ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

SAR Compliace Test Report

APPLICANT NAME & ADDRESS :
M3 Mobile Co., Ltd.
DongWon B/D, 725-30, Yeoksam-dong
Gangnam-gu, Seoul, 135-080, Korea

DATA & LOCATION OF TESTING
Dates of testing : 2009 -04-09 ~ 2009-08-18
Test Site : ESTECH Co., Ltd.
97-1, Hoeok-Ri, Majang-Myun, Icheon-City,
Kyonggi-Do, 467-811, Korea

Test Device :

Model : MM3

FCC ID : U7X-MM3

TYPE : Portable Data Collection Terminal (Prototype)

Test report no :	ESTSAR0908-003	Number of page :	32
Contact person :	Dong Ju Lee	Responsible test Engineer :	H.H.LEE

Testing has been Carried out in Accordance with : IEEE 1528(Dec.2003) Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate(SAR) in the Human Body Due to Wireless Communications Device : Experimental Techniques

Applicant Type : Certification

FCC CLASSIFICATION : Licensed Non-Broadcast Transmitter Held to Ear (TNE)
Licensed Portable Transmitter Held to Ear (PCE)
Digital Transmission System (DTS)

FCC Rule Part(s) : §2.1093; FCC/OET Bulletin 65 Supplement C (July 2001)

Test results : The Tested device complies with the requirements in respect of all parameters subject to the test. The test results and statements relate only to the items tested. The test report shall not be reproduced recept in full, without written approval of the laboratory

Date and Signatures : 2009-08-18
Report Prepared By : Engineer/ H.H.LEE
(Signature)
Engineering Manager/ Jin-Mo Yang
(Signature)

Table of Contents

1. SUMMARY FOR TEST REPORT

FCC ID	U7X-MM3
Date of test	2009 -04-09 ~ 2009-08-18
Responsible test engineer	Jin-Mo Yang
Measurement performed by	H.H.LEE
EUT Type	Portable Data Collection Terminal (Prototype)
Max. RF Output Power	GSM850 (33.0 dBm), GSM1900 (30.0 dBm), UMTS850 (24.0 dBm), UMTS1900 (24.0 dBm), 11b(18.0 dBm),11g(15.0 dBm)

1.1 Head Configuration

Max. SAR Measurement

FREQUENCY		Mod	Device test position	SAR (W/kg)
MHz	Ch			
836.60	190	GSM	Left Touch	0.723
836.60	190	GPRS	Left Touch	0.757
1880.00	661	GSM	Left Touch	0.108
1880.00	661	GPRS	Left Touch	0.096
836.40	4182	WCDMA	Left Touch	0.832
836.40	4182	HSDPA	Left Touch	0.812
1880.00	9400	WCDMA	Left Touch	0.341
1880.00	9400	HSDPA	Left Touch	0.342
2437.00	6	DSSS	Left Touch	0.133
2437.00	6	DSSS	Right Touch	0.170

1.2 Body Worn Configuration

Max. SAR Measurement

FREQUENCY		Mod	Device test position	SAR (W/kg)
MHz	Ch			
848.80	251	GPRS	1.5[w/o Holster]FRON	0.260
1850.20	512	GPRS	1.5[w/o Holster]REAR	0.081
836.40	4182	WCDMA	1.5[w/o Holster]FRON	0.298
1852.40	9262	HSDPA	1.5[w/o Holster]REAR	0.175
2412.00	1	DSSS	1.5[w/o Holster]REAR	0.114

1.3 Measurement Uncertainty

Combine Standard Uncertainty	± 11.00 (k=1)
Extended Standard Uncertainty	± 22.00 (k=2, 95% CONFIDENCE LEVEL)

2. INTRODUCATION

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

The safety limits used for the environmental evaluation measurements arethe criteria published by the based on 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 Electronic 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/ANSIC95.3-1992 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 radiationexposure
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 (IC NIRP) in Biological Effects and Exposure Criteria for Radio Frequency Electromagnetic Fields," IC NIRP Report No. 86 (c) IC NIRP, 1986, Bethesda, MD20814.[6] SAR is ameasure 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 (ρ). it is also defined as the rate of rf energy absorption per unit mass at a point in an absorbing body (see Fig. 2.1.).

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

Figure 2.1 SAR Mathematical Equation

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

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

Where:

σ = conductivity of the tissue-simulant material (S/m)
E = mass density of the tissue-simulant material (kg/㎥)
ρ = Total RMS electric field strength (V/m)

3. DESCRIPTION OF THE DEVICE UNDER TEST

The FCC rules for evaluating portable devices for RF exposure compliance are contained in 47 CFR §2.1093. For purposes of RF exposure evaluation, a portable device is defined as a transmitting device designed to be used with any part of its radiating structure in direct contact with the user's body or within 20 centimeters of the body of a user or bystanders under normal operating conditions. This category of devices would include hand-held cellular and PCS, WCDMA telephones that incorporate the radiating antenna into the hand-piece and wireless transmitters
that are carried next to the body. Portable sevices are evaluated with respect to SAR limits for RF

2.1 Antenna Description

Type	Internal Antenna
Location	the Top of the device
Radiator Material	Copper

2.2 Device Description

FCC ID	U7X-MM3
Serial numbers	NONE
Exposure environment	Uncontrolled exposure
Device category	Portable device
Mode(s) of Operation	GSM / GPRS / EDGE / UMTS / HSDPA / WLAN
Modulation Mode(s)	GMSK / 8-PSK / DSSS / OFDM
Duty Cycle	8.3 / 1 / 1
Transmitting FreQuency Range(s)	GSM/GPRS/EDGE :824.2~848.8MHz , 1850.2~1909.8MHz UMTS/HSDPA :826.4~846.6MHz, 1852.4~1907.6MHz WLAN :2412.0 ~ 2462.0 MHz
test signal method	■ Base station simulator ■ Internal test code

2.3 Battery Options

There is only one battery option available for tested device,

4. TEST CONDITIONS

4.1 Ambient Conditions

Ambient Temperature (°C)	23
Tissue simulating liquid temperature (°C)	23
Humidity (%)	48

4.2 RF Characteristics of The Test Site

Tests were performed in a fully enclosed RF Shielded environment

4.3 Test Signal, Frequencies, And Output Power

The device was put into operation by using a call tester except for testing WLAN2450 where control software was used. Communication between the device and the call tester was established by air link
In all operation bands the measurements were performed on lowest, middle and highest channels.

The phone was set to maximum power level during the all tests and at the beginning of the each te the battery was fully charged.

DASY4 system measures power drift during SAR testing by comparing e-field in the same location at the beginning and at the end of measurement. These records were used to monitor stability of power output.

Fig. 4.1 SAR Measurement System

5. DESCRIPTION OF THE TEST EQUIPMENT

An SAR measurement system usually consists of a small diameter isotropic electric field probe, a multiple axis probe positioning system, a test device holder, one or more phantom models, the field probe instrumentation, a computer and other electronic equipment for controlling the probe and making the measurements. Other supporting equipment, such as a network analyzer, power meters and RF signal generators, are also required to measure the dielectric parameters of the simulated tissue media and to verify the measurement accuracy of the SAR system.

5.1 Test System Specifications

Test Equipment	Model	Serial Number	Cal.Date
DAE	DAE4	551	4/28/2009
E-Field Probe	ET3DV6	1750	5/26/2009
E-Field Probe	ET3DV3	3123	1/20/2009
Dipole validation kit	D1900V2	5d058	9/15/2008
	D835V2	474	10/14/2008
	D2450V2	741	2/10/2009
Network analyzer	8753ES	MY40000609	10/12/2008
Signal generator	83620B	3722A00463	9/12/2008
RF Power meter	EPM-442A	GB37170412	10/13/2008
Power Sensor	8481A	3318A96476	10/13/2008
Power Sensor	8481A	2702A59566	10/20/2008
Dielectric Probe	85070D	US01440154	-
Power Amplifier	BBS3Q7ECK	NONE	2/10/2009
LP Filter	LA-15N	NONE	10/25/2008
	LA-30N	NONE	10/25/2008
Attenuator	8491B	21828	2/11/2009
Attenuator	50FH-010-5	74868	2/11/2009
Dual Directional Coupler	778D	17575	4/27/2009
Wireless Communications Test Set	E5515C	GB42230119	2/10/2009

5.2 SAR Measurement Setup

Measurement are performed using the DASY4 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 IV computer, near-field probe, probe alignment sensor, and the SAM 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. 5.1) 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 Intel Pentium IV 2.4 GHz computer with WindowsXP system and SAR measurement Software DASY4, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot data acquisition electronic (DAE) circuit that performs the signal amplification, signal multiplexing,
AD-conversion, offset measurements, mechanical surface detection, collision detection, etc.

5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

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.

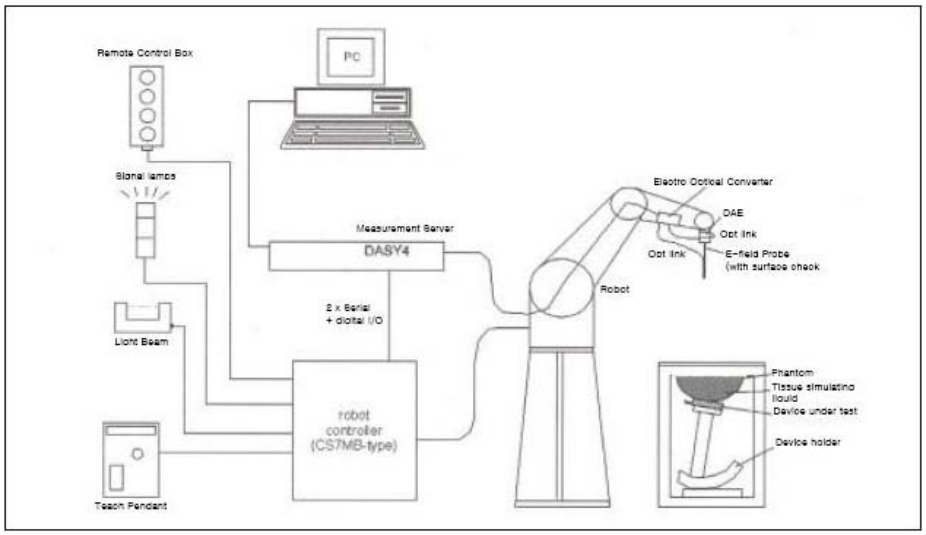


Fig. 5.1 SAR Measurement System Setup

The DAE4 consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel
and gainswitching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic
unit. Transmission to the Ethernet 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

5.3 DASY4 E-Field Probe System

The SAR measurements were conducted with the dosimetric probe ET3DV6, designed in the classical
triangular configuration [7] (see Fig.5.2) 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. It is connected to the EOC box in the robot arm and provides an automatic detection transmitter, the other half to a synchronized receiver.

5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

As the probe approach 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 coupling is zero. The distance of the coupling maximum to the surface is probe angle. The DASY4 software reads the reflection during a software approach and looks for the maximum using a 2nd order fitting (see Fig. 5.2). The approach is stopped at reaching the maximum.

Isotropic E-Field Probe

Isotropic E-Field Probe for Dosimetric Measurements	
Construction	Symmetrical design with triangular core Interleafed sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycol)
Calibration	In air from 10 MHz to 3 GHz In brain and muscle simulating tissue at frequencies of 450 MHz, 900 MHz and 1.8 GHz (accuracy ± 8%) Calibration for other liquids and frequencies upon request
Frequency	10 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz)
Directivity	± 0.2 dB in brain tissue (rotation around probe axis) ± 0.3 dB in brain tissue (rotation normal to probe axis)
Dynamic Range	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm Tip length: 20 mm Body diameter: 12 mm Tip diameter: 3.9 mm Distance from probe tip to dipole centers: 2.7 mm

Fig. 5.2 Probe Specifications

5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

5.4 Phantom & Equivalent Tissues

SAM Phantom

The SAM Twin Phantom V4.0 is constructed of the 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.

Head & Muscle simulation Mixture Characterization

The brain and muscle mixtures consist of a viscous gel using hydroxethlcellullose(HEC) gelling agent and saline solution (see Fig 5.3). Preservation with a bactericide 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 specified in 1528(Dec.2003) are derived from the issue dielectric parameters computed from
the 4-Cole-Cole equations The mixture characterizations used for the brain and muscle tissue simulation liquids are according to the data by C. Gabriel and G. Hartagrove [13]. (see Fig. 5.3)

Frequency	Head		Body	
(MHz)	εr	σ (S/m)	εr	σ (S/m)
150	52.3	0.76	61.9	0.8
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.9	55.2	0.97
900	41.5	0.97	55	1.05
915	41.5	0.98	55	1.06
1450	40.5	1.2	54	1.3
1610	40.3	1.29	53.8	1.4
1800-2000	40	1.4	53.3	1.52
2450	39.2	1.8	52.7	1.95
3000	38.5	2.4	52	2.73
5800	35.3	5.27	48.2	6

Fig.5.3 Head and body tissue parameters by the IEEE SCC-34/SC-2 in P1528

5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

Ingredients (% by weight)	Frequency (MHz)					
	835		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body
Water	41.5	52.4	54.9	40.4	62.7	73.2
Salt(NaCl)	1.5	1.4	0.2	0.5	0.5	0.0
Suger	56.0	45.0	0.0	58.0	0.0	0.0
HEC	1.0	1.0	0.0	1.0	0.0	0.0
Bactericide	0.1	0.1	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	44.9	0.0	0.0	26.7
ε	42.54	56.10	39.90	54.00	39.80	52.50
σ	0.95	0.95	1.42	1.45	1.88	1.78

Fig. 5.4 Composition of the Tissue Equivalent Matter

Device Holder for Transmitters

In combination with the SAM Twin Phantom V4.0, the Mounting Device enables the rotation of the 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. DESCRIPTION OF THE TEST PROCEDURE

6.1 Definition of Reference Point

EAR Reference point

The point "M" is the reference point for the center of the mouth, "ERP" is the ear reference point. The ERP are 15mm posterior to the entrance to the ear canal(EEC) along the B-M line (Back-Mouth), as shown is figure 6.1. 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 ERP is called the Reference Pivoting Line (see Figure 6.1) 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].

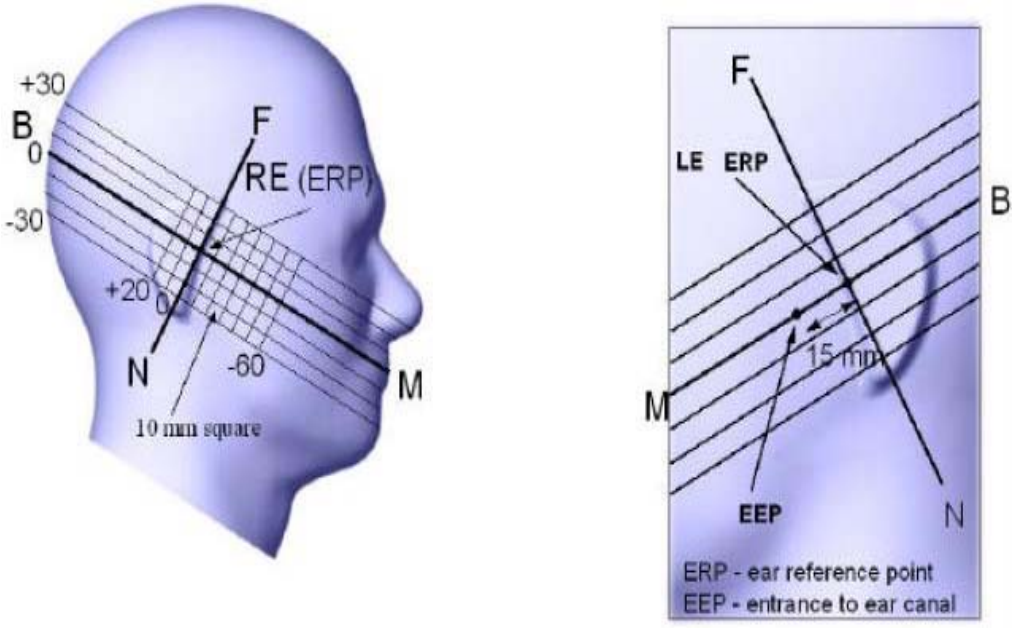


Figure 6.1 Close-up side view of ERP

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. 6.2). 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" on the outer surface of the both the left and right head phantoms on the ear reference point

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

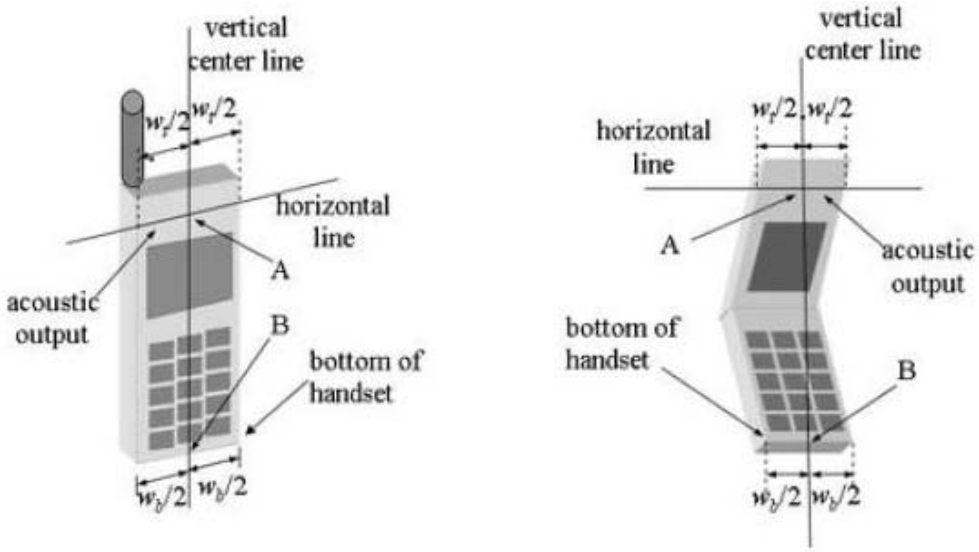


Figure 6.2 Handset Vertical Center & Horizontal Line Reference Points

6.2 Test Configuration Positions
Positioning for Cheek/Touch

1) Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece, open the cover . (If the phone can also be used with the cover closed ,both configurations must be tested.)
2) Define two imaginary lines on the handset: the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset: the midpoint of the width wt of the handset at the level of the acoustic output (point A on Figures 6.2), and the midpoint of the width wb of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Figure 6.2). The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output. However, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not ecessarily parallel to the front face of the handset (see Figure 6.2), especially for clamshell handsets, handsets with lip pieces, and other irregularly-shaped handsets.
3) Position the handset close to the surface of the phantom touch that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 6.3), 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.

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

4) Translate the handset towards the phantom along the line passing through RE and LE until the handset touches the ear.
5) While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to MB-NF including the line MB (called the reference plane).
6) Rotate the phone around the vertical centerline until the phone (horizontal line) is symmetrical with respect to the line NF.
7) 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, rotate the handset about the line NF until any point on the handset is in

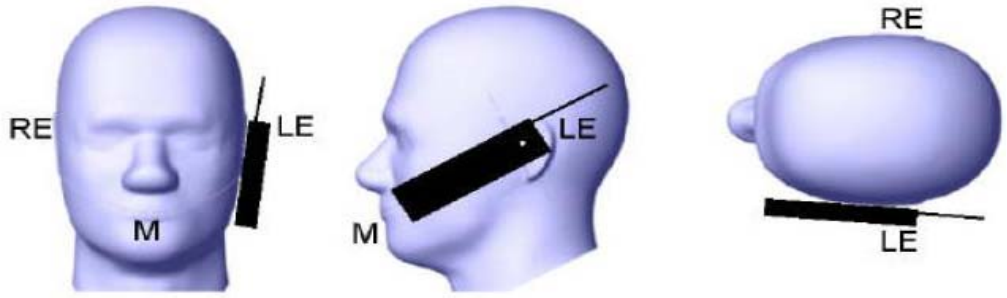


Figure 6.3 "Cheek" or "Touch" Position.

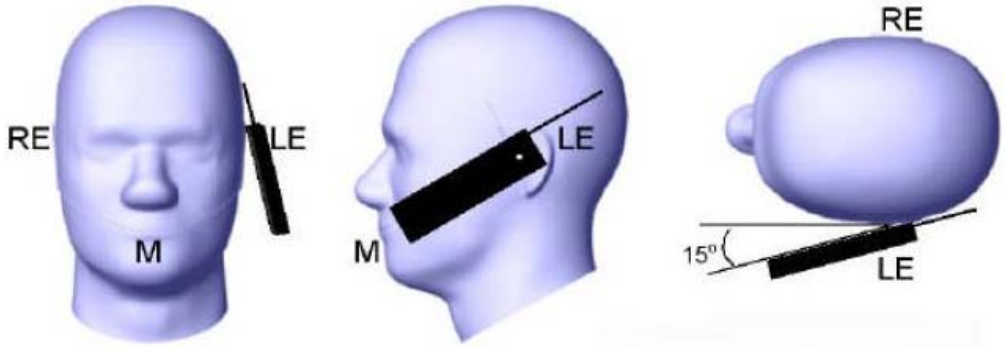


Figure 6.4 "Tilted" Position.

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

Positioning for Ear / 15° Tilted

1) Repeat steps 1 to 7 of 6.2(Positioning for Cheek/Touch) to place the device in the "cheek position."
2) While maintaining the orientation of the phone retract the phone parallel to the reference plane far enough to enable a rotation of the phone by 15 degree.
3) Rotate the phone around the horizontal line by 15 degree.
4) While maintaining the orientation of the phone, move the phone parallel to the reference plane until any part of the phone touches the head. (In this position, point A will be located on the line RE-LE). The tilted position is obtained when the contact is on the pinna. If the contact is at any location other than the pinna, the angle of the phone shall be reduced. The tilted position is obtained if any part of the phone is in contact of the ear as well as a second part of the phone is contact with the head.

Body Holder / Belt Clip Configurations

Body-worn operation configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration. A device with a headset output is tested with a headset connected to the device. Body dielectric parameters are used.

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 of 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 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 case 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 operation requirements for meeting RF exposure compliance, operation instructing instructions and cautions statements are included in the user's manual.

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

6.3 Scan Procedures

First coarse scans are used for quick determination of the field distribution. Nest cube scan, 5x5x7 points; spacing between each point 5x5x5 mm, is performed around the highest E-field value to determine the averaged SAR-distribution over 1g.

6.4 SAR Averaging Methods

The maximum SAR value is averaged over its volume using interpolation and extrapolation.
The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the “Not a Knot” ?condition [W.Gander, Computerma-thematik, p. 141-150](x, y and z directions) [Numerical Recipes in C, Second Edition, p 123].
The extrapolation is based on least square algorithm [W.Gander, Computermathematik, p. 168-180]. Through the points in the first 30 mm in all z-axis, polynomials of order four are calculated₩. This polynomial is then used to evaluate the points between the surface and the probe tip. The points calculated from the surface, have a distance of 1mm from one another

7. MEASUREMENT UNCERTAINTY

According to CENELEC [17], typical worst-case uncertainty of field measurements is 5 dB.
For well-defined modulation characteristics the uncertainty can be reduced to 3 dB.

ERROR Description	Uncertainty value ±%	Probability Distribution	Divisor	ci 1g	Standard unc. (1g)	vi or Veff
MEASUREMENT SYSTEM						
Probe Calibration	± 11.7 %	normal	1	1	± 4.8 %	∞
Axial Isotropy	± 4.7	rectangular	√3	$(1-cp)^{1/2}$	± 1.9%	∞
Hemispherical Isotropy	± 9.6	rectangular	√3	$(cp)^{1/2}$	± 3.9%	∞
Boundary Effects	± 1.0	rectangular	√3	1	± 0.6%	∞
Linearity	± 4.7	rectangular	√3	1	± 2.7%	∞
System 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 Amnient Conditions	± 3.0	rectangular	√3	1	± 1.7%	∞
Probe Positioner Mechanical Tolerance	± 0.4	rectangular	√3	1	± 0.2%	∞
Probe Positioning with respect to Phantom Shell	± 2.9	rectangular	√3	1	± 1.7%	∞
Extrapolation, Interpolation and Integration Algorithms for	± 1.0	rectangular	√3	1	± 0.6%	∞
Test Sample Related						
Test Sample Positioning	± 2.9	normal	1	1	± 2.97%	145
Device Holder Uncertainty	± 3.6	normal	0.84	1	± 3.69%	5
Output Power Validation - SAR drift measurement	± 5.0	rectangular	√3	1	± 2.9%	∞
Phantom and Tissue Parameters						
Phantom Uncertainty (shape and thickness tolerances)	± 4.0	rectangular	√3	1	± 2.3%	∞
Liquid conductivity Target - tolerance	± 5.0	rectangular	√3	0.64	± 1.8%	∞
Liquid Conductivity - measurement uncertainty	± 5.0	normal	1	0.64	± 3.2%	∞
Liquid permittivity Target - tolerance	± 5.0	rectangular	√3	0.6	± 1.7%	∞
Liquid Permittivity - measurement uncertainty	± 5.0	normal	1	0.6	± 3.0%	∞
Combined Standard Uncertainty					±11.00 %	330
Coverage Factor for 95%				K = 2		
Expanded Standard Uncertainty					± 22.00 %	

8. SYSTEM VERIFICATION

Tissue Verification

Table 8.1 Simulated Tissue Verification [5]

MEASURED TISSUE PARAMETERS(1)										
Liquid Temperature (°C)			23		Liquid Depth(mm)		150			
Date	6/25/2009		6/25/2009		6/29/2009		6/29/2009			
Tissue	835MHz Brain		835MHz Muscle		1900MHz Brain		1900MHz Muscle			
	Target	Measured	Target	Measured	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ε	41.5	43.4	55.2	53.5	40.0	38.4	53.3	52.6		
Conductivity: σ	0.90	0.97	0.97	0.98	1.40	1.4	1.52	1.45		
Deviation (%)	ε : 4.57% σ : 7.77 %		ε : −3.07% σ : 0.92%		ε : −4% σ : −0.92%		ε : −1.31% σ : −4.60%			

MEASURED TISSUE PARAMETERS(2)										
Liquid Temperature (°C)			22		Liquid Depth(mm)					
Date	7/6/2009		7/6/2009							
Tissue	2450MHz Brain		2450MHz Muscle							
	Target	Measured	Target	Measured	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ε	39.2	37.4	52.7	52.1						
Conductivity: σ	1.80	1.83	1.95	1.88						
Deviation (%)	ε : −4.59% σ : 1.66%		ε : −1.11% σ : −3.58%							

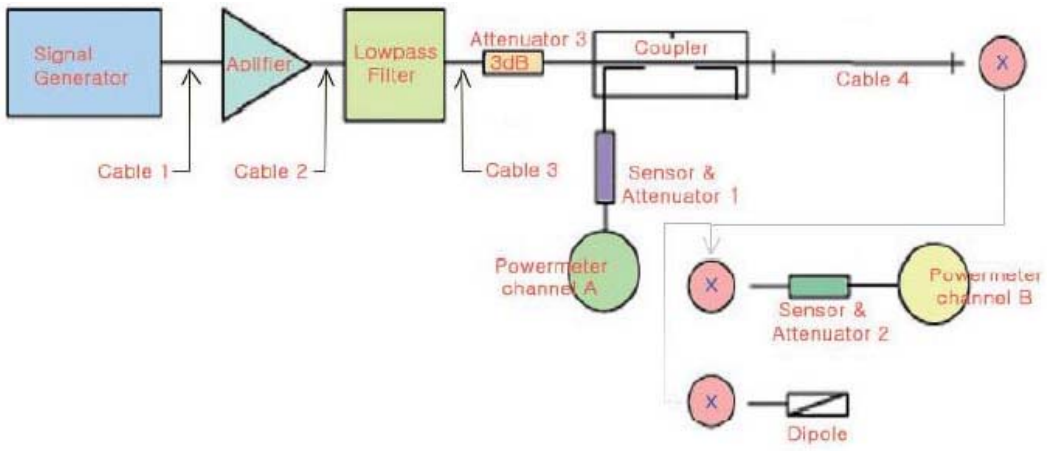
8. SYSTEM VERIFICATION

Test System Validation

- Prior to assessment, the system is verified to the ±10% of the specifications at 835MHz,1900MHz, 2450MHz (Graphic Plots Attached)
- The results are nominalized to 1W input power

Table 8.2 System Validation [5]

SYSTEM DIPOLE VALIDATION TARGET & MEASURED						
Tissue	System Validation Kit:	Forward Power (W)	Targeted SAR1g (mW/g)	Measured SAR1g	Deviation (%)	Test Date
835MHz Brain	D835V2(S/N:475)	1.0	9.6	10.0	4.17%	2009-06-25
1900MHz Brain	D1900V2(S/N :5d058)	1.0	41.6	41.2	-0.96%	2009-06-29
2450MHz Brain	D2450V2(S/N:741)	1.0	52.4	50.4	-3.82%	2009-07-06



9. FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

9.1 Introduction

the following procedure adopted from "FCC SAR Considerations for Cell Phones with Mutiple Transmitter" from February 2008 are applicable to handsets with built-in unlicensed transmitters suc as 802.11b/g and Bluetooth devices which may simultaneously transmit with the licensed transmitte

9.2 FCC Power Tables & Conditions

	2.45	5.15 - 5.35	5.47 - 5.85	GHz
P_{Ref}	12	6	5	mW
Device output power should be rounded to the nearest mW to compare with values specified in this table.				

Output Power Thresholds for Unlicensed Transmitters

	Individual Transmitter	Simultaneous Transmission
Licensed Transmitters	Routine evaluation required	SAR not required: Unlicensed only o when stand-alone 1-g SAR is not required and antenna is ≥ 5 cm from other antennas Licensed & Unlicensed o when the sum of the 1-g SAR is < 1.6 W/kg for all simultaneous transmitting antennas o when SAR to antenna separation ratio of simultaneous transmitting antenna pair is < 0.3 SAR required: Licensed & Unlicensed antenna pairs with SAR to antenna separation ratio ≥ 0.3; test is only required for the configuration that results in the highest SAR in stand-alone configuration for each wireless mode and exposure condition Note: simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply
Unlicensed Transmitters	When there is no simultaneous transmission – o output ≤ 60/f: SAR not required o output > 60/f: stand-alone SAR required When there is simultaneous transmission – Stand-alone SAR not required when o output ≤ 2·P_{Ref} and antenna is ≥ 5.0 cm from other antennas o output ≤ P_{Ref} and antenna is ≥ 2.5 cm from other antennas o output ≤ P_{Ref} and antenna is < 2.5 cm from other antennas, each with either output power ≤ P_{Ref} or 1-g SAR < 1.2 W/kg Otherwise stand-alone SAR is required When stand-alone SAR is required o test SAR on highest output channel for each wireless mode and exposure condition o if SAR for highest output channel is > 50% of SAR limit, evaluate all channels according to normal procedures	

SAR Evaluation Requirements for Multiple Transmitter Handsets

9.3 Multiple Antenna/Transmission Information for MM3

For FCC ID : U7X-MM3

KDB 648474 Assessment

Antenna Separation distance:

Cell-to-BT: 3.4 cm

Cell-to-WLAN: 3.4 cm

BT-to-WLAN: 6.8 cm

9.4 Conclusion

BT stand alone SAR evaluation is not required due to BT power is < 60/f(GHz) and SAR values of near by TX is less than 1.2W/kg and BT-to-cell and BT-to-WLAN separation is more than 2.5 cm

The highest measured SAR at Cell is 0.832W/kg, The highest Measured WLAN (2.4/5GHz) is 0.133 W/kg at left Touch position.

The SAR-to-peak location ratio = 0.832+0.133/3.4=0.28 < 0.3

Simultaneous SAR Evluation is not required for BT-Cell; Cell-WLAN and BT-WLAN antenna pair.

9.5 Power Table

		RF Conducted Power Table				
		Voice	GPRS Data/HSDPA Data		EDGE DATA	
Band	Channel	GSM [dBm]	GPRS[dBm]1 Tx Slot	GPRS[dBm]2 Tx Slot	GPRS[dBm]1 Tx Slot	GPRS[dBm]2 Tx Slot
GSM850	128	32.25	30.70	28.90	27.33	27.22
	190	32.23	30.18	28.50	27.22	27.15
	251	32.21	30.67	28.70	27.20	27.20
GSM1900	512	29.53	24.96	27.21	24.32	24.22
	661	29.64	28.07	27.51	24.42	24.38
	810	29.23	27.68	27.22	24.06	24.01
		RF Conducted Power Table				
		Voice	HSDPA DATA			
Band	Channel	UMTS [dBm]	HSDPA [dBm]			
WCDMA 850	4132	23.18	23.22			
	4182	23.30	23.30			
	4233	23.42	23.44			
WCDMA 1900	9262	23.58	23.56			
	9400	23.68	23.71			
	9538	23.41	23.38			

IEEE802.11b

Channel	Power [dBm]
1	11.89
6	11.22
11	10.62

IEEE802.11g

Channel	Power [dBm]
1	11.85
6	10.96
11	11.31

10. RESULTS(continued)

Ambient TEMPERATURE (C) : 23
Relative HUMIDITY (%) : 48
Mixture Type : 835MHz Brain
Dielectric Constant : 43.4
Conductivity: 0.97

Measurement Results (GSM850 Head SAR)

ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Brain 1.6 W/kg (mW/g) averaged over 1 gram

MEASUREMENT RESULTS (GSM850 Head SAR)

Frequency		Mod	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
836.60	190	GSM	32.23	32.24	Standrd	Left Touch	Fixed	**0.723**
836.60	190	GSM	32.23	32.21	Standrd	Right Touch	Fixed	0.694
836.60	190	GSM	32.23	32.23	Standrd	Left Tilt	Fixed	0.693
836.60	190	GSM	32.23	32.26	Standrd	Right Tilt	Fixed	0.673
836.60	190	GPRS	30.18	30.13	Standrd	Left Touch	Fixed	**0.757**
836.60	190	GPRS	30.18	30.10	Standrd	Right Touch	Fixed	0.677
836.60	190	GPRS	30.18	30.11	Standrd	Left Tilt	Fixed	0.733
836.60	190	GPRS	30.18	30.14	Standrd	Right Tilt	Fixed	0.659

NOTES:
1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration
2. All modes of operation were investigated and the worst-case are reported.
3. Battery Type : Standard
Justification for reduced test configuration: Per FCC/OET Bulletin 65 Supplement C[July 2001], if the SAR measured at the middle channel for each test configuration (left,light,cheek/touch,tilt/ear, extended and retracted)is at least 3.0dB lower than the SAR limit, testing at the high and low
4 Power Measured : Conducted
5 SAR Measurement System : SPEAG
6. SAR Configuration : Head

10. RESULTS(continued)

Ambient TEMPERATURE (C) : 23.0
Relative HUMIDITY (%) : 48
Mixture Type : 835MHz Body
Dielectric Constant : 53.5
Conductivity: 0.979

Measurement Results (GSM850 BODY SAR without Holster)

ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Brain 1.6 W/kg (mW/g) averaged over 1 gram

MEASUREMENT RESULTS (GSM850 Body SAR Without Holster)

Frequency		Mod	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
836.60	190	GSM	32.23	32.25	Standard	1.5[w/o Holster]FRONT	Fixed	0.204
836.60	190	GSM	32.23	32.23	Standard	1.5[w/o Holster]REAR	Fixed	0.091
824.20	128	GSM	32.25	32.29	Standard	1.5[w/o Holster]FRONT	Fixed	0.202
848.80	251	GSM	32.21	32.11	Standard	1.5[w/o Holster]FRONT	Fixed	**0.230**
836.60	190	GPRS	30.18	30.16	Standard	1.5[w/o Holster]FRONT	Fixed	0.239
836.60	190	GPRS	30.18	30.22	Standard	1.5[w/o Holster]REAR	Fixed	0.090
824.20	128	GPRS	30.70	30.72	Standard	1.5[w/o Holster]FRONT	Fixed	0.187
848.80	251	GPRS	30.67	30.68	Standard	1.5[w/o Holster]FRONT	Fixed	**0.260**

NOTES:
1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration.
2. All modes of operation were investigated and the worst-case are reported.
3. Battery Type : Standard
Justification for reduced test configuration: Per FCC/OET Bulletin 65 Supplement C[July 2001], if the SAR measured at the middle channel for each test configuration (left,light,cheek/touch,tilt/ear, extended and retracted)is at least 3.0dB lower than the SAR limit, testing at the high and low channels is optional for such test configration(s).
4. Power Measured : Conducted
5. SAR Measurement System : SPEAG
6. SAR Configuration : Body

10. RESULTS(continued)

Ambient TEMPERATURE (C) : 23.0
Relative HUMIDITY (%) : 49
Mixture Type : 1900MHz Brain
Dielectric Constant : 38.4
Conductivity: 1.39

Measurement Results (GSM1900 Head SAR)

ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Brain 1.6 W/kg (mW/g) averaged over 1 gram

MEASUREMENT RESULTS (GSM1900 Head SAR)

Frequency		Mod	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	29.64	29.72	Standrd	Left Touch	Fixed	**0.108**
1880.00	661	GSM	29.64	29.61	Standrd	Right Touch	Fixed	0.046
1880.00	661	GSM	29.64	29.71	Standrd	Left Tilt	Fixed	0.074
1880.00	661	GSM	29.64	29.68	Standrd	Right Tilt	Fixed	0.041
1880.00	661	GPRS	28.07	28.11	Standrd	Left Touch	Fixed	**0.096**
1880.00	661	GPRS	28.07	28.18	Standrd	Right Touch	Fixed	0.053
1880.00	661	GPRS	28.07	28.05	Standrd	Left Tilt	Fixed	0.067
1880.00	661	GPRS	28.07	28.11	Standrd	Right Tilt	Fixed	0.040

NOTES:
1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration
2. All modes of operation were investigated and the worst-case are reported.
3. Battery Type : Standard
Justification for reduced test configuration: Per FCC/OET Bulletin 65 Supplement C[July 2001], if the SAR measured at the middle channel for each test configuration (left,light,cheek/touch,tilt/ear, extended and retracted)is at least 3.0dB lower than the SAR limit, testing at the high and low
4. Power Measured : Conducted
5. SAR Measurement System : SPEAG
6. SAR Configuration : Head

10. RESULTS(continued)

Ambient TEMPERATURE (C) : 24.0
Relative HUMIDITY (%) : 49
Mixture Type : 1900MHz Body
Dielectric Constant : 52.6
Conductivity: 1.45

Measurement Results (GSM1900 BODY SAR without Holster)

ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Body 1.6 W/kg (mW/g) averaged over 1 gram

MEASUREMENT RESULTS (GSM1900 Body SAR Without Holster)

Frequency		Mod	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	29.64	29.64	Standard	1.5[w/o Holster]FRONT	Fixed	0.018
1880.00	661	GSM	29.64	29.64	Standard	1.5[w/o Holster]REAR	Fixed	0.056
1850.20	512	GSM	29.53	29.48	Standard	1.5[w/o Holster]REAR	Fixed	**0.081**
1909.80	810	GSM	29.23	29.26	Standard	1.5[w/o Holster]REAR	Fixed	0.042
1880.00	661	GPRS	28.07	28.18	Standard	1.5[w/o Holster]FRONT	Fixed	0.017
1880.00	661	GPRS	28.07	28.09	Standard	1.5[w/o Holster]REAR	Fixed	0.056
1850.20	512	GPRS	27.96	27.92	Standard	1.5[w/o Holster]REAR	Fixed	**0.081**
1909.80	810	GPRS	27.68	27.69	Standard	1.5[w/o Holster]REAR	Fixed	0.042

NOTES:
1. The test data were reported the worst-case SAR value with the antenna-head position set in a typical configuration.
2. All modes of operation were investigated and the worst-case are reported.
3. Battery Type : Standard
Justification for reduced test configuration: Per FCC/OET Bulletin 65 Supplement C[July 2001], if the SAR measured at the middle channel for each test configuration (left,light,cheek/touch,tilt/ear, extended and retracted)is at least 3.0dB lower than the SAR limit, testing at the high and low channels is optional for such test configration(s)
4. Power Measured : Conducted
5. SAR Measurement System : SPEAG
6. SAR Configuration : Body

10. RESULTS(continued)

Ambient TEMPERATURE (C) : 23.0
Relative HUMIDITY (%) : 48
Mixture Type : 835MHz Brain
Dielectric Constant : 43.4
Conductivity: 0.97

Measurement Results (WCDMA850 Head SAR)

ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Brain 1.6 W/kg (mW/g) averaged over 1 gram

MEASUREMENT RESULTS (WCDMA850 Head SAR)

Frequency		Mod	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
836.40	4182	WCDMA	23.30	23.43	Standrd	Left Touch	Fixed	0.832
836.40	4182	WCDMA	23.30	23.26	Standrd	Right Touch	Fixed	0.754
836.40	4182	WCDMA	23.30	23.20	Standrd	Left Tilt	Fixed	0.794
836.40	4182	WCDMA	23.30	23.36	Standrd	Right Tilt	Fixed	0.717
836.40	4182	HSDPA	23.30	23.33	Standrd	Left Touch	Fixed	0.812
836.40	4182	HSDPA	23.30	23.29	Standrd	Right Touch	Fixed	0.708
836.40	4182	HSDPA	23.30	23.30	Standrd	Left Tilt	Fixed	0.760
836.40	4182	HSDPA	23.30	23.40	Standrd	Right Tilt	Fixed	0.708

NOTES:
1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration
2. All modes of operation were investigated and the worst-case are reported.
3. Battery Type : Standard
Justification for reduced test configuration: Per FCC/OET Bulletin 65 Supplement C[July 2001], if the SAR measured at the middle channel for each test configuration (left,light,cheek/touch,tilt/ear, extended and retracted)is at least 3.0dB lower than the SAR limit, testing at the high and low channels is optional for
4. Power Measured : Conducted
5. SAR Measurement System : SPEAG
6. SAR Configuration : Head

10. RESULTS(continued)

Ambient TEMPERATURE (C) : 23.0
Relative HUMIDITY (%) : 48
Mixture Type : 835MHz Body
Dielectric Constant : 53.5
Conductivity: 0.979

Measurement Results (WCDMA850 BODY SAR without Holster)

ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Body 1.6 W/kg (mW/g) averaged over 1 gram

MEASUREMENT RESULTS (WCDMA850 Body SAR Without Holster)

Frequency		Mod	Conducted Power(dBm)		battery	Device Test position	Antenna Positio	SAR (W/kg)
MHz	Ch.		Begin	End				
836.40	4182	WCDMA	23.30	23.42	Standard	1.5[w/o Holster]FRONT	Fixed	**0.298**
836.40	4182	WCDMA	23.30	23.39	Standard	1.5[w/o Holster]REAR	Fixed	0.103
826.40	4132	WCDMA	23.18	23.30	Standard	1.5[w/o Holster]REAR	Fixed	0.221
846.60	4233	WCDMA	23.42	23.47	Standard	1.5[w/o Holster]REAR	Fixed	0.293
836.40	4182	HSDPA	23.30	23.36	Standard	1.5[w/o Holster]FRONT	Fixed	0.258
836.40	4182	HSDPA	23.30	23.38	Standard	1.5[w/o Holster]REAR	Fixed	0.097
826.40	4132	HSDPA	23.22	23.36	Standard	1.5[w/o Holster]REAR	Fixed	0.221
846.60	4233	HSDPA	23.44	23.46	Standard	1.5[w/o Holster]REAR	Fixed	**0.290**

NOTES:
1. The test data were reported the worst-case SAR value with the antenna-head position set in a typical configuration
2. All modes of operation were investigated and the worst-case are reported.
3. Battery Type : Standard
Justification for reduced test configuration: Per FCC/OET Bulletin 65 Supplement C[July 2001], if the SAR measured at the middle channel for each test configuration (left,light,cheek/touch,tilt/ear, extended and retracted)is at least 3.0dB lower than the SAR limit, testing at the high and low channels is optional for such test configration(s).
4. Power Measured : Conducted
5. SAR Measurement System : SPEAG
6. SAR Configuration : Body

10. RESULTS(continued)

Ambient TEMPERATURE (C) : 23.0
Relative HUMIDITY (%) : 48
Mixture Type : 1900MHz Brain
Dielectric Constant : 38.4
Conductivity: 1.39

Measurement Results (WCDMA1900 Head SAR)

ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Brain 1.6 W/kg (mW/g) averaged over 1 gram

MEASUREMENT RESULTS (WCDMA1900 Head SAR)

Frequency		Mod	Conducted Power(dBm)		battery	Device Test position	Antenna Positio	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	9400	WCDMA	23.68	23.71	Standrd	Left Touch	Fixed	**0.341**
1880.00	9400	WCDMA	23.68	23.69	Standrd	Right Touch	Fixed	0.155
1880.00	9400	WCDMA	23.68	23.81	Standrd	Left Tilt	Fixed	0.220
1880.00	9400	WCDMA	23.68	23.68	Standrd	Right Tilt	Fixed	0.119
1880.00	9400	HSDPA	23.71	23.68	Standrd	Left Touch	Fixed	**0.342**
1880.00	9400	HSDPA	23.71	23.78	Standrd	Right Touch	Fixed	0.162
1880.00	9400	HSDPA	23.71	23.87	Standrd	Left Tilt	Fixed	0.219
1880.00	9400	HSDPA	23.71	23.83	Standrd	Right Tilt	Fixed	0.119

NOTES:
1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration.
2. All modes of operation were investigated and the worst-case are reported.
3. Battery Type : Standard
Justification for reduced test configuration: Per FCC/OET Bulletin 65 Supplement C[July 2001], if the SAR measured at the middle channel for each test configuration (left,light,cheek/touch,tilt/ear, extended and retracted)is at least 3.0dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
4. Power Measured : Conducted
5. SAR Measurement System : SPEAG
6. SAR Configuration : Head

10. RESULTS(continued)

Ambient TEMPERATURE (C) : 23.0
Relative HUMIDITY (%) : 48
Mixture Type : 1900MHz Body
Dielectric Constant : 52.6
Conductivity: 1.45

Measurement Results (WCDMA1900 BODY SAR without Holster)

ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Body 1.6 W/kg (mW/g) averaged over 1 gram

MEASUREMENT RESULTS (WCDMA1900 Body SAR Without Holster)

Frequency		Mod	Conducted Power(dBm)		battery	Device Test position	Antenna Positio	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	9400	WCDMA	23.68	23.79	Standard	1.5[w/o Holster]FRONT	Fixed	0.048
1880.00	9400	WCDMA	23.68	23.77	Standard	1.5[w/o Holster]REAR	Fixed	0.165
1852.40	9262	WCDMA	23.58	23.45	Standard	1.5[w/o Holster]REAR	Fixed	**0.172**
1907.60	9536	WCDMA	23.41	23.26	Standard	1.5[w/o Holster]REAR	Fixed	0.118
1880.00	9400	HSDPA	23.71	23.81	Standard	1.5[w/o Holster]FRONT	Fixed	0.064
1880.00	9400	HSDPA	23.71	23.65	Standard	1.5[w/o Holster]REAR	Fixed	0.169
1852.40	9262	HSDPA	23.56	23.44	Standard	1.5[w/o Holster]REAR	Fixed	**0.175**
1907.60	9536	HSDPA	23.38	23.43	Standard	1.5[w/o Holster]REAR	Fixed	0.119

NOTES:
1. The test data were reported the worst-case SAR value with the antenna-head position set in a typical configuration
2. All modes of operation were investigated and the worst-case are reported.
3. Battery Type : Standard
Justification for reduced test configuration: Per FCC/OET Bulletin 65 Supplement C[July 2001], if the SAR measured at the middle channel for each test configuration (left,light,cheek/touch,tilt/ear, extended and retracted)is at least 3.0dB lower than the SAR limit, testing at the high and low channels is optional for such test configration(s).
4. Power Measured : Conducted
5. SAR Measurement System : SPEAG
6. SAR Configuration : Body

10. RESULTS(continued)

Ambient TEMPERATURE (C) : 24.0
Relative HUMIDITY (%) : 46
Mixture Type : 2450MHz Brain
Dielectric Constant : 37.4
Conductivity: 1.83

Measurement Results (WLAN Head SAR)

ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Brain 1.6 W/kg (mW/g) averaged over 1 gram

MEASUREMENT RESULTS (WLAN Head SAR)

Frequency		Mod	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
2437.00	6	11b	11.22	10.65	Standard	Left Touch	Fixed	**0.133**
2437.00	6	11b	11.22	11.06	Standard	Right Touch	Fixed	**0.170**
2437.00	6	11b	11.22	10.95	Standard	Left Tilt	Fixed	**0.099**
2437.00	6	11b	11.22	11.50	Standard	Right Tilt	Fixed	**0.150**
2412.00	1	11b	11.89	11.38	Standard	Right Touch	Fixed	0.180
2462.00	11	11b	10.62	10.51	Standard	Right Touch	Fixed	0.161
2437.00	6	11g	10.96	11.04	Standard	Left Touch	Fixed	0.092
2437.00	6	11g	10.96	9.77	Standard	Right Touch	Fixed	0.048
2437.00	6	11g	10.96	10.93	Standard	Left Tilt	Fixed	0.076
2437.00	6	11g	10.96	11.06	Standard	Right Tilt	Fixed	0.041
2412.00	1	11g	11.85	12.13	Standard	Left Touch	Fixed	0.083
2462.00	11	11g	11.31	11.53	Standard	Left Touch	Fixed	0.092

NOTES:
1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration.
2. All modes of operation were investigated and the worst-case are reported.
3. Battery Type : Standard
Justification for reduced test configuration: Per FCC/OET Bulletin 65 Supplement C[July 2001], if the SAR measured at the middle channel for each test configuration (left,light,cheek/touch,tilt/ear, extended and retracted)is at least 3.0dB lower than the SAR limit, testing at the hiah and low channels is optional for such test configration(s).
4. Power Measured : Conducted
5. SAR Measurement System : SPEAG
6. SAR Configuration : Head

10. RESULTS(continued)

Ambient TEMPERATURE (C) : 24.0
Relative HUMIDITY (%) : 46
Mixture Type : 2450MHz Brain
Dielectric Constant : 52.1
Conductivity: 1.88

Measurement Results (WLAN BODY SAR without Holster)

ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Body 1.6 W/kg (mW/g) averaged over 1 gram

MEASUREMENT RESULTS (WLAN Body SAR Without Holster)

Frequency		Mod	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
2437.00	6	11b	11.22	11.13	Standard	1.5[w/o Holster]FRONT	Fixed	0.077
2437.00	6	11b	11.22	10.97	Standard	1.5[w/o Holster]REAR	Fixed	0.051
2412.00	1	11b	11.89	11.69	Standard	1.5[w/o Holster]FRONT	Fixed	**0.114**
2462.00	11	11b	10.62	10.63	Standard	1.5[w/o Holster]FRONT	Fixed	0.080
2437.00	6	11g	10.96	11.04	Standard	1.5[w/o Holster]FRONT	Fixed	0.024
2437.00	6	11g	10.96	10.99	Standard	1.5[w/o Holster]REAR	Fixed	0.012
2412.00	1	11g	11.85	12.10	Standard	1.5[w/o Holster]FRONT	Fixed	0.027
2462.00	11	11g	11.31	11.32	Standard	1.5[w/o Holster]FRONT	Fixed	0.026

NOTES:
1. The test data were reported the worst-case SAR value with the antenna-head position set in a typical configuration.
2. All modes of operation were investigated and the worst-case are reported.
3. Battery Type : Standard
Justification for reduced test configuration: Per FCC/OET Bulletin 65 Supplement C[July 2001], if the SAR measured at the middle channel for each test configuration (left,light,cheek/touch,tilt/ear, extended and retracted)is at least 3.0dB lower than the SAR limit, testing at the high and low
4. Power Measured : Conducted
5. SAR Measurement System : SPEAG
6. SAR Configuration : Body

11. REFERENCE

[1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects

[2] ANSI/IEEE C95.1 - 1991, American National Standard safety levels with respect to human exposure to radio

[3] ANSI/IEEE C95.3 - 1991, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave, New York: IEEE, 1992.

[4] NCRP, National Council on Radiation Protection and Measurements, Biological Effects and Exposure Criteria

[5] T. Schmid, O. Egger, N. Kuster, Automated E-field scanning system for dosimetric assessments, IEEE Transaction on Microwave Theory and Techniques, vol. 44, Jan. 1996, pp. 105-113.

[6] K. Pokovic, T. Schmid, N. Kuster, Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies, ICECOM97, Oct. 1997, pp. 120-124.

[7]K. Pokovi æ , T. Schmid, and N. Kuster, E-field Probe with improved isotropy in brain simulating liquids, Proceedings of the ELMAR, Zadar, Croatia, June 23-25, 1996, pp. 172-175.

[8] Schmid & Partner Engineering AG, Application Note: Data Storage and Evaluation, June 1998, p2.

[9] V. Hombach, K. Meier, M. Burkhardt, E. Kuhn, N. Kuster, The Dependence of EM Energy Absorption upon Human Head Modeling at 900 MHz, IEEE Transaction on Microwave Theory and Techniques, vol. 44 no. 10, Oct. 1996, pp. 1865-1873.

[10] N. Kuster and Q. Balzano, Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300MHz, IEEE Transaction on Vehicular Technology, vol. 41, no. 1, Feb. 1992, pp. 17-23.

[11] G. Hartsgrove, A. Kraszewski, A. Surowiec, Simulated Biological Materials for Electromagnetic Radiation Absorption Studies, University of Ottawa, Bioelectromagnetics, Canada: 1987, pp. 29-36.

[12] Q. Balzano, O. Garay, T. Manning Jr., Electromagnetic Energy Exposure of Simulated Users of Portable Cellular Telephones, IEEE Transactions on Vehicular Technology, vol. 44, no.3, Aug. 1995.

[13] W. Gander, Computermathematick, Birkhaeuser, Basel, 1992.

[14] W.H. Press, S.A. Teukolsky, W.T. Vetterling, and B.P. Flannery, Numerical Recepies in C, The Art of Scientific Computing, Second edition, Cambridge University Press, 1992.

[15] Federal Communications Commission, OET Bulletin 65, Evaluating Compliance with FCC Guidelines for Human Exposure to RadioFrequency Electromagnetic Fields. Supplement C, Dec. 1997.

[16] N. Kuster, R. Kastle, T. Schmid, Dosimetric evaluation of mobile communications equipment with known precision, IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp. 645-652.

[17] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), Human Exposure to Electromagnetic Fields High-frequency: 10kHz-300GHz, Jan. 1995.

[18] Prof. Dr. Niels Kuster, ETH, Eidgen o ssische Technische Hoschschule Z u rich, Dosimetric Evaluation of the