

# FCC SAR Test Report

APPLICANT : ZTE CORPORATION  
EQUIPMENT : LTE/CDMA Multi-Mode Digital Mobile Phone  
BRAND NAME : ZTE  
MODEL NAME : Z2321U  
FCC ID : SRQ-Z2321U  
STANDARD : FCC 47 CFR Part 2 (2.1093)  
ANSI/IEEE C95.1-1992  
IEEE 1528-2013

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

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



Approved by: Mark Qu / Manager

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### Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA7N2813	Rev. 01	Initial issue of report	Jan. 23, 2018



**1. Statement of Compliance**

The maximum results of Specific Absorption Rate (SAR) found during testing for **ZTE CORPORATION, LTE/CDMA Multi-Mode Digital Mobile Phone, Z2321U**, are as follows.

Equipment Class	Frequency Band		Highest SAR Summary			Highest Simultaneous Transmission 1g SAR (W/kg)
			Head (Separation 0mm)	Hotspot (Separation 10mm)	Body-worn (Separation 15mm)	
			1g SAR (W/kg)			
Licensed	CDMA2000	BC0	0.55	1.06	<b>1.19</b>	1.46
		BC1	0.37	1.16	0.89	
	LTE	Band 12	0.53	0.85	0.52	
		Band 5	<b>0.59</b>	0.99	1.13	
		Band 4	0.31	1.02	0.79	
		Band 25/2	0.28	<b>1.19</b>	0.65	
DTS	WLAN	2.4GHz WLAN	0.33	0.39	0.14	1.46
Date of Testing:			2018/1/1 ~ 2018/1/5			
<b>Remark :</b> This device supports both LTE B2 and B25. Since the supported frequency span for LTE B2 falls completely within the supports frequency span for LTE B25, both LTE bands have the same target power, and both LTE bands share the same transmission path; therefore, SAR was only assessed for LTE B25.						

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



## 2. Administration Data

Testing Laboratory	
Test Site	Sporton International (Shenzhen) Inc.
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan Shenzhen City Guangdong Province 518055 China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595

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 D01 3G SAR Procedures v03r01
- 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	LTE/CDMA Multi-Mode Digital Mobile Phone
Brand Name	ZTE
Model Name	Z2321U
FCC ID	SRQ-Z2321U
MEID Code	99000899000449
Wireless Technology and Frequency Range	CDMA2000 BC0: 824.7 MHz ~ 848.31 MHz CDMA 2000 BC1: 1851.25 MHz ~ 1908.75 MHz 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 25: 1850.7 MHz ~ 1914.3 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	CDMA2000 : 1xRTT/1xEv-Do(Rev.0)/1xEv-Do(Rev.A) LTE: QPSK, 16QAM WLAN 2.4GHz : 802.11b/g/n HT20/HT40 Bluetooth v2.1 + EDR, Bluetooth v4.0 LE, Bluetooth v4.2 LE
HW Version	Z2321UHW1.0
SW Version	Z2321UV1.0.0B01
EUT Stage	Identical Prototype
<b>Remark:</b>	
<ol style="list-style-type: none"> <li>1. This device WLAN 2.4GHz supports hotspot operation and Bluetooth support tethering applications.</li> <li>2. When hotspot mode is enabled, power reduction will be activated to limit the maximum power of CDMA2000 BC0/BC1 and LTE Band 2/4/5/25.</li> <li>3. This device doesn't support VoIP function.</li> <li>4. This device supports VoLTE operation.</li> </ol>	



**4.2 General LTE SAR Test and Reporting Considerations**

Summarized necessary items addressed in KDB 941225 D05 v02r05																																																															
FCC ID	SRQ-Z2321U																																																														
Equipment Name	LTE/CDMA Multi-Mode Digital Mobile Phone																																																														
Operating Frequency Range of each LTE transmission band	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 25: 1850.7 MHz ~ 1914.3 MHz																																																														
Channel Bandwidth	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 25: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz																																																														
uplink modulations used	QPSK / 16QAM																																																														
LTE Voice / Data requirements	Voice and Data																																																														
LTE Release Version	R10, Cat4																																																														
CA Support	Not Supported																																																														
LTE MPR permanently built-in by design	<p><b>Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3</b></p> <table border="1"> <thead> <tr> <th rowspan="2">Modulation</th> <th colspan="6">Channel bandwidth / Transmission bandwidth (N<sub>RB</sub>)</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> </thead> <tbody> <tr> <td>QPSK</td> <td>&gt; 5</td> <td>&gt; 4</td> <td>&gt; 8</td> <td>&gt; 12</td> <td>&gt; 16</td> <td>&gt; 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>&gt; 5</td> <td>&gt; 4</td> <td>&gt; 8</td> <td>&gt; 12</td> <td>&gt; 16</td> <td>&gt; 18</td> <td>≤ 2</td> </tr> <tr> <td>64 QAM</td> <td>≤ 6</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>&gt; 5</td> <td>&gt; 4</td> <td>&gt; 8</td> <td>&gt; 12</td> <td>&gt; 16</td> <td>&gt; 18</td> <td>≤ 3</td> </tr> <tr> <td>256 QAM</td> <td colspan="6">≥ 1</td> <td>≤ 5</td> </tr> </tbody> </table>	Modulation	Channel bandwidth / Transmission bandwidth (N <sub>RB</sub> )						MPR (dB)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1	16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1	16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2	64 QAM	≤ 6	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2	64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3	256 QAM	≥ 1						≤ 5
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256 QAM	≥ 1						≤ 5																																																								
LTE A-MPR	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)																																																														
Spectrum plots for RB configuration	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.																																																														
Power reduction applied to satisfy SAR compliance	When hotspot mode is enabled, power reduction will be activated to limit the maximum power of LTE Band 2/4/5/25.																																																														



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)	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)	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 25												
	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	26047	1850.7	26055	1851.5	26065	1852.5	26090	1855	26115	1857.5	26140	1860
M	26340	1880	26340	1880	26340	1880	26340	1880	26340	1880	26340	1880
H	26683	1914.3	26675	1913.5	26665	1912.5	26640	1910	26615	1907.5	26590	1905





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)

Table with 3 columns: Whole-Body, Partial-Body, Hands, Wrists, Feet and Ankles. Values: 0.4, 8.0, 20.0

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

Table with 3 columns: Whole-Body, Partial-Body, Hands, Wrists, Feet and Ankles. Values: 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 ( $\rho$ ). The equation description is as below:

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

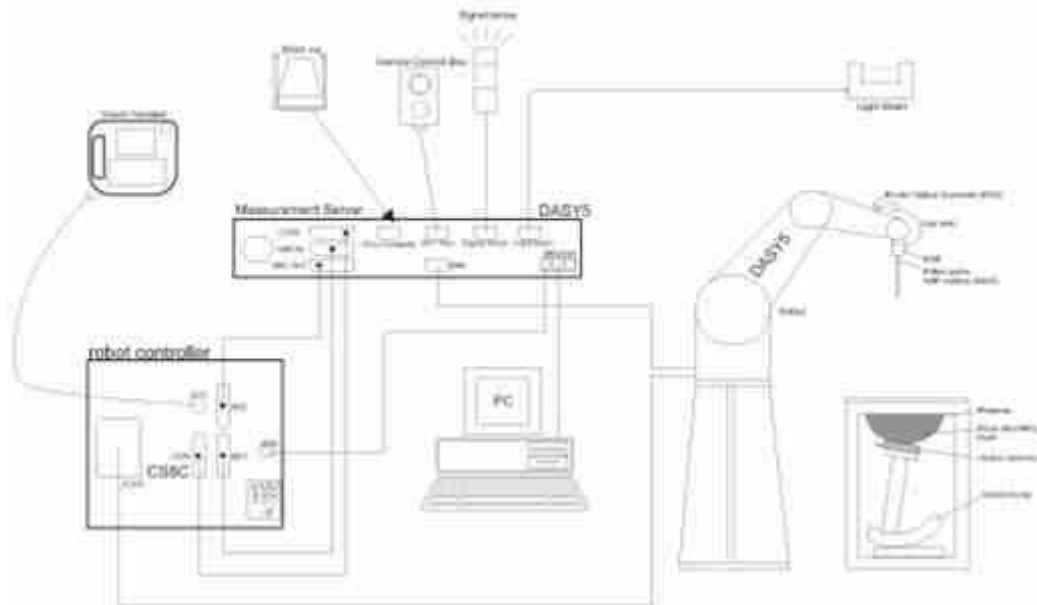
SAR is expressed in units of Watts per kilogram (W/kg)

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

Where:  $\sigma$  is the conductivity of the tissue,  $\rho$  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>**

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

**7.2 Data Acquisition Electronics (DAE)**

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

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



**Fig 5.1 Photo of DAE**

**7.3 Phantom**

**<SAM Twin Phantom>**

<b>Shell Thickness</b>	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
<b>Filling Volume</b>	Approx. 25 liters
<b>Dimensions</b>	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
<b>Measurement Areas</b>	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>**

<b>Shell Thickness</b>	2 ± 0.2 mm (sagging: <1%)
<b>Filling Volume</b>	Approx. 30 liters
<b>Dimensions</b>	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 from 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	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: $\Delta x_{Area}$ , $\Delta y_{Area}$	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	



**8.4 Zoom Scan**

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

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

		≤ 3 GHz	> 3 GHz	
Maximum zoom scan spatial resolution: $\Delta x_{Zoom}, \Delta y_{Zoom}$		$\leq 2$ GHz: $\leq 8$ mm 2 – 3 GHz: $\leq 5$ mm*	3 – 4 GHz: $\leq 5$ mm* 4 – 6 GHz: $\leq 4$ mm*	
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	$\leq 5$ mm	3 – 4 GHz: $\leq 4$ mm 4 – 5 GHz: $\leq 3$ mm 5 – 6 GHz: $\leq 2$ mm	
	graded grid	$\Delta z_{Zoom}(1)$ : between 1 <sup>st</sup> two points closest to phantom surface	$\leq 4$ mm	3 – 4 GHz: $\leq 3$ mm 4 – 5 GHz: $\leq 2.5$ mm 5 – 6 GHz: $\leq 2$ mm
		$\Delta z_{Zoom}(n>1)$ : between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z	$\geq 30$ mm	3 – 4 GHz: $\geq 28$ mm 4 – 5 GHz: $\geq 25$ mm 5 – 6 GHz: $\geq 22$ mm	
Note: $\delta$ 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 <i>reported</i> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB 447498 is $\leq 1.4$ W/kg, $\leq 8$ mm, $\leq 7$ mm and $\leq 5$ mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

**8.5 Volume Scan Procedures**

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

**8.6 Power Drift Monitoring**

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



**9. Test Equipment List**

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1087	Mar. 20, 2017	Mar. 19, 2018
SPEAG	835MHz System Validation Kit	D835V2	4d151	Mar. 20, 2017	Mar. 19, 2018
SPEAG	1750MHz System Validation Kit	D1750V2	1137	Jun. 05, 2017	Jun. 04, 2018
SPEAG	1900MHz System Validation Kit	D1900V2	5d170	Mar. 22, 2017	Mar. 21, 2018
SPEAG	2450MHz System Validation Kit	D2450V2	924	Mar. 21, 2017	Mar. 20, 2018
SPEAG	Data Acquisition Electronics	DAE4	1437	Sep. 15, 2017	Sep. 14, 2018
SPEAG	Dosimetric E-Field Probe	EX3DV4	3642	Sep. 25, 2017	Sep. 24, 2018
SPEAG	SAM Twin Phantom	QD 000 P40 CD	TP-1670	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Anritsu	Radio communication analyzer	MT8820C	6201300653	Jul. 19, 2017	Jul. 18, 2018
Agilent	Wireless Communication Test Set	E5515C	MY50267224	Sep. 12, 2017	Sep. 11, 2018
Agilent	Network Analyzer	E5071C	MY46523671	Oct. 18, 2017	Oct. 17, 2018
Speag	Dielectric Assessment KIT	DAK-3.5	1146	Jul. 18, 2017	Jul. 17, 2018
Agilent	Signal Generator	N5181A	MY50145381	Dec. 26, 2017	Dec. 25, 2018
Anritsu	Power Sensor	MA2411B	1306099	Aug. 21, 2017	Aug. 20, 2018
Anritsu	Power Meter	ML2495A	1349001	Jul. 19, 2017	Jul. 18, 2018
R&S	Spectrum Analyzer	FSP7	100818	Jul. 19, 2017	Jul. 18, 2018
LKM electronic	Hygrometer	DTM3000	3241	Jul. 21, 2017	Jul. 20, 2018
Anymetre	Thermo-Hygrometer	JR593	2015030904	Apr. 22, 2017	Apr. 21, 2018
Anymetre	Thermo-Hygrometer	JR593	2015030903	Jan. 01, 2018	Dec. 25, 2018
Anymetre	Thermo-Hygrometer	JR593	2015102801	Jan. 01, 2018	Dec. 25, 2018
ARRA	Power Divider	A3200-2	N/A	Note	
PASTERNAK	Dual Directional Coupler	PE2214-10	N/A	Note	
Agilent	Dual Directional Coupler	778D	50422	Note	
mini-circuits	Amplifier	ZHL-42W+	QA1341002	Note	
mini-circuits	Amplifier	ZVE-3W-83+	599201528	Note	
MCL	Attenuation1	BW-S10W5	N/A	Note	
Weinschel	Attenuation2	3M-20	N/A	Note	
Zhongjilianhe	Attenuation3	MVE2214-03	N/A	Note	

**Note:**

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

## 10. System Verification

### 10.1 Tissue Simulating Liquids

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



Fig 10.1 Photo of Liquid Height for Head SAR

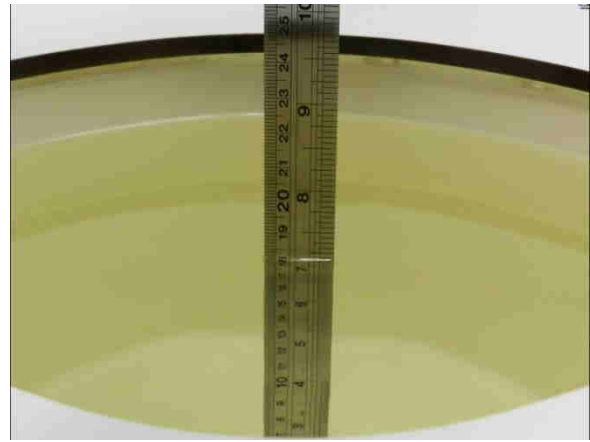


Fig 10.2 Photo of Liquid Height for Body SAR

**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)
<b>For Head</b>								
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
<b>For Body</b>								
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0	0	31.4	1.95	52.7

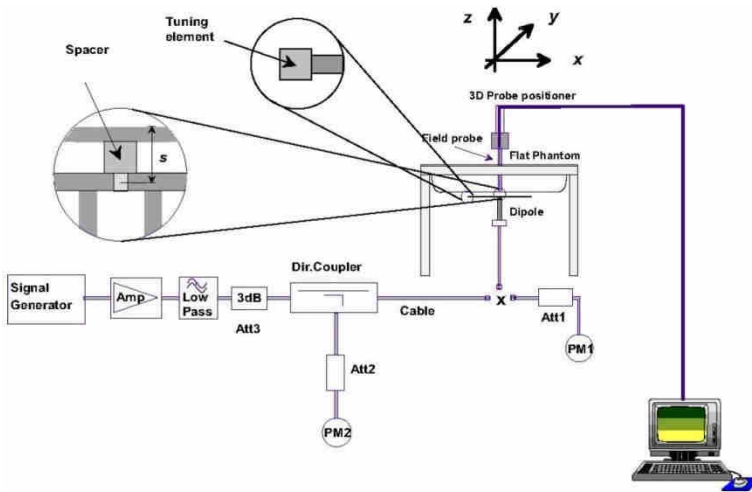
**<Tissue Dielectric Parameter Check Results>**

Frequency (MHz)	Tissue Type	Liquid Temp. (°C)	Conductivity (σ)	Permittivity (εr)	Conductivity Target (σ)	Permittivity Target (εr)	Delta (σ) (%)	Delta (εr) (%)	Limit (%)	Date
750	Head	22.5	0.886	41.532	0.89	41.90	-0.45	-0.88	±5	2018/1/2
835	Head	22.6	0.888	42.012	0.90	41.50	-1.33	1.23	±5	2018/1/2
1750	Head	22.4	1.382	41.560	1.37	40.10	0.88	3.64	±5	2018/1/1
1900	Head	22.5	1.443	40.030	1.40	40.00	3.07	0.08	±5	2018/1/1
2450	Head	22.7	1.750	39.767	1.80	39.20	-2.78	1.45	±5	2018/1/5
750	Body	22.6	0.961	53.914	0.96	55.50	0.10	-2.86	±5	2018/1/4
835	Body	22.7	0.977	54.466	0.97	55.20	0.72	-1.33	±5	2018/1/4
1750	Body	22.7	1.522	52.519	1.49	53.40	2.15	-1.65	±5	2018/1/3
1900	Body	22.6	1.576	54.212	1.52	53.30	3.68	1.71	±5	2018/1/3
2450	Body	22.8	1.992	52.291	1.95	52.70	2.15	-0.78	±5	2018/1/5

**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 (%)
2018/1/2	750	Head	250	1087	3642	1437	1.98	8.37	7.92	-5.38
2018/1/2	835	Head	250	4d151	3642	1437	2.32	9.73	9.28	-4.62
2018/1/1	1750	Head	250	1137	3642	1437	8.59	36.60	34.36	-6.12
2018/1/1	1900	Head	250	5d170	3642	1437	9.67	40.00	38.68	-3.30
2018/1/5	2450	Head	250	924	3642	1437	12.11	52.40	48.44	-7.56
2018/1/4	750	Body	250	1087	3642	1437	2.34	8.73	9.36	7.22
2018/1/4	835	Body	250	4d151	3642	1437	2.50	9.72	10	2.88
2018/1/3	1750	Body	250	1137	3642	1437	8.74	37.00	34.96	-5.51
2018/1/3	1900	Body	250	5d170	3642	1437	10.30	40.70	41.2	1.23
2018/1/5	2450	Body	250	924	3642	1437	13.20	50.50	52.8	4.55



**Fig 8.3.1 System Performance Check Setup**



**Fig 8.3.2 Setup Photo**

## 11. RF Exposure Positions

### 11.1 Ear and handset reference point

Figure 9.1.1 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 9.1.2 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 9.1.3). 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 9.1.2. The ear truncation is introduced to preclude the ear lobe from interfering with handset tilt, which could lead to unstable positioning at the cheek.

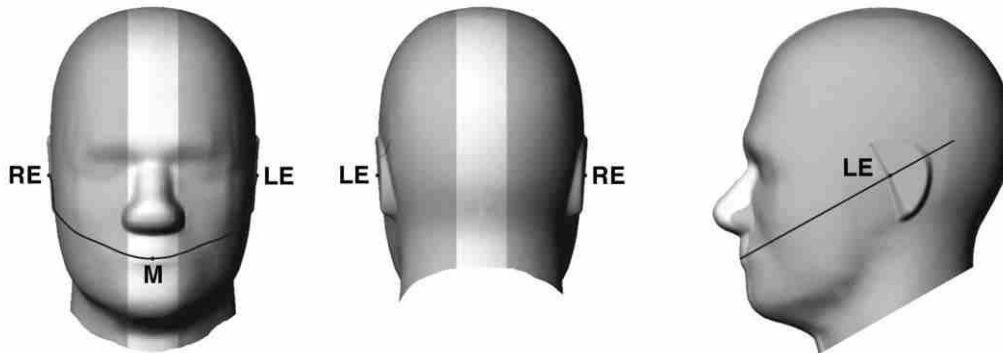


Fig 9.1.1 Front, back, and side views of SAM twin phantom

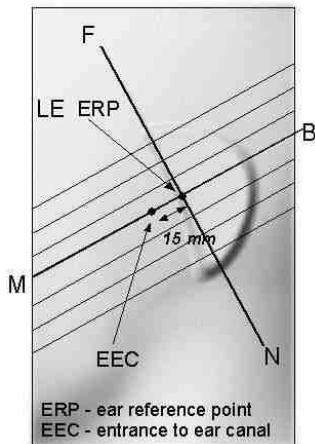


Fig 9.1.2 Close-up side view of phantom showing the ear region.

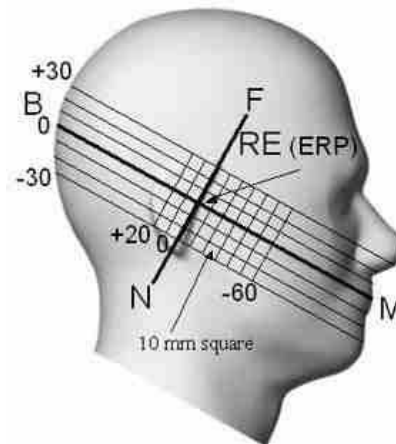
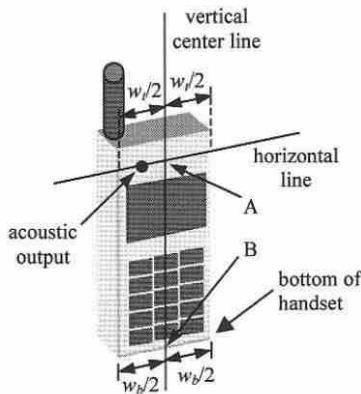


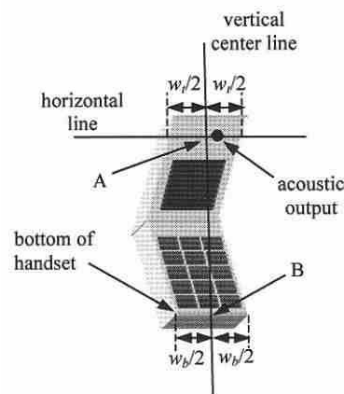
Fig 9.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

**11.2 Definition of the cheek position**

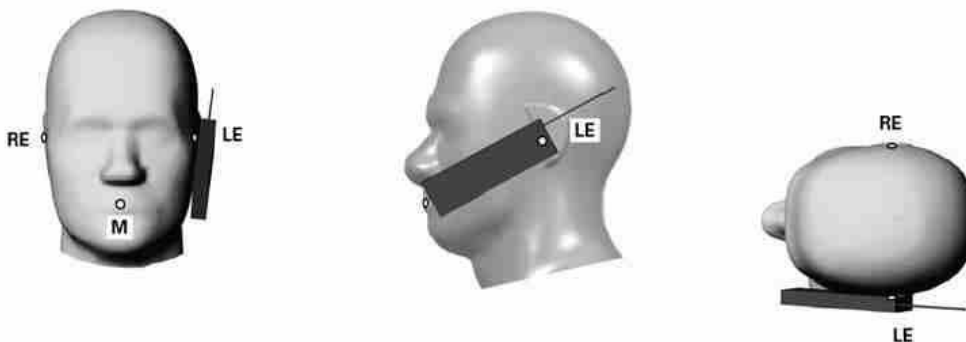
1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. Define two imaginary lines on the handset—the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset—the midpoint of the width  $w_t$  of the handset at the level of the acoustic output (point A in Figure 9.2.1 and Figure 9.2.2), and the midpoint of the width  $w_b$  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 9.2.1). 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 9.2.2), 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 9.2.3), 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 9.2.3. The actual rotation angles should be documented in the test report.



**Fig 9.2.1 Handset vertical and horizontal reference lines—“fixed case”**



**Fig 9.2.2 Handset vertical and horizontal reference lines—“clam-shell case”**



**Fig 9.2.3 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 9.3.1. 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

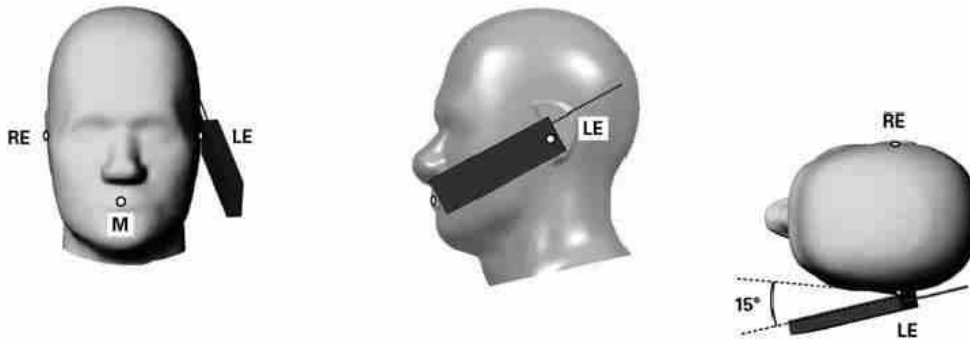


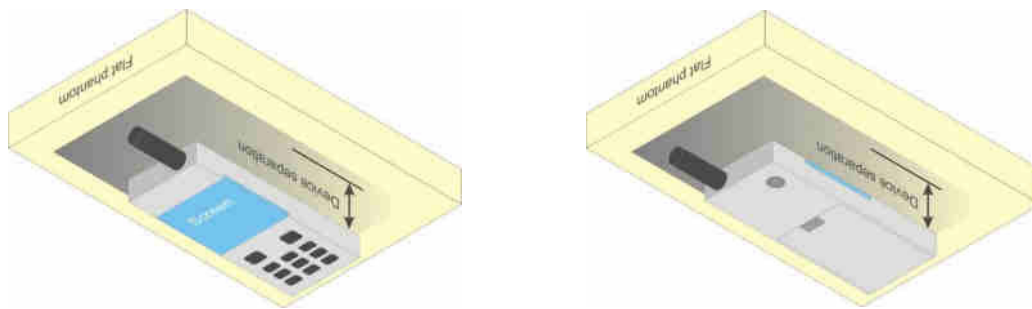
Fig 9.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.



### **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 9.4). 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 headset 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. 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 tested with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.



**Fig 9.4 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 ( $L \times W \geq 9$  cm  $\times$  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 from 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)**

**<CDMA2000 Conducted Power>**

**General Note:**

1. Per KDB 941225 D01v03r01, SAR for head exposure is measured in RC3 with the handset configured to transmit at full rate in SO55.
2. Per KDB 941225 D01v03r01, in Hotspot mode EUT is treated as data device and SAR is tested with Ev-Do Rev 0 (RTAP 153.6kbps) as the primary mode.
3. Per KDB 941225 D01v03r01, for Body-worn accessory SAR is measured in RC3 with the handset configured in TDSO/SO32 to transmit at full rate on FCH only with all other code channels disabled. The body-worn accessory procedures in KDB Publication 447498 are applied. The 3G SAR test reduction procedure is applied to the multiple code channel configuration (FCH+SCH), with FCH only as the primary mode.

**<Full Power Mode>**

Band	CDMA2000 BC0			Tune-up Limit (dBm)	CDMA2000 BC1			Tune-up Limit (dBm)
	1013	384	777		25	600	1175	
Tx Channel	824.7	836.52	848.31		1851.25	1880	1908.75	
Frequency (MHz)								
RC1 SO55	23.35	23.53	23.50	24.00	23.63	23.78	23.48	24.00
RC3 SO55	23.29	23.52	23.46	24.00	23.59	23.64	23.44	24.00
RC3 SO32 (F+SCH)	23.29	23.48	23.42	24.00	23.59	23.65	23.43	24.00
RC3 SO32 (+SCH)	23.27	23.46	23.41	24.00	23.55	23.62	23.41	24.00
RTAP 153.6Kbps	23.34	23.52	23.49	24.00	23.55	23.73	23.47	24.00
RETAP 4096Bits	23.29	23.48	23.41	24.00	23.49	23.68	23.43	24.00

**<Reduced Power Mode for Hotspot On>**

Band	CDMA2000 BC0			Tune-up Limit (dBm)	CDMA2000 BC1			Tune-up Limit (dBm)
	1013	384	777		25	600	1175	
Tx Channel	824.7	836.52	848.31		1851.25	1880	1908.75	
Frequency (MHz)								
RC1 SO55	21.77	21.88	21.87	22.00	21.49	21.68	21.39	22.00
RC3 SO55	21.69	21.84	21.79	22.00	21.43	21.65	21.36	22.00
RC3 SO32 (F+SCH)	21.76	21.85	21.87	22.00	21.47	21.64	21.38	22.00
RC3 SO32 (+SCH)	21.72	21.82	21.84	22.00	21.46	21.61	21.37	22.00
RTAP 153.6Kbps	21.75	21.87	21.86	22.00	21.44	21.62	21.38	22.00
RETAP 4096Bits	21.73	21.86	21.85	22.00	21.42	21.59	21.34	22.00



**<LTE Conducted Power>**

**General Note:**

1. Anritsu MT8820C 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  $\leq 0.8$  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  $\frac{1}{2}$  dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is  $\leq 1.45$  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  $\frac{1}{2}$  dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is  $\leq 1.45$  W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B4 / 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.
9. LTE band 2 SAR test was covered by Band 25; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
  - a. the maximum output power, including tolerance, for the smaller band is  $\leq$  the larger band to qualify for the SAR test exclusion
  - b. the channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band

**<Full Power Mode>**

**<LTE Band 2>**

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				18700	18900	19100		
Frequency (MHz)				1860	1880	1900		
20	QPSK	1	0	23.09	23.14	23.11	23.5	0
20	QPSK	1	49	23.32	23.38	23.37		
20	QPSK	1	99	23.07	23.37	23.16		
20	QPSK	50	0	22.42	22.58	22.53	23	0.5
20	QPSK	50	24	22.41	22.57	22.51		
20	QPSK	50	50	22.36	22.51	22.46		
20	QPSK	100	0	22.40	22.53	22.43	23	0.5
20	16QAM	1	0	22.93	22.07	22.07		
20	16QAM	1	49	22.56	22.70	22.56		
20	16QAM	1	99	22.30	22.62	22.48	22.5	1
20	16QAM	50	0	21.46	21.51	21.68		
20	16QAM	50	24	21.51	21.35	21.53		
20	16QAM	50	50	21.67	21.31	21.47	22.5	1
20	16QAM	100	0	21.50	21.41	21.58		
Channel				18675	18900	19125		
Frequency (MHz)				1857.5	1880	1902.5		
15	QPSK	1	0	23.20	23.25	23.21	23.5	0
15	QPSK	1	37	23.23	23.28	23.29		
15	QPSK	1	74	23.12	23.35	23.37		
15	QPSK	36	0	22.38	22.47	22.40	23	0.5
15	QPSK	36	20	22.36	22.36	22.49		
15	QPSK	36	39	22.36	22.36	22.45		
15	QPSK	75	0	22.37	22.33	22.47	23	0.5
15	16QAM	1	0	22.12	22.68	21.81		
15	16QAM	1	37	22.33	22.69	21.99		
15	16QAM	1	74	21.90	22.60	21.86	22.5	1
15	16QAM	36	0	21.42	21.40	21.46		
15	16QAM	36	20	21.43	21.41	21.65		
15	16QAM	36	39	21.34	21.44	21.51	22.5	1
15	16QAM	75	0	21.49	21.48	21.51		



Channel				18650	18900	19150	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1855	1880	1905		
10	QPSK	1	0	23.29	23.36	23.31	23.5	0
10	QPSK	1	25	23.32	23.33	23.36		
10	QPSK	1	49	23.18	23.26	23.21		
10	QPSK	25	0	22.43	22.46	22.43	23	0.5
10	QPSK	25	12	22.35	22.51	22.41		
10	QPSK	25	25	22.28	22.40	22.38		
10	QPSK	50	0	22.40	22.49	22.42	23	0.5
10	16QAM	1	0	21.74	22.39	21.98		
10	16QAM	1	25	22.34	22.59	22.57		
10	16QAM	1	49	22.43	22.27	22.16	22.5	1
10	16QAM	25	0	21.51	21.42	21.43		
10	16QAM	25	12	21.76	21.36	21.57		
10	16QAM	25	25	21.56	21.36	21.48	22.5	1
10	16QAM	50	0	21.57	21.37	21.49		
Channel				18625	18900	19175	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1907.5		
5	QPSK	1	0	23.32	23.35	23.32	23.5	0
5	QPSK	1	12	23.31	23.28	23.33		
5	QPSK	1	24	23.31	23.31	23.31		
5	QPSK	12	0	22.47	22.63	22.40	23	0.5
5	QPSK	12	7	22.55	22.59	22.47		
5	QPSK	12	13	22.28	22.37	22.37		
5	QPSK	25	0	22.37	22.27	22.36	23	0.5
5	16QAM	1	0	21.83	21.71	21.50		
5	16QAM	1	12	22.02	21.91	22.42		
5	16QAM	1	24	21.87	21.82	22.30	22.5	1
5	16QAM	12	0	21.25	21.13	21.41		
5	16QAM	12	7	21.70	21.13	21.31		
5	16QAM	12	13	21.53	21.24	21.22	22.5	1
5	16QAM	25	0	21.58	21.28	21.27		



Channel				18615	18900	19185	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1908.5		
3	QPSK	1	0	23.27	22.96	23.18	23.5	0
3	QPSK	1	8	23.24	23.03	23.27		
3	QPSK	1	14	23.26	23.03	23.29		
3	QPSK	8	0	22.34	22.26	22.31	23	0.5
3	QPSK	8	4	22.40	22.35	22.45		
3	QPSK	8	7	22.49	22.31	22.38		
3	QPSK	15	0	22.45	22.31	22.38	23	0.5
3	16QAM	1	0	22.39	22.49	22.37		
3	16QAM	1	8	22.37	21.90	22.25		
3	16QAM	1	14	22.32	21.82	22.38	22.5	1
3	16QAM	8	0	21.55	21.43	21.29		
3	16QAM	8	4	21.54	21.39	21.65		
3	16QAM	8	7	21.90	21.48	21.38	22.5	1
3	16QAM	15	0	21.52	21.55	21.60		
Channel				18607	18900	19193	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1909.3		
1.4	QPSK	1	0	23.37	23.23	23.29	23.5	0
1.4	QPSK	1	3	23.35	23.25	23.32		
1.4	QPSK	1	5	23.33	23.20	23.22		
1.4	QPSK	3	0	23.31	23.37	23.32		
1.4	QPSK	3	1	23.22	23.34	23.34		
1.4	QPSK	3	3	23.18	23.32	23.26	23	0.5
1.4	QPSK	6	0	22.48	22.32	22.40		
1.4	16QAM	1	0	22.11	21.87	22.42	23	0.5
1.4	16QAM	1	3	22.32	22.08	22.47		
1.4	16QAM	1	5	22.04	21.93	22.31		
1.4	16QAM	3	0	22.36	21.98	21.87		
1.4	16QAM	3	1	22.33	22.29	22.35		
1.4	16QAM	3	3	22.41	22.31	22.33	22.5	1
1.4	16QAM	6	0	21.28	21.51	21.45		



<LTE Band 4>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20050	20175	20300		
Frequency (MHz)				1720	1732.5	1745		
20	QPSK	1	0	23.05	23.23	23.33	24	0
20	QPSK	1	49	23.14	23.30	23.62		
20	QPSK	1	99	22.98	23.13	23.22		
20	QPSK	50	0	22.26	22.32	22.52	23	1
20	QPSK	50	24	22.22	22.28	22.35		
20	QPSK	50	50	22.25	22.30	22.32		
20	QPSK	100	0	22.33	22.34	22.37	23	1
20	16QAM	1	0	21.67	22.31	22.39		
20	16QAM	1	49	21.68	22.45	22.50		
20	16QAM	1	99	21.62	22.23	22.34	22	2
20	16QAM	50	0	21.32	21.36	21.69		
20	16QAM	50	24	21.47	21.53	21.58		
20	16QAM	50	50	21.28	21.41	21.43	22	2
20	16QAM	100	0	21.47	21.49	21.50		
Channel				20025	20175	20325		
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	22.95	23.17	23.22	24	0
15	QPSK	1	37	23.10	23.57	23.52		
15	QPSK	1	74	23.28	23.36	23.29		
15	QPSK	36	0	22.34	22.33	22.39	23	1
15	QPSK	36	20	22.16	22.31	22.24		
15	QPSK	36	39	22.17	22.24	22.29		
15	QPSK	75	0	22.31	22.28	22.32	23	1
15	16QAM	1	0	22.13	22.20	22.34		
15	16QAM	1	37	22.22	22.22	22.44		
15	16QAM	1	74	21.78	21.69	21.92	22	2
15	16QAM	36	0	21.36	21.29	21.32		
15	16QAM	36	20	21.26	21.36	21.41		
15	16QAM	36	39	21.04	21.45	21.27	22	2
15	16QAM	75	0	21.30	21.57	21.37		



Channel				20000	20175	20350	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	23.04	23.07	23.03	24	0
10	QPSK	1	25	23.46	23.29	23.48		
10	QPSK	1	49	22.87	23.42	23.31		
10	QPSK	25	0	22.29	22.35	22.32	23	1
10	QPSK	25	12	22.29	22.25	22.33		
10	QPSK	25	25	22.13	22.29	22.27		
10	QPSK	50	0	22.25	22.27	22.31	23	1
10	16QAM	1	0	21.80	21.96	21.94		
10	16QAM	1	25	21.58	22.46	21.60		
10	16QAM	1	49	21.74	22.21	21.87	22	2
10	16QAM	25	0	21.38	21.50	21.35		
10	16QAM	25	12	21.33	21.42	21.27		
10	16QAM	25	25	21.08	21.32	21.63	22	2
10	16QAM	50	0	21.35	21.33	21.42		
Channel				19975	20175	20375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	23.10	23.22	23.33	24	0
5	QPSK	1	12	23.33	23.31	23.49		
5	QPSK	1	24	23.12	23.33	23.55		
5	QPSK	12	0	22.31	22.32	22.33	23	1
5	QPSK	12	7	22.15	22.38	22.50		
5	QPSK	12	13	22.12	22.30	22.39		
5	QPSK	25	0	22.22	22.20	22.47	23	1
5	16QAM	1	0	21.79	21.96	21.92		
5	16QAM	1	12	21.94	21.65	22.12		
5	16QAM	1	24	21.35	21.73	21.75	22	2
5	16QAM	12	0	21.07	21.06	21.20		
5	16QAM	12	7	21.02	21.41	21.29		
5	16QAM	12	13	21.15	21.50	21.52	22	2
5	16QAM	25	0	21.20	21.36	21.56		





Channel				19965	20175	20385	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	22.94	23.07	23.27	24	0
3	QPSK	1	8	23.05	23.15	23.40		
3	QPSK	1	14	23.08	23.31	23.38		
3	QPSK	8	0	22.33	22.24	22.45	23	1
3	QPSK	8	4	22.33	22.30	22.39		
3	QPSK	8	7	22.25	22.24	22.33		
3	QPSK	15	0	22.27	22.34	22.34	23	1
3	16QAM	1	0	22.38	21.95	21.85		
3	16QAM	1	8	22.23	21.83	21.60		
3	16QAM	1	14	22.21	22.10	21.65	22	2
3	16QAM	8	0	21.36	21.13	21.25		
3	16QAM	8	4	21.17	21.14	21.61		
3	16QAM	8	7	21.20	21.33	21.43	22	2
3	16QAM	15	0	21.22	21.33	21.68		
Channel				19957	20175	20393	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	23.14	23.18	23.22	24	0
1.4	QPSK	1	3	23.19	23.30	23.29		
1.4	QPSK	1	5	23.18	23.38	23.39		
1.4	QPSK	3	0	23.20	23.24	23.39		
1.4	QPSK	3	1	23.38	23.35	23.46		
1.4	QPSK	3	3	23.31	23.39	23.59	23	1
1.4	QPSK	6	0	22.28	22.29	22.38		
1.4	16QAM	1	0	21.82	21.99	22.44	23	1
1.4	16QAM	1	3	22.39	22.41	22.57		
1.4	16QAM	1	5	21.75	21.83	22.45		
1.4	16QAM	3	0	21.72	22.14	22.40		
1.4	16QAM	3	1	22.22	22.26	22.43		
1.4	16QAM	3	3	22.50	22.29	22.46	22	2
1.4	16QAM	6	0	21.30	21.41	21.43		



<LTE Band 5>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20450	20525	20600		
Frequency (MHz)				829	836.5	844		
10	QPSK	1	0	23.17	23.15	23.03	24	0
10	QPSK	1	25	23.53	23.32	23.64		
10	QPSK	1	49	23.07	23.13	23.23		
10	QPSK	25	0	22.43	22.29	22.44	23	1
10	QPSK	25	12	22.46	22.38	22.56		
10	QPSK	25	25	22.33	22.36	22.44		
10	QPSK	50	0	22.40	22.27	22.49	23	1
10	16QAM	1	0	21.55	21.48	21.32		
10	16QAM	1	25	22.25	22.27	21.85		
10	16QAM	1	49	21.52	21.81	21.60	22	2
10	16QAM	25	0	21.34	21.30	21.33		
10	16QAM	25	12	21.49	21.54	21.63		
10	16QAM	25	25	21.43	21.30	21.55	22	2
10	16QAM	50	0	21.37	21.36	21.50		
Channel				20425	20525	20625		
Frequency (MHz)				826.5	836.5	846.5		
5	QPSK	1	0	23.38	23.21	23.29	24	0
5	QPSK	1	12	23.55	23.51	23.61		
5	QPSK	1	24	23.31	23.35	23.08		
5	QPSK	12	0	22.56	22.32	22.45	23	1
5	QPSK	12	7	22.50	22.37	22.41		
5	QPSK	12	13	22.39	22.26	22.34		
5	QPSK	25	0	22.41	22.30	22.36	23	1
5	16QAM	1	0	21.89	22.17	22.49		
5	16QAM	1	12	22.84	22.48	22.40		
5	16QAM	1	24	22.12	22.60	22.62	22	2
5	16QAM	12	0	21.54	21.24	21.38		
5	16QAM	12	7	21.45	21.43	21.60		
5	16QAM	12	13	21.44	21.38	21.20	22	2
5	16QAM	25	0	21.35	21.30	21.42		



Channel				20415	20525	20635	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				825.5	836.5	847.5		
3	QPSK	1	0	23.59	23.25	23.52	24	0
3	QPSK	1	8	23.54	23.32	23.38		
3	QPSK	1	14	23.50	23.46	23.38		
3	QPSK	8	0	22.43	22.53	22.43	23	1
3	QPSK	8	4	22.44	22.32	22.40		
3	QPSK	8	7	22.49	22.30	22.40		
3	QPSK	15	0	22.47	22.37	22.27	23	1
3	16QAM	1	0	21.69	22.32	21.73		
3	16QAM	1	8	22.32	22.27	22.13		
3	16QAM	1	14	22.29	21.94	21.63	22	2
3	16QAM	8	0	21.52	21.31	21.35		
3	16QAM	8	4	21.63	21.38	21.40		
3	16QAM	8	7	21.46	21.40	21.50	22	2
3	16QAM	15	0	21.40	21.41	21.56		
Channel				20407	20525	20643	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				824.7	836.5	848.3		
1.4	QPSK	1	0	23.33	23.28	23.33	24	0
1.4	QPSK	1	3	23.47	23.39	23.34		
1.4	QPSK	1	5	23.42	23.28	23.19		
1.4	QPSK	3	0	23.56	23.36	23.38		
1.4	QPSK	3	1	23.60	23.45	23.50		
1.4	QPSK	3	3	23.62	23.38	23.36	23	1
1.4	QPSK	6	0	22.56	22.36	22.33		
1.4	16QAM	1	0	22.17	22.69	21.95	23	1
1.4	16QAM	1	3	21.98	22.52	22.06		
1.4	16QAM	1	5	22.19	22.36	21.75		
1.4	16QAM	3	0	22.44	22.15	22.05		
1.4	16QAM	3	1	22.80	22.21	22.35		
1.4	16QAM	3	3	22.70	22.39	21.86	22	2
1.4	16QAM	6	0	21.25	21.10	21.11		



<LTE Band 12>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				23060	23095	23130	24	0
Frequency (MHz)				704	707.5	711		
10	QPSK	1	0	23.15	23.11	23.13		
10	QPSK	1	25	23.56	23.75	23.61	23	1
10	QPSK	1	49	23.13	23.20	23.19		
10	QPSK	25	0	22.31	22.42	22.53		
10	QPSK	25	12	22.45	22.61	22.56	23	1
10	QPSK	25	25	22.41	22.42	22.36		
10	QPSK	50	0	22.34	22.37	22.36		
10	16QAM	1	0	21.87	21.79	21.98	23	1
10	16QAM	1	25	22.50	22.74	21.92		
10	16QAM	1	49	22.40	21.91	22.05		
10	16QAM	25	0	21.27	21.39	21.61	22	2
10	16QAM	25	12	21.49	21.55	21.50		
10	16QAM	25	25	21.64	21.34	21.37		
10	16QAM	50	0	21.44	21.32	21.32	24	0
Channel				23035	23095	23155		
Frequency (MHz)				701.5	707.5	713.5		
5	QPSK	1	0	23.27	23.29	23.28	24	0
5	QPSK	1	12	23.52	23.71	23.60		
5	QPSK	1	24	23.44	23.27	23.54		
5	QPSK	12	0	22.34	22.46	22.41	23	1
5	QPSK	12	7	22.40	22.62	22.40		
5	QPSK	12	13	22.39	22.45	22.34		
5	QPSK	25	0	22.46	22.51	22.39	23	1
5	16QAM	1	0	21.76	21.69	21.81		
5	16QAM	1	12	22.21	22.34	21.98		
5	16QAM	1	24	21.69	21.67	22.48	23	1
5	16QAM	12	0	21.30	21.37	21.53		
5	16QAM	12	7	21.41	21.54	21.55		
5	16QAM	12	13	21.55	21.42	21.54	22	2
5	16QAM	25	0	21.54	21.63	21.47		



Channel				23025	23095	23165	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				700.5	707.5	714.5		
3	QPSK	1	0	23.44	23.41	23.44	24	0
3	QPSK	1	8	23.44	23.41	23.51		
3	QPSK	1	14	23.39	23.33	23.57		
3	QPSK	8	0	22.41	22.54	22.40	23	1
3	QPSK	8	4	22.28	22.52	22.48		
3	QPSK	8	7	22.40	22.62	22.44		
3	QPSK	15	0	22.36	22.53	22.37	23	1
3	16QAM	1	0	21.88	22.61	21.67		
3	16QAM	1	8	22.26	21.69	22.55		
3	16QAM	1	14	22.34	21.74	22.38	22	2
3	16QAM	8	0	21.49	21.10	21.30		
3	16QAM	8	4	21.66	21.38	21.85		
3	16QAM	8	7	21.69	21.58	21.74	22	2
3	16QAM	15	0	21.52	21.49	21.62		
Channel				23017	23095	23173	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				699.7	707.5	715.3		
1.4	QPSK	1	0	23.18	23.39	23.31	24	0
1.4	QPSK	1	3	23.19	23.49	23.42		
1.4	QPSK	1	5	23.19	23.40	23.43		
1.4	QPSK	3	0	23.36	23.56	23.32		
1.4	QPSK	3	1	23.45	23.56	23.50		
1.4	QPSK	3	3	23.46	23.51	23.49	23	1
1.4	QPSK	6	0	22.46	22.48	22.48		
1.4	16QAM	1	0	22.08	21.63	21.93	23	1
1.4	16QAM	1	3	22.08	21.99	21.96		
1.4	16QAM	1	5	21.71	22.21	21.98		
1.4	16QAM	3	0	22.40	22.40	22.31		
1.4	16QAM	3	1	22.40	22.79	22.40		
1.4	16QAM	3	3	22.36	22.39	22.41	22	2
1.4	16QAM	6	0	21.24	21.24	21.41		



<LTE Band 25>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				26140	26340	26590		
Frequency (MHz)				1860	1880	1905		
20	QPSK	1	0	22.83	22.83	22.90	23.5	0
20	QPSK	1	49	23.27	23.02	23.39		
20	QPSK	1	99	22.64	22.84	22.90		
20	QPSK	50	0	22.03	21.98	22.06	23	0.5
20	QPSK	50	24	21.94	21.92	22.01		
20	QPSK	50	50	21.80	21.94	22.04		
20	QPSK	100	0	21.86	21.94	21.96	23	0.5
20	16QAM	1	0	21.66	21.90	21.61		
20	16QAM	1	49	21.65	22.25	21.72		
20	16QAM	1	99	21.66	21.86	21.59	22.5	1
20	16QAM	50	0	21.04	20.90	21.09		
20	16QAM	50	24	21.05	20.87	21.05		
20	16QAM	50	50	21.02	20.92	21.16	22.5	1
20	16QAM	100	0	20.92	20.88	20.99		
Channel				26115	26340	26615		
Frequency (MHz)				1857.5	1880	1907.5		
15	QPSK	1	0	22.96	22.84	22.53	23.5	0
15	QPSK	1	37	23.16	23.04	23.04		
15	QPSK	1	74	22.84	22.88	22.81		
15	QPSK	36	0	22.13	21.91	22.04	23	0.5
15	QPSK	36	20	22.01	22.03	22.04		
15	QPSK	36	39	22.02	21.93	22.03		
15	16QAM	1	0	21.42	21.84	21.24	23	0.5
15	16QAM	1	37	21.97	22.00	21.67		
15	16QAM	1	74	21.50	21.14	21.55		
15	16QAM	36	0	21.03	20.84	20.94	22.5	1
15	16QAM	36	20	21.09	20.90	20.95		
15	16QAM	36	39	20.87	20.99	20.94		
15	16QAM	75	0	21.05	20.96	20.98		



Channel				26090	26340	26640	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1855	1880	1910		
10	QPSK	1	0	22.69	22.62	22.71	23.5	0
10	QPSK	1	25	22.99	22.77	23.10		
10	QPSK	1	49	22.68	22.73	22.95		
10	QPSK	25	0	22.02	21.96	22.04	23	0.5
10	QPSK	25	12	21.95	22.04	22.08		
10	QPSK	25	25	22.04	21.95	21.99		
10	QPSK	50	0	22.01	22.01	21.98	23	0.5
10	16QAM	1	0	21.70	21.67	21.59		
10	16QAM	1	25	21.91	22.20	21.96		
10	16QAM	1	49	21.49	22.28	21.36	22.5	1
10	16QAM	25	0	21.06	20.98	21.06		
10	16QAM	25	12	21.01	20.95	21.19		
10	16QAM	25	25	20.90	20.90	20.85	22.5	1
10	16QAM	50	0	21.02	20.92	20.93		
Channel				26065	26340	26665	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1912.5		
5	QPSK	1	0	22.83	22.70	23.08	23.5	0
5	QPSK	1	12	22.73	23.11	23.11		
5	QPSK	1	24	22.79	22.91	23.10		
5	QPSK	12	0	22.01	21.92	22.13	23	0.5
5	QPSK	12	7	22.15	21.94	22.07		
5	QPSK	12	13	21.96	21.97	22.07		
5	QPSK	25	0	21.98	21.95	22.05	23	0.5
5	16QAM	1	0	21.30	22.02	21.69		
5	16QAM	1	12	21.51	22.06	21.46		
5	16QAM	1	24	21.09	22.07	21.47	22.5	1
5	16QAM	12	0	20.86	21.10	20.85		
5	16QAM	12	7	20.92	21.23	20.88		
5	16QAM	12	13	20.97	20.99	21.08	22.5	1
5	16QAM	25	0	21.08	21.00	21.21		



Channel				26055	26340	26675	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1913.5		
3	QPSK	1	0	22.87	22.83	22.96	23.5	0
3	QPSK	1	8	22.81	22.96	23.09		
3	QPSK	1	14	22.80	23.01	23.12		
3	QPSK	8	0	21.97	21.92	22.18	23	0.5
3	QPSK	8	4	22.02	21.94	22.10		
3	QPSK	8	7	21.99	21.92	22.20		
3	QPSK	15	0	21.99	22.01	22.11	23	0.5
3	16QAM	1	0	22.14	21.75	21.74		
3	16QAM	1	8	21.43	22.01	21.31		
3	16QAM	1	14	21.32	22.25	21.81	22.5	1
3	16QAM	8	0	20.95	20.96	21.13		
3	16QAM	8	4	20.89	21.15	21.16		
3	16QAM	8	7	20.99	21.05	21.06	22.5	1
3	16QAM	15	0	21.08	21.05	21.02		
Channel				26047	26340	26683	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1914.3		
1.4	QPSK	1	0	22.98	22.87	23.01	23.5	0
1.4	QPSK	1	3	22.97	22.97	23.11		
1.4	QPSK	1	5	22.98	22.91	23.08		
1.4	QPSK	3	0	23.00	23.14	23.18		
1.4	QPSK	3	1	23.14	22.94	23.12		
1.4	QPSK	3	3	23.03	23.11	23.15		
1.4	QPSK	6	0	21.99	21.87	21.92	23	0.5
1.4	16QAM	1	0	22.08	21.39	21.32	23	0.5
1.4	16QAM	1	3	21.64	21.81	21.94		
1.4	16QAM	1	5	22.21	21.49	21.43		
1.4	16QAM	3	0	21.97	21.93	21.87		
1.4	16QAM	3	1	22.05	21.86	22.03		
1.4	16QAM	3	3	21.85	21.85	21.87		
1.4	16QAM	6	0	20.90	20.81	21.14	22.5	1





<Reduced Power Mode for Hotspot On>

<LTE Band 2>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				18700	18900	19100		
Frequency (MHz)				1860	1880	1900		
20	QPSK	1	0	21.72	21.74	21.56	22.5	0
20	QPSK	1	49	22.09	22.15	22.10		
20	QPSK	1	99	21.64	21.91	21.88		
20	QPSK	50	0	21.04	21.06	20.93	21.5	1
20	QPSK	50	24	20.96	20.98	20.96		
20	QPSK	50	50	20.95	20.96	20.95		
20	QPSK	100	0	20.97	20.99	20.94	21.5	1
20	16QAM	1	0	20.59	20.62	20.71		
20	16QAM	1	49	21.14	20.85	21.17		
20	16QAM	1	99	20.37	21.02	20.73	20.5	2
20	16QAM	50	0	19.91	20.02	20.07		
20	16QAM	50	24	19.91	19.93	20.01		
20	16QAM	50	50	20.00	19.93	20.00	20.5	2
20	16QAM	100	0	19.92	19.92	19.98		
Channel				18675	18900	19125		
Frequency (MHz)				1857.5	1880	1902.5		
15	QPSK	1	0	22.05	21.71	21.91	22.5	0
15	QPSK	1	37	21.96	22.12	22.14		
15	QPSK	1	74	21.93	22.02	21.91		
15	QPSK	36	0	20.98	20.83	20.97	21.5	1
15	QPSK	36	20	20.89	20.81	20.98		
15	QPSK	36	39	20.84	20.82	20.93		
15	QPSK	75	0	20.92	20.83	20.96	21.5	1
15	16QAM	1	0	20.48	20.40	20.48		
15	16QAM	1	37	20.63	20.50	21.38		
15	16QAM	1	74	20.39	20.39	20.45	20.5	2
15	16QAM	36	0	19.90	19.87	20.00		
15	16QAM	36	20	19.91	19.85	20.11		
15	16QAM	36	39	19.85	19.95	20.16	20.5	2
15	16QAM	75	0	20.04	19.89	20.10		



Channel				18650	18900	19150	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1855	1880	1905		
10	QPSK	1	0	21.77	21.73	21.74	22.5	0
10	QPSK	1	25	22.08	21.90	21.96		
10	QPSK	1	49	21.74	21.59	21.71		
10	QPSK	25	0	21.01	20.86	20.92	21.5	1
10	QPSK	25	12	20.88	20.87	20.94		
10	QPSK	25	25	20.83	20.77	20.89		
10	QPSK	50	0	20.91	20.82	20.97	21.5	1
10	16QAM	1	0	20.47	20.37	20.47		
10	16QAM	1	25	20.36	20.44	21.18		
10	16QAM	1	49	20.34	20.47	20.63	20.5	2
10	16QAM	25	0	20.13	19.80	19.97		
10	16QAM	25	12	20.00	19.92	19.99		
10	16QAM	25	25	19.84	19.92	20.05	20.5	2
10	16QAM	50	0	19.93	19.97	20.11		
Channel				18625	18900	19175	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1907.5		
5	QPSK	1	0	21.75	21.45	21.82	22.5	0
5	QPSK	1	12	21.95	21.81	21.85		
5	QPSK	1	24	21.63	21.84	21.71		
5	QPSK	12	0	20.80	20.72	20.85	21.5	1
5	QPSK	12	7	20.95	20.82	20.85		
5	QPSK	12	13	20.80	20.84	20.90		
5	QPSK	25	0	20.98	20.81	20.86	21.5	1
5	16QAM	1	0	20.32	20.00	20.77		
5	16QAM	1	12	20.61	20.44	20.76		
5	16QAM	1	24	19.96	19.93	20.87	20.5	2
5	16QAM	12	0	19.73	19.62	19.88		
5	16QAM	12	7	20.10	19.69	20.09		
5	16QAM	12	13	20.04	19.81	20.04	20.5	2
5	16QAM	25	0	20.04	19.97	19.97		



Channel				18615	18900	19185	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1908.5		
3	QPSK	1	0	21.65	21.72	21.77	22.5	0
3	QPSK	1	8	21.60	21.60	21.88		
3	QPSK	1	14	21.89	21.54	21.40		
3	QPSK	8	0	20.73	20.69	20.82	21.5	1
3	QPSK	8	4	20.85	20.72	20.80		
3	QPSK	8	7	20.83	20.68	20.72		
3	QPSK	15	0	20.76	20.70	20.72	21.5	1
3	16QAM	1	0	20.40	20.89	20.59		
3	16QAM	1	8	20.22	20.51	20.08		
3	16QAM	1	14	20.52	20.66	20.19	20.5	2
3	16QAM	8	0	19.66	19.80	19.54		
3	16QAM	8	4	20.01	19.86	19.78		
3	16QAM	8	7	20.05	19.87	19.85	20.5	2
3	16QAM	15	0	19.80	19.73	19.47		
Channel				18607	18900	19193	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1909.3		
1.4	QPSK	1	0	21.70	21.76	21.79	22.5	0
1.4	QPSK	1	3	22.02	21.75	21.82		
1.4	QPSK	1	5	21.84	21.71	21.67		
1.4	QPSK	3	0	21.89	21.76	21.89		
1.4	QPSK	3	1	22.13	21.88	22.04		
1.4	QPSK	3	3	21.99	21.79	21.87	21.5	1
1.4	QPSK	6	0	20.85	20.57	20.79		
1.4	16QAM	1	0	20.63	19.82	20.56	21.5	1
1.4	16QAM	1	3	20.49	20.01	20.28		
1.4	16QAM	1	5	20.65	20.51	20.18		
1.4	16QAM	3	0	20.35	20.55	20.63		
1.4	16QAM	3	1	21.26	20.64	20.66		
1.4	16QAM	3	3	20.72	20.63	20.56	20.5	2
1.4	16QAM	6	0	19.70	19.57	19.58		



<LTE Band 4>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20050	20175	20300		
Frequency (MHz)				1720	1732.5	1745		
20	QPSK	1	0	20.45	20.63	20.56	21	0
20	QPSK	1	49	20.80	20.98	20.96		
20	QPSK	1	99	20.31	20.58	20.56		
20	QPSK	50	0	19.59	19.96	19.95	20	1
20	QPSK	50	24	19.69	19.78	19.66		
20	QPSK	50	50	19.70	19.77	19.62		
20	QPSK	100	0	19.78	19.90	19.89	20	1
20	16QAM	1	0	18.81	19.23	19.62		
20	16QAM	1	49	18.91	19.06	19.67		
20	16QAM	1	99	18.88	19.24	19.25	19	2
20	16QAM	50	0	18.73	18.98	18.96		
20	16QAM	50	24	18.87	18.97	18.72		
20	16QAM	50	50	18.84	18.84	18.62	19	2
20	16QAM	100	0	18.88	18.82	18.82		
Channel				20025	20175	20325		
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	20.60	20.89	20.89	21	0
15	QPSK	1	37	20.92	20.84	20.84		
15	QPSK	1	74	20.61	20.91	20.76		
15	QPSK	36	0	19.75	19.77	19.75	20	1
15	QPSK	36	20	19.61	19.88	19.79		
15	QPSK	36	39	19.57	19.86	19.74		
15	QPSK	75	0	19.79	19.80	19.75	20	1
15	16QAM	1	0	19.05	19.70	19.43		
15	16QAM	1	37	19.08	19.36	19.81		
15	16QAM	1	74	19.34	19.16	19.60	19	2
15	16QAM	36	0	18.84	18.78	18.76		
15	16QAM	36	20	18.76	18.78	18.76		
15	16QAM	36	39	18.47	18.89	18.81	19	2
15	16QAM	75	0	18.70	18.72	18.77		



Channel				20000	20175	20350	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	20.56	20.58	20.68	21	0
10	QPSK	1	25	20.81	20.90	20.91		
10	QPSK	1	49	20.29	20.74	20.70		
10	QPSK	25	0	19.79	19.84	19.77	20	1
10	QPSK	25	12	19.72	19.82	19.72		
10	QPSK	25	25	19.49	19.79	19.81		
10	QPSK	50	0	19.70	19.86	19.92	20	1
10	16QAM	1	0	20.00	19.49	19.52		
10	16QAM	1	25	19.97	19.99	19.65		
10	16QAM	1	49	19.10	19.77	19.56	19	2
10	16QAM	25	0	18.77	18.90	18.94		
10	16QAM	25	12	18.83	18.78	18.95		
10	16QAM	25	25	18.48	18.86	18.88	19	2
10	16QAM	50	0	18.71	18.88	18.81		
Channel				19975	20175	20375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	20.52	20.60	20.71	21	0
5	QPSK	1	12	20.89	20.84	20.83		
5	QPSK	1	24	20.68	20.90	20.88		
5	QPSK	12	0	19.78	19.84	19.88	20	1
5	QPSK	12	7	19.69	19.89	19.91		
5	QPSK	12	13	19.69	19.89	19.83		
5	QPSK	25	0	19.73	19.84	19.90	20	1
5	16QAM	1	0	19.44	19.48	19.01		
5	16QAM	1	12	19.79	19.85	19.38		
5	16QAM	1	24	19.26	20.00	19.62	19	2
5	16QAM	12	0	18.67	18.66	18.64		
5	16QAM	12	7	18.55	19.00	18.95		
5	16QAM	12	13	18.49	19.00	18.91	19	2
5	16QAM	25	0	18.53	18.86	18.84		



Channel				19965	20175	20385	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	20.69	20.87	20.48	21	0
3	QPSK	1	8	20.45	20.91	20.49		
3	QPSK	1	14	20.54	20.94	20.76		
3	QPSK	8	0	19.71	20.00	19.78	20	1
3	QPSK	8	4	19.75	19.92	19.90		
3	QPSK	8	7	19.59	19.86	19.80		
3	QPSK	15	0	19.67	19.88	19.78	20	1
3	16QAM	1	0	19.58	19.82	19.45		
3	16QAM	1	8	19.49	19.17	19.86		
3	16QAM	1	14	19.91	19.27	19.17	19	2
3	16QAM	8	0	18.77	18.81	18.44		
3	16QAM	8	4	18.93	18.85	18.91		
3	16QAM	8	7	18.82	18.79	18.58	19	2
3	16QAM	15	0	18.79	19.00	18.87		
Channel				19957	20175	20393	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	20.71	20.63	20.94	21	0
1.4	QPSK	1	3	20.70	20.71	20.92		
1.4	QPSK	1	5	20.74	20.75	20.91		
1.4	QPSK	3	0	20.71	20.95	20.97		
1.4	QPSK	3	1	20.85	20.91	20.90		
1.4	QPSK	3	3	20.87	20.94	20.91	20	1
1.4	QPSK	6	0	19.74	19.82	19.93		
1.4	16QAM	1	0	20.00	19.10	19.70	20	1
1.4	16QAM	1	3	19.11	19.61	20.00		
1.4	16QAM	1	5	19.13	20.00	20.00		
1.4	16QAM	3	0	19.55	19.56	19.93		
1.4	16QAM	3	1	19.44	19.72	19.88		
1.4	16QAM	3	3	19.50	19.73	19.85	19	2
1.4	16QAM	6	0	18.64	18.88	18.61		



<LTE Band 5>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20450	20525	20600		
Frequency (MHz)				829	836.5	844		
10	QPSK	1	0	21.62	21.52	21.65	22.5	0
10	QPSK	1	25	21.70	21.95	22.15		
10	QPSK	1	49	21.51	21.59	21.60		
10	QPSK	25	0	20.77	20.80	20.81	21.5	1
10	QPSK	25	12	20.78	20.88	20.85		
10	QPSK	25	25	20.68	20.71	20.79		
10	QPSK	50	0	20.73	20.69	20.80	21.5	1
10	16QAM	1	0	20.82	19.91	20.36		
10	16QAM	1	25	20.83	20.47	20.45		
10	16QAM	1	49	20.67	19.87	20.33	20.5	2
10	16QAM	25	0	19.82	19.79	19.74		
10	16QAM	25	12	19.83	19.78	20.08		
10	16QAM	25	25	19.67	19.86	19.93	20.5	2
10	16QAM	50	0	19.74	19.86	19.74		
Channel				20425	20525	20625		
Frequency (MHz)				826.5	836.5	846.5		
5	QPSK	1	0	21.76	21.55	21.81	22.5	0
5	QPSK	1	12	22.11	21.87	22.09		
5	QPSK	1	24	21.84	21.54	21.46		
5	QPSK	12	0	20.92	20.75	20.73	21.5	1
5	QPSK	12	7	20.83	20.65	20.81		
5	QPSK	12	13	20.74	20.59	20.68		
5	QPSK	25	0	20.83	20.73	20.75	21.5	1
5	16QAM	1	0	20.54	20.94	21.00		
5	16QAM	1	12	20.24	20.97	21.08		
5	16QAM	1	24	20.30	20.19	20.56	20.5	2
5	16QAM	12	0	19.79	19.53	19.60		
5	16QAM	12	7	19.92	19.56	19.64		
5	16QAM	12	13	19.62	19.55	19.50	20.5	2
5	16QAM	25	0	19.71	19.66	19.75		



Channel				20415	20525	20635	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				825.5	836.5	847.5		
3	QPSK	1	0	21.85	21.71	21.78	22.5	0
3	QPSK	1	8	21.78	21.67	21.86		
3	QPSK	1	14	21.73	21.65	21.86		
3	QPSK	8	0	20.94	20.70	20.96	21.5	1
3	QPSK	8	4	20.98	20.78	20.65		
3	QPSK	8	7	20.91	20.67	20.75		
3	QPSK	15	0	20.93	20.74	20.72		
3	16QAM	1	0	21.11	20.22	20.53	21.5	1
3	16QAM	1	8	20.96	20.14	20.13		
3	16QAM	1	14	21.08	20.27	20.51		
3	16QAM	8	0	19.76	19.74	19.84	20.5	2
3	16QAM	8	4	19.98	19.62	19.78		
3	16QAM	8	7	19.98	19.69	19.78		
3	16QAM	15	0	20.00	19.66	19.80		
Channel				20407	20525	20643	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				824.7	836.5	848.3		
1.4	QPSK	1	0	21.77	21.67	21.51	22.5	0
1.4	QPSK	1	3	21.81	21.79	21.56		
1.4	QPSK	1	5	21.69	21.72	21.40		
1.4	QPSK	3	0	21.89	21.84	21.72		
1.4	QPSK	3	1	22.01	21.86	21.81		
1.4	QPSK	3	3	22.12	21.87	21.72		
1.4	QPSK	6	0	20.99	20.59	20.65	21.5	1
1.4	16QAM	1	0	20.69	20.13	20.33	21.5	1
1.4	16QAM	1	3	21.10	20.62	20.70		
1.4	16QAM	1	5	21.12	20.48	20.18		
1.4	16QAM	3	0	20.77	20.39	20.67		
1.4	16QAM	3	1	20.91	20.42	20.71		
1.4	16QAM	3	3	20.94	20.63	20.29		
1.4	16QAM	6	0	20.06	19.62	19.63	20.5	2





<LTE Band 25>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				26140	26340	26590		
Frequency (MHz)				1860	1880	1905		
20	QPSK	1	0	21.69	21.47	21.61	22.5	0
20	QPSK	1	49	21.93	22.15	22.16		
20	QPSK	1	99	21.34	21.63	21.66		
20	QPSK	50	0	21.00	20.86	21.11	21.5	1
20	QPSK	50	24	20.90	20.78	20.92		
20	QPSK	50	50	20.80	20.77	20.97		
20	QPSK	100	0	20.89	20.89	20.90	21.5	1
20	16QAM	1	0	20.85	20.26	20.35		
20	16QAM	1	49	20.73	21.17	21.26		
20	16QAM	1	99	20.27	21.18	20.45	20.5	2
20	16QAM	50	0	19.99	20.03	19.91		
20	16QAM	50	24	19.89	19.97	19.81		
20	16QAM	50	50	19.98	19.98	20.07	20.5	2
20	16QAM	100	0	20.00	19.92	19.94		
Channel				26115	26340	26615		
Frequency (MHz)				1857.5	1880	1907.5		
15	QPSK	1	0	21.93	21.63	21.59	22.5	0
15	QPSK	1	37	21.99	22.03	22.11		
15	QPSK	1	74	21.55	21.76	21.79		
15	QPSK	36	0	20.81	20.83	20.86	21.5	1
15	QPSK	36	20	20.81	20.81	20.88		
15	QPSK	36	39	20.89	20.82	20.97		
15	QPSK	75	0	20.85	20.83	20.88	21.5	1
15	16QAM	1	0	20.40	20.32	20.25		
15	16QAM	1	37	20.69	20.88	21.07		
15	16QAM	1	74	20.25	20.95	20.59	20.5	2
15	16QAM	36	0	20.04	19.86	19.87		
15	16QAM	36	20	19.92	19.95	19.88		
15	16QAM	36	39	19.78	19.96	19.90	20.5	2
15	16QAM	75	0	19.95	19.97	19.88		



Channel				26090	26340	26640	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1855	1880	1910		
10	QPSK	1	0	21.75	21.53	21.68	22.5	0
10	QPSK	1	25	22.08	21.91	22.13		
10	QPSK	1	49	21.76	21.72	21.97		
10	QPSK	25	0	20.91	20.87	20.86	21.5	1
10	QPSK	25	12	20.88	20.88	20.96		
10	QPSK	25	25	20.84	20.89	20.99		
10	QPSK	50	0	20.91	20.83	20.95	21.5	1
10	16QAM	1	0	20.44	20.38	20.34		
10	16QAM	1	25	20.38	21.15	20.57		
10	16QAM	1	49	20.53	20.93	20.55	20.5	2
10	16QAM	25	0	19.83	19.92	19.97		
10	16QAM	25	12	19.91	19.93	20.12		
10	16QAM	25	25	19.99	19.93	20.03	20.5	2
10	16QAM	50	0	19.94	19.88	20.08		
Channel				26065	26340	26665	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1912.5		
5	QPSK	1	0	21.74	21.55	22.03	22.5	0
5	QPSK	1	12	21.80	21.97	22.15		
5	QPSK	1	24	21.70	21.92	21.88		
5	QPSK	12	0	20.87	20.88	21.01	21.5	1
5	QPSK	12	7	20.92	20.85	20.95		
5	QPSK	12	13	20.87	20.81	20.99		
5	QPSK	25	0	20.96	20.89	20.96	21.5	1
5	16QAM	1	0	20.98	21.00	20.55		
5	16QAM	1	12	21.20	21.28	20.49		
5	16QAM	1	24	20.82	20.87	20.65	20.5	2
5	16QAM	12	0	19.99	19.75	19.90		
5	16QAM	12	7	20.17	19.76	19.92		
5	16QAM	12	13	20.10	19.98	19.87	20.5	2
5	16QAM	25	0	20.09	19.95	20.14		



Channel				26055	26340	26675	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1913.5		
3	QPSK	1	0	21.97	21.73	21.88	22.5	0
3	QPSK	1	8	22.02	21.80	21.91		
3	QPSK	1	14	22.00	21.89	21.91		
3	QPSK	8	0	20.84	20.84	21.08	21.5	1
3	QPSK	8	4	20.85	20.87	21.06		
3	QPSK	8	7	20.85	20.90	20.99		
3	QPSK	15	0	20.89	20.85	21.08	21.5	1
3	16QAM	1	0	20.49	20.52	20.72		
3	16QAM	1	8	20.95	20.09	20.85		
3	16QAM	1	14	21.03	20.05	20.81	20.5	2
3	16QAM	8	0	20.05	19.98	20.13		
3	16QAM	8	4	20.03	20.00	20.17		
3	16QAM	8	7	20.04	20.07	20.10	20.5	2
3	16QAM	15	0	20.04	20.03	20.17		
Channel				26047	26340	26683	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1914.3		
1.4	QPSK	1	0	21.67	21.78	21.92	22.5	0
1.4	QPSK	1	3	21.78	21.94	22.08		
1.4	QPSK	1	5	21.60	21.85	22.05		
1.4	QPSK	3	0	22.05	21.95	21.98		
1.4	QPSK	3	1	22.10	21.94	21.95		
1.4	QPSK	3	3	21.94	22.05	22.10		
1.4	QPSK	6	0	20.82	20.83	20.88	21.5	1
1.4	16QAM	1	0	20.65	20.27	20.46	21.5	1
1.4	16QAM	1	3	20.86	20.51	20.67		
1.4	16QAM	1	5	20.76	20.69	20.39		
1.4	16QAM	3	0	20.80	21.06	20.81		
1.4	16QAM	3	1	20.77	21.02	20.85		
1.4	16QAM	3	3	20.76	20.86	20.86		
1.4	16QAM	6	0	19.94	19.85	19.82	20.5	2



**<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  $\leq 0.4$  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  $\leq 0.8$  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  $\leq 1.2$  W/kg or all required channels are tested.



<2.4GHz WLAN>

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
2.4GHz WLAN	802.11b 1Mbps	1	2412	18.87	19.00	97.84
		6	2437	19.05	19.50	
		11	2462	18.63	19.00	
	802.11g 6Mbps	1	2412	15.90	16.00	87.38
		6	2437	15.81	16.00	
		11	2462	15.04	15.50	
	802.11n-HT20 MCS0	1	2412	14.89	15.00	86.76
		6	2437	14.95	15.00	
		11	2462	14.93	15.00	
	802.11n-HT40 MCS0	3	2422	13.62	14.00	76.04
		6	2437	14.87	15.00	
		9	2452	13.74	14.00	



### 13. Bluetooth Exclusions Applied

Mode Band	Max Average power(dBm)	
	Bluetooth v2.1 + EDR	Bluetooth v4.0/4.2 LE
2.4GHz Bluetooth	12.5	3.0

**Note:**

Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR}$$

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

Bluetooth Max Power (dBm)	Separation Distance (mm)	Frequency (GHz)	Exclusion Thresholds
12.5	15	2.48	1.9

**Note:**

Per KDB 447498 D01v06, a distance of 15 mm is applied to determine SAR test exclusion. The test exclusion threshold is 1.9 which is <= 3, SAR testing is not required.



## **14. Antenna Dimensions and Separation Distances**

Please refer to the separate filing document.



## **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: 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:
  - $\leq 0.8$  W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is  $\leq 100$  MHz
  - $\leq 0.6$  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
  - $\leq 0.4$  W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is  $\geq 200$  MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is  $\geq 0.8$ W/kg.
4. When hotspot mode is enabled, power reduction will be activated to limit the maximum power of CDMA2000 BC0/BC1 and LTE Band 5/4/5/25.
5. Per KDB 648474 D04v01r03, when the reported SAR for a body-worn accessory measured without a headset connected to the handset is  $\leq 1.2$  W/kg, SAR testing with a headset connected to the handset is not required.
6. Referring to KDB 941225 D06 v02r01, when the overall device length and width are  $\geq 9\text{cm} \times 5\text{cm}$ , the test distance is 10 mm. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge.
  - a) For WWAN transmitter antenna, front/back/bottom side/right side/left side located within 25mm from that surface or edge, therefore these surfaces hotspot SAR is necessary.
  - b) For WLAN transmitter antenna, front/back/top side/right side located within 25mm from that surface or edge, therefore these surfaces hotspot SAR is necessary.

### **CDMA Note:**

1. Per KDB 941225 D01v03r01, SAR for next to the ear head exposure is measured in RC3 with the handset configured to transmit at full rate in SO55.
2. Per KDB 941225 D01v03r01, in Hotspot mode EUT is treated as data device and SAR is tested with Ev-Do Rev 0 (RTAP 153.6kbps) as the primary mode.
3. Per KDB 941225 D01v03r01, for Body-worn accessory SAR is measured in RC3 with the handset configured in TDSO/SO32 to transmit at full rate on FCH only with all other code channels disabled. The body-worn accessory procedures in KDB Publication 447498 are applied. The 3G SAR test reduction procedure is applied to the multiple code channel configuration (FCH+SCH), with FCH only as the primary mode.



**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  $\leq 0.8$  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  $\frac{1}{2}$  dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is  $\leq 1.45$  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  $\frac{1}{2}$  dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is  $\leq 1.45$  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.
7. LTE band 2 SAR test was covered by Band 25; according to TCB workshop, SAR test for overlapping LTE bands can be reduced if
  - a. The maximum output power, including tolerance, for the smaller band is  $\leq$  the larger band to qualify for the SAR test exclusion.
  - b. The channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band.

**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  $\leq 1.2$  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  $\leq 0.8$  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  $\leq 1.2$  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

<CDMA2000 SAR>

Plot No.	Band	Mode	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)
	CDMA2000 BC0	RC3 SO55	Right Cheek	Full	384	836.52	23.52	24.00	1.117	0.09	0.476	0.532
	CDMA2000 BC0	RC3 SO55	Right Tilted	Full	384	836.52	23.52	24.00	1.117	0.06	0.224	0.250
01	CDMA2000 BC0	RC3 SO55	Left Cheek	Full	384	836.52	23.52	24.00	1.117	-0.05	0.489	0.546
	CDMA2000 BC0	RC3 SO55	Left Tilted	Full	384	836.52	23.52	24.00	1.117	-0.12	0.213	0.238
02	CDMA2000 BC1	RC3 SO55	Right Cheek	Full	600	1880	23.64	24.00	1.086	-0.07	0.340	0.369
	CDMA2000 BC1	RC3 SO55	Right Tilted	Full	600	1880	23.64	24.00	1.086	0.1	0.211	0.229
	CDMA2000 BC1	RC3 SO55	Left Cheek	Full	600	1880	23.64	24.00	1.086	-0.03	0.275	0.299
	CDMA2000 BC1	RC3 SO55	Left Tilted	Full	600	1880	23.64	24.00	1.086	-0.04	0.232	0.252



<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)
	LTE Band 12	10M	QPSK	1	25	Right Cheek	Full	23095	707.5	23.75	24.00	1.059	0.06	0.465	0.493
	LTE Band 12	10M	QPSK	1	25	Right Tilted	Full	23095	707.5	23.75	24.00	1.059	-0.02	0.197	0.209
03	LTE Band 12	10M	QPSK	1	25	Left Cheek	Full	23095	707.5	23.75	24.00	1.059	0.06	0.503	<b>0.533</b>
	LTE Band 12	10M	QPSK	1	25	Left Tilted	Full	23095	707.5	23.75	24.00	1.059	-0.08	0.221	0.234
	LTE Band 12	10M	QPSK	25	12	Right Cheek	Full	23095	707.5	22.61	23.00	1.094	0.03	0.340	0.372
	LTE Band 12	10M	QPSK	25	12	Right Tilted	Full	23095	707.5	22.61	23.00	1.094	0.04	0.154	0.168
	LTE Band 12	10M	QPSK	25	12	Left Cheek	Full	23095	707.5	22.61	23.00	1.094	-0.01	0.405	0.443
	LTE Band 12	10M	QPSK	25	12	Left Tilted	Full	23095	707.5	22.61	23.00	1.094	0.05	0.175	0.191
	LTE Band 5	10M	QPSK	1	25	Right Cheek	Full	20525	836.5	23.32	24.00	1.169	-0.08	0.420	0.491
	LTE Band 5	10M	QPSK	1	25	Right Tilted	Full	20525	836.5	23.32	24.00	1.169	-0.03	0.208	0.243
04	LTE Band 5	10M	QPSK	1	25	Left Cheek	Full	20525	836.5	23.32	24.00	1.169	0.03	0.506	<b>0.592</b>
	LTE Band 5	10M	QPSK	1	25	Left Tilted	Full	20525	836.5	23.32	24.00	1.169	-0.02	0.194	0.227
	LTE Band 5	10M	QPSK	25	12	Right Cheek	Full	20525	836.5	22.38	23.00	1.153	-0.05	0.339	0.391
	LTE Band 5	10M	QPSK	25	12	Right Tilted	Full	20525	836.5	22.38	23.00	1.153	-0.02	0.168	0.194
	LTE Band 5	10M	QPSK	25	12	Left Cheek	Full	20525	836.5	22.38	23.00	1.153	-0.07	0.344	0.397
	LTE Band 5	10M	QPSK	25	12	Left Tilted	Full	20525	836.5	22.38	23.00	1.153	-0.04	0.155	0.179
05	LTE Band 4	20M	QPSK	1	49	Right Cheek	Full	20175	1732.5	23.30	24.00	1.175	-0.01	0.262	<b>0.308</b>
	LTE Band 4	20M	QPSK	1	49	Right Tilted	Full	20175	1732.5	23.30	24.00	1.175	-0.06	0.218	0.256
	LTE Band 4	20M	QPSK	1	49	Left Cheek	Full	20175	1732.5	23.30	24.00	1.175	-0.05	0.253	0.297
	LTE Band 4	20M	QPSK	1	49	Left Tilted	Full	20175	1732.5	23.30	24.00	1.175	-0.03	0.218	0.256
	LTE Band 4	20M	QPSK	50	0	Right Cheek	Full	20175	1732.5	22.32	23.00	1.169	-0.01	0.201	0.235
	LTE Band 4	20M	QPSK	50	0	Right Tilted	Full	20175	1732.5	22.32	23.00	1.169	-0.04	0.164	0.192
	LTE Band 4	20M	QPSK	50	0	Left Cheek	Full	20175	1732.5	22.32	23.00	1.169	-0.04	0.188	0.220
	LTE Band 4	20M	QPSK	50	0	Left Tilted	Full	20175	1732.5	22.32	23.00	1.169	-0.06	0.164	0.192
06	LTE Band 25	20M	QPSK	1	49	Right Cheek	Full	26590	1905	23.39	23.50	1.026	-0.01	0.271	<b>0.278</b>
	LTE Band 25	20M	QPSK	1	49	Right Tilted	Full	26590	1905	23.39	23.50	1.026	0.03	0.143	0.147
	LTE Band 25	20M	QPSK	1	49	Left Cheek	Full	26590	1905	23.39	23.50	1.026	-0.01	0.241	0.247
	LTE Band 25	20M	QPSK	1	49	Left Tilted	Full	26590	1905	23.39	23.50	1.026	0.17	0.149	0.153
	LTE Band 25	20M	QPSK	50	0	Right Cheek	Full	26590	1905	22.06	23.00	1.242	0.09	0.214	0.266
	LTE Band 25	20M	QPSK	50	0	Right Tilted	Full	26590	1905	22.06	23.00	1.242	-0.09	0.121	0.150
	LTE Band 25	20M	QPSK	50	0	Left Cheek	Full	26590	1905	22.06	23.00	1.242	-0.06	0.193	0.240
	LTE Band 25	20M	QPSK	50	0	Left Tilted	Full	26590	1905	22.06	23.00	1.242	0.09	0.116	0.144

<WLAN 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)
07	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	6	2437	19.05	19.50	1.108	97.84	1.022	0.02	0.292	<b>0.331</b>
	WLAN2.4GHz	802.11b 1Mbps	Right Tilted	6	2437	19.05	19.50	1.108	97.84	1.022	0.03	0.051	0.058
	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	6	2437	19.05	19.50	1.108	97.84	1.022	-0.02	0.174	0.197
	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	6	2437	19.05	19.50	1.108	97.84	1.022	-0.09	0.049	0.055



**15.2 Hotspot SAR**

**<CDMA2000 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	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	CDMA2000 BC0	RTAP 153.6Kbps	Front	10	Reduced	384	836.52	21.87	22.00	1.030	0.03	0.349	0.360
	CDMA2000 BC0	RTAP 153.6Kbps	Back	10	Reduced	384	836.52	21.87	22.00	1.030	-0.03	0.931	0.959
	CDMA2000 BC0	RTAP 153.6Kbps	Left Side	10	Reduced	384	836.52	21.87	22.00	1.030	0.03	0.512	0.528
	CDMA2000 BC0	RTAP 153.6Kbps	Right Side	10	Reduced	384	836.52	21.87	22.00	1.030	0.01	0.523	0.539
	CDMA2000 BC0	RTAP 153.6Kbps	Bottom Side	10	Reduced	384	836.52	21.87	22.00	1.030	0.01	0.063	0.065
08	CDMA2000 BC0	RTAP 153.6Kbps	Back	10	Reduced	1013	824.7	21.75	22.00	1.059	-0.02	0.996	<b>1.055</b>
	CDMA2000 BC0	RTAP 153.6Kbps	Back	10	Reduced	777	848.31	21.86	22.00	1.033	-0.05	0.821	0.848
	CDMA2000 BC1	RTAP 153.6Kbps	Front	10	Reduced	600	1880	21.62	22.00	1.091	0.08	0.249	0.272
	CDMA2000 BC1	RTAP 153.6Kbps	Back	10	Reduced	600	1880	21.62	22.00	1.091	0.05	1.000	1.091
	CDMA2000 BC1	RTAP 153.6Kbps	Left Side	10	Reduced	600	1880	21.62	22.00	1.091	-0.01	0.366	0.399
	CDMA2000 BC1	RTAP 153.6Kbps	Right Side	10	Reduced	600	1880	21.62	22.00	1.091	0.08	0.188	0.205
	CDMA2000 BC1	RTAP 153.6Kbps	Bottom Side	10	Reduced	600	1880	21.62	22.00	1.091	0.01	0.566	0.618
09	CDMA2000 BC1	RTAP 153.6Kbps	Back	10	Reduced	25	1851.25	21.44	22.00	1.138	0.08	1.020	<b>1.160</b>
	CDMA2000 BC1	RTAP 153.6Kbps	Back	10	Reduced	1175	1908.75	21.38	22.00	1.153	-0.09	0.869	1.002



<LTE SAR>

Table with columns: 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). Rows include test results for LTE Bands 12, 5, 4, and 25 across various positions and power modes.



<WLAN 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	6	2437	19.05	19.50	1.108	97.84	1.022	-0.05	0.103	0.117
	WLAN2.4GHz	802.11b 1Mbps	Back	10	6	2437	19.05	19.50	1.108	97.84	1.022	-0.04	0.239	0.271
14	WLAN2.4GHz	802.11b 1Mbps	Right Side	10	6	2437	19.05	19.50	1.108	97.84	1.022	-0.08	0.343	0.388
	WLAN2.4GHz	802.11b 1Mbps	Top Side	10	6	2437	19.05	19.50	1.108	97.84	1.022	-0.01	0.211	0.239



**15.3 Body Worn Accessory SAR**

**<CDMA2000 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	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	CDMA2000 BC0	RC3 SO32 (F+SCH)	Front	15	Full	384	836.52	23.48	24.00	1.127	-0.08	0.400	0.451
	CDMA2000 BC0	RC3 SO32 (F+SCH)	Back	15	Full	384	836.52	23.48	24.00	1.127	-0.03	1.020	1.150
15	CDMA2000 BC0	RC3 SO32 (F+SCH)	Back	15	Full	1013	824.7	23.29	24.00	1.178	0.1	1.010	<b>1.189</b>
	CDMA2000 BC0	RC3 SO32 (F+SCH)	Back	15	Full	777	848.31	23.42	24.00	1.143	0.09	0.926	1.058
	CDMA2000 BC1	RC3 SO32 (F+SCH)	Front	15	Full	600	1880	23.65	24.00	1.084	-0.07	0.297	0.322
	CDMA2000 BC1	RC3 SO32 (F+SCH)	Back	15	Full	600	1880	23.65	24.00	1.084	-0.14	0.797	0.864
16	CDMA2000 BC1	RC3 SO32 (F+SCH)	Back	15	Full	25	1851.25	23.59	24.00	1.099	0.12	0.813	<b>0.893</b>
	CDMA2000 BC1	RC3 SO32 (F+SCH)	Back	15	Full	1175	1908.75	23.43	24.00	1.140	-0.01	0.731	0.834

**<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	23.75	24.00	1.059	-0.06	0.160	0.169
17	LTE Band 12	10M	QPSK	1	25	Back	15	Full	23095	707.5	23.75	24.00	1.059	-0.03	0.494	<b>0.523</b>
	LTE Band 12	10M	QPSK	25	12	Front	15	Full	23095	707.5	22.61	23.00	1.094	-0.02	0.143	0.156
	LTE Band 12	10M	QPSK	25	12	Back	15	Full	23095	707.5	22.61	23.00	1.094	0.04	0.416	0.455
	LTE Band 5	10M	QPSK	1	25	Front	15	Full	20525	836.5	23.32	24.00	1.169	0.06	0.371	0.434
18	LTE Band 5	10M	QPSK	1	25	Back	15	Full	20525	836.5	23.32	24.00	1.169	-0.07	0.969	<b>1.133</b>
	LTE Band 5	10M	QPSK	25	12	Front	15	Full	20525	836.5	22.38	23.00	1.153	0.03	0.294	0.339
	LTE Band 5	10M	QPSK	25	12	Back	15	Full	20525	836.5	22.38	23.00	1.153	0.03	0.787	0.908
	LTE Band 5	10M	QPSK	50	0	Back	15	Full	20525	836.5	22.27	23.00	1.183	0.07	0.771	0.912
	LTE Band 4	20M	QPSK	1	49	Front	15	Full	20175	1732.5	23.30	24.00	1.175	0.09	0.172	0.202
19	LTE Band 4	20M	QPSK	1	49	Back	15	Full	20175	1732.5	23.30	24.00	1.175	0.03	0.673	<b>0.791</b>
	LTE Band 4	20M	QPSK	50	0	Front	15	Full	20175	1732.5	22.32	23.00	1.169	-0.03	0.136	0.159
	LTE Band 4	20M	QPSK	50	0	Back	15	Full	20175	1732.5	22.32	23.00	1.169	0.06	0.536	0.627
	LTE Band 25	20M	QPSK	1	49	Front	15	Full	26590	1905	23.39	23.50	1.026	-0.05	0.231	0.237
20	LTE Band 25	20M	QPSK	1	49	Back	15	Full	26590	1905	23.39	23.50	1.026	0.04	0.631	<b>0.647</b>
	LTE Band 25	20M	QPSK	50	0	Front	15	Full	26590	1905	22.06	23.00	1.242	0.04	0.183	0.227
	LTE Band 25	20M	QPSK	50	0	Back	15	Full	26590	1905	22.06	23.00	1.242	0.03	0.516	0.641

**<WLAN 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	15	6	2437	19.05	19.50	1.108	97.84	1.022	0.01	0.052	0.058
21	WLAN2.4GHz	802.11b 1Mbps	Back	15	6	2437	19.05	19.50	1.108	97.84	1.022	-0.04	0.124	<b>0.140</b>



**15.4 Repeated SAR Measurement**

No.	Band	Mode	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	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	LTE Band 4	-	20M	QPSK	1RB	49Offset	Back	10	Reduced	20175	1732.5	20.98	21.00	1.005	-	-	-0.04	1.010	1	1.015
2nd	LTE Band 4	-	20M	QPSK	1RB	49Offset	Back	10	Reduced	20175	1732.5	20.98	21.00	1.005	-	-	0.02	1.000	1.010	1.005
1st	LTE Band 25		20M	QPSK	1RB	49Offset	Back	10	Reduced	26140	1860	21.93	22.50	1.140	-	-	0.06	1.040	1	1.186
2nd	LTE Band 25		20M	QPSK	1RB	49Offset	Back	10	Reduced	26140	1860	21.93	22.50	1.140	-	-	-0.07	1.030	1.010	1.174
1st	CDMA2000 BC0	RC3 SO32 (F+SCH)	-	-	-	-	Back	15	Full	384	836.52	23.48	24.00	1.127	-	-	-0.03	1.020	1	1.150
2nd	CDMA2000 BC0	RC3 SO32 (F+SCH)	-	-	-	-	Back	15	Full	384	836.52	23.48	24.00	1.127	-	-	-0.12	0.987	1.033	1.113

**General Note:**

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is  $\geq 0.8W/kg$ .
2. Per KDB 865664 D01v01r04, if the ratio among the repeated measurement is  $\leq 1.2$  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			Note
		Head	Hotspot	Body-worn	
1.	CDMA + WLAN2.4GHz	Yes	Yes	Yes	WWAN VoIP
2.	LTE + WLAN2.4GHz	Yes	Yes	Yes	WWAN VoIP
3.	CDMA + Bluetooth		Yes	Yes	WWAN VoIP
4.	LTE + Bluetooth		Yes	Yes	WWAN VoIP

### General Note:

- This device doesn't support VoIP function and supports VoLTE operation.
- This device WLAN 2.4GHz supports hotspot operation.
- WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
- EUT will choose either CDMA or LTE according to the network signal condition; therefore, they will not operate simultaneously at any moment.
- The reported SAR summation is calculated based on the same configuration and test position.
- Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
  - Scalar SAR summation < 1.6W/kg.
  - $SPLSR = (SAR1 + SAR2)^{1.5} / (\text{min. separation distance, mm})$ , 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.
  - If  $SPLSR \leq 0.04$ , simultaneously transmission SAR measurement is not necessary.
  - Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.
- For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01v06 based on the formula below.
  - $(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm}) \cdot [\sqrt{f(\text{GHz})} / x] \text{ W/kg}$  for test separation distances  $\leq 50 \text{ mm}$ ; where  $x = 7.5$  for 1-g SAR, and  $x = 18.75$  for 10-g SAR.
  - When the minimum separation distance is < 5mm, the distance is used 5mm to determine SAR test exclusion.
  - 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
12.5 dBm	Estimated SAR (W/kg)	0.378 W/kg	0.252 W/kg



**16.1 Head Exposure Conditions**

WWAN Band		Exposure Position	1	2	1+2 Summed 1g SAR (W/kg)
			WWAN 1g SAR (W/kg)	2.4GHz WLAN 1g SAR (W/kg)	
CDMA2000	BC0	Right Cheek	0.532	0.331	0.86
		Right Tilted	0.250	0.058	0.31
		Left Cheek	0.546	0.197	0.74
		Left Tilted	0.238	0.055	0.29
	BC1	Right Cheek	0.369	0.331	0.70
		Right Tilted	0.229	0.058	0.29
		Left Cheek	0.299	0.197	0.50
		Left Tilted	0.252	0.055	0.31
LTE	Band 12	Right Cheek	0.493	0.331	0.82
		Right Tilted	0.209	0.058	0.27
		Left Cheek	0.533	0.197	0.73
		Left Tilted	0.234	0.055	0.29
	Band 5	Right Cheek	0.491	0.331	0.82
		Right Tilted	0.243	0.058	0.30
		Left Cheek	0.592	0.197	0.79
		Left Tilted	0.227	0.055	0.28
	Band 4	Right Cheek	0.308	0.331	0.64
		Right Tilted	0.256	0.058	0.31
		Left Cheek	0.297	0.197	0.49
		Left Tilted	0.256	0.055	0.31
	Band 25	Right Cheek	0.278	0.331	0.61
		Right Tilted	0.150	0.058	0.21
		Left Cheek	0.247	0.197	0.44
		Left Tilted	0.153	0.055	0.21



**16.2 Hotspot Exposure Conditions**

WWAN Band		Exposure Position	1	2	3	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)
			WWAN	2.4GHz WLAN	Bluetooth		
			1g SAR (W/kg)	1g SAR (W/kg)	Estimated 1g SAR (W/kg)		
CDMA2000	BC0	Front	0.360	0.117	0.378	0.48	0.74
		Back	1.055	0.271	0.378	1.33	1.43
		Left side	0.528			0.53	0.53
		Right side	0.539	0.388	0.378	0.93	0.92
		Top side		0.239	0.378	0.24	0.38
		Bottom side	0.065			0.07	0.07
	BC1	Front	0.272	0.117	0.378	0.39	0.65
		Back	1.160	0.271	0.378	1.43	1.54
		Left side	0.399			0.40	0.40
		Right side	0.205	0.388	0.378	0.59	0.58
		Top side		0.239	0.378	0.24	0.38
		Bottom side	0.618			0.62	0.62
LTE	Band 12	Front	0.226	0.117	0.378	0.34	0.60
		Back	0.846	0.271	0.378	1.12	1.22
		Left side	0.468			0.47	0.47
		Right side	0.322	0.388	0.378	0.71	0.70
		Top side		0.239	0.378	0.24	0.38
		Bottom side	0.096			0.10	0.10
	Band 5	Front	0.365	0.117	0.378	0.48	0.74
		Back	0.993	0.271	0.378	1.26	1.37
		Left side	0.585			0.59	0.59
		Right side	0.597	0.388	0.378	0.99	0.98
		Top side		0.239	0.378	0.24	0.38
		Bottom side	0.072			0.07	0.07
	Band 4	Front	0.135	0.117	0.378	0.25	0.51
		Back	1.015	0.271	0.378	1.29	1.39
		Left side	0.182			0.18	0.18
		Right side	0.138	0.388	0.378	0.53	0.52
		Top side		0.239	0.378	0.24	0.38
		Bottom side	0.512			0.51	0.51
	Band 25	Front	0.222	0.117	0.378	0.34	0.60
		Back	1.186	0.271	0.378	1.46	1.56
		Left side	0.261			0.26	0.26
		Right side	0.151	0.388	0.378	0.54	0.53
		Top side		0.239	0.378	0.24	0.38
		Bottom side	0.348			0.35	0.35

**16.3 Body-Worn Accessory Exposure Conditions**

WWAN Band		Exposure Position	1	2	3	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)
			WWAN 1g SAR (W/kg)	2.4GHz WLAN 1g SAR (W/kg)	Bluetooth Estimated 1g SAR (W/kg)		
CDMA2000	BC0	Front	0.451	0.058	0.252	0.51	0.70
		Back	1.189	0.140	0.252	1.33	1.44
	BC1	Front	0.322	0.058	0.252	0.38	0.57
		Back	0.893	0.140	0.252	1.03	1.15
LTE	Band 12	Front	0.169	0.058	0.252	0.23	0.42
		Back	0.523	0.140	0.252	0.66	0.78
	Band 5	Front	0.434	0.058	0.252	0.49	0.69
		Back	1.133	0.140	0.252	1.27	1.39
	Band 4	Front	0.202	0.058	0.252	0.26	0.45
		Back	0.791	0.140	0.252	0.93	1.04
	Band 25	Front	0.237	0.058	0.252	0.30	0.49
		Back	0.647	0.140	0.252	0.79	0.90

**Test Engineer : Johnny Chen**



## **17. Uncertainty Assessment**

Pre KDB 865664 D01 SAR measurement 100MHz to 6GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg. The expanded SAR measurement uncertainty must be  $\leq 30\%$ , 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. 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 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.
- [6] FCC KDB 865664 D02 v01r02, "RF Exposure Compliance Reporting and Documentation Considerations" Oct 2015.
- [7] FCC KDB 447498 D01 v06, "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies", Oct 2015
- [8] FCC KDB 648474 D04 v01r03, "SAR Evaluation Considerations for Wireless Handsets", Oct 2015.
- [9] FCC KDB 248227 D01 v02r02, "SAR Guidance for IEEE 802.11 (WiFi) Transmitters", Oct 2015.
- [10] FCC KDB 941225 D01 v03r01, "3G SAR MEAUREMENT PROCEDURES", Oct 2015
- [11] FCC KDB 941225 D05 v02r05, "SAR Evaluation Considerations for LTE Devices", Dec 2015
- [12] FCC KDB 941225 D06 v02r01, "SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities", Oct 2015.



## **Appendix A. Plots of System Performance Check**

The plots are shown as follows.

## System Check\_Head\_750MHz\_180102

**DUT: D750V3-SN:1087**

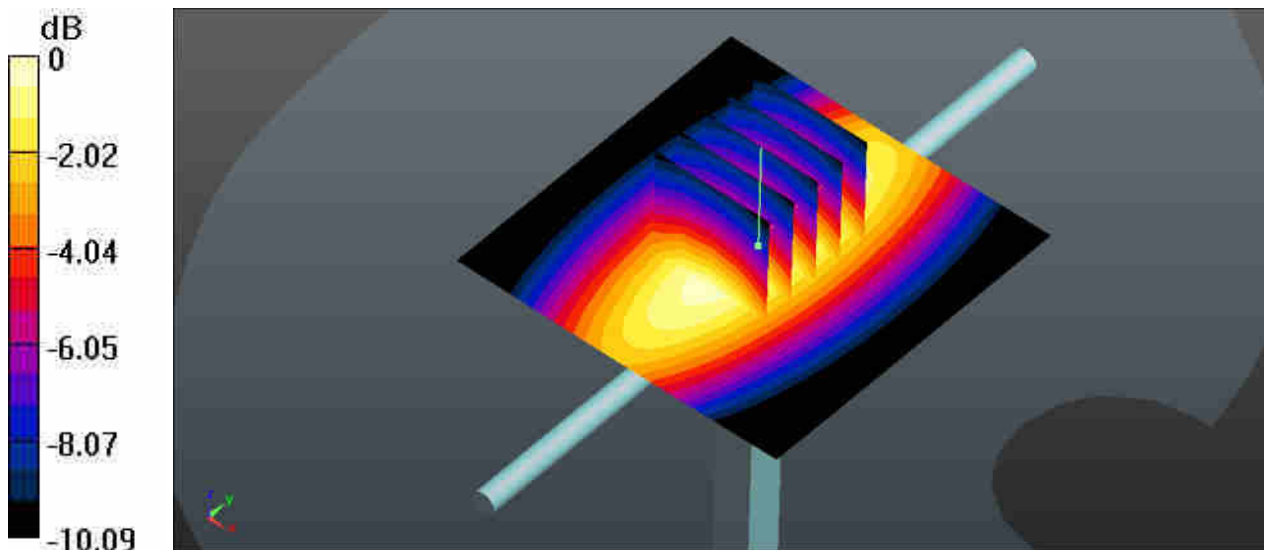
Communication System: UID 0, CW (0); Frequency: 750 MHz; Duty Cycle: 1:1  
Medium: HSL\_750\_180102 Medium parameters used:  $f = 750$  MHz;  $\sigma = 0.886$  S/m;  $\epsilon_r = 41.532$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.5 °C; Liquid Temperature : 22.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(9.2, 9.2, 9.2); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 2.48 W/kg

**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 54.46 V/m; Power Drift = -0.08 dB  
Peak SAR (extrapolated) = 2.87 W/kg  
**SAR(1 g) = 1.98 W/kg; SAR(10 g) = 1.32 W/kg**  
Maximum value of SAR (measured) = 2.49 W/kg



0 dB = 2.49 W/kg



## System Check\_Head\_835MHz\_180102

**DUT: D835V2-SN:4d151**

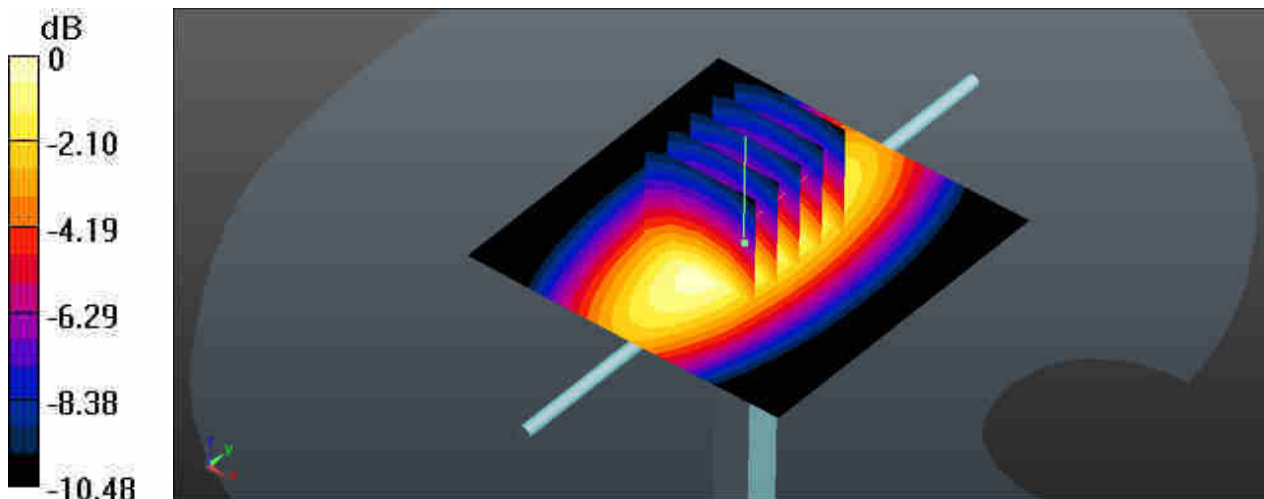
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1  
Medium: HSL\_835\_180102 Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.888 \text{ S/m}$ ;  $\epsilon_r = 42.012$ ;  $\rho = 1000 \text{ kg/m}^3$   
Ambient Temperature :  $23.5 \text{ }^\circ\text{C}$ ; Liquid Temperature :  $22.6 \text{ }^\circ\text{C}$

DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(9.04, 9.04, 9.04); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$   
Maximum value of SAR (interpolated) =  $2.91 \text{ W/kg}$

**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$   
Reference Value =  $58.56 \text{ V/m}$ ; Power Drift =  $-0.05 \text{ dB}$   
Peak SAR (extrapolated) =  $3.36 \text{ W/kg}$   
**SAR(1 g) =  $2.32 \text{ W/kg}$ ; SAR(10 g) =  $1.53 \text{ W/kg}$**   
Maximum value of SAR (measured) =  $2.91 \text{ W/kg}$



## System Check\_Head\_1750MHz\_180101

**DUT: D1750V2-SN:1137**

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: HSL\_1750\_180101 Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.382$  S/m;  $\epsilon_r = 41.56$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.4 °C; Liquid Temperature : 22.4 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(7.75, 7.75, 7.75); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 12.2 W/kg

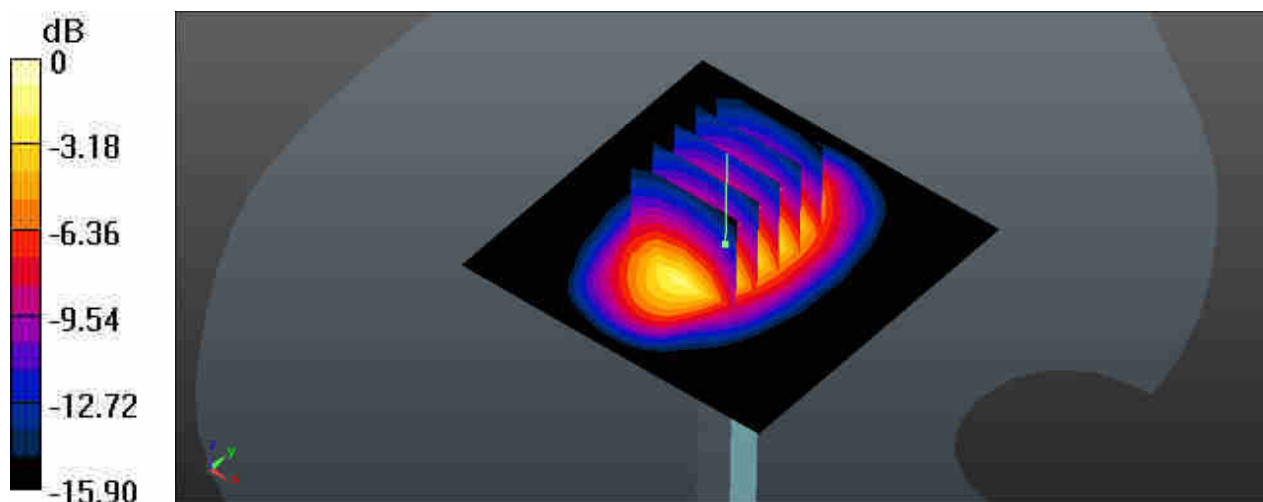
**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 95.45 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 14.9 W/kg

**SAR(1 g) = 8.59 W/kg; SAR(10 g) = 4.68 W/kg**

Maximum value of SAR (measured) = 12.1 W/kg



0 dB = 12.1 W/kg

## System Check\_Head\_1900MHz\_180101

**DUT: D1900V2-SN:5d170**

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL\_1900\_180101 Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.443$  S/m;  $\epsilon_r = 40.03$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.4 °C; Liquid Temperature : 22.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(7.59, 7.59, 7.59); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 13.9 W/kg

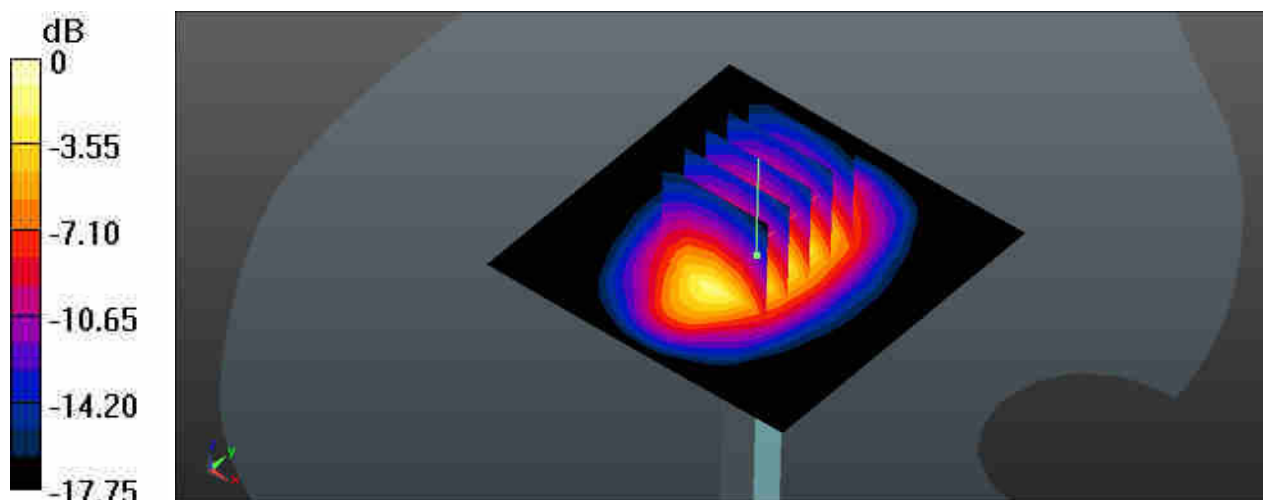
**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 99.26 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 17.3 W/kg

**SAR(1 g) = 9.67 W/kg; SAR(10 g) = 5.04 W/kg**

Maximum value of SAR (measured) = 13.8 W/kg



0 dB = 13.8 W/kg

## System Check\_Head\_2450MHz\_180105

**DUT: D2450V2-SN:924**

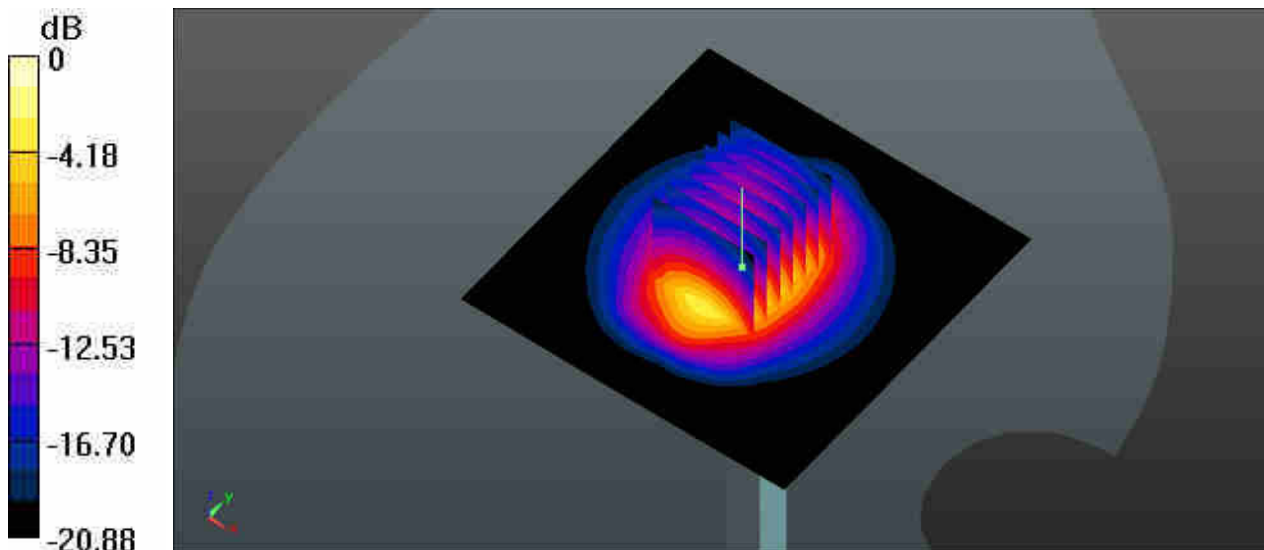
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1  
Medium: HSL\_2450\_180105 Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.75$  S/m;  $\epsilon_r = 39.767$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.4 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(7.25, 7.25, 7.25); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Pin=250mW/Area Scan (81x81x1):** Interpolated grid: dx=12mm, dy=12mm  
Maximum value of SAR (interpolated) = 17.8 W/kg

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 87.66 V/m; Power Drift = -0.03 dB  
Peak SAR (extrapolated) = 23.7 W/kg  
**SAR(1 g) = 12.11 W/kg; SAR(10 g) = 5.65 W/kg**  
Maximum value of SAR (measured) = 18.0 W/kg



0 dB = 18.0 W/kg

## System Check\_Body\_750MHz\_180104

**DUT: D750V3-SN:1087**

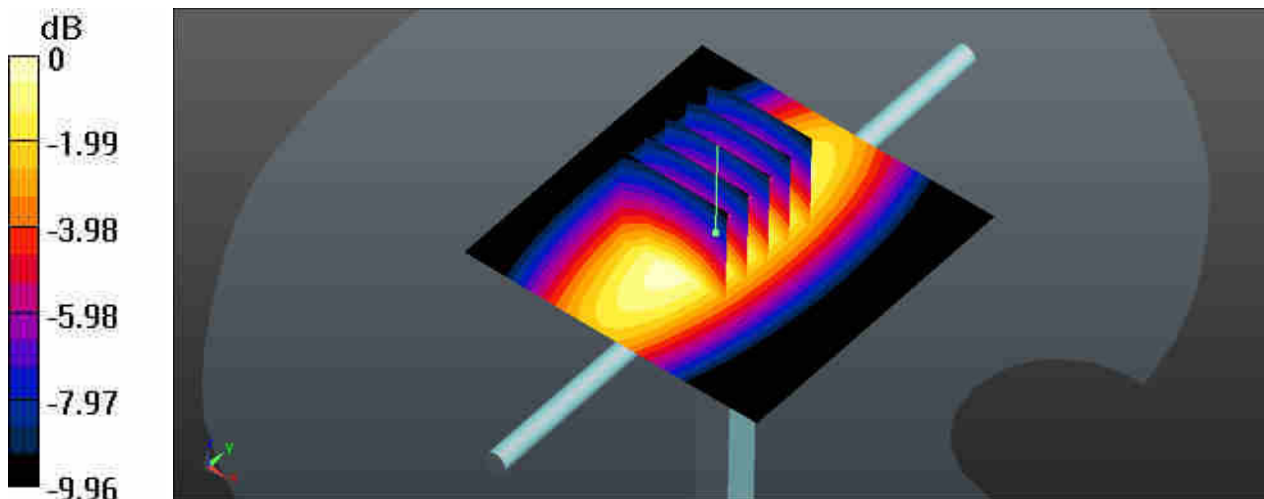
Communication System: UID 0, CW (0); Frequency: 750 MHz; Duty Cycle: 1:1  
Medium: MSL\_750\_180104 Medium parameters used:  $f = 750$  MHz;  $\sigma = 0.961$  S/m;  $\epsilon_r = 53.914$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.6 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(9.35, 9.35, 9.35); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 2.92 W/kg

**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 55.78 V/m; Power Drift = -0.01 dB  
Peak SAR (extrapolated) = 3.40 W/kg  
**SAR(1 g) = 2.34 W/kg; SAR(10 g) = 1.56 W/kg**  
Maximum value of SAR (measured) = 2.92 W/kg



0 dB = 2.92 W/kg

## System Check\_Body\_835MHz\_180104

**DUT: D835V2-SN:4d151**

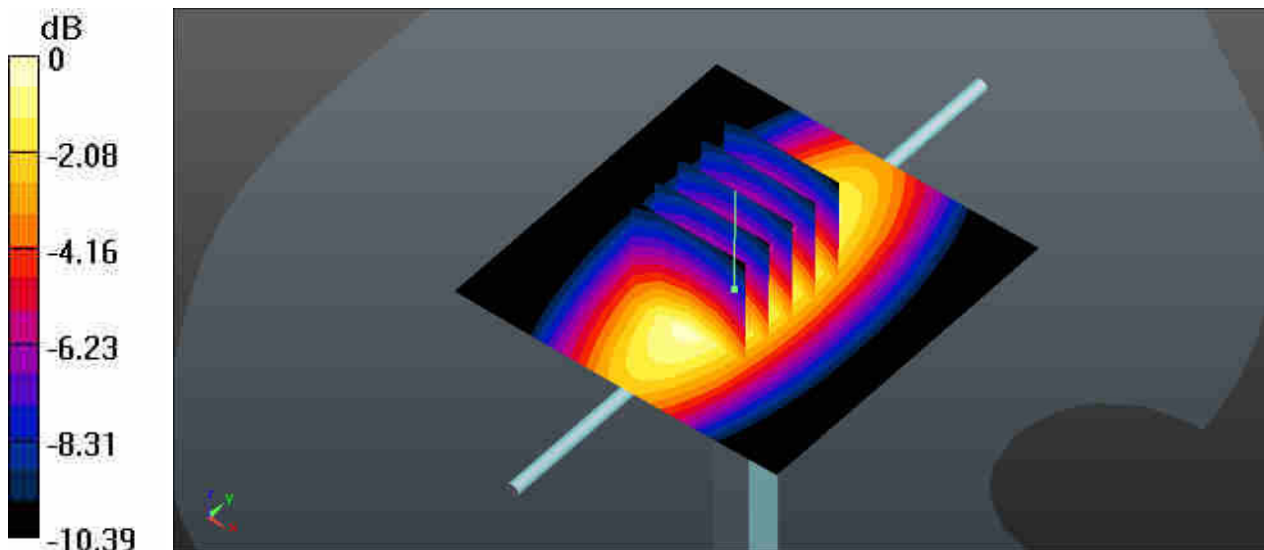
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1  
Medium: MSL\_835\_180104 Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.977$  S/m;  $\epsilon_r = 54.466$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.6 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(9.06, 9.06, 9.06); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 3.14 W/kg

**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 52.51 V/m; Power Drift = -0.04 dB  
Peak SAR (extrapolated) = 3.60 W/kg  
**SAR(1 g) = 2.5 W/kg; SAR(10 g) = 1.65 W/kg**  
Maximum value of SAR (measured) = 3.11 W/kg



0 dB = 3.11 W/kg

## System Check\_Body\_1750MHz\_180103

**DUT: D1750V2-SN:1137**

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: MSL\_1750\_180103 Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.522$  S/m;  $\epsilon_r = 52.519$ ;  
 $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(7.55, 7.55, 7.55); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 12.3 W/kg

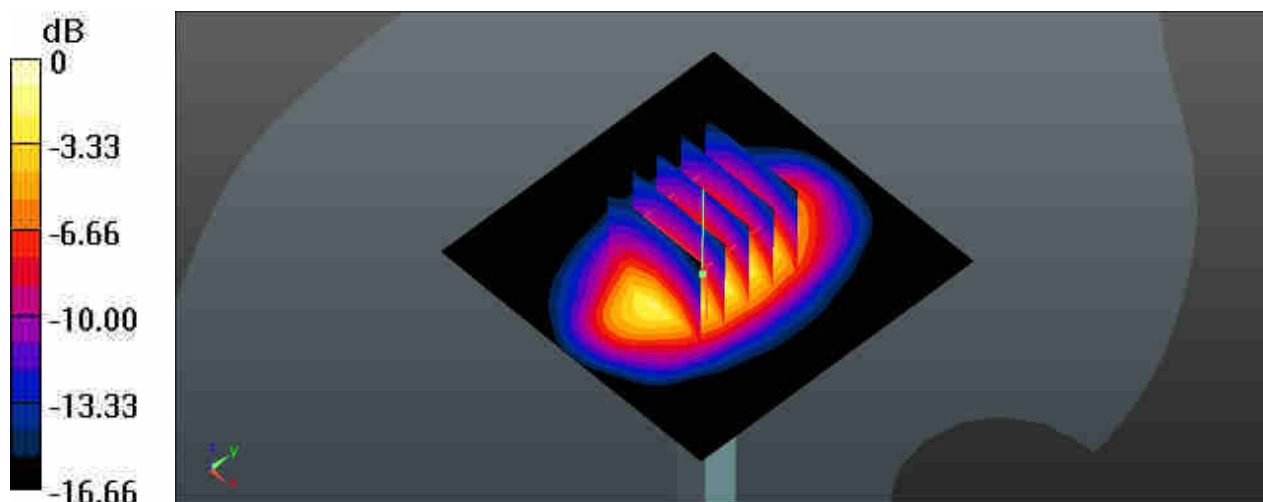
**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 90.06 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 15.1 W/kg

**SAR(1 g) = 8.74 W/kg; SAR(10 g) = 4.69 W/kg**

Maximum value of SAR (measured) = 12.2 W/kg



0 dB = 12.3 W/kg

## System Check\_Body\_1900MHz\_180103

### DUT: D1900V2-SN:5d170

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: MSL\_1900\_180103 Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.576$  S/m;  $\epsilon_r = 54.212$ ;  
 $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.6 °C

#### DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(7.58, 7.58, 7.58); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 14.8 W/kg

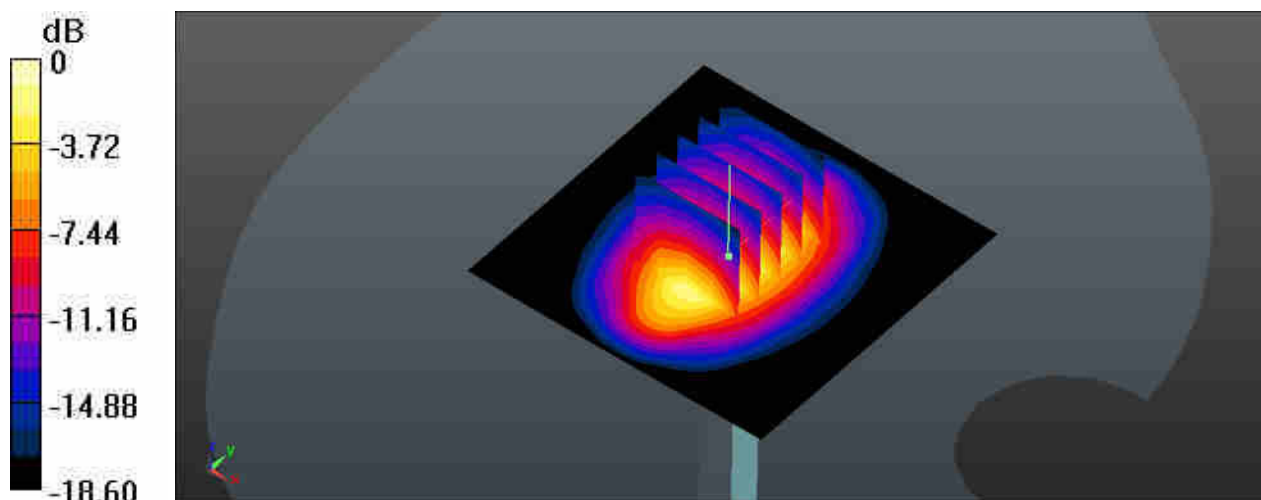
**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 85.57 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 18.6 W/kg

**SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.28 W/kg**

Maximum value of SAR (measured) = 14.5 W/kg



0 dB = 14.5 W/kg



## System Check\_Body\_2450MHz\_180105

**DUT: D2450V2-SN:924**

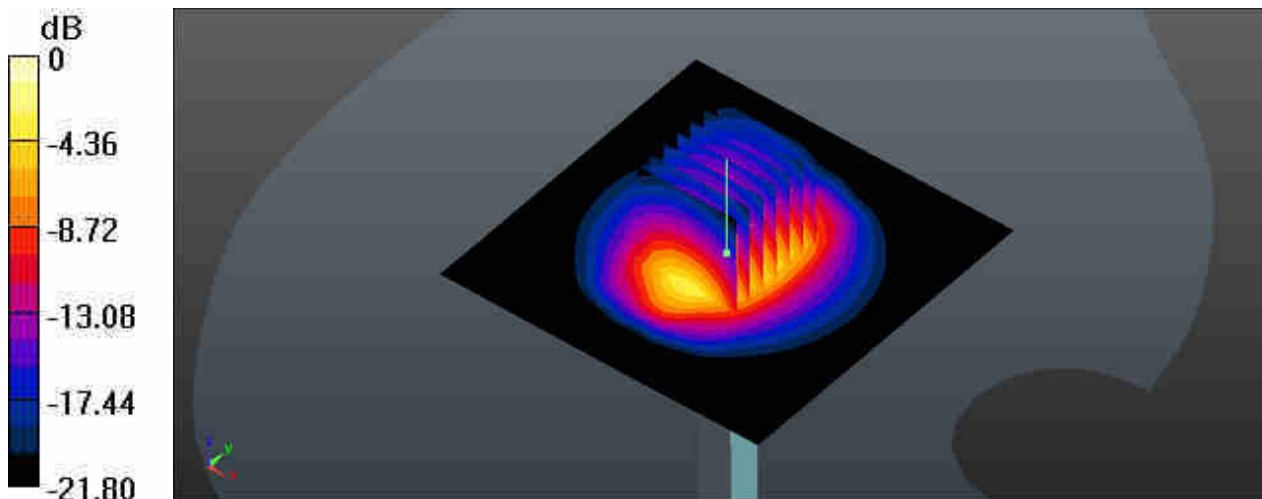
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1  
Medium: MSL\_2450\_180105 Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.992$  S/m;  $\epsilon_r = 52.291$ ;  
 $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.4 °C; Liquid Temperature : 22.8 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(7.09, 7.09, 7.09); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Pin=250mW/Area Scan (81x81x1):** Interpolated grid: dx=12mm, dy=12mm  
Maximum value of SAR (interpolated) = 20.3 W/kg

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 87.42 V/m; Power Drift = -0.06 dB  
Peak SAR (extrapolated) = 27.1 W/kg  
**SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.06 W/kg**  
Maximum value of SAR (measured) = 20.2 W/kg



0 dB = 20.2 W/kg



**Appendix B. Plots of High SAR Measurement**

The plots are shown as follows.

## 01\_CDMA BC0\_RC3 SO55\_Left Cheek\_Ch384

Communication System: UID 0, CDMA2000 (0); Frequency: 836.52 MHz; Duty Cycle: 1:1  
Medium: HSL\_835\_180102 Medium parameters used:  $f = 836.52$  MHz;  $\sigma = 0.888$  S/m;  $\epsilon_r = 41.968$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.5 °C; Liquid Temperature : 22.6 °C

### DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(9.04, 9.04, 9.04); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch384/Area Scan (61x141x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.589 W/kg

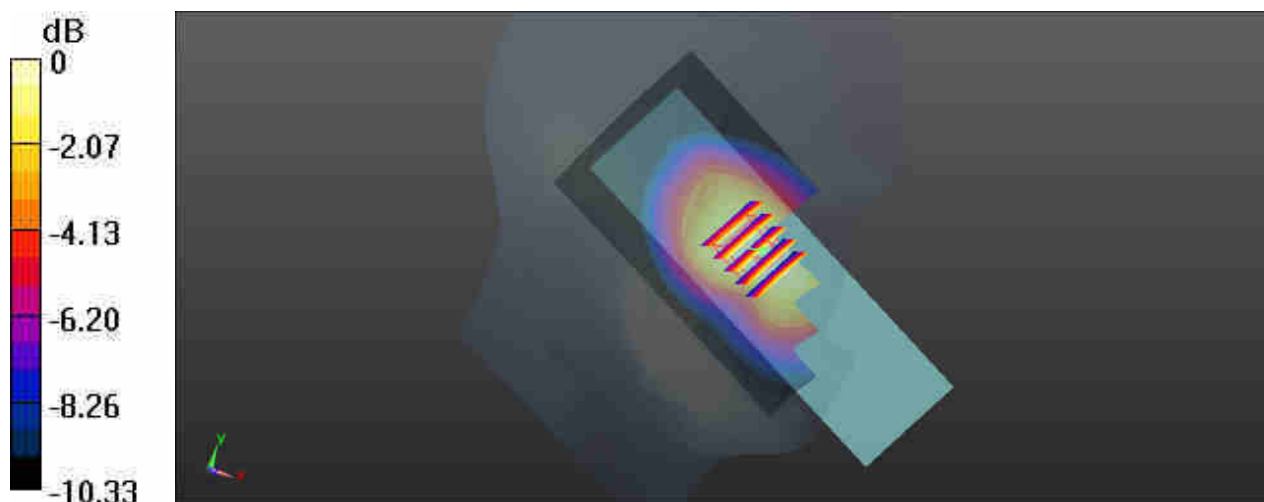
**Ch384/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.515 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.733 W/kg

**SAR(1 g) = 0.489 W/kg; SAR(10 g) = 0.341 W/kg**

Maximum value of SAR (measured) = 0.613 W/kg



0 dB = 0.589 W/kg

## 02\_CDMA BC1\_RC3 SO55\_Right Cheek\_Ch600

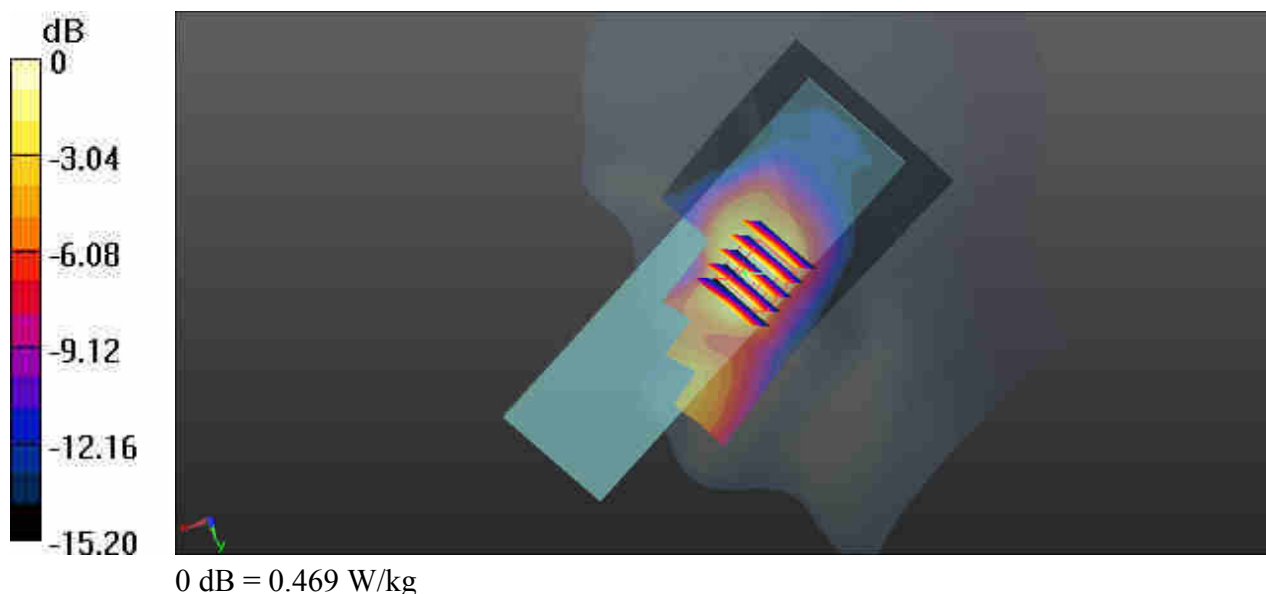
Communication System: UID 0, CDMA2000 (0); Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium: HSL\_1900\_180101 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.423$  S/m;  $\epsilon_r = 40.121$ ;  
 $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.4 °C; Liquid Temperature : 22.5 °C

### DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(7.59, 7.59, 7.59); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch600/Area Scan (61x141x1):** Interpolated grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.469 W/kg

**Ch600/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 6.906 V/m; Power Drift = -0.07 dB  
Peak SAR (extrapolated) = 0.557 W/kg  
**SAR(1 g) = 0.340 W/kg; SAR(10 g) = 0.200 W/kg**  
Maximum value of SAR (measured) = 0.435 W/kg



**03\_LTE Band 12\_10M\_QPSK\_1RB\_25Offset\_Left Cheek\_Ch23095**

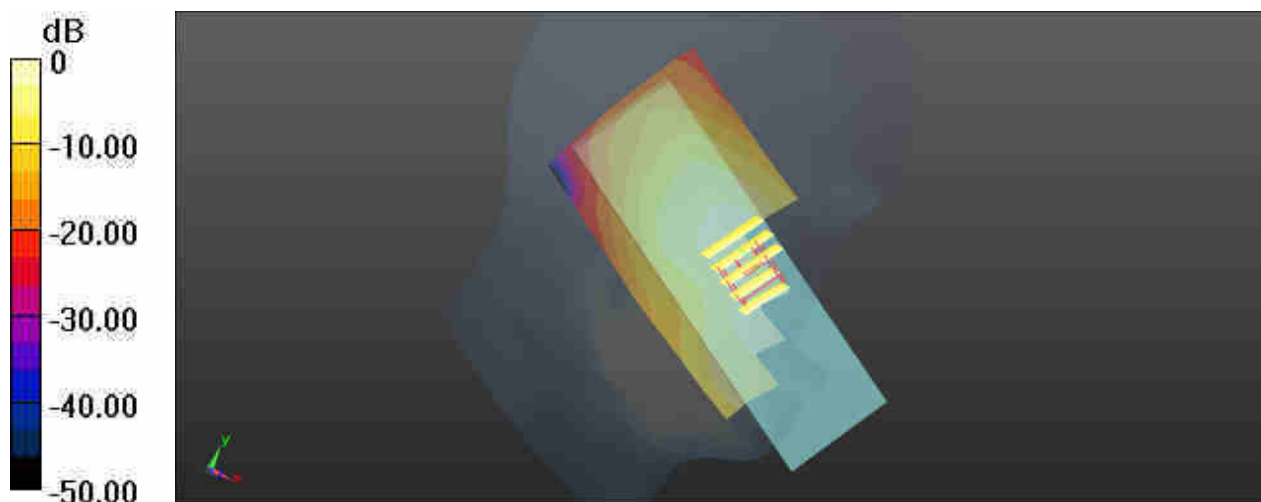
Communication System: UID 0, LTE (0); Frequency: 707.5 MHz; Duty Cycle: 1:1  
Medium: HSL\_750\_180102 Medium parameters used:  $f = 707.5$  MHz;  $\sigma = 0.864$  S/m;  $\epsilon_r = 42.444$ ;  
 $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.5 °C; Liquid Temperature : 22.5 °C

**DASY5 Configuration:**

- Probe: EX3DV4 - SN3642; ConvF(9.2, 9.2, 9.2); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch23095/Area Scan (61x141x1):** Interpolated grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.612 W/kg

**Ch23095/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 8.525 V/m; Power Drift = 0.06 dB  
Peak SAR (extrapolated) = 0.792 W/kg  
**SAR(1 g) = 0.503 W/kg; SAR(10 g) = 0.338 W/kg**  
Maximum value of SAR (measured) = 0.648 W/kg



0 dB = 0.648 W/kg

### 04\_LTE Band 5\_10M\_QPSK\_1RB\_25Offset\_Left Cheek\_Ch20525

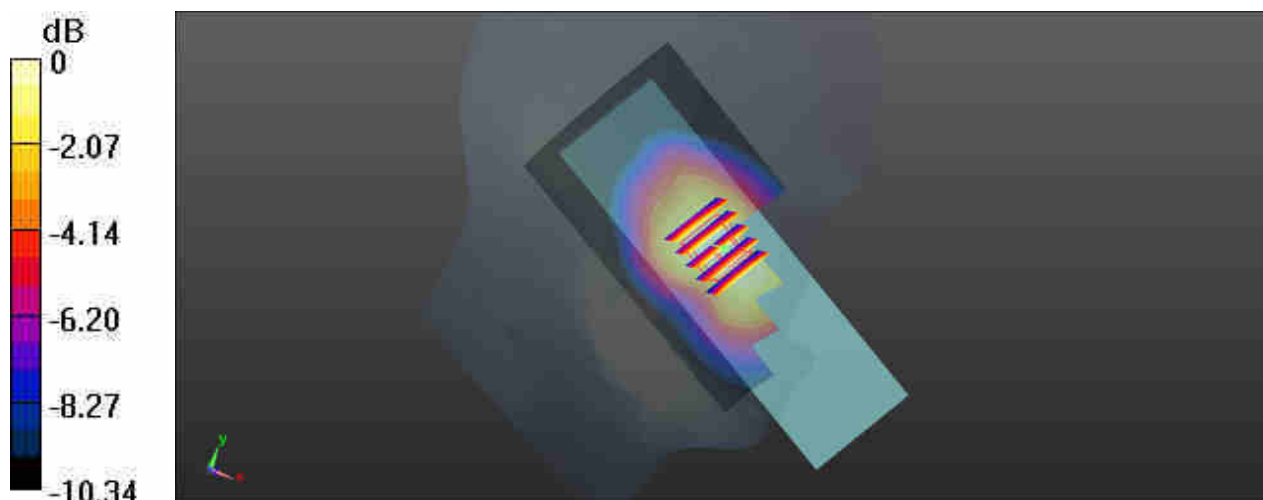
Communication System: UID 0, LTE (0); Frequency: 836.5 MHz; Duty Cycle: 1:1  
 Medium: HSL\_835\_180102 Medium parameters used:  $f = 836.5$  MHz;  $\sigma = 0.888$  S/m;  $\epsilon_r = 41.978$ ;  
 $\rho = 1000$  kg/m<sup>3</sup>  
 Ambient Temperature : 23.5 °C; Liquid Temperature : 22.6 °C

**DASY5 Configuration:**

- Probe: EX3DV4 - SN3642; ConvF(9.04, 9.04, 9.04); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch20525/Area Scan (61x141x1):** Interpolated grid: dx=15mm, dy=15mm  
 Maximum value of SAR (interpolated) = 0.601 W/kg

**Ch20525/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
 Reference Value = 9.101 V/m; Power Drift = 0.03 dB  
 Peak SAR (extrapolated) = 0.763 W/kg  
**SAR(1 g) = 0.506 W/kg; SAR(10 g) = 0.345 W/kg**  
 Maximum value of SAR (measured) = 0.641 W/kg



### 05\_LTE Band 4\_20M\_QPSK\_1RB\_49Offset\_Right Cheek\_Ch20175

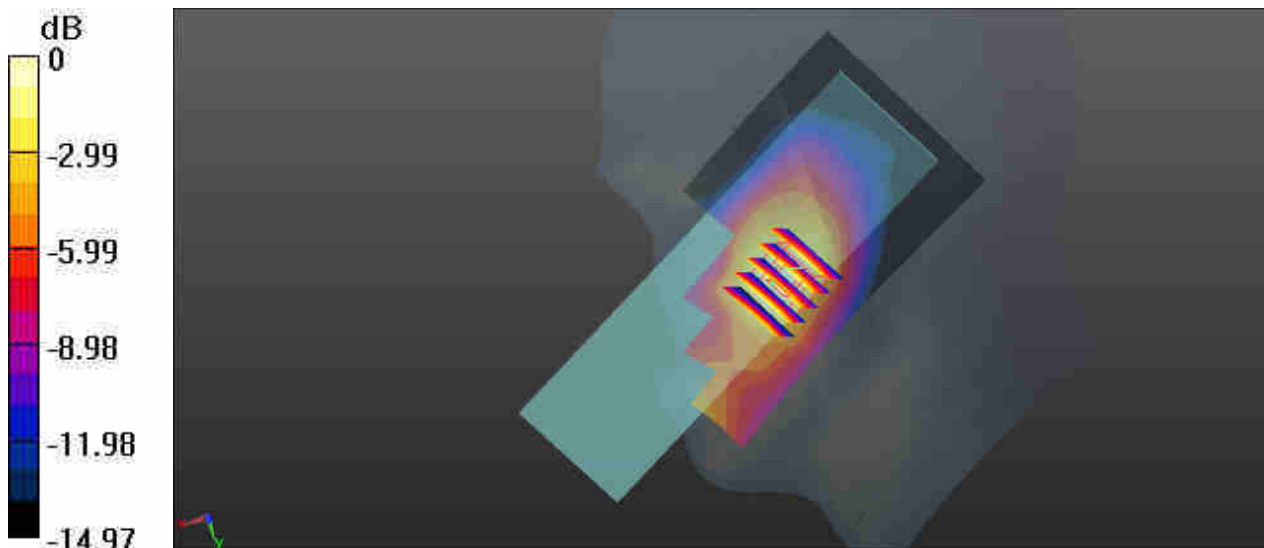
Communication System: UID 0, LTE (0); Frequency: 1732.5 MHz; Duty Cycle: 1:1  
Medium: HSL\_1750\_180101 Medium parameters used:  $f = 1732.5$  MHz;  $\sigma = 1.363$  S/m;  $\epsilon_r = 41.655$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.4 °C; Liquid Temperature : 22.4 °C

#### DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(7.75, 7.75, 7.75); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch20175/Area Scan (61x141x1):** Interpolated grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.355 W/kg

**Ch20175/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 6.322 V/m; Power Drift = -0.01 dB  
Peak SAR (extrapolated) = 0.394 W/kg  
**SAR(1 g) = 0.262 W/kg; SAR(10 g) = 0.162 W/kg**  
Maximum value of SAR (measured) = 0.324 W/kg



0 dB = 0.355 W/kg

**06\_LTE Band 25\_20M\_QPSK\_1RB\_49Offsett\_Right Cheek\_Ch26590**

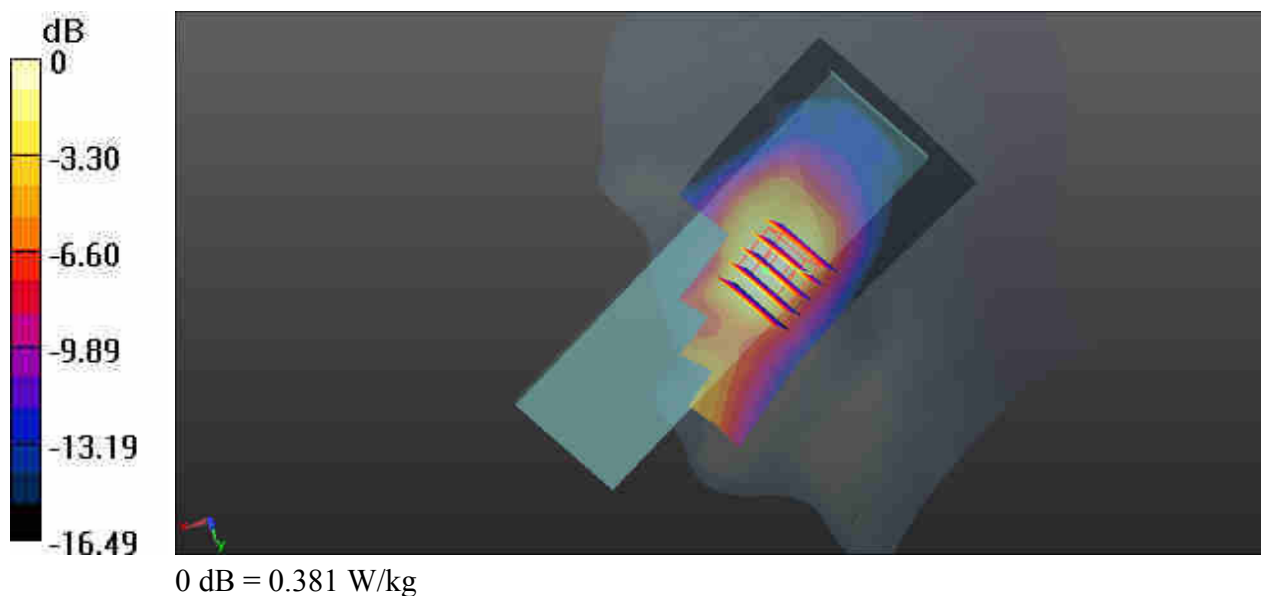
Communication System: UID 0, LTE (0); Frequency: 1905 MHz; Duty Cycle: 1:1  
Medium: HSL\_1900\_180101 Medium parameters used:  $f = 1905$  MHz;  $\sigma = 1.448$  S/m;  $\epsilon_r = 40.008$ ;  
 $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.4 °C; Liquid Temperature : 22.5 °C

**DASY5 Configuration:**

- Probe: EX3DV4 - SN3642; ConvF(7.59, 7.59, 7.59); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch26590/Area Scan (61x141x1):** Interpolated grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.381 W/kg

**Ch26590/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 5.226 V/m; Power Drift = -0.01 dB  
Peak SAR (extrapolated) = 0.436 W/kg  
**SAR(1 g) = 0.271 W/kg; SAR(10 g) = 0.161 W/kg**  
Maximum value of SAR (measured) = 0.346 W/kg





**07\_WLAN2.4GHz\_802.11b 1Mbps\_Right Cheek\_Ch6**

Communication System: UID 0, WIFI (0); Frequency: 2437 MHz; Duty Cycle: 1:1.022  
Medium: HSL\_2450\_180105 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.737$  S/m;  $\epsilon_r = 39.809$ ;  
 $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.4 °C; Liquid Temperature : 22.7 °C

**DASY5 Configuration:**

- Probe: EX3DV4 - SN3642; ConvF(7.25, 7.25, 7.25); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch6/Area Scan (61x171x1):** Interpolated grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 0.416 W/kg

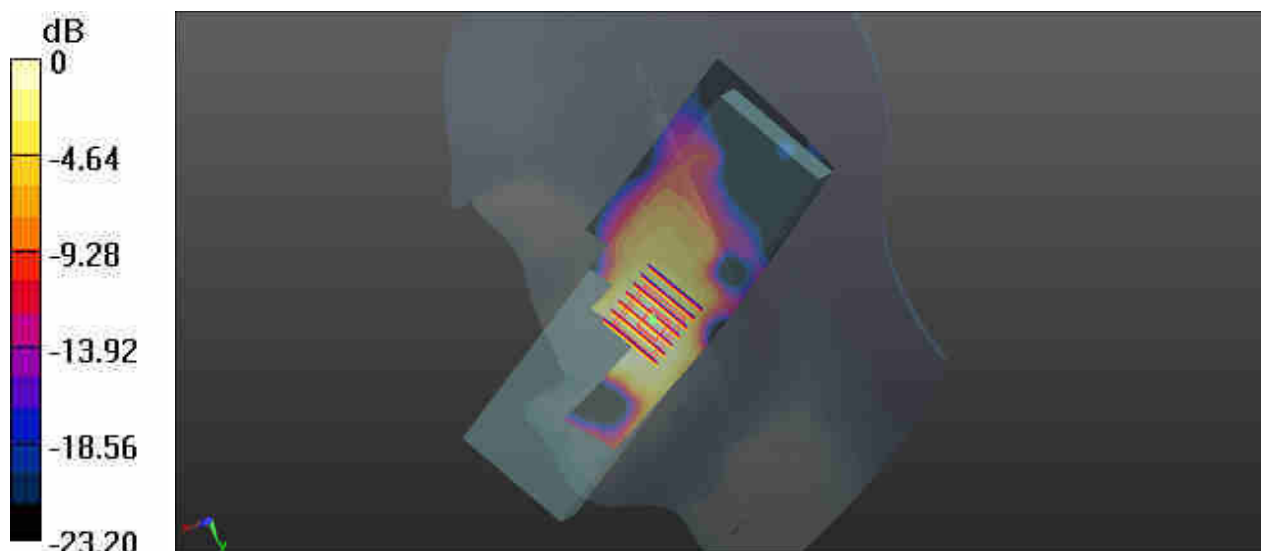
**Ch6/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.069 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.551 W/kg

**SAR(1 g) = 0.292 W/kg; SAR(10 g) = 0.153 W/kg**

Maximum value of SAR (measured) = 0.415 W/kg



0 dB = 0.415 W/kg

## 08\_CDMA BC0\_RTAP 153.6Kbps \_Back\_10mm\_Ch1013

Communication System: UID 0, CDMA2000 (0); Frequency: 824.7 MHz; Duty Cycle: 1:1  
Medium: MSL\_835\_180104 Medium parameters used:  $f = 824.7$  MHz;  $\sigma = 0.966$  S/m;  $\epsilon_r = 54.574$ ;  
 $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.6 °C; Liquid Temperature : 22.7 °C

### DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(9.06, 9.06, 9.06); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch1013/Area Scan (51x91x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.18 W/kg

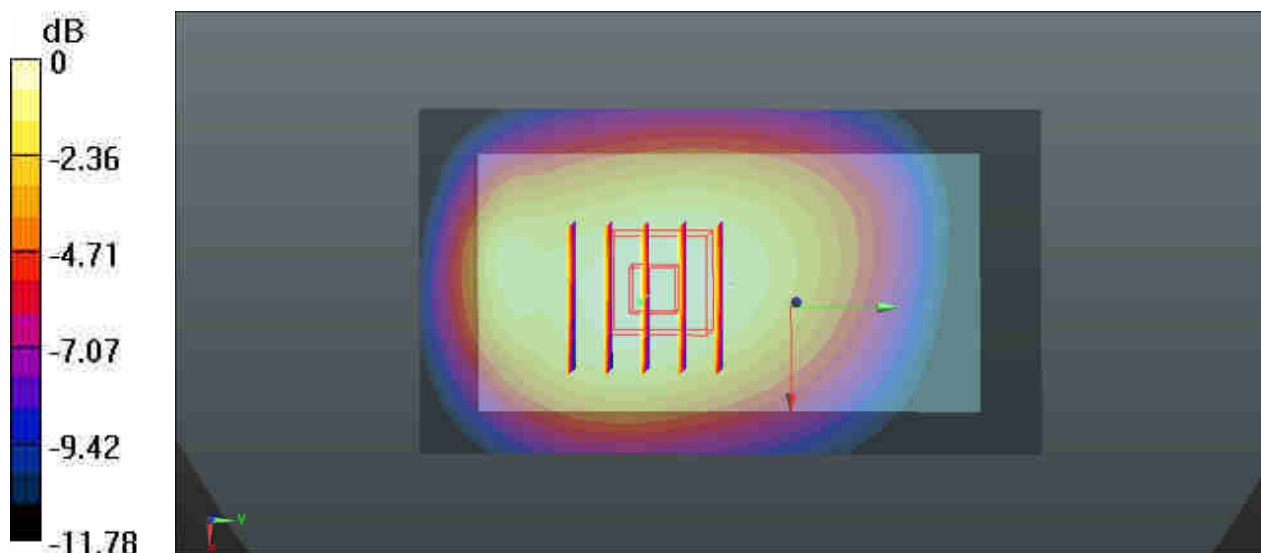
**Ch1013/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.953 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.33 W/kg

**SAR(1 g) = 0.996 W/kg; SAR(10 g) = 0.714 W/kg**

Maximum value of SAR (measured) = 1.18 W/kg



0 dB = 1.18 W/kg

### 09\_CDMA BC1\_RTAP 153.6Kbps\_Back\_10mm\_Ch25

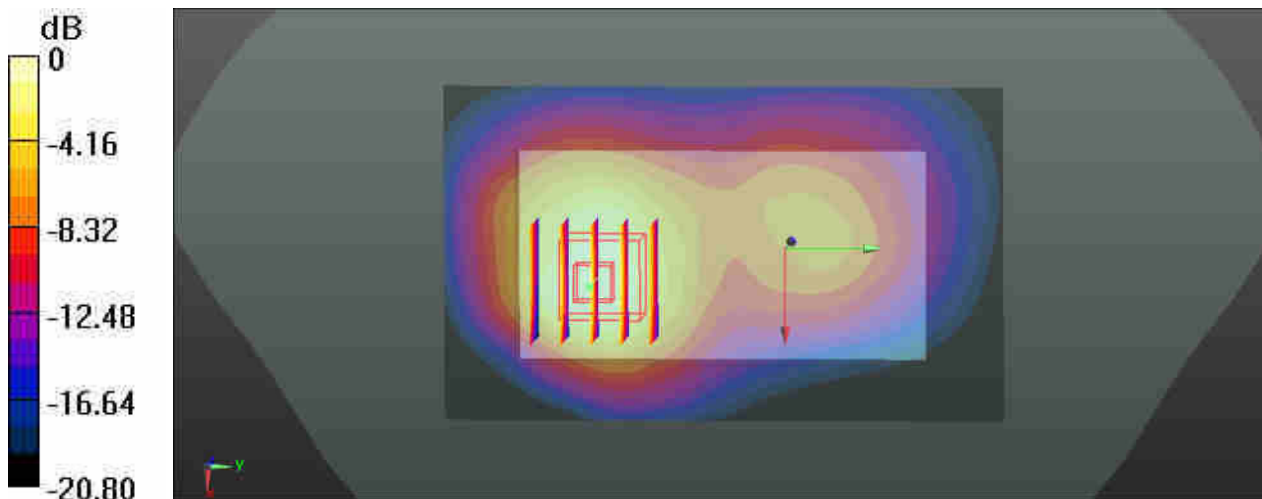
Communication System: UID 0, CDMA2000 (0); Frequency: 1851.25 MHz; Duty Cycle: 1:1  
Medium: MSL\_1900\_180103 Medium parameters used:  $f = 1851.25$  MHz;  $\sigma = 1.522$  S/m;  $\epsilon_r = 54.391$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.7 °C; Liquid Temperature : 22.6 °C

#### DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(7.58, 7.58, 7.58); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch25/Area Scan (61x101x1):** Interpolated grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 1.46 W/kg

**Ch25/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 2.082 V/m; Power Drift = 0.08 dB  
Peak SAR (extrapolated) = 1.73 W/kg  
**SAR(1 g) = 1.02 W/kg; SAR(10 g) = 0.567 W/kg**  
Maximum value of SAR (measured) = 1.38 W/kg



0 dB = 1.38 W/kg

### 10\_LTE Band 12\_10M\_QPSK\_1RB\_25Offset\_Back\_10mm\_Ch23095

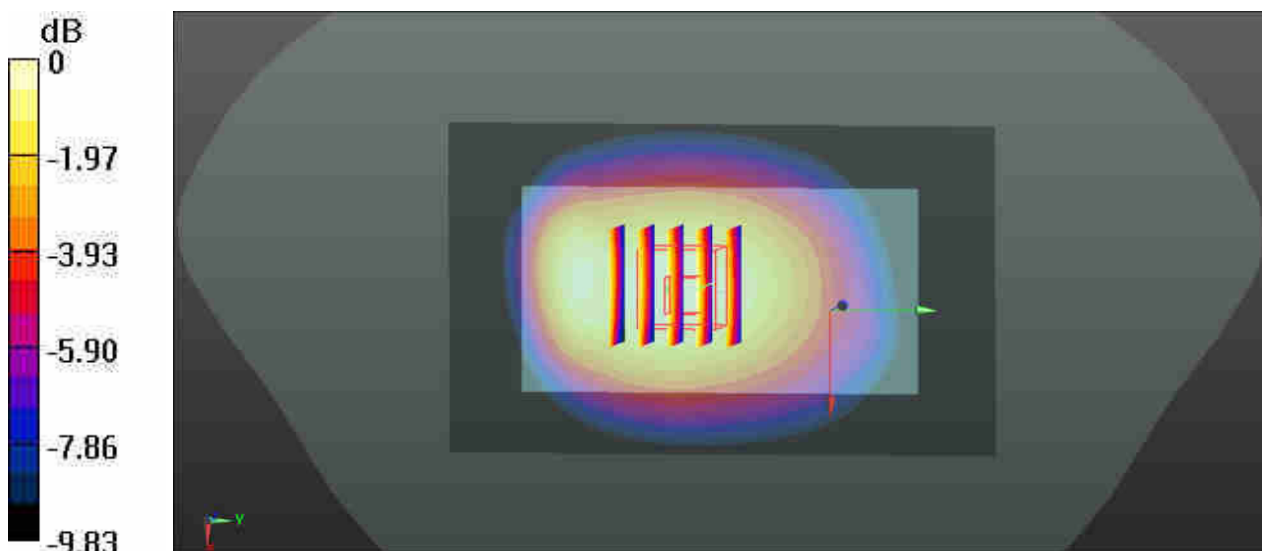
Communication System: UID 0, LTE (0); Frequency: 707.5 MHz; Duty Cycle: 1:1  
Medium: MSL\_750\_180104 Medium parameters used:  $f = 707.5$  MHz;  $\sigma = 0.931$  S/m;  $\epsilon_r = 54.88$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.6 °C; Liquid Temperature : 22.6 °C

#### DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(9.35, 9.35, 9.35); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch23095/Area Scan (61x101x1):** Interpolated grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.954 W/kg

**Ch23095/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 1.454 V/m; Power Drift = 0.08 dB  
Peak SAR (extrapolated) = 1.05 W/kg  
**SAR(1 g) = 0.799 W/kg; SAR(10 g) = 0.580 W/kg**  
Maximum value of SAR (measured) = 0.938 W/kg



0 dB = 0.954 W/kg

## 11\_LTE Band 5\_10M\_QPSK\_1RB\_25Offset\_Back\_10mm\_Ch20525

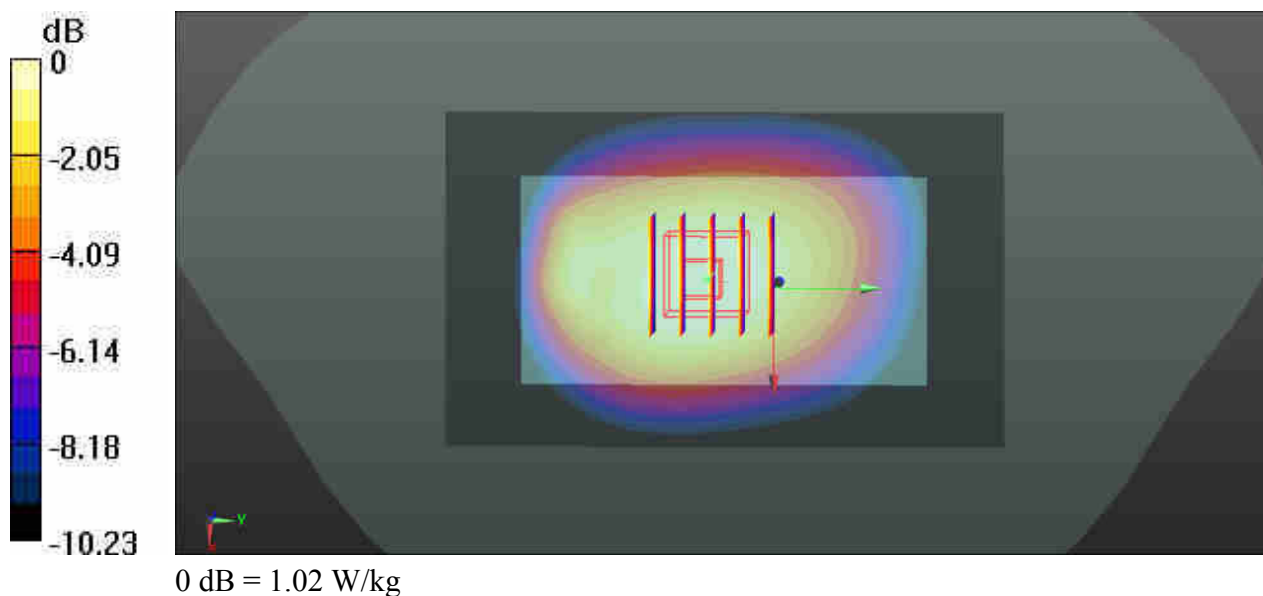
Communication System: UID 0, LTE (0); Frequency: 836.5 MHz; Duty Cycle: 1:1  
 Medium: MSL\_835\_180104 Medium parameters used:  $f = 836.5$  MHz;  $\sigma = 0.979$  S/m;  $\epsilon_r = 54.452$ ;  
 $\rho = 1000$  kg/m<sup>3</sup>  
 Ambient Temperature : 23.6 °C; Liquid Temperature : 22.7 °C

### DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(9.06, 9.06, 9.06); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch20525/Area Scan (61x101x1):** Interpolated grid: dx=15mm, dy=15mm  
 Maximum value of SAR (interpolated) = 1.05 W/kg

**Ch20525/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
 Reference Value = 2.796 V/m; Power Drift = -0.02 dB  
 Peak SAR (extrapolated) = 1.16 W/kg  
**SAR(1 g) = 0.875 W/kg; SAR(10 g) = 0.632 W/kg**  
 Maximum value of SAR (measured) = 1.02 W/kg



## 12\_LTE Band 4\_20M\_QPSK\_1RB\_49Offset\_Back\_10mm\_Ch20175

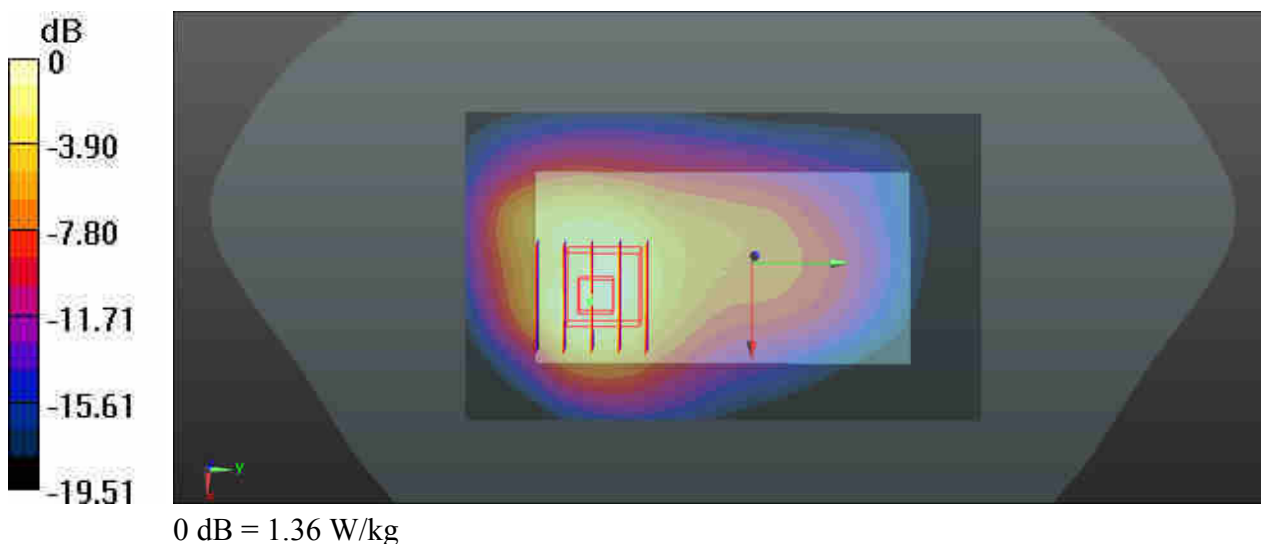
Communication System: UID 0, LTE (0); Frequency: 1732.5 MHz; Duty Cycle: 1:1  
Medium: MSL\_1750\_180103 Medium parameters used:  $f = 1732.5$  MHz;  $\sigma = 1.502$  S/m;  $\epsilon_r = 52.553$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.7 °C; Liquid Temperature : 22.7 °C

### DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(7.55, 7.55, 7.55); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch20175/Area Scan (61x101x1):** Interpolated grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 1.36 W/kg

**Ch20175/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 1.303 V/m; Power Drift = -0.04 dB  
Peak SAR (extrapolated) = 1.67 W/kg  
**SAR(1 g) = 1.01 W/kg; SAR(10 g) = 0.570 W/kg**  
Maximum value of SAR (measured) = 1.34 W/kg



### 13\_LTE Band 25\_20M\_QPSK\_1RB\_49Offset\_Back\_10mm\_Ch26140

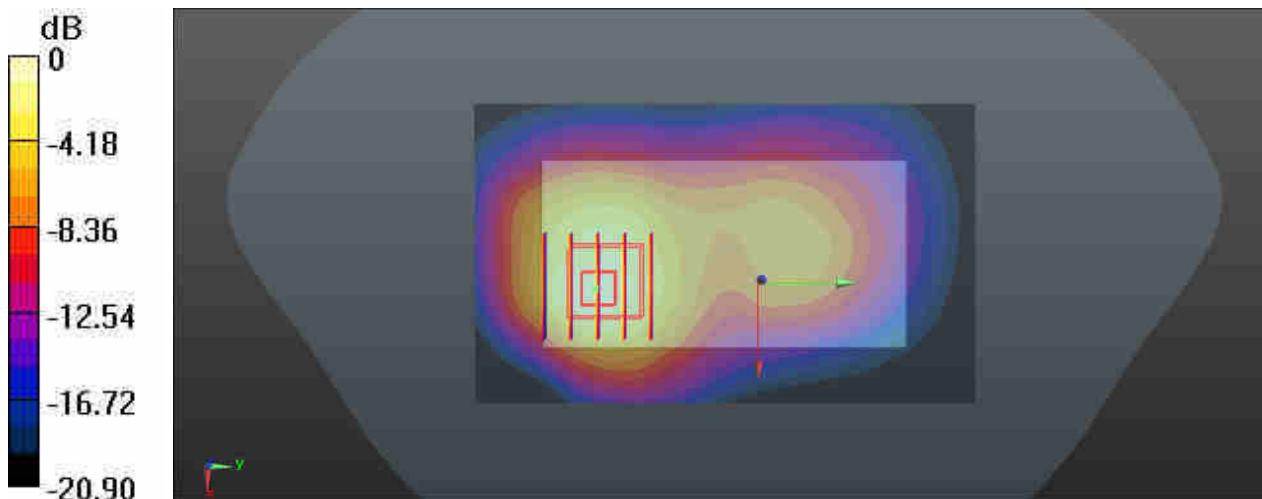
Communication System: UID 0, LTE (0); Frequency: 1860 MHz; Duty Cycle: 1:1  
Medium: MSL\_1900\_180103 Medium parameters used:  $f = 1860$  MHz;  $\sigma = 1.532$  S/m;  $\epsilon_r = 54.361$ ;  
 $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.7 °C; Liquid Temperature : 22.6 °C

#### DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(7.58, 7.58, 7.58); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch26140/Area Scan (61x101x1):** Interpolated grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 1.50 W/kg

**Ch26140/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 1.942 V/m; Power Drift = 0.06 dB  
Peak SAR (extrapolated) = 1.76 W/kg  
**SAR(1 g) = 1.04 W/kg; SAR(10 g) = 0.579 W/kg**  
Maximum value of SAR (measured) = 1.41 W/kg



0 dB = 1.50 W/kg

### 14\_WLAN2.4GHz\_802.11b 1Mbps\_Right Side\_10mm\_Ch6

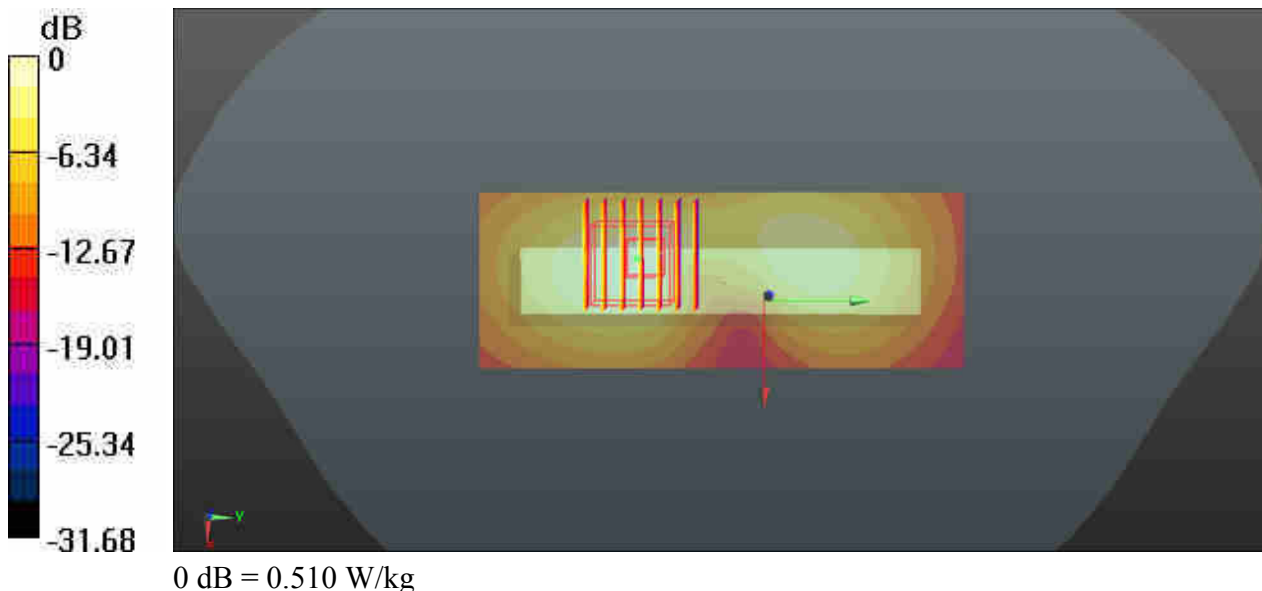
Communication System: UID 0, WIFI (0); Frequency: 2437 MHz; Duty Cycle: 1:1.022  
Medium: MSL\_2450\_180105 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.974$  S/m;  $\epsilon_r = 52.376$ ;  
 $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.4 °C; Liquid Temperature : 22.8 °C

#### DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(7.09, 7.09, 7.09); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch6/Area Scan (41x111x1):** Interpolated grid: dx=12mm, dy=12mm  
Maximum value of SAR (interpolated) = 0.532 W/kg

**Ch6/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 3.035 V/m; Power Drift = -0.08 dB  
Peak SAR (extrapolated) = 0.702 W/kg  
**SAR(1 g) = 0.343 W/kg; SAR(10 g) = 0.164 W/kg**  
Maximum value of SAR (measured) = 0.510 W/kg





### 15\_CDMA BC0\_RC3 SO32 (F+SCH) \_Back\_15mm\_Ch1013

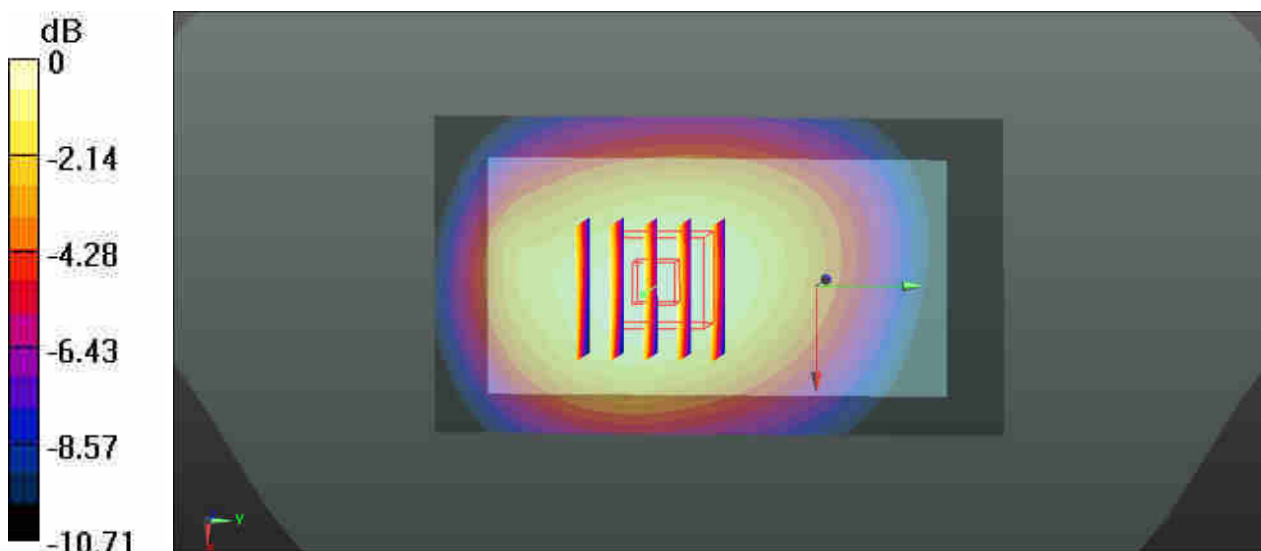
Communication System: UID 0, CDMA2000 (0); Frequency: 824.7 MHz; Duty Cycle: 1:1  
Medium: MSL\_835\_180104 Medium parameters used:  $f = 824.7$  MHz;  $\sigma = 0.966$  S/m;  $\epsilon_r = 54.574$ ;  
 $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.6 °C; Liquid Temperature : 22.7 °C

#### DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(9.06, 9.06, 9.06); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch1013/Area Scan (51x91x1):** Interpolated grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 1.20 W/kg

**Ch1013/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 6.169 V/m; Power Drift = 0.10 dB  
Peak SAR (extrapolated) = 1.35 W/kg  
**SAR(1 g) = 1.01 W/kg; SAR(10 g) = 0.736 W/kg**  
Maximum value of SAR (measured) = 1.21 W/kg



0 dB = 1.20 W/kg

### 16\_CDMA BC1\_RC3 SO32 (F+SCH)\_Back\_15mm\_Ch25

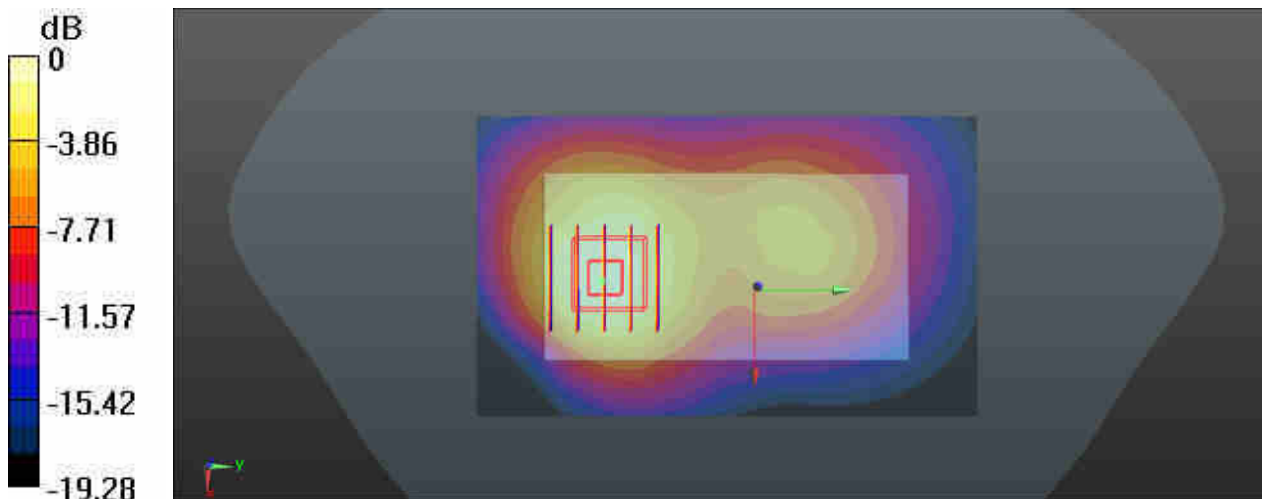
Communication System: UID 0, CDMA2000 (0); Frequency: 1851.25 MHz; Duty Cycle: 1:1  
Medium: MSL\_1900\_180103 Medium parameters used:  $f = 1851.25$  MHz;  $\sigma = 1.522$  S/m;  $\epsilon_r = 54.391$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.7 °C; Liquid Temperature : 22.6 °C

#### DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(7.58, 7.58, 7.58); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch25/Area Scan (61x101x1):** Interpolated grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 1.11 W/kg

**Ch25/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 3.237 V/m; Power Drift = 0.12 dB  
Peak SAR (extrapolated) = 1.40 W/kg  
**SAR(1 g) = 0.813 W/kg; SAR(10 g) = 0.462 W/kg**  
Maximum value of SAR (measured) = 1.11 W/kg



0 dB = 1.11 W/kg

### 17\_LTE Band 12\_10M\_QPSK\_1RB\_25Offset\_Back\_15mm\_Ch23095

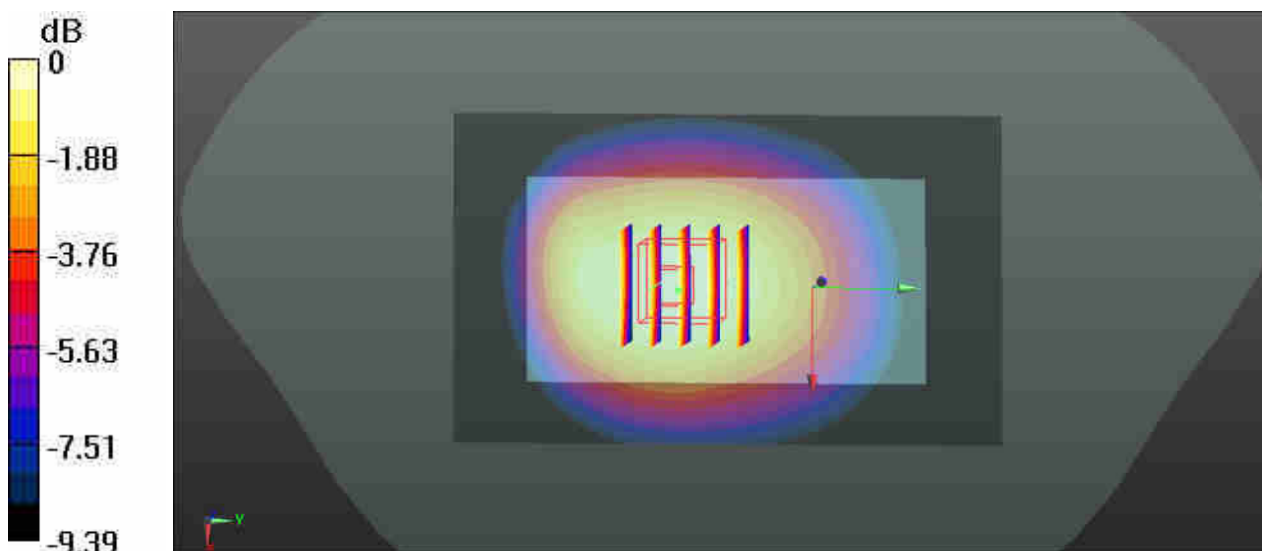
Communication System: UID 0, LTE (0); Frequency: 707.5 MHz; Duty Cycle: 1:1  
Medium: MSL\_750\_180104 Medium parameters used:  $f = 707.5$  MHz;  $\sigma = 0.931$  S/m;  $\epsilon_r = 54.88$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.6 °C; Liquid Temperature : 22.6 °C

#### DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(9.35, 9.35, 9.35); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch23095/Area Scan (61x101x1):** Interpolated grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.568 W/kg

**Ch23095/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 1.888 V/m; Power Drift = -0.03 dB  
Peak SAR (extrapolated) = 0.658 W/kg  
**SAR(1 g) = 0.494 W/kg; SAR(10 g) = 0.362 W/kg**  
Maximum value of SAR (measured) = 0.584 W/kg



0 dB = 0.568 W/kg

### 18\_LTE Band 5\_10M\_QPSK\_1RB\_25Offset\_Back\_15mm\_Ch20525

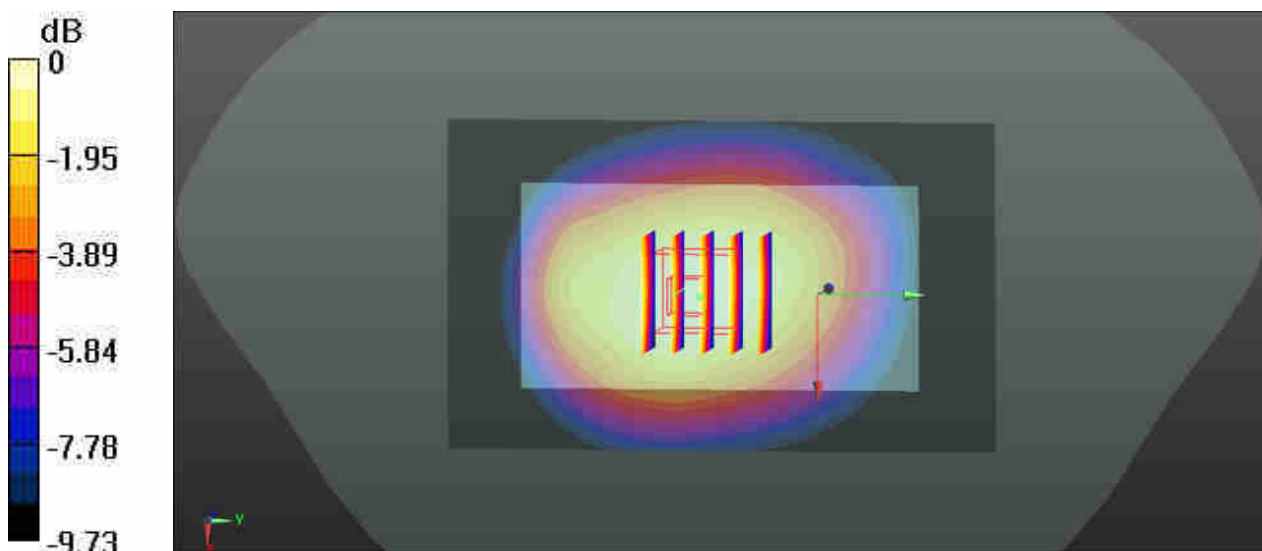
Communication System: UID 0, LTE (0); Frequency: 836.5 MHz; Duty Cycle: 1:1  
Medium: MSL\_835\_180104 Medium parameters used:  $f = 836.5$  MHz;  $\sigma = 0.979$  S/m;  $\epsilon_r = 54.452$ ;  
 $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.6 °C; Liquid Temperature : 22.7 °C

#### DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(9.06, 9.06, 9.06); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch20525/Area Scan (61x101x1):** Interpolated grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 1.13 W/kg

**Ch20525/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 3.754 V/m; Power Drift = -0.07 dB  
Peak SAR (extrapolated) = 1.28 W/kg  
**SAR(1 g) = 0.969 W/kg; SAR(10 g) = 0.705 W/kg**  
Maximum value of SAR (measured) = 1.14 W/kg



0 dB = 1.13 W/kg

### 19\_LTE Band 4\_20M\_QPSK\_1RB\_49Offset\_Back\_15mm\_Ch20175

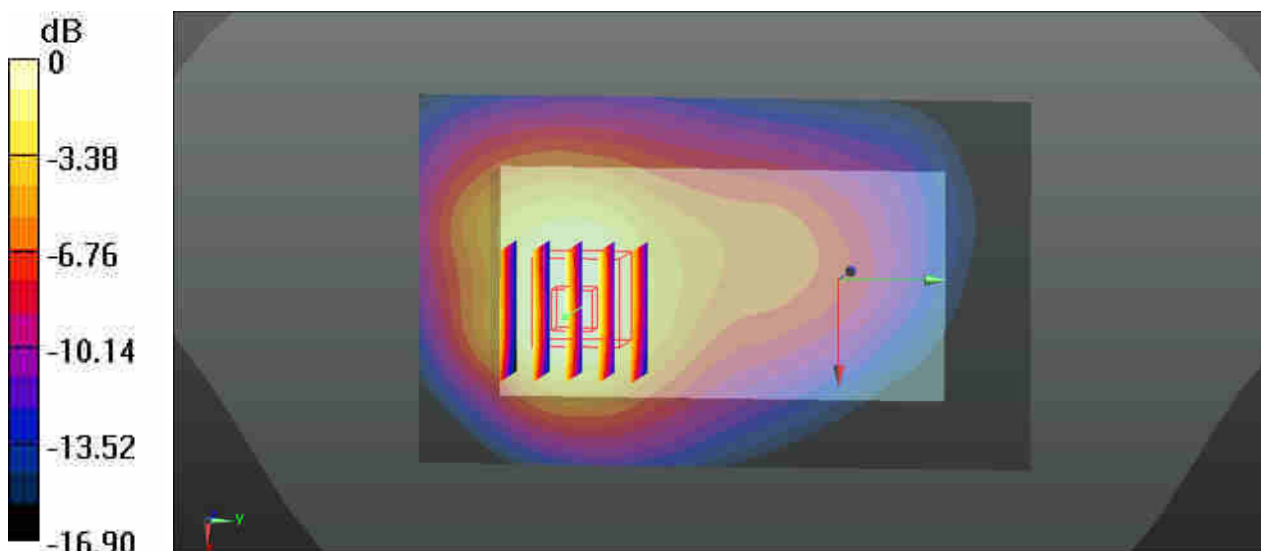
Communication System: UID 0, LTE (0); Frequency: 1732.5 MHz; Duty Cycle: 1:1  
Medium: MSL\_1750\_180103 Medium parameters used:  $f = 1732.5$  MHz;  $\sigma = 1.502$  S/m;  $\epsilon_r = 52.553$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.7 °C; Liquid Temperature : 22.7 °C

#### DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(7.55, 7.55, 7.55); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch20175/Area Scan (61x101x1):** Interpolated grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.900 W/kg

**Ch20175/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 1.647 V/m; Power Drift = 0.03 dB  
Peak SAR (extrapolated) = 1.08 W/kg  
**SAR(1 g) = 0.673 W/kg; SAR(10 g) = 0.401 W/kg**  
Maximum value of SAR (measured) = 0.885 W/kg



0 dB = 0.900 W/kg

## 20\_LTE Band 25\_20M\_QPSK\_1RB\_49Offset\_Back\_15mm\_Ch26590

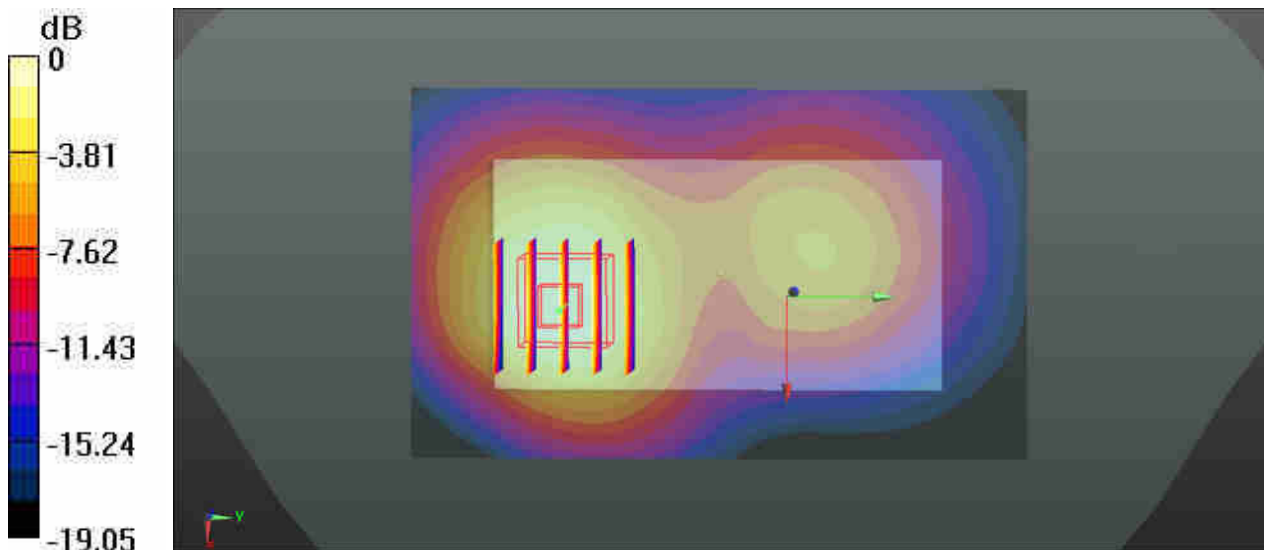
Communication System: UID 0, LTE (0); Frequency: 1905 MHz; Duty Cycle: 1:1  
Medium: MSL\_1900\_180103 Medium parameters used:  $f = 1905$  MHz;  $\sigma = 1.582$  S/m;  $\epsilon_r = 54.196$ ;  
 $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.7 °C; Liquid Temperature : 22.6 °C

### DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(7.58, 7.58, 7.58); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch26590/Area Scan (61x101x1):** Interpolated grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.875 W/kg

**Ch26590/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 2.401 V/m; Power Drift = 0.04 dB  
Peak SAR (extrapolated) = 1.06 W/kg  
**SAR(1 g) = 0.631 W/kg; SAR(10 g) = 0.364 W/kg**  
Maximum value of SAR (measured) = 0.846 W/kg



0 dB = 0.846 W/kg

## 21\_WLAN2.4GHz\_802.11b 1Mbps\_Back\_15mm\_Ch6

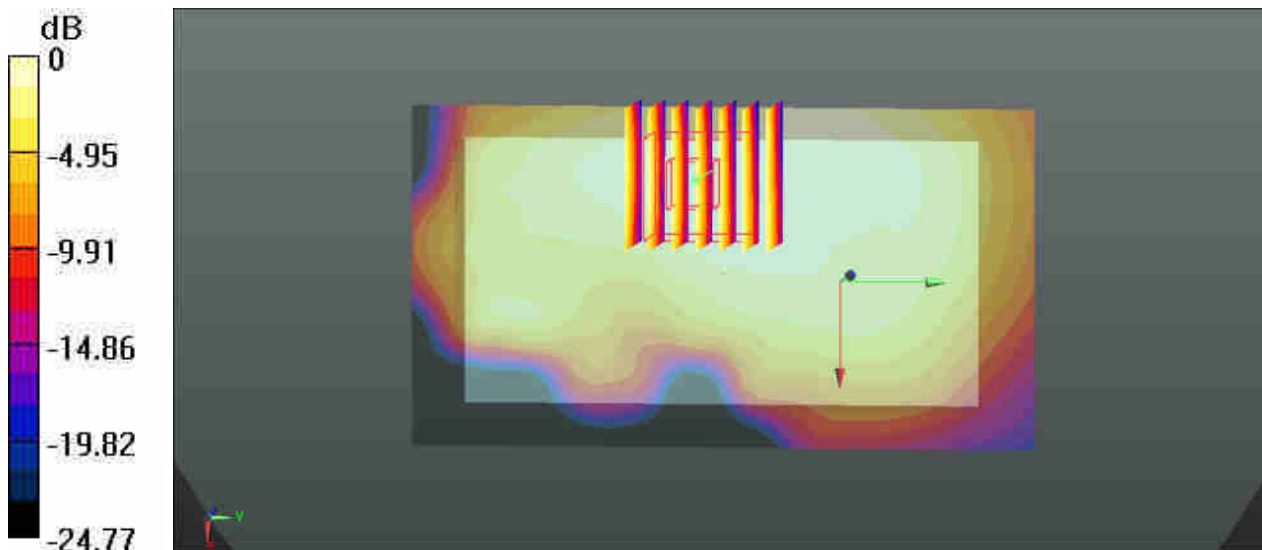
Communication System: UID 0, WIFI (0); Frequency: 2437 MHz; Duty Cycle: 1:1.022  
Medium: MSL\_2450\_180105 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.974$  S/m;  $\epsilon_r = 52.376$ ;  
 $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature : 23.4 °C ; Liquid Temperature : 22.8 °C

### DASY5 Configuration:

- Probe: EX3DV4 - SN3642; ConvF(7.09, 7.09, 7.09); Calibrated: 2017.09.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2017.09.15
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch6/Area Scan (61x111x1):** Interpolated grid: dx=12mm, dy=12mm  
Maximum value of SAR (interpolated) = 0.330 W/kg

**Ch6/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 4.382 V/m; Power Drift = -0.04 dB  
Peak SAR (extrapolated) = 0.222 W/kg  
**SAR(1 g) = 0.124 W/kg; SAR(10 g) = 0.070 W/kg**  
Maximum value of SAR (measured) = 0.328 W/kg



0 dB = 0.170 W/kg



**Appendix C. DASYS Calibration Certificate**

The DASYS calibration certificates are shown as follows.





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 CNAS L0570

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Client **Sporton\_XA**

Certificate No: **Z17-97037**

## CALIBRATION CERTIFICATE

Object: **D750V3 - SN: 1087**

Calibration Procedure(s): **FD-Z11-003-01**  
**Calibration Procedures for dipole validation kits**

Calibration date: **March 20, 2017**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	27-Jun-16 (CTTL, No.J16X04771)	Jun-17
Power sensor NRP-Z91	101547	27-Jun-16 (CTTL, No.J16X04771)	Jun-17
Reference Probe EX3DV4	SN 3617	23-Jan-17(SPEAG,No.EX3-3617_Jan17)	Jan-18
DAE4	SN 777	22-Aug-16(CTTL-SPEAG,No.Z16-97138)	Aug-17
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	13-Jan-17 (CTTL, No.J17X00286)	Jan-18
Network Analyzer E5071C	MY46110673	13-Jan-17 (CTTL, No.J17X00285)	Jan-18

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

Issued: March 24/ 2017

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



### Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
N/A	not applicable or not measured

### Calibration is Performed According to the Following Standards:

- 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
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
- 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
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

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

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



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### Measurement Conditions

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

DASY Version	DASY52	52.8.8.1258
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	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	41.4 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

### SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.13 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	8.37 mW / g ± 20.8 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.41 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	5.56 mW / g ± 20.4 % (k=2)

### Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.2 ± 6 %	0.95 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

### SAR result with Body TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.17 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	8.73 mW / g ± 20.8 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.46 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	5.87 mW / g ± 20.4 % (k=2)



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## Appendix (Additional assessments outside the scope of CNAS L0570)

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.0 $\Omega$ - 3.15j $\Omega$
Return Loss	- 29.7dB

### Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.7 $\Omega$ - 2.50j $\Omega$
Return Loss	- 32.0dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.115 ns
----------------------------------	----------

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

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

### Additional EUT Data

Manufactured by	SPEAG
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**DASY5 Validation Report for Head TSL**

Date: 03.20.2017

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1087**

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 750 \text{ MHz}$ ;  $\sigma = 0.908 \text{ S/m}$ ;  $\epsilon_r = 41.38$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(10.05, 10.05, 10.05); Calibrated: 1/23/2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn777; Calibrated: 8/22/2016
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

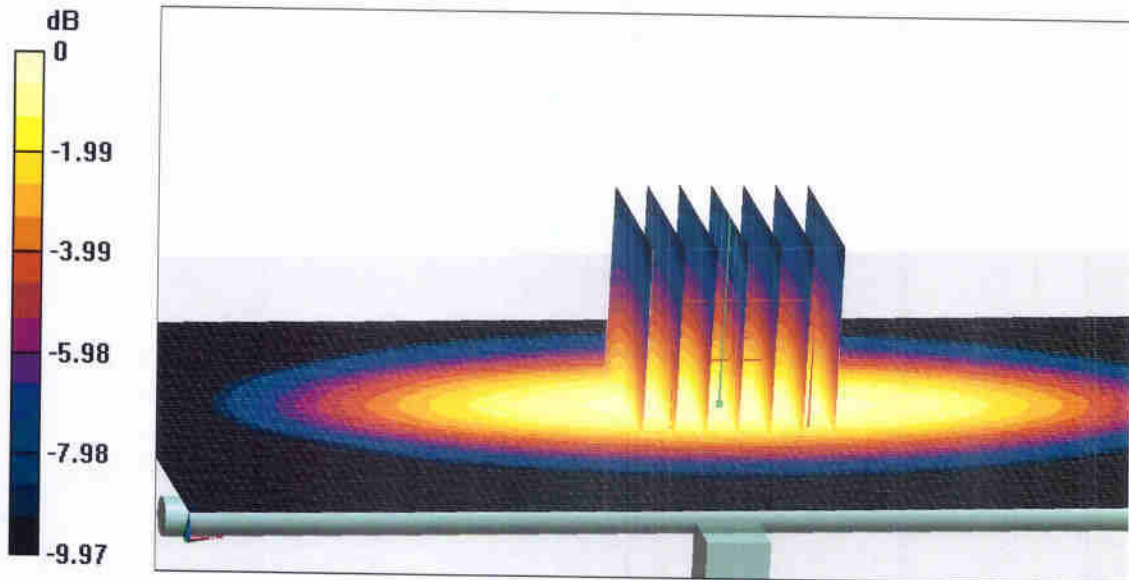
**Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 52.61 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 3.22 W/kg

**SAR(1 g) = 2.13 W/kg; SAR(10 g) = 1.41 W/kg**

Maximum value of SAR (measured) = 2.84 W/kg

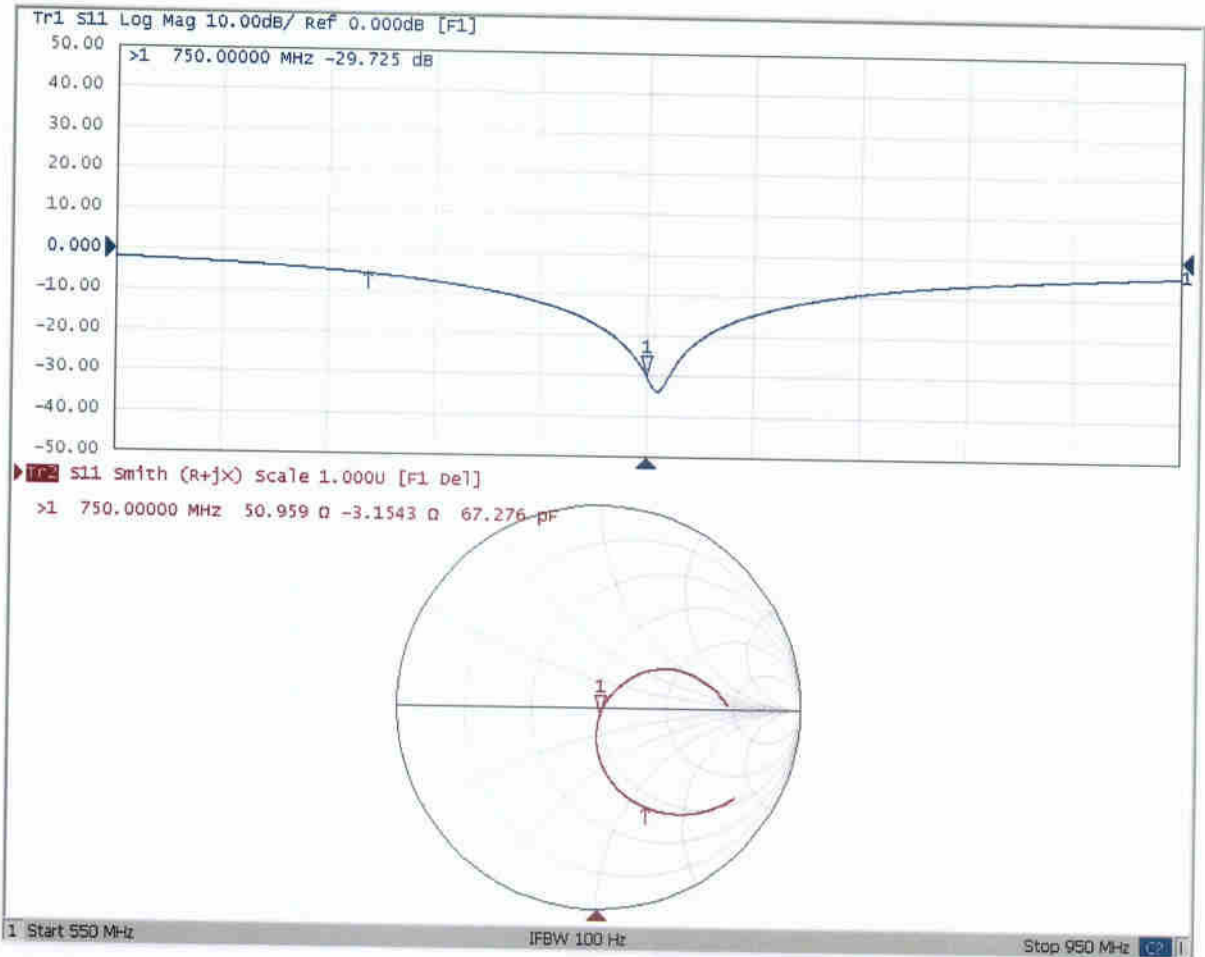


0 dB = 2.84 W/kg = 4.53 dBW/kg



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### Impedance Measurement Plot for Head TSL





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### DASY5 Validation Report for Body TSL

Date: 03.20.2017

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1087**

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 750 \text{ MHz}$ ;  $\sigma = 0.952 \text{ S/m}$ ;  $\epsilon_r = 55.23$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Center Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(9.8, 9.8, 9.8); Calibrated: 1/23/2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn777; Calibrated: 8/22/2016
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

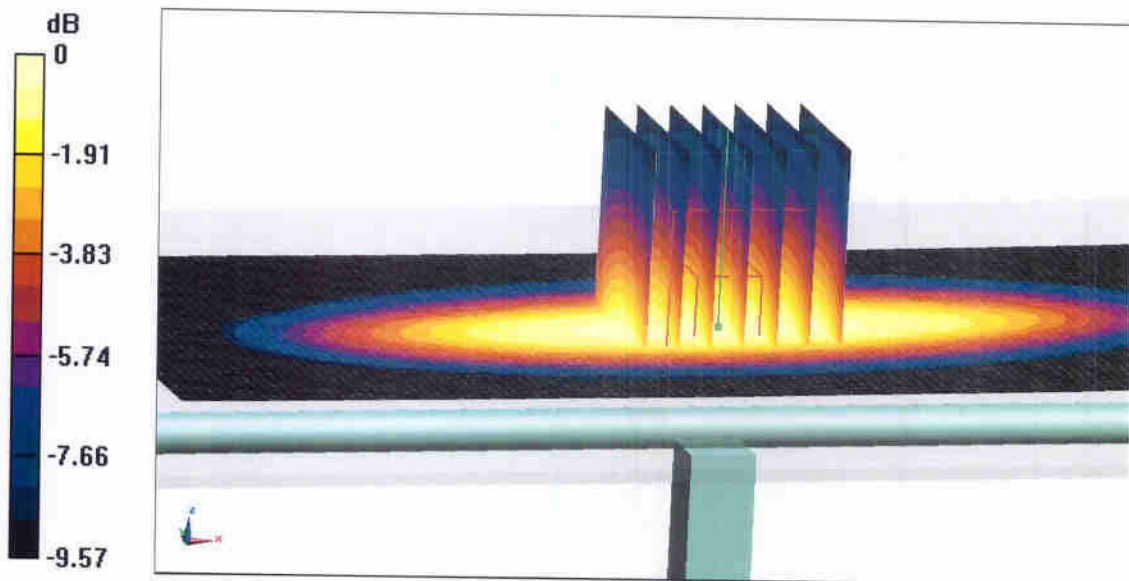
**Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 54.49 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 3.18 W/kg

**SAR(1 g) = 2.17 W/kg; SAR(10 g) = 1.46 W/kg**

Maximum value of SAR (measured) = 2.85 W/kg

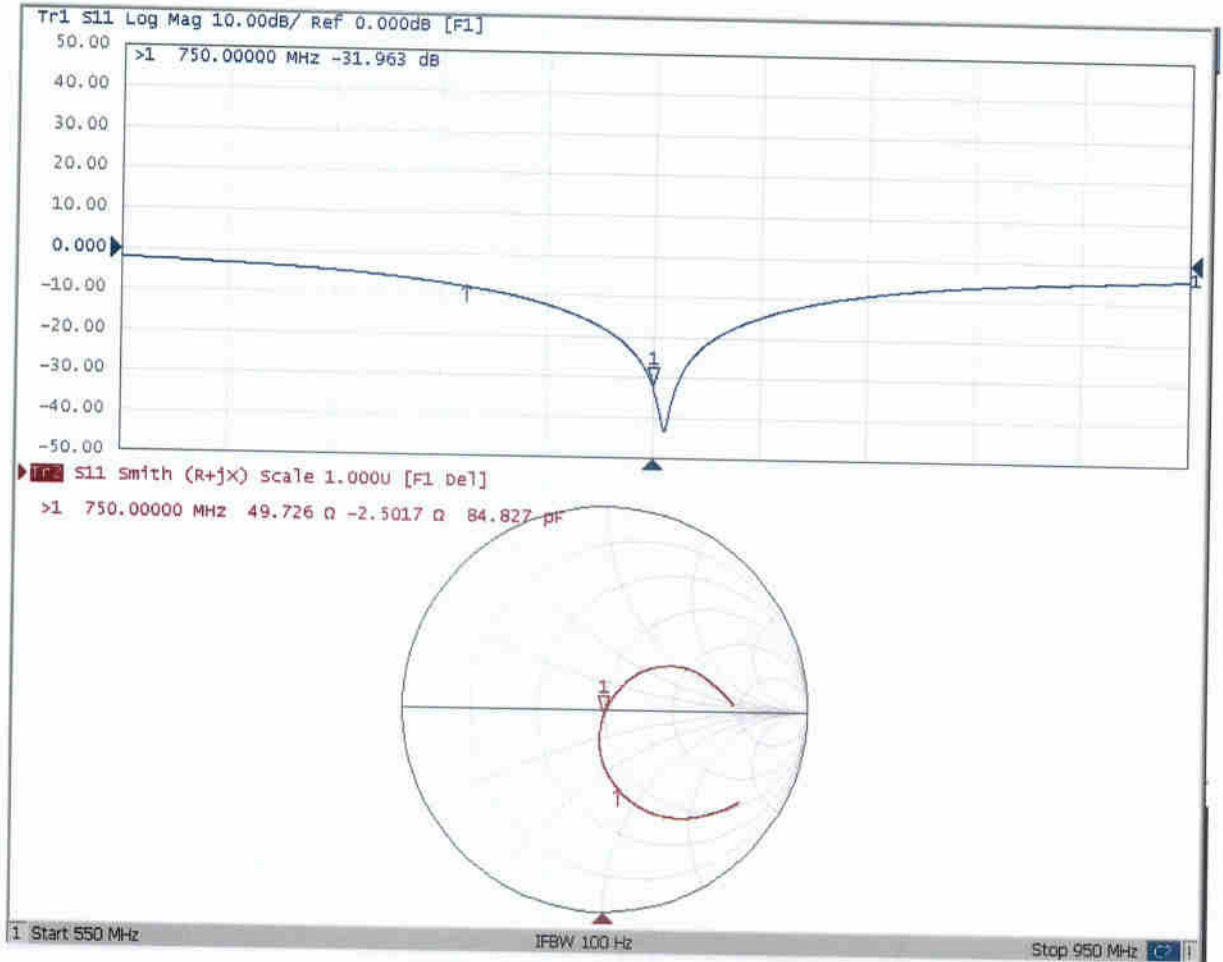


0 dB = 2.85 W/kg = 4.55 dBW/kg



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### Impedance Measurement Plot for Body TSL







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Client

**Sporton\_XA**

Certificate No: **Z17-97038**

## CALIBRATION CERTIFICATE

Object

D835V2 - SN: 4d151

Calibration Procedure(s)

FD-Z11-003-01

Calibration Procedures for dipole validation kits

Calibration date:

March 20, 2017

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

Issued: March 24, 2017

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