FCC SAR Test Report

APPLICANT	:	**ZTE CORPORATION**
EQUIPMENT	:	**Mobile Phone**
BRAND NAME	:	**ZTE**
MODEL NAME	:	**Z5157V**
FCC ID	:	**SRQ-Z5157V**
STANDARD	:	**FCC 47 CFR PART 2 (2.1093)** **ANSI/IEEE C95.1-1992** **IEEE 1528-2013**

The product was received on Jan. 06, 2020 and testing was started from Jan. 15, 2020 and completed on Mar. 01, 2020. We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has 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.

Rose Wang

Reviewed by: Rose Wang / Supervisor

Kat Yin

Approved by: Kat Yin / Manager

ilac-MRA
ACCREDITED
Cert #5145.02

Sporton International (Kunshan) Inc.
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA010604	Rev. 01	Initial issue of report	Mar. 27, 2020

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **ZTE CORPORATION, Mobile Phone, Z5157V**, are as follows.

Highest Standalone SAR Summary						Highest Simultaneous Transmission 1g SAR (W/kg)
Equipment Class	Frequency Band		Head (Separation 0mm)	Hotspot (Separation 10mm)	Body-worn (Separation 15mm)	
			1g SAR (W/kg)			
Licensed	LTE	Band 12	0.22	0.41	0.31	1.59
		Band 13	0.42	0.78	**0.69**	
		Band 5	0.47	0.61	0.44	
		Band 2	0.47	**1.14**	0.60	
		Band 4	0.31	0.90	0.40	
DTS	WLAN	2.4GHz WLAN	1.16	0.28	0.13	1.59
NII		5GHz WLAN	**1.20**	0.55	0.23	1.59
DSS	Bluetooth	Bluetooth	0.25			1.59
Date of Testing:			2020/1/15~2020/3/1			

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for Partial-Body 1g 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

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Testing Laboratory			
Test Firm	Sporton International (Kunshan) Inc.		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	SAR01	CN1257	314309

Applicant	
Company Name	ZTE CORPORATION
Address	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P. R. China

Manufacturer	
Company Name	ZTE CORPORATION
Address	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P. R. China

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 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r03
- FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB 941225 D05 SAR for LTE Devices v02r05
- FCC KDB 941225 D06 Hotspot Mode SAR v02r01

4. Equipment Under Test (EUT) Information

4.1 General Information

Product Feature & Specification	
Equipment Name	Mobile Phone
Brand Name	ZTE
Model Name	Z5157V
FCC ID	SRQ-Z5157V
IMEI Code	861583040006036
Wireless Technology and Frequency Range	LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz 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 ~ 5700 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	LTE: QPSK, 16QAM WLAN 2.4GHz : 802.11b/g/n HT20 WLAN 5GHz : 802.11a/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
HW Version	Z5157VHW1.0
SW Version	Z5157VV1.0.0B04
EUT Stage	Identical Prototype

Remark:

1. 802.11n-HT40 is not supported in 2.4GHz WLAN.
2. WLAN operation in 5600 MHz ~ 5650 MHz is notched.
3. This device WLAN 2.4GHz supports hotspot operation and Bluetooth support tethering applications.
4. This device 2.4GHz WLAN/5.2GHz WLAN/5.8GHz WLAN support hotspot operation, and 5.2GHz WLAN/5.8GHz WLAN supports WiFi Direct (GC/GO), and 5.3GHz / 5.5GHz supports WiFi Direct (GC only).
5. When hotspot mode is enabled, power reduction will be activated to limit the maximum power of LTE band 2.

4.2 General LTE SAR Test and Reporting Considerations

<table>
<tr><th colspan="2">Summarized necessary items addressed in KDB 941225 D05 v02r05</th></tr>
<tr><td>FCC ID</td><td>SRQ-Z5157V</td></tr>
<tr><td>Equipment Name</td><td>Mobile Phone</td></tr>
<tr><td>Operating Frequency Range of each LTE transmission band</td><td>LTE Band 2: 1850.7 MHz ~ 1909.3 MHz
LTE Band 4: 1710.7 MHz ~ 1754.3 MHz
LTE Band 5: 824.7 MHz ~ 848.3 MHz
LTE Band 12: 699.7 MHz ~ 715.3 MHz
LTE Band 13: 779.5 MHz ~ 784.5 MHz</td></tr>
<tr><td>Channel Bandwidth</td><td>LTE Band 2: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 4: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 5: 1.4MHz, 3MHz, 5MHz, 10MHz
LTE Band 12: 1.4MHz, 3MHz, 5MHz, 10MHz
LTE Band 13: 5MHz, 10MHz</td></tr>
<tr><td>Uplink Modulations used</td><td>QPSK / 16QAM</td></tr>
<tr><td>LTE Voice / Data requirements</td><td>Voice and Data</td></tr>
<tr><td>LTE Release Version</td><td>R11, Cat 5</td></tr>
<tr><td>CA Support</td><td>Not Supported</td></tr>
<tr><td>LTE MPR permanently built-in by design</td><td>
Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3
<table>
<tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (N_{RB})</th><th rowspan="2">MPR (dB)</th></tr>
<tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr>
<tr><td>QPSK</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 2</td></tr>
<tr><td>64 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 2</td></tr>
<tr><td>64 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 3</td></tr>
<tr><td>256 QAM</td><td colspan="6">≥ 1</td><td>≤ 5</td></tr>
</table>
</td></tr>
<tr><td>LTE A-MPR</td><td>In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)</td></tr>
<tr><td>Spectrum plots for RB configuration</td><td>A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.</td></tr>
<tr><td>Power reduction applied to satisfy SAR compliance</td><td>Yes, When hotspot mode is enabled, power reduction will be activated to limit the maximum power of LTE band 2.</td></tr>
</table>

Transmission (H, M, L) channel numbers and frequencies in each LTE band

LTE Band 2

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900

LTE Band 4

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745

LTE Band 5

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20407	824.7	20415	825.5	20425	826.5	20450	829
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5
H	20643	848.3	20635	847.5	20625	846.5	20600	844

LTE Band 12

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	23017	699.7	23025	700.5	23035	701.5	23060	704
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5
H	23173	715.3	23165	714.5	23155	713.5	23130	711

LTE Band 13

	Bandwidth 5 MHz		Bandwidth 10 MHz	
	Channel #	Freq.(MHz)	Channel #	Freq.(MHz)
L	23205	779.5		
M	23230	782	23230	782
H	23255	784.5		

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:

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

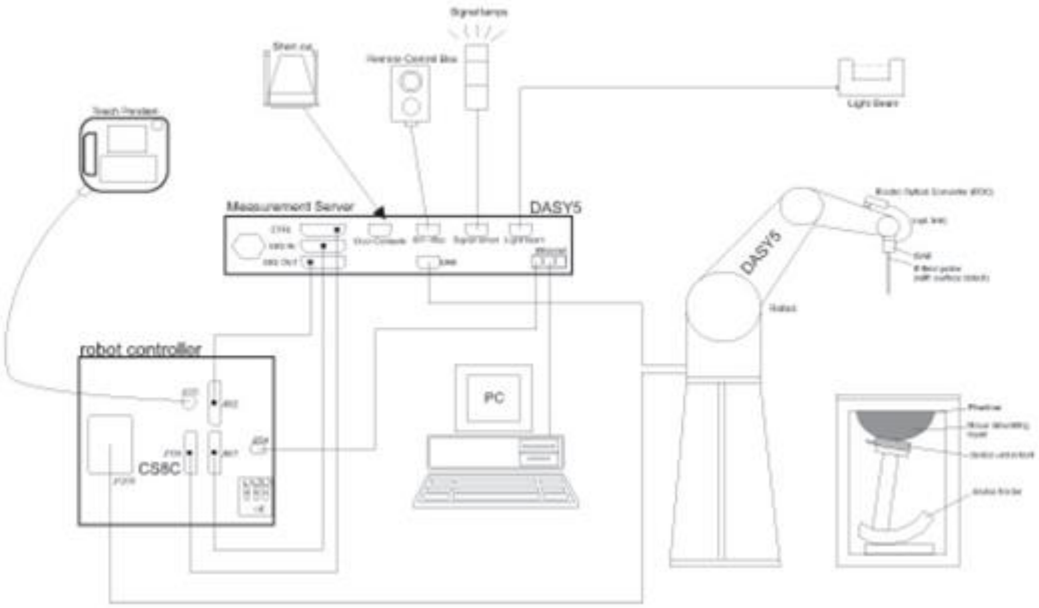
SAR is expressed in units of Watts per kilogram (W/kg)

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

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)

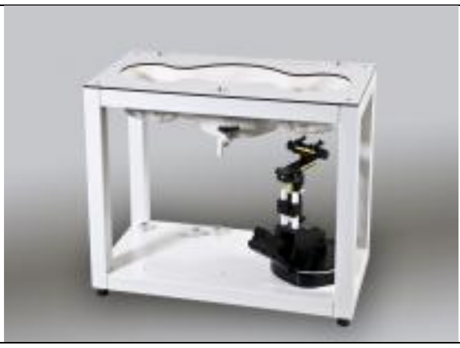
The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an 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.

Photo of DAE

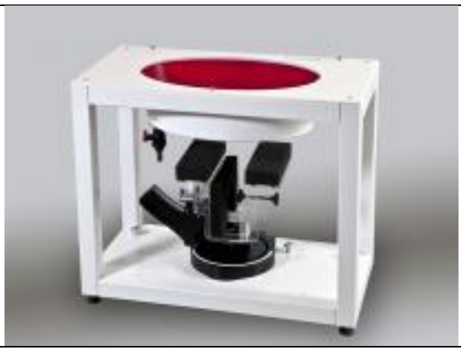
7.3 Phantom

<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 WWAN power measurement, use base station simulator to configure EUT WWAN transmission in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.
(b) Read the WWAN RF power level from the base station simulator.
(c) 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
(d) 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 WWAN transmission in radiated connection, and engineering software 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.

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

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	750MHz System Validation Kit	D750V3	1087	2019/3/27	2020/3/26
SPEAG	835MHz System Validation Kit	D835V2	4d151	2019/3/27	2020/3/26
SPEAG	1750MHz System Validation Kit	D1750V2	1090	2019/3/27	2020/3/26
SPEAG	1900MHz System Validation Kit	D1900V2	5d170	2019/3/26	2020/3/25
SPEAG	2450MHz System Validation Kit	D2450V2	908	2019/3/25	2020/3/24
SPEAG	5000MHz System Validation Kit	D5GHzV2	1113	2019/9/24	2020/9/23
SPEAG	Data Acquisition Electronics	DAE4	1210	2019/7/23	2020/7/22
SPEAG	Data Acquisition Electronics	DAE4	1358	2019/4/17	2020/4/16
SPEAG	Dosimetric E-Field Probe	EX3DV4	3857	2019/5/27	2020/5/26
SPEAG	Dosimetric E-Field Probe	EX3DV4	3843	2019/9/26	2020/9/25
SPEAG	SAM Twin Phantom	QD 000 P40 CB	TP-1696	NCR	NCR
SPEAG	SAM Twin Phantom	QD 000 P40 CB	TP-1697	NCR	NCR
Anritsu	Radio Communication Analyzer	MT8821C	6201432831	2019/4/17	2020/4/16
Agilent	Wireless Communication Test Set	E5515C	MY52102706	2019/4/17	2020/4/16
Agilent	ENA Series Network Analyzer	E5071C	MY46111157	2019/4/17	2020/4/16
SPEAG	Dielectric Probe Kit	DAK-3.5	1071	2019/10/28	2020/10/27
Anritsu	Vector Signal Generator	MG3710A	6201682672	2020/1/8	2021/1/7
Rohde & Schwarz	Power Meter	NRVD	102081	2019/8/15	2020/8/14
Rohde & Schwarz	Power Sensor	NRV-Z5	100538	2019/8/14	2020/8/13
Rohde & Schwarz	Power Sensor	NRV-Z5	100539	2019/8/14	2020/8/13
R&S	CBT BLUETOOTH TESTER	CBT	101641	2020/1/8	2021/1/7
EXA	Spectrum Analyzer	FSV7	101631	2020/1/8	2021/1/7
Testo	Hygrometer	608-H1	1241332088	2020/1/8	2021/1/7
FLUKE	DIGITAC THERMOMETER	51II	97240029	2019/8/15	2020/8/14
ARRA	Power Divider	A3200-2	N/A	Note	
MCL	Attenuation1	BW-S10W5+	N/A	Note	
MCL	Attenuation2	BW-S10W5+	N/A	Note	
MCL	Attenuation3	BW-S10W5+	N/A	Note	
Agilent	Dual Directional Coupler	778D	20500	Note	
Agilent	Dual Directional Coupler	11691D	MY48151020	Note	
BONN	POWER AMPLIFIER	BLMA 0830-3	087193A	Note	
BONN	POWER AMPLIFIER	BLMA 2060-2	087193B	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.

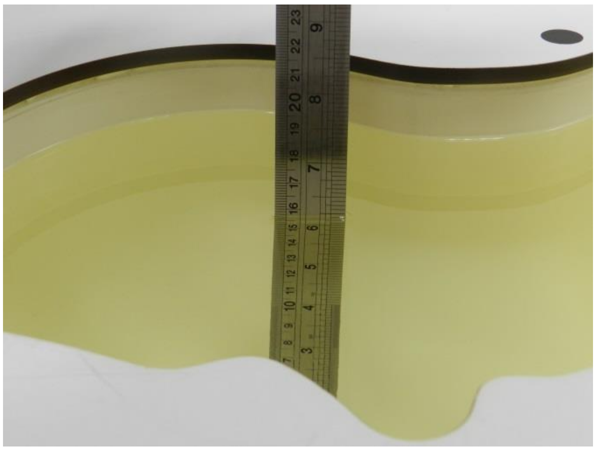


Fig 10.1Photo of Liquid Height for Head SAR

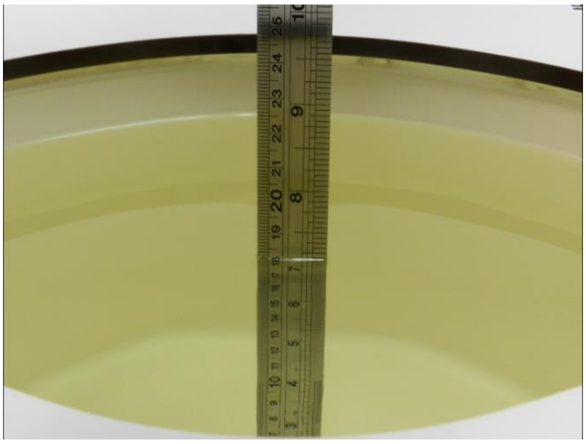


Fig 10.2 Photo of Liquid Height for Body SAR

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								
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.40	40.0
2450	55.0	0	0	0	0	45.0	1.80	39.2
2600	54.8	0	0	0.1	0	45.1	1.96	39.0

<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
750	Head	22.8	0.896	41.730	0.89	41.90	0.67	-0.41	±5	2020/1/15
835	Head	22.6	0.939	41.947	0.90	41.50	4.33	1.08	±5	2020/1/16
1750	Head	22.7	1.413	39.150	1.37	40.10	3.14	-2.37	±5	2020/1/19
1900	Head	22.8	1.403	39.092	1.40	40.00	0.21	-2.27	±5	2020/1/18
2450	Head	22.9	1.796	40.869	1.80	39.20	-0.22	4.26	±5	2020/1/21
5250	Head	22.6	4.600	36.382	4.71	35.90	-2.34	1.34	±5	2020/2/28
5600	Head	22.8	4.990	35.804	5.07	35.50	-1.58	0.86	±5	2020/2/29
5750	Head	22.9	5.166	35.550	5.22	35.40	-1.03	0.42	±5	2020/3/1

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.

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 (%)
2020/1/15	750	Head	250	1087	3843	1358	2.14	8.36	8.56	2.39
2020/1/16	835	Head	250	4d151	3843	1358	2.52	9.30	10.08	8.39
2020/1/19	1750	Head	250	1090	3843	1358	9.63	36.40	38.52	5.82
2020/1/18	1900	Head	250	5d170	3843	1358	10.00	39.00	40.00	2.56
2020/1/21	2450	Head	250	908	3843	1358	13.50	52.80	54.00	2.27
2020/2/28	5250	Head	100	1113	3857	1210	7.79	80.50	77.90	-3.23
2020/2/29	5600	Head	100	1113	3857	1210	7.94	83.40	79.40	-4.80
2020/3/1	5750	Head	100	1113	3857	1210	7.39	80.00	73.90	-7.63

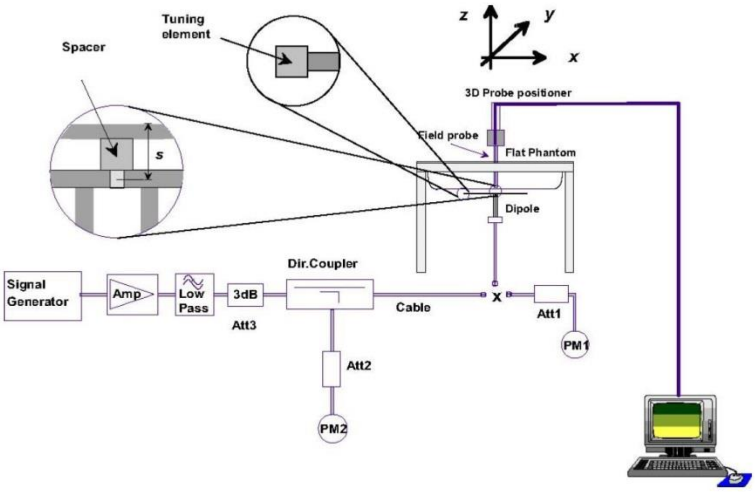


Fig 10.3.1 System Performance Check Setup

Fig 10.3.2 Setup Photo

11. RF Exposure Positions

11.1 Ear and handset reference point

Figure 11.1.1 shows the front, back, and side views of the SAM phantom. The center-of-mouth reference point is labeled "M," the left ear reference point (ERP) is marked "LE," and the right ERP is marked "RE." Each ERP is 15 mm along the B-M (back-mouth) line behind the entrance-to-ear-canal (EEC) point, as shown in Figure 11.1.2 The Reference Plane is defined as passing through the two ear reference points and point M. The line N-F (neck-front), also called the reference pivoting line, is normal to the Reference Plane and perpendicular to both a line passing through RE and LE and the B-M line (see Figure 11.1.3). Both N-F and B-M lines should be marked on the exterior of the phantom shell to facilitate handset positioning. Posterior to the N-F line the ear shape is a flat surface with 6 mm thickness at each ERP, and forward of the N-F line the ear is truncated, as illustrated in Figure 11.1.2. The ear truncation is introduced to preclude the ear lobe from interfering with handset tilt, which could lead to unstable positioning at the cheek.

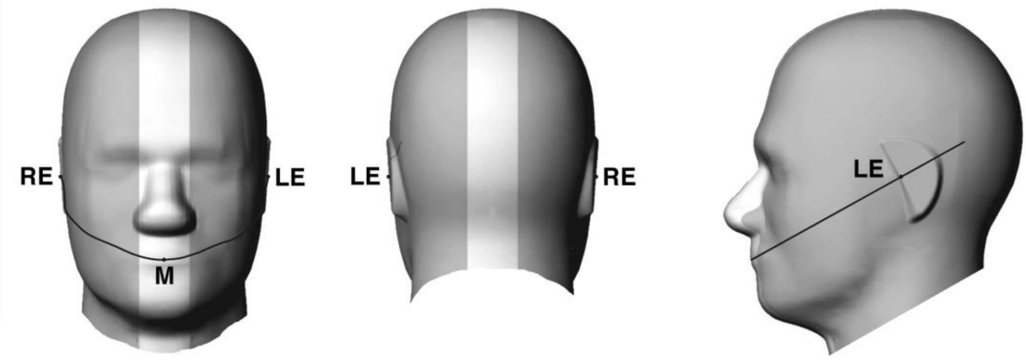


Fig 11.1.1 Front, back, and side views of SAM twin phantom

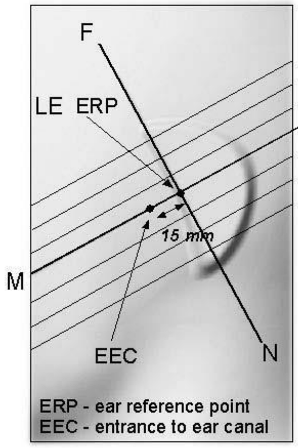


Fig 11.1.2 Close-up side view of phantom showing the ear region.

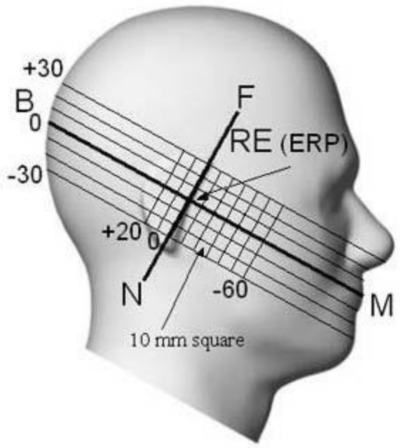


Fig 11.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

11.2 Definition of the cheek position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. Define two imaginary lines on the handset—the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset—the midpoint of the width wt of the handset at the level of the acoustic output (point A in Figure 11.2.1 and Figure 11.2.2), and the midpoint of the width wb of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Figure 11.2.1). The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset (see Figure 11.2.2), especially for clamshell handsets, handsets with flip covers, and other irregularly-shaped handsets.
3. Position the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 11.2.3), such that the plane defined by the vertical centerline and the horizontal line of the handset is approximately parallel to the sagittal plane of the phantom.
4. Translate the handset towards the phantom along the line passing through RE and LE until handset point A touches the pinna at the ERP.
5. While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to the plane containing B-M and N-F lines, i.e., the Reference Plane.
6. Rotate the handset around the vertical centerline until the handset (horizontal line) is parallel to the N-F line.
7. While maintaining the vertical centerline in the Reference Plane, keeping point A on the line passing through RE and LE, and maintaining the handset contact with the pinna, rotate the handset about the N-F line until any point on the handset is in contact with a phantom point below the pinna on the cheek. See Figure 11.2.3. The actual rotation angles should be documented in the test report.

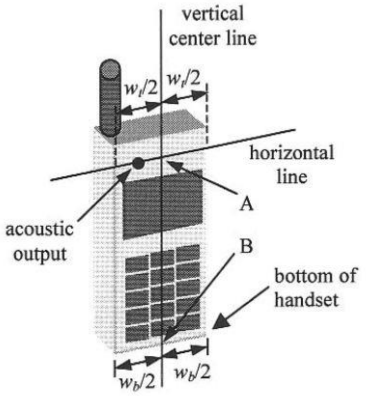


Fig 11.2.1 Handset vertical and horizontal reference lines—"fixed case

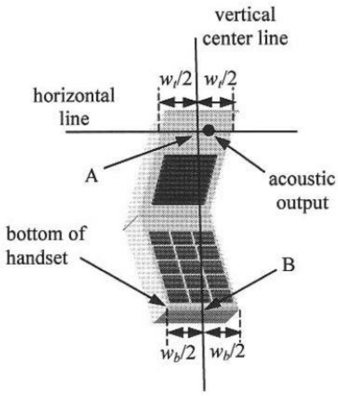


Fig 11.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

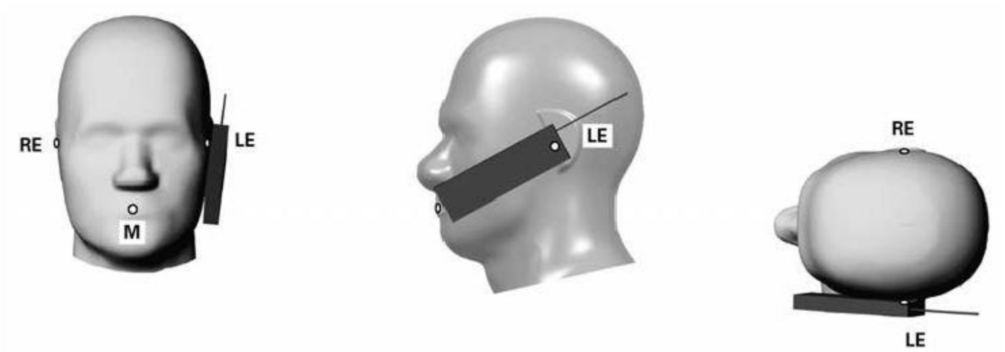


Fig 11.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

11.3 Definition of the tilt position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. While maintaining the orientation of the handset, move the handset away from the pinna along the line passing through RE and LE far enough to allow a rotation of the handset away from the cheek by 15°.
3. Rotate the handset around the horizontal line by 15°.
4. While maintaining the orientation of the handset, move the handset towards the phantom on the line passing through RE and LE until any part of the handset touches the ear. The tilt position is obtained when the contact point is on the pinna. See Figure 11.3.1. If contact occurs at any location other than the pinna, e.g., the antenna at the back of the phantom head, the angle of the handset should be reduced. In this case, the tilt position is obtained if any point on the handset is in contact with the pinna and a second point

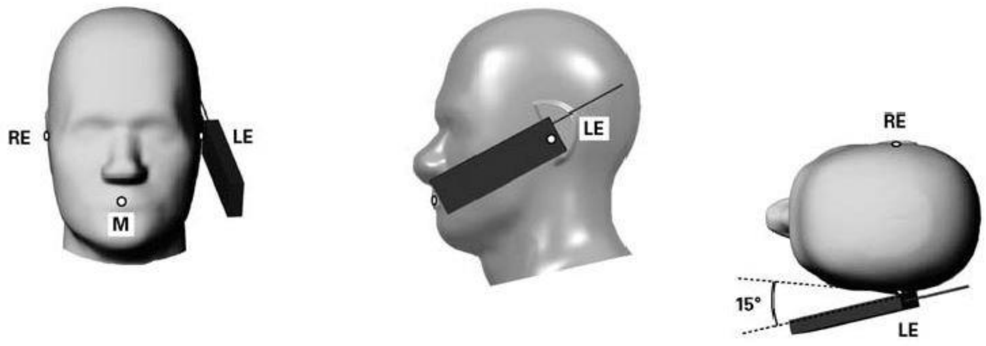


Fig 11.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

11.4 Body Worn Accessory

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 11.4). Per KDB648474 D04v01r03, body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB 447498 D01v06 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for body-worn accessory, measured without a headset connected to the handset is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a handset attached to the handset.

Accessories for body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are test with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-chip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

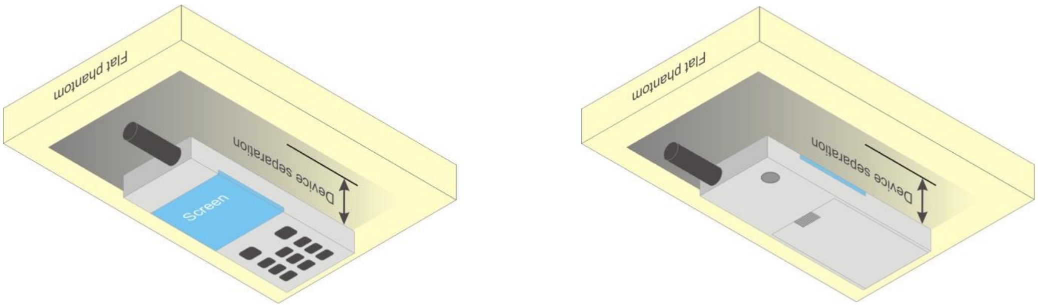


Fig 11.4 Body Worn Position

11.5 Wireless Router

Some battery-operated handsets have the capability to transmit and receive user through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06 v02r01 where SAR test considerations for handsets (L x W ≥ 9 cm x 5 cm) are based on a composite test separation distance of 10mm from the front, back and edges of the device containing transmitting antennas within 2.5cm of their edges, determined form general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WIFI transmitter according to FCC KDB Publication 447498 D01v06 publication procedures. The “Portable Hotspot” feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

12. Conducted RF Output Power (Unit: dBm)

The detailed conducted power table can refer to Appendix E.

<LTE Conducted Power>

General Note:

1. Anritsu MT8821C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, for QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE 4 / B5 / B12 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

<WLAN Conducted Power>

General Note:

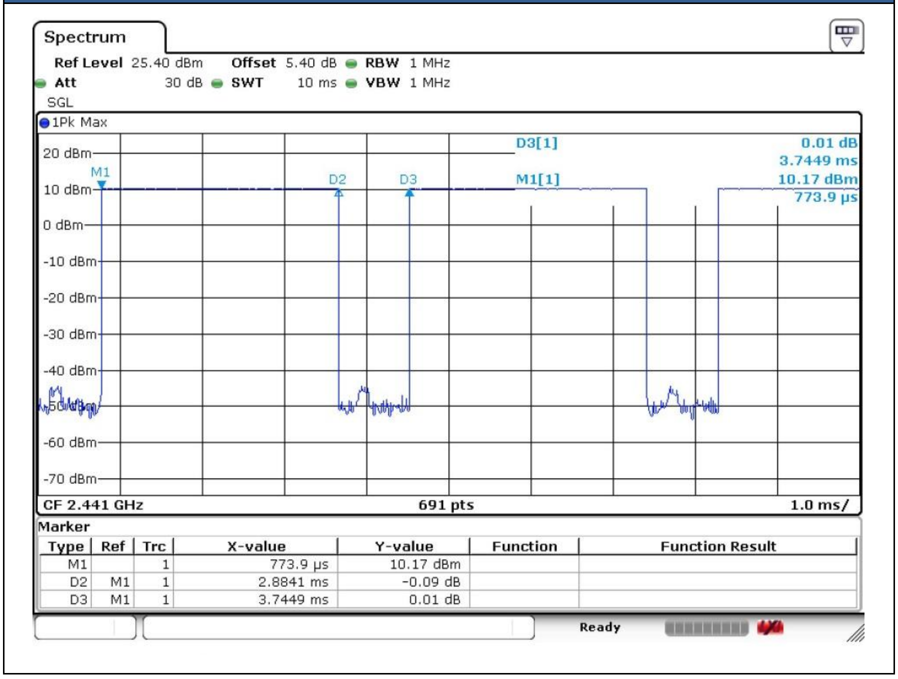
1. Per KDB 248227 D01v02r02, SAR test reduction is determined according to 802.11 transmission mode configurations and certain exposure conditions with multiple test positions. In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements. 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.
2. 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).
3. 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.
4. 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 Bluetooth>

General Note:

1. For 2.4GHz Bluetooth SAR testing was selected 1Mbps, due to its highest average power.
2. The Bluetooth duty cycle is 77.01 % as following figure, according to 2016 Oct. TCB workshop for Bluetooth SAR scaling need further consideration and the theoretical duty cycle is 83.3%, therefore the actual duty cycle will be scaled up to the theoretical value of Bluetooth reported SAR calculation.

Bluetooth time-domain plot



13. Bluetooth Exclusions Applied

Mode Band	Max Average power(dBm)	
	BR/EDR	LE
2.4GHz Bluetooth	11.00	0

Note:

1. 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*)] ·[$\sqrt{f(GHz)}$] ≤ 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

Hotspot SAR			
Bluetooth Max Power (dBm)	Separation Distance (mm)	Frequency (GHz)	exclusion thresholds
11.00	10	2.48	2.0

Note:
Per KDB 447498 D01v06, a distance of 10 mm for hotspot SAR is applied to determine SAR test exclusion. The test exclusion threshold is 2.0 which is <= 3, hotspot SAR testing is not required.

Body Worn SAR			
Bluetooth Max Power (dBm)	Separation Distance (mm)	Frequency (GHz)	exclusion thresholds
11.00	15	2.48	1.3

Note:
Per KDB 447498 D01v06, a distance of 15 mm for body worn SAR is applied to determine SAR test exclusion. The test exclusion threshold is 1.3 which is <= 3, body worn SAR testing is not required.

14. Antenna Location

Detail information can refer to Appendix D.

15. 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 WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
   d. For WLAN/Bluetooth: 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 required only when the measured SAR is ≥0.8W/kg.
4. When hotspot mode is enabled, power reduction will be activated to limit the maximum power of LTE B2.
5. Per KDB 648474 D04v01r03, when the reported SAR for a body-worn accessory measured without a headset connected to the handset is ≤ 1.2 W/kg, SAR testing with a headset connected to the handset is not required.

LTE Note:

1. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
2. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
4. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
5. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B12 / B5 / B4 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

WLAN Note:

1. 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.
2. 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.
3. 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.
4. During SAR testing the WLAN transmission was verified using a spectrum analyzer.

15.1 Head SAR

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB Offset	Test Position	Power Mode	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
01	LTE Band 12	10M	QPSK	1	25	Right Cheek	Full	23095	707.5	24.25	24.50	1.059	-0.02	0.203	**0.215**
	LTE Band 12	10M	QPSK	25	0	Right Cheek	Full	23095	707.5	23.18	23.50	1.076	0.02	0.165	0.178
	LTE Band 12	10M	QPSK	1	25	Right Tilted	Full	23095	707.5	24.25	24.50	1.059	0.09	0.131	0.139
	LTE Band 12	10M	QPSK	25	0	Right Tilted	Full	23095	707.5	23.18	23.50	1.076	0.04	0.111	0.119
	LTE Band 12	10M	QPSK	1	25	Left Cheek	Full	23095	707.5	24.25	24.50	1.059	0.08	0.185	0.196
	LTE Band 12	10M	QPSK	25	0	Left Cheek	Full	23095	707.5	23.18	23.50	1.076	-0.01	0.155	0.167
	LTE Band 12	10M	QPSK	1	25	Left Tilted	Full	23095	707.5	24.25	24.50	1.059	0	0.117	0.124
	LTE Band 12	10M	QPSK	25	0	Left Tilted	Full	23095	707.5	23.18	23.50	1.076	0.05	0.099	0.106
02	LTE Band 13	10M	QPSK	1	25	Right Cheek	Full	23230	782	24.24	24.50	1.062	0.01	0.394	**0.418**
	LTE Band 13	10M	QPSK	25	25	Right Cheek	Full	23230	782	23.13	23.50	1.089	-0.02	0.313	0.341
	LTE Band 13	10M	QPSK	1	25	Right Tilted	Full	23230	782	24.24	24.50	1.062	-0.06	0.242	0.257
	LTE Band 13	10M	QPSK	25	25	Right Tilted	Full	23230	782	23.13	23.50	1.089	0.04	0.196	0.213
	LTE Band 13	10M	QPSK	1	25	Left Cheek	Full	23230	782	24.24	24.50	1.062	0.05	0.382	0.406
	LTE Band 13	10M	QPSK	25	25	Left Cheek	Full	23230	782	23.13	23.50	1.089	0.04	0.329	0.358
	LTE Band 13	10M	QPSK	1	25	Left Tilted	Full	23230	782	24.24	24.50	1.062	-0.05	0.227	0.241
	LTE Band 13	10M	QPSK	25	25	Left Tilted	Full	23230	782	23.13	23.50	1.089	-0.09	0.188	0.205
03	LTE Band 5	10M	QPSK	1	25	Right Cheek	Full	20525	836.5	24.34	24.50	1.038	0.09	0.450	**0.467**
	LTE Band 5	10M	QPSK	25	12	Right Cheek	Full	20525	836.5	23.32	23.50	1.042	0.08	0.357	0.372
	LTE Band 5	10M	QPSK	1	25	Right Tilted	Full	20525	836.5	24.34	24.50	1.038	0.01	0.224	0.232
	LTE Band 5	10M	QPSK	25	12	Right Tilted	Full	20525	836.5	23.32	23.50	1.042	-0.02	0.178	0.186
	LTE Band 5	10M	QPSK	1	25	Left Cheek	Full	20525	836.5	24.34	24.50	1.038	0.09	0.417	0.433
	LTE Band 5	10M	QPSK	25	12	Left Cheek	Full	20525	836.5	23.32	23.50	1.042	0.07	0.345	0.360
	LTE Band 5	10M	QPSK	1	25	Left Tilted	Full	20525	836.5	24.34	24.50	1.038	0.01	0.225	0.233
	LTE Band 5	10M	QPSK	25	12	Left Tilted	Full	20525	836.5	23.32	23.50	1.042	-0.01	0.186	0.194
04	LTE Band 2	20M	QPSK	1	49	Right Cheek	Full	18900	1880	23.75	24.00	1.059	-0.03	0.442	**0.468**
	LTE Band 2	20M	QPSK	50	24	Right Cheek	Full	18900	1880	22.79	23.00	1.050	-0.09	0.346	0.363
	LTE Band 2	20M	QPSK	1	49	Right Tilted	Full	18900	1880	23.75	24.00	1.059	0.02	0.151	0.160
	LTE Band 2	20M	QPSK	50	24	Right Tilted	Full	18900	1880	22.79	23.00	1.050	-0.07	0.112	0.118
	LTE Band 2	20M	QPSK	1	49	Left Cheek	Full	18900	1880	23.75	24.00	1.059	0.07	0.326	0.345
	LTE Band 2	20M	QPSK	50	24	Left Cheek	Full	18900	1880	22.79	23.00	1.050	-0.04	0.261	0.274
	LTE Band 2	20M	QPSK	1	49	Left Tilted	Full	18900	1880	23.75	24.00	1.059	0.01	0.222	0.235
	LTE Band 2	20M	QPSK	50	24	Left Tilted	Full	18900	1880	22.79	23.00	1.050	-0.09	0.180	0.189
05	LTE Band 4	20M	QPSK	1	49	Right Cheek	Full	20175	1732.5	23.66	24.00	1.081	-0.01	0.285	**0.308**
	LTE Band 4	20M	QPSK	50	0	Right Cheek	Full	20175	1732.5	22.77	23.00	1.054	-0.01	0.260	0.274
	LTE Band 4	20M	QPSK	1	49	Right Tilted	Full	20175	1732.5	23.66	24.00	1.081	-0.05	0.055	0.059
	LTE Band 4	20M	QPSK	50	0	Right Tilted	Full	20175	1732.5	22.77	23.00	1.054	-0.03	0.052	0.055
	LTE Band 4	20M	QPSK	1	49	Left Cheek	Full	20175	1732.5	23.66	24.00	1.081	0.01	0.191	0.207
	LTE Band 4	20M	QPSK	50	0	Left Cheek	Full	20175	1732.5	22.77	23.00	1.054	0.09	0.172	0.181
	LTE Band 4	20M	QPSK	1	49	Left Tilted	Full	20175	1732.5	23.66	24.00	1.081	0.06	0.198	0.214
	LTE Band 4	20M	QPSK	50	0	Left Tilted	Full	20175	1732.5	22.77	23.00	1.054	0.09	0.175	0.185

<WLAN 2.4GHz SAR>

Plot No.	Band	Mode	Test Position	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)
	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	1	2412	14.86	15.50	1.159	100	1.000	-0.04	0.477	0.553
	WLAN2.4GHz	802.11b 1Mbps	Right Tilted	1	2412	14.86	15.50	1.159	100	1.000	0.01	0.418	0.484
	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	1	2412	14.86	15.50	1.159	100	1.000	0.03	0.916	1.061
06	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	6	2437	14.58	15.50	1.236	100	1.000	0.09	0.938	1.159
	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	1	2412	14.86	15.50	1.159	100	1.000	0.03	0.721	0.835
	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	6	2437	14.58	15.50	1.236	100	1.000	-0.11	0.739	0.913

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	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)
	Bluetooth	1Mbps	Right Cheek	78	2480	10.78	11.00	1.052	77.01	1.082	0.09	0.104	0.118
	Bluetooth	1Mbps	Right Tilted	78	2480	10.78	11.00	1.052	77.01	1.082	0.05	0.109	0.124
07	Bluetooth	1Mbps	Left Cheek	78	2480	10.78	11.00	1.052	77.01	1.082	0.06	0.223	0.254
	Bluetooth	1Mbps	Left Tilted	78	2480	10.78	11.00	1.052	77.01	1.082	0.04	0.147	0.167

<WLAN 5GHz SAR>

Plot No.	Band	Mode	Test Position	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)
	WLAN5.3GHz	802.11a 6Mbps	Right Cheek	52	5260	11.94	12.50	1.138	96.97	1.031	-0.06	0.575	0.674
	WLAN5.3GHz	802.11a 6Mbps	Right Tilted	52	5260	11.94	12.50	1.138	96.97	1.031	-0.06	0.616	0.723
	WLAN5.3GHz	802.11a 6Mbps	Left Cheek	52	5260	11.94	12.50	1.138	96.97	1.031	-0.09	0.920	1.079
	WLAN5.3GHz	802.11a 6Mbps	Left Cheek	64	5320	11.87	12.50	1.156	96.97	1.031	0.05	0.888	1.058
	WLAN5.3GHz	802.11a 6Mbps	Left Tilted	52	5260	11.94	12.50	1.138	96.97	1.031	-0.19	0.997	1.169
08	WLAN5.3GHz	802.11a 6Mbps	Left Tilted	64	5320	11.87	12.50	1.156	96.97	1.031	-0.02	0.995	1.186
	WLAN5.5GHz	802.11a 6Mbps	Right Cheek	116	5580	12.49	13.00	1.125	96.97	1.031	-0.12	0.596	0.691
	WLAN5.5GHz	802.11a 6Mbps	Right Tilted	116	5580	12.49	13.00	1.125	96.97	1.031	-0.19	0.578	0.670
	WLAN5.5GHz	802.11a 6Mbps	Left Cheek	116	5580	12.49	13.00	1.125	96.97	1.031	-0.08	0.899	1.042
09	WLAN5.5GHz	802.11a 6Mbps	Left Cheek	100	5500	12.46	13.00	1.132	96.97	1.031	-0.06	0.953	1.113
	WLAN5.5GHz	802.11a 6Mbps	Left Tilted	116	5580	12.49	13.00	1.125	96.97	1.031	0.11	0.942	1.092
	WLAN5.5GHz	802.11a 6Mbps	Left Tilted	100	5500	12.46	13.00	1.132	96.97	1.031	-0.08	0.937	1.094
	WLAN5.8GHz	802.11a 6Mbps	Right Cheek	149	5745	12.40	12.50	1.023	96.97	1.031	0.15	0.719	0.759
	WLAN5.8GHz	802.11a 6Mbps	Right Tilted	149	5745	12.40	12.50	1.023	96.97	1.031	0.03	0.780	0.823
	WLAN5.8GHz	802.11a 6Mbps	Left Cheek	149	5745	12.40	12.50	1.023	96.97	1.031	0.01	1.010	1.066
10	WLAN5.8GHz	802.11a 6Mbps	Left Cheek	165	5825	12.06	12.50	1.107	96.97	1.031	-0.06	1.050	1.198
	WLAN5.8GHz	802.11a 6Mbps	Left Tilted	149	5745	12.40	12.50	1.023	96.97	1.031	0.03	0.955	1.008
	WLAN5.8GHz	802.11a 6Mbps	Left Tilted	165	5825	12.06	12.50	1.107	96.97	1.031	-0.03	0.998	1.139

15.2 Hotspot SAR

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB Offset	Test Position	Gap (mm)	Power Mode	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 12	10M	QPSK	1	25	Front	10	Full	23095	707.5	24.25	24.50	1.059	-0.09	0.222	0.235
	LTE Band 12	10M	QPSK	25	0	Front	10	Full	23095	707.5	23.18	23.50	1.076	0.08	0.188	0.202
11	LTE Band 12	10M	QPSK	1	25	Back	10	Full	23095	707.5	24.25	24.50	1.059	-0.04	0.390	0.413
	LTE Band 12	10M	QPSK	25	0	Back	10	Full	23095	707.5	23.18	23.50	1.076	0.01	0.325	0.350
	LTE Band 12	10M	QPSK	1	25	Left Side	10	Full	23095	707.5	24.25	24.50	1.059	0.05	0.141	0.149
	LTE Band 12	10M	QPSK	25	0	Left Side	10	Full	23095	707.5	23.18	23.50	1.076	-0.03	0.118	0.127
	LTE Band 12	10M	QPSK	1	25	Right Side	10	Full	23095	707.5	24.25	24.50	1.059	0.1	0.247	0.262
	LTE Band 12	10M	QPSK	25	0	Right Side	10	Full	23095	707.5	23.18	23.50	1.076	-0.02	0.206	0.222
	LTE Band 12	10M	QPSK	1	25	Bottom Side	10	Full	23095	707.5	24.25	24.50	1.059	0.07	0.061	0.064
	LTE Band 12	10M	QPSK	25	0	Bottom Side	10	Full	23095	707.5	23.18	23.50	1.076	-0.02	0.049	0.053
	LTE Band 13	10M	QPSK	1	25	Front	10	Full	23230	782	24.24	24.50	1.062	0.01	0.461	0.489
	LTE Band 13	10M	QPSK	25	25	Front	10	Full	23230	782	23.13	23.50	1.089	-0.02	0.405	0.441
	LTE Band 13	10M	QPSK	1	25	Back	10	Full	23230	782	24.24	24.50	1.062	-0.03	0.683	0.725
	LTE Band 13	10M	QPSK	25	25	Back	10	Full	23230	782	23.13	23.50	1.089	-0.05	0.580	0.632
	LTE Band 13	10M	QPSK	1	25	Left Side	10	Full	23230	782	24.24	24.50	1.062	-0.02	0.508	0.539
	LTE Band 13	10M	QPSK	25	25	Left Side	10	Full	23230	782	23.13	23.50	1.089	-0.09	0.433	0.472
12	LTE Band 13	10M	QPSK	1	25	Right Side	10	Full	23230	782	24.24	24.50	1.062	-0.05	0.730	0.775
	LTE Band 13	10M	QPSK	25	25	Right Side	10	Full	23230	782	23.13	23.50	1.089	-0.02	0.611	0.665
	LTE Band 13	10M	QPSK	1	25	Bottom Side	10	Full	23230	782	24.24	24.50	1.062	0.18	0.174	0.185
	LTE Band 13	10M	QPSK	25	25	Bottom Side	10	Full	23230	782	23.13	23.50	1.089	-0.07	0.144	0.157
	LTE Band 5	10M	QPSK	1	25	Front	10	Full	20525	836.5	24.34	24.50	1.038	-0.07	0.331	0.343
	LTE Band 5	10M	QPSK	25	12	Front	10	Full	20525	836.5	23.32	23.50	1.042	0.05	0.297	0.310
13	LTE Band 5	10M	QPSK	1	25	Back	10	Full	20525	836.5	24.34	24.50	1.038	0.06	0.590	0.612
	LTE Band 5	10M	QPSK	25	12	Back	10	Full	20525	836.5	23.32	23.50	1.042	0.01	0.525	0.547
	LTE Band 5	10M	QPSK	1	25	Left Side	10	Full	20525	836.5	24.34	24.50	1.038	0.06	0.225	0.233
	LTE Band 5	10M	QPSK	25	12	Left Side	10	Full	20525	836.5	23.32	23.50	1.042	-0.08	0.185	0.193
	LTE Band 5	10M	QPSK	1	25	Right Side	10	Full	20525	836.5	24.34	24.50	1.038	0.08	0.481	0.499
	LTE Band 5	10M	QPSK	25	12	Right Side	10	Full	20525	836.5	23.32	23.50	1.042	-0.02	0.392	0.409
	LTE Band 5	10M	QPSK	1	25	Bottom Side	10	Full	20525	836.5	24.34	24.50	1.038	0.04	0.184	0.191
	LTE Band 5	10M	QPSK	25	12	Bottom Side	10	Full	20525	836.5	23.32	23.50	1.042	0.1	0.150	0.156

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB Offset	Test Position	Gap (mm)	Power Mode	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 2	20M	QPSK	1	49	Front	10	Reduced	18900	1880	22.51	23.00	1.119	-0.06	0.370	0.414
	LTE Band 2	20M	QPSK	50	24	Front	10	Reduced	18900	1880	22.39	23.00	1.151	-0.15	0.354	0.407
	LTE Band 2	20M	QPSK	1	49	Back	10	Reduced	18900	1880	22.51	23.00	1.119	-0.09	0.726	0.813
	LTE Band 2	20M	QPSK	1	49	Back	10	Reduced	18700	1860	22.41	23.00	1.146	-0.04	0.726	0.832
	LTE Band 2	20M	QPSK	1	49	Back	10	Reduced	19100	1900	22.46	23.00	1.132	0.06	0.833	0.943
	LTE Band 2	20M	QPSK	50	24	Back	10	Reduced	18900	1880	22.39	23.00	1.151	0.01	0.727	0.837
	LTE Band 2	20M	QPSK	50	24	Back	10	Reduced	18700	1860	22.20	23.00	1.202	-0.02	0.737	0.886
	LTE Band 2	20M	QPSK	50	24	Back	10	Reduced	19100	1900	22.20	23.00	1.202	-0.04	0.761	0.915
	LTE Band 2	20M	QPSK	100	0	Back	10	Reduced	18900	1880	22.32	23.00	1.169	0.04	0.757	0.885
	LTE Band 2	20M	QPSK	1	49	Left Side	10	Reduced	18900	1880	22.51	23.00	1.119	-0.09	0.207	0.232
	LTE Band 2	20M	QPSK	50	24	Left Side	10	Reduced	18900	1880	22.39	23.00	1.151	-0.11	0.204	0.235
	LTE Band 2	20M	QPSK	1	49	Right Side	10	Reduced	18900	1880	22.51	23.00	1.119	-0.01	0.131	0.147
	LTE Band 2	20M	QPSK	50	24	Right Side	10	Reduced	18900	1880	22.39	23.00	1.151	0.03	0.132	0.152
	LTE Band 2	20M	QPSK	1	49	Bottom Side	10	Reduced	18900	1880	22.51	23.00	1.119	0.17	0.855	0.957
	LTE Band 2	20M	QPSK	1	49	Bottom Side	10	Reduced	18700	1860	22.41	23.00	1.146	0.01	0.947	1.085
	LTE Band 2	20M	QPSK	1	49	Bottom Side	10	Reduced	19100	1900	22.46	23.00	1.132	0.13	0.940	1.064
	LTE Band 2	20M	QPSK	50	24	Bottom Side	10	Reduced	18900	1880	22.39	23.00	1.151	0.19	0.957	1.101
14	LTE Band 2	20M	QPSK	50	24	Bottom Side	10	Reduced	18700	1860	22.20	23.00	1.202	0.12	0.949	**1.141**
	LTE Band 2	20M	QPSK	50	24	Bottom Side	10	Reduced	19100	1900	22.20	23.00	1.202	0.06	0.940	1.130
	LTE Band 2	20M	QPSK	100	0	Bottom Side	10	Reduced	18900	1880	22.32	23.00	1.169	0.02	0.972	1.137
	LTE Band 4	20M	QPSK	1	49	Front	10	Full	20175	1732.5	23.66	24.00	1.081	-0.01	0.358	0.387
	LTE Band 4	20M	QPSK	50	0	Front	10	Full	20175	1732.5	22.77	23.00	1.054	-0.02	0.295	0.311
15	LTE Band 4	20M	QPSK	1	49	Back	10	Full	20175	1732.5	23.66	24.00	1.081	-0.02	0.835	**0.903**
	LTE Band 4	20M	QPSK	50	0	Back	10	Full	20175	1732.5	22.77	23.00	1.054	0.05	0.585	0.617
	LTE Band 4	20M	QPSK	100	0	Back	10	Full	20175	1732.5	22.70	23.00	1.072	-0.02	0.614	0.658
	LTE Band 4	20M	QPSK	1	49	Left Side	10	Full	20175	1732.5	23.66	24.00	1.081	0.18	0.095	0.103
	LTE Band 4	20M	QPSK	50	0	Left Side	10	Full	20175	1732.5	22.77	23.00	1.054	0.01	0.098	0.103
	LTE Band 4	20M	QPSK	1	49	Right Side	10	Full	20175	1732.5	23.66	24.00	1.081	-0.13	0.200	0.216
	LTE Band 4	20M	QPSK	50	0	Right Side	10	Full	20175	1732.5	22.77	23.00	1.054	0.05	0.123	0.130
	LTE Band 4	20M	QPSK	1	49	Bottom Side	10	Full	20175	1732.5	23.66	24.00	1.081	-0.04	0.694	0.751
	LTE Band 4	20M	QPSK	50	0	Bottom Side	10	Full	20175	1732.5	22.77	23.00	1.054	0.1	0.563	0.594

<WLAN 2.4GHz SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	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)
	WLAN2.4GHz	802.11b 1Mbps	Front	10	1	2412	14.86	15.50	1.159	100	1.000	0.04	0.213	0.247
16	WLAN2.4GHz	802.11b 1Mbps	Back	10	1	2412	14.86	15.50	1.159	100	1.000	0.14	0.244	**0.283**
	WLAN2.4GHz	802.11b 1Mbps	Right Side	10	1	2412	14.86	15.50	1.159	100	1.000	0.11	0.079	0.092
	WLAN2.4GHz	802.11b 1Mbps	Top Side	10	1	2412	14.86	15.50	1.159	100	1.000	0.11	0.162	0.188

<WLAN 5GHz SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Mode	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)
	WLAN5.2GHz	802.11a 6Mbps	Front	10	Full	44	5220	12.28	12.50	1.052	96.97	1.031	0.02	0.147	0.159
	WLAN5.2GHz	802.11a 6Mbps	Back	10	Full	44	5220	12.28	12.50	1.052	96.97	1.031	0.16	0.304	0.330
	WLAN5.2GHz	802.11a 6Mbps	Right Side	10	Full	44	5220	12.28	12.50	1.052	96.97	1.031	0.03	0.035	0.038
17	WLAN5.2GHz	802.11a 6Mbps	Top Side	10	Full	44	5220	12.28	12.50	1.052	96.97	1.031	-0.02	0.511	**0.554**
	WLAN5.8GHz	802.11a 6Mbps	Front	10	Full	149	5745	12.40	12.50	1.023	96.97	1.031	0.01	0.176	0.186
	WLAN5.8GHz	802.11a 6Mbps	Back	10	Full	149	5745	12.40	12.50	1.023	96.97	1.031	0.01	0.213	0.225
	WLAN5.8GHz	802.11a 6Mbps	Right Side	10	Full	149	5745	12.40	12.50	1.023	96.97	1.031	0.01	0.034	0.036
18	WLAN5.8GHz	802.11a 6Mbps	Top Side	10	Full	149	5745	12.40	12.50	1.023	96.97	1.031	0.1	0.321	**0.339**

15.3 Body Worn Accessory SAR

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB Offset	Test Position	Gap (mm)	Power Mode	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 12	10M	QPSK	1	25	Front	15	Full	23095	707.5	24.25	24.5	1.059	-0.09	0.221	0.234
	LTE Band 12	10M	QPSK	25	0	Front	15	Full	23095	707.5	23.18	23.50	1.076	-0.1	0.174	0.187
19	LTE Band 12	10M	QPSK	1	25	Back	15	Full	23095	707.5	24.25	24.50	1.059	0.1	0.294	0.311
	LTE Band 12	10M	QPSK	25	0	Back	15	Full	23095	707.5	23.18	23.50	1.076	0.06	0.265	0.285
	LTE Band 13	10M	QPSK	1	25	Front	15	Full	23230	782	24.24	24.50	1.062	-0.04	0.499	0.530
	LTE Band 13	10M	QPSK	25	25	Front	15	Full	23230	782	23.13	23.50	1.089	0	0.427	0.465
20	LTE Band 13	10M	QPSK	1	25	Back	15	Full	23230	782	24.24	24.50	1.062	0.05	0.653	0.693
	LTE Band 13	10M	QPSK	25	25	Back	15	Full	23230	782	23.13	23.50	1.089	0.04	0.550	0.599
	LTE Band 5	10M	QPSK	1	25	Front	15	Full	20525	836.5	24.34	24.50	1.038	0.06	0.328	0.340
	LTE Band 5	10M	QPSK	25	12	Front	15	Full	20525	836.5	23.32	23.50	1.042	0.01	0.263	0.274
21	LTE Band 5	10M	QPSK	1	25	Back	15	Full	20525	836.5	24.34	24.50	1.038	0.01	0.428	0.444
	LTE Band 5	10M	QPSK	25	12	Back	15	Full	20525	836.5	23.32	23.50	1.042	0.03	0.341	0.355
	LTE Band 2	20M	QPSK	1	49	Front	15	Full	18900	1880	23.75	24.00	1.059	0.08	0.367	0.389
	LTE Band 2	20M	QPSK	50	24	Front	15	Full	18900	1880	22.79	23.00	1.050	-0.03	0.282	0.296
22	LTE Band 2	20M	QPSK	1	49	Back	15	Full	18900	1880	23.75	24.00	1.059	-0.07	0.570	0.604
	LTE Band 2	20M	QPSK	50	24	Back	15	Full	18900	1880	22.79	23.00	1.050	0.01	0.480	0.504
	LTE Band 4	20M	QPSK	1	49	Front	15	Full	20175	1732.5	23.66	24.00	1.081	0.01	0.249	0.269
	LTE Band 4	20M	QPSK	50	0	Front	15	Full	20175	1732.5	22.77	23.00	1.054	0.09	0.218	0.230
23	LTE Band 4	20M	QPSK	1	49	Back	15	Full	20175	1732.5	23.66	24.00	1.081	-0.08	0.370	0.400
	LTE Band 4	20M	QPSK	50	0	Back	15	Full	20175	1732.5	22.77	23.00	1.054	0.01	0.314	0.331

<WLAN 2.4GHz SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Mode	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)
	WLAN2.4GHz	802.11b 1Mbps	Front	15	Full	1	2412	14.86	15.50	1.159	100	1.000	0.02	0.106	0.123
24	WLAN2.4GHz	802.11b 1Mbps	Back	15	Full	1	2412	14.86	15.50	1.159	100	1.000	0.02	0.114	0.132

<WLAN 5GHz SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Mode	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)
	WLAN5.3GHz	802.11a 6Mbps	Front	15	Full	52	5260	11.94	12.50	1.138	96.97	1.031	0.01	0.102	0.120
25	WLAN5.3GHz	802.11a 6Mbps	Back	15	Full	52	5260	11.94	12.50	1.138	96.97	1.031	-0.09	0.193	0.226
	WLAN5.5GHz	802.11a 6Mbps	Front	15	Full	116	5580	12.49	13.00	1.125	96.97	1.031	0.01	0.107	0.124
26	WLAN5.5GHz	802.11a 6Mbps	Back	15	Full	116	5580	12.49	13.00	1.125	96.97	1.031	0.01	0.163	0.189
	WLAN5.8GHz	802.11a 6Mbps	Front	15	Full	149	5745	12.40	12.50	1.023	96.97	1.031	0.01	0.107	0.113
27	WLAN5.8GHz	802.11a 6Mbps	Back	15	Full	149	5745	12.40	12.50	1.023	96.97	1.031	-0.09	0.158	0.167

15.4 Repeated SAR Measurement

No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Power State	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)	Ratio	Reported 1g SAR (W/kg)
1st	WLAN2.4GHz	-	-	-	-	802.11b 1Mbps	Left Cheek	0	Full	6	2437	14.58	15.50	1.236	100	1.000	0.09	0.938	1	1.159
2nd	WLAN2.4GHz	-	-	-	-	802.11b 1Mbps	Left Cheek	0	Full	6	2437	14.58	15.50	1.236	100	1.000	0.09	0.921	1.018	1.138
1st	WLAN5.3GHz	-	-	-	-	802.11a 6Mbps	Left Tilted	0	Full	64	5320	11.87	12.50	1.156	96.97	1.031	-0.02	0.995	1	1.186
2nd	WLAN5.3GHz	-	-	-	-	802.11a 6Mbps	Left Tilted	0	Full	64	5320	11.87	12.50	1.156	96.97	1.031	-0.01	0.982	1.013	1.170
1st	WLAN5.5GHz	-	-	-	-	802.11a 6Mbps	Left Cheek	0	Full	100	5500	12.46	13.00	1.132	96.97	1.031	-0.06	0.953	1	1.113
2nd	WLAN5.5GHz	-	-	-	-	802.11a 6Mbps	Left Cheek	0	Full	100	5500	12.46	13.00	1.132	96.97	1.031	-0.03	0.941	1.013	1.099
1st	WLAN5.8GHz	-	-	-	-	802.11a 6Mbps	Left Cheek	0	Full	165	5825	12.06	12.50	1.107	96.97	1.031	-0.06	1.050	1	1.198
2nd	WLAN5.8GHz	-	-	-	-	802.11a 6Mbps	Left Cheek	0	Full	165	5825	12.06	12.50	1.107	96.97	1.031	-0.03	1.010	1.040	1.152
1st	LTE Band 2	20M	QPSK	50	24	-	Bottom Side	10	Reduced	18700	1860	22.20	23.00	1.202	-	-	0.12	0.949	1	1.141
2nd	LTE Band 2	20M	QPSK	50	24	-	Bottom Side	10	Reduced	18700	1860	22.20	23.00	1.202	-	-	0.12	0.934	1.016	1.123
1st	LTE Band 4	20M	QPSK	1	49	-	Back	10	Full	20175	1732.5	23.66	24.00	1.081	-	-	-0.02	0.835	1	0.903
2nd	LTE Band 4	20M	QPSK	1	49	-	Back	10	Full	20175	1732.5	23.66	24.00	1.081	-	-	-0.01	0.821	1.017	0.888

General Note:

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
2. Per KDB 865664 D01v01r04, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR <1.45W/kg, only one repeated measurement is required.
3. The ratio is the difference in percentage between original and repeated *measured SAR*.
4. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

16. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Portable Handset		
		Head	Body-worn	Hotspot
1.	LTE + WLAN2.4GHz	Yes	Yes	Yes
2.	LTE + WLAN5.3/5.5GHz	Yes	Yes	
3.	LTE + WLAN5.2/5.8GHz	Yes	Yes	Yes
4.	LTE + 5.3/5.5GHz WLAN + Bluetooth	Yes	Yes	
5.	LTE + 5.2/5.8GHz WLAN + Bluetooth	Yes	Yes	Yes
6.	LTE + Bluetooth	Yes	Yes	Yes

General Note:

1. This device 2.4GHz WLAN support hotspot operation and Bluetooth support tethering applications.
2. WLAN 2.4GHz and Bluetooth share the same antenna so can't transmit simultaneously.
3. WLAN 5GHz can transmit simultaneously with Bluetooth.
4. This device 2.4GHz WLAN/5.2GHz WLAN/5.8GHz WLAN support hotspot operation, and 5.2GHz WLAN/5.8GHz WLAN supports WiFi Direct (GC/GO), and 5.3GHz / 5.5GHz supports WiFi Direct (GC only).
5. 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.
6. 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.
7. All licensed modes share the same antenna part and cannot transmit simultaneously.
8. The reported SAR summation is calculated based on the same configuration and test position.
9. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
   i) Scalar SAR summation < 1.6W/kg.
   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.
   v) The SPLSR calculated results please refer to section 16.4.
10. 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	Hotspot	Body worn
	Test separation	10 mm	15 mm
11.0 dBm	Estimated SAR (W/kg)	0.264 W/kg	0.176 W/kg

16.1 Head Exposure Conditions

WWAN Band		Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz WLAN 1g SAR (W/kg)	3 5GHz WLAN 1g SAR (W/kg)	4 Bluetooth 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)	1+3+4 Summed 1g SAR (W/kg)	1+3+4 SPLSR	1+3+4 Case No
LTE	LTE Band 2	Right Cheek	0.468	0.553	0.759	0.118	1.02	1.35		
		Right Tilted	0.160	0.484	0.823	0.124	0.64	1.11		
		Left Cheek	0.345	1.159	1.198	0.254	1.50	**1.80**	**0.04**	**#01**
		Left Tilted	0.235	0.913	1.186	0.167	1.15	**1.59**		
	LTE Band 4	Right Cheek	0.308	0.553	0.759	0.118	0.86	1.19		
		Right Tilted	0.059	0.484	0.823	0.124	0.54	1.01		
		Left Cheek	0.207	1.159	1.198	0.254	1.37	**1.66**	**0.03**	**#02**
		Left Tilted	0.214	0.913	1.186	0.167	1.13	1.57		
	LTE Band 5	Right Cheek	0.467	0.553	0.759	0.118	1.02	1.34		
		Right Tilted	0.232	0.484	0.823	0.124	0.72	1.18		
		Left Cheek	0.433	1.159	1.198	0.254	**1.59**	**1.89**	**0.04**	**#03**
		Left Tilted	0.233	0.913	1.186	0.167	1.15	1.59		
	LTE Band 12	Right Cheek	0.215	0.553	0.759	0.118	0.77	1.09		
		Right Tilted	0.139	0.484	0.823	0.124	0.62	1.09		
		Left Cheek	0.196	1.159	1.198	0.254	1.36	**1.65**	**0.03**	**#04**
		Left Tilted	0.124	0.913	1.186	0.167	1.04	1.48		
	LTE Band 13	Right Cheek	0.418	0.553	0.759	0.118	0.97	1.30		
		Right Tilted	0.257	0.484	0.823	0.124	0.74	1.20		
		Left Cheek	0.406	1.159	1.198	0.254	1.57	**1.86**	**0.04**	**#05**
		Left Tilted	0.241	0.913	1.186	0.167	1.15	1.59		

16.2 Hotspot Exposure Conditions

WWAN Band		Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz WLAN 1g SAR (W/kg)	3 5GHz WLAN 1g SAR (W/kg)	4 Bluetooth Estimated 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)	1+3+4 Summed 1g SAR (W/kg)
LTE	LTE Band 2	Front	0.414	0.247	0.186	0.264	0.66	0.86
		Back	0.943	0.283	0.330	0.264	1.23	1.54
		Left side	0.235				0.24	0.24
		Right side	0.152	0.092	0.038	0.264	0.24	0.45
		Top side		0.188	0.554	0.264	0.19	0.82
		Bottom side	1.141				1.14	1.14
	LTE Band 4	Front	0.387	0.247	0.186	0.264	0.63	0.84
		Back	0.903	0.283	0.330	0.264	1.19	1.50
		Left side	0.103				0.10	0.10
		Right side	0.216	0.092	0.038	0.264	0.31	0.52
		Top side		0.188	0.554	0.264	0.19	0.82
		Bottom side	0.751				0.75	0.75
	LTE Band 5	Front	0.343	0.247	0.186	0.264	0.59	0.79
		Back	0.612	0.283	0.330	0.264	0.90	1.21
		Left side	0.233				0.23	0.23
		Right side	0.499	0.092	0.038	0.264	0.59	0.80
		Top side		0.188	0.554	0.264	0.19	0.82
		Bottom side	0.191				0.19	0.19
	LTE Band 12	Front	0.235	0.247	0.186	0.264	0.48	0.69
		Back	0.413	0.283	0.330	0.264	0.70	1.01
		Left side	0.149				0.15	0.15
		Right side	0.262	0.092	0.038	0.264	0.35	0.56
		Top side		0.188	0.554	0.264	0.19	0.82
		Bottom side	0.064				0.06	0.06
	LTE Band 13	Front	0.489	0.247	0.186	0.264	0.74	0.94
		Back	0.725	0.283	0.330	0.264	1.01	1.32
		Left side	0.539				0.54	0.54
		Right side	0.775	0.092	0.038	0.264	0.87	1.08
		Top side		0.188	0.554	0.264	0.19	0.82
		Bottom side	0.185				0.19	0.19

16.3 Body-Worn Accessory Exposure Conditions

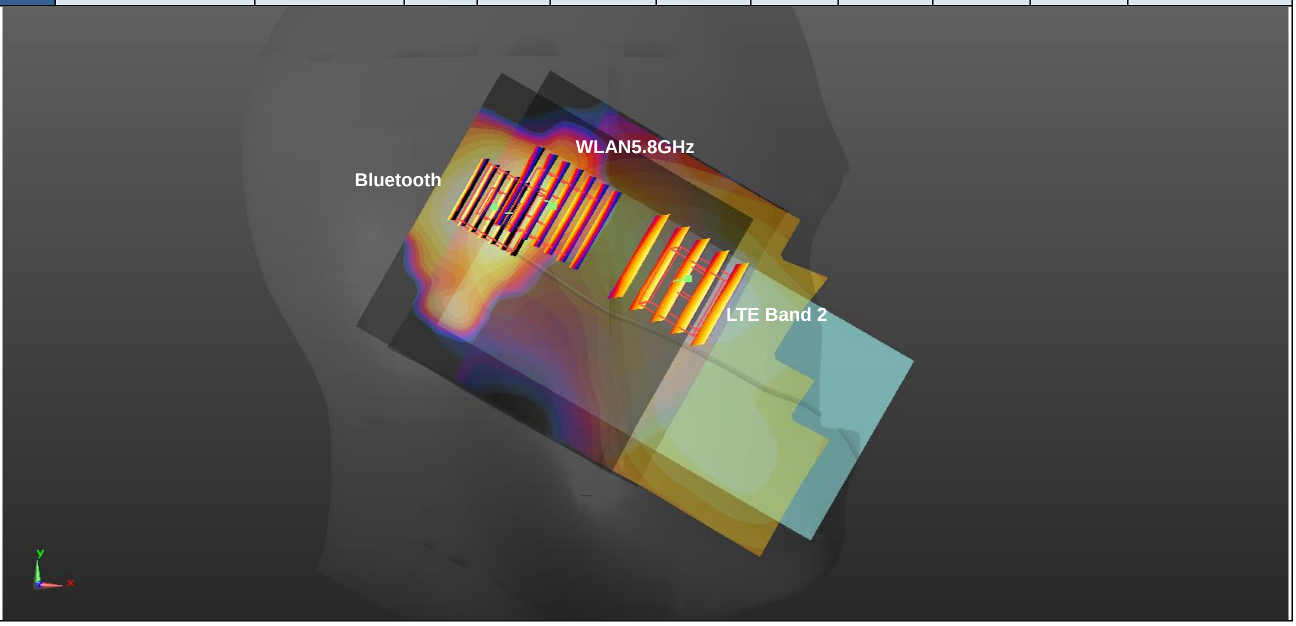
WWAN Band		Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz WLAN 1g SAR (W/kg)	3 5GHz WLAN 1g SAR (W/kg)	4 Bluetooth Estimated 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)	1+3+4 Summed 1g SAR (W/kg)
LTE	LTE Band 2	Front	0.389	0.123	0.124	0.176	0.51	0.69
		Back	0.604	0.132	0.226	0.176	0.74	1.01
	LTE Band 4	Front	0.269	0.123	0.124	0.176	0.39	0.57
		Back	0.400	0.132	0.226	0.176	0.53	0.80
	LTE Band 5	Front	0.340	0.123	0.124	0.176	0.46	0.64
		Back	0.444	0.132	0.226	0.176	0.58	0.85
	LTE Band 12	Front	0.234	0.123	0.124	0.176	0.36	0.53
		Back	0.311	0.132	0.226	0.176	0.44	0.71
	LTE Band 13	Front	0.530	0.123	0.124	0.176	0.65	0.83
		Back	0.693	0.132	0.226	0.176	0.83	1.10

16.4 SPLSR Evaluation and Analysis

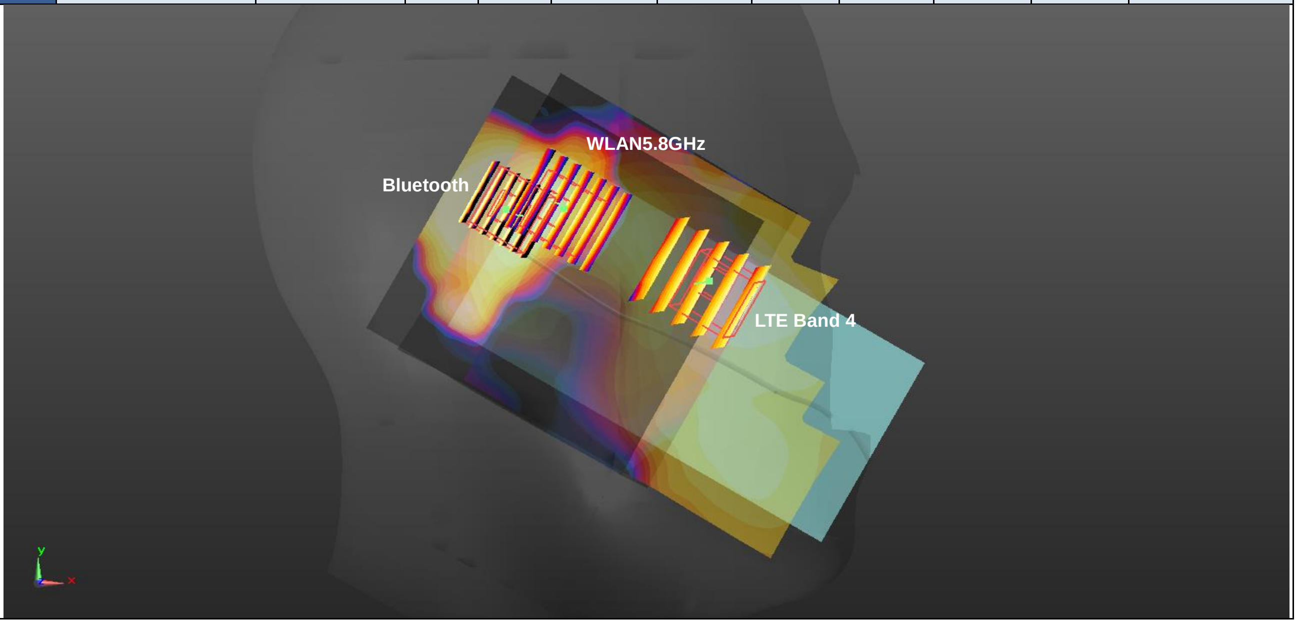
General Note:

1. When standalone SAR is measured for both antennas in the pair, the peak location separation distance is computed by the square root of [(x1−x2)2 + (y1−y2)2 + (z1−z2)2], where (x1, y1, z1) and (x2, y2, z2) are the coordinates in the area scans or extrapolated peak SAR locations in the zoom scans, as appropriate.
2. SPLSR = (SAR1 + SAR2)1.5 / (min. separation distance, mm). If SPLSR ≤ 0.04 for 1g SAR, simultaneously transmission SAR measurement is not necessary.

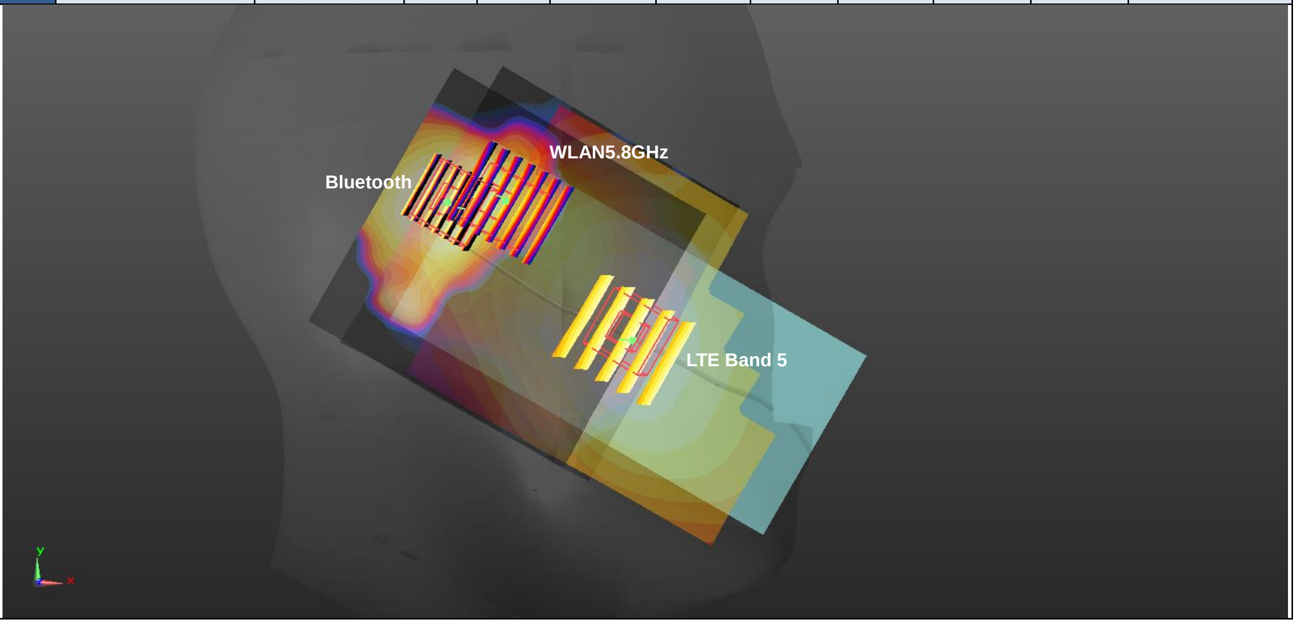
	Band	Position	SAR (W/kg)	Gap	SAR peak location (mm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				(mm)	X	Y	Z				
Case #01	LTE Band 2	Left Cheek	0.345	0	55.36	-12.72	-2.83	60.7	1.80	0.04	Not required
	WLAN5.8GHz		1.198	0	-0.01	11.41	1.62				
	Bluetooth		0.254	0	0.35	12.87	-1.49				
	LTE Band 2	Left Cheek	0.345	0	55.36	-12.72	-2.83	60.6	1.80	0.04	Not required
	Bluetooth		0.254	0	0.35	12.87	-1.49				
	WLAN5.8GHz		1.198	0	-0.01	11.41	1.62				



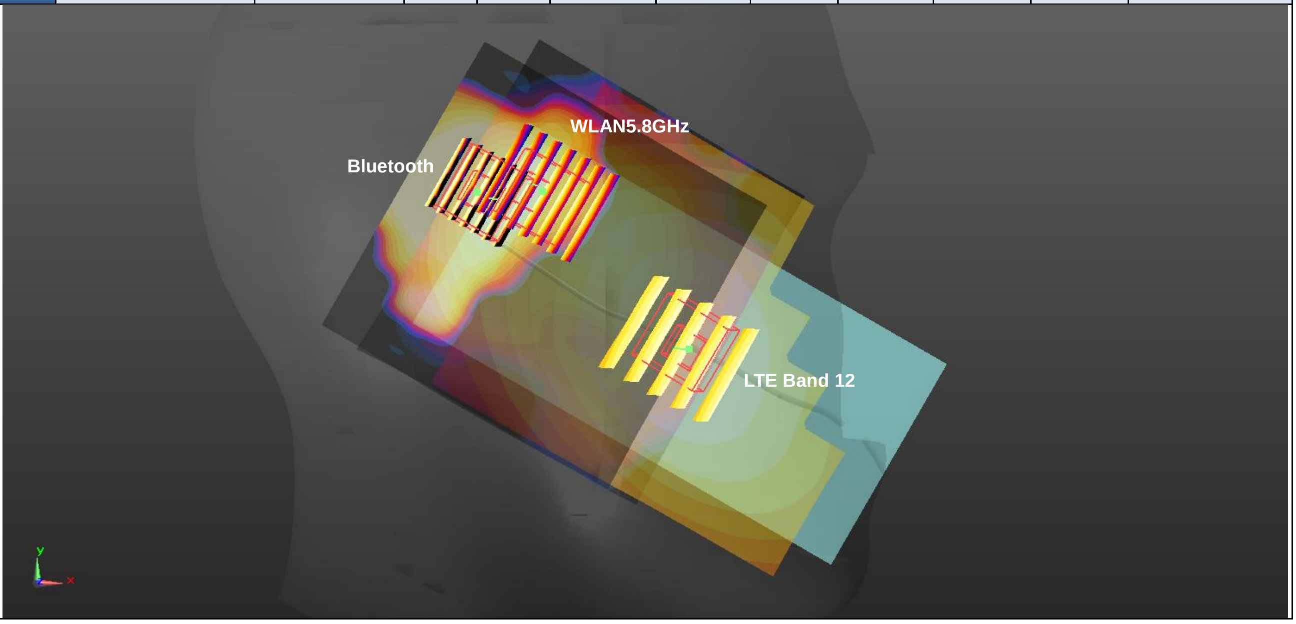
Case	Band	Position	SAR (W/kg)	Gap	SAR peak location (mm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				(mm)	X	Y	Z				
Case #02	LTE Band 4	Left Cheek	0.207	0	58.13	-10.71	-2.15	62.4	1.66	0.03	Not required
	WLAN5.8GHz		1.198	0	-0.01	11.41	1.62				
	Bluetooth		0.254	0	0.35	12.87	-1.49				
	LTE Band 4	Left Cheek	0.207	0	58.13	-10.71	-2.15	62.3	1.66	0.03	Not required
	Bluetooth		0.254	0	0.35	12.87	-1.49				
	WLAN5.8GHz		1.198	0	-0.01	11.41	1.62				



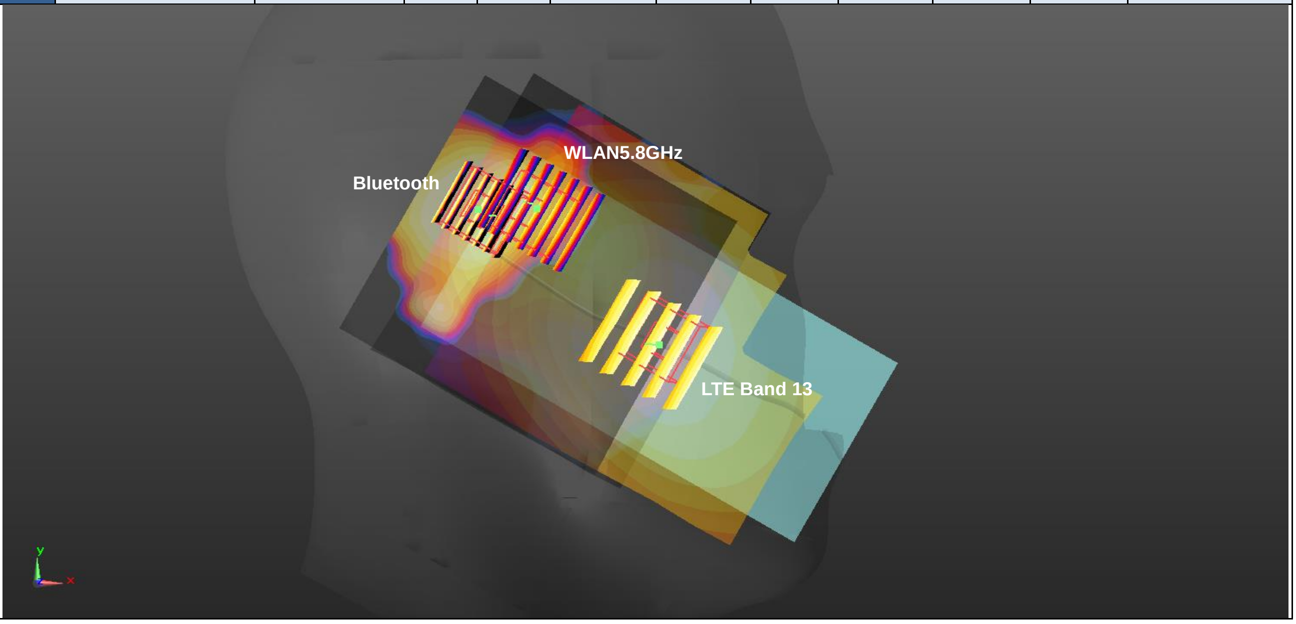
Case	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (mm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case #03	LTE Band 5	Left Cheek	0.433	0	49.19	-31.68	-4.15	66.2	1.89	0.04	Not required
	WLAN5.8GHz		1.198	0	-0.01	11.41	1.62				
	Bluetooth		0.254	0	0.35	12.87	-1.49				
	LTE Band 5	Left Cheek	0.433	0	49.19	-31.68	-4.15	65.7	1.89	0.04	Not required
	Bluetooth		0.254	0	0.35	12.87	-1.49				
	WLAN5.8GHz		1.198	0	-0.01	11.41	1.62				



	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (mm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case #04	LTE Band 12	Left Cheek	0.196	0	52.55	-35.42	-3.63	71.1	1.65	0.03	Not required
	WLAN5.8GHz		1.198	0	-0.01	11.41	1.62				
	Bluetooth		0.254	0	0.35	12.87	-1.49				
	LTE Band 12	Left Cheek	0.196	0	52.55	-35.42	-3.63	70.6	1.65	0.03	Not required
	Bluetooth		0.254	0	0.35	12.87	-1.49				
	WLAN5.8GHz		1.198	0	-0.01	11.41	1.62				



Case	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (mm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
Case #05	LTE Band 13	Left Cheek	0.406	0	50.87	-34.48	-3.88	69.3	1.86	0.04	Not required
	WLAN5.8GHz		1.198	0	-0.01	11.41	1.62				
	Bluetooth		0.254	0	0.35	12.87	-1.49				
	LTE Band 13	Left Cheek	0.406	0	50.87	-34.48	-3.88	68.7	1.86	0.04	Not required
	Bluetooth		0.254	0	0.35	12.87	-1.49				
	WLAN5.8GHz		1.198	0	-0.01	11.41	1.62				



Test Engineer： Nick Hu, Yuan Zhao, Jiaxing Chang, Yuankai Kong

17. Uncertainty Assessment

Per 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.

18. 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 248227 D01 v02r02, "SAR Guidance for IEEE 802.11 (WiFi) Transmitters", Oct 2015.

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

[7] FCC KDB 648474 D04 v01r03, "SAR Evaluation Considerations for Wireless Handsets", Oct 2015.

[8] FCC KDB 941225 D05 v02r05, "SAR Evaluation Considerations for LTE Devices", Dec 2015

[9] FCC KDB 941225 D06 v02r01, "SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities", Oct 2015.

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

[11] FCC KDB 865664 D02 v01r02, "RF Exposure Compliance Reporting and Documentation Considerations" Oct 2015.

------THE END------

Appendix A. Plots of System Performance Check

The plots are shown as follows.

System Check_Head_750MHz

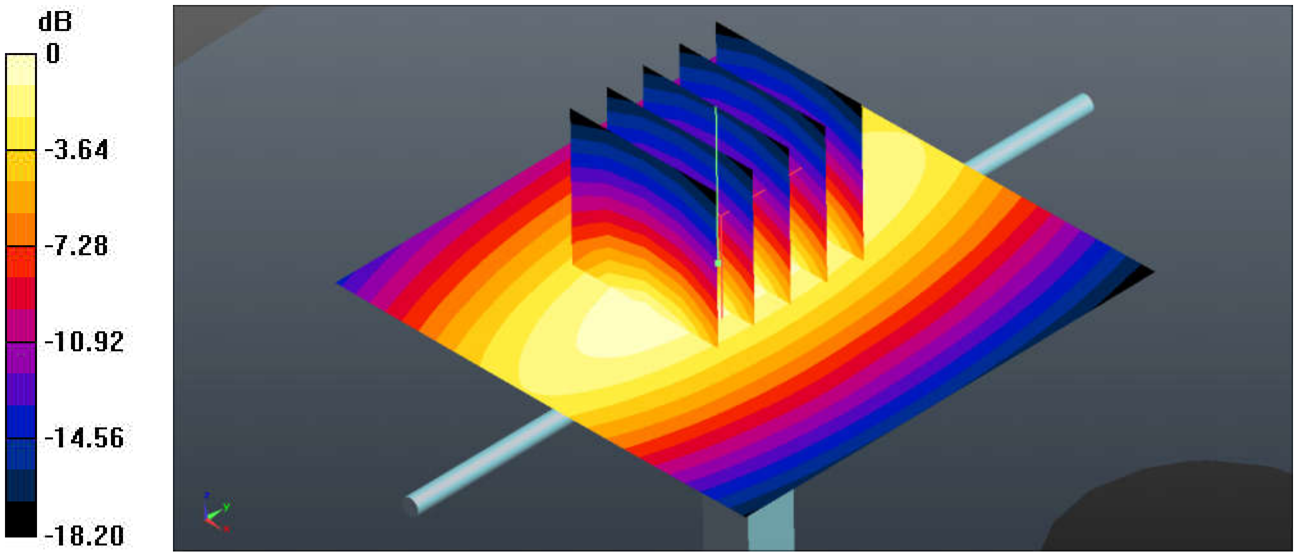
DUT: D750V3 - SN:1087

Communication System: UID 0, CW (0); Frequency: 750 MHz;Duty Cycle: 1:1
Medium: HSL_750 Medium parameters used: f = 750 MHz; $\sigma = 0.896$ S/m; $\varepsilon_r = 41.73$; $\rho = 1000$ kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(9.37, 9.37, 9.37); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.65 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 56.01 V/m; Power Drift = 0.1 dB
Peak SAR (extrapolated) = 3.12 W/kg
SAR(1 g) = 2.14 W/kg; SAR(10 g) = 1.43 W/kg
Maximum value of SAR (measured) = 2.69 W/kg



0 dB = 2.65 W/kg = 4.23 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.1.16

System Check_Head_835MHz

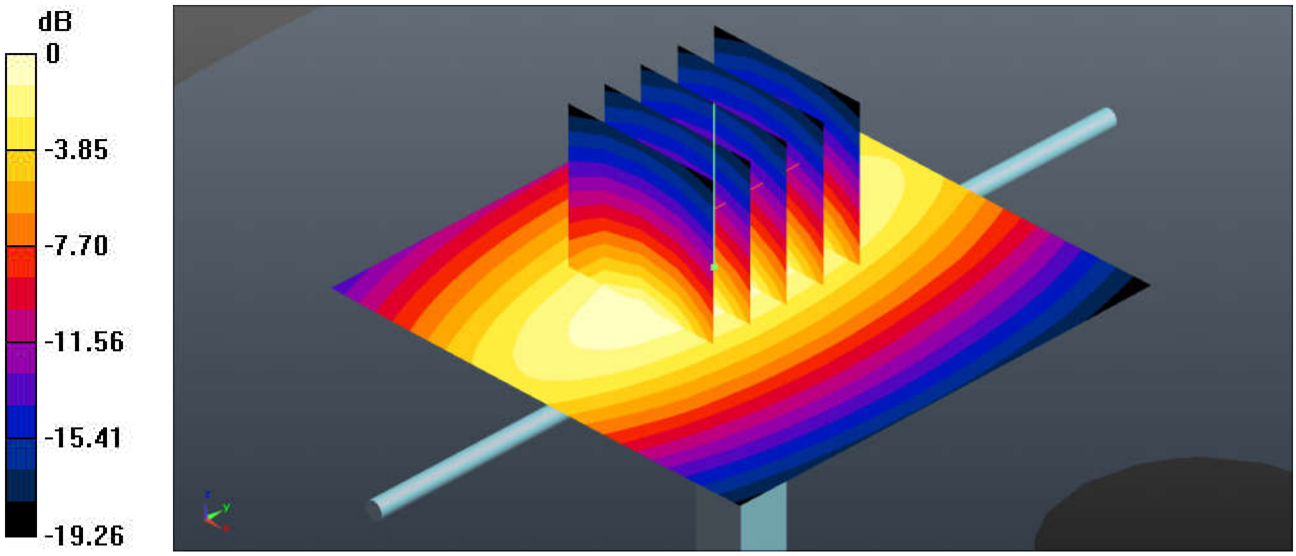
DUT: D835V2 - SN:4d151

Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium: HSL_850 Medium parameters used: f = 835 MHz; σ = 0.939 S/m; ε_r = 41.947; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(9.07, 9.07, 9.07); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.33 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 57.64 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 3.81 W/kg
SAR(1 g) = 2.52 W/kg; SAR(10 g) = 1.65 W/kg
Maximum value of SAR (measured) = 3.38 W/kg



0 dB = 3.33 W/kg = 5.22 dBW/kg

System Check_Head_1750MHz

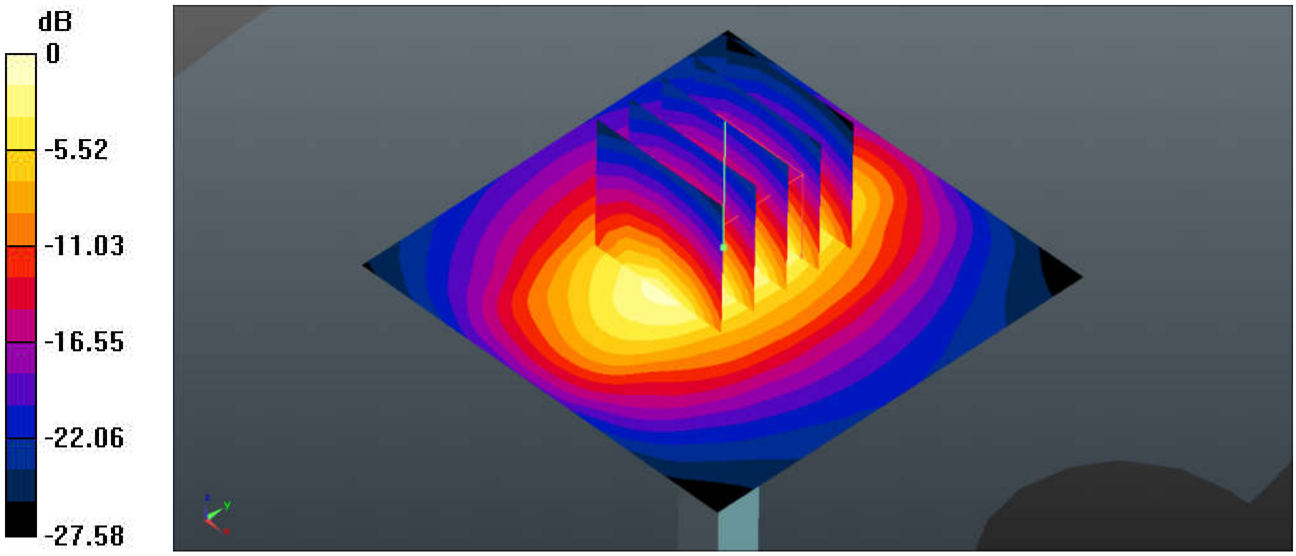
DUT: D1750V2 - SN:1090

Communication System: UID 0, CW (0); Frequency: 1750 MHz;Duty Cycle: 1:1
Medium: HSL_1750 Medium parameters used: f = 1750 MHz; σ = 1.413 S/m; ε_r = 39.15; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.95, 7.95, 7.95); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM2; Type: SAM; Serial: TP-1696
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 14.9 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 101.0 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 17.7 W/kg
SAR(1 g) = 9.63 W/kg; SAR(10 g) = 5.11 W/kg
Maximum value of SAR (measured) = 14.8 W/kg



0 dB = 14.9 W/kg = 11.73 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.1.18

System Check_Head_1900MHz

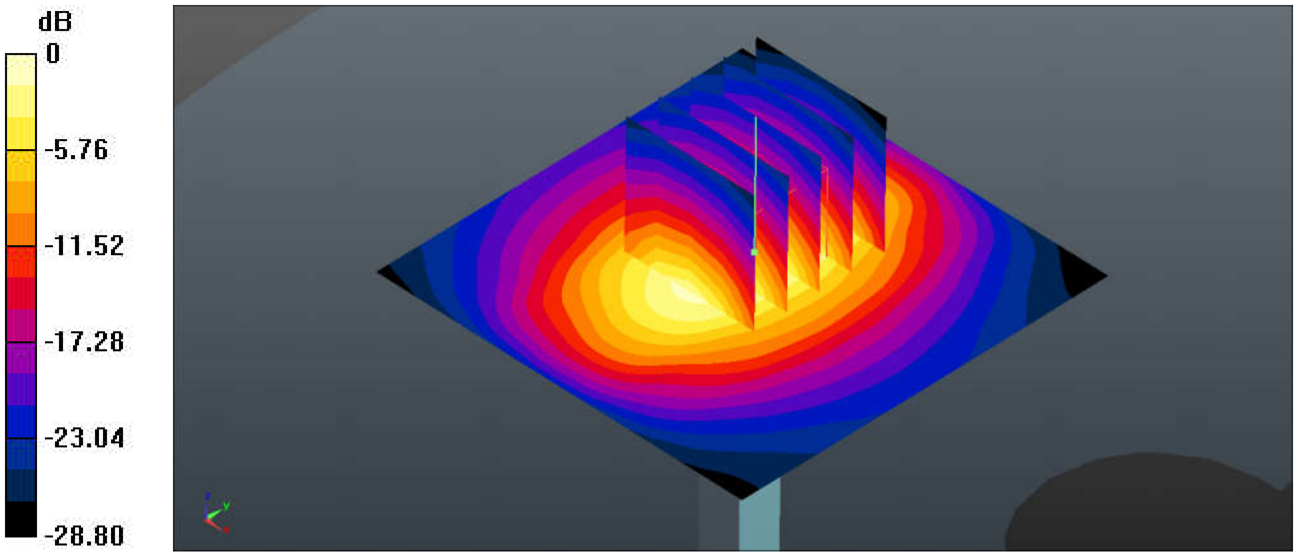
DUT: D1900V2 - SN:5d170

Communication System: UID 0, CW (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL_1900 Medium parameters used: f = 1900 MHz; σ = 1.403 S/m; ε_r = 39.092; ρ = 1000 kg/m^3
Ambient Temperature：23.1 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.67, 7.67, 7.67); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM2; Type: SAM; Serial: TP-1696
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 14.9 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 85.22 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 19.2 W/kg
SAR(1 g) = 10 W/kg; SAR(10 g) = 5.11 W/kg
Maximum value of SAR (measured) = 14.6 W/kg



0 dB = 14.9 W/kg = 11.73 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.1.21

System Check_Head_2450MHz

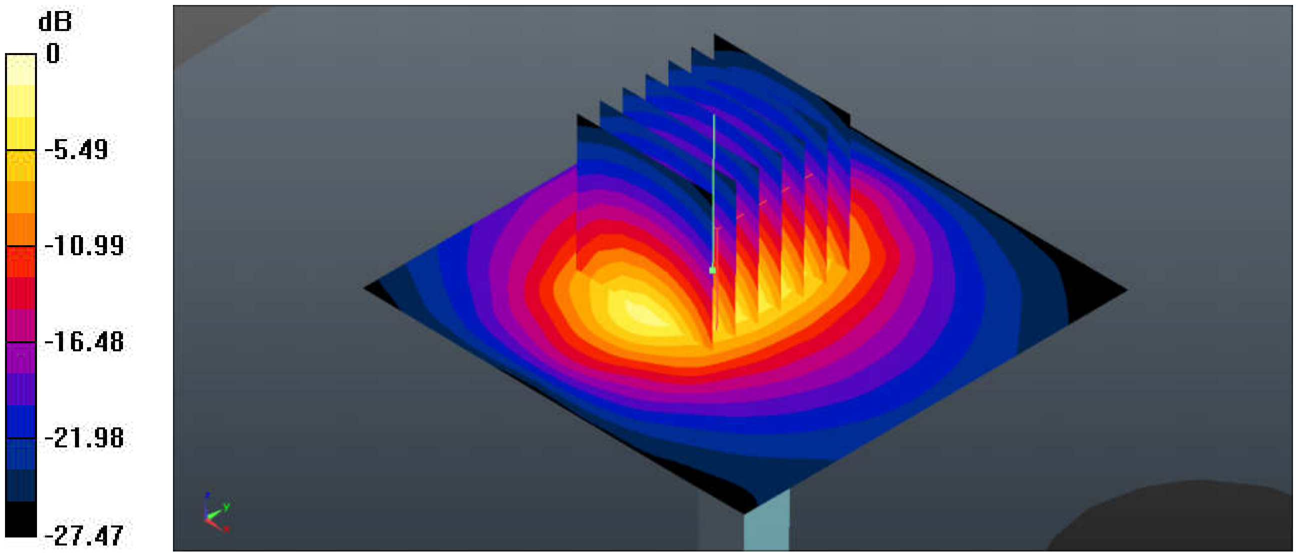
DUT: D2450V2 - SN:908

Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: HSL_2450 Medium parameters used: f = 2450 MHz; σ = 1.796 S/m; ε_r = 40.869; ρ = 1000 kg/m^3
Ambient Temperature：23.4 ℃; Liquid Temperature：22.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.06, 7.06, 7.06); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Pin=250mW/Area Scan (71x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 21.6 W/kg

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 77.45 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 28.6 W/kg
SAR(1 g) = 13.5 W/kg; SAR(10 g) = 6.2 W/kg
Maximum value of SAR (measured) = 21.0 W/kg



0 dB = 21.6 W/kg = 13.34 dBW/kg

System Check_Head_5250MHz

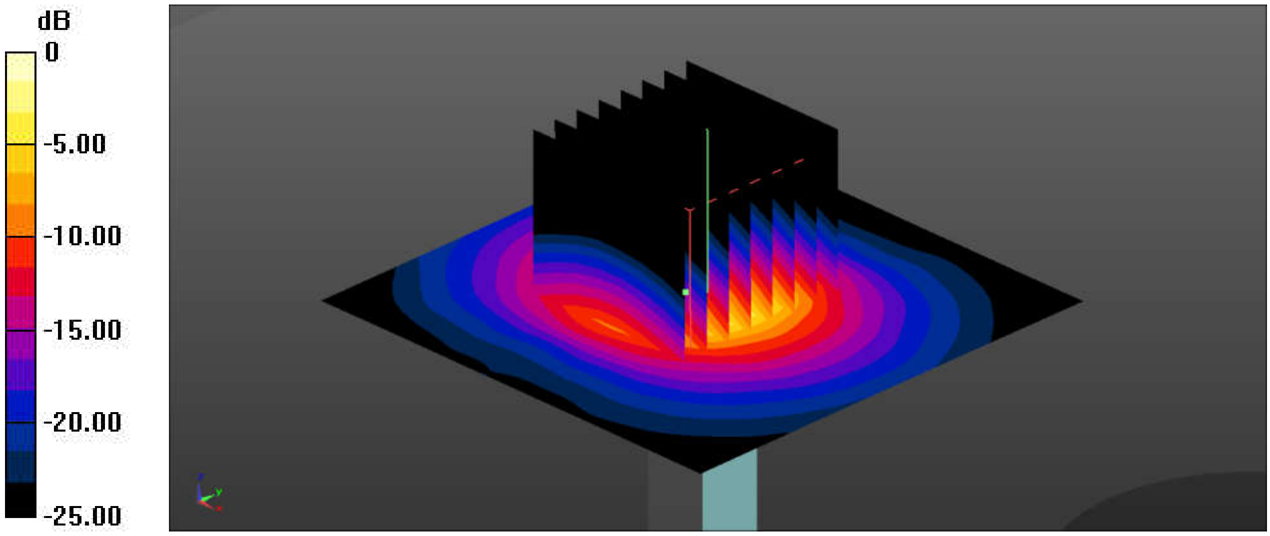
DUT: D5GHzV2 - SN:1113

Communication System: UID 0, CW (0); Frequency: 5250 MHz;Duty Cycle: 1:1
Medium: HSL_5000 Medium parameters used: f = 5250 MHz; σ = 4.6 S/m; ε_r = 36.382; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.19, 5.19, 5.19); Calibrated: 2019.5.27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2019.7.23
- Phantom: SAM1; Type: SAM; Serial: 1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Pin=100mW/Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 18.6 W/kg

Pin=100mW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 43.27 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 30.4 W/kg
SAR(1 g) = 7.79 W/kg; SAR(10 g) = 2.26 W/kg
Maximum value of SAR (measured) = 18.0 W/kg



0 dB = 18.6 W/kg = 12.70 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab   Date: 2020.2.29

System Check_Head_5600MHz

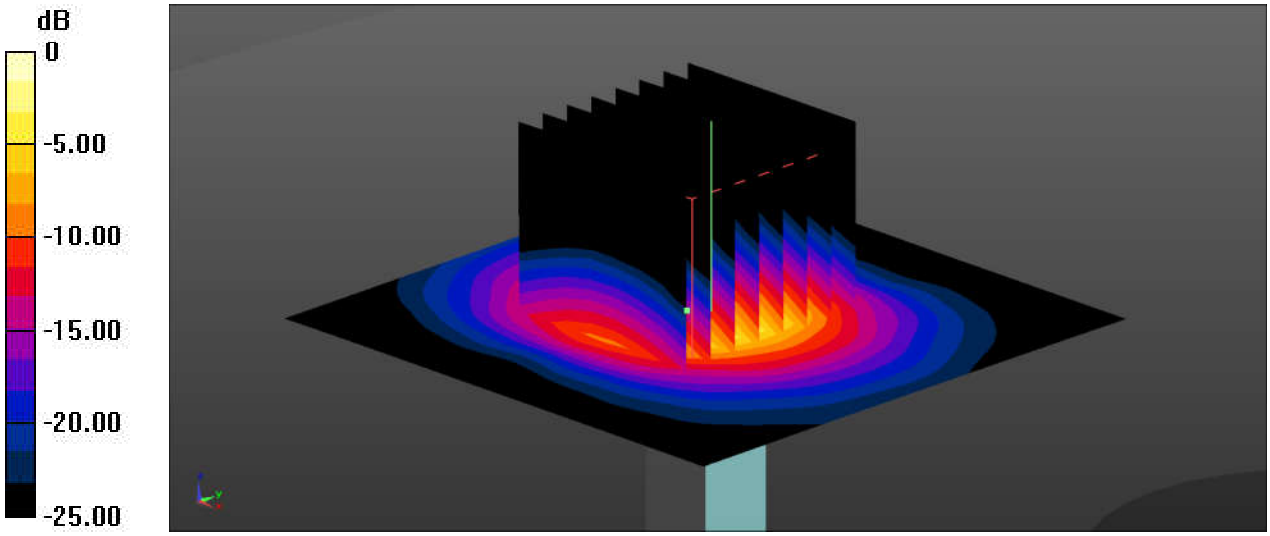
DUT: D5GHzV2 - SN:1113

Communication System: UID 0, CW (0); Frequency: 5600 MHz;Duty Cycle: 1:1
Medium: HSL_5000 Medium parameters used: f = 5600 MHz; σ = 4.99 S/m; ε_r = 35.804; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(4.92, 4.92, 4.92); Calibrated: 2019.5.27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2019.7.23
- Phantom: SAM1; Type: SAM; Serial: 1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Pin=100mW/Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 20.2 W/kg

Pin=100mW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 41.55 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 34.0 W/kg
SAR(1 g) = 7.94 W/kg; SAR(10 g) = 2.31 W/kg
Maximum value of SAR (measured) = 18.7 W/kg



0 dB = 20.2 W/kg = 13.05 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.3.1

System Check_Head_5750MHz

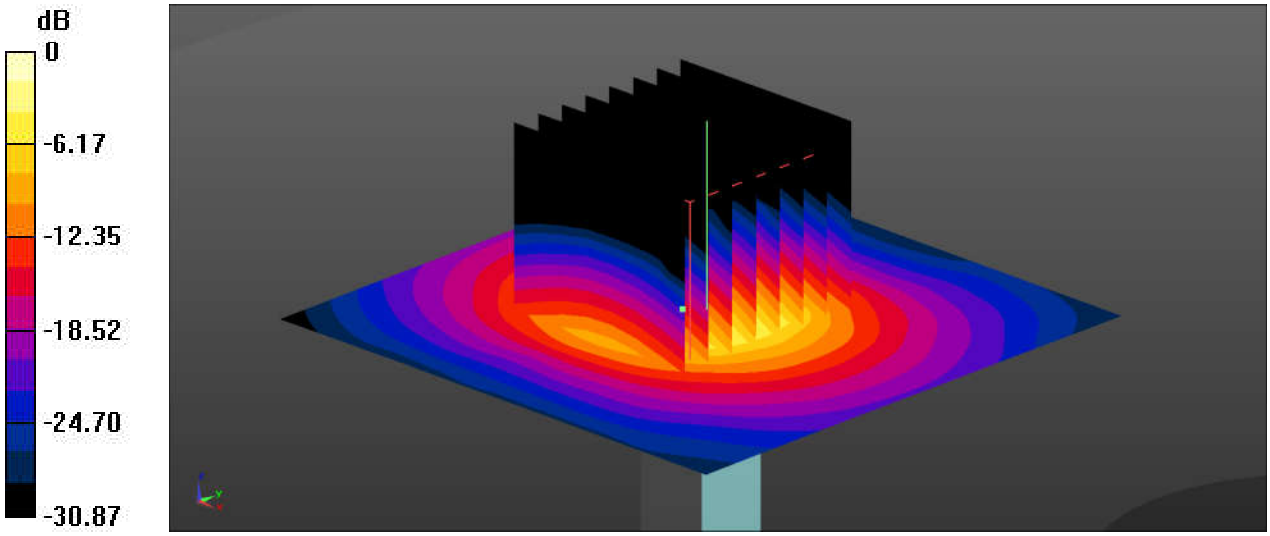
DUT: D5GHzV2 - SN:1113

Communication System: UID 0, CW (0); Frequency: 5750 MHz;Duty Cycle: 1:1
Medium: HSL_5000 Medium parameters used: f = 5750 MHz; σ = 5.166 S/m; ε_r = 35.55; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.17, 5.17, 5.17); Calibrated: 2019.5.27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2019.7.23
- Phantom: SAM1; Type: SAM; Serial: 1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Pin=100mW/Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 17.9 W/kg

Pin=100mW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 38.16 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 32.7 W/kg
SAR(1 g) = 7.39 W/kg; SAR(10 g) = 2.12 W/kg
Maximum value of SAR (measured) = 17.8 W/kg



0 dB = 17.9 W/kg = 12.53 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: 2020.1.15

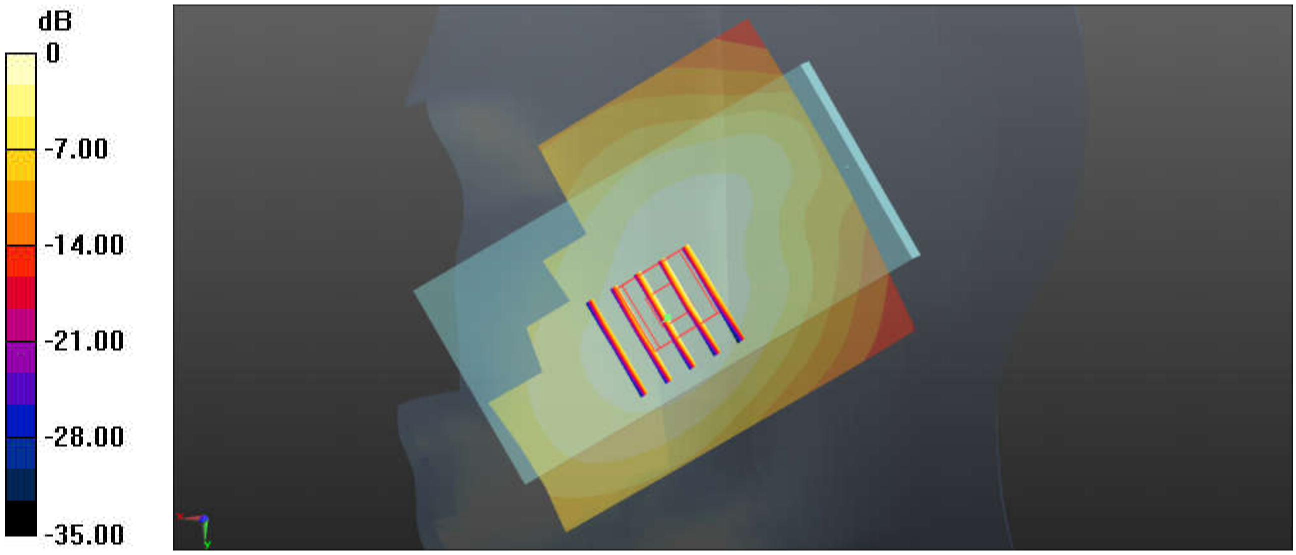
01_LTE Band 12_10M_QPSK_1RB_25Offset_Right Cheek_0mm_Ch23095

Communication System: UID 0, LTE-FDD (0); Frequency: 707.5 MHz;Duty Cycle: 1:1
Medium: HSL_750 Medium parameters used: f = 707.5 MHz; σ = 0.853 S/m; ε_r = 42.316; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(9.37, 9.37, 9.37); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch23095/Area Scan (71x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.224 W/kg

Ch23095/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.513 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.245 W/kg
SAR(1 g) = 0.203 W/kg; SAR(10 g) = 0.160 W/kg
Maximum value of SAR (measured) = 0.218 W/kg



0 dB = 0.224 W/kg = -6.50 dBW/kg

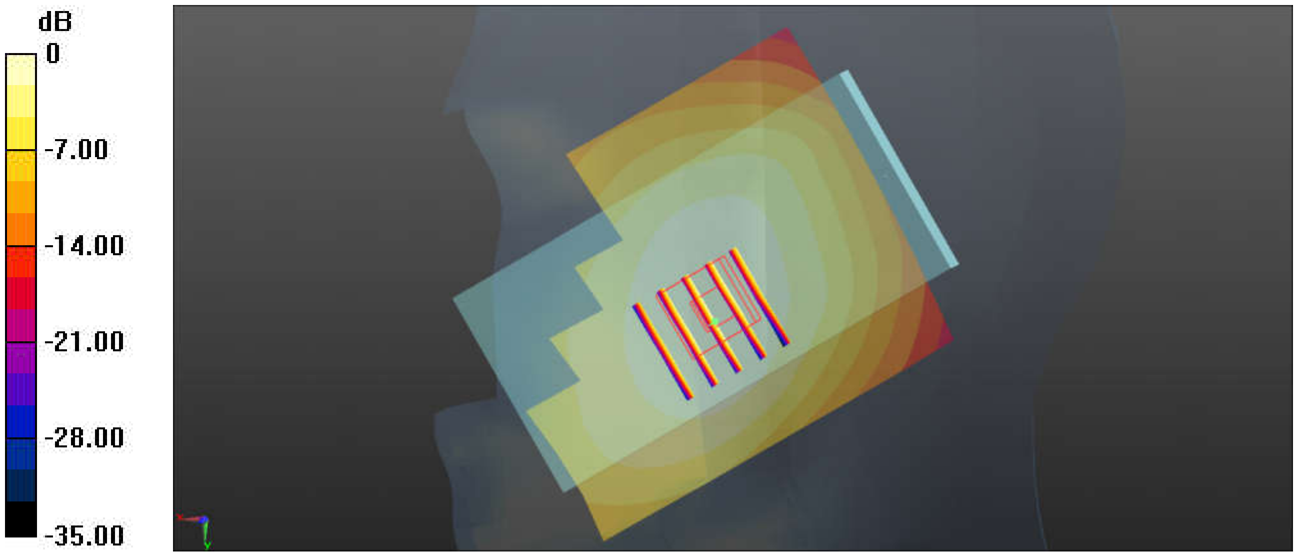
02_LTE Band 13_10M_QPSK_1RB_25Offset_Right Cheek_0mm_Ch23230

Communication System: UID 0, LTE-FDD (0); Frequency: 782 MHz;Duty Cycle: 1:1
Medium: HSL_750 Medium parameters used: f = 782 MHz; σ = 0.924 S/m; ε_r = 41.333; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(9.37, 9.37, 9.37); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch23230/Area Scan (71x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.429 W/kg

Ch23230/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.130 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.488 W/kg
SAR(1 g) = 0.394 W/kg; SAR(10 g) = 0.303 W/kg
Maximum value of SAR (measured) = 0.428 W/kg



0 dB = 0.429 W/kg = -3.68 dBW/kg

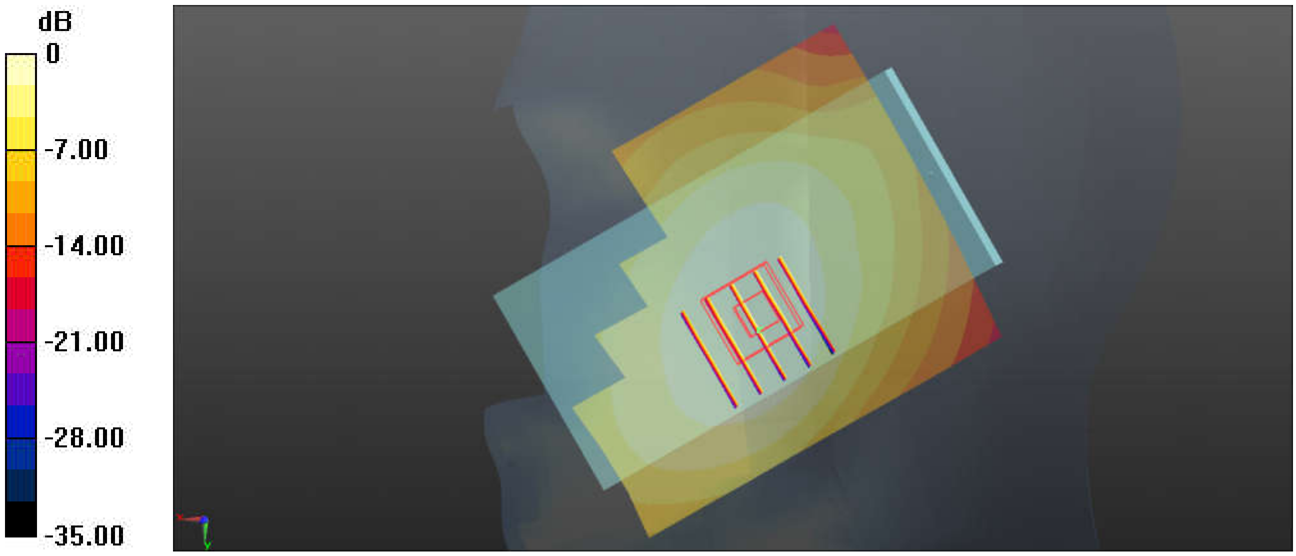
03_LTE Band 5_10M_QPSK_1RB_25Offset_Right Cheek_0mm_Ch20525

Communication System: UID 0, LTE-FDD (0); Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium: HSL_850 Medium parameters used: f = 836.5 MHz; σ = 0.94 S/m; ε_r = 41.929; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(9.07, 9.07, 9.07); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch20525/Area Scan (71x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.497 W/kg

Ch20525/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.211 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.575 W/kg
SAR(1 g) = 0.450 W/kg; SAR(10 g) = 0.338 W/kg
Maximum value of SAR (measured) = 0.492 W/kg



0 dB = 0.497 W/kg = -3.04 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.1.18

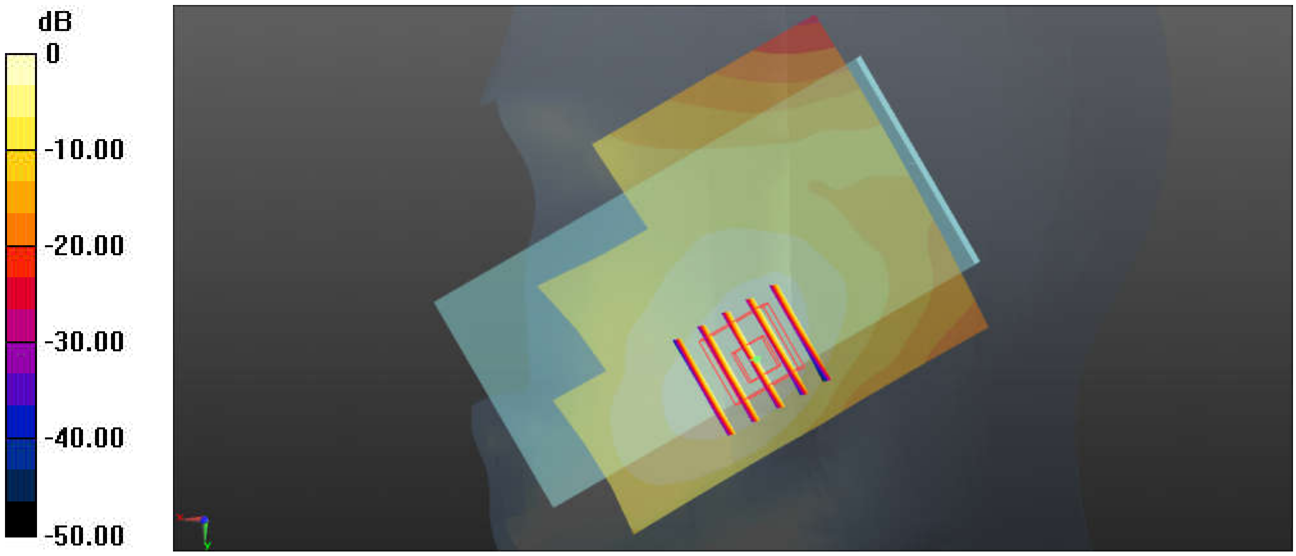
04_LTE Band 2_20M_QPSK_1RB_49Offset_Right Cheek_0mm_Ch18900

Communication System: UID 0, LTE-FDD (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: HSL_1900 Medium parameters used: f = 1880 MHz; σ = 1.382 S/m; ε_r = 39.196; ρ =1000 kg/m^3
Ambient Temperature：23.1 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.67, 7.67, 7.67); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM2; Type: SAM; Serial: TP-1696
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch18900/Area Scan (71x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.623 W/kg

Ch18900/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.673 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.729 W/kg
SAR(1 g) = 0.442 W/kg; SAR(10 g) = 0.267 W/kg
Maximum value of SAR (measured) = 0.618 W/kg



0 dB = 0.623 W/kg = -2.06 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.1.19

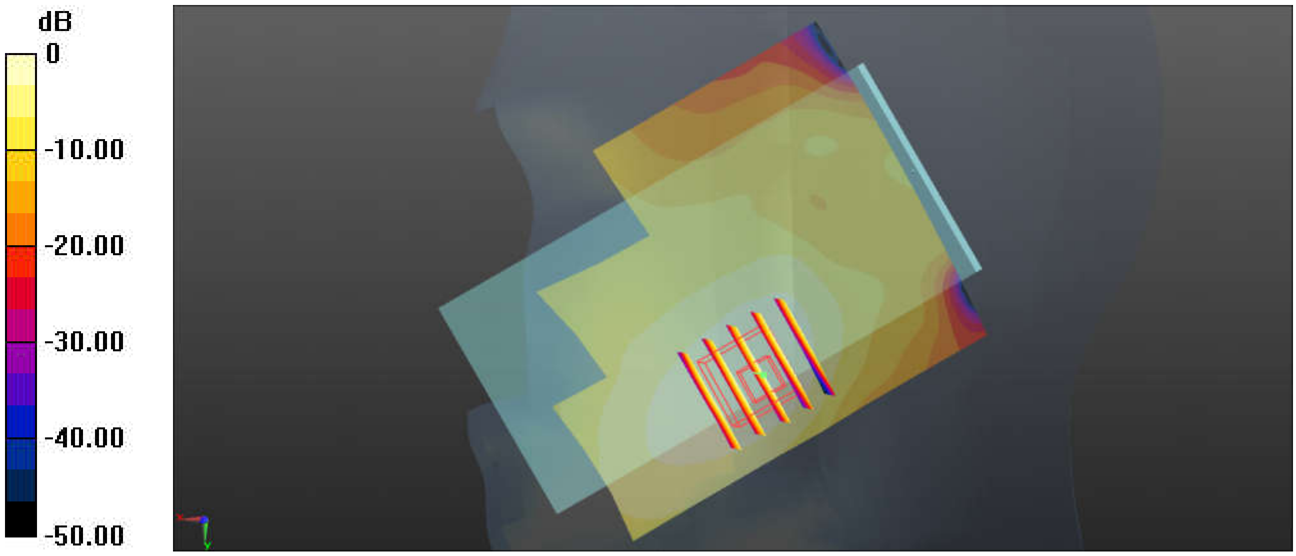
05_LTE Band 4_20M_QPSK_1RB_49Offset_Right Cheek_0mm_Ch20175

Communication System: UID 0, LTE-FDD (0); Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium: HSL_1750 Medium parameters used: f = 1732.5 MHz; σ = 1.401 S/m; ε_r = 39.18; ρ=1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.95, 7.95, 7.95); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM2; Type: SAM; Serial: TP-1696
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch20175/Area Scan (71x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.408 W/kg

Ch20175/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.178 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.470 W/kg
SAR(1 g) = 0.285 W/kg; SAR(10 g) = 0.183 W/kg
Maximum value of SAR (measured) = 0.375 W/kg



0 dB = 0.408 W/kg = -3.89 dBW/kg

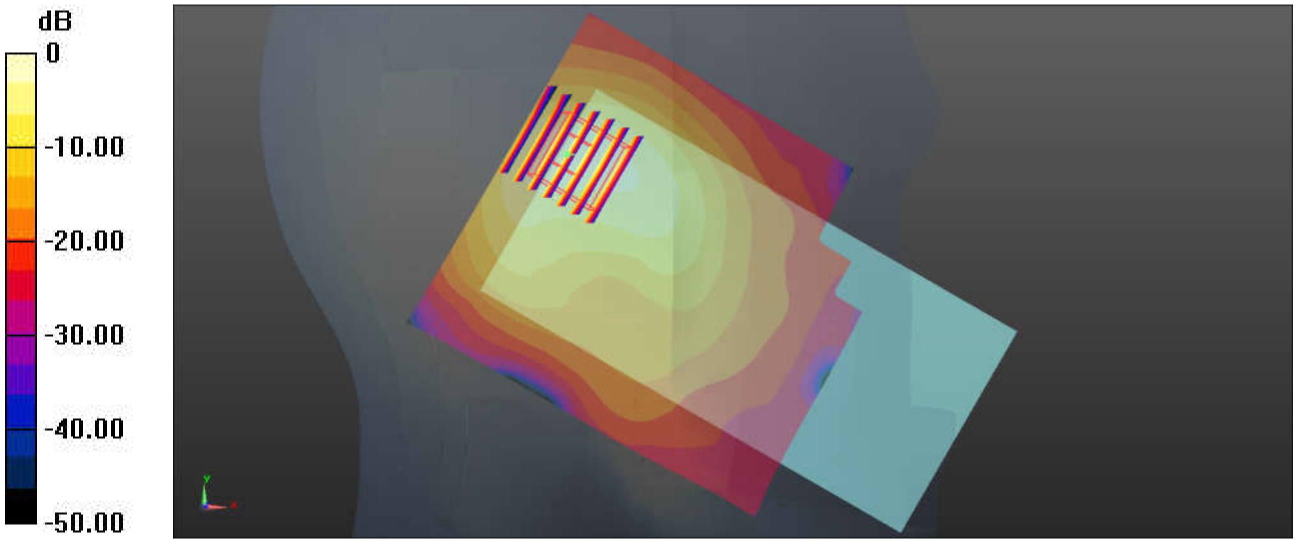
06_WLAN 2.4GHz_802.11b 1Mbps_Left Cheek_0mm_Ch6

Communication System: UID 0, 802.11b (0); Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: HSL_2450 Medium parameters used: f = 2437 MHz; σ = 1.776 S/m; ε_r = 40.857; ρ =1000 kg/m^3
Ambient Temperature：23.4 ℃; Liquid Temperature：22.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.06, 7.06, 7.06); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch6/Area Scan (91x101x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 1.39 W/kg

Ch6/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.63 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 2.13 W/kg
SAR(1 g) = 0.938 W/kg; SAR(10 g) = 0.426 W/kg
Maximum value of SAR (measured) = 1.22 W/kg



0 dB = 1.39 W/kg = 1.43 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.1.21

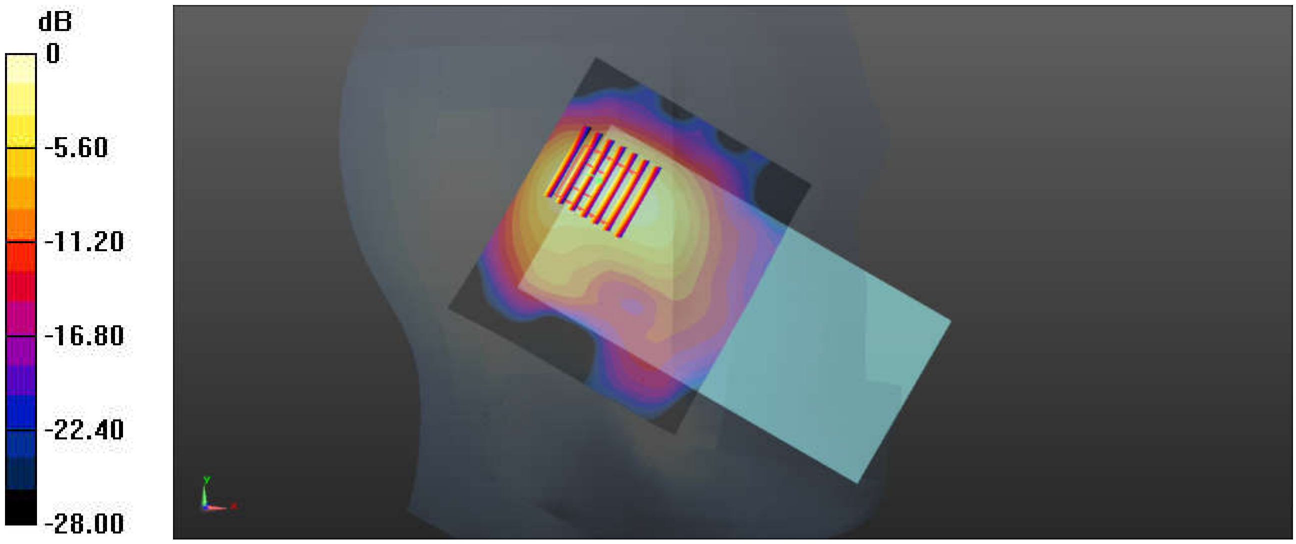
07_Bluetooth_ 1Mbps_Left Cheek_0mm_Ch78

Communication System: UID 0, Bluetooth (0); Frequency: 2480 MHz;Duty Cycle: 1:1.299
Medium: HSL_2450 Medium parameters used: f = 2480 MHz; σ = 1.824 S/m; ε_r = 40.71; ρ = 1000 kg/m^3
Ambient Temperature：23.4 ℃; Liquid Temperature：22.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.06, 7.06, 7.06); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch78/Area Scan (91x81x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.292 W/kg

Ch78/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.945 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.495 W/kg
SAR(1 g) = 0.223 W/kg; SAR(10 g) = 0.102 W/kg
Maximum value of SAR (measured) = 0.292 W/kg



0 dB = 0.292 W/kg = -5.35 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.2.28

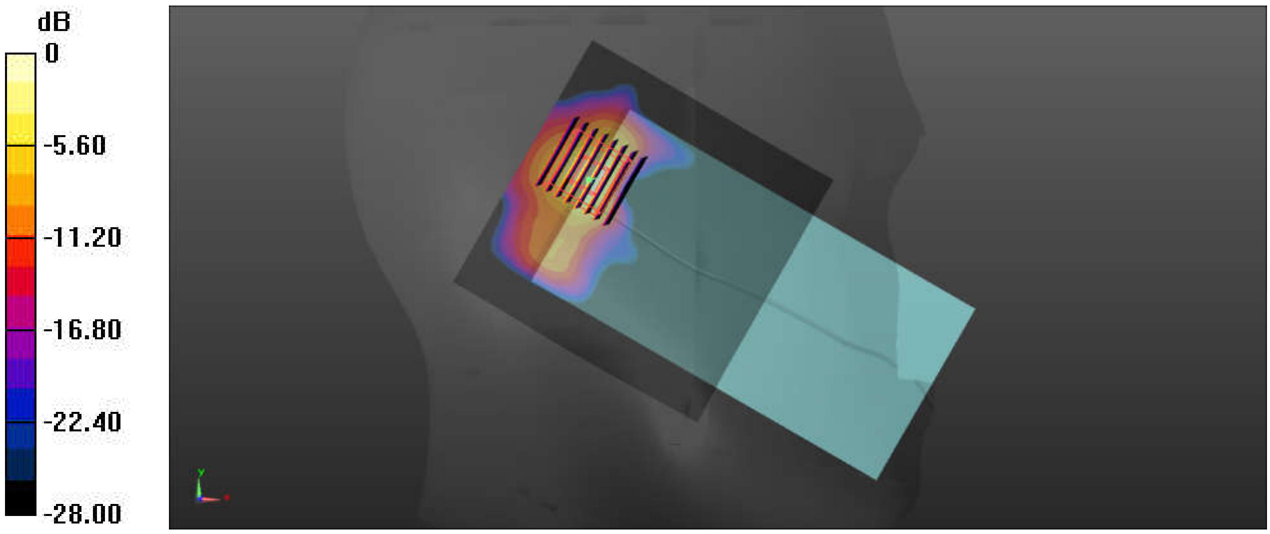
08_WLAN 5.3GHz_802.11a 6Mbps_Left Tilted_0mm__Ch64

Communication System: UID 0, 802.11a (0); Frequency: 5320 MHz;Duty Cycle: 1:1.031
Medium: HSL_5000 Medium parameters used: f = 5320 MHz; σ = 4.679 S/m; ε_r = 36.277; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.19, 5.19, 5.19); Calibrated: 2019.5.27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2019.7.23
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch64/Area Scan (101x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 2.31 W/kg

Ch64/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 15.65 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.77 W/kg
SAR(1 g) = 0.995 W/kg; SAR(10 g) = 0.280 W/kg
Maximum value of SAR (measured) = 2.36 W/kg



0 dB = 2.31 W/kg = 3.64 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab   Date: 2020.2.29

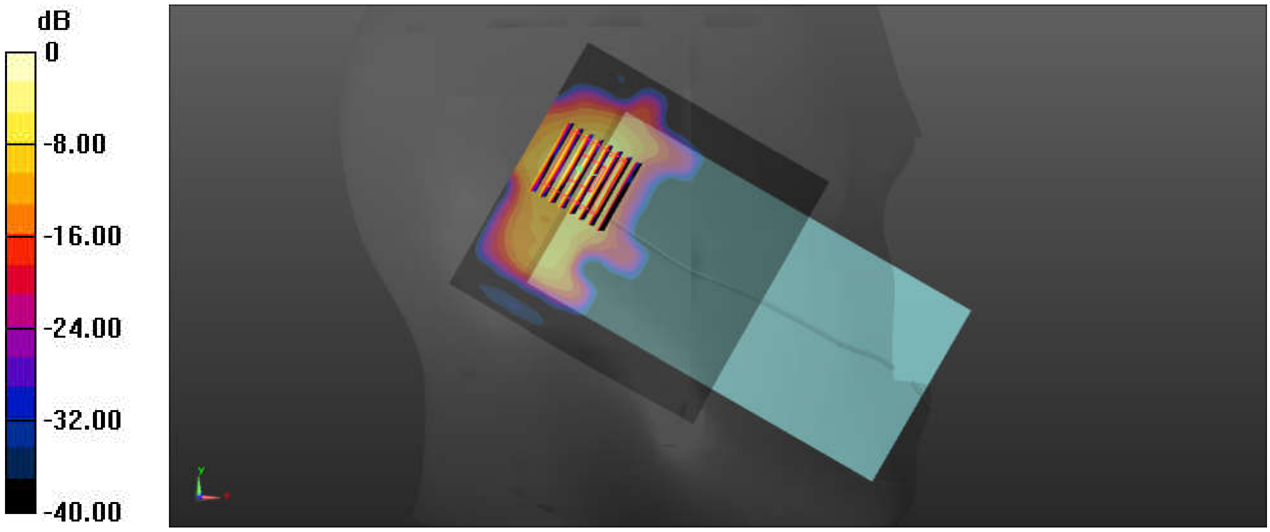
09_WLAN 5.5GHz_802.11a 6Mbps_Left Cheek_0mm_Ch100

Communication System: UID 0, 802.11a (0); Frequency: 5500 MHz;Duty Cycle: 1:1.031
Medium: HSL_5000 Medium parameters used: f = 5500 MHz; σ = 4.874 S/m; ε_r = 35.975; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(4.92, 4.92, 4.92); Calibrated: 2019.5.27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2019.7.23
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch100/Area Scan (101x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 2.14 W/kg

Ch100/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 12.05 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 3.71 W/kg
SAR(1 g) = 0.953 W/kg; SAR(10 g) = 0.264 W/kg
Maximum value of SAR (measured) = 2.31 W/kg



0 dB = 2.14 W/kg = 3.30 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.3.1

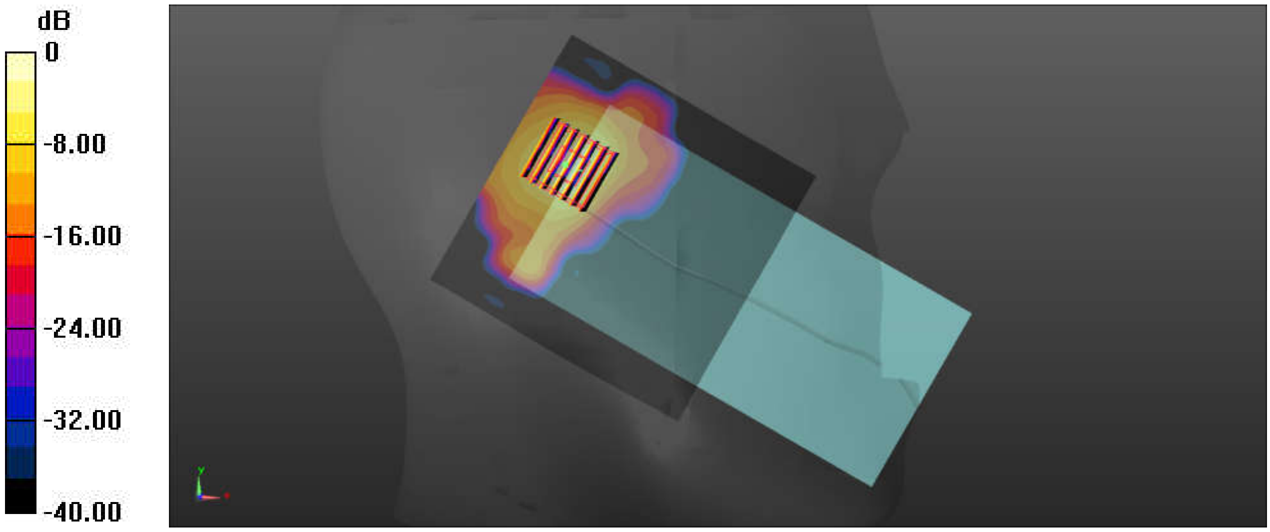
10_WLAN 5.8GHz_802.11a 6Mbps_Left Cheek_0mm_Ch165

Communication System: UID 0, 802.11a (0); Frequency: 5825 MHz;Duty Cycle: 1:1.031
Medium: HSL_5000 Medium parameters used: f = 5825 MHz; σ = 5.25 S/m; ε_r = 35.439; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.17, 5.17, 5.17); Calibrated: 2019.5.27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2019.7.23
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch165/Area Scan (101x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 2.32 W/kg

Ch165/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 12.16 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 4.41 W/kg
SAR(1 g) = 1.05 W/kg; SAR(10 g) = 0.293 W/kg
Maximum value of SAR (measured) = 2.61 W/kg



0 dB = 2.32 W/kg = 3.65 dBW/kg

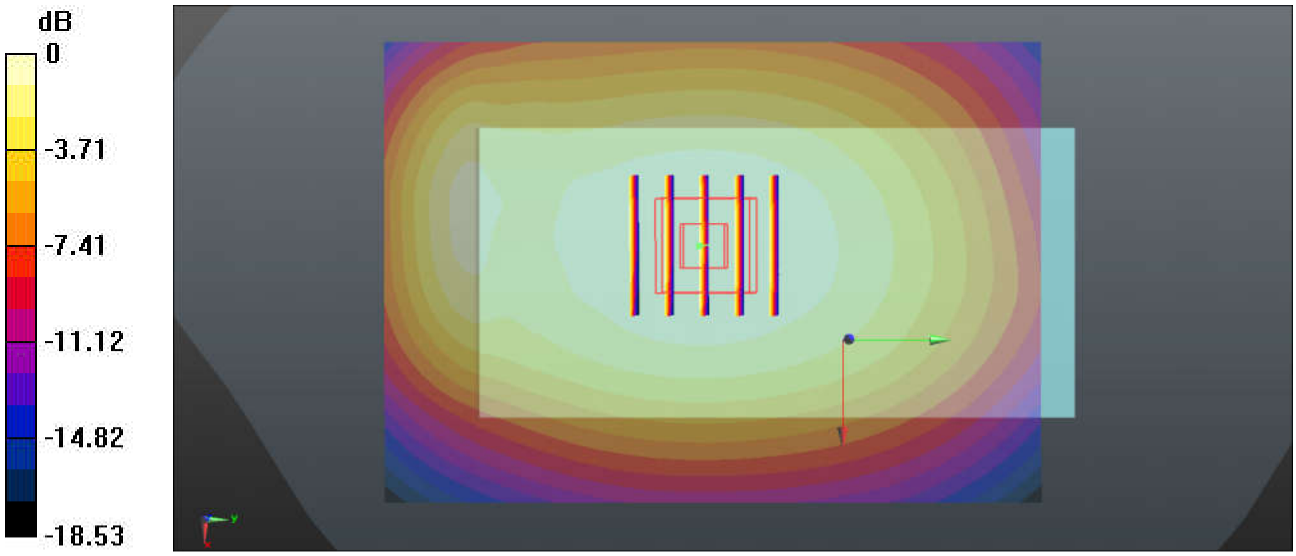
11_LTE Band 12_10M_QPSK_1RB_25Offset_Back_10mm_Ch23095

Communication System: UID 0, LTE-FDD (0); Frequency: 707.5 MHz;Duty Cycle: 1:1
Medium: HSL_750 Medium parameters used: f = 707.5 MHz; σ = 0.853 S/m; ε_r = 42.316; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(9.37, 9.37, 9.37); Calibrated: 2019.6.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch23095/Area Scan (71x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.427 W/kg

Ch23095/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.54 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.482 W/kg
SAR(1 g) = 0.390 W/kg; SAR(10 g) = 0.302 W/kg
Maximum value of SAR (measured) = 0.425 W/kg



0 dB = 0.427 W/kg = -3.70 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.1.15

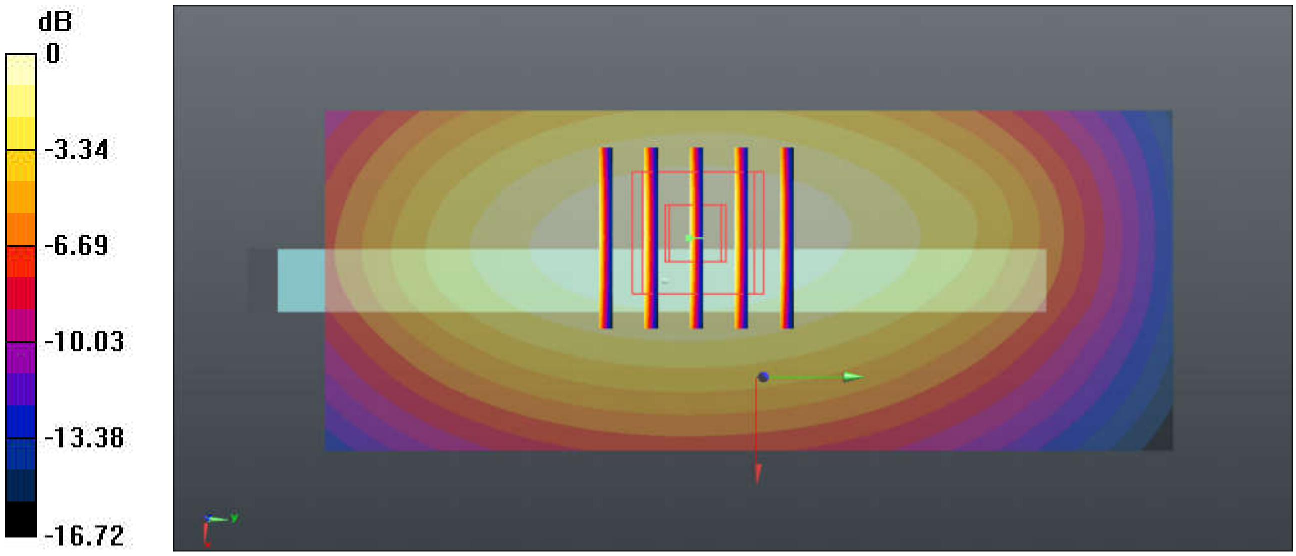
12_LTE Band 13_10M_QPSK_1RB_25Offset_Right Side_10mm_Ch23230

Communication System: UID 0, LTE-FDD (0); Frequency: 782 MHz;Duty Cycle: 1:1
Medium: HSL_750 Medium parameters used: f = 782 MHz; σ = 0.924 S/m; ε_r = 41.333; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(9.37, 9.37, 9.37); Calibrated: 2019.6.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch23230/Area Scan (41x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.886 W/kg

Ch23230/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.08 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 1.02 W/kg
SAR(1 g) = 0.730 W/kg; SAR(10 g) = 0.510 W/kg
Maximum value of SAR (measured) = 0.832 W/kg



0 dB = 0.886 W/kg = -0.53 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.1.16

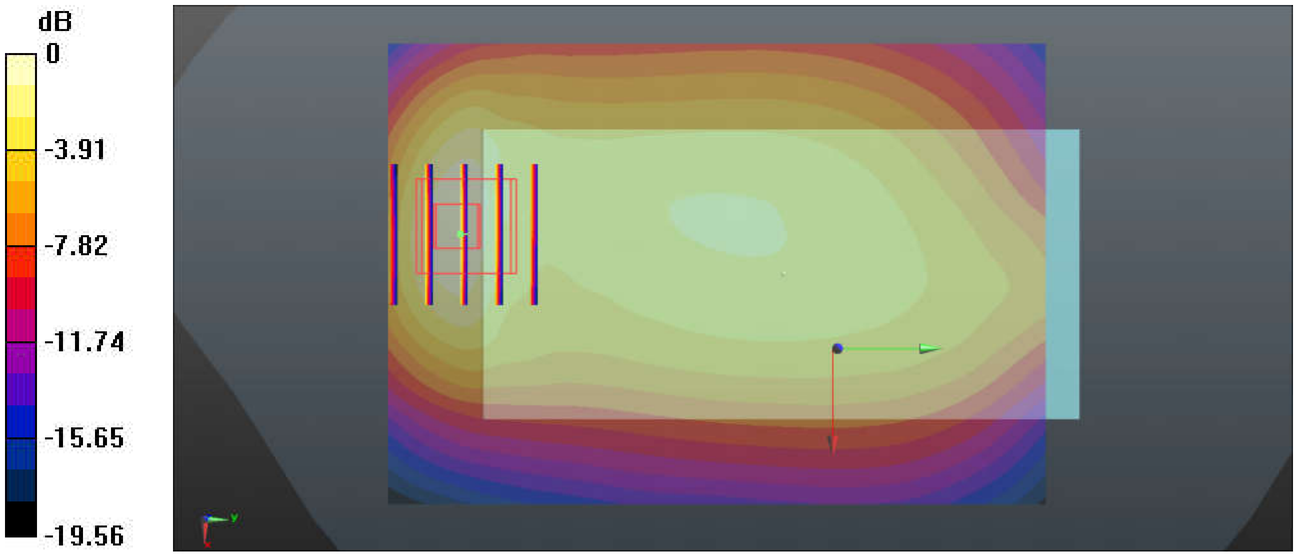
13_LTE Band 5_10M_QPSK_1RB_25Offset_Back_10mm_Ch20525

Communication System: UID 0, LTE-FDD (0); Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium: HSL_850 Medium parameters used: f = 836.5 MHz; σ = 0.94 S/m; ε_r = 41.929; ρ = 1000kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(9.07, 9.07, 9.07); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch20525/Area Scan (71x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.750 W/kg

Ch20525/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.73 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 1.05 W/kg
SAR(1 g) = 0.590 W/kg; SAR(10 g) = 0.333 W/kg
Maximum value of SAR (measured) = 0.743 W/kg



0 dB = 0.750 W/kg = -1.25 dBW/kg

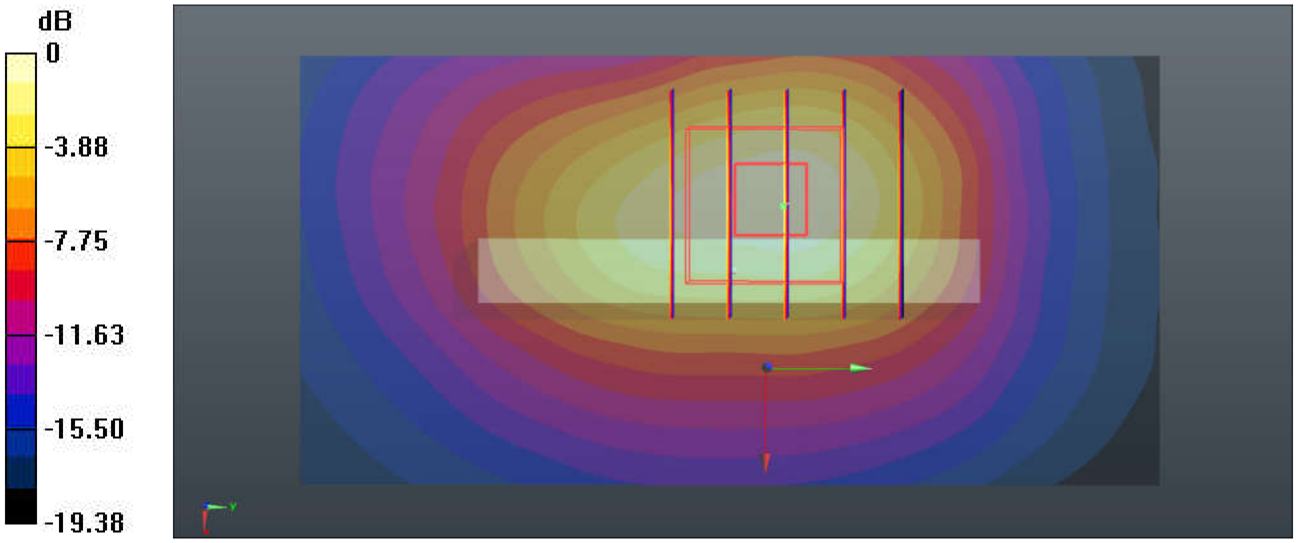
14_LTE Band 2_20M_QPSK_50RB_24Offset_Bottom side_10mm_Ch18700

Communication System: UID 0, LTE-FDD (0); Frequency: 1860 MHz;Duty Cycle: 1:1
Medium: HSL_1900 Medium parameters used: f = 1860 MHz; σ = 1.363 S/m; ε_r = 39.276; ρ =1000 kg/m^3
Ambient Temperature：23.1 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.67, 7.67, 7.67); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM2; Type: SAM; Serial: TP-1696
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch18700/Area Scan (41x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.25 W/kg

Ch18700/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.14 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 1.68 W/kg
SAR(1 g) = 0.949 W/kg; SAR(10 g) = 0.507 W/kg
Maximum value of SAR (measured) = 1.18 W/kg



0 dB = 1.25 W/kg = 0.97 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.1.19

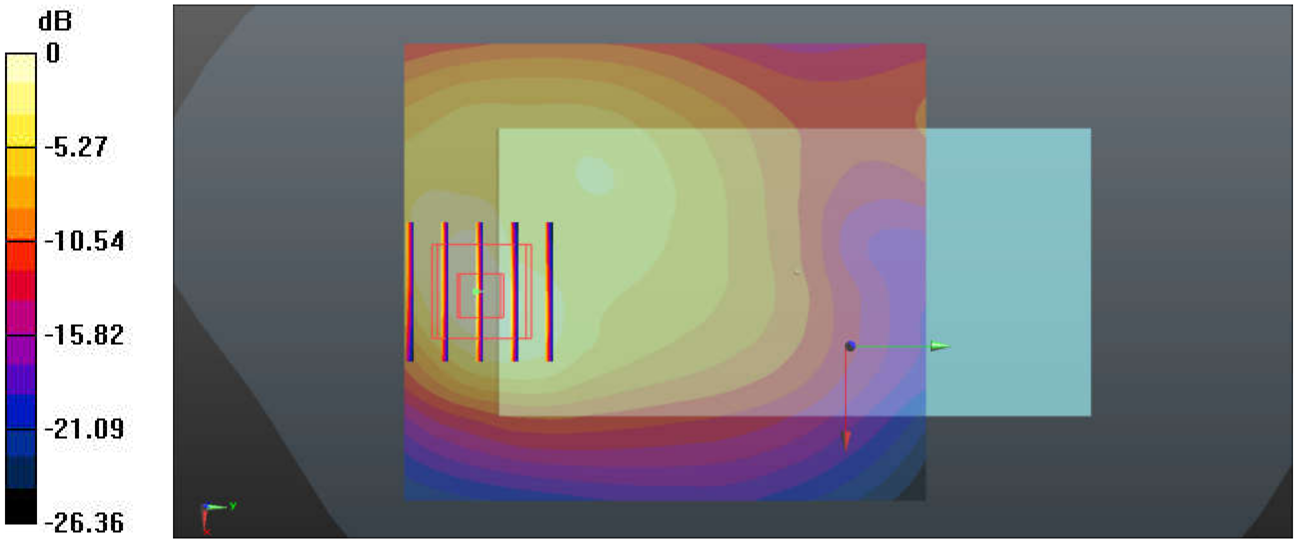
15_LTE Band 4_20M_QPSK_1RB_49Offset_Back_10mm_Ch20175

Communication System: UID 0, LTE-FDD (0); Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium: HSL_1750 Medium parameters used: f = 1732.5 MHz; σ = 1.401 S/m; ε_r = 39.18; ρ=1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.95, 7.95, 7.95); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM2; Type: SAM; Serial: TP-1696
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch20175/Area Scan (71x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.08 W/kg

Ch20175/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.933 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.57 W/kg
SAR(1 g) = 0.835 W/kg; SAR(10 g) = 0.431 W/kg
Maximum value of SAR (measured) = 1.08 W/kg



0 dB = 1.08 W/kg = 0.33 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.1.21

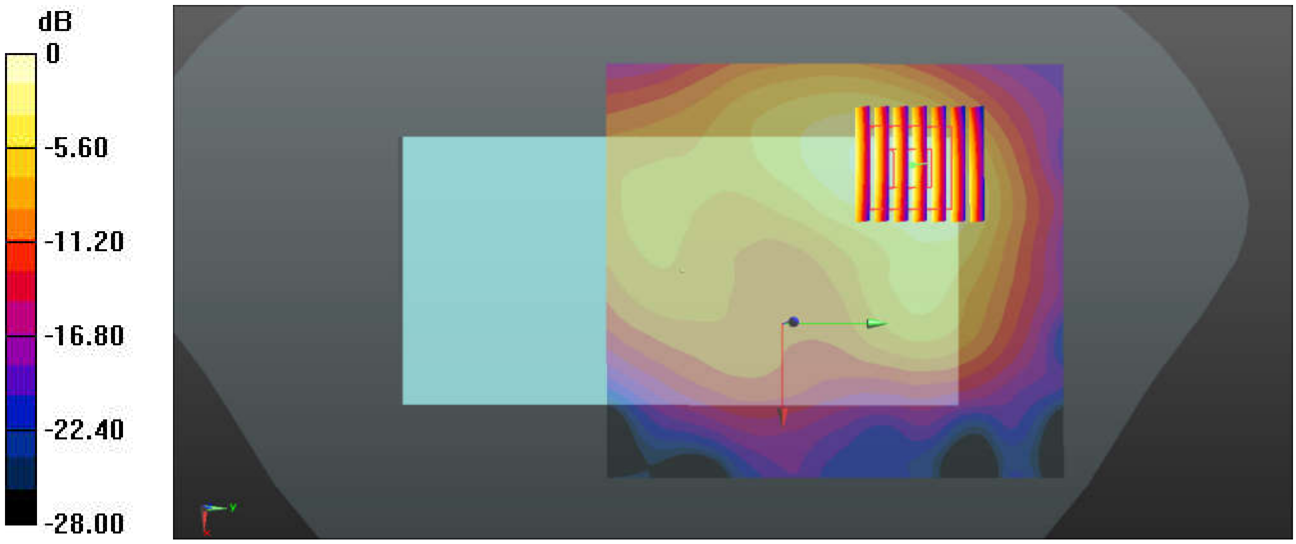
16_WLAN 2.4GHz_802.11b 1Mbps_Back_10mm_Ch1

Communication System: UID 0, 802.11b (0); Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: HSL_2450 Medium parameters used: f = 2412 MHz; σ = 1.748 S/m; ε_r = 40.967; ρ =1000 kg/m^3
Ambient Temperature：23.4 ℃; Liquid Temperature：22.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.06, 7.06, 7.06); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch1/Area Scan (91x101x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.317 W/kg

Ch1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.846 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.503 W/kg
SAR(1 g) = 0.244 W/kg; SAR(10 g) = 0.119 W/kg
Maximum value of SAR (measured) = 0.316 W/kg



0 dB = 0.317 W/kg = -4.99 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.2.28

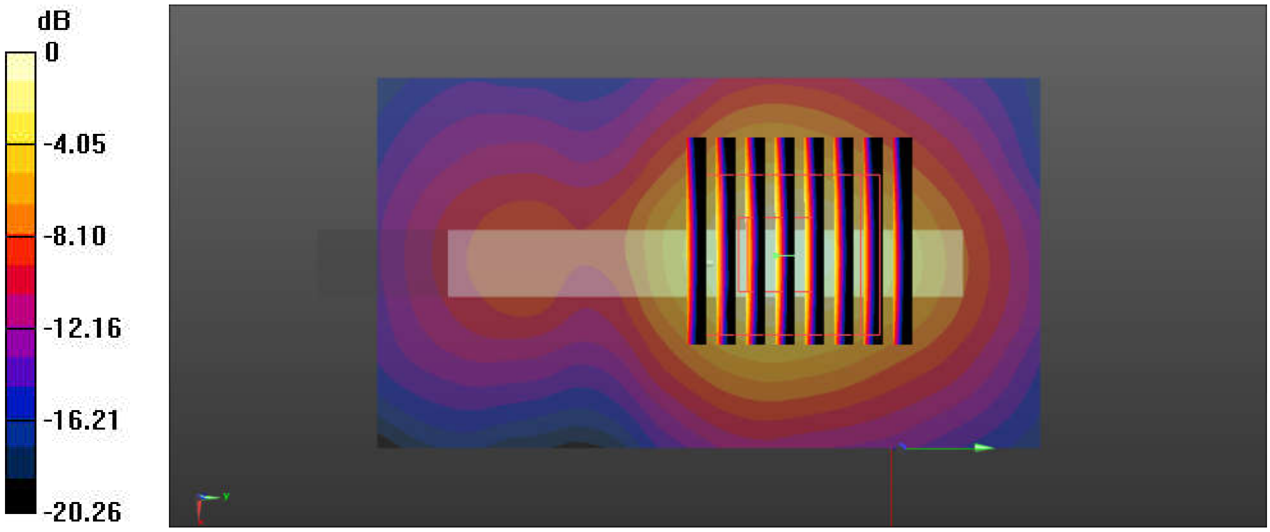
17_WLAN 5.2GHz_802.11a 6Mbps_Top Side_10mm_Ch44

Communication System: UID 0, 802.11a (0); Frequency: 5220 MHz;Duty Cycle: 1:1.031
Medium: HSL_5000 Medium parameters used: f = 5220 MHz; σ = 4.566 S/m; ε_r = 36.447; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.19, 5.19, 5.19); Calibrated: 2019.5.27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2019.7.23
- Phantom: SAM2; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch44/Area Scan (51x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.14 W/kg

Ch44/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 13.81 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.66 W/kg
SAR(1 g) = 0.511 W/kg; SAR(10 g) = 0.185 W/kg
Maximum value of SAR (measured) = 1.11 W/kg



0 dB = 1.14 W/kg = 0.57 dBW/kg

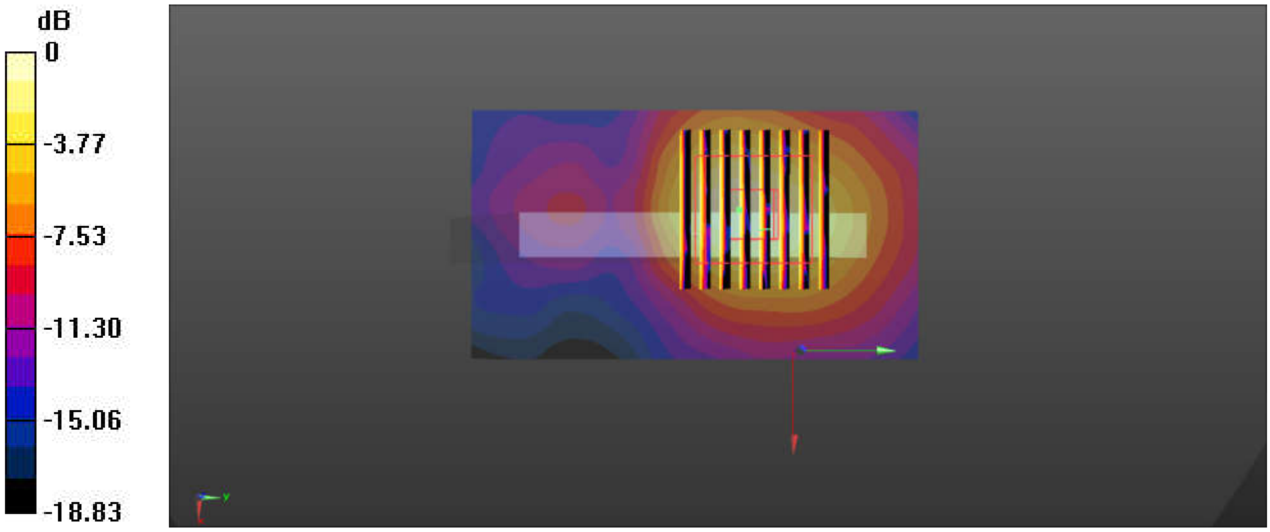
18_WLAN 5.8GHz_802.11a 6Mbps_Top Side_10mm_Ch149

Communication System: UID 0, 802.11a (0); Frequency: 5745 MHz;Duty Cycle: 1:1.031
Medium: HSL_5000 Medium parameters used: f = 5745 MHz; σ = 5.16 S/m; ε_r = 35.56; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.17, 5.17, 5.17); Calibrated: 2019.5.27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2019.7.23
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch149/Area Scan (51x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.848 W/kg

Ch149/Zoom Scan (9x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 9.770 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 1.36 W/kg
SAR(1 g) = 0.321 W/kg; SAR(10 g) = 0.115 W/kg
Maximum value of SAR (measured) = 0.753 W/kg



0 dB = 0.848 W/kg = -0.72 dBW/kg

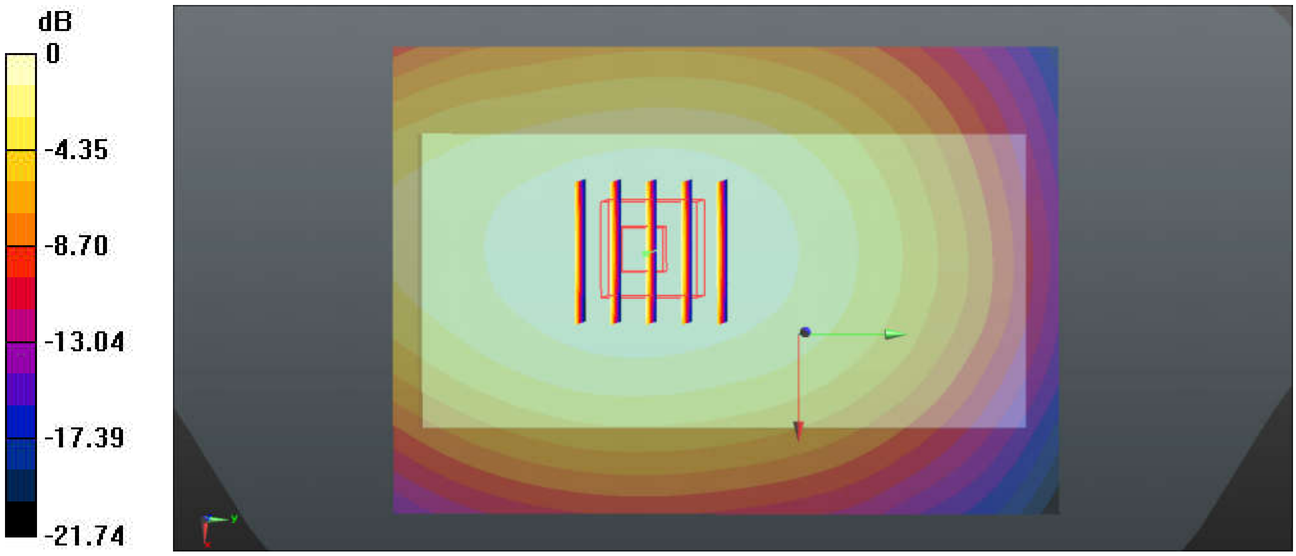
19_LTE Band 12_10M_QPSK_1RB_25Offset_Back_15mm_Ch23095

Communication System: UID 0, LTE-FDD (0); Frequency: 707.5 MHz;Duty Cycle: 1:1
Medium: HSL_750 Medium parameters used: f = 707.5 MHz; $\sigma = 0.853$ S/m; $\varepsilon_r = 42.316$; $\rho = 1000 kg/m^3$
Ambient Temperature：23.2 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(9.37, 9.37, 9.37); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch23095/Area Scan (71x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.322 W/kg

Ch23095/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.06 V/m; Power Drift = 0.1 dB
Peak SAR (extrapolated) = 0.364 W/kg
SAR(1 g) = 0.294 W/kg; SAR(10 g) = 0.227 W/kg
Maximum value of SAR (measured) = 0.320 W/kg



0 dB = 0.322 W/kg = -4.92 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.1.15

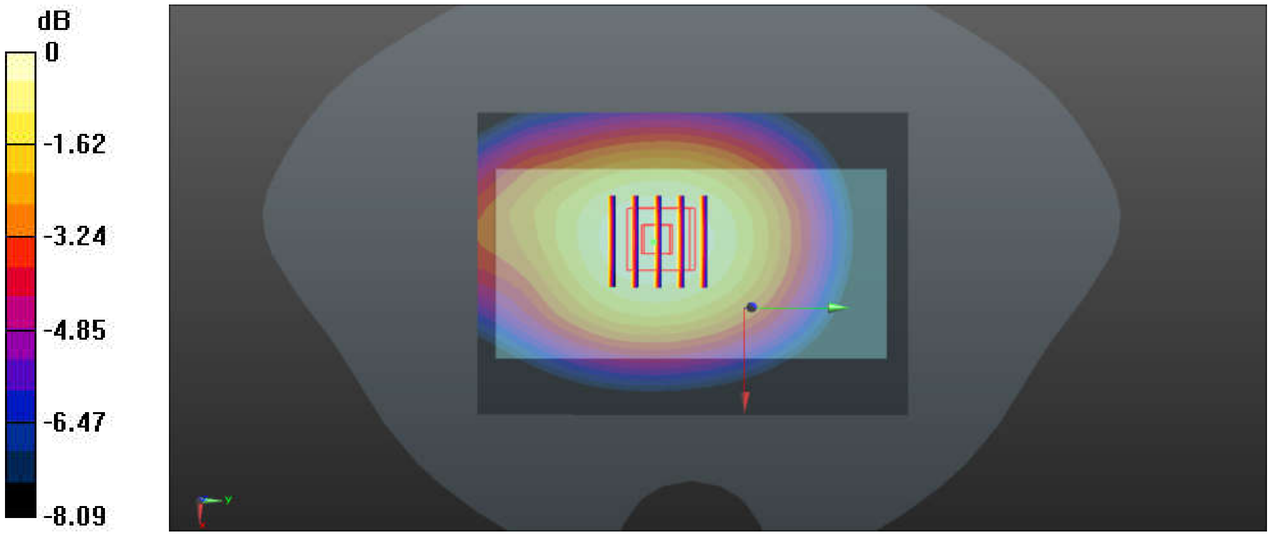
20_LTE Band 13_10M_QPSK_1RB_25Offset_Back_15mm_Ch23230

Communication System: UID 0, LTE-FDD (0); Frequency: 782 MHz;Duty Cycle: 1:1
Medium: HSL_750 Medium parameters used: f = 782 MHz; σ = 0.924 S/m; ε_r = 41.333; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(9.37, 9.37, 9.37); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch23230/Area Scan (71x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.720 W/kg

Ch23230/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.97 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.819 W/kg
SAR(1 g) = 0.653 W/kg; SAR(10 g) = 0.496 W/kg
Maximum value of SAR (measured) = 0.717 W/kg



0 dB = 0.717 W/kg = -1.44 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.1.16

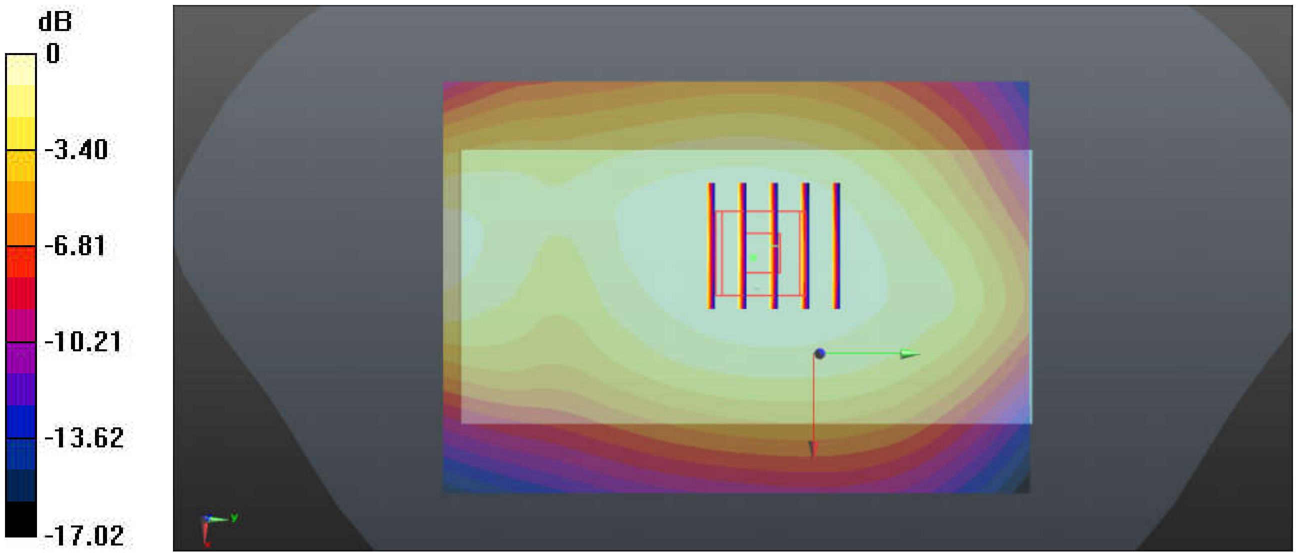
21_LTE Band 5_10M_QPSK_1RB_25Offset_Back_15mm_Ch20525

Communication System: UID 0, LTE-FDD (0); Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium: HSL_850 Medium parameters used: f = 836.5 MHz; σ = 0.94 S/m; ε_r = 41.929; ρ =1000kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(9.07, 9.07, 9.07); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch20525/Area Scan (71x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.506 W/kg

Ch20525/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.32 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.601 W/kg
SAR(1 g) = 0.428 W/kg; SAR(10 g) = 0.318 W/kg
Maximum value of SAR (measured) = 0.534 W/kg



0 dB = 0.506 W/kg = -2.96 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab   Date: 2020.1.18

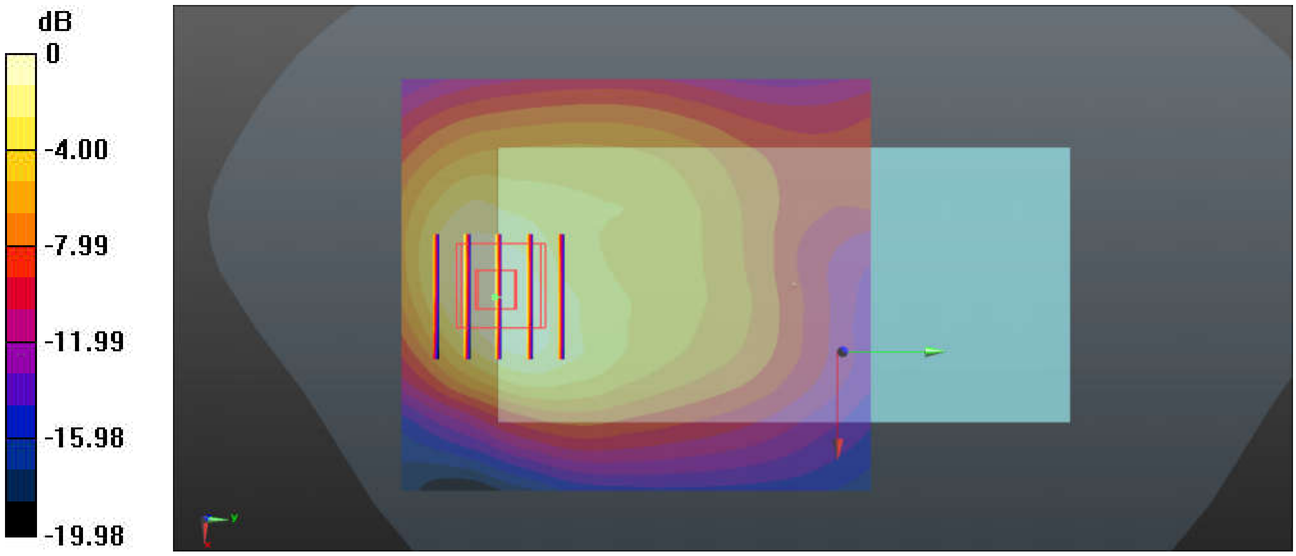
22_LTE Band 2_20M_QPSK_1RB_49Offset_Back_15mm_Ch18900

Communication System: UID 0, LTE-FDD (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: HSL_1900 Medium parameters used: f = 1880 MHz; $\sigma = 1.382$ S/m; $\varepsilon_r = 39.196$; $\rho = 1000$ kg/m^3
Ambient Temperature：23.1 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.67, 7.67, 7.67); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM2; Type: SAM; Serial: TP-1696
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch18900/Area Scan (71x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.881 W/kg

Ch18900/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.927 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.07 W/kg
SAR(1 g) = 0.570 W/kg; SAR(10 g) = 0.316 W/kg
Maximum value of SAR (measured) = 0.874 W/kg



0 dB = 0.881 W/kg = -0.55 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.1.19

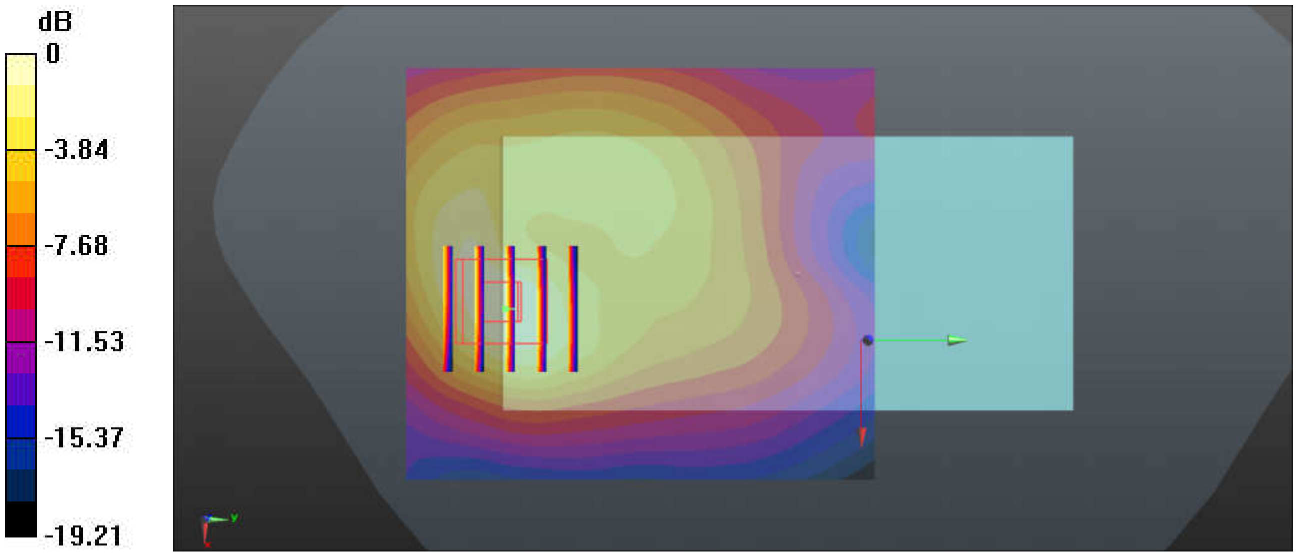
23_LTE Band 4_20M_QPSK_1RB_49Offset_Back_15mm_Ch20175

Communication System: UID 0, LTE-FDD (0); Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium: HSL_1750 Medium parameters used: f = 1732.5 MHz; σ = 1.401 S/m; ε_r = 39.18; ρ=1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.95, 7.95, 7.95); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM2; Type: SAM; Serial: TP-1696
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch20175/Area Scan (71x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.535 W/kg

Ch20175/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.165 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.678 W/kg
SAR(1 g) = 0.370 W/kg; SAR(10 g) = 0.204 W/kg
Maximum value of SAR (measured) = 0.559 W/kg



0 dB = 0.535 W/kg = -2.72 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab		Date: 2020.1.21

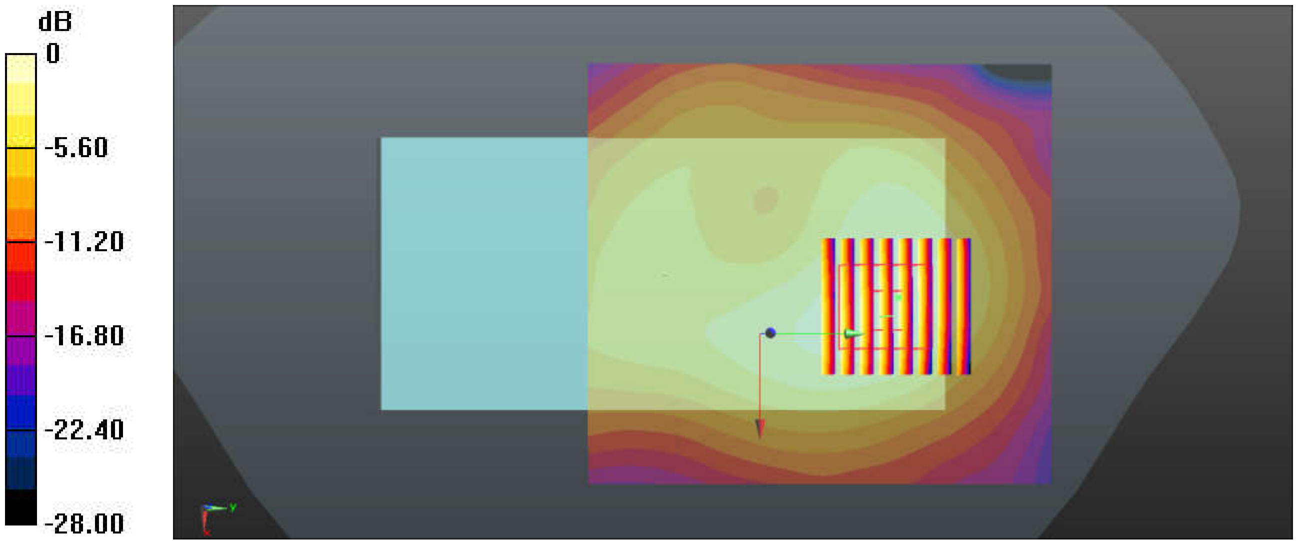
24_WLAN 2.4GHz_802.11b 1Mbps_Back_15mm_Ch1

Communication System: UID 0, 802.11b (0); Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: HSL_2450 Medium parameters used: f = 2412 MHz; σ = 1.748 S/m; ε_r = 40.967; ρ =1000 kg/m^3
Ambient Temperature：23.4 ℃; Liquid Temperature：22.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.06, 7.06, 7.06); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2019.4.17
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch1/Area Scan (91x101x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.136 W/kg

Ch1/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.528 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.202 W/kg
SAR(1 g) = 0.114 W/kg; SAR(10 g) = 0.06 W/kg
Maximum value of SAR (measured) = 0.132 W/kg



0 dB = 0.136 W/kg = -8.66 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab		Date: 2020.2.28

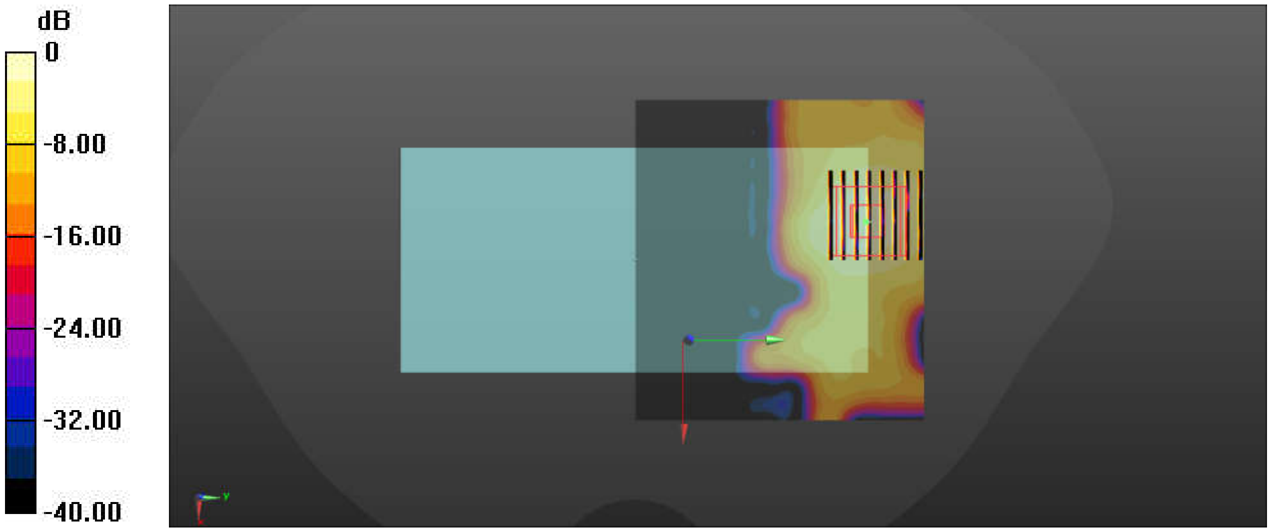
25_WLAN 5.3GHz_802.11a 6Mbps_Back_15mm_Ch52

Communication System: UID 0, 802.11a (0); Frequency: 5260 MHz;Duty Cycle: 1:1.031
Medium: HSL_5000 Medium parameters used: f = 5260 MHz; σ = 4.617 S/m; ε_r = 36.368; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.19, 5.19, 5.19); Calibrated: 2019.5.27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2019.7.23
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch52/Area Scan (101x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.426 W/kg

Ch52/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 0.3010 V/m; Power Drift = -0.09dB
Peak SAR (extrapolated) = 0.636 W/kg
SAR(1 g) = 0.193 W/kg; SAR(10 g) = 0.068 W/kg
Maximum value of SAR (measured) = 0.420 W/kg



0 dB = 0.426 W/kg = -3.71 dBW/kg

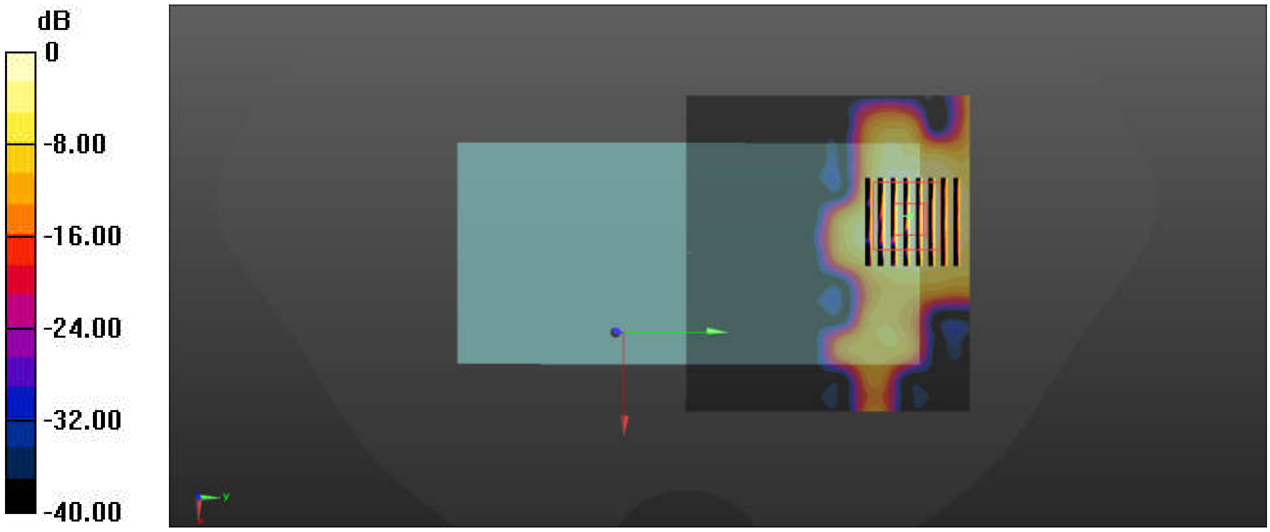
26_WLAN 5.5GHz_802.11a 6Mbps_Back_15mm_Ch116

Communication System: UID 0, 802.11a (0); Frequency: 5580 MHz;Duty Cycle: 1:1.031
Medium: HSL_5000 Medium parameters used: f = 5580 MHz; σ = 4.971 S/m; ε_r = 35.867; ρ = 1000kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(4.92, 4.92, 4.92); Calibrated: 2019.5.27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2019.7.23
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch116/Area Scan (101x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.377 W/kg

Ch116/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 0 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.573 W/kg
SAR(1 g) = 0.163 W/kg; SAR(10 g) = 0.056 W/kg
Maximum value of SAR (measured) = 0.369 W/kg



0 dB = 0.377 W/kg = -4.24 dBW/kg

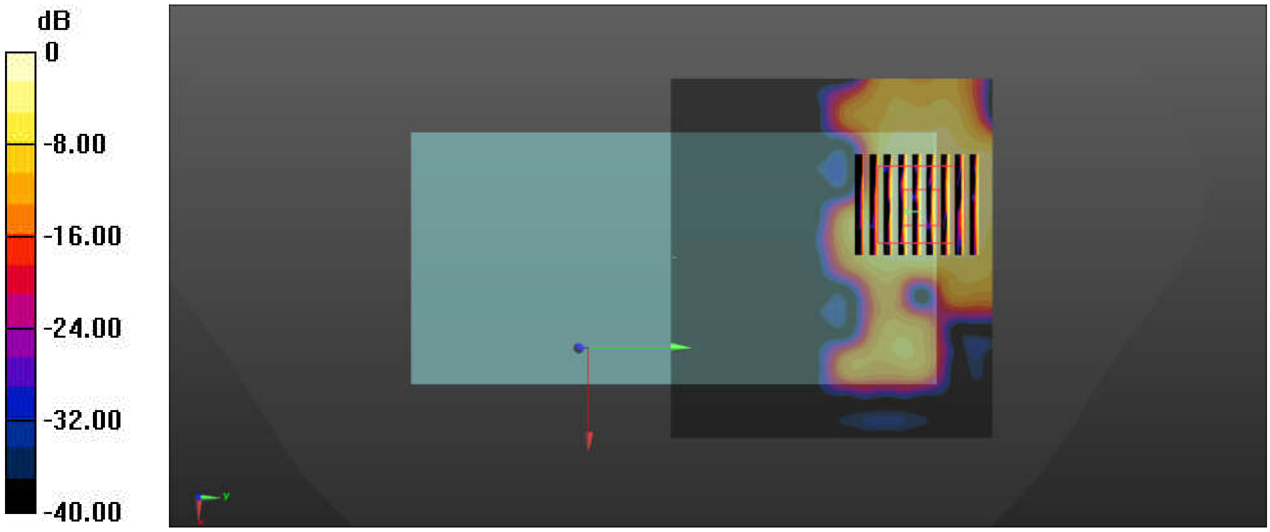
27_WLAN 5.8GHz_802.11a 6Mbps_Back_15mm_Ch149

Communication System: UID 0, 802.11a (0); Frequency: 5745 MHz;Duty Cycle: 1:1.031
Medium: HSL_5000 Medium parameters used: f = 5745 MHz; σ = 5.16 S/m; ε_r = 35.56; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.17, 5.17, 5.17); Calibrated: 2019.5.27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2019.7.23
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch149/Area Scan (101x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.395 W/kg

Ch149/Zoom Scan (8x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 0.3350 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.575 W/kg
SAR(1 g) = 0.158 W/kg; SAR(10 g) = 0.057 W/kg
Maximum value of SAR (measured) = 0.374 W/kg



0 dB = 0.395 W/kg = -4.03 dBW/kg

Appendix C. DASY Calibration Certificate

The DASY calibration certificates are shown as follows.

In Collaboration with
s p e a g
CALIBRATION LABORATORY
Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

中国认可
国际互认
校准
CALIBRATION
CNAS L0570

Client **Sporton** **Certificate No: Z19-60081**

CALIBRATION CERTIFICATE

Object	D750V3 - SN: 1087
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	March 27, 2019

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	106277	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Power sensor NRP8S	104291	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Reference Probe EX3DV4	SN 3617	31-Jan-19(SPEAG,No.EX3-3617_Jan19)	Jan-20
DAE4	SN 1331	06-Feb-19(SPEAG,No.DAE4-1331_Feb19)	Feb-20
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	23-Jan-19 (CTTL, No.J19X00336)	Jan-20
NetworkAnalyzer E5071C	MY46110673	24-Jan-19 (CTTL, No.J19X00547)	Jan-20

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: March 29, 2019

In Collaboration with
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CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

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, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
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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CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Measurement Conditions

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

DASY Version	DASY52	52.10.2.1495
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	43.0 ± 6 %	0.90 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	2.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.36 W/kg ± 18.8 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.42 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.65 W/kg ± 18.7 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	56.9 ± 6 %	0.94 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	2.09 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.58 W/kg ± 18.8 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.41 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.75 W/kg ±18.7 % (k=2)**

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.4Ω- 2.59jΩ
Return Loss	- 29.3dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	51.6Ω- 3.86jΩ
Return Loss	- 27.7dB

General Antenna Parameters and Design

Electrical Delay (one direction)	0.898 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