SAR TEST REPORT

(Mobile Phone)

REPORT NO.: SA110330C13-1
MODEL NO.: PG86300
FCC ID: NM8PG86300
RECEIVED: Mar. 30, 2011
TESTED: May 05 ~ Jun 25, 2011
ISSUED: Jun 27, 2011

APPLICANT: HTC Corporation

ADDRESS: No. 23, Xinghua Rd., Taoyuan City, Taoyuan, 330 Taiwan

ISSUED BY: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

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Testing Laboratory
2021

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
Original release	NA	Jun 27, 2011

1. CERTIFICATION

PRODUCT: Smart Phone
MODEL: PG86300
BRAND: hTC
APPLICANT: HTC Corporation
TESTED: May 05 ~ Jun 25, 2011
TEST SAMPLE: Production Unit
STANDARDS: **FCC Part 2 (Section 2.1093)**
FCC OET Bulletin 65, Supplement C (01-01)
RSS-102 Issue 4 (2010-03)

The above equipment (model: PG86300) have been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Ivy Lin / Specialist , **DATE:** Jun 27, 2011

APPROVED BY : Gary Chang / Assistant Manager , **DATE:** Jun 27, 2011

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

EUT	Smart Phone	
MODEL NO.	PG86300	
FCC ID	NM8PG86300	
POWER SUPPLY	3.7Vdc (Rechargeable lithium battery) 3.8Vdc (Rechargeable lithium battery) 5.0Vdc (Power adapter) 5.0Vdc (host equipment)	
CLASSIFICATION	Portable device, production unit	
MODULATION TYPE	GMSK / 8PSK / BPSK	
FREQUENCY RANGE	824MHz ~ 849MHz 1930MHz ~ 1990MHz 1712.4MHz ~1752.6MHz	
CHANNEL FREQUENCIES UNDER TEST AND ITS CONDUCTED OUTPUT POWER(dBm)	**GSM 850 band**	**GSM 1900 band**
	33.52/CH 128: 824.2MHz 33.92/CH 190: 836.6MHz 33.88/CH 251: 848.8MHz	29.86/CH 512: 1850.2MHz 30.31/CH 661: 1880.0MHz 29.20/CH 810: 1909.8MHz
	GPRS 850 band TS1	**GPRS 1900 band TS1**
	33.34/CH 128: 824.2MHz 33.16/CH 190: 836.6MHz 33.23/CH 251: 848.8MHz	29.83/CH 512: 1850.2MHz 30.21/CH 661: 1880.0MHz 29.15/CH 810: 1909.8MHz
	GPRS 850 band TS2	**GPRS 1900 band TS2**
	32.02/CH 128: 824.2MHz 32.11/CH 190: 836.6MHz 32.36/CH 251: 848.8MHz	28.60/CH 512: 1850.2MHz 29.79/CH 661: 1880.0MHz 28.82/CH 810: 1909.8MHz
	GPRS 850 band TS3	**GPRS 1900 band TS3**
	30.57/CH 128: 824.2MHz 30.49/CH 190: 836.6MHz 30.82/CH 251: 848.8MHz	28.62/CH 512: 1850.2MHz 30.28/CH 661: 1880.0MHz 28.92/CH 810: 1909.8MHz
	GPRS 850 band TS4	**GPRS 1900 band TS4**
	28.92/CH 128: 824.2MHz 29.09/CH 190: 836.6MHz 29.33/CH 251: 848.8MHz	26.93/CH 512: 1850.2MHz 27.98/CH 661: 1880.0MHz 26.47/CH 810: 1909.8MHz
	EGPRS 850 band TS1	**EGPRS 1900 band TS1**
	27.21 /CH 128: 824.2MHz 27.32/CH 190: 836.6MHz 27.34/CH 251: 848.8MHz	24.52/CH 512: 1850.2MHz 25.67/CH 661: 1880.0MHz 24.43/CH 810: 1909.8MHz
	EGPRS 850 band TS2	**EGPRS 1900 band TS2**
	25.97/CH 128: 824.2MHz 26.13/CH 190: 836.6MHz 26.16/CH 251: 848.8MHz	23.35/CH 512: 1850.2MHz 24.43/CH 661: 1880.0MHz 23.21/CH 810: 1909.8MHz

CHANNEL FREQUENCIES UNDER TEST AND ITS CONDUCTED OUTPUT POWER(dBm)

EGPRS 850 band TS3	EGPRS 1900 band TS3
25.84/CH 128: 824.2MHz 25.88/CH 190: 836.6MHz 25.82/CH 251: 848.8MHz	23.27/CH 512: 1850.2MHz 24.17/CH 661: 1880.0MHz 23.11/CH 810: 1909.8MHz
EGPRS 850 band TS4	**EGPRS 1900 band TS4**
25.71/CH 128: 824.2MHz 25.72/CH 190: 836.6MHz 25.83/CH 251: 848.8MHz	23.36/CH 512: 1850.2MHz 24.74/CH 661: 1880.0MHz 23.56/CH 810: 1909.8MHz
GPRS 850 band DTM (GSM + GPRS TS1)	**GPRS 850 band DTM (GSM + GPRS TS2)**
31.97/CH 128: 824.2MHz 32.02/CH 190: 836.6MHz 32.17/CH 251: 848.8MHz	30.42/CH 128: 824.2MHz 30.35/CH 190: 836.6MHz 30.65/CH 251: 848.8MHz

WCDMA Mode

Channel	Frequency (MHz)	WCDMA		HSDPA			
		RMC	AMR	Subtest 1	Subtest 2	Subtest 3	Subtest 4
1312	1712.4	23.26	22.96	21.58	21.72	21.8	21.6
1412	1732.4	23.44	23.15	21.63	21.89	21.98	21.66
1513	1752.6	23.22	23.03	21.55	21.64	21.85	21.68

Channel	Frequency (MHz)	HSUPA					
		Subtest 1	Subtest 2	Subtest 3	Subtest 4	Subtest 5	-
1312	1712.4	21.92	20.72	21.02	20.62	22.12	
1412	1732.4	21.75	20.60	20.65	20.53	21.65	
1513	1752.6	21.85	20.62	20.90	20.74	21.65	

MAX. AVERAGE SAR (1g)

Head		Body	
850MHz	1.208 mW/g	**850MHz**	0.956 mW/g
1700MHz	0.552 mW/g	**1700MHz**	0.856 mW/g
1900MHz	1.171 mW/g	**1900MHz**	1.230 mW/g

ANTENNA TYPE	Fixed internal antenna
MULTI SLOT CLASS	12 for GPRS / EGPRS
DTM	DTM is supported
MULTI SLOT CLASS FOR DTM	11 (Maximum 3 Uplink / 4 Downlink)
MAX. ANTENNA GAIN	**850MHz:** -3.6dBi **1700MHz:** -2.0 dBi **1900MHz:** 0.4dBi
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Refer to note as below

NOTE:

1. The EUT is a Smart Phone. The test data are separated into following test reports:

	REFERENCE REPORT
SAR test report-247 (WLAN 802.11b/g/n)	SA110330C13
SAR test report-GSM / GPRS/ E-GPRS 850	SA110330C13-1
SAR test report- GSM / GPRS/ E-GPRS 1900	
SAR test report-WCDMA	
RF Exposure (For Bluetooth)	SA110330C13-2

2. The communicated functions of EUT listed as below:

		850MHz	1700MHz	1900MHz	
2G	**GSM**	√		√	**With 802.11b/g/n + Bluetooth + GPS**
	GPRS	√		√	
	E-GPRS	√		√	
3G	**WCDMA**		√		
	HSDPA		√		
	HSUPA		√		

3. IMEI code: 35687104*********
4. The EUT has following accessories.

NO.	PRODUCT	BRAND	MODEL	DESCRIPTION
1	Power Adapter	hTC	TC X250 (X= U, B, E, C, A)	I/P: 100-240Vac, 200mA, 50-60Hz O/P: 5Vdc, 1A Manufacture: Emerson
2				I/P: 100-240Vac, 200mA, 50-60Hz O/P: 5Vdc, 1A Manufacture: Delta
3				I/P: 100-240Vac, 200mA, 50-60Hz O/P: 5Vdc, 1A Manufacture: Phihong
4	Battery	hTC	BG86100	Rating: 3.8Vdc, 1730mAh, 6.57Whr Manufacture: HT ENERGY
5				Rating: 3.7Vdc, 1730mAh, 6.40Whr Manufacture: HT ENERGY
6	USB cable	Chant Sincere Co., LTD (COXOC)	DC M410	1.30m non-shielded cable w/o core
7				1.27m non-shielded cable w/o core
8		Foxlink		1.25m non-shielded cable w/o core
9		MEC		1.27m non-shielded cable w/o core
10	Earphone cable	Merry	RC E160	1.23m non-shielded cable without core

5. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

2.2 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to the specifications of the manufacturer, this product must comply with the requirements of the following standards:

FCC 47 CFR Part 2 (2.1093)

FCC OET Bulletin 65, Supplement C (01- 01)

RSS-102 Issue 4 (2010-03)

IEEE 1528-2003

All test items have been performed and recorded as per the above standards.

2.3 GENERAL INOFRMATION OF THE SAR SYSTEM

DASY4(software 4.7 Build 80) consists of high precision robot, probe alignment sensor, phantom, robot controller, controlled measurement server and near-field probe. The robot includes six axes that can move to the precision position of the DASY4 software defined. The DASY4 software can define the area that is detected by the probe. The robot is connected to controlled box. Controlled measurement server is connected to the controlled robot box. The DAE includes amplifier, signal multiplexing, AD converter, offset measurement and surface detection. It is connected to the Electro-optical coupler (ECO). The ECO performs the conversion form the optical into digital electric signal of the DAE and transfers data to the PC.

EX3DV4 ISOTROPIC E-FIELD PROBE

CONSTRUCTION	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
FREQUENCY	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
DIRECTIVITY	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
DYNAMIC RANGE	10 μW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 μW/g)
DIMENSIONS	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
APPLICATION	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.

NOTE

1. The Probe parameters have been calibrated by the SPEAG. Please reference “APPENDIX D” for the Calibration Certification Report.
2. For frequencies above 800MHz, calibration in a rectangular wave-guide is used, because wave-guide size is manageable.
3. For frequencies below 800MHz, temperature transfer calibration is used because the wave-guide size becomes relatively large.

TWIN SAM V4.0

CONSTRUCTION	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-2003, CENELEC 50361 and IEC 62209. 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 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 with the robot.
SHELL THICKNESS	2 ± 0.2 mm
FILLING VOLUME	Approx. 25 liters
DIMENSIONS	Height: 810 mm; Length: 1000 mm; Width: 500 mm

SYSTEM VALIDATION KITS:

CONSTRUCTION	Symmetrical dipole with l/4 balun Enables measurement of feedpoint impedance with NWA Matched for use near flat phantoms filled with brain simulating solutions Includes distance holder and tripod adaptor
CALIBRATION	Calibrated SAR value for specified position and input power at the flat phantom in brain simulating solutions
FREQUENCY	835, 1900
RETURN LOSS	> 20 dB at specified validation position
POWER CAPABILITY	> 100 W (f < 1GHz); > 40 W (f > 1GHz)
OPTIONS	Dipoles for other frequencies or solutions and other calibration conditions upon request

DEVICE HOLDER FOR SAM TWIN PHANTOM

CONSTRUCTION The device holder for the GSM900/DCS1800/PCS1900 GSM/GPRS/CDMA Mobile Phone device is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles. The holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity ε =3 and loss tangent δ =0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered. The device holder for the portable device makes up of the polyethylene foam. The dielectric parameters of material close to the dielectric parameters of the air.

DATA ACQUISITION ELECTRONICS

CONSTRUCTION The data acquisition electronics (DAE3) consists of a highly sensitive electrometer grade preamplifier with auto-zeroing, a channel and gain-switching multiplex, a fast 16 bit AD converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock. The mechanical probe is mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection. The input impedance of the DAE3 box is 200MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

2.4 TEST EQUIPMENT

FOR SAR MEASURENENT

ITEM	NAME	BRAND	TYPE	SERIES NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
1	SAM Phantom	S & P	QD000 P40 CA	TP-1202	NA	NA
2	Signal Generator	Anritsu	68247B	984703	May 31, 2010	May 30, 2011
3	E-Field Probe	S & P	EX3DV4	3590	Feb. 25, 2011	Feb. 24, 2012
4	DAE	S & P	DAE 3	579	Sep. 20, 2010	Sep. 19, 2011
5	Robot Positioner	Staubli Unimation	NA	NA	NA	NA
6	Validation Dipole	S & P	D835V2	4d021	Mar. 23, 2011	Mar. 22, 2012
			D1900V2	5d022	Jan. 26, 2011	Jan. 25, 2012
			D1750V2	1003	Sep. 29, 2010	Sep. 28, 2011
7	Power Meter	Agilent	E4416A	GB41291763	Oct. 22, 2010	Oct. 21, 2011
8	Power Sensor	Agilent	E9327A	US40441181	Oct. 21, 2010	Oct. 20, 2011

NOTE: Before starting the measurement, all test equipment shall be warmed up for 30min.

FOR TISSUE PROPERTY

ITEM	NAME	BRAND	TYPE	SERIES NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
1	Network Analyzer	Agilent	E5071C	MY46104190	Apr. 15, 2011	Apr. 14, 2012
2	Dielectric Probe	Agilent	85070D	US01440176	NA	NA

NOTE:

1. Before starting, all test equipment shall be warmed up for 30min.
2. The tolerance (k=1) specified by Agilent for general dielectric measurements, deriving from inaccuracies in the calibration data, analyzer drift, and random errors, are usually ±2.5% and ±5% for measured permittivity and conductivity, respectively. However, the tolerances for the conductivity is smaller for material with large loss tangents, i.e., less than ±2.5% (k=1). It can be substantially smaller if more accurate methods are applied.

2.5 GENERAL DESCRIPTION OF THE SPATIAL PEAK SAR EVALUATION

The DASY4 post-processing software (SEMCAD) automatically executes the following procedures to calculate the field units from the micro-volt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	$Norm_i$, a_{i0}, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	dcp_i
Device parameters:	- Frequency	F
	- Crest factor	Cf
Media parameters:	- Conductivity	σ
	- Density	ρ

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \bullet \frac{cf}{dcp_i}$$

V_i	=compensated signal of channel i	(i = x, y, z)
U_i	=input signal of channel I	(i = x, y, z)
Cf	=crest factor of exciting field	(DASY parameter)
dcp_i	=diode compression point	(DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

$$\text{E-fieldprobes: } E_i = \sqrt{\frac{V_1}{Norm_i \cdot ConvF}}$$

$$\text{H-fieldprobes: } H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1} f + a_{i2} f^2}{f}$$

V_i	=compensated signal of channel I	(i = x, y, z)
$Norm_i$	=sensor sensitivity of channel i µV/(V/m)2 for E-field Probes	(i = x, y, z)
ConvF	= sensitivity enhancement in solution	
a_{ij}	= sensor sensitivity factors for H-field probes	
F	= carrier frequency [GHz]	
E_i	= electric field strength of channel i in V/m	
H_i	= magnetic field strength of channel i in A/m	

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

The primary field data are used to calculate the derived field units.

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1'000}$$

SAR	= local specific absorption rate in mW/g
E_{tot}	= total field strength in V/m
σ	= conductivity in [mho/m] or [Siemens/m]
ρ	= equivalent tissue density in g/cm3

Note that the density is set to 1, to account for actual head tissue density rather than the density of the tissue simulating liquid. The entire evaluation of the spatial peak values is performed within the Post-processing engine (SEMCAD). The system always gives the maximum values for the 1 g and 10 g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

1. The extraction of the measured data (grid and values) from the Zoom Scan
2. The calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
3. The generation of a high-resolution mesh within the measured volume
4. The interpolation of all measured values from the measurement grid to the high-resolution grid
5. The extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
6. The calculation of the averaged SAR within masses of 1 g and 10 g.

The probe is calibrated at the center of the dipole sensors that is located 1 to 2.7mm away from the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are included as parameters in the probe configuration file. The software always knows exactly how far away the measured point is from the surface. As the probe cannot directly measure at the surface, the values between the deepest measured point and the surface must be extrapolated. The angle between the probe axis and the surface normal line is less than 30 degree.

In the Area Scan, the gradient of the interpolation function is evaluated to find all the extreme of the SAR distribution. The uncertainty on the locations of the extreme is less than 1/20 of the grid size. Only local maximum within -2 dB of the global maximum are searched and passed for the Cube Scan measurement. In the Cube Scan, the interpolation function is used to extrapolate the Peak SAR from the lowest measurement points to the inner phantom surface (the extrapolation distance). The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5mm.

The maximum search is automatically performed after each area scan measurement. It is based on splines in two or three dimensions. The procedure can find the maximum for most SAR distributions even with relatively large grid spacing. After the area scanning measurement, the probe is automatically moved to a position at the interpolated maximum. The following scan can directly use this position for reference, e.g., for a finer resolution grid or the cube evaluations. The 1g and 10g peak evaluations are only available for the predefined cube 7 x 7 x 7 scans. The routines are verified and optimized for the grid dimensions used in these cube measurements. The measured volume of 30 x 30 x 30mm contains about 30g of tissue. The first procedure is an extrapolation (incl. boundary correction) to get the points between the lowest measured plane and the surface. The next step uses 3D interpolation to get all points within the measured volume in a 1mm grid (42875 points). In the last step, a 1g cube is placed numerically into the volume and its averaged SAR is calculated. This cube is the moved around until the highest averaged SAR is found. If the highest SAR is found at the edge of the measured volume, the system will issue a warning: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

2.6 DESCRIPTION OF SUPPORT UNITS

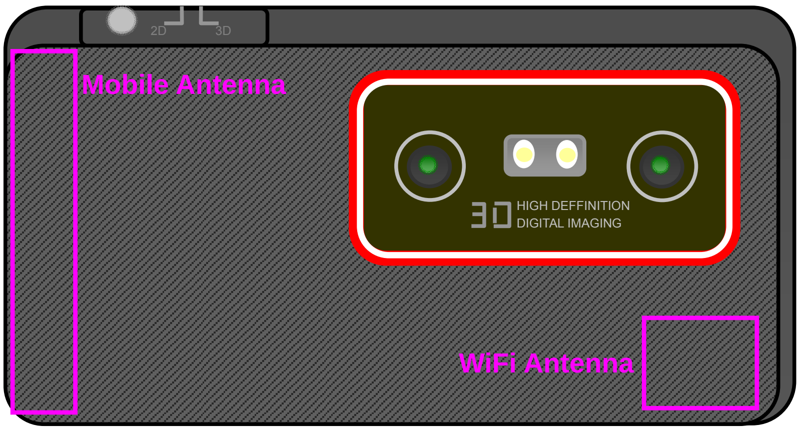
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.
1	Universal Radio Communication Tester	R&S	CMU200	101372
2	COMMUNICATIONS TESTER-WIRELESS	Agilent	8960 Series 10	MY50260642

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	NA

NOTE: All power cords of the above support units are non shielded (1.8m).

3. DESCRIPTION OF ANTENNA LOCATION



Note: The EUT size is 12.6cm *6.5cm*1.205cm > 9 cm * 5cm, therefore 10 mm is used to be test distance for body SAR evaluation.

4. DESCRIPTION OF TEST POSITION

4.1 DESCRIPTION OF TEST POSITION

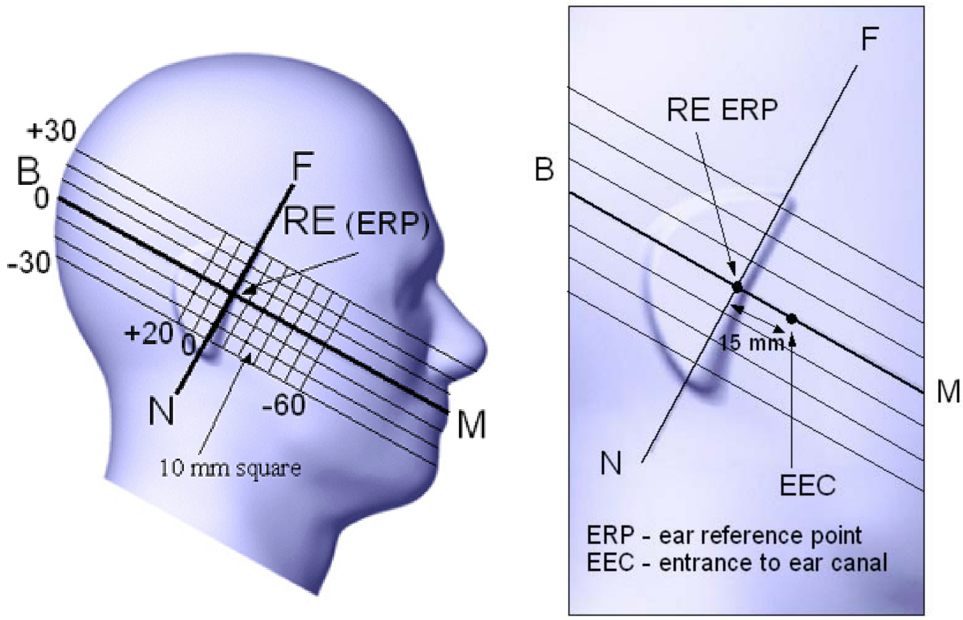


FIGURE 3.1

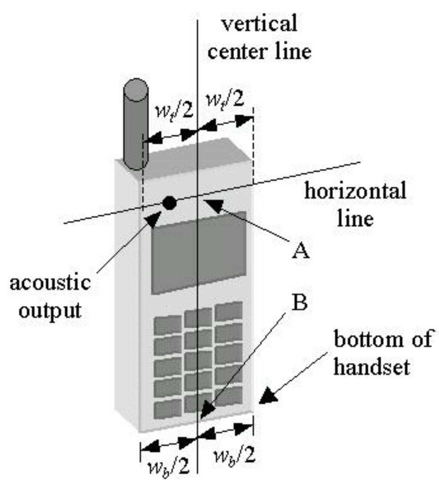


FIGURE 3.1a

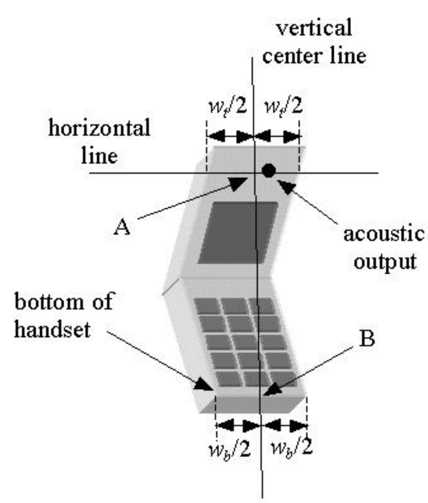
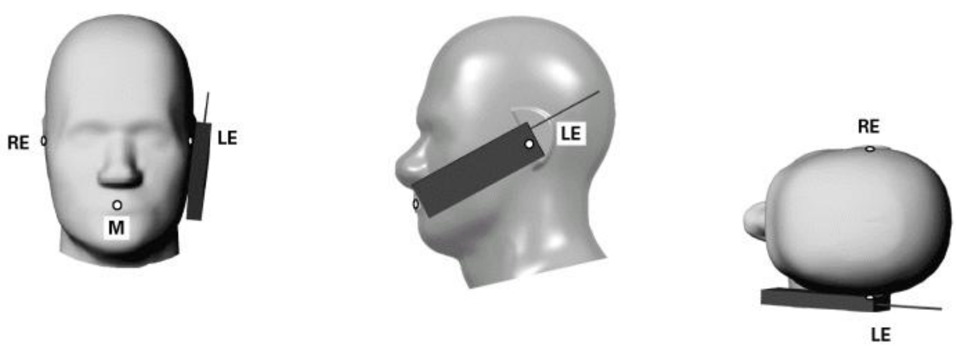


FIGURE 3.1b

4.1.1 TOUCH/CHEEK TEST POSITION

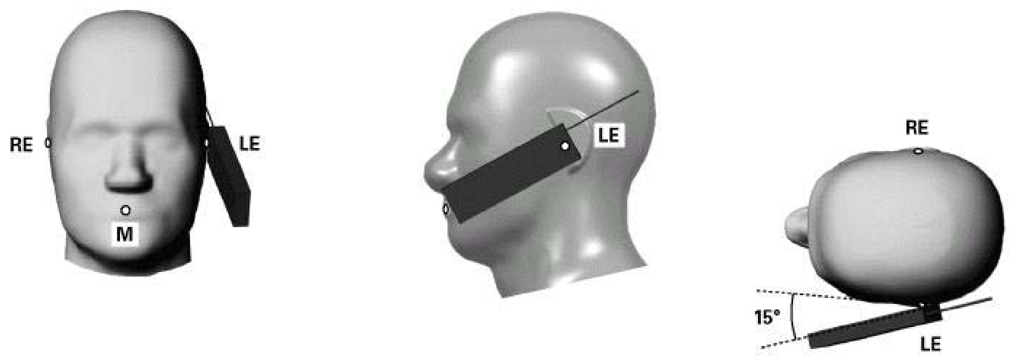
The head position in Figure 3.1, the ear reference points ERP are 15mm above entrance to ear canal along the B-M line. The line N-F (Neck-Front) is perpendicular to the B-M (Back Mouth) line. The handset device in Figure 3.1a and 3.1b,The vertical centerline pass through two points on the front side of handset: the midpoint of the width wt of the handset at the level of the acoustic output (point A) and the midpoint of the width Wb of the bottom of the handset (point B). The vertical centerline is perpendicular to the horizontal line and pass through the center of the acoustic output. The point A touches the ERP and the vertical centerline of the handset is parallel to the B-M line. While maintaining the point A contact with the ear(ERP), rotate the handset about the line NF until any point on handset is in contact with the cheek of the phantom



TOUCH/CHEEK POSITION FIGURE

4.1.2 TILT TEST POSITION

Adjust the device in the cheek position. While maintaining a point of the handset contact in the ear, move the bottom of the handset away from the mouth by an angle of 15 degrees.



TILT POSITION FIGURE

4.1.3 BODY-WORN CONFIGURATION

The handset device attached the belt clip or the holster. The keypad face of the handset is against with the bottom of the flat phantom face and the bottom of the keypad face contact to the bottom of the flat phantom.

When multiple accessories that do not contain metallic components are supplied with the device, the device may be tested with only the accessory that dictates the closest spacing to the body. When multiple accessories that contain metallic components are supplied with the device, the device must be tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component (e.g., the same metallic belt-clip used with different holsters with no other metallic components), only accessory that dictates the closest spacing to the body must be tested.

5. RECIPES FOR TISSUE SIMULATING LIQUIDS

For the measurement of the field distribution inside the SAM phantom, the phantom must be filled with 25 litters of tissue simulation liquid.

The following ingredients are used：

- **WATER-** Deionized water (pure H20), resistivity _16 M - as basis for the liquid
- **SUGAR-** Refined sugar in crystals, as available in food shops - to reduce relative permittivity
- **SALT-** Pure NaCl - to increase conductivity
- **CELLULOSE-** Hydroxyethyl-cellulose, medium viscosity (75-125 mPa.s, 2% in water, 20_C),
  CAS # 54290 - to increase viscosity and to keep sugar in solution
- **PRESERVATIVE-** Preventol D-7 Bayer AG, D-51368 Leverkusen, CAS # 55965-84-9 - to prevent the spread of bacteria and molds
- **DGMBE-** Diethylenglycol-monobuthyl ether (DGMBE), Fluka Chemie GmbH, CAS # 112-34-5 - to reduce relative permittivity

THE RECIPES FOR 835MHz SIMULATING LIQUID TABLE

INGREDIENT	HEAD SIMULATING LIQUID 835MHz (HSL-835)	MUSCLE SIMULATING LIQUID 835MHz (MSL-835)
Water	40.28%	50.07%
Cellulose	02.41%	NA
Salt	01.38%	0.94%
Preventtol D-7	00.18%	0.09%
Sugar	57.97%	48.2%
Dielectric Parameters at 22℃	f = 835MHz ε= 41.5 ± 5% σ= 0.9 ± 5% S/m	f= 835MHz ε= 55.2 ± 5% σ= 0.97 ± 5% S/m

THE RECIPES FOR 1700MHz SIMULATING LIQUID TABLE

INGREDIENT	HEAD SIMULATING LIQUID 1700MHz (HSL-1700)
Water	55.73%
DGBE	43.85%
Salt	0.42%

THE RECIPES FOR 1700MHz SIMULATING LIQUID TABLE

INGREDIENT	BODY SIMULATING LIQUID 1700MHz (MSL-1700)
Water	70.53%
Sugar	29.12%
Cellulose	0.35%

THE RECIPES FOR 1900MHz SIMULATING LIQUID TABLE

INGREDIENT	HEAD SIMULATING LIQUID 1900MHz (HSL-1900)	MUSCLE SIMULATING LIQUID 1900MHz (MSL-1900)
Water	55.24%	70.16%
DGMBE	44.45%	29.44%
Salt	0.306%	00.39%
Dielectric Parameters at 22℃	f= 1900MHz ε= 40.0 ± 5% σ= 1.40 ± 5% S/m	f= 1900MHz ε= 53.3 ± 5% σ= 1.52 ± 5% S/m

Testing the liquids using the Agilent Network Analyzer E8358A and Agilent Dielectric Probe Kit 85070D.The testing procedure is following as

1. Turn Network Analyzer on and allow at least 30 min. warm up.
2. Mount dielectric probe kit so that interconnecting cable to Network Analyzer will not be moved during measurements or calibration.
3. Pour de-ionized water and measure water temperature (±1°).
4. Set water temperature in Agilent-Software (Calibration Setup).
5. Perform calibration.
6. Validate calibration with dielectric material of known properties (e.g. polished ceramic slab with >8mm thickness ε'=10.0, ε''=0.0). If measured parameters do not fit within tolerance, repeat calibration (±0.2 for ε': ±0.1 for ε'').
7. Conductivity can be calculated from ε'' by $\sigma = \omega \varepsilon_0 \varepsilon'' = \varepsilon'' f$ [GHz] / 18.
8. Measure liquid shortly after calibration. Repeat calibration every hour.
9. Stir the liquid to be measured. Take a sample (~50ml) with a syringe from the center of the liquid container.
10. Pour the liquid into a small glass flask. Hold the syringe at the bottom of the flask to avoid air bubbles.
11. Put the dielectric probe in the glass flask. Check that there are no air bubbles in front of the opening in the dielectric probe kit.
12. Perform measurements.
13. Adjust medium parameters in DASY4 for the frequencies necessary for the measurements (‘Setup Config’, select medium and press ‘Option’-button.

Select the current medium for the frequency of the validation

FOR GSM 850 BAND SIMULATING LIQUID

LIQUID TYPE		HSL-835		
SIMULATING LIQUID TEMP.		21.3		
TEST DATE		May 05, 2011		
TESTED BY		Morrison Huang		
FREQ. (MHz)	**LIQUID PARAMETER**	**STANDARD VALUE**	**MEASUREMENT VALUE**	**ERROR PERCENTAGE (%)**
835.0	Permitivity (ε)	41.50	42.86	3.28
836.6		41.50	42.75	3.01
835.0	Conductivity (σ) S/m	0.90	0.91	1.11
836.6		0.90	0.92	2.22

LIQUID TYPE		MSL-835		
SIMULATING LIQUID TEMP.		21.1		
TEST DATE		May 06, 2011		
TESTED BY		Morrison Huang		
FREQ. (MHz)	**LIQUID PARAMETER**	**STANDARD VALUE**	**MEASUREMENT VALUE**	**ERROR PERCENTAGE (%)**
824.2	Permitivity (ε)	55.24	57.04	3.26
835.0		55.20	56.81	2.92
836.6		55.20	56.73	2.77
848.8		55.16	56.62	2.65
824.2	Conductivity (σ) S/m	0.97	0.98	1.03
835.0		0.97	0.99	2.06
836.6		0.97	0.99	2.06
848.8		0.99	1.00	1.01

LIQUID TYPE	MSL-835			
SIMULATING LIQUID TEMP.	21.1			
TEST DATE	May 07, 2011			
TESTED BY	Morrison Huang			

FREQ. (MHz)	LIQUID PARAMETER	STANDARD VALUE	MEASUREMENT VALUE	ERROR PERCENTAGE (%)
824.2	Permitivity (ε)	55.24	56.79	2.81
835.0		55.20	56.55	2.45
836.6		55.20	56.42	2.21
848.8		55.16	56.34	2.14
824.2	Conductivity (σ) S/m	0.97	1.00	3.09
835.0		0.97	1.01	4.12
836.6		0.97	1.01	4.12
848.8		0.99	1.02	3.03

FOR PCS 1900 BAND SIMULATING LIQUID

LIQUID TYPE		HSL-1900		
SIMULATING LIQUID TEMP.		21.3		
TEST DATE		May 10, 2011		
TESTED BY		Morrison Huang		
FREQ. (MHz)	**LIQUID PARAMETER**	**STANDARD VALUE**	**MEASUREMENT VALUE**	**ERROR PERCENTAGE (%)**
1880	Permitivity (ε)	40.00	40.88	2.20
1900		40.00	40.83	2.08
1880	Conductivity (σ) S/m	1.40	1.42	1.43
1900		1.40	1.43	2.14

LIQUID TYPE		MSL-1900		
SIMULATING LIQUID TEMP.		21.2		
TEST DATE		May 08, 2011		
TESTED BY		Morrison Huang		
FREQ. (MHz)	**LIQUID PARAMETER**	**STANDARD VALUE**	**MEASUREMENT VALUE**	**ERROR PERCENTAGE (%)**
1850.2	Permitivity (ε)	53.30	54.76	2.74
1880.0		53.30	54.62	2.48
1900.0		53.30	54.53	2.31
1909.8		53.30	54.41	2.08
1850.2	Conductivity (σ) S/m	1.52	1.51	-0.66
1880.0		1.52	1.54	1.32
1900.0		1.52	1.55	1.97
1909.8		1.52	1.57	3.29

LIQUID TYPE	MSL-1900			
SIMULATING LIQUID TEMP.	21.5			
TEST DATE	May 09, 2011			
TESTED BY	Morrison Huang			

FREQ. (MHz)	LIQUID PARAMETER	STANDARD VALUE	MEASUREMENT VALUE	ERROR PERCENTAGE (%)
1850.2	Permitivity (ε)	53.30	55.18	3.53
1880.0		53.30	55.04	3.26
1900.0		53.30	54.95	3.10
1909.8		53.30	54.83	2.87
1850.2	Conductivity (σ) S/m	1.52	1.48	-2.63
1880.0		1.52	1.51	-0.66
1900.0		1.52	1.52	0.00
1909.8		1.52	1.54	1.32

FOR WCDMA AWS BAND SIMULATING LIQUID

LIQUID TYPE		HSL-1700		
SIMULATING LIQUID TEMP.		21.5		
TEST DATE		May 11, 2011		
TESTED BY		Morrison Huang		
FREQ. (MHz)	LIQUID PARAMETER	STANDARD VALUE	MEASUREMENT VALUE	ERROR PERCENTAGE (%)
1732.4	Permitivity (ε)	40.10	41.65	3.87
1750.0		40.07	41.51	3.59
1732.4	Conductivity (σ) S/m	1.36	1.40	2.94
1750.0		1.37	1.41	2.92

LIQUID TYPE		MSL-1700		
SIMULATING LIQUID TEMP.		21.8		
TEST DATE		May 12, 2011		
TESTED BY		Morrison Huang		
FREQ. (MHz)	LIQUID PARAMETER	STANDARD VALUE	MEASUREMENT VALUE	ERROR PERCENTAGE (%)
1712.4	Permitivity (ε)	53.53	55.24	3.19
1732.4		53.48	55.13	3.09
1750.0		53.43	55.01	2.96
1752.6		53.42	54.93	2.83
1712.4	Conductivity (σ) S/m	1.46	1.49	2.05
1732.4		1.48	1.51	2.03
1750.0		1.49	1.52	2.01
1752.6		1.49	1.52	2.01

FOR GSM 850 BAND SIMULATING LIQUID

LIQUID TYPE		HSL-835		
SIMULATING LIQUID TEMP.		21.4		
TEST DATE		Jun 22, 2011		
TESTED BY		Morrison Huang		
FREQ. (MHz)	**LIQUID PARAMETER**	**STANDARD VALUE**	**MEASUREMENT VALUE**	**ERROR PERCENTAGE (%)**
835.0	Permitivity (ε)	41.50	42.49	2.39
836.6		41.50	42.35	2.05
835.0	Conductivity (σ) S/m	0.90	0.92	2.22
836.6		0.90	0.93	3.33

FOR PCS 1900 BAND SIMULATING LIQUID

LIQUID TYPE		HSL-1900		
SIMULATING LIQUID TEMP.		21.6		
TEST DATE		Jun 21, 2011		
TESTED BY		Morrison Huang		
FREQ. (MHz)	**LIQUID PARAMETER**	**STANDARD VALUE**	**MEASUREMENT VALUE**	**ERROR PERCENTAGE (%)**
1880	Permitivity (ε)	40.00	41.11	2.78
1900		40.00	41.09	2.73
1880	Conductivity (σ) S/m	1.40	1.43	2.14
1900		1.40	1.45	3.57

LIQUID TYPE		MSL-835		
SIMULATING LIQUID TEMP.		21.5		
TEST DATE		Jun 25, 2011		
TESTED BY		Morrison Huang		
FREQ. (MHz)	**LIQUID PARAMETER**	**STANDARD VALUE**	**MEASUREMENT VALUE**	**ERROR PERCENTAGE (%)**
824.2	Permitivity (ε)	55.24	56.57	2.41
835.0		55.20	56.36	2.10
836.6		55.20	56.24	1.88
848.8		55.16	56.15	1.79
824.2	Conductivity (σ) S/m	0.97	0.99	2.06
835.0		0.97	1	3.09
836.6		0.97	1	3.09
848.8		0.99	1.01	2.02

6. SYSTEM VALIDATION

The system validation was performed in the flat phantom with equipment listed in the following table. Since the SAR value is calculated from the measured electric field, dielectric constant and conductivity of the body tissue and the SAR is proportional to the square of the electric field. So, the SAR value will be also proportional to the RF power input to the system validation dipole under the same test environment. In our system validation test, 250mW RF input power was used.

6.1 TEST PROCEDURE

Before you start the system performance check, need only to tell the system with which components (probe, medium, and device) are performing the system performance check; the system will take care of all parameters. The dipole must be placed beneath the flat phantom section of the SAM Twin Phantom with the correct distance holder in place. The distance holder should touch the phantom surface with a light pressure at the reference marking (little cross) and be oriented parallel to the long side of the phantom. Accurate positioning is not necessary, since the system will search for the peak SAR location, except that the dipole arms should be parallel to the surface. The device holder for the EUT can be left in place but should be rotated away from the dipole.

1.The ”Power Reference Measurement” and ”Power Drift Measurement” jobs are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the amplifier output power. If it is too high (above ±0.1 dB), the system performance check should be repeated; some amplifiers have very high drift during warm-up. A stable amplifier gives drift results in the DASY system below ±0.02 dB.

2.The ”Surface Check” job tests the optical surface detection system of the DASY system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ±0.1mm). In that case it is better to abort the system performance check and stir the liquid.

3. The ”Area Scan” job measures the SAR above the dipole on a plane parallel to the surface. It is used to locate the approximate location of the peak SAR. The proposed scan uses large grid spacing for faster measurement; due to the symmetric field, the peak detection is reliable. If a finer graphic is desired, the grid spacing can be reduced. Grid spacing and orientation have no influence on the SAR result.

4. The ”Zoom Scan” job measures the field in a volume around the peak SAR value assessed in the previous ”Area Scan” job (for more information see the application note on SAR evaluation).

About the validation dipole positioning uncertainty, the constant and low loss dielectric spacer is used to establish the correct distance between the top surface of the dipole and the bottom surface of the phantom, the error component introduced by the uncertainty of the distance between the liquid (i.e., phantom shell) and the validation dipole in the DASY4 system is less than ±0.1mm.

$$SAR_{tolerance}[\%] = 100 \times (\frac{(a+d)^2}{a^2} - 1)$$

As the closest distance is 10mm, the resulting tolerance $SAR_{tolerance}[\%]$ is <2%.

6.2 VALIDATION RESULTS

SYSTEM VALIDATION TEST OF SIMULATING LIQUID					
FREQUENCY (MHz)	**REQUIRED SAR (mW/g)**	**MEASURED SAR (mW/g)**	**DEVIATION (%)**	**SEPARATION DISTANCE**	**TESTED DATE**
HSL 835	2.40 (1g)	2.25	-6.25	15mm	May 05, 2011
MSL 835	2.56 (1g)	2.49	-2.73	15mm	May 06, 2011
MSL 835	2.56 (1g)	2.48	-3.13	15mm	May 07, 2011
HSL 1900	10.40 (1g)	9.73	-6.44	10mm	May 10, 2011
MSL 1900	10.40 (1g)	10.6	1.92	10mm	May 08, 2011
MSL 1900	10.40 (1g)	10.6	1.92	10mm	May 09, 2011
HSL 1750	9.07 (1g)	9.46	4.30	15mm	May 11, 2011
MSL 1750	9.38 (1g)	9.82	4.69	15mm	May 12, 2011
HSL 835	2.40 (1g)	2.52	5.00	15	Jun 22, 2011
HSL 1900	10.40 (1g)	9.75	-6.25	10	Jun 21, 2011
MSL 835	2.56 (1g)	2.39	-6.64	15mm	Jun 25, 2011
TESTED BY	Morrison Huang				

NOTE: Please see Appendix for the photo of system validation test.

6.3 SYSTEM VALIDATION UNCERTAINTIES

In the table below, the system validation uncertainty with respect to the analytically assessed SAR value of a dipole source as given in the IEEE 1528 standard is given. This uncertainty is smaller than the expected uncertainty for mobile phone measurements due to the simplified setup and the symmetric field distribution.

Error Description	Tolerance (±%)	Probability Distribution	Divisor	(C_i) (1g)	(C_i) (10g)	Standard Uncertainty (±%) (1g)	Standard Uncertainty (±%) (10g)	(v_i)
Measurement System								
Probe Calibration	5.50	Normal	1	1	1	5.50	5.50	∞
Axial Isotropy	0.25	Rectangular	$\sqrt{3}$	0.7	0.7	0.10	0.10	∞
Hemispherical Isotropy	1.30	Rectangular	$\sqrt{3}$	0.7	0.7	0.53	0.53	∞
Boundary effects	1.00	Rectangular	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	0.30	Rectangular	$\sqrt{3}$	1	1	0.17	0.17	∞
System Detection Limits	1.00	Rectangular	$\sqrt{3}$	1	1	0.58	0.58	∞
Readout Electronics	0.30	Normal	1	1	1	0.30	0.30	∞
Response Time	0.80	Rectangular	$\sqrt{3}$	1	1	0.46	0.46	∞
Integration Time	2.60	Rectangular	$\sqrt{3}$	1	1	1.50	1.50	∞
RF Ambient Noise	3.00	Rectangular	$\sqrt{3}$	1	1	1.73	1.73	9
RF Ambient Reflections	3.00	Rectangular	$\sqrt{3}$	1	1	1.73	1.73	9
Probe Positioner	0.40	Rectangular	$\sqrt{3}$	1	1	0.23	0.23	∞
Probe Positioning	2.90	Rectangular	$\sqrt{3}$	1	1	1.67	1.67	∞
Max. SAR Eval.	1.00	Rectangular	$\sqrt{3}$	1	1	0.58	0.58	∞
Test sample related								
Sample positioning	1.90	Normal	1	1	1	1.90	1.90	4
Device holder uncertainty	2.80	Normal	1	1	1	2.80	2.80	4
Output power variation-SAR drift measurement	4.50	Rectangular	$\sqrt{3}$	1	1	2.60	2.60	1
Dipole Related								
Dipole Axis to Liquid Distance	1.60	Rectangular	$\sqrt{3}$	1	1	0.92	0.92	4
Input Power Drift	0.83	Rectangular	$\sqrt{3}$	1	1	0.48	0.48	1
Phantom and Tissue parameters								
Phantom Uncertainty	4.00	Rectangular	$\sqrt{3}$	1	1	2.31	2.31	∞
Liquid Conductivity (target)	5.00	Rectangular	$\sqrt{3}$	0.64	0.43	1.85	1.24	∞
Liquid Conductivity (measurement)	4.12	Normal	1	0.64	0.43	2.64	1.77	9
Liquid Permittivity (target)	5.00	Rectangular	$\sqrt{3}$	0.6	0.49	1.73	1.41	∞
Liquid Permittivity (measurement)	3.53	Normal	1	0.6	0.49	2.12	1.73	9
Combined Standard Uncertainty						**9.24**	**8.79**	
Coverage Factor for 95%						**Kp=2**		
Expanded Uncertainty (K=2)						**18.49**	**17.58**	

7. TEST RESULTS

7.1 TEST PROCEDURES

The EUT (Smart Phone) makes a phone call to the communication simulator station. Establish the simulation communication configuration rather the actual communication. Then the EUT could continuous the transmission mode. Adjust the PCL of the base station could controlled the EUT to transmitted the maximum output power. The base station also could control the transmission channel. The SAR value was calculated via the 3D spline interpolation algorithm that has been implemented in the software of DASY4 SAR measurement system manufactured and calibrated by SPEAG. According to the IEEE 1528 / EN 50361, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

• Power reference measurement
• Verification of the power reference measurement
• Area scan
• Zoom scan
• Power reference measurement

In the zoom scan, the distance between the measurement point at the probe sensor location (geometric center behind the probe tip) and the phantom surface is 2.0 mm and maintained at a constant distance of ±1.0 mm during a zoom scan to determine peak SAR locations. The distance is 2mm between the first measurement point and the bottom surface of the phantom.

The measurement time is 0.5 s at each point of the zoom scan. The probe boundary effect compensation shall be applied during the SAR test. Because of the tip of the probe to the Phantom surface separated distances are longer than half a tip probe diameter.

In the area scan, the separation distance is 2mm between the each measurement point and the phantom surface. The scan size shall be included the transmission portion of the EUT. The measurement time is the same as the zoom scan. At last the reference power drift shall be less than ±5%.

7.2 DESCRIPTION OF TEST CONDITION

TEST DATE	TEMPERATURE(°C)		HUMIDITY(%RH)	TESTED BY
	AIMBENT	LIQUID		
May 05, 2011	22.2	21.3	60	Morrison Huang
May 06, 2011	22.4	21.1	61	Morrison Huang
May 07, 2011	22.5	21.3	60	Morrison Huang
May 10, 2011	22.2	21.3	58	Morrison Huang
May 08, 2011	22.3	21.2	58	Morrison Huang
May 09, 2011	22.7	21.5	60	Morrison Huang
May 11, 2011	22.5	21.5	60	Morrison Huang
May 12, 2011	22.9	21.8	57	Morrison Huang
Jun 21, 2011	22.7	21.6	62	Morrison Huang
Jun 22, 2011	22.3	21.4	58	Morrison Huang
Jun 25, 2011	22.5	21.6	56	Morrison Huang

7.3 MEASURED SAR RESULTS

FOR 850 BAND

Battery (Manufacture: HT ENERGY, Rating: 3.8Vdc

HEAD POSITION						
			RIGHT		LEFT	
Communication Mode	CHAN.	FREQ. (MHz)	CHEEK	TILT	CHEEK	TILT
GSM 850	190	836.6	0.538	0.321	0.587	0.264
GPRS TS1	190	836.6	0.513	0.322	0.612	0.32
GPRS TS2	190	836.6	0.572	0.376	0.621	0.335
GSM+GPRS TS1	190	836.6	1.051	0.643	1.199	0.584
GSM+GPRS TS2	190	836.6	1.11	0.697	**1.208**	0.599

Battery (Manufacture: HT ENERGY, Rating: 3.7Vdc

HEAD POSITION						
			RIGHT		LEFT	
Communication Mode	CHAN.	FREQ. (MHz)	CHEEK	TILT	CHEEK	TILT
GSM 850	190	836.6	0.582	0.351	0.529	0.257
GPRS TS1	190	836.6	0.503	0.322	0.59	0.306
GPRS TS2	190	836.6	0.564	0.399	0.675	0.334
GSM+GPRS TS1	190	836.6	1.085	0.673	1.119	0.563
GSM+GPRS TS2	190	836.6	**1.146**	0.75	1.204	0.591

Note: Multi-slot class for DTM is 11 which support max 3 uplink slots. The SAR value of DTM (GSM+GPRS TS1 or TS2) is calculated by adding standalone GSM and GPRS directly not measured. This is allowed by “KDB# 941225-D04 SAR for GSM E GPRS Dual Xfer Mode v01”. EGPRS is not tested since the conducted power of GPRS is higher than EGPRS. This is accepted by FCC in tracking no.282288

Battery (Manufacture: HT ENERGY, Rating: 3.8Vdc

BODY POSITION							
Distance between EUT and phantom is 10mm							
Communication Mode	CHAN.	FREQ. (MHz)	Back	Front	Right Edge	Left Edge	Bottom Edge
GSM 850	190	836.6	0.743	0.381	0.336	0.447	0.159
GPRS850 TS1	190	836.6	0.758	0.401	0.344	0.394	0.158
GPRS850 TS2	128	824.2	0.665	-	-	-	-
	190	836.6	0.825	0.374	-	-	-
	251	848.8	0.869	-	-	-	-
GPRS850 TS3	190	836.6	0.702	0.379	-	-	-
GPRS850 TS4	190	836.6	0.675	0.416	-	-	-
GSM+GPRS TS1	190	836.6	Measured	0.782	0.68	0.841	0.317
GSM+GPRS TS2	190	836.6	Measured	0.755	-	-	-

Note: Multi-slot class for DTM is 11 which support max 3 uplink slots. Except back position, the SAR value for DTM at other positions is calculated by adding standalone GSM and GPRS SAR value as allowed in “KDB# 941225-D04 SAR for GSM E GPRS Dual Xfer Mode v01” . The DTM SAR value on back configurations have a calculated value higher than 75 % of SAR limit, therefore, these configurations are selected for DTM SAR measurement to get actual measurement value. EGPRS is not tested since the conducted power of GPRS is higher than EGPRS. This is accepted by FCC in tracking no.282288

Measured SAR value for DTM at back position

Communication Mode	CHAN.	FREQ. (MHz)	Back
GSM 850 (GSM + GPRS TS1)	128	824.2	0.759
	190	836.6	0.851
	251	848.8	0.855
GSM 850 (GSM + GPRS TS2)	128	824.2	0.755
	190	836.6	0.916
	251	848.8	0.956

Battery (Manufacture: HT ENERGY, Rating: 3.7Vdc

BODY POSITION							
Distance between EUT and phantom is 10mm							
Communication Mode	CHAN.	FREQ. (MHz)	Back	Front	Right Edge	Left Edge	Bottom Edge
GSM 850	128	824.2	0.749	-	-	-	-
	190	836.6	0.824	0.416	0.252	0.243	0.176
	251	848.8	0.755	-	-	-	-
GPRS850 TS1	190	836.6	0.711	0.397	0.235	0.229	0.167
GPRS850 TS2	190	836.6	0.742	0.403	-	-	-
GPRS850 TS3	128	824.2	0.814	-	-	-	-
	190	836.6	0.821	0.440	-	-	-
	251	848.8	0.890	-	-	-	-
GPRS850 TS4	190	836.6	0.780	0.447	-	-	-
GSM+GPRS TS1	190	836.6	Measured	0.813	0.487	0.472	0.343
GSM+GPRS TS2	190	836.6	Measured	0.819	-	-	-

Note: Multi-slot class for DTM is 11 which support max 3 uplink slots. Except back position, the SAR value for DTM at other positions is calculated by adding standalone GSM and GPRS SAR value as allowed in "KDB# 941225-D04 SAR for GSM E GPRS Dual Xfer Mode v01" . The DTM SAR value on back configurations have a calculated value higher than 75 % of SAR limit, therefore, these configurations are selected for DTM SAR measurement to get actual measurement value. EGPRS is not tested since the conducted power of GPRS is higher than EGPRS. This is accepted by FCC in tracking no.282288

Measured SAR value for DTM at back position

Communication Mode	CHAN.	FREQ. (MHz)	Back
GSM 850 (GSM + GPRS TS1)	128	824.2	0.690
	190	836.6	0.820
	251	848.8	0.701
GSM 850 (GSM + GPRS TS2)	128	824.2	0.757
	190	836.6	0.858
	251	848.8	0.844

FOR 1900 BAND

Battery (Manufacture: HT ENERGY, Rating: 3.8Vdc

HEAD POSITION						
			RIGHT		LEFT	
Communication Mode	CHAN.	FREQ. (MHz)	CHEEK	TILT	CHEEK	TILT
PCS1900	661	1880.0	0.493	0.290	0.486	0.357
GPRS TS1	661	1880.0	0.466	0.263	0.577	0.355
GPRS TS2	661	1880.0	0.653	0.41	0.591	0.587
PCS +GPRS TS1	661	1880.0	0.959	0.553	1.063	0.712
PCS +GPRS TS2	661	1880.0	**1.146**	0.7	1.077	0.944

Battery (Manufacture: HT ENERGY, Rating: 3.7Vdc

HEAD POSITION						
			RIGHT		LEFT	
Communication Mode	CHAN.	FREQ. (MHz)	CHEEK	TILT	CHEEK	TILT
PCS1900	661	1880.0	**0.512**	0.299	0.469	0.386
GPRS TS1	661	1880.0	0.441	0.248	0.45	0.328
GPRS TS2	661	1880.0	0.623	0.446	0.702	0.513
PCS +GPRS TS1	661	1880.0	0.953	0.547	0.919	0.714
PCS +GPRS TS2	661	1880.0	1.135	0.745	1.171	0.899

Note: Multi-slot class for DTM is 11 which support max 3 uplink slots. The SAR value of DTM (GSM+GPRS TS1 or TS2) is calculated by adding standalone GSM and GPRS directly not measured. This is allowed by “KDB# 941225-D04 SAR for GSM E GPRS Dual Xfer Mode v01”. EGPRS is not tested since the conducted power of GPRS is higher than EGPRS. This is accepted by FCC in tracking no.282288

Battery (Manufacture: HT ENERGY, Rating: 3.8Vdc

BODY POSITION							
Distance between EUT and phantom is 10mm							
Communication Mode	CHAN.	FREQ. (MHz)	Back	Front	Right Edge	Left Edge	Bottom Edge
PCS1900	661	1880.0	0.461	0.375	0.250	0.086	0.258
GPRS1900 TS1	661	1880.0	0.435	0.347	-	-	-
GPRS1900 TS2	661	1880.0	0.686	0.543	-	-	-
GPRS1900 TS3	512	1850.2	0.704	0.671	-	-	-
	661	1880.0	**1.230**	0.913	0.449	0.216	0.632
	810	1909.8	0.778	0.787	-	-	-
GPRS1900 TS4	661	1880.0	0.776	0.748	-	-	-
PCS +GPRS TS1	661	1880.0	0.896	0.722	-	-	-
PCS +GPRS TS2	661	1880.0	1.147	0.918	-	-	-

Battery (Manufacture: HT ENERGY, Rating: 3.7Vdc

BODY POSITION							
Distance between EUT and phantom is 10mm							
Communication Mode	CHAN.	FREQ. (MHz)	Back	Front	Right Edge	Left Edge	Bottom Edge
PCS1900	661	1880.0	0.442	0.422	0.181	0.102	0.330
GPRS1900 TS1	661	1880.0	0.420	0.319	-	-	-
GPRS1900 TS2	661	1880.0	0.662	0.516	-	-	-
GPRS1900 TS3	512	1850.2	0.706	-	-	-	-
	661	1880.0	1.000	0.766	0.408	0.222	0.615
	810	1909.8	0.660	-	-	-	-
GPRS1900 TS4	661	1880.0	0.550	0.734	-	-	-
PCS +GPRS TS1	661	1880.0	0.862	0.741	-	-	-
PCS +GPRS TS2	661	1880.0	1.104	0.938	-	-	-

Note: Multi-slot class for DTM is 11 which support max 3 uplink slots. The SAR value of DTM (GSM+GPRS TS1 or TS2) is calculated by adding standalone GSM and GPRS directly not measured. This is allowed by “KDB# 941225-D04 SAR for GSM E GPRS Dual Xfer Mode v01”. EGPRS is not tested since the conducted power of GPRS is higher than EGPRS. This is accepted by FCC in tracking no.282288

FOR WCDMA AWS BAND

HEAD POSITION						
			RIGHT		LEFT	
Communication Mode	CHAN.	FREQ. (MHz)	CHEEK	TILT	CHEEK	TILT
TEST MODE			Battery (Manufacture: HT ENERGY, Rating: 3.8Vdc)			
WCDMA	1412	1732.4	**0.552**	0.318	0.388	0.369
TEST MODE			Battery (Manufacture: HT ENERGY, Rating: 3.7Vdc)			
WCDMA	1513	1752.6	0.527	0.314	0.507	0.354

BODY POSITION							
Distance between EUT and phantom is 10mm							
Communication Mode	CHAN.	FREQ. (MHz)	Back	Front	Right Edge	Left Edge	Bottom Edge
TEST MODE			Battery (Manufacture: HT ENERGY, Rating: 3.8Vdc)				
WCDMA	1312	1712.4	0.690	-	-	-	-
	1412	1732.4	0.839	0.543	0.280	0.059	0.331
	1513	1752.6	0.756	-	-	-	-
TEST MODE			Battery (Manufacture: HT ENERGY, Rating: 3.7Vdc)				
WCDMA	1312	1712.4	0.795	-	-	-	-
	1412	1732.4	**0.856**	0.536	0.246	0.071	0.261
	1513	1752.6	0.790	-	-	-	-

NOTE:

1. In this testing, the limit for General Population Spatial Peak averaged over **1g, 1.6W/kg**, is applied.
2. Please see the Appendix A for the data.
3. The variation of the EUT conducted power measured before and after SAR testing should not over 5%.
4. Temperature of Liquid is 22±1°C
5. Body SAR is not required for handsets with HSDPA capabilities since the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is ≤ 75% of the SAR limit.

7.4 POWER DRIFT TABLE

FOR 850 BAND (5/5~5/7)

Test Mode	Configuration	Test Position	Communication Mode	Test Channel	Test Frequency (MHz)	Power (dBm)		Power Drift (%)
						Begin	After	
1	HT ENERGY Battery (3.8Vdc), without headset	Right Head Cheek	GSM850	190	836.6	33.92	33.80	-2.73
2		Right Head Tilt				33.92	33.79	-2.95
3		Left Head Cheek				33.92	33.78	-3.17
4		Left Head Tilt				33.92	33.77	-3.39
5	HT ENERGY Battery (3.7Vdc), without headset	Right Head Cheek	GSM850	190	836.6	33.92	33.76	-3.62
6		Right Head Tilt				33.92	33.75	-3.84
7		Left Head Cheek				33.92	33.74	-4.06
8		Left Head Tilt				33.92	33.73	-4.28
9	HT ENERGY Battery (3.8Vdc), with headset	Back 10mm	GSM850	190	836.6	33.92	33.81	-2.50
10	HT ENERGY Battery (3.8Vdc), with headset	Back 10mm	GPRS850 TS1	190	836.6	33.16	33.04	-2.73
11	HT ENERGY Battery (3.8Vdc), with headset	Back 10mm	GPRS850 TS2	128	824.2	32.02	31.89	-2.95
				190	836.6	32.11	31.97	-3.17
				251	848.8	32.36	32.21	-3.39
12	HT ENERGY Battery (3.8Vdc), with headset	Back 10mm	GPRS850 TS3	190	836.6	30.49	30.33	-3.62
13			GPRS850 TS4			29.09	28.92	-3.84
14	HT ENERGY Battery (3.7Vdc), with headset	Back 10mm	GSM850	128	824.2	33.52	33.50	-0.46
				190	836.6	33.92	33.89	-0.69
				251	848.8	33.88	33.84	-0.92

Test Mode	Configuration	Test Position	Communication Mode	Test Channel	Test Frequency (MHz)	Power (dBm)		Power Drift (%)
						Begin	After	
15	HT ENERGY Battery (3.7Vdc), with headset	Back 10mm	GPRS850 TS1	190	836.6	33.16	33.11	-1.14
16			GPRS850 TS2			32.11	32.05	-1.37
17	HT ENERGY Battery (3.7Vdc), with headset	Back 10mm	GPRS850 TS3	128	824.2	30.57	30.50	-1.60
				190	836.6	30.49	30.41	-1.83
				251	848.8	30.82	30.73	-2.05
18	HT ENERGY Battery (3.7Vdc), with headset	Back 10mm	GPRS850 TS4	190	836.6	29.09	28.99	-2.28
19	HT ENERGY Battery (3.8Vdc), with headset	Front 10mm	GSM850	190	836.6	33.92	33.88	-0.92
20	HT ENERGY Battery (3.8Vdc), with headset	Front 10mm	GPRS850 TS1	190	836.6	33.16	33.11	-1.14
21			GPRS850 TS2			32.11	32.05	-1.37
22			GPRS850 TS3			30.49	30.42	-1.60
23			GPRS850 TS4			29.09	29.01	-1.83
24	HT ENERGY Battery (3.7Vdc), with headset	Front 10mm	GSM850	190	836.6	33.92	33.79	-2.95
25	HT ENERGY Battery (3.7Vdc), with headset	Front 10mm	GPRS850 TS1	190	836.6	33.16	33.02	-3.17
26			GPRS850 TS2			32.11	31.96	-3.39
27			GPRS850 TS3			30.49	30.33	-3.62
28			GPRS850 TS4			29.09	28.92	-3.84
29	HT ENERGY Battery (3.8Vdc), with headset	Right edge 10mm	GSM850	190	836.6	33.92	33.88	-0.92
30			GPRS850 TS1			33.16	33.11	-1.14
31	HT ENERGY Battery (3.8Vdc), with headset	Right edge 10mm	GSM850	190	836.6	33.92	33.86	-1.37
32			GPRS850 TS1			33.16	33.09	-1.60
33	HT ENERGY Battery (3.8Vdc), with headset	Left edge 10mm	GSM850	190	836.6	33.92	33.82	-2.28
34			GPRS850 TS1			33.16	33.05	-2.50
35	HT ENERGY Battery (3.8Vdc), with headset	Left edge 10mm	GSM850	190	836.6	33.92	33.80	-2.73
36			GPRS850 TS1			33.16	33.03	-2.95
37	HT ENERGY Battery (3.8Vdc), with headset	Bottom edge 10mm	GSM850	190	836.6	33.92	33.76	-3.62
38			GPRS850 TS1			33.16	32.99	-3.84
39	HT ENERGY Battery (3.8Vdc), with headset	Bottom edge 10mm	GSM850	190	836.6	33.92	33.74	-4.06
40			GPRS850 TS1			33.16	32.97	-4.28

FOR 1900 BAND (5/9~5/12)

Test Mode	Configuration	Test Position	Communication Mode	Test Channel	Test Frequency (MHz)	Power (dBm)		Power Drift (%)
						Begin	After	
41	HT ENERGY Battery (3.8Vdc), without headset	Right Head Cheek	PCS1900	661	1880.0	30.31	30.27	-0.92
42		Right Head Tilt				30.31	30.26	-1.14
43		Left Head Cheek				30.31	30.25	-1.37
44		Left Head Tilt				30.31	30.24	-1.60
45	HT ENERGY Battery (3.7Vdc), without headset	Right Head Cheek	PCS1900	661	1880.0	30.31	30.23	-1.83
46		Right Head Tilt				30.31	30.22	-2.05
47		Left Head Cheek				30.31	30.21	-2.28
48		Left Head Tilt				30.31	30.20	-2.50
49	HT ENERGY Battery (3.8Vdc), with headset	Back 10mm	PCS1900	661	1880.0	30.31	30.24	-1.60
50	HT ENERGY Battery (3.8Vdc), with headset	Back 10mm	GPRS1900 TS1	661	1880.0	30.21	30.13	-1.83
51		Back 10mm	GPRS1900 TS2			29.79	29.70	-2.05
52	HT ENERGY Battery (3.8Vdc), with headset	Back 10mm	GPRS1900 TS3	512	1850.2	28.62	28.52	-2.28
				661	1880.0	30.28	30.17	-2.50
				810	1909.8	28.92	28.80	-2.73
53	HT ENERGY Battery (3.8Vdc), with headset	Back 10mm	GPRS1900 TS4	661	1880.0	27.98	27.85	-2.95
54	HT ENERGY Battery (3.7Vdc), with headset	Back 10mm	PCS1900	661	1880.0	30.31	30.13	-4.06

Test Mode	Configuration	Test Position	Communication Mode	Test Channel	Test Frequency (MHz)	Power (dBm)		Power Drift (%)
						Begin	After	
55	HT ENERGY Battery (3.7Vdc), with headset	Back 10mm	GPRS1900 TS1	661	1880.0	30.21	30.02	-4.28
56			GPRS1900 TS2			29.79	29.59	-4.50
57	HT ENERGY Battery (3.7Vdc), with headset	Back 10mm	GPRS1900 TS3	512	1850.2	28.62	28.61	-0.23
				661	1880.0	30.28	30.26	-0.46
				810	1909.8	28.92	28.89	-0.69
58	HT ENERGY Battery (3.7Vdc), with headset	Back 10mm	GPRS1900 TS4	661	1880.0	27.98	27.94	-0.92
59	HT ENERGY Battery (3.8Vdc), with headset	Front 10mm	PCS1900	661	1880.0	30.31	30.13	-4.06
60	HT ENERGY Battery (3.8Vdc), with headset	Front 10mm	GPRS1900 TS1	661	1880.0	30.21	30.02	-4.28
61			GPRS1900 TS2			29.79	29.59	-4.50
62	HT ENERGY Battery (3.8Vdc), with headset	Front 10mm	GPRS1900 TS3	512	1850.2	28.62	28.61	-0.23
				661	1880.0	30.28	30.26	-0.46
				810	1909.8	28.92	28.89	-0.69
63	HT ENERGY Battery (3.8Vdc), with headset	Front 10mm	GPRS1900 TS4	661	1880.0	27.98	27.94	-0.92

Test Mode	Configuration	Test Position	Communication Mode	Test Channel	Test Frequency (MHz)	Power (dBm)		Power Drift (%)
						Begin	After	
64	HT ENERGY Battery (3.7Vdc), with headset	Front 10mm	PCS1900	661	1880.0	30.31	30.22	-2.05
65	HT ENERGY Battery (3.7Vdc), with headset	Front 10mm	GPRS1900 TS1	661	1880.0	30.21	30.11	-2.28
66			GPRS1900 TS2			29.79	29.68	-2.50
67			GPRS1900 TS3			30.28	30.16	-2.73
68			GPRS1900 TS4			27.98	27.85	-2.95
69	HT ENERGY Battery (3.8Vdc), with headset	Right edge 10mm	PCS1900	661	1880.0	30.31	30.11	-4.50
70			GPRS1900 TS3			30.28	30.27	-0.23
71	HT ENERGY Battery (3.8Vdc), with headset	Right edge 10mm	PCS1900	661	1880.0	30.31	30.29	-0.46
72			GPRS1900 TS3			30.28	30.25	-0.69
73	HT ENERGY Battery (3.8Vdc), with headset	Left edge 10mm	PCS1900	661	1880.0	30.31	30.25	-1.37
74			GPRS1900 TS3			30.28	30.21	-1.60
75	HT ENERGY Battery (3.8Vdc), with headset	Left edge 10mm	PCS1900	661	1880.0	30.31	30.23	-1.83
76			GPRS1900 TS3			30.28	30.19	-2.05
77	HT ENERGY Battery (3.8Vdc), with headset	Bottom edge 10mm	PCS1900	661	1880.0	30.31	30.19	-2.73
78			GPRS1900 TS3			30.28	30.15	-2.95
79	HT ENERGY Battery (3.8Vdc), with headset	Bottom edge 10mm	PCS1900	661	1880.0	30.31	30.17	-3.17
80			GPRS1900 TS3			30.28	30.13	-3.39

FOR WCDMA AWS BAND

Test Mode	Configuration	Test Position	Communication Mode	Test Channel	Test Frequency (MHz)	Power (dBm)		Power Drift (%)
						Begin	After	
1	HT ENERGY Battery (3.8Vdc), without headset	Right Head Cheek	WCDMA	1412	1732.4	23.44	23.36	-1.83
2		Right Head Tilt				23.44	23.35	-2.05
3		Left Head Cheek				23.44	23.34	-2.28
4		Left Head Tilt				23.44	23.33	-2.50
5	HT ENERGY Battery (3.7Vdc), without headset	Right Head Cheek	WCDMA	1412	1732.4	23.44	23.32	-2.73
6		Right Head Tilt				23.44	23.31	-2.95
7		Left Head Cheek				23.44	23.30	-3.17
8		Left Head Tilt				23.44	23.29	-3.39
9	HT ENERGY Battery (3.8Vdc), with headset	Back 10mm	WCDMA	1312	1712.4	23.26	23.07	-4.28
				1412	1732.4	23.44	23.24	-4.50
				1513	1752.6	23.22	23.21	-0.23
10	HT ENERGY Battery (3.7Vdc), with headset	Back 10mm	WCDMA	1312	1712.4	23.26	23.24	-0.46
				1412	1732.4	23.44	23.41	-0.69
				1513	1752.6	23.22	23.18	-0.92
11	HT ENERGY Battery (3.8Vdc), with headset	Front 10mm	WCDMA	1412	1732.4	23.44	23.38	-1.37
12	HT ENERGY Battery (3.7Vdc), with headset	Front 10mm	WCDMA	1412	1732.4	23.44	23.37	-1.60
13	HT ENERGY Battery (3.8Vdc), with headset	Right edge 10mm	WCDMA	1412	1732.4	23.44	23.35	-2.05
14	HT ENERGY Battery (3.7Vdc), with headset		WCDMA	1412	1732.4	23.44	23.34	-2.28
15	HT ENERGY Battery (3.8Vdc), with headset	Left edge 10mm	WCDMA	1412	1732.4	23.44	23.32	-2.73
16	HT ENERGY Battery (3.7Vdc), with headset		WCDMA	1412	1732.4	23.44	23.31	-2.95
17	HT ENERGY Battery (3.8Vdc), with headset	Bottom edge 10mm	WCDMA	1412	1732.4	23.44	23.29	-3.39
18	HT ENERGY Battery (3.7Vdc), with headset		WCDMA	1412	1732.4	23.44	23.28	-3.62

FOR 850 BAND (6/22) and 1900 BAND (6/21)

Test Mode	Configuration	Test Position	Communication Mode	Test Channel	Test Frequency (MHz)	Power (dBm)		Power Drift (%)
						Begin	After	
1	HT ENERGY Battery (3.8Vdc), without headset	Right Head Cheek	GPRS 850 TS1	190	836.6	33.16	33.04	-2.73
2		Right Head Tilt				33.16	33.03	-2.95
3		Left Head Cheek				33.16	33.02	-3.17
4		Left Head Tilt				33.16	33.01	-3.39
5	HT ENERGY Battery (3.8Vdc), without headset	Right Head Cheek	GPRS 850 TS2	190	836.6	32.11	31.95	-3.62
6		Right Head Tilt				32.11	31.94	-3.84
7		Left Head Cheek				32.11	31.93	-4.06
8		Left Head Tilt				32.11	31.92	-4.28
9	HT ENERGY Battery (3.7Vdc), without headset	Right Head Cheek	GPRS 850 TS1	190	836.6	33.16	33.05	-2.50
10		Right Head Tilt				33.16	33.04	-2.73
11		Left Head Cheek				33.16	33.03	-2.95
12		Left Head Tilt				33.16	33.02	-3.17
13	HT ENERGY Battery (3.7Vdc), without headset	Right Head Cheek	GPRS 850 TS2	190	836.6	32.11	31.96	-3.39
14		Right Head Tilt				32.11	31.95	-3.62
15		Left Head Cheek				32.11	31.94	-3.84
16		Left Head Tilt				32.11	31.93	-4.06
17	HT ENERGY Battery (3.8Vdc), without headset	Right Head Cheek	GPRS 1900 TS1	661	1880	30.21	30.02	-4.28
18		Right Head Tilt				30.21	30.01	-4.50
19		Left Head Cheek				30.21	30.20	-0.23
20		Left Head Tilt				30.21	30.19	-0.46
21	HT ENERGY Battery (3.8Vdc), without headset	Right Head Cheek	GPRS 1900 TS2	661	1880	29.79	29.76	-0.69
22		Right Head Tilt				29.79	29.75	-0.92
23		Left Head Cheek				29.79	29.74	-1.14
24		Left Head Tilt				29.79	29.73	-1.37
25	HT ENERGY Battery (3.7Vdc), without headset	Right Head Cheek	GPRS 1900 TS1	661	1880	30.21	30.14	-1.60
26		Right Head Tilt				30.21	30.13	-1.83
27		Left Head Cheek				30.21	30.12	-2.05
28		Left Head Tilt				30.21	30.11	-2.28
29	HT ENERGY Battery (3.7Vdc), without headset	Right Head Cheek	GPRS 1900 TS2	661	1880	29.79	29.68	-2.50
30		Right Head Tilt				29.79	29.67	-2.73
31		Left Head Cheek				29.79	29.66	-2.95
32		Left Head Tilt				29.79	29.65	-3.17

FOR 850 BAND (6/25)

Test Mode	Configuration	Test Position	Communication Mode	Test Channel	Test Frequency (MHz)	Power (dBm)		Power Drift (%)
						Begin	After	
1	HT ENERGY Battery (3.8Vdc), with headset	Back 10mm	GSM850 (GSM + GPRS TS1)	128	824.2	31.97	31.85	-2.73
				190	836.6	32.02	31.85	-3.84
				251	848.8	32.17	32.01	-3.62
2	HT ENERGY Battery (3.8Vdc), with headset	Back 10mm	GSM850 (GSM + GPRS TS2)	128	824.2	30.42	30.22	-4.50
				190	836.6	30.35	30.15	-4.50
				251	848.8	30.65	30.45	-4.50
3	HT ENERGY Battery (3.7Vdc), with headset	Back 10mm	GSM850 (GSM + GPRS TS1)	128	824.2	31.97	31.85	-2.73
				190	836.6	32.02	31.92	-2.28
				251	848.8	32.17	32.05	-2.73
4	HT ENERGY Battery (3.7Vdc), with headset	Back 10mm	GSM850 (GSM + GPRS TS2)	128	824.2	30.42	30.25	-3.84
				190	836.6	30.35	30.17	-4.06
				251	848.8	30.65	30.48	-3.84

7.5 NO SIMULTANEOUS SAR JUSTIFICATION

The device has mobile (GSM / WCDMA), Wi-Fi and Bluetooth function.
850 and 1900MHz band can not be used at the same time. GSM and WCDMA can not transmit simultaneously. Wi-Fi and Bluetooth use same antenna but both functions will not active in the same time since time-sharing technology is used

SAR evaluation for Transmitter

Since the output power > 60/f(GHz), SAR is necessary for mobile and Wi-Fi function
The max output power of Bluetooth is 1.4mW < 24 mW (2.P_{Ref}) and antenna separation between mobile and Bluetooth is 10.15 cm > 5 cm. Therefore, SAR evaluation is not necessary.
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Hot spot function

DTM is supported for the device. Hot spot function supports simultaneous transmission mode as below

Configuration	GSM voice	GSM data	WCDMA	WIFI	BT
1	X	O	X	O	O
2	O	O	X	O	O
3	X	X	O	O	O

Antenna separation distance (cm)

	Mobile	Wi-Fi	Bluetooth
Mobile		10.15	10.15
Wi-Fi	10.15		0
Bluetooth	10.15	0	

Note: Wi-Fi and Bluetooth use same antenna but can not work at the same time.

Sum of max SAR value for simultaneous transmission (Unit: W/kg)

Head position

Battery	Frequency band (MHz)	Test configuration		GSM+GPRS	Wi-Fi	Sum of MAX SAR value of each band
3.8Vdc	850	Right	Cheek	1.110	0.446	1.556
		Right	Tilt	0.697	0.336	1.033
		Left	Cheek	1.208	0.390	1.598
		Left	Tilt	0.599	0.291	0.890
3.8Vdc	1900	Right	Cheek	1.146	0.446	1.592
		Right	Tilt	0.700	0.336	1.036
		Left	Cheek	1.077	0.390	1.467
		Left	Tilt	0.944	0.291	1.235
3.7Vdc	850	Right	Cheek	1.146	0.446	1.592
		Right	Tilt	0.750	0.321	1.071
		Left	Cheek	1.204	0.349	1.553
		Left	Tilt	0.591	0.301	0.892
3.7Vdc	1900	Right	Cheek	1.135	0.446	1.581
		Right	Tilt	0.745	0.321	1.066
		Left	Cheek	1.171	0.349	1.520
		Left	Tilt	0.899	0.301	1.200

Battery	Frequency band (MHz)	Test configuration		WCDMA	Wi-Fi	Sum of MAX SAR value of each band
3.8Vdc	1700	Right	Cheek	0.552	0.446	0.998
		Right	Tilt	0.318	0.336	0.654
		Left	Cheek	0.388	0.39	0.778
		Left	Tilt	0.369	0.291	0.66
3.7Vdc	1700	Right	Cheek	0.527	0.446	0.973
		Right	Tilt	0.314	0.321	0.635
		Left	Cheek	0.507	0.349	0.856
		Left	Tilt	0.354	0.301	0.655

Sum of max SAR value for all test configurations is < 1.6 W/kg, simultaneous transmission SAR is not required for head position

Body position

Battery	Frequency band (MHz)	Test side	GSM	Wi-Fi	Sum of MAX SAR value of each band
3.8Vdc	850	Back	0.956	0.199	1.155
	1900		1.147	0.199	1.346
3.7Vdc	850		0.858	0.222	1.080
	1900		1.104	0.222	1.326

Battery	Frequency band (MHz)	Test side	WCDMA	Wi-Fi	Sum of MAX SAR value of each band
3.8Vdc	1700	Back	0.839	0.199	1.038
3.7Vdc	1700		0.856	0.222	1.078

Sum of max SAR value for all test configurations is < 1.6 W/kg, simultaneous transmission SAR is not required for body position

Conclusion

Distance between simultaneous transmitting antennas is > 5cm and max sum of SAR value is <1.6 W / kg. Accordingly, simultaneous Transmission SAR is not required for this device.

7.6 SAR LIMITS

HUMAN EXPOSURE	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / controlled Exposure Environment)
Spatial Average (whole body)	0.08	0.4
Spatial Peak (averaged over 1 g)	**1.6**	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

NOTE: This limits accord to 47 CFR 2.1093 – Safety Limit.

8. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5.phtml. If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.