# FCC SAR Test Report

| | | |
|---|---|---|
| **APPLICANT** | **:** | **Elk LLC** |
| **EQUIPMENT** | **:** | **Tablet PC** |
| **MODEL NAME** | **:** | **3HT7G** |
| **FCC ID** | **:** | **ZHT-1013** |
| **STANDARD** | **:** | **FCC 47 CFR Part 2 (2.1093)**<br>**ANSI/IEEE C95.1-1992**<br>**IEEE 1528-2003**<br>**FCC OET Bulletin 65 Supplement C (Edition 01-01)** |

**The product was completely tested on Sep. 17, 2012. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the 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 INC., the test report shall not be reproduced except in full.**

**Reviewed by:**

Jones Tsai

**Jones Tsai / Manager**

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# Revision History

| REPORT NO. | VERSION | DESCRIPTION | ISSUED DATE |
|---|---|---|---|
| FA240709 | Rev. 01 | Initial issue of report | Sep. 05, 2012 |
| FA240709 | Rev. 02 | 1. Rearrange the section 11.2 standalone SAR summation table, from page 46 – page 49<br>2. Add simultaneous transmission exclusion description for BT, note 10 in section 11.2.<br>3. Revise the description of WLAN antenna to PIFA antenna, in section 3.1<br>4. Revise the description of EUT setting in section 3.4.2 | Sep. 12, 2012 |
| FA240709 | Rev. 03 | 1. Include SAR test data of curved-surface contacted with the phantom | Sep. 17, 2012 |
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# 1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Elk LLC, Tablet PC, 3HT7G,** are as follows.

**Highest 1-g SAR Summary**

| Band | Position | $SAR_{1g}$ (W/kg) |
|---|---|---|
| GSM850 | Body (0cm Gap) | 1.27 |
| GSM1900 | Body (0cm Gap) | 1.12 |
| WCDMA Band V | Body (0cm Gap) | 1.22 |
| WCDMA Band II | Body (0cm Gap) | 1.11 |
| LTE Band 17 | Body (0cm Gap) | 1.17 |
| LTE Band 4 | Body (0cm Gap) | 1.21 |
| WLAN 2.4G | Body (0cm Gap) | 1.26 |
| WLAN 5G | Body (0cm Gap) | 1.32 |

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 1528-2003 and FCC OET Bulletin 65 Supplement C (Edition 01-01).

# 2. Administration Data

## 2.1 Testing Laboratory

| | |
|---|---|
| **Test Site** | SPORTON INTERNATIONAL INC. |
| **Test Site Location** | No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park,<br>Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.<br>TEL: +886-3-327-3456<br>FAX: +886-3-328-4978 |

## 2.2 Applicant

| | |
|---|---|
| **Company Name** | Elk LLC |
| **Address** | Suite 100, 2730 Gateway Oaks Drive<br>Sacramento, CA 95833 |

## 2.3 Application Details

| | |
|---|---|
| **Date of Start during the Test** | Jul. 24, 2012 |
| **Date of End during the Test** | Sep. 17, 2012 |

# 3. General Information

## 3.1 Description of Equipment Under Test (EUT)

<table>
<tr><th colspan="2">Product Feature & Specification</th></tr>
<tr><td>EUT</td><td>Tablet PC</td></tr>
<tr><td>Model Name</td><td>3HT7G</td></tr>
<tr><td>FCC ID</td><td>ZHT-1013</td></tr>
<tr><td>Tx Frequency</td><td>GSM850: 824.2 MHz ~ 848.8 MHz<br>GSM1900: 1850.2 MHz ~ 1909.8 MHz<br>WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz<br>WCDMA Band V: 826.4 MHz ~ 846.6 MHz<br>LTE Band 17: 706.5 MHz ~ 713.5 MHz<br>LTE Band 4: 1712.5 MHz ~ 1752.5 MHz<br>WLAN2.4G: 2412 MHz ~ 2462 MHz<br>WLAN5G: 5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz;<br>5500 MHz ~ 5700 MHz; 5745 MHz ~ 5825 MHz<br>Bluetooth: 2402 MHz ~ 2480 MHz</td></tr>
<tr><td>Rx Frequency</td><td>GSM850: 869.2 MHz ~ 893.8 MHz<br>GSM1900: 1930.2 MHz ~ 1989.8 MHz<br>WCDMA Band II: 1932.4 MHz ~ 1987.6 MHz<br>WCDMA Band V: 871.4 MHz ~ 891.6 MHz<br>LTE Band 17 : 736.5 MHz ~ 743.5 MHz<br>LTE Band 4 : 2112.5 MHz ~ 2152.5 MHz<br>WLAN2.4G: 2412 MHz ~ 2462 MHz<br>WLAN5G: 5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz;<br>5500 MHz ~ 5700 MHz; 5745 MHz ~ 5825 MHz<br>Bluetooth: 2402 MHz ~ 2480 MHz</td></tr>
<tr><td>Maximum Average Output Power to Antenna</td><td>GSM850: 31.82 dBm<br>GSM1900: 29.28 dBm<br>WCDMA Band V: 23.05 dBm<br>WCDMA Band II: 23.39 dBm<br>LTE Band 4: 24.43 dBm<br>LTE Band 17: 23.23 dBm<br>802.11b: 16.88 dBm<br>802.11g: 16.00 dBm<br>802.11n-HT20 (2.4GHz): 17.91 dBm<br>802.11a: 12.65 dBm<br>802.11n-HT20 (5GHz): 16.37 dBm<br>802.11n-HT40 (5GHz): 16.08 dBm<br>Bluetooth: 6.88 dBm</td></tr>
<tr><td>Antenna Type</td><td>WWAN: Fixed Internal Antenna<br>WLAN: PIFA Antenna<br>Bluetooth: PIFA Antenna</td></tr>
<tr><td>Type of Modulation</td><td>GPRS: GMSK<br>EDGE: GMSK / 8PSK<br>WCDMA (Rel 99): QPSK<br>HSDPA (Rel 6): QPSK<br>HSUPA (Rel 6): QPSK<br>LTE: QPSK / 16QAM<br>802.11b: DSSS (BPSK / QPSK / CCK)<br>802.11a/g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)<br>Bluetooth: GFSK<br>Bluetooth EDR: π/4-DQPSK / 8-DPSK</td></tr>
<tr><td>EUT Stage</td><td>Production Unit</td></tr>
<tr><td colspan="2">Remark:<br>1. The above EUT's information was declared by the manufacturer. Please refer to the specifications or user's manual for more detailed description.<br>2. Voice call is not supported.<br>3. 5600 MHz ~ 5650 MHz is notched.</td></tr>
</table>

## The table below summarizes necessary items addressed in KDB 941225 D05 v01.

| | |
|---|---|
| FCC ID | ZHT-1013 |
| EUT | Tablet PC |
| Operating Frequency Range of each LTE transmission band | Band 4: TX: 1712.5 MHz ~ 1752.5 MHz, RX: 2112.5 MHz ~ 2152.5 MHz<br>Band 17: TX: 706.5 MHz ~ 713.5 MHz, RX: 736.5 MHz ~ 743.5 MHz |
| Channel Bandwidth | Band 4: 5MHz, 10MHz, 15MHz, 20MHz<br>Band 17: 5MHz, 10MHz |

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

Band 4

| | Bandwidth 5 MHz | | Bandwidth 10 MHz | | Bandwidth 15 MHz | | Bandwidth 20 MHz | |
|---|---|---|---|---|---|---|---|---|
| | Ch. # | Freq. (MHz) | Ch. # | Freq. (MHz) | Ch. # | Freq. (MHz) | Ch. # | Freq. (MHz) |
| L | 19975 | 1712.5 | 20000 | 1715 | 20025 | 1717.5 | 20050 | 1720 |
| M | 20175 | 1732.5 | 20175 | 1732.5 | 20175 | 1732.5 | 20175 | 1732.5 |
| H | 20375 | 1752.5 | 20350 | 1750 | 20325 | 1747.5 | 20300 | 1745 |

Band 17

| | Bandwidth 5 MHz | | Bandwidth 10 MHz | |
|---|---|---|---|---|
| | Channel # | Frequency (MHz) | Channel # | Frequency (MHz) |
| L | 23755 | 706.5 | 23780 | 709 |
| M | 23790 | 710 | 23790 | 710 |
| H | 23825 | 713.5 | 23800 | 711 |

| | | |
|---|---|---|
| UE category, uplink modulations used | Category 3, QPSK, and 16QAM | |
| LTE transmitter and antenna implementation (standalone or sharing hardware components / antennas ) | WWAN Antenna: LTE share the antenna with GPRS/EDGE/UMTS. | |
| LTE Voice / Data requirements | Data only | |
| LTE MPR permanently built-in by design | Yes | |
| LTE A-MPR | Disabled during SAR testing. With CMW500, set NS value to NS_01 to disable A-MPR. | |
| LTE maximum averaged conducted output power | LTE Band 4: 23.43 dBm<br>LTE Band 17: 23.23 dBm | |
| Other U.S. wireless operating modes / bands | GPRS/EDGE | GSM850: UL: 824.2 ~ 848.8 MHz / DL: 869.2 ~ 893.8 MHz<br>PCS : UL: 1850.2 ~ 1909.8 MHz / DL: 1930.2 ~ 1989.8 MHz |
| | WCDMA<br>HSDPA / HSUPA | Band V: UL: 826.4 ~ 846.6 MHz / DL: 871.4 ~ 891.6 MHz<br>Band II: UL: 1852.4 ~ 1907.6 MHz / DL: 1932.4 ~ 1987.6 MHz |
| | WLAN | 2.4G: 2412~2462 MHz<br>5G: 5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz;<br>5500 MHz ~ 5700 MHz; 5745 MHz ~ 5825 MHz |
| | Bluetooth | 2402~2480 MHz |
| Simultaneous transmission configurations | In Section 11.2 | |
| Power reduction applied to satisfy SAR compliance | 1. Yes, proximity sensor/power reduction is implemented for WWAN SAR compliance.<br>2. This device does not employ any type of power reduction (through sensing or determined by operation mode or orientation) to meet WLAN SAR requirement.<br>3. All WLAN SAR tests were performed with the device operating at maximum power. | |

## 3.2 Applied Standard

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 1528-2003
- FCC OET Bulletin 65 Supplement C (Edition 01-01)
- FCC KDB 447498 D01 v04
- FCC KDB 616217 D03 v01
- FCC KDB 941225 D01 v02
- FCC KDB 941225 D03 v01
- FCC KDB 941225 D05 v01
- FCC KDB 248227 D01 v01r02

## 3.3 Device Category and SAR Limits

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for General Population/Uncontrolled exposure should be applied to this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

## 3.4 Test Conditions

### 3.4.1 Ambient Condition

| | |
|---|---|
| **Ambient Temperature** | 20 to 24 ℃ |
| **Humidity** | < 60 % |

### 3.4.2 Test Configuration

For WWAN SAR testing, the device was controlled by using a base station emulator. Communication between the device and the emulator was established by air link. The distance between the EUT and the antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller than the output power of EUT.
The EUT was set from the emulator to radiate maximum WWAN output power during all tests; for Bottom-Face and Edge1 testing at 0cm separation, the proximity sensor will activate the power reduction and the maximum power is limited at the pre-defined level implemented in this device.
The power reduction scheme compliance is also verified at the proximity sensor trigger distance, and during this testing the proximity sensor was disable and EUT will transmit at the maximum power requested by the base station simulator.

For WLAN SAR testing, WLAN engineering testing software installed on the EUT can provide the continuous transmitting RF signal. The following table shows the duty cycle of each mode:

| **WiFi 2.4G** | **Mode** | **Duty Cycle** | **Duty Cycle Compensate Factor** |
|---|---|---|---|
| 802.11b | Legacy | 100.00% | 1.00 |
| 802.11g | Legacy | 99.15% | 1.01 |
| 802.11n-HT20 | SISO | 99.01% | 1.01 |
| 802.11n-HT20 | MIMO | 98.20% | 1.02 |
| **WiFi 5G** | **Mode** | **Duty Cycle** | **Duty Cycle Compensate Factor** |
| 802.11a (5180 MHz ~ 5700 MHz) | Legacy | 99.17% | 1.01 |
| 802.11a (5745 MHz ~ 5825 MHz) | Legacy | 99.36% | 1.01 |
| 802.11n-HT20 (5180 MHz ~ 5700 MHz) | SISO | 99.08% | 1.01 |
| 802.11n-HT20 (5745 MHz ~ 5825 MHz) | SISO | 99.08% | 1.01 |
| 802.11n-HT40 (5180 MHz ~ 5700 MHz) | SISO | 98.60% | 1.01 |
| 802.11n-HT40 (5745 MHz ~ 5825 MHz) | SISO | 98.60% | 1.01 |
| 802.11n-HT20 (5180 MHz ~ 5700 MHz) | MIMO | 98.21% | 1.02 |
| 802.11n-HT20 (5745 MHz ~ 5825 MHz) | MIMO | 98.21% | 1.02 |
| 802.11n-HT40 (5180 MHz ~ 5700 MHz) | MIMO | 96.70% | 1.03 |
| 802.11n-HT40 (5745 MHz ~ 5825 MHz) | MIMO | 97.00% | 1.03 |

The EUT implements the power reduction scheme for SAR compliance, for specific device configuration and orientations, as described below. The complete description of the implementation and functionality is provided in the "Operational Description of power reduction" exhibit.

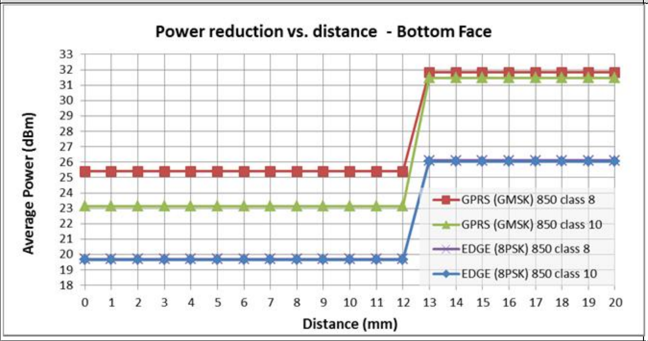
**Power reduction applied for each wireless mode and orientation**

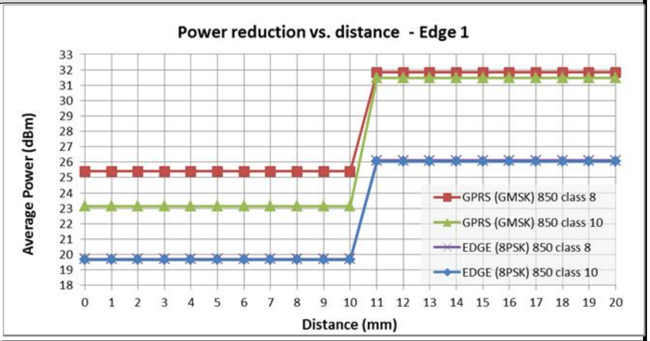
| Exposure Position / wireless mode | GPRS/EDGE 850 | GPRS/EDGE 1900 | UMTS Band 5 | UMTS Band 2 | LTE Band 4 | LTE Band 17 |
|---|---|---|---|---|---|---|
| Bottom Face | Yes | Yes | Yes | Yes | Yes | Yes |
| Edge 1 | Yes | Yes | Yes | Yes | Yes | Yes |
| Edge 2 | N/A | N/A | N/A | N/A | N/A | N/A |
| Edge 3 | N/A | N/A | N/A | N/A | N/A | N/A |
| Edge 4 | N/A | N/A | N/A | N/A | N/A | N/A |

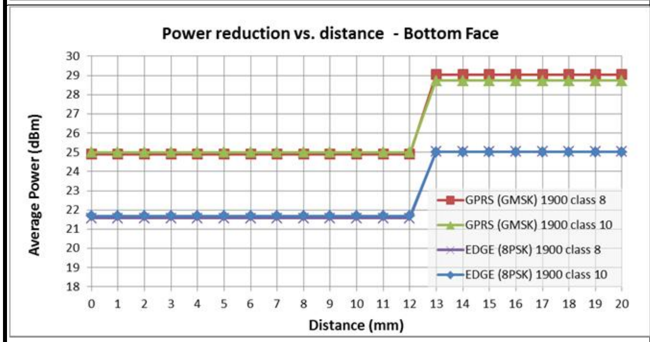
**Remark:**

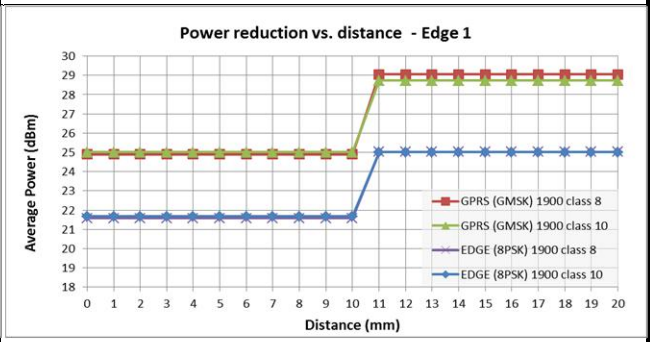
1. Yes: Reduced maximum limit applied by activation of the proximity sensor.
2. N/A: Normal output power without reduction
3. Power reduction is not applicable for WiFi and Bluetooth.

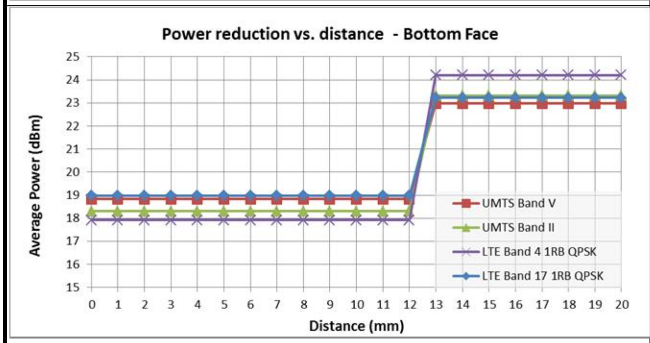
| Proximity Sensor for Bottom Face detection | Proximity Sensor for Edge 1 detection |
|---|---|

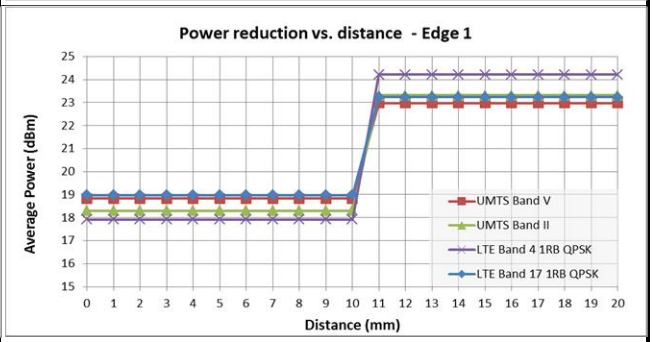


**Remark:**

1. GPRS (GMSK) 850 class 8, CH189. Full power: 31.82dBm, Reduced power: 25.40dBm. The power reduction level is 6.42dB.
2. GPRS (GMSK) 850 class 10, CH189. Full power: 31.48dBm, Reduced power: 23.15dBm. The power reduction level is 8.33dB.
3. EDGE (8PSK) 850 class 8, CH189. Full power: 26.10dBm, Reduced power: 19.71dBm. The power reduction level is 6.39dB.
4. EDGE (8PSK) 850 class 10, CH189. Full power: 26.05dBm, Reduced power: 19.65dBm. The power reduction level is 6.40dB.
5. GPRS (GMSK) 1900 class 8, CH661. Full power: 29.05dBm, Reduced power: 24.90dBm. The power reduction level is 4.15dB.
6. GPRS (GMSK) 1900 class 10, CH661. Full power: 28.73dBm, Reduced power: 25.00dBm. The power reduction level is 3.73dB.
7. EDGE (8PSK) 1900 class 8, CH661. Full power: 25.03dBm, Reduced power: 21.57dBm. The power reduction level is 3.46dB.
8. EDGE (8PSK) 1900 class 10, CH661. Full power: 25.01dBm, Reduced power: 21.68dBm. The power reduction level is 3.33dB.
9. WCDMA Band V, RMC12.2k, CH4182, Full power: 22.98dBm, Reduced power: 18.83dBm. The power reduction level is 4.15dB.
10. WCDMA Band II, RMC12.2k, CH9400 Full power: 23.32dBm, Reduced power: 18.30dBm. The power reduction level is 5.02dB.
11. LTE Band 4, BW 20MHz, QPSK, 1RB size at the lower edge of CH20175, Full power: 24.21dBm, Reduced power: 17.92dBm. The power reduction level is 6.29dB.
12. LTE Band 17, BW 10MHz, QPSK, 1RB size at the higher edge of CH23790, Full power: 23.23dBm, Reduced power: 18.98dBm. The power reduction level is 4.25dB.

This device has curved-edge industrial design of the outer housing, the 4 edges between Bottom-Face and Front-Face (Display surface) employ curvature transition; the detailed antenna location and proximity sensor pad location around the curvature surface is illustrated in operational description exhibit.

RF exposure at the curved-surface was taken into consideration. For SAR testing at the curved surface of Edge1 and Edge4 directly contacted with phantom, pre-test at different EUT tilt angles were performed and the worst case was chosen for SAR testing. SAR test data submitted represents the most conservative RF exposure level

In this SAR test setup, the proximity sensor will be triggered and EUT is in WWAN power reduction mode.

# 4. Specific Absorption Rate (SAR)

## 4.1 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.

## 4.2 SAR Definition

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

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

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

SAR measurement can be either related to the temperature elevation in tissue by

$$\mathbf{SAR} = \mathbf{C}\left(\frac{\boldsymbol{\delta}\mathbf{T}}{\boldsymbol{\delta}\mathbf{t}}\right)$$

Where: C is the specific heat capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

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

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

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

# 5. SAR Measurement System

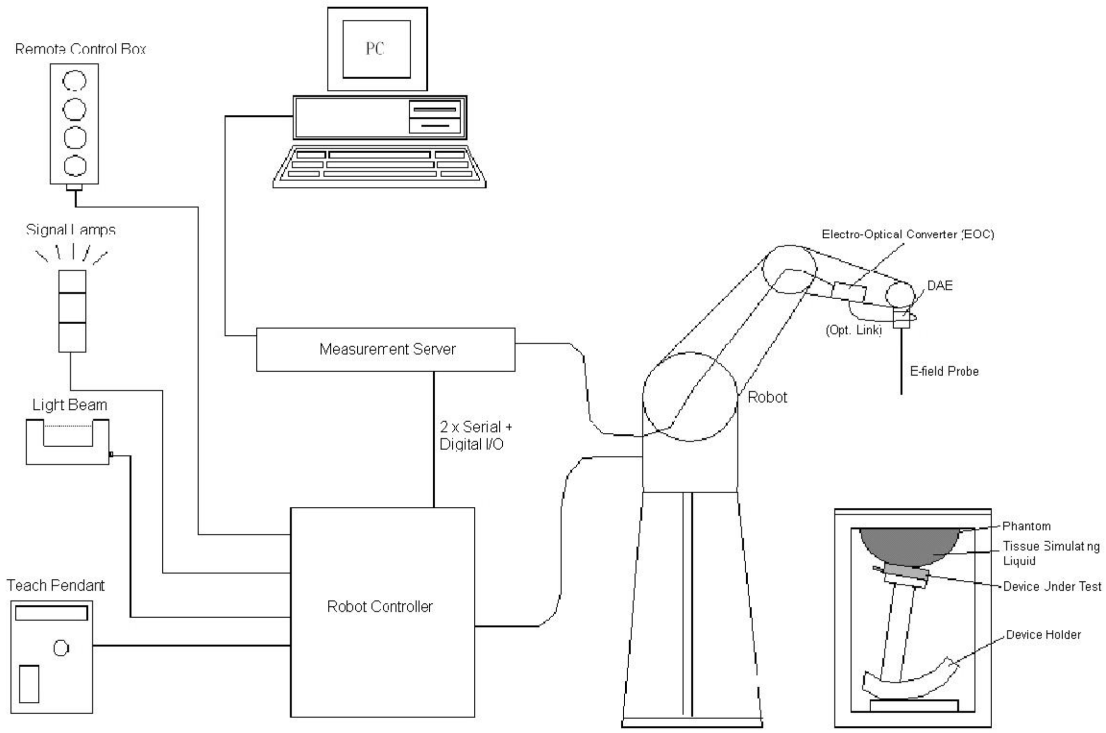



**Fig 5.1 SPEAG DASY System Configurations**

The DASY system for performance compliance tests is illustrated above graphically. This system consists of the following items:

- A standard high precision 6-axis robot with controller, a teach pendant and software
- A data acquisition electronic (DAE) attached to the robot arm extension
- A dosimetric probe equipped with an optical surface detector system
- The electro-optical converter (EOC) performs the conversion between optical and electrical signals
- A measurement server performs the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the accuracy of the probe positioning
- A computer operating Windows XP
- DASY software
- Remove control with teach pendant and additional circuitry for robot safety such as warming lamps, etc.
- The SAM twin phantom
- A device holder
- Tissue simulating liquid
- Dipole for evaluating the proper functioning of the system

Some of the components are described in details in the following sub-sections.

## 5.1 <u>E-Field Probe</u>

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

### 5.1.1 E-Field Probe Specification

**<ET3DV6 / ET3DV6R Probe >**

| | |
|---|---|
| **Construction** | Symmetrical design with triangular core<br>Built-in optical fiber for surface detection system.<br>Built-in shielding against static charges.<br>PEEK enclosure material (resistant to organic solvents, e.g., DGBE) |
| **Frequency** | 10 MHz to 3 GHz; Linearity: ± 0.2 dB |
| **Directivity** | ± 0.2 dB in HSL (rotation around probe axis)<br>± 0.4 dB in HSL (rotation normal to probe axis) |
| **Dynamic Range** | 5 µW/g to 100 mW/g; Linearity: ± 0.2 dB |
| **Dimensions** | Overall length: 330 mm (Tip: 16 mm)<br>Tip diameter: 6.8 mm (Body: 12 mm)<br>Distance from probe tip to dipole centers: 2.7 mm |

**Fig 5.2 Photo of ET3DV6/ET3DV6R**

**<EX3DV4 / ES3DV4 Probe>**

| | |
|---|---|
| **Construction** | Symmetrical design with triangular core<br>Built-in shielding against static charges<br>PEEK enclosure material (resistant to organic solvents, e.g., DGBE) |
| **Frequency** | 10 MHz to 6 GHz; Linearity: ± 0.2 dB |
| **Directivity** | ± 0.3 dB in HSL (rotation around probe axis)<br>± 0.5 dB in tissue material (rotation normal to probe axis) |
| **Dynamic Range** | 10 µW/g to 100 mW/g; Linearity: ± 0.2 dB<br>(noise: typically < 1 µW/g) |
| **Dimensions** | Overall length: 330 mm (Tip: 20 mm)<br>Tip diameter: 2.5 mm (Body: 12 mm)<br>Typical distance from probe tip to dipole centers: 1 mm |

**Fig 5.3 Photo of EX3DV4/ES3DV4**

### 5.1.2 E-Field Probe Calibration

Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy shall be evaluated and within ± 0.25 dB. The sensitivity parameters (NormX, NormY, and NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested. The calibration data can be referred to Appendix C of this report.

## 5.2 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 5.4 Photo of DAE**

## 5.3 Robot

The SPEAG DASY system uses the high precision robots (DASY4: RX90BL; DASY5: TX90XL) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY4: CS7MB; DASY5: CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability ±0.035 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)

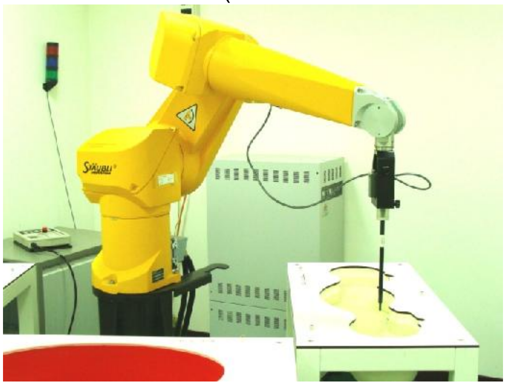


**Fig 5.5 Photo of DASY4**

**Fig 5.6 Photo of DASY5**

## 5.4 Measurement Server

The measurement server is based on a PC/104 CPU board with CPU (DASY4: 166 MHz, Intel Pentium; DASY5: 400 MHz, Intel Celeron), chipdisk (DASY4: 32 MB; DASY5: 128 MB), RAM (DASY4: 64 MB, DASY5: 128 MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all the real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operations.


**Fig 5.7 Photo of Server for DASY4**


**Fig 5.8 Photo of Server for DASY5**

## 5.5 Phantom

**<SAM Twin Phantom>**

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

**Fig 5.9 Photo of SAM 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.

**<ELI4 Phantom>**

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

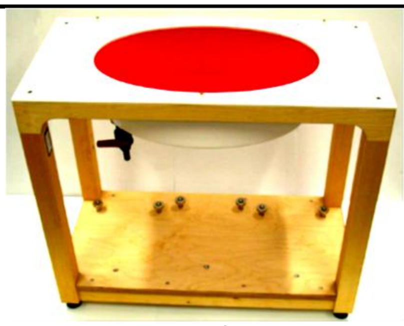


**Fig 5.10 Photo of ELI4 Phantom**

The ELI4 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.

## 5.6 *Device Holder*

**<Device Holder for SAM Twin Phantom>**

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of ± 0.5 mm would produce a SAR uncertainty of ± 20 %. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity ε = 3 and loss tangent δ = 0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

**Fig 5.11 Device Holder**

**<Laptop Extension Kit>**

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.

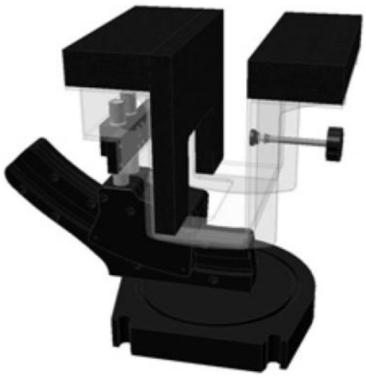


**Fig 5.12 Laptop Extension Kit**

## 5.7 <u>Data Storage and Evaluation</u>

### 5.7.1 Data Storage

The DASY software stores the assessed data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all the necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files. The post-processing software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of erroneous parameter settings. For example, if a measurement has been performed with an incorrect crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be reevaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type (e.g., [V/m], [A/m], [mW/g]). Some of these units are not available in certain situations or give meaningless results, e.g., a SAR-output in a non-lose media, will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

### 5.7.2 Data Evaluation

The DASY post-processing software (SEMCAD) automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software :

| | | |
|---|---|---|
| **Probe parameters** : | - Sensitivity | $Norm_i$, $a_{i0}$, $a_{i1}$, $a_{i2}$ |
| | - Conversion factor | $ConvF_i$ |
| | - Diode compression point | $dcp_i$ |
| **Device parameters** : | - Frequency | f |
| | - Crest factor | cf |
| **Media parameters** : | - Conductivity | σ |
| | - Density | ρ |

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multi-meter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power.

The formula for each channel can be given as：

$$\mathbf{V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}}$$

with $V_i$ = compensated signal of channel i, (i = x, y, z)
$U_i$ = input signal of channel i, (i = x, y, z)
cf = crest factor of exciting field (DASY parameter)
$dcp_i$ = diode compression point (DASY parameter)

From the compensated input signals, the primary field data for each channel can be evaluated：

E-field Probes：$\mathbf{E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}}$

H-field Probes：$\mathbf{H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1} f + a_{i2} f^2}{f}}$

with $V_i$ = compensated signal of channel i, (i = x, y, z)
$Norm_i$ = sensor sensitivity of channel i, (i = x, y, z), $\mu V/(V/m)^2$ for E-field Probes
ConvF = sensitivity enhancement in solution
$a_{ij}$ = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
$E_i$ = electric field strength of channel i in V/m
$H_i$ = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude)：

$$\mathbf{E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}}$$

The primary field data are used to calculate the derived field units.

$$\mathbf{SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1000}}$$

with SAR = local specific absorption rate in mW/g
$E_{tot}$ = total field strength in V/m
σ = conductivity in [mho/m] or [Siemens/m]
ρ = equivalent tissue density in $g/cm^3$

Note that the density is set to 1, to account for actual head tissue density rather than the density of the tissue simulating liquid.

## 5.8 Test Equipment List

| Manufacturer | Name of Equipment | Type/Model | Serial Number | Calibration | |
|---|---|---|---|---|---|
| | | | | Last Cal. | Due Date |
| SPEAG | 750MHz System Validation Kit | D750V3 | 1012 | Jun. 11, 2010 | Jun. 10, 2013 |
| SPEAG | 835MHz System Validation Kit | D835V2 | 499 | Mar. 22, 2010 | Mar. 21, 2013 |
| SPEAG | 1750MHz System Validation Kit | D1750V2 | 1023 | Jun. 20, 2012 | Jun. 19, 2013 |
| SPEAG | 1900MHz System Validation Kit | D1900V2 | 5d041 | Mar. 23, 2010 | Mar. 22, 2013 |
| SPEAG | 2450MHz System Validation Kit | D2450V2 | 736 | Jul. 25, 2011 | Jul. 24, 2013 |
| SPEAG | 5GHz System Validation Kit | D5GHzV2 | 1006 | Jan. 18, 2012 | Jan. 17, 2013 |
| SPEAG | Data Acquisition Electronics | DAE4 | 778 | Nov. 22, 2011 | Nov. 21, 2012 |
| SPEAG | Data Acquisition Electronics | DAE3 | 495 | Apr. 23, 2012 | Apr. 22, 2013 |
| SPEAG | Data Acquisition Electronics | DAE4 | 1279 | May 03, 2012 | May 02, 2013 |
| SPEAG | Data Acquisition Electronics | DAE4 | 1338 | Jun. 12, 2012 | Jun. 11, 2013 |
| SPEAG | Dosimetric E-Field Probe | ET3DV6 | 1787 | May 29, 2012 | May 28, 2013 |
| SPEAG | Dosimetric E-Field Probe | ET3DV6R | 1788 | Jan. 26, 2012 | Jan. 25, 2013 |
| SPEAG | Dosimetric E-Field Probe | EX3DV4 | 3792 | Jun. 21, 2012 | Jun. 20, 2013 |
| SPEAG | Dosimetric E-Field Probe | EX3DV4 | 3819 | Nov. 16, 2011 | Nov. 15, 2012 |
| SPEAG | Dosimetric E-Field Probe | EX3DV4 | 3578 | Jun. 21, 2012 | Jun. 20, 2013 |
| SPEAG | Device Holder | N/A | N/A | NCR | NCR |
| SPEAG | SAM Phantom | QD 000 P40 C | TP-1303 | NCR | NCR |
| SPEAG | SAM Phantom | QD 000 P40 C | TP-1383 | NCR | NCR |
| SPEAG | SAM Phantom | QD 000 P40 C | TP-1446 | NCR | NCR |
| SPEAG | SAM Phantom | QD 000 P40 C | TP-1478 | NCR | NCR |
| SPEAG | SAM Phantom | QD 000 P41 C | TP-1150 | NCR | NCR |
| SPEAG | SAM Phantom | QD 000 P40 CD | TP-1644 | NCR | NCR |
| SPEAG | SAM Phantom | SM 000 T01 DA | TP-1542 | NCR | NCR |
| SPEAG | ELI4 Phantom | QD 0VA 001 BB | 1026 | NCR | NCR |
| SPEAG | ELI4 Phantom | QD 0VA 001 BA | 1029 | NCR | NCR |
| SPEAG | ELI4 Phantom | QD 0VA 002 AA | TP-1127 | NCR | NCR |
| SPEAG | ELI4 Phantom | QD 0VA 002 AA | TP-1131 | NCR | NCR |
| Agilent | Network Analyzer | E5071C | MY46101588 | May 11, 2012 | May 10, 2013 |
| Agilent | ESG Vector Series Signal Generator | E4438C | MY49070755 | Oct. 17, 2011 | Oct. 16, 2012 |
| Anritsu | Power Meter | ML2495A | 0932001 | Sep. 21, 2011 | Sep. 20, 2012 |
| Anritsu | Radio Communication Analyzer | MT8820C | 6201074414 | Dec. 21, 2011 | Dec. 20, 2012 |
| Agilent | Wireless Communication Test Set | E5515C | MY48360820 | Jan. 05, 2012 | Jan. 04, 2014 |
| Agilent | Wireless Communication Test Set | E5515C | GB46311322 | Mar. 23, 2011 | Mar. 22, 2013 |
| Agilent | Wireless Communication Test Set | E5515C | MY50264370 | Apr. 19, 2011 | Apr. 18, 2013 |
| Agilent | Wireless Communication Test Set | E5515C | MY50266977 | Nov. 13, 2011 | Nov. 12, 2013 |
| R&S | Universal Digital Radiocommunication Tester | CMU200 | 117997 | Aug. 22, 2011 | Aug. 21, 2012 |
| R&S | Universal Digital Radiocommunication Tester | CMU200 | 106656 | Jun. 28, 2012 | Jun. 27, 2013 |
| R&S | Spectrum Analyzer | FSP7 | 101131 | Jul. 23, 2012 | Jul. 22, 2013 |

**Table 5.1 Test Equipment List**

**Note:**

1. The calibration certificate of DASY can be referred to Appendix C of this report.
2. Referring to KDB 450824 D02, the dipole calibration interval can be extended to 3 years with justification. The dipoles are also not physically damaged, or repaired during the interval.
3. The justification data of dipole D750V3, SN: 1012, D835V2, SN: 499, D1900V2, SN: 5d041, and D2450V2, SN: 736, can be found in appendix C. The return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration.

# 6. 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. 6.1. 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. 6.2.

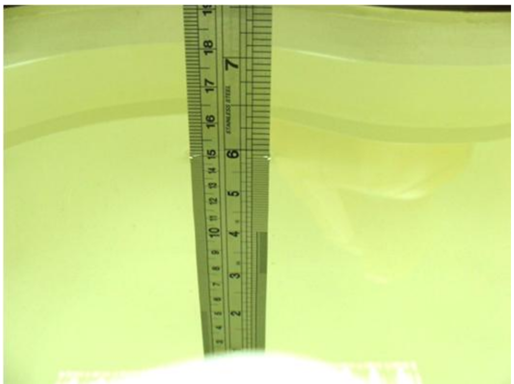


**Fig 6.1 Photo of Liquid Height for Head SAR**

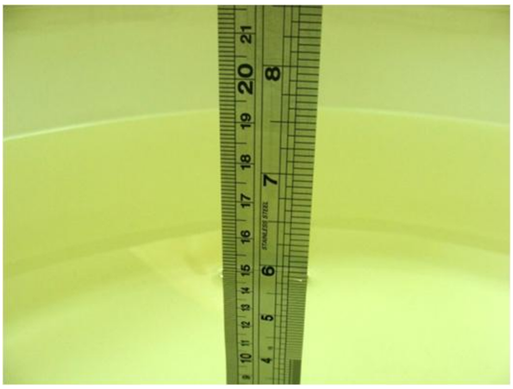


**Fig 6.2 Photo of Liquid Height for Body SAR**

The following table gives the recipes for tissue simulating liquid.

| Frequency (MHz) | Water (%) | Sugar (%) | Cellulose (%) | Salt (%) | Preventol (%) | DGBE (%) | Conductivity (σ) | Permittivity ($\varepsilon_r$) |
|---|---|---|---|---|---|---|---|---|
| **For Head** | | | | | | | | |
| 750 | 41.1 | 57.0 | 0.2 | 1.4 | 0.2 | 0 | 0.89 | 41.9 |
| 835 | 40.3 | 57.9 | 0.2 | 1.4 | 0.2 | 0 | 0.90 | 41.5 |
| 900 | 40.3 | 57.9 | 0.2 | 1.4 | 0.2 | 0 | 0.97 | 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 |
| **For Body** | | | | | | | | |
| 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 |
| 900 | 50.8 | 48.2 | 0 | 0.9 | 0.1 | 0 | 1.05 | 55.0 |
| 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 |

**Table 6.1 Recipes of Tissue Simulating Liquid**

**Simulating Liquid for 5G, Manufactured by SPEAG**

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

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an Agilent 85070D Dielectric Probe Kit and an Agilent Network Analyzer.

The following table shows the measurement results for simulating liquid.

| Freq. (MHz) | Liquid Type | Temp. (℃) | Conductivity ($\sigma$) | Permittivity ($\varepsilon_r$) | Conductivity Target ($\sigma$) | Permittivity Target ($\varepsilon_r$) | Delta ($\sigma$) (%) | Delta ($\varepsilon_r$) (%) | Limit (%) | Date |
|---|---|---|---|---|---|---|---|---|---|---|
| 750 | Body | 21.4 | 0.962 | 53.914 | 0.96 | 55.5 | 0.21 | -2.86 | ±5 | Jul. 24, 2012 |
| 750 | Body | 21.5 | 0.963 | 54.2 | 0.96 | 55.5 | 0.31 | -2.34 | ±5 | Aug. 16, 2012 |
| 835 | Body | 21.3 | 0.983 | 54.388 | 0.97 | 55.2 | 1.34 | -1.47 | ±5 | Jul. 24, 2012 |
| 835 | Body | 21.5 | 0.996 | 55.4 | 0.97 | 55.2 | 2.68 | 0.36 | ±5 | Aug. 15, 2012 |
| 835 | Body | 21.5 | 0.994 | 54.7 | 0.97 | 55.2 | 2.47 | -0.91 | ±5 | Aug. 21, 2012 |
| 1750 | Body | 21.5 | 1.55 | 51.7 | 1.52 | 53.3 | 1.97 | -3.00 | ±5 | Jul. 26, 2012 |
| 1750 | Body | 21.5 | 1.51 | 51.3 | 1.52 | 53.3 | -0.66 | -3.75 | ±5 | Aug. 16, 2012 |
| 1750 | Body | 21.5 | 1.51 | 52.2 | 1.52 | 53.3 | -0.66 | -2.06 | ±5 | Aug. 21, 2012 |
| 1900 | Body | 21.4 | 1.516 | 53.631 | 1.52 | 53.3 | -0.26 | 0.62 | ±5 | Jul. 25, 2012 |
| 1900 | Body | 21.5 | 1.55 | 51.9 | 1.52 | 53.3 | 1.97 | -2.63 | ±5 | Aug. 16, 2012 |
| 1900 | Body | 21.5 | 1.52 | 54.6 | 1.52 | 53.3 | 0.00 | 2.44 | ±5 | Aug. 20, 2012 |
| 2450 | Body | 21.5 | 1.96 | 53.8 | 1.95 | 52.7 | 0.51 | 2.09 | ±5 | Jul. 25, 2012 |
| 2450 | Body | 21.5 | 1.973 | 52.342 | 1.95 | 52.7 | 1.18 | -0.68 | ±5 | Jul. 26, 2012 |
| 2450 | Body | 21.5 | 1.96 | 53.8 | 1.95 | 52.7 | 0.51 | 2.09 | ±5 | Sep. 13, 2012 |
| 2450 | Body | 21.5 | 1.969 | 52.278 | 1.95 | 52.7 | 0.97 | -0.8 | ±5 | Sep. 15, 2012 |
| 5200 | Body | 21.5 | 5.373 | 48.526 | 5.30 | 49.0 | 1.38 | -0.97 | ±5 | Jul. 24, 2012 |
| 5200 | Body | 21.6 | 5.297 | 49.185 | 5.3 | 49 | -0.06 | 0.38 | ±5 | Jul. 25, 2012 |
| 5200 | Body | 21.5 | 5.3 | 49.2 | 5.30 | 49.0 | 0.00 | 0.41 | ±5 | Sep. 13, 2012 |
| 5200 | Body | 21.5 | 5.162 | 48.492 | 5.30 | 49.0 | -2.60 | -1.04 | ±5 | Sep. 14, 2012 |
| 5200 | Body | 21.5 | 5.297 | 49.185 | 5.30 | 49.0 | -0.06 | 0.38 | ±5 | Sep. 17, 2012 |
| 5200 | Body | 21.5 | 5.28 | 48.5 | 5.30 | 49.0 | -0.38 | -1.02 | ±5 | Sep. 17, 2012 |
| 5500 | Body | 21.5 | 5.806 | 47.837 | 5.65 | 48.6 | 2.76 | -1.57 | ±5 | Jul. 24, 2012 |
| 5500 | Body | 21.6 | 5.738 | 48.597 | 5.65 | 48.6 | 1.56 | -0.01 | ±5 | Jul. 25, 2012 |
| 5500 | Body | 21.5 | 5.74 | 48.6 | 5.65 | 48.6 | 1.59 | 0.00 | ±5 | Sep. 13, 2012 |
| 5500 | Body | 21.5 | 5.587 | 47.93 | 5.65 | 48.6 | -1.12 | -1.38 | ±5 | Sep. 14, 2012 |
| 5800 | Body | 21.5 | 6.219 | 47.128 | 6.00 | 48.2 | 3.65 | -2.22 | ±5 | Jul. 24, 2012 |
| 5800 | Body | 21.6 | 6.127 | 47.784 | 6 | 48.2 | 2.12 | -0.86 | ±5 | Jul. 25, 2012 |
| 5800 | Body | 21.5 | 6.13 | 47.8 | 6.00 | 48.2 | 2.17 | -0.83 | ±5 | Sep. 13, 2012 |
| 5800 | Body | 21.5 | 5.976 | 47.158 | 6.00 | 48.2 | -0.40 | -2.16 | ±5 | Sep. 15, 2012 |
| 5800 | Body | 21.5 | 6.11 | 47.2 | 6.00 | 48.2 | 1.83 | -2.07 | ±5 | Sep. 17, 2012 |

**Table 6.2 Measuring Results for Simulating Liquid**

# 7. SAR Measurement Evaluation

Each DASY system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY software, enable the user to conduct the system performance check and system validation. System validation kit includes a dipole, tripod holder to fix it underneath the flat phantom and a corresponding distance holder.

## 7.1 Purpose of System Performance check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

## 7.2 System Setup

In the simplified setup for system evaluation, the EUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:

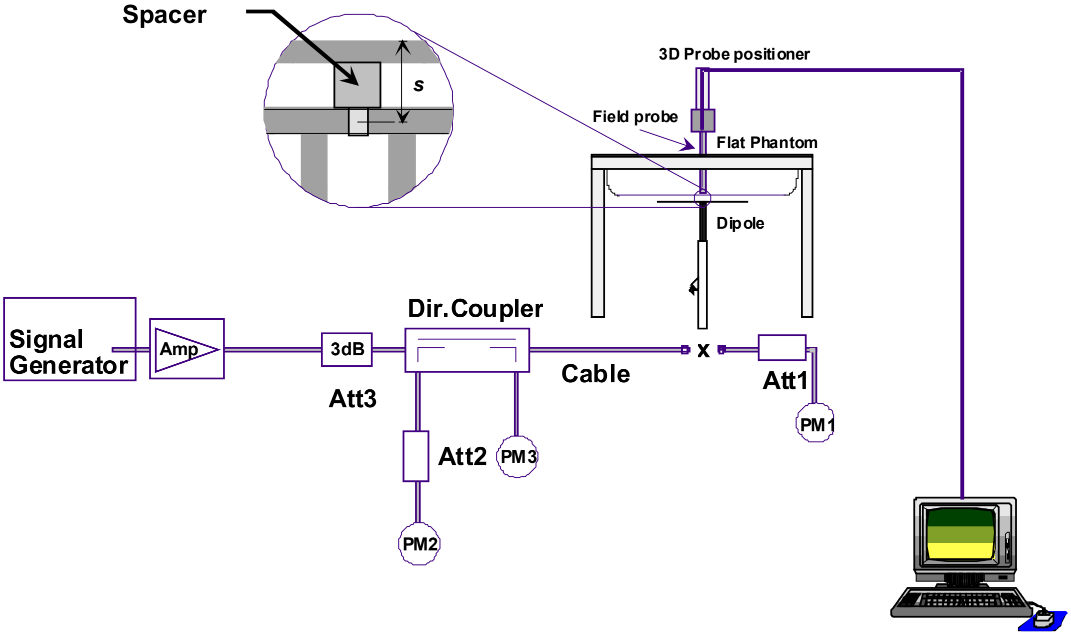



**Fig 7.1 System Setup for System Evaluation**

1. Signal Generator
2. Amplifier
3. Directional Coupler
4. Power Meter
5. Calibrated Dipole

The output power on dipole port must be calibrated to 24 dBm (250 mW) before dipole is connected.

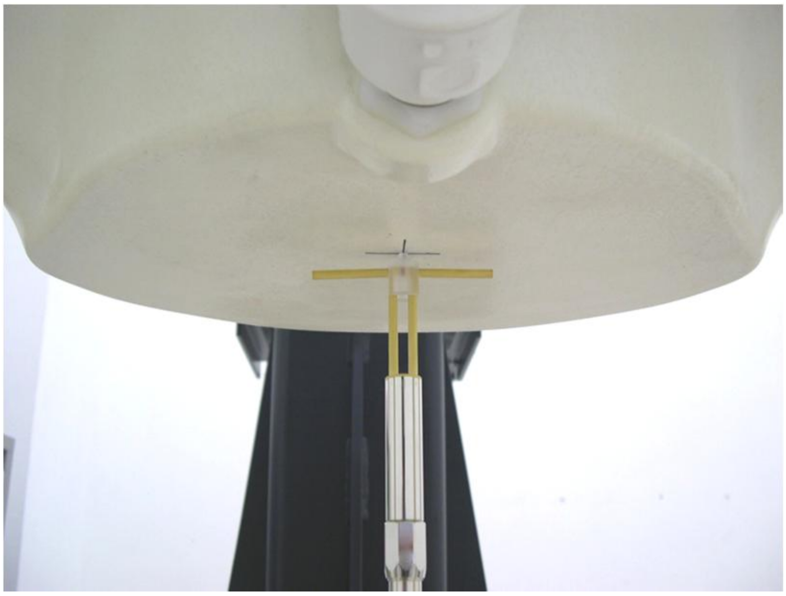


**Fig 7.2 Photo of Dipole Setup**

## 7.3 *Validation Results*

Comparing to the original SAR value provided by SPEAG, the validation data should be within its specification of 10 %. Table 7.1 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.

| Measurement Date | Frequency (MHz) | Liquid Type | Targeted $SAR_{1g}$ (W/kg) | Measured $SAR_{1g}$ (W/kg) | Normalized $SAR_{1g}$ (W/kg) | Deviation (%) |
|---|---|---|---|---|---|---|
| Jul. 24, 2012 | 750 | Body | 8.86 | 2.14 | 8.56 | -3.39 |
| Aug. 16, 2012 | 750 | Body | 8.86 | 2.28 | 9.12 | 2.93 |
| Jul. 24, 2012 | 835 | Body | 9.82 | 2.51 | 10.04 | 2.24 |
| Aug. 15, 2012 | 835 | Body | 9.82 | 2.55 | 10.20 | 3.87 |
| Aug. 21, 2012 | 835 | Body | 9.82 | 2.5 | 10.00 | 1.83 |
| Jul. 26, 2012 | 1750 | Body | 37 | 9.83 | 39.32 | 6.27 |
| Aug. 16, 2012 | 1750 | Body | 37 | 8.58 | 34.32 | -7.24 |
| Aug. 21, 2012 | 1750 | Body | 37 | 9.12 | 36.48 | -1.41 |
| Jul. 25, 2012 | 1900 | Body | 40 | 9.32 | 37.28 | -6.80 |
| Aug. 16, 2012 | 1900 | Body | 40 | 9.46 | 37.84 | -5.40 |
| Aug. 20, 2012 | 1900 | Body | 40 | 10.1 | 40.40 | 1.00 |
| Jul. 25, 2012 | 2450 | Body | 52.3 | 12.6 | 50.40 | -3.63 |
| Jul. 26, 2012 | 2450 | Body | 52.3 | 13.1 | 52.40 | 0.19 |
| Sep. 13, 2012 | 2450 | Body | 52.3 | 13 | 52.00 | -0.57 |
| Sep. 15, 2012 | 2450 | Body | 52.3 | 13 | 52.00 | -0.57 |
| Jul. 24, 2012 | 5200 | Body | 72.6 | 18.3 | 73.20 | 0.83 |
| Jul. 25, 2012 | 5200 | Body | 72.6 | 18 | 72.00 | -0.83 |
| Sep. 13, 2012 | 5200 | Body | 72.60 | 18.6 | 74.40 | 2.48 |
| Sep. 14, 2012 | 5200 | Body | 72.60 | 19 | 76.00 | 4.68 |
| Sep. 17, 2012 | 5200 | Body | 72.60 | 18.6 | 74.40 | 2.48 |
| Sep. 17, 2012 | 5200 | Body | 72.60 | 16.7 | 66.80 | -7.99 |
| Jul. 24, 2012 | 5500 | Body | 78.8 | 20.1 | 80.40 | 2.03 |
| Jul. 25, 2012 | 5500 | Body | 78.8 | 19.9 | 79.60 | 1.02 |
| Sep. 13, 2012 | 5500 | Body | 78.80 | 19.9 | 79.60 | 1.02 |
| Sep. 14, 2012 | 5500 | Body | 78.80 | 19.4 | 77.60 | -1.52 |
| Jul. 24, 2012 | 5800 | Body | 73.1 | 19.2 | 76.80 | 5.06 |
| Jul. 25, 2012 | 5800 | Body | 73.1 | 18.9 | 75.60 | 3.42 |
| Sep. 13, 2012 | 5800 | Body | 73.10 | 19.6 | 78.40 | 7.25 |
| Sep. 15, 2012 | 5800 | Body | 73.10 | 18.5 | 74.00 | 1.23 |
| Sep. 17, 2012 | 5800 | Body | 73.1 | 16.9 | 67.60 | -7.52 |

**Table 7.1 Target and Measurement SAR after Normalized**

# 8. *EUT Testing Position*

Refer to "SAR Test Photo exhibit for detailed test setup information.

# 9. Measurement Procedures

The measurement procedures are as follows:

(a) Use base station simulator (if applicable) or engineering software to transmit RF power continuously (continuous Tx) in the highest power channel.
(b) Keep EUT to radiate maximum output power or 100% duty factor (if applicable)
(c) Measure output power through RF cable and power meter.
(d) Place the EUT in the positions as Appendix E demonstrates.
(e) Set scan area, grid size and other setting on the DASY software.
(f) Measure SAR results for the highest power channel on each testing position.
(g) Find out the largest SAR result on these testing positions of each band
(h) Measure SAR results for other channels in worst SAR testing position if the 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

## 9.1 Spatial Peak SAR Evaluation

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

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

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

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

## 9.2 Area & Zoom Scan Procedures

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan measures 5x5x7 points with step size 8, 8 and 5 mm for 300 MHz to 3 GHz, and 8x8x8 points with step size 4, 4 and 2.5 mm for 3 GHz to 6 GHz. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g.

## 9.3 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 (step-size is 4, 4 and 2.5 mm). When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

## 9.4 SAR Averaged Methods

In DASY, the interpolation and extrapolation are both based on the modified Quadratic Shepard's method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5 mm.

## 9.5 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.

# 10. SAR Test Configurations

## 10.1 Exposure Positions Consideration

| Sides for SAR tests; Tablet mode | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Technology | Transmitting Antenna | Front Face | Bottom Face | Edge 1 | Edge 2 | Edge 3 | Edge 4 | Curved surface of Edge 1 / Bottom-Face | Curved surface of Edge 4 / Bottom-Face |
| GPRS/EDGE<br>UMTS<br>LTE | WWAN Main | No | Yes (0, 11mm) | Yes (0, 9mm) | Yes (0 mm) | No | No | Tilted | No |
| 2.4GHz 802.11 b/g/n (SISO)<br>5GHz 802.11 a/n (SISO) | WLAN Ant. 1 | No | Yes (0 mm) | Yes (0 mm) | No | No | Yes (0 mm) | Tilted | No |
| 2.4GHz 802.11 n (MIMO)<br>5GHz 802.11 n (MIMO) | WLAN Ant. 1+2 | No | Yes (0 mm) | Yes (0 mm) | No | No | Yes (0 mm) | Tilted | Tilted |

**Note:**

1. Per KDB 941225 D07, the EUT diagonal > 20 cm and Mini-Tablet procedure is not applied. Therefore, SAR tests follow the Tablet Mode in KDB 447498.
2. There is no screen orientation limitation in EUT; that is 4 orientations are supported. The power reduction for SAR compliance is not triggered by the screen orientation, but triggered by the proximity sensor.
3. As in (1), the test distance is 0 mm to the flat phantom; SAR evaluation is required for Bottom Face and each applicable Edge with the antenna within 5 cm to the user.
4. The proximity sensor is designed to be triggered for Bottom Face and Edge 1 exposure positions. During SAR tests for EUT other edges, the sensor was disabled via a test software tool which is for the purpose of performing SAR and EMC test only and will not be available to the end user.
5. The test distance 11 mm at Bottom Face and 9 mm at Edge 1 are for verifying the conservative condition, whichever EUT proximity sensor maximum activated distance are 12 mm and 10 mm respectively. The EUT is set in full-power mode at 11 mm test distance to the phantom for Bottom Face and 9 mm test distance to the phantom for Edge 1.
6. EUT does not support voice call function; therefore GSM SAR is not required.
7. Per KDB 447498 D01, the distance from the WWAN Main antenna to the Edge 3 / Edge 4 > 5 cm, therefore the stand-alone SAR in these configurations is not required.
8. Per KDB 447498 D01, the distance from WLAN antenna 1 and WLAN antenna 2 to the Edge 2 / Edge 3 > 5 cm, therefore the stand-alone in these configurations SAR are not required.
9. WLAN Antenna 2 only transmits during 802.11n MIMO mode, it cannot transmit in SISO mode. 802.11n SISO mode transmits via WLAN Ant. 1 only.
10. For SAR testing at the curved surface of Edge1 and Edge4 directly contacted with phantom, pre-test at different EUT tilt angles were performed and the worst case was chosen for SAR testing. SAR test data submitted represents the most conservative RF exposure level

## 10.2 Conducted RF Output Power (Unit: dBm)

### <GSM850>

| Burst Average Power | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Band | GSM850 | | | | | | | | |
| Channel | 128 | 189 | 251 | 128 | 189 | 251 | 128 | 189 | 251 |
| Frequency (MHz) | 824.2 | 836.4 | 848.8 | 824.2 | 836.4 | 848.8 | 824.2 | 836.4 | 848.8 |
| Mode | Without Power Back-off | | | With Power Back-off | | | Pwr. Reduction (dB) | | |
| GPRS 8 (1 Uplink) CS1 | 31.71 | 31.82 | 31.80 | 25.32 | 25.40 | 25.35 | 6.39 | 6.42 | 6.45 |
| GPRS 10 (2 Uplink) CS1 | 31.37 | 31.48 | 31.47 | 23.03 | 23.15 | 22.99 | 8.34 | 8.33 | 8.48 |
| EDGE 8 (GMSK, 1 Uplink) MCS1 | 31.70 | 31.81 | 31.78 | 25.28 | 25.37 | 25.32 | 6.42 | 6.44 | 6.46 |
| EDGE 10 (GMSK, 2 Uplink) MCS1 | 31.35 | 31.46 | 31.46 | 22.95 | 23.09 | 22.94 | 8.40 | 8.37 | 8.52 |
| EDGE 8 (8PSK, 1 Uplink) MCS9 | 26.05 | 26.10 | 26.07 | 19.60 | 19.71 | 19.67 | 6.45 | 6.39 | 6.40 |
| EDGE 10 (8PSK, 2 Uplink) MCS9 | 25.95 | 26.05 | 26.03 | 19.52 | 19.65 | 19.58 | 6.43 | 6.40 | 6.45 |
| Source-Based Time-Averaged Power | | | | | | | | | |
| Band | GSM850 | | | | | | | | |
| Channel | 128 | 189 | 251 | 128 | 189 | 251 | 128 | 189 | 251 |
| Frequency (MHz) | 824.2 | 836.4 | 848.8 | 824.2 | 836.4 | 848.8 | 824.2 | 836.4 | 848.8 |
| Mode | Without Power Back-off | | | With Power Back-off | | | Pwr. Reduction (dB) | | |
| GPRS 8 (1 Uplink) CS1 | 22.71 | 22.82 | 22.80 | 16.32 | 16.40 | 16.35 | 6.39 | 6.42 | 6.45 |
| GPRS 10 (2 Uplink) CS1 | 25.37 | 25.48 | 25.47 | 17.03 | 17.15 | 16.99 | 8.34 | 8.33 | 8.48 |
| EDGE 8 (GMSK, 1 Uplink) MCS1 | 22.70 | 22.81 | 22.78 | 16.28 | 16.37 | 16.32 | 6.42 | 6.44 | 6.46 |
| EDGE 10 (GMSK, 2 Uplink) MCS1 | 25.35 | 25.46 | 25.46 | 16.95 | 17.09 | 16.94 | 8.40 | 8.37 | 8.52 |
| EDGE 8 (8PSK, 1 Uplink) MCS9 | 17.05 | 17.10 | 17.07 | 10.60 | 10.71 | 10.67 | 6.45 | 6.39 | 6.40 |
| EDGE 10 (8PSK, 2 Uplink) MCS9 | 19.95 | 20.05 | 20.03 | 13.52 | 13.65 | 13.58 | 6.43 | 6.40 | 6.45 |

**Remark:** The source-based time-averaged power is linearly scaled the maximum burst averaged power based on time slots. The calculated method is shown as below:
Source based time averaged power = Maximum burst averaged power (1 Uplink) - 9 dB
Source based time averaged power = Maximum burst averaged power (2 Uplink) - 6 dB

**Note:**

1. Following KDB 941225 D03, for Body SAR testing, the EUT was set in GPRS 10 for GSM850 due to its highest source-based time-average power.
2. Per KDB 447498, the maximum output power channel is used for SAR testing and for further SAR test reduction.
3. EDGE tests with MCS1 setting, GMSK modulation. Burst average power with MCS9 setting 8 PSK modulations is provided voluntarily for reference.

<GSM1900>

| Burst Average Power | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Band | GSM1900 | | | | | | | | |
| Channel | 512 | 661 | 810 | 512 | 661 | 810 | 512 | 661 | 810 |
| Frequency (MHz) | 1850.2 | 1880 | 1909.8 | 1850.2 | 1880 | 1909.8 | 1850.2 | 1880 | 1909.8 |
| Mode | Without Power Back-off | | | With Power Back-off | | | Pwr. Reduction (dB) | | |
| GPRS 8 (1 Uplink) CS1 | 29.21 | 29.05 | 29.28 | 25.13 | 24.90 | 25.06 | 4.08 | 4.15 | 4.22 |
| GPRS 10 (2 Uplink) CS1 | 28.81 | 28.73 | 28.88 | 25.24 | 25.00 | 25.25 | 3.57 | 3.73 | 3.63 |
| EDGE 8 (GMSK, 1 Uplink) MCS1 | 29.19 | 29.04 | 29.26 | 25.23 | 24.86 | 25.06 | 3.96 | 4.18 | 4.20 |
| EDGE 10 (GMSK, 2 Uplink) MCS1 | 28.78 | 28.71 | 28.87 | 25.22 | 25.01 | 25.19 | 3.56 | 3.70 | 3.68 |
| EDGE 8 (8PSK, 1 Uplink) MCS9 | 25.02 | 25.03 | 25.08 | 21.73 | 21.57 | 21.75 | 3.29 | 3.46 | 3.33 |
| EDGE 10 (8PSK, 2 Uplink) MCS9 | 25.05 | 25.01 | 25.09 | 21.85 | 21.68 | 21.87 | 3.20 | 3.33 | 3.22 |
| Source-Based Time-Averaged Power | | | | | | | | | |
| Band | GSM1900 | | | | | | | | |
| Channel | 512 | 661 | 810 | 512 | 661 | 810 | 512 | 661 | 810 |
| Frequency (MHz) | 1850.2 | 1880 | 1909.8 | 1850.2 | 1880 | 1909.8 | 1850.2 | 1880 | 1909.8 |
| Mode | Without Power Back-off | | | With Power Back-off | | | Pwr. Reduction (dB) | | |
| GPRS 8 (1 Uplink) CS1 | 20.21 | 20.05 | 20.28 | 16.13 | 15.90 | 16.06 | 4.08 | 4.15 | 4.22 |
| GPRS 10 (2 Uplink) CS1 | 22.81 | 22.73 | 22.88 | 19.24 | 19.00 | 19.25 | 3.57 | 3.73 | 3.63 |
| EDGE 8 (GMSK, 1 Uplink) MCS1 | 20.19 | 20.04 | 20.26 | 16.23 | 15.86 | 16.06 | 3.96 | 4.18 | 4.20 |
| EDGE 10 (GMSK, 2 Uplink) MCS1 | 22.78 | 22.71 | 22.87 | 19.22 | 19.01 | 19.19 | 3.56 | 3.70 | 3.68 |
| EDGE 8 (8PSK, 1 Uplink) MCS9 | 16.02 | 16.03 | 16.08 | 12.73 | 12.57 | 12.75 | 3.29 | 3.46 | 3.33 |
| EDGE 10 (8PSK, 2 Uplink) MCS9 | 19.05 | 19.01 | 19.09 | 15.85 | 15.68 | 15.87 | 3.20 | 3.33 | 3.22 |

**Remark:** The source-based time-averaged power is linearly scaled the maximum burst averaged power based on time slots. The calculated method is shown as below:
Source based time averaged power = Maximum burst averaged power (1 Uplink) - 9 dB
Source based time averaged power = Maximum burst averaged power (2 Uplink) - 6 dB

**Note:**

1. Following KDB 941225 D03, for Body SAR testing, the EUT was set in GPRS 10 for GSM1900 due to its highest source-based time-average power.
2. Per KDB 447498, the maximum output power channel is used for SAR testing and for further SAR test reduction.
3. EDGE tests with MCS1 setting, GMSK modulation. Burst average power with MCS9 setting 8 PSK modulations is provided voluntarily for reference.

### <WCDMA Band V>

| Band | | WCDMA Band V | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Channel | | 4132 | 4182 | 4233 | 4132 | 4182 | 4233 | 4132 | 4182 | 4233 |
| Frequency (MHz) | | 826.4 | 836.4 | 846.6 | 826.4 | 836.4 | 846.6 | 826.4 | 836.4 | 846.6 |
| Mode | | Without Power Back-off | | | With Power Back-off | | | Pwr. Reduction (dB) | | |
| 3GPP Rel 99 | RMC 12.2K | 22.99 | 22.98 | 23.05 | 18.85 | 18.83 | 18.92 | 4.14 | 4.15 | 4.13 |
| 3GPP Rel 6 | HSDPA Subtest-1 | 22.11 | 22.23 | 22.21 | 17.90 | 18.02 | 18.08 | 4.21 | 4.21 | 4.13 |
| 3GPP Rel 6 | HSDPA Subtest-2 | 22.10 | 22.22 | 22.15 | 17.97 | 18.09 | 18.02 | 4.13 | 4.13 | 4.13 |
| 3GPP Rel 6 | HSDPA Subtest-3 | 21.62 | 21.73 | 21.75 | 17.49 | 17.60 | 17.62 | 4.13 | 4.13 | 4.13 |
| 3GPP Rel 6 | HSDPA Subtest-4 | 21.64 | 21.74 | 21.69 | 17.51 | 17.61 | 17.56 | 4.13 | 4.13 | 4.13 |
| 3GPP Rel 6 | HSUPA Subtest-1 | 21.41 | 22.10 | 22.06 | 17.28 | 17.92 | 17.88 | 4.13 | 4.18 | 4.18 |
| 3GPP Rel 6 | HSUPA Subtest-2 | 19.15 | 19.38 | 19.22 | 15.05 | 15.25 | 15.10 | 4.1 | 4.13 | 4.12 |
| 3GPP Rel 6 | HSUPA Subtest-3 | 20.52 | 20.85 | 20.88 | 16.39 | 16.70 | 16.73 | 4.13 | 4.15 | 4.15 |
| 3GPP Rel 6 | HSUPA Subtest-4 | 20.88 | 20.90 | 21.14 | 16.75 | 16.77 | 16.89 | 4.13 | 4.13 | 4.25 |
| 3GPP Rel 6 | HSUPA Subtest-5 | 21.22 | 21.88 | 21.78 | 17.09 | 17.75 | 17.65 | 4.13 | 4.13 | 4.13 |

**Note:**

1. Applying the subtest setup in Table C.11.1.3 of 3GPP TS 34.121-1 V9.1.0 to Rel. 6 HSPA.
2. Per KDB 941225 D01, RMC 12.2kbps setting is used to evaluate SAR. If HSDPA and HSUPA output power is < 1/4 dB higher than RMC, or SAR with RMC 12.2kbps setting is ≤ 1.2W/kg, HSDPA and HSUPA SAR evaluation can be excluded.
3. By design, HSDPA/HSUPA RF power will not be larger than RMC 12.2kbps; detailed information is included in Tune-up Procedure exhibit.
4. It is expected by the manufacturer that MPR for some HSDPA/HSUPA subtests may differ from the specification of 3GPP, according to the chipset implementation in this model. The implementation and expected deviation are detailed in the tune-up procedure exhibit.

**<WCDMA Band II>**

| Band | | WCDMA Band II | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Channel | | 9262 | 9400 | 9538 | 9262 | 9400 | 9538 | 9262 | 9400 | 9538 |
| Frequency (MHz) | | 1852.4 | 1880.0 | 1907.6 | 1852.4 | 1880.0 | 1907.6 | 1852.4 | 1880.0 | 1907.6 |
| Mode | | Without Power Back-off | | | With Power Back-off | | | Pwr. Reduction (dB) | | |
| 3GPP Rel 99 | RMC 12.2K | 23.39 | 23.32 | 23.38 | 18.39 | 18.30 | 18.35 | 5.00 | 5.02 | 5.03 |
| 3GPP Rel 6 | HSDPA Subtest-1 | 22.54 | 22.40 | 22.55 | 17.65 | 17.45 | 17.40 | 4.89 | 4.95 | 5.15 |
| 3GPP Rel 6 | HSDPA Subtest-2 | 22.40 | 22.33 | 22.34 | 17.61 | 17.48 | 17.45 | 4.79 | 4.85 | 4.89 |
| 3GPP Rel 6 | HSDPA Subtest-3 | 22.13 | 21.89 | 22.03 | 17.20 | 16.91 | 16.99 | 4.93 | 4.98 | 5.04 |
| 3GPP Rel 6 | HSDPA Subtest-4 | 21.90 | 21.89 | 21.86 | 17.19 | 16.94 | 17.01 | 4.71 | 4.95 | 4.85 |
| 3GPP Rel 6 | HSUPA Subtest-1 | 22.40 | 21.84 | 21.82 | 17.33 | 16.84 | 16.84 | 5.07 | 5.00 | 4.98 |
| 3GPP Rel 6 | HSUPA Subtest-2 | 19.63 | 19.70 | 19.77 | 14.76 | 14.76 | 14.77 | 4.87 | 4.94 | 5.00 |
| 3GPP Rel 6 | HSUPA Subtest-3 | 20.63 | 20.90 | 20.89 | 15.65 | 15.92 | 15.89 | 4.98 | 4.98 | 5.00 |
| 3GPP Rel 6 | HSUPA Subtest-4 | 21.32 | 21.37 | 21.41 | 16.02 | 16.07 | 16.09 | 5.30 | 5.30 | 5.32 |
| 3GPP Rel 6 | HSUPA Subtest-5 | 22.32 | 22.38 | 22.41 | 17.34 | 17.42 | 17.44 | 4.98 | 4.96 | 4.97 |

**Note:**

1. Applying the subtest setup in Table C.11.1.3 of 3GPP TS 34.121-1 V9.1.0 to Rel. 6 HSPA.
2. Per KDB 941225 D01, RMC 12.2kbps setting is used to evaluate SAR. If HSDPA and HSUPA output power is < 1/4 dB higher than RMC, or SAR with RMC 12.2kbps setting is ≤ 1.2W/kg, HSDPA and HSUPA SAR evaluation can be excluded.
3. By design, HSDPA/HSUPA RF power will not be larger than RMC 12.2kbps; detailed information is included in Tune-up Procedure exhibit.
4. It is expected by the manufacturer that MPR for some HSDPA/HSUPA subtests may differ from the specification of 3GPP, according to the chipset implementation in this model. The implementation and expected deviation are detailed in the tune-up procedure exhibit.

**<LTE band 17>**

| BW [MHz] | Mod / RB (Size - Offset) | Without Power Back-off | | | | | | | With Power Back-off | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Average Power. (dBm) | | | 3GPP MPR | MPR Result (dB) | | | Average Power. (dBm) | | | 3GPP MPR | MPR Result (dB) | | |
| | | Low Ch | Mid Ch | High Ch | | Low Ch | Mid Ch | High Ch | Low Ch | Mid Ch | High Ch | | Low Ch | Mid Ch | High Ch |
| Channel | | 23780 | 23790 | 23800 | | 23780 | 23790 | 23800 | 23780 | 23790 | 23800 | | 23780 | 23790 | 23800 |
| Frequency (MHz) | | 709 | 710 | 711 | | 709 | 710 | 711 | 709 | 710 | 711 | | 709 | 710 | 711 |
| 10 | QPSK 1-0 | 22.89 | 22.83 | 22.79 | 0 | 0.33 | 0.40 | 0.42 | 18.83 | 18.98 | 18.98 | 0 | 0.00 | 0.00 | 0.00 |
| 10 | QPSK 1-49 | 23.22 | 23.23 | 23.21 | | 0.00 | 0.00 | 0.00 | 18.79 | 18.92 | 18.92 | | 0.04 | 0.06 | 0.06 |
| 10 | QPSK 25-13 | 21.72 | 21.92 | 21.95 | ≤ 1 | 1.50 | 1.31 | 1.26 | 18.73 | 18.83 | 18.78 | ≤ 1 | 0.10 | 0.15 | 0.20 |
| 10 | QPSK 50-0 | 21.73 | 21.75 | 21.89 | | 1.49 | 1.48 | 1.32 | 18.68 | 18.80 | 18.82 | | 0.15 | 0.18 | 0.16 |
| 10 | 16QAM 1-0 | 22.41 | 21.81 | 21.71 | ≤ 1 | 0.81 | 1.42 | 1.50 | 18.80 | 18.91 | 18.93 | ≤ 1 | 0.03 | 0.07 | 0.05 |
| 10 | 16QAM 1-49 | 22.14 | 22.22 | 21.80 | | 1.08 | 1.01 | 1.41 | 18.75 | 18.85 | 18.81 | | 0.08 | 0.13 | 0.17 |
| 10 | 16QAM 25-13 | 20.88 | 20.89 | 20.89 | ≤ 2 | 2.34 | 2.34 | 2.32 | 18.62 | 18.86 | 18.88 | ≤ 2 | 0.21 | 0.12 | 0.10 |
| 10 | 16QAM 50-0 | 20.87 | 20.79 | 20.89 | | 2.35 | 2.44 | 2.32 | 18.68 | 18.66 | 18.83 | | 0.15 | 0.32 | 0.15 |
| Channel | | 23755 | 23790 | 23825 | | 23755 | 23790 | 23825 | 23755 | 23790 | 23825 | | 23755 | 23790 | 23825 |
| Frequency (MHz) | | 706.5 | 710 | 713.5 | | 706.5 | 710 | 713.5 | 706.5 | 710 | 713.5 | | 706.5 | 710 | 713.5 |
| 5 | QPSK 1-0 | 22.80 | 22.51 | 22.63 | 0 | 0.00 | 0.30 | 0.17 | 18.77 | 18.92 | 18.86 | 0 | 0.00 | 0.00 | 0.00 |
| 5 | QPSK 1-24 | 22.62 | 22.81 | 22.80 | | 0.18 | 0.00 | 0.00 | 18.75 | 18.85 | 18.82 | | 0.02 | 0.07 | 0.04 |
| 5 | QPSK 12-6 | 21.63 | 21.50 | 21.76 | ≤ 1 | 1.17 | 1.31 | 1.04 | 18.60 | 18.80 | 18.79 | ≤ 1 | 0.17 | 0.12 | 0.07 |
| 5 | QPSK 25-0 | 21.43 | 21.40 | 21.52 | | 1.37 | 1.41 | 1.28 | 18.63 | 18.73 | 18.81 | | 0.14 | 0.19 | 0.05 |
| 5 | 16QAM 1-0 | 22.03 | 21.69 | 21.65 | ≤ 1 | 0.77 | 1.12 | 1.15 | 18.71 | 18.81 | 18.83 | ≤ 1 | 0.06 | 0.11 | 0.03 |
| 5 | 16QAM 1-24 | 21.79 | 22.04 | 21.53 | | 1.01 | 0.77 | 1.27 | 18.63 | 18.76 | 18.73 | | 0.14 | 0.16 | 0.13 |
| 5 | 16QAM 12-6 | 20.71 | 20.55 | 20.74 | ≤ 2 | 2.09 | 2.26 | 2.06 | 18.62 | 18.66 | 18.68 | ≤ 2 | 0.15 | 0.26 | 0.18 |
| 5 | 16QAM 25-0 | 20.46 | 20.34 | 20.58 | | 2.34 | 2.47 | 2.22 | 18.63 | 18.75 | 18.70 | | 0.14 | 0.17 | 0.16 |

| BW [MHz] | Mod / RB (Size - Offset) | Power Reduction by P-Sensor (dB) | | |
|---|---|---|---|---|
| | | Low Ch | Middle Ch | High Ch |
| Channel | | 23780 | 23790 | 23800 |
| Frequency | | 709 MHz | 710 MHz | 711 MHz |
| 10 | QPSK 1-0 | 4.06 | 3.85 | 3.81 |
| 10 | QPSK 1-49 | 4.43 | 4.31 | 4.29 |
| 10 | QPSK 25-13 | 2.99 | 3.09 | 3.17 |
| 10 | QPSK 50-0 | 3.05 | 2.95 | 3.07 |
| 10 | 16QAM 1-0 | 3.61 | 2.90 | 2.78 |
| 10 | 16QAM 1-49 | 3.39 | 3.37 | 2.99 |
| 10 | 16QAM 25-13 | 2.26 | 2.03 | 2.01 |
| 10 | 16QAM 50-0 | 2.19 | 2.13 | 2.06 |
| Channel | | 23755 | 23790 | 23825 |
| Frequency | | 706.5 MHz | 710 MHz | 713.5 MHz |
| 5 | QPSK 1-0 | 4.03 | 3.59 | 3.77 |
| 5 | QPSK 1-24 | 3.87 | 3.96 | 3.98 |
| 5 | QPSK 12-6 | 3.03 | 2.70 | 2.97 |
| 5 | QPSK 25-0 | 2.80 | 2.67 | 2.71 |
| 5 | 16QAM 1-0 | 3.32 | 2.88 | 2.82 |
| 5 | 16QAM 1-24 | 3.16 | 3.28 | 2.80 |
| 5 | 16QAM 12-6 | 2.09 | 1.89 | 2.06 |
| 5 | 16QAM 25-0 | 1.83 | 1.59 | 1.88 |

**Note:**

1. Per KDB 941225, if the output power variation across the band < 0.5dB, test middle channel SAR first and determine further test reduction based on the SAR results
2. During proximity sensor activated and power reduction enabled, the LTE output is reduced to a certain level, while MPR for different RB configurations is disabled. The power reduction is based on the normal maximum output power.

## <LTE band 4>

| BW [MHz] | Mod / RB (Size - Offset) | Without Power Back-off | | | | | | | With Power Back-off | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Average Power. (dBm) | | | 3GPP MPR | MPR Result (dB) | | | Average Power. (dBm) | | | 3GPP MPR | MPR Result (dB) | | |
| | | Low Ch | Mid Ch | High Ch | | Low Ch | Mid Ch | High Ch | Low Ch | Mid Ch | High Ch | | Low Ch | Mid Ch | High Ch |
| Channel | | 20050 | 20175 | 20300 | | 20050 | 20175 | 20300 | 20050 | 20175 | 20300 | | 20050 | 20175 | 20300 |
| Frequency (MHz) | | 1720 | 1732.5 | 1745 | | 1720 | 1732.5 | 1745 | 1720 | 1732.5 | 1745 | | 1720 | 1732.5 | 1745 |
| 20 | QPSK 1-0 | 24.43 | 24.21 | 24.24 | 0 | 0.00 | 0.00 | 0.00 | 17.90 | 17.92 | 17.56 | 0 | 0.00 | 0.00 | 0.00 |
| 20 | QPSK 1-49 | 24.28 | 24.04 | 24.19 | | 0.15 | 0.17 | 0.05 | 17.80 | 17.85 | 17.55 | | 0.10 | 0.07 | 0.01 |
| 20 | QPSK 25-13 | 23.25 | 23.01 | 22.90 | ≤ 1 | 1.18 | 1.20 | 1.34 | 17.75 | 17.86 | 17.40 | ≤ 1 | 0.15 | 0.06 | 0.16 |
| 20 | QPSK 50-0 | 23.27 | 23.12 | 22.84 | | 1.16 | 1.09 | 1.40 | 17.63 | 17.70 | 17.50 | | 0.27 | 0.22 | 0.06 |
| 20 | 16QAM 1-0 | 23.76 | 23.04 | 22.92 | ≤ 1 | 0.67 | 1.17 | 1.32 | 17.91 | 17.88 | 17.63 | ≤ 1 | -0.01 | 0.04 | -0.07 |
| 20 | 16QAM 1-49 | 23.42 | 22.78 | 22.98 | | 1.01 | 1.43 | 1.26 | 17.60 | 17.79 | 17.50 | | 0.30 | 0.13 | 0.06 |
| 20 | 16QAM 25-13 | 22.08 | 21.82 | 21.86 | ≤ 2 | 2.35 | 2.39 | 2.38 | 17.73 | 17.80 | 17.55 | ≤ 2 | 0.17 | 0.12 | 0.01 |
| 20 | 16QAM 50-0 | 22.15 | 22.07 | 21.82 | | 2.28 | 2.14 | 2.42 | 17.62 | 17.70 | 17.62 | | 0.28 | 0.22 | -0.06 |
| Channel | | 20025 | 20175 | 20325 | | 20025 | 20175 | 20325 | 20025 | 20175 | 20325 | | 20025 | 20175 | 20325 |
| Frequency (MHz) | | 1717.5 | 1732.5 | 1747.5 | | 1717.5 | 1732.5 | 1747.5 | 1717.5 | 1732.5 | 1747.5 | | 1717.5 | 1732.5 | 1747.5 |
| 15 | QPSK 1-0 | 24.19 | 24.16 | 24.06 | 0 | 0.00 | 0.00 | 0.00 | 17.80 | 17.80 | 17.63 | 0 | 0.00 | 0.00 | 0.00 |
| 15 | QPSK 1-24 | 24.06 | 24.09 | 24.03 | | 0.13 | 0.07 | 0.03 | 17.75 | 17.70 | 17.55 | | 0.05 | 0.10 | 0.08 |
| 15 | QPSK 12-6 | 23.20 | 23.06 | 22.86 | ≤ 1 | 0.99 | 1.10 | 1.20 | 17.67 | 17.62 | 17.60 | ≤ 1 | 0.13 | 0.18 | 0.03 |
| 15 | QPSK 25-0 | 23.16 | 23.12 | 22.79 | | 1.03 | 1.04 | 1.27 | 17.55 | 17.60 | 17.49 | | 0.25 | 0.20 | 0.14 |
| 15 | 16QAM 1-0 | 23.76 | 23.01 | 22.80 | ≤ 1 | 0.43 | 1.15 | 1.26 | 17.88 | 17.82 | 17.78 | ≤ 1 | -0.08 | -0.02 | -0.15 |
| 15 | 16QAM 1-24 | 23.65 | 22.92 | 22.76 | | 0.54 | 1.24 | 1.30 | 17.77 | 17.70 | 17.67 | | 0.03 | 0.10 | -0.04 |
| 15 | 16QAM 12-6 | 22.32 | 22.16 | 21.77 | ≤ 2 | 1.87 | 2.00 | 2.29 | 17.68 | 17.74 | 17.77 | ≤ 2 | 0.12 | 0.06 | -0.14 |
| 15 | 16QAM 25-0 | 22.08 | 22.08 | 21.86 | | 2.11 | 2.08 | 2.20 | 17.62 | 17.58 | 17.60 | | 0.18 | 0.22 | 0.03 |
| Channel | | 20000 | 20175 | 20350 | | 20000 | 20175 | 20350 | 20000 | 20175 | 20350 | | 20000 | 20175 | 20350 |
| Frequency (MHz) | | 1715 | 1732.5 | 1750 | | 1715 | 1732.5 | 1750 | 1715 | 1732.5 | 1750 | | 1715 | 1732.5 | 1750 |
| 10 | QPSK 1-0 | 24.09 | 24.06 | 23.94 | 0 | 0.00 | 0.00 | 0.00 | 17.81 | 17.80 | 17.60 | 0 | 0.00 | 0.00 | 0.00 |
| 10 | QPSK 1-49 | 24.06 | 24.01 | 23.76 | | 0.03 | 0.05 | 0.18 | 17.67 | 17.67 | 17.55 | | 0.14 | 0.13 | 0.05 |
| 10 | QPSK 25-13 | 23.36 | 23.12 | 23.12 | ≤ 1 | 0.73 | 0.94 | 0.82 | 17.70 | 17.59 | 17.50 | ≤ 1 | 0.11 | 0.21 | 0.10 |
| 10 | QPSK 50-0 | 23.16 | 23.16 | 23.06 | | 0.93 | 0.90 | 0.88 | 17.49 | 17.70 | 17.52 | | 0.32 | 0.10 | 0.08 |
| 10 | 16QAM 1-0 | 23.86 | 23.01 | 22.82 | ≤ 1 | 0.23 | 1.05 | 1.12 | 17.89 | 17.90 | 17.45 | ≤ 1 | -0.08 | -0.10 | 0.15 |
| 10 | 16QAM 1-49 | 23.61 | 22.96 | 22.76 | | 0.48 | 1.10 | 1.18 | 17.70 | 17.78 | 17.43 | | 0.11 | 0.02 | 0.17 |
| 10 | 16QAM 25-13 | 22.36 | 21.86 | 21.86 | ≤ 2 | 1.73 | 2.20 | 2.08 | 17.66 | 17.80 | 17.40 | ≤ 2 | 0.15 | 0.00 | 0.20 |
| 10 | 16QAM 50-0 | 22.18 | 22.01 | 21.71 | | 1.91 | 2.05 | 2.23 | 17.57 | 17.67 | 17.35 | | 0.24 | 0.13 | 0.25 |
| Channel | | 19975 | 20175 | 20375 | | 19975 | 20175 | 20375 | 19975 | 20175 | 20375 | | 19975 | 20175 | 20375 |
| Frequency (MHz) | | 1712.5 | 1732.5 | 1752.5 | | 1712.5 | 1732.5 | 1752.5 | 1712.5 | 1732.5 | 1752.5 | | 1712.5 | 1732.5 | 1752.5 |
| 5 | QPSK 1-0 | 24.36 | 23.96 | 23.90 | 0 | 0.00 | 0.00 | 0.00 | 17.90 | 17.50 | 17.51 | 0 | 0.00 | 0.00 | 0.00 |
| 5 | QPSK 1-24 | 24.28 | 23.86 | 23.82 | | 0.08 | 0.10 | 0.08 | 17.70 | 17.10 | 17.35 | | 0.20 | 0.40 | 0.16 |
| 5 | QPSK 12-6 | 23.89 | 23.00 | 22.92 | ≤ 1 | 0.47 | 0.96 | 0.98 | 17.80 | 17.49 | 17.43 | ≤ 1 | 0.10 | 0.01 | 0.08 |
| 5 | QPSK 25-0 | 23.71 | 22.96 | 22.86 | | 0.65 | 1.00 | 1.04 | 17.78 | 17.39 | 17.39 | | 0.12 | 0.11 | 0.12 |
| 5 | 16QAM 1-0 | 23.92 | 22.98 | 22.89 | ≤ 1 | 0.44 | 0.98 | 1.01 | 17.78 | 17.40 | 17.50 | ≤ 1 | 0.12 | 0.10 | 0.01 |
| 5 | 16QAM 1-24 | 23.88 | 22.96 | 22.68 | | 0.48 | 1.00 | 1.22 | 17.74 | 17.35 | 17.47 | | 0.16 | 0.15 | 0.04 |
| 5 | 16QAM 12-6 | 22.76 | 21.82 | 21.76 | ≤ 2 | 1.60 | 2.14 | 2.14 | 17.77 | 17.39 | 17.48 | ≤ 2 | 0.13 | 0.11 | 0.03 |
| 5 | 16QAM 25-0 | 22.69 | 21.92 | 21.86 | | 1.67 | 2.04 | 2.04 | 17.76 | 17.26 | 17.49 | | 0.14 | 0.24 | 0.02 |

**Note:**

1. Per KDB 941225, if the output power variation across the band < 0.5dB, test middle channel SAR first and determine further test reduction based on the SAR results.
2. During proximity sensor activated and power reduction enabled, the LTE output is reduced to a certain level, while MPR for different RB configurations is disabled. The power reduction is based on the normal maximum output power.

| BW [MHz] | Mod / RB (Size - Offset) | Power Reduction by P-Sensor (dB) | | |
|---|---|---|---|---|
| | | Low Ch | Mid Ch | High Ch |
| Channel | | 20050 | 20175 | 20300 |
| Frequency (MHz) | | 1720 | 1732.5 | 1745 |
| 20 | QPSK 1-0 | 6.53 | 6.29 | 6.68 |
| 20 | QPSK 1-49 | 6.48 | 6.19 | 6.64 |
| 20 | QPSK 25-13 | 5.50 | 5.15 | 5.50 |
| 20 | QPSK 50-0 | 5.64 | 5.42 | 5.34 |
| 20 | 16QAM 1-0 | 5.85 | 5.16 | 5.29 |
| 20 | 16QAM 1-49 | 5.82 | 4.99 | 5.48 |
| 20 | 16QAM 25-13 | 4.35 | 4.02 | 4.31 |
| 20 | 16QAM 50-0 | 4.53 | 4.37 | 4.20 |
| Channel | | 20025 | 20175 | 20325 |
| Frequency (MHz) | | 1717.5 | 1732.5 | 1747.5 |
| 15 | QPSK 1-0 | 6.39 | 6.36 | 6.43 |
| 15 | QPSK 1-24 | 6.31 | 6.39 | 6.48 |
| 15 | QPSK 12-6 | 5.53 | 5.44 | 5.26 |
| 15 | QPSK 25-0 | 5.61 | 5.52 | 5.30 |
| 15 | 16QAM 1-0 | 5.88 | 5.19 | 5.02 |
| 15 | 16QAM 1-24 | 5.88 | 5.22 | 5.09 |
| 15 | 16QAM 12-6 | 4.64 | 4.42 | 4.00 |
| 15 | 16QAM 25-0 | 4.46 | 4.50 | 4.26 |
| Channel | | 20000 | 20175 | 20350 |
| Frequency (MHz) | | 1715 | 1732.5 | 1750 |
| 10 | QPSK 1-0 | 6.28 | 6.26 | 6.34 |
| 10 | QPSK 1-49 | 6.39 | 6.34 | 6.21 |
| 10 | QPSK 25-13 | 5.66 | 5.53 | 5.62 |
| 10 | QPSK 50-0 | 5.67 | 5.46 | 5.54 |
| 10 | 16QAM 1-0 | 5.97 | 5.11 | 5.37 |
| 10 | 16QAM 1-49 | 5.91 | 5.18 | 5.33 |
| 10 | 16QAM 25-13 | 4.70 | 4.06 | 4.46 |
| 10 | 16QAM 50-0 | 4.61 | 4.34 | 4.36 |
| Channel | | 19965 | 20175 | 20375 |
| Frequency (MHz) | | 1712.5 | 1732.5 | 1752.5 |
| 5 | QPSK 1-0 | 6.46 | 6.46 | 6.39 |
| 5 | QPSK 1-24 | 6.58 | 6.76 | 6.47 |
| 5 | QPSK 12-6 | 6.09 | 5.51 | 5.49 |
| 5 | QPSK 25-0 | 5.93 | 5.57 | 5.47 |
| 5 | 16QAM 1-0 | 6.14 | 5.58 | 5.39 |
| 5 | 16QAM 1-24 | 6.14 | 5.61 | 5.21 |
| 5 | 16QAM 12-6 | 4.99 | 4.43 | 4.28 |
| 5 | 16QAM 25-0 | 4.93 | 4.66 | 4.37 |

## <WLAN 2.4G - Without Power Reduction>

| WLAN 2.4G 802.11b Average Power (dBm) | | | | | | |
|---|---|---|---|---|---|---|
| Power vs. Channel | | | Power vs. Data Rate | | | |
| Channel | Frequency (MHz) | Data Rate (bps) | Channel | Data Rate (bps) | | |
| | | 1M | | 2M | 5.5M | 11M |
| CH 01 | 2412 | 16.35 | CH 06 | 16.84 | 16.87 | 16.74 |
| CH 06 | 2437 | 16.88 | | | | |
| CH 11 | 2462 | 16.86 | | | | |

| WLAN 2.4G 802.11g Average Power (dBm) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Power vs. Channel | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Data Rate (bps) | Channel | Data Rate (bps) | | | | | | |
| | | 6M | | 9M | 12M | 18M | 24M | 36M | 48M | 54M |
| CH 01 | 2412 | 11.72 | CH 06 | 15.99 | 15.97 | 15.97 | 15.93 | 15.93 | 15.95 | 15.99 |
| CH 06 | 2437 | 16.00 | | | | | | | | |
| CH 11 | 2462 | 13.37 | | | | | | | | |

| WLAN 2.4G 802.11n-HT20 Average Power (dBm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | MCS Index | Channel | MCS Index | | | | | | |
| | | | MCS0 | | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| CH 01 | 2412 | 1 | 10.48 | CH 06 | 14.85 | 14.84 | 14.85 | 14.81 | 14.85 | 14.79 | 14.84 |
| CH 06 | 2437 | 1 | 14.88 | | | | | | | | |
| CH 11 | 2462 | 1 | 12.82 | | | | | | | | |

| WLAN 2.4G 802.11n-HT20 Average Power (dBm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | MCS Index | Channel | MCS Index | | | | | | |
| | | | MCS8 | | MCS9 | MCS10 | MCS11 | MCS12 | MCS13 | MCS14 | MCS15 |
| CH 01 | 2412 | 1+2 | 13.58 | CH 06 | 17.88 | 17.80 | 17.85 | 17.90 | 17.86 | 17.90 | 17.88 |
| CH 06 | 2437 | 1+2 | 17.91 | | | | | | | | |
| CH 11 | 2462 | 1+2 | 14.35 | | | | | | | | |

**Note:**

1. Choose the 11b lowest data rate, highest output power channel to test SAR and determine further SAR exclusion
2. Per KDB 248227, 11g and 11n-HT20 SISO average output power is less than 1/4 dB higher than 11b mode, thus the SAR can be excluded.
3. Per KDB 248227, 11n-HT20 MIMO average output power is higher than 1/4 dB higher than 11b mode, SAR will be verified.
4. For each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 1/4 dB higher than those measured at the lowest data rate.

## <Bluetooth - Without Power Reduction>

| Band | Bluetooth | | |
|---|---|---|---|
| Channel | 0 | 39 | 78 |
| Frequency (MHz) | 2402 | 2441 | 2480 |
| Average Power (dBm) | 6.27 | 6.40 | 6.88 |

**Note:** Per KDB 447498, Bluetooth SAR is excluded due to the highest output power ≤ 60/f (GHz) mW, where 60/f (GHz) = 24mW = 13.8dBm.

## <WLAN 5G - Without Power Reduction>

| WLAN 5G 802.11a Average Power (dBm) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Power vs. Channel | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Data Rate (bps) | Channel | Data Rate (bps) | | | | | | |
| | | 6M | | 9M | 12M | 18M | 24M | 36M | 48M | 54M |
| CH 36 | 5180 | 11.82 | CH 44 | 12.61 | 12.57 | 12.60 | 12.48 | 12.45 | 12.26 | 12.37 |
| CH 40 | 5200 | 12.33 | | | | | | | | |
| CH 44 | 5220 | **12.65** | | | | | | | | |
| CH 48 | 5240 | 11.88 | | | | | | | | |
| CH 52 | 5260 | 12.15 | CH 60 | 12.61 | 12.52 | 12.56 | 12.54 | 12.51 | 12.54 | 12.43 |
| CH 56 | 5280 | 12.23 | | | | | | | | |
| CH 60 | 5300 | **12.65** | | | | | | | | |
| CH 64 | 5320 | 12.19 | | | | | | | | |
| CH 100 | 5500 | 10.70 | CH 116 | 11.16 | 11.10 | 11.15 | 11.12 | 11.18 | 11.20 | 11.19 |
| CH 104 | 5520 | 11.08 | | | | | | | | |
| CH 108 | 5540 | 10.79 | | | | | | | | |
| CH 112 | 5560 | 10.80 | | | | | | | | |
| CH 116 | 5580 | **11.44** | | | | | | | | |
| CH 132 | 5660 | 10.88 | | | | | | | | |
| CH 136 | 5680 | 10.85 | | | | | | | | |
| CH 140 | 5700 | 10.74 | | | | | | | | |
| CH 149 | 5745 | 11.74 | CH 157 | 11.90 | 11.84 | 11.87 | 11.82 | 11.83 | 11.86 | 11.87 |
| CH 153 | 5765 | 11.81 | | | | | | | | |
| CH 157 | 5785 | **11.97** | | | | | | | | |
| CH 161 | 5805 | 11.93 | | | | | | | | |
| CH 165 | 5825 | 11.78 | | | | | | | | |

| WLAN 5G 802.11n (BW 20M) Average Power (dBm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | MCS Index | Channel | MCS Index | | | | | | |
| | | | MCS0 | | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| CH 36 | 5180 | 1 | 11.15 | CH 44 | 12.30 | 12.32 | 12.28 | 12.20 | 12.18 | 12.12 | 12.15 |
| CH 40 | 5200 | 1 | 11.99 | | | | | | | | |
| CH 44 | 5220 | 1 | **12.31** | | | | | | | | |
| CH 48 | 5240 | 1 | 11.61 | | | | | | | | |
| CH 52 | 5260 | 1 | 12.05 | CH 60 | 12.57 | 12.57 | 12.58 | 12.59 | 12.59 | 12.58 | 12.58 |
| CH 56 | 5280 | 1 | 11.85 | | | | | | | | |
| CH 60 | 5300 | 1 | **12.60** | | | | | | | | |
| CH 64 | 5320 | 1 | 12.18 | | | | | | | | |
| CH 100 | 5500 | 1 | 10.30 | CH 116 | 10.85 | 10.85 | 10.83 | 10.84 | 10.89 | 10.84 | 10.83 |
| CH 104 | 5520 | 1 | 10.85 | | | | | | | | |
| CH 108 | 5540 | 1 | 10.55 | | | | | | | | |
| CH 112 | 5560 | 1 | 10.59 | | | | | | | | |
| CH 116 | 5580 | 1 | **10.90** | | | | | | | | |
| CH 132 | 5660 | 1 | 10.78 | | | | | | | | |
| CH 136 | 5680 | 1 | 10.75 | | | | | | | | |
| CH 140 | 5700 | 1 | 10.38 | | | | | | | | |
| CH 149 | 5745 | 1 | 11.32 | CH 157 | 11.43 | 11.42 | 11.43 | 11.46 | 11.40 | 11.45 | 11.46 |
| CH 153 | 5765 | 1 | 11.41 | | | | | | | | |
| CH 157 | 5785 | 1 | **11.48** | | | | | | | | |
| CH 161 | 5805 | 1 | 11.22 | | | | | | | | |
| CH 165 | 5825 | 1 | 11.19 | | | | | | | | |

**Note:**

1. Choose the 11a lowest data rate, highest output power channel of each band, to test SAR and determine further SAR exclusion.
2. Per KDB 248227, 11n-HT20 SISO output power is less than 1/4 dB higher than 11a mode, thus the SAR can be excluded.
3. For each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 1/4 dB higher than those measured at the lowest data rate.

| WLAN 5G 802.11n (BW 40M) Average Power (dBm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | MCS Index | Channel | MCS Index | | | | | | |
| | | | MCS0 | | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| CH 38 | 5190 | 1 | 9.25 | CH 46 | 11.93 | 11.94 | 11.96 | 12.00 | 11.99 | 11.98 | 11.95 |
| CH 46 | 5230 | **1** | **12.03** | | | | | | | | |
| CH 54 | 5270 | **1** | **12.15** | CH 54 | 12.14 | 12.07 | 12.03 | 12.03 | 12.14 | 12.07 | 12.08 |
| CH 62 | 5310 | 1 | 9.71 | | | | | | | | |
| CH 102 | 5510 | 1 | 9.89 | CH 134 | 10.74 | 10.66 | 10.65 | 10.59 | 10.75 | 10.69 | 10.73 |
| CH 110 | 5550 | 1 | 10.74 | | | | | | | | |
| CH 134 | 5670 | **1** | **10.76** | | | | | | | | |
| CH 151 | 5755 | 1 | 11.83 | CH 159 | 11.89 | 11.92 | 11.91 | 11.93 | 11.90 | 11.89 | 11.92 |
| CH 159 | 5795 | **1** | **11.87** | | | | | | | | |

| WLAN 5G 802.11n (BW 20M) Average Power (dBm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | MCS Index | Channel | MCS Index | | | | | | |
| | | | MCS8 | | MCS9 | MCS10 | MCS11 | MCS12 | MCS13 | MCS14 | MCS15 |
| CH 36 | 5180 | 1+2 | 14.35 | CH 44 | 14.82 | 14.82 | 14.72 | 14.71 | 14.69 | 14.70 | 14.72 |
| CH 40 | 5200 | 1+2 | 14.78 | | | | | | | | |
| CH 44 | 5220 | 1+2 | **14.88** | | | | | | | | |
| CH 48 | 5240 | 1+2 | 14.76 | | | | | | | | |
| CH 52 | 5260 | 1+2 | 16.20 | CH 60 | 16.29 | 16.28 | 16.27 | 16.18 | 16.17 | 16.30 | 16.17 |
| CH 56 | 5280 | 1+2 | 16.23 | | | | | | | | |
| CH 60 | 5300 | 1+2 | **16.37** | | | | | | | | |
| CH 64 | 5320 | 1+2 | 15.00 | | | | | | | | |
| CH 100 | 5500 | 1+2 | 14.13 | CH 116 | 15.06 | 14.86 | 14.84 | 14.81 | 14.83 | 14.85 | 14.84 |
| CH 104 | 5520 | 1+2 | 15.07 | | | | | | | | |
| CH 108 | 5540 | 1+2 | 15.08 | | | | | | | | |
| CH 112 | 5560 | 1+2 | 15.07 | | | | | | | | |
| CH 116 | 5580 | 1+2 | **15.25** | | | | | | | | |
| CH 132 | 5660 | 1+2 | 15.13 | | | | | | | | |
| CH 136 | 5680 | 1+2 | 15.05 | | | | | | | | |
| CH 140 | 5700 | 1+2 | 13.37 | | | | | | | | |
| CH 149 | 5745 | 1+2 | 15.12 | CH 157 | 15.64 | 15.60 | 15.61 | 15.63 | 15.67 | 15.61 | 15.63 |
| CH 153 | 5765 | 1+2 | 15.67 | | | | | | | | |
| CH 157 | 5785 | 1+2 | **15.68** | | | | | | | | |
| CH 161 | 5805 | 1+2 | 15.64 | | | | | | | | |
| CH 165 | 5825 | 1+2 | 15.27 | | | | | | | | |

| WLAN 5G 802.11n (BW 40M) Average Power (dBm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | MCS Index | Channel | MCS Index | | | | | | |
| | | | MCS8 | | MCS9 | MCS10 | MCS11 | MCS12 | MCS13 | MCS14 | MCS15 |
| CH 38 | 5190 | 1+2 | 14.04 | CH 46 | 14.73 | 14.68 | 14.73 | 14.73 | 14.68 | 14.67 | 14.67 |
| CH 46 | 5230 | **1+2** | **14.74** | | | | | | | | |
| CH 54 | 5270 | **1+2** | **16.08** | CH 54 | 16.00 | 15.88 | 15.88 | 16.05 | 16.06 | 16.07 | 16.03 |
| CH 62 | 5310 | 1+2 | 12.67 | | | | | | | | |
| CH 102 | 5510 | 1+2 | 13.25 | CH 110 | 14.94 | 14.77 | 14.96 | 14.91 | 14.85 | 14.86 | 14.82 |
| CH 110 | 5550 | **1+2** | **15.11** | | | | | | | | |
| CH 134 | 5670 | 1+2 | 14.14 | | | | | | | | |
| CH 151 | 5755 | 1+2 | 14.87 | CH 159 | 14.91 | 14.92 | 14.89 | 14.90 | 14.91 | 14.90 | 14.90 |
| CH 159 | 5795 | **1+2** | **14.95** | | | | | | | | |

**Note:**

1. Per KDB 248227, 11n-HT40 SISO output power is less than 1/4 dB higher than 11a mode, thus the SAR can be excluded.
2. MIMO SAR was tested per KDB 248227, and the lowest order modulation, 11n-HT20 MCS8, was chosen to test. 11n-HT40 power is less than 11n-HT20 and 11n-HT40 SAR is excluded.
3. For each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 1/4 dB higher than those measured at the lowest data rate.

# 11. SAR Test Results

## 11.1 Test Records for Body SAR Test

**<GSM>**

| Plot No. | Band | Mode | Test Position | Gap (cm) | Ch. | Freq. (MHz) | Average Power (dBm) | Power Back-off (dB) | Power Drift (dB) | $SAR_{1g}$ (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| 28 | GSM850 | GPRS10 | Bottom Face | 1.1 | 189 | 836.4 | 31.48 | OFF | -0.091 | 0.99 |
| 27 | GSM850 | GPRS10 | Bottom Face | 1.1 | 128 | 824.2 | 31.37 | OFF | -0.099 | 0.849 |
| 29 | GSM850 | GPRS10 | Bottom Face | 1.1 | 251 | 848.8 | 31.47 | OFF | -0.028 | 0.964 |
| 31 | GSM850 | GPRS10 | Edge 1 | 0.9 | 189 | 836.4 | 31.48 | OFF | 0.0029 | 0.847 |
| 30 | GSM850 | GPRS10 | Edge 1 | 0.9 | 128 | 824.2 | 31.37 | OFF | -0.00806 | 0.718 |
| 32 | GSM850 | GPRS10 | Edge 1 | 0.9 | 251 | 848.8 | 31.47 | OFF | 0.103 | 0.852 |
| 33 | GSM850 | GPRS10 | Edge 2 | 0 | 189 | 848.8 | 31.48 | OFF | 0.00244 | 0.251 |
| 2 | GSM850 | GPRS10 | Bottom Face | 0 | 189 | 836.4 | 23.15 | ON | -0.124 | 0.866 |
| 1 | GSM850 | GPRS10 | Bottom Face | 0 | 128 | 824.2 | 23.03 | ON | -0.128 | 0.689 |
| 3 | GSM850 | GPRS10 | Bottom Face | 0 | 251 | 848.8 | 22.99 | ON | -0.049 | 0.953 |
| 4 | GSM850 | GPRS10 | Edge 1 | 0 | 189 | 848.8 | 23.15 | ON | 0.066 | 0.667 |
| 107 | GSM850 | GPRS10 | Curved surface of Edge 1 / Bottom Face tilted | 0 | 189 | 836.4 | 23.15 | ON | -0.156 | 1.16 |
| 101 | GSM850 | GPRS10 | Curved surface of Edge 1 / Bottom Face tilted | 0 | 128 | 824.2 | 23.03 | ON | 0.172 | 1 |
| 102 | GSM850 | GPRS10 | Curved surface of Edge 1 / Bottom Face tilted | 0 | 251 | 848.8 | 22.99 | ON | 0.127 | **1.27** |
| 55 | GSM1900 | GPRS10 | Bottom Face | 1.1 | 810 | 1909.8 | 28.88 | OFF | -0.107 | 0.436 |
| 56 | GSM1900 | GPRS10 | Edge 1 | 0.9 | 810 | 1909.8 | 28.88 | OFF | -0.159 | 0.397 |
| 57 | GSM1900 | GPRS10 | Edge 2 | 0 | 810 | 1909.8 | 28.88 | OFF | -0.0754 | 0.393 |
| 99 | GSM1900 | GPRS10 | Bottom Face | 0 | 810 | 1909.8 | 25.25 | ON | -0.177 | 0.845 |
| 97 | GSM1900 | GPRS10 | Bottom Face | 0 | 512 | 1850.2 | 25.24 | ON | -0.12 | 1.1 |
| 98 | GSM1900 | GPRS10 | Bottom Face | 0 | 661 | 1880 | 25.00 | ON | -0.187 | 0.921 |
| 100 | GSM1900 | GPRS10 | Edge 1 | 0 | 810 | 1909.8 | 25.25 | ON | 0.11 | 0.432 |
| 109 | GSM1900 | GPRS10 | Curved surface of Edge 1 / Bottom Face tilted | 0 | 810 | 1909.8 | 25.25 | ON | 0.08 | 1.05 |
| 121 | GSM1900 | GPRS10 | Curved surface of Edge 1 / Bottom Face tilted | 0 | 512 | 1850.2 | 25.24 | ON | 0.066 | **1.12** |
| 108 | GSM1900 | GPRS10 | Curved surface of Edge 1 / Bottom Face tilted | 0 | 661 | 1880 | 25.00 | ON | -0.183 | 1.08 |

**Note:** Per KDB 447498, if the highest output channel SAR for each exposure position ≤ 0.8 W/kg other channels SAR tests are not necessary.

## <WCDMA>

| Plot No. | Band | Mode | Test Position | Gap (cm) | Ch. | Freq. (MHz) | Average Power (dBm) | Power Back-off | Power Drift (dB) | $SAR_{1g}$ (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| 34 | WCDMA V | RMC12.2K | Bottom Face | 1.1 | 4233 | 846.6 | 23.05 | OFF | 0.03 | 0.514 |
| 35 | WCDMA V | RMC12.2K | Edge 1 | 0.9 | 4233 | 846.6 | 23.05 | OFF | -0.03 | 0.467 |
| 36 | WCDMA V | RMC12.2K | Edge 2 | 0 | 4233 | 846.6 | 23.05 | OFF | -0.08 | 0.105 |
| 5 | WCDMA V | RMC12.2K | Bottom Face | 0 | 4132 | 826.4 | 18.85 | ON | -0.142 | 0.8 |
| 6 | WCDMA V | RMC12.2K | Bottom Face | 0 | 4182 | 846.6 | 18.83 | ON | 0.123 | 0.645 |
| 7 | WCDMA V | RMC12.2K | Bottom Face | 0 | 4233 | 846.6 | 18.92 | ON | -0.182 | 0.883 |
| 8 | WCDMA V | RMC12.2K | Edge 1 | 0 | 4132 | 826.4 | 18.85 | ON | 0.136 | 0.762 |
| 9 | WCDMA V | RMC12.2K | Edge 1 | 0 | 4182 | 846.6 | 18.83 | ON | 0.183 | 0.749 |
| 10 | WCDMA V | RMC12.2K | Edge 1 | 0 | 4233 | 846.6 | 18.92 | ON | 0.139 | 0.832 |
| 103 | WCDMA V | RMC12.2K | Curved surface of Edge 1 / Bottom Face tilted | 0 | 4132 | 826.4 | 18.85 | ON | 0.158 | 1.21 |
| 104 | WCDMA V | RMC12.2K | Curved surface of Edge 1 / Bottom Face tilted | 0 | 4182 | 846.6 | 18.83 | ON | 0.108 | 1.11 |
| 105 | WCDMA V | RMC12.2K | Curved surface of Edge 1 / Bottom Face tilted | 0 | 4233 | 846.6 | 18.92 | ON | 0.109 | **1.22** |
| 58 | WCDMA II | RMC12.2K | Bottom Face | 1.1 | 9262 | 1852.4 | 23.39 | OFF | 0.11 | 0.499 |
| 59 | WCDMA II | RMC12.2K | Edge 1 | 0.9 | 9262 | 1852.4 | 23.39 | OFF | -0.02 | 0.471 |
| 60 | WCDMA II | RMC12.2K | Edge 2 | 0 | 9262 | 1852.4 | 23.39 | OFF | 0.05 | 0.428 |
| 93 | WCDMA II | RMC12.2K | Bottom Face | 0 | 9262 | 1852.4 | 18.39 | ON | 0.132 | **1.11** |
| 94 | WCDMA II | RMC12.2K | Bottom Face | 0 | 9400 | 1880 | 18.30 | ON | -0.17 | 1.02 |
| 95 | WCDMA II | RMC12.2K | Bottom Face | 0 | 9538 | 1907.6 | 18.35 | ON | 0.172 | 0.763 |
| 96 | WCDMA II | RMC12.2K | Edge 1 | 0 | 9262 | 1852.4 | 18.39 | ON | 0.11 | 0.46 |
| 122 | WCDMA II | RMC12.2K | Curved surface of Edge 1 / Bottom Face tilted | 0 | 9262 | 1852.4 | 18.39 | ON | -0.05 | 0.968 |
| 110 | WCDMA II | RMC12.2K | Curved surface of Edge 1 / Bottom Face tilted | 0 | 9400 | 1880 | 18.30 | ON | -0.143 | 0.979 |
| 111 | WCDMA II | RMC12.2K | Curved surface of Edge 1 / Bottom Face tilted | 0 | 9538 | 1907.6 | 18.35 | ON | -0.155 | 0.863 |

**Note:** Per KDB 447498, if the highest output channel SAR for each exposure position ≤ 0.8 W/kg other channels SAR tests are not necessary.

**<LTE>**

| Plot No. | Band | Mode | BW [MHz] | Test Position | Gap (cm) | Ch. | Freq. (MHz) | Average Power (dBm) | Power Back-off | Power Drift (dB) | $SAR_{1g}$ (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 37 | LTE Band 17 | QPSK(25-13) | 10M | Bottom Face | 1.1 | 23790 | 710.0 | 21.92 | OFF | -0.02 | 0.45 |
| 38 | LTE Band 17 | QPSK(1-0) | 10M | Bottom Face | 1.1 | 23790 | 710.0 | 22.83 | OFF | 0.04 | 0.494 |
| 39 | LTE Band 17 | QPSK(1-49) | 10M | Bottom Face | 1.1 | 23790 | 710.0 | 23.23 | OFF | -0.03 | 0.507 |
| 46 | LTE Band 17 | 16QAM(25-13) | 10M | Bottom Face | 1.1 | 23790 | 710.0 | 20.89 | OFF | 0.04 | 0.357 |
| 47 | LTE Band 17 | 16QAM(1-0) | 10M | Bottom Face | 1.1 | 23790 | 710.0 | 21.81 | OFF | -0.04 | 0.386 |
| 48 | LTE Band 17 | 16QAM(1-49) | 10M | Bottom Face | 1.1 | 23790 | 710.0 | 22.22 | OFF | -0.06 | 0.398 |
| 40 | LTE Band 17 | QPSK(25-13) | 10M | Edge 1 | 0.9 | 23790 | 710.0 | 21.92 | OFF | 0.01 | 0.447 |
| 41 | LTE Band 17 | QPSK(1-0) | 10M | Edge 1 | 0.9 | 23790 | 710.0 | 22.83 | OFF | 0.02 | 0.523 |
| 42 | LTE Band 17 | QPSK(1-49) | 10M | Edge 1 | 0.9 | 23790 | 710.0 | 23.23 | OFF | 0.06 | 0.571 |
| 49 | LTE Band 17 | 16QAM(25-13) | 10M | Edge 1 | 0.9 | 23790 | 710.0 | 20.89 | OFF | 0.02 | 0.352 |
| 50 | LTE Band 17 | 16QAM(1-0) | 10M | Edge 1 | 0.9 | 23790 | 710.0 | 21.81 | OFF | -0.01 | 0.406 |
| 51 | LTE Band 17 | 16QAM(1-49) | 10M | Edge 1 | 0.9 | 23790 | 710.0 | 22.22 | OFF | 0.01 | 0.442 |
| 43 | LTE Band 17 | QPSK(25-13) | 10M | Edge 2 | 0 | 23790 | 710.0 | 21.92 | OFF | 0.02 | 0.246 |
| 44 | LTE Band 17 | QPSK(1-0) | 10M | Edge 2 | 0 | 23790 | 710.0 | 22.83 | OFF | 0.04 | 0.246 |
| 45 | LTE Band 17 | QPSK(1-49) | 10M | Edge 2 | 0 | 23790 | 710.0 | 23.23 | OFF | 0.09 | 0.288 |
| 52 | LTE Band 17 | 16QAM(25-13) | 10M | Edge 2 | 0 | 23790 | 710.0 | 20.89 | OFF | 0.03 | 0.201 |
| 53 | LTE Band 17 | 16QAM(1-0) | 10M | Edge 2 | 0 | 23790 | 710.0 | 21.81 | OFF | 0.02 | 0.206 |
| 54 | LTE Band 17 | 16QAM(1-49) | 10M | Edge 2 | 0 | 23790 | 710.0 | 22.22 | OFF | 0.06 | 0.236 |
| 11 | LTE Band 17 | QPSK(25-13) | 10M | Bottom Face | 0 | 23780 | 709.0 | 18.73 | ON | -0.083 | 0.744 |
| 12 | LTE Band 17 | QPSK(25-13) | 10M | Bottom Face | 0 | 23790 | 710.0 | 18.83 | ON | 0.125 | 0.826 |
| 13 | LTE Band 17 | QPSK(25-13) | 10M | Bottom Face | 0 | 23800 | 711.0 | 18.78 | ON | 0.177 | 0.85 |
| 14 | LTE Band 17 | QPSK(1-0) | 10M | Bottom Face | 0 | 23800 | 711.0 | 18.98 | ON | -0.16 | 0.571 |
| 15 | LTE Band 17 | QPSK(1-49) | 10M | Bottom Face | 0 | 23800 | 711.0 | 18.92 | ON | -0.14 | 0.734 |
| 21 | LTE Band 17 | 16QAM(25-13) | 10M | Bottom Face | 0 | 23800 | 711.0 | 18.88 | ON | 0.148 | 0.855 |
| 22 | LTE Band 17 | 16QAM(1-0) | 10M | Bottom Face | 0 | 23800 | 711.0 | 18.93 | ON | 0.158 | 0.598 |
| 23 | LTE Band 17 | 16QAM(1-49) | 10M | Bottom Face | 0 | 23800 | 711.0 | 18.81 | ON | 0.149 | 0.737 |
| 17 | LTE Band 17 | QPSK(25-13) | 10M | Edge 1 | 0 | 23790 | 710.0 | 18.83 | ON | 0.024 | 0.662 |
| 19 | LTE Band 17 | QPSK(1-0) | 10M | Edge 1 | 0 | 23790 | 710.0 | 18.98 | ON | 0.017 | 0.555 |
| 20 | LTE Band 17 | QPSK(1-49) | 10M | Edge 1 | 0 | 23790 | 710.0 | 18.92 | ON | -0.084 | 0.646 |
| 24 | LTE Band 17 | 16QAM(25-13) | 10M | Edge 1 | 0 | 23790 | 710.0 | 18.86 | ON | 0.079 | 0.656 |
| 25 | LTE Band 17 | 16QAM(1-0) | 10M | Edge 1 | 0 | 23790 | 710.0 | 18.91 | ON | 0.112 | 0.556 |
| 26 | LTE Band 17 | 16QAM(1-49) | 10M | Edge 1 | 0 | 23790 | 710.0 | 18.85 | ON | 0.065 | 0.652 |
| 123 | LTE Band 17 | QPSK(1-49) | 10M | Curved surface of Edge 1 / Bottom Face tilted | 0 | 23800 | 711.0 | 18.92 | ON | 0.135 | 1 |
| 116 | LTE Band 17 | QPSK(1-49) | 10M | Curved surface of Edge 1 / Bottom Face tilted | 0 | 23780 | 709.0 | 18.79 | ON | -0.0252 | 1.05 |
| 117 | LTE Band 17 | QPSK(1-49) | 10M | Curved surface of Edge 1 / Bottom Face tilted | 0 | 23790 | 710.0 | 18.92 | ON | 0.161 | 1.02 |
| 120 | LTE Band 17 | 16QAM(25-13) | 10M | Curved surface of Edge 1 / Bottom Face tilted | 0 | 23800 | 711.0 | 18.88 | ON | -0.097 | **1.17** |
| 118 | LTE Band 17 | 16QAM(25-13) | 10M | Curved surface of Edge 1 / Bottom Face tilted | 0 | 23780 | 709.0 | 18.62 | ON | -0.095 | 1.09 |
| 119 | LTE Band 17 | 16QAM(25-13) | 10M | Curved surface of Edge 1 / Bottom Face tilted | 0 | 23790 | 710.0 | 18.86 | ON | -0.05 | 1.15 |

**Note:**

1. Per KDB 941225 D05, for LTE, if the smaller bandwidth output power is within +/- 0.5dB of the largest bandwidth, and the maximum SAR of the largest bandwidth is < 1.45 W/kg, SAR for smaller bandwidth can be excluded. Therefore LTE smaller bandwidth SAR tests are excluded.
2. Per KDB 941225 D05, for LTE, if 50%-RB QPSK/16QAM SAR < 1.45 W/kg, 100%-RB SAR can be excluded.
3. During proximity sensor activated and power reduction enabled, the LTE output is reduced to a certain level, while MPR for different RB configurations is disabled. Therefore the MPR levels are not applicable.
4. If the 50%-RB QPSK SAR ≤ 0.8 W/kg, other channels SAR tests are not necessarily referring to KDB 941225.
5. 0.9 cm and 1.1 cm test results are for confirming operation of the power reduction scheme.
6. LTE Curved SAR was verified on the worst case that obtain from the routine LTE SAR testing.

<LTE>

| Plot No. | Band | Mode | BW [MHz] | Test Position | Gap (cm) | Ch. | Freq. (MHz) | Average Power (dBm) | Power Back-off | Power Drift (dB) | $SAR_{1g}$ (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 61 | LTE Band 4 | QPSK(50-25) | 20M | Bottom Face | 1.1 | 20175 | 1732.5 | 23.01 | OFF | -0.118 | 0.517 |
| 62 | LTE Band 4 | QPSK(1-0) | 20M | Bottom Face | 1.1 | 20175 | 1732.5 | 24.21 | OFF | -0.116 | 0.705 |
| 63 | LTE Band 4 | QPSK(1-99) | 20M | Bottom Face | 1.1 | 20175 | 1732.5 | 24.04 | OFF | -0.16 | 0.734 |
| 70 | LTE Band 4 | 16QAM(50-25) | 20M | Bottom Face | 1.1 | 20175 | 1732.5 | 21.82 | OFF | -0.121 | 0.403 |
| 71 | LTE Band 4 | 16QAM(1-0) | 20M | Bottom Face | 1.1 | 20175 | 1732.5 | 23.04 | OFF | -0.055 | 0.568 |
| 72 | LTE Band 4 | 16QAM(1-99) | 20M | Bottom Face | 1.1 | 20175 | 1732.5 | 22.78 | OFF | 0.00531 | 0.578 |
| 64 | LTE Band 4 | QPSK(50-25) | 20M | Edge 1 | 0.9 | 20175 | 1732.5 | 23.01 | OFF | 0.084 | 0.535 |
| 65 | LTE Band 4 | QPSK(1-0) | 20M | Edge 1 | 0.9 | 20175 | 1732.5 | 24.21 | OFF | 0.111 | 0.754 |
| 66 | LTE Band 4 | QPSK(1-99) | 20M | Edge 1 | 0.9 | 20175 | 1732.5 | 24.04 | OFF | 0.122 | 0.768 |
| 73 | LTE Band 4 | 16QAM(50-25) | 20M | Edge 1 | 0.9 | 20175 | 1732.5 | 21.82 | OFF | 0.095 | 0.423 |
| 74 | LTE Band 4 | 16QAM(1-0) | 20M | Edge 1 | 0.9 | 20175 | 1732.5 | 23.04 | OFF | 0.124 | 0.629 |
| 75 | LTE Band 4 | 16QAM(1-99) | 20M | Edge 1 | 0.9 | 20175 | 1732.5 | 22.78 | OFF | 0.16 | 0.623 |
| 67 | LTE Band 4 | QPSK(50-25) | 20M | Edge 2 | 0 | 20175 | 1732.5 | 23.01 | OFF | -0.063 | 0.351 |
| 68 | LTE Band 4 | QPSK(1-0) | 20M | Edge 2 | 0 | 20175 | 1732.5 | 24.21 | OFF | -0.06 | 0.476 |
| 69 | LTE Band 4 | QPSK(1-99) | 20M | Edge 2 | 0 | 20175 | 1732.5 | 24.04 | OFF | -0.064 | 0.523 |
| 76 | LTE Band 4 | 16QAM(50-25) | 20M | Edge 2 | 0 | 20175 | 1732.5 | 21.82 | OFF | 0.052 | 0.28 |
| 77 | LTE Band 4 | 16QAM(1-0) | 20M | Edge 2 | 0 | 20175 | 1732.5 | 23.04 | OFF | -0.126 | 0.38 |
| 78 | LTE Band 4 | 16QAM(1-99) | 20M | Edge 2 | 0 | 20175 | 1732.5 | 22.78 | OFF | -0.109 | 0.419 |
| 79 | LTE Band 4 | QPSK(50-25) | 20M | Bottom Face | 0 | 20050 | 1720.0 | 17.75 | ON | 0.011 | 1.09 |
| 80 | LTE Band 4 | QPSK(50-25) | 20M | Bottom Face | 0 | 20175 | 1732.5 | 17.86 | ON | -0.078 | 1.02 |
| 81 | LTE Band 4 | QPSK(50-25) | 20M | Bottom Face | 0 | 20300 | 1745.0 | 17.40 | ON | -0.041 | 1.06 |
| 82 | LTE Band 4 | QPSK(1-0) | 20M | Bottom Face | 0 | 20050 | 1720.0 | 17.90 | ON | 0.055 | 0.992 |
| 83 | LTE Band 4 | QPSK(1-99) | 20M | Bottom Face | 0 | 20050 | 1720.0 | 17.80 | ON | -0.025 | 1.04 |
| 87 | LTE Band 4 | 16QAM(50-25) | 20M | Bottom Face | 0 | 20050 | 1720.0 | 17.73 | ON | -0.134 | **1.21** |
| 88 | LTE Band 4 | 16QAM(1-0) | 20M | Bottom Face | 0 | 20050 | 1720.0 | 17.91 | ON | -0.05 | 0.968 |
| 89 | LTE Band 4 | 16QAM(1-99) | 20M | Bottom Face | 0 | 20050 | 1720.0 | 17.60 | ON | 0.141 | 1.06 |
| 84 | LTE Band 4 | QPSK(50-25) | 20M | Edge 1 | 0 | 20175 | 1732.5 | 17.86 | ON | 0.024 | 0.468 |
| 85 | LTE Band 4 | QPSK(1-0) | 20M | Edge 1 | 0 | 20175 | 1732.5 | 17.92 | ON | 0.003 | 0.432 |
| 86 | LTE Band 4 | QPSK(1-99) | 20M | Edge 1 | 0 | 20175 | 1732.5 | 17.85 | ON | 0.092 | 0.393 |
| 90 | LTE Band 4 | 16QAM(50-25) | 20M | Edge 1 | 0 | 20050 | 1720.0 | 17.73 | ON | 0.083 | 0.454 |
| 91 | LTE Band 4 | 16QAM(1-0) | 20M | Edge 1 | 0 | 20050 | 1720.0 | 17.91 | ON | 0.019 | 0.377 |
| 92 | LTE Band 4 | 16QAM(1-99) | 20M | Edge 1 | 0 | 20050 | 1720.0 | 17.60 | ON | 0.016 | 0.38 |
| 124 | LTE Band 4 | QPSK(1-99) | 20M | Curved surface of Edge 1 / Bottom Face tilted | 0 | 20050 | 1720.0 | 17.80 | ON | -0.137 | 0.952 |
| 112 | LTE Band 4 | QPSK(1-99) | 20M | Curved surface of Edge 1 / Bottom Face tilted | 0 | 20175 | 1732.5 | 17.85 | ON | 0.154 | 0.952 |
| 113 | LTE Band 4 | QPSK(1-99) | 20M | Curved surface of Edge 1 / Bottom Face tilted | 0 | 20300 | 1745.0 | 17.55 | ON | 0.12 | 1.06 |
| 125 | LTE Band 4 | 16QAM(50-25) | 20M | Curved surface of Edge 1 / Bottom Face tilted | 0 | 20050 | 1720.0 | 17.73 | ON | 0.02 | 0.933 |
| 114 | LTE Band 4 | 16QAM(50-25) | 20M | Curved surface of Edge 1 / Bottom Face tilted | 0 | 20175 | 1732.5 | 17.80 | ON | -0.132 | 0.881 |
| 115 | LTE Band 4 | 16QAM(50-25) | 20M | Curved surface of Edge 1 / Bottom Face tilted | 0 | 20300 | 1745.0 | 17.55 | ON | 0.051 | 0.765 |

**Note:**

1. Per KDB 941225 D05, for LTE, if the smaller bandwidth output power is within +/- 0.5dB of the largest bandwidth, and the maximum SAR of the largest bandwidth is < 1.45 W/kg, SAR for smaller bandwidth can be excluded. Therefore LTE smaller bandwidth SAR tests are excluded.
2. Per KDB 941225 D05, for LTE, if 50%-RB QPSK/16QAM SAR < 1.45 W/kg, 100%-RB SAR can be excluded.
3. During proximity sensor activated and power reduction enabled, the LTE output is reduced to a certain level, while MPR for different RB configurations is disabled. Therefore the MPR levels are not applicable.
4. If the 50%-RB QPSK SAR ≤ 0.8 W/kg, other channels SAR tests are not necessarily referring to KDB 941225.
5. 0.9 cm and 1.1 cm test results are for confirming operation of the power reduction scheme.
6. LTE Curved SAR was verified on the worst case that obtain from the routine LTE SAR testing.

## <WLAN2.4G>

| Plot No. | Band | Mode | Test Position | Gap (cm) | Ch. | Freq. (MHz) | Average Power (dBm) | Duty Cycle Compensate Factor | Duty Cycle % | Chain | Power Back-off | Power Drift (dB) | $SAR_{1g}$ (W/kg) | Duty Cycle Compensated $SAR_{1g}$ (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **231** | **WLAN2.4G** | **11b** | **Bottom Face** | **0** | **6** | **2437** | **16.88** | **1.00** | **100** | **1** | **OFF** | **0.158** | **1.26** | **1.26** |
| 232 | WLAN2.4G | 11b | Bottom Face | 0 | 1 | 2412 | 16.35 | 1.00 | 100 | 1 | OFF | 0.12 | 1.22 | 1.22 |
| 233 | WLAN2.4G | 11b | Bottom Face | 0 | 11 | 2462 | 16.86 | 1.00 | 100 | 1 | OFF | 0.146 | 1.17 | 1.17 |
| 234 | WLAN2.4G | 11b | Edge 1 | 0 | 6 | 2437 | 16.88 | 1.00 | 100 | 1 | OFF | 0.123 | 1.11 | 1.11 |
| 235 | WLAN2.4G | 11b | Edge 1 | 0 | 1 | 2412 | 16.35 | 1.00 | 100 | 1 | OFF | 0.182 | 0.9 | 0.90 |
| 236 | WLAN2.4G | 11b | Edge 1 | 0 | 11 | 2462 | 16.86 | 1.00 | 100 | 1 | OFF | -0.161 | 1.25 | 1.25 |
| 237 | WLAN2.4G | 11b | Edge 4 | 0 | 6 | 2437 | 16.88 | 1.00 | 100 | 1 | OFF | 0.126 | 0.095 | 0.10 |
| 268 | WLAN2.4G | 11b | Curved surface of Edge 1 / Bottom Face tilted | 0 | 6 | 2437 | 16.88 | 1.00 | 100 | 1 | OFF | 0.162 | 1.03 | 1.03 |
| 269 | WLAN2.4G | 11b | Curved surface of Edge 1 / Bottom Face tilted | 0 | 1 | 2412 | 16.35 | 1.00 | 100 | 1 | OFF | 0.108 | 1.07 | 1.07 |
| 270 | WLAN2.4G | 11b | Curved surface of Edge 1 / Bottom Face tilted | 0 | 11 | 2462 | 16.86 | 1.00 | 100 | 1 | OFF | 0.129 | 1.19 | 1.19 |
| 246 | WLAN2.4G | 11n(20M) | Bottom Face | 0 | 6 | 2437 | 17.91 | 1.02 | 98.2 | 1+2 | OFF | 0.168 | 1.15 | 1.17 |
| 267 | WLAN2.4G | 11n(20M) | Bottom Face | 0 | 1 | 2412 | 13.58 | 1.02 | 98.2 | 1+2 | OFF | 0.111 | 0.416 | 0.42 |
| 248 | WLAN2.4G | 11n(20M) | Bottom Face | 0 | 11 | 2462 | 14.35 | 1.02 | 98.2 | 1+2 | OFF | 0.152 | 0.394 | 0.40 |
| 249 | WLAN2.4G | 11n(20M) | Edge 1 | 0 | 6 | 2437 | 17.91 | 1.02 | 98.2 | 1+2 | OFF | 0.08 | 0.826 | 0.84 |
| 250 | WLAN2.4G | 11n(20M) | Edge 1 | 0 | 1 | 2412 | 13.58 | 1.02 | 98.2 | 1+2 | OFF | 0.071 | 0.261 | 0.27 |
| 251 | WLAN2.4G | 11n(20M) | Edge 1 | 0 | 11 | 2462 | 14.35 | 1.02 | 98.2 | 1+2 | OFF | 0.06 | 0.317 | 0.32 |
| 252 | WLAN2.4G | 11n(20M) | Edge 4 | 0 | 6 | 2437 | 17.91 | 1.02 | 98.2 | 1+2 | OFF | -0.16 | 0.64 | 0.65 |
| 305 | WLAN2.4G | 11n(20M) | Curved surface of Edge 4 / Bottom Face tilted | 0 | 6 | 2437 | 17.91 | 1.02 | 98.2 | 1+2 | OFF | 0.044 | 0.896 | 0.91 |
| 306 | WLAN2.4G | 11n(20M) | Curved surface of Edge 4 / Bottom Face tilted | 0 | 1 | 2412 | 13.58 | 1.02 | 98.2 | 1+2 | OFF | 0.049 | 0.299 | 0.30 |
| 307 | WLAN2.4G | 11n(20M) | Curved surface of Edge 4 / Bottom Face tilted | 0 | 11 | 2462 | 14.35 | 1.02 | 98.2 | 1+2 | OFF | 0.081 | 0.386 | 0.39 |
| 302 | WLAN2.4G | 11n(20M) | Curved surface of Edge 1 / Bottom Face tilted | 0 | 6 | 2437 | 17.91 | 1.02 | 98.2 | 1+2 | OFF | 0.099 | 0.818 | 0.83 |
| 303 | WLAN2.4G | 11n(20M) | Curved surface of Edge 1 / Bottom Face tilted | 0 | 1 | 2412 | 13.58 | 1.02 | 98.2 | 1+2 | OFF | 0.17 | 0.297 | 0.30 |
| 304 | WLAN2.4G | 11n(20M) | Curved surface of Edge 1 / Bottom Face tilted | 0 | 11 | 2462 | 14.35 | 1.02 | 98.2 | 1+2 | OFF | 0.048 | 0.337 | 0.34 |

**Note:**

1. Per KDB 447498, if the highest output channel SAR for each exposure position ≤ 0.8 W/kg other channels SAR tests are not necessary.
2. For SAR testing at the curved surface of Edge 1 directly contacted with phantom, pre-test at different EUT tilt angles were perfomed and the worst case was chosen for SAR testing. SAR test data submitted represents the most conservative RF exposure level.

## <WLAN5G – Single Chain>

| Plot No. | Band | Mode | Test Position | Gap (cm) | Ch. | Freq. (MHz) | Average Power (dBm) | Duty Cycle Compensate Factor | Duty Cycle % | Chain | Power Back-off | Power Drift (dB) | $SAR_{1g}$ (W/kg) | Duty Cycle Compensated $SAR_{1g}$ (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 203 | WLAN5G | 11a | Bottom Face | 0 | 44 | 5220 | 12.65 | 1.01 | 99.17 | 1 | OFF | -0.125 | 1.02 | 1.03 |
| 217 | WLAN5G | 11a | Bottom Face | 0 | 40 | 5200 | 12.33 | 1.01 | 99.17 | 1 | OFF | 0.048 | 0.886 | 0.89 |
| 204 | WLAN5G | 11a | Edge 1 | 0 | 44 | 5220 | 12.65 | 1.01 | 99.17 | 1 | OFF | 0.125 | 0.764 | 0.77 |
| 222 | WLAN5G | 11a | Edge 1 | 0 | 40 | 5200 | 12.33 | 1.01 | 99.17 | 1 | OFF | 0.137 | 0.729 | 0.74 |
| 255 | WLAN5G | 11a | Edge 4 | 0 | 44 | 5220 | 12.65 | 1.01 | 99.17 | 1 | OFF | 0.161 | 0.112 | 0.11 |
| 271 | WLAN5G | 11a | Curved surface of Edge 1 / Bottom Face tilted | 0 | 44 | 5220 | 12.65 | 1.01 | 99.17 | 1 | OFF | 0.179 | 1.23 | 1.24 |
| 272 | WLAN5G | 11a | Curved surface of Edge 1 / Bottom Face tilted | 0 | 40 | 5200 | 12.33 | 1.01 | 99.17 | 1 | OFF | -0.111 | 1.24 | 1.25 |
| 207 | WLAN5G | 11a | Bottom Face | 0 | 60 | 5300 | 12.65 | 1.01 | 99.17 | 1 | OFF | 0.001 | 1.07 | 1.08 |
| 218 | WLAN5G | 11a | Bottom Face | 0 | 56 | 5280 | 12.23 | 1.01 | 99.17 | 1 | OFF | 0.003 | 1.1 | 1.11 |
| 208 | WLAN5G | 11a | Edge 1 | 0 | 60 | 5300 | 12.65 | 1.01 | 99.17 | 1 | OFF | 0.14 | 1.08 | 1.09 |
| 223 | WLAN5G | 11a | Edge 1 | 0 | 56 | 5280 | 12.23 | 1.01 | 99.17 | 1 | OFF | 0.12 | 1.05 | 1.06 |
| 265 | WLAN5G | 11a | Edge 4 | 0 | 60 | 5300 | 12.65 | 1.01 | 99.17 | 1 | OFF | 0.069 | 0.168 | 0.17 |
| 277 | WLAN5G | 11a | Curved surface of Edge 1 / Bottom Face tilted | 0 | 60 | 5300 | 12.65 | 1.01 | 99.17 | 1 | OFF | 0.02 | 1.27 | 1.28 |
| 283 | WLAN5G | 11a | Curved surface of Edge 1 / Bottom Face tilted | 0 | 56 | 5280 | 12.23 | 1.01 | 99.17 | 1 | OFF | 0.058 | 1.23 | 1.24 |
| 209 | WLAN5G | 11a | Bottom Face | 0 | 116 | 5580 | 11.44 | 1.01 | 99.17 | 1 | OFF | 0.01 | 1.22 | 1.23 |
| 219 | WLAN5G | 11a | Bottom Face | 0 | 104 | 5520 | 11.08 | 1.01 | 99.17 | 1 | OFF | 0.018 | 1.2 | 1.21 |
| 220 | WLAN5G | 11a | Bottom Face | 0 | 132 | 5660 | 10.88 | 1.01 | 99.17 | 1 | OFF | 0.18 | 1.16 | 1.17 |
| 210 | WLAN5G | 11a | Edge 1 | 0 | 116 | 5580 | 11.44 | 1.01 | 99.17 | 1 | OFF | -0.038 | 1.03 | 1.04 |
| 224 | WLAN5G | 11a | Edge 1 | 0 | 104 | 5520 | 11.08 | 1.01 | 99.17 | 1 | OFF | 0.128 | 0.831 | 0.84 |
| 225 | WLAN5G | 11a | Edge 1 | 0 | 132 | 5660 | 10.88 | 1.01 | 99.17 | 1 | OFF | 0.08 | 1.14 | 1.15 |
| 266 | WLAN5G | 11a | Edge 4 | 0 | 116 | 5580 | 11.44 | 1.01 | 99.17 | 1 | OFF | -0.036 | 0.216 | 0.22 |
| 278 | WLAN5G | 11a | Curved surface of Edge 1 / Bottom Face tilted | 0 | 116 | 5580 | 11.44 | 1.01 | 99.17 | 1 | OFF | 0.001 | 1.18 | 1.19 |
| 284 | WLAN5G | 11a | Curved surface of Edge 1 / Bottom Face tilted | 0 | 104 | 5520 | 11.08 | 1.01 | 99.17 | 1 | OFF | 0.022 | 1.12 | 1.13 |
| 285 | WLAN5G | 11a | Curved surface of Edge 1 / Bottom Face tilted | 0 | 132 | 5660 | 10.88 | 1.01 | 99.17 | 1 | OFF | -0.087 | 1.21 | 1.22 |
| 201 | WLAN5G | 11a | Bottom Face | 0 | 157 | 5785 | 11.97 | 1.01 | 99.36 | 1 | OFF | -0.07 | 1.22 | 1.23 |
| 221 | WLAN5G | 11a | Bottom Face | 0 | 153 | 5765 | 11.81 | 1.01 | 99.36 | 1 | OFF | 0.043 | 1.27 | 1.28 |
| 254 | WLAN5G | 11a | Bottom Face | 0 | 161 | 5805 | 11.93 | 1.01 | 99.36 | 1 | OFF | 0.123 | 1.22 | 1.23 |
| 202 | WLAN5G | 11a | Edge 1 | 0 | 157 | 5785 | 11.97 | 1.01 | 99.36 | 1 | OFF | -0.07 | 0.662 | 0.67 |
| 256 | WLAN5G | 11a | Edge 4 | 0 | 157 | 5785 | 11.97 | 1.01 | 99.36 | 1 | OFF | 0.184 | 0.087 | 0.09 |
| 273 | WLAN5G | 11a | Curved surface of Edge 1 / Bottom Face tilted | 0 | 157 | 5785 | 11.97 | 1.01 | 99.36 | 1 | OFF | 0.064 | 1.14 | 1.15 |
| 274 | WLAN5G | 11a | Curved surface of Edge 1 / Bottom Face tilted | 0 | 153 | 5765 | 11.81 | 1.01 | 99.36 | 1 | OFF | 0.191 | 1.22 | 1.23 |
| 275 | WLAN5G | 11a | Curved surface of Edge 1 / Bottom Face tilted | 0 | 161 | 5805 | 11.93 | 1.01 | 99.36 | 1 | OFF | 0.17 | 1.15 | 1.16 |

**Note:**

1. Per KDB 447498, if the highest output channel SAR for each exposure position ≤ 0.8 W/kg other channels SAR tests are not necessary.
2. For SAR testing at the curved surface of Edge 1 directly contacted with phantom, pre-test at different EUT tilt angles were perfomed and the worst case was chosen for SAR testing. SAR test data submitted represents the most conservative RF exposure level.

## <WLAN5G – 2TX MIMO>

| Plot No. | Band | Mode | Test Position | Gap (cm) | Ch. | Freq. (MHz) | Average Power (dBm) | Duty Cycle Compensate Factor | Duty Cycle % | Chain | Power Back-off | Power Drift (dB) | $SAR_{1g}$ (W/kg) | Duty Cycle Compensated $SAR_{1g}$ (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 211 | WLAN5G | 11n(20M) | Bottom Face | 0 | 44 | 5220 | 14.88 | 1.02 | 98.21 | 1+2 | OFF | 0.13 | 0.717 | 0.73 |
| 212 | WLAN5G | 11n(20M) | Edge 1 | 0 | 44 | 5220 | 14.88 | 1.02 | 98.21 | 1+2 | OFF | 0.168 | 0.647 | 0.66 |
| 257 | WLAN5G | 11n(20M) | Edge 4 | 0 | 44 | 5220 | 14.88 | 1.02 | 98.21 | 1+2 | OFF | 0.029 | 1.11 | 1.13 |
| 258 | WLAN5G | 11n(20M) | Edge 4 | 0 | 40 | 5200 | 14.78 | 1.02 | 98.21 | 1+2 | OFF | 0.021 | 1.08 | 1.10 |
| 279 | WLAN5G | 11n(20M) | Curved surface of Edge 4 / Bottom Face tilted | 0 | 44 | 5220 | 14.88 | 1.02 | 98.21 | 1+2 | OFF | 0.136 | 0.948 | 0.97 |
| 287 | WLAN5G | 11n(20M) | Curved surface of Edge 4 / Bottom Face tilted | 0 | 40 | 5200 | 14.78 | 1.02 | 98.21 | 1+2 | OFF | 0.185 | 0.891 | 0.91 |
| 286 | WLAN5G | 11n(20M) | Curved surface of Edge 1 / Bottom Face tilted | 0 | 44 | 5220 | 14.88 | 1.02 | 98.21 | 1+2 | OFF | 0.15 | 0.98 | 1.00 |
| 288 | WLAN5G | 11n(20M) | Curved surface of Edge 1 / Bottom Face tilted | 0 | 40 | 5200 | 14.78 | 1.02 | 98.21 | 1+2 | OFF | 0.131 | 1.01 | 1.03 |
| 213 | WLAN5G | 11n(20M) | Bottom Face | 0 | 60 | 5300 | 16.37 | 1.02 | 98.21 | 1+2 | OFF | 0.05 | 1.2 | 1.22 |
| 227 | WLAN5G | 11n(20M) | Bottom Face | 0 | 56 | 5280 | 16.23 | 1.02 | 98.21 | 1+2 | OFF | 0.071 | 1.09 | 1.11 |
| 214 | WLAN5G | 11n(20M) | Edge 1 | 0 | 60 | 5300 | 16.37 | 1.02 | 98.21 | 1+2 | OFF | -0.03 | 0.995 | 1.01 |
| 245 | WLAN5G | 11n(20M) | Edge 1 | 0 | 56 | 5280 | 16.23 | 1.02 | 98.21 | 1+2 | OFF | 0.077 | 1.02 | 1.04 |
| 259 | WLAN5G | 11n(20M) | Edge 4 | 0 | 60 | 5300 | 16.37 | 1.02 | 98.21 | 1+2 | OFF | 0.1 | 1.05 | 1.07 |
| 260 | WLAN5G | 11n(20M) | Edge 4 | 0 | 56 | 5280 | 16.23 | 1.02 | 98.21 | 1+2 | OFF | -0.01 | 1.11 | 1.13 |
| 280 | WLAN5G | 11n(20M) | Curved surface of Edge 4 / Bottom Face tilted | 0 | 60 | 5300 | 16.37 | 1.02 | 98.21 | 1+2 | OFF | 0.045 | 1.29 | **1.32** |
| 290 | WLAN5G | 11n(20M) | Curved surface of Edge 4 / Bottom Face tilted | 0 | 56 | 5280 | 16.23 | 1.02 | 98.21 | 1+2 | OFF | 0.15 | 1.19 | 1.21 |
| 289 | WLAN5G | 11n(20M) | Curved surface of Edge 1 / Bottom Face tilted | 0 | 60 | 5300 | 16.37 | 1.02 | 98.21 | 1+2 | OFF | 0.125 | 1.22 | 1.24 |
| 291 | WLAN5G | 11n(20M) | Curved surface of Edge 1 / Bottom Face tilted | 0 | 56 | 5280 | 16.23 | 1.02 | 98.21 | 1+2 | OFF | 0.181 | 1.24 | 1.26 |
| 215 | WLAN5G | 11n(20M) | Bottom Face | 0 | 116 | 5580 | 15.25 | 1.02 | 98.21 | 1+2 | OFF | 0.13 | 1.24 | 1.26 |
| 228 | WLAN5G | 11n(20M) | Bottom Face | 0 | 108 | 5540 | 15.08 | 1.02 | 98.21 | 1+2 | OFF | 0.058 | 1.15 | 1.17 |
| 229 | WLAN5G | 11n(20M) | Bottom Face | 0 | 132 | 5660 | 15.13 | 1.02 | 98.21 | 1+2 | OFF | 0.02 | 1.22 | 1.24 |
| 216 | WLAN5G | 11n(20M) | Edge 1 | 0 | 116 | 5580 | 15.25 | 1.02 | 98.21 | 1+2 | OFF | -0.147 | 0.946 | 0.96 |
| 240 | WLAN5G | 11n(20M) | Edge 1 | 0 | 108 | 5540 | 15.08 | 1.02 | 98.21 | 1+2 | OFF | 0.111 | 0.989 | 1.01 |
| 241 | WLAN5G | 11n(20M) | Edge 1 | 0 | 132 | 5660 | 15.13 | 1.02 | 98.21 | 1+2 | OFF | 0.11 | 1.14 | 1.16 |
| 242 | WLAN5G | 11n(20M) | Edge 4 | 0 | 116 | 5580 | 15.25 | 1.02 | 98.21 | 1+2 | OFF | 0.133 | 0.947 | 0.97 |
| 243 | WLAN5G | 11n(20M) | Edge 4 | 0 | 108 | 5540 | 15.08 | 1.02 | 98.21 | 1+2 | OFF | 0.11 | 0.956 | 0.98 |
| 244 | WLAN5G | 11n(20M) | Edge 4 | 0 | 132 | 5660 | 15.13 | 1.02 | 98.21 | 1+2 | OFF | -0.09 | 0.956 | 0.98 |
| 281 | WLAN5G | 11n(20M) | Curved surface of Edge 4 / Bottom Face tilted | 0 | 116 | 5580 | 15.25 | 1.02 | 98.21 | 1+2 | OFF | 0.041 | 0.942 | 0.96 |
| 293 | WLAN5G | 11n(20M) | Curved surface of Edge 4 / Bottom Face tilted | 0 | 108 | 5540 | 15.08 | 1.02 | 98.21 | 1+2 | OFF | 0.147 | 0.832 | 0.85 |
| 295 | WLAN5G | 11n(20M) | Curved surface of Edge 4 / Bottom Face tilted | 0 | 132 | 5660 | 15.13 | 1.02 | 98.21 | 1+2 | OFF | 0.021 | 0.881 | 0.90 |
| 292 | WLAN5G | 11n(20M) | Curved surface of Edge 1 / Bottom Face tilted | 0 | 116 | 5580 | 15.25 | 1.02 | 98.21 | 1+2 | OFF | -0.119 | 1.28 | 1.31 |
| 294 | WLAN5G | 11n(20M) | Curved surface of Edge 1 / Bottom Face tilted | 0 | 108 | 5540 | 15.08 | 1.02 | 98.21 | 1+2 | OFF | 0.127 | 1.09 | 1.11 |
| 296 | WLAN5G | 11n(20M) | Curved surface of Edge 1 / Bottom Face tilted | 0 | 132 | 5660 | 15.13 | 1.02 | 98.21 | 1+2 | OFF | 0.063 | 1.23 | 1.25 |

**Note:**

1. Per KDB 447498, if the highest output channel SAR for each exposure position ≤ 0.8 W/kg other channels SAR tests are not necessary.
2. For SAR testing at the curved surface of Edge1 and Edge4 directly contacted with phantom, pre-test at different EUT tilt angles were performed and the worst case was chosen for SAR testing. SAR test data submitted represents the most conservative RF exposure level.

## <WLAN5G – 2TX MIMO>

| Plot No. | Band | Mode | Test Position | Gap (cm) | Ch. | Freq. (MHz) | Average Power (dBm) | Duty Cycle Compensate Factor | Duty Cycle % | Chain | Power Back-off | Power Drift (dB) | $SAR_{1g}$ (W/kg) | Duty Cycle Compensated $SAR_{1g}$ (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 205 | WLAN5G | 11n(20M) | Bottom Face | 0 | 157 | 5785 | 15.68 | 1.02 | 98.21 | 1+2 | OFF | 0.174 | 1.26 | 1.29 |
| 230 | WLAN5G | 11n(20M) | Bottom Face | 0 | 153 | 5765 | 15.67 | 1.02 | 98.21 | 1+2 | OFF | 0.075 | 1.24 | 1.26 |
| 263 | WLAN5G | 11n(20M) | Bottom Face | 0 | 161 | 5805 | 15.64 | 1.02 | 98.21 | 1+2 | OFF | 0.018 | 1.25 | 1.28 |
| 206 | WLAN5G | 11n(20M) | Edge 1 | 0 | 157 | 5785 | 15.68 | 1.02 | 98.21 | 1+2 | OFF | 0.158 | 0.778 | 0.79 |
| 238 | WLAN5G | 11n(20M) | Edge 4 | 0 | 157 | 5785 | 15.68 | 1.02 | 98.21 | 1+2 | OFF | 0.08 | 0.87 | 0.89 |
| 239 | WLAN5G | 11n(20M) | Edge 4 | 0 | 153 | 5765 | 15.67 | 1.02 | 98.21 | 1+2 | OFF | 0.05 | 0.921 | 0.94 |
| 261 | WLAN5G | 11n(20M) | Edge 4 | 0 | 161 | 5805 | 15.64 | 1.02 | 98.21 | 1+2 | OFF | -0.03 | 0.87 | 0.89 |
| 282 | WLAN5G | 11n(20M) | Curved surface of Edge 4 / Bottom Face tilted | 0 | 157 | 5785 | 15.68 | 1.02 | 98.21 | 1+2 | OFF | 0.054 | 0.918 | 0.94 |
| 300 | WLAN5G | 11n(20M) | Curved surface of Edge 4 / Bottom Face tilted | 0 | 153 | 5765 | 15.67 | 1.02 | 98.21 | 1+2 | OFF | 0.05 | 0.744 | 0.76 |
| 301 | WLAN5G | 11n(20M) | Curved surface of Edge 4 / Bottom Face tilted | 0 | 161 | 5805 | 15.64 | 1.02 | 98.21 | 1+2 | OFF | 0.02 | 0.705 | 0.72 |
| 297 | WLAN5G | 11n(20M) | Curved surface of Edge 1 / Bottom Face tilted | 0 | 157 | 5785 | 15.68 | 1.02 | 98.21 | 1+2 | OFF | -0.111 | 1.11 | 1.13 |
| 298 | WLAN5G | 11n(20M) | Curved surface of Edge 1 / Bottom Face tilted | 0 | 153 | 5765 | 15.67 | 1.02 | 98.21 | 1+2 | OFF | 0.083 | 1.02 | 1.04 |
| 299 | WLAN5G | 11n(20M) | Curved surface of Edge 1 / Bottom Face tilted | 0 | 161 | 5805 | 15.64 | 1.02 | 98.21 | 1+2 | OFF | 0.062 | 1.2 | 1.22 |

**Note:**

1. Per KDB 447498, if the highest output channel SAR for each exposure position ≤ 0.8 W/kg other channels SAR tests are not necessary.
2. For SAR testing at the curved surface of Edge1 and Edge4 directly contacted with phantom, pre-test at different EUT tilt angles were performed and the worst case was chosen for SAR testing. SAR test data submitted represents the most conservative RF exposure level.

## 11.2 Simultaneous Transmission SAR Analysis and Measurements

| No. | Applicable Simultaneous Transmission Combination |
|---|---|
| 1. | WWAN (data) + BT |
| 2. | WLAN 2TX MIMO |

**Note:**

1. WWAN Radio (GPRS/EGPRS/UMTS/LTE) cannot transmit simultaneously with WiFi Radio; Simultaneous transmission of WWAN+2.4GHz WLAN, WWAN+5GHz WLAN, are not supported
2. WLAN and BT share the same antenna, however, WiFi Radio cannot transmit simultaneously with Bluetooth Radio.
3. GPRS/EDGE, UMTS and LTE share the same antenna, and cannot transmit simultaneously.
4. EUT will choose either WLAN2.4G or WLAN5G according to the network signal condition, therefore, they will not transmit simultaneously.
5. Per KDB 447498 3)b)ii)1), Bluetoooth average power is <60/f, and the distance of Bluetooth antenna to WWAN antenna is >5cm, thus simultaneous transmission consideration is excluded
6. Per KDB 248227 MIMO SAR procedure, WLAN 2TX MIMO was evaluated and the results is listied in section 11.1.

**Test Engineer：** Ted Sun, Cona Huang, Aaron Chen, Vic Yang, and San Lin

# 12. Uncertainty Assessment

The component of uncertainly may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainly by the statistical analysis of a series of observations is termed a Type An evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance.

A Type A evaluation of standard uncertainty may be based on any valid statistical method for treating data. This includes calculating the standard deviation of the mean of a series of independent observations; using the method of least squares to fit a curve to the data in order to estimate the parameter of the curve and their standard deviations; or carrying out an analysis of variance in order to identify and quantify random effects in certain kinds of measurement.

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience, and knowledge of the behavior and properties of relevant materials and instruments, manufacture's specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in Table 12.1

| Uncertainty Distributions | Normal | Rectangular | Triangular | U-Shape |
|---|---|---|---|---|
| Multiplying Factor[(a)] | $1/k^{(b)}$ | $1/\sqrt{3}$ | $1/\sqrt{6}$ | $1/\sqrt{2}$ |

(a) Standard uncertainty is determined as the product of the multiplying factor and the estimated range of variations in the measured quantity

(b) $\kappa$ is the coverage factor

**Table 12.1 Standard Uncertainty for Assumed Distribution**

The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type B evaluation using the usual "root-sum-squares" (RSS) methods of combining standard deviations by taking the positive square root of the estimated variances.

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For purposes of this document, a coverage factor two is used, which corresponds to a confidence interval of about 95 %. The DASY uncertainty Budget is shown in the following tables:

| Error Description | Uncertainty Value (±%) | Probability Distribution | Divisor | Ci (1g) | Ci (10g) | Standard Uncertainty (1g) | Standard Uncertainty (10g) |
|---|---|---|---|---|---|---|---|
| **Measurement System** | | | | | | | |
| Probe Calibration | 6.0 | Normal | 1 | 1 | 1 | ± 6.0 % | ± 6.0 % |
| Axial Isotropy | 4.7 | Rectangular | √3 | 0.7 | 0.7 | ± 1.9 % | ± 1.9 % |
| Hemispherical Isotropy | 9.6 | Rectangular | √3 | 0.7 | 0.7 | ± 3.9 % | ± 3.9 % |
| Boundary Effects | 1.0 | Rectangular | √3 | 1 | 1 | ± 0.6 % | ± 0.6 % |
| Linearity | 4.7 | Rectangular | √3 | 1 | 1 | ± 2.7 % | ± 2.7 % |
| System Detection Limits | 1.0 | Rectangular | √3 | 1 | 1 | ± 0.6 % | ± 0.6 % |
| Readout Electronics | 0.3 | Normal | 1 | 1 | 1 | ± 0.3 % | ± 0.3 % |
| Response Time | 0.8 | Rectangular | √3 | 1 | 1 | ± 0.5 % | ± 0.5 % |
| Integration Time | 2.6 | Rectangular | √3 | 1 | 1 | ± 1.5 % | ± 1.5 % |
| RF Ambient Noise | 3.0 | Rectangular | √3 | 1 | 1 | ± 1.7 % | ± 1.7 % |
| RF Ambient Reflections | 3.0 | Rectangular | √3 | 1 | 1 | ± 1.7 % | ± 1.7 % |
| Probe Positioner | 0.4 | Rectangular | √3 | 1 | 1 | ± 0.2 % | ± 0.2 % |
| Probe Positioning | 2.9 | Rectangular | √3 | 1 | 1 | ± 1.7 % | ± 1.7 % |
| Max. SAR Eval. | 1.0 | Rectangular | √3 | 1 | 1 | ± 0.6 % | ± 0.6 % |
| **Test Sample Related** | | | | | | | |
| Device Positioning | 2.9 | Normal | 1 | 1 | 1 | ± 2.9 % | ± 2.9 % |
| Device Holder | 3.6 | Normal | 1 | 1 | 1 | ± 3.6 % | ± 3.6 % |
| Power Drift | 5.0 | Rectangular | √3 | 1 | 1 | ± 2.9 % | ± 2.9 % |
| **Phantom and Setup** | | | | | | | |
| Phantom Uncertainty | 4.0 | Rectangular | √3 | 1 | 1 | ± 2.3 % | ± 2.3 % |
| Liquid Conductivity (Target) | 5.0 | Rectangular | √3 | 0.64 | 0.43 | ± 1.8 % | ± 1.2 % |
| Liquid Conductivity (Meas.) | 2.5 | Normal | 1 | 0.64 | 0.43 | ± 1.6 % | ± 1.1 % |
| Liquid Permittivity (Target) | 5.0 | Rectangular | √3 | 0.6 | 0.49 | ± 1.7 % | ± 1.4 % |
| Liquid Permittivity (Meas.) | 2.5 | Normal | 1 | 0.6 | 0.49 | ± 1.5 % | ± 1.2 % |
| **Combined Standard Uncertainty** | | | | | | ± 11.0 % | ± 10.8 % |
| **Coverage Factor for 95 %** | | | | | | K=2 | |
| **Expanded Uncertainty** | | | | | | **± 22.0 %** | **± 21.5 %** |

**Table 12.2 Uncertainty Budget of DASY for frequency range 300 MHz to 3 GHz**

| Error Description | Uncertainty Value (±%) | Probability Distribution | Divisor | Ci (1g) | Ci (10g) | Standard Uncertainty (1g) | Standard Uncertainty (10g) |
|---|---|---|---|---|---|---|---|
| **Measurement System** | | | | | | | |
| Probe Calibration | 6.55 | Normal | 1 | 1 | 1 | ± 6.55 % | ± 6.55 % |
| Axial Isotropy | 4.7 | Rectangular | √3 | 0.7 | 0.7 | ± 1.9 % | ± 1.9 % |
| Hemispherical Isotropy | 9.6 | Rectangular | √3 | 0.7 | 0.7 | ± 3.9 % | ± 3.9 % |
| Boundary Effects | 2.0 | Rectangular | √3 | 1 | 1 | ± 1.2 % | ± 1.2 % |
| Linearity | 4.7 | Rectangular | √3 | 1 | 1 | ± 2.7 % | ± 2.7 % |
| System Detection Limits | 1.0 | Rectangular | √3 | 1 | 1 | ± 0.6 % | ± 0.6 % |
| Readout Electronics | 0.3 | Normal | 1 | 1 | 1 | ± 0.3 % | ± 0.3 % |
| Response Time | 0.8 | Rectangular | √3 | 1 | 1 | ± 0.5 % | ± 0.5 % |
| Integration Time | 2.6 | Rectangular | √3 | 1 | 1 | ± 1.5 % | ± 1.5 % |
| RF Ambient Noise | 3.0 | Rectangular | √3 | 1 | 1 | ± 1.7 % | ± 1.7 % |
| RF Ambient Reflections | 3.0 | Rectangular | √3 | 1 | 1 | ± 1.7 % | ± 1.7 % |
| Probe Positioner | 0.8 | Rectangular | √3 | 1 | 1 | ± 0.5 % | ± 0.5 % |
| Probe Positioning | 9.9 | Rectangular | √3 | 1 | 1 | ± 5.7 % | ± 5.7 % |
| Max. SAR Eval. | 4.0 | Rectangular | √3 | 1 | 1 | ± 2.3 % | ± 2.3 % |
| **Test Sample Related** | | | | | | | |
| Device Positioning | 2.9 | Normal | 1 | 1 | 1 | ± 2.9 % | ± 2.9 % |
| Device Holder | 3.6 | Normal | 1 | 1 | 1 | ± 3.6 % | ± 3.6 % |
| Power Drift | 5.0 | Rectangular | √3 | 1 | 1 | ± 2.9 % | ± 2.9 % |
| **Phantom and Setup** | | | | | | | |
| Phantom Uncertainty | 4.0 | Rectangular | √3 | 1 | 1 | ± 2.3 % | ± 2.3 % |
| Liquid Conductivity (Target) | 5.0 | Rectangular | √3 | 0.64 | 0.43 | ± 1.8 % | ± 1.2 % |
| Liquid Conductivity (Meas.) | 2.5 | Normal | 1 | 0.64 | 0.43 | ± 1.6 % | ± 1.1 % |
| Liquid Permittivity (Target) | 5.0 | Rectangular | √3 | 0.6 | 0.49 | ± 1.7 % | ± 1.4 % |
| Liquid Permittivity (Meas.) | 2.5 | Normal | 1 | 0.6 | 0.49 | ± 1.5 % | ± 1.2 % |
| **Combined Standard Uncertainty** | | | | | | ± 12.8 % | ± 12.6 % |
| **Coverage Factor for 95 %** | | | | | | K=2 | |
| **Expanded Uncertainty** | | | | | | **± 25.6 %** | **± 25.2 %** |

**Table 12.3 Uncertainty Budget of DASY for frequency range 3 GHz to 6 GHz**

# 13. 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. 1528-2003, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, December 2003

[4] FCC OET Bulletin 65 (Edition 97-01) Supplement C (Edition 01-01), “Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields”, June 2001

[5] SPEAG DASY System Handbook

[6] FCC KDB 248227 D01 v01r02, “SAR Measurement Procedures for 802.11 a/b/g Transmitters”, May 2007

[7] FCC KDB 447498 D01 v04, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, November 2009

[8] FCC KDB 616217 D03 v01, “SAR Evaluation Considerations for Laptop/Notebook/Netbook and Tablet Computers”, November 2009

[9] FCC KDB 941225 D01 v02, “SAR Measurement Procedures for 3G Devices – CDMA 2000 / Ev-Do / WCDMA / HSDPA / HSPA”, October 2007

[10] FCC KDB 941225 D03 v01, “Recommended SAR Test Reduction Procedures for GSM / GPRS / EDGE”, December 2008

[11] FCC KDB 941225 D04 v01, “Evaluating SAR for GSM/(E)GPRS Dual Transfer Mode”, January 27 2010

[12] FCC KDB 941225 D05 v01, “SAR Test Considerations for LTE Handsets and Data Modems”, December 2010

[13] FCC KDB 941225 D07 01, "SAR Evaluation Procedure for UMPC Mini-Tablet Devices", April 2011

[14] FCC KDB 388624 D02, "Permit But Ask List", December 2011.

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

The plots are shown as follows.

## System Check_Body_750MHz_120724

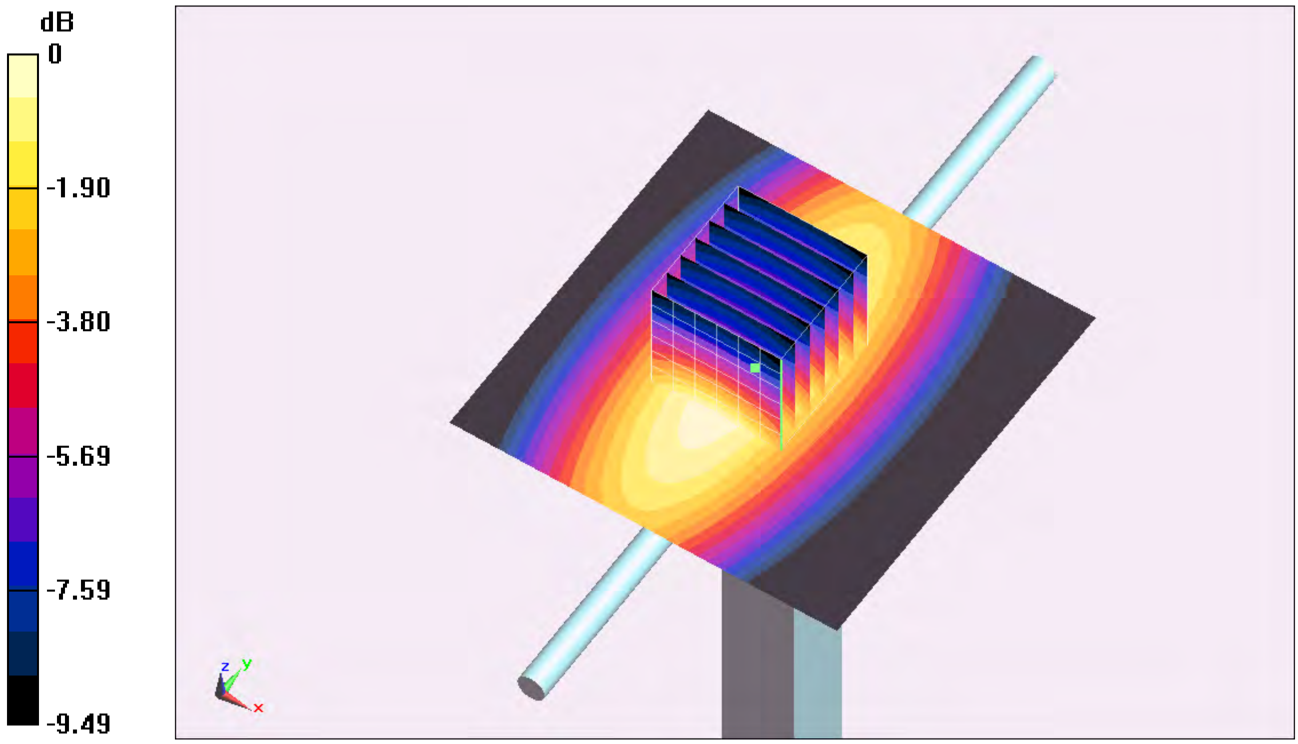
### DUT: D750V3-SN:1012

Communication System: CW; Frequency: 750 MHz;Duty Cycle: 1:1
Medium: MSL_750_120724 Medium parameters used: f = 750 MHz; $\sigma$ = 0.962 mho/m; $\varepsilon_r$ = 53.914; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.4 ℃; Liquid Temperature：21.4 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(6.2, 6.2, 6.2); Calibrated: 2012/5/29;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2012/5/3
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP1127
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

**Pin=250mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.29 mW/g

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 49.916 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 3.054 mW/g
**SAR(1 g) = 2.14 mW/g; SAR(10 g) = 1.44 mW/g**
Maximum value of SAR (measured) = 2.31 mW/g




0 dB = 2.31 mW/g = 7.27 dB mW/g

## System Check_Body_750MHz_120816

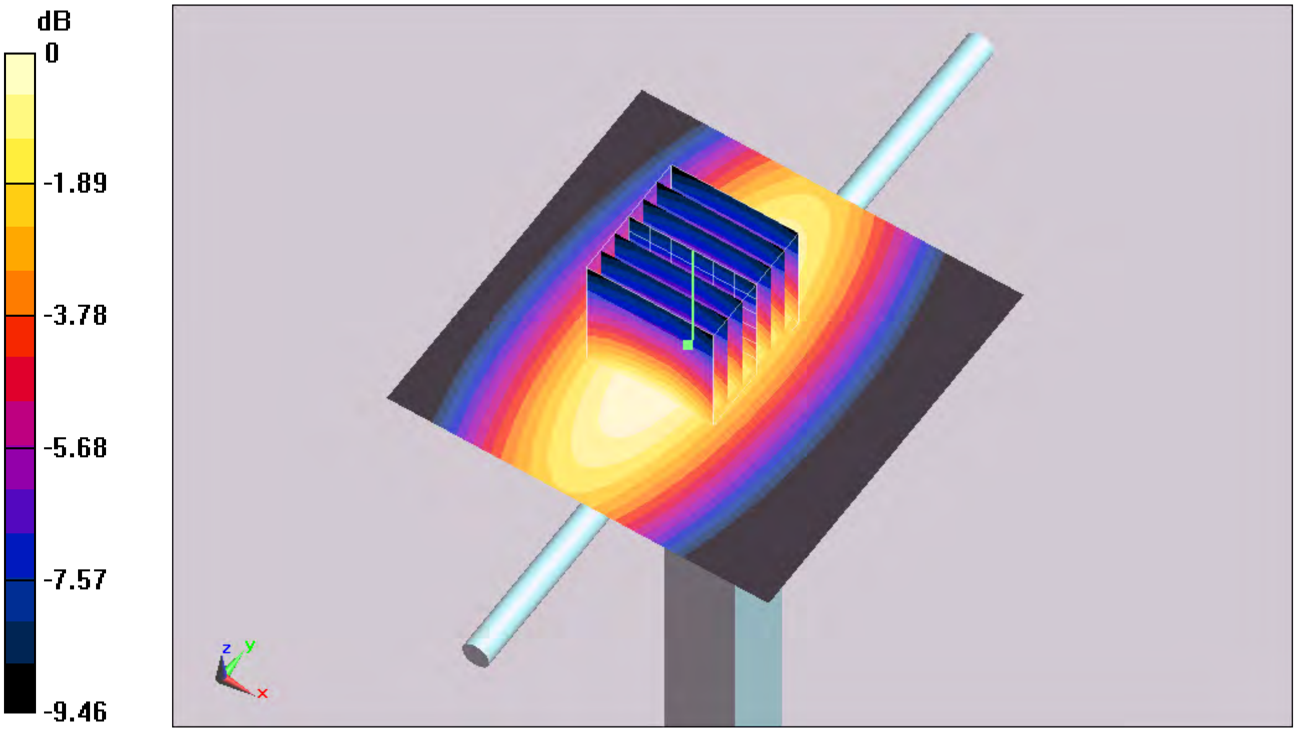
### DUT: D750V3-SN:1012

Communication System: CW; Frequency: 750 MHz;Duty Cycle: 1:1
Medium: MSL_750_120816 Medium parameters used: f = 750 MHz; $\sigma$ = 0.963 mho/m; $\varepsilon_r$ = 54.2; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(6.2, 6.2, 6.2); Calibrated: 2012/5/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1338; Calibrated: 2012/6/12
- Phantom: ELI 4.0_Front; Type: QD 0VA 002 AA; Serial: TP-1131
- Software: DASY5 Version; SEMCAD X Version 13.4 Build 45

**Pin=250mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.53 mW/g

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 50 V/m; Power Drift = 0.128 dB
Peak SAR (extrapolated) = 3.23 W/kg
**SAR(1 g) = 2.28 mW/g; SAR(10 g) = 1.54 mW/g**
Maximum value of SAR (measured) = 2.42 mW/g




0 dB = 2.42mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2012/7/24

## System Check_Body_835MHz_120724

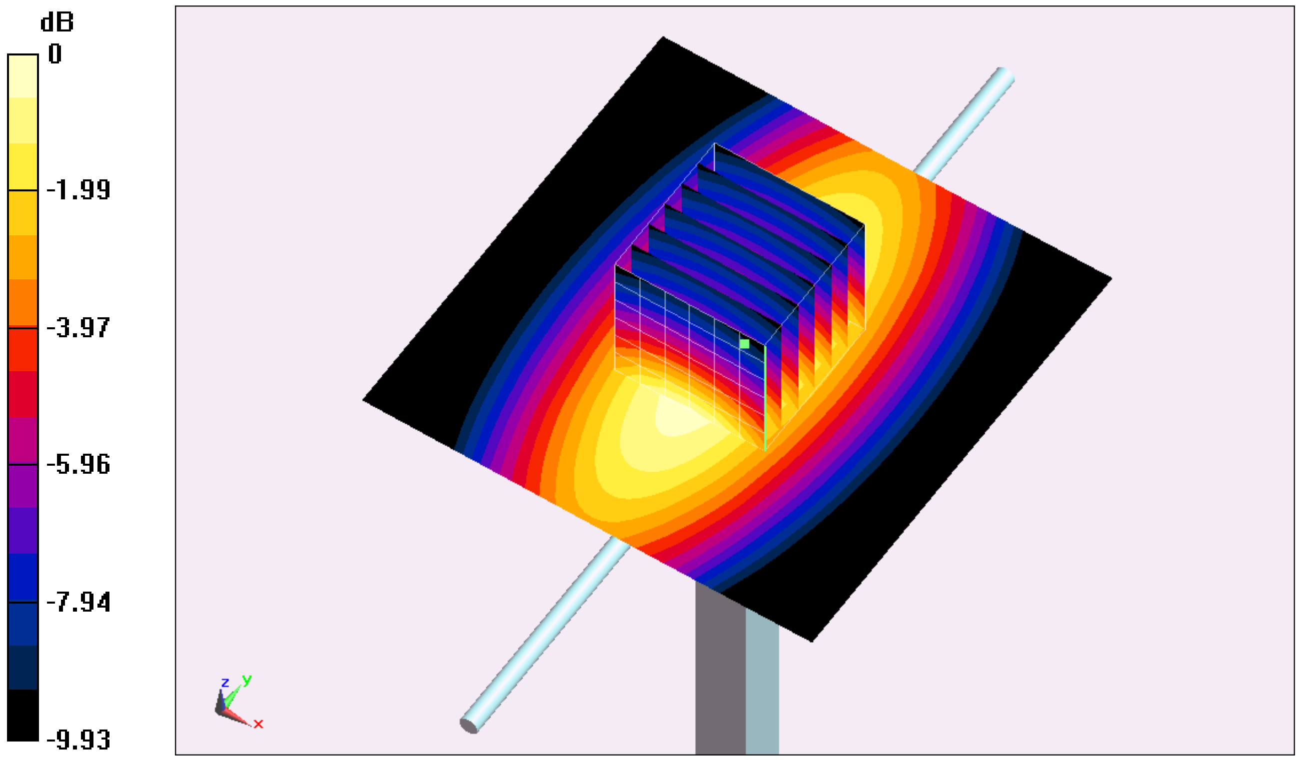
### DUT: D835V2-SN:499

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: MSL_835_120724 Medium parameters used: f = 835 MHz; $\sigma$ = 0.983 mho/m; $\varepsilon_r$ = 54.388; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.3 ℃; Liquid Temperature：21.3 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(6.08, 6.08, 6.08); Calibrated: 2012/5/29;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2012/5/3
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP1127
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

**Pin=250mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.72 mW/g

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.619 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.532 mW/g
**SAR(1 g) = 2.51 mW/g; SAR(10 g) = 1.67 mW/g**
Maximum value of SAR (measured) = 2.72 mW/g




0 dB = 2.72 mW/g = 8.69 dB mW/g

## System Check_Body_835MHz_120815

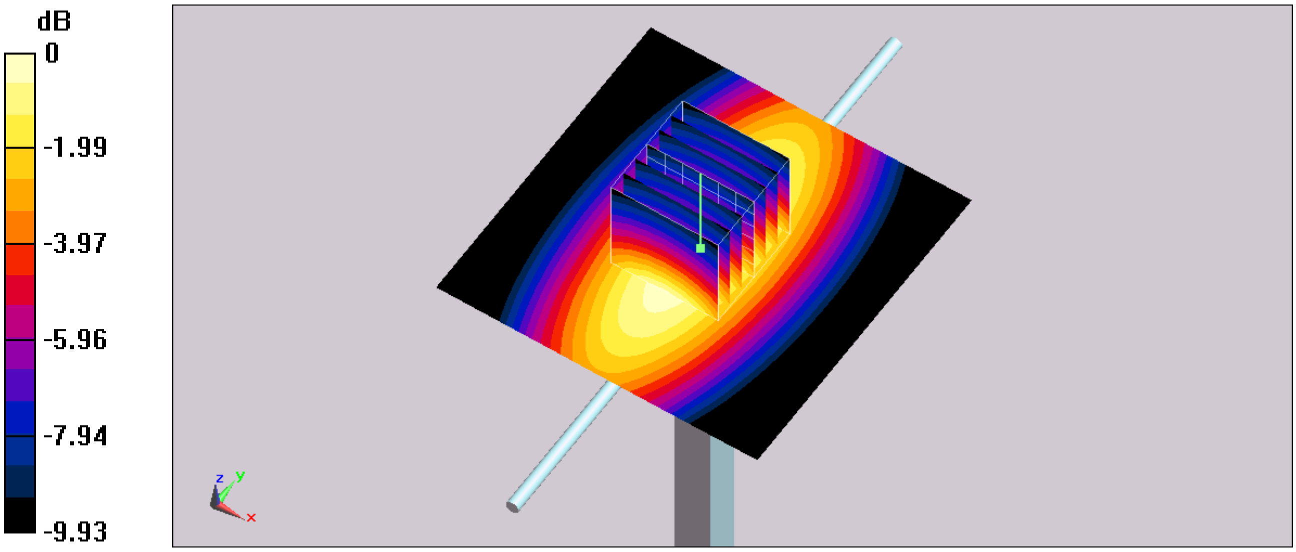
**DUT: D835V2-SN:499**

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: MSL_835_120815 Medium parameters used: f = 835 MHz; $\sigma$ = 0.996 mho/m; $\varepsilon_r$ = 55.4; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(6.08, 6.08, 6.08); Calibrated: 2012/5/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1338; Calibrated: 2012/6/12
- Phantom: ELI 4.0_Front; Type: QD 0VA 002 AA; Serial: TP-1131
- Software: DASY5 Version; SEMCAD X Version 13.4 Build 45

**Pin=250mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.76 mW/g

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.7 V/m; Power Drift = -0.043 dB
Peak SAR (extrapolated) = 3.59 W/kg
**SAR(1 g) = 2.55 mW/g; SAR(10 g) = 1.69 mW/g**
Maximum value of SAR (measured) = 2.76 mW/g



0 dB = 2.76mW/g

## System Check_Body_835MHz_120821

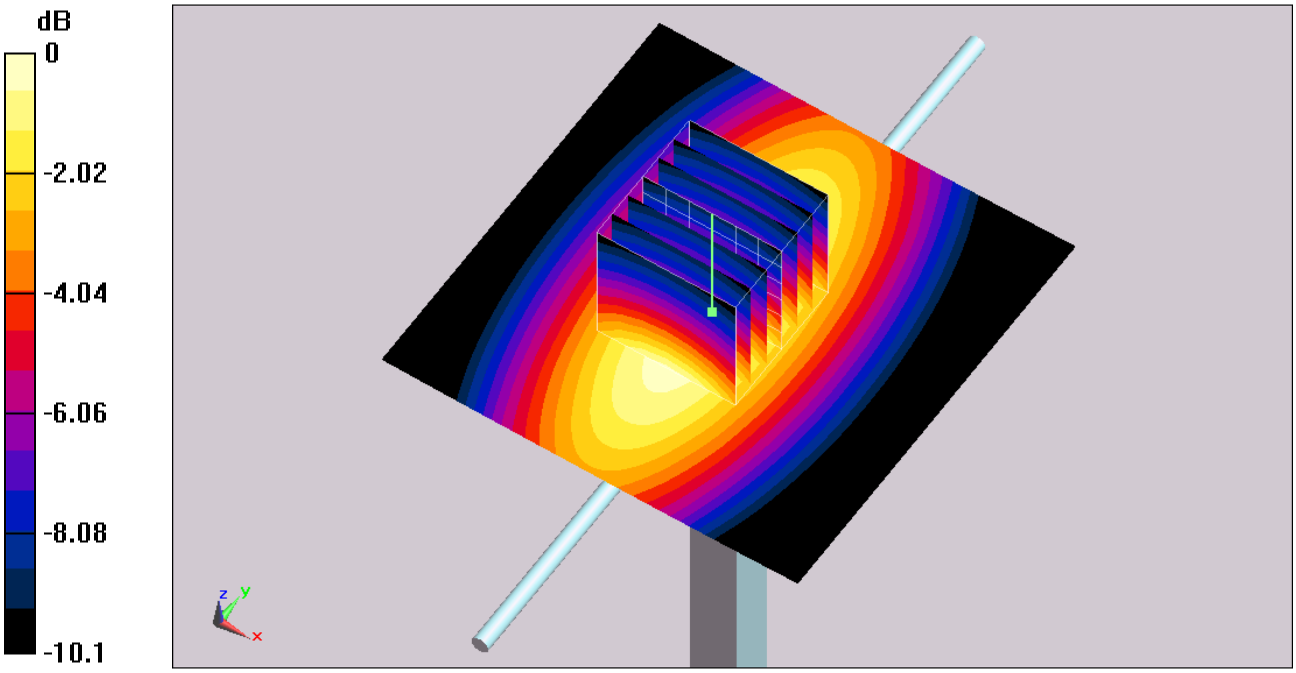
### DUT: D835V2-SN:499

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: MSL_850_120821 Medium parameters used: f = 835 MHz; $\sigma$ = 0.994 mho/m; $\varepsilon_r$ = 54.7; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(8.99, 8.99, 8.99); Calibrated: 2012/6/21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Software: DASY5 Version; SEMCAD X Version 13.4 Build 45

**Pin=250mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.69 mW/g

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 51.8 V/m; Power Drift = 0.044 dB
Peak SAR (extrapolated) = 3.72 W/kg
**SAR(1 g) = 2.5 mW/g; SAR(10 g) = 1.63 mW/g**
Maximum value of SAR (measured) = 2.7 mW/g



0 dB = 2.7mW/g

## System Check_Body_1750MHz_120726

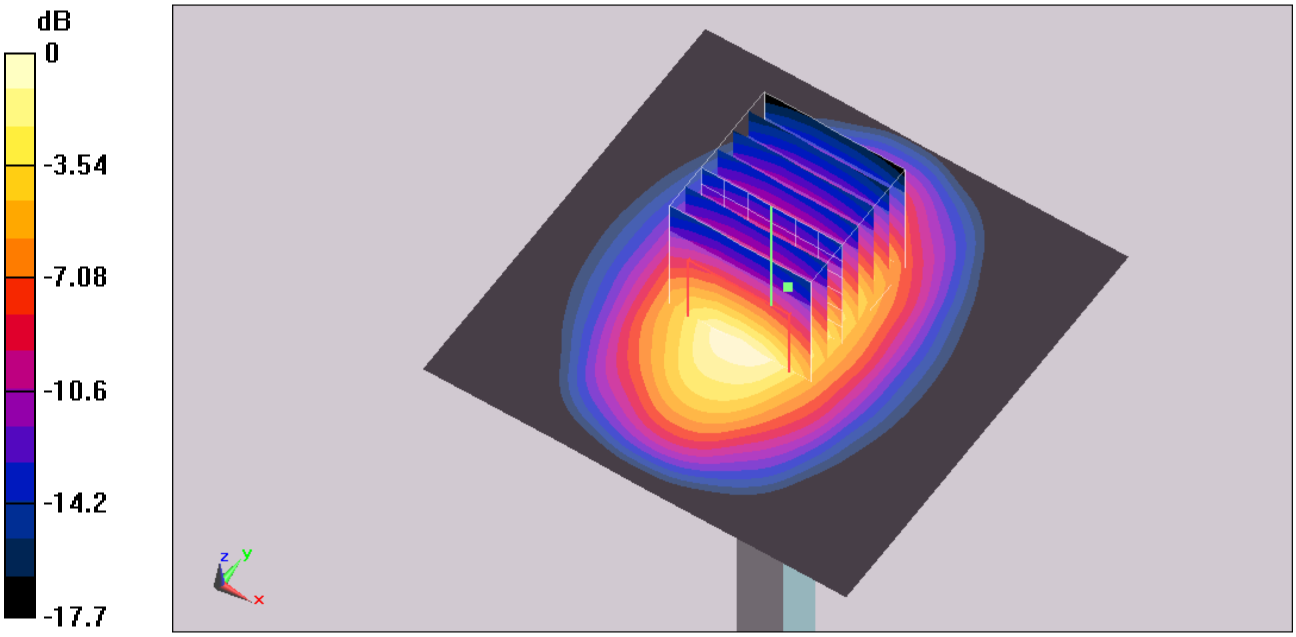
### DUT: D1750V2-SN:1023

Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium: MSL_1750_120726 Medium parameters used: f = 1750 MHz; σ = 1.55 mho/m; $\varepsilon_r$ = 51.7; ρ = 1000 kg/$m^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: ET3DV6R - SN1788; ConvF(4.29, 4.29, 4.29); Calibrated: 2012/1/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2011/11/22
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Software: DASY5 Version; SEMCAD X Version 13.4 Build 45

**Pin=250mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 12 mW/g

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.1 V/m; Power Drift = -0.0087 dB
Peak SAR (extrapolated) = 14.9 W/kg
**SAR(1 g) = 9.83 mW/g; SAR(10 g) = 5.38 mW/g**
Maximum value of SAR (measured) = 11.1 mW/g




0 dB = 11.1mW/g

## System Check_Body_1750MHz_120816

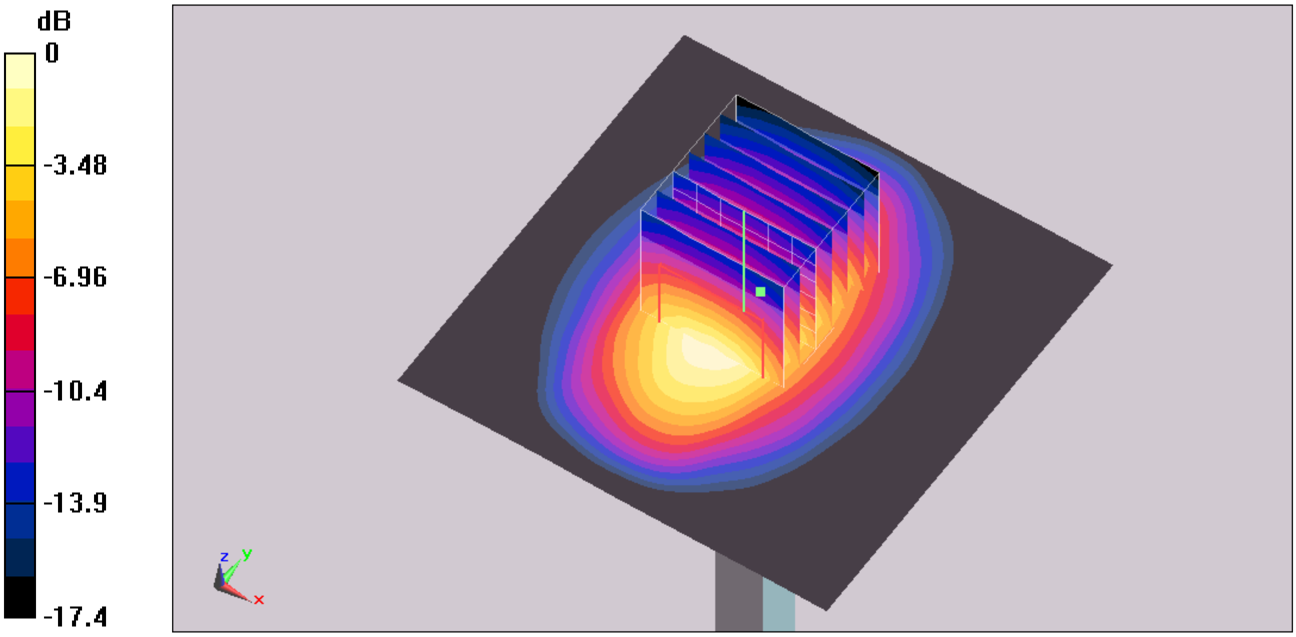
### DUT: D1750V2-SN:1023

Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium: MSL_1750_120816 Medium parameters used: f = 1750 MHz; $\sigma$ = 1.51 mho/m; $\varepsilon_r$ = 51.3; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(4.81, 4.81, 4.81); Calibrated: 2012/5/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1338; Calibrated: 2012/6/12
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Software: DASY5 Version; SEMCAD X Version 13.4 Build 45

**Pin=250mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 10.4 mW/g

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 85.9 V/m; Power Drift = 0.025 dB
Peak SAR (extrapolated) = 13.4 W/kg
**SAR(1 g) = 8.58 mW/g; SAR(10 g) = 4.68 mW/g**
Maximum value of SAR (measured) = 9.81 mW/g



0 dB = 9.81mW/g

## System Check_Body_1750MHz_120821

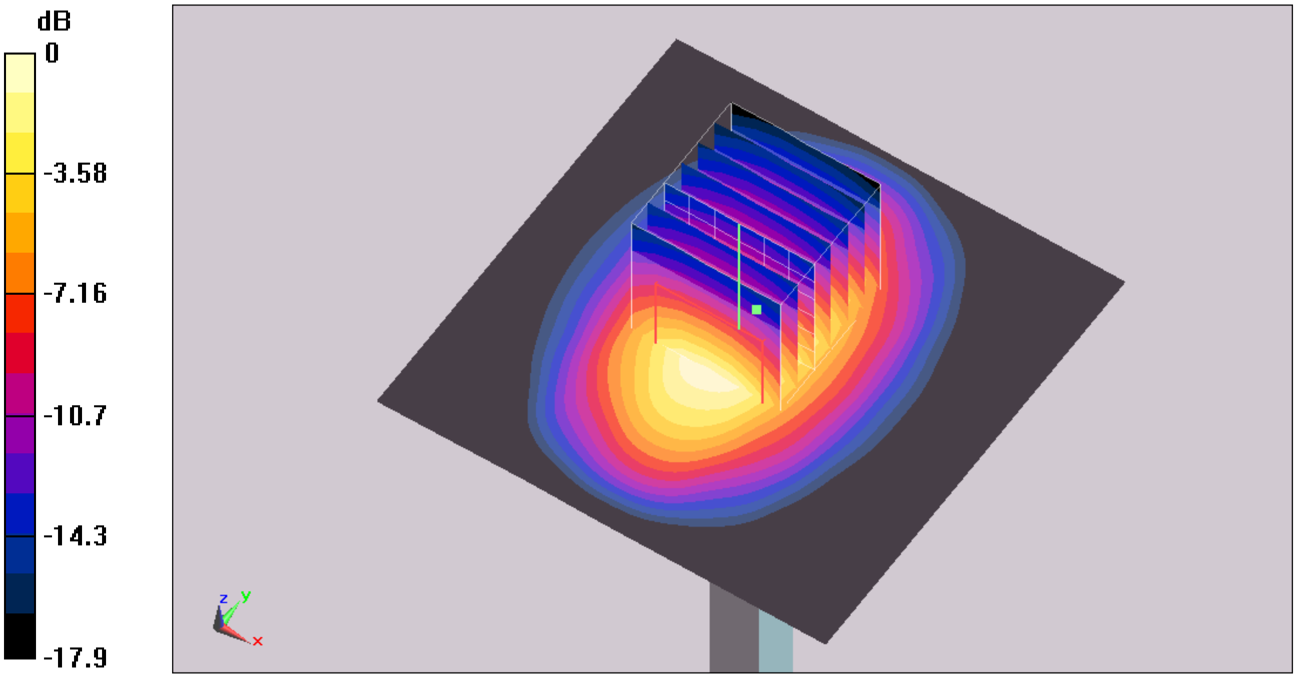
### DUT: D1750V2-SN:1023

Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium: MSL_1750_120821 Medium parameters used: f = 1750 MHz; $\sigma$ = 1.51 mho/m; $\varepsilon_r$ = 52.2; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(7.71, 7.71, 7.71); Calibrated: 2012/6/21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Software: DASY5 Version; SEMCAD X Version 13.4 Build 45

**Pin=250mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 11.1 mW/g

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 81.3 V/m; Power Drift = 0.00239 dB
Peak SAR (extrapolated) = 17.1 W/kg
**SAR(1 g) = 9.12 mW/g; SAR(10 g) = 4.8 mW/g**
Maximum value of SAR (measured) = 10.1 mW/g



0 dB = 10.1mW/g

## System Check_Body_1900MHz_120725

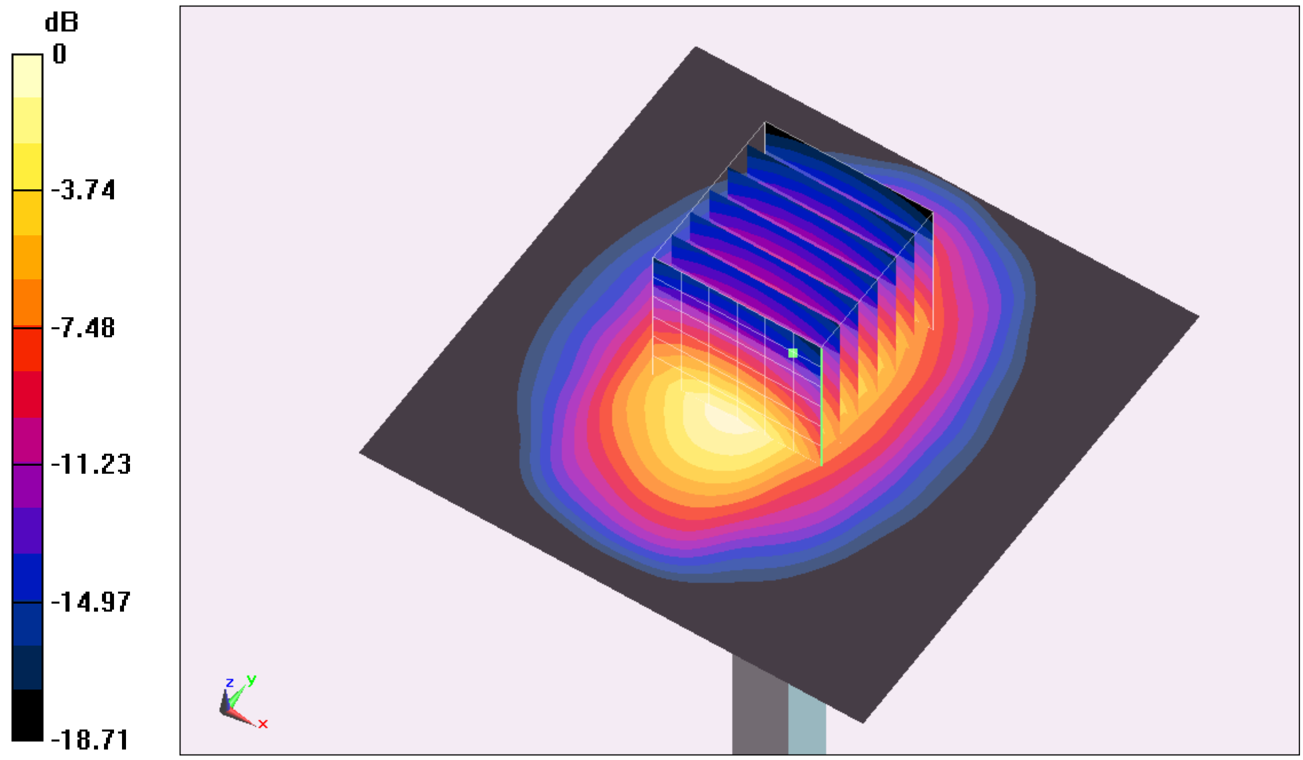
### DUT: D1900V2-SN:5d041

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: MSL_1900_120725 Medium parameters used: f = 1900 MHz; $\sigma$ = 1.516 mho/m; $\varepsilon_r$ = 53.631; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.4 ℃; Liquid Temperature：21.4 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(4.58, 4.58, 4.58); Calibrated: 2012/5/29;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2012/5/3
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP1127
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

**Pin=250mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 10.9 mW/g

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.729 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 15.082 mW/g
**SAR(1 g) = 9.32 mW/g; SAR(10 g) = 4.89 mW/g**
Maximum value of SAR (measured) = 10.7 mW/g




0 dB = 10.7 mW/g = 20.59 dB mW/g

## System Check_Body_1900MHz_120816

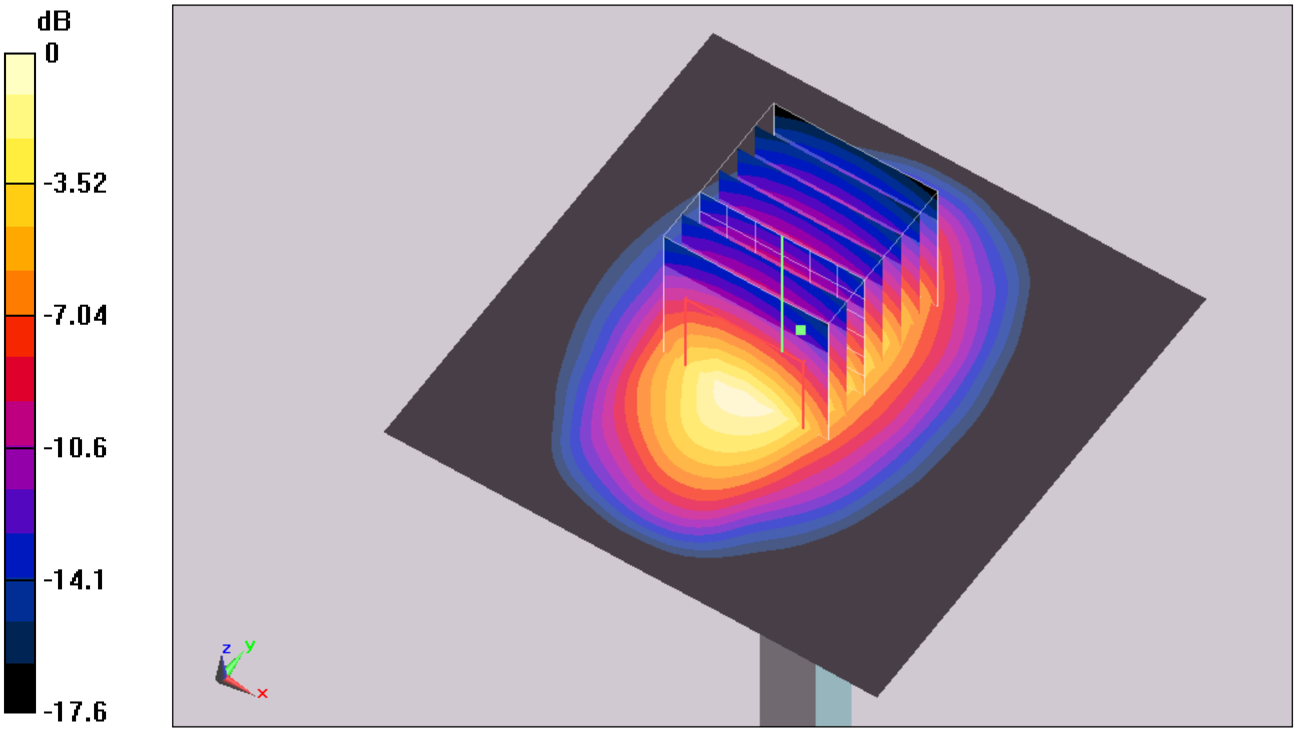
### DUT: D1900V2-SN:5d041

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: MSL_1900_120816 Medium parameters used: f = 1900 MHz; $\sigma$ = 1.55 mho/m; $\varepsilon_r$ = 51.9; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(4.58, 4.58, 4.58); Calibrated: 2012/5/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1338; Calibrated: 2012/6/12
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Software: DASY5 Version; SEMCAD X Version 13.4 Build 45

**Pin=250mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 11.5 mW/g

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88.4 V/m; Power Drift = 0.0084 dB
Peak SAR (extrapolated) = 15 W/kg
**SAR(1 g) = 9.46 mW/g; SAR(10 g) = 5.11 mW/g**
Maximum value of SAR (measured) = 10.8 mW/g



0 dB = 10.8mW/g

## System Check_Body_1900MHz_120820

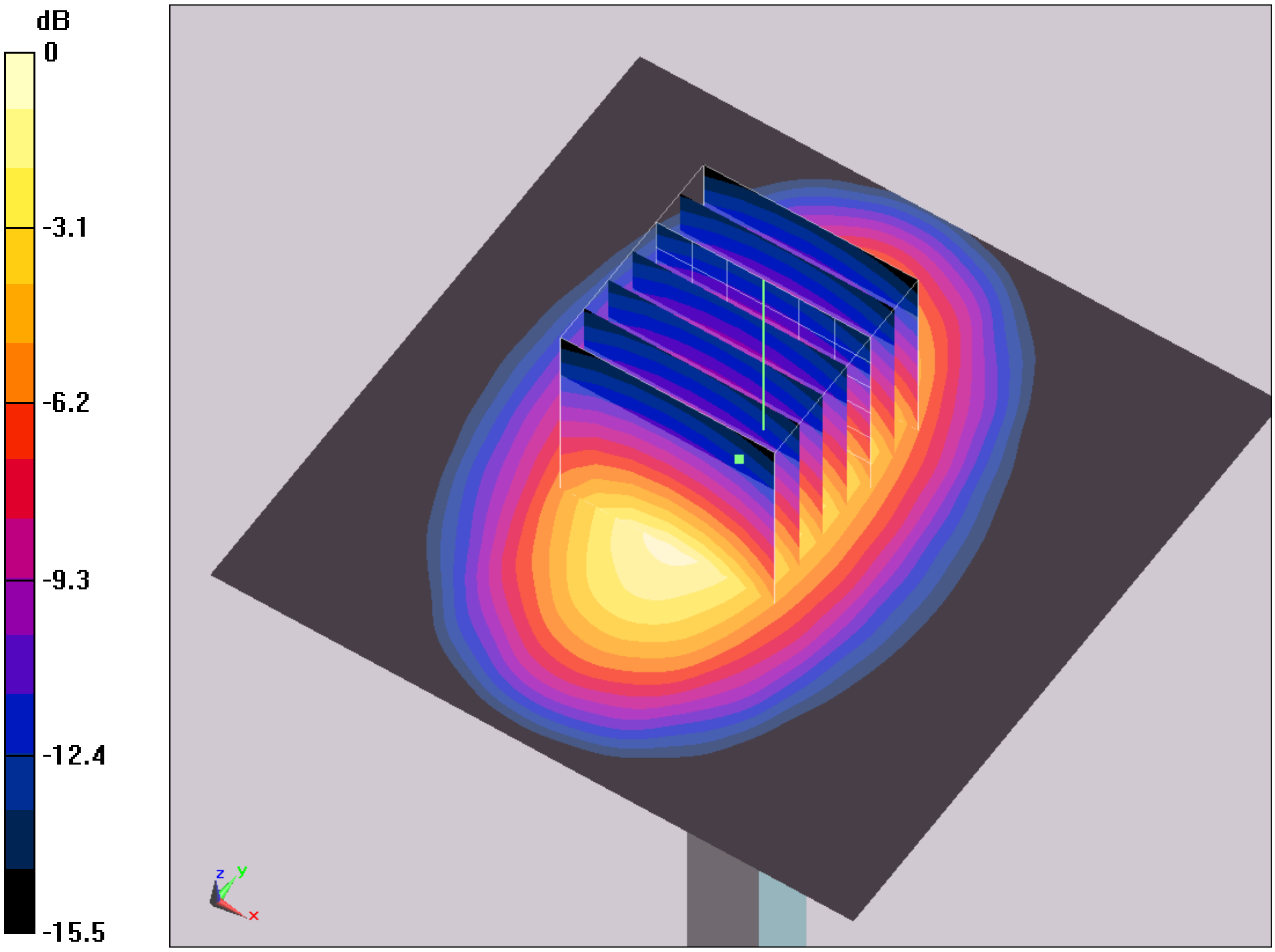
**DUT: D1900V2-SN:5d041**

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: MSL_1900_120820 Medium parameters used: f = 1900 MHz; $\sigma$ = 1.52 mho/m; $\varepsilon_r$ = 54.6; $\rho$ = 1000 kg/$m^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(7.29, 7.29, 7.29); Calibrated: 2012/6/21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Software: DASY5 Version; SEMCAD X Version 13.4 Build 45

**Pin=250mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 11.1 mW/g

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 83 V/m; Power Drift = 0.116 dB
Peak SAR (extrapolated) = 18.4 W/kg
**SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.57 mW/g**
Maximum value of SAR (measured) = 11.1 mW/g



0 dB = 11.1mW/g

## System Check_Body_2450MHz_120725

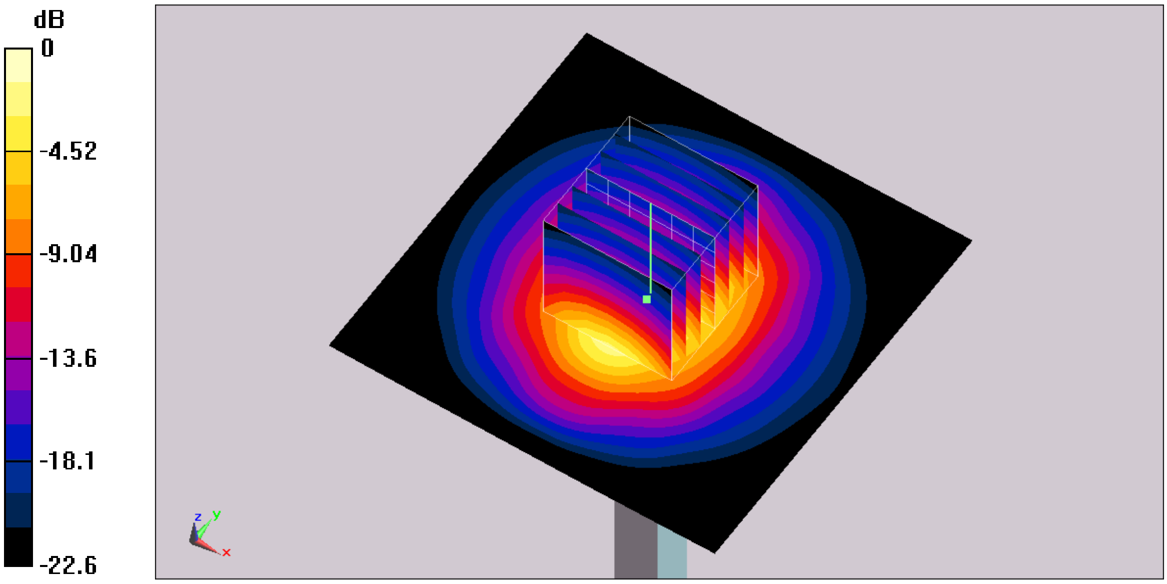
### DUT: D2450V2-SN:736

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: MSL_2450_120725 Medium parameters used: f = 2450 MHz; $\sigma$ = 1.96 mho/m; $\varepsilon_r$ = 53.8; $\rho$ = 1000 kg/$m^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3819; ConvF(7.4, 7.4, 7.4); Calibrated: 2011/11/16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1338; Calibrated: 2012/6/12
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Software: DASY5 Version; SEMCAD X Version 13.4 Build 45

**Pin=250mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 14.4 mW/g

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 85.8 V/m; Power Drift = -0.056 dB
Peak SAR (extrapolated) = 27.1 W/kg
**SAR(1 g) = 12.6 mW/g; SAR(10 g) = 5.76 mW/g**
Maximum value of SAR (measured) = 14.4 mW/g




0 dB = 14.4mW/g

## System Check_Body_2450MHz_120726

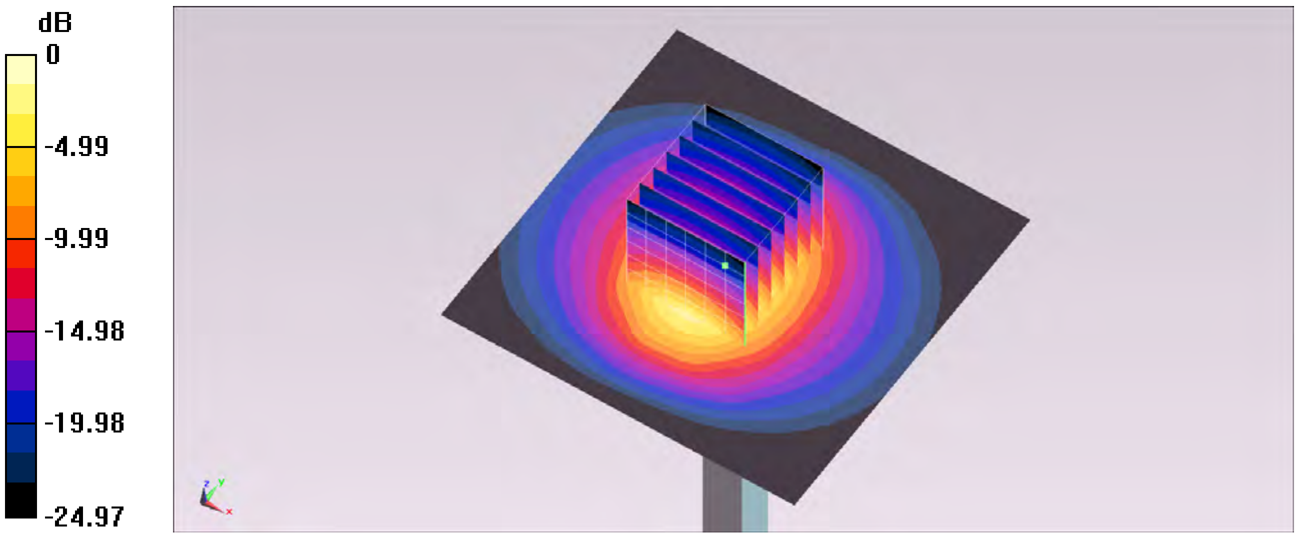
**DUT: D2450V2-SN:736**

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: MSL_2450_120726 Medium parameters used: f = 2450 MHz; $\sigma$ = 1.973 mho/m; $\varepsilon_r$ = 52.342; $\rho$ = 1000 kg/$m^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(7.1, 7.1, 7.1); Calibrated: 2012/6/21;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Software: DASY5 Version; SEMCAD X Version 14.6.6 (6477)

**Pin=250mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 15.0 mW/g

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 84.482 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 30.871 mW/g
**SAR(1 g) = 13.1 mW/g; SAR(10 g) = 5.68 mW/g**
Maximum value of SAR (measured) = 14.7 mW/g




0 dB = 14.7 mW/g = 23.35 dB mW/g

## System Check_Body_2450MHz_120913

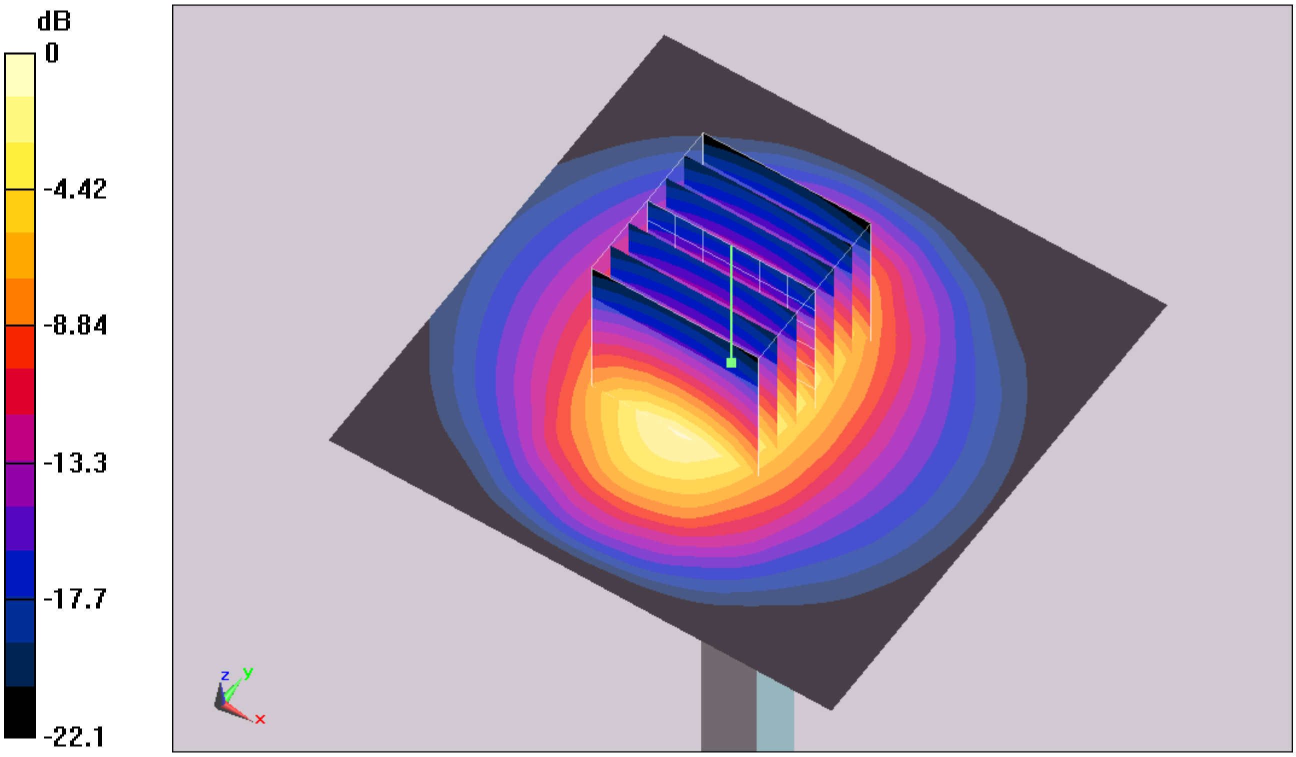
### DUT: D2450V2-SN:736

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: MSL_2450_120913 Medium parameters used: f = 2450 MHz; $\sigma$ = 1.96 mho/m; $\varepsilon_r$ = 53.8; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(7.1, 7.1, 7.1); Calibrated: 2012/6/21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI 4.0_Front; Type: QD 0VA 002 AA; Serial: TP-1131
- Software: DASY5 Version; SEMCAD X Version 13.4 Build 45

**Pin=250mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 14.8 mW/g

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 83.8 V/m; Power Drift = 0.143 dB
Peak SAR (extrapolated) = 28.5 W/kg
**SAR(1 g) = 13 mW/g; SAR(10 g) = 6.2 mW/g**
Maximum value of SAR (measured) = 14.4 mW/g



0 dB = 14.4mW/g

## System Check_Body_2450MHz_120915

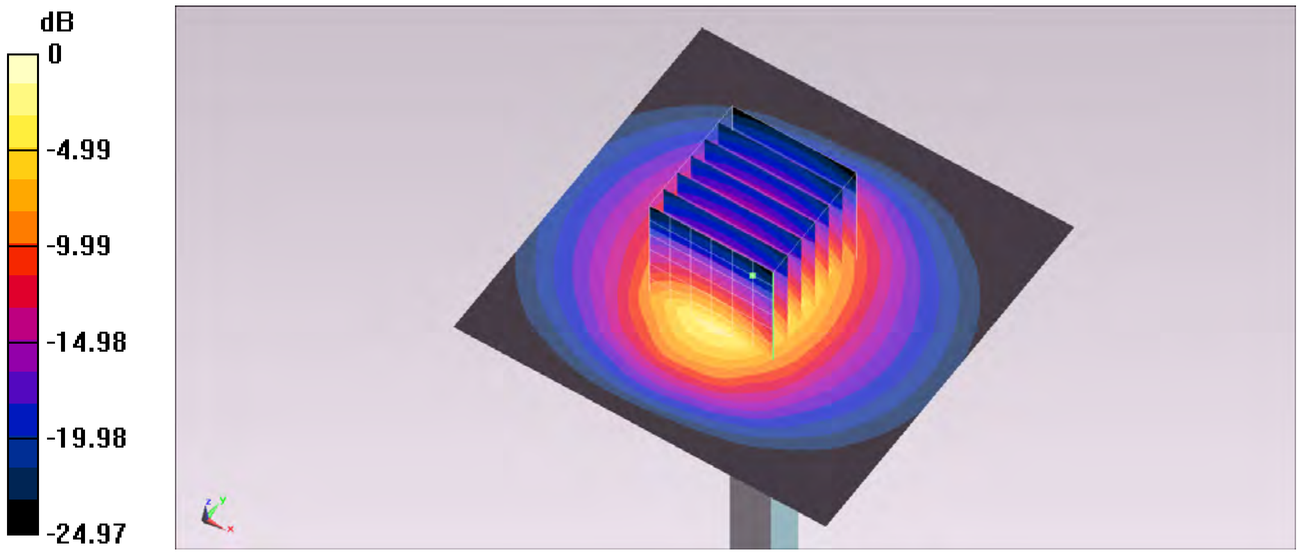
**DUT: D2450V2-SN:736**

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: MSL_2450_120915 Medium parameters used: f = 2450 MHz; $\sigma$ = 1.969 mho/m; $\varepsilon_r$ = 52.278; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(7.1, 7.1, 7.1); Calibrated: 2012/6/21;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6477)

**Pin=250mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 15.0 mW/g

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 84.482 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 30.811 mW/g
**SAR(1 g) = 13 mW/g; SAR(10 g) = 5.67 mW/g**
Maximum value of SAR (measured) = 14.7 mW/g




0 dB = 14.7 mW/g = 23.35 dB mW/g

## System Check_Body_5200MHz_120724

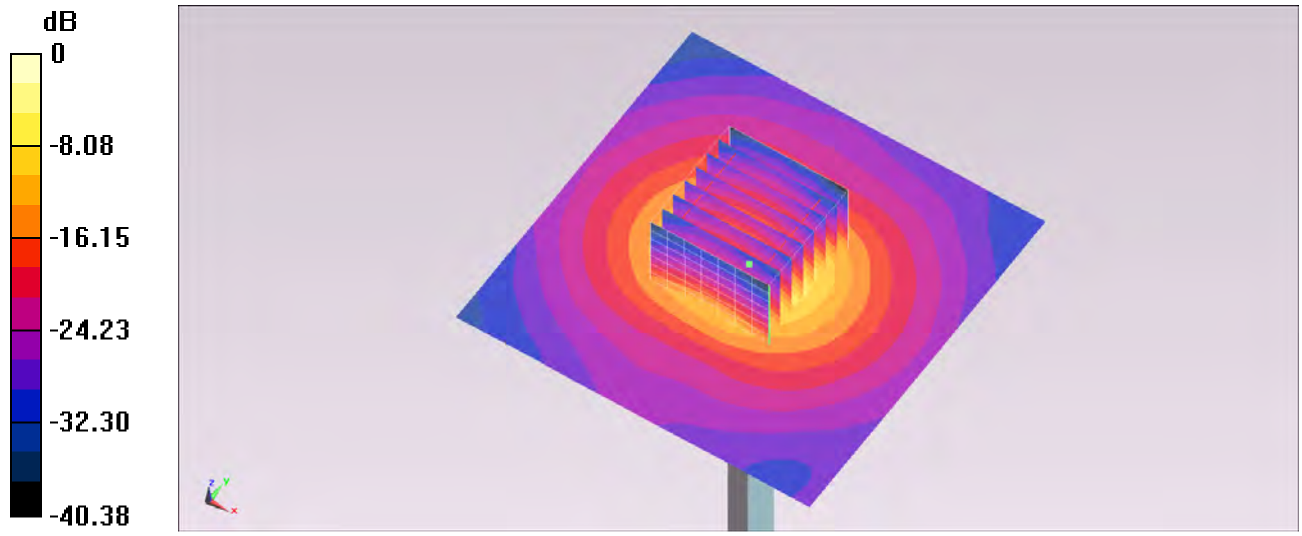
### DUT: D5GHzV2-SN:1006

Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: MSL_5G_120724 Medium parameters used: f = 5200 MHz; $\sigma$ = 5.373 mho/m; $\varepsilon_r$ = 48.526; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(4.2, 4.2, 4.2); Calibrated: 2012/6/21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Software: DASY5 Version; SEMCAD X Version 14.6.6 (6477)

**Pin=250mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 33.3 mW/g

**Pin=250mW/Zoom Scan (8x8x8)/Cube 0:** Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 89.582 V/m; Power Drift = -0.024 dB
Peak SAR (extrapolated) = 60.899 mW/g
**SAR(1 g) = 18.3 mW/g; SAR(10 g) = 5.19 mW/g**
Maximum value of SAR (measured) = 30.1 mW/g




0 dB = 30.1 mW/g = 29.57 dB mW/g

## System Check_Body_5200MHz_120725

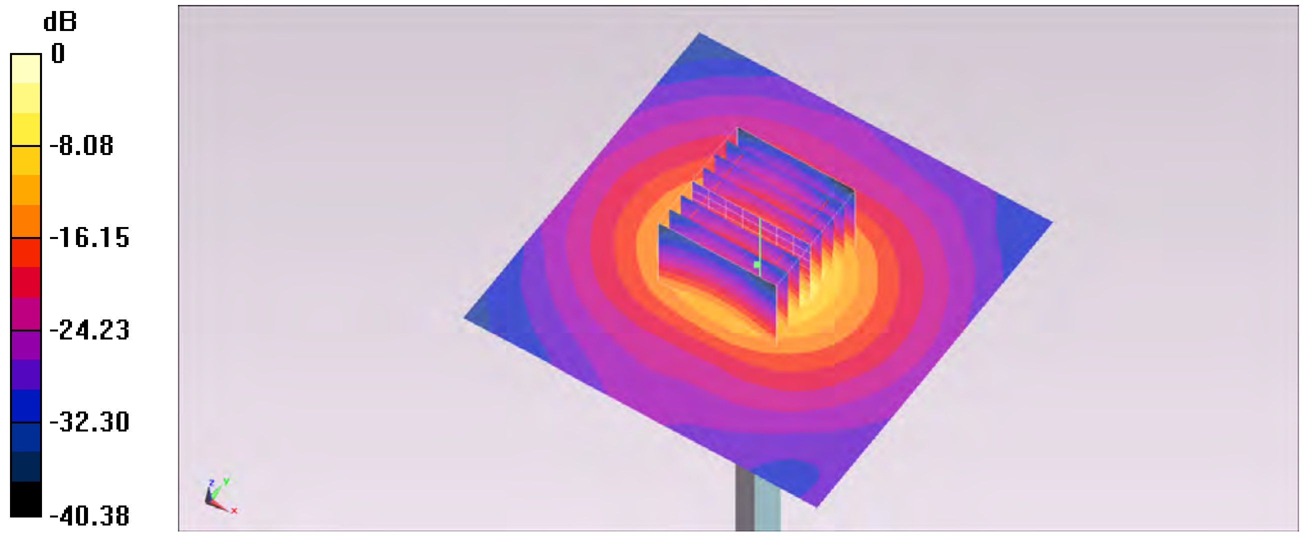
### DUT: D5GHzV2-SN:1006

Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: MSL_5G_120725 Medium parameters used: f = 5200 MHz; $\sigma = 5.297$ mho/m; $\varepsilon_r = 49.185$; $\rho = 1000$ kg/m$^3$
Ambient Temperature：22.6 ℃; Liquid Temperature：21.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(4.2, 4.2, 4.2); Calibrated: 2012/6/21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Software: DASY5 Version; SEMCAD X Version 14.6.6 (6477)

**Pin=250mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 32.8 mW/g

**Pin=250mW/Zoom Scan (8x8x8)/Cube 0:** Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 89.582 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 60.047 mW/g
**SAR(1 g) = 18 mW/g; SAR(10 g) = 5.12 mW/g**
Maximum value of SAR (measured) = 29.7 mW/g




0 dB = 29.7 mW/g = 29.46 dB mW/g

## System Check_Body_5200MHz_120913

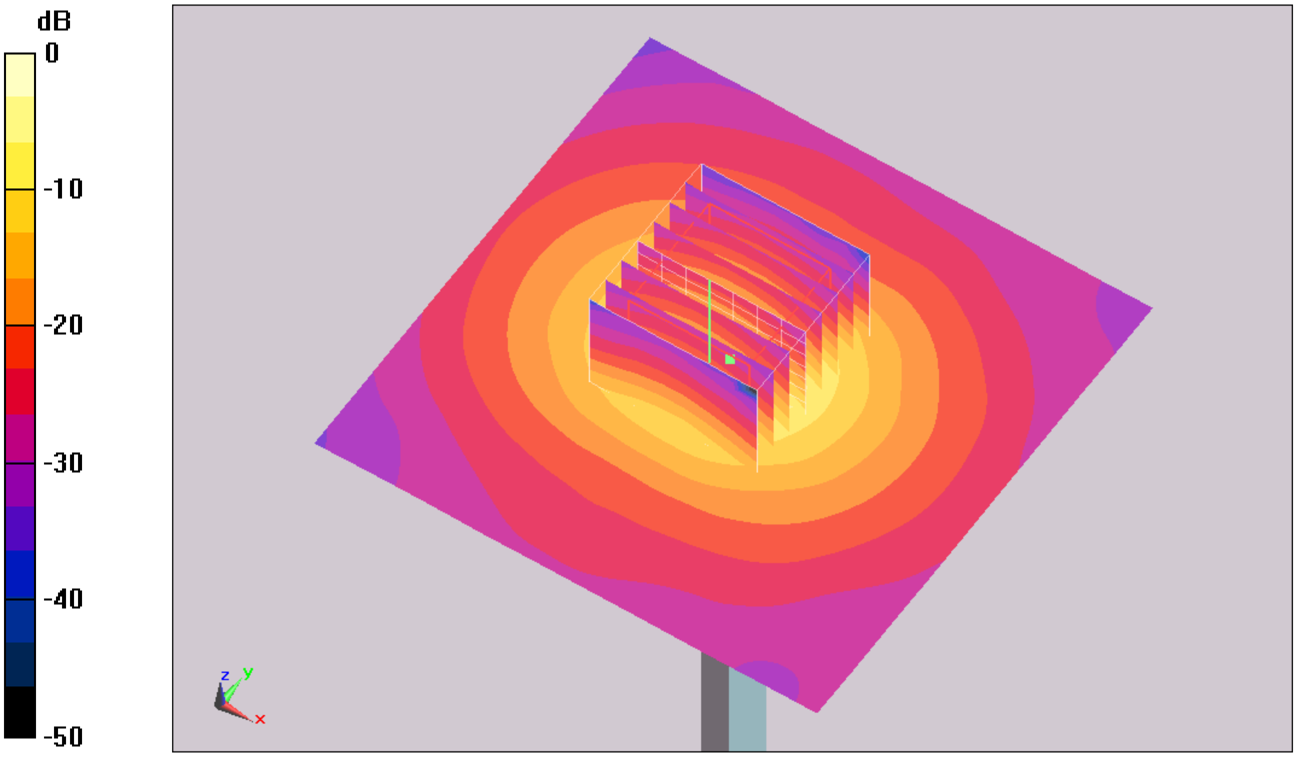
### DUT: D5GHzV2-SN:1006

Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: MSL_5G_120913 Medium parameters used: f = 5200 MHz; $\sigma$ = 5.3 mho/m; $\varepsilon_r$ = 49.2; $\rho$ = 1000 kg/$m^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(4.2, 4.2, 4.2); Calibrated: 2012/6/21
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Software: DASY5 Version; SEMCAD X Version 13.4 Build 45

**Pin=250mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 34 mW/g

**Pin=250mW/Zoom Scan (8x8x8)/Cube 0:** Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 82.5 V/m; Power Drift = -0.00185 dB
Peak SAR (extrapolated) = 59.7 W/kg
**SAR(1 g) = 18.6 mW/g; SAR(10 g) = 5.33 mW/g**
Maximum value of SAR (measured) = 31.1 mW/g



0 dB = 31.1mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2012/9/14

## System Check_Body_5200MHz_120914

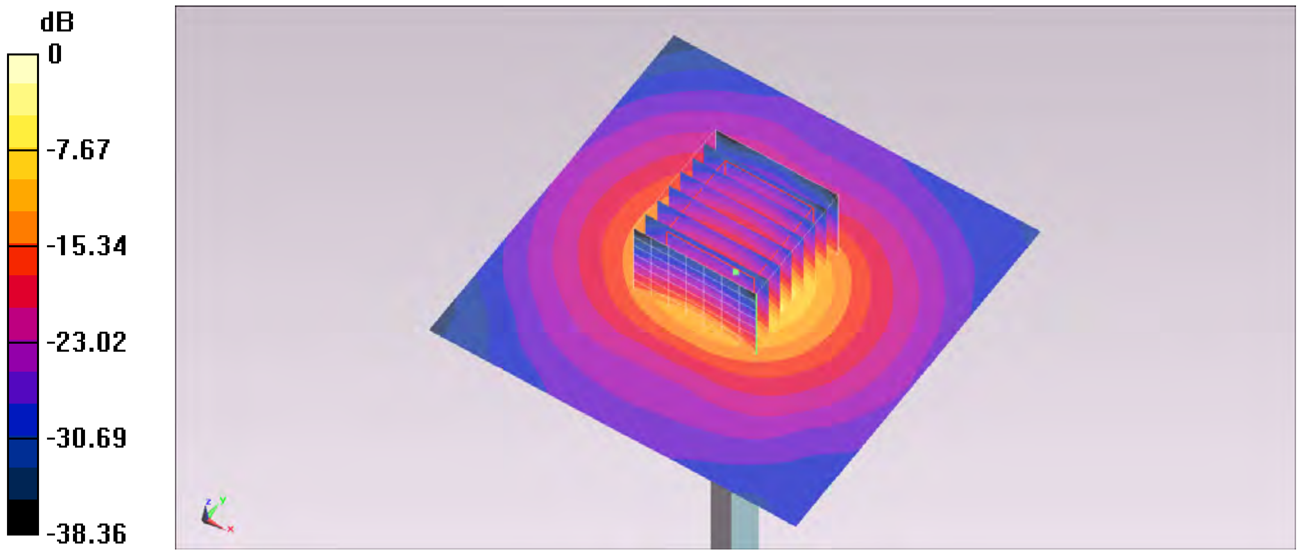
### DUT: D5GHzV2-SN:1006

Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: MSL_5G_120914 Medium parameters used: f = 5200 MHz; $\sigma$ = 5.162 mho/m; $\varepsilon_r$ = 48.492; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(4.2, 4.2, 4.2); Calibrated: 2012/6/21;
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6477)

**Pin=250mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 34.0 mW/g

**Pin=250mW/Zoom Scan (8x8x8)/Cube 0:** Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 85.344 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 65.064 mW/g
**SAR(1 g) = 19 mW/g; SAR(10 g) = 5.27 mW/g**
Maximum value of SAR (measured) = 32.4 mW/g




0 dB = 32.4 mW/g = 30.21 dB mW/g

## System Check_Body_5200MHz_120917

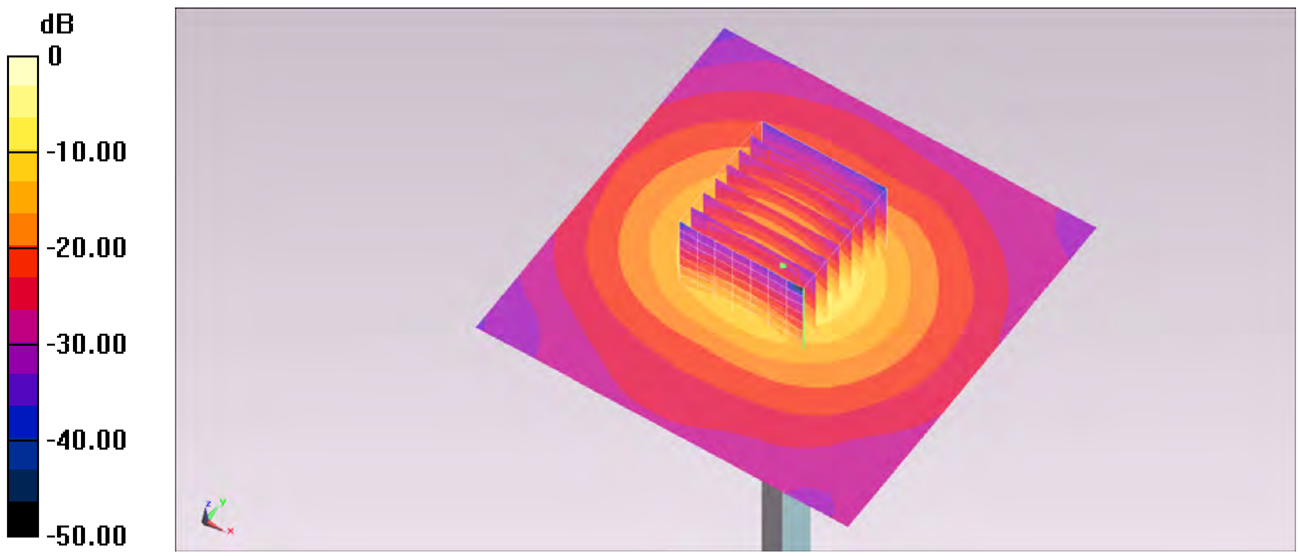
### DUT: D5GHzV2-SN:1006

Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: MSL_5G_120917 Medium parameters used: f = 5200 MHz; $\sigma$ = 5.297 mho/m; $\varepsilon_r$ = 49.185; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(4.2, 4.2, 4.2); Calibrated: 2012/6/21;
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2012/5/3
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6477)

**Pin=250mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 34.0 mW/g

**Pin=250mW/Zoom Scan (8x8x8)/Cube 0:** Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 82.488 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 59.753 mW/g
**SAR(1 g) = 18.6 mW/g; SAR(10 g) = 5.33 mW/g**
Maximum value of SAR (measured) = 31.1 mW/g




0 dB = 31.1 mW/g = 29.86 dB mW/g

## System Check_Body_5200MHz_120917

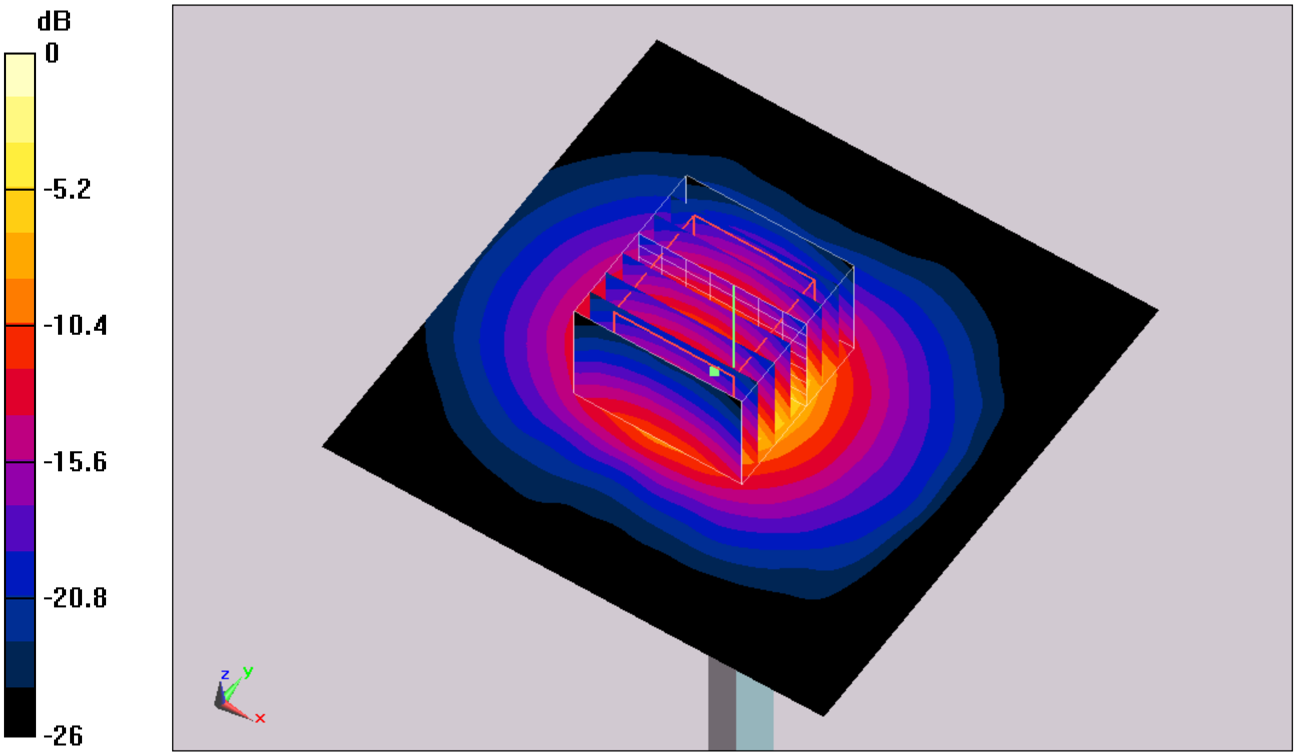
### DUT: Dipole 5GHz

Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: MSL_5G_120917 Medium parameters used: f = 5200 MHz; $\sigma$ = 5.28 mho/m; $\varepsilon_r$ = 48.5; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3578; ConvF(3.93, 3.93, 3.93); Calibrated: 2012/6/21
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1338; Calibrated: 2012/6/12
- Phantom: ELI 4.0_Front; Type: QD 0VA 002 AA; Serial: TP-1131
- Software: DASY5 Version; SEMCAD X Version 13.4 Build 45

**Pin=250mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 28.3 mW/g

**Pin=250mW/Zoom Scan (8x8x8)/Cube 0:** Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 0.608 V/m; Power Drift = 0.141 dB
Peak SAR (extrapolated) = 40.6 W/kg
**SAR(1 g) = 16.7 mW/g; SAR(10 g) = 5.6 mW/g**
Maximum value of SAR (measured) = 25 mW/g



0 dB = 25mW/g

# System Check_Body_5500MHz_120724

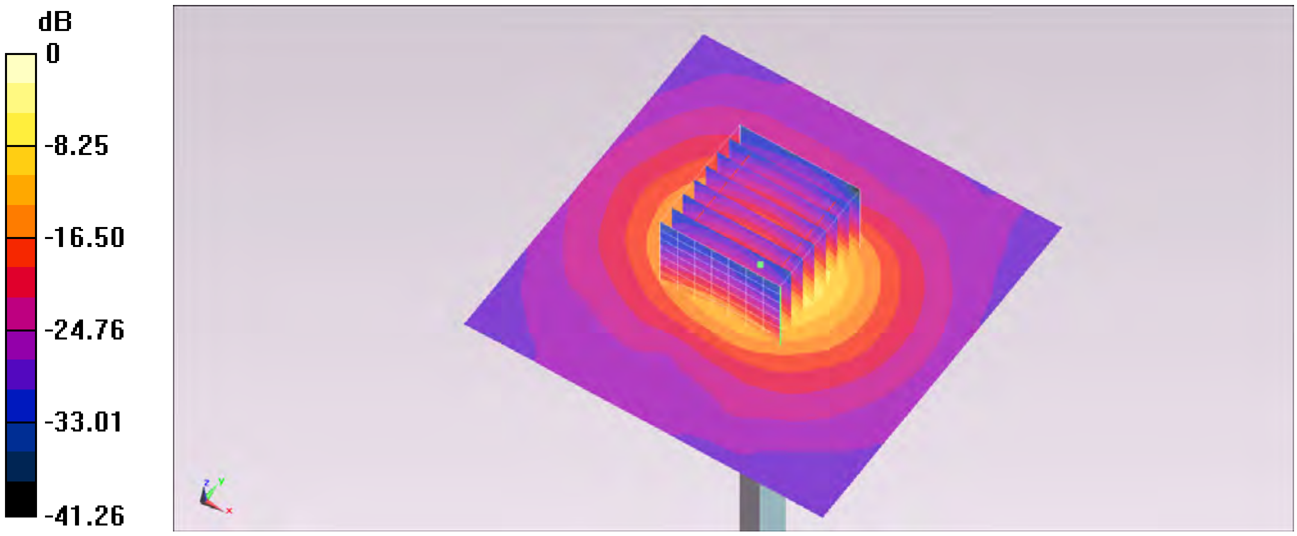
## DUT: D5GHzV2-SN:1006

Communication System: CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium: MSL_5G_120724 Medium parameters used: f = 5500 MHz; $\sigma$ = 5.806 mho/m; $\varepsilon_r$ = 47.837; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(3.81, 3.81, 3.81); Calibrated: 2012/6/21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Software: DASY5 Version; SEMCAD X Version 14.6.6 (6477)

**Pin=250mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 39.3 mW/g

**Pin=250mW/Zoom Scan (8x8x8)/Cube 0:** Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 83.078 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 65.387 mW/g
**SAR(1 g) = 20.1 mW/g; SAR(10 g) = 5.71 mW/g**
Maximum value of SAR (measured) = 35.5 mW/g




0 dB = 35.5 mW/g = 31.00 dB mW/g

## System Check_Body_5500MHz_120725

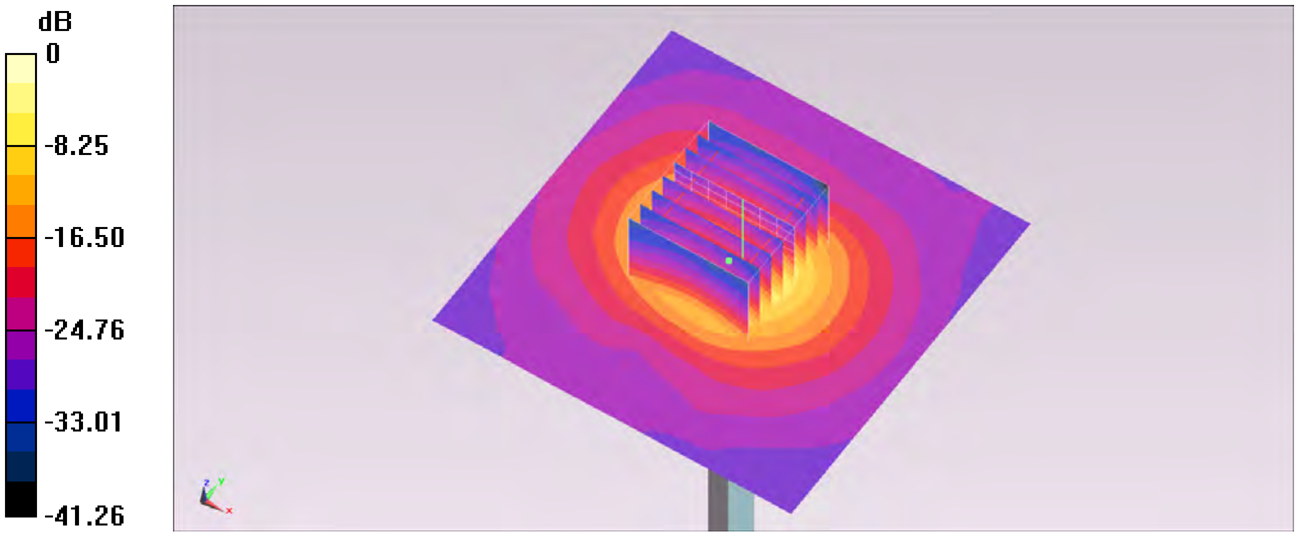
### DUT: D5GHzV2-SN:1006

Communication System: CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium: MSL_5G_120725 Medium parameters used: f = 5500 MHz; $\sigma$ = 5.738 mho/m; $\varepsilon_r$ = 48.597; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.6 ℃; Liquid Temperature：21.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(3.81, 3.81, 3.81); Calibrated: 2012/6/21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Software: DASY5 Version; SEMCAD X Version 14.6.6 (6477)

**Pin=250mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 38.8 mW/g

**Pin=250mW/Zoom Scan (8x8x8)/Cube 0:** Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 83.078 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 64.624 mW/g
**SAR(1 g) = 19.9 mW/g; SAR(10 g) = 5.64 mW/g**
Maximum value of SAR (measured) = 35.1 mW/g




0 dB = 35.1 mW/g = 30.91 dB mW/g

## System Check_Body_5500MHz_120913

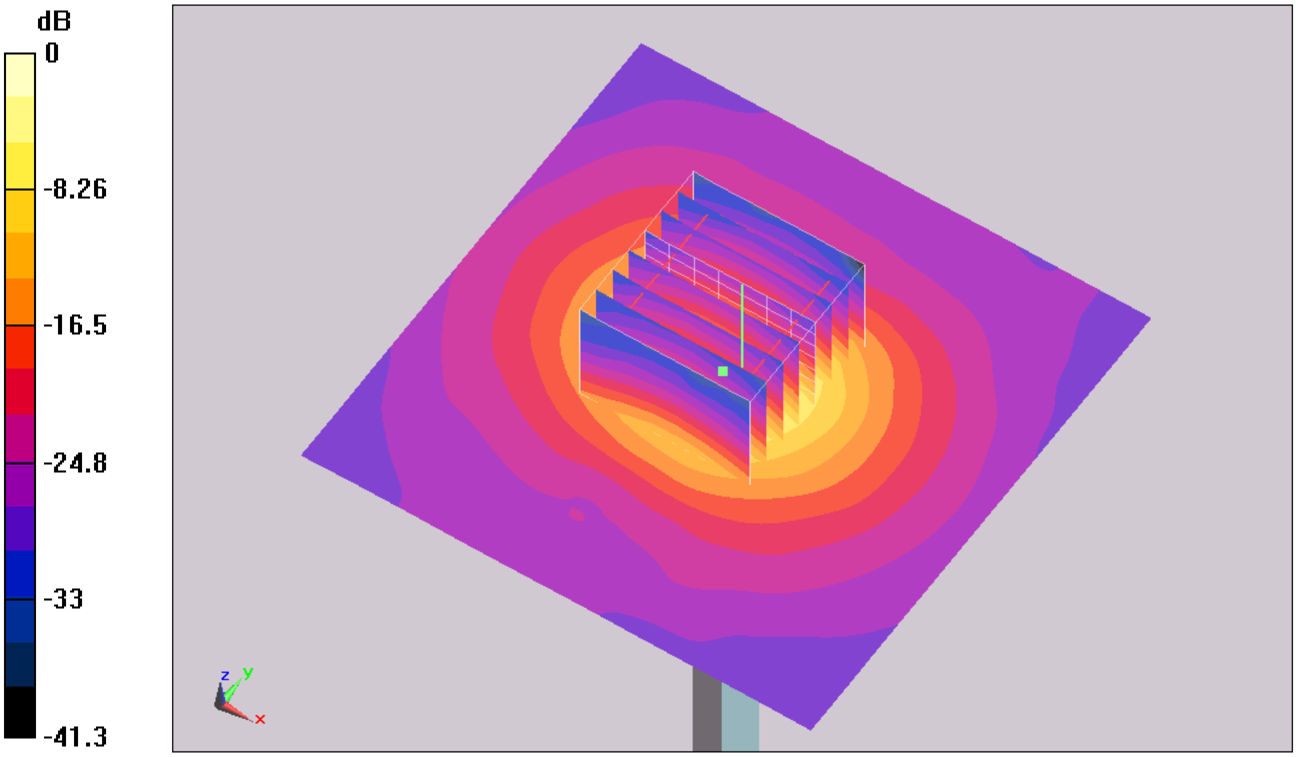
### DUT: D5GHzV2-SN:1006

Communication System: CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium: MSL_5G_120913 Medium parameters used: f = 5500 MHz; $\sigma$ = 5.74 mho/m; $\varepsilon_r$ = 48.6; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(3.81, 3.81, 3.81); Calibrated: 2012/6/21
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Software: DASY5 Version; SEMCAD X Version 13.4 Build 45

**Pin=250mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 38.8 mW/g

**Pin=250mW/Zoom Scan (8x8x8)/Cube 0:** Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 83.1 V/m; Power Drift = 0.086 dB
Peak SAR (extrapolated) = 64.6 W/kg
**SAR(1 g) = 19.9 mW/g; SAR(10 g) = 5.64 mW/g**
Maximum value of SAR (measured) = 35.1 mW/g



0 dB = 35.1mW/g

## System Check_Body_5500MHz_120914

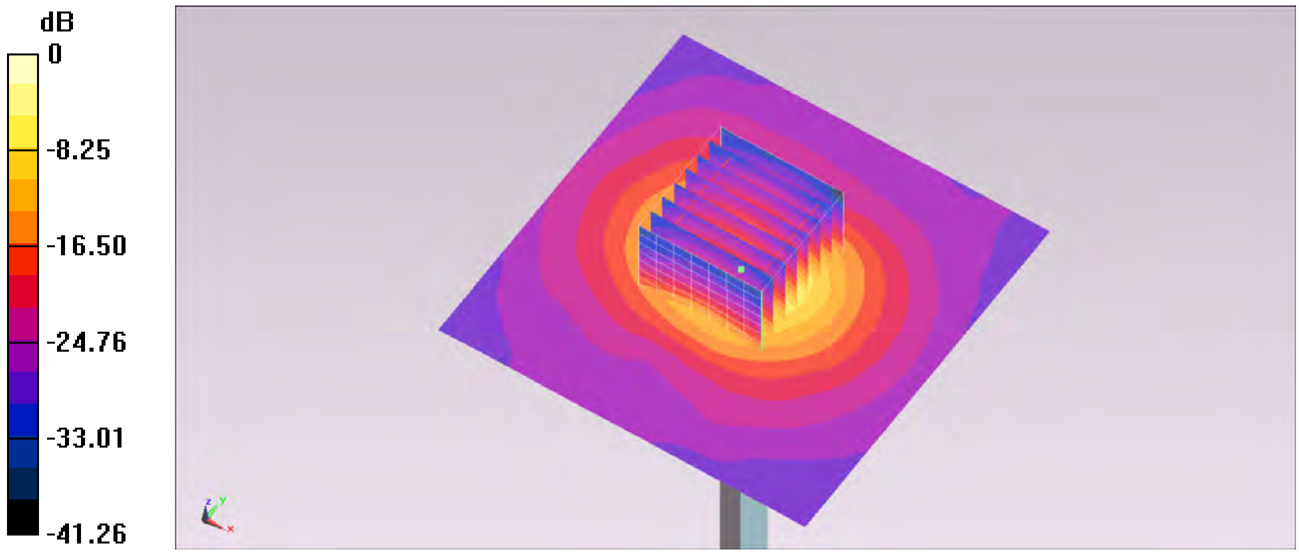
### DUT: D5GHzV2-SN:1006

Communication System: CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium: MSL_5G_120914 Medium parameters used: f = 5500 MHz; $\sigma$ = 5.587 mho/m; $\varepsilon_r$ = 47.93; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(3.81, 3.81, 3.81); Calibrated: 2012/6/21;
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6477)

**Pin=250mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 37.8 mW/g

**Pin=250mW/Zoom Scan (8x8x8)/Cube 0:** Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 83.078 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 62.924 mW/g
**SAR(1 g) = 19.4 mW/g; SAR(10 g) = 5.49 mW/g**
Maximum value of SAR (measured) = 34.2 mW/g




0 dB = 34.2 mW/g = 30.68 dB mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2012/7/24

## System Check_Body_5800MHz_120724

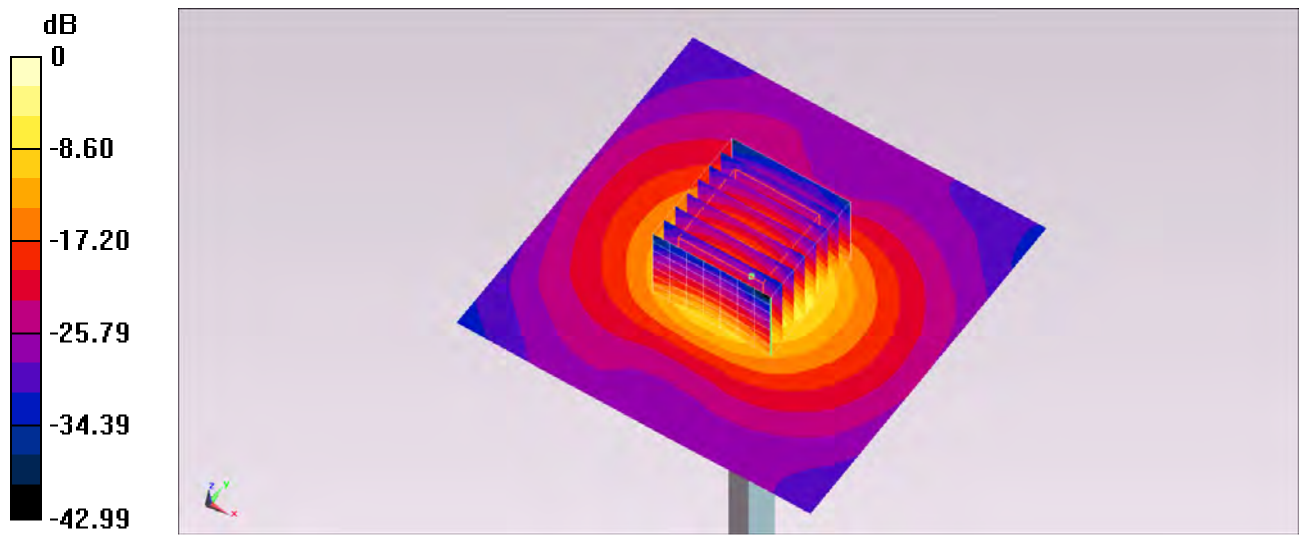
### DUT: D5GHzV2-SN:1006

Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: MSL_5G_120724 Medium parameters used: f = 5800 MHz; $\sigma$ = 6.219 mho/m; $\varepsilon_r$ = 47.128; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(3.89, 3.89, 3.89); Calibrated: 2012/6/21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Software: DASY5 Version; SEMCAD X Version 14.6.6 (6477)

**Pin=250mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 35.3 mW/g

**Pin=250mW/Zoom Scan (8x8x8)/Cube 0:** Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 81.539 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 56.274 mW/g
**SAR(1 g) = 19.2 mW/g; SAR(10 g) = 5.56 mW/g**
Maximum value of SAR (measured) = 32.7 mW/g




0 dB = 32.7 mW/g = 30.29 dB mW/g

## System Check_Body_5800MHz_120725

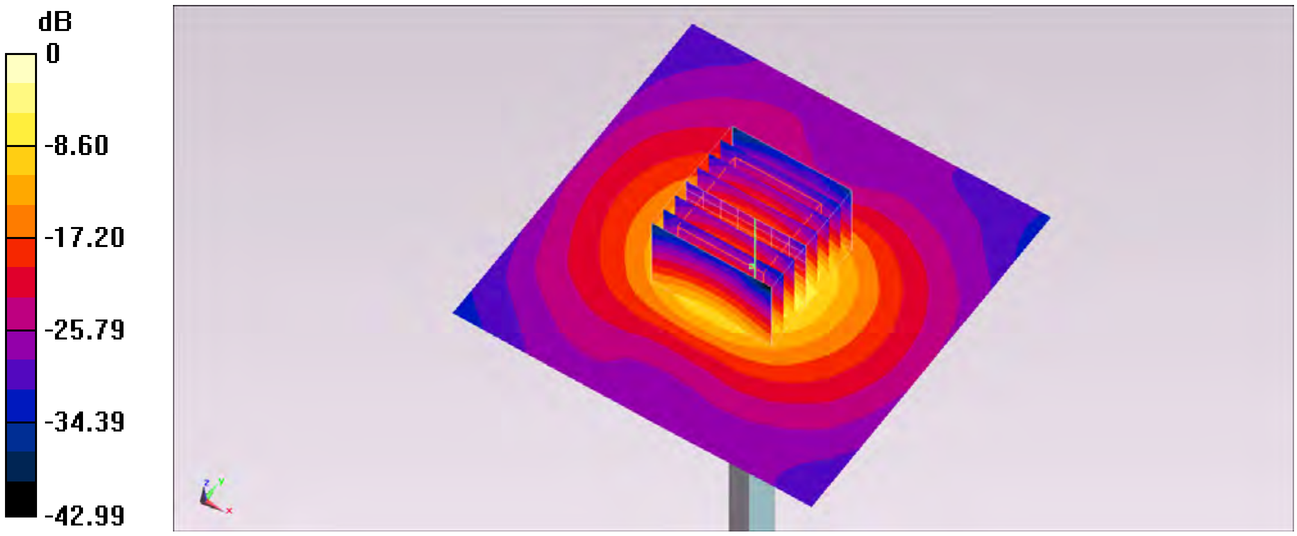
### DUT: D5GHzV2-SN:1006

Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: MSL_5G_120725 Medium parameters used: f = 5800 MHz; $\sigma$ = 6.127 mho/m; $\varepsilon_r$ = 47.784; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.6 ℃; Liquid Temperature：21.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(3.89, 3.89, 3.89); Calibrated: 2012/6/21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Software: DASY5 Version; SEMCAD X Version 14.6.6 (6477)

**Pin=250mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 34.8 mW/g

**Pin=250mW/Zoom Scan (8x8x8)/Cube 0:** Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 81.539 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 55.439 mW/g
**SAR(1 g) = 18.9 mW/g; SAR(10 g) = 5.47 mW/g**
Maximum value of SAR (measured) = 32.2 mW/g




0 dB = 32.2 mW/g = 30.16 dB mW/g

## System Check_Body_5800MHz_120913

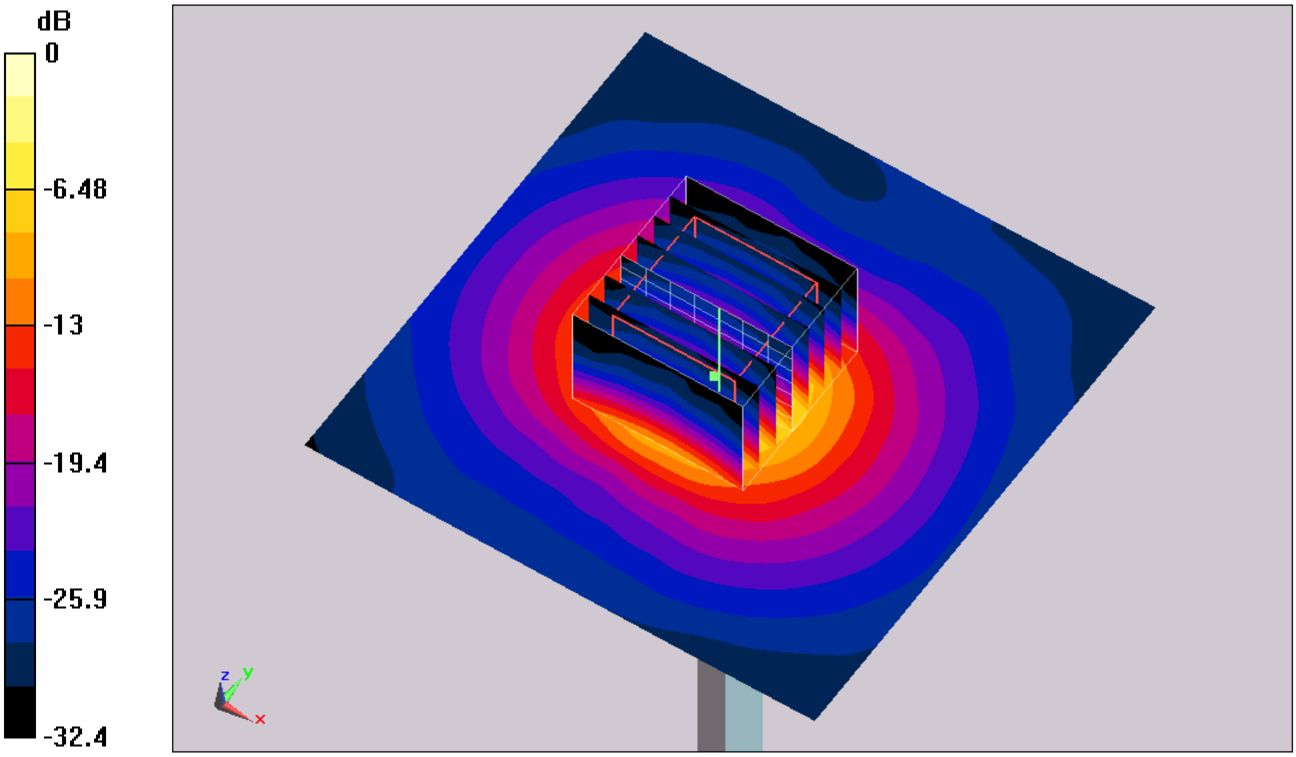
### DUT: D5GHzV2-SN:1006

Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: MSL_5G_120913 Medium parameters used: f = 5800 MHz; $\sigma$ = 6.13 mho/m; $\varepsilon_r$ = 47.8; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(3.89, 3.89, 3.89); Calibrated: 2012/6/21
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Software: DASY5 Version; SEMCAD X Version 13.4 Build 45

**Pin=250mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 34.4 mW/g

**Pin=250mW/Zoom Scan (8x8x8)/Cube 0:** Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 81.6 V/m; Power Drift = 0.166 dB
Peak SAR (extrapolated) = 78.5 W/kg
**SAR(1 g) = 19.6 mW/g; SAR(10 g) = 5.47 mW/g**
Maximum value of SAR (measured) = 33.7 mW/g



0 dB = 33.7mW/g

## System Check_Body_5800MHz_120915

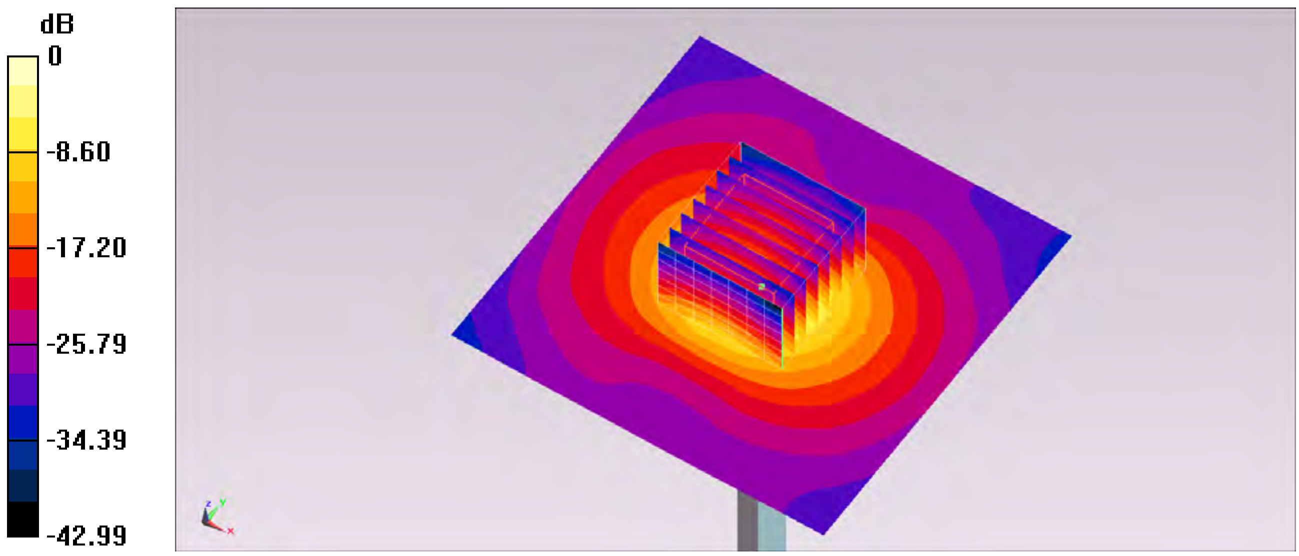
### DUT: D5GHzV2-SN:1006

Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: MSL_5G_120915 Medium parameters used: f = 5800 MHz; $\sigma$ = 5.976 mho/m; $\varepsilon_r$ = 47.158; $\rho$ = 1000 kg/$m^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(3.89, 3.89, 3.89); Calibrated: 2012/6/21;
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6477)

**Pin=250mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 34.0 mW/g

**Pin=250mW/Zoom Scan (8x8x8)/Cube 0:** Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 81.539 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 54.074 mW/g
**SAR(1 g) = 18.5 mW/g; SAR(10 g) = 5.34 mW/g**
Maximum value of SAR (measured) = 31.4 mW/g




0 dB = 31.4 mW/g = 29.94 dB mW/g

## System Check_Body_5800MHz_120917

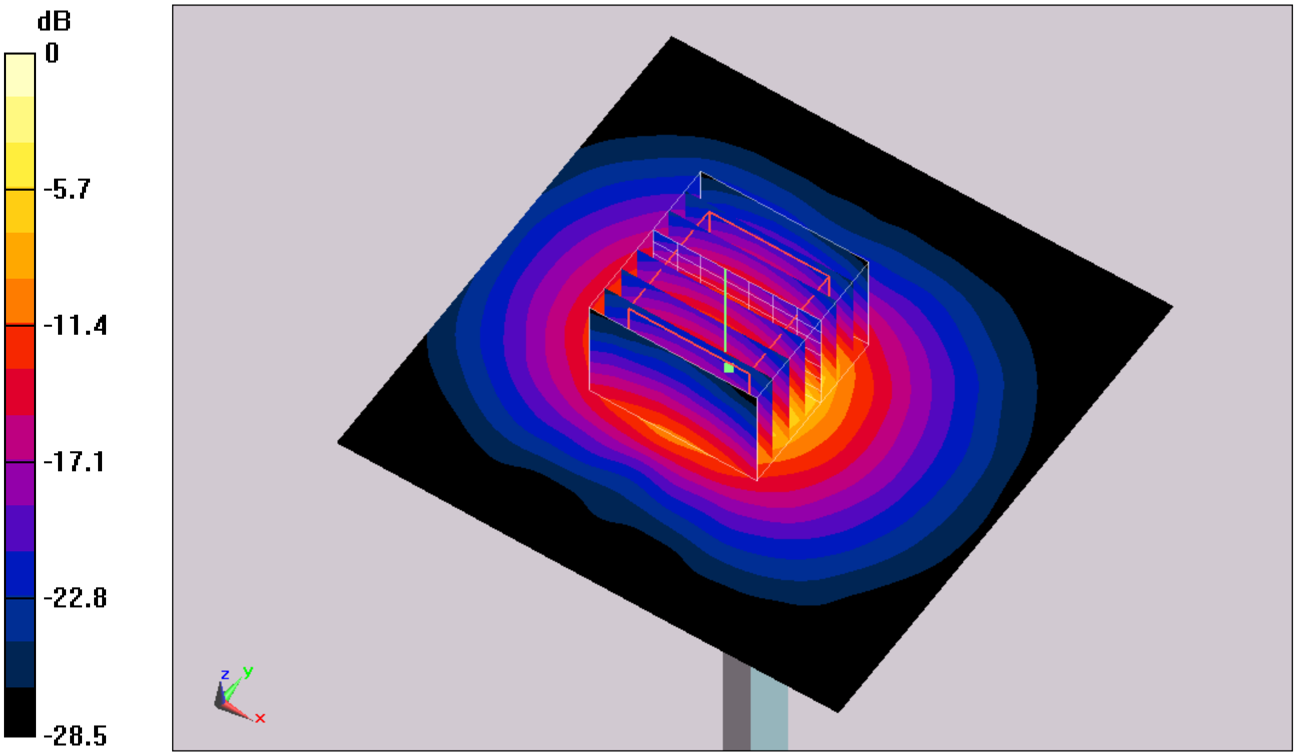
**DUT: D5GHzV2 - SN:1006**

Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: MSL_5G_120917 Medium parameters used: f = 5800 MHz; $\sigma$ = 6.11 mho/m; $\varepsilon_r$ = 47.2; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3578; ConvF(3.43, 3.43, 3.43); Calibrated: 2012/6/21
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1338; Calibrated: 2012/6/12
- Phantom: ELI 4.0_Front; Type: QD 0VA 002 AA; Serial: TP-1131
- Software: DASY5 Version; SEMCAD X Version 13.4 Build 45

**Pin=250mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 27.2 mW/g

**Pin=250mW/Zoom Scan (8x8x8)/Cube 0:** Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 64.7 V/m; Power Drift = 0.172 dB
Peak SAR (extrapolated) = 42.7 W/kg
**SAR(1 g) = 16.9 mW/g; SAR(10 g) = 5.29 mW/g**
Maximum value of SAR (measured) = 25.8 mW/g



0 dB = 25.8mW/g

# *Appendix B. Plots of SAR Measurement*

The plots are shown as follows.

# *Appendix C. DASY Calibration Certificate*

The DASY calibration certificates are shown as follows.