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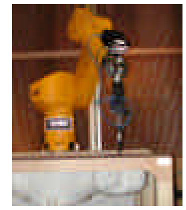

CERTIFICATE OF COMPLIANCE (SAR EVALUATION)

APPLICANT NAME & ADDRESS:	**DATE & LOCATION OF TESTING:**
Novatel Wireless, Inc.	**Dates of Tests: March 28-30, 2006**
9645 Scranton Road, Suite 205	**Test Report S/N: 0603280209**
San Diego, CA 92121	**Test Site: PCTEST Lab, Columbia MD**

FCC ID:	**PKRNVWXV620**
APPLICANT:	**Novatel Wireless, Inc.**

EUT Type:	**Dual-Band CDMA Modem Card**
Tx/Rx Frequency:	**824.70 – 848.31 MHz (CDMA)/ 1851.25 – 1908.75 MHz (PCS CDMA)** **869.70 – 893.31 MHz (CDMA)/ 1931.25 – 1988.75 MHz (PCS CDMA)**
Max. RF Output Power:	**0.284 W ERP CDMA (24.533 dBm) / 24.0 dBm Conducted** **0.253 W EIRP PCS CDMA (24.021 dBm) / 24.0 dBm Conducted**
Max. SAR Measurement:	**0.996 W/kg CDMA Laptop Body SAR (w/ COMPAQ V4332US);** **1.14 W/kg PCS CDMA Laptop Body SAR (w/ COMPAQ V4332US);** **0.036 W/kg CDMA Bystander Body SAR (w/ Dell FM1B);** **0.163 W/kg PCS CDMA Bystander Body SAR (w/ Dell M1210)**
Trade Name/Model(s):	**XV620, V640**
FCC Classification(s):	**Licensed Portable Transmitter (PCB)**
FCC Rule Part(s):	**§2.1093; FCC/OET Bulletin 65 Supplement C [July 2001]**
Application Type:	**Certification**
Test Device Serial No.:	***identical* prototype [S/N: #112]**

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE Std. C95.1-1992 and had been tested in accordance with the measurement procedures specified in FCC/OET Bulletin 65 Supplement C (2001) and IEEE Std. 1528 - 2003.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Grant c onditions: Power output listed is ERP for Part 22 and EIRP for Part 24. SAR compliance has been established in the host product(s) with slot configurations as tested in this filing, and can be used in host product(s) with substantially similar physical dimensions, construction, and electrical and RF characteristics. This transmitter is restricted for use with the specific antenna(s) tested for this filing. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. End-users must be provided with specific information required to satisfy RF exposure compliance for all final host devices.

PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

Alfred Cirwithian
Vice President Engineering

TABLE OF CONTENTS

1. INTRODUCTION / SAR DEFINITION

The FCC has adopted the guidelines for evaluating the environmental effects of radiofrequency radiation in ET Docket 93-62 on Aug. 6, 1996 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices.[1]

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in *IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz*. (c) 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017.[2] The measurement procedure described in *IEEE/ANSI C95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave*[3] is used for guidance in measuring SAR due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in *Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields*," NCRP Report No. 86 (c) NCRP, 1986, Bethesda, MD 20814.[6] SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

SAR Definition

Specific Absorption Rate (SAR) is defined as the time derivative (rate) of the incremental energy (*dU*) absorbed by (dissipated in) an incremental mass (*dm*) contained in a volume element (*dV*) of a given density (r). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Fig. 1.1).

$$SAR = \frac{d}{dt}\left(\frac{dU}{dm}\right) = \frac{d}{dt}\left(\frac{dU}{r\,dv}\right)$$

Figure 1.1
SAR Mathematical Equation

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

$$SAR = s\,\mathbf{E}^2 / r$$

where:

s	=	conductivity of the tissue-simulant material (S/m)
r	=	mass density of the tissue-simulant material (kg/m^3)
$\mathbf{E}$	=	Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relations to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.[6]

2. SAR MEASUREMENT SETUP

Robotic System

Measurements are performed using the DASY4 automated dosimetric assessment system. The DASY4 is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of high precision robotics system (Staubli), robot controller, Pentium III computer, near-field probe, probe alignment sensor, and the generic twin phantom containing the head equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF) (see Fig. 2.1).

System Hardware

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and a remote control used to drive the robot motors. The PC consists of the Gateway Pentium 4 2.53 GHz computer with Windows XP system and SAR Measurement Software DASY4, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit that performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

System Electronics

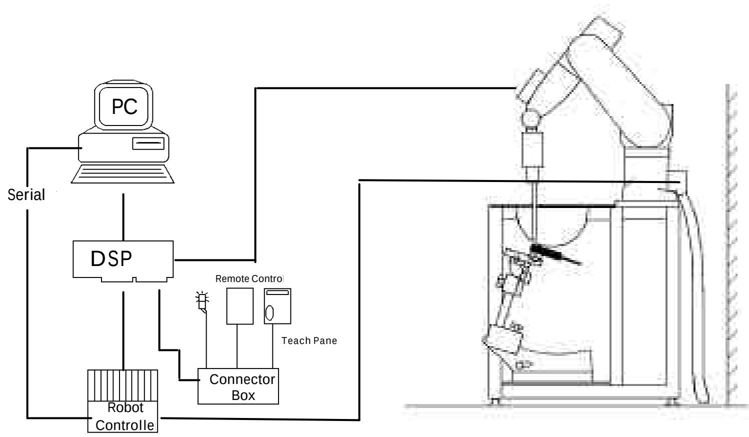

Figure 2.1 SAR Measurement System Setup

The DAE4 consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer. The system is described in detail in [7].

3. DASY4 E-FIELD PROBE SYSTEM

Probe Measurement System

Figure 3.1 DAE System

The SAR measurements were conducted with the dosimetric probe ET3DV6, designed in the classical triangular configuration [7] (see Fig. 3.2) and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber line ending at the front of the probe tip (see Fig. 3.3). It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY4 software reads the reflection during a software approach and looks for the maximum using a 2nd order fitting (see Fig.3.1). The approach is stopped at reaching the maximum.

Probe Specifications

Calibration:	In air from 10 MHz to 6 GHz
	In head and body simulating tissue at
	Frequencies of 150 MHz, 450 MHz, 835 MHz, 900 MHz, 1900MHz, 2450MHz, 5300MHz, & 5800MHz
Frequency:	10 MHz to > 6 GHz; Linearity: ± 0.2 dB
	(30 MHz to 6 GHz)
Directivity:	± 0.2 dB in HSL (rotation around probe axis)
	± 0.4 dB in HSL (rotation normal probe axis)
Dynamic:	5 mW/g to > 100 mW/g;
Range:	Linearity: ± 0.2 dB
Dimensions:	Overall length: 330 mm
	Tip length: 16 mm
	Body diameter: 12 mm
	Tip diameter: 3 mm
	Distance from probe tip to dipole centers: 2 mm
Application:	General dosimetry up to 6 GHz
	Compliance tests of mobile phones
	Fast automatic scanning in arbitrary phantoms

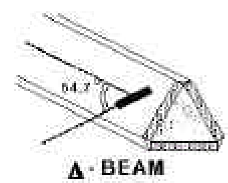

Figure 3.1 Triangular Probe Configuration

Figure 3.2 Probe Thick-Film Technique

4. PROBE CALIBRATION PROCESS

Dosimetric Assessment Procedure

Each probe is calibrated according to a dosimetric assessment procedure described in [8] with accuracy better than +/-10%. The spherical isotropy was evaluated with the procedure described in [9] and found to be better than +/-0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe is tested.

Free Space Assessment

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies below 1 GHz (see Fig. 4.1), and in a waveguide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity at the proper orientation with the field. The probe is then rotated 360 degrees.

Temperature Assessment *

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated head tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe (see Fig. 4.2).

$$SAR = C\frac{\Delta T}{\Delta t}$$

where:

Δt = exposure time (30 seconds),

C = heat capacity of tissue (head or body),

ΔT = temperature increase due to RF exposure.

SAR is proportional to $\Delta T / \Delta t$, the initial rate of tissue heating, before thermal diffusion takes place. Now it's possible to quantify the electric field in the simulated tissue by equating the thermally derived SAR to the E- field;

$$SAR = \frac{|E|^2 \cdot s}{r}$$

where:

σ = simulated tissue conductivity,

ρ = Tissue density (1.25 g/cm^3 for head tissue)

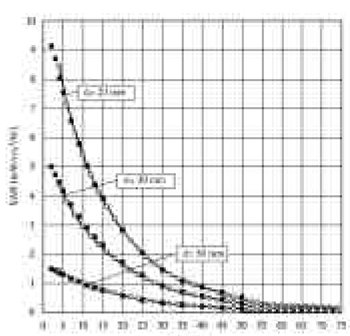

Figure 4.1 E-Field and Temperature measurements at 900MHz [7]

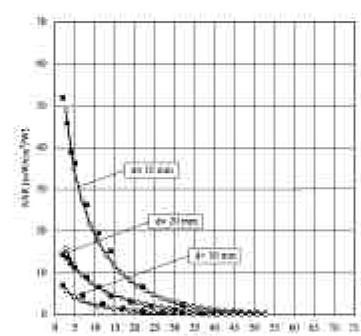

Figure 4.2 E-Field and temperature measurements at 1.9GHz [7]

**NOTE: The temperature calibration was not performed by PCTEST. For information use only.*

5. PHANTOM & EQUIVALENT TISSUES

SAM Phantom

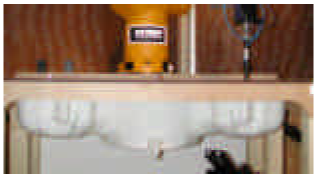

Figure 5.1 SAM Twin Phantom

The SAM Twin Phantom V4.0 is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users [11][12]. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. (see Fig. 5.1)

Head & Body Simulating Mixture Characterization

Figure 5.2 Simulated Tissue

The head and body mixtures consist of a viscous gel using hydroxethylcellullose (HEC) gelling agent and saline solution (see Table 6.1). Preservation with a bacteriacide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 have been incorporated in the following table. Other head and body tissue parameters that have not bee specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations The mixture characterizations used for the head and body tissue simulating liquids are according to the data by C. Gabriel and G. Hartsgrove [13].(see Fig. 5.2)

Table 5.1 Composition of the Head & Body Tissue Equivalent Matter

INGREDIENTS		SIMULATING TISSUE					
		835MHz Head	835MHz Body	1900MHz Head	1900MHz Body	2450MHz Head	2450MHz Body
Mixture Percentage							
WATER		41.45	52.50	54.90	59.98	62.70	73.2
DGBE		0.000	0.000	44.92	38.41	0.000	26.7
SUGAR		56.00	45.00	0.000	58.00	0.000	0.000
SALT		1.450	1.400	0.180	0.100	0.5	0.04
BACTERIACIDE		0.100	0.100	0.000	0.100	0.000	0.000
HEC		1.000	1.000	0.000	1.410	0.000	0.000
Dielectric Constant	Target	41.50	55.20	40.0	53.30	39.20	52.70
Conductivity (S/m)	Target	0.900	0.970	1.400	1.520	1.80	1.95

Device Holder for Transmitters

Figure 5.2 Mounting Device

In combination with the SAM Twin Phantom V4.0, the Mounting Device (see Fig. 5.2) enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation point is the ear opening. The devices can be easily, accurately, and repeatably be positioned according to the FCC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

* Note: A simulating human hand is not used due to the complex anatomical and geometrical structure of the hand that may produce infinite number of configurations [12]. To produce the worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.

6. TEST SYSTEM SPECIFICATIONS

Automated Test System Specifications

Positioner

Robot: Stäubli Unimation Corp. Robot Model: RX60L

Repeatability: 0.02 mm

No. of axis: 6

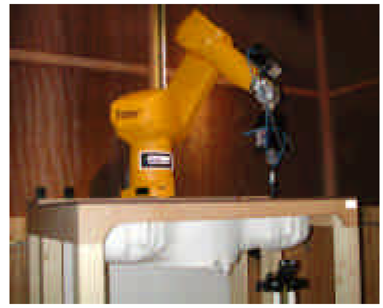

Figure 6.1 DASY4 Test System

Data Acquisition Electronic (DAE) System

Cell Controller

Processor: Pentium 4

Clock Speed: 2.53 GHz

Operating System: Windows XP Professional

Data Converter

Features: Signal Amplifier, multiplexer, A/D converter, & control logic

Software: DASY4 software

Connecting Lines: Optical downlink for data and status info.
Optical uplink for commands and clock

PC Interface Card

Function: 24 bit (64 MHz) DSP for real time processing
Link to DAE4
16 bit A/D converter for surface detection system
serial link to robot
direct emergency stop output for robot

E-Field Probes

Model: EX3DV4 S/N: 3561

Construction: Triangular core

Frequency: 10 MHz to 6 GHz

Linearity: ± 0.2 dB (30 MHz to 6 GHz)

Phantom

Phantom: SAM Twin Phantom (V4.0)

Shell Material: VIVAC Composite

Thickness: 2.0 ± 0.2 mm

7. DOSIMETRIC ASSESSMENT & PHANTOM SPECS

Measurement Procedure

The evaluation was performed using the following procedure:

1. The SAR measurement was taken at a selected spatial reference point to monitor power variations during testing. This fixed location point was measured and used as a reference value.
2. The SAR distribution at the exposed side of the head was measured at a distance of 3.9mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm x 15mm.
3. Based on the area scan data, the area of the maximum absorption was determined by spline interpolation. Around this point, a volume of 32mm x 32mm x 34mm (fine resolution volume scan, zoom scan) was assessed by measuring 7 x 7 x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see Fig. 7.1):

a. The data at the surface was extrapolated, since the center of the dipoles is 2.7mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2mm. The extrapolation was based on a least square algorithm [15]. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

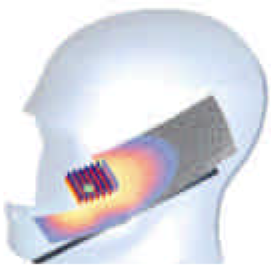

Figure 7.1 Sample SAR Area Scan

b. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions) [15][16]. The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.

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

4. The SAR reference value, at the same location as procedure #1, was re-measured. If the value changed by more than 5%, the evaluation is repeated.

Deviation from measurement procedure - None

Specific Anthropomorphic Mannequin (SAM) Specifications

The phantom for handset SAR assessment testing is a low-loss dielectric shell, with shape and dimensions derived from the anthropometric data of the 90th percentile adult male head dimensions as tabulated by the US Army. The SAM Twin Phantom shell is bisected along the mid-sagittal plane into right and left halves (see Fig. 7.2). The perimeter sidewalls of each phantom halves are extended to allow filling with liquid to a depth that is sufficient to minimized reflections from the upper surface. The liquid depth is maintained at a minimum depth of 15cm to minimize reflections from the upper surface.

Figure 7.2 SAM Twin Phantom shell

8. DEFINITION OF REFERENCE POINTS

EAR Reference Point

Figure 8.1 shows the front, back and side views of the SAM Twin Phantom. The point "M" is the reference point for the center of the mouth, "LE" is the left ear reference point (ERP), and "RE" is the right ERP. The ERPs are 15mm posterior to the entrance to the ear canal (EEC) along the B-M line (Back-Mouth), as shown in Figure 9.2. The plane passing through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck-Front) is perpendicular to the reference plane and passing through the RE (or LE) is called the Reference Pivoting Line (see Figure 8.2). Line B-M is perpendicular to the N-F line. Both N-F and B-M lines are marked on the external phantom shell to facilitate handset positioning [5].

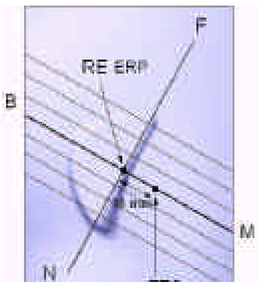

Figure 8.2 Close-up side view of ERPs

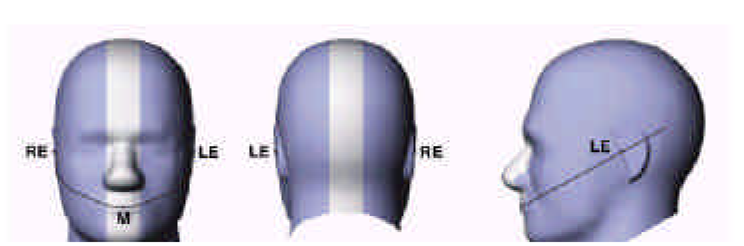

Figure 8.1 Front, back and side view of SAM Twin Phantom

Handset Reference Points

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The test device was placed 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" (See Fig. 8.3). The "test device reference point" was than located at the same level as the center of the ear reference point. The test device was positioned so that the "vertical centerline" was bisecting the front surface of the handset at it's top and bottom edges, positioning the "ear reference point" on the outer surface of the both the left and right head phantoms on the ear reference point.

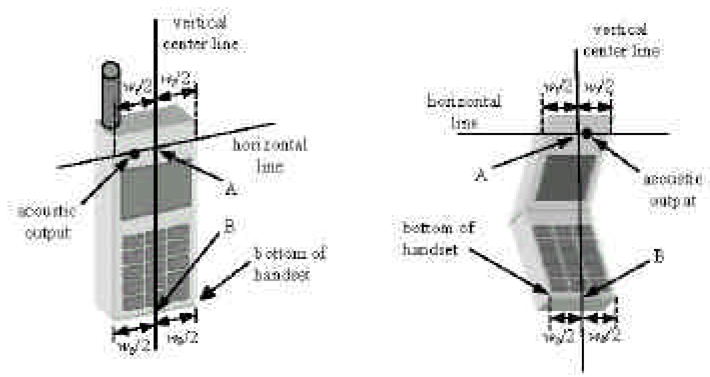

Figure 8.3 Handset Vertical Center & Horizontal Line Reference Points

9. TEST CONFIGURATION POSITIONS

Body Holster / Belt Clip Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 9.5). A device with a terminal output is tested with a terminal connected to the device. Body dielectric parameters are used.

In all cases SAR measurements are performed to investigate the worst-case positioning. Worst-case positioning is then documented and used to perform Body SAR testing.

In order for users to be aware of the body-worn operating requirements for meeting RF exposure compliance, operating instructions and cautions statements are included in the user's manual.

Figure 9.5 Typical Body Belt Clip & Holster Configurations Example Photo Only (Not Actual EUT)

10. ANSI/IEEE C95.1 - 1992 RF EXPOSURE LIMITS

Uncontrolled Environment

UNCONTROLLED ENVIRONMENTS are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

Controlled Environment

CONTROLLED ENVIRONMENTS are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Table 10.1. Safety Limits for Partial Body Exposure [2]

	HUMAN EXPOSURE LIMITS	
	UNCONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT Occupational (W/kg) or (mW/g)
SPATIAL PEAK SAR [1] Head	1.60	8.00
SPATIAL AVERAGE SAR [2] Whole Body	0.08	0.40
SPATIAL PEAK SAR [3] Hands, Feet, Ankles, Wrists	4.00	20.00

1 The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
2 The Spatial Average value of the SAR averaged over the whole body.
3 The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

11. MEASUREMENT UNCERTAINTIES 5 GHz Band

a	b	c	d	e= f(d,k)	f	g	h = cxf/e	i = cxg/e	k
Uncertainty Component	**Sec.**	**Tol. (± %)**	**Prob. Dist.**	**Div.**	**c_i (1 - g)**	**c_i (10 - g)**	**1 - g u_i (± %)**	**10 - g u_i (± %)**	**v_i**
Measurement System									
Probe Calibration	E1.1	4.8	N	1	1	1	4.8	4.8	∞
Axial Isotropy	E1.2	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
Hemishperical Isotropy	E1.2	9.6	R	$\sqrt{3}$	0.7	0.7	3.9	3.9	∞
Boundary Effect	E1.3	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Linearity	E1.4	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
System Detection Limits	E1.5	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Readout Electronics	E1.6	1.0	N	1	1	1	1.0	1.0	∞
Response Time	E1.7	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
Integration Time	E1.8	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
RF Ambient Conditions	E5.1	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E5.2	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	E5.3	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
Extrapolation, Interpolation & Integration Algorithms for Max. SAR Evaluation	E4.2	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E3.2.1	2.9	N	1	1	1	2.9	2.9	145
Device Holder Uncertainty	E3.1.1	3.6	N	1	1	1	3.6	3.6	5
Output Power Variation - SAR drift measurement	5.6.2	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E2.1	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E2.2	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E2.2	2.5	N	1	0.64	0.43	1.6	1.1	∞
Liquid Permittivity - deviation from target values	E2.2	5.0	R	$\sqrt{3}$	0.6	0.5	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E2.2	2.5	N	1	0.6	0.5	1.5	1.2	∞
Combined Standard Uncertainty (k=1)			RSS				10.3	10.0	
Expanded Uncertainty (k=2) (95% CONFIDENCE LEVEL)							20.6	20.1	

The above measurement uncertainties are according to IEEE 1528-2003

12. SYSTEM VERIFICATION

Tissue Verification

Table 12.1 Simulated Tissue Verification [5]

MEASURED TISSUE PARAMETERS									
	03-28-2006	835MHz Head		835MHz Body		1900MHz Head		1900MHz Body	
Liquid Temperature (°C)	23.5	Target	Measured	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ε		41.50	42.10	55.20	56.89	40.00	38.62	53.30	52.64
Conductivity: σ		0.900	0.88	0.970	0.99	1.400	1.46	1.520	1.57

Test System Validation

Prior to assessment, the system is verified to the ±10% of the specifications at 835MHz and 1900MHz, by using the system validation kit(s). (Graphic Plots Attached)

Table 12.2 System Validation [5]

System Validation TARGET & MEASURED							
Date:	**Amb. Temp (°C)**	**Liquid Temp(°C)**	**Input Power (W)**	**Tissue**	**Targeted SAR_{1g} (mW/g)**	**Measured SAR_{1g} (mW/g)**	**Deviation (%)**
03/28/2006	23.1	21.8	**0.250**	**835MHz Head**	**2.375**	2.330	-1.89
03/29/2006	23.4	21.6				2.440	2.73
03/28/2006	23.4	21.1	**0.100**	**1900MHz Head**	**3.970**	3.890	-2.01
03/29/2006	23.1	21.5				4.160	4.78
03/30/2006	23.5	21.4				4.070	2.51

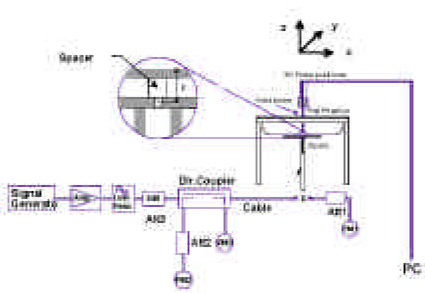

Figure 12.1 Dipole Validation Test Setup

13. FCC 3G MEASUREMENT PROCEDURES

Power measurements were performed using a base station simulator under digital average power.

Procedures Used to Establish RF Signal for SAR

The handset was placed into a simulated call using a base station simulator in a shielded chamber. Such test signals offer a consistent means for testing SAR and are recommended for evaluating SAR[4]. SAR measurements were taken with a fully charged battery. In order to verify that the device was tested and maintained at full power, this was configured with the base station simulator. The SAR measurement software calculates a reference point at the start and end of the test to check for power drifts. If conducted power deviations of more than 5% occurred, the tests were repeated.

SAR Measurement Conditions for CDMA2000

The following procedures were followed according to FCC "SAR Measurement Procedures for 3G Devices", May 2006.

5.1.1 Output Power Verification

See 3GPP2 C.S0011/TIA-98-E as recommended by "SAR Measurement Procedures for 3G Devices", May 2006. Maximum output power is verified on the High, Middle and Low channels according to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E. SO55 tests were measured with power control bits in "All Up" condition. .

1. If the mobile station (MS) supports Reverse TCH RC 1 and Forward TCH RC 1, set up a call using Fundamental Channel Test Mode 1 (RC=1/1) with 9600 bps data rate only.
2. Under RC1, C.S0011 Table 4.4.5.2-1, Table 0-1 parameters were applied.
3. If the MS supports the RC 3 Reverse FCH, RC3 Reverse SCH0 and demodulation of RC 3,4, or 5, set up a call using Supplemental Channel Test Mode 3 (RC 3/3) with 9600 bps Fundamental Channel and 9600 bps SCH0 data rate.
4. Under RC3, C.S0011 Table 4.4.5.2-2, Table 0-2 was applied.
5. FCHs were configured at full rate for maximum SAR with "All Up" power control bits.

Table 0-1
Parameters for Max. Power for RC1

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-104
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

Table 0-2
Parameters for Max. Power for RC3

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-86
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

5.1.2 Head SAR Measurements

SAR for head exposure configurations is measured in RC3 with the DUT configured to transmit at full rate using Loopback Service Option SO55. SAR for RC1 is not required when the maximum average output of each channel is less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel in RC1 using the exposure configuration that results in the highest SAR for that channel in RC3.

5.1.3 Body SAR Measurements

SAR for body exposure configurations is measured in RC3 with the DUT configured to transmit at full rate on FCH with all other code channels disabled using TDSO / SO32. SAR for multiple code channels (FCH + SCHn) is not required when the maximum average output of each RF channel is less than ¼ dB higher than that measured with FCH only. Otherwise, SAR is measured on the maximum output channel (FCH + SCHn) with FCH at full rate and SCH0 enabled at 9600 bps using the exposure configuration that results in the highest SAR for that channel with FCH only. When multiple code channels are enabled, the DUT output may shift by more than 0.5 dB and lead to higher SAR drifts and SCH dropouts. Body SAR was measured using TDSO / SO32 with power control bits in the "All Up"

Body SAR in RC1 is not required when the maximum average output of each channel is less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel in RC1; with Loopback Service Option SO55, at full rate, using the body exposure configuration that results in the highest SAR for that channel in RC3.

5.1.4 Handsets with EVDO

For handsets with Ev-Do capabilities, when the maximum average output of each channel in Rev. 0 is less than ¼ dB higher than that measured in RC3 (1x RTT), body SAR for EV-DO is not required.7 Otherwise, SAR for Rev. 0 is measured on the maximum output channel at 153.6 kbps using the body exposure configuration that results in the highest SAR for that channel in RC3.7 SAR for Rev. A is not required when the maximum average output of each channel is less than that measured in Rev. 0 or less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel for Rev. A using a Reverse Data Channel payload size of 4096 bits and a Termination Target of 16 slots defined for Subtype 2 Physical Layer configurations. A Forward Traffic Channel data rate corresponding to the 2-slot version of 307.2 kbps with the ACK Channel transmitting in all slots should be configured in the downlink for both Rev. 0 and Rev. A.

Table 0-3
Max. Power Output Table for PKRNWXV620

Band	Channel	1x EvDO (153.6kbps)	CDMA2000 RC	TDSO SO32 Loopback
Cellular	1013	23.75	RC1	
			RC3	23.83
	384	23.65	RC1	
			RC3	23.61
	777	23.75	RC1	
			RC3	23.75
PCS	25	24.49	RC1	
			RC3	24.15
	600	24	RC1	
			RC3	23.96
	1175	23.49	RC1	
			RC3	23.66

14. SAR DATA SUMMARY

Mixture Type: 835MHz Body

Host PC: COMPAQ V4332US

14.1 MEASUREMENT RESULTS (CDMA, Laptop Position)

FREQUENCY		Modulation	Begin / End Average POWER‡		Test Position	Separation Distance (cm)	Antenna Position	SAR (W/kg)
MHz	Ch.		(dBm)					
824.70	1013	CDMA	23.82	23.75	Laptop	0.9 cm	Open	0.990
824.70	1013	CDMA	23.82	23.69	Laptop	0.9 cm	Close	0.955
836.52	384	CDMA	23.61	23.65	Laptop	0.9 cm	Open	0.885
836.52	384	CDMA	23.61	23.43	Laptop	0.9 cm	Close	0.978
848.31	777	CDMA	23.74	23.52	Laptop	0.9 cm	Open	0.910
848.31	777	CDMA	23.74	23.71	Laptop	0.9 cm	Close	**0.996**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**					**Body** **1.6 W/kg (mW/g)** averaged over 1 gram			

NOTES:

1. The test data reported are the worst-case SAR value with the antenna position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Laptop is fully charged for all readings.
4. SAR Measurement System ☒ DASY4 ? IDX
   Phantom Configuration ? Left Head ☒ Flat Phantom ? Right Head
5. SAR Configuration ? Head ☒ Body ? Hand
6. Test Signal Call Mode ? Manu. Test Codes ☒ Base Station Simulator
7. Tissue parameters and temperatures are listed on the SAR plots.
8. Liquid tissue depth is 15.1 cm. ± 0.1
9. Body SAR was tested under RC3/SO32

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SAR DATA SUMMARY (Continued)

Mixture Type: 1900MHz Body

Host PC: COMPAQ V4332US

14.2 MEASUREMENT RESULTS (PCS, Laptop Position)

FREQUENCY		Modulation	Begin / End Average POWER‡		Test Position	Separation Distance (cm)	Antenna Position	SAR (W/kg)
MHz	Ch.		(dBm)					
1851.25	25	PCS CDMA	24.33	24.44	Laptop	0.9 cm	Open	**1.140**
1880.00	600	PCS CDMA	23.96	23.82	Laptop	0.9 cm	Open	0.947
1880.00	600	PCS CDMA	23.96	23.89	Laptop	0.9 cm	Close	0.700
1908.75	1175	PCS CDMA	23.46	23.39	Laptop	0.9 cm	Open	0.674
1880.00	600	PCS EVDO	23.81	23.90	Laptop	0.9 cm	Open	0.942
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**Body 1.6 W/kg (mW/g)** averaged over 1 gram			

NOTES:

1. The test data reported are the worst-case SAR value with the antenna position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Laptop is fully charged for all readings.
4. SAR Measurement System ☒ DASY4 ? IDX

   Phantom Configuration ? Left Head ☒ Flat Phantom ? Right Head
5. SAR Configuration ? Head ☒ Body ? Hand
6. Test Signal Call Mode ? Manu. Test Codes ☒ Base Station Simulator
7. Tissue parameters and temperatures are listed on the SAR plots.
8. Liquid tissue depth is 15.1 cm. ± 0.1
9. Body SAR was tested under RC3/SO32

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14. SAR DATA SUMMARY

Mixture Type: 835MHz Body

Host PC: COMPAQ V4332US

14.3 MEASUREMENT RESULTS (CDMA, Bystander Position)

FREQUENCY		Modulation	Begin / End Average POWER‡		Test Position	Separation Distance (cm)	Antenna Position	SAR (W/kg)
MHz	Ch.		(dBm)					
836.52	384	CDMA	23.61	23.79	Bystander	2.5 cm	Open	**0.028**
836.52	384	CDMA	23.61	23.77	Bystander	2.5 cm	Close	0.024
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**Body 1.6 W/kg (mW/g)** averaged over 1 gram			

NOTES:

1. The test data reported are the worst-case SAR value with the antenna position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Laptop is fully charged for all readings.
4. SAR Measurement System ☒ DASY4 ? IDX
   Phantom Configuration ? Left Head ☒ Flat Phantom ? Right Head
5. SAR Configuration ? Head ☒ Body ? Hand
6. Test Signal Call Mode ? Manu. Test Codes ☒ Base Station Simulator
7. Tissue parameters and temperatures are listed on the SAR plots.
8. Liquid tissue depth is 15.1 cm. ± 0.1
9. Body SAR was tested under RC3/SO32

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14. SAR DATA SUMMARY

Mixture Type: 1900MHz Body

Host PC: COMPAQ V4332US

14.4 MEASUREMENT RESULTS (PCS, Bystander Position)

FREQUENCY		Modulation	Begin / End Average POWER‡		Test Position	Separation Distance (cm)	Antenna Position	SAR (W/kg)
MHz	Ch.		(dBm)					
1880.00	600	PCS CDMA	23.96	23.78	Bystander	2.5 cm	Open	**0.144**
1880.00	600	PCS CDMA	23.96	23.75	Bystander	2.5 cm	Close	0.131
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**Body 1.6 W/kg (mW/g)** averaged over 1 gram			

NOTES:

1. The test data reported are the worst-case SAR value with the antenna position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Laptop is fully charged for all readings.
4. SAR Measurement System ☒ DASY4 ? IDX
   Phantom Configuration ? Left Head ☒ Flat Phantom ? Right Head
5. SAR Configuration ? Head ☒ Body ? Hand
6. Test Signal Call Mode ? Manu. Test Codes ☒ Base Station Simulator
7. Tissue parameters and temperatures are listed on the SAR plots.
8. Liquid tissue depth is 15.1 cm. ± 0.1
9. Body SAR was tested under RC3/SO32

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14. SAR DATA SUMMARY

Mixture Type: 835MHz Body

Host PC: Dell M1210

14.5 MEASUREMENT RESULTS (CDMA, Laptop Position)

FREQUENCY		Modulation	Begin / End Average POWER‡		Test Position	Separation Distance (cm)	Antenna Position	SAR (W/kg)
MHz	Ch.		(dBm)					
836.52	384	CDMA	23.61	23.66	Laptop	2.0 cm	Open	0.367
836.52	384	CDMA	23.61	23.64	Laptop	2.0 cm	Close	**0.516**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**Body 1.6 W/kg (mW/g)** averaged over 1 gram			

NOTES:

1. The test data reported are the worst-case SAR value with the antenna position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Laptop is fully charged for all readings.
4. SAR Measurement System ☒ DASY4 ? IDX
   Phantom Configuration ? Left Head ☒ Flat Phantom ? Right Head
5. SAR Configuration ? Head ☒ Body ? Hand
6. Test Signal Call Mode ? Manu. Test Codes ☒ Base Station Simulator
7. Tissue parameters and temperatures are listed on the SAR plots.
8. Liquid tissue depth is 15.1 cm. ± 0.1
9. Body SAR was tested under RC3/SO32

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SAR DATA SUMMARY (Continued)

Mixture Type: 1900MHz Body

Host PC: Dell M1210

14.6 MEASUREMENT RESULTS (PCS, Laptop Position)

FREQUENCY		Modulation	Begin / End Average POWER‡		Test Position	Separation Distance (cm)	Antenna Position	SAR (W/kg)
MHz	Ch.		(dBm)					
1880.00	600	PCS CDMA	23.96	23.86	Laptop	2.0 cm	Open	**0.416**
1880.00	600	PCS CDMA	23.96	24.18	Laptop	2.0 cm	Close	0.380
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**					**Body** **1.6 W/kg (mW/g)** averaged over 1 gram			

NOTES:

1. The test data reported are the worst-case SAR value with the antenna position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Laptop is fully charged for all readings.
4. SAR Measurement System ☒ DASY4 ? IDX
   Phantom Configuration ? Left Head ☒ Flat Phantom ? Right Head
5. SAR Configuration ? Head ☒ Body ? Hand
6. Test Signal Call Mode ? Manu. Test Codes ☒ Base Station Simulator
7. Tissue parameters and temperatures are listed on the SAR plots.
8. Liquid tissue depth is 15.1 cm. ± 0.1
9. Body SAR was tested under RC3/SO32

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14. SAR DATA SUMMARY

Mixture Type: 835MHz Body

Host PC: Dell M1210

14.7 MEASUREMENT RESULTS (CDMA, Bystander Position)

FREQUENCY		Modulation	Begin / End Average POWER‡		Test Position	Separation Distance (cm)	Antenna Position	SAR (W/kg)
MHz	Ch.		(dBm)					
836.52	384	CDMA	23.61	23.78	Bystander	2.5 cm	Open	**0.030**
836.52	384	CDMA	23.61	23.53	Bystander	2.5 cm	Close	0.023
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**Body 1.6 W/kg (mW/g)** averaged over 1 gram			

NOTES:

1. The test data reported are the worst-case SAR value with the antenna position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Laptop is fully charged for all readings.
4. SAR Measurement System ☒ DASY4 ? IDX

   Phantom Configuration ? Left Head ☒ Flat Phantom ? Right Head
5. SAR Configuration ? Head ☒ Body ? Hand
6. Test Signal Call Mode ? Manu. Test Codes ☒ Base Station Simulator
7. Tissue parameters and temperatures are listed on the SAR plots.
8. Liquid tissue depth is 15.1 cm. ± 0.1
9. Body SAR was tested under RC3/SO32

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14. SAR DATA SUMMARY

Mixture Type: 1900MHz Body

Host PC: Dell M1210

14.8 MEASUREMENT RESULTS (PCS, Bystander Position)

FREQUENCY		Modulation	Begin / End Average POWER‡		Test Position	Separation Distance (cm)	Antenna Position	SAR (W/kg)
MHz	Ch.		(dBm)					
1880.00	600	PCS CDMA	23.96	24.08	Bystander	2.5 cm	Open	0.086
1880.00	600	PCS CDMA	23.96	23.97	Bystander	2.5 cm	Close	**0.163**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**Body 1.6 W/kg (mW/g)** averaged over 1 gram			

NOTES:

1. The test data reported are the worst-case SAR value with the antenna position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Laptop is fully charged for all readings.
4. SAR Measurement System ☒ DASY4 ? IDX

   Phantom Configuration ? Left Head ☒ Flat Phantom ? Right Head
5. SAR Configuration ? Head ☒ Body ? Hand
6. Test Signal Call Mode ? Manu. Test Codes ☒ Base Station Simulator
7. Tissue parameters and temperatures are listed on the SAR plots.
8. Liquid tissue depth is 15.1 cm. ± 0.1
9. Body SAR was tested under RC3/SO32

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14. SAR DATA SUMMARY

Mixture Type: 835MHz Body

Host PC: Dell FM1B

14.9 MEASUREMENT RESULTS (CDMA, Laptop Position)

FREQUENCY		Modulation	Begin / End Average POWER‡		Test Position	Separation Distance (cm)	Antenna Position	SAR (W/kg)
MHz	Ch.		(dBm)					
836.52	384	CDMA	23.61	23.52	Laptop	1.6 cm	Open	0.725
836.52	384	CDMA	23.61	23.61	Laptop	1.6 cm	Close	**0.793**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					Body 1.6 W/kg (mW/g) averaged over 1 gram			

NOTES:

1. The test data reported are the worst-case SAR value with the antenna position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Laptop is fully charged for all readings.
4. SAR Measurement System ☒ DASY4 ? IDX
   Phantom Configuration ? Left Head ☒ Flat Phantom ? Right Head
5. SAR Configuration ? Head ☒ Body ? Hand
6. Test Signal Call Mode ? Manu. Test Codes ☒ Base Station Simulator
7. Tissue parameters and temperatures are listed on the SAR plots.
8. Liquid tissue depth is 15.1 cm. ± 0.1
9. Body SAR was tested under RC3/SO32

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SAR DATA SUMMARY (Continued)

Mixture Type: 1900MHz Body

Host PC: Dell FM1B

14.10 MEASUREMENT RESULTS (PCS, Laptop Position)

FREQUENCY		Modulation	Begin / End Average POWER‡		Test Position	Separation Distance (cm)	Antenna Position	SAR (W/kg)
MHz	Ch.		(dBm)					
1880.00	600	PCS CDMA	23.96	23.87	Laptop	1.6 cm	Open	0.409
1880.00	600	PCS CDMA	23.96	24.02	Laptop	1.6 cm	Close	**0.486**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					Body 1.6 W/kg (mW/g) averaged over 1 gram			

NOTES:

1. The test data reported are the worst-case SAR value with the antenna position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Laptop is fully charged for all readings.
4. SAR Measurement System ☒ DASY4 ? IDX
   Phantom Configuration ? Left Head ☒ Flat Phantom ? Right Head
5. SAR Configuration ? Head ☒ Body ? Hand
6. Test Signal Call Mode ? Manu. Test Codes ☒ Base Station Simulator
7. Tissue parameters and temperatures are listed on the SAR plots.
8. Liquid tissue depth is 15.1 cm. ± 0.1
9. Body SAR was tested under RC3/SO32

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14. SAR DATA SUMMARY

Mixture Type: 835MHz Body

Host PC: Dell M1210

14.11 MEASUREMENT RESULTS (CDMA, Bystander Position)

FREQUENCY		Modulation	Begin / End Average POWER‡ (dBm)		Test Position	Separation Distance (cm)	Antenna Position	SAR (W/kg)
MHz	Ch.							
836.52	384	CDMA	23.61	23.82	Bystander	2.5 cm	Open	0.032
836.52	384	CDMA	23.61	23.71	Bystander	2.5 cm	Close	**0.036**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					Body 1.6 W/kg (mW/g) averaged over 1 gram			

NOTES:

1. The test data reported are the worst-case SAR value with the antenna position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Laptop is fully charged for all readings.
4. SAR Measurement System ☒ DASY4 ? IDX
   Phantom Configuration ? Left Head ☒ Flat Phantom ? Right Head
5. SAR Configuration ? Head ☒ Body ? Hand
6. Test Signal Call Mode ? Manu. Test Codes ☒ Base Station Simulator
7. Tissue parameters and temperatures are listed on the SAR plots.
8. Liquid tissue depth is 15.1 cm. ± 0.1
9. Body SAR was tested under RC3/SO32

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14. SAR DATA SUMMARY

Mixture Type: 1900MHz Body

Host PC: Dell M1210

14.12 MEASUREMENT RESULTS (PCS, Bystander Position)

FREQUENCY		Modulation	Begin / End Average POWER‡		Test Position	Separation Distance (cm)	Antenna Position	SAR (W/kg)
MHz	Ch.		(dBm)					
1880.00	600	PCS CDMA	23.96	23.94	Bystander	2.5 cm	Open	**0.117**
1880.00	600	PCS CDMA	23.96	24.09	Bystander	2.5 cm	Close	0.095
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**					**Body** **1.6 W/kg (mW/g)** averaged over 1 gram			

NOTES:

1. The test data reported are the worst-case SAR value with the antenna position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Laptop is fully charged for all readings.
4. SAR Measurement System ☒ DASY4 ? IDX

   Phantom Configuration ? Left Head ☒ Flat Phantom ? Right Head
5. SAR Configuration ? Head ☒ Body ? Hand
6. Test Signal Call Mode ? Manu. Test Codes ☒ Base Station Simulator
7. Tissue parameters and temperatures are listed on the SAR plots.
8. Liquid tissue depth is 15.1 cm. ± 0.1
9. Body SAR was tested under RC3/SO32

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15. SAR TEST EQUIPMENT

Equipment Calibration

Type	Cal Due	Serial Number
Staubli Robot RX60L	Oct 2007	599131-01
Staubli Robot Controller	Oct 2007	PCT592
Staubli Teach Pendant (Joystick)	Oct 2007	3323-00161
Gateway Computer, 2.52GHz/768MB,Windows-XP	N/A	PCT678
SPEAG EDC3	Oct 2007	321
SPEAG DAE4	Sep 2006	649
SPEAG DAE4	Aug 2006	665
SPEAG E-Field Probe EX3DV4	Aug 2006	3561
SPEAG Dummy Probe	Oct 2006	PCT583
SPEAG SAM Twin Phantom V4.0	Oct 2006	PCT666
SPEAG Light Alignment Sensor	Oct 2006	205
SPEAG Validation Dipole D835V2	Feb 2007	PCT512
SPEAG Validation Dipole D1900V2	Feb 2007	PCT613
Rohde & Schwarz CMD80 Base Station Simulator	Jun 2006	830805/005
Rohde & Schwarz CMU200 Base Station Simulator	Oct 2006	650378
Agilent 8960 Test Communications Set	Jan 2007	GB43193972
SPEAG Freespace 1900MHz Dipole	Feb 2007	1002
SPEAG Freespace 2450 MHz Dipole	Feb 2007	1004
ETS Freespace 835 MHz Dipole	Feb 2007	A005
SPEAG Freespace 835 MHz Dipole	Feb 2007	1003
SPEAG Freespace H-Field Probe	Aug 2006	6170
SPEAG Freespace E-Field Probe	Aug 2006	2353
MW Amp. Model: 5S1G4, (800MHz - 4.2GHz)	Jan 2007	22332
Gigatronics 8651A Power Meter	Jan 2007	1835299
Gigatronics 80701A Sensor(50MHz-18GHz)	Jan 2007	PCT606
HP-8648D (9kHz ~ 4GHz) Signal Generator	Jan 2007	PCT530
HP-8241A (-18GHz) Signal Generator	Jan 2007	
Amplifier Research 5S1G4 AMP	Jan 2007	PCT540
HP-8753E (30kHz ~ 3GHz) Network Analyzer	Jun 2006	PCT552
HP85070B Dielectric Probe Kit	Jun 2006	PCT501
Ambient Noise/Reflection, etc. (<12mW/kg/<3%of SAR)	N/A	Anechoic Room PCT01

Table 15.1 Test Equipment Calibration

NOTE:

The E-field probe was calibrated by SPEAG, by waveguide technique procedure. Dipole Validation measurement is performed by PCTEST Lab. before each test. The head simulating material is calibrated by PCTEST using the dielectric probe system and network analyzer to determine the conductivity and permittivity (dielectric constant) of the head-equivalent material.

16. CONCLUSION

Measurement Conclusion

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the FCC. These measurements are taken to simulate the RF effects exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The tested device complies with the requirements in respect to all parameters subject to the test. The test results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because innumerable factors may interact to determine the specific biological outcome of an exposure to electromagnetic fields, any protection guide shall consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables.[3]

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