FCC SAR Test Report

APPLICANT	:	Lenovo (Shanghai) Electronics Technology Co., Ltd.
EQUIPMENT	:	Standalone VR Headset
BRAND NAME	:	Lenovo
MODEL NAME	:	Lenovo VR-1541F
MARKETING NAME	:	Mirage Solo with Daydream
FCC ID	:	O57VR1541F
STANDARD	:	FCC 47 CFR Part 2 (2.1093) ANSI/IEEE C95.1-1992 IEEE 1528-2013

We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the procedures and had been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.

Mark Qu

Approved by: Mark Qu / Manager

NVLAP® TESTING NVLAP LAB CODE 600155-0

Sporton International (Kunshan) Inc.

No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA790102	Rev. 01	Initial issue of report	Dec. 21, 2017

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Lenovo (Shanghai) Electronics Technology Co., Ltd., Standalone VR Headset, Lenovo VR-1541F**, are as follows.

Equipment Class	Frequency Band	Highest Standalone SAR Summary	
		Head 1g SAR (W/kg) (Separation 0mm)	Extremity 10g SAR (W/kg) (Separation 0mm)
DTS	WLAN 2.4GHz Band	0.41	**0.42**
NII	WLAN 5GHz Band	**0.51**	0.27
Date of Testing:		2017/11/30 ~ 2017/12/6	

Frequency Band	Highest Simultaneous Transmission	
	Head 1g SAR (W/kg) (Separation 0mm)	Extremity 10g SAR (W/kg) (Separation 0mm)
WLAN 2.4GHz Ant.1+ WLAN 2.4GHz Ant.2+Bluetooth	0.86	0.79
WLAN 5GHz Ant.1+ WLAN 5GHz Ant.2+Bluetooth	0.78	0.43

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for head 1g SAR, 4.0 W/kg for limb-worn 10g SAR) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications.

2. Administration Data

Testing Laboratory	
Test Site	Sporton International (Kunshan) Inc.
Test Site Location	No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China TEL : +86-512-57900158 FAX : +86-512-57900958

Applicant	
Company Name	Lenovo(Shanghai) Electronics Technology Co., Ltd.
Address	NO.68 BUILDING, 199 FENJU RD, Pilot Free Trade Zone, 200131, China

Manufacturer	
Company Name	Lenovo PC HK Limited
Address	23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong

3. Guidance Applied

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards:

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02

4. Equipment Under Test (EUT) Information

4.1 General Information

Product Feature & Specification	
Equipment Name	Standalone VR Headset
Brand Name	Lenovo
Model Name	Lenovo VR-1541F
Marketing Name	Mirage Solo with Daydream
FCC ID	O57VR1541F
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5720 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	WLAN 2.4GHz 802.11b/g/n HT20 WLAN 5GHz 802.11a/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth v2.0+EDR, Bluetooth v4.0, LE Bluetooth v4.2 LE, LE Bluetooth v5.0 LE
HW Version	R5
SW Version	OVR2.170822.001
EUT Stage	Identical Prototype

4.2 Specification of Accessory

Specification of Accessory				
AC Adapter 1 (US)	Brand Name	Lenovo (Huntkey)	Model Name	C-P35
	Power Rating	I/P: 100-240Vac, 500mA, O/P: 5.2V/ 2000 mA		
AC Adapter 1 (EU)	Brand Name	Lenovo (Huntkey)	Model Name	C-P36
	Power Rating	I/P: 100-240Vac, 500mA, O/P: 5.2V/ 2000 mA		
AC Adapter 1 (UK)	Brand Name	Lenovo (Huntkey)	Model Name	C-P37
	Power Rating	I/P: 100-240Vac, 500mA, O/P: 5.2V/ 2000 mA		
AC Adapter 1 (Korea)	Brand Name	Lenovo (Huntkey)	Model Name	C-P46
	Power Rating	I/P: 100-240Vac, 500mA, O/P: 5.2V/ 2000 mA		
AC Adapter 1 (AU)	Brand Name	Lenovo (Huntkey)	Model Name	C-P48
	Power Rating	I/P: 100-240Vac, 500mA, O/P: 5.2V/ 2000 mA		
AC Adapter 2 (US)	Brand Name	Lenovo (Acbel)	Model Name	C-P35
	Power Rating	I/P: 100-240Vac, 300mA, O/P: 5.2V/ 2000 mA		
AC Adapter 2 (EU)	Brand Name	Lenovo (Acbel)	Model Name	C-P36
	Power Rating	I/P: 100-240Vac, 300mA, O/P: 5.2V/ 2000 mA		
AC Adapter 2 (UK)	Brand Name	Lenovo (Acbel)	Model Name	C-P37
	Power Rating	I/P: 100-240Vac, 300mA, O/P: 5.2V/ 2000 mA		
Battery	Brand Name	Lenovo (SCUD)	Model Name	L17D1P33
	Power Rating	3.85Vdc, 4000mAh	Type	Li-ion
USB cable	Brand Name	Lenovo (Saibao)	Model Name	SGA-A016A
	Signal Line	1.0 meter, shielded cable, without ferrite core		
Controller	Brand Name	Lenovo (Daydream)	Model Name	DG1CA
Earphone	Brand Name	Lenovo	Model Name	CE-1601T
	Signal Line	0.5 meter, Unshielded cable, without ferrite core		

4.3 Component List

Note: There are two types of EUT, the details refer the following table. According to the difference, we choose the sample 1 to full test.

Component	Sample 1		Sample 2	
UFS(64G)	THGAF4G9N4LBAIR	Toshiba	KLUCG4J1ED-B0C1	Samsung

5. RF Exposure Limits

5.1 Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

5.2 Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. The exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Limits for Occupational/Controlled Exposure (W/kg)

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

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

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

Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1gram 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.

6. Specific Absorption Rate (SAR)

6.1 Introduction

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.

6.2 SAR Definition

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:

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

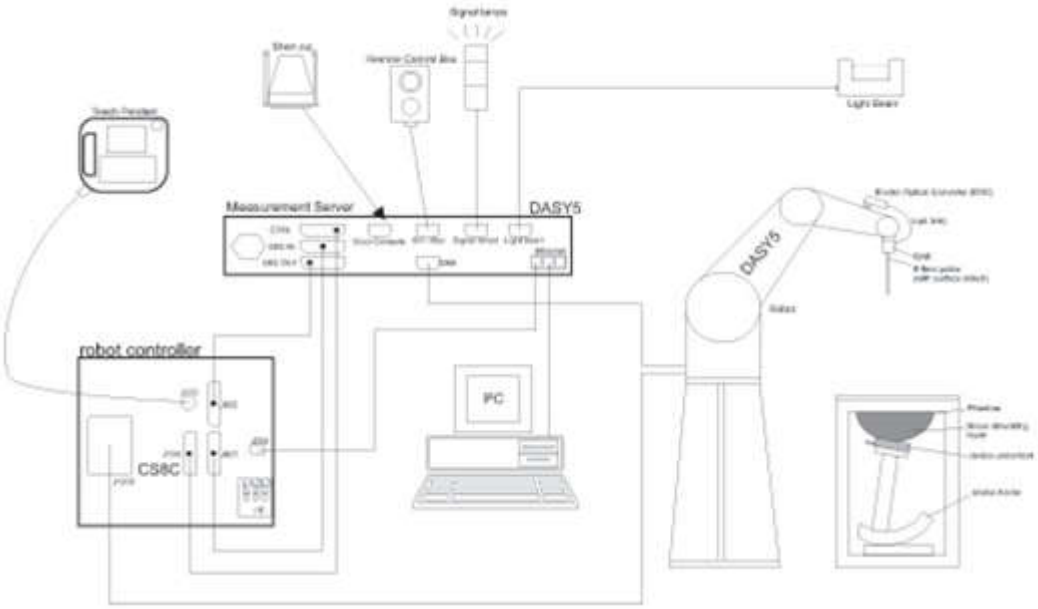
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

7. System Description and Setup

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



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- 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.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP or Win7 and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

7.1 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. This probe has a built in optical surface detection system to prevent from collision with phantom.

<EX3DV4 Probe>

Construction	Symmetric design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz – >6 GHz Linearity: ±0.2 dB (30 MHz – 6 GHz)	
Directivity	±0.3 dB in TSL (rotation around probe axis) ±0.5 dB in TSL (rotation normal to probe axis)	
Dynamic Range	10 μW/g – >100 mW/g Linearity: ±0.2 dB (noise: typically <1 μW/g)	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 2.5 mm (body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

7.2 Data Acquisition Electronics (DAE)

The data acquisition electronics (DAE) consists 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 and 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.

The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig 5.1 Photo of DAE

7.3 Phantom

<SAM Twin Phantom>

Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm	
Filling Volume	Approx. 25 liters	
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet	
Measurement Areas	Left Hand, Right Hand, Flat Phantom	

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

<ELI Phantom>

Shell Thickness	2 ± 0.2 mm (sagging: <1%)	
Filling Volume	Approx. 30 liters	
Dimensions	Major ellipse axis: 600 mm Minor axis: 400 mm	

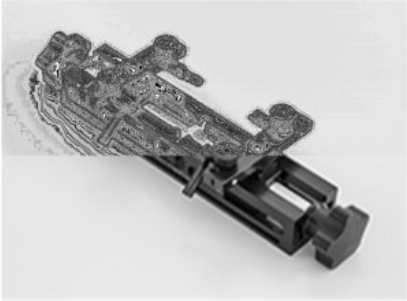
The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.

7.4 Device Holder

<Mounting Device for Hand-Held Transmitter>

In combination with the Twin SAM V5.0/V5.0c or ELI phantoms, the Mounting Device for Hand-Held Transmitters enables rotation of the mounted transmitter device to specified spherical coordinates. At the heads, the rotation axis is at the ear opening. Transmitter devices can be easily and accurately positioned according to IEC 62209-1, IEEE 1528, FCC, or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat). And upgrade kit to Mounting Device to enable easy mounting of wider devices like big smart-phones, e-books, small tablets, etc. It holds devices with width up to 140 mm.

Mounting Device for Hand-Held Transmitters



Mounting Device Adaptor for Wide-Phones

<Mounting Device for Laptops and other Body-Worn Transmitters>

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the mounting device in place of the phone positioned. The extension is fully compatible with the SAM Twin and ELI phantoms.

Mounting Device for Laptops

8. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

(a) For WLAN/BT power measurement, use engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power in each supported wireless interface and frequency band
(b) Connect EUT RF port through RF cable to the power meter, and measure WLAN/BT output power

<SAR measurement>

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

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

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

8.1 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

(a) Extraction of the measured data (grid and values) from the Zoom Scan
(b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
(c) Generation of a high-resolution mesh within the measured volume
(d) Interpolation of all measured values form the measurement grid to the high-resolution grid
(e) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
(f) Calculation of the averaged SAR within masses of 1g and 10g

8.2 Power Reference Measurement

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

8.3 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 found in the scanned area, within a range of the global maximum. The range (in dB0 is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan), if only one zoom scan follows the area scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of zoom scans has to be increased accordingly.

Area scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	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.	

8.4 Zoom Scan

Zoom scans are used assess the peak spatial SAR values within a cubic averaging volume containing 1 gram and 10 gram of simulated tissue. The zoom scan measures points (refer to table below) within a cube shoes 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 1 gram and 10 gram and displays these values next to the job's label.

Zoom scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

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

8.5 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

8.6 Power Drift Monitoring

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

9. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	2450MHz System Validation Kit	D2450V2	924	2017/3/21	2018/3/20
SPEAG	5000MHz System Validation Kit	D5GHzV2	1113	2016/12/13	2017/12/12
SPEAG	Data Acquisition Electronics	DAE4	1326	2017/9/15	2018/9/14
SPEAG	Data Acquisition Electronics	DAE4	1210	2017/5/25	2018/5/24
SPEAG	Dosimetric E-Field Probe	EX3DV4	3293	2017/9/25	2018/9/24
SPEAG	Dosimetric E-Field Probe	EX3DV4	3857	2017/5/26	2018/5/25
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
SPEAG	SAM Twin Phantom	QD 000 P40 CB	TP-1164	NCR	NCR
SPEAG	SAM Twin Phantom	QD 000 P40 CB	TP-1542	NCR	NCR
SPEAG	SAM Twin Phantom	QD 000 P40 CB	TP-1842	NCR	NCR
Agilent	ENA Series Network Analyzer	E5071C	MY46111157	2017/4/18	2018/4/17
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	2017/9/26	2018/9/25
R&S	Signal Generator	SMR40	100455	2017/1/19	2018/1/18
R&S	CBT BLUETOOTH TESTER	CBT	100783	2017/8/8	2018/8/7
Anritsu	Power Senor	MA2411B	1644003	2016/12/23	2017/12/22
Anritsu	Power Meter	ML2495A	1531197	2016/12/23	2017/12/22
Anritsu	Power Senor	MA2411B	1644004	2016/12/23	2017/12/22
Anritsu	Power Meter	ML2495A	1531198	2016/12/23	2017/12/22
WISEWIND	Hygrometer	WISEWIND 0905	0905	2017/4/20	2018/4/19
JM	DIGITAC THERMOMETER	JM222	AA1207166	2017/4/19	2018/4/18
EXA	Spectrum Analyzer	N9010A	MY55150244	2017/4/18	2018/4/17
ARRA	Power Divider	A3200-2	NA	Note	
Agilent	Dual Directional Coupler	778D	50422	Note	
PASTERNACK	Dual Directional Coupler	PE2214-10	N/A	Note	
AR	Amplifier	5S1G4	333096	Note	
mini-circuits	Amplifier	ZVE-3W-83+	162601250	Note	
MCL	Attenuation1	BW-S10W5+	N/A	Note	
MCL	Attenuation2	BW-S10W5+	N/A	Note	
MCL	Attenuation3	BW-S10W5+	N/A	Note	

Note:
Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.

10. System Verification

10.1 Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 10.1. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 10.2.

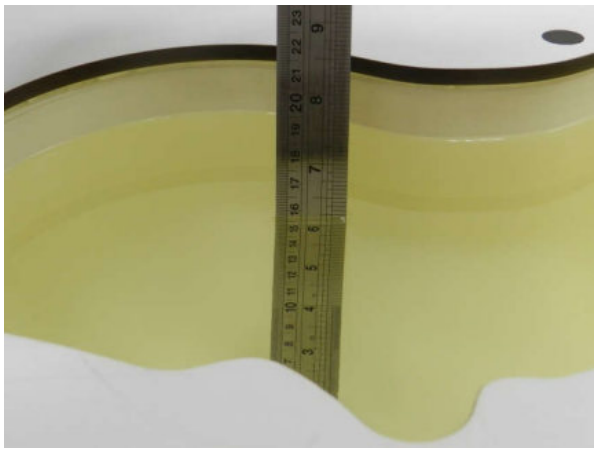


Fig 10.1Photo of Liquid Height for Head SAR

Fig 10.2 Photo of Liquid Height for Body SAR

10.2 Tissue Verification

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

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (εr)
For Head								
2450	55.0	0	0	0	0	45.0	1.80	39.2
For Body								
2450	68.6	0	0	0	0	31.4	1.95	52.7

Simulating Liquid for 5GHz, Manufactured by SPEAG

Ingredients	(% by weight)
Water	64~78%
Mineral oil	11~18%
Emulsifiers	9~15%
Additives and Salt	2~3%

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
2450	Head	22.6	1.806	38.913	1.80	39.20	0.33	-0.73	±5	2017/11/30
5250	Head	22.7	4.872	35.364	4.71	35.90	3.44	-1.49	±5	2017/12/5
5600	Head	22.8	5.229	34.698	5.07	35.50	3.14	-2.26	±5	2017/12/5
5750	Head	22.7	5.389	34.460	5.22	35.40	3.24	-2.66	±5	2017/12/5
2450	Body	22.9	2.011	54.103	1.95	52.70	3.13	2.66	±5	2017/12/6
5600	Body	22.6	5.960	47.221	5.77	48.50	3.29	-2.64	±5	2017/12/5
5750	Body	22.8	6.169	46.936	5.94	48.30	3.86	-2.82	±5	2017/12/6

10.3 System Performance Check Results

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

<1g SAR for Head>

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2017/11/30	2450	Head	250	924	3293	1326	13.30	52.40	53.2	1.53
2017/12/5	5250	Head	100	1113	3857	1210	7.15	76.40	71.5	-6.41
2017/12/5	5600	Head	100	1113	3857	1210	8.07	80.80	80.7	-0.12
2017/12/5	5750	Head	100	1113	3857	1210	7.59	80.30	75.9	-5.48

<10g SAR for Extremity>

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 10g SAR (W/kg)	Targeted 10g SAR (W/kg)	Normalized 10g SAR (W/kg)	Deviation (%)
2017/12/6	2450	Body	250	924	3857	1210	6.04	23.50	24.16	2.81
2017/12/5	5600	Body	100	1113	3857	1210	2.18	22.60	21.8	-3.54
2017/12/6	5750	Body	100	1113	3857	1210	2.06	21.10	20.6	-2.37

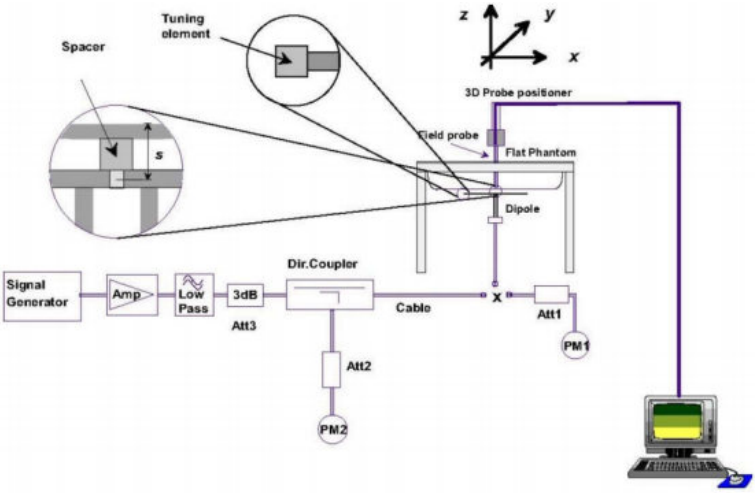


Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

11. Conducted RF Output Power (Unit: dBm)

<WLAN Conducted Power>

General Note:

1. For each antenna, transmit power in SISO operation is larger than (or equal to) the power in MIMO operation, RF exposure compliance of MIMO mode can be deduced from the compliance simultaneous transmission of antennas operating in SISO mode.
2. Per KDB 248227 D01v02r02, SAR test reduction is determined according to 802.11 transmission mode configurations and certain exposure conditions with multiple test positions. In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements. For OFDM, in both 2.4 and 5 GHz bands, an initial test configuration must be determined for each standalone and aggregated frequency band, according to the transmission mode configuration with the highest maximum output power specified for production units to perform SAR measurements. If the same highest maximum output power applies to different combinations of channel bandwidths, modulations and data rates, additional procedures are applied to determine which test configurations require SAR measurement. When applicable, an initial test position may be applied to reduce the number of SAR measurements required for next to the ear, UMPC mini-tablet or hotspot mode configurations with multiple test positions.
3. For 2.4 GHz 802.11b DSSS, either the initial test position procedure for multiple exposure test positions or the DSSS procedure for fixed exposure position is applied; these are mutually exclusive. For 2.4 GHz and 5 GHz OFDM configurations, the initial test configuration is applied to measure SAR using either the initial test position procedure for multiple exposure test position configurations or the initial test configuration procedures for fixed exposure test conditions. Based on the reported SAR of the measured configurations and maximum output power of the transmission mode configurations that are not included in the initial test configuration, the subsequent test configuration and initial test position procedures are applied to determine if SAR measurements are required for the remaining OFDM transmission configurations. In general, the number of test channels that require SAR measurement is minimized based on maximum output power measured for the test sample(s).
4. For OFDM transmission configurations in the 2.4 GHz and 5 GHz bands, When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel for each frequency band.
5. DSSS and OFDM configurations are considered separately according to the required SAR procedures. SAR is measured in the initial test position using the 802.11 transmission mode configuration required by the DSSS procedure or initial test configuration and subsequent test configuration(s) according to the OFDM procedures.18 The initial test position procedure is described in the following:
   a. When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and 802.11 transmission mode combinations within the frequency band or aggregated band.
   b. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is ≤ 0.8 W/kg or all required test position are tested.
   c. For all positions/configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

<2.4GHz WLAN Ant.1>

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
2.4GHz WLAN Ant.1	802.11b 1Mbps	1	2412	18.52	20.00	100.00
		6	2437	**18.67**	20.00	
		11	2462	18.25	20.00	
	802.11g 6Mbps	1	2412	14.33	16.00	94.98
		6	2437	15.51	17.00	
		11	2462	13.67	14.50	
	802.11n-HT20 MCS0	1	2412	13.92	15.50	94.64
		6	2437	14.59	16.00	
		11	2462	13.78	14.50	

<2.4GHz WLAN Ant.2>

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
2.4GHz WLAN Ant.2	802.11b 1Mbps	1	2412	18.29	20.00	100.00
		6	2437	18.21	20.00	
		11	2462	**18.91**	20.00	
	802.11g 6Mbps	1	2412	15.17	16.50	95.00
		6	2437	15.14	16.50	
		11	2462	15.49	16.50	
	802.11n-HT20 MCS0	1	2412	14.20	15.50	95.00
		6	2437	14.15	15.50	
		11	2462	15.10	15.50	

<2.4GHz WLAN Ant.1+2>

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
2.4GHz WLAN Ant.1+2	802.11n-HT20 MCS0	1	2412	14.60	15.50	94.64
		6	2437	18.04	18.50	
		11	2462	17.77	18.00	

<5GHz WLAN Ant.1>

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.2GHz WLAN Ant.1	802.11a 6Mbps	36	5180	16.24	17.50	94.86
		40	5200	16.05	17.50	
		44	5220	16.18	17.50	
		48	5240	**16.97**	17.50	
	802.11n-HT20 MCS0	36	5180	13.79	15.50	94.80
		40	5200	14.19	16.00	
		44	5220	14.73	16.50	
		48	5240	15.16	16.50	
	802.11n-HT40 MCS0	38	5190	14.04	16.00	89.97
		46	5230	15.14	16.50	
	802.11ac-VHT20 MCS0	36	5180	13.80	15.50	94.82
		40	5200	14.13	16.00	
		44	5220	14.64	16.50	
		48	5240	15.09	16.50	
	802.11ac-VHT40 MCS0	38	5190	13.51	15.50	90.66
		46	5230	14.61	16.00	
	802.11ac-VHT80 MCS0	42	5210	13.96	15.50	82.47

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.3GHz WLAN Ant.1	802.11a 6Mbps	52	5260	16.95	17.50	94.86
		56	5280	16.96	17.50	
		60	5300	16.92	17.50	
		64	5320	**16.99**	17.50	
	802.11n-HT20 MCS0	52	5260	14.81	16.50	94.80
		56	5280	14.78	16.50	
		60	5300	15.06	16.50	
		64	5320	14.98	16.50	
	802.11n-HT40 MCS0	54	5270	14.81	16.50	89.97
		62	5310	15.07	16.50	
	802.11ac-VHT20 MCS0	52	5260	14.88	16.50	94.82
		56	5280	14.77	16.50	
		60	5300	15.05	16.50	
		64	5320	14.98	16.50	
	802.11ac-VHT40 MCS0	54	5270	14.28	16.00	90.66
		62	5310	14.59	16.50	
	802.11ac-VHT80 MCS0	58	5290	10.71	12.00	82.47

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.5GHz WLAN Ant.1	802.11a 6Mbps	100	5500	15.64	17.50	94.86
		116	5580	15.15	17.00	
		124	5620	15.10	17.00	
		132	5660	16.19	18.00	
		140	5700	**16.95**	18.50	
		144	5720	16.89	18.50	
	802.11n-HT20 MCS0	100	5500	13.19	15.00	94.80
		116	5580	13.35	15.00	
		124	5620	13.50	15.00	
		132	5660	14.45	16.00	
		140	5700	14.74	16.00	
		144	5720	15.02	16.00	
	802.11n-HT40 MCS0	102	5510	13.05	15.00	89.97
		110	5550	12.70	14.50	
		126	5630	13.77	15.50	
		134	5670	14.63	16.00	
		142	5710	14.94	16.00	
	802.11ac-VHT20 MCS0	100	5500	13.23	15.00	94.82
		116	5580	13.30	15.00	
		124	5620	13.45	15.00	
		132	5660	14.54	16.00	
		140	5700	14.80	16.00	
		144	5720	15.00	16.00	
	802.11ac-VHT40 MCS0	102	5510	12.54	14.50	90.66
		110	5550	12.51	14.50	
		126	5630	13.27	15.00	
		134	5670	14.10	15.50	
		142	5710	14.48	15.50	
	802.11ac-VHT80 MCS0	106	5530	12.55	14.50	82.47
		122	5610	12.91	14.50	
		138	5690	14.17	16.00	

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.8GHz WLAN Ant.1	802.11a 6Mbps	149	5745	**16.94**	18.50	94.86
		157	5785	15.99	17.50	
		165	5825	16.09	17.50	
	802.11n-HT20 MCS0	149	5745	14.98	16.50	94.80
		157	5785	13.89	15.50	
		165	5825	14.00	15.50	
	802.11n-HT40 MCS0	151	5755	15.12	17.00	89.97
		159	5795	14.57	16.50	
	802.11ac-VHT20 MCS0	149	5745	14.96	16.50	94.82
		157	5785	13.79	15.50	
		165	5825	14.22	16.00	
	802.11ac-VHT40 MCS0	151	5755	14.54	16.50	90.66
		159	5795	13.99	15.50	
	802.11ac-VHT80 MCS0	155	5775	14.21	16.00	82.47

<5GHz WLAN Ant.2>

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.2GHz WLAN Ant.2	802.11a 6Mbps	36	5180	16.04	17.50	95.18
		40	5200	15.86	17.50	
		44	5220	16.14	17.50	
		48	5240	**16.95**	17.50	
	802.11n-HT20 MCS0	36	5180	14.79	16.50	94.64
		40	5200	14.67	16.50	
		44	5220	14.72	16.50	
		48	5240	15.22	17.00	
	802.11n-HT40 MCS0	38	5190	14.04	16.00	90.97
		46	5230	15.14	16.00	
	802.11ac-VHT20 MCS0	36	5180	14.75	16.50	95.02
		40	5200	14.61	16.50	
		44	5220	14.66	16.50	
		48	5240	15.18	17.00	
	802.11ac-VHT40 MCS0	38	5190	13.51	15.50	90.97
		46	5230	14.61	15.50	
	802.11ac-VHT80 MCS0	42	5210	13.91	15.50	83.33

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.3GHz WLAN Ant.2	802.11a 6Mbps	52	5260	16.92	17.50	95.18
		56	5280	16.95	17.50	
		60	5300	16.94	17.50	
		64	5320	**16.96**	17.50	
	802.11n-HT20 MCS0	52	5260	15.16	17.00	94.64
		56	5280	14.85	16.50	
		60	5300	15.17	17.00	
		64	5320	15.14	17.00	
	802.11n-HT40 MCS0	54	5270	14.81	16.00	90.97
		62	5310	15.07	16.00	
	802.11ac-VHT20 MCS0	52	5260	15.09	17.00	95.02
		56	5280	14.93	16.50	
		60	5300	15.13	17.00	
		64	5320	15.11	17.00	
	802.11ac-VHT40 MCS0	54	5270	14.28	15.50	90.97
		62	5310	14.59	15.50	
	802.11ac-VHT80 MCS0	58	5290	9.51	11.00	83.33

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.5GHz WLAN Ant.2	802.11a 6Mbps	100	5500	15.22	17.00	95.18
		116	5580	15.35	17.00	
		124	5620	15.39	17.00	
		132	5660	16.59	17.50	
		140	5700	**16.92**	17.50	
		144	5720	16.90	17.50	
	802.11n-HT20 MCS0	100	5500	13.65	15.50	94.64
		116	5580	13.15	15.00	
		124	5620	13.22	15.00	
		132	5660	14.36	16.00	
		140	5700	15.18	17.00	
		144	5720	15.09	17.00	
	802.11n-HT40 MCS0	102	5510	13.05	15.00	90.97
		110	5550	12.70	14.50	
		126	5630	13.77	15.50	
		134	5670	14.63	16.00	
		142	5710	14.94	16.00	
	802.11ac-VHT20 MCS0	100	5500	13.76	15.50	95.02
		116	5580	13.01	15.00	
		124	5620	13.20	15.00	
		132	5660	14.33	16.00	
		140	5700	15.08	17.00	
		144	5720	15.04	15.50	
	802.11ac-VHT40 MCS0	102	5510	12.54	14.50	90.97
		110	5550	12.51	14.50	
		126	5630	13.27	15.00	
		134	5670	14.10	15.50	
		142	5710	14.48	15.50	
	802.11ac-VHT80 MCS0	106	5530	12.52	14.50	83.33
		122	5610	12.54	14.50	
		138	5690	13.88	15.50	

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.8GHz WLAN Ant.2	802.11a 6Mbps	149	5745	**16.93**	17.50	95.18
		157	5785	15.63	17.50	
		165	5825	15.89	17.50	
	802.11n-HT20 MCS0	149	5745	15.19	17.00	94.64
		157	5785	14.42	16.00	
		165	5825	14.66	16.50	
	802.11n-HT40 MCS0	151	5755	15.12	17.00	90.97
		159	5795	14.57	16.50	
	802.11ac-VHT20 MCS0	149	5745	15.15	17.00	95.02
		157	5785	14.40	16.00	
		165	5825	14.73	16.50	
	802.11ac-VHT40 MCS0	151	5755	14.54	16.50	90.97
		159	5795	13.99	15.50	
	802.11ac-VHT80 MCS0	155	5775	14.11	16.00	83.33

<5GHz WLAN Ant.1+2>

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.2GHz WLAN Ant.1+2	802.11n-HT20 MCS0	36	5180	15.28	17.00	94.83
		40	5200	15.13	17.00	
		44	5220	15.33	17.00	
		48	5240	16.10	18.00	
	802.11n-HT40 MCS0	38	5190	15.92	17.00	90.95
		46	5230	18.86	20.00	
	802.11ac-VHT20 MCS0	36	5180	15.07	17.00	94.99
		40	5200	14.96	16.50	
		44	5220	15.22	17.00	
		48	5240	15.98	17.50	
	802.11ac-VHT40 MCS0	38	5190	15.08	17.00	90.95
		46	5230	15.57	17.50	
	802.11ac-VHT80 MCS0	42	5210	11.36	13.00	83.59

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.3GHz WLAN Ant.1+2	802.11n-HT20 MCS0	52	5260	19.79	20.00	94.83
		56	5280	19.78	20.00	
		60	5300	19.81	20.00	
		64	5320	19.87	20.00	
	802.11n-HT40 MCS0	54	5270	19.63	20.00	90.95
		62	5310	15.88	16.00	
	802.11ac-VHT20 MCS0	52	5260	19.77	20.00	94.99
		56	5280	19.75	20.00	
		60	5300	19.75	20.00	
		64	5320	19.86	20.00	
	802.11ac-VHT40 MCS0	54	5270	19.18	20.00	90.95
		62	5310	19.24	20.00	
	802.11ac-VHT80 MCS0	58	5290	13.20	13.50	83.59

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.5GHz WLAN Ant.1+2	802.11n-HT20 MCS0	100	5500	19.34	20.00	94.83
		116	5580	19.21	20.00	
		124	5620	19.28	20.00	
		132	5660	19.10	20.00	
		140	5700	18.67	20.00	
		144	5720	19.62	20.00	
	802.11n-HT40 MCS0	102	5510	17.06	17.50	90.95
		110	5550	18.39	20.00	
		126	5630	18.34	20.00	
		134	5670	19.49	20.00	
		142	5710	19.67	20.00	
	802.11ac-VHT20 MCS0	100	5500	18.89	20.00	94.99
		116	5580	19.04	20.00	
		124	5620	19.08	20.00	
		132	5660	19.19	20.00	
		140	5700	19.66	20.00	
		144	5720	19.60	20.00	
	802.11ac-VHT40 MCS0	102	5510	18.90	20.00	90.95
		110	5550	18.27	20.00	
		126	5630	17.80	19.00	
		134	5670	19.12	20.00	
		142	5710	19.35	20.00	
	802.11ac-VHT80 MCS0	106	5530	15.65	16.50	83.59
		122	5610	17.80	19.00	
		138	5690	18.73	20.00	

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.8GHz WLAN Ant.1+2	802.11n-HT20 MCS0	149	5745	19.52	20.00	94.83
		157	5785	18.92	20.00	
		165	5825	19.11	20.00	
	802.11n-HT40 MCS0	151	5755	19.14	20.00	90.95
		159	5795	18.71	20.00	
	802.11ac-VHT20 MCS0	149	5745	19.27	20.00	94.99
		157	5785	18.85	20.00	
		165	5825	18.63	20.00	
	802.11ac-VHT40 MCS0	151	5755	18.72	20.00	90.95
		159	5795	18.30	20.00	
	802.11ac-VHT80 MCS0	155	5775	18.27	20.00	83.59

12. Bluetooth Exclusions Applied

Mode Band	Average power(dBm)	
	Bluetooth v2.0+EDR	Bluetooth v4.0/4.2/5.0 LE
2.4GHz Bluetooth	13.00	4.0

Note:

Per KDB 447498 D01v06, the 1-g 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

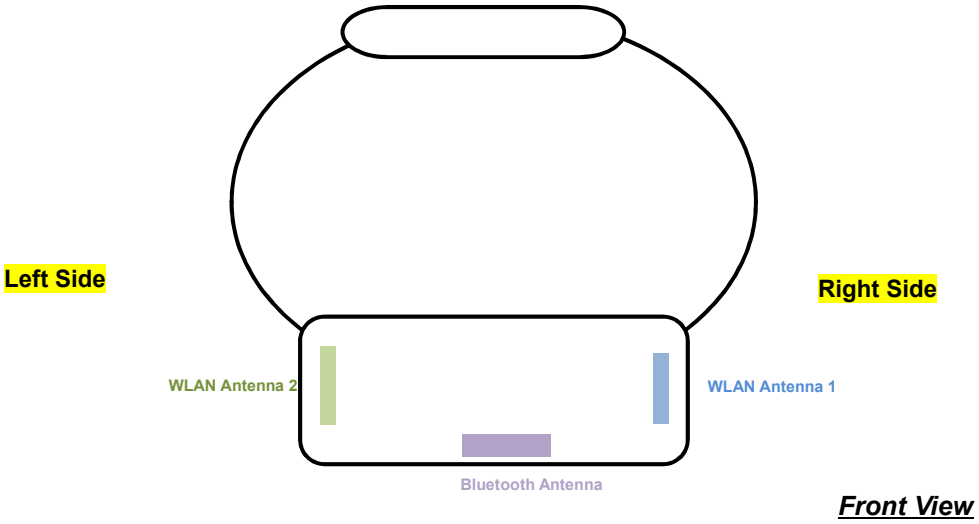
- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

Bluetooth Max Power (dBm)	Frequency (GHz)	Separation Distance (mm)		Exclusion Thresholds	
		Head	Extremity	Head	Extremity
13.00	2.48	101	101	0.3	0.3

Note:

1. Per KDB 447498 D01v06, a distance of 101 mm is applied to determine 1g SAR test exclusion. The test exclusion threshold is 0.3 which is <= 3, SAR testing is not required.
2. Per KDB 447498 D01v06, a distance of 101 mm is applied to determine 10g SAR test exclusion. The test exclusion threshold is 0.3 which is <= 7.5, SAR testing is not required.

13. Antenna Location



Antenna	To Face (mm)
WLAN Antenna 1	26.88
WLAN Antenna 2	25.9
Bluetooth Antenna	101

14. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, 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 SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
   c. For WLAN: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
   - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is not required when the measured SAR is < 0.8W/kg. Per KDB 865664 D01v01r04, if the extremity repeated SAR is necessary, the same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.
4. Per KDB 248227 D01v02r02, for 2.4GHz 802.11g/n SAR testing is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
5. Per KDB 248227 D01v02r02, U-NII-1 SAR testing is not required when the U-NII-2A band highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band.
6. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is ≤ 0.8 W/kg or all required test position are tested.
7. For all positions / configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions / configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.
8. During SAR testing the WLAN transmission was verified using a spectrum analyzer.
9. For WLAN 5GHz extremity SAR, we only verified the worst band from the head SAR.

14.1 Head SAR

<WLAN 2.4GHz SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
#01	WLAN2.4GHz	802.11b 1Mbps	Near to Head	0	1	6	2437	18.67	20.00	1.358	100	1.000	0.04	0.292	**0.397**
	WLAN2.4GHz	802.11b 1Mbps	Near to Head	0	1	1	2412	18.52	20.00	1.406	100	1.000	-0.09	0.280	0.394
	WLAN2.4GHz	802.11b 1Mbps	Near to Head	0	1	11	2462	18.25	20.00	1.496	100	1.000	0.04	0.171	0.256
	WLAN2.4GHz	802.11b 1Mbps	Near to Head	0	2	11	2462	18.91	20.00	1.285	100	1.000	-0.02	0.251	0.323
#02	WLAN2.4GHz	802.11b 1Mbps	Near to Head	0	2	1	2412	18.29	20.00	1.483	100	1.000	-0.09	0.279	**0.414**
	WLAN2.4GHz	802.11b 1Mbps	Near to Head	0	2	6	2437	18.21	20.00	1.510	100	1.000	0.03	0.243	0.367

<WLAN 5GHz SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
#03	WLAN 5.3GHz	802.11a 6Mbps	Near to Head	0	1	64	5320	16.99	17.50	1.125	94.86	1.054	-0.06	0.147	**0.174**
	WLAN 5.3GHz	802.11a 6Mbps	Near to Head	0	1	52	5260	16.95	17.50	1.135	94.86	1.054	-0.08	0.115	0.138
	WLAN 5.3GHz	802.11a 6Mbps	Near to Head	0	1	56	5280	16.96	17.50	1.132	94.86	1.054	0.01	0.116	0.138
#04	WLAN 5.3GHz	802.11a 6Mbps	Near to Head	0	2	64	5320	16.96	17.50	1.132	95.18	1.051	0.08	0.133	**0.158**
	WLAN 5.3GHz	802.11a 6Mbps	Near to Head	0	2	52	5260	16.92	17.50	1.143	95.18	1.051	0.05	0.123	0.148
	WLAN 5.3GHz	802.11a 6Mbps	Near to Head	0	2	56	5280	16.95	17.50	1.135	95.18	1.051	0.02	0.127	0.151
#05	WLAN 5.5GHz	802.11a 6Mbps	Near to Head	0	1	140	5700	16.95	18.50	1.429	94.86	1.054	0.08	0.317	**0.477**
	WLAN 5.5GHz	802.11a 6Mbps	Near to Head	0	1	100	5500	15.64	17.50	1.535	94.86	1.054	-0.17	0.178	0.288
	WLAN 5.5GHz	802.11a 6Mbps	Near to Head	0	1	144	5720	16.89	18.50	1.449	94.86	1.054	-0.09	0.250	0.382
#06	WLAN 5.5GHz	802.11a 6Mbps	Near to Head	0	2	140	5700	16.92	17.50	1.143	95.18	1.051	-0.05	0.191	**0.229**
	WLAN 5.5GHz	802.11a 6Mbps	Near to Head	0	2	100	5500	15.22	17.00	1.505	95.18	1.051	0.14	0.137	0.217
	WLAN 5.5GHz	802.11a 6Mbps	Near to Head	0	2	144	5720	16.90	17.50	1.147	95.18	1.051	-0.06	0.175	0.211
	WLAN 5.8GHz	802.11a 6Mbps	Near to Head	0	1	149	5745	16.94	18.50	1.432	94.86	1.054	0.02	0.249	0.376
	WLAN 5.8GHz	802.11a 6Mbps	Near to Head	0	1	157	5785	15.99	17.50	1.416	94.86	1.054	-0.06	0.270	0.403
#07	WLAN 5.8GHz	802.11a 6Mbps	Near to Head	0	1	165	5825	16.09	17.50	1.384	94.86	1.054	0.11	0.346	**0.505**
	WLAN 5.8GHz	802.11a 6Mbps	Near to Head	0	2	149	5745	16.93	17.50	1.139	95.18	1.051	0.15	0.149	0.178
#08	WLAN 5.8GHz	802.11a 6Mbps	Near to Head	0	2	157	5785	15.63	17.50	1.537	95.18	1.051	0.11	0.137	**0.221**
	WLAN 5.8GHz	802.11a 6Mbps	Near to Head	0	2	165	5825	15.89	17.50	1.447	95.18	1.051	0.02	0.118	0.179

14.2 Extremity 10g SAR

<WLAN 2.4GHz SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
#09	WLAN2.4GHz	802.11b 1Mbps	Right Side	0	1	6	2437	18.67	20.00	1.358	100	1.000	0.07	0.307	**0.417**
	WLAN2.4GHz	802.11b 1Mbps	Right Side	0	1	1	2412	18.52	20.00	1.406	100	1.000	0.07	0.272	0.382
	WLAN2.4GHz	802.11b 1Mbps	Right Side	0	1	11	2462	18.25	20.00	1.496	100	1.000	0.11	0.231	0.346
	WLAN2.4GHz	802.11b 1Mbps	Left Side	0	2	11	2462	18.91	20.00	1.285	100	1.000	-0.02	0.244	0.314
	WLAN2.4GHz	802.11b 1Mbps	Left Side	0	2	1	2412	18.29	20.00	1.483	100	1.000	0.04	0.134	0.199
#10	WLAN2.4GHz	802.11b 1Mbps	Left Side	0	2	6	2437	18.21	20.00	1.510	100	1.000	0.03	0.236	**0.356**

<WLAN 5GHz SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
#11	WLAN 5.8GHz	802.11a 6Mbps	Right Side	0	1	149	5745	16.94	18.50	1.432	94.86	1.054	-0.08	0.094	**0.142**
	WLAN 5.8GHz	802.11a 6Mbps	Right Side	0	1	157	5785	15.99	17.50	1.416	94.86	1.054	-0.15	0.094	0.140
	WLAN 5.8GHz	802.11a 6Mbps	Right Side	0	1	165	5825	16.09	17.50	1.384	94.86	1.054	0.04	0.089	0.130
#12	WLAN 5.5GHz	802.11a 6Mbps	Left Side	0	2	140	5700	16.92	17.50	1.143	95.18	1.051	-0.14	0.224	**0.269**
	WLAN 5.5GHz	802.11a 6Mbps	Left Side	0	2	100	5500	15.22	17.00	1.505	95.18	1.051	0.04	0.093	0.147
	WLAN 5.5GHz	802.11a 6Mbps	Left Side	0	2	144	5720	16.90	17.50	1.147	95.18	1.051	0.06	0.187	0.225

15. Simultaneous Transmission Analysis

No.	Simultaneous Transmission Configurations	Head	Extremity 10g SAR
1.	WLAN2.4GHz Ant.1 + WLAN2.4GHz Ant.2	Yes	Yes
2.	WLAN5GHz Ant.1 + WLAN5GHz Ant.2	Yes	Yes
3.	WLAN2.4GHz Ant.1 + WLAN2.4GHz Ant.2 + Bluetooth	Yes	Yes
4.	WLAN5GHz Ant.1 + WLAN5GHz Ant.2 + Bluetooth	Yes	Yes
5.	WLAN2.4GHz Ant.1 + Bluetooth	Yes	Yes
6.	WLAN2.4GHz Ant.2 + Bluetooth	Yes	Yes
7.	WLAN5GHz Ant.1 + Bluetooth	Yes	Yes
8.	WLAN5GHz Ant.2 + Bluetooth	Yes	Yes

General Note:

1. EUT will choose either WLAN 2.4GHz or WLAN 5GHz according to the network signal condition; therefore, 2.4GHz WLAN and 5GHz WLAN will not operate simultaneously at any moment.
2. The reported SAR summation is calculated based on the same configuration and test position.
3. For simultaneously analysis, since the SAR summation of 3 transmitters can cover others combination of 2 transmitters, therefore in this section did not additional to evaluate 2TX combination of simultaneously transmission.
4. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
   i) Scalar SAR summation < 1.6W/kg for 1g SAR and scalar SAR summation < 4.0W/kg for 10g SAR.
   ii) SPLSR = (SAR1 + SAR2)^1.5 / (min. separation distance, mm), and the peak separation distance is determined from the square root of [(x1-x2)2 + (y1-y2)2 + (z1-z2)2], where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
   iii) If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary.
   iv) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.
5. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01v06 based on the formula below.
   i) (*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]·[√f(GHz)/*x*] W/kg for *test separation distances* ≤ 50 mm; where *x* = 7.5 for 1-g SAR, and *x* = 18.75 for 10-g SAR.
   ii) When the minimum separation distance is < 5mm, the distance is used 5mm to determine SAR test exclusion.
   iii) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the *test separation distances* is > 50 mm.

Bluetooth Max Power	Exposure Position	Head 1g SAR	Extremity 10g SAR
	Test separation	101 mm	101 mm
13 dBm	Estimated SAR (W/kg)	0.042 W/kg	0.017 W/kg

15.1 Head Exposure Conditions

Exposure Position	1	2	3	4	5	1+2+5 Summed 1g SAR (W/kg)	3+4+5 Summed 1g SAR (W/kg)
	2.4GHz WLAN Ant.1	2.4GHz WLAN Ant.2	5GHz WLAN Ant.1	5GHz WLAN Ant.2	Bluetooth		
	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	Estimated 1g SAR (W/kg)		
Near to Head	0.399	0.414	0.505	0.229	0.042	0.86	0.78

15.2 Extremity 10g SAR Exposure Conditions

Exposure Position	1	2	3	4	5	1+2+5 Summed 1g SAR (W/kg)	3+4+5 Summed 1g SAR (W/kg)
	2.4GHz WLAN Ant.1	2.4GHz WLAN Ant.2	5GHz WLAN Ant.1	5GHz WLAN Ant.2	Bluetooth		
	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	Estimated 10g SAR (W/kg)		
Right/Left Side	0.417	0.356	0.142	0.269	0.017	0.79	0.43

Test Engineer: Nick Hu

16. Uncertainty Assessment

Pre KDB 865664 D01 SAR measurement 100MHz to 6GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be ≤ 30%, for a confidence interval of k = 2. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. For this device, the highest measured 1-g SAR is less 1.5W/kg and highest measured 10-g SAR is less 3.75W/kg. Therefore, the measurement uncertainty table is not required in this report.

17. References

[1] FCC 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”, September 1992

[3] IEEE Std. 1528-2013, “IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, Sep 2013

[4] SPEAG DASY System Handbook

[5] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015

[6] FCC KDB 865664 D02 v01r02, “RF Exposure Compliance Reporting and Documentation Considerations” Oct 2015

[7] FCC KDB 447498 D01 v06, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, Oct 2015

[8] FCC KDB 248227 D01 v02r02, “SAR Guidance for IEEE 802.11 (WiFi) Transmitters”, Oct 2015.

Appendix A. Plots of System Performance Check

The plots are shown as follows.

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.11.30

System Check_Head_2450MHz

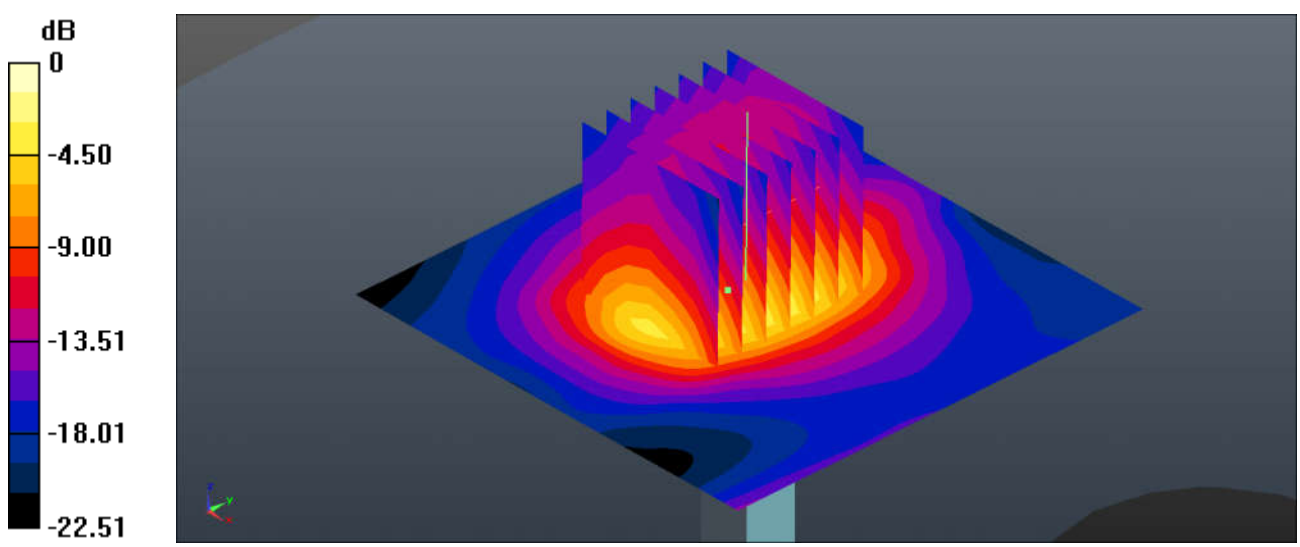
DUT: D2450V2 - SN:924

Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: HSL_2450 Medium parameters used: f = 2450 MHz; σ = 1.806 S/m; ε_r = 38.913; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: ES3DV3 - SN3293; ConvF(4.73, 4.73, 4.73); Calibrated: 2017.9.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1326; Calibrated: 2017.9.15
- Phantom: SAM1; Type: SAM; Serial: TP-1842
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (71x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 21.4 W/kg

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 86.03 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 28.8 W/kg
SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.02 W/kg
Maximum value of SAR (measured) = 20.8 W/kg



0 dB = 20.8 W/kg = 13.18 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.12.5

System Check_Head_5250MHz

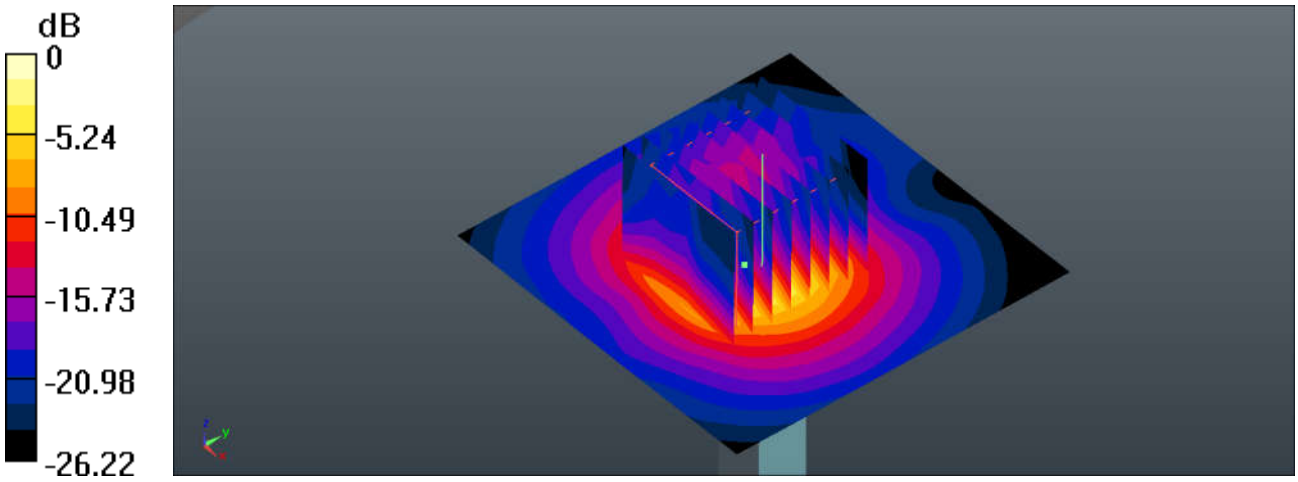
DUT: D5GHzV2-SN:1113

Communication System: UID 0, CW (0); Frequency: 5250 MHz;Duty Cycle: 1:1
Medium: HSL_5000 Medium parameters used: f = 5250 MHz; σ = 4.872 S/m; ε_r = 35.364; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.39, 5.39, 5.39); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

CW/Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 17.5 W/kg

CW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 42.51 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 30.3 W/kg
SAR(1 g) = 7.15 W/kg; SAR(10 g) = 2.09 W/kg
Maximum value of SAR (measured) = 17.4 W/kg



0 dB = 17.4 W/kg = 12.41 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.12.5

System Check_Head_5600MHz

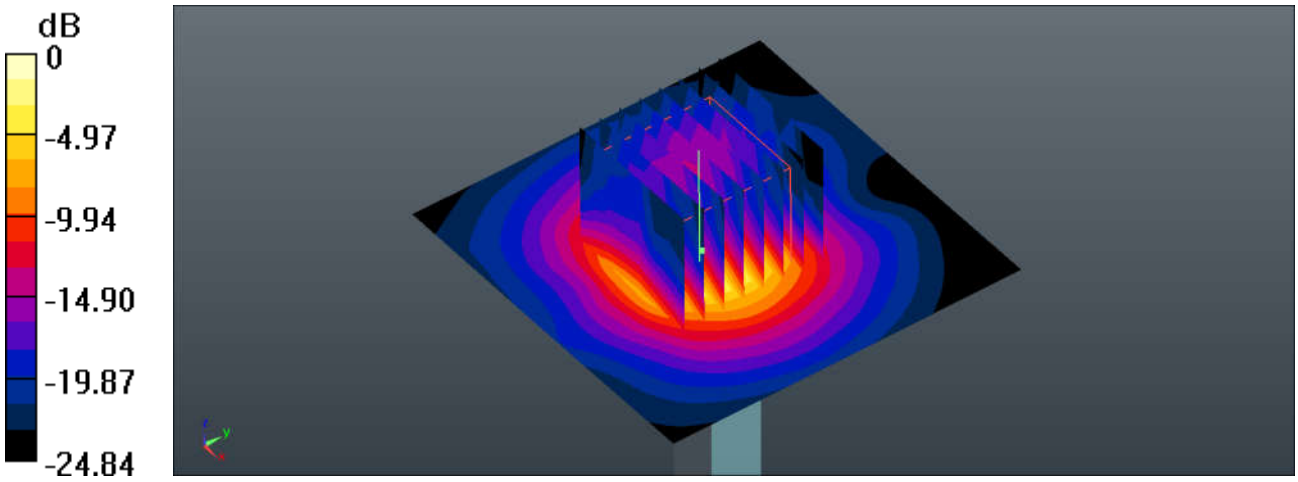
DUT: D5GHzV2-SN:1113

Communication System: UID 0, CW (0); Frequency: 5600 MHz;Duty Cycle: 1:1
Medium: HSL_5000 Medium parameters used: f = 5600 MHz; σ = 5.229 S/m; ε_r = 34.698; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.04, 5.04, 5.04); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

CW/Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 18.7 W/kg

CW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 39.44 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 29.7 W/kg
SAR(1 g) = 8.07 W/kg; SAR(10 g) = 2.22 W/kg
Maximum value of SAR (measured) = 18.4 W/kg



0 dB = 18.4 W/kg = 12.65 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.12.5

System Check_Head_5750MHz

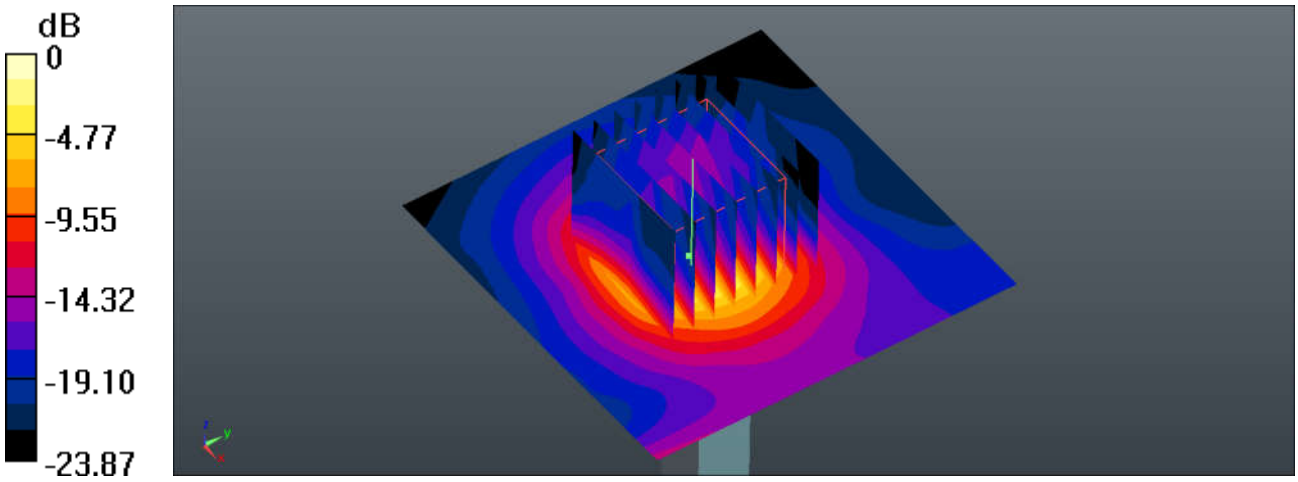
DUT: D5GHzV2-SN:1113

Communication System: UID 0, CW (0); Frequency: 5750 MHz;Duty Cycle: 1:1
Medium: HSL_5000 Medium parameters used: f = 5750 MHz; σ = 5.389 S/m; ε_r = 34.46; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃； Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.34, 5.34, 5.34); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

CW/Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 17.1 W/kg

CW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 36.93 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 28.9 W/kg
SAR(1 g) = 7.59 W/kg; SAR(10 g) = 2.37 W/kg
Maximum value of SAR (measured) = 17.5 W/kg



0 dB = 17.5 W/kg = 12.43 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.12.6

System Check_Body_2450MHz

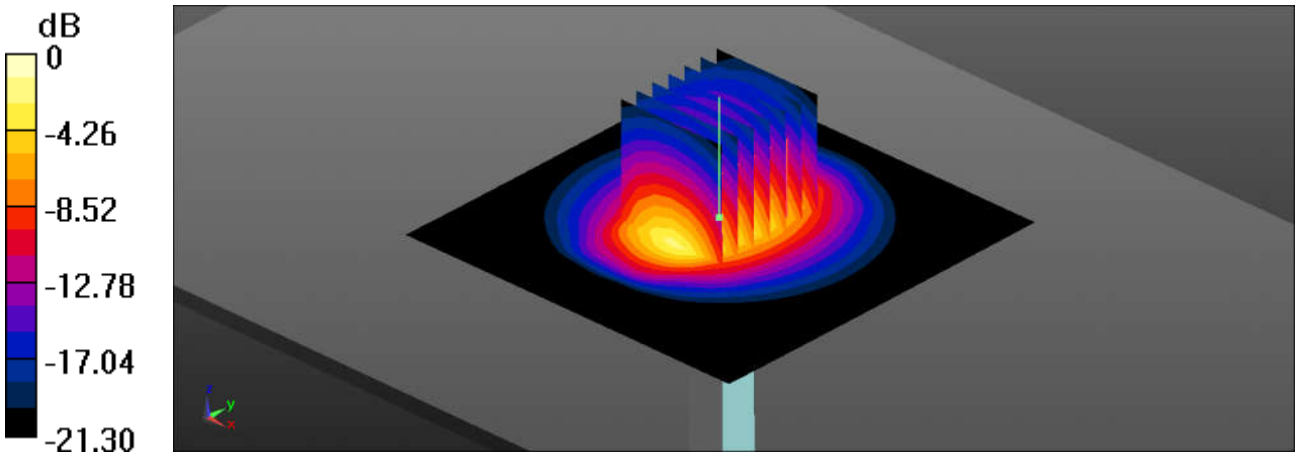
DUT: D2450V2 - SN:924

Communication System: UID 0, CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: MSL_2450 Medium parameters used: f = 2450 MHz; σ = 2.011 S/m; ε_r = 54.103; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃； Liquid Temperature：22.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(7.7, 7.7, 7.7); Calibrated: 2017.5.26;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM1; Type: SAM; Serial: TP-1164
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (81x81x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 19.3 W/kg

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 70.24 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 25.9 W/kg
SAR(1 g) = 12.8 W/kg; SAR(10 g) = 6.04 W/kg
Maximum value of SAR (measured) = 19.4 W/kg



0 dB = 19.4 W/kg = 12.88 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.12.5

System Check_Body_5600MHz

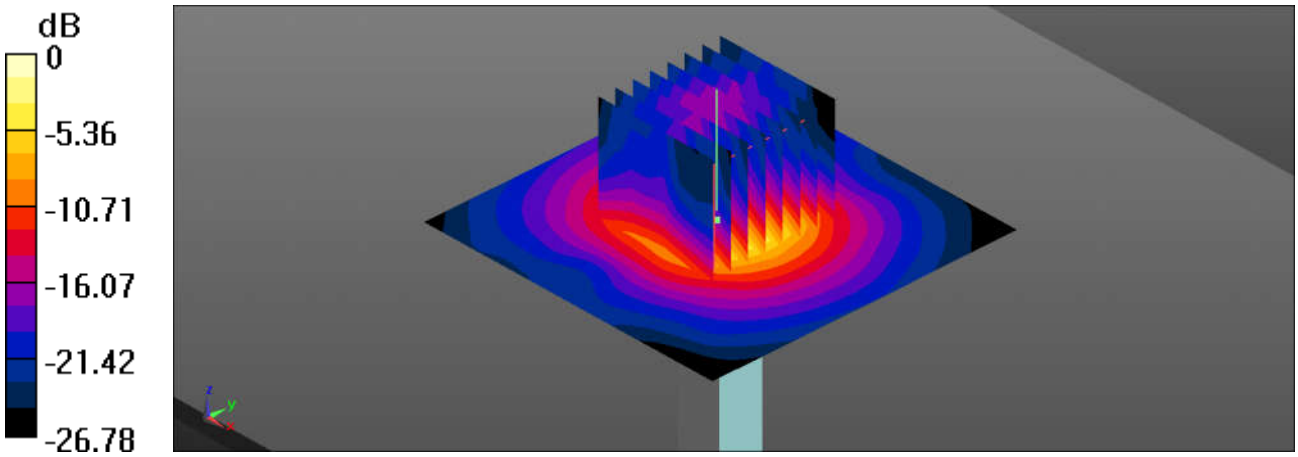
DUT: D5GHzV2-SN:1113

Communication System: UID 0, CW (0); Frequency: 5600 MHz;Duty Cycle: 1:1
Medium: MSL_5000 Medium parameters used: f = 5600 MHz; σ = 5.96 S/m; ε_r = 47.221; ρ = 1000 kg/m^3
Ambient Temperature：23.4 ℃; Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(4.01, 4.01, 4.01); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM1; Type: SAM; Serial: TP-1164
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

CW/Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 21.3 W/kg

CW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 43.01 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 32.8 W/kg
SAR(1 g) = 7.91 W/kg; SAR(10 g) = 2.18 W/kg
Maximum value of SAR (measured) = 20.8 W/kg



0 dB = 20.8 W/kg = 13.18 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.12.6

System Check_Body_5750MHz

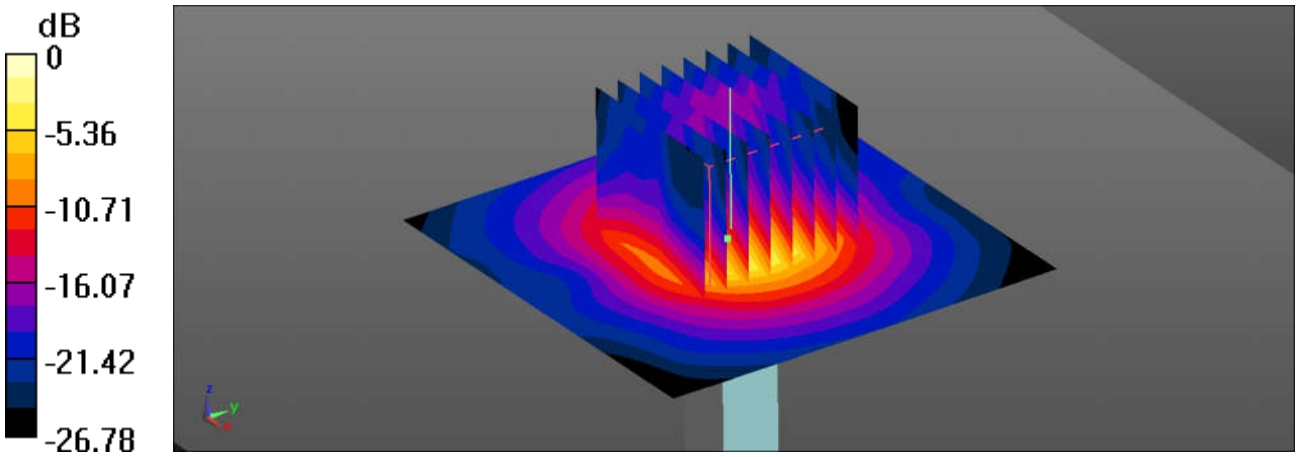
DUT: D5GHzV2-SN:1113

Communication System: UID 0, CW (0); Frequency: 5750 MHz;Duty Cycle: 1:1
Medium: MSL_5000 Medium parameters used: f = 5750 MHz; σ = 6.169 S/m; ε_r = 46.936; ρ = 1000 kg/m^3
Ambient Temperature：23.4 ℃； Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(4.31, 4.31, 4.31); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM1; Type: SAM; Serial: TP-1164
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

CW/Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 20.6 W/kg

CW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 41.49 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 31.6 W/kg
SAR(1 g) = 7.76 W/kg; SAR(10 g) = 2.06 W/kg
Maximum value of SAR (measured) = 20.0 W/kg



0 dB = 20.0 W/kg = 13.01 dBW/kg

Appendix B. Plots of High SAR Measurement

The plots are shown as follows.

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.11.30

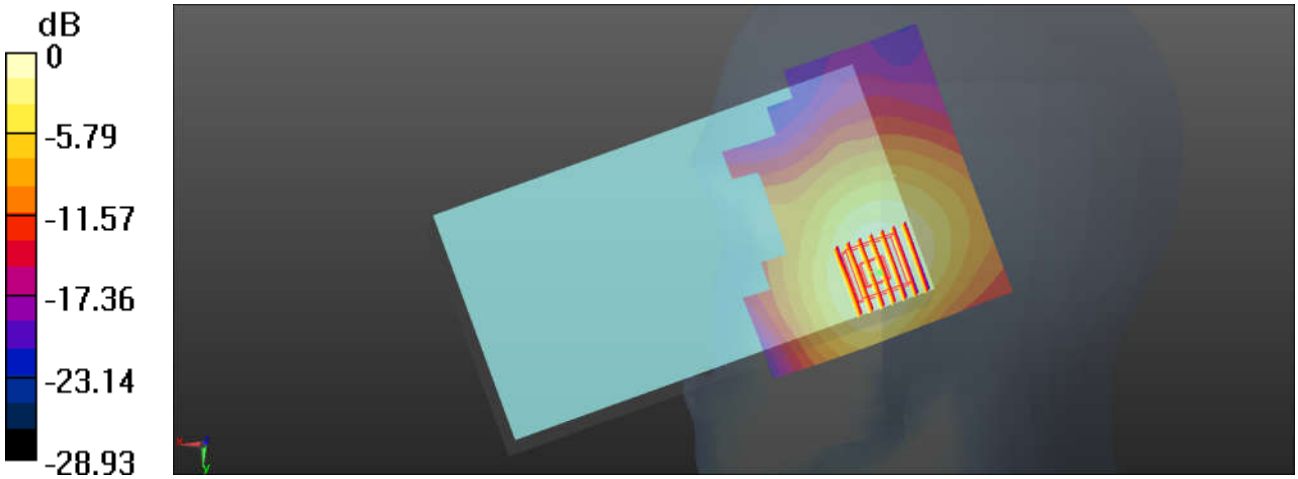
#01_WLAN2.4GHz_802.11b 1Mbps_Near to Head_0mm_Ant 1_Ch6

Communication System: UID 0, WIFI (0); Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: HSL_2450 Medium parameters used: f = 2437 MHz; σ = 1.79 S/m; ε_r = 38.961; ρ = 1000$_{kg/m^3}$
Ambient Temperature：23.2 ℃； Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: ES3DV3 - SN3293; ConvF(4.73, 4.73, 4.73); Calibrated: 2017.9.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1326; Calibrated: 2017.9.15
- Phantom: SAM1; Type: SAM; Serial: TP-1842
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch6/Area Scan (101x191x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.421 W/kg

Ch6/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.075 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.516 W/kg
SAR(1 g) = 0.292 W/kg; SAR(10 g) = 0.161 W/kg
Maximum value of SAR (measured) = 0.402 W/kg



0 dB = 0.402 W/kg = -3.96 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.11.30

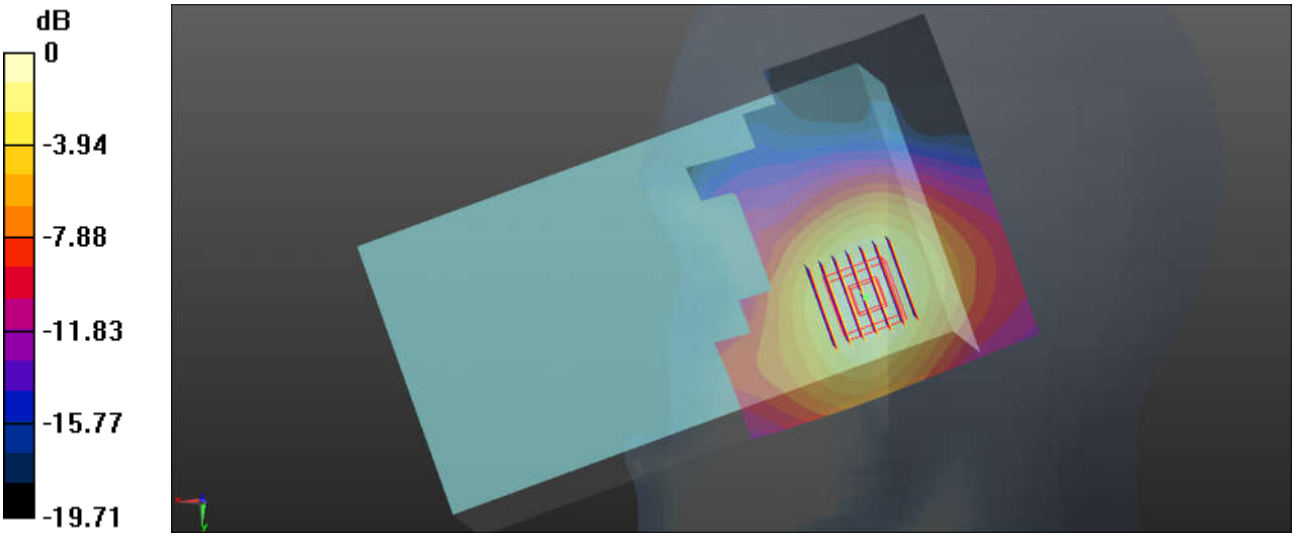
#02_WLAN2.4GHz_802.11b 1Mbps_Near to Head_0mm_Ant 2_Ch1

Communication System: UID 0, WIFI (0); Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: HSL_2450 Medium parameters used: f = 2412 MHz; σ = 1.761 S/m; ε_r = 39.057; ρ = 1000$_{kg/m^3}$
Ambient Temperature：23.2 ℃; Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: ES3DV3 - SN3293; ConvF(4.73, 4.73, 4.73); Calibrated: 2017.9.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1326; Calibrated: 2017.9.15
- Phantom: SAM1; Type: SAM; Serial: TP-1842
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch1/Area Scan (101x191x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.389 W/kg

Ch1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.961 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.505 W/kg
SAR(1 g) = 0.279 W/kg; SAR(10 g) = 0.154 W/kg
Maximum value of SAR (measured) = 0.391 W/kg



0 dB = 0.391 W/kg = -4.08 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.12.5

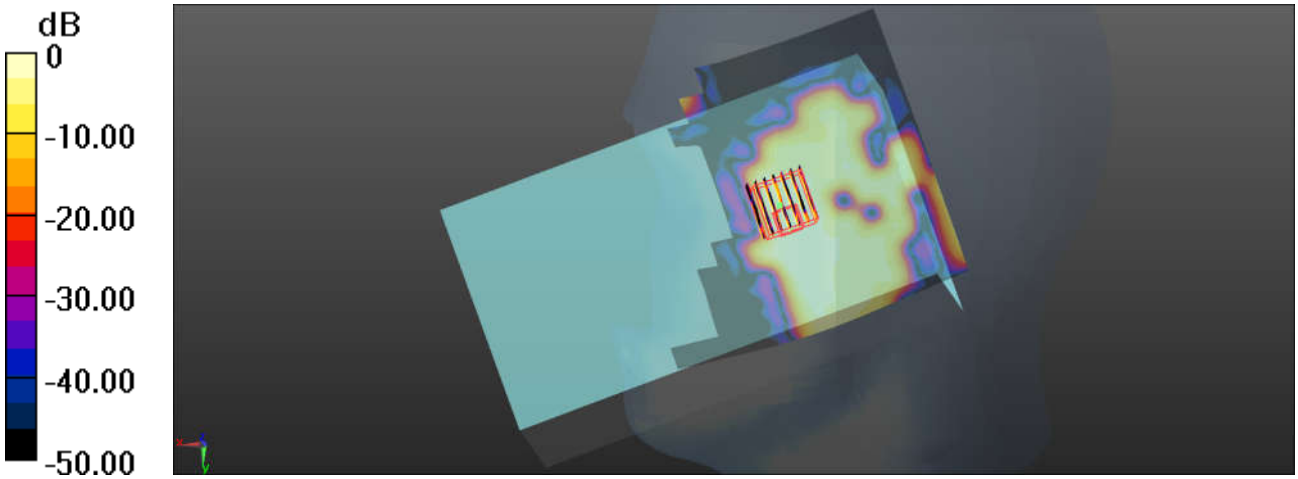
#03_WLAN 5.3GHz_802.11a 6Mbps_Near to Head_0mm_Ant 1_Ch64

Communication System: UID 0, WIFI (0); Frequency: 5320 MHz;Duty Cycle: 1:1.054
Medium: HSL_5000 Medium parameters used: f = 5320 MHz; σ = 4.937 S/m; ε_r = 35.227; ρ = 1000$_{kg/m^3}$
Ambient Temperature：23.3 ℃； Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.39, 5.39, 5.39); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch64/Area Scan (121x211x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.666 W/kg

Ch64/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 3.479 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.517 W/kg
SAR(1 g) = 0.147 W/kg; SAR(10 g) = 0.048 W/kg
Maximum value of SAR (measured) = 0.349 W/kg



0 dB = 0.349 W/kg = -4.57 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.12.5

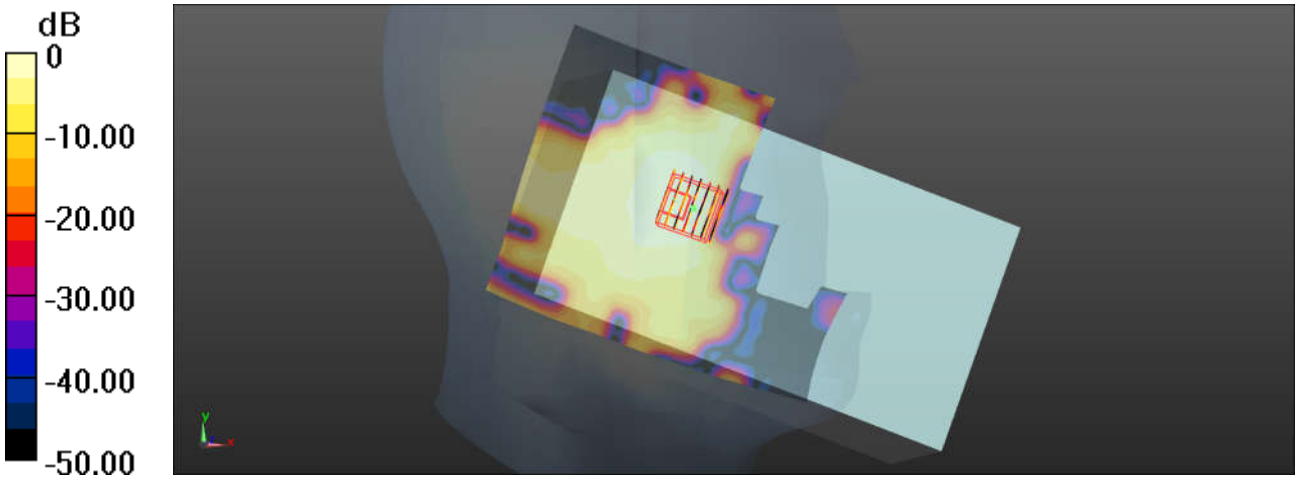
#04_WLAN5.3GHz_802.11a 6Mbps_Near to Head_0mm_Ant 2_Ch64

Communication System: UID 0, WIFI (0); Frequency: 5320 MHz;Duty Cycle: 1:1.051
Medium: HSL_5000 Medium parameters used: f = 5320 MHz; σ = 4.937 S/m; ε_r = 35.227; ρ = 1000$_{kg/m^3}$
Ambient Temperature：23.3 ℃； Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.39, 5.39, 5.39); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch64/Area Scan (121x211x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.361 W/kg

Ch64/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 2.510 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.467 W/kg
SAR(1 g) = 0.133 W/kg; SAR(10 g) = 0.043 W/kg
Maximum value of SAR (measured) = 0.299 W/kg



0 dB = 0.299 W/kg = -5.24 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.12.5

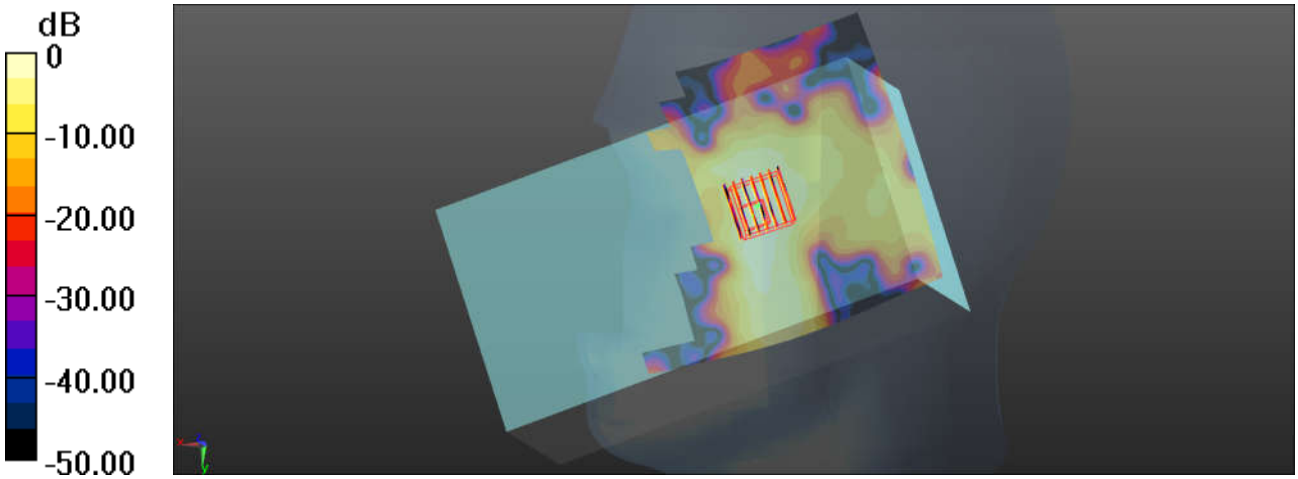
#05_WLAN5.5GHz_802.11a 6Mbps_Near to Head_0mm_Ant 1_Ch140

Communication System: UID 0, WIFI (0); Frequency: 5700 MHz;Duty Cycle: 1:1.054
Medium: HSL_5000 Medium parameters used: f = 5700 MHz; σ = 5.332 S/m; ε_r = 34.493; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.04, 5.04, 5.04); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch140/Area Scan (121x211x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.807 W/kg

Ch140/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 2.913 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 1.08 W/kg
SAR(1 g) = 0.317 W/kg; SAR(10 g) = 0.106 W/kg
Maximum value of SAR (measured) = 0.704 W/kg



0 dB = 0.704 W/kg = -1.52 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.12.5

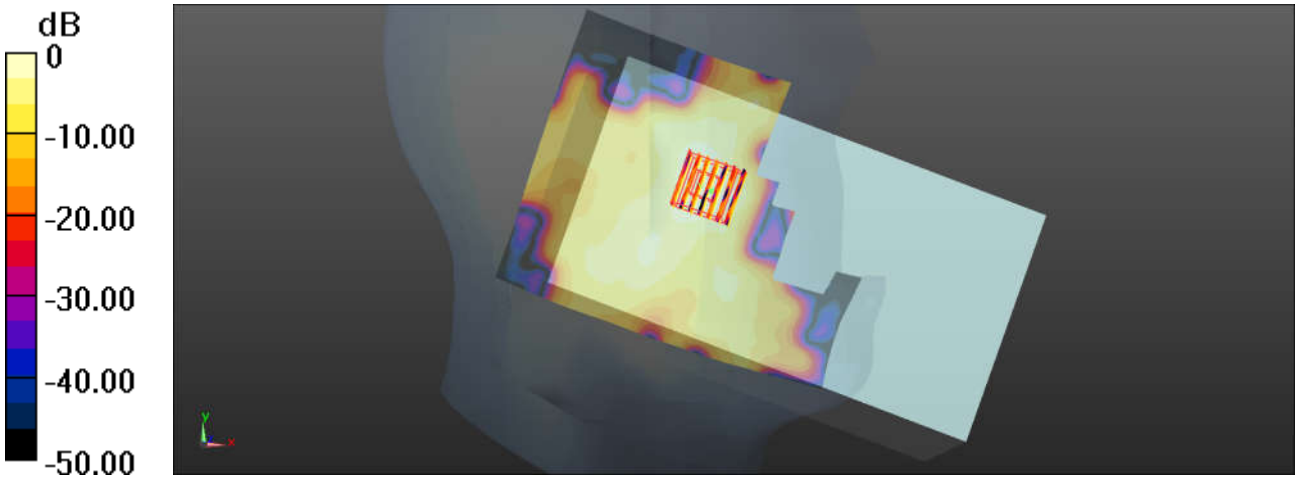
#06_WLAN5.5GHz_802.11a 6Mbps_Near to Head_0mm_Ant 2_Ch140

Communication System: UID 0, WIFI (0); Frequency: 5700 MHz;Duty Cycle: 1:1.051
Medium: HSL_5000 Medium parameters used: f = 5700 MHz; σ = 5.332 S/m; ε_r = 34.493; ρ = 1000$_{kg/m^3}$
Ambient Temperature：23.3 ℃； Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.04, 5.04, 5.04); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch140/Area Scan (121x211x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.504 W/kg

Ch140/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 3.201 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.730 W/kg
SAR(1 g) = 0.191 W/kg; SAR(10 g) = 0.068 W/kg
Maximum value of SAR (measured) = 0.456 W/kg



0 dB = 0.456 W/kg = -3.41 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.12.5

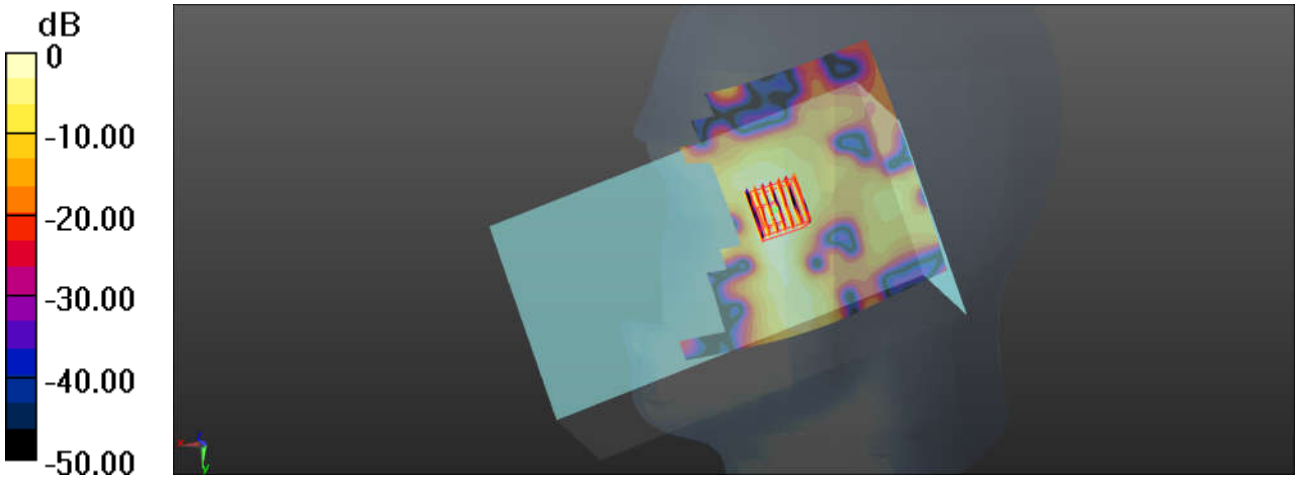
#07_WLAN5.8GHz_802.11a 6Mbps_Near to Head_0mm_Ant 1_Ch165

Communication System: UID 0, WIFI (0); Frequency: 5825 MHz;Duty Cycle: 1:1.054
Medium: HSL_5000 Medium parameters used: f = 5825 MHz; σ = 5.446 S/m; ε_r = 34.208; ρ = 1000$_{kg/m^3}$
Ambient Temperature：23.3 ℃； Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.34, 5.34, 5.34); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch165/Area Scan (121x211x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.784 W/kg

Ch165/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 3.191 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 1.26 W/kg
SAR(1 g) = 0.346 W/kg; SAR(10 g) = 0.110 W/kg
Maximum value of SAR (measured) = 0.804 W/kg



0 dB = 0.804 W/kg = -0.95 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.12.5

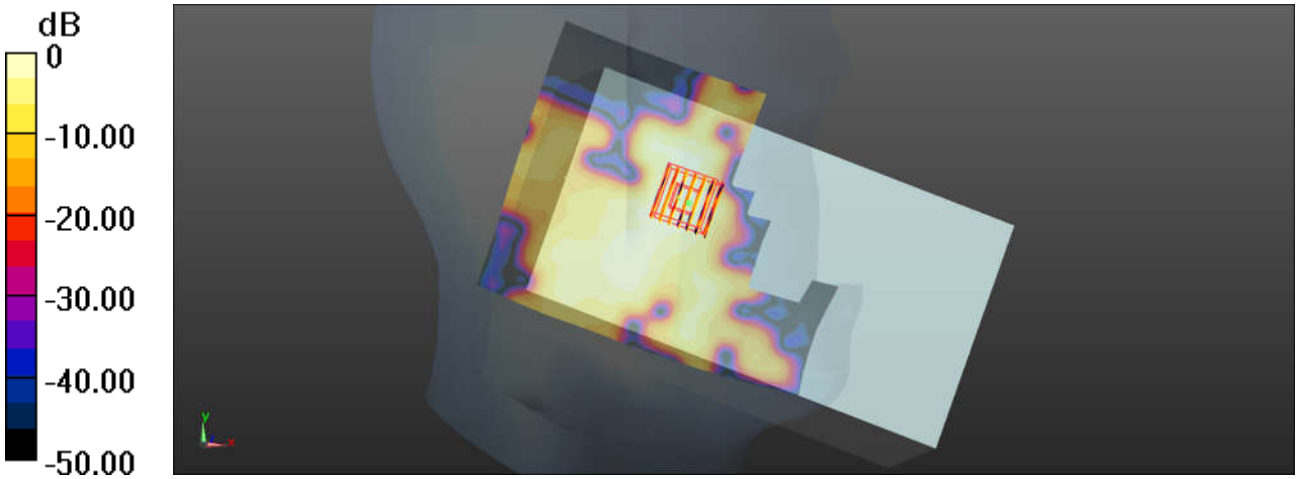
#08_WLAN5.8GHz_802.11a 6Mbps_Near to Head_0mm_Ant 2_Ch157

Communication System: UID 0, WIFI (0); Frequency: 5785 MHz;Duty Cycle: 1:1.051
Medium: HSL_5000 Medium parameters used: f = 5785 MHz; σ = 5.411 S/m; ε_r = 34.363; ρ = 1000$_{kg/m^3}$
Ambient Temperature：23.3 ℃； Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.34, 5.34, 5.34); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch157/Area Scan (121x211x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.399 W/kg

Ch157/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 2.717 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.612 W/kg
SAR(1 g) = 0.137 W/kg; SAR(10 g) = 0.045 W/kg
Maximum value of SAR (measured) = 0.332 W/kg



0 dB = 0.332 W/kg = -4.79 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.12.6

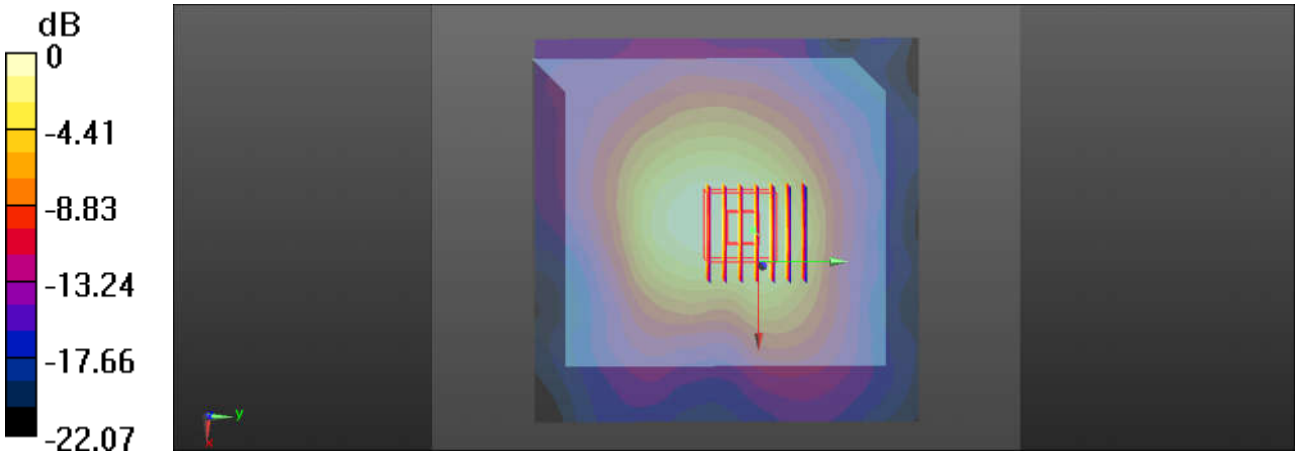
#09_WLAN2.4GHz_802.11b 1Mbps_Right Side_0mm_Ant 1_Ch6

Communication System: UID 0, WIFI (0); Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: MSL_2450 Medium parameters used: f = 2437 MHz; σ = 1.992 S/m; ε_r = 54.149; ρ = 1000$_{kg/m^3}$
Ambient Temperature：23.3 ℃; Liquid Temperature：22.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(7.7, 7.7, 7.7); Calibrated: 2017.5.26;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM1; Type: SAM; Serial: TP-1164
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch6/Area Scan (101x101x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.762 W/kg

Ch6/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.98 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.903 W/kg
SAR(1 g) = 0.537 W/kg; SAR(10 g) = 0.307 W/kg
Maximum value of SAR (measured) = 0.724 W/kg



0 dB = 0.724 W/kg = -1.40 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.12.6

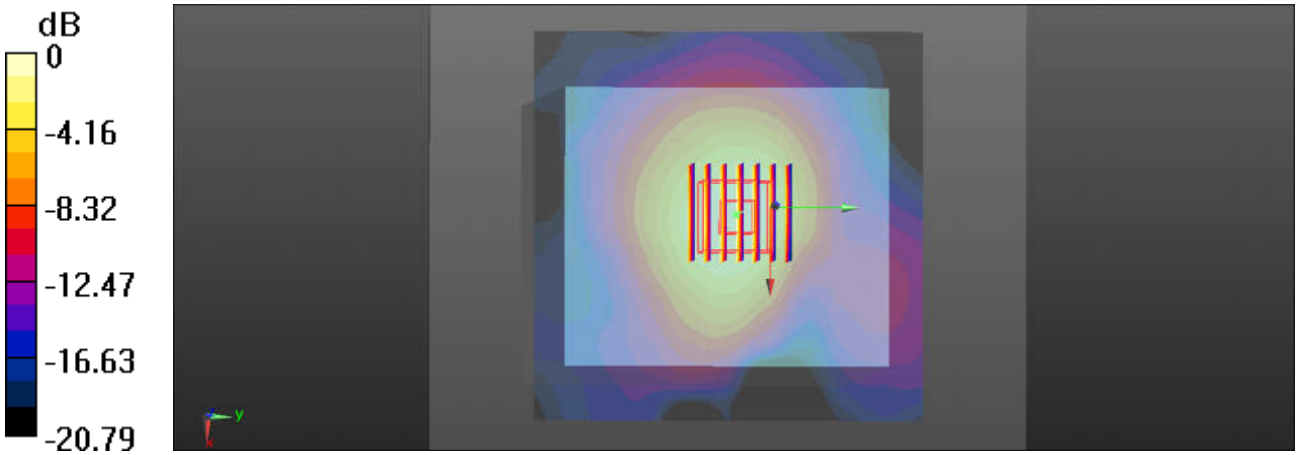
#10_WLAN2.4GHz_802.11b 1Mbps_Left Side_0mm_Ant 2_Ch6

Communication System: UID 0, WIFI (0); Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: MSL_2450 Medium parameters used: f = 2437 MHz; σ = 1.992 S/m; ε_r = 54.149; ρ = 1000$_{kg/m^3}$
Ambient Temperature：23.3 ℃； Liquid Temperature：22.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(7.7, 7.7, 7.7); Calibrated: 2017.5.26;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM1; Type: SAM; Serial: TP-1164
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch6/Area Scan (101x101x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.579 W/kg

Ch6/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.12 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.746 W/kg
SAR(1 g) = 0.423 W/kg; SAR(10 g) = 0.236 W/kg
Maximum value of SAR (measured) = 0.583 W/kg



0 dB = 0.583 W/kg = -2.34 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.12.6

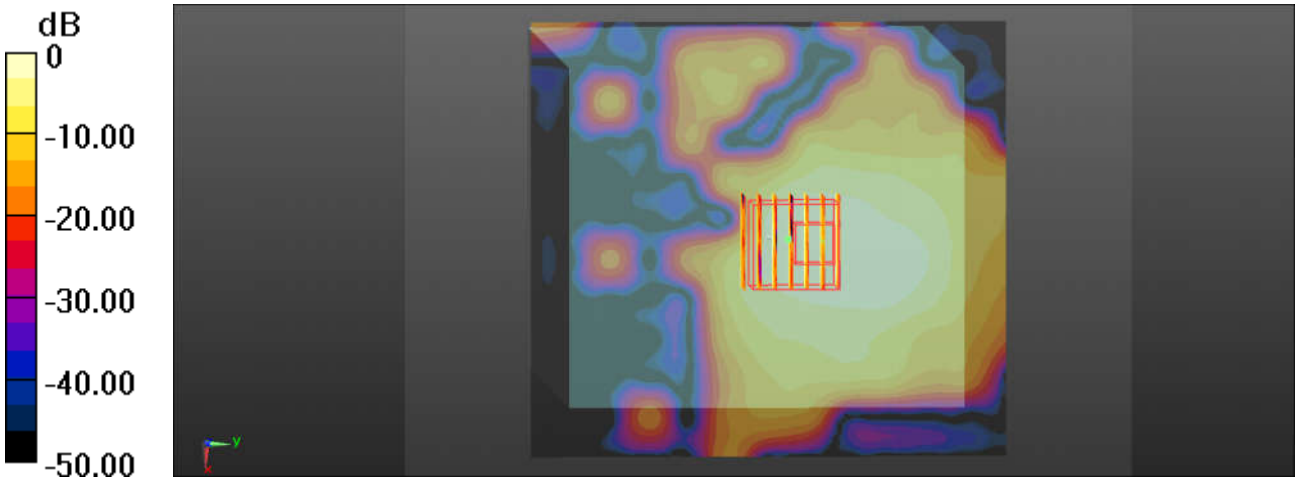
#11_WLAN5GHz_Band4 802.11a 6Mbps_Right Side_0mm_Ant 1_Ch149

Communication System: UID 0, WIFI (0); Frequency: 5745 MHz;Duty Cycle: 1:1.054
Medium: MSL_5000 Medium parameters used: f = 5745 MHz; σ = 6.159 S/m; ε_r = 46.943; ρ = 1000 kg/m^3
Ambient Temperature：23.4 ℃； Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(4.31, 4.31, 4.31); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM1; Type: SAM; Serial: TP-1164
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch149/Area Scan (111x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.741 W/kg

Ch149/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 8.456 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 1.04 W/kg
SAR(1 g) = 0.261 W/kg; SAR(10 g) = 0.094 W/kg
Maximum value of SAR (measured) = 0.622 W/kg



0 dB = 0.622 W/kg = -2.06 dBW/kg

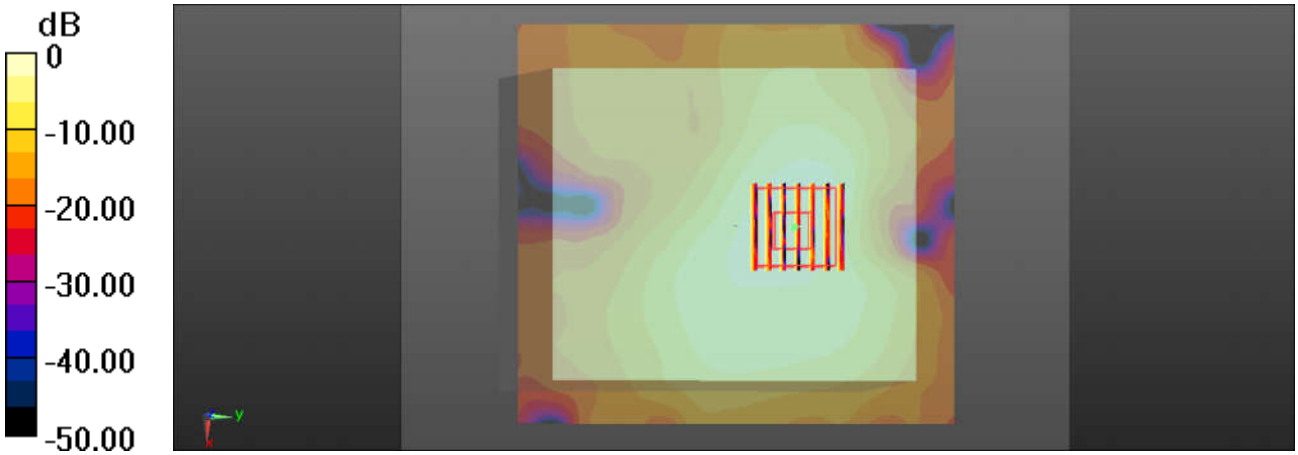
#12_WLAN5.5GHz_802.11a 6Mbps_Left Side_0mm_Ant 2_Ch140

Communication System: UID 0, WIFI (0); Frequency: 5700 MHz;Duty Cycle: 1:1.051
Medium: MSL_5000 Medium parameters used: f = 5700 MHz; σ = 6.102 S/m; ε_r = 47.063; ρ = 1000$_{kg/m^3}$
Ambient Temperature：23.4 ℃； Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(4.01, 4.01, 4.01); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM1; Type: SAM; Serial: TP-1164
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch140/Area Scan (111x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.40 W/kg

Ch140/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 9.850 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 2.27 W/kg
SAR(1 g) = 0.590 W/kg; SAR(10 g) = 0.224 W/kg
Maximum value of SAR (measured) = 1.37 W/kg



0 dB = 1.37 W/kg = 1.37 dBW/kg

Appendix C. DASY Calibration Certificate

The DASY calibration certificates are shown as follows.

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CNAS L0570

Client **Sporton_SZ** **Certificate No: Z17-97044**

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 924
Calibration Procedure(s)	FD-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	March 21, 2017

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
Power sensor NRP-Z91	101547	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
Reference Probe EX3DV4	SN 3617	23-Jan-17(SPEAG,No.EX3-3617_Jan17)	Jan-18
DAE4	SN 777	22-Aug-16(CTTL-SPEAG,No.Z16-97138)	Aug-17
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	13-Jan-17 (CTTL, No.J17X00286)	Jan-18
Network Analyzer E5071C	MY46110673	13-Jan-17 (CTTL, No.J17X00285)	Jan-18

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: March 25, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.

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Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY52	52.8.8.1258
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.0 ± 6 %	1.77 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**52.4 mW /g ± 20.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.04 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**24.3 mW /g ± 20.4 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.3 ± 6 %	1.93 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.6 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**50.5 mW /g ± 20.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.86 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**23.5 mW /g ± 20.4 % (k=2)**

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.9Ω+ 3.77jΩ
Return Loss	- 28.3dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.3Ω+ 4.18jΩ
Return Loss	- 26.8dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.260 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG

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DASY5 Validation Report for Head TSL Date: 03.21.2017

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 924

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: f = 2450 MHz; σ = 1.768 S/m; εr = 39.02; ρ = 1000 kg/m3

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(7.74, 7.74, 7.74); Calibrated: 1/23/2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn777; Calibrated: 8/22/2016
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

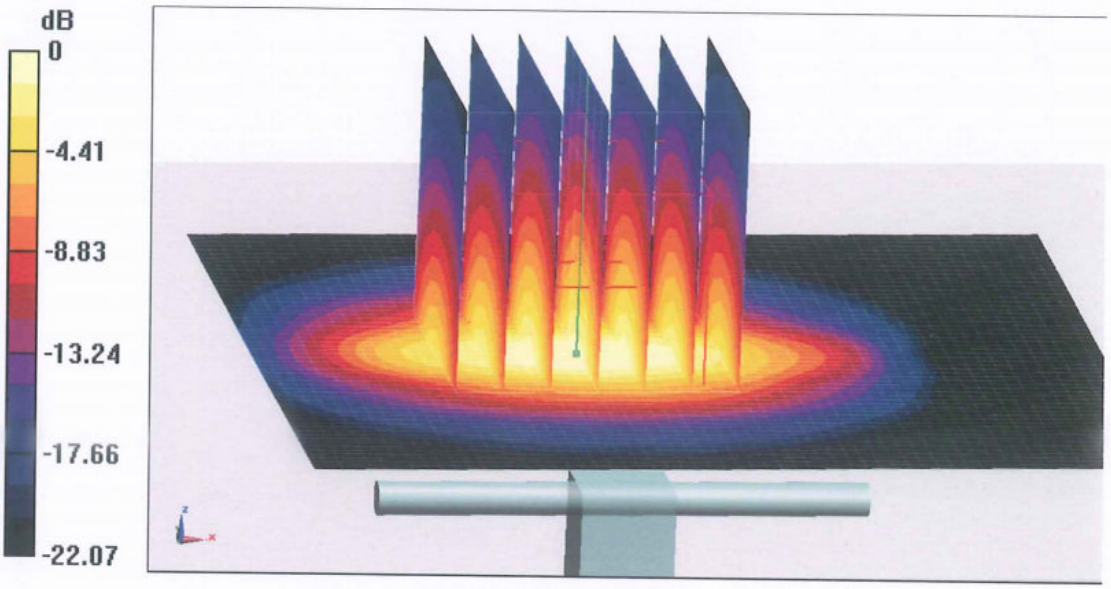
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 103.8 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 27.0 W/kg

SAR(1 g) = 13 W/kg; SAR(10 g) = 6.04 W/kg

Maximum value of SAR (measured) = 21.7 W/kg



0 dB = 21.7 W/kg = 13.36 dBW/kg

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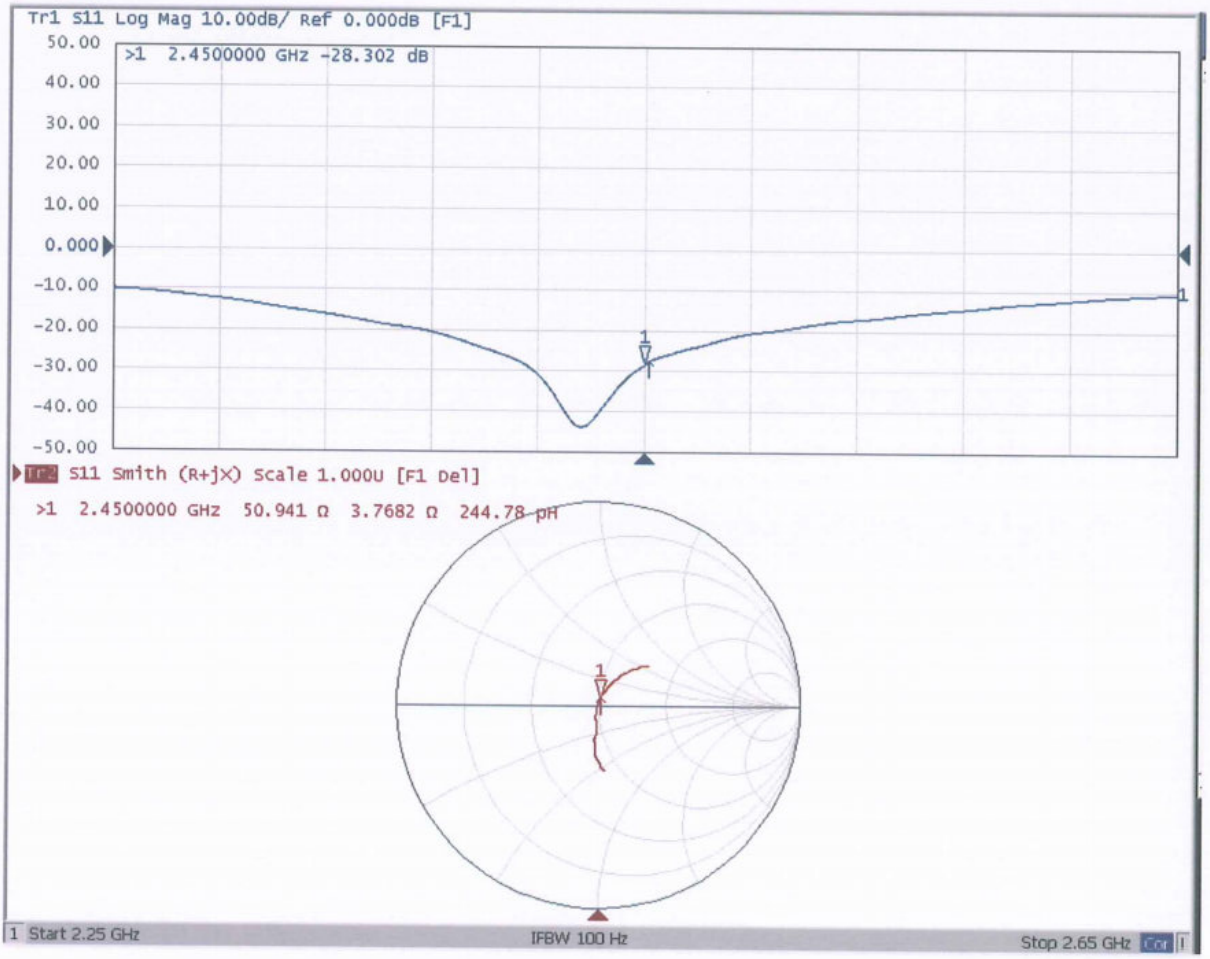
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL Date: 03.21.2017

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 924

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: f = 2450 MHz; σ = 1.931 S/m; ε_r = 52.27; ρ = 1000 kg/m^3

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(7.8, 7.8, 7.8); Calibrated: 1/23/2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn777; Calibrated: 8/22/2016
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

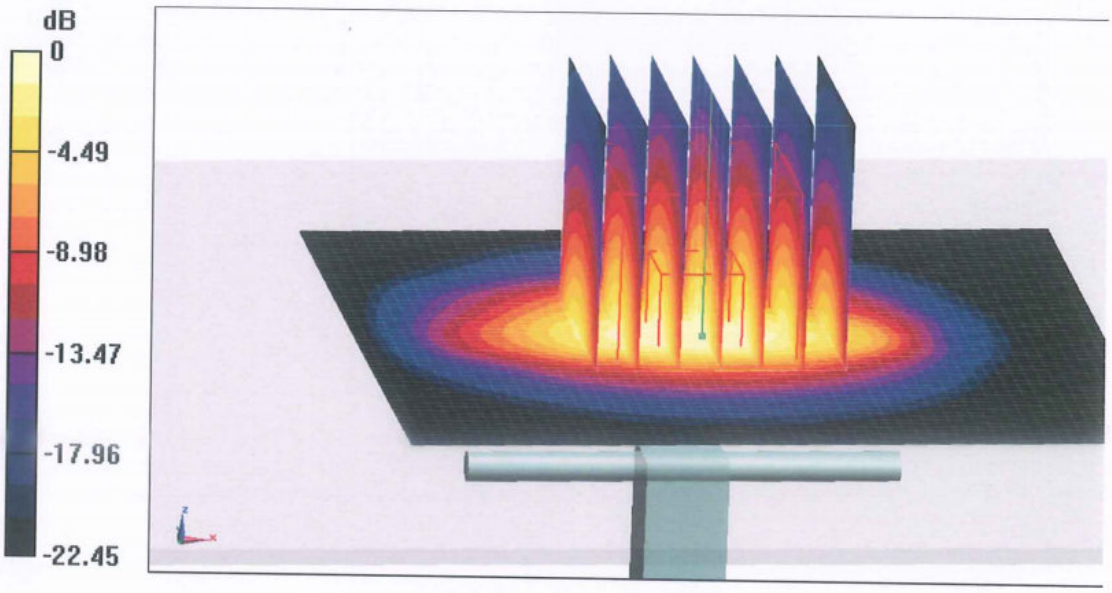
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.48 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 26.4 W/kg

SAR(1 g) = 12.6 W/kg; SAR(10 g) = 5.86 W/kg

Maximum value of SAR (measured) = 20.9 W/kg



0 dB = 20.9 W/kg = 13.20 dBW/kg

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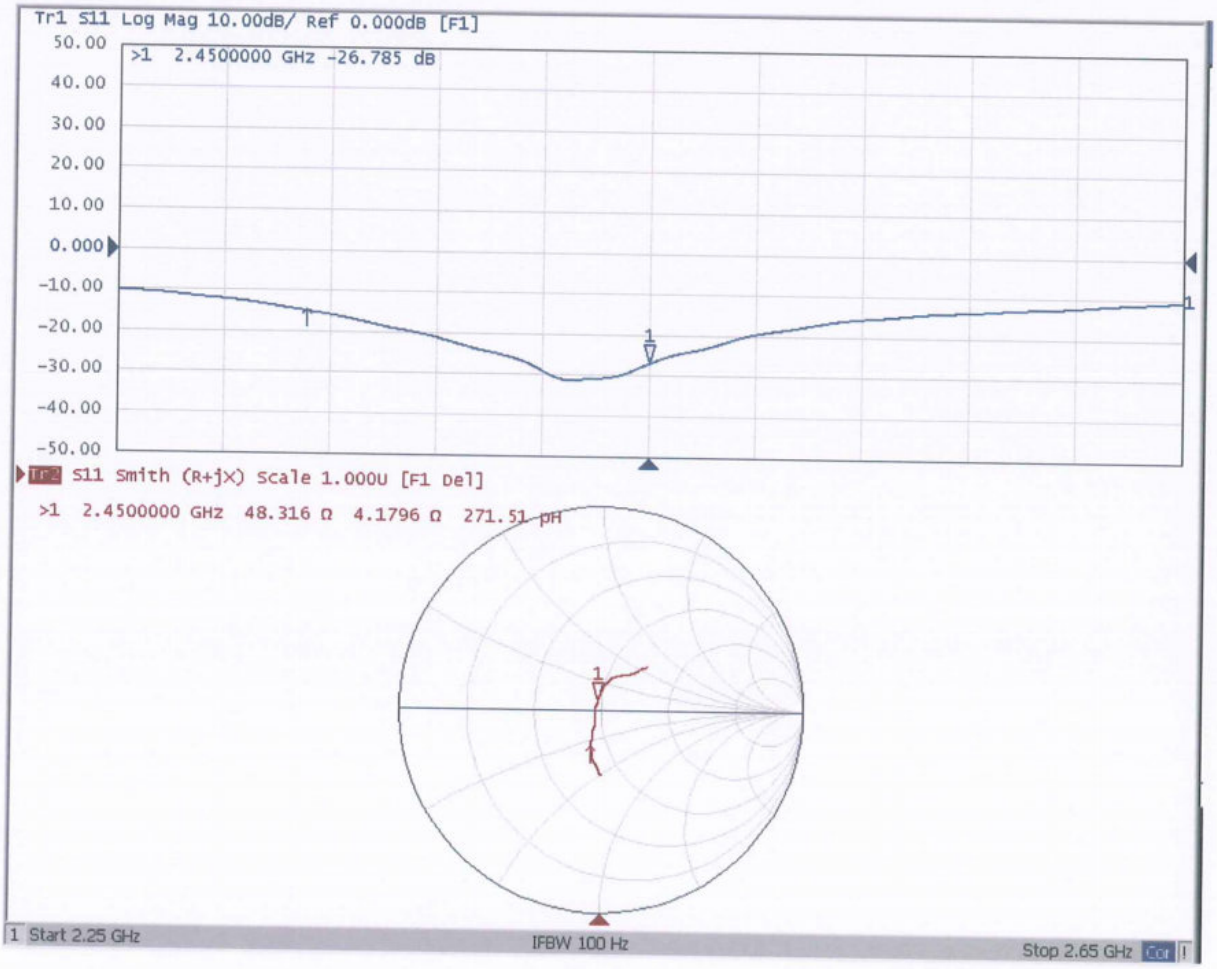
Impedance Measurement Plot for Body TSL



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CNAS L0570

Client **Sporton-CN** **Certificate No: Z16-97234**

CALIBRATION CERTIFICATE

Object	D5GHzV2 - SN: 1113
Calibration Procedure(s)	FD-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	December 13, 2016

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
Power sensor NRP-Z91	101547	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
ReferenceProbe EX3DV4	SN 7307	19-Feb-16(SPEAG,No.EX3-7307_Feb16)	Feb-17
DAE4	SN 771	02-Feb-16(CTTL-SPEAG,No.Z16-97011)	Feb-17
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	01-Feb-16 (CTTL, No.J16X00893)	Jan-17
NetworkAnalyzer E5071C	MY46110673	26-Jan-16 (CTTL, No.J16X00894)	Jan-17

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: December 15, 2016

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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005

c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010

d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.

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Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY52	52.8.8.1258
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz	

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	36.3 ± 6 %	4.72 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.62 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**76.4 mW /g ± 23.0 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	100 mW input power	2.17 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**21.8 mW /g ± 22.2 % (k=2)**

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Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.5 ± 6 %	5.17 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.07 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**80.8 mW /g ± 23.0 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	100 mW input power	2.30 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**23.0 mW /g ± 22.2 % (k=2)**

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.2 ± 6 %	5.37 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.03 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**80.3 mW /g ± 23.0 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	100 mW input power	2.28 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**22.8 mW /g ± 22.2 % (k=2)**

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Body TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.36 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.9 ± 6 %	5.44 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.63 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**76.1 mW /g ± 23.0 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	100 mW input power	2.16 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**21.5 mW /g ± 22.2 % (k=2)**

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	48.9 ± 6 %	5.74 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.97 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**79.8 mW /g ± 23.0 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	100 mW input power	2.25 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**22.6 mW /g ± 22.2 % (k=2)**

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Body TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.3	5.94 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	48.7 ± 6 %	5.91 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL at 5750 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.51 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**75.2 mW /g ± 23.0 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	100 mW input power	2.11 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**21.1 mW /g ± 22.2 % (k=2)**

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Appendix

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	51.2Ω - 5.57jΩ
Return Loss	- 25.0dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	57.9Ω - 0.17jΩ
Return Loss	- 22.7dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	53.2Ω - 0.30jΩ
Return Loss	- 30.3dB

Antenna Parameters with Body TSL at 5250 MHz

Impedance, transformed to feed point	52.0Ω - 4.21jΩ
Return Loss	- 26.8dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	56.3Ω + 4.48jΩ
Return Loss	- 22.8dB

Antenna Parameters with Body TSL at 5750 MHz

Impedance, transformed to feed point	53.7Ω + 2.93jΩ
Return Loss	- 26.9dB

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General Antenna Parameters and Design

Electrical Delay (one direction)	1.301 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG

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DASY5 Validation Report for Head TSL Date: 12.12.2016

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1113

Communication System: CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz,

Medium parameters used: f = 5250 MHz; σ = 4.724 mho/m; εr = 36.26; ρ = 1000 kg/m3, Medium parameters used: f = 5600 MHz; σ = 5.172 mho/m; εr = 35.54; ρ = 1000 kg/m3, Medium parameters used: f = 5750 MHz; σ = 5.371 mho/m; εr = 35.17; ρ = 1000 kg/m3,

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(5.32,5.32,5.32); Calibrated: 2016/2/19, ConvF(4.52,4.52,4.52); Calibrated: 2016/2/19, ConvF(4.45,4.45,4.45); Calibrated: 2016/2/19,
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2016/2/2
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/3
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

Dipole Calibration /Pin=100mW, d=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 66.56 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 31.1 W/kg
SAR(1 g) = 7.62 W/kg; SAR(10 g) = 2.17 W/kg
Maximum value of SAR (measured) = 17.6 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 70.62 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 35.2 W/kg
SAR(1 g) = 8.07 W/kg; SAR(10 g) = 2.3 W/kg
Maximum value of SAR (measured) = 19.8 W/kg

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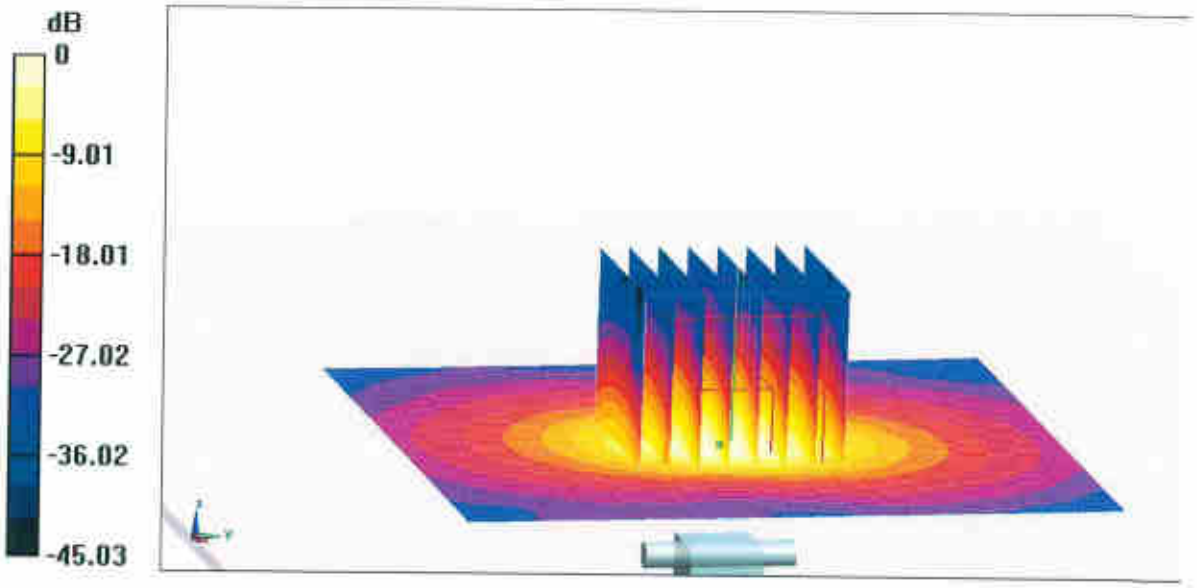
Dipole Calibration /Pin=100mW, d=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 69.62 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 33.9 W/kg
SAR(1 g) = 8.03 W/kg; SAR(10 g) = 2.28 W/kg
Maximum value of SAR (measured) = 19.6 W/kg



0 dB = 19.6 W/kg = 12.92 dBW/kg

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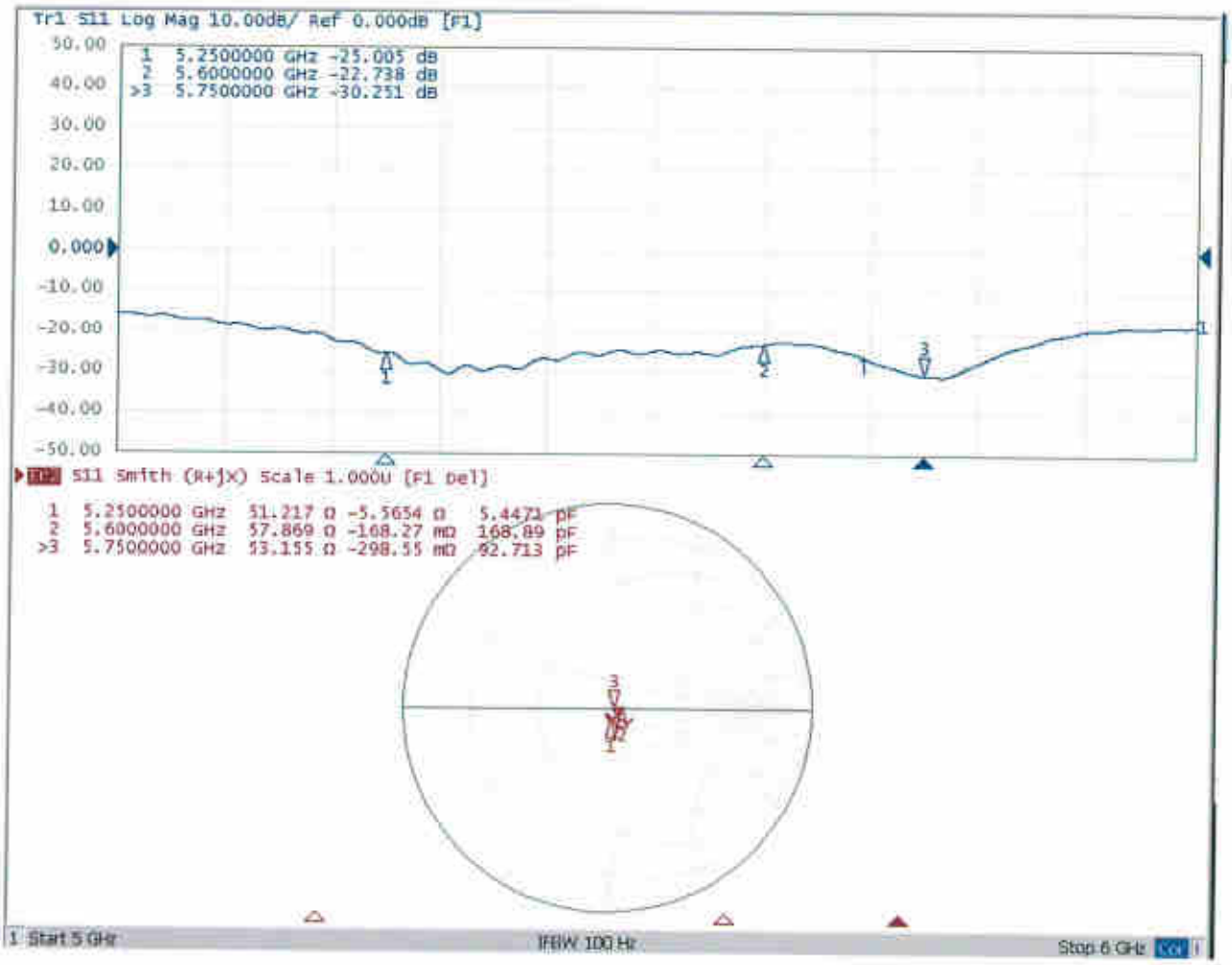
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL Date: 12.13.2016

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1113

Communication System: CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz,

Medium parameters used: f = 5250 MHz; σ = 5.442 mho/m; εr = 47.93; ρ = 1000 kg/m3, Medium parameters used: f = 5600 MHz; σ = 5.74 mho/m; εr = 48.92; ρ = 1000 kg/m3, Medium parameters used: f = 5750 MHz; σ = 5.91 mho/m; εr = 48.73; ρ = 1000 kg/m3,

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(4.48,4.48,4.48); Calibrated: 2016/2/19, ConvF(3.72,3.72,3.72); Calibrated: 2016/2/19, ConvF(3.91,3.91,3.91); Calibrated: 2016/2/19,
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2016/2/2
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/3
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

Dipole Calibration /Pin=100mW, d=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 50.72 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 29.1 W/kg
SAR(1 g) = 7.63 W/kg; SAR(10 g) = 2.16 W/kg
Maximum value of SAR (measured) = 17.9 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 58.44 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 30.7 W/kg
SAR(1 g) = 7.97 W/kg; SAR(10 g) = 2.25 W/kg
Maximum value of SAR (measured) = 18.3 W/kg

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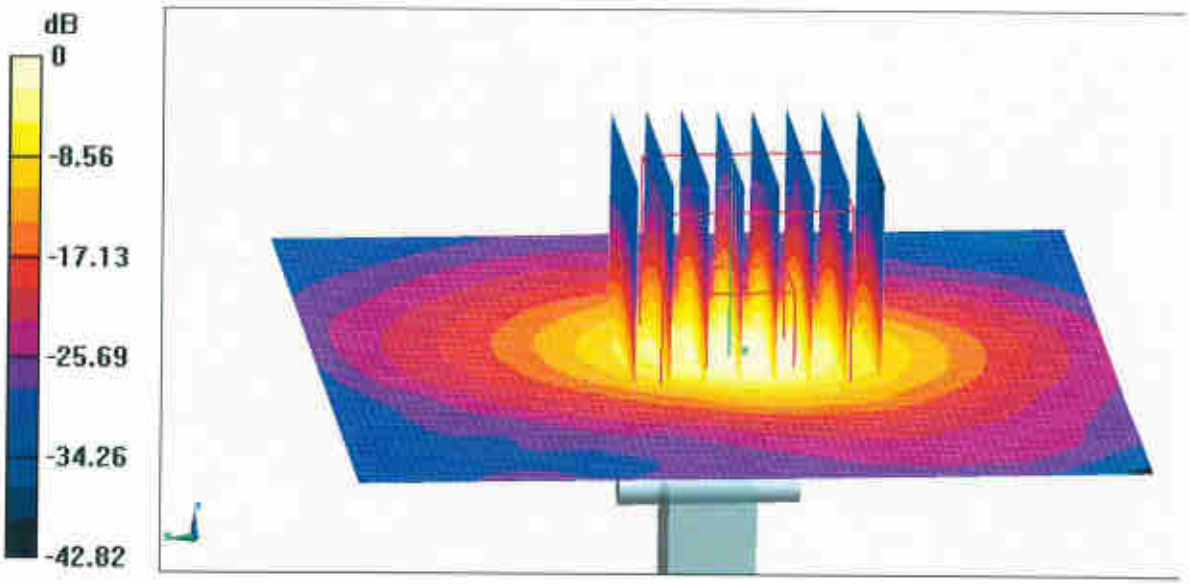
Dipole Calibration /Pin=100mW, d=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 61.59 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 31.1 W/kg
SAR(1 g) = 7.51 W/kg; SAR(10 g) = 2.11 W/kg
Maximum value of SAR (measured) = 18.5 W/kg



0 dB = 18.5 W/kg = 12.67 dBW/kg

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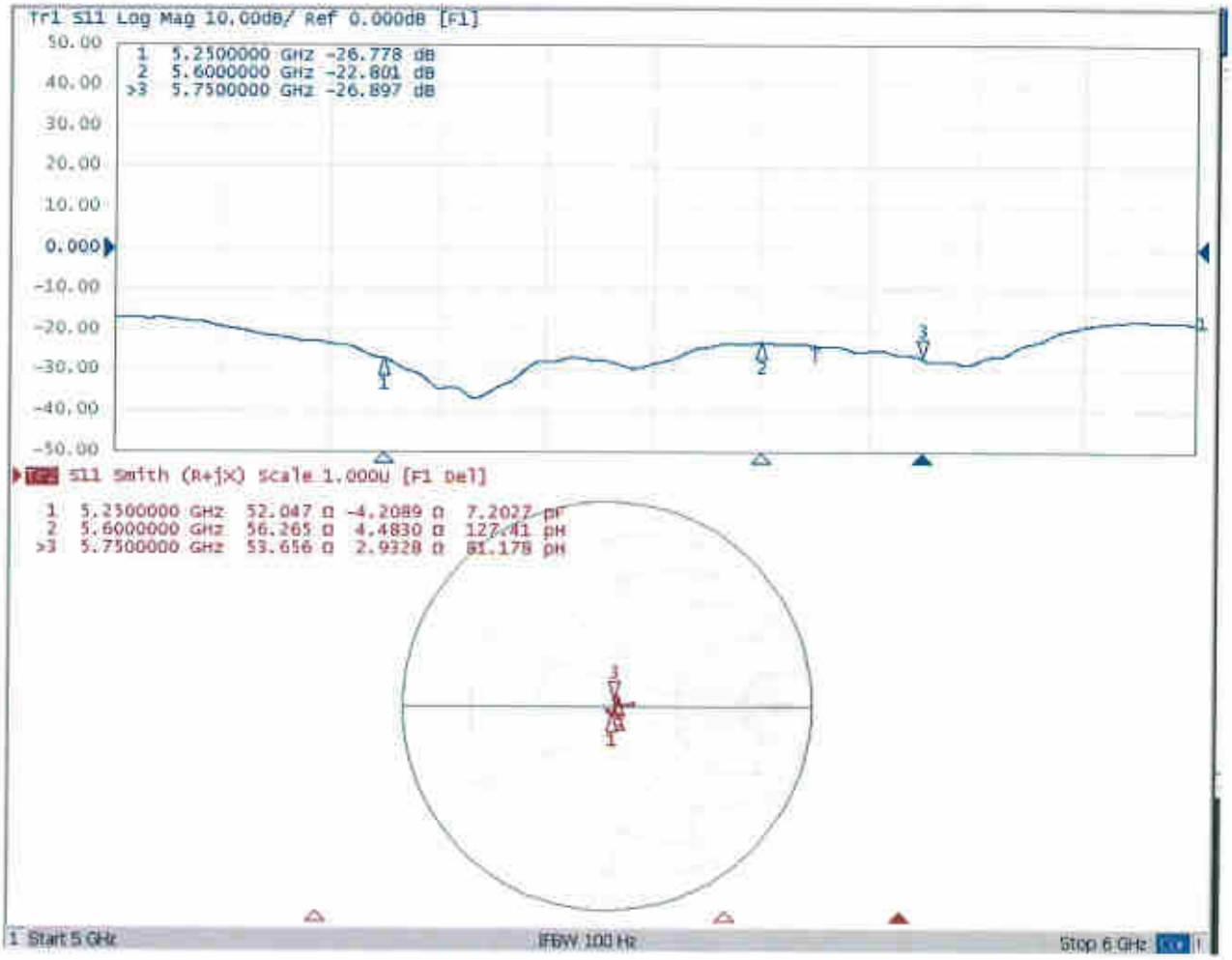
Impedance Measurement Plot for Body TSL