**FCC OET BULLETIN 65 SUPPLEMENT C**

**CLASS II PERMISSIVE CHANGE**

**IC RSS-102 ISSUE 3**

# SAR EVALUATION REPORT

*For*

**Cellular/PCS GSM/EDGE/WCDMA with 802.11 b/g/n 1x1 AR5B95 Mini PCI Transmitter Card**

**(Tested inside of Notebook PC, Model NP-N130)**

**MODEL NUMBER: Y3100**

**FCC ID: A3LSWDY3100**

**IC ID: 649E-SWDY3100**

**REPORT NUMBER: 09I12737-3**

**ISSUE DATE: August 17, 2009**

*Prepared for*

**SAMSUNG ELECTRONICS CO., LTD.**
**416 MAETAN 3-DONG,**
**YEONGTONG-GU,SUWON-CITY, GYEONGGI-DO**
**443-742 KOREA**

*Prepared by*

**COMPLIANCE CERTIFICATION SERVICES**
**47173 BENICIA STREET**
**FREMONT, CA 94538, U.S.A.**
**TEL: (510) 771-1000**
**FAX: (510) 661-0888**

NVLAP LAB CODE 200065-0

## Revision History

| Rev. | Issue Date | Revisions | Revised By |
|---|---|---|---|
| -- | August 17, 2009 | Initial Issue | -- |

# TABLE OF CONTENTS

# 1. ATTESTATION OF TEST RESULTS

| | |
|---|---|
| **COMPANY NAME:** | SAMSUNG ELECTRONICS CO., LTD.<br>416 MAETAN 3-DONG,<br>YEONGTONG-GU,SUWON-CITY, GYEONGGI-DO<br>443-742 KOREA |
| **EUT DESCRIPTION:** | Cellular/PCS GSM/EDGE/WCDMA with 802.11 b/g/n 1x1 AR5B95 Mini PCI Transmitter Card<br>(Tested inside of Notebook PC, Model NP-N130) |
| **MODEL NUMBER:** | Y3100 |
| **DEVICE CATEGORY:** | Portable |
| **EXPOSURE CATEGORY:** | General Population/Uncontrolled Exposure |
| **DATE TESTED:** | August 5 - 13, 2009 |

**THE HIGHEST SAR VALUES:**

| FCC / IC Rule Parts | Frequency Range [MHz] | The Highest SAR Values (1g_mW/g) | Limit (mW/g) |
|---|---|---|---|
| 22H / RSS-132 | 824 - 849 | 0.024 | 1.6 |
| 24E / RSS-133 | 1850 - 1910 | 0.034 | |
| 15.247 / RSS-102 | 2400 – 2483.5 | 0.041 | |

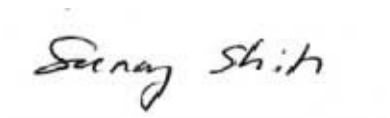
**APPLICABLE STANDARDS AND TEST PROCEDURES:**

| STANDARDS AND TEST PROCEDURES | TEST RESULTS |
|---|---|
| • FCC OET Bulletin 65 Supplement C and the following specific Test Procedures:<br>o KDB 941225 SAR test for 3G devices<br>o KDB 248227 SAR Measurement Procedure for 820.11abg Transmitters<br>o KDB 447498 Mobile Portable RF Exposure<br>o KDB 616217 Laptop Computer SAR Procedures | Pass |

Compliance Certification Services, Inc. (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 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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by 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.

Approved & Released For CCS By:



SUNNY SHIH
ENGINEERING SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

CHAO YEN LIN
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C and the following specific FCC Test Procedures.

- KDB 941225 D01 SAR test for 3G devices
- KDB 447498 D01 Mobile Portable RF Exposure
- KDB 248227 SAR Measurement Procedure for 820.11abg Transmitters
- KDB 616217 Laptop Computer SAR Procedures

# 3. FACILITIES AND ACCREDITATION

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

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.

| | | | | | | |
|---|---|---|---|---|---|---|
| Robot Remote Control | Stäubli | CS7MB | 3403-91535 | N/A | | |
| DASY4 Measurement Server | SPEAG | SEUMS001BA | 1041 | N/A | | |
| Probe Alignment Unit | SPEAG | LB (V2) | 261 | N/A | | |
| SAM Phantom (SAM1) | SPEAG | QD000P40CA | 1185 | N/A | | |
| SAM Phantom (SAM2) | SPEAG | QD000P40CA | 1050 | N/A | | |
| Oval Flat Phantom (ELI 4.0) | SPEAG | QD OVA001 B | 1003 | N/A | | |
| Electronic Probe kit | HP | 85070C | N/A | N/A | | |
| S-Parameter Network Analyzer | Agilent | 8753ES-6 | MY40001647 | 11 | 14 | 2009 |
| Signal Generator | Agilent | 8753ES-6 | MY40001647 | 11 | 14 | 2009 |
| E-Field Probe | SPEAG | EX3DV4 | 3686 | 3 | 23 | 2010 |
| Thermometer | ERTCO | 639-1S | 1718 | 5 | 1 | 2010 |
| Data Acquisition Electronics | SPEAG | DAE3 V1 | 427 | 10 | 20 | 2009 |
| System Validation Dipole | SPEAG | D835V2 | 4d002 | 4 | 23 | 2011 |
| System Validation Dipole | SPEAG | D900V2 | 108 | 1 | 21 | 2010 |
| System Validation Dipole | SPEAG | D1800V2 | 294 | 1 | 29 | 2010 |
| System Validation Dipole | SPEAG | D1900V2 | 5d043 | 1 | 29 | 2010 |
| System Validation Dipole | SPEAG | D2450V2 | 748 | 4 | 14 | 2010 |
| System Validation Dipole | SPEAG | D5GHzV2 | 1003 | 11 | 21 | 2009 |
| MXA Signal Analyzer | Agilent | N9020A | US48350984 | 10 | 23 | 2009 |
| ESG Vector Signal Generator | Agilent | E4438C | US44271090 | 9 | 17 | 2010 |
| Power Meter | Giga-tronics | 8651A | 8651404 | 1 | 11 | 2010 |
| Power Sensor | Giga-tronics | 80701A | 1834588 | 1 | 11 | 2010 |
| Amplifier | Mini-Circuits | ZVE-8G | 90606 | N/A | | |
| Amplifier | Mini-Circuits | ZHL-42W | D072701-5 | N/A | | |
| Simulating Liquid | CCS | H1900 | N/A | Within 24 hrs of first test | | |
| Simulating Liquid | CCS | M1900 | N/A | Within 24 hrs of first test | | |
| Simulating Liquid | CCS | H1800 | N/A | Within 24 hrs of first test | | |
| Simulating Liquid | CCS | M1800 | N/A | Within 24 hrs of first test | | |
| Simulating Liquid | CCS | H1700 | N/A | Within 24 hrs of first test | | |
| Simulating Liquid | CCS | M1700 | N/A | Within 24 hrs of first test | | |
| Simulating Liquid | CCS | H835 | N/A | Within 24 hrs of first test | | |
| Simulating Liquid | CCS | M835 | N/A | Within 24 hrs of first test | | |
| Simulating Liquid | CCS | H900 | N/A | Within 24 hrs of first test | | |
| Simulating Liquid | CCS | M900 | N/A | Within 24 hrs of first test | | |
| Simulating Liquid | SPAEG | H2450 | N/A | Within 24 hrs of first test | | |
| Simulating Liquid | SPAEG | M2450 | N/A | Within 24 hrs of first test | | |

## 4.2. MEASUREMENT UNCERTAINTY

Measurement uncertainty for 300 MHz – 3000 MHz

| Uncertainty component | Tol. (±%) | Probe Dist. | Div. | Ci (1g) | Ci (10g) | Std. Unc.(±%) | |
|---|---|---|---|---|---|---|---|
| | | | | | | Ui (1g) | Ui(10g) |
| **Measurement System** | | | | | | | |
| Probe Calibration | 4.80 | N | 1 | 1 | 1 | 4.80 | 4.80 |
| Axial Isotropy | 4.70 | R | 1.732 | 0.707 | 0.707 | 1.92 | 1.92 |
| Hemispherical Isotropy | 9.60 | R | 1.732 | 0.707 | 0.707 | 3.92 | 3.92 |
| Boundary Effects | 1.00 | R | 1.732 | 1 | 1 | 0.58 | 0.58 |
| Linearity | 4.70 | R | 1.732 | 1 | 1 | 2.71 | 2.71 |
| System Detection Limits | 1.00 | R | 1.732 | 1 | 1 | 0.58 | 0.58 |
| Readout Electronics | 1.00 | N | 1 | 1 | 1 | 1.00 | 1.00 |
| Response Time | 0.80 | R | 1.732 | 1 | 1 | 0.46 | 0.46 |
| Integration Time | 2.60 | R | 1.732 | 1 | 1 | 1.50 | 1.50 |
| RF Ambient Conditions - Noise | 1.59 | R | 1.732 | 1 | 1 | 0.92 | 0.92 |
| RF Ambient Conditions - Reflections | 0.00 | R | 1.732 | 1 | 1 | 0.00 | 0.00 |
| Probe Positioner Mechnical Tolerance | 0.40 | R | 1.732 | 1 | 1 | 0.23 | 0.23 |
| Probe Positioning With Respect to Phantom Shell | 2.90 | R | 1.732 | 1 | 1 | 1.67 | 1.67 |
| Extrapolation, interpolation, and integration algorithms for max. SAR evaluation | 3.90 | R | 1.732 | 1 | 1 | 2.25 | 2.25 |
| **Test sample Related** | | | | | | | |
| Test Sample Positioning | 1.10 | N | 1 | 1 | 1 | 1.10 | 1.10 |
| Device Holder Uncertainty | 3.60 | N | 1 | 1 | 1 | 3.60 | 3.60 |
| Power and SAR Drift Measurement | 5.00 | R | 1.732 | 1 | 1 | 2.89 | 2.89 |
| **Phantom and Tissue Parameters** | | | | | | | |
| Phantom Uncertainty | 4.00 | R | 1.732 | 1 | 1 | 2.31 | 2.31 |
| Liquid Conductivity - Target | 5.00 | R | 1.732 | 0.64 | 0.43 | 1.85 | 1.24 |
| Liquid Conductivity - Meas. | 8.60 | N | 1 | 0.64 | 0.43 | 5.50 | 3.70 |
| Liquid Permittivity - Target | 5.00 | R | 1.732 | 0.6 | 0.49 | 1.73 | 1.41 |
| Liquid Permittivity - Meas. | 3.30 | N | 1 | 0.6 | 0.49 | 1.98 | 1.62 |
| | | | | | | | |
| **Combined Standard Uncertainty** | RSS | | | | | 11.44 | 10.49 |
| **Expanded Uncertainty (95% Confidence Interval)** | K=2 | | | | | 22.87 | 20.98 |

Notesfor table
1. Tol. - tolerance in influence quaitity
2. N - Nomal
3. R - Rectangular
4. Div. - Divisor used to obtain standard uncertainty
5. Ci - is te sensitivity coefficient

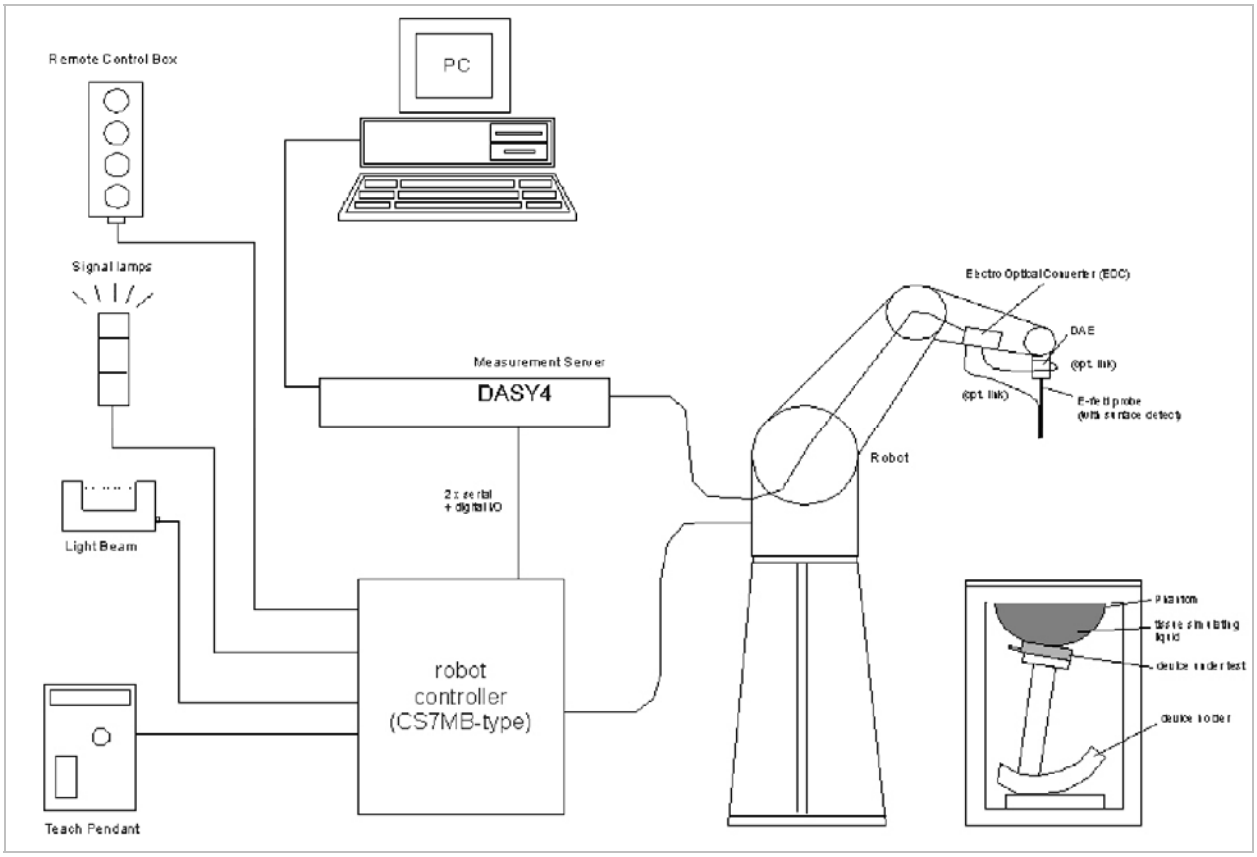
# 5. EQUIPMENT UNDER TEST

Cellular/PCS GSM/EDGE/WCDMA with 802.11 b/g/n 1x1 AR5B95 Mini PCI Transmitter Card

(Tested inside of Notebook PC, Model NP-N130)

| | |
|---|---|
| Normal operation: | Lap-held only<br>Note: SAR test with display open at 90° to the keyboard |
| Antenna(s): | Located at top of the display:<br>WWAN Main Antenna by WNC, 81.EJV-15.G07<br>WLAN Main Antenna by WNC, 81.EHD15.005<br>WLAN Aux Antenna by Foxconn, WDAN-M1WC1001-DF |
| Other radio modules in host: | 802.11bg |
| Co-located Tx: | • WWAN can transmit simultaneously with 802.11g<br>• WWAN can transmit simultaneously with Bluetooth<br>• 802.11g can transmit simultaneously with Bluetooth |
| Antenna to antenna separation distances: | 11.0 cm between WiFi, Main antenna and WWAN Main antenna.<br>8.2 cm between WiFi, Aux antenna and WWAN Main antenna. |

# 6. SYSTEM SPECIFICATIONS




**The DASY4 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.
- DASY4 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 to validate the proper functioning of the system.

# 7. COMPOSITION OF INGREDIENTS FOR TISSUE 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 | | 915 | | 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

# 8. LIQUID PARAMETERS CHECK

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. The relative permittivity and conductivity of the tissue material should be within ± 5% of the values given in the table below.

**Reference Values of Tissue Dielectric Parameters for Head and Body Phantom (for 150 – 3000 MHz and 5800 MHz)**

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in IEEE Standard 1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and 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 |
| 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 |
| 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 |
| 5800 | 35.3 | 5.27 | 48.2 | 6 |

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

## 8.1. LIQUID CHECK RESULTS FOR 1900 MHZ

Simulating Liquid Dielectric Parameters for Muscle 1900 MHz

Room Ambient Temperature = 24°C; Relative humidity = 35% Measured by: Chaoyen Lin

| f (MHz) | Muscle Liquid Parameters | | | Measured | Target | Delta (%) | Limit (%) |
|---|---|---|---|---|---|---|---|
| 1900 | e' | 53.309 | Relative Permittivity ($\epsilon_r$): | 53.3092 | 53.3 | 0.02 | ± 5 |
| | e" | 14.357 | Conductivity (σ): | 1.51748 | 1.52 | -0.17 | ± 5 |

Liquid temperature: 23 deg. C
August 05, 2009 02:20 PM

| Frequency | e' | e" |
|---|---|---|
| 1710000000 | 53.74 | 13.76 |
| 1720000000 | 53.9216 | 13.8364 |
| 1730000000 | 53.9482 | 13.9275 |
| 1740000000 | 53.9638 | 13.9978 |
| 1750000000 | 53.9807 | 14.0406 |
| 1760000000 | 53.9042 | 14.067 |
| 1770000000 | 53.828 | 14.0567 |
| 1780000000 | 53.7384 | 14.0035 |
| 1790000000 | 53.64 | 13.985 |
| 1800000000 | 53.5704 | 14.0268 |
| 1810000000 | 53.4861 | 14.0785 |
| 1820000000 | 53.4164 | 14.1401 |
| 1830000000 | 53.3935 | 14.2267 |
| 1840000000 | 53.3859 | 14.3439 |
| 1850000000 | 53.3937 | 14.4178 |
| 1860000000 | 53.3508 | 14.4493 |
| 1870000000 | 53.3274 | 14.4232 |
| 1880000000 | 53.3463 | 14.3658 |
| 1890000000 | 53.323 | 14.3252 |
| **1900000000** | **53.3092** | **14.3566** |
| 1910000000 | 53.2072 | 14.4524 |

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

*where* $f$ = target f * $10^6$

$\varepsilon_0 = 8.854 * 10^{-12}$

## 8.2. LIQUID CHECK RESULTS FOR 835 MHZ

Simulating Liquid Dielectric Parameters for Muscle 900 MHz

Room Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Chaoyen Lin

| f (MHz) | Liquid Parameters | | | Measured | Target | Delta (%) | Limit (%) |
|---|---|---|---|---|---|---|---|
| 835 | e' | 53.78 | Relative Permittivity ($\epsilon_r$): | 53.776 | 55.2 | -2.58 | ± 5 |
| | e" | 21.07 | Conductivity (σ): | 0.979 | 0.97 | 0.88 | ± 5 |
| 900 | e' | 53.33 | Relative Permittivity ($\epsilon_r$): | 53.330 | 55.0 | -3.04 | ± 5 |
| | e" | 20.83 | Conductivity (σ): | 1.043 | 1.05 | -0.67 | ± 5 |

Liquid temperature: 23 deg. C
August 10, 2009 09:35 AM

| Frequency | e' | e" |
|---|---|---|
| 800000000 | 54.2514 | 21.2512 |
| 805000000 | 54.1562 | 21.2266 |
| 810000000 | 54.0908 | 21.1865 |
| 815000000 | 54.0237 | 21.1699 |
| 820000000 | 53.9634 | 21.1066 |
| 825000000 | 53.9168 | 21.0945 |
| 830000000 | 53.8438 | 21.0977 |
| **835000000** | **53.776** | **21.0662** |
| 840000000 | 53.7094 | 21.0347 |
| 845000000 | 53.6763 | 21.0023 |
| 850000000 | 53.6449 | 21.0021 |
| 855000000 | 53.5874 | 20.9575 |
| 860000000 | 53.5508 | 20.9379 |
| 865000000 | 53.5279 | 20.924 |
| 870000000 | 53.4859 | 20.8853 |
| 875000000 | 53.4588 | 20.8839 |
| 880000000 | 53.4382 | 20.8693 |
| 885000000 | 53.4069 | 20.8799 |
| 890000000 | 53.3842 | 20.8556 |
| 895000000 | 53.3475 | 20.8473 |
| **900000000** | **53.3297** | **20.8317** |
| 905000000 | 53.2705 | 20.8012 |
| 910000000 | 53.2148 | 20.7903 |
| 915000000 | 53.1273 | 20.7614 |
| 920000000 | 53.096 | 20.7159 |
| 925000000 | 53.0476 | 20.6776 |
| 930000000 | 53.0044 | 20.6121 |
| 935000000 | 52.9324 | 20.5994 |
| 940000000 | 52.8874 | 20.5761 |
| 945000000 | 52.8554 | 20.5578 |
| 950000000 | 52.8326 | 20.5359 |

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

*where* $f$ = target f * $10^6$

$\varepsilon_0 = 8.854 * 10^{-12}$

## 8.3. LIQUID CHECK RESULTS FOR 2450 MHZ

Simulating Liquid Dielectric Parameters for Muscle 2450 MHz

Room Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Chaoyen Lin

| f (MHz) | Liquid Parameters | | | Measured | Target | Delta (%) | Limit (%) |
|---|---|---|---|---|---|---|---|
| 2450 | e' | 52.15 | Relative Permittivity ($\epsilon_r$): | 52.153 | 52.7 | -1.04 | ± 5 |
| | e" | 14.17 | Conductivity (σ): | 1.931 | 1.95 | -0.96 | ± 5 |

Liquid Temperature: 23 deg. C
August 12, 2009 08:32 AM

| Frequency | e' | e" |
|---|---|---|
| 2400000000 | 52.2453 | 13.9407 |
| 2405000000 | 52.2308 | 14.0401 |
| 2410000000 | 52.2245 | 14.107 |
| 2415000000 | 52.2154 | 14.174 |
| 2420000000 | 52.1986 | 14.1871 |
| 2425000000 | 52.1996 | 14.193 |
| 2430000000 | 52.1917 | 14.1916 |
| 2435000000 | 52.1806 | 14.1756 |
| 2440000000 | 52.1945 | 14.1878 |
| 2445000000 | 52.1726 | 14.1895 |
| **2450000000** | **52.1532** | **14.1693** |
| 2455000000 | 52.0831 | 14.1505 |
| 2460000000 | 52.0534 | 14.1102 |
| 2465000000 | 51.985 | 14.0749 |
| 2470000000 | 51.9539 | 14.0219 |
| 2475000000 | 51.9291 | 13.9911 |
| 2480000000 | 51.9358 | 13.9757 |
| 2485000000 | 51.9459 | 13.9975 |
| 2490000000 | 51.9558 | 14.0648 |
| 2495000000 | 51.959 | 14.1411 |
| 2500000000 | 51.9646 | 14.2676 |

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

*where* $f$ = target f * $10^6$

$\varepsilon_0 = 8.854 * 10^{-12}$

# 9. SYSTEM CHECK

The system performance check is performed prior to any usage of the system in order to guarantee reproducible results. 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 Isotropic E-Field Probe EX3DV3 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 250 mW±3%.
- The results are normalized to 1 W input power.

IEEE Standard 1528-2003 Numerical reference SAR values (W/kg) for reference dipole and flat phantom

| Frequency (MHz) | Distance (mm) | 1g SAR [W/kg] | 10g SAR [W/kg] | Local SAR at surface (above feed-point) |
|---|---|---|---|---|
| 300 | 15 | 3 | 2 | 4.4 |
| 450 | 15 | 4.9 | 3.3 | 7.2 |
| 835 | 15 | 9.5 | 6.2 | 4.1 |
| 900 | 15 | 10.8 | 6.9 | 16.4 |
| 1450 | 10 | 29 | 16 | 5.02 |
| 1800 | 10 | 38.1 | 19.8 | 69.5 |
| 1900 | 10 | 39.7 | 20.5 | 72.1 |
| 2000 | 10 | 41.1 | 21.1 | 74.6 |
| 2450 | 10 | 52.4 | 24 | 104.2 |
| 3000 | 10 | 63.8 | 25.7 | 104.2 |

Note: All SAR values normalized to 1 W forward power.

## 9.1. SYSTEM CHECK RESULTS FOR D1900V2

System Validation Dipole: D1900V2 SN: 5d043

Date: August 05, 2009

Ambient Temperature = 24°C; Relative humidity = 35% Measured by: Chaoyen Lin

| Medium | CW Signal (MHz) | Forward power (mW) | Measured (Normalized to 1 W) | | Target | Delta (%) | Tolerance (%) |
|---|---|---|---|---|---|---|---|
| Body | 1900 | 250 | 1g SAR: | 39.2 | 39.8 | -1.51 | ±10 |
| | | | 10g SAR: | 20.5 | 20.8 | -1.44 | |

## 9.2. SYSTEM CHECK RESULTS FOR D835V2

**System Validation Dipole: D835V2 SN:4d002**

Date: August 10, 2009

Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Chaoyen Lin

| Medium | CW Signal (MHz) | Forward power (mW) | Measured (Normalized to 1 W) | | Target | Delta (%) | Tolerance (%) |
|---|---|---|---|---|---|---|---|
| Body | 835 | 250 | 1g SAR: | 10.2 | 9.71 | 5.05 | ±10 |
| | | | 10g SAR: | 6.69 | 6.38 | 4.86 | |

## 9.3. SYSTEM CHECK RESULTS FOR D2450V2

System Validation Dipole: D2450V2 SN: 748

Date: August 12, 2009

Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Chaoyen Lin

| Medium | CW Signal (MHz) | Forward power (mW) | Measured (Normalized to 1 W) | | Target | Delta (%) | Tolerance (%) |
|---|---|---|---|---|---|---|---|
| Body | 2450 | 250 | 1g SAR: | 52.9 | 51.2 | 3.32 | ±10 |
| | | | 10g SAR: | 25.3 | 23.7 | 6.75 | |

# 10. OUTPUT POWER VERIFICATION

## 10.1. GSM

**GPRS (GMSK) - Coding Scheme: MCS4**

| Band | Ch. No. | f (MHz) | Conducted output power (dBm) | | | |
|---|---|---|---|---|---|---|
| | | | 1 slot | 2 slot | 3 slot | 4 slot |
| GSM850 | 128 | 824.2 | 32.4 | 32.3 | 29.2 | 28.1 |
| | 190 | 836.6 | 32.4 | 32.5 | 29.4 | 28.1 |
| | 251 | 848.8 | 32.3 | 32.4 | 29.3 | 28.0 |
| GSM1900 | 512 | 1850.2 | 28.1 | 28.1 | 25.9 | 24.8 |
| | 661 | 1880 | 28.2 | 28.3 | 26.1 | 24.7 |
| | 810 | 1909.8 | 28.1 | 28.0 | 26.1 | 24.7 |

**EGPRS (8PSK) - Coding scheme: MCS9**

| Band | Ch. No. | f (MHz) | Conducted output power (dBm) | | | |
|---|---|---|---|---|---|---|
| | | | 1 slot | 2 slot | 3 slot | 4 slot |
| GSM850 | 128 | 824.2 | 27.3 | 27.2 | 23.5 | 22.7 |
| | 190 | 836.6 | 27.4 | 27.2 | 24.0 | 23.0 |
| | 251 | 848.8 | 27.4 | 27.2 | 23.7 | 22.6 |
| GSM1900 | 512 | 1850.2 | 26.1 | 26.0 | 22.2 | 20.9 |
| | 661 | 1880 | 26.3 | 26.1 | 22.0 | 20.9 |
| | 810 | 1909.8 | 26.0 | 26.2 | 21.9 | 21.0 |

## 10.2. UMTS Rel 99

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

| | Mode | Rel99 |
|---|---|---|
| | Subtest | - |
| WCDMA General Settings | Loopback Mode | Test Mode 1 |
| | Rel99 RMC | 12.2kbps RMC |
| | HSDPA FRC | Not Applicable |
| | HSUPA Test | Not Applicable |
| | Power Control Algorithm | Algorithm2 |
| | βc | Not Applicable |
| | βd | Not Applicable |
| | βec | Not Applicable |
| | βc/βd | 8/15 |
| | βhs | Not Applicable |
| | βed | Not Applicable |

Results

**Rel 99 (12.2kps RMC)**

| Band | Mode | UL Ch No. | DL Ch No. | f (MHz) | O/P Power (dBm) |
|---|---|---|---|---|---|
| UMTS1900 (Band II) | Rel 99 12.2kps RMC | 9262 | 9662 | 1852.4 | 22.9 |
| | | 9400 | 9800 | 1880.0 | 23.0 |
| | | 9538 | 9938 | 1907.6 | 22.8 |

## 10.3. UMTS Rel 6 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 | Rel6 HSDPA | Rel6 HSDPA | Rel6 HSDPA | Rel6 HSDPA |
|---|---|---|---|---|---|
| | Subtest | 1 | 2 | 3 | 4 |
| WCDMA General Settings | Loopback Mode | Test Mode 1 | | | |
| | Rel99 RMC | 12.2kbps RMC | | | |
| | HSDPA FRC | H-Set1 | | | |
| | HSUPA Test | Not Applicable | | | |
| | 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 | | | |
| | βec | - | - | - | - |
| | βc/βd | 2/15 | 12/15 | 15/8 | 15/4 |
| | βhs | 4/15 | 24/15 | 30/15 | 30/15 |
| | βed | Not Applicable | | | |
| | CM (dB) | 0 | 1 | 1.5 | 1.5 |
| | MPR (dB) | 0 | 0 | 0.5 | 0.5 |
| HSDPA Specific Settings | DACK | 8 | | | |
| | DNAK | 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

**Rel 6 HSDPA**

| Band | Mode | UL Ch No. | DL Ch No. | f (MHz) | O/P Power (dBm) |
|---|---|---|---|---|---|
| UMTS1900 (Band II) | Subtest 1 | 9262 | 9662 | 1852.4 | 21.7 |
| | | 9400 | 9800 | 1880.0 | 21.7 |
| | | 9538 | 9938 | 1907.6 | 21.6 |
| | Subtest 2 | 9262 | 9662 | 1852.4 | 21.7 |
| | | 9400 | 9800 | 1880.0 | 21.7 |
| | | 9538 | 9938 | 1907.6 | 21.8 |
| | Subtest 3 | 9262 | 9662 | 1852.4 | 21.2 |
| | | 9400 | 9800 | 1880.0 | 21.3 |
| | | 9538 | 9938 | 1907.6 | 21.0 |
| | Subtest 4 | 9262 | 9662 | 1852.4 | 21.4 |
| | | 9400 | 9800 | 1880.0 | 21.2 |
| | | 9538 | 9938 | 1907.6 | 21.3 |

## 10.4. UMTS Rel 6 HSPA (HSUPA & HSUPA)

The following 5 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121, using the appropriate RMC, FRC and E-DCH configurations. A summary of these settings are illustrated below:

| | Mode | Rel6 HSUPA | Rel6 HSUPA | Rel6 HSUPA | Rel6 HSUPA | Rel6 HSUPA |
|---|---|---|---|---|---|---|
| | Subtest | 1 | 2 | 3 | 4 | 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 | 15/15 |
| | Bd (SF) | 64 | | | | |
| | βec | 209/225 | 12/15 | 30/15 | 2/15 | 24/15 |
| | βc/βd | 11/15 | 6/15 | 15/9 | 2/15 | 15/15 |
| | βhs | 22/15 | 12/15 | 30/15 | 4/15 | 30/15 |
| | βed | 1309/225 | 94/75 | 47/15<br>47/15 | 56/75 | 134/15 |
| | βed (SF) | 4 | | | | |
| | βed (codes) | 1 | 1 | 2 | 1 | 1 |
| | CM (dB) | 1 | 3 | 2 | 3 | 1 |
| | MPR (dB) | 0 | 2 | 1 | 2 | 0 |
| HSDPA Specific Settings | DACK | 8 | | | | |
| | DNAK | 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 | | | | |
| HSUPA Specific Settings | D E-DPCCH | 6 | 8 | 8 | 5 | 7 |
| | DHARQ | 0 | 0 | 0 | 0 | 0 |
| | AG Index | 20 | 12 | 15 | 17 | 21 |
| | ETFCI (from 34.121 Table C.11.1.3) | 75 | 67 | 92 | 71 | 81 |
| | Associated Max UL Data Rate kbps | 242.1 | 174.9 | 482.8 | 205.8 | 308.9 |
| | Reference E_TFCIs | E-TFCI 11<br>E-TFCI PO 4<br>E-TFCI 67<br>E-TFCI PO 18<br>E-TFCI 71<br>E-TFCI PO 23<br>E-TFCI 75<br>E-TFCI PO 26<br>E-TFCI 81<br>E-TFCI PO 27 | | E-TFCI 11<br>E-TFCI PO 4<br>E-TFCI 92<br>E-TFCI PO 18 | E-TFCI 11<br>E-TFCI PO 4<br>E-TFCI 67<br>E-TFCI PO 18<br>E-TFCI 71<br>E-TFCI PO 23<br>E-TFCI 75<br>E-TFCI PO 26<br>E-TFCI 81<br>E-TFCI PO 27 | |

## Results

**Rel 6 HSPA (HSDPA & HSUPA)**

| Band | Mode | UL Ch No. | DL Ch No. | f (MHz) | O/P Power (dBm) |
|---|---|---|---|---|---|
| UMTS1900 (Band II) | Subtest 1 | 9262 | 9662 | 1852.4 | 21.8 |
| | | 9400 | 9800 | 1880.0 | 21.7 |
| | | 9538 | 9938 | 1907.6 | 21.7 |
| | Subtest 2 | 9262 | 9662 | 1852.4 | 19.8 |
| | | 9400 | 9800 | 1880.0 | 19.9 |
| | | 9538 | 9938 | 1907.6 | 19.9 |
| | Subtest 3 | 9262 | 9662 | 1852.4 | 20.8 |
| | | 9400 | 9800 | 1880.0 | 20.7 |
| | | 9538 | 9938 | 1907.6 | 20.7 |
| | Subtest 4 | 9262 | 9662 | 1852.4 | 20.2 |
| | | 9400 | 9800 | 1880.0 | 20.1 |
| | | 9538 | 9938 | 1907.6 | 20.1 |
| | Subtest 5 | 9262 | 9662 | 1852.4 | 21.7 |
| | | 9400 | 9800 | 1880.0 | 21.8 |
| | | 9538 | 9938 | 1907.6 | 21.7 |

## 10.5. WiFi

The client provided a special driver and program, ART, v0.9_b7 which enable a user to control the frequency and output power of the module.

The modes with highest output power channel were chosen for the conducted output power measurement

**RF Conducted Output Power Measurement Results:**

802.11b

| Ch. No. | f (MHz) | Average Conducted power (dBm) |
|---|---|---|
| 6 | 2437 | 18.00 |

802.11n 20 MHz

| Ch. No. | f (MHz) | Average Conducted power (dBm) |
|---|---|---|
| 6 | 2437 | 17.40 |

# 11. KDB 941225 TEST REDUCTION CONSIDERATION

Based upon the power measurement in section 11, Body SAR for HSPA is not required due to the output power is not ¼ dB higher than 12.2 kbps RCM (Rel 99) and the maximum SAR for 12.2 kbps RCM is less than 75% of the SAR limit.

# 12. SUMMARY OF TEST RESULTS

If the SAR measured at the middle channel for each test configuration is at least 3.0 dB (0.8 mW/g) lower than the SAR limit (1.6 mW/g), testing at the high and low channels is optional for such test configuration(s).

## 12.1. UMTS1900 (BAND II)

| Test position | Mode | UL Ch No. | DL Ch No. | f (MHz) | 1g SAR (mW/g) | Limit (mW/g) |
|---|---|---|---|---|---|---|
| Lap-held | Rel 99 12.2kps RMC | 9262 | 9662 | 1852.4 | | 1.6 |
| | | 9400 | 9800 | 1880.0 | 0.034 | |
| | | 9538 | 9938 | 1907.6 | | |

## 12.2. GSM1900

| Test position | Mode | Ch No. | f (MHz) | 1g SAR (mW/g) | Limit (mW/g) |
|---|---|---|---|---|---|
| Lap-held | GPRS 2 slots | 512 | 1850.2 | | 1.6 |
| | | 661 | 1880.0 | 0.031 | |
| | | 810 | 1909.8 | | |

## 12.3. GSM850

| Test position | Mode | Ch No. | f (MHz) | 1g SAR (mW/g) | Limit (mW/g) |
|---|---|---|---|---|---|
| Lap-held | GSPS 2 slots | 128 | 824.2 | | 1.6 |
| | | 190 | 836.6 | 0.024 | |
| | | 251 | 848.8 | | |

## 12.4. WiFi (802.11b/g/n)

| Mode | Test Configuration | Ch No. | f (MHz) | 1g SAR (mW/g) | Limit (mW/g) |
|---|---|---|---|---|---|
| 802.11b | Lap-held | 1 | 2412 | | 1.6 |
| | | 6 | 2437 | 0.038 | |
| | | 11 | 2462 | | |
| 802.11n 20 MHz | Lap-held | 1 | 2412 | | 1.6 |
| | | 6 | 2437 | 0.041 | |
| | | 11 | 2462 | | |

# 13. KDB 616217 Laptop Computer SAR Procedures

**Physical closest antenna-to-antenna distance**

- 3G WWAN & 802.11 b/g/n: 11 cm ($d_1$)
- 3G WWAN & Bluetooth: 21.5 cm ($d_2$)
- 802.11 b/g/n & Bluetooth: 19.5 cm ($d_3$)

**Physical antenna-to-user distances**

- 3G WWAN: 17.5 cm ($r_1$)
- 802.11b/g/n: 17.5 cm ($r_2$)
- Bluetooth: 1.5 cm ($r_3$)

**Antenna-to-user separation distance calculations for simultaneous SAR requirements**

- 3G WWAN: (5+ ½ n) = 5+ ½ [200/(60/1.88)-1] = 5 + 3 = 8 cm ($R_1$)
- 802.11 at 2.437GHz: (5+ ½ n) = 5+ ½ [63/(60/2.437)-1] = 5 + 1 = 6 cm ($R_2$)

**Antenna-to-antenna separation distance calculations for simultaneous SAR requirements:**

- 3G WWAN (UMTS1900) & 802.11 (2.45GHz): (5+(1/2) $N_x$ + (1/2) $N_y$) = (5+3+0.78) = 8.78 cm ($D_1$)
- 3G WWAN (UMTS 1900) & Bluetooth: (5+(1/2) $N_x$ + (1/2) $N_y$) = (5+3+0) = 8 cm ($D_2$)

Conclusion:

1. $r_1$ (17.5 cm) > $R_1$ (8 cm); test reduction applies, SAR evaluation is required on the highest output power channel only for WWAN
2. Bluetooth output less than 60/f: user distance restriction does not apply; therefore, $r_3$ (1.5 cm) also does not apply and SAR evaluation is not required for Bluetooth for independent transmission.
3. $d_1$ (11 cm) > $D_1$ (8.78 cm) and $d_2$ (21.5 cm) > $D_2$ (8 cm), SAR evaluation for simultaneous transmission is not required for the WWAN antenna; it is also not required for the 802.11 and Bluetooth antenna
4. Bluetooth output less than 60/f: SAR is not required when the antenna is more than 5 cm from other antennas or users and nearby persons. Since $d_2$ (21.5 cm) and $d_3$ (19.5 cm) are > 5 cm, SAR for simultaneous transmission is not required; therefore, user separation distance ($r_3$ = 1.5 cm) does not apply

# 14. WORST-CASE SAR TEST PLOTS

WORST-CASE SAR PLOT for Part 22 (GSM850)

Date/Time: 8/10/2009 10:34:06 AM

Test Laboratory: Compliance Certification Services

## Lapheld for GSM850

DUT: Samsung; Type: NP-N130; Serial:NA

Communication System: Cell Band - GSM/WCDMA; Frequency: 836.6 MHz;Duty Cycle: 1:4
Medium parameters used (interpolated): f = 836.6 MHz; $\sigma$ = 0.98 mho/m; $\varepsilon_r$ = 53.8; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

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

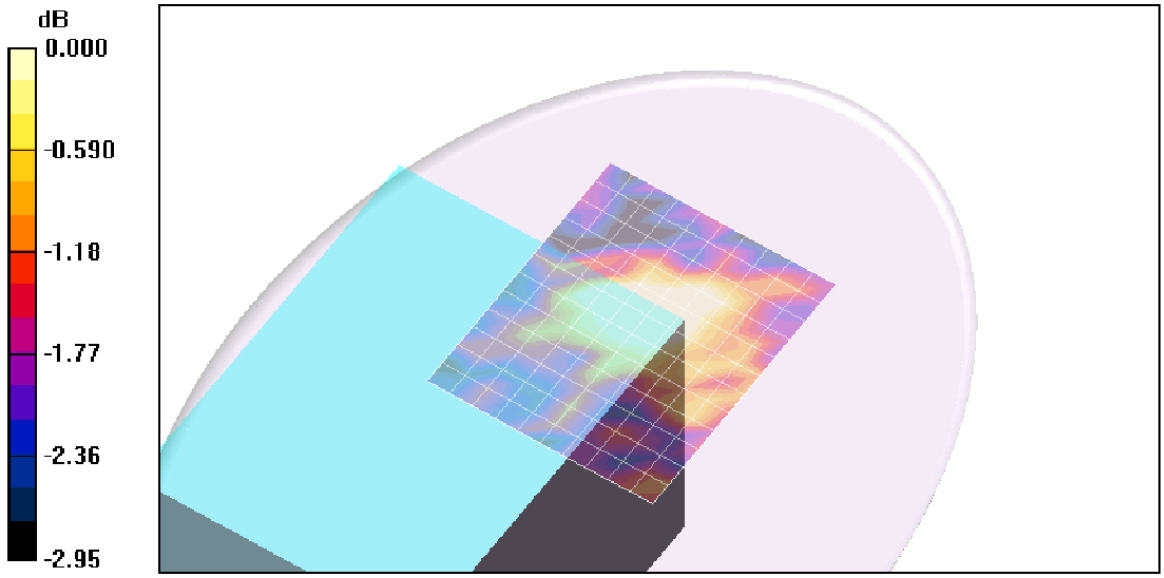
DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3686; ConvF(8.7, 8.7, 8.7); Calibrated: 3/23/2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Lapheld, GPRS 2 slots M-ch/Area Scan (11x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.034 mW/g

**Lapheld, GPRS 2 slots M-ch/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 3.68 V/m; Power Drift = -0.006 dB
Peak SAR (extrapolated) = 0.038 W/kg
**SAR(1 g) = 0.024 mW/g; SAR(10 g) = 0.021 mW/g**

Maximum value of SAR (measured) = 0.027 mW/g




0 dB = 0.027mW/g

WORST-CASE SAR PLOT for Part 24 (UMTS1900)

Date/Time: 8/5/2009 6:47:40 PM

Test Laboratory: Compliance Certification Services

## Lapheld for UMTS1900

DUT: Samsung; Type: NP-N130; Serial:NA

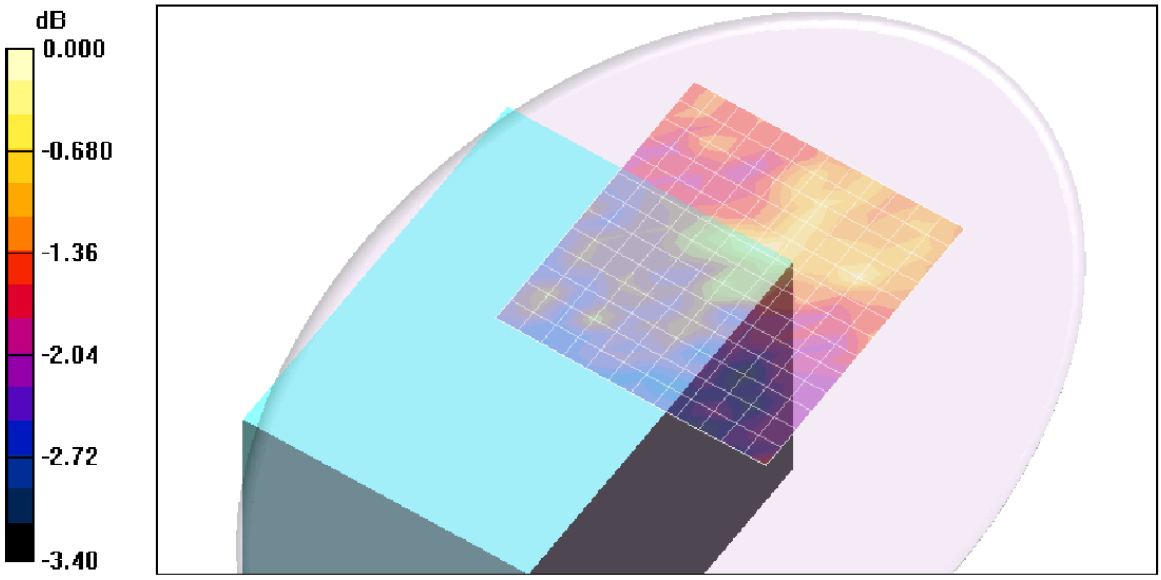
Communication System: UMTS Band II; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.5 mho/m; $\varepsilon_r$ = 53.3; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

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 - SN3686; ConvF(6.85, 6.85, 6.85); Calibrated: 3/23/2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Lapheld, R99 M-ch/Area Scan (13x14x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.036 mW/g

**Lapheld, R99 M-ch/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 3.76 V/m; Power Drift = 0.060 dB
Peak SAR (extrapolated) = 0.049 W/kg
**SAR(1 g) = 0.034 mW/g; SAR(10 g) = 0.030 mW/g**
Maximum value of SAR (measured) = 0.039 mW/g




0 dB = 0.039mW/g

WORST-CASE SAR PLOT for Part 15.247

Date/Time: 8/12/2009 3:23:24 PM

Test Laboratory: Compliance Certification Services

## 802.11n for Lapheld

DUT: Samsung; Type: NP-N130; Serial:NA

Communication System: 802.11bg; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; $\sigma$ = 1.92 mho/m; $\varepsilon_r$ = 52.2; $\rho$ = 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 - SN3686; ConvF(6.48, 6.48, 6.48); Calibrated: 3/23/2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

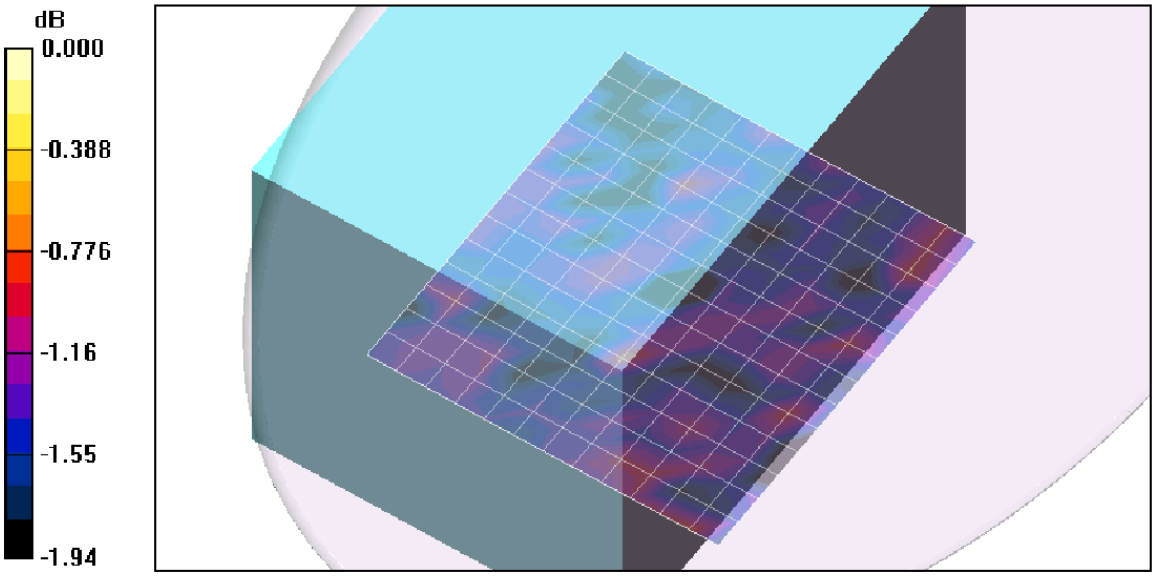
### Lapheld, 802.11n, M-ch/Area Scan (13x14x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.039 mW/g

### Lapheld, 802.11n, M-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 4.27 V/m; Power Drift = -0.357 dB
Peak SAR (extrapolated) = 0.046 W/kg
**SAR(1 g) = 0.041 mW/g; SAR(10 g) = 0.037 mW/g**

Maximum value of SAR (measured) = 0.046 mW/g




0 dB = 0.046mW/g

# 15. ATTACHMENTS

| No. | Contents | No. of page (s) |
|---|---|---|
| 1 | System Performance Check Plots | 6 |
| 2 | SAR Test Plots | 5 |
| 3 | Certificate of E-Field Probe – EX3DV4 SN3686 | 10 |
| 4 | Certificate of System Validation Dipole - D835V2 SN:4d002 | 9 |
| 5 | Certificate of System Validation Dipole - D1900V2 SN:5d043 | 9 |
| 6 | Certificate of System Validation Dipole - D2450V2 SN:748 | 6 |