TEST REPORT

Report Number: C21T00125-SAR01-V01

Applicant	Shanghai Sunmi Technology Co.,Ltd.
Product Name	Wireless data POS System
Model Name	T5930
Brand Name	SUNMI
FCC ID	2AH25T 5930

Industrial Internet Innovation Center (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in ANSI C95.1-1992, IEEE std 1528-2013.

Prepared by	李浪	Reviewed by	鄢航
Approved by	[signature]	Issue Date	2022-02-22

Industrial Internet Innovation Center (Shanghai) Co., Ltd.

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Revision Version

Report Number	Revision	Date	Memo
C21T00125-SAR01-V00	00	2022-02-14	Initial creation of test report
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CONTENTS

1. TEST LABORATORY 7
1.1. TESTING LOCATION 7
1.2. TESTING ENVIRONMENT 7
1.3. PROJECT INFORMATION 7
2. CLIENT INFORMATION 8
2.1. APPLICANT INFORMATION 8
2.2. MANUFACTURER INFORMATION 8
3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE) 9
3.1. ABOUT EUT 9
3.2. INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST 10
3.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST 10
4. REFERENCE DOCUMENTS 11
4.1. REFERENCE DOCUMENTS FOR TESTING 11
4.2. CRITERION 12
5. TEST SUMMARY 13
5.1. SUMMARY OF TEST RESULTS 13
5.2. STATEMENTS 14
6. SPECIFIC ABSORPTION RATE (SAR) 15
6.1. INTRODUCTION 15
6.2. SAR DEFINITION 15
7. SAR MEASUREMENT SYSTEM INTRODUCTION 16
7.1. MEASUREMENT SET-UP 16
7.2. E-FIELD PROBE SYSTEM 17
7.3. E-FIELD PROBE CALIBRATION 18

7.4. OTHER TEST EQUIPMENT 19
8. TEST POSITION IN RELATION TO THE PHANTOM 22
8.1. GENERAL CONSIDERATIONS 22
8.2. BODY-WORN DEVICE 23
8.3. DESKTOP DEVICE 24
9. TISSUE SIMULATING LIQUIDS 25
9.1. EQUIVALENT TISSUES COMPOSITION 25
9.2. DIELECTRIC PERFORMANCE OF TSL 26
9.3. LIQUID DEPTH 27
10. SYSTEM VALIDATION 28
10.1. SYSTEM VALIDATION 28
10.2. SYSTEM SETUP 28
10.3. SYSTEM VALIDATION RESULT 29
11. MEASUREMENT PROCEDURES 30
11.1. TEST STEPS 30
11.2. SPATIAL PEAK SAR EVALUATION 31
11.3. GENERAL MEASUREMENT PROCEDURE 32
11.4. WCDMA MEASUREMENT PROCEDURES 33
11.5. LTE MEASUREMENT PROCEDURE 34
11.6. BLUETOOTH & WI-FI MEASUREMENT PROCEDURES 35
12. SIMULTANEOUS TRANSMISSION SAR CONSIDERATIONS 37
12.1. REFERENCE DOCUMENT 37
12.2. ANTENNA SEPARATION DISTANCES 38
12.3. SAR MEASUREMENT POSITIONS 39
12.4. LOW POWER TRANSMITTERS SAR CONSIDERATION 39
12.5. SIMULTANEOUS TRANSMISSION ANALYSIS 40

12.6. SIMULTANEOUS TRANSMISSION TABLE 40

13. CONDUCTED OUTPUT POWER 41

13.1. GSM MEASUREMENT RESULT 41

13.2. WCDMA MEASUREMENT RESULT 42

13.3. LTE MEASUREMENT RESULT 44

13.4. BT MEASUREMENT RESULT 53

13.5. WI-FI MEASUREMENT RESULT 53

14. MEASUREMENT RESULTS 54

14.1. STANDALONE SAR TEST RESULT FOR C21T00009 54

14.2. STANDALONE SAR TEST RESULT FOR C21T00125 55

14.3. SIMULTANEOUS SAR EVALUATION 62

14.4. SAR MEASUREMENT VARIABILITY 63

15. TEST EQUIPMENT LIST 64

ANNEX A: GRAPH RESULTS 65

ANNEX B: SYSTEM CHECK PLOT 87

ANNEX C: MEASUREMENT UNCERTAINTY 101

ANNEX D: CALIBRATION CERTIFICATE 103

ANNEX E: PRODUCT CHANGE DESCRIPTION 152

ANNEX F: ACCREDITATION CERTIFICATE 154

1. Test Laboratory

1.1. Testing Location

Primary Lab:

Company Name	Industrial Internet Innovation Center (Shanghai) Co., Ltd.
Address	Building 4, No. 766 Jingang Rd, Pudong, Shanghai, China
FCC Registration No.	958356
FCC Designation No.	CN1177

1.2. Testing Environment

Normal Temperature	18℃~25℃
Relative Humidity	25%RH~75%RH

1.3. Project Information

Project Leader	Wang wenwen
Testing Start Date	2021-11-01
Testing End Date	2022-01-18

2. Client Information

2.1. Applicant Information

Company Name	Shanghai Sunmi Technology Co.,Ltd.
Address	Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai, China
Telephone	+86 18501703215

2.2. Manufacturer Information

Company Name	Shanghai Sunmi Technology Co.,Ltd.
Address	Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai, China
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3. Equipment under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Product Name	Wireless data POS System
Model name	T5930
Supported Radio Technology and Bands	GSM850/GSM900/GSM1800/GSM1900 WCDMA Band I/ II/IV/V LTE Band 2/3/4/7/17/28 BT4.0, BLE WLAN 802.11b,g,n,a GPS
Tx Frequency	824.2-848.8 MHz (GSM850) 1850.2-1909.8MHz (GSM1900) 1852.4-1907.6 MHz (WCDMA Band II) 1712.4-1752.6 MHz (WCDMA Band IV) 826.4-846.6MHz (WCDMA Band V) 1850.7-1909.3 MHz (LTE Band 2) 1710.7-1754.3 MHz (LTE Band 4) 2502.5-2567.5 MHz (LTE Band 7) 706.5-713.5 MHz (LTE Band 17) 2412-2462 MHz (Wi-Fi) 5180-5240 MHz (U-NII-1) 5745-5825 MHz (U-NII-3) 2402-2480 MHz (BLE)
Hardware Version	V3
Software Version	ZAP1522_769_DEV_dailybuild_20181205071714_userdebug_DCC
FCC ID	2AH25T 5930
Dimension	215mmx75mmx55mm

Note: Photographs of EUT are shown in ANNEX C of this test report.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of Receipt
N04	863123056610526	V3	ZAP1522_769_DEV_dailybuild_20181205071714_userdebug_DCC	2021-10-22
N07	863123056610500	V3	ZAP1522_769_DEV_dailybuild_20181205071714_userdebug_DCC	2021-10-22
N08	N/A	V3	ZAP1522_769_DEV_dailybuild_20181205071714_userdebug_DCC	2022-01-12

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

3.3. Internal Identification of AE used during the test

AE ID*	Description	Model	SN/Remark
N/A	N/A	N/A	N/A

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

*The AE is provided by the client.

4. Reference Documents

4.1. Reference Documents for testing

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

Reference	Title	Version
ANSI C95.1	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.	1992
IEEE std 1528	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques.	2013
KDB648474	Handset SAR	D04 v01r03
KDB248227	802 11 Wi-Fi SAR	D01 v02r02
KDB447498	General RF Exposure Guidance	D01 v06
KDB865664	SAR Measurement 100 MHz to 6 GHz	D01 v01r04
KDB865664	RF Exposure Reporting	D02 v01r02
KDB941225	3G SAR Procedures	D01 v03r01
KDB941225	SAR for LTE Devices	D05 v02r05
KDB941225	Hotspot SAR	D06 v02r01

4.2. Criterion

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

a) The exposure conditions can be shown by appropriate techniques to produce SARs below 0.08W/kg, as averaged over the whole body, and spatial peak SAR values not exceeding 1.6 W/kg, as averaged over any 1g of tissue (defined as a tissue volume in the shape of a cube), except for the hands, wrists, feet, and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10g of tissue (defined as a tissue volume in the shape of a cube); and
b) The induced currents in the body confirm with the MPE in table 2, Part B in ANSI C95.1-1992.

5. Test Summary

5.1. Summary of Test Results

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

Band	Reported SAR 1g(W/Kg)		
	Head	Body(5mm)	Limb(0mm)
GSM850	N/A	0.62(variation)	0.79(variation)
GSM1900	N/A	0.68(variation)	1.01(variation)
WCDMA Band2	N/A	1.18(variation)	0.88(variation)
WCDMA Band4	N/A	0.92(variation)	1.01(variation)
WCDMA Band5	N/A	0.80(variation)	**1.65**(variation)
LTE Band2	N/A	0.74(variation)	1.33(variation)
LTE Band4	N/A	0.60(variation)	0.95(variation)
LTE Band7	N/A	**1.32**(variation)	1.60(variation)
LTE Band17	N/A	0.27(variation)	0.65(variation)
Wi-Fi 2.4G	N/A	0.30(original)	0.36(variation)
Wi-Fi 5G UNII-1	N/A	0.73(variation)	0.46(variation)

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

Highest Reported SAR 1g(W/kg)		
Mode	Position	Simultaneous Transmission SAR
LTE B7&Wi-Fi 2.4G	Body(5mm)	1.35
WCDMA Band5&Wi-Fi 2.4G	Limb(0mm)	1.67

5.2. Statements

The T5930, manufactured by Shanghai Sunmi Technology Co.,Ltd. is a variant product for testing.

This project has two sets of configured sample N04 and N07 (Main supply) and N08 (Secondary supply). The difference between N04, N07 and N08 is battery. among which the N04 and N07 samples are the main test, and the N08 sample tests the worst mode of SAR.

This project is a variant project based on the original report C21T00009-SAR01-V01. According to the product change description (Annex E) of the product, we tested the all WWAN band and the worst mode of WLAN, and the test data of the worst mode was recorded in the report.

Item	Remark
Product Change Description	Refer to Annex E
Test Mode and Test Data	Refer to chapter 14.2

Industrial Internet Innovation Center (Shanghai) Co., Ltd. has verified that the compliance of the tested device specified in section 3 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 4 of this test report.

6. Specific Absorption Rate (SAR)

6.1. Introduction

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

6.2. SAR Definition

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

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

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

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

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

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

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

Where:

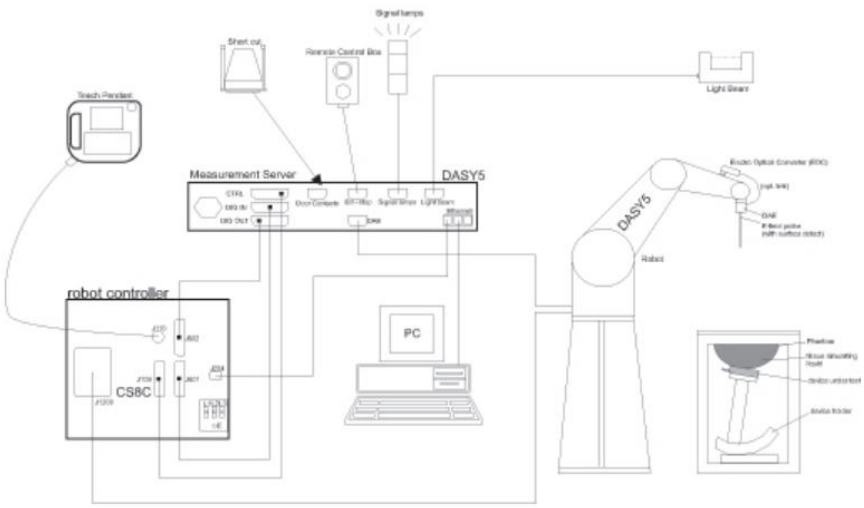
- σ is the conductivity of the tissue
- ρ is the mass density of tissue, which is normally set to 1g/cm^3
- E is the RMS electrical field strength

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

7. SAR Measurement System Introduction

7.1. Measurement Set-up

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



Picture 7-1 SAR Measurement Set-up

- A standard high precision 6-axis robot (Stäubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.

The phantom, the device holder and other accessories according to the targeted measurement.

7.2. E-field Probe System

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

Probe Specifications	
Model	EX3DV4
Frequency Range	4 MHz – 10 GHz
Calibration	In head simulating tissue at frequency from 650MHz to 5900MHz
Linearity	±0.2 dB (30 MHz – 10 GHz)
Dynamic Range	10 µW/g – >100 mW/g
Probe Length	337 mm
Probe Tip Length	20 mm
Body Diameter	12 mm
Tip Diameter	2.5 mm
Tip-Center	1 mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better than 30%

Picture 7-2 Detail of Probe

Picture 7-3 E-field Probe

7.3. E-field Probe Calibration

Each E-Probe/Probe Amplifier combination has unique calibration parameters. A TEM cell calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm2) using an RF Signal generator, TEM cell, and RF Power Meter.

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and inn a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1 mW/cm2..

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

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

Where:

Δt = Exposure time (30 seconds),

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

ΔT = Temperature increase due to RF exposure.

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

Where:

σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m^3).

7.4. Other Test Equipment

7.4.1. Data Acquisition Electronics (DAE)

The data acquisition electronics consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.	 Picture 7-4: DAE
The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection. The input impedance of the DAE is 200M Ohm; the inputs are symmetrical and floating. Common mode rejection is above 80dB.	

7.4.2. Robot

The SPEAG DASY system uses the high precision robots (DASY5: TX90) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version from Stäubli is used. The Stäubli robot series have many features that are important for our application	 Picture 7-5: DASY5
➢ High precision (repeatability 0.02mm) ➢ High reliability (industrial design) ➢ Low maintenance costs (virtually maintenance free due to direct drive gears; no belt drives) ➢ Jerk-free straight movements (brushless synchronal motors; no stepper motors) ➢ Low ELF interference (motor control fields shielded via the closed metallic construction shields)	

7.4.3. Measurement Server

The DASY5 measurement server is based on a PC/104 CPU board with a 400 MHz intel ULV Celeron, 128 MB chipdisk and 128 MB RAM. The necessary circuits for communication with either the DAE4 (or DAE3) electronics box as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY5 I/O board, which is directly connected to the PC/104 bus of the CPU board.

Picture 7-6: Server for DASY5

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

7.4.4. Device Holder for Phantom

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

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

Picture 7-7: Device Holder

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

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin-SAM and ELI phantoms.	
The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity ε =3 and loss tangent δ =0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.	Picture 7-8: Laptop Extension Kit

7.4.5. Phantom

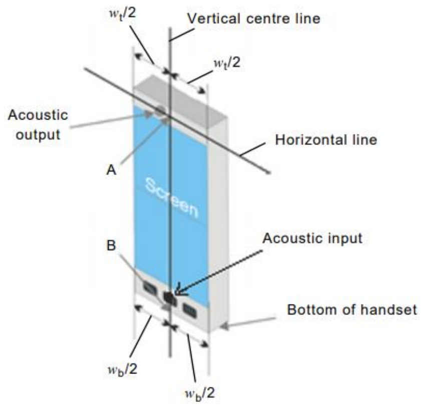
The SAM Twin Phantom V4.0 is constructed of a fiberglass shell integrated in a table. The shape of the shell is based on data from an anatomical study designed to represent the 90th percentile of the population. The phantom enables the dissymmetric evaluation of SAR for both left and right handed handset usage, as well as body-worn usage using the flat phantom region. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. The shell phantom has a 2mm shell thickness (except the ear region where shell thickness increases to 6 mm).

Shell Thickness	2 ± 0.2 mm	
Available	Special	
Filling Volume	Approx. 25 liters	
Dimensions	810 mm x l000 mm x 500 mm (H x L x W)	Picture 7-9: SAM Twin Phantom

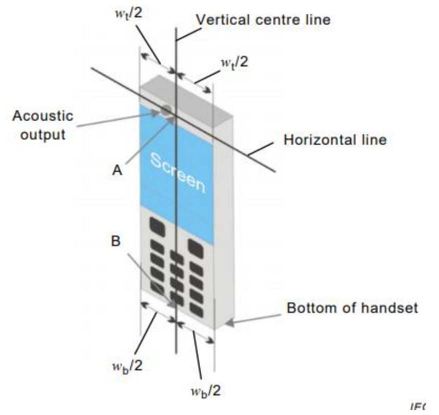
8. Test Position in Relation to the Phantom

8.1. General considerations

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

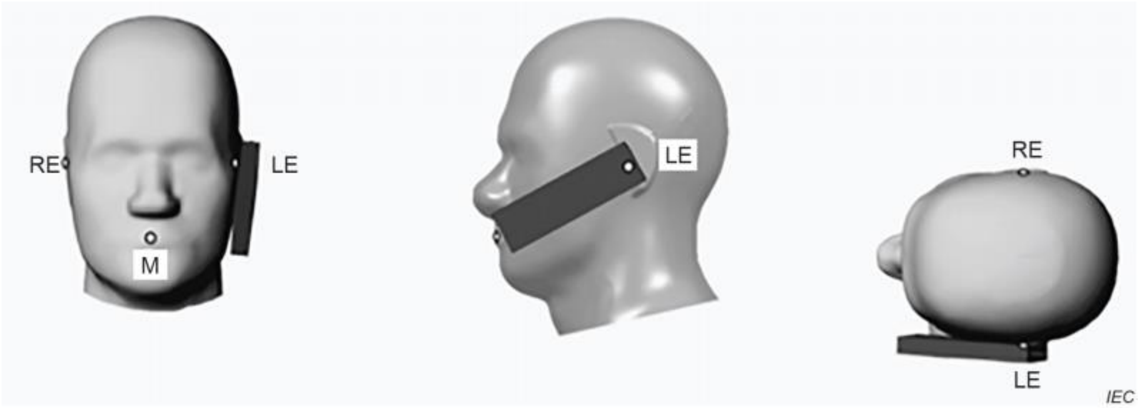


Picture 8-1 full touch screen smart phone (top)



Picture 8-2 keyboard handset (bottom)

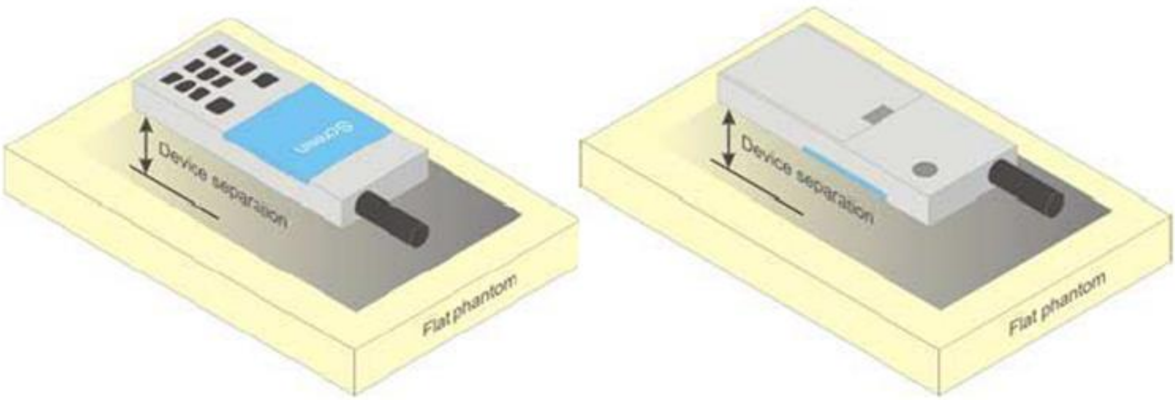
W_t	Width of the handset at the level of the acoustic output
W_b	Width of the bottom of the handset
A	Midpoint of the width W_t of the DUT at the level of the acoustic output
B	Midpoint of the width W_b of the bottom of the handset



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

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

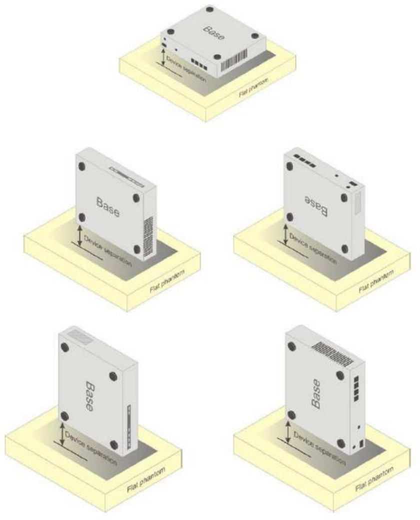
8.2. Body-worn device



Picture 8-5 Test positions for body-worn devices

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

8.3. Desktop device

A typical example of a desktop device is a wireless enabled desktop computer placed on a table or desk when used.	
The DUT shall be positioned at the distance and in the orientation to the phantom that corresponds to the intended use as specified by the manufacturer in the user instructions. For devices that employ an external antenna with variable positions.	
Tests shall be performed for all antenna positions specified.	
Picture 8-6 shows positions for desktop device SAR tests. If the intended use is not specified, the device shall be tested directly against the flat	Picture 8-6 Test positions for desktop devices

9. Tissue Simulating Liquids

9.1. Equivalent Tissues Composition

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

Table 9.1: Composition of the Head Tissue Equivalent Matter

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

Table 9.2: Targets for tissue simulating liquid

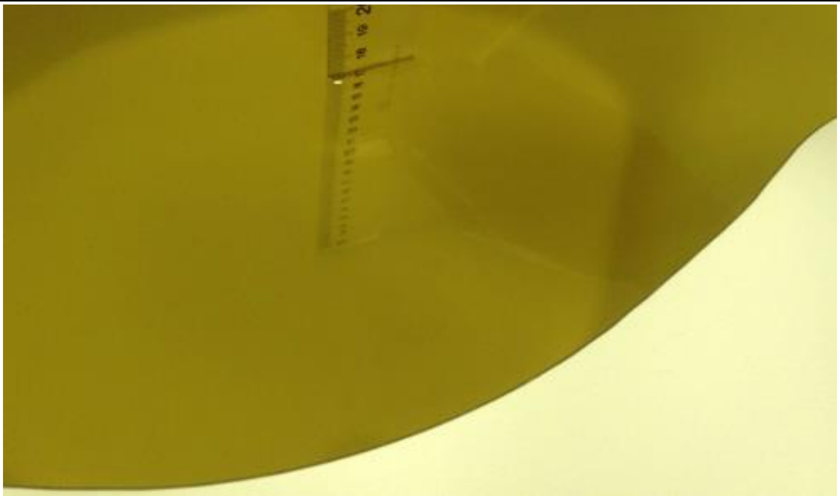
Frequency (MHz)	Liquid Type	Conductivity (σ)	± 5% Range	Permittivity (ε)	± 5% Range
835	Head	0.90	0.874~0.97	41.5	39.4~43.6
900	Head	0.97	0.92~1.02	41.5	39.4~43.6
1800	Head	1.40	1.33~1.47	40.0	38.0~42.0
1950	Head	1.40	1.33~1.47	40.0	38.0~42.0
2300	Head	1.67	1.59~1.75	39.5	37.5~41.4
2450	Head	1.80	1.71~1.89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

9.2. Dielectric Performance of TSL

Table 9.3: Dielectric Performance of Head Tissue Simulating Liquid

Tissue Simulating Liquid								
Frequency (MHz)	Head(Standard)		Temperature	Date	Test Result		Deviation (%)	
	Permittivity ε	Conductivity σ			Permittivity ε	Conductivity σ	Permittivity ε	Conductivity σ
750	41.90	0.89	21.4°C	2021/11/3	41.225	0.882	-1.61%	-0.90%
835-1	41.50	0.90	21.5°C	2021/11/2	41.011	0.915	-1.18%	1.67%
835-2	41.50	0.90	21.2°C	2021/11/4	40.986	0.916	-1.24%	1.78%
835-3	41.50	0.90	21.6°C	2022/1/18	40.414	0.924	-2.62%	2.67%
1750-1	40.10	1.37	21.5°C	2021/11/2	39.02	1.365	-2.69%	-0.36%
1750-2	40.10	1.37	21.4°C	2021/11/3	39.354	1.341	-1.86%	-2.12%
2000-1	40.00	1.40	21.7°C	2021/11/1	41.459	1.413	3.65%	0.93%
2000-2	40.00	1.40	21.4°C	2021/11/5	38.529	1.417	-3.68%	1.21%
2000-3	40.00	1.40	21.1°C	2021/11/8	38.514	1.417	-3.71%	1.21%
2450	39.20	1.80	21.4°C	2021/11/5	37.836	1.845	-3.48%	2.50%
2600-1	39.00	1.96	21.4°C	2021/11/5	37.555	1.964	-3.71%	0.20%
2600-2	39.00	1.96	21.6°C	2022/1/18	37.468	1.911	-3.93%	-2.50%
5200-1	36	4.66	21.4°C	2021/11/5	37.151	4.6	3.20%	-1.29%
5200-2	36	4.66	21.6°C	2022/1/18	34.787	4.529	-3.37%	-2.81%

9.3. Liquid depth

<table>
<tr><td colspan="2">
Picture 9-1 Liquid depth in the Flat Phantom</td></tr>
<tr><td>A</td><td>The Measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0±0.2mm (bottom Plate) filled with Body or Head simulating Liquid.</td></tr>
<tr><td>B</td><td>The depth of tissue-equivalent liquid in a phantom must be ⩾ 15.0 cm for SAR measurements.</td></tr>
</table>

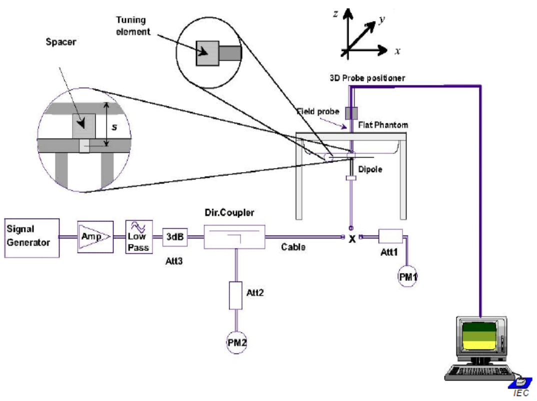
10. System Validation

10.1. System Validation

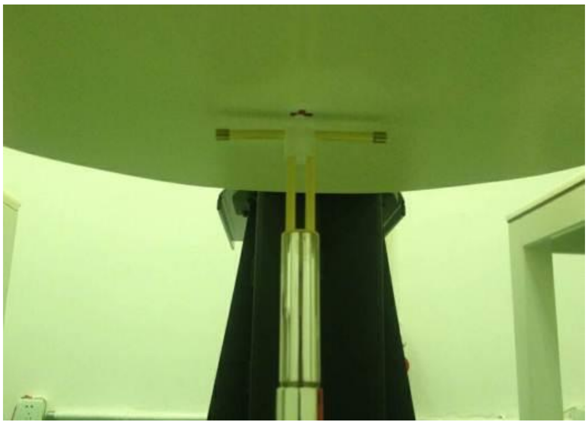
Each DASY system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY software, enable the user to conduct the system performance check and system validation. System validation kit includes a dipole, tripod holder to fix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

10.2. System Setup

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



Picture 10-1 Setup for System Evaluation



Picture 10-2. Setup for Dipole

10.3. System Validation Result

Table 10.1: System Validation Result of SAR

SAR System Validation								
Frequency (MHz)	Target Value (w/kg)		Temperature	Date	Test Result (w/kg)		Deviation (%)	
	10g	1g			10g	1g	10g	1g
750	5.43	8.3	21.4°C	2021/11/3	5.2	7.84	-4.24%	-5.54%
835-1	6.23	9.63	21.5°C	2021/11/2	6.08	9.28	-2.41%	-3.63%
835-2	6.23	9.63	21.2°C	2021/11/4	6.24	9.48	0.16%	-1.56%
835-3	6.23	9.63	21.6°C	2022/1/18	6.44	9.96	3.37%	3.43%
1750-1	19	36.4	21.5°C	2021/11/2	19.6	36.68	3.16%	0.77%
1750-2	19	36.4	21.4°C	2021/11/3	19.2	36.04	1.05%	-0.99%
2000-1	20.6	41.6	21.7°C	2021/11/1	21.24	41.6	3.11%	0.00%
2000-2	20.6	41.6	21.4°C	2021/11/5	21.68	42.4	5.24%	1.92%
2000-3	20.6	41.6	21.1°C	2021/11/8	21.6	42.4	4.85%	1.92%
2450	24	52.8	21.4°C	2021/11/5	24.72	53.2	3.00%	0.76%
2600-1	24.4	55.4	21.4°C	2021/11/5	24.92	54.4	2.13%	-1.81%
2600-2	24.4	55.4	21.6°C	2022/1/18	23.72	53.2	-2.79%	-3.97%
5200-1	21.4	74.9	21.4°C	2021/11/5	22.7	78.7	6.07%	5.07%
5200-2	21.4	74.9	21.6°C	2022/1/18	22.2	77.4	3.74%	3.34%
Note: The system verifies that the measured input power level is equivalent to 250mW, and the measured results are compared with the target value by converting to 1W.								

11. Measurement Procedures

11.1. Test Steps

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

(a) Power reference measurement

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

(b) Area scan

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

(c) Zoom scan

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

(d) Power drift measurement

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

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

(a) Make EUT to transmit it maximum output power

(b) Measure conducted output power through RF cable

(c) Place the EUT in the specific position of phantom

(d) Measure SAR results for Middle channel or the highest power channel on each testing position

(e) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg

(f) Record the SAR value

11.2. Spatial Peak SAR Evaluation

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

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

a) Maximum Search

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

b) Extrapolation

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

c) Boundary effect

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

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

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

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

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

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

11.3. General Measurement Procedure

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

Table 11.1: Test Resolution Requirement

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

Notes:

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

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

11.4. WCDMA Measurement Procedures

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

Table 11.2: HSDPA setting for Release 5

Sub-test	β_c	β_d	β_d (SF)	β_c / β_d	β_{hs}	CM (dB)	MPR (dB)
1	2/15	15/15	64	2/15	4/15	1.5	0.5
2	12/15	15/15	64	12/15	24/25	2.0	1
3	15/15	8/15	64	15/8	30/15	2.0	1
4	15/15	4/15	64	15/4	30/15	2.0	1

Table 11.3: HSUPA setting for Release 6

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

11.5. LTE Measurement Procedure

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

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

a. The maximum output power, including tolerance, for the smaller band is ≤ the larger band to qualify for the SAR test exclusion.

b. The channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band.

LTE Carrier Aggregation Conducted Power (Downlink)

According to KDB941225 D05A v01r02, Uplink maximum output power measurement with downlink carrier aggregation active should be measured, using the highest output channel measured without downlink carrier aggregation, to confirm that uplink maximum output power with downlink carrier aggregation active remains within the specified tune-up tolerance limits and not more than ¼ dB higher than the maximum output measured without downlink carrier aggregation active.

LTE Carrier Aggregation Conducted Power (Uplink)

UL CA shall be tested based on the worst-case SAR configuration determined from non-CA SAR testing result. The channel BW, channel number, RB allocation, etc. would be selected to allow contiguous CA of PCC and SCC. Uplink output power for UL CA is the total power measured across the PCC and SCC.

UL CA power measurements were performed for each antennas at with QPSK modulation based on the worst-case standalone SAR.

The UL CA mode power measurements represent the total power across both carriers. Measurements were made for all supported PCC bandwidths using the channel/RB combination resulting in the highest standalone output power at the least MPR (0 dB). SCCs were set to use configurations similar to the PCC to establish conservative or worst case equivalent SAR test conditions (highest maximum power with MPR of 0 dB).

The standalone power measurement is the power for the PCC in the non-CA mode (i.e. single carrier power). In all cases the UL CA power is less than or equal to the standalone power.

LTE TDD Considerations

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

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

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

Table 11.4 Calculated Duty Cycle for LTE TDD

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

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

Calculated Duty Cycle = (5120 × Ts × 2 + 6 ms) / 10ms = 63.33%

Where

Ts = 1/(15000 x 2048) seconds

11.6. Bluetooth & Wi-Fi Measurement Procedures

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

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

12. Simultaneous Transmission SAR Considerations

12.1. Reference Document

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

12.2. Antenna Separation Distances

Picture 12-1 Antenna Locations

12.3. SAR Measurement Positions

The edges with less than 2.5 cm distance to the antennas need to be tested for SAR.

Table 12.1: SAR measurement Positions

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

12.4. Low Power Transmitters SAR Consideration

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

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

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

Where:

- Frequency (GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

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

12.5. Simultaneous Transmission Analysis

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

$$\mathrm{SPLSR} = \sqrt{(\mathrm{SAR1} + \mathrm{SAR2})^3}/\mathrm{Ri}$$

Where:

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

$$(\mathrm{x1} - \mathrm{x2})^2 + (\mathrm{y1} - \mathrm{y2})^2 + (z1 - z2)^2$$

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

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

12.6. Simultaneous Transmission Table

Table 12.3: Simultaneous Transmission Configurations

Items	Capable Transmit Configurations
1	GSM/GPRS/EDGE + BT
2	GSM/GPRS/EDGE + Wi-Fi2.4G
3	GSM/GPRS/EDGE + Wi-Fi5G
4	WCDMA + BT
5	WCDMA+ Wi-Fi2.4G
6	WCDMA+ Wi-Fi5G
7	LTE + BT
8	LTE + Wi-Fi2.4G
9	LTE + Wi-Fi5G
Note: For the DUT, the WLAN and BT modules sharing a single antenna, and so these two modules can’t transmit signal simultaneously. GSM/WCDMA/LTE modules sharing a single antenna, so these two modules can’t transmit signal simultaneously. So we can get above combination that can transmit signal simultaneously.	

13. Conducted Output Power

13.1. GSM Measurement result

Table 13.1: The conducted power measurement results for GSM850

GSM			GSM850							
Model	Modulation	Time Slot	Tune up (dBm)	Measure Power(dBm)			Devision Factor (dB)	Average Power(dBm)		
				128	190	251		128	190	251
GPRS	GMSK	1 Tx	30.5	29.78	29.89	29.86	-9.03	20.75	20.86	20.83
		2 Tx	29.5	29.14	29.22	29.22	-6.02	23.12	23.20	23.20
		3 Tx	28	27.48	27.57	27.60	-4.26	23.22	23.31	23.34
		4 Tx	27	26.28	26.40	26.45	-3.01	23.27	23.39	23.44
EGPRS	8PSK	1 Tx	25	24.38	24.52	24.60	-9.03	15.35	15.49	15.57
		2 Tx	24	23.16	23.48	23.43	-6.02	17.14	17.46	17.41
		3 Tx	22	21.39	21.31	21.37	-4.26	17.13	17.05	17.11
		4 Tx	20	19.40	19.71	19.77	-3.01	16.39	16.70	16.76

Table 13.2: The conducted power measurement results for GSM1900

GSM			GSM1900							
Model	Modulation	Time Slot	Tune up (dBm)	Measure Power(dBm)			Devision Factor (dB)	Average Power(dBm)		
				512	661	810		512	661	810
GPRS	GMSK	1 Tx	27	26.22	26.37	26.15	-9.03	17.19	17.34	17.12
		2 Tx	26	25.47	25.62	25.44	-6.02	19.45	19.60	19.42
		3 Tx	24.5	23.75	23.86	23.71	-4.26	19.49	19.60	19.45
		4 Tx	23	22.63	22.75	22.63	-3.01	19.62	19.74	19.62
EGPRS	8PSK	1 Tx	23	22.57	22.64	22.63	-9.03	13.54	13.61	13.60
		2 Tx	22	21.61	21.57	21.76	-6.02	15.59	15.55	15.74
		3 Tx	20.5	20.22	20.29	20.04	-4.26	15.96	16.03	15.78
		4 Tx	19.5	18.85	18.74	18.67	-3.01	15.84	15.73	15.66

NOTES:

1) Division Factors

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

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

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

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

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

According to the conducted power as above, the body measurements are performed with 4Txslots for GSM850 and 4Txslots for GSM1900.

13.2. WCDMA Measurement result

Table 13.3: The conducted Power for WCDMA Band Ⅱ

WCDMA		WCDMA B2			
Mode	Test Mode	Tune up	Channel		
			9262	9400	9538
WCDMA	RMC	20	19.13	19.19	19.34
HSDPA	Subtest1	18.5	17.92	17.96	18.09
	Subtest2	18.5	18.02	18.07	18.21
	Subtest3	18.5	17.97	18.02	18.16
	Subtest4	18.5	18	18.03	18.17
HSUPA	Subtest1	18.5	17.9	17.95	18.09
	Subtest2	19	18.12	18.16	18.32
	Subtest3	18.5	18	18.06	18.18
	Subtest4	18.5	18.03	18.09	18.23
	Subtest5	18.5	17.94	17.99	18.13

Table 13.4: The conducted Power for WCDMA Band Ⅳ

WCDMA		WCDMA B4			
Mode	Test Mode	Tune up	Channel		
			1312	1413	1513
WCDMA	RMC	19.5	19.14	19.16	19.23
HSDPA	Subtest1	18.5	17.93	17.93	17.98
	Subtest2	18.5	18.03	18.04	18.1
	Subtest3	18.5	17.98	17.99	18.05
	Subtest4	18.5	18.01	18	18.06
HSUPA	Subtest1	18.5	17.91	17.92	17.98
	Subtest2	18.5	18.13	18.13	18.21
	Subtest3	18.5	18.01	18.03	18.07
	Subtest4	18.5	18.04	18.06	18.12
	Subtest5	18.5	17.95	17.96	18.02

Table 13.5: The conducted Power for WCDMA Band Ⅴ

WCDMA		WCDMA B5			
Mode	Test Mode	Tune up	Channel		
			4132	4183	4233
WCDMA	RMC	21.5	20.92	20.98	21.11
HSDPA	Subtest1	20.5	19.71	19.75	19.86
	Subtest2	20.5	19.81	19.86	19.98
	Subtest3	20.5	19.76	19.81	19.93
	Subtest4	20.5	19.79	19.82	19.94
HSUPA	Subtest1	20.5	19.69	19.74	19.86
	Subtest2	20.5	19.91	19.95	20.09
	Subtest3	20.5	19.79	19.85	19.95
	Subtest4	20.5	19.82	19.88	20
	Subtest5	20.5	19.73	19.78	19.9

13.3. LTE Measurement result

Table 13.6: The conducted Power for LTE Band 2/4/7/17

LTE				LTE B2		
Modulation	RB	RB Offset	Tune up	1.4MHz		
				18607	18900	19193
QPSK	1	Low	23.5	22.27	22.47	22.49
		Middle		22.35	22.62	22.59
		High		22.18	22.47	22.50
	50%	Low	23	22.27	22.60	22.57
		Middle		22.35	22.62	22.62
		High		22.29	22.59	22.54
	100%	/	22.5	21.30	21.61	21.62
16QAM	1	Low	22.5	21.35	21.64	21.67
		Middle		21.51	21.77	21.76
		High		21.37	21.69	21.66
	5	Low	22	21.21	21.69	21.64
		Middle		21.45	21.71	21.64
		High		21.33	21.61	21.64
	100%	/	21.5	20.42	20.64	20.64
Modulation	RB	RB Offset	Tune up	3MHz		
				18615	18900	19185
QPSK	1	Low	23.5	22.26	22.58	22.65
		Middle		22.32	22.98	22.61
		High		22.26	22.62	22.55
	50%	Low	23	21.31	21.60	21.61
		Middle		21.32	21.61	21.66
		High		21.35	21.57	21.62
	100%	/	22.5	21.34	21.57	21.62
16QAM	1	Low	22.5	21.46	21.95	22.03
		Middle		21.75	22.08	22.12
		High		21.50	21.87	22.00
	50%	Low	22	20.40	20.68	20.64
		Middle		20.38	20.68	20.65
		High		20.36	20.62	20.64
	100%	/	21.5	20.36	20.58	20.56
Modulation	RB	RB Offset	Tune up	5MHz		
				18625	18900	19175
QPSK	1	Low	23.5	22.11	22.51	22.57
		Middle		22.31	22.62	22.72
		High		22.18	22.56	22.58
	50%	Low	23	21.30	21.55	21.70

		Middle		21.42	21.63	21.71
		High		21.27	21.65	21.61
	100%	/	22.5	21.48	21.59	21.69
16QAM	1	Low	22.5	21.57	22.03	21.96
		Middle		21.97	22.26	21.98
		High		21.52	21.89	21.82
	50%	Low	22	20.36	20.57	20.67
		Middle		20.38	20.64	20.70
		High		20.24	20.60	20.70
	100%	/	21.5	20.29	20.61	20.73
Modulation	RB	RB Offset	Tune up	10MHz		
				18650	18900	19150
QPSK	1	Low	23.5	22.44	22.67	22.71
		Middle		22.53	22.75	22.82
		High		22.42	22.57	22.67
	50%	Low	23	21.48	21.66	21.86
		Middle		21.53	21.71	21.74
		High		21.36	21.70	21.73
	100%	/	22.5	21.42	21.68	21.80
16QAM	1	Low	22.5	21.51	21.94	21.92
		Middle		21.65	21.91	22.00
		High		21.59	21.98	21.66
	50%	Low	22	20.42	20.63	20.84
		Middle		20.44	20.63	20.75
		High		20.34	20.70	20.67
	100%	/	21.5	20.45	20.72	20.77
Modulation	RB	RB Offset	Tune up	15MHz		
				18675	18900	19125
QPSK	1	Low	23.5	22.47	22.62	22.61
		Middle		22.57	22.66	22.71
		High		22.47	22.56	22.59
	50%	Low	23	21.54	21.68	21.77
		Middle		21.51	21.67	21.78
		High		21.49	21.76	21.79
	100%	/	22.5	21.55	21.76	21.84
16QAM	1	Low	22.5	21.51	21.94	21.96
		Middle		21.67	22.02	21.93
		High		21.55	21.85	21.91
	50%	Low	22	20.53	20.67	20.85
		Middle		20.55	20.66	20.77
		High		20.53	20.74	20.71
	100%	/	21.5	20.50	20.67	20.84

Modulation	RB	RB Offset	Tune up	20MHz		
				18700	18900	19100
QPSK	1	Low	23.5	22.24	22.49	22.55
		Middle		22.59	22.74	**22.82**
		High		22.34	22.35	22.44
	50%	Low	23	21.78	21.66	**21.96**
		Middle		21.65	21.78	21.83
		High		21.52	21.82	21.64
	100%	/	22.5	21.67	21.79	**21.84**
16QAM	1	Low	22.5	21.48	21.72	21.69
		Middle		21.92	22.01	21.93
		High		21.58	21.59	21.64
	50%	Low	22	20.72	20.68	20.92
		Middle		20.59	20.67	20.80
		High		20.52	20.82	20.67
	100%	/	21.5	20.58	20.72	20.78

LTE				LTE B4		
Modulation	RB	RB Offset	Tune up	1.4MHz		
				19957	20175	20393
QPSK	1	Low	22	21.33	21.27	21.28
		Middle		21.37	21.38	21.29
		High		21.30	21.29	21.21
	50%	Low	22	21.34	21.35	21.29
		Middle		21.35	21.34	21.40
		High		21.32	21.36	21.37
	100%	/	21	20.35	20.35	20.38
16QAM	1	Low	21.5	20.68	20.70	20.34
		Middle		20.83	20.72	20.58
		High		20.49	20.60	20.52
	5	Low	21	20.43	20.41	20.42
		Middle		20.49	20.49	20.52
		High		20.51	20.39	20.35
	100%	/	20	19.46	19.49	19.33
Modulation	RB	RB Offset	Tune up	3MHz		
				19965	20175	20385
QPSK	1	Low	22	21.36	21.35	21.29
		Middle		21.39	21.33	21.51
		High		21.37	21.34	21.34
	50%	Low	22	20.40	20.41	20.35
		Middle		20.45	20.39	20.35
		High		20.39	20.39	20.39
	100%	/	21	20.40	20.39	20.36
16QAM	1	Low	21.5	20.79	20.56	20.64
		Middle		20.83	20.55	20.72
		High		20.77	20.46	20.54
	50%	Low	21	19.43	19.51	19.36
		Middle		19.45	19.55	19.44
		High		19.33	19.44	19.37
	100%	/	20	19.40	19.34	19.30
Modulation	RB	RB Offset	Tune up	5MHz		
				19975	20175	20375
QPSK	1	Low	22	21.30	21.25	21.16
		Middle		21.64	21.59	21.28
		High		21.25	21.17	21.16
	50%	Low	22	20.40	20.33	20.31
		Middle		20.42	20.41	20.39
		High		20.41	20.30	20.29
	100%	/	21	20.38	20.31	20.34

16QAM	1	Low	21.5	20.57	20.55	20.57
		Middle		20.80	20.95	20.65
		High		20.52	20.55	20.45
	50%	Low	21	19.42	19.44	19.29
		Middle		19.48	19.45	19.45
		High		19.45	19.35	19.26
	100%	/	20	19.43	19.43	19.29
Modulation	RB	RB Offset	Tune up	10MHz		
				20000	20175	20350
QPSK	1	Low	22	21.30	21.34	21.37
		Middle		21.46	21.47	21.40
		High		21.22	21.21	21.23
	50%	Low	22	20.48	20.45	20.29
		Middle		20.46	20.40	20.37
		High		20.51	20.35	20.38
	100%	/	21	20.50	20.46	20.35
16QAM	1	Low	21.5	20.94	20.58	20.77
		Middle		20.97	20.70	20.94
		High		20.85	20.49	20.79
	50%	Low	21	19.40	19.46	19.38
		Middle		19.39	19.38	19.38
		High		19.47	19.31	19.40
	100%	/	20	19.42	19.36	19.39
Modulation	RB	RB Offset	Tune up	15MHz		
				20025	20175	20325
QPSK	1	Low	22	21.37	21.39	21.29
		Middle		21.39	21.39	21.33
		High		21.24	21.20	21.13
	50%	Low	22	20.38	20.41	20.35
		Middle		20.46	20.42	20.41
		High		20.41	20.30	20.37
	100%	/	21	20.46	20.43	20.36
16QAM	1	Low	21.5	20.56	20.51	20.57
		Middle		20.61	20.69	20.63
		High		20.43	20.50	20.47
	50%	Low	21	19.38	19.51	19.45
		Middle		19.38	19.45	19.40
		High		19.46	19.42	19.37
	100%	/	20	19.39	19.32	19.36
Modulation	RB	RB Offset	Tune up	20MHz		
				20050	20175	20300
QPSK	1	Low	22	21.19	21.14	21.08

		Middle		21.35	21.50	21.41
		High		20.96	20.92	20.89
	50%	Low	22	20.32	20.54	20.44
		Middle		20.40	20.38	20.44
		High		20.43	20.29	20.46
	100%	/	21	20.34	20.41	20.48
16QAM	1	Low	21.5	20.61	20.57	20.50
		Middle		20.85	20.61	20.76
		High		20.46	20.16	20.34
	50%	Low	21	19.30	19.52	19.44
		Middle		19.45	19.46	19.44
		High		19.35	19.23	19.39
	100%	/	20	19.33	19.38	19.43

LTE			LTE B7			
Modulation	RB	RB Offset	Tune up	5MHz		
				20775	21100	21425
QPSK	1	Low	23	22.23	22.10	22.17
		Middle		22.52	22.43	22.44
		High		22.13	22.10	22.17
	50%	Low	22	21.23	21.09	21.33
		Middle		21.30	21.18	21.36
		High		21.41	21.16	21.32
	100%	/	22	21.27	21.24	21.30
16QAM	1	Low	22.5	21.47	21.24	21.56
		Middle		21.66	21.52	21.87
		High		21.45	21.14	21.53
	5	Low	21	20.33	20.23	20.39
		Middle		20.45	20.29	20.45
		High		20.44	20.19	20.37
	100%	/	21	20.30	20.17	20.39
Modulation	RB	RB Offset	Tune up	10MHz		
				20800	21100	21400
QPSK	1	Low	23	22.25	22.07	22.22
		Middle		22.27	22.20	22.44
		High		22.28	22.17	22.26
	50%	Low	22	21.30	21.17	21.35
		Middle		21.42	21.22	21.35
		High		21.43	21.25	21.39
	100%	/	22	21.35	21.23	21.37
16QAM	1	Low	22.5	21.48	21.56	21.80
		Middle		21.61	21.69	21.88
		High		21.46	21.56	21.65
	50%	Low	21	20.24	20.21	20.38
		Middle		20.39	20.23	20.45
		High		20.46	20.22	20.42
	100%	/	21	20.39	20.27	20.43
Modulation	RB	RB Offset	Tune up	15MHz		
				20825	21100	21375
QPSK	1	Low	23	22.12	22.04	22.03
		Middle		22.27	22.12	22.28
		High		22.15	22.10	22.23
	50%	Low	22	21.26	21.13	21.33
		Middle		21.33	21.29	21.33
		High		21.32	21.19	21.37
	100%	/	22	21.27	21.21	21.40

16QAM	1	Low	22.5	21.34	21.39	21.30
		Middle		21.49	21.49	21.55
		High		21.38	21.36	21.44
	50%	Low	21	20.28	20.20	20.36
		Middle		20.37	20.31	20.35
		High		20.34	20.27	20.41
	100%	/	21	20.33	20.21	20.29

Modulation	RB	RB Offset	Tune up	20MHz		
				20850	21100	21350
QPSK	1	Low	23	21.98	21.92	21.92
		Middle		22.31	**22.37**	22.35
		High		22.04	21.96	22.00
	50%	Low	22	21.19	21.08	21.23
		Middle		**21.40**	21.23	21.38
		High		21.38	21.23	21.32
	100%	/	22	21.23	21.19	**21.28**
16QAM	1	Low	22.5	21.33	20.95	21.21
		Middle		21.61	21.40	21.75
		High		21.34	21.15	21.40
	50%	Low	21	20.22	20.15	20.25
		Middle		20.36	20.29	20.33
		High		20.38	20.21	20.31
	100%	/	21	20.32	20.15	20.24

LTE			LTE B17			
Modulation	RB	RB Offset	Tune up	5MHz		
				23755	23790	23825
QPSK	1	Low	23.5	22.58	22.64	22.67
		Middle		22.88	22.94	22.90
		High		22.71	22.59	22.66
	50%	Low	22.5	21.67	21.79	21.77
		Middle		21.77	21.79	21.80
		High		21.71	21.81	21.63
	100%	/	22	21.79	21.79	21.76
16QAM	1	Low	23	21.98	22.05	21.90
		Middle		22.42	22.35	22.22
		High		22.12	22.06	21.84
	5	Low	21.5	20.78	20.76	20.86
		Middle		20.81	20.75	20.82
		High		20.70	20.72	20.69
	100%	/	21.5	20.77	20.80	20.72
Modulation	RB	RB Offset	Tune up	10MHz		
				23780	23790	23800
QPSK	1	Low	23.5	22.12	22.17	22.19
		Middle		22.31	22.46	22.36
		High		22.26	22.30	22.25
	50%	Low	22.5	21.31	21.39	21.38
		Middle		21.30	21.32	21.32
		High		21.35	21.31	21.30
	100%	/	22	21.35	21.29	21.38
16QAM	1	Low	23	21.46	21.61	21.43
		Middle		21.77	21.78	21.61
		High		21.75	21.64	21.42
	50%	Low	21.5	20.30	20.34	20.36
		Middle		20.30	20.34	20.36
		High		20.36	20.34	20.25
	100%	/	21.5	20.78	20.30	20.33

13.4. BT Measurement result

Please reference Industrial Internet Innovation Center (Shanghai) Co.,Ltd. and the report C21T00009-SAR01-V01, which is the test report for the initial product.

13.5. Wi-Fi Measurement result

Please reference Industrial Internet Innovation Center (Shanghai) Co.,Ltd. and the report C21T00009-SAR01-V01, which is the test report for the initial product.

14. Measurement Results

14.1. Standalone SAR Test Result For C21T00009

Table 14.1: SAR Values for Wi-Fi 2.4G

Test Position	Cover Type	Mode	BW(MHz)	Duty Cycle	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
										Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (HotSpot 5mm)													
Front Side	Standard	802.11b	20	1:1	6	2437	12.21	13	-0.090	0.110	1.20	0.132	/
Back Side	Standard	802.11b	20	1:1	6	2437	12.21	13	-0.020	0.032	1.20	0.038	/
Left Side	Standard	802.11b	20	1:1	6	2437	12.21	13	-0.020	0.025	1.20	0.030	/
Right Side	Standard	802.11b	20	1:1	6	2437	12.21	13	-0.100	0.248	1.20	**0.297**	**3**
Top Side	Standard	802.11b	20	1:1	6	2437	12.21	13	0.030	0.013	1.20	0.016	/
Test Position	**Cover Type**	**Mode**	**BW(MHz)**	**Duty Cycle**	**Channel**	**Frequency (MHz)**	**Measured power (dBm)**	**Tune-up (dBm)**	**Power Drift (dB)**	**Limit of 10gSAR 4.0 W/kg (mW/g)**			**Figure No.**
										Measured SAR10g	**Scaling Factor**	**Report SAR10g**	
Limb SAR (Distance 0mm)													
Front Side	Standard	802.11b	20	1:1	6	2437	12.21	13	-0.04	0.096	1.20	0.115	/
Back Side	Standard	802.11b	20	1:1	6	2437	12.21	13	0.01	0.026	1.20	0.031	/
Left Side	Standard	802.11b	20	1:1	6	2437	12.21	13	0.02	0.023	1.20	0.028	/
Right Side	Standard	802.11b	20	1:1	6	2437	12.21	13	-0.05	0.281	1.20	**0.337**	**4**
Top Side	Standard	802.11b	20	1:1	6	2437	12.21	13	0.04	0.009	1.20	0.011	/
Limb SAR (Distance 0mm)Second Supply N06													
Right Side	Standard	802.11b	20	1:1	6	2437	12.21	13	-0.10	0.257	1.20	0.308	/

Table 14.2: SAR Values for Wi-Fi 5G

Test Position	Cover Type	Mode	BW(MHz)	Duty Cycle	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
										Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (HotSpot 5mm)N08													
Front Side	Standard	802.11n	20	1:1	36	5180	15.55	16	0.010	0.070	1.11	0.078	/
Back Side	Standard	802.11n	20	1:1	36	5180	15.55	16	-0.010	0.034	1.11	0.038	/
Left Side	Standard	802.11n	20	1:1	36	5180	15.55	16	-0.030	0.018	1.11	0.020	/
Right Side	Standard	802.11a	20	1:1	36	5180	15.55	16	0.020	0.301	1.11	**0.334**	**5**
Top Side	Standard	802.11a	20	1:1	36	5180	15.55	16	-0.070	0.012	1.11	0.013	/
Body SAR (HotSpot 5mm) Second Supply N06													
Right Side	Standard	802.11n	20	1:1	36	5180	15.55	16	-0.050	0.272	1.11	0.302	/
Test Position	**Cover Type**	**Mode**		**Duty Cycle**	**Channel**	**Frequency (MHz)**	**Measured power (dBm)**	**Tune-up (dBm)**	**Power Drift (dB)**	**Limit of 10gSAR 4.0 W/kg (mW/g)**			**Figure No.**
										Measured SAR10g	**Scaling Factor**	**Report SAR10g**	
Limb SAR (Distance 0mm)N08													
Front Side	Standard	802.11n	40	1:1	36	5180	15.55	16	0.08	0.044	1.11	0.049	/
Back Side	Standard	802.11n	40	1:1	36	5180	15.55	16	0.01	0.021	1.11	0.023	/
Left Side	Standard	802.11n	40	1:1	36	5180	15.55	16	0.03	0.002	1.11	0.002	/
Right Side	Standard	802.11a	20	1:1	36	5180	15.55	16	-0.04	0.179	1.11	**0.199**	**6**
Top Side	Standard	802.11a	20	1:1	36	5180	15.55	16	0.00	0.006	1.11	0.007	/

14.2. Standalone SAR Test Result For C21T00125

Table 14.3: SAR Values for GSM850

Test Position	Cover Type	Mode	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
								Measured SAR1g	Scaling Factor	Report SAR1g	
Hospot & Body Worn (Distance 5mm)											
Front Side	Standard	GPRS 4TS	190	836.6	26.4	27	-0.02	0.370	1.15	0.425	/
Back Side	Standard	GPRS 4TS	190	836.6	26.4	27	0.07	0.248	1.15	0.285	/
Hospot (Distance 5mm)											
Left Side	Standard	GPRS 4TS	190	836.6	26.4	27	-0.06	0.542	1.15	**0.622**	1
Right Side	Standard	GPRS 4TS	190	836.6	26.4	27	-0.09	0.088	1.15	0.101	/
Top Side	Standard	GPRS 4TS	190	836.6	26.4	27	-0.01	0.032	1.15	0.037	/
Test Position	Cover Type	Mode	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 10gSAR 4.0 W/kg (mW/g)			Figure No.
								Measured SAR10g	Scaling Factor	Report SAR10g	
Limb SAR (Distance 0mm)											
Front Side	Standard	GPRS 4TS	190	836.6	26.4	27	-0.02	0.375	1.15	0.431	/
Back Side	Standard	GPRS 4TS	190	836.6	26.4	27	0.05	0.268	1.15	0.308	/
Left Side	Standard	GPRS 4TS	190	836.6	26.4	27	-0.07	0.691	1.15	**0.793**	2
Right Side	Standard	GPRS 4TS	190	836.6	26.4	27	-0.15	0.084	1.15	0.097	/
Top Side	Standard	GPRS 4TS	190	836.6	26.4	27	-0.02	0.028	1.15	0.032	/

Table 14.4: SAR Values for GSM1900

Test Position	Cover Type	Mode	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
								Measured SAR1g	Scaling Factor	Report SAR1g	
Hospot & Body Worn (Distance 5mm)											
Front Side	Standard	GPRS 4TS	661	1880	22.75	23	-0.11	0.201	1.06	0.213	/
Back Side	Standard	GPRS 4TS	661	1880	22.75	23	-0.17	0.109	1.06	0.115	/
Hospot (Distance 5mm)											
Left Side	Standard	GPRS 4TS	661	1880	22.75	23	0.07	0.645	1.06	**0.683**	3
Right Side	Standard	GPRS 4TS	661	1880	22.75	23	0.10	0.573	1.06	0.607	/
Top Side	Standard	GPRS 4TS	661	1880	22.75	23	-0.15	0.009	1.06	0.009	/
Test Position	Cover Type	Mode	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 10gSAR 4.0 W/kg (mW/g)			Figure No.
								Measured SAR10g	Scaling Factor	Report SAR10g	
Limb SAR (Distance 0mm)											
Front Side	Standard	GPRS 4TS	661	1880	22.75	23	-0.02	0.255	1.06	0.270	/
Back Side	Standard	GPRS 4TS	661	1880	22.75	23	-0.18	0.093	1.06	0.099	/
Left Side	Standard	GPRS 4TS	661	1880	22.75	23	0.05	0.955	1.06	**1.012**	4
Right Side	Standard	GPRS 4TS	661	1880	22.75	23	-0.19	0.086	1.06	0.091	/
Top Side	Standard	GPRS 4TS	661	1880	22.75	23	-0.08	0.005	1.06	0.005	/

Table 14.5: SAR Values for WCDMA Band Ⅱ

Test Position	Cover Type	Mode	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
								Measured SAR1g	Scaling Factor	Report SAR1g	
Hospot & Body Worn (Distance 5mm)											
Front Side	Standard	RMC12.2k	9400	1880	19.19	20	-0.03	0.163	1.21	0.196	/
Back Side	Standard	RMC12.2k	9400	1880	19.19	20	-0.11	0.083	1.21	0.100	/
Hospot (Distance 5mm)											
Left Side	Standard	RMC12.2k	9400	1880	19.19	20	-0.02	0.692	1.21	0.834	/
Right Side	Standard	RMC12.2k	9400	1880	19.19	20	-0.06	0.073	1.21	0.088	/
Top Side	Standard	RMC12.2k	9400	1880	19.19	20	0.18	0.009	1.21	0.011	/
Left Side	Standard	RMC12.2k	9262	1852.4	19.13	20	-0.03	0.901	1.22	1.101	/
Left Side	Standard	RMC12.2k	9538	1907.6	19.34	20	0.03	1.010	1.16	**1.176**	**5**
Hospot (Distance 5mm)											
Left Side	Standard	RMC12.2k	9538	1907.6	19.34	20	0.04	1.010	1.16	1.176	
Test Position	**Cover Type**	**Mode**	**Channel**	**Frequency (MHz)**	**Measured power (dBm)**	**Tune-up (dBm)**	**Power Drift (dB)**	**Limit of 10gSAR 4.0 W/kg (mW/g)**			**Figure No.**
								Measured SAR10g	**Scaling Factor**	**Report SAR10g**	
Limb SAR (Distance 0mm)											
Front Side	Standard	RMC12.2k	9400	1880	19.19	20	-0.04	0.190	1.21	0.229	/
Back Side	Standard	RMC12.2k	9400	1880	19.19	20	-0.10	0.074	1.21	0.089	/
Left Side	Standard	RMC12.2k	9400	1880	19.19	20	-0.11	0.734	1.21	**0.884**	**6**
Right Side	Standard	RMC12.2k	9400	1880	19.19	20	-0.04	0.072	1.21	0.087	/
Top Side	Standard	RMC12.2k	9400	1880	19.19	20	0.04	0.006	1.21	0.007	/

Table 14.6: SAR Values for WCDMA Band Ⅳ

Test Position	Cover Type	Mode	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
								Measured SAR1g	Scaling Factor	Report SAR1g	
Hospot & Body Worn (Distance 5mm)											
Front Side	Standard	RMC12.2k	1413	1732.6	19.16	19.5	-0.02	0.419	1.08	0.453	/
Back Side	Standard	RMC12.2k	1413	1732.6	19.16	19.5	0.12	0.143	1.08	0.155	/
Hospot (Distance 5mm)											
Left Side	Standard	RMC12.2k	1413	1732.6	19.16	19.5	-0.16	0.852	1.08	**0.921**	7
Right Side	Standard	RMC12.2k	1413	1732.6	19.16	19.5	0.04	0.049	1.08	0.053	/
Top Side	Standard	RMC12.2k	1413	1732.6	19.16	19.5	0.01	0.003	1.08	0.003	/
Left Side	Standard	RMC12.2k	1312	1712.4	19.14	19.5	0.01	0.840	1.09	0.913	/
Left Side	Standard	RMC12.3k	1513	1752.6	19.23	19.5	0.03	0.818	1.06	0.870	/
Hospot (Distance 5mm)Repeat											
Left Side	Standard	RMC12.2k	1413	1732.6	19.16	19.5	0.00	0.792	1.08	0.856	/
Test Position	Cover Type	Mode	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 10gSAR 4.0 W/kg (mW/g)			Figure No.
								Measured SAR10g	Scaling Factor	Report SAR10g	
Limb SAR (Distance 0mm)											
Front Side	Standard	RMC12.2k	1413	1732.6	19.16	19.5	-0.03	0.383	1.08	0.414	/
Back Side	Standard	RMC12.2k	1413	1732.6	19.16	19.5	-0.03	0.132	1.08	0.143	/
Left Side	Standard	RMC12.2k	1413	1732.6	19.16	19.5	0.05	0.931	1.08	**1.007**	8
Right Side	Standard	RMC12.2k	1413	1732.6	19.16	19.5	0.10	0.037	1.08	0.040	/
Top Side	Standard	RMC12.2k	1413	1732.6	19.16	19.5	0.03	0.003	1.08	0.003	/

Table 14.7: SAR Values for WCDMA Band Ⅴ

Test Position	Cover Type	Mode	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
								Measured SAR1g	Scaling Factor	Report SAR1g	
Hospot & Body Worn (Distance 5mm)											
Front Side	Standard	RMC12.2k	4183	836.6	20.98	21.5	0.01	0.708	1.13	**0.798**	9
Back Side	Standard	RMC12.2k	4183	836.6	20.98	21.5	0.06	0.345	1.13	0.389	/
Hospot (Distance 5mm)											
Left Side	Standard	RMC12.2k	4183	836.6	20.98	21.5	0.02	0.641	1.13	0.723	/
Right Side	Standard	RMC12.2k	4183	836.6	20.98	21.5	-0.02	0.109	1.13	0.123	/
Top Side	Standard	RMC12.2k	4183	836.6	20.98	21.5	0.01	0.031	1.13	0.034	/
Test Position	Cover Type	Mode	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 10gSAR 4.0 W/kg (mW/g)			Figure No.
								Measured SAR10g	Scaling Factor	Report SAR10g	
Limb SAR (Distance 0mm)											
Front Side	Standard	RMC12.2k	4183	836.6	20.98	21.5	0.16	0.468	1.13	0.528	/
Back Side	Standard	RMC12.2k	4183	836.6	20.98	21.5	0.03	0.417	1.13	0.470	/
Left Side	Standard	RMC12.2k	4183	836.6	20.98	21.5	0.03	1.460	1.13	**1.646**	10
Right Side	Standard	RMC12.2k	4183	836.6	20.98	21.5	-0.04	0.102	1.13	0.115	/
Top Side	Standard	RMC12.2k	4183	836.6	20.98	21.5	-0.11	0.045	1.13	0.050	/
Limb SAR (Distance 0mm)-Secondary Supply											
Left Side	Standard	RMC12.2k	4183	836.6	20.98	21.5	0.09	0.803	1.13	0.905	/

Table 14.8: SAR Values for LTE Band 2

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
Hospot & Body Worn (Distance 5mm)														
Front Side	Standard	QPSK	20	1	mid	19100	1900	22.82	23.5	0.07	0.237	1.17	0.277	/
Back Side	Standard	QPSK	20	1	mid	19100	1900	22.82	23.5	-0.11	0.131	1.17	0.153	/
Front Side	Standard	QPSK	20	50%	low	19100	1900	21.96	23	-0.14	0.181	1.27	0.230	/
Back Side	Standard	QPSK	20	50%	low	19100	1900	21.96	23	-0.10	0.103	1.27	0.131	/
Hospot (Distance 5mm)														
Left Side	Standard	QPSK	20	1	mid	19100	1900	22.82	23.5	-0.13	0.629	1.17	**0.736**	**11**
Right Side	Standard	QPSK	20	1	mid	19100	1900	22.82	23.5	-0.13	0.088	1.17	0.103	/
Top Side	Standard	QPSK	20	1	mid	19100	1900	22.82	23.5	0.01	0.010	1.17	0.012	/
Left Side	Standard	QPSK	20	50%	low	19100	1900	21.96	23	0.07	0.480	1.27	0.610	/
Right Side	Standard	QPSK	20	50%	low	19100	1900	21.96	23	-0.07	0.066	1.27	0.084	/
Top Side	Standard	QPSK	20	50%	low	19100	1900	21.96	23	-0.09	0.004	1.27	0.005	/
Test Position	**Cover Type**	**Mode**				**Channel**	**Frequency (MHz)**	**Measured power (dBm)**	**Tune-up (dBm)**	**Power Drift (dB)**	**Limit of 10gSAR 4.0 W/kg (mW/g)**			**Figure No.**
		Modulation	**BW(MHz)**	**RB Allocation**	**RB Offset**						**Measured SAR10g**	**Scaling Factor**	**Report SAR10g**	
Limb SAR (Distance 0mm)														
Front Side	Standard	QPSK	20	1	mid	19100	1900	22.82	23.5	0.03	0.303	1.17	0.354	/
Back Side	Standard	QPSK	20	1	mid	19100	1900	22.82	23.5	-0.16	0.122	1.17	0.143	/
Left Side	Standard	QPSK	20	1	mid	19100	1900	22.82	23.5	0.04	1.140	1.17	**1.333**	**12**
Right Side	Standard	QPSK	20	1	mid	19100	1900	22.82	23.5	-0.02	0.163	1.17	0.191	/
Top Side	Standard	QPSK	20	1	mid	19100	1900	22.82	23.5	0.07	0.012	1.17	0.013	/
Front Side	Standard	QPSK	20	50%	low	19100	1900	21.96	23	-0.14	0.232	1.27	0.295	/
Back Side	Standard	QPSK	20	50%	low	19100	1900	21.96	23	-0.17	0.094	1.27	0.120	/
Left Side	Standard	QPSK	20	50%	low	19100	1900	21.96	23	0.04	0.870	1.27	1.105	/
Right Side	Standard	QPSK	20	50%	low	19100	1900	21.96	23	-0.11	0.125	1.27	0.159	/
Top Side	Standard	QPSK	20	50%	low	19100	1900	21.96	23	0.08	0.007	1.27	0.009	/

Table 14.9: SAR Values for LTE Band 4

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
Hospot & Body Worn (Distance 5mm)														
Front Side	Standard	QPSK	20	1	mid	20175	1732.5	21.5	22	-0.16	0.187	1.12	0.210	/
Back Side	Standard	QPSK	20	1	mid	20175	1732.5	21.5	22	0.00	0.111	1.12	0.125	/
Front Side	Standard	QPSK	20	50%	mid	20175	1732.5	20.54	22	-0.14	0.151	1.40	0.211	/
Back Side	Standard	QPSK	20	50%	mid	20175	1732.5	20.54	22	-0.02	0.087	1.40	0.121	/
Hospot (Distance 5mm)														
Left Side	Standard	QPSK	20	1	mid	20175	1732.5	21.5	22	0.07	0.539	1.12	**0.605**	**13**
Right Side	Standard	QPSK	20	1	mid	20175	1732.5	21.5	22	0.07	0.023	1.12	0.026	/
Top Side	Standard	QPSK	20	1	mid	20175	1732.5	21.5	22	0.07	0.007	1.12	0.007	/
Left Side	Standard	QPSK	20	50%	mid	20175	1732.5	20.54	22	-0.10	0.430	1.40	0.602	/
Right Side	Standard	QPSK	20	50%	mid	20175	1732.5	20.54	22	0.14	0.019	1.40	0.027	/
Top Side	Standard	QPSK	20	50%	mid	20175	1732.5	20.54	22	-0.19	0.003	1.40	0.004	/
Test Position	**Cover Type**	**Mode**				**Channel**	**Frequency (MHz)**	**Measured power (dBm)**	**Tune-up (dBm)**	**Power Drift (dB)**	**Limit of 10gSAR 4.0 W/kg (mW/g)**			**Figure No.**
		Modulation	**BW(MHz)**	**RB Allocation**	**RB Offset**						**Measured SAR10g**	**Scaling Factor**	**Report SAR10g**	
Limb SAR (Distance 0mm)														
Front Side	Standard	QPSK	20	1	mid	20175	1732.5	21.5	22	-0.08	0.221	1.12	0.248	/
Back Side	Standard	QPSK	20	1	mid	20175	1732.5	21.5	22	0.01	0.0723	1.12	0.081	/
Left Side	Standard	QPSK	20	1	mid	20175	1732.5	21.5	22	0.11	0.847	1.12	**0.950**	**14**
Right Side	Standard	QPSK	20	1	mid	20175	1732.5	21.5	22	-0.04	0.0253	1.12	0.028	/
Top Side	Standard	QPSK	20	1	mid	20175	1732.5	21.5	22	0.04	0.00663	1.12	0.007	/
Front Side	Standard	QPSK	20	50%	mid	20175	1732.5	20.54	22	0.01	0.161	1.40	0.225	/
Back Side	Standard	QPSK	20	50%	mid	20175	1732.5	20.54	22	0.10	0.0559	1.40	0.078	/
Left Side	Standard	QPSK	20	50%	mid	20175	1732.5	20.54	22	0.11	0.656	1.40	0.918	/
Right Side	Standard	QPSK	20	50%	mid	20175	1732.5	20.54	22	0.12	0.0308	1.40	0.043	/
Top Side	Standard	QPSK	20	50%	mid	20175	1732.5	20.54	22	-0.02	0.0043	1.40	0.006	/

Table 14.10: SAR Values for LTE Band 7

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
Hospot & Body Worn (Distance 5mm)														
Front Side	Standard	QPSK	20	1	mid	21100	2535	22.37	23	-0.01	0.208	1.16	0.240	/
Back Side	Standard	QPSK	20	1	mid	21100	2535	22.37	23	0.03	0.185	1.16	0.214	/
Front Side	Standard	QPSK	20	50%	mid	20850	2510	21.4	22	-0.03	0.163	1.15	0.187	/
Back Side	Standard	QPSK	20	50%	mid	20850	2510	21.4	22	0.19	0.147	1.15	0.169	/
Hospot (Distance 5mm)														
Left Side	Standard	QPSK	20	1	mid	21100	2535	22.37	23	-0.07	0.925	1.16	1.069	/
Right Side	Standard	QPSK	20	1	mid	21100	2535	22.37	23	0.08	0.041	1.16	0.048	/
Top Side	Standard	QPSK	20	1	mid	21100	2535	22.37	23	0.11	0.028	1.16	0.033	/
Left Side	Standard	QPSK	20	50%	mid	20850	2510	21.4	22	-0.09	0.934	1.15	1.072	/
Right Side	Standard	QPSK	20	50%	mid	20850	2510	21.4	22	0.04	0.031	1.15	0.035	/
Left Side	Standard	QPSK	20	1	mid	20850	2510	22.31	23	-0.05	0.979	1.17	1.148	/
Left Side	Standard	QPSK	20	1	mid	21350	2560	22.35	23	0.11	1.140	1.16	**1.324**	**15**
Left Side	Standard	QPSK	20	50%	mid	21100	2535	21.23	22	0.09	0.847	1.19	1.011	/
Left Side	Standard	QPSK	20	50%	mid	21350	2560	21.38	22	0.11	0.888	1.15	1.024	/
Top Side	Standard	QPSK	20	50%	mid	20850	2510	21.4	22	-0.06	0.022	1.15	0.026	/
Hospot (Distance 5mm) Repeated														
Left Side	Standard	QPSK	20	1	mid	21350	2560	22.35	23	-0.14	0.967	1.16	1.123	/
Hospot (Distance 5mm)-Secondary Supply														
Left Side	Standard	QPSK	20	1	mid	21350	2560	22.35	23	0.00	0.964	1.16	1.120	/
Test Position	**Cover Type**	**Mode**				**Channel**	**Frequency (MHz)**	**Measured power (dBm)**	**Tune-up (dBm)**	**Power Drift (dB)**	**Limit of 10gSAR 4.0 W/kg (mW/g)**			**Figure No.**
		Modulation	**BW(MHz)**	**RB Allocation**	**RB Offset**						**Measured SAR10g**	**Scaling Factor**	**Report SAR10g**	
Limb SAR (Distance 0mm)														
Front Side	Standard	QPSK	20	1	mid	21100	2535	22.37	23	-0.01	0.205	1.16	0.237	/
Back Side	Standard	QPSK	20	1	mid	21100	2535	22.37	23	0.06	0.141	1.16	0.163	/
Left Side	Standard	QPSK	20	1	mid	21100	2535	22.37	23	-0.04	1.38	1.16	**1.595**	**16**
Right Side	Standard	QPSK	20	1	mid	21100	2535	22.37	23	0.07	0.0327	1.16	0.038	/
Top Side	Standard	QPSK	20	1	mid	21100	2535	22.37	23	-0.02	0.0181	1.16	0.021	/
Front Side	Standard	QPSK	20	50%	mid	20850	2510	21.4	22	-0.03	0.164	1.15	0.188	/
Back Side	Standard	QPSK	20	50%	mid	20850	2510	21.4	22	-0.09	0.113	1.15	0.130	/
Left Side	Standard	QPSK	20	50%	mid	20850	2510	21.4	22	0.03	0.99	1.15	1.137	/
Right Side	Standard	QPSK	20	50%	mid	20850	2510	21.4	22	0.16	0.0233	1.15	0.027	/
Top Side	Standard	QPSK	20	50%	mid	20850	2510	21.4	22	0.12	0.0135	1.15	0.016	/

Table 14.11: SAR Values for LTE Band 17

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
Hospot & Body Worn (Distance 5mm)														
Front Side	Standard	QPSK	10	1	mid	23790	710	22.46	23.5	0.01	0.172	1.27	0.219	/
Back Side	Standard	QPSK	10	1	mid	23790	710	22.46	23.5	0.04	0.108	1.27	0.137	/
Front Side	Standard	QPSK	10	50%	low	23790	710	21.39	22.5	0.01	0.136	1.29	0.176	/
Back Side	Standard	QPSK	10	50%	low	23790	710	21.39	22.5	0.01	0.083	1.29	0.107	/
Hospot (Distance 5mm)														
Left Side	Standard	QPSK	10	1	mid	23790	710	22.46	23.5	-0.06	0.214	1.27	**0.272**	**17**
Right Side	Standard	QPSK	10	1	mid	23790	710	22.46	23.5	0.10	0.133	1.27	0.169	/
Top Side	Standard	QPSK	10	1	mid	23790	710	22.46	23.5	0.07	0.015	1.27	0.019	/
Left Side	Standard	QPSK	10	50%	low	23790	710	21.39	22.5	-0.04	0.163	1.29	0.210	/
Right Side	Standard	QPSK	10	50%	low	23790	710	21.39	22.5	-0.01	0.107	1.29	0.138	/
Top Side	Standard	QPSK	10	50%	low	23790	710	21.39	22.5	-0.07	0.011	1.29	0.015	/
Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 10gSAR 4.0 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR10g	Scaling Factor	Report SAR10g	
Limb SAR (Distance 0mm)														
Front Side	Standard	QPSK	10	1	mid	23790	710	22.46	23.5	-0.03	0.21	1.27	0.267	/
Back Side	Standard	QPSK	10	1	mid	23790	710	22.46	23.5	0.05	0.17	1.27	0.216	/
Left Side	Standard	QPSK	10	1	mid	23790	710	22.46	23.5	0.04	0.509	1.27	**0.647**	**18**
Right Side	Standard	QPSK	10	1	mid	23790	710	22.46	23.5	0.05	0.0985	1.27	0.125	/
Top Side	Standard	QPSK	10	1	mid	23790	710	22.46	23.5	-0.04	0.0132	1.27	0.017	/
Front Side	Standard	QPSK	10	50%	low	23790	710	21.39	22.5	0.01	0.165	1.29	0.213	/
Back Side	Standard	QPSK	10	50%	low	23790	710	21.39	22.5	0.02	0.13	1.29	0.168	/
Left Side	Standard	QPSK	10	50%	low	23790	710	21.39	22.5	0.05	0.456	1.29	0.589	/
Right Side	Standard	QPSK	10	50%	low	23790	710	21.39	22.5	0.16	0.078	1.29	0.101	/
Top Side	Standard	QPSK	10	50%	low	23790	710	21.39	22.5	0.03	0.0105	1.29	0.014	/

Table 14.12: SAR Values for 2.4GWi-Fi

Test Position	Cover Type	Mode	BW(MHz)	Duty Cycle	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
										Measured SAR1g	Scaling Factor	Report SAR1g	
Hospot (Distance 5mm)													
Right Side	Standard	802.11b	20	1:1	6	2437	12.21	13	-0.10	0.208	1.20	**0.249**	**19**
Test Position	Cover Type	Mode	BW(MHz)	Duty Cycle	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 10gSAR 4.0 W/kg (mW/g)			Figure No.
										Measured SAR10g	Scaling Factor	Report SAR10g	
Limb SAR (Distance 0mm)													
Right Side	Standard	802.11b	20	1:1	6	2437	12.21	13	-0.07	0.299	1.20	**0.359**	**20**

Table 14.13: SAR Values for 5GWi-Fi

Test Position	Cover Type	Mode	BW(MHz)	Duty Cycle	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
										Measured SAR1g	Scaling Factor	Report SAR1g	
Hospot (Distance 5mm)													
Right Side	Standard	802.11a	20	1:1	36	5180	15.55	16	-0.06	0.655	1.11	**0.727**	**21**
Hospot (Distance 5mm)-Secondary Supply													
Right Side	Standard	802.11a	20	1:1	36	5180	15.55	16	0.00	0.572	1.11	0.634	/
Test Position	**Cover Type**	**Mode**		**Duty Cycle**	**Channel**	**Frequency (MHz)**	**Measured power (dBm)**	**Tune-up (dBm)**	**Power Drift (dB)**	**Limit of 10gSAR 4.0 W/kg (mW/g)**			**Figure No.**
										Measured SAR10g	**Scaling Factor**	**Report SAR10g**	
Limb SAR (Distance 0mm)													
Right Side	Standard	802.11a	20	1:1	36	5180	15.55	16	-0.04	0.411	1.11	**0.456**	**22**
Limb SAR (Distance 0mm)-Secondary Supply													
Right Side	Standard	802.11a	20	1:1	36	5180	15.55	16	-0.17	0.409	1.11	0.454	/

14.3. Simultaneous SAR Evaluation

Table 14.14 Simultaneous transmission SAR

FCC SAR Test		Cellular									Max. of Cellular	Non-Cellular		同步传输/Simultanuous Transmission	
		G850	G1900	W B2	W B4	W B5	L B2	L B4	L B7	L B17		WiFi2G Core0	WiFi5G Core0	Max(Cel.)+ WiFi2G Core0+1	Max(Cel.)+ WiFi5G Core0+1
Hotspot (5mm)	Top	0.04	0.01	0.01	0.00	0.03	0.01	0.01	0.03	0.02	0.04	0.02	0.01	0.05	0.05
	Left	0.62	0.68	1.18	0.92	0.72	0.74	0.60	1.32	0.27	1.32	0.03	0.02	**1.35**	1.34
	Right	0.10	0.61	0.09	0.05	0.12	0.10	0.03	0.05	0.17	0.61	0.30	0.73	0.90	1.33
	Front	0.42	0.21	0.20	0.45	0.80	0.28	0.21	0.24	0.22	0.80	0.13	0.08	0.93	0.88
	Back	0.28	0.12	0.10	0.15	0.39	0.15	0.12	0.21	0.14	0.39	0.04	0.04	0.43	0.43
Worn (5mm)	Front	0.42	0.21	0.20	0.45	0.80	0.28	0.21	0.24	0.22	0.80	0.13	0.08	0.93	0.88
	Back	0.28	0.12	0.10	0.15	0.39	0.15	0.12	0.21	0.14	0.39	0.04	0.04	0.43	0.43
Limb (0mm)	Top	0.03	0.01	0.01	0.00	0.05	0.01	0.01	0.02	0.02	0.05	0.01	0.01	0.06	0.06
	Left	0.79	1.01	0.88	1.01	1.65	1.33	0.95	1.60	0.65	1.65	0.03	0.00	**1.67**	1.65
	Right	0.10	0.09	0.09	0.04	0.11	0.19	0.04	0.04	0.13	0.19	0.36	0.46	0.55	0.65
	Front	0.43	0.27	0.23	0.41	0.53	0.35	0.25	0.24	0.27	0.53	0.12	0.05	0.64	0.58
	Back	0.31	0.10	0.09	0.14	0.47	0.14	0.08	0.16	0.22	0.47	0.03	0.02	0.50	0.49

According to the conducted power measurement result, we can draw the conclusion that: stand-alone SAR for Wi-Fi should be performed. Then, simultaneous transmission SAR for Wi-Fi/BT is considered with measurement results of GSM/WCDMA/LTE and Wi-Fi/BT.

According to the above table, the sum of reported SAR values for partial-body GSM/WCDMA/LTE and Wi-Fi < 1.6W/kg; the sum of reported SAR values for Limb GSM/WCDMA/LTE/CDMA and Wi-Fi < 4.0W/kg. So the simultaneous transmission SAR is not required for Wi-Fi/BT transmitter.

14.4. SAR Measurement Variability

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

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

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps2) through 4) do not apply.

2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45W/kg (~ 10% from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Table 14.5: SAR Measurement Variability (1g)

Frequency		Configuration	Test Position	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio
MHz	Ch.					
1907.6	9538	RMC12.2k	Left Side	1.010	1.010	1.000
1752.6	1513	RMC12.2k	Left Side	0.852	0.792	1.076
2560	21350	20MHz 1RB50offset	Left Side	1.14	0.967	1.179

Note: According to the KDB 865664 D01 repeated measurement is not required when the original highest measured SAR is < 0.8 W/kg.

15. Test Equipment List

Item	Equipment Name	Type	Serial Number	Manufacturer	Cal. Date	Cal. interval
1	Network analyzer	N5242A	MY51221755	Agilent	2021/10/23	1 year
2	Power meter	E4417A	MY60350007	keysight	2021/10/12	1 year
3	Power sensor	E9323A	MY60270002	keysight	2021/10/12	1 year
4	Power sensor	E9323A	MY60270003	keysight	2021/10/12	1 year
5	Signal Generator	E4438C	MY49072044	Agilent	2021/5/10	1 year
6	Amplifier	BLWA 0260-50/25D	2012865A	BONN	2021/11/9	1 year
7	BTS	MT8820C	6201240338	Anritsu	2021/10/23	1 year
8	BTS	CMU200	123102	RS	2021/5/10	1 year
9	E-field Probe	EX3DV4	7401	SPEAG	2021/6/7	1 year
10	DAE	DAE4	1581	SPEAG	2021/5/17	1 year
11	Dipole Validation Kit	D750V3	1144	SPEAG	2021/9/16	1 year
12	Dipole Validation Kit	D835V2	4d112	SPEAG	2021/9/17	1 year
13	Dipole Validation Kit	D1750V2	1044	SPEAG	2021/9/18	1 year
14	Dipole Validation Kit	D2000V2	1051	SPEAG	2021/9/18	1 year
15	Dipole Validation Kit	D2450V2	858	SPEAG	2021/9/18	1 year
16	Dipole Validation Kit	D2600V2	1031	SPEAG	2021/9/16	1 year
17	Dipole Validation Kit	D5GHzV2	1172	SPEAG	2021/3/23	1 year

Annex A: Graph Results

Fig.1 GSM 850 GPRS 4TS Left Mode Middle 5mm

Date/Time: 2021/11/4

Electronics: DAE4 Sn1581

Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.917 S/m; ε_r = 40.981; ρ = 1000 kg/m^3

Ambient Temperature:21.2°C   Liquid Temperature:21.2°C

Communication System: GPRS 850 4TS ; Frequency: 836.6 MHz; Duty Cycle: 1:2

Probe: EX3DV4 - SN7401ConvF(10.17, 10.17, 10.17) @ 836.6 MHz

GSM 850 GPRS 4TS Left Mode Middle 5mm/Area Scan (51x121x1):

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

Maximum value of SAR (Measurement) = 0.925 W/kg

GSM 850 GPRS 4TS Left Mode Middle 5mm/Zoom Scan (7x7x7)/Cube 0:

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

Reference Value = 13.91 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 1.02 W/kg

SAR(1 g) = 0.542 W/kg; SAR(10 g) = 0.306 W/kg

Maximum value of SAR (measured) = 0.596 W/kg

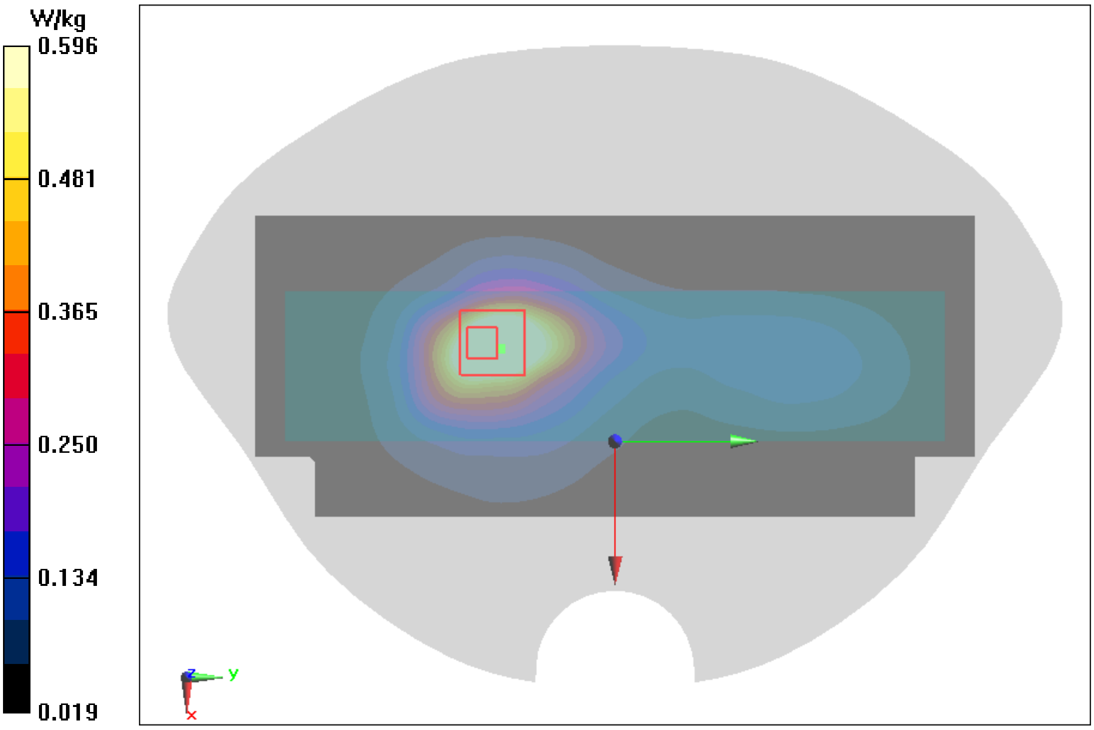


Fig.2 GSM 850 GPRS 4TS Left Mode Middle 0mm

Date/Time: 2021/11/4

Electronics: DAE4 Sn1581

Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.917 S/m; ε_r = 40.981; ρ = 1000 kg/m^3

Ambient Temperature: 21.2°C Liquid Temperature: 21.2°C

Communication System: GPRS 850 4TS ; Frequency: 836.6 MHz; Duty Cycle: 1:2

Probe: EX3DV4 - SN7401ConvF(10.17, 10.17, 10.17) @ 836.6 MHz

GSM 850 GPRS 4TS Left Mode Middle 0mm/Area Scan (51x121x1):

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

Maximum value of SAR (Measurement) = 2.92 W/kg

GSM 850 GPRS 4TS Left Mode Middle 0mm/Zoom Scan (7x7x7)/Cube 0:

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

Reference Value = 20.87 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 3.16 W/kg

SAR(1 g) = 1.36 W/kg; SAR(10 g) = 0.691 W/kg

Maximum value of SAR (measured) = 1.51 W/kg

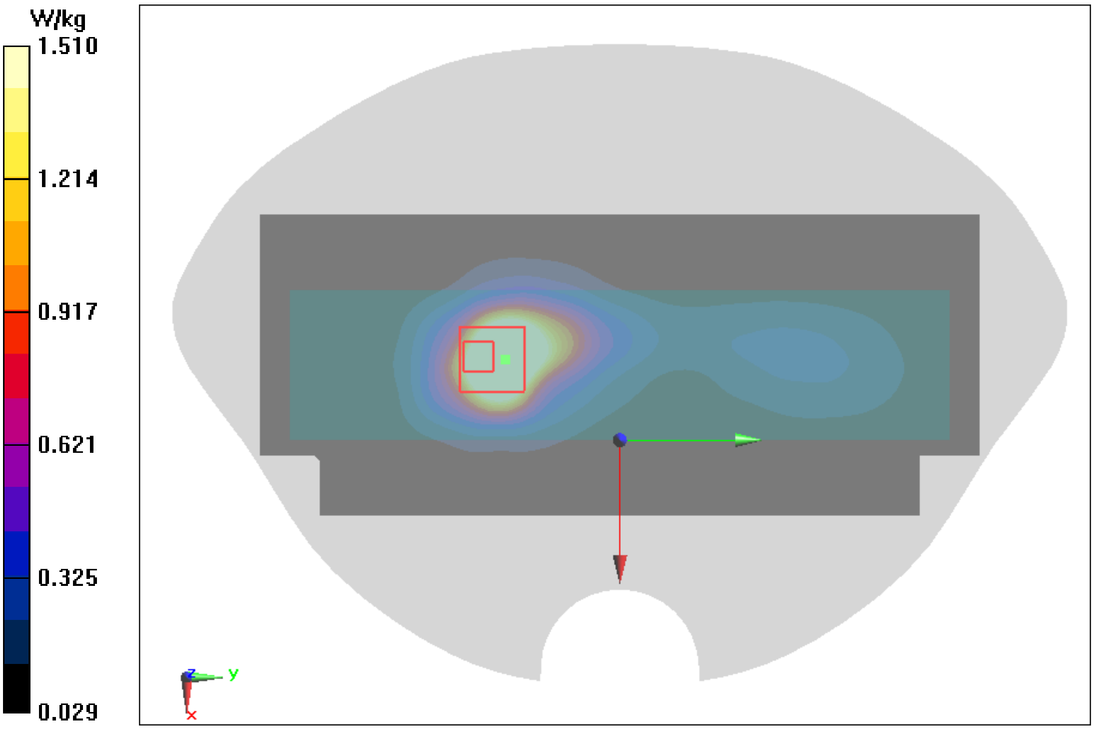


Fig.3 GSM 1900 GPRS 4TS Left Mode Middle 5mm

Date/Time: 2021/11/5

Electronics: DAE4 Sn1581

Medium parameters used: f = 1880 MHz; σ = 1.243 S/m; ε_r = 38.75; ρ = 1000 kg/m^3

Ambient Temperature:21.4°C Liquid Temperature: 21.4°C

Communication System: GPRS1900 4TS ; Frequency: 1880 MHz; Duty Cycle: 1:2

Probe: EX3DV4 - SN7401ConvF(8.35, 8.35, 8.35) @ 1880 MHz

GSM 1900 GPRS 4TS Left Mode Middle 5mm/Area Scan (51x121x1):

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

Maximum value of SAR (Measurement) = 1.06 W/kg

GSM 1900 GPRS 4TS Left Mode Middle 5mm/Zoom Scan (7x7x7)/Cube 0:

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

Reference Value = 14.75 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 1.28 W/kg

SAR(1 g) = 0.645 W/kg; SAR(10 g) = 0.313 W/kg

Maximum value of SAR (measured) = 0.715 W/kg

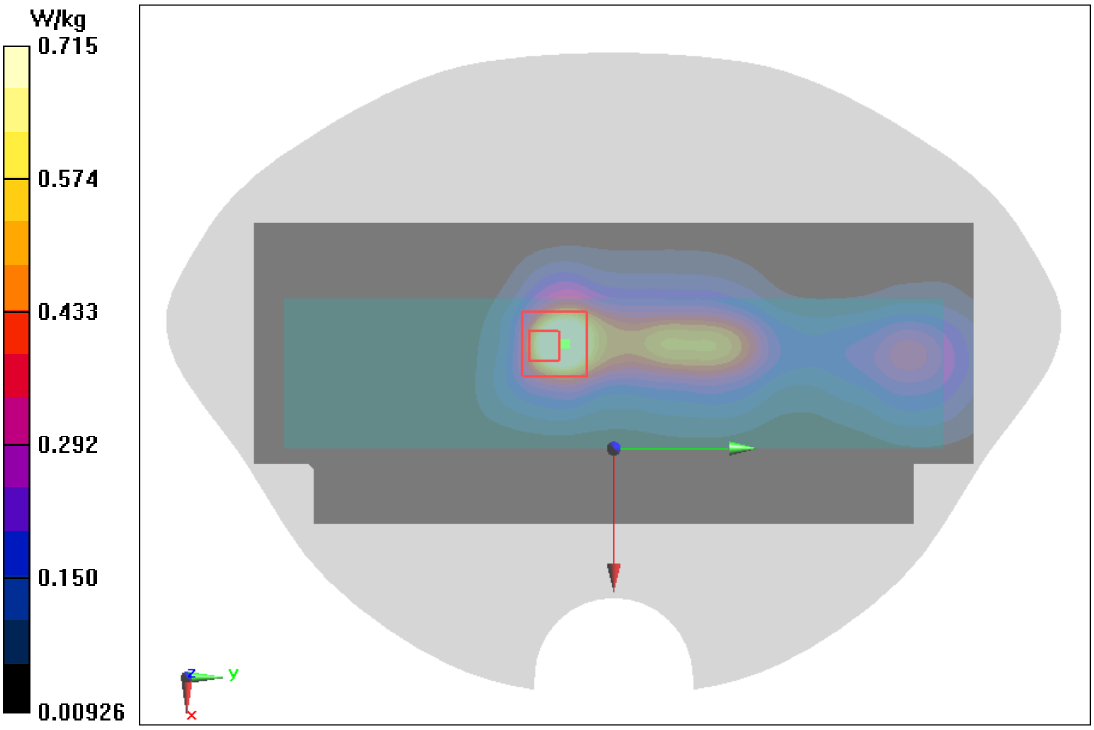


Fig.4 GSM 1900 GPRS 4TS Left Mode Middle 0mm

Date/Time: 2021/11/5

Electronics: DAE4 Sn1581

Medium parameters used: f = 1880 MHz; σ = 1.243 S/m; ε_r = 38.75; ρ = 1000 kg/m^3

Ambient Temperature: 21.4°C Liquid Temperature: 21.4°C

Communication System: GPRS1900 4TS ; Frequency: 1880 MHz; Duty Cycle: 1:2

Probe: EX3DV4 - SN7401ConvF(8.35, 8.35, 8.35) @ 1880 MHz

GSM 1900 GPRS 4TS Left Mode Middle 0mm/Area Scan (51x121x1):

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

Maximum value of SAR (Measurement) = 3.83 W/kg

GSM 1900 GPRS 4TS Left Mode Middle 0mm/Zoom Scan (7x7x7)/Cube 0:

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

Reference Value = 20.79 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 5.53 W/kg

SAR(1 g) = 2.24 W/kg; SAR(10 g) = 0.955 W/kg

Maximum value of SAR (measured) = 2.68 W/kg

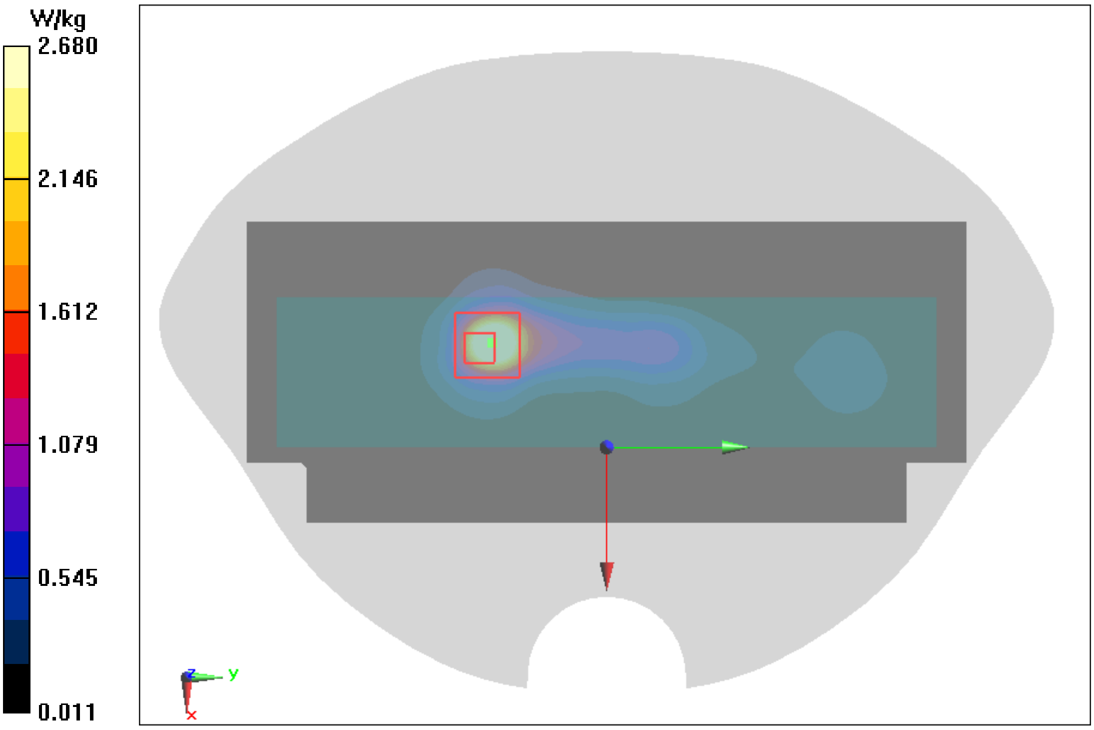


Fig.5 WCDMA B2 Left Mode High 5mm

Date/Time: 2021/11/8

Electronics: DAE4 Sn1581

Medium parameters used (interpolated): f = 1907.6 MHz; σ = 1.261 S/m; ε_r = 38.69; ρ = 1000 kg/m^3

Ambient Temperature: 21.1°C Liquid Temperature: 21.1°C

Communication System: UID 0, WCDMA Professional (0); Frequency: 1907.6 MHz; Duty Cycle: 1:1

Probe: EX3DV4 - SN7401ConvF(8.35, 8.35, 8.35) @ 1907.6 MHz

WCDMA B2 Left Mode High 5mm/Area Scan (51x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

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

WCDMA B2 Left Mode High 5mm/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 23.02 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 2.15 W/kg

SAR(1 g) = 1.01 W/kg; SAR(10 g) = 0.489 W/kg

Maximum value of SAR (measured) = 1.58 W/kg

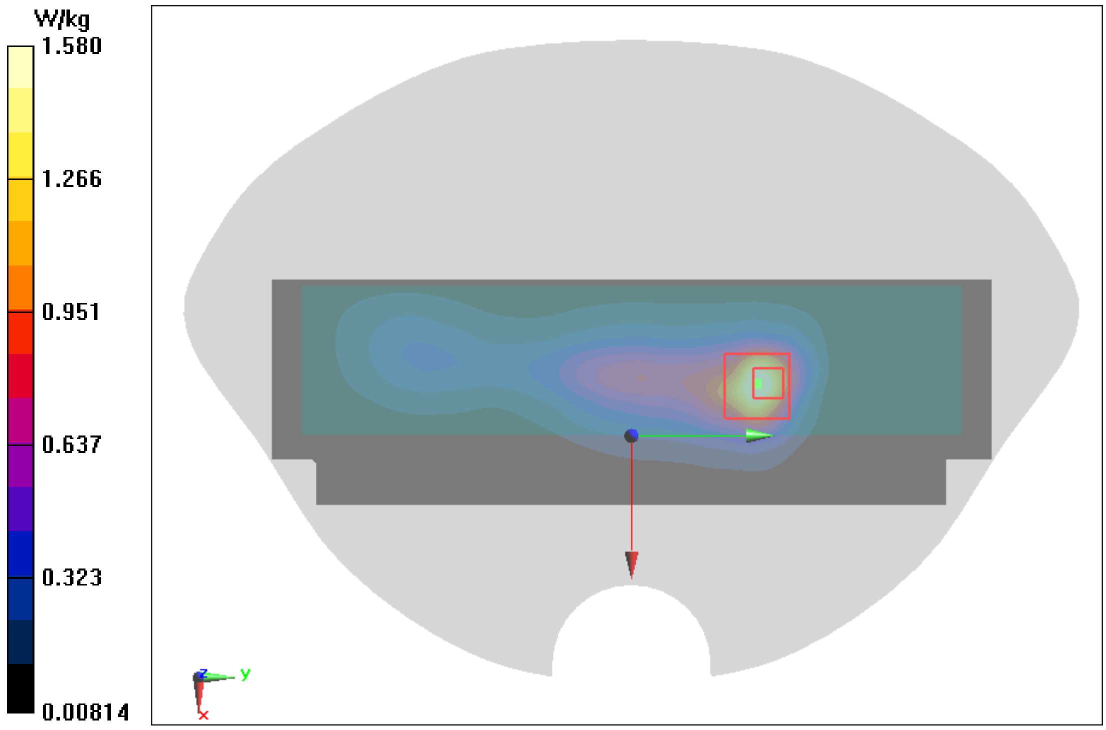


Fig.6 WCDMA B2 Left Mode Middle 0mm

Date/Time: 2021/11/8

Electronics: DAE4 Sn1581

Medium parameters used: f = 1880 MHz; σ = 1.243 S/m; ε_r = 38.75; ρ = 1000 kg/m^3

Ambient Temperature: Liquid Temperature:

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

Probe: EX3DV4 - SN7401ConvF(8.35, 8.35, 8.35) @ 1880 MHz

WCDMA B2 Left Mode Middle 0mm/Area Scan (51x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 3.44 W/kg

WCDMA B2 Left Mode Middle 0mm/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 22.31 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 3.97 W/kg

SAR(1 g) = 1.69 W/kg; SAR(10 g) = 0.734 W/kg

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

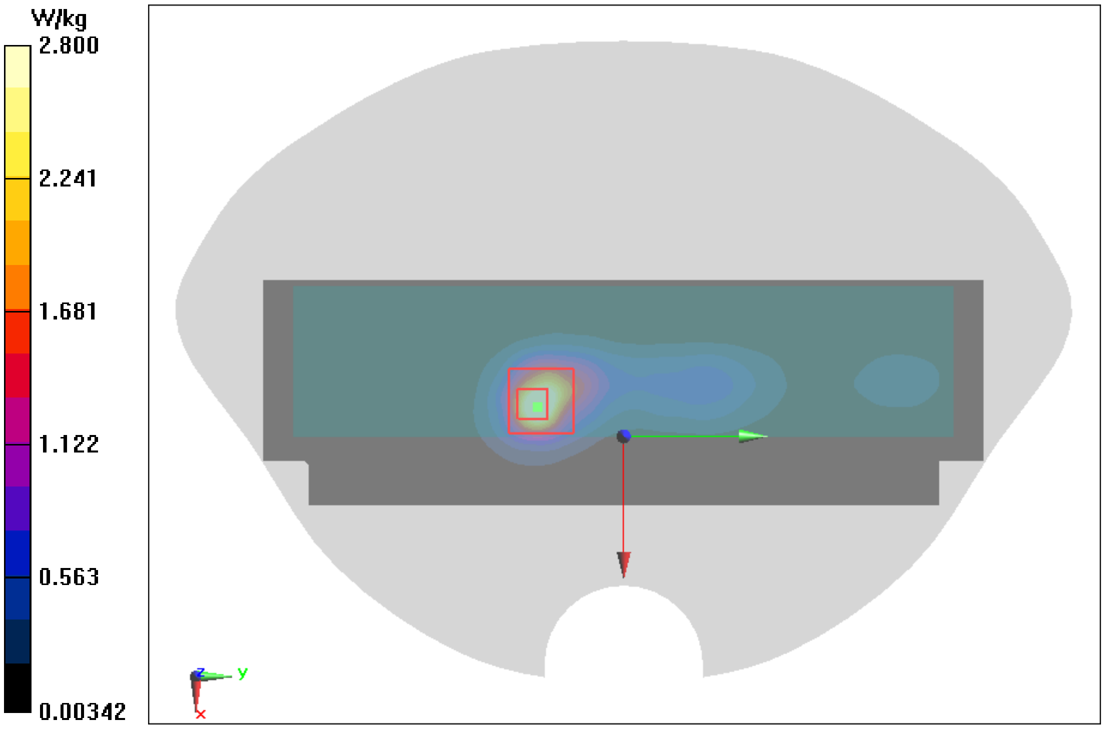


Fig.7 WCDMA B4 Left Mode Middle 5mm

Date/Time: 2021/11/2

Electronics: DAE4 Sn1581

Medium parameters used (interpolated): f = 1732.6 MHz; σ = 1.354 S/m; ε_r = 39.044; ρ = 1000 kg/m^3

Ambient Temperature: 21.5°C   Liquid Temperature: 21.5°C

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

Probe: EX3DV4 - SN7401ConvF(8.62, 8.62, 8.62) @ 1732.6 MHz

WCDMA B4 Left Mode Middle 5mm/Area Scan (51x161x1):

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

Maximum value of SAR (Measurement) = 1.19 W/kg

WCDMA B4 Left Mode Middle 5mm/Zoom Scan (7x7x7)/Cube 0:

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

Reference Value = 28.47 V/m; Power Drift = -0.16 dB

Peak SAR (extrapolated) = 1.75 W/kg

SAR(1 g) = 0.852 W/kg; SAR(10 g) = 0.437 W/kg

Maximum value of SAR (measured) = 1.35 W/kg

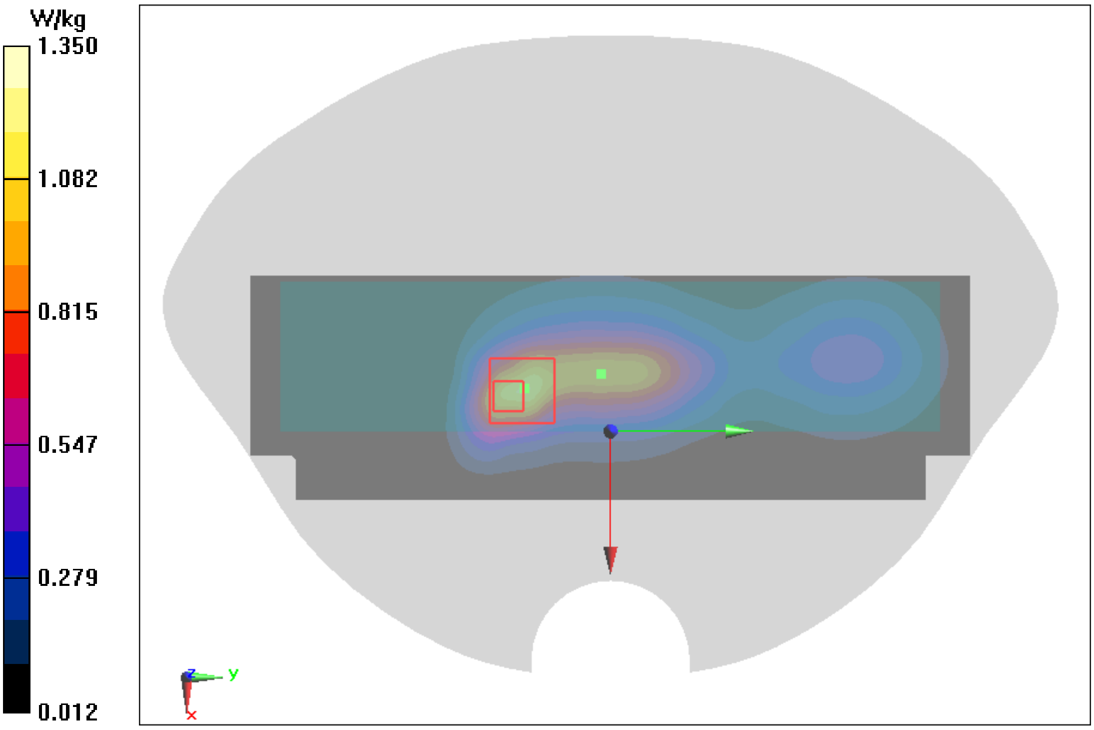


Fig.8 WCDMA B4 Left Mode Middle 0mm

Date/Time: 2021/11/2

Electronics: DAE4 Sn1581

Medium parameters used (interpolated): f = 1732.6 MHz; σ = 1.354 S/m; ε_r = 39.044; ρ = 1000 kg/m^3

Ambient Temperature: 21.5°C Liquid Temperature: 21.5°C

Communication System: UID 0, WCDMA Professional (0); Frequency: 1732.6 MHz; Duty Cycle: 1:1

Probe: EX3DV4 - SN7401ConvF(8.62, 8.62, 8.62) @ 1732.6 MHz

WCDMA B4 Left Mode Middle 0mm/Area Scan (51x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

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

WCDMA B4 Left Mode Middle 0mm/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.90 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 6.06 W/kg

SAR(1 g) = 2.12 W/kg; SAR(10 g) = 0.931 W/kg

Maximum value of SAR (measured) = 3.73 W/kg

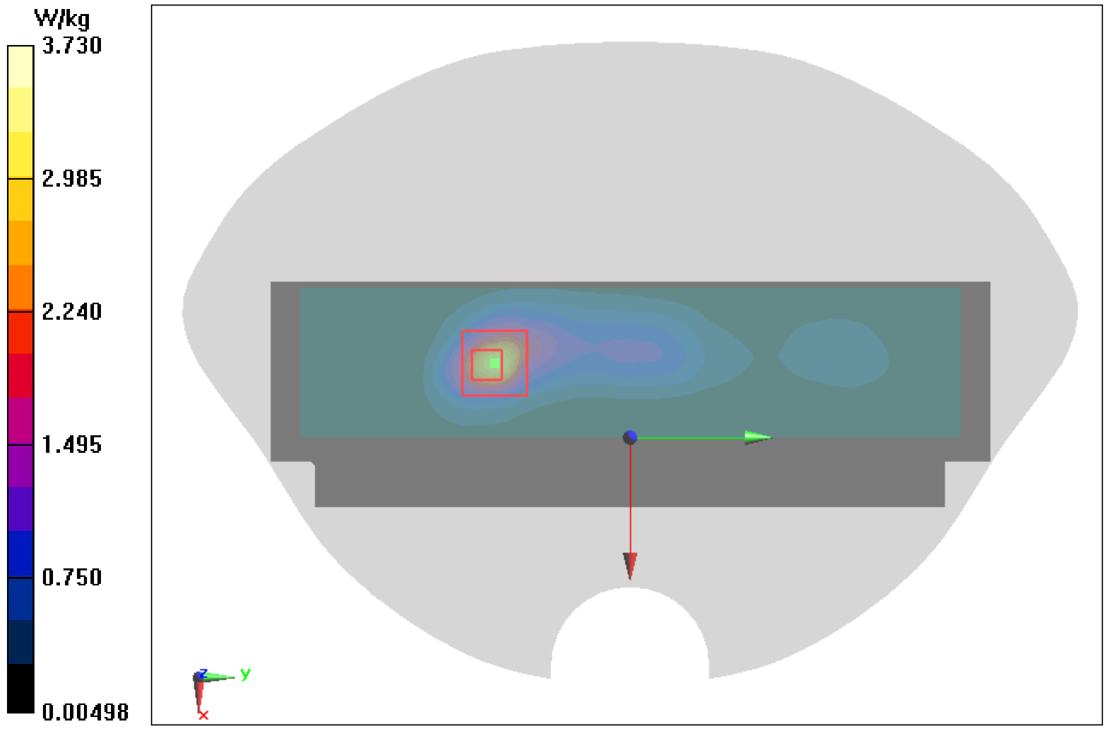


Fig.9 WCDMA B5 Front Mode Middle 5mm

Date/Time: 2021/11/2

Electronics: DAE4 Sn1581

Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.916 S/m; ε_r = 41.006; ρ = 1000 kg/m^3

Ambient Temperature: 21.5°C Liquid Temperature: 21.5°C

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

Probe: EX3DV4 - SN7401ConvF(10.17, 10.17, 10.17) @ 836.6 MHz

WCDMA B5 Front Mode Middle 5mm/Area Scan (71x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

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

WCDMA B5 Front Mode Middle 5mm/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.39 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 1.21 W/kg

SAR(1 g) = 0.708 W/kg; SAR(10 g) = 0.435 W/kg

Maximum value of SAR (measured) = 1.02 W/kg

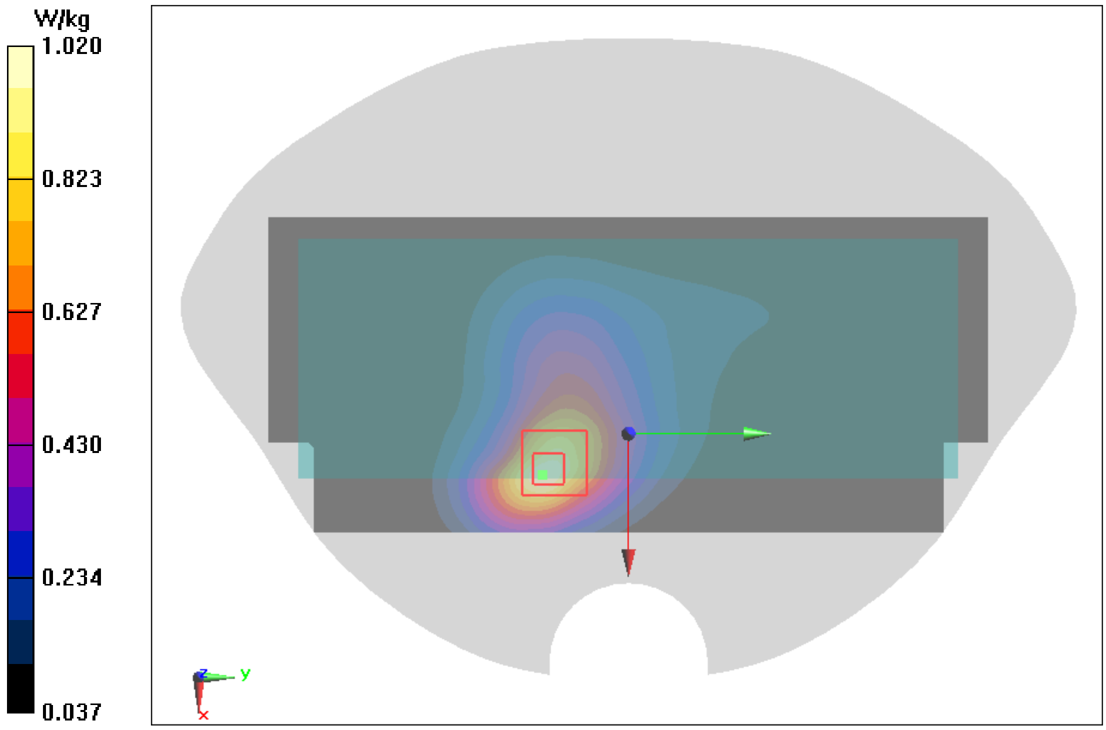


Fig.10 WCDMA B5 Left Mode Middle 0mm

Date/Time: 2021/11/2

Electronics: DAE4 Sn1581

Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.916 S/m; ε_r = 41.006; ρ = 1000 kg/m^3

Ambient Temperature: 21.5°C Liquid Temperature: 21.5°C

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

Probe: EX3DV4 - SN7401ConvF(10.17, 10.17, 10.17) @ 836.6 MHz

WCDMA B5 Left Mode Middle 0mm/Area Scan (51x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 2.99 W/kg

WCDMA B5 Left Mode Middle 0mm/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 27.09 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 4.52 W/kg

SAR(1 g) = 1.46 W/kg; SAR(10 g) = 0.717 W/kg

Maximum value of SAR (measured) = 2.59 W/kg

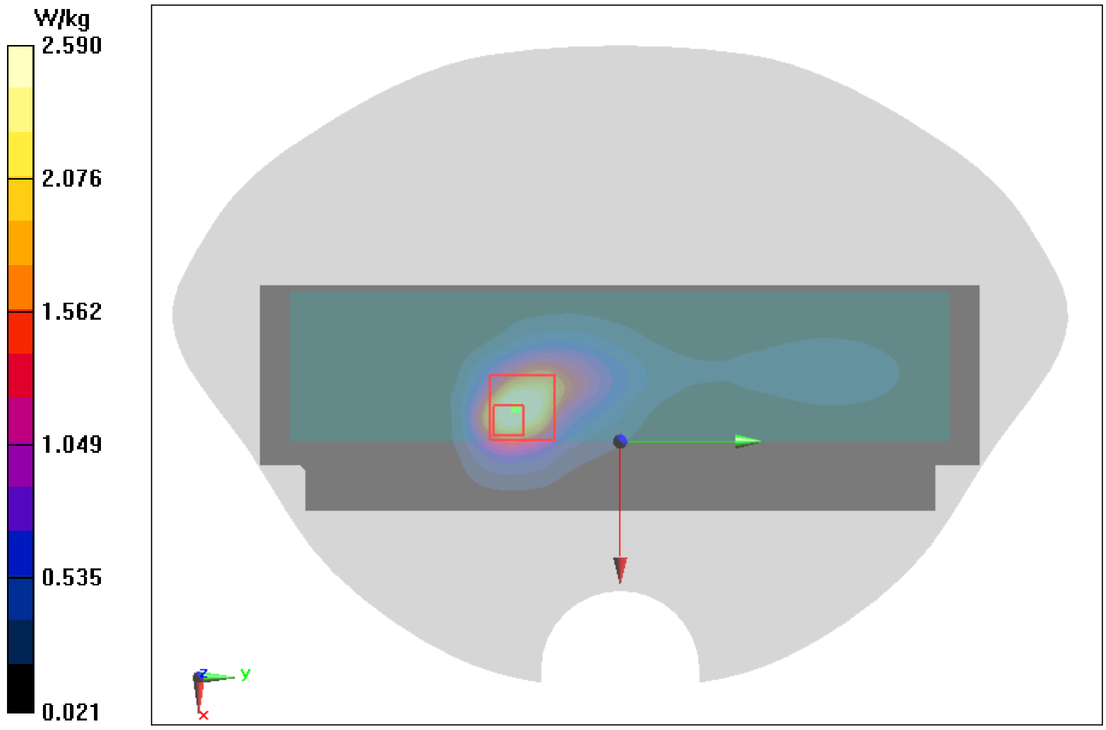


Fig.11 LTE B2 20MHz 1RB 50offset Left Mode High 5mm

Date/Time: 2021/11/1

Electronics: DAE4 Sn1581

Medium parameters used: f = 1900 MHz; σ = 1.249 S/m; ε_r = 41.631; ρ = 1000 kg/m^3

Ambient Temperature:21.7°C Liquid Temperature:21.7°C

Communication System: LTE B2 ; Frequency: 1900 MHz; Duty Cycle: 1:1

Probe: EX3DV4 - SN7401ConvF(8.35, 8.35, 8.35) @ 1900 MHz

LTE B2 20MHz 1RB 50offset Left Mode High 5mm/Area Scan (51x121x1):

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

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

LTE B2 20MHz 1RB 50offset Left Mode High 5mm/Zoom Scan (7x7x7)/Cube 0:

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

Reference Value = 12.61 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 1.20 W/kg

SAR(1 g) = 0.629 W/kg; SAR(10 g) = 0.324 W/kg

Maximum value of SAR (measured) = 0.713 W/kg

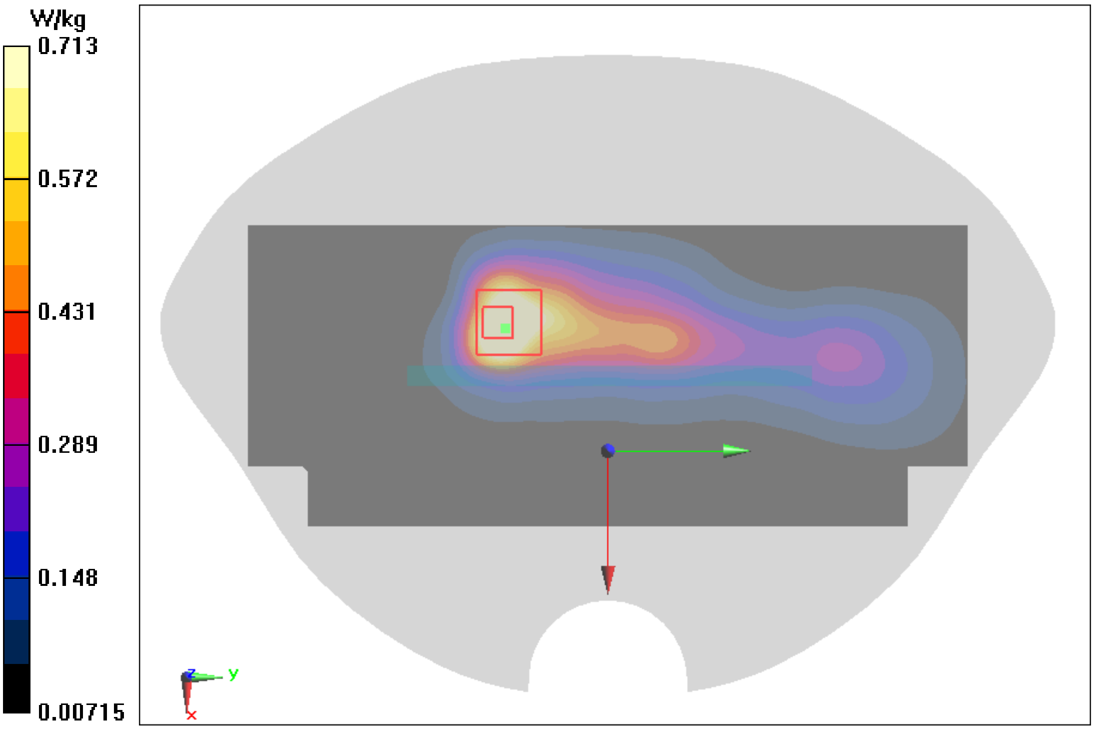


Fig.12 LTE B2 20MHz 1RB 50offset Left Mode High 0mm

Date/Time: 2021/11/1

Electronics: DAE4 Sn1581

Medium parameters used: f = 1900 MHz; σ = 1.249 S/m; ε_r = 41.631; ρ = 1000 kg/m^3

Ambient Temperature: 21.7°C   Liquid Temperature: 21.7°C

Communication System: LTE B2 ; Frequency: 1900 MHz; Duty Cycle: 1:1

Probe: EX3DV4 - SN7401ConvF(8.35, 8.35, 8.35) @ 1900 MHz

LTE B2 20MHz 1RB 50offset Left Mode High 0mm/Area Scan (51x121x1):

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

Maximum value of SAR (Measurement) = 4.75 W/kg

LTE B2 20MHz 1RB 50offset Left Mode High 0mm/Zoom Scan (7x7x7)/Cube 0:

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

Reference Value = 13.45 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 6.39 W/kg

SAR(1 g) = 2.64 W/kg; SAR(10 g) = 1.14 W/kg

Maximum value of SAR (measured) = 2.98 W/kg

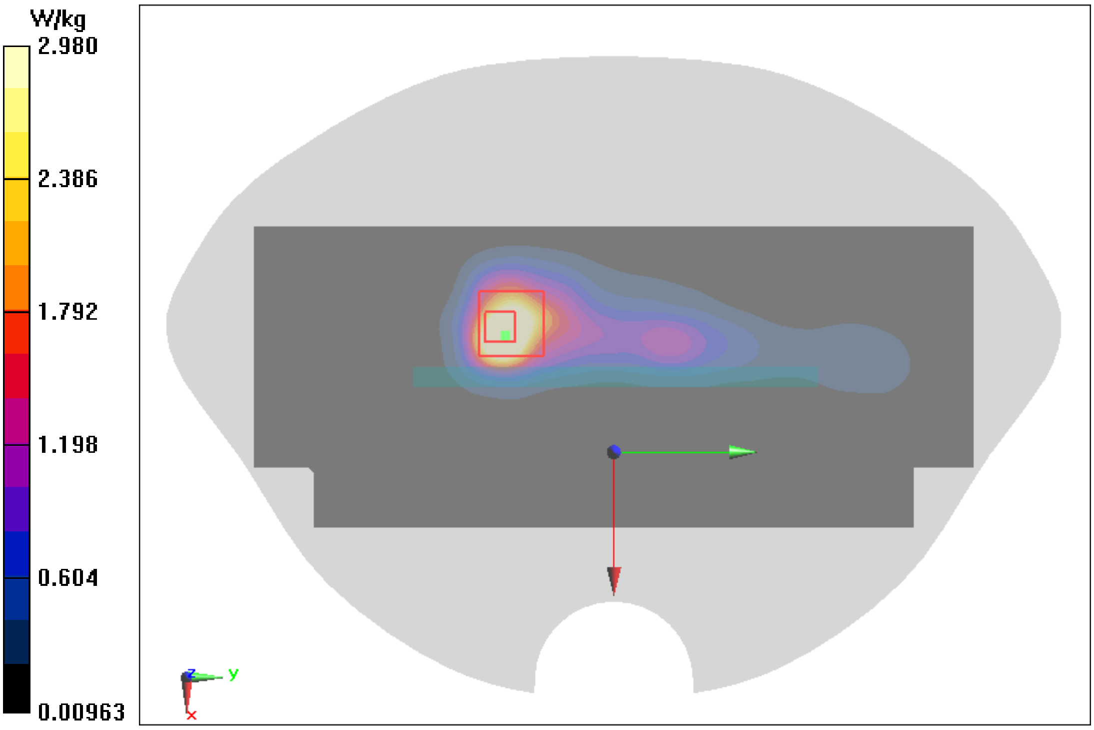


Fig.13 LTE B4 20MHz 1RB 50offset Left Mode Middle 5mm

Date/Time: 2021/11/3

Electronics: DAE4 Sn1581

Medium parameters used (interpolated): f = 1732.5 MHz; σ = 1.33 S/m; ε_r = 39.38; ρ = 1000 kg/m^3

Ambient Temperature:21.4°C Liquid Temperature:21.4°C

Communication System: LTE B4 ; Frequency: 1732.5 MHz; Duty Cycle: 1:1

Probe: EX3DV4 - SN7401ConvF(8.62, 8.62, 8.62) @ 1732.5 MHz

LTE B4 20MHz 1RB 50offset Left Mode Middle 5mm/Area Scan (51x121x1):

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

Maximum value of SAR (Measurement) = 0.777 W/kg

LTE B4 20MHz 1RB 50offset Left Mode Middle 5mm/Zoom Scan (7x7x7)/Cube 0:

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

Reference Value = 17.98 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 1.09 W/kg

SAR(1 g) = 0.539 W/kg; SAR(10 g) = 0.269 W/kg

Maximum value of SAR (measured) = 0.612 W/kg

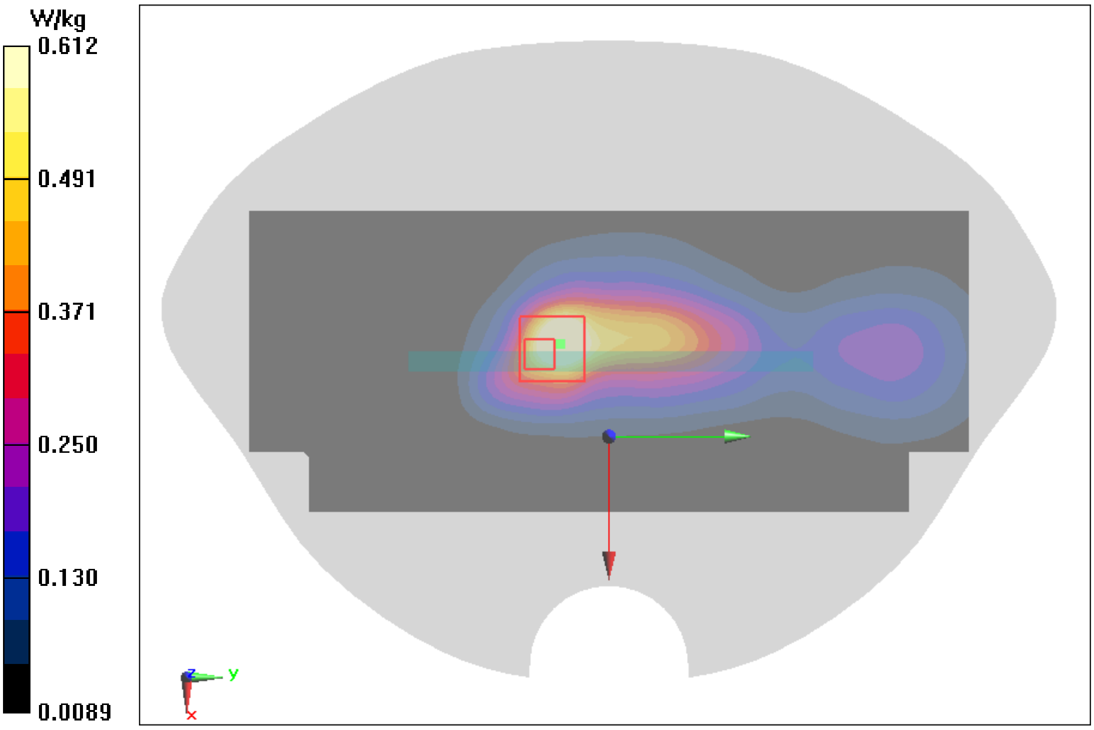


Fig.14 LTE B4 20MHz 1RB 50offset Left Mode Middle 0mm

Date/Time: 2021/11/3

Electronics: DAE4 Sn1581

Medium parameters used (interpolated): f = 1732.5 MHz; σ = 1.33 S/m; ε_r = 39.38; ρ = 1000 kg/m^3

Ambient Temperature:21.4°C   Liquid Temperature:21.4°C

Communication System: LTE B4 ;   Frequency: 1732.5 MHz; Duty Cycle: 1:1

Probe: EX3DV4 - SN7401ConvF(8.62, 8.62, 8.62) @ 1732.5 MHz

LTE B4 20MHz 1RB 50offset Left Mode Middle 0mm/Area Scan (51x121x1):

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

Maximum value of SAR (Measurement) = 3.51 W/kg

LTE B4 20MHz 1RB 50offset Left Mode Middle 0mm/Zoom Scan (7x7x7)/Cube 0:

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

Reference Value = 18.65 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 4.86 W/kg

SAR(1 g) = 1.96 W/kg; SAR(10 g) = 0.847 W/kg

Maximum value of SAR (measured) = 2.39 W/kg

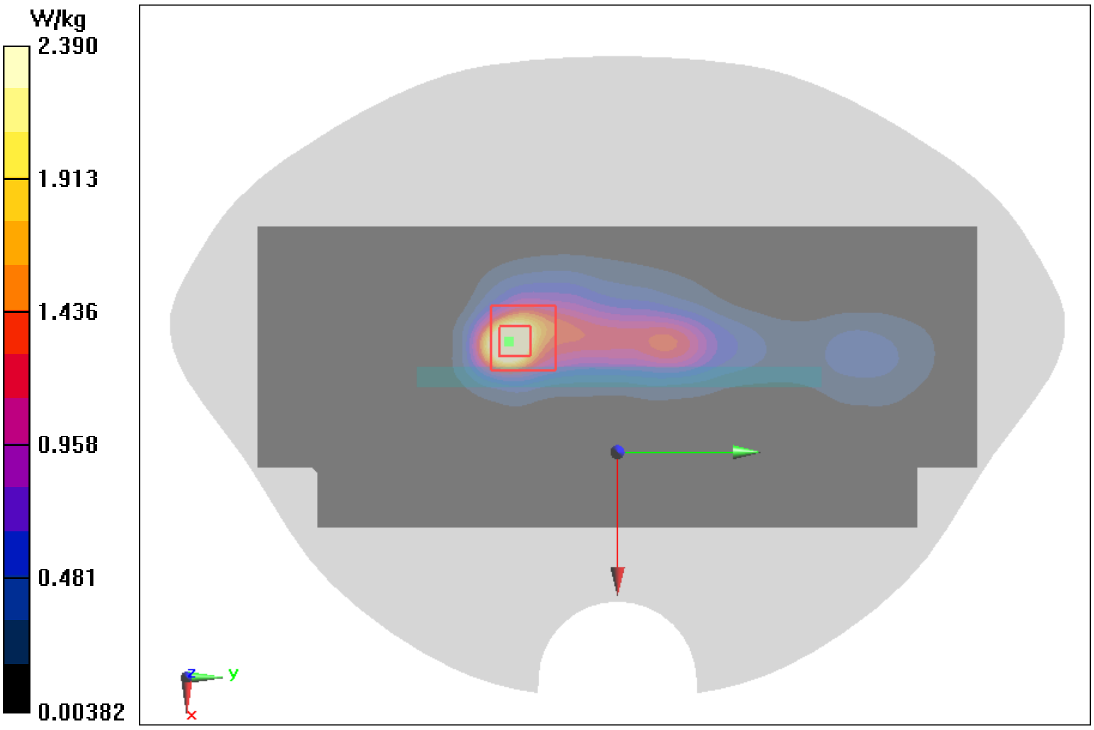


Fig.15 LTE B7 20MHz 1RB 50offset Left Mode High 5mm

Date/Time: 2021/11/5

Electronics: DAE4 Sn1581

Medium parameters used: f = 2560 MHz; σ = 1.932 S/m; ε_r = 37.6; ρ = 1000 kg/m^3

Ambient Temperature: 21.4°C   Liquid Temperature: 21.4°C

Communication System: LTE B7 ; Frequency: 2560 MHz; Duty Cycle: 1:1

Probe: EX3DV4 - SN7401ConvF(7.64, 7.64, 7.64) @ 2560 MHz

LTE B7 20MHz 1RB 50offset Left Mode High 5mm/Area Scan (51x121x1):

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

Maximum value of SAR (Measurement) = 1.15 W/kg

LTE B7 20MHz 1RB 50offset Left Mode High 5mm/Zoom Scan (7x7x7)/Cube 0:

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

Reference Value = 15.13 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 2.47 W/kg

SAR(1 g) = 1.14 W/kg; SAR(10 g) = 0.494 W/kg

Maximum value of SAR (measured) = 1.33 W/kg

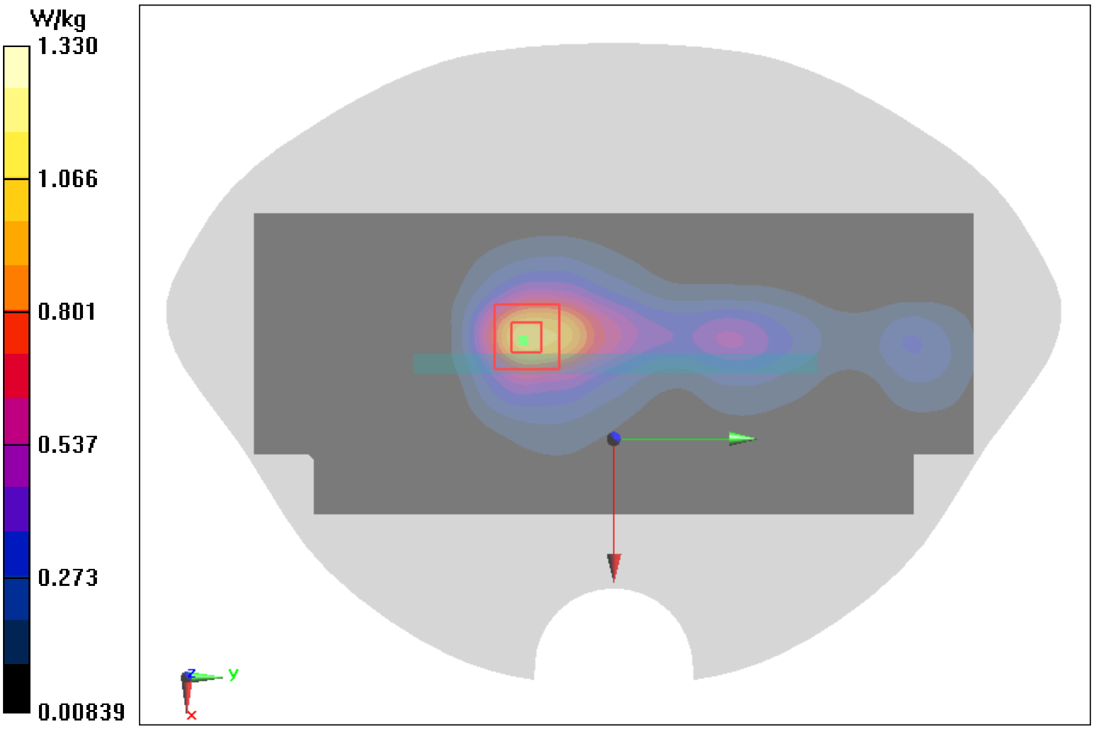


Fig.16 LTE B7 20MHz 1RB 50offset Left Mode Middle 0mm

Date/Time: 2021/11/5

Electronics: DAE4 Sn1581

Medium parameters used (interpolated): f = 2535 MHz; σ = 1.882 S/m; ε_r = 38.048; ρ = 1000 kg/m^3

Ambient Temperature:21.4°C   Liquid Temperature: 21.4°C

Communication System: LTE B7 ; Frequency: 2535 MHz; Duty Cycle: 1:1

Probe: EX3DV4 - SN7401ConvF(7.9, 7.9, 7.9) @ 2535 MHz

LTE B7 20MHz 1RB 50offset Left Mode Middle 0mm/Area Scan (51x121x1):

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

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

LTE B7 20MHz 1RB 50offset Left Mode Middle 0mm/Zoom Scan (7x7x7)/Cube 0:

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

Reference Value = 24.85 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 9.85 W/kg

SAR(1 g) = 3.87 W/kg; SAR(10 g) = 1.38 W/kg

Maximum value of SAR (measured) = 4.49 W/kg

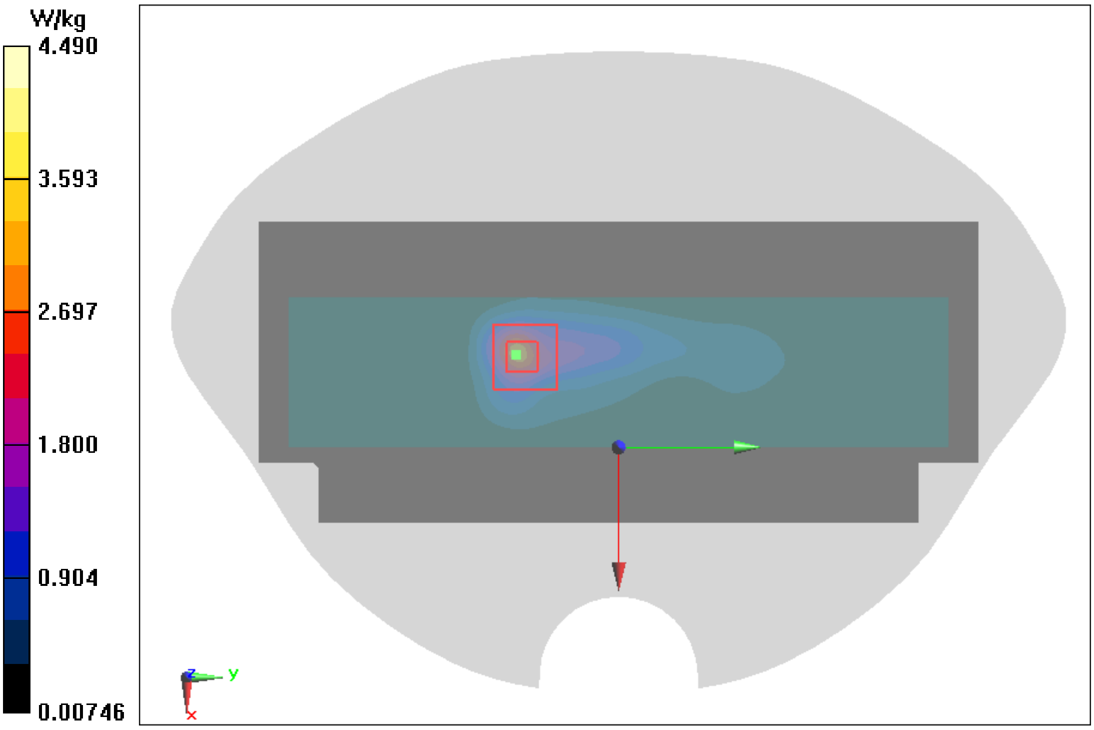


Fig.17 LTE B17 10MHz 1RB 25offset Left Mode Middle 5mm

Date/Time: 2021/11/3

Electronics: DAE4 Sn1581

Medium parameters used (interpolated): f = 710 MHz; σ = 0.868 S/m; ε_r = 41.364; ρ = 1000 kg/m^3

Ambient Temperature:21.4°C Liquid Temperature:21.4°C

Communication System: LTE Band 17 Professional ; Duty Cycle: 1:1

Probe: EX3DV4 - SN7401ConvF(10.59, 10.59, 10.59) @ 710 MHz

LTE B17 10MHz 1RB 25offset Left Mode Middle 5mm/Area Scan (51x161x1):

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

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

LTE B17 10MHz 1RB 25offset Left Mode Middle 5mm/Zoom Scan (7x7x7)/Cube 0:

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

Reference Value = 14.96 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.557 W/kg

SAR(1 g) = 0.214 W/kg; SAR(10 g) = 0.106 W/kg

Maximum value of SAR (measured) = 0.379 W/kg

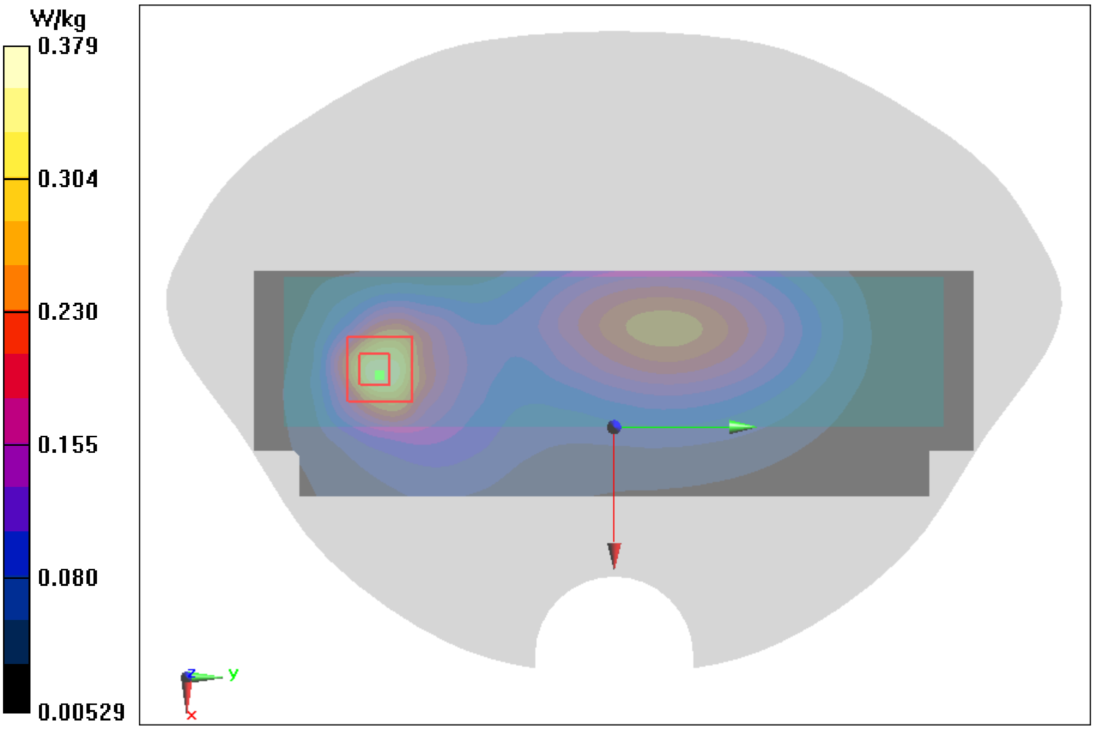


Fig.18 LTE B17 10MHz 1RB 25offset Left Mode Middle 0mm

Date/Time: 2021/11/3

Electronics: DAE4 Sn1581

Medium parameters used (interpolated): f = 710 MHz; σ = 0.868 S/m; ε_r = 41.364; ρ = 1000 kg/m^3

Ambient Temperature:21.4°C   Liquid Temperature: 21.4°C

Communication System: LTE Band 17 Professional ; Duty Cycle: 1:1

Probe: EX3DV4 - SN7401ConvF(10.59, 10.59, 10.59) @ 710 MHz

LTE B17 10MHz 1RB 25offset Left Mode Middle 0mm/Area Scan (51x161x1):

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

Maximum value of SAR (Measurement) = 2.71 W/kg

LTE B17 10MHz 1RB 25offset Left Mode Middle 0mm/Zoom Scan (7x7x7)/Cube 0:

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

Reference Value = 13.91 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 3.97 W/kg

SAR(1 g) = 1.23 W/kg; SAR(10 g) = 0.509 W/kg

Maximum value of SAR (measured) = 2.23 W/kg

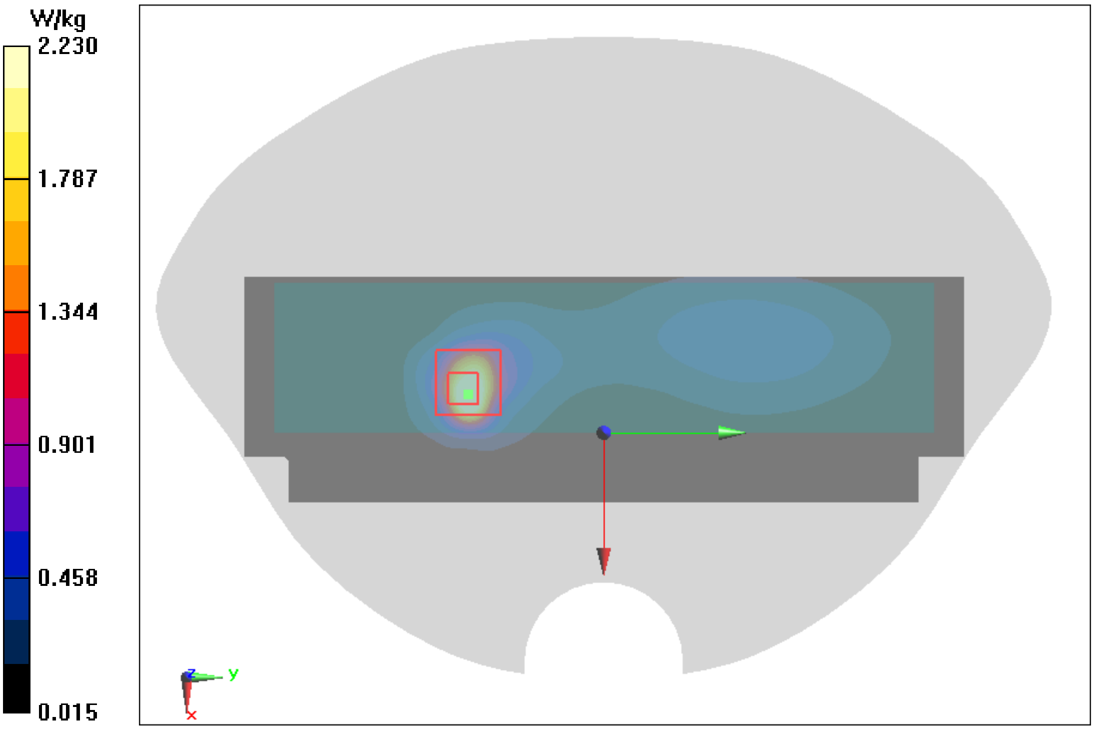


Fig.19 Wi-Fi 2.4G 11b Right Mode Mid 5mm

Date/Time: 2021/11/5

Electronics: DAE4 Sn1581

Medium parameters used (interpolated): f = 2437 MHz; σ = 1.833 S/m; ε_r = 37.856; ρ = 1000 kg/m^3

Ambient Temperature: 21.4°C Liquid Temperature: 21.4°C

Communication System: WLan 2450 ; Frequency: 2437 MHz; Duty Cycle: 1:1

Probe: EX3DV4 - SN7401ConvF(7.9, 7.9, 7.9) @ 2437 MHz

Wi-Fi 2.4G 11b Right Mode Mid 5mm/Area Scan (51x121x1):

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

Maximum value of SAR (Measurement) = 0.276 W/kg

Wi-Fi 2.4G 11b Right Mode Mid 5mm/Zoom Scan (7x7x7)/Cube 0:

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

Reference Value = 4.891 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 0.465 W/kg

SAR(1 g) = 0.208 W/kg; SAR(10 g) = 0.096 W/kg

Maximum value of SAR (measured) = 0.231 W/kg

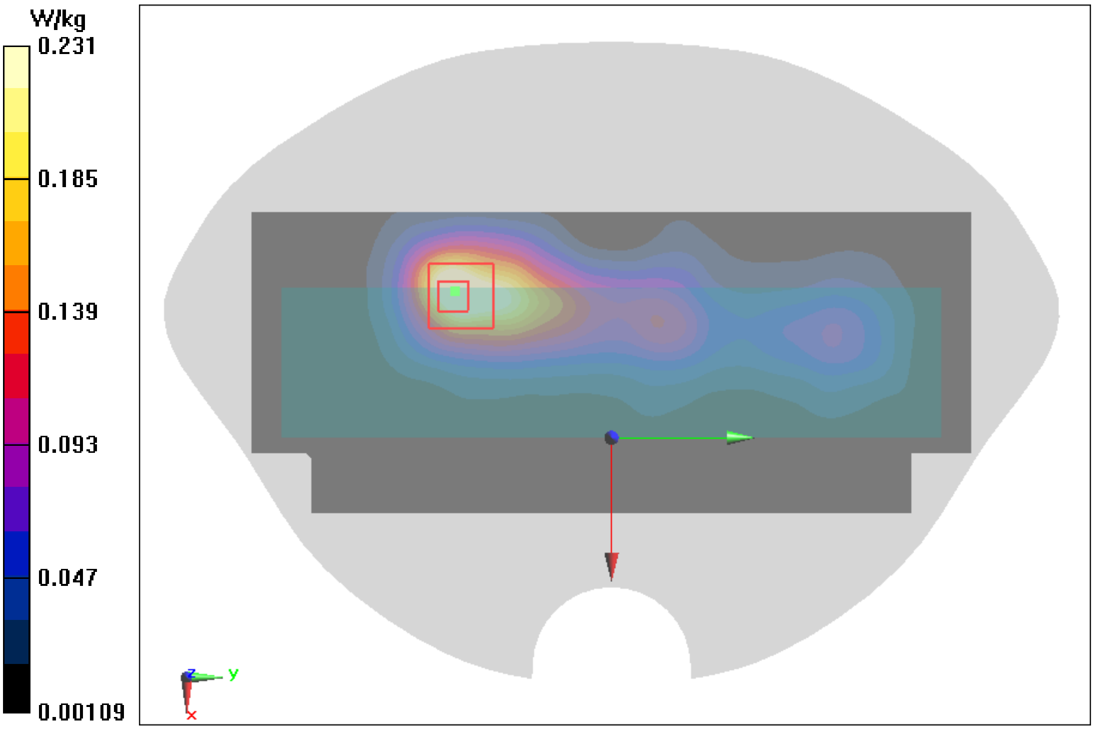


Fig.20 Wi-Fi 2.4G 11b Right Mode Mid 0mm

Date/Time: 2021/11/5

Electronics: DAE4 Sn1581

Medium parameters used (interpolated): f = 2437 MHz; σ = 1.833 S/m; ε_r = 37.856; ρ = 1000 kg/m^3

Ambient Temperature: 21.4°C   Liquid Temperature: 21.4°C

Communication System: WLan 2450 ; Frequency: 2437 MHz; Duty Cycle: 1:1

Probe: EX3DV4 - SN7401ConvF(7.9, 7.9, 7.9) @ 2437 MHz

Wi-Fi 2.4G 11b Right Mode Mid 0mm/Area Scan (51x121x1):

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

Maximum value of SAR (Measurement) = 1.18 W/kg

Wi-Fi 2.4G 11b Right Mode Mid 0mm/Zoom Scan (7x7x7)/Cube 0:

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

Reference Value = 13.17 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 2.34 W/kg

SAR(1 g) = 0.825 W/kg; SAR(10 g) = 0.299 W/kg

Maximum value of SAR (measured) = 0.900 W/kg

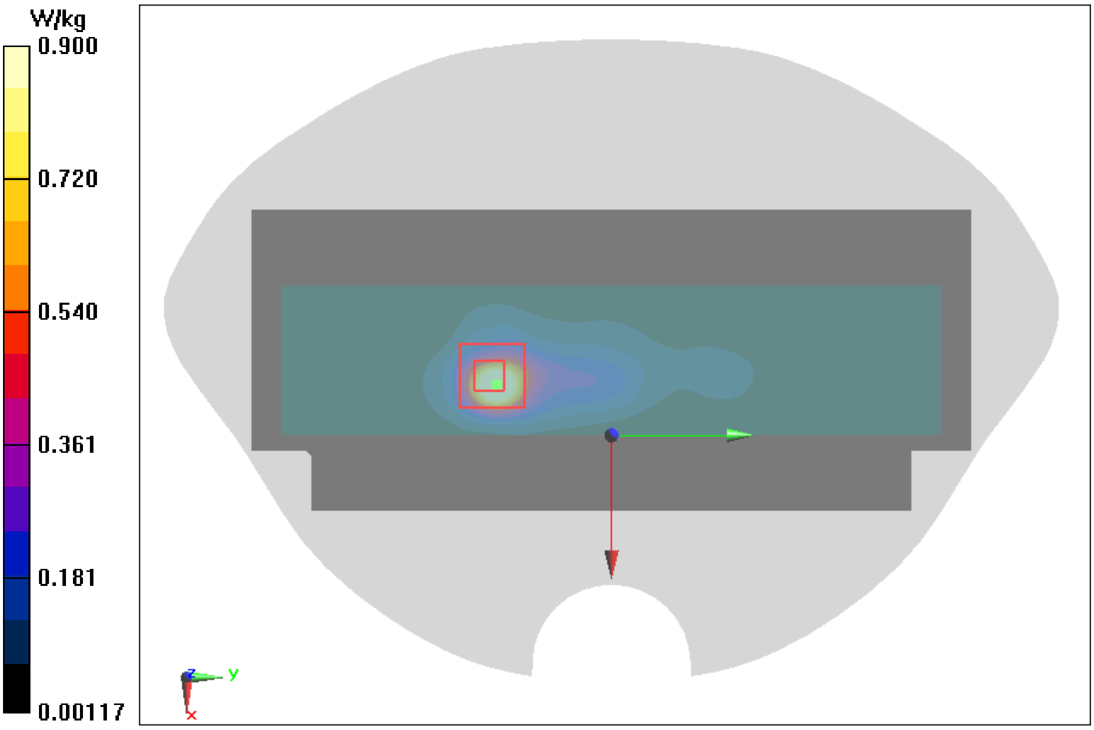


Fig.21 Wi-Fi 5G 11a Right Mode Low 5mm

Date/Time: 2021/11/5

Electronics: DAE4 Sn1581

Medium parameters used: f = 5180 MHz; σ = 4.578 S/m; ε_r = 37.19; ρ = 1000 kg/m^3

Ambient Temperature: 21.4°C Liquid Temperature: 21.4°C

Communication System: 5G-U-NII-1 ; Frequency: 5180 MHz; Duty Cycle: 1:1

Probe: EX3DV4 - SN7401ConvF(5.64, 5.64, 5.64) @ 5180 MHz

Wi-Fi 5G 11a Right Mode Low 5mm/Area Scan (51x121x1):

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

Maximum value of SAR (Measurement) = 1.24 W/kg

Wi-Fi 5G 11a Right Mode Low 5mm/Zoom Scan (7x7x7)/Cube 0:

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

Reference Value = 2.647 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 3.05 W/kg

SAR(1 g) = 0.655 W/kg; SAR(10 g) = 0.194 W/kg

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

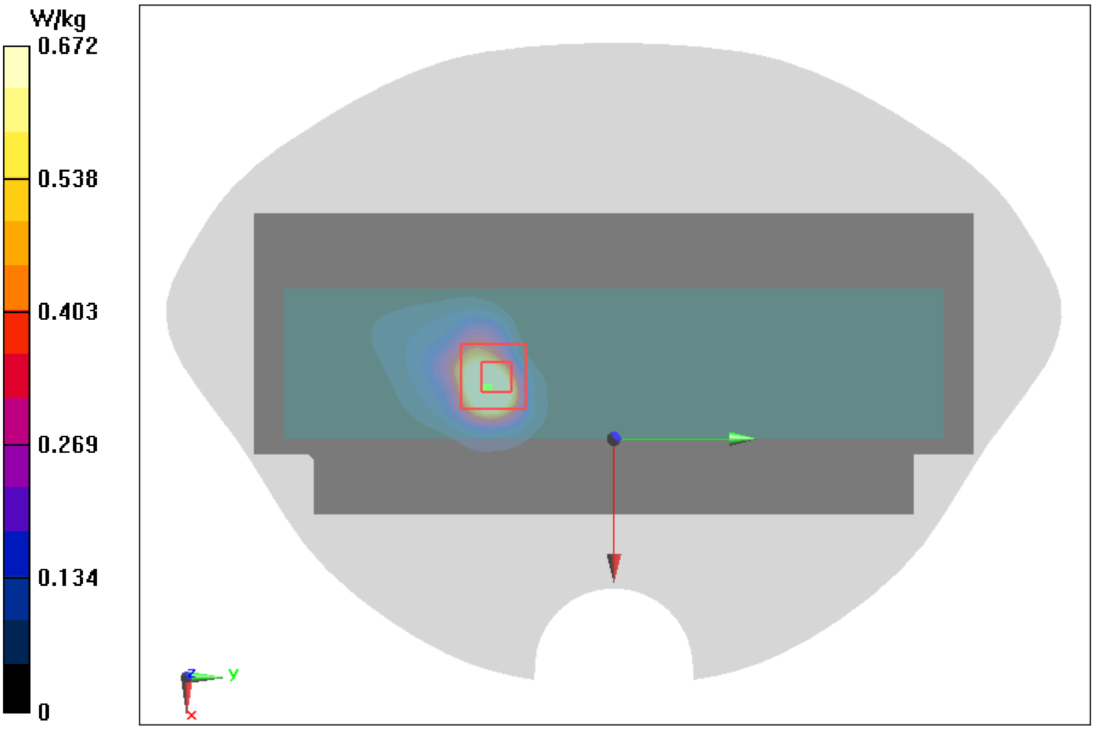


Fig.22 Wi-Fi 5G 11a Right Mode Low 0mm

Date/Time: 2021/11/5

Electronics: DAE4 Sn1581

Medium parameters used: f = 5180 MHz; σ = 4.578 S/m; ε_r = 37.19; ρ = 1000 kg/m^3

Ambient Temperature: 21.4°C   Liquid Temperature: 21.4°C

Communication System: 5G-U-NII-1 ;   Frequency: 5180 MHz; Duty Cycle: 1:1

Probe: EX3DV4 - SN7401ConvF(5.64, 5.64, 5.64) @ 5180 MHz

Wi-Fi 5G 11a Right Mode Low 0mm/Area Scan (51x121x1):

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

Maximum value of SAR (Measurement) = 1.98 W/kg

Wi-Fi 5G 11a Right Mode Low 0mm/Zoom Scan (7x7x7)/Cube 0:

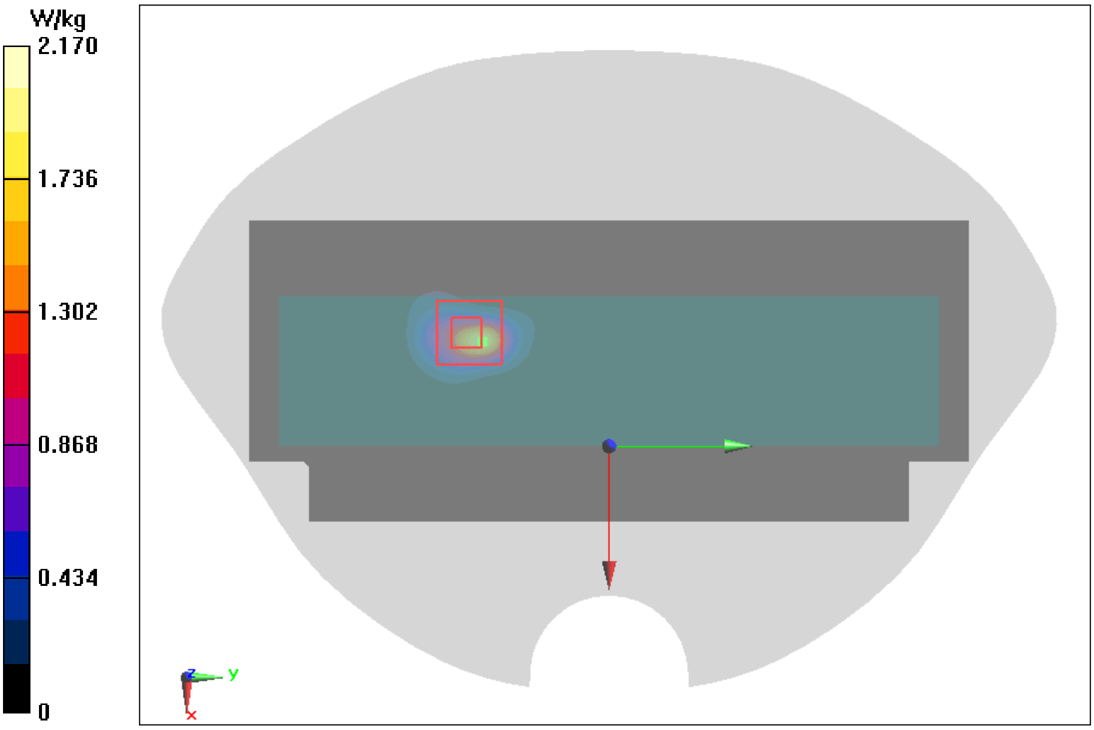
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.469 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 5.30 W/kg

SAR(1 g) = 1.62 W/kg; SAR(10 g) = 0.411 W/kg

Maximum value of SAR (measured) = 2.17 W/kg



Annex B: System Check Plot

Head 750MHz

Date/Time: 2021/11/3

Electronics: DAE4 Sn1581

Medium parameters used (interpolated): f = 750 MHz; σ = 0.882 S/m; ε_r = 41.225; ρ = 1000 kg/m^3

Ambient Temperature:21.4°C   Liquid Temperature:21.4°C

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

Probe: EX3DV4 - SN7401ConvF(10.59, 10.59, 10.59) @ 750 MHz

System Check Head 750MHz/Area Scan (61x121x1):

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

Maximum value of SAR (Measurement) = 2.61 W/kg

System Check Head 750MHz/Zoom Scan (7x7x7) (5x5x7)/Cube 0:

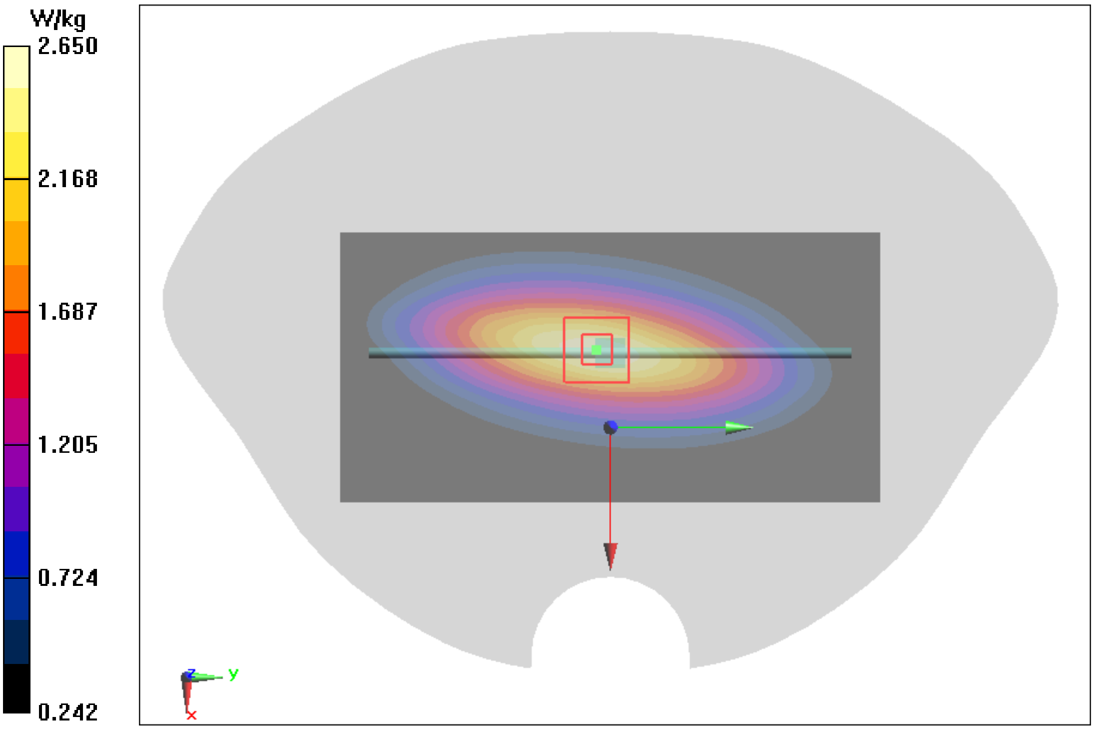
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.14 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 3.03 W/kg

SAR(1 g) = 1.96 W/kg; SAR(10 g) = 1.3 W/kg

Maximum value of SAR (measured) = 2.65 W/kg



Head 835MHz-1

Date/Time: 2021/11/2

Electronics: DAE4 Sn1581

Medium parameters used (interpolated): f = 835 MHz; σ = 0.915 S/m; ε_r = 41.011; ρ = 1000 kg/m^3

Ambient Temperature:21.5°C   Liquid Temperature:21.5°C

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

Probe: EX3DV4 - SN7401ConvF(10.17, 10.17, 10.17) @ 835 MHz

System Check Head 835MHz/Area Scan (61x121x1):

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

Maximum value of SAR (Measurement) = 3.12 W/kg

System Check Head 835MHz/Zoom Scan (7x7x7) (5x5x7)/Cube 0:

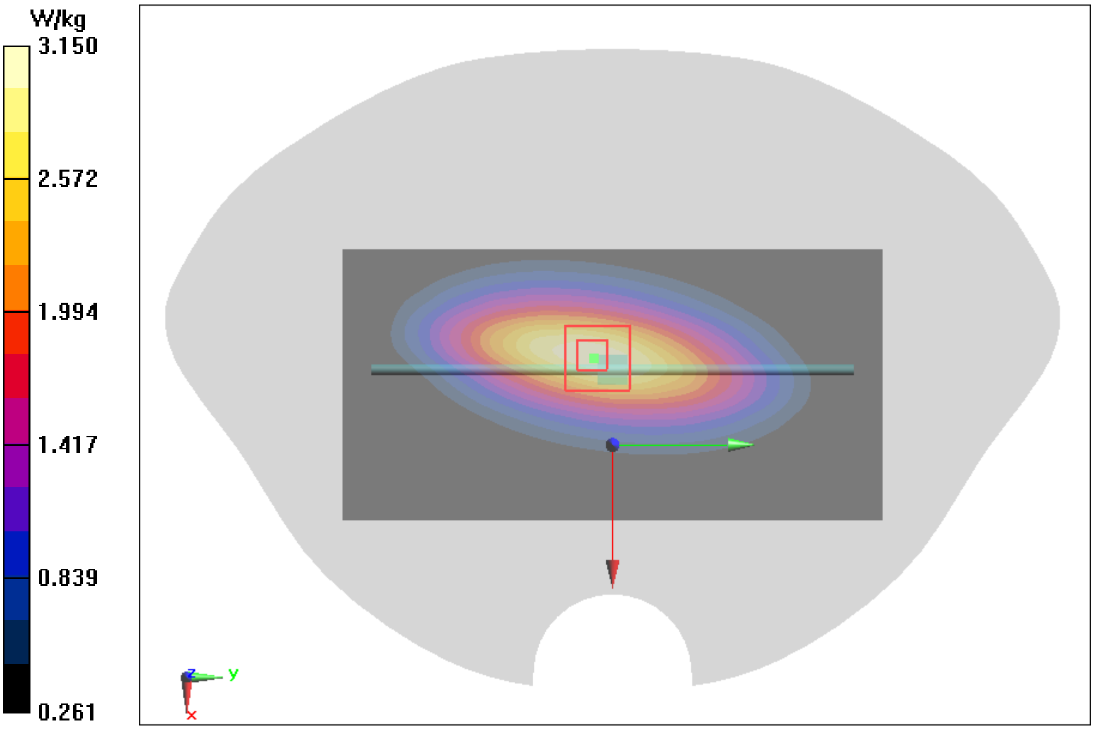
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 59.75 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 3.61 W/kg

SAR(1 g) = 2.32 W/kg; SAR(10 g) = 1.52 W/kg

Maximum value of SAR (measured) = 3.15 W/kg



Head 835MHz-2

Date/Time: 2021/11/4

Electronics: DAE4 Sn1581

Medium parameters used (interpolated): f = 835 MHz; σ = 0.916 S/m; ε_r = 40.986; ρ = 1000 kg/m^3

Ambient Temperature:21.2°C Liquid Temperature:21.2°C

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

Probe: EX3DV4 - SN7401ConvF(10.17, 10.17, 10.17) @ 835 MHz

System Check Head 835MHz/Area Scan (61x121x1):

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

Maximum value of SAR (Measurement) = 3.19 W/kg

System Check Head 835MHz/Zoom Scan (7x7x7) (5x5x7)/Cube 0:

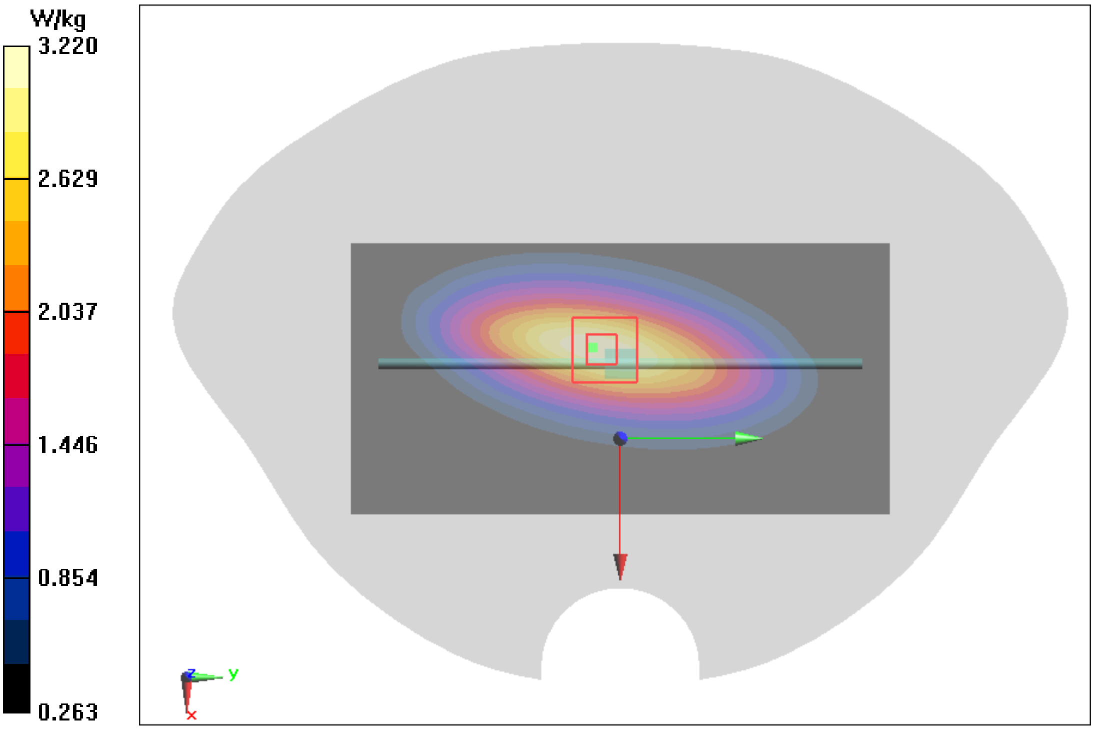
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 59.95 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 3.70 W/kg

SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.56 W/kg

Maximum value of SAR (measured) = 3.22 W/kg



Head 835MHz-3

Date/Time: 2022/1/18

Electronics: DAE4 Sn1581

Medium parameters used: f = 835 MHz; σ = 0.924 S/m; ε_r = 40.414; ρ = 1000 kg/m^3

Ambient Temperature:21.6°C   Liquid Temperature:21.6°C

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

Probe: EX3DV4 - SN7634ConvF(10.15, 10.15, 10.15) @ 835 MHz

System Check Head 835MHz/Area Scan (61x121x1):

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

Maximum value of SAR (Measurement) = 3.40 W/kg

System Check Head 835MHz/Zoom Scan (7x7x7) (5x5x7)/Cube 0:

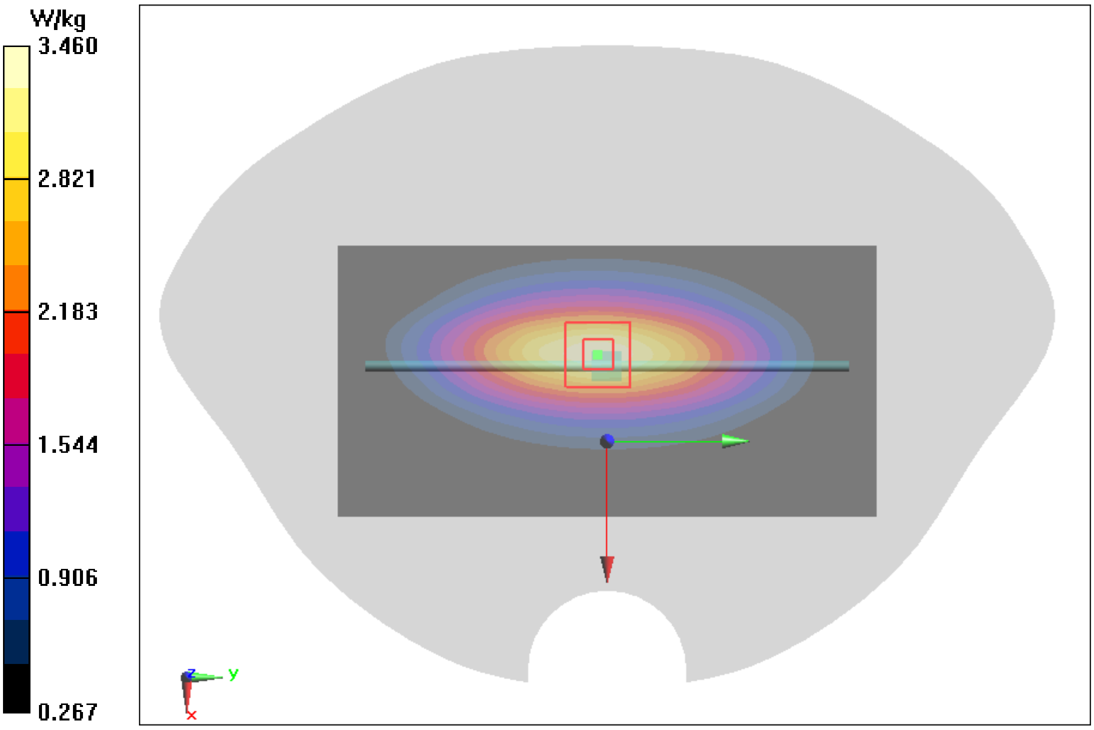
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 62.83 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 4.03 W/kg

SAR(1 g) = 2.49 W/kg; SAR(10 g) = 1.61 W/kg

Maximum value of SAR (measured) = 3.46 W/kg



Head 1750MHz-1

Date/Time: 2021/11/2

Electronics: DAE4 Sn1581

Medium parameters used (interpolated): f = 1750 MHz; σ = 1.365 S/m; ε_r = 39.02; ρ = 1000 kg/m^3

Ambient Temperature:21.5°C   Liquid Temperature:21.5°C

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

Probe: EX3DV4 - SN7401ConvF(8.62, 8.62, 8.62) @ 1750 MHz

System Check Head 1750MHz/Area Scan (71x61x1):

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

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

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

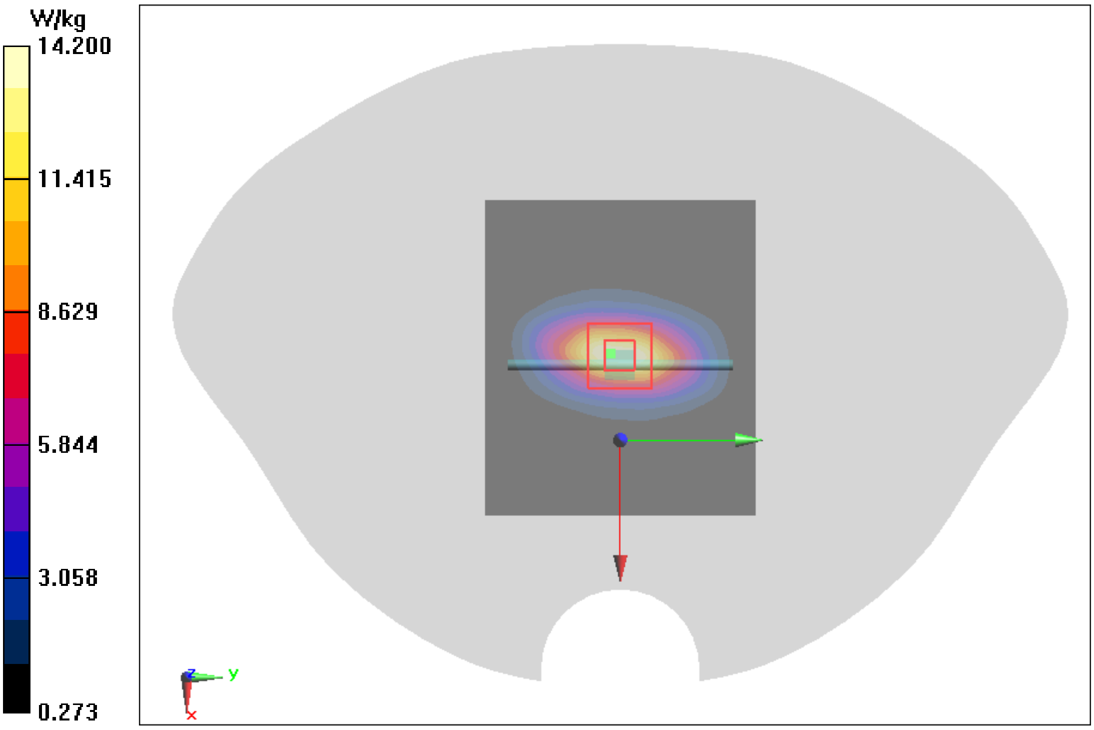
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 104.0 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 17.1 W/kg

SAR(1 g) = 9.17 W/kg; SAR(10 g) = 4.9 W/kg

Maximum value of SAR (measured) = 14.2 W/kg



Head 1750MHz-2

Date/Time: 2021/11/3

Electronics: DAE4 Sn1581

Medium parameters used (interpolated): f = 1750 MHz; σ = 1.341 S/m; ε_r = 39.354; ρ = 1000 kg/m^3

Ambient Temperature:21.4°C Liquid Temperature:21.4°C

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

Probe: EX3DV4 - SN7401ConvF(8.62, 8.62, 8.62) @ 1750 MHz

System Check Head 1750MHz/Area Scan (71x61x1):

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

Maximum value of SAR (Measurement) = 14.4 W/kg

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

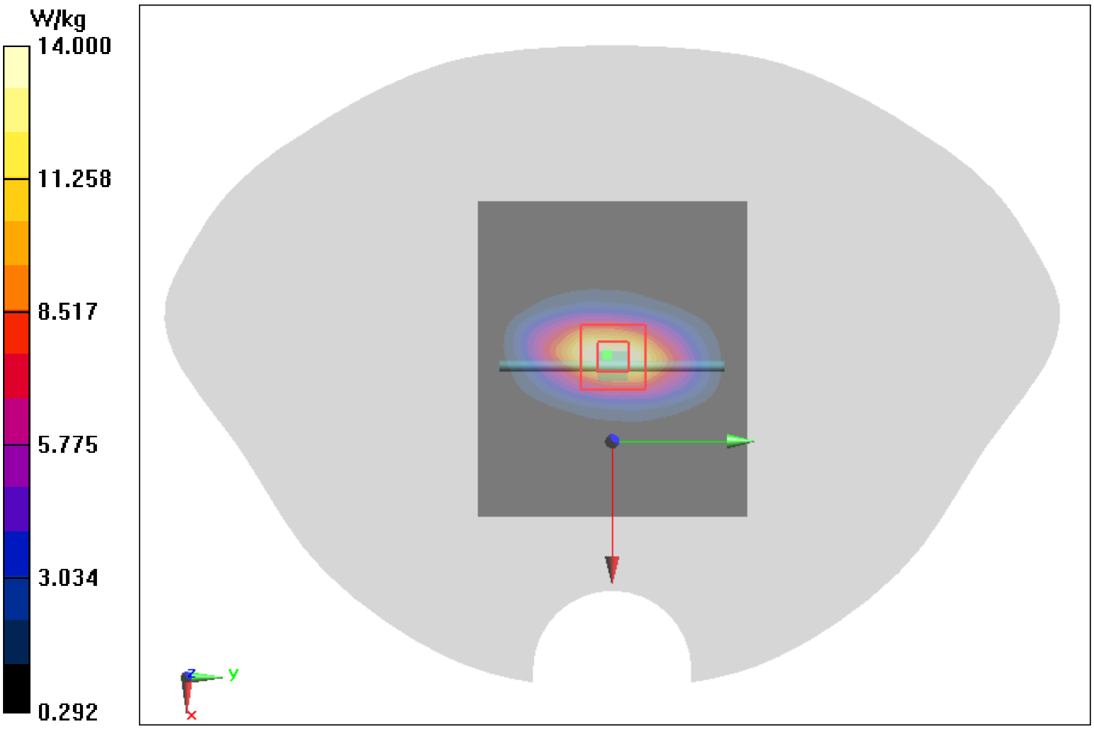
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 106.6 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 16.9 W/kg

SAR(1 g) = 9.01 W/kg; SAR(10 g) = 4.8 W/kg

Maximum value of SAR (measured) = 14.0 W/kg



Head 2000MHz-1

Date/Time: 2021/11/1

Electronics: DAE4 Sn1581

Medium parameters used: f = 2000 MHz; σ = 1.513 S/m; ε_r = 41.459; ρ = 1000 kg/m^3

Ambient Temperature:21.7°C   Liquid Temperature:21.7°C

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

Probe: EX3DV4 - SN7401ConvF(8.35, 8.35, 8.35) @ 2000 MHz

System Check Head 2000MHz/Area Scan (121x121x1):

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

Maximum value of SAR (Measurement) = 11.8 W/kg

System Check Head 2000MHz/Zoom Scan (7x7x7)/Cube 0:

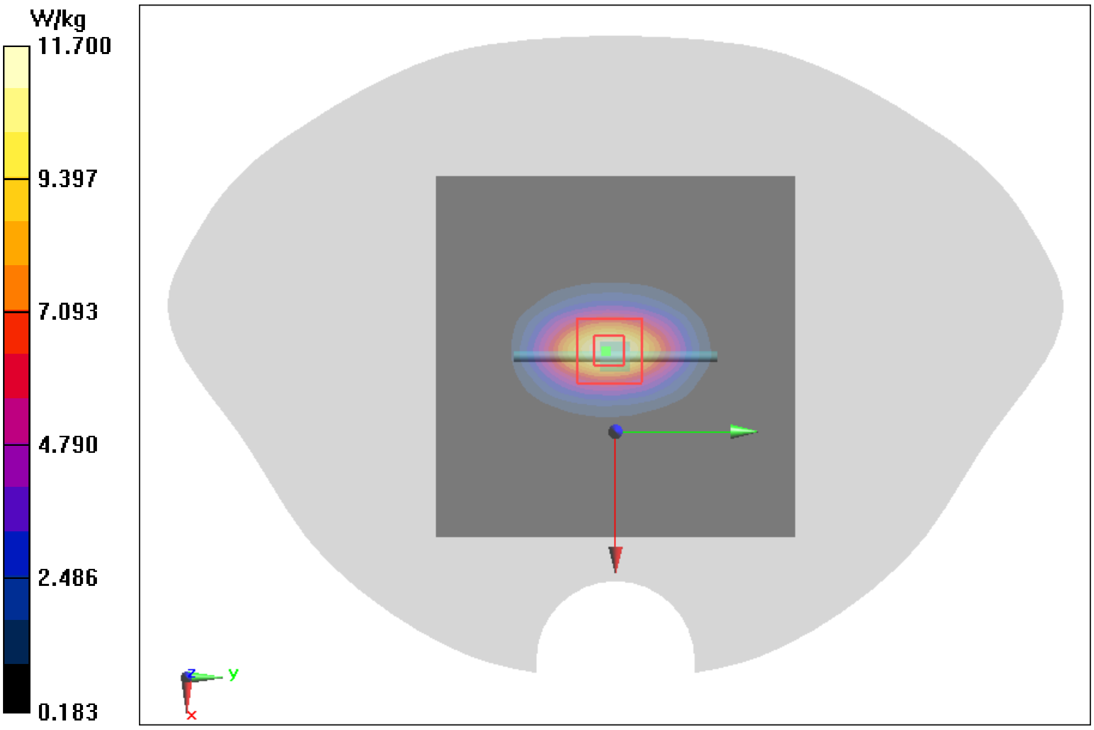
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 89.02 V/m; Power Drift = -0.18 dB

Peak SAR (extrapolated) = 19.7 W/kg

SAR(1 g) = 10.4 W/kg; SAR(10 g) = 5.31 W/kg

Maximum value of SAR (measured) = 11.7 W/kg



Head 2000MHz-2

Date/Time: 2021/11/5

Electronics: DAE4 Sn1581

Medium parameters used: f = 2000 MHz; σ = 1.517 S/m; ε_r = 38.529; ρ = 1000 kg/m^3

Ambient Temperature:21.4°C   Liquid Temperature:21.4°C

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

Probe: EX3DV4 - SN7401ConvF(8.35, 8.35, 8.35) @ 2000 MHz

System Check Head 2000MHz/Area Scan (121x121x1):

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

Maximum value of SAR (Measurement) = 12.2 W/kg

System Check Head 2000MHz/Zoom Scan (7x7x7)/Cube 0:

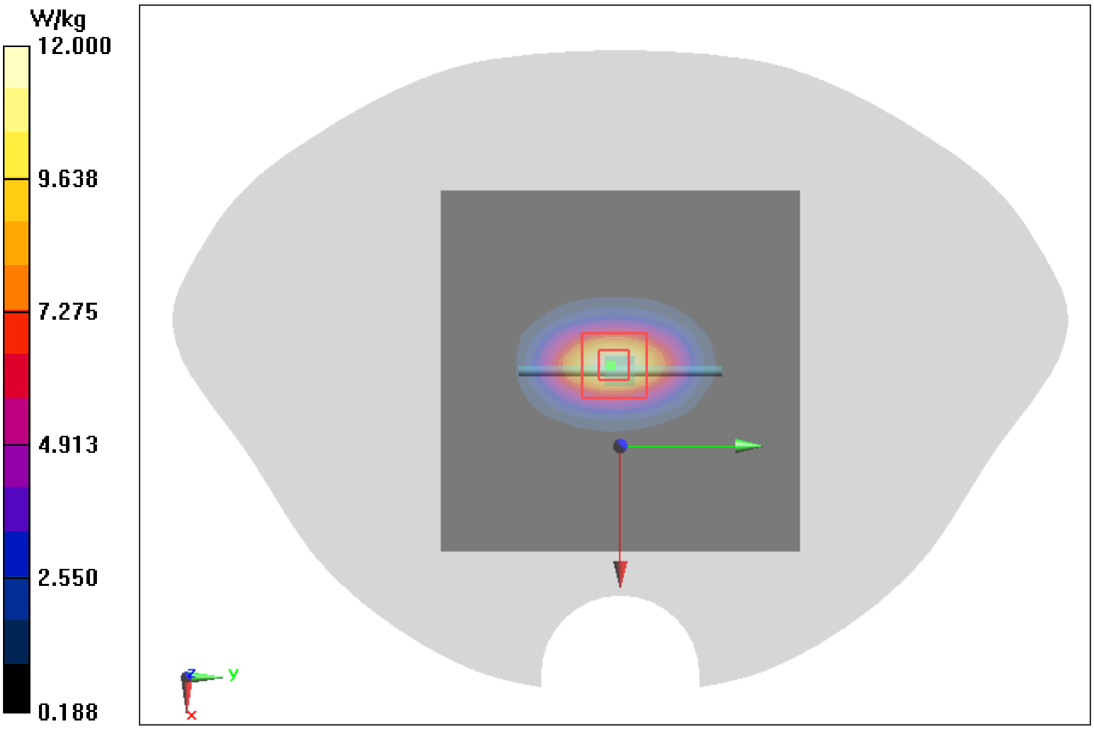
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 86.66 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 20.1 W/kg

SAR(1 g) = 10.6 W/kg; SAR(10 g) = 5.42 W/kg

Maximum value of SAR (measured) = 12.0 W/kg



Head 2000MHz-3

Date/Time: 2021/11/8

Electronics: DAE4 Sn1581

Medium parameters used: f = 2000 MHz; σ = 1.517 S/m; ε_r = 38.514; ρ = 1000 kg/m^3

Ambient Temperature:21.1°C   Liquid Temperature:21.1°C

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

Probe: EX3DV4 - SN7401ConvF(8.4, 8.4, 8.4) @ 2000 MHz

System Check Head 2000MHz/Area Scan (121x121x1):

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

Maximum value of SAR (Measurement) = 12.0 W/kg

System Check Head 2000MHz/Zoom Scan (7x7x7)/Cube 0:

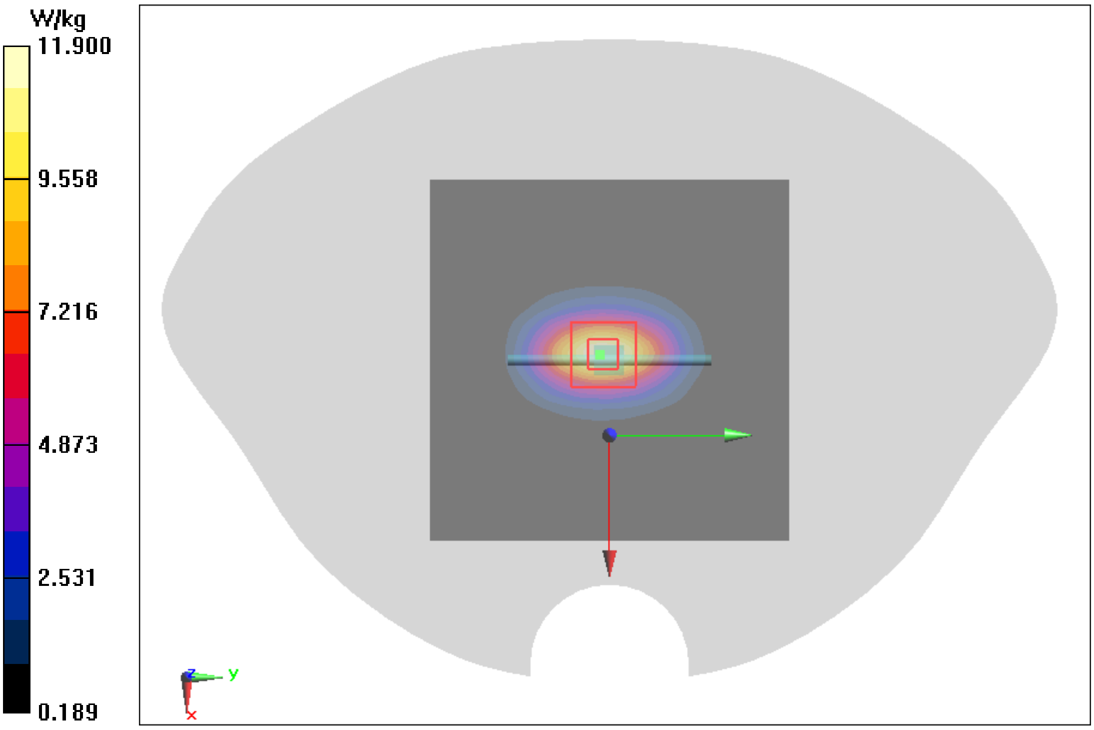
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 87.35 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 20.0 W/kg

SAR(1 g) = 10.6 W/kg; SAR(10 g) = 5.4 W/kg

Maximum value of SAR (measured) = 11.9 W/kg



Head 2450MHz

Date/Time: 2021/11/5

Electronics: DAE4 Sn1581

Medium parameters used (interpolated): f = 2450 MHz; σ = 1.845 S/m; ε_r = 37.836; ρ = 1000 kg/m^3

Ambient Temperature:21.4°C   Liquid Temperature:21.4°C

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

Probe: EX3DV4 - SN7401ConvF(7.9, 7.9, 7.9) @ 2450 MHz

System Check Head 2450MHz/Area Scan (101x101x1):

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

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

System Check Head 2450MHz/Zoom Scan (7x7x7)/Cube 0:

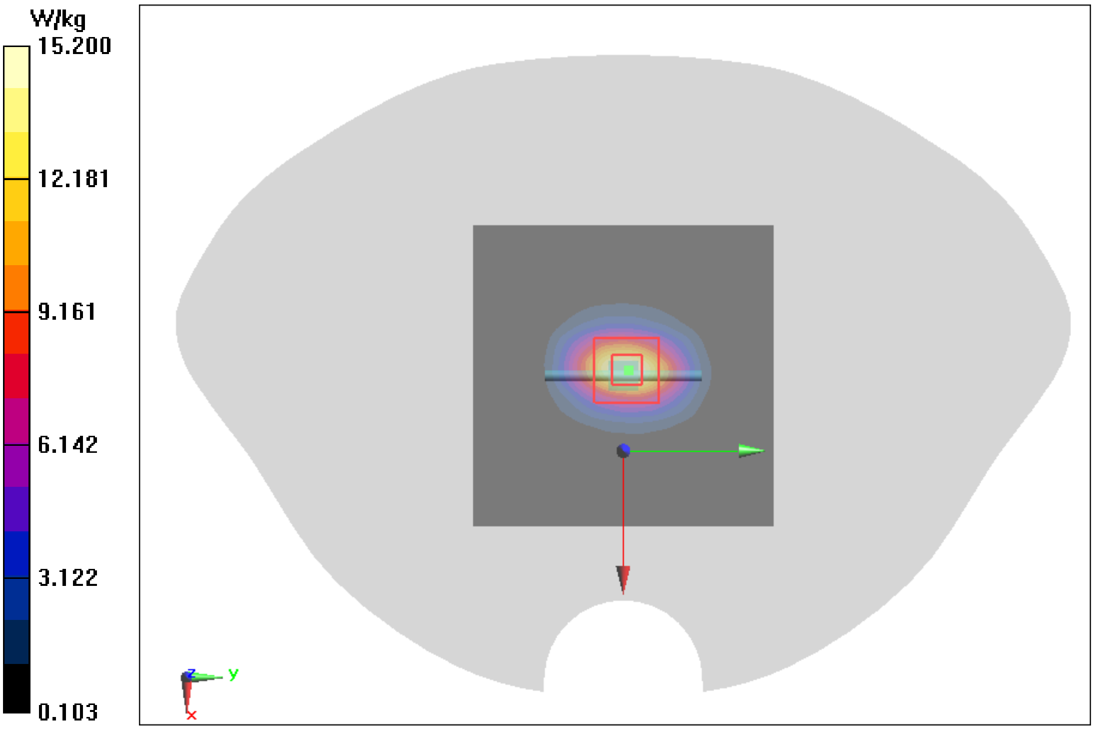
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 89.08 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 28.2 W/kg

SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.18 W/kg

Maximum value of SAR (measured) = 15.2 W/kg



Head 2600MHz-1

Date/Time: 2021/11/5

Electronics: DAE4 Sn1581

Medium parameters used: f = 2600 MHz; σ = 1.964 S/m; ε_r = 37.555; ρ = 1000 kg/m^3

Ambient Temperature:21.4°C   Liquid Temperature:21.4°C

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

Probe: EX3DV4 - SN7401ConvF(7.64, 7.64, 7.64) @ 2600 MHz

System Check Head 2600MHz/Area Scan (71x71x1):

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

Maximum value of SAR (Measurement) = 25.3 W/kg

System Check Head 2600MHz/Zoom Scan (7x7x7)/Cube 0:

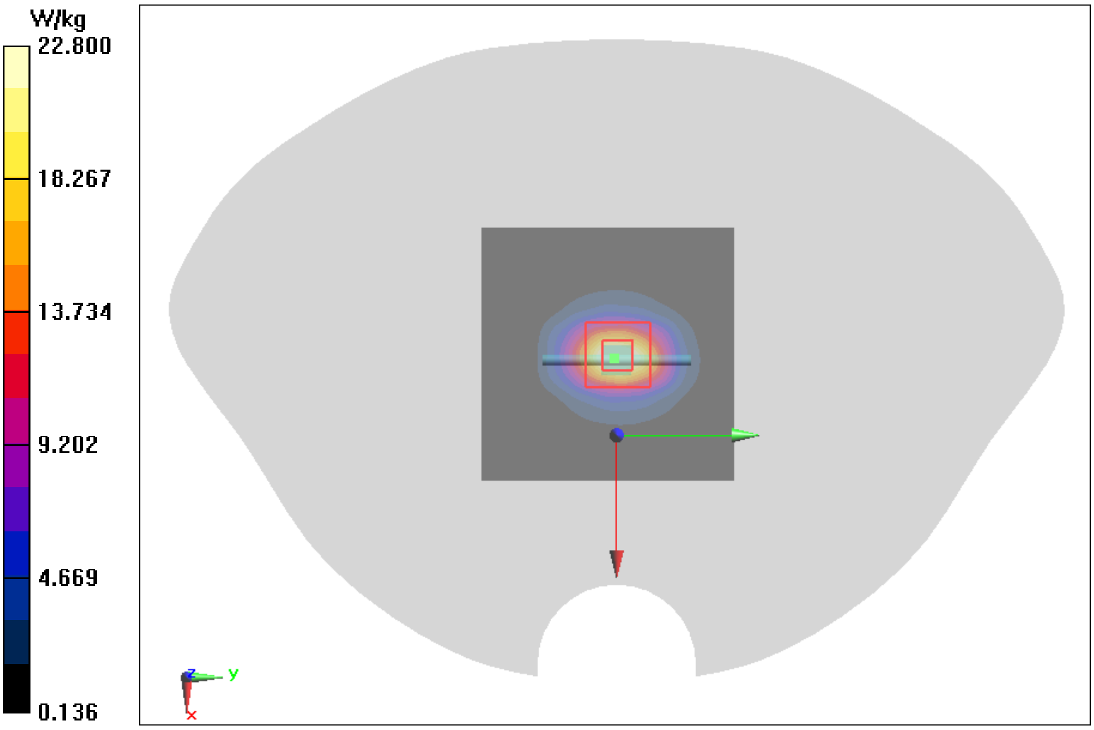
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 121.4 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 28.3 W/kg

SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.23 W/kg

Maximum value of SAR (measured) = 22.8 W/kg



Head 2600MHz-2

Date/Time: 2022/1/18

Electronics: DAE4 Sn1581

Medium parameters used: f = 2600 MHz; σ = 1.911 S/m; ε_r = 37.468; ρ = 1000 kg/m^3

Ambient Temperature:21.6°C   Liquid Temperature:21.6°C

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

Probe: EX3DV4 - SN7634ConvF(7.53, 7.53, 7.53) @ 2600 MHz

System Cheek Head 2600MHz 2/Area Scan (71x71x1):

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

Maximum value of SAR (Measurement) = 22.8 W/kg

System Cheek Head 2600MHz 2/Zoom Scan (7x7x7)/Cube 0:

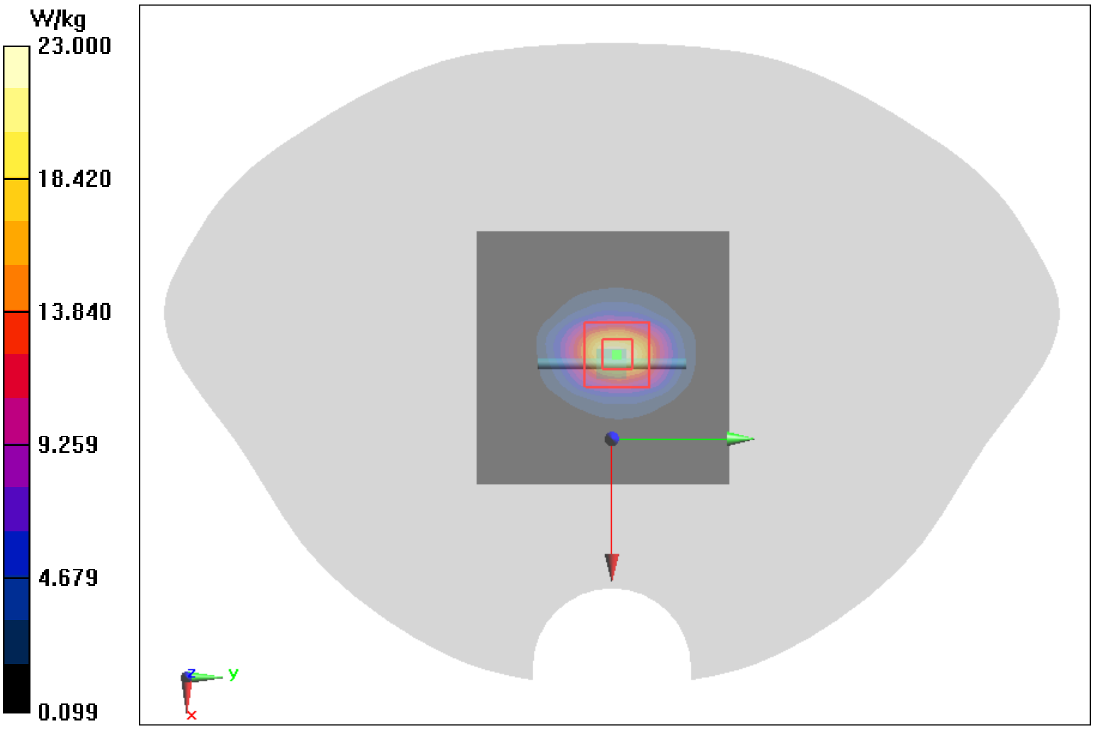
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 110.5 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 28.9 W/kg

SAR(1 g) = 13.3 W/kg; SAR(10 g) = 5.93 W/kg

Maximum value of SAR (measured) = 23.0 W/kg



Head 5200MHz-1

Date/Time: 2021/11/5

Electronics: DAE4 Sn1581

Medium parameters used: f = 5200 MHz; σ = 4.6 S/m; ε_r = 37.151; ρ = 1000 kg/m^3

Ambient Temperature:21.4°C   Liquid Temperature:21.4°C

Communication System: CW;   Frequency: 5200 MHz; Duty Cycle: 1:1

Probe: EX3DV4 - SN7401ConvF(5.64, 5.64, 5.64) @ 5200 MHz

System Check Head 5200MHz/Area Scan (71x71x1):

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

Maximum value of SAR (Measurement) = 20.7 W/kg

System Check Head 5200MHz/Zoom Scan (4x4x1.4mm, graded), dist=1.4mm (7x7x7)/Cube 0:

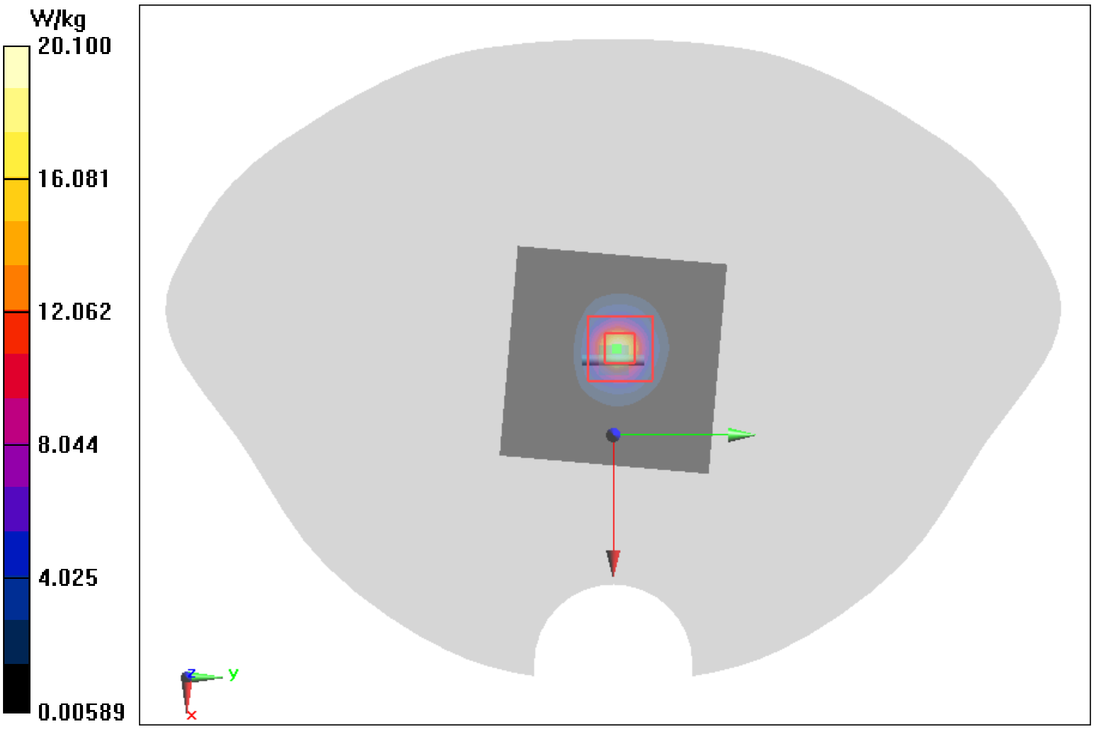
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 64.61 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 31.5 W/kg

SAR(1 g) = 7.87 W/kg; SAR(10 g) = 2.27 W/kg

Maximum of SAR (measured) = 20.1 W/kg



Head 5200MHz-2

Date/Time: 2022/1/18

Electronics: DAE4 Sn1581

Medium parameters used: f = 5200 MHz; σ = 4.529 S/m; $ε_r$ = 34.787; ρ = 1000 kg/m^3

Ambient Temperature:21.6°C Liquid Temperature:21.6°C

Communication System: ; Frequency: 5200 MHz; Duty Cycle: 1:1

Probe: EX3DV4 - SN7634ConvF(5.7, 5.7, 5.7) @ 5200 MHz

System Check 5200MHz/Area Scan (71x71x1):

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

Maximum value of SAR (Measurement) = 21.1 W/kg

System Check 5200MHz/Zoom Scan (4x4x1.4mm, graded), dist=1.4mm (7x7x7)/Cube 0:

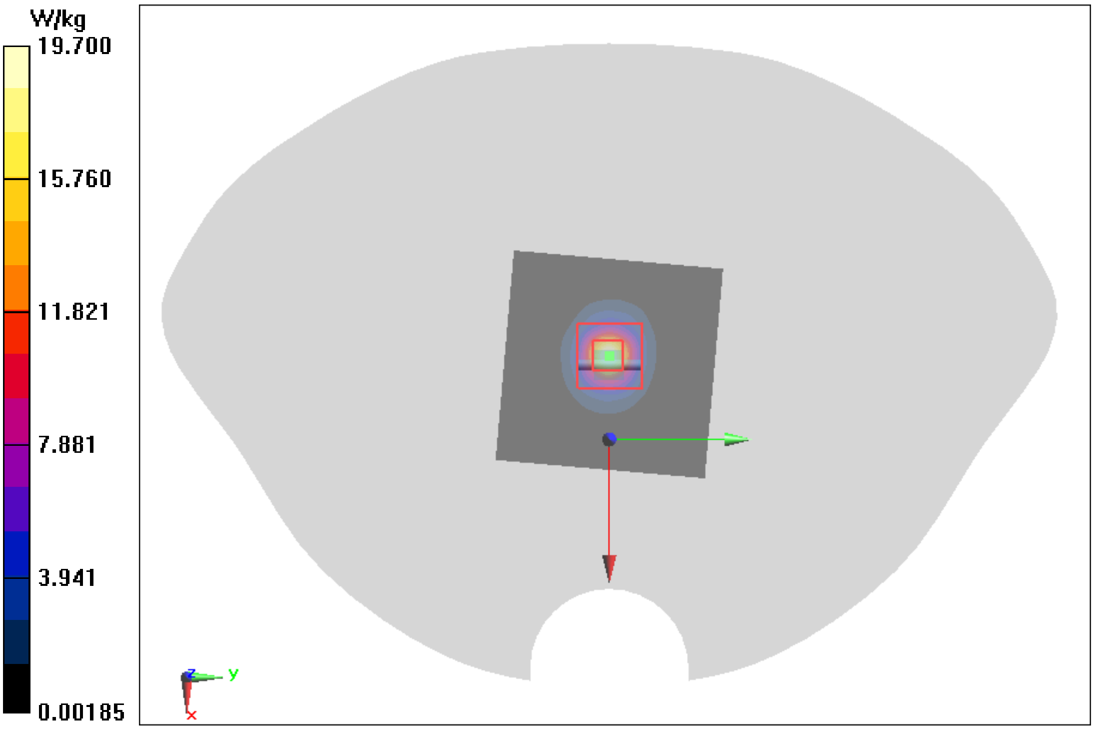
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 68.81 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 31.4 W/kg

SAR(1 g) = 7.74 W/kg; SAR(10 g) = 2.22 W/kg

Maximum value of SAR (measured) = 19.7 W/kg



Annex C: Measurement Uncertainty

Table D.1 Measurement Uncertainty Evaluation for SAR Test

Error Description	Uncert. Value	Prob. Dist.	Div.	(Ci) 1g	(Ci) 10g	Std. Unc.[%] (1g)	Std. Unc.[%] (10g)	(vi) veff
Measurement System								
Probe Calibration	13.30	N	2	1	1	6.65	6.65	∞
Axial Isotropy	4.70	R	$\sqrt{3}$	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.60	R	$\sqrt{3}$	0.7	0.7	3.88	3.88	∞
Boundary effects	2.00	R	$\sqrt{3}$	1	1	1.15	1.15	∞
Linearity	4.70	R	$\sqrt{3}$	1	1	2.71	2.71	∞
System Detection Limits	1.00	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Readout Electronics	0.30	N	1	1	1	0.30	0.30	∞
Response Time	0.80	R	$\sqrt{3}$	1	1	0.50	0.50	∞
Integration Time	2.60	R	$\sqrt{3}$	1	1	1.50	1.50	∞
RF Ambient Noise	3.00	R	$\sqrt{3}$	1	1	1.70	1.70	∞
RF Ambient Reflections	3.00	R	$\sqrt{3}$	1	1	1.70	1.70	∞
Probe Positioner	1.50	R	$\sqrt{3}$	1	1	0.87	0.87	∞
Probe Positioning	0.80	R	$\sqrt{3}$	1	1	0.40	0.40	∞
Post-processing	4.00	R	$\sqrt{3}$	1	1	2.30	2.30	∞
Test Sample Related								
Device Holder	1.01	N	1	1	1	1.01	1.01	71
Test sample Positioning	2.28	N	1	1	1	2.28	2.28	4
Power Drift	5.00	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Phantom and Setup								
Phantom Uncertainty	7.60	R	$\sqrt{3}$	1	1	4.40	4.40	∞
SAR correction	1.90	N	1	1	0.84	1.90	1.60	∞
Liquid Conductivity ((meas.)	2.50	N	1	0.78	0.71	2.00	1.80	∞
Liquid Permittivity ((meas.)	2.50	N	1	0.23	0.26	0.60	0.70	∞
Liquid Conductivity (Temp.)	2.45	R	$\sqrt{3}$	0.78	0.71	1.11	1.01	∞
Liquid Permittivity (Temp.)	0.72	R	$\sqrt{3}$	0.23	0.26	0.10	0.11	∞
Combined Std. Uncertainty	$u'_c = \sqrt{\sum_{i-1}^{n} c_i^2 u_i'^2}$					10.85	10.72	
Expanded STD Uncertainty	$u_c = k u'_c (k = 2)$					**21.70**	**21.44**	

Table D.2 Measurement Uncertainty Evaluation for System Validation

Error Description	Uncert. Value	Prob. Dist.	Div.	(Ci) 1g	(Ci) 10g	Std. Unc.[%] (1g)	Std. Unc.[%] (10g)	(vi) veff
Measurement System								
Probe Calibration	13.30	N	2	1	1	6.65	6.65	∞
Axial Isotropy	4.70	R	$\sqrt{3}$	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.60	R	$\sqrt{3}$	0.7	0.7	3.88	3.88	∞
Boundary effects	2.00	R	$\sqrt{3}$	1	1	1.15	1.15	∞
Linearity	4.70	R	$\sqrt{3}$	1	1	2.71	2.71	∞
System Detection Limits	1.00	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Readout Electronics	0.30	N	1	1	1	0.30	0.30	∞
Response Time	0.80	R	$\sqrt{3}$	1	1	0.50	0.50	∞
Integration Time	2.60	R	$\sqrt{3}$	1	1	1.50	1.50	∞
RF Ambient Noise	3.00	R	$\sqrt{3}$	1	1	1.70	1.70	∞
RF Ambient Reflections	3.00	R	$\sqrt{3}$	1	1	1.70	1.70	∞
Probe Positioner	1.50	R	$\sqrt{3}$	1	1	0.87	0.87	∞
Probe Positioning	0.80	R	$\sqrt{3}$	1	1	0.40	0.40	∞
Post-processing	4.00	R	$\sqrt{3}$	1	1	2.30	2.30	∞
Test Sample Related								
Validation Dipole Positioning	2.00	N	$\sqrt{3}$	1	1	1.15	1.15	∞
Dipole Input Power	5.00	N	$\sqrt{3}$	1	1	2.89	2.89	∞
Power Drift	5.00	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Phantom and Setup								
Phantom Uncertainty	7.60	R	$\sqrt{3}$	1	1	4.40	4.40	∞
SAR correction	1.90	N	1	1	0.84	1.90	1.60	∞
Liquid Conductivity ((meas.)	2.50	N	1	0.78	0.71	2.00	1.80	∞
Liquid Permittivity ((meas.)	2.50	N	1	0.23	0.26	0.60	0.70	∞
Liquid Conductivity (Temp.)	2.45	R	$\sqrt{3}$	0.78	0.71	1.11	1.01	∞
Liquid Permittivity (Temp.)	0.72	R	$\sqrt{3}$	0.23	0.26	0.10	0.11	∞
Combined Std. Uncertainty	$u'_c = \sqrt{\sum_{i-1}^{n} c_i^2 u_i'^2}$					10.01	10.88	
Expanded STD Uncertainty	$u_c = ku'_c(k=2)$					**22.01**	**21.76**	

Annex D: Calibration Certificate

TTL In Collaboration with speag CALIBRATION LABORATORY
Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
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Client : CTTL-SH

Certificate No: Z20-60180

CALIBRATION CERTIFICATE

Object	DAE4 - SN: 1581
Calibration Procedure(s)	FF-Z11-002-01 Calibration Procedure for the Data Acquisition Electronics (DAEx)
Calibration date:	May 06, 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)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

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

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

Issued: May 08, 2020

Certificate No: Z20-60180 Page 1 of 3

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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 = 6.1µV , 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	405.200 ± 0.15% (k=2)	405.459 ± 0.15% (k=2)	405.719 ± 0.15% (k=2)
Low Range	3.99505 ± 0.7% (k=2)	3.99885 ± 0.7% (k=2)	4.00362 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	13º ± 1 º

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Client 3in Certificate No: Z21-60345

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d112
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	September 17, 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)℃ 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	23-Sep-20 (CTTL, No.J20X08336)	Sep-21
Power sensor NRP8S	104291	23-Sep-20 (CTTL, No.J20X08336)	Sep-21
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
NetworkAnalyzer 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: September 22, 2021

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Glossary:

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

Calibration is Performed According to the Following Standards:

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	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	41.2 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.43 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.63 W/kg ± 18.8 % (*k*=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.57 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.23 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	54.1Ω+ 1.15jΩ
Return Loss	- 27.8dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.304 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

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Certificate No: Z21-60345 Page 4 of 6

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DASY5 Validation Report for Head TSL Date: 09.17.2021

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d112

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

Medium parameters used: f = 835 MHz; σ = 0.91 S/m; ε_r = 41.23; ρ = 1000 kg/m^3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7517; ConvF(9.81, 9.81, 9.81) @ 835 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 (7483)

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

Reference Value = 58.29 V/m; Power Drift = 0.00 dB

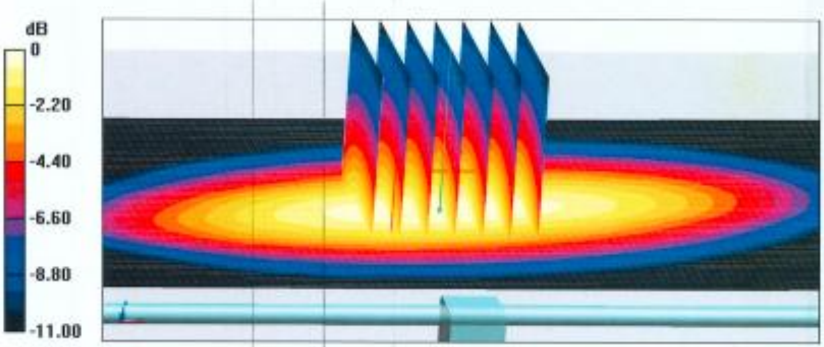
Peak SAR (extrapolated) = 3.84 W/kg

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

Smallest distance from peaks to all points 3 dB below = 17.1 mm

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

Maximum value of SAR (measured) = 3.34 W/kg



0 dB = 3.34 W/kg = 5.24 dBW/kg

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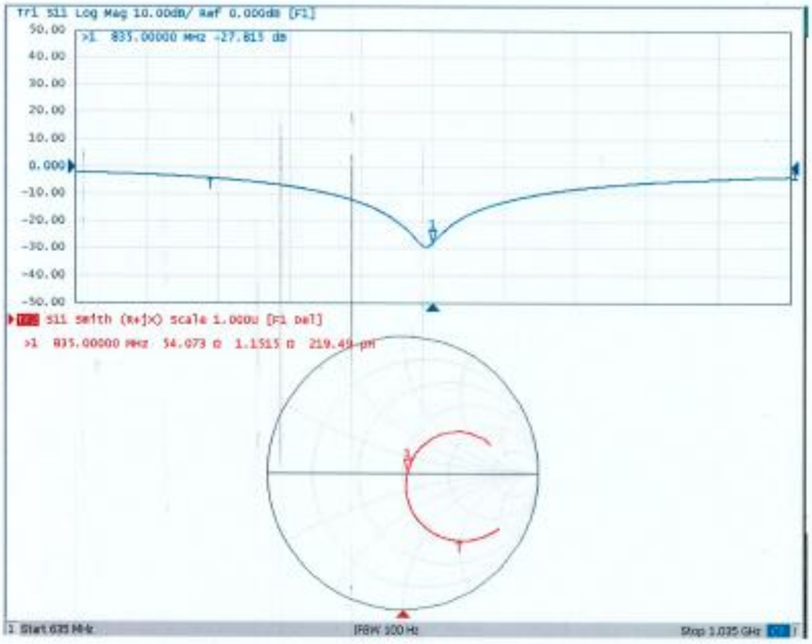
Impedance Measurement Plot for Head TSL



Certificate No: Z21-60345 Page 6 of 6

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Client 3in Certificate No: Z21-60347

CALIBRATION CERTIFICATE

Object	D1750V2 - SN: 1044
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	September 18, 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)℃ 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	23-Sep-20 (CTTL, No.J20X08336)	Sep-21
Power sensor NRP8S	104291	23-Sep-20 (CTTL, No.J20X08336)	Sep-21
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
NetworkAnalyzer 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: September 26, 2021

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Glossary:

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

Calibration is Performed According to the Following Standards:

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	1750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.3 ± 6 %	1.36 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.06 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**36.4 W/kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (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	**19.0 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- 1.09jΩ
Return Loss	- 36.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.120 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

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DASY5 Validation Report for Head TSL Date: 09.18.2021

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1044

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

Medium parameters used: f = 1750 MHz; σ = 1.36 S/m; ε_r = 40.28; ρ = 1000 kg/m^3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7517; ConvF(8.22, 8.22, 8.22) @ 1750 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 (7483)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.03 V/m; Power Drift = 0.00 dB

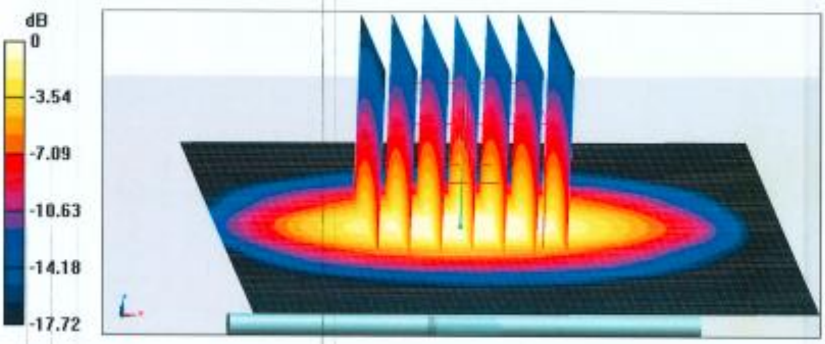
Peak SAR (extrapolated) = 17.4 W/kg

SAR(1 g) = 9.06 W/kg; SAR(10 g) = 4.73 W/kg

Smallest distance from peaks to all points 3 dB below = 10.2 mm

Ratio of SAR at M2 to SAR at M1 = 52.3%

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



0 dB = 14.3 W/kg = 11.55 dBW/kg

Certificate No: Z21-60347 Page 5 of 6

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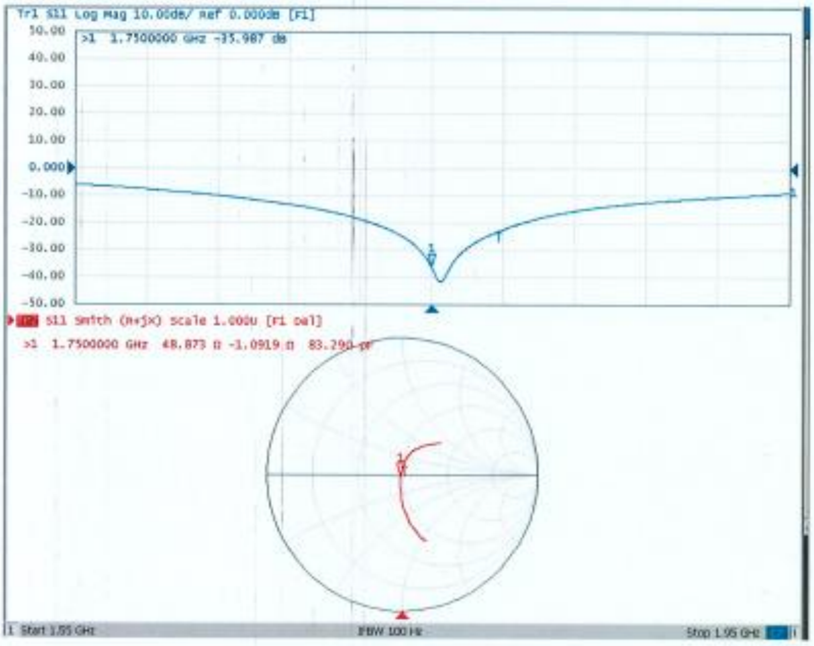
Impedance Measurement Plot for Head TSL



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Client 3in Certificate No: Z21-60348

CALIBRATION CERTIFICATE

Object: D2000V2 - SN: 1051

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

Calibration date: September 18, 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)℃ 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	23-Sep-20 (CTTL, No.J20X08336)	Sep-21
Power sensor NRP8S	104291	23-Sep-20 (CTTL, No.J20X08336)	Sep-21
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
NetworkAnalyzer 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: September 26, 2021

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lossary:

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

Calibration is Performed According to the Following Standards:

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%.

Certificate No: Z21-60348 Page 2 of 6

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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	2000 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.9 ± 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^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**41.6 W/kg ± 18.8 % (*k*=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.11 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.6 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	50.5Ω+ 1.27jΩ
Return Loss	- 37.4dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.091 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

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DASY5 Validation Report for Head TSL Date: 09.18.2021

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2000 MHz; Type: D2000V2; Serial: D2000V2 - SN: 1051

Communication System: UID 0, CW; Frequency: 2000 MHz; Duty Cycle: 1:1

Medium parameters used: f = 2000 MHz; σ = 1.388 S/m; ε_r = 40.92; ρ = 1000 kg/m^3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7517; ConvF(7.9, 7.9, 7.9) @ 2000 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 (7483)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 104.8 V/m; Power Drift = -0.05 dB

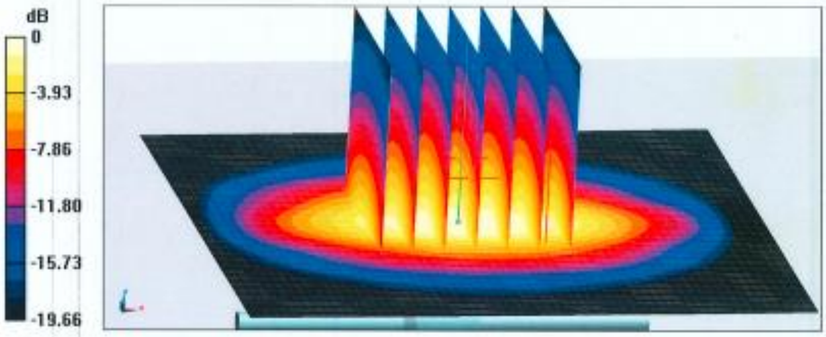
Peak SAR (extrapolated) = 20.6 W/kg

SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.11 W/kg

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

Ratio of SAR at M2 to SAR at M1 = 50%

Maximum value of SAR (measured) = 16.7 W/kg



0 dB = 16.7 W/kg = 12.23 dBW/kg

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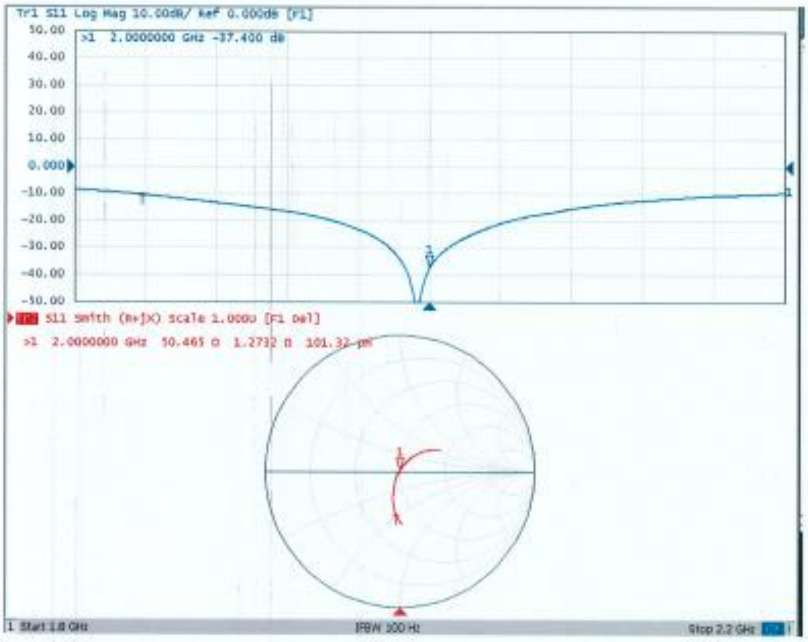
Impedance Measurement Plot for Head TSL



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Client 3in Certificate No: Z21-60350

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 858
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	September 18, 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)℃ 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	23-Sep-20 (CTTL, No.J20X08336)	Sep-21
Power sensor NRP8S	104291	23-Sep-20 (CTTL, No.J20X08336)	Sep-21
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
NetworkAnalyzer 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: September 26, 2021

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Glossary:

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

Calibration is Performed According to the Following Standards:

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	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	38.9 ± 6 %	1.79 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.2 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.8 W/kg ± 18.8 % (*k*=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.00 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.0 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	54.6Ω+ 4.25jΩ
Return Loss	- 24.5dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.067 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: 09.18.2021

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 858

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

Medium parameters used: f = 2450 MHz; σ = 1.79 S/m; ε_r = 38.85; ρ = 1000 kg/m^3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7517; ConvF(7.34, 7.34, 7.34) @ 2450 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 (7483)

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

Reference Value = 107.0 V/m; Power Drift = 0.02 dB

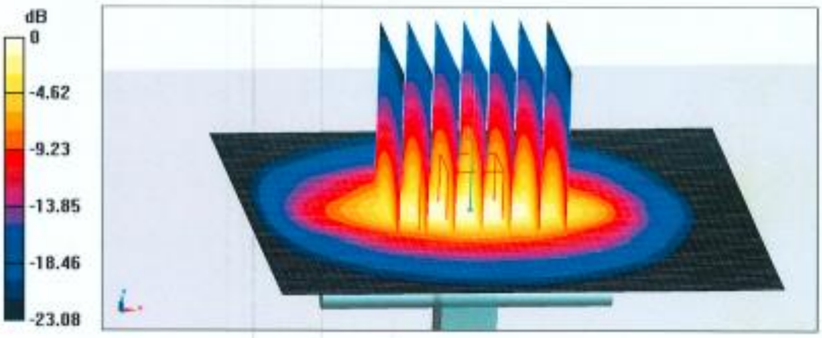
Peak SAR (extrapolated) = 27.8 W/kg

SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6 W/kg

Smallest distance from peaks to all points 3 dB below = 9 mm

Ratio of SAR at M2 to SAR at M1 = 47%

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



0 dB = 22.4 W/kg = 13.50 dBW/kg

Certificate No: Z21-60350 Page 5 of 6

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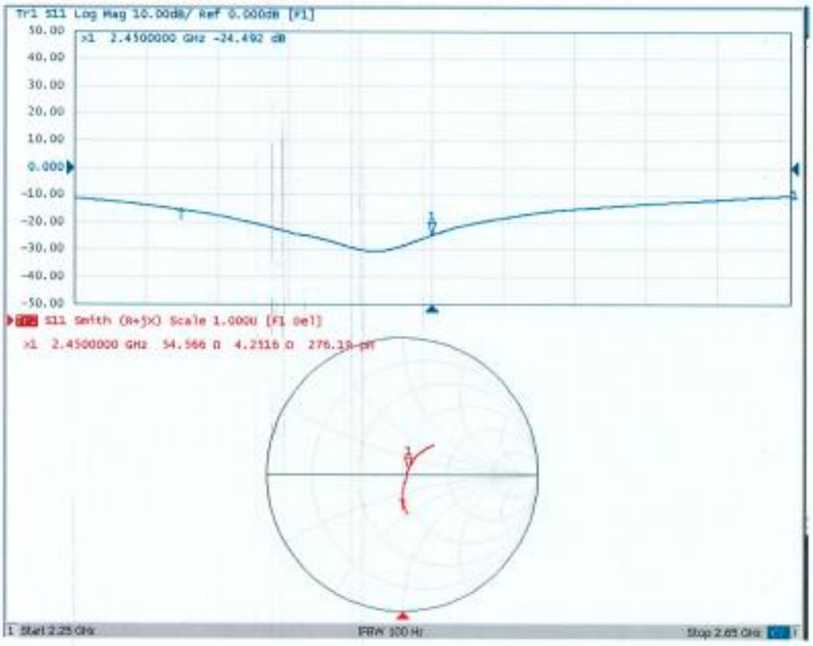
Impedance Measurement Plot for Head TSL



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Client 3in Certificate No: Z21-60351

CALIBRATION CERTIFICATE

Object	D2600V2 - SN: 1031
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	September 16, 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)℃ 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	23-Sep-20 (CTTL, No.J20X08336)	Sep-21
Power sensor NRP8S	104291	23-Sep-20 (CTTL, No.J20X08336)	Sep-21
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: September 21, 2021

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Glossary:

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

Calibration is Performed According to the Following Standards:

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	39.0 ± 6 %	1.95 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.8 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**55.4 W/kg ± 18.8 % (*k*=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.09 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.4 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	49.4Ω- 4.95jΩ
Return Loss	- 26.0dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.058 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

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DASY5 Validation Report for Head TSL Date: 09.16.2021

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1031

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

Medium parameters used: f = 2600 MHz; σ = 1.949 S/m; ε_r = 39.04; ρ = 1000 kg/m^3

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 (7483)

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

Reference Value = 107.3 V/m; Power Drift = -0.01 dB

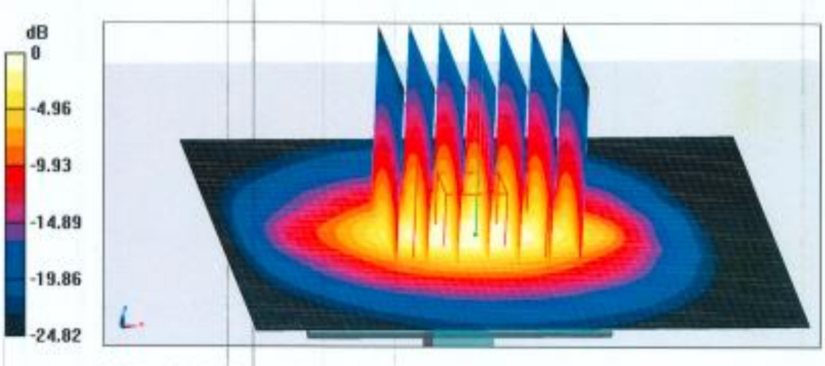
Peak SAR (extrapolated) = 30.5 W/kg

SAR(1 g) = 13.8 W/kg; SAR(10 g) = 6.09 W/kg

Smallest distance from peaks to all points 3 dB below = 9 mm

Ratio of SAR at M2 to SAR at M1 = 44.9%

Maximum value of SAR (measured) = 24.2 W/kg



0 dB = 24.2 W/kg = 13.84 dBW/kg

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Impedance Measurement Plot for Head TSL