



**In accordance with the requirements of
FCC 47 CFR Part 2(2.1093), ANSI/IEEE C95.1-1992 and
IEEE Std 1528-2013**

FCC SAR EVALUATION REPORT

Product Name : Smart phone

Trademark : Turbo E

Model Name : P4526A

Serial Model : P4526A1

Report No. : NTEK-2017NT04142703HF

FCC ID : 2ADWUP4526A

Prepared for

ONE DIAMOND ELECTRONICS INC.

1450 Frazee Road, Suite 303, San Diego, California, United States

Prepared by

Shenzhen NTEK Testing Technology Co., Ltd.

1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District,
Shenzhen 518126 P.R.China.

Tel.: +86-755-6115 9388 Fax.: +86-755-6115 6599

Website: <http://www.ntek.org.cn>

TEST RESULT CERTIFICATION

Applicant's name : ONE DIAMOND ELECTRONICS INC.

Address : 1450 Frazee Road, Suite 303, San Diego, California, United States

Manufacturer's Name : HUIZHOU MIKI COMMUNICATION EQUIPMENT CO.,LTD

Address : No,39,guangtai rd,huinan hi-tech industrial park,zhongkai
hi-tech district, huizhou city

Product description

Product name : Smart phone

Trademark : Turbo E

Model and/or type reference : P4526A

Serial Model : P4526A1

FCC 47 CFR Part 2(2.1093)

ANSI/IEEE C95.1-1992

IEEE Std 1528-2013

Published RF exposure KDB procedures

This device described above has been tested by Shenzhen NTEK. In accordance with the measurement methods and procedures specified in IEEE Std 1528-2013 and KDB 865664 D01. Testing has shown that this device is capable of compliance with localized specific absorption rate (SAR) specified in FCC 47 CFR Part 2(2.1093) and ANSI/IEEE C95.1-1992. The test results in this report apply only to the tested sample of the stated device/equipment. Other similar device/equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

This report shall not be reproduced except in full, without the written approval of Shenzhen NTEK, this document may be altered or revised by Shenzhen NTEK, personal only, and shall be noted in the revision of the document.

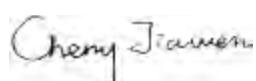
Date of Test

Date (s) of performance of tests : Apr. 20, 2017 ~ May. 08, 2017

Date of Issue : May. 27, 2017

Test Result : **Pass**

Prepared By
(Test Engineer)


(Cheng Jiawen)

Approved By
(Lab Manager)


(Sam Chen)

※ ※ Revision History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev.1.0	Initial Test Report Release	May. 27, 2017	Cheng Jiawen

TABLE OF CONTENTS

1.	General Information.....	6
1.1.	RF exposure limits.....	6
1.2.	Statement of Compliance.....	7
1.3.	EUT Description.....	8
1.4.	Test specification(s).....	10
1.5.	Ambient Condition.....	10
2.	SAR Measurement System.....	11
2.1.	SATIMO SAR Measurement Set-up Diagram	11
2.2.	Robot.....	12
2.3.	E-Field Probe	13
2.3.1.	E-Field Probe Calibration.....	14
2.4.	SAM phantoms.....	14
2.4.1.	Technical Data	14
2.5.	Device Holder.....	16
2.6.	Test Equipment List	17
3.	SAR Measurement Procedures	19
3.1.	Power Reference	19
3.2.	Area scan & Zoom scan	19
3.3.	Description of interpolation/extrapolation scheme.....	21
3.4.	Volumetric Scan.....	21
3.5.	Power Drift.....	21
4.	System Verification Procedure.....	22
4.1.	Tissue Verification	22
4.1.1.	Tissue Dielectric Parameter Check Results	23
4.2.	System Verification Procedure	24
4.2.1.	System Verification Results.....	25
5.	SAR Measurement variability and uncertainty.....	26
5.1.	SAR measurement variability.....	26
5.2.	SAR measurement uncertainty	26
6.	RF Exposure Positions	27
6.1.	Ear and handset reference point	27
6.2.	Definition of the cheek position	27
6.3.	Definition of the tilt position	29
6.4.	Body Worn Accessory	29
6.5.	Wireless Router Devices.....	30
7.	RF Output Power.....	31
7.1.	Maximum Tune-up Limit	31
7.2.	GSM Conducted Power	36
7.3.	WCDMA Conducted Power	37

7.4. LTE Conducted Power.....	39
7.5. WLAN & BT Output Power.....	49
7.5.1. Output Power Results Of WLAN.....	49
7.5.2. Output Power Results Of BT.....	49
8. Antenna Location.....	50
9. Stand-alone SAR test exclusion.....	51
10. SAR Measurement Results.....	52
10.1. SAR measurement results.....	52
10.1.1. SAR measurement Result of GSM850.....	53
10.1.2. SAR measurement Result of GSM1900.....	54
10.1.3. SAR measurement Result of WCDMA Band V	55
10.1.4. SAR measurement Result of WCDMA Band II.....	56
10.1.5. SAR measurement Result of LTE Band V	57
10.1.6. SAR measurement Result of LTE Band IV	58
10.1.7. SAR measurement Result of LTE Band II.....	61
10.1.8. SAR measurement Result of LTE Band VII	63
10.1.9. SAR measurement Result of WLAN 2.4G	65
10.2. Simultaneous Transmission Possibilities	66
10.3. SAR Summation Scenario	67
11. Appendix A. Photo documentation	74
12. Appendix B. System Check Plots.....	81
13. Appendix C. Plots of High SAR Measurement.....	92
14. Appendix D. Calibration Certificate	111

1. General Information

1.1. RF exposure limits

(A).Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

(B).Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

NOTE: **Whole-Body SAR** is averaged over the entire body, **partial-body SAR** is averaged over any 1 gram of tissue defined as a tissue volume in the shape of a cube. **SAR for hands, wrists, feet and ankles** is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

Occupational/Controlled Environments:

Are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

General Population/Uncontrolled Environments:

Are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

NOTE

HEAD AND TRUNK LIMIT

1.6 W/kg

APPLIED TO THIS EUT

1.2. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for P4526A are as follows.

Band	Max Reported SAR Value(W/kg)			
	1-g Head	1-g Body-Worn (Separation distance of 10mm)	1-g Hotspot (Separation distance of 10mm)	Max. SAR Summation
GSM 850	0.590	1.195	1.195	1.307
GSM 1900	0.287	0.539	0.539	
WCDMA Band V	0.349	0.565	0.565	
WCDMA Band II	0.344	0.533	0.533	
LTE Band V	0.387	0.672	0.672	
LTE Band IV	0.334	1.177	1.177	
LTE Band II	0.355	0.857	0.857	
LTE Band VII	0.341	0.518	0.518	
WLAN 2.4G	0.525	0.112	0.112	

NOTE: The Max. SAR Summation is calculated based on the same configuration and test position. This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR Part 2(2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE Std 1528-2013 & KDB 865664 D01.

1.3. EUT Description

Device Information			
Product Name	Smart phone		
Trade Name	Turbo E		
Model Name	P4526A		
Serial Model	P4526A1		
FCC ID	2ADWUP4526A		
Device Phase	Identical Prototype		
Exposure Category	General population / Uncontrolled environment		
Antenna	FPCB Antenna		
Battery Information	3.8V, 1700mAh		
Device Operating Configurations			
Supporting Mode(s)	GSM 850/1900, WCDMA Band V/II, LTE Band V/IV/II/VII, WLAN 2.4G, BT		
Test Modulation	GSM(GMSK/8PSK), WCDMA(QPSK), LTE(QPSK/16QAM), WLAN(DSSS/OFDM)		
Device Class	B		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM 850	824-849	869-894
	GSM 1900	1850-1910	1930-1990
	WCDMA Band V	824-849	869-894
	WCDMA Band II	1850-1910	1930-1990
	LTE Band V	824-849	869-894
	LTE Band IV	1710-1755	2110-2155
	LTE Band II	1850-1910	1930-1990
	LTE Band VII	2500-2570	2620-2690
	WLAN 2.4G	2412-2462	
	BT	2402-2480	
GPRS Multislot Class(12)	Max Number of Timeslots in Uplink		4
	Max Number of Timeslots in Downlink		4
	Max Total Timeslot		5
EDGE Multislot Class(12)	Max Number of Timeslots in Uplink		4
	Max Number of Timeslots in Downlink		4
	Max Total Timeslot		5
HSDPA UE Category	14		
HSUPA UE Category	6		
Power Class	4, tested with power level 5(GSM 850)		
	1, tested with power level 0(GSM 1900)		
	3, tested with power control —“1”(WCDMA Band V)		

Test Channels (low-mid-high)	3, tested with power control —#1"(WCDMA Band II)
	3, tested with power control all Max.(LTE Band V)
	3, tested with power control all Max.(LTE Band IV)
	3, tested with power control all Max.(LTE Band II)
	3, tested with power control all Max.(LTE Band VII)
	128-189-251(GSM 850)
	512-661-810(GSM 1900)
	4132-4182-4233(WCDMA Band V)
	9262-9400-9538(WCDMA Band II)
	20407-20525-20643(LTE Band V BW=1.4MHz)
	20415-20525-20635(LTE Band V BW=3MHz)
	20425-20525-20625(LTE Band V BW=5MHz)
	20450-20525-20600(LTE Band V BW=10MHz)
	19957-20175-20393(LTE Band IV BW=1.4MHz)
	19965-20175-20385(LTE Band IV BW=3MHz)
	19975-20175-20375(LTE Band IV BW=5MHz)
	20000-20175-20350(LTE Band IV BW=10MHz)
	20025-20175-20325(LTE Band IV BW=15MHz)
	20050-20175-20300(LTE Band IV BW=20MHz)
	18607-18900-19193(LTE Band II BW=1.4MHz)
	18615-18900-19185(LTE Band II BW=3MHz)
	18625-18900-19175(LTE Band II BW=5MHz)
	18650-18900-19150(LTE Band II BW=10MHz)
	18675-18900-19125(LTE Band II BW=15MHz)
	18700-18900-19100(LTE Band II BW=20MHz)
	20775-21100-21425(LTE Band VII BW=5MHz)
	20800-21100-21400(LTE Band VII BW=10MHz)
	20825-21100-21375(LTE Band VII BW=15MHz)
	20850-21100-21350(LTE Band VII BW=20MHz)
	802.11 b/g/n:1-6-11(WLAN 2.4G)

1.4. Test specification(s)

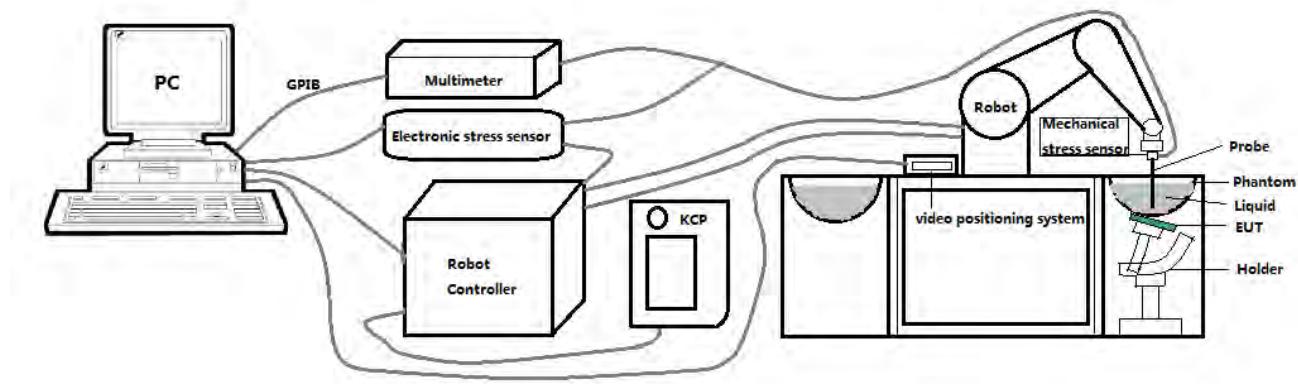
FCC 47 CFR Part 2(2.1093)
ANSI/IEEE C95.1-1992
IEEE Std 1528-2013
KDB 865664 D01 SAR measurement 100 MHz to 6 GHz
KDB 865664 D02 RF Exposure Reporting
KDB 447498 D01 General RF Exposure Guidance
KDB 248227 D01 802.11 WLAN SAR
KDB 941225 D01 3G SAR Procedures
KDB 941225 D05 SAR for LTE Devices
KDB 941225 D06 Hotspot SAR
KDB 648474 D04 Handset SAR

1.5. Ambient Condition

Ambient temperature	20°C – 24°C
Relative Humidity	30% – 70%

2. SAR Measurement System

2.1. SATIMO SAR Measurement Set-up Diagram



These measurements were performed with the automated near-field scanning system OPENSAR from SATIMO. The system is based on a high precision robot (working range: 901 mm), which positions the probes with a positional repeatability of better than ± 0.03 mm. The SAR measurements were conducted with dosimetric probe (manufactured by SATIMO), designed in the classical triangular configuration and optimized for dosimetric evaluation.

The first step of the field measurement is the evaluation of the voltages induced on the probe by the device under test. Probe diode detectors are nonlinear. Below the diode compression point, the output voltage is proportional to the square of the applied E-field; above the diode compression point, it is linear to the applied E-field. The compression point depends on the diode, and a calibration procedure is necessary for each sensor of the probe.

The Keithley multimeter reads the voltage of each sensor and send these three values to the PC. The corresponding E field value is calculated using the probe calibration factors, which are stored in the working directory. This evaluation includes linearization of the diode characteristics. The field calculation is done separately for each sensor. Each component of the E field is displayed on the "Dipole Area Scan Interface" and the total E field is displayed on the "3D Interface".

2.2. Robot

The SATIMO SAR system uses the high precision robots from KUKA. For the 6-axis controller system, the robot controller version (KUKA) from KUKA is used. The KUKA robot series have many features that are important for our application:



- High precision (repeatability ± 0.03 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)

2.3. E-Field Probe

This E-field detection probe is composed of three orthogonal dipoles linked to special Schottky diodes with low detection thresholds. The probe allows the measurement of electric fields in liquids such as the one defined in the IEEE and CENELEC standards.

For the measurements the Specific Dosimetric E-Field Probe SN 08/16 EPGO287 with following specifications is used



- Dynamic range: 0.01-100 W/kg
 - Tip Diameter : 2.5 mm
 - Distance between probe tip and sensor center: 1 mm
 - Distance between sensor center and the inner phantom surface: 4 mm (repeatability better than ± 1 mm).
 - Probe linearity: ± 0.08 dB
 - Axial isotropy: <0.25 dB
 - Hemispherical Isotropy: <0.50 dB
 - Calibration range: 450MHz to 6000MHz for head & body simulating liquid.
 - Lower detection limit: 8mW/kg
- Angle between probe axis (evaluation axis) and surface normal line: less than 30°.

For the measurements the Specific Dosimetric E-Field Probe SN 07/15 EP 247 with following specifications is used



- Dynamic range: 0.01-100 W/kg
 - Tip Diameter : 5 mm
 - Distance between probe tip and sensor center: 2.7 mm
 - Distance between sensor center and the inner phantom surface: 4 mm (repeatability better than ± 1 mm).
 - Probe linearity: ± 0.05 dB
 - Axial isotropy: <0.25 dB
 - Hemispherical Isotropy: <0.50 dB
 - Calibration range: 450MHz to 2600MHz for head & body simulating liquid.
 - Lower detection limit: 8mW/kg
- Angle between probe axis (evaluation axis) and surface normal line: less than 30°.

2.3.1. E-Field Probe Calibration

Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than $\pm 10\%$. The spherical isotropy shall be evaluated and within $\pm 0.25\text{dB}$. The sensitivity parameters (Norm X, Norm Y, and Norm Z), the diode compression parameter (DCP) and the conversion factor (Conv F) of the probe are tested. The calibration data can be referred to appendix D of this report.

2.4. SAM phantoms

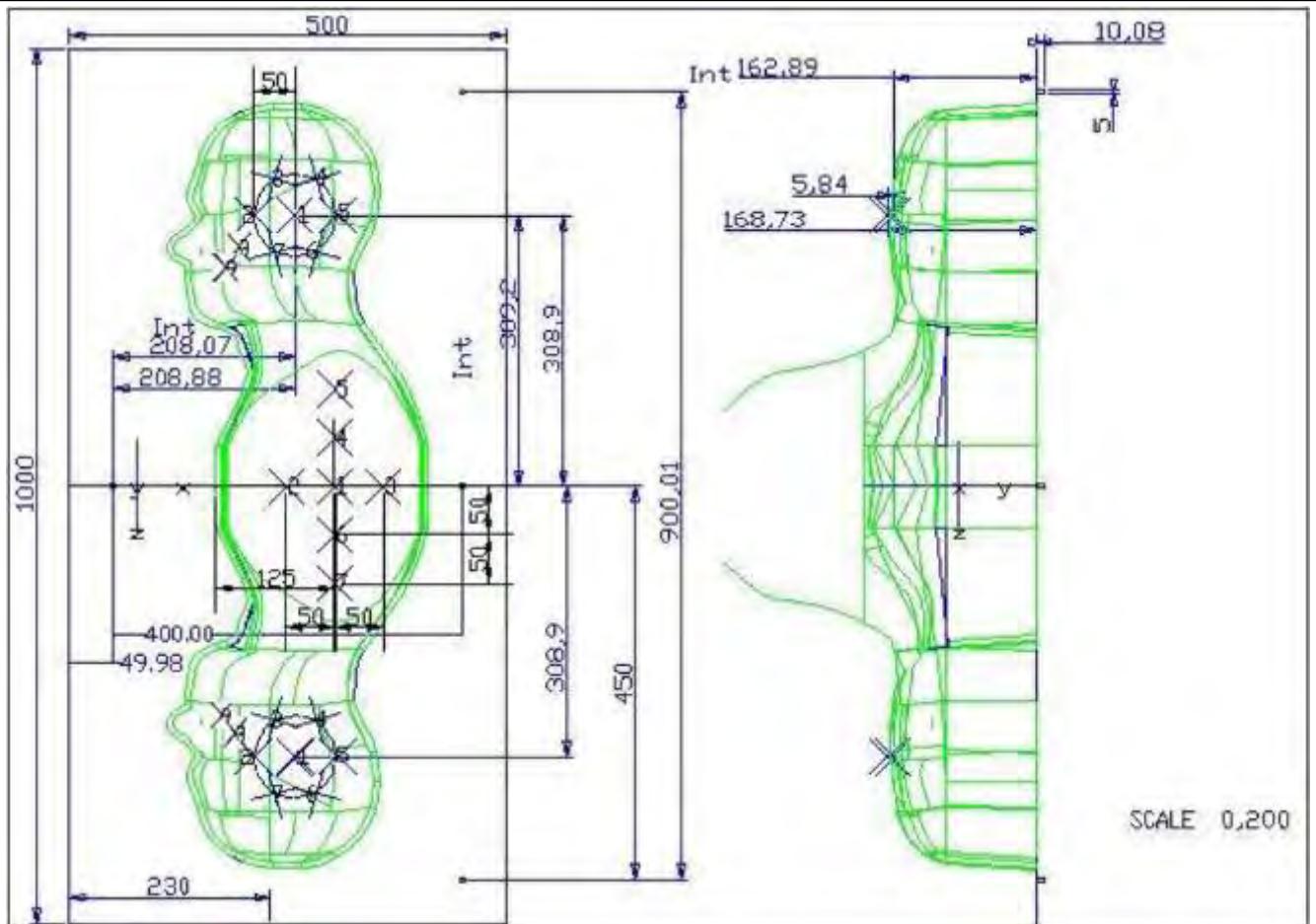
Photo of SAM phantom SN 16/15 SAM119



The SAM phantom is used to measure the SAR relative to people exposed to electro-magnetic field radiated by mobile phones.

2.4.1. Technical Data

Serial Number	Shell thickness	Filling volume	Dimensions	Positioner Material	Permittivity	Loss Tangent
SN 16/15 SAM119	2 mm ± 0.2 mm	27 liters	Length:1000 mm Width:500 mm Height:200 mm	Gelcoat with fiberglass	3.4	0.02

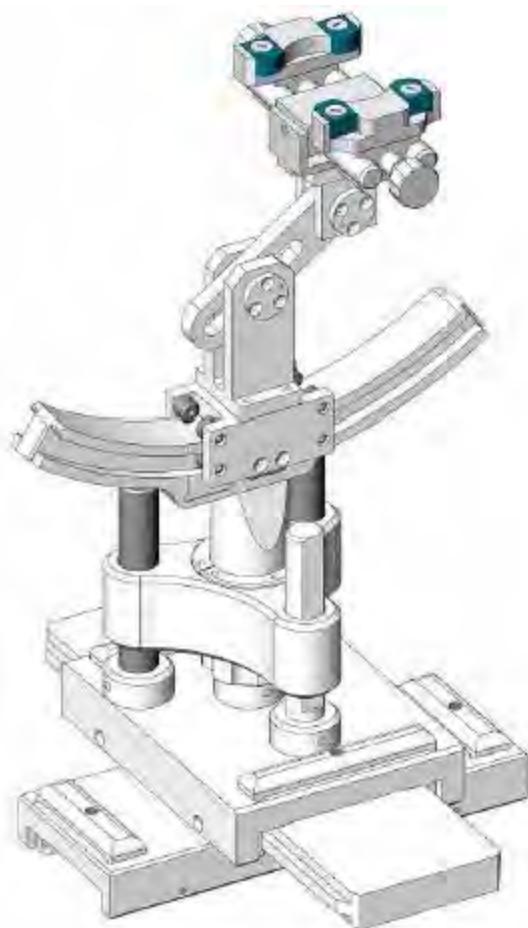


Serial Number	Left Head		Right Head		Flat Part	
SN 16/15 SAM119	2	2.02	2	2.08	1	2.09
	3	2.05	3	2.06	2	2.06
	4	2.07	4	2.07	3	2.08
	5	2.08	5	2.08	4	2.10
	6	2.05	6	2.07	5	2.10
	7	2.05	7	2.05	6	2.07
	8	2.07	8	2.06	7	2.07
	9	2.08	9	2.06	-	-

The test, based on ultrasonic system, allows measuring the thickness with an accuracy of 10 µm.

2.5. Device Holder

The positioning system allows obtaining cheek and tilting position with a very good accuracy. In compliance with CENELEC, the tilt angle uncertainty is lower than 1 degree.



Serial Number	Holder Material	Permittivity	Loss Tangent
SN 16/15 MSH100	Delrin	3.7	0.005

2.6. Test Equipment List

This table gives a complete overview of the SAR measurement equipment.

Devices used during the test described are marked

	Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
					Last Cal.	Due Date
<input checked="" type="checkbox"/>	MVG	E FIELD PROBE	SSE2	SN 08/16 EPGO287	Sep. 08, 2016	Sep. 07, 2017
<input checked="" type="checkbox"/>	MVG	E FIELD PROBE	SSE5	SN 07/15 EP247	Apr. 06, 2017	Apr. 05, 2018
<input type="checkbox"/>	MVG	450 MHz Dipole	SID450	SN 03/15 DIP 0G450-345	Apr. 06, 2015	Apr. 05, 2018
<input type="checkbox"/>	MVG	750 MHz Dipole	SID750	SN 03/15 DIP 0G750-355	Apr. 06, 2015	Apr. 05, 2018
<input checked="" type="checkbox"/>	MVG	835 MHz Dipole	SID835	SN 03/15 DIP 0G835-347	Apr. 06, 2015	Apr. 05, 2018
<input type="checkbox"/>	MVG	900 MHz Dipole	SID900	SN 03/15 DIP 0G900-348	Apr. 06, 2015	Apr. 05, 2018
<input checked="" type="checkbox"/>	MVG	1750 MHz Dipole	SID1750	SN 03/16 DIP 1G750-357	Dec. 09, 2016	Dec. 08, 2019
<input checked="" type="checkbox"/>	MVG	1900 MHz Dipole	SID1900	SN 03/15 DIP 1G900-350	Apr. 06, 2015	Apr. 05, 2018
<input type="checkbox"/>	MVG	2000 MHz Dipole	SID2000	SN 03/15 DIP 2G000-351	Apr. 06, 2015	Apr. 05, 2018
<input checked="" type="checkbox"/>	MVG	2450 MHz Dipole	SID2450	SN 03/15 DIP 2G450-352	Apr. 06, 2015	Apr. 05, 2018
<input checked="" type="checkbox"/>	MVG	2600 MHz Dipole	SID2600	SN 03/15 DIP 2G600-356	Apr. 06, 2015	Apr. 05, 2018
<input type="checkbox"/>	MVG	5000 MHz Dipole	SWG5500	SN 13/14 WGA 33	Apr. 06, 2015	Apr. 05, 2018
<input checked="" type="checkbox"/>	MVG	Liquid measurement Kit	SCLMP	SN 21/15 OCPG 72	NCR	NCR
<input checked="" type="checkbox"/>	MVG	Power Amplifier	N.A	AMPLISAR_28/14_003	NCR	NCR
<input checked="" type="checkbox"/>	KEITHLEY	Millivoltmeter	2000	4072790	NCR	NCR
<input checked="" type="checkbox"/>	R&S	Universal radio communication tester	CMU200	117858	Aug. 09, 2016	Aug. 08, 2017
<input checked="" type="checkbox"/>	R&S	Wideband radio communication tester	CMW500	148500	Jun. 26, 2016	Jun. 25, 2017

<input checked="" type="checkbox"/>	HP	Network Analyzer	8753D	3410J01136	Aug. 09, 2016	Aug. 08, 2017
<input checked="" type="checkbox"/>	Agilent	PSG Analog Signal Generator	E8257D	MY51110112	Aug. 09, 2016	Aug. 08, 2017
<input checked="" type="checkbox"/>	Agilent	Power meter	E4419B	MY45102538	Aug. 09, 2016	Aug. 08, 2017
<input checked="" type="checkbox"/>	Agilent	Power sensor	E9301A	MY41495644	Aug. 09, 2016	Aug. 08, 2017
<input checked="" type="checkbox"/>	Agilent	Power sensor	E9301A	US39212148	Aug. 09, 2016	Aug. 08, 2017
<input checked="" type="checkbox"/>	MCLI/USA	Directional Coupler	CB11-20	0D2L51502	Aug. 16, 2016	Aug. 15, 2017

3. SAR Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

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

<SAR measurement>

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

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

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

3.1. Power Reference

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

3.2. Area scan & Zoom scan

The area scan is a 2D scan to find the hot spot location on the DUT. The zoom scan is a 3D scan above the hot spot to calculate the 1g and 10g SAR value.

Measurement of the SAR distribution with a grid of 8 to 16 mm * 8 to 16 mm and a constant distance to the inner surface of the phantom. Since the sensors cannot directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme. Around this point, a cube of 30 * 30 * 30 mm or 32 * 32 * 32 mm is assessed by measuring 5 or 8 * 5 or 8 * 4 or 5 mm. With these data, the peak spatial-average SAR value can be calculated.

From the scanned SAR distribution, identify the position of the maximum SAR value, in addition identify the positions of any local maxima with SAR values within 2 dB of the maximum value that will not be within the zoom scan of other peaks; additional peaks shall be measured only when the primary peak is within 2 dB of the SAR compliance limit (e.g., 1 W/kg for 1,6 W/kg 1 g limit, or 1,26 W/kg for 2 W/kg, 10 g limit).

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

		≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location		$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: $\Delta x_{\text{Area}}, \Delta y_{\text{Area}}$		≤ 2 GHz: ≤ 15 mm $2 - 3$ GHz: ≤ 12 mm	$3 - 4$ GHz: ≤ 12 mm $4 - 6$ GHz: ≤ 10 mm
Maximum zoom scan spatial resolution: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$		≤ 2 GHz: ≤ 8 mm $2 - 3$ GHz: ≤ 5 mm*	$3 - 4$ GHz: ≤ 5 mm* $4 - 6$ GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{\text{Zoom}}(n)$	≤ 5 mm	$3 - 4$ GHz: ≤ 4 mm $4 - 5$ GHz: ≤ 3 mm $5 - 6$ GHz: ≤ 2 mm
	graded grid $\Delta z_{\text{Zoom}}(1)$: between 1 st two points closest to phantom surface $\Delta z_{\text{Zoom}}(n>1)$: between subsequent points	≤ 4 mm	$3 - 4$ GHz: ≤ 3 mm $4 - 5$ GHz: ≤ 2.5 mm $5 - 6$ GHz: ≤ 2 mm
Minimum zoom scan volume	x, y, z	≥ 30 mm	$3 - 4$ GHz: ≥ 28 mm $4 - 5$ GHz: ≥ 25 mm $5 - 6$ GHz: ≥ 22 mm

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

3.3. Description of interpolation/extrapolation scheme

The local SAR inside the phantom is measured using small dipole sensing elements inside a probe body. The probe tip must not be in contact with the phantom surface in order to minimise measurements errors, but the highest local SAR will occur at the surface of the phantom.

An extrapolation is used to determinate this highest local SAR values. The extrapolation is based on a fourth-order least-square polynomial fit of measured data. The local SAR value is then extrapolated from the liquid surface with a 1 mm step.

The measurements have to be performed over a limited time (due to the duration of the battery) so the step of measurement is high. It could vary between 5 and 8 mm. To obtain an accurate assessment of the maximum SAR averaged over 10 grams and 1 gram requires a very fine resolution in the three dimensional scanned data array.

3.4. Volumetric Scan

The volumetric scan consists to a full 3D scan over a specific area. This 3D scan is useful for multi Tx SAR measurement. Indeed, it is possible with OpenSAR to add, point by point, several volumetric scan to calculate the SAR value of the combined measurement as it is defined in the standard IEEE1528 and IEC62209.

3.5. Power Drift

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

4. System Verification Procedure

4.1. Tissue Verification

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% of weight)	Head Tissue							
Frequency Band (MHz)	750	835	900	1800	1900	2000	2450	2600
Water	34.40	34.40	34.40	55.36	55.36	57.87	57.87	57.87
NaCl	0.79	0.79	0.79	0.35	0.35	0.16	0.16	0.16
1,2-Propanediol	64.81	64.81	64.81	0.00	0.00	0.00	0.00	0.00
Triton X-100	0.00	0.00	0.00	30.45	30.45	19.97	19.97	19.97
DGBE	0.00	0.00	0.00	13.84	13.84	22.00	22.00	22.00
Ingredients (% of weight)	Body Tissue							
Frequency Band (MHz)	750	835	900	1800	1900	2000	2450	2600
Water	50.30	50.30	50.30	69.91	69.91	71.88	71.88	71.88
NaCl	0.60	0.60	0.60	0.13	0.13	0.16	0.16	0.16
1,2-Propanediol	49.10	49.10	49.10	0.00	0.00	0.00	0.00	0.00
Triton X-100	0.00	0.00	0.00	9.99	9.99	19.97	19.97	19.97
DGBE	0.00	0.00	0.00	19.97	19.97	7.99	7.99	7.99

4.1.1. Tissue Dielectric Parameter Check Results

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine if the dielectric parameter are within the tolerances of the specified target values. The measured conductivity and relative permittivity should be within $\pm 5\%$ of the target values.

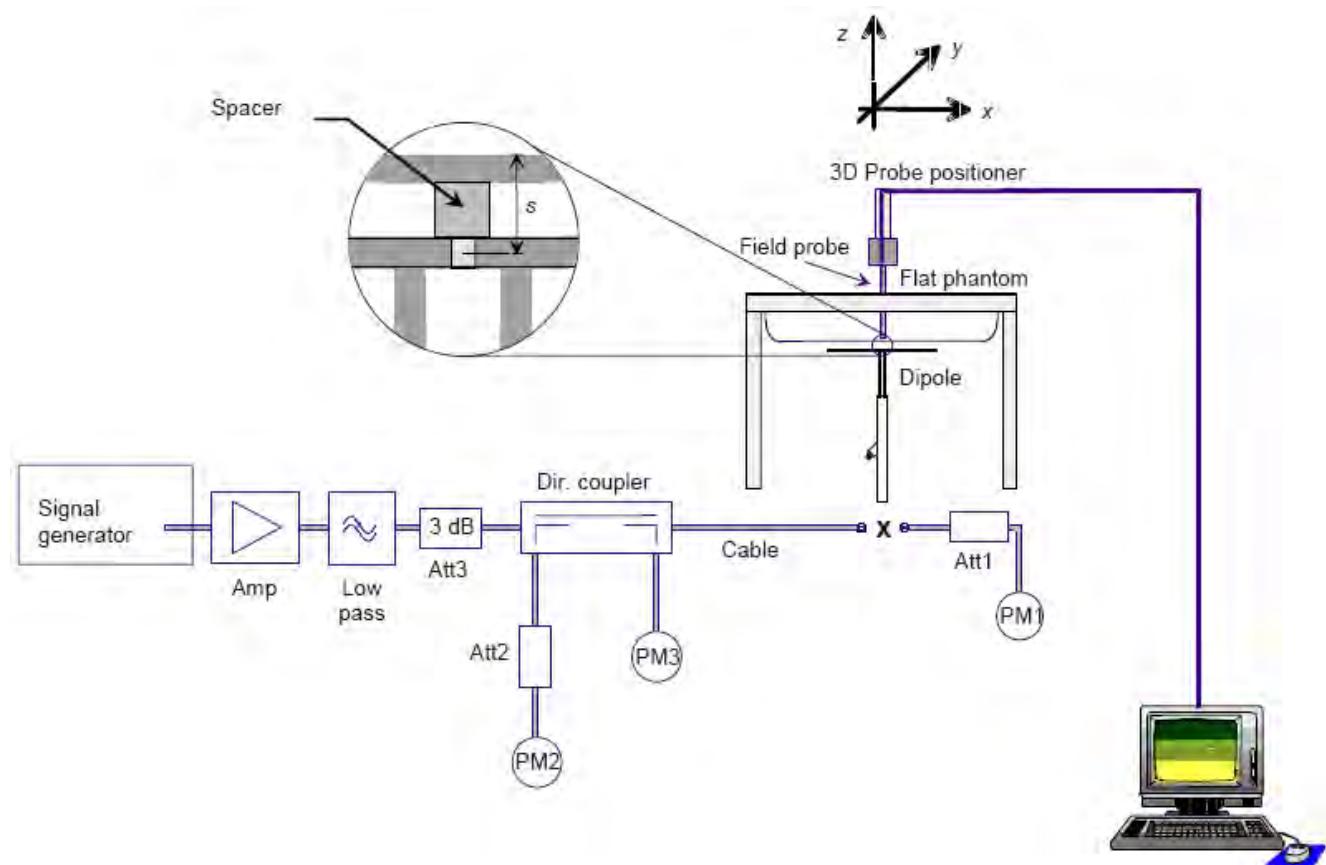
Tissue Type	Measured Frequency (MHz)	Target Tissue		Measured Tissue		Liquid Temp.	Test Date
		ϵ_r ($\pm 5\%$)	σ (S/m) ($\pm 5\%$)	ϵ_r	σ (S/m)		
Head 850	835	41.50 (39.43~43.57)	0.90 (0.86~0.94)	42.54	0.89	21.4 °C	Apr. 22, 2017
Body 850	835	55.20 (52.44~57.96)	0.97 (0.92~1.01)	55.40	0.98	21.6 °C	Apr. 22, 2017
Head 1750	1750	40.10 (38.10~42.11)	1.37 (1.30~1.44)	40.25	1.37	21.4 °C	Apr. 26, 2017
Body 1750	1750	53.40 (50.73~56.07)	1.49 (1.42~1.56)	54.22	1.50	21.3 °C	Apr. 28, 2017
Head 1900	1900	40.00 (38.00~42.00)	1.40 (1.33~1.47)	39.36	1.43	21.2 °C	Apr. 25, 2017
Body 1900	1900	53.30 (50.64~55.96)	1.52 (1.44~1.59)	53.51	1.56	21.5 °C	Apr. 25, 2017
Head 2450	2450	39.20 (37.24~41.16)	1.80 (1.71~1.89)	39.94	1.79	21.4 °C	Apr. 20, 2017
Body 2450	2450	52.70 (50.07~55.33)	1.95 (1.85~2.04)	52.33	1.96	21.6 °C	Apr. 20, 2017
Head 2600	2600	39.00 (37.05~40.95)	1.96 (1.86~2.05)	39.02	1.97	21.4 °C	May. 04, 2017
Body 2600	2600	52.50 (49.88~55.13)	2.16 (2.05~2.27)	53.70	2.17	21.5 °C	May. 08, 2017

NOTE: The dielectric parameters of the tissue-equivalent liquid should be measured under similar ambient conditions and within 2 °C of the conditions expected during the SAR evaluation to satisfy protocol requirements.

4.2. System Verification Procedure

The system verification is performed for verifying the accuracy of the complete measurement system and performance of the software. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 100mW (below 5GHz) or 100mW (above 5GHz). To adjust this power a power meter is used. The power sensor is connected to the cable before the system verification to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the system verification to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test (result on plot).

The system verification is shown as below picture:



4.2.1. System Verification Results

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

System Verification	Target SAR (1W) $(\pm 10\%)$		Measured SAR (Normalized to 1W)		Liquid Temp.	Test Date
	1-g (W/Kg)	10-g (W/Kg)	1-g (W/Kg)	10-g (W/Kg)		
835MHz Head	9.56 (8.60~10.51)	6.22 (5.60~6.84)	9.72	6.51	21.4 °C	Apr. 22, 2017
835MHz Body	9.48 (8.53~10.42)	6.29 (5.66~6.91)	9.54	6.37	21.6 °C	Apr. 22, 2017
1750MHz Head	36.40 (32.76~40.04)	19.30 (17.37~21.23)	37.39	19.68	21.4 °C	Apr. 26, 2017
1750MHz Body	36.91 (33.22~40.60)	20.18 (18.16~22.20)	36.71	19.00	21.3 °C	Apr. 28, 2017
1900MHz Head	39.70 (35.73~43.67)	20.50 (18.45~22.55)	41.94	21.68	21.2 °C	Apr. 25, 2017
1900MHz Body	38.43 (34.59~42.27)	20.34 (18.31~22.37)	40.10	20.77	21.5 °C	Apr. 25, 2017
2450MHz Head	52.40 (47.16~57.64)	24.00 (21.60~26.40)	54.84	24.07	21.4 °C	Apr. 20, 2017
2450MHz Body	49.32 (44.39~54.25)	22.89 (20.60~25.17)	50.15	22.21	21.6 °C	Apr. 20, 2017
2600MHz Head	55.30 (49.77~60.83)	24.60 (22.14~27.06)	53.40	23.62	21.4 °C	May. 04, 2017
2600MHz Body	52.95 (47.66~58.25)	23.64 (21.28~26.00)	51.75	22.91	21.5 °C	May. 08, 2017

5. SAR Measurement variability and uncertainty

5.1. SAR measurement variability

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz, 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. The additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

- 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 ($\sim 10\%$ 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 .

5.2. SAR measurement uncertainty

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

6. RF Exposure Positions

6.1. Ear and handset reference point

Figure 6.1.1 shows the front, back, and side views of the SAM phantom. The center-of-mouth reference point is labeled "M", the left ear reference point (ERP) is marked "LE", and the right ERP is marked "RE".



Fig 6.1.1 Front, back, and side views of SAM phantom

6.2. Definition of the cheek position

1. Define two imaginary lines on the handset, the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset: the midpoint of the width w_t of the handset at the level of the acoustic output (point A in Figure 6.2.1 and Figure 6.2.2), and the midpoint of the width w_b of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Figure 6.2.1). The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset (see Figure 6.2.2), especially for clamshell handsets, handsets with flip covers, and other irregularly-shaped handsets.
2. Position the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 6.2.3), such that the plane defined by the vertical centerline and the horizontal line of the handset is approximately parallel to the sagittal plane of the phantom.
3. Translate the handset towards the phantom along the line passing through RE and LE until handset point A touches the pinna at the ERP
4. While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to the plane containing B-M and N-F lines, i.e., the Reference Plane.
5. Rotate the handset around the vertical centerline until the handset (horizontal line) is parallel to the N-F line.

6. While maintaining the vertical centerline in the Reference Plane, keeping point A on the line passing through RE and LE, and maintaining the handset contact with the pinna, rotate the handset about the N-F line until any point on the handset is in contact with a phantom point below the pinna on the cheek. See Figure 6.2.3. The actual rotation angles should be documented in the test report.

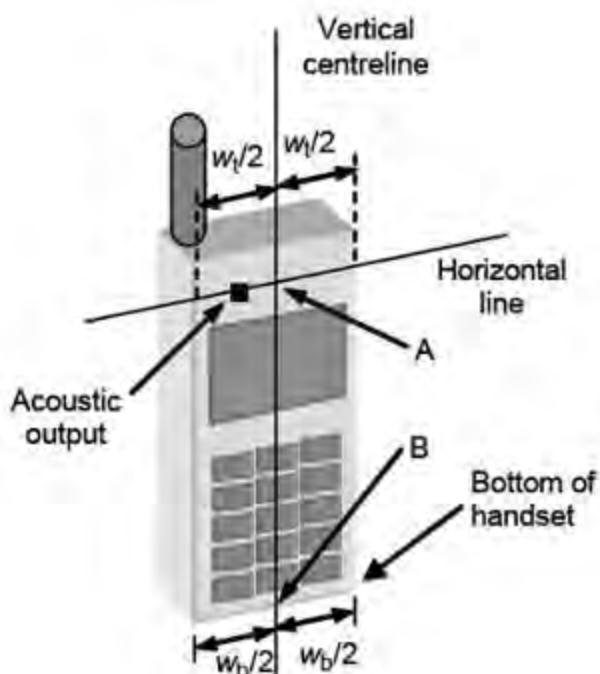


Fig 6.2.1 Handset vertical and horizontal reference lines—fixed case

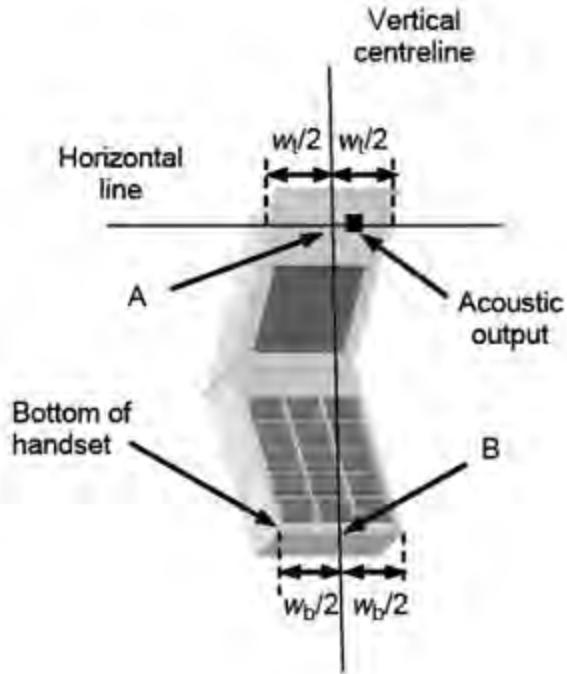


Fig 6.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

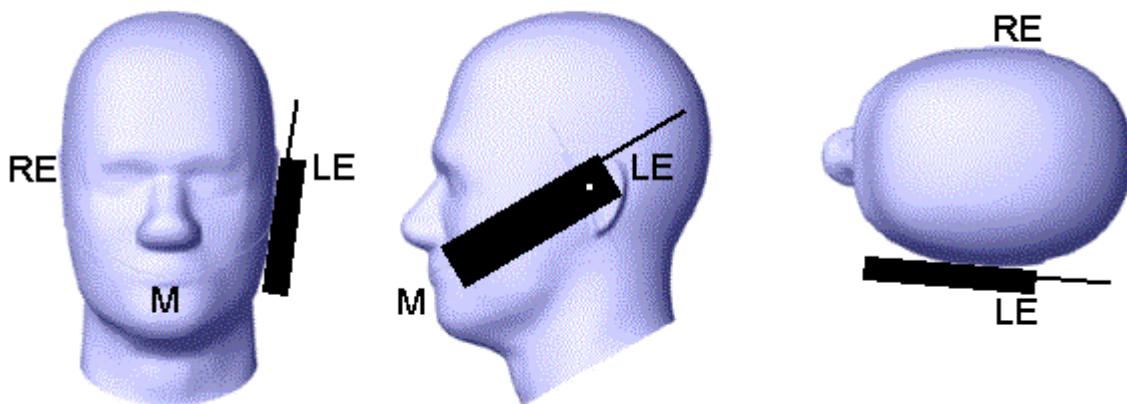


Fig 6.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

6.3. Definition of the tilt position

1. While maintaining the orientation of the handset, retract the handset parallel to the reference plane far enough away from the phantom to enable a rotation of the device by 15 degree.
2. Rotate the Handset around the horizontal line by 15 degree (see Figure 6.3.1).
3. While maintaining the orientation of the handset, move the handset towards the phantom on a line passing through RE and LE until any part of the handset touches the ear. The tilt position is obtained when the contact is on the pinna. If the contact is at any location other than the pinna, e.g., the antenna with the back of the phantom head, the angle of the handset shall be reduced. In this case, the tilt position is obtained if any part of the handset is in contact with the pinna as well as a second part of the handset is in contact with the phantom, e.g., the antenna with the back of the head.

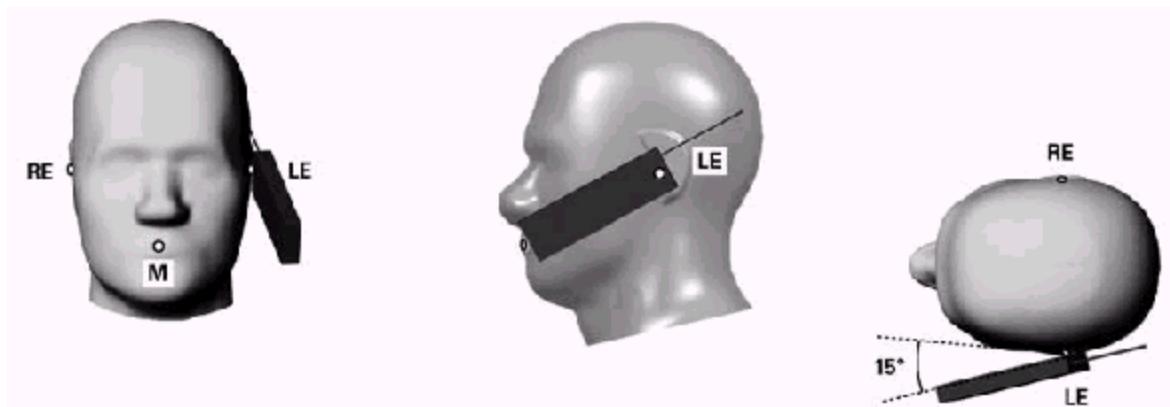


Figure 6.3.1 – Tilt position of the wireless device on the left side of SAM

6.4. Body Worn Accessory

1. Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 6.4.1). Per KDB 648474 D04, body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB 447498 D01 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for body-worn accessory, measured without a headset connected to the handset is < 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a handset attached to the handset.
2. Accessories for body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest

spacing to the body. Then multiple accessories that contain metallic components are tested with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-chip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

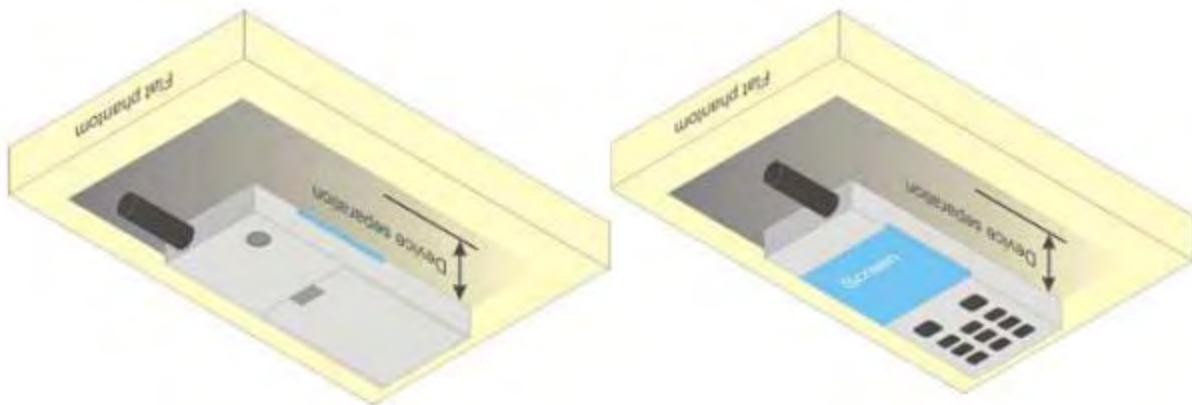


Figure 6.4.1 – Test positions for body-worn devices

6.5. Wireless Router Devices

Some battery-operated handsets have the capability to transmit and receive user through simultaneous transmission of WLAN simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC HDB Publication 941225 D06 where SAR test considerations for handsets ($L \times W \geq 9 \text{ cm} \times 5 \text{ cm}$) are based on a composite test separation distance of 10mm from the front, back and edges of the device containing transmitting antennas within 2.5cm of their edges, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WLAN transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WLAN transmitter according to FCC KDB Publication 447498 D01 publication procedures. The "Portable Hotspot" feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

7. RF Output Power

7.1. Maximum Tune-up Limit

Band	Mode	The Tune-up Maximum Power (Customer Declared)(dBm)	Range	Measured Maximum Output Power(dBm)
GSM 850	GSM (GMSK)	32±1	31~33	32.45
	GPRS(GMSK, 1 Tx slot)	32±1	31~33	32.45
	GPRS(GMSK, 2 Tx slot)	31±1	30~32	31.83
	GPRS(GMSK, 3 Tx slot)	30±1	29~31	30.15
	GPRS(GMSK, 4 Tx slot)	29±1	28~30	29.37
	EDGE(8PSK, 1 Tx slot)	26±1	25~27	26.32
	EDGE(8PSK, 2 Tx slot)	25±1	24~26	25.20
	EDGE(8PSK, 3 Tx slot)	23±1	22~24	23.16
	EDGE(8PSK, 4 Tx slot)	22±1	21~23	22.17
GSM 1900	GSM (GMSK)	29±1	28~30	29.59
	GPRS(GMSK, 1 Tx slot)	29±1	28~30	29.63
	GPRS(GMSK, 2 Tx slot)	28±1	27~29	28.92
	GPRS(GMSK, 3 Tx slot)	27±1	26~28	27.17
	GPRS(GMSK, 4 Tx slot)	26±1	25~27	26.11
	EDGE(8PSK, 1 Tx slot)	25±1	24~26	25.74
	EDGE(8PSK, 2 Tx slot)	24±1	23~25	24.50
	EDGE(8PSK, 3 Tx slot)	22±1	21~23	22.40
	EDGE(8PSK, 4 Tx slot)	21±1	20~22	21.43
WCDMA Band V	RMC 12.2Kbps	22±1	21~23	22.59
	HSDPA Subtest-1	21±1	20~22	21.48
	HSDPA Subtest-2	21±1	20~22	20.99
	HSDPA Subtest-3	21±1	20~22	21.04
	HSDPA Subtest-4	21±1	20~22	21.03
	HSUPA Subtest-1	21±1	20~22	21.02
	HSUPA Subtest-2	21±1	20~22	21.01
	HSUPA Subtest-3	21±1	20~22	21.06
	HSUPA Subtest-4	21±1	20~22	21.13
	HSUPA Subtest-5	21±1	20~22	21.46
WCDMA Band II	RMC 12.2Kbps	22±1	21~23	22.89
	HSDPA Subtest-1	21±1	20~22	21.88
	HSDPA Subtest-2	21±1	20~22	21.35
	HSDPA Subtest-3	21±1	20~22	21.38
	HSDPA Subtest-4	21±1	20~22	21.37

	HSUPA Subtest-1	21±1	20~22	21.36
	HSUPA Subtest-2	21±1	20~22	21.29
	HSUPA Subtest-3	21±1	20~22	21.32
	HSUPA Subtest-4	21±1	20~22	21.29
	HSUPA Subtest-5	21±1	20~22	21.86
LTE Band V	1.4M QPSK 1RB	23±1	22~24	23.53
	1.4M QPSK 3RB	23±1	22~24	23.71
	1.4M QPSK 6RB	22±1	21~23	22.49
	1.4M 16QAM 1RB	22±1	21~23	22.73
	1.4M 16QAM 3RB	22±1	21~23	22.72
	1.4M 16QAM 6RB	21±1	20~22	21.56
	3M QPSK 1RB	23±1	22~24	23.40
	3M QPSK 8RB	23±1	22~24	23.38
	3M QPSK 15RB	22±1	21~23	22.53
	3M 16QAM 1RB	23±1	22~24	23.19
	3M 16QAM 8RB	23±1	22~24	23.13
	3M 16QAM 15RB	21±1	20~22	21.87
	5M QPSK 1RB	23±1	22~24	23.57
	5M QPSK 12RB	22±1	21~23	22.65
	5M QPSK 25RB	22±1	21~23	22.61
	5M 16QAM 1RB	22±1	21~23	22.90
	5M 16QAM 12RB	22±1	21~23	22.65
	5M 16QAM 25RB	21±1	20~22	21.64
	10M QPSK 1RB	23±1	22~24	23.42
	10M QPSK 25RB	23±1	22~24	23.49
	10M QPSK 50RB	22±1	21~23	22.49
	10M 16QAM 1RB	23±1	22~24	23.02
	10M 16QAM 25RB	23±1	22~24	22.49
	10M 16QAM 50RB	21±1	20~22	21.55
LTE Band IV	1.4M QPSK 1RB	22.5±1	21.5~23.5	22.88
	1.4M QPSK 3RB	21.5±1	20.5~22.5	21.86
	1.4M QPSK 6RB	21.5±1	20.5~22.5	21.85
	1.4M 16QAM 1RB	21.5±1	20.5~22.5	21.87
	1.4M 16QAM 3RB	22.5±1	21.5~23.5	22.77
	1.4M 16QAM 6RB	21.5±1	20.5~22.5	21.71
	3M QPSK 1RB	22.5±1	21.5~23.5	22.94
	3M QPSK 8RB	22.5±1	21.5~23.5	22.89
	3M QPSK 15RB	21.5±1	20.5~22.5	21.91
	3M 16QAM 1RB	21.5±1	20.5~22.5	22.30
	3M 16QAM 8RB	21.5±1	20.5~22.5	22.24

	3M 16QAM 15RB	20.5±1	19.5~21.5	20.83
	5M QPSK 1RB	22.5±1	21.5~23.5	22.96
	5M QPSK 12RB	21.5±1	20.5~22.5	21.89
	5M QPSK 25RB	21.5±1	20.5~22.5	21.83
	5M 16QAM 1RB	21.5±1	20.5~22.5	21.88
	5M 16QAM 12RB	21.5±1	20.5~22.5	21.89
	5M 16QAM 25RB	20.5±1	19.5~21.5	20.89
	10M QPSK 1RB	22.5±1	21.5~23.5	22.96
	10M QPSK 25RB	21.5±1	20.5~22.5	21.86
	10M QPSK 50RB	21.5±1	20.5~22.5	21.84
	10M 16QAM 1RB	21.5±1	20.5~22.5	22.35
	10M 16QAM 25RB	21.5±1	20.5~22.5	21.86
	10M 16QAM 50RB	20.5±1	19.5~21.5	20.82
	15M QPSK 1RB	22.5±1	21.5~23.5	22.95
	15M QPSK 36RB	21.5±1	20.5~22.5	21.99
	15M QPSK 75RB	21.5±1	20.5~22.5	21.96
	15M 16QAM 1RB	21.5±1	20.5~22.5	22.34
	15M 16QAM 36RB	21.5±1	20.5~22.5	21.98
	15M 16QAM 75RB	20.5±1	19.5~21.5	20.91
	20M QPSK 1RB	22.5±1	21.5~23.5	23.06
	20M QPSK 50RB	22.5±1	21.5~23.5	22.90
	20M QPSK 100RB	21.5±1	20.5~22.5	22.05
	20M 16QAM 1RB	21.5±1	20.5~22.5	22.30
	20M 16QAM 50RB	21.5±1	20.5~22.5	21.90
	20M 16QAM 100RB	20.5±1	19.5~21.5	20.86
LTE Band II	1.4M QPSK 1RB	22.5±1	21.5~23.5	23.13
	1.4M QPSK 3RB	22.5±1	21.5~23.5	23.15
	1.4M QPSK 6RB	21.5±1	20.5~22.5	22.06
	1.4M 16QAM 1RB	21.5±1	20.5~22.5	22.08
	1.4M 16QAM 3RB	22.5±1	21.5~23.5	23.13
	1.4M 16QAM 6RB	20.5±1	19.5~21.5	21.10
	3M QPSK 1RB	22.5±1	21.5~23.5	23.17
	3M QPSK 8RB	22.5±1	21.5~23.5	23.22
	3M QPSK 15RB	21.5±1	20.5~22.5	22.14
	3M 16QAM 1RB	22.5±1	21.5~23.5	22.63
	3M 16QAM 8RB	22.5±1	21.5~23.5	22.61
	3M 16QAM 15RB	21.5±1	20.5~22.5	21.21
	5M QPSK 1RB	22.5±1	21.5~23.5	23.28
	5M QPSK 12RB	21.5±1	20.5~22.5	22.16
	5M QPSK 25RB	21.5±1	20.5~22.5	22.12

LTE Band VII	5M 16QAM 1RB	21.5±1	20.5~22.5	22.22
	5M 16QAM 12RB	21.5±1	20.5~22.5	22.16
	5M 16QAM 25RB	21.5±1	20.5~22.5	21.23
	10M QPSK 1RB	22.5±1	21.5~23.5	23.24
	10M QPSK 25RB	21.5±1	20.5~22.5	22.13
	10M QPSK 50RB	21.5±1	20.5~22.5	22.12
	10M 16QAM 1RB	22.5±1	21.5~23.5	22.66
	10M 16QAM 25RB	21.5±1	20.5~22.5	22.15
	10M 16QAM 50RB	20.5±1	19.5~21.5	21.13
	15M QPSK 1RB	22.5±1	21.5~23.5	23.22
	15M QPSK 36RB	21.5±1	20.5~22.5	22.14
	15M QPSK 75RB	21.5±1	20.5~22.5	22.17
	15M 16QAM 1RB	22.5±1	21.5~23.5	22.67
	15M 16QAM 36RB	21.5±1	20.5~22.5	22.13
	15M 16QAM 75RB	21.5±1	20.5~22.5	21.13
	20M QPSK 1RB	22.5±1	21.5~23.5	23.29
	20M QPSK 50RB	22.5±1	21.5~23.5	23.25
	20M QPSK 100RB	21.5±1	20.5~22.5	22.17
	20M 16QAM 1RB	22.5±1	21.5~23.5	22.48
	20M 16QAM 50RB	21.5±1	20.5~22.5	22.13
	20M 16QAM 100RB	20.5±1	19.5~21.5	21.07
	5M QPSK 1RB	22±1	21~23	22.25
	5M QPSK 12RB	20±1	19~21	20.65
	5M QPSK 25RB	20±1	19~21	20.38
	5M 16QAM 1RB	22±1	21~23	22.07
	5M 16QAM 12RB	20±1	19~21	20.61
	5M 16QAM 25RB	20±1	19~21	20.32
	10M QPSK 1RB	22±1	21~23	22.03
	10M QPSK 25RB	20±1	19~21	20.94
	10M QPSK 50RB	20±1	19~21	20.56
	10M 16QAM 1RB	22±1	21~23	22.42
	10M 16QAM 25RB	20±1	19~21	20.88
	10M 16QAM 50RB	20±1	19~21	20.28
	15M QPSK 1RB	22±1	21~23	22.52
	15M QPSK 36RB	21±1	20~22	21.10
	15M QPSK 75RB	21±1	20~22	21.45
	15M 16QAM 1RB	22±1	21~23	22.50
	15M 16QAM 36RB	21±1	20~22	21.44
	15M 16QAM 75RB	20±1	19~21	20.96
	20M QPSK 1RB	22±1	21~23	22.60

	20M QPSK 50RB	21±1	20~22	21.48
	20M QPSK 100RB	21±1	20~22	21.37
	20M 16QAM 1RB	22±1	21~23	22.35
	20M 16QAM 50RB	21±1	20~22	21.40
	20M 16QAM 100RB	21±1	20~22	21.22
WLAN 2.4G	802.11b	10±1	9~11	10.41
	802.11g	7±1	6~8	7.26
	802.11n-HT20	7±1	6~8	7.28
	802.11n-HT40	7±1	6~8	7.34
BT	3.0	0	-1.5±1	-2.5~-0.5
		39	-2.5±1	-3.5~-1.5
		78	-3.5±1	-4.5~-2.5
	4.0	0	-1±1	-2~0
		19	-2±1	-3~-1
		39	-4±1	-5~-3

7.2. GSM Conducted Power

Per KDB 447498 D01, the maximum output power channel is used for SAR testing and for further SAR test reduction. Therefore, the EUT was set in GPRS (4Tx slots) for GSM850/GSM1900.

Band GSM850	Burst-Averaged output Power (dBm)				Frame-Averaged output Power (dBm)			
Tx Channel	Tune-up (dBm)	128	189	251	Tune-up (dBm)	128	189	251
Frequency (MHz)		824.2	836.4	848.8		824.2	836.4	848.8
GSM (GMSK)	33.00	32.38	32.45	32.39	23.97	23.35	23.42	23.36
GPRS(GMSK, 1 TS)	33.00	32.39	32.45	32.38	23.97	23.36	23.42	23.35
GPRS(GMSK, 2 TS)	32.00	31.77	31.83	31.75	25.98	25.75	25.81	25.73
GPRS(GMSK, 3 TS)	31.00	30.12	30.15	29.98	26.74	25.86	25.89	25.72
GPRS(GMSK, 4 TS)	30.00	29.26	29.37	28.97	26.99	26.25	26.36	25.96
EDGE(8PSK, 1 TS)	27.00	26.30	26.32	26.23	17.97	17.27	17.29	17.20
EDGE(8PSK, 2 TS)	26.00	25.14	25.20	25.12	19.98	19.12	19.18	19.10
EDGE(8PSK, 3 TS)	24.00	23.14	23.16	23.15	19.74	18.88	18.90	18.89
EDGE(8PSK, 4 TS)	23.00	22.17	22.17	22.11	19.99	19.16	19.16	19.10
Band GSM1900	Burst-Averaged output Power (dBm)				Frame-Averaged output Power (dBm)			
Tx Channel	Tune-up (dBm)	512	661	810	Tune-up (dBm)	512	661	810
Frequency (MHz)		1850.2	1880.0	1909.8		1850.2	1880.0	1909.8
GSM (GMSK)	30.00	29.59	29.43	29.36	20.97	20.56	20.40	20.33
GPRS(GMSK, 1 TS)	30.00	29.63	29.48	29.39	20.97	20.60	20.45	20.36
GPRS(GMSK, 2 TS)	29.00	28.92	28.81	28.78	22.98	22.90	22.79	22.76
GPRS(GMSK, 3 TS)	28.00	27.14	27.08	27.17	23.74	22.88	22.82	22.91
GPRS(GMSK, 4 TS)	27.00	26.03	25.97	26.11	23.99	23.02	22.96	23.10
EDGE(8PSK, 1 TS)	26.00	25.73	25.74	25.53	16.97	16.70	16.71	16.50
EDGE(8PSK, 2 TS)	25.00	24.32	24.50	24.16	18.98	18.30	18.48	18.14
EDGE(8PSK, 3 TS)	23.00	22.27	22.40	22.19	18.74	18.01	18.14	17.93
EDGE(8PSK, 4 TS)	22.00	21.28	21.43	21.08	18.99	18.27	18.42	18.07

Note: The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots.

The calculated method are shown as below:

$$\text{Frame-averaged power} = \text{Maximum burst averaged power (1 TS)} - 9.03 \text{ dB}$$

$$\text{Frame-averaged power} = \text{Maximum burst averaged power (2 TS)} - 6.02 \text{ dB}$$

$$\text{Frame-averaged power} = \text{Maximum burst averaged power (3 TS)} - 4.26 \text{ dB}$$

$$\text{Frame-averaged power} = \text{Maximum burst averaged power (4 TS)} - 3.01 \text{ dB}$$

7.3. WCDMA Conducted Power

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

1. Release99 Setup Configuration

Mode	Subtest	Rel99			
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	Power Control Algorithm	Algorithm2			
	β_c/β_d	8/15			

2. HSDPA Setup Configuration

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm 2			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	β_c/β_d	2/15	12/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
HSDPA Specific Settings	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	$A_{hs} = \beta_{hs}/\beta_c$	30/15			

3. HSUPA Setup Configuration

	Mode	HSUPA	HSUPA	HSUPA	HSUPA	HSUPA
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	β_c	11/15	6/15	15/15	2/15	15/15
	β_d	15/15	15/15	9/15	15/15	15/15
	β_{ec}	209/225	12/15	30/15	2/15	24/15
	β_c/β_d	11/15	6/15	15/9	2/15	15/15
HSDPA Specific Settings	β_{hs}	22/15	12/15	30/15	4/15	30/15
	β_{ed}	1309/225	94/75	47/15 47/15	56/75	134/15
	CM (dB)	1.0	3.0	2.0	3.0	1.0
	D_{ACK}	8				
	D_{NAK}	8				

	CQI Repetition Factor (Table 5.2B.4)	2				
	Ahs = $\beta h_s / \beta c$	30/15				
HSUPA Specific Settings	D E-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9

4. WCDMA Conducted Power Results

- 1) Per KDB 941225 D01, SAR for Head / Hotspot / Body-worn exposure is measured using a 12.2 kbps RMC with TPC bits configured to all —'\$".
- 2) Per KDB 941225 D01, RMC 12.2kbps setting is used to evaluate SAR. If the maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA is $\leq 1/4$ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA.

Band	WCDMA Band V			
Tx Channel	Tune-up	4132	4182	4233
		826.4	836.4	846.6
RMC 12.2Kbps	23.00	22.45	22.33	22.59
HSDPA Subtest-1	22.00	21.38	21.33	21.48
HSDPA Subtest-2	22.00	20.91	20.80	20.99
HSDPA Subtest-3	22.00	20.98	20.87	21.04
HSDPA Subtest-4	22.00	20.92	20.86	21.03
HSUPA Subtest-1	22.00	20.88	20.79	21.02
HSUPA Subtest-2	22.00	20.85	20.82	21.01
HSUPA Subtest-3	22.00	20.79	20.75	21.06
HSUPA Subtest-4	22.00	20.86	20.86	21.13
HSUPA Subtest-5	22.00	21.38	21.35	21.46
Band	WCDMA Band II			
Tx Channel	Tune-up	9262	9400	9538
		1852.4	1880	1907.6
RMC 12.2Kbps	23.00	22.83	22.73	22.89
HSDPA Subtest-1	22.00	21.88	21.83	21.85
HSDPA Subtest-2	22.00	21.32	21.27	21.35
HSDPA Subtest-3	22.00	21.31	21.27	21.38
HSDPA Subtest-4	22.00	21.28	21.26	21.37
HSUPA Subtest-1	22.00	21.28	21.25	21.36

HSUPA Subtest-2	22.00	21.25	21.21	21.29
HSUPA Subtest-3	22.00	21.32	21.18	21.31
HSUPA Subtest-4	22.00	21.22	21.29	21.22
HSUPA Subtest-5	22.00	21.86	21.85	21.85

7.4. LTE Conducted Power

R&S CMW500 base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.

<LTE Band V>

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20407/824.7	20525/836.5	20643/848.3
LTE Band V	1.4MHz	QPSK	1	0	24.00	23.34	23.36	23.44
			1	2	24.00	23.40	23.39	23.53
			1	5	24.00	23.34	23.34	23.47
			3	0	24.00	23.50	23.49	23.67
			3	1	24.00	23.46	23.48	23.69
			3	2	24.00	23.46	23.45	23.71
			6	0	23.00	22.41	22.41	22.49
		16QAM	1	0	23.00	22.45	22.46	22.60
			1	2	23.00	22.51	22.50	22.73
			1	5	23.00	22.47	22.46	22.64
			3	0	23.00	22.47	22.46	22.71
			3	1	23.00	22.48	22.46	22.71
			3	2	23.00	22.48	22.45	22.72
			6	0	22.00	21.48	21.48	21.56
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20415/825.5	20525/836.5	20635/847.5
LTE Band V	3MHz	QPSK	1	0	24.00	23.35	23.30	23.40
			1	7	24.00	23.36	23.34	23.35
			1	14	24.00	23.31	23.27	23.36
			8	0	24.00	23.31	23.29	23.35
			8	4	24.00	23.32	23.29	23.35
			8	7	24.00	23.31	23.28	23.38

			15	0	23.00	22.46	22.43	22.53
		16QAM	1	0	24.00	22.98	22.87	23.13
			1	7	24.00	23.01	23.12	23.19
			1	14	24.00	22.96	22.95	23.11
			8	0	24.00	22.96	22.89	23.12
			8	4	24.00	22.95	23.08	23.13
			8	7	24.00	22.96	23.11	23.12
			15	0	22.00	21.55	21.87	21.69
			RB Configuration		Tune-up	Channel/Frequency(MHz)		
Band	Band Width	Modulation	RB Size	RB Offset		20425/826.5	20525/836.5	20625/846.5
LTE Band V	5MHz	QPSK	1	0	24.00	23.38	23.35	23.53
			1	12	24.00	23.36	23.37	23.56
			1	24	24.00	23.35	23.34	23.57
			12	0	23.00	22.47	22.48	22.63
			12	6	23.00	22.46	22.49	22.64
			12	11	23.00	22.45	22.46	22.65
			25	0	23.00	22.42	22.43	22.61
		16QAM	1	0	23.00	22.48	22.49	22.85
			1	12	23.00	22.49	22.49	22.90
			1	24	23.00	22.47	22.46	22.90
			12	0	23.00	22.46	22.48	22.65
			12	6	23.00	22.46	22.49	22.64
			12	11	23.00	22.45	22.47	22.64
			25	0	22.00	21.55	21.56	21.64
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
Band	Band Width	Modulation	RB Size	RB Offset		20450/829	20525/836.5	20600/844
LTE Band V	10MHz	QPSK	1	0	24.00	23.34	23.25	23.32
			1	24	24.00	23.28	23.30	23.37
			1	49	24.00	23.28	23.29	23.42
			25	0	24.00	23.42	23.39	23.43
			25	12	24.00	23.39	23.38	23.48
			25	24	24.00	23.38	23.37	23.49
			50	0	23.00	22.42	22.40	22.49
		16QAM	1	0	24.00	22.99	23.00	22.43
			1	24	24.00	23.02	23.00	22.51
			1	49	24.00	23.01	22.97	22.54

			25	0	24.00	22.38	22.37	22.49
			25	12	24.00	22.38	22.36	22.49
			25	24	24.00	22.38	22.37	22.49
			50	0	22.00	21.46	21.43	21.55

<LTE Band IV>

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		19957/1710.7	20175/1732.5	20393/1754.3
LTE Band IV	1.4MHz	QPSK	1	0	23.50	22.85	22.76	22.62
			1	2	23.50	22.85	22.57	22.67
			1	5	23.50	22.88	22.84	22.75
			3	0	22.50	21.86	21.78	21.69
			3	1	22.50	21.65	21.84	21.71
			3	2	22.50	21.69	21.68	21.77
			6	0	22.50	21.76	21.85	21.82
		16QAM	1	0	22.50	21.70	21.65	21.57
			1	2	22.50	21.76	21.66	21.65
			1	5	22.50	21.71	21.87	21.61
			3	0	23.50	22.77	22.51	22.69
			3	1	23.50	22.66	22.58	22.57
			3	2	23.50	22.62	22.62	22.16
			6	0	22.50	21.71	21.38	21.70
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		19965/1711.5	20175/1732.5	20385/1753.5
LTE Band IV	3MHz	QPSK	1	0	23.50	22.76	22.86	22.78
			1	7	23.50	22.84	22.94	22.84
			1	14	23.50	22.78	22.86	22.81
			8	0	23.50	22.79	22.86	22.59
			8	4	23.50	22.76	22.89	22.62
			8	7	23.50	22.79	22.87	22.65
			15	0	22.50	21.80	21.83	21.91
		16QAM	1	0	22.50	22.23	22.22	22.16
			1	7	22.50	22.27	22.30	22.13
			1	14	22.50	22.21	22.23	22.06
			8	0	22.50	22.21	22.24	22.06
			8	4	22.50	22.23	22.22	22.07

			8	7	22.50	22.21	22.23	22.04
			15	0	21.50	20.83	20.81	20.72
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		19975/1712.5	20175/1732.5	20375/1752.5
			1	0		22.85	22.93	22.80
LTE Band IV	5MHz	QPSK	1	12	23.50	22.87	22.96	22.77
			1	24	23.50	22.85	22.88	22.72
			12	0	22.50	21.87	21.89	21.77
			12	6	22.50	21.86	21.85	21.75
			12	11	22.50	21.85	21.88	21.75
			25	0	22.50	21.83	21.83	21.69
			1	0	22.50	21.86	21.84	21.88
		16QAM	1	12	22.50	21.84	21.87	21.86
			1	24	22.50	21.80	21.82	21.78
			12	0	22.50	21.87	21.87	21.74
			12	6	22.50	21.87	21.88	21.76
			12	11	22.50	21.87	21.89	21.75
			25	0	21.50	20.89	20.86	20.64
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20000/1715	20175/1732.5	20350/1750
			1	0		22.90	22.90	22.79
LTE Band IV	10MHz	QPSK	1	24	23.50	22.92	22.96	22.79
			1	49	23.50	22.87	22.91	22.72
			25	0	22.50	21.83	21.85	21.68
			25	12	22.50	21.83	21.85	21.67
			25	24	22.50	21.82	21.86	21.66
			50	0	22.50	21.84	21.83	21.69
			1	0	22.50	22.35	22.26	21.73
		16QAM	1	24	22.50	22.33	22.33	21.74
			1	49	22.50	22.25	22.30	21.65
			25	0	22.50	21.81	21.86	21.66
			25	12	22.50	21.81	21.86	21.65
			25	24	22.50	21.81	21.86	21.65
			50	0	21.50	20.82	20.80	20.69
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		

			RB Size	RB Offset		20025/1717.5	20175/1732.5	20325/1747.5
LTE Band IV	15MHz	QPSK	1	0	23.50	22.90	22.93	22.85
			1	37	23.50	22.92	22.95	22.79
			1	74	23.50	22.94	22.90	22.74
			36	0	22.50	21.98	21.97	21.82
			36	18	22.50	21.98	21.95	21.82
			36	37	22.50	21.99	21.96	21.80
			75	0	22.50	21.96	21.96	21.81
			1	0	22.50	22.34	22.26	22.12
		16QAM	1	37	22.50	22.30	22.31	22.07
			1	74	22.50	22.27	22.31	21.98
			36	0	22.50	21.98	21.97	21.80
			36	18	22.50	21.97	21.95	21.81
			36	37	22.50	21.96	21.98	21.80
			75	0	21.50	20.91	20.91	20.73
			RB Size	RB Configuration	Tune-up	Channel/Frequency(MHz)		
Band	Band Width	Modulation	RB Size	RB Offset		20050/1720	20175/1732.5	20300/1745
LTE Band IV	20MHz	QPSK	1	0	23.50	22.95	22.97	22.81
			1	49	23.50	23.01	23.06	22.84
			1	99	23.50	22.93	22.98	22.78
			50	0	23.50	21.86	21.85	21.79
			50	24	23.50	21.86	21.86	21.75
			50	49	23.50	22.86	22.90	22.76
			100	0	22.50	21.84	22.05	21.75
			1	0	22.50	22.15	22.10	22.26
		16QAM	1	49	22.50	22.16	22.22	22.30
			1	99	22.50	22.17	22.16	22.20
			50	0	22.50	21.86	21.89	21.76
			50	24	22.50	21.88	21.86	21.76
			50	49	22.50	21.86	21.90	21.76
			100	0	21.50	20.82	20.86	20.75

<LTE Band II>

LTE Band II	1.4MHz	QPSK	1	0	23.50	22.99	23.03	23.05
			1	2	23.50	22.99	23.03	23.09
			1	5	23.50	23.03	23.04	23.13
			3	0	23.50	23.15	23.04	23.01
			3	1	23.50	23.05	23.13	23.08
			3	2	23.50	23.13	22.99	23.02
			6	0	22.50	22.06	21.96	21.93
		16QAM	1	0	22.50	22.08	21.94	22.01
			1	2	22.50	22.06	21.95	22.00
			1	5	22.50	22.09	21.96	22.03
			3	0	23.50	23.13	22.99	23.00
			3	1	23.50	23.12	22.95	23.05
			3	2	23.50	23.13	22.99	23.02
			6	0	21.50	21.10	20.96	20.84
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		18615/1851.5	18900/1880	19185/1908.5
LTE Band II	3MHz	QPSK	1	0	23.50	23.15	23.06	23.05
			1	7	23.50	23.17	23.07	23.08
			1	14	23.50	23.13	23.02	23.10
			8	0	23.50	23.13	23.03	23.12
			8	4	23.50	23.15	23.22	23.18
			8	7	23.50	23.12	23.02	23.13
			15	0	22.50	22.14	22.00	21.98
		16QAM	1	0	23.50	22.61	22.46	22.00
			1	7	23.50	22.63	22.48	22.00
			1	14	23.50	22.55	22.43	21.98
			8	0	23.50	22.56	22.43	21.99
			8	4	23.50	22.54	22.61	22.38
			8	7	23.50	22.56	22.44	21.99
			15	0	22.50	21.21	21.04	21.05
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		18625/1852.5	18900/1880	19175/1907.5
LTE Band II	5MHz	QPSK	1	0	23.50	23.28	23.14	23.17
			1	12	23.50	23.24	23.15	23.16
			1	24	23.50	23.18	23.09	23.16
			12	0	22.50	22.16	22.05	22.07

			12	6	22.50	22.15	22.16	22.06
			12	11	22.50	22.16	22.02	22.05
			25	0	22.50	22.12	21.98	22.01
LTE Band II	10MHz	Modulation	1	0	22.50	22.22	22.04	22.16
			1	12	22.50	22.18	22.05	22.17
			1	24	22.50	22.13	22.01	22.08
			12	0	22.50	22.16	22.03	22.07
			12	6	22.50	22.12	22.10	22.11
			12	11	22.50	22.16	22.03	22.07
			25	0	22.50	21.23	21.07	20.99
			RB Configuration		Tune-up	Channel/Frequency(MHz)		
Band	Band Width	Modulation	RB Size	RB Offset		18650/1855	18900/1880	19150/1905
LTE Band II	10MHz	Modulation	1	0	23.50	23.24	23.15	23.12
			1	24	23.50	23.17	23.09	23.13
			1	49	23.50	23.15	23.09	23.20
			25	0	22.50	22.12	21.99	21.96
			25	12	22.50	22.13	21.86	21.95
			25	24	22.50	22.08	21.99	22.00
			50	0	22.50	22.12	22.01	21.97
	10MHz	Modulation	1	0	23.50	22.66	22.50	21.93
			1	24	23.50	22.59	22.47	21.97
			1	49	23.50	22.57	22.52	22.03
			25	0	22.50	22.07	21.98	22.00
			25	12	22.50	22.13	21.95	22.15
			25	24	22.50	22.07	21.98	22.01
			50	0	21.50	21.13	21.01	21.00
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
Band	Band Width	Modulation	RB Size	RB Offset		18675/1857.5	18900/1880	19125/1902.5
LTE Band II	15MHz	Modulation	1	0	23.50	23.22	23.15	23.09
			1	37	23.50	23.15	23.14	23.14
			1	74	23.50	23.11	23.12	23.18
			36	0	22.50	22.14	22.11	22.07
			36	18	22.50	22.08	22.11	22.06
			36	37	22.50	22.11	22.09	22.11
			75	0	22.50	22.17	22.11	22.06
	15MHz	16QAM	1	0	23.50	22.67	22.49	22.23

			1	37	23.50	22.61	22.52	22.23
			1	74	23.50	22.52	22.53	22.31
			36	0	22.50	22.11	22.08	22.11
			36	18	22.50	22.13	22.05	22.13
			36	37	22.50	22.11	22.08	22.11
			75	0	22.50	21.13	21.06	20.99
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		18700/1860	18900/1880	19100/1900
LTE Band II	20MHz	QPSK	1	0	23.50	23.29	23.13	23.18
			1	49	23.50	23.13	23.07	23.03
			1	99	23.50	23.16	23.09	23.13
			50	0	23.50	22.25	22.98	22.94
			50	24	23.50	22.08	22.04	22.06
			50	49	23.50	23.25	22.99	22.99
			100	0	22.50	22.17	21.99	21.95
	16QAM	16QAM	1	0	23.50	22.48	22.27	22.42
			1	49	23.50	22.35	22.25	22.30
			1	99	23.50	22.31	22.29	22.50
			50	0	22.50	22.02	22.00	21.99
			50	24	22.50	21.96	22.02	22.13
			50	49	22.50	22.02	22.00	22.00
			100	0	21.50	21.07	20.97	20.89

<LTE Band VII>

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20775/2502.5	21100/2535	21425/2567.5
LTE Band VII	5MHz	QPSK	1	0	23.00	21.59	21.09	21.82
			1	12	23.00	21.40	21.23	21.52
			1	24	23.00	22.25	21.78	21.11
			12	0	21.00	20.10	20.10	19.70
			12	6	21.00	20.56	20.38	19.88
			12	11	21.00	20.65	20.65	19.86
			25	0	21.00	20.30	20.38	19.76
	16QAM	16QAM	1	0	23.00	21.08	21.97	21.75
			1	12	23.00	21.10	21.17	21.47
			1	24	23.00	22.07	21.72	21.05

			12	0	21.00	19.96	20.06	19.67
			12	6	21.00	20.13	20.15	20.23
			12	11	21.00	20.54	20.61	20.31
			25	0	21.00	20.23	20.32	20.10
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20800/2505	21100/2535	21400/2565
			1	0		21.87	21.34	21.11
LTE Band VII	10MHz	QPSK	1	24	23.00	21.35	21.41	21.53
			1	49	23.00	22.01	22.03	21.74
			25	0	21.00	20.13	19.93	19.90
			25	12	21.00	20.11	20.26	19.89
			25	24	21.00	20.15	20.94	19.79
			50	0	21.00	20.56	20.39	19.86
			1	0	23.00	21.06	21.13	21.11
		16QAM	1	24	23.00	22.13	21.27	21.53
			1	49	23.00	22.42	21.91	21.73
			25	0	21.00	20.49	20.79	19.88
			25	12	21.00	20.46	20.88	19.95
			25	24	21.00	20.55	20.83	19.76
			50	0	21.00	20.08	20.28	19.82
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20825/2507.5	21100/2535	21375/2562.5
			1	0		21.99	21.61	21.01
LTE Band VII	15MHz	QPSK	1	37	23.00	22.39	21.03	21.59
			1	74	23.00	21.11	22.52	21.46
			36	0	22.00	20.88	20.26	20.11
			36	18	22.00	20.90	20.13	20.22
			36	37	22.00	21.10	20.94	21.08
			75	0	22.00	21.03	20.07	21.45
			1	0	23.00	21.75	21.49	22.50
		16QAM	1	37	23.00	22.25	21.94	21.85
			1	74	23.00	21.97	22.44	21.83
			36	0	22.00	20.83	20.79	20.89
			36	18	22.00	20.95	20.76	20.56
			36	37	22.00	21.00	21.44	20.58
			75	0	21.00	20.96	20.38	20.18

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20850/2510	21100/2535	21350/2560
LTE Band VII	20MHz	QPSK	1	0	23.00	21.21	21.53	22.32
			1	49	23.00	22.33	21.14	21.76
			1	99	23.00	22.51	22.60	21.99
			50	0	22.00	21.26	20.12	21.48
			50	24	22.00	21.13	20.29	20.35
			50	49	22.00	20.58	21.23	20.12
			100	0	22.00	20.94	20.06	21.37
	16QAM	16QAM	1	0	23.00	21.95	21.96	22.35
			1	49	23.00	22.17	22.11	21.52
			1	99	23.00	21.33	22.33	21.80
			50	0	22.00	21.18	20.21	21.40
			50	24	22.00	20.86	20.56	20.69
			50	49	22.00	20.45	21.42	20.91
			100	0	22.00	20.85	20.91	21.22

7.5. WLAN & BT Output Power

7.5.1. Output Power Results Of WLAN

The output power of WLAN is as following:

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11b	1	2412	11.00	10.23.
	6	2437	11.00	10.41
	11	2462	11.00	10.36
802.11g	1	2412	8.00	6.33
	6	2437	8.00	7.26
	11	2462	8.00	6.78
802.11n (HT20)	1	2412	8.00	6.23
	6	2437	8.00	7.28
	11	2462	8.00	6.67
802.11n (HT40)	3	2422	8.00	7.34
	6	2437	8.00	6.74
	9	2452	8.00	6.32

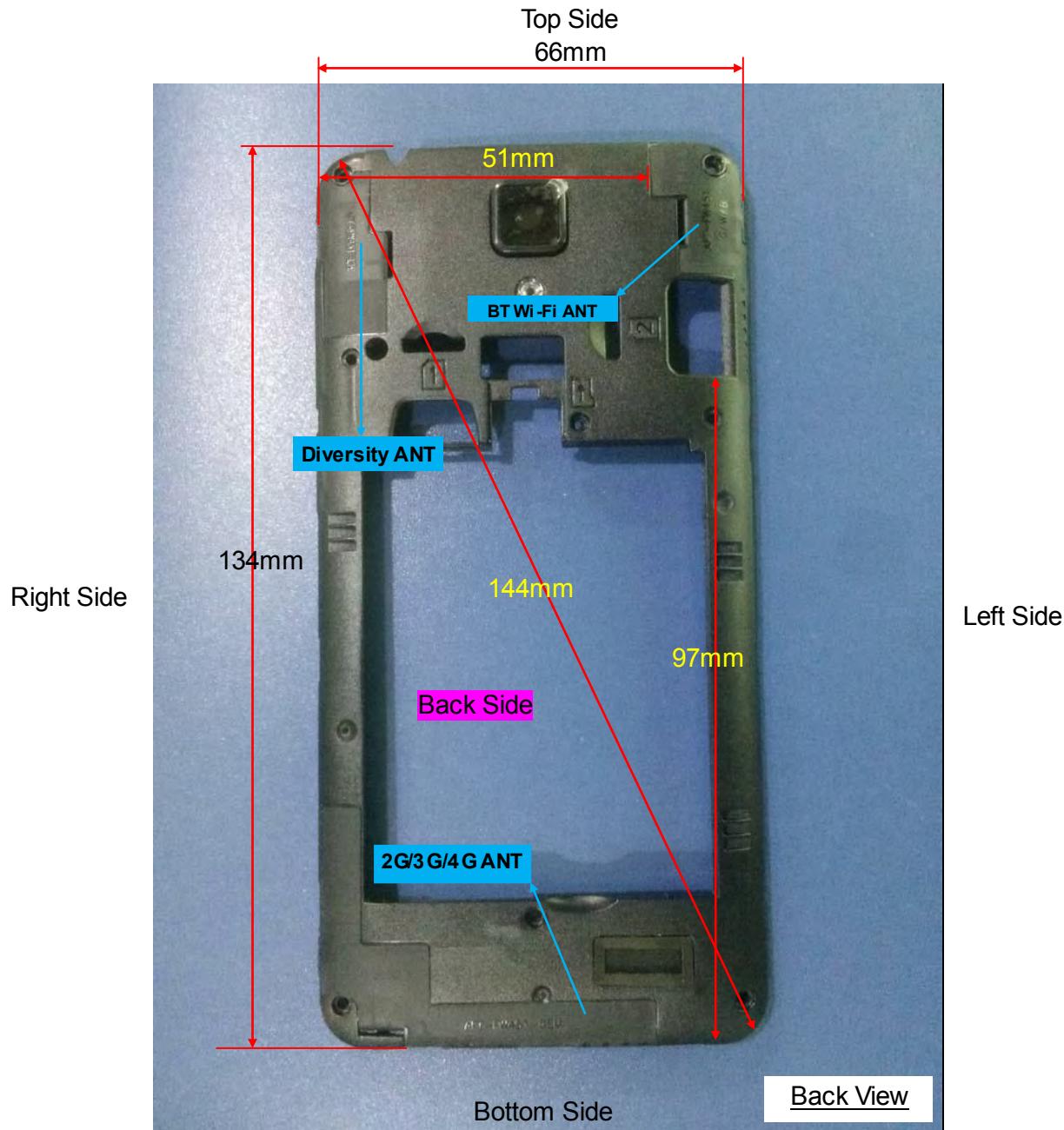
7.5.2. Output Power Results Of BT

The output power of BT is as following:

BT(3.0)	Output Power (dBm)				
	Channel	Tune-up	Data Rates		
			1M	2M	3M
	0CH	-0.50	-1.05	-2.08	-1.73
	39CH	-1.50	-1.85	-3.02	-2.67
	78CH	-2.50	-2.70	-4.08	-3.69

BT(4.0)	Channel	Tune-up	Output Power (dBm)
	0CH	0.00	-1.10
	19CH	-1.00	-2.18
	39CH	-3.00	-3.34

8. Antenna Location



Distance of the Antenna to the EUT surface/edge						
Antennas	Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
WWAN Main	≤ 25mm	≤ 25mm	≤ 25mm	≤ 25mm	>25mm	≤ 25mm
WLAN & BT	≤ 25mm	≤ 25mm	≤ 25mm	>25mm	≤ 25mm	>25mm

Positions for SAR tests						
Antennas	Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
WWAN Main	Yes	Yes	Yes	Yes	No	Yes
WLAN & BT	Yes	Yes	Yes	No	Yes	No

9. Stand-alone SAR test exclusion

Per FCC KDB 447498D01, the 1-g SAR and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

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

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

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Mode	P _{max} (dBm)	P _{max} (mW)	Distance (mm)	f (GHz)	Calculation Result	SAR Exclusion threshold	SAR test exclusion
BT	0	1.00	5	2.480	0.31	3.0	Yes

NOTE: Standalone SAR test exclusion for BT

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:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f_{(\text{GHz})}/x}] \text{ W/kg}$ for test separation distances ≤ 50 mm, where $x = 7.5$ for 1-g SAR and $x = 18.75$ for 10-g SAR.

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Mode	Position	P _{max} (dBm)	P _{max} (mW)	Distance (mm)	f (GHz)	x	Estimated SAR (W/Kg)
BT	Head	0	1.00	5	2.480	7.5	0.042
BT	Body	0	1.00	10	2.480	7.5	0.021
BT	Hotspot	0	1.00	10	2.480	7.5	0.021

NOTE: Estimated SAR calculation for BT

10. SAR Measurement Results

10.1. SAR measurement results

General Notes:

- 1) Per KDB447498 D01, all measurement SAR results are scaled to the maximum tune-up tolerance limit to demonstrate compliant.
- 2) Per KDB447498 D01, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is: $\leq 0.8 \text{ W/kg}$ or 2.0 W/kg , for 1-g or 10-g respectively, when the transmission band is $\leq 100 \text{ MHz}$. When the maximum output power variation across the required test channels is $> \frac{1}{2} \text{ dB}$, instead of the middle channel, the highest output power channel must be used.
- 3) Per KDB865664 D01, for each frequency band, repeated SAR measurement is required only when the measured SAR is $\geq 0.8 \text{ W/Kg}$; if the deviation among the repeated measurement is $\leq 20\%$, and the measured SAR $< 1.45 \text{ W/Kg}$, only one repeated measurement is required.
- 4) Per KDB648474 D04, SAR is evaluated without a headset connected to the device. When the standalone reported Body-Worn SAR is $\leq 1.2 \text{ W/kg}$, no additional SAR evaluations using a headset are required.
- 5) Per KDB865664 D02, SAR plot is only required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination; Plots are also required when the measured SAR is $> 1.5 \text{ W/kg}$, or $> 7.0 \text{ W/kg}$ for occupational exposure. The published RF exposure KDB procedures may require additional plots; for example, to support SAR to peak location separation ratio test exclusion and/or volume scan post-processing(Refer to appendix C for details).
- 6) Per KDB 941225 D05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
- 7) Per KDB 941225 D05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
- 8) Per KDB 941225 D05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are $\leq 0.8 \text{ W/kg}$. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is $> 1.45 \text{ W/kg}$, the remaining required test channels must also be tested.
- 9) Per KDB 941225 D05, 16QAM output power for each RB allocation configuration is $>$ not $\frac{1}{2} \text{ dB}$ higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is $\leq 1.45 \text{ W/kg}$; Per KDB 941225 D05, 16QAM SAR testing is not required.
- 10) Per KDB 941225 D05, Smaller bandwidth output power for each RB allocation configuration is $>$ not $\frac{1}{2} \text{ dB}$ higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is $\leq 1.45 \text{ W/kg}$; Per KDB 941225 D05, smaller bandwidth SAR testing is not required.

10.1.1. SAR measurement Result of GSM850

Test Position of Head	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift ($\pm 5\%$)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Left Cheek	189/836.4	GPRS(GMSK 4TS)	0.510	0.373	2.47	29.37	30.00	0.590
Left Tilt 15 Degree	189/836.4	GPRS(GMSK 4TS)	0.386	0.295	-1.62	29.37	30.00	0.446
Right Cheek	189/836.4	GPRS(GMSK 4TS)	0.506	0.374	0.95	29.37	30.00	0.585
Right Tilt 15 Degree	189/836.4	GPRS(GMSK 4TS)	0.375	0.278	1.63	29.37	30.00	0.434

NOTE: Head SAR test results of GSM850.

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift ($\pm 5\%$)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Front Side	189/836.4	GPRS(GMSK 4TS)	0.639	0.460	1.27	29.37	30.00	0.739
Back Side	189/836.4	GPRS(GMSK 4TS)	0.872	0.637	-0.16	29.37	30.00	1.008
Back Side	128/824.2	GPRS(GMSK 4TS)	1.008	0.739	-0.87	29.26	30.00	1.195
Back Side-Repeated	128/824.2	GPRS(GMSK 4TS)	0.995	0.735	-1.59	29.26	30.00	1.180
Back Side	251/848.8	GPRS(GMSK 4TS)	0.708	0.531	-1.56	28.97	30.00	0.897

NOTE: Body-Worn SAR test results of GSM850

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift ($\pm 5\%$)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Front Side	189/836.4	GPRS(GMSK 4TS)	0.639	0.460	1.27	29.37	30.00	0.739
Back Side	189/836.4	GPRS(GMSK 4TS)	0.872	0.637	-0.16	29.37	30.00	1.008
Left Side	189/836.4	GPRS(GMSK 4TS)	0.589	0.407	3.40	29.37	30.00	0.681
Right Side	189/836.4	GPRS(GMSK 4TS)	0.365	0.251	1.99	29.37	30.00	0.422
Bottom Side	189/836.4	GPRS(GMSK 4TS)	0.116	0.073	-0.23	29.37	30.00	0.134
Back Side	128/824.2	GPRS(GMSK 4TS)	1.008	0.739	-0.87	29.26	30.00	1.195
Back Side-Repeated	128/824.2	GPRS(GMSK 4TS)	0.995	0.735	-1.59	29.26	30.00	1.180
Back Side	251/848.8	GPRS(GMSK 4TS)	0.708	0.531	-1.56	28.97	30.00	0.897

NOTE: Hotspot SAR test results of GSM850

10.1.2. SAR measurement Result of GSM1900

Test Position of Head	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Left Cheek	810/1909.8	GPRS(GMSK 4TS)	0.129	0.078	1.61	26.11	27.00	0.158
Left Tilt 15 Degree	810/1909.8	GPRS(GMSK 4TS)	0.079	0.038	-4.72	26.11	27.00	0.097
Right Cheek	810/1909.8	GPRS(GMSK 4TS)	0.234	0.141	-0.60	26.11	27.00	0.287
Right Tilt 15 Degree	810/1909.8	GPRS(GMSK 4TS)	0.102	0.064	-2.07	26.11	27.00	0.125

NOTE: Head SAR test results of GSM1900

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Front Side	810/1909.8	GPRS(GMSK 4TS)	0.314	0.196	0.66	26.11	27.00	0.385
Back Side	810/1909.8	GPRS(GMSK 4TS)	0.439	0.227	-1.09	26.11	27.00	0.539

NOTE: Body-Worn SAR test results of GSM1900

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Front Side	810/1909.8	GPRS(GMSK 4TS)	0.314	0.196	0.66	26.11	27.00	0.385
Back Side	810/1909.8	GPRS(GMSK 4TS)	0.439	0.227	-1.09	26.11	27.00	0.539
Left Side	810/1909.8	GPRS(GMSK 4TS)	0.159	0.086	-2.16	26.11	27.00	0.195
Right Side	810/1909.8	GPRS(GMSK 4TS)	0.191	0.108	-0.25	26.11	27.00	0.234
Bottom Side	810/1909.8	GPRS(GMSK 4TS)	0.149	0.082	-1.45	26.11	27.00	0.183

NOTE: Hotspot SAR test results of GSM1900

10.1.3. SAR measurement Result of WCDMA Band V

Test Position of Head	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Left Cheek	4233/846.6	RMC12.2K	0.318	0.233	-3.72	22.59	23.00	0.349
Left Tilt 15 Degree	4233/846.6	RMC12.2K	0.206	0.165	-1.68	22.59	23.00	0.226
Right Cheek	4233/846.6	RMC12.2K	0.312	0.234	0.79	22.59	23.00	0.343
Right Tilt 15 Degree	4233/846.6	RMC12.2K	0.231	0.173	-0.48	22.59	23.00	0.254

NOTE: Head SAR test results of WCDMA Band V

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Front Side	4233/846.6	RMC12.2K	0.389	0.277	0.20	22.59	23.00	0.428
Back Side	4233/846.6	RMC12.2K	0.514	0.373	-0.60	22.59	23.00	0.565

NOTE: Body-Worn SAR test results of WCDMA Band V

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Front Side	4233/846.6	RMC12.2K	0.389	0.277	0.20	22.59	23.00	0.428
Back Side	4233/846.6	RMC12.2K	0.514	0.373	-0.60	22.59	23.00	0.565
Left Side	4233/846.6	RMC12.2K	0.186	0.106	-1.65	22.59	23.00	0.204
Right Side	4233/846.6	RMC12.2K	0.114	0.079	-0.66	22.59	23.00	0.125
Bottom Side	4233/846.6	RMC12.2K	0.093	0.060	3.72	22.59	23.00	0.102

NOTE: Hotspot SAR test results of WCDMA Band V

10.1.4. SAR measurement Result of WCDMA Band II

Test Position of Head	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Left Cheek	9538/1907.6	RMC12.2K	0.176	0.109	0.59	22.89	23.00	0.181
Left Tilt 15 Degree	9538/1907.6	RMC12.2K	0.075	0.044	-2.15	22.89	23.00	0.077
Right Cheek	9538/1907.6	RMC12.2K	0.335	0.202	-3.84	22.89	23.00	0.344
Right Tilt 15 Degree	9538/1907.6	RMC12.2K	0.137	0.085	-0.01	22.89	23.00	0.141

NOTE: Head SAR test results of WCDMA Band II

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Front Side	9538/1907.6	RMC12.2K	0.376	0.228	-0.67	22.89	23.00	0.386
Back Side	9538/1907.6	RMC12.2K	0.520	0.266	-0.19	22.89	23.00	0.533

NOTE: Body-Worn SAR test results of WCDMA Band II

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Front Side	9538/1907.6	RMC12.2K	0.376	0.228	-0.67	22.89	23.00	0.386
Back Side	9538/1907.6	RMC12.2K	0.520	0.266	-0.19	22.89	23.00	0.533
Left Side	9538/1907.6	RMC12.2K	0.047	0.028	-0.27	22.89	23.00	0.048
Right Side	9538/1907.6	RMC12.2K	0.234	0.131	0.21	22.89	23.00	0.240
Bottom Side	9538/1907.6	RMC12.2K	0.198	0.106	0.24	22.89	23.00	0.203

NOTE: Hotspot SAR test results of WCDMA Band II

10.1.5. SAR measurement Result of LTE Band V

Test Position of Head	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift ($\pm 5\%$)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Left Cheek	20600/844	10M QPSK(1,49)	0.339	0.253	1.17	23.42	24.00	0.387
Left Tilt 15 Degree	20600/844	10M QPSK(1,49)	0.201	0.133	-1.35	23.42	24.00	0.230
Right Cheek	20600/844	10M QPSK(1,49)	0.324	0.245	1.64	23.42	24.00	0.370
Right Tilt 15 Degree	20600/844	10M QPSK(1,49)	0.192	0.102	2.23	23.42	24.00	0.219
50%RB								
Left Cheek	20600/844	10M QPSK(25,24)	0.267	0.194	1.82	23.49	24.00	0.300
Left Tilt 15 Degree	20600/844	10M QPSK(25,24)	0.162	0.101	-2.34	23.49	24.00	0.182
Right Cheek	20600/844	10M QPSK(25,24)	0.253	0.190	-2.08	23.49	24.00	0.285
Right Tilt 15 Degree	20600/844	10M QPSK(25,24)	0.143	0.086	3.15	23.49	24.00	0.161

NOTE: Head SAR test results of LTE Band V

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift ($\pm 5\%$)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	20600/844	10M QPSK(1,49)	0.440	0.320	-0.70	23.42	24.00	0.503
Back Side	20600/844	10M QPSK(1,49)	0.588	0.433	0.25	23.42	24.00	0.672
50%RB								
Front Side	20600/844	10M	0.340	0.246	-0.42	23.49	24.00	0.382

		QPSK(25,24)						
Back Side	20600/844	10M QPSK(25,24)	0.453	0.334	3.23	23.49	24.00	0.509

NOTE: Body-Worn SAR test results of LTE Band V

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	20600/844	10M QPSK(1,49)	0.440	0.320	-0.70	23.42	24.00	0.503
Back Side	20600/844	10M QPSK(1,49)	0.588	0.433	0.25	23.42	24.00	0.672
Left Side	20600/844	10M QPSK(1,49)	0.195	0.124	-1.19	23.42	24.00	0.223
Right Side	20600/844	10M QPSK(1,49)	0.238	0.167	0.32	23.42	24.00	0.272
Bottom Side	20600/844	10M QPSK(1,49)	0.085	0.050	3.52	23.42	24.00	0.097
50%RB								
Front Side	20600/844	10M QPSK(25,24)	0.340	0.246	-0.42	23.49	24.00	0.382
Back Side	20600/844	10M QPSK(25,24)	0.453	0.334	3.23	23.49	24.00	0.509
Left Side	20600/844	10M QPSK(25,24)	0.157	0.098	-1.96	23.49	24.00	0.177
Right Side	20600/844	10M QPSK(25,24)	0.188	0.121	-3.28	23.49	24.00	0.211
Bottom Side	20600/844	10M QPSK(25,24)	0.059	0.037	-0.34	23.49	24.00	0.066

NOTE: Hotspot SAR test results of LTE Band V

10.1.6. SAR measurement Result of LTE Band IV

Left Cheek	20175/1732.5	20M QPSK(1,49)	0.153	0.108	-1.88	23.06	23.50	0.169
Left Tilt 15 Degree	20175/1732.5	20M QPSK(1,49)	0.073	0.046	1.53	23.06	23.50	0.081
Right Cheek	20175/1732.5	20M QPSK(1,49)	0.302	0.186	-2.24	23.06	23.50	0.334
Right Tilt 15 Degree	20175/1732.5	20M QPSK(1,49)	0.102	0.068	1.53	23.06	23.50	0.113
50%RB								
Left Cheek	20175/1732.5	20M QPSK(50,49)	0.120	0.065	1.87	22.90	23.50	0.138
Left Tilt 15 Degree	20175/1732.5	20M QPSK(50,49)	0.042	0.027	0.62	22.90	23.50	0.048
Right Cheek	20175/1732.5	20M QPSK(50,49)	0.213	0.137	0.94	22.90	23.50	0.245
Right Tilt 15 Degree	20175/1732.5	20M QPSK(50,49)	0.075	0.043	-1.57	22.90	23.50	0.086

NOTE: Head SAR test results of LTE Band IV

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tuned power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	20175/1732.5	20M QPSK(1,49)	0.432	0.271	-1.16	23.06	23.50	0.478
Back Side	20175/1732.5	20M QPSK(1,49)	1.064	0.610	-0.50	23.06	23.50	1.177
Back Side-Repeated	20175/1732.5	20M QPSK(1,49)	1.058	0.580	-1.03	23.06	23.50	1.171
Back Side	20050/1720	20M QPSK(1,49)	1.045	0.608	1.58	23.01	23.50	1.170
Back Side	20300/1745	20M QPSK(1,49)	1.001	0.530	-0.45	22.84	23.50	1.165
50%RB								
Front Side	20175/1732.5	20M QPSK (50,49)	0.302	0.184	0.84	22.90	23.50	0.347
Back Side	20175/1732.	20M QPSK	0.853	0.450	-0.66	22.90	23.50	0.979

	5	(50,49)						
Back Side-Repeated	20175/1732.5	20M QPSK (50,49)	0.831	0.445	2.16	22.90	23.50	0.954
Back Side	20050/1720	20M QPSK (50,49)	0.813	0.406	-2.78	22.86	23.50	0.942
Back Side	20300/1745	20M QPSK (50,49)	0.832	0.439	-0.07	22.76	23.50	0.987
100%RB								
Back Side	20175/1732.5	20M QPSK (100,0)	0.866	0.456	-0.85	22.05	22.50	0.961

NOTE: Body-Worn SAR test results of LTE Band IV

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift ($\pm 5\%$)	Conducted power (dBm)	Tuned up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	20175/1732.5	20M QPSK(1,49)	0.432	0.271	-1.16	23.06	23.50	0.478
Back Side	20175/1732.5	20M QPSK(1,49)	1.064	0.610	-0.50	23.06	23.50	1.177
Back Side-Repeated	20175/1732.5	20M QPSK(1,49)	1.058	0.580	-1.03	23.06	23.50	1.171
Left Side	20175/1732.5	20M QPSK(1,49)	0.095	0.056	1.84	23.06	23.50	0.105
Right Side	20175/1732.5	20M QPSK(1,49)	0.265	0.175	-2.84	23.06	23.50	0.293
Bottom Side	20175/1732.5	20M QPSK(1,49)	0.323	0.183	-0.87	23.06	23.50	0.357
Back Side	20050/1720	20M QPSK(1,49)	1.045	0.608	1.58	23.01	23.50	1.170
Back Side	20300/1745	20M QPSK(1,49)	1.001	0.530	-0.45	22.84	23.50	1.165
50%RB								
Front Side	20175/1732.5	20M QPSK (50,49)	0.302	0.184	0.84	22.90	23.50	0.347
Back Side	20175/1732.5	20M QPSK (50,49)	0.853	0.450	-0.66	22.90	23.50	0.979
Back	20175/1732.	20M QPSK	0.831	0.445	2.16	22.90	23.50	0.954

Side-Repeated	5	(50,49)						
Left Side	20175/1732.5	20M QPSK (50,49)	0.062	0.041	3.28	22.90	23.50	0.071
Right Side	20175/1732.5	20M QPSK (50,49)	0.186	0.123	1.54	22.90	23.50	0.214
Bottom Side	20175/1732.5	20M QPSK (50,49)	0.267	0.142	2.87	22.90	23.50	0.307
Back Side	20050/1720	20M QPSK (50,49)	0.813	0.406	-2.78	22.86	23.50	0.942
Back Side	20300/1745	20M QPSK (50,49)	0.832	0.439	-0.07	22.76	23.50	0.987
100%RB								
Back Side	20175/1732.5	20M QPSK (100,0)	0.866	0.456	-0.85	22.05	22.50	0.961

NOTE: Hotspot SAR test results of LTE Band IV

10.1.7. SAR measurement Result of LTE Band II

Test Position of Head	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift ($\pm 5\%$)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Left Cheek	18700/1860	20M QPSK(1,0)	0.192	0.121	1.74	23.29	23.50	0.202
Left Tilt 15 Degree	18700/1860	20M QPSK(1,0)	0.103	0.072	-1.81	23.29	23.50	0.108
Right Cheek	18700/1860	20M QPSK(1,0)	0.338	0.208	2.39	23.29	23.50	0.355
Right Tilt 15 Degree	18700/1860	20M QPSK(1,0)	0.135	0.086	2.68	23.29	23.50	0.142
50%RB								
Left Cheek	18700/1860	20M QPSK(50,49)	0.172	0.091	0.71	23.25	23.50	0.182
Left Tilt 15 Degree	18700/1860	20M QPSK(50,49)	0.084	0.053	-0.93	23.25	23.50	0.089
Right	18700/1860	20M QPSK(50,49)	0.258	0.159	-0.92	23.25	23.50	0.273

Cheek								
Right Tilt 15 Degree	18700/1860	20M QPSK(50,49)	0.095	0.055	-2.61	23.25	23.50	0.101

NOTE: Head SAR test results of LTE Band II

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	18700/1860	20M QPSK(1,0)	0.430	0.269	0.90	23.29	23.50	0.451
Back Side	18700/1860	20M QPSK(1,0)	0.817	0.422	0.20	23.29	23.50	0.857
Back Side-Repeated	18700/1860	20M QPSK(1,0)	0.811	0.420	-2.00	23.29	23.50	0.851
Back Side	18900/1880	20M QPSK(1,0)	0.764	0.396	2.41	23.13	23.50	0.832
Back Side	19100/1900	20M QPSK(1,0)	0.695	0.356	-0.62	23.18	23.50	0.748
50%RB								
Front Side	18700/1860	20M QPSK (50,49)	0.295	0.176	1.82	23.25	23.50	0.312
Back Side	18700/1860	20M QPSK (50,49)	0.506	0.262	-0.10	23.25	23.50	0.536
100%RB								
Back Side	18700/1860	20M QPSK (100,0)	0.713	0.326	-0.11	22.17	22.50	0.769

NOTE: Body-Worn SAR test results of LTE Band II

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	18700/1860	20M QPSK(1,0)	0.430	0.269	0.90	23.29	23.50	0.451
Back Side	18700/1860	20M QPSK(1,0)	0.817	0.422	0.20	23.29	23.50	0.857
Back Side-Repeated	18700/1860	20M QPSK(1,0)	0.811	0.420	-2.00	23.29	23.50	0.851
Left Side	18900/1880	20M QPSK(1,0)	0.167	0.095	1.84	23.24	23.50	0.177
Right Side	18900/1880	20M QPSK(1,0)	0.300	0.167	0.45	23.24	23.50	0.319
Bottom	18900/1880	20M QPSK(1,0)	0.245	0.131	0.20	23.24	23.50	0.260

Side								
Back Side	18900/1880	20M QPSK(1,0)	0.764	0.396	2.41	23.13	23.50	0.832
Back Side	19100/1900	20M QPSK(1,0)	0.695	0.356	-0.62	23.18	23.50	0.748
50%RB								
Front Side	18700/1860	20M QPSK (50,49)	0.295	0.176	1.82	23.25	23.50	0.312
Back Side	18700/1860	20M QPSK (50,49)	0.506	0.262	-0.10	23.25	23.50	0.536
Left Side	18700/1860	20M QPSK (50,49)	0.095	0.058	1.52	23.25	23.50	0.101
Right Side	18700/1860	20M QPSK (50,49)	0.201	0.135	3.28	23.25	23.50	0.213
Bottom Side	18700/1860	20M QPSK (50,49)	0.182	0.099	1.53	23.25	23.50	0.193
100%RB								
Back Side	18700/1860	20M QPSK (100,0)	0.713	0.326	-0.11	22.17	22.50	0.769

NOTE: Hotspot SAR test results of LTE Band II

10.1.8. SAR measurement Result of LTE Band VII

Test Position of Head	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift ($\pm 5\%$)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Left Cheek	21100/2535	20M QPSK(1,99)	0.195	0.104	1.54	22.60	23.00	0.214
Left Tilt 15 Degree	21100/2535	20M QPSK(1,99)	0.105	0.072	-3.17	22.60	23.00	0.115
Right Cheek	21100/2535	20M QPSK(1,99)	0.311	0.165	-3.63	22.60	23.00	0.341
Right Tilt 15 Degree	21100/2535	20M QPSK(1,99)	0.164	0.098	2.14	22.60	23.00	0.180
50%RB								
Left Cheek	21350/2560	20M QPSK(50,0)	0.103	0.062	-1.57	21.48	22.00	0.116
Left Tilt 15	21350/2560	20M QPSK(50,0)	0.065	0.041	2.84	21.48	22.00	0.073

Degree								
Right Cheek	21350/2560	20M QPSK(50,0)	0.137	0.073	3.70	21.48	22.00	0.154
Right Tilt 15 Degree	21350/2560	20M QPSK(50,0)	0.072	0.046	2.08	21.48	22.00	0.081

NOTE: Head SAR test results of LTE Band VII

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	21100/2535	20M QPSK(1,99)	0.449	0.238	-0.11	22.60	23.00	0.492
Back Side	21100/2535	20M QPSK(1,99)	0.472	0.252	-0.55	22.60	23.00	0.518
50%RB								
Front Side	21350/2560	20M QPSK(50,0)	0.189	0.121	2.07	21.48	22.00	0.213
Back Side	21350/2560	20M QPSK(50,0)	0.210	0.112	1.01	21.48	22.00	0.237

NOTE: Body-Worn SAR test results of LTE Band VII

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	21100/2535	20M QPSK(1,99)	0.449	0.238	-0.11	22.60	23.00	0.492
Back Side	21100/2535	20M QPSK(1,99)	0.472	0.252	-0.55	22.60	23.00	0.518
Left Side	21100/2535	20M QPSK(1,99)	0.037	0.021	-1.48	22.60	23.00	0.041
Right Side	21100/2535	20M QPSK(1,99)	0.167	0.098	-1.84	22.60	23.00	0.183
Bottom Side	21100/2535	20M QPSK(1,99)	0.342	0.177	1.37	22.60	23.00	0.375
50%RB								
Front Side	21350/2560	20M QPSK(50,0)	0.189	0.121	2.07	21.48	22.00	0.213
Back Side	21350/2560	20M QPSK(50,0)	0.210	0.112	1.01	21.48	22.00	0.237
Left Side	21350/2560	20M	0.028	0.016	-3.05	21.48	22.00	0.032

		QPSK(50,0)						
Right Side	21350/2560	20M QPSK(50,0)	0.095	0.061	1.85	21.48	22.00	0.107
Bottom Side	21350/2560	20M QPSK(50,0)	0.156	0.084	1.55	21.48	22.00	0.176

NOTE: Hotspot SAR test results of LTE Band VII

10.1.9. SAR measurement Result of WLAN 2.4G

Test Position of Head	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift ($\pm 5\%$)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Left Cheek	6/2437	802.11 b	0.117	0.080	-0.72	10.41	11.00	0.134
Left Tilt 15 Degree	6/2437	802.11 b	0.102	0.050	0.11	10.41	11.00	0.117
Right Cheek	6/2437	802.11 b	0.458	0.234	1.94	10.41	11.00	0.525
Right Tilt 15 Degree	6/2437	802.11 b	0.242	0.133	-0.27	10.41	11.00	0.277

NOTE: Head SAR test results of WLAN 2.4G

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift ($\pm 5\%$)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Front Side	6/2437	802.11 b	0.072	0.043	-1.56	10.41	11.00	0.082
Back Side	6/2437	802.11 b	0.098	0.058	-0.42	10.41	11.00	0.112

NOTE: Body-Worn SAR test results of WLAN 2.4G

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift ($\pm 5\%$)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Front Side	6/2437	802.11 b	0.072	0.043	-1.56	10.41	11.00	0.082
Back Side	6/2437	802.11 b	0.098	0.058	-0.42	10.41	11.00	0.112
Left Side	6/2437	802.11 b	0.018	0.010	-1.35	10.41	11.00	0.021
Top Side	6/2437	802.11 b	0.037	0.019	-0.54	10.41	11.00	0.042

NOTE: Hotspot SAR test results of WLAN 2.4G

10.2. Simultaneous Transmission Possibilities

The Simultaneous Transmission Possibilities of this device are as below:

No.	Configuration	Head	Body	Hotspot	Note
1	GSM(Voice) + WLAN 2.4GHz(data)	Yes	Yes	N/A	
2	WCDMA(Voice) + WLAN 2.4GHz(data)	Yes	Yes	N/A	
3	GSM(Voice) + BT(data)	Yes	Yes	N/A	
4	WCDMA(Voice) + BT(data)	Yes	Yes	N/A	
5	GPRS/EDGE(data) + WLAN 2.4GHz(data)	Yes	Yes	Yes	2.4GHz Hotspot
6	WCDMA(data) + WLAN 2.4GHz(data)	Yes	Yes	Yes	2.4GHz Hotspot
7	LTE(data) + WLAN 2.4GHz(data)	Yes	Yes	Yes	2.4GHz Hotspot
8	GPRS/EDGE(data) + BT(data)	Yes	Yes	Yes	BT Tethering
9	WCDMA(data) + BT(data)	Yes	Yes	Yes	BT Tethering
10	LTE(data) + BT(data)	Yes	Yes	Yes	BT Tethering

NOTE:

- 1) This device supported VoIP in GPRS/EDGE, WCDMA and LTE(e.g. 3rd party VoIP).
- 2) This device WLAN 2.4GHz supports Hotspot operation.
- 3) WLAN 2.4GHz and BT share the same antenna, and cannot transmit simultaneously.
- 4) EUT will choose each GSM, WCDMA and LTE according to the network signal condition; therefore, they will not operate simultaneously at any moment.
- 5) The Scaled SAR summation is calculated based on the same configuration and test position.

10.3. SAR Summation Scenario

Per KDB 447498 D01, simultaneous transmission SAR is compliant if,

- 1) Scalar SAR summation < 1.6W/kg.
- 2) SPLSR = $(\text{SAR}_1 + \text{SAR}_2)^{1.5} / (\text{min. separation distance, mm})$, and the peak separation distance is determined from the square root of $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$, where (x_1, y_1, z_1) and (x_2, y_2, z_2) are the coordinates of the extrapolated peak SAR locations in the zoom scan. If $\text{SPLSR} \leq 0.04$, simultaneously transmission SAR measurement is not necessary.

Test Position		Scaled SAR _{MAX}		$\Sigma 1\text{-g SAR}$ (W/Kg)	SPLSR	Remark
		GSM 850	WLAN 2.4G			
Head	Left Cheek	0.590	0.134	0.724	N/A	N/A
	Left Tilt 15 Degree	0.446	0.117	0.563	N/A	N/A
	Right Cheek	0.585	0.525	1.110	N/A	N/A
	Right Tilt 15 Degree	0.434	0.277	0.711	N/A	N/A
Body-Worn	Front Side	0.739	0.082	0.821	N/A	N/A
	Back Side	1.195	0.112	1.307	N/A	N/A
Hotspot	Front Side	0.739	0.082	0.821	N/A	N/A
	Back Side	1.195	0.112	1.307	N/A	N/A
	Left Side	0.681	0.021	0.702	N/A	N/A
	Right Side	0.422	N/A	0.422	N/A	N/A
	Top Side	N/A	0.042	0.042	N/A	N/A
	Bottom Side	0.134	N/A	0.134	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of GSM850 and WLAN 2.4G.

Test Position		Scaled SAR _{MAX}		$\Sigma 1\text{-g SAR}$ (W/Kg)	SPLSR	Remark
		GSM 1900	WLAN 2.4G			
Head	Left Cheek	0.158	0.134	0.292	N/A	N/A
	Left Tilt 15 Degree	0.097	0.117	0.214	N/A	N/A
	Right Cheek	0.287	0.525	0.812	N/A	N/A
	Right Tilt 15 Degree	0.125	0.277	0.402	N/A	N/A
Body-Worn	Front Side	0.385	0.082	0.468	N/A	N/A
	Back Side	0.539	0.112	0.651	N/A	N/A
Hotspot	Front Side	0.385	0.082	0.468	N/A	N/A
	Back Side	0.539	0.112	0.651	N/A	N/A
	Left Side	0.195	0.021	0.216	N/A	N/A
	Right Side	0.234	N/A	0.234	N/A	N/A
	Top Side	N/A	0.042	0.042	N/A	N/A
	Bottom Side	0.183	N/A	0.183	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of GSM1900 and WLAN 2.4G.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		WCDMA Band V	WLAN 2.4G			
Head	Left Cheek	0.349	0.134	0.484	N/A	N/A
	Left Tilt 15 Degree	0.226	0.117	0.343	N/A	N/A
	Right Cheek	0.343	0.525	0.868	N/A	N/A
	Right Tilt 15 Degree	0.254	0.277	0.531	N/A	N/A
Body-Worn	Front Side	0.428	0.082	0.510	N/A	N/A
	Back Side	0.565	0.112	0.677	N/A	N/A
Hotspot	Front Side	0.428	0.082	0.510	N/A	N/A
	Back Side	0.565	0.112	0.677	N/A	N/A
	Left Side	0.204	0.021	0.225	N/A	N/A
	Right Side	0.125	N/A	0.125	N/A	N/A
	Top Side	N/A	0.042	0.042	N/A	N/A
	Bottom Side	0.102	N/A	0.102	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of WCDMA Band V and WLAN 2.4G.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		WCDMA Band II	WLAN 2.4G			
Head	Left Cheek	0.181	0.134	0.315	N/A	N/A
	Left Tilt 15 Degree	0.077	0.117	0.194	N/A	N/A
	Right Cheek	0.344	0.525	0.868	N/A	N/A
	Right Tilt 15 Degree	0.141	0.277	0.418	N/A	N/A
Body-Worn	Front Side	0.386	0.082	0.468	N/A	N/A
	Back Side	0.533	0.112	0.646	N/A	N/A
Hotspot	Front Side	0.386	0.082	0.468	N/A	N/A
	Back Side	0.533	0.112	0.646	N/A	N/A
	Left Side	0.048	0.021	0.069	N/A	N/A
	Right Side	0.240	N/A	0.240	N/A	N/A
	Top Side	N/A	0.042	0.042	N/A	N/A
	Bottom Side	0.203	N/A	0.203	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of WCDMA Band II and WLAN 2.4G.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band V	WLAN 2.4G			
Head	Left Cheek	0.387	0.134	0.521	N/A	N/A
	Left Tilt 15 Degree	0.230	0.117	0.347	N/A	N/A

	Right Cheek	0.370	0.525	0.895	N/A	N/A
	Right Tilt 15 Degree	0.219	0.277	0.497	N/A	N/A
Body-Worn	Front Side	0.503	0.082	0.585	N/A	N/A
	Back Side	0.672	0.112	0.784	N/A	N/A
Hotspot	Front Side	0.503	0.082	0.585	N/A	N/A
	Back Side	0.672	0.112	0.784	N/A	N/A
	Left Side	0.223	0.021	0.243	N/A	N/A
	Right Side	0.272	N/A	0.272	N/A	N/A
	Top Side	N/A	0.042	0.042	N/A	N/A
	Bottom Side	0.097	N/A	0.097	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band V and WLAN 2.4G.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band IV	WLAN 2.4G			
Head	Left Cheek	0.169	0.134	0.303	N/A	N/A
	Left Tilt 15 Degree	0.081	0.117	0.198	N/A	N/A
	Right Cheek	0.334	0.525	0.859	N/A	N/A
	Right Tilt 15 Degree	0.113	0.277	0.390	N/A	N/A
Body-Worn	Front Side	0.478	0.082	0.561	N/A	N/A
	Back Side	1.177	0.112	1.290	N/A	N/A
Hotspot	Front Side	0.478	0.082	0.561	N/A	N/A
	Back Side	1.177	0.112	1.290	N/A	N/A
	Left Side	0.105	0.021	0.126	N/A	N/A
	Right Side	0.293	N/A	0.293	N/A	N/A
	Top Side	N/A	0.042	0.042	N/A	N/A
	Bottom Side	0.357	N/A	0.357	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band IV and WLAN 2.4G.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band II	WLAN 2.4G			
Head	Left Cheek	0.202	0.134	0.336	N/A	N/A
	Left Tilt 15 Degree	0.108	0.117	0.225	N/A	N/A
	Right Cheek	0.355	0.525	0.879	N/A	N/A
	Right Tilt 15 Degree	0.142	0.277	0.419	N/A	N/A
Body-Worn	Front Side	0.451	0.082	0.534	N/A	N/A
	Back Side	0.857	0.112	0.970	N/A	N/A
Hotspot	Front Side	0.451	0.082	0.534	N/A	N/A
	Back Side	0.857	0.112	0.970	N/A	N/A
	Left Side	0.177	0.021	0.198	N/A	N/A

	Right Side	0.319	N/A	0.319	N/A	N/A
	Top Side	N/A	0.042	0.042	N/A	N/A
	Bottom Side	0.260	N/A	0.260	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band II and WLAN 2.4G.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band VII	WLAN 2.4G			
Head	Left Cheek	0.214	0.134	0.348	N/A	N/A
	Left Tilt 15 Degree	0.115	0.117	0.232	N/A	N/A
	Right Cheek	0.341	0.525	0.866	N/A	N/A
	Right Tilt 15 Degree	0.180	0.277	0.457	N/A	N/A
	Front Side	0.492	0.082	0.575	N/A	N/A
Body-Worn	Back Side	0.518	0.112	0.630	N/A	N/A
	Front Side	0.492	0.082	0.575	N/A	N/A
Hotspot	Back Side	0.518	0.112	0.630	N/A	N/A
	Left Side	0.041	0.021	0.061	N/A	N/A
	Right Side	0.183	N/A	0.183	N/A	N/A
	Top Side	N/A	0.042	0.042	N/A	N/A
	Bottom Side	0.375	N/A	0.375	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band VII and WLAN 2.4G.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		GSM 850	BT			
Head	Left Cheek	0.590	0.042	0.632	N/A	N/A
	Left Tilt 15 Degree	0.446	0.042	0.488	N/A	N/A
	Right Cheek	0.585	0.042	0.627	N/A	N/A
	Right Tilt 15 Degree	0.434	0.042	0.476	N/A	N/A
Body-Worn	Front Side	0.739	0.021	0.760	N/A	N/A
	Back Side	1.195	0.021	1.216	N/A	N/A
Hotspot	Front Side	0.739	0.021	0.760	N/A	N/A
	Back Side	1.195	0.021	1.216	N/A	N/A
	Left Side	0.681	0.021	0.702	N/A	N/A
	Right Side	0.422	N/A	0.422	N/A	N/A
	Top Side	N/A	0.021	0.021	N/A	N/A
	Bottom Side	0.134	N/A	0.134	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of GSM850 and BT

Test Position	Scaled SAR _{MAX}	Σ 1-g SAR	SPLSR	Remark
---------------	---------------------------	------------------	-------	--------

		GSM 1900	BT	(W/Kg)		
Head	Left Cheek	0.158	0.042	0.200	N/A	N/A
	Left Tilt 15 Degree	0.097	0.042	0.139	N/A	N/A
	Right Cheek	0.287	0.042	0.329	N/A	N/A
	Right Tilt 15 Degree	0.125	0.042	0.167	N/A	N/A
Body-Worn	Front Side	0.385	0.021	0.406	N/A	N/A
	Back Side	0.539	0.021	0.560	N/A	N/A
Hotspot	Front Side	0.385	0.021	0.406	N/A	N/A
	Back Side	0.539	0.021	0.560	N/A	N/A
	Left Side	0.195	0.021	0.216	N/A	N/A
	Right Side	0.234	N/A	0.234	N/A	N/A
	Top Side	N/A	0.021	0.021	N/A	N/A
	Bottom Side	0.183	N/A	0.183	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of GSM1900 and BT

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		WCDMA Band V	BT			
Head	Left Cheek	0.349	0.042	0.391	N/A	N/A
	Left Tilt 15 Degree	0.226	0.042	0.268	N/A	N/A
	Right Cheek	0.343	0.042	0.385	N/A	N/A
	Right Tilt 15 Degree	0.254	0.042	0.296	N/A	N/A
Body-Worn	Front Side	0.428	0.021	0.449	N/A	N/A
	Back Side	0.565	0.021	0.586	N/A	N/A
Hotspot	Front Side	0.428	0.021	0.449	N/A	N/A
	Back Side	0.565	0.021	0.586	N/A	N/A
	Left Side	0.204	0.021	0.225	N/A	N/A
	Right Side	0.125	N/A	0.125	N/A	N/A
	Top Side	N/A	0.021	0.021	N/A	N/A
	Bottom Side	0.102	N/A	0.102	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of WCDMA Band V and BT

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		WCDMA Band II	BT			
Head	Left Cheek	0.181	0.042	0.223	N/A	N/A
	Left Tilt 15 Degree	0.077	0.042	0.119	N/A	N/A
	Right Cheek	0.344	0.042	0.386	N/A	N/A
	Right Tilt 15 Degree	0.141	0.042	0.183	N/A	N/A

Body-Worn	Front Side	0.386	0.021	0.407	N/A	N/A
	Back Side	0.533	0.021	0.554	N/A	N/A
Hotspot	Front Side	0.386	0.021	0.407	N/A	N/A
	Back Side	0.533	0.021	0.554	N/A	N/A
	Left Side	0.048	0.021	0.069	N/A	N/A
	Right Side	0.240	N/A	0.240	N/A	N/A
	Top Side	N/A	0.021	0.021	N/A	N/A
	Bottom Side	0.203	N/A	0.203	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of WCDMA Band II and BT

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band V	BT			
Head	Left Cheek	0.387	0.042	0.429	N/A	N/A
	Left Tilt 15 Degree	0.230	0.042	0.272	N/A	N/A
	Right Cheek	0.370	0.042	0.412	N/A	N/A
	Right Tilt 15 Degree	0.219	0.042	0.261	N/A	N/A
Body-Worn	Front Side	0.503	0.021	0.524	N/A	N/A
	Back Side	0.672	0.021	0.693	N/A	N/A
Hotspot	Front Side	0.503	0.021	0.524	N/A	N/A
	Back Side	0.672	0.021	0.693	N/A	N/A
	Left Side	0.223	0.021	0.244	N/A	N/A
	Right Side	0.272	N/A	0.272	N/A	N/A
	Top Side	N/A	0.021	0.021	N/A	N/A
	Bottom Side	0.097	N/A	0.097	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band V and BT

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band IV	BT			
Head	Left Cheek	0.169	0.042	0.211	N/A	N/A
	Left Tilt 15 Degree	0.081	0.042	0.123	N/A	N/A
	Right Cheek	0.334	0.042	0.376	N/A	N/A
	Right Tilt 15 Degree	0.113	0.042	0.155	N/A	N/A
Body-Worn	Front Side	0.478	0.021	0.499	N/A	N/A
	Back Side	1.177	0.021	1.198	N/A	N/A
Hotspot	Front Side	0.478	0.021	0.499	N/A	N/A
	Back Side	1.177	0.021	1.198	N/A	N/A
	Left Side	0.105	0.021	0.126	N/A	N/A
	Right Side	0.293	N/A	0.293	N/A	N/A
	Top Side	N/A	0.021	0.021	N/A	N/A

	Bottom Side	0.357	N/A	0.357	N/A	N/A
--	-------------	-------	-----	-------	-----	-----

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band IV and BT

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band II	BT			
Head	Left Cheek	0.202	0.042	0.244	N/A	N/A
	Left Tilt 15 Degree	0.108	0.042	0.150	N/A	N/A
	Right Cheek	0.355	0.042	0.397	N/A	N/A
	Right Tilt 15 Degree	0.142	0.042	0.184	N/A	N/A
Body-Worn	Front Side	0.451	0.021	0.472	N/A	N/A
	Back Side	0.857	0.021	0.878	N/A	N/A
Hotspot	Front Side	0.451	0.021	0.472	N/A	N/A
	Back Side	0.857	0.021	0.878	N/A	N/A
	Left Side	0.177	0.021	0.198	N/A	N/A
	Right Side	0.319	N/A	0.319	N/A	N/A
	Top Side	N/A	0.021	0.021	N/A	N/A
	Bottom Side	0.260	N/A	0.260	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band II and BT

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band VII	BT			
Head	Left Cheek	0.214	0.042	0.256	N/A	N/A
	Left Tilt 15 Degree	0.115	0.042	0.157	N/A	N/A
	Right Cheek	0.341	0.042	0.383	N/A	N/A
	Right Tilt 15 Degree	0.180	0.042	0.222	N/A	N/A
Body-Worn	Front Side	0.492	0.021	0.513	N/A	N/A
	Back Side	0.518	0.021	0.539	N/A	N/A
Hotspot	Front Side	0.492	0.021	0.513	N/A	N/A
	Back Side	0.518	0.021	0.539	N/A	N/A
	Left Side	0.041	0.021	0.062	N/A	N/A
	Right Side	0.183	N/A	0.183	N/A	N/A
	Top Side	N/A	0.021	0.021	N/A	N/A
	Bottom Side	0.375	N/A	0.375	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band VII and BT

11. Appendix A. Photo documentation

Table of contents

Test Facility

Product Photo

Test Positions

Liquid depth

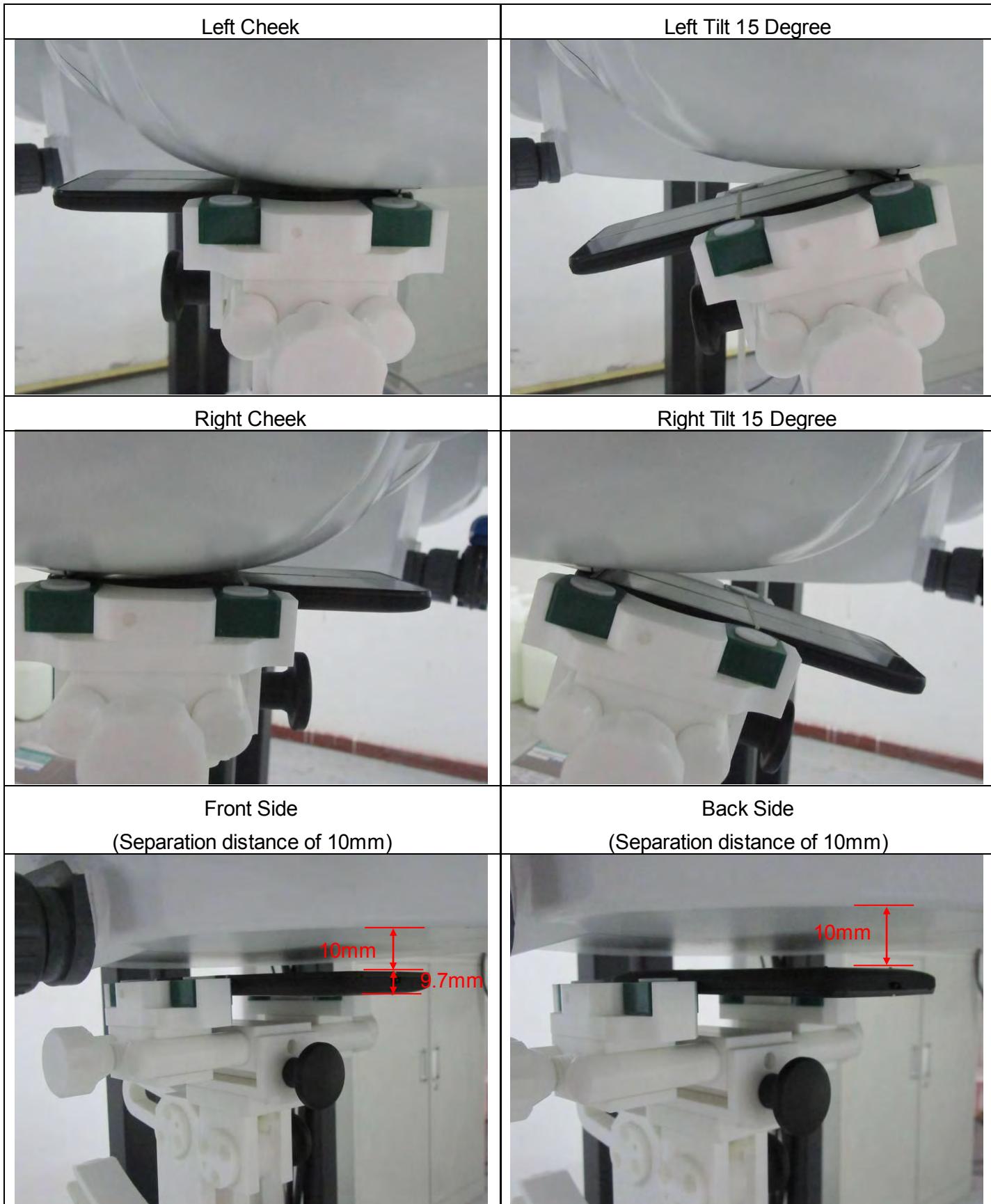
Test Facility

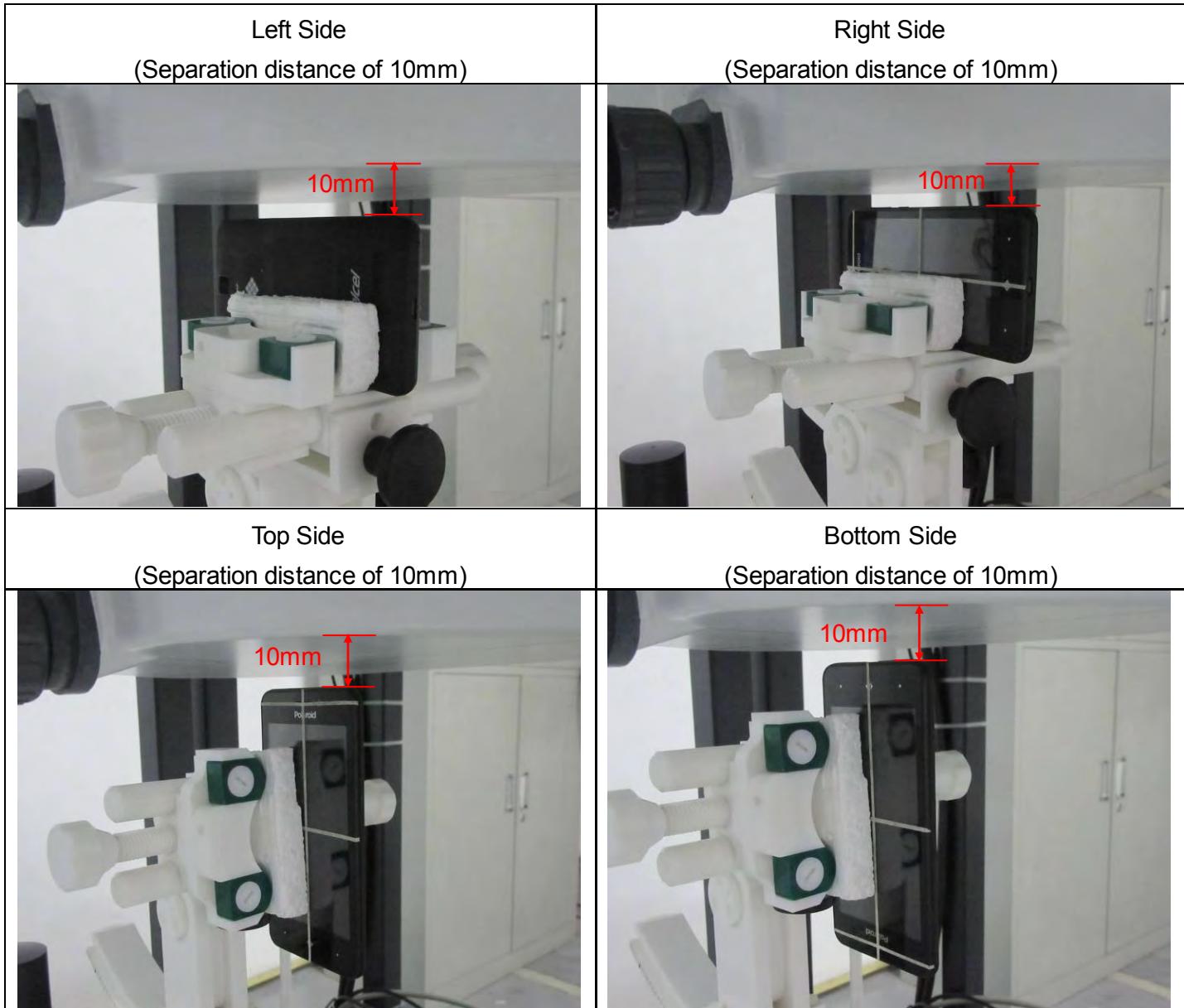
Measurement System SATIMO



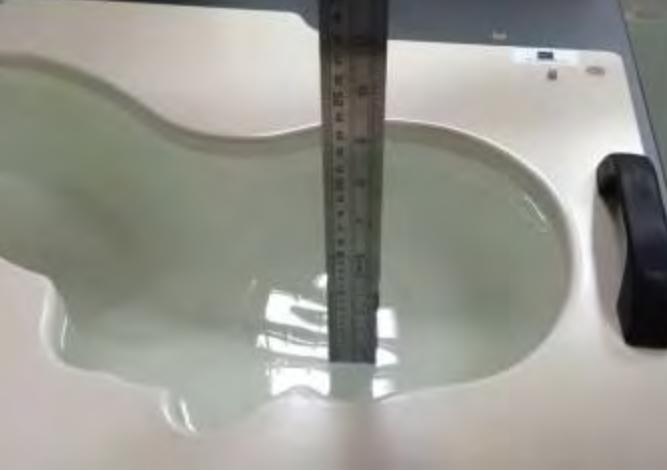
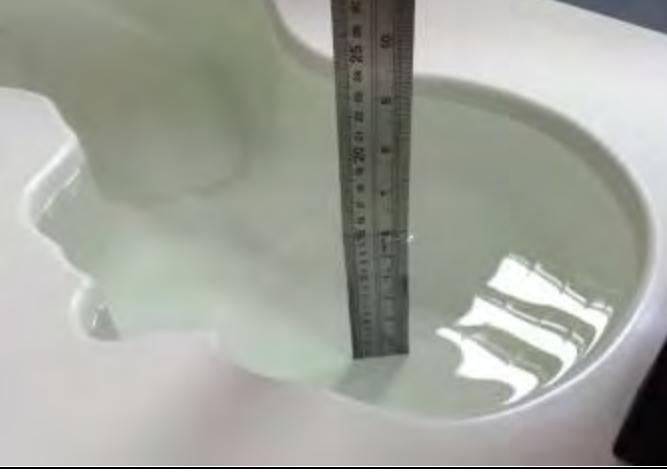
Product Photo

Front View	Back View
	
Reference Line	N/A
	N/A

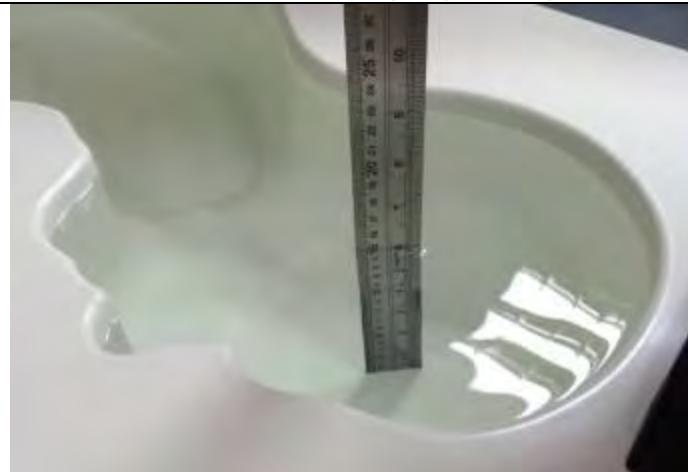
Test Positions



Liquid depth

Head 850MHz depth (15.2cm)	Body 850MHz depth (15.3cm)
 A photograph showing a clear plastic container holding a green liquid. A vertical ruler is placed vertically into the liquid to measure its depth. The ruler shows markings from 0 to 25 cm, and the liquid level is just above the 15 cm mark.	 A photograph showing a clear plastic container holding a green liquid. A vertical ruler is placed vertically into the liquid to measure its depth. The ruler shows markings from 0 to 25 cm, and the liquid level is just above the 15 cm mark.
Head 1750MHz depth (15.1cm)	Body 1750MHz depth (15.4cm)
 A photograph showing a clear plastic container holding a green liquid. A vertical ruler is placed vertically into the liquid to measure its depth. The ruler shows markings from 0 to 25 cm, and the liquid level is just above the 15 cm mark.	 A photograph showing a clear plastic container holding a green liquid. A vertical ruler is placed vertically into the liquid to measure its depth. The ruler shows markings from 0 to 25 cm, and the liquid level is just above the 15 cm mark.
Head 1900MHz depth (15.3cm)	Body 1900MHz depth (15.2cm)
 A photograph showing a clear plastic container holding a green liquid. A vertical ruler is placed vertically into the liquid to measure its depth. The ruler shows markings from 0 to 25 cm, and the liquid level is just above the 15 cm mark.	 A photograph showing a clear plastic container holding a green liquid. A vertical ruler is placed vertically into the liquid to measure its depth. The ruler shows markings from 0 to 25 cm, and the liquid level is just above the 15 cm mark.

Head 2450MHz depth (15.1cm)



Body 2450MHz depth (15.2cm)



Head 2600MHz depth (15.2cm)



Body 2600MHz depth (15.3cm)



12. Appendix B. System Check Plots

Table of contents

System Performance Check - SID835 - Head

System Performance Check - SID835 - Body

System Performance Check - SID1750 - Head

System Performance Check - SID1750 - Body

System Performance Check - SID1900 - Head

System Performance Check - SID1900 - Body

System Performance Check - SID2450 - Head

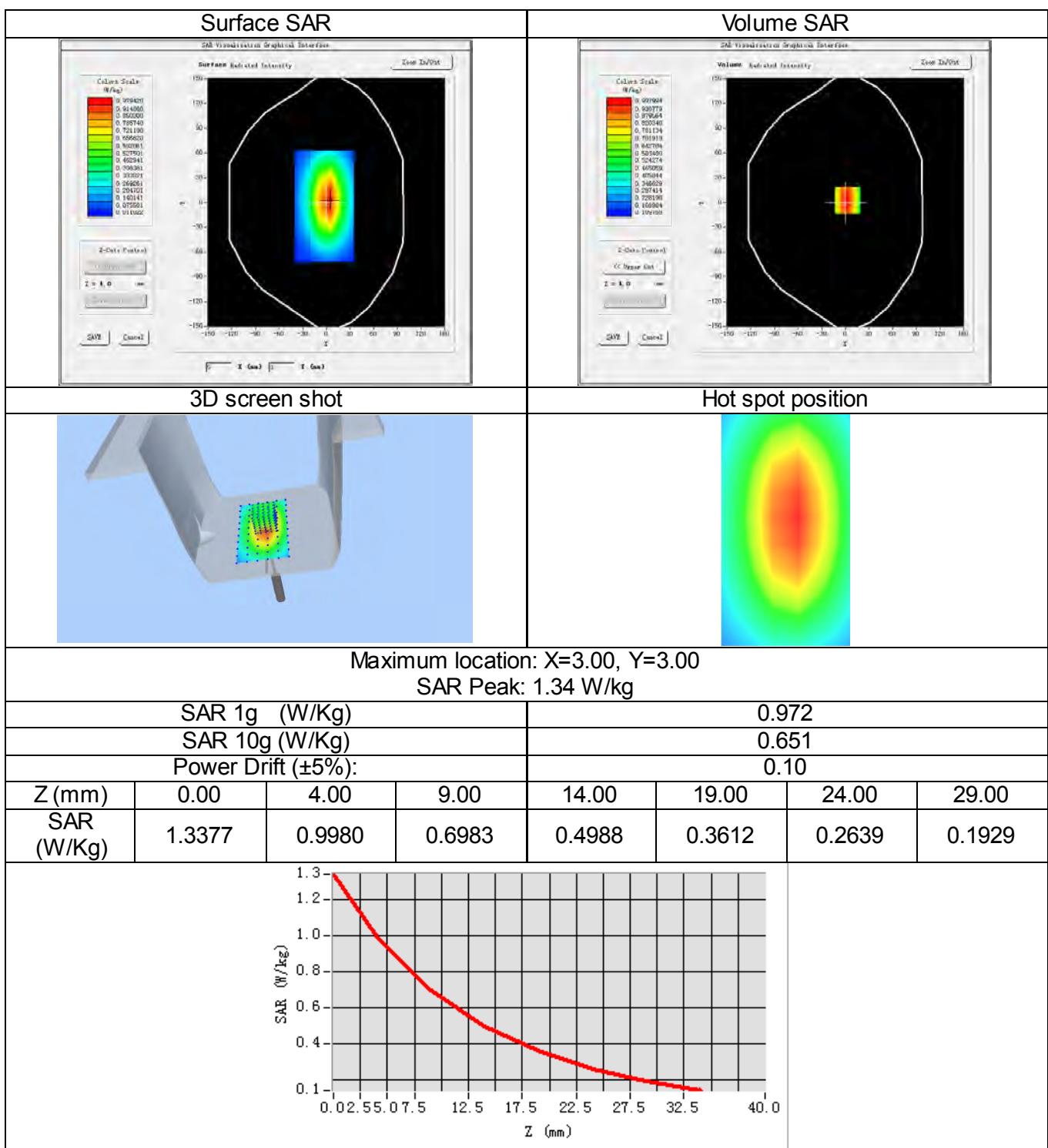
System Performance Check - SID2450 - Body

System Performance Check - SID2600 - Head

System Performance Check - SID2600 - Body

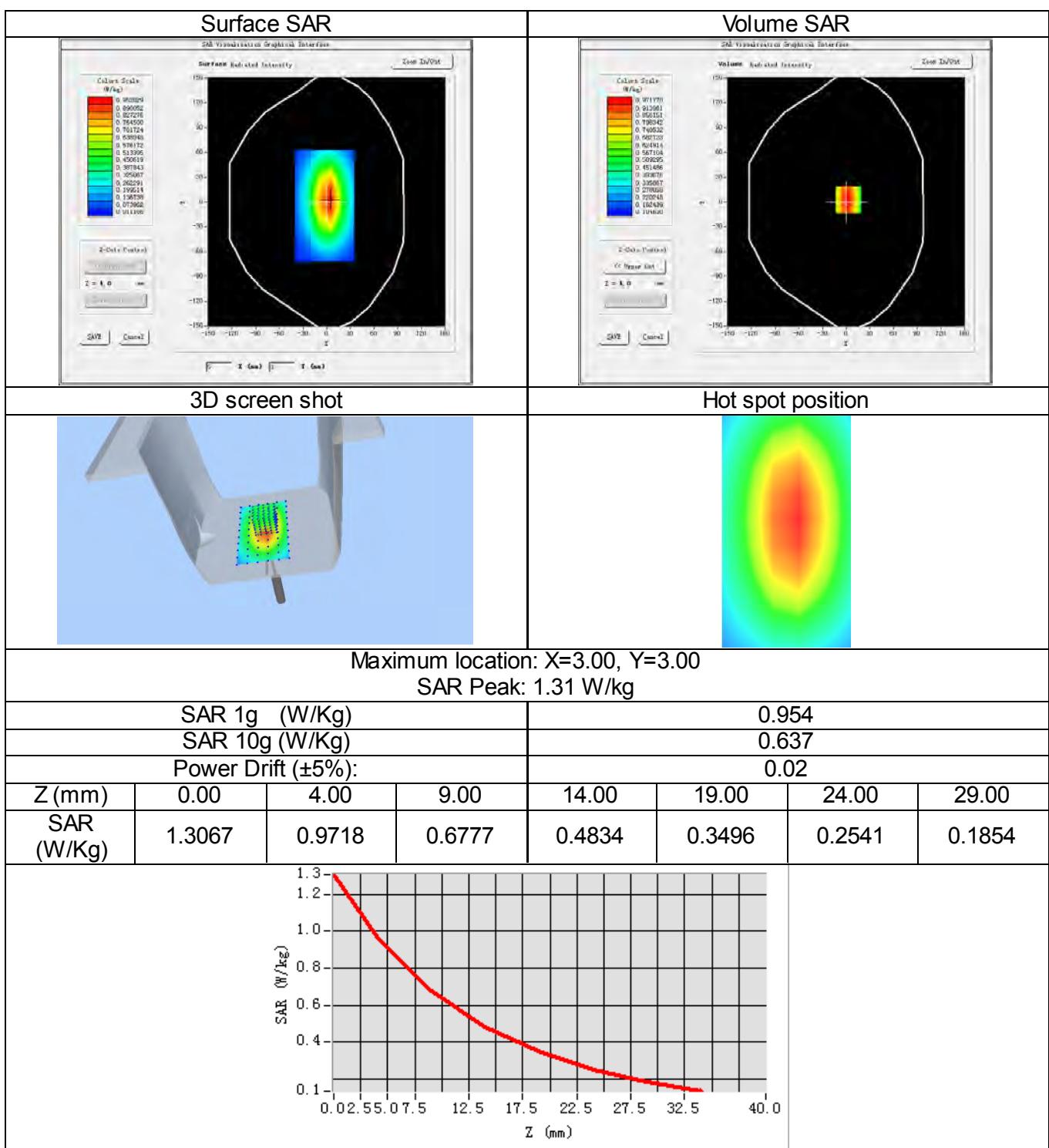
System Performance Check - SID835-Head

Date of measurement:	Apr. 22, 2017
Signal:	Communication System: CW; Frequency: 835.00MHz; Duty Cycle: 1:1.00
ConvF:	1.53
Liquid Parameters:	Relative permittivity (real part): 42.54; Conductivity (S/m): 0.89;
Device Position:	Dipole
Area Scan:	dx=15mm dy=15mm, h=5.00mm
Zoom Scan:	5x5x7, dx=8mm dy=8mm dz=5mm, h=5.00mm



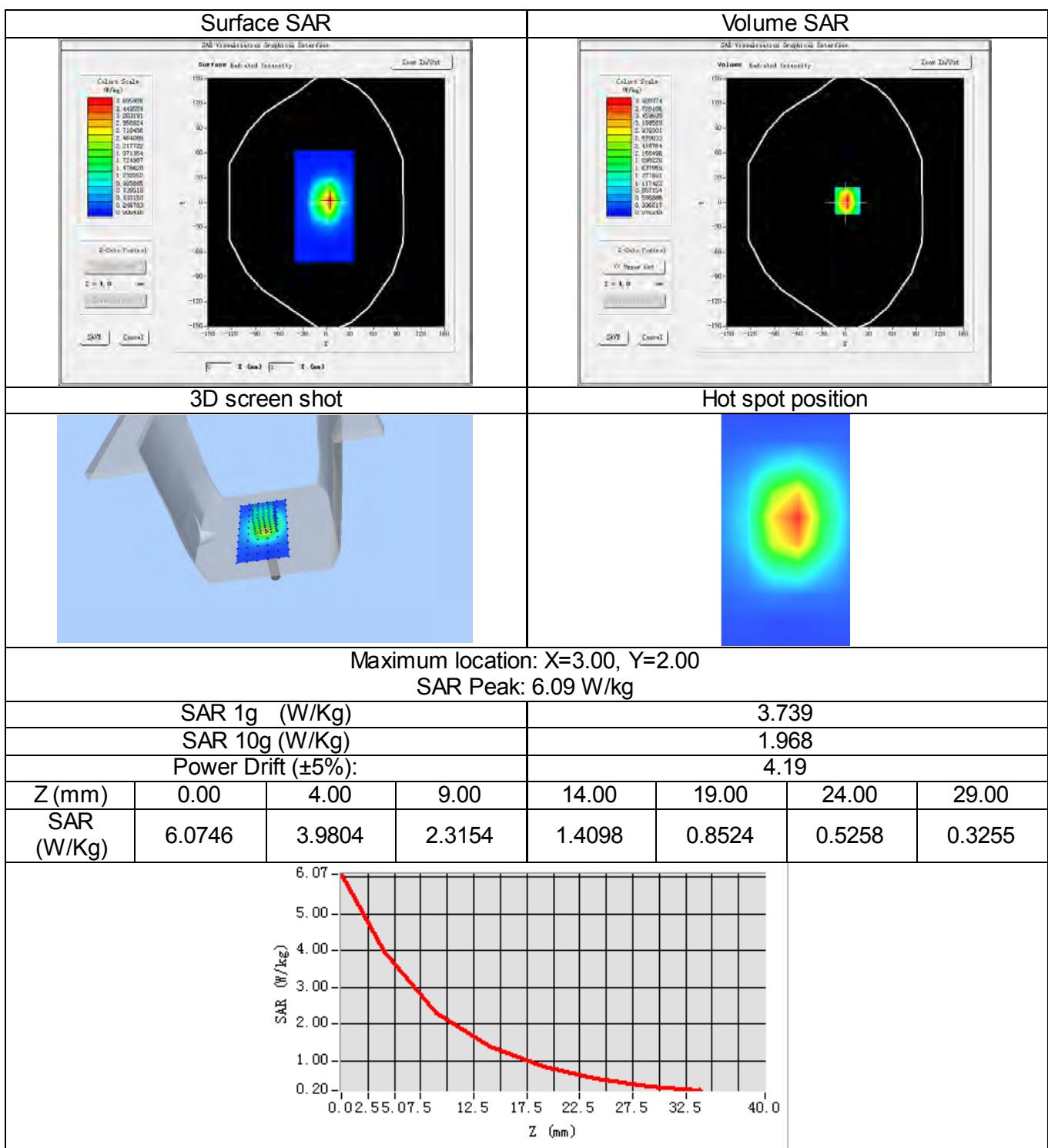
System Performance Check - SID835-Body

Date of measurement:	Apr. 22, 2017
Signal:	Communication System: CW; Frequency: 835.00MHz; Duty Cycle: 1:1.00
ConvF:	1.59
Liquid Parameters:	Relative permittivity (real part): 55.40; Conductivity (S/m): 0.98;
Device Position:	Dipole
Area Scan:	dx=15mm dy=15mm, h=5.00mm
Zoom Scan:	5x5x7, dx=8mm dy=8mm dz=5mm, h=5.00mm



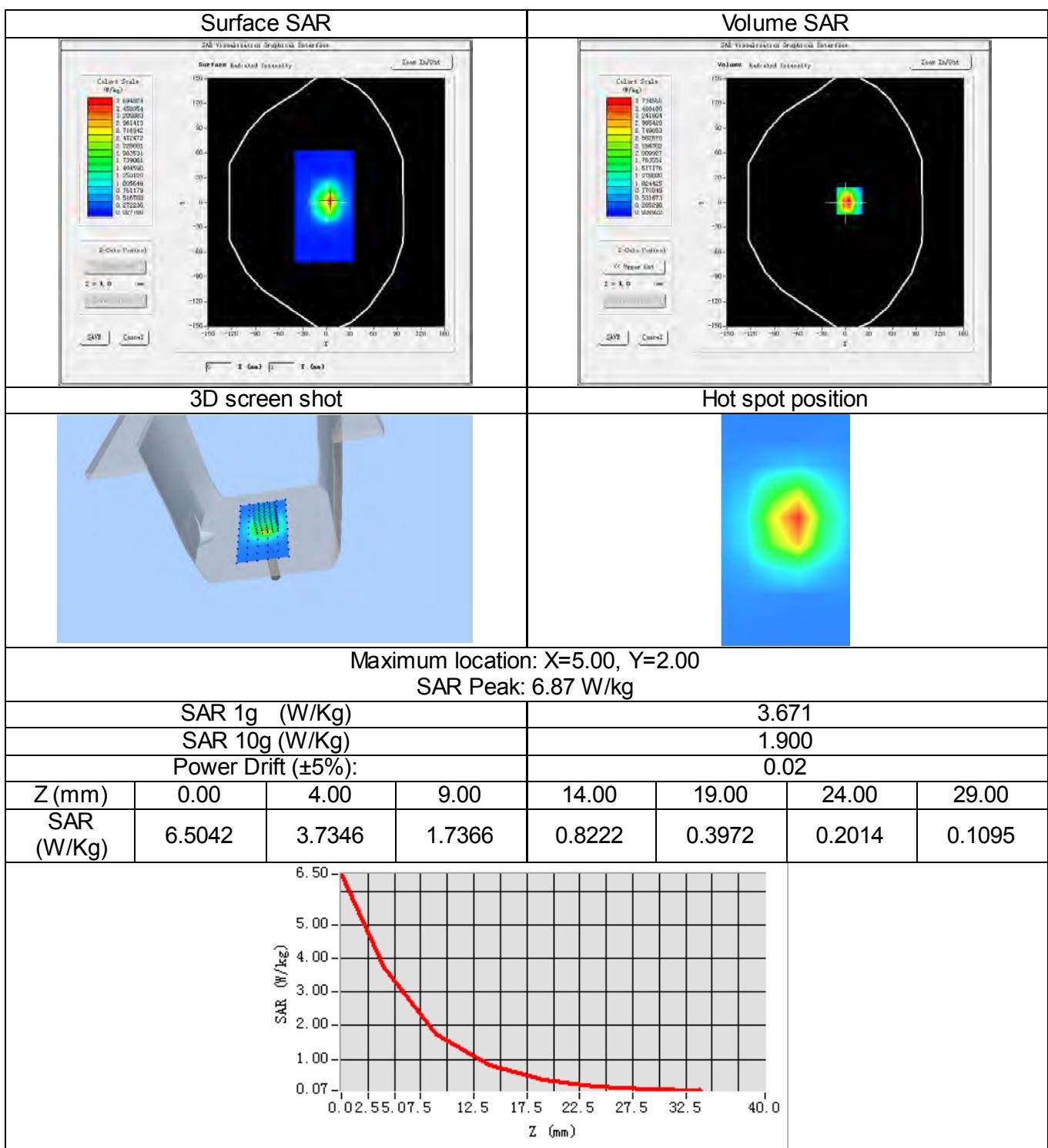
System Performance Check - SID1750-Head

Date of measurement:	Apr. 26, 2017
Signal:	Communication System: CW; Frequency: 1750.00MHz; Duty Cycle: 1:1.00
ConvF:	3.77
Liquid Parameters:	Relative permittivity (real part): 40.25; Conductivity (S/m): 1.37;
Device Position:	Dipole
Area Scan:	dx=15mm dy=15mm, h=5.00mm
Zoom Scan:	5x5x7, dx=8mm dy=8mm dz=5mm, h=5.00mm



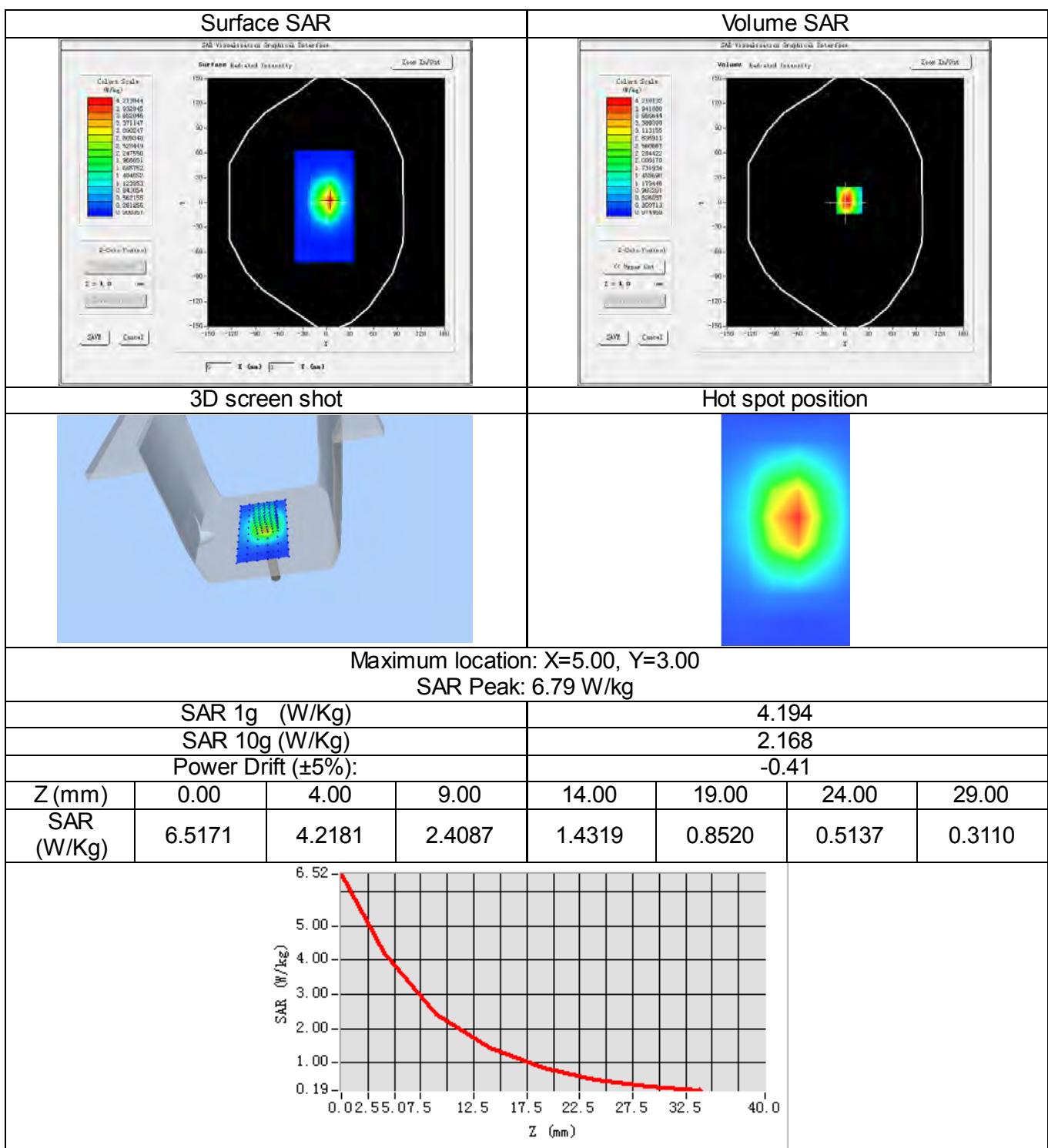
System Performance Check - SID1750-Body

Date of measurement:	Apr. 28, 2017
Signal:	Communication System: CW; Frequency: 1750.00MHz; Duty Cycle: 1:1.00
ConvF:	3.85
Liquid Parameters:	Relative permittivity (real part): 54.22; Conductivity (S/m): 1.50;
Device Position:	Dipole
Area Scan:	dx=15mm dy=15mm, h=5.00mm
Zoom Scan:	5x5x7, dx=8mm dy=8mm dz=5mm, h=5.00mm



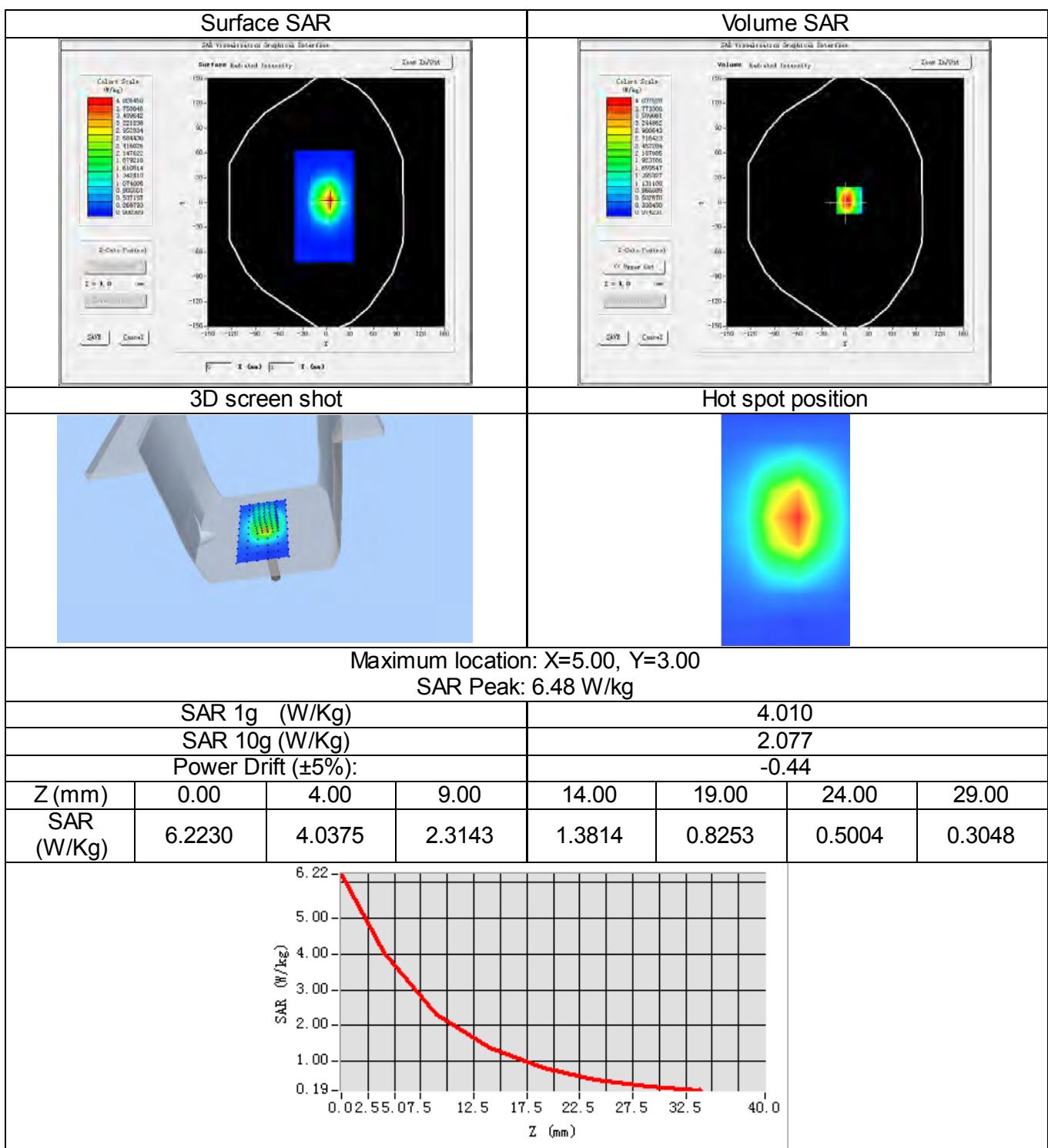
System Performance Check - SID1900-Head

Date of measurement:	Apr. 25, 2017
Signal:	Communication System: CW; Frequency: 1900.00MHz; Duty Cycle: 1:1.00
ConvF:	1.94
Liquid Parameters:	Relative permittivity (real part): 39.36; Conductivity (S/m): 1.43;
Device Position:	Dipole
Area Scan:	dx=15mm dy=15mm, h=5.00mm
Zoom Scan:	5x5x7, dx=8mm dy=8mm dz=5mm, h=5.00mm



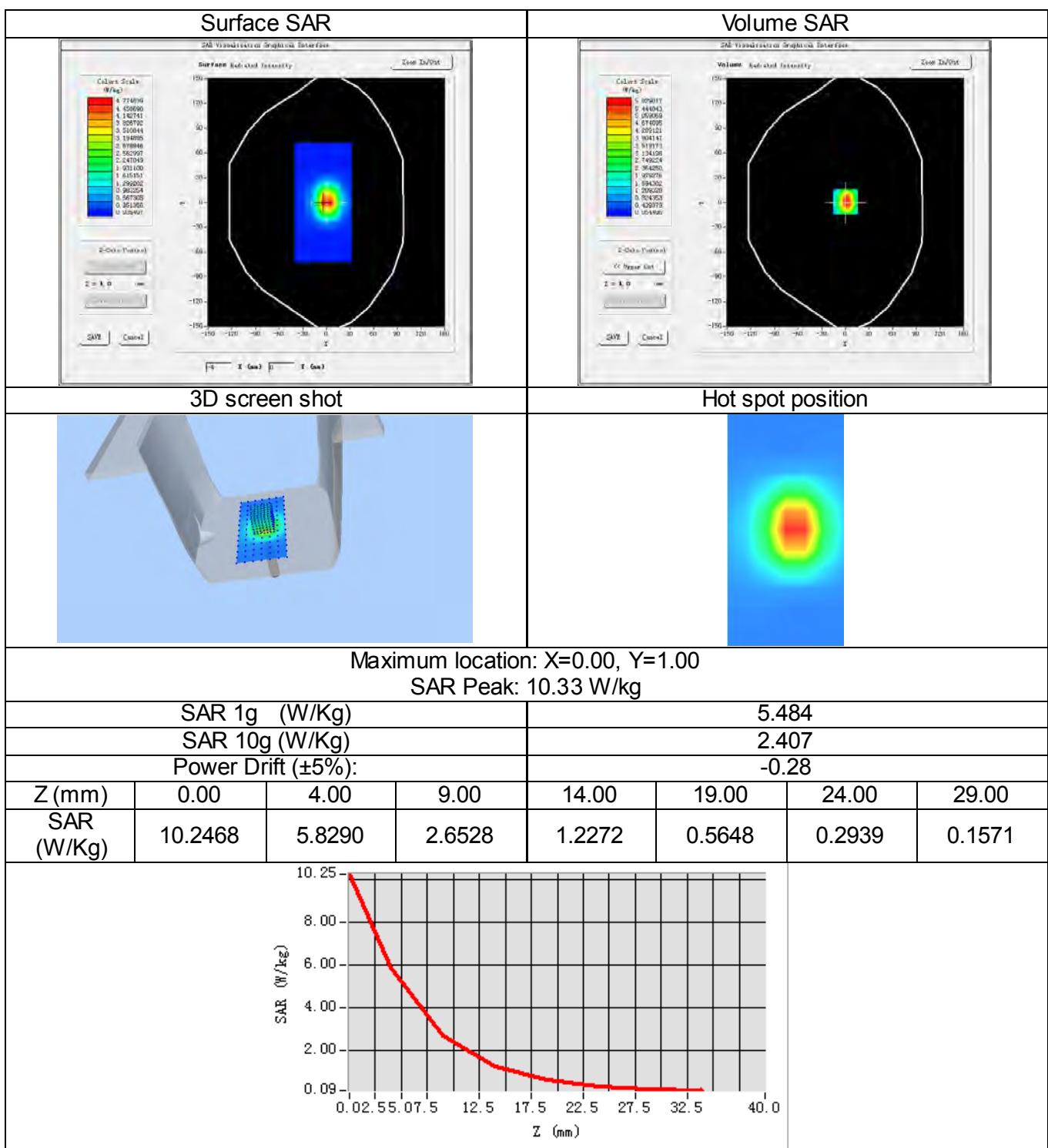
System Performance Check - SID1900-Body

Date of measurement:	Apr. 25, 2017
Signal:	Communication System: CW; Frequency: 1900.00MHz; Duty Cycle: 1:1.00
ConvF:	2.00
Liquid Parameters:	Relative permittivity (real part): 53.51; Conductivity (S/m): 1.56;
Device Position:	Dipole
Area Scan:	dx=15mm dy=15mm, h=5.00mm
Zoom Scan:	5x5x7, dx=8mm dy=8mm dz=5mm, h=5.00mm



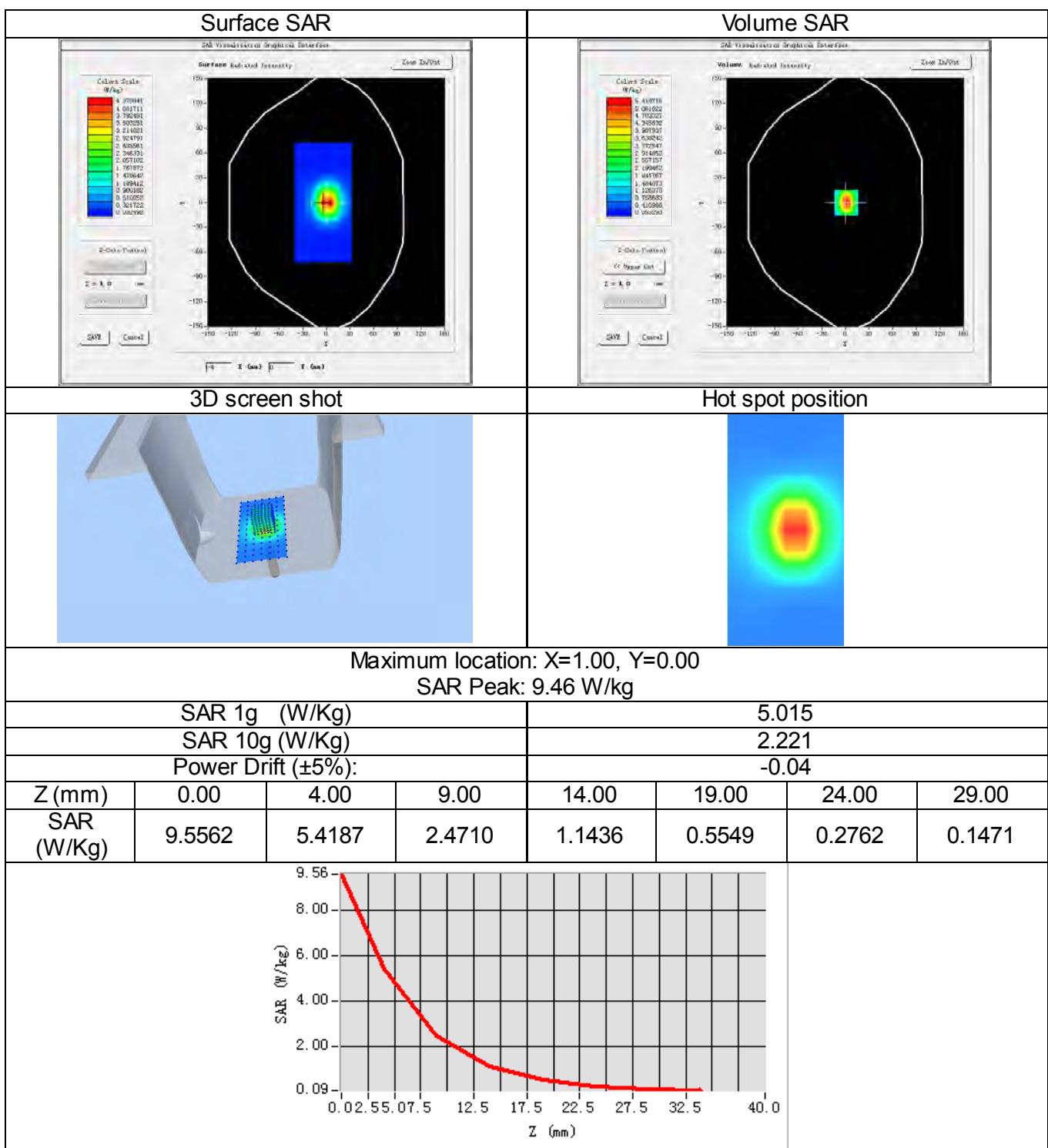
System Performance Check - SID2450-Head

Date of measurement:	Apr. 20, 2017
Signal:	Communication System: CW; Frequency: 2450.00MHz; Duty Cycle: 1:1.00
ConvF:	2.03
Liquid Parameters:	Relative permittivity (real part): 39.94; Conductivity (S/m): 1.79;
Device Position:	Dipole
Area Scan:	dx=12mm dy=12mm, h=5.00mm
Zoom Scan:	7x7x7, dx=5mm dy=5mm dz=5mm, h=5.00mm



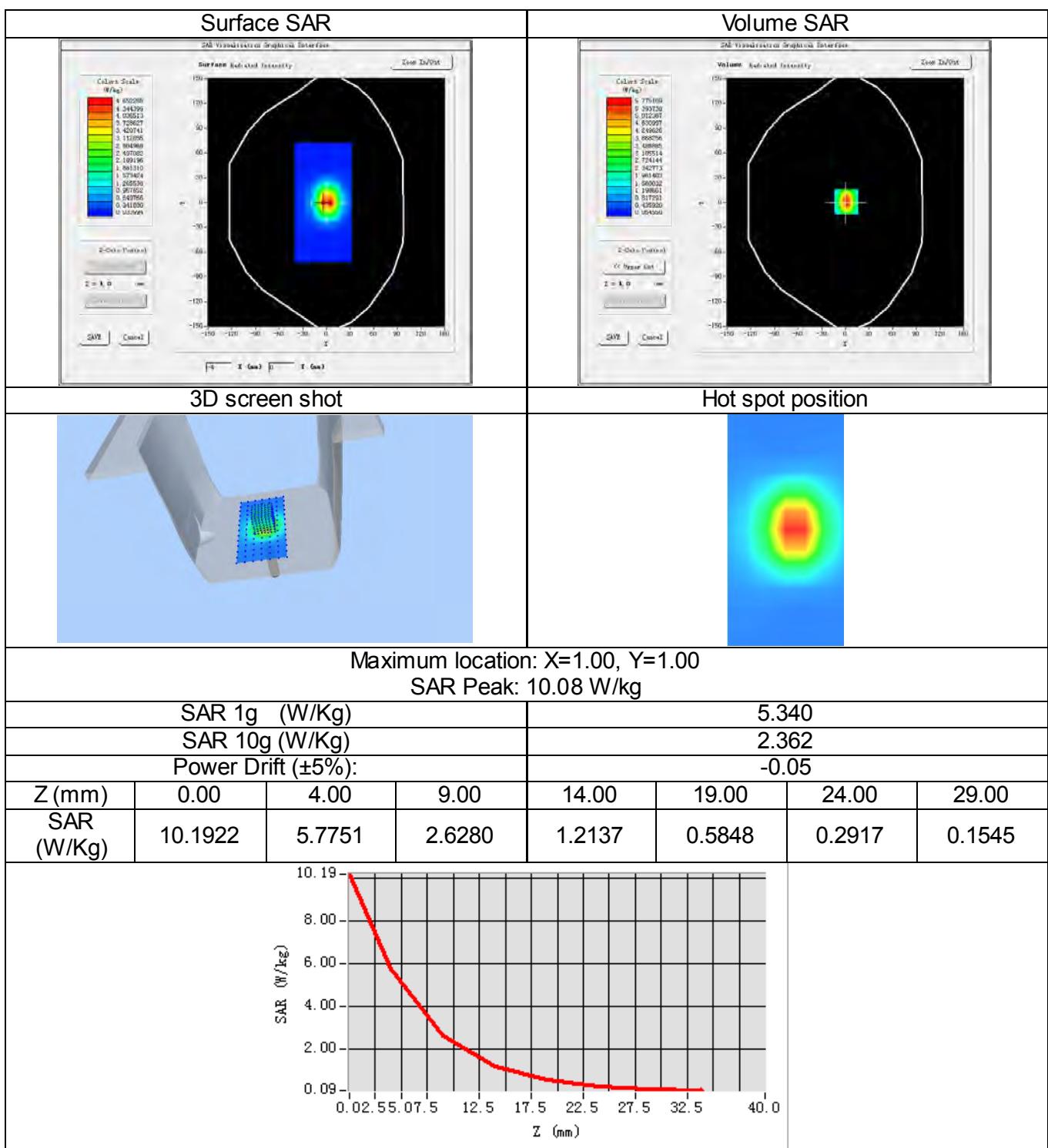
System Performance Check - SID2450-Body

Date of measurement:	Apr. 20, 2017
Signal:	Communication System: CW; Frequency: 2450.00MHz; Duty Cycle: 1:1.00
ConvF:	2.10
Liquid Parameters:	Relative permittivity (real part): 52.33; Conductivity (S/m): 1.96;
Device Position:	Dipole
Area Scan:	dx=12mm dy=12mm, h=5.00mm
Zoom Scan:	7x7x7, dx=5mm dy=5mm dz=5mm, h=5.00mm



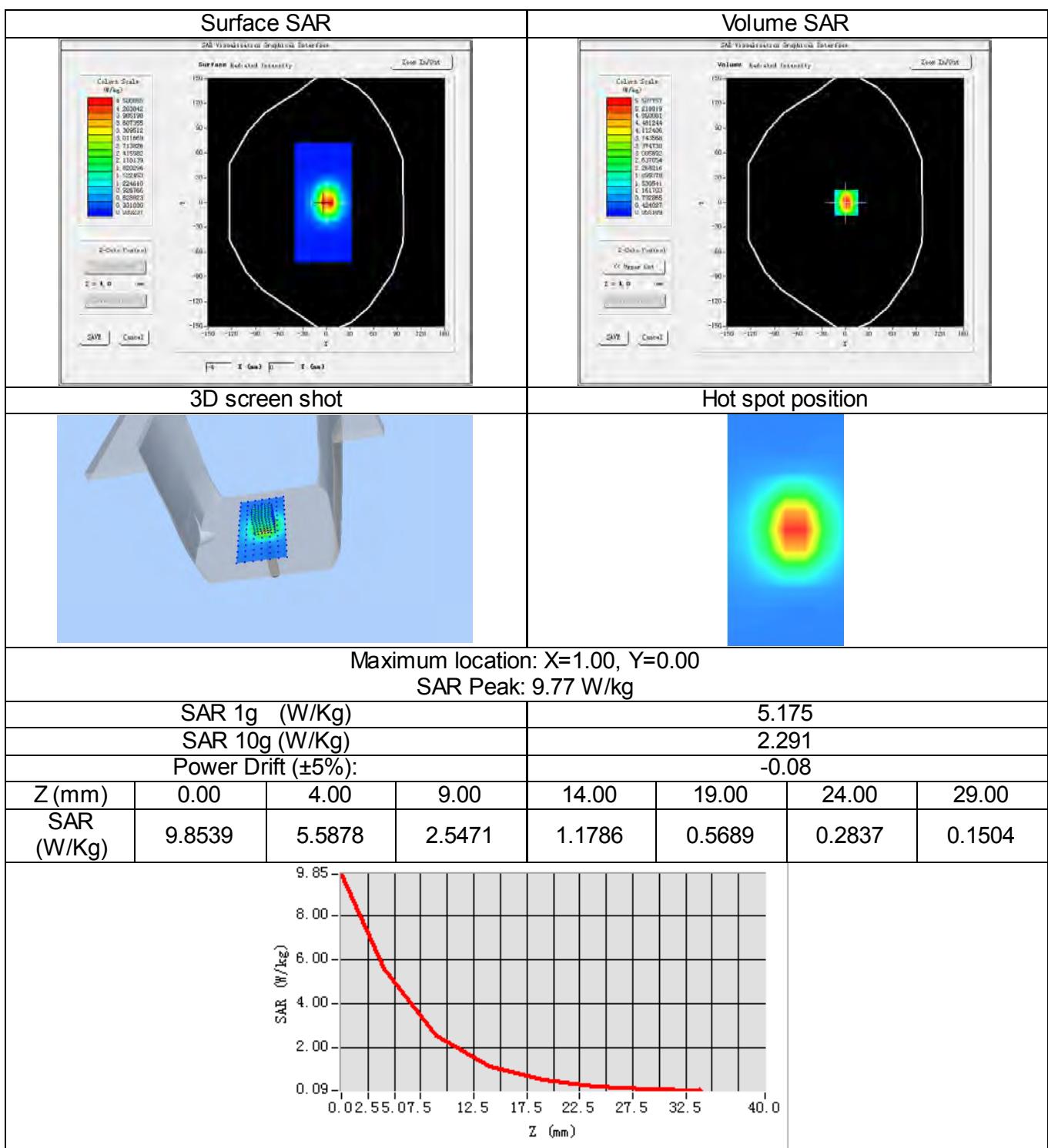
System Performance Check - SID2600-Head

Date of measurement:	May. 04, 2017
Signal:	Communication System: CW; Frequency: 2600.00MHz; Duty Cycle: 1:1.00
ConvF:	2.11
Liquid Parameters:	Relative permittivity (real part): 39.02; Conductivity (S/m): 1.97;
Device Position:	Dipole
Area Scan:	dx=12mm dy=12mm, h=5.00mm
Zoom Scan:	7x7x7, dx=5mm dy=5mm dz=5mm, h=5.00mm



System Performance Check - SID2600-Body

Date of measurement:	May. 08, 2017
Signal:	Communication System: CW; Frequency: 2600.00MHz; Duty Cycle: 1:1.00
ConvF:	2.17
Liquid Parameters:	Relative permittivity (real part): 53.70; Conductivity (S/m): 2.17;
Device Position:	Dipole
Area Scan:	dx=12mm dy=12mm, h=5.00mm
Zoom Scan:	7x7x7, dx=5mm dy=5mm dz=5mm, h=5.00mm



13. Appendix C. Plots of High SAR Measurement

Table of contents

GSM 850 Head

GSM 850 Body

GSM 1900 Head

GSM 1900 Body

WCDMA Band V Head

WCDMA Band V Body

WCDMA Band II Head

WCDMA Band II Body

LTE Band V Head

LTE Band V Body

LTE Band IV Head

LTE Band IV Body

LTE Band II Head

LTE Band II Body

LTE Band VII Head

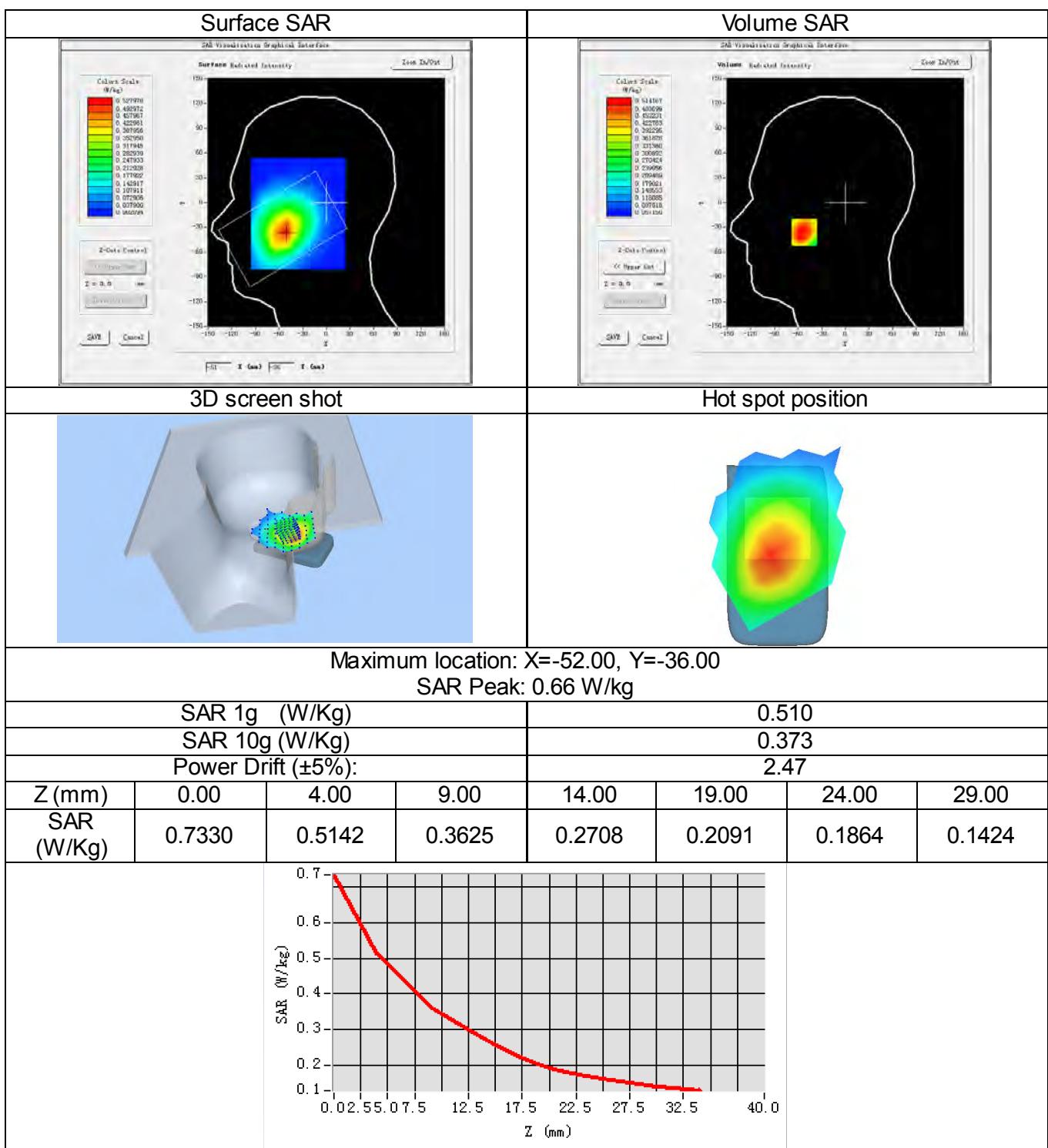
LTE Band VII Body

WLAN 2.4G Head

WLAN 2.4G Body

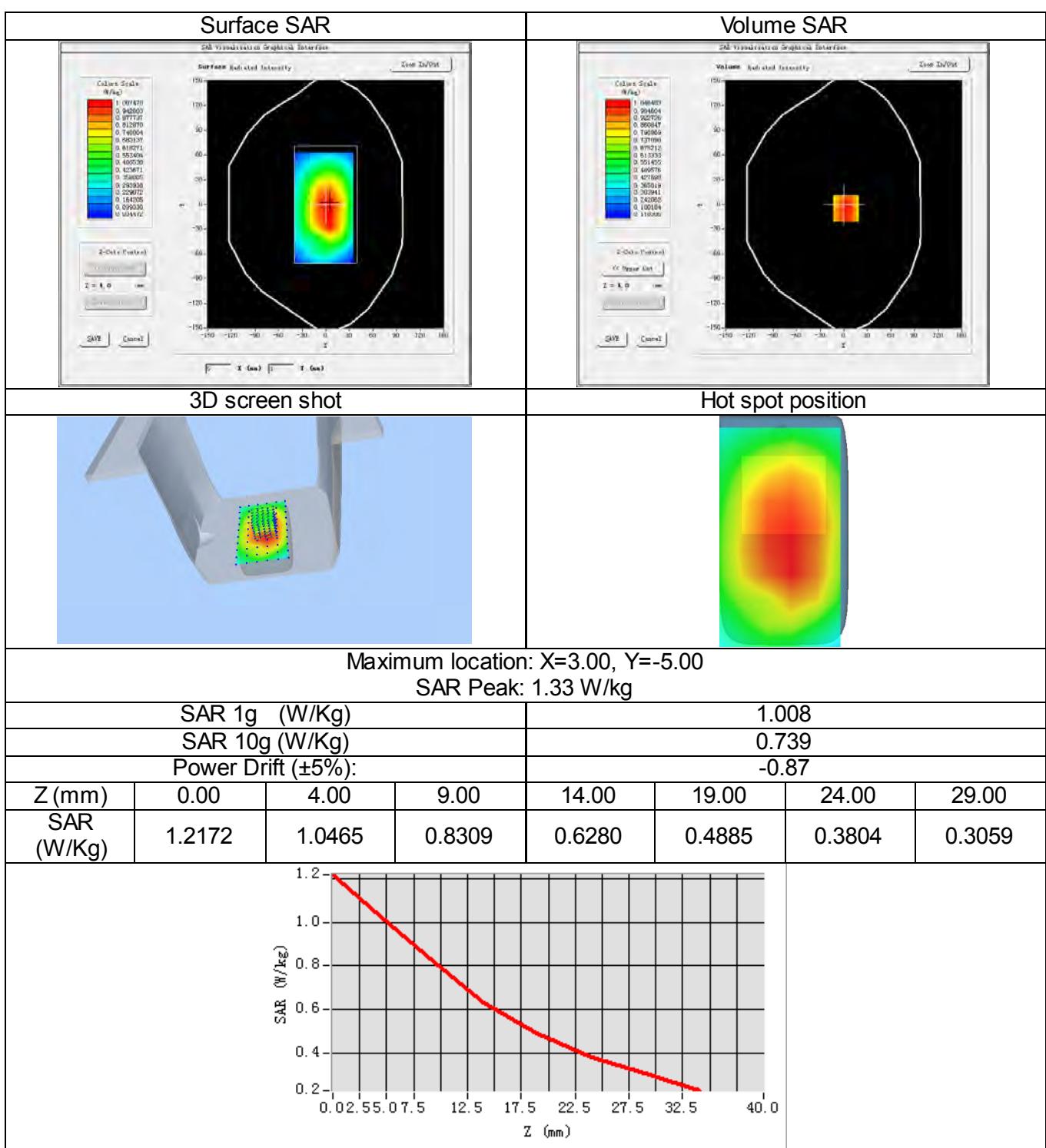
GSM850_GPRS(GMSK 4TS)_Ch189_Left Cheek

Date of measurement:	Apr. 22, 2017
Signal:	Communication System: GPRS(GMSK 4TS); Frequency: 836.40MHz; Duty Cycle: 1:2.08
ConvF:	1.53
Liquid Parameters:	Relative permittivity (real part): 42.51; Conductivity (S/m): 0.89;
Device Position:	Cheek
Area Scan:	dx=15mm dy=15mm, h=5.00mm
Zoom Scan:	5x5x7, dx=8mm dy=8mm dz=5mm, h=5.00mm



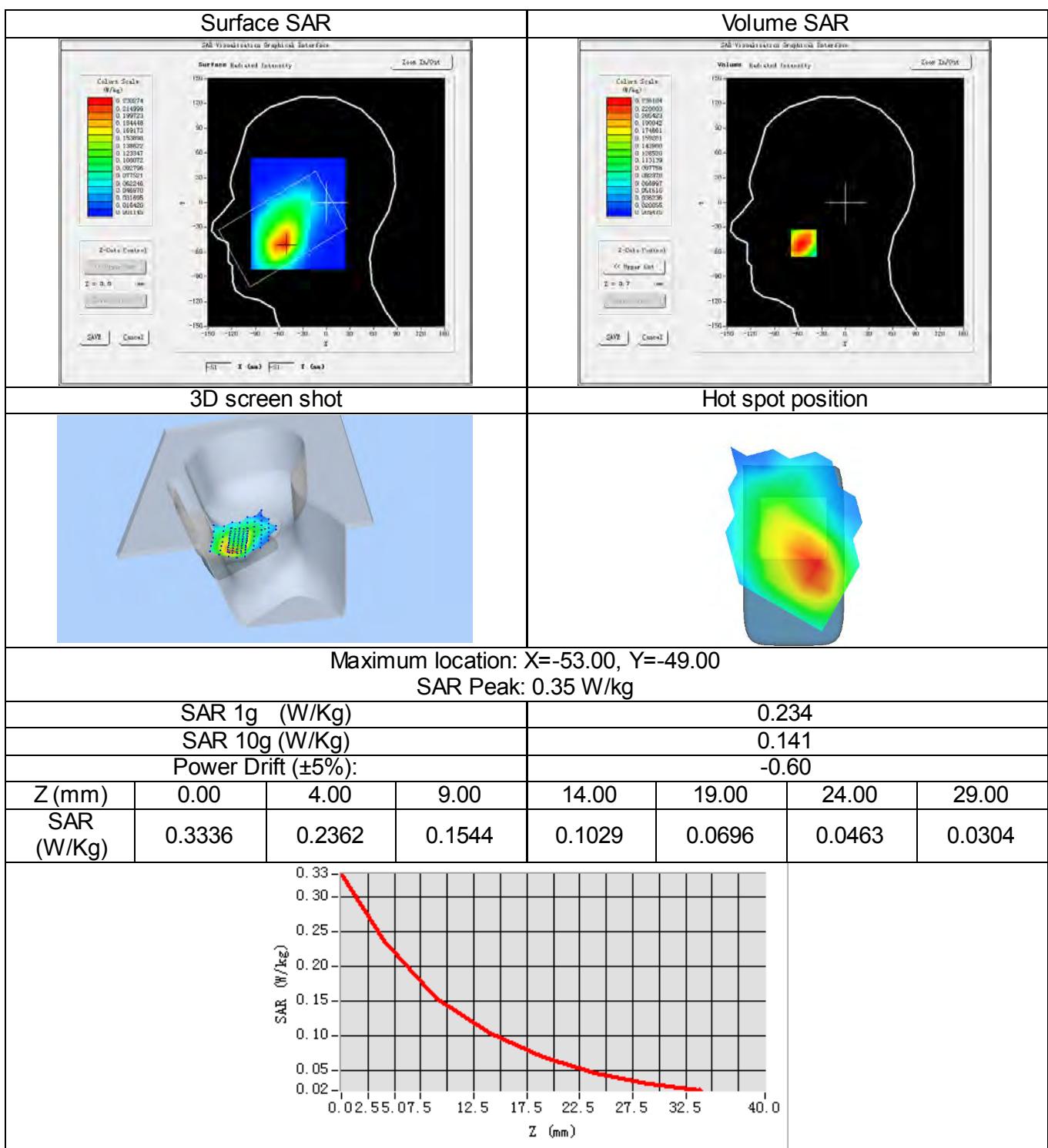
GSM850_GPRS(GMSK 4TS)_Ch128_Back Side_10mm

Date of measurement:	Apr. 22, 2017
Signal:	Communication System: GPRS(GMSK 4TS); Frequency: 824.20MHz; Duty Cycle: 1:2.08
ConvF:	1.59
Liquid Parameters:	Relative permittivity (real part): 55.44; Conductivity (S/m): 0.96;
Device Position:	Body
Area Scan:	dx=15mm dy=15mm, h=5.00mm
Zoom Scan:	5x5x7, dx=8mm dy=8mm dz=5mm, h=5.00mm



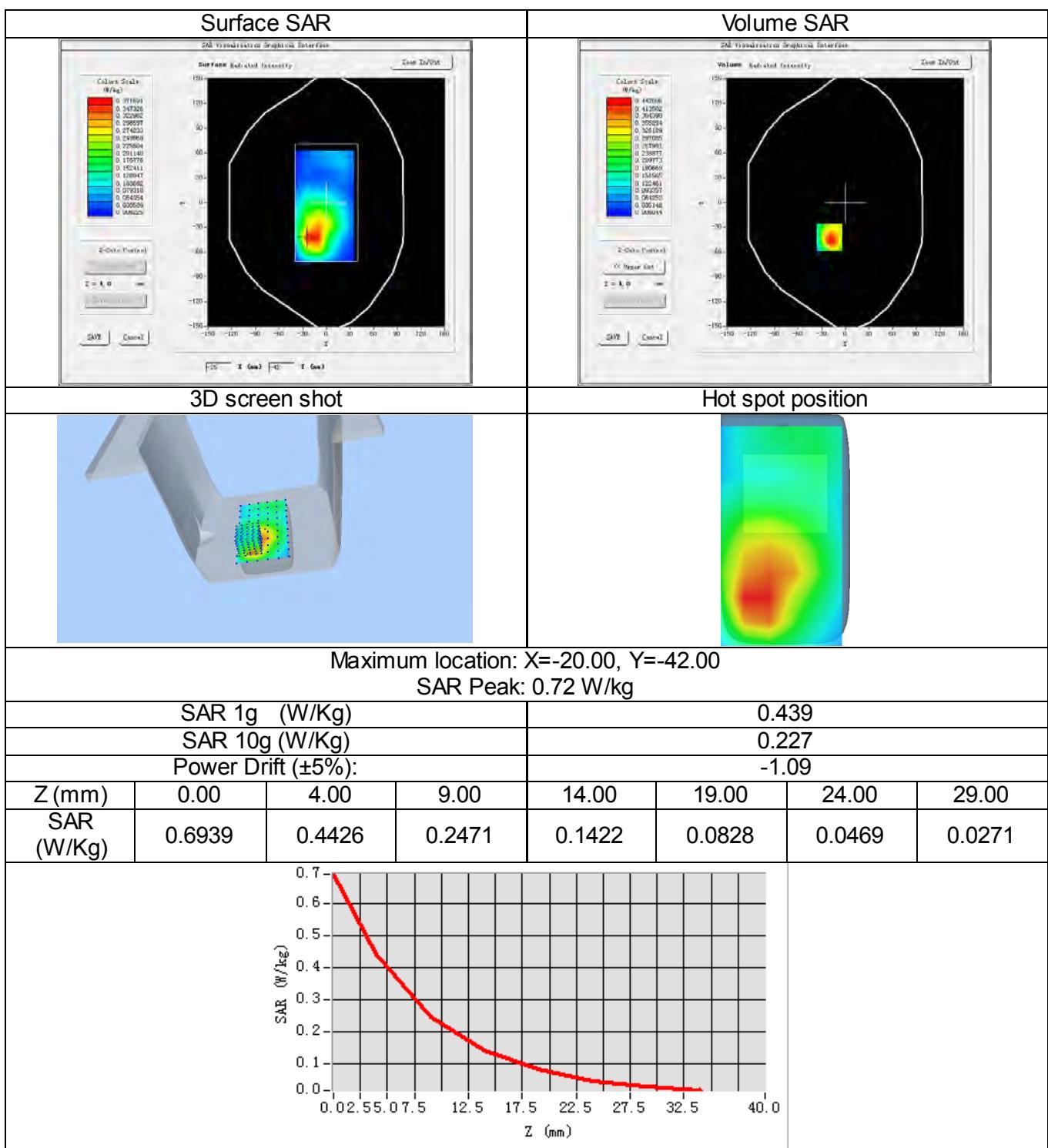
GSM1900_GPRS(GMSK 4TS)_Ch810_Right Cheek

Date of measurement:	Apr. 25, 2017
Signal:	Communication System: GPRS(GMSK 4TS); Frequency: 1909.80MHz; Duty Cycle: 1:2.08
ConvF:	1.94
Liquid Parameters:	Relative permittivity (real part): 39.32; Conductivity (S/m): 1.43;
Device Position:	Cheek
Area Scan:	dx=15mm dy=15mm, h=5.00mm
Zoom Scan:	5x5x7, dx=8mm dy=8mm dz=5mm, h=5.00mm



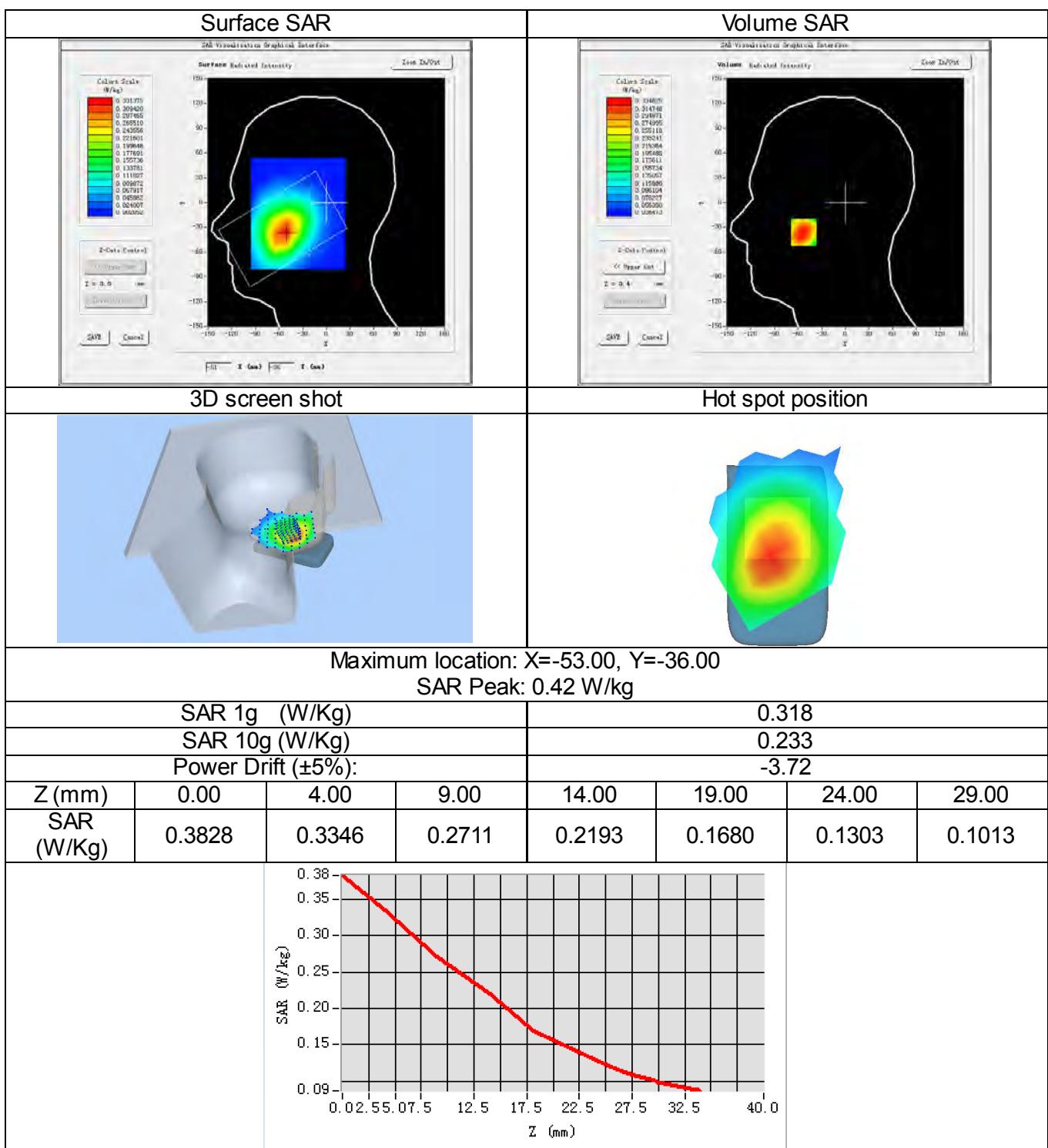
GSM1900_GPRS(GMSK 4TS)_Ch810_Back Side_10mm

Date of measurement:	Apr. 25, 2017
Signal:	Communication System: GPRS(GMSK 4TS); Frequency: 1909.80MHz; Duty Cycle: 1:2.08
ConvF:	2.00
Liquid Parameters:	Relative permittivity (real part): 53.51; Conductivity (S/m): 1.57;
Device Position:	Body
Area Scan:	dx=15mm dy=15mm, h=5.00mm
Zoom Scan:	5x5x7, dx=8mm dy=8mm dz=5mm, h=5.00mm



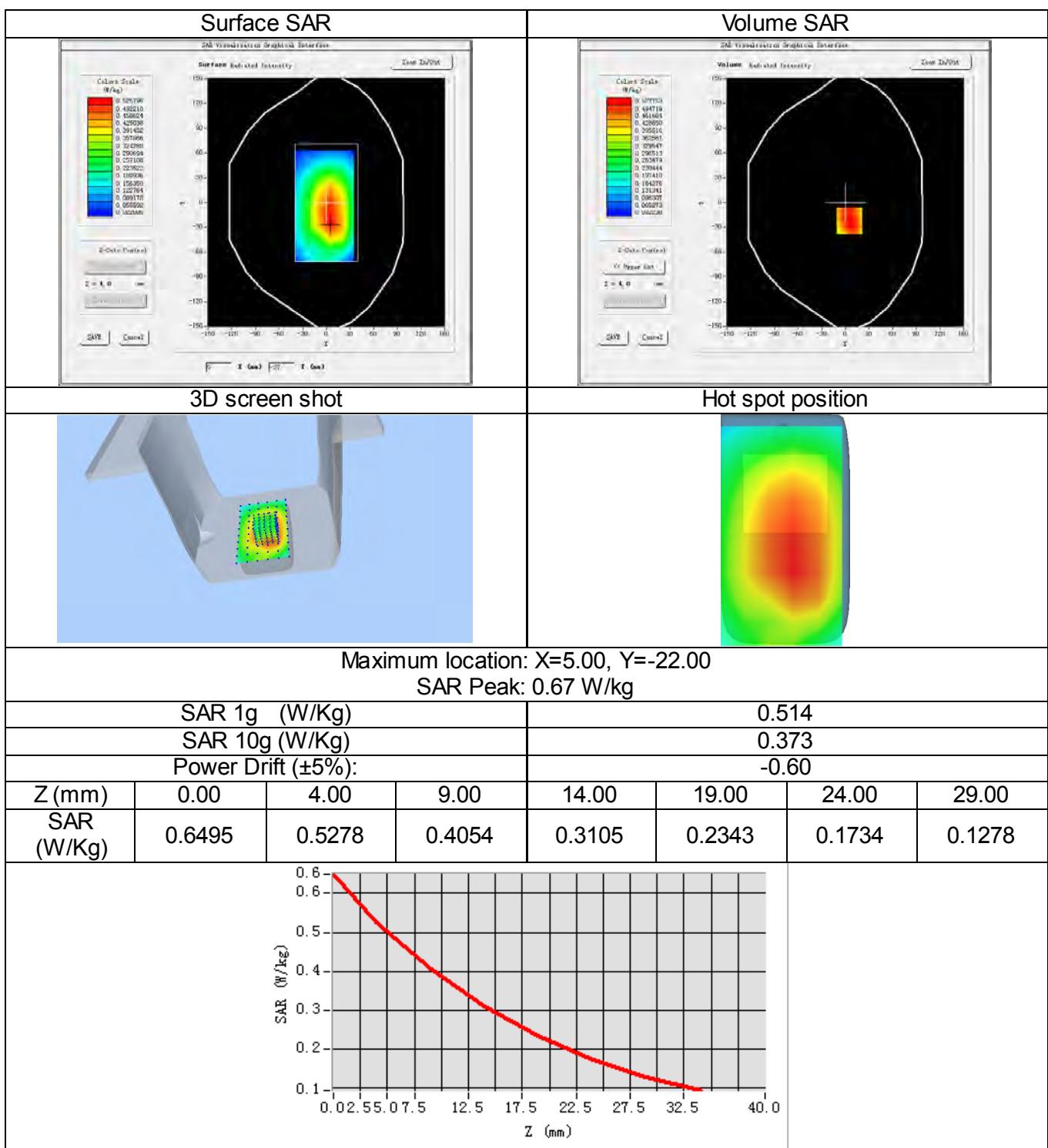
WCDMA Band V_RMC 12.2Kbps_Ch4233_Left Cheek

Date of measurement:	Apr. 22, 2017
Signal:	Communication System: WCDMA-FDD(WCDMA); Frequency: 846.6MHz; Duty Cycle: 1:1.00
ConvF:	1.53
Liquid Parameters:	Relative permittivity (real part): 42.40; Conductivity (S/m): 0.91;
Device Position:	Cheek
Area Scan:	dx=15mm dy=15mm, h=5.00mm
Zoom Scan:	5x5x7, dx=8mm dy=8mm dz=5mm, h=5.00mm



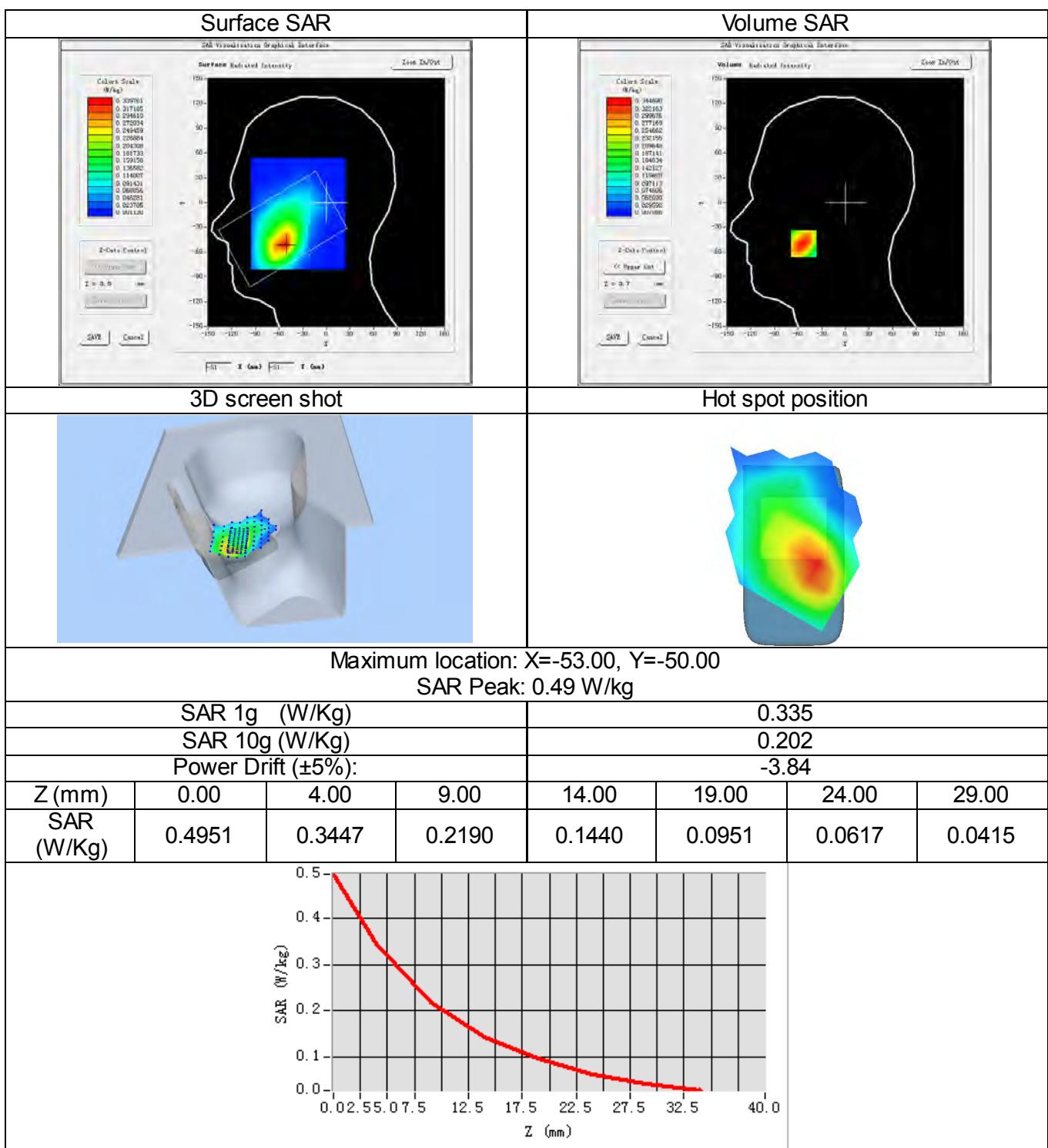
WCDMA Band V_RMC 12.2Kbps_Ch4233_Back Side_10mm

Date of measurement:	Apr. 22, 2017
Signal:	Communication System: WCDMA-FDD(WCDMA); Frequency: 846.60MHz; Duty Cycle: 1:1.00
ConvF:	1.59
Liquid Parameters:	Relative permittivity (real part): 55.29; Conductivity (S/m): 0.99;
Device Position:	Body
Area Scan:	dx=15mm dy=15mm, h=5.00mm
Zoom Scan:	5x5x7, dx=8mm dy=8mm dz=5mm, h=5.00mm



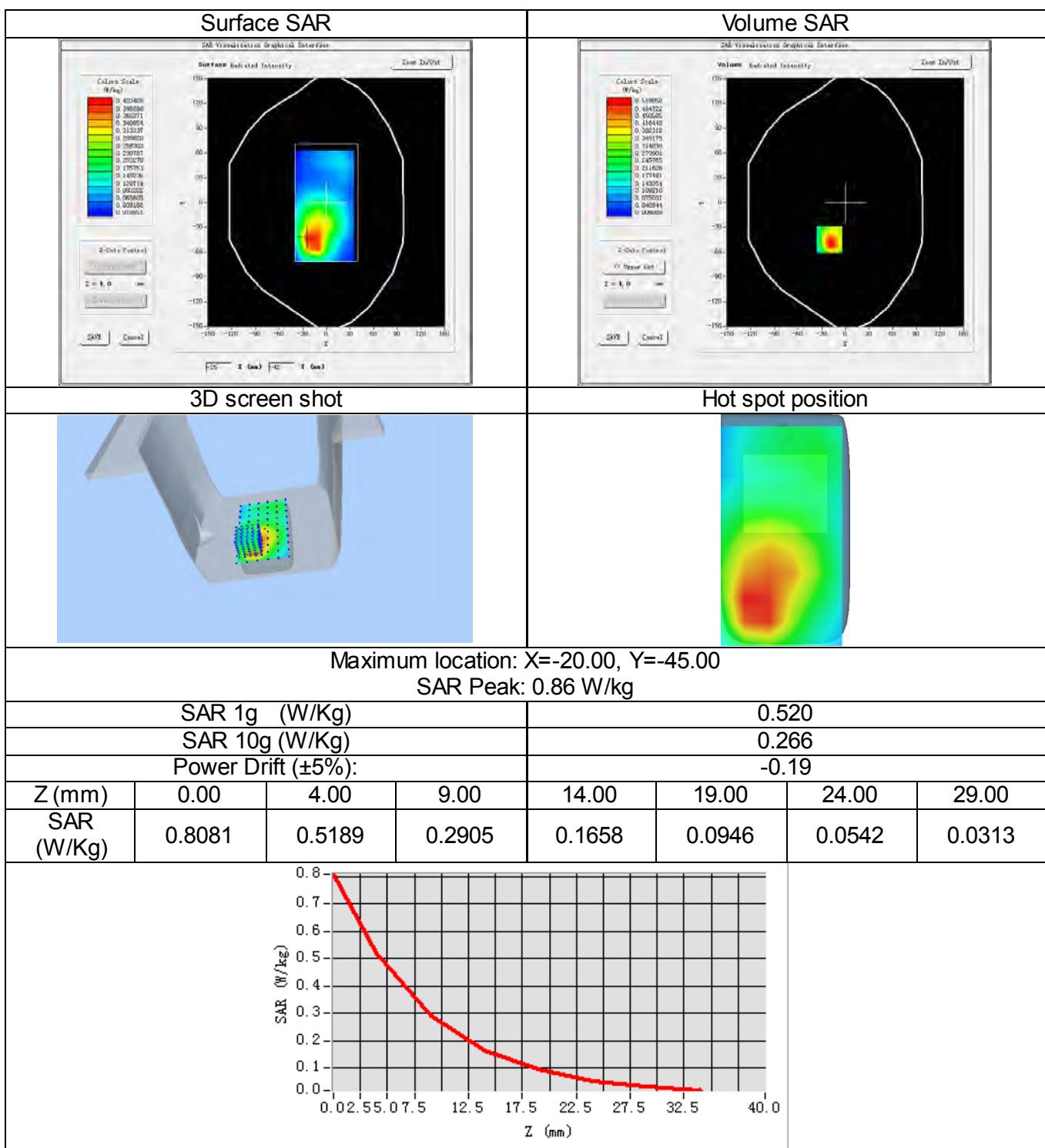
WCDMA Band II_RMC 12.2Kbps_Ch9538_Right Cheek

Date of measurement:	Apr. 25, 2017
Signal:	Communication System: WCDMA-FDD(WCDMA); Frequency: 1907.60MHz; Duty Cycle: 1:1.00
ConvF:	1.94
Liquid Parameters:	Relative permittivity (real part): 39.31; Conductivity (S/m): 1.43;
Device Position:	Cheek
Area Scan:	dx=15mm dy=15mm, h=5.00mm
Zoom Scan:	5x5x7, dx=8mm dy=8mm dz=5mm, h=5.00mm



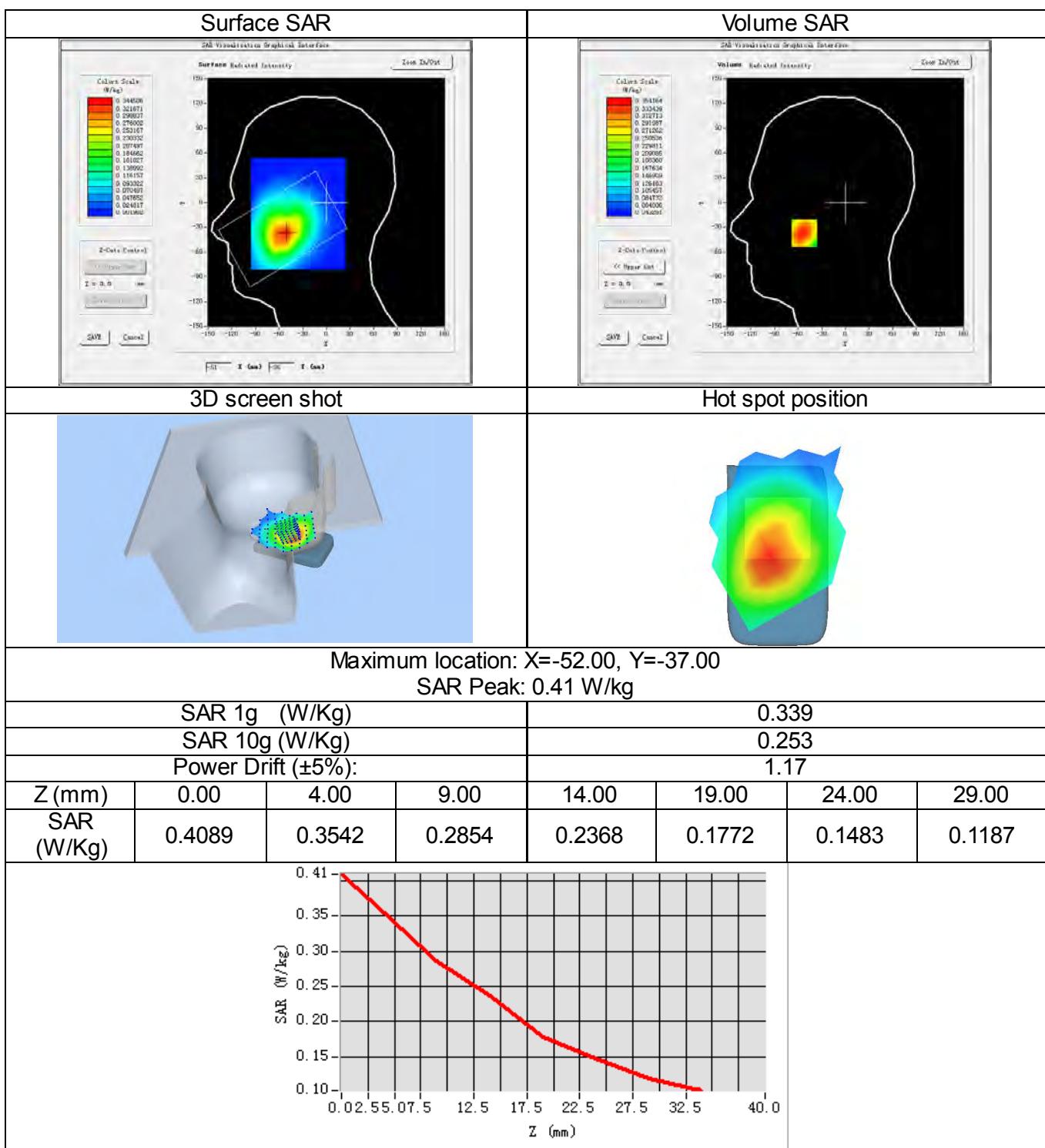
WCDMA Band II_RMC 12.2Kbps_Ch9538_Back Side_10mm

Date of measurement:	Apr. 25, 2017
Signal:	Communication System: WCDMA-FDD(WCDMA); Frequency: 1907.60MHz; Duty Cycle: 1:1.00
ConvF:	2.00
Liquid Parameters:	Relative permittivity (real part): 53.50; Conductivity (S/m): 1.57;
Device Position:	Body
Area Scan:	dx=15mm dy=15mm, h=5.00mm
Zoom Scan:	5x5x7, dx=8mm dy=8mm dz=5mm, h=5.00mm



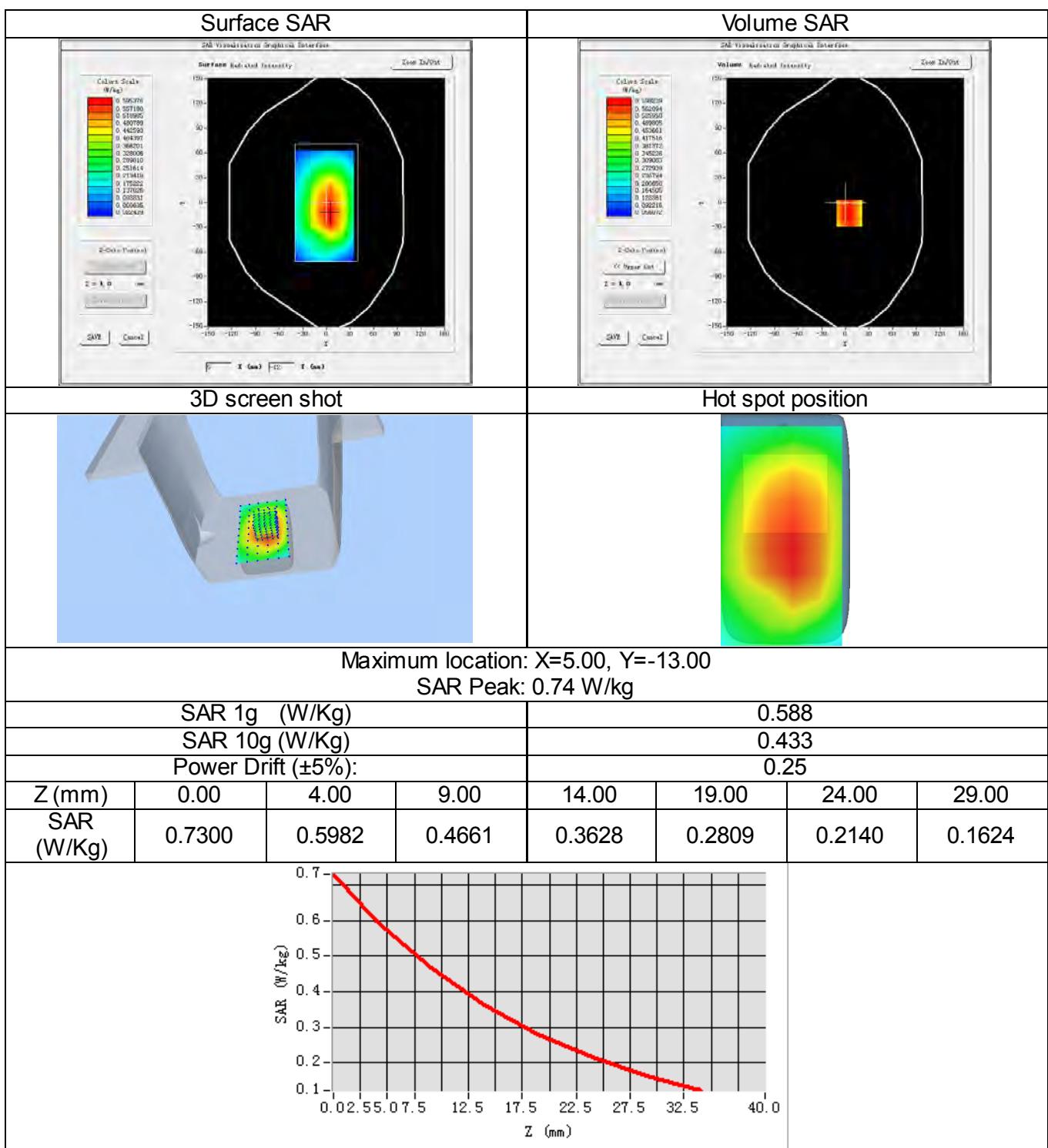
LTE Band V_10M_QPSK(1,49)_Ch20600_Left Cheek

Date of measurement:	Apr. 22, 2017
Signal:	Communication System: LTE-FDD(SC-FDMA QPSK/16-QAM); Frequency: 844.00MHz; Duty Cycle: 1:1.00
ConvF:	1.53
Liquid Parameters:	Relative permittivity (real part): 42.46; Conductivity (S/m): 0.90;
Device Position:	Cheek
Area Scan:	dx=15mm dy=15mm, h=5.00mm
Zoom Scan:	5x5x7, dx=8mm dy=8mm dz=5mm, h=5.00mm



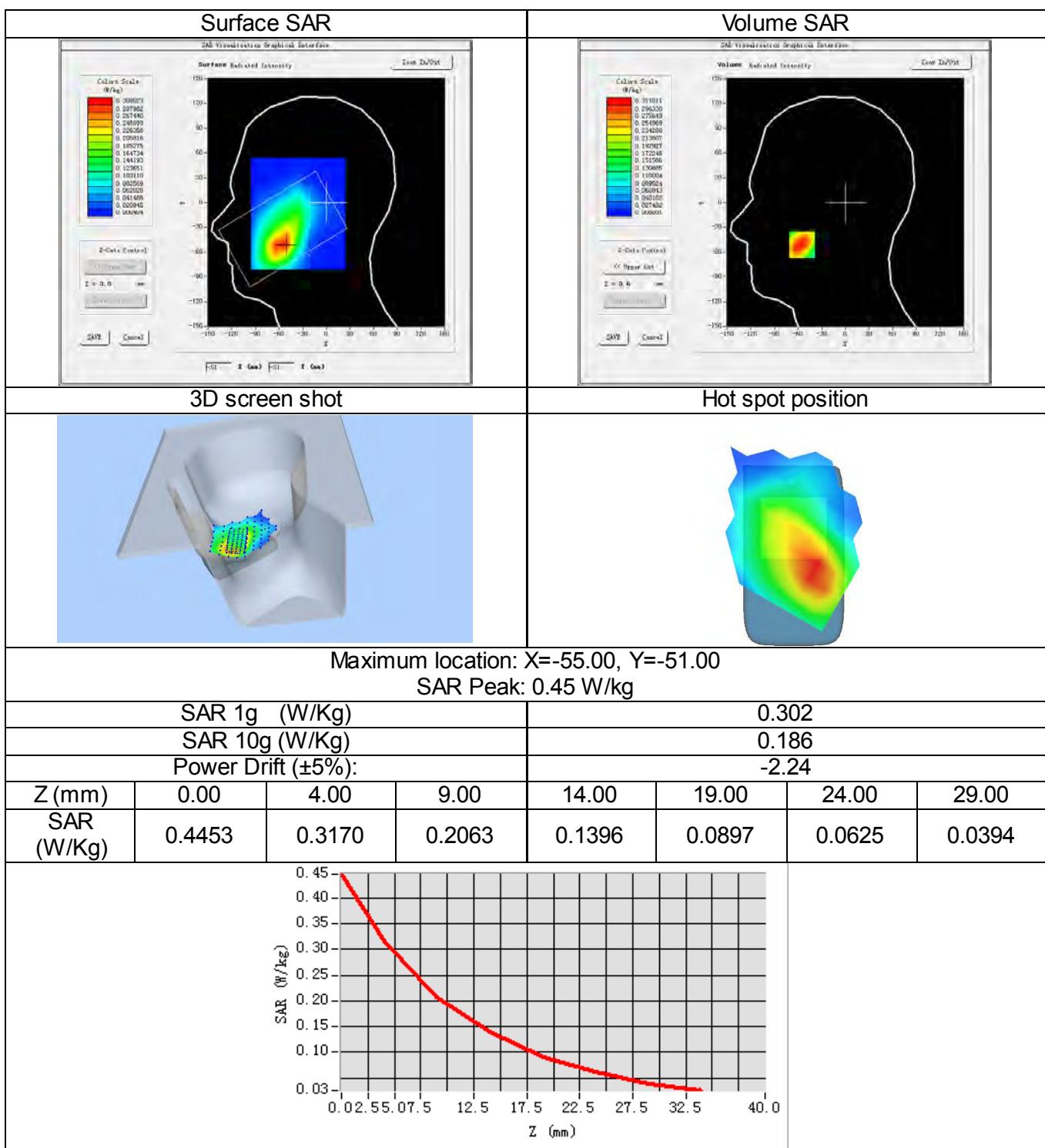
LTE Band V_10M_QPSK(1,49)_Ch20600_Back Side_10mm

Date of measurement:	Apr. 22, 2017
Signal:	Communication System: LTE-FDD(SC-FDMA QPSK/16-QAM); Frequency: 844.00MHz; Duty Cycle: 1:1.00
ConvF:	1.59
Liquid Parameters:	Relative permittivity (real part): 55.29; Conductivity (S/m): 0.99;
Device Position:	Body
Area Scan:	dx=15mm dy=15mm, h=5.00mm
Zoom Scan:	5x5x7, dx=8mm dy=8mm dz=5mm, h=5.00mm



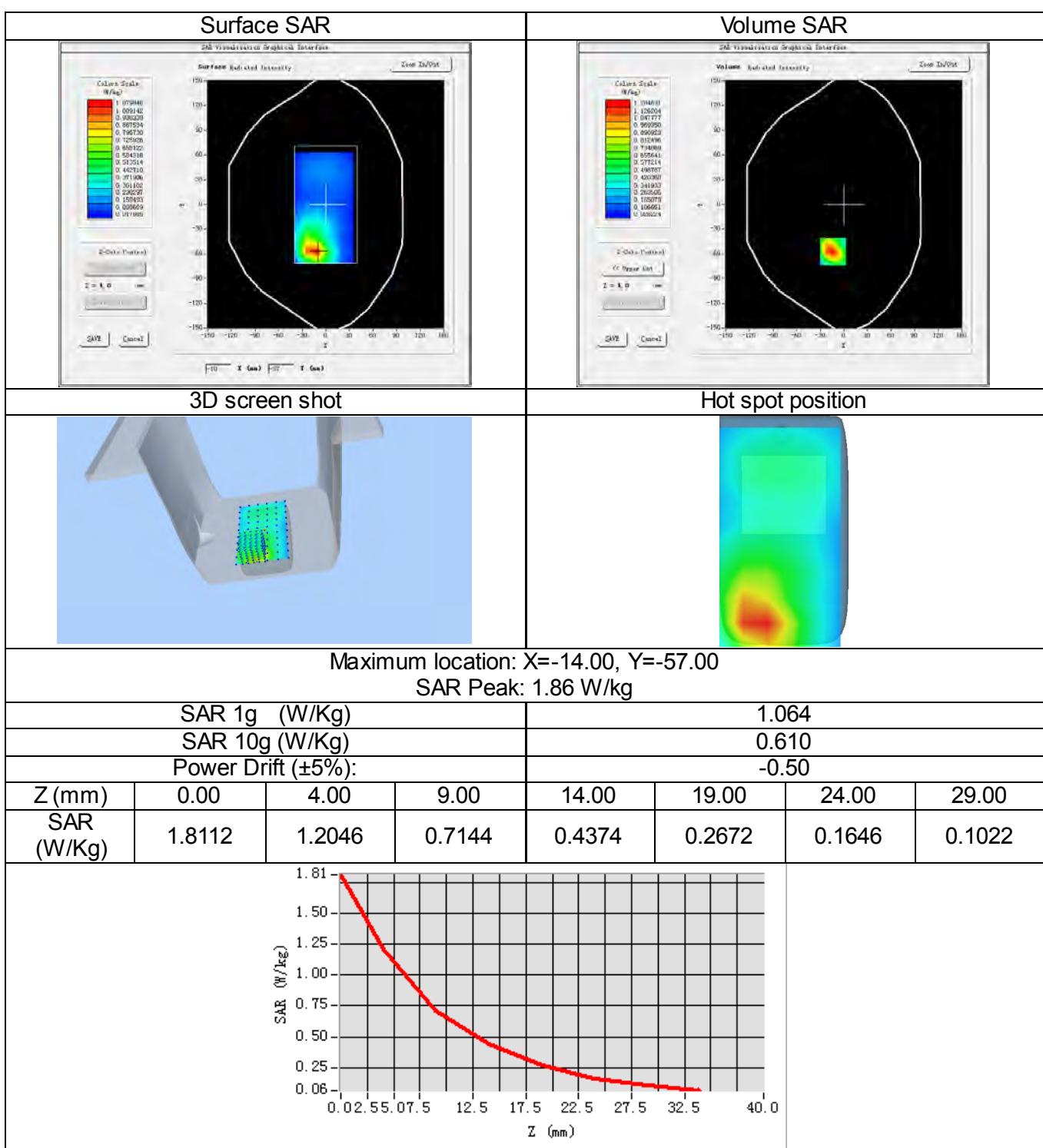
LTE Band IV_20M_QPSK(1,49)_Ch20175_Right Cheek

Date of measurement:	Apr. 26, 2017
Signal:	Communication System: LTE-FDD(SC-FDMA QPSK/16-QAM); Frequency: 1732.50MHz; Duty Cycle: 1:1.00
ConvF:	3.77
Liquid Parameters:	Relative permittivity (real part): 40.72; Conductivity (S/m): 1.31;
Device Position:	Cheek
Area Scan:	dx=15mm dy=15mm, h=5.00mm
Zoom Scan:	5x5x7, dx=8mm dy=8mm dz=5mm, h=5.00mm



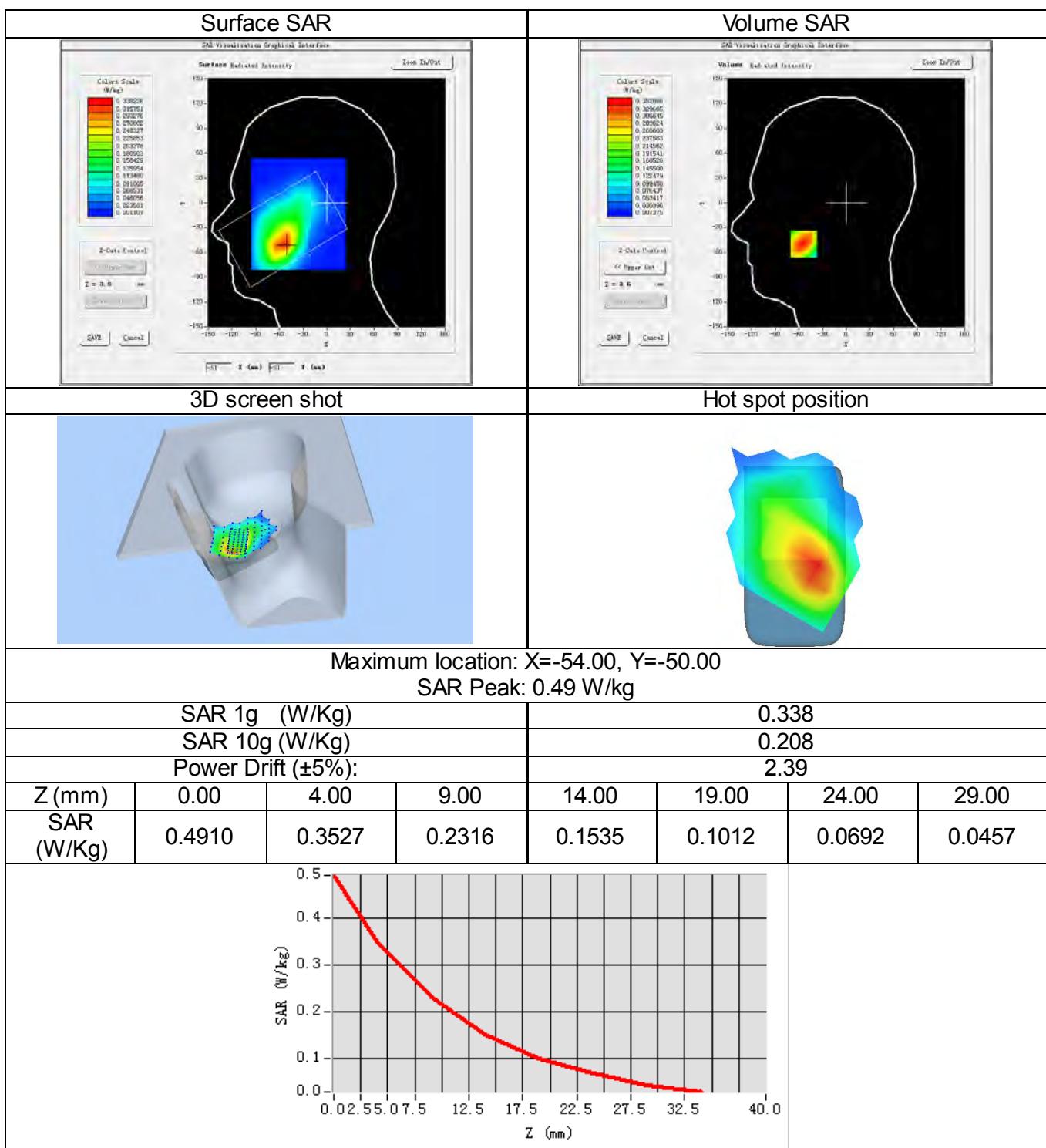
LTE Band IV_20M_QPSK(1,49)_Ch20175_Back Side_10mm

Date of measurement:	Apr. 28, 2017
Signal:	Communication System: LTE-FDD(SC-FDMA QPSK/16-QAM); Frequency: 1732.50MHz; Duty Cycle: 1:1.00
ConvF:	3.85
Liquid Parameters:	Relative permittivity (real part): 54.61; Conductivity (S/m): 1.45;
Device Position:	Body
Area Scan:	dx=15mm dy=15mm, h=5.00mm
Zoom Scan:	5x5x7, dx=8mm dy=8mm dz=5mm, h=5.00mm



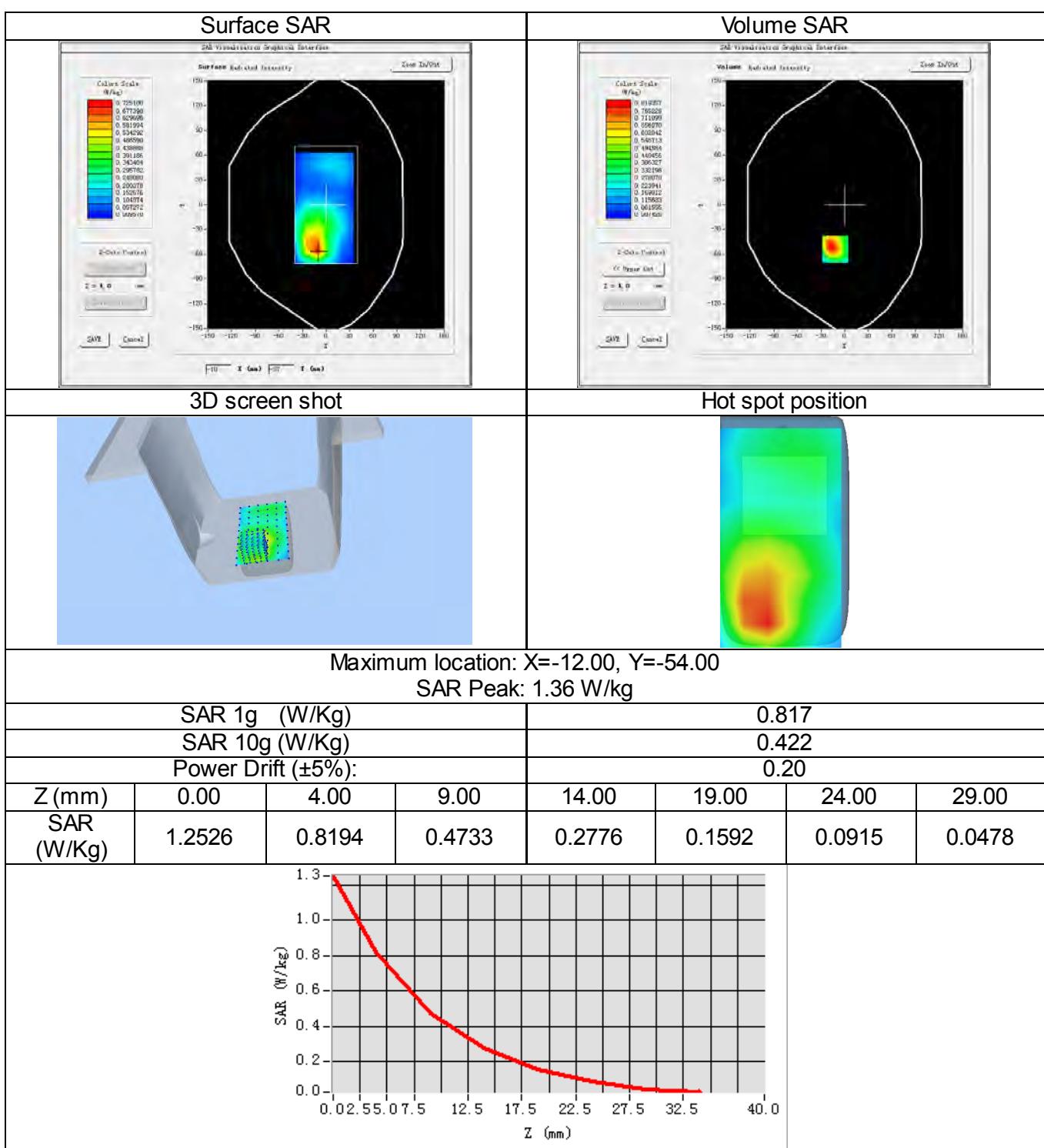
LTE Band II_20M_QPSK(1,0)_Ch18700_Right Cheek

Date of measurement:	Apr. 25, 2017
Signal:	Communication System: LTE-FDD(SC-FDMA QPSK/16-QAM); Frequency: 1860.00MHz; Duty Cycle: 1:1.00
ConvF:	1.94
Liquid Parameters:	Relative permittivity (real part): 39.54; Conductivity (S/m): 1.41;
Device Position:	Cheek
Area Scan:	dx=15mm dy=15mm, h=5.00mm
Zoom Scan:	5x5x7, dx=8mm dy=8mm dz=5mm, h=5.00mm



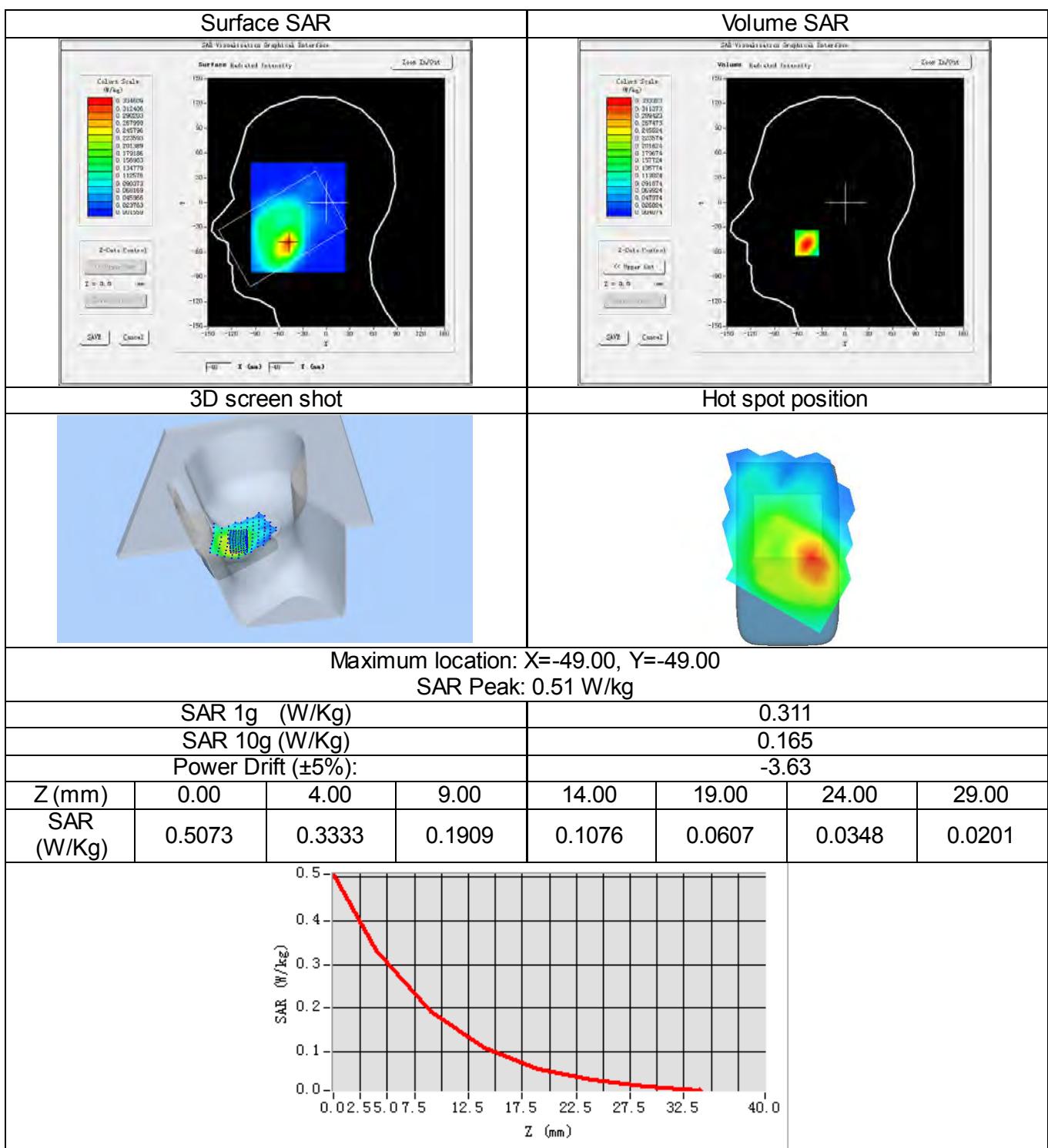
LTE Band II_20M_QPSK(1,0)_Ch18700_Back Side_10mm

Date of measurement:	Apr. 25, 2017
Signal:	Communication System: LTE-FDD(SC-FDMA QPSK/16-QAM); Frequency: 1860.00MHz; Duty Cycle: 1:1.00
ConvF:	2.00
Liquid Parameters:	Relative permittivity (real part): 53.66; Conductivity (S/m): 1.54;
Device Position:	Body
Area Scan:	dx=15mm dy=15mm, h=5.00mm
Zoom Scan:	5x5x7, dx=8mm dy=8mm dz=5mm, h=5.00mm



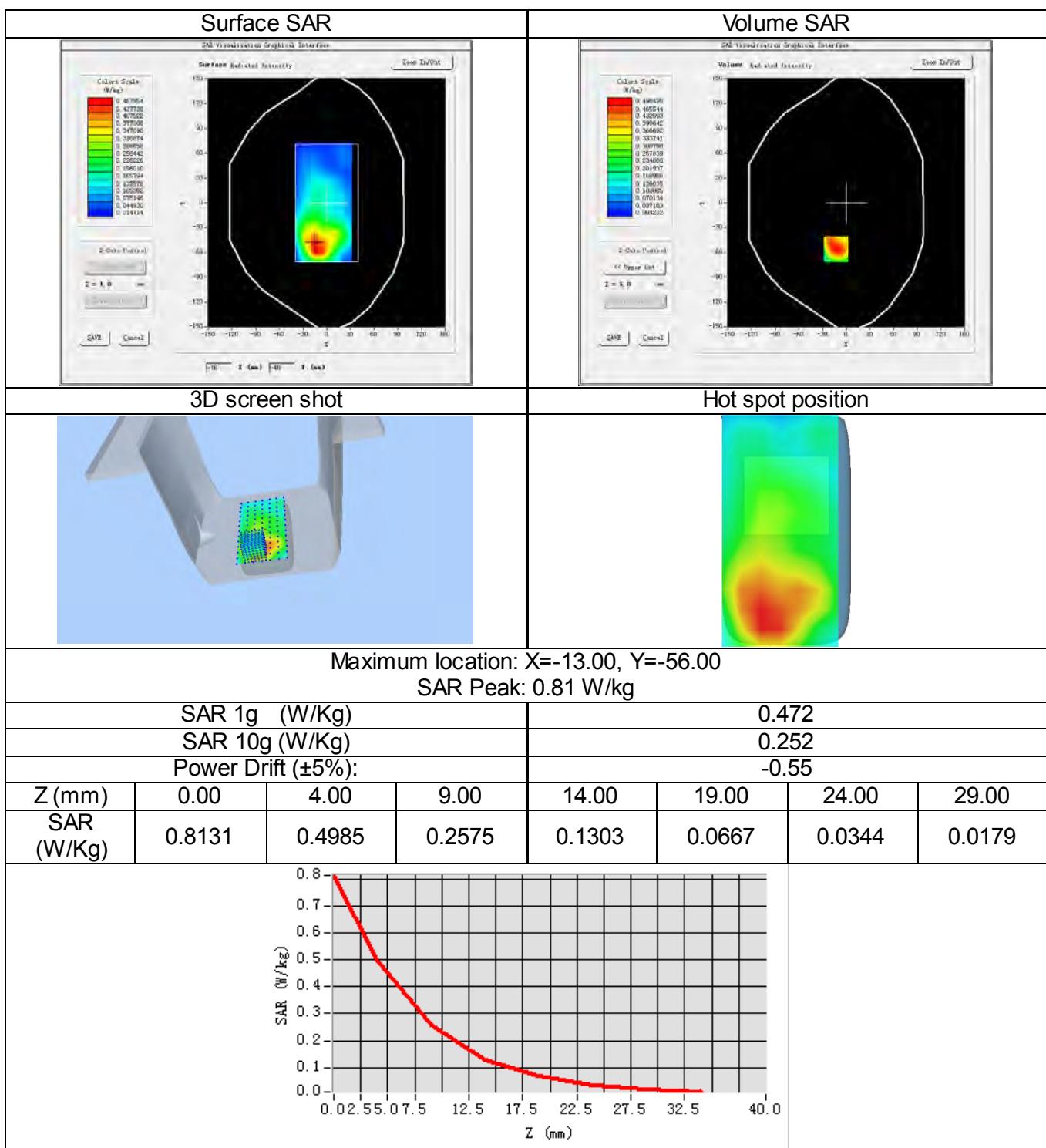
LTE Band VII_20M_QPSK(1,99)_Ch21100_Right Cheek

Date of measurement:	May. 04, 2017
Signal:	Communication System: LTE-FDD(SC-FDMA QPSK/16-QAM); Frequency: 2535.00MHz; Duty Cycle: 1:1.00
ConvF:	2.11
Liquid Parameters:	Relative permittivity (real part): 39.35; Conductivity (S/m): 1.90;
Device Position:	Cheek
Area Scan:	dx=12mm dy=12mm, h=5.00mm
Zoom Scan:	7x7x7, dx=5mm dy=5mm dz=5mm, h=5.00mm



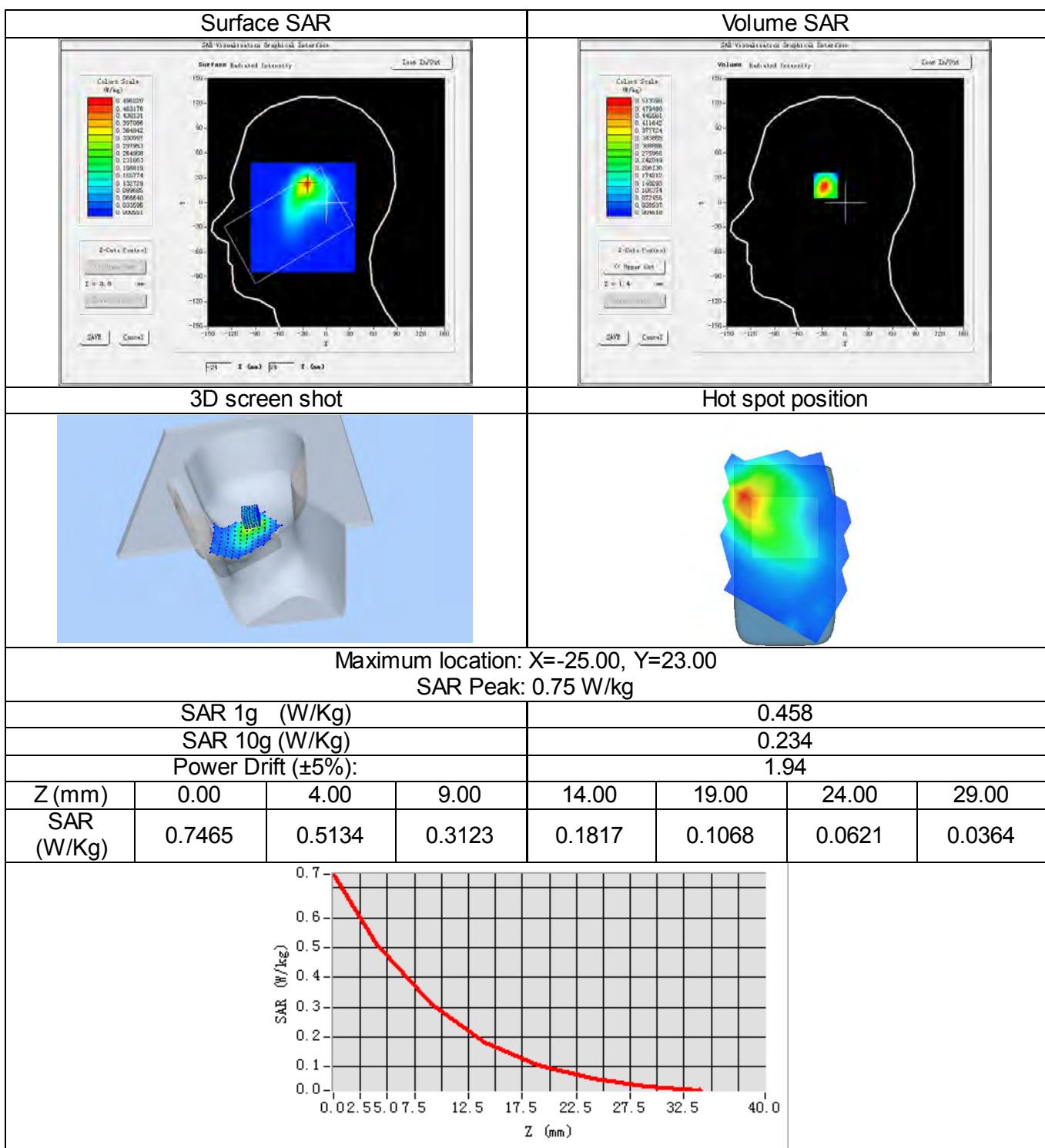
LTE Band VII_20M_QPSK(1,99)_Ch21100_Back Side_10mm

Date of measurement:	May. 08, 2017
Signal:	Communication System: LTE-FDD(SC-FDMA QPSK/16-QAM); Frequency: 2535.00MHz; Duty Cycle: 1:1.00
ConvF:	2.17
Liquid Parameters:	Relative permittivity (real part): 54.04; Conductivity (S/m): 2.10;
Device Position:	Body
Area Scan:	dx=12mm dy=12mm, h=5.00mm
Zoom Scan:	7x7x7, dx=5mm dy=5mm dz=5mm, h=5.00mm



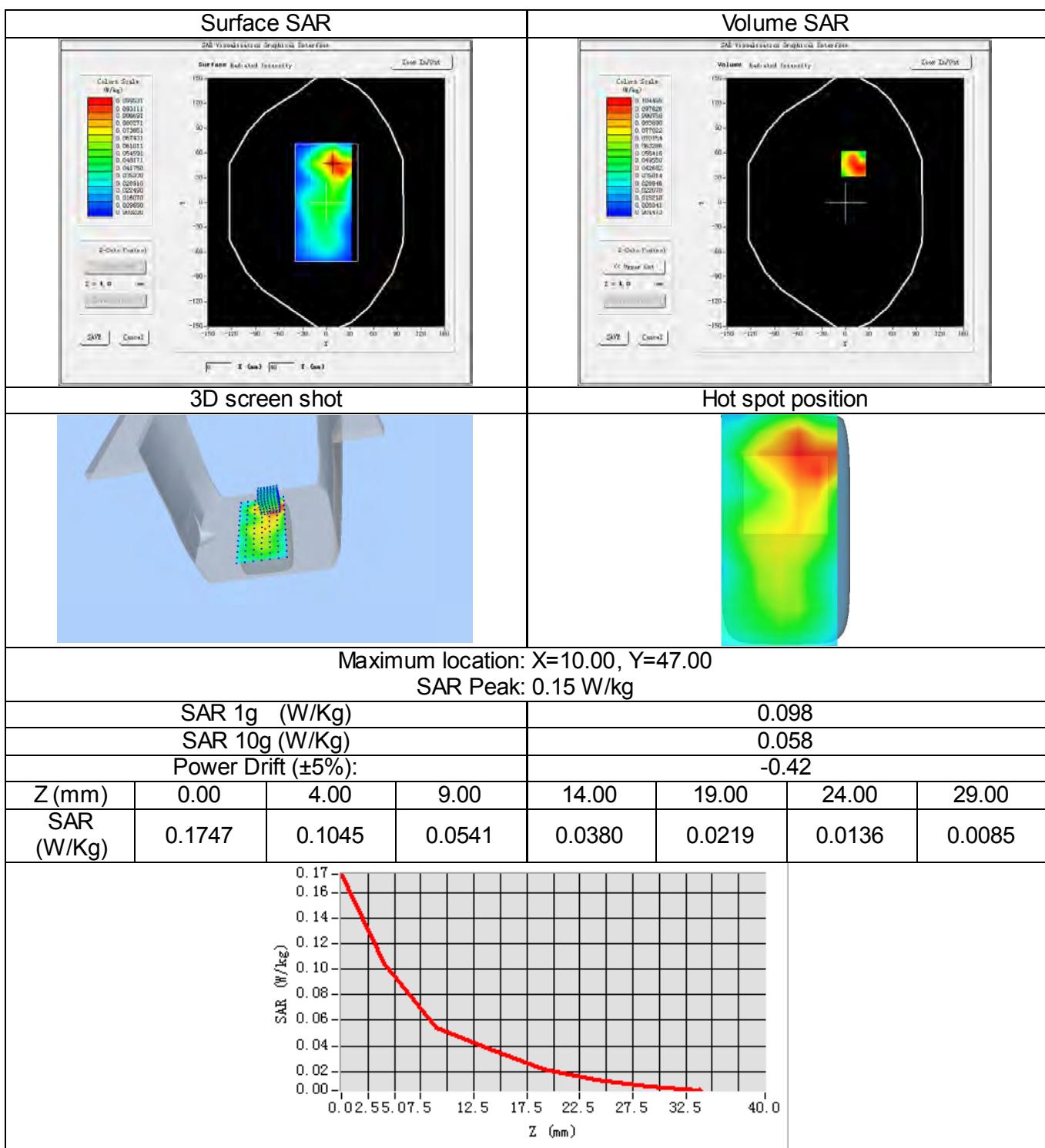
WLAN 2.4G_802.11b_Ch6_Right Cheek

Date of measurement:	Apr. 20, 2017
Signal:	Communication System: WLAN 802.11a/b/g/n/ac; Frequency: 2437.00MHz; Duty Cycle: 1:1.00
ConvF:	2.03
Liquid Parameters:	Relative permittivity (real part): 40.00; Conductivity (S/m): 1.77;
Device Position:	Cheek
Area Scan:	dx=12mm dy=12mm, h=5.00mm
Zoom Scan:	7x7x7, dx=5mm dy=5mm dz=5mm, h=5.00mm



WLAN 2.4G_802.11b_Ch6_Back Side_10mm

Date of measurement:	Apr. 20, 2017
Signal:	Communication System: WLAN 802.11a/b/g/n/ac; Frequency: 2437.00MHz; Duty Cycle: 1:1.00
ConvF:	2.10
Liquid Parameters:	Relative permittivity (real part): 52.40; Conductivity (S/m): 1.94;
Device Position:	Body
Area Scan:	dx=12mm dy=12mm, h=5.00mm
Zoom Scan:	7x7x7, dx=5mm dy=5mm dz=5mm, h=5.00mm



14. Appendix D. Calibration Certificate

Table of contents

E Field Probe - SN 08/16 EPGO287

E Field Probe - SN 07/15 EP247

835 MHz Dipole - SN 03/15 DIP 0G835-347

1750 MHz Dipole - SN 03/16 DIP 1G750-357

1900 MHz Dipole - SN 03/15 DIP 1G900-350

2450 MHz Dipole - SN 03/15 DIP 2G450-352

2600 MHz Dipole - SN 03/15 DIP 2G600-356

Extended Calibration Certificate



COMOSAR E-Field Probe Calibration Report

Ref : ACR.263.1.16.SATU.A

**NTEK TESTING TECHNOLOGY CO., LTD.
BUILDING E, FENDA SCIENCE PARK, SANWEI
COMMUNITY, XIXIANG STREET,
BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA
MVG COMOSAR DOSIMETRIC E-FIELD PROBE
SERIAL NO.: SN 08/16 EPGO287**

**Calibrated at MVG US
2105 Barrett Park Dr. - Kennesaw, GA 30144**



Calibration Date: 09/08/2016

Summary:

This document presents the method and results from an accredited COMOSAR Dosimetric E-Field Probe calibration performed in MVG USA using the CALISAR / CALIBAIR test bench, for use with a COMOSAR system only. All calibration results are traceable to national metrology institutions.



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.263.1.16.SATU.A

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Product Manager	9/19/2016	
Checked by :	Jérôme LUC	Product Manager	9/19/2016	
Approved by :	Kim RUTKOWSKI	Quality Manager	9/19/2016	Kim RUTKOWSKI

Distribution :	Customer Name
	NTEK TESTING TECHNOLOGY CO., LTD.

Issue	Date	Modifications
A	9/19/2016	Initial release



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.263.1.16.SATU.A

TABLE OF CONTENTS

1	Device Under Test	4
2	Product Description	4
2.1	General Information	4
3	Measurement Method	4
3.1	Linearity	4
3.2	Sensitivity	5
3.3	Lower Detection Limit	5
3.4	Isotropy	5
3.5	Boundary Effect	5
4	Measurement Uncertainty.....	5
5	Calibration Measurement Results	6
5.1	Sensitivity in air	6
5.2	Linearity	7
5.3	Sensitivity in liquid	7
5.4	Isotropy	8
6	List of Equipment	10



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref. ACR.263.1.16.SATU.A

1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	SN 08/16 EPGO287
Product Condition (new / used)	New
Frequency Range of Probe	0.7 GHz-6GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.206 MΩ Dipole 2: R2=0.193 MΩ Dipole 3: R3=0.194 MΩ

A yearly calibration interval is recommended.

2 PRODUCT DESCRIPTION**2.1 GENERAL INFORMATION**

MVG's COMOSAR E field Probes are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards.



Figure 1 – MVG COMOSAR Dosimetric E field Dipole

Probe Length	330 mm
Length of Individual Dipoles	2 mm
Maximum external diameter	8 mm
Probe Tip External Diameter	2.5 mm
Distance between dipoles / probe extremity	1 mm

3 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards provide recommended practices for the probe calibrations, including the performance characteristics of interest and methods by which to assess their affect. All calibrations / measurements performed meet the fore mentioned standards.

3.1 LINEARITY

The evaluation of the linearity was done in free space using the waveguide, performing a power sweep to cover the SAR range 0.01W/kg to 100W/kg.



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref. ACR.263.1.16.SATU.A

3.2 SENSITIVITY

The sensitivity factors of the three dipoles were determined using a two step calibration method (air and tissue simulating liquid) using waveguides as outlined in the standards.

3.3 LOWER DETECTION LIMIT

The lower detection limit was assessed using the same measurement set up as used for the linearity measurement. The required lower detection limit is 10 mW/kg.

3.4 ISOTROPY

The axial isotropy was evaluated by exposing the probe to a reference wave from a standard dipole with the dipole mounted under the flat phantom in the test configuration suggested for system validations and checks. The probe was rotated along its main axis from 0 - 360 degrees in 15 degree steps. The hemispherical isotropy is determined by inserting the probe in a thin plastic box filled with tissue-equivalent liquid, with the plastic box illuminated with the fields from a half wave dipole. The dipole is rotated about its axis (0°–180°) in 15° increments. At each step the probe is rotated about its axis (0°–360°).

3.5 BOUNDARY EFFECT

The boundary effect is defined as the deviation between the SAR measured data and the expected exponential decay in the liquid when the probe is oriented normal to the interface. To evaluate this effect, the liquid filled flat phantom is exposed to fields from either a reference dipole or waveguide. With the probe normal to the phantom surface, the peak spatial average SAR is measured and compared to the analytical value at the surface.

4 MEASUREMENT UNCERTAINTY

The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty associated with an E-field probe calibration using the waveguide technique. All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

Uncertainty analysis of the probe calibration in waveguide					
ERROR SOURCES	Uncertainty value (%)	Probability Distribution	Divisor	ci	Standard Uncertainty (%)
Incident or forward power	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Reflected power	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Liquid conductivity	5.00%	Rectangular	$\sqrt{3}$	1	2.887%
Liquid permittivity	4.00%	Rectangular	$\sqrt{3}$	1	2.309%
Field homogeneity	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Field probe positioning	5.00%	Rectangular	$\sqrt{3}$	1	2.887%



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref. ACR.263.1.16.SATU.A

Field probe linearity	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Combined standard uncertainty					5.831%
Expanded uncertainty 95 % confidence level k = 2					12.0%

5 CALIBRATION MEASUREMENT RESULTS

Calibration Parameters	
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

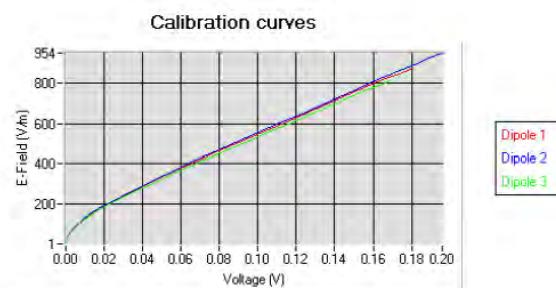
5.1 SENSITIVITY IN AIR

Normx dipole 1 ($\mu\text{V}/(\text{V}/\text{m})^2$)	Normy dipole 2 ($\mu\text{V}/(\text{V}/\text{m})^2$)	Normz dipole 3 ($\mu\text{V}/(\text{V}/\text{m})^2$)
0.70	0.81	0.63

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
91	90	94

Calibration curves $e_i=f(V)$ ($i=1,2,3$) allow to obtain H-field value using the formula:

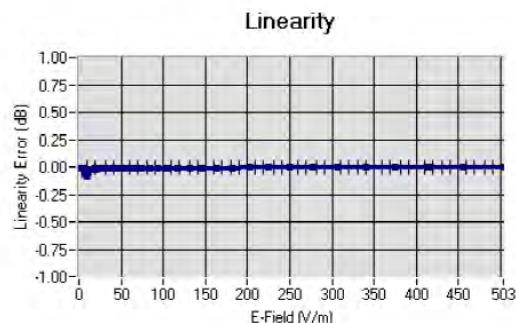
$$E = \sqrt{E_1^2 + E_2^2 + E_3^2}$$





COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.263.1.16.SATU.A

5.2 LINEARITY

Linearity: +/-1.83% (+/-0.08dB)

5.3 SENSITIVITY IN LIQUID

Liquid	Frequency (MHz +/- 100MHz)	Permittivity	Epsilon (S/m)	ConvF
HL450	450	42.17	0.86	1.51
BL450	450	57.65	0.95	1.55
HL750	750	40.03	0.93	1.36
BL750	750	56.83	1.00	1.41
HL850	835	42.19	0.90	1.53
BL850	835	54.67	1.01	1.59
HL900	900	42.08	1.01	1.43
BL900	900	55.25	1.08	1.48
HL1800	1800	41.68	1.46	1.66
BL1800	1800	53.86	1.46	1.69
HL1900	1900	38.45	1.45	1.94
BL1900	1900	53.32	1.56	2.00
HL2000	2000	38.26	1.38	1.87
BL2000	2000	52.70	1.51	1.94
HL2450	2450	37.50	1.80	2.03
BL2450	2450	53.22	1.89	2.10
HL2600	2600	39.80	1.99	2.11
BL2600	2600	52.52	2.23	2.17
HL5200	5200	35.64	4.67	1.99
BL5200	5200	48.64	5.51	2.04
HL5400	5400	36.44	4.87	2.09
BL5400	5400	46.52	5.77	2.16
HL5600	5600	36.66	5.17	2.10
BL5600	5600	46.79	5.77	2.17
HL5800	5800	35.31	5.31	2.02
BL5800	5800	47.04	6.10	2.07

LOWER DETECTION LIMIT: 8mW/kg

Page: 7/10

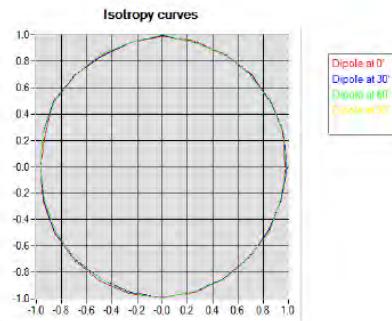


COMOSAR E-FIELD PROBE CALIBRATION REPORT

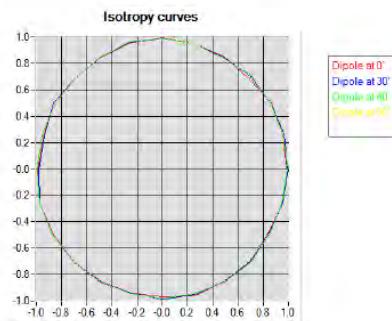
Ref: ACR.263.1.16.SATU.A

5.4 ISOTROPYHL900 MHz

- Axial isotropy: 0.04 dB
- Hemispherical isotropy: 0.07 dB

HL1800 MHz

- Axial isotropy: 0.05 dB
- Hemispherical isotropy: 0.07 dB



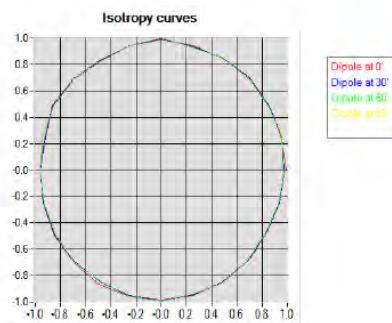


COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref. ACR.263.1.16.SATU.A

HL5600 MHz

- Axial isotropy: 0.06 dB
- Hemispherical isotropy: 0.10 dB





COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.263.1.16.SATU.A

6 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
Flat Phantom	MVG	SN-20/09-SAM71	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2016	02/2019
Reference Probe	MVG	EP 94 SN 37/08	10/2015	10/2016
Multimeter	Keithley 2000	1188656	12/2013	12/2016
Signal Generator	Agilent E4438C	MY49070581	12/2013	12/2016
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	12/2013	12/2016
Power Sensor	HP ECP-E26A	US37181460	12/2013	12/2016
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Waveguide	Mega Industries	069Y7-158-13-712	Validated. No cal required.	Validated. No cal required.
Waveguide Transition	Mega Industries	069Y7-158-13-701	Validated. No cal required.	Validated. No cal required.
Waveguide Termination	Mega Industries	069Y7-158-13-701	Validated. No cal required.	Validated. No cal required.
Temperature / Humidity Sensor	Control Company	150798832	10/2015	10/2017



COMOSAR E-Field Probe Calibration Report

Ref : ACR.139.1.17.SATU.A

NTEK TESTING TECHNOLOGY CO., LTD.
BUILDING E, FENDA SCIENCE PARK, SANWEI
COMMUNITY, XIXIANG STREET,
BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA
MVG COMOSAR DOSIMETRIC E-FIELD PROBE
SERIAL NO.: SN 07/15 EP247

Calibrated at MVG US
2105 Barrett Park Dr. - Kennesaw, GA 30144



04/06/2017

Summary:

This document presents the method and results from an accredited COMOSAR Dosimetric E-Field Probe calibration performed in MVG USA using the CALISAR / CALIBAIR test bench, for use with a COMOSAR system only. All calibration results are traceable to national metrology institutions.



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.139.1.17.SATU.A

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Product Manager	4/10/2017	
Checked by :	Jérôme LUC	Product Manager	4/10/2017	
Approved by :	Kim RUTKOWSKI	Quality Manager	4/10/2017	Kim RUTKOWSKI

	Customer Name
Distribution :	NTEK TESTING TECHNOLOGY CO., LTD.

Issue	Date	Modifications
A	4/10/2017	Initial release



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.139.1.17.SATU.A

TABLE OF CONTENTS

1	Device Under Test	4
2	Product Description	4
2.1	General Information	4
3	Measurement Method	4
3.1	Linearity	4
3.2	Sensitivity	5
3.3	Lower Detection Limit	5
3.4	Isotropy	5
3.5	Boundary Effect	5
4	Measurement Uncertainty	5
5	Calibration Measurement Results	6
5.1	Sensitivity in air	6
5.2	Linearity	7
5.3	Sensitivity in liquid	7
5.4	Isotropy	8
6	List of Equipment	9



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref. ACR.139.1.17.SATU.A

1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE5
Serial Number	SN 07/15 EP247
Product Condition (new / used)	New
Frequency Range of Probe	0.7 GHz-3GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.181 MΩ Dipole 2: R2=0.167 MΩ Dipole 3: R3=0.175 MΩ

A yearly calibration interval is recommended.

2 PRODUCT DESCRIPTION**2.1 GENERAL INFORMATION**

MVG's COMOSAR E field Probes are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards.



Figure 1 – MVG COMOSAR Dosimetric E field Dipole

Probe Length	330 mm
Length of Individual Dipoles	4.5 mm
Maximum external diameter	8 mm
Probe Tip External Diameter	5 mm
Distance between dipoles / probe extremity	2.7 mm

3 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards provide recommended practices for the probe calibrations, including the performance characteristics of interest and methods by which to assess their affect. All calibrations / measurements performed meet the fore mentioned standards.

3.1 LINEARITY

The evaluation of the linearity was done in free space using the waveguide, performing a power sweep to cover the SAR range 0.01W/kg to 100W/kg.



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.139.1.17.SATU.A

3.2 SENSITIVITY

The sensitivity factors of the three dipoles were determined using a two step calibration method (air and tissue simulating liquid) using waveguides as outlined in the standards.

3.3 LOWER DETECTION LIMIT

The lower detection limit was assessed using the same measurement set up as used for the linearity measurement. The required lower detection limit is 10 mW/kg.

3.4 ISOTROPY

The axial isotropy was evaluated by exposing the probe to a reference wave from a standard dipole with the dipole mounted under the flat phantom in the test configuration suggested for system validations and checks. The probe was rotated along its main axis from 0 - 360 degrees in 15 degree steps. The hemispherical isotropy is determined by inserting the probe in a thin plastic box filled with tissue-equivalent liquid, with the plastic box illuminated with the fields from a half wave dipole. The dipole is rotated about its axis (0°–180°) in 15° increments. At each step the probe is rotated about its axis (0°–360°).

3.5 BOUNDARY EFFECT

The boundary effect is defined as the deviation between the SAR measured data and the expected exponential decay in the liquid when the probe is oriented normal to the interface. To evaluate this effect, the liquid filled flat phantom is exposed to fields from either a reference dipole or waveguide. With the probe normal to the phantom surface, the peak spatial average SAR is measured and compared to the analytical value at the surface.

4 MEASUREMENT UNCERTAINTY

The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty associated with an E-field probe calibration using the waveguide technique. All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

Uncertainty analysis of the probe calibration in waveguide					
ERROR SOURCES	Uncertainty value (%)	Probability Distribution	Divisor	ci	Standard Uncertainty (%)
Incident or forward power	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Reflected power	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Liquid conductivity	5.00%	Rectangular	$\sqrt{3}$	1	2.887%
Liquid permittivity	4.00%	Rectangular	$\sqrt{3}$	1	2.309%
Field homogeneity	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Field probe positioning	5.00%	Rectangular	$\sqrt{3}$	1	2.887%



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.139.1.17.SATU.A

Field probe linearity	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Combined standard uncertainty					5.831%
Expanded uncertainty 95 % confidence level k = 2					12.0%

5 CALIBRATION MEASUREMENT RESULTS

Calibration Parameters	
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

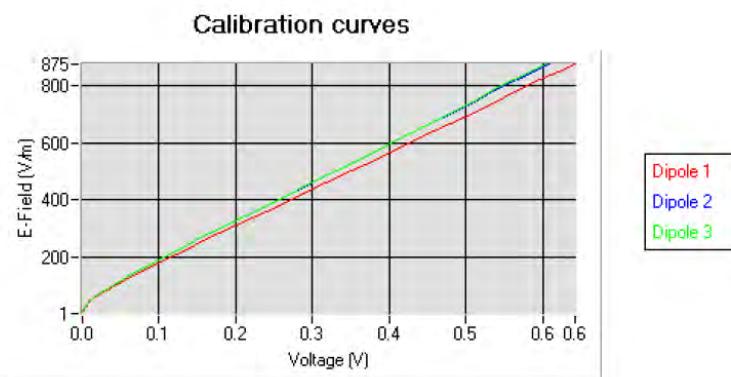
5.1 SENSITIVITY IN AIR

Normx dipole 1 ($\mu\text{V}/(\text{V}/\text{m})^2$)	Normy dipole 2 ($\mu\text{V}/(\text{V}/\text{m})^2$)	Normz dipole 3 ($\mu\text{V}/(\text{V}/\text{m})^2$)
6.82	6.16	6.12

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
95	93	90

Calibration curves $e_i=f(V)$ ($i=1,2,3$) allow to obtain H-field value using the formula:

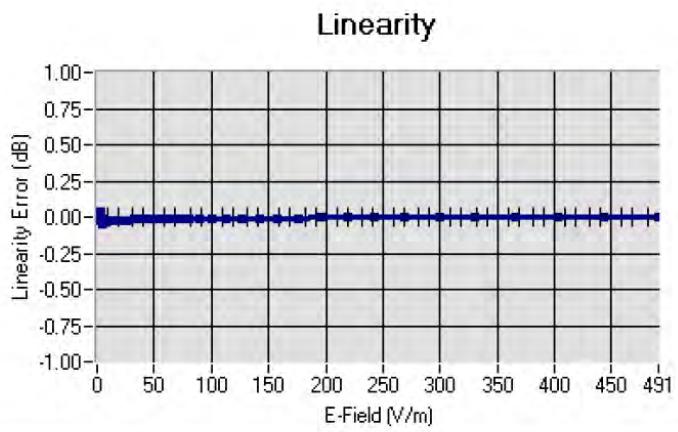
$$E = \sqrt{E_1^2 + E_2^2 + E_3^2}$$





COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.139.1.17.SATU.A

5.2 LINEARITYLinearity: +/-1.05% (+/-0.05dB)5.3 SENSITIVITY IN LIQUID

Liquid	Frequency (MHz +/- 100MHz)	Permittivity	Epsilon (S/m)	ConvF
HL450	450	43.68	0.87	5.01
BL450	450	58.34	0.99	5.35
HL750	750	41.82	0.90	4.23
BL750	750	56.28	0.98	4.39
HL850	835	42.59	0.90	4.54
BL850	835	53.19	0.97	4.71
HL900	900	42.05	0.98	4.25
BL900	900	56.41	1.08	4.39
HL1750	1750	41.82	1.38	3.77
BL1750	1750	53.00	1.52	3.85
HL1900	1900	40.38	1.41	4.27
BL1900	1900	53.93	1.55	4.39
HL2300	2300	40.12	1.43	3.90
BL2300	2300	53.65	1.54	4.05
HL2450	2450	38.34	1.80	3.72
BL2450	2450	52.70	1.94	3.84
HL2600	2600	38.16	1.93	3.65
BL2600	2600	51.55	2.21	3.75

LOWER DETECTION LIMIT: 8mW/kg

Page: 7/9

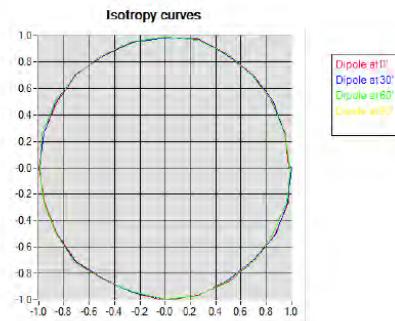


COMOSAR E-FIELD PROBE CALIBRATION REPORT

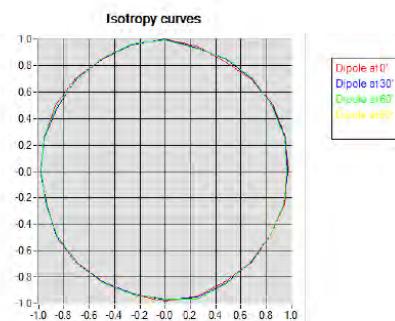
Ref. ACR.139.1.17.SATU.A

5.4 ISOTROPYHL900 MHz

- Axial isotropy: 0.04 dB
- Hemispherical isotropy: 0.05 dB

HL1750 MHz

- Axial isotropy: 0.05 dB
- Hemispherical isotropy: 0.08 dB





COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.139.1.17.SATU.A

6 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
Flat Phantom	MVG	SN-20/09-SAM71	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2016	02/2019
Reference Probe	MVG	EP 94 SN 37/08	10/2016	10/2017
Multimeter	Keithley 2000	1188656	12/2016	12/2019
Signal Generator	Agilent E4438C	MY49070581	12/2016	12/2019
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	12/2016	12/2019
Power Sensor	HP ECP-E26A	US37181460	12/2016	12/2019
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Waveguide	Mega Industries	069Y7-158-13-712	Validated. No cal required.	Validated. No cal required.
Waveguide Transition	Mega Industries	069Y7-158-13-701	Validated. No cal required.	Validated. No cal required.
Waveguide Termination	Mega Industries	069Y7-158-13-701	Validated. No cal required.	Validated. No cal required.
Temperature / Humidity Sensor	Control Company	11-661-9	8/2016	8/2019