# SAR Evaluation Report

**IN ACCORDANCE WITH THE REQUIREMENTS OF**
**FCC OET BULLETIN 65 SUPPLEMENT C**

**FOR**

**CDMA MOBILE PHONE**

**MODEL: M318**

**FCC ID: QISM318A**

**REPORT NUMBER: 07U11269-1, REVISION B**

**ISSUE DATE: NOVEMBER 15, 2007**

*Prepared for*

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*Prepared by*


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NVLAP LAB CODE 200065-0

**Revision History**

| Rev. | Issued date | Revisions | Revised By |
|---|---|---|---|
| -- | August 28, 2007 | Initial issue | Sunny Shih |
| A | August 31, 2007 | Corrected typo on page 22 – 24 | J. King |
| B | November 15, 2007 | Updated FCC ID and corrected applicant name | J. King |

## CERTIFICATE OF COMPLIANCE (SAR EVALUATION)

**DATES OF TEST:** August 27 and 28, 2007

| | |
|---|---|
| APPLICANT:<br>ADDRESS: | Huawei Technologies Co., Ltd<br>Bantian, Longgang District, Shenzhen, China |
| FCC ID:<br>MODEL: | QISM318A<br>M318 |
| DEVICE CATEGORY:<br>EXPOSURE CATEGORY: | Portable Device<br>General Population/Uncontrolled Exposure |

| CDMA Mobile Phone | | |
|---|---|---|
| Test Sample is a: | Production unit | |
| FCC Rule Parts | Frequency Range [MHz] | The Highest SAR Values [1g_mW/g] |
| 22H | 824 - 849 | Head: 1.130<br>Body: 0.438 |
| 24E | 1850 - 1910 | Head: 1.204<br>Body: 0.551 |

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General Population/Uncontrolled Exposure limits specified in ANSI/IEEE Std. C95.1-1992 and had been tested in accordance with the measurement procedures specified in FCC OET 65 Supplement C (Edition 01-01)

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 Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

Hsin Fu Shih
Engineering Supervisor
Compliance Certification Services

Tested By:

Jonathan King
EMC Engineer
Compliance Certification Services

TABLE OF CONTENTS

## 1 DEVICE UNDER TEST (DUT) DESCRIPTION

| Dual Band Cell Phone model M318 is tested for SAR in Cell and PCS bands (US frequencies). | |
|---|---|
| Mobile capabilities: | CDMA200 1XRTT (IS-2000) |
| Accessories: | N/A |
| Earphone/Headset Jack: | N/A |
| Duty cycle: | 100% |
| Battery: | Huawei, PN# HBU83S, Li-ion battery, 3.7Vdc, 800mAh |

## 2 FACILITIES AND ACCREDITATION

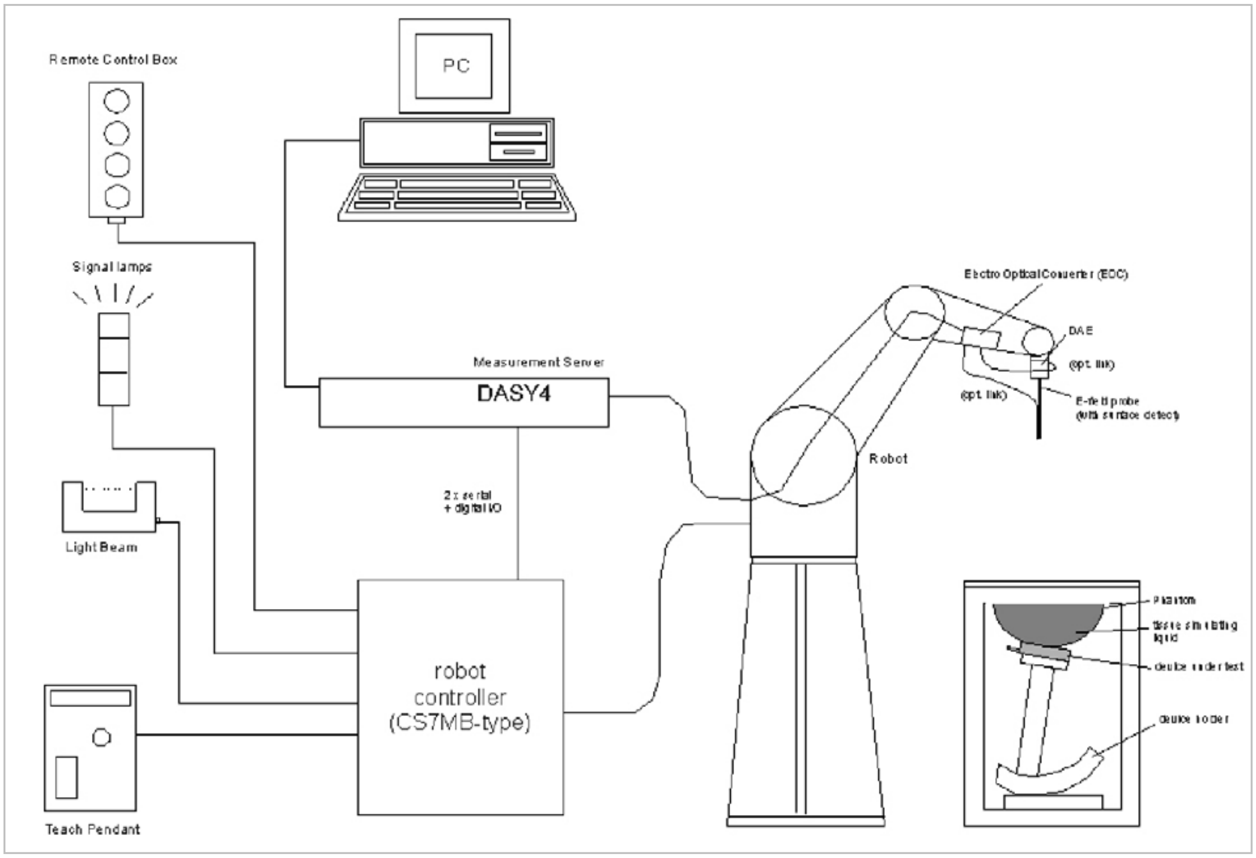
The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, CA 94538 USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

NVLAP LAB CODE 200065-0

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

No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

## 3 SYSTEM DESCRIPTION




**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.

### 3.1 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.

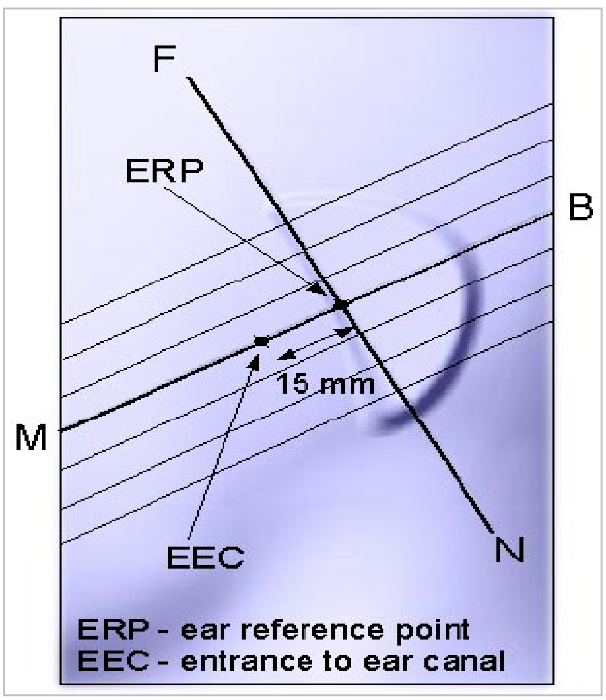
| Ingredients (% by weight) | Frequency (MHz) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 450 | | 835 | | 915 | | 1900 | | 2450 | |
| Tissue Type | Head | Body | Head | Body | Head | Body | Head | Body | Head | Body |
| Water | 38.56 | 51.16 | 41.45 | 52.4 | 41.05 | 56.0 | 54.9 | 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 |

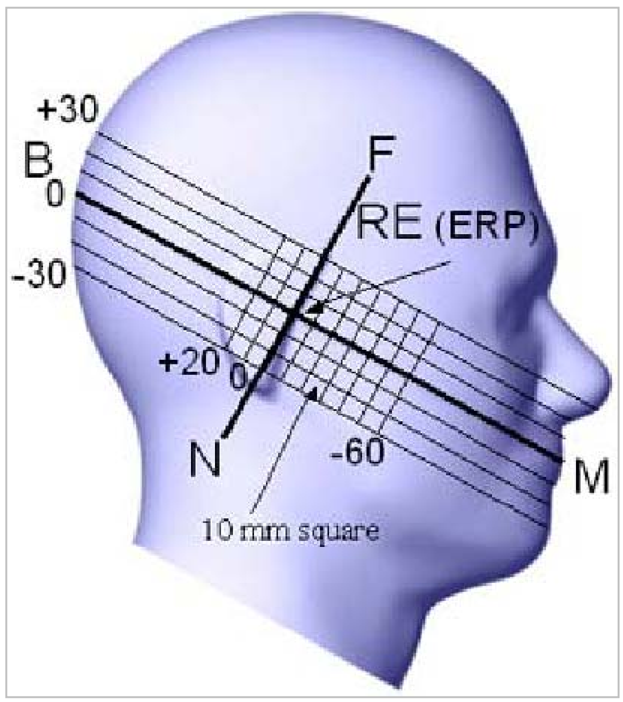
Salt: 99+% Pure Sodium Chloride Sugar: 98+% Pure Sucrose
Water: De-ionized, 16 MΩ+ resistivity HEC: Hydroxyethyl Cellulose
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

## 4 TEST POSITIONS FOR DEVICES OPERATING NEXT TO A PERSON'S EAR

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

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



### 4.1 CHEEK/TOUCH POSITION

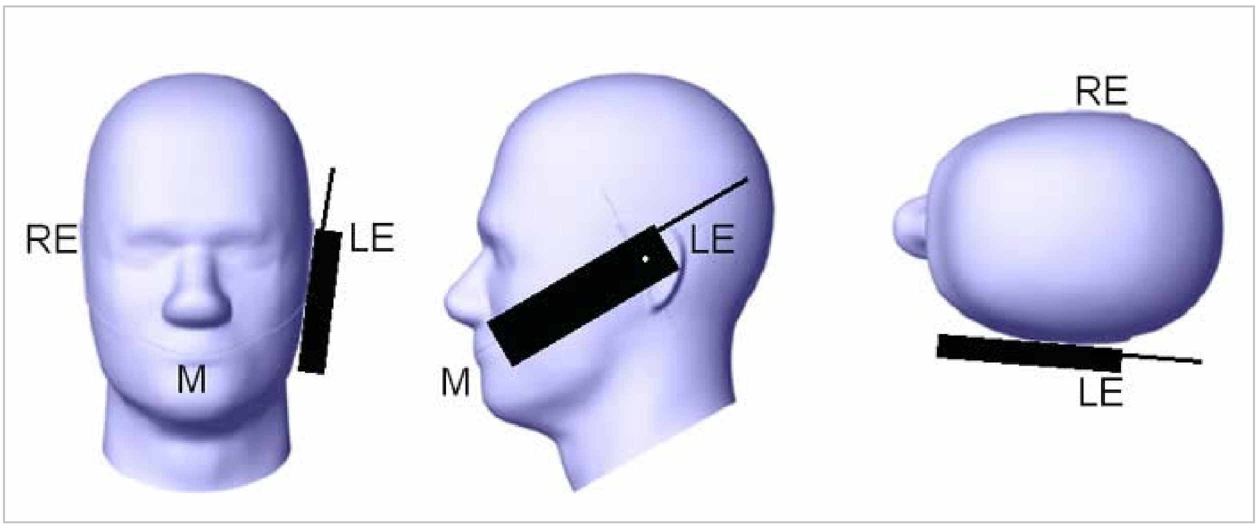
The device is brought toward the mouth of the head phantom by pivoting against the “ear reference point” or along the “N-F” line for the SCC-34/SC-2 head phantom.

This test position is established:

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

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

Cheek / Touch Position



### 4.2 EAR/TILT POSITION

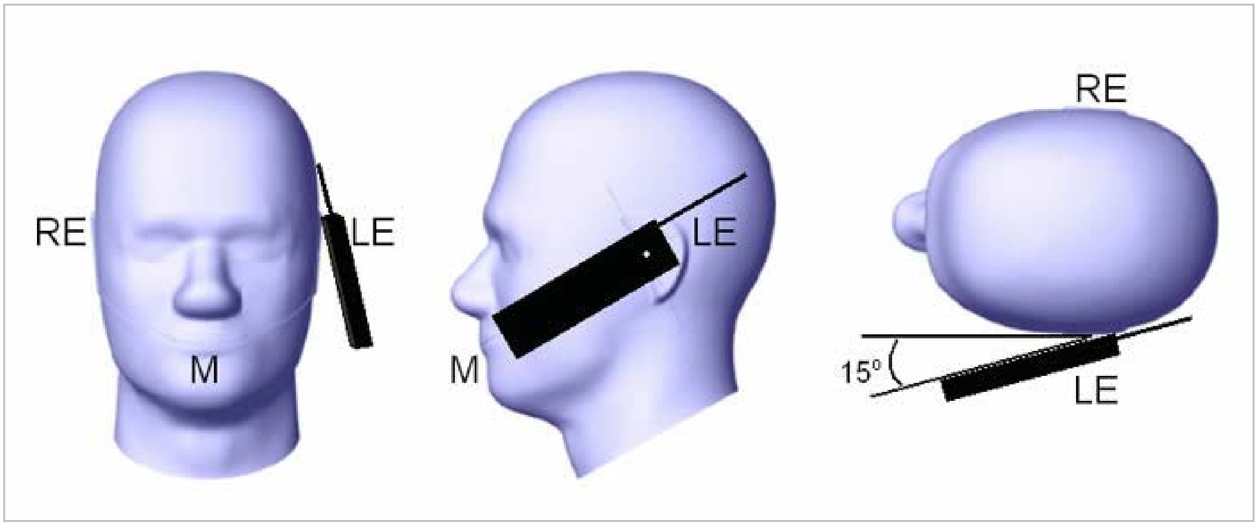
With the handset aligned in the "Cheek/Touch Position":

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

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

If a device is also designed to transmit with its keypad cover closed for operating in the head position, such positions should also be considered in the SAR evaluation. The device should be tested on the left and right side of the head phantom in the "Cheek/Touch" and "Ear/Tilt" positions. When applicable, each configuration should be tested with the antenna in its fully extended and fully retracted positions. These test configurations should be tested at the high, middle and low frequency channels of each operating mode; for example, AMPS, CDMA, and TDMA. If the SAR measured at the middle channel for each test configuration (left, right, Cheek/Touch, Tilt/Ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s). If the transmission band of the test device is less than 10 MHz, testing at the high and low frequency channels is optional.

Ear/Tilt 15° Position



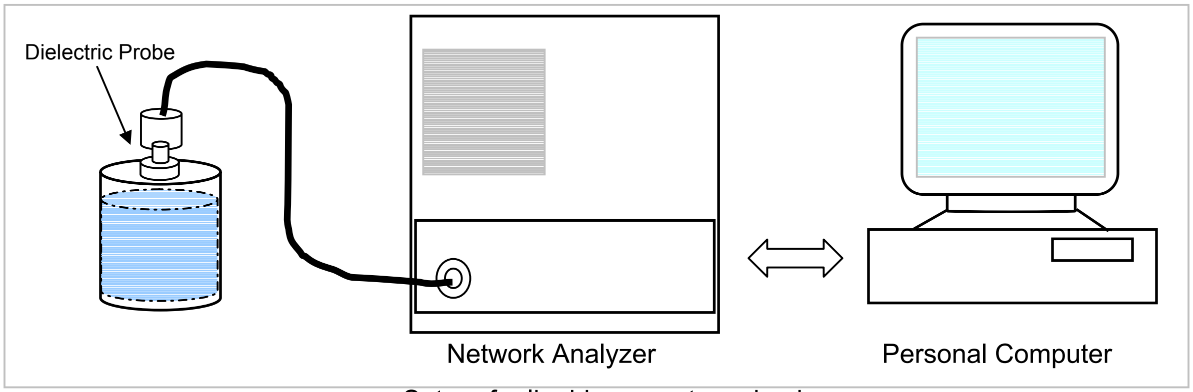
## 4.3 TEST POSITIONS FOR BODY-WORN AND OTHER SIMILAR CONFIGURATIONS

Without the belt-clips or holsters

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

## 5 SIMULATING 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.




Set-up for liquid parameters check

**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** | |
|---|---|---|---|---|
| | $\varepsilon_r$ | σ (S/m) | $\varepsilon_r$ | σ (S/m) |
| 150 | 52.3 | 0.76 | 61.9 | 0.80 |
| 300 | 45.3 | 0.87 | 58.2 | 0.92 |
| 450 | 43.5 | 0.87 | 56.7 | 0.94 |
| 835 | 41.5 | 0.90 | 55.2 | 0.97 |
| 900 | 41.5 | 0.97 | 55.0 | 1.05 |
| 915 | 41.5 | 0.98 | 55.0 | 1.06 |
| 1450 | 40.5 | 1.20 | 54.0 | 1.30 |
| 1610 | 40.3 | 1.29 | 53.8 | 1.40 |
| 1800 – 2000 | 40.0 | 1.40 | 53.3 | 1.52 |
| 2450 | 39.2 | 1.80 | 52.7 | 1.95 |
| 3000 | 38.5 | 2.40 | 52.0 | 2.73 |
| 5800 | 35.3 | 5.27 | 48.2 | 6.00 |

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

## 5.1 SIMULATING LIQUID PARAMETER CHECK RESULT

Simulating Liquid Dielectric Parameters Check Result @ Head 835 MHz

Room Ambient Temperature = 23°C; Relative humidity = 50% Measured by: Jonathan King

| Simulating Liquid | | | Parameters | | | Measured | Target | Deviation (%) | Limit (%) |
|---|---|---|---|---|---|---|---|---|---|
| f (MHz) | Temp. (°C) | Depth (cm) | | | | | | | |
| 835 | 22 | 15 | e' | 41.7468 | Relative Permittivity ($\varepsilon_r$): | 41.7468 | 41.5 | 0.59 | ± 5 |
| | | | e" | 19.0058 | Conductivity (σ): | 0.88286 | 0.90 | -1.90 | ± 5 |

Liquid Check
Ambient temperature: 23 deg. C; Liquid temperature: 22 deg. C
August 27, 2007 08:57 AM

| Frequency | e' | e" |
|---|---|---|
| 800000000. | 42.1735 | 18.9532 |
| 805000000. | 42.1132 | 18.9418 |
| 810000000. | 42.0680 | 18.9426 |
| 815000000. | 42.0240 | 19.0020 |
| 820000000. | 41.9857 | 19.0007 |
| 825000000. | 41.8962 | 19.0032 |
| 830000000. | 41.8080 | 19.0055 |
| **835000000.** | **41.7468** | **19.0058** |
| 840000000. | 41.6854 | 18.9645 |
| 845000000. | 41.6084 | 18.9386 |
| 850000000. | 41.5353 | 18.9224 |
| 855000000. | 41.5040 | 18.9049 |
| 860000000. | 41.4301 | 18.8794 |
| 865000000. | 41.3557 | 18.8137 |
| 870000000. | 41.3013 | 18.8140 |
| 875000000. | 41.2238 | 18.8011 |
| 880000000. | 41.1670 | 18.7523 |
| 885000000. | 41.1180 | 18.7618 |
| 890000000. | 41.0812 | 18.7080 |
| 895000000. | 41.0804 | 18.6738 |
| 900000000. | 41.0095 | 18.6853 |
| 905000000. | 40.9771 | 18.6904 |
| 910000000. | 40.9387 | 18.7217 |
| 915000000. | 40.8809 | 18.7343 |
| 920000000. | 40.7959 | 18.7504 |
| 925000000. | 40.7201 | 18.7444 |
| 930000000. | 40.6086 | 18.7449 |
| 935000000. | 40.5362 | 18.7433 |
| 940000000. | 40.4743 | 18.7102 |
| 945000000. | 40.4365 | 18.6606 |
| 950000000. | 40.3814 | 18.6453 |

The conductivity (σ) can be given as:

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

*where* $f = \text{target } f * 10^6$

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

Simulating Liquid Dielectric Parameters Check Result @ Muscle 835 MHz

Room Ambient Temperature = 23°C; Relative humidity = 50% Measured by: Jonathan King

| Simulating Liquid | | | Parameters | | | Measured | Target | Deviation (%) | Limit (%) |
|---|---|---|---|---|---|---|---|---|---|
| f (MHz) | Temp. (°C) | Depth (cm) | | | | | | | |
| 835 | 22 | 15 | e' | 52.7811 | Relative Permittivity ($\varepsilon_r$): | 52.7811 | 55.2 | -4.38 | ± 5 |
| | | | e" | 21.2134 | Conductivity (σ): | 0.98541 | 0.97 | 1.59 | ± 5 |

Liquid Check
Ambient temperature: 23 deg. C; Liquid temperature: 22 deg. C
August 27, 2007 09:56 AM

| Frequency | e' | e" |
|---|---|---|
| 800000000. | 53.1580 | 20.9804 |
| 805000000. | 53.1357 | 21.0244 |
| 810000000. | 53.1140 | 21.0507 |
| 815000000. | 53.0856 | 21.1182 |
| 820000000. | 53.0327 | 21.1435 |
| 825000000. | 52.9468 | 21.1970 |
| 830000000. | 52.8730 | 21.2018 |
| **835000000.** | **52.7811** | **21.2134** |
| 840000000. | 52.7217 | 21.1587 |
| 845000000. | 52.6545 | 21.1402 |
| 850000000. | 52.6007 | 21.0955 |
| 855000000. | 52.5530 | 21.0060 |
| 860000000. | 52.4880 | 20.9558 |
| 865000000. | 52.4146 | 20.9094 |
| 870000000. | 52.4020 | 20.8518 |
| 875000000. | 52.3167 | 20.7686 |
| 880000000. | 52.2867 | 20.7185 |
| 885000000. | 52.2609 | 20.6778 |
| 890000000. | 52.2391 | 20.6462 |
| 895000000. | 52.2579 | 20.6099 |
| 900000000. | 52.2329 | 20.6214 |
| 905000000. | 52.1999 | 20.6771 |
| 910000000. | 52.1365 | 20.7441 |
| 915000000. | 52.0396 | 20.8135 |
| 920000000. | 51.9278 | 20.8527 |
| 925000000. | 51.8263 | 20.8881 |
| 930000000. | 51.7109 | 20.8834 |
| 935000000. | 51.6217 | 20.8387 |
| 940000000. | 51.5512 | 20.7873 |
| 945000000. | 51.5388 | 20.7036 |
| 950000000. | 51.4922 | 20.6840 |

The conductivity (σ) can be given as:

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

*where* $f = \text{target } f * 10^6$

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

Simulating Liquid Dielectric Parameters Check Result @ Head 1900 MHz

Room Ambient Temperature = 23°C; Relative humidity = 50% Measured by: Jonathan King

| Simulating Liquid | | | Parameters | | | Measured | Target | Deviation (%) | Limit (%) |
|---|---|---|---|---|---|---|---|---|---|
| f (MHz) | Temp. (°C) | Depth (cm) | | | | | | | |
| 1900 | 22 | 15 | e' | 38.1925 | Relative Permittivity ($\varepsilon_r$): | 38.1925 | 40.0 | -4.52 | ± 5 |
| | | | e" | 13.2714 | Conductivity (σ): | 1.40278 | 1.40 | 0.20 | ± 5 |

Liquid Check
Ambient temperature: 23 deg. C; Liquid temperature: 22 deg. C
August 27, 2007 02:41 PM

| Frequency | e' | e" |
|---|---|---|
| 1710000000. | 38.9004 | 12.8167 |
| 1720000000. | 38.7911 | 12.8480 |
| 1730000000. | 38.6774 | 12.8578 |
| 1740000000. | 38.6078 | 12.9102 |
| 1750000000. | 38.5914 | 12.9415 |
| 1760000000. | 38.6116 | 12.9819 |
| 1770000000. | 38.6428 | 13.0184 |
| 1780000000. | 38.6687 | 13.0544 |
| 1790000000. | 38.6801 | 13.0741 |
| 1800000000. | 38.6555 | 13.0666 |
| 1810000000. | 38.5957 | 13.0891 |
| 1820000000. | 38.4874 | 13.0629 |
| 1830000000. | 38.3549 | 13.0936 |
| 1840000000. | 38.2211 | 13.0992 |
| 1850000000. | 38.1148 | 13.1188 |
| 1860000000. | 38.0649 | 13.1317 |
| 1870000000. | 38.0745 | 13.1735 |
| 1880000000. | 38.1054 | 13.2051 |
| 1890000000. | 38.1625 | 13.2493 |
| **1900000000.** | **38.1925** | **13.2714** |
| 1910000000. | 38.2341 | 13.2828 |

The conductivity (σ) can be given as:

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

*where* $f = \text{target } f * 10^6$

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

Simulating Liquid Dielectric Parameters Check Result @ Muscle 1900 MHz

Room Ambient Temperature = 23°C; Relative humidity = 50% Measured by: Jonathan King

| Simulating Liquid | | | Parameters | | | Measured | Target | Deviation (%) | Limit (%) |
|---|---|---|---|---|---|---|---|---|---|
| f (MHz) | Temp. (°C) | Depth (cm) | | | | | | | |
| 1900 | 22 | 15 | e' | 50.9629 | Relative Permittivity ($\varepsilon_r$): | 50.9629 | 53.3 | -4.38 | ± 5 |
| | | | e" | 14.2369 | Conductivity (σ): | 1.50483 | 1.52 | -1.00 | ± 5 |

Liquid Check
Ambient temperature: 23 deg. C; Liquid temperature: 22 deg. C
August 27, 2007 3:23 PM

| Frequency | e' | e" |
|---|---|---|
| 1710000000. | 51.6400 | 13.5966 |
| 1720000000. | 51.6300 | 13.6335 |
| 1730000000. | 51.5871 | 13.6715 |
| 1740000000. | 51.5751 | 13.7098 |
| 1750000000. | 51.5245 | 13.7506 |
| 1760000000. | 51.5021 | 13.7973 |
| 1770000000. | 51.4645 | 13.8315 |
| 1780000000. | 51.4321 | 13.8651 |
| 1790000000. | 51.3985 | 13.9035 |
| 1800000000. | 51.3521 | 13.9455 |
| 1810000000. | 51.3277 | 13.9942 |
| 1820000000. | 51.2738 | 13.9969 |
| 1830000000. | 51.2108 | 14.0538 |
| 1840000000. | 51.1845 | 14.0764 |
| 1850000000. | 51.1307 | 14.1227 |
| 1860000000. | 51.0990 | 14.1470 |
| 1870000000. | 51.0823 | 14.1620 |
| 1880000000. | 51.0295 | 14.1944 |
| 1890000000. | 51.0093 | 14.2094 |
| **1900000000.** | **50.9629** | **14.2369** |
| 1910000000. | 50.9267 | 14.2699 |

The conductivity (σ) can be given as:

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

*where* $f = \text{target } f * 10^6$

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

## 6 SYSTEM PERFORMANCE 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 simulating liquid of the following parameters.
- The DASY4 system with an Isotropic E-Field Probe EX3DV3-SN: 3554 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 5 x 5 x 7 fine cube was chosen for cube integration(dx=dy=7.5mm; dz=5mm).
  For 5 GHz band - Special 8x8x8 fine cube was chosen for cube integration(dx=dy=4.3mm; dz=3mm)
- Distance between probe sensors and phantom surface was set to 4 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.0mm
- The dipole input power (forward power) was 250 mW±3%.
- The results are normalized to 1 W input power.

IEEE Standard 1528-2003 Recommended Reference Value.

| Frequency (MHz) | Distance (mm) | 1g SAR [W/kg] | 10g SAR [W/kg] |
|---|---|---|---|
| 300 | 15 | 3.0 | 2.0 |
| 450 | 15 | 4.9 | 3.3 |
| 835 | 15 | 9.5 | 6.2 |
| 900 | 15 | 10.8 | 6.9 |
| 1450 | 10 | 29.0 | 16.0 |
| 1800 | 10 | 38.1 | 19.8 |
| 1900 | 10 | 39.7 | 20.5 |
| 2000 | 10 | 41.1 | 21.1 |
| 2450 | 10 | 52.4 | 24.0 |
| 3000 | 10 | 63.8 | 25.7 |

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

## 6.1 SYSTEM PERFORMANCE CHECK RESULTS

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

Date: August 27, 2007

Ambient Temperature = 23°C; Relative humidity = 50% Measured by: Jonathan King

| Head Simulating Liquid | | | SAR (mW/g) | | Normalized to 1 W | Target | Deviation (%) | Limit (%) |
|---|---|---|---|---|---|---|---|---|
| f (MHz) | Temp. (°C) | Depth (cm) | | | | | | |
| 835 | 22 | 15 | 1g | 2.54 | 10.16 | 9.5 | 6.95 | ± 10 |
| | | | 10g | 1.67 | 6.68 | 6.2 | 7.74 | ± 10 |

**System Validation Dipole: D1900V2 SN:5d043**

Date: August 27, 2007

Ambient Temperature = 23°C; Relative humidity = 50% Measured by: Jonathan King

| Head Simulating Liquid | | | SAR (mW/g) | | Normalized to 1 W | Target | Deviation (%) | Limit (%) |
|---|---|---|---|---|---|---|---|---|
| f (MHz) | Temp. (°C) | Depth (cm) | | | | | | |
| 1900 | 22 | 15 | 1g | 10.30 | 41.2 | 39.7 | 3.78 | ± 10 |
| | | | 10g | 5.32 | 21.28 | 20.5 | 3.80 | ± 10 |

## 7 PROCEDURE USED TO ESTABLISH TEST SIGNAL

The following procedures had been used to prepare the EUT for the SAR test.

**3G-CDMA2000 1xRTT**

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

| Application | Rev, License |
|---|---|
| CDMA2000 Mobil Test | B.10.11, L |

1xRTT

- Call Setup > Shift & Preset
- Protocol Rev > 6 (IS-2000-0)
- Radio Config (RC) > RC3 (Fwd3, Rvs3) (For both head and body SAR)
- FCH Service Option (SO) Setup > 55 (Loopback) (for head SAR)
  32 (+ F-SCH) (for body SAR)
- Traffic Data Rate > Full
- TDSO SCH Info > F-SCH Parameters > F-SCH Data Rate > 153.6 kbps
  > R-SCH Parameters > R-SCH Data Rate > 153.6 kbps
- Cell Info > Cell Parameters > System ID (SID) > 6503
  > Network ID (NID) > 0

Once “Active Cell” show “Connected ” then change “Rvs Power Ctrl” from “Active bits” to “**All Up bits**” to get the maximum power.

Preliminary Measurement Results @ Middle channel

| Radio Configuration (RC) | Service Option (SO) | Average Output Power (dBm) | |
|---|---|---|---|
| | | Cell Band | PCS Band |
| RC1(Fwd1, Rvs1) | 1 (Voice) | | |
| | 2 (Loopback) | 24.2 | 24.2 |
| | 3 (Voice) | | |
| | 55 (Loopback) | 24.2 | 24.2 |
| RC2 (Fwd2, Rvs2) | 9 (Loopback) | 24.2 | 24.2 |
| | 17 (Voice) | | |
| | 55 (Loopback) | 24.2 | 24.2 |
| RC3 (Fwd3, Rvs3) | 1 (Voice) | | |
| | 2 (Loopback) | 24.2 | 24.2 |
| | 3 (Voice) | | |
| | 55 (Loopback) | 24.2 | 24.2 |
| | 32 (+ F-SCH) | 24.2 | 24.2 |
| | 32 (+ SCH) | 24.2 | 24.2 |
| RC43 (Fwd4, Rvs3) | 1 (Voice) | | |
| | 2 (Loopback) | 24.2 | 24.2 |
| | 3 (Voice) | | |
| | 55 (Loopback) | 24.2 | 24.2 |
| | 32 (+ F-SCH) | 24.2 | 24.2 |
| | 32 (+ SCH) | 24.2 | 24.2 |
| RC54 (Fwd5, Rvs4) | 9 (Loopback) | 24.2 | 24.2 |
| | 17 (Voice) | | |
| | 55 (Loopback) | 24.2 | 24.2 |

Worst-case Measurement Result @ Low, Middle and High Channel

**RC3, SO55 (Loopback) – for Head SAR**

| Cell band | | |
|---|---|---|
| Channel | Frequency (MHz) | Conducted Power |
| | | Average (dBm) |
| 1013 | 824.7 | 24.2 |
| 384 | 836.52 | 24.2 |
| 777 | 848.31 | 24.2 |
| PCS band | | |
| 25 | 1851.25 | 24.2 |
| 600 | 1880 | 24.2 |
| 1175 | 1908.75 | 24.2 |

**RC3, SO32 (+F-SCH) – for Body SAR**

| Cell band | | |
|---|---|---|
| Channel | Frequency (MHz) | Conducted Power |
| | | Average (dBm) |
| 1013 | 824.7 | 24.2 |
| 384 | 836.52 | 24.2 |
| 777 | 848.31 | 24.2 |
| PCS band | | |
| 25 | 1851.25 | 24.2 |
| 600 | 1880 | 24.2 |
| 1175 | 1908.75 | 24.2 |

# 8 SAR MEASURMENT RESULTS

## 8.1 HEAD TOUCH POSITIONS

|  |  |
|---|---|
| Left Hand Side (LHS) | Right Hand Side (RHS) |

***CDMA Cell Band - RC3, SO55 (Loopback)***

| Test Position | Channel | f (MHz) | Measured SAR 1g (mW/g) | Power Drift (dB) | Extrapolated[1)] SAR 1g (mW/g) |
|---|---|---|---|---|---|
| LHS | 1013 | 824.70 | 1.120 | -0.060 | 1.136 |
| | 384 | 836.52 | 0.838 | 0.000 | 0.838 |
| | **777** | **848.31** | **1.130** | **0.000** | **1.130** |
| RHS | 1013 | 824.70 | | | |
| | 384 | 836.52 | 0.704 | -0.109 | 0.722 |
| | 777 | 848.31 | | | |

***CDMA PCS Band - RC3, SO55 (Loopback)***

| Test Position | Channel | f (MHz) | Measured SAR 1g (mW/g) | Power Drift (dB) | Extrapolated[1)] SAR 1g (mW/g) |
|---|---|---|---|---|---|
| LHS | 25 | 1851.25 | 1.040 | 0.000 | 1.040 |
| | 600 | 1880 | 0.951 | 0.000 | 0.951 |
| | 1175 | 1908.75 | 0.847 | 0.000 | 0.847 |
| RHS | **25** | **1851.25** | **1.190** | **-0.049** | **1.204** |
| | 600 | 1880 | 1.100 | 0.000 | 1.100 |
| | 1175 | 1908.75 | 0.948 | -0.002 | 0.948 |

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.
4) The battery was fully charged in accordance with manufacture’s instructions prior to SAR measurements.

## 8.2 HEAD TILT POSITIONS

Left Hand Side (LHS)

Right Hand Side (RHS)

***CDMA Cell Band - RC3, SO55 (Loopback)***

| Test Position | Channel | f (MHz) | Measured SAR 1g (mW/g) | Power Drift (dB) | Extrapolated[1)] SAR 1g (mW/g) |
|---|---|---|---|---|---|
| LHS | 1013<br>384<br>777 | 824.70<br>836.52<br>848.31 | 0.173 | -0.090 | 0.177 |
| RHS | 1013<br>384<br>777 | 824.70<br>836.52<br>848.31 | 0.160 | -0.036 | 0.161 |

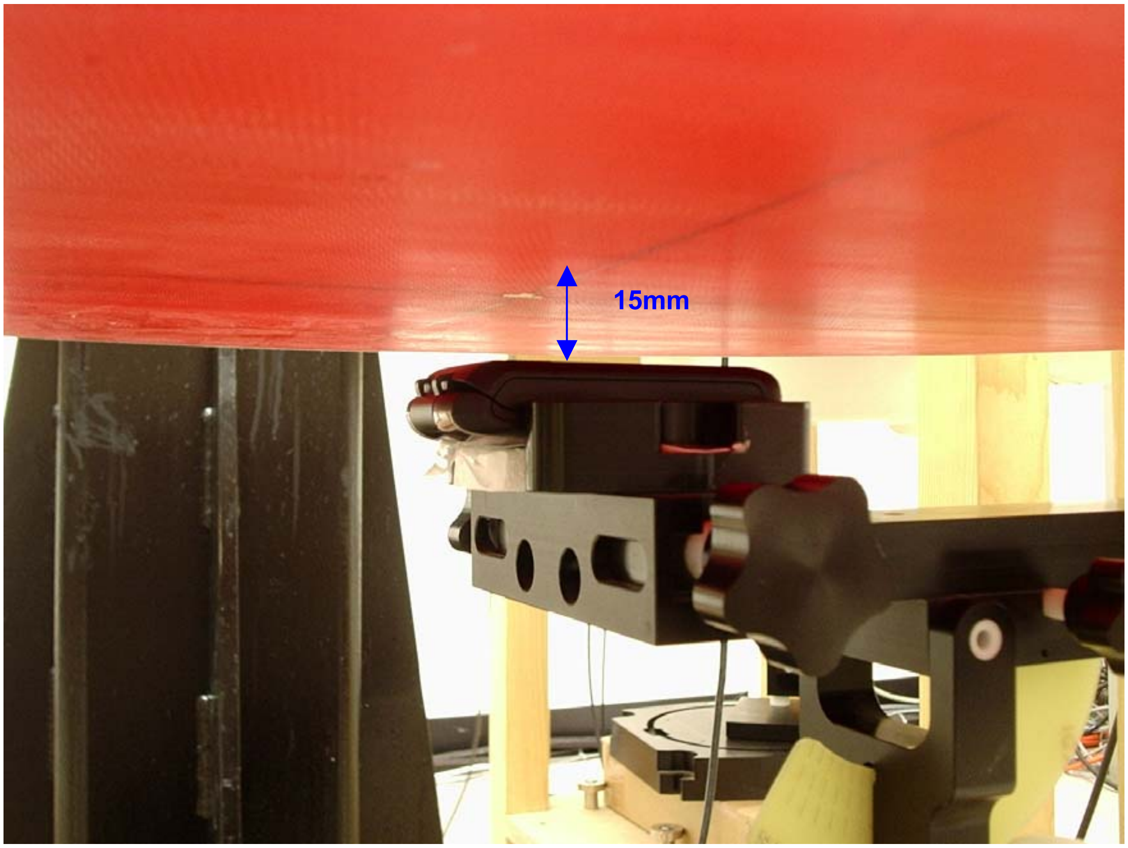
***CDMA PCS Band - RC3, SO55 (Loopback)***

| Test Position | Channel | f (MHz) | Measured SAR 1g (mW/g) | Power Drift (dB) | Extrapolated[1)] SAR 1g (mW/g) |
|---|---|---|---|---|---|
| LHS | 25<br>600<br>1175 | 1851.25<br>1880<br>1908.75 | 0.149 | -0.049 | 0.151 |
| RHS | 25<br>600<br>1175 | 1851.25<br>1880<br>1908.75 | 0.147 | 0.000 | 0.147 |

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.
4) The battery was fully charged in accordance with manufacture's instructions prior to SAR measurements.

## 8.3 BODY WORN POSITION




| ***CDMA Cell Band - RC3, SO32 (+F-SCH)*** | | | | | |
|---|---|---|---|---|---|
| **Test Position** | **Channel** | **f (MHz)** | **Measured SAR 1g (mW/g)** | **Power Drift (dB)** | **Extrapolated[1)] SAR 1g (mW/g)** |
| Body-worn | 1013 | 824.70 | 0.409 | 0.000 | 0.409 |
| | 384 | 836.52 | 0.329 | 0.000 | 0.329 |
| | **777** | **848.31** | **0.428** | **-0.101** | **0.438** |

| ***CDMA PCS Band - RC3, SO32 (+F-SCH)*** | | | | | |
|---|---|---|---|---|---|
| **Test Position** | **Channel** | **f (MHz)** | **Measured SAR 1g (mW/g)** | **Power Drift (dB)** | **Extrapolated[1)] SAR 1g (mW/g)** |
| Body-worn | **25** | **1851.25** | **0.547** | **-0.033** | **0.551** |
| | 600 | 1880 | 0.548 | 0.000 | 0.548 |
| | 1175 | 1908.75 | 0.510 | -0.001 | 0.510 |

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.
3) The battery was fully charged in accordance with manufacture's instructions prior to SAR measurements.

# 9 MEASURMENT UNCERTAINTY

## 9.1 MEASURMENT 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

## 10 EQUIPMENT LIST AND CALIBRATION

| Name of Equipment | Manufacturer | Type/Model | Serial Number | Cal. Due date | | |
|---|---|---|---|---|---|---|
| | | | | MM | DD | Year |
| Robot - Six Axes | Stäubli | RX90BL | N/A | N/A | | |
| 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 | US39173569 | 2 | 14 | 2008 |
| E-Field Probe | SPEAG | EX3DV4 | 3554 | 4 | 24 | 2008 |
| Thermometer | ERTCO | 639-1S | 1718 | 11 | 7 | 2007 |
| Data Acquisition Electronics | SPEAG | DAE3 V1 | 427 | 11 | 16 | 2007 |
| System Validation Dipole | SPEAG | D835V2 | 4d002 | 1 | 19 | 2008 |
| System Validation Dipole | SPEAG | D1900V2 | 5d043 | 1 | 23 | 2008 |
| Signal Generator | R&S | SMP 04 | DE34210 | 10 | 9 | 2007 |
| Power Meter | Giga-tronics | 8651A | 8651404 | 4 | 3 | 2008 |
| Amplifier | Mini-Circuits | ZHL-42W | D072701-5 | N/A | | |
| Radio Communication Tester | Agilent | E5515C | GB46160222 | 6 | 29 | 2007 |
| Simulating Liquid | CCS | H835 | N/A | Within 24 hrs of first test | | |
| Simulating Liquid | CCS | H1900 | N/A | Within 24 hrs of first test | | |
| Simulating Liquid | CCS | M835 | N/A | Within 24 hrs of first test | | |
| Simulating Liquid | CCS | M1900 | N/A | Within 24 hrs of first test | | |

## 11 PHOTOS

EUT


**Antenna Location**

## 12 ATTACHMENTS

| No. | Contents | No. Of Pages |
|---|---|---|
| 1 | System Performance Check Plots | 4 |
| 2-1 | SAR Test Plots – Cell Band | 10 |
| 2-2 | SAR Test Plots – PCS Band | 12 |
| 3 | Certificate of E-Field Probe - EX3DV4SN3554 | 10 |
| 4 | Certificate of System Validation Dipole - D835V2 SN:4d002 | 9 |
| 5 | Certificate of System Validation Dipole - D1900V2 SN:5d043 | 9 |

**END OF REPORT**