TEST REPORT

No. I20N02478-SAR

For

TCL Communication Ltd.

GSM/UMTS/LTE Mobile phone

Model name: 5007S

With

Hardware Version: 03

Software Version: v2D23UZ31

FCC ID: 2ACCJH130

Issued Date: 2020-10-20

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of SAICT.

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
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1. Summary of Test Report

1.1. Test Items

Description:	GSM/UMTS/LTE Mobile phone
Model Name:	5007S
Applicant's name:	TCL Communication Ltd.
Manufacturer's Name:	TCL Communication Ltd.

1.2. Test Standards

ANSI C95.1–1992, IEEE 1528–2013

1.3. Test Result

Pass. Please refer to "14. Summary of Test Results"

1.4. Testing Location

Address: Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China

1.5. Project Data

Testing Start Date: 2020-09-12

Testing End Date: 2020-09-16

1.6. Signature

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2. Statement of Compliance

The maximum results of SAR found during testing for TCL Communication Ltd. GSM/UMTS/LTE Mobile phone 5007S are as follows:

Table 2.1: Highest Reported SAR (1g)

Exposure Configuration	Technology Band	Highest Reported SAR 1g(W/kg)	Equipment Class
Head (Separation Distance 0mm)	GSM 850	0.34	PCE
	PCS 1900	0.04	
	UMTS FDD 5	0.76	
	UMTS FDD 4	0.40	
	UMTS FDD 2	0.15	
	LTE Band 2	0.11	
	LTE Band 5	1.15	
	LTE Band 12	0.53	
	LTE Band 13	0.26	
	LTE Band 66	0.27	
	WLAN 2.4 GHz	0.32	DTS
Hotspot (Separation Distance 10mm)	GSM 850	0.48	PCE
	PCS 1900	0.93	
	UMTS FDD 5	0.19	
	UMTS FDD 4	1.03	
	UMTS FDD 2	1.06	
	LTE Band 2	1.23	
	LTE Band 5	0.37	
	LTE Band 12	0.32	
	LTE Band 13	0.53	
	LTE Band 66	**1.28**	
	WLAN 2.4 GHz	0.18	DTS
Body-worn (Separation Distance 15mm)	PCS 1900	0.52	PCE
	UMTS FDD 4	0.54	
	UMTS FDD 2	0.65	
	LTE Band 2	0.90	
	LTE Band 66	0.90	

The SAR values found for the Mobile Phone are below the maximum recommended levels of 1.6 W/kg as averaged over any 1g tissue according to the ANSI C95.1-1992.

For body operation, this device has been tested and meets FCC RF exposure guidelines when used with any accessory that contains no metal and which provides a minimum separation distance of 10 mm for hotspot and 15mm for body worn between this device and the body of the user. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.

The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output.

The measurement together with the test system set-up is described in annex C of this test report. A detailed description of the equipment under test can be found in chapter 4 of this test report. The highest reported SAR value is obtained at the case of **(Table 2.1),** and the values are**: 1.28 W/kg(1g).**

Table 2.2: The sum of reported SAR values for cellular antenna and WiFi

	Position	Band	Cellular antenna	WiFi	Sum
Highest reported SAR value for Head	Right hand, Touch cheek	LTE B5	1.15	0.32	**1.47**
Highest reported SAR value for Body	Bottom 10mm	LTE B66	1.28	/	**1.28**

Note1: we have evaluated and chose the highest value of WiFi 2.4G and 5G in the above table.
Note2: we have evaluated and chose the highest value of body 10mm and 15mm in the above table.

Table 2.3: The sum of reported SAR values for cellular antenna and BT

	Position	Band	Cellular antenna	BT	Sum
Maximum reported SAR value for Head	Right hand, Touch cheek	LTE B5	1.15	<0.01[1]	**1.15**
Maximum reported SAR value for Body	Rear 10mm	LTE B2	1.09	0.23[2]	**1.32**

[1] – The head SAR of BT is too low to get it, so the "<0.01" is used to indicate the head SAR of BT.
[2] - Estimated SAR for Bluetooth (see the table 13.3)

According to the above tables, the highest sum of reported SAR values is **1.47 W/kg (1g)**. The detail for simultaneous transmission consideration is described in chapter 13.

According to the KDB648474 D04, the UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge, in direct contact with a flat phantom, for 10-g extremity SAR according to the body-equivalent tissue dielectric parameters in KDB Publication 865664 D01 to address interactive hand use exposure conditions. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg

Table 2.4: 0mm Reported SAR for phablet (10g)

Exposure Configuration	Technology Band	Highest Reported SAR 10g(W/kg)	Limit 10g (W/kg)
10g extremity SAR (Separation Distance 0mm)	GSM1900	1.32	4.0
	UMTS FDD 4	3.13	4.0
	UMTS FDD 2	2.84	4.0
	LTE Band 2	3.34	4.0
	LTE Band 66	3.46	4.0

3. Client Information

3.1. Applicant Information

Company Name:	TCL Communication Ltd.
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Fax:	0086-75536612000-81722

3.2. Manufacturer Information

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Contact Person:	Gong Zhizhou
E-mail:	zhizhou.gong@tcl.com
Telephone:	0086-755-36611722
Fax:	0086-75536612000-81722

4. Equipment Under Test (EUT) and Ancillary Equipment (AE)

4.1. About EUT

Description:	GSM/UMTS/LTE Mobile phone
Model name:	5007S
Operating mode(s):	GSM 850/900/1800/1900, UMTS FDD 2/4/5, BT, Wi-Fi LTE Band 2/4/5/12/13/66
Tested Tx Frequency:	825 – 848.8 MHz (GSM 850)
	1850.2 – 1910 MHz (GSM 1900)
	826.4–846.6 MHz (WCDMA 850 Band V)
	1712.4 – 1752.6 MHz (WCDMA 1700 Band IV)
	1852.4–1907.6 MHz (WCDMA1900 Band II)
	1850 – 1910 MHz (LTE Band 2)
	824 – 849 MHz (LTE Band 5)
	699.7 – 715.3 MHz (LTE Band 12)
	779.5 –784.5 MHz (LTE Band 13)
	1710.7 –1779.3 MHz (LTE Band 66)
	2412 – 2462 MHz (Wi-Fi 2.4G)
GPRS/EGPRS Multislot Class:	12
GPRS capability Class:	B
Test device Production information:	Production unit
Device type:	Portable device
Antenna type:	Integrated antenna
Accessories/Body-worn configurations:	Headset
Hotspot mode:	Support

4.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW	SW Version
EUT1	015794000205329	03	v2D23UZ31
EUT2	015794000205451	03	v2D23UZ31
EUT3	015794000205303	03	v2D23UZ31

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

Note: It is performed to test SAR with the EUT1&2 and conducted power with the EUT3.

4.3. Internal Identification of AE used during the test

AE ID*	Description	Model	SN	Manufacturer
AE1	Battery	TLp034G1	/	BYD

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

5. TEST METHODOLOGY

5.1. Applicable Limit Regulations

ANSI C95.1–1992:IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

It specifies the maximum exposure limit of **1.6 W/kg** as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

5.2. Applicable Measurement Standards

IEEE 1528–2013: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.

KDB447498 D01: General RF Exposure Guidance v06: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

KDB648474 D04 Handset SAR v01r03: SAR Evaluation Considerations for Wireless Handsets.

KDB941225 D01 SAR test for 3G devices v03r01: SAR Measurement Procedures for 3G Devices

KDB941225 D05 SAR for LTE Devices v02r05: SAR Evaluation Considerations for LTE Devices

KDB941225 D06 Hotspot Mode SAR v02r01: SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities

KDB248227 D01 802.11 Wi-Fi SAR v02r02: SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS

KDB865664 D01SAR measurement 100 MHz to 6 GHz v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz.

KDB865664 D02RF Exposure Reporting v01r02: RF Exposure Compliance Reporting and Documentation Considerations

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:

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

SAR is expressed in units of Watts per kilogram (W/kg)
SAR measurement can be either related to the temperature elevation in tissue by

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

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 and E is the RMS electrical field strength.

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

7. Tissue Simulating Liquids

7.1. Targets for tissue simulating liquid

Table 7.1: Targets for tissue simulating liquid

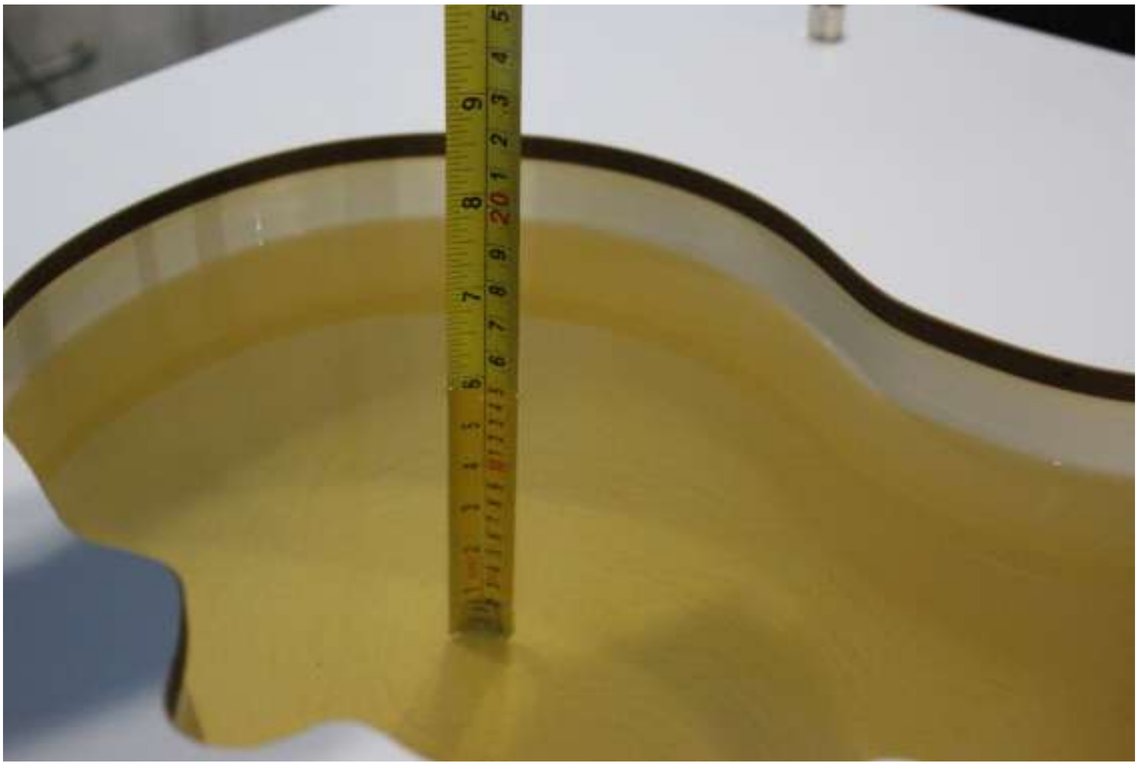
Frequency(MHz)	Liquid Type	Conductivity(σ)	± 5% Range	Permittivity(ε)	± 5% Range
750	Head	0.89	0.85～0.93	41.94	39.8～44.0
835	Head	0.90	0.86～0.95	41.5	39.4～43.6
1750	Head	1.37	1.30～1.44	40.08	38.1～42.1
1900	Head	1.40	1.33～1.47	40.0	38.0～42.0
2450	Head	1.80	1.71～1.89	39.2	37.2～41.2

7.2. Dielectric Performance

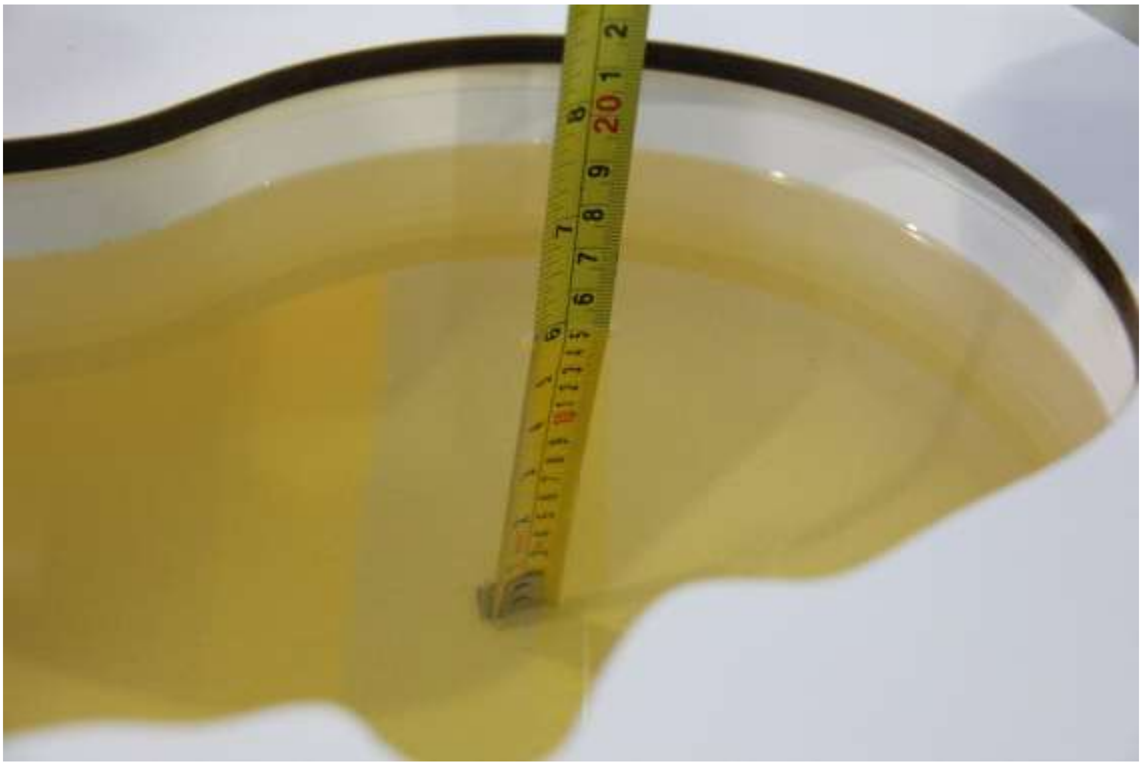
Table 7.2: Dielectric Performance of Tissue Simulating Liquid

Measurement Date (yyyy-mm-dd)	Type	Frequency	Permittivity ε	Drift (%)	Conductivity σ (S/m)	Drift (%)
2020-9-12	Head	750 MHz	41.28	-1.57	0.89	0.00
2020-9-13	Head	835 MHz	40.92	-1.40	0.898	-0.22
2020-9-14	Head	1750 MHz	39.69	-0.97	1.358	-0.88
2020-9-15	Head	1900 MHz	40.74	1.85	1.408	0.57
2020-9-16	Head	2450 MHz	39.19	-0.03	1.836	2.00

Note: The liquid temperature is 22.0^{o}℃

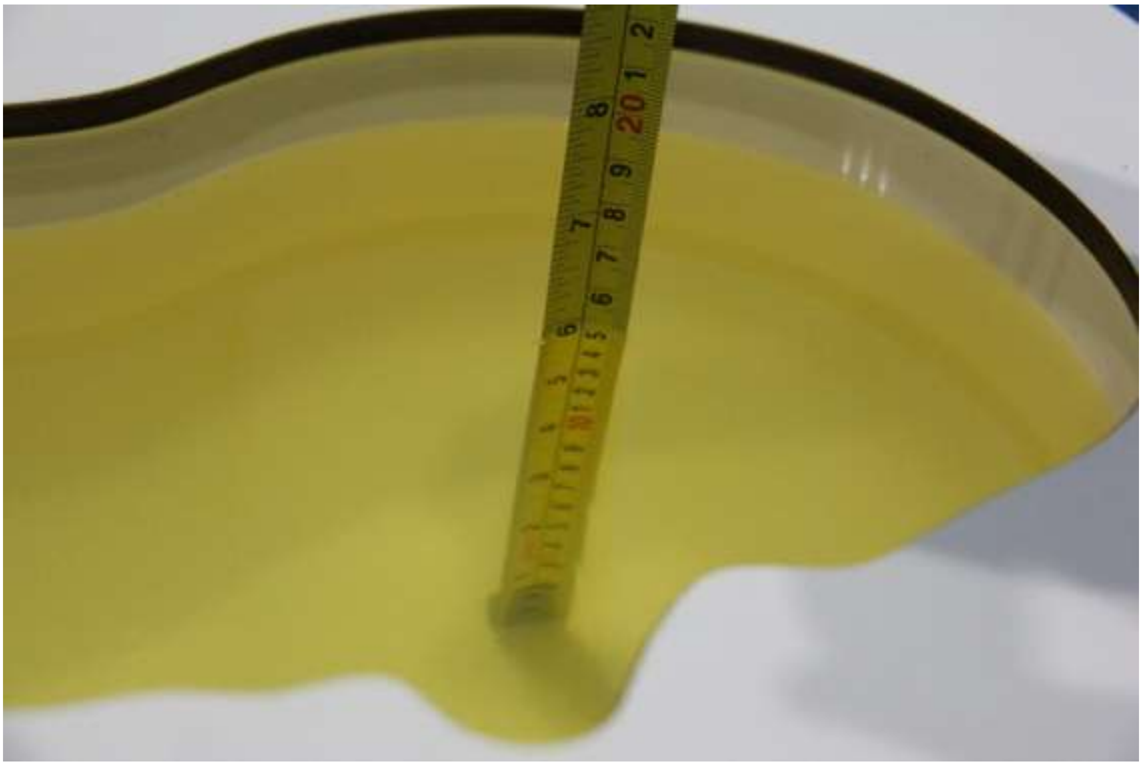


Picture 7-1 Liquid depth in the Head Phantom (750MHz)



Picture 7-2 Liquid depth in the Head Phantom (835 MHz)

Picture 7-3 Liquid depth in the Head Phantom (1750 MHz)



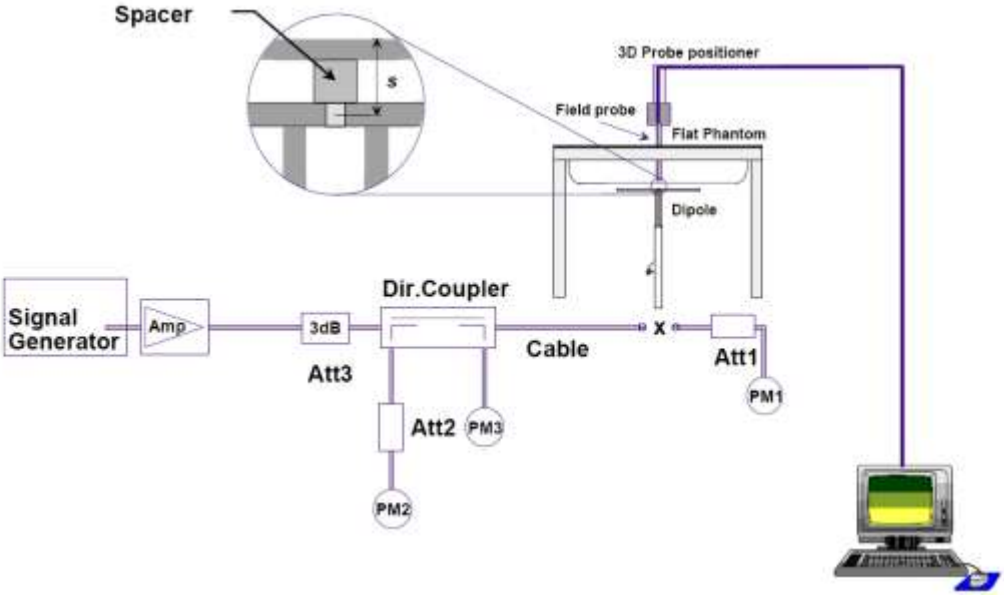
Picture 7-4 Liquid depth in the Head Phantom (1900 MHz)

Picture 7-5 Liquid depth in the Head Phantom (2450MHz)

8. System verification

8.1. 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 8.1 System Setup for System Evaluation

Picture 8.2 Photo of Dipole Setup

8.2. System Verification

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device.

The system verification results are required that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR. The details are presented in annex B.

Table 8.1: System Verification of Head

Measurement Date (yyyy-mm-dd)	Frequency	Target value (W/kg)		Measured value(W/kg)		Deviation	
		10 g Average	1 g Average	10 g Average	1 g Average	10 g Average	1 g Average
2020-9-12	750 MHz	5.70	8.53	5.56	8.32	-2.46%	-2.46%
2020-9-13	835 MHz	6.29	9.62	6.36	9.64	1.11%	0.21%
2020-9-14	1750 MHz	19.30	36.40	19.16	36.08	-0.73%	-0.88%
2020-9-15	1900 MHz	21.00	40.50	20.64	39.68	-1.71%	-2.02%
2020-9-16	2450 MHz	24.10	52.00	24.88	52.48	3.24%	0.92%

9. Measurement Procedures

9.1. Tests to be performed

In order to determine the highest value of the peak spatial-average SAR of a handset, all device positions, configurations and operational modes shall be tested for each frequency band according to steps 1 to 3 below. A flowchart of the test process is shown in picture 9.1.

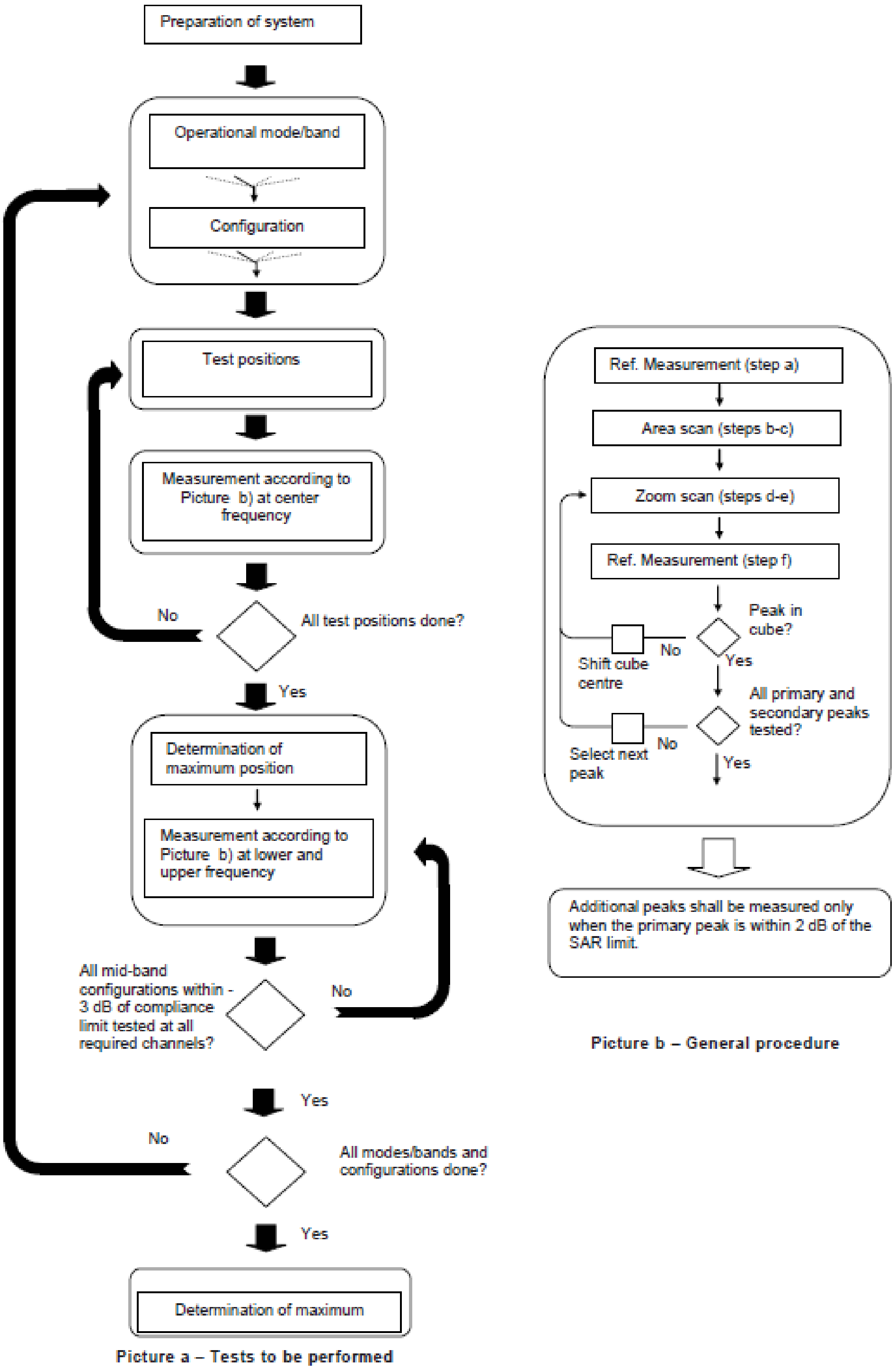
Step 1: The tests described in 9.2 shall be performed at the channel that is closest to the centre of the transmit frequency band (f_c) for:

a) all device positions (cheek and tilt, for both left and right sides of the SAM phantom, as described in annex D),
b) all configurations for each device position in a), e.g., antenna extended and retracted, and
c) all operational modes, e.g., analogue and digital, for each device position in a) and configuration in b) in each frequency band.

If more than three frequencies need to be tested according to 11.1 (i.e., $N_c > 3$), then all frequencies, configurations and modes shall be tested for all of the above test conditions.

Step 2: For the condition providing highest peak spatial-average SAR determined in Step 1,perform all tests described in 9.2 at all other test frequencies, i.e., lowest and highest frequencies. In addition, for all other conditions (device position, configuration and operational mode) where the peak spatial-average SAR value determined in Step 1 is within3 dB of the applicable SAR limit, it is recommended that all other test frequencies shall be tested as well.

Step 3: Examine all data to determine the highest value of the peak spatial-average SAR found in Steps 1 to 2.



Picture 9.1Block diagram of the tests to be performed

9.2. 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 1528-2003. 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>
<tr><th colspan="3"></th><th>≤ 3 GHz</th><th>> 3 GHz</th></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>½·δ·ln(2) ± 0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3 – 4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤ 4 mm</td><td>3 – 4 GHz: ≤ 3 mm
4 – 5 GHz: ≤ 2.5 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">≤ 1.5·$\Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 – 4 GHz: ≥ 28 mm
4 – 5 GHz: ≥ 25 mm
5 – 6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the <u>reported</u> SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

9.3. WCDMA Measurement Procedures for SAR

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 & $DPDCH_n$), 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.

For Release 5 HSDPA Data Devices:

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs}	CM/dB
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15	15/15	64	12/15	24/25	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

For Release 6 HSPA Data Devices

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	1.5	1.5	20	75
2	6/15	15/15	64	6/15	12/15	12/15	12/15	4	1	1.5	1.5	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}:47/15 β_{ed2}:47/15	4	2	1.5	1.5	15	92
4	2/15	15/15	64	2/15	4/15	4/15	56/75	4	1	1.5	1.5	17	71
5	15/15	15/15	64	15/15	24/15	30/15	134/15	4	1	1.5	1.5	21	81

Rel.8 DC-HSDPA (Cat 24)

SAR test exclusion for Rel.8 DC-HSDPA must satisfy the SAR test exclusion requirements of Rel.5 HSDPA. SAR test exclusion for DC-HSDPA devices is determined by power measurements according to the H-Set 12, Fixed Reference Channel (FRC) configuration in Table C.8.1.12 of 3GPP TS 34.121-1. A primary and a secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to qualify for SAR test exclusion.

9.4. SAR Measurement for LTE

SAR tests for LTE are performed with a base station simulator, Rohde & Rchwarz CMW500. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. All powers were measured with the CMW 500.
It is performed for conducted power and SAR based on the KDB941225 D05.
SAR is evaluated separately according to the following procedures for the different test positions in each exposure condition – head, body, body-worn accessories and other use conditions. The procedures in the following subsections are applied separately to test each LTE frequency band.

1) QPSK with 1 RB allocation
   Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.
2) QPSK with 50% RB allocation
   The procedures required for 1 RB allocation in 1) are applied to measure the SAR for QPSK with 50% RB allocation.
3) QPSK with 100% RB allocation
   For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation in 1) and 2) 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.

TDD test:

TDD testing is performed using guidance from FCC KDB 941225 D05 v02r05 and the SAR test guidance provided in April 2013 TCB works hop notes. TDD is tested at the highest duty factor using UL-DL configuration 0 with special subframe configuration 6 and applying the FDD LTE procedures in KDB 941225 D05 v02r05. SAR testing is performed using the extended cyclic prefix listed in 3GPP TS 36.211.

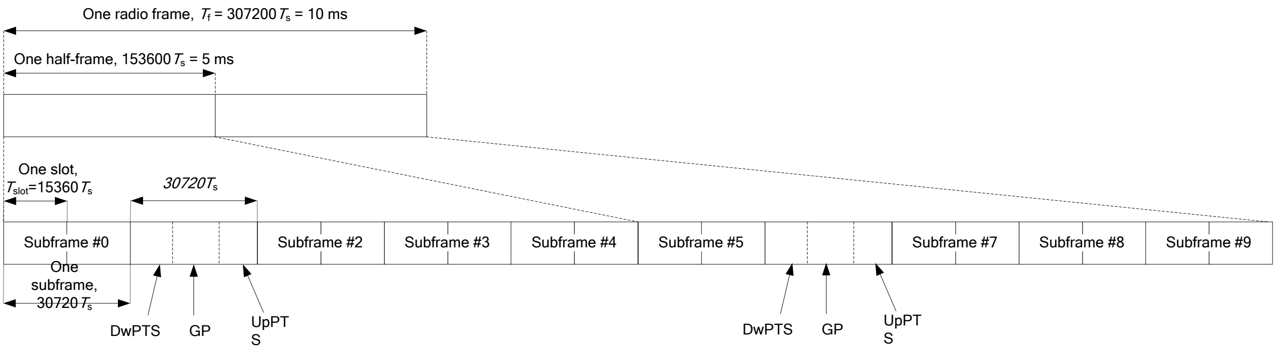


Figure 9.2: Frame structure type 2 (for 5 ms switch-point periodicity)

Table 9.1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS)

<table>
<tr><th rowspan="3">Special subframe configuration</th><th colspan="3">Normal cyclic prefix in downlink</th><th colspan="3">Extended cyclic prefix in downlink</th></tr>
<tr><th rowspan="2">DwPTS</th><th colspan="2">UpPTS</th><th rowspan="2">DwPTS</th><th colspan="2">UpPTS</th></tr>
<tr><th>Normal cyclic prefix in uplink</th><th>Extended cyclic prefix in uplink</th><th>Normal cyclic prefix in uplink</th><th>Extended cyclic prefix in uplink</th></tr>
<tr><td>0</td><td>$6592 \cdot T_s$</td><td rowspan="5">$2192 \cdot T_s$</td><td rowspan="5">$2560 \cdot T_s$</td><td>$7680 \cdot T_s$</td><td rowspan="4">$2192 \cdot T_s$</td><td rowspan="4">$2560 \cdot T_s$</td></tr>
<tr><td>1</td><td>$19760 \cdot T_s$</td><td>$20480 \cdot T_s$</td></tr>
<tr><td>2</td><td>$21952 \cdot T_s$</td><td>$23040 \cdot T_s$</td></tr>
<tr><td>3</td><td>$24144 \cdot T_s$</td><td>$25600 \cdot T_s$</td></tr>
<tr><td>4</td><td>$26336 \cdot T_s$</td><td>$7680 \cdot T_s$</td><td rowspan="4">$4384 \cdot T_s$</td><td rowspan="4">$5120 \cdot T_s$</td></tr>
<tr><td>5</td><td>$6592 \cdot T_s$</td><td rowspan="5">$4384 \cdot T_s$</td><td rowspan="5">$5120 \cdot T_s$</td><td>$20480 \cdot T_s$</td></tr>
<tr><td>6</td><td>$19760 \cdot T_s$</td><td>$23040 \cdot T_s$</td></tr>
<tr><td>7</td><td>$21952 \cdot T_s$</td><td>$12800 \cdot T_s$</td></tr>
<tr><td>8</td><td>$24144 \cdot T_s$</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>9</td><td>$13168 \cdot T_s$</td><td>-</td><td>-</td><td>-</td></tr>
</table>

Table 9.2: Uplink-downlink configurations

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

Duty factor is calculated by:

Duty factor = uplink frame*6+UpPTS*2/one frame length

= ($30720.T_s$ * 6+5120. T_s*2)/$307200.T_s$

= 0.633

According to the KDB 447498 D01, SAR should be evaluated at more than 3 frequencies for devices supporting transmit bands wider than 100MHz. Oct.2014 FCC-TCB conference notes (Dec. 2014 rev.) specifies the 5 test channels to use for 3GPP band 41 SAR evaluation.

9.5. Bluetooth & Wi-Fi Measurement Procedures for SAR

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.

9.6. Power Drift

To control the output power stability during the SAR test, DASY4 system calculates the power drift by measuring the E-field at the same location at the beginning and at the end of the measurement for each test position. These drift values can be found in section14 labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 5%.

10. Area Scan Based 1-g SAR

10.1. Requirement of KDB

According to the KDB447498 D01 v05, when the implementation is based the specific polynomial fit algorithm as presented at the 29th Bioelectromagnetics Society meeting (2007) and the estimated 1-gSAR is ≤ 1.2 W/kg, a zoom scan measurement is not required provided it is also not needed for any other purpose; for example, if the peak SAR location required for simultaneous transmission SAR test exclusion can be determined accurately by the SAR system or manually to discriminate between distinctive peaks and scattered noisy SAR distributions from area scans.

There must not be any warning or alert messages due to various measurement concerns identified by the SAR system; for example, noise in measurements, peaks too close to scan boundary, peaks are too sharp, spatial resolution and uncertainty issues etc. The SAR system verification must also demonstrate that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR (See Annex B). When all the SAR results for each exposure condition in a frequency band and wireless mode are based on estimated 1-g SAR, the 1-g SAR for the highest SAR configuration must be determined by a zoom scan.

10.2. Fast SAR Algorithms

The approach is based on the area scan measurement applying a frequency dependent attenuation parameter. This attenuation parameter was empirically determined by analyzing a large number of phones. The MOTOROLA FAST SAR was developed and validated by the MOTOROLA Research Group in Ft. Lauderdale.

In the initial study, an approximation algorithm based on Linear fit was developed. The accuracy of the algorithm has been demonstrated across a broad frequency range (136-2450 MHz)and for both 1- and 10-g averaged SAR using a sample of 264 SAR measurements from 55wireless handsets. For the sample size studied, the root-mean-squared errors of the algorithm mare 1.2% and 5.8% for 1- and 10-g averaged SAR, respectively. The paper describing the algorithm in detail is expected to be published in August 2004 within the Special Issue of Transactions on MTT.

In the second step, the same research group optimized the fitting algorithm to an Polynomial fit whereby the frequency validity was extended to cover the range 30-6000MHz. Details of this study can be found in the BEMS 2007 Proceedings.

Both algorithms are implemented in DASY software.

11. Conducted Output Power

For Main antenna, there are two sets of tune-up power, Normal power and Low power, used for different use cases for GSM1900, W1700/1900 and LTE Band 2/66. Normal power status is applied for head test and body worn test of above bands. Low power status is applied for hotspot test of above bands. For other bands, Normal power status is applied for both head and body test.

11.1. GSM Measurement result

During the process of testing, the EUT was controlled via Agilent Digital Radio Communication tester (E5515C) to ensure the maximum power transmission and proper modulation. This result contains conducted output power for the EUT. In all cases, the measured peak output power should be greater and within 5% than EMI measurement.

Normal Power

Table 11.1-1: The conducted power measurement results for GSM, GPRS and EGPRS

GSM 850 Speech (GMSK)	Measured Power (dBm)			Tune up	calculation	Averaged Power (dBm)		
	251	190	128			251	190	128
1 Txslot	32.10	32.11	32.09	33.30	/	/	/	/
GSM 850 GPRS (GMSK)	Measured Power (dBm)				calculation	Averaged Power (dBm)		
	251	190	128			251	190	128
1 Txslot	32.09	32.07	31.86	33.30	-9.03	23.06	23.04	22.83
2 Txslots	**29.77**	**29.72**	**29.48**	**30.50**	**-6.02**	**23.75**	**23.70**	**23.46**
3Txslots	27.73	27.65	27.35	28.50	-4.26	23.47	23.39	23.09
4 Txslots	26.39	26.27	25.90	27.50	-3.01	23.38	23.26	22.89
GSM 850 EGPRS (GMSK)	Measured Power (dBm)				calculation	Averaged Power (dBm)		
	251	190	128			251	190	128
1 Txslot	32.04	31.99	31.78	33.30	-9.03	23.01	22.96	22.75
2 Txslots	29.71	29.64	29.40	30.50	-6.02	23.69	23.62	23.38
3Txslots	27.68	27.58	27.28	28.50	-4.26	23.42	23.32	23.02
4 Txslots	26.33	26.19	25.83	27.50	-3.01	23.32	23.18	22.82
GSM 850 EGPRS (8PSK)	Measured Power (dBm)				calculation	Averaged Power (dBm)		
	251	190	128			251	190	128
1 Txslot	25.61	25.62	25.50	26.80	-9.03	16.58	16.59	16.47
2 Txslots	23.60	23.72	23.63	25.50	-6.02	17.58	17.70	17.61
3Txslots	22.35	22.49	22.56	24.00	-4.26	18.09	18.23	18.30
4 Txslots	20.62	20.87	20.76	22.50	-3.01	17.61	17.86	17.75
PCS1900 Speech (GMSK)	Measured Power (dBm)			Tune up	calculation	Averaged Power (dBm)		
	810	661	512			810	661	512
1 Txslot	28.93	29.02	29.16	29.50	/	/	/	/
PCS1900 GPRS (GMSK)	Measured Power (dBm)				calculation	Averaged Power (dBm)		
	810	661	512			810	661	512
1 Txslot	28.80	28.87	29.01	29.50	-9.03	19.77	19.84	19.98
2 Txslots	**27.10**	**27.11**	**27.25**	**27.80**	**-6.02**	**21.08**	**21.09**	**21.23**

3Txslots	24.69	24.67	24.76	25.30	-4.26	20.43	20.41	20.50
4 Txslots	23.64	23.62	23.73	24.30	-3.01	20.63	20.61	20.72
PCS1900 EGPRS (GMSK)	Measured Power (dBm)				calculation	Averaged Power (dBm)		
	810	661	512			810	661	512
1 Txslot	28.81	28.87	29.01	29.50	-9.03	19.78	19.84	19.98
2 Txslots	27.11	27.11	27.25	27.80	-6.02	21.09	21.09	21.23
3Txslots	24.70	24.67	24.76	25.30	-4.26	20.44	20.41	20.50
4 Txslots	23.65	23.62	23.73	24.30	-3.01	20.64	20.61	20.72
PCS1900 EGPRS (8PSK)	Measured Power (dBm)				calculation	Averaged Power (dBm)		
	810	661	512			810	661	512
1 Txslot	25.34	25.18	25.23	25.80	-9.03	16.31	16.15	16.20
2 Txslots	23.18	23.03	23.30	23.80	-6.02	17.16	17.01	17.28
3Txslots	21.92	21.98	21.90	22.50	-4.26	17.66	17.72	17.64
4 Txslots	20.86	20.64	20.67	21.30	-3.01	17.85	17.63	17.66

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 2Txslots for GSM850 and GSM1900.

Low Power

Table 11.1-2: The conducted power measurement results for GSM, GPRS and EGPRS

PCS1900	Measured Power (dBm)				calculation	Averaged Power (dBm)		
GPRS (GMSK)	810	661	512			810	661	512
1 Txslot	26.89	26.89	27.00	27.50	-9.03	17.86	17.86	17.97
2 Txslots	24.70	24.66	24.75	25.30	-6.02	18.68	18.64	18.73
3Txslots	**22.97**	**22.91**	**23.01**	**23.80**	**-4.26**	**18.71**	**18.65**	**18.75**
4 Txslots	21.61	21.60	21.72	22.30	-3.01	18.60	18.59	18.71
PCS1900	Measured Power (dBm)				calculation	Averaged Power (dBm)		
EGPRS (GMSK)	810	661	512			810	661	512
1 Txslot	26.97	26.97	27.09	27.50	-9.03	17.94	17.94	18.06
2 Txslots	24.77	24.73	24.83	25.30	-6.02	18.75	18.71	18.81
3Txslots	23.03	22.98	23.10	23.80	-4.26	18.77	18.72	18.84
4 Txslots	21.67	21.66	21.81	22.30	-3.01	18.66	18.65	18.80
PCS1900	Measured Power (dBm)				calculation	Averaged Power (dBm)		
EGPRS (8PSK)	810	661	512			810	661	512
1 Txslot	23.35	23.29	23.19	24.00	-9.03	14.32	14.26	14.16
2 Txslots	21.18	20.80	20.79	21.80	-6.02	15.16	14.78	14.77
3Txslots	19.55	19.31	19.49	20.00	-4.26	15.29	15.05	15.23
4 Txslots	18.07	17.87	17.91	18.50	-3.01	15.06	14.86	14.90

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 3Txslots for GSM1900.

11.2. WCDMA Measurement result

Normal power

Table 11.2-1: The conducted Power for WCDMA

Item	band	FDDV result			
	ARFCN	4233 (846.6MHz)	4182 (836.4MHz)	4132 (8246.4MHz)	Tune up
WCDMA	\	23.18	23.22	23.20	24.00
HSUPA	1	20.13	20.19	20.18	21.00
	2	20.09	20.16	20.17	21.00
	3	21.07	21.16	21.17	22.00
	4	19.59	19.67	19.69	20.80
	5	21.06	21.14	21.16	22.00
DC-HSDPA	1	22.06	22.14	22.12	23.00
	2	22.07	22.08	22.11	23.00
	3	21.52	21.64	21.61	22.50
	4	21.51	21.59	21.57	22.50
Item	band	FDDIV result			
	ARFCN	1513 (1752.6MHz)	1412 (1732.4MHz)	1312 (1712.4MHz)	
WCDMA	\	22.78	22.66	22.58	23.50
HSUPA	1	19.87	19.81	19.77	20.80
	2	19.86	19.80	19.75	20.80
	3	20.86	20.83	20.74	21.80
	4	19.36	19.33	19.28	20.30
	5	20.84	20.81	20.75	21.80
DC-HSDPA	1	21.86	21.83	21.78	22.80
	2	21.78	21.78	21.72	22.80
	3	21.31	21.30	21.27	22.30
	4	21.36	21.35	21.30	22.30
Item	band	FDDII result			
	ARFCN	9538 (1907.6MHz)	9400 (1880MHz)	9262 (1852.4MHz)	
WCDMA	\	22.86	22.80	22.79	23.50
HSUPA	1	19.86	19.79	19.82	20.80
	2	19.82	19.78	19.76	20.80
	3	20.8	20.74	20.76	21.80
	4	19.34	19.27	19.29	20.30
	5	20.75	20.71	20.74	21.80
DC-HSDPA	1	21.78	21.79	21.80	22.80
	2	21.73	21.76	21.77	22.80
	3	21.31	21.37	21.36	22.30
	4	21.35	21.40	21.43	22.30

Low power

Table 11.2-2: The conducted Power for WCDMA

Item	band	FDDIV result			
	ARFCN	1513 (1752.6MHz)	1412 (1732.4MHz)	1312 (1712.4MHz)	
WCDMA	\	19.75	19.70	19.69	20.50
HSUPA	1	17.92	17.84	17.77	18.80
	2	17.95	17.86	17.81	18.80
	3	18.91	18.83	18.74	19.80
	4	17.42	17.39	17.32	18.30
	5	18.94	18.86	18.80	19.80
DC-HSDPA	1	18.92	18.90	18.88	19.80
	2	18.9	18.83	18.85	19.80
	3	18.36	18.21	18.19	19.30
	4	18.33	18.18	18.23	19.30
Item	band	FDDII result			
	ARFCN	9538 (1907.6MHz)	9400 (1880MHz)	9262 (1852.4MHz)	
WCDMA	\	19.27	19.18	19.18	20.00
HSUPA	1	17.38	17.36	17.37	18.30
	2	17.35	17.30	17.29	18.30
	3	18.37	18.32	18.35	19.30
	4	16.91	16.87	16.83	17.80
	5	18.38	18.33	18.32	19.30
DC-HSDPA	1	18.48	18.43	18.51	19.30
	2	18.44	18.40	18.48	19.30
	3	17.79	17.89	17.86	18.80
	4	17.84	17.83	17.85	18.80

11.3. LTE Measurement result

Table 13.3-1: Maximum Power Reduction (MPR) for LTE

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]						MPR (dB)
	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	2

Table 13.3-2: Maximum Power Reduction (MPR) for LTE Band7/41 on Low power

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]						MPR (dB)
	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	0
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	0
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	0

Table 13.3-3: The tune up for LTE – Normal Power

Band	Tune up
LTE Band 2	23.3
LTE Band 5	23.3
LTE Band 12	23.3
LTE Band 13	23.3
LTE Band 66	23.3

Table 13.3-4: The tune up for LTE – Low Power

Band	Tune up
LTE Band 2	19.8
LTE Band 66	20.3

Normal power

Table 11.3-1: The conducted Power for LTE

Band 2				
Bandwidth (MHz)	RB allocation	Frequency (MHz)	QPSK	16QAM
	RB offset (Start RB)		Actual output power (dBm)	Actual output power (dBm)
1.4 MHz	1RB High (5)	1909.3	22.36	21.39
		1880	22.30	21.32
		1850.7	22.39	21.75
	1RB Middle (3)	1909.3	22.59	21.54
		1880	22.46	21.46
		1850.7	22.53	21.90
	1RB Low (0)	1909.3	22.35	21.38
		1880	22.26	21.32
		1850.7	22.38	21.74
	3RB High (3)	1909.3	22.46	21.60
		1880	22.35	21.36
		1850.7	22.46	21.68
	3RB Middle (1)	1909.3	22.49	21.65
		1880	22.38	21.39
		1850.7	22.54	21.69
	3RB Low (0)	1909.3	22.40	21.60
		1880	22.31	21.34
		1850.7	22.48	21.68
	6RB (0)	1909.3	21.51	20.62
		1880	21.34	20.47
		1850.7	21.49	20.34
3 MHz	1RB High (14)	1908.5	22.39	21.39
		1880	22.31	21.18
		1851.5	22.44	21.79
	1RB Middle (7)	1908.5	22.57	21.58
		1880	22.46	21.34
		1851.5	22.58	21.91
	1RB Low (0)	1908.5	22.51	21.48
		1880	22.27	21.23
		1851.5	22.41	21.77
	8RB High (7)	1908.5	21.47	20.46
		1880	21.31	20.45
		1851.5	21.37	20.54
	8RB Middle (4)	1908.5	21.53	20.52
		1880	21.37	20.50
		1851.5	21.46	20.57
	8RB Low (0)	1908.5	21.54	20.56
		1880	21.37	20.46
		1851.5	21.43	20.54
	15RB (0)	1908.5	21.53	20.42
		1880	21.34	20.38
		1851.5	21.41	20.45

5 MHz	1RB High (24)	1907.5	22.35	21.38
		1880	22.28	21.42
		1852.5	22.28	21.83
	1RB Middle (12)	1907.5	22.65	21.70
		1880	22.51	21.62
		1852.5	22.55	22.07
	1RB Low (0)	1907.5	22.41	21.42
		1880	22.28	21.35
		1852.5	22.29	21.79
	12RB High (13)	1907.5	21.28	20.34
		1880	21.22	20.30
		1852.5	21.52	20.52
	12RB Middle (6)	1907.5	21.51	20.56
		1880	21.35	20.43
		1852.5	21.47	20.61
	12RB Low (0)	1907.5	21.50	20.49
		1880	21.28	20.38
		1852.5	21.40	20.55
	25RB (0)	1907.5	21.41	20.37
		1880	21.27	20.33
		1852.5	21.40	20.47
10 MHz	1RB High (49)	1905	22.35	21.33
		1880	22.23	21.20
		1855	22.33	21.66
	1RB Middle (24)	1905	22.62	21.49
		1880	22.35	21.28
		1855	22.55	21.80
	1RB Low (0)	1905	22.36	21.37
		1880	22.23	21.12
		1855	22.39	21.72
	25RB High (25)	1905	21.27	20.36
		1880	21.20	20.27
		1855	21.48	20.50
	25RB Middle (12)	1905	21.46	20.55
		1880	21.31	20.36
		1855	21.43	20.50
	25RB Low (0)	1905	21.42	20.51
		1880	21.34	20.36
		1855	21.32	20.46
	50RB (0)	1905	21.35	20.38
		1880	21.29	20.31
		1855	21.39	20.44
15 MHz	1RB High (74)	1902.5	22.31	21.59
		1880	22.20	21.63
		1857.5	22.23	21.17
	1RB Middle (37)	1902.5	22.44	21.73
		1880	22.29	21.64
		1857.5	22.30	21.25

	1RB Low (0)	1902.5	22.37	21.72
		1880	22.21	21.50
		1857.5	22.25	21.22
	36RB High (38)	1902.5	21.46	20.42
		1880	21.25	20.21
		1857.5	21.39	20.37
	36RB Middle (19)	1902.5	21.54	20.52
		1880	21.34	20.28
		1857.5	21.39	20.40
	36RB Low (0)	1902.5	21.45	20.44
		1880	21.36	20.30
		1857.5	21.34	20.34
	75RB (0)	1902.5	21.41	20.44
		1880	21.32	20.28
		1857.5	21.40	20.40
20 MHz	1RB High (99)	1900	22.11	21.50
		1880	22.04	21.46
		1860	22.03	21.54
	1RB Middle (50)	1900	22.61	21.95
		1880	22.43	21.74
		1860	22.46	21.97
	1RB Low (0)	1900	22.08	21.57
		1880	22.08	21.34
		1860	22.13	21.63
	50RB High (50)	1900	21.31	20.33
		1880	21.19	20.17
		1860	21.36	20.43
	50RB Middle (25)	1900	21.42	20.44
		1880	21.31	20.30
		1860	21.37	20.38
	50RB Low (0)	1900	21.38	20.42
		1880	21.33	20.32
		1860	21.31	20.35
	100RB (0)	1900	21.35	20.37
		1880	21.26	20.31
		1860	21.33	20.39

Band 5				
Bandwidth (MHz)	RB allocation RB offset (Start RB)	Frequency (MHz)	QPSK Actual output power (dBm)	16QAM Actual output power (dBm)
1.4 MHz	1RB High (5)	848.3	22.66	21.49
		836.5	22.67	21.53
		824.7	22.58	21.52
	1RB Middle (3)	848.3	22.67	21.50
		836.5	22.67	21.54
		824.7	22.60	21.52
	1RB Low (0)	848.3	22.71	21.53
		836.5	22.70	21.59
		824.7	22.61	21.55
	3RB High (3)	848.3	22.73	21.96
		836.5	22.75	22.00
		824.7	22.52	21.95
	3RB Middle (1)	848.3	22.74	21.94
		836.5	22.74	22.02
		824.7	22.67	21.97
	3RB Low (0)	848.3	22.73	21.97
		836.5	22.75	22.03
		824.7	22.67	21.98
	6RB (0)	848.3	21.72	20.74
		836.5	21.72	20.79
		824.7	21.62	20.71
3 MHz	1RB High (14)	847.5	22.66	21.65
		836.5	22.66	21.83
		825.5	22.68	21.56
	1RB Middle (7)	847.5	22.84	21.61
		836.5	22.60	21.88
		825.5	22.66	21.57
	1RB Low (0)	847.5	22.71	21.65
		836.5	22.67	21.89
		825.5	22.67	21.61
	8RB High (7)	847.5	21.80	20.72
		836.5	21.79	20.68
		825.5	21.76	20.82
	8RB Middle (4)	847.5	21.76	20.70
		836.5	21.76	20.74
		825.5	21.75	20.84
	8RB Low (0)	847.5	21.77	20.72
		836.5	21.79	20.75
		825.5	21.79	20.86
	15RB (0)	847.5	21.74	20.61
		836.5	21.74	20.73
		825.5	21.74	20.79
5 MHz	1RB High (24)	846.5	22.58	21.64
		836.5	22.71	21.75
		826.5	22.68	22.21

	1RB Middle (12)	846.5	22.81	21.86
		836.5	22.91	21.96
		826.5	22.90	21.93
	1RB Low (0)	846.5	22.58	21.63
		836.5	22.70	21.74
		826.5	22.63	22.14
	12RB High (13)	846.5	21.58	20.62
		836.5	21.72	20.75
		826.5	21.79	20.92
	12RB Middle (6)	846.5	21.71	20.73
		836.5	21.76	20.82
		826.5	21.83	20.99
	12RB Low (0)	846.5	21.62	20.69
		836.5	21.70	20.76
		826.5	21.68	20.83
	25RB (0)	846.5	21.61	20.57
		836.5	21.73	20.76
		826.5	21.74	20.84
10 MHz	1RB High (49)	844	22.63	21.55
		836.5	22.74	22.06
		829	22.71	21.73
	1RB Middle (24)	844	22.68	21.62
		836.5	22.80	22.15
		829	22.78	21.85
	1RB Low (0)	844	22.67	21.61
		836.5	22.75	22.08
		829	22.66	21.74
	25RB High (25)	844	21.60	20.66
		836.5	21.77	20.80
		829	21.75	20.87
	25RB Middle (12)	844	21.66	20.71
		836.5	21.73	20.78
		829	21.79	20.92
	25RB Low (0)	844	21.63	20.69
		836.5	21.80	20.82
		829	21.73	20.83
	50RB (0)	844	21.66	20.64
		836.5	21.79	20.83
		829	21.73	20.77

Band 12				
Bandwidth (MHz)	RB allocation RB offset (Start RB)	Frequency (MHz)	QPSK Actual output power (dBm)	16QAM Actual output power (dBm)
1.4 MHz	1RB High (5)	715.3	22.45	21.46
		707.5	22.48	21.51
		699.7	22.49	21.77
	1RB Middle (3)	715.3	22.59	21.66
		707.5	22.66	21.70
		699.7	22.67	21.93
	1RB Low (0)	715.3	22.44	21.45
		707.5	22.49	21.51
		699.7	22.46	21.75
	3RB High (3)	715.3	22.56	21.63
		707.5	22.47	21.52
		699.7	22.52	21.65
	3RB Middle (1)	715.3	22.62	21.69
		707.5	22.55	21.57
		699.7	22.53	21.65
	3RB Low (0)	715.3	22.57	21.66
		707.5	22.53	21.51
		699.7	22.49	21.62
	6RB (0)	715.3	21.57	20.78
		707.5	21.56	20.68
		699.7	21.50	20.43
3 MHz	1RB High (14)	714.5	22.49	21.42
		707.5	22.50	21.38
		700.5	22.55	21.83
	1RB Middle (7)	714.5	22.63	21.65
		707.5	22.60	21.53
		700.5	22.64	21.95
	1RB Low (0)	714.5	22.54	21.57
		707.5	22.45	21.39
		700.5	22.46	21.82
	8RB High (7)	714.5	21.52	20.59
		707.5	21.49	20.63
		700.5	21.47	20.56
	8RB Middle (4)	714.5	21.61	20.65
		707.5	21.56	20.68
		700.5	21.53	20.62
	8RB Low (0)	714.5	21.55	20.60
		707.5	21.49	20.63
		700.5	21.47	20.59
	15RB (0)	714.5	21.50	20.51
		707.5	21.46	20.52
		700.5	21.44	20.54
5 MHz	1RB High (24)	713.5	22.38	21.48
		707.5	22.43	21.56
		701.5	22.42	21.90

	1RB Middle (12)	713.5	22.65	21.71
		707.5	22.57	21.77
		701.5	22.60	22.09
	1RB Low (0)	713.5	22.42	21.52
		707.5	22.37	21.51
		701.5	22.35	21.80
	12RB High (13)	713.5	21.46	20.52
		707.5	21.52	20.58
		701.5	21.46	20.59
	12RB Middle (6)	713.5	21.55	20.62
		707.5	21.48	20.60
		701.5	21.50	20.68
	12RB Low (0)	713.5	21.44	20.51
		707.5	21.42	20.51
		701.5	21.51	20.69
	25RB (0)	713.5	21.47	20.46
		707.5	21.46	20.53
		701.5	21.43	20.58
10 MHz	1RB High (49)	711	22.60	21.43
		707.5	22.65	21.95
		704	22.58	21.59
	1RB Middle (24)	711	22.71	21.60
		707.5	22.73	22.01
		704	22.67	21.65
	1RB Low (0)	711	22.51	21.43
		707.5	22.57	21.82
		704	22.45	21.48
	25RB High (25)	711	21.58	20.59
		707.5	21.80	20.89
		704	21.75	20.88
	25RB Middle (12)	711	21.64	20.70
		707.5	21.63	20.67
		704	21.61	20.74
	25RB Low (0)	711	21.38	20.45
		707.5	21.51	20.58
		704	21.71	20.88
	50RB (0)	711	21.45	20.49
		707.5	21.72	20.80
		704	21.74	20.83

Band 13				
Bandwidth (MHz)	RB allocation RB offset (Start RB)	Frequency (MHz)	QPSK Actual output power (dBm)	16QAM Actual output power (dBm)
5 MHz	1RB High (24)	784.5	22.61	21.74
		782	22.63	21.78
		779.5	22.61	22.14
	1RB Middle (12)	784.5	22.85	21.99
		782	22.93	22.08
		779.5	22.72	22.22
	1RB Low (0)	784.5	22.60	21.75
		782	22.44	21.55
		779.5	22.48	21.90
	12RB High (13)	784.5	21.70	20.74
		782	21.74	20.81
		779.5	21.67	20.82
	12RB Middle (6)	784.5	21.75	20.84
		782	21.77	20.87
		779.5	21.60	20.77
	12RB Low (0)	784.5	21.72	20.84
		782	21.62	20.74
		779.5	21.41	20.52
	25RB (0)	784.5	21.75	20.75
		782	21.72	20.77
		779.5	21.54	20.68
10 MHz	1RB High (49)	782	22.60	21.65
	1RB Middle (24)	782	22.63	21.67
	1RB Low (0)	782	22.43	21.40
	25RB High (25)	782	21.64	20.76
	25RB Middle (12)	782	21.62	20.79
	25RB Low (0)	782	21.42	20.52
	50RB (0)	782	21.52	20.56

Band 66				
Bandwidth (MHz)	RB allocation RB offset (Start RB)	Frequency (MHz)	QPSK Actual output power (dBm)	16QAM Actual output power (dBm)
1.4 MHz	1RB High (5)	1779.3	22.48	21.53
		1745	22.58	21.69
		1710.7	22.59	21.94
	1RB Middle (3)	1779.3	22.65	21.60
		1745	22.68	21.88
		1710.7	22.71	22.11
	1RB Low (0)	1779.3	22.39	21.48
		1745	22.51	21.68
		1710.7	22.52	21.94
	3RB High (3)	1779.3	22.51	21.67
		1745	22.64	21.70
		1710.7	22.67	21.85
	3RB Middle (1)	1779.3	22.60	21.78
		1745	22.69	21.77
		1710.7	22.70	21.86
	3RB Low (0)	1779.3	22.49	21.70
		1745	22.65	21.71
		1710.7	22.64	21.87
	6RB (0)	1779.3	21.56	20.70
		1745	21.58	20.75
		1710.7	21.60	20.51
3 MHz	1RB High (14)	1778.5	22.48	21.49
		1745	22.63	21.51
		1711.5	22.57	21.93
	1RB Middle (7)	1778.5	22.68	21.65
		1745	22.77	21.69
		1711.5	22.78	22.12
	1RB Low (0)	1778.5	22.51	21.54
		1745	22.52	21.54
		1711.5	22.56	21.94
	8RB High (7)	1778.5	21.47	20.55
		1745	21.56	20.70
		1711.5	21.55	20.66
	8RB Middle (4)	1778.5	21.54	20.63
		1745	21.59	20.79
		1711.5	21.61	20.72
	8RB Low (0)	1778.5	21.52	20.58
		1745	21.58	20.74
		1711.5	21.59	20.72
	15RB (0)	1778.5	21.51	20.52
		1745	21.55	20.66
		1711.5	21.53	20.60
5 MHz	1RB High (24)	1777.5	22.48	21.55
		1745	22.54	22.06

		1712.5	22.53	21.60
	1RB Middle (12)	1777.5	22.72	21.80
		1745	22.76	21.97
		1712.5	22.77	21.83
	1RB Low (0)	1777.5	22.52	21.55
		1745	22.54	22.04
		1712.5	22.58	21.60
	12RB High (13)	1777.5	21.51	20.55
		1745	21.62	20.75
		1712.5	21.63	20.63
	12RB Middle (6)	1777.5	21.55	20.64
		1745	21.64	20.76
		1712.5	21.64	20.65
	12RB Low (0)	1777.5	21.54	20.58
		1745	21.60	20.75
		1712.5	21.53	20.56
	25RB (0)	1777.5	21.51	20.56
		1745	21.62	20.69
		1712.5	21.56	20.54
10 MHz	1RB High (49)	1775	22.41	21.37
		1745	22.59	21.97
		1715	22.54	21.53
	1RB Middle (24)	1775	22.56	21.47
		1745	22.72	22.05
		1715	22.64	21.62
	1RB Low (0)	1775	22.46	21.34
		1745	22.62	21.95
		1715	22.54	21.62
	25RB High (25)	1775	21.53	20.56
		1745	21.68	20.73
		1715	21.62	20.73
	25RB Middle (12)	1775	21.52	20.55
		1745	21.65	20.71
		1715	21.62	20.70
	25RB Low (0)	1775	21.57	20.60
		1745	21.66	20.70
		1715	21.57	20.69
	50RB (0)	1775	21.54	20.57
		1745	21.67	20.70
		1715	21.66	20.72
15 MHz	1RB High (74)	1772.5	22.44	21.74
		1745	22.50	21.91
		1717.5	22.43	21.33
	1RB Middle (37)	1772.5	22.55	21.86
		1745	22.64	22.06
		1717.5	22.57	21.48
	1RB Low (0)	1772.5	22.51	21.82
		1745	22.54	21.94

		1717.5	22.48	21.42
	36RB High (38)	1772.5	21.56	20.56
		1745	21.68	20.61
		1717.5	21.59	20.52
	36RB Middle (19)	1772.5	21.56	20.56
		1745	21.64	20.61
		1717.5	21.63	20.58
	36RB Low (0)	1772.5	21.59	20.56
		1745	21.65	20.57
		1717.5	21.56	20.52
	75RB (0)	1772.5	21.54	20.56
		1745	21.65	20.65
		1717.5	21.58	20.57
20 MHz	1RB High (99)	1770	22.09	21.58
		1745	22.16	21.64
		1720	22.21	21.71
	1RB Middle (50)	1770	22.49	21.95
		1745	22.55	22.04
		1720	22.62	22.10
	1RB Low (0)	1770	22.11	21.63
		1745	22.19	21.58
		1720	22.20	21.71
	50RB High (50)	1770	21.28	20.33
		1745	21.53	20.55
		1720	21.31	20.40
	50RB Middle (25)	1770	21.37	20.43
		1745	21.53	20.53
		1720	21.42	20.46
	50RB Low (0)	1770	21.35	20.38
		1745	21.55	20.56
		1720	21.32	20.36
	100RB (0)	1770	21.28	20.34
		1745	21.53	20.58
		1720	21.32	20.38

Low power

Table 11.3-2: The conducted Power for LTE

Band 2				
Bandwidth (MHz)	RB allocation	Frequency (MHz)	QPSK	16QAM
	RB offset (Start RB)		Actual output power (dBm)	Actual output power (dBm)
1.4 MHz	1RB High (5)	1909.3	18.90	19.03
		1880	18.81	18.97
		1850.7	18.96	19.37
	1RB Middle (3)	1909.3	19.04	19.17
		1880	18.97	19.14
		1850.7	19.09	19.51
	1RB Low (0)	1909.3	18.88	18.99
		1880	18.83	18.96
		1850.7	18.98	19.37
	3RB High (3)	1909.3	19.13	19.22
		1880	18.94	18.98
		1850.7	19.05	19.24
	3RB Middle (1)	1909.3	19.16	19.29
		1880	18.98	19.01
		1850.7	19.10	19.32
	3RB Low (0)	1909.3	19.07	19.16
		1880	18.91	18.98
		1850.7	19.08	19.27
	6RB (0)	1909.3	19.02	19.17
		1880	18.92	19.05
		1850.7	18.99	18.92
3 MHz	1RB High (14)	1908.5	18.94	19.03
		1880	18.89	18.83
		1851.5	19.03	19.40
	1RB Middle (7)	1908.5	19.13	19.20
		1880	19.00	19.00
		1851.5	19.09	19.56
	1RB Low (0)	1908.5	19.01	19.14
		1880	18.84	18.86
		1851.5	19.02	19.41
	8RB High (7)	1908.5	18.98	19.08
		1880	18.87	19.00
		1851.5	18.97	19.12
	8RB Middle (4)	1908.5	19.08	19.14
		1880	18.93	19.08
		1851.5	19.04	19.15
	8RB Low (0)	1908.5	19.11	19.15
		1880	18.94	19.03
		1851.5	19.03	19.15
	15RB (0)	1908.5	19.05	19.05
		1880	18.93	18.94
		1851.5	19.00	19.07

5 MHz	1RB High (24)	1907.5	19.01	19.11
		1880	18.83	19.00
		1852.5	18.87	19.41
	1RB Middle (12)	1907.5	19.32	19.37
		1880	19.12	19.23
		1852.5	19.03	19.66
	1RB Low (0)	1907.5	19.04	19.12
		1880	18.87	19.00
		1852.5	18.88	19.43
	12RB High (13)	1907.5	18.93	18.96
		1880	18.81	18.90
		1852.5	18.92	19.09
	12RB Middle (6)	1907.5	19.13	19.21
		1880	18.95	19.01
		1852.5	19.07	19.13
	12RB Low (0)	1907.5	19.12	19.13
		1880	18.89	18.98
		1852.5	18.92	19.10
	25RB (0)	1907.5	19.04	19.01
		1880	18.87	18.92
		1852.5	18.94	19.05
10 MHz	1RB High (49)	1905	18.99	19.04
		1880	18.78	18.83
		1855	18.94	19.29
	1RB Middle (24)	1905	19.15	19.21
		1880	18.96	18.95
		1855	19.18	19.47
	1RB Low (0)	1905	18.98	19.08
		1880	18.82	18.83
		1855	18.96	19.34
	25RB High (25)	1905	18.92	19.04
		1880	18.82	18.88
		1855	18.97	19.09
	25RB Middle (12)	1905	19.11	19.24
		1880	18.94	18.98
		1855	19.02	19.11
	25RB Low (0)	1905	19.08	19.13
		1880	18.93	18.99
		1855	18.95	19.00
	50RB (0)	1905	19.02	19.08
		1880	18.90	18.90
		1855	18.98	19.07
15 MHz	1RB High (74)	1902.5	19.03	19.35
		1880	18.83	19.37
		1857.5	18.74	18.77
	1RB Middle (37)	1902.5	19.14	19.45
		1880	18.94	19.40
		1857.5	18.88	18.91

	1RB Low (0)	1902.5	19.03	19.41
		1880	18.81	19.25
		1857.5	18.81	18.84
	36RB High (38)	1902.5	19.06	19.08
		1880	18.89	18.83
		1857.5	18.97	18.98
	36RB Middle (19)	1902.5	19.18	19.19
		1880	18.95	18.90
		1857.5	19.00	19.00
	36RB Low (0)	1902.5	19.05	19.09
		1880	18.96	18.92
		1857.5	18.95	18.97
	75RB (0)	1902.5	19.07	19.10
		1880	18.92	18.91
		1857.5	19.00	19.01
20 MHz	1RB High (99)	1900	18.69	19.17
		1880	18.55	19.03
		1860	18.60	19.13
	1RB Middle (50)	1900	19.10	19.59
		1880	18.93	19.29
		1860	18.95	19.52
	1RB Low (0)	1900	18.64	19.18
		1880	18.47	18.95
		1860	18.66	19.20
	50RB High (50)	1900	18.90	18.92
		1880	18.71	18.76
		1860	18.92	19.00
	50RB Middle (25)	1900	18.98	19.05
		1880	18.88	18.87
		1860	18.90	18.97
	50RB Low (0)	1900	18.92	19.01
		1880	18.88	18.91
		1860	18.84	18.93
	100RB (0)	1900	18.89	18.93
		1880	18.83	18.89
		1860	18.89	18.94

Band 66				
Bandwidth (MHz)	RB allocation RB offset (Start RB)	Frequency (MHz)	QPSK Actual output power (dBm)	16QAM Actual output power (dBm)
1.4 MHz	1RB High (5)	1779.3	19.51	19.66
		1745	19.62	20.02
		1710.7	19.56	19.70
	1RB Middle (3)	1779.3	19.67	19.86
		1745	19.78	20.20
		1710.7	19.75	19.82
	1RB Low (0)	1779.3	19.52	19.67
		1745	19.59	20.05
		1710.7	19.54	19.70
	3RB High (3)	1779.3	19.62	19.68
		1745	19.72	19.96
		1710.7	19.79	19.95
	3RB Middle (1)	1779.3	19.65	19.73
		1745	19.76	19.96
		1710.7	19.79	19.98
	3RB Low (0)	1779.3	19.60	19.66
		1745	19.72	19.99
		1710.7	19.71	19.90
	6RB (0)	1779.3	19.58	19.70
		1745	19.65	19.57
		1710.7	19.68	19.86
3 MHz	1RB High (14)	1778.5	19.55	19.47
		1745	19.65	20.06
		1711.5	19.57	19.65
	1RB Middle (7)	1778.5	19.64	19.64
		1745	19.82	20.19
		1711.5	19.72	19.85
	1RB Low (0)	1778.5	19.48	19.51
		1745	19.67	20.03
		1711.5	19.60	19.73
	8RB High (7)	1778.5	19.52	19.68
		1745	19.60	19.76
		1711.5	19.61	19.69
	8RB Middle (4)	1778.5	19.60	19.73
		1745	19.63	19.79
		1711.5	19.64	19.74
	8RB Low (0)	1778.5	19.60	19.71
		1745	19.62	19.75
		1711.5	19.64	19.67
	15RB (0)	1778.5	19.56	19.62
		1745	19.63	19.69
		1711.5	19.61	19.63
5 MHz	1RB High (24)	1777.5	19.48	19.63
		1745	19.54	20.10

		1712.5	19.56	19.71
	1RB Middle (12)	1777.5	19.73	19.87
		1745	19.79	20.17
		1712.5	19.81	19.91
	1RB Low (0)	1777.5	19.54	19.66
		1745	19.57	20.11
		1712.5	19.61	19.69
	12RB High (13)	1777.5	19.44	19.55
		1745	19.55	19.83
		1712.5	19.61	19.68
	12RB Middle (6)	1777.5	19.60	19.66
		1745	19.65	19.87
		1712.5	19.70	19.73
	12RB Low (0)	1777.5	19.50	19.57
		1745	19.60	19.82
		1712.5	19.55	19.61
	25RB (0)	1777.5	19.49	19.53
		1745	19.60	19.76
		1712.5	19.59	19.58
10 MHz	1RB High (49)	1775	19.45	19.56
		1745	19.60	20.04
		1715	19.58	19.68
	1RB Middle (24)	1775	19.59	19.57
		1745	19.75	20.09
		1715	19.67	19.75
	1RB Low (0)	1775	19.47	19.44
		1745	19.64	20.05
		1715	19.58	19.69
	25RB High (25)	1775	19.50	19.51
		1745	19.63	19.80
		1715	19.70	19.84
	25RB Middle (12)	1775	19.55	19.61
		1745	19.68	19.79
		1715	19.68	19.77
	25RB Low (0)	1775	19.58	19.60
		1745	19.62	19.77
		1715	19.55	19.68
	50RB (0)	1775	19.51	19.54
		1745	19.65	19.80
		1715	19.65	19.71
15 MHz	1RB High (74)	1772.5	19.37	19.11
		1745	19.56	19.91
		1717.5	19.49	19.99
	1RB Middle (37)	1772.5	19.47	19.49
		1745	19.68	20.07
		1717.5	19.65	20.09
	1RB Low (0)	1772.5	19.43	19.42
		1745	19.58	20.01

		1717.5	19.57	20.06
	36RB High (38)	1772.5	19.50	19.50
		1745	19.65	19.76
		1717.5	19.54	19.56
	36RB Middle (19)	1772.5	19.59	19.58
		1745	19.65	19.74
		1717.5	19.67	19.63
	36RB Low (0)	1772.5	19.55	19.55
		1745	19.62	19.75
		1717.5	19.59	19.55
	75RB (0)	1772.5	19.50	19.57
		1745	19.64	19.73
		1717.5	19.60	19.58
20 MHz	1RB High (99)	1770	19.14	19.71
		1745	19.19	19.71
		1720	19.25	19.82
	1RB Middle (50)	1770	19.52	20.06
		1745	19.60	19.97
		1720	19.58	20.17
	1RB Low (0)	1770	19.13	19.74
		1745	19.18	19.69
		1720	19.27	19.82
	50RB High (50)	1770	19.29	19.37
		1745	19.54	19.60
		1720	19.39	19.47
	50RB Middle (25)	1770	19.42	19.49
		1745	19.57	19.56
		1720	19.46	19.55
	50RB Low (0)	1770	19.40	19.44
		1745	19.59	19.60
		1720	19.38	19.44
	100RB (0)	1770	19.33	19.42
		1745	19.59	19.63
		1720	19.33	19.41

11.4. Wi-Fi and BT Measurement result

The maximum output power of BT antenna is 9.97dBm.
The maximum tune up of BT antenna is 10.5dBm.

The average conducted power for Wi-Fi is as following:

802.11b(dBm)								
Channel\data rate	1Mbps	2Mbps	5.5Mbps	11Mbps				
11(2462MHz)	16.23	/	16.32	/				
6(2437MHz)	15.90	/	16.02	/				
1(2412MHz)	16.31	16.22	16.36	16.08				
Tune up	16.80	16.80	16.80	16.80				
802.11g(dBm)								
Channel\data rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
11(2462MHz)	13.80	/	/	/	/	/	/	13.92
6(2437MHz)	13.55	/	/	/	/	/	/	13.71
1(2412MHz)	13.85	13.84	13.82	13.83	13.81	13.62	13.99	14.01
Tune up	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50
802.11n(dBm)-20MHz								
Channel\data rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
11(2462MHz)	12.60	/	/	/	/	/	/	12.97
6(2437MHz)	12.62	/	/	/	/	/	/	12.76
1(2412MHz)	12.63	12.59	12.58	12.61	12.62	12.94	12.97	12.98
Tune up	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50
802.11n(dBm)-40MHz								
Channel\data rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
9(2452MHz)	9.55	9.31	9.30	9.52	9.26	9.71	9.69	9.70
6(2437MHz)	9.18	/	/	/	/	9.20	/	/
3(2422MHz)	9.48	/	/	/	/	9.44	/	/
Tune up	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30

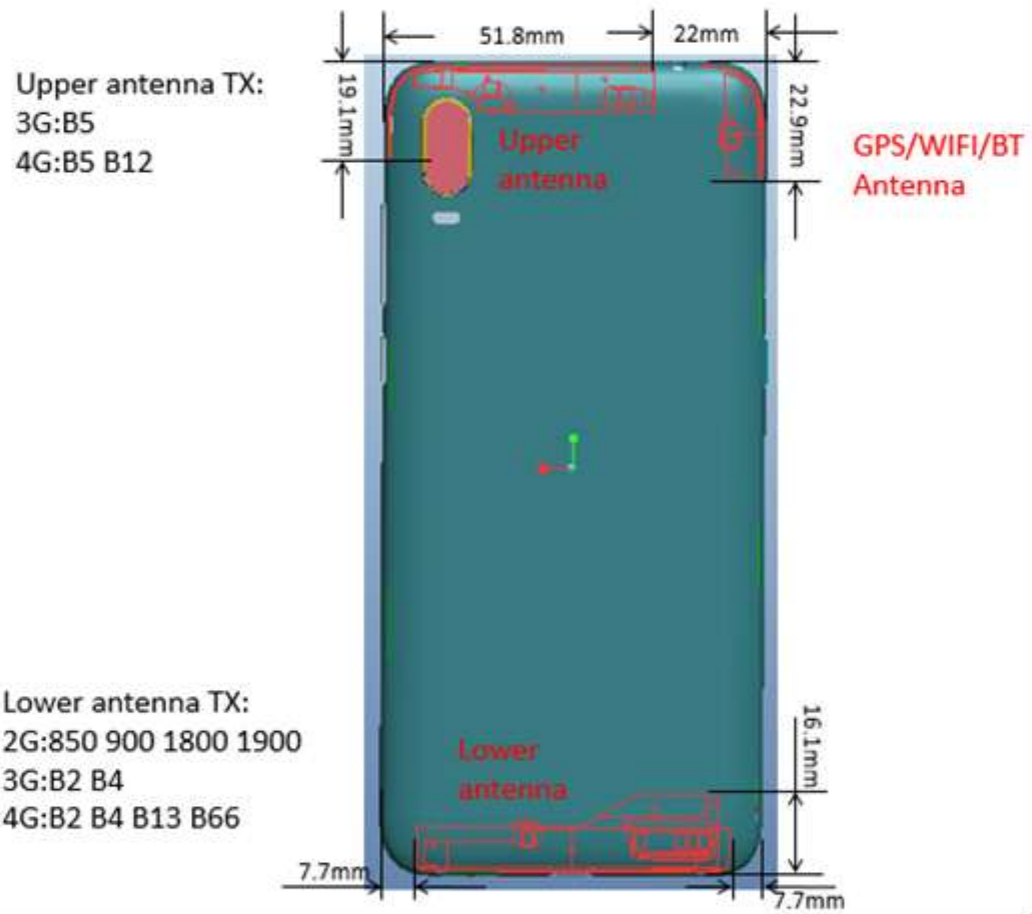
12. Simultaneous TX SAR Considerations

12.1. Introduction

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.

For this device, the BT and Wi-Fi can transmit simultaneous with other transmitters.

12.2. Transmit Antenna Separation Distances



Picture 12.1 Antenna Locations

12.3. SAR Measurement Positions

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

SAR measurement positions						
Mode	Front	Rear	Left edge	Right edge	Top edge	Bottom edge
Upper antenna	Yes	Yes	Yes	Yes	Yes	No
Lower antenna	Yes	Yes	Yes	Yes	No	Yes
WIFI antenna	Yes	Yes	No	Yes	Yes	No

12.4. Standalone SAR Test Exclusion Considerations

Standalone 1-g head or body SAR evaluation by measurement or numerical simulation 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:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR, where

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

Table 12.1: Standalone SAR test exclusion considerations

Band/Mode	F(GHz)	Position	SAR test exclusion threshold(mW)	RF output power		SAR test exclusion
				dBm	mW	
Bluetooth	2.441	Head	9.60	10.5	11.2	No
		Body	19.20	10.5	11.2	Yes
2.4GHz WLAN	2.45	Head	9.58	16.8	48	No
		Body	19.17	16.8	48	No

13. Evaluation of Simultaneous

Table 13.1: The sum of reported SAR values for cellular antenna and WiFi

	Position	Band	Cellular antenna	WiFi	Sum
Highest reported SAR value for Head	Right hand, Touch cheek	LTE B5	1.15	0.32	**1.47**
Highest reported SAR value for Body	Bottom 10mm	LTE B66	1.28	/	**1.28**

Note1: we have evaluated and chose the highest value of WiFi 2.4G and 5G in the above table.
Note2: we have evaluated and chose the highest value of body 10mm and 15mm in the above table.

Table 13.2: The sum of reported SAR values for cellular antenna and BT

	Position	Band	Cellular antenna	BT	Sum
Maximum reported SAR value for Head	Right hand, Touch cheek	LTE B5	1.15	<0.01[1]	**1.15**
Maximum reported SAR value for Body	Rear 10mm	LTE B2	1.09	0.23[2]	**1.32**

[1] – The head SAR of BT is too low to get it, so the "<0.01" is used to indicate the head SAR of BT.
[2] - Estimated SAR for Bluetooth (see the table 13.3)

Table 13.3: Estimated SAR for Bluetooth

Mode/Band	F (GHz)	Position	Distance (mm)	Upper limit of power *		Estimated$_{1g}$ (W/kg)
				dBm	mW	
Bluetooth	2.441	Body	10	10.5	11.2	0.23
Bluetooth	2.441	Body	15	10.5	11.2	0.16

* - Maximum possible output power declared by manufacturer

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:
(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance,mm)]·[√f(GHz)/x] W/kg for test separation distances ≤ 50 mm;
where x = 7.5 for 1-g SAR.
When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

Conclusion:
According to the above tables, the sum of reported SAR values is<1.6W/kg. So the simultaneous transmission SAR with volume scans is not required.

14. SAR Test Result

It is determined by user manual for the distance between the EUT and the phantom bottom.
The distance is 10 mm or 15mm and just applied to the condition of body worn accessory.

It is performed for all SAR measurements with area scan based 1-g SAR estimation (Fast SAR). A zoom scan measurement is added when the estimated 1-gSAR is the highest measured SAR in each exposure configuration, wireless mode and frequency band combination or more than 1.2W/kg.

The calculated SAR is obtained by the following formula:

$$\text{Reported SAR} = \text{Measured SAR} \times 10^{(P_{\text{Target}} - P_{\text{Measured}})/10}$$

Where P_{Target} is the power of manufacturing upper limit;
$P_{Measured}$ is the measured power in chapter 11.

Table 14.1: Duty Cycle

Mode	Duty Cycle
GSM850	1:4
GSM1900-Normal Power	1:4
GSM1900-Low Power	1:2.67
WCDMA&LTE FDD	1:1

Table 14.2: Testing Environment

Temperature:	18°C~25°C
Relative humidity:	30%~70%
Ground system resistance:	<4Ω
Ambient noise & Reflection:	< 0.012 W/kg

14.1. SAR results for Fast SAR

Table 14.1-1: SAR Values (GSM 850 MHz Band - Head)

Ambient Temperature: 22.9 °C		Liquid Temperature: 22.5°C									
Frequency		Side	Test Position	Figure No./Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
190	836.6	Left	Touch	/	32.11	33.30	0.176	**0.23**	0.215	**0.28**	0.03
190	836.6	Left	Tilt	/	32.11	33.30	0.111	**0.15**	0.134	**0.18**	-0.04
251	848.8	Right	Touch	/	32.10	33.30	0.156	**0.21**	0.199	**0.26**	0.07
190	836.6	Right	Touch	/	32.11	33.30	0.190	**0.25**	0.249	**0.33**	0.07
128	824.2	Right	Touch	Fig.1	32.09	33.30	0.196	**0.26**	0.252	**0.33**	0.11
190	836.6	Right	Tilt	/	32.11	33.30	0.094	**0.12**	0.116	**0.15**	-0.07

Table 14.1-2: SAR Values (GSM 850 MHz Band - Body)

Ambient Temperature: 22.9 °C		Liquid Temperature: 22.5°C									
Frequency		Mode (number of timeslots)	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
190	836.6	GPRS (2)	Front	/	29.72	30.50	0.138	**0.17**	0.181	**0.22**	0.11
251	848.8	GPRS (2)	Rear	/	29.77	30.50	0.187	**0.22**	0.338	**0.40**	-0.02
190	836.6	GPRS (2)	Rear	Fig.2	29.72	30.50	0.219	**0.26**	0.399	**0.48**	-0.08
128	824.2	GPRS (2)	Rear	/	29.48	30.50	0.200	**0.25**	0.354	**0.45**	0.05
190	836.6	GPRS (2)	Left	/	29.72	30.50	0.075	**0.09**	0.108	**0.13**	-0.10
190	836.6	GPRS (2)	Right	/	29.72	30.50	0.131	**0.16**	0.186	**0.22**	-0.13
190	836.6	GPRS (2)	Bottom	/	29.72	30.50	0.081	**0.10**	0.145	**0.17**	0.08
190	836.6	EGPRS (2)	Rear	/	29.64	30.50	0.201	**0.25**	0.373	**0.45**	0.05

Note: The distance between the EUT and the phantom bottom is 10mm.

Table 14.1-3: SAR Values (GSM 1900 MHz Band - Head)

Ambient Temperature: 22.9 °C		Liquid Temperature: 22.5°C									
Frequency		Side	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
661	1880	Left	Touch	/	29.02	29.50	0.019	**0.02**	0.029	**0.03**	0.03
661	1880	Left	Tilt	/	29.02	29.50	0.018	**0.02**	0.027	**0.03**	-0.03
810	1909.8	Right	Touch	/	28.93	29.50	0.018	**0.02**	0.029	**0.03**	0.05
661	1880	Right	Touch	Fig.3	29.02	29.50	0.025	**0.03**	0.039	**0.04**	0.12
512	1850.2	Right	Touch	/	29.16	29.50	0.019	**0.02**	0.031	**0.03**	0.14
661	1880	Right	Tilt	/	29.02	29.50	0.016	**0.02**	0.026	**0.03**	-0.12

Table 14.1-4: SAR Values (GSM 1900 MHz Band - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Mode (number of timeslots)	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
661	1880	GPRS (3)	Front	/	22.91	23.80	0.198	**0.24**	0.372	**0.46**	-0.05
661	1880	GPRS (3)	Rear	/	22.91	23.80	0.228	**0.28**	0.411	**0.50**	-0.12
661	1880	GPRS (3)	Left	/	22.91	23.80	0.037	**0.05**	0.051	**0.06**	0.06
661	1880	GPRS (3)	Right	/	22.91	23.80	0.024	**0.03**	0.039	**0.05**	0.01
810	1909.8	GPRS (3)	Bottom	/	22.97	23.80	0.296	**0.36**	0.554	**0.67**	0.03
661	1880	GPRS (3)	Bottom	/	22.91	23.80	0.369	**0.45**	0.694	**0.85**	0.03
512	1850.2	GPRS (3)	Bottom	Fig.4	23.01	23.80	0.418	**0.50**	0.774	**0.93**	0.02
512	1850.2	EGPRS (3)	Bottom	/	23.10	23.80	0.411	**0.48**	0.768	**0.90**	0.05
512	1850.2	GPRS (2)	Bottom	Note1	27.25	27.80	1.160	**1.32**	3.020	**3.43**	0.08

Note: The distance between the EUT and the phantom bottom is 10mm.

Note1: The distance between the EUT and the phantom bottom is 0mm.

Table 14.1-5: SAR Values (GSM 1900 MHz Band - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Mode (number of timeslots)	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
661	1880	GPRS (2)	Front	/	27.11	27.80	0.151	**0.18**	0.269	**0.32**	0.05
810	1909.8	GPRS (2)	Rear	/	27.10	27.80	0.157	**0.18**	0.285	**0.33**	0.05
661	1880	GPRS (2)	Rear	/	27.11	27.80	0.194	**0.23**	0.354	**0.41**	-0.10
512	1850.2	GPRS (2)	Rear	Fig.5	27.25	27.80	0.264	**0.30**	0.462	**0.52**	-0.05
512	1850.2	EGPRS (2)	Rear	/	27.25	27.80	0.258	**0.29**	0.453	**0.51**	0.05

Note: The distance between the EUT and the phantom bottom is 15mm.

Table 14.1-6: SAR Values (WCDMA 850 MHz Band - Head)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Side	Test Position	Figure No./Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
4182	836.4	Left	Touch	/	23.22	24.00	0.394	**0.47**	0.567	**0.68**	0.12
4182	836.4	Left	Tilt	/	23.22	24.00	0.241	**0.29**	0.406	**0.49**	-0.09
4233	846.6	Right	Touch	/	23.18	24.00	0.382	**0.46**	0.558	**0.67**	-0.12
4182	836.4	Right	Touch	Fig.6	23.22	24.00	0.442	**0.53**	0.631	**0.76**	0.05
4132	826.4	Right	Touch	/	23.20	24.00	0.352	**0.42**	0.504	**0.61**	-0.12

4182	836.4	Right	Tilt	/	23.22	24.00	0.234	**0.28**	0.395	**0.47**	-0.10

Table 14.1-7: SAR Values (WCDMA 850 MHz Band - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C										
Frequency		Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz									
4182	836.4	Front	/	23.22	24.00	0.091	**0.11**	0.115	**0.14**	-0.02
4233	846.6	Rear	/	23.18	24.00	0.127	**0.15**	0.159	**0.19**	0.06
4182	836.4	Rear	Fig.7	23.22	24.00	0.128	**0.15**	0.160	**0.19**	0.13
4132	826.4	Rear	/	23.20	24.00	0.127	**0.15**	0.157	**0.19**	-0.09
4182	836.4	Left	/	23.22	24.00	0.057	**0.07**	0.078	**0.09**	-0.08
4182	836.4	Right	/	23.22	24.00	0.097	**0.12**	0.133	**0.16**	-0.02
4182	836.4	Top	/	23.22	24.00	0.055	**0.07**	0.090	**0.11**	-0.09

Note: The distance between the EUT and the phantom bottom is 10mm.

Table 14.1-8: SAR Values (WCDMA 1700 MHz Band - Head)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Side	Test Position	Figure No./Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
1412	1732.4	Left	Touch	/	22.66	23.50	0.140	**0.17**	0.204	**0.25**	-0.08
1412	1732.4	Left	Tilt	/	22.66	23.50	0.109	**0.13**	0.162	**0.20**	0.03
1513	1752.6	Right	Touch	/	22.78	23.50	0.163	**0.19**	0.244	**0.29**	-0.08
1412	1732.4	Right	Touch	/	22.66	23.50	0.172	**0.21**	0.259	**0.31**	0.13
1312	1712.4	Right	Touch	Fig.8	22.58	23.50	0.215	**0.27**	0.321	**0.40**	0.09
1412	1732.4	Right	Tilt	/	22.66	23.50	0.095	**0.12**	0.144	**0.17**	0.01

Table 14.1-9: SAR Values (WCDMA 1700 MHz Band - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C										
Frequency		Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz									
1412	1732.4	Front	/	19.70	20.50	0.312	**0.38**	0.556	**0.67**	0.13
1412	1732.4	Rear	/	19.70	20.50	0.282	**0.34**	0.483	**0.58**	0.00
1412	1732.4	Left	/	19.70	20.50	0.056	**0.07**	0.091	**0.11**	-0.13
1412	1732.4	Right	/	19.70	20.50	0.058	**0.07**	0.094	**0.11**	-0.06
1513	1752.6	Bottom	/	19.75	20.50	0.461	**0.55**	0.870	**1.03**	-0.06
1412	1732.4	Bottom	Fig.9	19.70	20.50	0.402	**0.48**	0.742	**0.89**	-0.10
1312	1712.4	Bottom	/	19.69	20.50	0.397	**0.48**	0.739	**0.89**	0.08

1513	1752.6	Bottom	Note2	22.78	23.50	2.41	**2.84**	6.33	**7.47**	0.05
1412	1732.4	Bottom	Note2	22.66	23.50	2.58	**3.13**	6.42	**7.79**	0.18
1312	1712.4	Bottom	Note2	22.58	23.50	2.50	**3.09**	6.39	**7.90**	0.01

Note1: The distance between the EUT and the phantom bottom is 10mm.

Note2: The distance between the EUT and the phantom bottom is 0mm.

Table 14.1-10: SAR Values (WCDMA 1700 MHz Band - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C										
Frequency		Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz									
1513	1752.6	Front	/	22.78	23.50	0.257	**0.30**	0.425	**0.50**	-0.05
1412	1732.4	Front	Fig.10	22.66	23.50	0.268	**0.33**	0.446	**0.54**	-0.13
1312	1712.4	Front	/	22.58	23.50	0.258	**0.32**	0.426	**0.53**	-0.05
1412	1732.4	Rear	/	22.66	23.50	0.256	**0.31**	0.412	**0.50**	0.04

Note1: The distance between the EUT and the phantom bottom is 15mm.

Table 14.1-11: SAR Values (WCDMA 1900 MHz Band - Head)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Side	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
9400	1880	Left	Touch	/	22.80	23.50	0.065	**0.08**	0.099	**0.12**	0.13
9400	1880	Left	Tilt	/	22.80	23.50	0.059	**0.07**	0.092	**0.11**	0.05
9538	1907.6	Right	Touch	/	22.86	23.50	0.062	**0.07**	0.098	**0.11**	-0.01
9400	1880	Right	Touch	/	22.80	23.50	0.065	**0.08**	0.103	**0.12**	-0.03
9262	1852.4	Right	Touch	Fig.11	22.79	23.50	0.084	**0.10**	0.131	**0.15**	-0.07
9400	1880	Right	Tilt	/	22.80	23.50	0.053	**0.06**	0.086	**0.10**	-0.03

Table 14.1-12: SAR Values (WCDMA 1900 MHz Band - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C										
Frequency		Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz									
9400	1880	Front	/	19.18	20.00	0.250	**0.30**	0.462	**0.56**	-0.05
9400	1880	Rear	/	19.18	20.00	0.293	**0.35**	0.530	**0.64**	0.00
9400	1880	Left	/	19.18	20.00	0.027	**0.03**	0.042	**0.05**	0.10
9400	1880	Right	/	19.18	20.00	0.031	**0.04**	0.051	**0.06**	0.05
9538	1907.6	Bottom	Fig.12	19.27	20.00	0.465	**0.55**	0.892	**1.06**	-0.13
9400	1880	Bottom	/	19.18	20.00	0.449	**0.54**	0.856	**1.03**	0.10
9262	1852.4	Bottom	/	19.18	20.00	0.458	**0.55**	0.871	**1.05**	-0.13
9538	1907.6	Bottom	Note2	22.86	23.50	2.430	**2.82**	6.430	**7.45**	0.02
9400	1880	Bottom	Note2	22.80	23.50	2.390	**2.81**	6.340	**7.45**	0.18

9262	1852.4	Bottom	Note2	22.79	23.50	2.410	**2.84**	6.410	**7.55**	0.06

Note1: The distance between the EUT and the phantom bottom is 10mm.

Note2: The distance between the EUT and the phantom bottom is 0mm.

Table 14.1-13: SAR Values (WCDMA 1900 MHz Band - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C										
Frequency		Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz									
9400	1880	Front	/	22.80	23.50	0.273	**0.32**	0.472	**0.55**	0.02
9538	1907.6	Rear	/	22.86	23.50	0.301	**0.35**	0.514	**0.60**	0.10
9400	1880	Rear	/	22.80	23.50	0.304	**0.36**	0.518	**0.61**	-0.10
9262	1852.4	Rear	Fig.13	22.79	23.50	0.325	**0.38**	0.551	**0.65**	0.00

Note1: The distance between the EUT and the phantom bottom is 15mm.

Table 14.1-14: SAR Values (LTE Band2 - Head)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C												
Frequency		Mode	Side	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g)(W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz											
19100	1900	1RB_Mid	Left	Touch	Fig.14	22.61	23.30	0.050	**0.06**	0.098	**0.11**	0.12
19100	1900	1RB_Mid	Left	Tilt	/	22.61	23.30	0.031	**0.04**	0.051	**0.06**	-0.02
19100	1900	1RB_Mid	Right	Touch	/	22.61	23.30	0.046	**0.05**	0.075	**0.09**	-0.03
19100	1900	1RB_Mid	Right	Tilt	/	22.61	23.30	0.032	**0.04**	0.054	**0.06**	-0.02
19100	1900	50RB_Mid	Left	Touch	/	21.42	22.30	0.044	**0.05**	0.071	**0.09**	-0.07
19100	1900	50RB_Mid	Left	Tilt	/	21.42	22.30	0.025	**0.03**	0.042	**0.05**	-0.05
19100	1900	50RB_Mid	Right	Touch	/	21.42	22.30	0.034	**0.04**	0.057	**0.07**	0.06
19100	1900	50RB_Mid	Right	Tilt	/	21.42	22.30	0.026	**0.03**	0.043	**0.05**	-0.03

Note1: The LTE mode is QPSK_20MHz.

Table 14.1-15: SAR Values (LTE Band2 - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
19100	1900	1RB_Mid	Front	/	19.10	19.80	0.251	**0.29**	0.463	**0.54**	-0.11
19100	1900	1RB_Mid	Rear	/	19.10	19.80	0.478	**0.56**	0.870	**1.02**	-0.02
18900	1880	1RB_Mid	Rear	/	18.93	19.80	0.485	**0.59**	0.862	**1.05**	0.01
18700	1860	1RB_Mid	Rear	/	18.95	19.80	0.499	**0.61**	0.900	**1.09**	-0.08
19100	1900	1RB_Mid	Left	/	19.10	19.80	0.198	**0.23**	0.377	**0.44**	0.00
19100	1900	1RB_Mid	Right	/	19.10	19.80	0.079	**0.09**	0.135	**0.16**	0.12
19100	1900	1RB_Mid	Bottom	/	19.10	19.80	0.466	**0.55**	0.889	**1.04**	0.06

18900	1880	1RB_Mid	Bottom	/	18.93	19.80	0.477	**0.58**	0.904	**1.10**	0.06
18700	1860	1RB_Mid	Bottom	/	18.95	19.80	0.496	**0.60**	0.943	**1.15**	0.11
19100	1900	50RB_Mid	Front	/	18.98	19.80	0.201	**0.24**	0.372	**0.45**	-0.04
19100	1900	50RB_Mid	Rear	/	18.98	19.80	0.389	**0.47**	0.690	**0.83**	0.13
18900	1880	50RB_Mid	Rear	/	18.88	19.80	0.395	**0.49**	0.684	**0.85**	0.15
18700	1860	50RB_ High	Rear	/	18.92	19.80	0.406	**0.50**	0.714	**0.87**	0.03
19100	1900	50RB_Mid	Left	/	18.98	19.80	0.162	**0.20**	0.308	**0.37**	-0.10
19100	1900	50RB_Mid	Right	/	18.98	19.80	0.062	**0.07**	0.109	**0.13**	-0.01
19100	1900	50RB_Mid	Bottom	Fig.15	18.98	19.80	0.533	**0.64**	1.02	**1.23**	-0.05
18900	1880	50RB_Mid	Bottom	/	18.88	19.80	0.375	**0.46**	0.712	**0.88**	-0.04
18700	1860	50RB_ High	Bottom	/	18.92	19.80	0.511	**0.63**	0.993	**1.22**	0.13
19100	1900	100RB	Rear	/	18.89	19.80	0.411	**0.51**	0.731	**0.90**	0.05
19100	1900	100RB	Bottom	/	18.89	19.80	0.502	**0.62**	0.983	**1.21**	0.17
19100	1900	1RB_Mid	Bottom	Note2	22.61	23.30	2.71	**3.18**	7.12	**8.35**	0.05
18900	1880	1RB_Mid	Bottom	Note2	22.43	23.30	2.73	**3.34**	7.13	**8.71**	-0.02
18700	1860	1RB_Mid	Bottom	Note2	22.46	23.30	2.70	**3.28**	7.10	**8.62**	0.06
19100	1900	50RB_Mid	Bottom	Headset	18.98	19.80	0.513	**0.62**	0.980	**1.18**	0.05

Note1: The distance between the EUT and the phantom bottom is 10mm.

Note2: The distance between the EUT and the phantom bottom is 0mm.

Note3: The LTE mode is QPSK_20MHz.

Table 14.1-16: SAR Values (LTE Band2 - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
19100	1900	1RB_Mid	Front	/	22.61	23.30	0.242	**0.28**	0.415	**0.49**	-0.03
19100	1900	1RB_Mid	Rear	/	22.61	23.30	0.406	**0.48**	0.713	**0.84**	0.05
18900	1880	1RB_Mid	Rear	/	22.43	23.30	0.418	**0.51**	0.737	**0.90**	0.01
18700	1860	1RB_Mid	Rear	Fig.16	22.46	23.30	0.425	**0.52**	0.745	**0.90**	-0.07
19100	1900	50RB_ Mid	Front	/	21.42	22.30	0.192	**0.24**	0.330	**0.40**	0.11
19100	1900	50RB_ High	Rear	/	21.42	22.30	0.328	**0.40**	0.578	**0.71**	-0.01
19100	1900	100RB	Rear	/	21.35	22.30	0.317	**0.39**	0.549	**0.68**	0.05

Note1: The distance between the EUT and the phantom bottom is 15mm.

Note2: The LTE mode is QPSK_20MHz.

Table 14.1-17: SAR Values (LTE Band5- Head)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C												
Frequency		Mode	Side	Test Position	Figure No./ Note	Conducted Power (dBm)	tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz											
20525	836.5	1RB_ Mid	Left	Touch	/	22.80	23.30	0.479	**0.54**	0.706	**0.79**	-0.13

20525	836.5	1RB_ Mid	Left	Tilt	/	22.80	23.30	0.287	**0.32**	0.419	**0.47**	0.05
20600	844	1RB_ Mid	Right	Touch	Fig.17	22.68	23.30	0.653	**0.75**	0.998	**1.15**	-0.03
20525	836.5	1RB_ Mid	Right	Touch		22.80	23.30	0.598	**0.67**	0.916	**1.03**	0.08
20450	829	1RB_ Mid	Right	Touch		22.78	23.30	0.537	**0.61**	0.822	**0.93**	0.02
20525	836.5	1RB_ Mid	Right	Tilt	/	22.80	23.30	0.315	**0.35**	0.463	**0.52**	0.04
20525	836.5	25RB_Low	Left	Touch	/	21.80	22.30	0.379	**0.43**	0.561	**0.63**	-0.09
20525	836.5	25RB_Low	Left	Tilt	/	21.80	22.30	0.229	**0.26**	0.336	**0.38**	-0.09
20525	836.5	25RB_Low	Right	Touch	/	21.80	22.30	0.462	**0.52**	0.706	**0.79**	0.10
20525	836.5	25RB_Low	Right	Tilt	/	21.80	22.30	0.253	**0.28**	0.374	**0.42**	0.01
20525	836.5	50RB	Right	Touch	/	21.79	22.30	0.437	**0.49**	0.672	**0.76**	0.05

Note1: The LTE mode is QPSK_10MHz.

Table 14.1-18: SAR Values (LTE Band26 - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
20525	836.5	1RB_ Mid	Front	/	22.80	23.30	0.176	**0.20**	0.230	**0.26**	0.02
20525	836.5	1RB_ Mid	Rear	Fig.18	22.80	23.30	0.219	**0.25**	0.331	**0.37**	-0.07
20525	836.5	1RB_ Mid	Left	/	22.80	23.30	0.066	**0.07**	0.075	**0.08**	0.05
20525	836.5	1RB_ Mid	Right	/	22.80	23.30	0.175	**0.20**	0.198	**0.22**	0.12
20525	836.5	1RB_ Mid	Top	/	22.80	23.30	0.209	**0.23**	0.306	**0.34**	0.07
20525	836.5	25RB_Low	Front	/	21.80	22.30	0.137	**0.15**	0.173	**0.19**	-0.03
20525	836.5	25RB_Low	Rear	/	21.80	22.30	0.195	**0.22**	0.250	**0.28**	-0.05
20525	836.5	25RB_Low	Left	/	21.80	22.30	0.053	**0.06**	0.059	**0.07**	0.07
20525	836.5	25RB_Low	Right	/	21.80	22.30	0.141	**0.16**	0.159	**0.18**	-0.08
20525	836.5	25RB_Low	Top	/	21.80	22.30	0.146	**0.16**	0.218	**0.24**	-0.05

Note1: The distance between the EUT and the phantom bottom is 10mm.

Note2: The LTE mode is QPSK_10MHz.

Table 14.1-19: SAR Values (LTE Band12 - Head)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C												
Frequency		Mode	Side	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz											
23095	707.5	1RB_ Mid	Left	Touch	Fig.19	22.73	23.30	0.346	**0.39**	0.461	**0.53**	-0.12
23095	707.5	1RB_ Mid	Left	Tilt	/	22.73	23.30	0.264	**0.30**	0.409	**0.47**	-0.06
23095	707.5	1RB_ Mid	Right	Touch	/	22.73	23.30	0.272	**0.31**	0.360	**0.41**	0.04
23095	707.5	1RB_ Mid	Right	Tilt	/	22.73	23.30	0.292	**0.33**	0.421	**0.48**	-0.10
23095	707.5	25RB_ High	Left	Touch	/	21.80	22.30	0.264	**0.30**	0.347	**0.39**	0.13
23095	707.5	25RB_ High	Left	Tilt	/	21.80	22.30	0.213	**0.24**	0.318	**0.36**	0.01
23095	707.5	25RB_ High	Right	Touch	/	21.80	22.30	0.190	**0.21**	0.247	**0.28**	0.01

23095	707.5	25RB_ High	Right	Tilt	/	21.80	22.30	0.235	**0.26**	0.321	**0.36**	-0.05

Note1: The LTE mode is QPSK_10MHz.

Table 14.1-20: SAR Values (LTE Band12 - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
23095	707.5	1RB_ Mid	Front	/	22.73	23.30	0.143	**0.16**	0.184	**0.21**	-0.12
23095	707.5	1RB_ Mid	Rear	/	22.73	23.30	0.196	**0.22**	0.252	**0.29**	-0.10
23095	707.5	1RB_ Mid	Left	/	22.73	23.30	0.128	**0.15**	0.176	**0.20**	-0.02
23095	707.5	1RB_ Mid	Right	Fig.20	22.73	23.30	0.207	**0.24**	0.284	**0.32**	0.00
23095	707.5	1RB_ Mid	Top	/	22.73	23.30	0.067	**0.08**	0.116	**0.13**	-0.03
23095	707.5	25RB_ High	Front	/	21.80	22.30	0.096	**0.11**	0.124	**0.14**	-0.04
23095	707.5	25RB_ High	Rear	/	21.80	22.30	0.161	**0.18**	0.207	**0.23**	0.04
23095	707.5	25RB_ High	Left	/	21.80	22.30	0.104	**0.12**	0.142	**0.16**	0.05
23095	707.5	25RB_ High	Right	/	21.80	22.30	0.165	**0.19**	0.227	**0.25**	0.09
23095	707.5	25RB_ High	Top	/	21.80	22.30	0.051	**0.06**	0.089	**0.10**	0.07

Note1: The distance between the EUT and the phantom bottom is 10mm.

Note2: The LTE mode is QPSK_10MHz.

Table 14.1-21: SAR Values (LTE Band13 - Head)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C												
Frequency		Mode	Side	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz											
23230	782	1RB_ Mid	Left	Touch	Fig.21	22.63	23.30	0.180	**0.21**	0.220	**0.26**	-0.06
23230	782	1RB_ Mid	Left	Tilt	/	22.63	23.30	0.122	**0.14**	0.143	**0.17**	-0.07
23230	782	1RB_ Mid	Right	Touch	/	22.63	23.30	0.175	**0.20**	0.218	**0.25**	-0.02
23230	782	1RB_ Mid	Right	Tilt	/	22.63	23.30	0.105	**0.12**	0.124	**0.14**	-0.10
23230	782	25RB_ High	Left	Touch	/	21.64	22.30	0.123	**0.14**	0.148	**0.17**	0.05
23230	782	25RB_ High	Left	Tilt	/	21.64	22.30	0.084	**0.10**	0.100	**0.12**	0.02
23230	782	25RB_ High	Right	Touch	/	21.64	22.30	0.132	**0.15**	0.164	**0.19**	0.01
23230	782	25RB_ High	Right	Tilt	/	21.64	22.30	0.078	**0.09**	0.092	**0.11**	0.02

Note1: The LTE mode is QPSK_10MHz.

Table 14.1-22: SAR Values (LTE Band13 - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										

						(dBm)					
23230	782	1RB_ Mid	Front	/	22.63	23.30	0.210	**0.25**	0.382	**0.45**	0.07
23230	782	1RB_ Mid	Rear		22.63	23.30	0.229	**0.27**	0.451	**0.53**	0.03
23230	782	1RB_ Mid	Left	/	22.63	23.30	0.154	**0.18**	0.301	**0.35**	0.05
23230	782	1RB_ Mid	Right	Fig.22	22.63	23.30	0.233	**0.27**	0.452	**0.53**	-0.07
23230	782	1RB_ Mid	Bottom	/	22.63	23.30	0.075	**0.09**	0.179	**0.21**	0.07
23230	782	25RB_ High	Front	/	21.64	22.30	0.160	**0.19**	0.291	**0.34**	-0.04
23230	782	25RB_ High	Rear	/	21.64	22.30	0.201	**0.23**	0.360	**0.42**	-0.12
23230	782	25RB_ High	Left	/	21.64	22.30	0.122	**0.14**	0.236	**0.27**	-0.08
23230	782	25RB_ High	Right	/	21.64	22.30	0.177	**0.21**	0.345	**0.40**	0.09
23230	782	25RB_ High	Bottom	/	21.64	22.30	0.055	**0.06**	0.127	**0.15**	0.05

Note1: The distance between the EUT and the phantom bottom is 10mm.

Note2: The LTE mode is QPSK_10MHz.

Table 14.1-23: SAR Values (LTE band66 - Head)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C												
Frequency		Mode	Side	Test Position	Figure No.	Conducted Power (dBm)	tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz											
132072	1720	1RB_Mid	Left	Touch	/	22.62	23.30	0.113	**0.13**	0.171	**0.20**	-0.08
132072	1720	1RB_Mid	Left	Tilt	/	22.62	23.30	0.083	**0.10**	0.127	**0.15**	-0.03
132072	1720	1RB_Mid	Right	Touch	Fig.23	22.62	23.30	0.145	**0.17**	0.227	**0.27**	0.06
132072	1720	1RB_Mid	Right	Tilt	/	22.62	23.30	0.085	**0.10**	0.135	**0.16**	0.00
132333	1745	50RB_Low	Left	Touch	/	21.55	22.30	0.087	**0.10**	0.131	**0.16**	-0.02
132333	1745	50RB_Low	Left	Tilt	/	21.55	22.30	0.064	**0.08**	0.097	**0.12**	-0.06
132333	1745	50RB_Low	Right	Touch	/	21.55	22.30	0.101	**0.12**	0.150	**0.18**	-0.12
132333	1745	50RB_Low	Right	Tilt	/	21.55	22.30	0.054	**0.06**	0.083	**0.10**	0.11

Table 14.1-24: SAR Values (LTE band66 - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
132572	1770	1RB_Mid	Front	/	19.52	20.30	0.404	**0.48**	0.750	**0.90**	0.04
132322	1745	1RB_Mid	Front	/	19.60	20.30	0.417	**0.49**	0.773	**0.91**	-0.01
132072	1720	1RB_Mid	Front	/	19.58	20.30	0.414	**0.49**	0.778	**0.92**	-0.11
132572	1770	1RB_Mid	Rear	/	19.52	20.30	0.369	**0.44**	0.659	**0.79**	0.03
132322	1745	1RB_Mid	Rear	/	19.60	20.30	0.394	**0.46**	0.708	**0.83**	0.05
132072	1720	1RB_Mid	Rear	/	19.58	20.30	0.351	**0.41**	0.616	**0.73**	-0.13
132322	1745	1RB_Mid	Left	/	19.60	20.30	0.070	**0.08**	0.115	**0.14**	-0.12
132322	1745	1RB_Mid	Right	/	19.60	20.30	0.085	**0.10**	0.143	**0.17**	0.09
132572	1770	1RB_Mid	Bottom	/	19.52	20.30	0.550	**0.66**	1.07	**1.28**	0.01
132322	1745	1RB_Mid	Bottom	Fig.24	19.60	20.30	0.556	**0.65**	1.09	**1.28**	-0.03

132072	1720	1RB_Mid	Bottom	/	19.58	20.30	0.527	**0.62**	1.04	**1.23**	-0.03
132572	1770	50RB_Mid	Front	/	19.42	20.30	0.396	**0.48**	0.730	**0.89**	0.00
132322	1745	50RB_Low	Front	/	19.59	20.30	0.420	**0.49**	0.788	**0.93**	0.08
132072	1720	50RB_Mid	Front	/	19.46	20.30	0.374	**0.45**	0.688	**0.83**	0.00
132572	1770	50RB_Mid	Rear	/	19.42	20.30	0.387	**0.47**	0.691	**0.85**	0.08
132322	1745	50RB_Low	Rear	/	19.59	20.30	0.363	**0.43**	0.649	**0.76**	-0.08
132072	1720	50RB_Mid	Rear	/	19.46	20.30	0.356	**0.43**	0.682	**0.83**	0.07
132322	1745	50RB_Low	Left	/	19.59	20.30	0.074	**0.09**	0.123	**0.14**	0.05
132322	1745	50RB_Low	Right	/	19.59	20.30	0.079	**0.09**	0.132	**0.16**	-0.13
132572	1770	50RB_Mid	Bottom	/	19.42	20.30	0.525	**0.64**	1.02	**1.25**	0.08
132322	1745	50RB_Low	Bottom	/	19.59	20.30	0.545	**0.64**	1.08	**1.27**	0.09
132072	1720	50RB_Mid	Bottom	/	19.46	20.30	0.479	**0.58**	0.949	**1.15**	0.09
132322	1745	100RB	Front	/	19.59	20.30	0.396	**0.47**	0.731	**0.86**	0.17
132322	1745	100RB	Rear	/	19.59	20.30	0.367	**0.43**	0.657	**0.77**	0.01
132322	1745	100RB	Bottom	/	19.59	20.30	0.521	**0.61**	0.983	**1.16**	0.09
132572	1770	1RB_Mid	Bottom	Note2	22.49	23.30	2.87	**3.46**	7.02	**8.46**	0.08
132322	1745	1RB_Mid	Bottom	Note2	22.55	23.30	2.71	**3.22**	6.85	**8.13**	0.15
132072	1720	1RB_Mid	Bottom	Note2	22.62	23.30	2.81	**3.29**	6.94	**8.11**	0.08
132322	1745	1RB_Mid	Bottom	Headset	19.60	20.30	0.522	**0.61**	0.974	**1.14**	0.15

Note1: The distance between the EUT and the phantom bottom is 10mm.

Note2: The distance between the EUT and the phantom bottom is 0mm.

Note3: The LTE mode is QPSK_20MHz.

Table 14.1-25: SAR Values (LTE band66 - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
132572	1770	1RB_Mid	Front	/	22.49	23.30	0.382	**0.46**	0.645	**0.78**	0.11
132322	1745	1RB_Mid	Front	Fig.25	22.55	23.30	0.452	**0.54**	0.754	**0.90**	0.04
132072	1720	1RB_Mid	Front	/	22.62	23.30	0.420	**0.49**	0.696	**0.81**	-0.12
132072	1720	1RB_Mid	Rear	/	22.62	23.30	0.389	**0.45**	0.633	**0.74**	0.01
132333	1745	50RB_Low	Front	/	21.55	22.30	0.338	**0.40**	0.566	**0.67**	-0.13
132333	1745	50RB_Low	Rear	/	21.55	22.30	0.328	**0.39**	0.538	**0.64**	0.05
132333	1745	100RB	Front	/	21.53	22.30	0.322	**0.38**	0.517	**0.62**	0.17

Note1: The distance between the EUT and the phantom bottom is 15mm.

Note2: The LTE mode is QPSK_20MHz.

14.2. SAR results for Standard procedure

There is zoom scan measurement to be added for the highest measured SAR in each exposure configuration/band.

Test Band	Channel	Frequency	Tune-Up	Measured Power	Test Position	Measured 10g SAR	Measured 1g SAR	Reported 10g SAR	Reported 1g SAR	Power Drift
GSM850	128	824.2	33.30	32.09	Right Cheek	0.205	0.259	0.27	0.34	0.11
GSM850	190	836.6	30.50	29.72	Rear	0.219	0.399	0.26	0.48	-0.08
PCS1900	661	1880	29.50	29.02	Right Cheek	0.025	0.039	0.03	0.04	0.12
PCS1900	512	1850.2	23.80	23.01	Bottom	0.418	0.774	0.50	0.93	0.02
PCS1900	512	1850.2	27.80	27.10	Rear	0.264	0.462	0.30	0.52	-0.05
WCDMA1900-BII	9262	1852.4	23.50	22.79	Right Cheek	0.084	0.131	0.10	0.15	-0.07
WCDMA1900-BII	9538	1907.6	20.00	19.27	Bottom	0.465	0.892	0.55	1.06	-0.13
WCDMA1900-BII	9262	1852.4	23.50	22.79	Rear	0.325	0.551	0.38	0.65	0
WCDMA1700-BIV	1312	1712.4	23.50	22.58	Right Cheek	0.215	0.321	0.27	0.40	0.09
WCDMA1700-BIV	1513	1752.6	20.50	19.75	Bottom	0.461	0.87	0.55	1.03	-0.06
WCDMA1700-BIV	1412	1732.5	23.50	22.66	Front	0.268	0.446	0.33	0.54	-0.13
WCDMA850-BV	4132	826.4	24.00	23.22	Right Cheek	0.442	0.631	0.53	0.76	0.05
WCDMA850-BV	4183	836.6	24.00	23.22	Rear	0.128	0.16	0.15	0.19	0.13
LTE1900-FDD2	19100	1900 MHz	23.30	22.61	Left Cheek	0.050	0.098	0.06	0.11	0.12
LTE1900-FDD2	19100	1900 MHz	19.80	18.98	Bottom	0.533	1.02	0.64	1.23	-0.05
LTE1900-FDD2	18700	1860 MHz	23.30	22.46	Rear	0.425	0.745	0.52	0.90	-0.07
LTE850-FDD5	20600	844 MHz	23.30	22.68	Right Cheek	0.653	0.998	0.75	1.15	-0.03
LTE850-FDD5	20525	836.5 MHz	23.30	22.80	Rear	0.219	0.331	0.25	0.37	-0.07
LTE700-FDD12	23095	707.5 MHz	23.30	22.73	Left Cheek	0.346	0.461	0.39	0.53	-0.12
LTE700-FDD12	23095	707.5 MHz	23.30	22.73	Right	0.207	0.284	0.24	0.32	0
LTE750-FDD13	23230	782 MHz	23.30	22.63	Left Cheek	0.18	0.22	0.21	0.26	-0.06
LTE750-FDD13	23230	782 MHz	23.30	22.63	Right	0.233	0.452	0.27	0.53	-0.07
LTE1700-FDD66	132072	782 MHz	23.30	22.62	Right Cheek	0.145	0.227	0.17	0.27	0.06
LTE1700-FDD66	132322	782 MHz	20.30	19.60	Bottom	0.556	1.09	0.65	1.28	-0.03
LTE1700-FDD66	132322	782 MHz	23.30	22.55	Front	0.452	0.754	0.54	0.90	0.04
WLAN2450	1	2412	16.80	16.36	Right Cheek	0.154	0.29	0.17	0.32	0.03
WLAN2450	1	2412	16.80	16.36	Rear	0.077	0.16	0.09	0.18	0.05

14.3. WLAN Evaluation for 2.4G

According to the KDB248227 D01, SAR is measured for 2.4GHz 802.11b DSSS using the initial test position procedure.

Head Evaluation

Table 14.3-1: SAR Values (WLAN - Head)– 802.11b (Fast SAR)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Side	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g)(W/kg)	Power Drift (dB)
MHz	Ch.										
2412	1	Left	Touch	/	16.36	16.80	0.090	**0.10**	0.155	**0.17**	0.05
2412	1	Left	Tilt	/	16.36	16.80	0.091	**0.10**	0.176	**0.19**	0.14
2412	1	Right	Touch	/	16.36	16.80	0.138	**0.15**	0.272	**0.30**	0.03
2412	1	Right	Tilt	/	16.36	16.80	0.106	**0.12**	0.201	**0.22**	0.09

As shown above table, the initial test position for head is “Right Touch”. So the head SAR of WLAN is presented as below:

Table 14.3-2: SAR Values (WLAN - Head)– 802.11b (Full SAR)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Side	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g)(W/kg)	Power Drift (dB)
MHz	Ch.										
2412	1	Right	Touch	Fig.26	16.36	16.80	0.154	**0.17**	0.290	**0.32**	0.03
Note1: When the reported SAR of the initial test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position using subsequent highest estimated 1-g SAR conditions determined by area scans, on the highest maximum output power channel, until the reported SAR is ≤ 0.8 W/kg. Note2: For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.											

According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. The scaled reported SAR is presented as below.

Table 14.3-3: SAR Values (WLAN - Head) – 802.11b (Scaled Reported SAR)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C							
Frequency		Side	Test Position	Actual duty factor	maximum duty factor	Reported SAR (1g)(W/kg)	Scaled reported SAR (1g)(W/kg)
MHz	Ch.						
2412	1	Right	Touch	100%	100%	**0.32**	**0.32**

SAR is not required for OFDM because the 802.11b adjusted SAR ≤ 1.2 W/kg.

Body Evaluation

Table 14.3-4: SAR Values (WLAN - Body)– 802.11b (Fast SAR)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C										
Frequency		Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g)(W/kg)	Power Drift (dB)
MHz	Ch.									
2412	1	Front	/	16.36	16.80	0.039	**0.04**	0.064	**0.07**	0.15
2412	1	Rear	/	16.36	16.80	0.079	**0.09**	0.152	**0.17**	0.05
2412	1	Left	/	16.36	16.80	0.047	**0.05**	0.088	**0.10**	0.17
2412	1	Top	/	16.36	16.80	0.039	**0.04**	0.067	**0.07**	0.09

As shown above table, the initial test position for body is “Rear”. So the body SAR of WLAN is presented as below:

Table 14.3-5: SAR Values (WLAN - Body)– 802.11b (Full SAR)

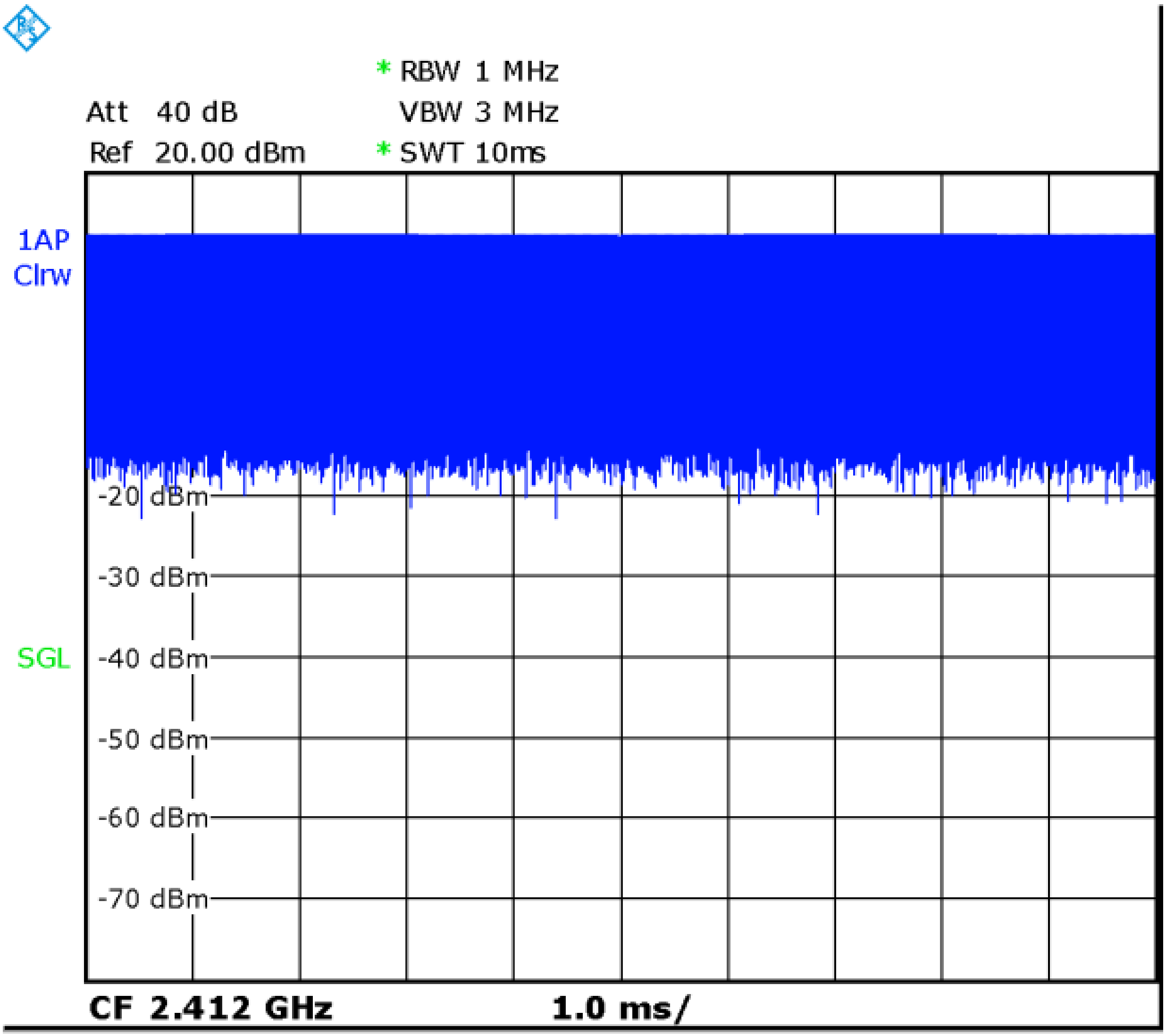
Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C										
Frequency		Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g)(W/kg)	Power Drift (dB)
MHz	Ch.									
2412	1	Rear	Fig.27	16.36	16.80	0.077	**0.09**	0.160	**0.18**	0.05
Note1: When the reported SAR of the initial test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position using subsequent highest estimated 1-g SAR conditions determined by area scans, on the highest maximum output power channel, until the reported SAR is ≤ 0.8 W/kg. Note2: For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.										

According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. The scaled reported SAR is presented as below.

Table 14.3-6: SAR Values (WLAN - Body) – 802.11b (Scaled Reported SAR)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C						
Frequency		Test Position	Actual duty factor	maximum duty factor	Reported SAR (1g)(W/kg)	Scaled reported SAR (1g)(W/kg)
MHz	Ch.					
2412	1	Rear	100%	100%	**0.18**	**0.18**

SAR is not required for OFDM because the 802.11b adjusted SAR ≤ 1.2 W/kg.



Picture 14.1 Duty factor plot

14.4. BT Evaluation

Table 14.4-1: SAR Values (Bluetooth - Head)

Ch.	Side	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g)(W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
39	Left	Touch	/	9.97	10.5	< 0.01	**< 0.01**	< 0.01	**< 0.01**	/
39	Left	Tilt	/	9.97	10.5	< 0.01	**< 0.01**	< 0.01	**< 0.01**	/
39	Right	Touch	/	9.97	10.5	< 0.01	**< 0.01**	< 0.01	**< 0.01**	/
39	Right	Tilt	/	9.97	10.5	< 0.01	**< 0.01**	< 0.01	**< 0.01**	/

15. 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 15.1: SAR Measurement Variability for Body W1700 (1g)

Frequency		Test Position	Spacing (mm)	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
Ch.	MHz						
1513	1752.6	Bottom	10	0.87	0.847	1.03	/

Table 15.2: SAR Measurement Variability for Body W1900 (1g)

Frequency		Test Position	Spacing (mm)	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
Ch.	MHz						
9538	1907.6	Bottom	10	0.892	0.861	1.04	/

Table 15.3: SAR Measurement Variability for Body LTE B2 (1g)

Frequency		Mode	Test Position	Spacing (mm)	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
Ch.	MHz							
19100	1900	50RB_Mid	Bottom	10	1.02	0.972	1.05	/

Table 15.4: SAR Measurement Variability for Head LTE B5 (1g)

Frequency		Mode	Side	Test Position	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
Ch.	MHz							
20600	844	1RB_Mid	Right	Cheek	0.998	0.979	1.02	/

Table 15.5: SAR Measurement Variability for Body LTE B66 (1g)

Frequency		Mode	Test Position	Spacing (mm)	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
Ch.	MHz							
132322	1745	1RB_Mid	Bottom	10	1.09	1.01	1.08	/

16. Measurement Uncertainty

16.1. Measurement Uncertainty for Normal SAR Tests (300MHz~3GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	12	N	2	1	1	6.0	6.0	∞
2	Axial isotropy	B	4.7	R	$\sqrt{3}$	√0.5	√0.5	4.3	4.3	∞
3	Hemispherical isotropy	B	9.6	R	$\sqrt{3}$	1	1	4.8	4.8	∞
4	Boundary effect	B	1.1	R	$\sqrt{3}$	1	1	0.6	0.6	∞
5	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
6	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
7	Modulation response	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
8	Readout electronics	B	1.0	N	1	1	1	1.0	1.0	∞
9	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
10	Integration time	B	1.7	R	$\sqrt{3}$	1	1	1.0	1.0	∞
11	RF ambient conditions-noise	B	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
12	RF ambient conditions-reflection	B	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Probe positioned mech. restrictions	B	0.35	R	$\sqrt{3}$	1	1	0.2	0.2	∞
14	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
15	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Test sample related										
16	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	5
17	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
18	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
19	Phantom uncertainty	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
20	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
21	Liquid conductivity (meas.)	A	1.3	N	1	0.64	0.43	0.83	0.56	9
22	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
23	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	0.96	0.78	9
Combined standard uncertainty		$u_c^{'} = \sqrt{\sum_{i=1}^{23} c_i^2 u_i^2}$						11.3	11.2	95.5
Expanded uncertainty (Confidence interval of 95 %)		$u_e = 2u_c$						22.6	22.4	

16.2. Measurement Uncertainty for Normal SAR Tests (3~6GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	13	N	2	1	1	6.5	6.5	∞
2	Axial isotropy	B	4.7	R	$\sqrt{3}$	√0.5	√0.5	4.3	4.3	∞
3	Hemispherical isotropy	B	9.6	R	$\sqrt{3}$	1	1	4.8	4.8	∞
4	Boundary effect	B	2.3	R	$\sqrt{3}$	1	1	1.3	1.3	∞
5	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
6	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
7	Modulation response	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
8	Readout electronics	B	1.0	N	1	1	1	1.0	1.0	∞
9	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
10	Integration time	B	1.7	R	$\sqrt{3}$	1	1	1.0	1.0	∞
11	RF ambient conditions-noise	B	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
12	RF ambient conditions-reflection	B	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Probe positioned mech. restrictions	B	0.71	R	$\sqrt{3}$	1	1	0.4	0.4	∞
14	Probe positioning with respect to phantom shell	B	5.7	R	$\sqrt{3}$	1	1	3.3	3.3	∞
15	Post-processing	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
Test sample related										
16	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	5
17	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
18	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
19	Phantom uncertainty	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
20	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
21	Liquid conductivity (meas.)	A	1.3	N	1	0.64	0.43	0.83	0.56	9
22	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
23	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	0.96	0.78	9
Combined standard uncertainty		$u_c' = \sqrt{\sum_{i=1}^{23} c_i^2 u_i^2}$						12.2	12.1	95.5
Expanded uncertainty (Confidence interval of 95 %)		$u_e = 2u_c$						24.4	24.2	

16.3. Measurement Uncertainty for Fast SAR Tests (300MHz~3GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.0	N	1	1	1	6.0	6.0	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RFambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. Restrictions	B	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
12	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
14	Fast SAR z-Approximation	B	7.0	R	$\sqrt{3}$	1	1	4.0	4.0	∞
Test sample related										
15	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
16	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
17	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
18	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
19	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
20	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
21	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
22	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521

Combined standard uncertainty	$u_c^{'} = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$					10.4	10.3	257
Expanded uncertainty (confidence interval of 95 %)	$u_e = 2u_c$					20.8	20.6	

16.4. Measurement Uncertainty for Fast SAR Tests (3~6GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.55	N	1	1	1	6.55	6.55	∞
2	Isotropy	B	4.7	R	√3	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	2.0	R	√3	1	1	1.2	1.2	∞
4	Linearity	B	4.7	R	√3	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	R	√3	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	√3	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	√3	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	√3	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	√3	1	1	0	0	∞
10	RFambient conditions-reflection	B	0	R	√3	1	1	0	0	∞
11	Probe positioned mech. Restrictions	B	0.8	R	√3	1	1	0.5	0.5	∞
12	Probe positioning with respect to phantom shell	B	6.7	R	√3	1	1	3.9	3.9	∞
13	Post-processing	B	1.0	R	√3	1	1	0.6	0.6	∞
14	Fast SAR z-Approximation	B	14.0	R	√3	1	1	8.1	8.1	∞
Test sample related										
15	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
16	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
17	Drift of output power	B	5.0	R	√3	1	1	2.9	2.9	∞
Phantom and set-up										
18	Phantom uncertainty	B	4.0	R	√3	1	1	2.3	2.3	∞
19	Liquid conductivity (target)	B	5.0	R	√3	0.64	0.43	1.8	1.2	∞
20	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
21	Liquid permittivity (target)	B	5.0	R	√3	0.6	0.49	1.7	1.4	∞
22	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521

Combined standard uncertainty	$u_c^{'}=\sqrt{\sum_{i=1}^{22}c_i^2u_i^2}$					13.5	13.4	257
Expanded uncertainty (confidence interval of 95 %)	$u_e=2u_c$					27.0	26.8	

17. MAIN TEST INSTRUMENTS

Table 17.1: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	E5071C	MY46103759	2019-11-15	One year
02	Power meter	E4418B	MY50000366	2019-12-14	One year
03	Power sensor	E9304A	MY50000188		
04	Power meter	NRP	101460	2020-01-15	One year
05	Power sensor	NRP-Z91	100553		
06	Signal Generator	E8257D	MY47461211	2020-01-15	One year
07	Amplifier	VTL5400	0404	/	/
08	Radio Communication Analyzer	MT8820C	6201341853	2020-01-15	One year
09	E-field Probe	EX3DV4	3633	2020-04-01	One year
10	DAE	DAE4	786	2020-03-03	One year
11	Dipole Validation Kit	D750V3	1163	2019-09-03	Three year
12	Dipole Validation Kit	D835V2	4d057	2018-10-09	Three year
13	Dipole Validation Kit	D1750V2	1152	2019-08-30	Three year
14	Dipole Validation Kit	D1900V2	5d088	2018-10-24	Three year
15	Dipole Validation Kit	D2450V2	873	2018-10-26	Three year
16	Dielectric probe	85070E	MY44300317	/	/
17	Software	DASY5	52.8.8.1222	/	/

ANNEX A: Graph Results

GSM850_CH128 Right Cheek
Date: 9/13/2020
Electronics: DAE4 Sn786
Medium: head 835 MHz
Medium parameters used: f = 824.2; σ = 0.888 mho/m; εr = 40.93; ρ = 1000 kg/m^3
Ambient Temperature: 22.5^{o}C, Liquid Temperature: 22.3^{o}C
Communication System: GSM850 824.2 Duty Cycle: 1：8.3
Probe: EX3DV4 – SN3633 ConvF(9.59, 9.59, 9.59)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.295 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.692 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.328 W/kg
SAR(1 g) = 0.259 W/kg; SAR(10 g) = 0.205 W/kg
Maximum value of SAR (measured) = 0.301 W/kg

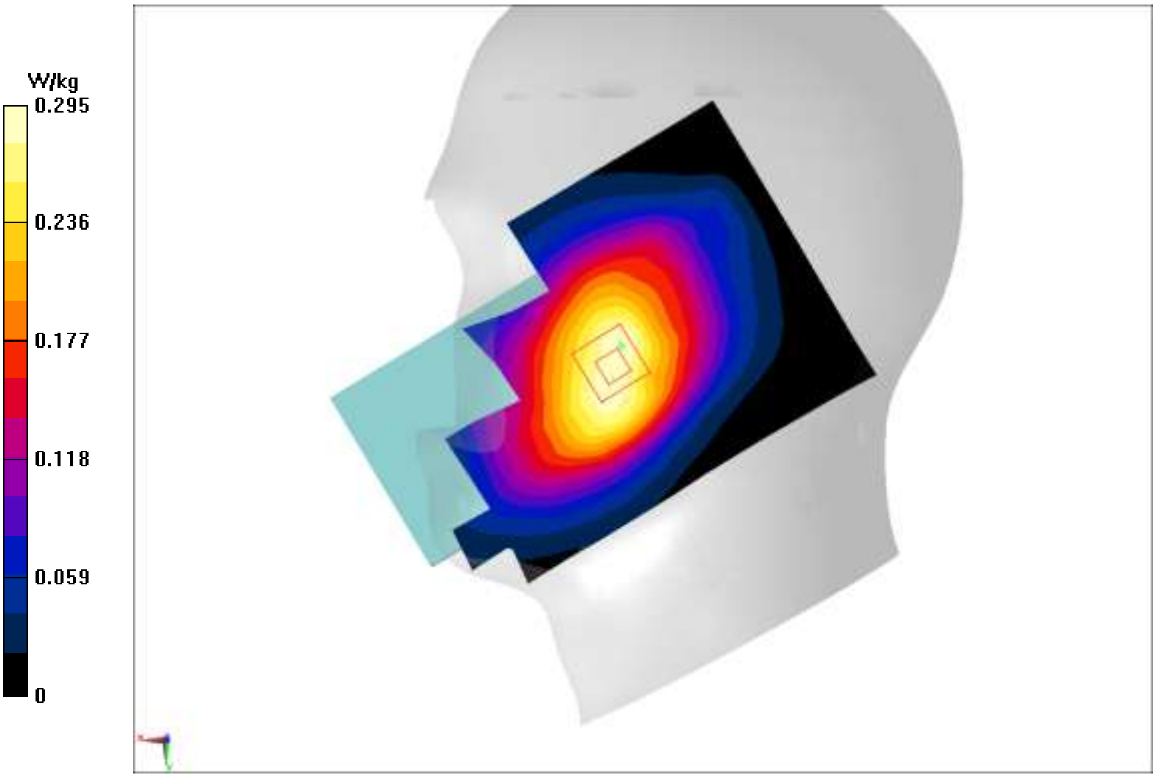


Fig A.1

GSM850_CH190 Rear
Date: 9/13/2020
Electronics: DAE4 Sn786
Medium: head 835 MHz
Medium parameters used: f = 836.6; σ = 0.9 mho/m; εr = 40.92; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: GSM850 836.6 Duty Cycle: 1：4
Probe: EX3DV4 – SN3633 ConvF(9.59, 9.59, 9.59)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.531 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.49 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.761 W/kg
SAR(1 g) = 0.399 W/kg; SAR(10 g) = 0.219 W/kg
Maximum value of SAR (measured) = 0.599 W/kg

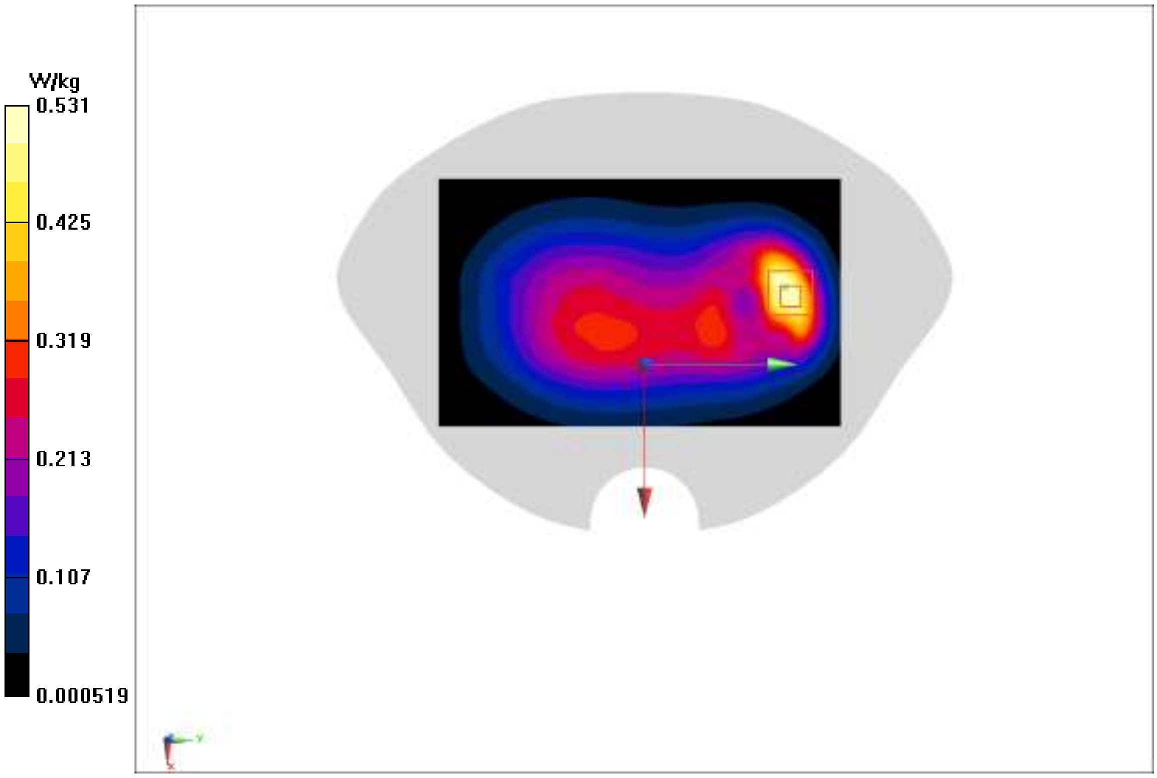


Fig A.2

PCS1900_CH661 Right Cheek
Date: 9/15/2020
Electronics: DAE4 Sn786
Medium: head 1900 MHz
Medium parameters used: f = 1880; σ = 1.389 mho/m; εr = 40.76; ρ = 1000 kg/m^3
Ambient Temperature: 22.5^{o}C, Liquid Temperature: 22.3^{o}C
Communication System: PCS1900 1880 Duty Cycle: 1：8.3
Probe: EX3DV4 – SN3633 ConvF(7.76, 7.76, 7.76)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.0543 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.108 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.059 W/kg
SAR(1 g) = 0.039 W/kg; SAR(10 g) = 0.025 W/kg
Maximum value of SAR (measured) = 0.0518 W/kg

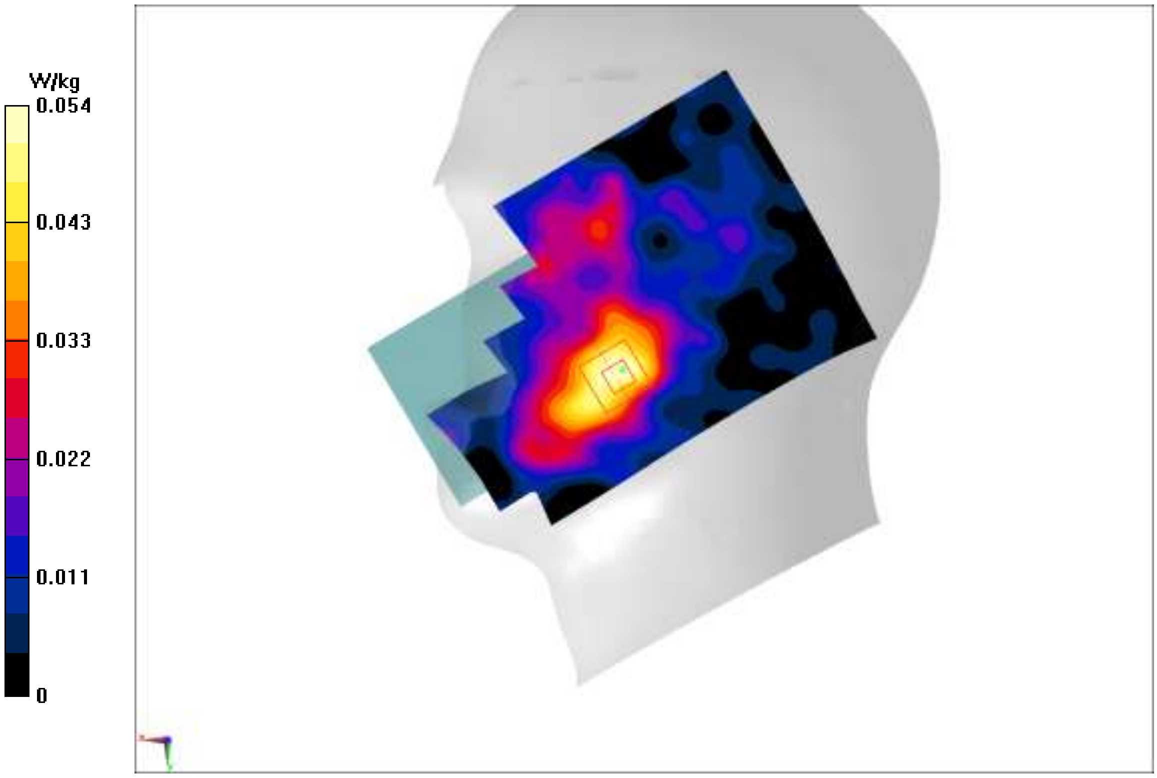


Fig A.3

PCS1900_CH512 Bottom
Date: 9/15/2020
Electronics: DAE4 Sn786
Medium: head 1900 MHz
Medium parameters used: f = 1850.2; σ = 1.36 mho/m; εr = 40.8; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: PCS1900 1850.2 Duty Cycle: 1：2.67
Probe: EX3DV4 – SN3633 ConvF(7.76, 7.76, 7.76)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.14 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.94 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.22 W/kg
SAR(1 g) = 0.774 W/kg; SAR(10 g) = 0.418 W/kg
Maximum value of SAR (measured) = 1.06 W/kg

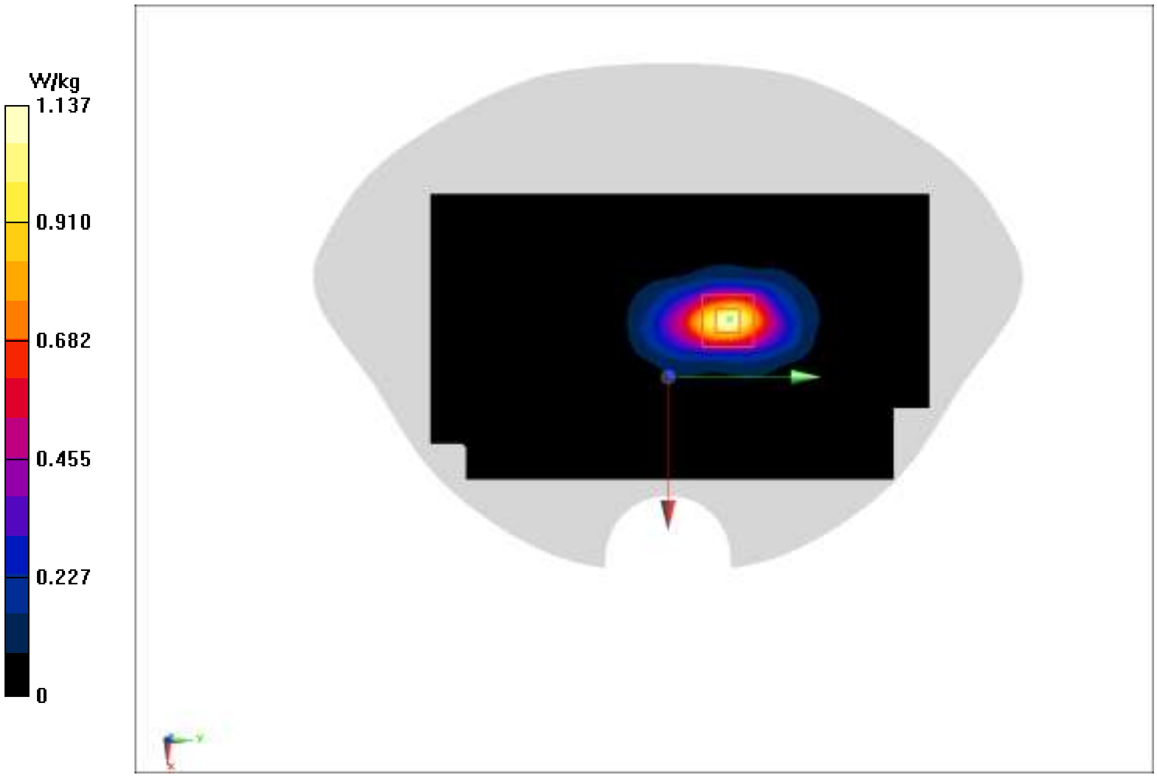


Fig A.4

PCS1900_CH512 Rear
Date: 9/15/2020
Electronics: DAE4 Sn786
Medium: head 1900 MHz
Medium parameters used: f = 1850.2; σ = 1.36 mho/m; εr = 40.8; ρ = 1000 kg/m^3
Ambient Temperature: 22.5^{o}C, Liquid Temperature: 22.3^{o}C
Communication System: PCS1900 1850.2 Duty Cycle: 1：4
Probe: EX3DV4 – SN3633 ConvF(7.76, 7.76, 7.76)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.654 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.406 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.767 W/kg
SAR(1 g) = 0.462 W/kg; SAR(10 g) = 0.264 W/kg
Maximum value of SAR (measured) = 0.64 W/kg

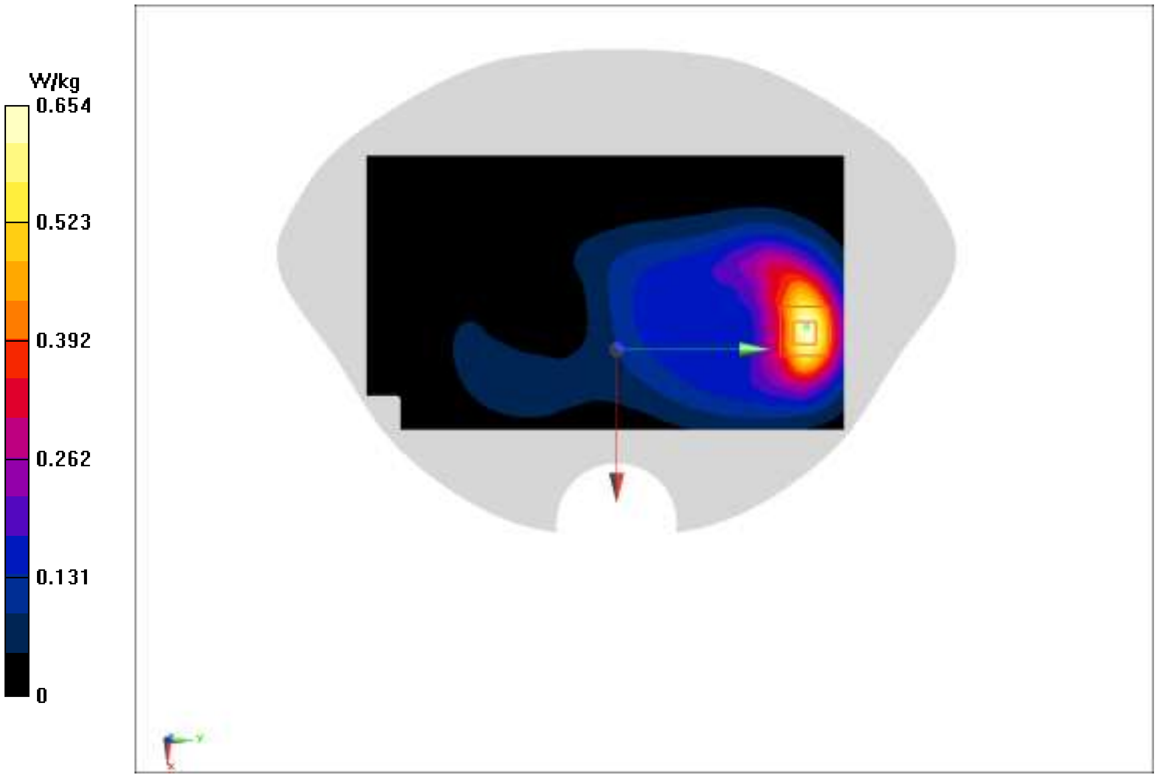


Fig A.5

WCDMA1900-BII_CH9262 Right Cheek
Date: 9/15/2020
Electronics: DAE4 Sn786
Medium: head 1900 MHz
Medium parameters used: f = 1852.4; σ = 1.362 mho/m; εr = 40.8; ρ = 1000 kg/m^3
Ambient Temperature: 22.5^{o}C, Liquid Temperature: 22.3^{o}C
Communication System: WCDMA1900-BII 1852.4 Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(7.76, 7.76, 7.76)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.174 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.145 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.186 W/kg
SAR(1 g) = 0.131 W/kg; SAR(10 g) = 0.084 W/kg
Maximum value of SAR (measured) = 0.167 W/kg

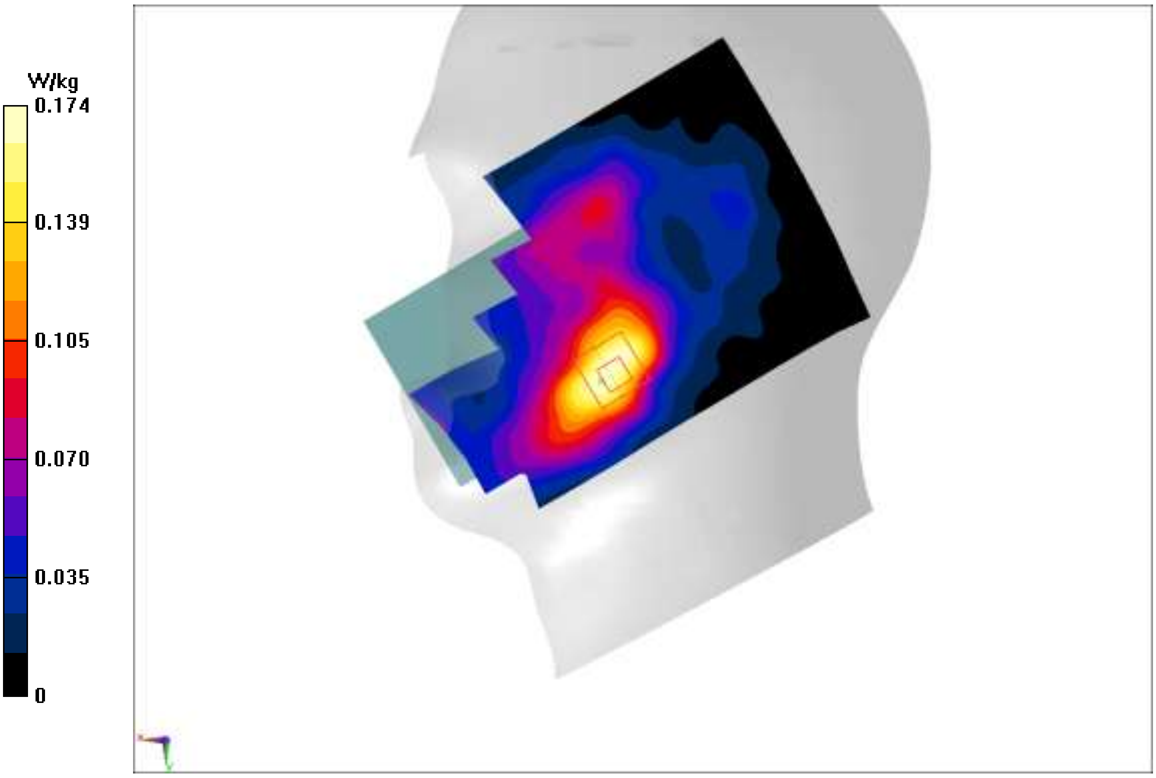


Fig A.6

WCDMA1900-BII_CH9538 Bottom
Date: 9/15/2020
Electronics: DAE4 Sn786
Medium: head 1900 MHz
Medium parameters used: f = 1907.6; σ = 1.416 mho/m; εr = 40.73; ρ = 1000 kg/m^3
Ambient Temperature: 22.5^{o}C, Liquid Temperature: 22.3^{o}C
Communication System: WCDMA1900-BII 1907.6 Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(7.76, 7.76, 7.76)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.36 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.72 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 1.47 W/kg
SAR(1 g) = 0.892 W/kg; SAR(10 g) = 0.465 W/kg
Maximum value of SAR (measured) = 1.26 W/kg

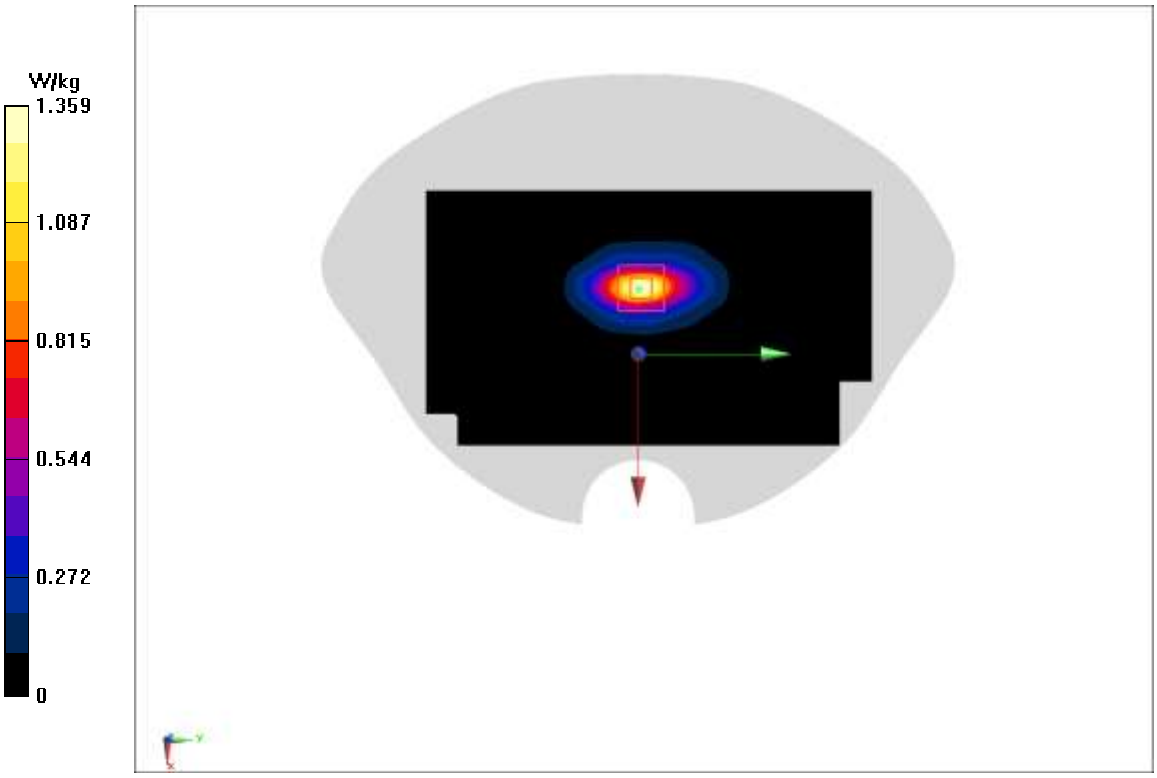


Fig A.7

WCDMA1900-BII_CH9262 Rear
Date: 9/15/2020
Electronics: DAE4 Sn786
Medium: head 1900 MHz
Medium parameters used: f = 1852.4; σ = 1.362 mho/m; εr = 40.8; ρ = 1000 kg/m^3
Ambient Temperature: 22.5^{o}C, Liquid Temperature: 22.3^{o}C
Communication System: WCDMA1900-BII 1852.4 Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(7.76, 7.76, 7.76)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.774 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.425 V/m; Power Drift = 0 dB
Peak SAR (extrapolated) = 0.858 W/kg
SAR(1 g) = 0.551 W/kg; SAR(10 g) = 0.325 W/kg
Maximum value of SAR (measured) = 0.714 W/kg

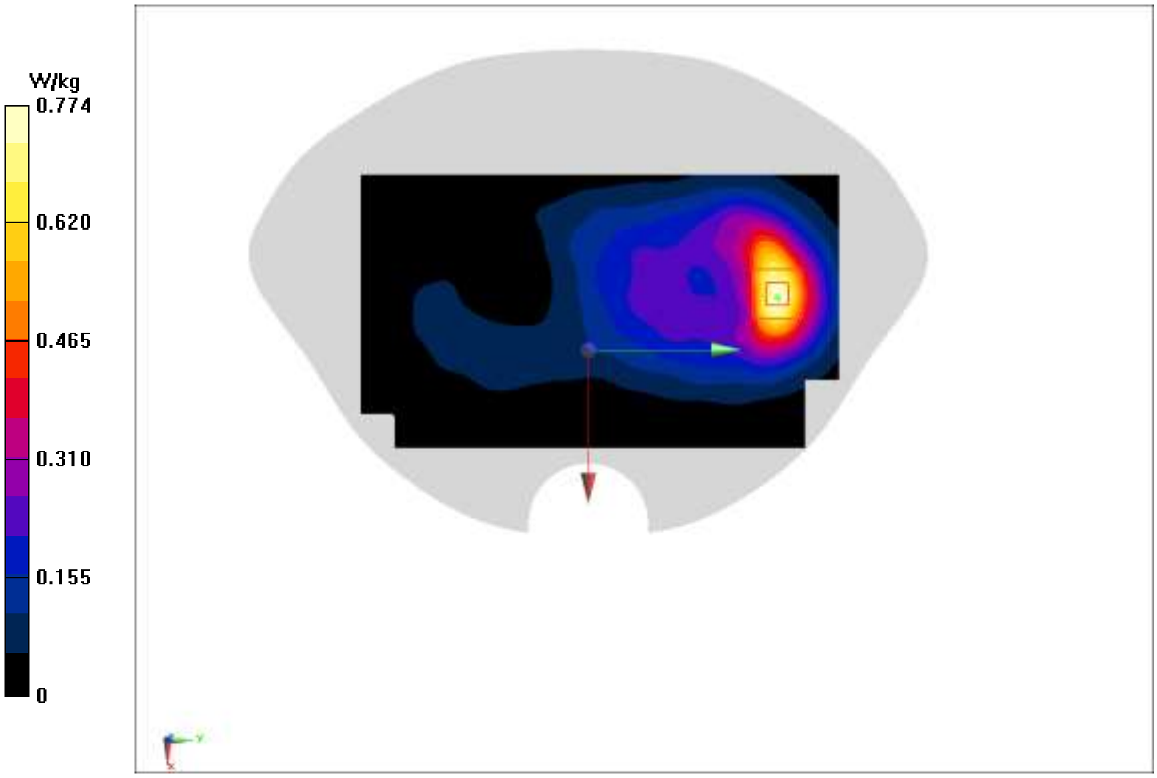


Fig A.8

WCDMA1700-BIV_CH1312 Right Cheek
Date: 9/14/2020
Electronics: DAE4 Sn786
Medium: head 1750 MHz
Medium parameters used: f = 1712.4; σ = 1.322 mho/m; εr = 39.74; ρ = 1000 kg/m^3
Ambient Temperature: 22.5^{o}C, Liquid Temperature: 22.3^{o}C
Communication System: WCDMA1700-BIV 1712.4 Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(8.09, 8.09, 8.09)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.416 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.741 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.446 W/kg
SAR(1 g) = 0.321 W/kg; SAR(10 g) = 0.215 W/kg
Maximum value of SAR (measured) = 0.392 W/kg

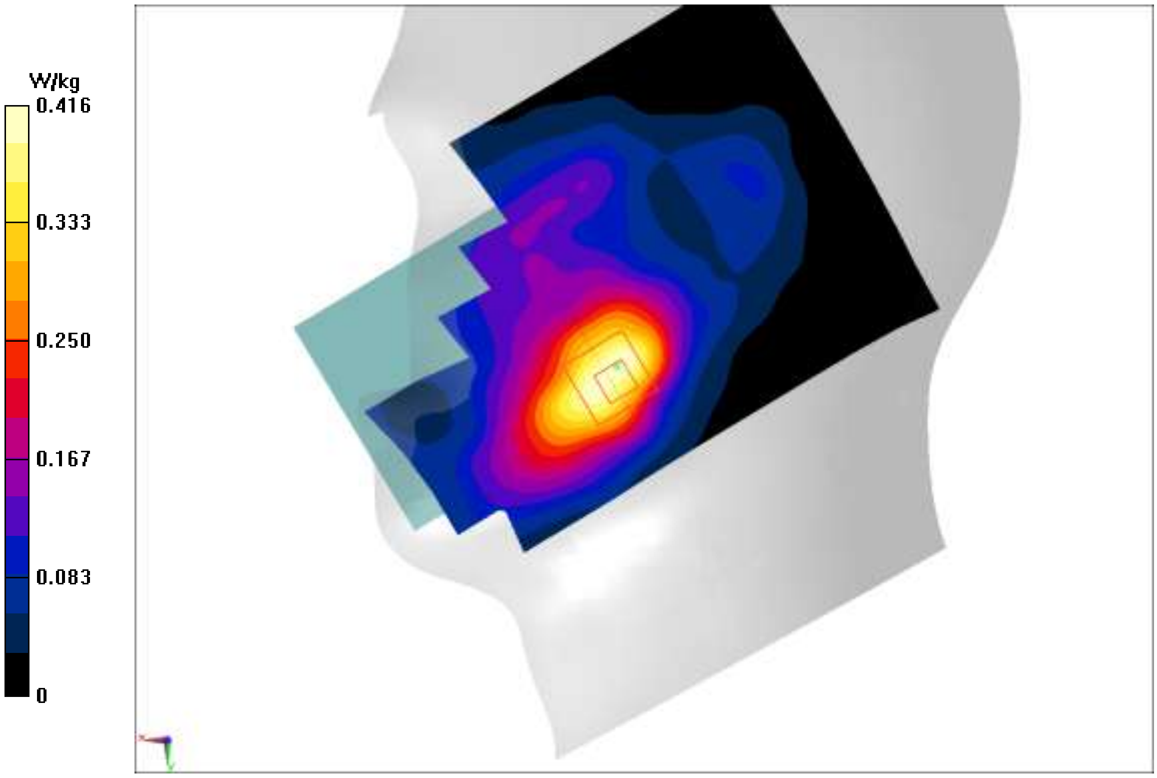


Fig A.9

WCDMA1700-BIV_CH1513 Bottom
Date: 9/14/2020
Electronics: DAE4 Sn786
Medium: head 1750 MHz
Medium parameters used: f = 1752.6; σ = 1.361 mho/m; εr = 39.69; ρ = 1000 kg/m^3
Ambient Temperature: 22.5^{o}C,   Liquid Temperature: 22.3^{o}C
Communication System: WCDMA1700-BIV 1752.6 Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(8.09, 8.09, 8.09)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.25 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 21.12 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 1.44 W/kg
SAR(1 g) = 0.87 W/kg; SAR(10 g) = 0.461 W/kg
Maximum value of SAR (measured) = 1.21 W/kg

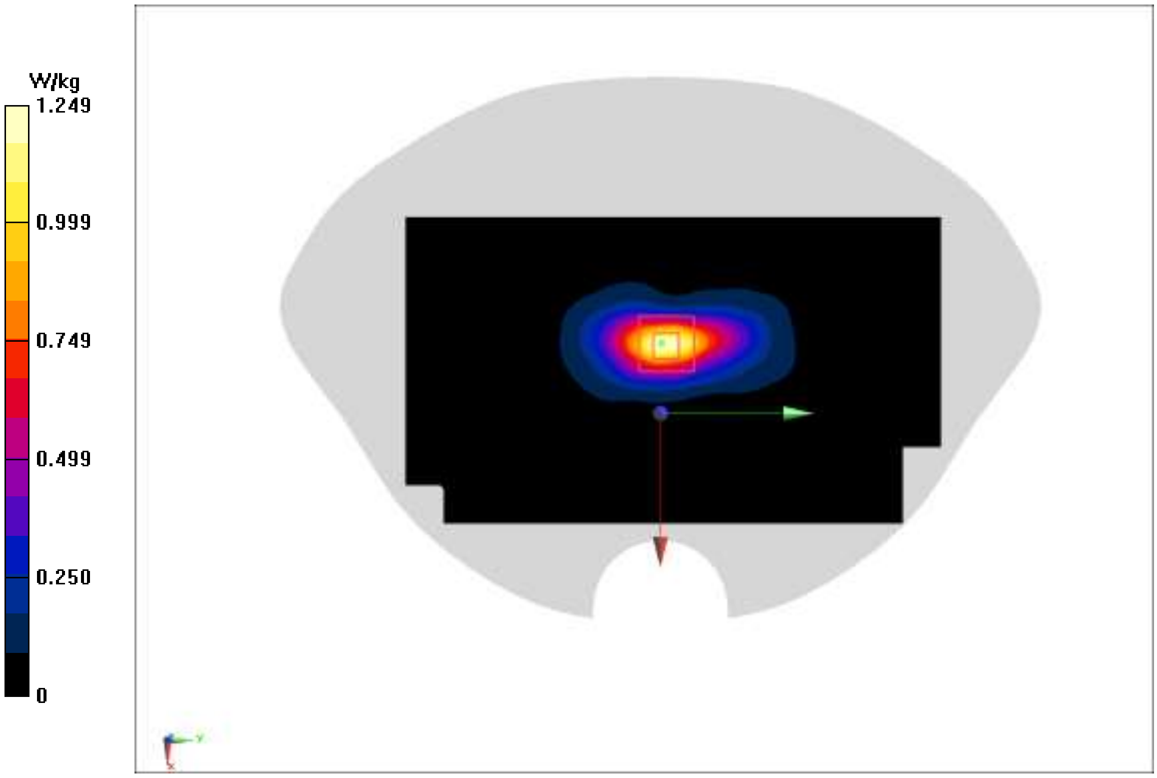


Fig A.10

WCDMA1700-BIV_CH1412 Front
Date: 9/14/2020
Electronics: DAE4 Sn786
Medium: head 1750 MHz
Medium parameters used: f = 1732.5; σ = 1.341 mho/m; εr = 39.71; ρ = 1000 kg/m^3
Ambient Temperature: 22.5^{o}C, Liquid Temperature: 22.3^{o}C
Communication System: WCDMA1700-BIV 1732.5 Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(8.09, 8.09, 8.09)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.591 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.077 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.695 W/kg
SAR(1 g) = 0.446 W/kg; SAR(10 g) = 0.268 W/kg
Maximum value of SAR (measured) = 0.6 W/kg

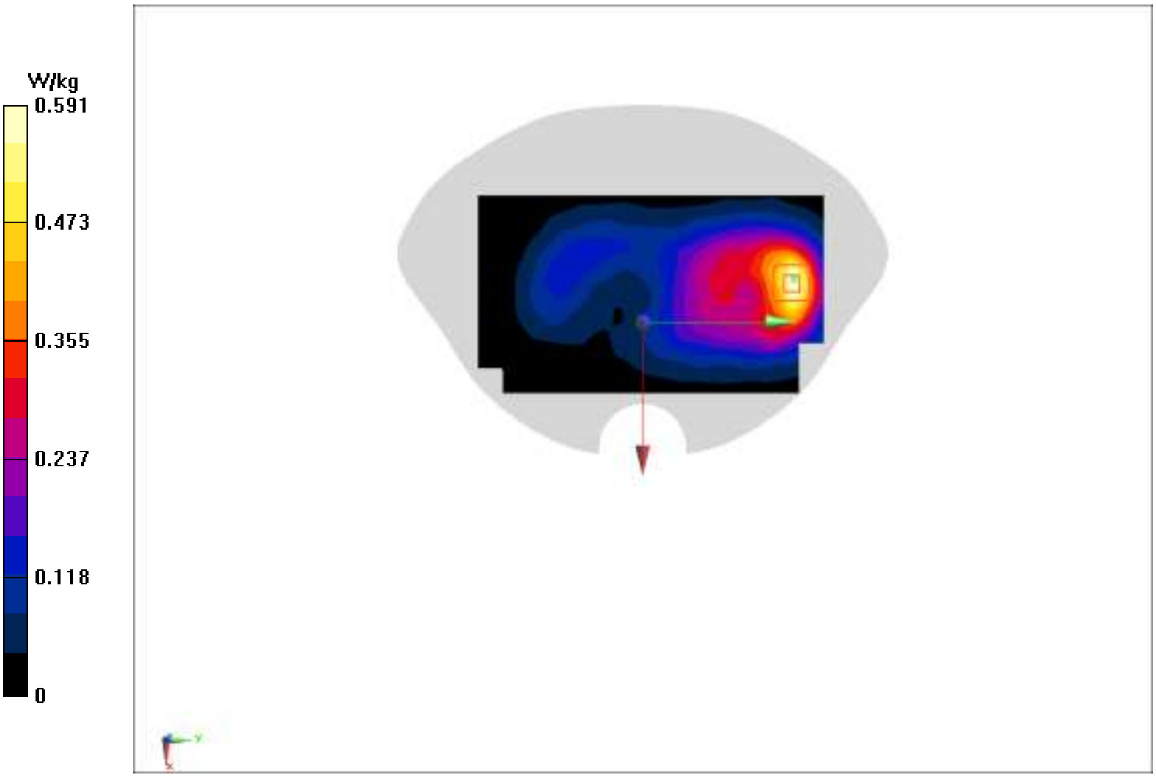


Fig A.11

WCDMA850-BV_CH4132 Right Cheek
Date: 9/13/2020
Electronics: DAE4 Sn786
Medium: head 835 MHz
Medium parameters used: f = 826.4; σ = 0.889 mho/m; εr = 40.93; ρ = 1000 kg/m^3
Ambient Temperature: 22.5^{o}C, Liquid Temperature: 22.3^{o}C
Communication System: WCDMA850-BV 826.4 Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(9.59, 9.59, 9.59)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.86 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 31.17 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.944 W/kg
SAR(1 g) = 0.631 W/kg; SAR(10 g) = 0.442 W/kg
Maximum value of SAR (measured) = 0.827 W/kg

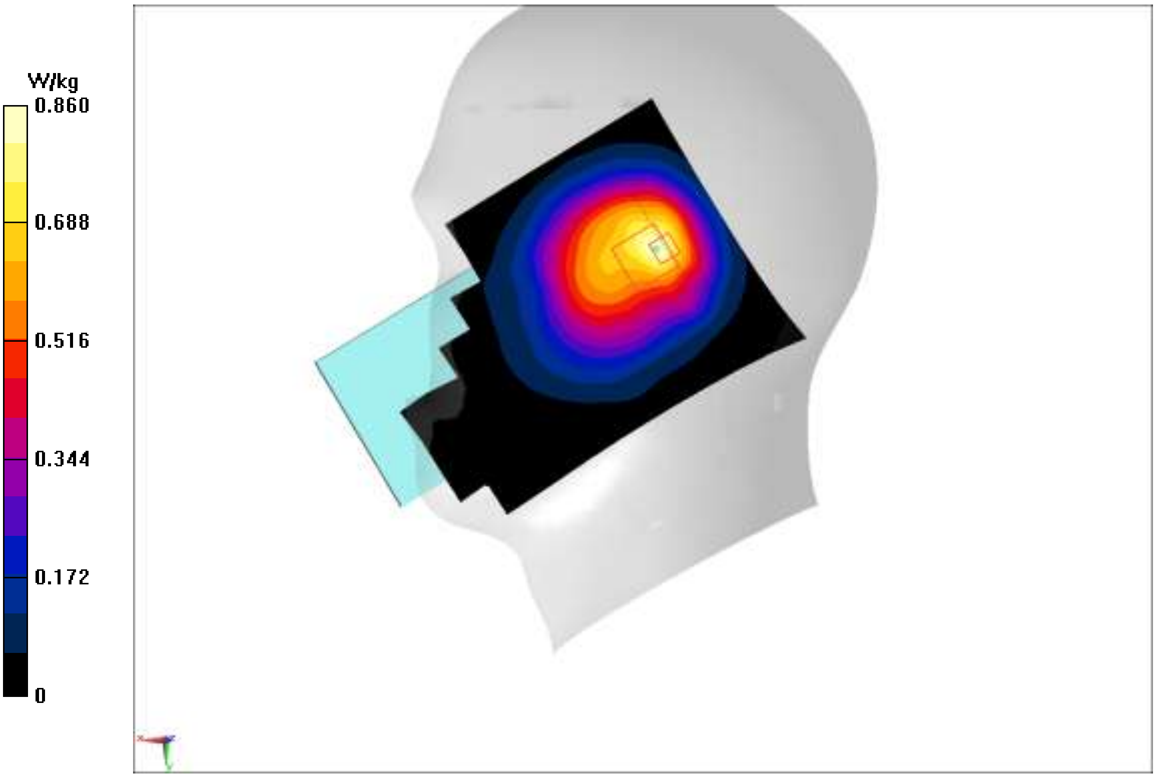


Fig A.12

WCDMA850-BV_CH4183 Rear
Date: 9/13/2020
Electronics: DAE4 Sn786
Medium: head 835 MHz
Medium parameters used: f = 836.6; σ = 0.9 mho/m; εr = 40.92; ρ = 1000 kg/m^3
Ambient Temperature: 22.5^{o}C, Liquid Temperature: 22.3^{o}C
Communication System: WCDMA850-BV 836.6 Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(9.59, 9.59, 9.59)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.197 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.4 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.187 W/kg
SAR(1 g) = 0.16 W/kg; SAR(10 g) = 0.128 W/kg
Maximum value of SAR (measured) = 0.179 W/kg

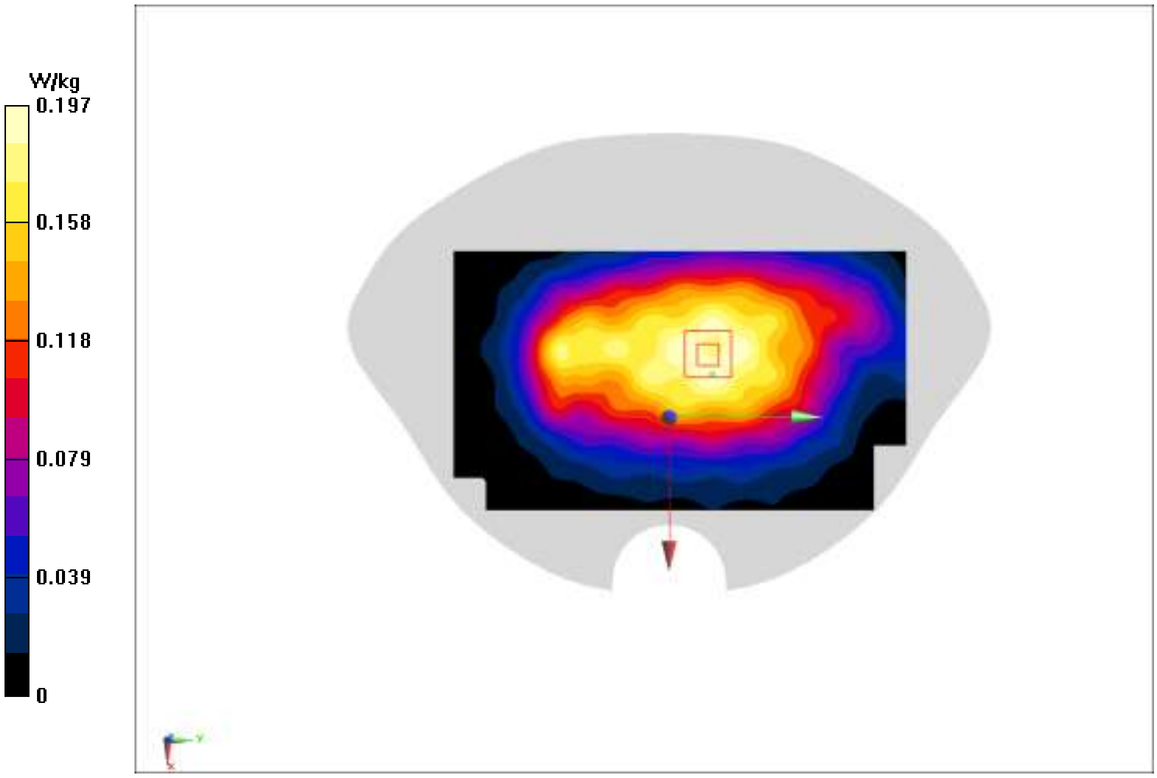


Fig A.13

LTE1900-FDD2_CH19100 Left Cheek
Date: 9/15/2020
Electronics: DAE4 Sn786
Medium: head 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.408 mho/m; εr = 40.74; ρ = 1000 kg/m^3
Ambient Temperature: 22.5^{o}C, Liquid Temperature: 22.3^{o}C
Communication System: LTE1900-FDD2 1900 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(7.76, 7.76, 7.76)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.145 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.469 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.157 W/kg
SAR(1 g) = 0.098 W/kg; SAR(10 g) = 0.050 W/kg
Maximum value of SAR (measured) = 0.134 W/kg

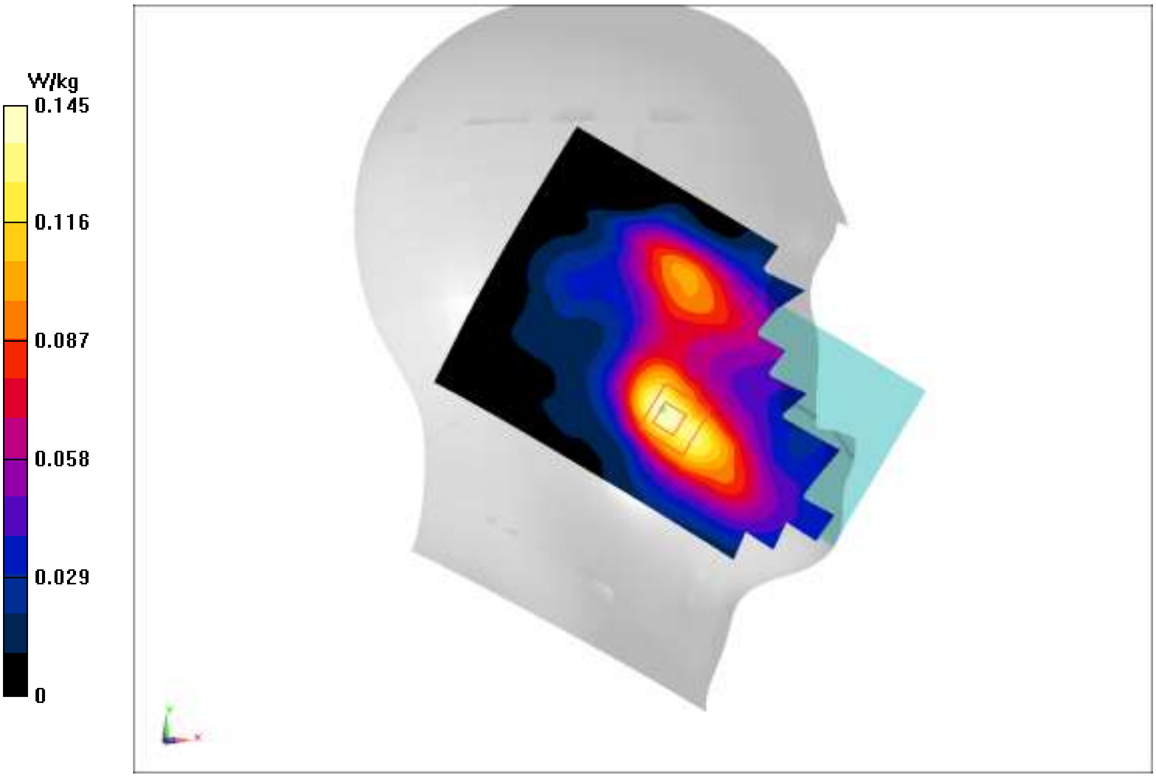


Fig A.14

LTE1900-FDD2_CH19100 Bottom
Date: 9/15/2020
Electronics: DAE4 Sn786
Medium: head 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.408 mho/m; εr = 40.74; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: LTE1900-FDD2 1900 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(7.76, 7.76, 7.76)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.5 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 30.83 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 1.69 W/kg
SAR(1 g) = 1.02 W/kg; SAR(10 g) = 0.533 W/kg
Maximum value of SAR (measured) = 1.48 W/kg

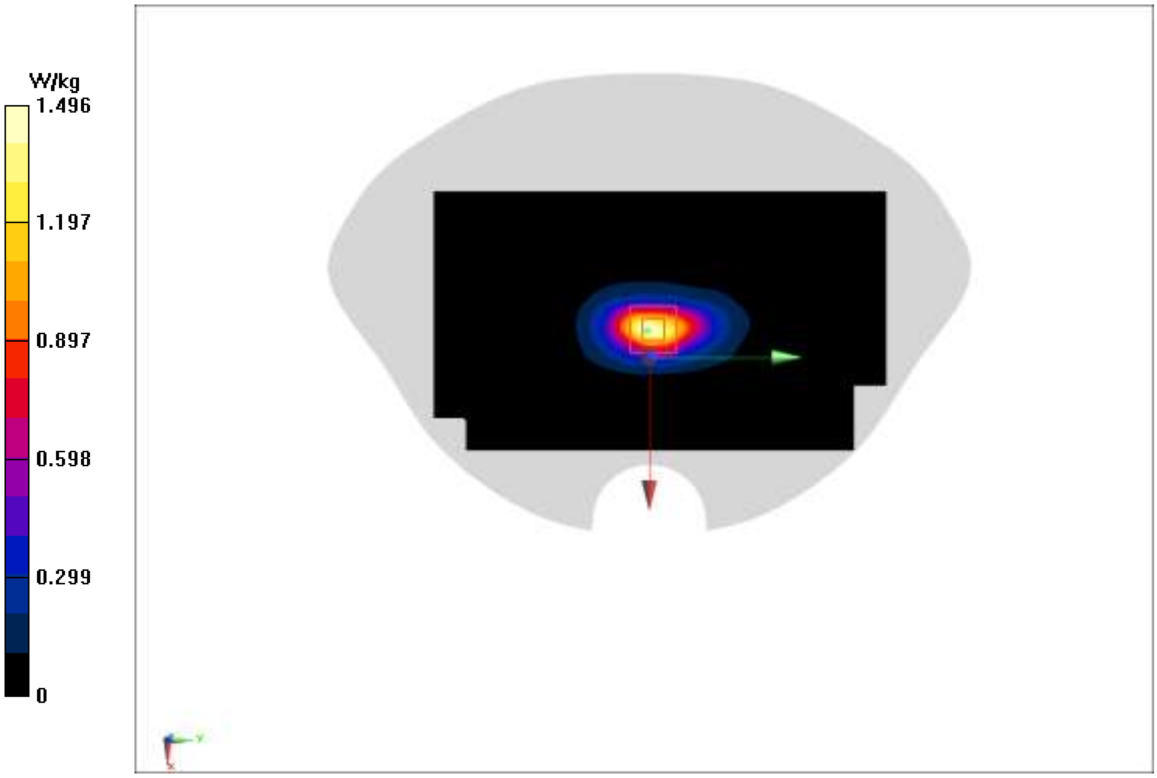


Fig A.15

LTE1900-FDD2_CH18700 Rear
Date: 9/15/2020
Electronics: DAE4 Sn786
Medium: head 1900 MHz
Medium parameters used: f = 1860 MHz; σ = 1.37 mho/m; εr = 40.79; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: LTE1900-FDD2 1860 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(7.76, 7.76, 7.76)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.03 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.34 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.25 W/kg
SAR(1 g) = 0.745 W/kg; SAR(10 g) = 0.425 W/kg
Maximum value of SAR (measured) = 1.07 W/kg

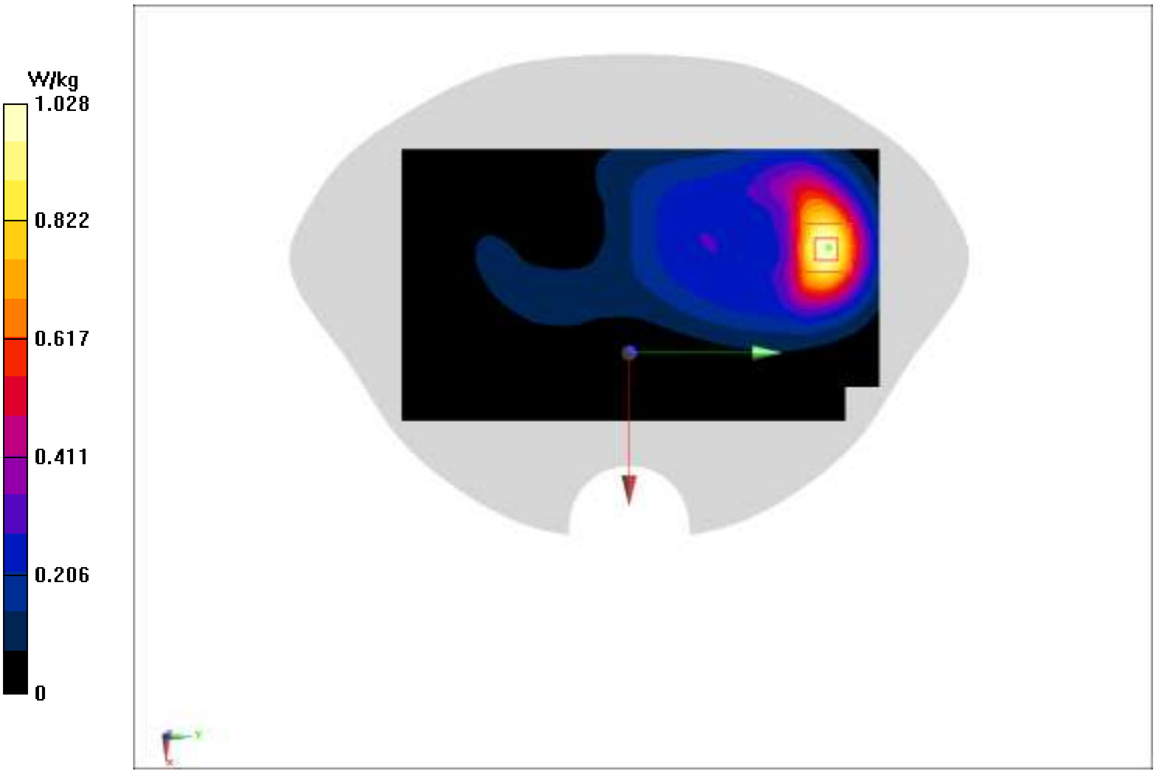


Fig A.16

LTE850-FDD5_CH20600 Right Cheek
Date: 9/13/2020
Electronics: DAE4 Sn786
Medium: head 835 MHz
Medium parameters used: f = 844 MHz; σ = 0.907 mho/m; εr = 40.91; ρ = 1000 kg/m^3
Ambient Temperature: 22.5^{o}C, Liquid Temperature: 22.3^{o}C
Communication System: LTE850-FDD5 844 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(9.59, 9.59, 9.59)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.3 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 33.91 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.77 W/kg
SAR(1 g) = 0.998 W/kg; SAR(10 g) = 0.653 W/kg
Maximum value of SAR (measured) = 1.45 W/kg

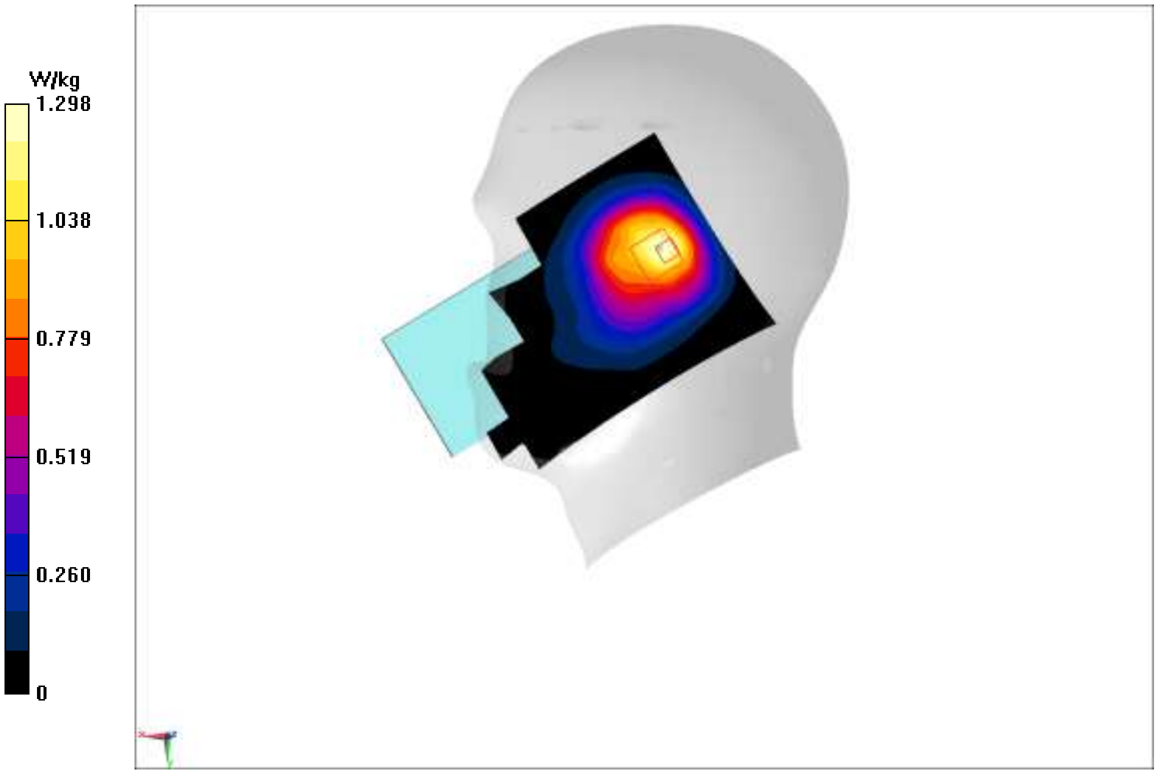


Fig A.17

LTE850-FDD5_CH20525 Rear
Date: 9/13/2020
Electronics: DAE4 Sn786
Medium: head 835 MHz
Medium parameters used: f = 836.5 MHz; σ = 0.899 mho/m; εr = 40.92; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: LTE850-FDD5 836.5 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(9.59, 9.59, 9.59)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.44 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 21.16 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.48 W/kg
SAR(1 g) = 0.331 W/kg; SAR(10 g) = 0.219 W/kg
Maximum value of SAR (measured) = 0.428 W/kg

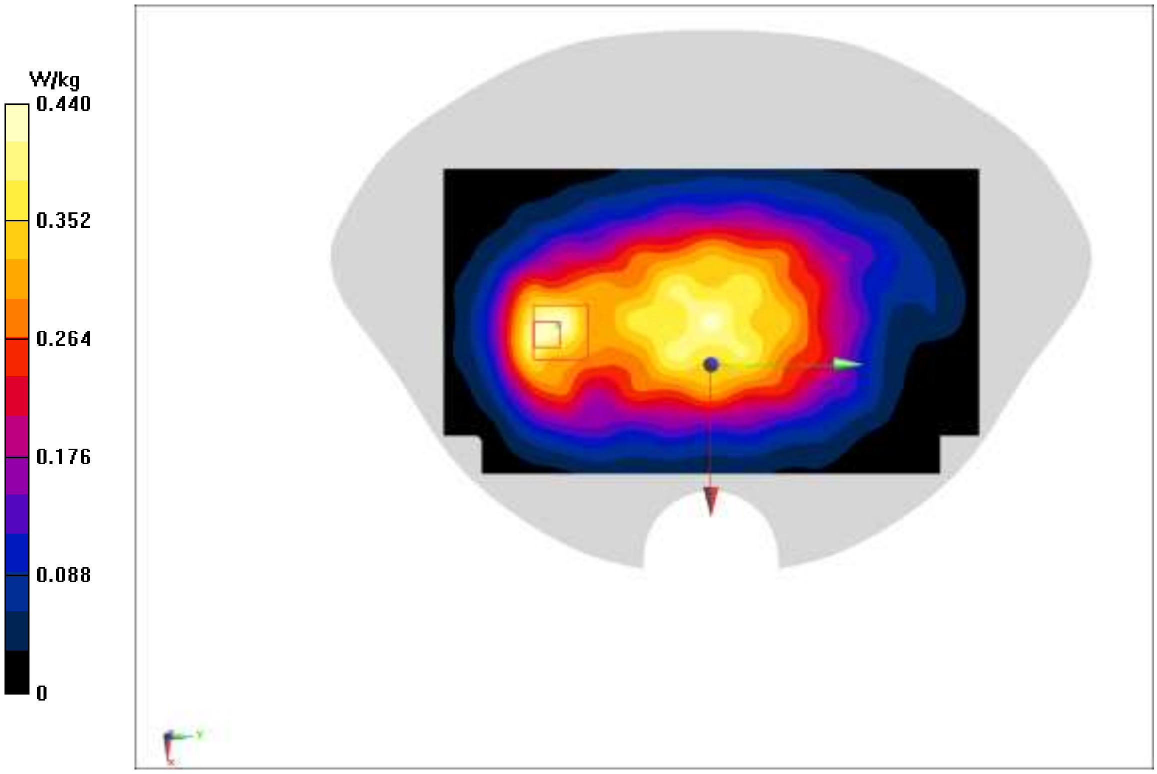


Fig A.18

LTE700-FDD12_CH23095 Left Cheek
Date: 9/12/2020
Electronics: DAE4 Sn786
Medium: head 750 MHz
Medium parameters used: f = 707.5 MHz; σ = 0.85 mho/m; εr = 41.33; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: LTE700-FDD12 707.5 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(9.59, 9.59, 9.59)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.611 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 21.95 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.787 W/kg
SAR(1 g) = 0.461 W/kg; SAR(10 g) = 0.346 W/kg
Maximum value of SAR (measured) = 0.628 W/kg

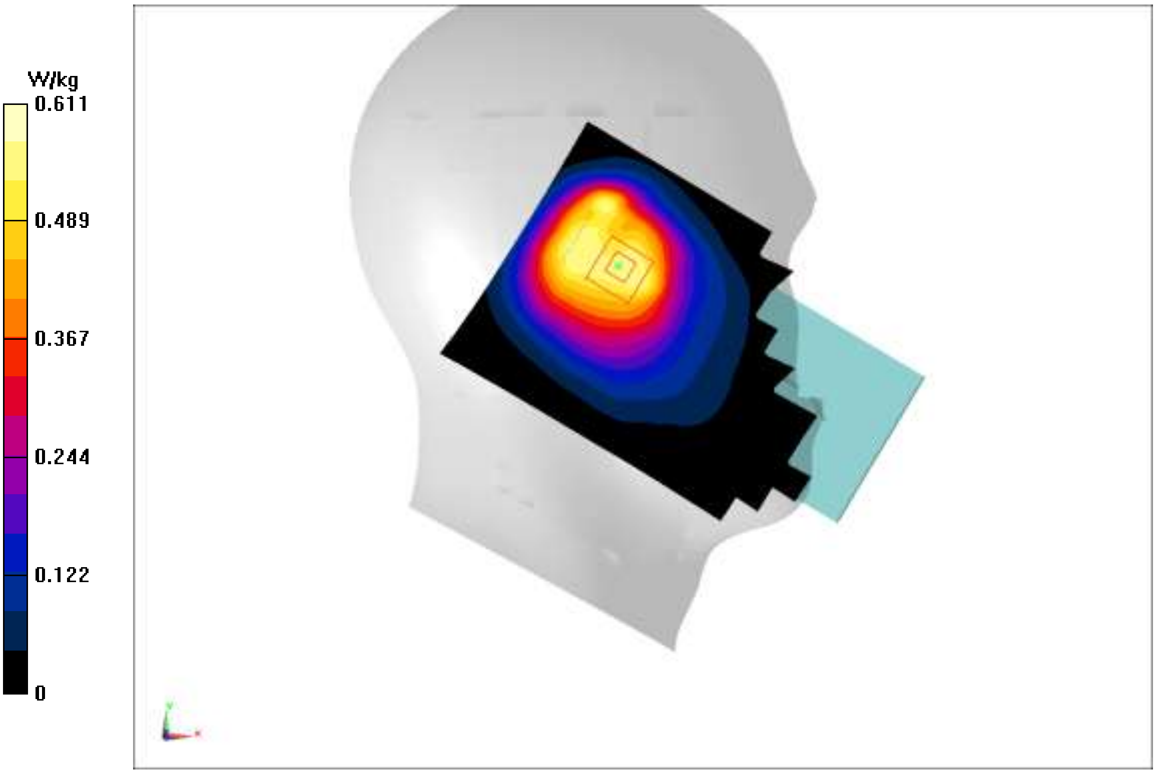


Fig A.19

LTE700-FDD12_CH23095 Right
Date: 9/12/2020
Electronics: DAE4 Sn786
Medium: head 750 MHz
Medium parameters used: f = 707.5 MHz; σ = 0.85 mho/m; εr = 41.33; ρ = 1000 kg/m^3
Ambient Temperature: 22.5^{o}C, Liquid Temperature: 22.3^{o}C
Communication System: LTE700-FDD12 707.5 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(9.59, 9.59, 9.59)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.361 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.53 V/m; Power Drift = 0 dB
Peak SAR (extrapolated) = 0.372 W/kg
SAR(1 g) = 0.284 W/kg; SAR(10 g) = 0.207 W/kg
Maximum value of SAR (measured) = 0.336 W/kg

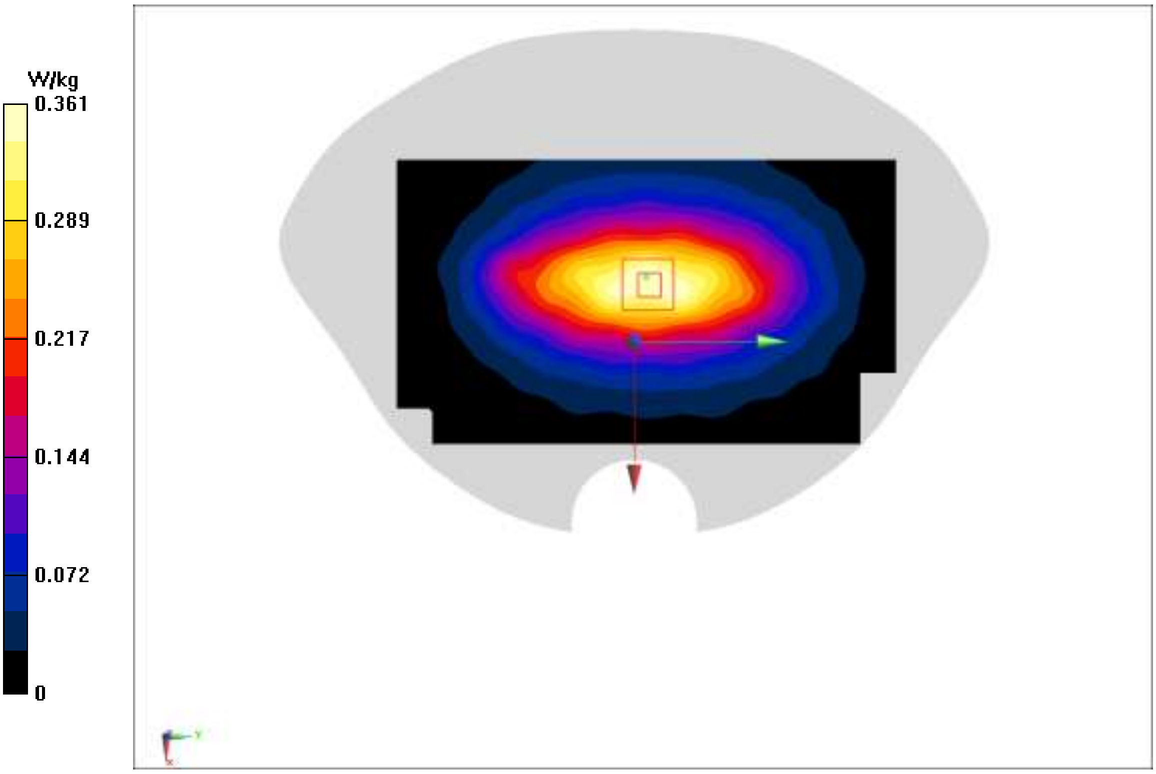


Fig A.20

LTE750-FDD13_CH23230 Left Cheek
Date: 9/12/2020
Electronics: DAE4 Sn786
Medium: head 750 MHz
Medium parameters used: f = 782 MHz; σ = 0.92 mho/m; εr = 41.24; ρ = 1000 kg/m^3
Ambient Temperature: 22.5^{o}C, Liquid Temperature: 22.3^{o}C
Communication System: LTE750-FDD13 782 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(9.59, 9.59, 9.59)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.264 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.608 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.275 W/kg
SAR(1 g) = 0.22 W/kg; SAR(10 g) = 0.18 W/kg
Maximum value of SAR (measured) = 0.255 W/kg

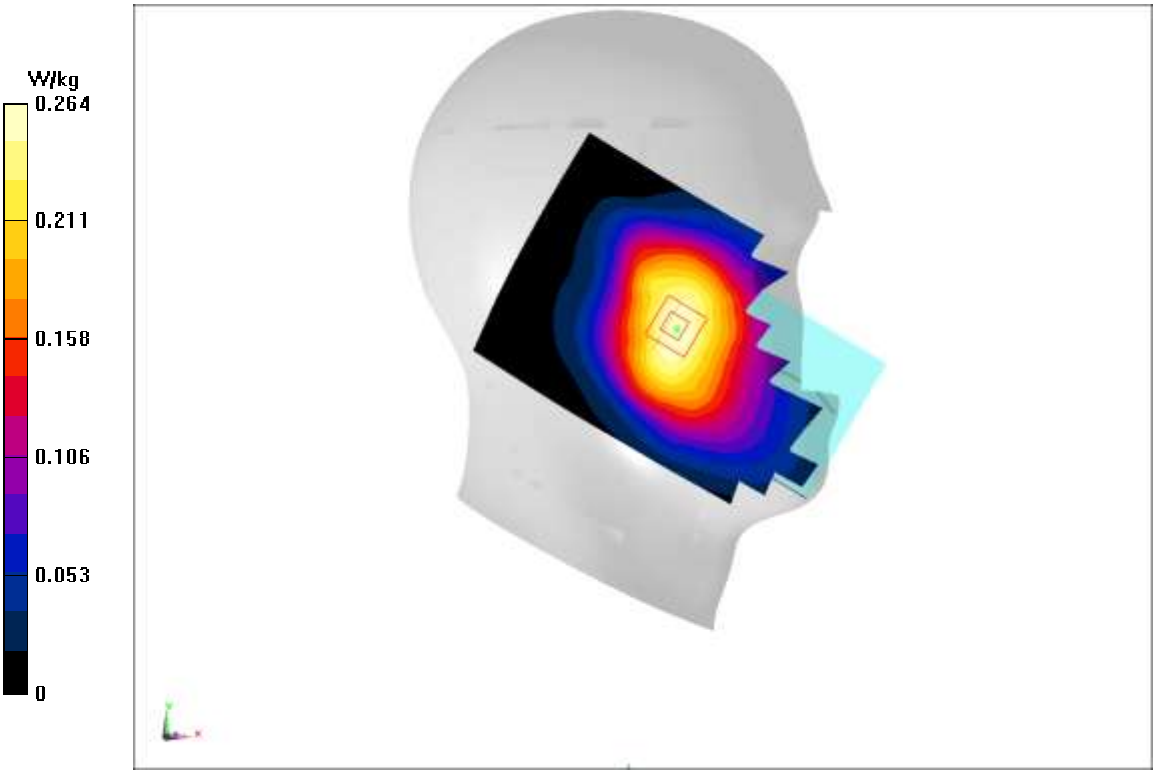


Fig A.21

LTE750-FDD13_CH23230 Right
Date: 9/12/2020
Electronics: DAE4 Sn786
Medium: head 750 MHz
Medium parameters used: f = 782 MHz; σ = 0.92 mho/m; εr = 41.24; ρ = 1000 kg/m^3
Ambient Temperature: 22.5^{o}C, Liquid Temperature: 22.3^{o}C
Communication System: LTE750-FDD13 782 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(9.59, 9.59, 9.59)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.74 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.37 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.814 W/kg
SAR(1 g) = 0.452 W/kg; SAR(10 g) = 0.233 W/kg
Maximum value of SAR (measured) = 0.689 W/kg

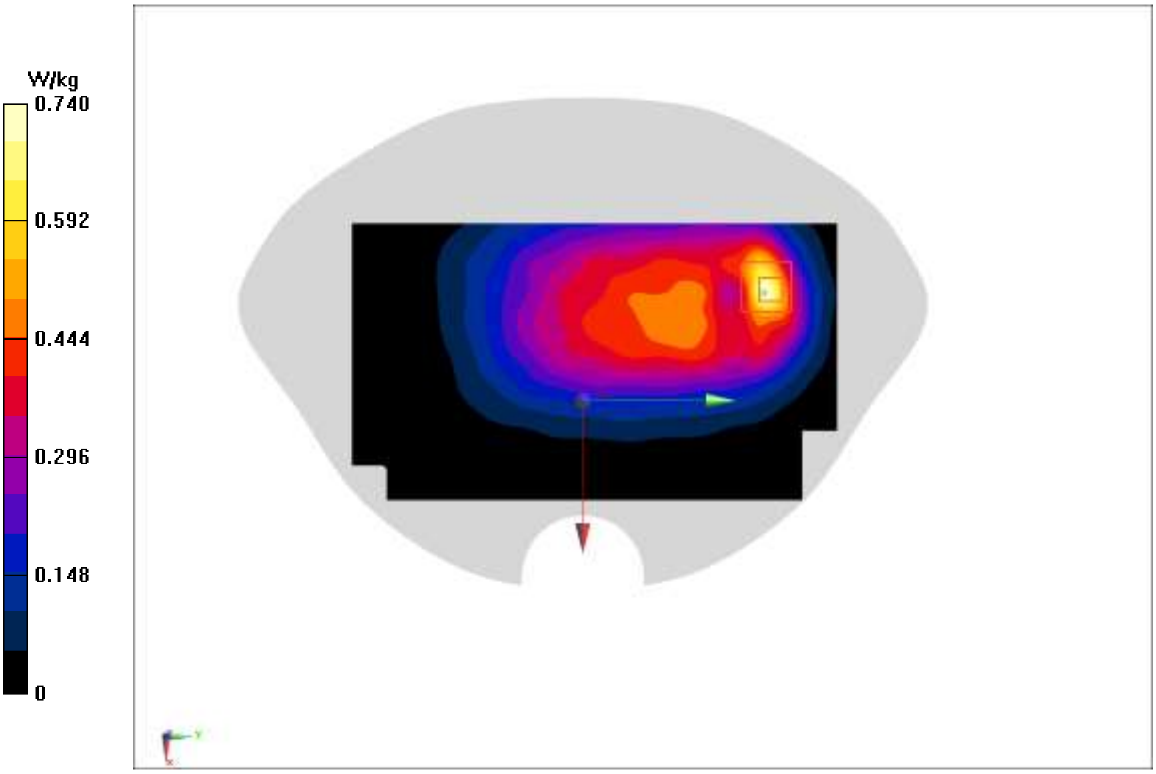


Fig A.22

LTE1700-FDD66_CH132072 Right Cheek
Date: 9/14/2020
Electronics: DAE4 Sn786
Medium: head 1750 MHz
Medium parameters used: f = 782 MHz; σ = 0.438 mho/m; εr = 40.85; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: LTE1700-FDD66 782 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(8.09, 8.09, 8.09)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.361 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.164 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.34 W/kg
SAR(1 g) = 0.227 W/kg; SAR(10 g) = 0.145 W/kg
Maximum value of SAR (measured) = 0.299 W/kg

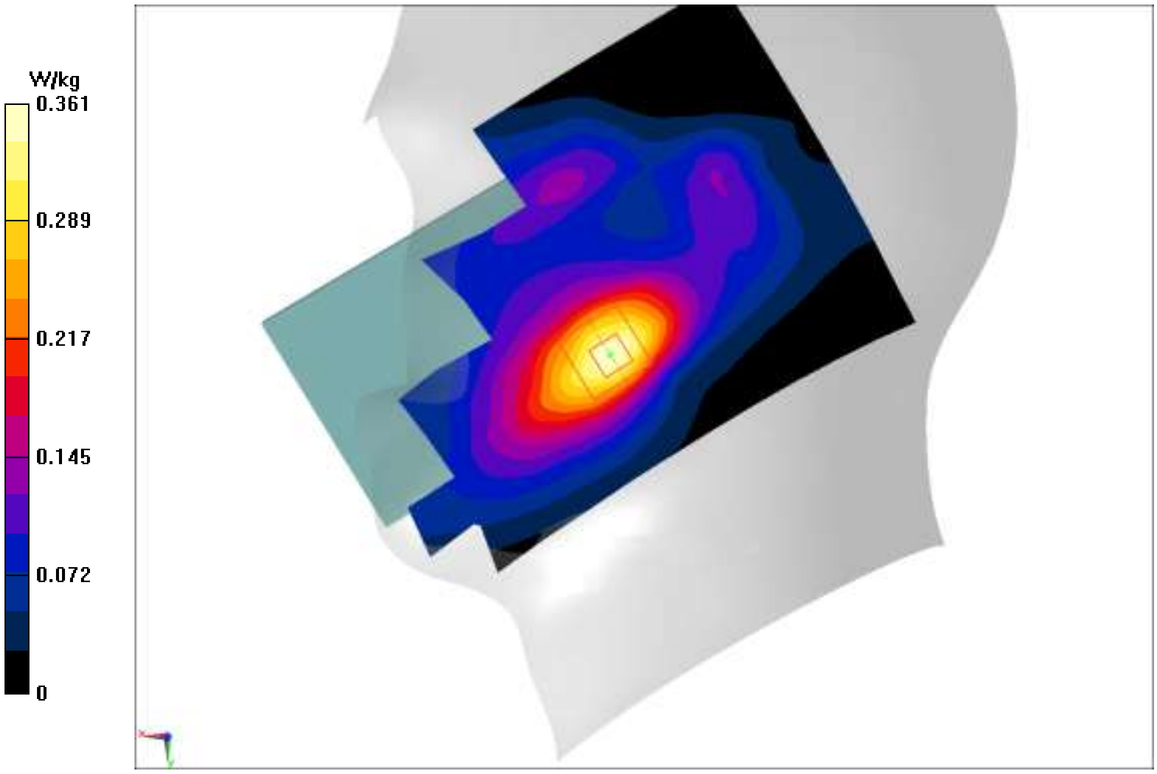


Fig A.23

LTE1700-FDD66_CH132322 Bottom
Date: 9/14/2020
Electronics: DAE4 Sn786
Medium: head 1750 MHz
Medium parameters used: f = 782 MHz; σ = 0.438 mho/m; εr = 40.85; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: LTE1700-FDD66 782 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(8.09, 8.09, 8.09)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.64 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.83 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 2 W/kg
SAR(1 g) = 1.09 W/kg; SAR(10 g) = 0.556 W/kg
Maximum value of SAR (measured) = 1.68 W/kg

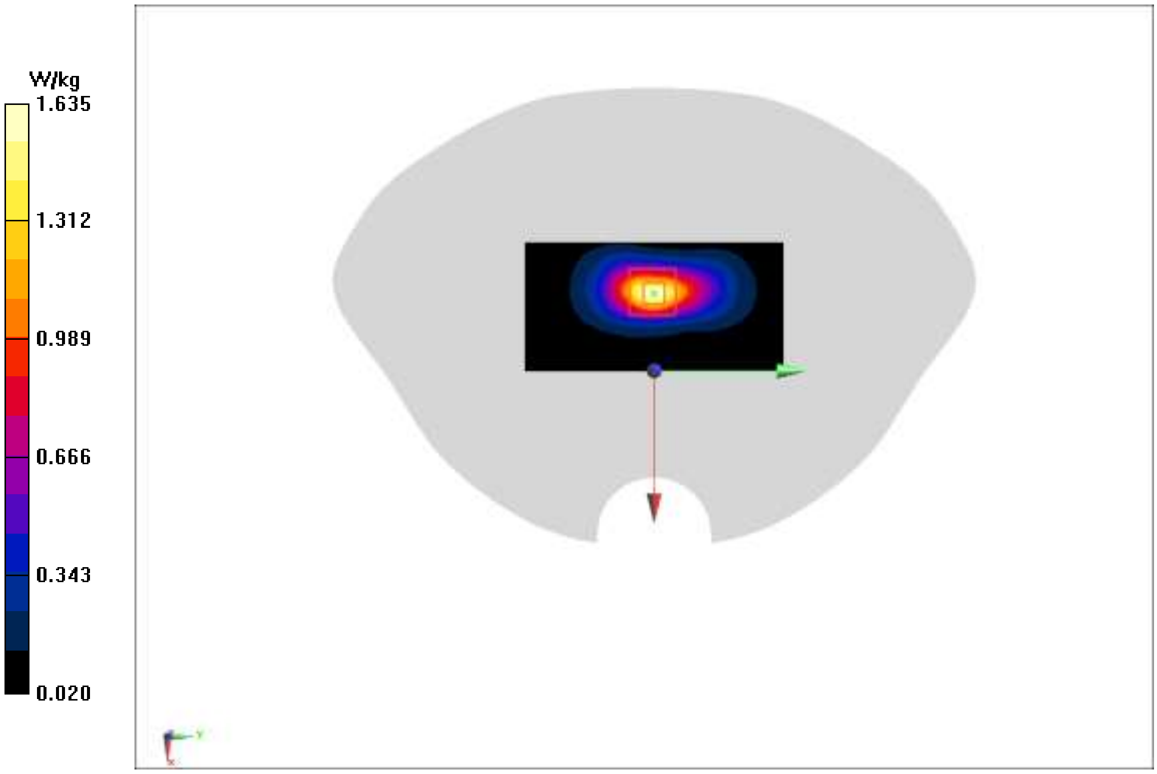


Fig A.24

LTE1700-FDD66_CH132322 Front
Date: 9/14/2020
Electronics: DAE4 Sn786
Medium: head 1750 MHz
Medium parameters used: f = 782 MHz; σ = 0.438 mho/m; εr = 40.85; ρ = 1000 kg/m^3
Ambient Temperature: 22.5^{o}C, Liquid Temperature: 22.3^{o}C
Communication System: LTE1700-FDD66 782 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(8.09, 8.09, 8.09)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.975 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.33 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.16 W/kg
SAR(1 g) = 0.754 W/kg; SAR(10 g) = 0.452 W/kg
Maximum value of SAR (measured) = 1.02 W/kg

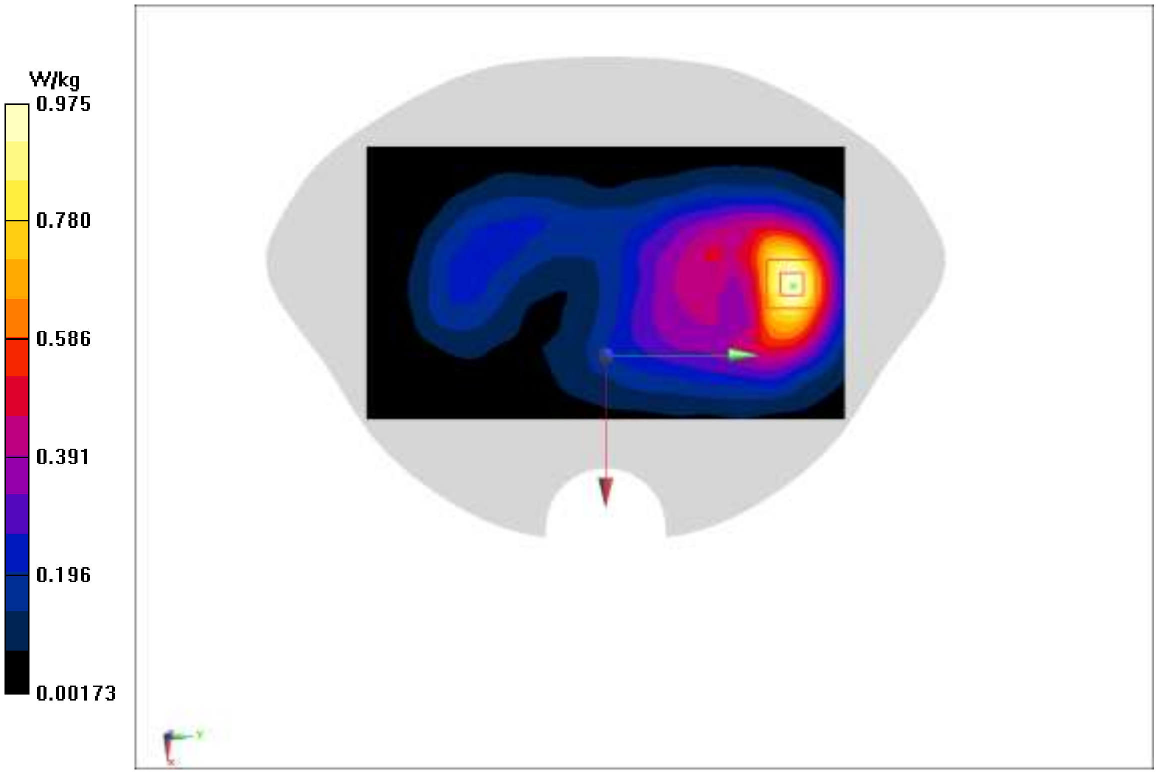


Fig A.25

WLAN2450_CH1 Right Cheek
Date: 9/16/2020
Electronics: DAE4 Sn786
Medium: head 2450 MHz
Medium parameters used: f = 2412; σ = 1.8 mho/m; εr = 39.24; ρ = 1000 kg/m^3
Ambient Temperature: 22.5^{o}C, Liquid Temperature: 22.3^{o}C
Communication System: WLAN2450 2412 Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(7.43, 7.43, 7.43)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.443 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.583 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.483 W/kg
SAR(1 g) = 0.29 W/kg; SAR(10 g) = 0.154 W/kg
Maximum value of SAR (measured) = 0.413 W/kg

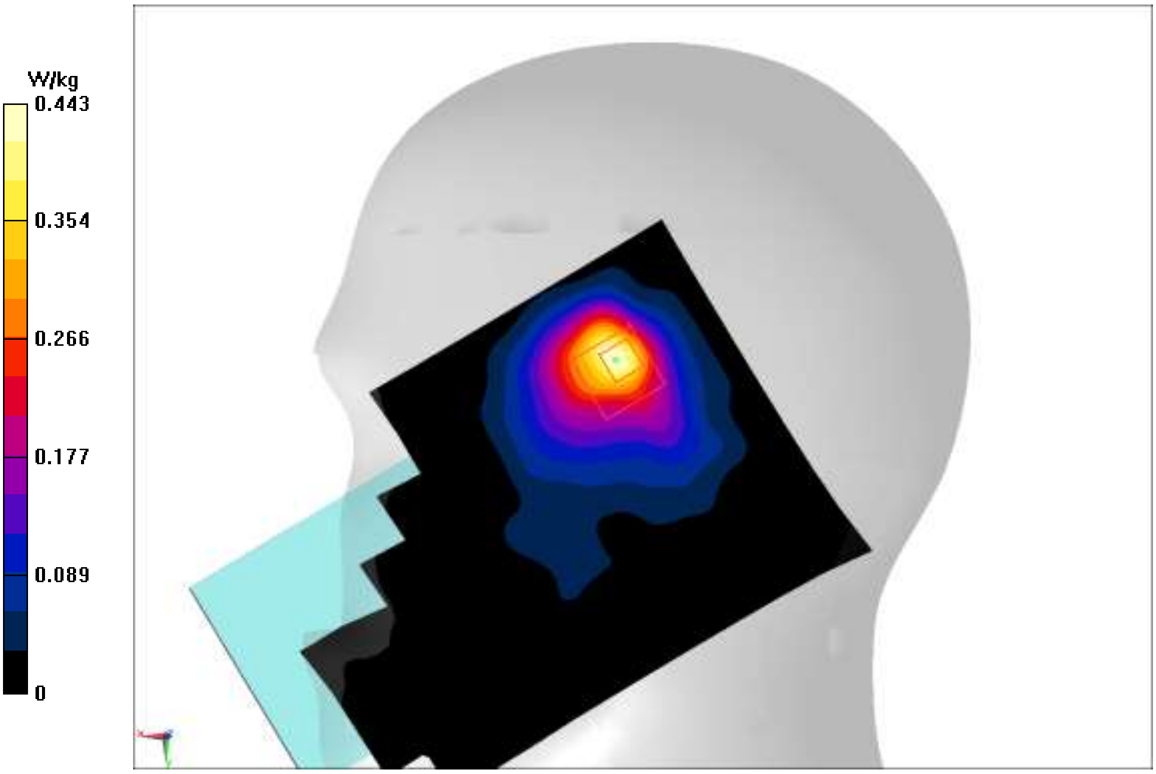


Fig A.26

WLAN2450_CH1 Rear
Date: 9/16/2020
Electronics: DAE4 Sn786
Medium: head 2450 MHz
Medium parameters used: f = 2412; σ = 1.8 mho/m; εr = 39.24; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: WLAN2450 2412 Duty Cycle: 1：1
Probe: EX3DV4 – SN3633 ConvF(7.43, 7.43, 7.43)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.249 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.781 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.325 W/kg
SAR(1 g) = 0.16 W/kg; SAR(10 g) = 0.077 W/kg
Maximum value of SAR (measured) = 0.245 W/kg

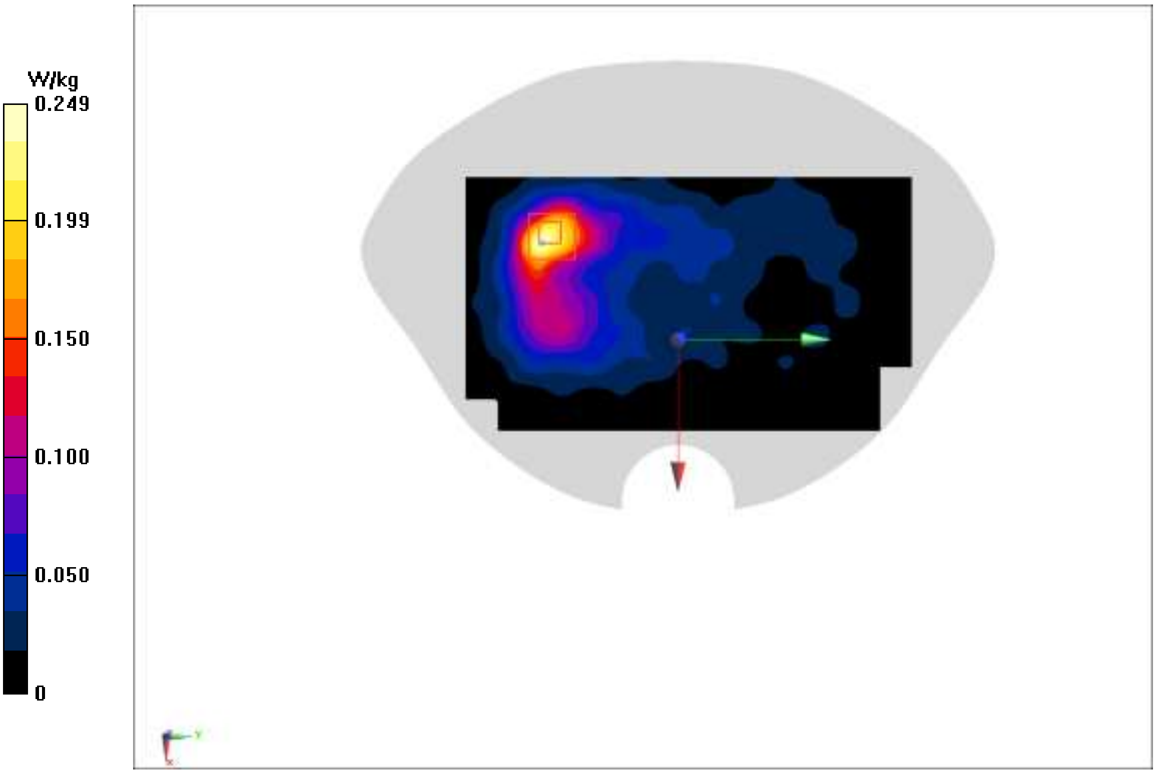


Fig A.27

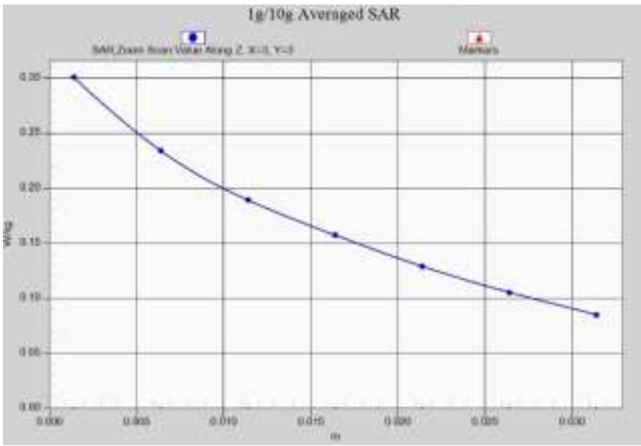


Fig. 1-1 Z-Scan at power reference point (850 MHz)

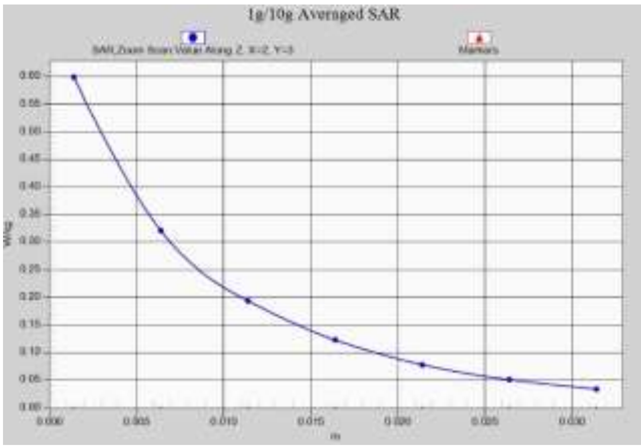


Fig. 1-2 Z-Scan at power reference point (850 MHz)

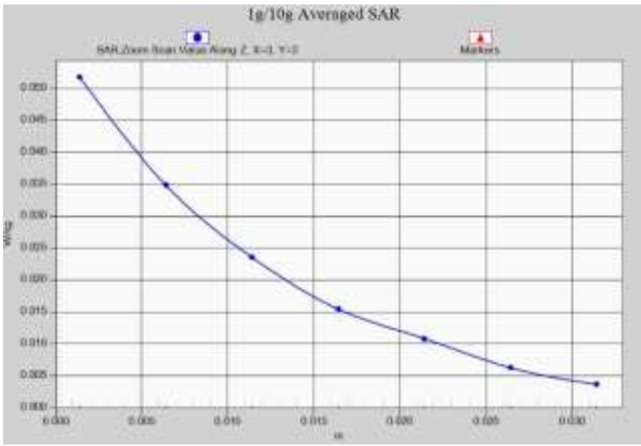


Fig. 1-3 Z-Scan at power reference point (1900 MHz)

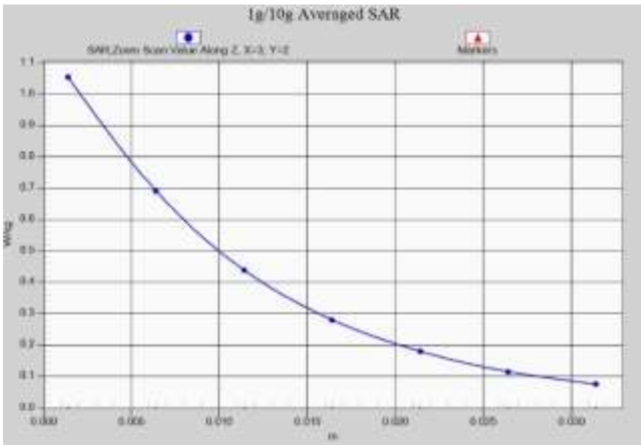


Fig. 1-4　Z-Scan at power reference point (1900 MHz)

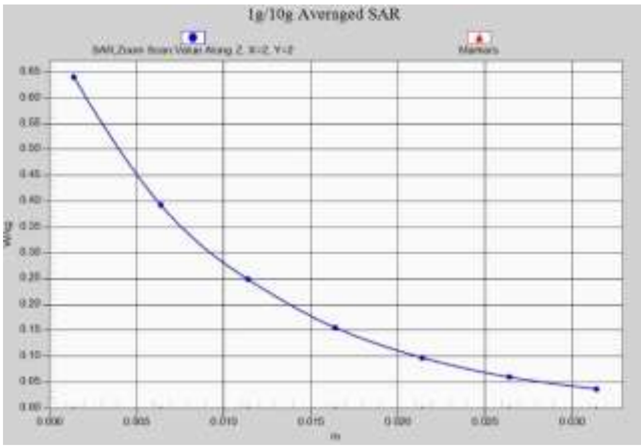


Fig. 1-5　Z-Scan at power reference point (1900 MHz)

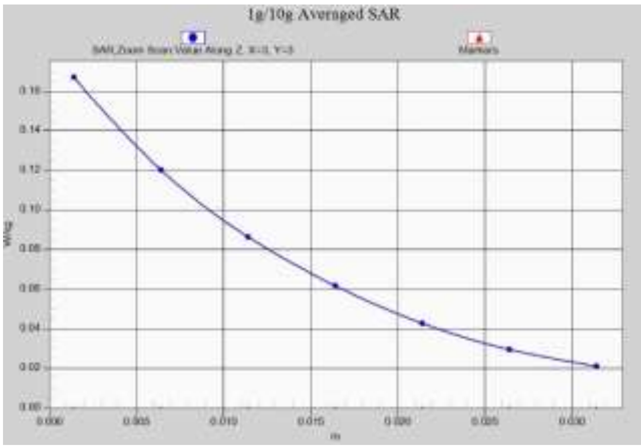


Fig. 1-6　Z-Scan at power reference point (WCDMA1900)

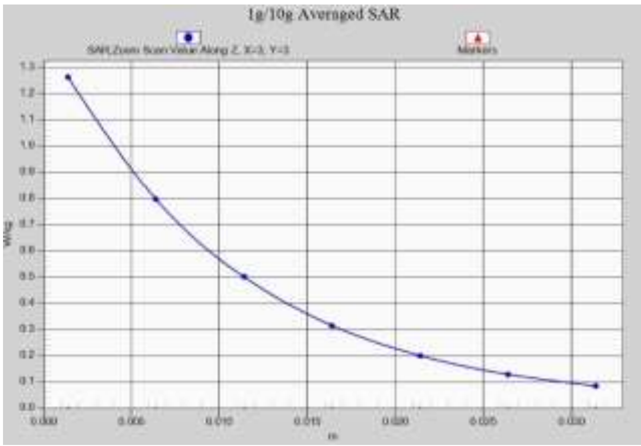


Fig. 1-7   Z-Scan at power reference point (WCDMA1900)

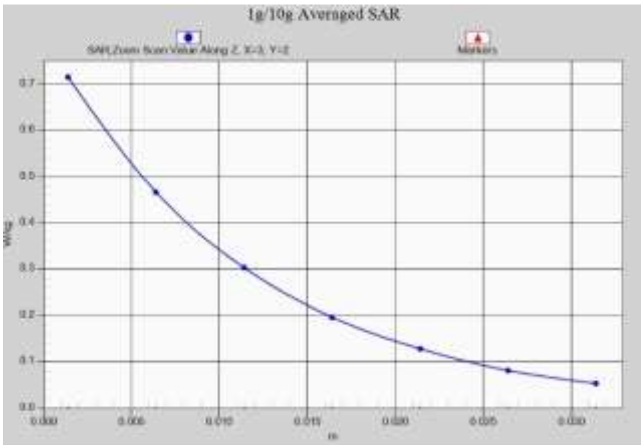


Fig. 1-8   Z-Scan at power reference point (WCDMA1900)

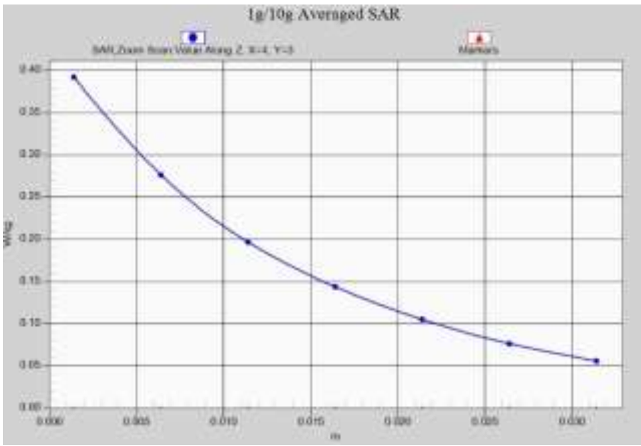


Fig. 1-9   Z-Scan at power reference point (WCDMA1700)

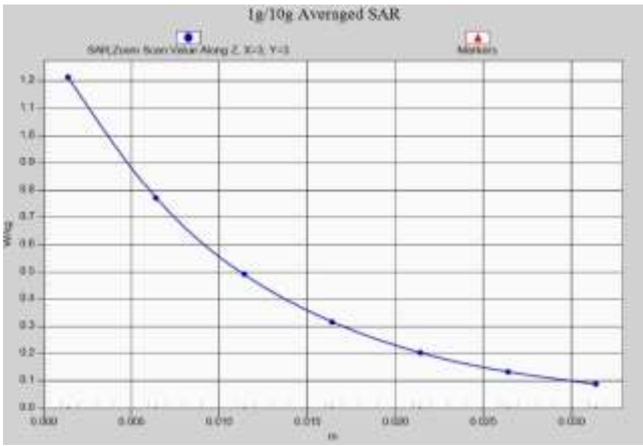


Fig. 1-10 Z-Scan at power reference point (WCDMA1700)

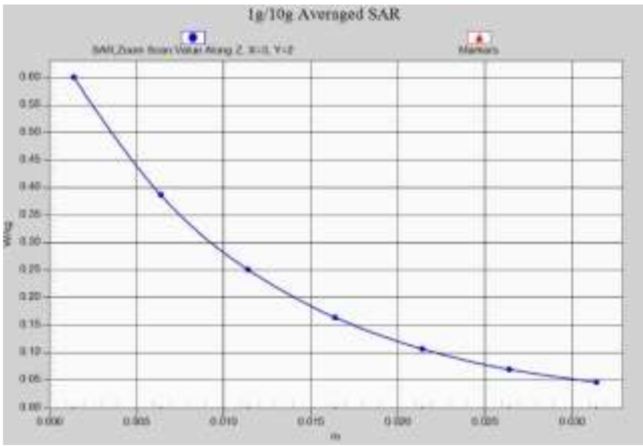


Fig. 1-11 Z-Scan at power reference point (WCDMA1700)

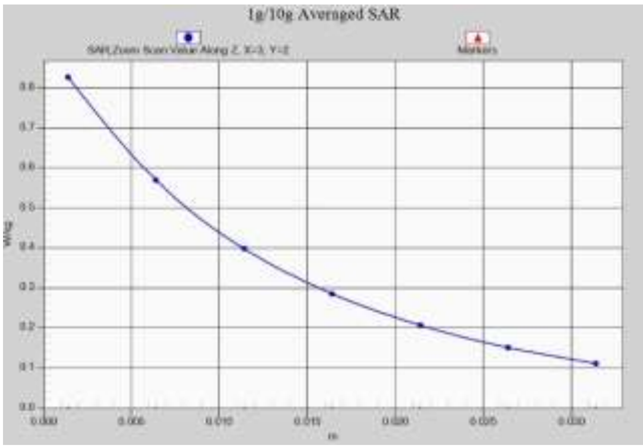


Fig. 1-12 Z-Scan at power reference point (WCDMA850)

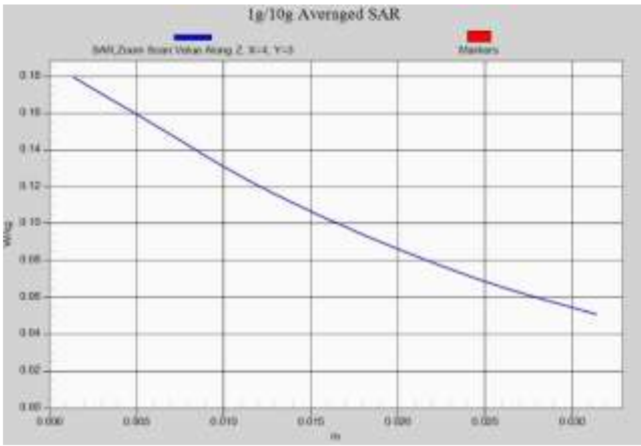


Fig. 1-13 Z-Scan at power reference point (WCDMA850)

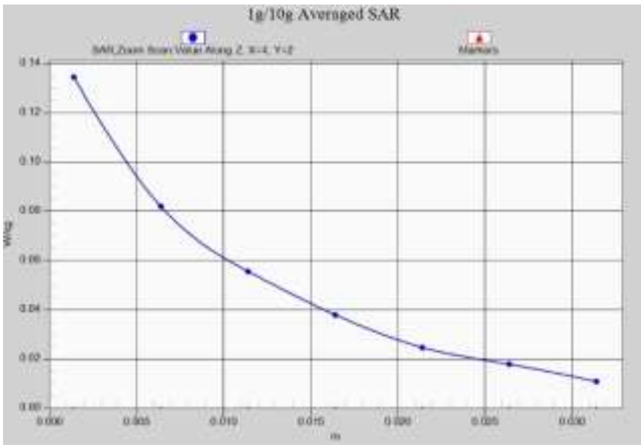


Fig. 1-14 Z-Scan at power reference point (LTE Band2)

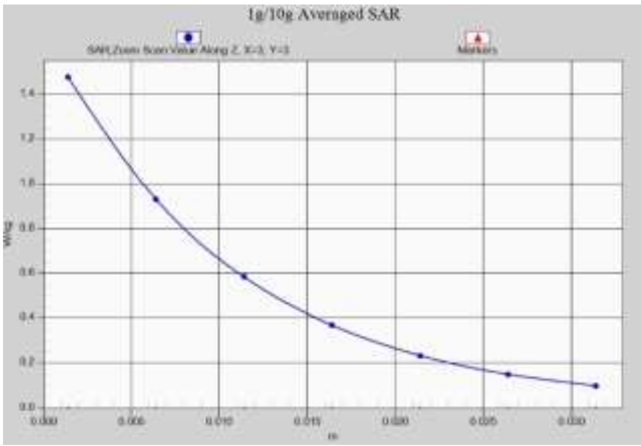


Fig. 1-15 Z-Scan at power reference point (LTE Band2)

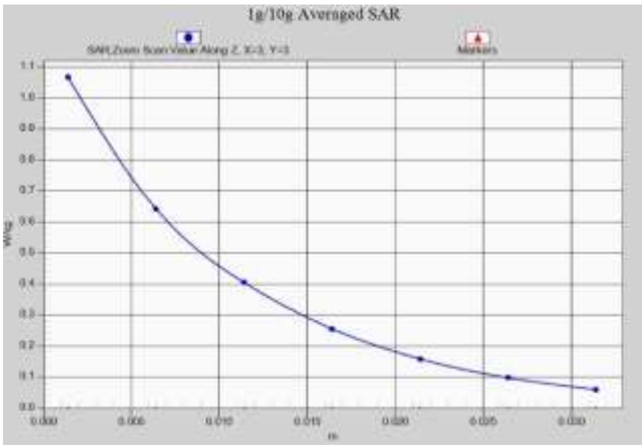


Fig. 1-16 Z-Scan at power reference point (LTE Band2)

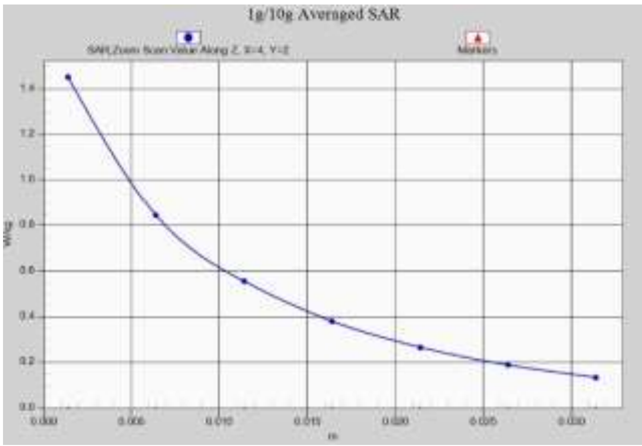


Fig. 1-18 Z-Scan at power reference point (LTE Band5)

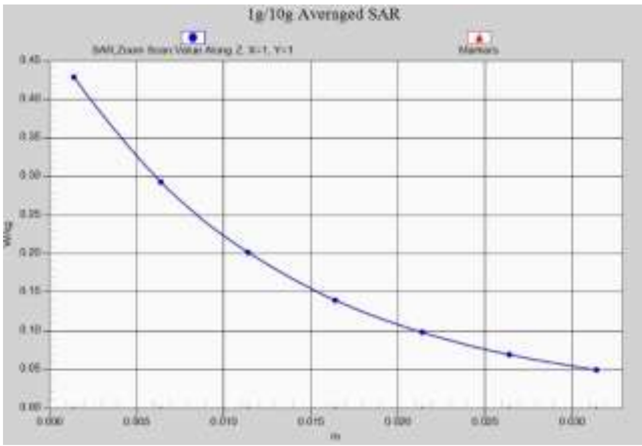


Fig. 1-18 Z-Scan at power reference point (LTE Band5)

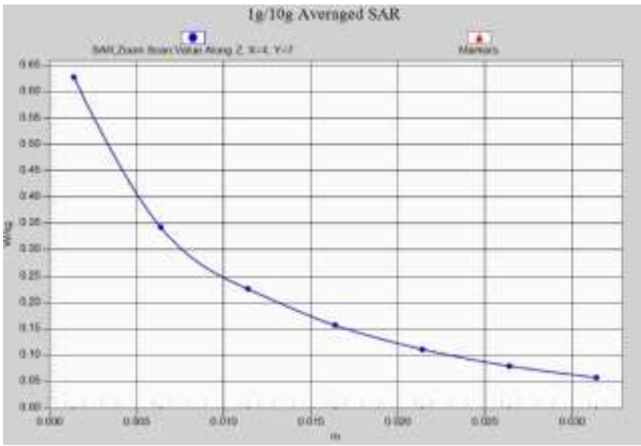


Fig. 1-19 Z-Scan at power reference point (LTE Band12)

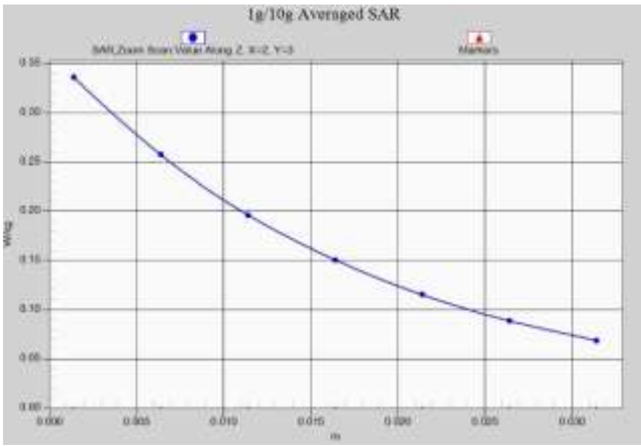


Fig. 1-20 Z-Scan at power reference point (LTE Band12)

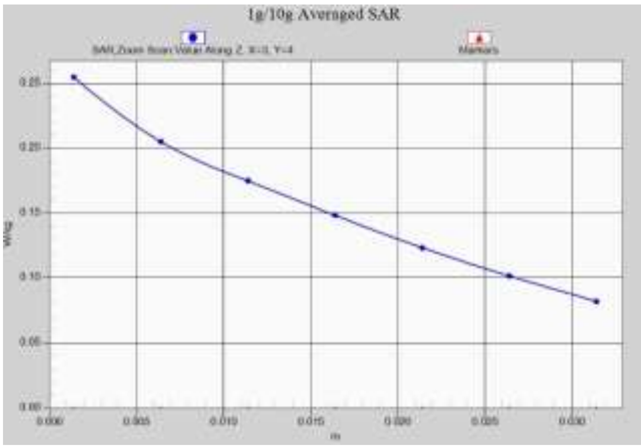


Fig. 1-21 Z-Scan at power reference point (LTE Band13)

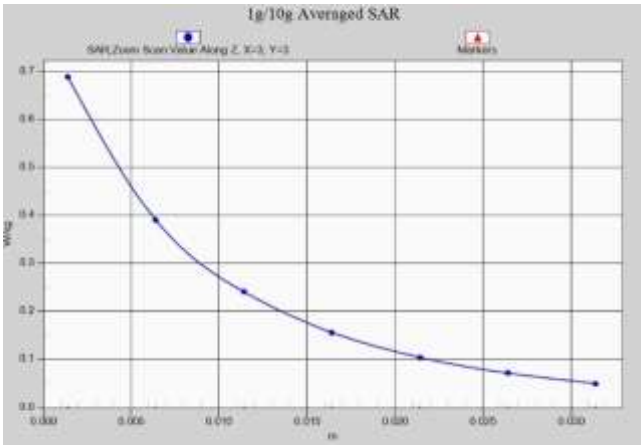


Fig. 1-22 Z-Scan at power reference point (LTE Band13)

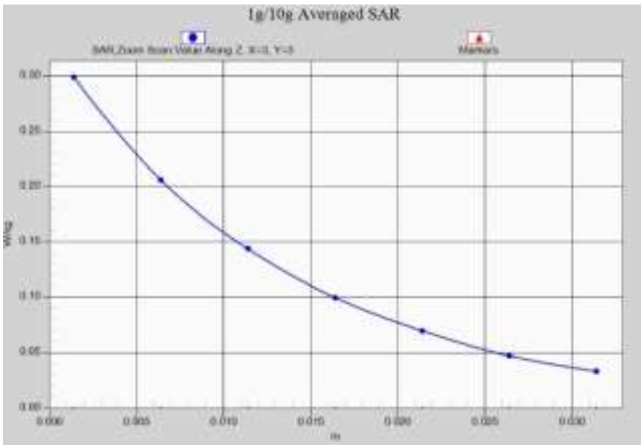


Fig. 1-23 Z-Scan at power reference point (LTE Band66)

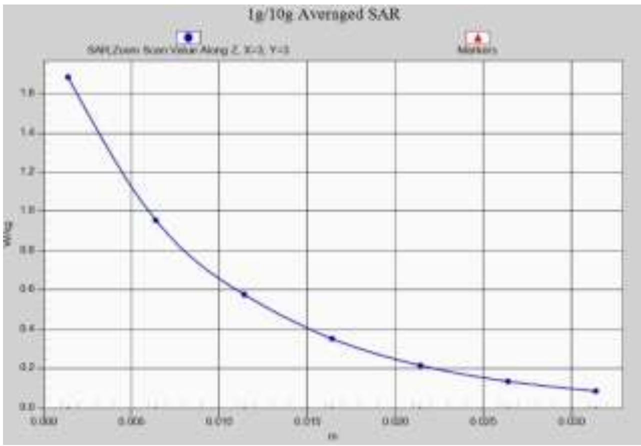


Fig. 1-24 Z-Scan at power reference point (LTE Band66)

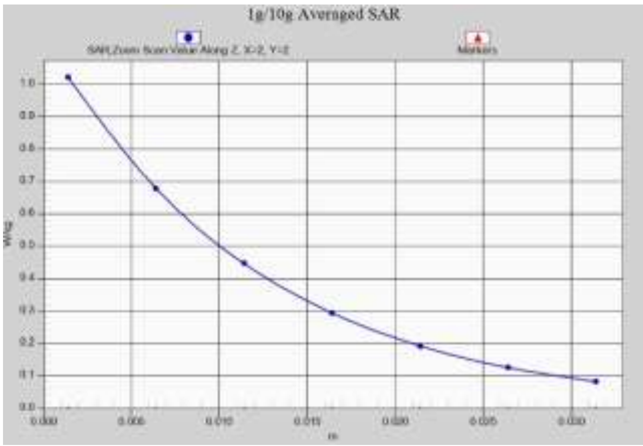


Fig. 1-25 Z-Scan at power reference point (LTE Band66)

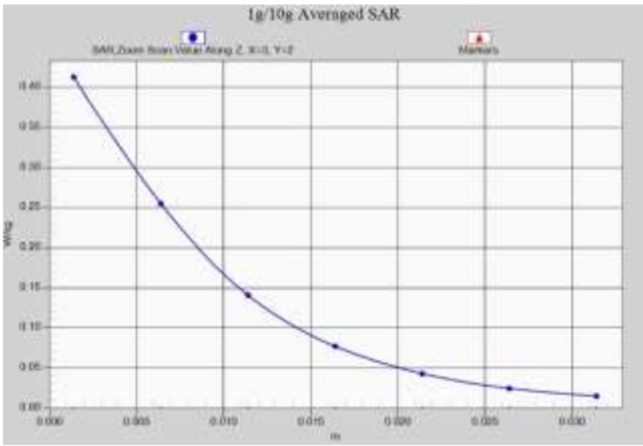


Fig. 1-26 Z-Scan at power reference point (wifi2450)

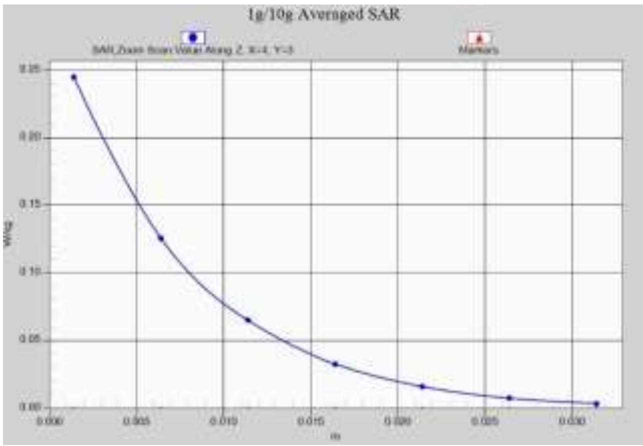


Fig. 1-27 Z-Scan at power reference point (wifi2450)

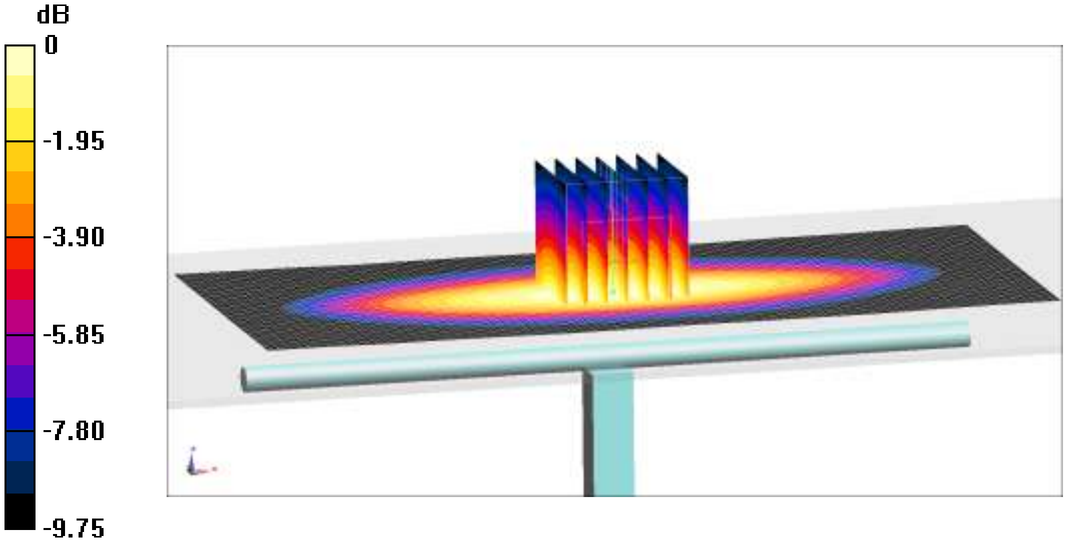
ANNEX B: System Verification Results

750 MHz

Date: 9/12/2020
Electronics: DAE4 Sn786
Medium: Head 750 MHz
Medium parameters used: f = 750 MHz; σ =0.89 mho/m; ε_r = 41.28; ρ = 1000 kg/m^3
Ambient Temperature: 22.5^{o}C Liquid Temperature: 22.3^{o}C
Communication System: CW Frequency: 750 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3633 ConvF(9.59, 9.59, 9.59)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 59.36 V/m; Power Drift = 0.02
Fast SAR: SAR(1 g) = 2.08 W/kg; SAR(10 g) = 1.37 W/kg
Maximum value of SAR (interpolated) = 2.78 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =59.36 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.2 W/kg
SAR(1 g) = 2.08 W/kg; SAR(10 g) = 1.39 W/kg
Maximum value of SAR (measured) = 2.91 W/kg



0 dB = 2.91 W/kg = 4.64 dB W/kg

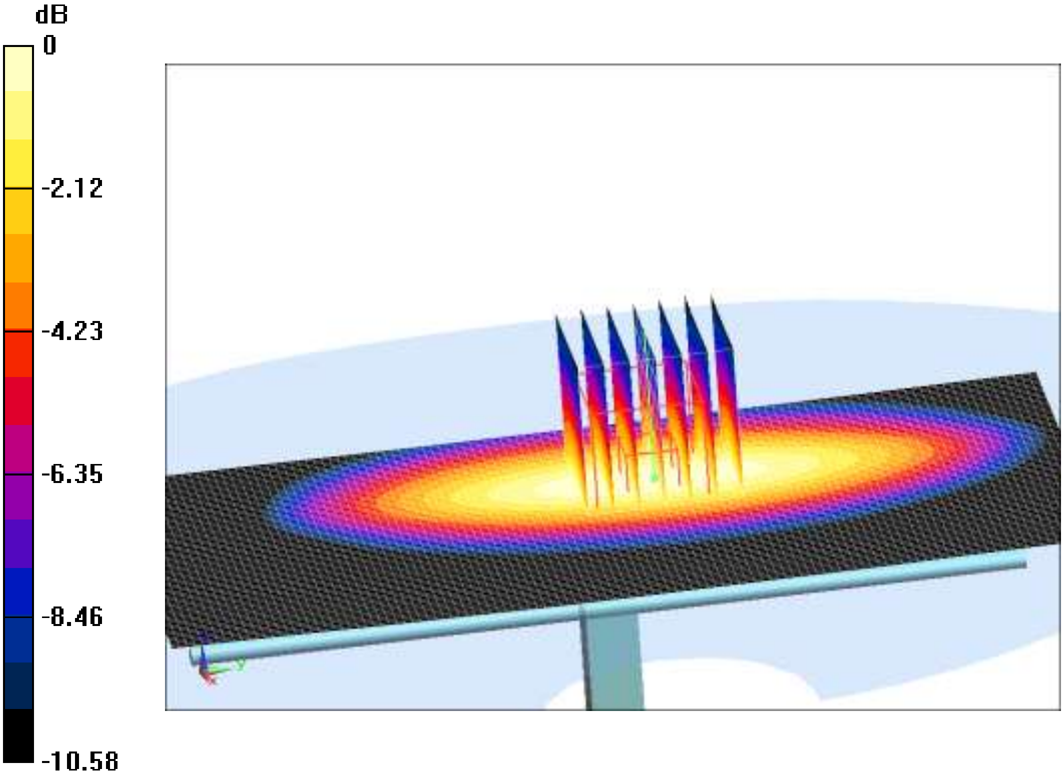
Fig.B.1 validation 750 MHz 250mW

835 MHz

Date: 9/13/2020
Electronics: DAE4 Sn786
Medium: Head 835 MHz
Medium parameters used: f = 835 MHz; σ =0.898 mho/m; ε_r = 40.92; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C
Communication System: CW Frequency: 835 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3633 ConvF(9.59, 9.59, 9.59)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 64.22 V/m; Power Drift = -0.08
Fast SAR: SAR(1 g) = 2.4 W/kg; SAR(10 g) = 1.55 W/kg
Maximum value of SAR (interpolated) = 3.23 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =64.22 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 3.64 W/kg
SAR(1 g) = 2.41 W/kg; SAR(10 g) = 1.59 W/kg
Maximum value of SAR (measured) = 3.25 W/kg



0 dB = 3.25 W/kg = 5.12 dB W/kg

Fig.B.2 validation 835 MHz 250mW

1750 MHz

Date: 9/14/2020
Electronics: DAE4 Sn786
Medium: Head 1750 MHz
Medium parameters used: f = 1750 MHz; σ =1.358 mho/m; ε_r = 39.69; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C
Communication System: CW Frequency: 1750 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3633 ConvF(8.09, 8.09, 8.09)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 104.11 V/m; Power Drift = 0.06

Fast SAR: SAR(1 g) = 9.04 W/kg; SAR(10 g) = 4.69 W/kg

Maximum value of SAR (interpolated) = 14.07 W/kg

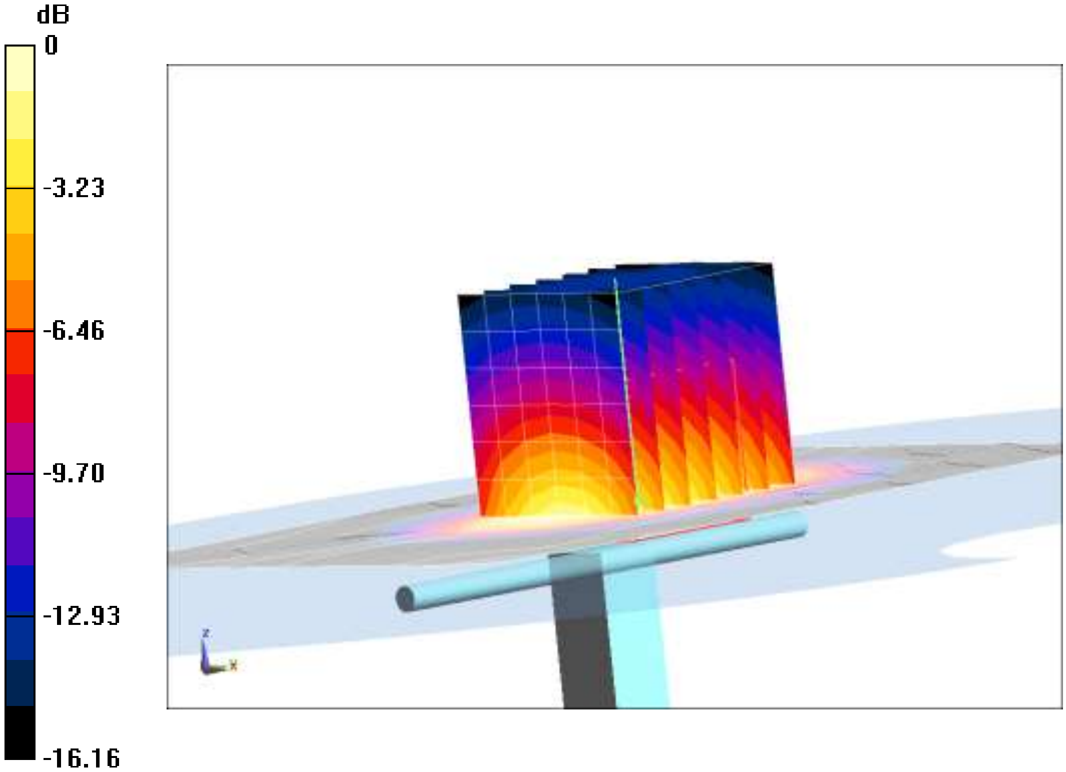
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value =104.11 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 16.62 W/kg

SAR(1 g) = 9.02 W/kg; SAR(10 g) = 4.79 W/kg

Maximum value of SAR (measured) = 14.34 W/kg



0 dB = 14.34 W/kg = 11.57 dB W/kg

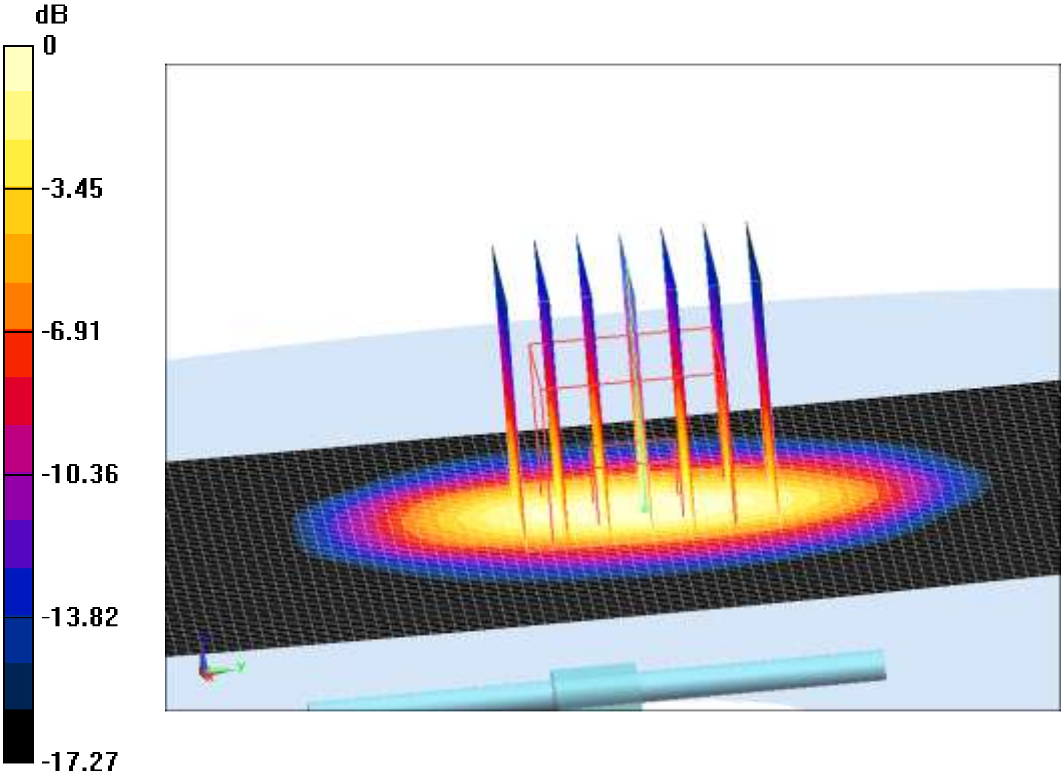
Fig.B.3 validation 1750 MHz 250mW

1900 MHz

Date: 9/15/2020
Electronics: DAE4 Sn786
Medium: Head 1900 MHz
Medium parameters used: f = 1900 MHz; σ =1.408 mho/m; ε_r = 40.74; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C
Communication System: CW Frequency: 1900 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3633 ConvF(7.76, 7.76, 7.76)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 110.74 V/m; Power Drift = -0.03
Fast SAR: SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.05 W/kg
Maximum value of SAR (interpolated) = 15.26 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =110.74 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 18.19 W/kg
SAR(1 g) = 9.92 W/kg; SAR(10 g) = 5.16 W/kg
Maximum value of SAR (measured) = 15.41 W/kg



0 dB = 15.41 W/kg = 11.88 dB W/kg

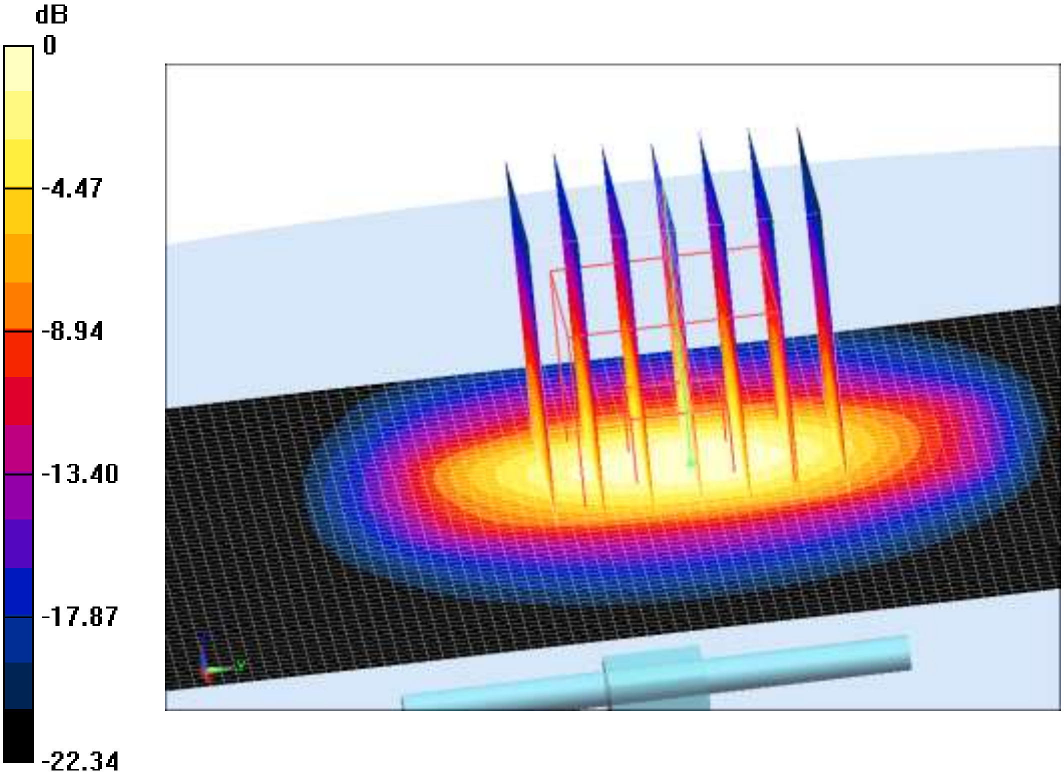
Fig.B.4 validation 1900 MHz 250mW

2450 MHz

Date: 9/16/2020
Electronics: DAE4 Sn786
Medium: Head 2450 MHz
Medium parameters used: f = 2450 MHz; σ =1.836 mho/m; ε_r = 39.19; ρ = 1000 kg/m^3
Ambient Temperature: 22.5^{o}C Liquid Temperature: 22.3^{o}C
Communication System: CW Frequency: 2450 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3633 ConvF(7.43, 7.43, 7.43)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 119.12 V/m; Power Drift = -0.02
Fast SAR: SAR(1 g) = 13.09 W/kg; SAR(10 g) = 6.06 W/kg
Maximum value of SAR (interpolated) = 21.41 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =119.12 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 26.53 W/kg
SAR(1 g) = 13.12 W/kg; SAR(10 g) = 6.22 W/kg
Maximum value of SAR (measured) = 21.63 W/kg



0 dB = 21.63 W/kg = 13.35 dB W/kg

Fig.B.5 validation 2450 MHz 250mW

The SAR system verification must be required that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR.

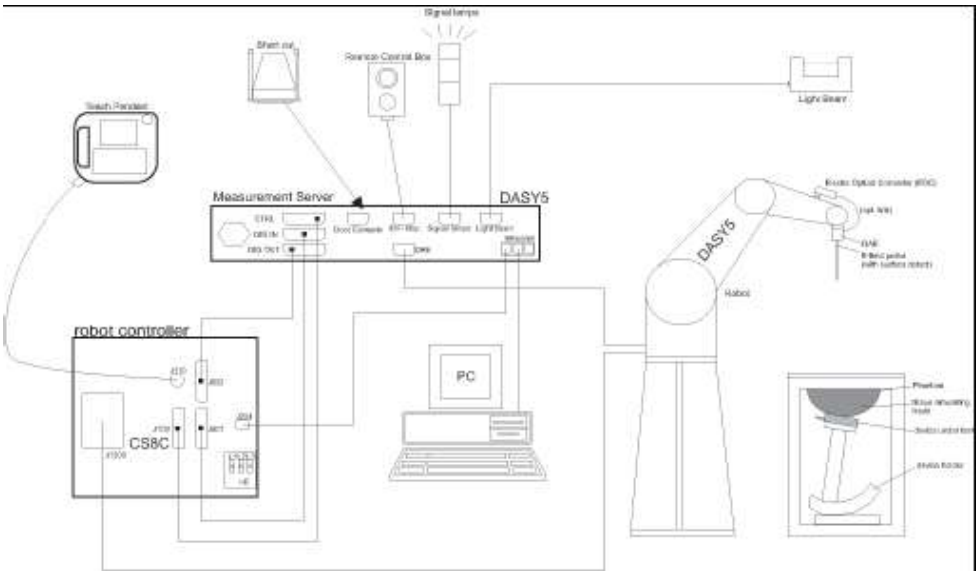
Table B.1 Comparison between area scan and zoom scan for system verification

Date	Band	Position	Area scan (1g)	Zoom scan (1g)	Drift (%)
2020-9-12	750	Head	2.08	2.08	0.00
2020-9-13	835	Head	2.4	2.41	-0.41
2020-9-14	1750	Head	9.04	9.02	0.22
2020-9-15	1900	Head	10.1	9.92	1.81
2020-9-16	2450	Head	13.09	13.12	-0.23

ANNEX C: SAR Measurement Setup

C.1. Measurement Set-up

The Dasy4 or DASY5 system for performing compliance tests is illustrated above graphically. This system consists of the following items:



Picture C.1SAR Lab Test Measurement Set-up

- A standard high precision 6-axis robot (StäubliTX=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 DASY4 or 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.

C.2. Dasy4 or DASY5 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 multifiber 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 DASY4 or DASY5 software reads the reflection durning a software approach and looks for the maximum using 2nd ord curve fitting. The approach is stopped at reaching the maximum.

Picture C.2Near-field Probe

Probe Specifications:

Model: ES3DV3, EX3DV4

Frequency 10MHz — 6.0GHz(EX3DV4)

Range: 10MHz — 4GHz(ES3DV3)

Calibration: In head and body simulating tissue at Frequencies from 835 up to 5800MHz

Linearity: ± 0.2 dB(30 MHz to 6 GHz) for EX3DV4

± 0.2 dB(30 MHz to 4 GHz) for ES3DV3

DynamicRange: 10 mW/kg — 100W/kg

Probe Length: 330 mm

Probe Tip

Length: 20 mm

Body Diameter: 12 mm

Tip Diameter: 2.5 mm (3.9 mm for ES3DV3)

Tip-Center: 1 mm (2.0mm for ES3DV3)

Application:SAR Dosimetry Testing

Compliance tests ofmobile phones

Dosimetry in strong gradient fields

Picture C.3E-field Probe

C.3. E-field Probe Calibration

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

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and inn a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1 mW/cm^2.

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).

C.4. Other Test Equipment

C.4.1 Data Acquisition Electronics(DAE)

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

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

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

PictureC.4: DAE

C.4.2 Robot

The SPEAG DASY system uses the high precision robots (DASY4: RX90XL; DASY5: RX160L) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version from Stäubli is used. The Stäubli robot series have many features that are important for our application:

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

Picture C.5DASY 4

Picture C.6DASY 5

C.4.3 Measurement Server

The Measurement server is based on a PC/104 CPU broad with CPU (dasy4: 166 MHz, Intel Pentium; DASY5: 400 MHz, Intel Celeron), chipdisk (DASY4: 32 MB; DASY5: 128MB), RAM (DASY4: 64 MB, DASY5: 128MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O broad, which is directly connected to the PC/104 bus of the CPU broad.

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.

Picture C.7 Server for DASY 4 **Picture C.8 Server for DASY 5**

C.4.4 Device Holder for Phantom

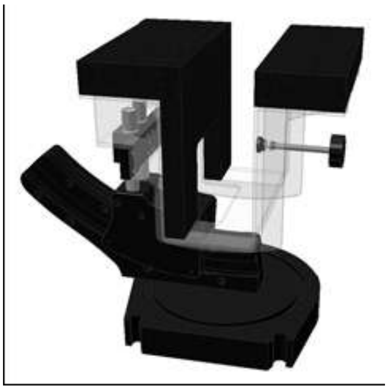
The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5mm distance, a positioning uncertainty of ±0.5mm would produce a SAR uncertainty of ±20%. Accurate device positioning is therefore crucial for accurate 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 are the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity 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.

<Laptop Extension Kit>

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.



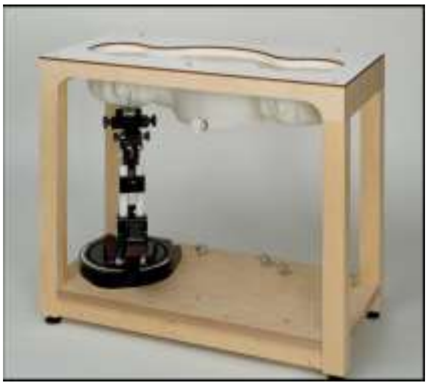
Picture C.9-1: Device Holder **Picture C.9-2: Laptop Extension Kit**

C.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
Filling Volume: Approx. 25 liters
Dimensions: 810 x l000 x 500 mm (H x L x W)
Available: Special

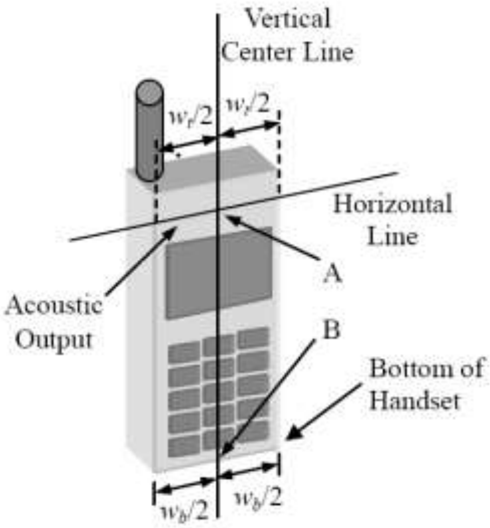


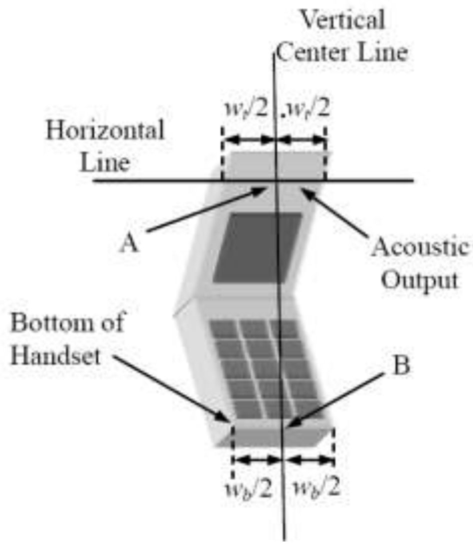
Picture C.10: SAM Twin Phantom

ANNEX D: Position of the wireless device in relation to the phantom

D.1. General considerations

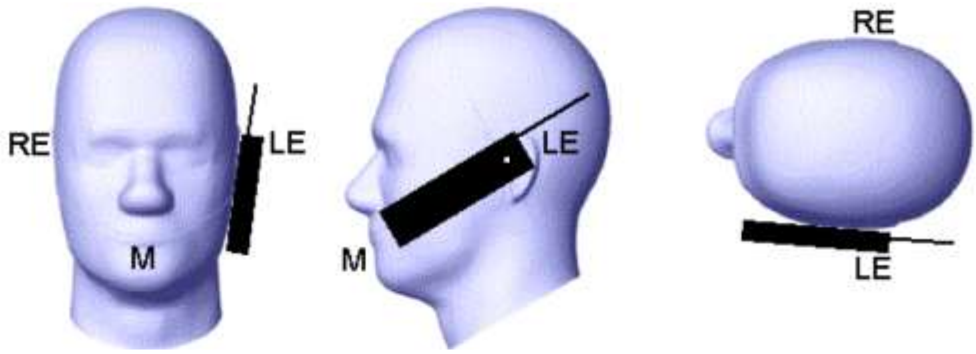
This standard specifies two handset test positions against the head phantom – the “cheek” position and the “tilt” position.



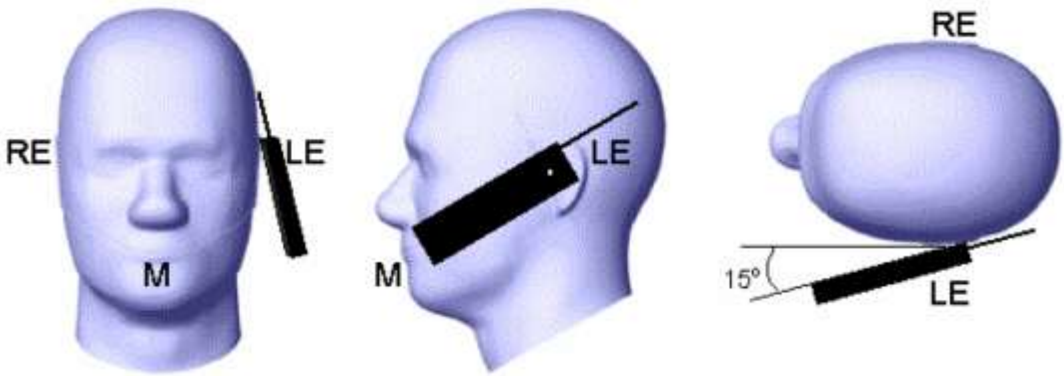


W_t	Width of the handset at the level of the acoustic
W_b	Width of the bottom of the handset
A	Midpoint of the width W_t of the handset at the level of the acoustic output
B	Midpoint of the width W_b of the bottom of the handset

Picture D.1-a Typical “fixed” case handset **Picture D.1-b Typical “clam-shell” case handset**



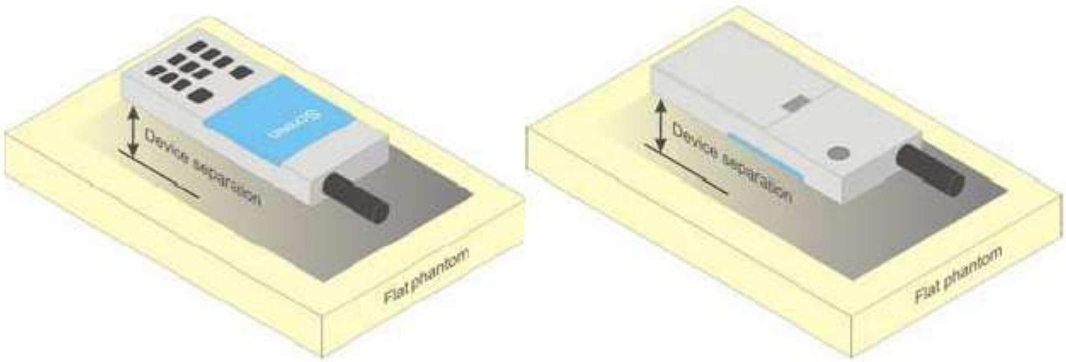
Picture D.2 Cheek position of the wireless device on the left side of SAM



Picture D.3 Tilt position of the wireless device on the left side of SAM

D.2. Body-worn device

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

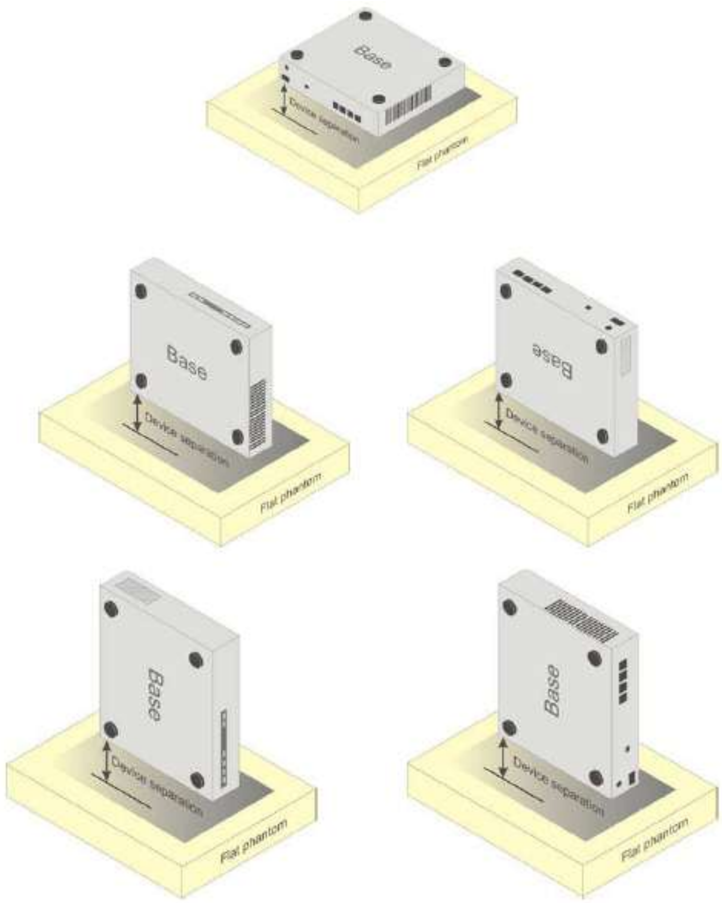


Picture D.4Test positions for body-worn devices

D.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. Picture8.5 show positions for desktop device SAR tests. If the intended use is not specified, the device shall be tested directly against the flat phantom.



Picture D.5 Test positions for desktop devices

D.4. DUT Setup Photos

Picture D.6

ANNEX E: Equivalent Media Recipes

The liquid used for the frequency range of 800-3000 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 E.1 shows the detail solution. It’s satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528 and IEC 62209.

TableE.1: Composition of the Tissue Equivalent Matter

Frequency (MHz)	835Head	835Body	1900 Head	1900 Body	2450 Head	2450 Body	5800 Head	5800 Body
Ingredients (% by weight)								
Water	41.45	52.5	55.242	69.91	58.79	72.60	65.53	65.53
Sugar	56.0	45.0	\	\	\	\	\	\
Salt	1.45	1.4	0.306	0.13	0.06	0.18	\	\
Preventol	0.1	0.1	\	\	\	\	\	\
Cellulose	1.0	1.0	\	\	\	\	\	\
Glycol Monobutyl	\	\	44.452	29.96	41.15	27.22	\	\
Diethylenglycol monohexylether	\	\	\	\	\	\	17.24	17.24
Triton X-100	\	\	\	\	\	\	17.24	17.24
Dielectric Parameters Target Value	ε=41.5 σ=0.90	ε=55.2 σ=0.97	ε=40.0 σ=1.40	ε=53.3 σ=1.52	ε=39.2 σ=1.80	ε=52.7 σ=1.95	ε=35.3 σ=5.27	ε=48.2 σ=6.00

Note: There are a little adjustment respectively for 750, 1750, 2600, 5200, 5300 and 5600 based on the recipe of closest frequency in table E.1.

ANNEX F: System Validation

The SAR system must be validated against its performance specifications before it is deployed. When SAR probes, system components or software are changed, upgraded or recalibrated, these must be validated with the SAR system(s) that operates with such components.

Table F.1: System Validation for 3617

Probe SN.	Liquid name	Validation date	Frequency point	Status (OK or Not)
3633	Head 750MHz	2020-04-03	750MHz	OK
3633	Head 835MHz	2020-04-03	835MHz	OK
3633	Head 1750MHz	2020-04-03	1750MHz	OK
3633	Head 1900MHz	2020-04-03	1900MHz	OK
3633	Head 2450MHz	2020-04-04	2450MHz	OK

ANNEX G: DAE Calibration Certificate

DAE4 SN: 786 Calibration Certificate

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中国认可
国际互认
校准
CALIBRATION
CNAS L0570

Client : CTTL(South Branch) Certificate No: Z20-60101

CALIBRATION CERTIFICATE

Object	DAE4 - SN: 786
Calibration Procedure(s)	FF-Z11-002-01 Calibration Procedure for the Data Acquisition Electronics (DAEx)
Calibration date:	March 03, 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: March 05, 2020

Certificate No: Z20-60101 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	404.081 ± 0.15% (k=2)	404.251 ± 0.15% (k=2)	404.649 ± 0.15% (k=2)
Low Range	3.97247 ± 0.7% (k=2)	3.97408 ± 0.7% (k=2)	3.95771 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	229.5° ± 1 °

Certificate No: Z20-60101 Page 3 of 3

ANNEX H: Probe Calibration Certificate

Probe 3633 Calibration Certificate

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Client **CTTL(South Branch)** **Certificate No: Z20-60108**

CALIBRATION CERTIFICAT

Object: EX3DV4 - SN : 3633

Calibration Procedure(s): FF-Z11-004-01 Calibration Procedures for Dosimetric E-field Probes

Calibration date: April 01, 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
Power Meter NRP2	101919	18-Jun-19(CTTL, No.J19X05125)	Jun-20
Power sensor NRP-Z91	101547	18-Jun-19(CTTL, No.J19X05125)	Jun-20
Power sensor NRP-Z91	101548	18-Jun-19(CTTL, No.J19X05125)	Jun-20
Reference 10dBAttenuator	18N50W-10dB	10-Feb-20(CTTL, No.J20X00525)	Feb-22
Reference 20dBAttenuator	18N50W-20dB	10-Feb-20(CTTL, No.J20X00526)	Feb-22
Reference Probe EX3DV4	SN 7307	24-May-19(SPEAG, No.EX3-7307_May19/2)	May-20
DAE4	SN 1525	26-Aug-19(SPEAG, No.DAE4-1525_Aug19)	Aug-20

Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
SignalGenerator MG3700A	6201052605	18-Jun-19(CTTL, No.J19X05127)	Jun-20
Network Analyzer E5071C	MY46110673	10-Feb-20(CTTL, No.J20X00515)	Feb-21

	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: April 03, 2020

Certificate No: Z20-60108 Page 1 of 10

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Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A,B,C,D	modulation dependent linearization parameters
Polarization Φ	Φ rotation around probe axis
Polarization θ	θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i θ=0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016

c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010

d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

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

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DASY/EASY – Parameters of Probe: EX3DV4 – SN:3633

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm(μV/(V/m)²)[A]	0.37	0.37	0.39	±10.0%
DCP(mV)[B]	98.2	98.8	98.0	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	141.5	±2.3%
		Y	0.0	0.0	1.0		141.5	
		Z	0.0	0.0	1.0		141.9	

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%.

[A] The uncertainties of Norm X, Y, Z do not affect the E²-field uncertainty inside TSL (see Page 4 and Page 5).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainly is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3633

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz][C]	Relative Permittivity[F]	Conductivity (S/m)[F]	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unct. (k=2)
750	41.9	0.89	9.59	9.59	9.59	0.40	0.75	±12.1%
900	41.5	0.97	9.33	9.33	9.33	0.21	1.14	±12.1%
1640	40.3	1.29	8.17	8.17	8.17	0.16	1.22	±12.1%
1750	40.1	1.37	8.09	8.09	8.09	0.15	1.42	±12.1%
1900	40.0	1.40	7.76	7.76	7.76	0.19	1.14	±12.1%
2100	39.8	1.49	7.73	7.73	7.73	0.18	1.26	±12.1%
2300	39.5	1.67	7.69	7.69	7.69	0.48	0.78	±12.1%
2450	39.2	1.80	7.43	7.43	7.43	0.50	0.77	±12.1%
2600	39.0	1.96	7.20	7.20	7.20	0.58	0.72	±12.1%
3500	37.9	2.91	6.88	6.88	6.88	0.35	1.23	±13.3%
3700	37.7	3.12	6.57	6.57	6.57	0.44	0.98	±13.3%
3900	37.5	3.32	6.51	6.51	6.51	0.35	1.40	±13.3%
4100	37.2	3.53	6.44	6.44	6.44	0.40	1.20	±13.3%
4400	36.9	3.84	6.30	6.30	6.30	0.35	1.35	±13.3%
4600	36.7	4.04	6.10	6.10	6.10	0.45	1.40	±13.3%
4800	36.4	4.25	5.98	5.98	5.98	0.45	1.60	±13.3%
4950	36.3	4.40	5.80	5.80	5.80	0.45	1.45	±13.3%
5250	35.9	4.71	5.47	5.47	5.47	0.45	1.25	±13.3%
5600	35.5	5.07	4.72	4.72	4.72	0.45	1.50	±13.3%
5750	35.4	5.22	4.73	4.73	4.73	0.45	1.50	±13.3%

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

[F] At frequency below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3633

Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz][C]	Relative Permittivity[F]	Conductivity (S/m)[F]	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unct. (k=2)
750	55.5	0.96	9.57	9.57	9.57	0.40	0.80	±12.1%
900	55.0	1.05	9.34	9.34	9.34	0.25	1.11	±12.1%
1640	53.8	1.40	8.05	8.05	8.05	0.22	1.19	±12.1%
1750	53.4	1.49	7.85	7.85	7.85	0.16	1.35	±12.1%
1900	53.3	1.52	7.66	7.66	7.66	0.17	1.32	±12.1%
2100	53.2	1.62	7.69	7.69	7.69	0.21	1.30	±12.1%
2300	52.9	1.81	7.61	7.61	7.61	0.50	0.86	±12.1%
2450	52.7	1.95	7.56	7.56	7.56	0.50	0.83	±12.1%
2600	52.5	2.16	7.33	7.33	7.33	0.59	0.74	±12.1%
3500	52.3	3.31	6.28	6.28	6.28	0.40	1.30	±13.3%
3700	52.1	3.55	6.14	6.14	6.14	0.40	1.35	±13.3%
3900	50.8	3.78	6.13	6.13	6.13	0.40	1.45	±13.3%
4100	50.5	4.01	6.12	6.12	6.12	0.35	1.40	±13.3%
4400	50.1	4.37	5.93	5.93	5.93	0.35	1.70	±13.3%
4600	49.8	4.60	5.60	5.60	5.60	0.45	1.50	±13.3%
4800	49.6	4.83	5.42	5.42	5.42	0.45	1.60	±13.3%
4950	49.4	5.01	5.22	5.22	5.22	0.45	1.70	±13.3%
5250	48.9	5.36	5.04	5.04	5.04	0.50	1.45	±13.3%
5600	48.5	5.77	4.16	4.16	4.16	0.55	1.50	±13.3%
5750	48.3	5.94	4.26	4.26	4.26	0.55	1.60	±13.3%

[C] Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.
[F] At frequency below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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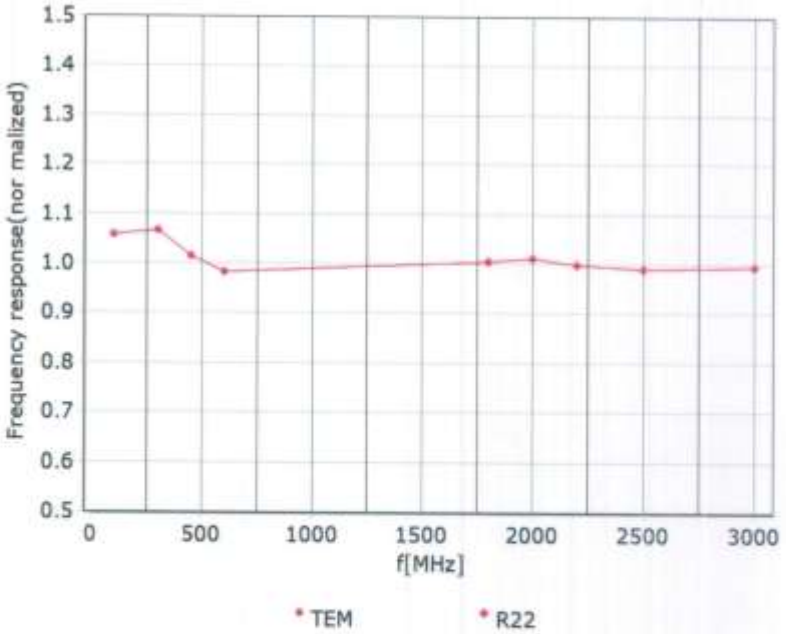
Frequency Response of E-Field
(TEM-Cell: ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ±7.4% (k=2)

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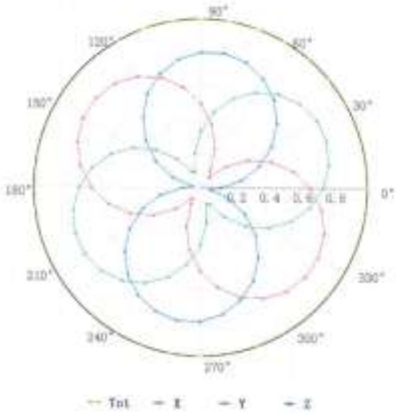
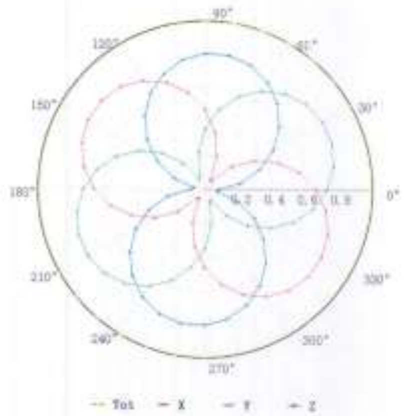
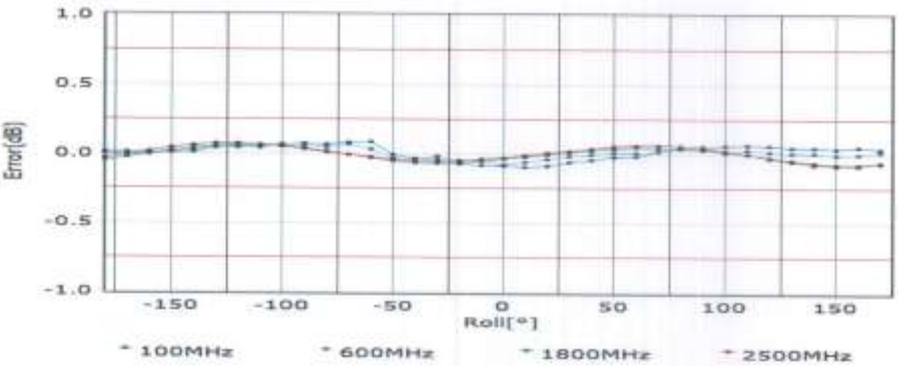
Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM



f=1800 MHz, R22





Uncertainty of Axial Isotropy Assessment: ±1.2% (k=2)

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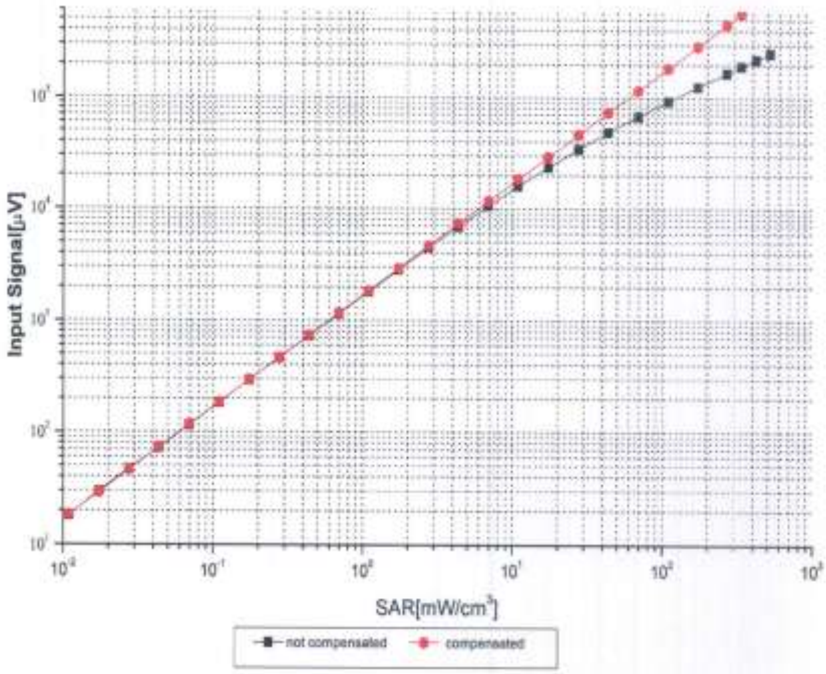
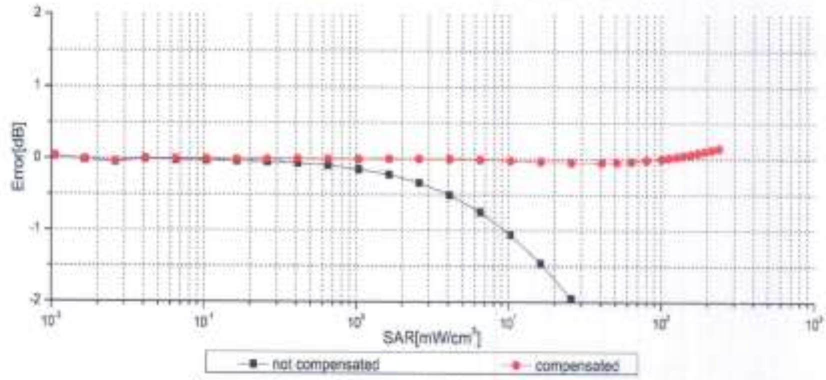
Dynamic Range f(SAR_{head})
(TEM cell, f = 900 MHz)





Uncertainty of Linearity Assessment: ±0.9% (k=2)

Certificate No:Z20-60108 Page 8 of 10

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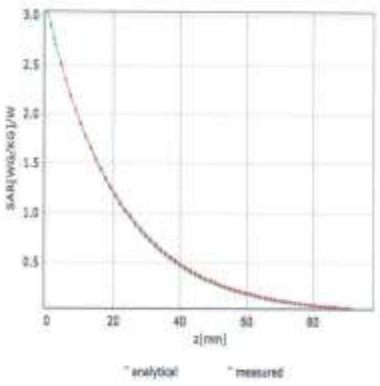
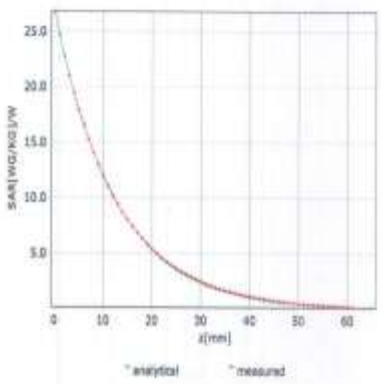
Conversion Factor Assessment

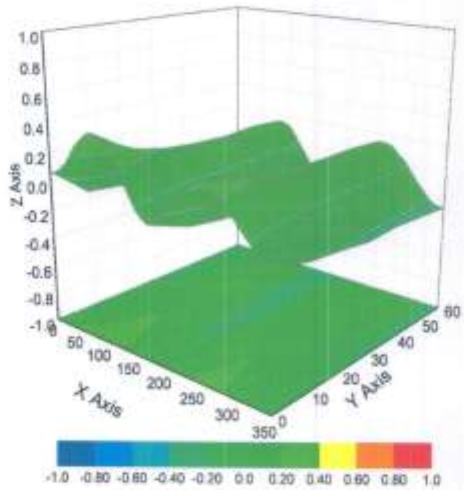
f=750 MHz,WGLS R9(H_convF)



f=1750 MHz,WGLS R22(H_convF)



Deviation from Isotropy in Liquid



Uncertainty of Spherical Isotropy Assessment: ±3.2% (K=2)

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DASY/EASY – Parameters of Probe: EX3DV4 – SN:3633

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	71.2
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	10mm
Tip Diameter	2.5mm
Probe Tip to Sensor X Calibration Point	1mm
Probe Tip to Sensor Y Calibration Point	1mm
Probe Tip to Sensor Z Calibration Point	1mm
Recommended Measurement Distance from Surface	1.4mm

ANNEX I: Dipole Calibration Certificate

750 MHz Dipole Calibration Certificate

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CNAS L0570

Client CTTL(South Branch) Certificate No: Z19-60291

CALIBRATION CERTIFICATE

Object	D750V3 - SN: 1163
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	September 3, 2019

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

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ 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	106276	11-Apr-19 (CTTL, No.J19X02605)	Apr-20
Power sensor NRP6A	101369	11-Apr-19 (CTTL, No.J19X02605)	Apr-20
Reference Probe EX3DV4	SN 3617	31-Jan-19(SPEAG,No.EX3-3617_Jan19)	Jan-20
DAE4	SN 1555	22-Aug-19(CTTL-SPEAG,No.Z19-60295)	Aug-20
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	23-Jan-19 (CTTL, No.J19X00336)	Jan-20
NetworkAnalyzer E5071C	MY46110673	24-Jan-19 (CTTL, No.J19X00547)	Jan-20

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

Issued: September 6, 2019

Certificate No: Z19-60291 Page 1 of 8

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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	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.6 ± 6 %	0.90 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	2.16 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.53 W/kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.44 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.70 W/kg ± 18.7 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.9 ± 6 %	0.94 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.16 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.78 W/kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.45 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.87 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- 4.53jΩ
Return Loss	- 26.9dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.5Ω- 3.38jΩ
Return Loss	- 28.5dB

General Antenna Parameters and Design

Electrical Delay (one direction)	0.900 ns

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

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

Additional EUT Data

Manufactured by	SPEAG

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DASY5 Validation Report for Head TSL Date: 09.03.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1163

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

Medium parameters used: f = 750 MHz; σ = 0.904 S/m; ε_r = 41.62; ρ = 1000 kg/m3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(10.03, 10.03, 10.03) @ 750 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 8/22/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

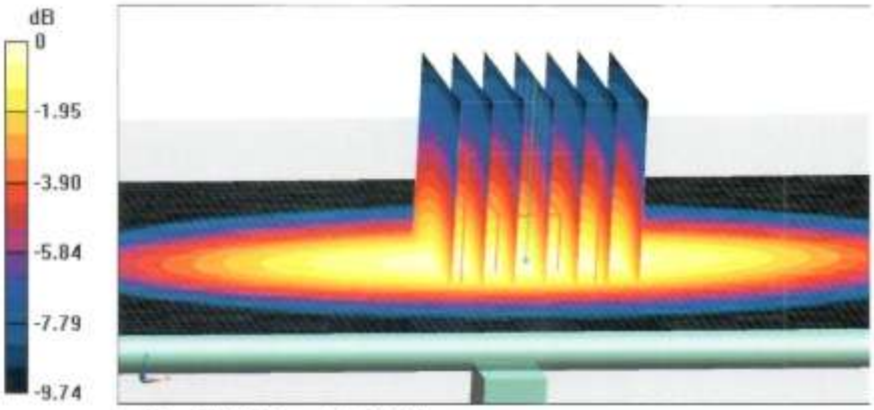
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.16 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 3.11 W/kg

SAR(1 g) = 2.16 W/kg; SAR(10 g) = 1.44 W/kg

Maximum value of SAR (measured) = 2.81 W/kg



0 dB = 2.81 W/kg = 4.49 dBW/kg

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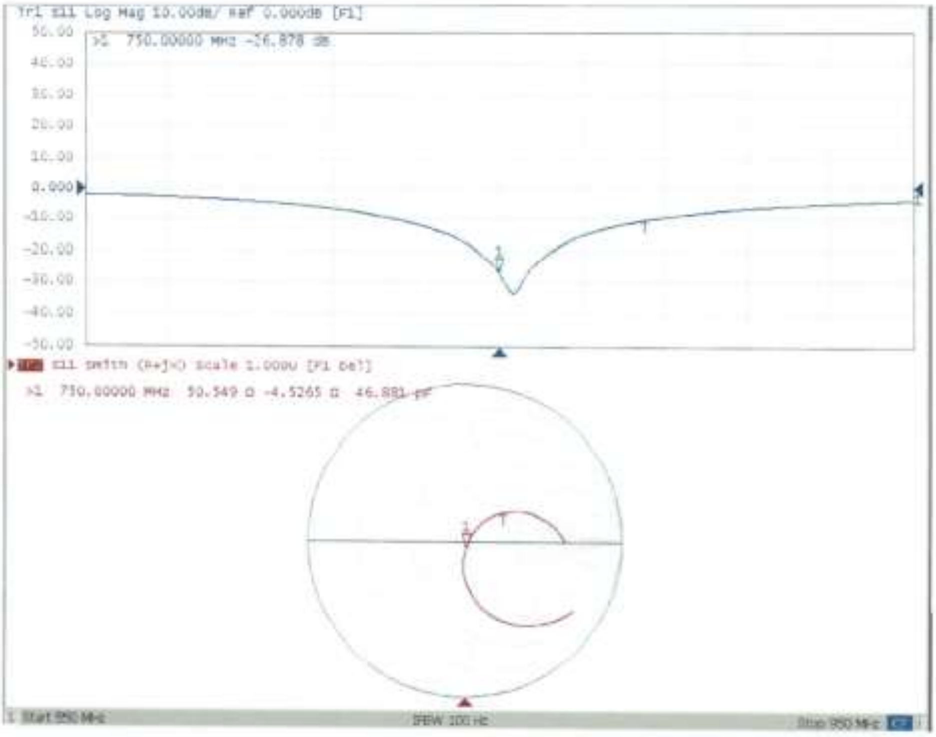
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL Date: 09.03.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1163

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

Medium parameters used: f = 750 MHz; σ = 0.942 S/m; ε_r = 55.87; ρ = 1000 kg/m3

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(9.85, 9.85, 9.85) @ 750 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 8/22/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

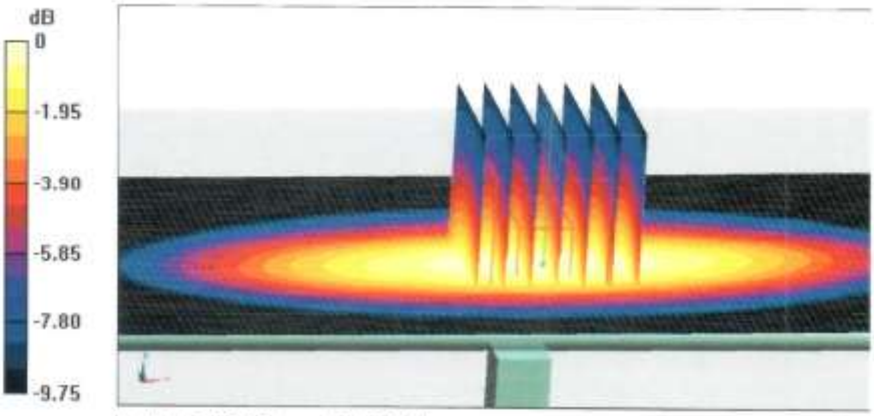
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 52.88 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 3.20 W/kg

SAR(1 g) = 2.16 W/kg; SAR(10 g) = 1.45 W/kg

Maximum value of SAR (measured) = 2.85 W/kg



0 dB = 2.85 W/kg = 4.55 dBW/kg

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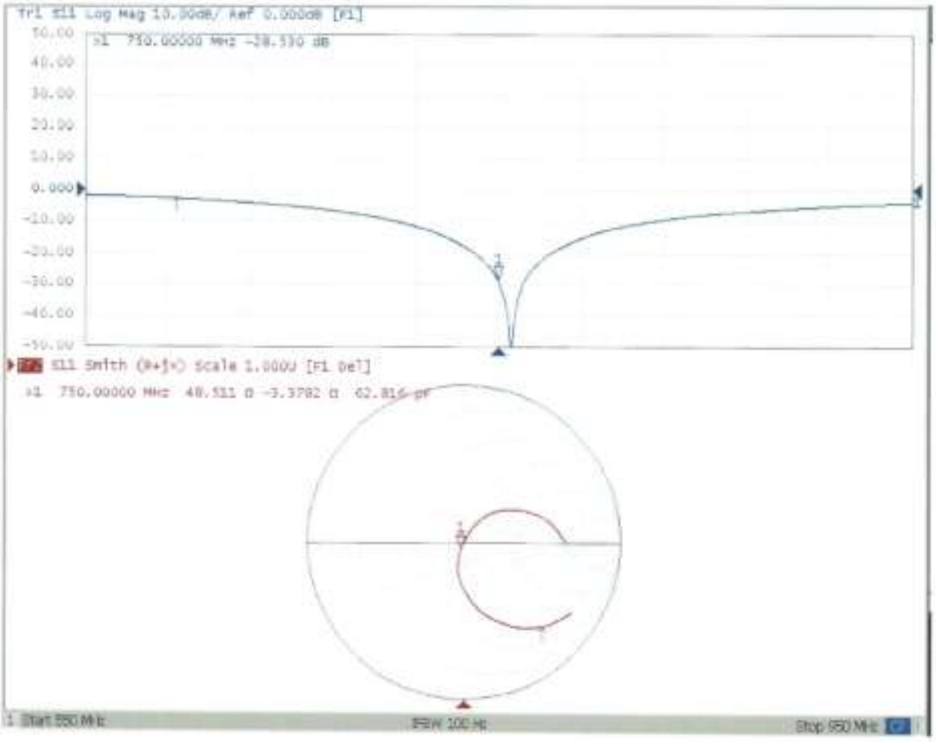
Impedance Measurement Plot for Body TSL



835 MHz Dipole Calibration Certificate

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Client CTTL(South Branch) Certificate No: Z18-60385

CALIBRATION CERTIFICATE

Object: D835V2 - SN: 4d057

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

Calibration date: October 9, 2018

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 NRVD	102083	01-Nov-17 (CTTL, No.J17X08756)	Oct-18
Power sensor NRV-Z5	100542	01-Nov-17 (CTTL, No.J17X08756)	Oct-18
Reference Probe EX3DV4	SN 7514	27-Aug-18(SPEAG,No.EX3-7514_Aug18)	Aug-19
DAE4	SN 1555	20-Aug-18(SPEAG,No.DAE4-1555_Aug18)	Aug-19
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	23-Jan-18 (CTTL, No.J18X00560)	Jan-19
NetworkAnalyzer E5071C	MY46110673	24-Jan-18 (CTTL, No.J18X00561)	Jan-19

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

Issued: October 11, 2018

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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	52.10.1.1476
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	42.2 ± 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	2.42 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**9.62 mW /g ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.58 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.29 mW /g ± 18.7 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.9 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.51 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**9.90 mW /g ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.66 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.56 mW /g ± 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	49.6Ω- 4.08jΩ
Return Loss	- 27.7dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.8Ω- 4.96jΩ
Return Loss	- 24.3dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.260 ns

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

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

Additional EUT Data

Manufactured by	SPEAG

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DASY5 Validation Report for Head TSL Date: 10.08.2018

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d057

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

Medium parameters used: f = 835 MHz; σ = 0.912 S/m; ε_r = 42.22; ρ = 1000 kg/m3

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7514; ConvF(9.09, 9.09, 9.09) @ 835 MHz; Calibrated: 8/27/2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 8/20/2018
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

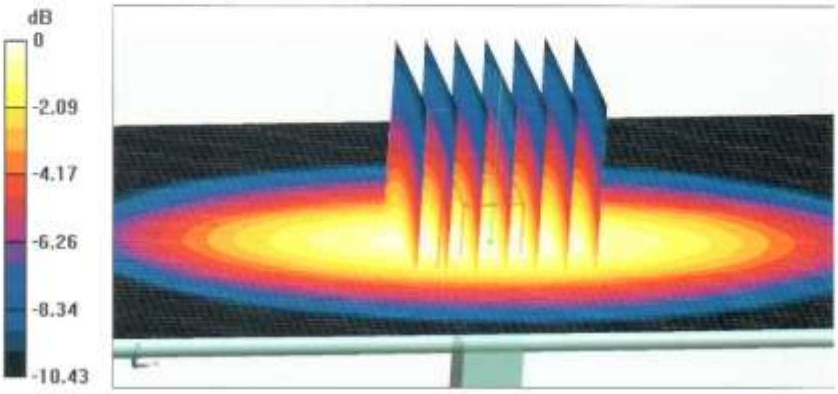
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.57 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 3.61 W/kg

SAR(1 g) = 2.42 W/kg; SAR(10 g) = 1.58 W/kg

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



0 dB = 3.22 W/kg = 5.08 dBW/kg

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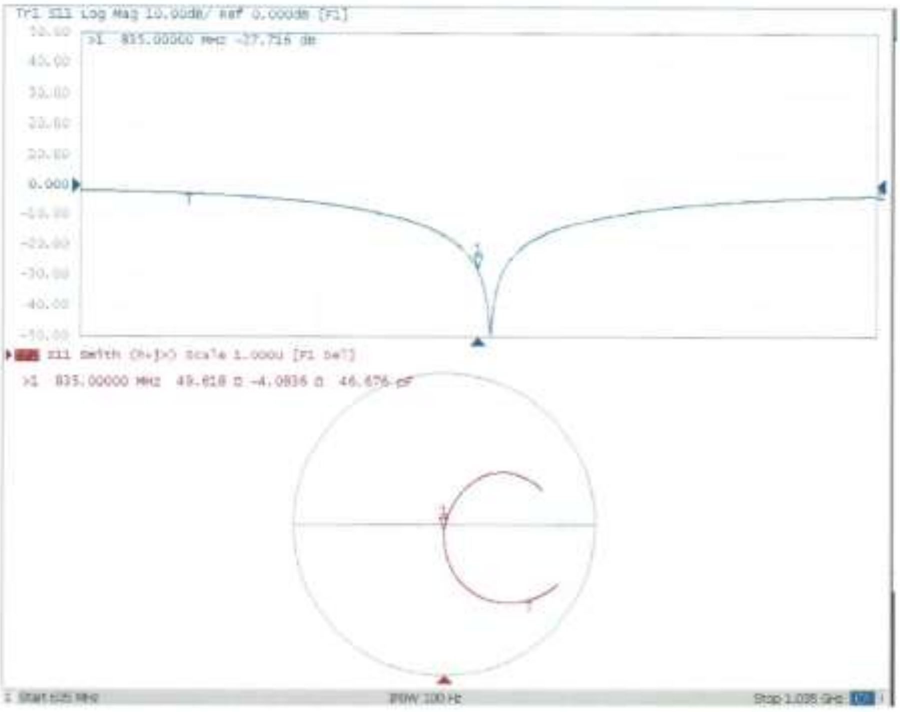
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL Date: 10.08.2018

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d057

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

Medium parameters used: f = 835 MHz; σ = 0.992 S/m; ε_r = 55.93; ρ = 1000 kg/m3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7514; ConvF(9.47, 9.47, 9.47) @ 835 MHz; Calibrated: 8/27/2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 8/20/2018
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

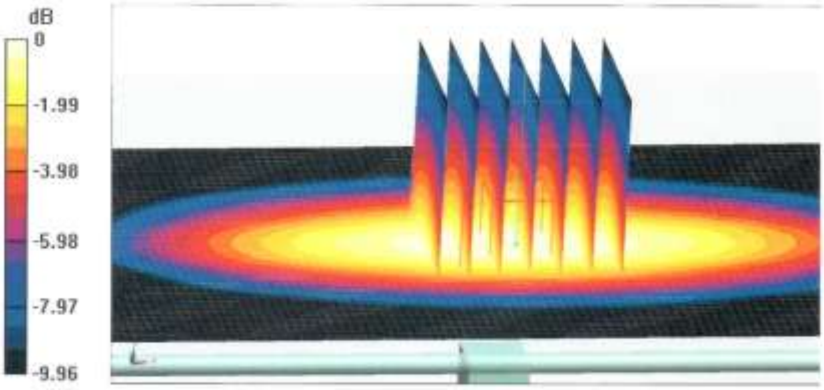
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.64 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 3.83 W/kg

SAR(1 g) = 2.51 W/kg; SAR(10 g) = 1.66 W/kg

Maximum value of SAR (measured) = 3.36 W/kg



0 dB = 3.36 W/kg = 5.26 dBW/kg

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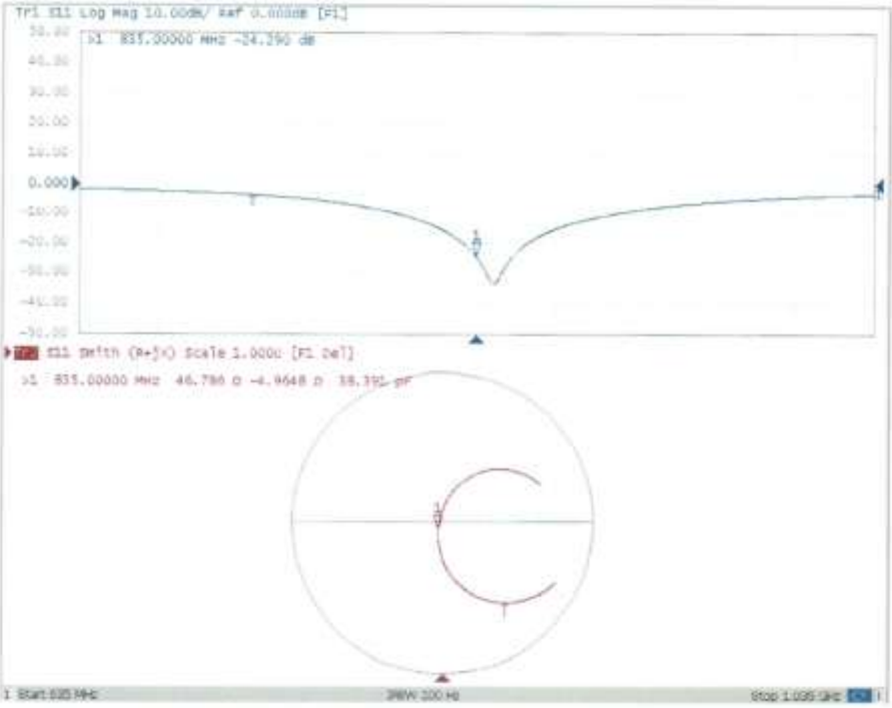
Impedance Measurement Plot for Body TSL



1750 MHz Dipole Calibration Certificate

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Client CTTL(South Branch) Certificate No: Z19-60292

CALIBRATION CERTIFICATE

Object	D1750V2 - SN: 1152
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	August 30, 2019

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

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ 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	106276	11-Apr-19 (CTTL, No.J19X02605)	Apr-20
Power sensor NRP6A	101369	11-Apr-19 (CTTL, No.J19X02605)	Apr-20
Reference Probe EX3DV4	SN 3617	31-Jan-19(SPEAG,No.EX3-3617_Jan19)	Jan-20
DAE4	SN 1555	22-Aug-19(CTTL-SPEAG,No.Z19-60295)	Aug-20
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	23-Jan-19 (CTTL, No.J19X00336)	Jan-20
NetworkAnalyzer E5071C	MY46110673	24-Jan-19 (CTTL, No.J19X00547)	Jan-20

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

Issued: September 2, 2019

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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	V52.10.2
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	39.9 ± 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	9.05 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	4.80 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.3 W/kg ± 18.7 % (k=2)**

Body TSL parameters
The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.1 ± 6 %	1.52 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.45 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**37.3 W/kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.05 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.0 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	49.1Ω- 0.84 jΩ
Return Loss	- 38.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.2Ω- 1.37 jΩ
Return Loss	- 25.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.084 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: 08.30.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1152

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

Medium parameters used: f = 1750 MHz; σ = 1.358 S/m; ε_r = 39.91; ρ = 1000 kg/m3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(8.38, 8.38, 8.38) @ 1750 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 8/22/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

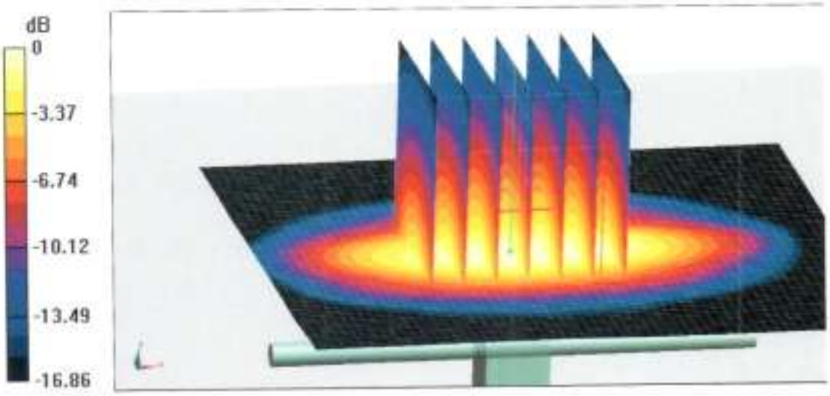
System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.38 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 16.8 W/kg

SAR(1 g) = 9.05 W/kg; SAR(10 g) = 4.8 W/kg

Maximum value of SAR (measured) = 13.9 W/kg



0 dB = 13.9 W/kg = 11.43 dBW/kg

Certificate No: Z19-60292 Page 5 of 8

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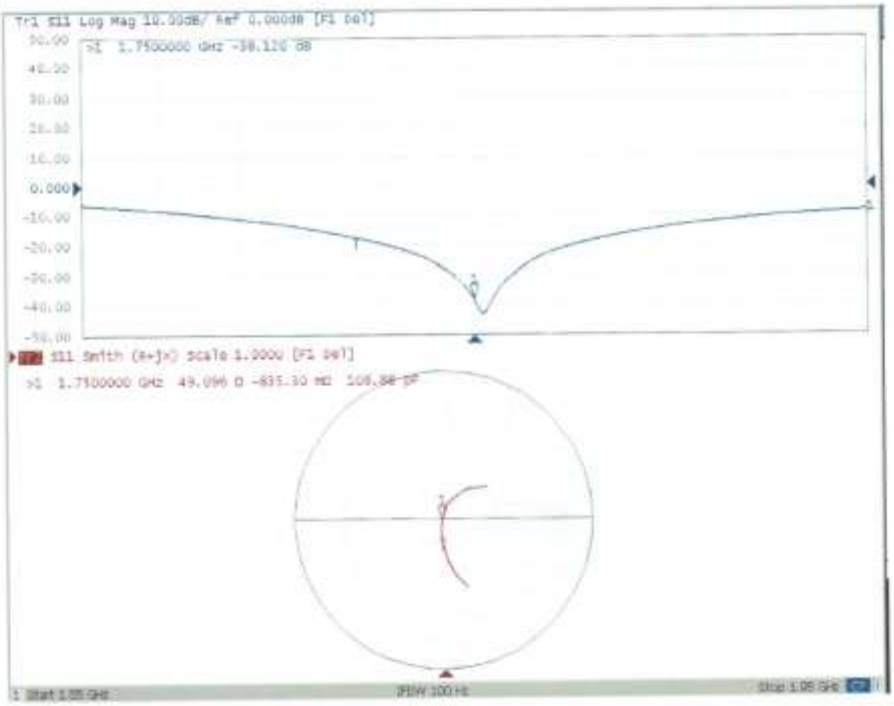
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL Date: 08.30.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1152

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

Medium parameters used: f = 1750 MHz; σ = 1.516 S/m; ε_r = 53.05; ρ = 1000 kg/m3

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(8.03, 8.03, 8.03) @ 1750 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 8/22/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

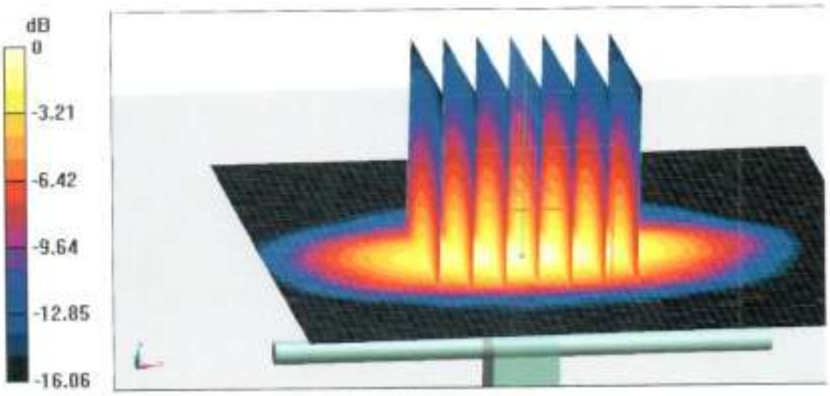
System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 87.16 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 17.0 W/kg

SAR(1 g) = 9.45 W/kg; SAR(10 g) = 5.05 W/kg

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



0 dB = 14.4 W/kg = 11.58 dBW/kg

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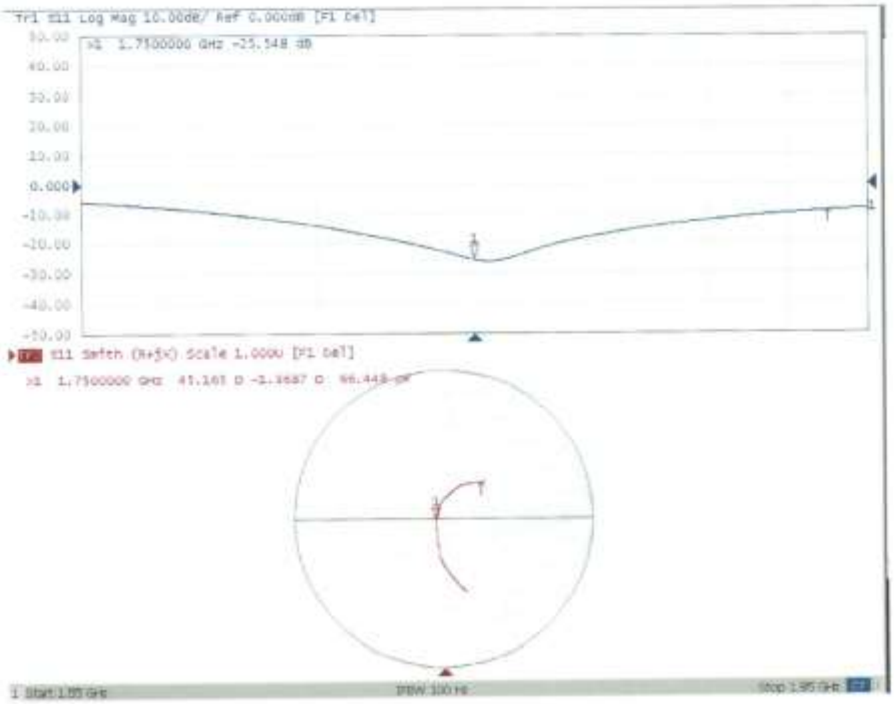
Impedance Measurement Plot for Body TSL



Certificate No: Z19-60292 Page 8 of 8

1900 MHz Dipole Calibration Certificate

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CNAS L0570

Client CTTL(South Branch) Certificate No: Z18-60387

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d088
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	October 24, 2018

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 NRVD	102083	01-Nov-17 (CTTL, No.J17X08756)	Oct-18
Power sensor NRV-Z5	100542	01-Nov-17 (CTTL, No.J17X08756)	Oct-18
Reference Probe EX3DV4	SN 7514	27-Aug-18(SPEAG,No.EX3-7514_Aug18)	Aug-19
DAE4	SN 1555	20-Aug-18(SPEAG,No.DAE4-1555_Aug18)	Aug-19
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	23-Jan-18 (CTTL, No.J18X00560)	Jan-19
NetworkAnalyzer E5071C	MY46110673	24-Jan-18 (CTTL, No.J18X00561)	Jan-19

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

Issued: October 28, 2018

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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%.

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Measurement Conditions

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

DASY Version	DASY52	52.10.2.1495
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.1 ± 6 %	1.37 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	9.92 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**40.5 mW /g ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.17 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**21.0 mW /g ± 18.7 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.6 ± 6 %	1.55 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.3 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**40.6 mW /g ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.41 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**21.4 mW /g ± 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	52.7Ω+ 6.63jΩ
Return Loss	- 23.2dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.5Ω+ 7.40jΩ
Return Loss	- 22.3dB

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

Manufactured by	SPEAG

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DASY5 Validation Report for Head TSL

Date: 10.24.2018

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d088

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

Medium parameters used: f = 1900 MHz; σ = 1.367 S/m; ε_r = 41.1; ρ = 1000 kg/m3

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7514; ConvF(7.73, 7.73, 7.73) @ 1900 MHz; Calibrated: 8/27/2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 8/20/2018
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

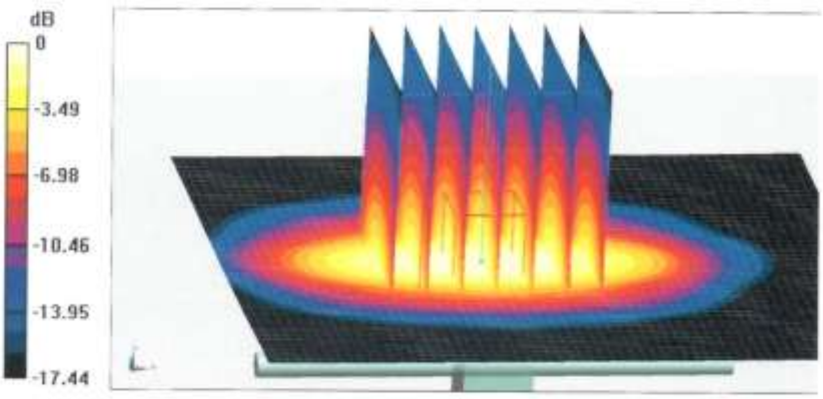
System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 102.2 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 19.0 W/kg

SAR(1 g) = 9.92 W/kg; SAR(10 g) = 5.17 W/kg

Maximum value of SAR (measured) = 15.7 W/kg



0 dB = 15.7 W/kg = 11.96 dBW/kg

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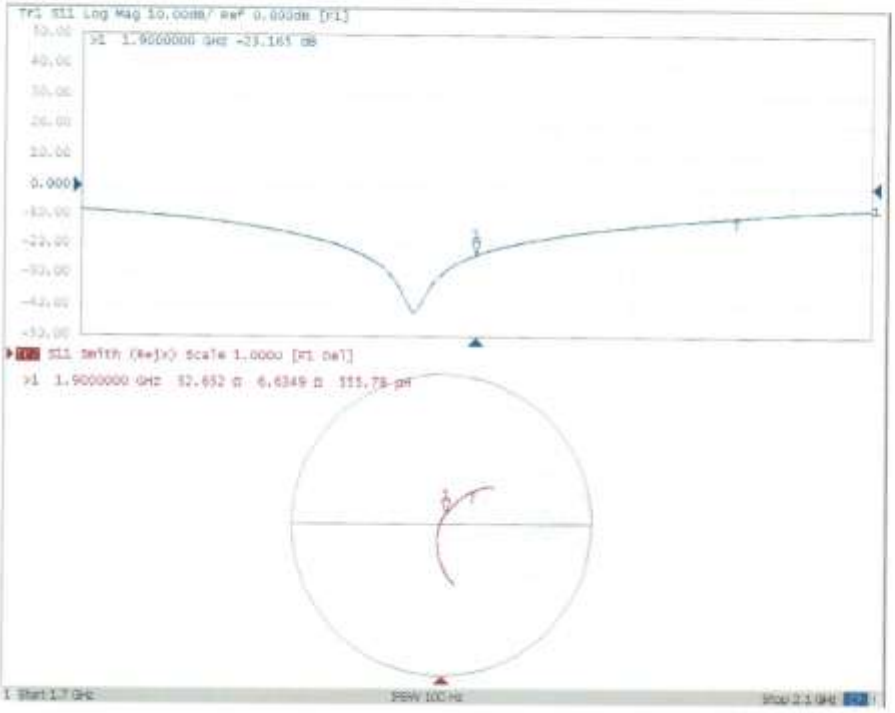
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 10.24.2018

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d088

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

Medium parameters used: f = 1900 MHz; σ = 1.551 S/m; ε_r = 52.63; ρ = 1000 kg/m3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7514; ConvF(7.53, 7.53, 7.53) @ 1900 MHz; Calibrated: 8/27/2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 8/20/2018
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

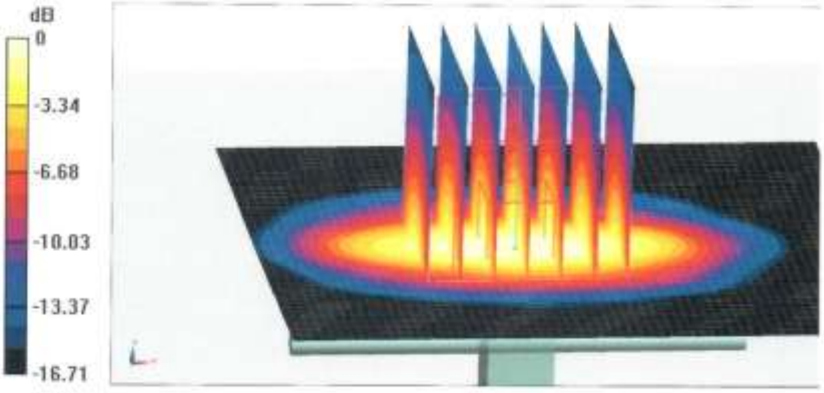
System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.60 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 19.0 W/kg

SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.41 W/kg

Maximum value of SAR (measured) = 15.9 W/kg



0 dB = 15.9 W/kg = 12.01 dBW/kg

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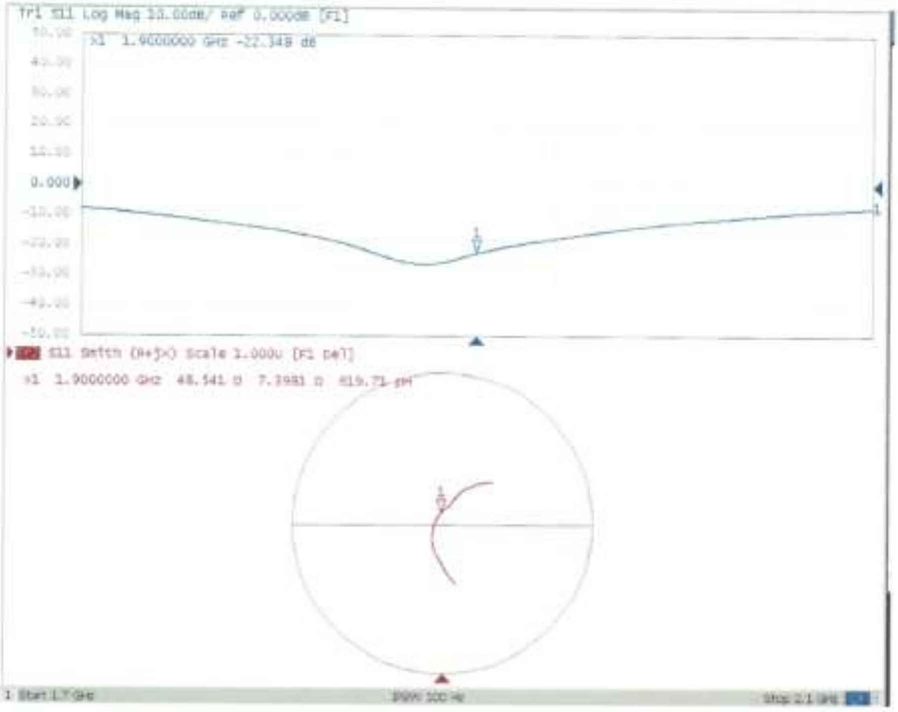
Impedance Measurement Plot for Body TSL



Certificate No: Z18-60387 Page 8 of 8

2450 MHz Dipole Calibration Certificate

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中国认可
国际互认
校准
CALIBRATION
CNAS L0570

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Client CTTL(South Branch) Certificate No: Z18-60388

CALIBRATION CERTIFICATE

Object D2450V2 - SN: 873

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

Calibration date: October 26, 2018

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 NRVD	102083	01-Nov-17 (CTTL, No.J17X08756)	Oct-18
Power sensor NRV-Z5	100542	01-Nov-17 (CTTL, No.J17X08756)	Oct-18
Reference Probe EX3DV4	SN 7514	27-Aug-18(SPEAG,No.EX3-7514_Aug18)	Aug-19
DAE4	SN 1555	20-Aug-18(SPEAG,No.DAE4-1555_Aug18)	Aug-19
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	23-Jan-18 (CTTL, No.J18X00560)	Jan-19
NetworkAnalyzer E5071C	MY46110673	24-Jan-18 (CTTL, No.J18X00561)	Jan-19

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

Issued: October 29, 2018

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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	52.10.2.1495
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	39.2 ± 6 %	1.80 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	13.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**52.0 mW /g ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.02 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**24.1 mW /g ± 18.7 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.8 ± 6 %	2.01 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.8 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**50.5 mW /g ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.91 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**23.5 mW /g ± 18.7 % (k=2)**

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.5Ω+ 2.11 jΩ
Return Loss	- 28.0dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	51.3Ω+ 4.51 jΩ
Return Loss	- 26.7dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.024 ns

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

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

Additional EUT Data

Manufactured by	SPEAG

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DASY5 Validation Report for Head TSL Date: 10.26.2018

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 873

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

Medium parameters used: f = 2450 MHz; σ = 1.802 S/m; ε_r = 39.2; ρ = 1000 kg/m3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7514; ConvF(6.95, 6.95, 6.95) @ 2450 MHz; Calibrated: 8/27/2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 8/20/2018
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

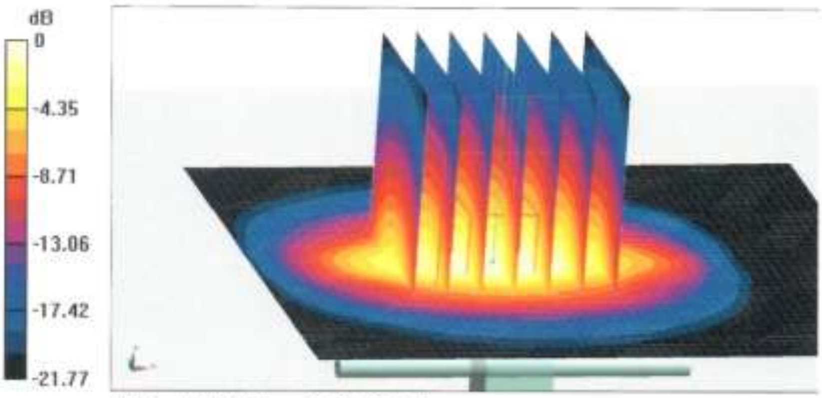
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 105.0 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 26.8 W/kg

SAR(1 g) = 13 W/kg; SAR(10 g) = 6.02 W/kg

Maximum value of SAR (measured) = 21.8 W/kg



0 dB = 21.8 W/kg = 13.38 dBW/kg

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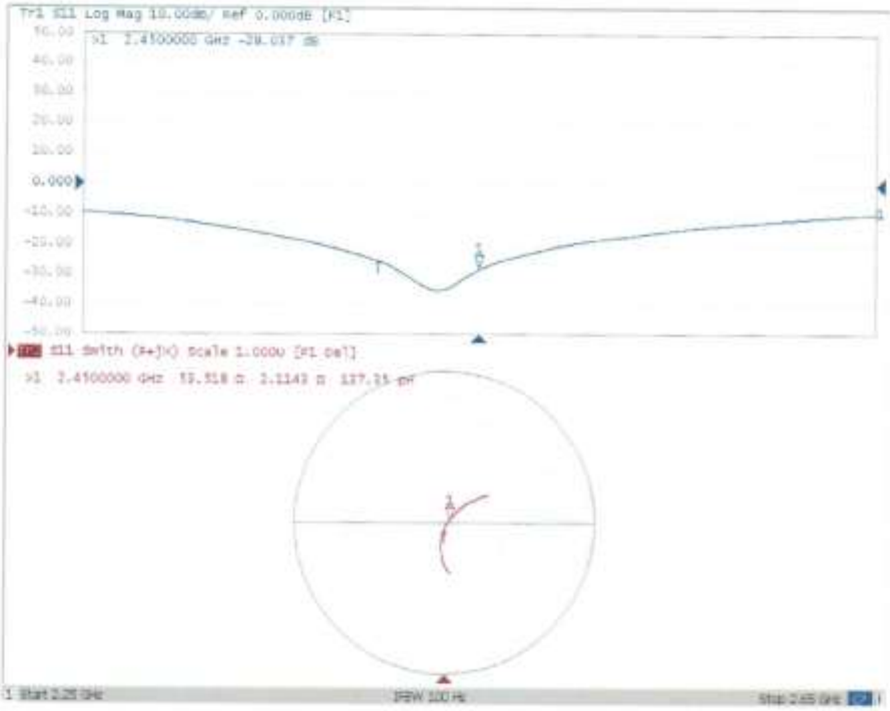
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL Date: 10.26.2018

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 873

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

Medium parameters used: f = 2450 MHz; σ = 2.008 S/m; ε_r = 52.76; ρ = 1000 kg/m3

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7514; ConvF(7.13, 7.13, 7.13) @ 2450 MHz; Calibrated: 8/27/2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 8/20/2018
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

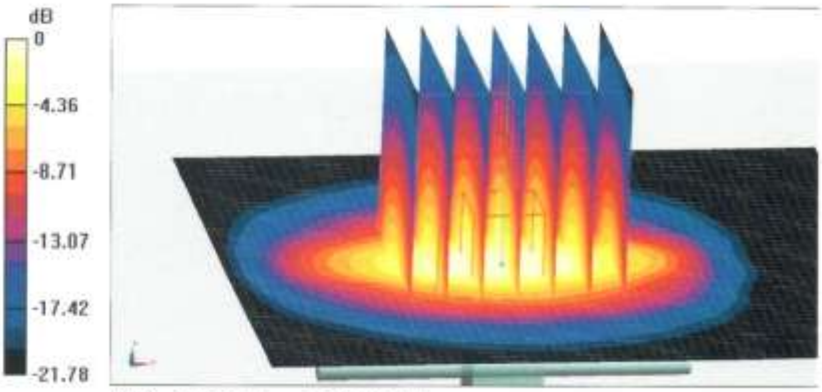
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.89 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 26.4 W/kg

SAR(1 g) = 12.8 W/kg; SAR(10 g) = 5.91 W/kg

Maximum value of SAR (measured) = 21.3 W/kg



0 dB = 21.3 W/kg = 13.28 dBW/kg

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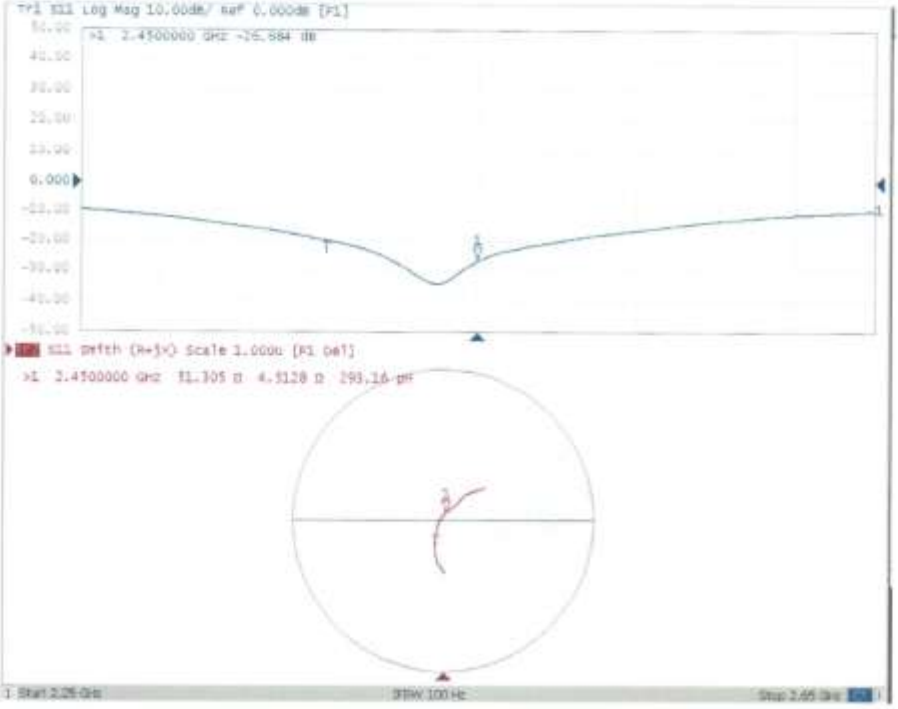
Impedance Measurement Plot for Body TSL



ANNEX J: Extended Calibration SAR Dipole

Referring to KDB865664 D01, if dipoles are verified in return loss (<-20dBm, within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

Justification of Extended Calibration SAR Dipole D750V3– serial no.1163

Head						
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (johm)	Delta (johm)
2019-09-03	-26.9	/	50.5	/	-4.53	/
2020-09-01	-25.8	4.1	51.2	0.7	-4.29	0.24

Justification of Extended Calibration SAR Dipole D835V2– serial no.4d057

Head						
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (johm)	Delta (johm)
2018-10-09	-27.7	/	49.6	/	-4.08	/
2019-10-06	-26.9	2.9	50.1	0.5	-3.95	0.13

Justification of Extended Calibration SAR Dipole D1750V2– serial no. 1152

Head						
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (johm)	Delta (johm)
2019-08-30	-38.1	/	49.1	/	-0.84	/
2020-08-28	-36.5	4.2	50.2	1.1	-0.49	0.35

Justification of Extended Calibration SAR Dipole D1900V2– serial no. 5d088

Head						
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (johm)	Delta (johm)
2018-10-24	-23.2	/	52.7	/	6.63	/
2019-10-22	-22.9	1.3	53.5	0.8	6.86	0.23

Justification of Extended Calibration SAR Dipole D2450V2– serial no. 873

Head						
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (johm)	Delta (johm)
2018-10-26	-28.0	/	53.5	/	2.11	/
2019-10-22	-27.3	2.5	54.4	0.9	2.29	0.18

The Return-Loss is <-20dB, and within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the value result should support extended cabration.

ANNEX K: Accreditation Certificate

Accredited Laboratory

A2LA has accredited

SHENZHEN ACADEMY OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

Shenzhen, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 30th day of October 2019.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 4353.01
Valid to November 30, 2021

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

*****END OF REPORT*****