SAR Test Report

Report No.: AGC01632180901FH01

PRODUCT DESIGNATION	:	Bluetooth Helmet Communicator
BRAND NAME	:	UCLEAR-DIGITAL
MODEL NAME	:	MOTION INFINITY, MOTION 6
CLIENT	:	BITWAVE PTE LTD
DATE OF ISSUE	:	Dec. 12,2018
STANDARD(S)	:	IEEE Std. 1528:2013 FCC 47CFR § 2.1093 IEEE/ANSI C95.1:2005
REPORT VERSION	:	V1.1

Attestation of Global Compliance(Shenzhen) Co., Ltd.

Attestation of Global Compliance

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Oct.17,2018	Invalid	Initial Release
V1.1	1st	Dec. 12,2018	Valid	Added SAR system validation

Test Report

Applicant Name	BITWAVE PTE LTD
Applicant Address	11, Serangoon North Ave 5, #05-03 Singapore 554809
Manufacturer Name	BITWAVE PTE LTD
Manufacturer Address	11, Serangoon North Ave 5, #05-03 Singapore 554809
Product Designation	Bluetooth Helmet Communicator
Brand Name	UCLEAR-DIGITAL
Model Name	MOTION INFINITY, MOTION 6
Different Description	All the same, except for the model name. The test model is MOTION INFINITY.
EUT Voltage	DC3.7V by battery
Applicable Standard	IEEE Std. 1528:2013 FCC 47CFR § 2.1093 IEEE/ANSI C95.1:2005
Test Date	Oct.11,2018
Report Template	AGCRT-US-2.4G/SAR (2018-01-01)

Note:The results of testing in this report apply to the product/system which was tested only.

Tested By

Eric Zhou(Zhou Yongkang) Oct.11,2018

Checked By

Angela Li(Li Jiao) Dec. 12,2018

Authorized By

Forrest Lei(Lei Yonggang)
Authorized Officer
Dec. 12,2018

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1. SUMMARY OF MAXIMUM SAR VALUE

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

Frequency Band	Highest Reported 1g-SAR(W/Kg)	SAR Test Limit (W/Kg)
	Head SAR（with 0mm separation）	
Bluetooth	0.919	1.6
SAR Test Result	PASS	

This device is compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6W/Kg) specified in IEEE Std. 1528:2013; FCC 47CFR § 2.1093; IEEE/ANSI C95.1:2005 and the following specific FCC Test Procedures:

- KDB 447498 D01 General RF Exposure Guidance v06
- KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04

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2. GENERAL INFORMATION

2.1. EUT Description

General Information	
Product Designation	Bluetooth Helmet Communicator
Test Model	MOTION INFINITY
Hardware Version	REV 3.8
Software Version	RC 1.0
Device Category	Portable
RF Exposure Environment	Uncontrolled
Antenna Type	Internal
Bluetooth	
Operation Frequency	2402~2480MHz
Antenna Gain	2.3dBi
Bluetooth Version	BR/EDR, BLE
Type of modulation	**BR/EDR :**GFSK, π /4-DQPSK, 8-DPSK; **BLE**: GFSK
Maximum Peak Power	BR/EDR : 19.61dBm; BLE: 7.05dBm
Li-ion Battery	
Brand Name	N/A
Model Name	STK602535
Manufacturer Name	A&S Power
Manufacturer Address	NO.11, Yinhu Industrial Park, JiaoYiTang Village, TangXia, DongGuan, China
Capacitance	650mAh
Rated Voltage/ Charging Voltage	DC3.7V/ DC4.2V

Note: The sample used for testing is end product.

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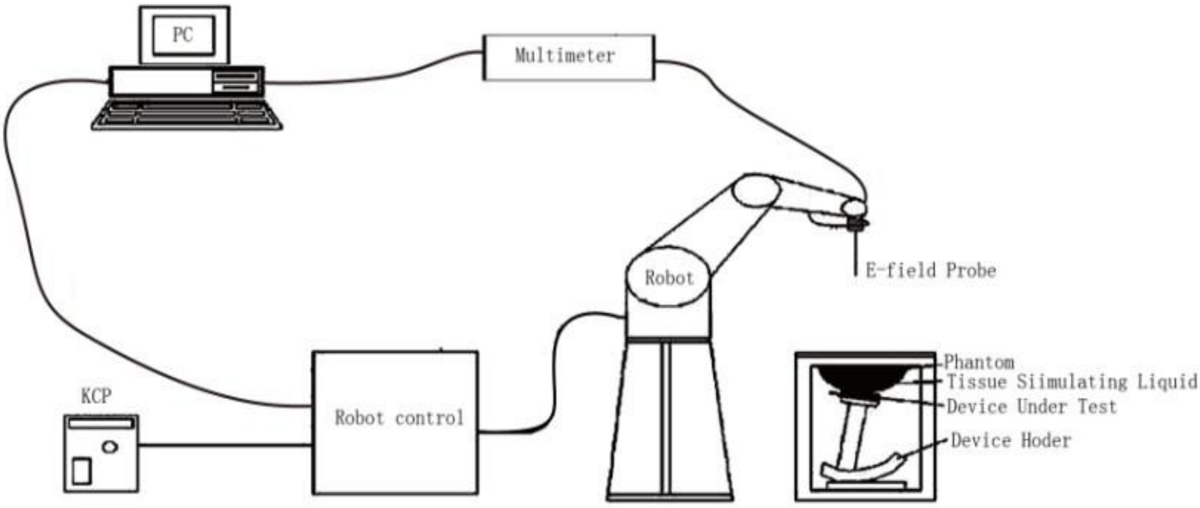
3. SAR MEASUREMENT SYSTEM

3.1. The SATIMO system used for performing compliance tests consists of following items



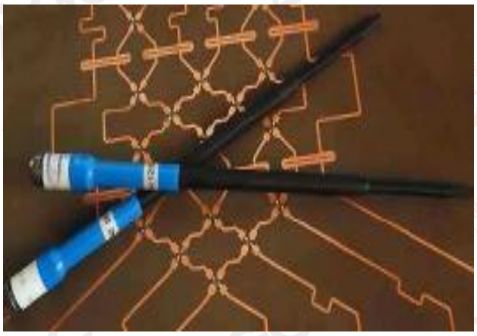
The COMOSAR system for performing compliance tests consists of the following items:

- The PC. It controls most of the bench devices and stores measurement data.A computer running WinXP and the Opensar software.
- The E-Field probe. The probe is a 3-axis system made of 3 distinct dipoles. Each dipole returns a voltage in function of the ambient electric field.
- The Keithley multimeter measures each probe dipole voltages.
- The SAM phantom simulates a human head. The measurement of the electric field is made inside the phantom.
- The liquids simulate the dielectric properties of the human head tissues.
- The network emulator controls the mobile phone under test.
- The validation dipoles are used to measure a reference SAR. They are used to periodically check the bench to make sure that there is no drift of the system characteristics over time.
- The phantom, the device holder and other accessories according to the targeted measurement.

3.2. COMOSAR E-Field Probe

The SAR measurement is conducted with the dosimetric probe manufactured by SATIMO. The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. SATIMO conducts the probe calibration in compliance with international and national standards (e.g. IEEE Std. 1528:2013; FCC 47CFR § 2.1093; IEEE/ANSI C95.1:2005 and relevant KDB files.)Under ISO17025.The calibration data are in Appendix D.

Isotropic E-Field Probe Specification

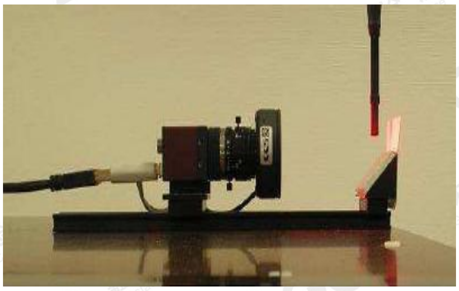
Model	SSE5	
Manufacturer	MVG	
Identification No.	SN 22/12 EP159	
Frequency	0.45GHz-3GHz Linearity:±0.11dB(0.45GHz-3GHz)	
Dynamic Range	0.01W/Kg-100W/Kg Linearity:±0.11dB	
Dimensions	Overall length:330mm Length of individual dipoles:4.5mm Maximum external diameter:8mm Probe Tip external diameter:5mm Distance between dipoles/ probe extremity:2.7mm	
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 3 GHz with precision of better 30%.	

3.3. Robot

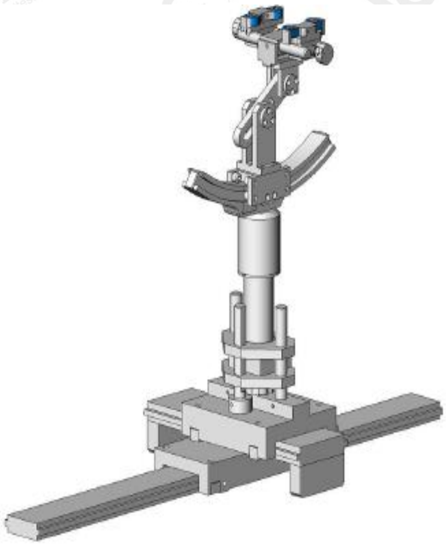
The COMOSAR system uses the KUKA robot from SATIMO SA (France).For the 6-axis controller COMOSAR system, the KUKA robot controller version from SATIMO is used.
The XL robot series have many features that are important for our application:

- High precision (repeatability 0.02 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)
- 6-axis controller

3.4. Video Positioning System

The video positioning system is used in OpenSAR to check the probe. Which is composed of a camera, LED, mirror and mechanical parts.The camera is piloted by the main computer with firewire link. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip. The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1 mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position.	

3.5. Device Holder

The COMOSAR device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (EPR). Thus the device needs no repositioning when changing the angles. The COMOSAR device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity εr =3 and loss tangent δ = 0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.	

3.6. SAM Twin Phantom

The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region where shell thickness increases to 6mm). It has three measurement areas: □ Left head □ Right head □ Flat phantom	

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

4. SAR MEASUREMENT PROCEDURE

4.1. Specific Absorption Rate (SAR)

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

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

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

SAR is expressed in units of Watts per kilogram (W/Kg)
SAR can be obtained using either of the following equations:

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

$$SAR = c_h \left.\frac{dT}{dt}\right|_{t=0}$$

Where

SAR is the specific absorption rate in watts per kilogram;
E is the r.m.s. value of the electric field strength in the tissue in volts per meter;
σ is the conductivity of the tissue in siemens per metre;
ρ is the density of the tissue in kilograms per cubic metre;
c_h is the heat capacity of the tissue in joules per kilogram and Kelvin;

$\frac{dT}{dt} \mid t = 0$ is the initial time derivative of temperature in the tissue in kelvins per second

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4.2. SAR Measurement Procedure

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurement are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface is 2.7mm This distance cannot be smaller than the distance os sensor calibration points to probe tip as `defined in the probe properties,

Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in db) is specified in the standards for compliance testing. For example, a 2db range is required in IEEE Standard 1528 standards, whereby 3db is a requirement when compliance is assessed in accordance with the ARIB standard (Japan) If one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximum are detected, the number of Zoom Scan has to be increased accordingly.

Area Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100MHz to 6GHz

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

Step 3: Zoom Scan

Zoom Scan are used to assess the peak spatial SAR value within a cubic average volume containing 1g abd 10g of simulated tissue. The Zoom Scan measures points(refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1g and 10g and displays these values next to the job's label.

Zoom Scan Parameters extracted from KDB865664 d01 SAR Measurement 100MHz to 6GHz

<table>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤ 4 mm</td><td>3 – 4 GHz: ≤ 3 mm
4 – 5 GHz: ≤ 2.5 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 – 4 GHz: ≥ 28 mm
4 – 5 GHz: ≥ 25 mm
5 – 6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the <u>reported</u> SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

Step 4: Power Drift Measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the same settings. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

5. TISSUE SIMULATING LIQUID

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15cm. For head SAR testing the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15cm For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15cm.The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 5% are listed in 5.2

5.1. The composition of the tissue simulating liquid

Ingredient (% Weight) / Frequency (MHz)	Water	Nacl	Polysorbate 20	DGBE	1,2-Propanediol	Triton X-100
2450 Head	71.88	0.16	0.0	7.99	0.0	19.97

5.2. Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE 1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in IEEE 1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in IEEE 1528.

Target Frequency (MHz)	head		body	
	εr	σ (S/m)	εr	σ (S/m)
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	1.01	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800–2000	40.0	1.40	53.3	1.52
2450	**39.2**	**1.80**	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

(εr = relative permittivity, σ = conductivity and ρ = 1000 kg/m3)

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5.3. Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using SATIMO Dielectric Probe Kit and R&S Network Analyzer ZVL6.

Tissue Stimulant Measurement for 2450MHz					
	Fr. (MHz)	Dielectric Parameters (±5%)		Tissue Temp [°C]	Test time
		εr39.2(37.24-41.16)	δ[s/m]1.80(1.71-1.89)		
Head	2402	40.05	1.75	21.5	Oct.11,2018
	2441	39.56	1.77		
	2450	39.17	1.80		
	2480	38.75	1.82		

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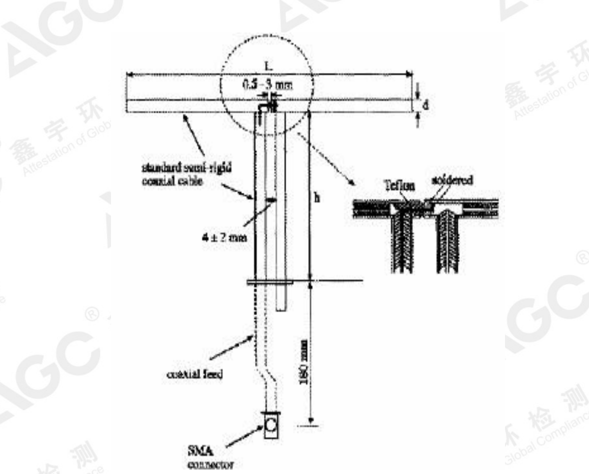
6. SAR SYSTEM CHECK PROCEDURE

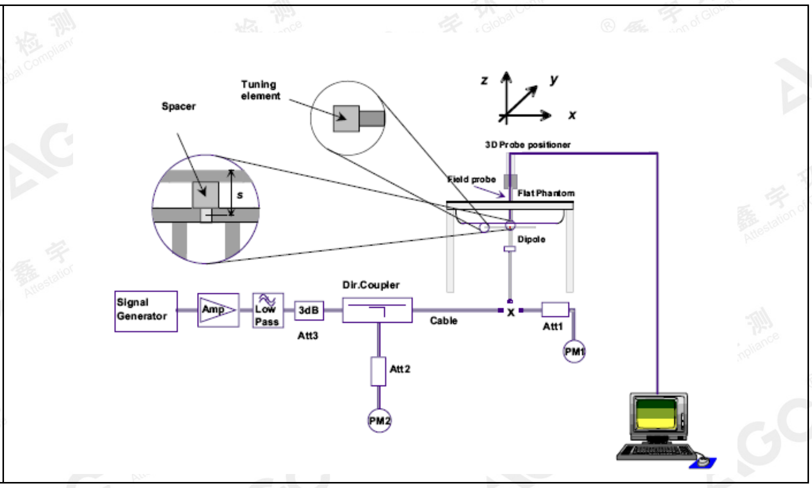
6.1. SAR System Check Procedures

SAR system check is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every three to four days when the liquid parameters are remeasured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

Each SATIMO system is equipped with one or more system check kits. These units, together with the predefined measurement procedures within the SATIMO software, enable the user to conduct the system check and system validation. System kit includes a dipole, and dipole device holder.

The system check verifies that the system operates within its specifications. It's performed daily or before every SAR measurement. The system check uses normal SAR measurement in the flat section of the phantom with a matched dipole at a specified distance. The system check setup is shown as below.





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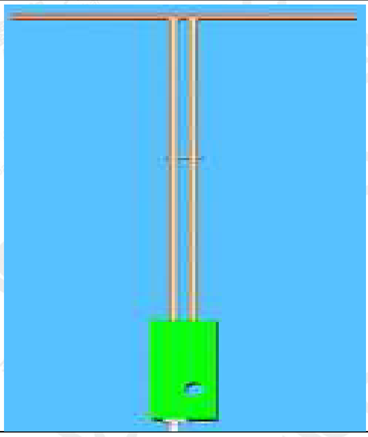
6.2. SAR System Check
6.2.1. Dipoles



The dipoles used is based on the IEEE-1528 standard, and is complied with mechanical and electrical specifications in line with the requirements of IEEE. the table below provides details for the mechanical and electrical Specifications for the dipoles.

Frequency	L (mm)	h (mm)	d (mm)
2450MHz	51.5	30.4	3.6

6.2.2. System Check Result

System Performance Check at 2450MHz for Head								
Validation Kit: SN 29/15DIP 2G450-393								
Frequency [MHz]	Target Value(W/Kg)		Reference Result (± 10%)		Normalized to 1W(W/Kg)		Tissue Temp. [°C]	Test time
	1g	10g	1g	10g	1g	10g		
2450	54.53	24.30	49.077-59.983	21.87-26.730	51.70	23.25	21.3	Oct.11,2018

Note:
(1) We use a CW signal of 18dBm for system check, and then all SAR value are normalized to 1W forward power. The result must be within ±10% of target value.

6.3. SAR System Validation

The SAR measurement system was validated according to procedures in KDB 865664 D01.
SAR probe and tissue dielectric parameters are as shown bellow.

Test Data	Probe S/N	Tested Freq. (MHz)	Tissue Type	Cond.	Perm	CW validation			Mod. validation		
						Sensitivity	Probe Linearity	Probe Isotropy	Mod. Type	Duty Factor	Peak to average power ratio
9/27/2018	SN 22/12 EP159	2450	head	1.80	39.57	PASS	PASS	PASS	GFSK	PASS	N/A
9/27/2018	SN 22/12 EP159	2450	body	1.95	53.05	PASS	PASS	PASS	GFSK	PASS	N/A

7. EUT TEST POSITION

The EUT is tested in **Head SAR Back, Head SAR Front**

7.1. Body Worn Position

(1) To position the EUT parallel to the phantom surface.

(2) To adjust the EUT parallel to the flat phantom.

(3) To adjust the distance between the EUT surface and the flat phantom to **0mm.**

8. SAR EXPOSURE LIMITS

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

Type Exposure	Uncontrolled Environment Limit (W/kg)
Spatial Peak SAR (1g cube tissue for brain or body)	1.60
Spatial Average SAR (Whole body)	0.08
Spatial Peak SAR (Limbs)	4.0

9. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2F., Bldg.2, No.1-4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang, Bao'an District B112-B113, Shenzhen 518012
NVLAP Lab Code	600153-0
Designation Number	CN5028
Test Firm Registration Number	682566
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by National Voluntary Laboratory Accreditation program, NVLAP Code 600153-0

10. TEST EQUIPMENT LIST

Equipment description	Manufacturer/ Model	Identification No.	Current calibration date	Next calibration date
SAR Probe	MVG	SN 22/12 EP159	Aug. 08,2018	Aug. 07,2019
Phantom	SATIMO	SN_4511_SAM90	Validated. No cal required.	Validated. No cal required.
Liquid	SATIMO	-	Validated. No cal required.	Validated. No cal required.
Multimeter	Keithley 2000	1188656	Mar. 01,2018	Feb. 28,2019
Dipole	SATIMO SID2450	SN29/15 DIP 2G450-393	July 05,2016	July 04,2019
Signal Generator	Agilent-E4438C	US41461365	Mar. 01,2018	Feb. 28,2019
Vector Analyzer	Agilent / E4440A	US41421290	Mar. 01,2018	Feb. 28,2019
Network Analyzer	Rhode & Schwarz ZVL6	SN100132	Mar. 01,2018	Feb. 28,2019
Attenuator	Warison /WATT-6SR1211	N/A	N/A	N/A
Attenuator	Mini-circuits / VAT-10+	N/A	N/A	N/A
Amplifier	EM30180	SN060552	Mar. 01,2018	Feb. 28,2019
Directional Couple	Werlatone/ C5571-10	SN99463	June. 12,2018	June. 11,2019
Directional Couple	Werlatone/ C6026-10	SN99482	June. 12,2018	June. 11,2019
Power Sensor	NRP-Z21	1137.6000.02	Sep. 20,2018	Sep. 19,2019
Power Sensor	NRP-Z23	US38261498	Mar. 01,2018	Feb. 28,2019
Power Viewer	R&S	V2.3.1.0	N/A	N/A

Note: Per KDB 865664 Dipole SAR Validation, AGC Lab has adopted 3 years calibration intervals. On annual basis, every measurement dipole has been evaluated and is in compliance with the following criteria:
1. There is no physical damage on the dipole;
2. System validation with specific dipole is within 10% of calibrated value;
3. Return-loss is within 20% of calibrated measurement;
4. Impedance is within 5Ω of calibrated measurement.

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11. MEASUREMENT UNCERTAINTY

Measurement uncertainty for Dipole averaged over 1 gram / 10 gram.									
a	b	c	d	e f(d,k)	f	g	h c×f/e	i c×g/e	k
Uncertainty Component	Sec.	Tol (± %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (±%)	10g Ui (±%)	vi
Measurement System									
Probe calibration	E.2.1	5.831	N	1	1	1	5.83	5.83	∞
Axial Isotropy	E.2.2	0.695	R	$\sqrt{3}$	√0.5	√0.5	0.28	0.28	∞
Hemispherical Isotropy	E.2.2	1.045	R	$\sqrt{3}$	√0.5	√0.5	0.43	0.43	∞
Boundary effect	E.2.3	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	E.2.4	0.685	R	$\sqrt{3}$	1	1	0.40	0.40	∞
System detection limits	E.2.4	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Modulation response	E2.5	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Readout Electronics	E.2.6	0.021	N	1	1	1	0.021	0.021	∞
Response Time	E.2.7	0	R	$\sqrt{3}$	1	1	0	0	∞
Integration Time	E.2.8	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
RF ambient conditions-Noise	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
RF ambient conditions-reflections	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe positioner mechanical tolerance	E.6.2	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to phantom shell	E.6.3	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation, interpolation, and integrations algorithms for max. SAR evaluation	E.5	2.3	R	$\sqrt{3}$	1	1	1.33	1.33	∞
Test sample Related									
Test sample positioning	E.4.2	2.6	N	1	1	1	2.6	2.6	∞
Device holder uncertainty	E.4.1	3	N	1	1	1	3	3	∞
Output power variation—SAR drift measurement	E.2.9	5	R	$\sqrt{3}$	1	1	2.89	2.89	∞
SAR scaling	E.6.5	5	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Phantom and tissue parameters									
Phantom shell uncertainty—shape, thickness, and permittivity	E.3.1	4	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	E.3.2	1.9	N	1	1	0.84	1.90	1.60	∞
Liquid conductivity measurement	E.3.3	4	N	1	0.78	0.71	3.12	2.84	M
Liquid permittivity measurement	E.3.3	5	N	1	0.23	0.26	1.15	1.30	M
Liquid conductivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.78	0.71	1.13	1.02	∞
Liquid permittivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.23	0.26	0.33	0.38	∞
Combined Standard Uncertainty			RSS				9.79	9.59	
Expanded Uncertainty (95% Confidence interval)			K=2				19.58	19.18	
System check uncertainty for Dipole averaged over 1 gram / 10 gram.									

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a	b	c	d	e f(d,k)	f	g	h c×f/e	i c×g/e	k
Uncertainty Component	Sec.	Tol (± %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (±%)	10g Ui (±%)	vi
Measurement System									
Probe calibration drift	E.2.1.3	0.5	N	1	1	1	0.50	0.50	∞
Axial Isotropy	E.2.2	0.695	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Hemispherical Isotropy	E.2.2	1.045	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Boundary effect	E.2.3	1.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Linearity	E.2.4	0.685	R	$\sqrt{3}$	0	0	0.00	0.00	∞
System detection limits	E.2.4	1.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Modulation response	E2.5	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Readout Electronics	E.2.6	0.021	N	1	0	0	0.00	0.00	∞
Response Time	E.2.7	0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Integration Time	E.2.8	1.4	R	$\sqrt{3}$	0	0	0.00	0.00	∞
RF ambient conditions-Noise	E.6.1	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
RF ambient conditions-reflections	E.6.1	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Probe positioner mechanical tolerance	E.6.2	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to phantom shell	E.6.3	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation, interpolation, and integrations algorithms for max. SAR evaluation	E.5	2.3	R	$\sqrt{3}$	0	0	0.00	0.00	∞
System check source (dipole)									
Deviation of experimental dipoles	E.6.4	2	N	1	1	1	2	2	∞
Input power and SAR drift measurement	8,6.6.4	5	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Dipole axis to liquid distance	8,E.6.6	2	R	$\sqrt{3}$	1	1	1.15	1.15	∞
Phantom and tissue parameters									
Phantom shell uncertainty—shape, thickness, and permittivity	E.3.1	4	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	E.3.2	1.9	N	1	1	0.84	1.90	1.60	∞
Liquid conductivity measurement	E.3.3	4	N	1	0.78	0.71	3.12	2.84	M
Liquid permittivity measurement	E.3.3	5	N	1	0.23	0.26	1.15	1.30	M
Liquid conductivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.78	0.71	1.13	1.02	∞
Liquid permittivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.23	0.26	0.33	0.38	∞
Combined Standard Uncertainty			RSS				5.564	5.205	
Expanded Uncertainty (95% Confidence interval)			K=2				11.128	10.410	

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System Validation uncertainty for Dipole averaged over 1 gram / 10 gram.									
a	b	c	d	e f(d,k)	f	g	h c×f/e	i c×g/e	k
Uncertainty Component	Sec.	Tol (±%)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (±%)	10g Ui (±%)	vi
Measurement System									
Probe calibration	E.2.1	5.831	N	1	1	1	5.83	5.83	∞
Axial Isotropy	E.2.2	0.695	R	$\sqrt{3}$	1	1	0.40	0.40	∞
Hemispherical Isotropy	E.2.2	1.045	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Boundary effect	E.2.3	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	E.2.4	0.685	R	$\sqrt{3}$	1	1	0.40	0.40	∞
System detection limits	E.2.4	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Modulation response	E2.5	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Readout Electronics	E.2.6	0.021	N	1	1	1	0.021	0.021	∞
Response Time	E.2.7	0.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Integration Time	E.2.8	1.4	R	$\sqrt{3}$	0	0	0.00	0.00	∞
RF ambient conditions-Noise	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
RF ambient conditions-reflections	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe positioner mechanical tolerance	E.6.2	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to phantom shell	E.6.3	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation, interpolation, and integrations algorithms for max. SAR evaluation	E.5	2.3	R	$\sqrt{3}$	1	1	1.33	1.33	∞
System check source (dipole)									
Deviation of experimental dipole from numerical dipole	E.6.4	5.0	N	1	1	1	5.00	5.00	∞
Input power and SAR drift measurement	8,6.6.4	5.0	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Dipole axis to liquid distance	8,E.6.6	2.0	R	$\sqrt{3}$	1	1	1.15	1.15	∞
Phantom and tissue parameters									
Phantom shell uncertainty—shape, thickness, and permittivity	E.3.1	4.0	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	E.3.2	1.9	N	1	1	0.84	1.90	1.60	∞
Liquid conductivity measurement	E.3.3	4.0	N	1	0.78	0.71	3.12	2.84	M
Liquid permittivity measurement	E.3.3	5.0	N	1	0.23	0.26	1.15	1.30	M
Liquid conductivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.78	0.71	1.13	1.02	∞
Liquid permittivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.23	0.26	0.33	0.38	∞
Combined Standard Uncertainty			RSS				9.718	9.517	
Expanded Uncertainty (95% Confidence interval)			K=2				19.437	19.035	

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12. CONDUCTED POWER MEASUREMENT

Bluetooth_BR/EDR

Modulation	Channel	Frequency(MHz)	Maximum Peak Power (dBm)
DH5 (GFSK)	0	2402	19.41
	39	2441	**19.61**
	78	2480	19.46
2DH5 (π /4-DQPSK)	0	2402	19.26
	39	2441	19.38
	78	2480	19.33
3DH5 (8-DPSK)	0	2402	19.10
	39	2441	19.30
	78	2480	19.13

Bluetooth_BLE

Modulation	Channel	Frequency(MHz)	Maximum Peak Power (dBm)
GFSK	0	2402	5.19
	19	2440	**7.05**
	39	2480	5.91

13. TEST RESULTS

13.1. SAR Test Results Summary

13.1.1. Test position and configuration

1. The EUT is a model of Bluetooth headset;
2. A non-standard setup was used for SAR testing based on guidance from the FCC. The operational description contains additional information;
   According to KDB 447498 D01 General RF Exposure Guidance v06, due to the Max peak power for Bluetooth is more than the test exclusion threshold, which have to be tested;
3. And an inquiry about SAR test method is request:

(1). Using a Flat phantom flied with head tissue simulating liquid for test;
(2). Using a separation distance of less than or equal to 15mm (we use 0mm) for test;

FCC response on 09/14/2018

Thanks for the inquiry. You need to place the headset against the flat phantom directly and use such worst configuration to perform the head SAR test for this product. then provide the test set uo showing the following:

the most conservative assessment to the head's distance in mm what is proposed as measurement distance to a flat phantom filled with head simulation liquid.

Please provide a photo of the head set worn on the user showing the position of the external antennas in front of the forehead. If possible, identify the separation distances on the photo

More detail operational description that includes, new concept and the mechanism of turning on and off , the proposed test configuration and all the wireless modes need to be submitted. If the device is "head worn only", head SAR only is acceptable. We recommend the review of KDB 648474 and KDB447498 and KDB 941225 for wireless mode.

Please provide the digital photo of the device showing the position(s) of the antenna(s) and their relative positions to each other and to the phantom

In order to make a SAR test determination, the FCC will require additional documentation such as RF exposure conditions/output power data, transmission mode,operational description for both models ,tune-up data, external and internal photos, documented theory of operation with established specific operating conditions for both models., duty cycle factor, etc. An FCC equipment authorization filing for a licensed transmitter that does not include a SAR evaluation must include a duty factor analysis instead.SAR exclusion by means of low duty factor requires a PAG

4. For SAR testing, the device was controlled by software to test at reference fixed frequency.

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13.1.2. Operation Mode

1. Per KDB 447498 D01 v06 ,for each exposure position, if the highest 1-g SAR is ≤ 0.8 W/kg, testing for low and high channel is optional.
2. Per KDB 865664 D01 v01r04,for each frequency band, if the measured SAR is ≥0.8W/Kg, testing for repeated SAR measurement is required , that the highest measured SAR is only to be tested. When the SAR results are near the limit, the following procedures are required for each device to verify these types of SAR measurement related variation concerns by repeating the highest measured SAR configuration in each frequency band.
   (1) When the original highest measured SAR is ≥0.8W/Kg, repeat that measurement once.
   (2) 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.
   (3) Perform a third repeated measurement only if the original, first and second repeated measurement is ≥1.5 W/Kg and ratio of largest to smallest SAR for the original, first and second measurement is ≥ 1.20.
3. Maximum Scaling SAR in order to calculate the Maximum SAR values to test under the standard Peak Power, Calculation method is as follows:
   Maximum Scaling SAR =tested SAR (Max.) ×[maximum turn-up power (mw)/ maximum measurement output power(mw)]

13.1.3. Antenna Location: (back view)

13.1.4. SAR Test Results Summary

SAR MEASUREMENT									
Depth of Liquid (cm):>15				Relative Humidity (%): 53.1					
Product: Bluetooth Helmet Communicator									
Test Mode: Bluetooth_ BR/EDR									
Position	**Mode**	**Ch.**	**Fr. (MHz)**	**Power Drift (<±5%)**	**SAR (1g) (W/kg)**	**Max. Tune-up Power (dBm)**	**Meas. output Power (dBm)**	**Scaled SAR (W/Kg)**	**Limit W/kg**
Head SAR back	DH5	0	2402	-0.56	0.494	20.00	19.41	0.566	1.6
Head SAR back	DH5	39	2441	-1.33	0.840	20.00	19.61	**0.919**	1.6
Head SAR back	DH5	78	2480	0.02	0.712	20.00	19.46	0.806	1.6
Head SAR front	DH5	39	2441	1.55	0.483	20.00	19.61	0.528	1.6
Head SAR back	2DH5	39	2441	-0.02	0.252	20.00	19.38	0.291	1.6
Head SAR back	3DH5	39	2441	-0.23	0.228	20.00	19.30	0.268	1.6

Note:
(1) When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
(2)The test separation of all above tableis 0mm.

SAR MEASUREMENT									
Depth of Liquid (cm):>15				Relative Humidity (%): 49.6					
Product: Bluetooth Helmet Communicator									
Test Mode: Bluetooth_BLE									
Position	**Mode**	**Ch.**	**Fr. (MHz)**	**Power Drift (<±5%)**	**SAR (1g) (W/kg)**	**Max. Tune-up Power (dBm)**	**Meas. output Power (dBm)**	**Scaled SAR (W/Kg)**	**Limit W/kg**
Head SAR back	GFSK	19	2440	-0.25	0.358	7.50	7.05	0.397	1.6
Head SAR front	GFSK	19	2440	-1.96	0.235	7.50	7.05	0.261	1.6

Note:
(1) When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
(2)The test separation of all above tableis 0mm.

Repeated SAR										
Product: Bluetooth Helmet Communicator										
Test Mode: Bluetooth_ BR/EDR										
Position	**Mode**	**Ch.**	**Fr. (MHz)**	**Power Drift (<±50.%)**	**Once SAR (1g) (W/kg)**	**Power Drift (<±5%)**	**Twice SAR (1g) (W/kg)**	**Power Drift (<±5%)**	**Third SAR (1g) (W/kg)**	**Limit (W/kg)**
Head SAR back	DH5	39	2441	0.78	0.809	--	--	--	--	1.6

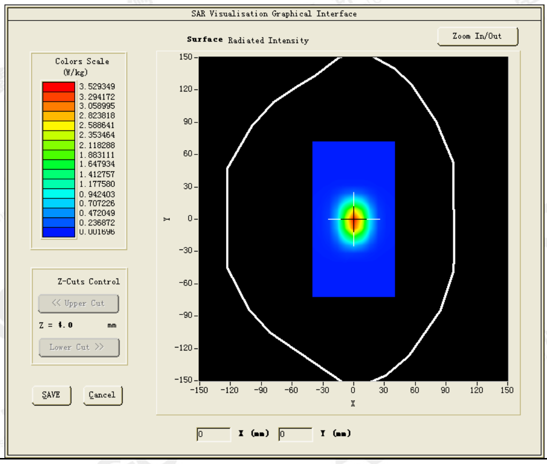
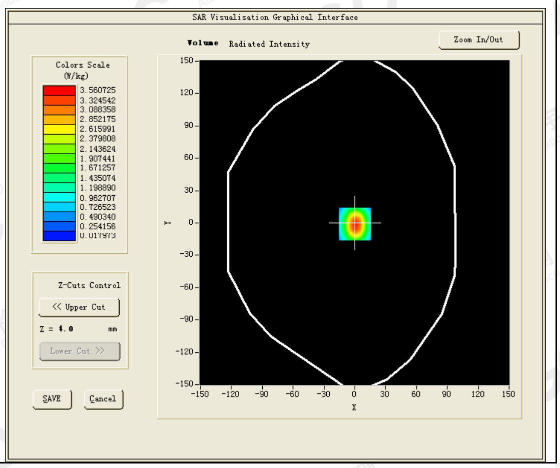
APPENDIX A. SAR SYSTEM CHECK DATA

Test Laboratory: AGC Lab **Date: Oct.11,2018**
System Check Head 2450 MHz
DUT: Dipole 2450 MHz Type: SID 2450
Communication System CW; Communication System Band: D2450 (2450.0 MHz); Duty Cycle: 1:1; Conv.F=4.90
Frequency: 2450 MHz; Medium parameters used: f = 2450 MHz; σ=1.80 mho/m; εr =39.17; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature (℃): 22.0, Liquid temperature (℃): 21.5

SATIMO Configuration

- Probe: SSE5; Calibrated: Aug. 08,2018; Serial No.: SN 22/12 EP159
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

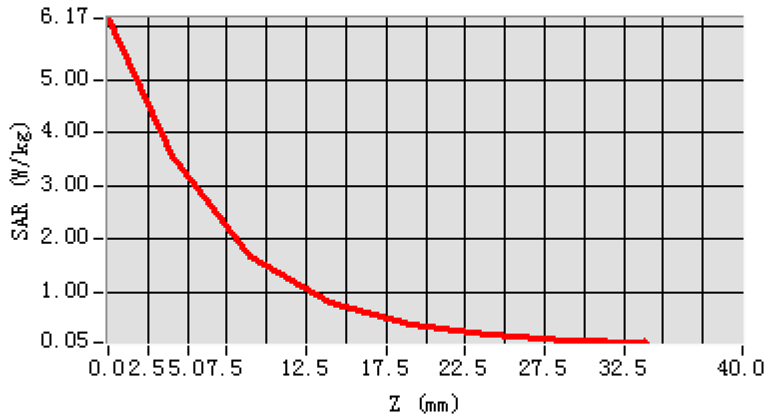
Configuration/System Check 2450MHz Head/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/System Check 2450MHz Head/Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm

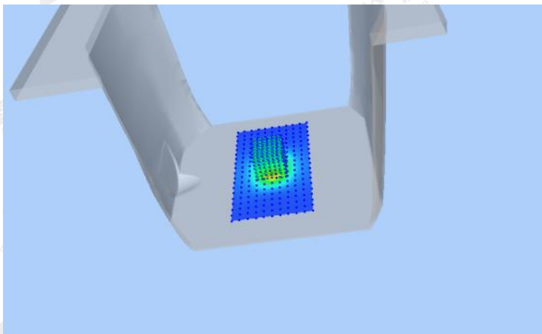
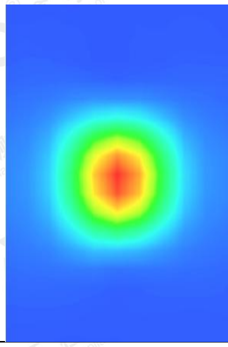
SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=-1.00
SAR Peak: 6.15 W/kg

SAR 10g (W/Kg)	1.467153
SAR 1g (W/Kg)	3.261742

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	6.1726	3.5695	1.6823	0.8155	0.4013	0.2011	0.1035



3D screen shot	Hot spot position
	

APPENDIX B. SAR MEASUREMENT DATA

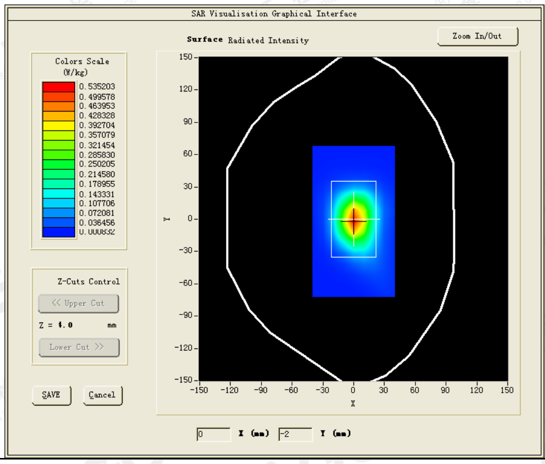
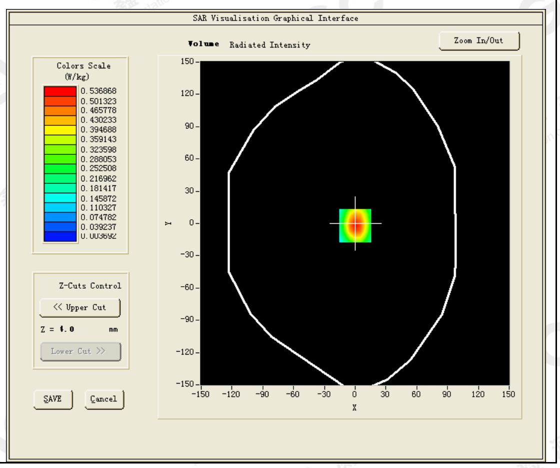
Test Laboratory: AGC Lab **Date: Oct.11,2018**
Low- Head SAR - Back (DH5)
DUT: Bluetooth Helmet Communicator; **Type: MOTION INFINITY**

Communication System: 2.4G; Communication System Band: 2.4G; Duty Cycle: 78%; Conv.F=4.90
Frequency: 2402MHz; Medium parameters used: f = 2450 MHz; σ=1.75 mho/m; εr =40.05; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 22.0, Liquid temperature (℃): 21.5

SATIMO Configuration:
- Probe: SSE5; Calibrated: Aug. 08,2018; Serial No.: SN 22/12 EP159
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/ Low - Head SAR - Back /Area Scan: Measurement grid: dx=10mm, dy=10mm
Configuration/ Low - Head SAR - Back /Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm;

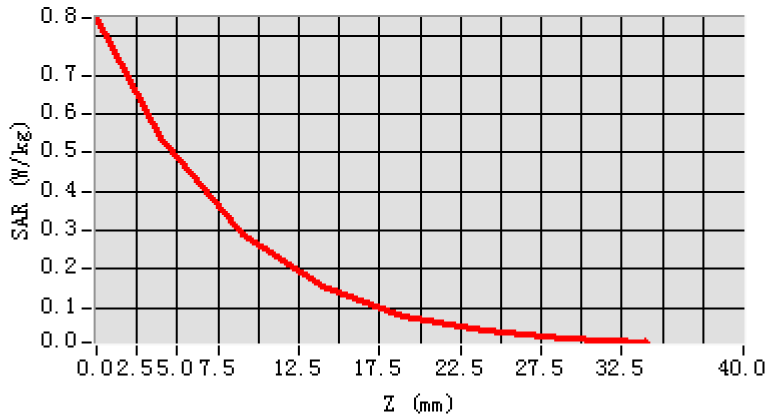
Area Scan	sam_direct_droit2_surf10mm.txt
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Head SAR Back
Band	Bluetooth
Channels	Low
Signal	Crest factor: 1.28

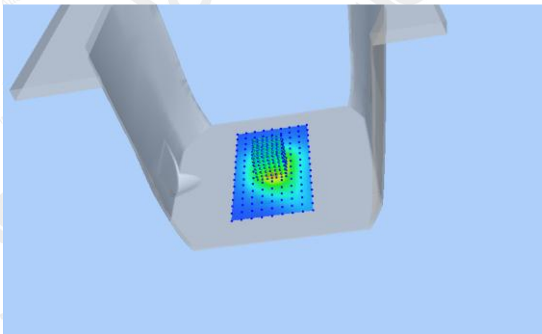
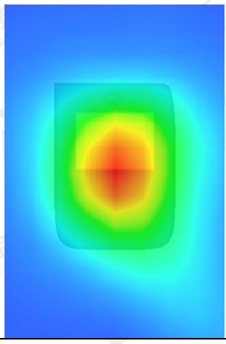
SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=-2.00
SAR Peak: 0.84 W/kg

SAR 10g (W/Kg)	0.251785
SAR 1g (W/Kg)	0.494320

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.8481	0.5369	0.2905	0.1533	0.0801	0.0412	0.0210



3D screen shot	Hot spot position
	

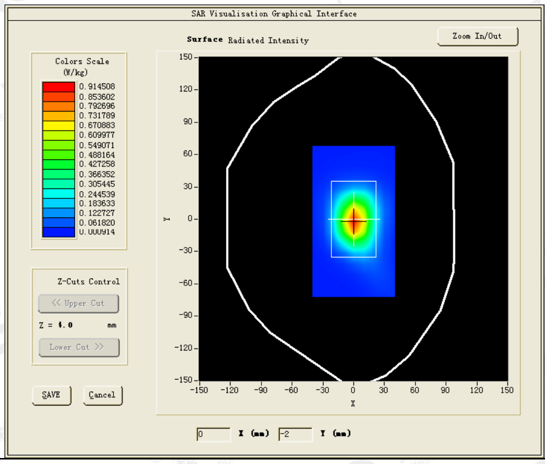
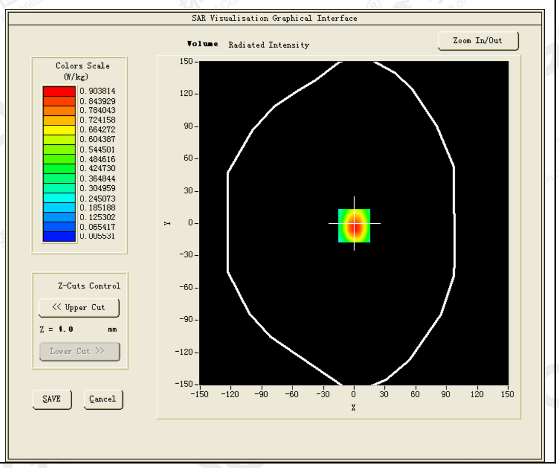
Test Laboratory: AGC Lab **Date: Oct.11,2018**
Mid- Head SAR - Back (DH5)
DUT: Bluetooth Helmet Communicator; Type: MOTION INFINITY

Communication System: 2.4G; Communication System Band: 2.4G; Duty Cycle: 78%; Conv.F=4.90
Frequency: 2441 MHz; Medium parameters used: f = 2450 MHz; σ=1.77 mho/m; εr =39.56; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 22.0, Liquid temperature (℃): 21.5

SATIMO Configuration:
- Probe: SSE5; Calibrated: Aug. 08,2018; Serial No.: SN 22/12 EP159
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/ Mid- Head SAR - Back /Area Scan: Measurement grid: dx=10mm, dy=10mm
Configuration/ Mid- Head SAR - Back /Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm;

Area Scan	sam_direct_droit2_surf10mm.txt
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Head SAR Back
Band	Bluetooth
Channels	Middle
Signal	Crest factor: 1.28

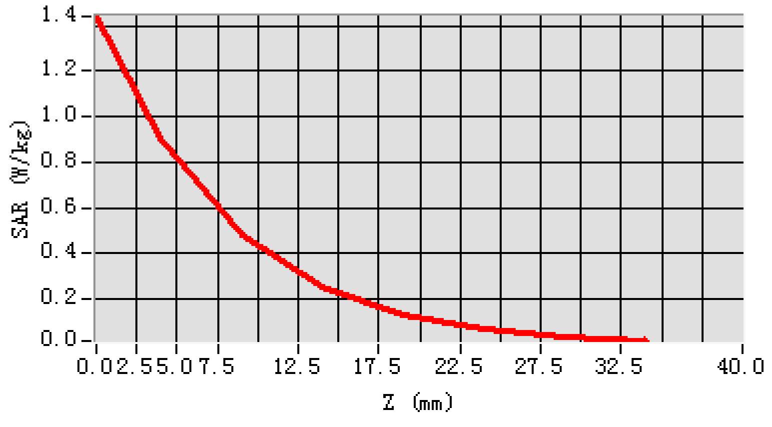
SURFACE SAR	VOLUME SAR
	

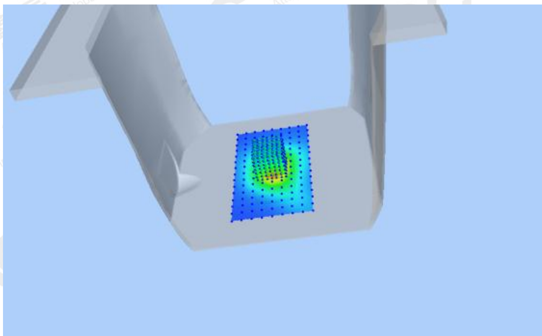
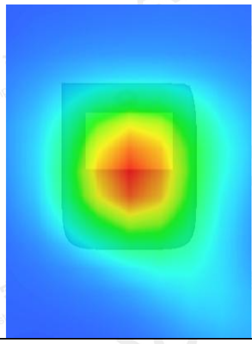
Maximum location: X=0.00, Y=-2.00
SAR Peak: 1.44 W/kg

SAR 10g (W/Kg)	0.422274
SAR 1g (W/Kg)	0.840048

Tel: +86-755 2908 1955 Fax: +86-755 2600 8484 E-mail: agc@agc-cert.com 400 089 2118
Add: 2/F. , Building 2, No.1-4,Chaxi Sanwei Technical Industrial Park,Gushu, Xixiang, Baoan District, Shenzhen, Guangdong China

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.4398	0.9038	0.4825	0.2493	0.1289	0.0656	0.0332



3D screen shot	Hot spot position
	

Tel: +86-755 2908 1955 Fax: +86-755 2600 8484 E-mail: agc@agc-cert.com 400 089 2118
Add: 2/F. , Building 2, No.1-4,Chaxi Sanwei Technical Industrial Park,Gushu, Xixiang, Baoan District, Shenzhen, Guangdong China

Test Laboratory: AGC Lab **Date: Oct.11,2018**
High- Head SAR - Back (DH5)
DUT: Bluetooth Helmet Communicator; **Type: MOTION INFINITY**

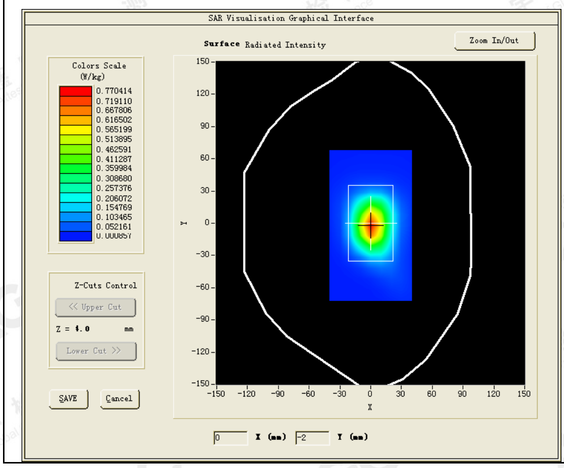
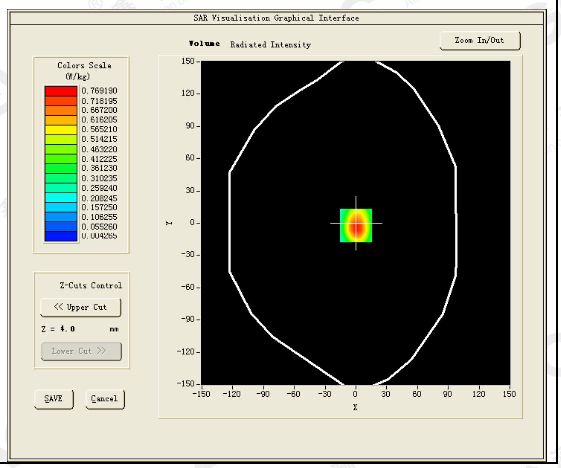
Communication System: 2.4G; Communication System Band: 2.4G; Duty Cycle: 78%; Conv.F=4.90
Frequency: 2480 MHz; Medium parameters used: f = 2450 MHz; σ=1.82 mho/m; εr =38.75; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 22.0, Liquid temperature (℃): 21.5

SATIMO Configuration:

- Probe: SSE5; Calibrated: Aug. 08,2018; Serial No.: SN 22/12 EP159
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/ High - Head SAR - Back /Area Scan: Measurement grid: dx=10mm, dy=10mm
Configuration/ High - Head SAR - Back /Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm;

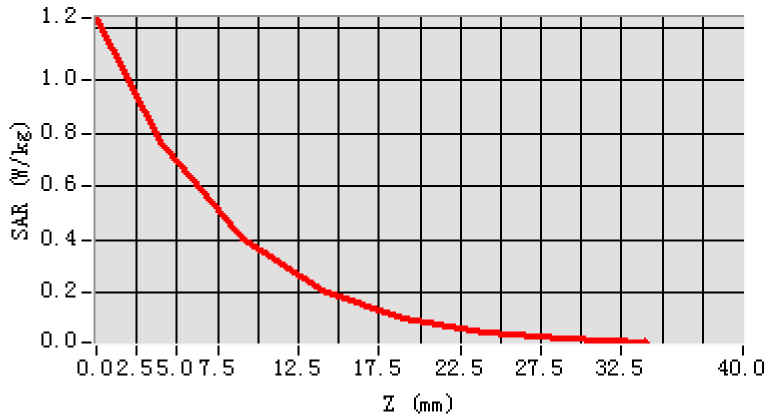
Area Scan	sam_direct_droit2_surf10mm.txt
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Head SAR Back
Band	Bluetooth
Channels	High
Signal	Crest factor: 1.28

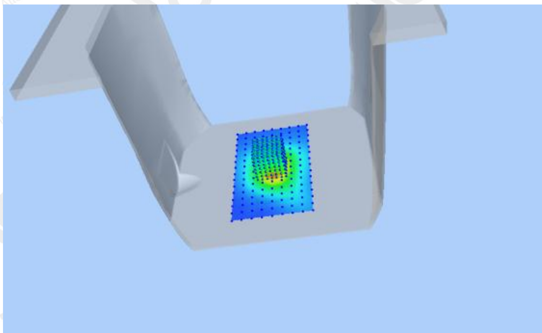
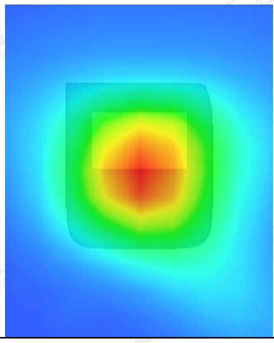
SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=-2.00
SAR Peak: 1.23 W/kg

SAR 10g (W/Kg)	0.360327
SAR 1g (W/Kg)	0.711851

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.2343	0.7692	0.4056	0.2083	0.1057	0.0537	0.0270



3D screen shot	Hot spot position
	

Test Laboratory: AGC Lab **Date: Oct.11,2018**
Mid- Head SAR - Front (DH5)
DUT: Bluetooth Helmet Communicator; Type: MOTION INFINITY

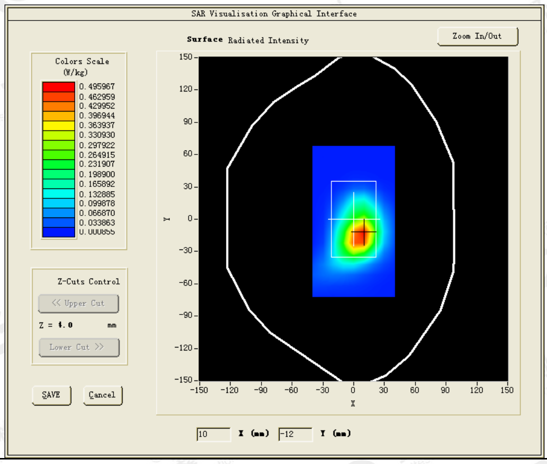
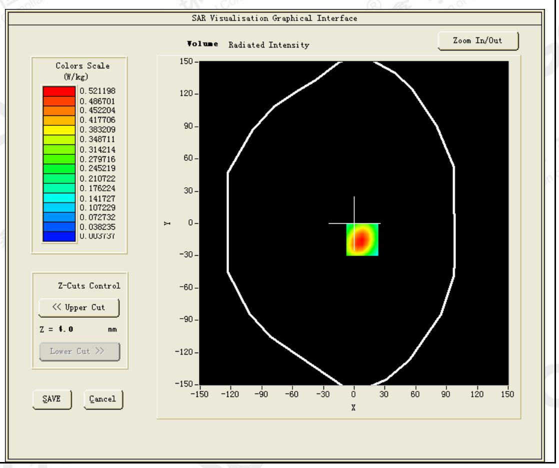
Communication System: 2.4G; Communication System Band: 2.4G; Duty Cycle: 78%; Conv.F=4.90
Frequency: 2441 MHz; Medium parameters used: f = 2450 MHz; σ=1.77 mho/m; εr =39.56; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 22.0, Liquid temperature (℃): 21.5

SATIMO Configuration:

- Probe: SSE5; Calibrated: Aug. 08,2018; Serial No.: SN 22/12 EP159
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/ Mid- Head SAR - Front /Area Scan: Measurement grid: dx=10mm, dy=10mm
Configuration/ Mid- Head SAR - Front /Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm;

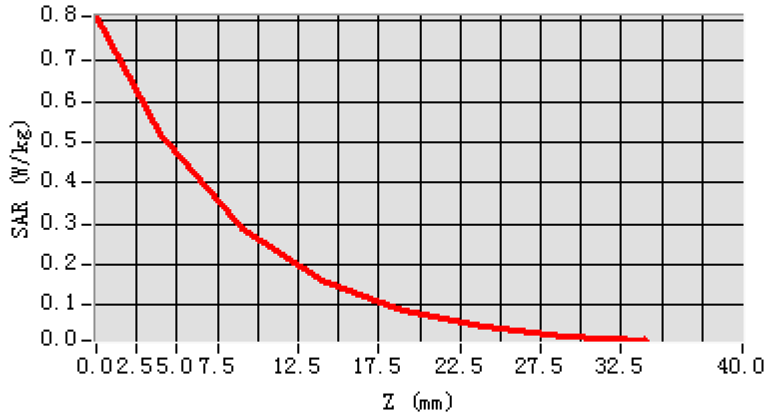
Area Scan	sam_direct_droit2_surf10mm.txt
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Head SAR Front
Band	Bluetooth
Channels	Middle
Signal	Crest factor: 1.28

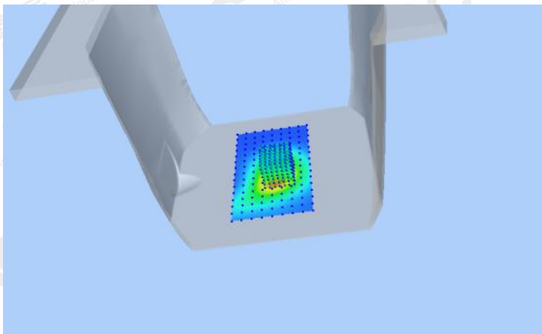
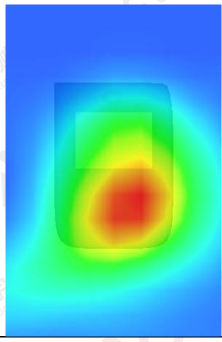
SURFACE SAR	VOLUME SAR
	

Maximum location: X=8.00, Y=-15.00
SAR Peak: 0.81 W/kg

SAR 10g (W/Kg)	0.253421
SAR 1g (W/Kg)	0.483404

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.8090	0.5212	0.2894	0.1577	0.0848	0.0449	0.0241



3D screen shot	Hot spot position
	

Test Laboratory: AGC Lab **Date: Oct.11,2018**
Mid- Head SAR - Back(2DH5)
DUT: Bluetooth Helmet Communicator; Type: MOTION INFINITY

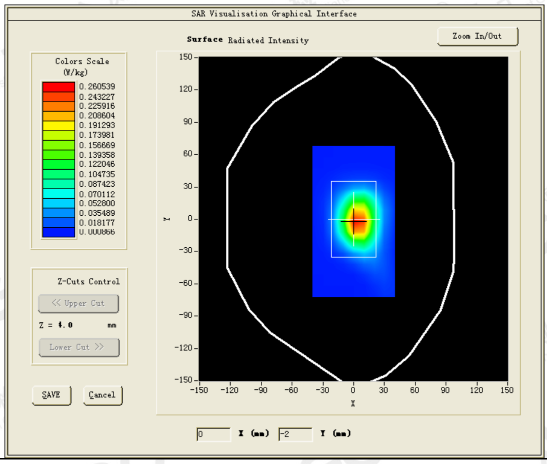
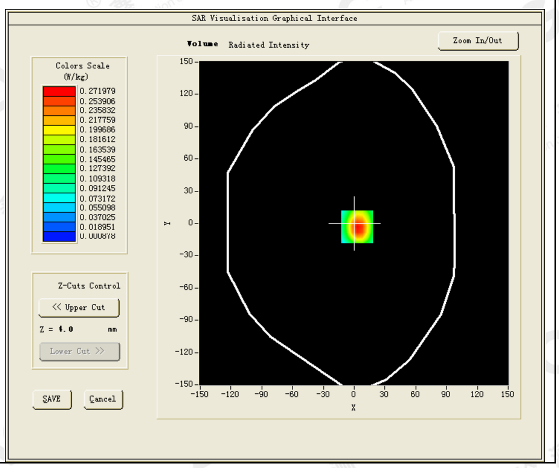
Communication System: 2.4G; Communication System Band: 2.4G; Duty Cycle: 78%; Conv.F=4.90
Frequency: 2441 MHz; Medium parameters used: f = 2450 MHz; σ=1.77 mho/m; εr =39.56; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 22.0, Liquid temperature (℃): 21.5

SATIMO Configuration:

- Probe: SSE5; Calibrated: Aug. 08,2018; Serial No.: SN 22/12 EP159
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/ Mid- Head SAR - Back /Area Scan: Measurement grid: dx=10mm, dy=10mm
Configuration/ Mid- Head SAR - Back /Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm;

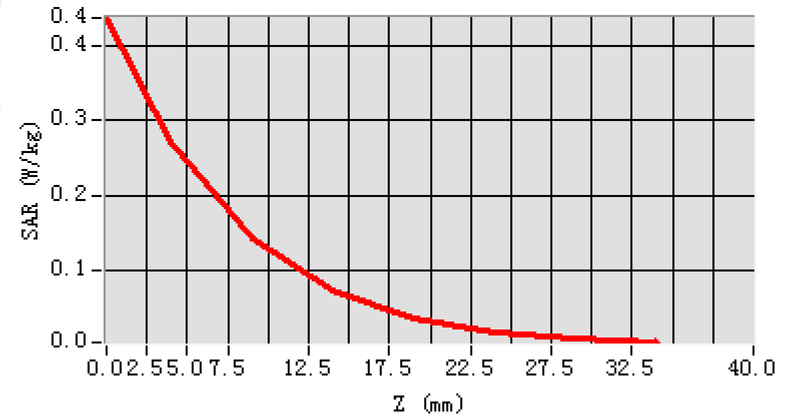
Area Scan	sam_direct_droit2_surf10mm.txt
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Head SAR Back
Band	Bluetooth
Channels	Middle
Signal	Crest factor: 1.28

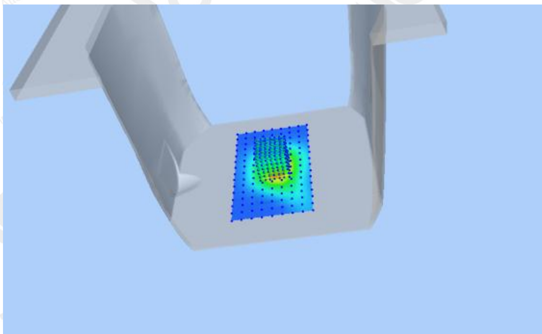
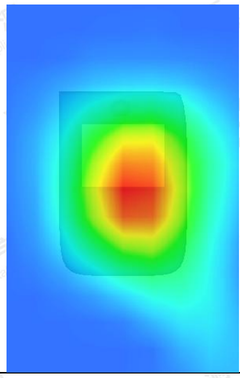
SURFACE SAR	VOLUME SAR
	

Maximum location: X=3.00, Y=-3.00
SAR Peak: 0.44 W/kg

SAR 10g (W/Kg)	0.124179
SAR 1g (W/Kg)	0.252065

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.4365	0.2720	0.1432	0.0733	0.0369	0.0181	0.0088



3D screen shot	Hot spot position
	

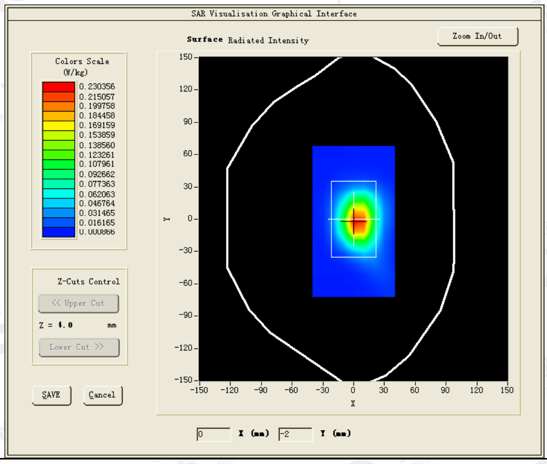
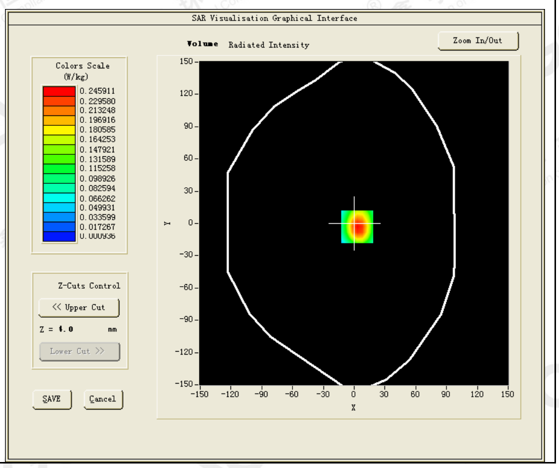
Test Laboratory: AGC Lab **Date: Oct.11,2018**
Mid- Head SAR - Back(3DH5)
DUT: Bluetooth Helmet Communicator; Type: MOTION INFINITY

Communication System: 2.4G; Communication System Band: 2.4G; Duty Cycle: 78%; Conv.F=4.90
Frequency: 2441 MHz; Medium parameters used: f = 2450 MHz; σ=1.77 mho/m; εr =39.56; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 22.0, Liquid temperature (℃): 21.5

SATIMO Configuration:
- Probe: SSE5; Calibrated: Aug. 08,2018; Serial No.: SN 22/12 EP159
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/ Mid- Head SAR - Back /Area Scan: Measurement grid: dx=10mm, dy=10mm
Configuration/ Mid- Head SAR - Back /Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm;

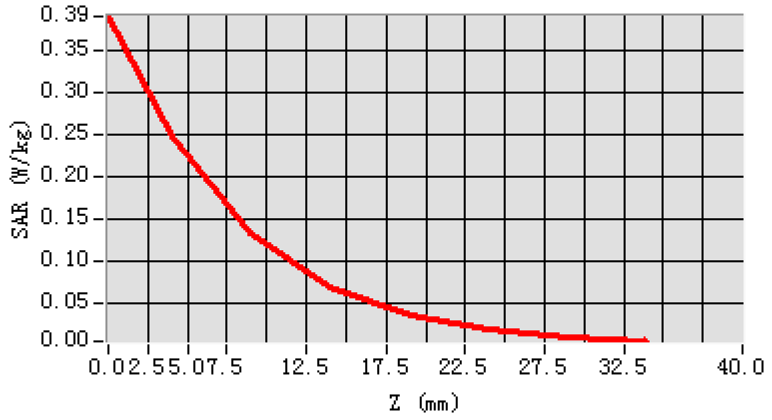
Area Scan	sam_direct_droit2_surf10mm.txt
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Head SAR Back
Band	Bluetooth
Channels	Middle
Signal	Crest factor: 1.28

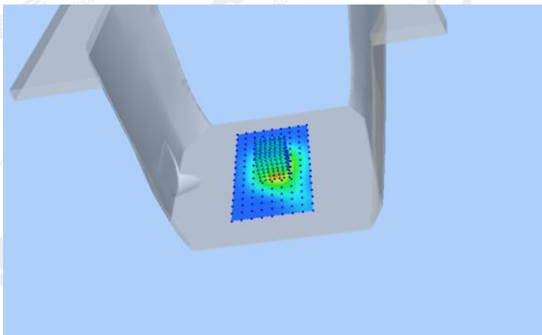
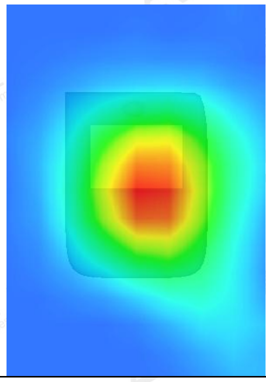
SURFACE SAR	VOLUME SAR
	

Maximum location: X=3.00, Y=-3.00
SAR Peak: 0.39 W/kg

SAR 10g (W/Kg)	0.113301
SAR 1g (W/Kg)	0.228289

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.3898	0.2459	0.1320	0.0679	0.0347	0.0173	0.0083



3D screen shot	Hot spot position
	

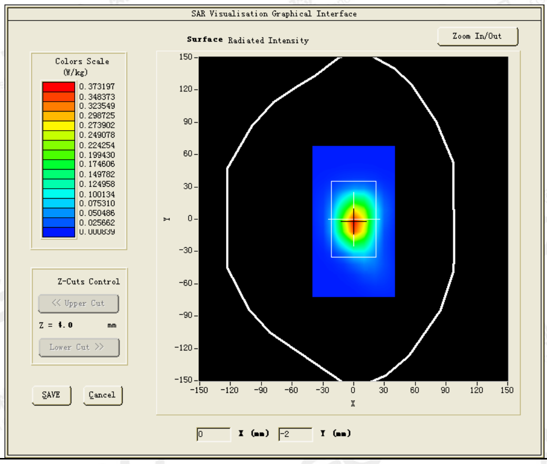
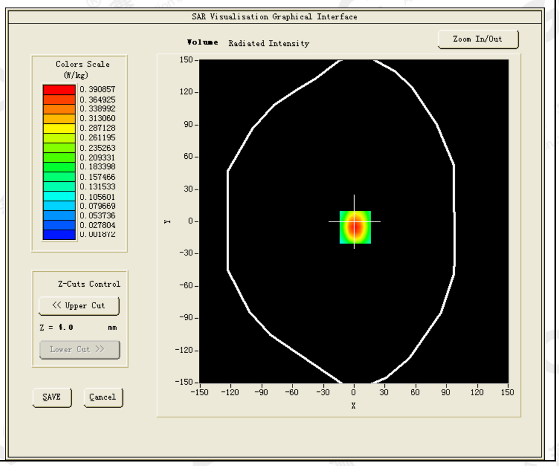
Bluetooth_BLE
Test Laboratory: AGC Lab **Date: Oct.11,2018**
Mid- Head SAR - Back
DUT: Bluetooth Helmet Communicator; **Type: MOTION INFINITY**

Communication System: 2.4G; Communication System Band: 2.4G; Duty Cycle: 30%; Conv.F=4.90
Frequency: 2440 MHz; Medium parameters used: f = 2450 MHz; σ=1.77 mho/m; εr =39.56; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 22.0, Liquid temperature (℃): 21.5

SATIMO Configuration:
- Probe: SSE5; Calibrated: Aug. 08,2018; Serial No.: SN 22/12 EP159
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/ Mid- Head SAR - Back /Area Scan: Measurement grid: dx=10mm, dy=10mm
Configuration/ Mid- Head SAR - Back /Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm;

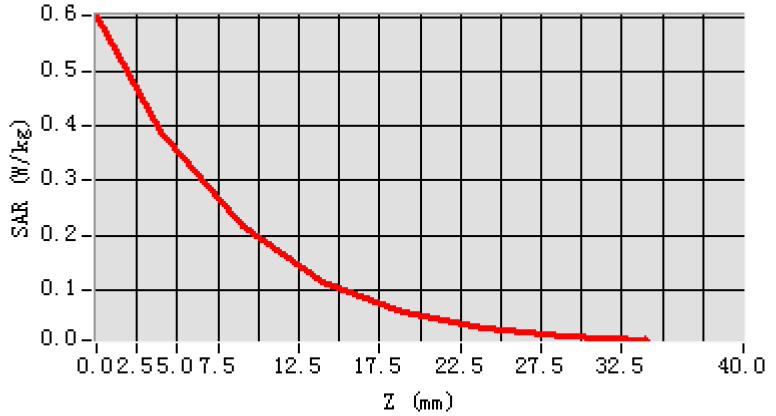
Area Scan	sam_direct_droit2_surf10mm.txt
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Head SAR Back
Band	Bluetooth
Channels	Middle
Signal	Crest factor: 3.33

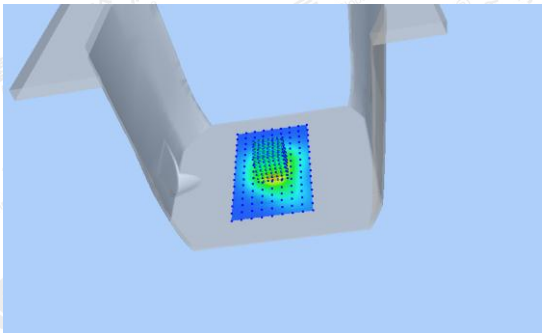
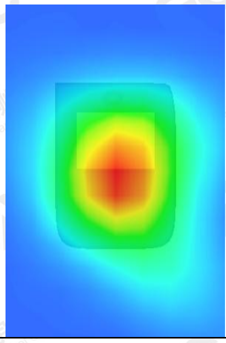
SURFACE SAR	VOLUME SAR
	

Maximum location: X=1.00, Y=-5.00
SAR Peak: 0.60 W/kg

SAR 10g (W/Kg)	0.183727
SAR 1g (W/Kg)	0.357976

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.6020	0.3909	0.2182	0.1158	0.0609	0.0311	0.0159



3D screen shot	Hot spot position
	

Test Laboratory: AGC Lab **Date: Oct.11,2018**
Mid- Head SAR - Front
DUT: Bluetooth Helmet Communicator; Type: MOTION INFINITY

Communication System: 2.4G; Communication System Band: 2.4G; Duty Cycle: 30%; Conv.F=4.90
Frequency: 2440 MHz; Medium parameters used: f = 2450 MHz; σ=1.77 mho/m; εr =39.56; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 22.0, Liquid temperature (℃): 21.5

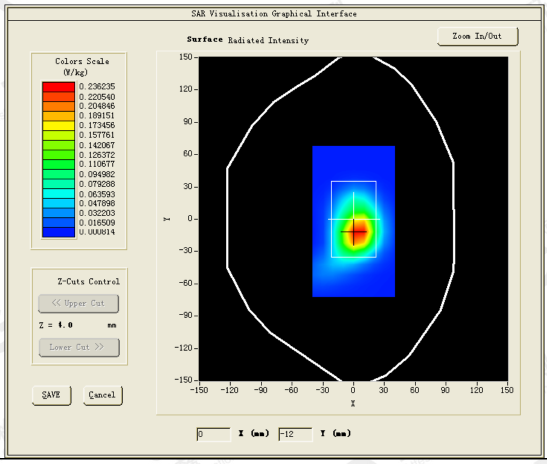
SATIMO Configuration:

- Probe: SSE5; Calibrated: Aug. 08,2018; Serial No.: SN 22/12 EP159
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

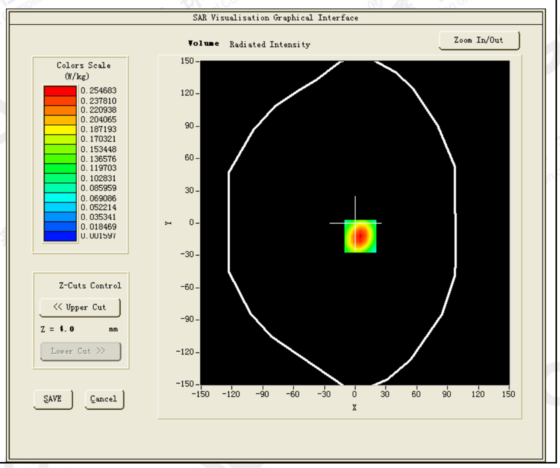
Configuration/ Mid- Head SAR - Front /Area Scan: Measurement grid: dx=10mm, dy=10mm
Configuration/ Mid- Head SAR - Front /Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm;

Area Scan	sam_direct_droit2_surf10mm.txt
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Head SAR Front
Band	Bluetooth
Channels	Middle
Signal	Crest factor: 3.33

SURFACE SAR



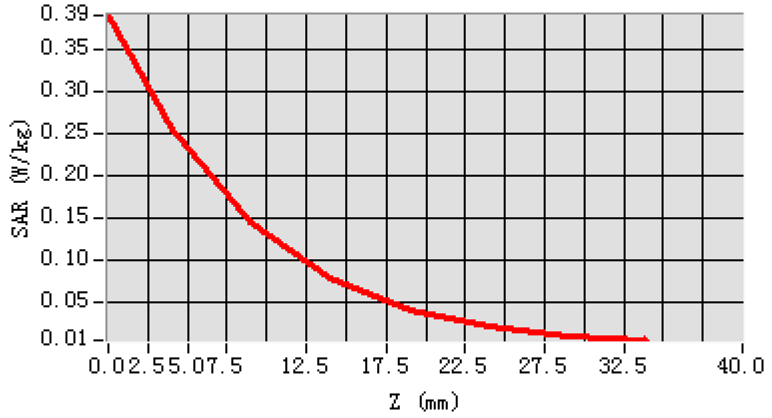
VOLUME SAR

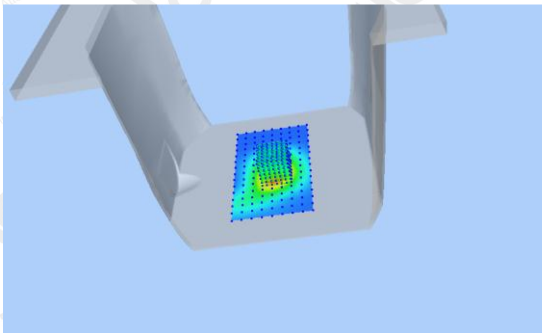
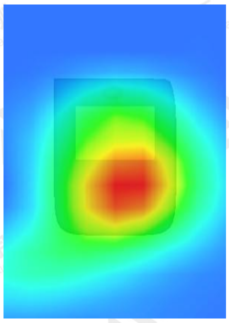


Maximum location: X=5.00, Y=-12.00
SAR Peak: 0.39 W/kg

SAR 10g (W/Kg)	0.123622
SAR 1g (W/Kg)	0.235197

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.3891	0.2547	0.1443	0.0789	0.0424	0.0224	0.0116



3D screen shot	Hot spot position
	

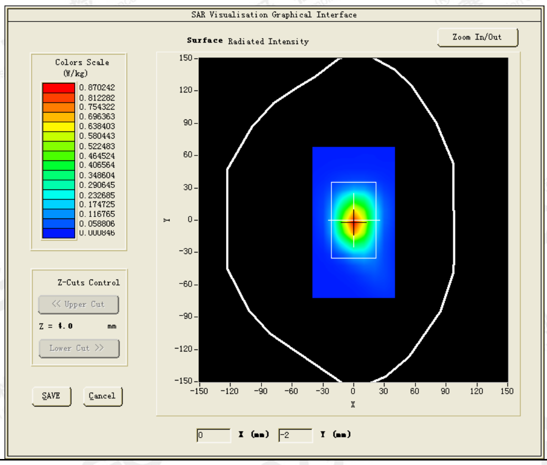
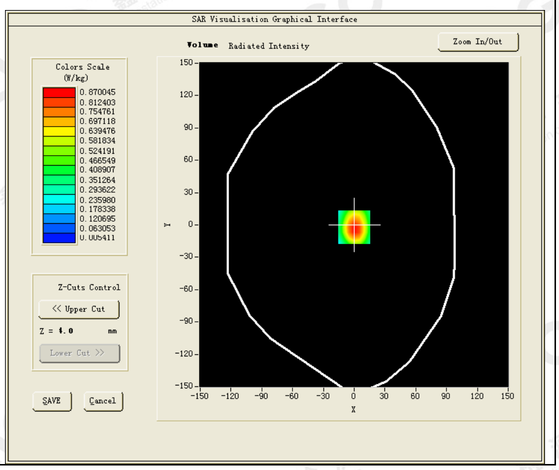
Repeated SAR
Test Laboratory: AGC Lab **Date: Oct.11,2018**
Mid- Head SAR - Back (DH5)
DUT: Bluetooth Helmet Communicator; **Type: MOTION INFINITY**

Communication System: 2.4G; Communication System Band: 2.4G; Duty Cycle: 78%; Conv.F=4.90
Frequency: 2441 MHz; Medium parameters used: f = 2450 MHz; σ=1.77 mho/m; εr =39.56; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 22.0, Liquid temperature (℃): 21.5

SATIMO Configuration:
- Probe: SSE5; Calibrated: Aug. 08,2018; Serial No.: SN 22/12 EP159
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/ Mid- Head SAR - Back /Area Scan: Measurement grid: dx=10mm, dy=10mm
Configuration/ Mid- Head SAR - Back /Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm;

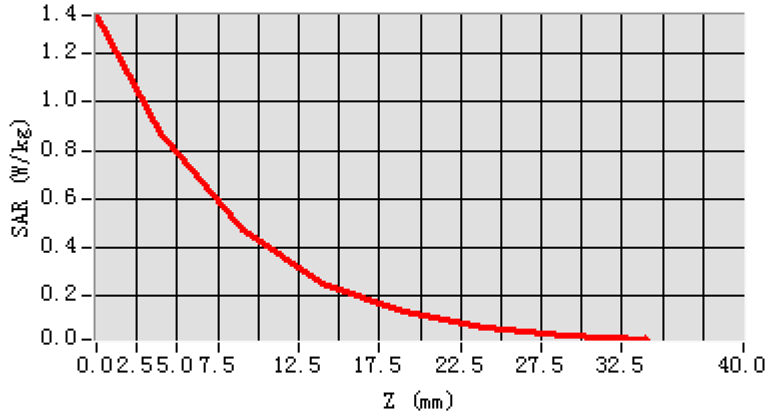
Area Scan	sam_direct_droit2_surf10mm.txt
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Head SAR Back
Band	Bluetooth
Channels	Middle
Signal	Crest factor: 1.28

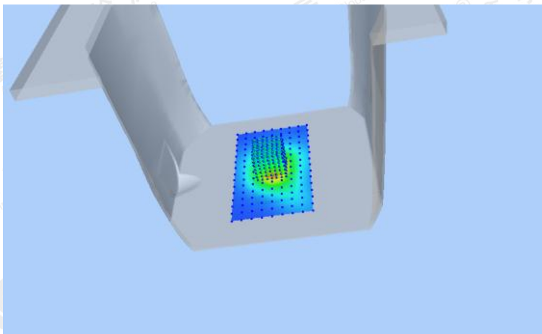
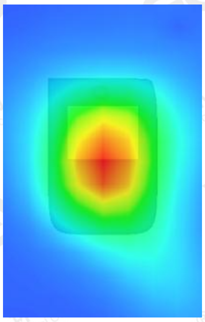
SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=-2.00
SAR Peak: 1.36 W/kg

SAR 10g (W/Kg)	0.409532
SAR 1g (W/Kg)	0.808622

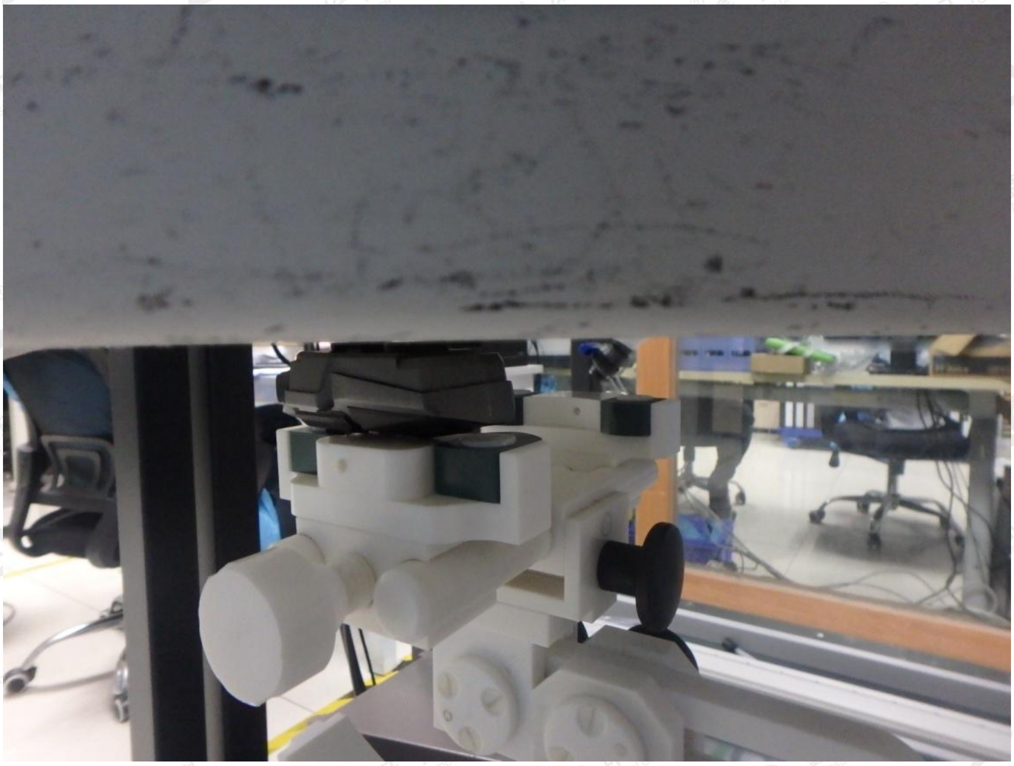
Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.3598	0.8700	0.4756	0.2487	0.1290	0.0659	0.0341



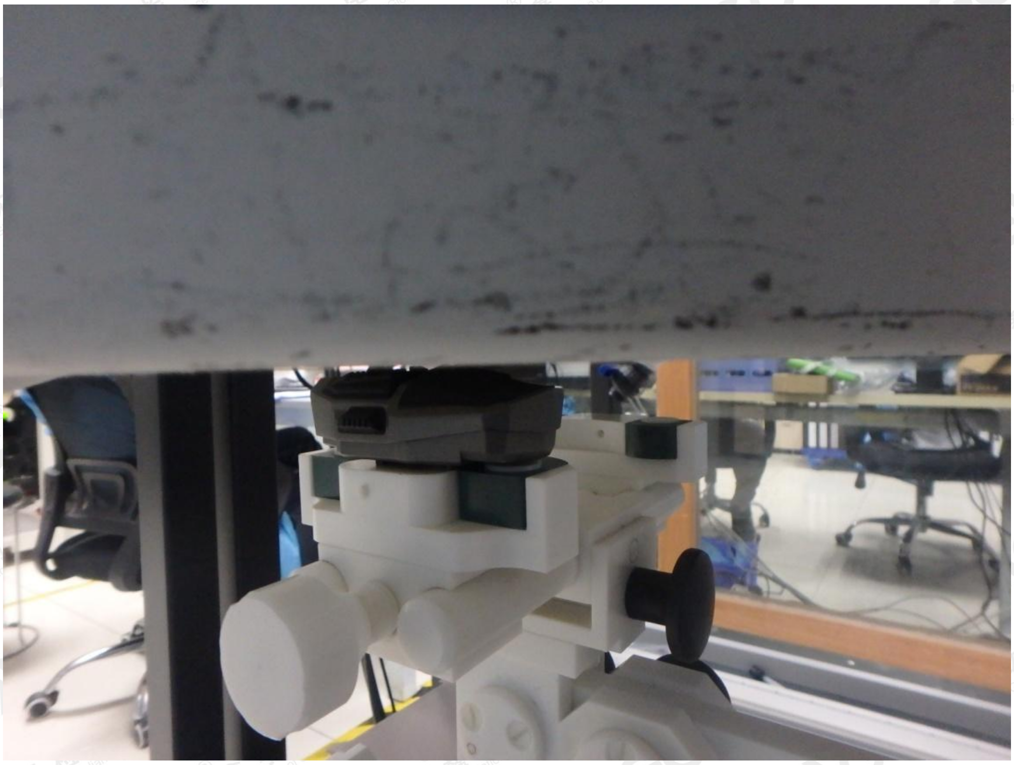
3D screen shot	Hot spot position
	

APPENDIX C. TEST SETUP PHOTOGRAPHS

Head SAR Back 0mm

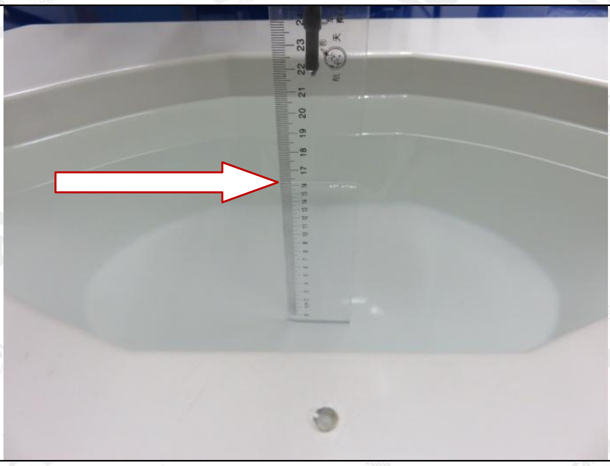


Head SAR Front 0mm



DEPTH OF THE LIQUID IN THE PHANTOM—ZOOM IN

Note：The position used in the measurement were according to IEEE 1528-2013

2450MHz head


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APPENDIX D. CALIBRATION DATA

Refer to Attached files.