FCC SAR TEST REPORT

Report No.: STS2006297H01

Issued for

Leia, Inc

2440 Sand Hill Road, STE 100, Menlo Park, California 94025, United States

Product Name:	LUME PAD
Brand Name:	N/A
Model Name:	LPD-10W
Series Model:	LPD-11W
FCC ID:	2AWLP-LPD10-11
Test Standard:	ANSI/IEEE Std. C95.1
	FCC 47 CFR Part 2 (2.1093)
	IEEE 1528: 2013
Max. Report SAR (1g):	Body:0.821 W/kg

ShenZhen STS Test Services Co.,Ltd.
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TEL: +86-755 3688 6288 FAX: +86-755 3688 6277 E-mail:sts@stsapp.com

Test Report Certification

Applicant's name ..... :	Leia, Inc
Address ..... :	2440 Sand Hill Road, STE 100, Menlo Park, California 94025, United States
Manufacture's Name ..... :	Leia, Inc
Address ..... :	2440 Sand Hill Road, STE 100, Menlo Park, California 94025, United States

Product description

Product name ..... :	LUME PAD
Brand name ..... :	N/A
Model name ..... :	LPD-10W
Series Model..... :	LPD-11W
Standards..... :	ANSI/IEEE Std. C95.1-1992 FCC 47 CFR Part 2 (2.1093) IEEE 1528: 2013

The device was tested by Shenzhen STS Test Services Co., Ltd. in accordance with the measurement methods and procedures specified in KDB 865664 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.

Date of Test..... :	
Date (s) of performance of tests..... :	28 May 2020~12 June 2020
Date of Issue..... :	15 June 2020
Test Result..... :	**Pass**

Testing Engineer : Aaron Bu

(Aaron Bu)

Technical Manager : Jason Lu

(Jason Lu)

Authorized Signatory : Vita Li

(Vita Li)

Table of Contents

Revision History

Rev.	Issue Date	Report No.	Effect Page	Contents
00	15 June 2020	STS2006297H01	ALL	Initial Issue
Note: **Format version** of the report -V01				

1. General Information

Environmental evaluation measurements of specific absorption rate (SAR) distributions in emulated human head and body tissues exposed to radio frequency (RF) radiation from wireless portable devices for compliance with the rules and regulations of the U.S. Federal Communications Commission (FCC).

1.1 EUT Description

Product Name	LUME PAD		
Brand Name	N/A		
Model Name	LPD-10W		
Series Model	LPD-11W		
Model Difference	All models above are identical in interior structure, electrical circuits and components, and just model names are different for the marketing requirement.		
AC adapter	Adapter Information: Model: A138A-120150U-US4 Input: AC 100-240V, 50/60Hz, 0.5A Output: DC 5V, 3A/DC 9V, 2A/DC 12V, 1.5A		
Power Supply	Rechargeable Li-ion Battery DC 3.85V		
Device Category	Portable		
Product stage	Production unit		
RF Exposure Environment	General Population / Uncontrolled		
Hardware Version	N/A		
Software Version	N/A		
Frequency Range	5GHz WLAN IEEE 802.11a/n/ac (20MHz): 5180MHz to 5240MHz, 5745MHz to 5825MHz 5GHz WLAN IEEE 802.11n/ac (40MHz): 5190MHz to 5230MHz, 5755MHz to 5795MHz 5GHz WLAN IEEE 802.11ac (80MHz): 5210MHz, 5775MHz		
Max. Reported SAR(1g): (Limit:1.6W/kg)	Band	Mode	Body Worn and Hotspot(W/kg)
	NII	5.2G WLAN ANT 0	0.762
	NII	5.2G WLAN ANT 1	0.821
	NII	5.2G WLAN MIMO(ANT 0+1)	0.795
	NII	5.8G WLAN ANT 0	0.807
	NII	5.8G WLAN ANT 1	0.791
	NII	5.8G WLAN MIMO(ANT 0+1)	0.817
FCC Equipment Class	Unlicensed National Information Infrastructure TX (NII)		
Operating Mode:	802.11a(OFDM): BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM): BPSK,QPSK,16-QAM,64-QAM 802.11ac(OFDM): BPSK,QPSK,16-QAM,64-QAM,256-QAM		
Antenna Gain	WIFI 5.2G: Antenna 0: 1.75dBi, Antenna 1: 1.47dBi WIFI 5.8G: Antenna 0: 0.8dBi, Antenna 1: 1.0dBi		
Antenna Specification:	WLAN: Internal Antenna		
Hotspot Mode:	Support		
DTM Mode:	Not Support		
Note: 1. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power			

1.2 Test Environment

Ambient conditions in the SAR laboratory:

Items	Required
Temperature (℃)	18-25
Humidity (%RH)	30-70

1.3 Test Factory

ShenZhen STS Test Services Co.,Ltd.

A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ, Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC test Firm Registration No.: 625569

IC Registration No.: 12108A

A2LA Certificate No.: 4338.01

2. Test Standards and Limits

No.	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	ANSI/IEEE Std. C95.1-1992	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
3	IEEE Std. 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
4	FCC KDB 447498 D01 v06	Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
5	FCC KDB 865664 D01 v01r04	SAR Measurement 100 MHz to 6 GHz
6	FCC KDB 865664 D02 v01r02	RF Exposure Reporting
7	FCC KDB 941225 D06 v02r01	Hotspot Mode SAR
8	FCC KDB 648474 D04 v01r03	SAR Evaluation Considerations for Wireless Handsets
9	FCC KDB 248227 D01 Wi-Fi SAR v02r02	SAR Considerations for 802.11 Devices
10	FCC KDB 616217 D04 v01r02	SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers

(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.

Population/Uncontrolled Environments:

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

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).

NOTE

GENERAL POPULATION/UNCONTROLLED EXPOSURE

PARTIAL BODY LIMIT

1.6 W/kg

3. SAR Measurement System

3.1 Definition of Specific Absorption Rate (SAR)

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.
The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

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

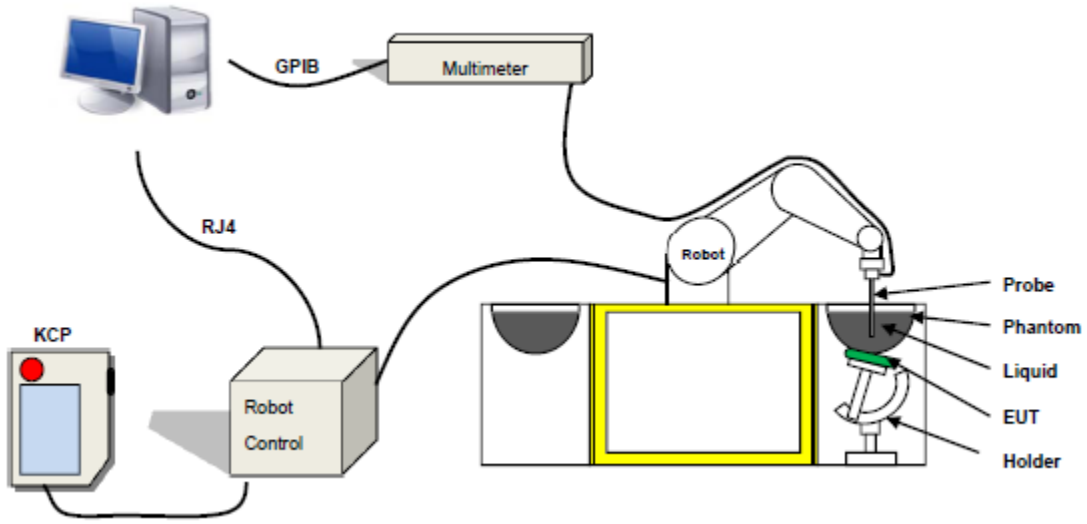
SAR is expressed in units of Watts per kilogram (W/kg) SAR measurement can be related to the electrical field in the tissue by

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

Where: σ is the conductivity of the tissue,
ρ is the mass density of the tissue and E is the RMS electrical field strength.

3.2 SAR System

MVG SAR System Diagram:



COMOSAR is a system that is able to determine the SAR distribution inside a phantom of human being according to different standards. The COMOSAR system consists of the following items:

- Main computer to control all the system
- 6 axis robot
- Data acquisition system
- Miniature E-field probe
- Phone holder
- Head simulating tissue

The following figure shows the system.

The EUT under test operating at the maximum power level is placed in the phone holder, under the phantom, which is filled with head simulating liquid. The E-Field probe measures the electric field inside the phantom. The Open SAR software computes the results to give a SAR value in a 1g or 10g mass.

3.2.1 Probe

For the measurements the Specific Dosimetric E-Field Probe SN 45/15 EPGO281 with following specifications is used

- Dynamic range: 0.01-100 W/kg
- Tip Diameter: 2.5 mm
- Length of Individual Dipoles: 2 mm
- Maximum external diameter: 8 mm
- Distance between dipole/probe extremity: 8 mm (repeatability better than +/- 1mm)
- Probe linearity: 0±2.60%(0.11dB)
- Axial Isotropy: < 0.25 dB
- Spherical Isotropy: < 0.25 dB
- Calibration range: 450 MHz to 6 GHz for head & body simulating liquid.
- Angle between probe axis (evaluation axis) and surface normal line: less than 30°

Figure-MVG COMOSAR Dosimetric E field Dipole

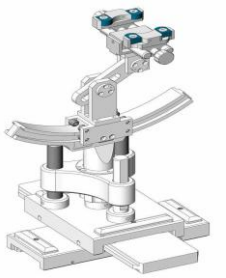
3.2.2 Phantom

For the measurements the Specific Anthropomorphic Mannequin (SAM) defined by the IEEE SCC-34/SC2 group is used. The phantom is a polyurethane shell integrated in a wooden table. The thickness of the phantom amounts to 2mm +/- 0.2mm. It enables the dosimetric evaluation of left and right phone usage and includes an additional flat phantom part for the simplified performance check. The phantom set-up includes a cover, which prevents the evaporation of the liquid.

SN 32/14 SAM115

SN 32/14 SAM116

3.2.3 Device Holder



The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of ± 0.5 mm would produce a SAR uncertainty of ± 20 %. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.4. Tissue Simulating Liquids

4. Tissue Simulating Liquids

4.1 Simulating Liquids Parameter Check

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 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 P1528 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 P1528.

Head Tissue

Frequency (MHz)	cellulose	DGBE	HEC	NaCl	Preventol	Sugar	X100	Water	Conductivity	Permittivity
	%	%	%	%	%	%	%	%	σ	εr
750	0.2	/	/	1.4	0.2	57.0	/	41.1	0.89	41.9
835	0.2	/	/	1.4	0.2	57.9	/	40.3	0.90	41.5
900	0.2	/	/	1.4	0.2	57.9	/	40.3	0.97	41.5
1800	/	44.5	/	0.3	/	/	30.45	55.2	1.4	40.0
1900	/	44.5	/	0.3	/	/	30.45	55.2	1.4	40.0
2000	/	44.5	/	0.3	/	/	/	55.2	1.4	40.0
2450	/	44.9	/	0.1	/	/	/	55.0	1.80	39.2
2600	/	45.0	/	0.1	/	/	/	54.9	1.96	39.0

Body Tissue

Frequency (MHz)	cellulose	DGBE	HEC	NaCl	Preventol	Sugar	X100	Water	Conductivity	Permittivity
	%	%	%	%	%	%	%	%	σ	εr
750	0.2	/	/	0.9	0.1	47.2	/	51.7	0.96	55.5
835	0.2	/	/	0.9	0.1	48.2	/	50.8	0.97	55.2
900	0.2	/	/	0.9	0.1	48.2	/	50.8	1.05	55.0
1800	/	29.4	/	0.4	/	/	30.45	70.2	1.52	53.3
1900	/	29.4	/	0.4	/	/	30.45	70.2	1.52	53.3
2000	/	29.4	/	0.4	/	/	/	70.2	1.52	53.3
2450	/	31.3	/	0.1	/	/	/	68.6	1.95	52.7
2600	/	31.7	/	0.1	/	/	/	68.2	2.16	52.3

Tissue dielectric parameters for head and body phantoms				
Frequency	εr		σ S/m	
	Head	Body	Head	Body
300	45.3	58.2	0.87	0.92
450	43.5	56.7	0.87	0.94
900	41.5	55.0	0.97	1.05
1450	40.5	54.0	1.20	1.30
1800	40.0	53.3	1.40	1.52
2450	39.2	52.7	1.80	1.95
3000	38.5	52.0	2.40	2.73
5800	35.3	48.2	5.27	6.00

LIQUID MEASUREMENT RESULTS

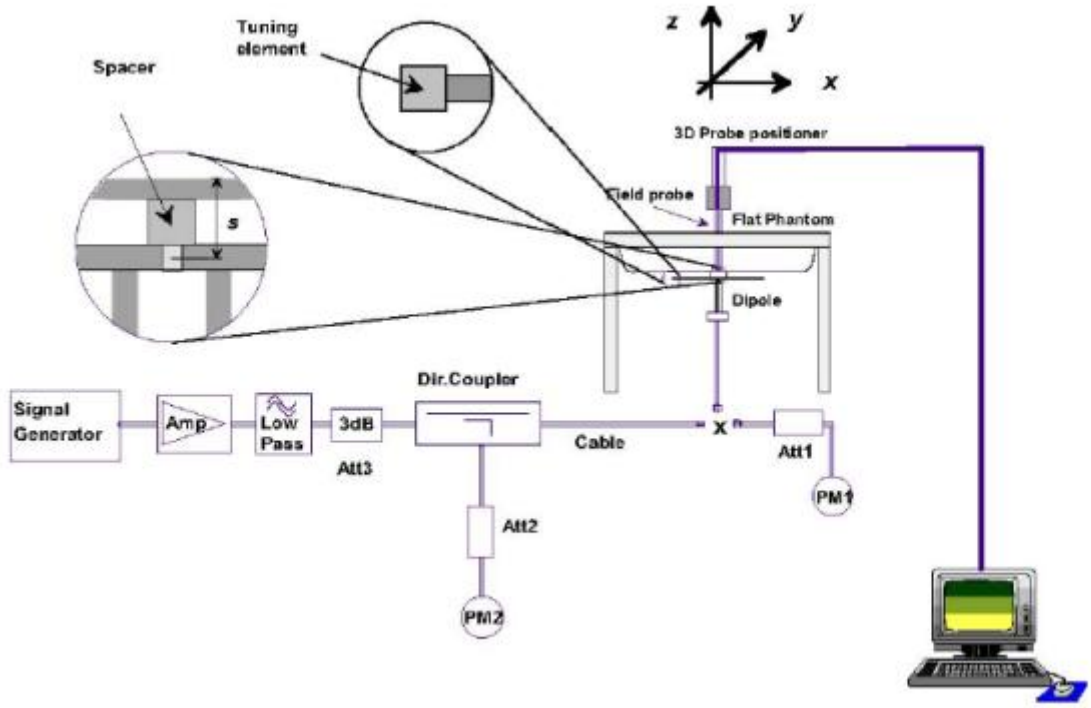
Date	Ambient condition		Body Simulating Liquid		Parameters	Target	Measured	Deviation [%]	Limited [%]
	Temp. [°C]	Humidity [%]	Frequency	Temp. [°C]					
2020-05-28	22.9	51	5200 MHz	22.7	Permittivity:	49.0	48.53	-0.96	±5
					Conductivity:	5.30	5.38	1.51	±5
2020-06-12	23.3	50	5800 MHz	23.0	Permittivity:	48.2	49.26	2.20	±5
					Conductivity:	6.00	6.11	1.83	±5

5. SAR System Validation

5.1 Validation System

Each MVG system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the MVG software, enable the user to conduct the system performance 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 validation setup is shown as below.



5.2 Validation Result

Comparing to the original SAR value provided by MVG, the validation data should be within its specification of 10 %.

Freq.(MHz)	Power(mW)	Tested Value (W/Kg)	Normalized SAR (W/kg/W)	Target (W/Kg/W)	Tolerance(%)	Date
5200 Body	100	16.287	162.87	159	2.43	2020-05-28
5800 Body	100	18.461	184.61	181.2	1.88	2020-06-12

Note:

1. The tolerance limit of System validation ±10%.
2. The dipole input power (forward power) was 100 mW.
3. The results are normalized to 1 W input power.

6. SAR Evaluation Procedures

The procedure for assessing the average SAR value consists of the following steps:
The following steps are used for each test position

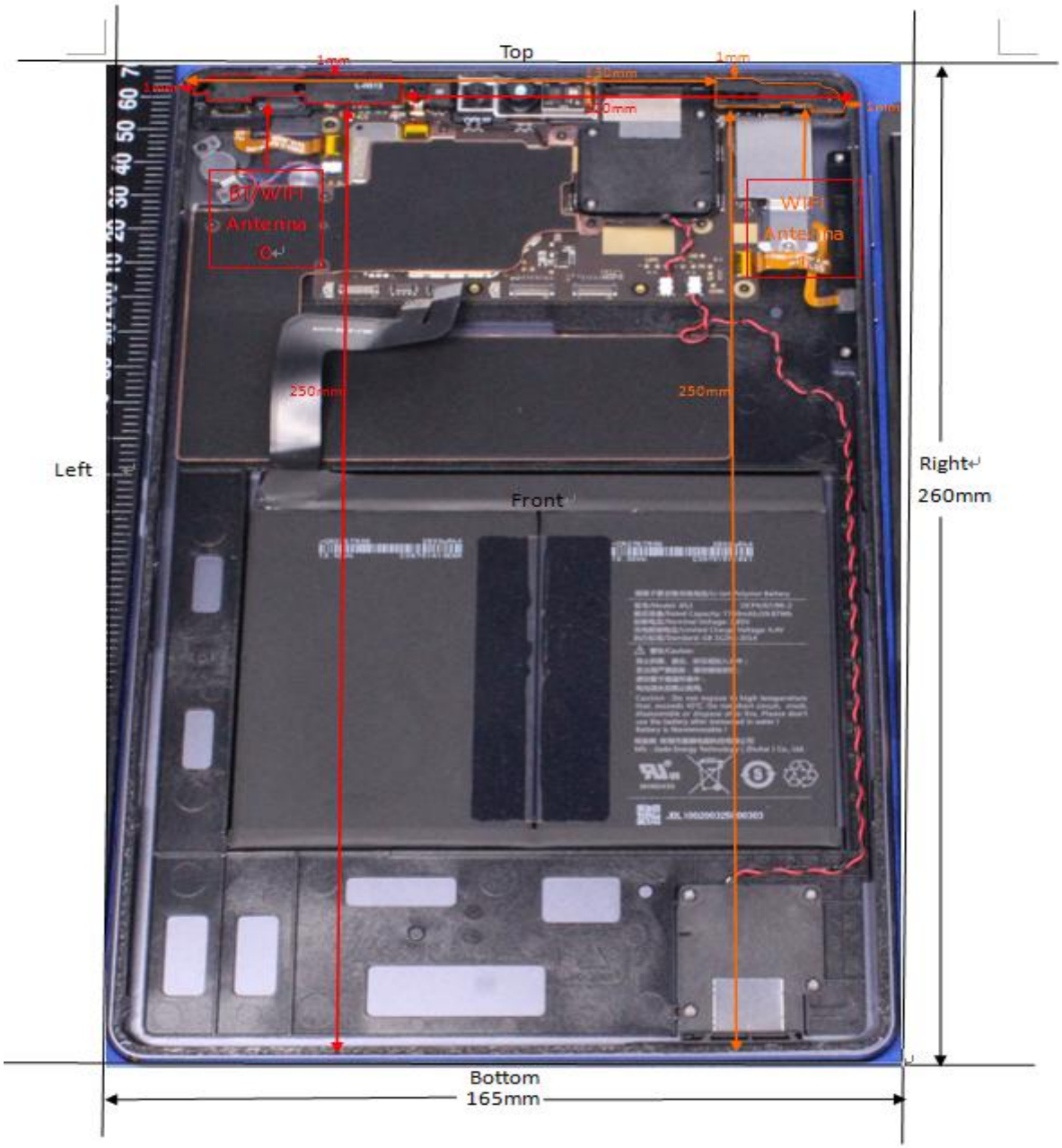
- Establish a call with the maximum output power with a base station simulator. The connection between the mobile and the base station simulator is established via air interface
- Measurement of the local E-field value at a fixed location. This value serves as a reference value for calculating a possible power drift.
- Measurement of the SAR distribution with a grid of 8 to 16mm * 8 to16 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.

➢ Area Scan& Zoom Scan

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. Area scan and zoom scan resolution setting follows KDB 865664 D01 quoted below.
When the 1-g SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are required for other peaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR.

7. EUT Antenna Location Sketch

It is a LUME PAD, support WLAN mode.



(Front view)

Note :

1. The antenna information refer the manufacturer provide report, applicable only to the tested sample identified in the report.

7.1 SAR test exclusion consider table

According with FCC KDB 447498 D01, appendix A, <SAR test exclusion thresholds for 100MHz ~6GHz and≤50mm＞table, this device SAR test configurations consider as following:

Band	Mode	Maxim um power		Test Position Configurations				
		dBm	mW	Back Side	Left Edge	Right Edge	Top Edge	Bottom Edge
WLAN 5.2 G ANT 0	Distance to User			<5mm	<5mm	120mm	<5mm	250mm
	exclusion threshold			7	7	766	7	2066
	802.11a	6	3.981	No	No	No	No	No
WLAN 5.2 G ANT 1	Distance to User			<5mm	130mm	<5mm	<5mm	250mm
	exclusion threshold			7	866	7	7	2066
	802.11a	5	3.162	No	No	No	No	No
WLAN 5.2 G MIMO (ANT 0)	Distance to User			<5mm	<5mm	120mm	<5mm	250mm
	exclusion threshold			7	7	766	7	2066
	802.11n-HT40	8	6.310	No	No	No	No	No
WLAN 5.2 G MIMO (ANT 1)	Distance to User			<5mm	130mm	<5mm	<5mm	250mm
	exclusion threshold			7	866	7	7	2066
	802.11n-HT40	8	6.310	No	No	No	No	No
WLAN 5.8 G ANT 0	Distance to User			<5mm	<5mm	120mm	<5mm	250mm
	exclusion threshold			6	6	762	6	2062
	802.11a	6	3.981	No	No	No	No	No
WLAN 5.8 G ANT 1	Distance to User			<5mm	130mm	<5mm	<5mm	250mm
	exclusion threshold			6	862	6	6	2062
	802.11a	5	3.162	No	No	No	No	No
WLAN 5.8 G MIMO (ANT 0)	Distance to User			<5mm	<5mm	120mm	<5mm	250mm
	exclusion threshold			6	6	762	6	2062
	802.11n-HT20	8	6.310	Yes	Yes	No	Yes	No
WLAN 5.8 G MIMO (ANT 1)	Distance to User			<5mm	130mm	<5mm	<5mm	250mm
	exclusion threshold			6	862	6	6	2062
	802.11n-HT20	8	6.310	Yes	No	Yes	Yes	No

Note：

1. maximum power is the source-based time-average power and represents the maximum RF output power among production units.
2. per KDB 447498 D01, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
3. per KDB 447498 D01, standalone SAR test exclusion threshold is applied; if the distance of the antenna to the user is <5mm, 5mm is user to determine SAR exclusion threshold
4. per KDB 447498 D01, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distance ≤50mm are determined by:

   [(max. power of channel, including tune-up tolerance, Mw)/(min. test separation distance, mm)]*[√f(GHZ）)≤3.0 for 1-g SAR and≤7.5 for10-g extremity SAR ,f(GHz) is the RF channel transmit frequency in GHz. Power and distance are rounded to the nearest mW and mm before calculation. The result is rounded to one decimal place for comparison

   For <50mm distance, we just calculate mW of the exclusion threshold value(3.0)to do compare
5. per KDB 447498 D01, at 100 MHz to 6GHz and for test separation distances >50mm, the SAR test exclusion threshold is determined according to the following

   a)[threshold at 50mm in step 1]+(test separation distance -50mm)*(f (MHz)/150)]Mw, at 100 MHz to 1500 MHz

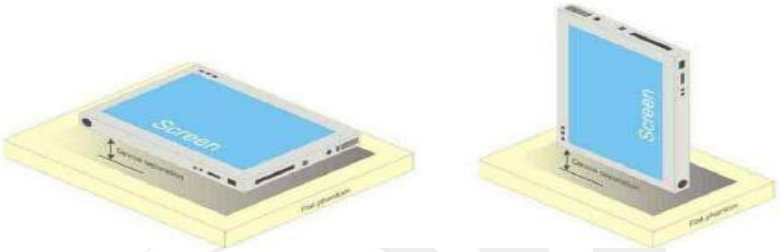
   b) [threshold at 50mm in step1]+(test separation distance -50mm) *10]mW at＞1500MHz and≤6GHz
6. Per KDB 248227 D01, choose the highest output power channel to test SAR and determine further SAR exclusion 8.for each frequency band ,testing at higher data rates and higher order modulations is not required when the maximum average output power for each of each of these configurations is less than 1/4db higher than those measured at the lower data rate than 11b mode ,thus the SAR can be excluded.
7. Per KDB 616217 D04 Exposures from antennas through the front (top) surface of the display section of a full-size tablet, away from the edges, are generally limited to the user's hands. Exposures to hands for typical consumer transmitters used in tablets are not expected to exceed the extremity SAR limit; therefore, SAR evaluation for the front surface of tablet display screens are generally not necessary.

8. EUT Test Position

This EUT was tested in Front Face and Rear Face.

8.1 Define Two Imaginary Lines On The Handset

Body-worn Position Conditions:
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 KDB Publication 447498 D01 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. When the same wireless transmission configuration is used for testing body-worn accessory and hotspot mode SAR, respectively, in voice and data mode, SAR results for the most conservative *test separation distance* configuration may be used to support both SAR conditions. When the *reported* SAR for a 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 the body-worn accessory with a headset attached to the handset.



9. Uncertainty

9.1 Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in IEEE 1528: 2013.This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Uncertainty Component	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	vi
Measurement System								
Probe calibration	5.831	N	1	1	1	5.83	5.83	∞
Axial Isotropy	0.695	R	$\sqrt{3}$	√0.5	√0.5	0.28	0.28	∞
Hemispherical Isotropy	1.045	R	$\sqrt{3}$	√0.5	√0.5	0.43	0.43	∞
Boundary effect	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	0.685	R	$\sqrt{3}$	1	1	0.40	0.40	∞
System detection limits	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Modulation response	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Readout Electronics	0.021	N	1	1	1	0.021	0.021	∞
Response Time	0	R	$\sqrt{3}$	1	1	0	0	∞
Integration Time	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
RF ambient conditions-Noise	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
RF ambient conditions-reflections	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe positioner mechanical tolerance	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to phantom shell	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Post-processing	2.3	R	$\sqrt{3}$	1	1	1.33	1.33	∞
Test sample Related								
Test sample positioning	2.6	N	1	1	1	2.6	2.6	∞
Device holder uncertainty	3	N	1	1	1	3	3	∞
SAR drift measurement	5	R	$\sqrt{3}$	1	1	2.89	2.89	∞
SAR scaling	5	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Phantom and tissue parameters								
Phantom uncertainty（shape and thickness uncertainty）	4	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	1.9	N	1	1	0.84	1.90	1.60	∞
Liquid conductivity （temperature uncertainty）	2.5	R	$\sqrt{3}$	0.78	0.71	1.13	1.02	∞
Liquid conductivity （measured）	4	N	1	0.78	0.71	3.12	2.84	M
Liquid permittivity （temperature uncertainty）	2.5	R	$\sqrt{3}$	0.23	0.26	0.33	0.38	∞
Liquid permittivity （measured）	5	N	1	0.23	0.26	1.15	1.30	M
Combined Standard Uncertainty		RSS				9.79	9.59	
Expanded Uncertainty (95% Confidence interval)		K=2				19.58	19.18	

9.2 System validation Uncertainty

Uncertainty Component	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	vi
Measurement System								
Probe calibration	5.831	N	1	1	1	5.83	5.83	∞
Axial Isotropy	0.695	R	$\sqrt{3}$	1	1	0.40	0.40	∞
Hemispherical Isotropy	1.045	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Boundary effect	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	0.685	R	$\sqrt{3}$	1	1	0.40	0.40	∞
System detection limits	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Modulation response	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Readout Electronics	0.021	N	1	1	1	0.021	0.021	∞
Response Time	0.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Integration Time	1.4	R	$\sqrt{3}$	0	0	0.00	0.00	∞
RF ambient conditions-Noise	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
RF ambient conditions-reflections	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe positioner mechanical tolerance	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to phantom shell	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Post-Processing	2.3	R	$\sqrt{3}$	1	1	1.33	1.33	∞
System validation source								
Deviation of experimental dipole from numerical dipole	5.0	N	1	1	1	5.00	5.00	∞
Input power and SAR drift measurement	5.0	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Other source contribution Uncertainty	2.0	R	$\sqrt{3}$	1	1	1.15	1.15	∞
Phantom and set-up								
Phantom uncertainty（shape and thickness uncertainty）	4.0	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	1.9	N	1	1	0.84	1.90	1.60	∞
Liquid conductivity （temperature uncertainty）	2.5	R	$\sqrt{3}$	0.78	0.71	1.13	1.02	∞
Liquid conductivity （measured）	4	N	1	0.78	0.71	3.12	2.84	M
Liquid permittivity （temperature uncertainty）	2.5	R	$\sqrt{3}$	0.23	0.26	0.33	0.38	∞
Liquid permittivity （measured）	5	N	1	0.23	0.26	1.15	1.30	M
Combined Standard Uncertainty		RSS				9.718	9.517	
Expanded Uncertainty (95% Confidence interval)		K=2				19.44	19.04	

10. Conducted Power Measurement

10.1 Test Result

WLAN (5.2Gband)

Mode	Channel Number	Frequency (MHz)	Average Power (dBm)		
			ANT 0	ANT 1	ANT 0+1
802.11a	36	5180	3.91	3.52	N/A
	40	5200	4.30	4.41	N/A
	48	5240	5.15	4.12	N/A
802.11 n-HT20	36	5180	4.02	3.35	6.71
	40	5200	4.22	3.61	6.94
	48	5240	5.08	3.48	7.36
802.11 n-HT40	38	5190	4.47	3.61	7.07
	46	5230	5.61	3.78	7.80
802.11 ac-VHT20	36	5180	3.99	3.41	6.72
	40	5200	4.24	3.59	6.94
	48	5240	5.09	3.41	7.34
802.11 ac-VHT40	38	5190	4.42	3.56	7.02
	46	5230	5.58	3.72	7.76
802.11 ac-VHT80	42	5210	4.99	3.97	7.52

WLAN (5.8Gband)

Mode	Channel Number	Frequency (MHz)	Average Power (dBm)		
			ANT 0	ANT 1	ANT 0+1
802.11a	149	5745	5.10	4.13	N/A
	157	5785	5.38	4.07	N/A
	165	5825	5.31	3.55	N/A
802.11 n-HT20	149	5745	4.96	4.14	7.58
	157	5785	4.18	4.02	7.11
	165	5825	3.98	3.96	6.98
802.11 n-HT40	151	5755	4.69	4.23	7.48
	159	5795	4.21	3.60	6.93
802.11 ac-VHT20	149	5745	4.94	4.10	7.55
	157	5785	4.19	4.02	7.12
	165	5825	4.02	4.01	7.03
802.11 ac-VHT40	151	5755	4.68	4.20	7.46
	159	5795	4.23	3.58	6.93
802.11 ac-VHT80	155	5775	4.31	3.97	7.15

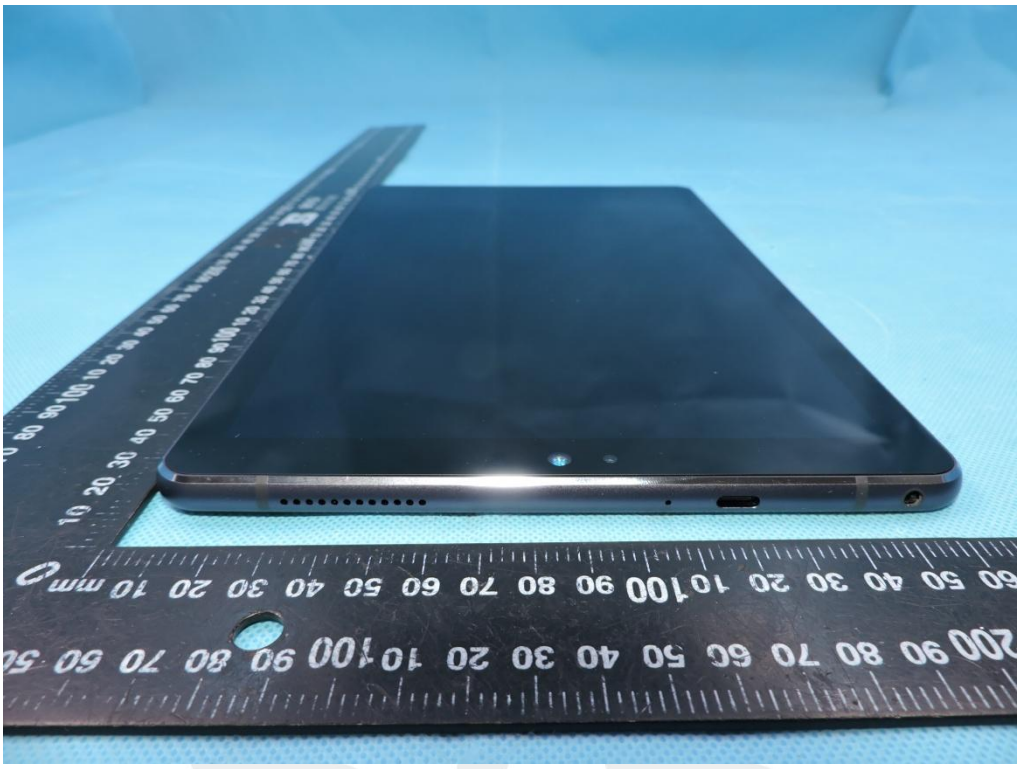
11. EUT And Test Setup Photo

11.1 EUT Photo

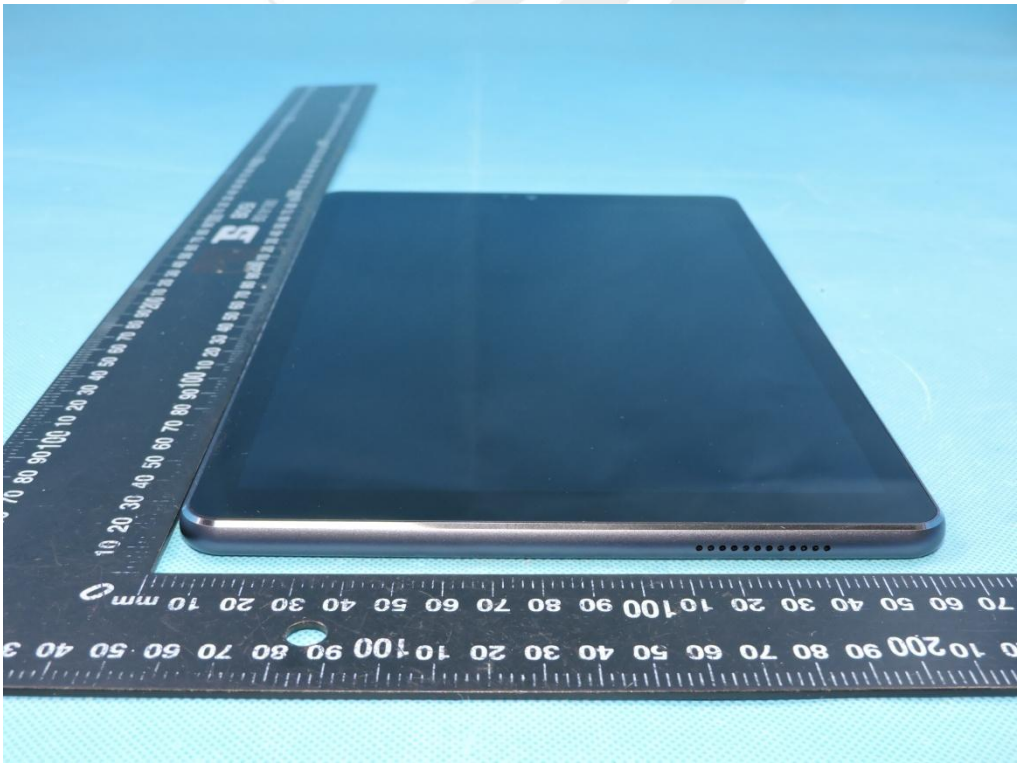
Front side

Back side

Top Edge

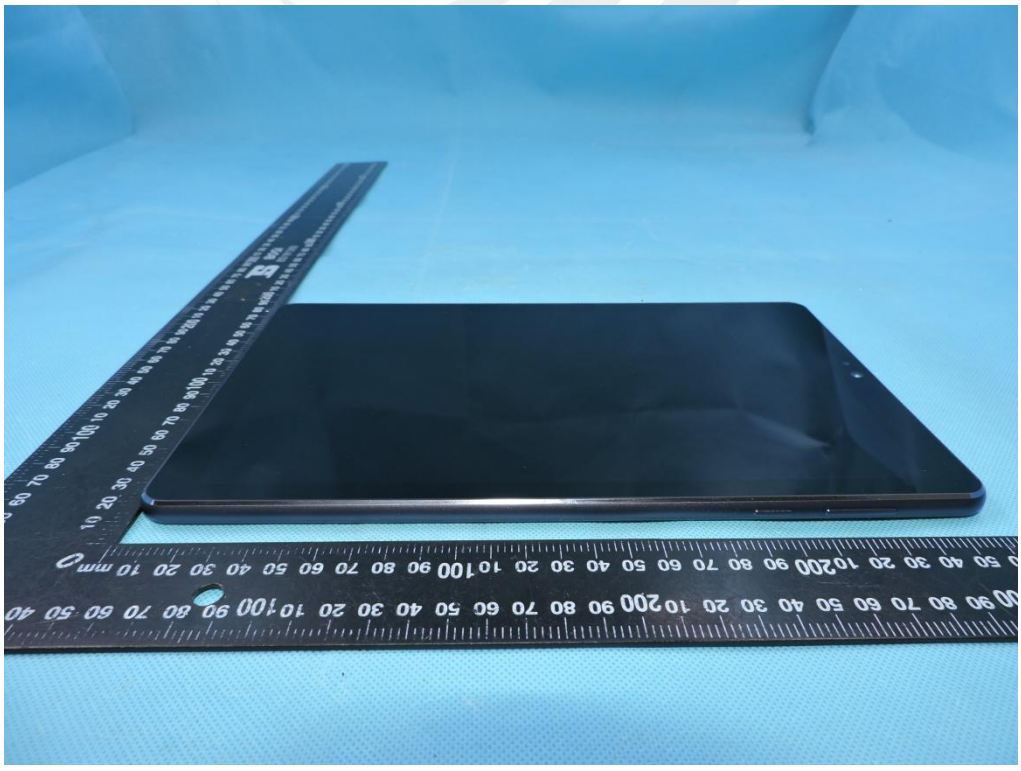


Bottom Edge



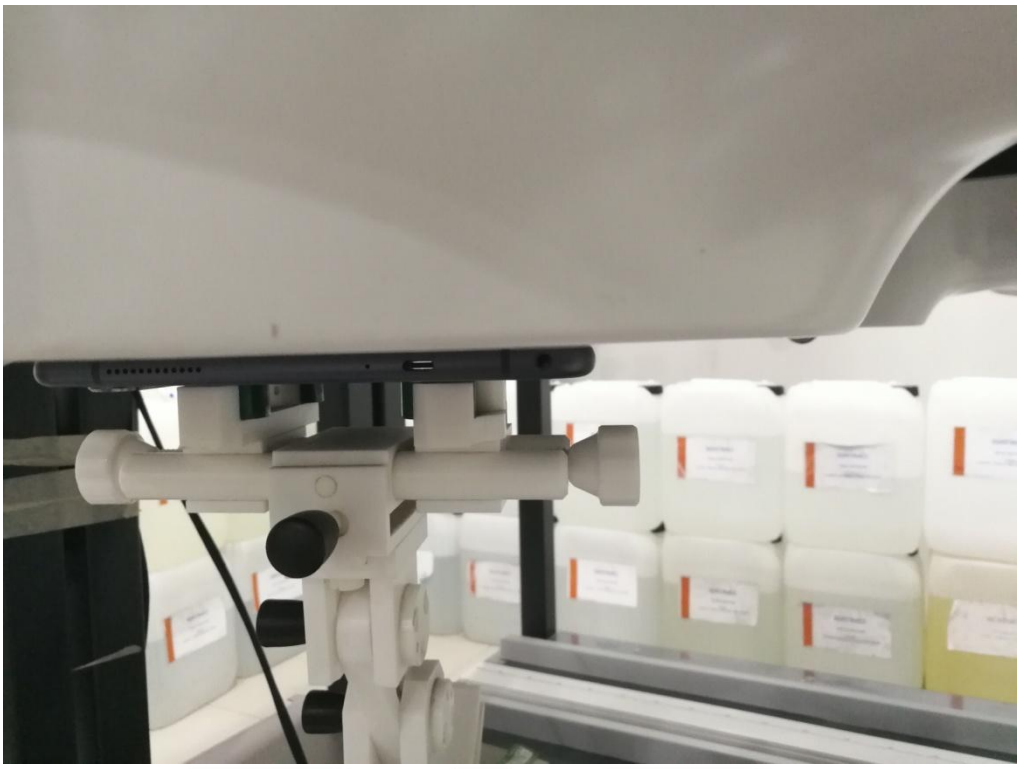
Left Edge

Right Edge

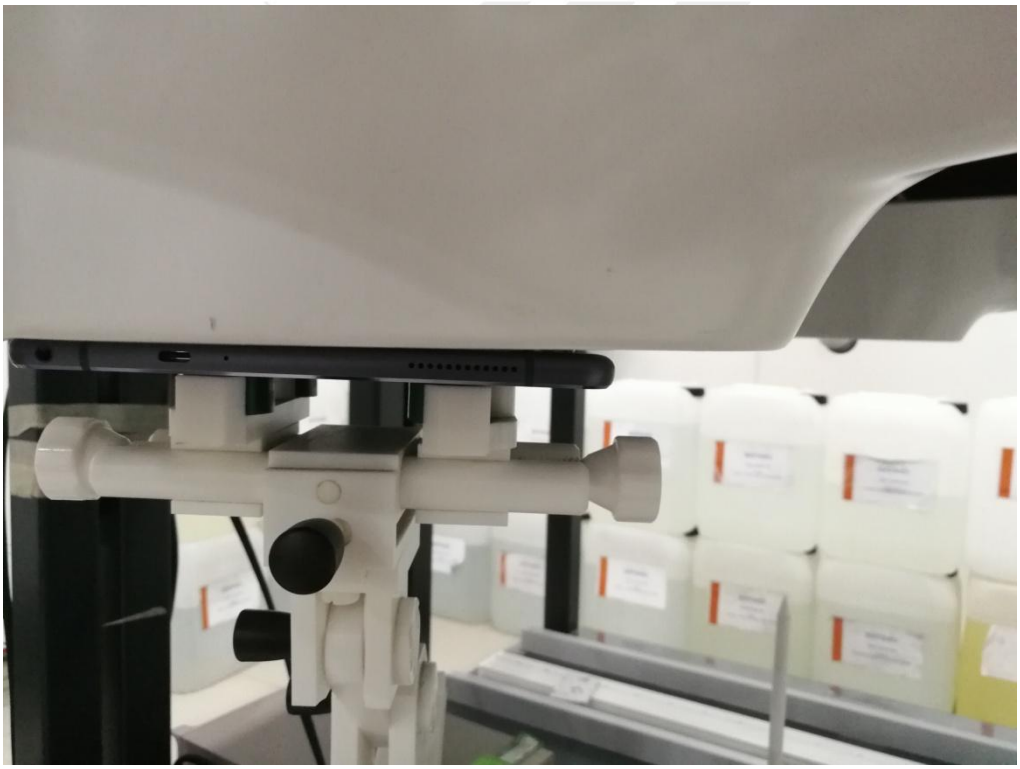


11.2 Setup Photo

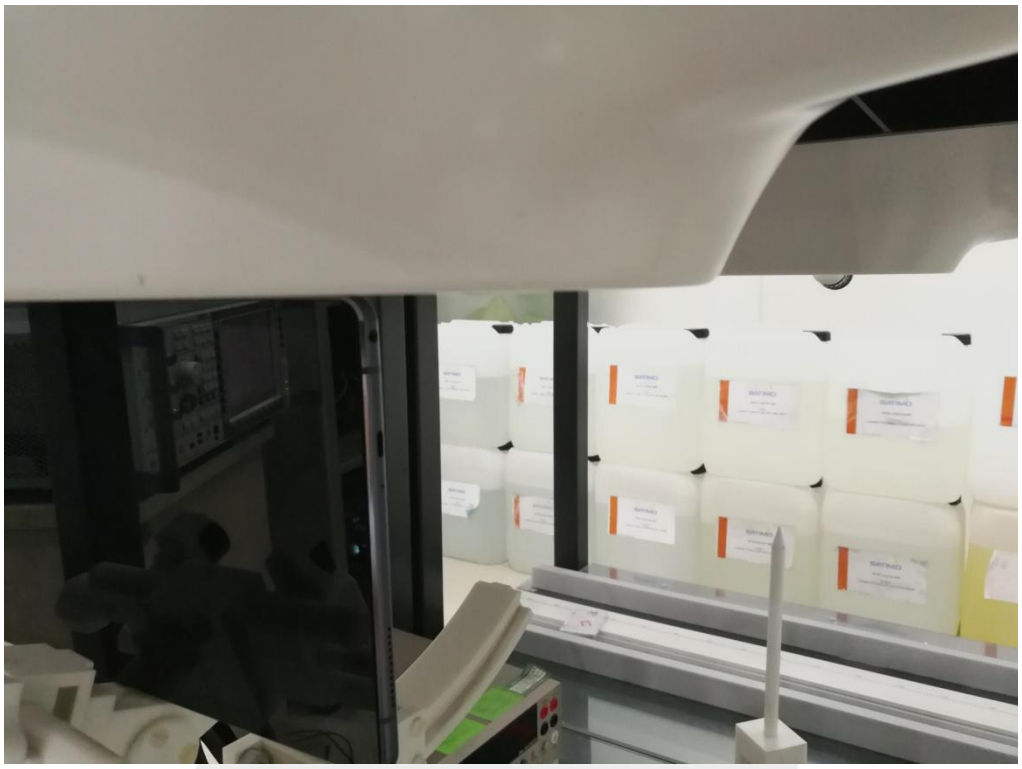
Body Front side(separation distance is 0mm)



Body Back side(separation distance is 0mm)



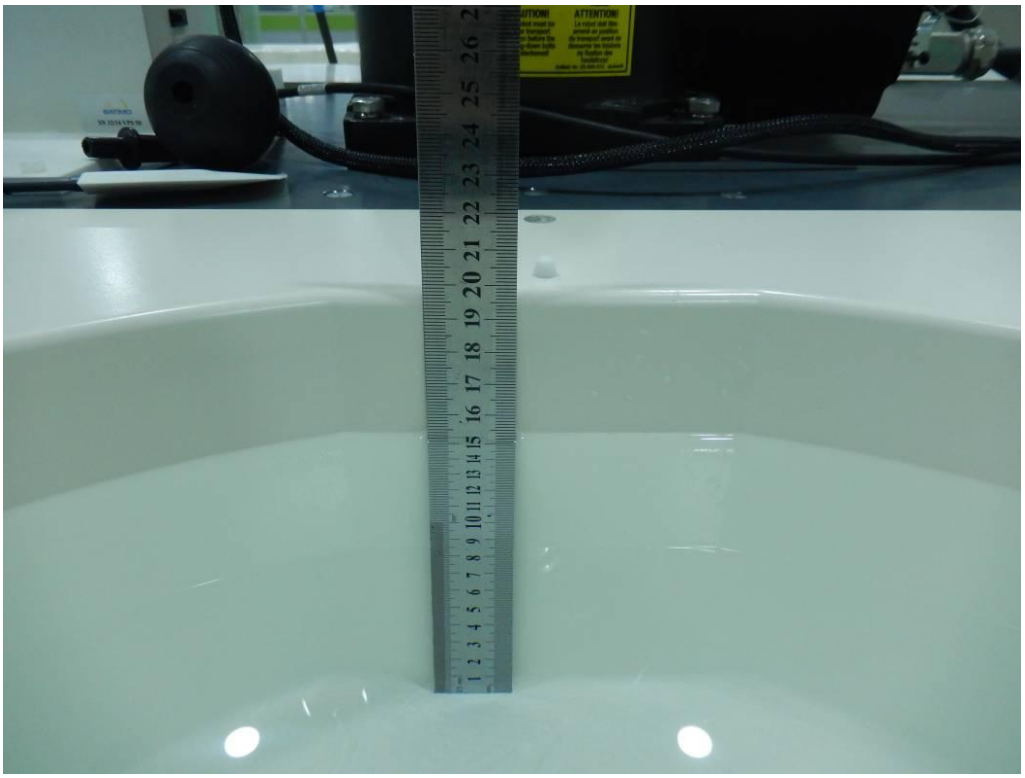
Left Edge(separation distance is 0mm)



Right Edge(separation distance is 0mm)

Top Edge(separation distance is 0mm)

Liquid depth (15 cm)



12. SAR Result Summary

12.1 Body-worn and Hotspot SAR

Band	Mode	Antenna	Test Position	Ch.	Result 1g (W/Kg)	Power Drift (%)	Max.Turn-up Power(dBm)	Meas.Output Power(dBm)	Duty cycle (%)	Scaled SAR (W/Kg)	Meas. No.
5.2G WLAN	802.11a	0	Front side	48	0.753	-1.07	5.2	5.15	100	**0.762**	1
			Back side	48	0.377	-3.08	5.2	5.15	100	0.381	/
			Left Edge	48	0.148	-0.17	5.2	5.15	100	0.150	/
			Top Edge	48	0.053	-2.87	5.2	5.15	100	0.054	/
		1	Front side	36	0.542	-1.25	5	3.52	100	0.762	/
			Front side	40	0.717	-2.83	5	4.41	100	**0.821**	2
			Front side	48	0.624	0.17	5	4.12	100	0.764	/
			Back side	40	0.313	-3.58	5	4.41	100	0.359	/
			Right Edge	40	0.066	0.34	5	4.41	100	0.076	/
			Top Edge	40	0.026	0.52	5	4.41	100	0.030	/
	802.11n -HT40	MIMO	Front side	46	0.759	-0.73	8	7.80	100	**0.795**	3
			Back side	46	0.477	-2.71	8	7.80	100	0.499	/
			Left Edge	46	0.351	-1.09	8	7.80	100	0.368	/
			Right Edge	46	0.019	1.26	8	7.80	100	0.020	/
			Top Edge	46	0.669	-1.95	8	7.80	100	0.701	/

Band	Mode	Antenna	Test Position	Ch.	Result 1g (W/Kg)	Power Drift (%)	Max.Turn-up Power(dBm)	Meas.Output Power(dBm)	Duty cycle (%)	Scaled SAR (W/Kg)	Meas. No.
5.8G WLAN	802.11a	0	Front side	149	0.623	2.57	6	5.10	100	0.766	/
			Front side	157	0.700	-1.82	6	5.38	100	**0.807**	4
			Front side	165	0.667	1.40	6	5.31	100	0.782	/
			Back side	157	0.341	-1.74	6	5.38	100	0.393	/
			Left Edge	157	0.127	-2.93	6	5.38	100	0.146	/
			Top Edge	157	0.064	-1.90	6	5.38	100	0.074	/
		1	Front side	149	0.647	-2.83	5	4.13	100	**0.791**	5
			Back side	149	0.286	-1.70	5	4.13	100	0.349	/
			Right Edge	149	0.065	1.49	5	4.13	100	0.079	/
			Top Edge	149	0.027	2.28	5	4.13	100	0.033	/
	802.11n -HT20	MIMO	Front side	149	0.742	-0.87	8	7.58	100	**0.817**	6
			Front side	157	0.635	1.92	8	7.11	100	0.779	/
			Front side	165	0.602	0.55	8	6.98	100	0.761	/
			Back side	149	0.434	-2.71	8	7.58	100	0.478	/
			Left Edge	149	0.376	-2.73	8	7.58	100	0.414	/
			Right Edge	149	0.023	-1.92	8	7.58	100	0.025	/
			Top Edge	149	0.593	-0.34	8	7.58	100	0.653	/

Note:

1. The test separation of all above table is 0mm.
2. Per KDB 447498 D01v05r01, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For WWAN: Scaled SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor

Repeated SAR

Band	Mode	Antenna	Test Position	Ch.	Result 1g (W/Kg)	Power Drift(%)	Max.Turn-up Power(dBm)	Meas.Output Power(dBm)	Scaled SAR (W/Kg)	Meas. No.
5.2G WLAN	802.11a	1	Front Side	40	0.723	1.36	5	4.41	0.828	/
5.8G WLAN	802.11a	0	Front Side	157	0.685	-2.14	6	5.38	0.790	
5.8G WLAN	802.11n-HT20	MIMO	Front Side	149	0.729	0.76	8	7.58	0.803	

12.2 repeated SAR measurement

Band	Mode	Antenna	Test Position	Ch.	Original Measured SAR 1g(mW/g)	1 st Repeated SAR 1g	Ratio	Original Measured SAR 1g(mW/g)	2nd Repeated SAR 1g	Ratio
5.2G WLAN	802.11a	1	Front Side	40	0.717	0.723	1.01	-	-	-
5.8G WLAN	802.11a	0	Front Side	157	0.700	0.685	1.02	-	-	-
5.8G WLAN	802.11n-HT20	MIMO	Front Side	149	0.742	0.729	1.02	-	-	-

Note:

1. Per KDB 865664 D01,for each frequency band ,repeated SAR measurement is required only when the measured SAR is≥0.8W/Kg.
2. Per KDB 865664 D01,if the ratio of largest to smallest SAR for the original and first repeated measurement is≤1.2and the measured SAR＜1.45W/Kg, only one repeated measurement is required.
3. Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is＞1.20 or when the original or repeated measurement is ≥ 1.45W/Kg
4. The ratio is the difference in percentage between original and repeated measured SAR.

13. Equipment List

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Waveguide	SATIMO	SWG5500	SN 13/14 WGA32	2017.08.15	2020.08.14
E-Field Probe	MVG	SSE2	SN 45/15 EPGO281	2020.04.07	2021.04.06
Dielectric Probe Kit	MVG	SCLMP	SN 32/14 OCPG67	2019.11.25	2020.11.24
Antenna	MVG	ANTA3	SN 07/13 ZNTA52	N/A	N/A
Phantom1	MVG	SAM	SN 32/14 SAM115	N/A	N/A
Phantom2	MVG	SAM	SN 32/14 SAM116	N/A	N/A
Phone holder	MVG	N/A	SN 32/14 MSH97	N/A	N/A
Laptop holder	MVG	N/A	SN 32/14 LSH29	N/A	N/A
Attenuator	Agilent	99899	DC-18GHz	N/A	N/A
Directional coupler	Narda	4226-20	3305	N/A	N/A
Network Analyzer	Agilent	8753ES	US38432810	2019.10.11	2020.10.10
Multi Meter	Keithley	Multi Meter 2000	4050073	2019.10.11	2020.10.10
Signal Generator	Agilent	N5182A	MY50140530	2019.10.09	2020.10.08
Wireless Communication Test Set	Agilent	8960-E5515C	MY48360751	2019.10.09	2020.10.08
Wireless Communication Test Set	R&S	CMW500	117239	2019.10.09	2020.10.08
Power Amplifier	DESAY	ZHL-42W	9638	2019.10.09	2020.10.08
Power Meter	R&S	NRP	100510	2019.10.16	2020.10.15
Power Meter	Agilent	E4419B	QB43312265	2019.10.12	2020.10.11
Power Sensor	R&S	NRP-Z11	101919	2019.10.12	2020.10.11
Power Sensor	HP	E9300A	US39210170	2019.10.09	2020.10.08
Temperature hygrometer	SuWei	SW-108	N/A	2019.10.13	2020.10.12
Thermograph	Elitech	RC-4	S/N EF7176501537	2019.10.11	2020.10.10

Note:
Per KDB 865664 D01, Dipole SAR Validation Verification, STS 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
Return-loss in within 20% of calibrated measurement

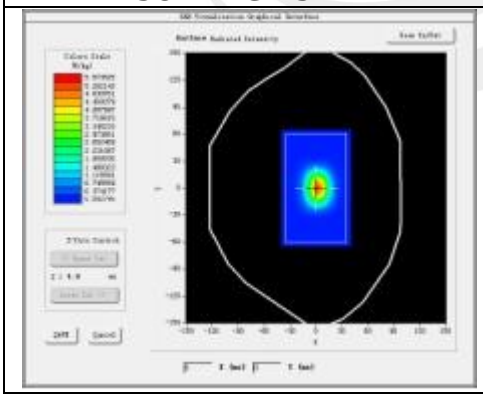
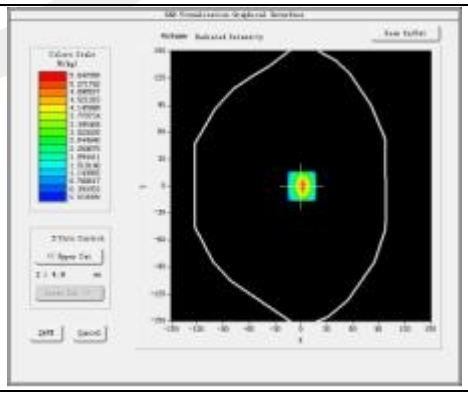
Appendix A. System Validation Plots

System Performance Check Data(5200MHz Body)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=4mm, dy=4mm, dz=2mm
Date of measurement: 2020-05-28

Experimental conditions.

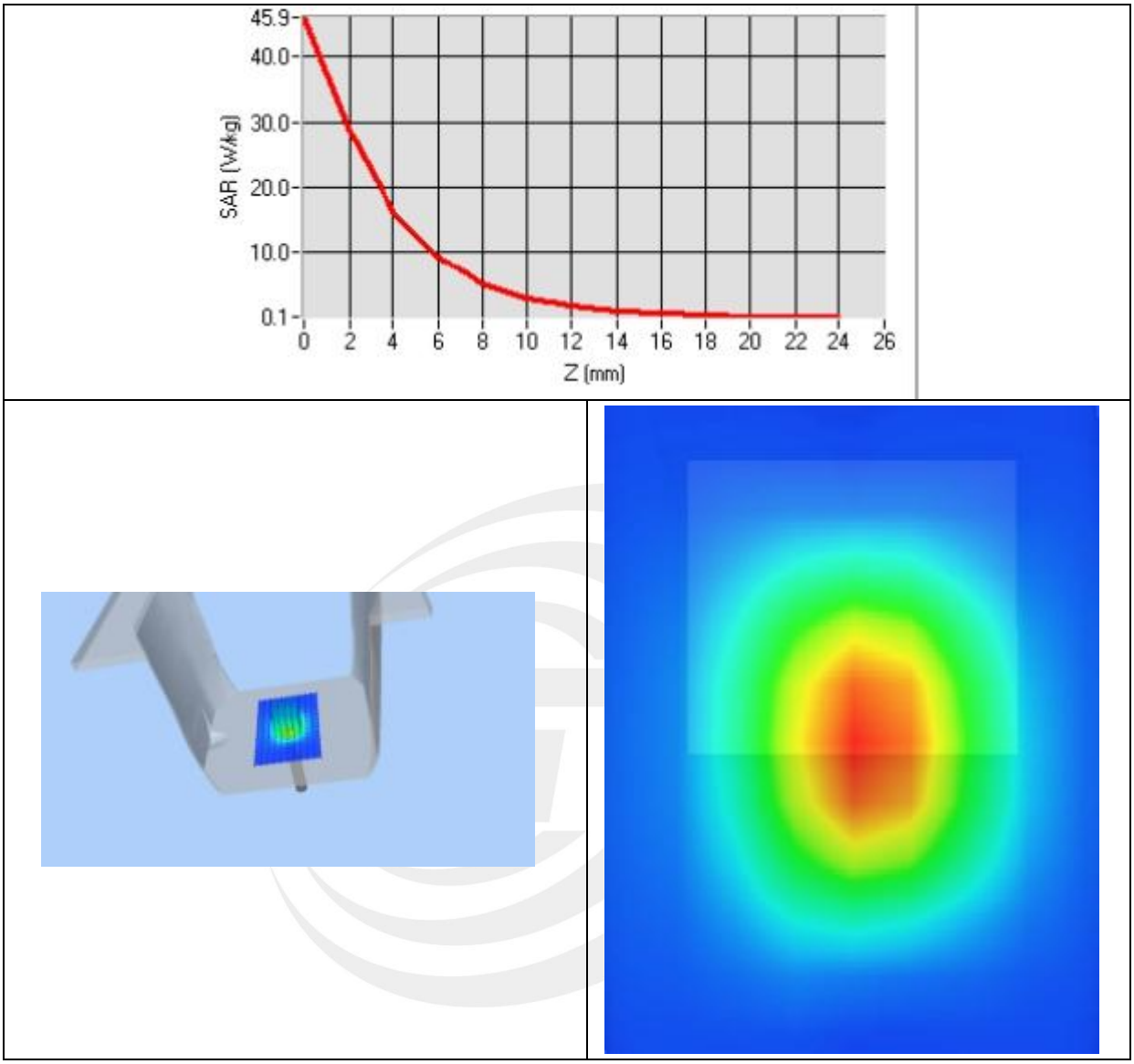
Device Position	Validation plane
Band	5200 MHz
Channels	-
Signal	CW
Frequency (MHz)	5200
Relative permittivity	48.53
Conductivity (S/m)	5.38
Power drift (%)	2.14
Probe	SN 45/15 EPGO281
ConvF	2.52
Crest factor:	1:1

SURFACE SAR	VOLUME SAR
	

Maximum location: X=7.00, Y=2.00

SAR 10g (W/Kg)	5.912478
SAR 1g (W/Kg)	16.287335

Z Axis Scan

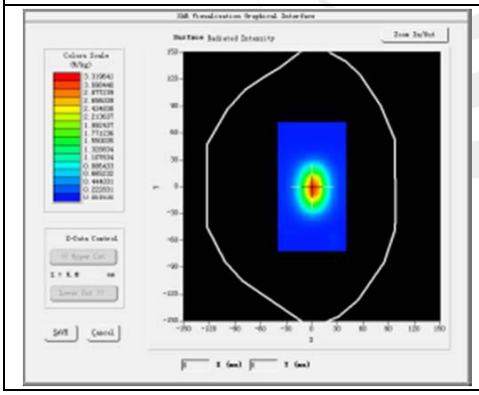
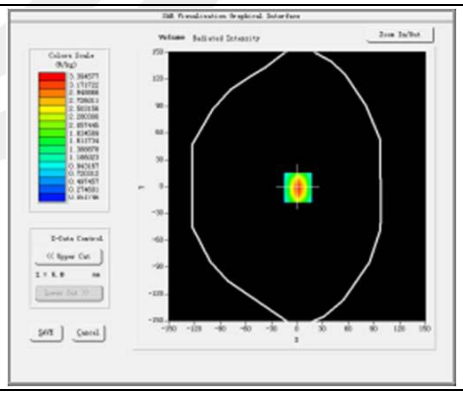


System Performance Check Data(5800MHz Body)

Type: Dipole measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=4mm, dy=4mm, dz=2mm
Date of measurement: 2020-06-12

Experimental conditions.

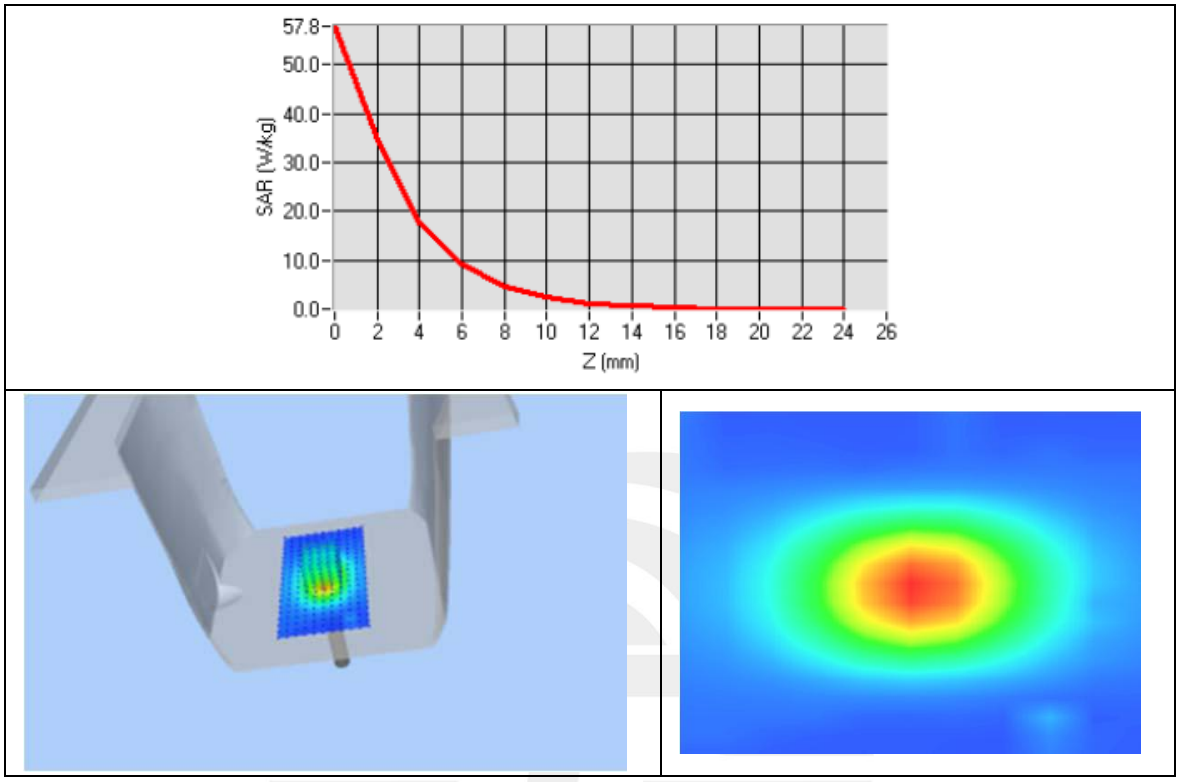
Device Position	Validation plane
Band	5800 MHz
Channels	-
Signal	CW
Frequency (MHz)	5800
Relative permittivity	49.26
Conductivity (S/m)	6.11
Power drift (%)	-0.52
Probe	SN 45/15 EPGO281
ConvF	2.60
Crest factor:	1:1

SURFACE SAR	VOLUME SAR
	

Maximum location: X=7.00, Y=2.00

SAR 10g (W/Kg)	6.171195
SAR 1g (W/Kg)	18.460572

Z Axis Scan


57.8
50.0
40.0
30.0
20.0
10.0
0.0
SAR (W/kg)
0 2 4 6 8 10 12 14 16 18 20 22 24 26
Z (mm)

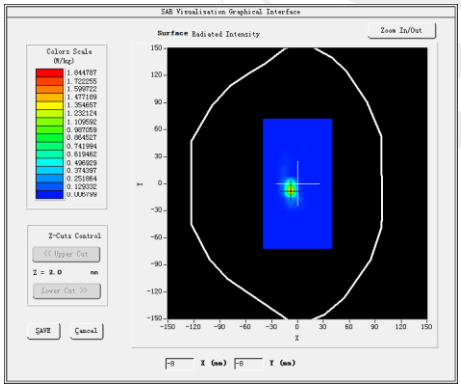
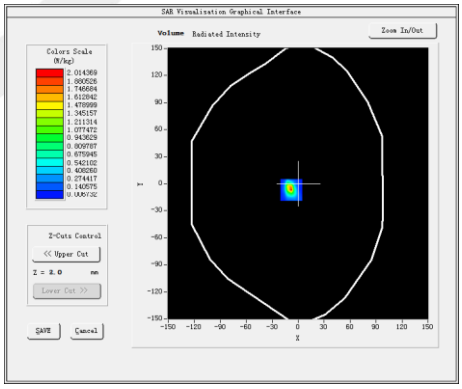
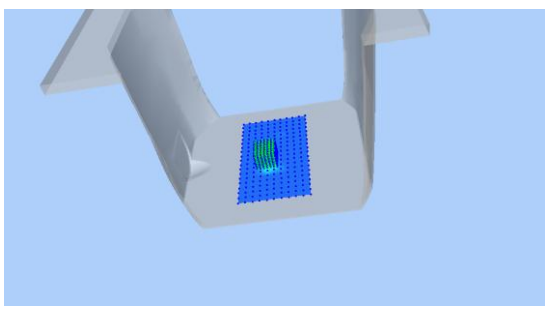
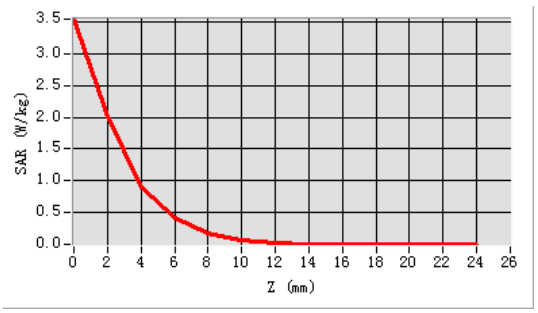
Appendix B. SAR Test Plots

Plot 1: DUT: LUME PAD; EUT Model: LPD-10W

Test Date	2020-05-28
Probe	SN 45/15 EPGO281
ConvF	2.52
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Front side
Band	IEEE 802.11a ISM
Antenna	0
Signal	IEEE802.a (Crest factor: 1.0)
Frequency (MHz)	5240
Relative permittivity (real part)	48.53
Conductivity (S/m)	5.38
Variation (%)	-1.07

Maximum location: X=-8.00, Y=-7.00
SAR Peak: 3.93 W/kg

SAR 10g (W/Kg)	0.155102
SAR 1g (W/Kg)	0.753371

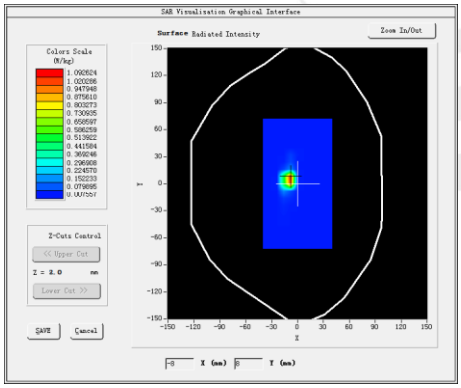
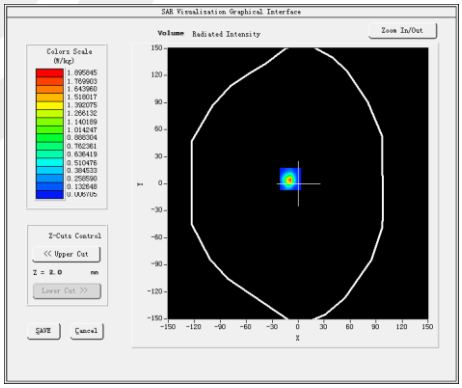
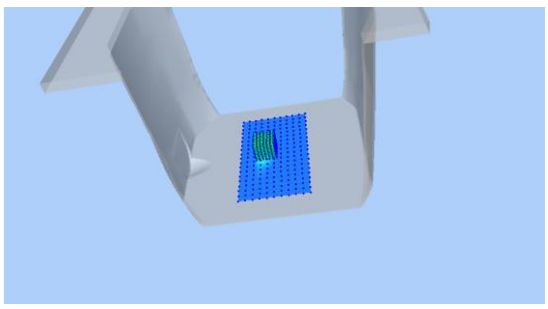
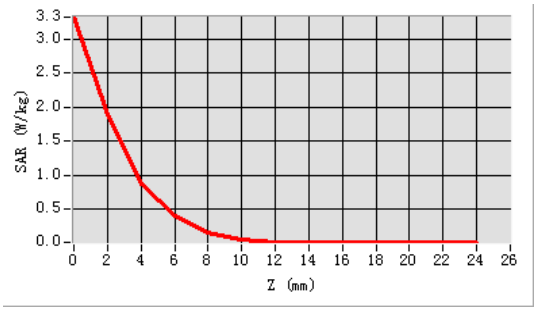
SURFACE SAR	VOLUME SAR
	
3D	**Z Axis Scan**
	

Plot 2: DUT: LUME PAD; EUT Model: LPD-10W

Test Date	2020-05-28
Probe	SN 45/15 EPGO281
ConvF	2.52
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Front side
Band	IEEE 802.11a ISM
Antenna	1
Signal	IEEE802.a (Crest factor: 1.0)
Frequency (MHz)	5200
Relative permittivity (real part)	48.53
Conductivity (S/m)	5.38
Variation (%)	-2.83

Maximum location: X=-9.00, Y=5.00
SAR Peak: 3.68 W/kg

SAR 10g (W/Kg)	0.132187
SAR 1g (W/Kg)	0.717221

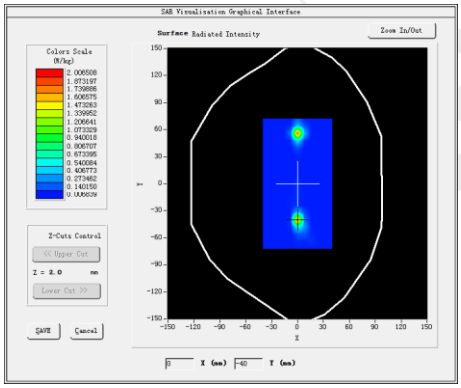
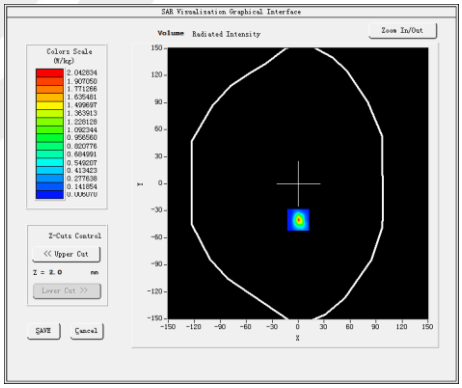
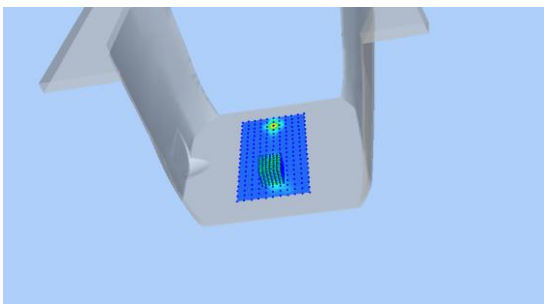
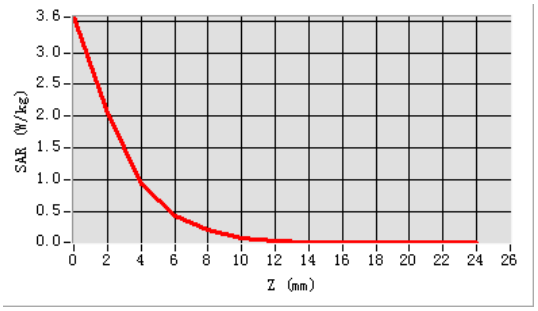
SURFACE SAR	VOLUME SAR
	
3D	**Z Axis Scan**
	

Plot 3: DUT: LUME PAD; EUT Model: LPD-10W

Test Date	2020-05-28
Probe	SN 45/15 EPGO281
ConvF	2.52
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Front side
Band	IEEE 802.11n ISM
Antenna	MIMO(ANT 0+1)
Signal	IEEE802.n (Crest factor: 1.0)
Frequency (MHz)	5230
Relative permittivity (real part)	48.53
Conductivity (S/m)	5.38
Variation (%)	-0.73

Maximum location: X=0.00, Y=-40.00
SAR Peak: 3.85 W/kg

SAR 10g (W/Kg)	0.151037
SAR 1g (W/Kg)	0.759210

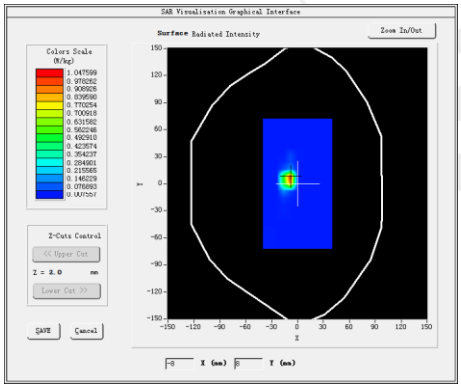
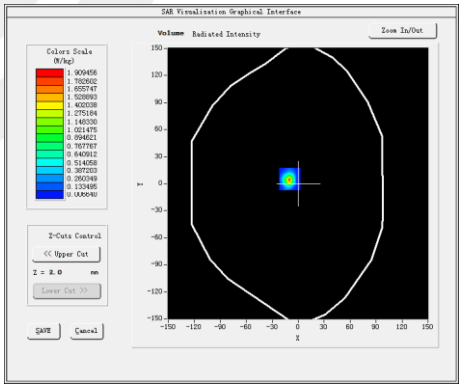
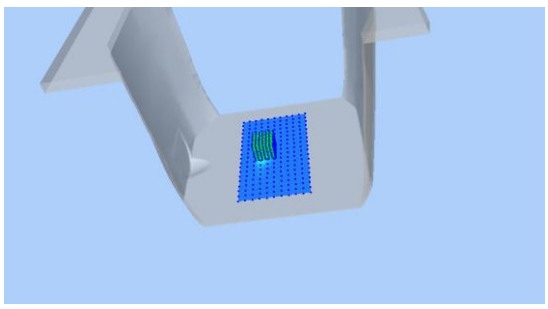
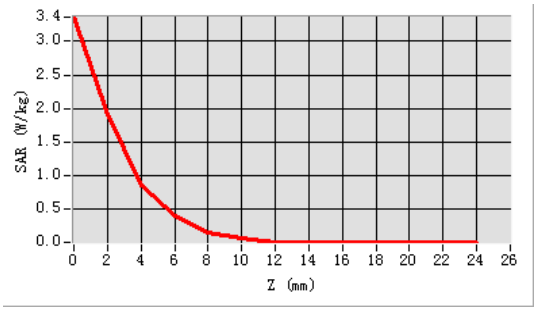
SURFACE SAR	VOLUME SAR
	
3D	**Z Axis Scan**
	

Plot 4: DUT: LUME PAD; EUT Model: LPD-10W

Test Date	2020-06-12
Probe	SN 45/15 EPGO281
ConvF	2.60
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Front side
Band	IEEE 802.11a ISM
Antenna	0
Signal	IEEE802.a (Crest factor: 1.0)
Frequency (MHz)	5785
Relative permittivity (real part)	49.26
Conductivity (S/m)	6.11
Variation (%)	-1.82

Maximum location: X=-10.00, Y=5.00
SAR Peak: 3.82 W/kg

SAR 10g (W/Kg)	0.129993
SAR 1g (W/Kg)	0.700430

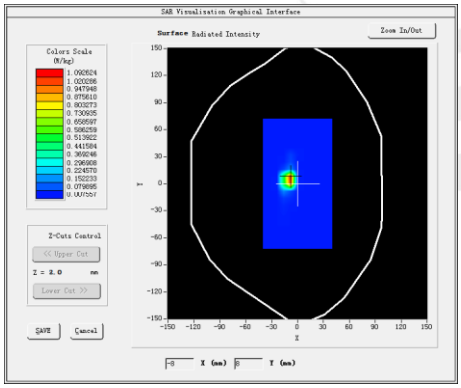
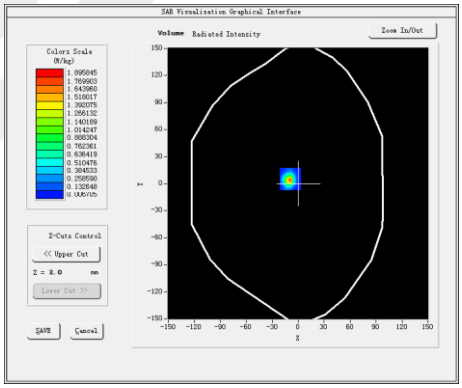
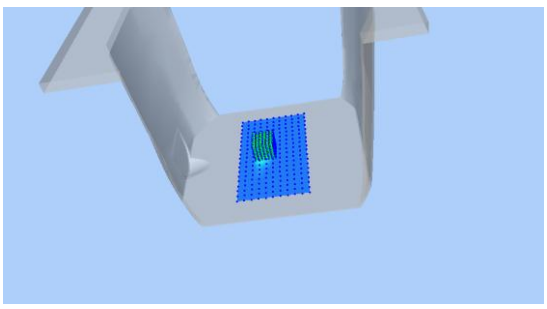
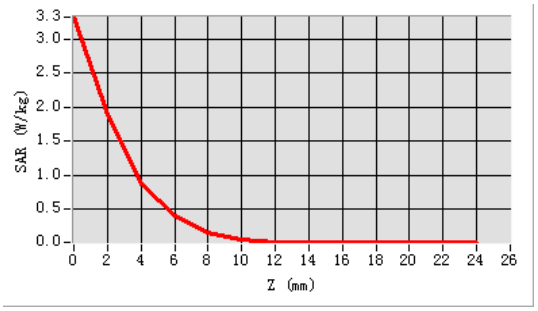
SURFACE SAR	VOLUME SAR
	
3D	**Z Axis Scan**
	

Plot 5: DUT: LUME PAD; EUT Model: LPD-10W

Test Date	2020-06-12
Probe	SN 45/15 EPGO281
ConvF	2.60
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Front side
Band	IEEE 802.11a ISM
Antenna	1
Signal	IEEE802.a (Crest factor: 1.0)
Frequency (MHz)	5745
Relative permittivity (real part)	49.26
Conductivity (S/m)	6.11
Variation (%)	-2.83

Maximum location: X=-9.00, Y=5.00
SAR Peak: 3.61 W/kg

SAR 10g (W/Kg)	0.112187
SAR 1g (W/Kg)	0.647221

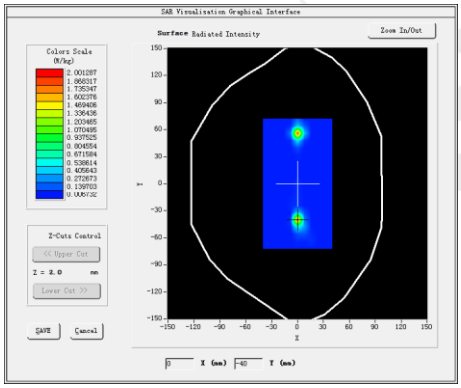
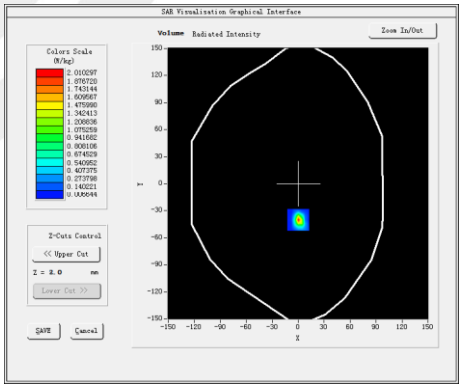
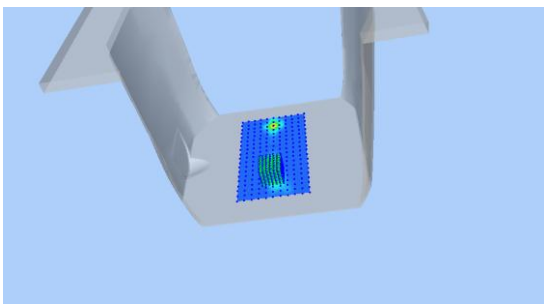
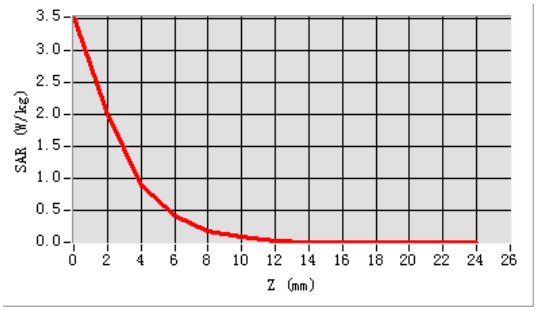
SURFACE SAR	VOLUME SAR
	
3D	**Z Axis Scan**
	

Plot 6: DUT: LUME PAD; EUT Model: LPD-10W

Test Date	2020-06-12
Probe	SN 45/15 EPGO281
ConvF	2.60
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Front side
Band	IEEE 802.11n ISM
Antenna	MIMO(ANT 0+1)
Signal	IEEE802.n (Crest factor: 1.0)
Frequency (MHz)	5745
Relative permittivity (real part)	49.26
Conductivity (S/m)	6.11
Variation (%)	-0.87

Maximum location: X=0.00, Y=-40.00
SAR Peak: 3.75 W/kg

SAR 10g (W/Kg)	0.131029
SAR 1g (W/Kg)	0.741772

SURFACE SAR	VOLUME SAR
	
3D	**Z Axis Scan**
	

Appendix C. Probe Calibration And Dipole Calibration Report

Refer the appendix Calibration Report.

※※※※※END OF THE REPORT※※※※※