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Dates of Tests: March 30~April 08, 2009
Test Report S/N:DR50110903L-R1
Test Site : DIGITAL EMC CO., LTD.

SAR TEST REPORT

FCC ID	**R2NSUC-2000**
APPLICANT	**Epivalley CO., LTD.**

FCC Classification:	**Licensed Portable Transmitter (PCB)**
EUT Type:	**HSUPA USB Modem**
Model Name	**SUC-2000**
Test Device Serial No.:	**Identical prototype**
TX Frequency Range:	**824.20 ~848.80 MHz (GSM850) / 826.40~846.60 MHz (Cellular WCDMA)** **1850.20~1909.80MHz(PCS1900) / 1852.4~1907.6 MHz (PCS WCDMA)**
RX Frequency Range:	**869.20 ~893.80 MHz (GSM850) / 871.40~891.60 MHz (Cellular WCDMA)** **1930.2~1989.8 MHz(PCS1900) / 1932.4~1987.6 MHz (PCS WCDMA)**
Max. SAR Measurement:	**0.837 mW/g GSM850 GPRS Body SAR / 0.478 mW/g WCDMA Cellular Body SAR** **0.869 mW/g PCS1900 GPRS Body SAR / 0.589 mW/g WCDMA PCS Body SAR**
Max. RF Output Power	**GSM Cellular Band: 21.61 dBm ERP(0.145W)** **GSM PCS Band: 25.20 dBm EIRP(0.331W)** **WCDMA Cellular Band: 16.04 dBm ERP(0.040 W)** **WCDMA PCS Band: 20.24 dBm EIRP(0.106 W)**
Application Type:	**FCC Certification**
Rule Part(s):	**§2.1093; FCC/OET Bulletin 65 Supplement C[July 2001]**
Data of issue:	**April 13, 2009**

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.

Tested by : Sun-Kyu Ryu (Engineer)

Reviewed by : Harvey Sung (Chief Engineering Director)

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1. INTROCUCTION/SAR DEFINITION

In 1974, the International Radiation Protection Association (IRPA) formed a working group on non-ionizing radiation (NIR), which examined the problems arising in the field of Protection against the various types of NIR. At the IRPA Congress in Paris in 1977, this working group because the International Non-Ionizing Radiation Committee (INIRC).
In cooperation with the Environmental Health Division of the World Health Organization (WHO), the IRPA/INIRC developed a number of health criteria documents on NIR as part of WHO'S Environmental Health Criteria Programme, sponsored by the United Nations Environment Programme (UNEP). Each document includes an overview of the physical characteristics, measurement and instrumentation, sources, and applications of NIR, a thorough review of the literature on biological effects, and an evaluation of the health risks of exposure to NIR. These health criteria have provided the scientific database for the subsequent development of exposure limits and codes of practice relating to NIR.
At the Eighth International Congress of the IRPA (Montreal, 18-22 May 1992), a new, independent scientific organization-the International Commission on Non-Ionizing Radiation Protection (ICNIRP)-was established as a successor to the IRPA/INIRC. The functions of the Commission are to investigate the hazards that may be association with the different forms of NIR, develop international guidelines on NIR exposure to static and extremely-low-frequency (ELF) electric and magnetic field have been reviewed by UNEP/WHO/IRPA (1984, 1987). Those publications and a number of others, including UNEP/WHO/IRPA (1993) and Allen et al. (1991), provided the scientific rationale for these guidelines.
A glossary of terms appears in the Appendix.

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 (ρ) 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)

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

Figure 1.1
SAR Mathematical Equation

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

$$SAR = E^2 / \rho$$

Where:

σ = conductivity of the tissue-simulant material (S/m)
ρ = mass density of the tissue-simulant material (kg/m3)
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 brain 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 Micron Pentium IV 500 MHz computer with Windows NT 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.

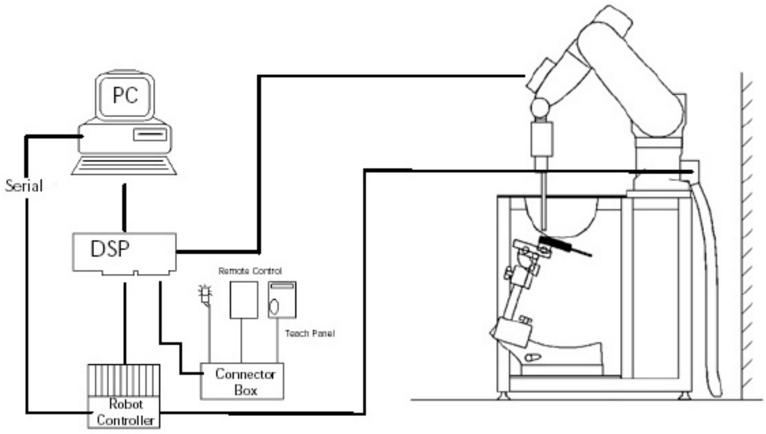


Figure 2.1 SAR Measurement System Setup

System Electronics

The DAE3 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. SAR MEASUREMENT SETUP

Probe Measurement 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.

Figure 3.1 DAE System

Probe Specifications

Calibration : In air from 10 MHz to 6.0 GHz

In brain and muscle simulating tissue at

Frequencies of 900 MHz, 1810 MHz, 1950 MHz, 2450 MHz, 2600 MHz

Frequency : 10 MHz to 6 GHz

Linearity : ±0.2dB (30 MHz to 6 GHz)

Dynamic : 10 mW/kg to 100 W/kg

Range : Linearity: ±0.2 dB

Dimensions: Overall length: 330 mm

Tip length : 20 mm

Body diameter :12 mm

Tip diameter: 2.5 mm

Distance from probe tip to sensor center: 1 mm

Application: SAR Dosimetry Testing

Compliance tests of mobile phones

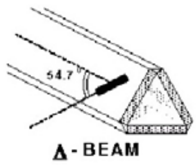


Figure 3.1 Triangular Probe Configuration

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 1GHz 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 brain 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).

$$\text{SAR} = C\frac{\Delta T}{\Delta t} \qquad\qquad \text{SAR} = \frac{|E|^2 \cdot \sigma}{\rho}$$

where:

Δt = exposure time (30 seconds),

C = heat capacity of tissue (brain or muscle),

ΔT = temperature increase due to RF exposure.

where:

σ = simulated tissue conductivity,

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

SAR is proportional to ΔT / Δt , 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;

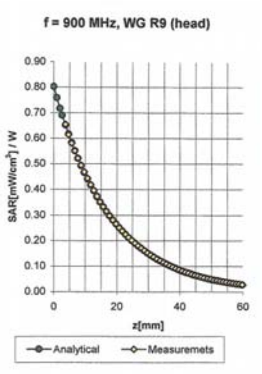


Figure 4.1 E-Field and Temperature Measurements at 900MHz[7]

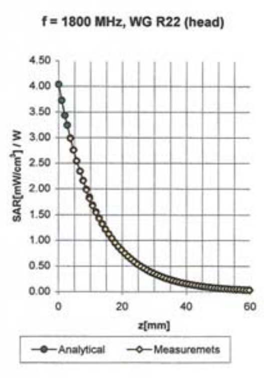


Figure 4.2 E-Field and Temperature Measurements at 1900MHz[7]

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 o f 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)

Brain & Muscle Simulating Mixture Characterization

Figure 5.2 Simulated Tissue

The brain and muscle mixtures consist of a viscous gel using hydroxethyl cellullose (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 issue dielectric parameters computed from he 4-Cole-Cole equations The mixture characterizations used for the brain and muscle 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 Muscle Tissue Equivalent Matter

INGREDIENTS		SIMULATING TISSUE			
		835 MHz Brain	835 MHz Muscle	1900 MHz Brain	1900 MHz Muscle
Mixture Percentage					
WATER		41.45	52.50	54.90	40.40
DGBE		0.000	0.000	44.92	58.00
SUGAR		56.00	45.00	0.000	0.000
SALT		1.450	1.400	0.180	0.500
BACTERICIDE		0.100	0.100	0.000	0.100
HEC		1.000	1.000	0.000	1.000
Dielectric Constant	Target	**41.50**	**55.20**	**40.00**	**53.30**
Conductivity (S/m)	Target	**0.900**	**0.970**	**1.400**	**1.520**

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 where by 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

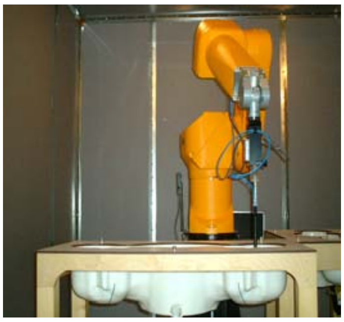


Figure 6.1 DASY4 Test System

Data Acquisition Electronic (DAE) System

Cell Controller

Processor: Pentium 4 CPU

Clock Speed: 3 GHz

Operating System: Window 2000

Data Card: DASY4 PC-Board

Data Converter

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

Software: DASY4

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 DAE 3

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: 3643

Construction: Triangular core fiber optic detection system

Frequency: 10 MHz to 6 GHz

Linearity: ±0.2dB(30MHz to 6GHz)

Phantom

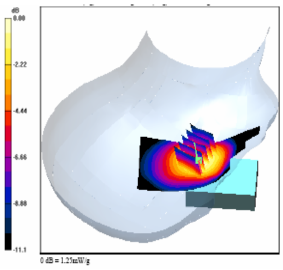
Phantom: SAM Twin Phantom (V4.0)

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 o f 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 30mm (fine resolution volume scan, zoom scan) was assessed by measuring 5 x 5 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 2.7 mm 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.

b. The maximum interpolated value was searched with a straight-for war dalgorithm. 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.

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

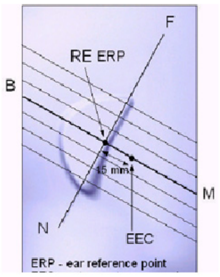


Figure 8.2 Close-up side view of ERPs

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 8.1 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.

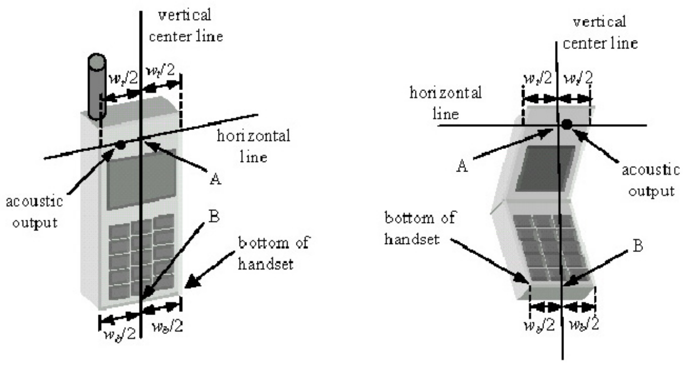


Figure 8.3 Handset Vertical Center & Horizontal Line Reference Points

9. TEST CONFIGURATION POSITIONS

Positioning for Cheek/Touch

1. The test device was positioned with the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 9.1), such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom.

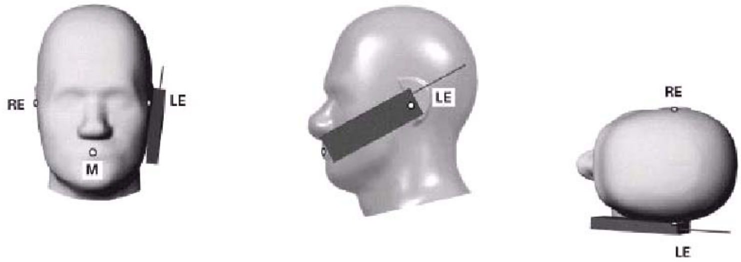


Figure 9.1 Front, Side and Top View of Cheek/Touch Position

2. The handset was translated towards the phantom along the line passing through RE & LE until the handset touches the ear.

3. While maintaining the handset in this plane, the handset was rotated around the LE-RE line until the vertical centerline was in the plane normal to MB-NF including the line MB (reference plane).

4. The phone was hen rotated around the vertical centerline until the phone(horizontal line) was symmetrical was respect to the line NF.

5. While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the phone contact with the ear, the handset was rotated about the line NF until any point on the handset made contact with a phantom point below the ear (cheek). See Figure 9.2)

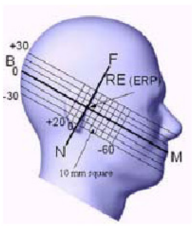


Figure 9.2 Side view w/ relevant markings

9. TEST CONFIGURATION POSITIONS (Continued)

Positioning for Ear / 15 ° Tilt

With the test device aligned in the "Cheek/Touch Position":

1. While maintaining the orientation of the phone, the phone was retracted parallel to the reference plane far enough to enable a rotation of the phone by 15degree.
2. The phone was then rotated around the horizontal line by 15 degree.
3. While maintaining the orientation of the phone, the phone was moved parallel to the reference plane until any part of the phone touches the head. (In this position, point A was located on the line RE-LE). The tilted position is obtained when the contact is on the pinna. If the contact was at any location other than the pinna, the angle of the phone would then be reduced. The tilted position was obtained when any part of the phone was in contact of the ear as well as a second part of the phone was in contact with the head (see Figure 9.3).

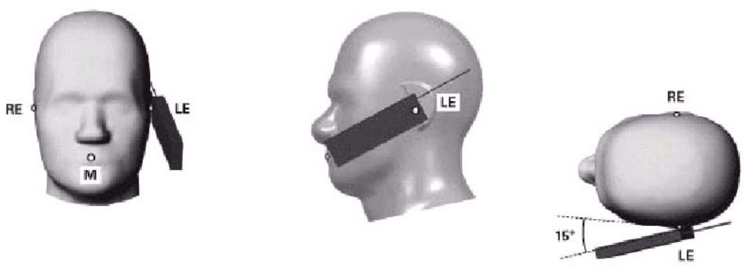


Figure 9.3 Front, Side and Top View of Ear/15° Tilt Position

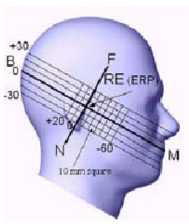


Figure 9.4 Side view w/ relevant markings

9. TEST CONFIGURATION POSITIONS (Continued)

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 headset output is tested with a headset connected to the device. Body dielectric parameters are used.

Figure 9.5 Body Belt Clip & Holster Configurations

Accessories for Body- worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are supplied with the device, the device is tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied or available as options for some Devices intended to be authorized for body-worn use. In this case, a test configuration where a separation distance between the back of the device and the flat phantom is used.All test position spacings are documented.

Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessory(ies), including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

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.

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 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.

SAR Human Exposure Specified in ANSI/IEEE C95.1-1992

	HUMAN EXPOSURE LIMITS	
	General Public Exposure (W/kg) or (mW/g)	Occupational Exposure (W/kg) or (mW/g)
Whole-Body average SAR (W/kg)	0.08	0.40
Localized SAR (head and trunk) (W/kg)	1.60	8.00
Localized SAR (limbs) (W/kg)	4.00	20.0

11.IEEE P1528 – MEASUREMENT UNCERTAINTIES

Error Description	Uncertaint value ±%	Probability Distribution	Divisor	(Ci) 1g	Standard (1g)	vi 2 or Veff
Measurement System						
Probe calibration	± 4.8	Normal	1	1	± 4.8 %	∞
Axial isotropy	± 4.7	Rectangular	√3	0.7	± 1.9 %	∞
Hemispherical isotropy	± 9.6	Rectangular	√3	0.7	± 3.9 %	∞
Boundary Effects	± 1.0	Rectangular	√3	1	± 0.6 %	∞
Probe Linearity	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Detection limits	± 1.0	Rectangular	√3	1	± 0.6 %	∞
Readout Electronics	± 1.0	Normal	1	1	± 1.0 %	∞
Response time	± 0.8	Rectangular	√3	1	± 0.5 %	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Conditions	± 3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	± 0.4	Rectangular	√3	1	± 0.2 %	∞
Probe Positioning	± 2.9	Rectangular	√3	1	± 1.7 %	∞
Algorithms for Max. SAR Eval.	± 1.0	Rectangular	√3	1	± 0.6 %	∞
Test Sample Related						
Device Positioning	± 2.9	Normal	1	1	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	± 2.9 %	∞
Physical Parameters						
Phantom Shell	± 4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	± 1.8 %	∞
Liquid conductivity (Meas.)	± 2.5	Normal	1	0.64	± 1.6 %	∞
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.6	± 1.7 %	∞
Liquid permittivity (Meas.)	± 2.5	Normal	1	0.6	± 1.5 %	∞
Combined Standard Uncertainty					**± 10.3 %**	330
Expanded Uncertainty (k=2)					**± 20.6 %**	

The above measurement uncertainties are according to IEEE P1528 (2003)

12. SYSTEM VERIFICATION

Tissue Verification

Table 12.1 Simulated Tissue Verification [5]

MEASURED TISSUE PARAMETERS					
Date(s)	Target Frequency	Dielectric constant: ε		Conductivity: σ	
		Target	Measured	Target	Measured
April.08, 2009	835 MHz Brain	41.5	41.3	0.90	0.917
April.08, 2009	835 MHz Muscle	55.2	53.7	0.97	1.005
March.30, 2009	1900 MHz Brain	40.0	39.0	1.40	1.450
March.30, 2009	1900 MHz Muscle	53.3	51.2	1.52	1.584

Test System Validation

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

Table 12.2 System Validation [5]

SYSTEM DIPOLE VALIDATION TARGET & MEASURED (835 MHz / 1900 MHz values are normalized to a forward power of 1/4 W)					
Date(s)	System Validation Kit:	Target Frequency	Targeted SAR_{1g} (mW/g)	Measured SAR_{1g} (mW/g)	Deviation (%)
March.30, 2009	D-835V2, S/N: 464	835 MHz Brain	2.375	2.42	1.89
April.08, 2009	D-1900V2, S/N: 5d029	1900 MHz Brain	9.925	10.1	1.76

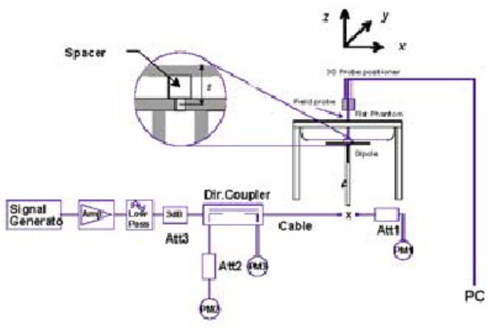


Figure 12.1 Dipole Validation Test Setup

13. FCC 3G SAR MEASUREMENT PROCEDURES – Oct 2007

13.1 Procedures Used To Establish Test Signal

This USB Modem 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]. See data pages for actual procedure used in measurement.

13.2 Device Test Conditions

This USB Modem was operated by laptop. So each SAR measurement was taken with a laptop w/ or w/o USB extension cable. In order to verify that the device was tested at full power, conducted output power measurements were performed before and after each SAR measurement to confirm the output power. If a conducted power deviation of more than 5% occurred, the test was repeated.

13.3 SAR Measurement Conditions for UMTS

The following procedures were followed according to FCC "SAR Measurement Procedures for 3G Devices", Oct 2007.

13.4 Procedures Used to Establish RF Signal for SAR

The following procedures are applicable to HSPA (HSUPA/HSDPA) data devices operation under 3GPP Release6. Body exposure conditions generally apply to these devices, including handsets and data modems operating in various electronic devices. HSUPA operates in conjunction with WCDMA and HSDPA. SAR is initially measured in WCDMA test configurations without HSPA. The default test configuration is to an establish radio link between the DUT and a communication test set to configure a 12.2 kbps RMC (reference measurement channel) in Test Loop Mode 1. SAR for HSPA is selectively measured with HS-DPCCH, E-DPCCH and E-DPDCH, all enabled, along with a 12.2 kbps RMC using the highest SAR configuration in WCDMA with 12.2 kbps RMC only. An FRC is configured to E-DCH Sub-test 5 requirements. SAR for other HSPA sub-test configurations is also confirmed selectively according to output power, exposure conditions and E-DCH UE Category. Maximum output power is verified according to procedures in applicable versions of 3GPP TS 34.121 and SAR must be measured according to these maximum output conditions. The UE Categories for HS-DPCCH and HSPA should be clearly identified in the SAR report. The following procedures are applicable only if Maximum Power Reduction (MPR) is implemented according to Cubic Metric (CM) requirements.

13.4.1 SAR Measurement conditions for HSPA Data Devices

13.4.1.1 Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to the Release 6 procedures in section 5.2 of 3GPP TS 34.121, using the appropriate RMC, FRC and E-DCH configurations. When E-DCH is not active, TPC (transmit power control) is set to all "1's"; otherwise, inner loop power control with power control algorithm 2 is required to maintain E-TFCI requirements. When HSPA is active output power for the applicable HSPA modes should be measured for E-DCH Sub-test1-5. Results for all applicable physical channel configurations (DPCCH, DPDCH and spreading codes, HS-DPCCH, E-DPCCH, E-DPDCH$_k$) should be tabulated in the SAR report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations should be clearly identified.

13. FCC 3G SAR MEASUREMENT PROCEDURES – Oct 2007(Continued)

13.4.2 Body SAR Measurements

SAR for body exposure configurations in voice and data modes is measured using a 12.2 kbps RMC with TPC bits configured to all " 1's". SAR for other spreading codes and multiple $DPDCH_n$, when supported by the DUT, are not required when the maximum average output of each RF channel, for each spreading code and $DPDCH_n$ configuration, are less than 1/4 dB higher than those measured in 12.2 kbps RMC. Otherwise, SAR is measured on the maximum output channel with an applicable RMC configuration for the corresponding spreading code or $DPDCH_n$ using the exposure configuration that results in the highest SAR with 12.2 kbps RMC.

In addition, body SAR is also measured for HSPA when the maximum average output of each RF channel with HSPA active is at least ¼ dB higher than that measured without HSPA using 12.2 kbps RMC or the maximum SAR for 12.2 kbps RMC is above 75% of the SAR limit. Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 with power control algorithm 2, according to the highest body SAR configuration in 12.2 kbps RMC without HSPA. When VOIP is applicable for head exposure, SAR is not required when the maximum output of each RF channel with HSPA is less than ¼ dB higher than that measured using 12.2 kbps RMC; otherwise, the same HSPA configuration used for body measurement should be used to test for head exposure.

DPCH and DPDCH gain factors (β_c,β_d), and HS-DPCCH power offset parameters($\triangle_{ACK}$, $\triangle_{NACK}$, $\triangle_{CQI}$) should be set according to values indicated in the Table below.

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}: 47/15 β_{ed2}: 47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (4)	15/15 (4)	64	15/15 (4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 8 ⇔ $A_{hs} = \beta_{hs}/\beta_c = 30/15$ ⇔ $\beta_{hs} = 30/15 * \beta_c$.
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.
Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.
Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.
Note 6: β_{ed} can not be set directly; it is set by Absolute Grant Value.

14. TEST CONFIGURATION POSITIONS AND POWER TABLE

• Summary of SAR Test Configuration

DUT Orientation	Host PC or USB Cable (Length)	Separation [mm]	Remark
Horizontal-Up	Toshiba L310	5.0	FCC DoC Approved
Horizontal-Down	Extension Cable (12 cm)	5.0	N/A
Vertical-Front	Extension Cable (12 cm)	5.0	N/A
Vertical-Back	Extension Cable (12 cm)	5.0	N/A
Bottom	Extension Cable (12 cm)	5.0	N/A
Top	Extension Cable (12 cm)	5.0	N/A

Max. Power Output Table for SUC-2000 (W/ Short USB Cable)

Band	Mode	GSM Conducted Output Power(dBm)		
		Low Channel	Middle Channel	High Channel
Cellular	GSM	29.9	30.0	30.1
	GPRS 8	29.8	29.9	29.9
	GPRS 10	29.6	29.8	29.8
	GPRS 11	29.6	29.7	29.7
	GPRS 12	29.4	29.6	29.7
PCS	GSM	29.2	29.2	29.1
	GPRS 8	29.1	29.0	28.9
	GPRS 10	28.8	28.8	28.7
	GPRS 11	28.7	28.7	28.5
	GPRS 12	28.6	28.5	28.4

RF Conducted Power Table					
EDGE Data					
Band	Channel	EDGE 8 [dBm]	EDGE 10 [dBm]	EDGE 11 [dBm]	EDGE 12 [dBm]
Cellular	128	25.7	25.6	25.4	25.3
	190	25.7	25.6	25.4	25.3
	251	25.6	25.5	25.2	25.1
PCS	512	25.0	24.9	24.8	24.9
	661	25.2	25.1	25.0	25.0
	810	25.2	25.2	25.1	25.1

15. POWER TABLE

Max. Power Output Table for SUC-2000 (W/ Short USB Cable)

3GPP Release Version	Mode	Power (dBm)			MPR	B_c	β_d	B_c/β_d	Sub-Test
	Channel	4132	4182	4233					
99	*WCDMA*	23.6	22.3	23.6	-	-	-	-	-
6	*HSDPA (Cellular)*	23.4	22.0	23.4	0	2/15	15/15	2/15	1
6		23.3	22.0	23.4	0	12/15	15/15	12/15	2
6		23.4	22.0	23.3	0.5	15/15	8/15	15/8	3
6		23.2	21.9	23.3	0.5	15/15	4/15	15/4	4
-	**Channel**	**9262**	**9400**	**9538**	**-**	**-**	**-**	**-**	**-**
99	*WCDMA*	23.0	23.4	23.0	-	-	-	-	-
6	*HSDPA (PCS)*	22.9	23.3	22.8	0	2/15	15/15	2/15	1
6		22.9	23.4	22.9	0	12/15	15/15	12/15	2
6		22.9	23.4	22.9	0.5	15/15	8/15	15/8	3
6		22.9	23.3	22.8	0.5	15/15	4/15	15/4	4

3GPP Release Version	Mode	Power (dBm)			MPR	B_c	β_d	B_c/β_d	Sub-Test
	Channel	4132	4182	4233					
6	*HSUPA (Cellular)*	22.8	21.8	22.9	0	11/15	15/15	11/15	1
6		20.6	19.3	20.7	2	6/15	15/15	6/15	2
6		21.7	20.4	21.6	1	15/15	9/15	15/9	3
6		20.9	19.7	21.0	2	2/15	15/15	2/15	4
6		22.8	21.7	23.0	0	15/15	15/15	15/15	5
-	**Channel**	**9262**	**9400**	**9538**	**-**	**-**	**-**	**-**	**-**
6	*HSUPA (PCS)*	22.8	22.8	22.7	0	11/15	15/15	11/15	1
6		20.7	20.9	20.8	2	6/15	15/15	6/15	2
6		21.8	22.0	21.9	1	15/15	9/15	15/9	3
6		21.1	21.3	21.2	2	2/15	15/15	2/15	4
6		22.8	23.0	22.9	0	15/15	15/15	15/15	5

NOTE1: There was no power deviation between the power when using the short USB cable and the power when direct plug into USB port of the Laptop PC.

16. SAR TEST DATA SUMMARY(Continued)

Mixture Type: 835 MHz Body   Host PC : Toshiba Laptop L310

16.1 MEASUREMENT RESULTS (GSM850 GPRS Body SAR)							
FREQUENCY		**Begin Power (dBm)**	**End Power (dBm)**	**Mode**	**Device Test Position**	**Antenna Position**	**SAR (W/kg)**
MHz	**Ch**						
836.6	190	29.6	29.3	GPRS	5.0 mm [H-Up]	Internal	0.656
824.2	128	29.4	20.4	GPRS	5.0 mm [H-Down]	Internal	0.641
836.6	**190**	**29.6**	**29.6**	**GPRS**	**5.0 mm [H- Down]**	**Internal**	**0.837**
848.8	251	29.7	29.6	GPRS	5.0 mm [H- Down]	Internal	0.489
836.6	190	29.6	29.5	GPRS	5.0 mm [V-Front]	Internal	0.404
836.6	190	29.6	29.6	GPRS	5.0 mm [V-Back]	Internal	0.308
836.6	190	29.6	29.3	GPRS	5.0 mm [Bottom]	Internal	0.135
836.6	190	29.6	29.5	GPRS	5.0 mm [Top]	Internal	0.104
836.6	190	25.3	25.3	EDGE	5.0 mm [H-Down]	Internal	0.266
836.6	190	30.0	29.9	GSM	5.0 mm [H-Down]	Internal	0.355
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							**Body 1.6 W/kg (mW/g)** averaged over 1 gram

NOTE:

1. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001] and FCC 3G SAR MEASUREMENT PROCEDURES – OCT 2007.
2. All modes of operation were investigated, and worst-case results are reported.
3. Prior to testing the conducted output power was measured.
4. The EUT is tested 2nd hot-spot peak, if it is less than 2dB below the highest peak.
5. Test Signal Call Mode □ Continuous Tx On □ Manu.Test Codes ▣BaseStation Simulator
6. Tissue parameters and temperatures are listed on the SAR plots.
7. Liquid tissue depth is 15.0 cm.±0.1
8. In case of Horizontal Up, the DUT and laptop has a direct connection.
9. Laptop M/N : Toshiba L310 S/N : 48346917W
10. Basically the Body SAR Tests were performed with GPRS Class12 (4TX, 1RX)
11. The body SAR test was repeated with EDGE and GSM mode on the worst case channel of GPRS Class12
12. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (July,2001), if the SAR measured at the middle channel for each test configuration is least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

16. SAR TEST DATA SUMMARY(Continued)

Mixture Type: 1900 MHz Body   Host PC : Toshiba Laptop L310

16.2 MEASUREMENT RESULTS (PCS1900 GPRS Body SAR)							
FREQUENCY		**Begin Power (dBm)**	**End Power (dBm)**	**Mode**	**Device Test Position**	**Antenna Position**	**SAR (W/kg)**
MHz	**Ch**						
1880.0	661	28.5	28.4	GPRS	5.0 mm [H-Up]	Internal	0.300
1880.0	661	28.5	28.5	GPRS	5.0 mm [H-Down]	Internal	0.399
1850.2	**512**	**28.6**	**28.6**	**GPRS**	**5.0 mm [V-Front]**	**Internal**	**0.869**
1880.0	661	28.5	28.5	GPRS	5.0 mm [V-Front]	Internal	0.663
1909.8	810	28.4	28.4	GPRS	5.0 mm [V-Front]	Internal	0.555
1880.0	661	28.5	28.5	GPRS	5.0 mm [V-Back]	Internal	0.302
1880.0	661	28.5	28.5	GPRS	5.0 mm [Bottom]	Internal	0.167
1880.0	661	28.5	28.5	GPRS	5.0 mm [Top]	Internal	0.037
1880.0	512	24.9	24.8	EDGE	5.0 mm [V-Front]	Internal	0.531
1880.0	512	29.2	29.2	GSM	5.0 mm [V-Front]	Internal	0.386
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							**Body 1.6 W/kg (mW/g)** averaged over 1 gram

NOTE:

1. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001] and FCC 3G SAR MEASUREMENT PROCEDURES – OCT 2007.
2. All modes of operation were investigated, and worst-case results are reported.
3. Prior to testing the conducted output power was measured.
4. The EUT is tested 2nd hot-spot peak, if it is less than 2dB below the highest peak.
5. Test Signal Call Mode   □ Continuous Tx On   □ Manu.Test Codes   ▣BaseStation Simulator
6. Tissue parameters and temperatures are listed on the SAR plots.
7. Liquid tissue depth is 15.0 cm.±0.1
8. In case of Horizontal Up, the DUT and laptop has a direct connection.
9. Laptop M/N : Toshiba L310 S/N : 48346917W
10. Basically the Body SAR Tests were performed with GPRS Class12 (4TX, 1RX)
11. The body SAR test was repeated with EDGE and GSM mode on the worst case channel of GPRS Class12
12. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (July,2001), if the SAR measured at the middle channel for each test configuration is least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

16. SAR TEST DATA SUMMARY(Continued)

Mixture Type : 835 MHz Body   Host PC : Toshiba Laptop L310

16.3 MEASUREMENT RESULTS (WCDMA_Cellular Body SAR)							
FREQUENCY		**Begin Power (dBm)**	**End Power (dBm)**	**Mode**	**Device Test Position**	**Antenna Position**	**SAR (W/kg)**
MHz	**Ch**						
826.4	**4132**	**23.6**	**23.5**	**WCDMA**	**5.0 mm [H-Up]**	**Internal**	**0.478**
836.4	4182	22.3	22.3	WCDMA	5.0 mm [H-Up]	Internal	0.209
846.6	4233	23.6	23.6	WCDMA	5.0 mm [H-Up]	Internal	0.251
836.4	4182	22.3	22.3	WCDMA	5.0 mm [H-Down]	Internal	0.189
836.4	4182	22.3	22.3	WCDMA	5.0 mm [V-Front]	Internal	0.146
836.4	4182	22.3	22.3	WCDMA	5.0 mm [V-Back]	Internal	0.076
836.4	4182	22.3	22.3	WCDMA	5.0 mm [Bottom]	Internal	0.020
836.4	4182	22.3	22.3	WCDMA	5.0 mm [Top]	Internal	0.017
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							**Body 1.6 W/kg (mW/g)** averaged over 1 gram

NOTE:

1. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001] and FCC 3G SAR MEASUREMENT PROCEDURES – OCT 2007.
2. All modes of operation were investigated, and worst-case results are reported.
3. Prior to testing the conducted output power was measured.
4. The EUT is tested 2nd hot-spot peak, if it is less than 2dB below the highest peak.
5. Test Signal Call Mode   □ Continuous Tx On   □ Manu.Test Codes   ▣BaseStation Simulator
6. Tissue parameters and temperatures are listed on the SAR plots.
7. Liquid tissue depth is 15.0 cm.±0.1
8. In case of Horizontal Up, the DUT and laptop has a direct connection.
9. Laptop M/N : Toshiba L310 S/N : 48346917W
10. WCDMA mode was tested under RMC 12.2 kbps configured in Test Loop Mode 1
11. Body SAR for HSPA is not measured because the maximum average output of each RF channel with HSPA active is not at least ¼ dB higher than that measured without HSPA using 12.2 kbps RMC or the maximum SAR for 12.2 kbps RMC is not above 75% of the SAR limit
12. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (July,2001), if the SAR measured at the middle channel for each test configuration is least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

16. SAR TEST DATA SUMMARY

Mixture Type : <u>1900 MHz Body</u>   Host PC : Toshiba Laptop L310

16.4 MEASUREMENT RESULTS (WCDMA_PCS Body SAR)							
FREQUENCY		Begin Power (dBm)	End Power (dBm)	Mode	Device Test Position	Antenna Position	SAR (W/kg)
MHz	Ch						
1880.0	9400	23.4	23.4	WCDMA	5.0 mm [H-Up]	Internal	0.253
1880.0	9400	23.4	23.4	WCDMA	5.0 mm [H-Down]	Internal	0.340
1852.4	**9262**	**23.0**	**23.0**	**WCDMA**	**5.0 mm [V-Front]**	**Internal**	**0.589**
1880.0	9400	23.4	23.2	WCDMA	5.0 mm [V-Front]	Internal	0.552
1907.6	9538	23.0	23.0	WCDMA	5.0 mm [V-Front]	Internal	0.320
1880.0	9400	23.4	23.4	WCDMA	5.0 mm [V-Back]	Internal	0.293
1880.0	9400	23.4	23.4	WCDMA	5.0 mm [Bottom]	Internal	0.149
1880.0	9400	23.4	23.3	WCDMA	5.0 mm [Top]	Internal	0.032
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							**Body 1.6 W/kg (mW/g)** averaged over 1 gram

NOTE:

1. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001] and FCC 3G SAR MEASUREMENT PROCEDURES – OCT 2007.
2. All modes of operation were investigated, and worst-case results are reported.
3. Prior to testing the conducted output power was measured.
4. The EUT is tested 2nd hot-spot peak, if it is less than 2dB below the highest peak.
5. Test Signal Call Mode   □ Continuous Tx On   □ Manu.Test Codes   ▣BaseStation Simulator
6. Tissue parameters and temperatures are listed on the SAR plots.
7. Liquid tissue depth is 15.0 cm.±0.1
8. In case of Horizontal Up, the DUT and laptop has a direct connection.
9. Laptop M/N : Toshiba L310 S/N : 48346917W
10. WCDMA mode was tested under RMC 12.2 kbps configured in Test Loop Mode 1
11. Body SAR for HSPA is not measured because the maximum average output of each RF channel with HSPA active is not at least ¼ dB higher than that measured without HSPA using 12.2 kbps RMC or the maximum SAR for 12.2 kbps RMC is not above 75% of the SAR limit
12. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (July,2001), if the SAR measured at the middle channel for each test configuration is least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

17. SAR TEST EQUIPMENT

Table 17.1 Test Equipment Calibration

EQUIPMENT SPECIFICATIONS			
Type	**Calibration Date**	**Next Calibration Date**	**Serial Number**
Robot	N/A	N/A	F02/5Q85A1/A/01
Robot Controller	N/A	N/A	F02/5Q85A1/C/01
Joystick	N/A	N/A	D221340031
Hicron Computer 1.1GHz Pentium Celeron ,Window 2000	N/A	N/A	N/A
Data Acquisition Electronics	November 12, 2008	November 12, 2009	519
Dosimetric E-Field Probe	January 19, 2009	January 19, 2010	3643
Dummy Probe	N/A	N/A	N/A
Sam Phantom	N/A	N/A	N/A
Probe Alignment Unit LB	N/A	N/A	321
SPEAG Validation Dipole D835MHz	January 28, 2008	January 28, 2010	464
SPEAG Validation Dipole D1900MHz	March 17, 2009	March 17, 2011	5d029
Head/Body Equivalent Matter(835MHz)	January 2009	January 2010	N/A
Head/Body Equivalent Matter(1900MHz)	January 2009	January 2010	N/A
HP EPM-442A Power Meter	March 13, 2009	March 13, 2010	GB37170267
HP E4421A Signal Generator	July 09, 2008	July 09, 2009	US37230529
Attenuator (10dB)	January 19, 2009	January 19, 2010	BP4387
Attenuator (3dB)	July 15, 2008	July 15,2009	MY39260699
Low pass filter (1.5GHz)	February 03, 2009	February 03, 2010	N/A
Low pass filter (3.0GHz)	October 01, 2008	October 01, 2009	N/A
Dual Directional Coupler	February 03, 2009	February 03, 2010	50228
Amplifier	February 02, 2009	February 02, 2010	1020 D/C 0221
Network Analyzer	March 13, 2009	March 13, 2010	8753D
HP85070D Dielectric Probe Kit	N/A	N/A	LISO1440118
SEMITEC Engineering	N/A	N/A	Shield Room

NOTE:

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

18. 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.

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