# SAR EVALUATION REPORT

For

# Acegame S.A

Gorriti 4539 - C.A.B.A., Buenos Aires, Argentina

**FCC ID:2ADTU-ZENMAGNET**

| **Report Type:** | **Product Type:** |
| --- | --- |
| Original Report | Mobile Phone |

| | |
| --- | --- |
| **Test Engineer:** | Rocky Xiao |
| **Report Number:** | RDG150605001-20 |
| **Report Date:** | 2015-06-15 |
| **Reviewed By:** | Sula Huang<br>RF Leader |
| **Test Laboratory:** | Bay Area Compliance Laboratories Corp. (Dongguan)<br>No.69 Pulongcun, Puxinhu Industrial Zone,<br>Tangxia, Dongguan, Guangdong, China<br>Tel: +86-769-86858888<br>Fax: +86-769-86858891<br>www.baclcorp.com.cn |

**Attestation of Test Results**

| | | |
|---|---|---|
| **EUT Information** | **Company Name** | Acegame S.A |
| | **EUT Description** | Mobile Phone |
| | **FCC ID** | 2ADTU-ZENMAGNET |
| | **Model Number:** | Zen Magnet |
| | **Serial Number:4** | 150605001 |
| | **Test Date** | 2015-06-14 |

| **MODE** | | **Max. SAR Level(s) Reported (W/Kg)** | **Limit (W/Kg)** |
|---|---|---|---|
| **GSM 850** | 1g Head SAR | 0.06 | **1. 6** |
| | 1g Body SAR | 0.284 | |
| **PCS 1900** | 1g Head SAR | 0.18 | |
| | 1g Body SAR | 1.131 | |
| **WCDMA 850** | 1g Head SAR | 0.061 | |
| | 1g Body SAR | 0.143 | |
| **WCDMA 1900** | 1g Head SAR | 0.177 | |
| | 1g Body SAR | 0.687 | |
| **LTE Band 4** | 1g Head SAR | 0.27 | |
| | 1g Body SAR | 0.466 | |
| **Simultaneous** | 1g Head SAR | 0.6686 | |
| | 1g Body SAR | 1.327 | |

| | |
|---|---|
| **Applicable Standards** | **ANSI / IEEE C95.1 : 2005**<br>IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fileds,3 kHz to 300 GHz. |
| | **ANSI / IEEE C95.3 : 2002**<br>IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to SuchFields,100 kHz—300 GHz. |
| | **FCC 47 CFR part 2.1093**<br>Radiofrequency radiation exposure evaluation: portable devices |
| | **IEEE1528:2013**<br>IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques |
| | **IEC 62209-2:**<br>2010 Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices-Human models, instrumentation, and procedures-Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz) |
| | **KDB procedures**<br>KDB 447498 D01 General RF Exposure Guidance v05r02.<br>KDB 648474 D04 Handset SAR v01r02.<br>KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r03<br>KDB 865664 D02 RF Exposure Reporting v01r01<br>KDB 941225 D01 3G SAR Procedures v03<br>KDB 941225 D06 Hotspot Mode v02 |

**Note:** This wireless device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General Population/Uncontrolled Exposure limits specified in ANSI/IEEE Standards and has been tested in accordance with the measurement procedures specified in IEEE 1528-2013 and RF exposure KDB procedures.

**The results and statements contained in this report pertain only to the device(s) evaluated.**

# TABLE OF CONTENTS

# DOCUMENT REVISION HISTORY

| Revision Number | Report Number | Description of Revision | Date of Revision |
|---|---|---|---|
| 0 | RDG150605001-20 | Original Report | 2015-06-15 |

# EUT DESCRIPTION

This report has been prepared on behalf of Acegame S.A and their product, Model: Zen Magnet, FCC ID: 2ADTU-ZENMAGNET or the EUT (Equipment under Test) as referred to in the rest of this report.

## Technical Specification

| | |
|---|---|
| **Product Type** | Mobile Phone |
| **Exposure Category:** | Population / Uncontrolled |
| **Antenna Type(s):** | Internal Antenna |
| **Body-Worn Accessories:** | Portable |
| **Face-Head Accessories:** | None |
| **Multi-slot Class:** | Class12 |
| **Operation Mode :** | GSM Voice, GPRS/EGPRS Data,<br>WCDMA R99 (Voice+Data),HSUPA Rel 6,HSDPA Rel 7, DC-HSDPA Rel 8, HSPA+ Rel 6<br>FDD-LTE<br>WLAN<br>Bluetooth |
| **Frequency Band:** | GSM 850 : 824-849 MHz(TX) ; 869-894 MHz(RX)<br>PCS 1900: 1850-1910 MHz(TX) ; 1930-1990 MHz(RX)<br>WCDMA850: 824-849 MHz(TX) ; 869-894 MHz(RX)<br>WCDMA1900: 1850-1910 MHz(TX) ; 1930-1990 MHz(RX)<br>LTE Band 4: 1710-1755MHz(TX) ; 2110-2155MHz(RX)<br>WLAN: 2412MHz-2462MHz<br>Bluetooth : 2402MHz-2480MHz |
| **Conducted RF Power:** | GSM 850 : 33dBm<br>PCS 1900: 30.1 dBm<br>WCDMA 850: 22.5 dBm<br>WCDMA 1900: 21.51 dBm<br>LTE Band 4:23.07 dBm<br>WLAN: 9.73 dBm<br>Bluetooth: 6.44dBm |
| **Dimensions (L*W*H):** | 157mm (L) × 79 mm (W) × 10 mm (H) |
| **Power Source:** | 3.8 VDC Rechargeable Battery |
| **Normal Operation:** | Head and Body-worn |

# REFERENCE, STANDARDS, AND GUILDELINES

**FCC:**

The Report and Order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 1.6 mW/g as recommended by the ANSI/IEEE standard C95.1-1992 [6] for an uncontrolled environment (Paragraph 65). According to the Supplement C of OET Bulletin 65 “Evaluating Compliance with FCC Guide-lines for Human Exposure to Radio frequency Electromagnetic Fields", released on Jun 29, 2001 by the FCC, the device should be evaluated at maximum output power (radiated from the antenna) under “worst-case” conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

This report describes the methodology and results of experiments performed on wireless data terminal. The objective was to determine if there is RF radiation and if radiation is found, what is the extent of radiation with respect to safety limits. SAR (Specific Absorption Rate) is the measure of RF exposure determined by the amount of RF energy absorbed by human body (or its parts) – to determine how the RF energy couples to the body or head which is a primary health concern for body worn devices. The limit below which the exposure to RF is considered safe by regulatory bodies in North America is 1.6 mW/g average over 1 gram of tissue mass.

**CE:**

The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 2 mW/g as recommended by EN62209-1 for an uncontrolled environment. According to the Standard, the device should be evaluated at maximum output power (radiated from the antenna) under “worst-case” conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

This report describes the methodology and results of experiments performed on wireless data terminal. The objective was to determine if there is RF radiation and if radiation is found, what is the extent of radiation with respect to safety limits. SAR (Specific Absorption Rate) is the measure of RF exposure determined by the amount of RF energy absorbed by human body (or its parts) – to determine how the RF energy couples to the body or head which is a primary health concern for body worn devices. The limit below which the exposure to RF is considered safe by regulatory bodies in Europe is 2 mW/g average over 10 gram of tissue mass.

The test configurations were laid out on a specially designed test fixture to ensure the reproducibility of measurements. Each configuration was scanned for SAR. Analysis of each scan was carried out to characterize the above effects in the device.

## SAR Limits

FCC Limit (1g Tissue)

| EXPOSURE LIMITS | SAR (W/kg) | |
|---|---|---|
| | (General Population / Uncontrolled Exposure Environment) | (Occupational / Controlled Exposure Environment) |
| Spatial Average (averaged over the whole body) | 0.08 | 0.4 |
| Spatial Peak (averaged over any 1 g of tissue) | 1.60 | 8.0 |
| Spatial Peak (hands/wrists/feet/ankles averaged over 10 g) | 4.0 | 20.0 |

CE Limit (10g Tissue)

| EXPOSURE LIMITS | SAR (W/kg) | |
|---|---|---|
| | (General Population / Uncontrolled Exposure Environment) | (Occupational / Controlled Exposure Environment) |
| Spatial Average (averaged over the whole body) | 0.08 | 0.4 |
| Spatial Peak (averaged over any 10 g of tissue) | 2.0 | 10 |
| Spatial Peak (hands/wrists/feet/ankles averaged over 10 g) | 4.0 | 20.0 |

Population/Uncontrolled Environments are defined as locations where there is the exposure of individual who have no knowledge or control of their exposure.

Occupational/Controlled Environments are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure (i.e. as a result of employment or occupation).

General Population/Uncontrolled environments Spatial Peak limit 1.6W/kg (FCC) & 2 W/kg (CE) applied to the EUT.

# FACILITIES

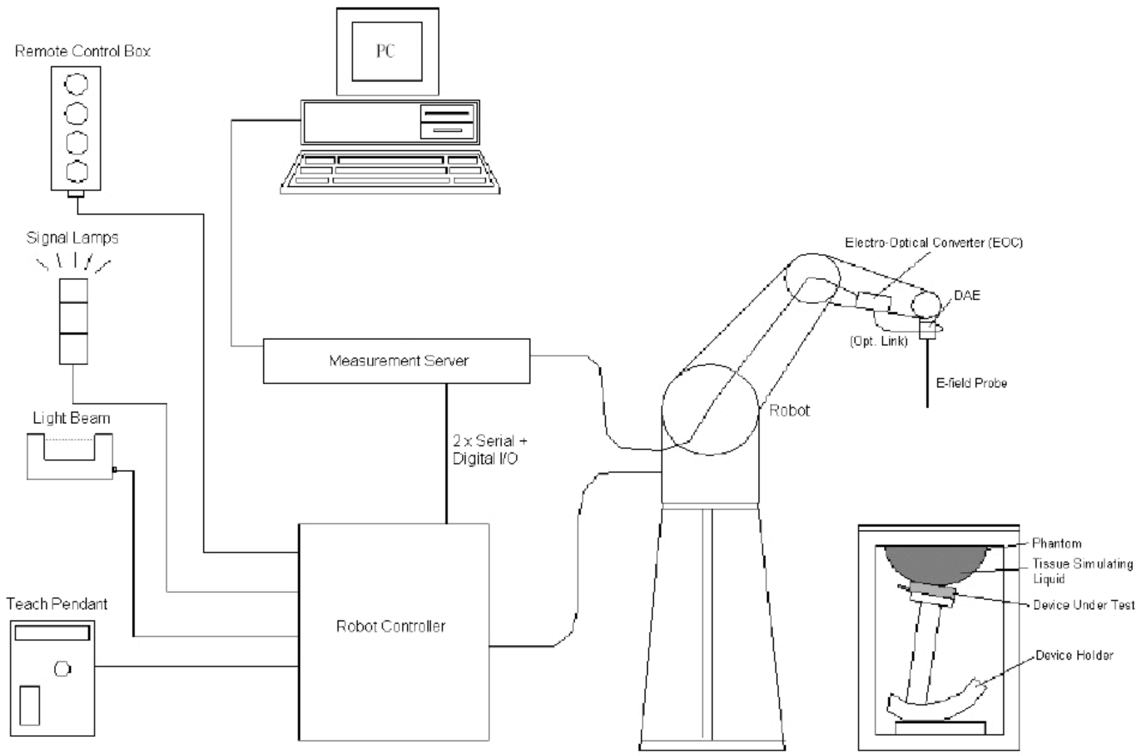
The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

# DESCRIPTION OF TEST SYSTEM

These measurements were performed with the automated near-field scanning system DASY5 from Schmid & Partner Engineering AG (SPEAG) which is the Fifth generation of the system shown in the figure hereinafter:


## DASY5 System Description

The DASY5 system for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot (Staubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplication, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win7 profesional operating system and the DASY52 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

**DASY5 Measurement Server**

The DASY5 measurement server is based on a PC/104 CPU board with a 400MHz intel ULV Celeron, 128MB chip-disk and 128MB RAM. The necessary circuits for communication with the DAE4 (or DAE3) electronics box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY5 I/O board, which is directly connected to the PC/104 bus of the CPU board.


The measurement server performs all real-time data evaluation of field measurements and surface detection, controls robot movements and handles safety operation. The PC operating system cannot interfere with these time critical processes. All connections are supervised by a watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program-controlled robot movements. Furthermore, the measurement server is equipped with an expansion port which is reserved for future applications. Please note that this expansion port does not have a standardized point out, and therefore only devices provided by SPEAG can be connected. Devices from any other supplier could seriously damage the measurement server.

**Data Acquisition Electronics**

The data acquisition electronics (DAE4) consist of a highly sensitive electrometer-grade preamplifer with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.

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

The input impedance of both the DAE4 as well as of the DAE3 box is 200MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

### EX3DV4 E-Field Probes

| | |
|---|---|
| **Frequency** | 10 MHz to > 6 GHz<br>Linearity: ± 0.2 dB (30 MHz to 6 GHz) |
| **Directivity** | ± 0.3 dB in TSL (rotation around probe axis)<br>± 0.5 dB in TSL (rotation normal to probe axis) |
| **Dynamic Range** | 10 µW/g to > 100 mW/g<br>Linearity: ± 0.2 dB (noise: typically < 1 µW/g) |
| **Dimensions** | Overall length: 337 mm (Tip: 20 mm)<br>Tip diameter: 2.5 mm (Body: 12 mm)<br>Typical distance from probe tip to dipole centers: 1 mm |
| **Application** | High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%. |
| **Compatibility** | DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI |

### SAM Twin Phantom

The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region, where shell thickness increases to 6 mm). The phantom has three measurement areas:

_ Left hand

_ Right hand

_ Flat phantom

The phantom table for the DASY systems based on the TX90XL and RX160L robots have the size of 100 x 50 x 85 cm (L xWx H). The phantom table for the compact DASY systems based on the RX60L robot have the size of 100 x 75 x 91 cm (L xWx H); these tables are reinforced for mounting of the robot onto the table. For easy dislocation these tables have fork lift cut outs at the bottom.
The bottom plate contains three pairs of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. Only one device holder is necessary if two phantoms are used (e.g., for different liquids)
A white cover is provided to cover the phantom during o_-periods to prevent water evaporation and changes in the liquid parameters. Free space scans of devices on top of this phantom cover are possible.
Three reference marks are provided on the phantom counter. These reference marks are used to teach the absolute phantom position relative to the robot.

### 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 in 5mm distance, a positioning uncertainty of ±0.5 mm would produce a SAR uncertainty of ±20%. An 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 centers for both scales are the ear reference point ERP). Thus the device needs no repositioning when changing the angles.

The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity "=3 and loss tangent _=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.

### Robots

The DASY5 system uses the high precision industrial robots TX90XL from Staubli SA (France). The TX robot family is the successor of the well known RX robot family and offers the same features important for our application:

- High precision (repeatability 0.02mm)
- High reliability (industrial design)
- Low maintenance costs (virtually maintenance free due to direct drive gears; no belt drives)
- Jerk-free straight movements (brushless synchron motors; no stepper motors)
- Low ELF interference (motor control fields shielded via the closed metallic construction shields)

The above mentioned robots are controlled by the Staubli CS8c robot controllers. All information regarding the use and maintenance of the robot arm and the robot controller is contained on the CDs delivered along with the robot. Paper manuals are available upon request direct from Staubli.

### Area Scans

Area scans are defined prior to the measurement process being executed with a user defined variable spacing between each measurement point (integral) allowing low uncertainty measurements to be conducted. Scans defined for FCC applications utilize a 10mm2 step integral, with 1mm interpolation used to locate the peak SAR area used for zoom scan assessments.

Where the system identifies multiple SAR peaks (which are within 25% of peak value) the system will provide the user with the option of assessing each peak location individually for zoom scan averaging.

### Zoom Scan (Cube Scan Averaging)

The averaging zoom scan volume utilized in the DASY5 software is in the shape of a cube and the side dimension of a 1 g or 10 g mass is dependent on the density of the liquid representing the simulated tissue. A density of 1000 kg/m3 is used to represent the head and body tissue density and not the phantom liquid density, in order to be consistent with the definition of the liquid dielectric properties, i.e. the side length of the 1 g cube is 10mm,with the side length of the 10 g cube 21,5mm.

When the cube intersects with the surface of the phantom, it is oriented so that 3 vertices touch the surface of the shell or the center of a face is tangent to the surface. The face of the cube closest to the surface is modified in order to conform to the tangent surface.

The zoom scan integer steps can be user defined so as to reduce uncertainty, but normal practice for typical test applications (including FCC) utilize a physical step of 5x5x8 (8mmx8mmx5mm) providing a volume of 32mm in the X & Y axis, and 35mm in the Z axis.

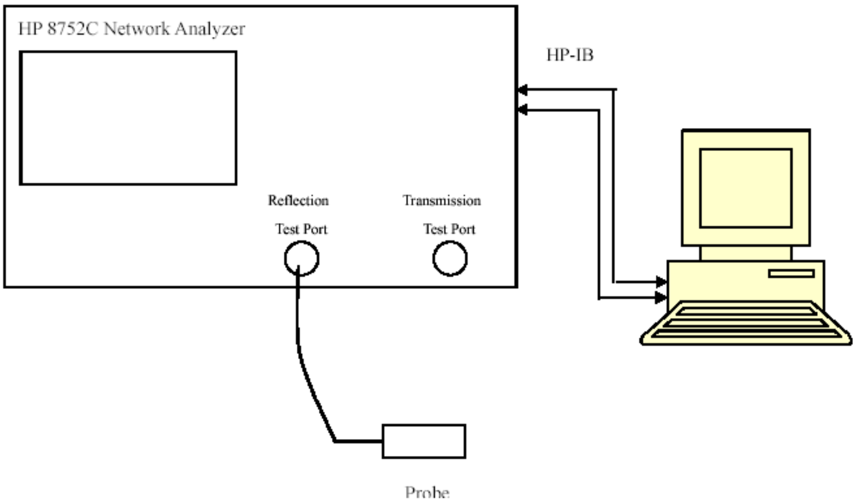
# EQUIPMENT LIST AND CALIBRATION

## Equipments List & Calibration Information

| Equipment | Model | S/N | Calibration Date | Calibration Due Date |
|---|---|---|---|---|
| Robot | RX90 | D03636 | N/A | N/A |
| DASY5 Test Software | DASY52.8 | N/A | N/A | N/A |
| DASY5 Measurement Server | DASY5 4.5.12 | 1470 | N/A | N/A |
| Data Acquistion Electronics | DAE4 | 1459 | 2015-01-26 | 2016-01-26 |
| E-Field Probe | EX3DV4 | 7329 | 2015-02-05 | 2016-02-05 |
| Dipole, 835MHz | ALS-D-835-S-2 | 180-00558 | 2014-10-08 | 2017-10-08 |
| Dipole, 1750MHz | ALS-D-1750-S-2 | 198-00304 | 2013-10-08 | 2017-10-08 |
| Dipole,1900MHz | ALS-D-1900-S-2 | 210-00710 | 2013-10-09 | 2016-10-09 |
| R&S, universal Radio Communication Tester | CMU200 | 105047 | 2014-11-20 | 2015-11-20 |
| 8960 Series 10 Wireless Communication Test Set | E5515C | MY50266471 | 2015-01-13 | 2016-01-13 |
| Mounting Device | MD4HHTV5 | SD 000 H01 KA | N/A | N/A |
| Twin SAM | Twin SAM V5.0 | 1874 | N/A | N/A |
| Simulated Tissue 835 MHz Head | TS-835-H | 201504 | Each Time | / |
| Simulated Tissue 835 MHz Body | TS-835-B | 201505 | Each Time | / |
| Simulated Tissue 1750 MHz Head | TS-1750-H | 201508 | Each Time | / |
| Simulated Tissue 1750 MHz Body | TS-1750-B | 201509 | Each Time | / |
| Simulated Tissue 1900 MHz Head | TS-1900-H | 201506 | Each Time | / |
| Simulated Tissue 1900 MHz Body | TS-1900-B | 201507 | Each Time | / |
| Network Analyzer | 8752C | 3140A02356 | 2015-06-03 | 2016-06-03 |
| Dielectric probe kit | 85070B | US33020324 | N/A | N/A |
| Signal Generator | E4422B | MY41000355 | 2014-10-27 | 2015-10-27 |
| Power Meter | EPM-441A | GB37481494 | 2014-11-03 | 2015-11-03 |
| Power Meter Sensor | 8481A | T-03-EM-127 | 2014-11-03 | 2015-11-03 |
| Power Amplifier | 5205PE | 1015 | N/A | N/A |
| Directional Coupler | 488Z | N/A | N/A | N/A |
| attenuator | 20dB, 100W | N/A | N/A | N/A |

# SAR MEASUREMENT SYSTEM VERIFICATION

## Liquid Verification




Liquid Verification Setup Block Diagram

### Liquid Verification Results

| Frequency | Liquid Type | Liquid Parameter | | Target Value | | Delta (%) | | Tolerance (%) |
|---|---|---|---|---|---|---|---|---|
| | | $\varepsilon_r$ | σ (S/m) | $\varepsilon_r$ | σ (S/m) | $\Delta\varepsilon_r$ | Δσ (S/m) | |
| 824.2 | Head | 42.91 | 0.88 | 41.5 | 0.9 | 3.4 | -2.22 | ±5 |
| | Body | 55.17 | 0.96 | 55.2 | 0.97 | -0.05 | -1.03 | ±5 |
| 826.4 | Head | 42.89 | 0.88 | 41.5 | 0.9 | 3.35 | -2.22 | ±5 |
| | Body | 55.12 | 0.97 | 55.2 | 0.97 | -0.14 | 0 | ±5 |
| 836.6 | Head | 42.89 | 0.89 | 41.5 | 0.9 | 3.35 | -1.11 | ±5 |
| | Body | 55.09 | 0.98 | 55.2 | 0.97 | -0.2 | 1.03 | ±5 |
| 846.6 | Head | 42.82 | 0.9 | 41.5 | 0.9 | 3.18 | 0 | ±5 |
| | Body | 55.03 | 0.98 | 55.2 | 0.97 | -0.31 | 1.03 | ±5 |
| 848.8 | Head | 42.7 | 0.9 | 41.5 | 0.9 | 2.89 | 0 | ±5 |
| | Body | 55 | 0.99 | 55.2 | 0.97 | -0.36 | 2.06 | ±5 |
| 1720 | Head | 39.85 | 1.37 | 40.8 | 1.37 | -2.33 | 0 | ±5 |
| | Body | 53.5 | 1.47 | 53.43 | 1.49 | 0.13 | -1.34 | ±5 |
| 1732.5 | Head | 40.41 | 1.38 | 40.8 | 1.37 | -0.96 | 0.73 | ±5 |
| | Body | 53.43 | 1.48 | 53.43 | 1.49 | 0 | -0.67 | ±5 |
| 1745 | Head | 39.71 | 1.38 | 40.8 | 1.37 | -2.67 | 0.73 | ±5 |
| | Body | 53.29 | 1.49 | 53.43 | 1.49 | -0.26 | 0 | ±5 |
| 1850.2 | Head | 39.86 | 1.36 | 40 | 1.4 | -0.35 | -2.86 | ±5 |
| | Body | 55.26 | 1.48 | 53.3 | 1.52 | 3.68 | -2.63 | ±5 |
| 1852.4 | Head | 39.84 | 1.36 | 40 | 1.4 | -0.4 | -2.86 | ±5 |
| | Body | 55.24 | 1.47 | 53.3 | 1.52 | 3.64 | -3.29 | ±5 |
| 1880 | Head | 39.75 | 1.38 | 40 | 1.4 | -0.63 | -1.43 | ±5 |
| | Body | 53.73 | 1.54 | 53.3 | 1.52 | 0.81 | 1.32 | ±5 |
| 1907.6 | Head | 39.57 | 1.41 | 40 | 1.4 | -1.08 | 0.71 | ±5 |
| | Body | 53.6 | 1.49 | 53.3 | 1.52 | 0.56 | -1.97 | ±5 |
| 1909.8 | Head | 39.59 | 1.42 | 40 | 1.4 | -1.02 | 1.43 | ±5 |
| | Body | 53.38 | 1.49 | 53.3 | 1.52 | 0.15 | -1.97 | ±5 |

**Liquid Verification was performed on 2015-06-14.*

Please refer to the following tables.

| 835 MHz Head | | | 835 MHz Body | | |
|---|---|---|---|---|---|
| Frequency (MHz) | e' | e'' | Frequency (MHz) | e' | e'' |
| 824 | 42.8922 | 19.1424 | 824 | 55.1543 | 21.0581 |
| 824.5 | 42.9469 | 19.1078 | 824.5 | 55.1893 | 20.9314 |
| 825 | 42.9624 | 19.127 | 825 | 55.1451 | 21.0197 |
| 825.5 | 42.8931 | 19.1776 | 825.5 | 55.1792 | 20.9621 |
| 826 | 42.8901 | 19.1219 | 826 | 55.132 | 21.0635 |
| 826.5 | 42.8855 | 19.1532 | 826.5 | 55.1193 | 21.0239 |
| 827 | 42.8896 | 19.1785 | 827 | 55.0142 | 20.9834 |
| 827.5 | 42.9015 | 19.1586 | 827.5 | 55.182 | 20.9694 |
| 828 | 42.9707 | 19.1983 | 828 | 55.1486 | 20.971 |
| 828.5 | 42.9282 | 19.2015 | 828.5 | 55.1732 | 21.013 |
| 829 | 42.968 | 19.2239 | 829 | 55.1081 | 20.9144 |
| 829.5 | 42.9315 | 19.1444 | 829.5 | 55.0733 | 20.8947 |
| 830 | 43.0025 | 19.1986 | 830 | 55.1175 | 20.9766 |
| 830.5 | 42.9458 | 19.2088 | 830.5 | 55.099 | 20.9613 |
| 831 | 42.925 | 19.196 | 831 | 55.0996 | 20.9611 |
| 831.5 | 42.8746 | 19.1602 | 831.5 | 55.1765 | 20.9605 |
| 832 | 42.9674 | 19.1688 | 832 | 55.1969 | 20.9554 |
| 832.5 | 42.9515 | 19.2468 | 832.5 | 55.1124 | 20.927 |
| 833 | 43.0025 | 19.1985 | 833 | 55.1417 | 20.944 |
| 833.5 | 42.9425 | 19.2188 | 833.5 | 55.1478 | 20.9617 |
| 834 | 42.8922 | 19.24 | 834 | 55.1534 | 21.0454 |
| 834.5 | 42.8714 | 19.2086 | 834.5 | 55.095 | 20.9306 |
| 835 | 42.9457 | 19.2017 | 835 | 55.1098 | 20.9484 |
| 835.5 | 42.9547 | 19.1762 | 835.5 | 55.1053 | 21.0055 |
| 836 | 42.9443 | 19.1417 | 836 | 55.1455 | 20.9983 |
| 836.5 | 42.8926 | 19.1724 | 836.5 | 55.0941 | 20.9888 |
| 837 | 42.8704 | 19.2121 | 837 | 55.0905 | 20.9852 |
| 837.5 | 42.8721 | 19.2011 | 837.5 | 55.0449 | 20.9125 |
| 838 | 42.8442 | 19.2383 | 838 | 55.1147 | 20.9997 |
| 838.5 | 42.898 | 19.1763 | 838.5 | 55.15 | 20.9813 |
| 839 | 42.9123 | 19.1944 | 839 | 55.0635 | 20.9566 |
| 839.5 | 42.8964 | 19.1693 | 839.5 | 55.0948 | 20.996 |
| 840 | 42.935 | 19.1157 | 840 | 55.0383 | 21.0312 |
| 840.5 | 42.9046 | 19.0804 | 840.5 | 55.1766 | 20.9828 |
| 841 | 42.9133 | 19.1947 | 841 | 55.0339 | 20.9802 |
| 841.5 | 42.8949 | 19.1276 | 841.5 | 55.0223 | 20.9953 |
| 842 | 42.8971 | 19.082 | 842 | 55.0741 | 20.9699 |
| 842.5 | 42.8168 | 19.14 | 842.5 | 55.0102 | 20.9742 |
| 843 | 42.8208 | 19.0539 | 843 | 55.0577 | 20.9525 |
| 843.5 | 42.8251 | 19.0977 | 843.5 | 54.9899 | 20.9314 |
| 844 | 42.7895 | 19.0585 | 844 | 55.0919 | 20.9319 |
| 844.5 | 42.8488 | 19.0026 | 844.5 | 55.0661 | 21.0468 |
| 845 | 42.7827 | 19.0615 | 845 | 55.0782 | 20.9617 |
| 845.5 | 42.8304 | 19.0939 | 845.5 | 55.0231 | 20.9434 |
| 846 | 42.8423 | 19.0395 | 846 | 55.0442 | 20.9613 |
| 846.5 | 42.8397 | 19.0094 | 846.5 | 55.0377 | 20.896 |
| 847 | 42.7559 | 19.0663 | 847 | 55.0193 | 20.9676 |
| 847.5 | 42.7453 | 19 | 847.5 | 55.043 | 20.9628 |
| 848 | 42.8039 | 19.0297 | 848 | 55.0121 | 20.9771 |
| 848.5 | 42.7009 | 19.0236 | 848.5 | 54.9841 | 20.8994 |
| 849 | 42.7027 | 18.9396 | 849 | 55.0134 | 20.9178 |

| 1750 MHz Head | | | | | |
|---|---|---|---|---|---|
| **Frequency (MHz)** | **e'** | **e''** | **Frequency (MHz)** | **e'** | **e''** |
| 1710 | 40.4308 | 14.3265 | 1748 | 40.2427 | 14.1949 |
| 1711 | 40.4333 | 14.3176 | 1749 | 40.2517 | 14.2340 |
| 1712 | 40.4458 | 14.3489 | 1750 | 40.3594 | 14.2625 |
| 1713 | 40.4234 | 14.2811 | 1751 | 40.3348 | 14.2822 |
| 1714 | 40.4196 | 14.2708 | 1752 | 40.3206 | 14.2516 |
| 1715 | 40.399 | 14.3226 | 1753 | 40.3343 | 14.1992 |
| 1716 | 40.442 | 14.2938 | 1754 | 40.2795 | 14.2699 |
| 1717 | 40.3959 | 14.3079 | 1755 | 40.3494 | 14.2205 |
| 1718 | 40.4159 | 14.3209 | 1756 | 40.2865 | 14.2727 |
| 1719 | 40.3904 | 14.3183 | 1757 | 40.2782 | 14.2050 |
| 1720 | 40.4199 | 14.3353 | 1758 | 40.2083 | 14.1712 |
| 1721 | 40.5981 | 14.2655 | 1759 | 40.25 | 14.1982 |
| 1722 | 40.4953 | 14.2672 | 1760 | 40.2828 | 14.2178 |
| 1723 | 40.4896 | 14.2786 | 1761 | 40.2877 | 14.3133 |
| 1724 | 40.5814 | 14.2258 | 1762 | 40.3267 | 14.2930 |
| 1725 | 40.5481 | 14.2436 | 1763 | 40.2348 | 14.2860 |
| 1726 | 40.5745 | 14.2324 | 1764 | 40.1812 | 14.2688 |
| 1727 | 40.4347 | 14.2982 | 1765 | 40.1898 | 14.2622 |
| 1728 | 40.4847 | 14.3090 | 1766 | 40.2034 | 14.3372 |
| 1729 | 40.5082 | 14.2738 | 1767 | 40.1863 | 14.2600 |
| 1730 | 40.433 | 14.3113 | 1768 | 40.1854 | 14.2637 |
| 1731 | 40.3971 | 14.3460 | 1769 | 40.3761 | 14.2615 |
| 1732 | 40.4166 | 14.3082 | 1770 | 40.3254 | 14.2237 |
| 1733 | 40.3955 | 14.2818 | 1771 | 40.3345 | 14.2499 |
| 1734 | 40.3642 | 14.2878 | 1772 | 40.3399 | 14.2365 |
| 1735 | 40.3971 | 14.3239 | 1773 | 40.2853 | 14.2673 |
| 1736 | 40.3965 | 14.2531 | 1774 | 40.3159 | 14.2510 |
| 1737 | 40.3673 | 14.3043 | 1775 | 40.2884 | 14.2042 |
| 1738 | 40.3094 | 14.3431 | 1776 | 40.2544 | 14.2590 |
| 1739 | 40.3574 | 14.3351 | 1777 | 40.234 | 14.2175 |
| 1740 | 40.3338 | 14.2799 | 1778 | 40.2163 | 14.3073 |
| 1741 | 40.3609 | 14.2628 | 1779 | 40.2615 | 14.2219 |
| 1742 | 40.3437 | 14.2540 | 1780 | 40.3469 | 14.2511 |
| 1743 | 40.2835 | 14.2718 | 1781 | 40.3648 | 14.2156 |
| 1744 | 40.3234 | 14.3321 | 1782 | 40.3644 | 14.2719 |
| 1745 | 40.2987 | 14.2542 | 1783 | 40.3126 | 14.2052 |
| 1746 | 40.2848 | 14.2536 | 1784 | 40.3061 | 14.1601 |
| 1747 | 40.2065 | 14.2866 | 1785 | 40.3458 | 14.1885 |

| 1750 MHz Body | | | | | |
|---|---|---|---|---|---|
| **Frequency (MHz)** | **e'** | **e''** | **Frequency (MHz)** | **e'** | **e''** |
| 1710 | 53.5133 | 15.367 | 1748 | 53.1882 | 15.2964 |
| 1711 | 53.5124 | 15.3597 | 1749 | 53.2234 | 15.332 |
| 1712 | 53.4701 | 15.4169 | 1750 | 53.3828 | 15.335 |
| 1713 | 53.4268 | 15.3442 | 1751 | 53.3862 | 15.3225 |
| 1714 | 53.4574 | 15.3822 | 1752 | 53.3479 | 15.3528 |
| 1715 | 53.3796 | 15.3911 | 1753 | 53.3492 | 15.2704 |
| 1716 | 53.4682 | 15.3853 | 1754 | 53.312 | 15.3385 |
| 1717 | 53.4196 | 15.378 | 1755 | 53.3154 | 15.262 |
| 1718 | 53.5032 | 15.3842 | 1756 | 53.285 | 15.3695 |
| 1719 | 53.4142 | 15.4103 | 1757 | 53.2501 | 15.2733 |
| 1720 | 53.4965 | 15.3896 | 1758 | 53.205 | 15.2739 |
| 1721 | 53.7051 | 15.3186 | 1759 | 53.209 | 15.2903 |
| 1722 | 53.5659 | 15.3357 | 1760 | 53.2779 | 15.275 |
| 1723 | 53.5736 | 15.3419 | 1761 | 53.2677 | 15.3796 |
| 1724 | 53.6852 | 15.3021 | 1762 | 53.2859 | 15.3519 |
| 1725 | 53.5781 | 15.3207 | 1763 | 53.2018 | 15.3255 |
| 1726 | 53.6339 | 15.2804 | 1764 | 53.1392 | 15.3676 |
| 1727 | 53.482 | 15.3438 | 1765 | 53.1377 | 15.3658 |
| 1728 | 53.5464 | 15.3705 | 1766 | 53.1822 | 15.3875 |
| 1729 | 53.5481 | 15.3448 | 1767 | 53.1644 | 15.339 |
| 1730 | 53.497 | 15.3868 | 1768 | 53.1201 | 15.2893 |
| 1731 | 53.4477 | 15.4202 | 1769 | 53.3483 | 15.3307 |
| 1732 | 53.4645 | 15.3526 | 1770 | 53.3536 | 15.266 |
| 1733 | 53.3861 | 15.395 | 1771 | 53.3438 | 15.3292 |
| 1734 | 53.4161 | 15.3147 | 1772 | 53.3222 | 15.3316 |
| 1735 | 53.4133 | 15.404 | 1773 | 53.2835 | 15.3185 |
| 1736 | 53.4197 | 15.3661 | 1774 | 53.2921 | 15.3106 |
| 1737 | 53.3552 | 15.3499 | 1775 | 53.2965 | 15.2724 |
| 1738 | 53.3333 | 15.3706 | 1776 | 53.2744 | 15.3061 |
| 1739 | 53.3386 | 15.4051 | 1777 | 53.1812 | 15.2686 |
| 1740 | 53.3534 | 15.3761 | 1778 | 53.1993 | 15.3389 |
| 1741 | 53.3583 | 15.3537 | 1779 | 53.2469 | 15.308 |
| 1742 | 53.3078 | 15.3595 | 1780 | 53.3472 | 15.3257 |
| 1743 | 53.3054 | 15.3573 | 1781 | 53.3516 | 15.2695 |
| 1744 | 53.3502 | 15.3968 | 1782 | 53.3463 | 15.3679 |
| 1745 | 53.2919 | 15.3249 | 1783 | 53.3101 | 15.2848 |
| 1746 | 53.266 | 15.333 | 1784 | 53.2865 | 15.23 |
| 1747 | 53.1853 | 15.3612 | 1785 | 53.3182 | 15.2497 |

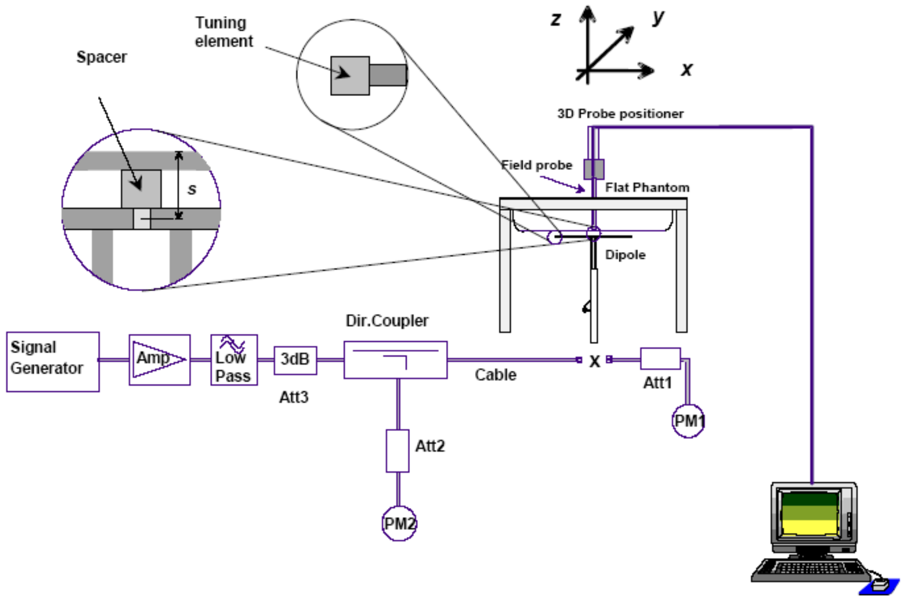
| 1900 MHz Head | | | 1900 MHz Body | | |
|---|---|---|---|---|---|
| Frequency (MHz) | e' | e'' | Frequency (MHz) | e' | e'' |
| 1850 | 39.8526 | 13.2071 | 1850 | 55.237 | 14.3941 |
| 1851 | 39.8825 | 13.2154 | 1851 | 55.3605 | 14.3624 |
| 1852 | 39.8425 | 13.1865 | 1852 | 55.2588 | 14.3353 |
| 1853 | 39.8291 | 13.1664 | 1853 | 55.1998 | 14.29 |
| 1854 | 39.8746 | 13.1718 | 1854 | 55.0756 | 14.1947 |
| 1855 | 39.8749 | 13.1814 | 1855 | 55.0662 | 14.2297 |
| 1856 | 39.834 | 13.1599 | 1856 | 54.9077 | 14.2891 |
| 1857 | 39.9222 | 13.185 | 1857 | 54.7605 | 14.1775 |
| 1858 | 39.8461 | 13.1806 | 1858 | 54.6066 | 14.1317 |
| 1859 | 39.8338 | 13.1847 | 1859 | 54.5773 | 14.0614 |
| 1860 | 39.823 | 13.2191 | 1860 | 54.4584 | 14.1588 |
| 1861 | 39.8441 | 13.2279 | 1861 | 54.4935 | 14.0909 |
| 1862 | 39.8751 | 13.2357 | 1862 | 54.3557 | 14.1254 |
| 1863 | 39.8019 | 13.1659 | 1863 | 54.2082 | 14.1114 |
| 1864 | 39.8094 | 13.1861 | 1864 | 54.1551 | 14.1465 |
| 1865 | 39.8408 | 13.1863 | 1865 | 54.077 | 14.1406 |
| 1866 | 39.7778 | 13.2049 | 1866 | 53.9723 | 14.1583 |
| 1867 | 39.8087 | 13.2005 | 1867 | 53.8814 | 14.176 |
| 1868 | 39.8219 | 13.2214 | 1868 | 53.8122 | 14.2507 |
| 1869 | 39.8339 | 13.2792 | 1869 | 53.706 | 14.1849 |
| 1870 | 39.8411 | 13.2236 | 1870 | 53.6585 | 14.2805 |
| 1871 | 39.8058 | 13.1934 | 1871 | 53.6424 | 14.2955 |
| 1872 | 39.7985 | 13.2241 | 1872 | 53.6887 | 14.3511 |
| 1873 | 39.8003 | 13.1954 | 1873 | 53.6618 | 14.4527 |
| 1874 | 39.7331 | 13.2348 | 1874 | 53.6089 | 14.4166 |
| 1875 | 39.7695 | 13.205 | 1875 | 53.641 | 14.4693 |
| 1876 | 39.7687 | 13.2383 | 1876 | 53.6118 | 14.5733 |
| 1877 | 39.8064 | 13.2302 | 1877 | 53.6574 | 14.6077 |
| 1878 | 39.774 | 13.2207 | 1878 | 53.6276 | 14.6964 |
| 1879 | 39.7548 | 13.2271 | 1879 | 53.6881 | 14.6612 |
| 1880 | 39.746 | 13.2418 | 1880 | 53.728 | 14.7341 |
| 1881 | 39.753 | 13.2078 | 1881 | 53.7522 | 14.7594 |
| 1882 | 39.7435 | 13.2671 | 1882 | 53.7814 | 14.7818 |
| 1883 | 39.7128 | 13.2668 | 1883 | 53.7993 | 14.8202 |
| 1884 | 39.7435 | 13.2356 | 1884 | 53.8987 | 14.7794 |
| 1885 | 39.7092 | 13.2814 | 1885 | 53.9327 | 14.849 |
| 1886 | 39.6818 | 13.2853 | 1886 | 54.1184 | 14.8118 |
| 1887 | 39.6825 | 13.2929 | 1887 | 54.1604 | 14.7551 |
| 1888 | 39.6487 | 13.2857 | 1888 | 54.2321 | 14.8173 |
| 1889 | 39.6637 | 13.3356 | 1889 | 54.2331 | 14.7176 |
| 1890 | 39.6974 | 13.3237 | 1890 | 54.2766 | 14.7304 |
| 1891 | 39.6944 | 13.302 | 1891 | 54.3231 | 14.7275 |
| 1892 | 39.7125 | 13.2925 | 1892 | 54.4034 | 14.7282 |
| 1893 | 39.6827 | 13.3222 | 1893 | 54.3572 | 14.6782 |
| 1894 | 39.6689 | 13.2699 | 1894 | 54.3053 | 14.6512 |
| 1895 | 39.6032 | 13.3186 | 1895 | 54.3306 | 14.6023 |
| 1896 | 39.6857 | 13.3048 | 1896 | 54.458 | 14.5188 |
| 1897 | 39.6328 | 13.2799 | 1897 | 54.3783 | 14.4995 |
| 1898 | 39.6619 | 13.3124 | 1898 | 54.3953 | 14.4488 |
| 1899 | 39.6567 | 13.3021 | 1899 | 54.2346 | 14.4089 |
| 1900 | 39.6829 | 13.3497 | 1900 | 54.1955 | 14.3458 |

| 1900 MHz Head | | | 1900 MHz Body | | |
|---|---|---|---|---|---|
| **Frequency (MHz)** | **e'** | **e''** | **Frequency (MHz)** | **e'** | **e''** |
| 1901 | 39.6551 | 13.3273 | 1901 | 54.1541 | 14.2408 |
| 1902 | 39.5875 | 13.3592 | 1902 | 54.0683 | 14.246 |
| 1903 | 39.6324 | 13.2493 | 1903 | 53.9906 | 14.2238 |
| 1904 | 39.6691 | 13.3587 | 1904 | 53.9045 | 14.1478 |
| 1905 | 39.6351 | 13.3203 | 1905 | 53.7612 | 14.1482 |
| 1906 | 39.5849 | 13.3839 | 1906 | 53.7206 | 14.1201 |
| 1907 | 39.5452 | 13.2985 | 1907 | 53.6266 | 14.1435 |
| 1908 | 39.5862 | 13.3158 | 1908 | 53.588 | 14.0409 |
| 1909 | 39.5829 | 13.3292 | 1909 | 53.4324 | 14.0146 |
| 1910 | 39.5897 | 13.3269 | 1910 | 53.3627 | 14.0537 |

## System Accuracy Verification

Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of ±10%. The validation results are tabulated below. And also the corresponding SAR plot is attached as well in the SAR plots files.

### System Verification Setup Block Diagram




### System Accuracy Check Results

| Date | Frequency Band | Liquid Type | Measured SAR (W/Kg) | | Target Value (W/Kg) | Delta (%) | Tolerance (%) |
|---|---|---|---|---|---|---|---|
| 2015/6/14 | 835 | Head | 1g | 9.81 | 9.773 | 0.38 | ±10 |
| | | Body | 1g | 9.26 | 9.736 | -4.89 | ±10 |
| | 1750 | Head | 1g | 37.6 | 37.02 | 1.57 | ±10 |
| | | Body | 1g | 36.2 | 36.65 | -1.23 | ±10 |
| | 1900 | Head | 1g | 39.4 | 39.481 | -0.21 | ±10 |
| | | Body | 1g | 40.4 | 39.715 | 1.72 | ±10 |

*All SAR values are normalized to 1 Watt forward power.

## SAR SYSTEM VALIDATION DATA

**Test Laboratory: Bay Area Compliance Labs Corp.(Dongguan)**

### System Performance 835MHz Head

**DUT: ALS-D-835-S-2; Type: 835 MHz; Serial: 180-00558**

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; $\sigma$ = 0.892 S/m; $\varepsilon_r$ = 42.946; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section

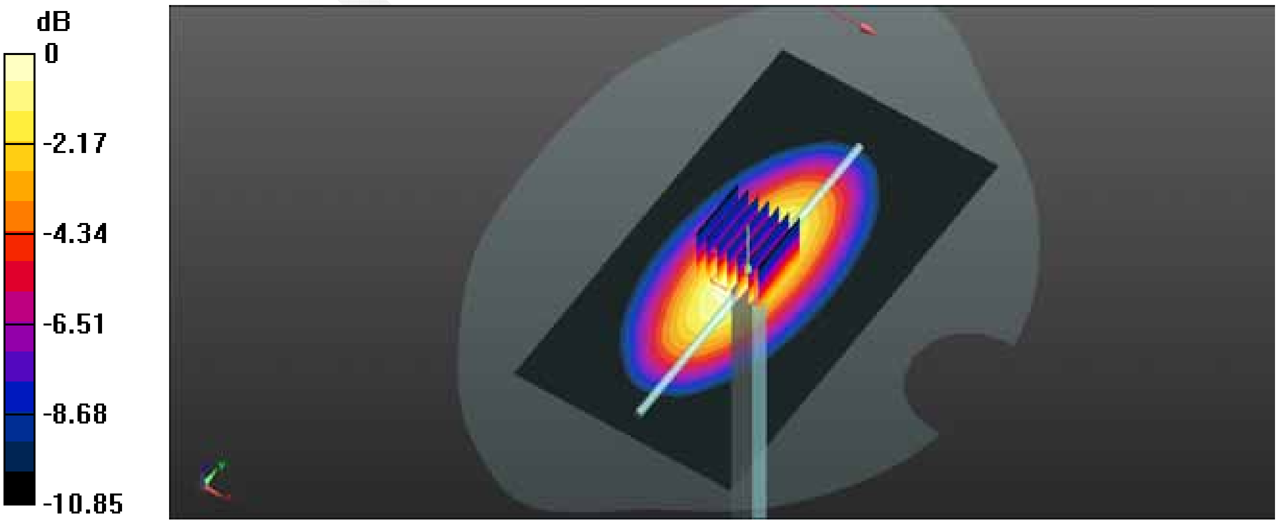
DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.52, 9.52, 9.52); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

**System Performance 835MHz Head /Area Scan (71x131x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 10.4 W/kg

**System Performance 835MHz Head /Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 107.3 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 15.2 W/kg
**SAR(1 g) = 9.81 W/kg; SAR(10 g) = 6.28 W/kg**
Maximum value of SAR (measured) = 10.6 W/kg






0 dB = 10.6 W/kg = 10.25 dBW/kg

**Test Laboratory: Bay Area Compliance Labs Corp.(Dongguan)**

**System Performance 835MHz Body**

**DUT: ALS-D-835-S-2; Type: 835 MHz; Serial: 180-00558**

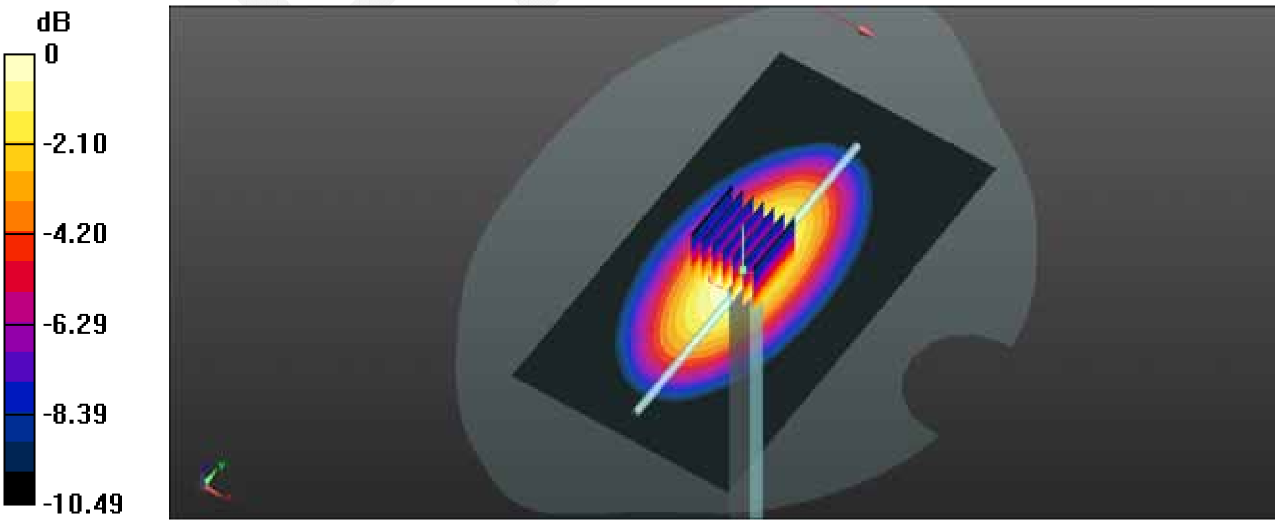
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; $\sigma$ = 0.973 S/m; $\varepsilon_r$ = 55.11; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.17, 9.17, 9.17); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

**System Performance 835MHz Body /Area Scan (71x131x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 9.95 W/kg

**System Performance 835MHz Body /Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.47 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 13.9 W/kg
**SAR(1 g) = 9.26 W/kg; SAR(10 g) = 6.07 W/kg**
Maximum value of SAR (measured) = 9.98 W/kg




0 dB = 9.98 W/kg = 9.99 dBW/kg

**Test Laboratory: Bay Area Compliance Labs Corp.(Dongguan)**

## System Performance 1750MHz Head

**DUT: ALS-D-1750-S-2; Type: 1750 MHz; Serial: 198-00304**

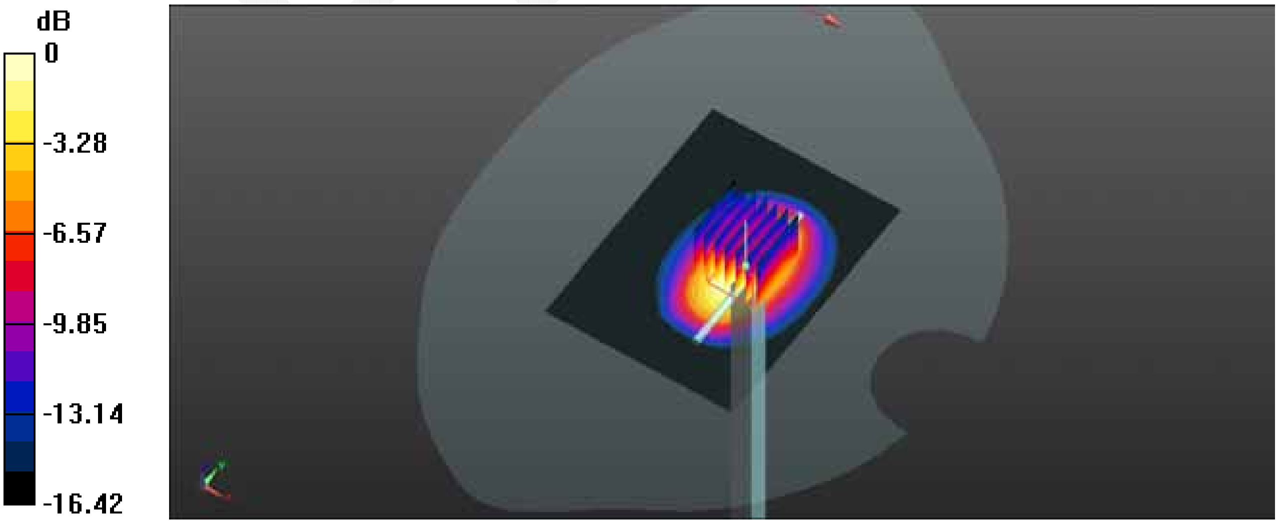
Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; σ = 1.404 S/m; $\varepsilon_r$ = 40.368; ρ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(8.12, 8.12, 8.12); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

**System Performance 835MHz Body /Area Scan (61x81x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 43.2 W/kg

**System Performance 835MHz Body /Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 133.2 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 69.2 W/kg
**SAR(1 g) = 37.6 W/kg; SAR(10 g) = 19.9 W/kg**
Maximum value of SAR (measured) = 42.0 W/kg




0 dB = 42.0 W/kg = 16.23 dBW/kg

**Test Laboratory: Bay Area Compliance Labs Corp.(Dongguan)**

## System Performance 1750MHz Body

**DUT: ALS-D-1750-S-2; Type: 1750 MHz; Serial: 198-00304**

Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; $\sigma$ = 1.494 S/m; $\varepsilon_r$ = 53.347; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

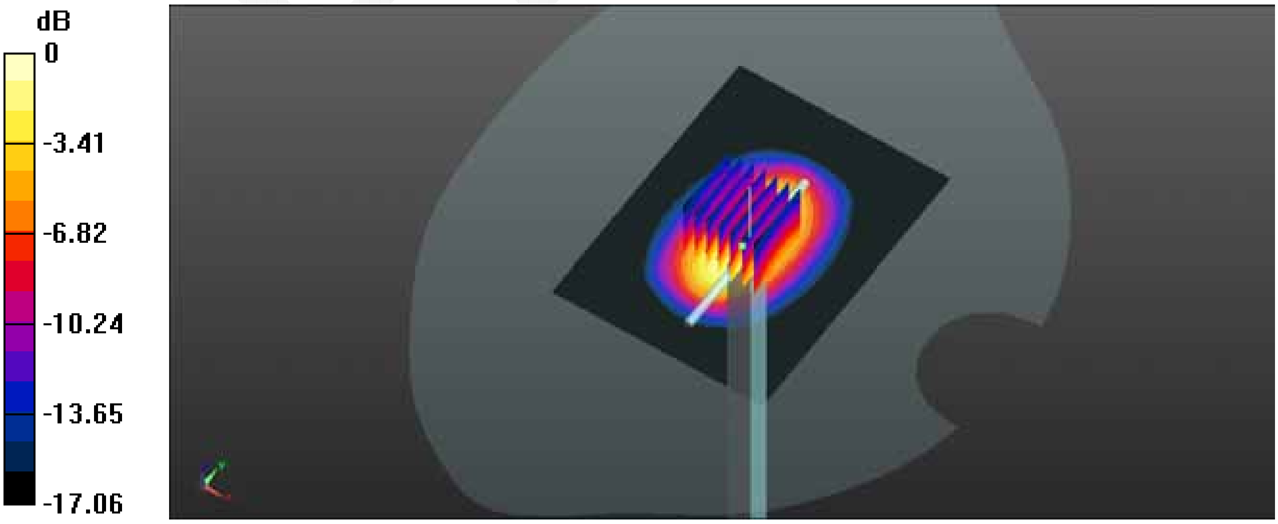
DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.85, 7.85, 7.85); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

**System Performance 835MHz Body /Area Scan (61x81x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 42.4 W/kg

**System Performance 835MHz Body /Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 164.4 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 67.5 W/kg
**SAR(1 g) = 36.2 W/kg; SAR(10 g) = 19.1 W/kg**
Maximum value of SAR (measured) = 40.5 W/kg






0 dB = 40.5 W/kg = 16.07 dBW/kg

**Test Laboratory:Bay Area Compliance Labs Corp.(Dongguan)**

**System Performance 1900MHz Head**

**DUT: ALS-D-1900-S-2; Type: 1900 MHz; Serial: 210-00710**

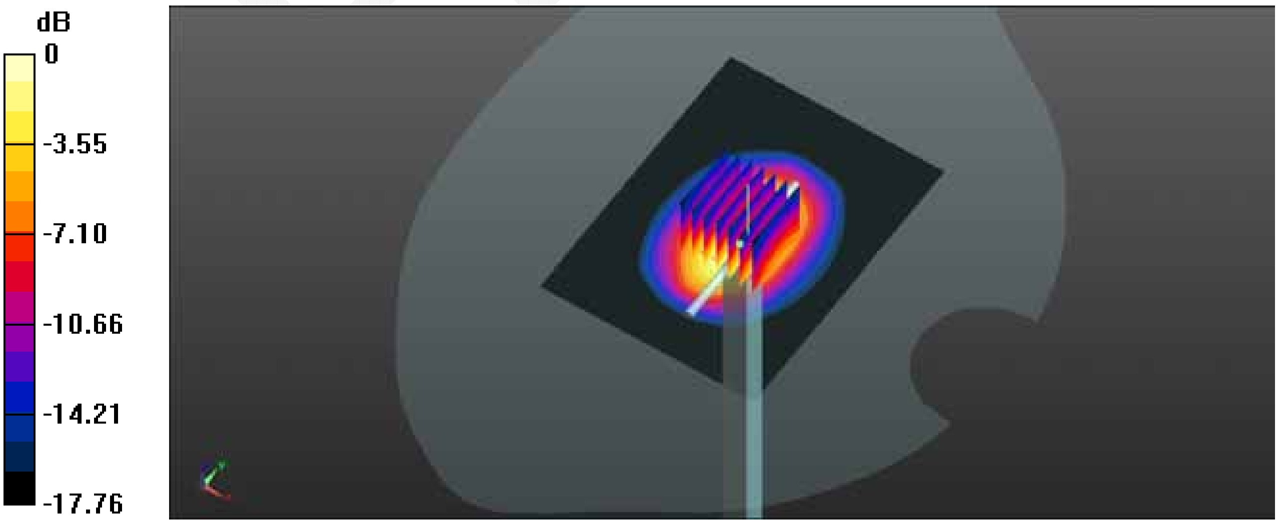
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.409 S/m; $\varepsilon_r$ = 39.646; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

**System Performance 835MHz Body /Area Scan (61x81x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 46.9 W/kg

**System Performance 835MHz Body /Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 174.5 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 73.9 W/kg
**SAR(1 g) = 39.4 W/kg; SAR(10 g) = 20.4 W/kg**
Maximum value of SAR (measured) = 44.3 W/kg




0 dB = 44.3 W/kg = 16.46 dBW/kg

**Test Laboratory:Bay Area Compliance Labs Corp.(Dongguan)**

## System Performance 1900MHz Body

**DUT: ALS-D-1900-S-2; Type: 1900 MHz; Serial: 210-00710**

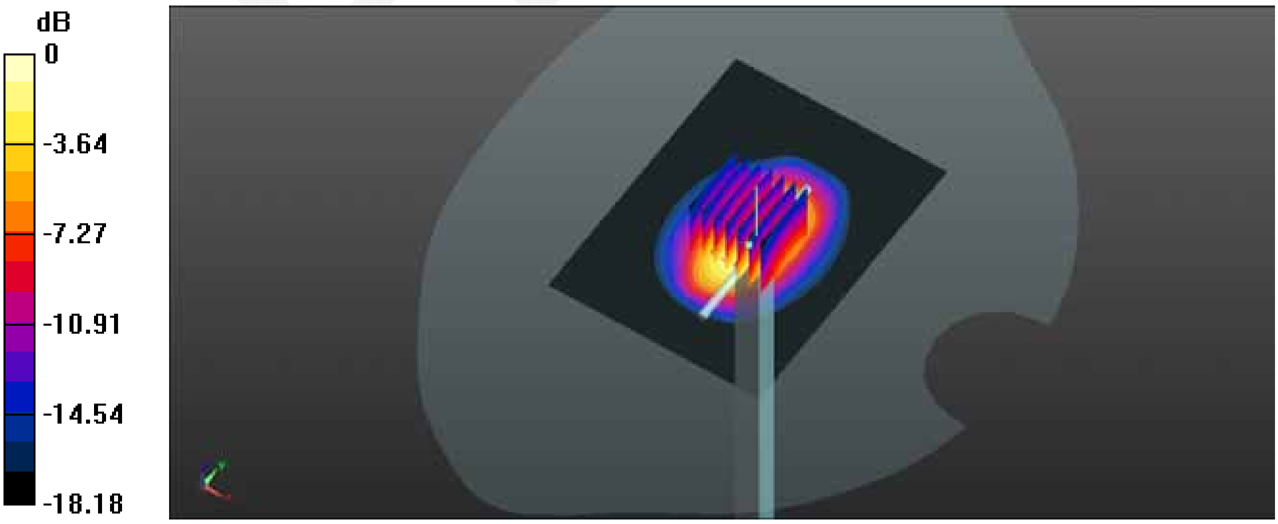
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.515 S/m; $\varepsilon_r$ = 54.189; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.56, 7.56, 7.56); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

**System Performance 835MHz Body /Area Scan (61x81x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 49.0 W/kg

**System Performance 835MHz Body/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 172.8 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 76.2 W/kg
**SAR(1 g) = 40.4 W/kg; SAR(10 g) = 20.5 W/kg**
Maximum value of SAR (measured) = 45.7 W/kg



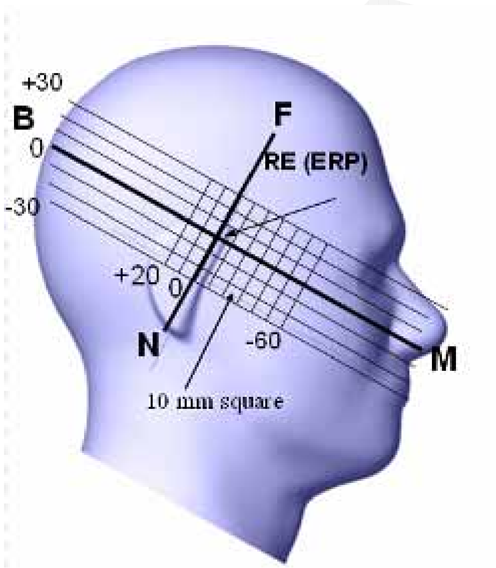

0 dB = 45.7 W/kg = 16.60 dBW/kg

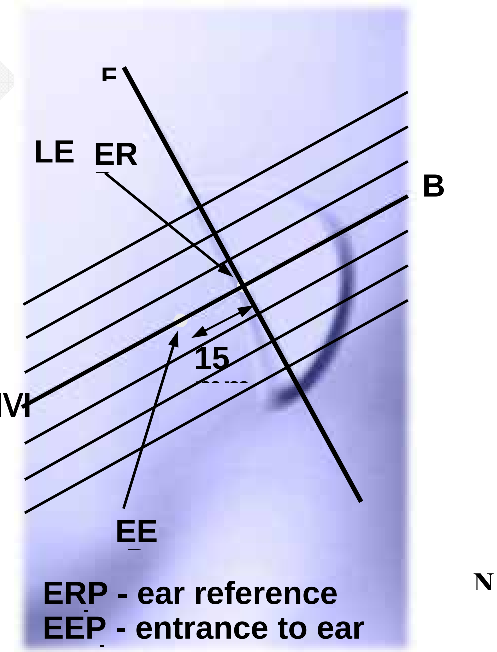
# EUT TEST STRATEGY AND METHODOLOGY

## Test Positions for Device Operating Next to a Person's Ear

This category includes most wireless handsets with fixed, retractable or internal antennas located toward the top half of the device, with or without a foldout, sliding or similar keypad cover. The handset should have its earpiece located within the upper ¼ of the device, either along the centerline or off-centered, as perceived by its users. This type of handset should be positioned in a normal operating position with the "test device reference point" located along the "vertical centerline" on the front of the device aligned to the "ear reference point". The "test device reference point" should be located at the same level as the center of the earpiece region. The "vertical centerline" should bisect the front surface of the handset at its top and bottom edges. A "ear reference point" is located on the outer surface of the head phantom on each ear spacer. It is located 1.5 cm above the center of the ear canal entrance in the "phantom reference plane" defined by the three lines joining the center of each "ear reference point" (left and right) and the tip of the mouth.

A handset should be initially positioned with the earpiece region pressed against the ear spacer of a head phantom. For the SCC-34/SC-2 head phantom, the device should be positioned parallel to the "N-F" line defined along the base of the ear spacer that contains the "ear reference point". For interim head phantoms, the device should be positioned parallel to the cheek for maximum RF energy coupling. The "test device reference point" is aligned to the "ear reference point" on the head phantom and the "vertical centerline" is aligned to the "phantom reference plane". This is called the "initial ear position". While maintaining these three alignments, the body of the handset is gradually adjusted to each of the following positions for evaluating SAR:



## Cheek/Touch Position

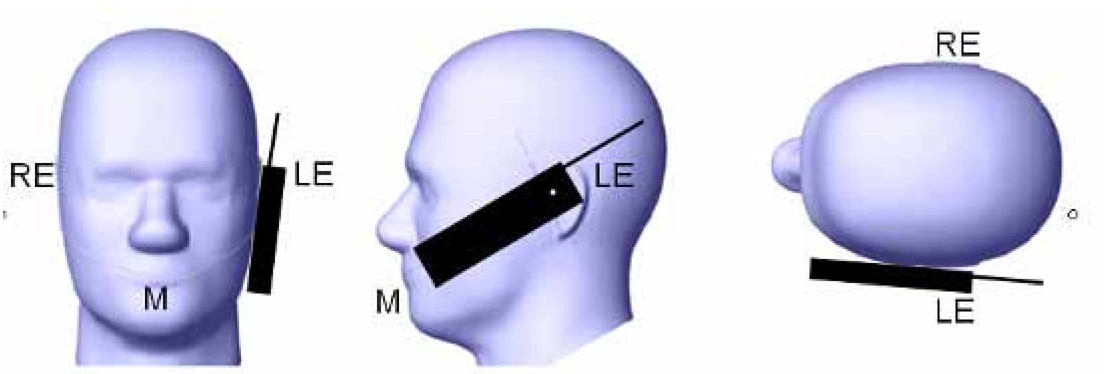
The device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line for the SCC-34/SC-2 head phantom.

This test position is established:

- When any point on the display, keypad or mouthpiece portions of the handset is in contact with the phantom.
- (or) When any portion of a foldout, sliding or similar keypad cover opened to its intended self-adjusting normal use position is in contact with the cheek or mouth of the phantom.

For existing head phantoms – when the handset loses contact with the phantom at the pivoting point, rotation should continue until the device touches the cheek of the phantom or breaks its last contact from the ear spacer.

**Cheek /Touch Position**




## Ear/Tilt Position

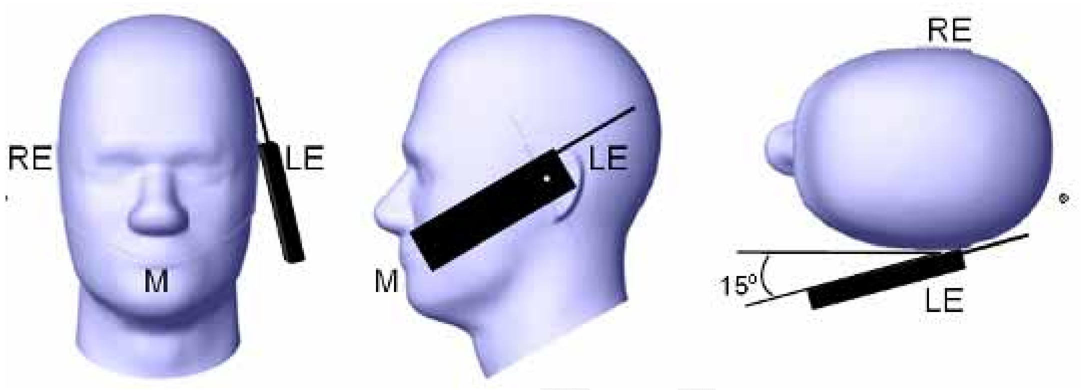
With the handset aligned in the "Cheek/Touch Position":

1) If the earpiece of the handset is not in full contact with the phantom's ear spacer (in the "Cheek/Touch position") and the peak SAR location for the "Cheek/Touch" position is located at the ear spacer region or corresponds to the earpiece region of the handset, the device should be returned to the "initial ear position" by rotating it away from the mouth until the earpiece is in full contact with the ear spacer.

2) (otherwise) The handset should be moved (translated) away from the cheek perpendicular to the line passes through both "ear reference points" (note: one of these ear reference points may not physically exist on a split head model) for approximate 2-3 cm. While it is in this position, the device handset is tilted away from the mouth with respect to the "test device reference point" until the inside angle between the vertical centerline on the front surface of the phone and the horizontal line passing through the ear reference point isby 15 80°. After the tilt, it is then moved (translated) back toward the head perpendicular to the line passes through both "ear reference points" until the device touches the phantom or the ear spacer. If the antenna touches the head first, the positioning process should be repeated with a tilt angle less than 15° so that the device and its antenna would touch the phantom simultaneously. This test position may require a device holder or positioner to achieve the translation and tilting with acceptable positioning repeatability.

If a device is also designed to transmit with its keypad cover closed for operating in the head position, such positions should also be considered in the SAR evaluation. The device should be tested on the left and right side of the head phantom in the "Cheek/Touch" and "Ear/Tilt" positions. When applicable, each configuration should be tested with the antenna in its fully extended and fully retracted positions. These test configurations should be tested at the high, middle and low frequency channels of each operating mode; for example, AMPS, CDMA, and TDMA. If the SAR measured at the middle channel for each test configuration (left, right, Cheek/Touch, Tilt/Ear, extended and retracted) is at least 2.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s). If the transmission band of the test device is less than 10 MHz, testing at the high and low frequency channels is optional.

**Ear /Tilt 15° Position**




## Test positions for body-worn and other configurations

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations. Devices with a headset output should be tested with a headset connected to the device. When multiple accessories that do not contain metallic components are supplied with the device, the device may be tested with only the accessory that dictates the closest spacing to the body. When multiple accessories that contain metallic components are supplied with the device, the device must be tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component (e.g., the same metallic belt-clip used with different holsters with no other metallic components), only the accessory that dictates the closest spacing to the body must be tested.

Body-worn accessories may not always be supplied or available as options for some devices that are intended to be authorized for body-worn use. A separation distance of 1.5 cm between the back of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances. Other separation distances may be used, but they should not exceed 2.5 cm. In these cases, the device may use body-worn accessories that provide a separation distance greater than that tested for the device provided however that the accessory contains no metallic components.

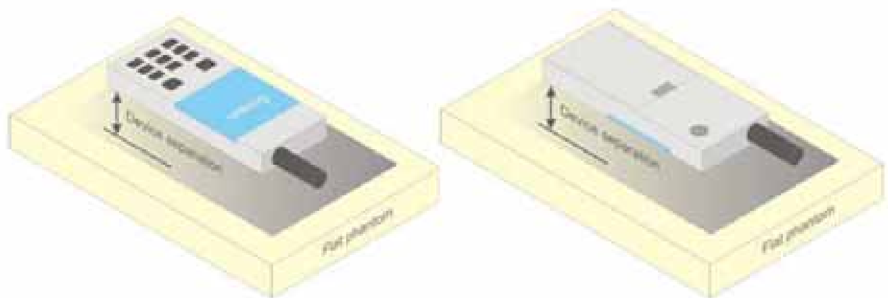


Figure 5 – Test positions for body-worn devices

## SAR Evaluation Procedure

The evaluation was performed with the following procedure:

Step 1: Measurement of the SAR value at a fixed location above the ear point or central position was used as a reference value for assessing the power drop. The SAR at this point is measured at the start of the test and then again at the end of the testing.

Step 2: The SAR distribution at the exposed side of the head was measured at a distance of 4 mm from the inner surface of the shell. The area covered the entire dimension of the head or EUT and the horizontal grid spacing was 10 mm x 10 mm. Based on these data, the area of the maximum absorption was determined by spline interpolation. The first Area Scan covers the entire dimension of the EUT to ensure that the hotspot was correctly identified.

Step 3: Around this point, a volume of 30 mm x 30 mm x 30 mm was assessed by measuring 7x 7 x 7 points. On the basis of this data set, the spatial peak SAR value was evaluated under the following procedure:

1) The data at the surface were extrapolated, since the center of the dipoles is 1.2 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.3 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

2) The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed by the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one dimensional splines with the “Not a knot"-condition (in x, y and z-directions). The volume was integrated with the trapezoidal-algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the averages.

All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

Step 4: Re-measurement of the SAR value at the same location as in Step 1. If the value changed by more than 5%, the evaluation was repeated.

### Test methodology

KDB 447498 D01 General RF Exposure Guidance v05r02.
KDB 648474 D04 Handset SAR v01r02.
KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r03
KDB 865664 D02 RF Exposure Reporting v01r01
KDB 941225 D01 3G SAR Procedures v03
KDB 941225 D06 Hotspot Mode v02

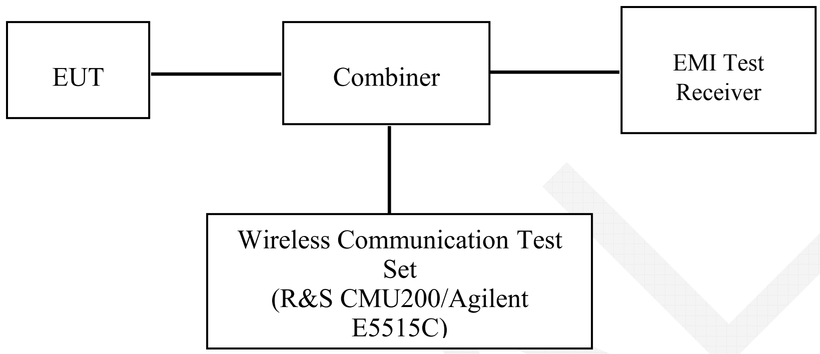
# CONDUCTED OUTPUT POWER MEASUREMENT

## Provision Applicable

The measured peak output power should be greater and within 5% than EMI measurement.

## Test Procedure

The RF output of the transmitter was connected to the input of the EMI Test Receiver through sufficient attenuation.




**GSM/WCDMA**

## Radio Configuration

The power measurement was configured by the Wireless Communication Test Set CMU200 for all Radio configurations except the HSPA+/DC-HSDPA configured by E5515C.

### GSM

Function: Menu select > GSM Mobile Station > GSM 850/1900
Press Connection control to choose the different menus
Press RESET > choose all the reset all settings
Connection: Press Signal Off to turn off the signal and change settings
Network Support > GSM + only
MS Signal
> 33 dBm for GSM 850
> 30 dBm for GSM 1900
BS Signal:Enter the same channel number for TCH channel (test channel) and BCCH channel
Frequency Offset >+ 0 Hz
Mode > BCCH and TCH
BCCH Level > -85 dBm (May need to adjust if link is not stabe)
BCCH Channel >choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]
Channel Type > Off
P0 > 4 dB
TCH > choose desired test channel
Hopping >Off
AF/RF: Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input
Connection: Press Signal on to turn on the signal and change settings

**GPRS**

Function: Menu select > GSM Mobile Station > GSM 850/1900
Press Connection control to choose the different menus
Press RESET > choose all the reset all settings
Connection:Press Signal Off to turn off the signal and change settings
Network Support > GSM + GPRS or GSM + EGSM
Main Service > Packet Data

Service selection > Test Mode A – Auto Slot Config. off
MS Signal:Press Slot Config Bottom on the right twice to select and change the number of time slots and power setting
> Slot configuration > Uplink/Gamma
> 33 dBm for GPRS 850
> 30 dBm for GPRS 1900
BS Signal: Enter the same channel number for TCH channel (test channel) and BCCH channel
Frequency Offset >+ 0 Hz
Mode >BCCH and TCH
BCCH Level >-85 dBm (May need to adjust if link is not stabe)
BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]

Channel Type > Off
P0 > 4 dB
Slot Config > Unchanged (if already set under MS signal)
TCH > choose desired test channel
Hopping >Off
Main Timeslot >3
Network:Coding Scheme >CS4 (GPRS)
Bit Stream >2E9-1 PSR Bit Stream
AF/RF: Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input
Connection: Press Signal on to turn on the signal and change settings

**WCDMA Release 99**

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification. The EUT has a nominal maximum output power of 24dBm (+1.7/-3.7).

| | | |
|---|---|---|
| **WCDMA General Settings** | Loopback Mode | Test Mode 1 |
| | Rel99 RMC | 12.2kbps RMC |
| | Power Control Algorithm | Algorithm2 |
| | **βc / βd** | 8/15 |

**HSDPA**

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification.

| | Mode | HSDPA | HSDPA | HSDPA | HSDPA |
|---|---|---|---|---|---|
| | Subset | 1 | 2 | 3 | 4 |
| WCDMA General Settings | Loopback Mode | Test Mode 1 | | | |
| | Rel99 RMC | 12.2kbps RMC | | | |
| | HSDPA FRC | H-Set1 | | | |
| | Power Control Algorithm | Algorithm2 | | | |
| | βc | 2/15 | 12/15 | 15/15 | 15/15 |
| | βd | 15/15 | 15/15 | 8/15 | 4/15 |
| | βd (SF) | 64 | | | |
| | βc/ βd | 2/15 | 12/15 | 15/8 | 15/4 |
| | βhs | 4/15 | 24/15 | 30/15 | 30/15 |
| | MPR(dB) | 0 | 0 | 0.5 | 0.5 |
| HSDPA Specific Settings | DACK | 8 | | | |
| | DNAK | 8 | | | |
| | DCQI | 8 | | | |
| | Ack-Nack repetition factor | 3 | | | |
| | CQI Feedback | 4ms | | | |
| | CQI Repetition Factor | 2 | | | |
| | Ahs=βhs/ βc | 30/15 | | | |

**HSUPA**

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification.

| | **Mode**<br>**Subset** | **HSUPA**<br>**1** | **HSUPA**<br>**2** | **HSUPA**<br>**3** | **HSUPA**<br>**4** | **HSUPA**<br>**5** |
|---|---|---|---|---|---|---|
| **WCDMA General Settings** | Loopback Mode | Test Mode 1 | | | | |
| | Rel99 RMC | 12.2kbps RMC | | | | |
| | HSDPA FRC | H-Set1 | | | | |
| | HSUPA Test | HSUPA Loopback | | | | |
| | Power Control Algorithm | Algorithm2 | | | | |
| | βc | 11/15 | 6/15 | 15/15 | 2/15 | 15/15 |
| | βd | 15/15 | 15/15 | 9/15 | 15/15 | 0 |
| | βec | 209/225 | 12/15 | 30/15 | 2/15 | 5/15 |
| | βc/ βd | 11/15 | 6/15 | 15/9 | 2/15 | - |
| | βhs | 22/15 | 12/15 | 30/15 | 4/15 | 5/15 |
| | CM(dB) | 1.0 | 3.0 | 2.0 | 3.0 | 1.0 |
| | MPR(dB) | 0 | 2 | 1 | 2 | 0 |
| **HSDPA Specific Settings** | DACK | 8 | | | | |
| | DNAK | 8 | | | | |
| | DCQI | 8 | | | | |
| | Ack-Nack repetition factor | 3 | | | | |
| | CQI Feedback | 4ms | | | | |
| | CQI Repetition Factor | 2 | | | | |
| | Ahs=βhs/ βc | 30/15 | | | | |
| **HSUPA Specific Settings** | DE-DPCCH | 6 | 8 | 8 | 5 | 7 |
| | DHARQ | 0 | 0 | 0 | 0 | 0 |
| | AG Index | 20 | 12 | 15 | 17 | 21 |
| | ETFCI | 75 | 67 | 92 | 71 | 81 |
| | Associated Max UL Data Rate kbps | 242.1 | 174.9 | 482.8 | 205.8 | 308.9 |
| | Reference E_FCls | E-TFCI 11 E<br>E-TFCI PO 4<br>E-TFCI 67<br>E-TFCI PO 18<br>E-TFCI 71<br>E-TFCI PO23<br>E-TFCI 75<br>E-TFCI PO26<br>E-TFCI 81<br>E-TFCI PO 27 | | E-TFCI<br>11<br>E-TFCI<br>PO4<br>E-TFCI<br>92<br>E-TFCI<br>PO 18 | E-TFCI 11 E<br>E-TFCI PO 4<br>E-TFCI 67<br>E-TFCI PO 18<br>E-TFCI 71<br>E-TFCI PO23<br>E-TFCI 75<br>E-TFCI PO26<br>E-TFCI 81<br>E-TFCI PO 27 | |

**HSPA+**

The following tests were conducted according to the test requirements in Table C.11.1.4 of 3GPP TS 34.121-1

| Sub-test | $\beta_c$ (Note3) | $\beta_d$ | $\beta_{HS}$ (Note1) | $\beta_{ec}$ | $\beta_{ed}$ (2xSF2) (Note 4) | $\beta_{ed}$ (2xSF4) (Note 4) | CM (dB) (Note 2) | MPR (dB) (Note 2) | AG Index (Note 4) | E-TFCI (Note 5) | E-TFCI (boost) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 0 | 30/15 | 30/15 | $\beta_{ed}$1: 30/15<br>$\beta_{ed}$2: 30/15 | $\beta_{ed}$3: 24/15<br>$\beta_{ed}$4: 24/15 | 3.5 | 2.5 | 14 | 105 | 105 |

Note 1: $\Delta_{ACK}$, $\Delta_{NACK}$ and $\Delta_{CQI}$ = 30/15 with $\beta_{hs}$ = 30/15 * $\beta_c$ .
Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0).
Note 3: DPDCH is not configured, therefore the $\beta_c$ is set to 1 and $\beta_d$ = 0 by default.
Note 4: $\beta_{ed}$ can not be set directly; it is set by Absolute Grant Value.
Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.

**DC-HSDPA**

The following tests were conducted according to the test requirements in Table Table C.8.1.12 of 3GPP TS 34.121-1

**Table C.8.1.12: Fixed Reference Channel H-Set 12**

| Parameter | Unit | Value |
|---|---|---|
| Nominal Avg. Inf. Bit Rate | kbps | 60 |
| Inter-TTI Distance | TTI's | 1 |
| Number of HARQ Processes | Processes | 6 |
| Information Bit Payload ( $N_{INF}$ ) | Bits | 120 |
| Number Code Blocks | Blocks | 1 |
| Binary Channel Bits Per TTI | Bits | 960 |
| Total Available SML's in UE | SML's | 19200 |
| Number of SML's per HARQ Proc. | SML's | 3200 |
| Coding Rate | | 0.15 |
| Number of Physical Channel Codes | Codes | 1 |
| Modulation | | QPSK |
| Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table.<br>Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used. | | |

**LTE**

For UE Power Class 1 and 3, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2-1due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1.

**Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1 and 3**

| Modulation | Channel bandwidth / Transmission bandwidth ($N_{RB}$) | | | | | | MPR (dB) |
|---|---|---|---|---|---|---|---|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz | |
| QPSK | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 1 |
| 16 QAM | ≤ 5 | ≤ 4 | ≤ 8 | ≤ 12 | ≤ 16 | ≤ 18 | ≤ 1 |
| 16 QAM | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 2 |

For UE Power Class 1 and 3 the specific requirements and identified subclauses are specified in Table 6.2.4-1 along with the allowed A-MPR values that may be used to meet these requirements. The allowed A-MPR values specified below in Table 6.2.4.-1 to 6.2.4-15 are in addition to the allowed MPR requirements specified in subclause 6.2.3.

**Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)**

| Network Signalling value | Requirements (subclause) | E-UTRA Band | Channel bandwidth (MHz) | Resources Blocks ($N_{RB}$) | A-MPR (dB) |
|---|---|---|---|---|---|
| NS_01 | 6.6.2.1.1 | Table 5.5-1 | 1.4, 3, 5, 10, 15, 20 | Table 5.6-1 | N/A |
| NS_03 | 6.6.2.2.1 | 2, 4,10, 23, 25, 35, 36 | 3 | >5 | ≤ 1 |
| | | | 5 | >6 | ≤ 1 |
| | | | 10 | >6 | ≤ 1 |
| | | | 15 | >8 | ≤ 1 |
| | | | 20 | >10 | ≤ 1 |
| NS_04 | 6.6.2.2.2 | 41 | 5 | >6 | ≤ 1 |
| | | | 10, 15, 20 | Table 6.2.4-4 | |
| NS_05 | 6.6.3.3.1 | 1 | 10,15,20 | ≥ 50 | ≤ 1 |
| NS_06 | 6.6.2.2.3 | 12, 13, 14, 17 | 1.4, 3, 5, 10 | Table 5.6-1 | N/A |
| NS_07 | 6.6.2.2.3<br>6.6.3.3.2 | 13 | 10 | Table 6.2.4-2 | |
| NS_08 | 6.6.3.3.3 | 19 | 10, 15 | > 44 | ≤ 3 |
| NS_09 | 6.6.3.3.4 | 21 | 10, 15 | > 40 | ≤ 1 |
| | | | | > 55 | ≤ 2 |
| NS_10 | | 20 | 15, 20 | Table 6.2.4-3 | |
| NS_11 | 6.6.2.2.1 | 23 | 1.4, 3, 5, 10, 15, 20 | Table 6.2.4-5 | |
| NS_12 | 6.6.3.3.5 | 26 | 1.4, 3, 5 | Table 6.2.4-6 | |
| NS_13 | 6.6.3.3.6 | 26 | 5 | Table 6.2.4-7 | |
| NS_14 | 6.6.3.3.7 | 26 | 10, 15 | Table 6.2.4-8 | |
| NS_15 | 6.6.3.3.8 | 26 | 1.4, 3, 5, 10, 15 | Table 6.2.4-9<br>Table 6.2.4-10 | |
| NS_16 | 6.6.3.3.9 | 27 | 3, 5, 10 | Table 6.2.4-11, Table 6.2.4-12, Table 6.2.4-13 | |
| NS_17 | 6.6.3.3.10 | 28 | 5, 10 | Table 5.6-1 | N/A |
| NS_18 | 6.6.3.3.11 | 28 | 5 | ≥ 2 | ≤ 1 |
| | | | 10, 15, 20 | ≥ 1 | ≤ 4 |
| NS_19 | 6.6.3.3.12 | 44 | 10, 15, 20 | Table 6.2.4-14 | |
| NS_20 | 6.2.2<br>6.6.2.2.1<br>6.6.3.2 | 23 | 5, 10, 15, 20 | Table 6.2.4-15 | |
| ... | | | | | |
| NS_32 | - | - | - | - | - |

**Maximum Target Power:**

| Max Target Power (dBm) | | | |
|---|---|---|---|
| Mode/Band | Channel | | |
| | Low | Middle | High |
| GSM 850 | 33 | 33 | 33 |
| GPRS 1 TX Slot | 32.8 | 32.8 | 32.8 |
| GPRS 2 TX Slot | 32 | 32 | 32 |
| GPRS 3 TX Slot | 30.8 | 30.8 | 30.8 |
| GPRS 4 TX Slot | 29.8 | 29.8 | 29.8 |
| EDGE 1 TX Slot | 27 | 27 | 27 |
| EDGE 2 TX Slot | 26 | 26 | 26 |
| EDGE 3 TX Slot | 24.6 | 24.6 | 24.6 |
| EDGE 4 TX Slot | 23.2 | 23.2 | 23.2 |
| GSM 1900 | 30.1 | 30.1 | 30.1 |
| GPRS 1 TX Slot | 30.1 | 30.1 | 30.1 |
| GPRS 2 TX Slot | 29.2 | 29.2 | 29.2 |
| GPRS 3 TX Slot | 28.2 | 28.2 | 28.2 |
| GPRS 4 TX Slot | 27.1 | 27.1 | 27.1 |
| EDGE 1 TX Slot | 26.1 | 26.1 | 26.1 |
| EDGE 2 TX Slot | 24.9 | 24.9 | 24.9 |
| EDGE 3 TX Slot | 22.7 | 22.7 | 22.7 |
| EDGE 4 TX Slot | 21.5 | 21.5 | 21.5 |
| WCDMA850 | 22. 5 | 22. 5 | 22. 5 |
| HSDPA | 21.5 | 21.5 | 21.5 |
| HSUPA | 21.4 | 21.4 | 21.4 |
| DC-HSDPA | 21.4 | 21.4 | 21.4 |
| HSPA+ | 21.4 | 21.4 | 21.4 |
| WCDMA1900 | 21.6 | 21.6 | 21.6 |
| HSDPA | 20.5 | 20.5 | 20.5 |
| HSUPA | 20.6 | 20.6 | 20.6 |
| DC-HSDPA | 20.6 | 20.6 | 20.6 |
| HSPA+ | 20.6 | 20.6 | 20.6 |
| LTE BAND 4 | 23.2 | 23.2 | 23.2 |
| WLAN | 9.8 | 9.8 | 9.8 |
| Bluetooth | 6.5 | 6.5 | 6.5 |

## Test Results:

### GSM:

| Band | Channel No. | Frequency (MHz) | RF Output Power (dBm) |
|---|---|---|---|
| GSM 850 | 128 | 824.2 | 32.9 |
| | 190 | 836.6 | 32.9 |
| | 251 | 848.8 | **33.0** |
| PCS 1900 | 512 | 1850.2 | **30.1** |
| | 661 | 1880 | 29.9 |
| | 810 | 1909.8 | 29.9 |

### GPRS:

| Band | Channel No. | Frequency (MHz) | RF Output Power (dBm) | | | |
|---|---|---|---|---|---|---|
| | | | 1 slot | 2 slots | 3 slots | 4 slots |
| GSM 850 | 128 | 824.2 | 32.69 | 31.78 | 30.54 | 29.65 |
| | 190 | 836.6 | 32.64 | 31.7 | 30.58 | 29.5 |
| | 251 | 848.8 | 32.72 | 31.86 | 30.62 | **29.67** |
| PCS 1900 | 512 | 1850.2 | 30.02 | 29.14 | 28.16 | **27.09** |
| | 661 | 1880 | 29.87 | 28.9 | 27.98 | 26.94 |
| | 810 | 1909.8 | 29.81 | 28.97 | 28.07 | 27.03 |

### EGPRS:

| Band | Channel No. | Frequency (MHz) | RF Output Power (dBm) | | | |
|---|---|---|---|---|---|---|
| | | | 1 slot | 2 slots | 3 slots | 4 slots |
| GSM 850 | 128 | 824.2 | 26.97 | 25.86 | 24.57 | 23.19 |
| | 190 | 836.6 | 26.78 | 25.63 | 24.39 | 22.97 |
| | 251 | 848.8 | 26.51 | 25.19 | 24.03 | 22.62 |
| PCS 1900 | 512 | 1850.2 | 25.77 | 24.84 | 22.65 | 21.46 |
| | 661 | 1880 | 26.01 | 24.69 | 22.63 | 21.3 |
| | 810 | 1909.8 | 26.04 | 24.48 | 22.4 | 20.97 |

For SAR, the time based average power is relevant, the difference in between depends on the duty cycle of the TDMA signal.

| Number of Time slot | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Duty Cycle | 1:8 | 1:4 | 1:2.66 | 1:2 |
| Time based Ave. power compared to slotted Ave. power | -9 dB | -6 dB | -4.25 dB | -3 dB |
| Crest Factor | 8 | 4 | 2.66 | 2 |

**The time based average power for GPRS**

| Band | Channel No. | Frequency (MHz) | Time based average Power (dBm) | | | |
|---|---|---|---|---|---|---|
| | | | 1 slot | 2 slot | 3 slots | 4 slots |
| GSM 850 | 128 | 824.2 | 23.69 | 25.78 | 26.29 | 26.65 |
| | 190 | 836.6 | 23.64 | 25.7 | 26.33 | 26.5 |
| | 251 | 848.8 | 23.72 | 25.86 | 26.37 | **26.67** |
| PCS 1900 | 512 | 1850.2 | 21.02 | 23.14 | 23.91 | **24.09** |
| | 661 | 1880 | 20.87 | 22.9 | 23.73 | 23.94 |
| | 810 | 1909.8 | 20.81 | 22.97 | 23.82 | 24.03 |

**The time based average power for EGPRS**

| Band | Channel No. | Frequency (MHz) | Time based average Power (dBm) | | | |
|---|---|---|---|---|---|---|
| | | | 1 slot | 2 slot | 3 slots | 4 slots |
| GSM 850 | 128 | 824.2 | 17.97 | 19.86 | 20.32 | 20.19 |
| | 190 | 836.6 | 17.78 | 19.63 | 20.14 | 19.97 |
| | 251 | 848.8 | 17.51 | 19.19 | 19.78 | 19.62 |
| PCS 1900 | 512 | 1850.2 | 16.77 | 18.84 | 18.4 | 18.46 |
| | 661 | 1880 | 17.01 | 18.69 | 18.38 | 18.3 |
| | 810 | 1909.8 | 17.04 | 18.48 | 18.15 | 17.97 |

**Note:**
1. Rohde & Schwarz Radio Communication Tester (CMU200) was used for the measurement of GSM peak and average output power for active timeslots.
2. For GSM voice, 1 timeslot has been activated with power level 5 (850 MHz band) and 0 (1900 MHz band).
3. For GPRS, 1, 2, 3 and 4 timeslots has been activated separately with power level 3(850 MHz band) and 3(1900 MHz band).
4. According to KDB941225D06-SAR for EGPRS mode are not required when the source-based time-averaged output power for data mode is lower than that in the normal GPRS mode

**WCDMA:**

**Results (12.2kbps RMC)**

| Band | Channel No. | Frequency (MHz) | RF Output Power (dBm) |
|---|---|---|---|
| WCDMA 850 | 4132 | 826.4 | 22.25 |
| | 4183 | 836.6 | 22.32 |
| | 4233 | 846.6 | **22.5** |
| WCDMA 1900 | 9262 | 1852.4 | 21.1 |
| | 9400 | 1880 | **21.51** |
| | 9538 | 1907.6 | 21.42 |

**Results (HSDPA)**

| Band | Channel No. | Frequency (MHz) | RF Output Power (dBm) | | | |
|---|---|---|---|---|---|---|
| | | | Subset 1 | Subset 2 | Subset 3 | Subset 4 |
| WCDMA 850 | 4132 | 826.4 | 21.19 | 21.14 | 21.17 | 21.1 |
| | 4183 | 836.6 | 21.27 | 21.22 | 21.29 | 21.21 |
| | 4233 | 846.6 | 21.45 | 21.41 | 21.44 | 21.36 |
| WCDMA 1900 | 9262 | 1852.4 | 20.08 | 20.04 | 20.09 | 20.03 |
| | 9400 | 1880 | 20.45 | 20.41 | 20.49 | 20.43 |
| | 9538 | 1907.6 | 20.34 | 20.31 | 20.36 | 20.38 |

**Results (HSUPA)**

| Band | Channel No. | Frequency (MHz) | RF Output Power (dBm) | | | | |
|---|---|---|---|---|---|---|---|
| | | | Subset 1 | Subset 2 | Subset 3 | Subset 4 | Subset 5 |
| WCDMA 850 | 4132 | 826.4 | 21.13 | 21.15 | 21.07 | 21.09 | 21.12 |
| | 4183 | 836.6 | 21.24 | 21.2 | 21.26 | 21.18 | 21.14 |
| | 4233 | 846.6 | **21.39** | 21.34 | 21.38 | 21.3 | 21.33 |
| WCDMA 1900 | 9262 | 1852.4 | 20.11 | 20.14 | 20.1 | 20.16 | 20.06 |
| | 9400 | 1880 | 20.48 | 20.42 | **20.51** | 20.44 | 20.4 |
| | 9538 | 1907.6 | 20.41 | 20.45 | 20.41 | 20.48 | 20.42 |

**Results (DC-HSDPA):**

| Band | Channel No. | Frequency (MHz) | RF Output Power (dBm) | | | |
|---|---|---|---|---|---|---|
| | | | Subset 1 | Subset 2 | Subset 3 | Subset 4 |
| WCDMA 850 | 4132 | 826.4 | 21.14 | 21.05 | 21.08 | 21.02 |
| | 4183 | 836.6 | 21.19 | 21.13 | 21.1 | 21.15 |
| | 4233 | 846.6 | **21.37** | 21.35 | 21.3 | 21.36 |
| WCDMA 1900 | 9262 | 1852.4 | 20.08 | 20.13 | 20.07 | 20.12 |
| | 9400 | 1880 | 20.45 | 20.38 | 20.46 | 20.52 |
| | 9538 | 1907.6 | 20.49 | 20.43 | 20.39 | 20.35 |

**Results (HSPA+)**

| Band | Channel No. | Frequency (MHz) | RF Output Power (dBm) |
|---|---|---|---|
| WCDMA 850 | 4132 | 826.4 | 21 |
| | 4183 | 836.6 | 21.11 |
| | 4233 | 846.6 | **21.31** |
| WCDMA 1900 | 9262 | 1852.4 | 20.15 |
| | 9400 | 1880 | 20.47 |
| | 9538 | 1907.6 | 20.4 |

**Note:**

1. The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2 kbps RMC (reference measurement Channel) Configured in Test Loop Model 1.
2. KDB 941225 D01-Body SAR is not required for HSDPA/HSUPA/HSPA+/DC-HSDPA when the maximum average output of each RF channel is less than ¼ dB higher than measured 12.2kbps RMC or the maximum SAR for 12.2kbps RMC is < 75% of SAR limit.

**LTE Band 4:**

| Test Bandwidth | Test Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|---|---|---|---|---|---|
| 1.4M | QPSK | 1#0 | 22.01 | 22.19 | 22.53 |
| | | 1#3 | 21.88 | 22.07 | 22.31 |
| | | 1#5 | 21.97 | 22.12 | 22.29 |
| | | 3#0 | 21.87 | 22.01 | 22.17 |
| | | 3#1 | 21.91 | 22.06 | 22.32 |
| | | 3#3 | 21.94 | 22.08 | 22.25 |
| | | 6#0 | 20.94 | 21.15 | 21.38 |
| | 16-QAM | 1#0 | 21.63 | 21.79 | 21.95 |
| | | 1#3 | 21.58 | 21.74 | 21.90 |
| | | 1#5 | 21.64 | 21.81 | 21.94 |
| | | 3#0 | 21.34 | 21.53 | 21.77 |
| | | 3#1 | 21.39 | 21.51 | 21.70 |
| | | 3#3 | 21.35 | 21.54 | 21.82 |
| | | 6#0 | 20.66 | 20.79 | 20.93 |
| 3M | QPSK | 1#0 | 22.00 | 22.13 | 22.32 |
| | | 1#7 | 22.05 | 22.17 | 22.25 |
| | | 1#14 | 21.97 | 22.09 | 22.33 |
| | | 8#0 | 21.59 | 21.79 | 22.04 |
| | | 8#4 | 21.53 | 21.73 | 21.98 |
| | | 8#7 | 21.58 | 21.75 | 21.90 |
| | | 15#0 | 20.87 | 21.07 | 21.34 |
| | 16-QAM | 1#0 | 21.34 | 21.53 | 21.79 |
| | | 1#7 | 21.32 | 21.49 | 21.77 |
| | | 1#14 | 21.35 | 21.50 | 21.81 |
| | | 8#0 | 21.17 | 21.31 | 21.59 |
| | | 8#4 | 21.19 | 21.37 | 21.63 |
| | | 8#7 | 21.30 | 21.42 | 21.62 |
| | | 15#0 | 20.41 | 20.59 | 20.80 |
| 5M | QPSK | 1#0 | 21.87 | 22.04 | 22.25 |
| | | 1#12 | 21.78 | 21.99 | 22.15 |
| | | 1#24 | 21.86 | 22.07 | 22.28 |
| | | 12#0 | 21.24 | 21.44 | 21.67 |
| | | 12#6 | 21.17 | 21.35 | 21.62 |
| | | 12#11 | 21.38 | 21.49 | 21.68 |
| | | 25#0 | 20.54 | 20.74 | 20.89 |
| | 16-QAM | 1#0 | 21.16 | 21.29 | 21.48 |
| | | 1#12 | 20.98 | 21.15 | 21.42 |
| | | 1#24 | 21.04 | 21.18 | 21.42 |
| | | 12#0 | 20.82 | 20.94 | 21.18 |
| | | 12#6 | 20.67 | 20.88 | 21.01 |
| | | 12#11 | 20.83 | 20.96 | 21.09 |
| | | 25#0 | 20.03 | 20.16 | 20.36 |
| 10M | QPSK | 1#0 | 21.74 | 21.90 | 22.08 |
| | | 1#24 | 21.82 | 21.98 | 22.22 |
| | | 1#49 | 21.79 | 21.95 | 22.25 |
| | | 25#0 | 21.15 | 21.36 | 21.49 |

| | | | | | |
|---|---|---|---|---|---|
| | | 25#12 | 21.28 | 21.41 | 21.65 |
| | | 25#24 | 21.17 | 21.33 | 21.51 |
| | | 50#0 | 20.49 | 20.62 | 20.76 |
| | 16-QAM | 1#0 | 21.01 | 21.17 | 21.30 |
| | | 1#24 | 21.13 | 21.30 | 21.57 |
| | | 1#49 | 20.91 | 21.11 | 21.41 |
| | | 25#0 | 20.56 | 20.73 | 21.00 |
| | | 25#12 | 20.61 | 20.79 | 21.06 |
| | | 25#24 | 20.52 | 20.71 | 20.96 |
| | | 50#0 | 19.83 | 19.96 | 20.08 |
| 15M | QPSK | 1#0 | 21.76 | 21.94 | 22.12 |
| | | 1#37 | 21.84 | 22.02 | 22.16 |
| | | 1#74 | 22.01 | 22.16 | 22.31 |
| | | 36#0 | 21.47 | 21.63 | 21.95 |
| | | 36#17 | 21.63 | 21.77 | 21.86 |
| | | 36#35 | 21.59 | 21.71 | 21.83 |
| | | 75#0 | 20.71 | 20.82 | 21.08 |
| | 16-QAM | 1#0 | 21.12 | 21.29 | 21.45 |
| | | 1#37 | 21.17 | 21.32 | 21.54 |
| | | 1#74 | 21.16 | 21.36 | 21.54 |
| | | 36#0 | 20.50 | 20.69 | 20.80 |
| | | 36#17 | 20.64 | 20.83 | 21.06 |
| | | 36#35 | 20.57 | 20.71 | 20.83 |
| | | 75#0 | 19.95 | 20.10 | 20.22 |
| 20M | QPSK | 1#0 | 21.84 | 21.95 | 22.20 |
| | | 1#49 | 21.85 | 22.01 | 22.28 |
| | | 1#99 | **22.66** | **22.80** | **23.07** |
| | | 50#0 | 21.24 | 21.44 | 21.58 |
| | | 50#24 | 21.29 | 21.49 | 21.76 |
| | | 50#49 | 21.38 | 21.53 | 21.72 |
| | | 100#0 | 20.76 | 20.88 | 21.07 |
| | 16-QAM | 1#0 | 21.17 | 21.36 | 21.62 |
| | | 1#49 | 21.28 | 21.39 | 21.48 |
| | | 1#99 | 21.28 | 21.47 | 21.63 |
| | | 50#0 | 20.69 | 20.89 | 21.09 |
| | | 50#24 | 20.78 | 20.97 | 21.22 |
| | | 50#49 | 20.75 | 20.92 | 21.14 |
| | | 100#0 | 20.08 | 20.23 | 20.32 |

Note:
1.SAR for LTE band exposure configurations is measured according to the procedures of KDB 941225 D05 SAR for LTE Devices v02.
2.The CMW500 Wideband Radio Communication tester is used for LTE output power measurements and SAR testing. Closed loop power control is used to keep the radio transmitters the max output power during the test.
3.KDB941225D05v02- SAR for higher order modulation is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg

**Bluetooth**

| Mode | Channel No. | Channel frequency (MHz) | RF Output Power (dBm) |
|---|---|---|---|
| BDR(GFSK) | 0 | 2402 | 4.49 |
| | 39 | 2441 | 5.21 |
| | 78 | 2480 | 4.23 |
| | 9 | 2411 | **6.44** |
| | 48 | 2450 | 6.37 |
| EDR(4-DQPSK) | 0 | 2402 | 3.31 |
| | 39 | 2441 | 3.98 |
| | 78 | 2480 | 3.22 |
| | 9 | 2411 | 5.16 |
| | 46 | 2448 | 5.13 |
| EDR-8DPSK | 0 | 2402 | 3.41 |
| | 39 | 2441 | 4.11 |
| | 78 | 2480 | 3.27 |
| | 10 | 2412 | 5.24 |
| | 50 | 2450 | 5.24 |
| BLE | 0 | 2402 | -2.95 |
| | 19 | 2440 | -2.79 |
| | 39 | 2480 | -2.73 |
| | 5 | 2412 | -1.1 |
| | 23 | 2448 | -1.71 |

**WLAN**

| Mode | Channel No. | Channel frequency (MHz) | RF Output Power (dBm) |
|---|---|---|---|
| **802.11b** | 1 | 2412 | 9.47 |
| | 6 | 2437 | 9.62 |
| | 11 | 2462 | 9.40 |
| 802.11g | 1 | 2412 | 9.37 |
| | 6 | 2437 | 9.72 |
| | 11 | 2462 | 9.59 |
| 802.11n HT20 | 1 | 2412 | 9.66 |
| | 6 | 2437 | 9.61 |
| | 11 | 2462 | 9.57 |
| 802.11n HT40 | 3 | 2422 | 9.31 |
| | 6 | 2437 | **9.73** |
| | 9 | 2452 | 9.34 |

**Note:**

1. The output power was tested under data rate 1Mbps for 802.11b, 6Mbps for 802.11g, 6.5Mbps for 802.11n HT20, 13.5Mbps for 802.11n HT40.

# SAR MEASUREMENT RESULTS

This page summarizes the results of the performed dosimetric evaluation.

The EUT is capable of function as a WLAN to cellular mobile hotspot. Additional SAR test was performed according to KDB941225 D06. Test was performed with a separation of 1cm between the EUT and the flat phantom. The EUT was positioned for SAR tests with the front and back surfaces facing the edge. Each transmit band was utilized for SAR testing. The tested mode has been selected within each band that exhibits the highest time average output power.

## SAR Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 21-22 ℃ |
| **Relative Humidity:** | 36 % |
| **ATM Pressure:** | 999-1000 mbar |

*Testing was performed by Rocky Xiao on 2015-06-14*

**GSM 850:**

| EUT Position | Frequency (MHz) | Test Mode | Power Drift (%) | Max. Meas. Power (dBm) | Max. Rated Power (dBm) | 1g SAR (W/Kg) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Scaled Factor | Meas. SAR | Scaled SAR | Plot |
| Left Head Cheek | 824.2 | GSM | 0.509 | 32.9 | 33 | 1.023 | 0.054 | 0.055 | / |
| | 836.6 | GSM | 2.486 | 32.9 | 33 | 1.023 | 0.057 | 0.058 | / |
| | 848.8 | GSM | -4.06 | 33 | 33 | 1 | 0.06 | **0.06** | **1#** |
| Left Head Tilt | 824.2 | GSM | / | / | / | / | / | / | / |
| | 836.6 | GSM | 1.556 | 32.9 | 33 | 1.023 | 0.042 | 0.043 | / |
| | 848.8 | GSM | / | / | / | / | / | / | / |
| Right Head Cheek | 824.2 | GSM | / | / | / | / | / | / | / |
| | 836.6 | GSM | 0.256 | 32.9 | 33 | 1.023 | 0.055 | 0.056 | / |
| | 848.8 | GSM | / | / | / | / | / | / | / |
| Right Head Tilt | 824.2 | GSM | / | / | / | / | / | / | / |
| | 836.6 | GSM | 0.948 | 32.9 | 33 | 1.023 | 0.039 | 0.040 | / |
| | 848.8 | GSM | / | / | / | / | / | / | / |
| Body-Back-Headset (10mm) | 824.2 | GSM | / | / | / | / | / | / | / |
| | 836.6 | GSM | 3.535 | 32.9 | 33 | 1.023 | 0.225 | 0.230 | / |
| | 848.8 | GSM | / | / | / | / | / | / | / |
| Body-Back (10mm) | 824.2 | GPRS | -0.305 | 29.65 | 29.8 | 1.035 | 0.262 | 0.271 | / |
| | 836.6 | GPRS | -1.775 | 29.5 | 29.8 | 1.072 | 0.265 | 0.284 | / |
| | 848.8 | GPRS | -3.395 | 29.67 | 29.8 | 1.03 | 0.276 | **0.284** | **2#** |
| Body-Left (10mm) | 824.2 | GPRS | / | / | / | / | / | / | / |
| | 836.6 | GPRS | 0.842 | 29.67 | 29.8 | 1.03 | 0.088 | 0.091 | / |
| | 848.8 | GPRS | / | / | / | / | / | / | / |
| Body-Right (10mm) | 824.2 | GPRS | / | / | / | / | / | / | / |
| | 836.6 | GPRS | -1.224 | 29.67 | 29.8 | 1.03 | 0.123 | 0.127 | / |
| | 848.8 | GPRS | / | / | / | / | / | / | / |
| Body-Bottom (10mm) | 824.2 | GPRS | / | / | / | / | / | / | / |
| | 836.6 | GPRS | -1.088 | 29.67 | 29.8 | 1.03 | 0.147 | 0.151 | / |
| | 848.8 | GPRS | / | / | / | / | / | / | / |

**Note**:
1. When the 1-g SAR is ≤ 0.8W/Kg, testing for other channels are optional.
2. The EUT transmit and receive through the same GSM antenna while testing SAR.
3. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.
4. When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.
5. The Multi-slot Classes of EUT is Class 12 which has maximum 4 Downlink slots and 4 Uplink slots, the maximum active slots is 5, when perform the multiple slots scan, 1DL+4UL is the worst case.

**PCS Band:**

| EUT Position | Frequency (MHz) | Test Mode | Power Drift (%) | Max. Meas. Power (dBm) | Max. Rated Power (dBm) | 1g SAR (W/Kg) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Scaled Factor | Meas. SAR | Scaled SAR | Plot |
| Left Head Cheek | 1850.2 | GSM | 4.232 | 30.1 | 30.1 | 1 | 0.180 | **0.18** | **3#** |
| | 1880 | GSM | 1.789 | 29.9 | 30.1 | 1.047 | 0.162 | 0.17 | / |
| | 1909.8 | GSM | 3.936 | 29.9 | 30.1 | 1.047 | 0.171 | 0.179 | / |
| Left Head Tilt | 1850.2 | GSM | / | / | / | / | / | / | / |
| | 1880 | GSM | 0.844 | 29.9 | 30.1 | 1.047 | 0.103 | 0.108 | / |
| | 1909.8 | GSM | / | / | / | / | / | / | / |
| Right Head Cheek | 1850.2 | GSM | / | / | / | / | / | / | / |
| | 1880 | GSM | -0.599 | 29.9 | 30.1 | 1.047 | 0.154 | 0.161 | / |
| | 1909.8 | GSM | / | / | / | / | / | / | / |
| Right Head Tilt | 1850.2 | GSM | / | / | / | / | / | / | / |
| | 1880 | GSM | 0.049 | 29.9 | 30.1 | 1.047 | 0.092 | 0.096 | / |
| | 1909.8 | GSM | / | / | / | / | / | / | / |
| Body-Back-Headset (10mm) | 1850.2 | GSM | / | / | / | / | / | / | / |
| | 1880 | GSM | 0.559 | 29.9 | 30.1 | 1.047 | 0.786 | 0.823 | / |
| | 1909.8 | GSM | / | / | / | / | / | / | / |
| Body-Back (10mm) | 1850.2 | GPRS | -3.619 | 27.09 | 27.1 | 1.002 | 1.070 | 1.072 | / |
| | 1880.0 | GPRS | 0.925 | 26.94 | 27.1 | 1.038 | 1.090 | **1.131** | **4#** |
| | 1909.8 | GPRS | -1.25 | 27.03 | 27.1 | 1.016 | 0.990 | 1.006 | / |
| Body-Left (10mm) | 1850.2 | GPRS | / | / | / | / | / | / | / |
| | 1880.0 | GPRS | 1.917 | 26.94 | 27.1 | 1.038 | 0.560 | 0.581 | / |
| | 1909.8 | GPRS | / | / | / | / | / | / | / |
| Body-Right (10mm) | 1850.2 | GPRS | / | / | / | / | / | / | / |
| | 1880.0 | GPRS | 2.937 | 26.94 | 27.1 | 1.038 | 0.451 | 0.468 | / |
| | 1909.8 | GPRS | / | / | / | / | / | / | / |
| Body-Bottom (10mm) | 1850.2 | GPRS | / | / | / | / | / | / | / |
| | 1880.0 | GPRS | -2.143 | 26.94 | 27.1 | 1.038 | 0.779 | 0.809 | / |
| | 1909.8 | GPRS | / | / | / | / | / | / | / |

**Note**:
1. When the 1-g SAR is ≤ 0.8W/Kg, testing for other channels are optional.
2. The EUT transmit and receive through the same GSM antenna while testing SAR.
3. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.
4. When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.
5. The Multi-slot Classes of EUT is Class 12 which has maximum 4 Downlink slots and 4 Uplink slots, the maximum active slots is 5, when perform the multiple slots scan, 1DL+4UL is the worst case.

**WCDMA 850 Band:**

| EUT Position | Frequency (MHz) | Test Mode | Power Drift (%) | Max. Meas. Power (dBm) | Max. Rated Power (dBm) | 1g SAR (W/Kg) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Scaled Factor | Meas. SAR | Scaled SAR | Plot |
| Left Head Cheek | 826.4 | WCDMA | 1.035 | 22.25 | 22.5 | 1.059 | 0.046 | 0.049 | / |
| | 836.6 | WCDMA | 0.457 | 22.32 | 22.5 | 1.042 | 0.058 | 0.06 | / |
| | 846.6 | WCDMA | 3.039 | 22.5 | 22.5 | 1 | 0.061 | **0.061** | **5#** |
| Left Head Tilt | 826.4 | WCDMA | / | / | / | / | / | / | / |
| | 836.6 | WCDMA | / | / | / | / | / | / | / |
| | 846.6 | WCDMA | -1.164 | 22.5 | 22.5 | 1 | 0.037 | 0.037 | / |
| Right Head Cheek | 826.4 | WCDMA | / | / | / | / | / | / | / |
| | 836.6 | WCDMA | / | / | / | / | / | / | / |
| | 846.6 | WCDMA | 2.965 | 22.5 | 22.5 | 1 | 0.051 | 0.051 | / |
| Right Head Tilt | 826.4 | WCDMA | / | / | / | / | / | / | / |
| | 836.6 | WCDMA | / | / | / | / | / | / | / |
| | 846.6 | WCDMA | -2.224 | 22.5 | 22.5 | 1 | 0.036 | 0.036 | / |
| Body-Back (10mm) | 826.4 | WCDMA | -0.554 | 22.25 | 22.5 | 1.059 | 0.128 | 0.136 | / |
| | 836.6 | WCDMA | 1.916 | 22.32 | 22.5 | 1.042 | 0.134 | 0.14 | / |
| | 846.6 | WCDMA | -3.395 | 22.5 | 22.5 | 1 | 0.143 | **0.143** | **6#** |
| Body-Left (10mm) | 826.4 | WCDMA | / | / | / | / | / | / | / |
| | 836.6 | WCDMA | / | / | / | / | / | / | / |
| | 846.6 | WCDMA | -1.108 | 22.5 | 22.5 | 1 | 0.047 | 0.047 | / |
| Body-Right (10mm) | 826.4 | WCDMA | / | / | / | / | / | / | / |
| | 836.6 | WCDMA | / | / | / | / | / | / | / |
| | 846.6 | WCDMA | -1.448 | 22.5 | 22.5 | 1 | 0.062 | 0.062 | / |
| Body-Bottom (10mm) | 826.4 | WCDMA | / | / | / | / | / | / | / |
| | 836.6 | WCDMA | / | / | / | / | / | / | / |
| | 846.6 | WCDMA | 1.934 | 22.5 | 22.5 | 1 | 0.095 | 0.095 | / |

1. When the 1-g SAR is≤ 0.8W/Kg, testing for other channels are optional.
2. The EUT transmit and receive through the same antenna while testing SAR.
3. The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2 kbps RMC (reference measurement Channel) Configured in Test Loop Model.
4. KDB 941225 D01-Body SAR is not required for HSDPA/HSUPA/HSPA+/DC-HSDPA when the maximum average output of each RF channel is less than ¼ dB higher than measured 12.2kbps RMC or the maximum SAR for 12.2kbps RMC is < 75% of SAR limit.

5. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.

**WCDMA 1900 Band:**

| EUT Position | Frequency (MHz) | Test Mode | Power Drift (%) | Max. Meas. Power (dBm) | Max. Rated Power (dBm) | 1g SAR (W/Kg) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Scaled Factor | Meas. SAR | Scaled SAR | Plot |
| Left Head Cheek | 1852.4 | WCDMA | -0.013 | 21.1 | 21.6 | 1.122 | 0.158 | 0.177 | / |
| | 1880 | WCDMA | -2.949 | 21.51 | 21.6 | 1.021 | 0.173 | **0.177** | **7#** |
| | 1907.6 | WCDMA | -2.671 | 21.42 | 21.6 | 1.042 | 0.169 | 0.176 | / |
| Left Head Tilt | 1852.4 | WCDMA | / | / | / | / | / | / | / |
| | 1880 | WCDMA | -0.124 | 21.51 | 21.6 | 1.021 | 0.095 | 0.097 | / |
| | 1907.6 | WCDMA | / | / | / | / | / | / | / |
| Right Head Cheek | 1852.4 | WCDMA | / | / | / | / | / | / | / |
| | 1880 | WCDMA | -1.413 | 21.51 | 21.6 | 1.021 | 0.155 | 0.158 | / |
| | 1907.6 | WCDMA | / | / | / | / | / | / | / |
| Right Head Tilt | 1852.4 | WCDMA | / | / | / | / | / | / | / |
| | 1880 | WCDMA | 2.921 | 21.51 | 21.6 | 1.021 | 0.082 | 0.084 | / |
| | 1907.6 | WCDMA | / | / | / | / | / | / | / |
| Body-Back (10mm) | 1852.4 | WCDMA | -3.682 | 21.1 | 21.6 | 1.122 | 0.544 | 0.61 | / |
| | 1880 | WCDMA | 1.158 | 21.51 | 21.6 | 1.021 | 0.673 | **0.687** | **8#** |
| | 1907.6 | WCDMA | -3.357 | 21.42 | 21.6 | 1.042 | 0.651 | 0.678 | / |
| Body-Left (10mm) | 1852.4 | WCDMA | / | / | / | / | / | / | / |
| | 1880 | WCDMA | -1.95 | 21.51 | 21.6 | 1.021 | 0.394 | 0.402 | / |
| | 1907.6 | WCDMA | / | / | / | / | / | / | / |
| Body-Right (10mm) | 1852.4 | WCDMA | / | / | / | / | / | / | / |
| | 1880 | WCDMA | 2.906 | 21.51 | 21.6 | 1.021 | 0.278 | 0.284 | / |
| | 1907.6 | WCDMA | / | / | / | / | / | / | / |
| Body-Bottom (10mm) | 1852.4 | WCDMA | / | / | / | / | / | / | / |
| | 1880 | WCDMA | 0.016 | 21.51 | 21.6 | 1.021 | 0.502 | 0.513 | / |
| | 1907.6 | WCDMA | / | / | / | / | / | / | / |

**Note**:

1. When the 1-g SAR is≤ 0.8W/Kg, testing for other channels are optional.
2. The EUT transmit and receive through the same antenna while testing SAR.
3. The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2 kbps RMC (reference measurement Channel) Configured in Test Loop Model.
4. KDB 941225 D01-Body SAR is not required for HSDPA/HSUPA/HSPA+/DC-HSDPA when the maximum average output of each RF channel is less than ¼ dB higher than measured 12.2kbps RMC or the maximum SAR for 12.2kbps RMC is < 75% of SAR limit.

5. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.

**LTE Band 4:**

| EUT Position | Frequency (MHz) | Test Mode | Power Drift (%) | Max. Meas. Power (dBm) | Max. Rated Power (dBm) | 1g SAR (W/Kg) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Scaled Factor | Meas. SAR | Scaled SAR | Plot |
| Left Head Cheek | 1720 | 1RB | 3.937 | 22.6 | 23.2 | 1.148 | 0.224 | 0.257 | / |
| | 1732.5 | 1RB | -0.413 | 22.8 | 23.2 | 1.096 | 0.245 | 0.269 | / |
| | 1745 | 1RB | -3.839 | 23.07 | 23.2 | 1.03 | 0.262 | **0.27** | **9#** |
| | 1745 | 50%RB | 1.351 | 21.76 | 23.2 | 1.393 | 0.182 | 0.254 | / |
| Left Head Tilt | 1720 | 1RB | / | / | / | / | / | / | / |
| | 1732.5 | 1RB | / | / | / | / | / | / | / |
| | 1745 | 1RB | -3.776 | 23.07 | 23.2 | 1.03 | 0.139 | 0.143 | / |
| | 1745 | 50%RB | -0.342 | 21.76 | 23.2 | 1.393 | 0.082 | 0.114 | / |
| Right Head Cheek | 1720 | 1RB | / | / | / | / | / | / | / |
| | 1732.5 | 1RB | / | / | / | / | / | / | / |
| | 1745 | 1RB | 2.498 | 23.07 | 23.2 | 1.03 | 0.223 | 0.23 | / |
| | 1745 | 50%RB | -2.864 | 21.76 | 23.2 | 1.393 | 0.163 | 0.227 | / |
| Right Head Tilt | 1720 | 1RB | / | / | / | / | / | / | / |
| | 1732.5 | 1RB | / | / | / | / | / | / | / |
| | 1745 | 1RB | 0.355 | 23.07 | 23.2 | 1.03 | 0.132 | 0.136 | / |
| | 1745 | 50%RB | 2.662 | 21.76 | 23.2 | 1.393 | 0.088 | 0.123 | / |
| Body-Back (10mm) | 1720 | 1RB | 3.56 | 22.6 | 23.2 | 1.148 | 0.387 | 0.444 | / |
| | 1732.5 | 1RB | -0.236 | 22.8 | 23.2 | 1.096 | 0.412 | 0.452 | / |
| | 1745 | 1RB | -2.051 | 23.07 | 23.2 | 1.03 | 0.452 | **0.466** | **10#** |
| | 1745 | 50%RB | -0.386 | 21.76 | 23.2 | 1.393 | 0.313 | 0.436 | / |
| Body-Left (10mm) | 1720 | 1RB | / | / | / | / | / | / | / |
| | 1732.5 | 1RB | / | / | / | / | / | / | / |
| | 1745 | 1RB | -3.187 | 23.07 | 23.2 | 1.03 | 0.251 | 0.259 | / |
| | 1745 | 50%RB | 0.283 | 21.76 | 23.2 | 1.393 | 0.192 | 0.267 | / |
| Body-Right (10mm) | 1720 | 1RB | / | / | / | / | / | / | / |
| | 1732.5 | 1RB | / | / | / | / | / | / | / |
| | 1745 | 1RB | 3.214 | 23.07 | 23.2 | 1.03 | 0.156 | 0.161 | / |
| | 1745 | 50%RB | 3.374 | 21.76 | 23.2 | 1.393 | 0.104 | 0.145 | / |
| Body-Bottom (10mm) | 1720 | 1RB | / | / | / | / | / | / | / |
| | 1732.5 | 1RB | / | / | / | / | / | / | / |
| | 1745 | 1RB | 1.737 | 23.07 | 23.2 | 1.03 | 0.302 | 0.311 | / |
| | 1745 | 50%RB | -2.884 | 21.76 | 23.2 | 1.393 | 0.212 | 0.295 | / |

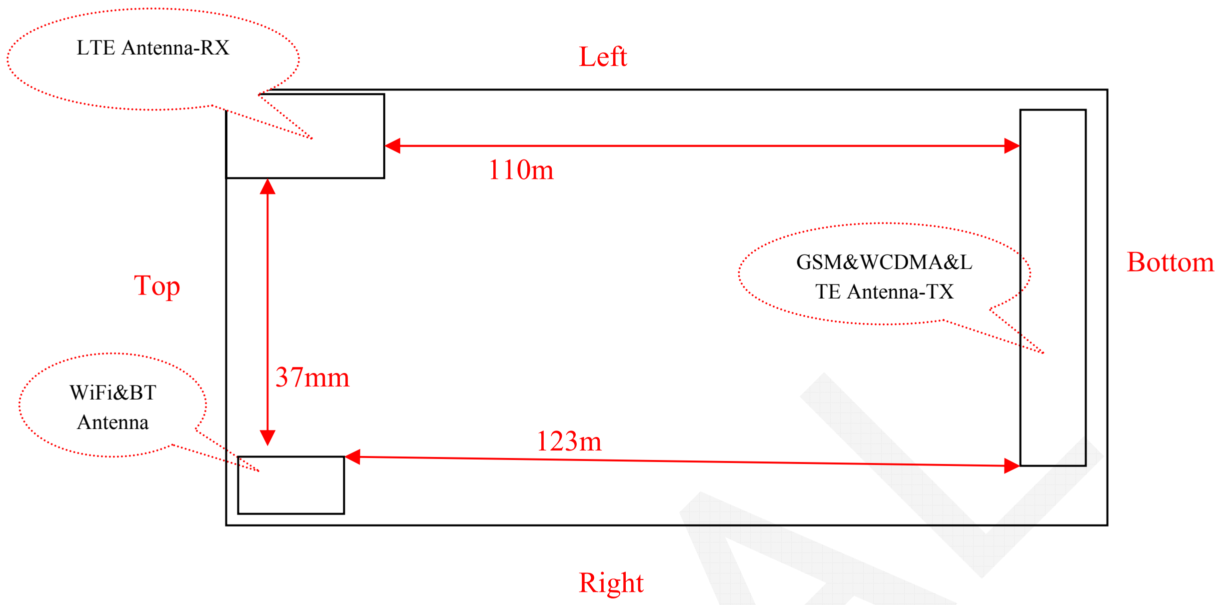
**Note:**

1. When the 1-g SAR is ≤ 0.8W/Kg, testing for other channels are optional.

2. SAR for LTE band exposure configurations is measured according to the procedures of KDB 941225 D05 SAR for LTE Devices v02.
3. KDB941225D05- SAR for higher order modulation is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg
4. KDB941225D05- For QPSK with 100% RB allocation, when the reported SAR measured for the Highest output power channel is <1.45 W/kg, tests for the remaining required test channels are optional.
5.KDB941225D05- For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg.
6. KDB941225D05- Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offset the upper edge, middle and lower edge of each required test channel.
7. KDB941225D05- SAR for the other channel bandwidth is not necessary except the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg.

# SAR SIMULTANEOUS TRANSMISSION DESCRIPTION

**BT&WLAN and GSM&3G Antennas Location:**




**Simultaneous Transmission:**

| Description of Simultaneous Transmit Capabilities | | | Antennas Distance (mm) |
|---|---|---|---|
| Transmitter Combination | Simultaneous? | Hotspot? | |
| GSM + WCDMA | × | × | 0 |
| GSM+LTE | × | × | 0 |
| GSM + Bluetooth | √ | × | 123 |
| GSM + WLAN | √ | √ | 123 |
| WCDMA+LTE | × | × | 0 |
| WCDMA+Bluetooth | √ | × | 123 |
| WCDMA + WLAN | √ | √ | 123 |
| LTE + Bluetooth | √ | × | 123 |
| LTE + WLAN | √ | √ | 123 |

**Standalone SAR test exclusion considerations**

| Mode | Frequency (MHz) | Pavg (dBm) | Pavg (mW) | Distance (mm) | Calculated value | Threshold (1-g) | SAR Test Exclusion |
|---|---|---|---|---|---|---|---|
| WLAN | 2450 | 9.8 | 9.55 | 0 | 2.99 | 3 | YES |
| Bluetooth | 2450 | 6.5 | 4.47 | 0 | 1.40 | 3 | YES |

**NOTE:**

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[( max. power of channel, including tune-up tolerance, mW )/( min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤7.5 for 10-g extremity SAR, where
1. f(GHz) is the RF channel transmit frequency in GHz.
2. Power and distance are rounded to the nearest mW and mm before calculation.
3. The result is rounded to one decimal place for comparison.
4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

**Standalone SAR estimation:**

| Mode | Frequency (GHz) | Pavg (dBm) | Pavg (mW) | Distance (mm) | Estimated 1-g (W/kg) |
|---|---|---|---|---|---|
| WLAN Head | 2450 | 9.8 | 9.55 | 0 | 0.3986 |
| WLAN Body | 2450 | 9.8 | 9.55 | 10 | 0.1993 |
| BT Head | 2450 | 6.5 | 4.47 | 0 | 0.1864 |
| BT Body | 2450 | 6.5 | 4.47 | 10 | 0.0932 |

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:
[( max. power of channel, including tune-up tolerance , mW)/( min. test separation distance,mm)] · [√f(GHz)/x ]
W/kg for test separation distances ≤50 mm;
where x = 7.5 for 1-g SAR.
When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion

**Simultaneous and Hotspot SAR test exclusion considerations:**

| Mode (SAR1+SAR2) | Position | Reported SAR (W/kg) | | ΣSAR < 1.6W/kg |
|---|---|---|---|---|
| | | SAR1 | SAR2 | |
| GSM 850+Bluetooth | Left Head Cheek | 0.06 | 0.1864 | 0.2464 |
| | Left Head Tilt | 0.043 | 0.1864 | 0.2294 |
| | Right Head Cheek | 0.056 | 0.1864 | 0.2424 |
| | Right Head Tilt | 0.004 | 0.1864 | 0.1904 |
| | Body-Back-Headset | 0.23 | 0.0932 | 0.3232 |
| GPRS 850 + Bluetooth | Body-Back | 0.284 | 0.0932 | 0.3772 |
| | Body-Right | 0.091 | 0.0932 | 0.1842 |
| | Body-Left | 0.127 | 0.0932 | 0.2202 |
| | Body-Bottom | 0.151 | 0.0932 | 0.2442 |
| PCS1900 +Bluetooth | Left Head Cheek | 0.18 | 0.1864 | 0.3664 |
| | Left Head Tilt | 0.108 | 0.1864 | 0.2944 |
| | Right Head Cheek | 0.161 | 0.1864 | 0.3474 |
| | Right Head Tilt | 0.096 | 0.1864 | 0.2824 |
| | Body-Back-Headset | 0.823 | 0.0932 | 0.9162 |
| GPRS 1900 + Bluetooth | Body-Back | 1.131 | 0.0932 | 1.2242 |
| | Body-Right | 0.581 | 0.0932 | 0.6742 |
| | Body-Left | 0.468 | 0.0932 | 0.5612 |
| | Body-Bottom | 0.809 | 0.0932 | 0.9022 |
| WCDMA 850+Bluetooth | Left Head Cheek | 0.061 | 0.1864 | 0.2474 |
| | Left Head Tilt | 0.037 | 0.1864 | 0.2234 |
| | Right Head Cheek | 0.051 | 0.1864 | 0.2374 |
| | Right Head Tilt | 0.036 | 0.1864 | 0.2224 |
| | Body-Back | 0.143 | 0.0932 | 0.2362 |
| | Body-Right | 0.047 | 0.0932 | 0.1402 |
| | Body-Left | 0.062 | 0.0932 | 0.1552 |
| | Body-Bottom | 0.095 | 0.0932 | 0.1882 |
| WCDMA 1900+Bluetooth | Left Head Cheek | 0.177 | 0.1864 | 0.3634 |
| | Left Head Tilt | 0.097 | 0.1864 | 0.2834 |
| | Right Head Cheek | 0.158 | 0.1864 | 0.3444 |
| | Right Head Tilt | 0.084 | 0.1864 | 0.2704 |
| | Body-Back | 0.687 | 0.0932 | 0.7802 |
| | Body-Right | 0.402 | 0.0932 | 0.4952 |
| | Body-Left | 0.284 | 0.0932 | 0.3772 |
| | Body-Bottom | 0.513 | 0.0932 | 0.6062 |
| LTE Band 4 +Bluetooth | Left Head Cheek | 0.27 | 0.1864 | 0.4564 |
| | Left Head Tilt | 0.143 | 0.1864 | 0.3294 |
| | Right Head Cheek | 0.23 | 0.1864 | 0.4164 |
| | Right Head Tilt | 0.136 | 0.1864 | 0.3224 |
| | Body-Back | 0.466 | 0.0932 | 0.5592 |
| | Body-Right | 0.259 | 0.0932 | 0.3522 |
| | Body-Left | 0.161 | 0.0932 | 0.2542 |
| | Body-Bottom | 0.311 | 0.0932 | 0.4042 |

| Mode (SAR1+SAR2) | Position | Reported SAR (W/kg) | | ΣSAR < 1.6W/kg |
|---|---|---|---|---|
| | | SAR1 | SAR2 | |
| GSM 850+ WLAN | Left Head Cheek | 0.06 | 0.3986 | 0.4586 |
| | Left Head Tilt | 0.043 | 0.3986 | 0.4416 |
| | Right Head Cheek | 0.056 | 0.3986 | 0.4546 |
| | Right Head Tilt | 0.004 | 0.3986 | 0.4026 |
| | Body-Back-Headset | 0.23 | 0.1993 | 0.4293 |
| GPRS 850 + WLAN (Hotspot) | Body-Back | 0.284 | 0.1993 | 0.4833 |
| | Body-Right | 0.091 | 0.1993 | 0.2903 |
| | Body-Left | 0.127 | 0.1993 | 0.3263 |
| | Body-Bottom | 0.151 | 0.1993 | 0.3503 |
| PCS1900 + WLAN | Left Head Cheek | 0.18 | 0.3986 | 0.5786 |
| | Left Head Tilt | 0.108 | 0.3986 | 0.5066 |
| | Right Head Cheek | 0.161 | 0.3986 | 0.5596 |
| | Right Head Tilt | 0.096 | 0.3986 | 0.4946 |
| | Body-Back-Headset | 0.823 | 0.1993 | 1.0223 |
| GPRS 1900 + WLAN (Hotspot) | Body-Back | 1.131 | 0.1993 | **1.3303** |
| | Body-Right | 0.581 | 0.1993 | 0.7803 |
| | Body-Left | 0.468 | 0.1993 | 0.6673 |
| | Body-Bottom | 0.809 | 0.1993 | 1.0083 |
| WCDMA 850+ WLAN | Left Head Cheek | 0.061 | 0.3986 | 0.4596 |
| | Left Head Tilt | 0.037 | 0.3986 | 0.4356 |
| | Right Head Cheek | 0.051 | 0.3986 | 0.4496 |
| | Right Head Tilt | 0.036 | 0.3986 | 0.4346 |
| WCDMA 850+ WLAN (Hotspot) | Body-Back | 0.143 | 0.1993 | 0.3423 |
| | Body-Right | 0.047 | 0.1993 | 0.2463 |
| | Body-Left | 0.062 | 0.1993 | 0.2613 |
| | Body-Bottom | 0.095 | 0.1993 | 0.2943 |
| WCDMA 1900+ WLAN | Left Head Cheek | 0.177 | 0.3986 | 0.5756 |
| | Left Head Tilt | 0.097 | 0.3986 | 0.4956 |
| | Right Head Cheek | 0.158 | 0.3986 | 0.5566 |
| | Right Head Tilt | 0.084 | 0.3986 | 0.4826 |
| WCDMA 1900+ WLAN (Hotspot) | Body-Back | 0.687 | 0.1993 | 0.8863 |
| | Body-Right | 0.402 | 0.1993 | 0.6013 |
| | Body-Left | 0.284 | 0.1993 | 0.4833 |
| | Body-Bottom | 0.513 | 0.1993 | 0.7123 |
| LTE Band 4 + WLAN | Left Head Cheek | 0.27 | 0.3986 | **0.6686** |
| | Left Head Tilt | 0.143 | 0.3986 | 0.5416 |
| | Right Head Cheek | 0.23 | 0.3986 | 0.6286 |
| | Right Head Tilt | 0.136 | 0.3986 | 0.5346 |
| LTE Band 4 + WLAN (Hotspot) | Body-Back | 0.466 | 0.1993 | 0.6653 |
| | Body-Right | 0.259 | 0.1993 | 0.4583 |
| | Body-Left | 0.161 | 0.1993 | 0.3603 |
| | Body-Bottom | 0.311 | 0.1993 | 0.5103 |

Note: Hotspot mode SAR is only required for the edges within 25mm from the transmitting antenna located.

**Conclusion:**

**Σ SAR < 1.6 W/kg** therefore simultaneous transmission SAR with Volume Scans is **not** required.

# SAR Plots (Summary of the Highest SAR Values)

**Test Laboratory: Bay Area Compliance Labs Corp.(Dongguan)**

**Test Plot 1#:GSM 850 Left-Cheek High Channel**

**DUT: Mobile Phone; Type: Zen MAgnet**

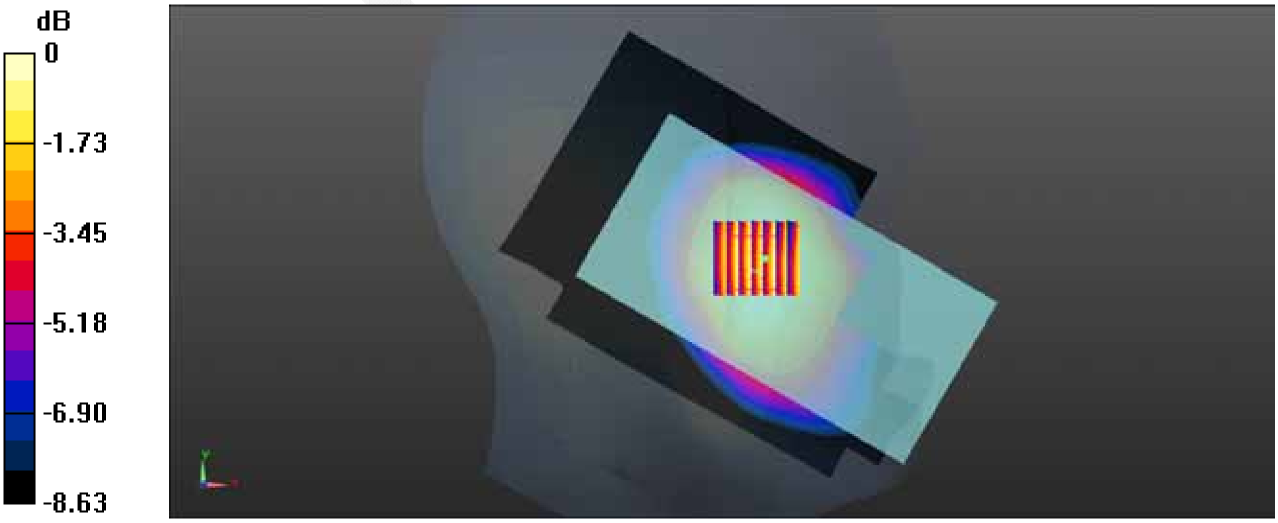
Communication System: Generic GSM; Frequency: 848.8 MHz;Duty Cycle: 1: 8
Medium parameters used: f = 848.8 MHz; $\sigma$ = 0.895 S/m; $\varepsilon_r$ = 42.703; $\rho$ = 1000 kg/$m^3$
Phantom section: Left Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.52, 9.52, 9.52); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

**Head/Left Cheek/Area Scan (81x131x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.0635 W/kg

**Head/Left Cheek/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.351 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 0.0730 W/kg
**SAR(1 g) = 0.060 W/kg; SAR(10 g) = 0.046 W/kg**
Maximum value of SAR (measured) = 0.0624 W/kg




0 dB = 0.0624 W/kg = -12.05 dBW/kg

**Test Laboratory: Bay Area Compliance Labs Corp.(Dongguan)**

**Test Plot 2#:GSM 850 Body-Back High Channel**

**DUT: Mobile Phone; Type: Zen MAgnet**

Communication System: Generic GPRS-4 SLOT; Frequency: 848.8 MHz;Duty Cycle: 1:2
Medium parameters used: f = 848.8 MHz; $\sigma$ = 0.988 S/m; $\varepsilon_r$ = 55.013; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

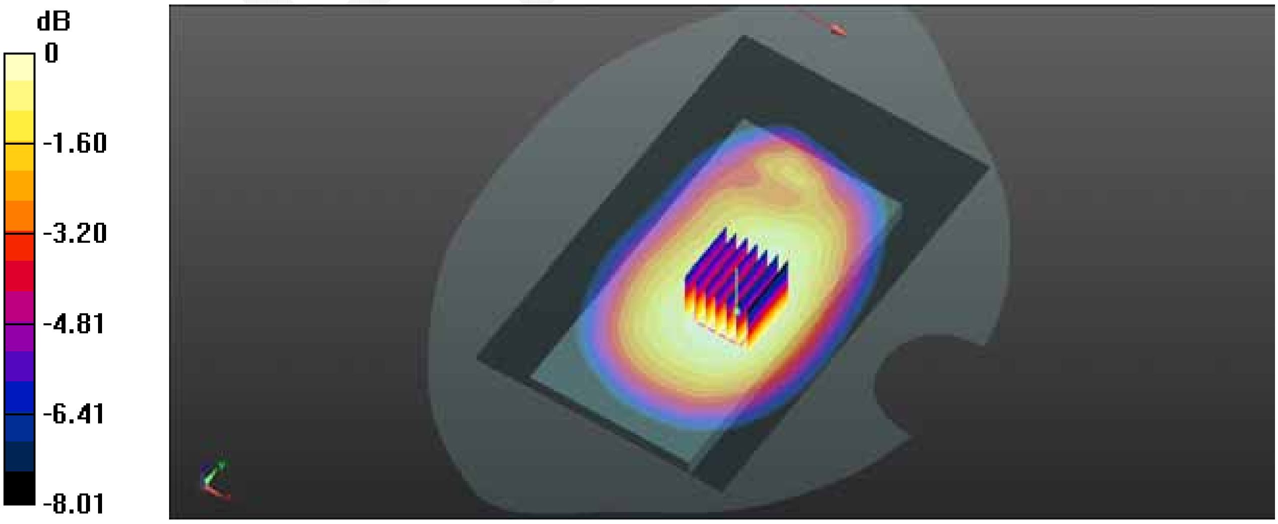
DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.17, 9.17, 9.17); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

**Body/ Back/Area Scan (81x131x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.295 W/kg

**Body/ Back/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.33 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.358 W/kg
**SAR(1 g) = 0.276 W/kg; SAR(10 g) = 0.211 W/kg**
Maximum value of SAR (measured) = 0.290 W/kg






0 dB = 0.290 W/kg = -5.38 dBW/kg

**Test Laboratory: Bay Area Compliance Labs Corp.(Dongguan)**

**Test Plot 3#:GSM 1900Left Cheek Low Channel**

**DUT: Mobile Phone; Type: Zen MAgnet**

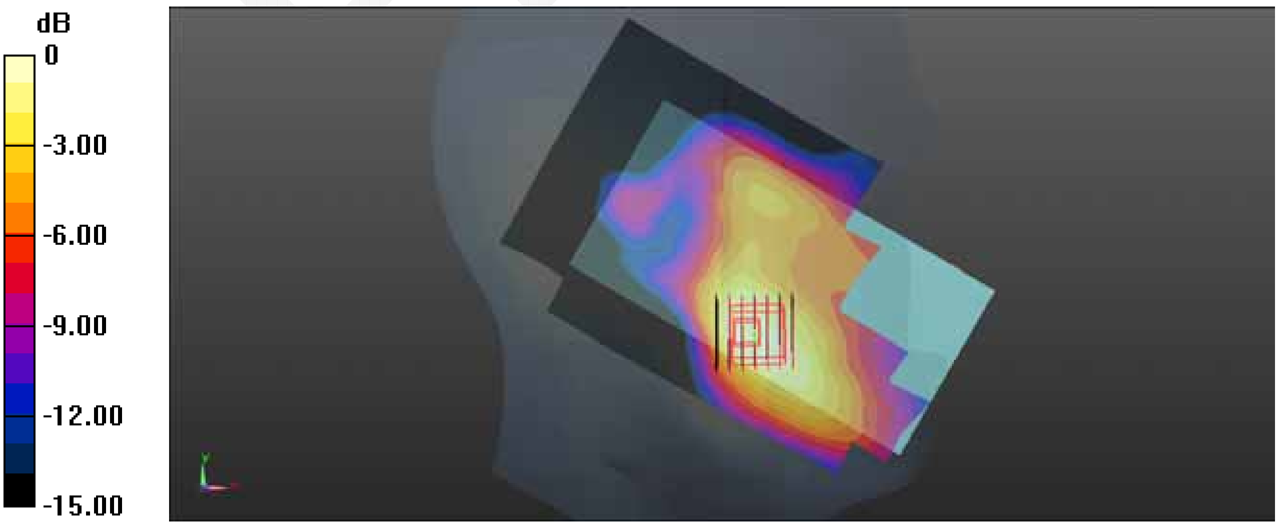
Communication System: Generic GSM; Frequency: 1850.2 MHz;Duty Cycle: 1:8
Medium parameters used: f = 1850.2 MHz; $\sigma$ = 1.359 S/m; $\varepsilon_r$ = 39.853; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

**Head/Left Cheek/Area Scan (81x131x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.151 W/kg

**Head/Left Cheek/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.045 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 0.222 W/kg
**SAR(1 g) = 0.180 W/kg; SAR(10 g) = 0.085 W/kg**
Maximum value of SAR (measured) = 0.149 W/kg




0 dB = 0.149 W/kg = -8.27 dBW/kg

**Test Laboratory: Bay Area Compliance Labs Corp.(Dongguan)**

**Test Plot 4#:PCS 1900 Body-Back Middle Channel**

**DUT: Mobile Phone; Type: Zen MAgnet**

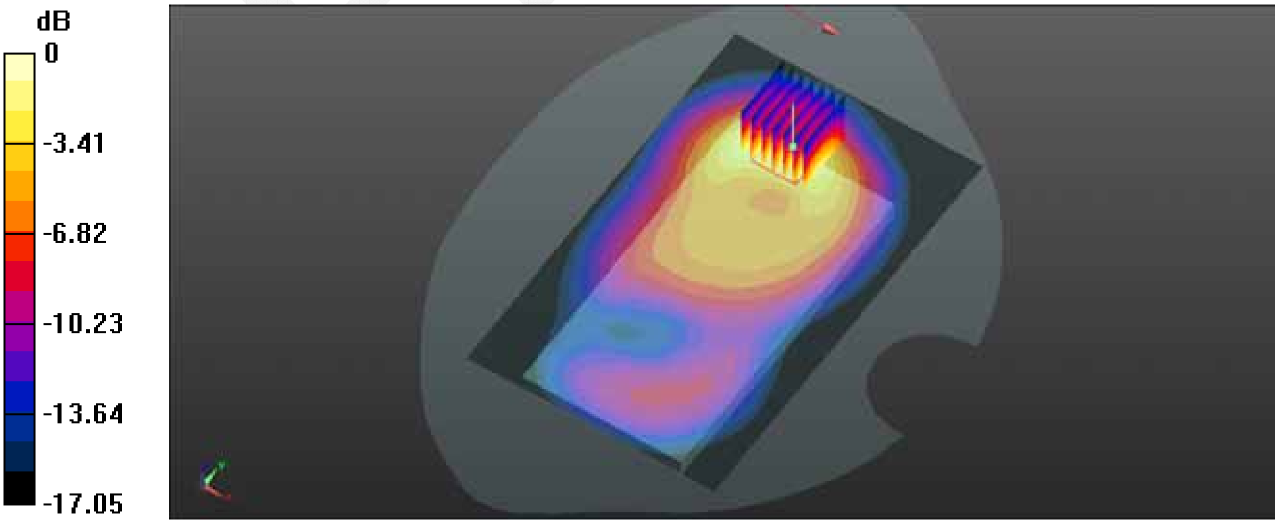
Communication System: Generic GPRS-4 SLOT; Frequency: 1880 MHz;Duty Cycle: 1:2
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.543 S/m; $\varepsilon_r$ = 53.738; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.56, 7.56, 7.56); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

**Body/Back/Area Scan (81x131x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.21 W/kg

**Body/Back/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.77 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.86 W/kg
**SAR(1 g) = 1.09 W/kg; SAR(10 g) = 0.596 W/kg**
Maximum value of SAR (measured) = 1.22 W/kg




0 dB = 1.22 W/kg = 0.86 dBW/kg

**Test Laboratory: Bay Area Compliance Labs Corp.(Dongguan)**

**Test Plot 5#:WCDMA 850 Left-Cheek High Channel**

**DUT: Mobile Phone; Type: Zen MAgnet**

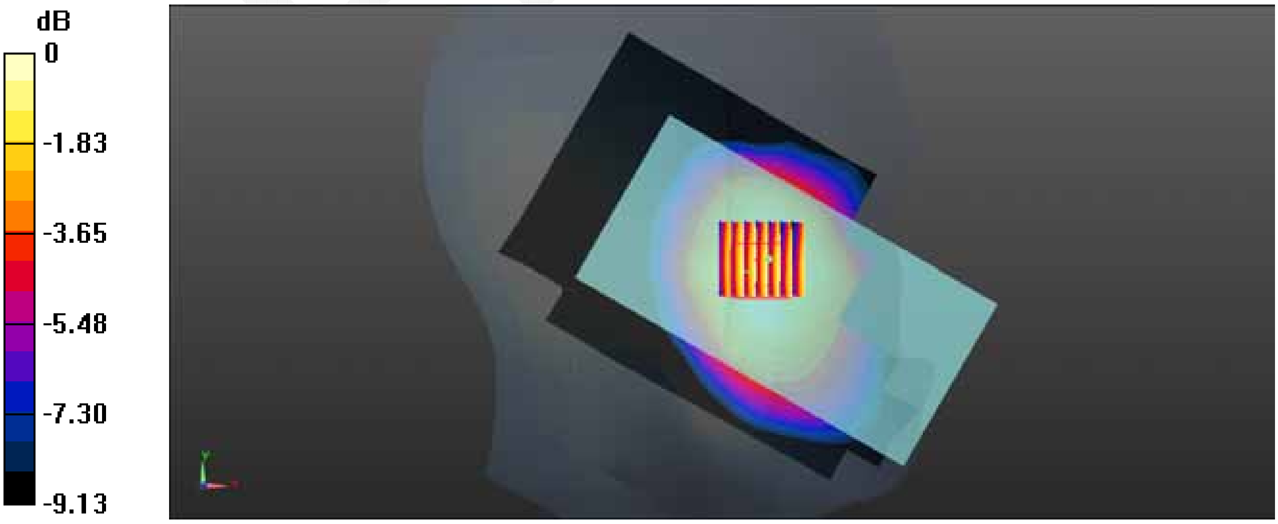
Communication System: BAND V; Frequency: 846.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 846.6 MHz; $\sigma$ = 0.895 S/m; $\varepsilon_r$ = 42.84; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.52, 9.52, 9.52); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

**Head/ Left Cheek/Area Scan (81x131x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.0658 W/kg

**Head/ Left Cheek/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.054 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.0750 W/kg
**SAR(1 g) = 0.061 W/kg; SAR(10 g) = 0.047 W/kg**
Maximum value of SAR (measured) = 0.0638 W/kg




0 dB = 0.0638 W/kg = -11.95 dBW/kg

**Test Laboratory: Bay Area Compliance Labs Corp.(Dongguan)**

**Test Plot 6#:WCDMA 850 Body-Back High Channel**

**DUT: Mobile Phone; Type: Zen MAgnet**

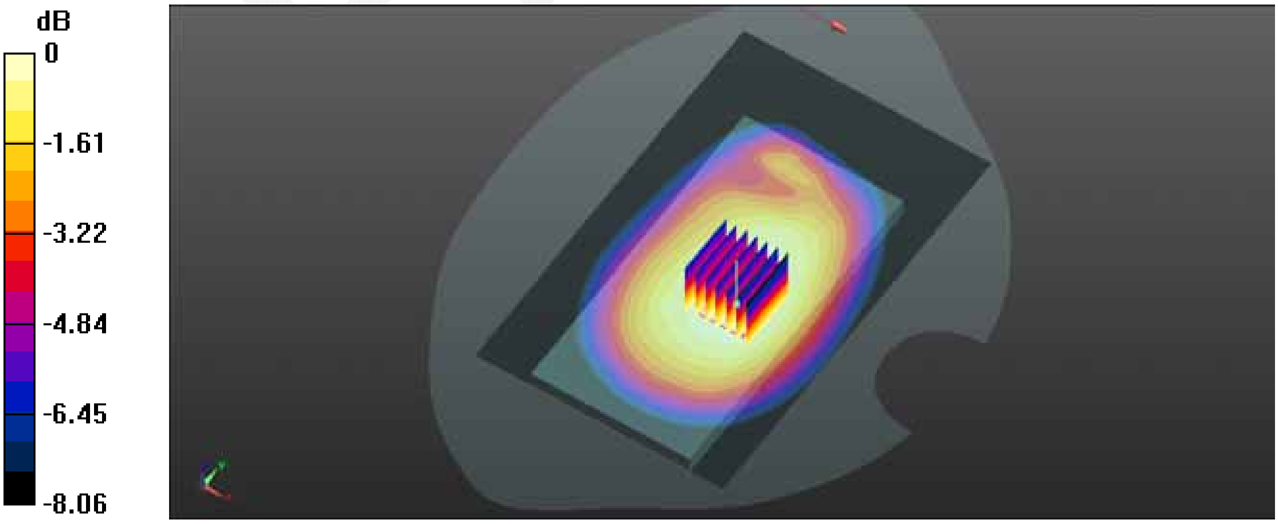
Communication System: BAND V; Frequency: 846.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 846.6 MHz; $\sigma$ = 0.984 S/m; $\varepsilon_r$ = 55.038; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.17, 9.17, 9.17); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

**Body/Back/Area Scan (81x131x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.151 W/kg

**Body/Back/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.24 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.182 W/kg
**SAR(1 g) = 0.143 W/kg; SAR(10 g) = 0.109 W/kg**
Maximum value of SAR (measured) = 0.150 W/kg




0 dB = 0.150 W/kg = -8.24 dBW/kg

**Test Laboratory: Bay Area Compliance Labs Corp.(Dongguan)**

**Test Plot 7#:WCDMA 1900 Left Cheek Middle Channel**

**DUT: Mobile Phone; Type: Zen MAgnet**

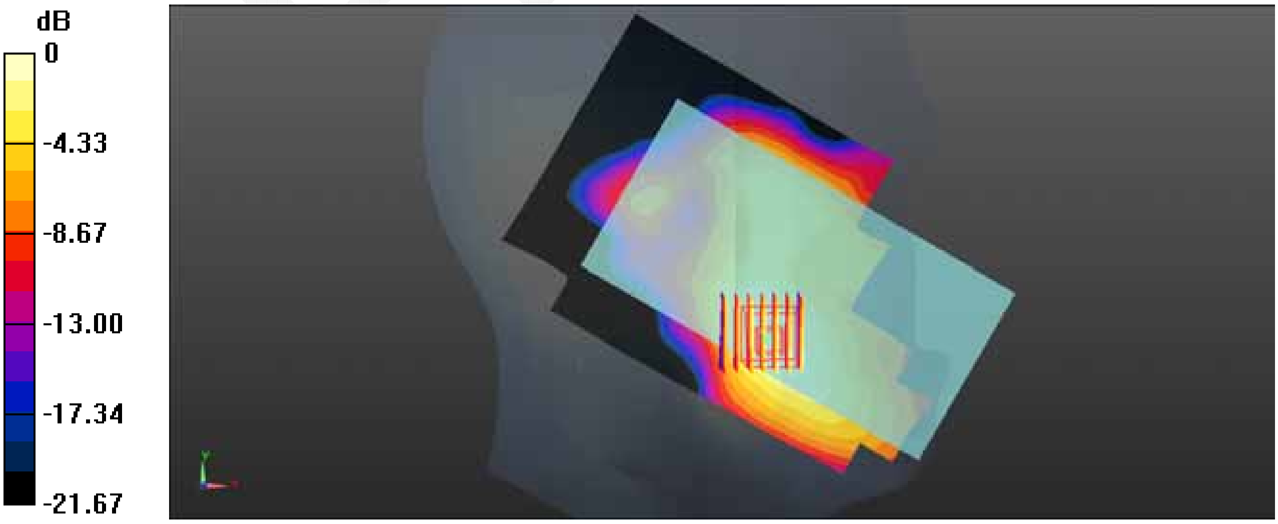
Communication System: BAND II; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.385 S/m; $\varepsilon_r$ = 39.746; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

**Head/Left Cheek/Area Scan (81x131x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.185 W/kg

**Head/Left Cheek/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.740 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.277 W/kg
**SAR(1 g) = 0.173 W/kg; SAR(10 g) = 0.104 W/kg**
Maximum value of SAR (measured) = 0.191 W/kg




0 dB = 0.191 W/kg = -7.19 dBW/kg

**Test Laboratory: Bay Area Compliance Labs Corp.(Dongguan)**

**Test Plot 8#:WCDMA 1900 Body-Back Middle Channel**

**DUT: Mobile Phone; Type: Zen MAgnet**

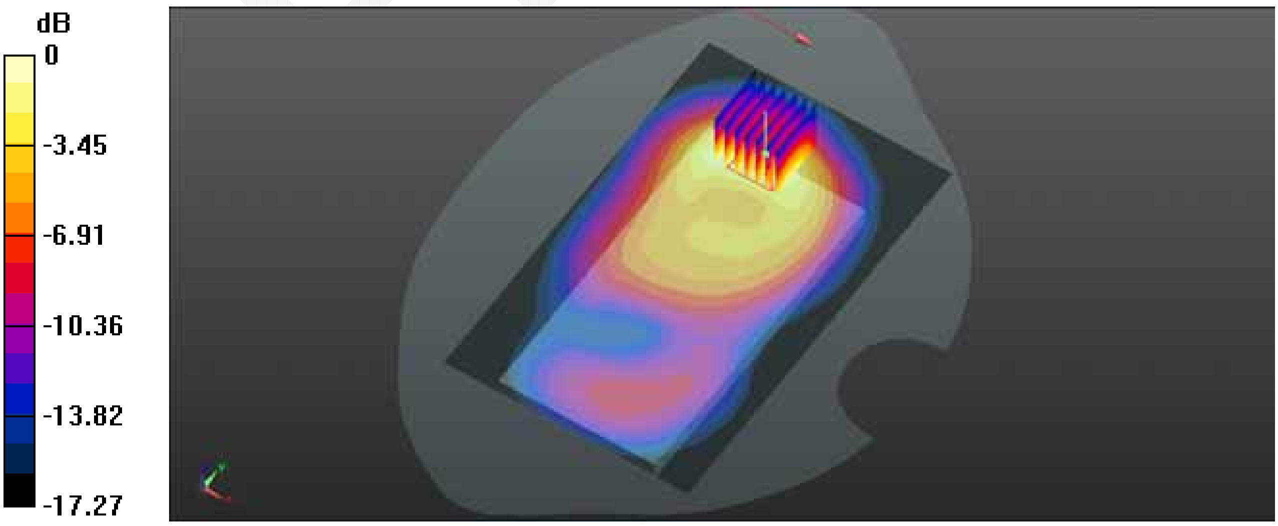
Communication System: BAND II; Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1852.4 MHz; $\sigma$ = 1.479 S/m; $\varepsilon_r$ = 55.244; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.56, 7.56, 7.56); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

**Body/Back/Area Scan (81x131x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.751 W/kg

**Body/Back/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.23 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 1.17 W/kg
**SAR(1 g) = 0.673 W/kg; SAR(10 g) = 0.369 W/kg**
Maximum value of SAR (measured) = 0.753 W/kg




0 dB = 0.753 W/kg = -1.23 dBW/kg

**Test Laboratory: Bay Area Compliance Labs Corp.(Dongguan)**

**Test Plot 9#:LTE Band 4 Left Cheek High Channel**

**DUT: Mobile Phone; Type: Zen MAgnet**

Communication System: Generic LTE; Frequency: 1745 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1745 MHz; $\sigma$ = 1.388 S/m; $\varepsilon_r$ = 40.349; $\rho$ = 1000 kg/$m^3$
Phantom section: Left Section

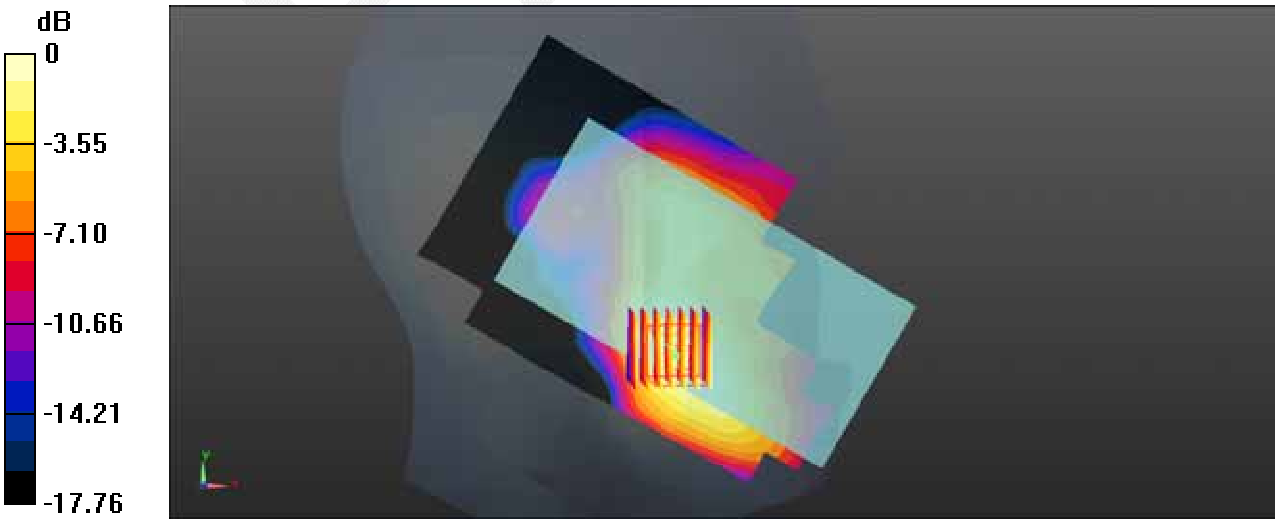
DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(8.12, 8.12, 8.12); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

**Head/Left Cheek/Area Scan (81x131x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.289 W/kg

**Head/Left Cheek/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.974 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 0.378 W/kg
**SAR(1 g) = 0.262 W/kg; SAR(10 g) = 0.171 W/kg**
Maximum value of SAR (measured) = 0.282 W/kg






0 dB = 0.282 W/kg = -5.50 dBW/kg

**Test Laboratory: Bay Area Compliance Labs Corp.(Dongguan)**

**Test Plot 10#:LTE Band 4 Back High Channel**

**DUT: Mobile Phone; Type: Zen MAgnet**

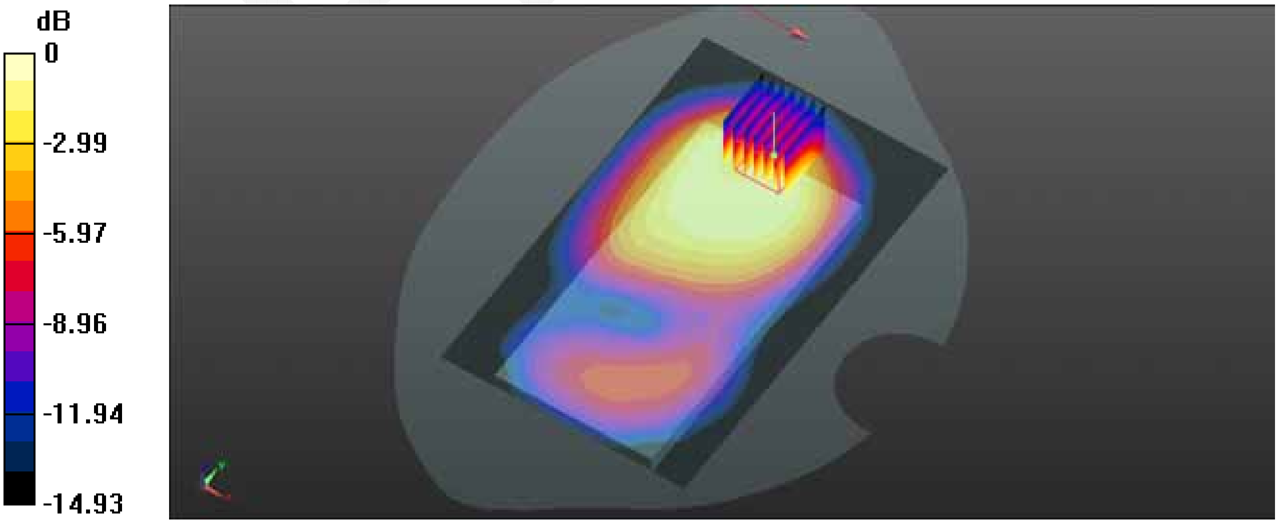
Communication System: Generic LTE; Frequency: 1745MHz;Duty Cycle: 1:1
Medium parameters used: f = 1745 MHz; σ = 1.49 S/m; $\varepsilon_r$ = 53.315; ρ = 1000 kg/$m^3$
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.85, 7.85, 7.85); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

**Body/Back/Area Scan (81x131x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.510 W/kg

**Body/Back/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.29 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.755 W/kg
**SAR(1 g) = 0.452 W/kg; SAR(10 g) = 0.260 W/kg**
Maximum value of SAR (measured) = 0.509 W/kg




0 dB = 0.509 W/kg = -2.93 dBW/kg

# APPENDIX A MEASUREMENT UNCERTAINTY

The uncertainty budget has been determined for the measurement system and is given in the following Table.

**Measurement uncertainty evaluation for IEEE1528-2013 SAR test**

| Source of uncertainty | Tolerance/ uncertainty ± % | Probability distribution | Disisor | ci (1 g) | ci (10 g) | Standard uncertainty ± %, (1 g) | Standard uncertainty ± %, (10 g) |
|---|---|---|---|---|---|---|---|
| **Measurement system** | | | | | | | |
| Probe calibration | 6.55 | N | 1 | 1 | 1 | 6.6 | 6.6 |
| Axial Isotropy | 4.7 | R | √3 | 1 | 1 | 2.7 | 2.7 |
| Hemispherical Isotropy | 9.6 | R | √3 | 0 | 0 | 0.0 | 0.0 |
| Boundary effect | 1.0 | R | √3 | 1 | 1 | 0.6 | 0.6 |
| Linearity | 4.7 | R | √3 | 1 | 1 | 2.7 | 2.7 |
| Detection limits | 1.0 | R | √3 | 1 | 1 | 0.6 | 0.6 |
| Readout electronics | 0.3 | N | 1 | 1 | 1 | 0.3 | 0.3 |
| Response time | 0.0 | R | √3 | 1 | 1 | 0.0 | 0.0 |
| Integration time | 0.0 | R | √3 | 1 | 1 | 0.0 | 0.0 |
| RF ambientconditions – noise | 1.0 | R | √3 | 1 | 1 | 0.6 | 0.6 |
| RF ambient conditions–reflections | 1.0 | R | √3 | 1 | 1 | 0.6 | 0.6 |
| Probe positioner mech. Restrictions | 0.8 | R | √3 | 1 | 1 | 0.5 | 0.5 |
| Probe positioning with respect to phantom shell | 6.7 | R | √3 | 1 | 1 | 3.9 | 3.9 |
| Post-processing | 2.0 | R | √3 | 1 | 1 | 1.2 | 1.2 |
| **Test sample related** | | | | | | | |
| Test sample positioning | 2.8 | N | 1 | 1 | 1 | 2.8 | 2.8 |
| Device holder uncertainty | 6.3 | N | 1 | 1 | 1 | 6.3 | 6.3 |
| Drift of output power | 5.0 | R | √3 | 1 | 1 | 2.9 | 2.9 |
| **Phantom and set-up** | | | | | | | |
| Phantom uncertainty (shape and thickness tolerances) | 4.0 | R | √3 | 1 | 1 | 2.3 | 2.3 |
| Liquid conductivity target) | 5.0 | R | √3 | 0.64 | 0.43 | 1.8 | 1.2 |
| Liquid conductivity meas.) | 2.5 | N | 1 | 0.64 | 0.43 | 1.6 | 1.1 |
| Liquid permittivity target) | 5.0 | R | √3 | 0.6 | 0.49 | 1.7 | 1.4 |
| Liquid permittivity meas.) | 2.5 | N | 1 | 0.6 | 0.49 | 1.5 | 1.2 |
| Combined standard uncertainty | | RSS | | | | 12.2 | 12.0 |
| Expanded uncertainty 95 % confidence interval) | | | | | | 24.3 | 23.9 |

**Measurement uncertainty evaluation for IEC62209-2 SAR test**

| Source of uncertainty | Tolerance/ uncertainty ± % | Probability distribution | Disisor | ci (1 g) | ci (10 g) | Standard uncertainty ± %, (1 g) | Standard uncertainty ± %, (10 g) |
|---|---|---|---|---|---|---|---|
| **Measurement system** | | | | | | | |
| Probe calibration | 6.55 | N | 1 | 1 | 1 | 6.6 | 6.6 |
| Axial Isotropy | 4.7 | R | √3 | 1 | 1 | 2.7 | 2.7 |
| Hemispherical Isotropy | 9.6 | R | √3 | 0 | 0 | 0.0 | 0.0 |
| Linearity | 4.7 | R | √3 | 1 | 1 | 2.7 | 2.7 |
| Modulation Response | 0.0 | R | √3 | 1 | 1 | 0.0 | 0.0 |
| Detection limits | 1.0 | R | √3 | 1 | 1 | 0.6 | 0.6 |
| Boundary effect | 1.0 | R | √3 | 1 | 1 | 0.6 | 0.6 |
| Readout electronics | 0.3 | N | 1 | 1 | 1 | 0.3 | 0.3 |
| Response time | 0.0 | R | √3 | 1 | 1 | 0.0 | 0.0 |
| Integration time | 0.0 | R | √3 | 1 | 1 | 0.0 | 0.0 |
| RF ambientconditions – noise | 1.0 | R | √3 | 1 | 1 | 0.6 | 0.6 |
| RF ambient conditions–reflections | 1.0 | R | √3 | 1 | 1 | 0.6 | 0.6 |
| Probe positioner mech. Restrictions | 0.8 | R | √3 | 1 | 1 | 0.5 | 0.5 |
| Probe positioning with respect to phantom shell | 6.7 | R | √3 | 1 | 1 | 3.9 | 3.9 |
| Post-processing | 2.0 | R | √3 | 1 | 1 | 1.2 | 1.2 |
| **Test sample related** | | | | | | | |
| Device holder Uncertainty | 6.3 | N | 1 | 1 | 1 | 6.3 | 6.3 |
| Test sample positioning | 2.8 | N | 1 | 1 | 1 | 2.8 | 2.8 |
| Power scaling | 4.5 | R | √3 | 1 | 1 | 2.6 | 2.6 |
| Drift of output power | 5.0 | R | √3 | 1 | 1 | 2.9 | 2.9 |
| **Phantom and set-up** | | | | | | | |
| Phantom uncertainty (shape and thickness tolerances) | 4.0 | R | √3 | 1 | 1 | 2.3 | 2.3 |
| Algorithm for correcting SAR for deviations in permittivity and conductivity | 1.9 | N | 1 | 1 | 0.84 | 1.1 | 0.9 |
| Liquid conductivity (meas.) | 2.5 | N | 1 | 0.64 | 0.43 | 1.6 | 1.1 |
| Liquid permittivity (meas.) | 2.5 | N | 1 | 0.6 | 0.49 | 1.5 | 1.2 |
| Temp. unc. - Conductivity | 1.7 | R | √3 | 0.78 | 0.71 | 0.8 | 0.7 |
| Temp. unc. - Permittivity | 0.3 | R | √3 | 0.23 | 0.26 | 0.0 | 0.0 |
| Combined standard uncertainty | | RSS | | | | 12.2 | 12.1 |
| Expanded uncertainty 95 % confidence interval) | | | | | | 24.5 | 24.2 |

# APPENDIX B – PROBE CALIBRATION CERTIFICATES

**Calibration Laboratory of**
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **BACL China (Vitec)** Certificate No: **EX3-7329_Feb15**

## CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | EX3DV4 - SN:7329 |
| Calibration procedure(s) | QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6<br>Calibration procedure for dosimetric E-field probes |
| Calibration date: | February 5, 2015 |

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter E4419B | GB41293874 | 03-Apr-14 (No. 217-01911) | Apr-15 |
| Power sensor E4412A | MY41498087 | 03-Apr-14 (No. 217-01911) | Apr-15 |
| Reference 3 dB Attenuator | SN: S5054 (3c) | 03-Apr-14 (No. 217-01915) | Apr-15 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 03-Apr-14 (No. 217-01919) | Apr-15 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 03-Apr-14 (No. 217-01920) | Apr-15 |
| Reference Probe ES3DV2 | SN: 3013 | 30-Dec-14 (No. ES3-3013_Dec14) | Dec-15 |
| DAE4 | SN: 660 | 14-Jan-15 (No. DAE4-660_Jan15) | Jan-16 |
| | | | |
| Secondary Standards | ID | Check Date (in house) | Scheduled Check |
| RF generator HP 8648C | US3642U01700 | 4-Aug-99 (in house check Apr-13) | In house check: Apr-16 |
| Network Analyzer HP 8753E | US37390585 | 18-Oct-01 (in house check Oct-14) | In house check: Oct-15 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Claudio Leubler | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: February 9, 2015

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

Certificate No: EX3-7329_Feb15 Page 1 of 11

**Calibration Laboratory of**
Schmid & Partner
Engineering AG
**Zeughausstrasse 43, 8004 Zurich, Switzerland**

**S** Schweizerischer Kalibrierdienst
**C** Service suisse d'étalonnage
Servizio svizzero di taratura
**S** Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

**Accreditation No.: SCS 0108**

## Glossary:

| | |
|---|---|
| TSL | tissue simulating liquid |
| NORMx,y,z | sensitivity in free space |
| ConvF | sensitivity in TSL / NORMx,y,z |
| DCP | diode compression point |
| CF | crest factor (1/duty_cycle) of the RF signal |
| A, B, C, D | modulation dependent linearization parameters |
| Polarization φ | φ rotation around probe axis |
| Polarization ϑ | ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis |
| Connector Angle | information used in DASY system to align probe sensor X to the robot coordinate system |

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

## Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the $E^2$-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Certificate No: EX3-7329_Feb15 Page 2 of 11

# Probe EX3DV4

## SN:7329

Manufactured: December 11, 2014
Calibrated: February 5, 2015

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

EX3DV4– SN:7329 February 5, 2015

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:7329

## Basic Calibration Parameters

| | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|---|---|---|---|---|
| Norm ($\mu V/(V/m)^2$)[A] | 0.48 | 0.43 | 0.46 | ± 10.1 % |
| DCP (mV)[B] | 96.7 | 97.6 | 94.2 | |

## Modulation Calibration Parameters

| UID | Communication System Name | | A dB | B dB√μV | C | D dB | VR mV | Unc[E] (k=2) |
|---|---|---|---|---|---|---|---|---|
| 0 | CW | X | 0.0 | 0.0 | 1.0 | 0.00 | 137.9 | ±3.0 % |
| | | Y | 0.0 | 0.0 | 1.0 | | 147.0 | |
| | | Z | 0.0 | 0.0 | 1.0 | | 150.5 | |

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

[A] The uncertainties of NormX,Y,Z do not affect the $E^2$-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Certificate No: EX3-7329_Feb15 Page 4 of 11

EX3DV4– SN:7329 February 5, 2015

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:7329

## Calibration Parameter Determined in Head Tissue Simulating Media

| f (MHz) [C] | Relative Permittivity [F] | Conductivity (S/m) [F] | ConvF X | ConvF Y | ConvF Z | Alpha [G] | Depth [G] (mm) | Unct. (k=2) |
|---|---|---|---|---|---|---|---|---|
| 900 | 41.5 | 0.97 | 9.52 | 9.52 | 9.52 | 0.40 | 0.86 | ± 12.0 % |
| 1750 | 40.1 | 1.37 | 8.12 | 8.12 | 8.12 | 0.29 | 0.90 | ± 12.0 % |
| 1900 | 40.0 | 1.40 | 7.88 | 7.88 | 7.88 | 0.68 | 0.61 | ± 12.0 % |
| 2450 | 39.2 | 1.80 | 7.06 | 7.06 | 7.06 | 0.33 | 0.84 | ± 12.0 % |

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

Certificate No: EX3-7329_Feb15 Page 5 of 11

EX3DV4– SN:7329 February 5, 2015

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:7329

## Calibration Parameter Determined in Body Tissue Simulating Media

| f (MHz) [C] | Relative Permittivity [F] | Conductivity (S/m) [F] | ConvF X | ConvF Y | ConvF Z | Alpha [G] | Depth [G] (mm) | Unct. (k=2) |
|---|---|---|---|---|---|---|---|---|
| 900 | 55.0 | 1.05 | 9.17 | 9.17 | 9.17 | 0.41 | 0.90 | ± 12.0 % |
| 1750 | 53.4 | 1.49 | 7.85 | 7.85 | 7.85 | 0.70 | 0.64 | ± 12.0 % |
| 1900 | 53.3 | 1.52 | 7.56 | 7.56 | 7.56 | 0.56 | 0.70 | ± 12.0 % |
| 2450 | 52.7 | 1.95 | 7.20 | 7.20 | 7.20 | 0.78 | 0.59 | ± 12.0 % |

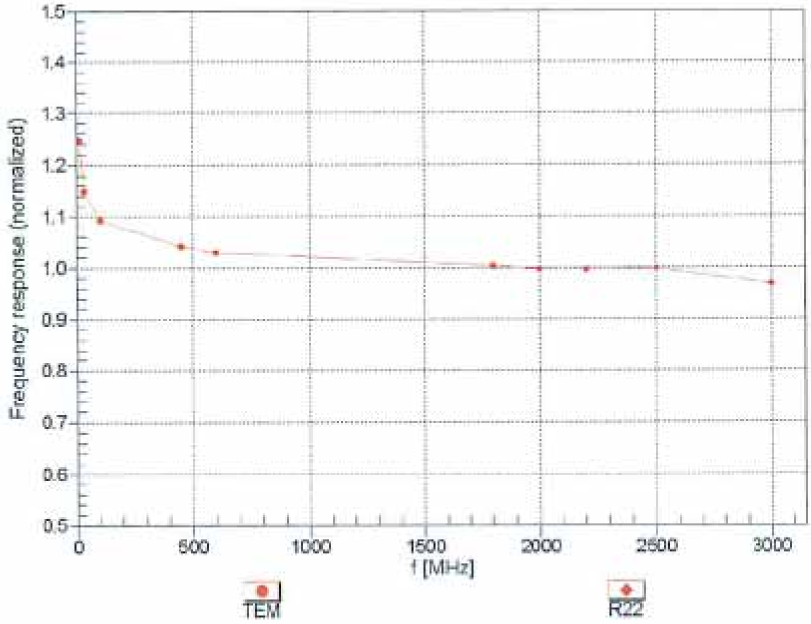
[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.
[F] At frequencies below 3 GHz, the validity of tissue parameters ($\varepsilon$ and $\sigma$) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ($\varepsilon$ and $\sigma$) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

Certificate No: EX3-7329_Feb15 Page 6 of 11

EX3DV4– SN:7329 February 5, 2015

# Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)



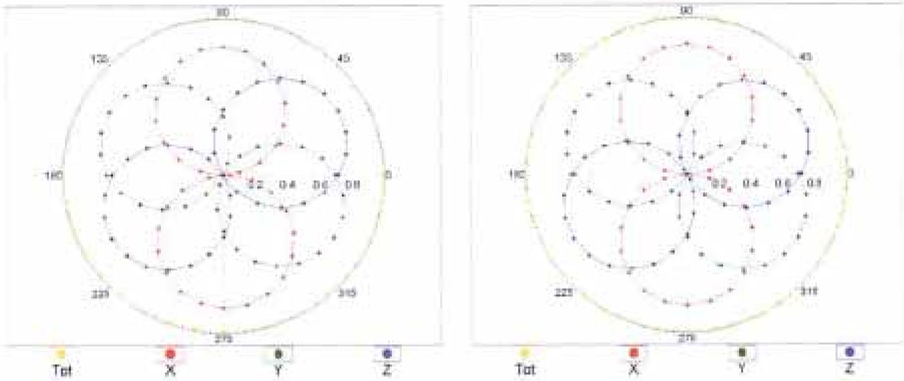

**Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)**

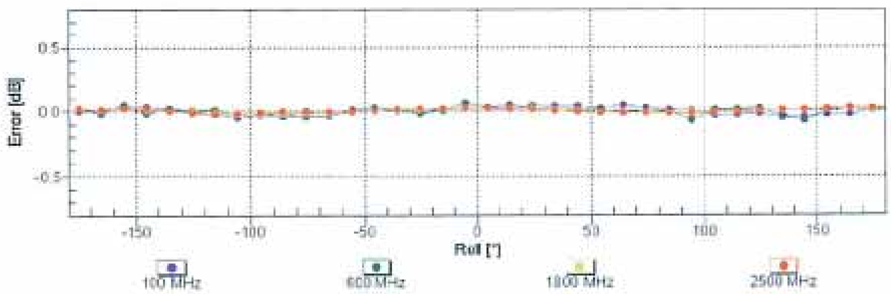
Certificate No: EX3-7329_Feb15 Page 7 of 11

EX3DV4– SN:7329 February 5, 2015

## Receiving Pattern (ϕ), $\vartheta = 0°$

f=600 MHz,TEM f=1800 MHz,R22



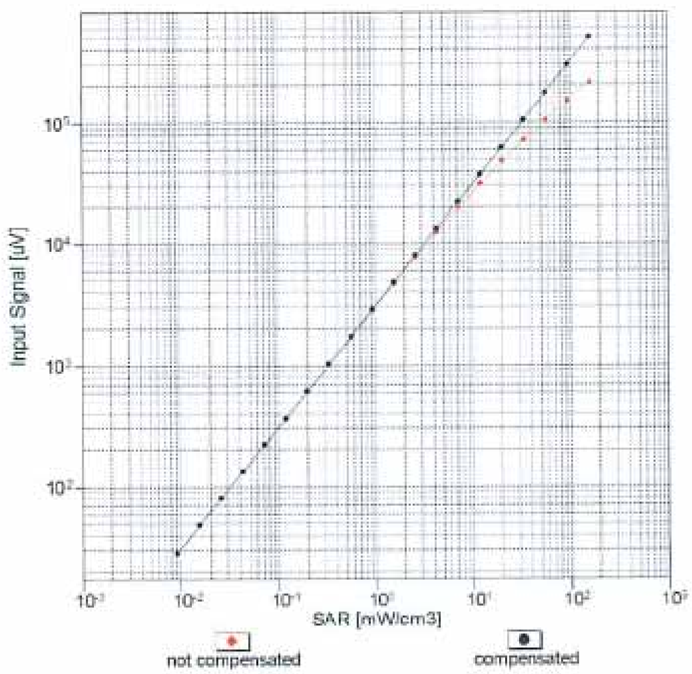



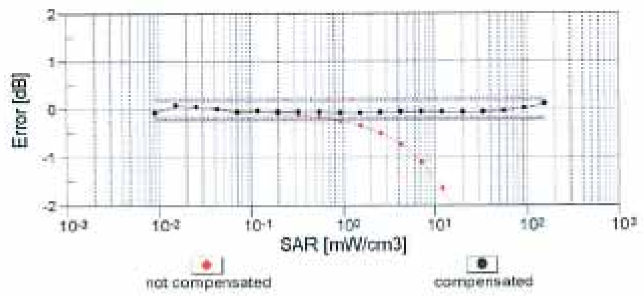

**Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)**

EX3DV4– SN:7329 February 5, 2015

# Dynamic Range f(SAR$_{head}$)

**(TEM cell , f$_{eval}$= 1900 MHz)**



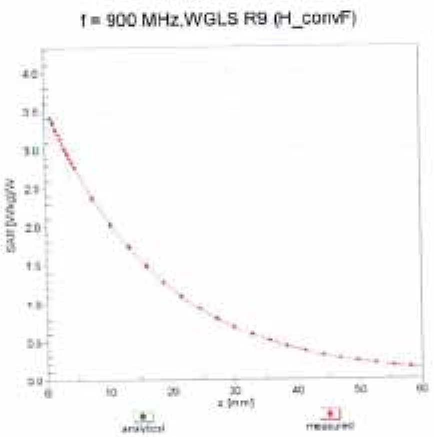

**Uncertainty of Linearity Assessment: ± 0.6% (k=2)**

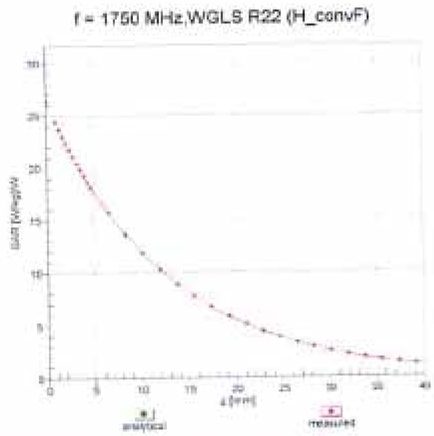
Certificate No: EX3-7329_Feb15 Page 9 of 11

EX3DV4– SN:7329

February 5, 2015

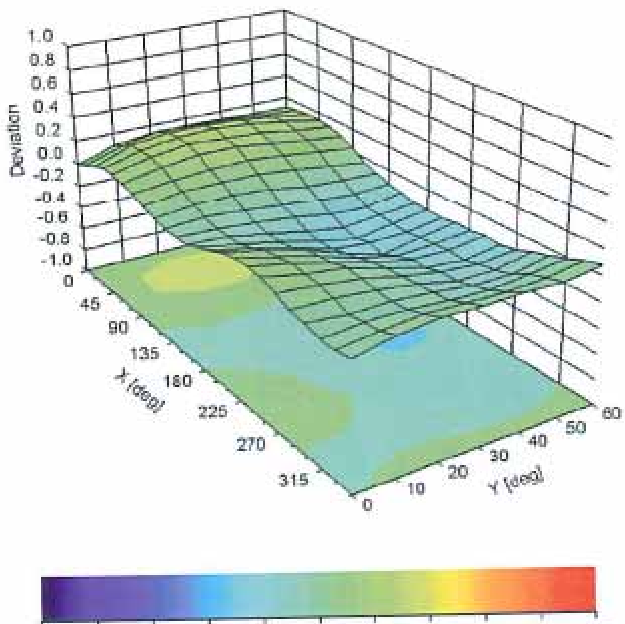
# Conversion Factor Assessment




# Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz




Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Certificate No: EX3-7329_Feb15 Page 10 of 11

EX3DV4– SN:7329 February 5, 2015

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:7329

## Other Probe Parameters

| | |
|---|---|
| Sensor Arrangement | Triangular |
| Connector Angle (°) | 24.5 |
| Mechanical Surface Detection Mode | enabled |
| Optical Surface Detection Mode | disabled |
| Probe Overall Length | 337 mm |
| Probe Body Diameter | 10 mm |
| Tip Length | 9 mm |
| Tip Diameter | 2.5 mm |
| Probe Tip to Sensor X Calibration Point | 1 mm |
| Probe Tip to Sensor Y Calibration Point | 1 mm |
| Probe Tip to Sensor Z Calibration Point | 1 mm |
| Recommended Measurement Distance from Surface | 1.4 mm |

Certificate No: EX3-7329_Feb15 Page 11 of 11

# APPENDIX C DIPOLE CALIBRATION CERTIFICATES

## NCL CALIBRATION LABORATORIES

Calibration File No: DC-1599
Project Number: BAC-dipole-cal-5779

# CERTIFICATE OF CALIBRATION

It is certified that the equipment identified below has been calibrated in the **NCL CALIBRATION LABORATORIES** by qualified personnel following recognized procedures and using transfer standards traceable to NRC/NIST.

Validation Dipole(Head and Body)

Manufacturer: APREL Laboratories
Part number: ALS-D-835-S-2
Frequency: 835 MHz
Serial No: 180-00558

Customer: Bay Area Compliance Laboratory (China)

Calibrated: 8th October 2014
Released on: 8th October 2014

This Calibration Certificate is Incomplete Unless Accompanied with the Calibration Results Summary

Released By: 

Art Brennan, Quality Manager

NCL CALIBRATION LABORATORIES

Suite 102, 303 Terry Fox Dr.
Kanata, ONTARIO
CANADA K2K 3J1

Division of APREL Lab.
TEL: (613) 435-8300
FAX: (613)435-8306

**NCL Calibration Laboratories**

Division of APREL Laboratories.

## Conditions

Dipole 180-00558 was received with a damaged connection for a re-calibration.

**Ambient Temperature of the Laboratory:** 22 °C +/- 0.5°C
**Temperature of the Tissue:** 21 °C +/- 0.5°C

### Attestation

The below named signatories have conducted the calibration and review of the data which is presented in this calibration report.

**We the undersigned attest that to the best of our knowledge the calibration of this subject has been accurately conducted and that all information contained within the results pages have been reviewed for accuracy.**

**Art Brennan, Quality Manager**

**Maryna Nesterova Calibration Engineer**

**Primary Measurement Standards**

| Instrument | Serial Number | Cal due date |
|---|---|---|
| Tektronix USB Power Meter | 11C940 | May 14, 2015 |
| Network Analyzer Anritsu 37347C | 002106 | Feb. 20, 2015 |

This page has been reviewed for content and attested to by signature within this document.

**NCL Calibration Laboratories**
Division of APREL Laboratories.

## Calibration Results Summary

The following results relate the Calibrated Dipole and should be used as a quick reference for the user.

### Mechanical Dimensions

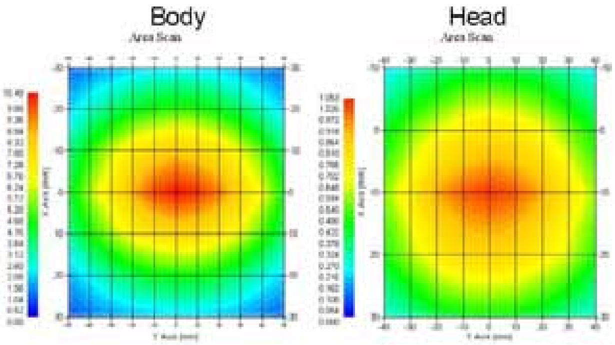
**Length:** 162.2 mm
**Height:** 89.4 mm

### Electrical Specification

| Tissue | Frequency | SWR: | Return Loss | Impedance |
|---|---|---|---|---|
| Head | 835 MHz | 1.066 U | -30.344 dB | 49.001 Ω |
| Body | 835 MHz | 1.089 U | -28.118 dB | 53.117 Ω |

### System Validation Results

| Tissue | Frequency | 1 Gram | 10 Gram | Peak |
|---|---|---|---|---|
| Head | 835 MHz | 9.773 | 6.174 | 14.713 |
| Body | 835 MHz | 9.736 | 6.297 | 14.513 |

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**NCL Calibration Laboratories**
Division of APREL Laboratories.

## Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 180-00558. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-020 30 MHz to 6 GHz E-Field Probe Serial Number 225.

## References

- IEC-62209 "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures"
- Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 30 MHz to 6 GHz)"
- TP-D01-032-E020-V2 E-Field probe calibration procedure
- D22-012-Tissue dielectric tissue calibration procedure
- D28-002-Dipole procedure for validation of SAR system using a dipole
- IEEE 1309 Draft Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9kHz to 40GHz

## Conditions

Dipole 180-00558 was repaired prior to this calibration. The repair reliability depends upon correct usage of the dipole.

| | |
|---|---|
| **Ambient Temperature of the Laboratory:** | 22 °C +/- 0.5°C |
| **Temperature of the Tissue:** | 20 °C +/- 0.5°C |

### Dipole Calibration uncertainty

The calibration uncertainty for the dipole is made up of various parameters presented below.

| | |
|---|---|
| **Mechanical** | 1% |
| **Positioning Error** | 1.22% |
| **Electrical** | 1.7% |
| **Tissue** | 2.2% |
| **Dipole Validation** | 2.2% |
| **TOTAL** | **8.32% (16.64% K=2)** |

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**NCL Calibration Laboratories**
Division of APREL Laboratories.

## Dipole Calibration Results

### Mechanical Verification

| APREL Length | APREL Height | Measured Length | Measured Height |
|---|---|---|---|
| 161.0 mm | 89.8 mm | 162.2 mm | 89.4 mm |

### Electrical Verification

| Tissue Type | Return Loss: | SWR: | Impedance: |
|---|---|---|---|
| Head | -30.344 dB | 1.066 U | 49.001 Ω |
| Body | -28.118 dB | 1.089 U | 53.117 Ω □ |

### Tissue Validation

| | Dielectric constant, $\varepsilon_r$ | Conductivity, σ [S/m] |
|---|---|---|
| **Head Tissue 835MHz** | 43.42 | 0.94 |
| **Body Tissue 835MHz** | 55.77 | 1.01 |

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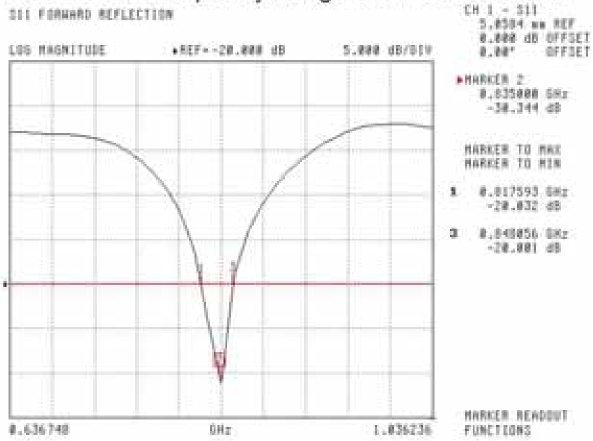
**NCL Calibration Laboratories**
Division of APREL Laboratories.

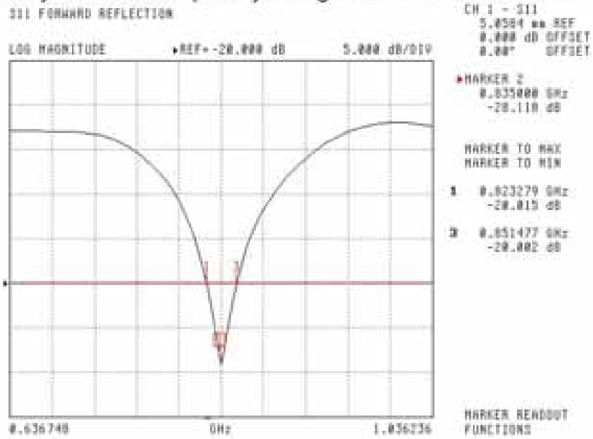
The Following Graphs are the results as displayed on the Vector Network Analyzer.

**S11 Parameter Return Loss**

Head Tissue: Frequency Range 0.817 to 0.848 GHz




Body Tissue: Frequency Range 0.823 to 0.851 GHz

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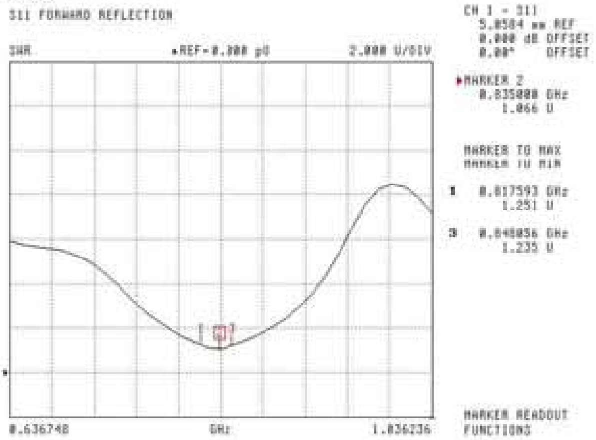
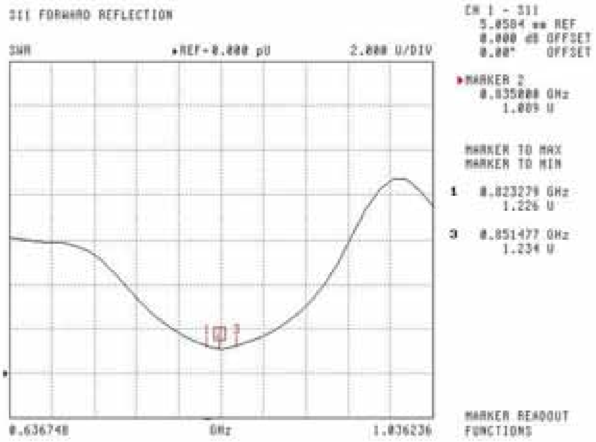
**SWR**

Head




Body

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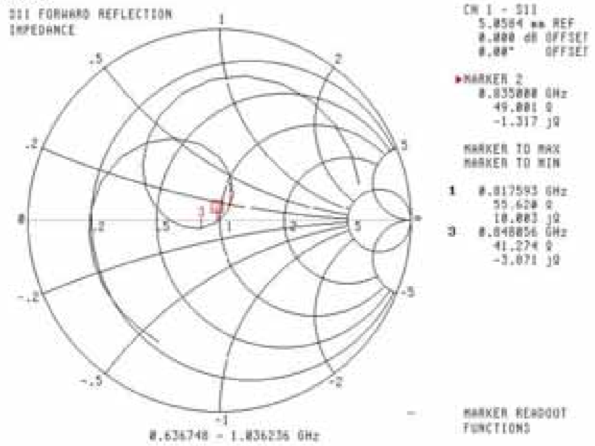
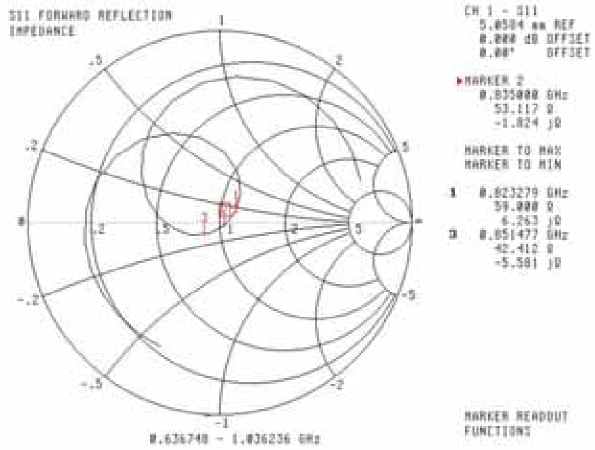
Division of APREL Laboratories.

## Smith Chart Dipole Impedance

Head




Body

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**NCL Calibration Laboratories**

Division of APREL Laboratories.

## Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List 2014.

## NCL CALIBRATION LABORATORIES

Calibration File No: DC-1601
Project Number: BAC-dipole –cal-5779

# CERTIFICATE OF CALIBRATION

It is certified that the equipment identified below has been calibrated in the **NCL CALIBRATION LABORATORIES** by qualified personnel following recognized procedures and using transfer standards traceable to NRC/NIST.

Validation Dipole (Head & Body)

Manufacturer: APREL Laboratories
Part number: ALS-D-1900-S-2
Frequency: 1900 MHz
Serial No: 210-00710

Customer: Bay Area Compliance Laboratory (China)

Calibrated: 9th October, 2014
Released on: 9th October, 2014

This Calibration Certificate is Incomplete Unless Accompanied with the Calibration Results Summary

Released By: ____________________

Art Brennan, Quality Manager

**NCL** CALIBRATION LABORATORIES

Suite 102, 303 Terry Fox Dr.
Kanata, ONTARIO
CANADA K2K 3J1

Division of APREL Lab.
TEL: (613) 435-8300
FAX: (613)435-8306

**NCL Calibration Laboratories**
Division of APREL Laboratories.

## Conditions

Dipole 210-00710 was received in good condition and was a re-calibration.

**Ambient Temperature of the Laboratory:** 22 °C +/- 0.5°C
**Temperature of the Tissue:** 21 °C +/- 0.5°C

### Attestation

The below named signatories have conducted the calibration and review of the data which is presented in this calibration report.

**We the undersigned attest that to the best of our knowledge the calibration of this subject has been accurately conducted and that all information contained within the results pages have been reviewed for accuracy.**

Art Brennan, Quality Manager

Maryna Nesterova Calibration Engineer

**Primary Measurement Standards**

| Instrument | Serial Number | Cal due date |
|---|---|---|
| Tektronix USB Power Meter | 11C940 | May 14, 2015 |
| Network Analyzer Anritsu 37347C | 002106 | Feb. 20, 2015 |

This page has been reviewed for content and attested to by signature within this document.

**NCL Calibration Laboratories**

Division of APREL Laboratories.

## Calibration Results Summary

The following results relate the Calibrated Dipole and should be used as a quick reference for the user.

### Mechanical Dimensions

**Length:** 67.1 mm
**Height:** 38.9 mm

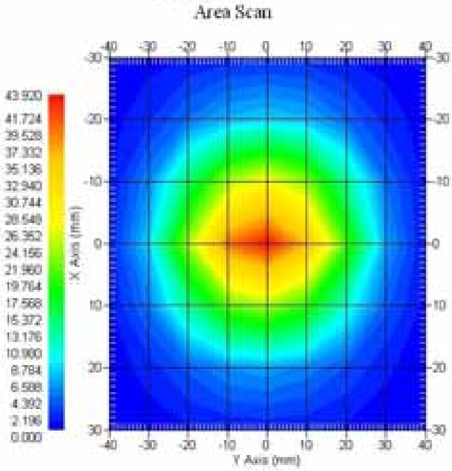
### Electrical Specification

| Tissue | Frequency | SWR: | Return Loss | Impedance |
|---|---|---|---|---|
| Head | 1900MHz | 1.084 U | -27.92 dB | 52.247 Ω |
| Body | 1900MHz | 1.128 U | -24.40 dB | 52.618 Ω |

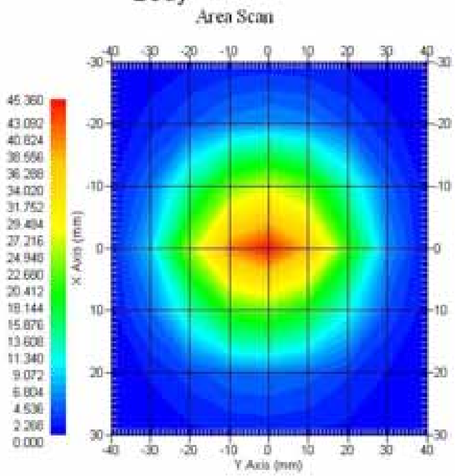
### System Validation Results

| Tissue | Frequency | 1 Gram | 10 Gram | Peak |
|---|---|---|---|---|
| Head | 1900 MHz | 39.481 | 20.44 | 73.364 |
| Body | 1900 MHz | 39.715 | 20.552 | 73.565 |

Head




Body

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**NCL Calibration Laboratories**
Division of APREL Laboratories.

## Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 210-00710. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-020 30 MHz to 6 GHz E-Field Probe Serial Number 225.

## References

- IEC-62209 "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures"
- Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 30 MHz to 6 GHz)"
- TP-D01-032-E020-V2 E-Field probe calibration procedure
- D22-012-Tissue dielectric tissue calibration procedure
- D28-002-Dipole procedure for validation of SAR system using a dipole
- IEEE 1309 Draft Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9kHz to 40GHz

## Conditions

Dipole 210-00710 was a recalibration.

| | |
|---|---|
| **Ambient Temperature of the Laboratory:** | 22 °C +/- 0.5°C |
| **Temperature of the Tissue:** | 20 °C +/- 0.5°C |

### Dipole Calibration uncertainty

The calibration uncertainty for the dipole is made up of various parameters presented below.

| | |
|---|---|
| **Mechanical** | 1% |
| **Positioning Error** | 1.22% |
| **Electrical** | 1.7% |
| **Tissue** | 2.2% |
| **Dipole Validation** | 2.2% |
| **TOTAL** | **8.32% (16.64% K=2)** |

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NCL Calibration Laboratories
Division of APREL Laboratories.

## Dipole Calibration Results

### Mechanical Verification

| APREL Length | APREL Height | Measured Length | Measured Height |
|---|---|---|---|
| 68.0 mm | 39.5 mm | 67.1mm | 38.9 mm |

### Electrical Validation

| Tissue | Frequency | SWR: | Return Loss | Impedance |
|---|---|---|---|---|
| Head | 1900MHz | 1.084 U | -27.92 dB | 52.247 Ω |
| Body | 1900MHz | 1.128 U | -24.40 dB | 52.618 Ω |

### Tissue Validation

| | Dielectric constant, $\varepsilon_r$ | Conductivity, $\sigma$ [S/m] |
|---|---|---|
| **Head Tissue 1900MHz** | 40.20 | 1.38 |
| **Body Tissue 1900MHz** | 52.63 | 1.46 |

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This page has been reviewed for content and attested to by signature within this document.

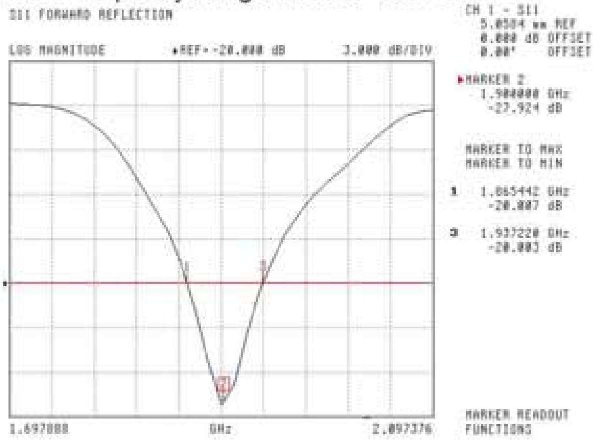
**NCL Calibration Laboratories**

Division of APREL Laboratories.

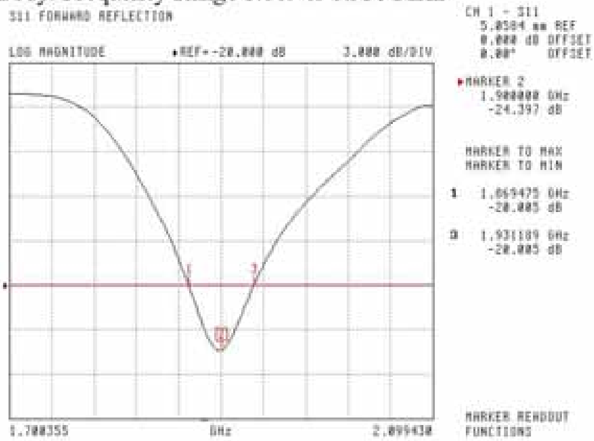
The Following Graphs are the results as displayed on the Vector Network Analyzer.

**S11 Parameter Return Loss**

Head: Frequency Range 1.865 to 1.937 GHz




Body: Frequency Range 1.869 to 1.931 MHz

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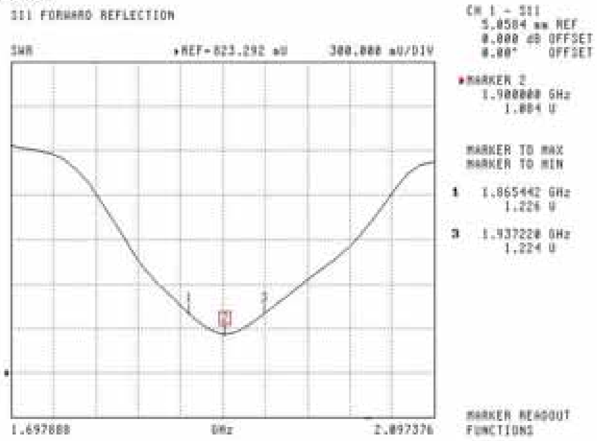
**NCL Calibration Laboratories**

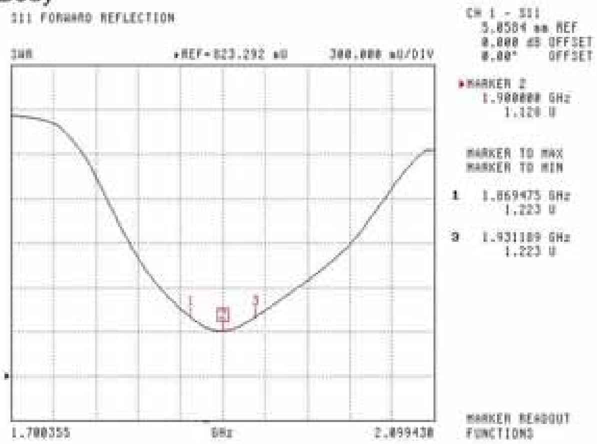
Division of APREL Laboratories.

## SWR

### Head




### Body

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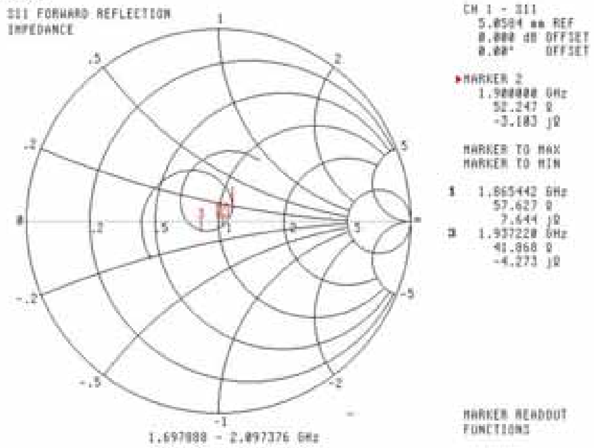
**NCL Calibration Laboratories**

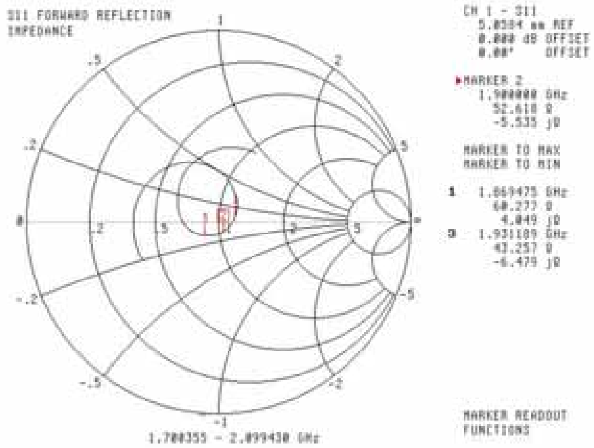
Division of APREL Laboratories.

## Smith Chart Dipole Impedance

### Head




### Body

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**NCL Calibration Laboratories**

Division of APREL Laboratories.

## Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List 2014



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NCL CALIBRATION LABORATORIES

Calibration File No: DC-1531
Project Number: BACL-5745

# CERTIFICATE OF CALIBRATION

It is certified that the equipment identified below has been calibrated in the **NCL CALIBRATION LABORATORIES** by qualified personnel following recognized procedures and using transfer standards traceable to NRC/NIST.

BACL Head & Body Validation Dipole

Manufacturer: APREL Laboratories
Part number: ALS-D-1750-S-2
Frequency: 1750 MHz
Serial No: 198-00304

Customer: ISL

Calibrated: 8th October, 2013
Released on: 8th October, 2013

This Calibration Certificate is Incomplete Unless Accompanied with the Calibration Results Summary

Released By: ______________________

Art Brennan, Quality Manager

NCL CALIBRATION LABORATORIES
Suite 102, 303 Terry Fox Dr, OTTAWA, ONTARIO CANADA K2K 3J1
Division of APREL Lab. TEL: (613) 435-8300 FAX: (613) 435-8306

NCL Calibration Laboratories

Division of APREL Laboratories.

## Conditions

Dipole 198-00304 was an original calibration.

NCL Calibration Laboratories

Division of APREL Laboratories.

## Calibration Results Summary

The following results relate the Calibrated Dipole and should be used as a quick reference for the user.

### Mechanical Dimensions

**Length:** 75 mm
**Height:** 42 mm

### Electrical Calibration

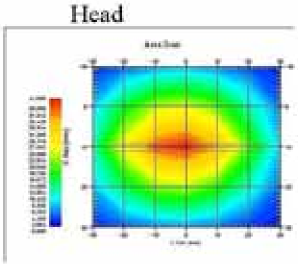
| Test | Result Head | Result Body |
|---|---|---|
| S11 R/L | -25.567 | -20.548 dB |
| SWR | 1.111U | 1.207 U |
| Impedance | 53.637Ω | 55.929 Ω |

### System Validation Results, 1750 MHz

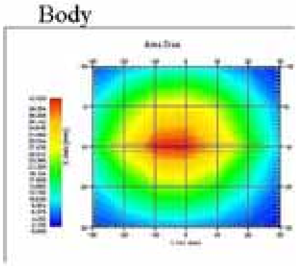
| | 1g | 10g |
|---|---|---|
| Head | 37.02 | 18.99 |
| Body | 36.65 | 18.85 |

| Type | Epsilon | Sigma |
|---|---|---|
| Head | 38.51 | 1.36 |
| Body | 51.79 | 1.53 |

Head



Body





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## Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-030 130 MHz to 26 GHz E-Field Probe Serial Number 215.

## References

SSI-TP-018-ALSAS Dipole Calibration Procedure
SSI-TP-016 Tissue Calibration Procedure
IEEE 1528 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"
IEC-62209 "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures"
Part 1: "Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 300 MHz to 3 GHz)"
IEC-62209 "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures"
Part 2 *Draft*: "Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 30 MHz to 6 GHz)"

## Conditions

| | |
|---|---|
| **Ambient Temperature of the Laboratory:** | 22 °C +/- 0.5°C |
| **Temperature of the Tissue:** | 20 °C +/- 0.5°C |

This was an original calibration taken from stock.

### Dipole Calibration uncertainty

The calibration uncertainty for the dipole is made up of various parameters presented below.

| | |
|---|---|
| **Mechanical** | 1% |
| **Positioning Error** | 1.22% |
| **Electrical** | 1.7% |
| **Tissue** | 2.2% |
| **Dipole Validation** | 2.2% |
| **TOTAL** | **8.32% (16.64% K=2)** |

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# Dipole Calibration Results

## Mechanical Verification

| Measured Length | Measured Height |
|---|---|
| 75 mm | 42 mm |

## Tissue Validation

| Frequency | Permittivity ε | Conductivity σ |
|---|---|---|
| 1750 Head | 38.23 | 1.38 |
| 1750 Body | 52.86 | 1.54 |



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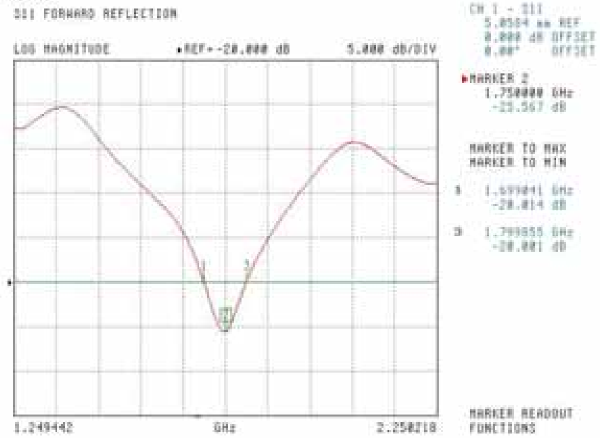
### Electrical Calibration

| Test | Result Head | Result Body |
|---|---|---|
| S11 R/L | -25.567 | -20.548 dB |
| SWR | 1.111U | 1.207 U |
| Impedance | 53.637Ω | 55.929 Ω |

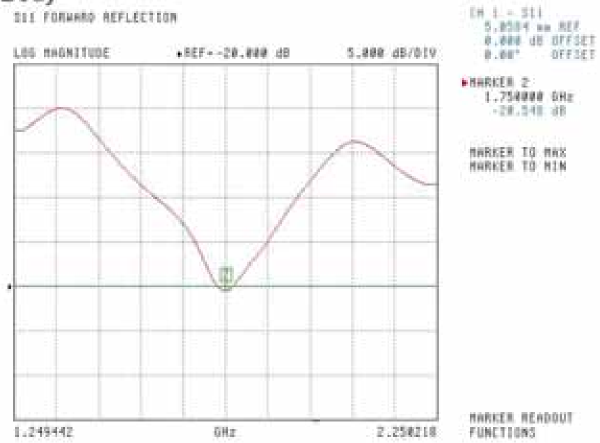
The Following Graphs are the results as displayed on the Vector Network Analyzer.

**S11 Parameter Return Loss**

Head




Body

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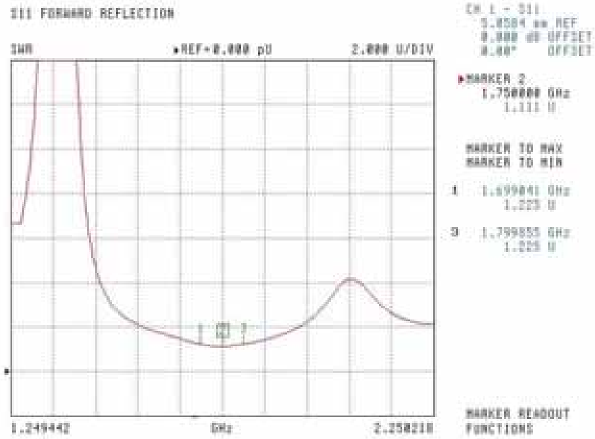
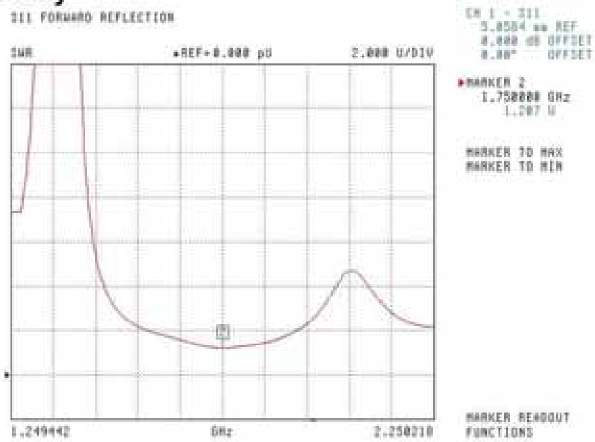
## SWR

### Head




### Body

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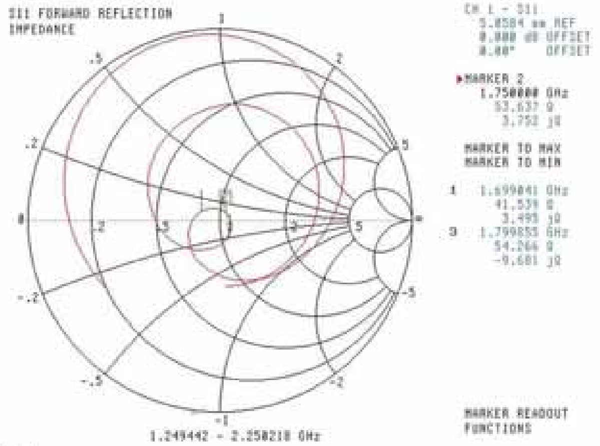
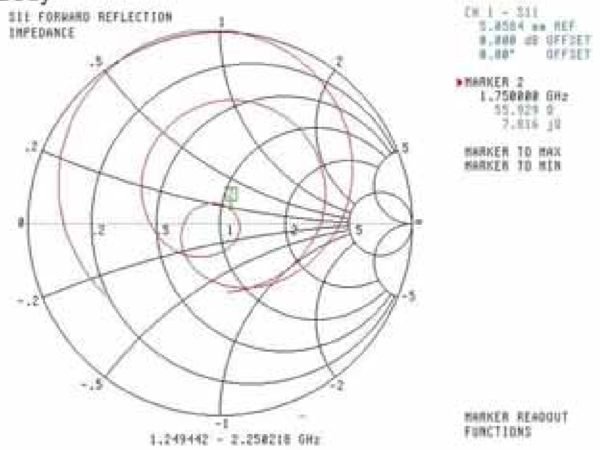
## Smith Chart Dipole Impedance

Head




Body

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## Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2013
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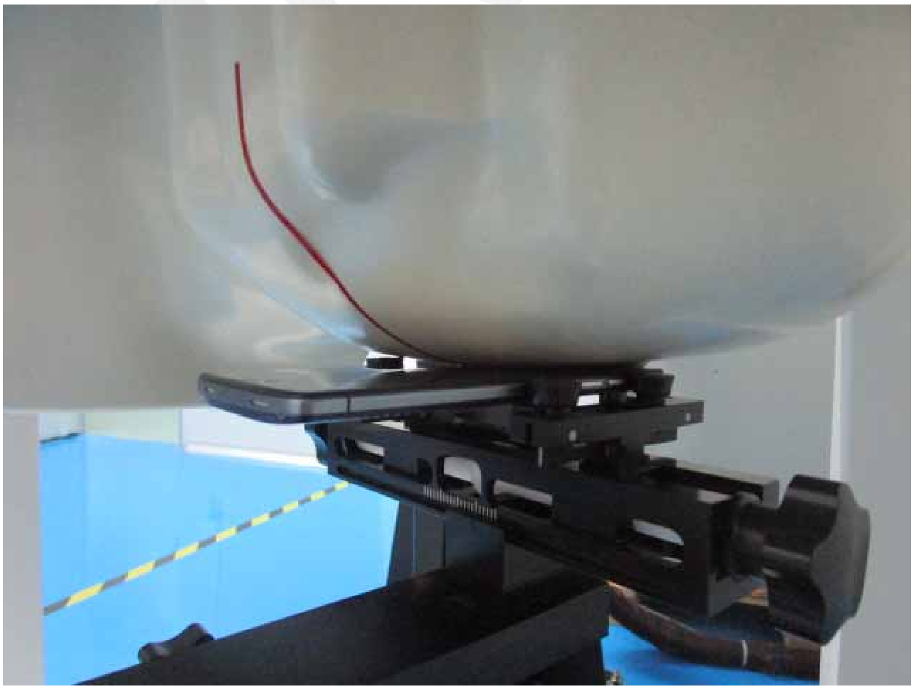
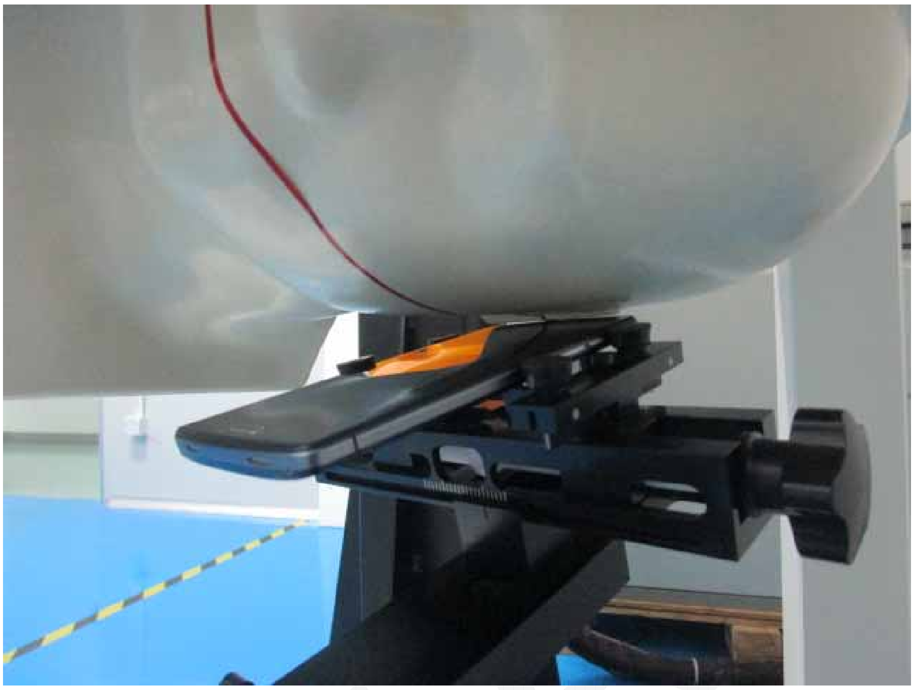
# APPENDIX D EUT TEST POSITION PHOTOS

**Liquid depth ≥ 15cm**

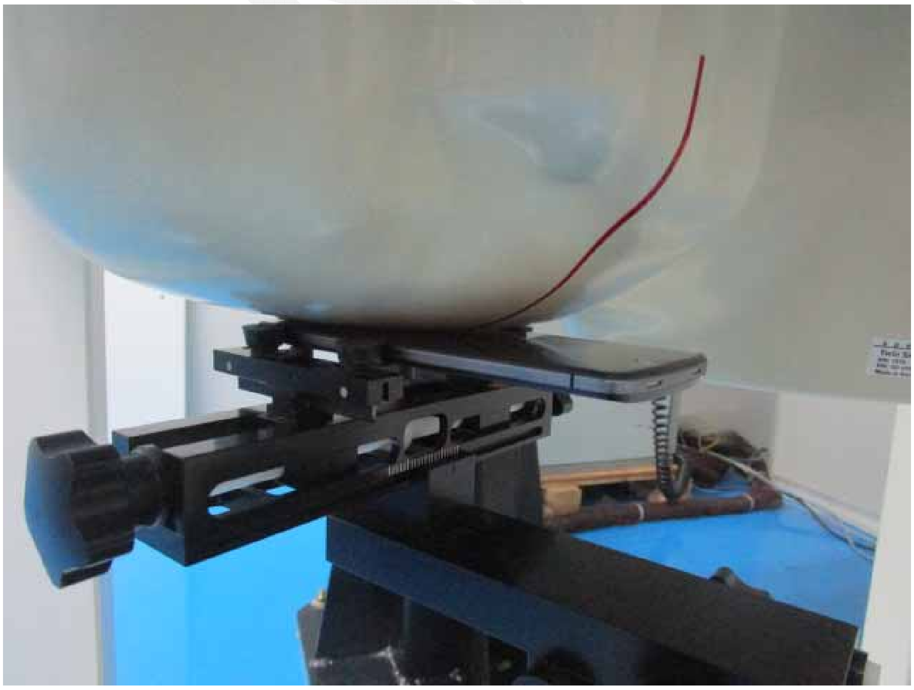
**Left Head Cheek**



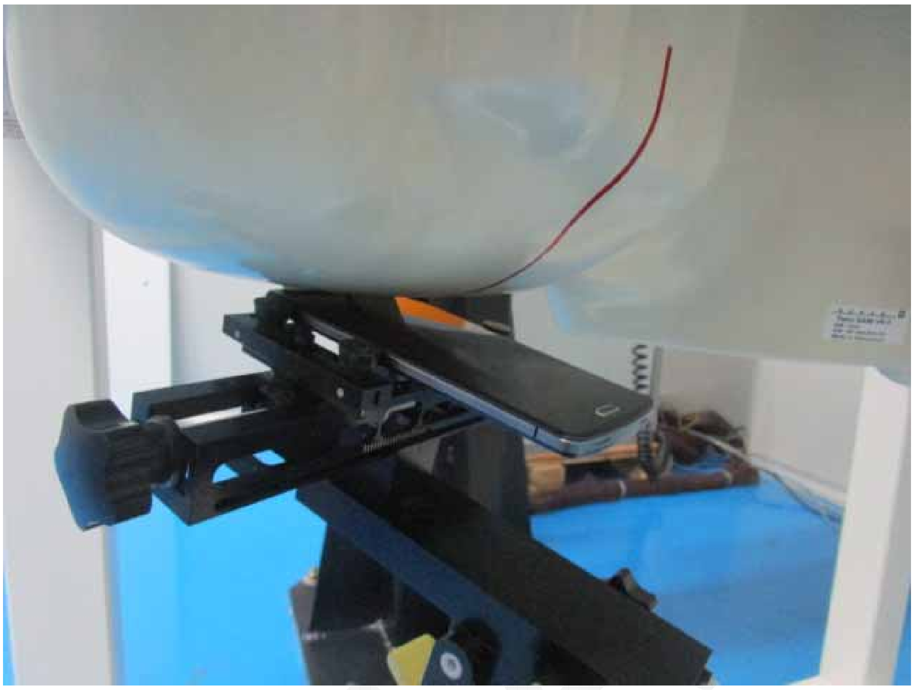
**Left Head Tilt**



**Right Head Cheek**



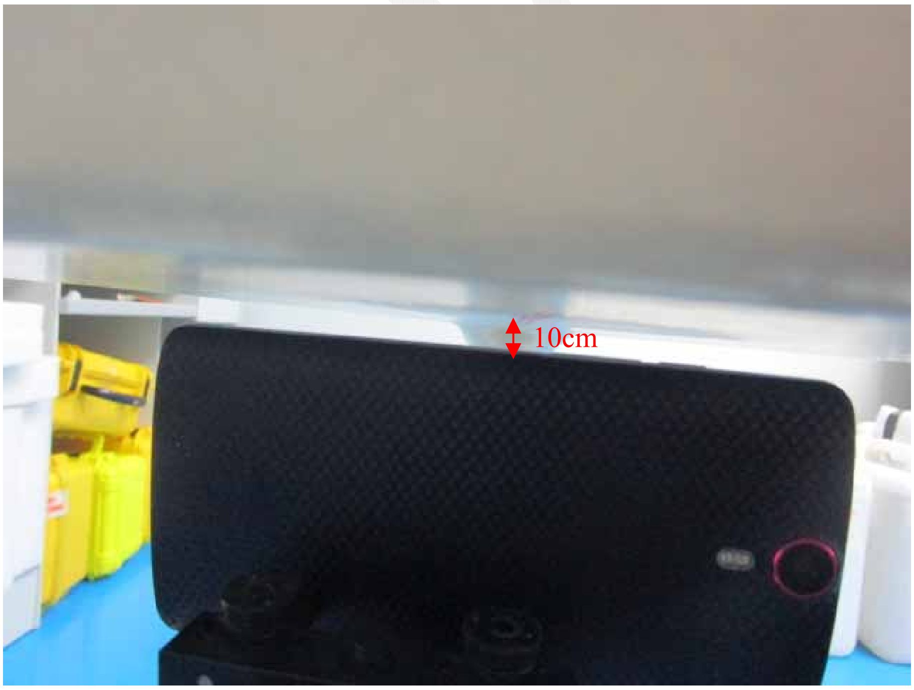
**Right Head Tilt**



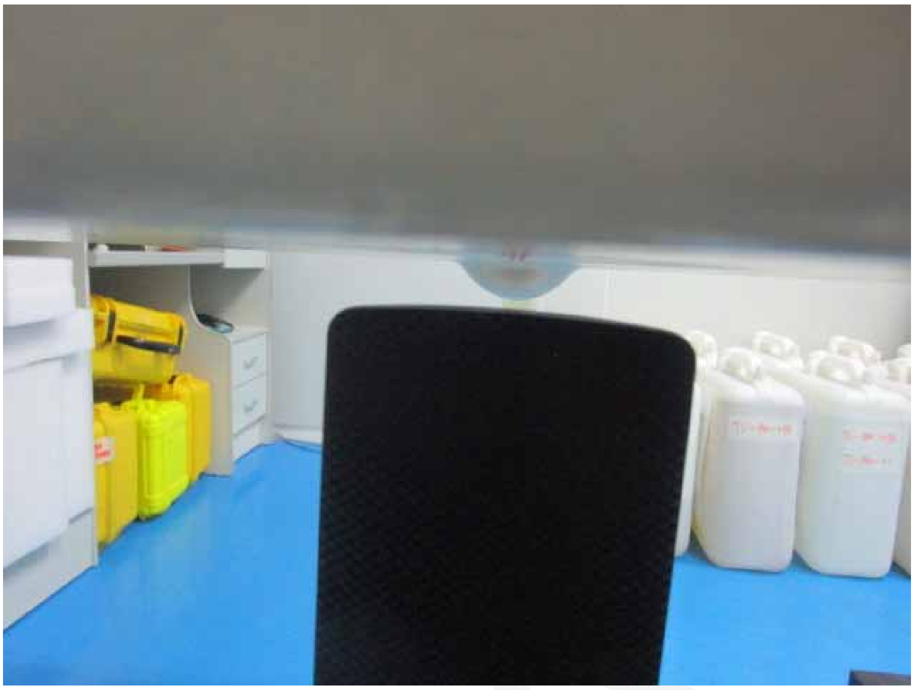
**Body -Worn-Back (10mm)**

**Body -Worn-Left (10mm)**


**Body -Worn-Right (10mm)**



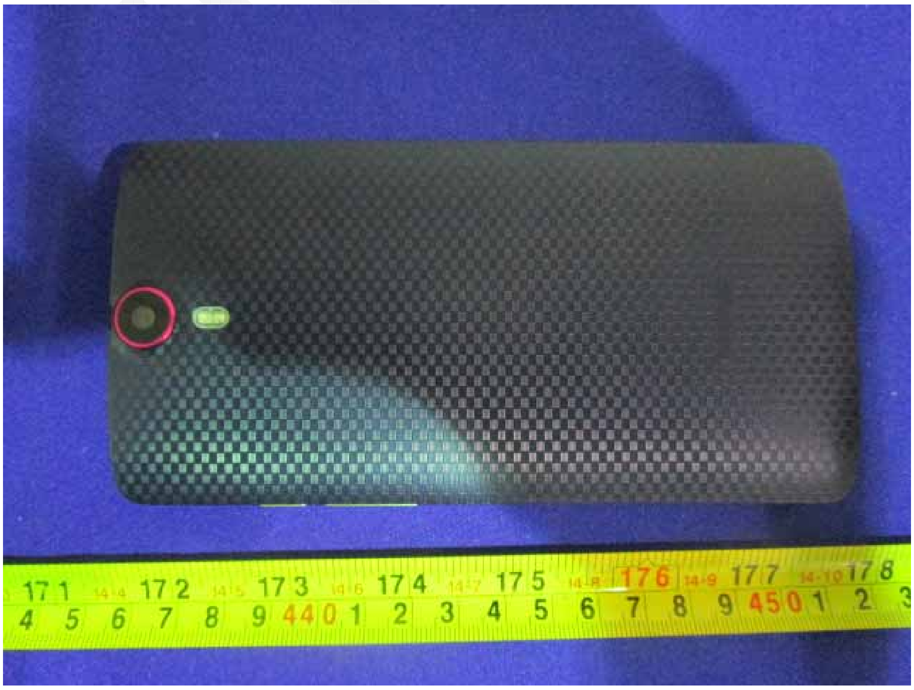
**Body -Worn-Bottom(10mm)**



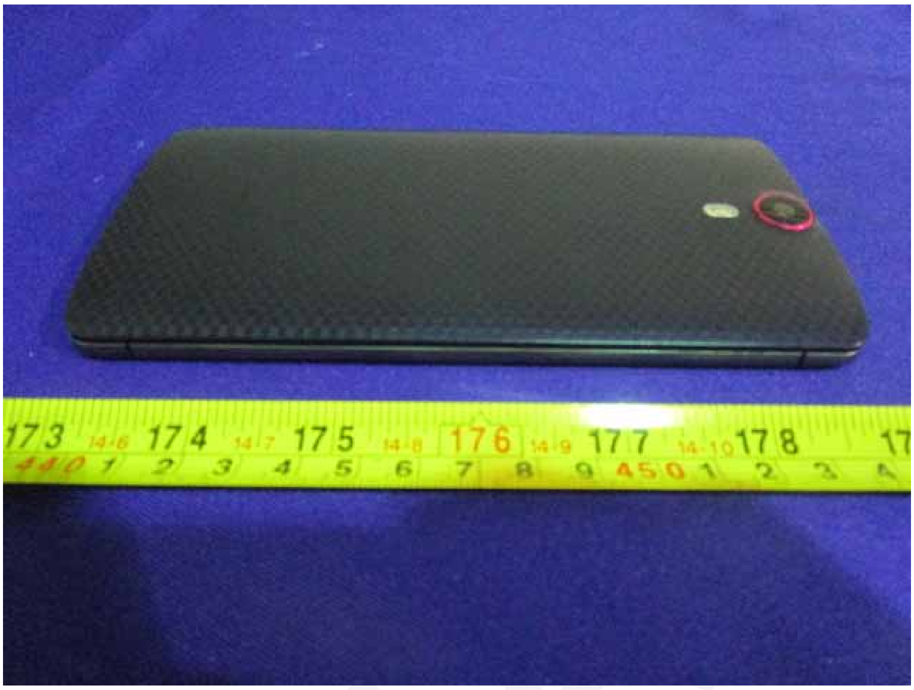
# APPENDIX E EUT PHOTOS

**EUT – Front View**

**EUT – Back View**

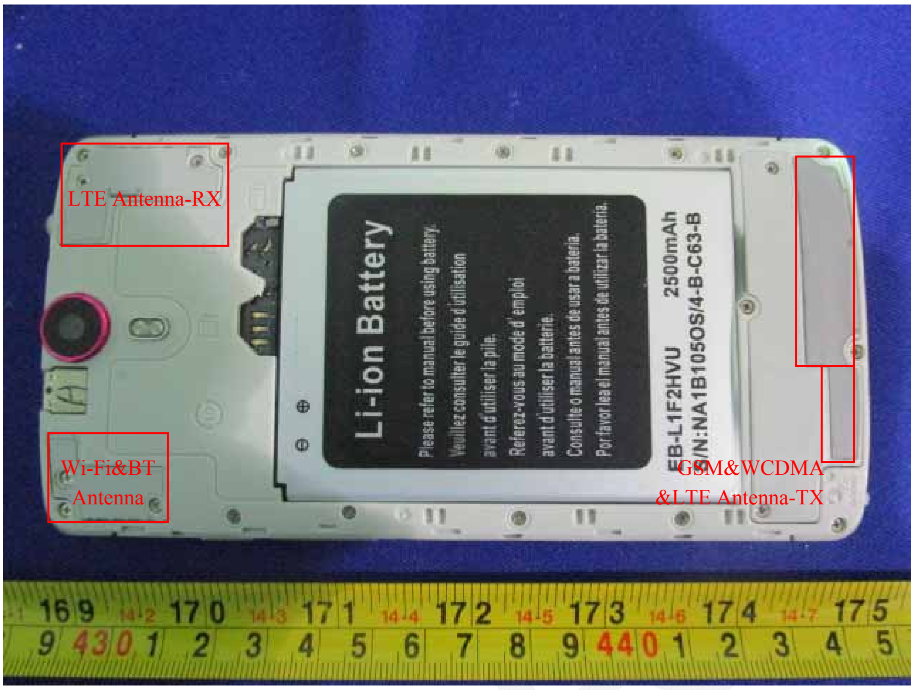


**EUT –Left Side View**



**EUT – Right Side View**

## EUT – Uncover View




******* END OF REPORT *******