FCC SAR TEST REPORT

Report No: STS1801064H01

Issued for

Inventec Appliances Corp.

37 Wugong 5th road, New Taipei Industrial Park, Wugu District, New Taipei City, Taiwan

Product Name:	Notebook
Brand Name:	NuVision
Model Name:	NEBP12
Series Model:	NEBP12-C464SSA, NEBP12-C464SBA, NEBP12-C464SGA, NEBP12-C464SBLA, NEBP12-C464SGNA, NEBP12-C464SPA
FCC ID:	POT-NEBP12
Test Standard:	ANSI/IEEE Std. C95.1
	FCC 47 CFR Part 2 (2.1093)
	IEEE 1528: 2013
Max. Report SAR (1g):	Body: 0.574 W/kg

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Test Report Certification

Applicant's name ..... :	Inventec Appliances Corp.
Address..... :	37 Wugong 5th road, New Taipei Industrial Park, Wugu District, New Taipei City, Taiwan
Manufacture's Name..... :	Inventec Appliances(Pudong) Corporation
Address..... :	No.789 Pu Xing Road, Shanghai, PRC

Product description

Product name..... :	Notebook
Brand name ..... :	NuVision
Model name ..... :	NEBP12
Series Model..... :	NEBP12-C464SSA, NEBP12-C464SBA, NEBP12-C464SGA, NEBP12-C464SBLA, NEBP12-C464SGNA, NEBP12-C464SPA
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.....:	12 Jan. 2018
Date of Issue .....:	13 Jan. 2018
Test Result.....:	**Pass**

Testing Engineer **:** Aaron Bu

(Aaron Bu)

Technical Manager **:**

(John Zou)

Authorized Signatory **:**

(Vita Li)

Table of Contents

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	Notebook		
Brand Name	NuVision		
Model Name.	NEBP12		
Series Model	NEBP12-C464SSA,NEBP12-C464SBA,NEBP12-C464SGA, NEBP12-C464SBLA, NEBP12-C464SGNA, NEBP12-C464SPA		
FCC ID	POT-NEBP12		
Model Difference	Only different in model name and appearance.		
Adapter	Input: AC 100-240V, 600mA, 50/60 Hz Output: DC 12V, 3000mA		
Battery	Rated Voltage: 7.6V; Capacity: 4200mAh		
Device Category	Portable		
Product stage	Production unit		
RF Exposure Environment	General Population / Uncontrolled		
Hardware Version	APL05_V5.0		
Software Version	Win 10 1709		
Frequency Range	WLAN 802.11a/n/ac(HT20/40/80): 5150~5250 MHz; WLAN 802.11a/n/ac(HT20/40/80): 5725~5875 MHz;		
Max. Reported SAR(1g): (Limit:1.6W/kg)	Band	Mode	Body Worn and Hotspot(W/kg)
	NII	5.2G WLAN ANT A	0.241
	NII	5.2G WLAN ANT B	0.333
	NII	5.2G WLAN ANT A+B	0.574
	NII	5.8G WLAN ANT A	0.227
	NII	5.8G WLAN ANT B	0.305
	NII	5.8G WLAN ANT A+B	0.532
Operating Mode:	WLAN: 802.11 n(HT20/40) /a/ac20/ac40/ac80		
Antenna Specification:	WLAN: PIFA 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.
Add. : 1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road,
Fuyong Street, Bao'an District, Shenzhen, Guangdong, China
CNAS Registration No.: L7649
FCC 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	Notebook 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 648474 D04 v01r03	SAR Evaluation Considerations for Wireless Handsets
8	FCC KDB 248227 D01 Wi-Fi SAR v02r02	SAR Considerations for 802.11 Devices
9	FCC KDB 616217 D04	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:

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

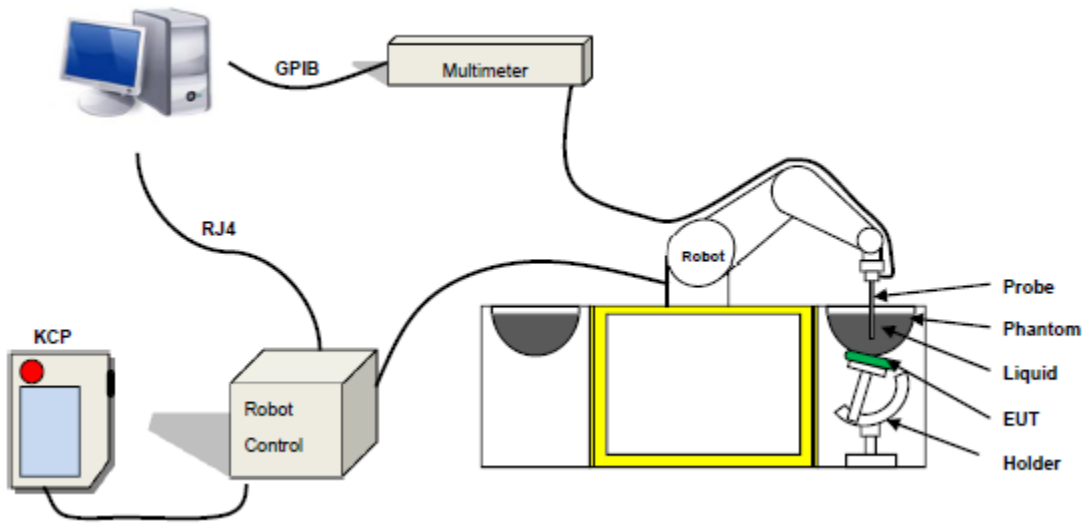
SAR is expressed in units of Watts per kilogram (W/kg) SAR measurement can be related to the electrical field in the tissue by

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

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 OpenSAR 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.

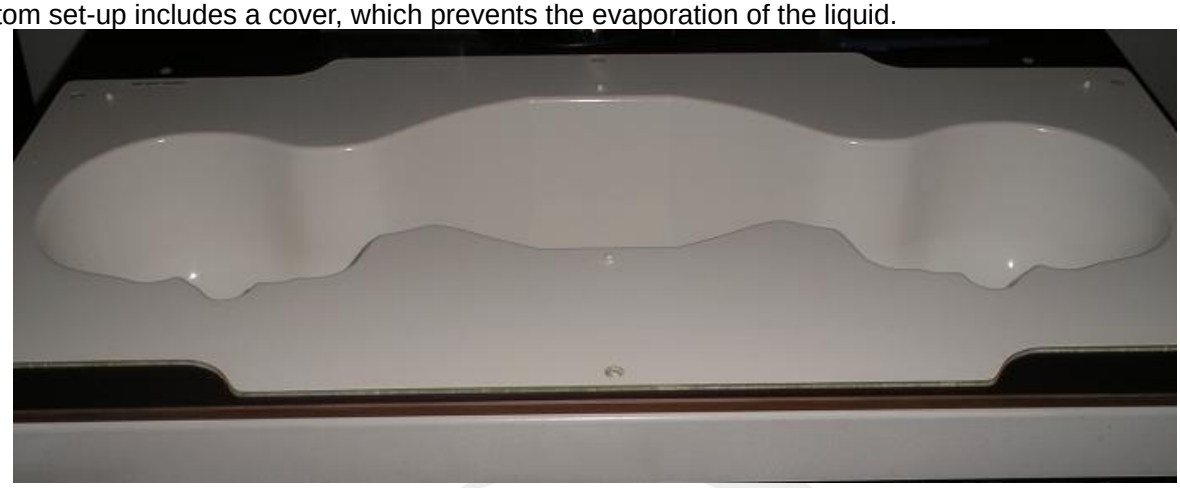
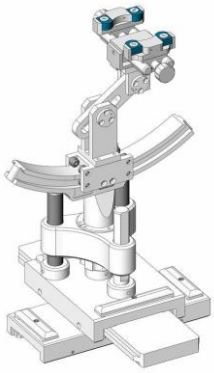


Figure-SN 32/14 SAM115

Figure-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

4.1 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.

Frequency (MHz)	Bactericide	DGBE	HEC	NaCl	Sucrose	1,2-Propanediol	X100	Water	Conductivity	Permittivity
	%	%	%	%	%	%	%	%	σ	εr
750	/	/	/	0.79	/	64.81	/	34.40	0.97	41.8
835	/	/	/	0.79	/	64.81	/	34.40	0.97	41.8
900	/	/	/	0.79	/	64.81	/	34.40	0.97	41.8
1800	/	13.84	/	0.35	/	/	30.45	55.36	1.38	41.0
1900	/	13.84	/	0.35	/	/	30.45	55.36	1.38	41.0
2000	/	7.99	/	0.16	/	/	19.97	71.88	1.55	41.1
2450	/	7.99	/	0.16	/	/	19.97	71.88	1.88	40.3
2600	/	7.99	/	0.16	/	/	19.97	71.88	1.88	40.3

Tissue dielectric parameters for head and body phantoms				
Frequency	ε_r		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

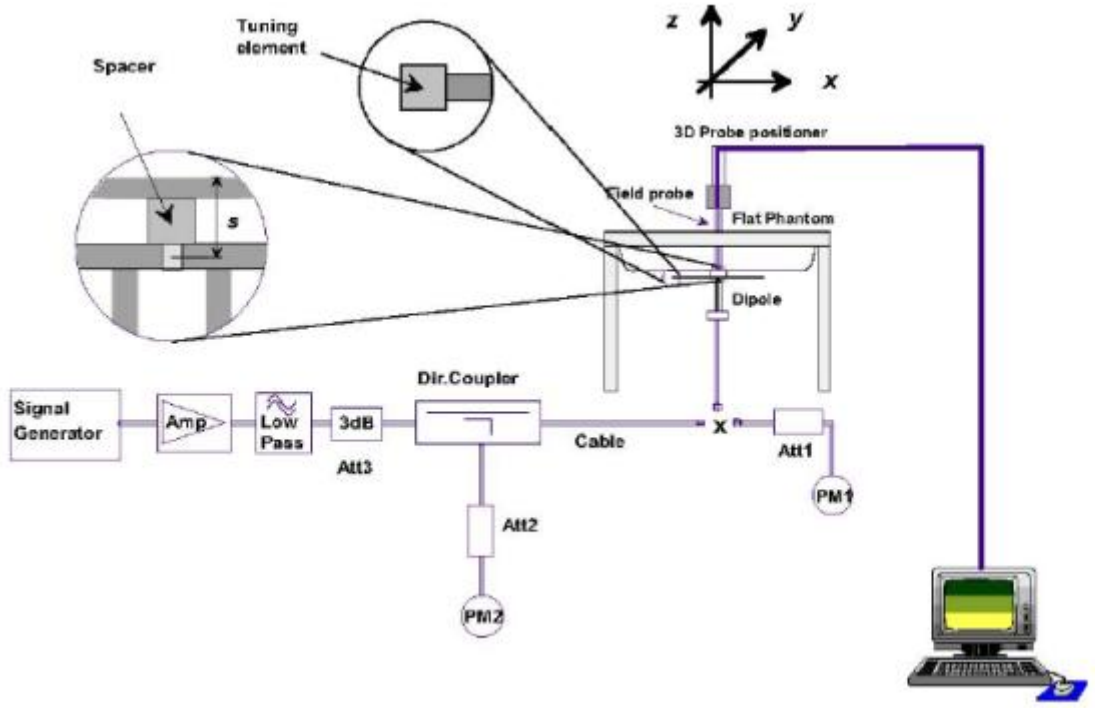
Date	Ambient condition		Body Simulating Liquid		Parameters	Target	Measured	Deviation [%]	Limited [%]
	Temp. [°C]	Humidity [%]	Frequency	Temp. [°C]					
2018-01-12	22.4	44	5200 MHz	21.9	Permittivity:	49.0	48.61	-0.80	±10
					Conductivity	5.30	5.27	-0.57	±10
2018-01-12	22.4	44	5800 MHz	21.9	Permittivity:	48.2	49.22	2.12	±10
					Conductivity	6.00	6.03	0.50	±10

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)	Target(W/Kg)	Tolerance(%)	Date
5200 Body	100	15.849	158.49	159	-0.32	2018-01-12
5800 Body	100	17.964	179.640	181.2	-0.86	2018-01-12

Note: The tolerance limit of System validation ±10%.

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 D01v01r01 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 Notebook, support WLAN/BT mode.

WLAN/BT Antenna A

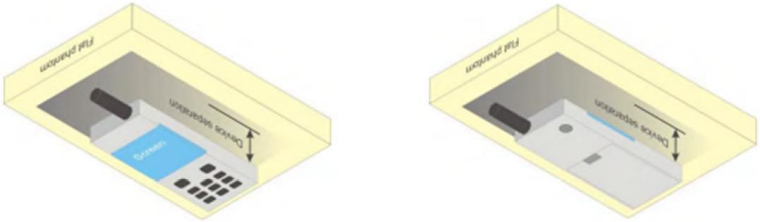
WLAN Antenna B

8. EUT Test Position

This EUT was tested in Rear Face.

Body-worn Position Conditions:

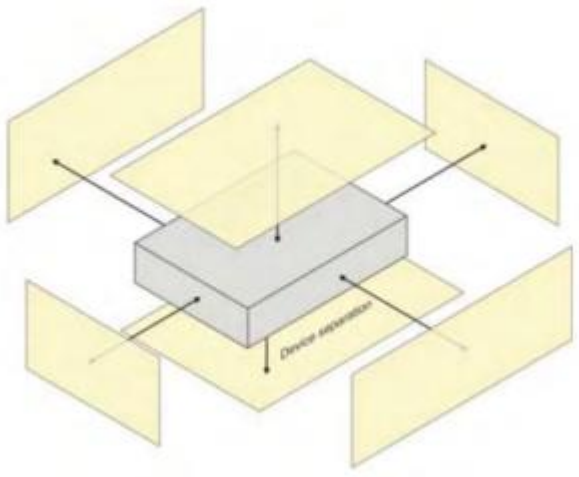
Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in KDB Publication 447498 D01 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. When the same 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.



8.1 Hotspot mode exposure position condition

For handsets that support hotspot mode operations, with wireless router capabilities and various web browsing function, the relevant hand and body exposure condition are tested according to the hotspot SAR procedures in KDB 941225. A test separation distance of 10 mm is required between the phantom and all surface and edges with a transmitting antenna located within 25 mm form that surface or edge.

When form factor of a handset is smaller than 9cm x 5cm, a test separation distance of 5mm (instead of 10mm)is required for testing hotspot mode. When the separate distance required for body-worn accessory testing is larger than or equal to that tested for hotspot mode, in the same wireless mode and for the same surface of the phone, the hotspot mode SAR data may be used to support body-worn accessory SAR compliance for that particular configuration(surface).



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.

NO	Source	Tol(%)	Prob. Dist.	Div. k	ci (1g)	ci (10g)	1gUi	10gUi	Veff
Measurement System									
1	Probe calibration	5.8	N	1	1	1	5.8	5.8	∞
2	Axial isotropy	3.5	R	√3	$(1\text{-cp})^{1/2}$	$(1\text{-cp})^{1/2}$	1.43	1.43	∞
3	Hemispherical isotropy	5.9	R	√3	$\sqrt{C_p}$	$\sqrt{C_p}$	2.41	2.41	∞
4	Boundary effect	1.0	R	√3	1	1	0.58	0.58	∞
5	Linearity	4.7	R	√3	1	1	2.71	2.71	∞
6	System Detection limits	1.0	R	√3	1	1	0.58	0.58	∞
7	Readout electronics	0.5	N	1	1	1	0.50	0.50	∞
8	Response time	0	R	√3	1	1	0	0	∞
9	Integration time	1.4	R	√3	1	1	0.81	0.81	∞
10	Ambient noise	3.0	R	√3	1	1	1.73	1.73	∞
11	Ambient reflections	3.0	R	√3	1	1	1.73	1.73	∞
12	Probe positioner mech. restrictions	1.4	R	√3	1	1	0.81	0.81	∞
13	Probe positioning with respect to phantom shell	1.4	R	√3	1	1	0.81	0.81	∞
14	Max.SAR evaluation	1.0	R	√3	1	1	0.6	0.6	∞
Test sample related									

15	Device positioning	2.6	N	1	1	1	2.6	2.6	11
16	Device holder	3	N	1	1	1	3.0	3.0	7
17	Drift of output power	5.0	R	√3	1	1	2.89	2.89	∞
Phantom and set-up									
18	Phantom uncertainty	4.0	R	√3	1	1	2.31	2.31	∞
19	Liquid conductivity (target)	2.5	N	1	0.78	0.71	1.95	1.78	5
20	Liquid conductivity (meas)	4	N	1	0.23	0.26	0.92	1.04	5
21	Liquid Permittivity (target)	2.5	N	1	0.78	0.71	1.95	1.78	∞
22	Liquid Permittivity (meas)	5.0	N	1	0.23	0.26	1.15	1.30	∞
Combined standard			RSS	$U_C = \sqrt{\sum_{i=1}^{n} C_i^2 U_i^2}$			10.63%	10.54%	
Expanded uncertainty (P=95%)		$U = k\, U_C$,k=2					21.26%	21.08%	

9.2 System validation Uncertainty

NO	Source	Tol(%)	Prob. Dist.	Div. k	ci (1g)	ci (10g)	1gUi	10gUi	Veff
Measurement System									
1	Probe calibration	5.8	N	1	1	1	5.8	5.8	∞
2	Axial isotropy	3.5	R	√3	$(1\text{-cp})^{1/2}$	$(1\text{-cp})^{1/2}$	1.43	1.43	∞
3	Hemispherical isotropy	5.9	R	√3	$\sqrt{C_p}$	$\sqrt{C_p}$	2.41	2.41	∞
4	Boundary effect	1.0	R	√3	1	1	0.58	0.58	∞
5	Linearity	4.7	R	√3	1	1	2.71	2.71	∞
6	System Detection limits	1.0	R	√3	1	1	0.58	0.58	∞
7	Modulation response	0	N	1	1	1	0	0	∞
8	Readout electronics	0.5	N	1	1	1	0.50	0.50	∞
9	Response time	0	R	√3	1	1	0	0	∞
10	Integration time	1.4	R	√3	1	1	0.81	0.81	∞
11	Ambient noise	3.0	R	√3	1	1	1.73	1.73	∞
12	Ambient reflections	3.0	R	√3	1	1	1.73	1.73	∞
13	Probe positioner mech. restrictions	1.4	R	√3	1	1	0.81	0.81	∞
14	Probe positioning with respect to phantom shell	1.4	R	√3	1	1	0.81	0.81	∞
15	Max.SAR evaluation	1.0	R	√3	1	1	0.6	0.6	∞
Dipole									
16	Deviation of experimental source from	4	N	1	1	1	4.00	4.00	∞

17	Input power and SAR drit measurement	5	R	√3	1	1	2.89	2.89	∞
18	Dipole Axis to liquid Distance	2	R	√3	1	1			∞
Phantom and set-up									
19	Phantom uncertainty	4.0	R	√3	1	1	2.31	2.31	∞
20	Uncertainty in SAR correction for deviation(in	2.0	N	1	1	0.84	2	1.68	∞
21	Liquid conductivity (target)	2	N	1	1	0.84	2.00	1.68	∞
22	Liquid conductivity (temperature uncertainty)	2.5	N	1	0.78	0.71	1.95	1.78	5
23	Liquid conductivity (meas)	4	N	1	0.23	0.26	0.92	1.04	5
24	Liquid Permittivity (target)	2.5	N	1	0.78	0.71	1.95	1.78	∞
25	Liquid Permittivity (temperature uncertainty)	2.5	N	1	0.78	0.71	1.95	1.78	5
26	Liquid Permittivity (meas)	5.0	N	1	0.23	0.26	1.15	1.30	∞
Combined standard			RSS	$U_C = \sqrt{\sum_{i=1}^{n} C_i^2 U_i^2}$			10.15%	10.05%	
Expanded uncertainty (P=95%)		$U = k\ U_C$,k=2					20.29%	20.10%	

10. Conducted Power Measurement

WLAN (5.2Gband)

Mode	Channel Number	Frequency (MHz)	Average EIRP Power (dBm)		
			Antenna A	Antenna B	Antenna A+B
802.11a	36	5180	10.55	10.55	N/A
	40	5200	12.01	11.36	N/A
	48	5240	11.15	11.15	N/A
802.11 n-HT20	36	5180	10.72	9.96	13.37
	40	5200	11.77	11.74	14.77
	48	5240	11.53	10.72	14.15
802.11 n-HT40	38	5190	10.19	10.00	13.11
	46	5230	9.62	9.29	12.47
802.11ac(HT20)	36	5180	10.74	10.63	13.70
	40	5200	11.57	11.65	14.62
	48	5240	11.24	10.90	14.08
802.11ac(HT40)	38	5190	9.32	9.25	12.30
	46	5230	9.44	8.97	12.22
802.11ac(HT80)	42	5210	8.65	8.11	11.40

WLAN (5.8Gband)

Mode	Channel Number	Frequency (MHz)	Average EIRP Power (dBm)		
			Antenna A	Antenna B	Antenna A+B
802.11a	149	5745	12.22	11.25	N/A
	157	5785	12.50	11.01	N/A
	165	5825	11.44	11.16	N/A
802.11 n-HT20	149	5745	12.19	10.59	14.474
	157	5785	12.17	11.37	14.799
	165	5825	11.53	10.15	13.905
802.11 n-HT40	151	5755	9.76	8.60	12.229
	159	5795	9.74	8.73	12.275
802.11ac(HT20)	149	5745	11.30	10.91	14.120
	157	5785	12.22	11.42	14.849
	165	5825	11.16	10.22	13.726
802.11ac(HT40)	151	5755	9.97	8.45	12.286
	159	5795	10.07	8.23	12.257
802.11ac(HT80)	155	5775	9.45	8.02	11.804

10.1 Tune-up Power

	Mode	WLAN(AVG)		
		Antenna A	Antenna B	Antenna A+B
5200 MHz	802.11a	11.1±1dBm	11±1dBm	N/A
	802.11 n-HT20	11±1dBm	10.8±1dBm	14±1dBm
	802.11 n-HT40	10±1dBm	10±1dBm	13±1dBm
	802.11ac(HT20)	11±1dBm	11±1dBm	14±1dBm
	802.11ac(HT40)	9±1dBm	9±1dBm	12±1dBm
	802.11ac(HT80)	8±1dBm	8±1dBm	11±1dBm

	Mode	WLAN(AVG)		
		Antenna A	Antenna B	Antenna A+B
5800 MHz	802.11a	12±1dBm	11±1dBm	N/A
	802.11 n-HT20	12±1dBm	11±1dBm	14±1dBm
	802.11 n-HT40	9±1dBm	8±1dBm	12±1dBm
	802.11ac(HT20)	12±1dBm	11±1dBm	14±1dBm
	802.11ac(HT40)	10±1dBm	8±1dBm	12±1dBm
	802.11ac(HT80)	9±1dBm	8±1dBm	11±1dBm

10.2 SAR Test Exclusions Applied

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

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

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

$$\frac{Max\ Power\ of\ Channel\ (mW)}{Test\ Separation\ Dist\ (mm)} * \sqrt{Frequency(GHz)} \leq 3.0$$

Based on the maximum conducted power of **5.2 GHz WLAN ANT A Body** (rounded to the nearest mW) and the antenna to user separation distance,

5.2 GHz WLAN ANT A SAR was required; [16.218/5)* √5200] = **7.40** > 3.0.

Based on the maximum conducted power of **5.2 GHz WLAN ANT B Body** (rounded to the nearest mW) and the antenna to user separation distance,

5.2 GHz WLAN ANT B SAR was required; [15.849/5)* √5200] = **7.23** > 3.0.

Based on the maximum conducted power of **5.2 GHz WLAN ANT A+B Body** (rounded to the nearest mW) and the antenna to user separation distance,

5.2 GHz WLAN ANT A+B SAR was required; [31.623/5)* √5200] = **14.42** > 3.0.

Based on the maximum conducted power of **5.8 GHz WLAN ANT A Body** (rounded to the nearest mW) and the antenna to user separation distance,

5.8 GHz WLAN ANT A SAR was required; [(19.953/5)* √5800] = **9.61** > 3.0

Based on the maximum conducted power of **5.8 GHz WLAN ANT B Body** (rounded to the nearest mW) and the antenna to user separation distance,

5.8 GHz WLAN ANT B SAR was required; [(15.849/5)* √5800] = **7.63** > 3.0

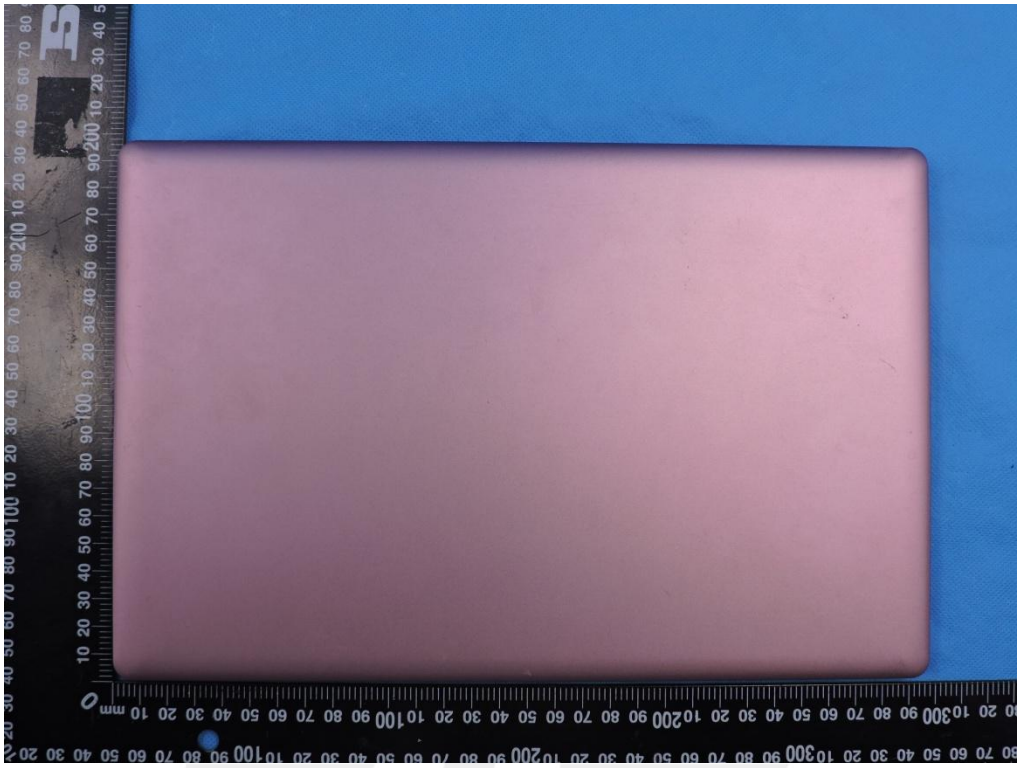
Based on the maximum conducted power of **5.8 GHz WLAN ANT A+B Body** (rounded to the nearest mW) and the antenna to user separation distance,

5.8 GHz WLAN ANT A+B SAR was required; [(31.623/5)* √5800] = **15.23** > 3.0

11. EUT And Test Setup Photo

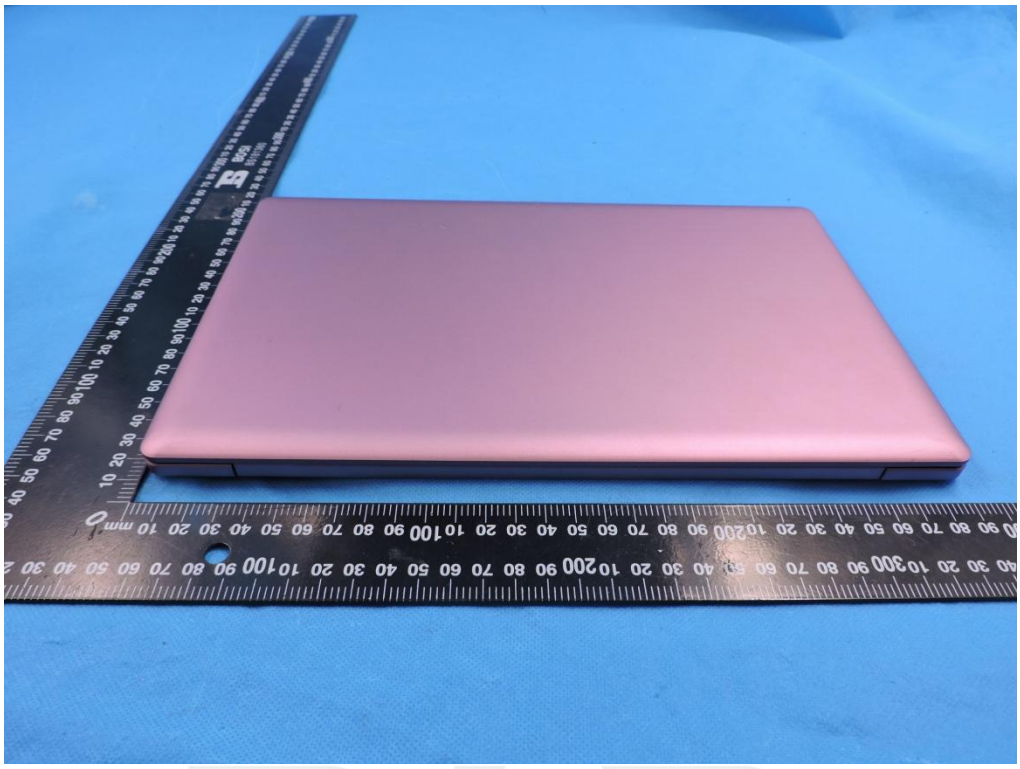
11.1 EUT Photo

Front side

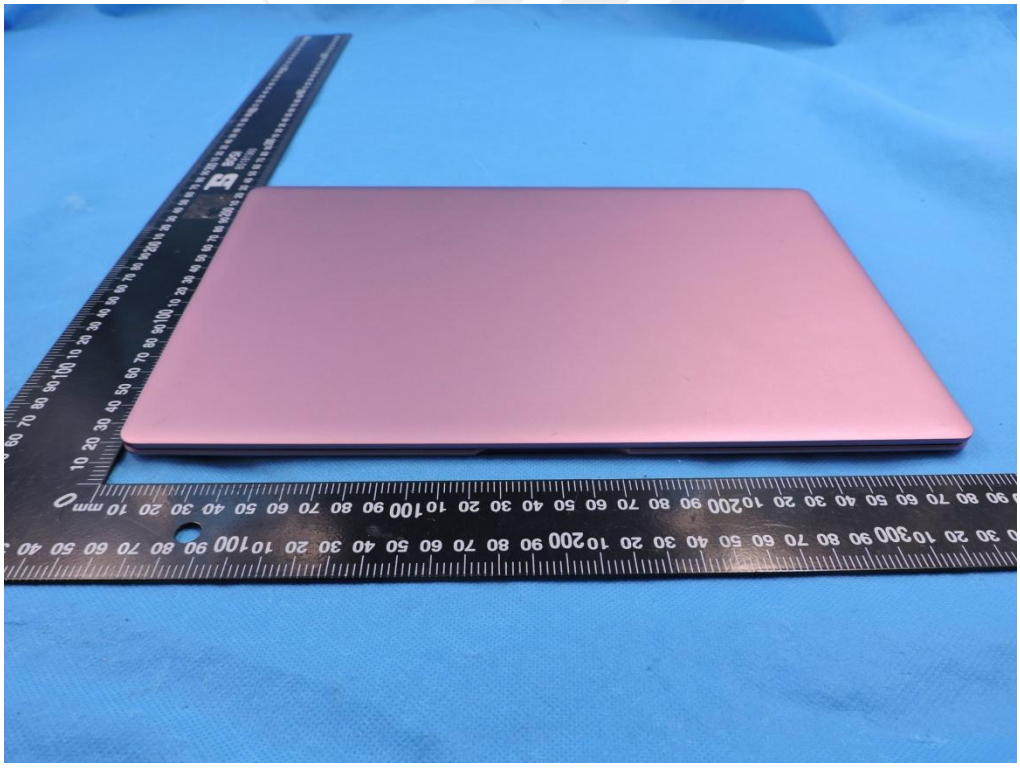


Back side

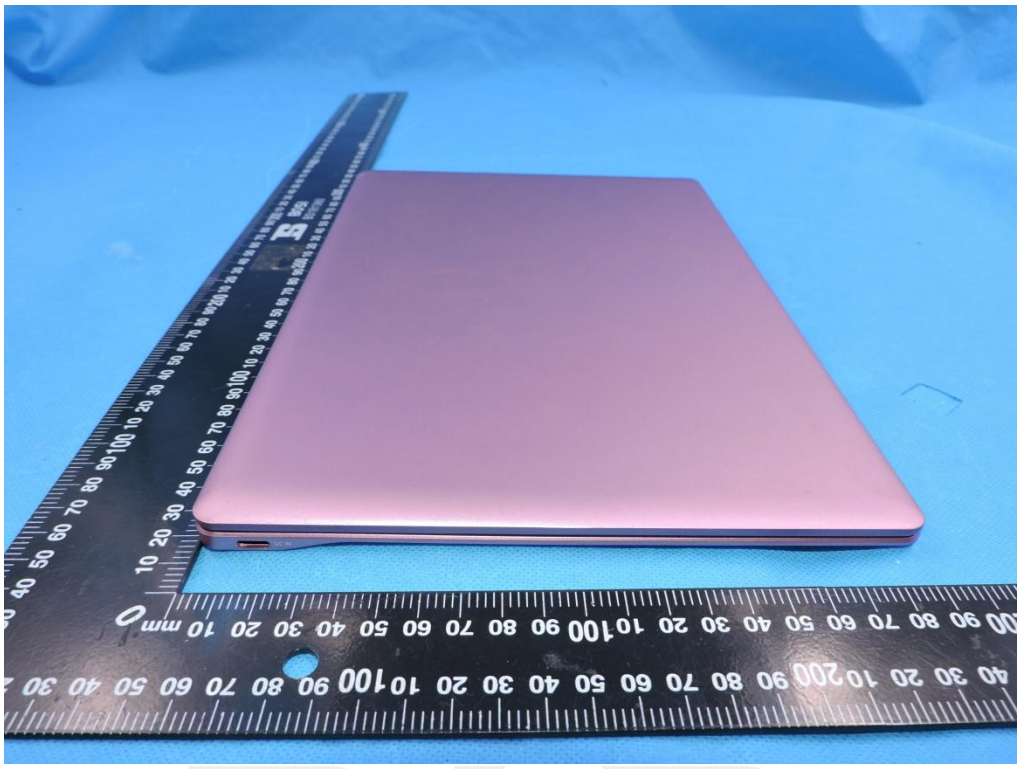
Top side



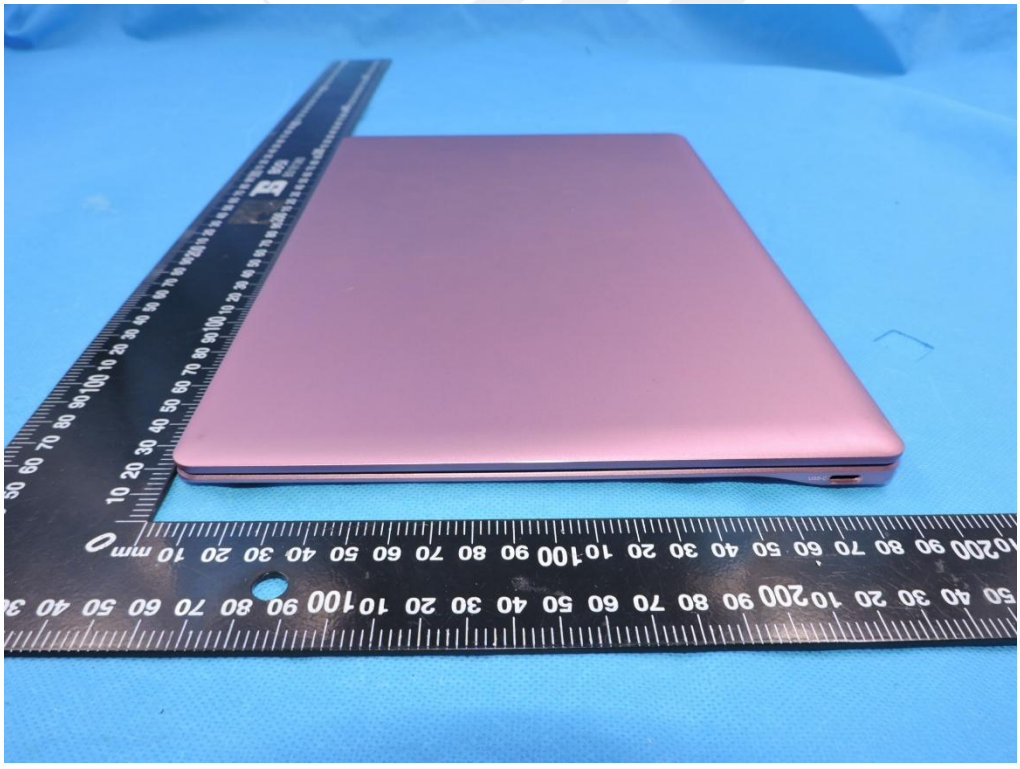
Bottom side



Left side

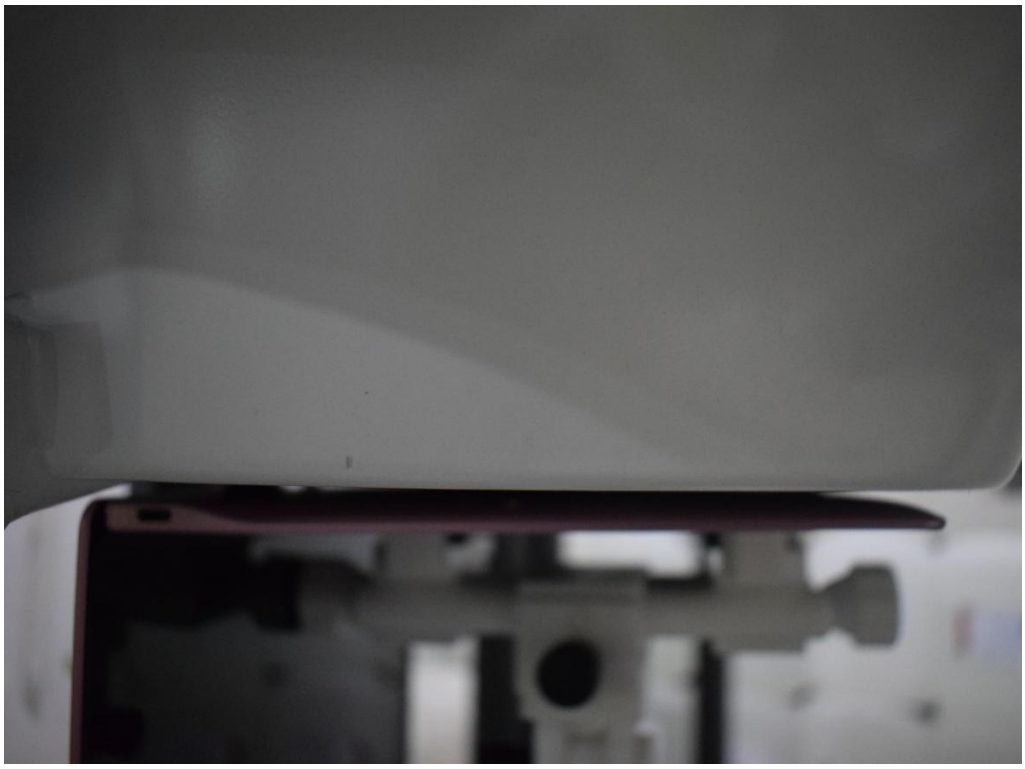


Right side

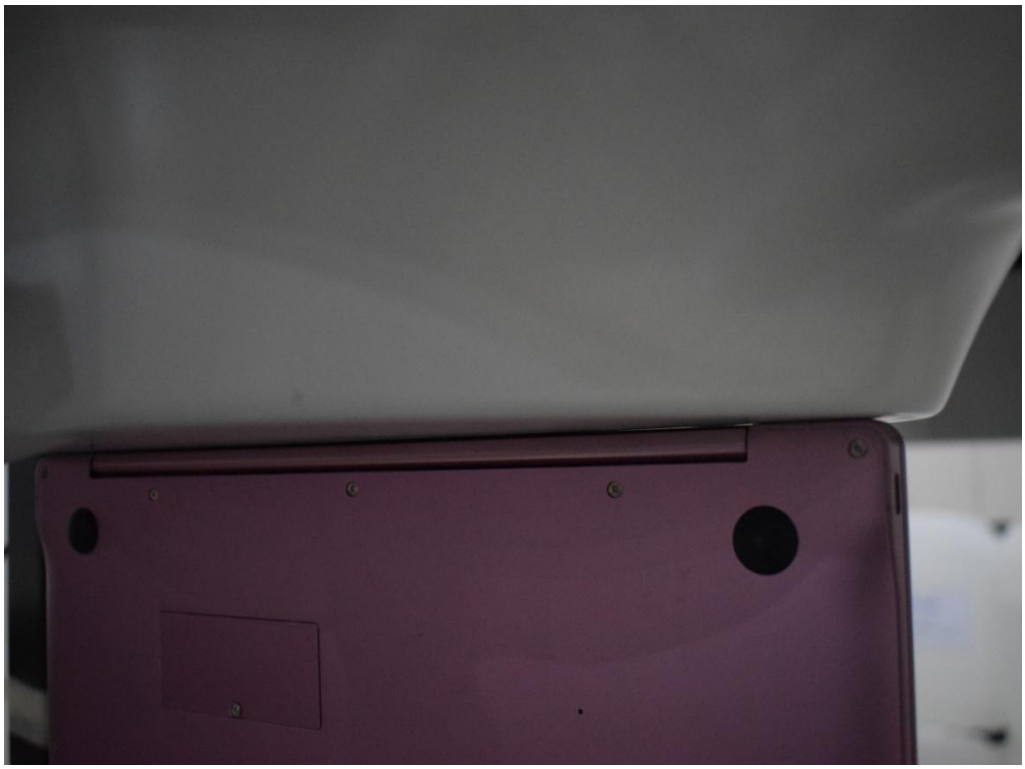


11.2 Setup Photo

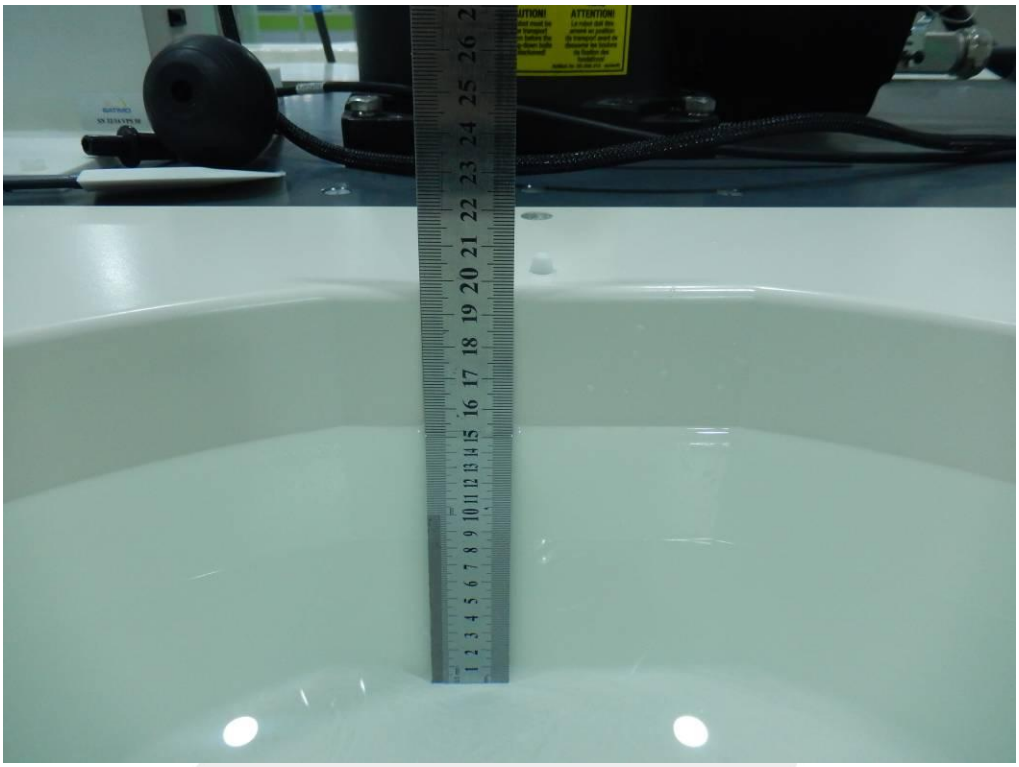
Back side(separation distance is 0mm)



Top side (separation distance is 0mm)



Liquid depth (15 cm)



12. SAR Result Summary

12.1 Body-worn and Hotspot SAR

802.11a（Antenna A）

Band	Mode	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.
WLAN 5.2G	802.11a	Back side	40	0.194	-2.00	12.1	12.01	100%	**0.198**	1
WLAN 5.2G	802.11a	Top side	40	0.057	-0.42	12.1	12.01	100%	0.058	/
WLAN 5.8G	802.11a	Back side	157	0.183	2.44	13	12.50	100%	**0.205**	3
WLAN 5.8G	802.11a	Top side	157	0.046	0.61	13	12.50	100%	0.052	/

802.11a（Antenna B）

Band	Mode	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.
WLAN 5.2G	802.11a	Back side	40	0.172	-0.91	12	11.36	100%	**0.199**	2
WLAN 5.2G	802.11a	Top side	40	0.052	0.82	12	11.36	100%	0.060	/
WLAN 5.8G	802.11a	Back side	149	0.134	0.64	12	11.25	100%	**0.159**	4
WLAN 5.8G	802.11a	Top side	149	0.042	-2.07	12	11.25	100%	0.050	/

802.11n（Antenna A）

Band	Mode	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.
WLAN 5.2G	802.11n	Back side	40	0.229	0.94	15	14.77	100%	**0.241**	5
WLAN 5.2G	802.11n	Top side	40	0.075	-3.71	15	14.77	100%	0.079	/
WLAN 5.8G	802.11n	Back side	157	0.217	3.65	15	14.80	100%	**0.227**	7
WLAN 5.8G	802.11n	Top side	157	0.066	-1.86	15	14.80	100%	0.069	/

802.11n（Antenna B）

Band	Mode	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.
WLAN 5.2G	802.11n	Back side	40	0.316	-2.00	15	14.77	100%	**0.333**	6
WLAN 5.2G	802.11n	Top side	40	0.084	-3.03	15	14.77	100%	0.089	/
WLAN 5.8G	802.11n	Back side	157	0.291	-2.28	15	14.80	100%	**0.305**	8
WLAN 5.8G	802.11n	Top side	157	0.078	3.63	15	14.80	100%	0.082	/

Band	Mode	Scaled SAR (W/Kg)		A+B
WLAN 5.2G	802.11n	Antenna A	0.241	**0.574**
	802.11n	Antenna B	0.333	
WLAN 5.8G	802.11n	Antenna A	0.227	0.532
	802.11n	Antenna B	0.305	

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
3. When the user enables the personal Wireless router functions for the handsets, actual operations include simultaneous transmission of both the Wi-Fi transmitting frequency and thus cannot be evaluated for SAR under actual use conditions. The “Portable Hotspot” feature on the handset was NOT activated, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal.

13. Equipment List

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Waveguide	MVG	SWG5500	SN 13/14 WGA32	2017.08.15	2020.08.14
E-Field Probe	MVG	SSE2	SN 45/15 EPGO281	2017.02.04	2018.02.03
Dielectric Probe Kit	MVG	SCLMP	SN 32/14 OCPG67	2017.12.03	2018.12.02
Antenna	MVG	ANTA3	SN 07/13 ZNTA52	N/A	N/A
Phantom1	MVG	SAM	SN 32/14 SAM115	2014.09.01	N/A
Phantom2	MVG	SAM	SN 32/14 SAM116	2014.09.01	N/A
Phone holder	MVG	N/A	SN 32/14 MSH97	2014.09.01	N/A
Laptop holder	MVG	N/A	SN 32/14 LSH29	2014.09.01	N/A
Network Analyzer	Agilent	8753ES	US38432810	2017.03.16	2018.03.15
Multi Meter	Keithley	Multi Meter 2000	4050073	2017.10.15	2018.10.14
Signal Generator	Agilent	N5182A	MY50140530	2017.10.15	2018.10.14
Wireless Communication Test Set	Agilent	8960-E5515C	MY48360751	2017.10.15	2018.10.14
Power Amplifier	DESAY	ZHL-42W	9638	2017.10.15	2018.10.14
Power Meter	R&S	NRP	100510	2017.10.15	2018.10.14
Power Meter	Agilent	E4418B	GB43312526	2017.10.15	2018.10.14
Power Sensor	R&S	NRP-Z11	101919	2017.10.15	2018.10.14
Power Sensor	Agilent	E9301A	MY41497725	2017.10.15	2018.10.14
9dB Attenuator	Agilent	99899	DC-18GHz	2017.05.10	2018.05.09
11dB Attenuator	Agilent	8494B	DC-18GHz	2017.05.10	2018.05.09
110dB Attenuator	Agilent	8494B	DC-18GHz	2017.05.10	2018.05.09
Dual Directional Coupler	Agilent	SHWPDI-1080S	N/A	2017.05.09	2018.05.08
hygrothermograph	MiEO	HH660	N/A	2017.10.18	2018.10.17
Thermograph	Elitech	RC-4	S/N EF7176501537	2017.11.10	2018.11.09

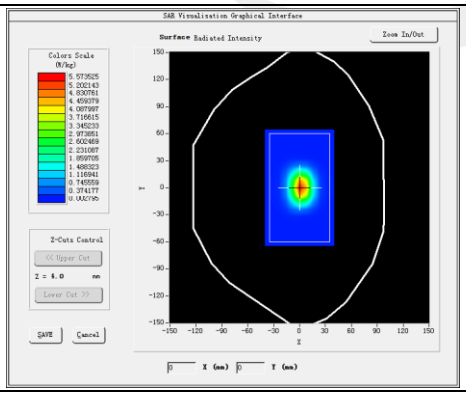
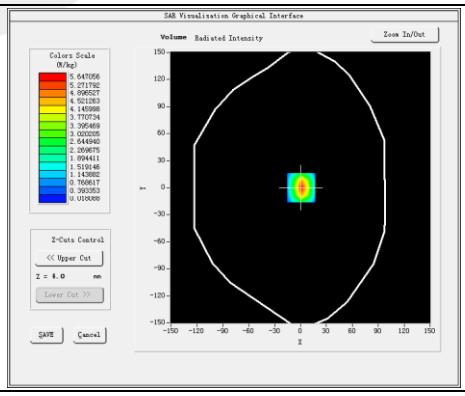
Appendix A. System Validation Plots

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: 2018-01-12
Measurement duration: 23 minutes 28 seconds

Experimental conditions.

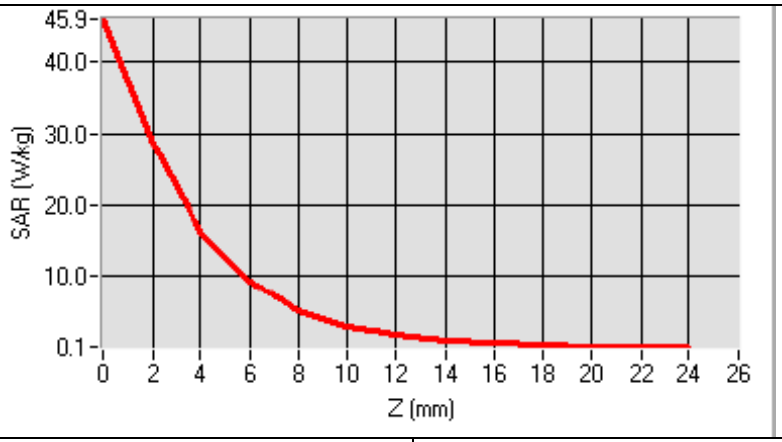
Device Position	Validation plane
Band	5200 MHz
Channels	-
Signal	CW
Frequency (MHz)	5200
Relative permittivity	48.61
Conductivity (S/m)	5.27
Power drift (%)	2.52
Probe	SN 45/15 EPGO281
ConvF	2.52
Crest factor:	1:1

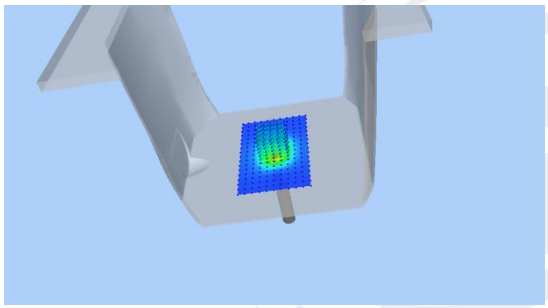
SURFACE SAR	VOLUME SAR
	

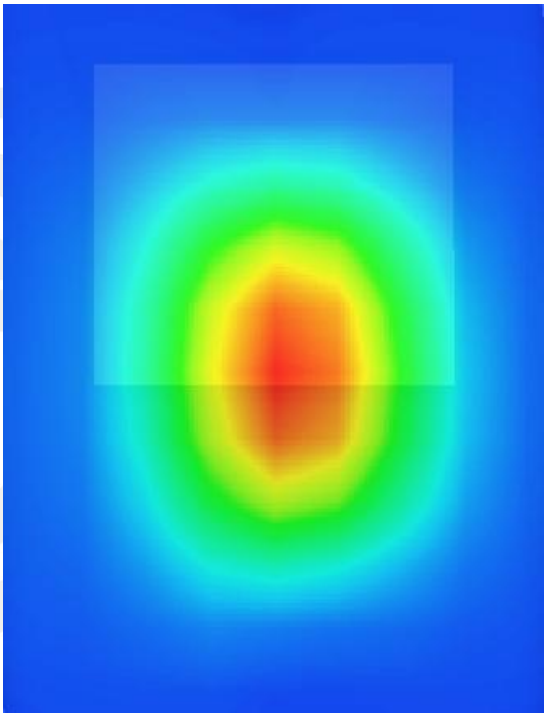
Maximum location: X=7.00, Y=2.00

SAR 10g (W/Kg)	5.433627
SAR 1g (W/Kg)	15.849223

Z Axis Scan





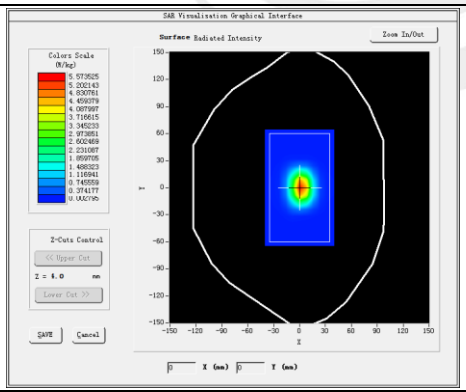
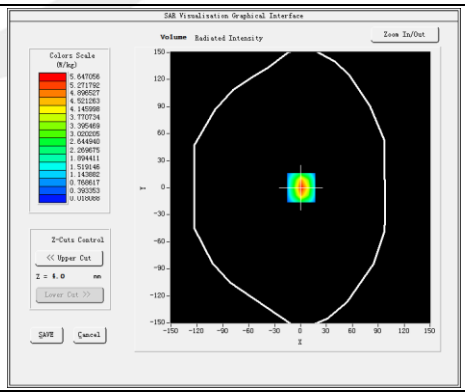


System Performance Check Data(5800MHz Body)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=4mm, dy=4mm, dz=2mm
Date of measurement: 2018-01-12
Measurement duration: 23 minutes 25 seconds

Experimental conditions.

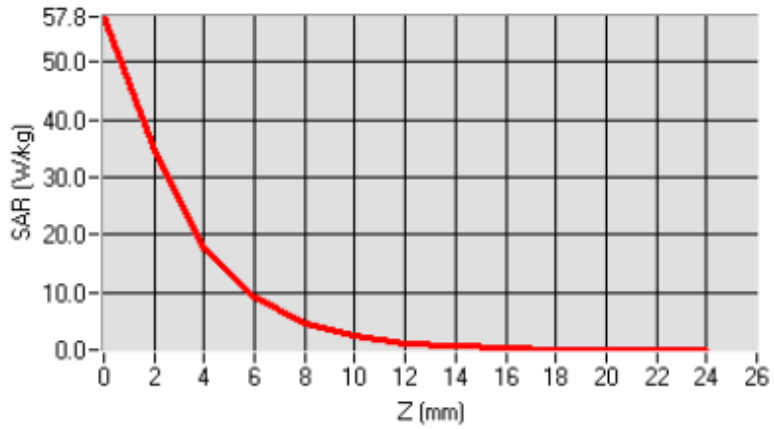
Device Position	Validation plane
Band	5800 MHz
Channels	-
Signal	CW
Frequency (MHz)	5800
Relative permittivity	49.22
Conductivity (S/m)	6.03
Power drift (%)	2.74
Probe	SN 45/15 EPGO281
ConvF	2.60
Crest factor:	1:1

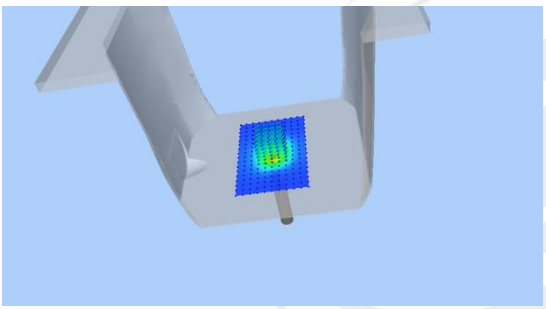
SURFACE SAR	VOLUME SAR
	

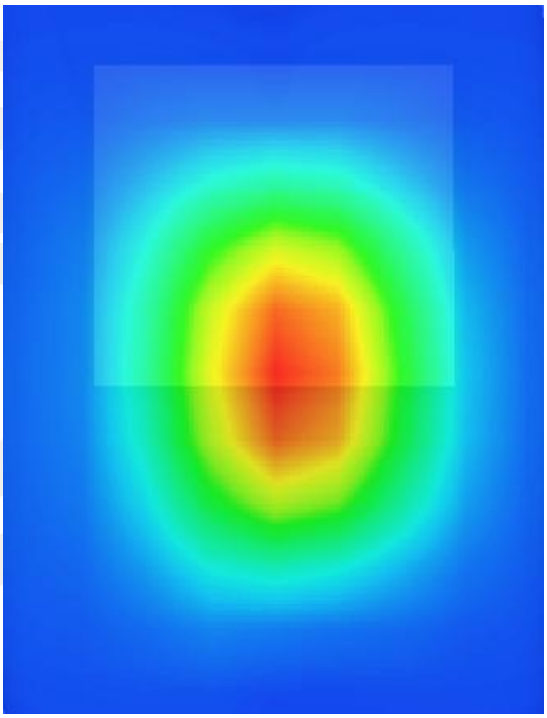
Maximum location: X=7.00, Y=2.00

SAR 10g (W/Kg)	6.032685
SAR 1g (W/Kg)	17.964072

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)





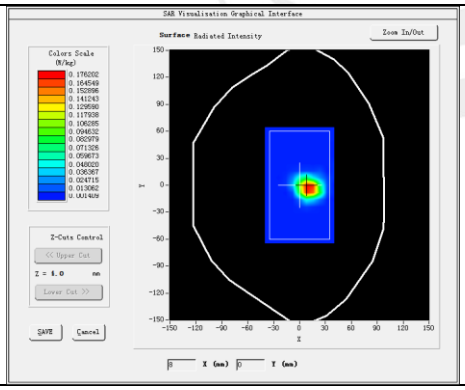
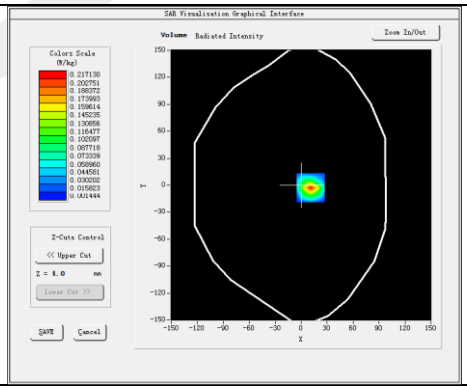
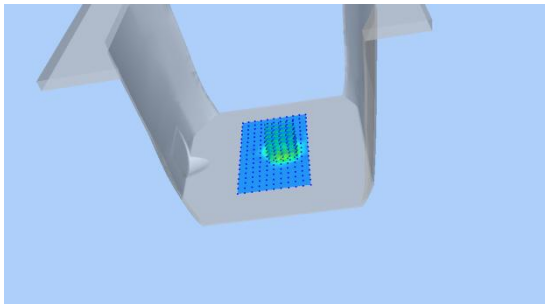
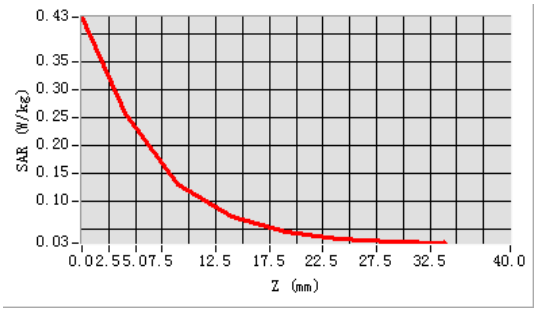
Appendix B. SAR Test Plots

Plot 1: DUT: Notebook; EUT Model: NEBP12

Test Date	2018-01-12
Probe	SN 45/15 EPGO281
ConvF	2.52
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	7x7x12,dx=4mm dy=4mm dz=2mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Back side
Antenna	A
Band	IEEE 802.11a ISM
Channels	Middle
Signal	IEEE802.a (Crest factor: 1.0)
Frequency (MHz)	5200
Relative permittivity (real part)	49.0
Conductivity (S/m)	5.30
Variation (%)	-2.00

Maximum location: X=11.00, Y=-3.00
SAR Peak: 0.43 W/kg

SAR 10g (W/Kg)	0.067759
SAR 1g (W/Kg)	0.193956

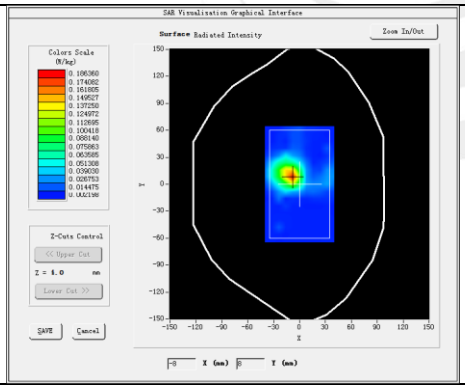
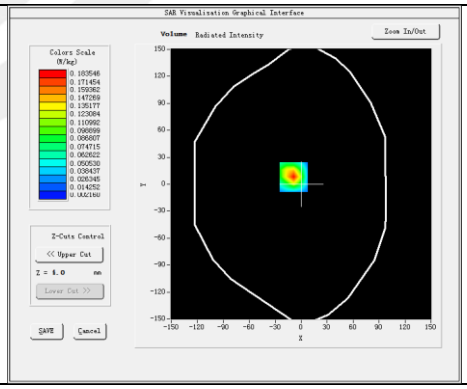
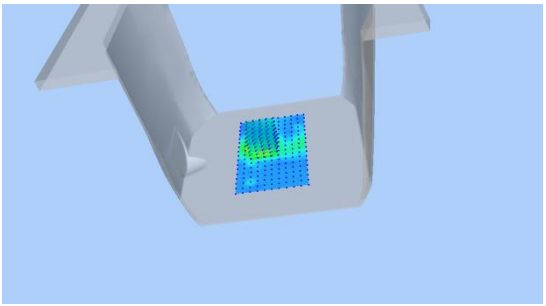
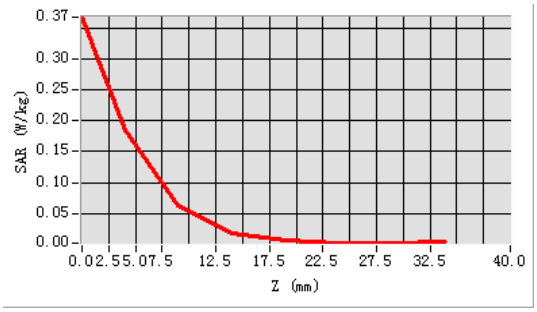
SURFACE SAR	VOLUME SAR
	
3D	**Z Axis Scan**
	

Plot 2: DUT: Notebook; EUT Model: NEBP12

Test Date	2018-01-12
Probe	SN 45/15 EPGO281
ConvF	2.52
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	7x7x12,dx=4mm dy=4mm dz=2mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Back side
Antenna	B
Band	IEEE 802.11a ISM
Channels	Middle
Signal	IEEE802.a (Crest factor: 1.0)
Frequency (MHz)	5200
Relative permittivity (real part)	49.0
Conductivity (S/m)	5.30
Variation (%)	-0.91

Maximum location: X=-9.00, Y=8.00
SAR Peak: 0.36 W/kg

SAR 10g (W/Kg)	0.066308
SAR 1g (W/Kg)	0.171583

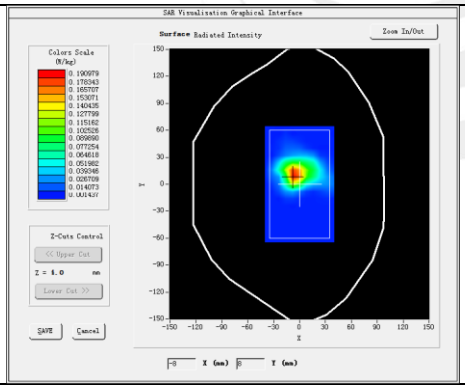
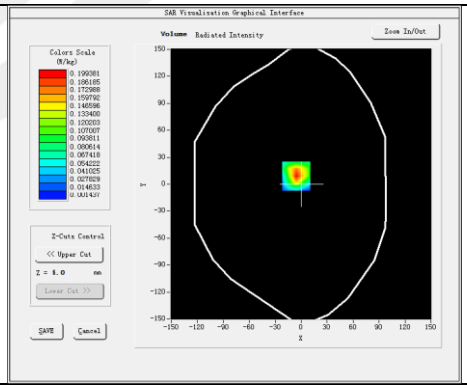
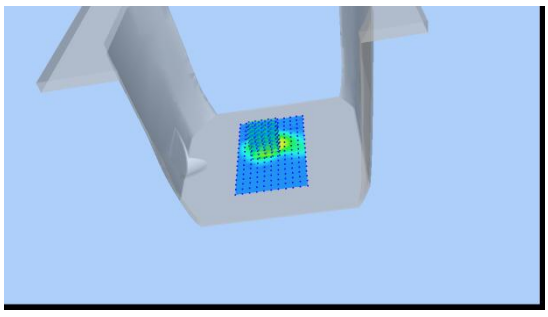
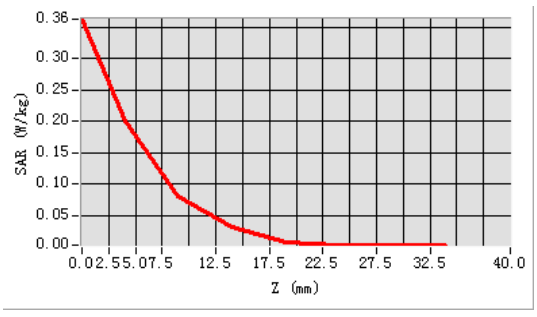
SURFACE SAR	VOLUME SAR
	
3D	**Z Axis Scan**
	

Plot 3: DUT: Notebook; EUT Model: NEBP12

Test Date	2018-01-12
Probe	SN 45/15 EPGO281
ConvF	2.60
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	7x7x12,dx=4mm dy=4mm dz=2mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Back side
Antenna	A
Band	IEEE 802.11a ISM
Channels	Middle
Signal	IEEE802.a (Crest factor: 1.0)
Frequency (MHz)	5785
Relative permittivity (real part)	48.2
Conductivity (S/m)	6.00
Variation (%)	2.44

Maximum location: X=-6.00, Y=9.00
SAR Peak: 0.36 W/kg

SAR 10g (W/Kg)	0.073298
SAR 1g (W/Kg)	0.182927

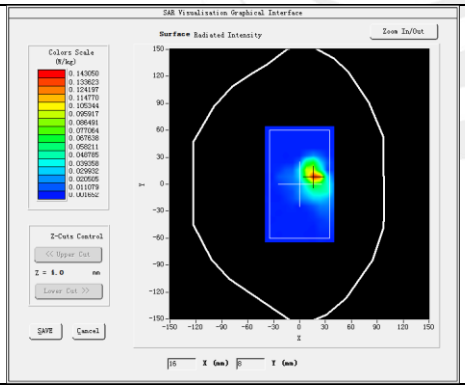
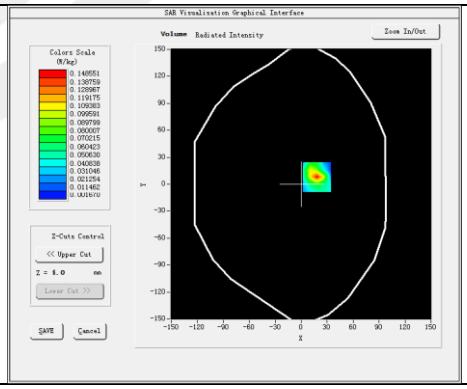
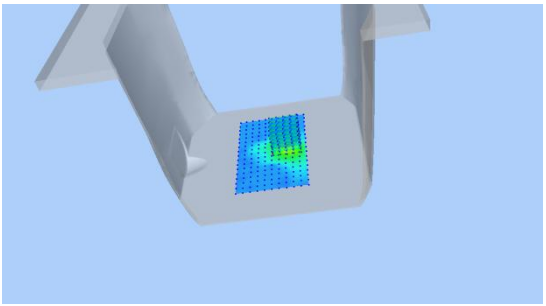
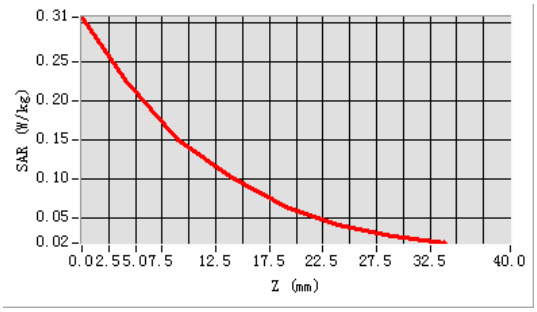
SURFACE SAR	VOLUME SAR
	
3D	**Z Axis Scan**
	

Plot 4: DUT: Notebook; EUT Model: NEBP12

Test Date	2018-01-12
Probe	SN 45/15 EPGO281
ConvF	2.60
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	7x7x12,dx=4mm dy=4mm dz=2mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Back side
Antenna	B
Band	IEEE 802.11a ISM
Channels	Low
Signal	IEEE802.a (Crest factor: 1.0)
Frequency (MHz)	5745
Relative permittivity (real part)	48.2
Conductivity (S/m)	6.00
Variation (%)	0.64

Maximum location: X=18.00, Y=8.00
SAR Peak: 0.31 W/kg

SAR 10g (W/Kg)	0.045457
SAR 1g (W/Kg)	0.134052

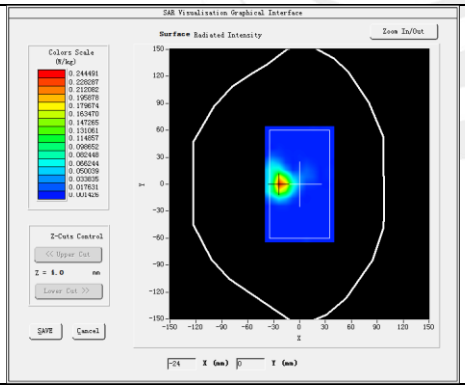
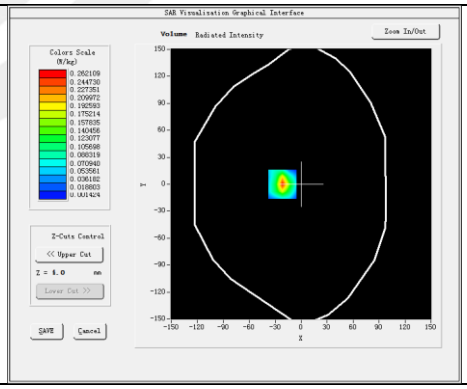
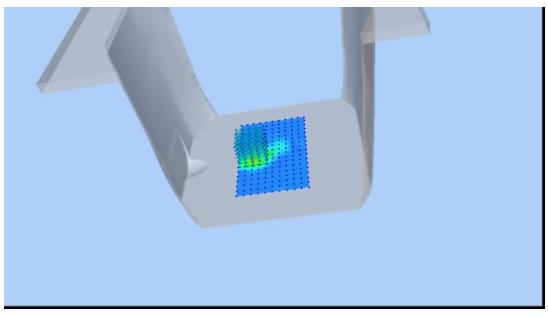
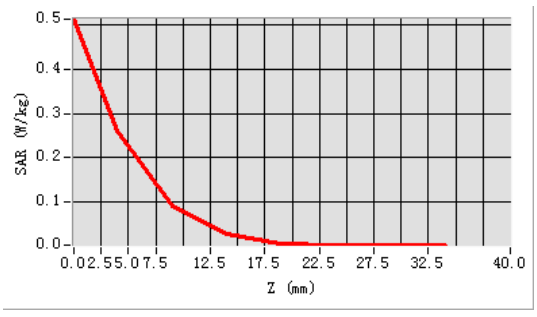
SURFACE SAR	VOLUME SAR
	
3D	**Z Axis Scan**
	

Plot 5: DUT: Notebook; EUT Model: NEBP12

Test Date	2018-01-12
Probe	SN 45/15 EPGO281
ConvF	2.52
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	7x7x12,dx=4mm dy=4mm dz=2mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Back side
Antenna	A
Band	IEEE 802.11n ISM
Channels	Middle
Signal	IEEE802.n (Crest factor: 1.0)
Frequency (MHz)	5200
Relative permittivity (real part)	49.0
Conductivity (S/m)	5.30
Variation (%)	0.94

Maximum location: X=-22.00, Y=0.00
SAR Peak: 0.51 W/kg

SAR 10g (W/Kg)	0.080115
SAR 1g (W/Kg)	0.228978

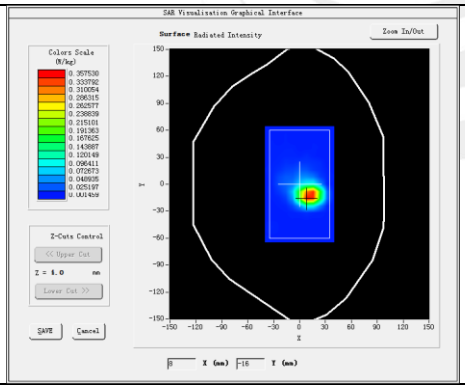
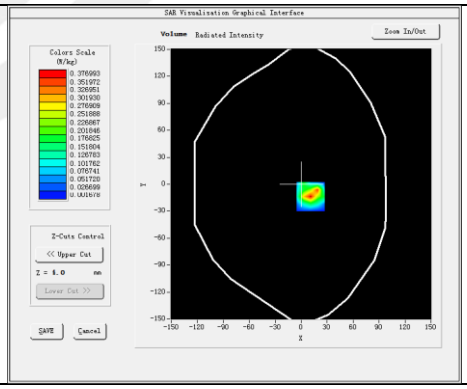
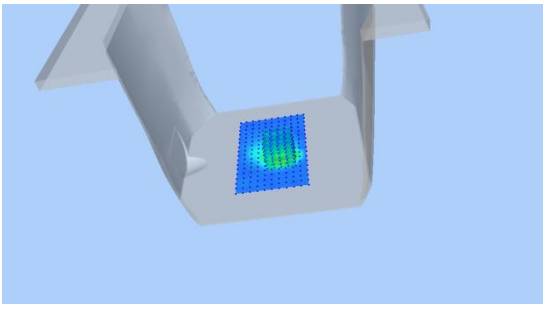
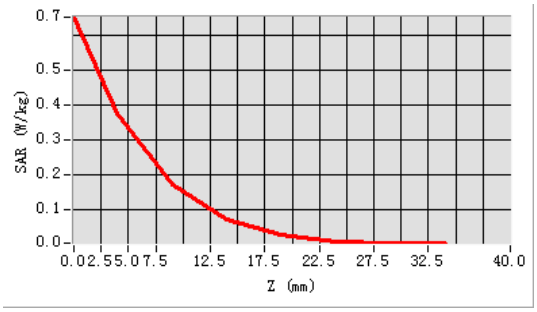
SURFACE SAR	VOLUME SAR
	
3D	**Z Axis Scan**
	

Plot 6: DUT: Notebook; EUT Model: NEBP12

Test Date	2018-01-12
Probe	SN 45/15 EPGO281
ConvF	2.52
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	7x7x12,dx=4mm dy=4mm dz=2mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Back side
Antenna	B
Band	IEEE 802.11n ISM
Channels	Middle
Signal	IEEE802.n (Crest factor: 1.0)
Frequency (MHz)	5200
Relative permittivity (real part)	49.0
Conductivity (S/m)	5.30
Variation (%)	-2.00

Maximum location: X=11.00, Y=-14.00
SAR Peak: 0.78 W/kg

SAR 10g (W/Kg)	0.122017
SAR 1g (W/Kg)	0.316066

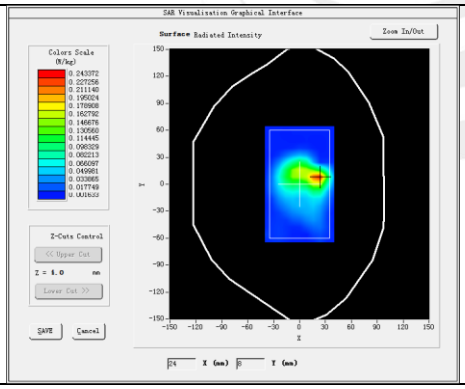
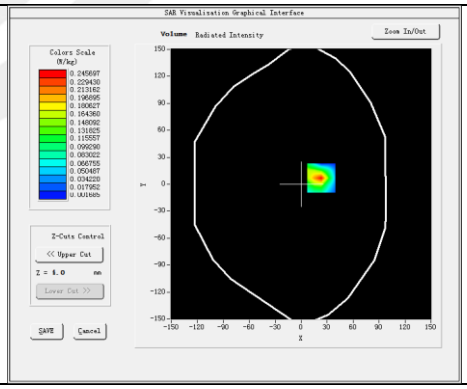
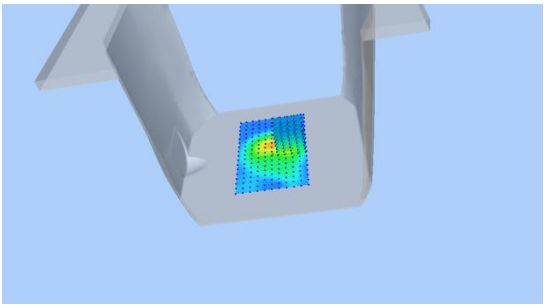
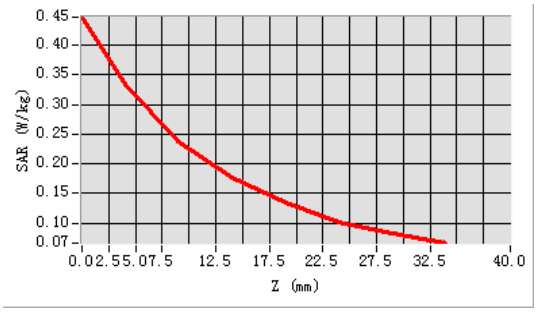
SURFACE SAR	VOLUME SAR
	
3D	**Z Axis Scan**
	

Plot 7: DUT: Notebook; EUT Model: NEBP12

Test Date	2018-01-12
Probe	SN 45/15 EPGO281
ConvF	2.60
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	7x7x12,dx=4mm dy=4mm dz=2mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Back side
Antenna	A
Band	IEEE 802.11n ISM
Channels	Middle
Signal	IEEE802.n (Crest factor: 1.0)
Frequency (MHz)	5785
Relative permittivity (real part)	48.2
Conductivity (S/m)	6.00
Variation (%)	3.65

Maximum location: X=23.00, Y=7.00
SAR Peak: 0.45 W/kg

SAR 10g (W/Kg)	0.084142
SAR 1g (W/Kg)	0.217462

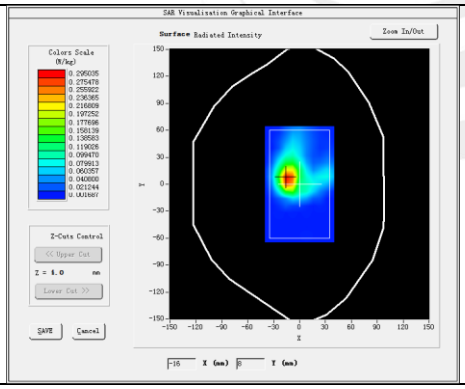
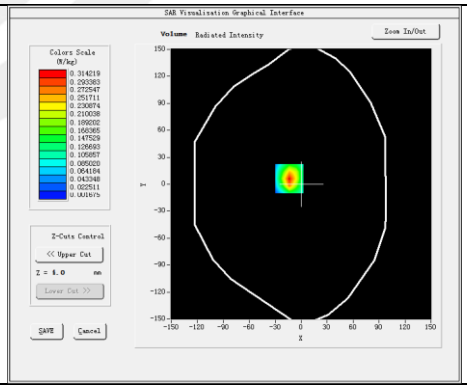
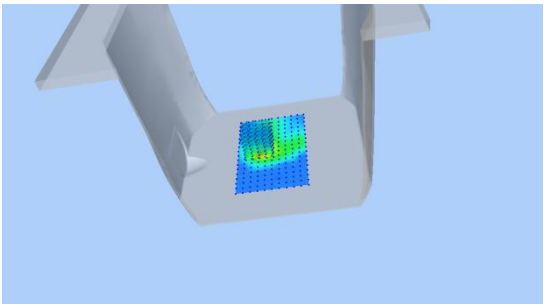
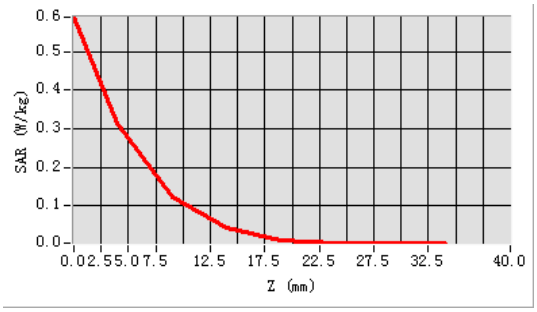
SURFACE SAR	VOLUME SAR
	
3D	**Z Axis Scan**
	

Plot 8: DUT: Notebook; EUT Model: NEBP12

Test Date	2018-01-12
Probe	SN 45/15 EPGO281
ConvF	2.60
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	7x7x12,dx=4mm dy=4mm dz=2mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Back side
Antenna	B
Band	IEEE 802.11n ISM
Channels	Middle
Signal	IEEE802.n (Crest factor: 1.0)
Frequency (MHz)	5785
Relative permittivity (real part)	48.2
Conductivity (S/m)	6.00
Variation (%)	-2.28

Maximum location: X=-14.00, Y=6.00
SAR Peak: 0.59 W/kg

SAR 10g (W/Kg)	0.116274
SAR 1g (W/Kg)	0.291121

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※※※※※