



# Variant FCC SAR Test Report

**APPLICANT** : HTC Corporation  
**EQUIPMENT** : Smartphone  
**MODEL NAME** : PG05100  
**FCC ID** : NM8PG05100  
**STANDARD** : FCC 47 CFR Part 2 (2.1093)  
IEEE C95.1-1991  
IEEE 1528-2003  
FCC OET Bulletin 65 Supplement C (Edition 01-01)

This is a variant report which is only valid together with the original test report. The product was received on Dec. 30, 2010 and completely tested on Mar. 04, 2011. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:

Roy Wu / Manager



## **SPORTON INTERNATIONAL INC.**

No. 52, Hwa Ya 1<sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

SPORTON INTERNATIONAL INC.

TEL : 886-3-327-3456

FAX : 886-3-328-4978

FCC ID : NM8PG05100

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1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **HTC Corporation Smartphone PG05100** are as follows (with expanded uncertainty 21.4 % for 300 MHz to 3 GHz).

<Phone + Extend Battery + Extend Battery Cover>

Band		Position	SAR <sub>1g</sub> (W/kg)
Ant-1 (1xRTT)	CDMA2000 BC0	Head	0.409
		Body (1 cm Gap)	0.48
	CDMA2000 BC1	Head	0.949
		Body (1 cm Gap)	1.42
Ant-2 (EVDO / LTE)	CDMA2000 BC0	Head	0.274
		Body (1 cm Gap)	0.363
	CDMA2000 BC1	Head	1.18
		Body (1 cm Gap)	0.349
	LTE Band 13	Head	0.153
		Body (1 cm Gap)	0.285

<Phone + Wireless Charging Cover>

Band		Position	SAR <sub>1g</sub> (W/kg)
Ant-1 (1xRTT)	CDMA2000 BC0	Head	0.421
		Body (1 cm Gap)	0.544
	CDMA2000 BC1	Head	0.893
		Body (1 cm Gap)	1.3
Ant-2 (EVDO / LTE)	CDMA2000 BC0	Head	0.224
		Body (1 cm Gap)	0.271
	CDMA2000 BC1	Head	1.17
		Body (1 cm Gap)	0.471
	LTE Band 13	Head	0.099
		Body (1 cm Gap)	0.15

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1991, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2003 and FCC OET Bulletin 65 Supplement C (Edition 01-01).



## 2. Administration Data

### 2.1 Testing Laboratory

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1 <sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978

### 2.2 Applicant

Company Name	HTC Corporation
Address	No. 23, Xinghua Rd., Taoyuan City, Taiwan

### 2.3 Manufacturer

Company Name	HTC Corporation
Address	No. 23, Xinghua Rd., Taoyuan City, Taiwan

### 2.4 Application Details

Date of Receipt of Application	Dec. 30, 2010
Date of Start during the Test	Jan. 28, 2011
Date of End during the Test	Mar. 04, 2011



### 3. General Information

#### 3.1 Description of Device Under Test (DUT)

Product Feature & Specification	
DUT Type	Smartphone
Model Name	PG05100
FCC ID	NM8PG05100
Sample 1	EUT with LCM1, Camera1, Filter1 ,and PA1
Sample 2	EUT with LCM2, Camera2, Filter2 ,and PA2
Tx Frequency	CDMA2000 BC0 : 824 MHz ~ 849 MHz CDMA2000 BC1 : 1850 MHz ~ 1910 MHz LTE Band 13 : 777 MHz ~ 787 MHz
Rx Frequency	CDMA2000 BC0 : 869 MHz ~ 894 MHz CDMA2000 BC1 : 1930 MHz ~ 1990 MHz LTE Band 13 : 746 MHz ~ 756 MHz
LTE Bandwidth	10MHz
Maximum Output Power to Antenna	<Sample 1> CDMA2000 BC0 : 23.96 dBm CDMA2000 BC1 : 24.00 dBm LTE Band 13 : 23.00 dBm <Sample 2> CDMA2000 BC0 : 23.96 dBm CDMA2000 BC1 : 24.00 dBm LTE Band 13 : 23.00 dBm
Antenna Type	Fixed Internal Antenna
Type of Modulation	CDMA2000 : QPSK LTE : QPSK, 16QAM (Uplink)
DUT Stage	Production Unit

**Remark:** The above DUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.



### 3.2 Applied Standards

The Specific Absorption Rate (SAR) testing specification, method and procedure for this device is in accordance with the following standards:

- FCC 47 CFR Part 2 (2.1093)
- IEEE C95.1-1991
- IEEE 1528-2003
- FCC OET Bulletin 65 Supplement C (Edition 01-01)
- FCC KDB 648474 D01 v01r05
- FCC KDB 941225 D01 v02

### 3.3 Device Category and SAR Limits

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

### 3.4 Test Conditions

#### 3.4.1 **Ambient Condition**

Ambient Temperature	20 to 24 °C
Humidity	< 60 %

#### 3.4.2 **Test Configuration**

The EUT is a dual transmitter Simultaneous Voice and Data device that contains two independent WWAN transmitters with the capabilities listed in Table 3.1. The first transmitter supports a CDMA2000 1x call (e.g. voice, SMS) and the second transmitter supports a CDMA2000 EVDO or LTE data call. A simultaneous CDMA 1x voice and CDMA EVDO data connection is referred to as “SVDO” while a simultaneous CDMA 1x voice and LTE data connection is referred to as “SVLTE”. The transmitters are independent in respect to the RF chains as each transmitter has dedicated RF circuitry (PA, RF filtering) and a unique transmit antenna. The device also contains an additional antenna associated with receiver diversity or unlicensed transmitters. The LTE UL MIMO configuration is 1x2 (1 UL antenna and 2 DL RX antennas).

Although the RF circuits are independent for both transmitters, the chipset solution incorporated SVDO/SVLTE implementation does include electrical connections between the voice and data transmitters such that the device can coordinate the transmit power of both transmitters. That said, the transmitters operate independently in the sense that they independently support voice or data connection without interaction between the modems or signaling from the WWAN network.



**Table 3.1 EUT Technology Support**

Mode	WWAN Technology	Supported Frequency Band(s) (MHz)	Channel BW (MHz)
Voice	CDMA2000 1x	Band Class 0: 824-848 Band Class I: 1850-1910	1.23 MHz 1.25 MHz
Data	CDMA2000 1xEvDO RevA	Band Class 0: 824-848 Band Class I: 1850-1910	1.23 MHz 1.25 MHz
Data	LTE	Band 13 (Upper 700 MHz): 777-787	Max of 10 MHz
Data	802.11b/g/n	2.45 GHz	40 MHz max

**Table 3.2 Definition of Antennas**

Antenna	Antenna Use	Technologies	TX Bands
1	Voice 1x TX/ RX+ DO/LTE diversity (RX only)	1x TX/RX	850/1900
2	DO/LTE Data TX/RX	DO + LTE	850/1900/700
3	WLAN/BT	802.11 + Bluetooth	2400 MHz

Confirming the LTE transmitter follows 3GPP standards, is category 3, 10MHz, Band 13, and supports QPSK / 16QAM modulations. Tested per 3GPP 36.521 maximum transmit procedures for both QPSK / 16QAM.

**Table 3.3 Simultaneous Transmission Possibilities**

Simultaneous TX Combination	Configuration
1	CDMA850 Voice + DO850 Data + WLAN/BT
2	CDMA850 Voice + DO1900 Data + WLAN/BT
3	CDMA850 Voice + LTE700 Data + WLAN/BT
4	CDMA1900 Voice + DO850 Data + WLAN/BT
5	CDMA1900 Voice + DO1900 Data + WLAN/BT
6	CDMA1900 Voice + LTE700 Data + WLAN/BT
7	CDMA850 Voice + DO850 Data
8	CDMA850 Voice + DO1900 Data
9	CDMA850 Voice + LTE700 Data
10	CDMA1900 Voice + DO850 Data
11	CDMA1900 Voice + DO1900 Data
12	CDMA1900 Voice + LTE700 Data
13	CDMA850 Voice + WLAN/BT
14	CDMA1900 Voice + WLAN/BT
15	DO850 Data + WLAN/BT
16	DO1900 Data + WLAN/BT
17	LTE700 Data + WLAN/BT





**SVDO/SVLTE Power Reduction**

All standalone SAR was tested at individual mode maximum transmit power level. Simultaneous SAR of CDMA 1x 1900 + EV DO 850, and CDMA 1x 1900 + LTE was also tested at maximum individual mode transmit power level. Simultaneous SAR for CDMA 1x 1900 + EV DO 1900 was tested using SVDO power reduction. Additional simultaneous SAR configuration information is described in Note 2 of Table 11.7

The device also implements maximum power reduction per 3GPP 36.101 requirements where the MPR target is 1 dB for RB allocations > 12. Measured test results demonstrate the expected MPR variation for the product. Additional information is included in the technical description document. LTE MPR cannot be disabled by the end user or LTE network.

**Table 3.4 Power Reduction Settings**

Mode	Voice Average Power 1x 850 MHz (dBm)	Maximum DO850 MHz Average Power (dBm)
SVDO	P < 15	23
	P ≥ 15	18
Mode	Voice Average Power 1x 850 MHz (dBm)	Maximum DO1900 MHz Average Power (dBm)
SVDO	P < 15	23
	P ≥ 15	18
Mode	Voice Average Power 1x 1900 MHz (dBm)	Maximum DO850 MHz Average Power (dBm)
SVDO	P < 15	23
	P ≥ 15	18
Mode	Voice Average Power 1x 1900 MHz (dBm)	Maximum DO1900 MHz Average Power (dBm)
SVDO	P < 15	23
	P ≥ 15	18
Mode	Voice Average Power 1x850 MHz (dBm)	Maximum LTE700 MHz Average Power (dBm)
SVLTE	P < 18	23
	P ≥ 18	19
Mode	Voice Average Power 1x 1900 MHz (dBm)	Maximum LTE700 MHz Average Power (dBm)
SVLTE	P < 18	23
	P ≥ 18	19

**Note:** Please see the technical description for additional details on the power reduction.

A-MPR was disabled by setting NS=01 on the R&S CMW500.



The WLAN and BT cannot transmit simultaneously, so there is no co-location test requirement for WLAN and BT.

According to KDB 648474, the BT standalone SAR was not required, because the output power of Bluetooth (4.97 dBm) is less than  $P_{Ref}$  (10.8 dBm).

The device was controlled by using a base station emulator. Communication between the device and the emulator was established by air link. The distance between the DUT and the antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller than the output power of DUT. The DUT was set from the emulator to radiate maximum output power during all tests.

For WWAN SAR testing, the DUT is in CDMA2000 or LTE link mode, and the crest factor is 1.

This device supports WiFi hotspot function, so body SAR was tested under 1 cm for the surfaces/slide edges where a transmitting antenna is within 2.5 cm from the edge.

## **4. Specific Absorption Rate (SAR)**

### **4.1 Introduction**

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

### **4.2 SAR Definition**

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density ( $\rho$ ). The equation description is as below:

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

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

SAR measurement can be either related to the temperature elevation in tissue by

$$\text{SAR} = C \left( \frac{\delta T}{\delta t} \right)$$

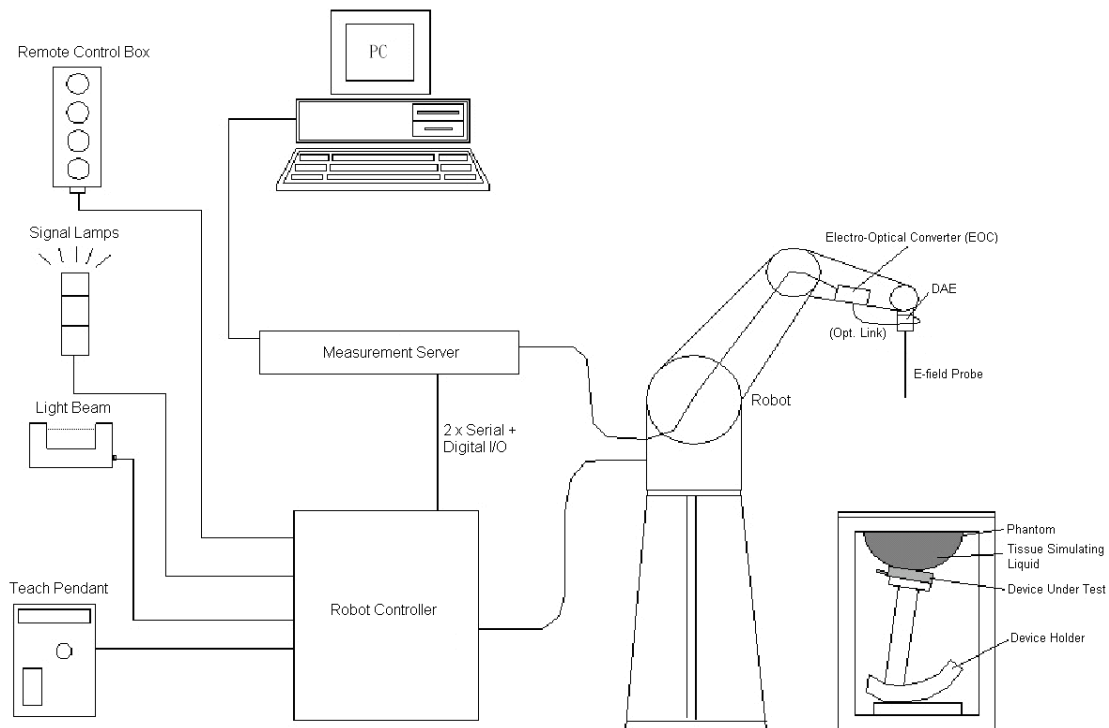
Where: C is the specific heat capacity,  $\delta T$  is the temperature rise and  $\delta t$  is the exposure duration, or related to the electrical field in the tissue by

$$\text{SAR} = \frac{\sigma |E|^2}{\rho}$$

Where:  $\sigma$  is the conductivity of the tissue,  $\rho$  is the mass density of the tissue and E is the RMS electrical field strength.

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

## 5. SAR Measurement System



**Fig 5.1 SPEAG DASY4 or DASY5 System Configurations**

The DASY4 or DASY5 system for performance compliance tests is illustrated above graphically. This system consists of the following items:

- A standard high precision 6-axis robot with controller, a teach pendant and software
- A data acquisition electronic (DAE) attached to the robot arm extension
- A dosimetric probe equipped with an optical surface detector system
- The electro-optical converter (ECO) performs the conversion between optical and electrical signals
- A measurement server performs the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the accuracy of the probe positioning
- A computer operating Windows XP
- DASY4 or DASY5 software
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom
- A device holder
- Tissue simulating liquid
- Dipole for evaluating the proper functioning of the system

Some of the components are described in details in the following sub-sections.

### 5.1 E-Field Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by SPEAG). The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. This probe has a built in optical surface detection system to prevent from collision with phantom.

#### 5.1.1 E-Field Probe Specification

##### <ET3DV6>

<b>Construction</b>	Symmetrical design with triangular core Built-in optical fiber for surface detection system. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
<b>Frequency</b>	10 MHz to 3 GHz; Linearity: $\pm 0.2$ dB
<b>Directivity</b>	$\pm 0.2$ dB in HSL (rotation around probe axis) $\pm 0.4$ dB in HSL (rotation normal to probe axis)
<b>Dynamic Range</b>	5 $\mu$ W/g to 100 mW/g; Linearity: $\pm 0.2$ dB
<b>Dimensions</b>	Overall length: 330 mm (Tip: 16 mm) Tip diameter: 6.8 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.7 mm

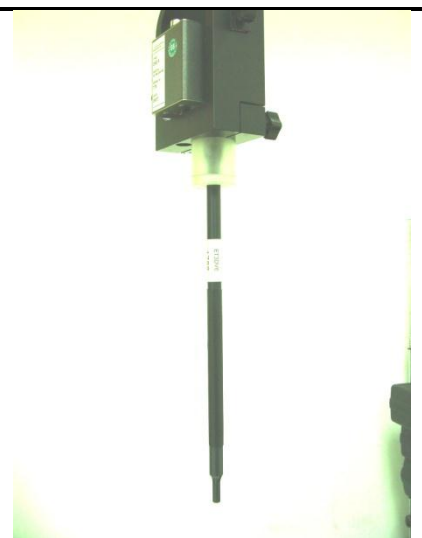


Fig 5.2 Photo of ET3DV6

##### <EX3DV4 Probe>

<b>Construction</b>	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
<b>Frequency</b>	10 MHz to 6 GHz; Linearity: $\pm 0.2$ dB
<b>Directivity</b>	$\pm 0.3$ dB in HSL (rotation around probe axis) $\pm 0.5$ dB in tissue material (rotation normal to probe axis)
<b>Dynamic Range</b>	10 $\mu$ W/g to 100 mW/g; Linearity: $\pm 0.2$ dB (noise: typically $< 1$ $\mu$ W/g)
<b>Dimensions</b>	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



Fig 5.3 Photo of EX3DV4

### 5.1.2 E-Field Probe Calibration

Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than  $\pm 10\%$ . The spherical isotropy shall be evaluated and within  $\pm 0.25$  dB. The sensitivity parameters (NormX, NormY, and NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested. The calibration data can be referred to appendix C of this report.

### 5.2 Data Acquisition Electronics (DAE)

The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the 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 input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

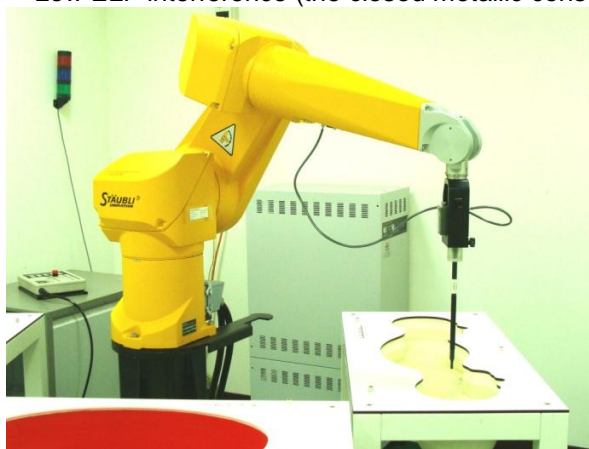


**Fig 5.4 Photo of DAE**

### 5.3 Robot

The SPEAG DASY system uses the high precision robots (DASY4: RX90BL; DASY5: TX90XL) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY4: CS7MB; DASY5: CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability  $\pm 0.035$  mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)



**Fig 5.5 Photo of DASY4**



**Fig 5.6 Photo of DASY5**

### **5.4 Measurement Server**

The measurement server is based on a PC/104 CPU board with CPU (DASY4: 166 MHz, Intel Pentium; DASY5: 400 MHz, Intel Celeron), chipdisk (DASY4: 32 MB; DASY5: 128 MB), RAM (DASY4: 64 MB, DASY5: 128 MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all the real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operations.



**Fig 5.7 Photo of Server for DASY4**




**Fig 5.8 Photo of Server for DASY5**



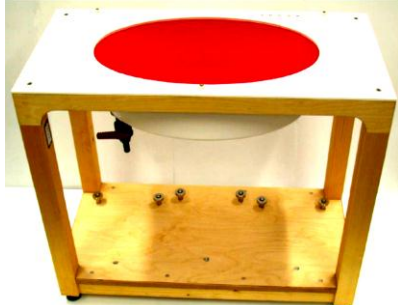
**5.5 Phantom**

**<SAM Twin Phantom>**

<b>Shell Thickness</b>	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm	 <p><b>Fig 5.9 Photo of SAM Phantom</b></p>
<b>Filling Volume</b>	Approx. 25 liters	
<b>Dimensions</b>	Length: 1000 mm; Width: 500 mm; Height: adjustable feet	
<b>Measurement Areas</b>	Left Hand, Right Hand, Flat Phantom	

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

**<ELI4 Phantom>**

<b>Shell Thickness</b>	2 ± 0.2 mm (sagging: <1%)	 <p><b>Fig 5.10 Photo of ELI4 Phantom</b></p>
<b>Filling Volume</b>	Approx. 30 liters	
<b>Dimensions</b>	Major ellipse axis: 600 mm Minor axis: 400 mm	

The ELI4 phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.



## 5.6 Device Holder

### <Device Holder for SAM Twin Phantom>

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of  $\pm 0.5$  mm would produce a SAR uncertainty of  $\pm 20$  %. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

The DASY device holder 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 center for both scales is the ear reference point (EPR). Thus the device needs no repositioning when changing the angles.

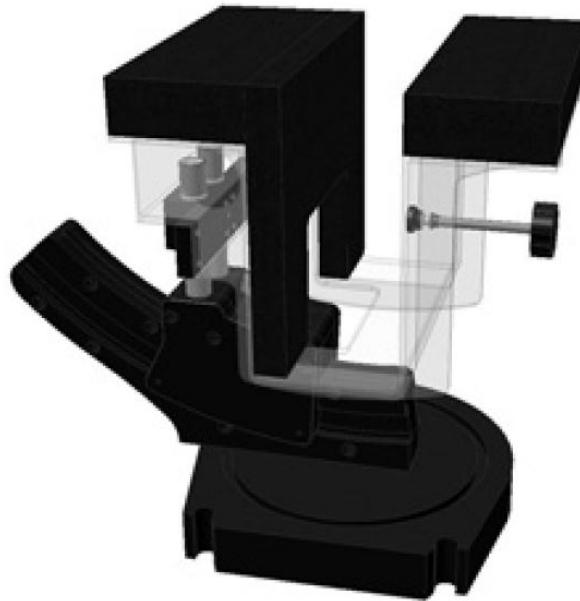
The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity  $\epsilon = 3$  and loss tangent  $\delta = 0.02$ . The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.



Fig 5.11 Device Holder

**<Laptop Extension Kit>**

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the mounting device in place of the phone positioned. The extension is fully compatible with the SAM Twin and ELI phantoms.



**Fig 5.12**      **Laptop Extension Kit**



## 5.7 Data Storage and Evaluation

### 5.7.1 Data Storage

The DASY software stores the assessed data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all the necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files. The post-processing software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of erroneous parameter settings. For example, if a measurement has been performed with an incorrect crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be reevaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type (e.g., [V/m], [A/m], [mW/g]). Some of these units are not available in certain situations or give meaningless results, e.g., a SAR-output in a non-lose media, will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

### 5.7.2 Data Evaluation

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

<b>Probe parameters :</b>	- Sensitivity	Norm <sub>i</sub> , a <sub>10</sub> , a <sub>11</sub> , a <sub>12</sub>
	- Conversion factor	ConvF <sub>i</sub>
	- Diode compression point	dcp <sub>i</sub>
<b>Device parameters :</b>	- Frequency	f
	- Crest factor	cf
<b>Media parameters :</b>	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multi-meter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

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 :

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

with  $V_i$  = 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<sub>i</sub> = diode compression point (DASY parameter)

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

$$\text{E-field Probes : } E_i = \sqrt{\frac{V_i}{\text{Norm}_i \cdot \text{ConvF}}}$$

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

with  $V_i$  = compensated signal of channel i, (i = x, y, z)  
 Norm<sub>i</sub> = sensor sensitivity of channel i, (i = x, y, z),  $\mu\text{V}/(\text{V/m})^2$  for E-field Probes  
 ConvF = sensitivity enhancement in solution  
 a<sub>ij</sub> = 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) :

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

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

$$\text{SAR} = E_{\text{tot}}^2 \cdot \frac{\sigma}{\rho \cdot 1000}$$

with SAR = local specific absorption rate in mW/g  
 $E_{\text{tot}}$  = total field strength in V/m  
 $\sigma$  = conductivity in [mho/m] or [Siemens/m]  
 $\rho$  = equivalent tissue density in  $\text{g}/\text{cm}^3$

Note that the density is set to 1, to account for actual head tissue density rather than the density of the tissue simulating liquid.



**5.8 Test Equipment List**

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	Dosimetric E-Field Probe	ET3DV6	1787	May 18, 2010	May 17, 2011
SPEAG	Dosimetric E-Field Probe	ET3DV6	1788	Sep. 21, 2010	Sep. 20, 2011
SPEAG	Dosimetric E-Field Probe	EX3DV4	3731	Jul. 16, 2010	Jul. 15, 2011
SPEAG	750MHz System Validation Kit	D750V3	1012	Jun. 11, 2010	Jun. 10, 2012
SPEAG	835MHz System Validation Kit	D835V2	499	Mar. 22, 2010	Mar. 21, 2012
SPEAG	1900MHz System Validation Kit	D1900V2	5d041	Mar. 23, 2010	Mar. 22, 2012
SPEAG	Data Acquisition Electronics	DAE3	577	Jan. 13, 2011	Jan. 12, 2012
SPEAG	Data Acquisition Electronics	DAE4	778	Oct. 22, 2010	Oct. 21, 2011
SPEAG	Device Holder	N/A	N/A	NCR	NCR
SPEAG	SAM Phantom	QD 000 P40 C	TP-1303	NCR	NCR
SPEAG	SAM Phantom	QD 000 P40 C	TP-1383	NCR	NCR
SPEAG	SAM Phantom	QD 000 P40 C	TP-1446	NCR	NCR
SPEAG	SAM Phantom	QD 000 P40 C	TP-1478	NCR	NCR
SPEAG	ELI4 Phantom	QD 0VA 001 BB	1026	NCR	NCR
SPEAG	ELI4 Phantom	QD 0VA 001 BA	1029	NCR	NCR
Agilent	PNA Series Network Analyzer	E8358A	US40260131	May 06, 2010	May 05, 2011
Agilent	Wireless Communication Test Set	E5515C	MY48360820	Jan. 12, 2010	Jan. 11, 2012
R&S	Wideb. Radio Comm. Tester	CMW500	102159	Sep. 09, 2010	Sep. 08, 2011
R&S	Universal Radio Communication Tester	CMU200	117995	Mar. 19, 2009	Mar. 18, 2011
Agilent	Dielectric Probe Kit	85070D	US01440205	NCR	NCR
Agilent	Dual Directional Coupler	778D	50422	NCR	NCR
AR	Power Amplifier	5S1G4M2	0328767	NCR	NCR
R&S	Spectrum Analyzer	FSP30	101329	Apr. 26, 2010	Apr. 25, 2011

**Table 5.1 Test Equipment List**

**Note:** The calibration certificate of DASYS can be referred to appendix C of this report.

## 6. Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 6.1. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 6.2.

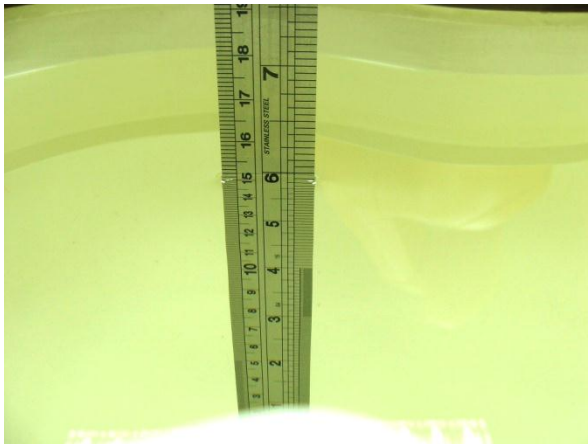


Fig 6.1 Photo of Liquid Height for Head SAR



Fig 6.2 Photo of Liquid Height for Body SAR

The following table gives the recipes for tissue simulating liquid.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity ( $\sigma$ )	Permittivity ( $\epsilon_r$ )
<b>For Head</b>								
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
900	40.3	57.9	0.2	1.4	0.2	0	0.97	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.40	40.0
2450	55.0	0	0	0	0	45.0	1.80	39.2
<b>For Body</b>								
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
900	50.8	48.2	0	0.9	0.1	0	1.05	55.0
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0	0	31.4	1.95	52.7

Table 6.1 Recipes of Tissue Simulating Liquid



The following table gives the targets for tissue simulating liquid.

Frequency (MHz)	Liquid Type	Conductivity ( $\sigma$ )	$\pm 5\%$ Range	Permittivity ( $\epsilon_r$ )	$\pm 5\%$ Range
750	Head	0.89	0.85 ~ 0.93	41.9	39.8 ~ 44.0
835	Head	0.90	0.86 ~ 0.95	41.5	39.4 ~ 43.6
900	Head	0.97	0.92 ~ 1.02	41.5	39.4 ~ 43.6
1800, 1900, 2000	Head	1.40	1.33 ~ 1.47	40.0	38.0 ~ 42.0
2450	Head	1.80	1.71 ~ 1.89	39.2	37.2 ~ 41.2
750	Body	0.96	0.91 ~ 1.01	55.5	52.7 ~ 58.3
835	Body	0.97	0.92 ~ 1.02	55.2	52.4 ~ 58.0
900	Body	1.05	1.00 ~ 1.10	55.0	52.3 ~ 57.8
1800, 1900, 2000	Body	1.52	1.44 ~ 1.60	53.3	50.6 ~ 56.0
2450	Body	1.95	1.85 ~ 2.05	52.7	50.1 ~ 55.3

Table 6.2 Targets of Tissue Simulating Liquid

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an Agilent 85070D Dielectric Probe Kit and an Agilent Network Analyzer.



The following table shows the measuring results for simulating liquid.

Frequency (MHz)	Liquid Type	Temperature (°C)	Conductivity ( $\sigma$ )	Deviation (%)	Permittivity ( $\epsilon_r$ )	Deviation (%)	Measurement Date
750	Head	21.5	0.861	-3.26	41.0	-2.15	Mar. 03, 2011
777	Head		0.866	-2.70	40.7	-2.86	
782	Head		0.871	-2.13	40.7	-2.86	
787	Head		0.875	-1.69	40.5	-3.34	
750	Body	21.4	0.922	-3.96	56.1	1.08	Mar. 04, 2011
777	Body		0.929	-3.23	55.9	0.72	
782	Body		0.935	-2.60	55.8	0.54	
787	Body		0.939	-2.19	55.8	0.54	
835	Head	21.2	0.884	-1.78	43.0	3.61	Feb. 08, 2011
835	Head	21.5	0.912	1.33	40.6	-2.17	Feb. 10, 2011
835	Head	21.6	0.921	2.33	41.3	-0.48	Mar. 01, 2011
835	Body	21.5	0.956	-1.44	57.5	4.17	Jan. 29, 2011
835	Body	21.3	0.978	0.82	53.4	-3.26	Feb. 26, 2011
1900	Head	21.6	1.42	1.43	39.3	-1.75	Feb. 07, 2011
1900	Head	21.5	1.44	2.86	40.6	1.50	Mar. 01, 2011
1900	Head	21.4	1.45	3.57	38.5	-3.75	Mar. 01, 2011
1900	Body	21.6	1.52	0.00	53.6	0.56	Jan. 28, 2011
1900	Body	21.4	1.56	2.63	52.2	-2.06	Mar. 02, 2011

**Table 6.3 Measuring Results for Simulating Liquid**



## **7. Uncertainty Assessment**

The component of uncertainty may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainty by the statistical analysis of a series of observations is termed a Type A evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance.

A Type A evaluation of standard uncertainty may be based on any valid statistical method for treating data. This includes calculating the standard deviation of the mean of a series of independent observations; using the method of least squares to fit a curve to the data in order to estimate the parameter of the curve and their standard deviations; or carrying out an analysis of variance in order to identify and quantify random effects in certain kinds of measurement.

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience and knowledge of the behavior and properties of relevant materials and instruments, manufacture’s specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in Table 7.1

<b>Uncertainty Distributions</b>	<b>Normal</b>	<b>Rectangular</b>	<b>Triangular</b>	<b>U-Shape</b>
Multi-plying Factor <sup>(a)</sup>	1/k <sup>(b)</sup>	1/√3	1/√6	1/√2

- (a) standard uncertainty is determined as the product of the multiplying factor and the estimated range of variations in the measured quantity
- (b)  $\kappa$  is the coverage factor

**Table 7.1 Standard Uncertainty for Assumed Distribution**

The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type B evaluation using the usual “root-sum-squares” (RSS) methods of combining standard deviations by taking the positive square root of the estimated variances.

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %. The DASY uncertainty Budget is showed in Table 7.2.



Error Description	Uncertainty Value (±%)	Probability Distribution	Divisor	Ci (1g)	Standard Uncertainty (1g)
<b>Measurement System</b>					
Probe Calibration	5.5	Normal	1	1	± 5.5 %
Axial Isotropy	4.7	Rectangular	√3	0.7	± 1.9 %
Hemispherical Isotropy	9.6	Rectangular	√3	0.7	± 3.9 %
Boundary Effects	1.0	Rectangular	√3	1	± 0.6 %
Linearity	4.7	Rectangular	√3	1	± 2.7 %
System Detection Limits	1.0	Rectangular	√3	1	± 0.6 %
Readout Electronics	0.3	Normal	1	1	± 0.3 %
Response Time	0.8	Rectangular	√3	1	± 0.5 %
Integration Time	2.6	Rectangular	√3	1	± 1.5 %
RF Ambient Noise	3.0	Rectangular	√3	1	± 1.7 %
RF Ambient Reflections	3.0	Rectangular	√3	1	± 1.7 %
Probe Positioner	0.4	Rectangular	√3	1	± 0.2 %
Probe Positioning	2.9	Rectangular	√3	1	± 1.7 %
Max. SAR Eval.	1.0	Rectangular	√3	1	± 0.6 %
<b>Test Sample Related</b>					
Device Positioning	2.9	Normal	1	1	± 2.9 %
Device Holder	3.6	Normal	1	1	± 3.6 %
Power Drift	5.0	Rectangular	√3	1	± 2.9 %
<b>Phantom and Setup</b>					
Phantom Uncertainty	4.0	Rectangular	√3	1	± 2.3 %
Liquid Conductivity (Target)	5.0	Rectangular	√3	0.64	± 1.8 %
Liquid Conductivity (Meas.)	2.5	Normal	1	0.64	± 1.6 %
Liquid Permittivity (Target)	5.0	Rectangular	√3	0.6	± 1.7 %
Liquid Permittivity (Meas.)	2.5	Normal	1	0.6	± 1.5 %
<b>Combined Standard Uncertainty</b>					± 10.7 %
<b>Coverage Factor for 95 %</b>					K = 2
<b>Expanded Uncertainty</b>					± 21.4 %

Table 7.2 Uncertainty Budget of DASY for frequency range 300 MHz to 3 GHz

## 8. SAR Measurement Evaluation

Each DASY system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY software, enable the user to conduct the system performance check and system validation. System validation kit includes a dipole, tripod holder to fix it underneath the flat phantom and a corresponding distance holder.

### 8.1 Purpose of System Performance check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

### 8.2 System Setup

In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:

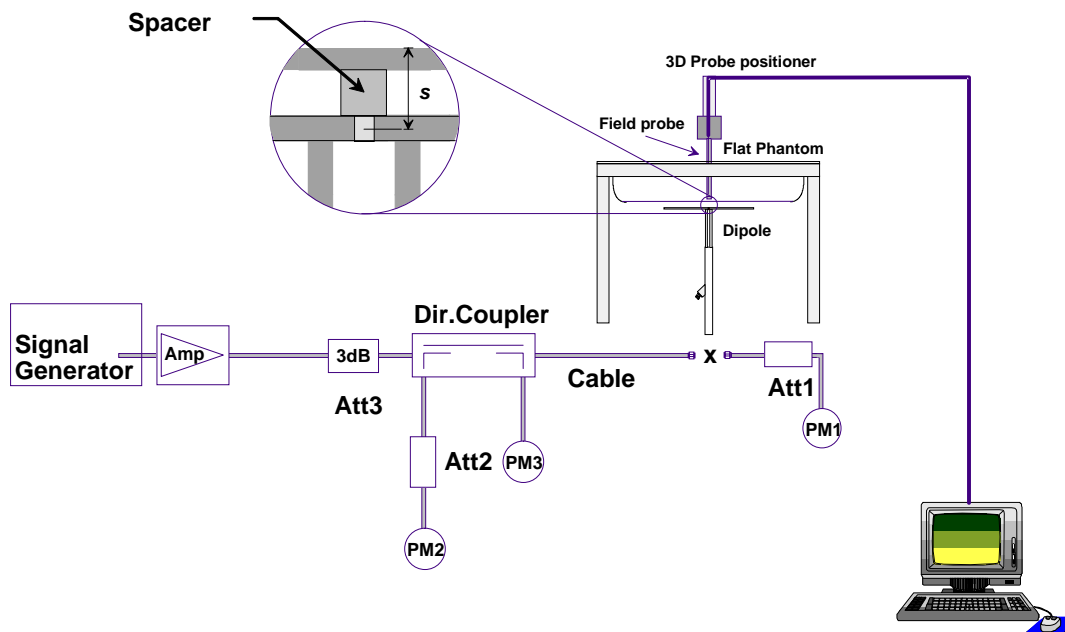
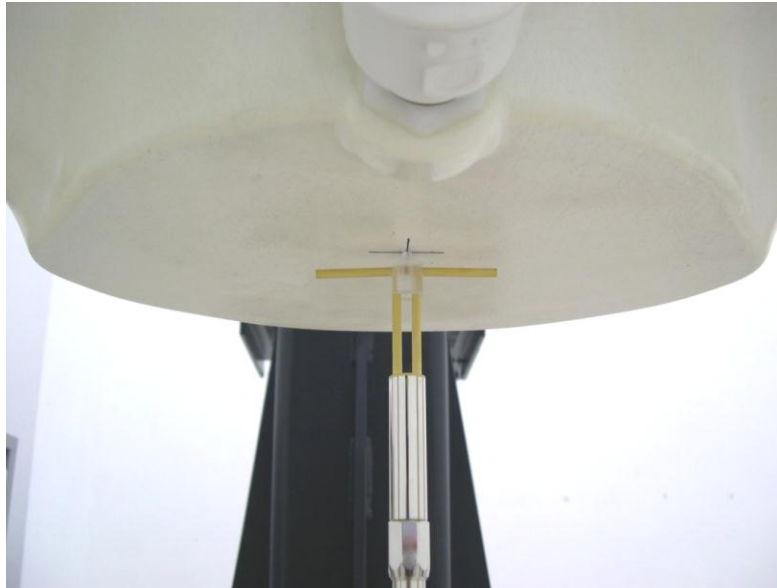


Fig 8.1 System Setup for System Evaluation

1. Signal Generator
2. Amplifier
3. Directional Coupler
4. Power Meter
5. Calibrated Dipole

The output power on dipole port must be calibrated to 24 dBm (250 mW) before dipole is connected.



**Fig 8.2 Photo of Dipole Setup**



**8.3 Validation Results**

Comparing to the original SAR value provided by SPEAG, the validation data should be within its specification of 10 %. Table 8.1 shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

Measurement Date	Frequency (MHz)	Targeted SAR <sub>1g</sub> (W/kg)	Measured SAR <sub>1g</sub> (W/kg)	Deviation (%)
Mar. 03, 2011	750	8.28	8.24	-0.48
Mar. 04, 2011	750	8.86	8.56	-3.39
Feb. 08, 2011	835	9.71	9.72	0.10
Feb. 10, 2011	835	9.71	10.12	4.22
Mar. 01, 2011	835	9.71	9.96	2.57
Jan. 29, 2011	835	9.82	9.68	-1.43
Feb. 26, 2011	835	9.82	10.28	4.68
Feb. 07, 2011	1900	39.80	41.60	4.52
Mar. 01, 2011	1900	39.80	39.16	-1.61
Mar. 01, 2011	1900	39.80	41.60	4.52
Jan. 28, 2011	1900	40.00	42.40	6.00
Mar. 02, 2011	1900	40.00	42.80	7.00

**Table 8.1 Target and Measurement SAR after Normalized**

## 9. DUT Testing Position

This DUT was tested in ten different positions. They are right cheek, right tilted, left cheek, left tilted, front face of the DUT with phantom 1 cm gap, rear face of the DUT with phantom 1 cm gap, top side of the DUT with phantom 1 cm gap, bottom side of the DUT with phantom 1 cm gap, left side of the DUT with phantom 1 cm gap, and right side of the DUT with phantom 1 cm gap as illustrated below:

### 1. Define two imaginary lines on the handset

- (a) The vertical centerline passes through two points on the front side of the handset - the midpoint of the width  $w_t$  of the handset at the level of the acoustic output, and the midpoint of the width  $w_b$  of the bottom of the handset.
- (b) The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output. The horizontal line is also tangential to the face of the handset at point A.
- (c) 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 necessarily parallel to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.

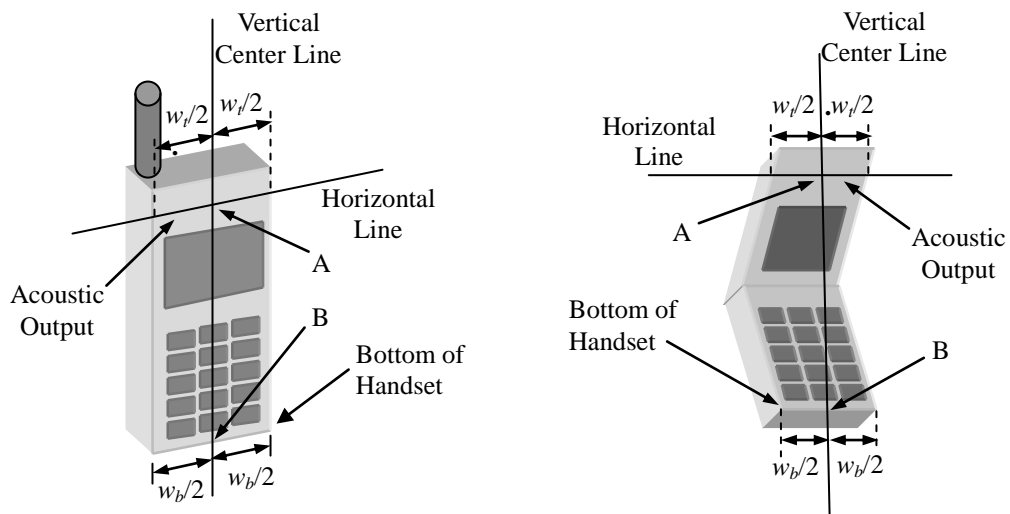
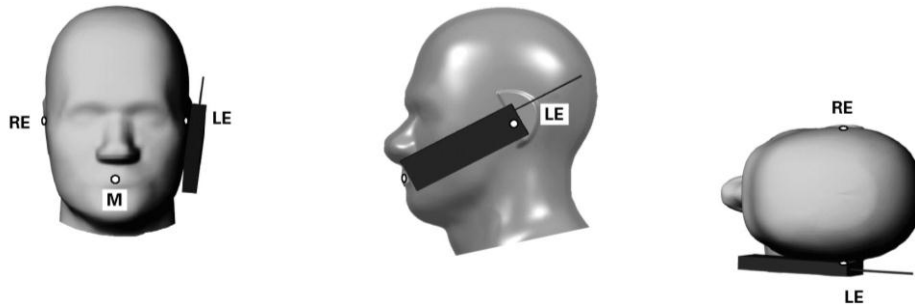


Fig 9.1 Illustration for Handset Vertical and Horizontal Reference Lines

**2. Cheek Position**

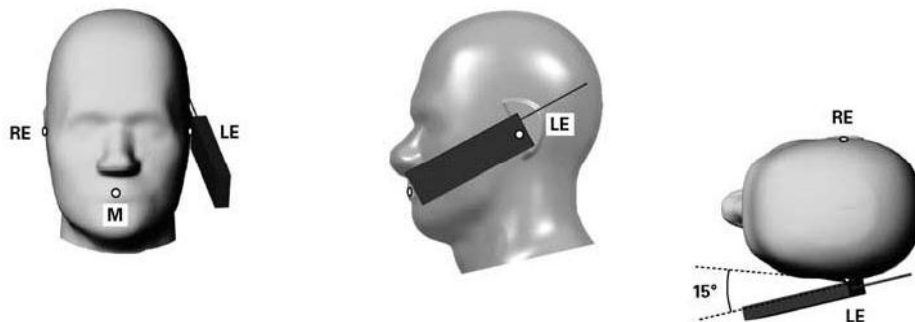
- (a) To position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the three ear and mouth reference point (M: Mouth, RE: Right Ear, and LE: Left Ear) and align the center of the ear piece with the line RE-LE.
- (b) To move the device towards the phantom with the ear piece aligned with the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the phone until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost (see Fig. 9.2).



**Fig 9.2 Illustration for Cheek Position**

**3. Tilted Position**

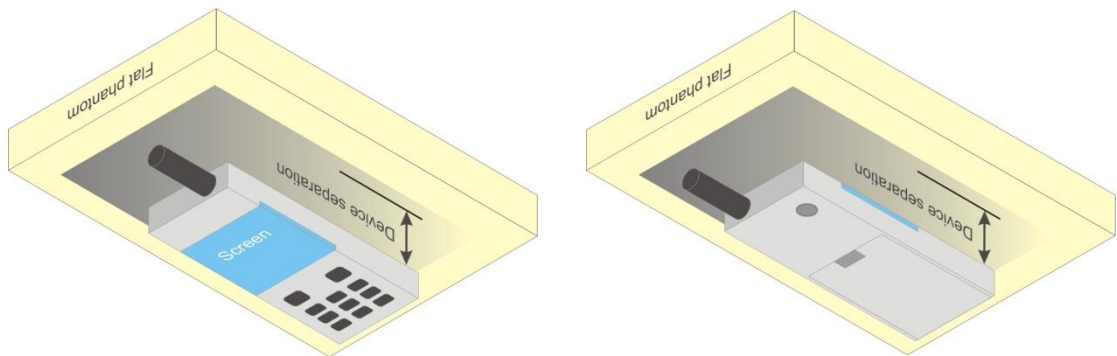
- (a) To position the device in the “cheek” position described above.
- (b) While maintaining the device the reference plane described above and pivoting against the ear, moves it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost (see Fig. 9.3).



**Fig 9.3 Illustration for Tilted Position**

#### 4. Body Worn Position

- (a) To position the device parallel to the phantom surface with DUT.
- (b) To adjust the device parallel to the flat phantom.
- (c) To adjust the distance between the device surface and the flat phantom to 1 cm.



**Fig 9.4 Illustration for Body Worn Position**

#### 5. DUT Setup Photos

Please refer to Appendix D for the test setup photos.



## **10. Measurement Procedures**

The measurement procedures are as follows:

- (a) For WWAN function, link DUT with base station emulator in highest power channel
- (b) Set base station emulator to allow DUT to radiate maximum output power
- (c) Measure output power through RF cable and power meter
- (d) Place the DUT in the positions described in the last section
- (e) Set scan area, grid size and other setting on the DASY software
- (f) Taking data for the middle channel on each testing position
- (g) Find out the largest SAR result on these testing positions of each band
- (h) Measure SAR results for other channels in worst SAR testing position if the SAR of highest power channel is larger than 0.8 W/kg

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

- (a) Power reference measurement
- (b) Area scan
- (c) Zoom scan
- (d) Power drift measurement

### **10.1 Spatial Peak SAR Evaluation**

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

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 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

- (a) Extraction of the measured data (grid and values) from the Zoom Scan
- (b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
- (c) Generation of a high-resolution mesh within the measured volume
- (d) Interpolation of all measured values from the measurement grid to the high-resolution grid
- (e) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
- (f) Calculation of the averaged SAR within masses of 1g and 10g



## **10.2 Area & Zoom Scan Procedures**

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan measures 5x5x7 points with step size 8, 8 and 5 mm for 300 MHz to 3 GHz, and 8x8x8 points with step size 4, 4 and 2.5 mm for 3 GHz to 6 GHz. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g.

## **10.3 Volume Scan Procedures**

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the DUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing (step-size is 4, 4 and 2.5 mm). When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

## **10.4 SAR Averaged Methods**

In DASy, the interpolation and extrapolation are both based on the modified Quadratic Shepard's method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. 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 5 mm.

## **10.5 Power Drift Monitoring**

All SAR testing is under the DUT install full charged battery and transmit maximum output power. In DASy measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of DUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drift more than 5%, the SAR will be retested.



## 11. SAR Test Results

### 11.1 Conducted Power (Unit: dBm)

<Sample 1>

Band	CDMA2000 BC0			CDMA2000 BC1		
Channel	1013	384	777	25	600	1175
Frequency (MHz)	824.70	836.52	848.31	1851.25	1880.00	1908.75
Ant-1 RC1+SO55	23.79	23.96	23.90	23.85	23.93	23.91
Ant-1 RC3+SO55	23.81	23.93	23.92	24.00	23.97	23.86
Ant-1 RC3+SO32 (FCH)	23.83	23.92	23.90	23.98	23.90	23.92
Ant-1 RC3+SO32 (SCH)	23.83	23.93	23.89	24.00	23.93	23.90
Ant-2 RTAP 153.6	23.65	23.78	23.76	23.95	23.91	23.93
Ant-2 RETAP 4096	23.71	23.80	23.81	23.82	23.81	23.82
Band	LTE Band 13					
Modulation	RB Size	RB Offset	Power (dBm)	MPR Target	Measured Reduction for 23 dBm Target (dB)	Note
Ant-2 QPSK	1	0	22.51	0	0.49	-
Ant-2 QPSK	1	49	22.92	0	0.08	-
Ant-2 QPSK	25	13	21.47	1	1.53	MPR Enabled
Ant-2 QPSK	50	0	21.42	1	1.58	MPR Enabled
Ant-2 16QAM	1	0	22.49	0	0.51	-
Ant-2 16QAM	1	49	23.00	0	0.00	-
Ant-2 16QAM	25	13	21.46	1	1.54	MPR Enabled
Ant-2 16QAM	50	0	21.39	1	1.61	MPR Enabled

**Note:** Above EVDO power is measured on standalone mode which does not include 1 dB power reduction for SVDO operation.



<Sample 2>

Band	CDMA2000 BC0			CDMA2000 BC1		
Channel	1013	384	777	25	600	1175
Frequency (MHz)	824.70	836.52	848.31	1851.25	1880.00	1908.75
Ant-1 RC1+SO55	23.80	23.92	23.89	23.81	23.95	23.92
Ant-1 RC3+SO55	23.82	23.96	23.89	24.00	23.96	23.88
Ant-1 RC3+SO32 (FCH)	23.83	23.91	23.88	23.96	23.94	23.93
Ant-1 RC3+SO32 (SCH)	23.82	23.90	23.88	23.96	23.93	23.93
Ant-2 RTAP 153.6	23.72	23.82	23.79	23.96	23.92	23.91
Ant-2 RETAP 4096	23.70	23.81	23.78	23.90	23.87	23.85
Band	LTE Band 13					
Modulation	RB Size	RB Offset	Power (dBm)	MPR Target	Measured Reduction for 23 dBm Target (dB)	Note
Ant-2 QPSK	1	0	22.65	0	0.35	-
Ant-2 QPSK	1	49	23.00	0	0.00	-
Ant-2 QPSK	25	13	21.66	1	1.34	MPR Enabled
Ant-2 QPSK	50	0	21.58	1	1.42	MPR Enabled
Ant-2 16QAM	1	0	22.55	0	0.45	-
Ant-2 16QAM	1	49	22.96	0	0.04	-
Ant-2 16QAM	25	13	21.58	1	1.42	MPR Enabled
Ant-2 16QAM	50	0	21.52	1	1.48	MPR Enabled

**Note:** Above EVDO power is measured on standalone mode which does not include 1 dB power reduction for SVDO operation.



11.2 Test Records for Head SAR Test

<Phone + Extend Battery + Extend Battery Cover>

Plot No.	Band	Mode	Test Position	Channel	Ant Status	Sample	Battery	SAR <sub>1g</sub> (W/kg)
#77	<b>CDMA2000 BC0</b>	<b>RC3+SO55</b>	<b>Right Cheek</b>	<b>384</b>	<b>1(Voice)</b>	1	5	<b>0.409</b>
#78	CDMA2000 BC0	RC3+SO55	Right Tilted	384	1(Voice)	1	5	0.246
#79	CDMA2000 BC0	RC3+SO55	Left Cheek	384	1(Voice)	1	5	0.341
#80	CDMA2000 BC0	RC3+SO55	Left Tilted	384	1(Voice)	1	5	0.257
#128	CDMA2000 BC0	RC3+SO55	Right Cheek	384	1(Voice)	2	5	0.301
#85	CDMA2000 BC0	RTAP 153.6	Right Cheek	384	2(Data)	1	5	0.183
#86	CDMA2000 BC0	RTAP 153.6	Right Tilted	384	2(Data)	1	5	0.124
#87	<b>CDMA2000 BC0</b>	<b>RTAP 153.6</b>	<b>Left Cheek</b>	<b>384</b>	<b>2(Data)</b>	1	5	<b>0.274</b>
#88	CDMA2000 BC0	RTAP 153.6	Left Tilted	384	2(Data)	1	5	0.206
#129	CDMA2000 BC0	RTAP 153.6	Left Cheek	384	2(Data)	2	5	0.22
#59	CDMA2000 BC1	RC3+SO55	Right Cheek	25	1(Voice)	1	5	0.465
#60	CDMA2000 BC1	RC3+SO55	Right Tilted	25	1(Voice)	1	5	0.273
#61	<b>CDMA2000 BC1</b>	<b>RC3+SO55</b>	<b>Left Cheek</b>	<b>25</b>	<b>1(Voice)</b>	1	5	<b>0.949</b>
#62	CDMA2000 BC1	RC3+SO55	Left Tilted	25	1(Voice)	1	5	0.286
#63	CDMA2000 BC1	RC3+SO55	Left Cheek	600	1(Voice)	1	5	0.848
#64	CDMA2000 BC1	RC3+SO55	Left Cheek	1175	1(Voice)	1	5	0.866
#137	CDMA2000 BC1	RC3+SO55	Left Cheek	25	1(Voice)	2	5	0.783
#65	CDMA2000 BC1	RTAP 153.6	Right Cheek	25	2(Data)	1	5	0.555
#66	CDMA2000 BC1	RTAP 153.6	Right Tilted	25	2(Data)	1	5	0.608
#67	CDMA2000 BC1	RTAP 153.6	Left Cheek	25	2(Data)	1	5	1.18
#68	CDMA2000 BC1	RTAP 153.6	Left Tilted	25	2(Data)	1	5	0.941
#69	CDMA2000 BC1	RTAP 153.6	Left Cheek	600	2(Data)	1	5	0.92
#70	CDMA2000 BC1	RTAP 153.6	Left Cheek	1175	2(Data)	1	5	0.68
#71	CDMA2000 BC1	RTAP 153.6	Left Tilted	600	2(Data)	1	5	0.643
#72	CDMA2000 BC1	RTAP 153.6	Left Tilted	1175	2(Data)	1	5	0.443
#134	<b>CDMA2000 BC1</b>	<b>RTAP 153.6</b>	<b>Left Cheek</b>	<b>25</b>	<b>2(Data)</b>	2	5	<b>1.18</b>
#135	CDMA2000 BC1	RTAP 153.6	Left Cheek	600	2(Data)	2	5	0.979
#136	CDMA2000 BC1	RTAP 153.6	Left Cheek	1175	2(Data)	2	5	1.12



Plot No.	Band	Mode	Test Position	Channel	Ant Status	Sample	Battery	RB	Offset	SAR <sub>1g</sub> (W/kg)
#156	LTE Band13	QPSK	Right Cheek	23230	2(Data)	1	5	25	13	0.1
#157	LTE Band13	QPSK	Right Tilted	23230	2(Data)	1	5	25	13	0.066
#158	LTE Band13	QPSK	Left Cheek	23230	2(Data)	1	5	25	13	0.113
#159	LTE Band13	QPSK	Left Tilted	23230	2(Data)	1	5	25	13	0.099
#160	LTE Band13	QPSK	Left Cheek	23230	2(Data)	1	5	1	0	0.106
#161	LTE Band13	QPSK	Left Cheek	23230	2(Data)	1	5	1	49	0.141
#162	LTE Band13	QPSK	Left Cheek	23230	2(Data)	1	5	50	0	0.123
#163	LTE Band13	QPSK	Left Cheek	23230	2(Data)	2	5	1	49	0.064
#172	LTE Band13	16QAM	Right Cheek	23230	2(Data)	1	5	25	13	0.084
#173	LTE Band13	16QAM	Right Tilted	23230	2(Data)	1	5	25	13	0.064
#174	LTE Band13	16QAM	Left Cheek	23230	2(Data)	1	5	25	13	0.153
#175	LTE Band13	16QAM	Left Tilted	23230	2(Data)	1	5	25	13	0.118
#176	LTE Band13	16QAM	Left Cheek	23230	2(Data)	1	5	1	0	0.095
#177	LTE Band13	16QAM	Left Cheek	23230	2(Data)	1	5	1	49	0.134
#178	LTE Band13	16QAM	Left Cheek	23230	2(Data)	1	5	50	0	0.123
#179	LTE Band13	16QAM	Left Cheek	23230	2(Data)	2	5	25	13	0.125



<Phone + Wireless Changing Cover>

Plot No.	Band	Mode	Test Position	Channel	Ant Status	Sample	Battery	SAR <sub>1g</sub> (W/kg)
#73	CDMA2000 BC0	RC3+SO55	Right Cheek	384	1(Voice)	1	1	0.421
#74	CDMA2000 BC0	RC3+SO55	Right Tilted	384	1(Voice)	1	1	0.26
#75	CDMA2000 BC0	RC3+SO55	Left Cheek	384	1(Voice)	1	1	0.372
#76	CDMA2000 BC0	RC3+SO55	Left Tilted	384	1(Voice)	1	1	0.238
#126	CDMA2000 BC0	RC3+SO55	Right Cheek	384	1(Voice)	2	1	0.311
#81	CDMA2000 BC0	RTAP 153.6	Right Cheek	384	2(Data)	1	1	0.153
#82	CDMA2000 BC0	RTAP 153.6	Right Tilted	384	2(Data)	1	1	0.119
#83	CDMA2000 BC0	RTAP 153.6	Left Cheek	384	2(Data)	1	1	0.224
#84	CDMA2000 BC0	RTAP 153.6	Left Tilted	384	2(Data)	1	1	0.192
#127	CDMA2000 BC0	RTAP 153.6	Left Cheek	384	2(Data)	2	1	0.176
#47	CDMA2000 BC1	RC3+SO55	Right Cheek	25	1(Voice)	1	1	0.466
#48	CDMA2000 BC1	RC3+SO55	Right Tilted	25	1(Voice)	1	1	0.232
#49	CDMA2000 BC1	RC3+SO55	Left Cheek	25	1(Voice)	1	1	0.893
#50	CDMA2000 BC1	RC3+SO55	Left Tilted	25	1(Voice)	1	1	0.265
#51	CDMA2000 BC1	RC3+SO55	Left Cheek	600	1(Voice)	1	1	0.807
#52	CDMA2000 BC1	RC3+SO55	Left Cheek	1175	1(Voice)	1	1	0.844
#130	CDMA2000 BC1	RC3+SO55	Left Cheek	25	1(Voice)	2	1	0.792
#53	CDMA2000 BC1	RTAP 153.6	Right Cheek	25	2(Data)	1	1	0.705
#54	CDMA2000 BC1	RTAP 153.6	Right Tilted	25	2(Data)	1	1	0.614
#55	CDMA2000 BC1	RTAP 153.6	Left Cheek	25	2(Data)	1	1	1.17
#56	CDMA2000 BC1	RTAP 153.6	Left Tilted	25	2(Data)	1	1	0.764
#57	CDMA2000 BC1	RTAP 153.6	Left Cheek	600	2(Data)	1	1	1.03
#58	CDMA2000 BC1	RTAP 153.6	Left Cheek	1175	2(Data)	1	1	1.07
#131	CDMA2000 BC1	RTAP 153.6	Left Cheek	25	2(Data)	2	1	0.731



Plot No.	Band	Mode	Test Position	Channel	Ant Status	Sample	Battery	RB	Offset	SAR <sub>1g</sub> (W/kg)
#140	LTE Band13	QPSK	Right Cheek	23230	2(Data)	1	1	25	13	0.042
#141	LTE Band13	QPSK	Right Tilted	23230	2(Data)	1	1	25	13	0.031
#142	LTE Band13	QPSK	Left Cheek	23230	2(Data)	1	1	25	13	0.05
#143	LTE Band13	QPSK	Left Tilted	23230	2(Data)	1	1	25	13	0.038
#144	LTE Band13	QPSK	Left Cheek	23230	2(Data)	1	1	1	0	0.049
#145	LTE Band13	QPSK	Left Cheek	23230	2(Data)	1	1	1	49	0.053
#146	LTE Band13	QPSK	Left Cheek	23230	2(Data)	1	1	50	0	0.053
#147	LTE Band13	QPSK	Left Cheek	23230	2(Data)	2	1	50	0	0.099
#148	LTE Band13	16QAM	Right Cheek	23230	2(Data)	1	1	25	13	0.05
#149	LTE Band13	16QAM	Right Tilted	23230	2(Data)	1	1	25	13	0.034
#150	LTE Band13	16QAM	Left Cheek	23230	2(Data)	1	1	25	13	0.071
#151	LTE Band13	16QAM	Left Tilted	23230	2(Data)	1	1	25	13	0.05
#152	LTE Band13	16QAM	Left Cheek	23230	2(Data)	1	1	1	0	0.05
#153	LTE Band13	16QAM	Left Cheek	23230	2(Data)	1	1	1	49	0.054
#154	LTE Band13	16QAM	Left Cheek	23230	2(Data)	1	1	50	0	0.053
#155	LTE Band13	16QAM	Left Cheek	23230	2(Data)	2	1	25	13	0.095





**11.3 Test Records for Body SAR Test**

**<Phone + Extend Battery + Extend Battery Cover>**

Plot No.	Band	Mode	Test Position	Ch.	Ant Status	Sample	Battery	Ear-phone	SAR <sub>1g</sub> (W/kg)
#33	<b>CDMA2000 BC0</b>	<b>RC3+SO32</b>	<b>Front Face</b>	<b>384</b>	<b>1(Voice)</b>	<b>1</b>	<b>5</b>	<b>w/o</b>	<b>0.48</b>
#34	CDMA2000 BC0	RC3+SO32	Rear Face	384	1(Voice)	1	5	w/o	0.362
#35	CDMA2000 BC0	RC3+SO32	Bottom Side	384	1(Voice)	1	5	w/o	0.22
#37	CDMA2000 BC0	RC3+SO32	Left Side	384	1(Voice)	1	5	w/o	0.381
#38	CDMA2000 BC0	RC3+SO32	Right Side	384	1(Voice)	1	5	w/o	0.303
#39	CDMA2000 BC0	RC3+SO32	Front Face	384	1(Voice)	1	5	w/	0.379
#124	CDMA2000 BC0	RC3+SO32	Front Face	384	1(Voice)	2	5	w/o	0.391
#40	CDMA2000 BC0	RTAP 153.6	Front Face	384	2(Data)	1	5	w/o	0.136
#41	CDMA2000 BC0	RTAP 153.6	Rear Face	384	2(Data)	1	5	w/o	0.285
#43	CDMA2000 BC0	RTAP 153.6	Top Side	384	2(Data)	1	5	w/o	0.09
#44	CDMA2000 BC0	RTAP 153.6	Left Side	384	2(Data)	1	5	w/o	0.341
#46	CDMA2000 BC0	RTAP 153.6	Rear Face	384	2(Data)	1	5	w/	0.237
#125	<b>CDMA2000 BC0</b>	<b>RTAP 153.6</b>	<b>Left Side</b>	<b>384</b>	<b>2(Data)</b>	<b>2</b>	<b>5</b>	<b>w/o</b>	<b>0.363</b>
#17	CDMA2000 BC1	RC3+SO32	Front Face	25	1(Voice)	1	5	w/o	0.64
#18	CDMA2000 BC1	RC3+SO32	Rear Face	25	1(Voice)	1	5	w/o	0.473
#19	<b>CDMA2000 BC1</b>	<b>RC3+SO32</b>	<b>Bottom Side</b>	<b>25</b>	<b>1(Voice)</b>	<b>1</b>	<b>5</b>	<b>w/o</b>	<b>1.42</b>
#21	CDMA2000 BC1	RC3+SO32	Left Side	25	1(Voice)	1	5	w/o	0.052
#22	CDMA2000 BC1	RC3+SO32	Right Side	25	1(Voice)	1	5	w/o	0.557
#23	CDMA2000 BC1	RC3+SO32	Bottom Side	600	1(Voice)	1	5	w/o	1.21
#24	CDMA2000 BC1	RC3+SO32	Bottom Side	1175	1(Voice)	1	5	w/o	1.27
#25	CDMA2000 BC1	RC3+SO32	Front Face	25	1(Voice)	1	5	w/	0.611
#164	CDMA2000 BC1	RC3+SO32	Bottom Side	25	1(Voice)	2	5	w/o	1.28
#165	CDMA2000 BC1	RC3+SO32	Bottom Side	600	1(Voice)	2	5	w/o	1.21
#166	CDMA2000 BC1	RC3+SO32	Bottom Side	1175	1(Voice)	2	5	w/o	1.17
#26	CDMA2000 BC1	RTAP 153.6	Front Face	25	2(Data)	1	5	w/o	0.293
#27	<b>CDMA2000 BC1</b>	<b>RTAP 153.6</b>	<b>Rear Face</b>	<b>25</b>	<b>2(Data)</b>	<b>1</b>	<b>5</b>	<b>w/o</b>	<b>0.349</b>
#29	CDMA2000 BC1	RTAP 153.6	Top Side	25	2(Data)	1	5	w/o	0.293
#30	CDMA2000 BC1	RTAP 153.6	Left Side	25	2(Data)	1	5	w/o	0.217
#32	CDMA2000 BC1	RTAP 153.6	Rear Face	25	2(Data)	1	5	w/	0.287
#171	CDMA2000 BC1	RTAP 153.6	Rear Face	25	2(Data)	2	5	w/o	0.227

**Notes:**

1. For EVDO body SAR testing, the device was set on standalone mode which does not include 1 dB power reduction for SVDO operation.
2. According to April 2010 TCB Workshop RF Exposure Procedures, the SAR testing is use the maximum power channel to determine test reduction.
3. According to October 2010 TCB Workshop RF Exposure Procedures Update, the Ant-1 (1xRTT) SAR for hotspot mode only Front Face, Rear Face, Bottom Side, Left Side, and Right Side are needed due to the antenna location is within 2.5 cm from the edge.
4. The Ant-2 (EVDO) SAR for hotspot mode only Front Face, Rear Face, Top Side, and Left Side are needed due to the antenna location is within 2.5 cm from the edge.



Plot No.	Band	Mode	Test Position	Ch.	Ant Status	Sample	Battery	Ear- phone	RB	Offset	SAR <sub>1g</sub> (W/kg)
#180	LTE Band13	QPSK	Front Face	23230	2(Data)	1	5	w/o	25	13	0.078
#181	LTE Band13	QPSK	Rear Face	23230	2(Data)	1	5	w/o	25	13	0.16
#183	LTE Band13	QPSK	Top Side	23230	2(Data)	1	5	w/o	25	13	0.051
#184	LTE Band13	QPSK	Left Side	23230	2(Data)	1	5	w/o	25	13	0.273
#186	LTE Band13	QPSK	Rear Face	23230	2(Data)	1	5	w/	25	13	0.142
#187	LTE Band13	QPSK	Left Side	23230	2(Data)	1	5	w/o	1	0	0.155
#188	LTE Band13	QPSK	Left Side	23230	2(Data)	1	5	w/o	1	49	0.285
#189	LTE Band13	QPSK	Left Side	23230	2(Data)	1	5	w/o	50	0	0.227
#190	LTE Band13	QPSK	Left Side	23230	2(Data)	2	5	w/o	1	49	0.196
#191	LTE Band13	16QAM	Front Face	23230	2(Data)	1	5	w/o	25	13	0.073
#192	LTE Band13	16QAM	Rear Face	23230	2(Data)	1	5	w/o	25	13	0.175
#194	LTE Band13	16QAM	Top Side	23230	2(Data)	1	5	w/o	25	13	0.05
#195	LTE Band13	16QAM	Left Side	23230	2(Data)	1	5	w/o	25	13	0.234
#197	LTE Band13	16QAM	Rear Face	23230	2(Data)	1	5	w/	25	13	0.163
#198	LTE Band13	16QAM	Left Side	23230	2(Data)	1	5	w/o	1	0	0.13
#199	LTE Band13	16QAM	Left Side	23230	2(Data)	1	5	w/o	1	49	0.26
#200	LTE Band13	16QAM	Left Side	23230	2(Data)	1	5	w/o	50	0	0.183
#201	LTE Band13	16QAM	Left Side	23230	2(Data)	2	5	w/o	1	49	0.175

Notes:

1. LTE 100% BW was not tested since the SAR is < 1.45 W/kg.
2. According to October 2010 TCB Workshop RF Exposure Procedures Update, the Ant-2 (LTE) SAR for hotspot mode only Front Face, Rear Face, Top Side, and Left Side are needed due to the antenna location is within 2.5 cm from the edge.



<Phone + Wireless Charging Cover>

Plot No.	Band	Mode	Test Position	Ch.	Ant Status	Sample	Battery	Ear-phone	SAR <sub>1g</sub> (W/kg)
#47	CDMA2000 BC0	RC3+SO32	Front Face	384	1(Voice)	1	1	w/o	0.544
#48	CDMA2000 BC0	RC3+SO32	Rear Face	384	1(Voice)	1	1	w/o	0.511
#49	CDMA2000 BC0	RC3+SO32	Bottom Side	384	1(Voice)	1	1	w/o	0.187
#51	CDMA2000 BC0	RC3+SO32	Left Side	384	1(Voice)	1	1	w/o	0.492
#52	CDMA2000 BC0	RC3+SO32	Right Side	384	1(Voice)	1	1	w/o	0.314
#53	CDMA2000 BC0	RC3+SO32	Front Face	384	1(Voice)	1	1	w/	0.447
#122	CDMA2000 BC0	RC3+SO32	Front Face	384	1(Voice)	2	1	w/o	0.393
#54	CDMA2000 BC0	RTAP 153.6	Front Face	384	2(Data)	1	1	w/o	0.119
#55	CDMA2000 BC0	RTAP 153.6	Rear Face	384	2(Data)	1	1	w/o	0.271
#57	CDMA2000 BC0	RTAP 153.6	Top Side	384	2(Data)	1	1	w/o	0.089
#58	CDMA2000 BC0	RTAP 153.6	Left Side	384	2(Data)	1	1	w/o	0.271
#60	CDMA2000 BC0	RTAP 153.6	Rear Face	384	2(Data)	1	1	w/	0.241
#123	CDMA2000 BC0	RTAP 153.6	Rear Face	384	2(Data)	2	1	w/o	0.266
#01	CDMA2000 BC1	RC3+SO32	Front Face	25	1(Voice)	1	1	w/o	0.622
#02	CDMA2000 BC1	RC3+SO32	Rear Face	25	1(Voice)	1	1	w/o	0.797
#03	CDMA2000 BC1	RC3+SO32	Bottom Side	25	1(Voice)	1	1	w/o	1.3
#05	CDMA2000 BC1	RC3+SO32	Left Side	25	1(Voice)	1	1	w/o	0.058
#06	CDMA2000 BC1	RC3+SO32	Right Side	25	1(Voice)	1	1	w/o	0.472
#07	CDMA2000 BC1	RC3+SO32	Bottom Side	600	1(Voice)	1	1	w/o	1.1
#08	CDMA2000 BC1	RC3+SO32	Bottom Side	1175	1(Voice)	1	1	w/o	1.12
#09	CDMA2000 BC1	RC3+SO32	Rear Face	25	1(Voice)	1	1	w/	0.74
#167	CDMA2000 BC1	RC3+SO32	Bottom Side	25	1(Voice)	2	1	w/o	1.25
#168	CDMA2000 BC1	RC3+SO32	Bottom Side	600	1(Voice)	2	1	w/o	1.17
#169	CDMA2000 BC1	RC3+SO32	Bottom Side	1175	1(Voice)	2	1	w/o	1.13
#10	CDMA2000 BC1	RTAP 153.6	Front Face	25	2(Data)	1	1	w/o	0.413
#11	CDMA2000 BC1	RTAP 153.6	Rear Face	25	2(Data)	1	1	w/o	0.471
#13	CDMA2000 BC1	RTAP 153.6	Top Side	25	2(Data)	1	1	w/o	0.226
#14	CDMA2000 BC1	RTAP 153.6	Left Side	25	2(Data)	1	1	w/o	0.355
#16	CDMA2000 BC1	RTAP 153.6	Rear Face	25	2(Data)	1	1	w/	0.469
#170	CDMA2000 BC1	RTAP 153.6	Rear Face	25	2(Data)	2	1	w/o	0.241

Notes:

1. For EVDO body SAR testing, the device was set on standalone mode which does not include 1 dB power reduction for SVDO operation.
2. According to April 2010 TCB Workshop RF Exposure Procedures, the SAR testing is use the maximum power channel to determine test reduction.
3. According to October 2010 TCB Workshop RF Exposure Procedures Update, the Ant-1 (1xRTT) SAR for hotspot mode only Front Face, Rear Face, Bottom Side, Left Side, and Right Side are needed due to the antenna location is within 2.5 cm from the edge.
4. The Ant-2 (EVDO) SAR for hotspot mode only Front Face, Rear Face, Top Side, and Left Side are needed due to the antenna location is within 2.5 cm from the edge.



Plot No.	Band	Mode	Test Position	Ch.	Ant Status	Sample	Battery	Ear- phone	RB	Offset	SAR <sub>1g</sub> (W/kg)
#202	LTE Band13	QPSK	Front Face	23230	2(Data)	1	1	w/o	25	13	0.049
#203	LTE Band13	QPSK	Rear Face	23230	2(Data)	1	1	w/o	25	13	0.112
#205	LTE Band13	QPSK	Top Side	23230	2(Data)	1	1	w/o	25	13	0.036
#206	LTE Band13	QPSK	Left Side	23230	2(Data)	1	1	w/o	25	13	0.11
#208	LTE Band13	QPSK	Rear Face	23230	2(Data)	1	1	w/	25	13	0.114
#209	LTE Band13	QPSK	Rear Face	23230	2(Data)	1	1	w/o	1	0	0.057
#210	LTE Band13	QPSK	Rear Face	23230	2(Data)	1	1	w/o	1	49	0.142
#211	LTE Band13	QPSK	Rear Face	23230	2(Data)	1	1	w/o	50	0	0.135
#212	LTE Band13	QPSK	Rear Face	23230	2(Data)	2	1	w/o	1	49	0.136
#213	LTE Band13	16QAM	Front Face	23230	2(Data)	1	1	w/o	25	13	0.036
#214	LTE Band13	16QAM	Rear Face	23230	2(Data)	1	1	w/o	25	13	0.139
#216	LTE Band13	16QAM	Top Side	23230	2(Data)	1	1	w/o	25	13	0.037
#217	LTE Band13	16QAM	Left Side	23230	2(Data)	1	1	w/o	25	13	0.14
#219	LTE Band13	16QAM	Rear Face	23230	2(Data)	1	1	w/	25	13	0.136
#220	LTE Band13	16QAM	Left Side	23230	2(Data)	1	1	w/o	1	0	0.134
#221	LTE Band13	16QAM	Left Side	23230	2(Data)	1	1	w/o	1	49	0.15
#222	LTE Band13	16QAM	Left Side	23230	2(Data)	1	1	w/o	50	0	0.107
#223	LTE Band13	16QAM	Left Side	23230	2(Data)	2	1	w/o	1	49	0.116

Notes:

- 1. LTE 100% BW was not tested since the SAR is < 1.45 W/kg.
- 2. According to October 2010 TCB Workshop RF Exposure Procedures Update, the Ant-2 (LTE) SAR for hotspot mode only Front Face, Rear Face, Top Side, and Left Side are needed due to the antenna location is within 2.5 cm from the edge.

Test Engineer : Robert Liu and A-Rod Chen



## **12. References**

- [1] FCC 47 CFR Part 2 "Frequency Allocations and Radio Treaty Matters; General Rules and Regulations"
- [2] IEEE Std. C95.1-1991, "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz", 1991
- [3] IEEE Std. 1528-2003, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
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## ***Appendix A. Plots of System Performance Check***

The plots are shown as follows.



## ***Appendix B. Plots of SAR Measurement***

The plots are shown as follows.



## **Appendix C. DASYS Calibration Certificate**

The DASYS calibration certificates are shown as follows.





## Appendix F. Product Equality Declaration



宏達國際電子股份有限公司  
HTC Corporation

1F, No. 6-3, Baoqiang Rd.,  
Xindian City, Taipei County  
231, Taiwan

Mar. 14, 2011

Federal Communication Commission  
Equipment Authorization Division, Application Processing Branch  
7435 Oakland Mills Road  
Columbia, MD 21048

TO WHOM IT MAY CONCERN :

SUBJECT: Class II Permissive Change for FCC ID: NM8PG05100

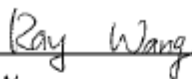
The product, Smartphone, has been granted by FCC dated 02/07/2011, FCC ID:  
NM8PG05100.

Now we, HTC Corporation, would like to modify the authorized equipment for below  
changes:

- Extend Battery
- Extend Battery cover
- Wireless Charging cover

We would like to certify the additional of certified FCC ID: NM8PG05100 as a Class  
II Permissive Change in this device.

Sincerely yours,

  
\_\_\_\_\_  
Ray Wang  
HTC Corporation  
TEL: + 886-2-89124138  
FAX: + 886-2-89126307