



SAR TEST REPORT

HCT CO., LTD

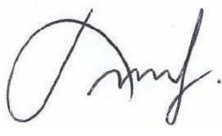

EUT Type:	USB Dongle					
FCC ID:	XHG-U602					
Model:	U602	Trade Name	Franklin			
Date of Issue:	Aug. 23, 2011					
Test report No.:	HCTA1108FS05					
Test Laboratory:	HCT CO., LTD. 105-1, Jangam-ri, Majang-myeon, Icheon-si, Gyeonggi-do, Korea 467-811 TEL: +82 31 645 6485 FAX: +82 31 645 6401					
Applicant :	Franklin Technology Inc. 906 JEI Platz, 459-11, Gasan-Dong, Gumcheon-Gu, Seoul, Korea 153-803					
Testing has been carried out in accordance with:	47CFR §2.1093 FCC OET Bulletin 65(Edition 97-01), Supplement C (Edition 01-01) ANSI/ IEEE C95.1 – 1992 IEEE 1528-2003 KDB 447498 D02 SAR Procedures for Dongle v02					
Test result:	The tested device complies with the requirements in respect of all parameters subject to the test. The test results and statements relate only to the items tested. The test report shall not be reproduced except in full, without written approval of the laboratory.					
Signature	 _____ Report prepared by : Sun-Hee Kim Test Engineer of SAR Part			 _____ Approved by : Jae-Sang So Manager of SAR Part		

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1. INTRODUCTION

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

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

SAR Definition

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

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

Figure 2. SAR Mathematical Equation

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

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

where:

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

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

2. DESCRIPTION OF DEVICE

Environmental evaluation measurements of specific absorption rate (SAR) distributions in emulated human head and body tissues exposed to radio frequency (RF) radiation from wireless portable devices for compliance with the rules and regulations of the U.S. Federal Communications Commission (FCC).

EUT Type	USB Dongle
FCC ID	XHG-U602
Model(s)	U602
Trade Name	Franklin
Serial Number(s)	#1
Application Type	Certification
Modulation(s)	CDMA835/PCS1900
Tx Frequency	824.70 – 848.31 MHz (CDMA) 1 851.25 – 1 908.75 MHz (PCS CDMA)
Rx Frequency	869.70 – 893.31 MHz (CDMA) 1 931.25 – 1 988.75 MHz (PCS CDMA)
FCC Classification	PCS Licensed Transmitter (PCB)
Production Unit or Identical Prototype	Prototype
Max. SAR	1.12 W/kg CDMA835 Body SAR 1.22 W/kg PCS1900 Body SAR
Date(s) of Tests	Aug. 11, 2011
Antenna Type	Intenna

Modes of operation Tested

	1xRTT	1xEVDO
824-849 MHz Cellular	Not tested	Tested
1850-1910 MHz PCS	Not Tested	Tested
2498.5 - 2687.5 MHz Wimax	Refer to Separate Wimax SAR Report	Refer to Separate Wimax SAR Report
2501 - 2685 MHz Wimax	Refer to Separate Wimax SAR Report	Refer to Separate Wimax SAR Report

Simultaneous Operation

– Simultaneous operation is not possible. Only 1 transmitter with 1 mode can operate at a time. Data only. Voice transmission is not supported.

	824-849 MHz Cellular 1xEVDO	1850-1910 MHz PCS 1xEVDO	2498.5 - 2687.5 MHz Wimax	2501-2685 MHz Wimax
824-849 MHz Cellular 1xEVDO	X	N/A	N/A	N/A
1850-1910 MHz PCS 1xEVDO	N/A	X	N/A	N/A
2498.5 - 2687.5 MHz Wimax	N/A	N/A	X	N/A
2501 - 2685 MHz Wimax	N/A	N/A	N/A	X

NOTE :

1. This is a data modem. Therefore, there is no voice transmission.

The device was tested only EVDO Rev.0 mode, because 1xRTT and EVDO Rev.A output power is not greater than 0.25 dB of EVDO Rev.0

2. There is no simultaneous transmission between CDMA and Wimax.

3. Wimax Tx antenna have a just one path. Therefore, Tx1 & Tx2 cannot transmit simultaneously. Only it can be operated by a switched internally.

3. DESCRIPTION OF TEST EQUIPMENT

3.1 SAR MEASUREMENT SETUP

These measurements are performed using the DASY4 automated dosimetric assessment system. It is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland. It consists of high precision robotics system (Staubli), robot controller, Pentium III computer, near-field probe, probe alignment sensor, and the generic twin phantom containing the brain equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF) (see Figure.3.1).

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The PC consists of the HP Pentium IV 3.0 GHz computer with Windows XP system and SAR Measurement Software DASY4, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

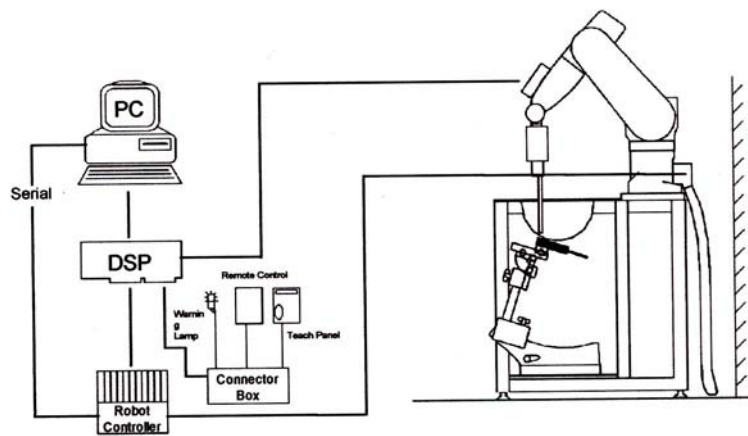


Figure 3.1 HCT SAR Lab. Test Measurement Set-up

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

3.2 DASY E-FIELD PROBE SYSTEM

3.1 ET3DV6 Probe Specification

Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection System Built-in shielding against static charges
Calibration	In air from 10 MHz to 2.5 GHz In brain and muscle simulating tissue at Frequencies of 450 MHz, 900 MHz and 1.8 GHz (accuracy: 8 %)
Frequency	10 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz)
Directivity	± 0.2 dB in brain tissue (rotation around probe axis) ± 0.4 dB in brain tissue (rotation normal probe axis)
Dynamic	5 μ W/g to > 100 mW/g;
Range Linearity:	± 0.2 dB
Surface Detection	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces.
Dimensions	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm
Application	General dissymmetry up to 3 GHz Compliance tests of mobile GSM/WCDMA Phones Fast automatic scanning in arbitrary phantoms

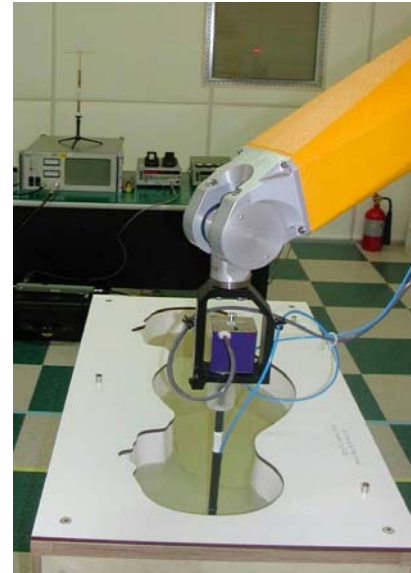


Figure 3.2 Photograph of the probe and the Phantom

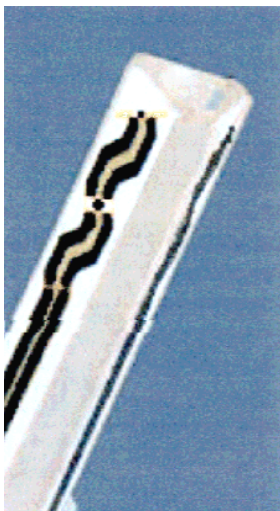


Figure 3.3 ET3DV6 E-field

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

3.3 PROBE CALIBRATION PROCESS

3.3.1 E-Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with an accuracy better than ± 10 %. The spherical isotropy was evaluated with the proper procedure and found to be better than ± 0.25 dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe is tested.

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

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

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

where:

- Δt = exposure time (30 seconds),
- C = heat capacity of tissue (brain or muscle),
- ΔT = temperature increase due to RF exposure.

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

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

where:

- σ = simulated tissue conductivity,
- ρ = Tissue density (1.25 g/cm³ for brain tissue)

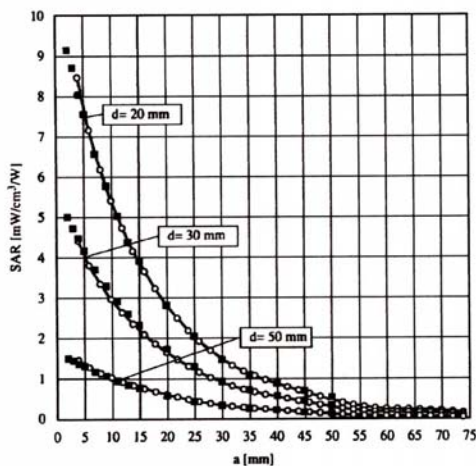


Figure 3.4 E-Field and Temperature measurements at 900 MHz

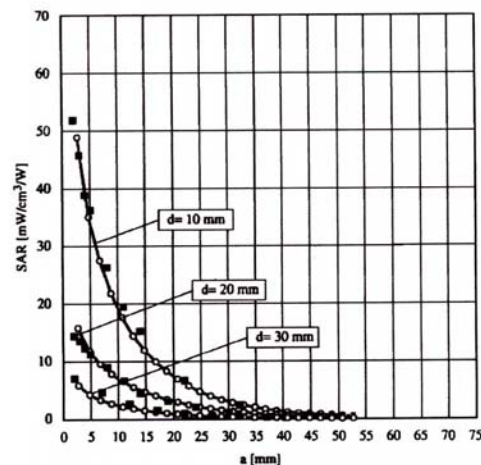


Figure 3.5 E-Field and temperature measurements at 1.8 GHz

3.3.2 Data Extrapolation

The DASY4 software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. 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 like below;

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

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_i = diode compression point (DASY parameter)

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

E-field probes:

$$E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

with V_i = compensated signal of channel i (i = x,y,z)
 $Norm_i$ = sensor sensitivity of channel i (i = x,y,z)
 $\mu V/(V/m)^2$ for E-field probes
 $ConvF$ = sensitivity of enhancement in solution
 E_i = electric field strength of channel i in V/m

The RSS value of the field components gives the total field strength (Hermetian 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.

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

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

The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = \frac{E_{tot}^2}{3770}$$

with P_{pwe} = equivalent power density of a plane wave in W/cm²
 E_{tot} = total electric field strength in V/m

3.4 SAM Phantom

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. 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 teaching three points with the robot.



Figure 3.6 SAM Phantom

Shell Thickness	2.0 mm
Filling Volume	about 25 L
Dimensions	1 000 mm x 500 mm (L x W)

3.5 Device Holder for Transmitters

In combination with the SAM Phantom V 4.0, the Mounting Device (POM) enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening. The devices can be easily, accurately, and repeatably positioned according to the FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

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



Figure 3.7 Device Holder

3.6 Brain & Muscle Simulating Mixture Characterization

The brain and muscle mixtures consist of a viscous gel using hydrox-ethyl cellulose (HEC) gelling agent and saline solution (see Table 3.1). Preservation with a bactericide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The mixture characterizations used for the brain and muscle tissue simulating liquids are according to the data by C. Gabriel and G. Hartsgrove.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1 900		2 450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7

Salt:	99 % Pure Sodium Chloride	Sugar:	98 % Pure Sucrose
Water:	De-ionized, 16M resistivity	HEC:	Hydroxyethyl Cellulose
DGBE:	99 % Di(ethylene glycol) butyl ether,[2-(2-butoxyethoxy) ethanol]		
Triton X-100(ultra pure):	Polyethylene glycol mono[4-(1,1,3,3-tetramethylbutyl)phenyl] ether		

Table 3.1 Composition of the Tissue Equivalent Matter

3.7 SAR TEST EQUIPMENT

Manufacturer	Type / Model	S/N	Calib. Date	Calib.Interval	Calib.Due
SPEAG	SAM Phantom	-	N/A	N/A	N/A
Staubli	Robot RX90L	F01/5K09A1/A/01	N/A	N/A	N/A
Staubli	Robot ControllerCS7MB	F99/5A82A1/C/01	N/A	N/A	N/A
HP	Pavilion t000_puffer	KRJ51201TV	N/A	N/A	N/A
SPEAG	Light Alignment Sensor	265	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	D221340.01	N/A	N/A	N/A
SPEAG	DAE4	869	Sep 21, 2010	Annual	Sep 21, 2011
SPEAG	E-Field Probe ET3DV6	1609	Nov. 24, 2010	Annual	Nov. 24, 2011
SPEAG	Validation Dipole D835V2	441	May 16, 2011	Annual	May 16, 2012
SPEAG	Validation Dipole D1900V2	5d032	July 22, 2011	Annual	July 22, 2012
Agilent	Power Meter(F) E4419B	MY41291386	Nov. 05, 2010	Annual	Nov. 05, 2011
Agilent	Power Sensor(G) 8481	MY41090870	Nov. 05, 2010	Annual	Nov. 05, 2011
HP	Dielectric Probe Kit 85070C	00721521	N/A	N/A	N/A
HP	Dual Directional Coupler	16072	Nov. 05, 2010	Annual	Nov. 05, 2011
R&S	Base Station CMU200	110740	July 26, 2011	Annual	July 26, 2012
Agilent	Base Station E5515C	GB44400269	Feb. 10, 2011	Annual	Feb. 10, 2012
HP	Signal Generator E4438C	MY42082646	Nov. 11, 2010	Annual	Nov. 11, 2011
HP	Network Analyzer 8753ES	JP39240221	Mar. 30, 2011	Annual	Mar. 30, 2012

NOTE:

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

4. SAR MEASUREMENT PROCEDURE

The evaluation was performed with the following procedure:

1. The SAR value at a fixed location above the ear point was measured and was used as a reference value for assessing the power drop.
2. The SAR distribution at the exposed side of the head was measured at a distance of 3.9 mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 20 mm x 20 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.
3. Around this point, a volume of 32 mm x 32 mm x 30 mm was assessed by measuring 5 x 5 x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:
 - a. The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.
 - b. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions. The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.
 - c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR value, at the same location as procedure #1, was re-measured. If the value changed by more than 5 %, the evaluation is repeated.

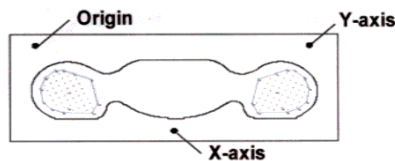


Figure 4.1 SAR Measurement Point in Area Scan

5. DESCRIPTION OF TEST POSITION

5.1 Test Configurations

According to KDB 447498, the device that can be connected to a host through a cable must be tested with the device positioned in all applicable orientations against the flat phantom. And a separation distance ≤ 0.5 cm is required for USB-dongle transmitters.

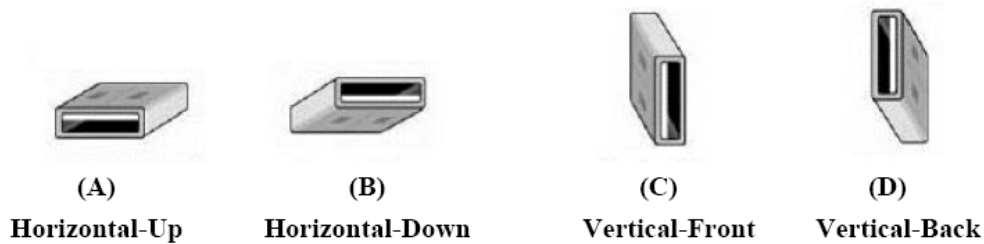


Figure 5.3 USB Connector Orientations Implemented on Laptop Computers

Therefore, the EUT was tested in following orientations;

- 1) **Configuration 1:** Front side of the EUT was tested with the direct-connection to the host device with Horizontal-Up (A), and separation distance between EUT and Phantom is 5 mm.
- 2) **Configuration 2:** Back side of the EUT was connected to the host device with Horizontal-Down (B) using a USB cable, and separation distance between EUT and Phantom is 5 mm.
- 3) **Configuration 3:** Right side of the EUT was connected to the host device with Vertical-Front (C) using a USB cable, and separation distance between EUT and Phantom is 5 mm.
- 4) **Configuration 4:** Left side of the EUT was tested with the direct-connection to the host device with Vertical-Back (D), and separation distance between EUT and Phantom is 5 mm.
- 5) **Configuration 5:** Top side of the EUT was tested with the direct-connection to the host device, and separation distance between EUT and Phantom is 5 mm.

Note;

This USB cable was used to operate this unit in the highest RF performance capability for SAR testing.

6. MEASUREMENT UNCERTAINTY

Error Description	Tol (± %)	Prob. dist.	Div.	c_i	Standard Uncertainty (± %)	V_{eff}
1. Measurement System						
Probe Calibration	6.00	N	1	1	6.00	∞
Axial Isotropy	4.70	R	1.73	0.7	1.90	∞
Hemispherical Isotropy	9.60	R	1.73	0.7	3.88	∞
Boundary Effects	1.00	R	1.73	1	0.58	∞
Linearity	4.70	R	1.73	1	2.71	∞
System Detection Limits	1.00	R	1.73	1	0.58	∞
Readout Electronics	0.30	N	1.00	1	0.30	∞
Response Time	0.8	R	1.73	1	0.46	∞
Integration Time	2.6	R	1.73	1	1.50	∞
RF Ambient Conditions	3.00	R	1.73	1	1.73	∞
Probe Positioner	0.40	R	1.73	1	0.23	∞
Probe Positioning	2.90	R	1.73	1	1.67	∞
Max SAR Eval	1.00	R	1.73	1	0.58	∞
2. Test Sample Related						
Device Positioning	2.90	N	1.00	1	2.90	145
Device Holder	3.60	N	1.00	1	3.60	5
Power Drift	5.00	R	1.73	1	2.89	∞
3. Phantom and Setup						
Phantom Uncertainty	4.00	R	1.73	1	2.31	∞
Liquid Conductivity(target)	5.00	R	1.73	0.64	1.85	∞
Liquid Conductivity(meas.)	2.07	N	1	0.64	1.32	9
Liquid Permittivity(target)	5.00	R	1.73	0.6	1.73	∞
Liquid Permittivity(meas.)	5.02	N	1	0.6	3.01	9
Combine Standard Uncertainty					11.13	
Coverage Factor for 95 %					$k = 2$	
Expanded STD Uncertainty					22.25	

Table 6.1 Uncertainty (800 MHz- 2450 MHz)

7. ANSI/ IEEE C95.1 – 1992 RF EXPOSURE LIMITS

HUMAN EXPOSURE	UNCONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT Occupational (W/kg) or (mW/g)
SPATIAL PEAK SAR * (Brain)	1.60	8.00
SPATIAL AVERAGE SAR ** (Whole Body)	0.08	0.40
SPATIAL PEAK SAR *** (Hands / Feet / Ankle / Wrist)	4.00	20.00

Table 7.1 Safety Limits for Partial Body Exposure

NOTES:

* The Spatial Peak value of the SAR averaged over any 1 g of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

** The Spatial Average value of the SAR averaged over the whole-body.

*** The Spatial Peak value of the SAR averaged over any 10 g of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e.as a result of employment or occupation).

8. SYSTEM VERIFICATION

8.1 Tissue Verification

Freq. [MHz]	Date	Liquid	Liquid Temp.[°C]	Parameters	Target Value	Measured Value	Deviation [%]	Limit [%]
835	Aug. 11, 2011	Body	21.2	ϵ_r	55.2	55.9	+ 1.27	± 5
				σ	0.97	0.95	- 2.06	± 5
1 900	Aug. 11, 2011	Body	21.2	ϵ_r	53.3	53.1	- 0.38	± 5
				σ	1.52	1.57	+ 3.29	± 5

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

8.2 System Validation

Prior to assessment, the system is verified to the $\pm 10\%$ of the specifications at 835 MHz / 1 900 MHz by using the system validation kit. (Graphic Plots Attached)

*Input Power: 100 mW

Freq. [MHz]	Date	Probe (SN)	Liquid	Liquid Temp. [°C]	SAR Average	Target Value (SPEAG) (mW/g)	* Measured Value (mW/g)	Deviation [%]	Limit [%]
835	Aug. 11, 2011	1609	Body	21.2	1 g	9.45	0.970	+ 2.65	± 10
1 900	Aug. 11, 2011	1609	Body	21.2	1 g	40.9	4.22	+ 3.18	± 10

8.3 System Validation Procedure

SAR measurement was Prior to assessment, the system is verified to the $\pm 10\%$ of the specifications at each frequency band by using the system validation kit. (Graphic Plots Attached)

- Cabling the system, using the validation kit equipments.
- Generate about 100 mW Input Level from the Signal generator to the Dipole Antenna.
- Dipole Antenna was placed below the Flat phantom.
- The measured one-gram SAR at the surface of the phantom above the dipole feed-point should be within 10 % of the target reference value.

9. 3G MEASUREMENT PROCEDURES

9.1 Procedures Used To Establish Test Signal

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

9.2 SAR Measurement Conditions for 1x Ev-Do Devices

These procedures were followed according to FCC "SAR Measurement Procedures for 3G Devices",

9.2.1 1xEv-Do Data Devices

The following procedures apply to Access Terminals (AT) operating under CDMA 2000 High Rate packer Data, Rev.0 and Rev.A, 1x Ev-Do protocols.

SAR for body exposure conditions are typically required devices with Ev-Do Capabilities, including handsets and data modems.

operating in various electronic devices. When VOIP is available for Ev-Do devices to operate in configurations next to the ear, head exposure conditions are applicable.

The default test configuration is to measure SAR with an established radio link between the AT and a communication test set according to 3GPP2 Test Application Protocols(TAP), FTAT/RTAP for Rev.0 and FETAP/RETAP for Rev.A. The code channel power levels, RF channel output power (ALL Bits Up) and other operating parameters should be actively monitored and controlled by the communications test set during the SAR measurement. The use of FTM should be avoided.

Maximum output power is verified according to procedures defined in 3 GPP2 C.S0033 and TIA-866, and SAR must be measured according to these maximum output conditions.

9.2.2 Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to procedures in section 3.1.2.3.4 of 3GPP2 C.S0033-0/TIA-866 for Rev.0 and section 4.3.4 of 3GPP2 C.S0033-A for Rev.A For Rev.A, maximum outpour for both Subtype 0/1 and subtype 2 Physical Layer configurations should be measured.

The device operating configurations under TAP/ETAP should be documented in the test report; including power control, code channel and RF channel output power levels. The measurement results should be tabulated in the SAR report with any measurement difficulties and equipment limitations clearly identified.

9.2.3 SAR Measurements

SAR is measured using FTAP/RTAP and FETAP/RETAP respectively for Rev.0 and Rev.A device. The AT is Tested with a Reverse Data Channel rate of 153.6kbps in Subtype 0/1 and Subtype 2 Physical Layer configurations should be measured. The device operating configurations under TAP/ETAP should be documented in the test report; including power Control, code channel and RF channel output power levels, The measurement results should be tabulated in the SAR report with any measurement difficulties and equipment limitations clearly identified. output of each RF channels is less than that measured in Subtype 0/1 Physical layer configurations. otherwise, SAR is measured on the maximum output channel for Rev.A using the exposure configuration that results in the highest SAR for that RF channels in Rev.0. Head SAR is required for Ev-Do devices that support operations next to the ear; for example, with VOIP, using Subtype 2 Physical Layer configurations according to the required handset test configurations.

9.2.4 1x RTT Support

For Ev-Do device that also support 1xRTT voice and/or data operations ,SAR is not required for 1xRTT when the maximum average output of each channel is less than 1/4dB higher than that measured in Subtype 0/1 Physical Layer configurations for Rev.0

9.3 CDMA2000 1xRTT

Agilent 8960 base station was used for output power verification.

Following is the detail set-up configuration.

Protocol Rev.> 6

Radio Config (RC): Body SAR in RC1 is not required when the maximum average output of each channel is less than 1/4 dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel in RC1; with Loopback Service Option SO55, at full rate, using the body exposure configuration that results in the highest SAR for that channel in RC3.

FCH SO: Body-Worn SAR was tested under RC3/SO32 with FCH Only since FCH+SCH modes are not greater than 0.25 dB of the FCH only mode per KDB publication 941225.

Traffic Data Rate > Full

Power: All Up bits

9.4 CDMA2000 1xEv-Do

Body SAR is measured using Subtype 0/1 Physical Layer configurations for Rev.0. SAR for subtype 2 Physical layer configurations is not required for Rev.A when the maximum average output of each RF channels is less than that measured in Subtype 0/1 Physical layer configurations. Otherwise, SAR is measured on the maximum output channel for Rev.A using the exposure configuration that results in the highest SAR for that RF channels in Rev.0.

9.4.1 EVDO Release 0 (RTAP)

Application Config > Enhanced Test Application Protocol > RTAP

RTAP Rate > 153.6 kbps

Protocol Rev > 0 (1x EVDO)

Power: All Up bits

9.4.2 EVDO Release 0 (FTAP)

Application Config > Enhanced Test Application Protocol > FTAP

RTAP Rate > 307.2 kbps

Protocol Rev > 0 (1x EVDO)

Power: All Up bits

9.4.3 EVDO Release A (RETAP)

Protocol Rev > A (1x EVDO A)

Application Config > Enhanced Test Application Protocol > RETAP

R-Data Pkt Size > 4096

Power: All Up bits

9.4.4 EVDO Release A (FETAP)

Protocol Rev > A (1x EVDO A)

Application Config > Enhanced Test Application Protocol > FETAP

F-Traffic Format > 4 (1024, 2, 128) Canonical (307.2k, QPSK)

Power: All Up bits

Maximum Average Output power for FCC ID: XHG-U602

Band	Channel	SO2	SO2	SO55	SO55	TDSO SO32	1xEvDO Rev.0	1xEvDO Rev.0	1xEvDO Rev.A	1xEvDO Rev.A
		RC1/1 (dBm)	RC3/3 (dBm)	RC1/1 (dBm)	RC3/3 (dBm)	RC3/3 (dBm)	(FTAP)	(RTAP)	(FETAP)	(RETAP)
CDMA	1013	23.83	24.04	24.00	24.16	24.11	23.71	23.96	23.95	23.90
	384	23.63	23.72	23.61	23.80	23.72	23.50	23.80	23.55	23.78
	777	23.64	23.73	23.67	23.84	23.75	23.64	23.63	23.48	23.50
PCS	25	24.08	24.12	23.90	24.17	24.09	24.15	24.13	24.09	24.07
	600	23.93	23.83	23.90	24.07	24.08	23.73	23.89	23.91	23.75
	1175	23.76	23.66	23.34	23.26	23.26	23.81	23.63	23.62	23.43

10. SAR TEST DATA SUMMARY

10.1 Measurement Results (CDMA835 Body SAR)

Frequency		Modulation	Conducted Power (dBm)		Configuration	Separation Distance	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
824.70	1013 (Low)	EVDO	23.96	23.98	Horizontal up	5 mm	Intenna	1.12
836.52	384 (Mid)	EVDO	23.80	23.84	Horizontal up	5 mm	Intenna	0.878
848.31	777 (High)	EVDO	23.63	23.66	Horizontal up	5 mm	Intenna	0.794
836.52	384 (Mid)	EVDO	23.80	23.83	Horizontal down	5 mm	Intenna	0.594
836.52	384 (Mid)	EVDO	23.80	23.80	Vertical front	5 mm	Intenna	0.389
836.52	384 (Mid)	EVDO	23.80	23.65	Vertical back	5 mm	Intenna	0.540
836.52	384 (Mid)	EVDO	23.80	23.66	Top	5 mm	Intenna	0.510
ANSI/ IEEE C95.1 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg (mW/g) Averaged over 1 gram		

NOTES:

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Power Supply Power supplied through host device (TOSHIBA)
- 6 Test Signal Call Mode Manual Test cord Base Station Simulator
- 7 All side of the phone were tested and the worst-case side is reported.
- 9 Test Configuration With Holster Without Holster
The EUT was fixed by using a Styrofoam to avoid perturbation due to the device holder clamps.
- 10 EVDO Body SAR was tested under EVDO Rev.0 RTAP.
- 11 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
- 12 Simultaneous CDMA+Wimax operation is not possible.
- 13 KDB447498 D02 V02 were applied for SAR evaluation of the device

10.2 Measurement Results (PCS1900 Body SAR)

Frequency		Modulation	Conducted Power (dBm)		Configuration	Separation Distance	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
1 851.25	25 (Low)	EVDO	24.13	24.12	Horizontal up	5 mm	Intenna	1.21
1 880.00	600 (Mid)	EVDO	23.89	23.80	Horizontal up	5 mm	Intenna	1.05
1 908.75	1175 (High)	EVDO	23.63	23.69	Horizontal up	5 mm	Intenna	1.22
1 851.25	25 (Low)	EVDO	24.13	24.06	Horizontal down	5 mm	Intenna	1.20
1 880.00	600 (Mid)	EVDO	23.89	23.69	Horizontal down	5 mm	Intenna	1.00
1 908.75	1175 (High)	EVDO	23.63	23.68	Horizontal down	5 mm	Intenna	1.13
1 880.00	600 (Mid)	EVDO	23.89	23.83	Vertical front	5 mm	Intenna	0.599
1 880.00	600 (Mid)	EVDO	23.89	23.91	Vertical back	5 mm	Intenna	0.733
1 880.00	600 (Mid)	EVDO	23.89	23.82	Top	5 mm	Intenna	0.284
ANSI/ IEEE C95.1 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg (mW/g) Averaged over 1 gram		

NOTES:

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
 - 2 All modes of operation were investigated and the worst-case are reported.
 - 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
 - 4 Tissue parameters and temperatures are listed on the SAR plot.
 - 5 Power Supply Power supplied through host device (TOSHIBA)
 - 6 Test Signal Call Mode Manual Test cord Base Station Simulator
 - 7 All side of the phone were tested and the worst-case side is reported.
 - 9 Test Configuration With Holster Without Holster
- The EUT was fixed by using a Styrofoam to avoid perturbation due to the device holder clamps.
- 10 EVDO Body SAR was tested under EVDO Rev.0 RTAP.
 - 11 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
 - 12 Simultaneous CDMA+Wimax operation is not possible.
 - 13 KDB447498 D02 V02 were applied for SAR evaluation of the device

11. CONCLUSION

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the ANSI/IEEE C95.1 1992.

These measurements are taken to simulate the RF effects exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests.

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Attachment 1. – SAR Test Plots

Test Laboratory: HCT CO., LTD
EUT Type: USB Dongle
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug. 11, 2011

DUT: U602; Type: Bar; Serial: #1

Communication System: CDMA 835MHz FCC; Frequency: 824.7 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 825$ MHz; $\sigma = 0.939$ mho/m; $\epsilon_r = 56$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(6.12, 6.12, 6.12); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

CDMA EVDO Horizontal up 1013/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.19 mW/g

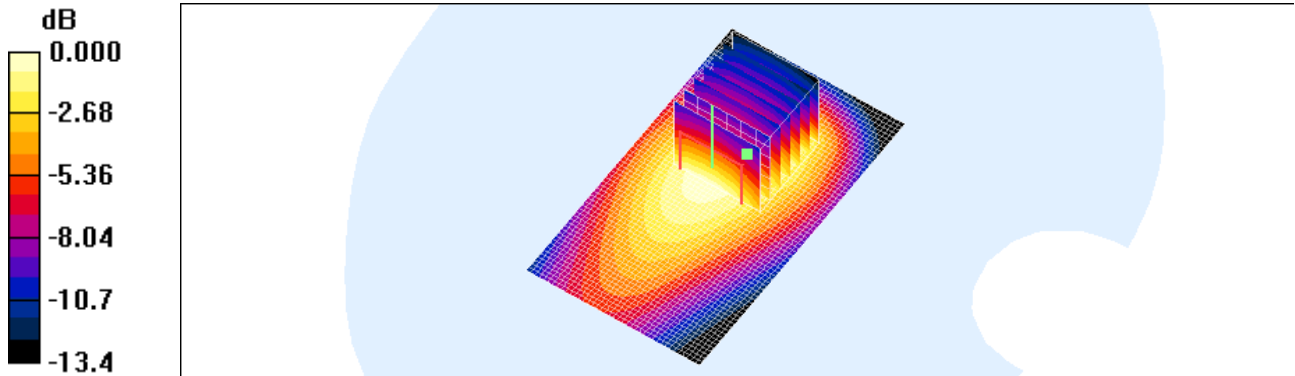
CDMA EVDO Horizontal up 1013/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 35.8 V/m; Power Drift = 0.020 dB

Peak SAR (extrapolated) = 1.97 W/kg

SAR(1 g) = 1.12 mW/g; SAR(10 g) = 0.732 mW/g

Maximum value of SAR (measured) = 1.19 mW/g



0 dB = 1.19mW/g

Test Laboratory: HCT CO., LTD
EUT Type: USB Dongle
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug. 11, 2011

DUT: U602; Type: Bar; Serial: #1

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.952$ mho/m; $\epsilon_r = 55.9$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(6.12, 6.12, 6.12); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

CDMA EVDO Horizontal up 384/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.881 mW/g

CDMA EVDO Horizontal up 384/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

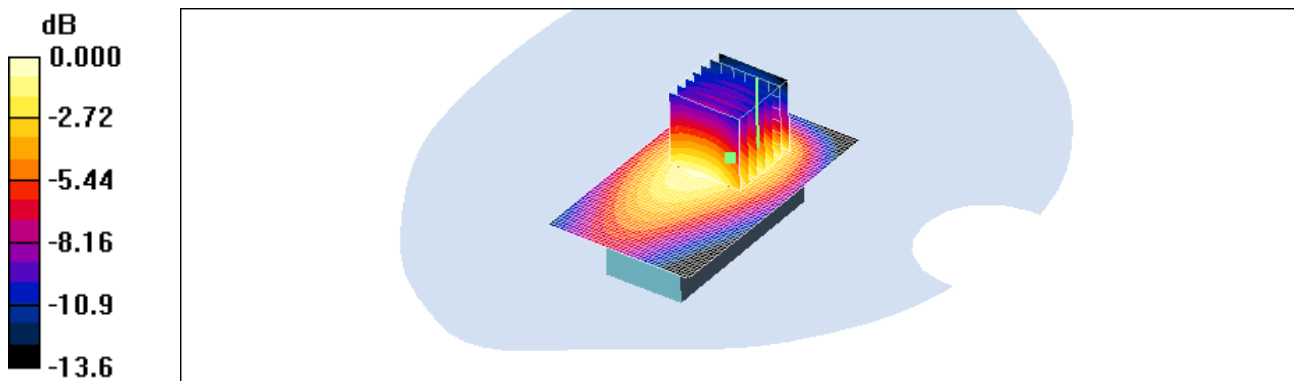
Reference Value = 31.2 V/m; Power Drift = 0.036 dB

Peak SAR (extrapolated) = 1.58 W/kg

SAR(1 g) = 0.878 mW/g; SAR(10 g) = 0.568 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.948 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: USB Dongle
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug. 11, 2011

DUT: U602; Type: Bar; Serial: #1

Communication System: CDMA 835MHz FCC; Frequency: 848.31 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 848.31$ MHz; $\sigma = 0.963$ mho/m; $\epsilon_r = 55.8$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(6.12, 6.12, 6.12); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

CDMA EVDO Horizontal up 777/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.881 mW/g

CDMA EVDO Horizontal up 777/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

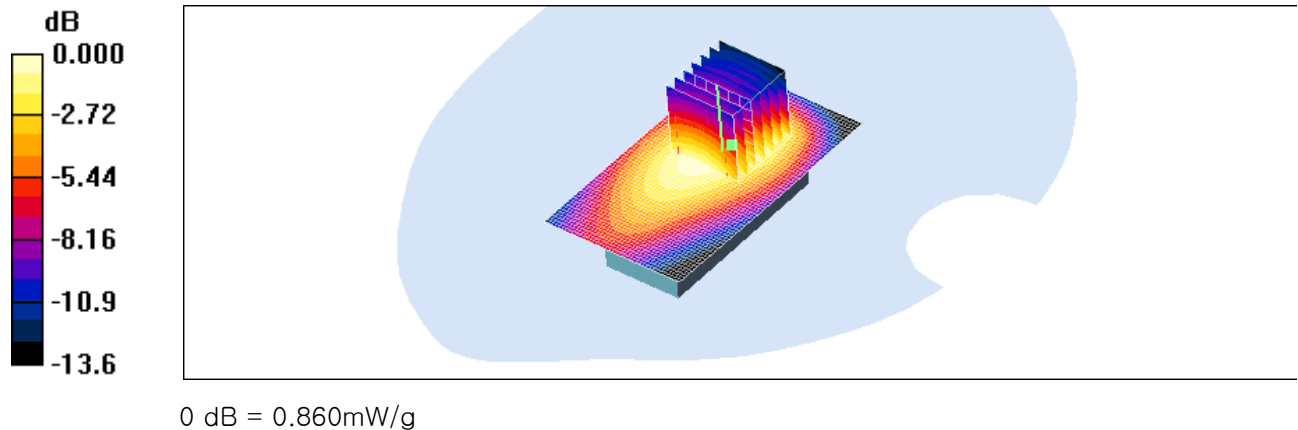
Reference Value = 30.8 V/m; Power Drift = 0.029 dB

Peak SAR (extrapolated) = 1.42 W/kg

SAR(1 g) = 0.794 mW/g; SAR(10 g) = 0.517 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.860 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: USB Dongle
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug. 11, 2011

DUT: U602; Type: Bar; Serial: #1

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.952$ mho/m; $\epsilon_r = 55.9$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(6.12, 6.12, 6.12); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

CDMA Horizontal Down 384/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.646 mW/g

CDMA Horizontal Down 384/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

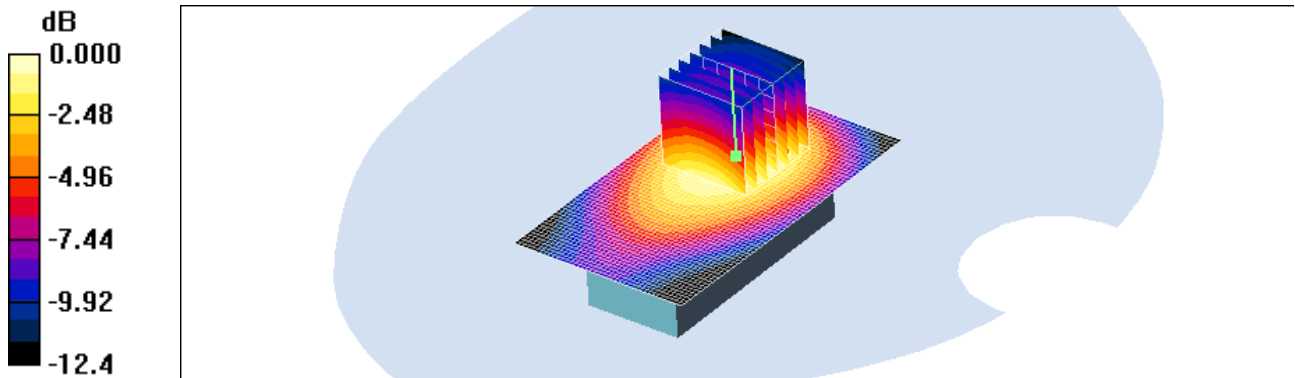
Reference Value = 25.4 V/m; Power Drift = 0.030 dB

Peak SAR (extrapolated) = 0.810 W/kg

SAR(1 g) = 0.594 mW/g; SAR(10 g) = 0.390 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.647 mW/g



0 dB = 0.647mW/g

Test Laboratory: HCT CO., LTD
EUT Type: USB Dongle
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug. 11, 2011

DUT: U602; Type: side; Serial: #1

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.952$ mho/m; $\epsilon_r = 55.9$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(6.12, 6.12, 6.12); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

CDMA EVDO Vertical Front 384/Area Scan (31x61x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.413 mW/g

CDMA EVDO Vertical Front 384/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

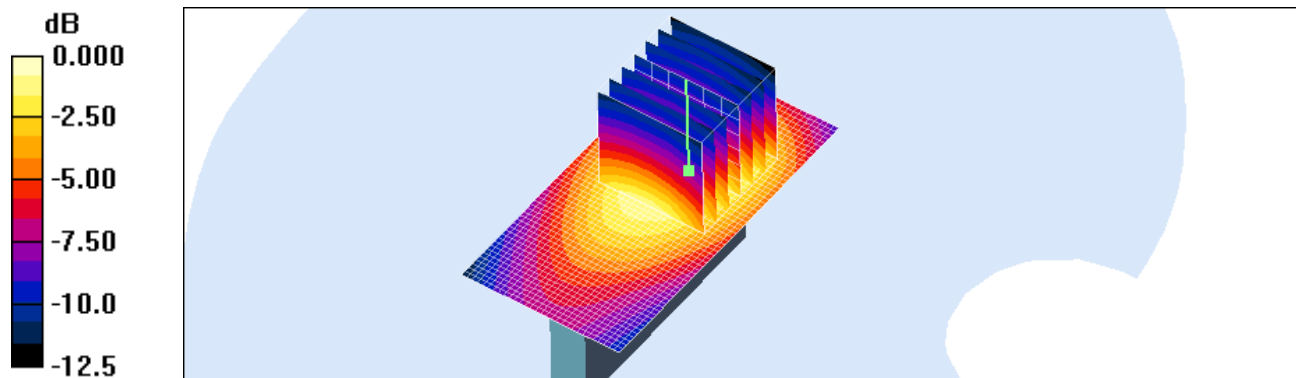
Reference Value = 21.3 V/m; Power Drift = 0.003 dB

Peak SAR (extrapolated) = 0.596 W/kg

SAR(1 g) = 0.389 mW/g; SAR(10 g) = 0.240 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.423 mW/g



0 dB = 0.423mW/g

Test Laboratory: HCT CO., LTD
EUT Type: USB Dongle
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug. 11, 2011

DUT: U602; Type: side; Serial: #1

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.952$ mho/m; $\epsilon_r = 55.9$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(6.12, 6.12, 6.12); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

CDMA EVDO Vertical Back 384/Area Scan (31x61x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.595 mW/g

CDMA EVDO Vertical Back 384/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

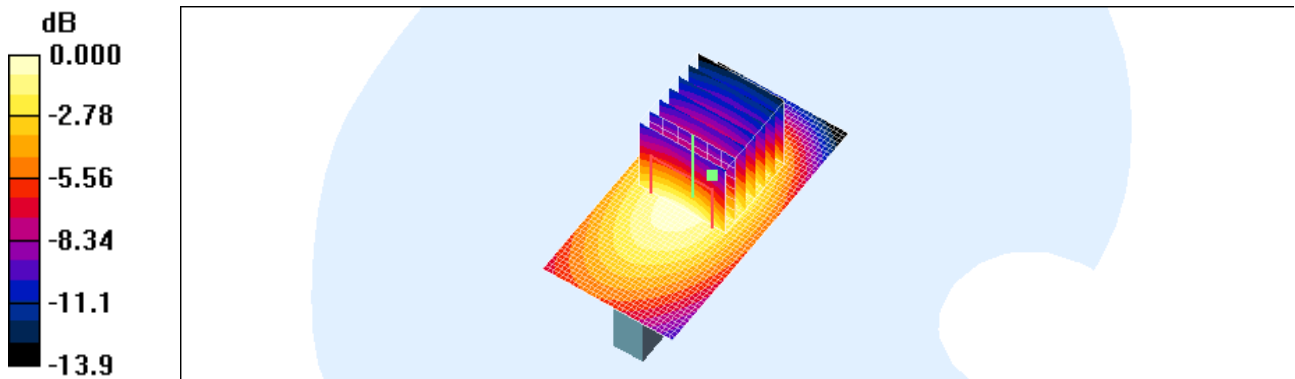
Reference Value = 25.9 V/m; Power Drift = -0.153 dB

Peak SAR (extrapolated) = 1.13 W/kg

SAR(1 g) = 0.540 mW/g; SAR(10 g) = 0.346 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.590 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: USB Dongle
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug. 11, 2011

DUT: U602; Type: Top; Serial: #1

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.952$ mho/m; $\epsilon_r = 55.9$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(6.12, 6.12, 6.12); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

CDMA EVDO Top Body 384/Area Scan (41x41x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.610 mW/g

CDMA EVDO Top Body 384/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

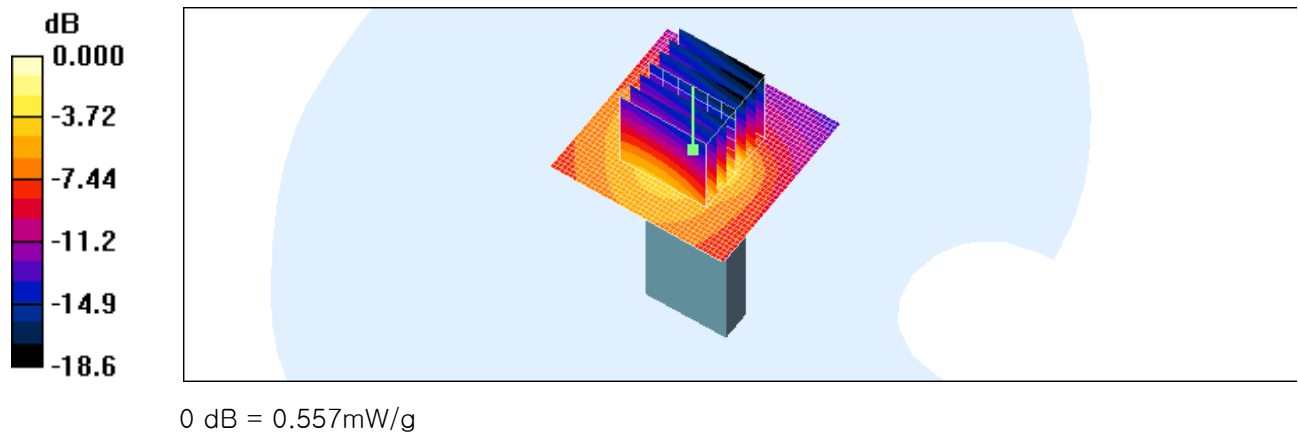
Reference Value = 25.5 V/m; Power Drift = -0.141 dB

Peak SAR (extrapolated) = 1.94 W/kg

SAR(1 g) = 0.510 mW/g; SAR(10 g) = 0.208 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.557 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: USB Dongle
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug. 11, 2011

DUT: U602; Type: Bar; Serial: #1

Communication System: PCS 1900MHz FCC; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.55$ mho/m; $\epsilon_r = 53.2$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.6, 4.6, 4.6); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: 800/900 Phantom; Type: SAM

PCS EVDO Horizontal Up 25/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.57 mW/g

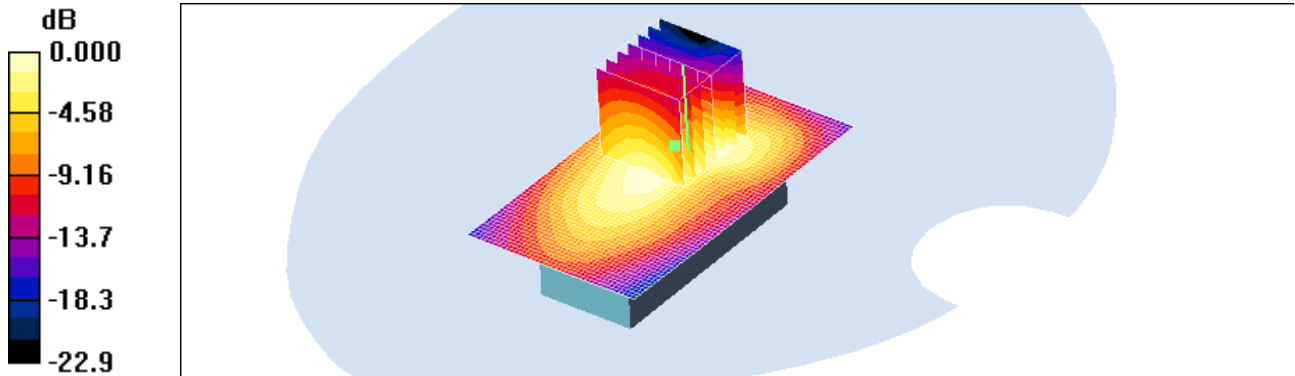
PCS EVDO Horizontal Up 25/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 23.6 V/m; Power Drift = -0.014 dB

Peak SAR (extrapolated) = 2.10 W/kg

SAR(1 g) = 1.21 mW/g; SAR(10 g) = 0.700 mW/g

Maximum value of SAR (measured) = 1.35 mW/g



0 dB = 1.35mW/g

Test Laboratory: HCT CO., LTD
EUT Type: USB Dongle
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug. 11, 2011

DUT: U602; Type: Bar; Serial: #1

Communication System: PCS 1900MHz FCC; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.55$ mho/m; $\epsilon_r = 53.2$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.6, 4.6, 4.6); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: 800/900 Phantom; Type: SAM

PCS EVDO Horizontal Up 600/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.39 mW/g

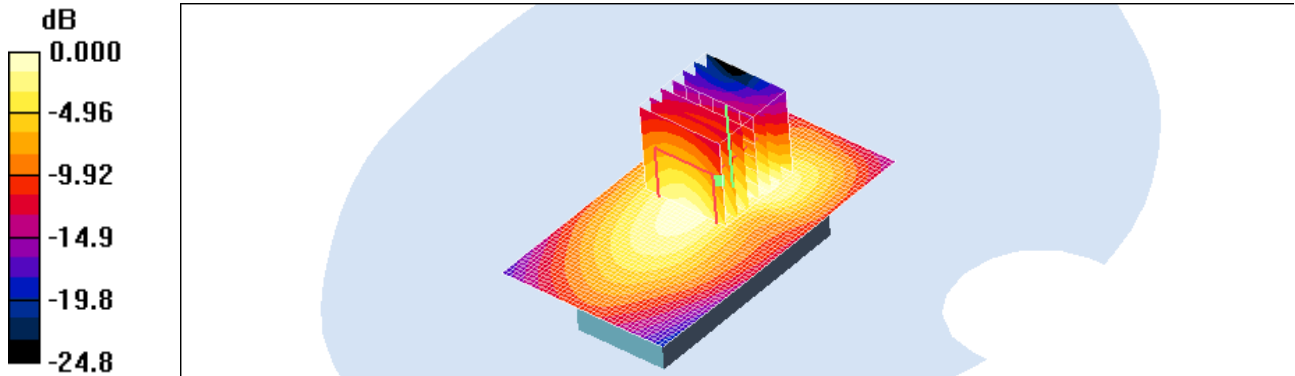
PCS EVDO Horizontal Up 600/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 22.1 V/m; Power Drift = -0.089 dB

Peak SAR (extrapolated) = 1.93 W/kg

SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.605 mW/g

Maximum value of SAR (measured) = 1.17 mW/g



0 dB = 1.17mW/g

Test Laboratory: HCT CO., LTD
EUT Type: USB Dongle
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug. 11, 2011

DUT: U602; Type: Bar; Serial: #1

Communication System: PCS 1900MHz FCC; Frequency: 1908.75 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 1908.75$ MHz; $\sigma = 1.58$ mho/m; $\epsilon_r = 53.1$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.6, 4.6, 4.6); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: 800/900 Phantom; Type: SAM

PCS EVDO Horizontal Up 1175/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 1.44 mW/g

PCS EVDO Horizontal Up 1175/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

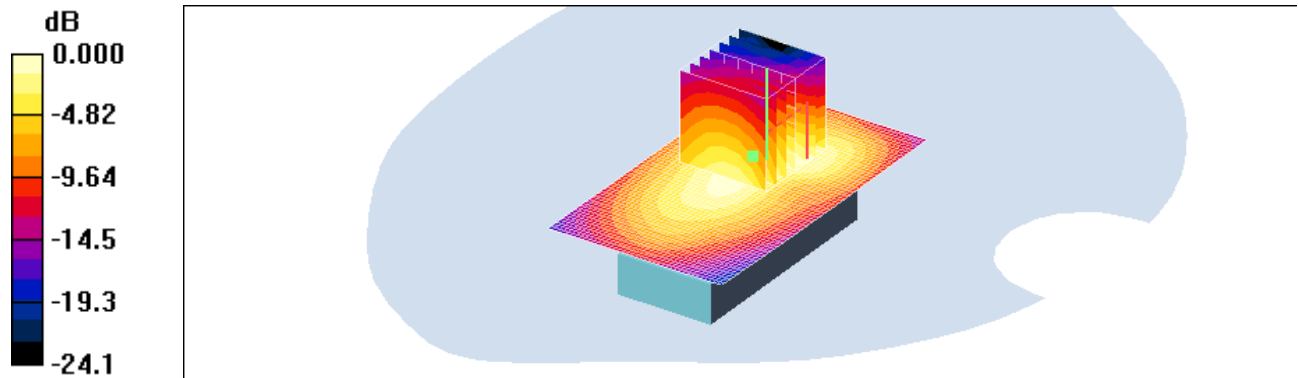
Reference Value = 20.5 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 2.15 W/kg

SAR(1 g) = 1.22 mW/g; SAR(10 g) = 0.646 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.37 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: USB Dongle
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug. 11, 2011

DUT: U602; Type: Bar; Serial: #1

Communication System: PCS 1900MHz FCC; Frequency: 1851.25 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 1851.25$ MHz; $\sigma = 1.51$ mho/m; $\epsilon_r = 53.3$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.6, 4.6, 4.6); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: 800/900 Phantom; Type: SAM

PCS EVDO Horizontal Down 25/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 1.39 mW/g

PCS EVDO Horizontal Down 25/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

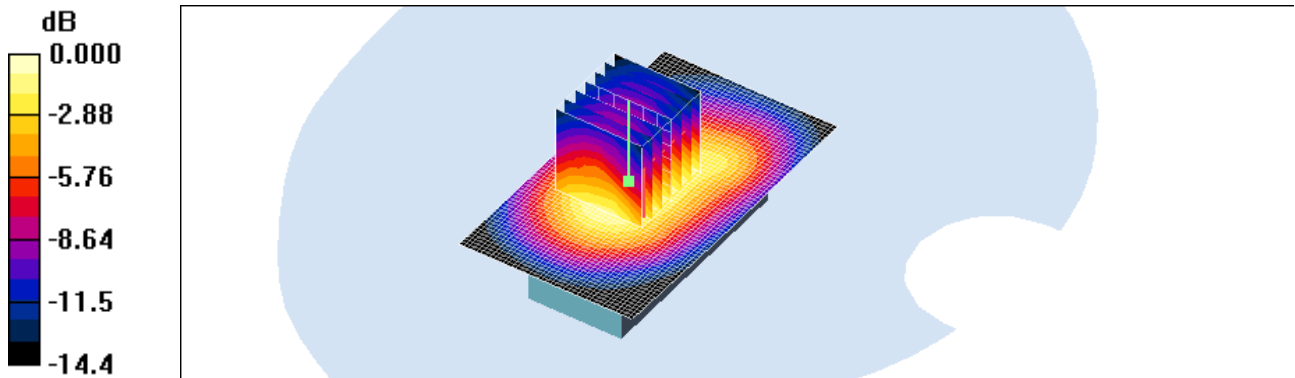
Reference Value = 19.8 V/m; Power Drift = -0.072 dB

Peak SAR (extrapolated) = 1.82 W/kg

SAR(1 g) = 1.2 mW/g; SAR(10 g) = 0.734 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.36 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: USB Dongle
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug. 11, 2011

DUT: U602; Type: Bar; Serial: #1

Communication System: PCS 1900MHz FCC; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.55$ mho/m; $\epsilon_r = 53.2$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.6, 4.6, 4.6); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: 800/900 Phantom; Type: SAM

PCS EVDO Horizontal Down 600/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.15 mW/g

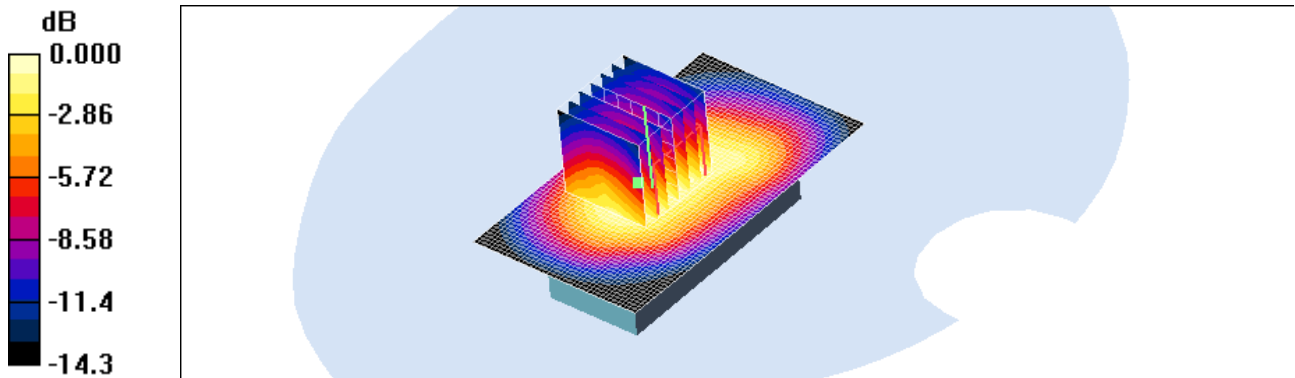
PCS EVDO Horizontal Down 600/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 17.7 V/m; Power Drift = -0.198 dB

Peak SAR (extrapolated) = 1.62 W/kg

SAR(1 g) = 1 mW/g; SAR(10 g) = 0.646 mW/g

Maximum value of SAR (measured) = 1.11 mW/g



0 dB = 1.11mW/g

Test Laboratory: HCT CO., LTD
EUT Type: USB Dongle
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug. 11, 2011

DUT: U602; Type: Bar; Serial: #1

Communication System: PCS 1900MHz FCC; Frequency: 1908.75 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 1908.75$ MHz; $\sigma = 1.58$ mho/m; $\epsilon_r = 53.1$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.6, 4.6, 4.6); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: 800/900 Phantom; Type: SAM

PCS EVDO Horizontal Down 1175/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 1.26 mW/g

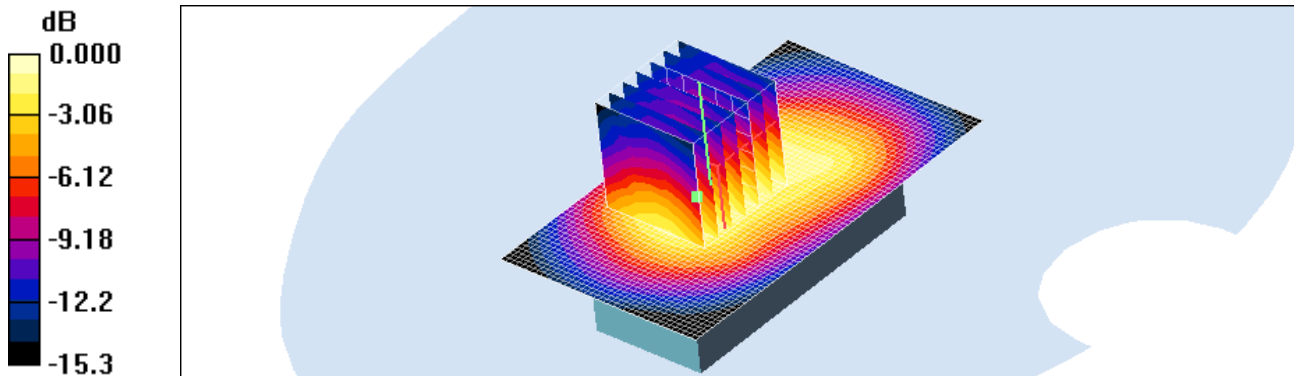
PCS EVDO Horizontal Down 1175/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 19.4 V/m; Power Drift = 0.054 dB

Peak SAR (extrapolated) = 1.57 W/kg

SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.714 mW/g

Maximum value of SAR (measured) = 1.24 mW/g



0 dB = 1.24mW/g

Test Laboratory: HCT CO., LTD
EUT Type: USB Dongle
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug. 11, 2011

DUT: U602; Type: side; Serial: #1

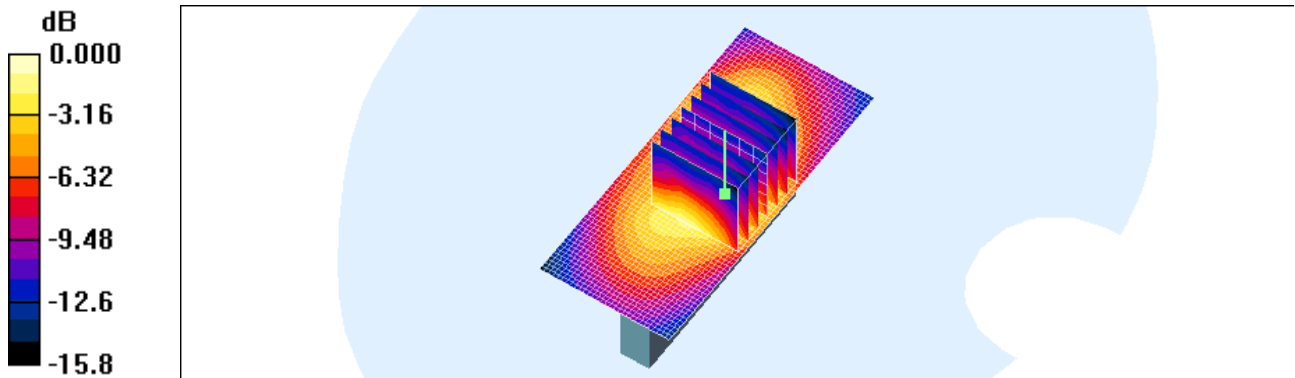
Communication System: PCS 1900MHz FCC; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.55$ mho/m; $\epsilon_r = 53.2$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.6, 4.6, 4.6); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: 800/900 Phantom; Type: SAM

PCS Vertical Front 600/Area Scan (31x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.735 mW/g

PCS Vertical Front 600/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.7 V/m; Power Drift = -0.061 dB
Peak SAR (extrapolated) = 0.940 W/kg
SAR(1 g) = 0.599 mW/g; SAR(10 g) = 0.344 mW/g
Maximum value of SAR (measured) = 0.657 mW/g



0 dB = 0.657mW/g

Test Laboratory: HCT CO., LTD
EUT Type: USB Dongle
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug. 11, 2011

DUT: U602; Type: side; Serial: #1

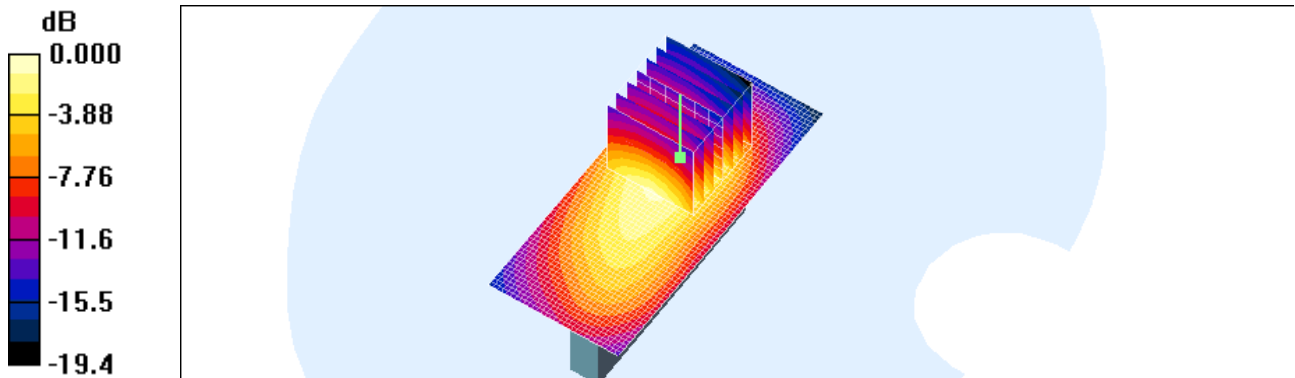
Communication System: PCS 1900MHz FCC; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.55$ mho/m; $\epsilon_r = 53.2$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.6, 4.6, 4.6); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: 800/900 Phantom; Type: SAM

PCS Vertical Back 600/Area Scan (31x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.794 mW/g

PCS Vertical Back 600/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.3 V/m; Power Drift = 0.020 dB
Peak SAR (extrapolated) = 1.16 W/kg
SAR(1 g) = 0.733 mW/g; SAR(10 g) = 0.413 mW/g
Maximum value of SAR (measured) = 0.812 mW/g



0 dB = 0.812mW/g

Test Laboratory: HCT CO., LTD
EUT Type: USB Dongle
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug. 11, 2011

DUT: U602; Type: Bar; Serial: #1

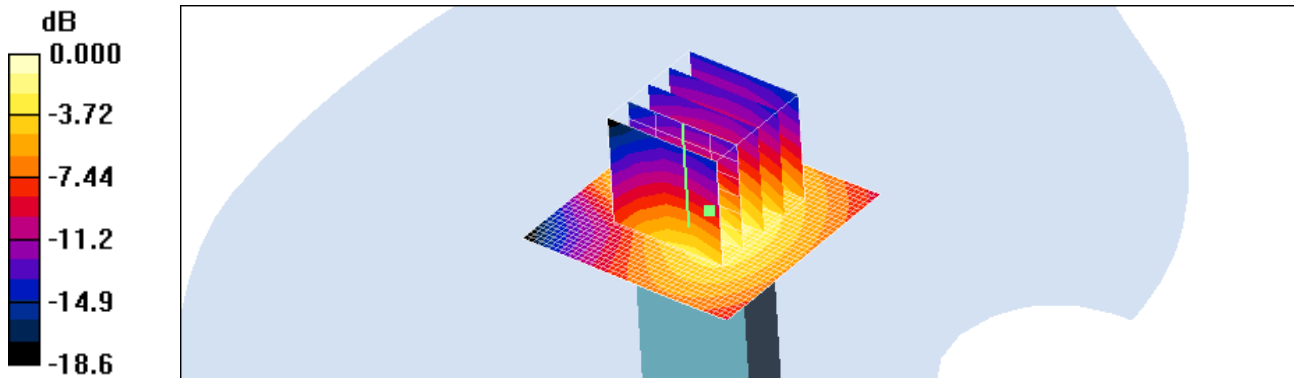
Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.55$ mho/m; $\epsilon_r = 53.2$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.6, 4.6, 4.6); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: 800/900 Phantom; Type: SAM

PCS Top 600/Area Scan (41x41x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.302 mW/g

PCS Top 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.3 V/m; Power Drift = -0.067 dB
Peak SAR (extrapolated) = 0.488 W/kg
SAR(1 g) = 0.284 mW/g; SAR(10 g) = 0.159 mW/g
Maximum value of SAR (measured) = 0.332 mW/g



0 dB = 0.332mW/g

Test Laboratory: HCT CO., LTD
EUT Type: USB Dongle
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug. 11, 2011

DUT: U602; Type: Bar; Serial: #1

Communication System: CDMA 835MHz FCC; Frequency: 824.7 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 825$ MHz; $\sigma = 0.939$ mho/m; $\epsilon_r = 56$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(6.12, 6.12, 6.12); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

CDMA EVDO Horizontal up 1013/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.19 mW/g

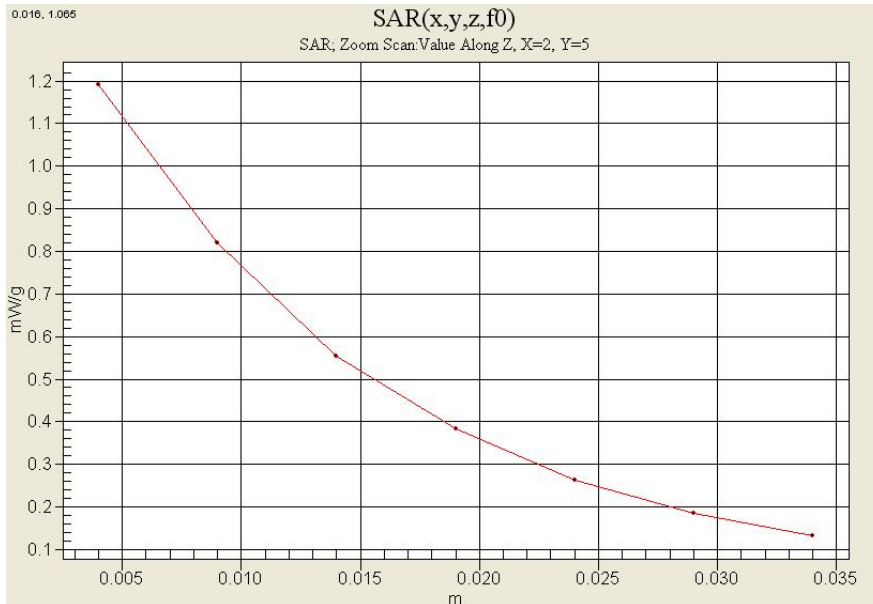
CDMA EVDO Horizontal up 1013/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 35.8 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.97 W/kg

SAR(1 g) = 1.12 mW/g; SAR(10 g) = 0.732 mW/g

Maximum value of SAR (measured) = 1.19 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: USB Dongle
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug. 11, 2011

DUT: U602; Type: Bar; Serial: #1

Communication System: PCS 1900MHz FCC; Frequency: 1908.75 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 1908.75$ MHz; $\sigma = 1.58$ mho/m; $\epsilon_r = 53.1$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.6, 4.6, 4.6); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: 800/900 Phantom; Type: SAM

PCS EVDO Horizontal Up 1175/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 1.44 mW/g

PCS EVDO Horizontal Up 1175/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

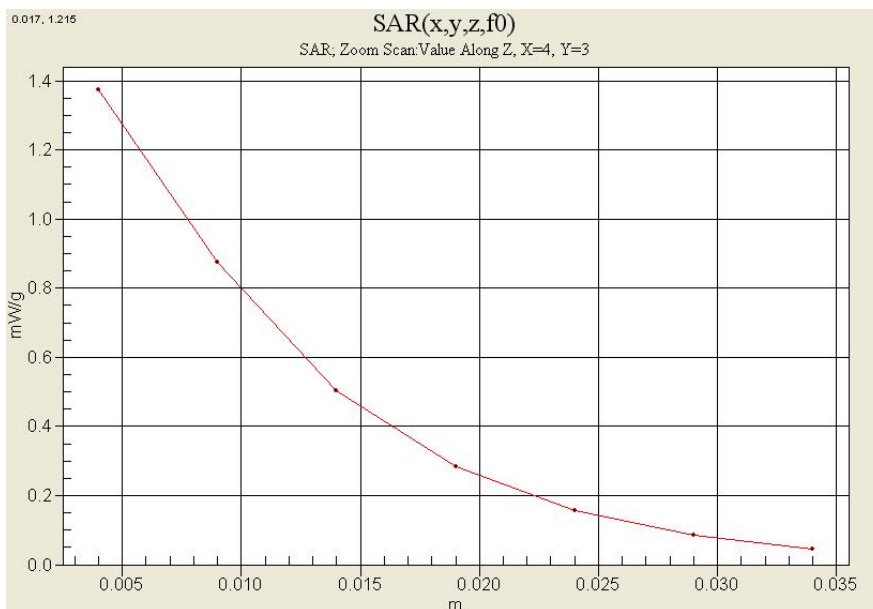
Reference Value = 20.5 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 2.15 W/kg

SAR(1 g) = 1.22 mW/g; SAR(10 g) = 0.646 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.37 mW/g



Attachment 2. – Dipole Validation Plots

■ Validation Data (835 MHz Body)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20dBm)
Liquid Temp: 21.2 °C
Test Date: Aug. 11, 2011

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 – SN:441

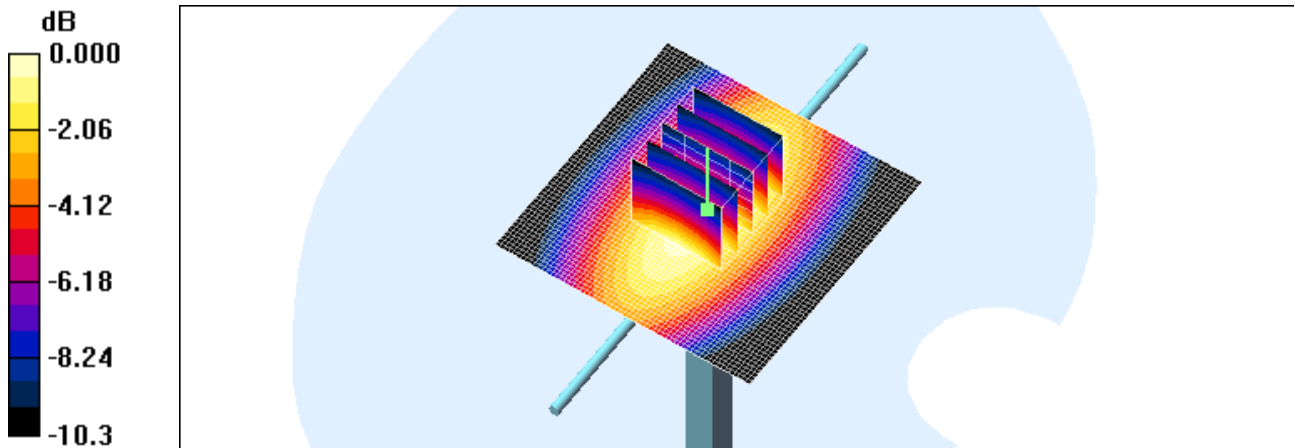
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.95 \text{ mho/m}$; $\epsilon_r = 55.9$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 – SN1609; ConvF(6.12, 6.12, 6.12); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

Validation 835MHz/Area Scan (61x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 1.04 mW/g

Validation 835MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 34.7 V/m; Power Drift = -0.051 dB
Peak SAR (extrapolated) = 1.38 W/kg
SAR(1 g) = 0.970 mW/g; SAR(10 g) = 0.645 mW/g
Maximum value of SAR (measured) = 1.05 mW/g



0 dB = 1.05mW/g

■ Validation Data (1900 MHz Body)

Test Laboratory: HCT CO., LTD
Input Power: 100 mW (20 dBm)
Liquid Temp: 21.2 °C
Test Date: Aug. 11, 2011

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 – SN:5d032

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.57 \text{ mho/m}$; $\epsilon_r = 53.1$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

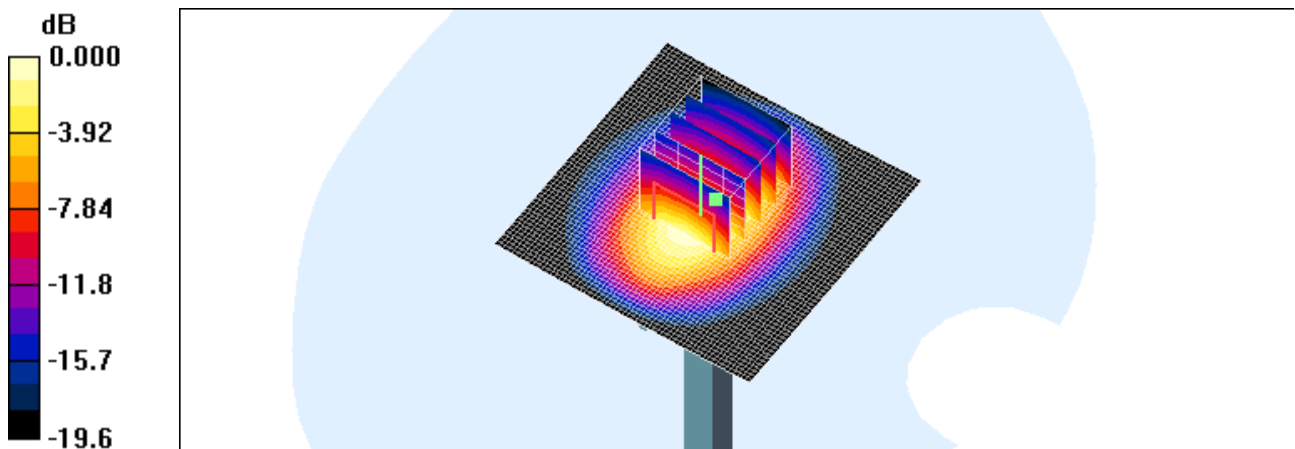
DASY4 Configuration:

- Probe: ET3DV6 – SN1609; ConvF(4.6, 4.6, 4.6); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

Dipole 1900MHz Validation/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 5.06 mW/g

Dipole 1900MHz Validation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 59.9 V/m; Power Drift = -0.012 dB
Peak SAR (extrapolated) = 6.74 W/kg
SAR(1 g) = 4.22 mW/g; SAR(10 g) = 2.23 mW/g

Maximum value of SAR (measured) = 4.78 mW/g



0 dB = 4.78mW/g

■ Dielectric Parameter (835 MHz Body)

Title U602
SubTitle CDMA835(Body)
Test Date Aug. 11, 2011

Frequency	e'	e''
800000000.0000	56.2420	20.6467
805000000.0000	56.2296	20.5859
810000000.0000	56.1663	20.5480
815000000.0000	56.0803	20.5501
820000000.0000	56.0484	20.5145
825000000.0000	56.0173	20.4699
830000000.0000	55.9391	20.4692
835000000.0000	55.9341	20.4515
840000000.0000	55.8705	20.4391
845000000.0000	55.8435	20.4337
850000000.0000	55.7799	20.3999
855000000.0000	55.7206	20.3953
860000000.0000	55.6917	20.3872
865000000.0000	55.6264	20.3823
870000000.0000	55.6125	20.3881
875000000.0000	55.5638	20.3612
880000000.0000	55.4909	20.3661
885000000.0000	55.4607	20.3816
890000000.0000	55.4787	20.3432
895000000.0000	55.4453	20.3044
900000000.0000	55.3882	20.2971

■ Dielectric Parameter (1900 MHz Body)

Title U602
SubTitle PCS1900(Body)
Test Date Aug. 11, 2011

Frequency	e'	e''
1850000000.0000	53.2769	14.6795
1855000000.0000	53.2487	14.7021
1860000000.0000	53.2378	14.7081
1865000000.0000	53.2078	14.7342
1870000000.0000	53.1849	14.7422
1875000000.0000	53.1786	14.7833
1880000000.0000	53.1513	14.7986
1885000000.0000	53.1403	14.8188
1890000000.0000	53.1239	14.8433
1895000000.0000	53.1023	14.8472
1900000000.0000	53.0983	14.8706
1905000000.0000	53.0857	14.8906
1910000000.0000	53.0729	14.9073
1915000000.0000	53.0788	14.9249
1920000000.0000	53.0616	14.9241
1925000000.0000	53.0279	14.9365
1930000000.0000	53.0096	14.9423
1935000000.0000	52.9755	14.9645
1940000000.0000	52.9633	14.9950
1945000000.0000	52.9624	15.0001
1950000000.0000	52.9331	15.0079

Attachment 3. – Probe Calibration Data

**Calibration Laboratory of
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Accreditation No.: **SCS 108**

Client **HCT (Dymstec)**

Certificate No: **ET3-1609_Nov10**

CALIBRATION CERTIFICATE

Object **ET3DV6 - SN:1609**

Calibration procedure(s) **QA CAL-01.v6, QA CAL-12.v6, QA CAL-23.v3 and QA CAL-25.v2
Calibration procedure for dosimetric E-field probes**

Calibration date: **November 24, 2010**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	20-Apr-10 (No. DAE4-660_Apr10)	Apr-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: November 25, 2010

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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORM_{x,y,z}*: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). *NORM_{x,y,z}* are only intermediate values, i.e., the uncertainties of *NORM_{x,y,z}* does not effect the E^2 -field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)_{x,y,z}* = *NORM_{x,y,z}* * *frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCP_{x,y,z}*: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *A_{x,y,z}*; *B_{x,y,z}*; *C_{x,y,z}*; *VR_{x,y,z}*: *A*, *B*, *C* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF* and *Boundary Effect Parameters*: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORM_{x,y,z}* * *ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

ET3DV6 SN:1609

November 24, 2010

Probe ET3DV6

SN:1609

Manufactured:	July 21, 2001
Last calibrated:	March 17, 2009
Modified:	November 17, 2010
Recalibrated:	November 24, 2010

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1609

November 24, 2010

DASY/EASY - Parameters of Probe: ET3DV6 SN:1609
Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.98	1.88	1.83	± 10.1%
DCP (mV) ^B	99.1	97.1	98.2	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	152.5	± 2.6 %
			Y	0.00	0.00	1.00	144.6	
			Z	0.00	0.00	1.00	150.5	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the maximum deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

ET3DV6 SN:1609

November 24, 2010

DASY/EASY - Parameters of Probe: ET3DV6 SN:1609

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz] ^c	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
300	± 50 / ± 100	45.3 ± 5%	0.87 ± 5%	7.94	7.94	7.94	0.30	1.54 ± 13.3%
450	± 50 / ± 100	43.5 ± 5%	0.87 ± 5%	7.13	7.13	7.13	0.21	2.35 ± 13.3%
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	6.27	6.27	6.27	0.52	2.06 ± 11.0%
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	6.15	6.15	6.15	0.42	2.33 ± 11.0%
1750	± 50 / ± 100	40.1 ± 5%	1.37 ± 5%	5.51	5.51	5.51	0.53	2.63 ± 11.0%
1900	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	5.26	5.26	5.26	0.68	2.21 ± 11.0%
1950	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	5.05	5.05	5.05	0.70	2.24 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.61	4.61	4.61	0.99	1.70 ± 11.0%

^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

ET3DV6 SN:1609

November 24, 2010

DASY/EASY - Parameters of Probe: ET3DV6 SN:1609

Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz] ^C	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
300	± 50 / ± 100	58.2 ± 5%	0.92 ± 5%	7.65	7.65	7.65	0.28	2.26 ± 13.3%
450	± 50 / ± 100	56.7 ± 5%	0.94 ± 5%	7.50	7.50	7.50	0.15	2.30 ± 13.3%
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	6.12	6.12	6.12	0.54	2.10 ± 11.0%
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	6.05	6.05	6.05	0.42	2.49 ± 11.0%
1750	± 50 / ± 100	53.4 ± 5%	1.49 ± 5%	4.83	4.83	4.83	0.60	3.10 ± 11.0%
1900	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.60	4.60	4.60	0.84	2.40 ± 11.0%
1950	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.74	4.74	4.74	0.85	2.50 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	4.20	4.20	4.20	0.99	1.82 ± 11.0%

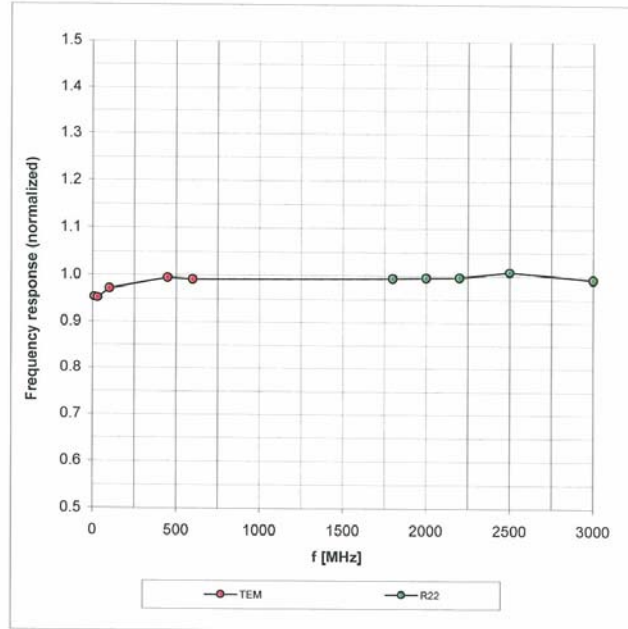
^C The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

ET3DV6 SN:1609

November 24, 2010

Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)

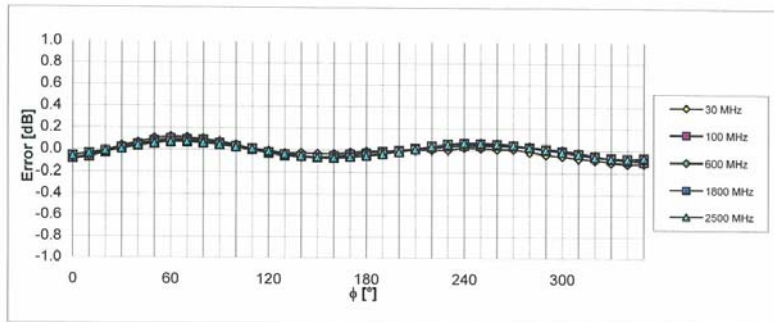
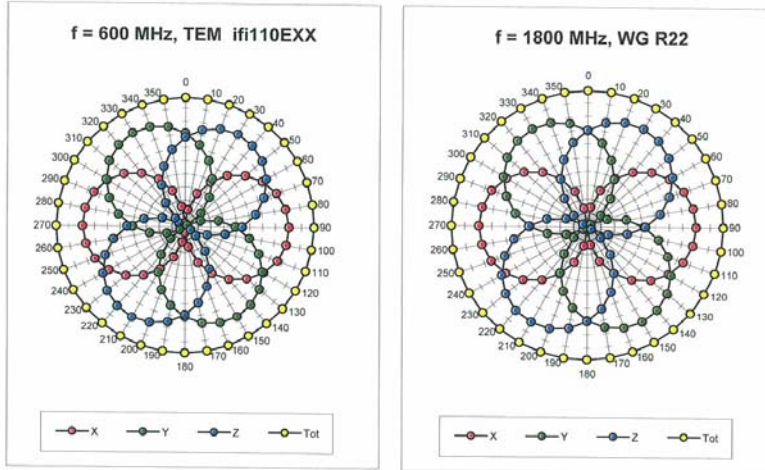


Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

ET3DV6 SN:1609

November 24, 2010

Receiving Pattern (ϕ), $\vartheta = 0^\circ$

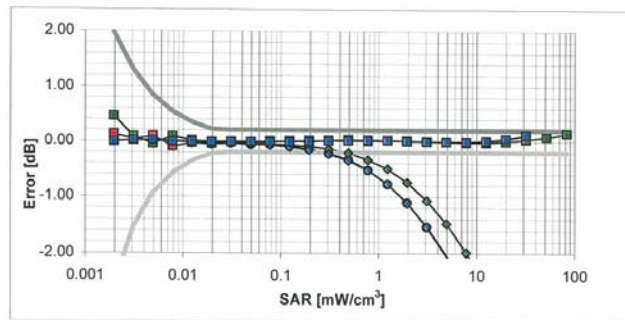
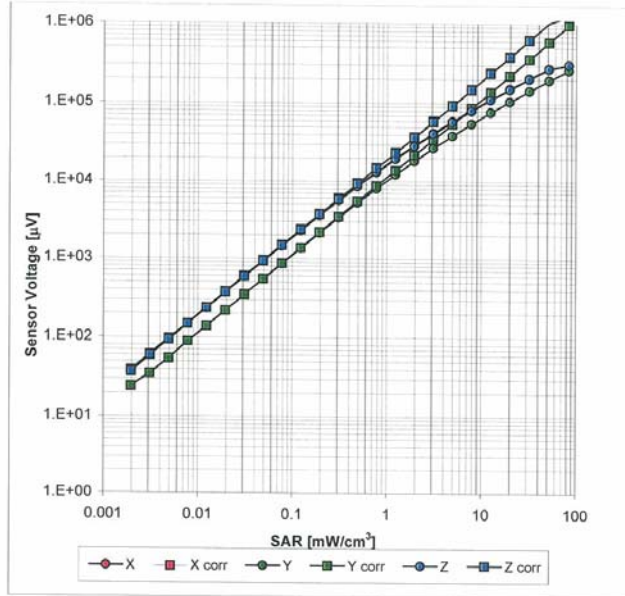


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

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Dynamic Range f(SAR_{head})
(TEM cell, f = 900 MHz)

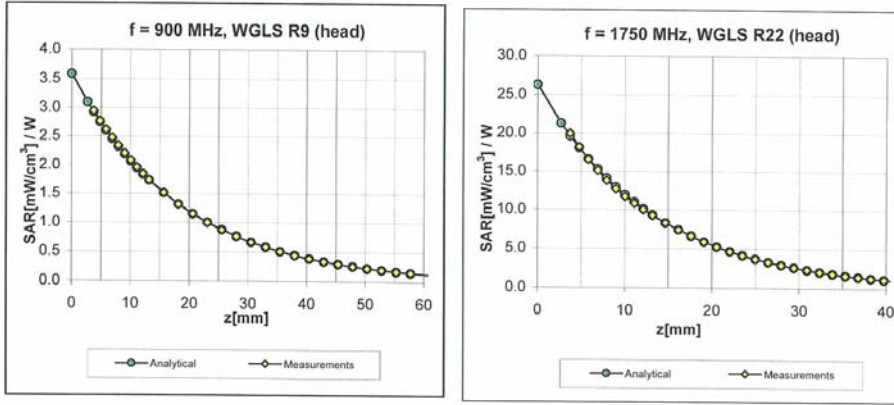


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

ET3DV6 SN:1609

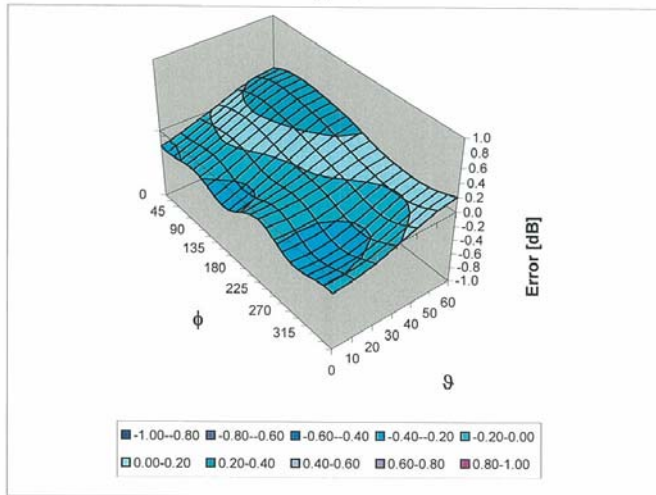
November 24, 2010

Conversion Factor Assessment



Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ (k=2)

ET3DV6 SN:1609

November 24, 2010

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	3.7 mm

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Additional Conversion Factors for Dosimetric E-Field Probe

Type:

ET3DV6

Serial Number:

1609

Place of Assessment:

Zurich

Date of Assessment:

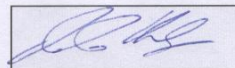
November 26, 2010

Probe Calibration Date:

November 24, 2010

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1750 MHz.

Assessed by:



ET3DV6-SN:1609

Page 1 of 2

November 26, 2010

Schmid & Partner Engineering AG

s p e a g

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Dosimetric E-Field Probe ET3DV6 SN:1609

Conversion factor (\pm standard deviation)

150 \pm 50 MHz *ConvF* 8.4 \pm 10%

$\epsilon_r = 52.3$
 $\sigma = 0.76 \text{ mho/m}$
(head tissue)

150 \pm 50 MHz *ConvF* 8.1 \pm 10%

$\epsilon_r = 61.9$
 $\sigma = 0.80 \text{ mho/m}$
(body tissue)

Important Note:

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.

Please see also DASY4 Manual.

Attachment 4. – Dipole Calibration Data

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Accreditation No.: SCS 108

Client **HCT (Dymstec)**

Certificate No: D835V2-441_May11

CALIBRATION CERTIFICATE

Object **D835V2 - SN: 441**

Calibration procedure(s) **QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **May 16, 2011**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by: **Name** Dimce Iliev **Function** Laboratory Technician **Signature** *[Signature]*

Approved by: **Name** Katja Pokovic **Function** Technical Manager **Signature** *[Signature]*

Issued: May 16, 2011

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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:* SAR measured at the stated antenna input power.
- SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz \pm 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 \pm 0.2) °C	40.4 \pm 6 %	0.88 mho/m \pm 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.31 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.34 mW / g \pm 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.51 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.09 mW / g \pm 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 \pm 0.2) °C	53.9 \pm 6 %	1.00 mho/m \pm 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.43 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.45 mW / g \pm 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.60 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	6.27 mW / g \pm 16.5 % (k=2)

Appendix**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	50.2 Ω - 9.8 j Ω
Return Loss	- 20.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.3 Ω - 10.3 j Ω
Return Loss	- 18.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.374 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 09, 2001

DASY5 Validation Report for Head TSL

Date: 16.05.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 441Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL900Medium parameters used: $f = 835$ MHz; $\sigma = 0.88$ mho/m; $\epsilon_r = 40.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

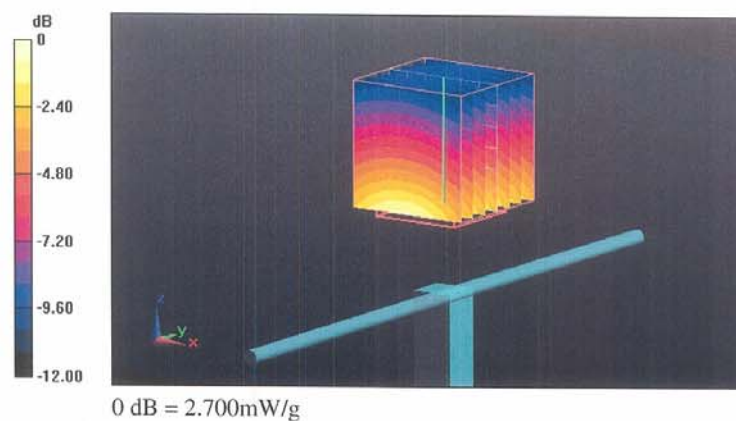
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.041 V/m; Power Drift = 0.03 dB

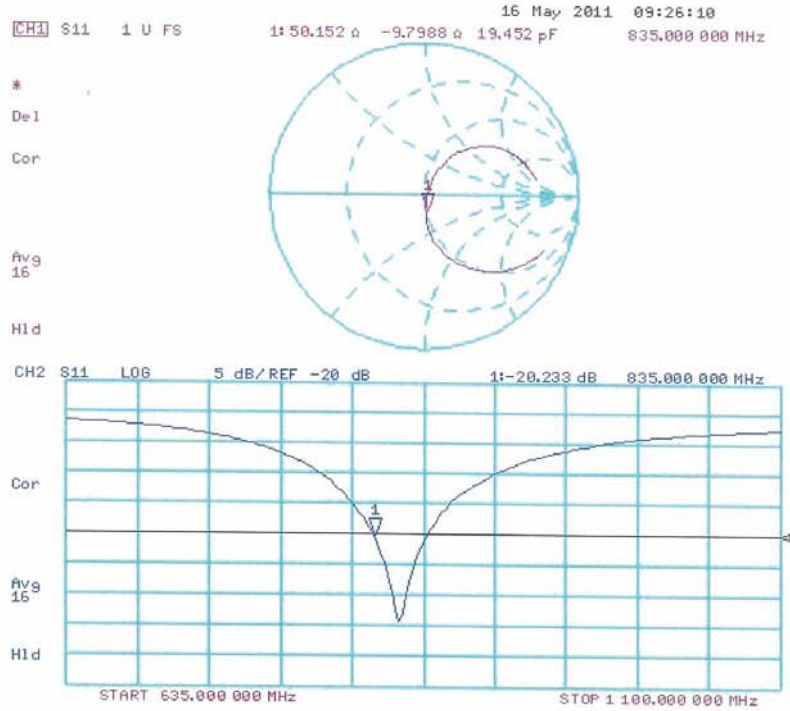
Peak SAR (extrapolated) = 3.442 W/kg

SAR(1 g) = 2.31 mW/g; SAR(10 g) = 1.51 mW/g

Maximum value of SAR (measured) = 2.703 mW/g



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 16.05.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:441Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL900Medium parameters used: $f = 835$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 53.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

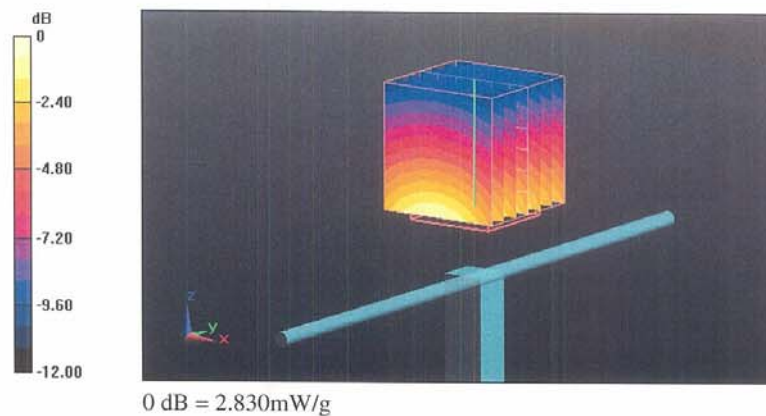
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.302 V/m; Power Drift = 0.02 dB

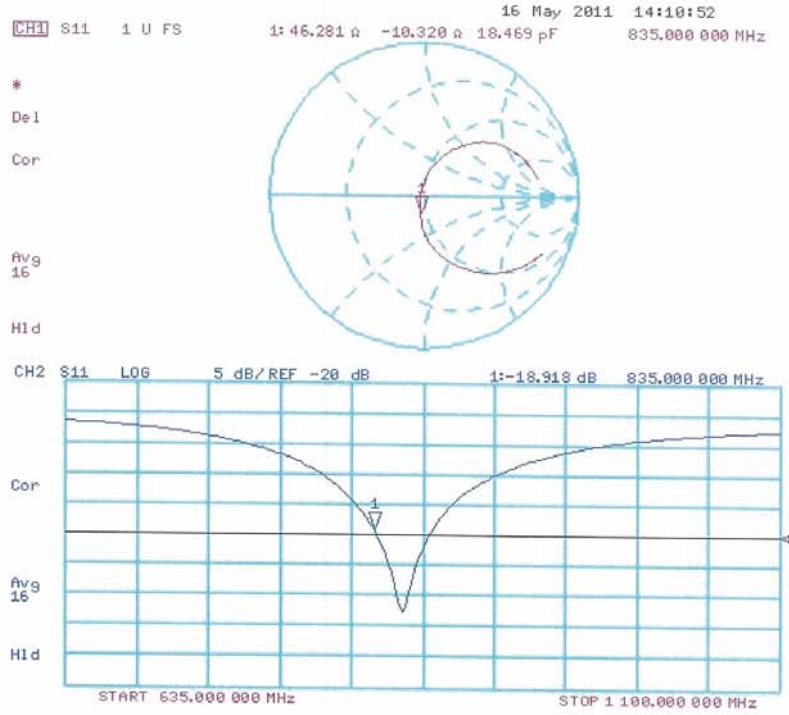
Peak SAR (extrapolated) = 3.553 W/kg

SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.6 mW/g

Maximum value of SAR (measured) = 2.833 mW/g



Impedance Measurement Plot for Body TSL



**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



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Accreditation No.: **SCS 108**

Client **HCT (Dymstec)**

Certificate No: **D1900V2-5d032_Jul11**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d032**

Calibration procedure(s) **QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **July 22, 2011**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by:	Name Dimce Iliev	Function Laboratory Technician	Signature
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 2, 2011

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland



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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz \pm 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 \pm 0.2) °C	39.1 \pm 6 %	1.42 mho/m \pm 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.1 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	39.9 mW / g \pm 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.29 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	21.0 mW / g \pm 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 \pm 0.2) °C	52.3 \pm 6 %	1.53 mho/m \pm 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.3 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	40.9 mW / g \pm 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.39 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	21.5 mW / g \pm 16.5 % (k=2)

Appendix**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	52.6 Ω + 6.5 j Ω
Return Loss	- 23.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.6 Ω + 6.0 j Ω
Return Loss	- 22.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.190 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 17, 2003

DASY5 Validation Report for Head TSL

Date: 20.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d032

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

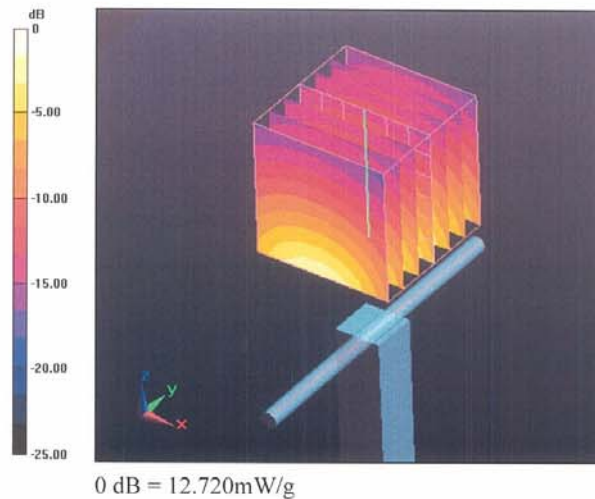
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.253 V/m; Power Drift = 0.03 dB

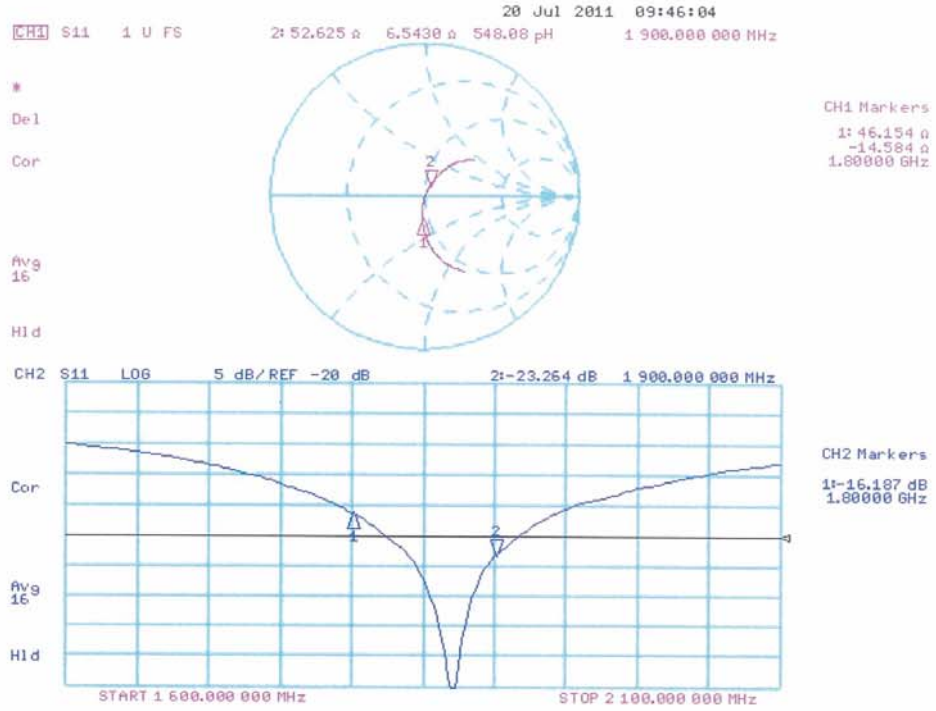
Peak SAR (extrapolated) = 18.469 W/kg

SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.29 mW/g

Maximum value of SAR (measured) = 12.721 mW/g



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 22.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d032

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

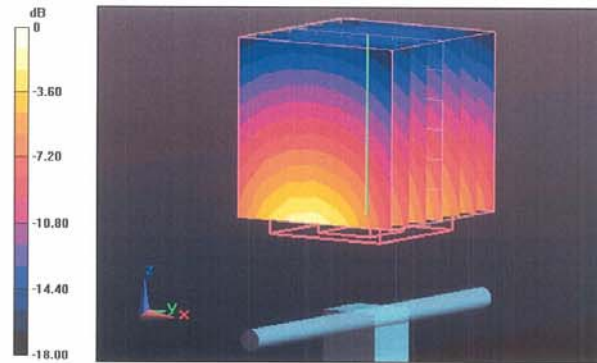
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.827 V/m; Power Drift = 0.0078 dB

Peak SAR (extrapolated) = 18.111 W/kg

SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.39 mW/g

Maximum value of SAR (measured) = 12.898 mW/g



Impedance Measurement Plot for Body TSL

