SAR Test Report

Report No.: AGC01662180102FH01

FCC ID	:	OMCIFT1018
PRODUCT DESIGNATION	:	TABLET
BRAND NAME	:	iFIT
MODEL NAME	:	IFT1018
CLIENT	:	ICON Health & Fitness Inc.
DATE OF ISSUE	:	Mar. 23,2018
STANDARD(S)	:	IEEE Std. 1528:2013 FCC 47CFR § 2.1093 IEEE/ANSI C95.1:2005
REPORT VERSION	:	V1.0

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Mar. 23,2018	Valid	Initial Release

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Test Report Certification

Applicant Name	ICON Health & Fitness Inc.
Applicant Address	1500 South 1000 West, Logan, UT 84321,USA
Manufacturer Name	ICON Health & Fitness Inc.
Manufacturer Address	1500 South 1000 West, Logan, UT 84321,USA
Product Designation	TABLET
Brand Name	iFIT
Model Name	IFT1018
Different Description	N/A
EUT Voltage	DC3.8V by battery
Applicable Standard	IEEE Std. 1528:2013 FCC 47CFR § 2.1093 IEEE/ANSI C95.1:2005
Test Date	Mar. 01,2018 to Mar. 11,2018
Report Template	AGCRT- US -5G/SAR (2018-01-01)

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

Tested By: Owen Xiao (signature)

Qwen Xiao(Xiao Qi) Mar. 11,2018

Checked By: Angela Li (signature)

Angela Li(Li Jiao) Mar. 23,2018

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1. SUMMARY OF MAXIMUM SAR VALUE

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

Frequency Band	Highest Reported 1g-SAR(W/Kg) Body (with 0mm separation)	SAR Test Limit (W/Kg)
U-NII-1	1.487	1.6
U-NII-2A	1.366	
U-NII-2C	1.480	
U-NII-3	0.817	
SAR Test Result	PASS	

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

- KDB 447498 D01 General RF Exposure Guidance v06
- KDB 865664 D01 SAR Measurement 100MHz to 6GHz v01r04
- KDB 248227 D01 802 11 Wi-Fi SAR v02r02
- KDB 616217 D04 SAR for laptop and tablets v01r02

2. GENERAL INFORMATION

2.1. EUT Description

General Information	
Product Designation	TABLET
Test Model	IFT1018
Hardware Version	9731C
Software Version	iFit_Compass_V1.4
Device Category	Portable
RF Exposure Environment	Uncontrolled
Antenna Type	Internal
5 GHz WIFI	
WIFI Specification	☒802.11a ☐802.11b ☐802.11g ☒802.11n(20) ☒802.11n(40)
Operation Frequency	U-NII-1: 5180MHz~5240MHz; U-NII-2A: 5260MHz~5320MHz; U-NII-2C: 5470MHz~5725MHz;U-NII-3: 5745MHz~5825MHz
Max. conducted Power	U-NII-1: 7.8dBm; U-NII-2A: 7.6dBm; U-NII-2C: 7.0dBm; U-NII-3: 5.8dBm
Antenna Gain	2.88dBi
Accessories	
Battery	Brand name: N/A Model No. : BT-H001 Manufacturer Name: ZHAOQING FENGHUA LITHIUM BATTERY CO.,LTD Manufacturer Address: 2#Taihe Road, Mugang Town, Zhaoqing, Guangdong, China Voltage and Capacitance: 3.8V & 6000mAh
Adapter	Brand name: N/A Model No. : SAW12-050-200USB Manufacturer Name: SHENZHEN SHI YING YUAN ELECTRONICS CO LTD Manufacturer Address: Fl 5-7 Of West, Bldg 8,Hongye Industry Park Lezhujiao Resident Squad, Huangmabu Comminity Xixiang St, Bao'an District Shenzhen, Guangdong518101 CHINA Input: AC 100-240V, 50/60Hz, 200mA
Earphone	Brand name: N/A Model No. : N/A

Note: The sample used for testing is end product.

Product	Type	
	☒ Production unit	☐ Identical Prototype

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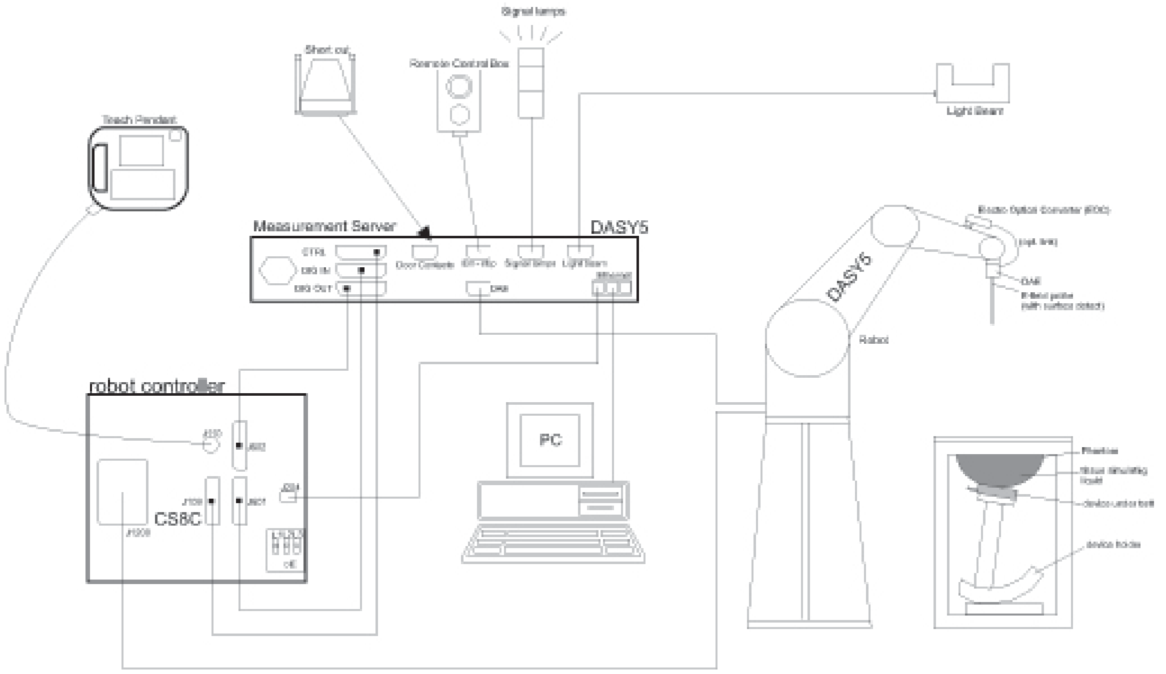
3. SAR MEASUREMENT SYSTEM

3.1. The DASY5 system used for performing compliance tests consists of following items



- A standard high precision 6-axis robot with controller, teach pendant and software.
- Data acquisition electronics (DAE) which attached to the robot arm extension. The DAE consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock
- A dosimetric probe equipped with an optical surface detector system.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital Communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- A Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- Phantoms, device holders and other accessories according to the targeted measurement.

3.2. DASY5 E-Field Probe

The SAR measurement is conducted with the dosimetric probe manufactured by SPEAG. The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. SPEAG conducts the probe calibration in compliance with international and national standards (e.g. IEEE 1528 and relevant KDB files.) The calibration data are in Appendix D.

Isotropic E-Field Probe Specification

Model	ES3DV4-SN3753
Manufacture	SPEAG
frequency	0.7GHz-6GHz Linearity:±0.9%
Dynamic Range	0.01W/Kg-100W/Kg Linearity: ±0.9%
Dimensions	Overall length:337mm Tip diameter:2.5mm Typical distance from probe tip to dipole centers:1mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.

3.3. Data Acquisition Electronics description

The data acquisition electronics (DAE) consist if a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converte and a command decoder with a control logic unit. Transmission to the measurement sever is accomplished through an optical downlink fir data and status information, as well as an optical uplink for commands and the clock.

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

DAE4

Input Impedance	200MOhm
The Inputs	Symmetrical and floating
Common mode rejection	above 80 dB

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3.4. Robot

The DASY system uses the high precision robots (DASY5:TX60) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version from is used. The XL robot series have many features that are important for our application: □ High precision (repeatability 0.02 mm) □ High reliability (industrial design) □ Jerk-free straight movements □ Low ELF interference (the closed metallic construction shields against motor control fields) □ 6-axis controller	

3.5. Light Beam Unit

The light beam switch allows automatic “tooling” of the probe. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip. The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned prob.1 mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position. e, the same position will be reached with another aligned probe within 0	

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3.6. Device Holder

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

3.7. Measurement Server

The measurement server is based on a PC/104 CPU board with CPU (DASY5: 400 MHz, Intel Celeron), chip-disk (DASY5: 128MB), RAM (DASY5: 128MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DAYS I/O board, which is directly connected to the PC/104 bus of the CPU board. The measurement server performs all the real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operations.	

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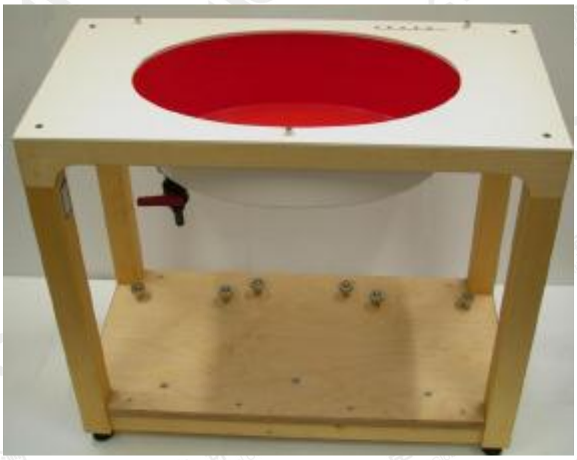
3.8. PHANTOM

ELI4 Phantom

□ Flat phantom a fiberglass shell flat phantom with 2mm+/- 0.2 mm shell thickness. It has only one measurement area for Flat phantom	

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4. SAR MEASUREMENT PROCEDURE

4.1. Specific Absorption Rate (SAR)

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

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

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

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

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

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

Where

SAR	is the specific absorption rate in watts per kilogram;
E	is the r.m.s. value of the electric field strength in the tissue in volts per meter;
σ	is the conductivity of the tissue in siemens per metre;
ρ	is the density of the tissue in kilograms per cubic metre;
c_h	is the heat capacity of the tissue in joules per kilogram and Kelvin;
$\frac{dT}{dt} \mid t=0$	is the initial time derivative of temperature in the tissue in kelvins per second

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4.2. SAR Measurement Procedure

Step 1: Power Reference Measurement

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

Step 2: Area Scan

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

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

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

Step 3: Zoom Scan

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

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

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

Step 4: Power Drift Measurement

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

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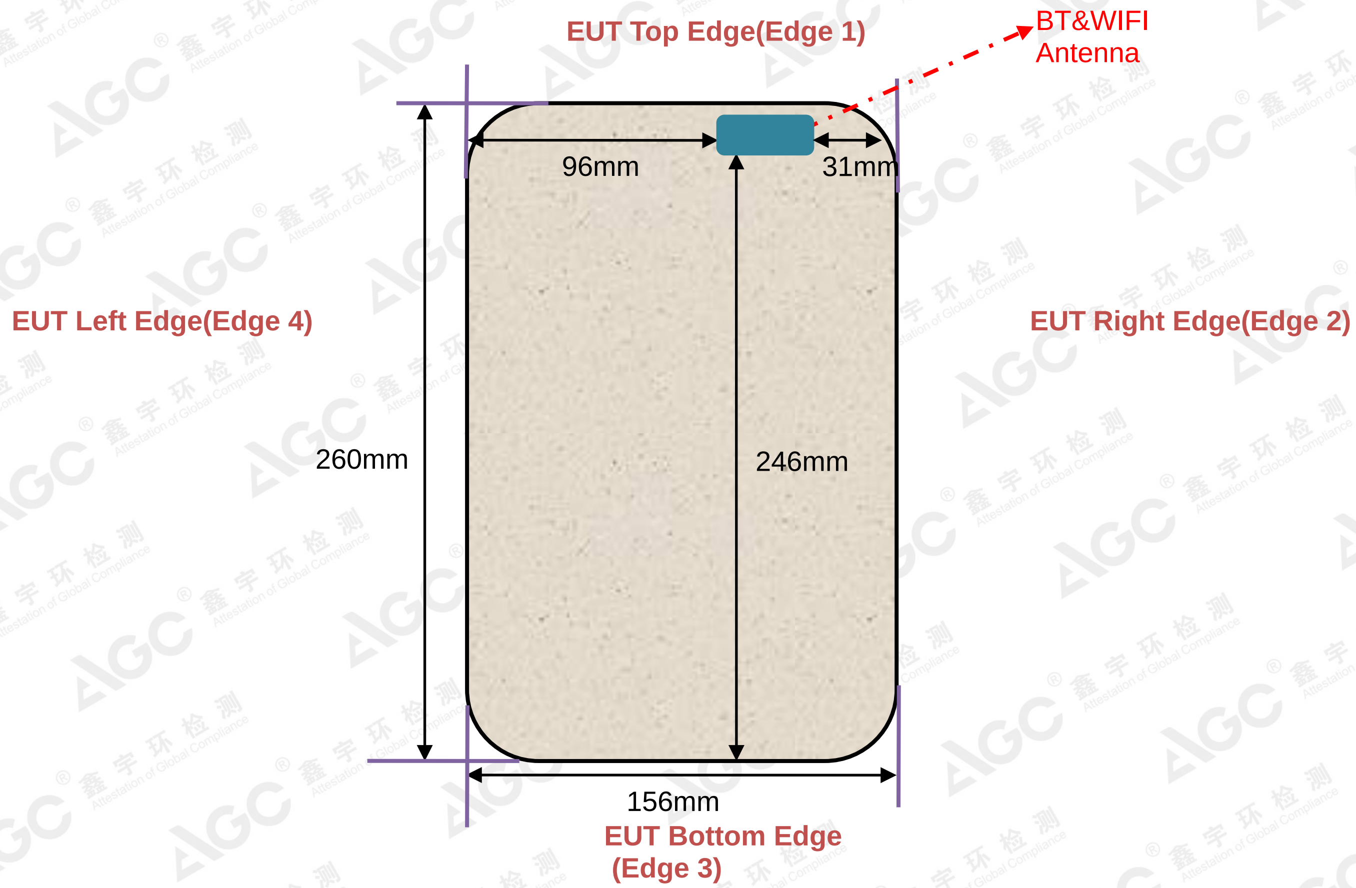
4.3. RF Exposure Conditions

Test Configuration and setting:

For WLAN testing, the EUT is configured with the WLAN continuous TX tool through engineering command.

Antenna Location: (front view)



5. TISSUE SIMULATING LIQUID

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

5.1. The composition of the tissue simulating liquid

Ingredient	5000MHz
(Weight)	Body (100%)
Water	80%
Salt	0
DGBE	10%
Triton X-100	10%

5.2. Tissue Dielectric Parameters for Head and Body Phantoms

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

Target Frequency (MHz)	**head**		**body**	
	εr	**σ (S/m)**	**εr**	**σ (S/m)**
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	1.01	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5200	36.0	4.66	**49.0**	**5.30**
5300	35.9	4.76	**48.9**	**5.42**
5600	35.5	5.07	**48.5**	**5.77**
5800	35.3	5.27	**48.2**	**6.00**

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

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5.3. Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using DASY5 Dielectric Probe Kit and R&S Network Analyzer ZVL6.

Tissue Stimulant Measurement for 5200MHz					
Body	Fr. (MHz)	Dielectric Parameters (±5%)		Tissue Temp [oC]	Test time
		εr 49.0(46.55-51.450)	δ[s/m]5.30(5.035 -5.565)		
	5180	49.78	5.19	21.6	Mar. 09,2018
	5200	49.62	5.22		
	5240	49.07	5.31		
	5260	48.00	5.37		

Tissue Stimulant Measurement for 5300 MHz					
Body	Fr. (MHz)	Dielectric Parameters (±5%)		Tissue Temp [oC]	Test time
		εr 48.9(46.455-51.345)	δ[s/m]5.42(5.149-5.691)		
	5200	50.78	5.19	21.0	Mar. 01,2018
	5260	49.29	5.33		
	5280	49.10	5.35		
	5300	48.95	5.40		
	5320	48.14	5.49		

Tissue Stimulant Measurement for 5600MHz					
Body	Fr. (MHz)	Dielectric Parameters (±5%)		Tissue Temp [oC]	Test time
		εr 48.5 (46.075-50.925)	δ[s/m] 5.77(5.4815 -6.059)		
	5500	49.33	5.50	21.6	Mar. 11,2018
	5540	48.76	5.53		
	5580	48.09	5.73		
	5600	47.55	5.95		

Tissue Stimulant Measurement for 5800MHz					
Body	Fr. (MHz)	Dielectric Parameters (±5%)		Tissue Temp [oC]	Test time
		εr 48.2 (45.79-50.610)	δ[s/m] 6.00 (5.70-6.30)		
	5745	50.11	5.81	21.8	Mar. 08,2018
	5785	49.97	5.93		
	5800	48.55	5.95		
	5825	48.52	6.07		

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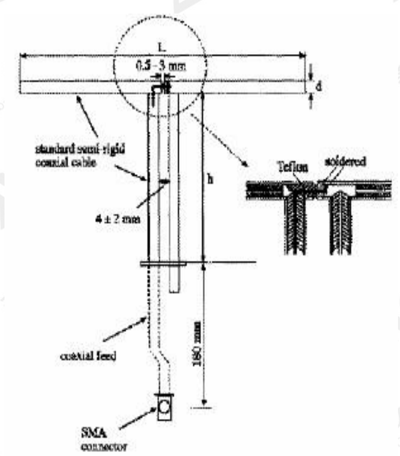
6. SAR SYSTEM CHECK PROCEDURE

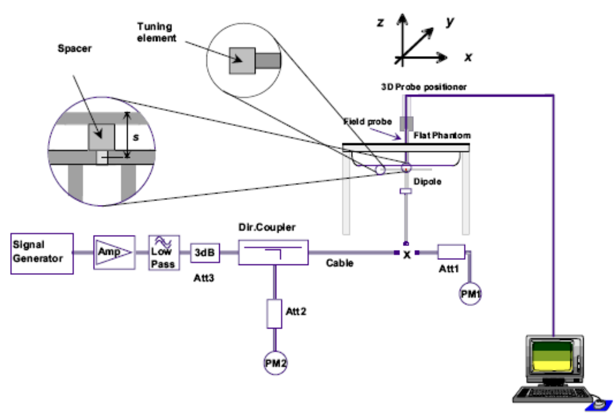
6.1. SAR System Check Procedures

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

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

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





6.2. SAR System Check
6.2.1. Wave Guide

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

Frequency	L (mm)	W (mm)	L_f (mm)	W_f (mm)
5000MHz	40.39	20.19	81.03	61.98

6.2.2. System Check Result

System Performance Check at 5200MHz& 5600MHz & 5800MHz								
Validation Kit: SN 15/15 WGA 36								
Freq. [MHz]	Target Value(W/Kg)		Reference Result (± 10%)		Normalized to 1 W (W/Kg)		Tissue Temp. [°C]	Test time
	1g	10g	1g	10g	1g	10g		
5200 Body	158.49	56.44	142.641-174.339	50.796-62.084	166.65	58.50	21.6	Mar. 09,2018
5200 Body	158.49	56.44	142.641-174.339	50.796-62.084	150.21	51.55	21.0	Mar. 01,2018
5600 Body	171.11	59.96	153.999-188.221	53.964-65.956	169.81	58.50	21.6	Mar. 11,2018
5800 Body	176.30	61.30	158.67-193.93	55.17-67.43	173.61	61.98	21.8	Mar. 08,2018

Note:
(1) We use a CW signal of 15dBm for system check, and then all SAR values are normalized to 1W forward power. The result must be within ±10% of target values.

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7. EUT TEST POSITION

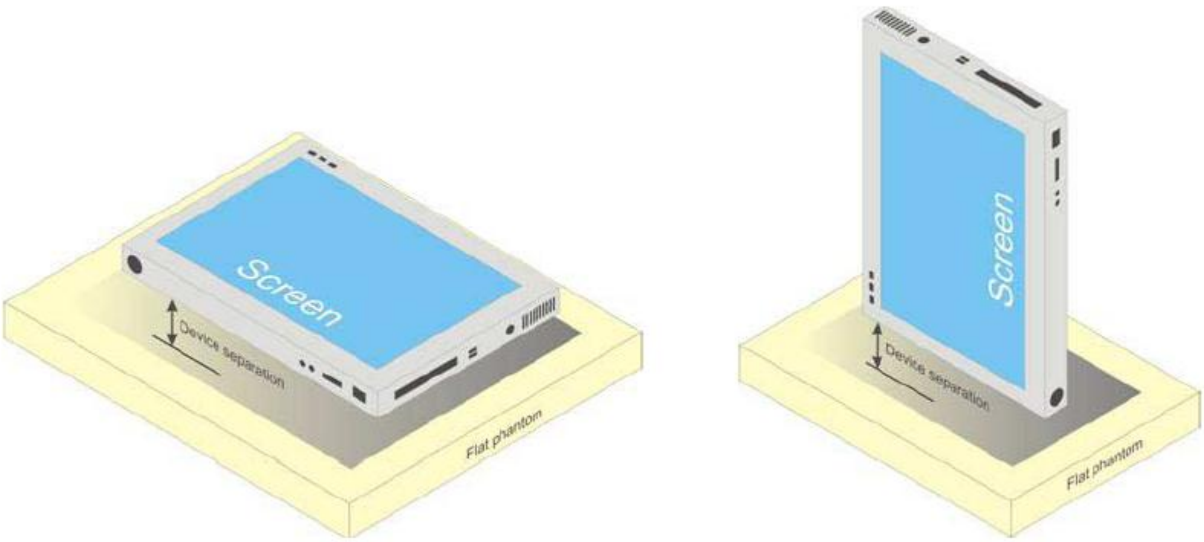
This EUT was tested in **Body back, Body front and 4 edges.**

7.1. Body Worn Position

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

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

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



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8. SAR EXPOSURE LIMITS

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

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

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9. TEST FACILITY

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

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10. TEST EQUIPMENT LIST

Equipment description	Manufacturer/ Model	Identification No.	Current calibration date	Next calibration date
Stäubli Robot	Stäubli-TX60	F13/5Q2UD1/A/01	N/A	N/A
Robot Controller	Stäubli-CS8	139522	N/A	N/A
E-Field Probe	Speag- EX3DV4	SN:3753	May 05,2017	May 04,2018
EL4 Phantom	ELI V5.0	1210	N/A	N/A
Device Holder	Speag-SD 000 H01 KA	SD 000 H01 KA	N/A	N/A
DAE4	Speag-SD 000 D04 BM	1398	Feb. 08,2018	Feb. 07,2019
SAR Software	Speag-DASY5	DASY52.8	N/A	N/A
Liquid	SATIMO	-	N/A	N/A
Dipole	SWG5500	SN 15/15 WGA 36	July 05,2016	July 04,2019
Signal Generator	Agilent-E4438C	US41461365	Mar. 01,2018	Feb. 28,2019
Vector Analyzer	Agilent / E4440A	US41421290	Mar. 01,2018	Feb. 28,2019
Network Analyzer	Rhode & Schwarz ZVL6	SN100132	Mar. 01,2018	Feb. 28,2019
Attenuator	Warison /WATT-6SR1211	N/A	N/A	N/A
Attenuator	Mini-circuits / VAT-10+	N/A	N/A	N/A
Amplifier	EM30180	SN060552	Mar. 01,2018	Feb. 28,2019
Directional Couple	Werlatone/ C5571-10	SN99463	June 20,2017	June 19,2018
Directional Couple	Werlatone/ C6026-10	SN99482	June 20,2017	June 19,2018
Power Sensor	NRP-Z21	1137.6000.02	Oct. 12,2017	Oct. 11,2018
Power Sensor	NRP-Z23	US38261498	Mar. 01,2018	Feb. 28,2019
Power Viewer	R&S	V2.3.1.0	N/A	N/A

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

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11. MEASUREMENT UNCERTAINTY

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is< 1.5 W/Kg, the extensive SAR measurement uncertainty analysis described in IEEE 1528-2013 is not required in SAR reports submitted for equipment approval.

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12. CONDUCTED POWER MEASUREMENT

WiFi(5G)

Band	Mode	Channel	Frequency (MHz)	Max. Conducted Power (dBm)
U-NII-1	802.11a	36	5180	**7.8**
		40	5200	7.5
		44	5220	7.3
		48	5240	7.8
	802.11n(20)	36	5180	7.7
		40	5200	7.5
		44	5220	6.9
		48	5240	6.8
	802.11n(40)	38	5190	7.8
		46	5230	7.3

Band	Mode	Channel	Frequency (MHz)	Max. Conducted Power (dBm)
U-NII-2A	802.11a	52	5260	7.2
		56	5280	7.1
		60	5300	7.3
		64	5320	7.4
	802.11n(20)	52	5260	7.2
		56	5280	7.3
		60	5300	7.5
		64	5320	7.6
	802.11n(40)	54	5270	6.7
		62	5310	**7.6**

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Band	Mode	Channel	Frequency (MHz)	Max. Conducted Power (dBm)
U-NII-2C	802.11a	100	5500	6.6
		104	5520	6.2
		108	5540	6.8
		112	5560	6.7
		116	5580	**7.0**
		120	5600	6.3
		140	5700	6.7
	802.11n(20)	100	5500	6.6
		104	5520	6.3
		108	5540	6.1
		112	5560	6.7
		116	5580	6.8
		120	5600	6.0
		140	5700	6.2
	802.11n(40)	102	5510	6.5
		110	5550	6.7
		134	5670	6.6

Band	Mode	Channel	Frequency (MHz)	Max. Conducted Power (dBm)
U-NII-3	802.11a	149	5745	5.1
		153	5765	5.0
		157	5785	**5.8**
		161	5805	5.1
		165	5825	5.7
	802.11n(20)	149	5745	5.2
		153	5765	5.3
		157	5785	5.1
		161	5805	5.4
		165	5825	5,6
	802.11n(40)	151	5755	5.5
		159	5795	5.7

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13. TEST RESULTS

13.1. SAR Test Results Summary

13.1.1. Test position and configuration

Body SAR was performed with the device 0mm from the phantom according to KDB 616217.

13.1.2. Operation Mode

1. Per KDB 447498 D01 v06 ,for each exposure position, if the highest 1-g SAR is ≤ 0.8 W/kg, testing for low and high channel is optional.
2. Per KDB 865664 D01 v01r04,for each frequency band, if the measured SAR is ≥0.8W/Kg, testing for repeated SAR measurement is required , that the highest measured SAR is only to be tested. When the SAR results are near the limit, the following procedures are required for each device to verify these types of SAR measurement related variation concerns by repeating the highest measured SAR configuration in each frequency band.
   (1) When the original highest measured SAR is ≥0.8W/Kg, repeat that measurement once.
   (2) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is >1.20 or when the original or repeated measurement is ≥1.45 W/Kg.
   (3) Perform a third repeated measurement only if the original, first and second repeated measurement is ≥1.5 W/Kg and ratio of largest to smallest SAR for the original, first and second measurement is ≥ 1.20.
3. Maximum Scaling SAR in order to calculate the Maximum SAR values to test under the standard Peak Power, Calculation method is as follows:
   Maximum Scaling SAR =tested SAR (Max.) ×[maximum turn-up power (mw)/ maximum measurement output power(mw)]

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13.1.3. Test Result

SAR MEASUREMENT								
Depth of Liquid (cm):>15								
Product: TABLET								
Test Mode: WiFi 5G								
Position	**Ch.**	**Fr. (MHz)**	**Power Drift (<±0.2dB)**	**SAR (1g) (W/kg)**	**Max. Tune-up Power (dBm)**	**Meas. output Power (dBm)**	**Scaled SAR (W/Kg)**	**Limit (W/kg)**
Test Band:WiFi 5G(U-NII-1)								
Body back	36	5180	0.00	1.28	8	7.8	1.340	1.6
Body back	40	5200	0.00	1.12	8	7.5	1.257	1.6
Body back	48	5240	0.12	**1.42**	8	7.8	**1.487**	1.6
Body front	40	5200	-0.07	0.324	8	7.5	0.364	1.6
Body back+ Ear.	36	5180	-0.01	1.23	8	7.8	1.288	1.6
Body back+ Ear.	40	5200	0.04	1.29	8	7.5	1.447	1.6
Body back+ Ear.	48	5240	0.11	1.33	8	7.8	1.393	1.6
Edge 1 (Top)	40	5200	-0.14	0.356	8	7.5	0.399	1.6
Test Band:WiFi 5G(U-NII-2A)								
Body back	52	5260	0.00	1.09	8	7.2	1.310	1.6
Body back	56	5280	0.05	**1.11**	8	7.1	**1.366**	1.6
Body back	64	5320	-0.11	1.08	8	7.4	1.240	1.6
Body front	56	5280	0.09	0.298	8	7.1	0.367	1.6
Edge 1 (Top)	56	5280	0.19	0.416	8	7.1	0.512	1.6
Test Band:WiFi 5G(U-NII-2C)								
Body back	100	5500	0.12	1.35	7	6.6	**1.480**	1.6
Body back	108	5540	0.09	**1.39**	7	6.8	1.456	1.6
Body back	116	5580	-0.05	1.26	7	7.0	1.260	1.6
Body front	108	5540	-0.10	0.302	7	6.8	0.316	1.6
Body back+ Ear.	100	5500	-0.10	1.25	7	6.6	1.371	1.6
Body back+ Ear.	108	5540	-0.07	1.27	7	6.8	1.330	1.6
Body back+ Ear.	116	5580	-0.09	1.32	7	7.0	1.320	1.6
Edge 1 (Top)	108	5540	0.03	0.409	7	6.8	0.428	1.6
Test Band:WiFi 5G(U-NII-3)								
Body back	157	5785	0.07	**0.620**	7	5.8	**0.817**	1.6
Body front	157	5785	-0.07	0.125	7	5.8	0.165	1.6
Edge 1 (Top)	157	5785	0.07	0.180	7	5.8	0.237	1.6

Note:
(1).When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
(2).The test separation of all above table is 0mm.
(3).Plots are only shown for the bold markered worst case SAR results

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Repeated SAR										
Product: TABLET										
Test Mode: WiFi 5G										
Position	**Mode**	**Ch.**	**Fr. (MHz)**	**Power Drift (<±0.2dB)**	**Once SAR (1g) (W/kg)**	**Power Drift (<±0.2dB)**	**Twice SAR (1g) (W/kg)**	**Power Drift (<±0.2)**	**Third SAR (1g) (W/kg)**	**Limit (W/kg)**
Body back	5G(U-NII-1)	48	5240	0.09	1.41	-0.09	1.27	-0.10	1.46	1.6
Body back	5G(U-NII-2A)	56	5280	0.00	1.07	-	-	-	-	1.6
Body back	5G(U-NII-2C)	112	5560	-0.05	1.23	-	-	-	-	1.6

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SAR Test Exclusion Consideration for Adjacent Edges

Per KDB 447498 D01 cl. 4.3.1:

a) For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0

b) For 100 MHz to 6 GHz and test separation distances > 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

1) {[Power allowed at numeric threshold for 50 mm in step a)] + [(test separation distance – 50 mm)·(f(MHz)/150)]} mW, for 100 MHz to 1500 MHz

2) {[Power allowed at numeric threshold for 50 mm in step a)] + [(test separation distance – 50 mm)·10]} mW, for > 1500 MHz and ≤ 6 GHz

Edge 2(Right)

SAR test exclusion threshold

= [(min. test separation distance, mm) · 3]/√f(GHz)

=(31 x3)/ √5.180

=40.86mW.

Edge 3(Bottom)

SAR test exclusion threshold

= (Power allowed at numeric threshold for 50 mm in step 1)+(test separation distance - 50 mm) x 10 mW

= 65.906 + (246-50) x 10 mW

=2025.906 mW.

Edge 4 (Left)

SAR test exclusion threshold

= (Power allowed at numeric threshold for 50 mm in step 1)+(test separation distance - 50 mm) x 10 mW

= 65.906 + (96-50) x 10 mW

= 525.906mW.

Conclusion

Since the Maximum Tune-up Power [6.31mW(8dBm)] is less than the SAR Exclusion Threshold for bottom, Right and left edges, SAR evaluation for these adjacent edges are not required.

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APPENDIX A. SAR SYSTEM CHECK DATA

Test Laboratory: AGC Lab **Date: Mar. 09,2018**
System Check Body 5200 MHz
DUT: Dipole 5000MHz Type: SWG5500

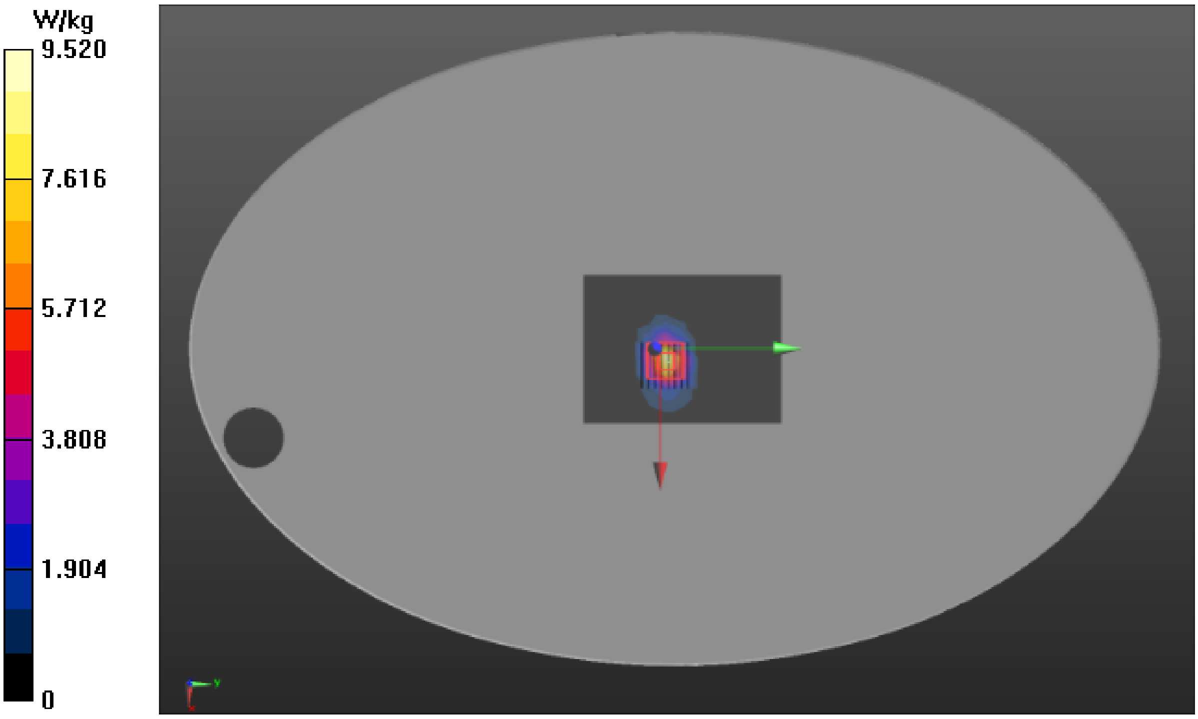
Communication System: CW; Communication System Band: D5000 (5000.0 MHz); Duty Cycle: 1:1;
Frequency: 5200 MHz; Medium parameters used: f = 5250 MHz; σ =5.22mho/m; εr = 49.62; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=15dBm
Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.6, Relative Humidity (%):50.2

DASY Configuration:

- Probe: ES3DV4 – SN3753; ConvF(4.87, 4.87, 4.87); Calibrated: May 05,2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn1398; Calibrated: Feb. 08,2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1210;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/System Check 5200MHz Body/Area Scan (10x13x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 9.27 W/kg

Configuration/System Check 5200MHz Body/Zoom Scan (8x8x13)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 36.721 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 17.7 W/kg
SAR(1 g) = 5.27 W/kg; SAR(10 g) = 1.85 W/kg
Maximum value of SAR (measured) = 9.52 W/kg



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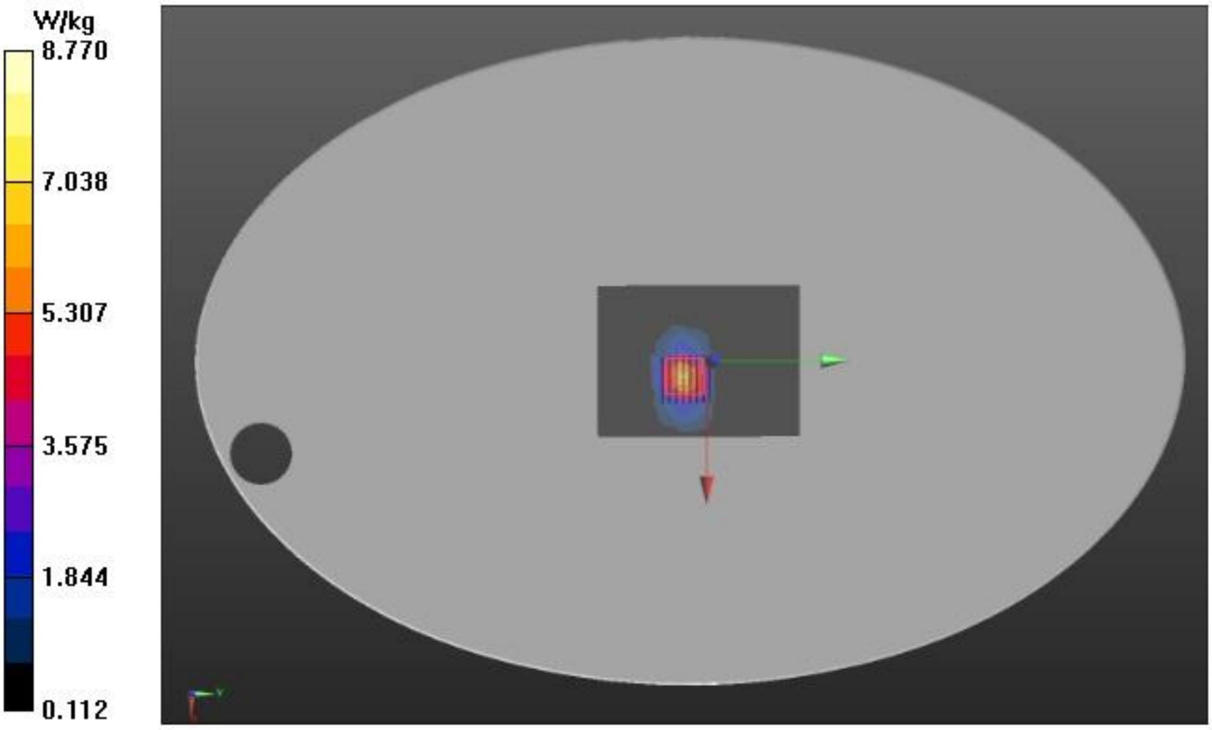
Test Laboratory: AGC Lab **Date: Mar. 01,2018**
System Check Body 5200 MHz
DUT: Dipole 5000MHz Type: SWG5500

Communication System: CW; Communication System Band: D5000 (5000.0 MHz); Duty Cycle: 1:1;
Frequency: 5200 MHz; Medium parameters used: f = 5250 MHz; σ =5.19mho/m; εr = 50.78; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=15dBm
Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0, Relative Humidity (%):48.3

DASY Configuration:
- Probe: ES3DV4 – SN3753; ConvF(4.87, 4.87, 4.87); Calibrated: May 05,2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn1398; Calibrated: Feb. 08,2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1210;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/System Check 5200MHz Body/Area Scan (10x13x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 8.05 W/kg

Configuration/System Check 5200MHz Body/Zoom Scan (8x8x13)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 31.509 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 16.5 W/kg
SAR(1 g) = 4.75 W/kg; SAR(10 g) = 1.63 W/kg
Maximum value of SAR (measured) = 8.77 W/kg



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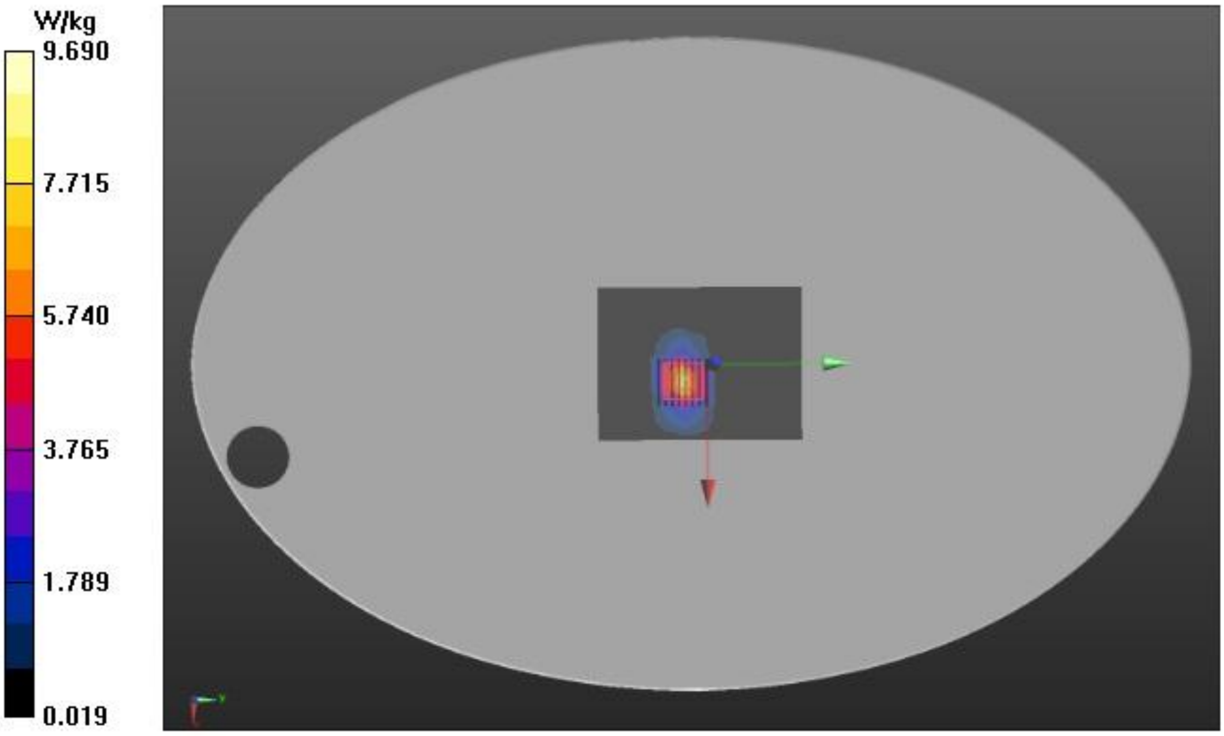
Test Laboratory: AGC Lab **Date: Mar. 11,2018**
System Check Body 5600 MHz
DUT: Dipole 5000MHz Type: SWG5500

Communication System: CW; Communication System Band: D5000 (5000.0 MHz); Duty Cycle: 1:1;
Frequency: 5600 MHz; Medium parameters used: f = 5600 MHz; σ = 5.95 mho/m; εr = 47.55; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=15dBm
Ambient temperature (℃): 22.4, Liquid temperature (℃): 21.6, Relative Humidity (%):47.8

DASY Configuration:
• Probe: ES3DV4 – SN3753; ConvF(4.27, 4.27, 4.27); Calibrated: May 05,2017
• Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 31.0
• Electronics: DAE4 Sn1398; Calibrated: Feb. 08,2018
• Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1210;
• DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/System Check 5600MHz Body/Area Scan (10x13x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 8.67 W/kg
Configuration/System Check 5600MHz Body/Zoom Scan (8x8x13)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 32.152 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 16.3 W/kg
SAR(1 g) = 5.37 W/kg; SAR(10 g) = 1.85 W/kg
Maximum value of SAR (measured) = 9.69 W/kg



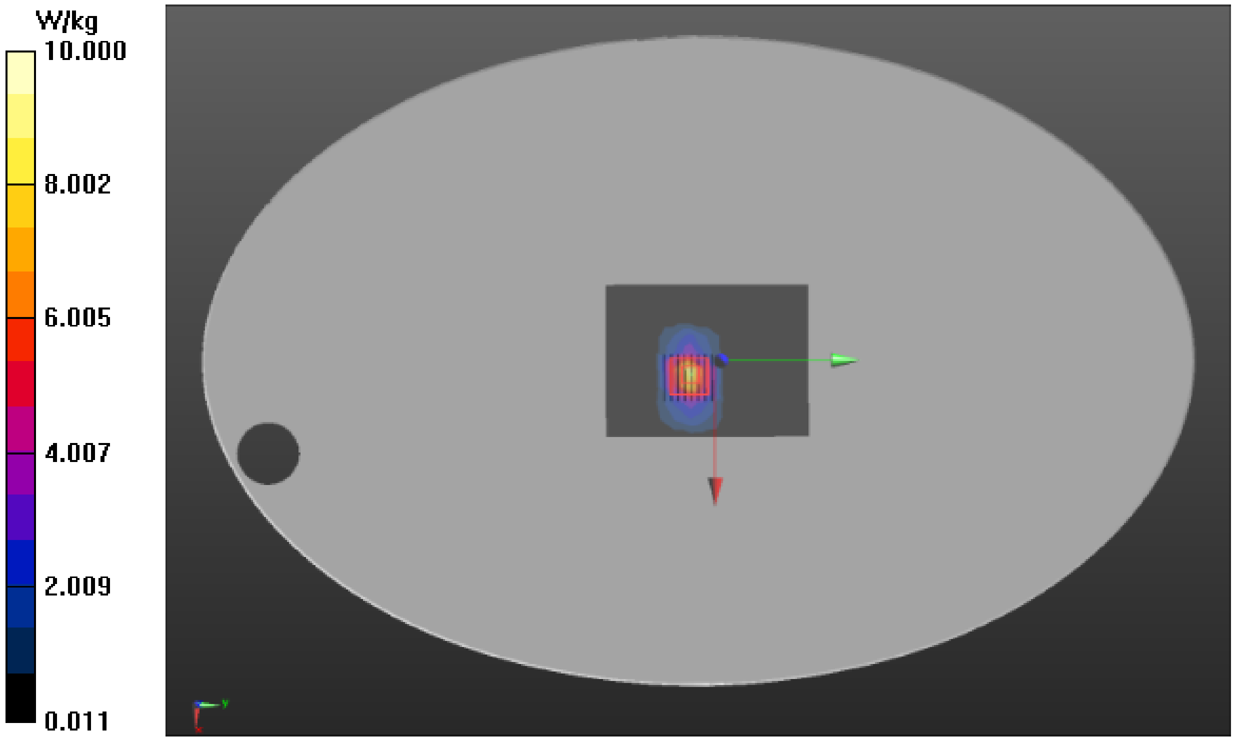
Test Laboratory: AGC Lab **Date: Mar. 08,2018**
System Check Body 5800 MHz
DUT: Dipole 5000MHz Type: SWG5500

Communication System: CW; Communication System Band: D5000 (5000.0 MHz); Duty Cycle: 1:1;
Frequency: 5800 MHz; Medium parameters used: f = 5800 MHz; σ = 5.95 mho/m; εr = 48.55; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=15dBm
Ambient temperature (℃): 22.4, Liquid temperature (℃): 21.8, Relative Humidity (%):54.6

DASY Configuration:
- Probe: ES3DV4 – SN3753; ConvF(4.52, 4.52, 4.52); Calibrated: May 05,2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn1398; Calibrated: Feb. 08,2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1210;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/System Check 5800MHz Body/Area Scan (10x13x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 9.33 W/kg

Configuration/System Check 5800MHzBody/Zoom Scan (8x8x13)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 32.605 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 17.4 W/kg
SAR(1 g) = 5.49 W/kg; SAR(10 g) = 1.96 W/kg
Maximum value of SAR (measured) = 10.0 W/kg



APPENDIX B. SAR MEASUREMENT DATA

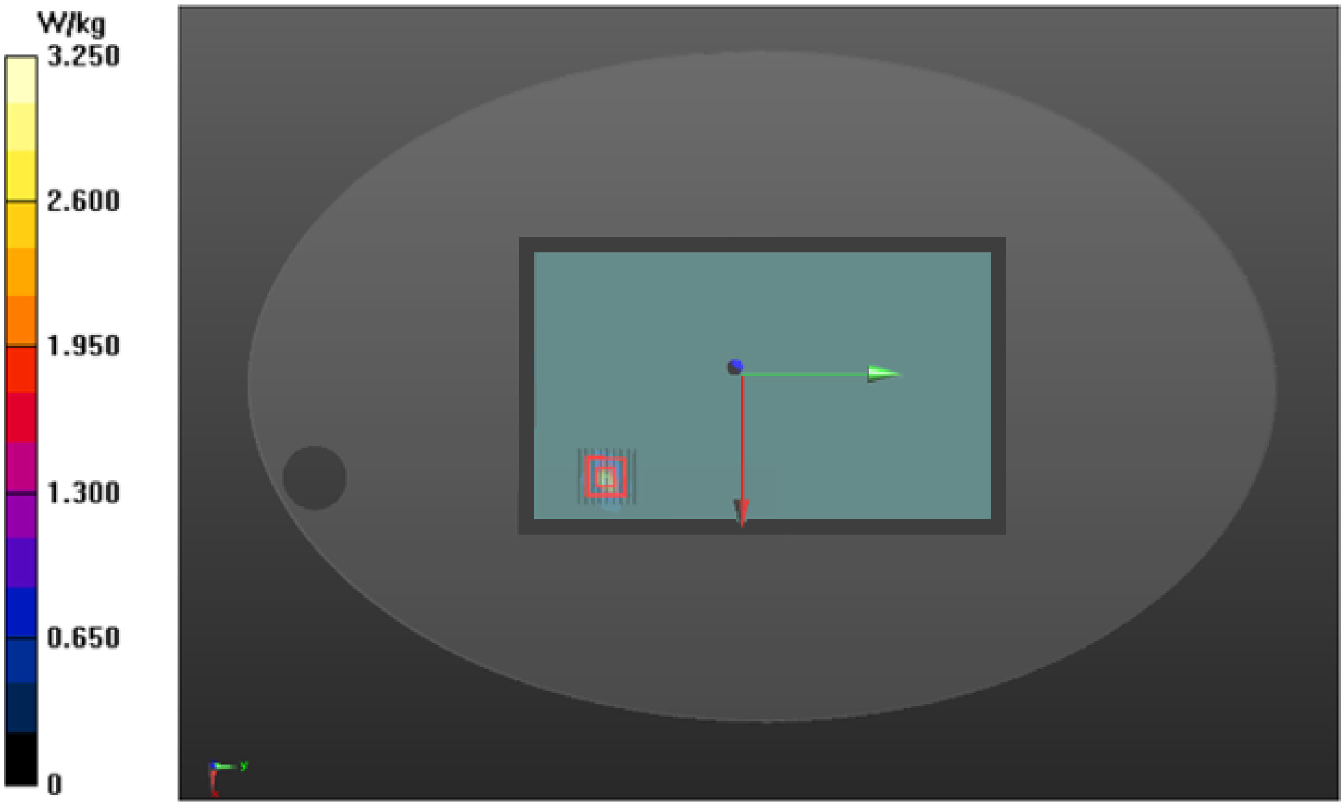
Test Laboratory: AGC Lab **Date: Mar. 09,2018**
5.2G -802.11a High- Body- Back
DUT: TABLET; Type: IFT1018

Communication System: Wi-Fi;Communication System Band: 802.11a; Duty Cycle: 1:1
Frequency: 5240 MHz; Medium parameters used: f = 5250 MHz; σ=5.31mho/m; εr =49.07; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.6

DASY Configuration:
- Probe: ES3DV4 – SN3753; ConvF(4.87, 4.87, 4.87); Calibrated: May 05,2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn1398; Calibrated: Feb. 08,2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1210;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

BODY/BACK-H/Area Scan (18x16x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 3.66 W/kg

BODY/BACK-H/Zoom Scan (9x9x16)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0 V/m; Power Drift = 0.12dB
Peak SAR (extrapolated) = 7.87 W/kg
SAR(1 g) = 1.42 W/kg; SAR(10 g) = 0.325 W/kg
Maximum value of SAR (measured) = 3.25 W/kg



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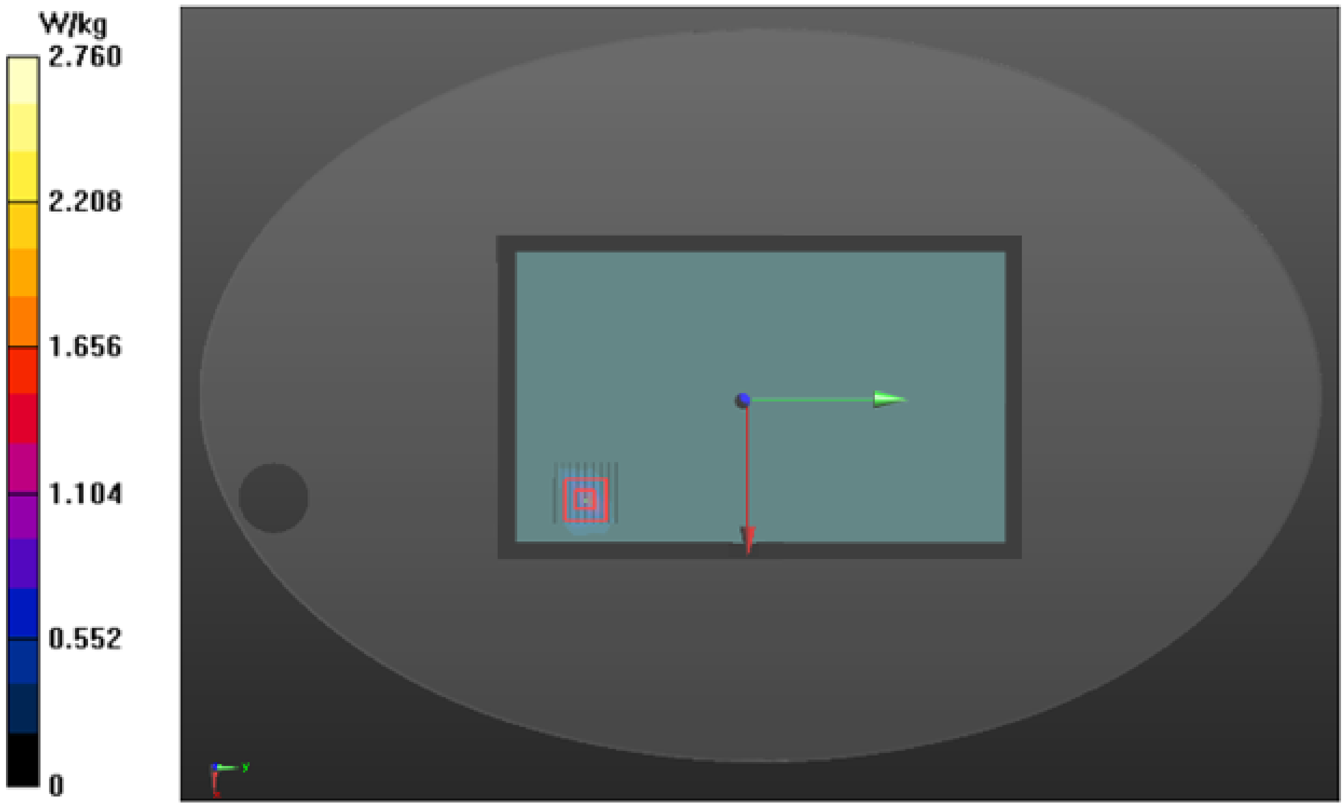
Test Laboratory: AGC Lab **Date: Mar. 09,2018**
5.3G -802.11a Mid- Body- Back
DUT: TABLET; Type: IFT1018

Communication System: Wi-Fi;Communication System Band: 802.11a; Duty Cycle: 1:1
Frequency: 5280 MHz; Medium parameters used: f = 5250 MHz; σ=5.35 mho/m; εr =49.10; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.6

DASY Configuration:
- Probe: ES3DV4 – SN3753; ConvF(4.87, 4.87, 4.87); Calibrated: May 05,2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn1398; Calibrated: Feb. 08,2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1210;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

BODY/BACK/Area Scan (18x16x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.59 W/kg

BODY/BACK/Zoom Scan (9x9x16)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 6.20 W/kg
SAR(1 g) = 1.11 W/kg; SAR(10 g) = 0.263 W/kg
Maximum value of SAR (measured) = 2.76 W/kg



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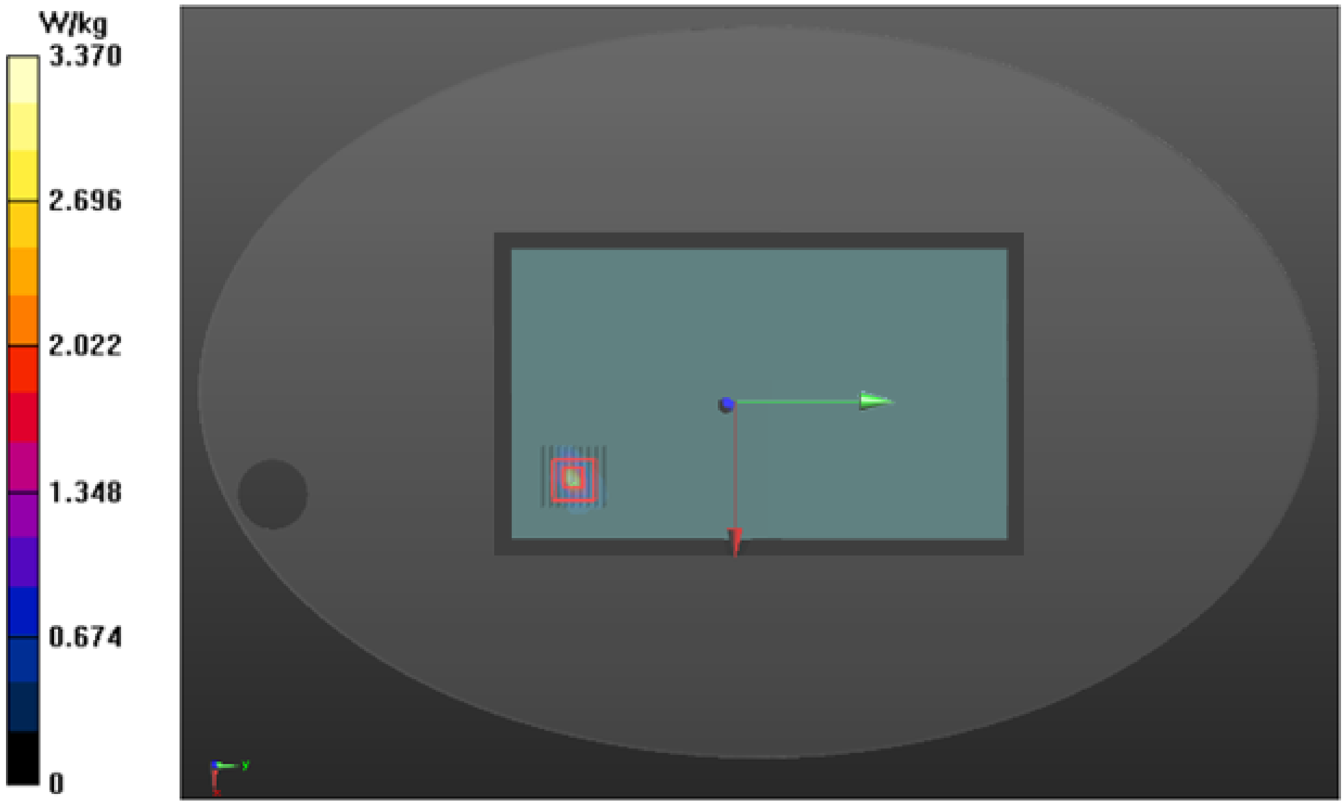
Test Laboratory: AGC Lab **Date: Mar. 11,2018**
5.6G -802.11a Mid- Body- Back
DUT: TABLET; Type: IFT1018

Communication System: Wi-Fi;Communication System Band: 802.11a; Duty Cycle: 1:1
Frequency: 5540; Medium parameters used: f = 5600 MHz; σ=5.53 mho/m; εr =48.76; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 22.4, Liquid temperature (℃): 21.6

DASY Configuration:
- Probe: ES3DV4 – SN3753; ConvF(4.27, 4.27, 4.27); Calibrated: May 05,2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn1398; Calibrated: Feb. 08,2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1210;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

BODY/BACK/Area Scan (18x16x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.87 W/kg

BODY/BACK/Zoom Scan (9x9x16)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 7.21 W/kg
SAR(1 g) = 1.39 W/kg; SAR(10 g) = 0.321 W/kg
Maximum value of SAR (measured) = 3.37 W/kg



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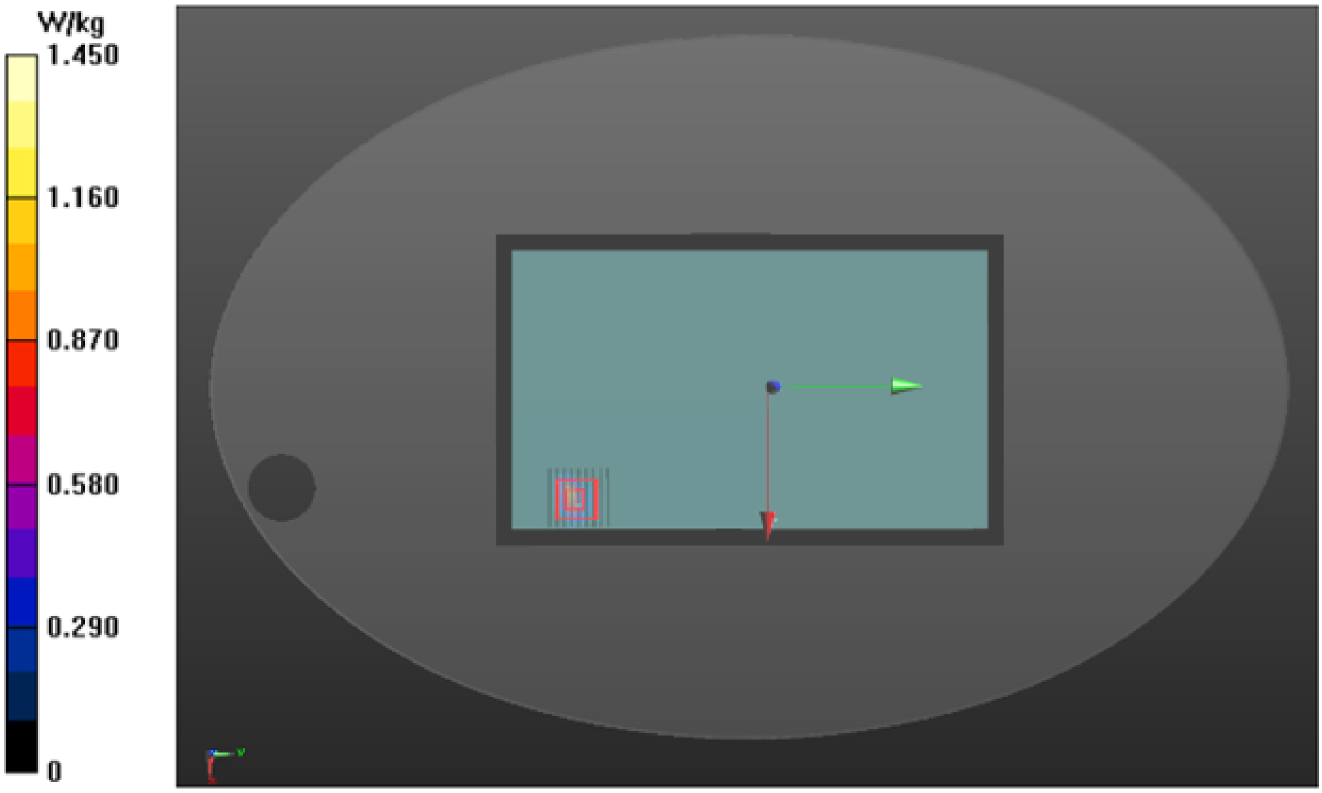
Test Laboratory: AGC Lab **Date: Mar. 08,2018**
5.8G -802.11a Mid- Body- Back
DUT: TABLET; Type: IFT1018

Communication System: Wi-Fi;Communication System Band: 802.11a; Duty Cycle: 1:1
Frequency: 5785 MHz; Medium parameters used: f = 5800 MHz; σ=5.93 mho/m; εr =49.97; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 22.4, Liquid temperature (℃): 21.8

DASY Configuration:
- Probe: ES3DV4 – SN3753; ConvF(4.52, 4.52, 4.52); Calibrated: May 05,2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn1398; Calibrated: Feb. 08,2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1210;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

BODY/BACK/Area Scan (18x16x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.10 W/kg

BODY/BACK/Zoom Scan (9x9x16)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 2.81 W/kg
SAR(1 g) = 0.620 W/kg; SAR(10 g) = 0.136 W/kg
Maximum value of SAR (measured) = 1.45 W/kg



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APPENDIX C. TEST SETUP PHOTOGRAPHS

Refer to Attached files.

APPENDIX D. CALIBRATION DATA

Refer to Attached files.

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