**FCC OET BULLETIN 65 SUPPLEMENT C 01-01**
**IEEE STD 1528:2003**

# SAR EVALUATION REPORT

*For*
**BT3.0+EDR, 802.11 b/g/n 1x1 HT20, GSM850/1900 & WCDMA850 Bar phone**

**MODEL: GT-B5510B**
**FCC ID: A3LGTB5510B**

**REPORT NUMBER: 11I13982-5**
**ISSUE DATE: October 5, 2011**

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NVLAP LAB CODE 200065-0

## Revision History

| Rev. | Issue Date | Revisions | Revised By |
|---|---|---|---|
| -- | October 4, 2011 | Initial Issue | -- |
| A | October 5, 2011 | Updated report based on reviewer's comments.<br>• Sec. 5: Added battery specification information<br>• Sec. 5.1: Added DTM class information.<br>• Sec. 15: Simultaneous Transmission SAR analysis<br>- Updated section from "4.1" & "4.2" to "15.1" & "15.2".<br>- Fixed typo from "0.266" to "0.280" in sec. 15.2 | Sunny Shih |

# Table of Contents

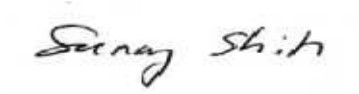
# 1. Attestation of Test Results

| | | | |
|---|---|---|---|
| Applicant: | Samsung Electronics Co., Ltd. | | |
| EUT description: | BT3.0+EDR, 802.11b/g/n 1x1 HT20, GSM850/1900 & WCDMA850MHz Bar phone. W/ hotspots. VOIP supported. | | |
| Model number: | GT-B5510B | | |
| Device category: | Portable devices | | |
| Exposure category: | General Population/Uncontrolled Exposure | | |
| Date tested: | August 11 - 22, 2011 | | |
| FCC Rule Parts | Freq. Range [MHz] | Highest 1-g SAR (W/kg) | Limit (W/kg) |
| 22H | 824 - 849 | Head: **0.317** W/kg (Right Touch)<br>Body-worn & hotspot: **0.769** W/kg (Rear w/ 10 mm distance) | 1.6 |
| 24E | 1850 - 1910 | Head: **0.418** W/kg (Right Touch)<br>Body-worn & hotspot: **0.560** W/kg (Rear w/ 10 mm distance) | |
| 15.247 | 2412 – 2462 | Head: **0.263** W/kg (Left Touch)<br>Body-worn & hotspot: **0.280** W/kg (Rear w/ 10 mm distance) | |
| Applicable Standards | | | Test Results |
| FCC OET Bulletin 65 Supplement C 01-01, IEEE Std 1528:2003 | | | Pass |

Compliance Certification Services, Inc. (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

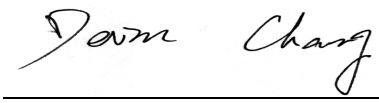
**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.

Approved & Released For UL CCS By:



Sunny Shih
Engineering Team Leader
Compliance Certification Services (UL CCS)

Tested By:



DEVIN CHANG
EMC Associate Engineer
Compliance Certification Services (UL CCS)

# 2. Test Methodology

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C Edition 01-01, IEEE STD 1528:2003 and the following KDB Procedures.

- o 648474 D01 SAR Handsets Multi Xmiter and Ant, v01r05
- o 248227 D01 SAR meas for 802 11abg v01r02
- o 941225 D01 SAR test for 3G devices v02
- o 941225 D02 Guidance for 3GPP R6 and R7 HSPA v02v01
- o 941225 D06 Hot Spot SAR v01

# 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

# 4. Calibration and Uncertainty

## 4.1. Measuring Instrument Calibration

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

| Name of Equipment | Manufacturer | Type/Model | Serial No. | Cal. Due date | | |
|---|---|---|---|---|---|---|
| | | | | MM | DD | Year |
| Dielectronic Probe kit | HP | 85070C | N/A | N/A | | |
| ESA Series Network Analyzer | Agilent | E5071B | MY42100131 | 8 | 2 | 2012 |
| Synthesized Signal Generator | HP | 83732B | US34490599 | 7 | 14 | 2012 |
| E-Field Probe | SPEAG | EX3DV4 | 3749 | 12 | 13 | 2011 |
| Thermometer | ERTCO | 639-1S | 1718 | 7 | 19 | 2012 |
| Data Acquisition Electronics | SPEAG | DAE4 | 1259 | 5 | 3 | 2012 |
| System Validation Dipole | SPEAG | D835V2 | 4d117 | 4 | 15 | 2012 |
| System Validation Dipole | SPEAG | D1900V2 | 5d140 | 4 | 18 | 2012 |
| System Validation Dipole | SPEAG | *D2450V2 | 706 | 4 | 19 | 2012 |
| Power Meter | Giga-tronics | 8651A | 8651404 | 5 | 13 | 2012 |
| Power Sensor | Giga-tronics | 80701A | 1834588 | 5 | 13 | 2012 |
| Power Meter | HP | 437B | 3125U16345 | 5 | 13 | 2012 |
| Power Sensor | HP | 8481A | 2702A60780 | 5 | 13 | 2012 |
| Amplifier | MITEQ | 4D00400600-50-30P | 1620606 | N/A | | |
| Directional coupler | Werlatone | C8060-102 | 2141 | N/A | | |

**Notes:**

*Per KDB 450824 D02 requirements for dipole calibration, UL CCS has adopted two years calibration intervals. On annual basis, each measurement dipole has been evaluated and is in compliance with the following criteria:

1. There is no physical damage on the dipole
2. System validation with specific dipole is within 10% of calibrated value.
3. Return-loss is within 20% of calibrated measurement. (See Appendix I_Calibration Certificate for D2450V2 SN 706" with extended cal. data)
4. Impedance is within 5Ω of calibrated measurement (See Appendix I_Calibration Certificate for D2450V2 SN 706" with extended cal. data)

## 4.2. Measurement Uncertainty

Measurement uncertainty for 300 MHz to 3 GHz averaged over 1 gram

| Component | error, % | Probe Distribution | Divisor | Sensitivity | U (Xi), % |
|---|---|---|---|---|---|
| **Measurement System** | | | | | |
| Probe Calibration (k=1) | 5.50 | Normal | 1 | 1 | 5.50 |
| Axial Isotropy | 1.15 | Rectangular | 1.732 | 0.7071 | 0.47 |
| Hemispherical Isotropy | 2.30 | Rectangular | 1.732 | 0.7071 | 0.94 |
| Boundary Effect | 0.90 | Rectangular | 1.732 | 1 | 0.52 |
| Probe Linearity | 3.45 | Rectangular | 1.732 | 1 | 1.99 |
| System Detection Limits | 1.00 | Rectangular | 1.732 | 1 | 0.58 |
| Readout Electronics | 0.30 | Normal | 1 | 1 | 0.30 |
| Response Time | 0.80 | Rectangular | 1.732 | 1 | 0.46 |
| Integration Time | 2.60 | Rectangular | 1.732 | 1 | 1.50 |
| RF Ambient Conditions - Noise | 3.00 | Rectangular | 1.732 | 1 | 1.73 |
| RF Ambient Conditions - Reflections | 3.00 | Rectangular | 1.732 | 1 | 1.73 |
| Probe Positioner Mechanical Tolerance | 0.40 | Rectangular | 1.732 | 1 | 0.23 |
| Probe Positioning with respect to Phantom | 2.90 | Rectangular | 1.732 | 1 | 1.67 |
| Extrapolation, Interpolation and Integration | 1.00 | Rectangular | 1.732 | 1 | 0.58 |
| **Test Sample Related** | | | | | |
| Test Sample Positioning | 2.90 | Normal | 1 | 1 | 2.90 |
| Device Holder Uncertainty | 3.60 | Normal | 1 | 1 | 3.60 |
| Output Power Variation - SAR Drift | 5.00 | Rectangular | 1.732 | 1 | 2.89 |
| **Phantom and Tissue Parameters** | | | | | |
| Phantom Uncertainty (shape and thickness) | 4.00 | Rectangular | 1.732 | 1 | 2.31 |
| Liquid Conductivity - deviation from target | 5.00 | Rectangular | 1.732 | 0.64 | 1.85 |
| Liquid Conductivity - measurement (Body 1900 MHz) | -3.62 | Normal | 1 | 0.64 | -2.32 |
| Liquid Permittivity - deviation from target | 5.00 | Rectangular | 1.732 | 0.6 | 1.73 |
| Liquid Permittivity - measurement uncertainty (Head 835 MHz) | 4.01 | Normal | 1 | 0.6 | 2.41 |
| | | | | Combined Standard Uncertainty Uc(y) = | 10.01 |
| | | | | Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 20.03 | % |
| | | | | Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 1.59 | dB |

Measurement uncertainty for 300 MHz to 3 GHz averaged over 10 gram

| Component | error, % | Probe Distribution | Divisor | Sensitivity | U (Xi), % |
|---|---|---|---|---|---|
| **Measurement System** | | | | | |
| Probe Calibration (k=1) | 5.50 | Normal | 1 | 1 | 5.50 |
| Axial Isotropy | 1.15 | Rectangular | 1.732 | 0.7071 | 0.47 |
| Hemispherical Isotropy | 2.30 | Rectangular | 1.732 | 0.7071 | 0.94 |
| Boundary Effect | 0.90 | Rectangular | 1.732 | 1 | 0.52 |
| Probe Linearity | 3.45 | Rectangular | 1.732 | 1 | 1.99 |
| System Detection Limits | 1.00 | Rectangular | 1.732 | 1 | 0.58 |
| Readout Electronics | 0.30 | Normal | 1 | 1 | 0.30 |
| Response Time | 0.80 | Rectangular | 1.732 | 1 | 0.46 |
| Integration Time | 2.60 | Rectangular | 1.732 | 1 | 1.50 |
| RF Ambient Conditions - Noise | 3.00 | Rectangular | 1.732 | 1 | 1.73 |
| RF Ambient Conditions - Reflections | 3.00 | Rectangular | 1.732 | 1 | 1.73 |
| Probe Positioner Mechanical Tolerance | 0.40 | Rectangular | 1.732 | 1 | 0.23 |
| Probe Positioning with respect to Phantom | 2.90 | Rectangular | 1.732 | 1 | 1.67 |
| Extrapolation, Interpolation and Integration | 1.00 | Rectangular | 1.732 | 1 | 0.58 |
| **Test Sample Related** | | | | | |
| Test Sample Positioning | 2.90 | Normal | 1 | 1 | 2.90 |
| Device Holder Uncertainty | 3.60 | Normal | 1 | 1 | 3.60 |
| Output Power Variation - SAR Drift | 5.00 | Rectangular | 1.732 | 1 | 2.89 |
| **Phantom and Tissue Parameters** | | | | | |
| Phantom Uncertainty (shape and thickness) | 4.00 | Rectangular | 1.732 | 1 | 2.31 |
| Liquid Conductivity - deviation from target | 5.00 | Rectangular | 1.732 | 0.43 | 1.24 |
| Liquid Conductivity - measurement (Body 1900 MHz) | -3.62 | Normal | 1 | 0.43 | -1.56 |
| Liquid Permittivity - deviation from target | 5.00 | Rectangular | 1.732 | 0.49 | 1.41 |
| Liquid Permittivity - measurement uncertainty (Head 835 MHz) | 4.01 | Normal | 1 | 0.49 | 1.96 |
| | | | | Combined Standard Uncertainty Uc(y), % = | 9.62 |
| | | | | Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 19.24 | % |
| | | | | Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 1.53 | dB |

# 5. Equipment Under Test

| | |
|---|---|
| BT3.0+EDR, 802.11b/g/n 1x1 HT20, GSM850/1900 & WCDMA850MHz Bar phone. W/ hotspots. VOIP supported.<br>Model: GT-B5510B | |
| Normal operation: | - Held to head,<br>- Body-worn (Rear and Front sides) with 10 mm separation distance.<br>- Personal Hotspot with 10 mm separation distance to all sides and edges. |
| Body Worn Accessory | - Headset |
| Battery: | Li-ion Battery<br>Standard type. manufactured by “Samsung”, Model “EB45357VU”, rated 3.7 Vdc, 1200 mAh |
| Antenna-to-antenna and antenna-to-edges’ separation distances: | Please refer to Section 17 “Antenna Locations & Separation Distances” for details |

## 5.1. Band and Air interlaces

| | |
|---|---|
| Tx Frequency Bands: | GSM: GSM/GPRS850/1900<br>UMTS (WCDMA): Band V (850MHz)<br>WiFi: 802.11bng (2.4 GHz)<br>Bluetooth: 2.4 GHz |
| Air Interfaces: | GSM, GPRS and EGPRS (Rx only)<br>UMTS (WCDMA) Rel 99, HSDPA (Rel 6, CAT 8), HSUPA (Not support)<br>802.11b/g/n<br>Bluetooth Ver 3.0 with EDR |
| Uplink Modulations: | GSM Modes: GMSK, 8PSK<br>UMTS Modes: BPSK, QPSK<br>802.11b: DSS CCK<br>802.11g: OFDM<br>802.11n: OFDM<br>Bluetooth: DQPSK, 8DPSK, GFSK |
| GPRS Multi-Slot Class: | 12<br>**Note:** EGPRS mode support Rx only. |
| DTM Class: | Not support |
| GPRS Class: | Class B |

## 5.2. Personal Hotspot Mode

This device is capability to enable wireless router (hotspot mode) functions. The hotspot mode can be enabled by the users. SAR measurements in the Personal hot spot function are performed with 10 m separation distance to all sides and edges to the body phantom.

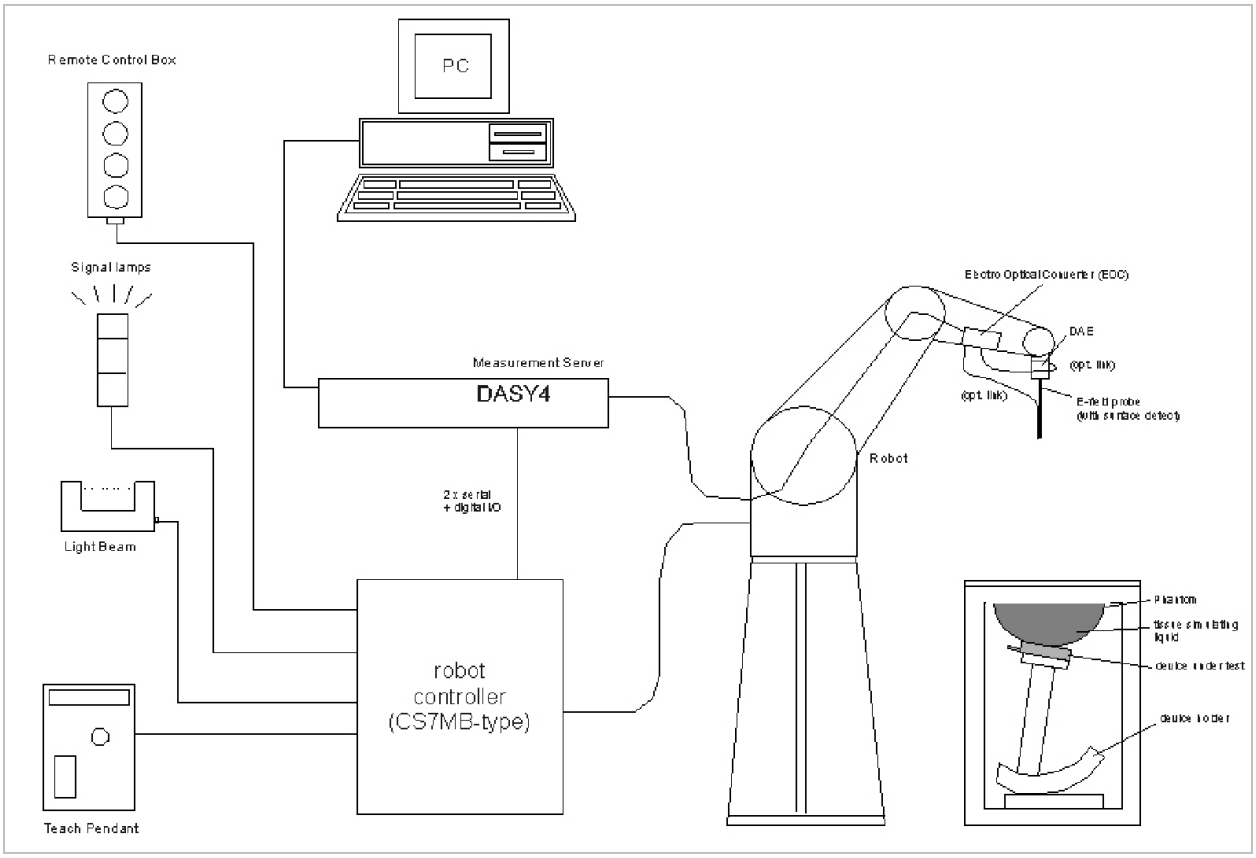
## 5.3. Simultaneous Transmission Conditions

| User usage | Simultaneous Tx |
|---|---|
| Held to ear | GSM voice + WiFi/BT |
| | WCDMA R99 + WiFi/BT |
| | WCDMA HSDPA + WiFi/BT |
| Body-worn | GSM voice + WiFi/BT |
| | GPRS (data) + WiFi/BT |
| | WCDMA R99 + WiFi/BT |
| | WCDMA HSDPA + WiFi/BT |
| Body-hotspot | GPRS (data) + WiFi/BT |
| | WCDMA R99 + WiFi/BT |
| | WCDMA HSDPA + WiFi/BT |

**Note(s):**

1. VIOP is not support GPRS mode
2. EGPRS mode is supported RX only
3. HSUPD is not support

# 6. System Specifications




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

- A standard high precision 6-axis robot (Stäubli RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The 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.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- DASY software.
- Remote controls with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing validating the proper functioning of the system.

# 7. Composition of Ingredients for Simulating Liquids

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

| Ingredients (% by weight) | Frequency (MHz) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 450 | | 835 | | 900 | | 1800 - 1900 | | 2450 | |
| Tissue Type | Head | Body | Head | Body | Head | Body | Head | Body | Head | Body |
| Water | 38.56 | 51.16 | 41.45 | 52.4 | 41.05 | 56.0 | 54.9 | 40.4 | 62.7 | 73.2 |
| Salt (NaCl) | 3.95 | 1.49 | 1.45 | 1.4 | 1.35 | 0.76 | 0.18 | 0.5 | 0.5 | 0.04 |
| Sugar | 56.32 | 46.78 | 56.0 | 45.0 | 56.5 | 41.76 | 0.0 | 58.0 | 0.0 | 0.0 |
| HEC | 0.98 | 0.52 | 1.0 | 1.0 | 1.0 | 1.21 | 0.0 | 1.0 | 0.0 | 0.0 |
| Bactericide | 0.19 | 0.05 | 0.1 | 0.1 | 0.1 | 0.27 | 0.0 | 0.1 | 0.0 | 0.0 |
| Triton X-100 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 36.8 | 0.0 |
| DGBE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 44.92 | 0.0 | 0.0 | 26.7 |
| Dielectric Constant | 43.42 | 58.0 | 42.54 | 56.1 | 42.0 | 56.8 | 39.9 | 54.0 | 39.8 | 52.5 |
| Conductivity (S/m) | 0.85 | 0.83 | 0.91 | 0.95 | 1.0 | 1.07 | 1.42 | 1.45 | 1.88 | 1.78 |

Salt: 99+% Pure Sodium Chloride Sugar: 98+% Pure Sucrose
Water: De-ionized, 16 MΩ+ resistivity HEC: Hydroxyethyl Cellulose
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

**Simulating Liquids for 5 GHz, Manufactured by SPEAG**

| Ingredients | (% by weight) |
|---|---|
| Water | 78 |
| Mineral oil | 11 |
| Emulsifiers | 9 |
| Additives and Salt | 2 |

# 8. Liquid Parameters

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectric parameters are within the tolerances of the specified target values. For frequencies in 300 MHz to just under 2 GHz, the measured conductivity and relative permittivity should be within ± 5% of the target values. For frequencies in the range of 2–3 GHz and above the measured conductivity should be within ± 5% of the target values. The measured relative permittivity tolerance can be relaxed to no more than ± 10%.

**Reference Values of Tissue Dielectric Parameters for Head & Body Phantom**

The body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in IEEE Standard 1528.

| Target Frequency (MHz) | Head | | Body | |
|---|---|---|---|---|
| | $\varepsilon_r$ | $\sigma$ (S/m) | $\varepsilon_r$ | $\sigma$ (S/m) |
| 150 | 52.3 | 0.76 | 61.9 | 0.8 |
| 300 | 45.3 | 0.87 | 58.2 | 0.92 |
| 450 | 43.5 | 0.87 | 56.7 | 0.94 |
| 750 | 41.96 | 0.89 | 55.6 | 0.96 |
| 835 | 41.5 | 0.9 | 55.2 | 0.97 |
| 900 | 41.5 | 0.97 | 55 | 1.05 |
| 915 | 41.5 | 0.98 | 55 | 1.06 |
| 1450 | 40.5 | 1.2 | 54 | 1.3 |
| 1610 | 40.3 | 1.29 | 53.8 | 1.4 |
| 1750 | 40.08 | 1.37 | 53.44 | 1.49 |
| 1800 – 2000 | 40 | 1.4 | 53.3 | 1.52 |
| 2450 | 39.2 | 1.8 | 52.7 | 1.95 |
| 3000 | 38.5 | 2.4 | 52 | 2.73 |

($\varepsilon_r$ = relative permittivity, $\sigma$ = conductivity and $\rho$ = 1000 kg/m$^3$)

## 8.1. Liquid Check Results

| Date | Freq. (MHz) | Liquid Parameters | | | Measured | Target | Delta (%) | Limit ±(%) |
|---|---|---|---|---|---|---|---|---|
| 8/11/2011 | Head 1900 | e' | 38.4189 | Relative Permittivity ($\epsilon_r$): | 38.42 | 40.00 | -3.95 | 5 |
| | | e'' | 13.2816 | Conductivity (σ): | 1.40 | 1.40 | 0.22 | 5 |
| 8/15/2011 | Head 2450 | e' | 40.3382 | Relative Permittivity ($\epsilon_r$): | 40.34 | 39.20 | 2.90 | 5 |
| | | e'' | 13.0919 | Conductivity (σ): | 1.78 | 1.80 | -0.92 | 5 |
| 8/16/2011 | Head 835 | e' | 43.1625 | Relative Permittivity ($\epsilon_r$): | 43.16 | 41.50 | 4.01 | 5 |
| | | e'' | 19.3010 | Conductivity (σ): | 0.90 | 0.90 | -0.43 | 5 |

| Date | Freq. (MHz) | Liquid Parameters | | | Measured | Target | Delta (%) | Limit ±(%) |
|---|---|---|---|---|---|---|---|---|
| 8/11/2011 | Body 1900 | e' | 52.0009 | Relative Permittivity ($\epsilon_r$): | 52.00 | 53.30 | -2.44 | 5 |
| | | e'' | 14.0996 | Conductivity (σ): | 1.49 | 1.52 | -2.00 | 5 |
| 8/12/2011 | Body 1900 | e' | 53.9131 | Relative Permittivity ($\epsilon_r$): | 53.91 | 53.30 | 1.15 | 5 |
| | | e'' | 13.8675 | Conductivity (σ): | 1.47 | 1.52 | -3.62 | 5 |
| 8/14/2011 | Body 2450 | e' | 51.1435 | Relative Permittivity ($\epsilon_r$): | 51.14 | 52.70 | -2.95 | 5 |
| | | e'' | 14.4471 | Conductivity (σ): | 1.97 | 1.95 | 0.93 | 5 |
| 8/21/2011 | Body 835 | e' | 54.5474 | Relative Permittivity ($\epsilon_r$): | 54.55 | 55.20 | -1.18 | 5 |
| | | e'' | 20.9541 | Conductivity (σ): | 0.97 | 0.97 | 0.30 | 5 |
| 8/22/2011 | Body 835 | e' | 54.4577 | Relative Permittivity ($\epsilon_r$): | 54.46 | 55.20 | -1.34 | 5 |
| | | e'' | 21.0976 | Conductivity (σ): | 0.98 | 0.97 | 0.98 | 5 |

# 9. System Verification

The system performance check is performed prior to any usage of the system in order to verify SAR system measurement accuracy. The system performance check verifies that the system operates within its specifications of ±10%.

**System Performance Check Measurement Conditions**

- The measurements were performed in the flat section of the SAM twin phantom filled with Head or Body simulating liquid of the following parameters.
- The DASY4 system with an E-Field Probe EX3DV4 was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
  For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 fine cube was chosen for cube
- Distance between probe sensors and phantom surface was set to 3 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was 100 mW
- The results are normalized to 1 W input power.

**Reference SAR Values** for HEAD & BODY-tissue from calibration certificate of SPEAG.

| System validation dipole | Cal. certificate # | Cal. date | Cal. Freq. (GHz) | SAR Avg (mW/g) | | |
|---|---|---|---|---|---|---|
| | | | | Tissue: | Head | Body |
| D835V2 | D835V2-4d117 | 4/15/11 | 0.835 | 1g SAR: | 9.64 | 10.1 |
| | | | | 10g SAR: | 6.28 | 6.6 |
| D1900V2 | D1900V2-5d140 | 4/18/11 | 1.9 | 1g SAR: | 41.6 | 41.2 |
| | | | | 10g SAR: | 21.5 | 21.6 |
| D2450V2 | D2450V2-706 | 4/19/11 | 2.45 | 1g SAR: | 51.6 | 52.4 |
| | | | | 10g SAR: | 24.4 | 24.5 |

## 9.1. System Check Results

| Date Tested | System validation dipole | | Measured (Normalized to 1 W) | | Target | Delta (%) | Tolerance (%) |
|---|---|---|---|---|---|---|---|
| 08/11/11 | Head | D1900V2 | $SAR_{1g}$: | 42.0 | 41.6 | 0.96 | ±10 |
| | | | $SAR_{10g}$: | 21.8 | 21.5 | 1.40 | |
| 08/12/11 | Body | D1900V2 | $SAR_{1g}$: | 39.6 | 41.2 | -3.88 | ±10 |
| | | | $SAR_{10g}$: | 20.7 | 21.6 | -4.17 | |
| 08/14/11 | Body | D2450V2 | $SAR_{1g}$: | 50.1 | 52.4 | -4.39 | ±10 |
| | | | $SAR_{10g}$: | 23.3 | 24.5 | -4.90 | |
| 05/15/11 | Head | D2450V2 | $SAR_{1g}$: | 51.3 | 51.6 | -0.58 | ±10 |
| | | | $SAR_{10g}$: | 23.3 | 24.4 | -4.51 | |
| 05/16/11 | Head | D835V2 | $SAR_{1g}$: | 9.66 | 9.64 | 0.21 | ±10 |
| | | | $SAR_{10g}$: | 6.31 | 6.28 | 0.48 | |
| 08/21/11 | Body | D835V2 | $SAR_{1g}$: | 9.85 | 10.1 | -2.48 | ±10 |
| | | | $SAR_{10g}$: | 6.46 | 6.6 | -2.12 | |
| 08/22/11 | Body | D835V2 | $SAR_{1g}$: | 9.98 | 10.1 | -1.19 | ±10 |
| | | | $SAR_{10g}$: | 6.55 | 6.6 | -0.76 | |

# 10. SAR Measurement Procedures

**Step 1: Power Reference Measurement**
The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The Minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties.

**Step 2: Area Scan**
The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY4 software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE Standard 1528, IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

**Step 3: Zoom Scan**
Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures ≥ 7x7x9 (above 4.5 GHz) or 5x5x7 (below 3 GHz) points within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

**Step 4: Power drift measurement**
The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

**Step 5: Z-Scan**
The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation, the extrapolated distance should not be larger than the step size in Z-direction.

# 11. RF Output Power Measurement

## 11.1. GSM

GSM (GMSK) voice mode

| Band | Ch No. | Freq. (MHz) | Avg burst Pwr |
|---|---|---|---|
| GSM850 | 128 | 824.2 | 32.5 |
| | 190 | 836.6 | 32.5 |
| | 251 | 848.8 | 32.6 |
| GSM1900 | 512 | 1850.2 | 29.2 |
| | 661 | 1880.0 | 29.3 |
| | 810 | 1909.8 | 29.3 |

**GPRS (GMSK) - Coding Scheme: CS1**

| Band | Ch No. | Freq. (MHz) | Avg burst Pwr (dBm) | | | | Avg burst Pwr (dBm) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 slot | Frame Avg Pwr | 2 slots | Frame Avg Pwr | 3 slots | Frame Avg Pwr | 4 slots | Frame Avg Pwr |
| GSM850 | 128 | 824.2 | 32.4 | 23.4 | 30.9 | **24.9** | 28.9 | 24.6 | 26.9 | 23.9 |
| | 190 | 836.6 | 32.5 | 23.5 | 31.0 | **25.0** | 28.9 | 24.6 | 26.9 | 23.9 |
| | 251 | 848.8 | 32.6 | 23.6 | 31.1 | **25.1** | 29.0 | 24.7 | 27.0 | 24.0 |
| GSM1900 | 512 | 1850.2 | 29.2 | 20.2 | 27.6 | **21.6** | 25.6 | 21.3 | 23.5 | 20.5 |
| | 661 | 1880 | 29.2 | 20.2 | 27.6 | **21.6** | 25.6 | 21.3 | 23.6 | 20.6 |
| | 810 | 1909.8 | 29.2 | 20.2 | 27.6 | **21.6** | 25.6 | 21.3 | 23.6 | 20.6 |

**Note(s):**

1. EGPRS mode support Rx only
2. Based on output power table above, the following worst-case slot was chosen for Body SAR testing.
   a. GPRS850 2 time slots
   b. GPRS1900 2 time slots

## 11.2. UMTS (WCDMA) Release 99

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 specification. The EUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7). RMC 12.2 kbps is used for this testing.

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

**Results**

**Rel 99 (12.2kbps RMC)**

| Band | Mode | UL Ch No. | Freq. (MHz) | Avg Tx Pwr (dBm) |
|---|---|---|---|---|
| UMTS850 (Band V) | Rel 99 12.2kbps RMC | 4132 | 826.4 | 23.1 |
| | | 4183 | 836.6 | 23.1 |
| | | 4233 | 846.6 | 23.0 |

## 11.3. UMTS (WCDMA) HSDPA

The following 4 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

| | Mode | Rel5 HSDPA | | | |
|---|---|---|---|---|---|
| | Subtest | 1 | 2 | 3 | 4 |
| WCDMA General Settings | Loopback Mode | Test Mode 1 | | | |
| | Rel99 RMC | 12.2kbps RMC | | | |
| | HSDPA FRC | H-Set1 | | | |
| | Power Control Algorithm | Algorithm 2 | | | |
| | βc | 2/15 | 12/15 | 15/15 | 15/15 |
| | βd | 15/15 | 15/15 | 8/15 | 4/15 |
| | Bd (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 | $D_{ACK}$ | 8 | | | |
| | $D_{NAK}$ | 8 | | | |
| | DCQI | 8 | | | |
| | Ack-Nack repetition factor | 3 | | | |
| | CQI Feedback (Table 5.2B.4) | 4ms | | | |
| | CQI Repetition Factor (Table 5.2B.4) | 2 | | | |
| | Ahs =βhs/βc | 30/15 | | | |

**Results**

| Band | Mode | UL Ch No. | f (MHz) | MPR | Avg Tx Pwr (dBm) |
|---|---|---|---|---|---|
| UMTS (WCDMA) Band V | Subtest 1 | 4132 | 826.4 | 0 | 22.9 |
| | | 4183 | 836.6 | 0 | 23.0 |
| | | 4233 | 846.6 | 0 | 22.9 |
| | Subtest 2 | 4132 | 826.4 | 0 | 22.6 |
| | | 4183 | 836.6 | 0 | 22.8 |
| | | 4233 | 846.6 | 0 | 22.7 |
| | Subtest 3 | 4132 | 826.4 | 0.5 | 22.2 |
| | | 4183 | 836.6 | 0.5 | 22.1 |
| | | 4233 | 846.6 | 0.5 | 22.2 |
| | Subtest 4 | 4132 | 826.4 | 0.5 | 22.2 |
| | | 4183 | 836.6 | 0.5 | 22.1 |
| | | 4233 | 846.6 | 0.5 | 22.2 |

**Note:**

KDB 941225 D01 – Body SAR is not required for HSDPA when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC.

## 11.4. WIFI

| Mode | Channel | Freq. (MHz) | Conducted Avg Power | |
|---|---|---|---|---|
| | | | (dBm) | (mW) |
| 802.11b | 1 | 2412 | 16.1 | 40.7 |
| | 6 | 2437 | 16.4 | 43.7 |
| | 11 | 2462 | 16.0 | 39.8 |
| 802.11g | 1 | 2412 | 14.2 | 26.3 |
| | 6 | 2437 | 13.9 | 24.5 |
| | 11 | 2462 | 14.0 | 25.1 |
| 802.11n (HT20) | 1 | 2412 | 12.0 | 15.8 |
| | 6 | 2437 | 12.4 | 17.4 |
| | 11 | 2462 | 12.1 | 16.2 |

**Note(s):**
KDB 248227 - SAR is not required for 802.11g/HT20 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

## 11.5. Bluetooth

| Mode | Channel | Freq. (MHz) | Conducted Avg Power | |
|---|---|---|---|---|
| | | | (dBm) | (mW) |
| GFSK | 0 | 2402 | 6.7 | 4.7 |
| | 39 | 2441 | 6.0 | 4.0 |
| | 78 | 2480 | 6.0 | 4.0 |
| 8PSK | 0 | 2402 | 4.8 | 3.0 |
| | 39 | 2441 | 5.5 | 3.5 |
| | 78 | 2480 | 4.2 | 2.6 |

**Note(s):**
According to KDB 648474, Table 2, Unlicensed transmitters
When there is simultaneous transmission, Stand-alone SAR not required due to

- ☐ Output ≤ $2 \cdot P_{Ref}$ (24 mW) and antenna is ≥ 5.0 cm from other antennas
- ☐ Output ≤ $P_{Ref}$ (12 mW) and antenna is ≥ 2.5 cm from other antennas
- ☒ Output ≤ $P_{Ref}$ (12 mW) and antenna is < 2.5 cm from other antennas

# 12. Standalone SAR Test Results

## 12.1. GSM850

**Head SAR**

| Test position | Mode | Ch No. | Freq. (MHz) | Avg Pwr (dBm) | SAR (mW/g) | | Note |
|---|---|---|---|---|---|---|---|
| | | | | | 1-g | 10-g | |
| Left Touch | Voice | 128 | 824.2 | 32.5 | | | 1 |
| | | 190 | 836.6 | 32.5 | 0.249 | 0.186 | |
| | | 251 | 848.8 | 32.6 | | | 1 |
| Left Tilt | Voice | 128 | 824.2 | 32.5 | | | 1 |
| | | 190 | 836.6 | 32.5 | 0.153 | 0.117 | |
| | | 251 | 848.8 | 32.6 | | | 1 |
| Right Touch | Voice | 128 | 824.2 | 32.5 | | | 1 |
| | | 190 | 836.6 | 32.5 | **0.317** | 0.234 | |
| | | 251 | 848.8 | 32.6 | | | 1 |
| Right Tilt | Voice | 128 | 824.2 | 32.5 | | | 1 |
| | | 190 | 836.6 | 32.5 | 0.165 | 0.126 | |
| | | 251 | 848.8 | 32.6 | | | 1 |

**Body-worn & -hotspot SAR with 10 mm separation**

| Test position | Mode | Ch No. | Freq. (MHz) | Avg Pwr (dBm) | SAR (mW/g) | | Note |
|---|---|---|---|---|---|---|---|
| | | | | | 1-g | 10-g | |
| Rear (Back) | GPRS 2 Slot | 128 | 824.2 | 30.9 | | | 1 |
| | | 190 | 836.6 | 31.0 | **0.769** | 0.553 | |
| | | 190 | 836.6 | 31.0 | 0.631 | 0.428 | 2 |
| | | 251 | 848.8 | 31.1 | | | 1 |
| Front | GPRS 2 Slot | 128 | 824.2 | 30.9 | | | 1 |
| | | 190 | 836.6 | 31.0 | 0.413 | 0.302 | |
| | | 251 | 848.8 | 31.1 | | | 1 |
| Left | GPRS 2 Slot | 128 | 824.2 | 30.9 | | | 1 |
| | | 190 | 836.6 | 31.0 | 0.177 | 0.123 | |
| | | 251 | 848.8 | 31.1 | | | 1 |
| Right | GPRS 2 Slot | 128 | 824.2 | 30.9 | | | 1 |
| | | 190 | 836.6 | 31.0 | 0.314 | 0.217 | |
| | | 251 | 848.8 | 31.1 | | | 1 |
| Bottom | GPRS 2 Slot | 128 | 824.2 | 30.9 | | | 1 |
| | | 190 | 836.6 | 31.0 | 0.106 | 0.064 | |
| | | 251 | 848.8 | 31.1 | | | 1 |
| Top | GPRS 2 Slot | 128 | 824.2 | 30.9 | | | 3 |
| | | 190 | 836.6 | 31.0 | | | 3 |
| | | 251 | 848.8 | 31.1 | | | 3 |

**Note(s):**

1. SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC “Public Notice DA 02-1438” by the SCC-34/SC-2. Testing in the low and high channel is optional.
2. With headset attached
3. SAR is not required due to antenna-to-top edge’s distance is greater than 2.5 cm.

## 12.2. GSM1900

**Head SAR**

| Test position | Mode | Ch No. | Freq. (MHz) | Avg Pwr (dBm) | SAR (mW/g) | | Note |
|---|---|---|---|---|---|---|---|
| | | | | | 1-g | 10-g | |
| Left Touch | Voice | 512 | 1850.2 | 29.2 | | | 1 |
| | | 661 | 1880.0 | 29.3 | 0.244 | 0.145 | |
| | | 810 | 1909.8 | 29.3 | | | 1 |
| Left Tilt | Voice | 512 | 1850.2 | 29.2 | | | 1 |
| | | 661 | 1880.0 | 29.3 | 0.135 | 0.081 | |
| | | 810 | 1909.8 | 29.3 | | | 1 |
| Right Touch | Voice | 512 | 1850.2 | 29.2 | | | 1 |
| | | 661 | 1880.0 | 29.3 | **0.418** | 0.232 | |
| | | 810 | 1909.8 | 29.3 | | | 1 |
| Right Tilt | Voice | 512 | 1850.2 | 29.2 | | | 1 |
| | | 661 | 1880.0 | 29.3 | 0.131 | 0.072 | |
| | | 810 | 1909.8 | 29.3 | | | 1 |

**Body-worn & -hotspot SAR with 10 mm separation**

| Test position | Mode | Ch No. | Freq. (MHz) | Avg Pwr (dBm) | SAR (mW/g) | | Note |
|---|---|---|---|---|---|---|---|
| | | | | | 1-g | 10-g | |
| Rear (Back) | GPRS 2 Slot | 512 | 1850.2 | 27.6 | | | 1 |
| | | 661 | 1880.0 | 27.6 | 0.552 | 0.303 | |
| | | 810 | 1909.8 | 27.6 | | | 1 |
| | | 661 | 1880.0 | 27.6 | **0.560** | 0.310 | 2 |
| Front | GPRS 2 Slot | 512 | 1850.2 | 27.6 | | | 1 |
| | | 661 | 1880.0 | 27.6 | 0.401 | 0.241 | |
| | | 810 | 1909.8 | 27.6 | | | 1 |
| Left | GPRS 2 Slot | 512 | 1850.2 | 27.6 | | | 1 |
| | | 661 | 1880.0 | 27.6 | 0.062 | 0.037 | |
| | | 810 | 1909.8 | 27.6 | | | 1 |
| Right | GPRS 2 Slot | 512 | 1850.2 | 27.6 | | | 1 |
| | | 661 | 1880.0 | 27.6 | 0.118 | 0.070 | |
| | | 810 | 1909.8 | 27.6 | | | 1 |
| Bottom | GPRS 2 Slot | 512 | 1850.2 | 27.6 | | | 1 |
| | | 661 | 1880.0 | 27.6 | 0.395 | 0.224 | |
| | | 810 | 1909.8 | 27.6 | | | 1 |
| Top | GPRS 2 Slot | 512 | 1850.2 | 27.6 | | | 3 |
| | | 661 | 1880.0 | 27.6 | | | 3 |
| | | 810 | 1909.8 | 27.6 | | | 3 |

**Note(s):**

1. SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC “Public Notice DA 02-1438” by the SCC-34/SC-2. Testing in the low and high channel is optional.
2. With headset attached
3. SAR is not required due to antenna-to-top edge’s distance is greater than 2.5 cm.

## 12.3. UMTS (WCDMA) Band V)

**Head SAR**

| Test Position | Mode | UL Ch #. | Freq. (MHz) | Avg Pwr (dBm) | SAR (mW/g) | | Note |
|---|---|---|---|---|---|---|---|
| | | | | | 1-g | 10-g | |
| Left Touch | R99 (RMC, 12.2 kbps) | 4133 | 826.6 | 23.1 | | | 1 |
| | | 4183 | 836.6 | 23.1 | 0.235 | 0.175 | |
| | | 4232 | 842.4 | 23.0 | | | 1 |
| Left Tilt | R99 (RMC, 12.2 kbps) | 4133 | 826.6 | 23.1 | | | 1 |
| | | 4183 | 836.6 | 23.1 | 0.139 | 0.106 | |
| | | 4232 | 842.4 | 23.0 | | | 1 |
| Right Touch | R99 (RMC, 12.2 kbps) | 4133 | 826.6 | 23.1 | | | 1 |
| | | 4183 | 836.6 | 23.1 | 0.303 | 0.224 | |
| | | 4232 | 842.4 | 23.0 | | | 1 |
| Right Tilt | R99 (RMC, 12.2 kbps) | 4133 | 826.6 | 23.1 | | | 1 |
| | | 4183 | 836.6 | 23.1 | 0.156 | 0.118 | |
| | | 4232 | 842.4 | 23.0 | | | 1 |

**Body-worn & Body-hotspot SAR with 10 mm separation distance**

| Test Position | Mode | UL Ch #. | Freq. (MHz) | Avg Pwr (dBm) | SAR (mW/g) | | Note |
|---|---|---|---|---|---|---|---|
| | | | | | 1-g | 10-g | |
| Rear (Back) | R99 (RMC, 12.2 kbps) | 4132 | 826.4 | 23.1 | | | 1 |
| | | 4183 | 836.6 | 23.1 | 0.462 | 0.332 | |
| | | 4233 | 846.6 | 23.0 | | | 1 |
| | | 4183 | 836.6 | 23.1 | 0.358 | 0.244 | 2 |
| Front | R99 (RMC, 12.2 kbps) | 4132 | 826.4 | 23.1 | | | 1 |
| | | 4183 | 836.6 | 23.1 | 0.242 | 0.179 | |
| | | 4233 | 846.6 | 23.0 | | | |
| Left | R99 (RMC, 12.2 kbps) | 4132 | 826.4 | 23.1 | | | 1 |
| | | 4183 | 836.6 | 23.1 | 0.097 | 0.067 | |
| | | 4233 | 846.6 | 23.0 | | | 1 |
| Right | R99 (RMC, 12.2 kbps) | 4132 | 826.4 | 23.1 | | | 1 |
| | | 4183 | 836.6 | 23.1 | 0.189 | 0.130 | |
| | | 4233 | 846.6 | 23.0 | | | 1 |
| Bottom | R99 (RMC, 12.2 kbps) | 4132 | 826.4 | 23.1 | | | 1 |
| | | 4183 | 836.6 | 23.1 | 0.065 | 0.039 | |
| | | 4233 | 846.6 | 23.0 | | | 1 |
| Top | R99 (RMC, 12.2 kbps) | 4132 | 826.4 | 23.1 | | | 3 |
| | | 4183 | 836.6 | 23.1 | | | 3 |
| | | 4233 | 846.6 | 23.0 | | | 3 |

**Note(s):**

1. SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC “Public Notice DA 02-1438” by the SCC-34/SC-2. Testing in the low and high channel is optional.
2. With headset attached.
3. SAR is not required due to antenna-to-top edge’s distance is greater than 2.5 cm.

## 12.4. WiFi

**Head SAR**

| Test position | Mode | Ch No. | Freq. (MHz) | Avg Pwr (dBm) | SAR (mW/g) | | Note |
|---|---|---|---|---|---|---|---|
| | | | | | 1-g | 10-g | |
| Left Touch | 802.11b | 1 | 2412 | 16.1 | | | 1 |
| | | 6 | 2437 | 16.4 | **0.263** | 0.122 | |
| | | 11 | 2462 | 16.0 | | | 1 |
| Left Tilt | 802.11b | 1 | 2412 | 16.1 | | | 1 |
| | | 6 | 2437 | 16.4 | 0.137 | 0.064 | |
| | | 11 | 2462 | 16.0 | | | 1 |
| Right Touch | 802.11b | 1 | 2412 | 16.1 | | | 1 |
| | | 6 | 2437 | 16.4 | 0.130 | 0.065 | |
| | | 11 | 2462 | 16.0 | | | 1 |
| Right Tilt | 802.11b | 1 | 2412 | 16.1 | | | 1 |
| | | 6 | 2437 | 16.4 | 0.081 | 0.039 | |
| | | 11 | 2462 | 16.0 | | | 1 |

**Body-worn & Body-hotspot SAR with 10 mm separation distance**

| Test position | Mode | Ch No. | Freq. (MHz) | Avg Pwr (dBm) | SAR (mW/g) | | Note |
|---|---|---|---|---|---|---|---|
| | | | | | 1-g | 10-g | |
| Rear (Back) | 802.11b | 1 | 2412 | 16.1 | | | 1 |
| | | 6 | 2437 | 16.4 | **0.280** | 0.147 | |
| | | 11 | 2462 | 16.0 | | | 1 |
| | | 6 | 2437 | 16.4 | 0.258 | 0.136 | 2 |
| Front | 802.11b | 1 | 2412 | 16.1 | | | 1 |
| | | 6 | 2437 | 16.4 | 0.057 | 0.032 | |
| | | 11 | 2462 | 16.0 | | | 1 |
| Left | 802.11b | 1 | 2412 | 16.1 | | | 1 |
| | | 6 | 2437 | 16.4 | 0.031 | 0.016 | |
| | | 11 | 2462 | 16.0 | | | 1 |
| Right | 802.11b | 1 | 2412 | 16.1 | | | 3 |
| | | 6 | 2437 | 16.4 | 0.104 | 0.057 | |
| | | 11 | 2462 | 16.0 | | | 3 |
| Bottom | 802.11b | 1 | 2412 | 16.1 | | | 3 |
| | | 6 | 2437 | 16.4 | | | 3 |
| | | 11 | 2462 | 16.0 | | | 3 |
| Top | 802.11b | 1 | 2412 | 16.1 | | | 1 |
| | | 6 | 2437 | 16.4 | 0.118 | 0.058 | |
| | | 11 | 2462 | 16.0 | | | 1 |

**Note(s):**

1. SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC “Public Notice DA 02-1438” by the SCC-34/SC-2. Testing in the low and high channel is optional.
2. With headset attached.
3. SAR is not required due to antenna-to-left/bottom edge’s distances are greater than 2.5 cm.

# 13. Summary of Highest 1g SAR

| FCC rule part | Technology | Test configuration | Mode | Sep. distance (mm) | Highest 1g SAR (W/kg) |
|---|---|---|---|---|---|
| 22H | GSM850 | Head: Right touch | GSM voice | - | **0.317** |
| | | Body-worn & -hotspot: Rear | GPRS 2 Slot, CS1 | 10 | **0.769** |
| | UMTS (WCDMA) Band V | Head: Right touch | R99 (RMC, 12.2 kbps) | - | 0.303 |
| | | Body-worn & -hotspot: Rear | R99 (RMC, 12.2 kbps) | 10 | 0.462 |
| 24E | GSM1900 | Head Right Touch | GSM Voice | - | **0.418** |
| | | Body-worn & -hotspot: Rear | GPRS 2 Slot, CS1 | 10 | **0.560** |
| 15.247 | WiFi 2.4 GHz | Head: Left touch | 802.11b, 1 Mbps | - | **0.263** |
| | | Body-worn & -hotspot: Rear | 802.11b, 1 Mbps | 10 | **0.280** |

# 14. Worst-case SAR Plots

Date/Time: 8/16/2011 4:52:51 PM

Test Laboratory: UL CCS SAR Lab D

## GSM850_Right Hand Side

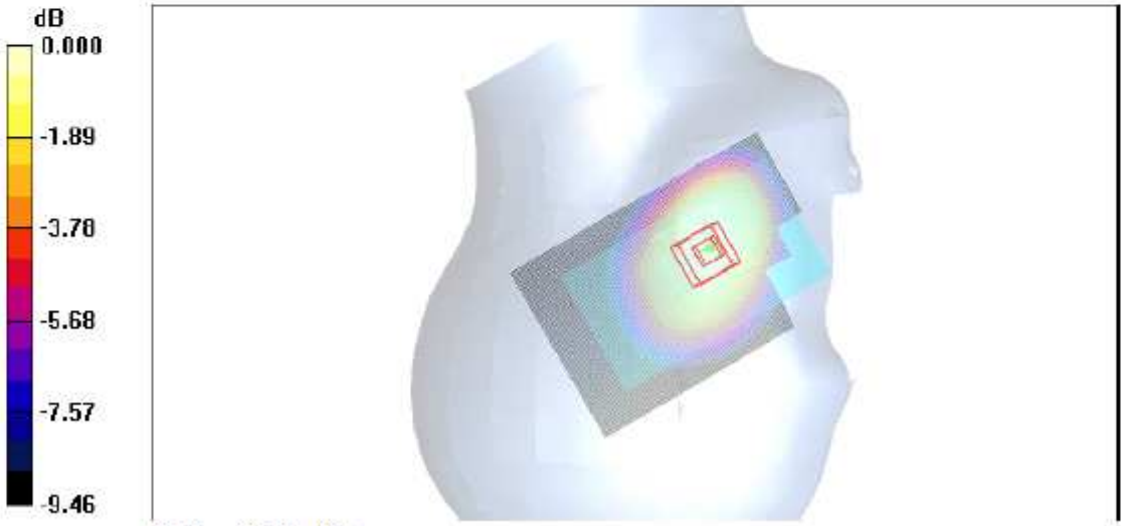
Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:8
Medium parameters used (interpolated): f = 836.6 MHz; $\sigma$ = 0.898 mho/m; $\varepsilon_r$ = 43.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(8.82, 8.82, 8.82); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1259; Calibrated: 5/3/2011
- Phantom: SAM A (Twin); Type: SAM A; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Touch_M ch/Area Scan (61x91x1):** Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.371 mW/g

**Touch_M ch/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.0 V/m; Power Drift = -0.051 dB
Peak SAR (extrapolated) = 0.412 W/kg
**SAR(1 g) = 0.317 mW/g; SAR(10 g) = 0.234 mW/g**
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.364 mW/g



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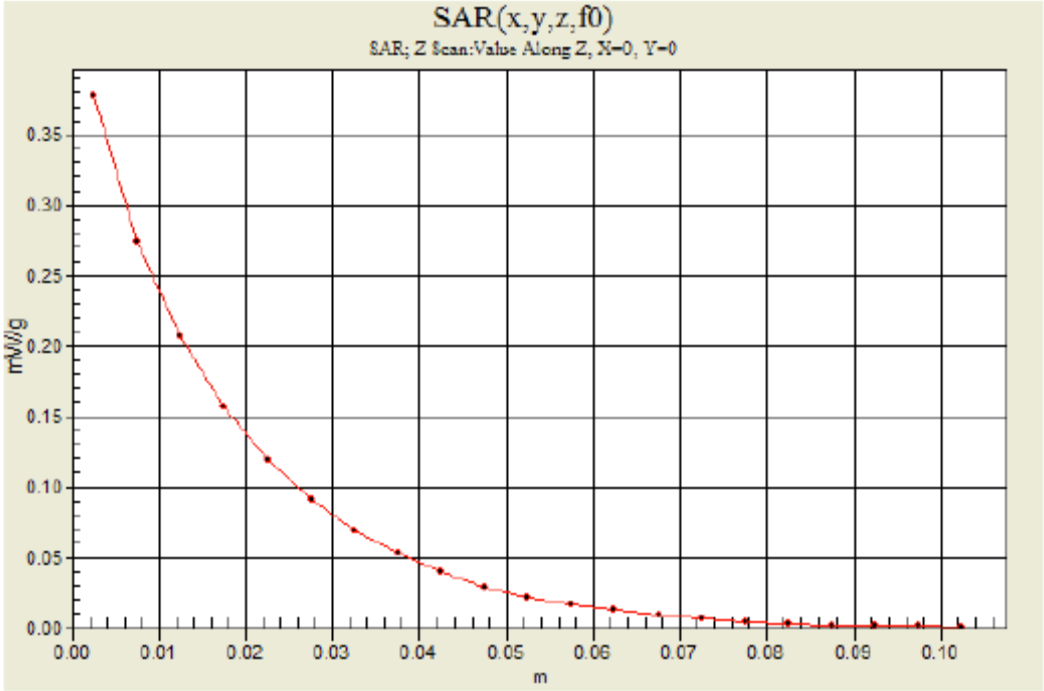
Test Laboratory: UL CCS SAR Lab D

## GSM850_Right Hand Side

Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:8

**Touch_M ch/Z Scan (1x1x21):** Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.378 mW/g



Date/Time: 8/21/2011 9:30:37 PM

Test Laboratory: UL CCS SAR Lab D

## GPRS850 2 slot_Body

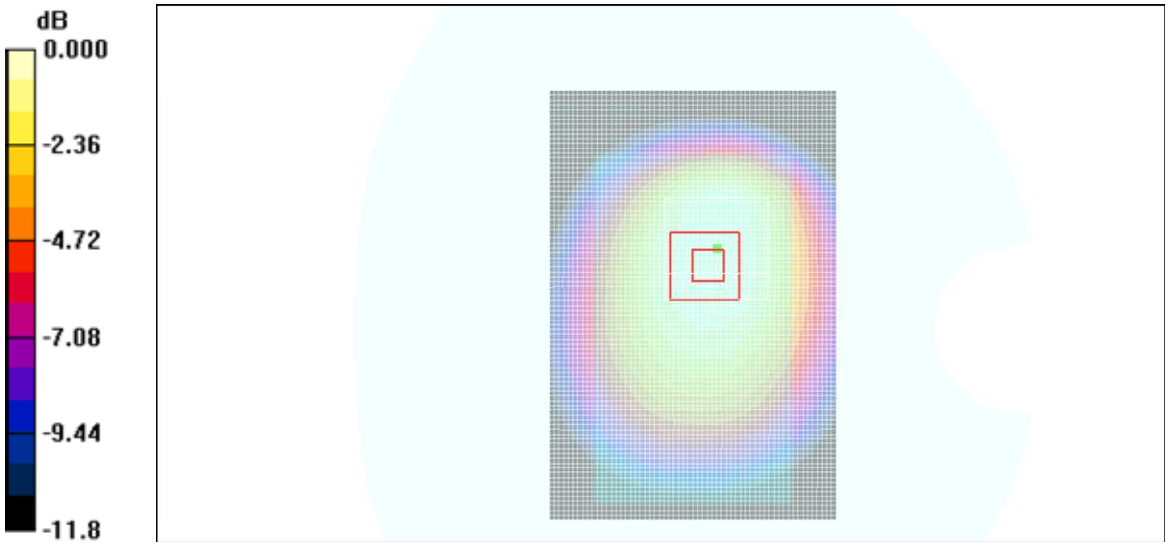
Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:4
Medium parameters used (interpolated): f = 836.6 MHz; $\sigma$ = 0.975 mho/m; $\varepsilon_r$ = 54.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(8.79, 8.79, 8.79); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1259; Calibrated: 5/3/2011
- Phantom: SAM B (Twin); Type: SAM B; Serial: TP-105
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Back side_M ch_2 solt/Area Scan (61x91x1):** Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.919 mW/g

**Back side_M ch_2 solt/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.7 V/m; Power Drift = -0.089 dB
Peak SAR (extrapolated) = 1.04 W/kg
**SAR(1 g) = 0.769 mW/g; SAR(10 g) = 0.553 mW/g**
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.882 mW/g




0 dB = 0.882mW/g

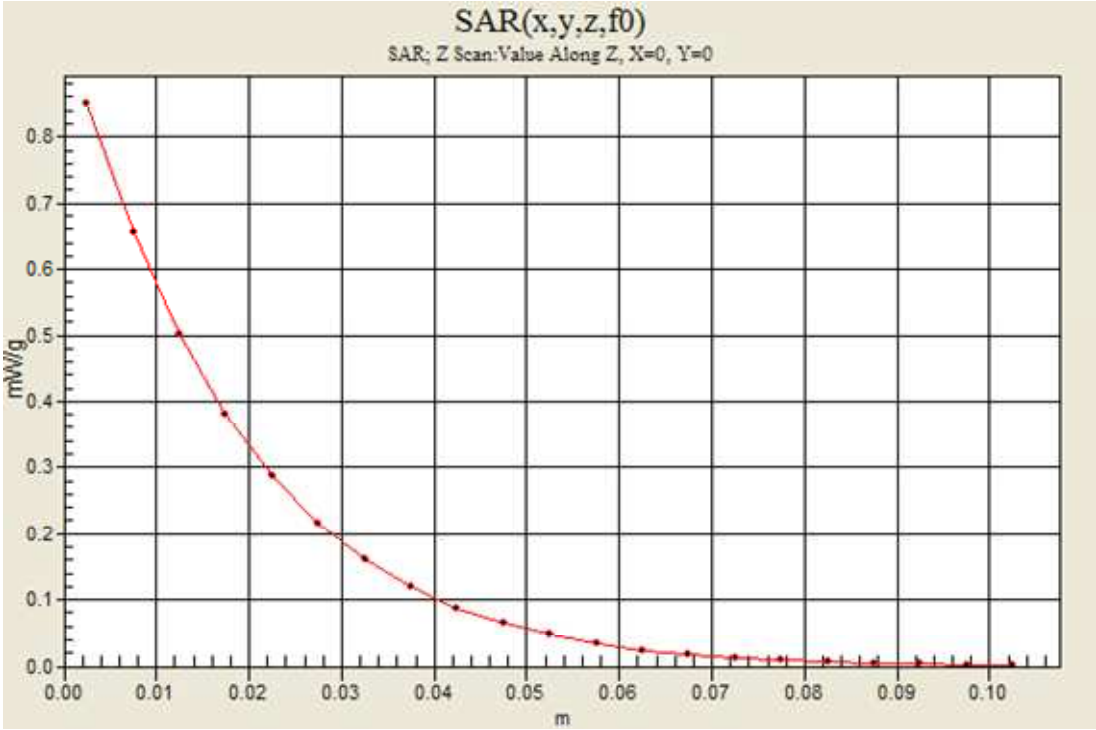
Date/Time: 8/21/2011 9:39:49 PM

Test Laboratory: UL CCS SAR Lab D

## GPRS850 2 slot_Body

Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:4

**Back side_M ch_2 solt/Z Scan (1x1x21):** Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.851 mW/g



Date/Time: 8/16/2011 3:28:30 PM

Test Laboratory: UL CCS SAR Lab D

## UMTS band V_Right Hand Side

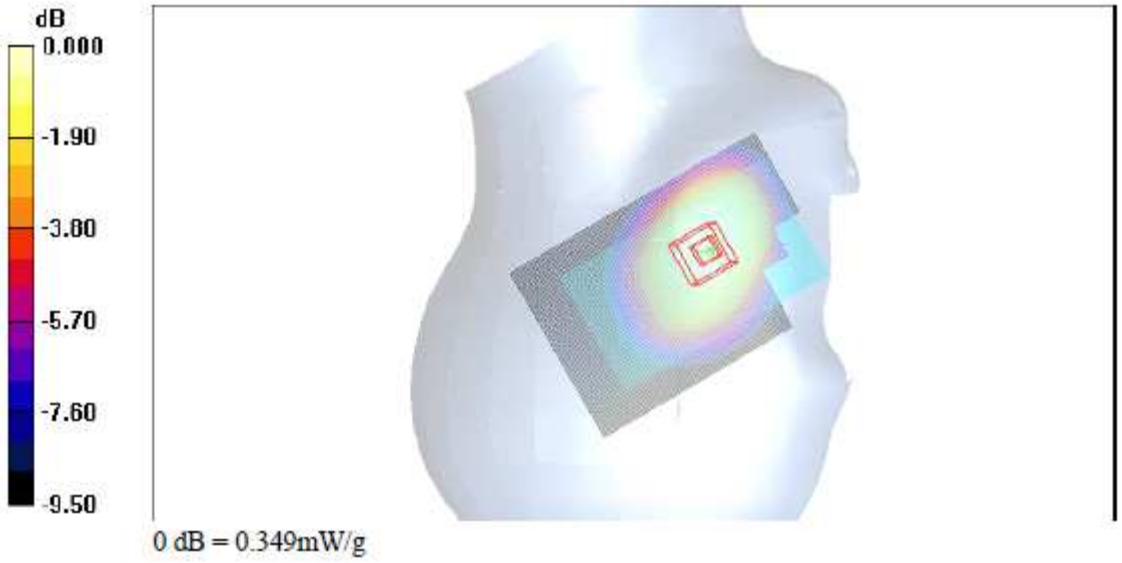
Communication System: UMTS Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; $\sigma$ = 0.898 mho/m; $\varepsilon_r$ = 43.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(8.82, 8.82, 8.82); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1259; Calibrated: 5/3/2011
- Phantom: SAM A (Twin); Type: SAM A; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Touch_M ch/Area Scan (61x91x1):** Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.360 mW/g

**Touch_M ch/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.5 V/m; Power Drift = -0.008 dB
Peak SAR (extrapolated) = 0.396 W/kg
**SAR(1 g) = 0.303 mW/g; SAR(10 g) = 0.224 mW/g**
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.349 mW/g




0 dB = 0.349mW/g

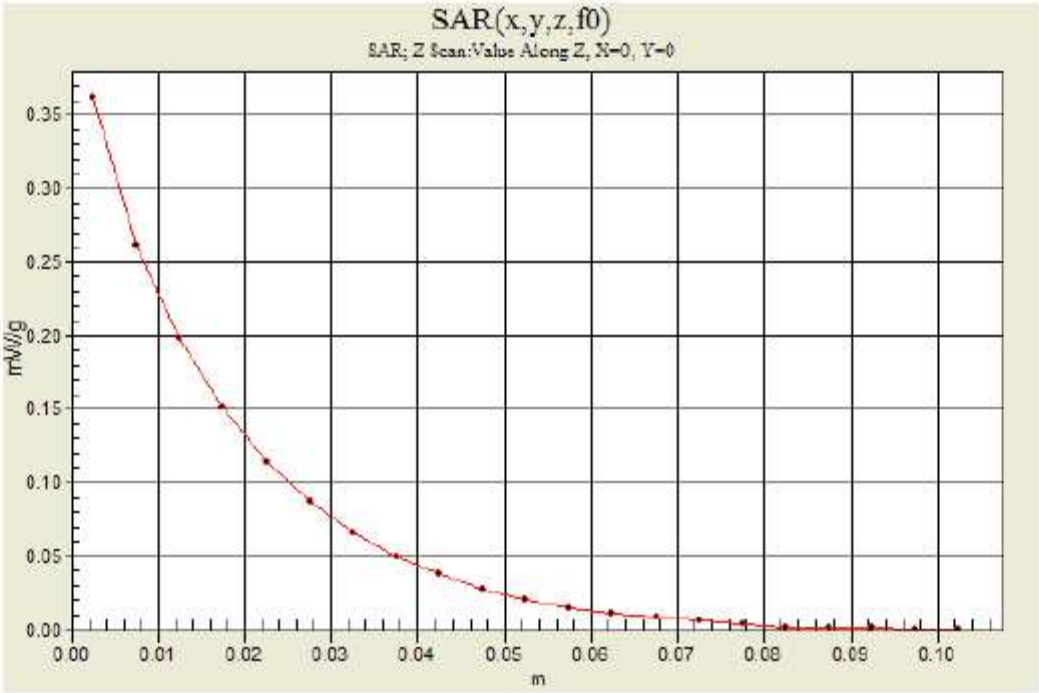
Date/Time: 8/16/2011 3:40:44 PM

Test Laboratory: UL CCS SAR Lab D

## UMTS band V_Right Hand Side

Communication System: UMTS Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1

**Touch_M ch/Z Scan (1x1x21):** Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.362 mW/g



Date/Time: 8/22/2011 4:01:08 PM

Test Laboratory: UL CCS SAR Lab D

## UMTS band V_Body

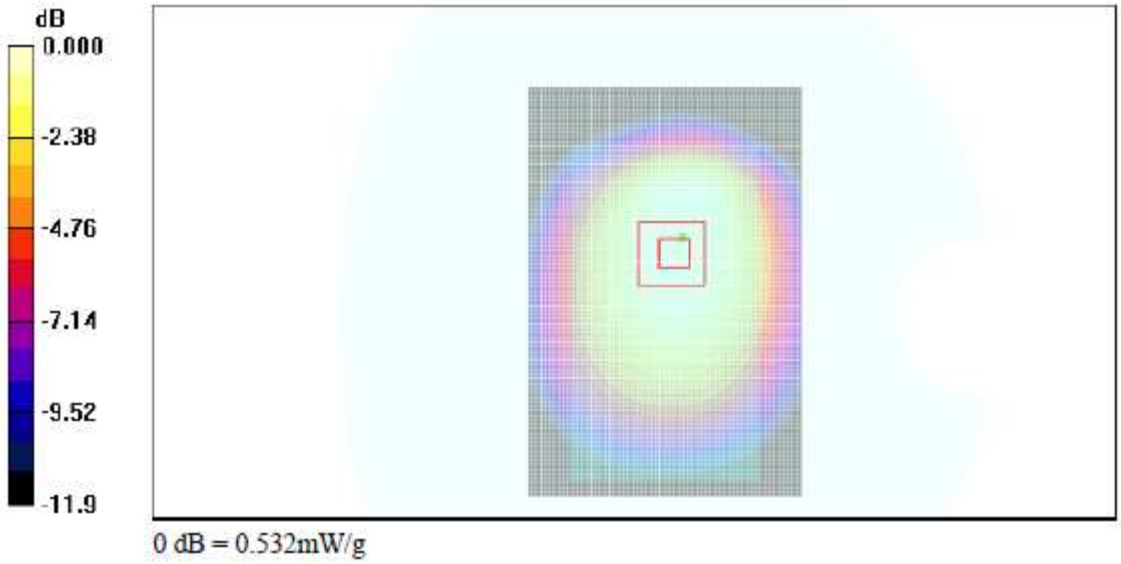
Communication System: UMTS Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; $\sigma$ = 0.982 mho/m; $\varepsilon_r$ = 54.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(8.79, 8.79, 8.79); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1259; Calibrated: 5/3/2011
- Phantom: SAM B (Twin); Type: SAM B; Serial: TP-105
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Back side_M ch/Area Scan (61x91x1):** Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.545 mW/g

**Back side_M ch/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.4 V/m; Power Drift = -0.137 dB
Peak SAR (extrapolated) = 0.625 W/kg
**SAR(1 g) = 0.462 mW/g; SAR(10 g) = 0.332 mW/g**
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.532 mW/g




0 dB = 0.532mW/g

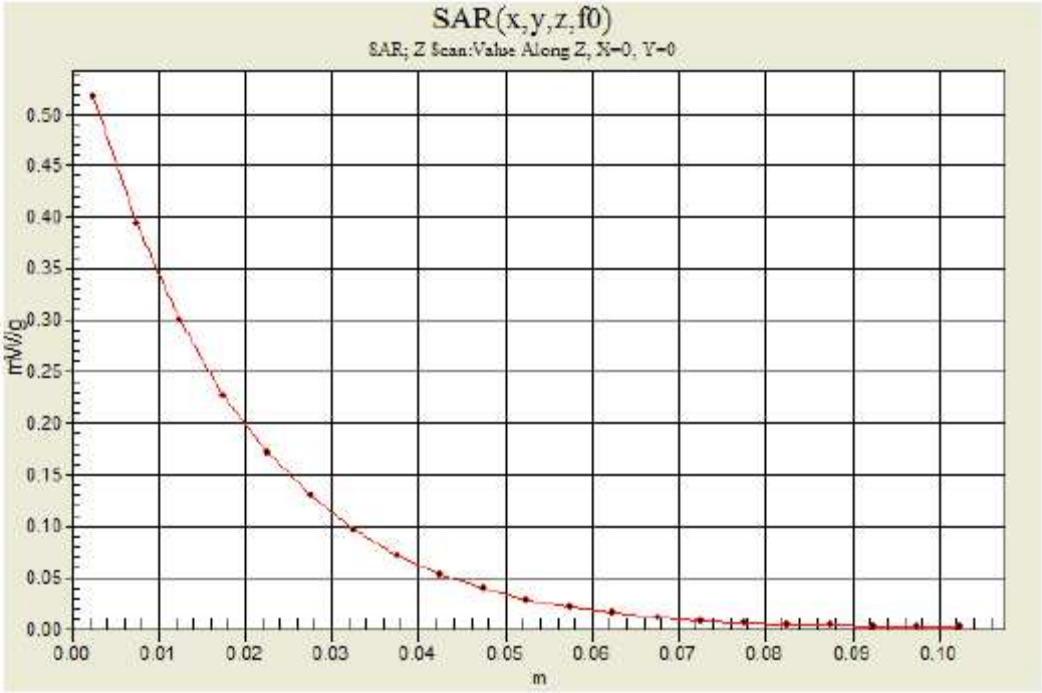
Date/Time: 8/22/2011 4:10:19 PM

Test Laboratory: UL CCS SAR Lab D

## UMTS band V_Body

Communication System: UMTS Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1

**Back side_M ch/Z Scan (1x1x21):** Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.518 mW/g



Date/Time: 8/12/2011 12:09:11 AM

Test Laboratory: UL CCS SAR Lab D

## PCS1900_Right Hand Side

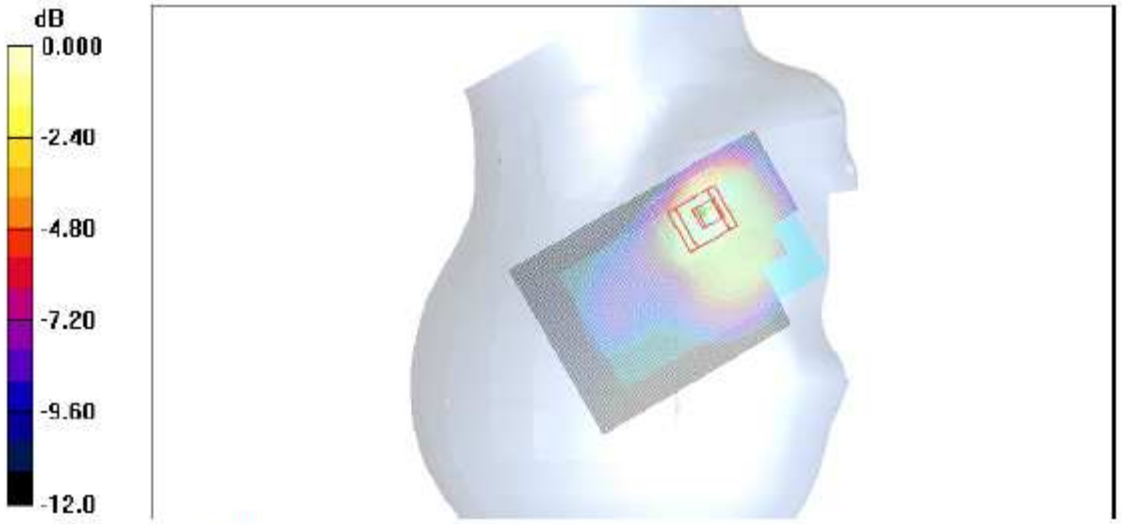
Communication System: PCS1900; Frequency: 1880 MHz;Duty Cycle: 1:8
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.38 mho/m; $\varepsilon_r$ = 38.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(7.36, 7.36, 7.36); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1259; Calibrated: 5/3/2011
- Phantom: SAM A (Twin); Type: SAM A; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Touch_M ch/Area Scan (61x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.474 mW/g

**Touch_M ch/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.3 V/m; Power Drift = 0.080 dB
Peak SAR (extrapolated) = 0.707 W/kg
**SAR(1 g) = 0.418 mW/g; SAR(10 g) = 0.232 mW/g**
Maximum value of SAR (measured) = 0.522 mW/g




0 dB = 0.522mW/g

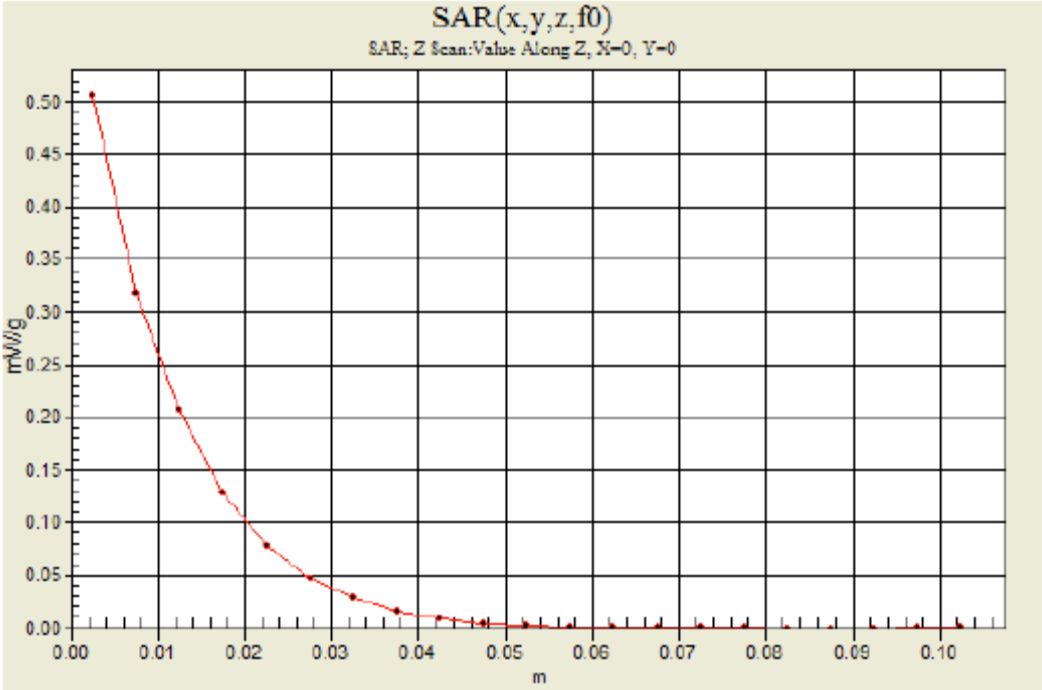
Date/Time: 8/12/2011 12:21:33 AM

Test Laboratory: UL CCS SAR Lab D

## PCS1900_Right Hand Side

Communication System: PCS1900; Frequency: 1880 MHz;Duty Cycle: 1:8

**Touch_M ch/Z Scan (1x1x21):** Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.506 mW/g



Date/Time: 8/12/2011 1:46:38 AM

Test Laboratory: UL CCS SAR Lab D

## GPRS1900_Body

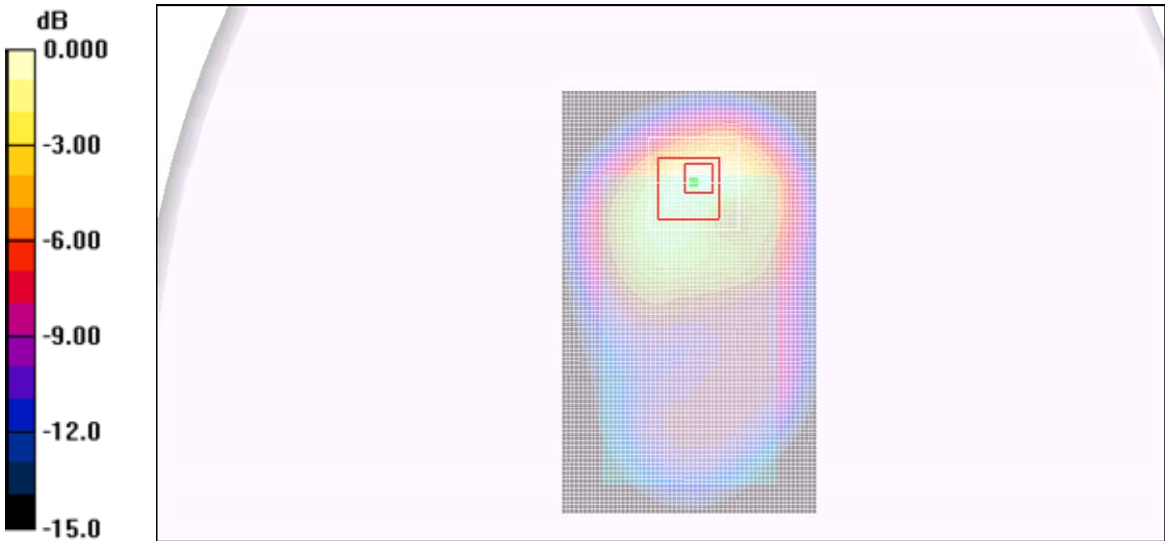
Communication System: GPRS1900; Frequency: 1880 MHz;Duty Cycle: 1:4
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.47 mho/m; $\varepsilon_r$ = 52.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(7.33, 7.33, 7.33); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1259; Calibrated: 5/3/2011
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: 1017
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Back side_M ch_2 solt w/headset/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.748 mW/g

**Back side_M ch_2 solt w/headset/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.8 V/m; Power Drift = -0.092 dB
Peak SAR (extrapolated) = 0.917 W/kg
**SAR(1 g) = 0.560 mW/g; SAR(10 g) = 0.310 mW/g**
Maximum value of SAR (measured) = 0.739 mW/g




0 dB = 0.739mW/g

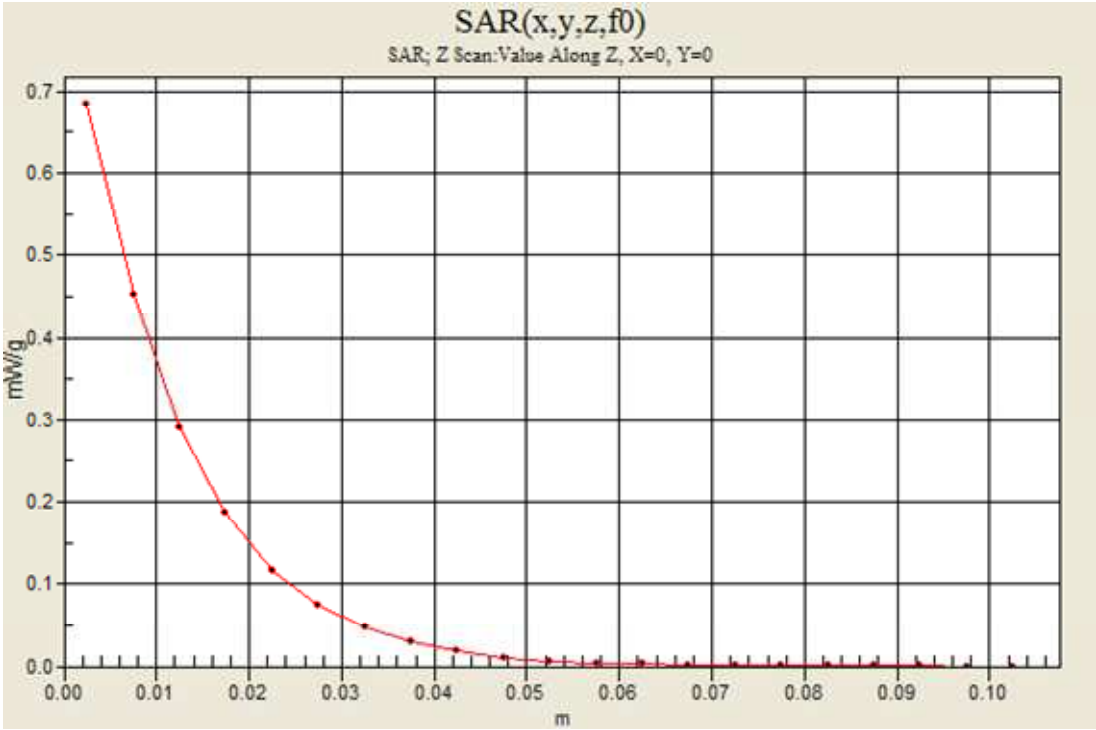
Date/Time: 8/12/2011 1:56:23 AM

Test Laboratory: UL CCS SAR Lab D

## GPRS1900_Body

Communication System: GPRS1900; Frequency: 1880 MHz;Duty Cycle: 1:4

**Back side_M ch_2 solt w/headset/Z Scan (1x1x21):** Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.684 mW/g



Date/Time: 8/15/2011 10:57:05 PM

Test Laboratory: UL CCS SAR Lab D

## WiFi_Left Hand Side

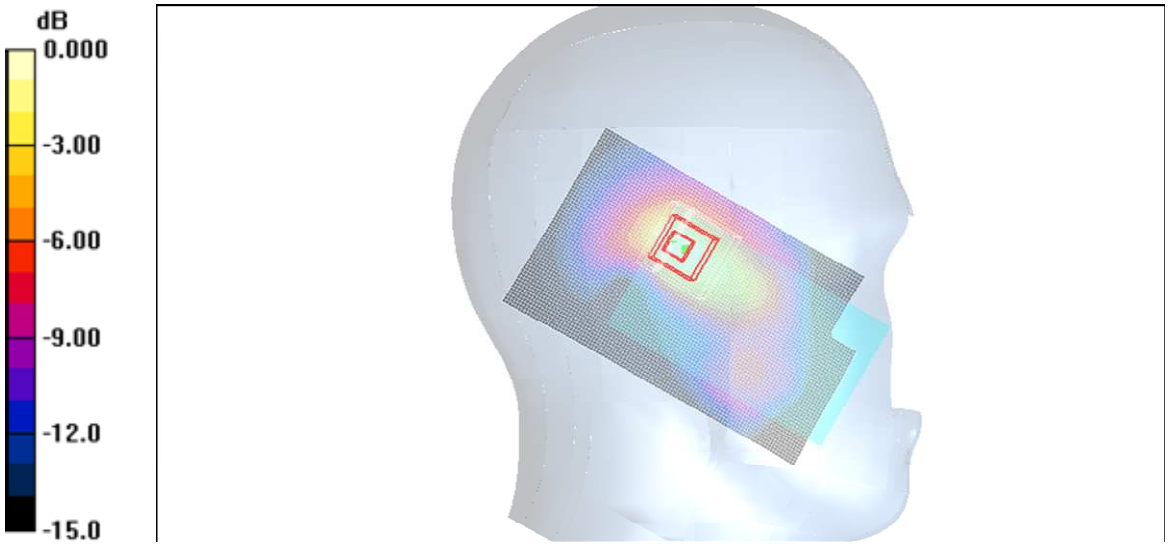
Communication System: 802.11b/g 2.4GHz; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; $\sigma$ = 1.77 mho/m; $\varepsilon_r$ = 40.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(6.69, 6.69, 6.69); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1259; Calibrated: 5/3/2011
- Phantom: SAM B (Twin); Type: SAM B; Serial: TP-105
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Touch_M ch/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.331 mW/g

**Touch_M ch/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.7 V/m; Power Drift = -0.102 dB
Peak SAR (extrapolated) = 0.531 W/kg
**SAR(1 g) = 0.263 mW/g; SAR(10 g) = 0.122 mW/g**
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.359 mW/g




0 dB = 0.359mW/g

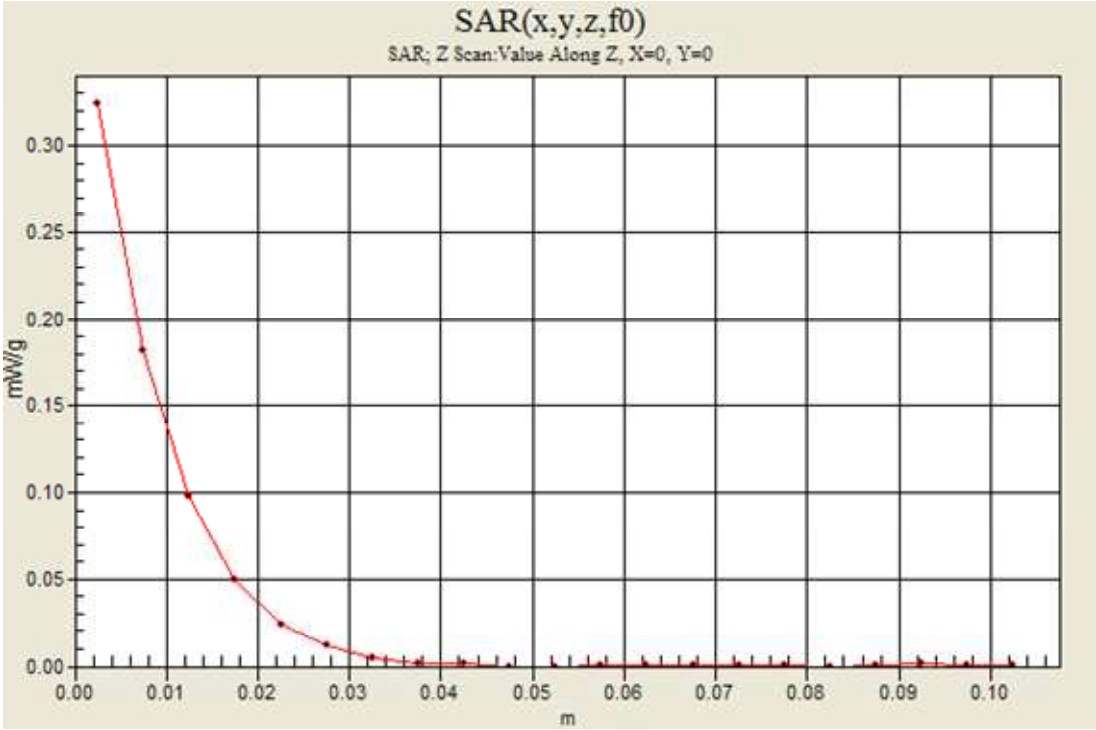
Date/Time: 8/15/2011 11:10:35 PM

Test Laboratory: UL CCS SAR Lab D

## WiFi_Left Hand Side

Communication System: 802.11b/g 2.4GHz; Frequency: 2437 MHz;Duty Cycle: 1:1

**Touch_M ch/Z Scan (1x1x21):** Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.324 mW/g



Date/Time: 8/14/2011 5:54:40 PM

Test Laboratory: UL CCS SAR Lab D

## WiFi_Body

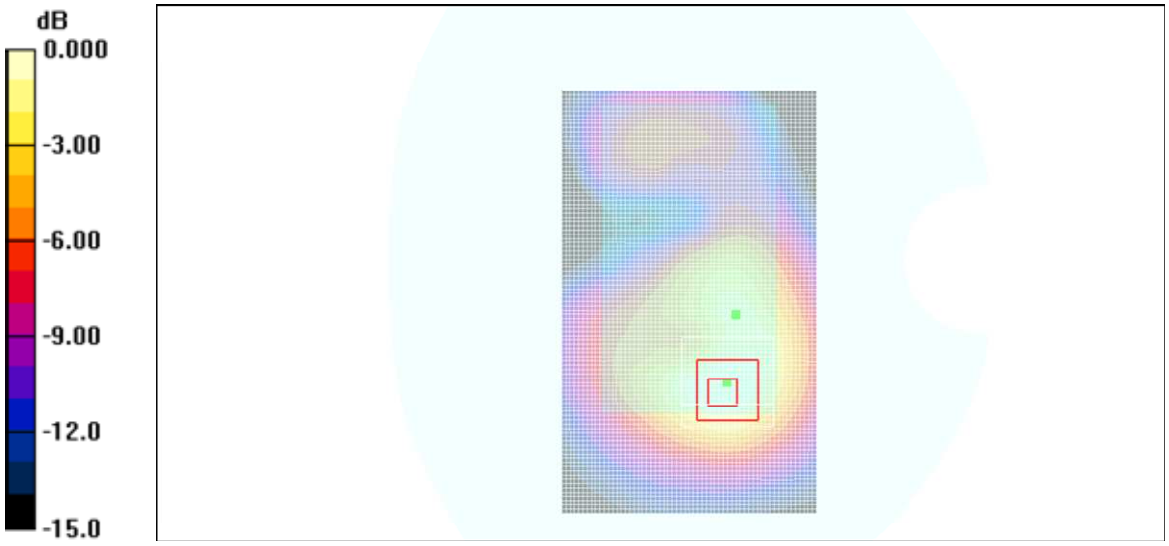
Communication System: 802.11b/g 2.4GHz; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; $\sigma$ = 1.95 mho/m; $\varepsilon_r$ = 51.2; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(6.9, 6.9, 6.9); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1259; Calibrated: 5/3/2011
- Phantom: SAM B (Twin); Type: SAM B; Serial: TP-105
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Back side_M ch/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.368 mW/g

**Back side_M ch/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.7 V/m; Power Drift = -0.050 dB
Peak SAR (extrapolated) = 0.537 W/kg
**SAR(1 g) = 0.280 mW/g; SAR(10 g) = 0.147 mW/g**
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.352 mW/g




0 dB = 0.352mW/g

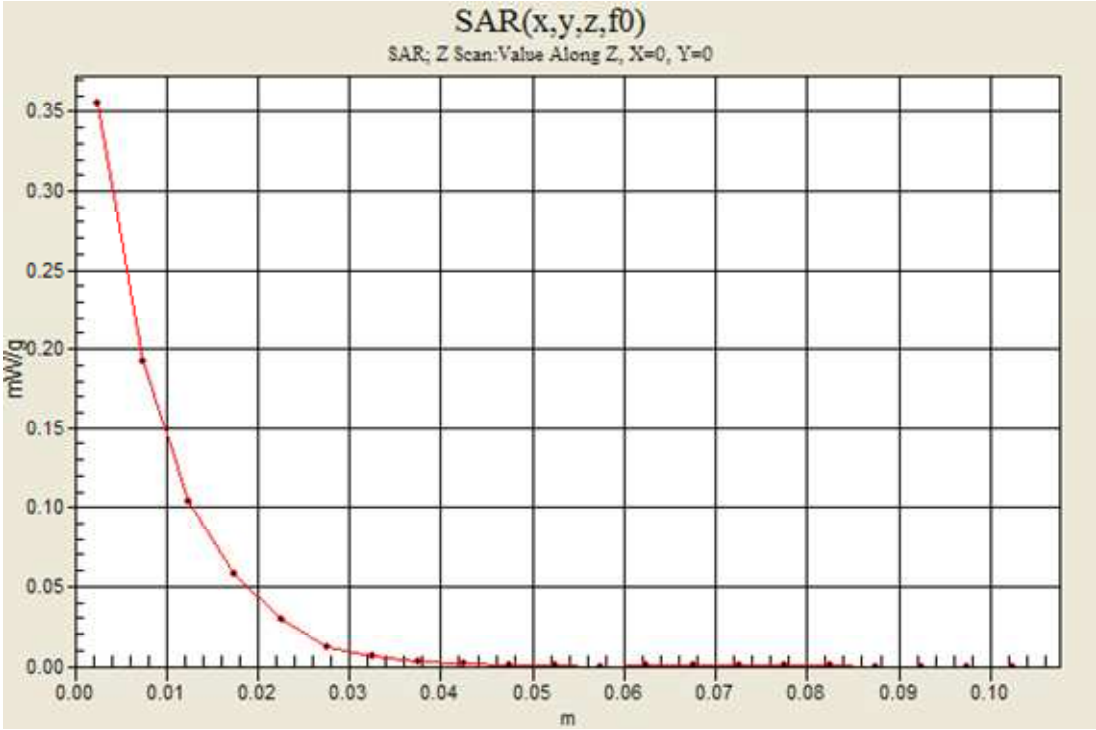
Date/Time: 8/14/2011 6:07:04 PM

Test Laboratory: UL CCS SAR Lab D

## WiFi_Body

Communication System: 802.11b/g 2.4GHz; Frequency: 2437 MHz;Duty Cycle: 1:1

**Back side_M ch/Z Scan (1x1x21):** Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.355 mW/g



# 15. Simultaneous Transmission SAR Analysis (KDB 648474)

## 15.1. Head Exposure Condition

| Test configuration | (1) GSM850 | (2) GSM1900 | (3) UMTS (WCDMA) Band V | (4) UMTS (WCDMA) Band II | (5) WiFi | Sum of 1g SAR (mW/g) |
|---|---|---|---|---|---|---|
| Left Touch | 0.249 | | | | 0.263 | 0.512 |
| | | 0.224 | | | 0.263 | 0.487 |
| | | | 0.235 | | 0.263 | 0.498 |
| | | | | | 0.263 | 0.263 |
| Left Tilt | 0.153 | | | | 0.137 | 0.290 |
| | | 0.135 | | | 0.137 | 0.272 |
| | | | 0.139 | | 0.137 | 0.276 |
| | | | | | 0.137 | 0.137 |
| Right Touch | 0.317 | | | | 0.130 | 0.447 |
| | | 0.418 | | | 0.130 | 0.548 |
| | | | 0.303 | | 0.130 | 0.433 |
| | | | | | 0.130 | 0.130 |
| Right Tilt | 0.165 | | | | 0.081 | 0.246 |
| | | 0.131 | | | 0.081 | 0.212 |
| | | | 0.156 | | 0.081 | 0.237 |
| | | | | | 0.081 | 0.081 |

**Conclusions:**

☒ Simultaneous transmission SAR is not required because the sum of the 1-g SAR is < 1.6 W/kg

☐ Simultaneous transmission SAR is not required because the SAR to peak location separation ratios (SPLSR) is < 0.3 for WiFi and WWAN antenna pairs.

## 15.2. Body-worn & hotspot exposure condition

| Test configuration | (1) GSM850 | (2) GSM1900 | (3) UMTS (WCDMA) Band V | (4) UMTS (WCDMA) Band II | (5) WiFi | Sum of 1g SAR (mW/g) |
|---|---|---|---|---|---|---|
| Rear | 0.769 | | | | 0.280 | **1.049** |
| | | 0.56 | | | 0.280 | 0.840 |
| | | | 0.462 | | 0.280 | **0.742** |
| Front | 0.413 | | | | 0.053 | 0.466 |
| | | 0.401 | | | 0.053 | 0.454 |
| | | | 0.242 | | 0.053 | 0.295 |
| Left | 0.177 | | | | 0.004 | 0.181 |
| | | 0.062 | | | 0.004 | 0.066 |
| | | | 0.097 | | 0.004 | 0.101 |
| Right | 0.314 | | | | 0.061 | 0.375 |
| | | 0.118 | | | 0.061 | 0.179 |
| | | | 0.189 | | 0.061 | 0.250 |
| Bottom | 0.106 | | | | 0.000 | 0.106 |
| | | 0.395 | | | 0.000 | 0.395 |
| | | | 0.065 | | 0.000 | 0.065 |

**Conclusions:**

☒ Simultaneous transmission SAR is not required because the sum of the 1-g SAR is < 1.6 W/kg

☐ Simultaneous transmission SAR is not required because the SAR to peak location separation ratios (SPLSR) is < 0.3 for WiFi and WWAN antenna pairs.

# 16. Appendixes

**Refer to separated files for the following appendixes.**

**16.1. Appendix A: System check plots**

**16.2. Appendix B: SAR test plots for GSM850**

**16.3. Appendix C: SAR test plots for GSM1900**

**16.4. Appendix D: SAR test plots for UMTS Band V**

**16.5. Appendix E: SAR test plots for WiFi**

**16.6. Appendix F: Calibration certificate for E-Field Probe EX3DV4 SN 3749**

**16.7. Appendix G: Calibration Certificate for D835V2 - SN 4d117**

**16.8. Appendix H: Calibration certificate for D1900V2 SN 5d140**

**16.9. Appendix I: Calibration certificate for D2450V2 SN: 706 w/ extended cal. data**