SAR TEST REPORT

No. I19Z61729-SEM01

For

LG Electronics USA, Inc.

Multi-band GSM/WCDMA/LTE phone with Bluetooth, WLAN

Model Name: LM-X120HN,LMX120HN, X120HN

With

FCC ID: ZNFX120HM

Issued Date: 2019-9-24

TESTING
NVLAP LAB CODE 600118-0

Note:

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REPORT HISTORY

Report Number	Revision	Issue Date	Description
I19Z61729-SEM01	Rev.0	2019-9-24	Initial creation of test report

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1 Test Laboratory

1.1 Testing Location

Company Name:	CTTL(Shouxiang)
Address:	No. 51 Shouxiang Science Building, Xueyuan Road, Haidian District, Beijing, P. R. China100191

1.2 Testing Environment

Temperature:	18°C~25 °C,
Relative humidity:	30%~ 70%
Ground system resistance:	< 0.5 Ω
Ambient noise & Reflection:	< 0.012 W/kg

1.3 Project Data

Project Leader:	Qi Dianyuan
Test Engineer:	Lin Xiaojun
Testing Start Date:	June 1, 2019
Testing End Date:	September 20, 2019

1.4 Signature

Lin Xiaojun

(Prepared this test report)

Qi Dianyuan

(Reviewed this test report)

Lu Bingsong

Deputy Director of the laboratory

(Approved this test report)

2 Statement of Compliance

This EUT is a variant product and the report of original sample is No.I19Z60740-SEM01.
We share the test results of original sample and add the measurement of new band (LTE Band12)

The maximum results of SAR found during testing for LG Electronics USA, Inc. Multi-band GSM/WCDMA/LTE phone with Bluetooth, WLAN LM-X120HN,LMX120HN, X120HN is as follows:

Table 2.1: Highest Reported SAR (1g)

Exposure Configuration	Technology Band	Highest Reported SAR 1g (W/Kg)	Equipment Class
Head	GSM 850	0.62	PCE
	PCS 1900	0.26	
	UMTS FDD 2	0.48	
	UMTS FDD 4	0.25	
	UMTS FDD 5	0.25	
	LTE Band 2	0.11	
	LTE Band 5	0.36	
	LTE Band 7	0.06	
	LTE Band 12	0.24	
	LTE Band 17	0.24	
	LTE Band 66	0.23	
	WLAN 2.4 GHz	1.28	DTS
Hotspot	GSM 850	0.27	PCE
	PCS 1900	0.38	
	UMTS FDD 2	0.63	
	UMTS FDD 4	1.03	
	UMTS FDD 5	0.33	
	LTE Band 2	0.30	
	LTE Band 5	0.43	
	LTE Band 7	0.86	
	LTE Band 12	0.50	
	LTE Band 17	0.43	
	LTE Band 66	0.24	
	WLAN 2.4 GHz	0.31	DTS

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 worn 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 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 main antenna and WiFi

	Position	Main antenna	WLAN 2.4G	Highest Simultaneous Transmission
Maximum reported SAR value for Head	Left hand, Tilt	0.30	1.28	**1.58**
Maximum reported SAR value for Body	Bottom	1.03	/	**1.03**

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

	Position	Main antenna	BT	Sum
Maximum reported SAR value for Head	Left hand, Check	0.62	0.37	**0.99**
Maximum reported SAR value for Body	Bottom	1.03	0.19	**1.22**

[1] - Estimated SAR for Bluetooth (see the table 13.3)

3 Client Information

3.1 Applicant Information

Company Name:	LG Electronics USA, Inc.
Address /Post:	1000 Sylvan Avenue, Englewood Cliffs NJ 07632
Contact Person:	/
E-mail:	/
Telephone:	/
Fax:	/

3.2 Manufacturer Information

Company Name:	LG Electronics Inc.
Address /Post:	LG Twin Towers,128,Yeoui-daero,Yeongdeungpo-gu
Contact Person:	/
E-mail:	/
Telephone:	+82-2-6946-1675
Fax:	/

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

4.1 About EUT

Description:	Multi-band GSM/WCDMA/LTE phone with Bluetooth, WLAN
Model name:	LM-X120HN,LMX120HN, X120HN
Operating mode(s):	GSM850/900/1800/1900 WCDMA850/9000/1700/1900/2100 LTE B1/2/3/4/5/7/8/17/28/66, BT, WLAN
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)
	1860 – 1900 MHz (LTE Band 2)
	824.7 – 848.3 MHz (LTE Band 5)
	2502.5 – 2567.5 MHz (LTE Band 7)
	699.7 – 715.3 MHz (LTE Band 12)
	706.5 – 713.5MHz(LTE Band 17)
	1710.7 –1779.3 MHz (LTE Band 66)
	2412 – 2462 MHz (Wi-Fi 2.4G)
GPRS/EGPRS Multislot Class:	33
Test device Production information:	Production unit
Device type:	Portable device
Antenna type:	Integrated antenna
Hotspot mode:	Support
Product dimension	L: 146.3mm W: 73.2mm overall diagonal:163.6mm

4.2 Internal Identification of EUT used during the test

EUTID	IMEI	HW Version	SW Version
1	351686110000636	/	/
2	351686110000982	/	/

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

Note: It is performed to test SAR with the EUT1 and conducted power with the EUT2.

4.3 Internal Identification of AE used during the test

AE ID*	Description	Model	SN	Manufacturer
AE1	Battery	EAC64559001	/	Jiade Energy Technology(Zhuhai)Co.,Ltd
AE2	Headset	EAB64468444	/	Cresyn

*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 D05A LTE Rel.10 KDB Inquiry Sheet v01r02 REL.10 LTE SAR TEST GUIDANCE AND KDB INQUIRIES

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:

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

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

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

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

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

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

Where: σ is the conductivity of the tissue, ρ is the mass density of tissue 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

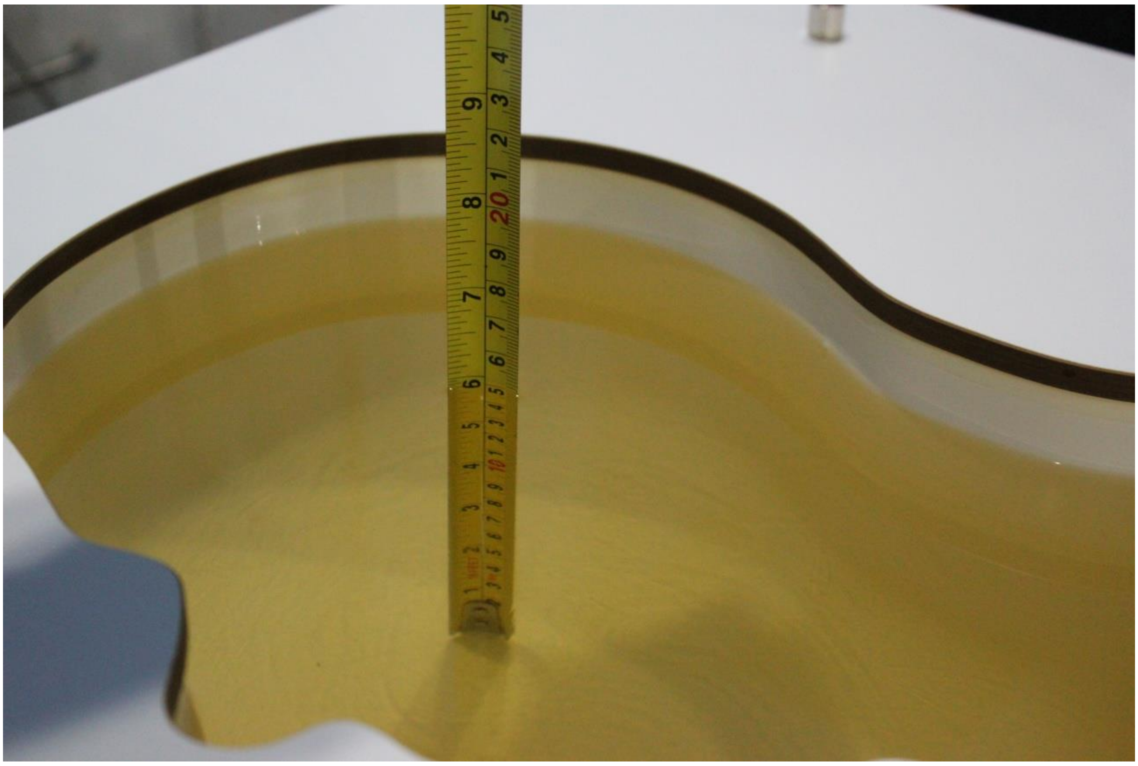
Table 7.1: Targets for tissue simulating liquid

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
750	Body	0.96	0.91～1.01	55.5	52.7～58.3
835	Head	0.90	0.86～0.95	41.5	39.4～43.6
835	Body	0.97	0.92～1.02	55.2	52.4～58.0
1750	Head	1.37	1.30～1.44	40.08	38.1～42.1
1750	Body	1.49	1.42～1.56	53.4	50.7～56.1
1900	Head	1.40	1.33～1.47	40.0	38.0～42.0
1900	Body	1.52	1.44～1.60	53.3	50.6～56.0
2450	Head	1.80	1.71～1.89	39.2	37.2～41.2
2450	Body	1.95	1.85～2.05	52.7	50.1～55.3
2600	Head	1.96	1.86～2.06	39.01	37.06～40.96
2600	Body	2.16	2.05～2.27	52.5	49.9～55.1

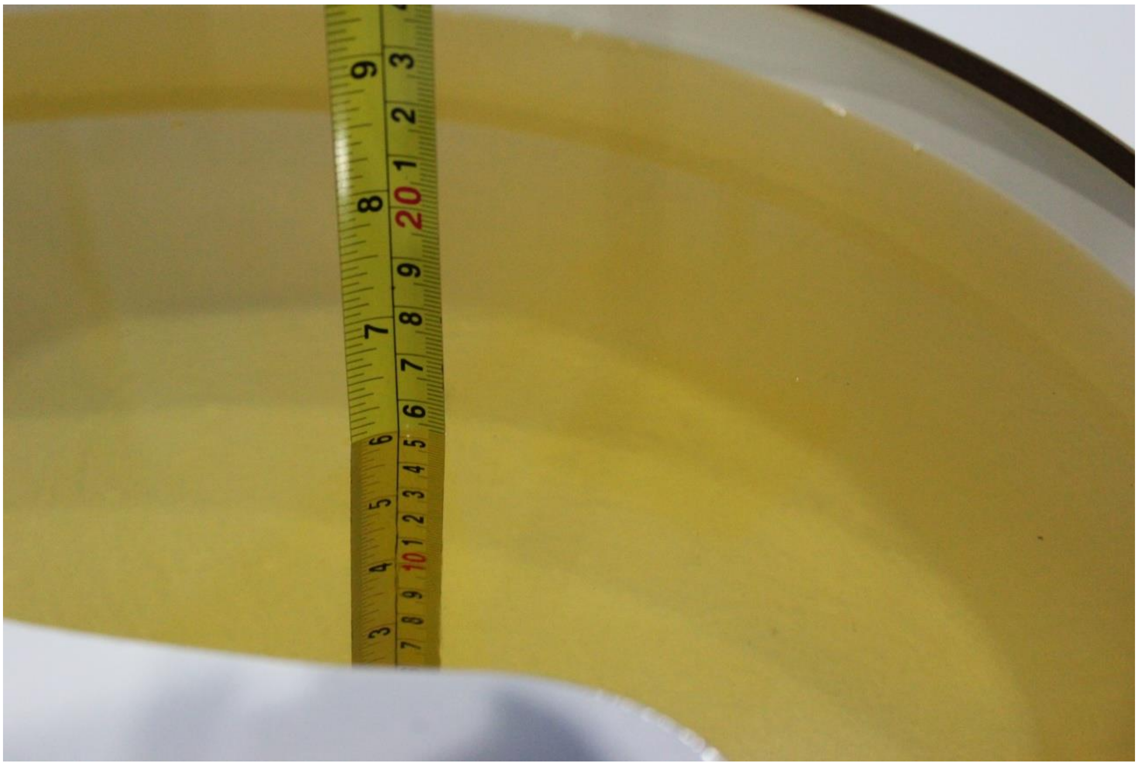
7.2 Dielectric Performance

Table 7.2: Dielectric Performance of Tissue Simulating Liquid

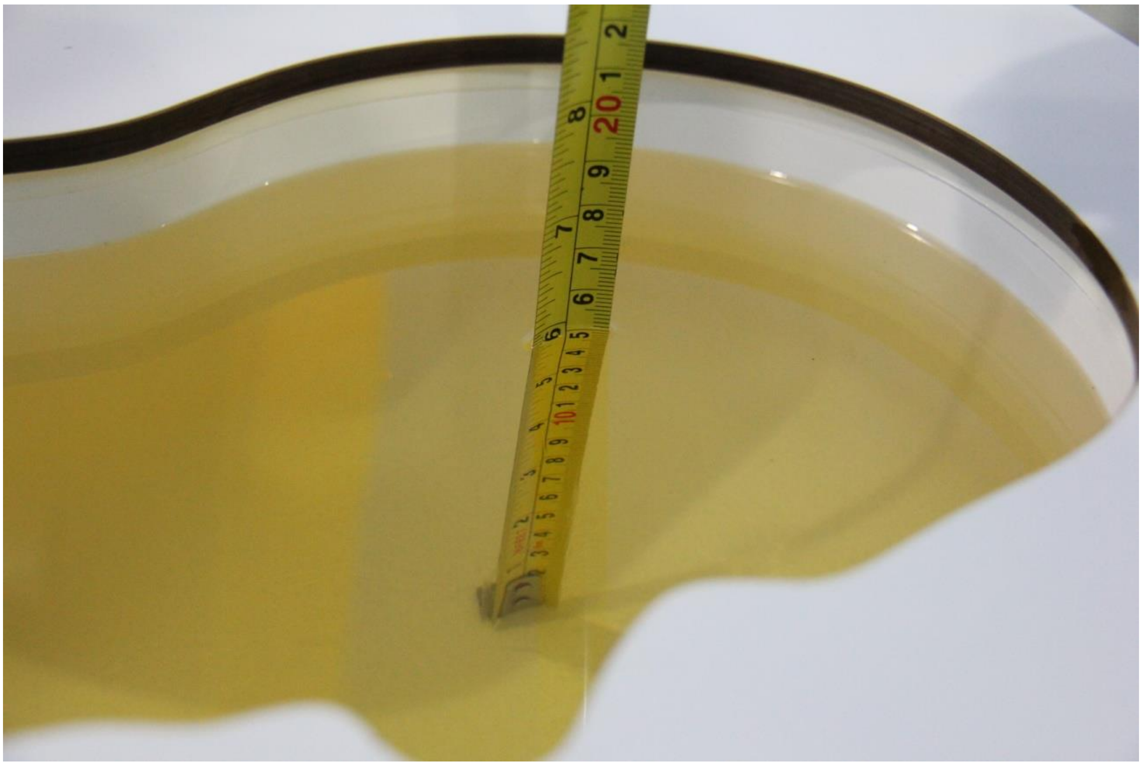
Measurement Date yyyy/mm/dd	Frequency	Type	Permittivity ε	Drift (%)	Conductivity σ (S/m)	Drift (%)
2019/6/1	750 MHz	Head	42.50	1.34	0.890	0.00
		Body	55.24	-0.47	0.970	1.04
2019/6/2	835 MHz	Head	40.69	-1.95	0.888	-1.33
		Body	54.43	-1.39	0.955	-1.55
2019/6/3	1750 MHz	Head	40.20	0.30	1.354	-1.17
		Body	53.07	-0.62	1.482	-0.54
2019/6/4	1900 MHz	Head	39.38	-1.55	1.411	0.79
		Body	52.85	-0.84	1.496	-1.58
2019/6/5	2450 MHz	Head	39.83	1.61	1.818	1.00
		Body	52.24	-0.87	1.947	-0.15
2019/6/6	2600 MHz	Head	39.01	0.00	1.956	-0.20
		Body	52.30	-0.38	2.177	0.79
2019/9/20	750 MHz	Head	41.89	-0.12	0.874	-1.80
		Body	55.05	-0.81	0.964	0.42



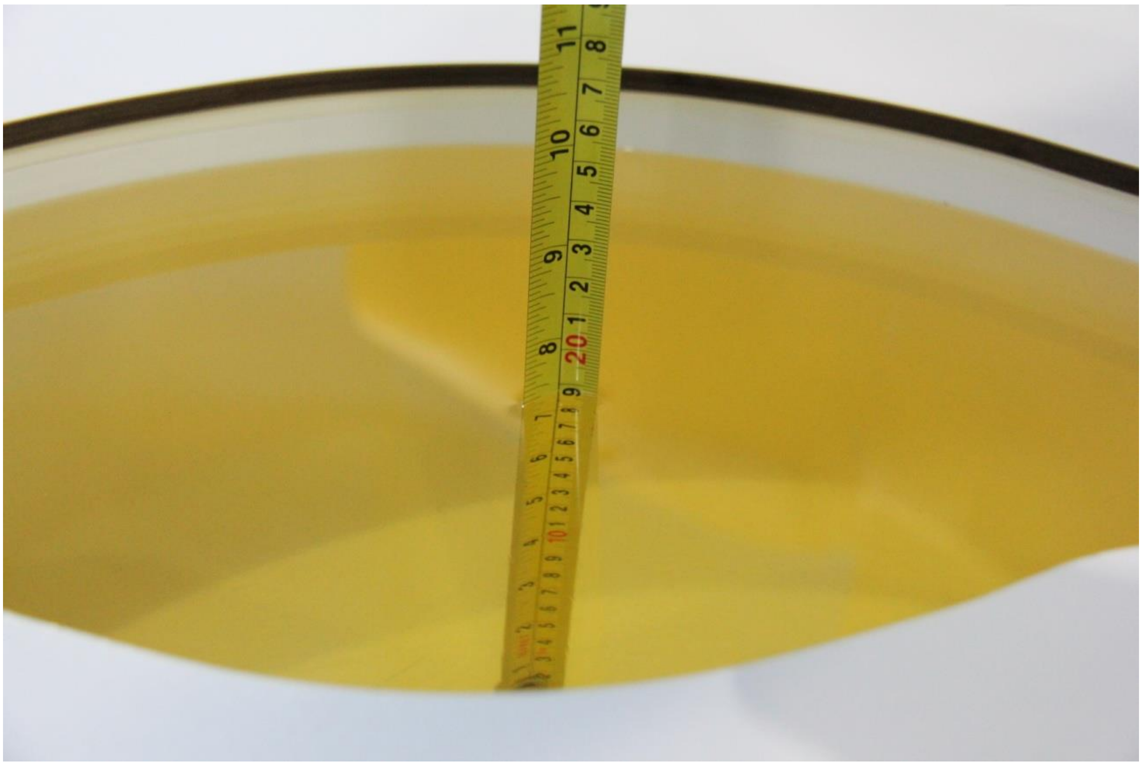
Picture 7-1 Liquid depth in the Head Phantom (750 MHz)



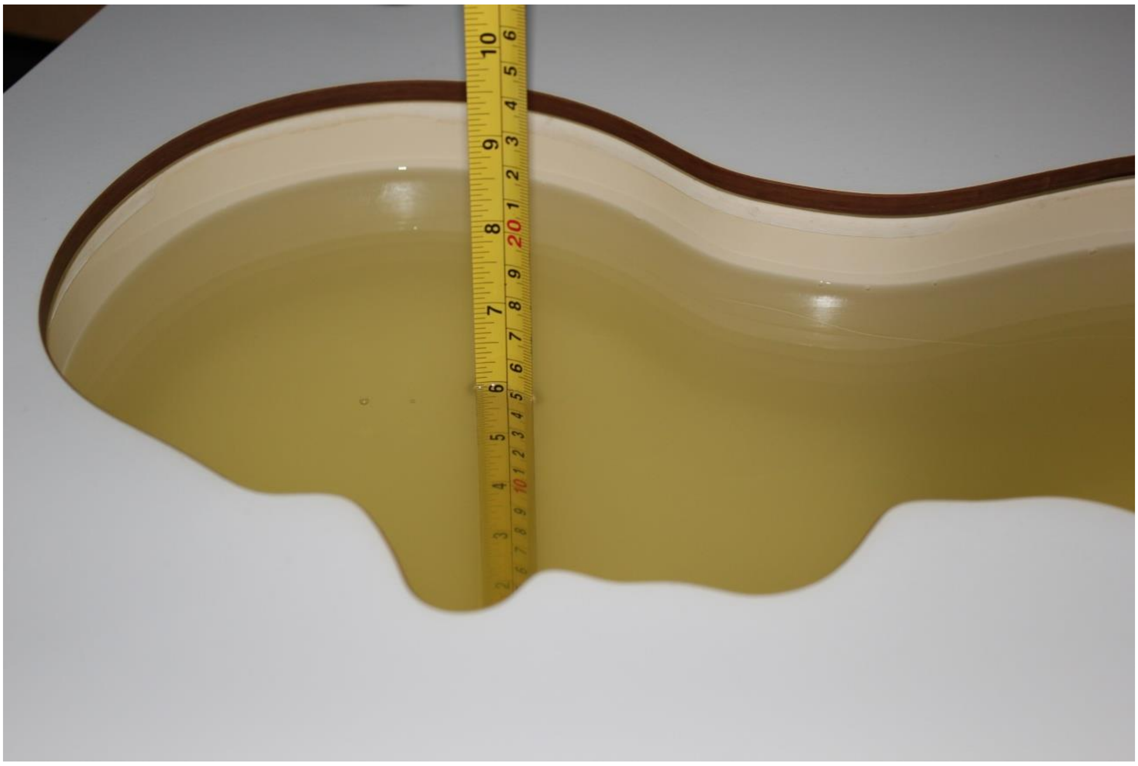
Picture 7-2 Liquid depth in the Flat Phantom (750 MHz)



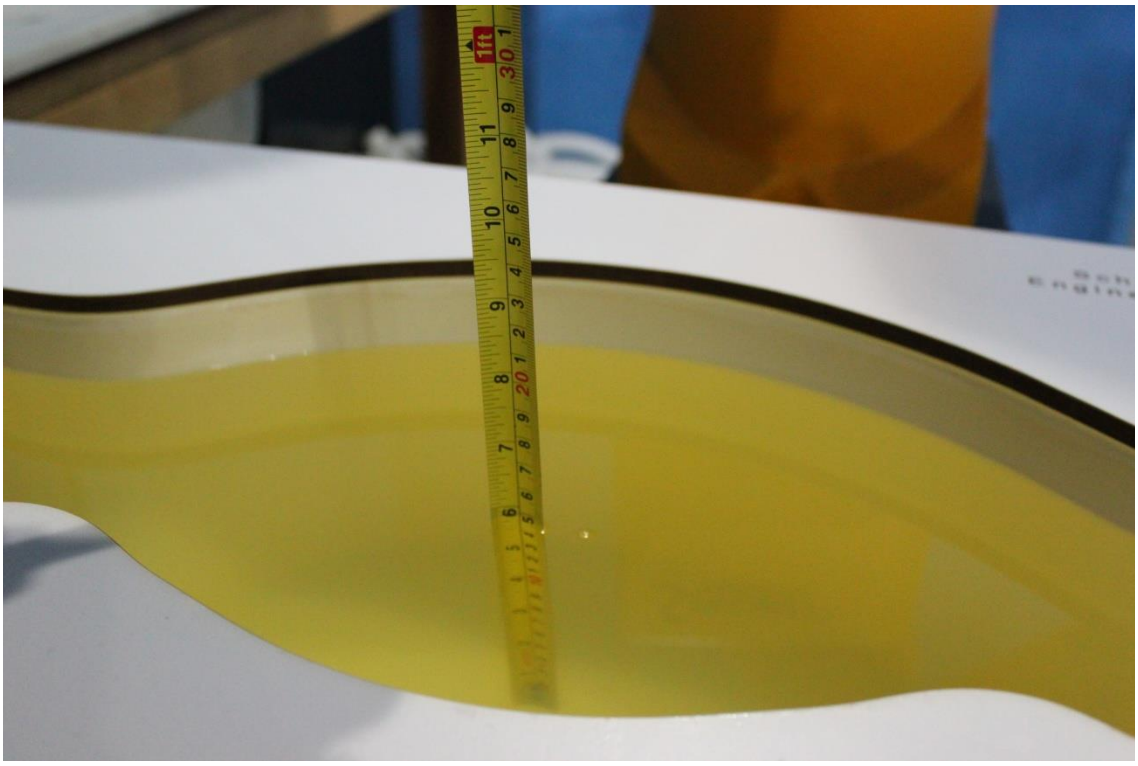
Picture 7-3 Liquid depth in the Head Phantom (835MHz)



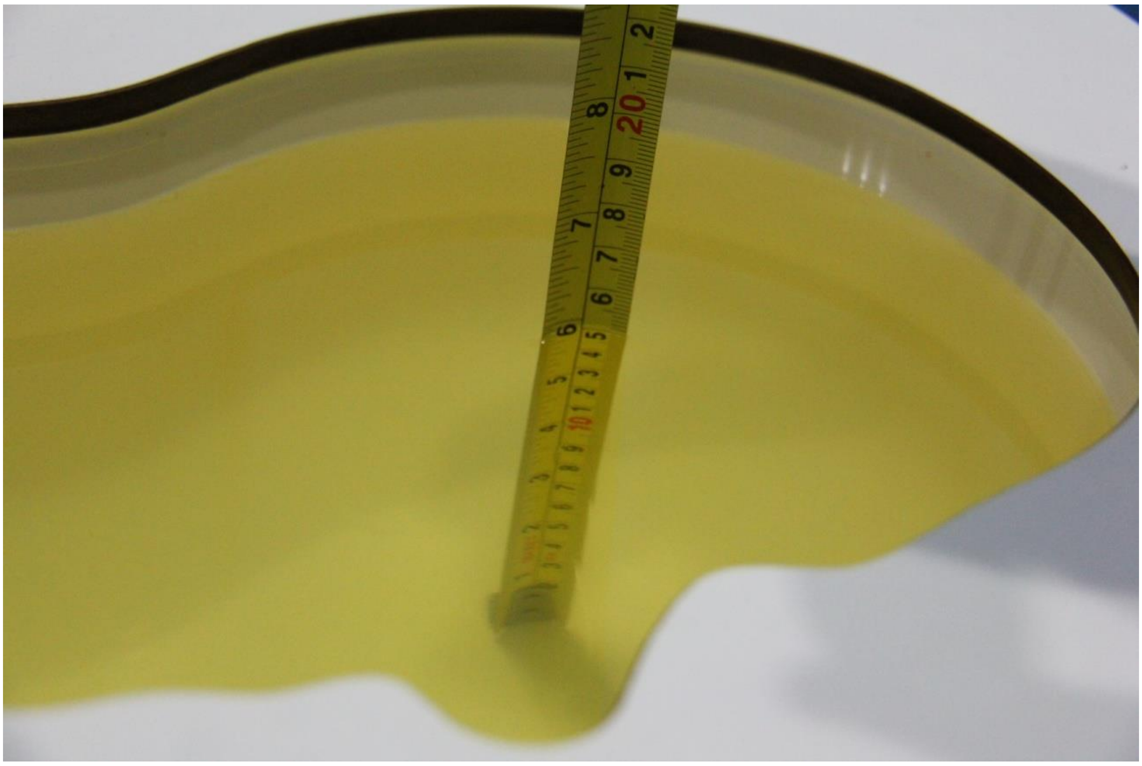
Picture 7-4 Liquid depth in the Flat Phantom (835MHz)



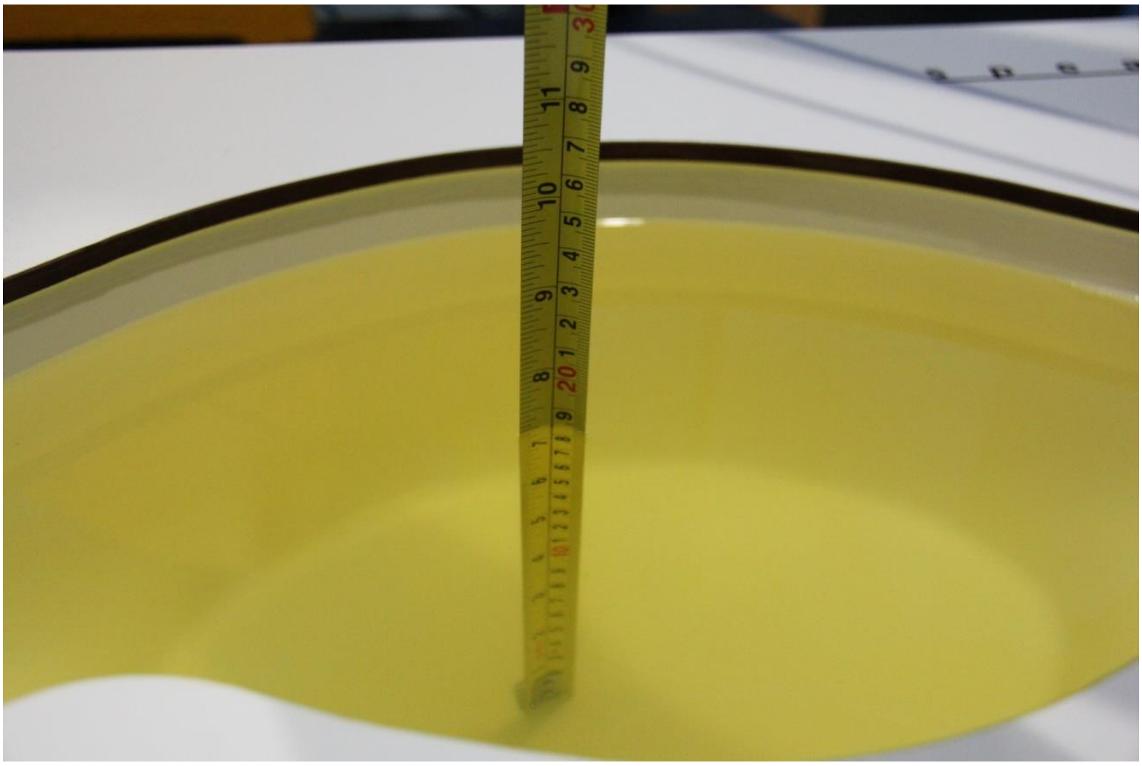
Picture 7-5 Liquid depth in the Head Phantom (1750 MHz)



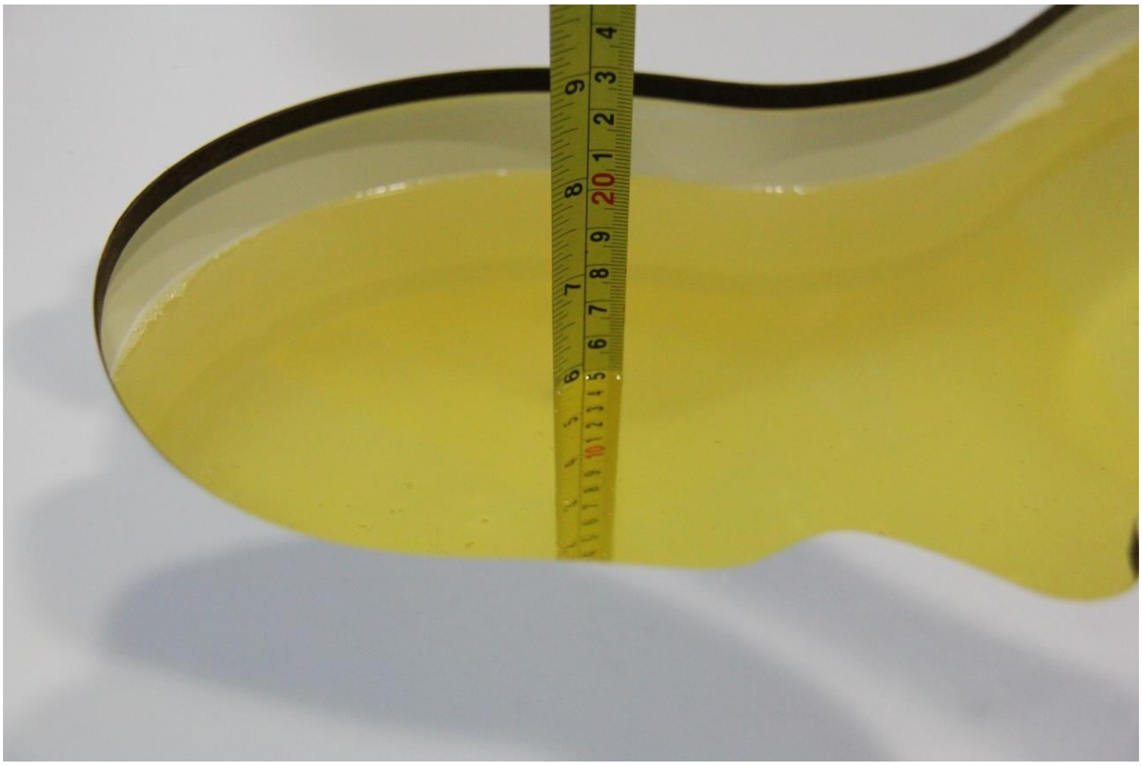
Picture 7-6 Liquid depth in the Flat Phantom (1750MHz)



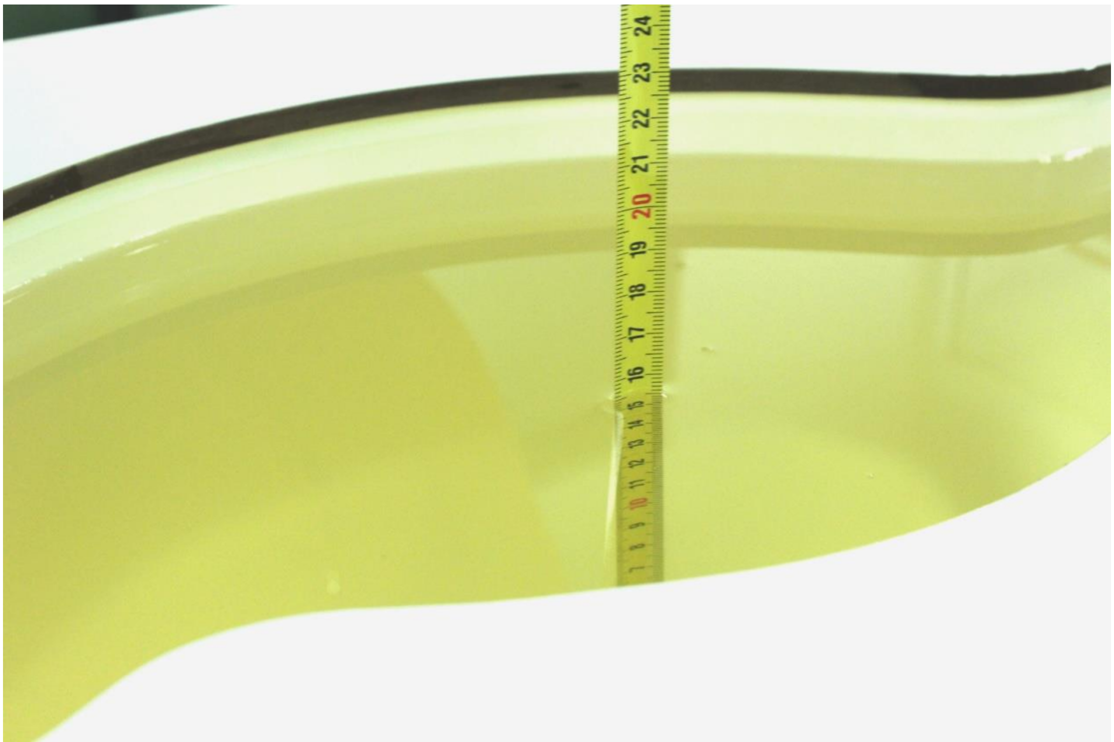
Picture 7-7 Liquid depth in the Head Phantom (1900 MHz)



Picture 7-8 Liquid depth in the Flat Phantom (1900MHz)

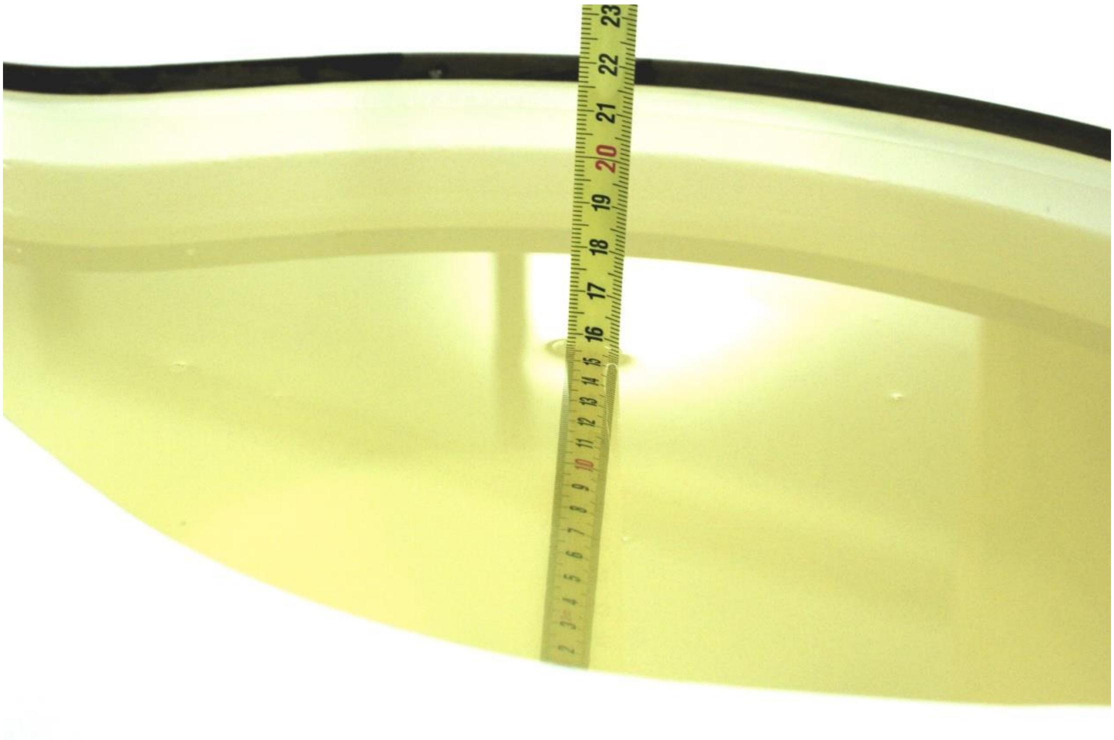


Picture 7-9 Liquid depth in the Head Phantom (2450MHz)



Picture 7-10 Liquid depth in the Flat Phantom (2450MHz)

Picture 7-11 Liquid depth in the Head Phantom (2600 MHz Head)

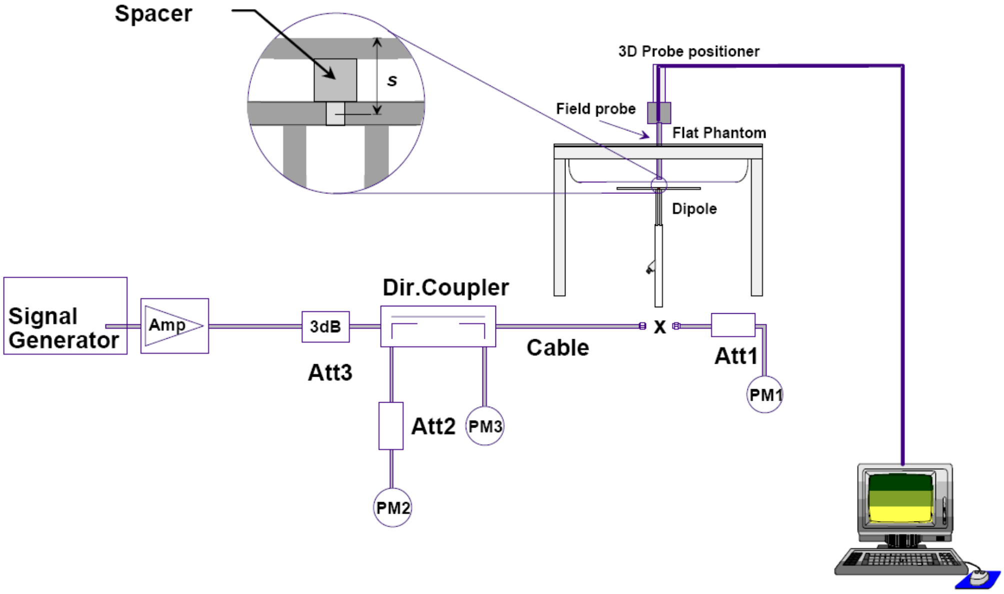


Picture 7-12 Liquid depth in the Flat Phantom (2600MHz)

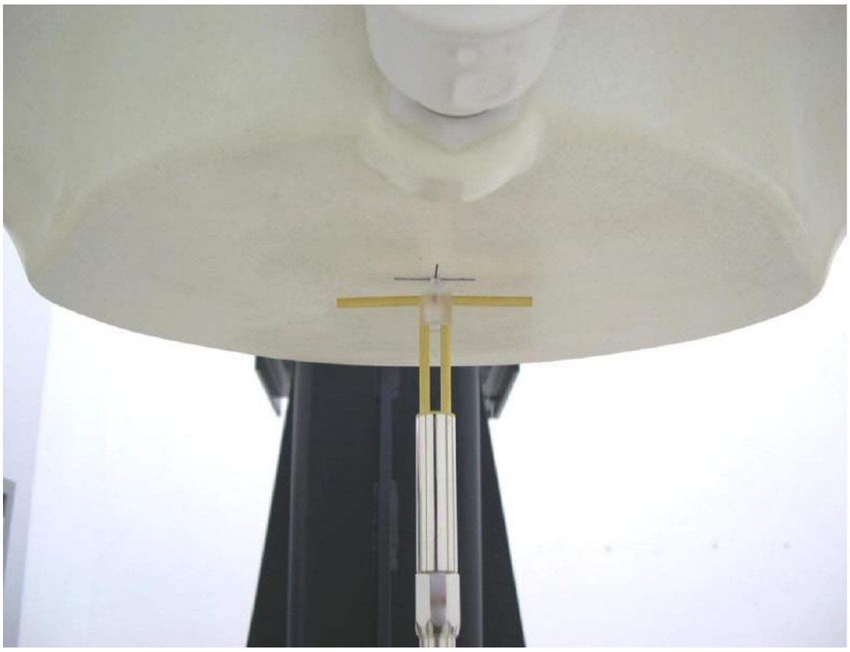
8 System verification

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
2019/6/1	750 MHz	5.42	8.32	5.32	8.48	-1.85%	1.92%
2019/6/2	835 MHz	6.06	9.37	6.00	9.48	-0.99%	1.17%
2019/6/3	1750 MHz	19.4	36.7	19.76	36.56	1.86%	-0.38%
2019/6/4	1900 MHz	21.0	40.0	20.92	40.36	-0.38%	0.90%
2019/6/5	2450 MHz	24.7	52.2	25.00	51.72	1.21%	-0.92%
2019/6/6	2600 MHz	25.8	57.9	25.88	57.72	0.31%	-0.31%
2019/9/20	750 MHz	5.57	8.57	5.52	8.64	-0.90%	0.82%

Table 8.2: System Verification of Body

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
2019/6/1	750 MHz	5.68	8.66	5.68	8.64	0.00%	-0.23%
2019/6/2	835 MHz	6.12	9.41	6.12	9.52	0.00%	1.17%
2019/6/3	1750 MHz	19.8	37.1	19.60	37.56	-1.01%	1.24%
2019/6/4	1900 MHz	21.5	40.5	21.88	40.76	1.77%	0.64%
2019/6/5	2450 MHz	23.8	50.4	24.16	50.4	1.51%	0.00%
2019/6/6	2600 MHz	24.8	55.5	25.08	55.6	1.13%	0.18%
2019/9/20	750 MHz	5.63	8.55	5.64	8.72	0.18%	1.99%

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.

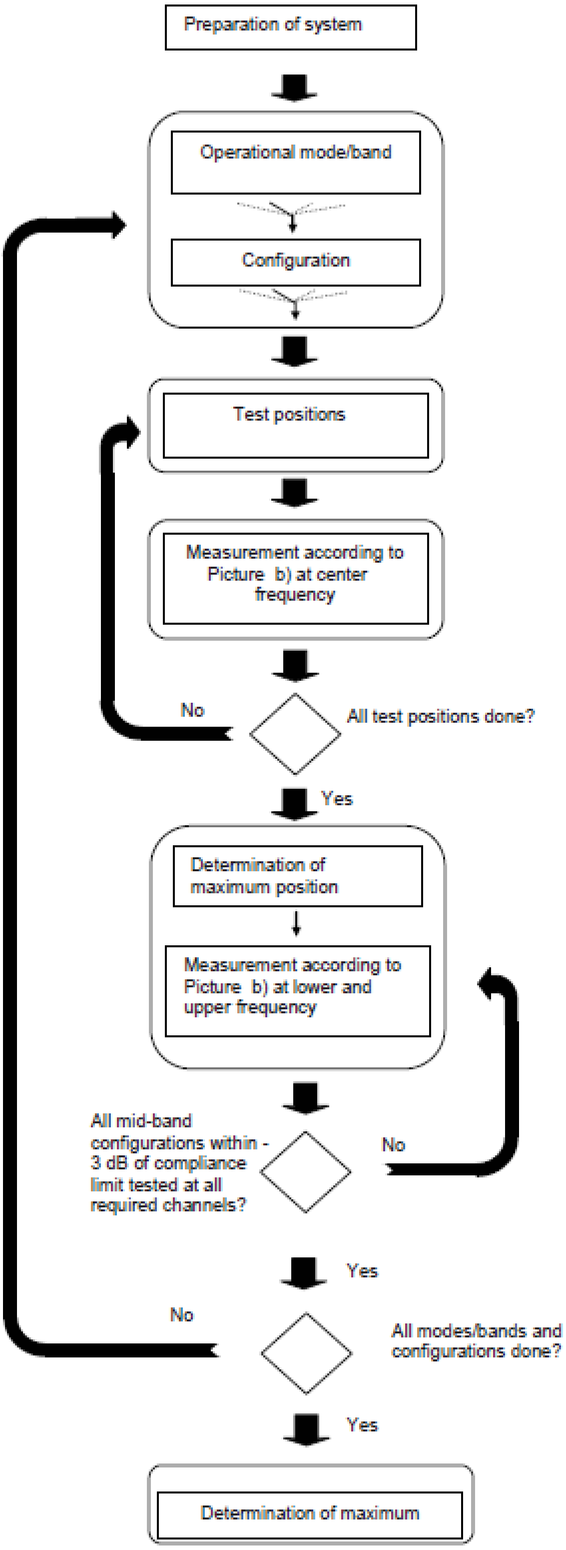
Step 1: The tests described in 9.2 shall be performed at the channel that is closest to the center of the transmit frequency band (f_c) for:

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.

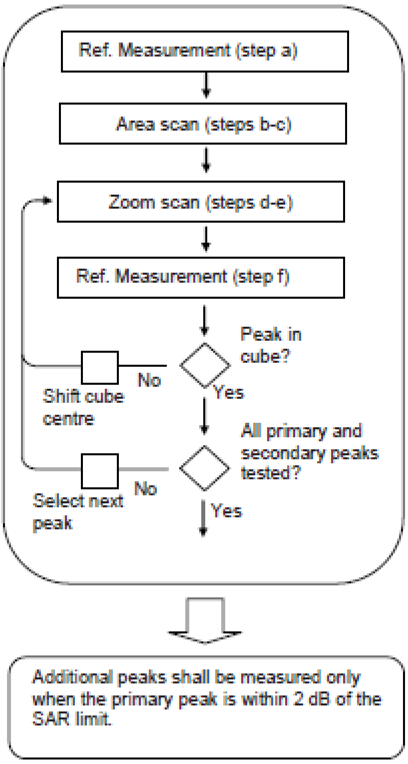
If more than three frequencies need to be tested according to 11.1 (i.e., N_c > 3), then all frequencies, configurations and modes shall be tested for all of the above test conditions.

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 within 3 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 a – Tests to be performed



Picture b – General procedure

Picture 9.1 Block 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 1528-2013. The results should be documented as part of the system validation records and may be requested to support test results when all the measurement parameters in the following table are not satisfied.

<table>
<tr><td colspan="3"></td><td>$\leq$ 3 GHz</td><td>> 3 GHz</td></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>$\leq$ 2 GHz: $\leq$ 15 mm
2 – 3 GHz: $\leq$ 12 mm</td><td>3 – 4 GHz: $\leq$ 12 mm
4 – 6 GHz: $\leq$ 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 $\leq$ 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>$\leq$ 2 GHz: $\leq$ 8 mm
2 – 3 GHz: $\leq$ 5 mm*</td><td>3 – 4 GHz: $\leq$ 5 mm*
4 – 6 GHz: $\leq$ 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>$\leq$ 5 mm</td><td>3 – 4 GHz: $\leq$ 4 mm
4 – 5 GHz: $\leq$ 3 mm
5 – 6 GHz: $\leq$ 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>$\leq$ 4 mm</td><td>3 – 4 GHz: $\leq$ 3 mm
4 – 5 GHz: $\leq$ 2.5 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>$\geq$ 30 mm</td><td>3 – 4 GHz: $\geq$ 28 mm
4 – 5 GHz: $\geq$ 25 mm
5 – 6 GHz: $\geq$ 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 $\leq$ 1.4 W/kg, $\leq$ 8 mm, $\leq$ 7 mm and $\leq$ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</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.

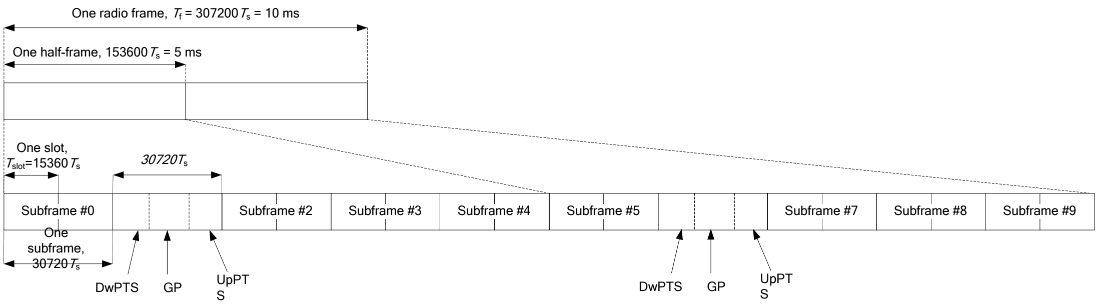
It is performed for conducted power and SAR based on the KDB941225 D05.

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.

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

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



Picture 10-4 Frame structure type 2

Table 11.6-1: 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 11.6-2: Uplink-downlink configurations

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

According to Picture 11.1, one radio frame is configured by 10 subframes, which consist of Uplink-subframe, Downlink-subframe and Special subframe. For TDD-LTE, the Duty Cycle should be calculated on Uplink-subframes and Special subframes, due to Special subframe containing both

Uplink transmissions. So for one radio frame, Duty Cycle can be calculated with formula as below. The count of Uplink subframes are according to Table 11.6-2:

Duty cycle =(30720Ts*Ups+Uplink Component*Specials)/(307200Ts)

About the uplink component of Special subframes, we can figure out by Table 11.6-1:

Uplink Component=UpPTS

In conclusion, for the **TDD LTE Band 40**, Duty Cycle can be calculated with formula as below .all these sets are ok when we test, or we can set as below.

Duty cycle =[(30720Ts*Ups)+ UpPTS *Specials]/(307200Ts)

And we can get different Duty cycles under different configurations:

Uplink-downlink configuration	Subframe number			Configuration of special subframe							
				Normal cyclic prefix in downlink				Extended cyclic prefix in downlink			
				Normal cyclic prefix in uplink		Extended cyclic prefix in uplink		Normal cyclic prefix in uplink		Extended cyclic prefix in uplink	
	D	S	U	configuration 0~4	configuration 5~9	configuration 0~4	configuration 5~9	configuration 0~3	configuration 4~7	configuration 0~3	configuration 4~7
0	2	2	6	61.43%	62.85%	61.67%	63.33%	61.43%	62.85%	61.67%	63.33%
1	4	2	4	41.43%	42.85%	41.67%	43.33%	41.43%	42.85%	41.67%	43.33%
2	6	2	2	21.43%	22.85%	21.67%	23.33%	21.43%	22.85%	21.67%	23.33%
3	6	1	3	30.71%	31.43%	30.83%	31.67%	30.71%	31.43%	30.83%	31.67%
4	7	1	2	20.71%	21.43%	20.83%	21.67%	20.71%	21.43%	20.83%	21.67%
5	8	1	1	10.71%	11.43%	10.83%	11.67%	10.71%	11.43%	10.83%	11.67%
6	3	2	5	51.43%	52.85%	51.67%	53.33%	51.43%	52.85%	51.67%	53.33%

SAR test Plan: For TDD LTE, SAR should be tested with the highest transmission duty factor **(63.33%)** using Uplink-downlink configuration **0** and Special subframe configuration **7** for Frame structure **type 2.**

Note:

1. From May 2017 TCB Workshop, HPUE does not support uplink-downlink configurations 0 and 6.

2. This device supports uplink-downlink configurations 0-6. The configuration with highest duty cycle was used for SAR Testing: configuration 0 at 63.3% (Power Class 3) and configuration 1 at 43.3% (Power Class 2) duty cycle.

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 section 14 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 v06, when the implementation is based the specific polynomial fit
algorithm as presented at the 29th Bioelectromagnetics Society meeting (2007) and the estimated 1-g SAR 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 55 wireless handsets. For the sample size studied, the root-mean-squared errors of the algorithm are 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

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.

Table 11.1-1: The conducted power measurement results for 2G

GSM 850	Measured Power (dBm)			Tune up	calculation	Averaged Power (dBm)		
Speech (GMSK)	251	190	128			251	190	128
1 Txslot	33.48	33.50	33.53	34.00	/	/	/	/
GSM 850	Measured Power (dBm)				calculation	Averaged Power (dBm)		
GPRS (GMSK)	251	190	128			251	190	128
1 Txslot	33.56	33.52	33.54	34.00	-9.03	24.53	24.49	24.51
2 Txslots	**32.49**	**32.48**	**32.49**	**33.00**	**-6.02**	**26.47**	**26.46**	**26.47**
3Txslots	30.30	30.27	30.28	31.00	-4.26	26.04	26.01	26.02
4 Txslots	28.67	28.64	28.59	29.00	-3.01	25.66	25.63	25.58
GSM 850	Measured Power (dBm)				calculation	Averaged Power (dBm)		
EGPRS (GMSK)	251	190	128			251	190	128
1 Txslot	33.48	33.43	33.50	34.00	-9.03	24.45	24.40	24.47
2 Txslots	32.46	32.46	32.47	33.00	-6.02	26.44	26.44	26.45
3Txslots	30.27	30.25	30.26	31.00	-4.26	26.01	25.99	26.00
4 Txslots	28.58	28.61	28.60	29.00	-3.01	25.57	25.60	25.59
GSM 850	Measured Power (dBm)				calculation	Averaged Power (dBm)		
EGPRS (8PSK)	251	190	128			251	190	128
1 Txslot	27.41	27.46	27.48	27.50	-9.03	18.38	18.43	18.45
2 Txslots	26.41	26.44	26.49	26.50	-6.02	20.39	20.42	20.47
3Txslots	24.15	24.16	24.27	24.50	-4.26	19.89	19.90	20.01
4 Txslots	22.66	22.72	22.78	23.50	-3.01	19.65	19.71	19.77
PCS1900	Measured Power (dBm)			Tune up	calculation	Averaged Power (dBm)		
Speech (GMSK)	810	661	512			810	661	512
1 Txslot	30.54	30.52	30.55	31.00	/	/	/	/
PCS1900	Measured Power (dBm)				calculation	Averaged Power (dBm)		
GPRS (GMSK)	810	661	512			810	661	512
1 Txslot	30.55	30.54	30.54	31.00	-9.03	21.52	21.51	21.51
2 Txslots	**29.60**	**29.57**	**29.57**	**30.00**	**-6.02**	**23.58**	**23.55**	**23.55**
3Txslots	27.48	27.46	27.48	27.50	-4.26	23.22	23.20	23.22
4 Txslots	26.28	26.22	26.18	26.50	-3.01	23.27	23.21	23.17
PCS1900	Measured Power (dBm)				calculation	Averaged Power (dBm)		
EGPRS (GMSK)	810	661	512			810	661	512
1 Txslot	30.54	30.53	30.53	31.00	-9.03	21.51	21.50	21.50
2 Txslots	29.58	29.56	29.54	30.00	-6.02	23.56	23.54	23.52

3Txslots	27.47	27.48	27.46	27.50	-4.26	23.21	23.22	23.20
4 Txslots	26.26	26.20	26.16	26.50	-3.01	23.25	23.19	23.15
PCS1900 EGPRS (8PSK)	Measured Power (dBm)				calculation	Averaged Power (dBm)		
	810	661	512			810	661	512
1 Txslot	25.69	25.76	25.85	27.00	-9.03	16.66	16.73	16.82
2 Txslots	25.19	25.20	25.17	26.00	-6.02	19.17	19.18	19.15
3Txslots	23.38	23.42	23.39	24.00	-4.26	19.12	19.16	19.13
4 Txslots	22.02	22.07	22.01	23.00	-3.01	19.01	19.06	19.00

NOTES:

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 850MHz and 1900MHz.

11.2 WCDMA Measurement result

Table 11.2-1: The conducted Power for WCDMA

Item	**band**	**FDDV result**			
	ARFCN	**4233 (846.6MHz)**	**4182 (836.4MHz)**	**4132 (826.4MHz)**	**Tune up**
WCDMA	****	23.97	23.91	23.93	24.50
HSUPA	**1**	21.05	20.98	20.99	22.00
	2	21.02	20.97	20.98	22.00
	3	22.01	21.98	21.97	23.00
	4	20.56	20.52	20.48	21.50
	5	21.99	21.96	21.95	23.00
DC-HSDPA	**1**	23.02	22.97	22.94	23.50
	2	22.98	22.92	22.89	23.50
	3	22.46	22.41	22.39	23.50
	4	22.47	22.42	22.35	23.50
Item	**band**	**FDDII result**			
	ARFCN	**9538 (1907.6MHz)**	**9400 (1880MHz)**	**9262 (1852.4MHz)**	**Tune up**
WCDMA	****	22.71	22.65	22.55	23.00
HSUPA	**1**	19.58	19.55	19.49	21.00
	2	19.57	19.53	19.46	21.00
	3	20.53	20.51	20.44	22.00
	4	19.05	19.01	18.97	20.50
	5	20.52	20.46	20.42	22.00
	1	21.52	21.55	21.50	22.50

DC-HSDPA	**2**	21.44	21.41	21.42	22.50
	3	20.97	20.98	20.95	22.50
	4	20.99	20.98	20.93	22.50
Item	**band**	**FDDIV result**			
	ARFCN	**1513 (1752.6MHz)**	**1412(1732.4MHz)**	**1312(1712.4MHz)**	**Tune up**
WCDMA	****	23.27	23.16	23.25	23.50
HSUPA	**1**	20.14	20.02	20.13	21.00
	2	20.15	20.01	20.12	21.00
	3	21.18	21.02	21.12	22.00
	4	19.68	19.53	19.62	20.50
	5	21.16	21.01	21.09	22.00
DC-HSDPA	**1**	22.09	22.06	22.15	22.50
	2	21.97	21.93	22.07	22.50
	3	21.55	21.51	21.61	22.50
	4	21.54	21.57	21.56	22.50

11.3 LTE Measurement result

Table 11.4-1: Tune up for LTE

Band	Tune up (dBm)
	Normal power
Band 2	24.5
Band 5	24.5
Band 7	23
Band 12	24.5
Band 17	24.5
Band 66	23.5

Table 11.4-2: Maximum Power Reduction (MPR) for LTE Normal 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	1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	2

Table 11.4-1 LTE Band2

Bandwidth (MHz)	RB allocation / RB offset	Frequency (MHz)	Actual output power (dBm) QPSK	Actual output power (dBm) 16QAM
1.4MHz	1RB-High (5)	1909.3 (19193)	24.02	23.19
		1880 (18900)	24.02	23.33
		1850.7 (18607)	24.07	23.26
	1RB-Middle (3)	1909.3 (19193)	24.12	23.29
		1880 (18900)	24.14	23.40
		1850.7 (18607)	24.19	23.42
	1RB-Low (0)	1909.3 (19193)	24.02	23.22
		1880 (18900)	24.01	23.31
		1850.7 (18607)	24.09	23.31
	3RB-High (3)	1909.3 (19193)	24.07	23.16
		1880 (18900)	24.11	23.27
		1850.7 (18607)	24.18	23.27
	3RB-Middle (1)	1909.3 (19193)	24.14	23.25
		1880 (18900)	24.14	23.33
		1850.7 (18607)	24.21	23.34
	3RB-Low (0)	1909.3 (19193)	24.08	23.20
		1880 (18900)	24.12	23.29
		1850.7 (18607)	24.17	23.27
	6RB (0)	1909.3 (19193)	23.10	22.21
		1880 (18900)	23.19	22.21
		1850.7 (18607)	23.18	22.28
3MHz	1RB-High (14)	1908.5 (19185)	24.10	23.25
		1880 (18900)	24.09	23.35
		1851.5 (18615)	24.12	23.35
	1RB-Middle (7)	1908.5 (19185)	24.27	23.37
		1880 (18900)	24.28	23.49
		1851.5 (18615)	24.32	23.50
	1RB-Low (0)	1908.5 (19185)	24.05	23.23
		1880 (18900)	24.10	23.31
		1851.5 (18615)	24.15	23.31
	8RB-High (7)	1908.5 (19185)	23.10	22.20
		1880 (18900)	23.18	22.21
		1851.5 (18615)	23.18	22.29
	8RB-Middle (4)	1908.5 (19185)	23.16	22.23
		1880 (18900)	23.26	22.26
		1851.5 (18615)	23.22	22.31
	8RB-Low (0)	1908.5 (19185)	23.12	22.24
		1880 (18900)	23.21	22.23
		1851.5 (18615)	23.19	22.28
	15RB (0)	1908.5 (19185)	23.12	22.18
		1880 (18900)	23.19	22.17
		1851.5 (18615)	23.14	22.23

5MHz	1RB-High (24)	1907.5 (19175)	23.97	23.18
		1880 (18900)	23.97	23.25
		1852.5 (18625)	23.98	23.27
	1RB-Middle (12)	1907.5 (19175)	24.31	23.41
		1880 (18900)	24.29	23.44
		1852.5 (18625)	24.31	23.40
	1RB-Low (0)	1907.5 (19175)	23.97	23.16
		1880 (18900)	23.99	23.30
		1852.5 (18625)	24.03	23.24
	12RB-High (13)	1907.5 (19175)	23.09	22.20
		1880 (18900)	23.16	22.22
		1852.5 (18625)	23.22	22.24
	12RB-Middle (6)	1907.5 (19175)	23.16	22.27
		1880 (18900)	23.23	22.26
		1852.5 (18625)	23.20	22.33
	12RB-Low (0)	1907.5 (19175)	23.08	22.19
		1880 (18900)	23.18	22.21
		1852.5 (18625)	23.15	22.25
	25RB (0)	1907.5 (19175)	23.16	22.21
		1880 (18900)	23.20	22.22
		1852.5 (18625)	23.19	22.29
10MHz	1RB-High (49)	1905 (19150)	24.08	23.26
		1880 (18900)	24.06	23.35
		1855 (18650)	24.09	23.37
	1RB-Middle (24)	1905 (19150)	24.21	23.41
		1880 (18900)	24.23	23.48
		1855 (18650)	24.24	23.43
	1RB-Low (0)	1905 (19150)	24.09	23.31
		1880 (18900)	24.11	23.38
		1855 (18650)	24.15	23.37
	25RB-High (25)	1905 (19150)	23.23	22.29
		1880 (18900)	23.25	22.25
		1855 (18650)	23.33	22.34
	25RB-Middle (12)	1905 (19150)	23.16	22.27
		1880 (18900)	23.25	22.27
		1855 (18650)	23.28	22.29
	25RB-Low (0)	1905 (19150)	23.20	22.29
		1880 (18900)	23.27	22.26
		1855 (18650)	23.24	22.32
	50RB (0)	1905 (19150)	23.21	22.27
		1880 (18900)	23.25	22.25
		1855 (18650)	23.33	22.29

15MHz	1RB-High (74)	1902.5 (19125)	24.01	23.19
		1880 (18900)	24.05	23.22
		1857.5 (18675)	24.04	23.32
	1RB-Middle (37)	1902.5 (19125)	24.22	23.47
		1880 (18900)	24.25	23.41
		1857.5 (18675)	24.27	23.46
	1RB-Low (0)	1902.5 (19125)	24.02	23.18
		1880 (18900)	24.08	23.34
		1857.5 (18675)	24.13	23.34
	36RB-High (38)	1902.5 (19125)	23.19	22.26
		1880 (18900)	23.23	22.26
		1857.5 (18675)	23.31	22.32
	36RB-Middle (19)	1902.5 (19125)	23.16	22.25
		1880 (18900)	23.25	22.27
		1857.5 (18675)	23.28	22.29
	36RB-Low (0)	1902.5 (19125)	23.17	22.28
		1880 (18900)	23.28	22.29
		1857.5 (18675)	23.22	22.35
	75RB (0)	1902.5 (19125)	23.20	22.26
		1880 (18900)	23.27	22.25
		1857.5 (18675)	23.30	22.31
20MHz	1RB-High (99)	1900 (19100)	23.86	23.05
		1880 (18900)	23.85	23.01
		1860 (18700)	23.88	23.13
	1RB-Middle (50)	1900 (19100)	24.17	23.41
		1880 (18900)	24.21	23.46
		1860 (18700)	24.28	23.41
	1RB-Low (0)	1900 (19100)	23.86	23.07
		1880 (18900)	23.92	23.18
		1860 (18700)	23.97	23.15
	50RB-High (50)	1900 (19100)	23.14	22.16
		1880 (18900)	23.21	22.28
		1860 (18700)	23.35	22.30
	50RB-Middle (25)	1900 (19100)	23.16	22.21
		1880 (18900)	23.26	22.24
		1860 (18700)	23.30	22.29
	50RB-Low (0)	1900 (19100)	23.21	22.27
		1880 (18900)	23.30	22.25
		1860 (18700)	23.25	22.22
	100RB (0)	1900 (19100)	23.16	22.23
		1880 (18900)	23.25	22.26
		1860 (18700)	23.27	22.30

Table 11.4-2 LTE Band5

Bandwidth (MHz)	RB allocation / RB offset	Frequency (MHz)	Actual output power (dBm) QPSK	16QAM
1.4MHz	1RB-High (5)	848.3 (20643)	24.16	23.13
		836.5 (20525)	24.13	23.16
		824.7 (20407)	23.99	23.27
	1RB-Middle (3)	848.3 (20643)	24.36	23.28
		836.5 (20525)	24.29	23.36
		824.7 (20407)	24.17	23.47
	1RB-Low (0)	848.3 (20643)	24.08	23.12
		836.5 (20525)	24.12	23.14
		824.7 (20407)	23.98	23.28
	3RB-High (3)	848.3 (20643)	24.26	23.38
		836.5 (20525)	24.12	23.25
		824.7 (20407)	24.03	23.18
	3RB-Middle (1)	848.3 (20643)	24.27	23.42
		836.5 (20525)	24.10	23.23
		824.7 (20407)	24.10	23.23
	3RB-Low (0)	848.3 (20643)	24.19	23.35
		836.5 (20525)	24.15	23.20
		824.7 (20407)	24.03	23.19
	6RB (0)	848.3 (20643)	23.30	22.42
		836.5 (20525)	23.16	22.25
		824.7 (20407)	23.10	22.04
3MHz	1RB-High (14)	847.5 (20635)	24.18	23.10
		836.5 (20525)	24.11	22.99
		825.5 (20415)	24.05	23.34
	1RB-Middle (7)	847.5 (20635)	24.29	23.31
		836.5 (20525)	24.25	23.14
		825.5 (20415)	24.16	23.46
	1RB-Low (0)	847.5 (20635)	24.14	23.17
		836.5 (20525)	24.06	23.00
		825.5 (20415)	24.05	23.27
	8RB-High (7)	847.5 (20635)	23.20	22.25
		836.5 (20525)	23.13	22.21
		825.5 (20415)	23.04	22.04
	8RB-Middle (4)	847.5 (20635)	23.26	22.26
		836.5 (20525)	23.21	22.27
		825.5 (20415)	23.07	22.10
	8RB-Low (0)	847.5 (20635)	23.23	22.20
		836.5 (20525)	23.15	22.23
		825.5 (20415)	23.07	22.06
	15RB (0)	847.5 (20635)	23.19	22.17
		836.5 (20525)	23.15	22.18
		825.5 (20415)	22.99	22.03

5MHz	1RB-High (24)	846.5 (20625)	24.15	23.12
		836.5 (20525)	24.10	23.19
		826.5 (20425)	23.95	23.39
	1RB-Middle (12)	846.5 (20625)	24.33	23.37
		836.5 (20525)	24.39	23.44
		826.5 (20425)	24.18	23.44
	1RB-Low (0)	846.5 (20625)	24.08	23.08
		836.5 (20525)	24.07	23.12
		826.5 (20425)	23.91	23.36
	12RB-High (13)	846.5 (20625)	23.15	22.21
		836.5 (20525)	23.08	22.17
		826.5 (20425)	23.00	22.14
	12RB-Middle (6)	846.5 (20625)	23.21	22.25
		836.5 (20525)	23.11	22.25
		826.5 (20425)	23.05	22.19
	12RB-Low (0)	846.5 (20625)	23.19	22.23
		836.5 (20525)	23.07	22.16
		826.5 (20425)	22.96	22.10
	25RB (0)	846.5 (20625)	23.18	22.12
		836.5 (20525)	23.13	22.14
		826.5 (20425)	23.00	22.04
10MHz	1RB-High (49)	844 (20600)	24.29	23.14
		836.5 (20525)	24.24	23.05
		829 (20450)	24.17	23.46
	1RB-Middle (24)	844 (20600)	24.36	23.21
		836.5 (20525)	24.31	23.21
		829 (20450)	24.23	23.49
	1RB-Low (0)	844 (20600)	24.16	23.12
		836.5 (20525)	24.11	22.99
		829 (20450)	24.05	23.30
	25RB-High (25)	844 (20600)	23.20	22.23
		836.5 (20525)	23.21	22.18
		829 (20450)	23.16	22.11
	25RB-Middle (12)	844 (20600)	23.33	22.36
		836.5 (20525)	23.21	22.22
		829 (20450)	23.16	22.15
	25RB-Low (0)	844 (20600)	23.28	22.38
		836.5 (20525)	23.20	22.18
		829 (20450)	23.03	22.05
	50RB (0)	844 (20600)	23.25	22.27
		836.5 (20525)	23.23	22.18
		829 (20450)	23.06	22.08

Table 11.4-3 LTE Band7

BANDWIDTH	Number of RBs	Frequency	QPSK	16QAM
Bandwidth (MHz)	RB allocation / RB offset	Frequency (MHz)	Actual output power (dBm) QPSK	Actual output power (dBm) 16QAM
5MHz	1RB-High (24)	2567.5 (21425)	22.65	21.69
		2535 (21100)	22.67	21.61
		2502.5 (20775)	22.35	21.78
	1RB-Middle (12)	2567.5 (21425)	22.91	21.97
		2535 (21100)	22.95	21.90
		2502.5 (20775)	22.62	21.95
	1RB-Low (0)	2567.5 (21425)	22.65	21.72
		2535 (21100)	22.61	21.66
		2502.5 (20775)	22.31	21.76
	12RB-High (13)	2567.5 (21425)	21.70	20.77
		2535 (21100)	21.58	20.66
		2502.5 (20775)	21.43	20.59
	12RB-Middle (6)	2567.5 (21425)	21.82	20.82
		2535 (21100)	21.67	20.73
		2502.5 (20775)	21.46	20.55
	12RB-Low (0)	2567.5 (21425)	21.76	20.76
		2535 (21100)	21.62	20.66
		2502.5 (20775)	21.37	20.46
	25RB (0)	2567.5 (21425)	21.77	20.63
		2535 (21100)	21.65	20.61
		2502.5 (20775)	21.35	20.42
10MHz	1RB-High (49)	2565 (21400)	22.72	21.67
		2535 (21100)	22.69	21.50
		2505 (20800)	22.52	21.80
	1RB-Middle (24)	2565 (21400)	22.81	21.79
		2535 (21100)	22.79	21.59
		2505 (20800)	22.61	21.83
	1RB-Low (0)	2565 (21400)	22.69	21.72
		2535 (21100)	22.59	21.47
		2505 (20800)	22.43	21.68
	25RB-High (25)	2565 (21400)	21.82	20.89
		2535 (21100)	21.75	20.74
		2505 (20800)	21.51	20.54
	25RB-Middle (12)	2565 (21400)	21.79	20.88
		2535 (21100)	21.73	20.67
		2505 (20800)	21.49	20.50
	25RB-Low (0)	2565 (21400)	21.77	20.85
		2535 (21100)	21.67	20.66
		2505 (20800)	21.43	20.45
	50RB (0)	2565 (21400)	21.81	20.79
		2535 (21100)	21.71	20.67
		2505 (20800)	21.51	20.47

15MHz	1RB-High (74)	2562.5 (21375)	22.70	21.77
		2535 (21100)	22.56	21.47
		2507.5 (20825)	22.46	21.79
	1RB-Middle (37)	2562.5 (21375)	22.78	21.80
		2535 (21100)	22.64	21.53
		2507.5 (20825)	22.53	21.78
	1RB-Low (0)	2562.5 (21375)	22.65	21.99
		2535 (21100)	22.55	21.43
		2507.5 (20825)	22.42	21.67
	36RB-High (38)	2562.5 (21375)	21.88	20.79
		2535 (21100)	21.76	20.75
		2507.5 (20825)	21.59	20.64
	36RB-Middle (19)	2562.5 (21375)	21.82	20.80
		2535 (21100)	21.79	20.70
		2507.5 (20825)	21.51	20.52
	36RB-Low (0)	2562.5 (21375)	21.81	20.78
		2535 (21100)	21.70	20.66
		2507.5 (20825)	21.42	20.48
	75RB (0)	2562.5 (21375)	21.84	20.79
		2535 (21100)	21.76	20.66
		2507.5 (20825)	21.56	20.50
20MHz	1RB-High (99)	2560 (21350)	22.45	21.90
		2535 (21100)	22.45	21.77
		2510 (20850)	22.27	21.79
	1RB-Middle (50)	2560 (21350)	22.91	22.30
		2535 (21100)	22.84	22.10
		2510 (20850)	22.61	22.09
	1RB-Low (0)	2560 (21350)	22.45	21.91
		2535 (21100)	22.33	21.73
		2510 (20850)	22.16	21.61
	50RB-High (50)	2560 (21350)	21.79	20.77
		2535 (21100)	21.67	20.65
		2510 (20850)	21.58	20.57
	50RB-Middle (25)	2560 (21350)	21.76	20.80
		2535 (21100)	21.71	20.61
		2510 (20850)	21.53	20.50
	50RB-Low (0)	2560 (21350)	21.78	20.79
		2535 (21100)	21.63	20.57
		2510 (20850)	21.39	20.41
	100RB (0)	2560 (21350)	21.79	20.75
		2535 (21100)	21.67	20.65
		2510 (20850)	21.49	20.50

Table 11.4-4 LTE Band17

Bandwidth (MHz)	RB allocation / RB offset	Frequency (MHz)	Actual output power (dBm) QPSK	16QAM
5MHz	1RB-High (24)	713.5 (23825)	23.79	22.72
		710 (23790)	23.88	22.88
		706.5 (23755)	23.87	22.98
	1RB-Middle (12)	713.5 (23825)	24.05	23.01
		710 (23790)	24.15	23.17
		706.5 (23755)	24.13	22.87
	1RB-Low (0)	713.5 (23825)	23.81	22.83
		710 (23790)	23.94	22.94
		706.5 (23755)	23.95	22.99
	12RB-High (13)	713.5 (23825)	22.77	21.80
		710 (23790)	22.83	21.93
		706.5 (23755)	22.93	22.04
	12RB-Middle (6)	713.5 (23825)	22.86	21.89
		710 (23790)	22.92	22.01
		706.5 (23755)	23.00	22.12
	12RB-Low (0)	713.5 (23825)	22.82	21.89
		710 (23790)	22.89	21.95
		706.5 (23755)	23.01	22.14
	25RB (0)	713.5 (23825)	22.79	21.72
		710 (23790)	22.86	21.85
		706.5 (23755)	22.98	22.02
10MHz	1RB-High (49)	711 (23800)	23.89	22.95
		710 (23790)	23.84	22.75
		709 (23780)	23.88	22.71
	1RB-Middle (24)	711 (23800)	24.07	22.99
		710 (23790)	24.03	22.93
		709 (23780)	24.05	22.90
	1RB-Low (0)	711 (23800)	23.95	23.22
		710 (23790)	23.94	22.88
		709 (23780)	23.99	22.84
	25RB-High (25)	711 (23800)	22.87	21.90
		710 (23790)	22.93	21.97
		709 (23780)	22.94	21.93
	25RB-Middle (12)	711 (23800)	22.95	21.95
		710 (23790)	22.99	22.04
		709 (23780)	22.93	21.96
	25RB-Low (0)	711 (23800)	22.95	21.95
		710 (23790)	22.95	22.03
		709 (23780)	22.97	22.00
	50RB (0)	711 (23800)	22.90	21.90
		710 (23790)	22.93	21.97
		709 (23780)	22.97	21.97

Table 11.4-4 LTE Band66

Bandwidth (MHz)	RB allocation / RB offset	Frequency (MHz)	Actual output power (dBm) QPSK	16QAM
1.4MHz	1RB-High (5)	1779.3 (132665)	23.20	22.19
		1745 (132322)	22.94	22.26
		1710.7 (131979)	22.91	21.97
	1RB-Middle (3)	1779.3 (132665)	23.36	22.41
		1745 (132322)	23.17	22.36
		1710.7 (131979)	23.15	22.13
	1RB-Low (0)	1779.3 (132665)	23.20	22.19
		1745 (132322)	22.92	22.23
		1710.7 (131979)	22.89	21.99
	3RB-High (3)	1779.3 (132665)	23.22	22.23
		1745 (132322)	22.98	22.18
		1710.7 (131979)	23.05	22.21
	3RB-Middle (1)	1779.3 (132665)	23.25	22.26
		1745 (132322)	23.06	22.17
		1710.7 (131979)	23.08	22.25
	3RB-Low (0)	1779.3 (132665)	23.21	22.25
		1745 (132322)	22.99	22.17
		1710.7 (131979)	23.08	22.20
	6RB (0)	1779.3 (132665)	22.26	21.37
		1745 (132322)	21.97	20.91
		1710.7 (131979)	22.01	21.19
3MHz	1RB-High (14)	1778.5 (132657)	23.18	22.03
		1745 (132322)	22.97	22.23
		1711.5 (131987)	22.89	21.93
	1RB-Middle (7)	1778.5 (132657)	23.32	22.20
		1745 (132322)	23.12	22.42
		1711.5 (131987)	23.09	22.15
	1RB-Low (0)	1778.5 (132657)	23.13	22.03
		1745 (132322)	22.95	22.26
		1711.5 (131987)	22.96	22.00
	8RB-High (7)	1778.5 (132657)	22.16	21.29
		1745 (132322)	21.91	21.01
		1711.5 (131987)	21.95	21.01
	8RB-Middle (4)	1778.5 (132657)	22.25	21.36
		1745 (132322)	21.95	21.09
		1711.5 (131987)	22.04	21.08
	8RB-Low (0)	1778.5 (132657)	22.19	21.31
		1745 (132322)	21.90	21.03
		1711.5 (131987)	21.99	21.04
	15RB (0)	1778.5 (132657)	22.16	21.20
		1745 (132322)	21.91	20.95
		1711.5 (131987)	21.98	21.00

5MHz	1RB-High (24)	1777.5 (132647)	23.15	22.20
		1745 (132322)	22.85	22.32
		1712.5 (131997)	22.88	21.92
	1RB-Middle (12)	1777.5 (132647)	23.45	22.48
		1745 (132322)	23.08	22.47
		1712.5 (131997)	23.20	22.25
	1RB-Low (0)	1777.5 (132647)	23.15	22.17
		1745 (132322)	22.81	22.32
		1712.5 (131997)	22.95	21.98
	12RB-High (13)	1777.5 (132647)	22.14	21.24
		1745 (132322)	21.92	21.08
		1712.5 (131997)	21.91	21.05
	12RB-Middle (6)	1777.5 (132647)	22.21	21.31
		1745 (132322)	21.98	21.14
		1712.5 (131997)	22.02	21.10
	12RB-Low (0)	1777.5 (132647)	22.17	21.26
		1745 (132322)	21.90	21.06
		1712.5 (131997)	21.95	21.08
	25RB (0)	1777.5 (132647)	22.18	21.23
		1745 (132322)	21.92	21.00
		1712.5 (131997)	21.95	20.91
10MHz	1RB-High (49)	1775 (132622)	23.18	22.02
		1745 (132322)	22.97	22.23
		1715 (132022)	22.84	21.92
	1RB-Middle (24)	1775 (132622)	23.30	22.08
		1745 (132322)	23.03	22.39
		1715 (132022)	23.02	21.99
	1RB-Low (0)	1775 (132622)	23.13	22.03
		1745 (132322)	22.91	22.21
		1715 (132022)	22.89	21.93
	25RB-High (25)	1775 (132622)	22.20	21.26
		1745 (132322)	21.99	21.06
		1715 (132022)	21.97	21.09
	25RB-Middle (12)	1775 (132622)	22.23	21.30
		1745 (132322)	21.98	21.02
		1715 (132022)	22.02	21.11
	25RB-Low (0)	1775 (132622)	22.20	21.25
		1745 (132322)	21.93	20.99
		1715 (132022)	22.00	21.12
	50RB (0)	1775 (132622)	22.21	21.22
		1745 (132322)	21.96	21.00
		1715 (132022)	21.98	21.04

15MHz	1RB-High (74)	1772.5 (132597)	22.93	22.42
		1745 (132322)	22.84	21.78
		1717.5 (132047)	22.83	22.15
	1RB-Middle (37)	1772.5 (132597)	23.21	22.34
		1745 (132322)	22.92	21.83
		1717.5 (132047)	22.99	22.29
	1RB-Low (0)	1772.5 (132597)	23.10	22.41
		1745 (132322)	22.78	21.70
		1717.5 (132047)	22.91	22.20
	36RB-High (38)	1772.5 (132597)	22.23	21.24
		1745 (132322)	22.01	21.01
		1717.5 (132047)	21.95	21.05
	36RB-Middle (19)	1772.5 (132597)	22.26	21.25
		1745 (132322)	21.99	21.01
		1717.5 (132047)	21.98	21.07
	36RB-Low (0)	1772.5 (132597)	22.23	21.23
		1745 (132322)	21.92	20.93
		1717.5 (132047)	21.98	21.06
	75RB (0)	1772.5 (132597)	22.22	21.26
		1745 (132322)	22.03	21.00
		1717.5 (132047)	21.99	21.01
20MHz	1RB-High (99)	1770 (132572)	22.97	22.37
		1745 (132322)	22.76	22.20
		1720 (132072)	22.78	22.26
	1RB-Middle (50)	1770 (132572)	23.36	22.49
		1745 (132322)	23.13	22.43
		1720 (132072)	23.18	22.46
	1RB-Low (0)	1770 (132572)	22.80	22.30
		1745 (132322)	22.66	22.07
		1720 (132072)	22.86	22.35
	50RB-High (50)	1770 (132572)	22.26	21.33
		1745 (132322)	22.01	21.03
		1720 (132072)	22.04	21.11
	50RB-Middle (25)	1770 (132572)	22.26	21.31
		1745 (132322)	22.04	21.07
		1720 (132072)	22.10	21.17
	50RB-Low (0)	1770 (132572)	22.26	21.30
		1745 (132322)	21.98	20.97
		1720 (132072)	22.05	21.13
	100RB (0)	1770 (132572)	22.24	21.27
		1745 (132322)	22.00	21.02
		1720 (132072)	22.09	21.15

Table 11.4-5 LTE Band12

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	23.57	22.51
		707.5	23.59	22.57
		699.7	23.64	22.86
	1RB Middle (3)	715.3	23.83	22.70
		707.5	23.78	22.77
		699.7	23.88	23.09
	1RB Low (0)	715.3	23.52	22.51
		707.5	23.62	22.59
		699.7	23.62	22.86
	3RB High (3)	715.3	23.64	22.76
		707.5	23.63	22.63
		699.7	23.66	22.80
	3RB Middle (1)	715.3	23.70	22.82
		707.5	23.69	22.67
		699.7	23.73	22.79
	3RB Low (0)	715.3	23.62	22.74
		707.5	23.63	22.64
		699.7	23.63	22.79
	6RB (0)	715.3	22.69	21.85
		707.5	22.63	21.80
		699.7	22.65	21.57
3 MHz	1RB High (14)	714.5	23.63	22.51
		707.5	23.62	22.40
		700.5	23.68	22.89
	1RB Middle (7)	714.5	23.76	22.72
		707.5	23.76	22.59
		700.5	23.85	23.11
	1RB Low (0)	714.5	23.65	22.62
		707.5	23.60	22.51
		700.5	23.68	22.88
	8RB High (7)	714.5	22.64	21.72
		707.5	22.61	21.79
		700.5	22.68	21.80
	8RB Middle (4)	714.5	22.73	21.82
		707.5	22.70	21.81
		700.5	22.72	21.83
	8RB Low (0)	714.5	22.62	21.73
		707.5	22.65	21.81
		700.5	22.66	21.76
	15RB (0)	714.5	22.59	21.63
		707.5	22.65	21.72
		700.5	22.63	21.74
5 MHz	1RB High (24)	713.5	23.61	22.55
		707.5	23.61	22.62

		701.5	23.52	22.94
	1RB Middle (12)	713.5	23.85	22.83
		707.5	23.87	22.88
		701.5	23.79	23.19
	1RB Low (0)	713.5	23.56	22.55
		707.5	23.57	22.63
		701.5	23.49	22.94
	12RB High (13)	713.5	22.54	21.69
		707.5	22.59	21.78
		701.5	22.59	21.82
	12RB Middle (6)	713.5	22.65	21.81
		707.5	22.62	21.81
		701.5	22.65	21.87
	12RB Low (0)	713.5	22.62	21.78
		707.5	22.55	21.77
		701.5	22.54	21.80
	25RB (0)	713.5	22.59	21.63
		707.5	22.58	21.69
		701.5	22.58	21.71
10 MHz	1RB High (49)	711	23.63	22.44
		707.5	23.64	22.88
		704	23.57	22.56
	1RB Middle (24)	711	23.74	22.56
		707.5	23.77	22.99
		704	23.71	22.63
	1RB Low (0)	711	23.59	22.42
		707.5	23.60	22.79
		704	23.53	22.48
	25RB High (25)	711	22.63	21.70
		707.5	22.64	21.71
		704	22.63	21.78
	25RB Middle (12)	711	22.67	21.75
		707.5	22.65	21.75
		704	22.62	21.79
	25RB Low (0)	711	22.64	21.73
		707.5	22.63	21.73
		704	22.58	21.71
	50RB (0)	711	22.63	21.71
		707.5	22.63	21.69
		704	22.61	21.71

11.4 Wi-Fi and BT Measurement result

The output power of BT antenna is as following:

Table 11-4-6 Bluetooth Power

GFSK			EDR2M-4_DQPSK			EDR3M-8DPSK		
Channel	Power	tuneup	Channel	Power	tuneup	Channel	Power	tuneup
68.00	9.29	9.50	47.00	7.78	9.50	47.00	7.79	9.50

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

Table 11-4-7 WIFI Power

802.11b(dBm)				
Channel\data rate	1Mbps	2Mbps	5.5Mbps	11Mbps
11(2462MHz)	17.06	17.07	17.10	17.03
6(2437MHz)	/	/	16.55	/
1(2412MHz)	/	/	16.67	/
tuneup	**18.00**	**18.00**	**18.00**	**18.00**

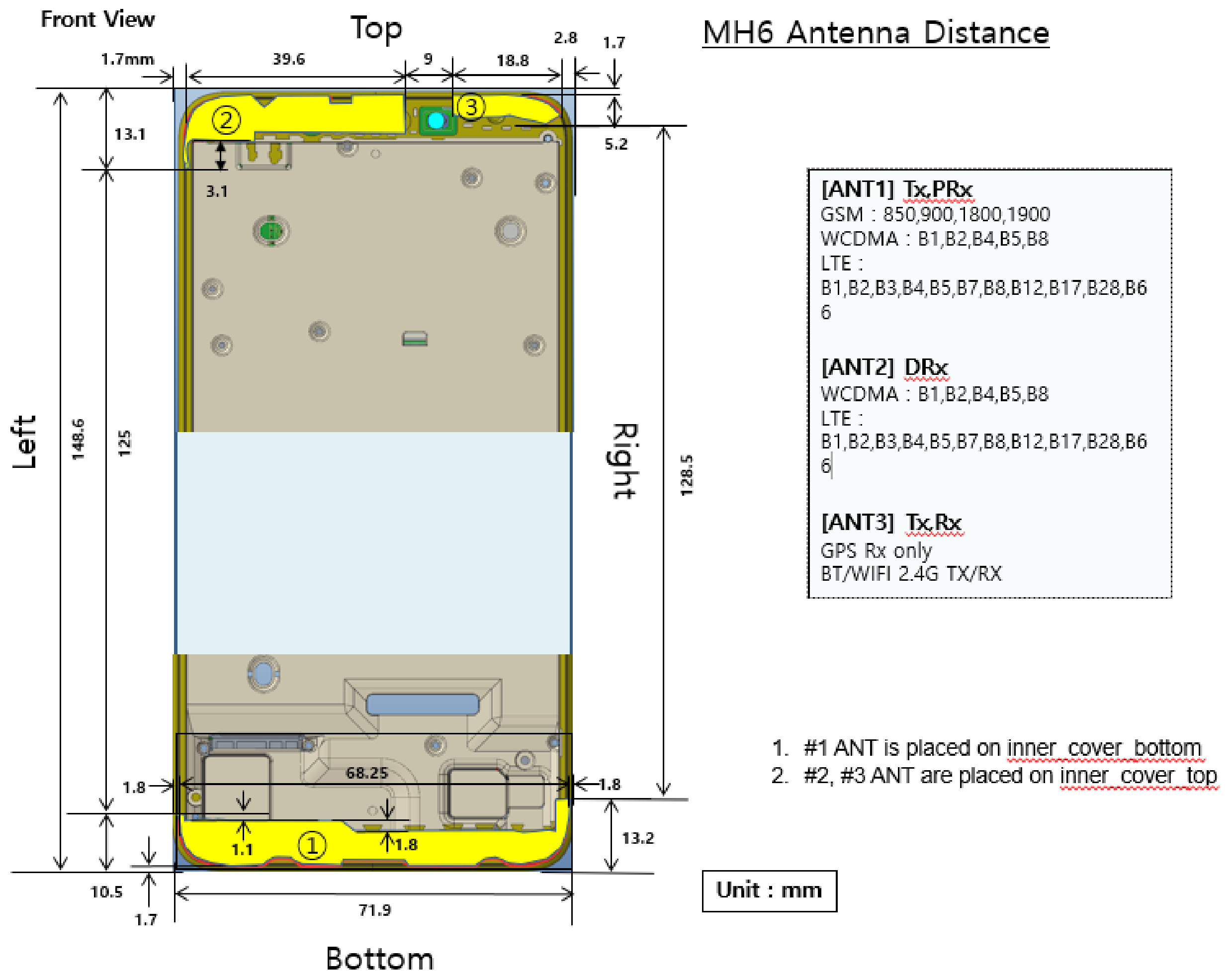
802.11g(dBm)								
Channel\data rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
11(2462MHz)	14.57	14.52	14.71	14.63	14.32	14.16	13.66	13.60
6(2437MHz)	14.16	/	14.32	/	/	/	/	/
1(2412MHz)	14.14	/	14.26	/	/	/	/	/
tuneup	**15.50**	**15.50**	**15.50**	**15.50**	**15.50**	**15.00**	**15.00**	**15.00**
802.11n(dBm)-20MHz								
Channel\data rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
11(2462MHz)	14.27	13.96	14.08	14.04	14.02	13.48	13.51	13.31
6(2437MHz)	13.90	/	/	/	/	/	/	/
1(2412MHz)	13.69	/	/	/	/	/	/	/
tuneup	**15.50**	**15.50**	**15.50**	**15.50**	**15.50**	**14.50**	**14.50**	**14.50**

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 v02r01, 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
Main antenna	Yes	Yes	Yes	Yes	No	Yes
WLAN	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	9.6	9.5	8.9	Yes
		Body	19.2	9.5	8.9	Yes
2.4GHz WLAN 802.11 b	2.45	Head	9.58	17.5	56.2	No
		Body	19.17	17.5	56.2	No

13 Evaluation of Simultaneous

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

	Position	Main antenna	WLAN 2.4G	Highest Simultaneous Transmission
Maximum reported SAR value for Head	Left hand, Tilt	0.30	1.28	**1.58**
Maximum reported SAR value for Body	Bottom	1.03	/	**1.03**

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

	Position	Main antenna	BT	Sum
Maximum reported SAR value for Head	Left hand, Check	0.62	0.37	**0.99**
Maximum reported SAR value for Body	Bottom	1.03	0.19	**1.22**

[1] - Estimated SAR for Bluetooth (see the table 13.3)

Table 13.3: Estimated SAR Bluetooth

Position	F (GHz)	Distance (mm)	Upper limit of power *		Estimated$_{1g}$
			dBm	mW	(W/kg)
Head	2.441	5	9.5	8.91	0.37
Body	2.441	10	9.5	8.91	0.19

* - 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 10mm 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-g SAR 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	**14.1.1.1.1.1 Duty Cycle**
Speech for GSM850/1900	1:8.3
GPRS&EGPRS for GSM850	1:4
WCDMA&LTE FDD	1:1
LTE TDD	1:1.58

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 Ch.	Frequency MHz	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)
251	848.8	Left	Cheek	Fig.1	32.49	33.00	0.425	**0.48**	0.555	**0.62**	0.12
190	836.6	Left	Cheek	/	32.48	33.00	0.380	**0.43**	0.473	**0.53**	0.04
128	824.2	Left	Cheek	/	32.49	33.00	0.360	**0.40**	0.471	**0.53**	0.06
190	836.6	Left	Tilt	/	32.48	33.00	0.210	**0.24**	0.266	**0.30**	-0.03
190	836.6	Right	Cheek	/	32.48	33.00	0.346	**0.39**	0.445	**0.50**	-0.03
190	836.6	Right	Tilt	/	32.48	33.00	0.258	**0.29**	0.321	**0.36**	-0.01

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

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C

Frequency Ch.	Frequency MHz	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)
251	848.8	GPRS (2)	Front	Fig.2	32.49	33.00	0.184	**0.21**	0.237	**0.27**	0.12
190	836.6	GPRS (2)	Front	/	32.48	33.00	0.161	**0.18**	0.212	**0.24**	0.07
128	824.2	GPRS (2)	Front	/	32.49	33.00	0.169	**0.19**	0.222	**0.25**	-0.11
190	836.6	GPRS (2)	Front	/	32.48	33.00	0.139	**0.16**	0.183	**0.21**	0.08
190	836.6	GPRS (2)	Left	/	32.48	33.00	0.102	**0.11**	0.149	**0.17**	-0.01
190	836.6	GPRS (2)	Right	/	32.48	33.00	0.124	**0.14**	0.181	**0.20**	0.02
190	836.6	GPRS (2)	Bottom	/	32.48	33.00	0.014	**0.02**	0.023	**0.03**	0.06
251	848.8	EGPRS (2)	Front	/	32.46	33.00	0.122	**0.14**	0.170	**0.19**	-0.09

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 Ch.	Frequency MHz	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)
661	1880	Left	Cheek	/	29.57	30.00	0.122	**0.13**	0.199	**0.22**	0.07
661	1880	Left	Tilt	/	29.57	30.00	0.111	**0.12**	0.185	**0.20**	-0.07
810	1909.8	Right	Cheek	Fig.3	29.60	30.00	0.146	**0.16**	0.233	**0.26**	0.13
661	1880	Right	Cheek	/	29.57	30.00	0.135	**0.15**	0.211	**0.23**	-0.09
512	1850.2	Right	Cheek	/	29.57	30.00	0.138	**0.15**	0.219	**0.24**	-0.10
661	1880	Right	Tilt	/	29.57	30.00	0.111	**0.12**	0.175	**0.19**	0.09

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(2)	Front	/	29.57	30.00	0.169	**0.19**	0.286	**0.32**	0.07
810	1909.8	GPRS(2)	Rear	/	29.60	30.00	0.180	**0.20**	0.310	**0.34**	0.01
661	1880	GPRS(2)	Rear	Fig.4	29.57	30.00	0.188	**0.21**	0.340	**0.38**	-0.07
512	1850.2	GPRS(2)	Rear	/	29.57	30.00	0.187	**0.21**	0.333	**0.37**	0.10
661	1880	GPRS(2)	Left	/	29.57	30.00	0.122	**0.13**	0.240	**0.26**	-0.09
661	1880	GPRS(2)	Right	/	29.57	30.00	0.100	**0.11**	0.183	**0.20**	0.09
661	1880	GPRS(2)	Bottom	/	29.57	30.00	0.137	**0.15**	0.290	**0.32**	0.09
661	1880	EGPRS(2)	Rear	/	29.56	30.00	0.192	**0.21**	0.335	**0.37**	0.03

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

Table 14.1-5: 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										
4183	836.6	Left	Cheek	/	23.91	24.50	0.286	**0.33**	0.370	**0.42**	-0.05
4183	836.6	Left	Tilt	/	23.91	24.50	0.223	**0.26**	0.265	0.30	-0.12
4233	846.6	Right	Cheek	Fig.5	23.97	24.50	0.319	**0.36**	0.427	**0.48**	-0.09
4183	836.6	Right	Cheek	/	23.91	24.50	0.305	**0.35**	0.409	**0.47**	0.05
4132	826.4	Right	Cheek	/	23.93	24.50	0.284	**0.32**	0.378	**0.43**	0.11
4183	836.6	Right	Tilt	/	23.91	24.50	0.243	**0.28**	0.309	**0.35**	-0.09

Table 14.1-6: 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									
4183	836.6	Front	/	23.91	24.50	0.352	**0.40**	0.450	**0.52**	0.08
4233	846.6	Rear	/	23.97	24.50	0.420	**0.47**	0.546	**0.62**	-0.11
4183	836.6	Rear	Fig.6	23.91	24.50	0.425	**0.49**	0.550	**0.63**	0.01
4132	826.4	Rear	/	23.93	24.50	0.410	**0.47**	0.537	**0.61**	0.01
4183	836.6	Left	/	23.91	24.50	0.131	**0.15**	0.193	**0.22**	-0.05
4183	836.6	Right	/	23.91	24.50	0.215	**0.25**	0.313	**0.36**	-0.03
4183	836.6	Bottom	/	23.91	24.50	0.037	**0.04**	0.062	**0.07**	0.04

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

Table 14.1-7: 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	Cheek	/	23.16	23.50	0.110	**0.12**	0.167	**0.18**	0.08
1412	1732.4	Left	Tilt	/	23.16	23.50	0.063	**0.07**	0.095	**0.10**	-0.11
1513	1752.6	Right	Cheek	/	23.27	23.50	0.120	**0.13**	0.187	**0.20**	-0.05
1412	1732.4	Right	Cheek	/	23.16	23.50	0.125	**0.14**	0.193	**0.21**	0.10
1312	1712.4	Right	Cheek	Fig.7	23.25	23.50	0.151	**0.16**	0.232	**0.25**	0.02
1412	1732.4	Right	Tilt	/	23.16	23.50	0.073	**0.08**	0.110	**0.12**	0.11

Table 14.1-8: 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	1732.5	Front	/	23.16	23.50	0.330	**0.36**	0.515	**0.56**	-0.01
1412	1732.5	Rear	/	23.16	23.50	0.243	**0.26**	0.464	**0.50**	-0.08
1412	1732.5	Left	/	23.16	23.50	0.157	**0.17**	0.267	**0.29**	-0.02
1412	1732.5	Right	/	23.16	23.50	0.094	**0.10**	0.146	**0.16**	0.06
1513	1752.6	Bottom	/	23.27	23.50	0.436	**0.46**	0.761	**0.80**	0.01
1412	1732.5	Bottom	Fig.8	23.16	23.50	0.534	**0.58**	0.957	**1.03**	-0.07
1312	1712.4	Bottom	/	23.25	23.50	0.423	**0.45**	0.738	**0.78**	-0.03

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

Table 14.1-9: 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										
9538	1907.6	Left	Cheek	Fig.9	22.71	23.00	0.140	**0.15**	0.238	**0.25**	0.14
9400	1880	Left	Cheek	/	22.65	23.00	0.110	**0.12**	0.186	**0.20**	-0.10
9262	1852.4	Left	Cheek	/	22.55	23.00	0.081	**0.09**	0.149	**0.17**	0.01
9400	1880	Left	Tilt	/	22.65	23.00	0.077	**0.08**	0.127	**0.14**	-0.11
9400	1880	Right	Cheek	/	22.65	23.00	0.079	**0.09**	0.128	**0.14**	0.12
9400	1880	Right	Tilt	/	22.65	23.00	0.065	**0.07**	0.104	**0.11**	0.04

Table 14.1-10: 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	/	22.65	23.00	0.113	**0.12**	0.223	**0.24**	0.11
9538	1907.6	Rear	Fig.10	22.71	23.00	0.163	**0.17**	0.306	**0.33**	-0.04
9400	1880	Rear	/	22.65	23.00	0.145	**0.16**	0.269	**0.29**	-0.05
9262	1852.4	Rear	/	22.55	23.00	0.094	**0.10**	0.198	**0.22**	-0.09
9400	1880	Left	/	22.65	23.00	0.118	**0.13**	0.242	**0.26**	0.01
9400	1880	Right	/	22.65	23.00	0.081	**0.09**	0.168	**0.18**	0.03
9400	1880	Bottom	/	22.65	23.00	0.108	**0.12**	0.235	**0.25**	-0.11

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

Table 14.1-11: 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											
18700	1860	1RB-Mid	Left	Cheek	Fig.11	24.28	24.5	0.069	**0.07**	0.108	**0.11**	0.10
18700	1860	1RB-Mid	Left	Tilt	/	24.28	24.5	0.056	**0.06**	0.090	**0.09**	0.07
18700	1860	1RB-Mid	Right	Cheek	/	24.28	24.5	0.049	**0.05**	0.078	**0.08**	0.07
18700	1860	1RB-Mid	Right	Tilt	/	24.28	24.5	0.039	**0.04**	0.060	**0.06**	-0.04
18700	1860	50RB-High	Left	Cheek	/	23.35	23.5	0.055	**0.06**	0.087	**0.09**	0.04
18700	1860	50RB-High	Left	Tilt	/	23.35	23.5	0.046	**0.05**	0.073	**0.08**	0.01
18700	1860	50RB-High	Right	Cheek	/	23.35	23.5	0.041	**0.04**	0.065	**0.07**	0.11
18700	1860	50RB-High	Right	Tilt	/	23.35	23.5	0.034	**0.04**	0.051	**0.05**	0.12

Note1: The LTE mode is QPSK_20MHz.

Table 14.1-12: 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										
18700	1860	1RB_Mid	Front	/	24.28	24.5	0.136	**0.14**	0.246	**0.26**	0.02
18700	1860	1RB_Mid	Rear	Fig.12	24.28	24.5	0.157	**0.17**	0.283	**0.30**	0.00
18700	1860	1RB_Mid	Left	/	24.28	24.5	0.107	**0.11**	0.211	**0.22**	0.10
18700	1860	1RB_Mid	Right	/	24.28	24.5	0.094	**0.10**	0.201	**0.21**	0.06
18700	1860	1RB_Mid	Bottom	/	24.28	24.5	0.131	**0.14**	0.274	**0.29**	-0.11
18700	1860	50RB_High	Front	/	23.35	23.5	0.109	**0.11**	0.192	**0.20**	0.02
18700	1860	50RB_High	Rear	/	23.35	23.5	0.121	**0.13**	0.217	**0.22**	-0.07

18700	1860	50RB_High	Left	/	23.35	23.5	0.087	**0.09**	0.173	**0.18**	-0.05
18700	1860	50RB_High	Right	/	23.35	23.5	0.073	**0.08**	0.156	**0.16**	0.10
18700	1860	50RB_High	Bottom	/	23.35	23.5	0.100	**0.10**	0.210	**0.22**	-0.08

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

Note2: The LTE mode is QPSK_20MHz.

Table 14.1-13: SAR Values (LTE Band5 - Head)

Ambient Temperature: 22.9℃ Liquid Temperature: 22.5℃												
Frequency		Mode	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)
Ch.	MHz											
20600	844	1RB-Mid	Left	Cheek	Fig.13	24.36	24.5	0.265	**0.27**	0.345	**0.36**	-0.03
20600	844	1RB-Mid	Left	Tilt	/	24.36	24.5	0.201	**0.21**	0.256	**0.26**	-0.05
20600	844	1RB-Mid	Right	Cheek	/	24.36	24.5	0.267	**0.28**	0.347	**0.36**	0.02
20600	844	1RB-Mid	Right	Tilt	/	24.36	24.5	0.183	**0.19**	0.229	**0.24**	-0.05
20600	844	25RB-Mid	Left	Cheek	/	23.33	23.5	0.201	**0.21**	0.261	**0.27**	-0.02
20600	844	25RB-Mid	Left	Tilt	/	23.33	23.5	0.150	**0.16**	0.190	**0.20**	-0.01
20600	844	25RB-Mid	Right	Cheek	/	23.33	23.5	0.201	**0.21**	0.263	**0.27**	0.05
20600	844	25RB-Mid	Right	Tilt	/	23.33	23.5	0.129	**0.13**	0.163	**0.17**	0.08

Note1: The LTE mode is QPSK_10MHz.

Table 14.1-14: SAR Values (LTE Band5 - Body)

Ambient Temperature: 22.9 ℃ Liquid Temperature: 22.5℃											
Frequency		Mode	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)
Ch.	MHz										
20600	844	1RB-Mid	Front	/	24.36	24.5	0.209	**0.22**	0.275	**0.28**	0.04
20600	844	1RB-Mid	Rear	Fig.14	24.36	24.5	0.326	**0.34**	0.421	**0.43**	0.06
20600	844	1RB-Mid	Left	/	24.36	24.5	0.130	**0.13**	0.189	**0.20**	0.03
20600	844	1RB-Mid	Right	/	24.36	24.5	0.148	**0.15**	0.210	**0.22**	0.06
20600	844	1RB-Mid	Bottom	/	24.36	24.5	0.024	**0.02**	0.043	**0.04**	-0.03
20600	844	25RB-Mid	Front	/	23.33	23.5	0.158	**0.16**	0.208	**0.22**	-0.07
20600	844	25RB-Mid	Rear	/	23.33	23.5	0.245	**0.25**	0.317	**0.33**	-0.07
20600	844	25RB-Mid	Left	/	23.33	23.5	0.100	**0.10**	0.146	**0.15**	0.12
20600	844	25RB-Mid	Right	/	23.33	23.5	0.108	**0.11**	0.153	**0.16**	0.10
20600	844	25RB-Mid	Bottom	/	23.33	23.5	0.017	**0.02**	0.037	**0.04**	-0.03

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

Note2: The LTE mode is QPSK_10MHz.

Table 14.1-15: SAR Values (LTE Band7 - Head)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C												
Frequency		Mode	Side	Test Position	Figure No./ Note	Conduct 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											
21350	2560	1RB-Mid	Left	Cheek	/	22.91	23	0.013	**0.01**	0.024	**0.02**	0.14
21350	2560	1RB-Mid	Left	Tilt	/	22.91	23	0.008	**0.01**	0.016	**0.02**	-0.05
21350	2560	1RB-Mid	Right	Cheek	Fig.15	22.91	23	0.029	**0.03**	0.063	**0.06**	0.00
21350	2560	1RB-Mid	Right	Tilt	/	22.91	23	0.006	**0.01**	0.013	**0.01**	0.09
21350	2560	50RB-High	Left	Cheek	/	21.79	22	0.010	**0.01**	0.019	**0.02**	0.07
21350	2560	50RB-High	Right	Cheek	/	21.79	22	0.024	**0.02**	0.050	**0.05**	-0.10

Note1: The LTE mode is QPSK_20MHz.

Table 14.1-16: SAR Values (LTE Band7 - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Mode	Test Position	Figure No./ Note	Conduct 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										
21350	2560	1RB-Mid	Front	/	22.91	23	0.227	**0.23**	0.466	**0.48**	0.02
21350	2560	1RB-Mid	Rear	Fig.16	22.91	23	0.386	**0.39**	0.846	**0.86**	-0.04
21100	2535	1RB-Mid	Rear	/	22.84	23	0.379	**0.39**	0.824	**0.85**	-0.01
20850	2510	1RB-Mid	Rear	/	22.61	23	0.372	**0.41**	0.789	**0.86**	-0.05
21350	2560	1RB-Mid	Left	/	22.91	23	0.073	**0.07**	0.127	**0.13**	-0.12
21350	2560	1RB-Mid	Right	/	22.91	23	0.087	**0.09**	0.152	**0.16**	0.03
21350	2560	1RB-Mid	Bottom	/	22.91	23	0.319	**0.33**	0.687	**0.70**	0.03
21350	2560	50RB-High	Front	/	21.79	22	0.185	**0.19**	0.379	**0.40**	0.02
21350	2560	50RB-High	Rear	/	21.79	22	0.302	**0.32**	0.666	**0.70**	-0.07
21350	2560	50RB-High	Left	/	21.79	22	0.060	**0.06**	0.104	**0.11**	-0.03
21350	2560	50RB-High	Right	/	21.79	22	0.070	**0.07**	0.123	**0.13**	0.09
21350	2560	50RB-High	Bottom	/	21.79	22	0.256	**0.27**	0.556	**0.58**	-0.09
21350	2560	100RB	Rear	/	21.79	22	0.304	**0.32**	0.659	**0.69**	-0.02

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

Note2: The LTE mode is QPSK_20MHz.

Table 14.1-17: SAR Values (LTE Band17 - 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											
23800	711	1RB-Mid	Left	Cheek	Fig.17	24.07	24.5	0.169	**0.19**	0.215	**0.24**	-0.01
23800	711	1RB-Mid	Left	Tilt	/	24.07	24.5	0.124	**0.14**	0.163	**0.18**	0.04
23800	711	1RB-Mid	Right	Cheek	/	24.07	24.5	0.132	**0.15**	0.178	**0.20**	-0.11
23800	711	1RB-Mid	Right	Tilt	/	24.07	24.5	0.077	**0.09**	0.100	**0.11**	0.08
23790	710	25RB-Mid	Left	Cheek	/	22.99	23.5	0.093	**0.10**	0.129	**0.15**	-0.07
23790	710	25RB-Mid	Left	Tilt	/	22.99	23.5	0.052	**0.06**	0.111	**0.12**	-0.08
23790	710	25RB-Mid	Right	Cheek	/	22.99	23.5	0.111	**0.12**	0.148	**0.17**	-0.11
23790	710	25RB-Mid	Right	Tilt	/	22.99	23.5	0.073	**0.08**	0.095	**0.11**	-0.10

Note1: The LTE mode is QPSK_10MHz.

Table 14.1-18: SAR Values (LTE Band17 - 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										
23800	711	1RB-Mid	Front	/	24.07	24.5	0.205	**0.23**	0.257	**0.28**	-0.07
23800	711	1RB-Mid	Rear	Fig.18	24.07	24.5	0.308	**0.34**	0.390	**0.43**	0.01
23800	711	1RB-Mid	Left	/	24.07	24.5	0.208	**0.23**	0.282	**0.31**	-0.02
23800	711	1RB-Mid	Right	/	24.07	24.5	0.235	**0.26**	0.321	**0.35**	0.02
23800	711	1RB-Mid	Bottom	/	24.07	24.5	0.015	**0.02**	0.025	**0.03**	-0.07
23790	710	25RB-Mid	Front	/	22.99	23.5	0.156	**0.18**	0.197	**0.22**	0.02
23790	710	25RB-Mid	Rear	/	22.99	23.5	0.245	**0.28**	0.306	**0.34**	-0.10
23790	710	25RB-Mid	Left	/	22.99	23.5	0.161	**0.18**	0.220	**0.25**	0.05
23790	710	25RB-Mid	Right	/	22.99	23.5	0.180	**0.20**	0.244	**0.27**	-0.04
23790	710	25RB-Mid	Bottom	/	22.99	23.5	0.087	**0.10**	0.054	**0.06**	0.04

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 Band66 - 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											
132572	1770	1RB-Mid	Left	Cheek	/	23.36	23.5	0.124	**0.13**	0.192	**0.20**	-0.05
132572	1770	1RB-Mid	Left	Tilt	/	23.36	23.5	0.083	**0.09**	0.128	**0.13**	-0.04
132572	1770	1RB-Mid	Right	Cheek	Fig.19	23.36	23.5	0.146	**0.15**	0.225	**0.23**	0.02
132572	1770	1RB-Mid	Right	Tilt	/	23.36	23.5	0.082	**0.08**	0.136	**0.14**	-0.09
132572	1770	50RB-Mid	Left	Cheek	/	22.26	22.5	0.092	**0.10**	0.144	**0.15**	-0.08
132572	1770	50RB-Mid	Left	Tilt	/	22.26	22.5	0.062	**0.07**	0.095	**0.10**	0.05
132572	1770	50RB-Mid	Right	Cheek	/	22.26	22.5	0.117	**0.12**	0.182	**0.19**	-0.03
132572	1770	50RB-Mid	Right	Tilt	/	22.26	22.5	0.064	**0.07**	0.107	**0.11**	-0.05

Note1: The LTE mode is QPSK_20MHz.

Table 14.1-20: 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	/	23.36	23.5	0.091	**0.09**	0.139	**0.14**	0.04
132572	1770	1RB-Mid	Rear	/	23.36	23.5	0.095	**0.10**	0.176	**0.18**	0.01
132572	1770	1RB-Mid	Left	/	23.36	23.5	0.037	**0.04**	0.062	**0.06**	-0.08
132572	1770	1RB-Mid	Right	/	23.36	23.5	0.030	**0.03**	0.047	**0.05**	0.11
132572	1770	1RB-Mid	Bottom	Fig.20	23.36	23.5	0.131	**0.14**	0.232	**0.24**	0.01
132572	1770	50RB-Mid	Front	/	22.26	22.5	0.071	**0.08**	0.108	**0.11**	-0.08
132572	1770	50RB-Mid	Rear	/	22.26	22.5	0.074	**0.08**	0.137	**0.14**	0.07
132572	1770	50RB-Mid	Left	/	22.26	22.5	0.029	**0.03**	0.048	**0.05**	-0.08
132572	1770	50RB-Mid	Right	/	22.26	22.5	0.026	**0.03**	0.040	**0.04**	0.18
132572	1770	50RB-Mid	Bottom	/	22.26	22.5	0.099	**0.10**	0.176	**0.19**	-0.02

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

Note2: The LTE mode is QPSK_20MHz.

Table 14.1-21: SAR Values (LTE Band12- Head)

Ambient Temperature: 22.9 ºC Liquid Temperature: 22.5ºC												
Frequency		Mode	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)
Ch.	MHz											
23095	707.5	1RB_Mid	Left	Touch	Fig.21	23.77	24.5	0.123	**0.15**	0.204	**0.24**	0.03
23095	707.5	1RB_Mid	Left	Tilt	/	23.77	24.5	0.060	**0.07**	0.098	**0.12**	-0.04
23095	707.5	1RB_Mid	Right	Touch	/	23.77	24.5	0.118	**0.14**	0.198	**0.23**	0.11
23095	707.5	1RB_Mid	Right	Tilt	/	23.77	24.5	0.067	**0.08**	0.114	**0.13**	-0.03
23130	711	25RB_Mid	Left	Touch	/	22.67	23.5	0.115	**0.14**	0.190	**0.23**	-0.04
23130	711	25RB_Mid	Left	Tilt	/	22.67	23.5	0.072	**0.09**	0.117	**0.14**	-0.12
23130	711	25RB_Mid	Right	Touch	/	22.67	23.5	0.090	**0.11**	0.151	**0.18**	0.03
23130	711	25RB_Mid	Right	Tilt	/	22.67	23.5	0.055	**0.07**	0.089	**0.11**	-0.05

Note1: The LTE mode is QPSK_10MHz.

Table 14.1-22: SAR Values (LTE Band12 - Body)

Ambient Temperature: 22.9 ºC Liquid Temperature: 22.5ºC											
Frequency		Mode	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)
Ch.	MHz										
23095	707.5	1RB_Mid	Front	/	23.77	24.5	0.242	**0.29**	0.307	**0.36**	-0.04
23095	707.5	1RB_Mid	Rear	Fig.22	23.77	24.5	0.333	**0.39**	0.420	**0.50**	0.10
23095	707.5	1RB_Mid	Left	/	23.77	24.5	0.222	**0.26**	0.309	**0.37**	0.07
23095	707.5	1RB_Mid	Right	/	23.77	24.5	0.254	**0.30**	0.352	**0.42**	0.00
23095	707.5	1RB_Mid	Bottom	/	23.77	24.5	0.064	**0.08**	0.088	**0.10**	0.07
23130	711	25RB_Mid	Front	/	22.67	23.5	0.200	**0.24**	0.256	**0.31**	0.00
23130	711	25RB_Mid	Rear	/	22.67	23.5	0.269	**0.33**	0.346	**0.42**	-0.04
23130	711	25RB_Mid	Left	/	22.67	23.5	0.126	**0.15**	0.178	**0.22**	0.10
23130	711	25RB_Mid	Right	/	22.67	23.5	0.160	**0.19**	0.226	**0.27**	0.10
23130	711	25RB_Mid	Bottom	/	22.67	23.5	0.050	**0.06**	0.060	**0.07**	0.10

Note1: The distance between the EUT and the phantom bottom is 10mm.
Note2: The LTE mode is QPSK_10MHz.

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.

Frequency Band	Channel Number	Frequency (MHz)	Test Position		EUT Measured Power (dBm)	Tune up (dBm)	Measured SAR 10g (W/kg)	Calculated SAR 10g (W/kg)	Measured SAR 1g (W/kg)	Calculated SAR 1g (W/kg)	Power Drift
GSM850	251	848.8	Left Cheek	Fig.1	32.49	33.00	0.425	**0.48**	0.555	**0.62**	0.12
GSM850	251	848.8	Front	Fig.2	32.49	33.00	0.184	**0.21**	0.237	**0.27**	0.12
GSM1900	810	1909.8	Right Cheek	Fig.3	29.60	30.00	0.146	**0.16**	0.233	**0.26**	0.13
GSM1900	661	1880	Rear	Fig.4	29.57	30.00	0.188	**0.21**	0.340	**0.38**	-0.07
WCDMA 850	4233	846.6	Right Cheek	Fig.5	23.97	24.50	0.319	**0.36**	0.427	**0.48**	-0.09
WCDMA 850	4183	836.6	Rear	Fig.6	23.91	24.50	0.425	**0.49**	0.550	**0.63**	0.01
WCDMA1700	1312	1712.4	Right Cheek	Fig.7	23.25	23.50	0.151	**0.16**	0.232	**0.25**	0.02
WCDMA1700	1412	1732.5	Bottom	Fig.8	23.16	23.50	0.534	**0.58**	0.957	**1.03**	-0.07
WCDMA1900	9538	1907.6	Left Cheek	Fig.9	22.71	23.00	0.140	**0.15**	0.238	**0.25**	0.14
WCDMA1900	9538	1907.6	Rear	Fig.10	22.71	23.00	0.163	**0.17**	0.306	**0.33**	-0.04
LTE Band2	18700	1860	Cheek	Fig.11	24.28	24.50	0.069	**0.07**	0.108	**0.11**	0.10
LTE Band2	18700	1860	Rear	Fig.12	24.28	24.50	0.157	**0.17**	0.283	**0.30**	0.00
LTE Band5	20600	844	Left Cheek	Fig.13	24.36	24.50	0.265	**0.27**	0.345	**0.36**	-0.03
LTE Band5	20600	844	Rear	Fig.12	24.36	24.50	0.326	**0.34**	0.421	**0.43**	0.06
LTE Band7	21350	2560	R ight Cheek	Fig.15	22.91	23.00	0.029	**0.03**	0.063	**0.06**	0.00
LTE Band7	21350	2560	Rear	Fig.16	22.91	23.00	0.386	**0.39**	0.846	**0.86**	-0.04
LTE Band17	23800	711	Left Cheek	Fig.17	24.07	24.50	0.169	**0.19**	0.215	**0.24**	-0.01
LTE Band17	23800	711	Rear	Fig.18	24.07	24.50	0.308	**0.34**	0.390	**0.43**	0.01
LTE Band66	132572	1770	R ight Cheek	Fig.19	23.36	23.50	0.146	**0.15**	0.225	**0.23**	0.02
LTE Band66	132572	1770	Bottom	Fig.20	23.36	23.50	0.131	**0.14**	0.232	**0.24**	0.01
WLAN	11	2462	Left Tilt	Fig.21	17.10	17.50	0.453	**0.50**	1.170	**1.28**	0.02
WLAN	11	2462	Top	Fig.22	17.10	17.50	0.128	**0.14**	0.283	**0.31**	-0.03
LTE Band12	23095	707.5	Left Cheek	Fig.23	23.77	24.50	0.123	**0.15**	0.204	**0.24**	0.03
LTE Band12	23095	707.5	Rear	Fig.24	23.77	24.50	0.333	**0.39**	0.420	**0.50**	0.10

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 ℃ Liquid Temperature: 22.5℃											
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.										
2462	11	Left	Cheek	S2	17.10	**17.50**	0.546	**0.60**	1.260	**1.38**	0.07
2462	11	Left	Tilt	/	17.10	**17.50**	0.505	**0.55**	1.230	**1.35**	0.02
2462	11	Right	Cheek	/	17.10	**17.50**	0.127	**0.14**	0.250	**0.27**	0.06
2462	11	Right	Tilt	/	17.10	**17.50**	0.165	**0.18**	0.342	**0.37**	0.09
2462	11	Left	Cheek	/	17.10	**17.50**	0.516	**0.57**	1.119	**1.23**	-0.10

As shown above table, the initial test position for head is "Left 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 ℃ Liquid Temperature: 22.5℃											
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.										
2462	11	Left	Cheek	/	17.10	**17.50**	0.459	**0.50**	1.130	**1.24**	0.07
2462	11	Left	Tilt	Fig.21	17.10	**17.50**	0.453	**0.50**	1.170	**1.28**	0.02
2462	11	Right	Cheek	/	17.10	**17.50**	0.164	**0.18**	0.373	**0.41**	0.09
2462	11	Right	Cheek	/	17.10	**17.50**	0.168	**0.18**	0.384	**0.42**	-0.08
2412	1	Left	Cheek	/	16.67	**17.50**	0.341	**0.41**	0.827	**1.00**	-0.04
2412	1	Left	Tilt	/	16.67	**17.50**	0.397	**0.48**	1.030	**1.25**	0.04
2437	6	Left	Tilt	/	16.55	**17.50**	0.376	**0.47**	0.973	**1.21**	0.05
2462	11	Left	Tilt	S2	17.10	**17.50**	0.440	**0.48**	1.094	**1.20**	0.01
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 ℃ Liquid Temperature: 22.5℃							
Frequency		Side	Test Position	Actual duty factor	maximum duty factor	Reported SAR (1g)(W/kg)	Scaled reported SAR (1g)(W/kg)
MHz	Ch.						
2462	11	Left	Tilt	100%	100%	**1.28**	**1.20**
2462	11	Right	Check	100%	100%	**0.41**	**0.41**

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.									
2462	11	Front	/	17.10	**17.50**	0.085	**0.09**	0.160	**0.18**	-0.10
2462	11	Rear	/	17.10	**17.50**	0.120	**0.13**	0.230	**0.25**	0.04
2462	11	Left	/	17.10	**17.50**	<0.01	<0.01	<0.01	<0.01	/
2462	11	Right	/	17.10	**17.50**	0.061	**0.07**	0.115	**0.13**	0.08
2462	11	Top		17.10	**17.50**	0.124	**0.14**	0.271	**0.30**	0.01
2462	11	Top	S2	17.10	**17.50**	0.120	**0.13**	0.264	**0.29**	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)

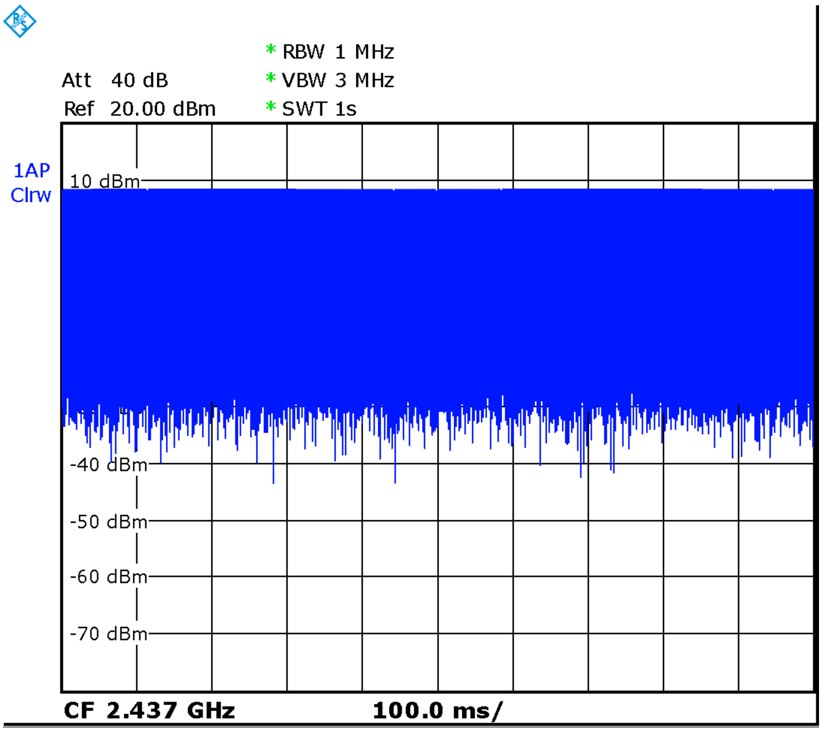
Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C										
Frequency		Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g)(W/kg)	Power Drift (dB)
MHz	Ch.									
2462	11	Top	Fig.22	17.10	**17.50**	0.128	**0.14**	0.283	**0.31**	-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.

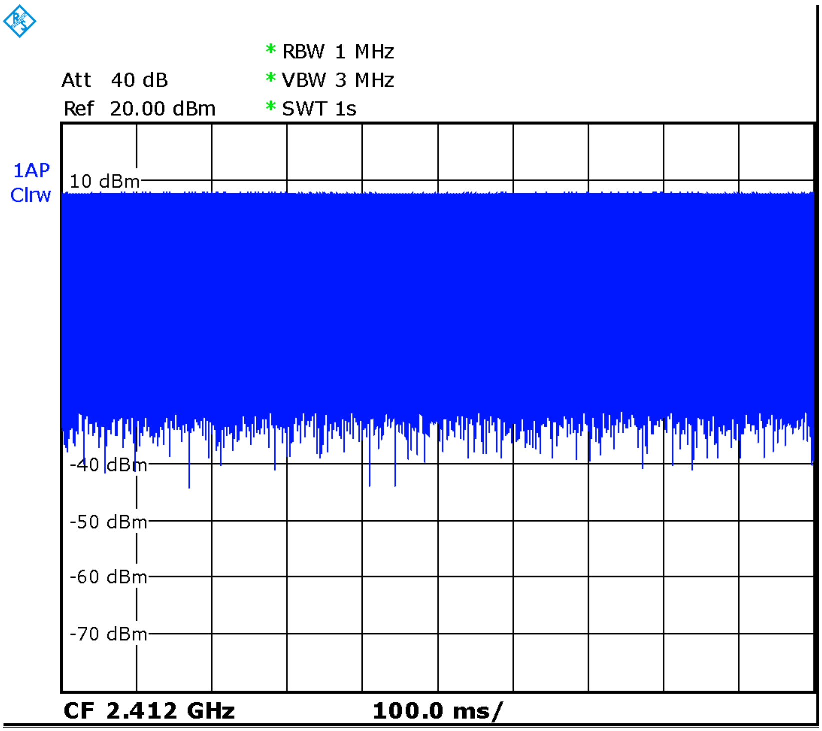
Table 14.3-6: SAR Values (WLAN - Body) – 802.11b (Scaled Reported SAR)

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.					
2437	6	Rear	100%	100%	**0.31**	**0.31**

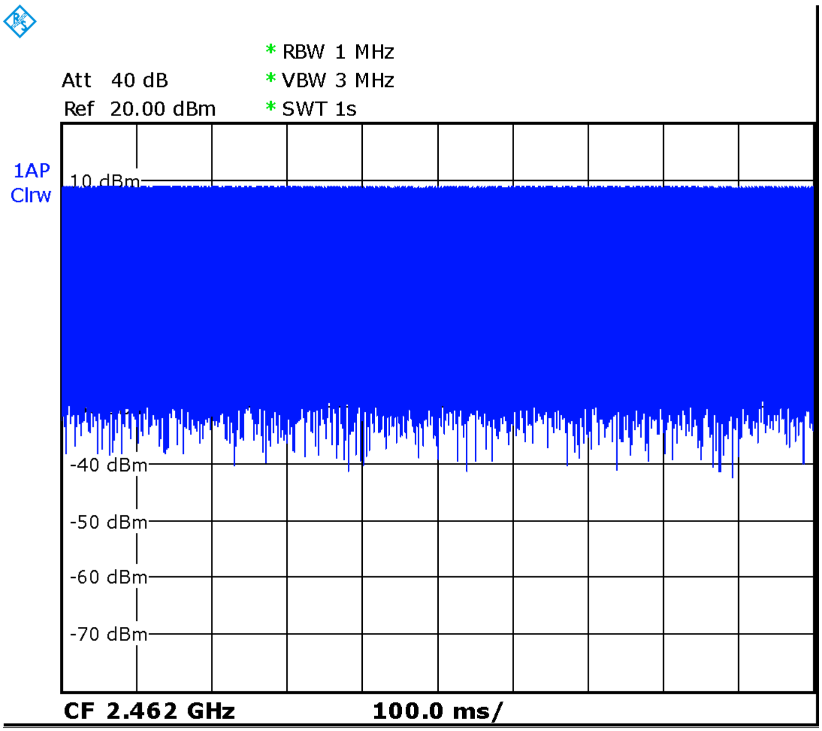
SAR is not required for OFDM because the 802.11b adjusted SAR ≤ 1.2 W/kg.



Picture 14.1 Duty factor plot CH6



Picture 14.2 Duty factor plot CH1



Picture 14.3 Duty factor plot CH11

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; steps 2) 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 ≥ 1.45 W/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						
1412	1732.5	Bottom	10	1.03	0.978	1.05	/

Table 15.2: SAR Measurement Variability for Body LTE B7 (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							
21350	2560	1RB_Mid	Rear	10	0.86	0.85	1.01	/

Table 15.3: SAR Measurement Variability for Head WLAN (1g)

Frequency		Test Position	Test Position	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
Ch.	MHz						
11	2462	Tilt	Left	1.28	1.19	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	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	N	1	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	∞
Test sample related										
14	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
15	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
16	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
17	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
18	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
19	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
20	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
21	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521

Combined standard uncertainty	$u_c^{'} = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$						9.55	9.43	257
Expanded uncertainty (confidence interval of 95 %)	$u_e = 2u_c$						19.1	18.9	

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	6.55	N	1	1	1	6.55	6.55	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	2.0	R	$\sqrt{3}$	1	1	1.2	1.2	∞
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	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. restrictions	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
12	Probe positioning with respect to phantom shell	B	6.7	R	$\sqrt{3}$	1	1	3.9	3.9	∞
13	Post-processing	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
Test sample related										
14	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
15	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
16	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
17	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
18	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
19	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
20	Liquid permittivity	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞

	(target)									
21	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u_c' = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$						10.7	10.6	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						21.4	21.1	

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	RF ambient 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	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	2.0	R	$\sqrt{3}$	1	1	1.2	1.2	∞
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	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. Restrictions	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
12	Probe positioning with respect to phantom shell	B	6.7	R	$\sqrt{3}$	1	1	3.9	3.9	∞
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
14	Fast SAR z-Approximation	B	14.0	R	$\sqrt{3}$	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	$\sqrt{3}$	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		$u_c^{'} = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$						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	N5239A	MY55491241	June 15, 2018	One year
02	Network analyzer	E5071C	MY46110673	January 24, 2019	One year
03	Power meter	NRVD	102083	Octomber 24, 2018	One year
04	Power sensor	NRV-Z5	100542		
05	Signal Generator	E4438C	MY49070393	January 4, 2019	One Year
06	Amplifier	60S1G4	0331848	No Calibration Requested	
07	BTS	CMW500	149646	Octomber 22, 2018	One year
08	BTS	CMW500	159890	January 3, 2019	One year
09	E-field Probe	SPEAG EX3DV4	7514	August 27,2018	One year
10	DAE	SPEAG DAE4	1525	September 18, 2018	One year
11	E-field Probe	SPEAG EX3DV4	3617	January 31, 2019	One year
12	DAE	SPEAG DAE4	771	January 11,2019	One year
13	Dipole Validation Kit	SPEAG D750V3	1017	July 23,2018	One year
14	Dipole Validation Kit	SPEAG D835V2	4d069	July 23, 2018	One year
15	Dipole Validation Kit	SPEAG D1750V2	1003	July 20, 2018	One year
16	Dipole Validation Kit	SPEAG D1900V2	5d101	July 24,2018	One year
17	Dipole Validation Kit	SPEAG D835V2	4d069	July 23, 2018	One year
18	Dipole Validation Kit	SPEAG D2600V2	1012	July 26,2018	One year
19	Dipole Validation Kit	SPEAG D750V3	1017	July 18, 2019	One year

END OF REPORT BODY

ANNEX A Graph Results

GSM850_CH251 Left Cheek

Date: 6/2/2019

Electronics: DAE4 Sn1525

Medium: head 835 MHz

Medium parameters used: f = 848.8 MHz; σ = 0.89 mho/m; εr = 40.69; ρ = 1000 kg/m^3

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: GSM850 848.8 MHz Duty Cycle: 1:8.3

Probe: EX3DV4 – SN7514 ConvF(9.09,9.09,9.09)

Area Scan (81x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

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

Reference Value = 6.763 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 0.687 W/kg

SAR(1 g) = 0.555 W/kg; SAR(10 g) = 0.425 W/kg

Maximum value of SAR (measured) = 0.631 W/kg

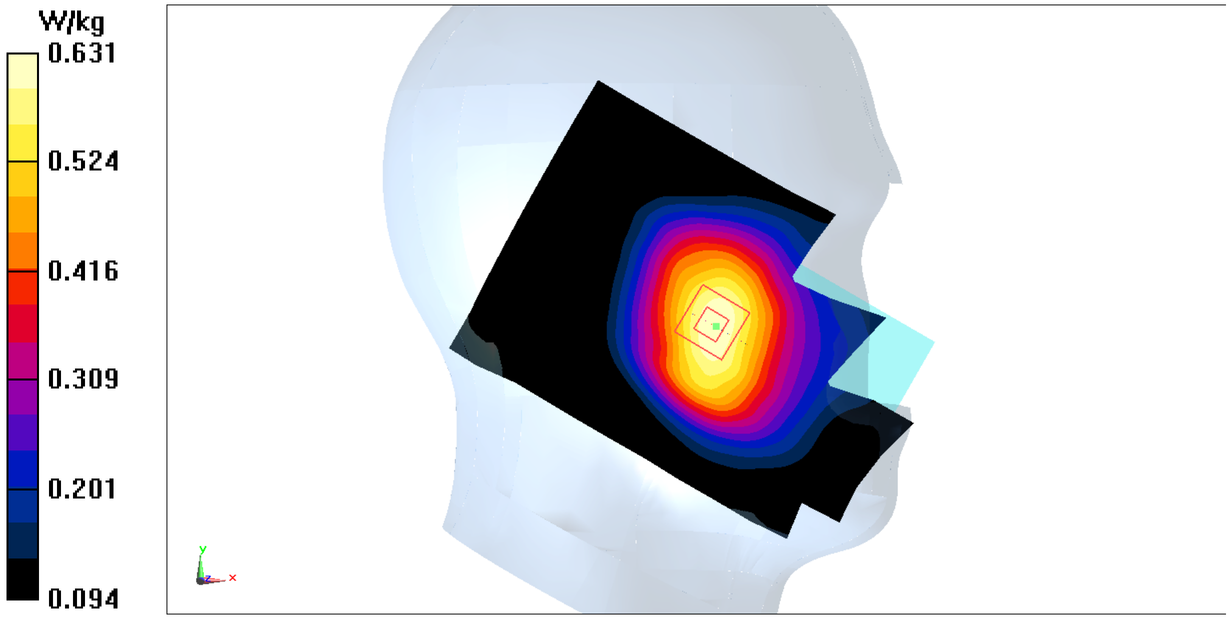


Fig A.1

GSM850_CH251 Front
Date: 6/2/2019
Electronics: DAE4 Sn1525
Medium: body 835 MHz
Medium parameters used: f = 848.8 MHz; σ = 0.968 mho/m; εr = 54.41; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: GSM850 848.8 MHz Duty Cycle: 1:4
Probe: EX3DV4 – SN7514 ConvF(9.47,9.47,9.47)

Area Scan (81x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.270 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.93 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.303 W/kg
SAR(1 g) = 0.237 W/kg; SAR(10 g) = 0.184 W/kg
Maximum value of SAR (measured) = 0.272 W/kg

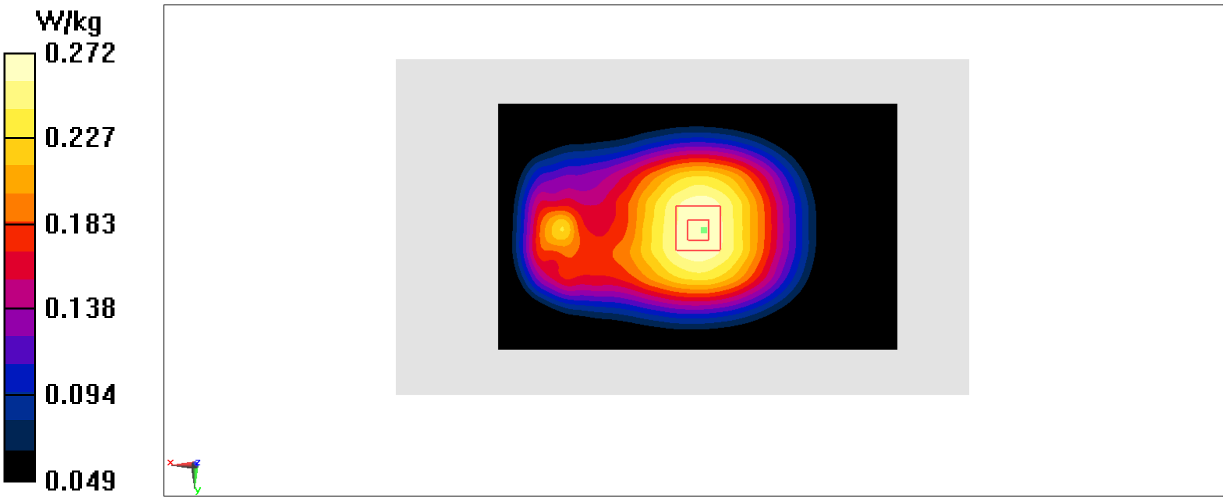


Fig A.2

PCS1900_CH810 Right Cheek

Date: 6/4/2019

Electronics: DAE4 Sn1525

Medium: head 1900 MHz

Medium parameters used: f = 1909.8 MHz; σ = 1.364 mho/m; εr = 39.44; ρ = 1000 kg/m^3

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: PCS1900 1909.8 MHz Duty Cycle: 1:8.3

Probe: EX3DV4 – SN7514 ConvF(7.73,7.73,7.73)

Area Scan (81x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.314 W/kg

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

Reference Value = 6.071 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.354 W/kg

SAR(1 g) = 0.233 W/kg; SAR(10 g) = 0.146 W/kg

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

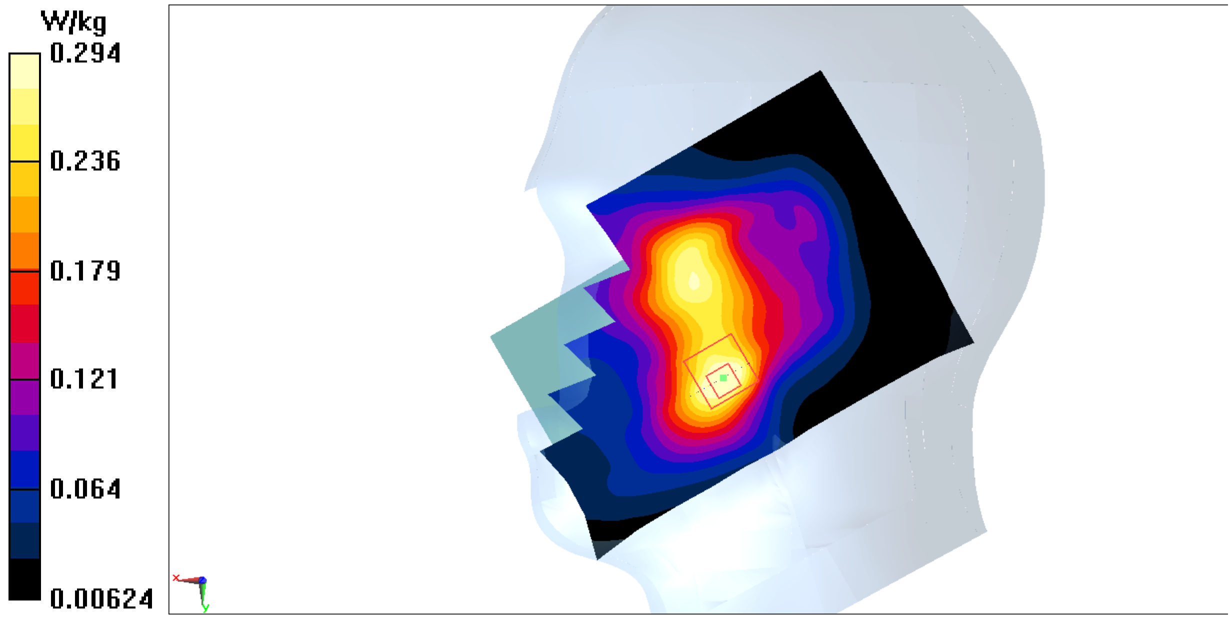


Fig A.3

PCS1900_CH661 Rear
Date: 6/4/2019
Electronics: DAE4 Sn1525
Medium: body 1900 MHz
Medium parameters used: f = 1880 MHz; σ = 1.448 mho/m; εr = 52.91; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: PCS1900 1880 MHz Duty Cycle: 1:4
Probe: EX3DV4 – SN7514 ConvF(7.53,7.53,7.53)

Area Scan (81x131x1): 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 = 6.444 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.703 W/kg
SAR(1 g) = 0.340 W/kg; SAR(10 g) = 0.188 W/kg
Maximum value of SAR (measured) = 0.499 W/kg

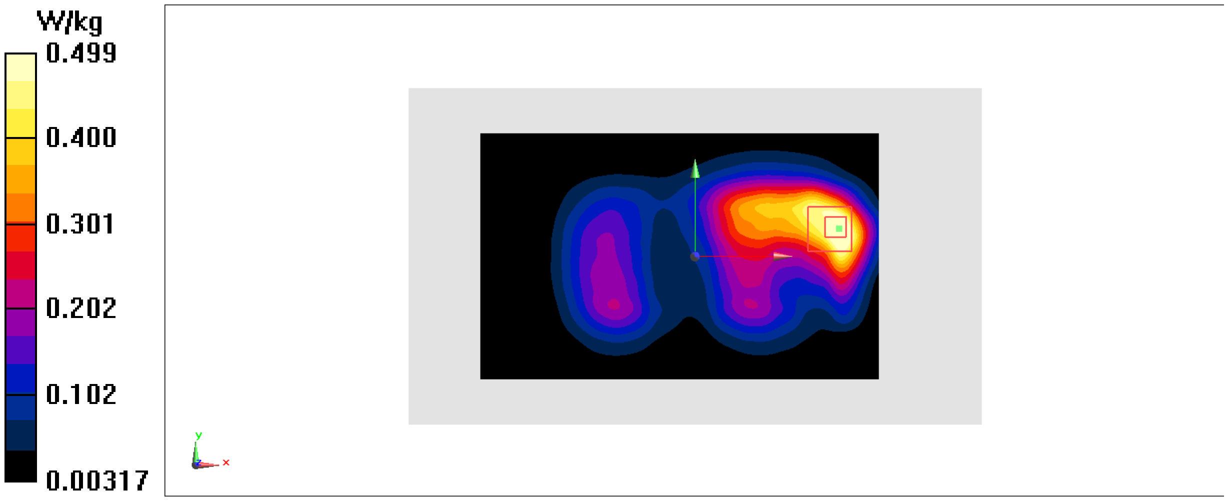


Fig A.4

WCDMA1900-BII_CH9538 Left Cheek
Date: 6/4/2019
Electronics: DAE4 Sn1525
Medium: head 1900 MHz
Medium parameters used: f = 1907.6 MHz; σ = 1.392 mho/m; εr = 39.4; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: WCDMA1900-BII 1907.6 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(7.73,7.73,7.73)

Area Scan (81x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.333 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.374 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.378 W/kg
SAR(1 g) = 0.238 W/kg; SAR(10 g) = 0.140 W/kg
Maximum value of SAR (measured) = 0.312 W/kg

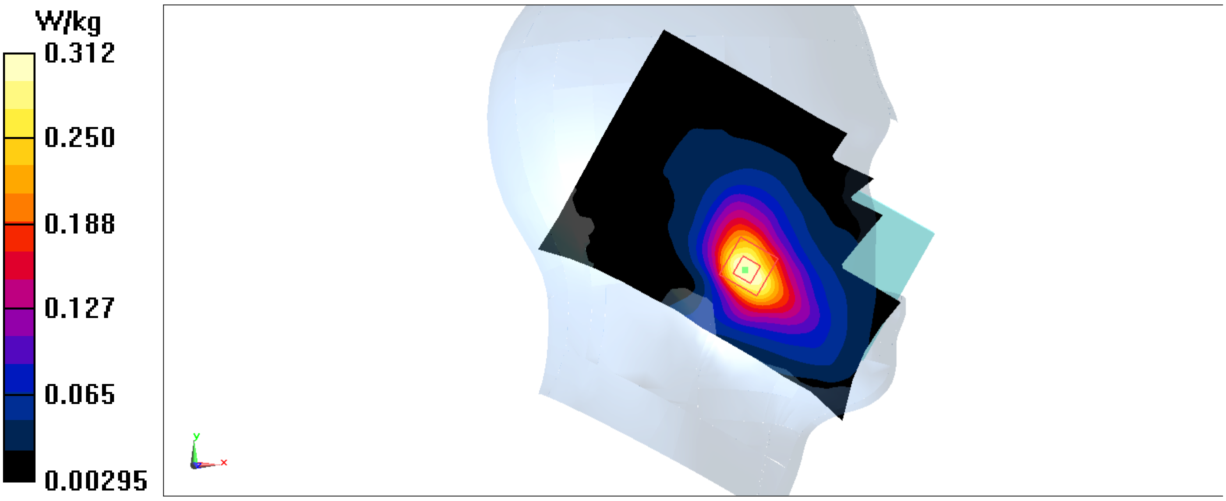


Fig A.5

WCDMA1900-BII_CH9538 Rear
Date: 6/4/2019
Electronics: DAE4 Sn1525
Medium: body 1900 MHz
Medium parameters used: f = 1907.6 MHz; σ = 1.477 mho/m; εr = 52.87; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: WCDMA1900-BII 1907.6 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(7.53,7.53,7.53)

Area Scan (81x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.454 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.906 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.638 W/kg
SAR(1 g) = 0.306 W/kg; SAR(10 g) = 0.163 W/kg
Maximum value of SAR (measured) = 0.465 W/kg

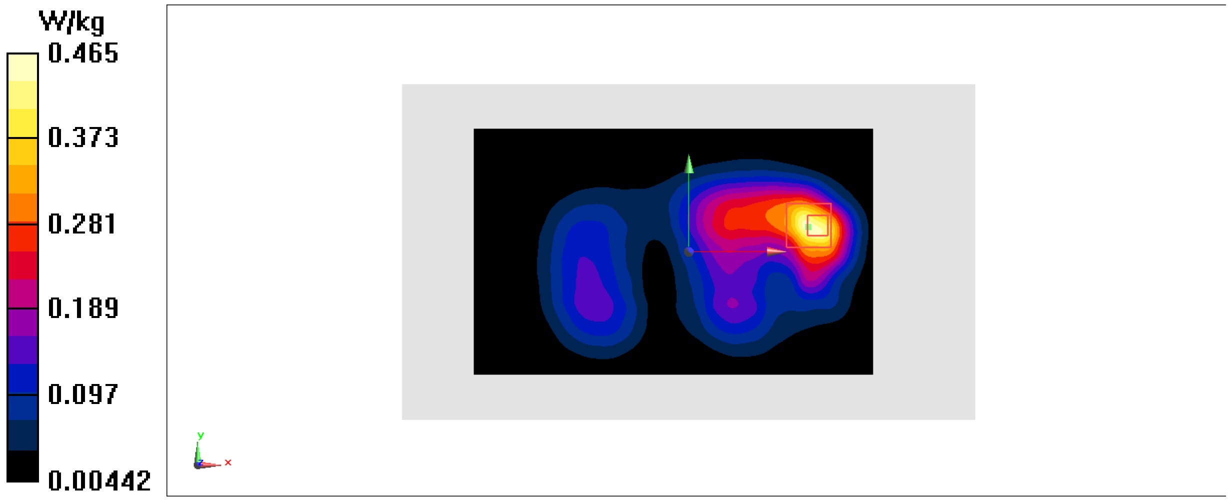


Fig A.6

WCDMA1700-BIV_CH1312 Right Cheek
Date: 6/3/2019
Electronics: DAE4 Sn1525
Medium: head 1750 MHz
Medium parameters used: f = 1712.4 MHz; σ = 1.357 mho/m; εr = 40.2; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: WCDMA1700-BIV 1712.4 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(8.10,8.10,8.10)

Area Scan (81x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.289 W/kg

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

Reference Value = 5.169 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.343 W/kg
SAR(1 g) = 0.232 W/kg; SAR(10 g) = 0.151 W/kg
Maximum value of SAR (measured) = 0.292 W/kg

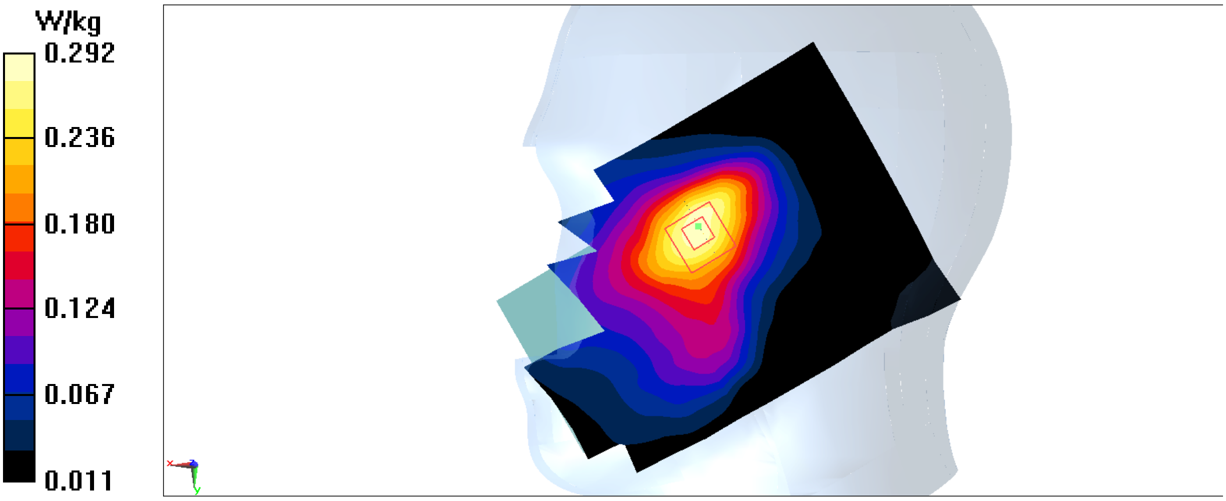


Fig A.7

WCDMA1700-BIV_CH1412 Rear
Date: 6/3/2019
Electronics: DAE4 Sn1525
Medium: body 1750 MHz
Medium parameters used: f = 1732.5 MHz; σ = 1.485 mho/m; εr = 53.07; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: WCDMA1700-BIV 1732.5 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(7.82,7.82,7.82)

Area Scan (131x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 1.30 W/kg

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

Reference Value = 25.84 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.57 W/kg
SAR(1 g) = 0.957 W/kg; SAR(10 g) = 0.534 W/kg
Maximum value of SAR (measured) = 1.28 W/kg

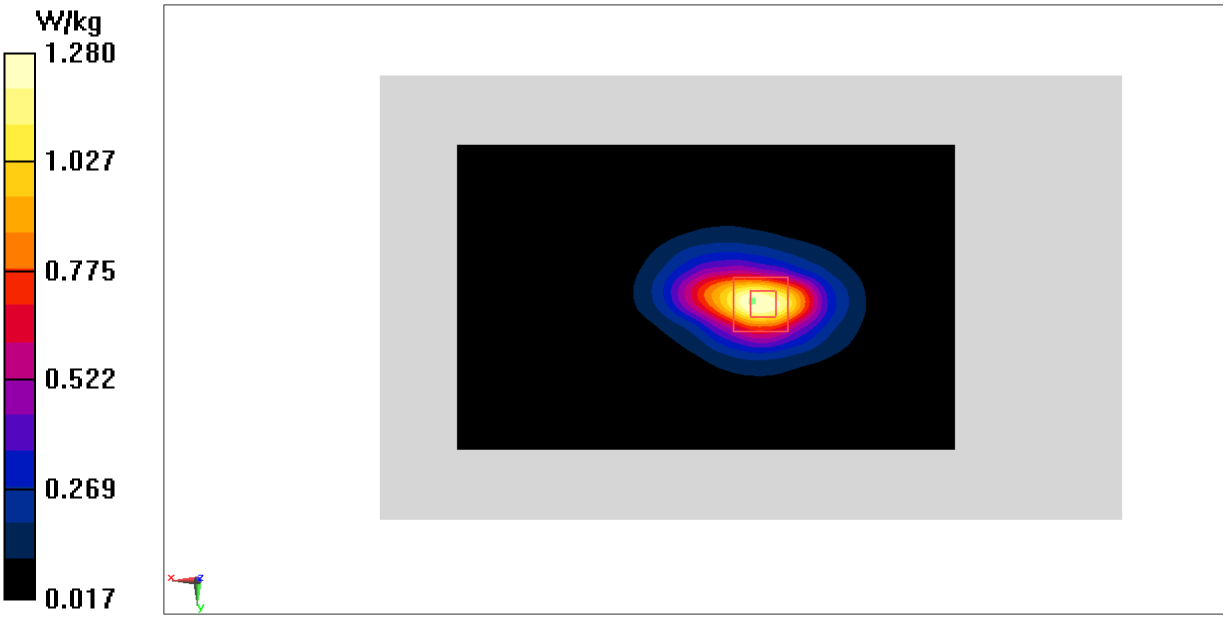


Fig A.8

WCDMA850-BV_CH4183 Right Cheek
Date: 6/2/2019
Electronics: DAE4 Sn1525
Medium: head 835 MHz
Medium parameters used: f = 836.6 MHz; σ = 0.899 mho/m; εr = 40.68; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: WCDMA850-BV 836.6 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(9.09,9.09,9.09)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.468 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.350 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.565 W/kg
SAR(1 g) = 0.427 W/kg; SAR(10 g) = 0.319 W/kg
Maximum value of SAR (measured) = 0.512 W/kg

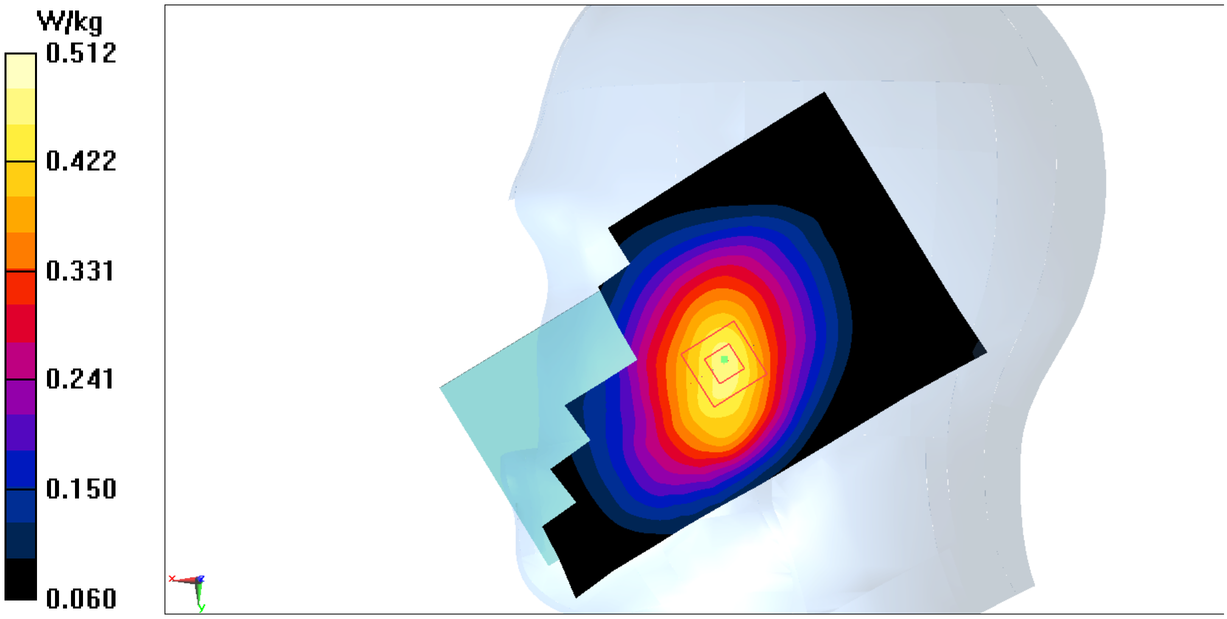


Fig A.9

WCDMA850-BV_CH4183 Rear

Date: 6/2/2019

Electronics: DAE4 Sn1525

Medium: body 835 MHz

Medium parameters used: f = 826.4 MHz; σ = 0.955 mho/m; εr = 54.43; ρ = 1000 kg/m^3

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: WCDMA850-BV 826.4 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7514 ConvF(9.47,9.47,9.47)

Area Scan (81x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.636 W/kg

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

Reference Value = 24.56 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.694 W/kg

SAR(1 g) = 0.550 W/kg; SAR(10 g) = 0.425 W/kg

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

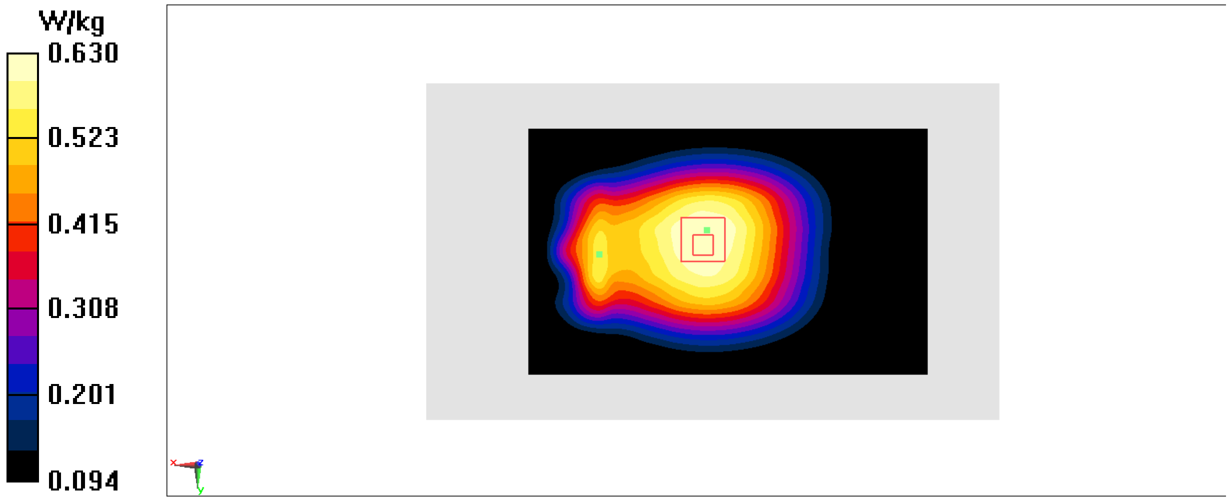


Fig A.10

LTE-FDD2_CH 18700 Left Cheek
Date: 6/4/2019
Electronics: DAE4 Sn1525
Medium: head 1900 MHz
Medium parameters used: f = 1860 MHz; σ = 1.392 mho/m; εr = 39.4; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: WCDMA1900-BII 1860 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(7.73,7.73,7.73)

Area Scan (81x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.154 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.397 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.161 W/kg
SAR(1 g) = 0.108 W/kg; SAR(10 g) = 0.069 W/kg
Maximum value of SAR (measured) = 0.137 W/kg

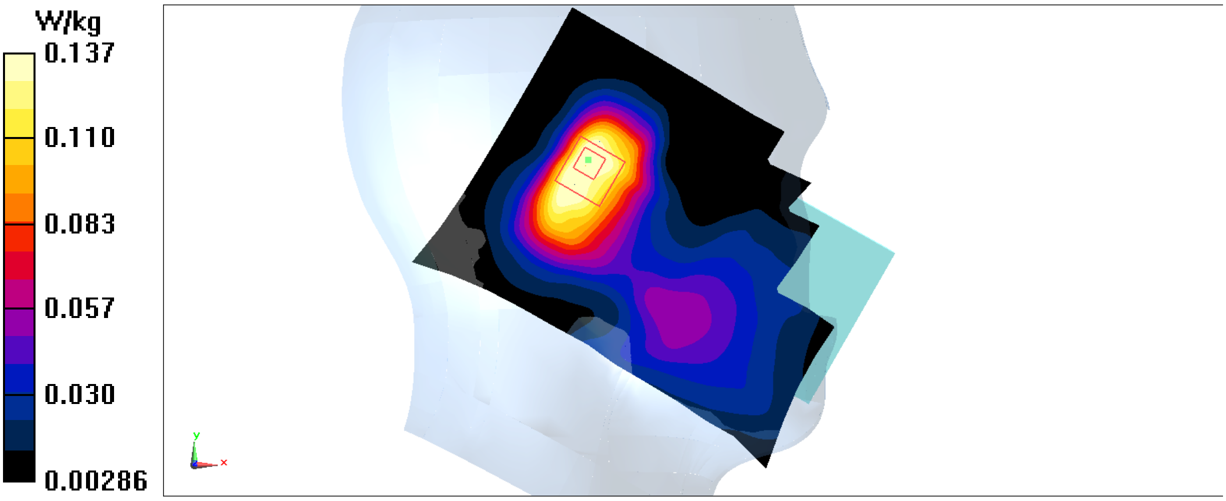


Fig A.11

LTE-FDD2 _CH 18700 Rear
Date: 6/4/2019
Electronics: DAE4 Sn1525
Medium: body 1900 MHz
Medium parameters used: f = 1860 MHz; σ = 1.477 mho/m; εr = 52.87; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: WCDMA1900-BII 1860 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(7.53,7.53,7.53)

Area Scan (81x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.399 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.744 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 0.567 W/kg
SAR(1 g) = 0.283 W/kg; SAR(10 g) = 0.157 W/kg
Maximum value of SAR (measured) = 0.416 W/kg

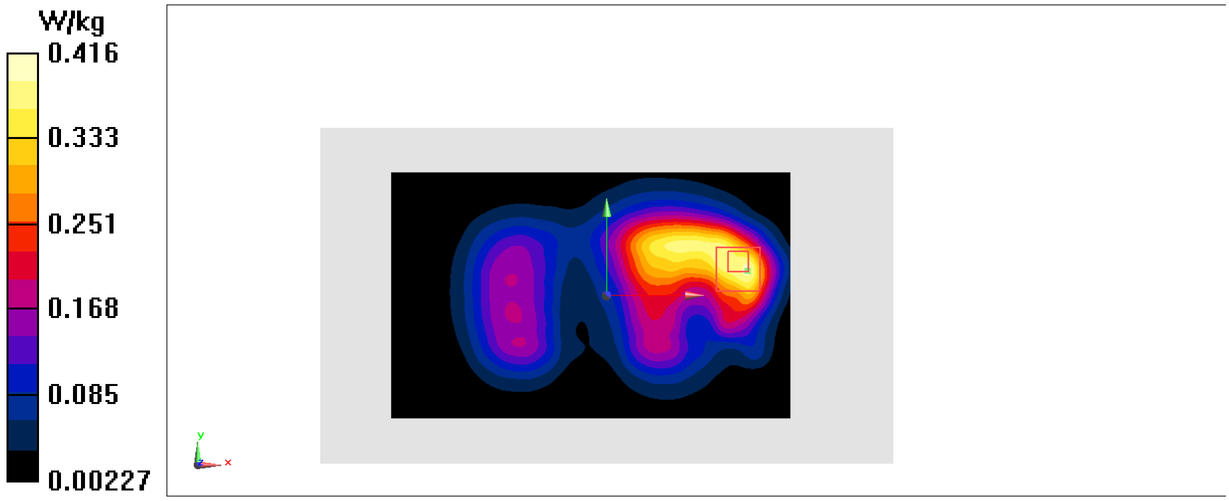


Fig A.12

LTE-FDD5_CH 20600 Right Cheek

Date: 6/2/2019
Electronics: DAE4 Sn1525
Medium: head 835 MHz
Medium parameters used: f = 844 MHz; σ = 0.899 mho/m; εr = 40.68; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: WCDMA850-BV 844 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(9.09,9.09,9.09)

Area Scan (81x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

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

Reference Value = 5.676 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.437 W/kg
SAR(1 g) = 0.347 W/kg; SAR(10 g) = 0.267 W/kg.
Maximum value of SAR (measured) = 0.396 W/kg

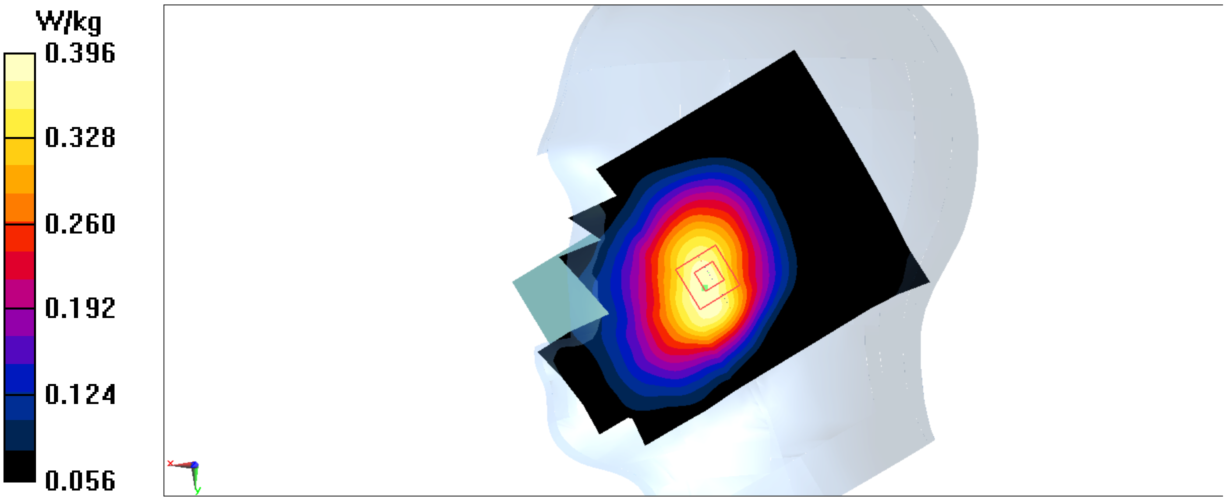


Fig A.13

LTE-FDD5_CH 20600 Rear
Date: 6/2/2019
Electronics: DAE4 Sn1525
Medium: body 835 MHz
Medium parameters used: f = 844 MHz; σ = 0.955 mho/m; εr = 54.43; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: WCDMA850-BV 844 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(9.47,9.47,9.47)

Area Scan (81x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.482 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 21.42 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.532 W/kg
SAR(1 g) = 0.421 W/kg; SAR(10 g) = 0.326 W/kg
Maximum value of SAR (measured) = 0.482 W/kg

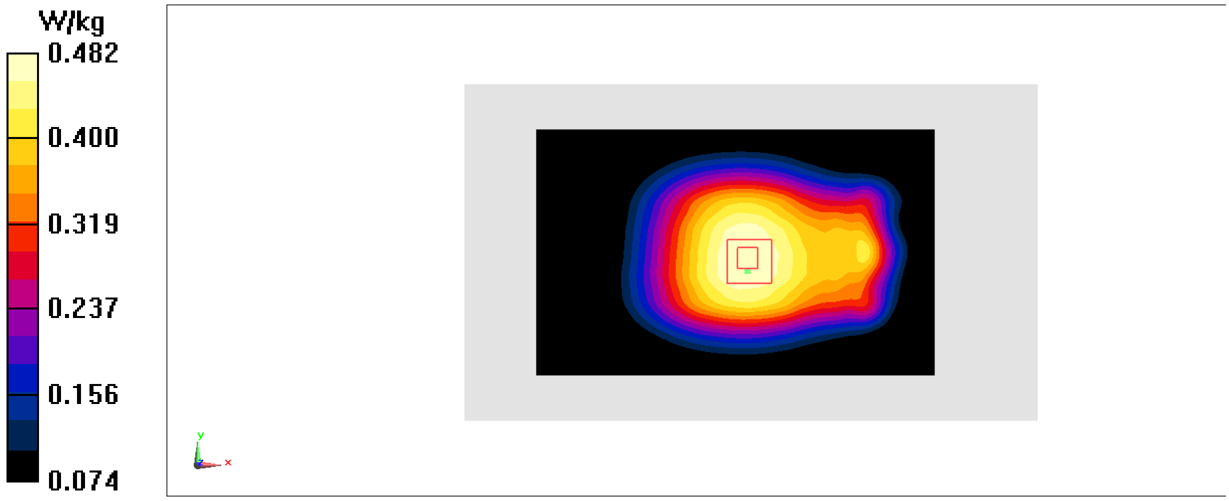


Fig A.14

LTE-FDD7_CH 21350 Right Cheek
Date: 6/6/2019
Electronics: DAE4 Sn1525
Medium: body 2600 MHz
Medium parameters used: f = 2560 MHz; σ = 2.088 mho/m; εr = 52.41; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: LTE2500-TDD41 2560 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(7.06,7.06,7.06)

Area Scan (91x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.118 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.137 W/kg
SAR(1 g) = 0.063 W/kg; SAR(10 g) = 0.029 W/kg
Maximum value of SAR (measured) = 0.0924 W/kg

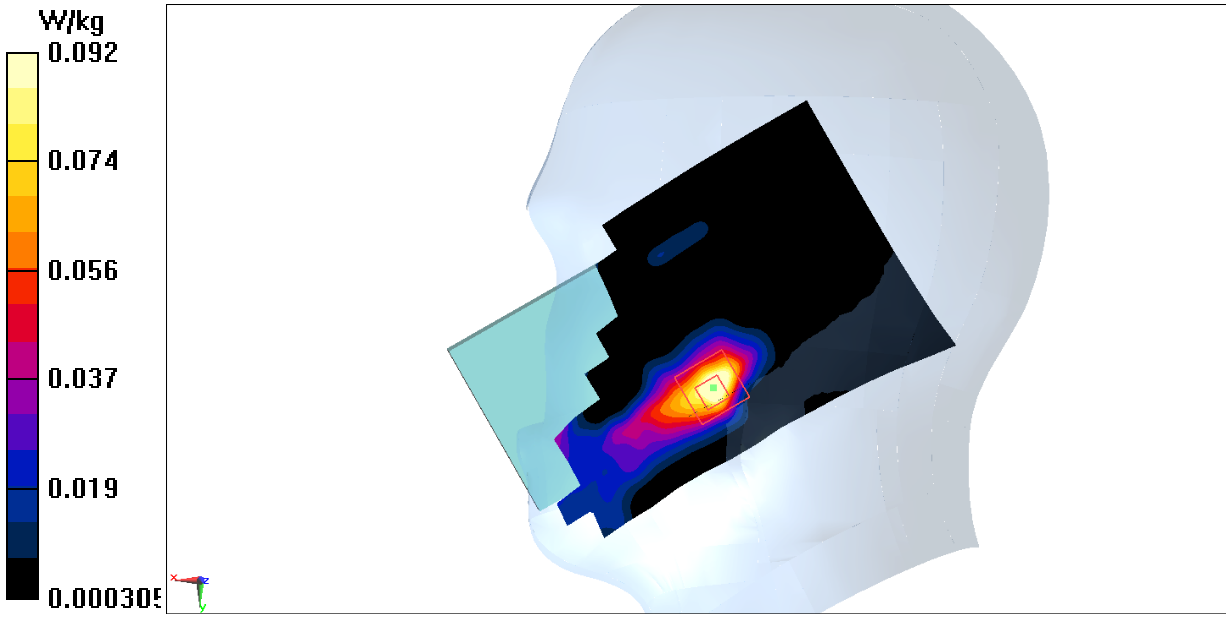


Fig A.15

LTE-TDD7_CH 21350 Rear
Date: 6/6/2019
Electronics: DAE4 Sn1525
Medium: head 2600 MHz
Medium parameters used: f = 2560 MHz; σ = 1.867 mho/m; εr = 39.12; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: LTE2500-TDD41 2560 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(6.92,6.92,6.92)

Area Scan (151x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.28 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.847 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.69 W/kg
SAR(1 g) = 0.846 W/kg; SAR(10 g) = 0.386 W/kg
Maximum value of SAR (measured) = 1.27 W/kg

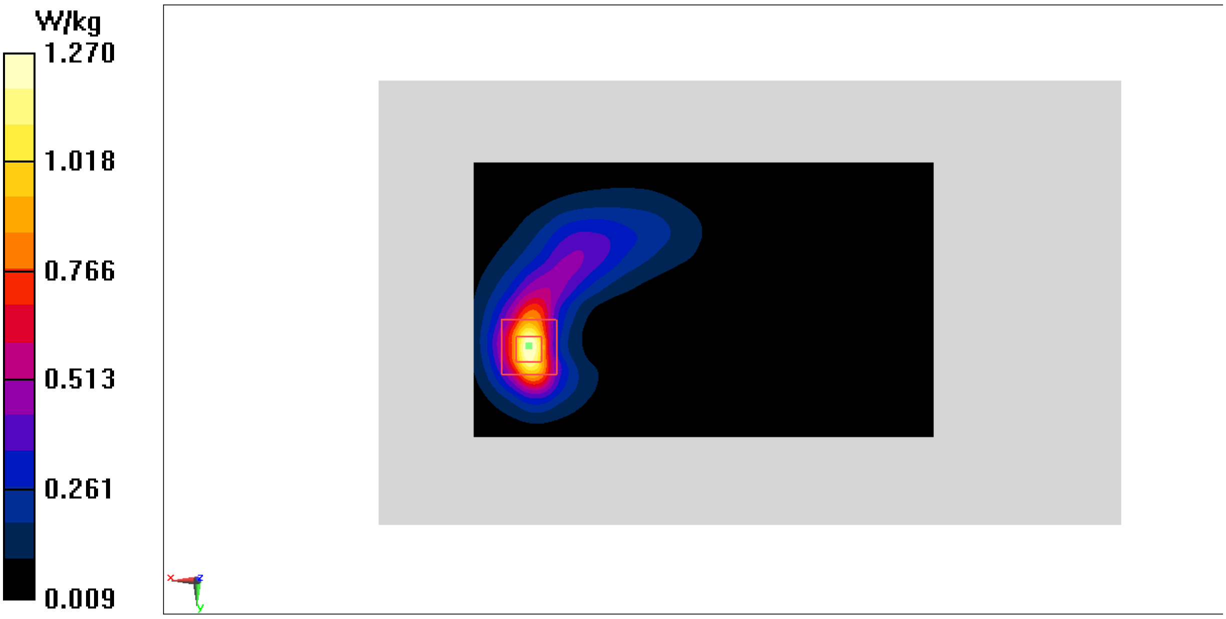


Fig A.16

LTE-FDD17_CH123800 Right Cheek
Date: 6/1/2019
Electronics: DAE4 Sn1525
Medium: head 750 MHz
Medium parameters used: f = 711 MHz; σ = 2.558 mho/m; εr = 40.39; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: LTE700-FDD71 711 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(9.47,9.47,9.47)

Area Scan (81x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.253 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.891 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.273 W/kg
SAR(1 g) = 0.215 W/kg; SAR(10 g) = 0.169 W/kg
Maximum value of SAR (measured) = 0.248 W/kg

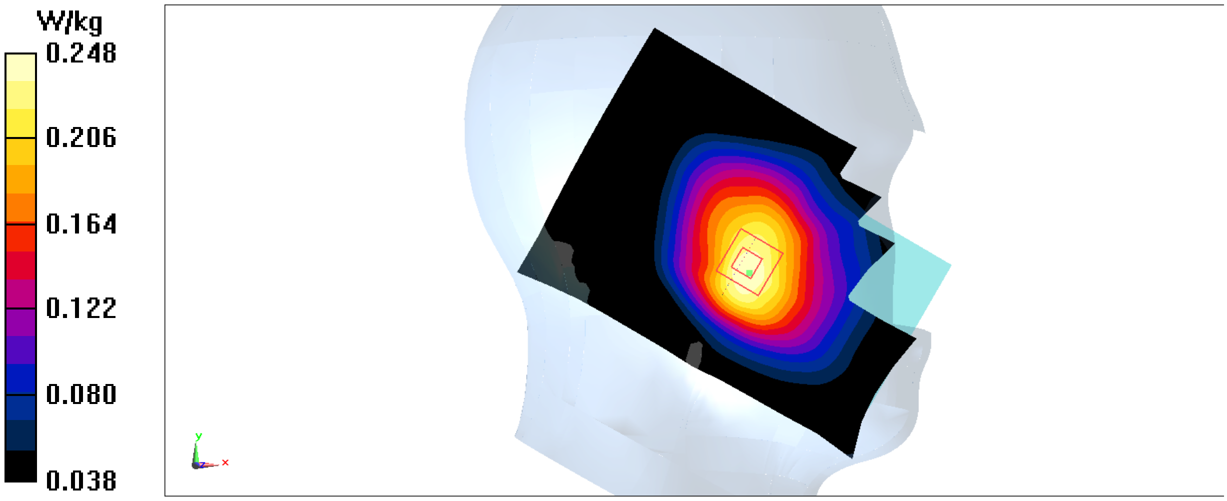


Fig A.17

LTE-FDD17_CH133372 Rear
Date: 6/1/2019
Electronics: DAE4 Sn1525
Medium: body 750 MHz
Medium parameters used: f = 688 MHz; σ = 2.638 mho/m; εr = 53.13; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: LTE700-FDD71 688 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(9.68,9.68,9.68)

Area Scan (81x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.442 W/kg

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

Reference Value = 21.07 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.483 W/kg
SAR(1 g) = 0.390 W/kg; SAR(10 g) = 0.308 W/kg
Maximum value of SAR (measured) = 0.441 W/kg

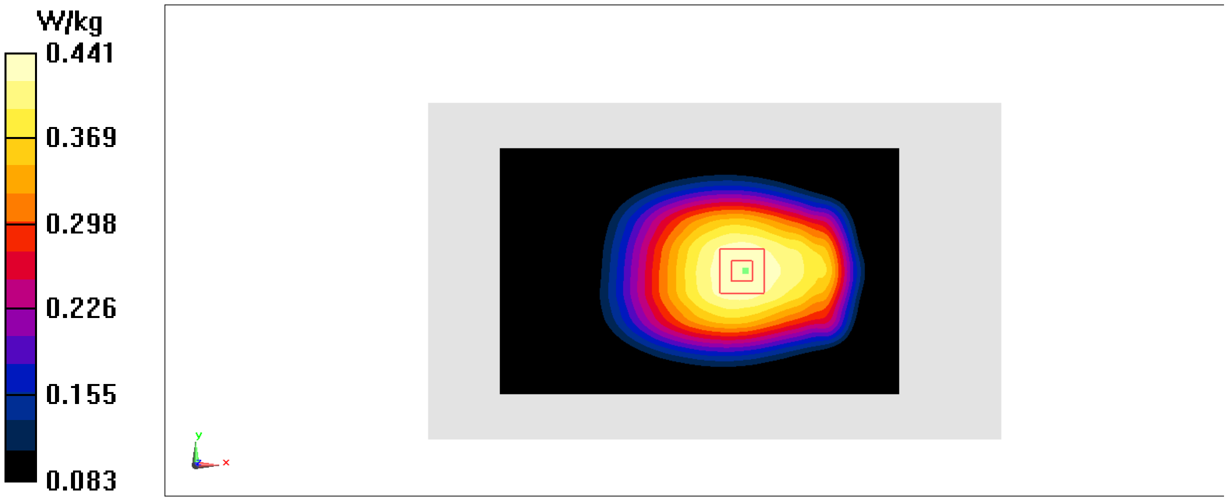


Fig A.18

LTE-Band66_CH 132572 Right Cheek
Date: 6/3/2019
Electronics: DAE4 Sn1525
Medium: head 1750 MHz
Medium parameters used: f = 1770 MHz; σ = 1.357 mho/m; εr = 40.2; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: WCDMA1700-BIV 1770 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(8.10,8.10,8.10)

Area Scan (81x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.281 W/kg

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

Reference Value = 4.150 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.326 W/kg
SAR(1 g) = 0.225 W/kg; SAR(10 g) = 0.146 W/kg
Maximum value of SAR (measured) = 0.281 W/kg

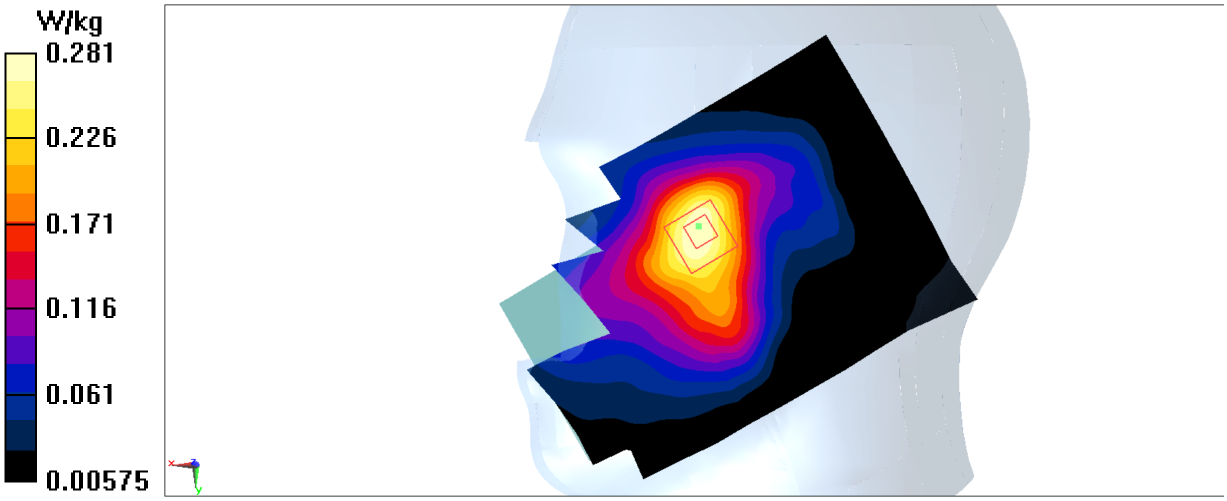


Fig A.19

LTE-Band66_CH 132572 Bottom
Date: 6/3/2019
Electronics: DAE4 Sn1525
Medium: body 1750 MHz
Medium parameters used: f = 1770 MHz; σ = 1.485 mho/m; εr = 53.07; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: WCDMA1700-BIV 1770 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(7.82,7.82,7.82)

Area Scan (31x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

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

Reference Value = 13.49 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.389 W/kg
SAR(1 g) = 0.232 W/kg; SAR(10 g) = 0.131 W/kg
Maximum value of SAR (measured) = 0.314 W/kg

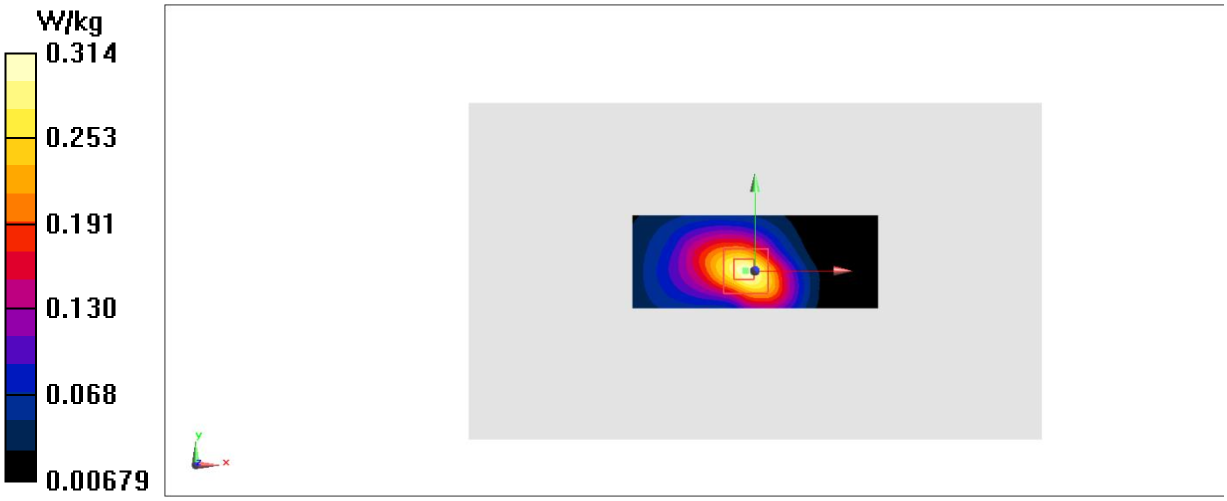


Fig A.20

WLAN2450_CH1 Left Tilt Cheek
Date: 6/5/2019
Electronics: DAE4 Sn1525
Medium: head 2450 MHz
Medium parameters used: f = 2462 MHz; σ = 1.782 mho/m; εr = 39.88; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: WLAN2450 2462 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(6.95,6.95,6.95)

Area Scan (91x161x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 2.33 W/kg

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

Reference Value = 13.64 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.09 W/kg
SAR(1 g) = 1.17 W/kg; SAR(10 g) = 0.453 W/kg
Maximum value of SAR (measured) = 2.29 W/kg

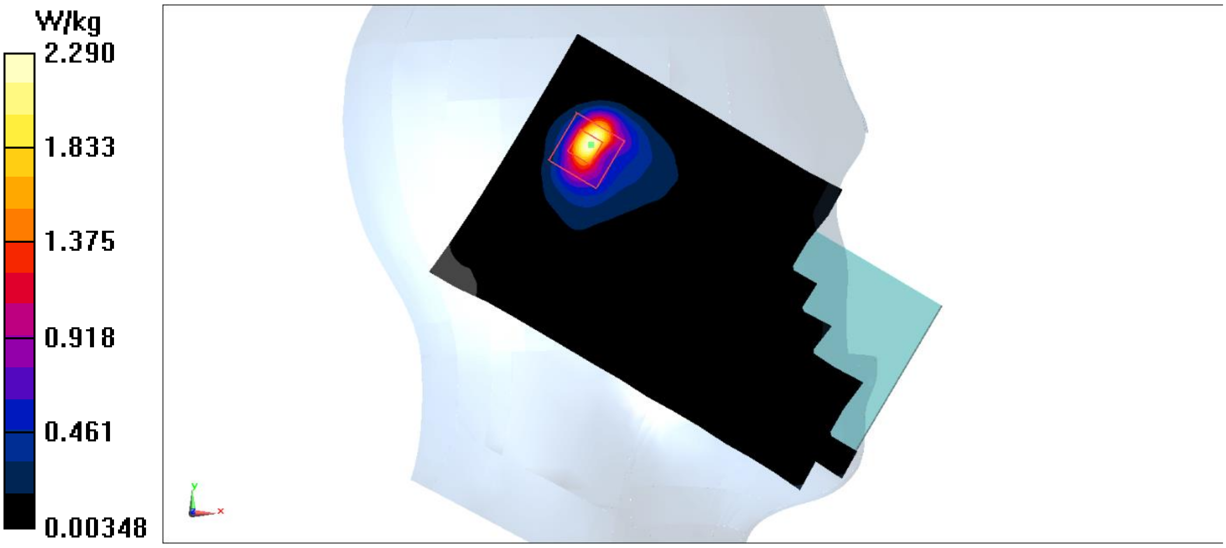


Fig A.21

WLAN2450_CH11 Rear
Date: 6/5/2019
Electronics: DAE4 Sn1525
Medium: body 2450 MHz
Medium parameters used: f = 2462 MHz; σ = 1.935 mho/m; εr = 52.26; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C,   Liquid Temperature: 22.3°C
Communication System: WLAN2450 2462 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(7.13,7.13,7.13)

Area Scan (151x91x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.457 W/kg

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

Reference Value = 9.512 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.572 W/kg
SAR(1 g) = 0.283 W/kg; SAR(10 g) = 0.128 W/kg
Maximum value of SAR (measured) = 0.463 W/kg

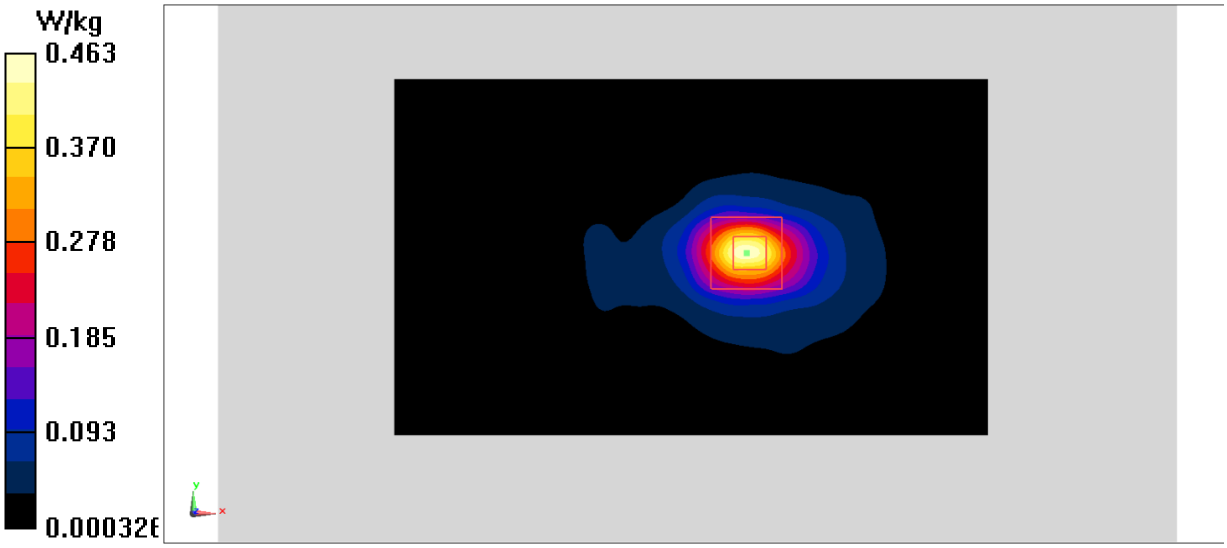


Fig A.22

LTE700-FDD12_CH23095 Left Cheek
Date: 9/20/2019
Electronics: DAE4 Sn771
Medium: head 750 MHz
Medium parameters used: f = 707.5 MHz; σ = 0.834 mho/m; εr = 41.94; 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 – SN3617 ConvF(10.03,10.03,10.03)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.246 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.569 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.265 W/kg
SAR(1 g) = 0.204 W/kg; SAR(10 g) = 0.123 W/kg
Maximum value of SAR (measured) = 0.242 W/kg

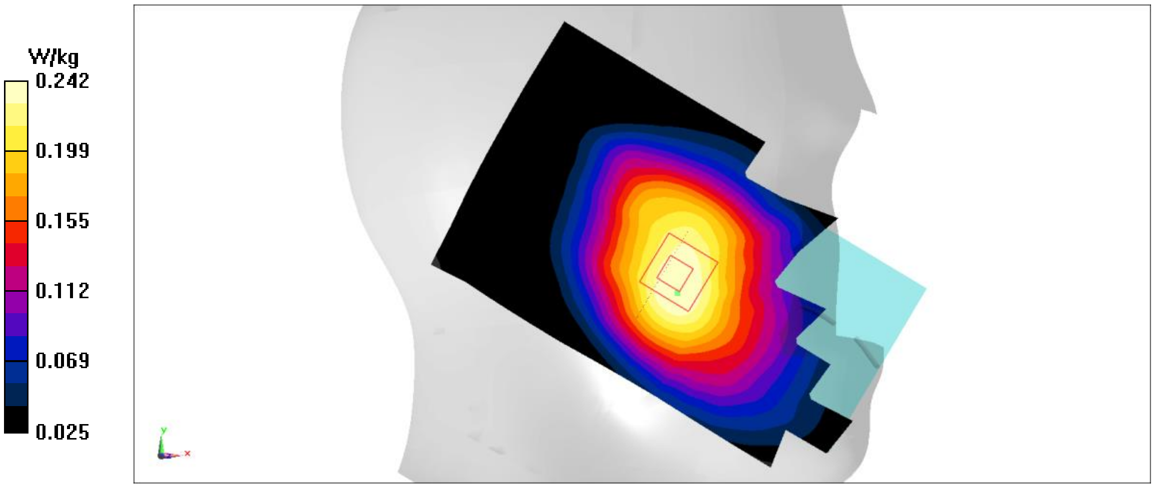


Fig A.23

LTE700-FDD12_CH23095 Rear
Date: 9/20/2019
Electronics: DAE4 Sn771
Medium: body 750 MHz
Medium parameters used: f = 707.5 MHz; σ = 0.924 mho/m; εr = 55.1; 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 – SN3617 ConvF(9.85,9.85,9.85)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.499 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 21.89 V/m; Power Drift = 0.1 dB
Peak SAR (extrapolated) = 0.539 W/kg
SAR(1 g) = 0.42 W/kg; SAR(10 g) = 0.333 W/kg
Maximum value of SAR (measured) = 0.497 W/kg

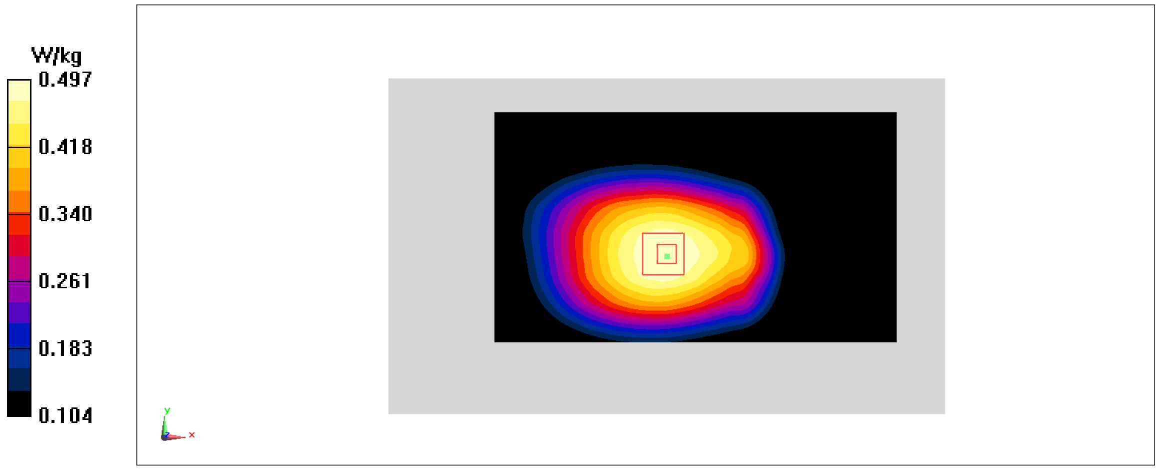


Fig A.24

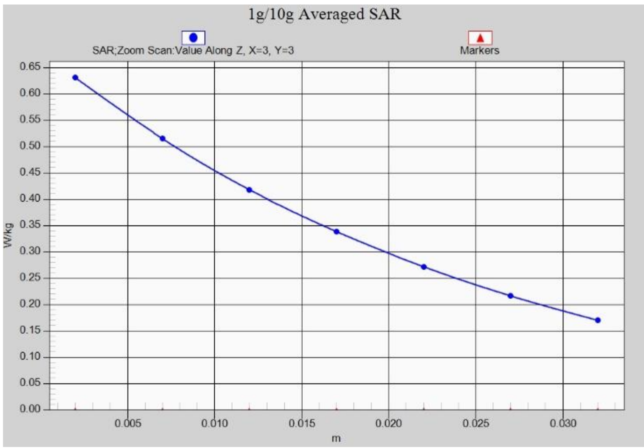


Fig.A.1- 1 Z-Scan at power reference point (GSM850)

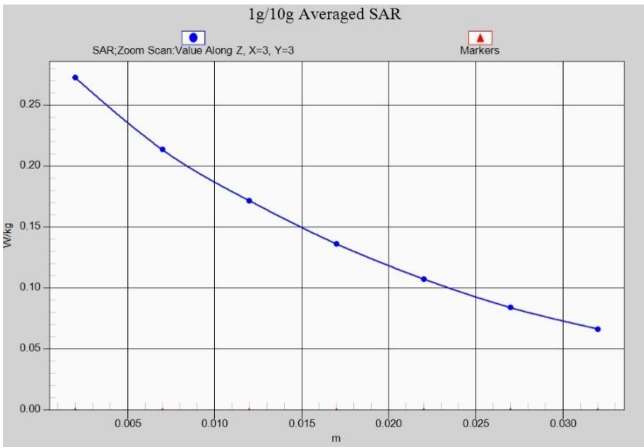


Fig.A.1- 2 Z-Scan at power reference point (GSM850)

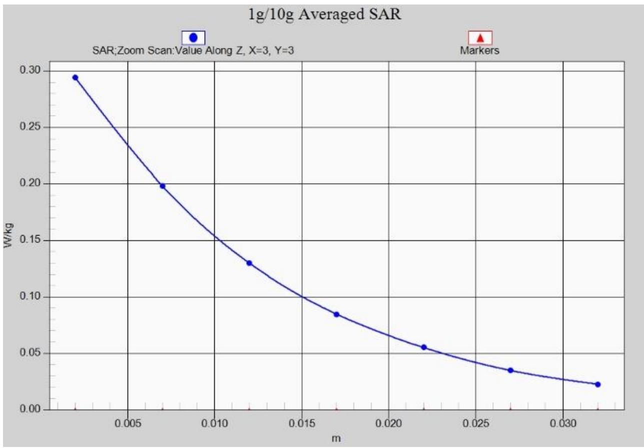


Fig.A.1- 3 Z-Scan at power reference point (PCS1900)

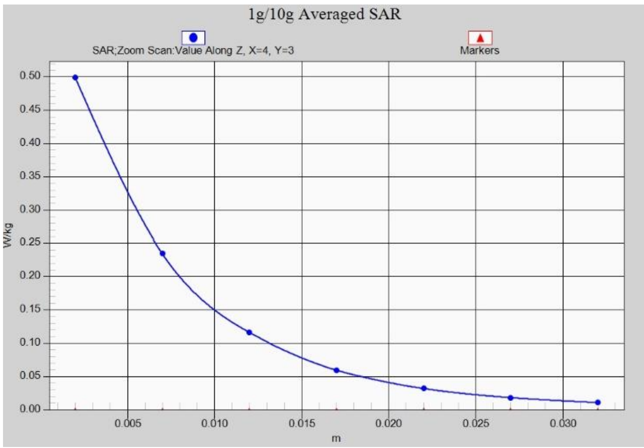


Fig.A.1- 4 Z-Scan at power reference point (PCS1900)

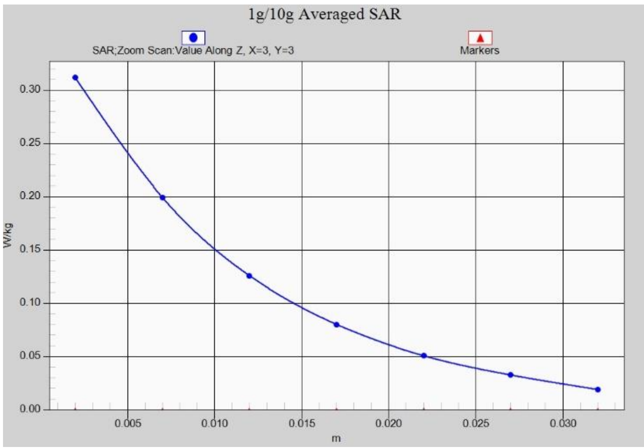


Fig.A.1- 5 Z-Scan at power reference point (W1900)

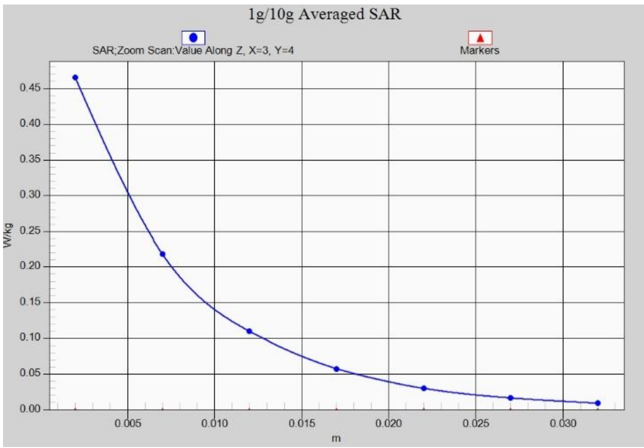


Fig.A.1- 6 Z-Scan at power reference point (W1900)

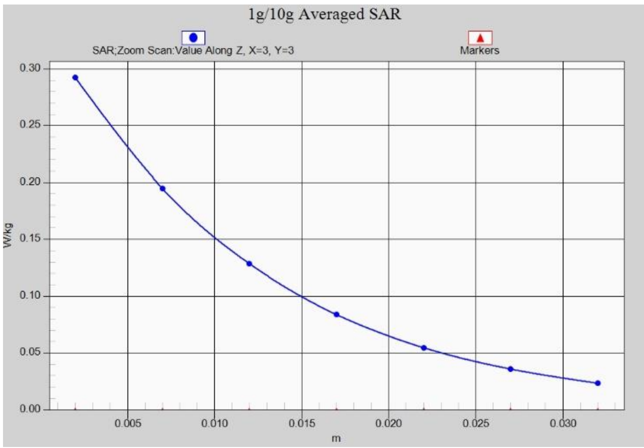


Fig.A.1- 7 Z-Scan at power reference point (W1700)

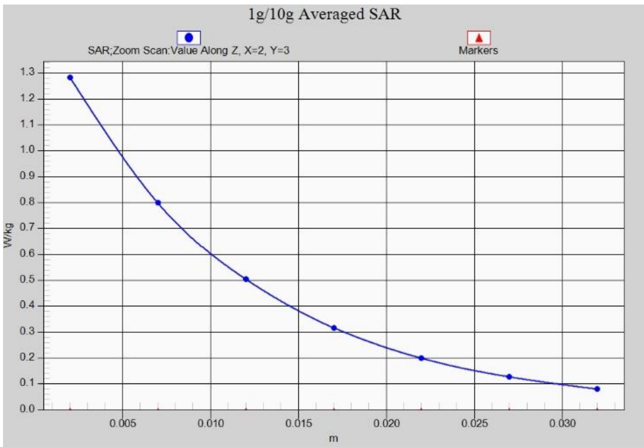


Fig.A.1- 8 Z-Scan at power reference point (W1700)

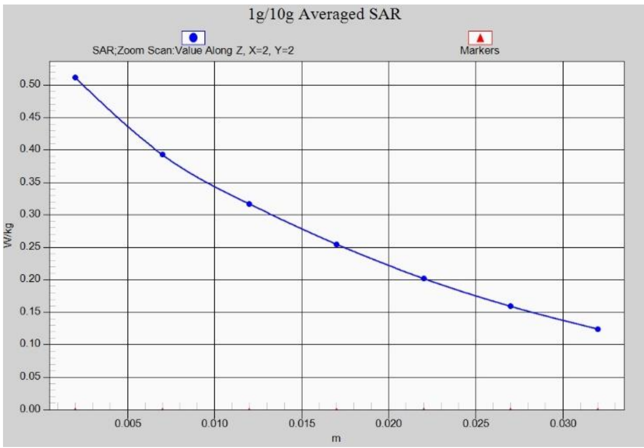


Fig.A.1- 9 Z-Scan at power reference point (W850)

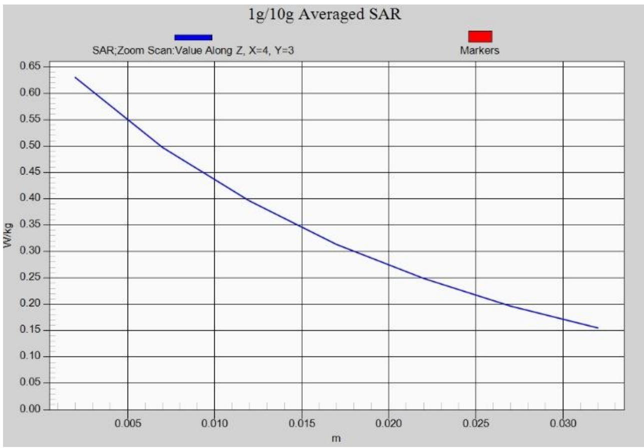


Fig.A.1- 10 Z-Scan at power reference point (W850)

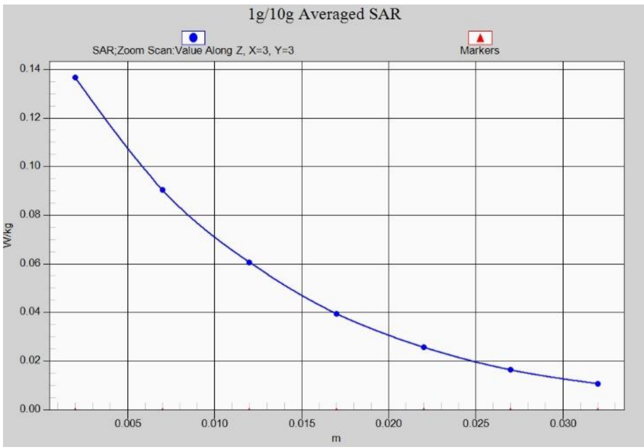


Fig.A.1- 11 Z-Scan at power reference point (LTE band2)

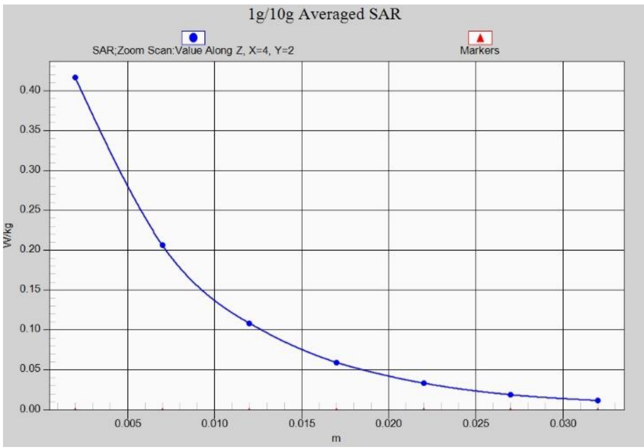


Fig.A.1- 12 Z-Scan at power reference point (LTE band2)

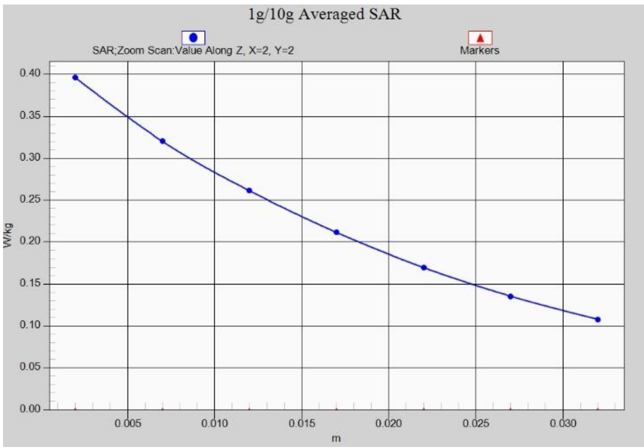


Fig.A.1- 13 Z-Scan at power reference point (LTE band5)

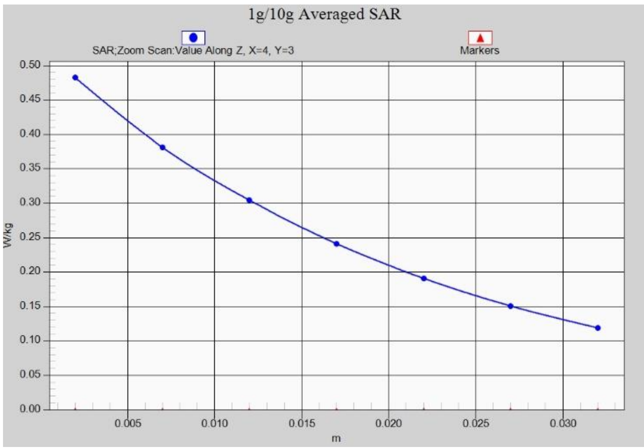


Fig.A.1- 14 Z-Scan at power reference point (LTE band5)

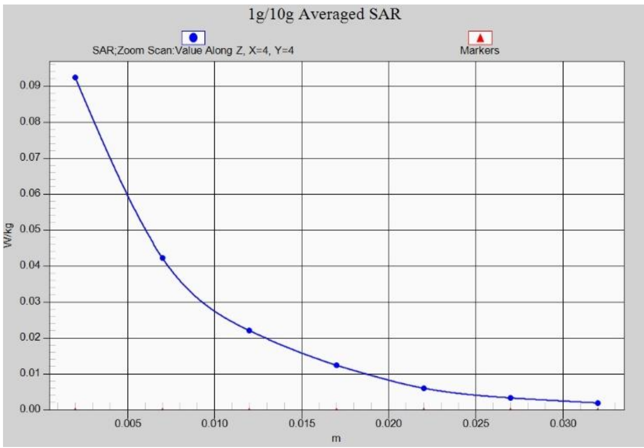


Fig.A.1- 15 Z-Scan at power reference point (LTE band7)

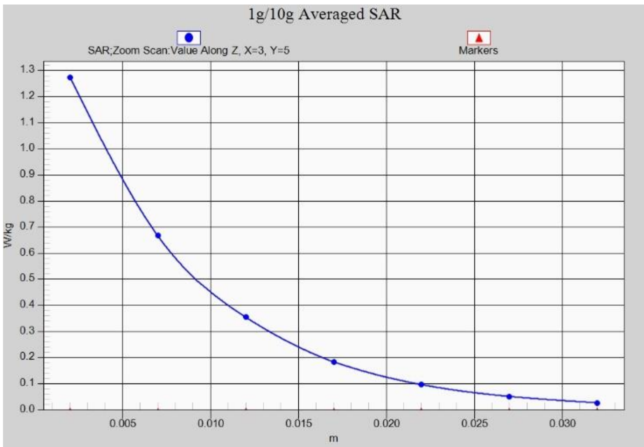


Fig.A.1- 16 Z-Scan at power reference point (LTE band7)

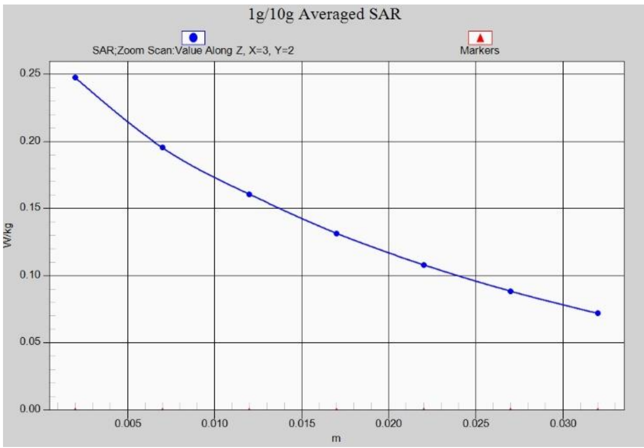


Fig.A.1- 17 Z-Scan at power reference point (LTE band17)

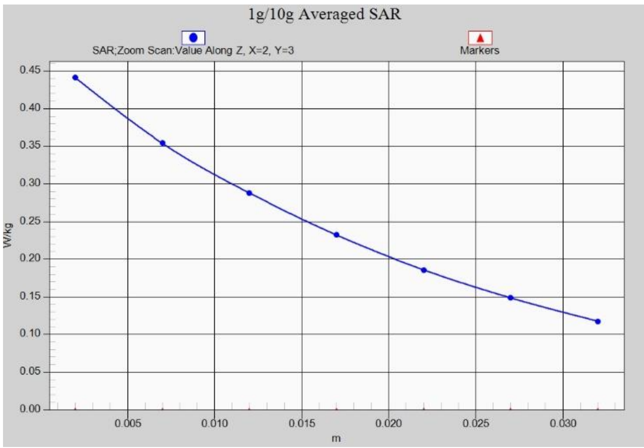


Fig.A.1- 18 Z-Scan at power reference point (LTE band17)

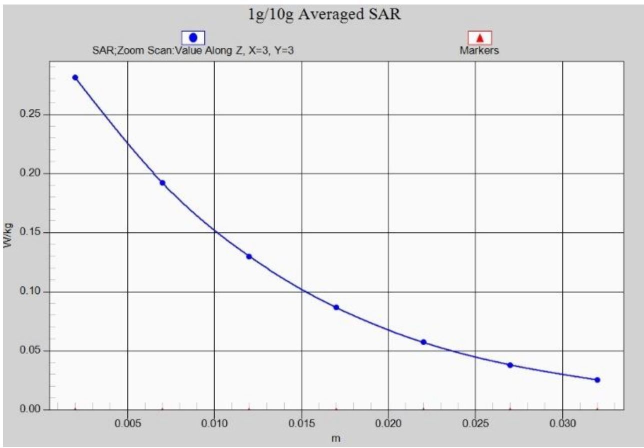


Fig.A.1- 19 Z-Scan at power reference point (LTE band66)

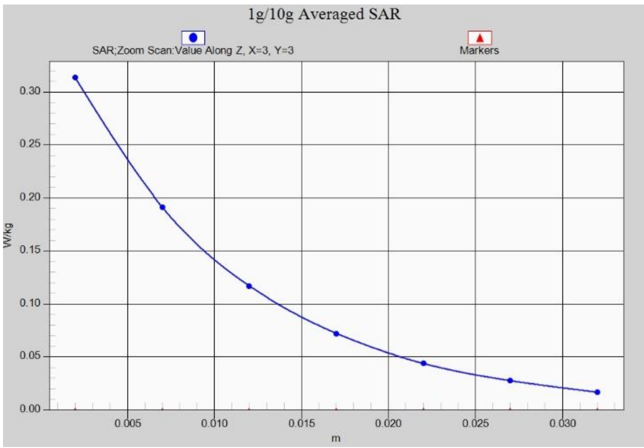


Fig.A.1- 20 Z-Scan at power reference point (LTE band66)

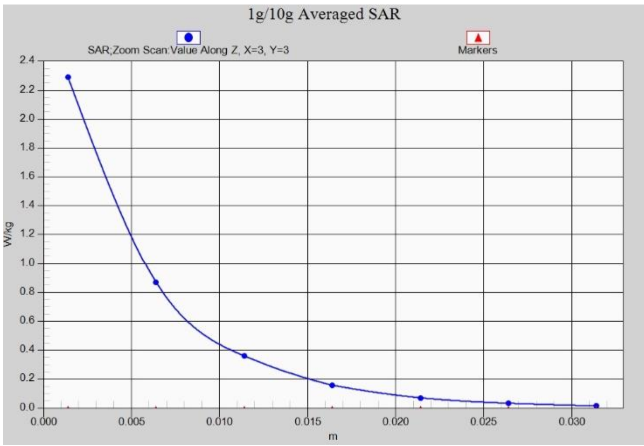


Fig.A.1-21 Z-Scan at power reference point (Wifi2450)

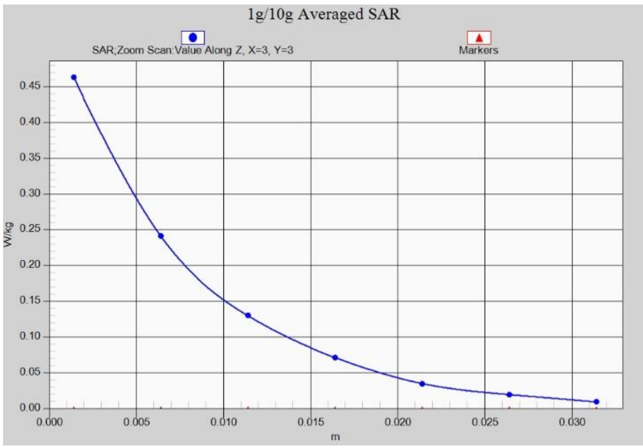


Fig.A.1- 22 Z-Scan at power reference point (Wifi2450)

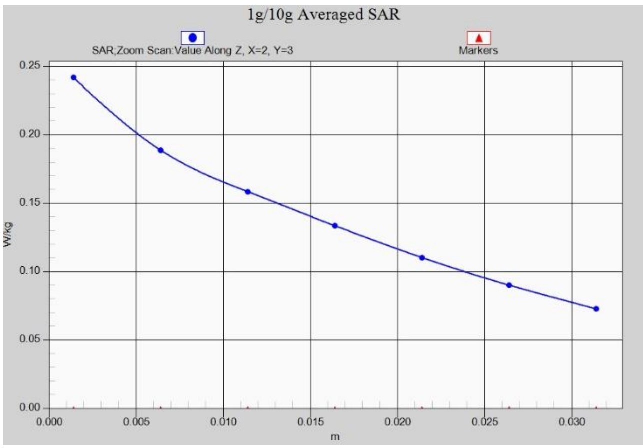


Fig.A.1- 23 Z-Scan at power reference point (LTE band17)

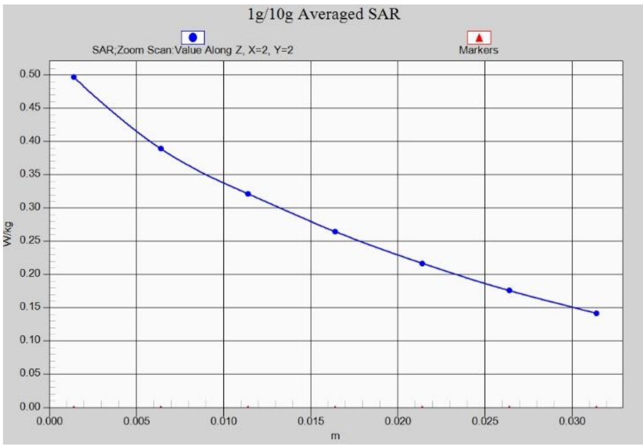


Fig.A.1- 24 Z-Scan at power reference point (LTE band17)

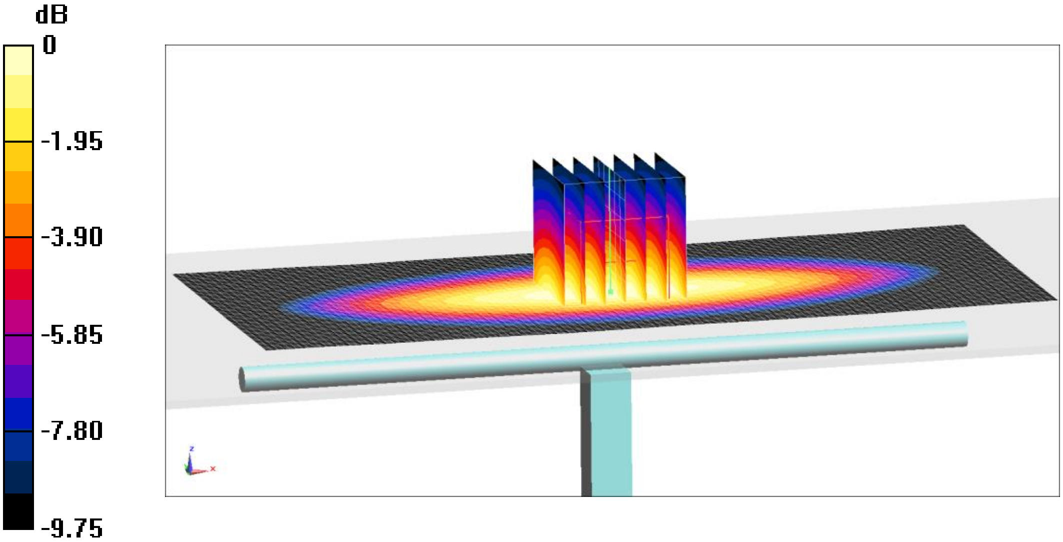
ANNEX B System Verification Results

750 MHz

Date: 6/1/2019
Electronics: DAE4 Sn1525
Medium: Head 750 MHz
Medium parameters used: f = 750 MHz; σ =0.89 mho/m; ε_r = 42.5; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C
Communication System: CW Frequency: 750 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(9.47,9.47,9.47)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 58.13 V/m; Power Drift = -0.02
Fast SAR: SAR(1 g) = 2.06 W/kg; SAR(10 g) = 1.36 W/kg
Maximum value of SAR (interpolated) = 2.79 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =58.13 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.24 W/kg
SAR(1 g) = 2.12 W/kg; SAR(10 g) = 1.33 W/kg
Maximum value of SAR (measured) = 2.81 W/kg



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

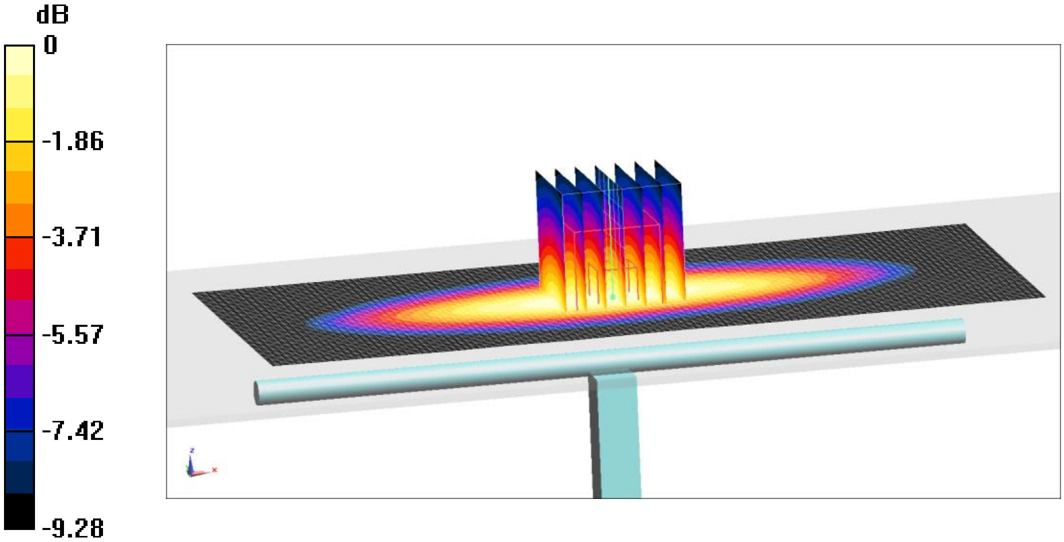
Fig.B.1 validation 750 MHz 250mW

750 MHz

Date: 6/1/2019
Electronics: DAE4 Sn1525
Medium: Body 750 MHz
Medium parameters used: f = 750 MHz; σ =0.97 mho/m; ε_r = 55.24; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C
Communication System: CW Frequency: 750 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(9.68,9.68,9.68)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 57.27 V/m; Power Drift = -0.07
Fast SAR: SAR(1 g) = 2.18 W/kg; SAR(10 g) = 1.4 W/kg
Maximum value of SAR (interpolated) = 3.32 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =57.27 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 3.29 W/kg
SAR(1 g) = 2.16 W/kg; SAR(10 g) = 1.42 W/kg
Maximum value of SAR (measured) = 2.96 W/kg



0 dB = 2.96 W/kg = 4.71 dB W/kg

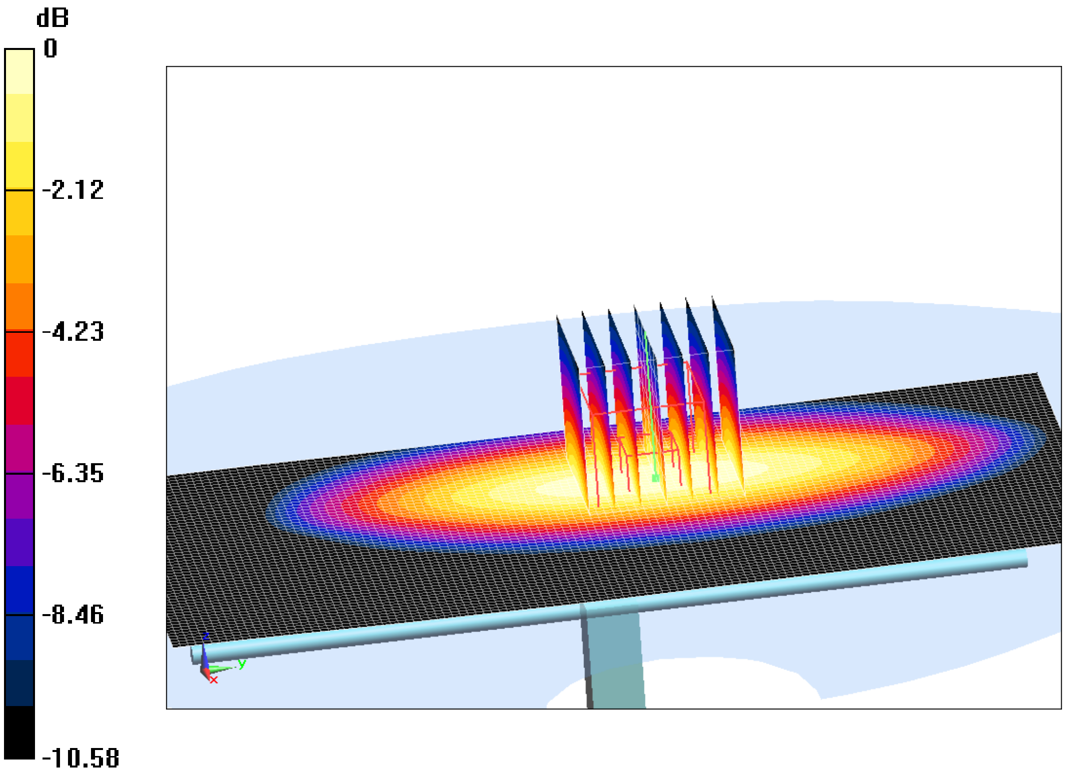
Fig.B.2 validation 750 MHz 250mW

835 MHz

Date: 6/2/2019
Electronics: DAE4 Sn1525
Medium: Head 835 MHz
Medium parameters used: f = 835 MHz; σ =0.888 mho/m; ε_r = 40.69; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC Liquid Temperature: 22.3ºC
Communication System: CW Frequency: 835 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(9.09,9.09,9.09)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 64.08 V/m; Power Drift = 0.1
Fast SAR: SAR(1 g) = 2.31 W/kg; SAR(10 g) = 1.49 W/kg
Maximum value of SAR (interpolated) = 3.74 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =64.08 V/m; Power Drift = 0.1 dB
Peak SAR (extrapolated) = 4.09 W/kg
SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.5 W/kg
Maximum value of SAR (measured) = 3.6 W/kg



0 dB = 3.6 W/kg = 5.56 dB W/kg

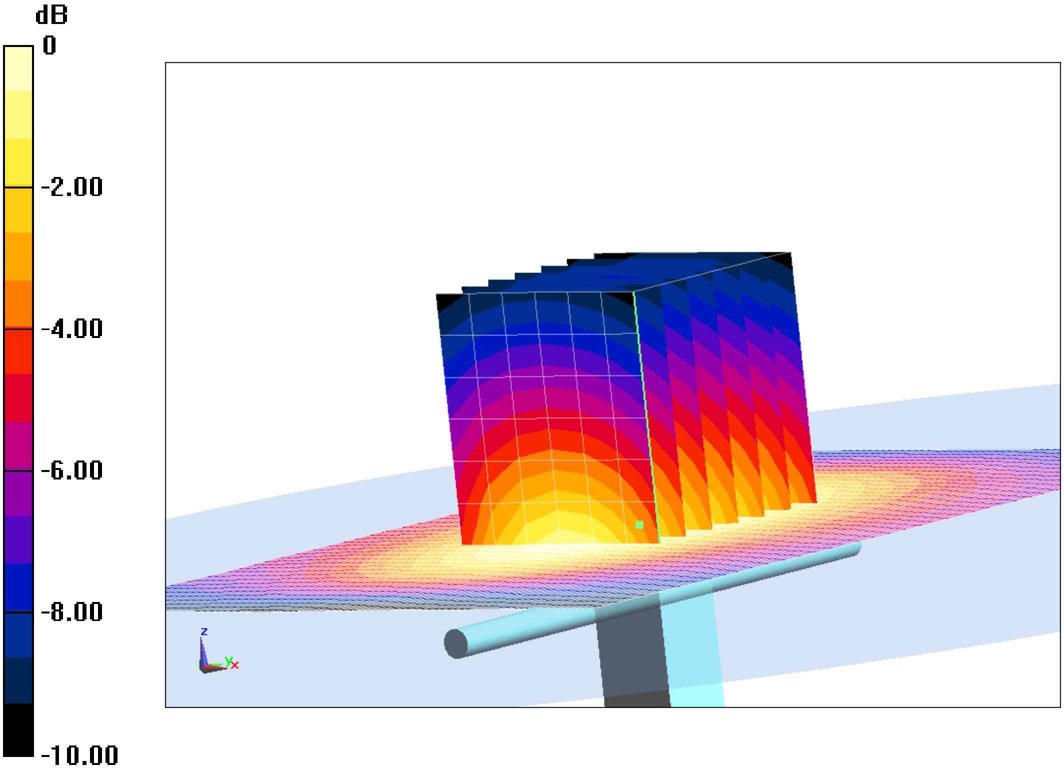
Fig.B.3 validation 835 MHz 250mW

835 MHz

Date: 6/2/2019
Electronics: DAE4 Sn1525
Medium: Body 835 MHz
Medium parameters used: f = 835 MHz; σ =0.955 mho/m; ε_r = 54.43; 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 – SN7514 ConvF(9.47,9.47,9.47)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 58.61 V/m; Power Drift = 0.07
Fast SAR: SAR(1 g) = 2.33 W/kg; SAR(10 g) = 1.55 W/kg
Maximum value of SAR (interpolated) = 3.5 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =58.61 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 3.7 W/kg
SAR(1 g) = 2.38 W/kg; SAR(10 g) = 1.53 W/kg
Maximum value of SAR (measured) = 3.26 W/kg



0 dB = 3.26 W/kg = 5.13 dB W/kg

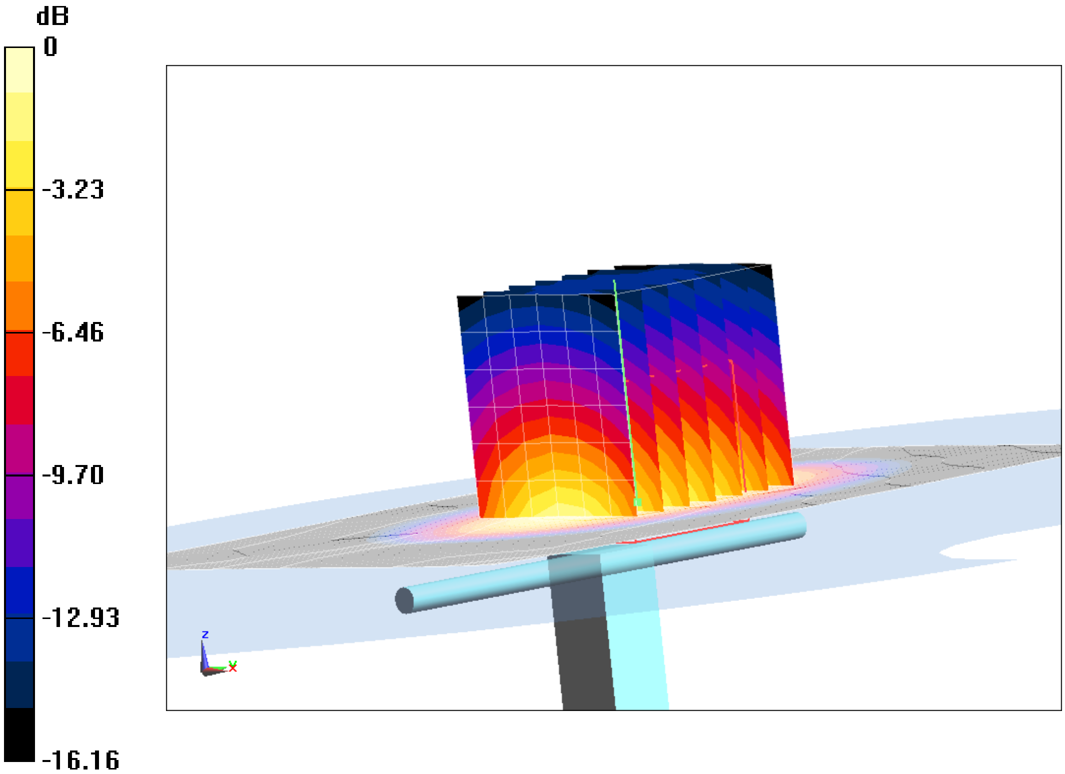
Fig.B.4 validation 835 MHz 250mW

1750 MHz

Date: 6/3/2019
Electronics: DAE4 Sn1525
Medium: Head 1750 MHz
Medium parameters used: f = 1750 MHz; σ =1.354 mho/m; ε_r = 40.2; 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 – SN7514 ConvF(8.10,8.10,8.10)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 106.22 V/m; Power Drift = 0.01
Fast SAR: SAR(1 g) = 9.34 W/kg; SAR(10 g) = 4.95 W/kg
Maximum value of SAR (interpolated) = 14.39 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =106.22 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 18.03 W/kg
SAR(1 g) = 9.14 W/kg; SAR(10 g) = 4.94 W/kg
Maximum value of SAR (measured) = 14.31 W/kg



0 dB = 14.31 W/kg = 11.56 dB W/kg

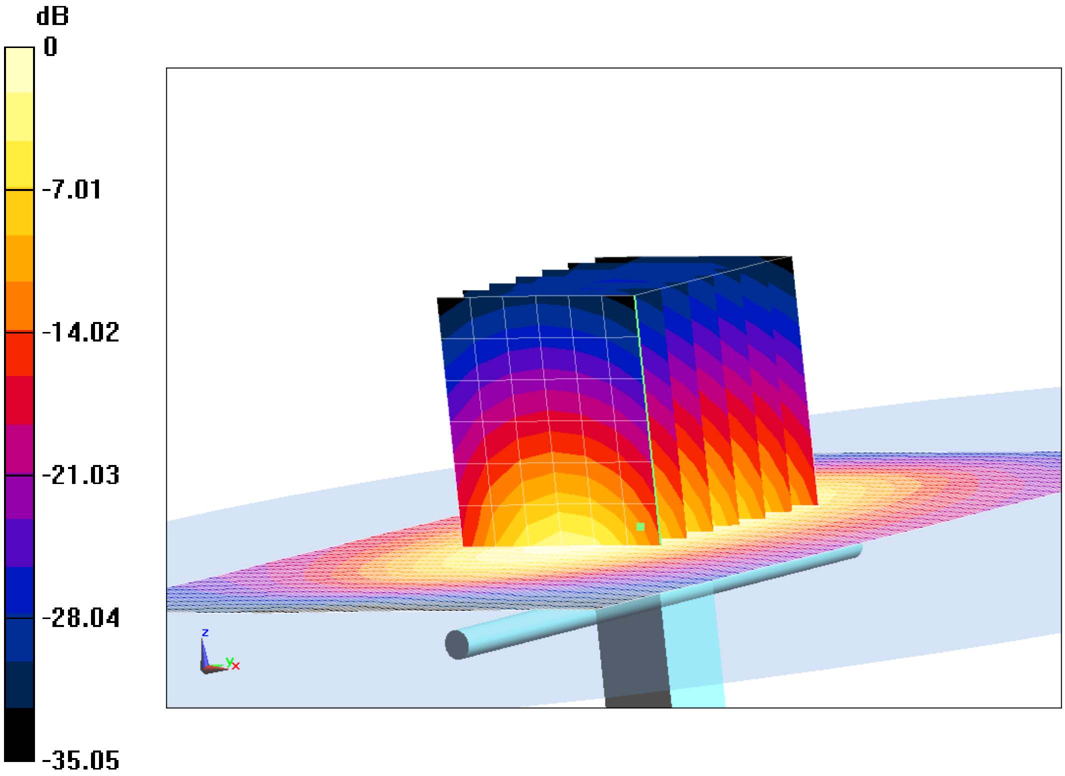
Fig.B.5 validation 1750 MHz 250mW

1750 MHz

Date: 6/3/2019
Electronics: DAE4 Sn1525
Medium: Body 1750 MHz
Medium parameters used: f = 1750 MHz; σ =1.482 mho/m; ε_r = 53.07; 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 – SN7514 ConvF(7.82,7.82,7.82)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 99.04 V/m; Power Drift = -0.09
Fast SAR: SAR(1 g) = 9.44 W/kg; SAR(10 g) = 5.02 W/kg
Maximum value of SAR (interpolated) = 16.21 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =99.04 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 16.21 W/kg
SAR(1 g) = 9.39 W/kg; SAR(10 g) = 4.9 W/kg
Maximum value of SAR (measured) = 13.5 W/kg



0 dB = 13.5 W/kg = 11.3 dB W/kg

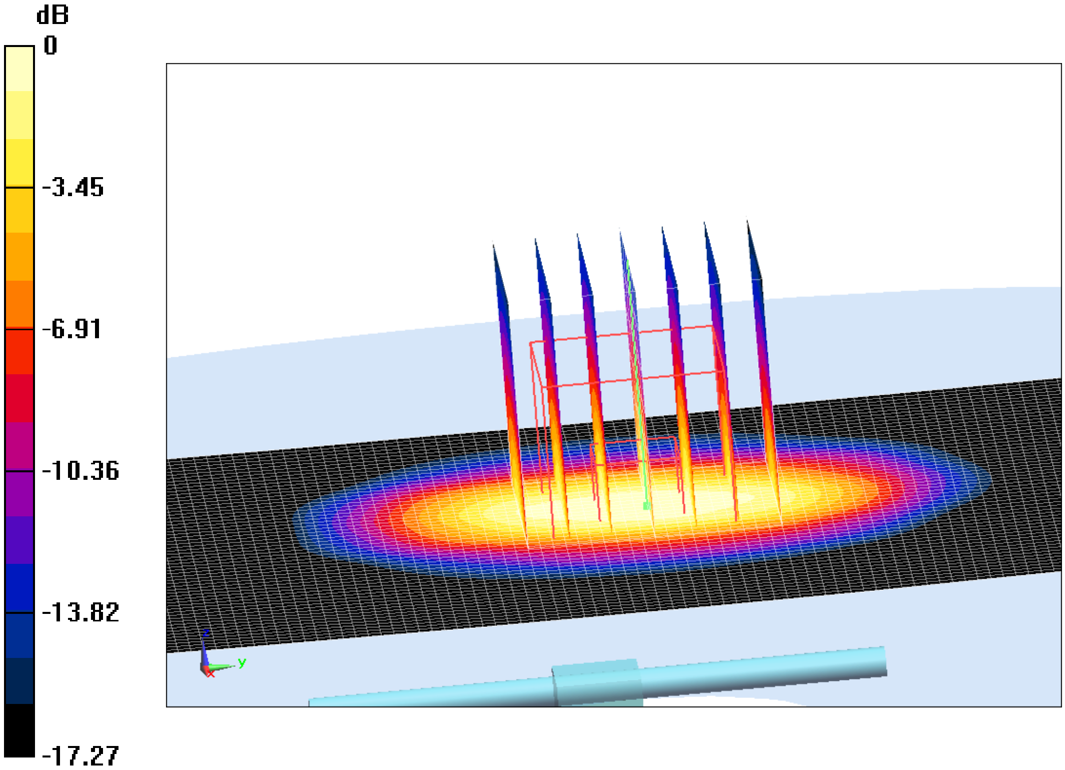
Fig.B.6 validation 1750 MHz 250mW

1900 MHz

Date: 6/4/2019
Electronics: DAE4 Sn1525
Medium: Head 1900 MHz
Medium parameters used: f = 1900 MHz; σ =1.411 mho/m; ε_r = 39.38; 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 – SN7514 ConvF(7.73,7.73,7.73)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 105.87 V/m; Power Drift = -0.04
Fast SAR: SAR(1 g) = 9.95 W/kg; SAR(10 g) = 5.32 W/kg
Maximum value of SAR (interpolated) = 14.65 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =105.87 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 18.63 W/kg
SAR(1 g) = 10.09 W/kg; SAR(10 g) = 5.23 W/kg
Maximum value of SAR (measured) = 14.99 W/kg



0 dB = 14.99 W/kg = 11.76 dB W/kg

Fig.B.7 validation 1900 MHz 250mW

1900 MHz

Date: 6/4/2019
Electronics: DAE4 Sn1525
Medium: Body 1900 MHz
Medium parameters used: f = 1900 MHz; σ =1.496 mho/m; ε_r = 52.85; 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 – SN7514 ConvF(7.53,7.53,7.53)

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

Reference Value = 102.04 V/m; Power Drift = -0.04

Fast SAR: SAR(1 g) = 10.08 W/kg; SAR(10 g) = 5.36 W/kg

Maximum value of SAR (interpolated) = 17.6 W/kg

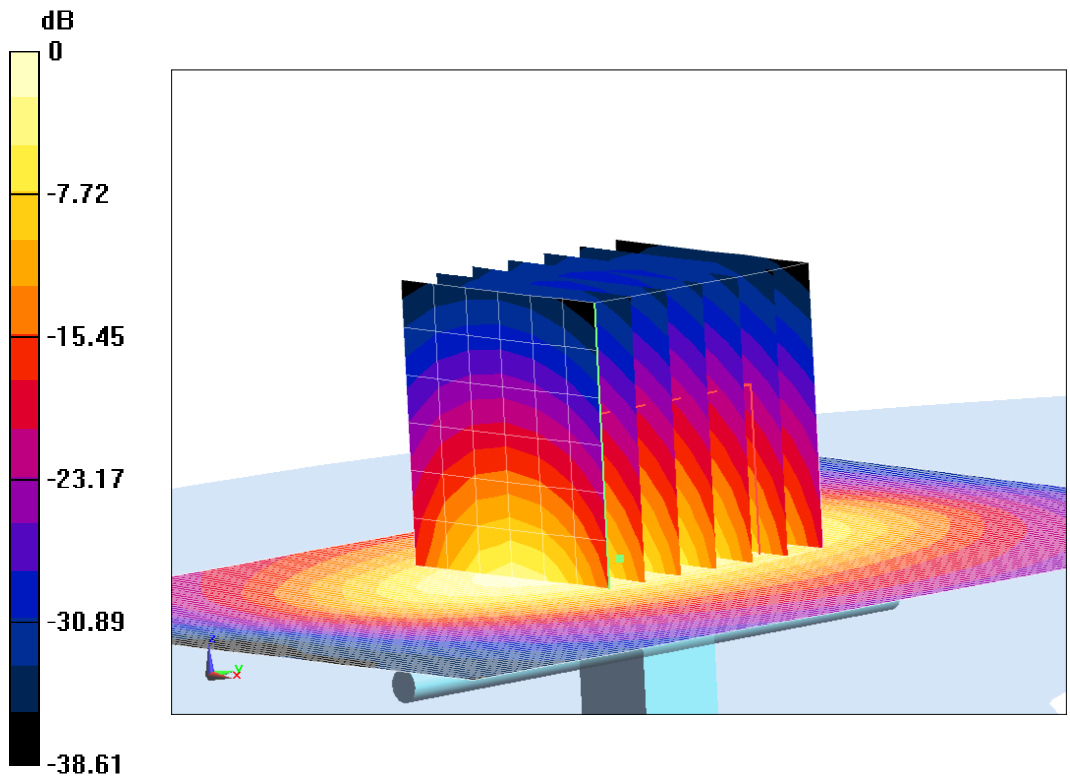
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value =102.04 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 17.47 W/kg

SAR(1 g) = 10.19 W/kg; SAR(10 g) = 5.47 W/kg

Maximum value of SAR (measured) = 14.41 W/kg



0 dB = 14.41 W/kg = 11.59 dB W/kg

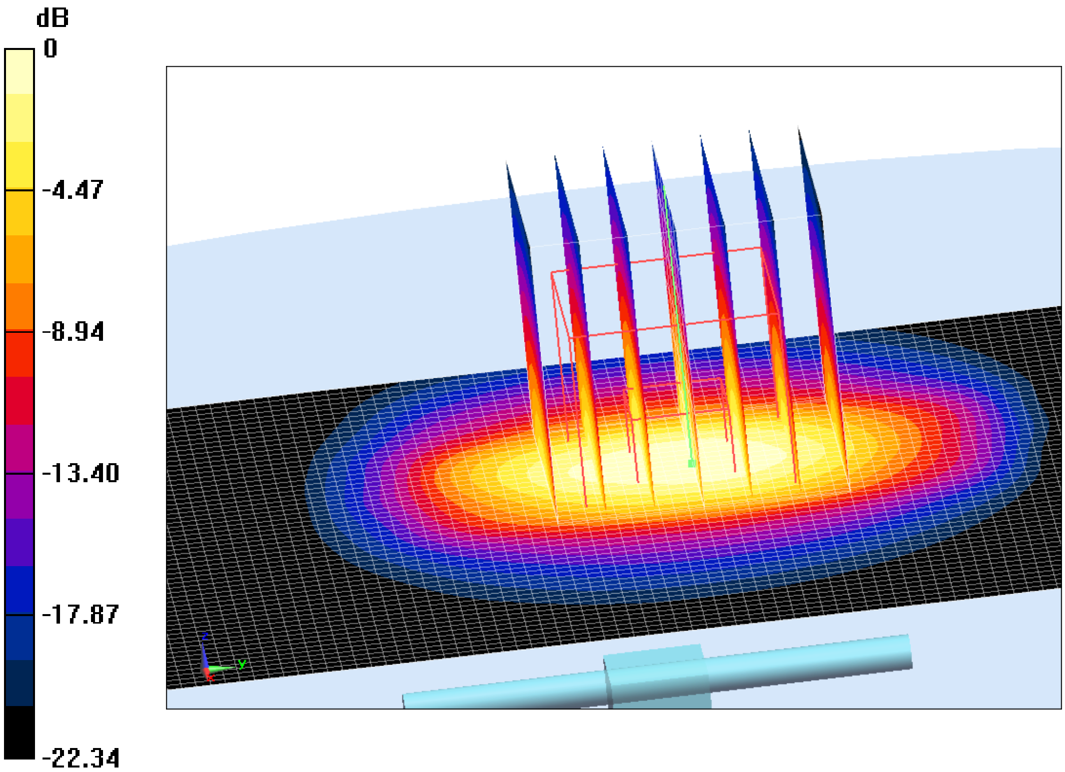
Fig.B.8 validation 1900 MHz 250mW

2450 MHz

Date: 6/5/2019
Electronics: DAE4 Sn1525
Medium: Head 2450 MHz
Medium parameters used: f = 2450 MHz; σ =1.818 mho/m; ε_r = 39.83; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C
Communication System: CW Frequency: 2450 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(6.95,6.95,6.95)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 113.46 V/m; Power Drift = -0.04
Fast SAR: SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.19 W/kg
Maximum value of SAR (interpolated) = 21.25 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =113.46 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 26.48 W/kg
SAR(1 g) = 12.93 W/kg; SAR(10 g) = 6.25 W/kg
Maximum value of SAR (measured) = 21.15 W/kg



0 dB = 21.15 W/kg = 13.25 dB W/kg

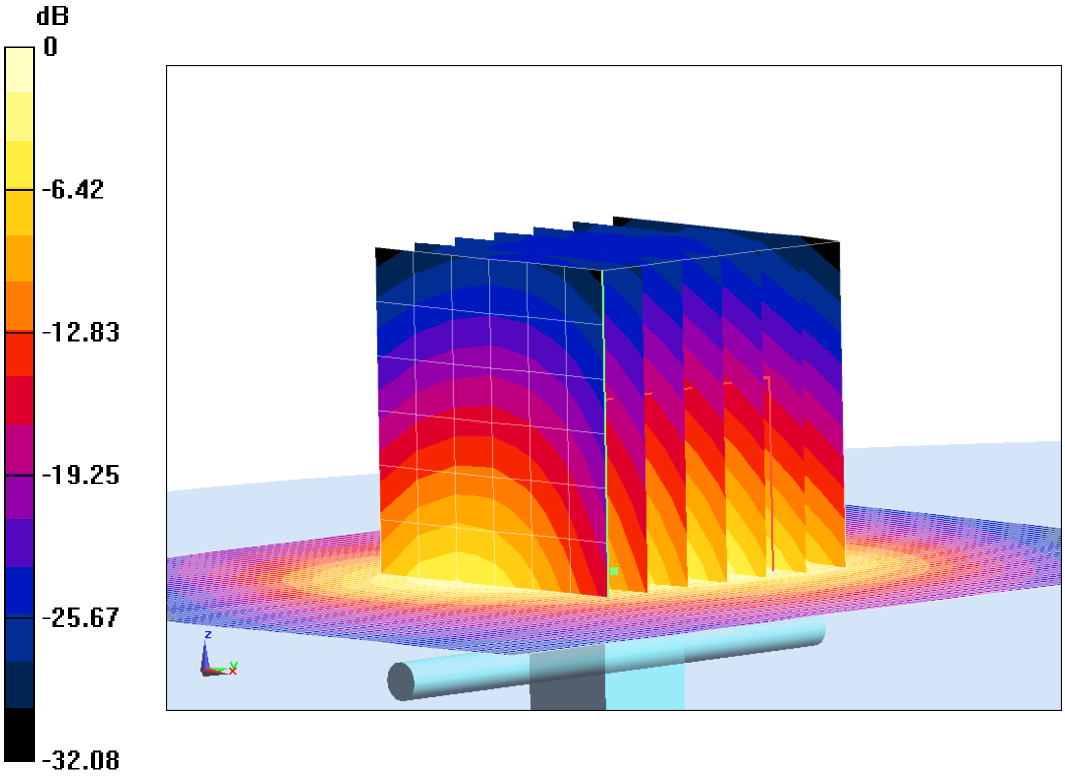
Fig.B.9 validation 2450 MHz 250mW

2450 MHz

Date: 6/5/2019
Electronics: DAE4 Sn1525
Medium: Body 2450 MHz
Medium parameters used: f = 2450 MHz; σ =1.947 mho/m; ε_r = 52.24; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C
Communication System: CW Frequency: 2450 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(7.13,7.13,7.13)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 105.72 V/m; Power Drift = -0.03
Fast SAR: SAR(1 g) = 12.73 W/kg; SAR(10 g) = 5.98 W/kg
Maximum value of SAR (interpolated) = 25.04 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =105.72 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 25.29 W/kg
SAR(1 g) = 12.6 W/kg; SAR(10 g) = 6.04 W/kg
Maximum value of SAR (measured) = 20.03 W/kg



0 dB = 20.03 W/kg = 13.02 dB W/kg

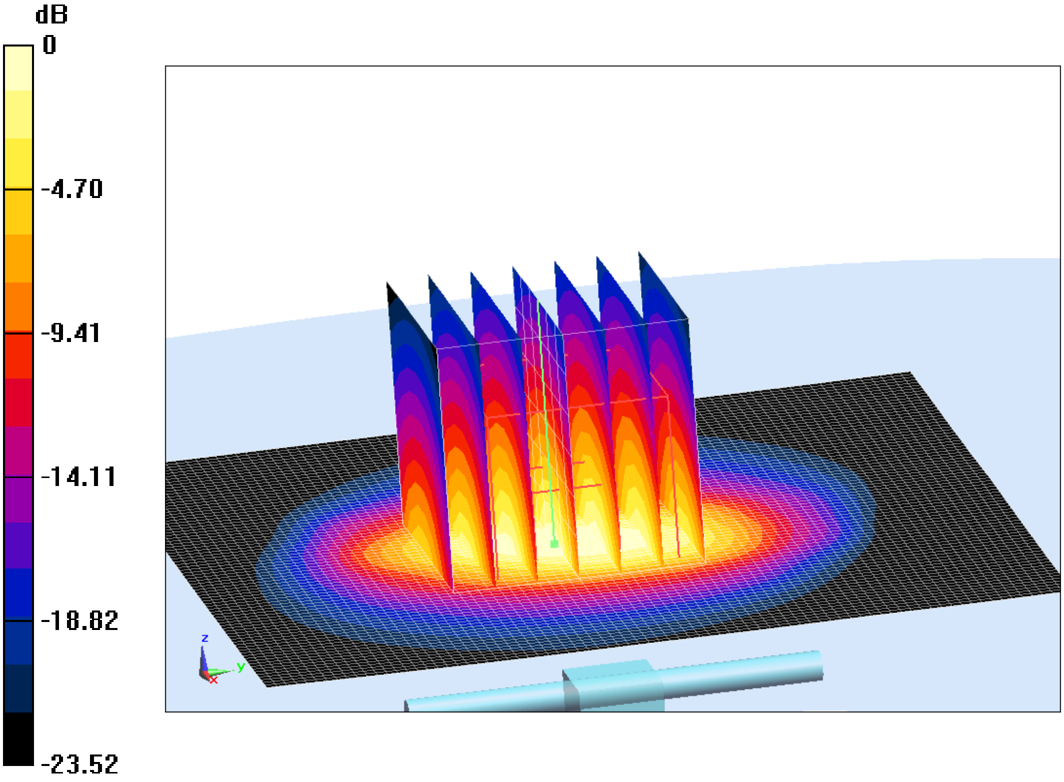
Fig.B.10 validation 2450 MHz 250mW

2600 MHz

Date: 6/6/2019
Electronics: DAE4 Sn1525
Medium: Head 2600 MHz
Medium parameters used: f = 2600 MHz; σ =1.956 mho/m; ε_r = 39.01; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C
Communication System: CW Frequency: 2600 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(6.92,6.92,6.92)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 115.62 V/m; Power Drift = 0.02
Fast SAR: SAR(1 g) = 14.29 W/kg; SAR(10 g) = 6.33 W/kg
Maximum value of SAR (interpolated) = 24.36 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =115.62 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 32.45 W/kg
SAR(1 g) = 14.43 W/kg; SAR(10 g) = 6.47 W/kg
Maximum value of SAR (measured) = 24.54 W/kg



0 dB = 24.54 W/kg = 13.9 dB W/kg

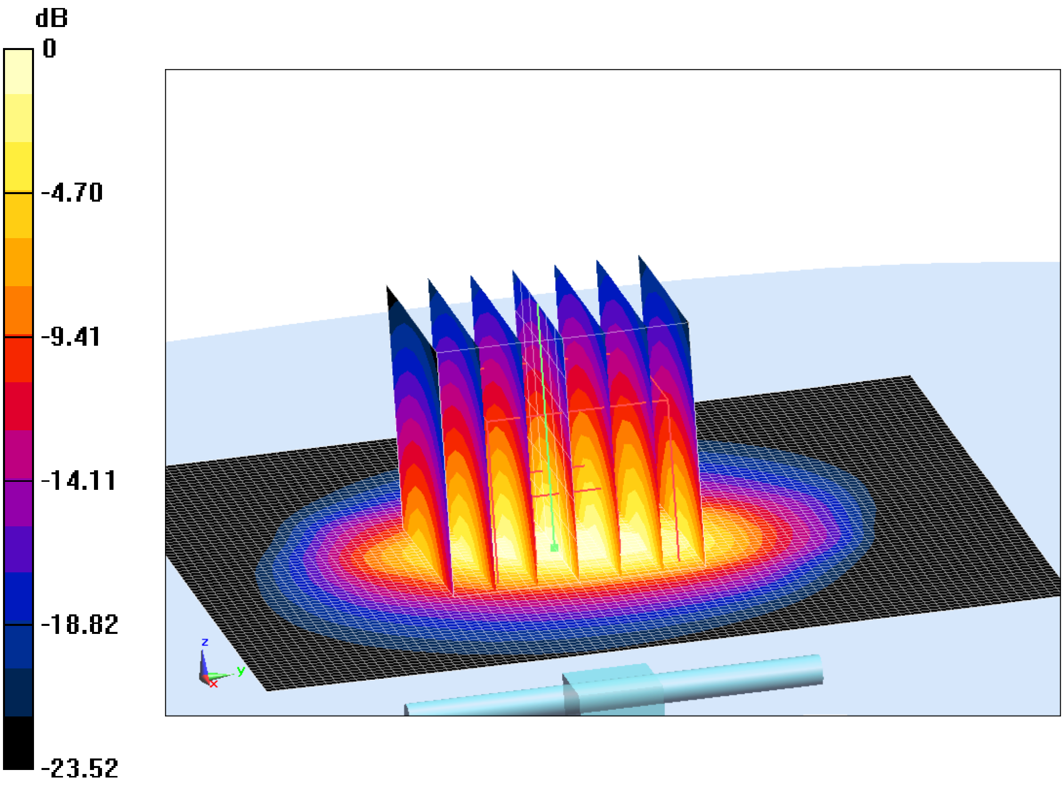
Fig.B.11 validation 2600 MHz 250mW

2600 MHz

Date: 6/6/2019
Electronics: DAE4 Sn1525
Medium: Body 2600 MHz
Medium parameters used: f = 2600 MHz; σ =2.177 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C
Communication System: CW Frequency: 2600 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7514 ConvF(7.06,7.06,7.06)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 108.67 V/m; Power Drift = 0.01
Fast SAR: SAR(1 g) = 13.75 W/kg; SAR(10 g) = 6.11 W/kg
Maximum value of SAR (interpolated) = 29.69 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =108.67 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 29.61 W/kg
SAR(1 g) = 13.9 W/kg; SAR(10 g) = 6.27 W/kg
Maximum value of SAR (measured) = 23.31 W/kg



0 dB = 23.31 W/kg = 13.68 dB W/kg

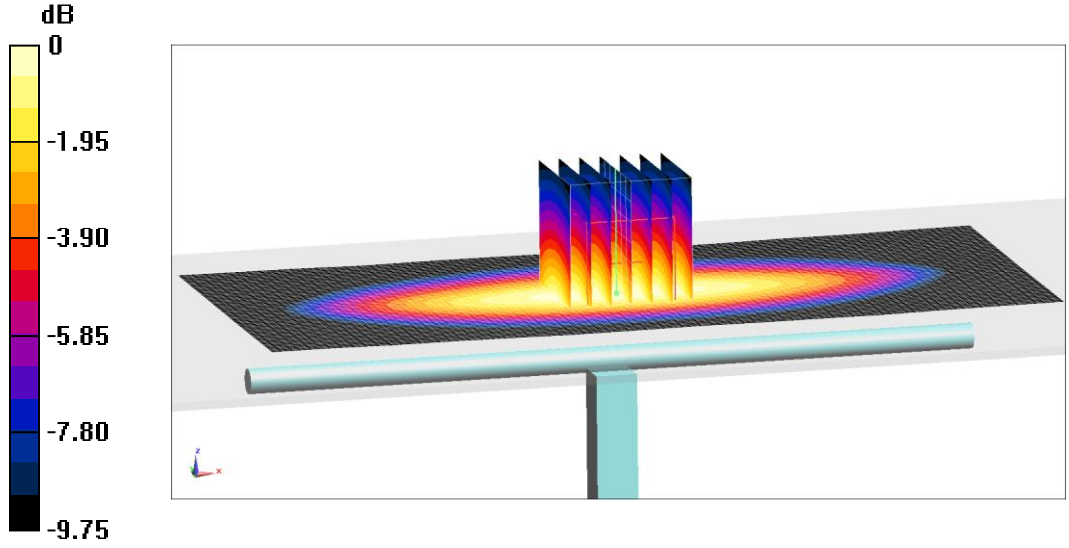
Fig.B.12 validation 2600 MHz 250mW

750 MHz

Date: 9/20/2019
Electronics: DAE4 Sn771
Medium: Head 750 MHz
Medium parameters used: f = 750 MHz; σ =0.874 mho/m; ε_r = 41.89; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C
Communication System: CW Frequency: 750 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3617 ConvF(10.03,10.03,10.03)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 60.01 V/m; Power Drift = -0.05
Fast SAR: SAR(1 g) = 2.15 W/kg; SAR(10 g) = 1.42 W/kg
Maximum value of SAR (interpolated) = 2.8 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =60.01 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 3.25 W/kg
SAR(1 g) = 2.16 W/kg; SAR(10 g) = 1.38 W/kg
Maximum value of SAR (measured) = 2.8 W/kg



0 dB = 2.8 W/kg = 4.47 dB W/kg

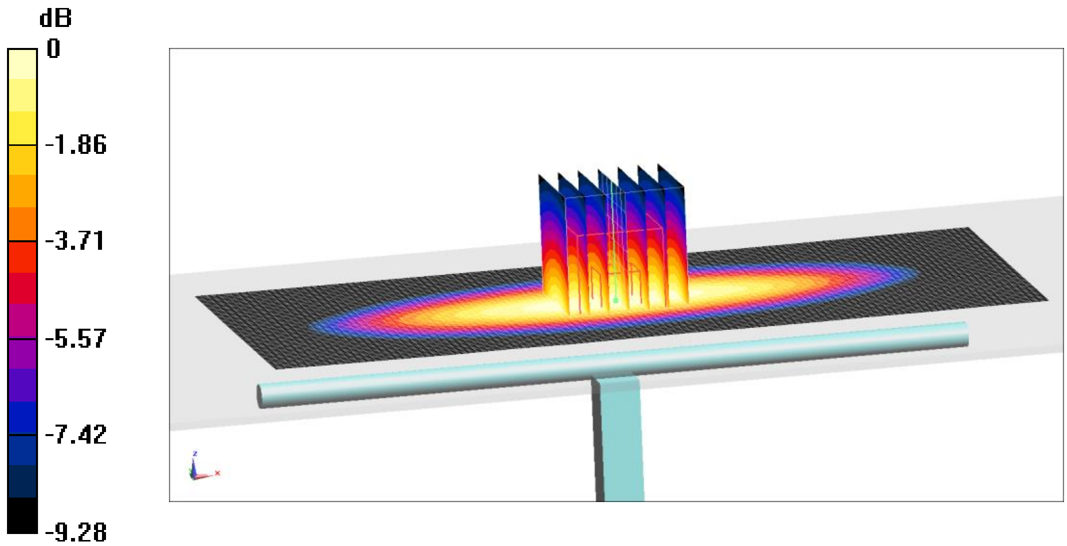
Fig.B.13 validation 750 MHz 250mW

750 MHz

Date: 9/20/2019
Electronics: DAE4 Sn771
Medium: Body 750 MHz
Medium parameters used: f = 750 MHz; σ =0.964 mho/m; ε_r = 55.05; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C
Communication System: CW Frequency: 750 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3617 ConvF(9.85,9.85,9.85)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 56.07 V/m; Power Drift = -0.04
Fast SAR: SAR(1 g) = 2.18 W/kg; SAR(10 g) = 1.39 W/kg
Maximum value of SAR (interpolated) = 2.96 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =56.07 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.22 W/kg
SAR(1 g) = 2.18 W/kg; SAR(10 g) = 1.41 W/kg
Maximum value of SAR (measured) = 2.9 W/kg



0 dB = 2.9 W/kg = 4.62 dB W/kg

Fig.B.14 validation 750 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.

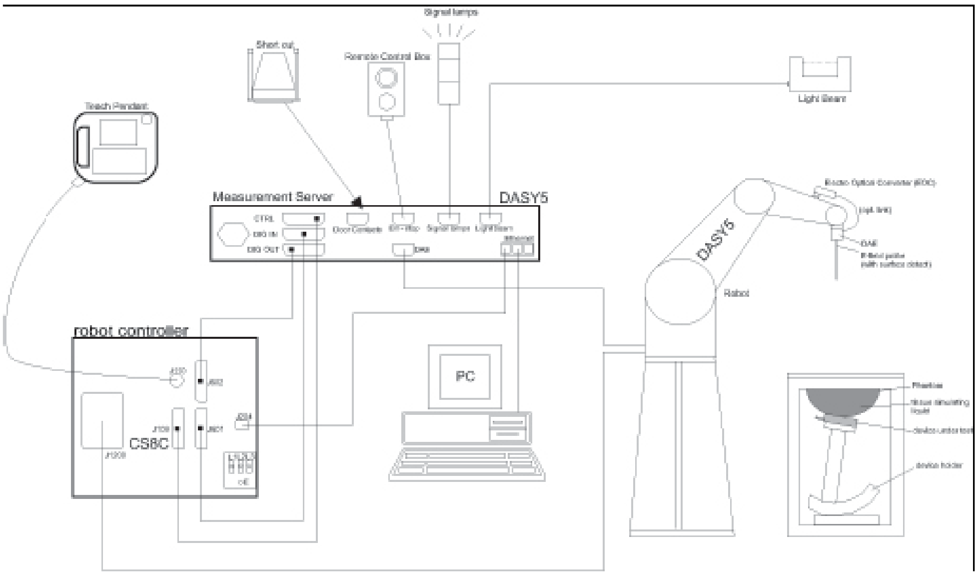
Table B.1 Comparison between area scan and zoom scan for system verification

Date	Band	Position	Area scan (1g)	Zoom scan (1g)	Drift (%)
2019/6/1	750	Head	2.06	2.12	-2.83
	750	Body	2.18	2.16	0.93
2019/6/2	835	Head	2.31	2.37	-2.53
	835	Body	2.33	2.38	-2.10
2019/6/3	1750	Head	9.34	9.14	2.19
	1750	Body	9.44	9.39	0.53
2019/6/4	1900	Head	9.95	10.09	-1.39
	1900	Body	10.08	10.19	-1.08
2019/6/5	2450	Head	13.3	12.93	2.86
	2450	Body	12.73	12.6	1.03
2019/6/6	2600	Head	14.29	14.43	-0.97
	2600	Body	13.75	13.9	-1.08
2019/9/20	750	Head	2.16	2.15	0.47
	750	Body	2.18	2.18	0.00

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.1 SAR Lab Test Measurement Set-up

- A standard high precision 6-axis robot (Stäubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP and the 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 2^{nd} ord curve fitting. The approach is stopped at reaching the maximum.

Probe Specifications:

Model: ES3DV3, EX3DV4
Frequency Range: 10MHz — 6.0GHz(EX3DV4)
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
Dynamic Range: 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 of mobile phones
Dosimetry in strong gradient fields

Picture C.2 Near-field Probe

Picture C.3 E-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.5 DASY 4

Picture C.6 DASY 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.

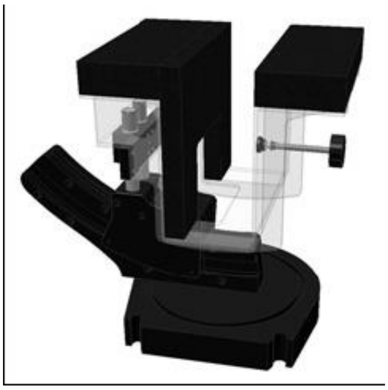
The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference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

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

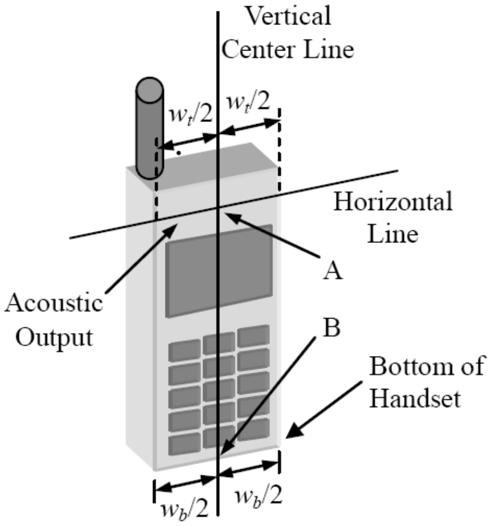
Available: Special

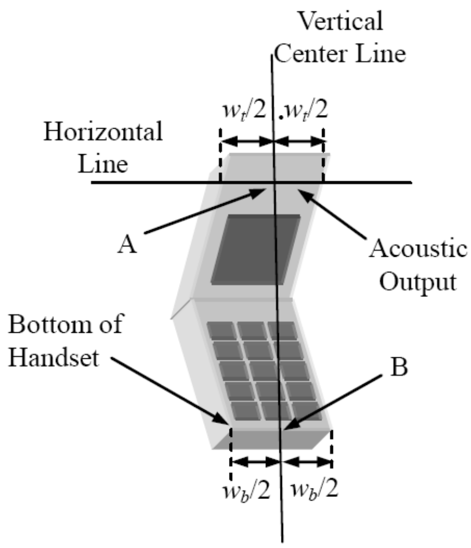
Picture C.10: SAM Twin Phantom

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

D.1 General considerations

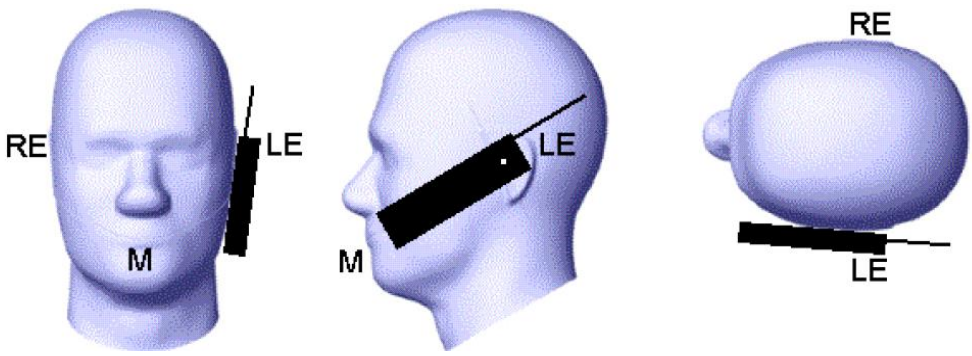
This standard specifies two handset test positions against the head phantom – the “cheek” position and the “tilt” position.



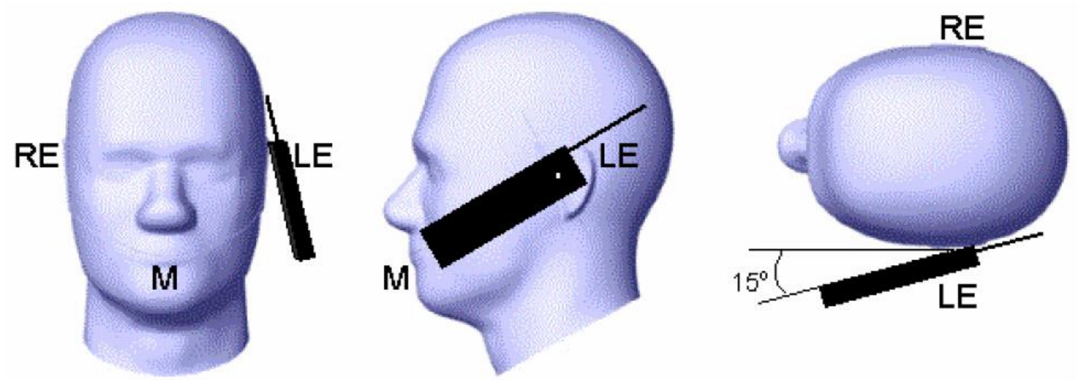


W_t	Width of the handset at the level of the acoustic
W_b	Width of the bottom of the handset
A	Midpoint of the width W_t of the handset at the level of the acoustic output
B	Midpoint of the width W_b of the bottom of the handset

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



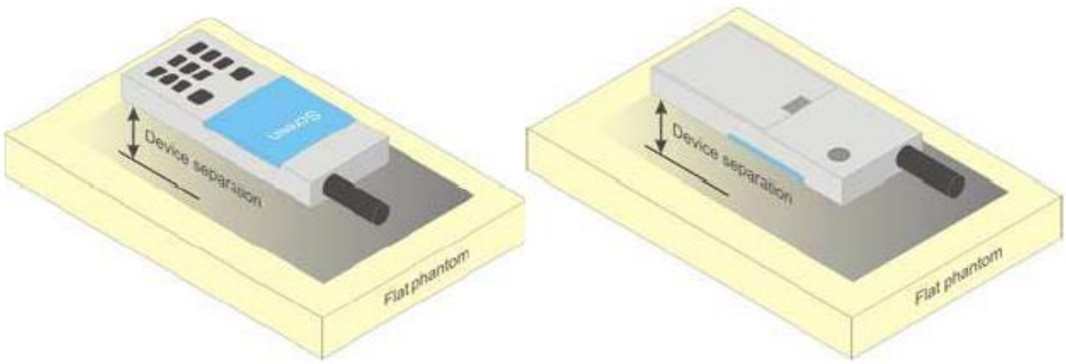
Picture D.2 Cheek position of the wireless device on the left side of SAM



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.

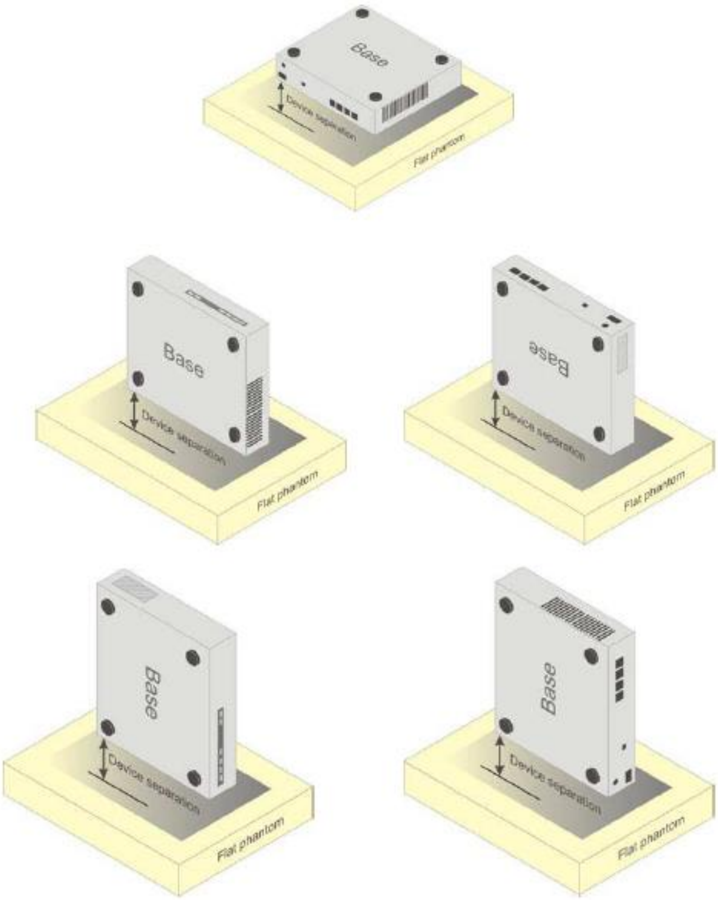


Picture D.4 Test positions for body-worn devices

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. Picture 8.5 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.

Table E.1: Composition of the Tissue Equivalent Matter

Frequency (MHz)	835 Head	835 Body	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 7514

Probe SN.	Liquid name	Validation date	Frequency point	Status (OK or Not)
7514	Head 750MHz	Sep.10,2018	750 MHz	OK
7514	Head 850MHz	Sep.10,2018	835 MHz	OK
7514	Head 900MHz	Sep.10,2018	900 MHz	OK
7514	Head 1750MHz	Sep.10,2018	1750 MHz	OK
7514	Head 1810MHz	Sep.10,2018	1810 MHz	OK
7514	Head 1900MHz	Sep.11,2018	1900 MHz	OK
7514	Head 2000MHz	Sep.11,2018	2000 MHz	OK
7514	Head 2100MHz	Sep.11,2018	2100 MHz	OK
7514	Head 2300MHz	Sep.11,2018	2300 MHz	OK
7514	Head 2450MHz	Sep.11,2018	2450 MHz	OK
7514	Head 2600MHz	Sep.12,2018	2600 MHz	OK
7514	Head 3500MHz	Sep.12,2018	3500 MHz	OK
7514	Head 3700MHz	Sep.12,2018	3700 MHz	OK
7514	Head 5200MHz	Sep.12,2018	5250 MHz	OK
7514	Head 5500MHz	Sep.12,2018	5600 MHz	OK
7514	Head 5800MHz	Sep.12,2018	5800 MHz	OK
7514	Body 750MHz	Sep.12,2018	750 MHz	OK
7514	Body 850MHz	Sep.9,2018	835 MHz	OK
7514	Body 900MHz	Sep.9,2018	900 MHz	OK
7514	Body 1750MHz	Sep.9,2018	1750 MHz	OK
7514	Body 1810MHz	Sep.9,2018	1810 MHz	OK
7514	Body 1900MHz	Sep.9,2018	1900 MHz	OK
7514	Body 2000MHz	Sep.13,2018	2000 MHz	OK
7514	Body 2100MHz	Sep.13,2018	2100 MHz	OK
7514	Body 2300MHz	Sep.13,2018	2300 MHz	OK
7514	Body 2450MHz	Sep.13,2018	2450 MHz	OK
7514	Body 2600MHz	Sep.13,2018	2600 MHz	OK
7514	Body 3500MHz	Sep.8,2018	3500 MHz	OK
7514	Body 3700MHz	Sep.8,2018	3700 MHz	OK
7514	Body 5200MHz	Sep.8,2018	5250 MHz	OK
7514	Body 5500MHz	Sep.8,2018	5600 MHz	OK
7514	Body 5800MHz	Sep.8,2018	5800 MHz	OK

Table F.2: System Validation for 3617

Probe SN.	Liquid name	Validation date	Frequency point	Status (OK or Not)
3617	Head 750MHz	Feb.14,2019	750 MHz	OK
3617	Head 850MHz	Feb.14,2019	835 MHz	OK
3617	Head 900MHz	Feb.14,2019	900 MHz	OK
3617	Head 1750MHz	Feb.14,2019	1750 MHz	OK
3617	Head 1810MHz	Feb.14,2019	1810 MHz	OK
3617	Head 1900MHz	Feb.15,2019	1900 MHz	OK
3617	Head 2000MHz	Feb.15,2019	2000 MHz	OK
3617	Head 2100MHz	Feb.15,2019	2100 MHz	OK
3617	Head 2300MHz	Feb.15,2019	2300 MHz	OK
3617	Head 2450MHz	Feb.15,2019	2450 MHz	OK
3617	Head 2600MHz	Feb.16,2019	2600 MHz	OK
3617	Head 3500MHz	Feb.16,2019	3500 MHz	OK
3617	Head 3700MHz	Feb.16,2019	3700 MHz	OK
3617	Head 5200MHz	Feb.16,2019	5250 MHz	OK
3617	Head 5500MHz	Feb.16,2019	5600 MHz	OK
3617	Head 5800MHz	Feb.16,2019	5800 MHz	OK
3617	Body 750MHz	Feb.16,2019	750 MHz	OK
3617	Body 850MHz	Feb.13,2019	835 MHz	OK
3617	Body 900MHz	Feb.13,2019	900 MHz	OK
3617	Body 1750MHz	Feb.13,2019	1750 MHz	OK
3617	Body 1810MHz	Feb.13,2019	1810 MHz	OK
3617	Body 1900MHz	Feb.13,2019	1900 MHz	OK
3617	Body 2000MHz	Feb.17,2019	2000 MHz	OK
3617	Body 2100MHz	Feb.17,2019	2100 MHz	OK
3617	Body 2300MHz	Feb.17,2019	2300 MHz	OK
3617	Body 2450MHz	Feb.17,2019	2450 MHz	OK
3617	Body 2600MHz	Feb.17,2019	2600 MHz	OK
3617	Body 3500MHz	Feb.12,2019	3500 MHz	OK
3617	Body 3700MHz	Feb.12,2019	3700 MHz	OK
3617	Body 5200MHz	Feb.12,2019	5250 MHz	OK
3617	Body 5500MHz	Feb.12,2019	5600 MHz	OK
3617	Body 5800MHz	Feb.12,2019	5800 MHz	OK