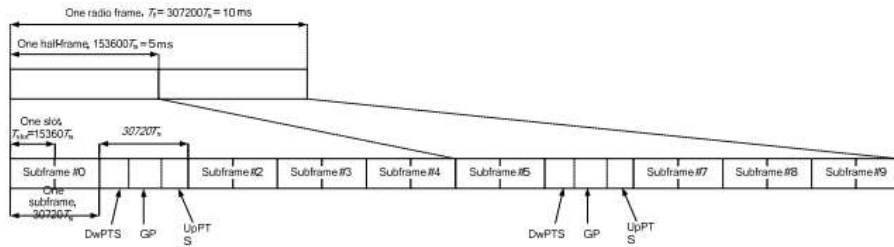


Figure 4.2-1: Frame structure type 2 (for 5 ms switch-point periodicity)

Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS)

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink				
	DwPTS	UpPTS		DwPTS	UpPTS			
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		
0	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$		
1	$19760 \cdot T_s$			$20480 \cdot T_s$				
2	$21952 \cdot T_s$			$23040 \cdot T_s$				
3	$24144 \cdot T_s$			$25600 \cdot T_s$				
4	$26336 \cdot T_s$			$7680 \cdot T_s$				
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$		
6	$19760 \cdot T_s$			$23040 \cdot T_s$				
7	$21952 \cdot T_s$			$12800 \cdot T_s$				
8	$24144 \cdot T_s$			-			-	-
9	$13168 \cdot T_s$			-			-	-

Per 3GPP 36.211 section 4.2, each radio frame of length  $T_f=37200 \cdot T_s = 10$  ms consists of two half-frames of length  $153600 \cdot T_s = 5$ ms each. Each half-frame consists of five subframes of length  $30720 \cdot T_s = 1$ ms. So, the uplink duty factor in special subframe as below:

Special Subframe configuration	Normal cyclic prefix in downlink		Extended cyclic prefix in downlink	
	Duty factor of Uplink		Duty factor of Uplink	
	Normal cyclic prefix in uplink	Extended cyclic prefix in uplink	Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	7.14%	8.33%	7.14%	8.33%
1	7.14%	8.33%	7.14%	8.33%
2	7.14%	8.33%	7.14%	8.33%
3	7.14%	8.33%	7.14%	8.33%
4	7.14%	8.33%	14.27%	16.67%
5	14.27%	16.67%	14.27%	16.67%
6	14.27%	16.67%	14.27%	16.67%
7	14.27%	16.67%	14.27%	16.67%
8	14.27%	16.67%	/	/
9	14.27%	16.67%	/	/

Table 4.2-2: Uplink-downlink configurations

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

According to above table:

1. The highest duty factor is configuration 0;
2. The duty factor of uplink in one half-frame with normal cyclic prefix is:  $(3\text{ms} + 0.143\text{ms})/5\text{ms}=62.86\%$ ;
3. The duty factor of uplink in one half-frame with extended cyclic prefix is:  $(3\text{ms} + 0.167\text{ms})/5\text{ms}=63.34\%$ ;
4. For purpose to get the worst case SAR test duty factor, the duty factor of normal cyclic prefix in uplink scaled-up to the extended cyclic prefix in uplink, the scaling factor is  $63.34\%/62.86\%=1.008$ , and the scaling factor will be taken into the final measured SAR.

**LTE Band 2 part:**

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					18607	18900	19193
					1850.7MHz	1880.0MHz	1909.3MHz
Band 2	1.4	QPSK	1	0	23.80	23.83	23.53
			1	2	23.97	23.91	23.58
			1	5	23.80	23.79	23.50
			3	0	23.83	23.94	23.56
			3	1	23.83	23.90	23.54
			3	2	23.81	23.90	23.54
			6	0	22.84	22.87	22.60
		16QAM	1	0	22.59	22.86	22.62
			1	2	22.92	23.04	22.63
			1	5	22.67	22.89	22.55
			3	0	22.62	22.84	22.46
			3	1	22.68	22.80	22.46
			3	2	22.66	22.83	22.45
			6	0	21.81	21.90	21.45

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					18615	18900	19185
					1851.5MHz	1880.0MHz	1908.5MHz
Band 2	3	QPSK	1	0	23.80	23.98	23.71
			1	7	23.87	23.89	23.72
			1	14	23.93	23.83	23.65
			8	0	22.86	22.94	22.66
			8	4	22.85	22.94	22.66
			8	7	22.95	22.83	22.64
			15	0	22.84	22.83	22.64
		16QAM	1	0	22.98	23.08	22.54
			1	7	22.96	23.00	22.52
			1	14	22.97	22.99	22.45
			8	0	21.86	21.90	21.68
			8	4	21.88	21.90	21.69
			8	7	21.92	21.87	21.65
			15	0	21.83	21.77	21.56

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					18625	18900	19175
					1852.5MHz	1880.0MHz	1907.5MHz
Band 2	5	QPSK	1	0	23.76	23.91	23.69
			1	12	24.00	23.95	23.75
			1	24	23.92	23.76	23.56
			12	0	22.81	22.88	22.65
			12	6	22.81	22.93	22.69
			12	11	22.79	22.93	22.58
			25	0	22.93	22.92	22.64
		16QAM	1	0	22.72	23.01	22.67
			1	12	22.94	23.14	22.73
			1	24	22.91	22.93	22.51
			12	0	21.80	21.97	21.69
			12	6	21.74	21.99	21.68
			12	11	21.78	21.97	21.70
			25	0	21.92	21.88	21.73

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					18650	18900	19150
					1855.0MHz	1880.0MHz	1905.0MHz
Band 2	10	QPSK	1	0	23.72	24.02	23.65
			1	24	24.03	24.02	23.80
			1	49	23.99	23.73	23.60
			25	0	22.87	23.01	22.80
			25	12	22.85	23.00	22.79
			25	24	22.87	23.01	22.81
			50	0	22.98	22.96	22.77
		16QAM	1	0	22.86	23.11	22.53
			1	24	23.10	22.89	22.72
			1	49	23.06	22.86	22.49
			25	0	21.82	22.04	21.84
			25	12	21.77	22.04	21.84
			25	24	21.82	22.01	21.83
			50	0	21.91	21.96	21.79

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					18675	18900	19125
					1857.5MHz	1880.0MHz	1902.5MHz
Band 2	15	QPSK	1	0	23.71	24.04	23.55
			1	37	23.96	23.88	23.73
			1	74	23.96	23.61	23.55
			36	0	22.96	23.08	22.83
			36	16	22.93	23.14	22.85
			36	35	22.95	23.11	22.84
			75	0	23.07	23.02	22.80
		16QAM	1	0	22.84	23.18	22.41
			1	37	23.07	23.14	22.65
			1	74	23.07	22.86	22.44
			36	0	21.89	22.14	21.76
			36	16	21.86	22.12	21.76
			36	35	21.85	22.12	21.70
			75	0	21.96	21.92	21.75

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					18700	18900	19100
					1860.0MHz	1880.0MHz	1900.0MHz
Band 2	20	QPSK	1	0	23.66	23.96	23.29
			1	49	24.23	24.02	23.72
			1	99	23.90	23.50	23.35
			50	0	22.80	23.09	22.70
			50	24	22.83	23.08	22.70
			50	49	22.83	23.07	22.67
			100	0	22.91	22.91	22.67
		16QAM	1	0	22.59	23.00	22.34
			1	49	23.15	23.09	22.74
			1	99	22.83	22.60	22.41
			50	0	21.74	22.03	21.70
			50	24	21.76	22.01	21.73
			50	49	21.75	22.05	21.74
			100	0	21.89	21.91	21.66

LTE Band 5 part:

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20407	20525	20643
					824.7MHz	836.5MHz	848.3MHz
Band 5	1.4	QPSK	1	0	22.93	23.16	23.09
			1	2	23.09	23.25	23.15
			1	5	22.91	23.12	23.09
			3	0	23.01	23.21	23.12
			3	1	23.00	23.20	23.17
			3	2	23.00	23.21	23.17
			6	0	21.92	22.13	22.14
		16QAM	1	0	22.02	22.30	21.97
			1	2	22.19	22.49	22.18
			1	5	22.07	22.27	21.94
			3	0	21.93	22.18	22.02
			3	1	21.94	22.20	22.10
			3	2	21.92	22.17	22.08
			6	0	20.97	20.99	21.14

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20415	20525	20635
					825.5MHz	836.5MHz	847.5MHz
Band 5	3	QPSK	1	0	22.90	23.13	23.14
			1	7	22.96	23.16	23.13
			1	14	23.02	23.17	23.09
			8	0	21.96	22.10	22.16
			8	4	21.99	22.13	22.15
			8	7	21.97	22.19	22.11
			15	0	21.93	22.13	22.13
		16QAM	1	0	22.14	22.36	22.00
			1	7	22.12	22.34	22.03
			1	14	22.16	22.31	22.02
			8	0	21.02	21.13	21.20
			8	4	21.00	21.18	21.20
			8	7	21.01	21.20	21.16
			15	0	21.00	21.12	21.09



LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20425	20525	20625
					826.5MHz	836.5MHz	846.5MHz
Band 5	5	QPSK	1	0	22.89	23.10	23.10
			1	12	23.09	23.22	23.21
			1	24	23.00	23.13	23.09
			12	0	22.00	22.12	22.13
			12	6	21.98	22.11	22.12
			12	11	21.99	22.13	22.10
			25	0	21.99	22.27	22.14
		16QAM	1	0	21.91	22.32	22.11
			1	12	22.15	22.40	22.25
			1	24	22.04	22.36	22.13
			12	0	21.05	21.21	21.14
			12	6	21.03	21.16	21.18
			12	11	21.05	21.17	21.13
			25	0	21.03	21.26	21.21

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20450	20525	20600
					829MHz	836.5MHz	844MHz
Band 5	10	QPSK	1	0	22.87	23.05	23.12
			1	24	23.13	23.24	23.27
			1	49	23.05	23.10	23.05
			25	0	22.17	22.22	22.16
			25	12	22.13	22.18	22.16
			25	24	22.17	22.19	22.16
			50	0	22.11	22.27	22.17
		16QAM	1	0	22.07	22.26	22.05
			1	24	22.29	22.45	22.16
			1	49	22.20	22.34	22.01
			25	0	21.20	21.21	21.20
			25	12	21.14	21.21	21.21
			25	24	21.18	21.20	21.21
			50	0	21.12	21.32	21.15

**LTE Band 7 part:**

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20775	21100	21425
					2502.5MHz	2535MHz	2567.5MHz
Band 7	5	QPSK	1	0	24.03	23.84	23.55
			1	12	24.23	24.01	23.61
			1	24	24.09	23.86	23.45
			12	0	23.11	22.91	22.59
			12	6	23.15	22.95	22.56
			12	11	23.11	22.94	22.58
			25	0	23.17	22.96	22.58
		16QAM	1	0	23.02	23.02	22.52
			1	12	23.19	23.18	22.61
			1	24	23.08	23.04	22.43
			12	0	22.10	21.95	21.56
			12	6	22.10	21.92	21.55
			12	11	22.10	21.94	21.56
			25	0	22.19	21.96	21.54

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20800	21100	21400
					2505MHz	2535MHz	2565MHz
Band 7	10	QPSK	1	0	23.64	23.69	23.61
			1	24	23.68	23.94	23.66
			1	49	23.57	23.89	23.42
			25	0	22.66	23.04	22.63
			25	12	22.67	23.06	22.63
			25	24	22.68	23.06	22.68
			50	0	22.70	23.01	22.61
		16QAM	1	0	22.71	22.89	22.54
			1	24	22.96	23.08	22.59
			1	49	22.72	22.96	22.34
			25	0	21.59	22.04	21.66
			25	12	21.59	22.06	21.64
			25	24	21.59	22.03	21.67
			50	0	21.65	22.01	21.55

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20825	21100	21375
					2507.5MHz	2535MHz	2562.5MHz
Band 7	15	QPSK	1	0	23.98	23.91	23.64
			1	37	24.16	23.99	23.62
			1	74	24.01	23.78	23.38
			36	0	23.20	23.10	22.85
			36	16	23.21	23.10	22.81
			36	35	23.25	23.12	22.80
			75	0	23.22	23.12	22.77
		16QAM	1	0	23.14	23.07	22.55
			1	37	23.29	23.17	22.51
			1	74	23.08	23.04	22.28
			36	0	22.13	22.10	21.72
			36	16	22.17	22.08	21.72
			36	35	22.13	22.07	21.71
			75	0	22.18	22.00	21.69

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20850	21100	21350
					2510MHz	2535MHz	2560MHz
Band 7	20	QPSK	1	0	23.78	23.72	23.42
			1	49	24.11	24.14	23.70
			1	99	23.56	23.70	23.07
			50	0	22.92	22.99	22.82
			50	24	22.94	22.98	22.80
			50	49	23.03	22.99	22.75
			100	0	22.88	22.96	22.62
		16QAM	1	0	22.56	22.86	22.57
			1	49	22.75	23.16	22.76
			1	99	22.42	22.85	21.97
			50	0	21.97	21.94	21.80
			50	24	21.65	22.00	21.81
			50	49	21.94	21.95	21.82
			100	0	21.76	21.95	21.62

LTE Band 12 part:

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					23017	23095	23175
					699.7MHz	707.5MHz	715.3MHz
Band 12	1.4	QPSK	1	0	23.15	23.25	23.18
			1	2	23.27	23.32	23.27
			1	5	23.16	23.24	23.16
			3	0	23.19	23.28	23.23
			3	1	23.19	23.32	23.23
			3	2	23.19	23.33	23.20
			6	0	22.21	22.31	22.24
		16QAM	1	0	22.26	22.40	22.03
			1	2	22.43	22.47	22.24
			1	5	22.33	22.36	22.01
			3	0	22.12	22.22	22.04
			3	1	22.07	22.24	22.00
			3	2	22.13	22.24	22.05
			6	0	21.28	21.24	21.29

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					23025	23095	23165
					700.5MHz	707.5MHz	714.5MHz
Band 12	3	QPSK	1	0	23.11	23.21	23.28
			1	7	23.18	23.30	23.19
			1	14	23.18	23.32	23.24
			8	0	22.12	22.28	22.29
			8	4	22.14	22.24	22.31
			8	7	22.23	22.24	22.20
			15	0	22.17	22.26	22.19
		16QAM	1	0	22.28	22.41	22.11
			1	7	22.31	22.40	22.11
			1	14	22.28	22.37	22.11
			8	0	21.22	21.30	21.28
			8	4	21.23	21.31	21.33
			8	7	21.32	21.31	21.26
			15	0	21.24	21.27	21.19

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					23035	23095	23155
					701.5MHz	707.5MHz	713.5MHz
Band 12	5	QPSK	1	0	23.14	23.21	23.23
			1	12	23.27	23.38	23.34
			1	24	23.19	23.26	23.18
			12	0	22.11	22.22	22.27
			12	6	22.10	22.22	22.30
			12	11	22.09	22.25	22.26
			25	0	22.18	22.28	22.27
		16QAM	1	0	22.12	22.39	22.19
			1	12	22.22	22.51	22.33
			1	24	22.18	22.39	22.14
			12	0	21.18	21.40	21.38
			12	6	21.17	21.36	21.34
			12	11	21.16	21.39	21.36
			25	0	21.26	21.30	21.28

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					23060	23095	23130
					704MHz	707.5MHz	711MHz
Band 12	10	QPSK	1	0	23.12	23.17	23.26
			1	24	23.26	23.31	23.41
			1	49	23.26	23.25	23.22
			25	0	22.18	22.28	22.41
			25	12	22.20	22.33	22.41
			25	24	22.20	22.31	22.42
			50	0	22.20	22.31	22.31
		16QAM	1	0	22.29	22.31	22.12
			1	24	22.57	22.52	22.27
			1	49	22.45	22.38	22.07
			25	0	21.24	21.35	21.49
			25	12	21.19	21.35	21.51
			25	24	21.19	21.34	21.51
			50	0	21.24	21.36	21.32

LTE Band 13 part:

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					23205	23230	23255
					779.5MHz	782MHz	784.5MHz
Band 13	5	QPSK	1	0	23.15	23.22	22.17
			1	12	23.24	23.36	22.40
			1	24	23.27	23.33	22.23
			12	0	21.99	22.23	21.33
			12	6	22.01	22.23	21.33
			12	11	22.00	22.22	21.27
			25	0	22.14	22.38	21.38
		16QAM	1	0	23.18	22.00	22.44
			1	12	23.38	22.20	22.57
			1	24	23.26	22.27	22.52
			12	0	22.34	20.96	21.31
			12	6	22.28	20.96	21.30
			12	11	22.29	20.96	21.31
			25	0	22.30	21.16	21.31

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
						23230	
						782MHz	
Band 13	10	QPSK	1	0		23.05	
			1	24		23.27	
			1	49		23.17	
			25	0		22.14	
			25	12		22.13	
			25	24		22.14	
			50	0		22.24	
		16QAM	1	0		22.11	
			1	24		22.41	
			1	49		22.37	
			25	0		21.15	
			25	12		21.11	
			25	24		21.11	
			50	0		21.25	

**LTE Band 66 part:**

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					131979	132322	132665
					1710.70MHz	1745.00MHz	1779.3MHz
Band 66	1.4	QPSK	1	0	22.95	22.86	22.54
			1	2	23.11	23.00	22.74
			1	5	22.91	22.85	22.57
			3	0	23.00	22.94	22.66
			3	1	23.04	22.92	22.65
			3	2	22.99	22.95	22.61
			6	0	22.01	21.99	21.66
		16QAM	1	0	22.02	22.04	21.49
			1	2	22.17	22.14	21.67
			1	5	22.02	21.95	21.49
			3	0	21.96	21.91	21.52
			3	1	21.95	21.89	21.49
			3	2	21.94	21.91	21.51
			6	0	21.06	20.84	20.61

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					131987	132322	132657
					1711.50MHz	1745.00MHz	1778.50MHz
Band 66	3	QPSK	1	0	22.98	22.88	22.60
			1	7	22.94	22.93	22.63
			1	14	22.94	22.88	22.67
			8	0	22.03	21.97	21.66
			8	4	22.01	21.98	21.67
			8	7	22.02	21.94	21.66
			15	0	21.97	21.97	21.62
		16QAM	1	0	22.19	22.13	21.52
			1	7	22.14	22.09	21.54
			1	14	22.07	22.05	21.60
			8	0	21.06	20.99	20.66
			8	4	21.04	20.93	20.62
			8	7	20.99	20.89	20.67
			15	0	20.97	20.83	20.49

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					131997	132322	132647
					1712.50MHz	1745.00MHz	1777.50MHz
Band 66	5	QPSK	1	0	22.97	22.87	22.45
			1	12	23.07	23.01	22.69
			1	24	22.86	22.86	22.61
			12	0	21.97	21.91	21.55
			12	6	21.99	21.92	21.55
			12	11	21.98	21.95	21.55
			25	0	22.00	21.97	21.59
		16QAM	1	0	21.95	22.07	21.45
			1	12	22.07	22.14	21.71
			1	24	21.87	22.10	21.64
			12	0	20.96	20.98	20.61
			12	6	20.91	20.98	20.58
			12	11	20.92	21.01	20.57
			25	0	20.97	20.88	20.65

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					132022	132322	132622
					1715.00MHz	1745.00MHz	1775.00MHz
Band 66	10	QPSK	1	0	22.97	22.81	22.41
			1	24	23.01	23.06	22.67
			1	49	22.80	22.88	22.68
			25	0	22.07	22.00	21.53
			25	12	22.03	21.95	21.49
			25	24	22.02	22.00	21.50
			50	0	21.92	21.97	21.54
		16QAM	1	0	22.14	22.06	21.36
			1	24	22.16	22.22	21.54
			1	49	21.99	22.08	21.55
			25	0	21.01	21.02	20.51
			25	12	21.00	21.00	20.53
			25	24	21.00	20.99	20.52
			50	0	20.91	20.95	20.52



LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					132047	132322	132597
					1717.50MHz	1745.00MHz	1772.50MHz
Band 66	15	QPSK	1	0	22.84	22.77	22.41
			1	37	22.88	22.98	22.52
			1	74	22.65	22.74	22.59
			36	0	21.96	22.02	21.46
			36	16	22.03	21.99	21.40
			36	35	22.03	22.00	21.44
			75	0	21.95	22.02	21.56
		16QAM	1	0	22.06	22.07	21.33
			1	37	22.10	22.28	21.46
			1	74	21.88	21.99	21.48
			36	0	20.99	21.04	20.36
			36	16	20.98	21.06	20.34
			36	35	20.99	21.03	20.30
			75	0	20.88	20.94	20.51

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					132072	132322	132572
					1720.00MHz	1745.00MHz	1770.00MHz
Band 66	20	QPSK	1	0	22.76	22.58	22.18
			1	49	23.01	23.12	22.42
			1	99	22.55	22.54	22.31
			50	0	21.98	21.93	21.45
			50	24	22.03	21.91	21.43
			50	49	21.98	21.93	21.43
			100	0	21.91	21.89	21.53
		16QAM	1	0	21.85	21.80	21.28
			1	49	21.96	22.23	21.54
			1	99	21.56	21.84	21.40
			50	0	20.96	20.93	20.50
			50	24	20.96	20.92	20.50
			50	49	21.04	20.92	20.52
			100	0	20.87	20.86	20.46

### 13.4 Bluetooth Conducted Power

Average Power (dBm)				
Channel	Frequency (MHz)	GFSK	$\pi/4$ -DQPSK	8DPSK
CH 00	2402	<b>2.72</b>	2.07	2.47
CH 39	2441	0.52	0.05	0.33
CH 78	2480	1.43	0.90	1.17

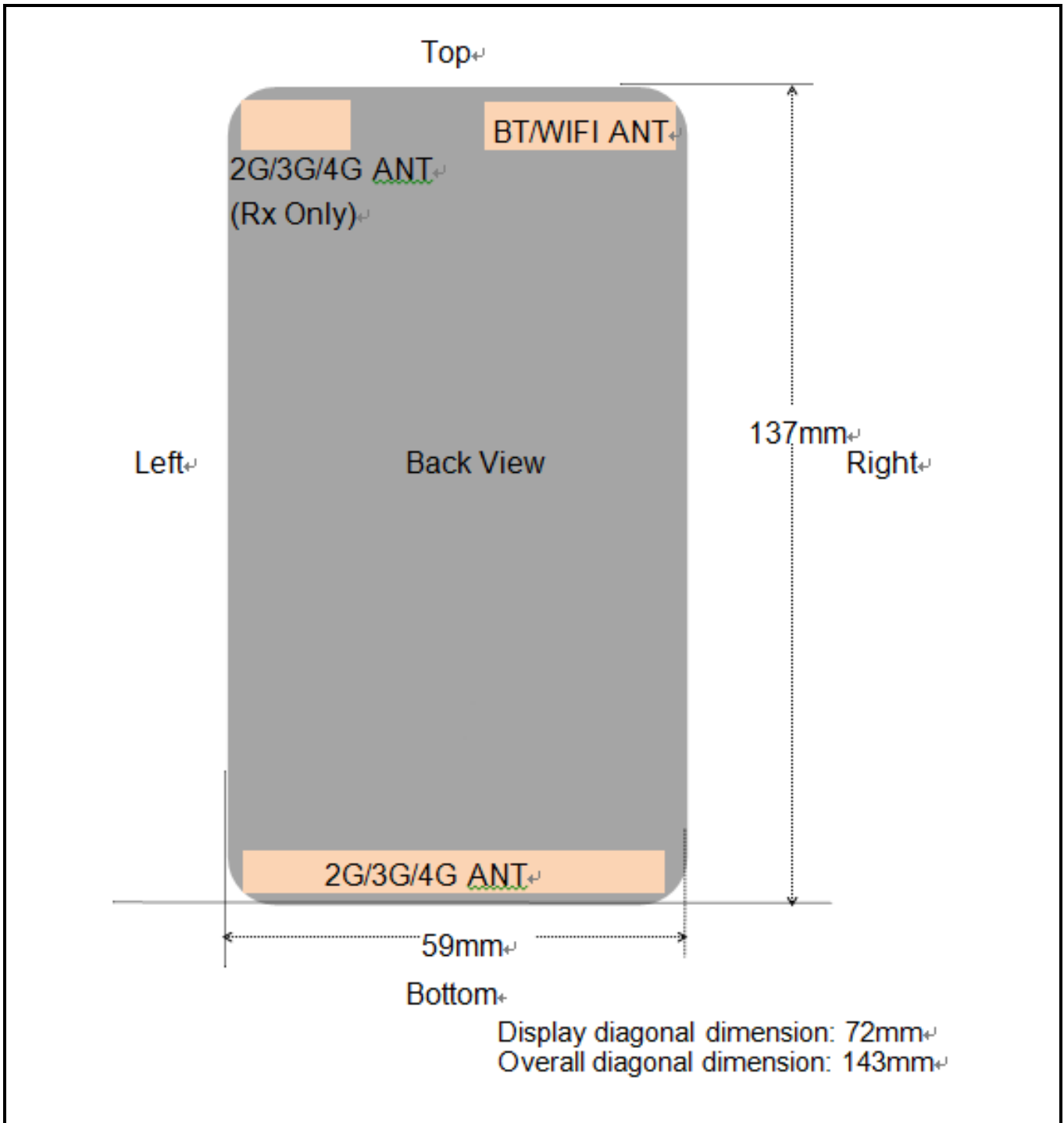
Average Power (dBm)		
Channel	Frequency (MHz)	BLE
CH 00	2402	<b>2.88</b>
CH 20	2442	0.65
CH 39	2480	1.51

**Note:**

1. SAR test of Bluetooth is performed and the mode with highest average power is selected for SAR testing.
2. The output power of all data rate were pre-scan, just the worst case of all mode were shown in report.
3. Per KDB 248227 D01V02r02 section 2.2, when the EUT in continuously transmitting mode, the actual duty cycle is 100%, so the duty cycle factor is 1.

## 14 Exposure Positions Consideration

### 14.1 EUT Antenna Locations



**Fig.14.1 EUT Antenna Locations**

*Note: This antenna diagram is only used as a reference for the distance from the antenna to each edge. For the specific shape of the antenna, please refer to the physical photo.*

## 15 SAR Test Results Summary

### 15.1 Standalone Head SAR Data

#### > GSM Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)
	GSM850/Voice	Right Cheek	251	848.5	33.85	-0.08	34.0	0.532	1.035	0.551
	GSM850/Voice	Right Tilted	251	848.5	33.85	0.11	34.0	0.294	1.035	0.304
1	GSM850/Voice	Left Cheek	251	848.5	33.85	-0.02	34.0	<b>0.566</b>	1.035	0.586
	GSM850/Voice	Left Tilted	251	848.5	33.85	0.15	34.0	0.358	1.035	0.371
2	GSM1900/Voice	Right Cheek	661	1880	30.80	-0.02	31.0	<b>0.162</b>	1.047	0.170
	GSM1900/Voice	Right Tilted	661	1880	30.80	0.03	31.0	0.094	1.047	0.098
	GSM1900/Voice	Left Cheek	661	1880	30.80	0.02	31.0	0.126	1.047	0.132
	GSM1900/Voice	Left Tilted	661	1880	30.80	0.18	31.0	0.072	1.047	0.075
<b>ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population</b>					<b>1.6 W/kg (mW/g) Averaged over 1g</b>					

#### > WCDMA Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)
3	Band II/RMC	Right Cheek	9400	1880	23.99	0.08	24.0	<b>0.248</b>	1.002	0.248
	Band II/RMC	Right Tilted	9400	1880	23.99	-0.18	24.0	0.143	1.002	0.143
	Band II/RMC	Left Cheek	9400	1880	23.99	-0.13	24.0	0.154	1.002	0.154
	Band II/RMC	Left Tilted	9400	1880	23.99	0.07	24.0	0.086	1.002	0.086
4	Band IV/RMC	Right Cheek	1312	1712.4	23.21	0.00	23.5	<b>0.111</b>	1.069	0.119
	Band IV/RMC	Right Tilted	1312	1712.4	23.21	-0.01	23.5	0.061	1.069	0.065
	Band IV/RMC	Left Cheek	1312	1712.4	23.21	0.06	23.5	0.072	1.069	0.077
	Band IV/RMC	Left Tilted	1312	1712.4	23.21	-0.14	23.5	0.039	1.069	0.042
	Band V/RMC	Right Cheek	4183	836.6	23.37	0.19	23.5	0.379	1.03	0.390
	Band V/RMC	Right Tilted	4183	836.6	23.37	0.11	23.5	0.217	1.03	0.224
5	Band V/RMC	Left Cheek	4183	836.6	23.37	-0.18	23.5	<b>0.394</b>	1.03	0.406
	Band V/RMC	Left Tilted	4183	836.6	23.37	-0.12	23.5	0.246	1.03	0.253
<b>ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population</b>					<b>1.6 W/kg (mW/g) Averaged over 1g</b>					

➤ FDD-LTE Band 2(20MHz) QPSK Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)
6	Band2/1RB#49	Right Cheek	18700	1860	24.23	0.19	24.5	<b>0.303</b>	1.064	0.322
	Band2/1RB#49	Right Tilted	18700	1860	24.23	0.04	24.5	0.101	1.064	0.107
	Band2/1RB#49	Left Cheek	18700	1860	24.23	-0.17	24.5	0.165	1.064	0.176
	Band2/1RB#49	Left Tilted	18700	1860	24.23	-0.13	24.5	0.069	1.064	0.073
	Band2/50%RB#0	Right Cheek	18900	1880	23.09	0.15	23.5	0.286	1.099	0.314
	Band2/50%RB#0	Right Tilted	18900	1880	23.09	-0.05	23.5	0.091	1.099	0.100
	Band2/50%RB#0	Left Cheek	18900	1880	23.09	-0.04	23.5	0.155	1.099	0.170
	Band2/50%RB#0	Left Tilted	18900	1880	23.09	-0.17	23.5	0.061	1.099	0.067
<b>ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population</b>							<b>1.6 W/kg (mW/g) Averaged over 1g</b>			

➤ FDD-LTE Band 5(10MHz) QPSK Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)	
	Band5/1RB#24	Right Cheek	20600	844	23.27	0.08	23.5	0.334	1.054	0.352	
	Band5/1RB#24	Right Tilted	20600	844	23.27	0.02	23.5	0.181	1.054	0.191	
	7	Band5/1RB#24	Left Cheek	20600	844	23.27	-0.07	23.5	<b>0.350</b>	1.054	0.369
	Band5/1RB#24	Left Tilted	20600	844	23.27	0.16	23.5	0.198	1.054	0.209	
	Band5/50%RB#0	Right Cheek	20525	836.5	22.27	0.04	22.5	0.321	1.054	0.338	
	Band5/50%RB#0	Right Tilted	20525	836.5	22.27	0.06	22.5	0.164	1.054	0.173	
	Band5/50%RB#0	Left Cheek	20525	836.5	22.27	-0.16	22.5	0.337	1.054	0.355	
	Band5/50%RB#0	Left Tilted	20525	836.5	22.27	-0.16	22.5	0.182	1.054	0.192	
<b>ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population</b>							<b>1.6 W/kg (mW/g) Averaged over 1g</b>				

➤ FDD-LTE Band 7(20MHz) QPSK Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)
8	Band7/1RB#49	Right Cheek	21100	2535	24.14	-0.18	24.5	<b>0.723</b>	1.086	0.785
	Band7/1RB#49	Right Tilted	21100	2535	24.14	-0.13	24.5	0.414	1.086	0.450
	Band7/1RB#49	Left Cheek	21100	2535	24.14	0.07	24.5	0.582	1.086	0.632
	Band7/1RB#49	Left Tilted	21100	2535	24.14	0.02	24.5	0.316	1.086	0.343
	Band7/50%RB#49	Right Cheek	20850	2510	23.03	0.08	23.5	0.689	1.114	0.768
	Band7/50%RB#49	Right Tilted	20850	2510	23.03	-0.18	23.5	0.397	1.114	0.442
	Band7/50%RB#49	Left Cheek	20850	2510	23.03	-0.04	23.5	0.554	1.114	0.617
	Band7/50%RB#49	Left Tilted	20850	2510	23.03	0.16	23.5	0.299	1.114	0.333
<b>ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population</b>							<b>1.6 W/kg (mW/g) Averaged over 1g</b>			

➤ FDD-LTE Band 12(10MHz) QPSK Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)
9	Band12/1RB#24	Right Cheek	23130	711	23.41	0.13	23.5	<b>0.223</b>	1.021	0.228
	Band12/1RB#24	Right Tilted	23130	711	23.41	-0.12	23.5	0.117	1.021	0.119
	Band12/1RB#24	Left Cheek	23130	711	23.41	0.07	23.5	0.220	1.021	0.225
	Band12/1RB#24	Left Tilted	23130	711	23.41	-0.16	23.5	0.114	1.021	0.116
	Band12/50%RB#0	Right Cheek	23095	707.5	22.31	-0.03	22.5	0.211	1.045	0.220
	Band12/50%RB#0	Right Tilted	23095	707.5	22.31	-0.11	22.5	0.104	1.045	0.109
	Band12/50%RB#0	Left Cheek	23095	707.5	22.31	0.02	22.5	0.202	1.045	0.211
	Band12/50%RB#0	Left Tilted	23095	707.5	22.31	0.11	22.5	0.099	1.045	0.103
<b>ANSI / IEEE C95.1 – SAFETY LIMIT</b>							<b>1.6 W/kg (mW/g)</b>			

<b>Spatial Peak Uncontrolled Exposure/General Population</b>	<b>Averaged over 1g</b>
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➤ FDD-LTE Band 13(10MHz) QPSK Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)
10	Band13/1RB#24	Right Cheek	23230	782	23.27	0.03	23.5	<b>0.237</b>	1.054	0.250
	Band13/1RB#24	Right Tilted	23230	782	23.27	0.07	23.5	0.135	1.054	0.142
	Band13/1RB#24	Left Cheek	23230	782	23.27	0.06	23.5	0.223	1.054	0.235
	Band13/1RB#24	Left Tilted	23230	782	23.27	-0.01	23.5	0.121	1.054	0.128
	Band13/50%RB#0	Right Cheek	23230	782	22.24	0.13	22.5	0.224	1.062	0.238
	Band13/50%RB#0	Right Tilted	23230	782	22.24	0.04	22.5	0.119	1.062	0.126
	Band13/50%RB#0	Left Cheek	23230	782	22.24	-0.11	22.5	0.214	1.062	0.227
	Band13/50%RB#0	Left Tilted	23230	782	22.24	0.05	22.5	0.107	1.062	0.114
<b>ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population</b>							<b>1.6 W/kg (mW/g) Averaged over 1g</b>			

➤ FDD-LTE Band 66(20MHz) QPSK Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)
11	Band66/1RB#49	Right Cheek	132322	1745	23.12	0.03	23.5	<b>0.187</b>	1.091	0.204
	Band66/1RB#49	Right Tilted	132322	1745	23.12	-0.15	23.5	0.102	1.091	0.111
	Band66/1RB#49	Left Cheek	132322	1745	23.12	-0.02	23.5	0.125	1.091	0.136
	Band66/1RB#49	Left Tilted	132322	1745	23.12	0.01	23.5	0.069	1.091	0.075
	Band66/50%RB#24	Right Cheek	132072	1720	22.03	-0.10	22.5	0.177	1.114	0.197
	Band66/50%RB#24	Right Tilted	132072	1720	22.03	-0.15	22.5	0.093	1.114	0.104
	Band66/50%RB#24	Left Cheek	132072	1720	22.03	0.13	22.5	0.114	1.114	0.127
	Band66/50%RB#24	Left Tilted	132072	1720	22.03	-0.03	22.5	0.065	1.114	0.072
<b>ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population</b>							<b>1.6 W/kg (mW/g) Averaged over 1g</b>			

➤ Bluetooth Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR <sub>1g</sub> (W/kg)	Scaling Factor	D.C Factor	Reported SAR <sub>1g</sub> (W/kg)
	BT/GFSK	Right Cheek	0	2402	2.72	0.01	3.0	<0.001	1.067	1.000	<0.001
	BT/GFSK	Right Tilted	0	2402	2.72	0.00	3.0	<0.001	1.067	1.000	<0.001
	BT/GFSK	Left Cheek	0	2402	2.72	0.00	3.0	<0.001	1.067	1.000	<0.001
	BT/GFSK	Left Tilted	0	2402	2.72	0.00	3.0	<0.001	1.067	1.000	<0.001
<b>ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population</b>							<b>1.6 W/kg (mW/g) Averaged over 1g</b>				

**Note:**

- Per KDB 447498 D04v01, for each exposure position, if the highest output power channel Reported SAR ≤ 0.8W/kg, other channels SAR testing is not necessary.
- Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required when the measured SAR is ≥ 0.8W/kg.
- Per KDB 941225 D05v02r05, 100% RB allocation SAR measurement is not required when the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg.
- According to KDB 865664 D02v01r02, SAR plot is required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.

## 15.2 Standalone Body SAR

### ➤ GSM Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)
	GPRS850/4 slots	Front	251	848.8	32.43	0.11	32.5	0.657	1.016	0.668
	GPRS850/4 slots	Back	251	848.8	32.43	0.01	32.5	1.060	1.016	1.077
12	GPRS850/4 slots	Back	128	824.2	32.00	-0.03	32.5	<b>1.080</b>	1.122	1.212
	GPRS850/4 slots	Back	190	836.6	32.14	-0.08	32.5	1.070	1.086	1.162
	<b>GPRS850/4 slots</b>	<b>Back</b>	<b>128</b>	<b>824.2</b>	<b>32.00</b>	<b>0.05</b>	<b>32.5</b>	<b>0.997</b>	<b>1.122</b>	<b>1.119</b>
	GPRS850/4 slots with headset	Back	128	824.2	32.00	-0.03	32.5	0.959	1.122	1.076
	GPRS1900/4 slots	Front	810	1909.8	27.07	0.13	27.5	0.259	1.104	0.286
13	GPRS1900/4 slots	Back	810	1909.8	27.07	0.14	27.5	0.548	1.104	0.605
<b>ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population</b>					<b>1.6 W/kg (mW/g) Averaged over 1g</b>					

### ➤ WCDMA Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)
	Band II/RMC	Front	9400	1880	23.99	-0.14	24.0	0.411	1.002	0.412
	Band II/RMC	Back	9400	1880	23.99	0.05	24.0	0.804	1.002	0.806
14	Band II/RMC	Back	9262	1852.4	23.94	0.05	24.0	<b>0.986</b>	1.014	1.000
	Band II/RMC	Back	9538	1907.6	23.64	0.05	24.0	0.833	1.086	0.905
	<b>Band II/RMC</b>	<b>Back</b>	<b>9262</b>	<b>1852.4</b>	<b>23.94</b>	<b>-0.01</b>	<b>24.0</b>	<b>0.978</b>	<b>1.014</b>	<b>0.992</b>
	Band IV/RMC	Front	1312	1712.4	23.21	0.06	23.5	0.547	1.069	0.585
15	Band IV/RMC	Back	1312	1712.4	23.21	-0.02	23.5	<b>1.000</b>	1.069	1.069
	Band IV/RMC	Back	1413	1732.6	22.96	0.01	23.5	0.859	1.132	0.972
	Band IV/RMC	Back	1513	1752.6	23.04	0.02	23.5	0.748	1.112	0.832
	<b>Band IV/RMC</b>	<b>Back</b>	<b>1312</b>	<b>1712.4</b>	<b>23.21</b>	<b>0.07</b>	<b>23.5</b>	<b>0.982</b>	<b>1.069</b>	<b>1.050</b>
	Band V/RMC	Front	4183	836.6	23.37	0.12	23.5	0.423	1.030	0.436
16	Band V/RMC	Back	4183	836.6	23.37	0.00	23.5	0.651	1.030	0.671
<b>ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population</b>					<b>1.6 W/kg (mW/g) Averaged over 1g</b>					

### ➤ FDD-LTE Band 2(20MHz) QPSK Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)
	Band2/1RB#49	Front	18700	1860	24.23	-0.11	24.5	0.451	1.064	0.480
17	Band2/1RB#49	Back	18700	1860	24.23	0.02	24.5	<b>1.030</b>	1.064	1.096
	Band2/1RB#49	Back	18900	1880	24.02	-0.06	24.5	0.890	1.117	0.994
	Band2/1RB#49	Back	19100	1900	23.72	0.12	24.5	0.766	1.197	0.917
	Band2/50%RB#0	Front	18900	1880	23.09	-0.09	23.5	0.427	1.099	0.469
	Band2/50%RB#0	Back	18900	1880	23.09	-0.15	23.5	0.787	1.099	0.865
	Band2/50%RB#24	Back	18700	1860	22.83	0.07	23.5	0.792	1.167	0.924
	Band2/50%RB#0	Back	19100	1900	22.70	-0.13	23.5	0.761	1.202	0.915
	Band2/100%RB#0	Back	18700	1860	22.91	-0.05	23.0	0.748	1.021	0.764
	<b>Band2/1RB#49</b>	<b>Back</b>	<b>18700</b>	<b>1860</b>	<b>24.23</b>	<b>0.07</b>	<b>24.5</b>	<b>0.994</b>	<b>1.064</b>	<b>1.058</b>
<b>ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population</b>					<b>1.6 W/kg (mW/g) Averaged over 1g</b>					

➤ FDD-LTE Band 5(10MHz) QPSK Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)
18	Band5/1RB#24	Front	20600	844	23.27	-0.02	23.5	0.416	1.054	0.438
	Band5/1RB#24	Back	20600	844	23.27	0.00	23.5	<b>0.606</b>	1.054	0.639
	Band5/50%RB#0	Front	20525	836.5	22.27	0.01	22.5	0.387	1.054	0.408
	Band5/50%RB#0	Back	20525	836.5	22.27	-0.10	22.5	0.578	1.054	0.609
<b>ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population</b>					<b>1.6 W/kg (mW/g) Averaged over 1g</b>					

➤ FDD-LTE Band 7(20MHz) QPSK Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)
19	Band7/1RB#49	Front	21100	2535	24.14	-0.03	24.5	0.536	1.086	0.582
	Band7/1RB#49	Back	21100	2535	24.14	0.03	24.5	0.903	1.086	0.981
	Band7/1RB#49	Back	20850	2510	24.11	0.00	24.5	0.930	1.094	1.017
	Band7/1RB#49	Back	21350	2560	23.71	0.06	24.5	0.714	1.199	0.856
	Band7/50%RB#49	Front	20850	2510	23.03	0.13	23.5	0.552	1.114	0.615
	Band7/50%RB#49	Back	20850	2510	23.03	-0.01	23.5	<b>0.938</b>	1.114	1.045
	Band7/50%RB#0	Back	21100	2535	22.99	0.16	23.5	0.911	1.125	1.025
	Band7/50%RB#0	Back	21350	2560	22.82	-0.07	23.5	0.889	1.169	1.039
	Band7/100%RB#0	Back	21100	2535	22.96	-0.03	23.5	0.857	1.132	0.970
	Band7/100%RB#0	Back	20850	2510	22.88	-0.10	23.5	0.871	1.153	1.004
	Band7/100%RB#0	Back	21350	2560	22.62	-0.07	23.5	0.864	1.225	1.058
	<b>Band7/50%RB#49</b>	<b>Back</b>	<b>20850</b>	<b>2510</b>	<b>23.03</b>	<b>-0.06</b>	<b>23.5</b>	<b>0.925</b>	<b>1.114</b>	<b>1.030</b>
<b>ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population</b>					<b>1.6 W/kg (mW/g) Averaged over 1g</b>					

➤ FDD-LTE Band 12(10MHz) QPSK Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)
20	Band12/1RB#24	Front	23130	711	23.41	-0.06	23.5	<b>0.335</b>	1.021	0.342
	Band12/1RB#24	Back	23130	711	23.41	0.02	23.5	0.302	1.021	0.308
	Band12/50%RB#0	Front	23095	707.5	22.31	-0.18	22.5	0.321	1.045	0.335
	Band12/50%RB#0	Back	23095	707.5	22.31	-0.01	22.5	0.290	1.045	0.303
<b>ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population</b>					<b>1.6 W/kg (mW/g) Averaged over 1g</b>					

➤ FDD-LTE Band 13(10MHz) QPSK Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)
21	Band13/1RB#24	Front	23230	782	23.27	0.15	23.5	0.487	1.054	0.513
	Band13/1RB#24	Back	23230	782	23.27	-0.02	23.5	<b>0.535</b>	1.054	0.564
	Band13/50%RB#0	Front	23230	782	22.24	-0.13	22.5	0.475	1.062	0.504
	Band13/50%RB#0	Back	23230	782	22.24	0.19	22.5	0.522	1.062	0.554
<b>ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population</b>					<b>1.6 W/kg (mW/g) Averaged over 1g</b>					



## &gt; FDD-LTE Band 66(20MHz) QPSK Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)	
	Band66/1RB#49	Front	132322	1745	23.12	0.15	23.5	0.487	1.091	0.531	
	Band66/1RB#49	Back	132322	1745	23.12	-0.02	23.5	0.990	1.091	1.080	
22	Band66/1RB#49	Back	132072	1720	23.01	0.05	23.5	<b>1.250</b>	1.119	1.399	
	Band66/1RB#49	Back	132572	1770	22.42	0.09	23.5	0.878	1.282	1.126	
	Band66/50%RB#24	Front	132072	1720	22.03	-0.05	22.5	0.514	1.114	0.573	
	Band66/50%RB#24	Back	132072	1720	22.03	-0.03	22.5	1.150	1.114	1.281	
	Band66/50%RB#0	Back	132322	1745	21.93	0.17	22.5	0.950	1.140	1.083	
	Band66/50%RB#0	Back	132572	1770	21.45	-0.01	22.5	0.780	1.274	0.994	
	Band66/100%RB#0	Back	132072	1720	21.91	-0.03	22.0	1.070	1.021	1.092	
	Band66/100%RB#0	Back	132322	1745	21.89	0.06	22.0	1.020	1.026	1.047	
	Band66/100%RB#0	Back	132572	1770	21.53	-0.01	22.0	0.996	1.114	1.110	
	<b>Band66/1RB#49</b>	<b>Back</b>	<b>132072</b>	<b>1720</b>	<b>23.01</b>	<b>0.13</b>	<b>23.5</b>	<b>1.190</b>	<b>1.119</b>	<b>1.332</b>	
	Band66/1RB#49 with headset	Back	132072	1720	23.01	0.03	23.5	1.150	1.119	1.287	
<b>ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population</b>					<b>1.6 W/kg (mW/g) Averaged over 1g</b>						

## &gt; Bluetooth Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR <sub>1g</sub> (W/kg)	Scaling Factor	D.C Factor	Reported SAR <sub>1g</sub> (W/kg)
	BT/GFSK	Front	0	2402	2.72	0.05	3.0	<0.001	1.067	1.000	<0.001
	BT/GFSK	Back	0	2402	2.72	0.14	3.0	<0.001	1.067	1.000	<0.001
<b>ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population</b>					<b>1.6 W/kg (mW/g) Averaged over 1g</b>						

**Note:**

1. Body-worn SAR testing was performed at 10mm separation, and this distance is determined by the handset manufacturer that there will be body-worn accessories that users may acquire at the time of equipment certification, to enable users to purchase aftermarket body-worn accessories with the required minimum separation.
2. Per KDB 941225 D06v02r01, when the same wireless modes and device transmission configurations are required for testing body-worn accessories and hotspot mode, it is not necessary to test body-worn accessory SAR for the same device orientation if the test separation distance for hotspot mode is more conservative than that used for body-worn accessories.
3. Body-worn exposure conditions are intended to voice call operations, therefore GSM voice call is selected to be tested.
4. Per KDB 648474 D04v01r03, when the *Reported* SAR for a body-worn accessory measured without a headset connected to the handset is  $\leq 1.2$  W/kg, SAR testing with a headset connected to the handset is not required.
5. The WLAN SAR perform the front and back position, due considered the simultaneous SAR for body-worn.
6. Per KDB 447498 D04v01, for each exposure position, if the highest output channel Reported SAR  $\leq 0.8$ W/kg, other channels SAR testing is not necessary.
7. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required when the measured SAR is  $\geq 0.8$ W/kg.
8. Per KDB 941225 D05v02r05, 100% RB allocation SAR measurement is not required when the highest reported SAR for 1 RB and 50% RB allocation are  $\leq 0.8$  W/kg.
9. According to KDB 865664 D02v01r02, SAR plot is required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.
10. Highlight part of test data means repeated test.

### 15.3 Repeated SAR measurement

Band/ Mode	Test Position	CH.	Freq. (MHz)	Measured SAR (W/kg)				
				Original	1 <sup>st</sup> Repeated		2 <sup>nd</sup> Repeated	
					Value	Ratio	Value	Ratio
GPRS850/4 slots	Back	128	824.2	1.08	0.997	1.08	/	/
Band II/RMC	Back	9262	1852.4	0.986	0.978	1.01	/	/
Band IV/RMC	Back	1312	1712.4	1.00	0.982	1.02	/	/
Band2/1RB#49	Back	18700	1860	1.03	0.994	1.04	/	/
Band7/50%RB#49	Back	20850	2510	0.938	0.925	1.01	/	/
Band66/1RB#49	Back	132072	1720	1.25	1.19	1.05	/	/
<b>ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population</b>				<b>1.6 W/kg (mW/g) Averaged over 1g</b>				

**Note:**

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is  $\geq 0.8$  W/kg
2. Per KDB 865664 D01v01r04, if the ratio of *original* and *repeated* is  $\leq 1.2$  and the measured SAR  $< 1.45$  W/kg, only one repeated measurement is required.

### 15.4 DUT holder perturbation uncertainty evaluation

1. According to TCB workshop, Oct 2016:  
When the highest reported SAR of an antenna is > 1.2 W/kg, holder perturbation verification is required for each antenna, using the highest SAR configuration among all applicable frequency bands.
2. When the highest reported SAR of an antenna is > 1.2 W/kg, holder perturbation verification is required for each antenna, using the highest SAR configuration among all applicable frequency bands.
3. According to IEEE 1528-2013 section E.4.1, When it is unknown if a device holder perturbs the fields of a test device, the SAR uncertainty shall be assessed with a flat phantom (see Clause 5) by comparing the SAR with and without the device holder according to the following tests:
  - a) With device holder: 1 g or 10 g peak spatial-average SAR is measured with the handset fixed in the holder in a manner similar to the way it was held when tested for the head SAR position. The handset horizontal and vertical centerlines (see Clause 6) are aligned parallel to the bottom of the flat phantom and the device is in direct contact with the phantom. The test shall be performed with the antenna position and device operational configuration corresponding to that where the highest head SAR was previously measured for each frequency band.
  - b) Without device holder: 1 g or 10 g peak spatial-average SAR is measured with the handset placed on a low-loss foam block or support in the position identical to that tested with the device holder. The relative permittivity and loss tangent of the foam material shall be less than 1.2 and 10<sup>-5</sup>, respectively.

Test result:

Plot	Band/ Mode	Test Position	CH.	Freq. (MHz)	Test configuration	Measured SAR (W/kg) Averaged over 1g
23	Band66/1RB#49	Back	132072	1720	With device holder	2.00
24	Band66/1RB#49	Back	132072	1720	Without device holder	1.99

The following equation is used to computed the SAR tolerance,

$$SAR_{tolerance} [\%] = 100 \times \left( \frac{SAR_{w/holder} - SAR_{w/o holder}}{SAR_{w/o holder}} \right)$$

Therefore, the SAR<sub>tolerance</sub>=100× [(2.00-1.99)/ 1.99] = 0.5%.

**15.5 Multi-Band Simultaneous Transmission Considerations**

➤ **Simultaneous Transmission Capabilities**

According to FCC KDB Publication 447498 D04v01, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the EUT are shown in below Figure and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.



**Fig.15.1 Simultaneous Transmission Paths**

➤ **Multi-Band simultaneous Transmission Consideration**

Simultaneous Transmission Consideration	Position	Applicable Combination
	Head	WWAN (Voice) + Bluetooth
	Body	WWAN (Voice) + Bluetooth
	Hotspot	WWAN (Data) + Bluetooth

**Note:**

1. GSM/WCDMA/LTE shares the same antenna, and cannot transmit simultaneously.
2. The Report SAR summation is calculated based on the same configuration and test position.
3. Per KDB 447498 D04v01, simultaneous transmission SAR is compliant if,
  - i. Scalar SAR summation < 1.6 W/kg.
  - ii.  $SPLSR = (SAR_1 + SAR_2)^{1.5} / (min. \text{ separation distance, mm})$ , and the peak separation distance is determined from the square root of  $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$ , where  $(x_1, y_1, z_1)$  and  $(x_2, y_2, z_2)$  are the coordinates of the extrapolated peak SAR locations in the zoom scan. If  $SPLSR \leq 0.04$ , simultaneously transmission SAR measurement is not necessary.
  - iii. Simultaneously transmission SAR measurement, and the Reported multi-band SAR < 1.6 W/kg

### 15.6 SAR Simultaneous Transmission Analysis

➤ **Simultaneous Transmission**

Position		Standalone SAR(W/kg)		$\Sigma$ SAR <sub>1g</sub> (W/kg)
		1	3	1+2
		WWAN	BT	
Head	Right Cheek	0.785	0.000	0.785
	Right Tilted	0.450	0.000	0.450
	Left Cheek	0.632	0.000	0.632
	Left Tilted	0.371	0.000	0.371
Body- worn	Front	0.668	0.000	0.668
	Back	1.399	0.000	1.399

➤ **Simultaneous Transmission Conclusion**

The above numerical summed SAR results for all the case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D04v01.

### **15.7 Measurement Uncertainty**

Per KDB865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. The equivalent ratio (1.5/1.6) is applied to extremity and occupational exposure conditions.

## **15.8 Measurement Conclusion**

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of the FCC and Industry Canada, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested. Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables.

## 16 Reference

- [1]. FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”
- [2]. ANSI/IEEE Std. C95.1-1992, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”, September 1992
- [3]. IEEE Std. 1528-2013, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, September 2013
- [4]. SPEAG DASY52 System Handbook
- [5]. FCC KDB 447498 D04 v01, “RF EXPOSURE PROCEDURES AND EQUIPMENT AUTHORIZATION POLICIES FOR MOBILE AND PORTABLE DEVICES”, November 2021
- [6]. FCC KDB 648474 D04 v01r03, “SAR EVALUATION CONSIDERATIONS FOR WIRELESS HANDSETS”, October 2015
- [7]. FCC KDB 941225 D01 v03r01, “3G SAR MEASUREMENT PROCEDURES”, October 2015
- [8]. FCC KDB 941225 D05 v02r05, “SAR EVALUATION CONSIDERATIONS FOR LTE DEVICES”, Dec 2015
- [9]. FCC KDB 865664 D01 v01r04, “SAR MEASUREMENT REQUIREMENTS FOR 100 MHz TO 6 GHz”, August 2015



## Appendix A: Plots of SAR System Check

Test Laboratory: JYTSZ

Date: 08.02.2022

**DUT: Dipole 750 MHz; Type: D750V3; Serial: SN:1118**

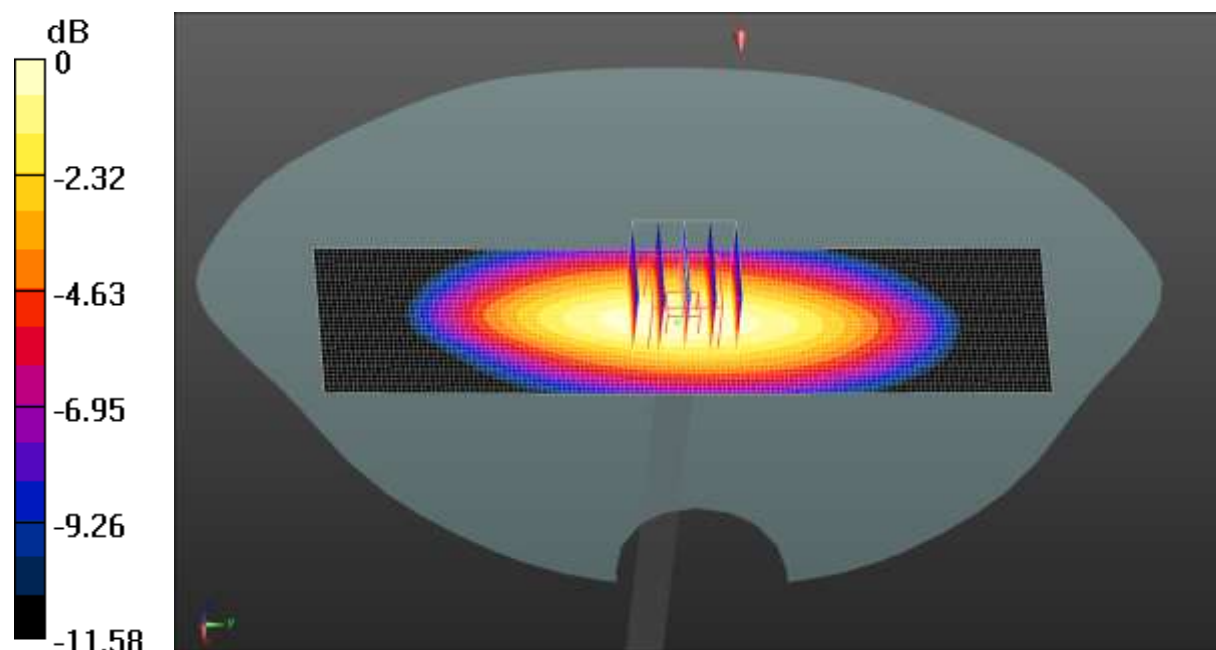
Communication System: UID 0, CW (0); Frequency: 750 MHz; Duty Cycle: 1:1  
 Medium parameters used:  $f = 750 \text{ MHz}$ ;  $\sigma = 0.898 \text{ S/m}$ ;  $\epsilon_r = 40.482$ ;  $\rho = 1000 \text{ kg/m}^3$   
 Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7601; ConvF(10.58, 10.58, 10.58) @ 750 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**System Performance Check at Frequency 750 MHz Head Tissue/d=15mm, Pin=80 mW, dist=1.4mm (EX-Probe)/Area Scan (41x151x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$   
 Maximum value of SAR (interpolated) = 0.939 W/kg

**System Performance Check at Frequency 750 MHz Head Tissue/d=15mm, Pin=80 mW, dist=1.4mm (EX-Probe)/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$   
 Reference Value = 30.07 V/m; Power Drift = -0.14 dB  
 Peak SAR (extrapolated) = 1.02 W/kg  
**SAR(1 g) = 0.688 W/kg; SAR(10 g) = 0.447 W/kg**  
 Smallest distance from peaks to all points 3 dB below = 14.2 mm  
 Ratio of SAR at M2 to SAR at M1 = 55.7%  
 Maximum value of SAR (measured) = 0.948 W/kg



0 dB = 0.948 W/kg = -0.23 dBW/kg

Test Laboratory: JYTSZ

Date: 08.02.2022

**DUT: Dipole 835 MHz; Type: D835V2; Serial: SN:4D154**

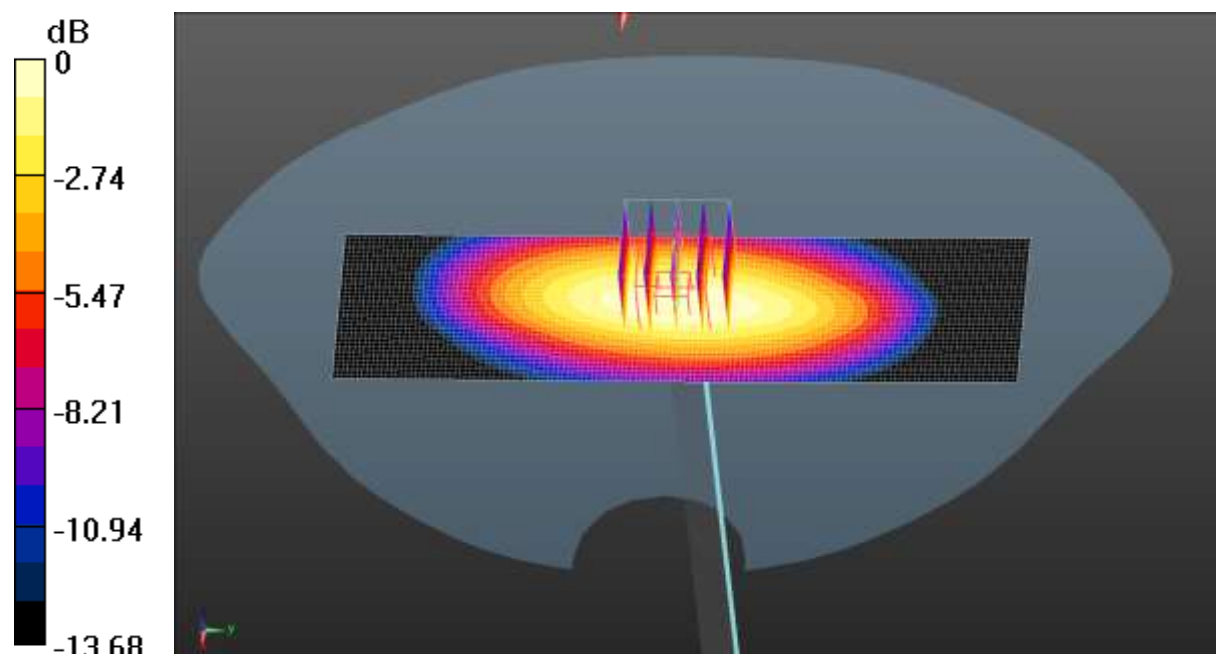
Communication System: UID 0, CW (0); Frequency: 835 MHz; Duty Cycle: 1:1  
 Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.918 \text{ S/m}$ ;  $\epsilon_r = 40.271$ ;  $\rho = 1000 \text{ kg/m}^3$   
 Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7601; ConvF(10.20, 10.20, 10.20) @ 835 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**System Performance Check at Frequency 835 MHz Head Tissue/d=15mm, Pin=80 mW, dist=1.4mm (EX-Probe)/Area Scan (41x141x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
 Maximum value of SAR (interpolated) = 0.985 W/kg

**System Performance Check at Frequency 835 MHz Head Tissue/d=15mm, Pin=80 mW, dist=1.4mm (EX-Probe)/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
 Reference Value = 31.25V/m; Power Drift = -0.01 dB  
 Peak SAR (extrapolated) = 1.06 W/kg  
**SAR(1 g) = 0.775 W/kg; SAR(10 g) = 0.508 W/kg**  
 Smallest distance from peaks to all points 3 dB below = 14.1 mm  
 Ratio of SAR at M2 to SAR at M1 = 57.8%  
 Maximum value of SAR (measured) = 1.01 W/kg



0 dB = 1.01 W/kg = 0.04 dBW/kg

Test Laboratory: JYTSZ

Date: 08.05.2022

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: SN:1177**

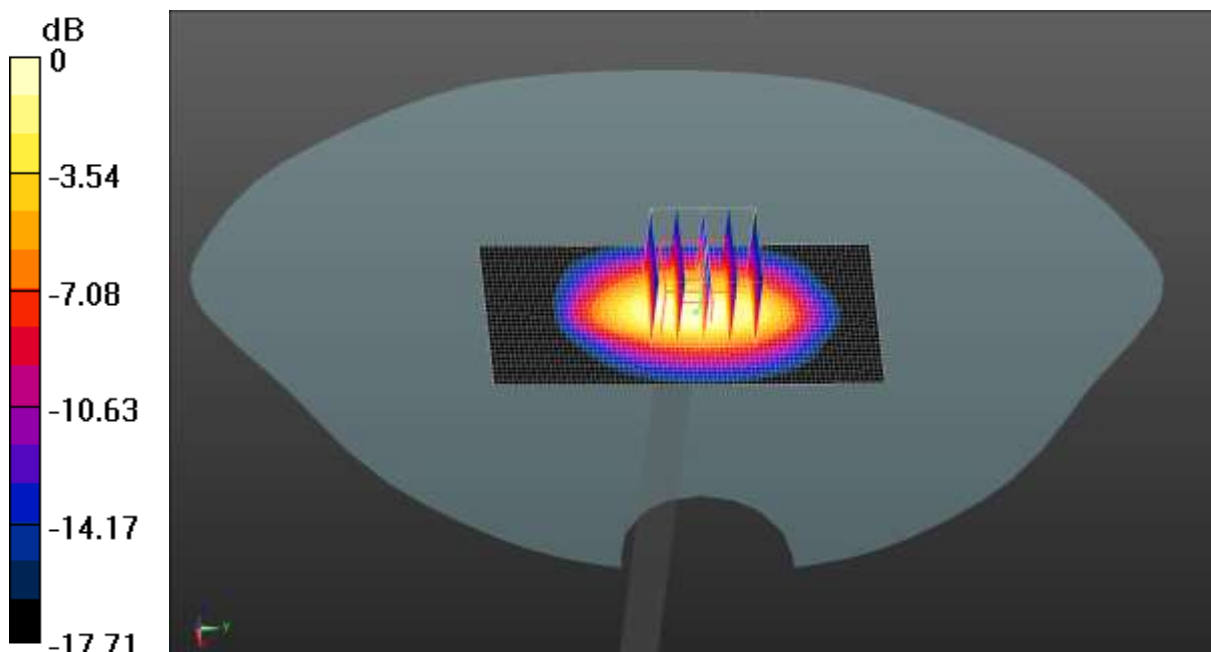
Communication System: UID 0, CW (0); Frequency: 1750 MHz; Duty Cycle: 1:1  
 Medium parameters used:  $f = 1750 \text{ MHz}$ ;  $\sigma = 1.363 \text{ S/m}$ ;  $\epsilon_r = 38.947$ ;  $\rho = 1000 \text{ kg/m}^3$   
 Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7601; ConvF(8.62, 8.62, 8.62) @ 1750 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**System Performance Check at Frequency 1750 MHz Head Tissue/d=10mm, Pin=40 mW, dist=1.4mm (EX-Probe)/Area Scan (41x81x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$   
 Maximum value of SAR (interpolated) = 2.33 W/kg

**System Performance Check at Frequency 1750 MHz Head Tissue/d=10mm, Pin=40 mW, dist=1.4mm (EX-Probe)/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$   
 Reference Value = 41.34 V/m; Power Drift = 0.06 dB  
 Peak SAR (extrapolated) = 2.85 W/kg  
**SAR(1 g) = 1.49 W/kg; SAR(10 g) = 0.774 W/kg**  
 Smallest distance from peaks to all points 3 dB below = 9.3 mm  
 Ratio of SAR at M2 to SAR at M1 = 51.2%  
 Maximum value of SAR (measured) = 2.34 W/kg



0 dB = 2.34 W/kg = 3.69 dBW/kg

Test Laboratory: JYTSZ

Date: 08.05.2022

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

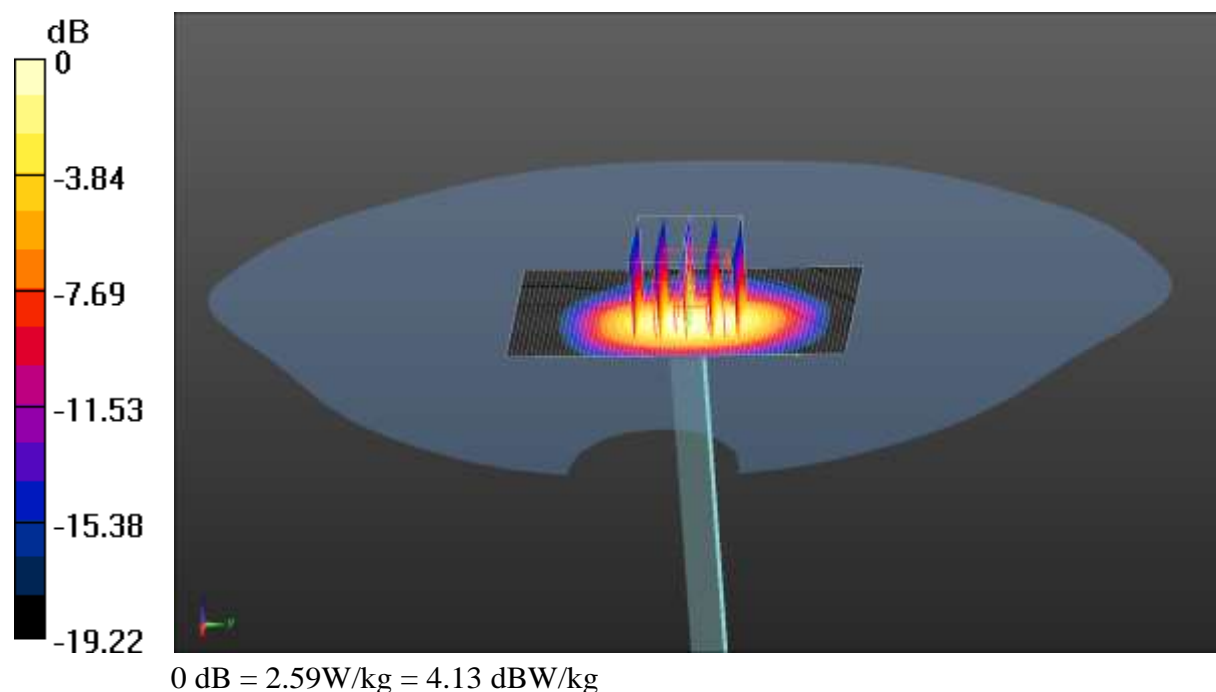
Communication System: UID 0, CW (0); Frequency: 1900 MHz; Duty Cycle: 1:1  
 Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.374 \text{ S/m}$ ;  $\epsilon_r = 38.768$ ;  $\rho = 1000 \text{ kg/m}^3$   
 Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7601; ConvF(8.37, 8.37, 8.37) @ 1900 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**System Performance Check at Frequency 1900 MHz Head Tissue/d=10mm, Pin=40 mW, dist=1.4mm (EX-Probe)/Area Scan (41x71x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
 Maximum value of SAR (interpolated) = 2.57 W/kg

**System Performance Check at Frequency 1900 MHz Head Tissue/d=10mm, Pin=40 mW, dist=1.4mm (EX-Probe)/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
 Reference Value = 33.15 V/m; Power Drift = 0.06 dB  
 Peak SAR (extrapolated) = 3.18 W/kg  
**SAR(1 g) = 1.62 W/kg; SAR(10 g) = 0.835 W/kg**  
 Smallest distance from peaks to all points 3 dB below = 8.4 mm  
 Ratio of SAR at M2 to SAR at M1 = 48.2%  
 Maximum value of SAR (measured) = 2.59 W/kg



Test Laboratory: JYTSZ

Date: 08.07.2022

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

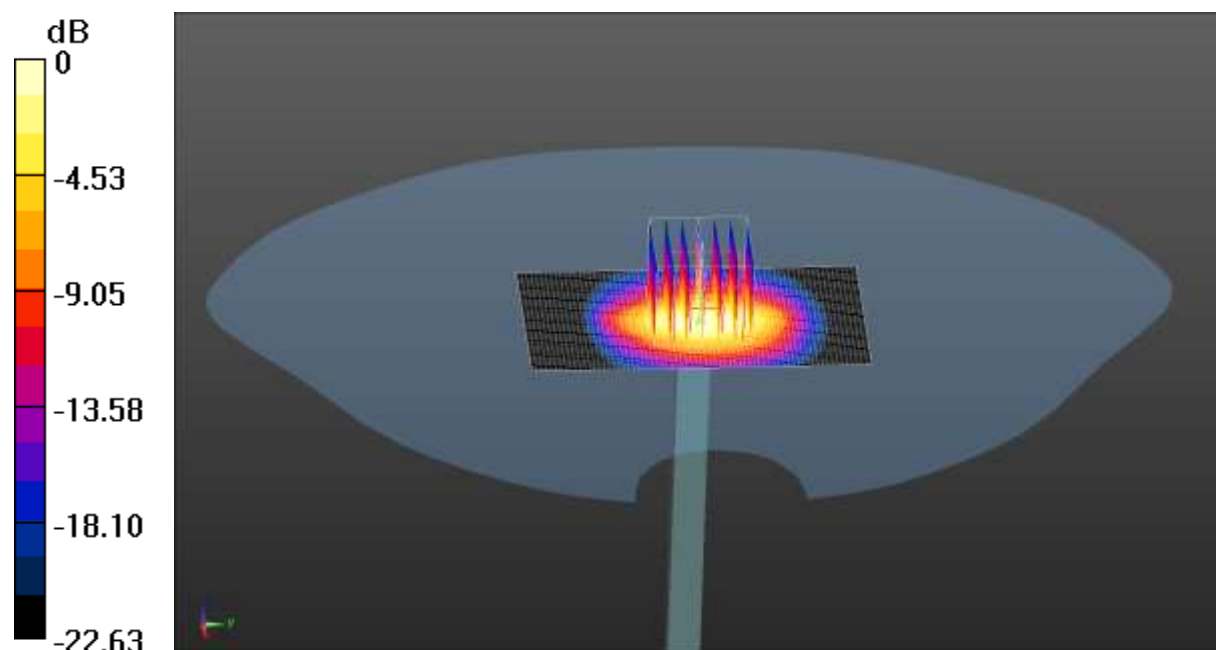
Communication System: UID 0, CW (0); Frequency: 2450 MHz; Duty Cycle: 1:1  
 Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.792$  S/m;  $\epsilon_r = 37.988$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7601; ConvF(7.74, 7.74, 7.74) @ 2450 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**System Performance Check at Frequency 2450 MHz Head Tissue/d=10mm, Pin=40 mW, dist=1.4mm (EX-Probe)/Area Scan (41x71x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm  
 Maximum value of SAR (interpolated) = 3.75 W/kg

**System Performance Check at Frequency 2450 MHz Head Tissue/d=10mm, Pin=40 mW, dist=1.4mm (EX-Probe)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
 Reference Value = 41.22 V/m; Power Drift = -0.12 dB  
 Peak SAR (extrapolated) = 4.56 W/kg  
**SAR(1 g) = 2.17 W/kg; SAR(10 g) = 0.991 W/kg**  
 Smallest distance from peaks to all points 3 dB below = 8.8 mm  
 Ratio of SAR at M2 to SAR at M1 = 44.5%  
 Maximum value of SAR (measured) = 3.61 W/kg



0 dB = 3.61 W/kg = 5.58 dBW/kg

Test Laboratory: JYTSZ

Date: 08.07.2022

**DUT: Dipole 2600 MHz; Type: D2600V2; Serial: SN:1114**

Communication System: UID 0, CW (0); Frequency: 2600 MHz; Duty Cycle: 1:1  
 Medium parameters used:  $f = 2600$  MHz;  $\sigma = 1.907$  S/m;  $\epsilon_r = 37.611$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7601; ConvF(7.49, 7.49, 7.49) @ 2600 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**System Performance Check at Frequency 2600 MHz Head Tissue/d=10mm, Pin=40 mW, dist=1.4mm (EX-Probe)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 44.23 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 5.06 W/kg

**SAR(1 g) = 2.31 W/kg; SAR(10 g) = 1.01 W/kg**

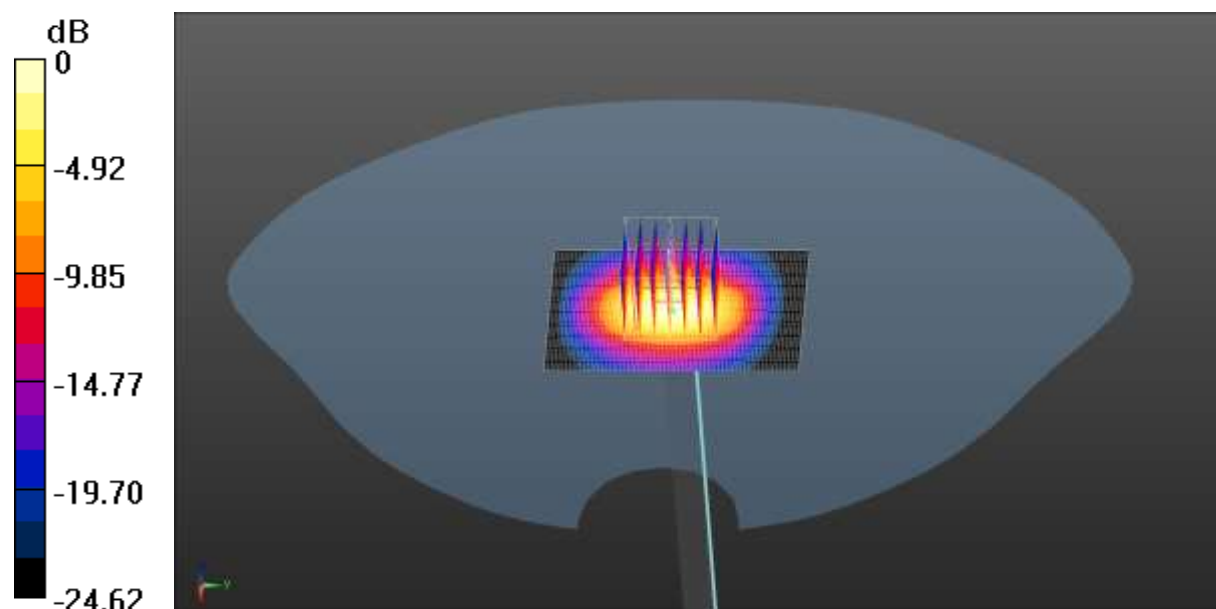
Smallest distance from peaks to all points 3 dB below = 9.6 mm

Ratio of SAR at M2 to SAR at M1 = 43.4%

Maximum value of SAR (measured) = 4.04 W/kg

**System Performance Check at Frequency 2600 MHz Head Tissue/d=10mm, Pin=40 mW, dist=1.4mm (EX-Probe)/Area Scan (51x71x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 4.35 W/kg



0 dB = 4.35 W/kg = 6.38 dBW/kg

## Appendix B: Plots of SAR Test Data



Test Laboratory: JYTSZ

Date: 08.02.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, GSM (0); Frequency: 848.5 MHz; Duty Cycle: 1:8.30042  
 Medium parameters used (interpolated):  $f = 848.5 \text{ MHz}$ ;  $\sigma = 0.917 \text{ S/m}$ ;  $\epsilon_r = 40.25$ ;  $\rho = 1000 \text{ kg/m}^3$   
 Phantom section: Left Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(10.2, 10.2, 10.2) @ 848.5 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**GSM 850 Left Cheek/High Channel/Area Scan (41x51x1):** Interpolated grid:

$dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 0.692 W/kg

**GSM 850 Left Cheek/ High Channel/Zoom Scan (5x5x7)/Cube 0:** Measurement

grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 12.87 V/m; Power Drift = -0.02 dB

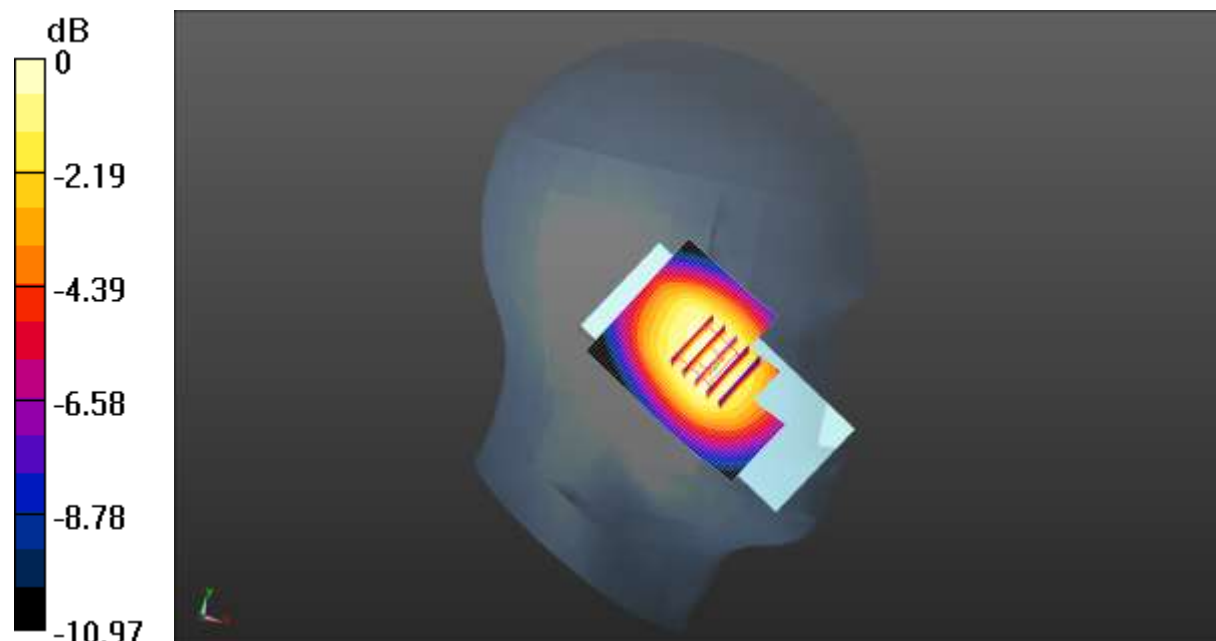
Peak SAR (extrapolated) = 0.779 W/kg

**SAR(1 g) = 0.566 W/kg; SAR(10 g) = 0.416 W/kg**

Smallest distance from peaks to all points 3 dB below = 25.3 mm

Ratio of SAR at M2 to SAR at M1 = 72.8%

Maximum value of SAR (measured) = 0.697 W/kg



0 dB = 0.697 W/kg = -1.57 dBW/kg

Test Laboratory: JYTSZ

Date: 08.05.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, GSM (0); Frequency: 1880 MHz; Duty Cycle: 1:8.30042

Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.354 \text{ S/m}$ ;  $\epsilon_r = 39.01$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(8.37, 8.37, 8.37) @ 1880 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**GSM 1900 Right Cheek/Middle Channel/Area Scan (41x51x1):** Interpolated grid:  
 $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 0.219 W/kg

**GSM 1900 Right Cheek/Middle Channel/Zoom Scan (5x5x7)/Cube 0:**

Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 4.404 V/m; Power Drift = -0.02 dB

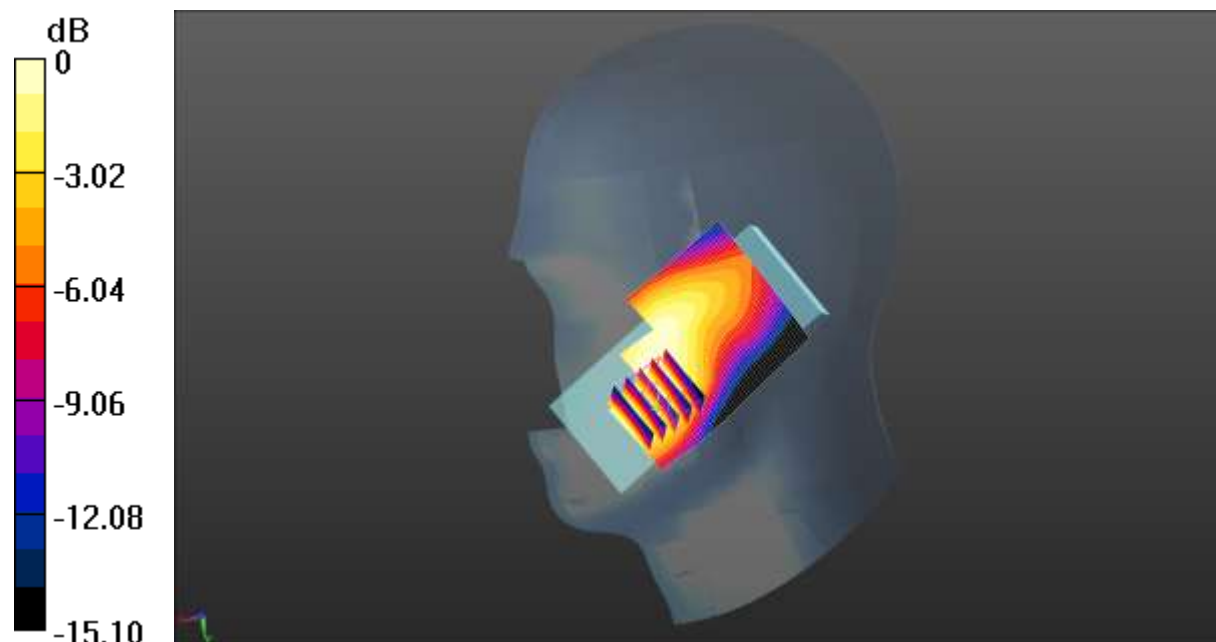
Peak SAR (extrapolated) = 0.257 W/kg

**SAR(1 g) = 0.162 W/kg; SAR(10 g) = 0.102 W/kg**

Smallest distance from peaks to all points 3 dB below = 13.8 mm

Ratio of SAR at M2 to SAR at M1 = 63.3%

Maximum value of SAR (measured) = 0.217 W/kg



0 dB = 0.217 W/kg = -6.64 dBW/kg

Test Laboratory: JYTSZ

Date: 08.05.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, UMTS-FDD(WCDMA) (0); Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.354 \text{ S/m}$ ;  $\epsilon_r = 39.01$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(8.37, 8.37, 8.37) @ 1880 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**WCDMA 1900 Right Cheek/Middle Channel/Area Scan (41x51x1):** Interpolated

grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 0.347 W/kg

**WCDMA 1900 Right Cheek/Middle Channel/Zoom Scan (5x5x7)/Cube 0:**

Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 4.713 V/m; Power Drift = 0.08 dB

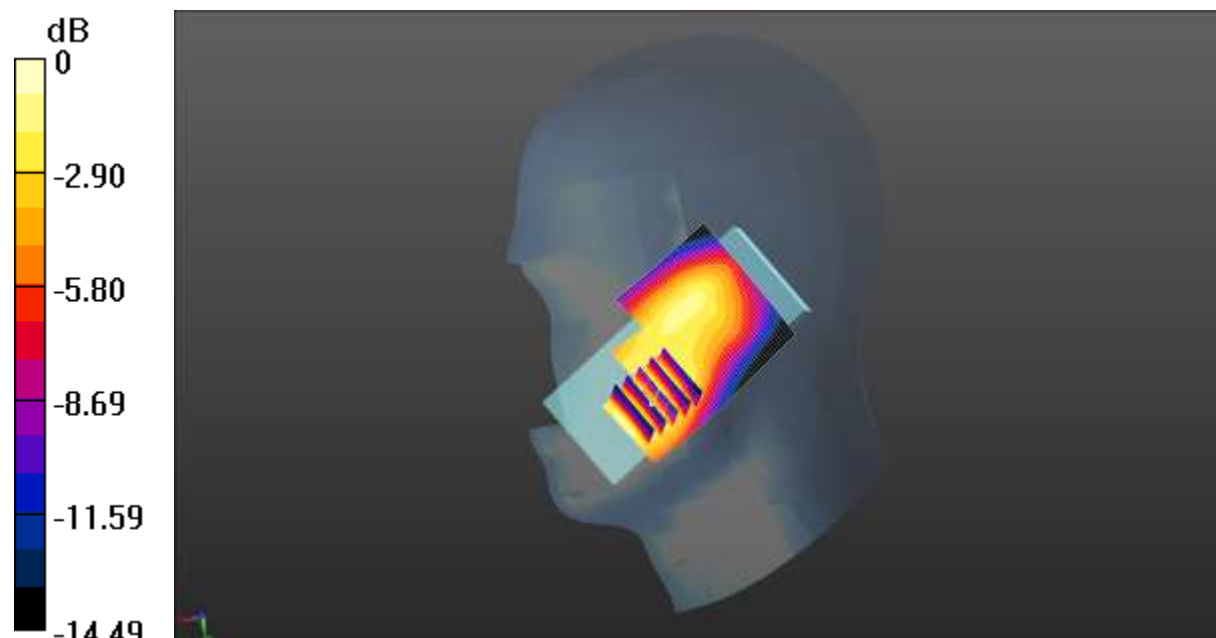
Peak SAR (extrapolated) = 0.398 W/kg

**SAR(1 g) = 0.248 W/kg; SAR(10 g) = 0.153 W/kg**

Smallest distance from peaks to all points 3 dB below = 14.6 mm

Ratio of SAR at M2 to SAR at M1 = 62.6%

Maximum value of SAR (measured) = 0.337 W/kg



0 dB = 0.337 W/kg = -4.72 dBW/kg

Test Laboratory: JYTSZ

Date: 08.05.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, UMTS-FDD(WCDMA) (0); Frequency: 1712.4 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1712.4 \text{ MHz}$ ;  $\sigma = 1.327 \text{ S/m}$ ;  $\epsilon_r = 38.554$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(8.62, 8.62, 8.62) @ 1712.4 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**WCDMA 1700 Right Cheek/Low Channel/Area Scan (41x51x1):** Interpolated

grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 0.175 W/kg

**WCDMA 1700 Right Cheek/Low Channel/Zoom Scan (5x5x7)/Cube 0:**

Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 4.715 V/m; Power Drift = 0.00 dB

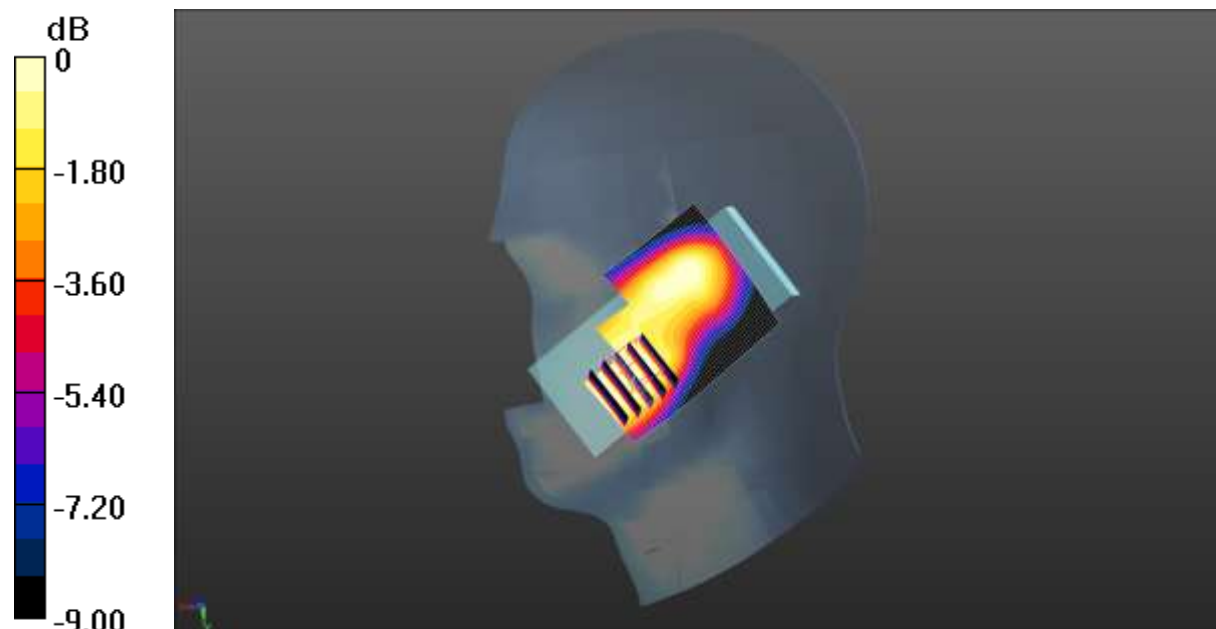
Peak SAR (extrapolated) = 0.171 W/kg

**SAR(1 g) = 0.111 W/kg; SAR(10 g) = 0.072 W/kg**

Smallest distance from peaks to all points 3 dB below = 15.3 mm

Ratio of SAR at M2 to SAR at M1 = 64.9%

Maximum value of SAR (measured) = 0.146 W/kg



0 dB = 0.146 W/kg = -8.36 dBW/kg

Test Laboratory: JYTSZ

Date: 08.02.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, UMTS-FDD(WCDMA) (0); Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 836.6$  MHz;  $\sigma = 0.917$  S/m;  $\epsilon_r = 40.25$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(10.2, 10.2, 10.2) @ 836.6 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**WCDMA 850 Left Cheek/Middle Channel/Area Scan (41x51x1):** Interpolated

grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.491 W/kg

**WCDMA 850 Left Cheek/Middle Channel/Zoom Scan (5x5x7)/Cube 0:**

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.838 V/m; Power Drift = -0.18 dB

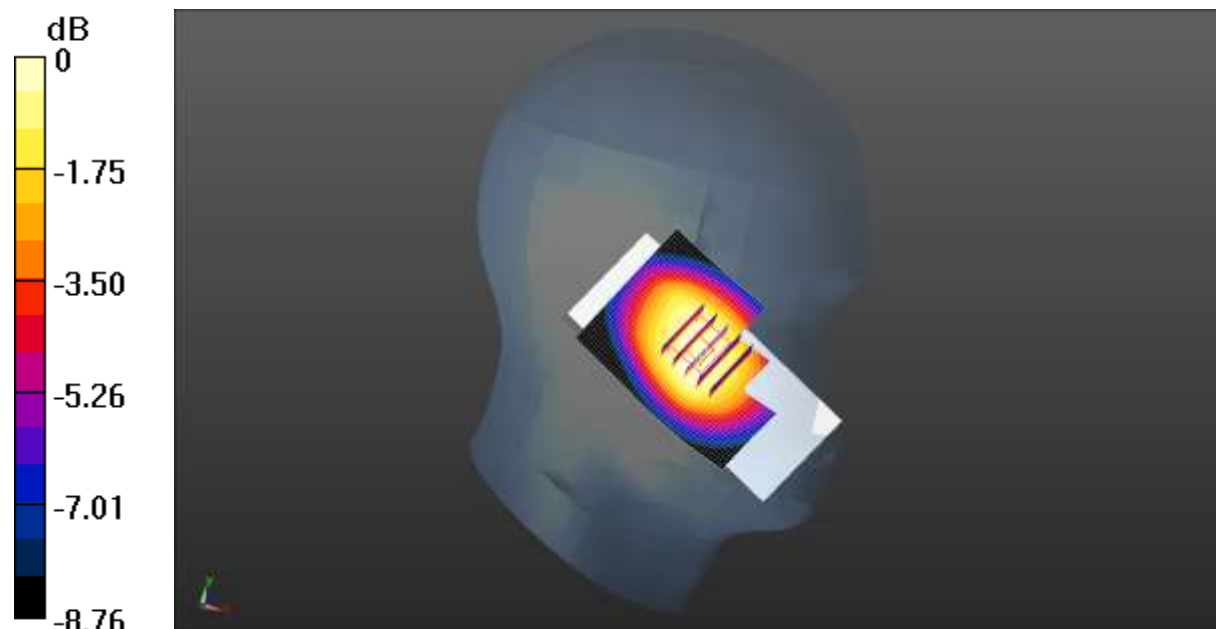
Peak SAR (extrapolated) = 0.543 W/kg

**SAR(1 g) = 0.394 W/kg; SAR(10 g) = 0.289 W/kg**

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

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

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



0 dB = 0.487 W/kg = -3.12 dBW/kg

Test Laboratory: JYTSZ

Date: 08.05.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, LTE-Fdd(USA) 1RB QPSK (0); Frequency: 1860 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1860 \text{ MHz}$ ;  $\sigma = 1.354 \text{ S/m}$ ;  $\epsilon_r = 39.01$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(8.37, 8.37, 8.37) @ 1860 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**LTE Band 2 1RB(20MHz) Right Cheek/Low Channel/Area Scan (41x51x1):**

Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 0.408 W/kg

**LTE Band 2 1RB(20MHz) Right Cheek/Low Channel/Zoom Scan**

**(5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 3.781 V/m; Power Drift = 0.19 dB

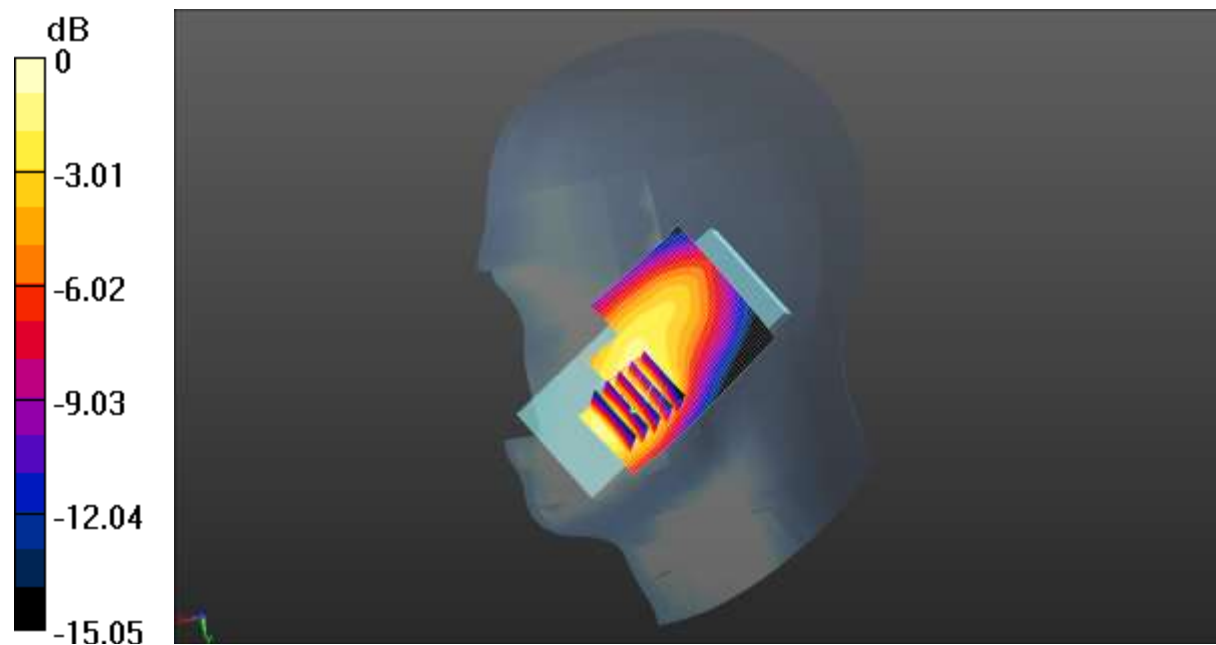
Peak SAR (extrapolated) = 0.489 W/kg

**SAR(1 g) = 0.303 W/kg; SAR(10 g) = 0.187 W/kg**

Smallest distance from peaks to all points 3 dB below = 13.8 mm

Ratio of SAR at M2 to SAR at M1 = 60.1%

Maximum value of SAR (measured) = 0.402 W/kg



0 dB = 0.402 W/kg = -3.96 dBW/kg

Test Laboratory: JYTSZ

Date: 08.02.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, LTE-Fdd(USA) 1RB QPSK (0); Frequency: 844 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 844 \text{ MHz}$ ;  $\sigma = 0.917 \text{ S/m}$ ;  $\epsilon_r = 40.25$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(10.2, 10.2, 10.2) @ 844 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**LTE Band 5 1RB(10MHz) Left Cheek/High Channel/Area Scan (41x51x1):**

Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 0.435 W/kg

**LTE Band 5 1RB(10MHz) Left Cheek/High Channel/Zoom Scan (5x5x7)/Cube**

**0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 8.979 V/m; Power Drift = -0.07 dB

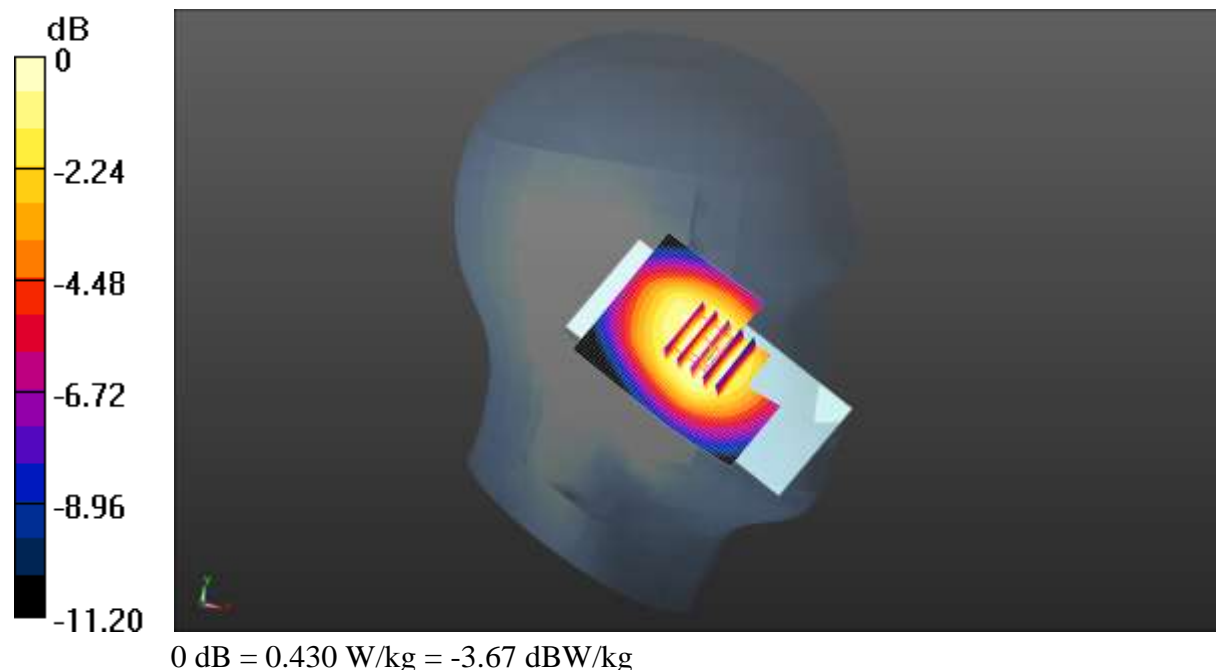
Peak SAR (extrapolated) = 0.484 W/kg

**SAR(1 g) = 0.350 W/kg; SAR(10 g) = 0.256 W/kg**

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

Ratio of SAR at M2 to SAR at M1 = 72.2%

Maximum value of SAR (measured) = 0.430 W/kg



Test Laboratory: JYTSZ

Date: 08.07.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, LTE-Fdd(USA) 1RB QPSK (0); Frequency: 2535 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 2535 \text{ MHz}$ ;  $\sigma = 1.808 \text{ S/m}$ ;  $\epsilon_r = 38.098$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(7.74, 7.74, 7.74) @ 2535 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**LTE Band 7 1RB(20MHz) Right Cheek/Middle Channel/Area Scan (41x51x1):**

Interpolated grid:  $dx=1.200 \text{ mm}$ ,  $dy=1.200 \text{ mm}$

Maximum value of SAR (interpolated) = 1.07 W/kg

**LTE Band 7 1RB(20MHz) Right Cheek/Middle Channel/Zoom Scan**

**(5x5x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 8.443 V/m; Power Drift = -0.18 dB

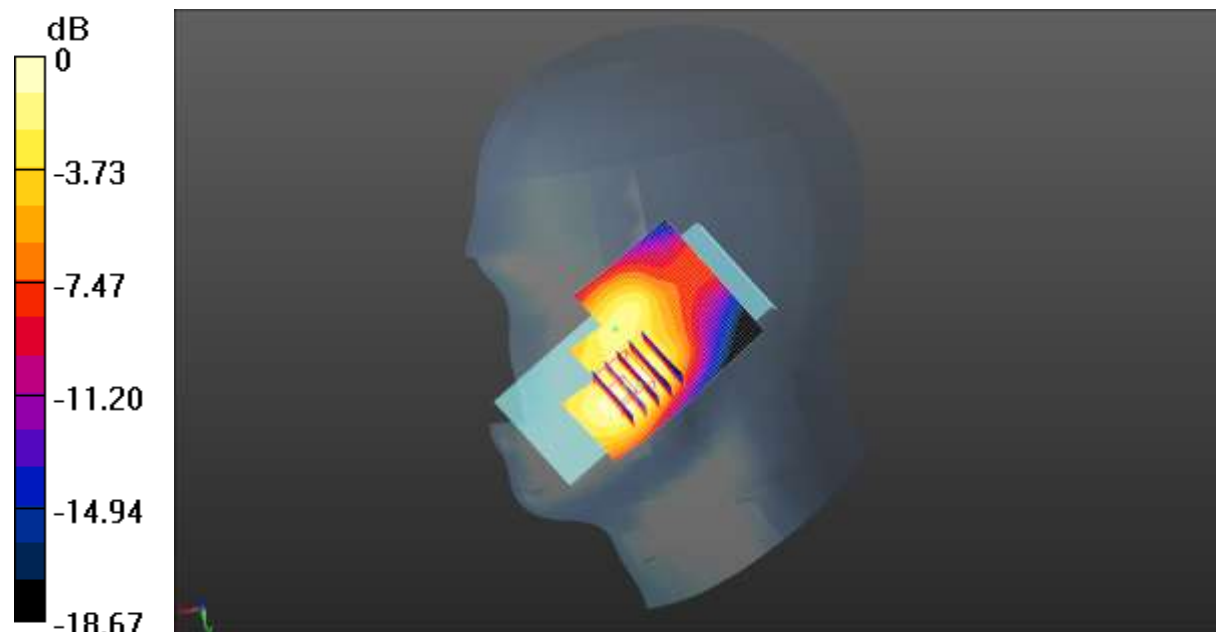
Peak SAR (extrapolated) = 1.31 W/kg

**SAR(1 g) = 0.723 W/kg; SAR(10 g) = 0.397 W/kg**

Smallest distance from peaks to all points 3 dB below = 12.9 mm

Ratio of SAR at M2 to SAR at M1 = 53.8%

Maximum value of SAR (measured) = 1.04 W/kg



0 dB = 1.04 W/kg = 0.17 dBW/kg



Test Laboratory: JYTSZ

Date: 07.27.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, LTE-Fdd(USA) 1RB QPSK (0); Frequency: 711 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 711 \text{ MHz}$ ;  $\sigma = 0.878 \text{ S/m}$ ;  $\epsilon_r = 40.626$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(10.58, 10.58, 10.58) @ 711 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**LTE Band 12 1RB(10MHz) Right Cheek/High Channel/Area Scan (41x51x1):**

Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 0.271 W/kg

**LTE Band 12 1RB(10MHz) Right Cheek/High Channel/Zoom Scan**

**(5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 5.945 V/m; Power Drift = 0.13 dB

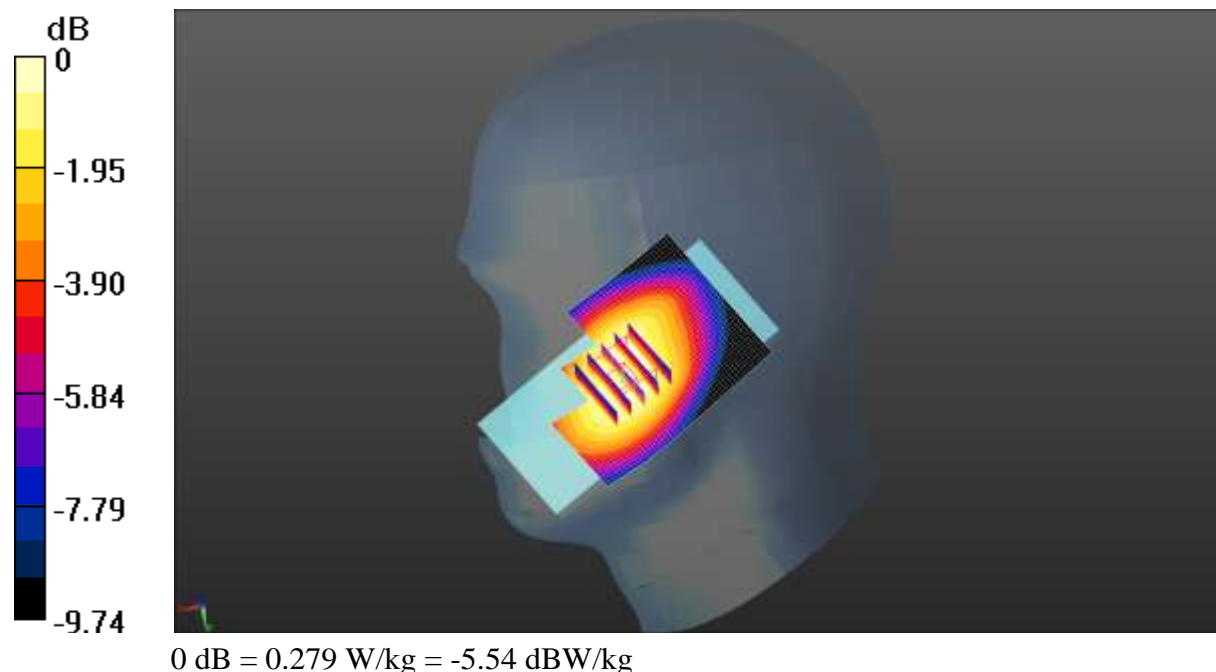
Peak SAR (extrapolated) = 0.309 W/kg

**SAR(1 g) = 0.223 W/kg; SAR(10 g) = 0.163 W/kg**

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

Ratio of SAR at M2 to SAR at M1 = 73%

Maximum value of SAR (measured) = 0.279 W/kg



Test Laboratory: JYTSZ

Date: 08.02.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, LTE-Fdd(USA) 1RB QPSK (0); Frequency: 782 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 782 \text{ MHz}$ ;  $\sigma = 0.909 \text{ S/m}$ ;  $\epsilon_r = 40.302$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(10.58, 10.58, 10.58) @ 782 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**LTE Band 13 1RB(10MHz) Right Cheek/Middle Channel/Area Scan**

**(41x51x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 0.294 W/kg

**LTE Band 13 1RB(10MHz) Right Cheek/Middle Channel/Zoom Scan**

**(5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 6.039 V/m; Power Drift = 0.03 dB

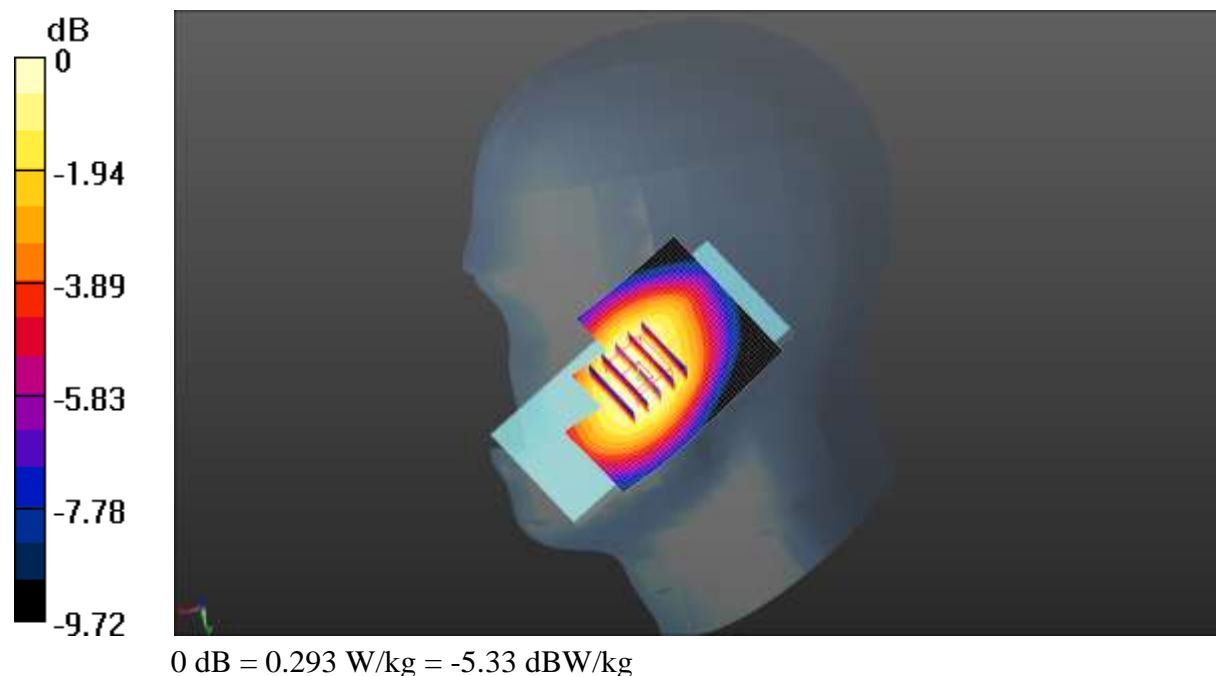
Peak SAR (extrapolated) = 0.324 W/kg

**SAR(1 g) = 0.237 W/kg; SAR(10 g) = 0.174 W/kg**

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

Ratio of SAR at M2 to SAR at M1 = 74.3%

Maximum value of SAR (measured) = 0.293 W/kg



Test Laboratory: JYTSZ

Date: 08.05.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, LTE-Fdd(USA) 1RB QPSK (0); Frequency: 1745 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1745 \text{ MHz}$ ;  $\sigma = 1.332 \text{ S/m}$ ;  $\epsilon_r = 38.532$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(8.62, 8.62, 8.62) @ 1745 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**LTE Band 66 1RB(20MHz) Right Cheek/Middle Channel/Area Scan**

**(41x51x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$

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

**LTE Band 66 1RB(20MHz) Right Cheek/Middle Channel/Zoom Scan**

**(5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 3.663 V/m; Power Drift = 0.03 dB

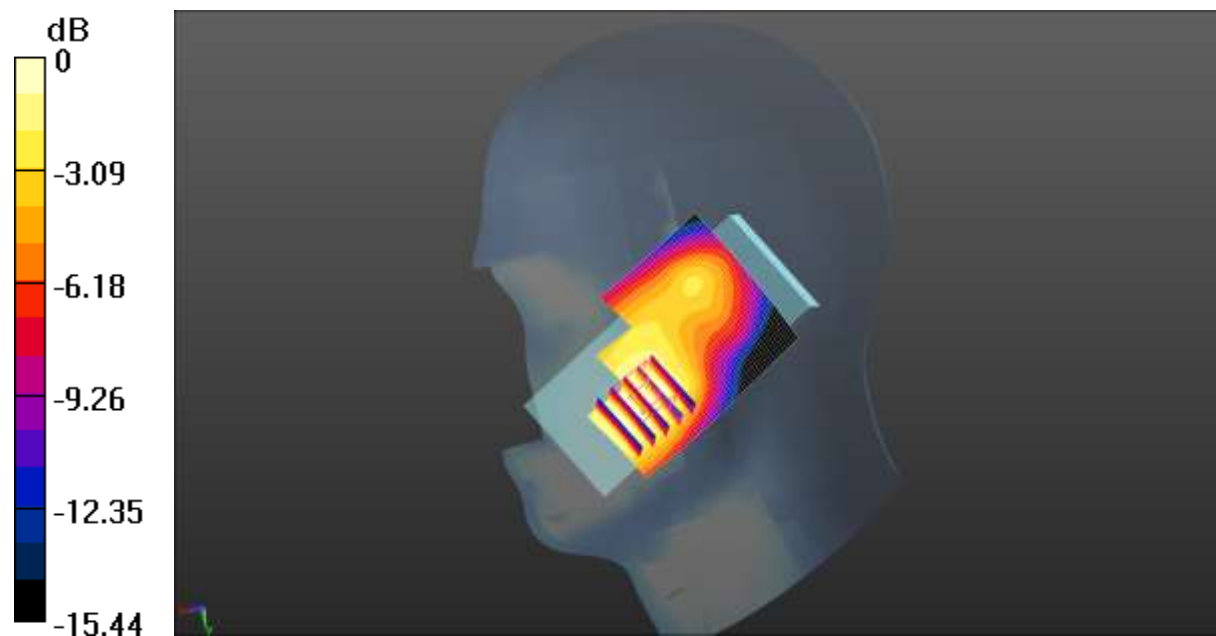
Peak SAR (extrapolated) = 0.298 W/kg

**SAR(1 g) = 0.187 W/kg; SAR(10 g) = 0.118 W/kg**

Smallest distance from peaks to all points 3 dB below = 14.6 mm

Ratio of SAR at M2 to SAR at M1 = 65.4%

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



0 dB = 0.248 W/kg = -6.06 dBW/kg

Test Laboratory: JYTSZ

Date: 08.02.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, GPRS(4 Slots) (0); Frequency: 824.2 MHz; Duty Cycle: 1:1.99986

Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.913$  S/m;  $\epsilon_r = 40.284$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(10.2, 10.2, 10.2) @ 824.2 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**GPRS 850 4slots Body Back/Low Channel/Area Scan (41x51x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.38 W/kg

**GPRS 850 4slots Body Back/Low Channel/Zoom Scan (5x5x7)/Cube 0:**

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 39.97 V/m; Power Drift = -0.03 dB

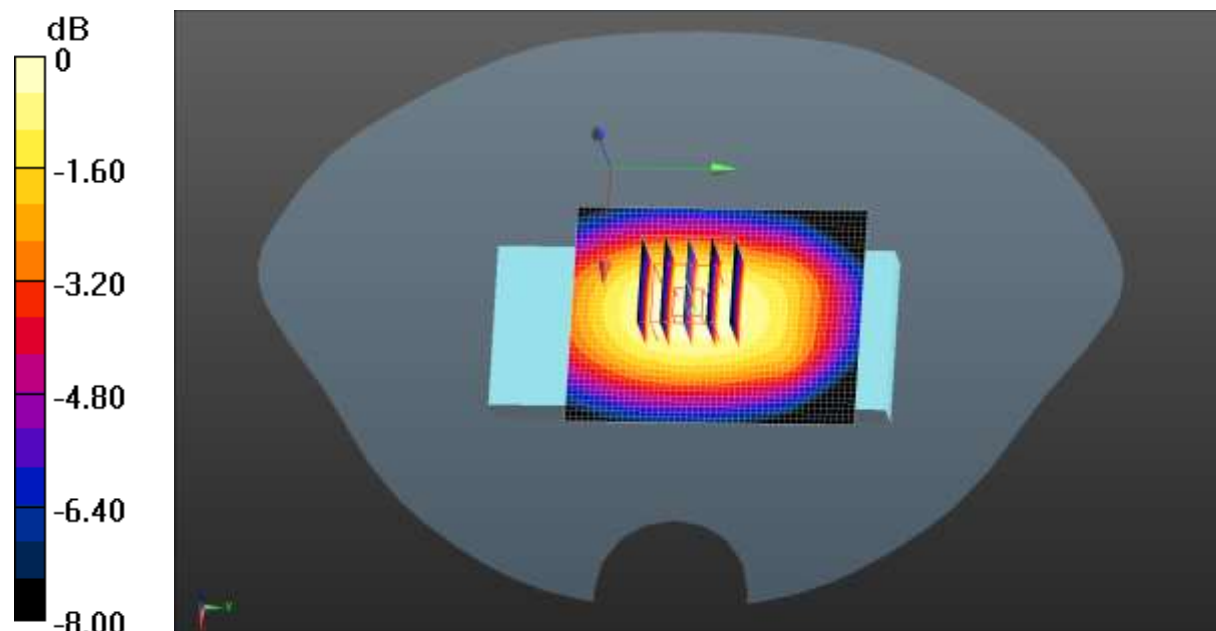
Peak SAR (extrapolated) = 1.58 W/kg

**SAR(1 g) = 1.08 W/kg; SAR(10 g) = 0.765 W/kg**

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

Ratio of SAR at M2 to SAR at M1 = 68.4%

Maximum value of SAR (measured) = 1.39 W/kg



0 dB = 1.39 W/kg = 1.43 dBW/kg

Test Laboratory: JYTSZ

Date: 08.05.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

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

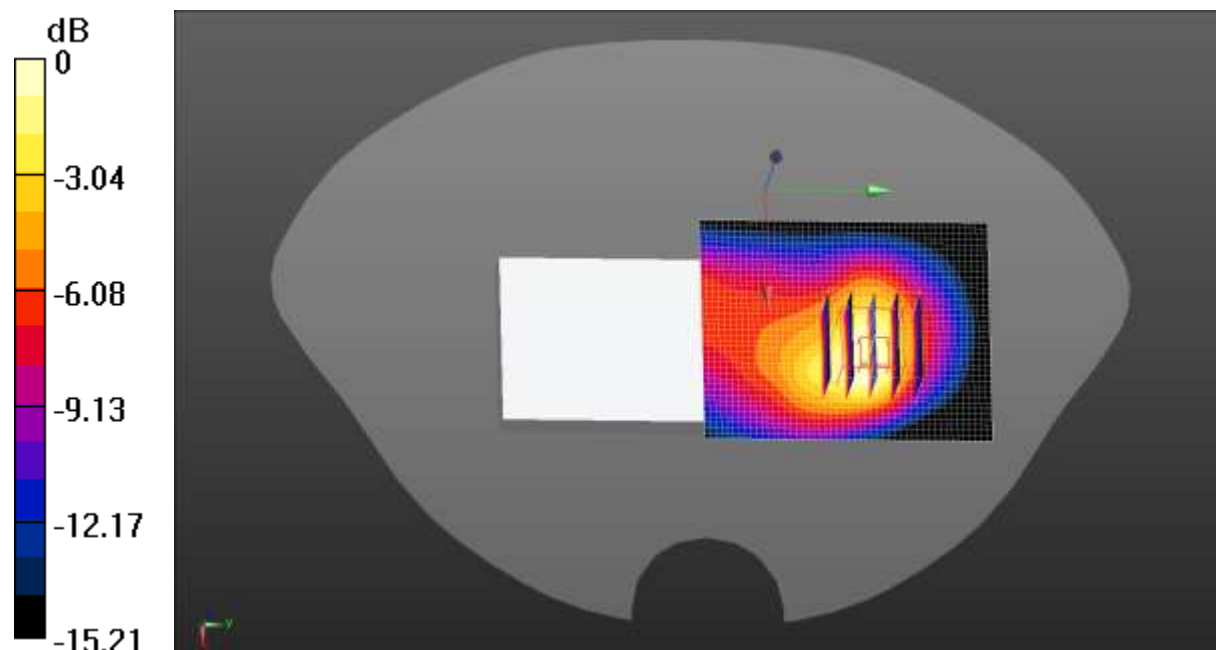
Medium parameters used:  $f = 1909.8 \text{ MHz}$ ;  $\sigma = 1.354 \text{ S/m}$ ;  $\epsilon_r = 39.01$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(8.37, 8.37, 8.37) @ 1909.8 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**GPRS 1900 4slots Body Back/High Channel/Area Scan (41x51x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$   
Maximum value of SAR (interpolated) = 0.956 W/kg

**GPRS 1900 4slots Body Back/High Channel/Zoom Scan (5x5x7)/Cube 0:**  
Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$   
Reference Value = 11.99 V/m; Power Drift = 0.14 dB  
Peak SAR (extrapolated) = 1.04 W/kg  
**SAR(1 g) = 0.548 W/kg; SAR(10 g) = 0.290 W/kg**  
Smallest distance from peaks to all points 3 dB below = 12.2 mm  
Ratio of SAR at M2 to SAR at M1 = 52.4%  
Maximum value of SAR (measured) = 0.858 W/kg



0 dB = 0.858 W/kg = -0.67 dBW/kg

Test Laboratory: JYTSZ

Date: 08.05.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

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

Medium parameters used (interpolated):  $f = 1852.4 \text{ MHz}$ ;  $\sigma = 1.34 \text{ S/m}$ ;  $\epsilon_r = 38.583$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(8.37, 8.37, 8.37) @ 1852.4 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**WCDMA 1900 Body Back/Low Channel/Area Scan (41x51x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 1.70 W/kg

**WCDMA 1900 Body Back/Low Channel/Zoom Scan (5x5x7)/Cube 0:**

Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 16.25 V/m; Power Drift = 0.05 dB

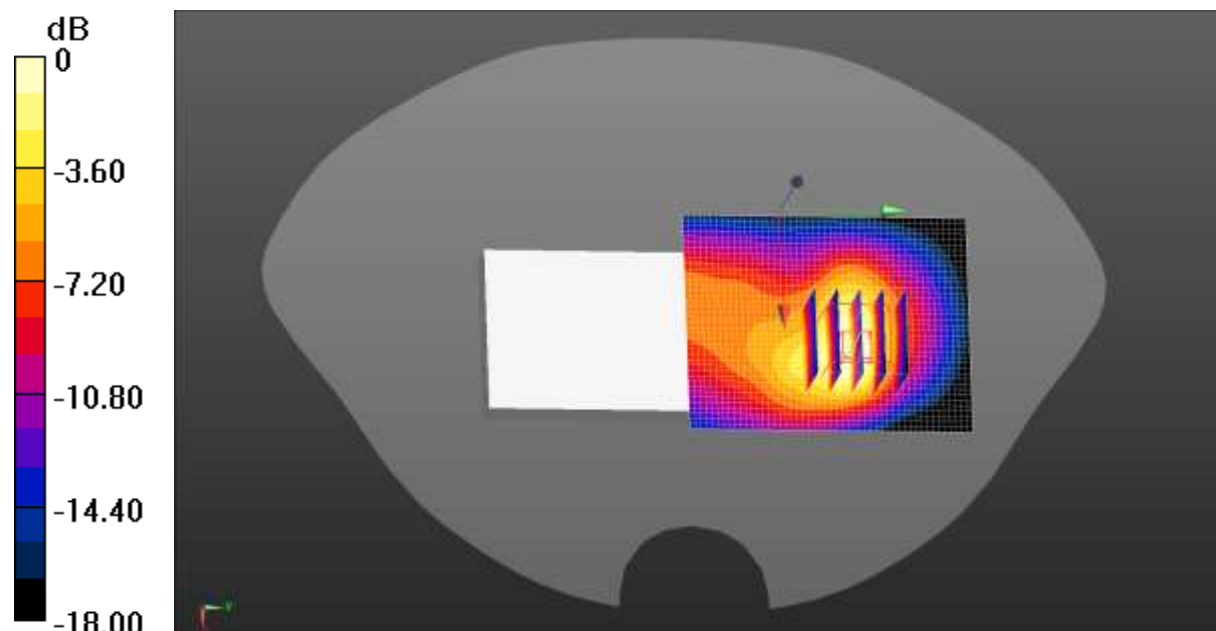
Peak SAR (extrapolated) = 1.88 W/kg

**SAR(1 g) = 0.986 W/kg; SAR(10 g) = 0.515 W/kg**

Smallest distance from peaks to all points 3 dB below = 10.7 mm

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

Maximum value of SAR (measured) = 1.54 W/kg



0 dB = 1.54 W/kg = 1.88 dBW/kg

Test Laboratory: JYTSZ

Date: 08.05.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, UMTS-FDD(WCDMA) (0); Frequency: 1712.4 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1712.4$  MHz;  $\sigma = 1.316$  S/m;  $\epsilon_r = 38.594$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(8.62, 8.62, 8.62) @ 1712.4 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**WCDMA 1700 Body Back/Low Channel/Area Scan (41x51x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.77 W/kg

**WCDMA 1700 Body Back/Low Channel/Zoom Scan (5x5x7)/Cube 0:**

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.50 V/m; Power Drift = -0.02 dB

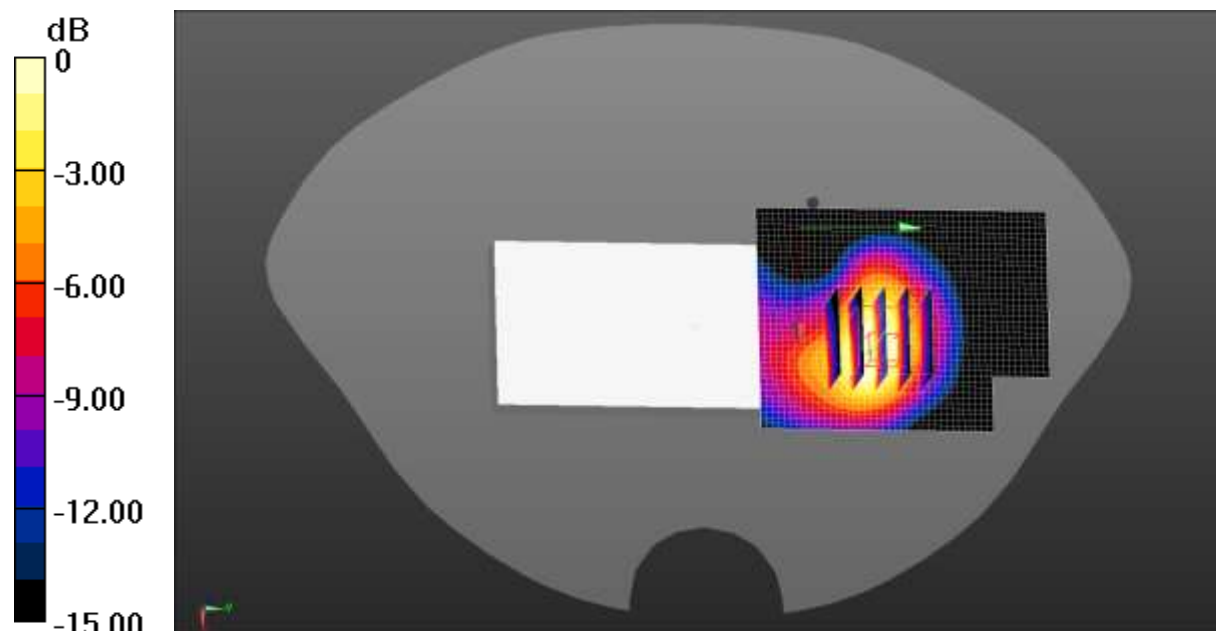
Peak SAR (extrapolated) = 1.89 W/kg

**SAR(1 g) = 1 W/kg; SAR(10 g) = 0.513 W/kg**

Smallest distance from peaks to all points 3 dB below = 9.3 mm

Ratio of SAR at M2 to SAR at M1 = 54.5%

Maximum value of SAR (measured) = 1.48 W/kg



0 dB = 1.48 W/kg = 1.70 dBW/kg

Test Laboratory: JYTSZ

Date: 08.02.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, UMTS-FDD(WCDMA) (0); Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 836.6$  MHz;  $\sigma = 0.917$  S/m;  $\epsilon_r = 40.25$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(10.2, 10.2, 10.2) @ 836.6 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**WCDMA 850 Body Back/Middle Channel/Area Scan (41x51x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.844 W/kg

**WCDMA 850 Body Back/Middle Channel/Zoom Scan (5x5x7)/Cube 0:**

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 30.96 V/m; Power Drift = 0.00 dB

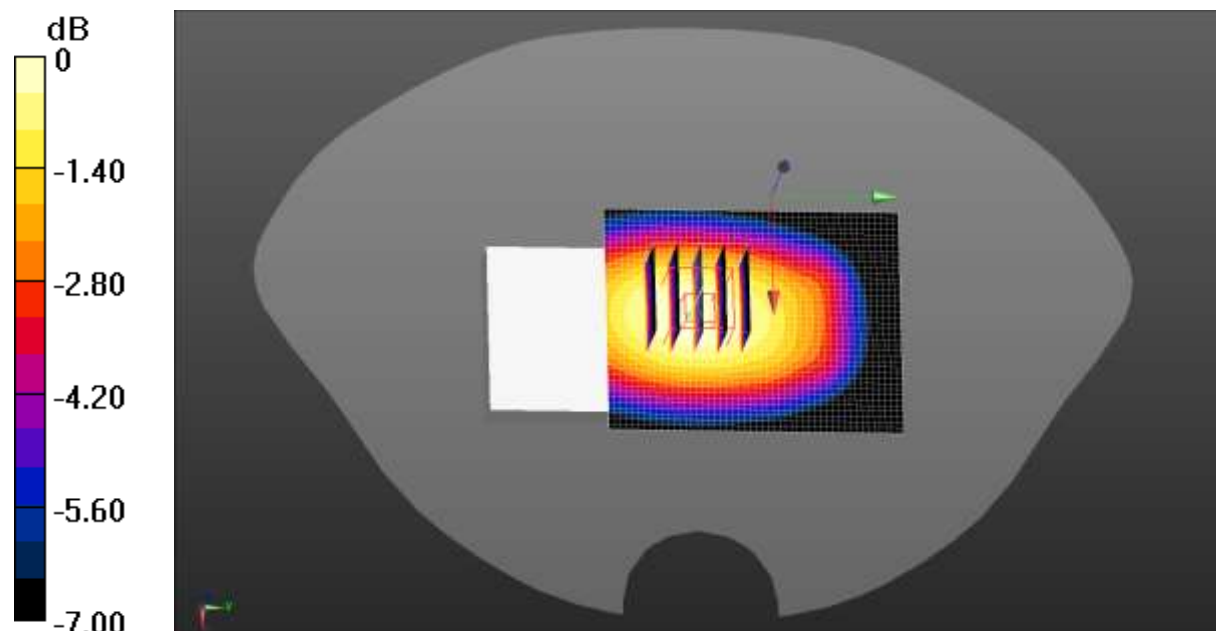
Peak SAR (extrapolated) = 0.957 W/kg

**SAR(1 g) = 0.651 W/kg; SAR(10 g) = 0.458 W/kg**

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

Ratio of SAR at M2 to SAR at M1 = 68.5%

Maximum value of SAR (measured) = 0.837 W/kg



0 dB = 0.837 W/kg = -0.77 dBW/kg



Test Laboratory: JYTSZ

Date: 08.05.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, LTE-Fdd(USA) 1RB QPSK (0); Frequency: 1860 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1860 \text{ MHz}$ ;  $\sigma = 1.344 \text{ S/m}$ ;  $\epsilon_r = 39.266$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section

DASY5 Configuration:

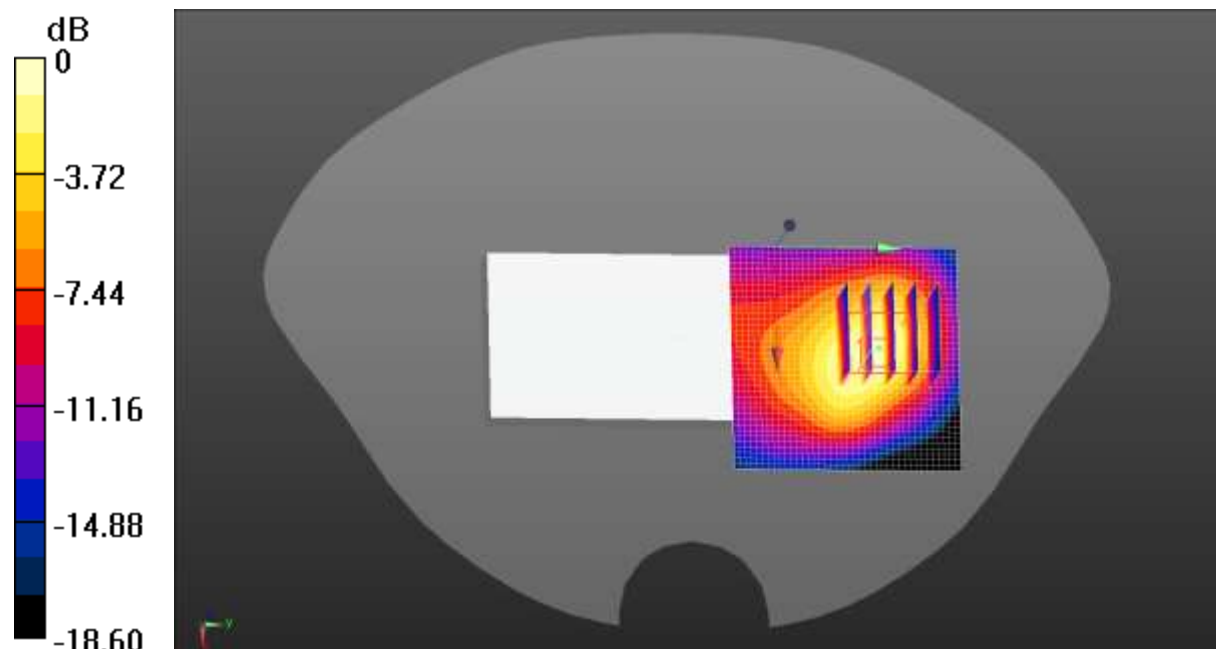
- Probe: EX3DV4 - SN7601; ConvF(8.37, 8.37, 8.37) @ 1860 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**LTE Band 2 1RB(20MHz) Body Back/Low Channel/Area Scan (41x41x1):**

Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$   
Maximum value of SAR (interpolated) = 1.30 W/kg

**LTE Band 2 1RB(20MHz) Body Back/Low Channel/Zoom Scan (5x5x7)/Cube**

**0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$   
Reference Value = 12.86 V/m; Power Drift = 0.02 dB  
Peak SAR (extrapolated) = 1.94 W/kg  
**SAR(1 g) = 1.03 W/kg; SAR(10 g) = 0.542 W/kg**  
Smallest distance from peaks to all points 3 dB below = 10.7 mm  
Ratio of SAR at M2 to SAR at M1 = 53.9%  
Maximum value of SAR (measured) = 1.49 W/kg



0 dB = 1.49 W/kg = 1.73 dBW/kg

Test Laboratory: JYTSZ

Date: 08.02.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, LTE-Fdd(USA) 1RB QPSK (0); Frequency: 836.5 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 844$  MHz;  $\sigma = 0.917$  S/m;  $\epsilon_r = 40.25$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(10.2, 10.2, 10.2) @ 836.5 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**LTE Band 5 1RB(10MHz) Body Back/High Channel/Area Scan (41x51x1):**

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.781 W/kg

**LTE Band 5 1RB(10MHz) Body Back/High Channel/Zoom Scan (5x5x7)/Cube**

**0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 29.55 V/m; Power Drift = 0.00 dB

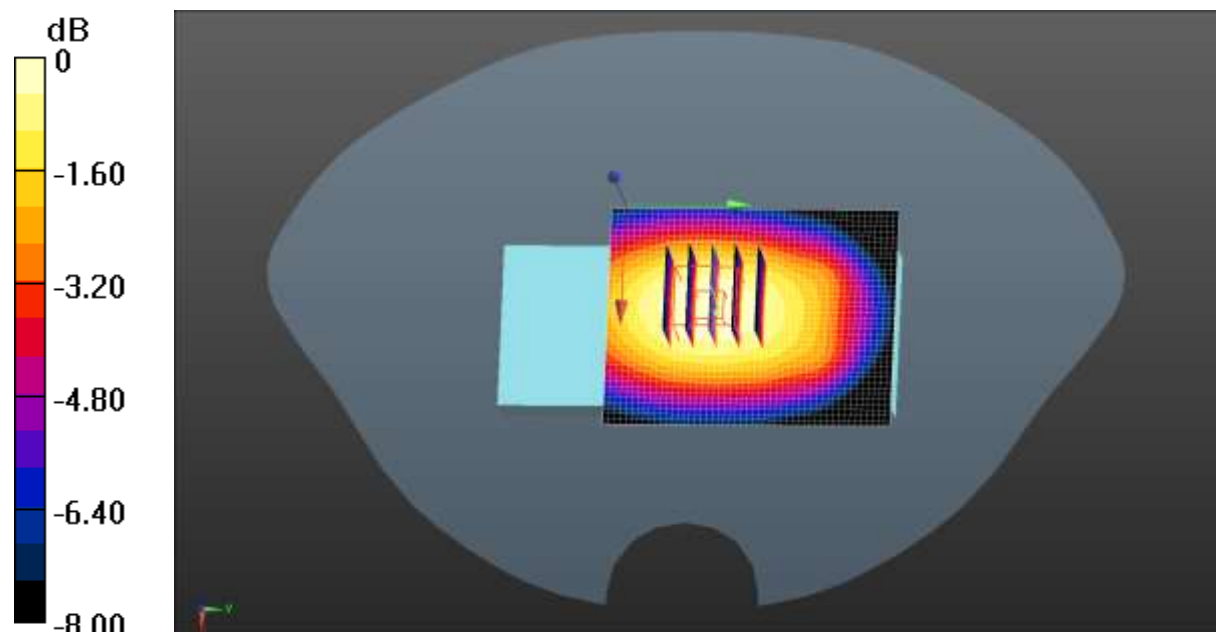
Peak SAR (extrapolated) = 0.886 W/kg

**SAR(1 g) = 0.606 W/kg; SAR(10 g) = 0.429 W/kg**

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

Ratio of SAR at M2 to SAR at M1 = 68.7%

Maximum value of SAR (measured) = 0.778 W/kg



0 dB = 0.778 W/kg = -1.09 dBW/kg

Test Laboratory: JYTSZ

Date: 08.07.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, LTE-Fdd(USA) 1RB QPSK (0); Frequency: 2510 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2510 \text{ MHz}$ ;  $\sigma = 1.788 \text{ S/m}$ ;  $\epsilon_r = 37.895$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section

DASY5 Configuration:

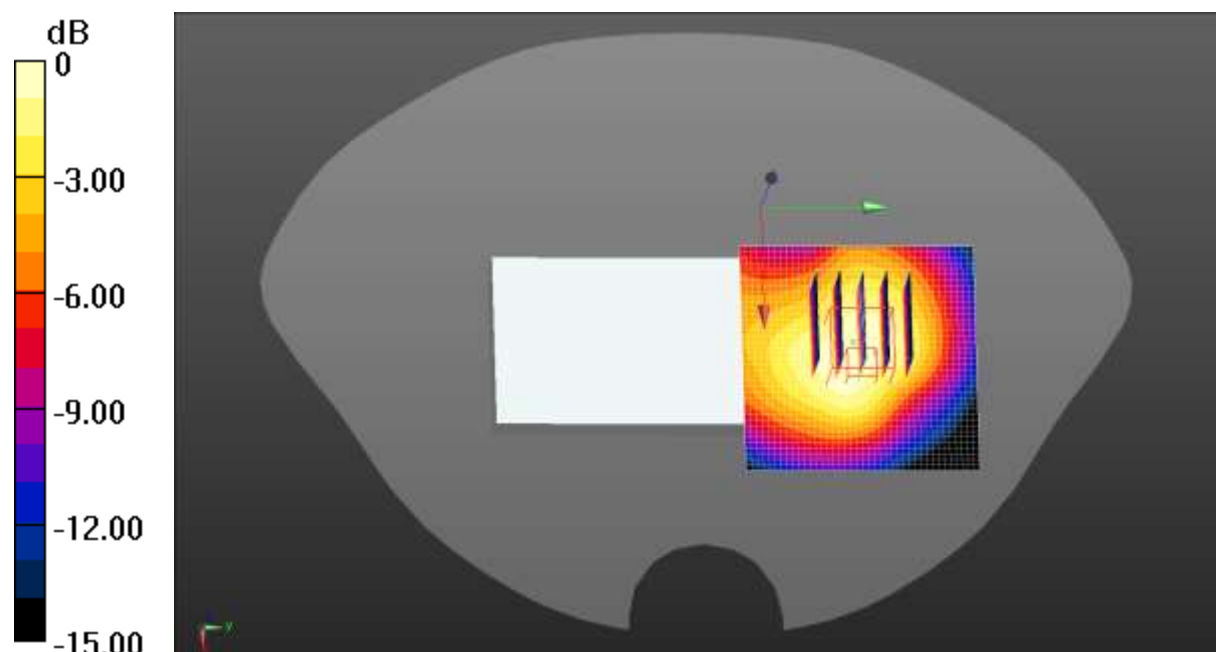
- Probe: EX3DV4 - SN7601; ConvF(7.74, 7.74, 7.74) @ 2510 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**LTE Band 7 1RB(20MHz) Body Back/Low Channel/Area Scan (41x41x1):**

Interpolated grid:  $dx=1.200 \text{ mm}$ ,  $dy=1.200 \text{ mm}$   
Maximum value of SAR (interpolated) = 1.39 W/kg

**LTE Band 7 1RB(20MHz) Body Back/Low Channel/Zoom Scan (5x5x7)/Cube**

**0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$   
Reference Value = 21.31 V/m; Power Drift = -0.01 dB  
Peak SAR (extrapolated) = 1.79 W/kg  
**SAR(1 g) = 0.938 W/kg; SAR(10 g) = 0.512 W/kg**  
Smallest distance from peaks to all points 3 dB below = 30.8 mm  
Ratio of SAR at M2 to SAR at M1 = 52.4%  
Maximum value of SAR (measured) = 1.46 W/kg



Test Laboratory: JYTSZ

Date: 08.02.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, LTE-Fdd(USA) 1RB QPSK (0); Frequency: 711 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 711 \text{ MHz}$ ;  $\sigma = 0.878 \text{ S/m}$ ;  $\epsilon_r = 40.626$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(10.58, 10.58, 10.58) @ 711 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**LTE Band 12 1RB(10MHz) Body Back/High Channel/Area Scan (41x51x1):**

Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 0.461 W/kg

**LTE Band 12 1RB(10MHz) Body Back/High Channel/Zoom Scan**

**(5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 22.55 V/m; Power Drift = -0.06 dB

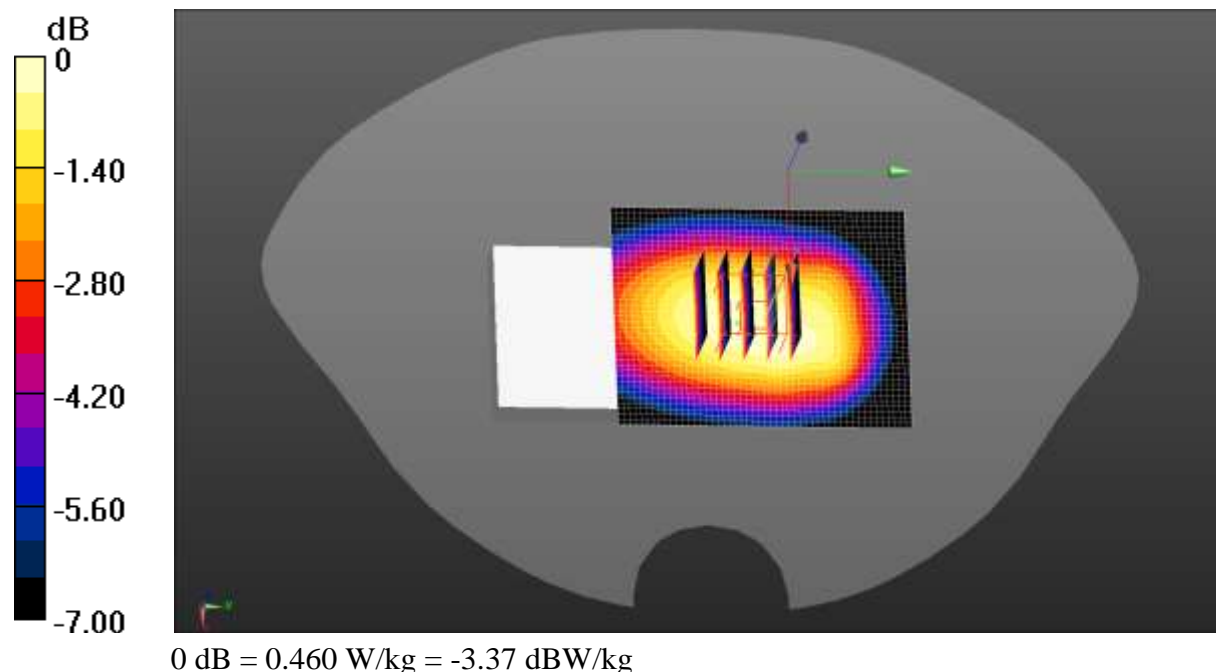
Peak SAR (extrapolated) = 0.529 W/kg

**SAR(1 g) = 0.355 W/kg; SAR(10 g) = 0.249 W/kg**

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

Ratio of SAR at M2 to SAR at M1 = 67.2%

Maximum value of SAR (measured) = 0.460 W/kg



Test Laboratory: JYTSZ

Date: 08.02.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, LTE-Fdd(USA) 1RB QPSK (0); Frequency: 782 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 782 \text{ MHz}$ ;  $\sigma = 0.909 \text{ S/m}$ ;  $\epsilon_r = 40.302$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(10.58, 10.58, 10.58) @ 782 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**LTE Band 13 1RB(10MHz) Body Back/Middle Channel/Area Scan (41x51x1):**

Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) =  $0.690 \text{ W/kg}$

**LTE Band 13 1RB(10MHz) Body Back/Middle Channel/Zoom Scan**

**(5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $28.20 \text{ V/m}$ ; Power Drift =  $-0.02 \text{ dB}$

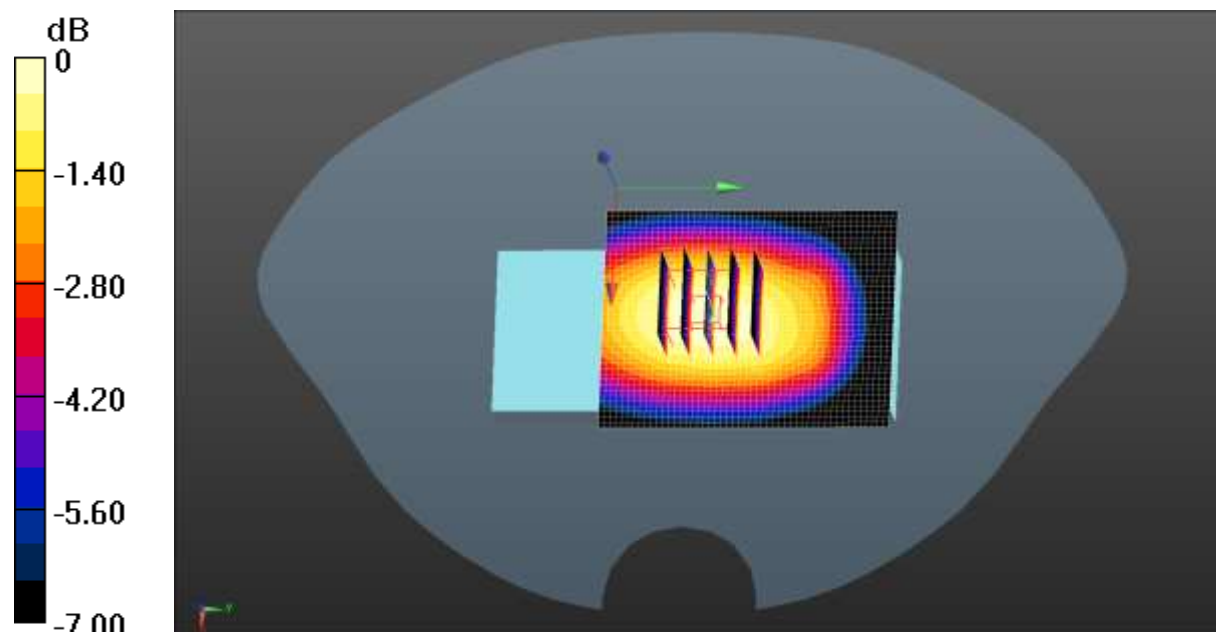
Peak SAR (extrapolated) =  $0.786 \text{ W/kg}$

**SAR(1 g) =  $0.535 \text{ W/kg}$ ; SAR(10 g) =  $0.377 \text{ W/kg}$**

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

Ratio of SAR at M2 to SAR at M1 =  $68.1\%$

Maximum value of SAR (measured) =  $0.691 \text{ W/kg}$



0 dB =  $0.691 \text{ W/kg}$  =  $-1.61 \text{ dBW/kg}$

Test Laboratory: JYTSZ

Date: 08.05.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, LTE-Fdd(USA) 1RB QPSK (0); Frequency: 1720 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1720 \text{ MHz}$ ;  $\sigma = 1.32 \text{ S/m}$ ;  $\epsilon_r = 38.578$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section

DASY5 Configuration:

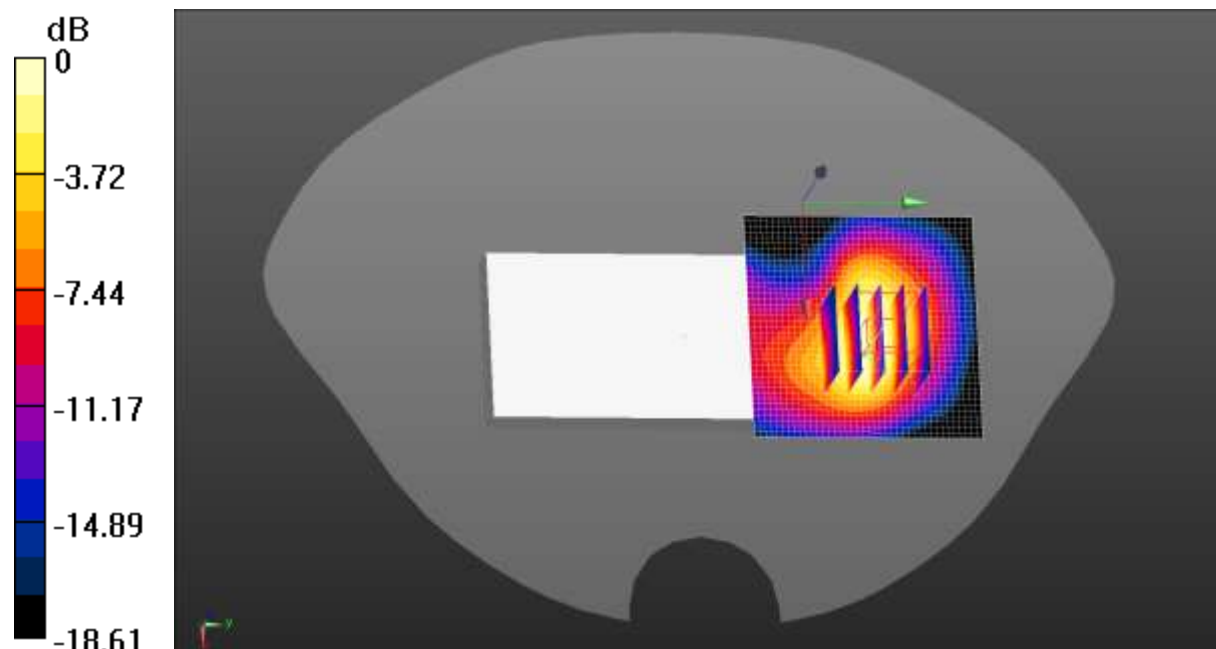
- Probe: EX3DV4 - SN7601; ConvF(8.62, 8.62, 8.62) @ 1720 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**LTE Band 66 1RB(20MHz) Body Back/Low Channel/Area Scan (41x41x1):**

Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$   
Maximum value of SAR (interpolated) = 1.79 W/kg

**LTE Band 66 1RB(20MHz) Body Back/Low Channel/Zoom Scan**

**(5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$   
Reference Value = 10.78 V/m; Power Drift = 0.05 dB  
Peak SAR (extrapolated) = 2.36 W/kg  
**SAR(1 g) = 1.25 W/kg; SAR(10 g) = 0.661 W/kg**  
Smallest distance from peaks to all points 3 dB below = 9.3 mm  
Ratio of SAR at M2 to SAR at M1 = 55%  
Maximum value of SAR (measured) = 1.84 W/kg



0 dB = 1.84 W/kg = 2.65 dBW/kg

Test Laboratory: JYTSZ

Date: 08.07.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, LTE-Fdd(USA) 1RB QPSK (0); Frequency: 1720 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 1720 \text{ MHz}$ ;  $\sigma = 1.32 \text{ S/m}$ ;  $\epsilon_r = 38.578$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(8.62, 8.62, 8.62) @ 1720 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**LTE Band 66 1RB(20MHz) Body Back With Device Holder/Low**

**Channel/Area Scan (51x51x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 3.66 W/kg

**LTE Band 66 1RB(20MHz) Body Back With Device Holder /Low**

**Channel/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 13.57 V/m; Power Drift = -0.11 dB

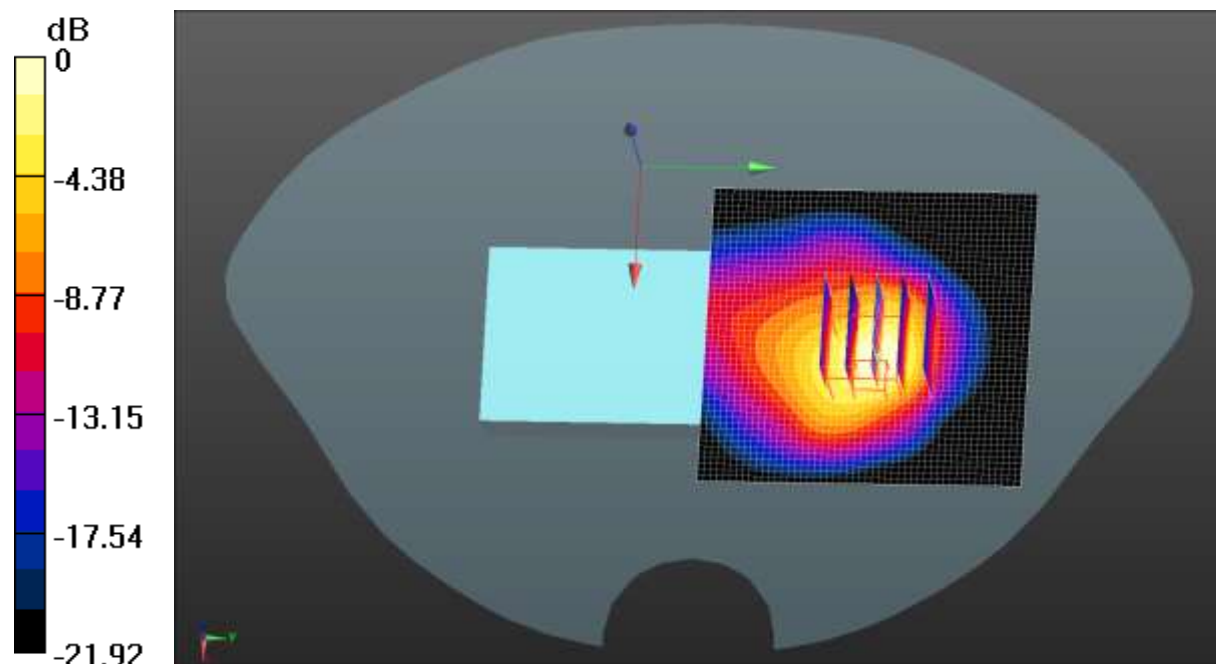
Peak SAR (extrapolated) = 4.63 W/kg

**SAR(1 g) = 2 W/kg; SAR(10 g) = 0.894 W/kg**

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 43.2%

Maximum value of SAR (measured) = 3.65 W/kg



0 dB = 3.65 W/kg = 5.62 dBW/kg

Test Laboratory: JYTSZ

Date: 08.07.2022

**DUT: 4G VoLTE Feature Phone; Type: G799; Serial: 1#**

Communication System: UID 0, LTE-Fdd(USA) 1RB QPSK (0); Frequency: 1720 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 1720 \text{ MHz}$ ;  $\sigma = 1.32 \text{ S/m}$ ;  $\epsilon_r = 38.578$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7601; ConvF(8.62, 8.62, 8.62) @ 1720 MHz; Calibrated: 12.28.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 06.06.2022
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

**LTE Band 66 1RB(20MHz) Body Back Without Device Holder/Low**

**Channel/Area Scan (51x51x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 3.32 W/kg

**LTE Band 66 1RB(20MHz) Body Back Without Device Holder/Low**

**Channel/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 10.53 V/m; Power Drift = 0.12 dB

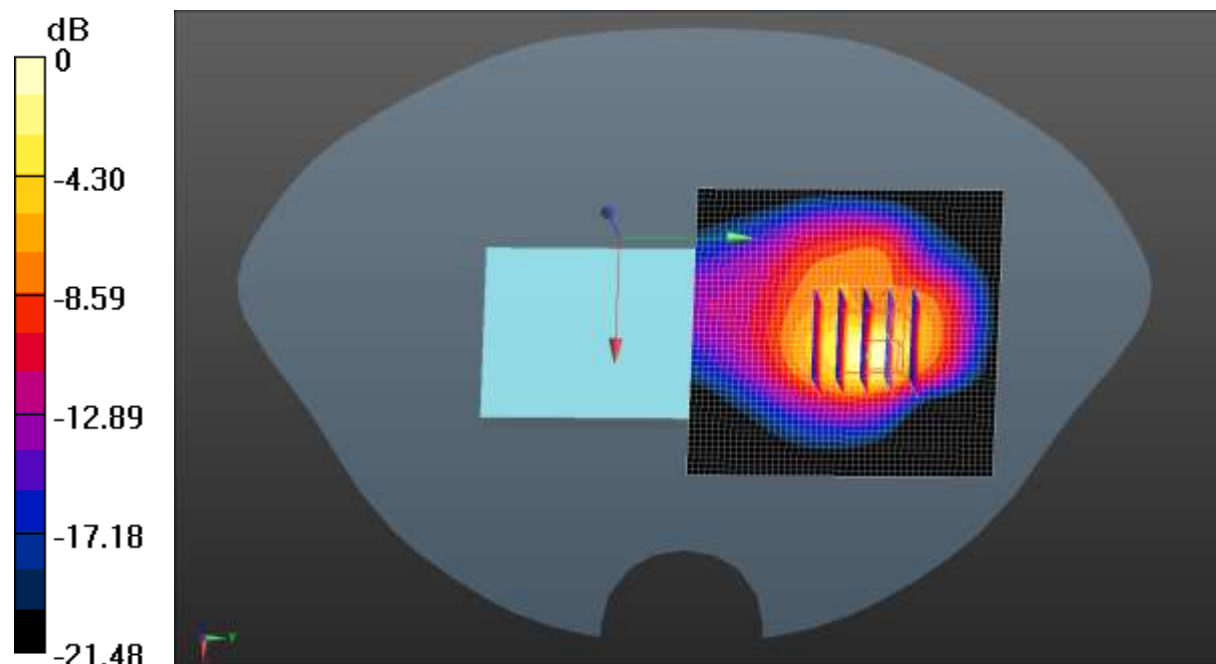
Peak SAR (extrapolated) = 5.11 W/kg

**SAR(1 g) = 1.99 W/kg; SAR(10 g) = 0.894 W/kg**

Smallest distance from peaks to all points 3 dB below = 5.8 mm

Ratio of SAR at M2 to SAR at M1 = 41.2%

Maximum value of SAR (measured) = 3.50 W/kg



0 dB = 3.50 W/kg = 5.44 dBW/kg



## Appendix C: System Calibration Certificate

Calibration information for E-field probes



Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China  
 Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504  
 E-mail: cttl@chinattl.com [Http://www.chinattl.cn](http://www.chinattl.cn)



中国认可  
 国际互认  
 校准  
 CALIBRATION  
 CNAS L0570

Client **JYT(formerly CCIS)**

Certificate No: **Z21-60407**

**CALIBRATION CERTIFICATE**

Object: **EX3DV4 - SN : 7601**

Calibration Procedure(s): **FF-Z11-004-02**  
**Calibration Procedures for Dosimetric E-field Probes**

Calibration date: **December 28, 2021**

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	15-Jun-21(CTTL, No.J21X04466)	Jun-22
Power sensor NRP-Z91	101547	15-Jun-21(CTTL, No.J21X04466)	Jun-22
Power sensor NRP-Z91	101548	15-Jun-21(CTTL, No.J21X04466)	Jun-22
Reference 10dBAttenuator	18N50W-10dB	10-Feb-20(CTTL, No.J20X00525)	Feb-22
Reference 20dBAttenuator	18N50W-20dB	10-Feb-20(CTTL, No.J20X00526)	Feb-22
Reference Probe EX3DV4	SN 3617	27-Jan-21(SPEAG, No.EX3-3617_Jan21)	Jan-22
DAE4	SN 1555	20-Aug-21(SPEAG, No.DAE4-1555_Aug21/2)	Aug-22
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
SignalGenerator MG3700A	6201052605	16-Jun-21(CTTL, No.J21X04467)	Jun-22
Network Analyzer E5071C	MY46110673	14-Jan-21 (CTTL, No.J21X00232)	Jan -22

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

Issued: December 30, 2021

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



Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China  
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 E-mail: cttl@chinattl.com <http://www.chinattl.cn>

**Glossary:**

- TSL tissue simulating liquid
- NORM<sub>x,y,z</sub> sensitivity in free space
- ConvF sensitivity in TSL / NORM<sub>x,y,z</sub>
- DCP diode compression point
- CF crest factor (1/duty\_cycle) of the RF signal
- A,B,C,D modulation dependent linearization parameters
- Polarization  $\Phi$   $\Phi$  rotation around probe axis
- Polarization  $\theta$   $\theta$  rotation around an axis that is in the plane normal to probe axis (at measurement center),  $\theta=0$  is normal to probe axis
- Connector Angle information used in DASY system to align probe sensor X to the robot coordinate system

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

- a) 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
- b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Methods Applied and Interpretation of Parameters:**

- NORM<sub>x,y,z</sub>: Assessed for E-field polarization  $\theta=0$  ( $f \leq 900\text{MHz}$  in TEM-cell;  $f > 1800\text{MHz}$ : waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not effect the  $E^2$ -field uncertainty inside TSL (see below ConvF).
- NORM(f)<sub>x,y,z</sub> = NORM<sub>x,y,z</sub> \* frequency\_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP<sub>x,y,z</sub>: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.
- Ax,y,z; Bx,y,z; Cx,y,z; VRx,y,z; A,B,C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800\text{MHz}$ ) and inside waveguide using analytical field distributions based on power measurements for  $f > 800\text{MHz}$ . The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty valued are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50\text{MHz}$  to  $\pm 100\text{MHz}$ .
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).



Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China  
 Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504  
 E-mail: cttl@chinattl.com [Http://www.chinattl.cn](http://www.chinattl.cn)

## DASY/EASY – Parameters of Probe: EX3DV4 – SN:7601

### Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup>	0.71	0.66	0.66	$\pm 10.0\%$
DGP(mV) <sup>B</sup>	109.8	108.5	107.3	

### Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc <sup>E</sup> (k=2)
0	CW	X	0.0	0.0	1.0	0.00	223.3	$\pm 2.1\%$
		Y	0.0	0.0	1.0		213.1	
		Z	0.0	0.0	1.0		208.0	

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%.

<sup>A</sup> The uncertainties of Norm X, Y, Z do not affect the  $E^2$ -field uncertainty inside TSL (see Page 4).

<sup>B</sup> Numerical linearization parameter; uncertainty not required.

<sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.



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## DASY/EASY – Parameters of Probe: EX3DV4 – SN:7601

### Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz] <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unct. (k=2)
750	41.9	0.89	10.58	10.58	10.58	0.14	1.33	±12.1%
835	41.5	0.90	10.20	10.20	10.20	0.11	1.60	±12.1%
900	41.5	0.97	10.18	10.18	10.18	0.16	1.34	±12.1%
1750	40.1	1.37	8.62	8.62	8.62	0.25	1.00	±12.1%
1900	40.0	1.40	8.37	8.37	8.37	0.23	1.07	±12.1%
2300	39.5	1.67	7.94	7.94	7.94	0.51	0.73	±12.1%
2450	39.2	1.80	7.74	7.74	7.74	0.37	0.93	±12.1%
2600	39.0	1.96	7.49	7.49	7.49	0.43	0.86	±12.1%
5250	35.9	4.71	5.35	5.35	5.35	0.45	1.35	±13.3%
5600	35.5	5.07	4.96	4.96	4.96	0.50	1.30	±13.3%
5750	35.4	5.22	5.04	5.04	5.04	0.50	1.32	±13.3%

<sup>C</sup> Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

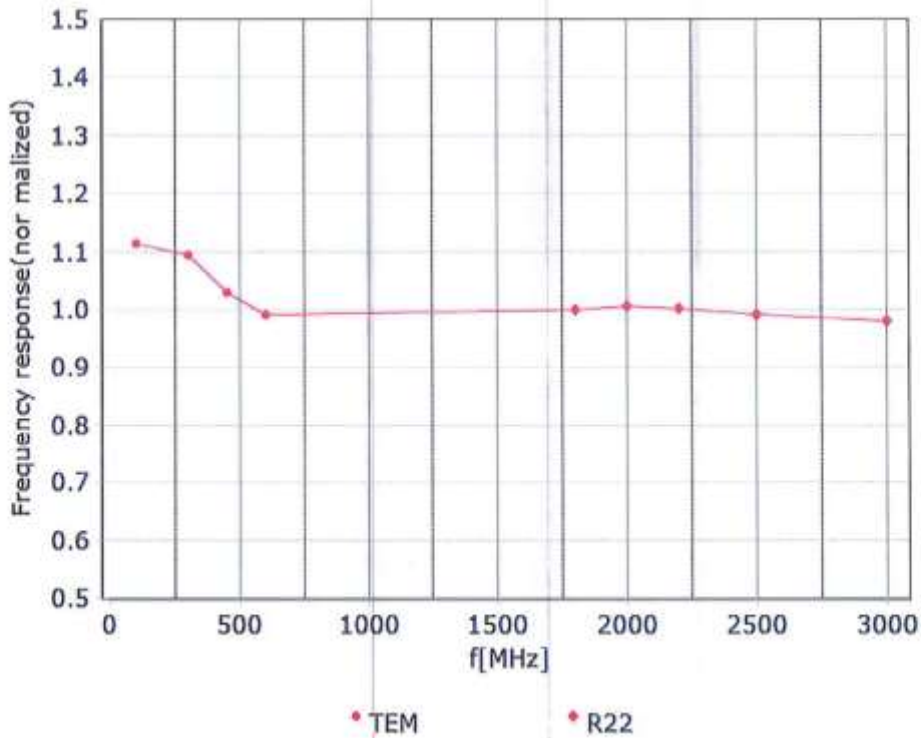
<sup>F</sup> At frequency below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-8 GHz at any distance larger than half the probe tip diameter from the boundary.



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### Frequency Response of E-Field (TEM-Cell: ifi110 EXX, Waveguide: R22)



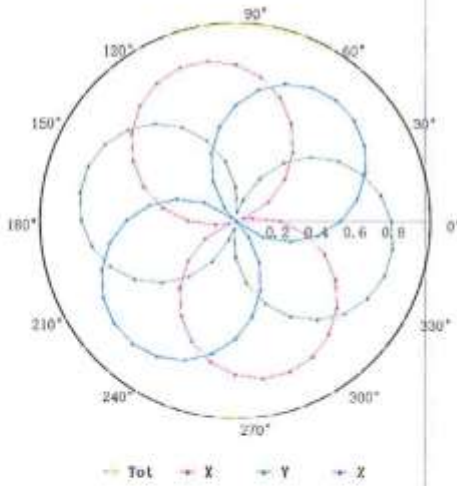
Uncertainty of Frequency Response of E-field:  $\pm 7.4\%$  ( $k=2$ )



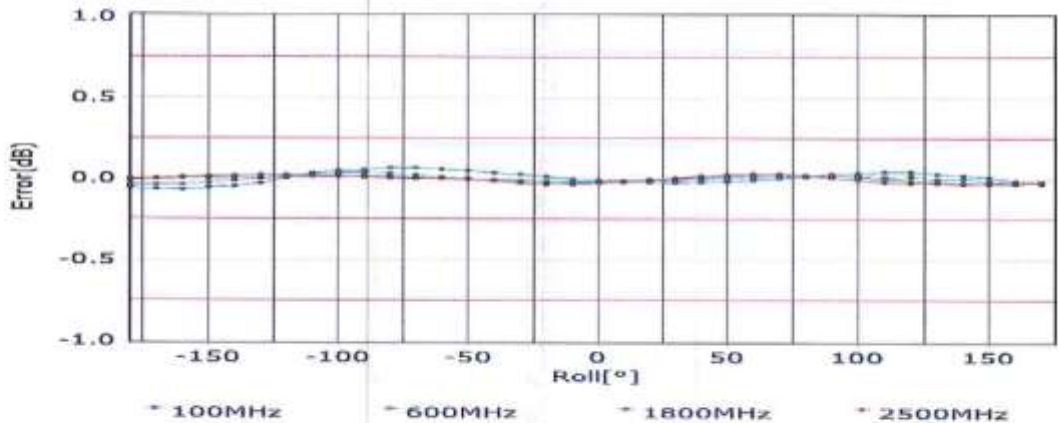
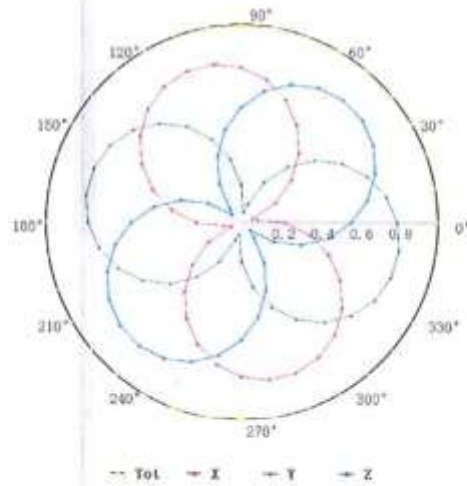
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**Receiving Pattern ( $\Phi$ ),  $\theta=0^\circ$**

**f=600 MHz, TEM**



**f=1800 MHz, R22**

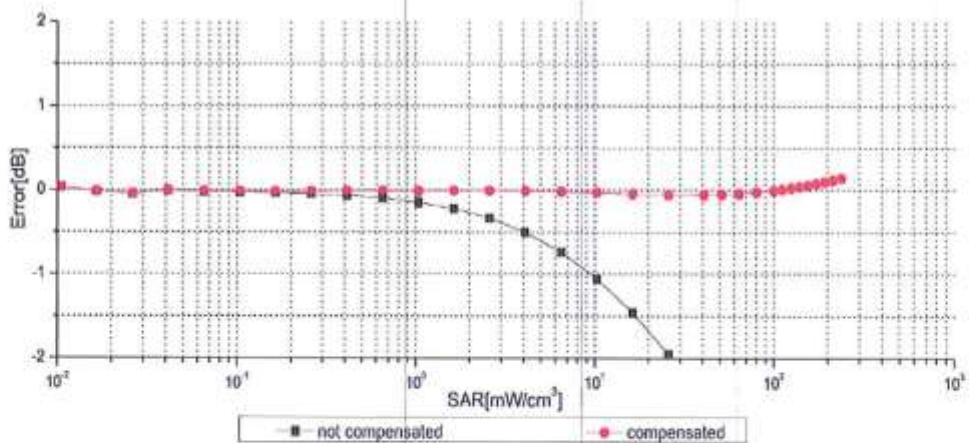
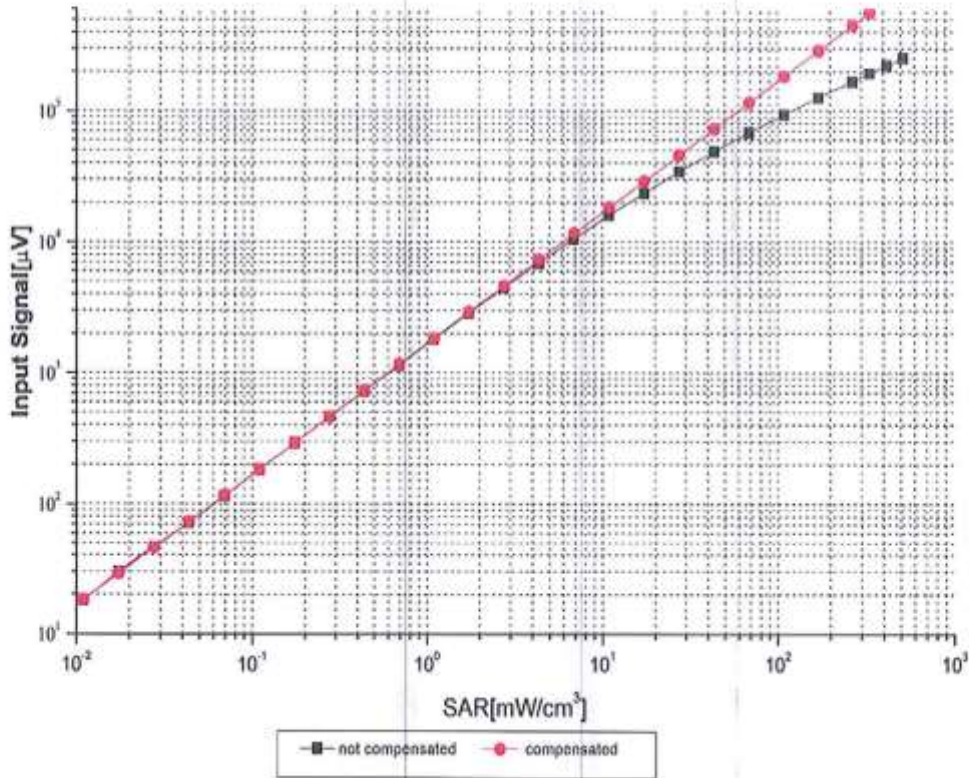


Uncertainty of Axial Isotropy Assessment:  $\pm 1.2\%$  ( $k=2$ )



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### Dynamic Range f(SAR<sub>head</sub>) (TEM cell, f = 900 MHz)



Uncertainty of Linearity Assessment:  $\pm 0.9\%$  ( $k=2$ )



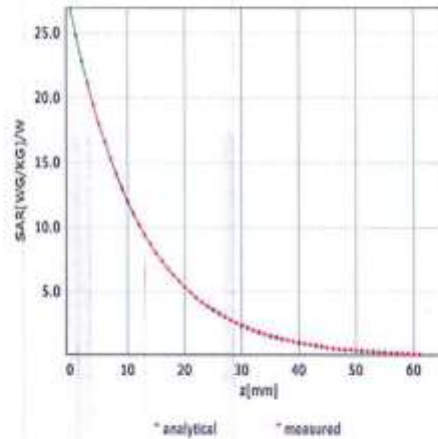
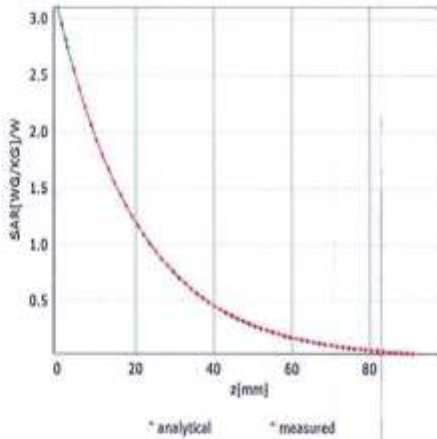


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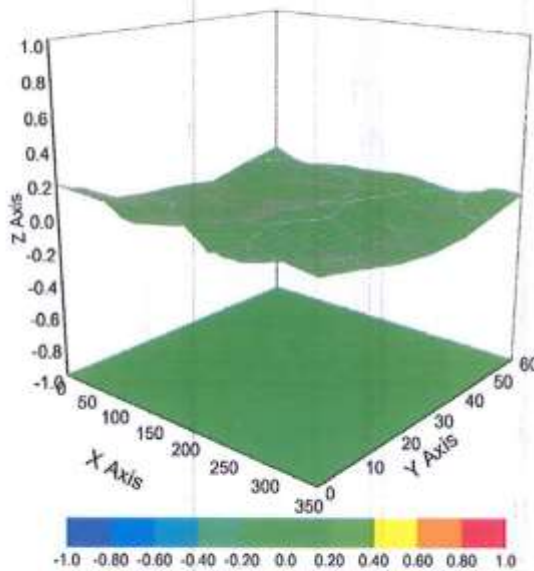
### Conversion Factor Assessment

f=750 MHz,WGLS R9(H\_convF)

f=1750 MHz,WGLS R22(H\_convF)



### Deviation from Isotropy in Liquid



Uncertainty of Spherical Isotropy Assessment:  $\pm 3.2\%$  ( $k=2$ )



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**DASY/EASY – Parameters of Probe: EX3DV4 – SN:7601**

**Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	59.4
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	9mm
Tip Diameter	2.5mm
Probe Tip to Sensor X Calibration Point	1mm
Probe Tip to Sensor Y Calibration Point	1mm
Probe Tip to Sensor Z Calibration Point	1mm
Recommended Measurement Distance from Surface	1.4mm

Calibration information for Dipole



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CNAS L0570

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Client

CCIS

Certificate No:

Z20-60195

**CALIBRATION CERTIFICATE**

Object: D750V3 - SN: 1118

Calibration Procedure(s): FF-Z11-003-01  
Calibration Procedures for dipole validation kits

Calibration date: May 28, 2020

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	106277	04-Sep-19 (CTTL, No.J19X07825)	Sep-20
Power sensor NRP6A	104291	04-Sep-19 (CTTL, No.J19X07825)	Sep-20
Reference Probe EX3DV4 DAE4	SN 7514	27-Sep-19(CTTL-SPEAG,No.Z19-60306)	Sep-20
	SN 1555	22-Aug-19(CTTL-SPEAG,No.Z19-60295)	Aug-20
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	25-Feb-20 (CTTL, No.J20X00516)	Feb-21
NetworkAnalyzer E5071C	MY46110673	10-Feb-20 (CTTL, No.J20X00515)	Feb-21

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

Issued: May 30, 2020

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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:**

- a) 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
- b) IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- c) 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
- d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

**Additional Documentation:**

- e) 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	V52.10.4
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	750 MHz ± 1 MHz	

**Head TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.1 ± 6 %	0.87 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	2.07 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.37 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.53 W/kg ± 18.7 % (k=2)

**Body TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.0 ± 6 %	0.94 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	2.12 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	8.61 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.40 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	5.67 W/kg ± 18.7 % (k=2)



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**Appendix (Additional assessments outside the scope of CNAS L0570)**

**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	54.4Ω- 4.05jΩ
Return Loss	- 24.8dB

**Antenna Parameters with Body TSL**

Impedance, transformed to feed point	49.0Ω- 6.05jΩ
Return Loss	- 24.2dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	0.900 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: 05.27.2020

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1118**

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 750 \text{ MHz}$ ;  $\sigma = 0.872 \text{ S/m}$ ;  $\epsilon_r = 41.1$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7514; ConvF(9.7, 9.7, 9.7) @ 750 MHz; Calibrated: 2019-09-27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 2019-08-22
- Phantom: MFP\_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

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

Reference Value = 53.61 V/m; Power Drift = -0.04 dB

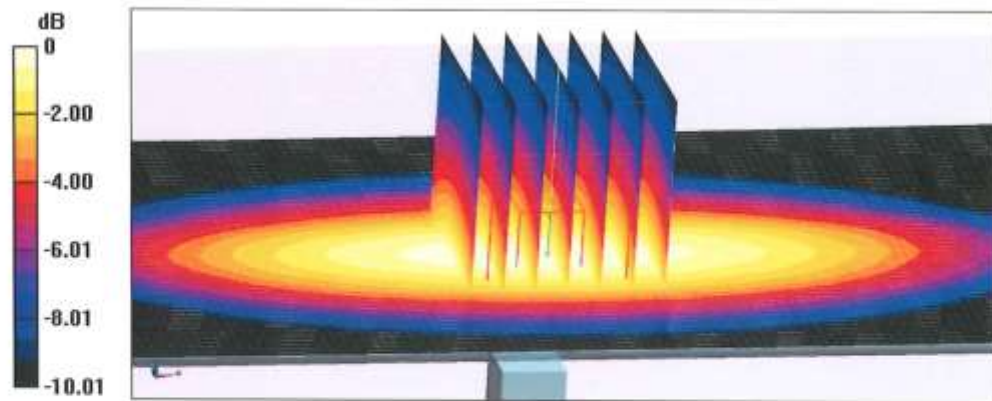
Peak SAR (extrapolated) = 3.21 W/kg

**SAR(1 g) = 2.07 W/kg; SAR(10 g) = 1.37 W/kg**

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

Ratio of SAR at M2 to SAR at M1 = 64.7%

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

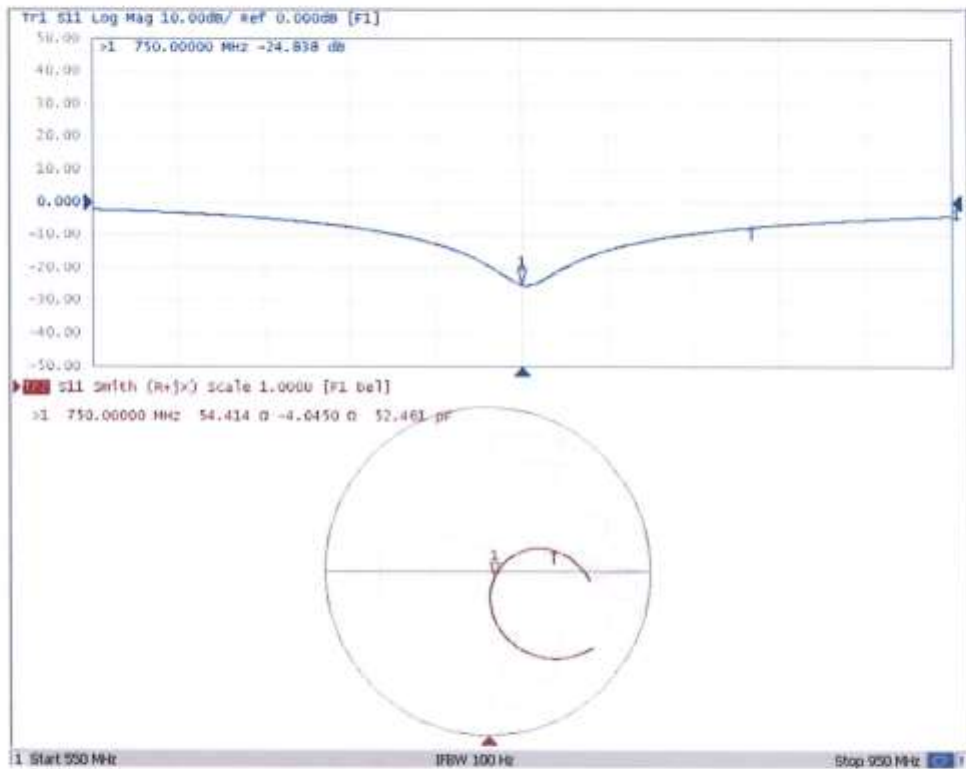


0 dB = 2.80 W/kg = 4.47 dBW/kg



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**Impedance Measurement Plot for Head TSL**







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**DASY5 Validation Report for Body TSL**

Date: 05.28.2020

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1118**

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 750 \text{ MHz}$ ;  $\sigma = 0.938 \text{ S/m}$ ;  $\epsilon_r = 55.02$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Center Section

**DASY5 Configuration:**

- Probe: EX3DV4 - SN7514; ConvF(9.87, 9.87, 9.87) @ 750 MHz; Calibrated: 2019-09-27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 2019-08-22
- Phantom: MFP\_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

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

Reference Value = 53.55 V/m; Power Drift = 0.01 dB

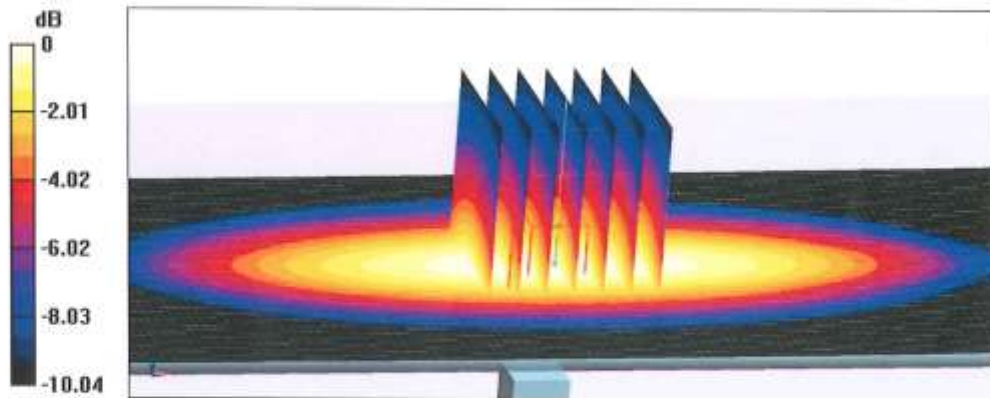
Peak SAR (extrapolated) = 3.31 W/kg

**SAR(1 g) = 2.12 W/kg; SAR(10 g) = 1.4 W/kg**

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

Ratio of SAR at M2 to SAR at M1 = 64.7%

Maximum value of SAR (measured) = 2.87 W/kg

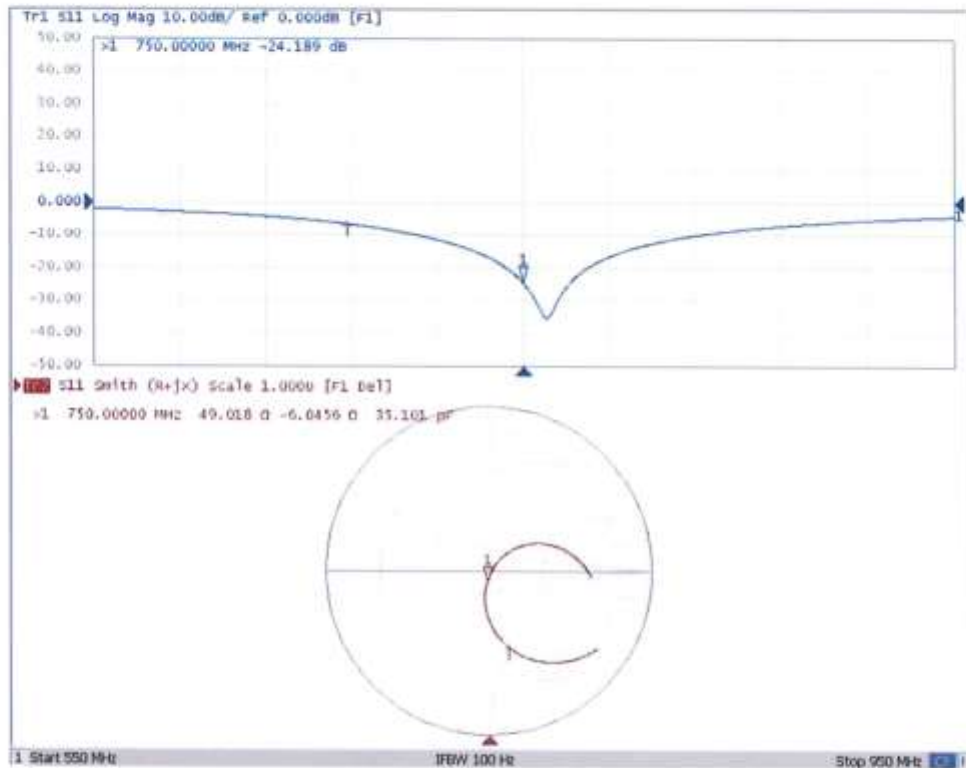


0 dB = 2.87 W/kg = 4.58 dBW/kg



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### Impedance Measurement Plot for Body TSL



## Dipole Impedance and Return Loss calibration Report

**Object:** D750V2 - SN: 1118

**Calibration Date:** May 30, 2022

**Calibration reference:** IEEE Std 1528:2013, IEC 62209-1:2006, FCC KDB 865664 D01

**Calibrated By:** *Janet Wei* (Janet Wei, SAR project engineer)

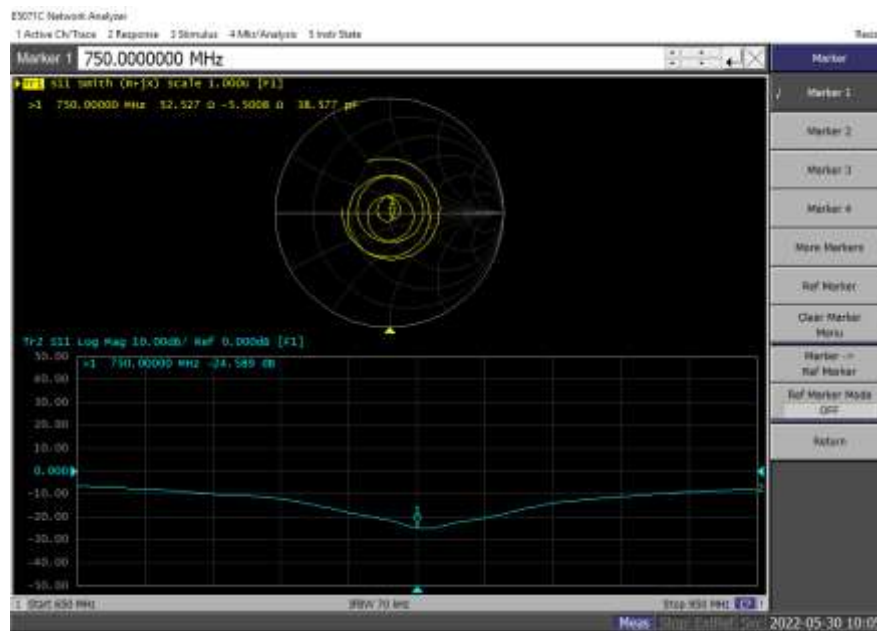
**Reviewed By:** *Winner Zhang* (Winner Zhang, Technical manager)

### Environment of Test Site

Temperature:	21 ~ 23°C
Humidity:	50~60% RH
Atmospheric Pressure:	1011 mbar

### Test Data

Measurement Plot for Head TSL In 2022



### Comparison with Original report

Items	Calibrated By JYT In 2021	Calibrated By JYT In 2022	Deviation	Limit
Impedence for Head TSL	53.02Ω -3.64jΩ	52.53Ω -5.50jΩ	-0.49Ω -1.86jΩ	±5Ω
Return Loss for Head TSL	-26.26	-24.59	-6.36%	±20%(No less than 20 dB)

### Result

Compliance



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 CNAS L0570



Client **JYT**

Certificate No: **Z22-60210**

**CALIBRATION CERTIFICATE**

Object: D835V2 - SN: 4d154  
 Calibration Procedure(s): FF-Z11-003-01  
 Calibration Procedures for dipole validation kits  
 Calibration date: June 8, 2022

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	106277	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Power sensor NRP8S	104291	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Reference Probe EX3DV4	SN 7464	26-Jan-22(SPEAG,No.EX3-7464_Jan22)	Jan-23
DAE4	SN 1556	12-Jan-22(CTTL-SPEAG,No.Z22-60007)	Jan-23
Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	13-Jan-22 (CTTL, No.J22X00409)	Jan-23
Network Analyzer E5071C	MY46110673	14-Jan-22 (CTTL, No.J22X00406)	Jan-23

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

Issued: June 13, 2022

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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:**

- a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

- c) 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	V52.10.4
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	41.9 ± 6 %	0.88 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	2.36 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.60 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.53 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.20 W/kg ± 18.7 % (k=2)



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**Appendix (Additional assessments outside the scope of CNAS L0570)**

**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	48.9Ω- 3.78jΩ
Return Loss	- 28.0dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.310 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point 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 feed-point may be damaged.

**Additional EUT Data**

Manufactured by	SPEAG
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**DASY5 Validation Report for Head TSL**

Date: 2022-06-08

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:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.882 \text{ S/m}$ ;  $\epsilon_r = 41.9$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

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

**DASY5 Configuration:**

- Probe: EX3DV4 - SN7464; ConvF(9.96, 9.96, 9.96) @ 835 MHz; Calibrated: 2022-01-26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2022-01-12
- Phantom: MFP\_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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

Reference Value = 59.20 V/m; Power Drift = -0.01 dB

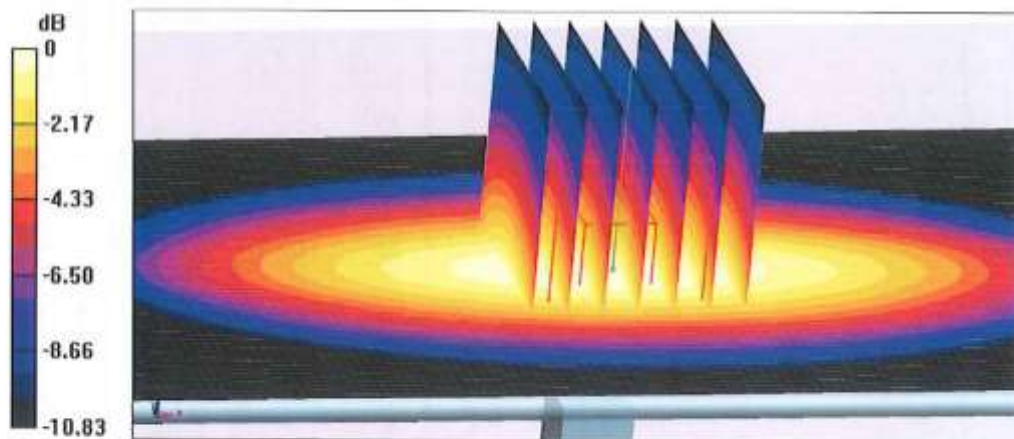
Peak SAR (extrapolated) = 3.58 W/kg

**SAR(1 g) = 2.36 W/kg; SAR(10 g) = 1.53 W/kg**

Smallest distance from peaks to all points 3 dB below = 18 mm

Ratio of SAR at M2 to SAR at M1 = 65.7%

Maximum value of SAR (measured) = 3.17 W/kg



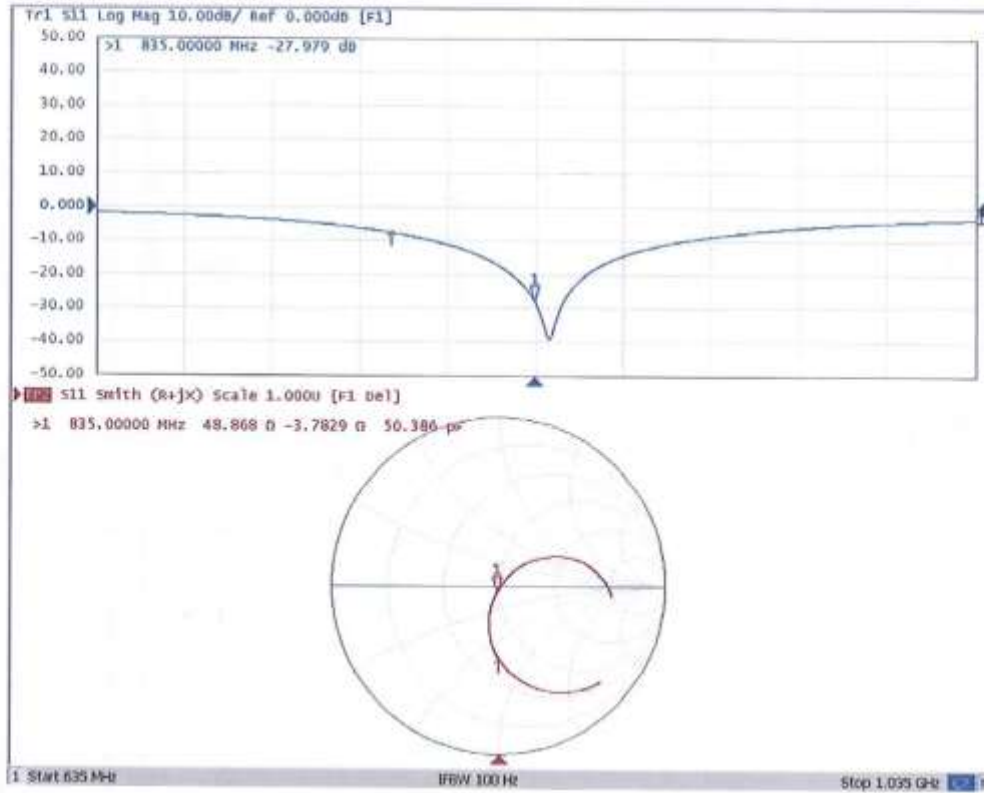
0 dB = 3.17 W/kg = 5.01 dBW/kg





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Impedance Measurement Plot for Head TSL



**Calibration Laboratory of  
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Engineering AG**  
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **JYT (Auden)**

Certificate No: **D1750V2-1177\_Feb21**

CALIBRATION CERTIFICATE			
Object	D1750V2 - SN:1177		
Calibration procedure(s)	QA CAL-05.v11 Calibration Procedure for SAR Validation Sources between 0.7-3 GHz		
Calibration date:	February 10, 2021		
This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.			
All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.			
Calibration Equipment used (M&TE critical for calibration)			
Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	01-Apr-20 (No. 217-03100/03101)	Apr-21
Power sensor NRP-Z91	SN: 103244	01-Apr-20 (No. 217-03100)	Apr-21
Power sensor NRP-Z91	SN: 103245	01-Apr-20 (No. 217-03101)	Apr-21
Reference 20 dB Attenuator	SN: BH9394 (20k)	31-Mar-20 (No. 217-03106)	Apr-21
Type-N mismatch combination	SN: 310982 / 06327	31-Mar-20 (No. 217-03104)	Apr-21
Reference Probe EX3DV4	SN: 7349	28-Dec-20 (No. EX3-7349_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent EB358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21
Calibrated by:	Name Jeffrey Katzman	Function Laboratory Technician	Signature 
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature 
			Issued: February 11, 2021
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			

Certificate No: D1750V2-1177\_Feb21

Page 1 of 6

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**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)

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

Accreditation No.: **SCS 0108**

**Glossary:**

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

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

- a) 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
- b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

- e) DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

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

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

**Measurement Conditions**

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

DASY Version	DASY5	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
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	39.4 ± 6 %	1.34 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °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	9.00 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>36.4 W/kg ± 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.73 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>19.0 W/kg ± 16.5 % (k=2)</b>

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

**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	49.5 Ω - 1.2 jΩ
Return Loss	- 37.5 dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.218 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: 10.02.2021

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1177**

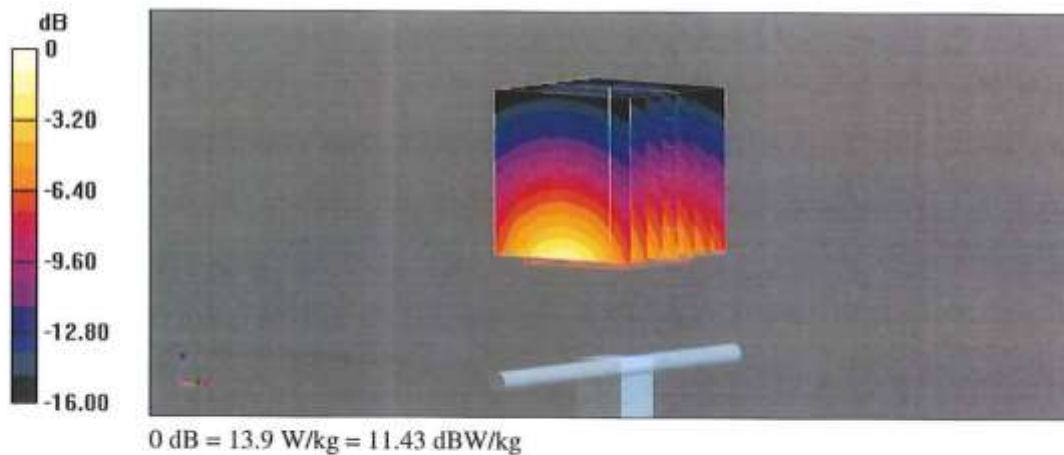
Communication System: UID 0 - CW; Frequency: 1750 MHz  
 Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.34$  S/m;  $\epsilon_r = 39.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: Flat Section  
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

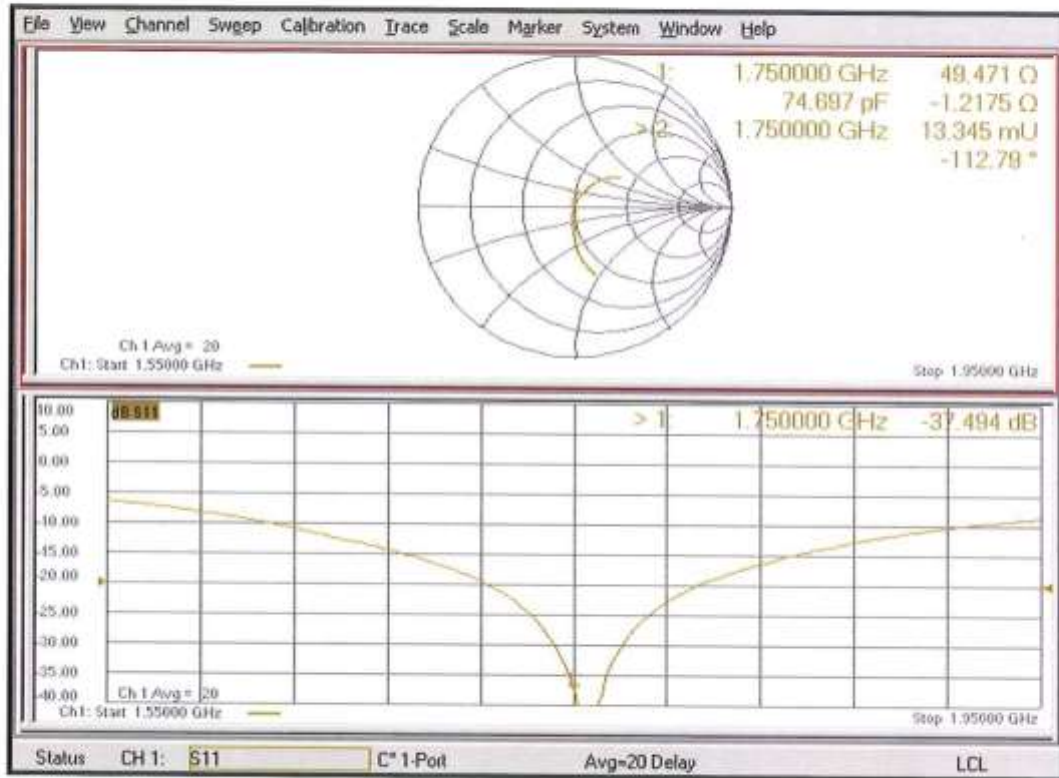
- Probe: EX3DV4 - SN7349; ConvF(8.67, 8.67, 8.67) @ 1750 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:**

Measurement grid: dx=5mm, dy=5mm, dz=5mm  
 Reference Value = 106.3 V/m; Power Drift = 0.02 dB  
 Peak SAR (extrapolated) = 16.7 W/kg  
**SAR(1 g) = 9 W/kg; SAR(10 g) = 4.73 W/kg**  
 Smallest distance from peaks to all points 3 dB below = 10 mm  
 Ratio of SAR at M2 to SAR at M1 = 54.2%  
 Maximum value of SAR (measured) = 13.9 W/kg



**Impedance Measurement Plot for Head TSL**



## Dipole Impedance and Return Loss calibration Report

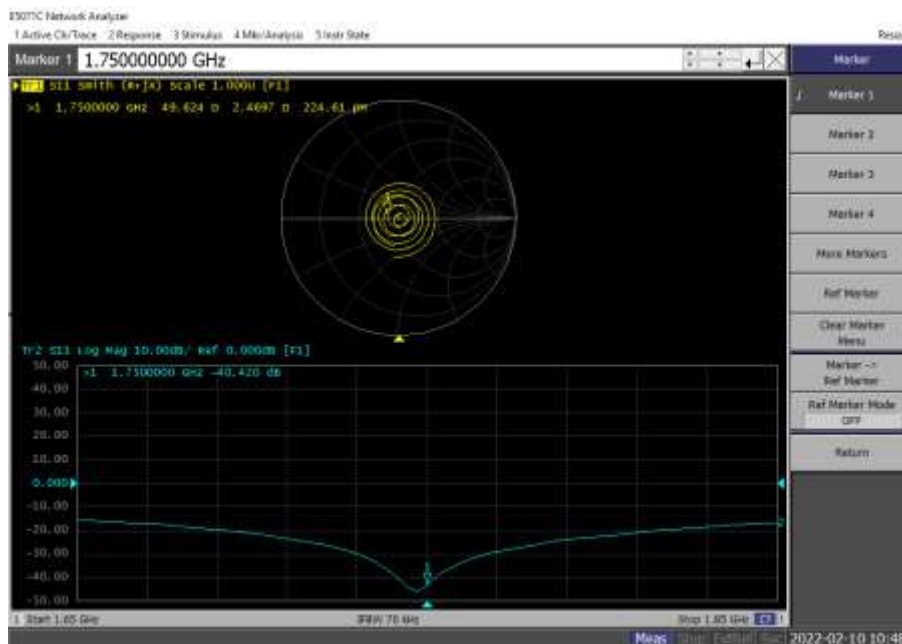
**Object:** D1750V2 - SN: 1177  
**Calibration Date:** February 10, 2022  
**Calibration reference:** IEEE Std 1528:2013, IEC 62209-1:2006, FCC KDB 865664 D01  
**Calibrated By:** *Janet Wei* (Janet Wei, SAR project engineer)  
**Reviewed By:** *Winner Zhang* (Winner Zhang, Technical manager)

### Environment of Test Site

Temperature:	21 ~ 23°C
Humidity:	50~60% RH
Atmospheric Pressure:	1011 mbar

### Test Data

Measurement Plot for Head TSL In 2022



### Comparison with Original report

Items	Calibrated By CTTL	Calibrated By JYT In 2022	Deviation	Limit
Impedence for Head TSL	49.50Ω -1.20jΩ	49.62Ω +2.47jΩ	0.12Ω -3.67jΩ	±5Ω
Return Loss for Head TSL	-37.50	-40.42	7.79%	±20%(No less than 20 dB)

### Result

Compliance





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 CNAS L0570



Client **JYT**

Certificate No: **Z22-60211**

**CALIBRATION CERTIFICATE**

Object: D1900V2 - SN: 5d175  
 Calibration Procedure(s): FF-Z11-003-01  
 Calibration Procedures for dipole validation kits  
 Calibration date: June 7, 2022

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	106277	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Power sensor NRP8S	104291	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Reference Probe EX3DV4	SN 7464	26-Jan-22(SPEAG,No.EX3-7464_Jan22)	Jan-23
DAE4	SN 1556	12-Jan-22(CTTL-SPEAG,No.Z22-60007)	Jan-23
Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	13-Jan-22 (CTTL, No.J22X00409)	Jan-23
Network Analyzer E5071C	MY46110673	14-Jan-22 (CTTL, No.J22X00406)	Jan-23

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

Issued: June 13, 2022

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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:**

- a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

- c) 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	52.10.4
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	39.9 ± 6 %	1.39 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	9.93 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	39.9 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.18 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.8 W/kg ± 18.7 % (k=2)



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**Appendix (Additional assessments outside the scope of CNAS L0570)**

**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	51.7Ω+ 5.90jΩ
Return Loss	- 24.4dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.110 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point 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 feed-point may be damaged.

**Additional EUT Data**

Manufactured by	SPEAG
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**DASY5 Validation Report for Head TSL**

Date: 2022-06-07

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;  $\sigma = 1.385$  S/m;  $\epsilon_r = 39.85$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

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

**DASY5 Configuration:**

- Probe: EX3DV4 - SN7464; ConvF(8.18, 8.18, 8.18) @ 1900 MHz; Calibrated: 2022-01-26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2022-01-12
- Phantom: MFP\_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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

Reference Value = 101.8 V/m; Power Drift = 0.00 dB

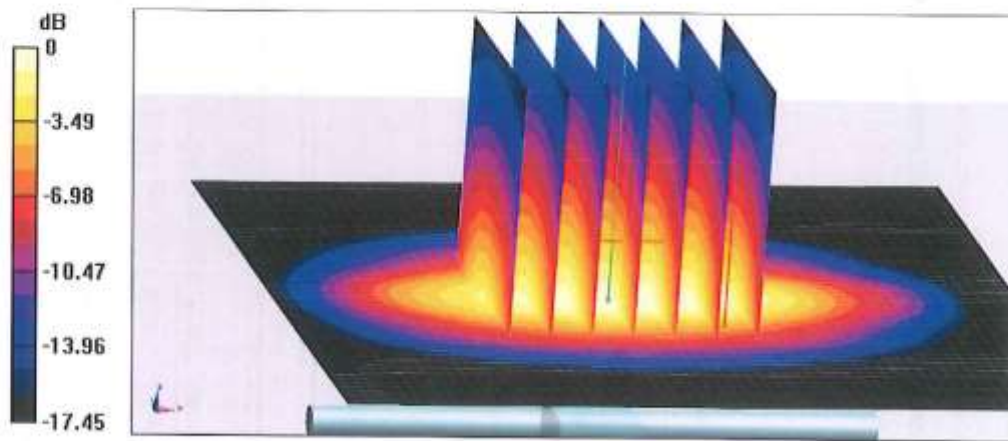
Peak SAR (extrapolated) = 18.5 W/kg

**SAR(1 g) = 9.93 W/kg; SAR(10 g) = 5.18 W/kg**

Smallest distance from peaks to all points 3 dB below = 10 mm

Ratio of SAR at M2 to SAR at M1 = 54.3%

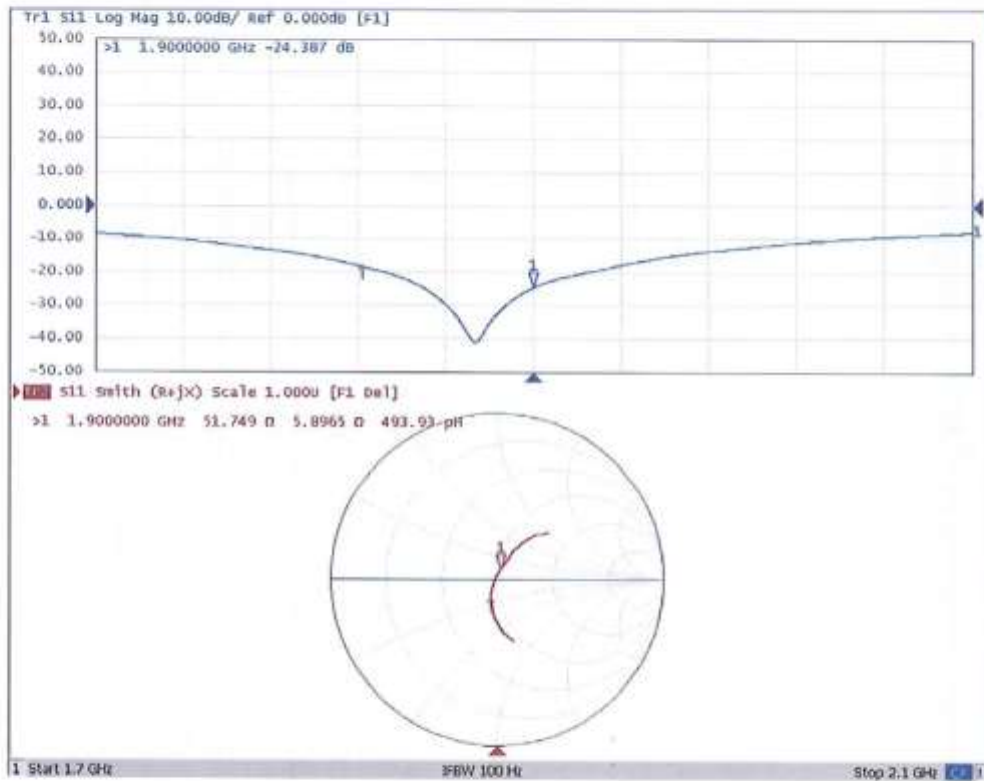
Maximum value of SAR (measured) = 15.5 W/kg





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### Impedance Measurement Plot for Head TSL





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Client **JYT**

Certificate No: **Z22-60212**

CALIBRATION CERTIFICATE			
Object	D2450V2 - SN: 910		
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits		
Calibration date:	June 6, 2022		
<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	106277	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Power sensor NRP8S	104291	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Reference Probe EX3DV4	SN 7464	26-Jan-22(SPEAG,No.EX3-7464_Jan22)	Jan-23
DAE4	SN 1556	12-Jan-22(CTTL-SPEAG,No.Z22-60007)	Jan-23
Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	13-Jan-22 (CTTL, No. J22X00409)	Jan-23
Network Analyzer E5071C	MY46110673	14-Jan-22 (CTTL, No.J22X00408)	Jan-23
Calibrated by:	Name Zhao Jing	Function SAR Test Engineer	Signature 
Reviewed by:	Name Lin Hao	Function SAR Test Engineer	Signature 
Approved by:	Name Qi Dianyuan	Function SAR Project Leader	Signature 
Issued: June 13, 2022			
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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:**

- a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

- c) 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	52.10.4
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	2450 MHz ± 1 MHz	

**Head TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.0 ± 6 %	1.81 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	13.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	53.4 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.19 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.8 W/kg ± 18.7 % (k=2)



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**Appendix (Additional assessments outside the scope of CNAS L0570)**

**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	53.2Ω+ 2.79jΩ
Return Loss	- 27.7dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.086 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point 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 feed-point may be damaged.

**Additional EUT Data**

Manufactured by	SPEAG
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**DASY5 Validation Report for Head TSL**

Date: 2022-06-06

Test Laboratory: CTTL, Beijing, China

**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:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.806 \text{ S/m}$ ;  $\epsilon_r = 40.03$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

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

**DASY5 Configuration:**

- Probe: EX3DV4 - SN7464; ConvF(7.77, 7.77, 7.77) @ 2450 MHz; Calibrated: 2022-01-26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2022-01-12
- Phantom: MFP\_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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

Reference Value = 97.85 V/m; Power Drift = -0.03 dB

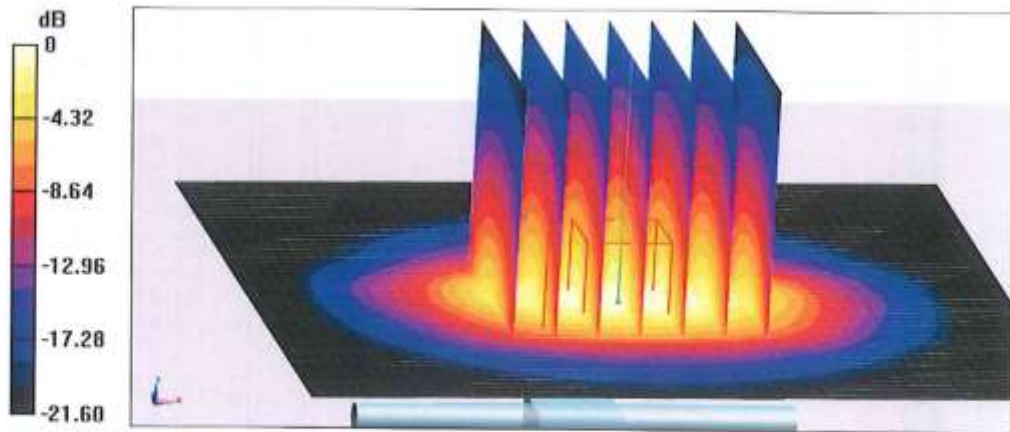
Peak SAR (extrapolated) = 27.3 W/kg

**SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.19 W/kg**

Smallest distance from peaks to all points 3 dB below = 8.5 mm

Ratio of SAR at M2 to SAR at M1 = 49.3%

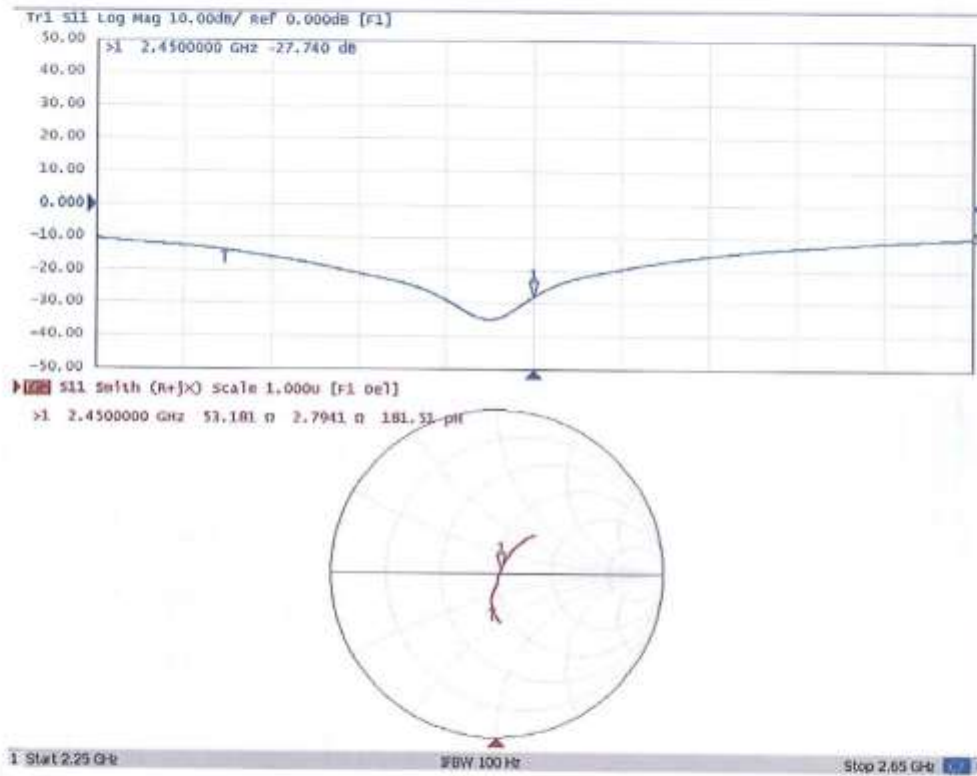
Maximum value of SAR (measured) = 22.3 W/kg





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Impedance Measurement Plot for Head TSL





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Client **JYT**

Certificate No: **Z21-60440**

**CALIBRATION CERTIFICATE**

Object **D2600V2 - SN: 1114**

Calibration Procedure(s) **FF-Z11-003-01**  
**Calibration Procedures for dipole validation kits**

Calibration date: **October 28, 2021**

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	106277	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Power sensor NRP8S	104291	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Reference Probe EX3DV4	SN 7517	03-Feb-21(CTTL-SPEAG,No.Z21-60001)	Feb-22
DAE4	SN 1556	15-Jan-21(SPEAG,No.DAE4-1556_Jan21)	Jan-22
Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-21 (CTTL, No.J21X00593)	Jan-22
Network Analyzer E5071C	MY46110673	14-Jan-21 (CTTL, No.J21X00232)	Jan-22

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

Issued: October 31, 2021

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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:**

- a) 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
- b) IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- c) 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
- d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

**Additional Documentation:**

- e) 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	V52.10.4
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	2600 MHz ± 1 MHz	

**Head TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.8 ± 6 %	1.94 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	13.7 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	55.3 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.05 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.3 W/kg ± 18.7 % (k=2)



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**Appendix (Additional assessments outside the scope of CNAS L0570)**

**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	51.1Ω- 7.05jΩ
Return Loss	- 23.1dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.060 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: 10.28.2021

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1114**

Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2600$  MHz;  $\sigma = 1.944$  S/m;  $\epsilon_r = 39.81$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7517; ConvF(7.1, 7.1, 7.1) @ 2600 MHz; Calibrated: 2021-02-03
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2021-01-15
- Phantom: MFP\_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

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

Reference Value = 106.6 V/m; Power Drift = -0.01 dB

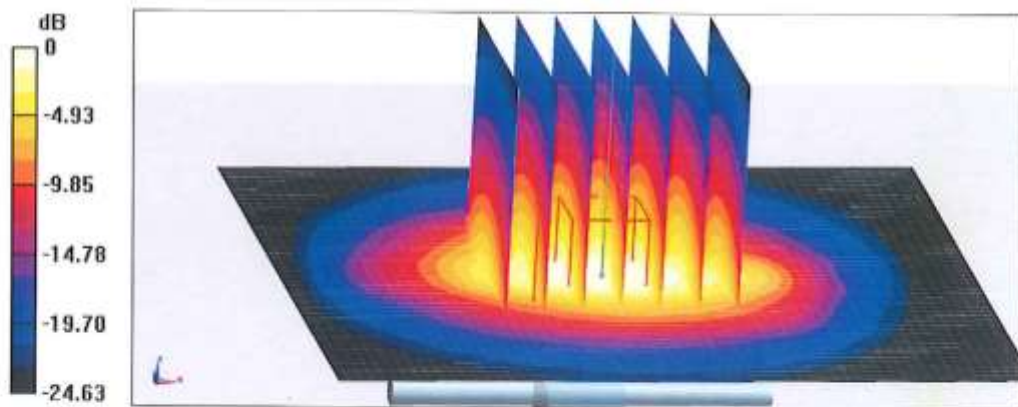
Peak SAR (extrapolated) = 30.2 W/kg

**SAR(1 g) = 13.7 W/kg; SAR(10 g) = 6.05 W/kg**

Smallest distance from peaks to all points 3 dB below = 8.9 mm

Ratio of SAR at M2 to SAR at M1 = 45%

Maximum value of SAR (measured) = 24.0 W/kg



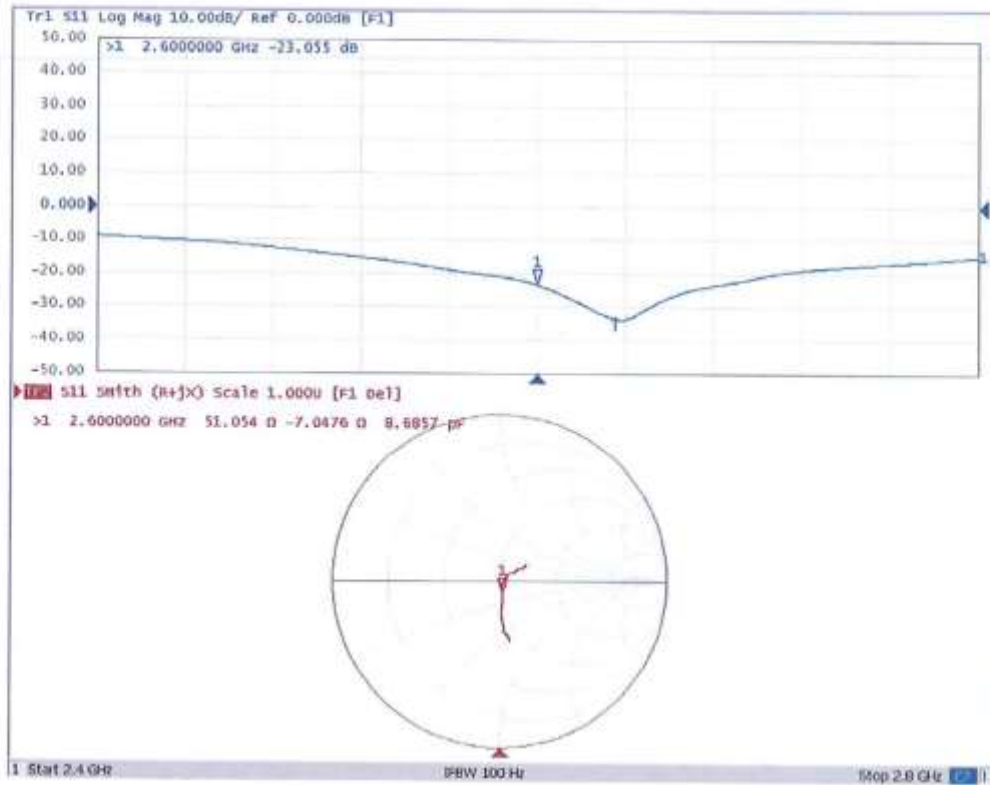
0 dB = 24.0 W/kg = 13.80 dBW/kg



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**Impedance Measurement Plot for Head TSL**



Calibration information for DAE



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Client : JYT

Certificate No: Z22-60209

**CALIBRATION CERTIFICATE**

Object: DAE4 - SN: 1373

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

Calibration date: June 06, 2022

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(Callibrated by, Certificate No.)	Scheduled Calibration
Process Calibrator 753	1971018	15-Jun-21 (CTTL, No.J21X04465)	Jun-22

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

Issued: June 09, 2022

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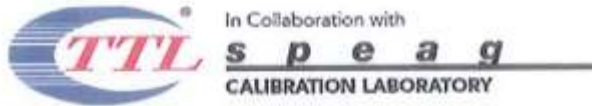
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**Glossary:**

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

**Methods Applied and Interpretation of Parameters:**

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



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### DC Voltage Measurement

A/D - Converter Resolution nominal

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

Low Range: 1LSB = 61nV, full range = -1.....+3mV

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

Calibration Factors	X	Y	Z
High Range	403.940 $\pm$ 0.15% (k=2)	403.903 $\pm$ 0.15% (k=2)	404.196 $\pm$ 0.15% (k=2)
Low Range	3.98687 $\pm$ 0.7% (k=2)	4.00795 $\pm$ 0.7% (k=2)	4.01128 $\pm$ 0.7% (k=2)

### Connector Angle

Connector Angle to be used in DASY system	347° $\pm$ 1 °
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-----End of Report-----