TEST REPORT

Equipment Under Test	:	Dual Band CDMA 1xEV-DO USB Modem
Model No.	:	CDU-650
Applicant	:	C-motech
Address of Applicant	:	5F B/D. Etronix 17-10 Yoido-dong, Youngdungpo-gu, Seoul, South Korea, 150-874
Date of Receipt	:	2006-10-18
Date of Test(s)	:	2006-09-15 ~ 2006-10-16
Date of Issue	:	2006-10-18

FCC OET Bulletin 65 supplement C,

ANSI/IEEE C95.1, C95.3

In the configuration tested, the EUT complied with the standards specified above.

Remarks:

Tested by	**:**	**Feel Jeong**		**2006-10-18**
Approved by	**:**	**Albert Lim**		**2006-10-18**

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APPENDIX

A. DASY4 SAR Report
B. Uncertainty Analysis
C. Photographs of EUT & EUT's Test Setup
D. Calibration certificate

1. General Information

1.1 Testing Laboratory

SGS Testing Korea Co., Ltd.
Wireless Div. 2FL, 18-34, Sanbon-dong, Gunpo-Si, Gyeonggi-do, Korea 435-040
Telephone : +82 +31 428 5700
FAX : +82 +31 427 2371
Homepage : www.sgstesting.co.kr

1.2 Details of Applicant

Manufacturer : C-motech Co., Ltd
Address : 5F B/D. Etronix 17-10 Yoido-dong, Youngdungpo-gu, Seoul, South Korea, 150-874
Contact Person : Bahn Gil-Sung
Phone No. : 82-2-785-5540
Fax No. : 82-2-785-2369

1.3 Description of EUT(s)

EUT Type	Dual Band CDMA 1x-EVDO Wireless USB modem
Model	CDU-650
Serial Number	N/A
Hardware Version	-
Software Version	-
Modulation Method	OQPSK, QPSK
Average RF Conducted Power	CDMA835: 23.52 dBm PCS1900: 22.85 dBm
Tx Frequency Range	**CDMA835: Tx: 824 MHz ~ 849 MHz** **PCS1900 : Tx : 1850 MHz ~ 1910 MHz**
Rx Frequency Range	**CDMA835: Rx : 869 MHz ~ 894 MHz** **PCS1900 : Rx : 1930 ~ 1990 MHz**
Channel Spacing	1.23 MHz
Antenna Type	Monopole Antenna
Dimensions	75mm* 30mm*10mm

1.4 The SAR Measurement System

A photograph of the SAR measurement System is given in Fig. a. This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (Speag Dasy 4 professional system).

A Model ET3DV6 1782 E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ (|Ei|2)/ ρ where σ and ρ are the conductivity and mass density of the tissue-simulant. The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Staubli RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimeter probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc.

The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

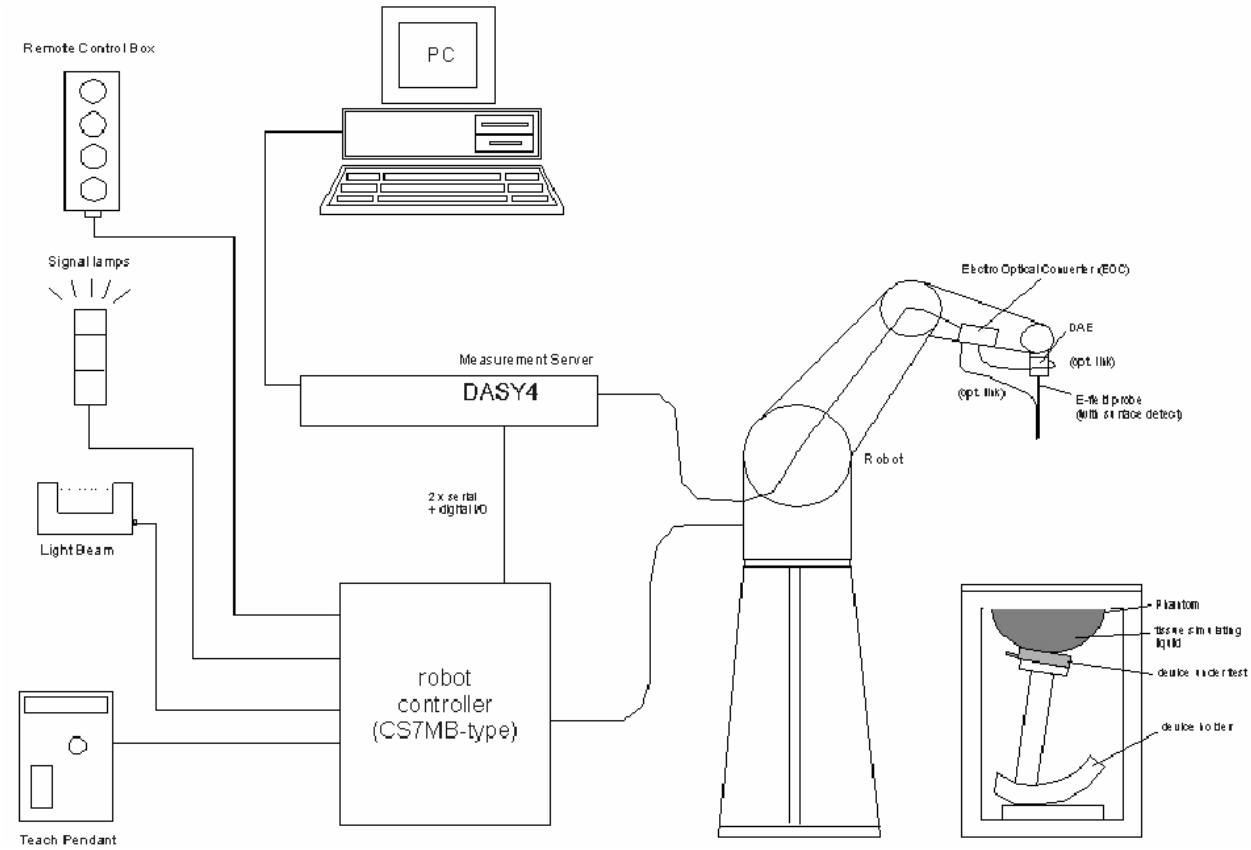


Fig a. The microwave circuit arrangement used for SAR system verification

- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- DASY4 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

1.5 Configuration for test operation

The device was controlled by using a Mobile Test Unit (E5515C). Communication between the device and the tester was established by air link. Measurements were performed on the lowest, middle and highest channels of the operating band. The EUT was set to maximum power level during all tests. The DASY4 system measures power drift during SAR testing by comparing e-field in the same location at the beginning and at the end of measurement.

1.6 EVALUATION PROCEDURES

The entire evaluation of the spatial peak values is performed within the Post-processing engine (SEMCAD). The system always gives the maximum values for the 1 g and 10 g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

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

6. The calculation of the averaged SAR within masses of 1g and 10g.

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

In the Area Scan, the gradient of the interpolation function is evaluated to find all the extreme of the SAR distribution. The uncertainty on the locations of the extreme is less than 1/20 of the grid size. Only local maximum within –2 dB of the global maximum are searched and passed for the Cube Scan measurement.

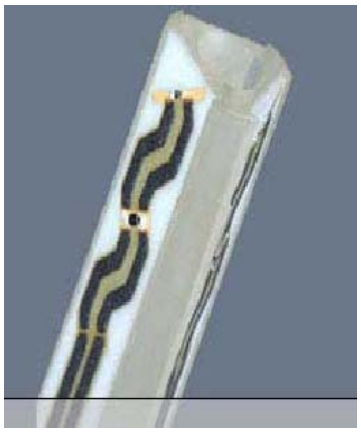
In the Cube Scan, the interpolation function is used to extrapolate the Peak SAR from the lowest measurement points to the inner phantom surface (the extrapolation distance). The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5mm.

The maximum search is automatically performed after each area scan measurement. It is based on splines in two or three dimensions. The procedure can find the maximum for most SAR distributions even with relatively large grid spacing. After the area scanning measurement, the probe is automatically moved to a position at the interpolated maximum. The following scan can directly use this position for reference, e.g., for a finer resolution grid or the cube evaluations. The 1g and 10g peak evaluations are only available for the predefined cube 7x7x7 scans. The routines are verified and optimized for the grid dimensions used in these cube measurements. The measured volume of 30x30x30mm contains about 30g of tissue. The first procedure is an extrapolation (incl. Boundary correction) to get the points between the lowest measured plane and the surface. The next step uses 3D interpolation to get all points within the measured volume. In the last step, a 1g cube is placed numerically into the volume and its averaged SAR is calculated. This cube is the moved around until the highest averaged SAR is found. If the highest SAR is found at the edge of the measured volume, the system will issue a warning: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

1.7 System Components

ET3DV6 E-Field Probe

Construction : Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g. glycol).
Calibration : In air from 10 MHz to 2.5 GHz In brain simulating tissue at frequencies of 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 to probe axis)
Dynamic Range : 5 μW/g to >100 mW/g; Linearity: ±0.2 dB
Srfce. Detect : ±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 dosimetry up to 3 GHz Compliance tests of mobile phone


ET3DV6 E-Field Probe

***NOTE:** The Probe parameters have been calibrated by the SPEAG. Please reference "APPENDIX D" for the Calibration Certification Report.

SAM Phantom

Construction: The SAM Phantom is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. This SAM phantom defined in IEEE 1528-2003, EN 50361:2001 and IEC 62209.
Shell Thickness: 2.0 ± 0.1 mm
Filling Volume: Approx. 25 liters
Dimensions 810mm(H); 1000mm(L); 500 mm(D)


SAM Phantom

DEVICE HOLDER

Construction

In combination with the Twin SAM Phantom V4.0 / V4.0C, the Mounting Device (made from POM) enables the rotation of the mounted transmitter in spherical coordinates, whereby the rotation point is the ear opening. The devices can be easily and accurately positioned according to EN 50361:2001 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 configuration. To produce worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.

Device Holder

1.8 Tissue Simulant Fluid for the Frequency Band

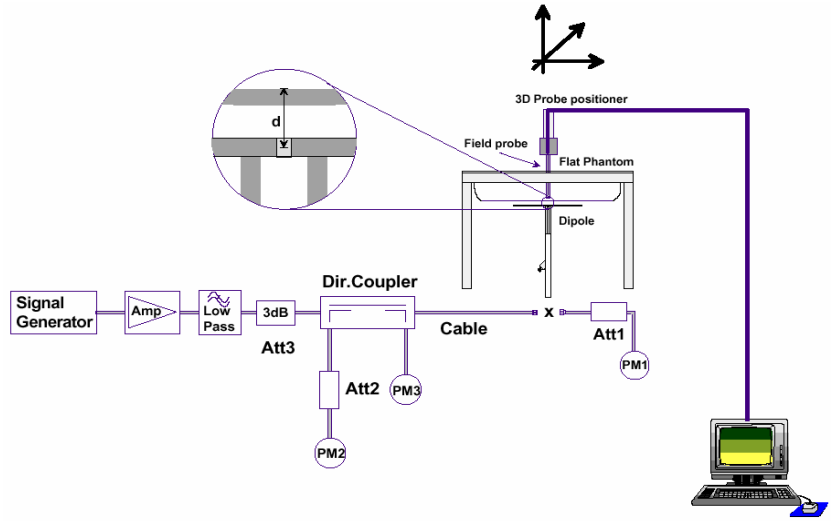
The dielectric properties for this simulant fluid were measured by using the Agilent Model 85070D Dielectric Probe (rates frequency band 200 MHz to 20 GHz) in conjunction with Agilent E5070B Network Analyzer (300 kHz-3000 MHz) by using a procedure detailed in Section 1.5.

	835 MHz Brain			835 MHz Muscle			1900 MHz Brain			1900 MHz Muscle		
	Target	Measured	Deviation (%)	Target	Measured	Deviation (%)	Target	Measured	Deviation (%)	Target	Measured	Deviation (%)
Dielectric Constant: ε	41.5	40.1	-3.4	55.2	53.0	-4.0	40.0	39.1	-2.3	53.3	53.3	+0.0
Conductivity : σ	0.90	0.91	+1.1	0.97	0.93	-4.1	1.40	1.44	+2.9	1.52	1.59	+4.6
Liquid Temperature (°C)	-	21.1	-	-	21.1	-	-	21.3	-	-	21.3	-
Date	-	Sep.15, 2006	-	-	Sep.15, 2006		-	Sep.18, 2006		-	Sep.18, 2006	
Dielectric Constant: ε	41.5	43.2	+4.1	55.2	53.7	-2.7	40.0	38.5	-3.8	53.3	53.1	-0.4
Conductivity : σ	0.90	0.92	+2.2	0.97	0.94	-3.1	1.40	1.37	-2.1	1.52	1.49	-2.0
Liquid Temperature (°C)	-	21.4	-	-	21.4	-	-	21.6	-	-	21.6	-
Date	-	Oct.13, 2006	-	-	Oct 13, 2006		-	Oct.15, 2006		-	Oct.15, 2006	

1.9 SAR System Verification

The microwave circuit arrangement for system verification is sketched in Fig. b. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. These tests were done at 900, 1800 and 1900 MHz. The tests were conducted on the same days as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the table 1 (SAR values are normalized to 1W forward power delivered to the dipole). During the tests, the ambient temperature of the laboratory was in the range 22.7 °C, the relative humidity was in the range 60% and the liquid depth above the ear reference points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

Dipole Antenna



[Note]

d:
Distance with Liquid to Dipole

300MHz ≤ f ≥ 1GHz
d = 15mm

1GHz ≤ f ≥ 3GHz
d = 10mm

Fig b. The microwave circuit arrangement used for SAR system verification

System Validation Results

Validation Kit	Tissue	Target SAR 1g (1 mW/g)	Measured SAR 1g (1 mW/g)	Deviation (%)	Date	Liquid Temp. (°C)
D835V2 S/N: 490	835 MHz Brain	2.375 mW/g	**2.400**	**+1.1**	Sep.15, 2006	21.1
D1900V2 S/N:5d033	1900 MHz Brain	9.925 mW/g	**9.590**	**-3.5**	Sep.18, 2006	21.3
D835V2 S/N: 490	835 MHz Brain	2.375 mW/g	**2.320**	**-2.3**	Oct.13, 2006	21.4
D1900V2 S/N:5d033	1900 MHz Brain	9.925 mW/g	**9.710**	**-2.2**	Oct.15, 2006	21.6

Table 1. Results system validation

1.10 Test Standards and Limits

According to FCC 47CFR §2.1093(d) The limits to be used for evaluation are based generally on criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (‘‘SAR’’) in Section 4.2 of ‘‘IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz,’’ ANSI/IEEE C95.1–1992, Copyright 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. 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, Section 17.4.5. Copyright NCRP, 1986, Bethesda, Maryland 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. The criteria to be used are specified in paragraphs (d)(1) and (d)(2) of this section and shall apply for portable devices transmitting in the frequency range from 100 kHz to 6 GHz. Portable devices that transmit at frequencies above 6 GHz are to be evaluated in terms of the MPE limits specified in § 1.1310 of this chapter. Measurements and calculations to demonstrate compliance with MPE field strength or power density limits for devices operating above 6 GHz should be made at a minimum distance of 5 cm from the radiating source.

(1) Limits for Occupational/Controlled exposure: 0.4 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 8 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 20 W/kg, as averaged over an 10 grams of tissue (defined as a tissue volume in the shape of a cube). Occupational/Controlled limits apply when persons are exposed as a consequence of their employment provided these persons are fully aware of and exercise control over their exposure. Awareness of exposure can be accomplished by use of warning labels or by specific training or education through appropriate means, such as an RF safety program in a work environment.

(2) Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). General Population/Uncontrolled limits apply when the general public may be exposed, or when persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or do not exercise control over their exposure. Warning labels placed on consumer devices such as cellular telephones will not be sufficient reason to allow these devices to be evaluated subject to limits for occupational/controlled exposure in paragraph (d)(1) of this section.(Table .4)

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR (Partial-Body)	1.60 m W/g	8.00 m W/g
Spatial Average SAR (Whole Body)	0.08 m W/g	0.40 m W/g
Spatial Peak SAR (Hands/Feet/Ankles/Wrists)	4.00 m W/g	20.00 m W/g

Table .4 RF exposure limits

Notes:

1. Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.

2. Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.

2. Instruments List

Manufacturer	Device	Type	Serial Number	Due date of Calibration
Stäubli	Robot	RX90BL	F03/5W05A1/A/01	N/A
Schmid& Partner Engineering AG	Dosimetric E-Field Probe	ET3DV6	1782	May 02, 2007
Schmid& Partner Engineering AG	835 MHz System Validation Dipole	D835V2	490	August 14, 2007
Schmid& Partner Engineering AG	1900 MHz System Validation Dipole	D1900V2	5d033	August 16, 2007
Schmid& Partner Engineering AG	Data acquisition Electronics	DAE4	614	August 22,2007
Schmid& Partner Engineering AG	Software	DASY 4 V4.6	-	N/A
Schmid& Partner Engineering AG	Phantom	SAM Twin Phantom V4.0	TP-1300	N/A
Schmid& Partner Engineering AG	Phantom	SAM Twin Phantom V4.0	TP-1299	N/A
Agilent	Network Analyzer	E5070B	MY42100282	May 20, 2007
Agilent	Dielectric Probe Kit	85070D	2184	N/A
Agilent	Dual Direction Coupler	778D	50454	December 8, 2006
Agilent	Power Meter	E4419B	GB43311126 GB43311125	December 8, 2006
Agilent	Power Sensor	E9300H	MY41495307 MY41495308 MY41495314	December 8, 2006
Agilent	Mobile Test Unit	E5515C	GB43345198	May 20, 2007

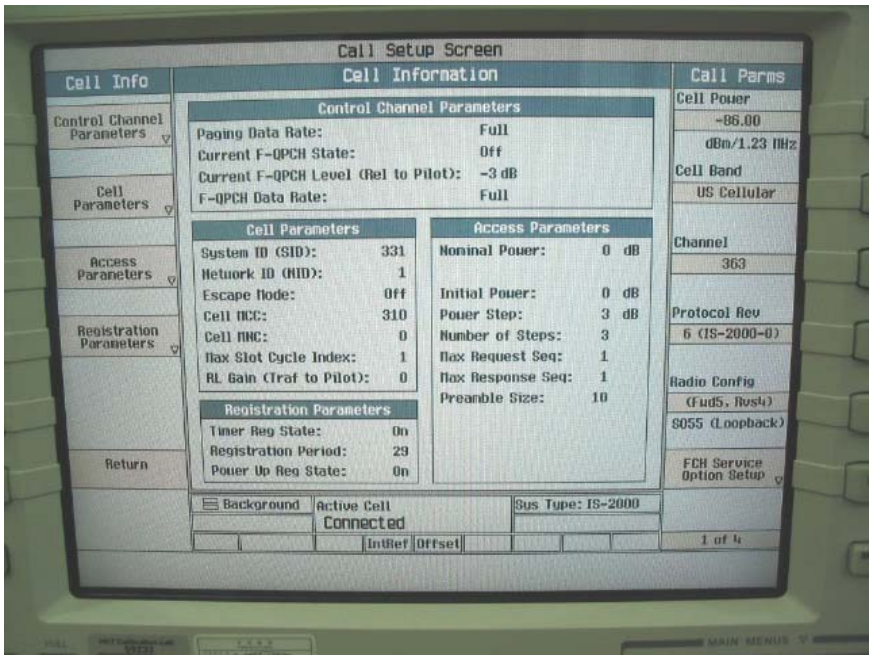
3. SAR Measurement Results

SAR Measurement Conditions for CDMA 1x

These procedures were followed according to FCC “SAR Measurement Procedures for 3G Device”, May 2006.

Output Power Verification

See 3GPP2 C.S0011/TIA-98-E as recommended by "SAR Measurement Procedures for 3G Devices", May 2006. Maximum output power is verified on the High, Middle and Low channels according to procedures defined in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E. SO55 tests were measured with power control bits in “All Up” condition.
Test procedure refers to the picture below:

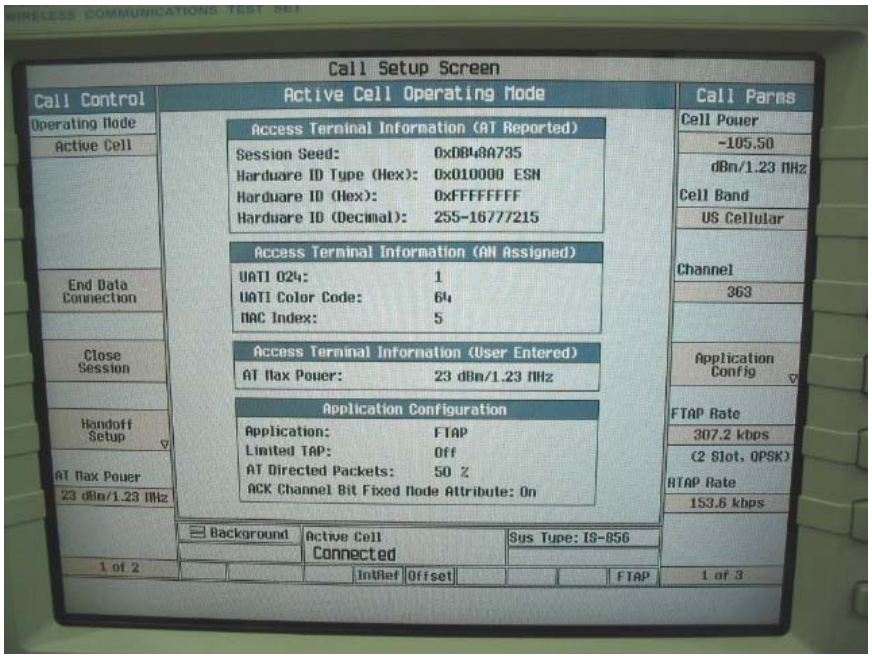


SAR Measurement Conditions for 1xEV-DO

These procedures were followed according to FCC "SAR Measurement Procedures for 3G Device", May 2006.

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. tests were measured with power control bits in "All Up" condition. Test procedure refers to the picture below:



Average Power Output Table (CDMA 1x)

Band	Channel	CDMA2000 RC	S02 (dBm)	S09 (dBm)	S032(+SCH) (dBm)	S032(+F-SCH) (dBm)	S055 (dBm)
CDMA	1013	RC1	22.15	-	-	-	22.10
		RC2	-	22.12	-	-	22.01
		RC3	22.64	-	22.71	22.43	22.41
		RC4	22.31	-	22.40	22.43	22.41
		RC5	-	22.81	-	-	23.52
	363	RC1	22.91	-	-	-	22.98
		RC2	-	23.10	-	-	23.01
		RC3	23.14	-	23.01	23.10	23.00
		RC4	23.07	-	23.01	23.10	23.16
		RC5	-	22.72	-	-	23.49
	777	RC1	21.89	-	-	-	21.94
		RC2	-	21.82	-	-	21.71
		RC3	22.20	-	22.10	22.21	22.18
		RC4	21.42	-	21.41	21.49	22.39
		RC5	-	22.80	-	-	23.40
Band	**Channel**	**CDMA2000 RC**	**S02 (dBm)**	**S09 (dBm)**	**S032(+SCH) (dBm)**	**S032(+F-SCH) (dBm)**	**S055 (dBm)**
PCS	25	RC1	22.80	-	-	-	22.76
		RC2	-	22.61	-	-	22.56
		RC3	22.54	-	22.51	22.60	22.64
		RC4	22.79	-	22.80	22.71	22.84
		RC5	-	22.70	-	-	22.85
	600	RC1	22.20	-	-	-	22.28
		RC2	-	22.25	-	-	22.07
		RC3	22.00	-	22.07	22.10	22.17
		RC4	22.10	-	22.21	22.18	22.10
		RC5	-	22.10	-	-	22.30
	1175	RC1	20.11	-	-	-	20.58
		RC2	-	20.82	-	-	20.61
		RC3	21.52	-	21.61	21.64	21.54
		RC4	21.37	-	21.40	21.80	21.43
		RC5	-	21.21	-	-	21.87

Average Power Output Table (1xEV-DO)

Band	Channel	Conducted Power(dBm)
CDMA	1013	21.22
	363	20.90
	777	21.36
PCS	25	20.14
	600	20.20
	1175	20.07

*The EUT supports only Rev.0 (IS-856)

CDMA 835
Laptop 1 [IBM 2864]
Body SAR

Ambient Temperature (°C)	21.0 ,21.3
Liquid Temperature (°C)	21.1,21.4
Date	Sep. 15, 2006, Oct. 13, 2006

Application	Position	Channel		1 g SAR
		Frequency (MHz)	Channel	
CDMA2000	Top	835.89	363	**1.18**
	120 degree	835.89	363	0.40
	Top	824.70	1013	0.75
	Top	848.31	777	0.81
1x EV-DO	Top	835.89	363	0.74

Notes:

1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration
2. All modes of operation were investigated, and the worst-case results are reported.
3. SAR Measurement System ■ DASY4
4. Liquid tissue depth is 15.1 ± 0.2cm
5. Phantom Configuration ☐ Left Head ■ Flat Phantom ☐ Right Head
6. SAR Configuration ☐ Head ■ Body ☐ Hand
7. Test Signal Call Mode ☐ Manu. Test Codes ■ Base Station Simulator
8. Body SAR was tested under RC5/SO55

CDMA 835
Laptop 2 [Nalea CY23]
Body SAR

Ambient Temperature (°C)	21.0,21.3
Liquid Temperature (°C)	21.1,21.4
Date	Sep. 15, 2006, Oct. 15, 2006

Application	Position	Channel		1 g SAR
		Frequency (MHz)	Channel	
CDMA2000	Top	835.89	363	**1.48**
	Top 90 degree	835.89	363	0.29
	Side	835.89	363	0.14
	Antenna in	835.89	363	0.05
	Top	824.70	1013	0.87
	Top	848.31	777	0.74
1x EV-DO	Top	835.89	363	0.93

Notes:

1.The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration

2. All modes of operation were investigated, and the worst-case results are reported.

3. SAR Measurement System ■ DASY4

4. Liquid tissue depth is 15.1 ± 0.2cm

5. Phantom Configuration ☐ Left Head ■ Flat Phantom ☐ Right Head

6. SAR Configuration ☐ Head ■ Body ☐ Hand

7. Test Signal Call Mode ☐ Manu. Test Codes ■ Base Station Simulator

8. Body SAR was tested under RC5/SO55

CDMA 835
Laptop 3 [TG]
Body SAR

Ambient Temperature (°C)	21.3
Liquid Temperature (°C)	21.6
Date	Oct. 13, 2006

Application	Position	Channel		1 g SAR
		Frequency (MHz)	Channel	
CDMA2000	Side	835.89	363	0.40
	Side 90 degree	835.89	363	0.28
	Side	824.70	1013	0.42
	Side	848.31	777	0.54
1x EV-DO	Side	848.31	777	**0.68**

Notes:

1.The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration

2. All modes of operation were investigated, and the worst-case results are reported.

3. SAR Measurement System ■ DASY4

4. Liquid tissue depth is 15.1 ± 0.2cm

5. Phantom Configuration ☐ Left Head ■ Flat Phantom ☐ Right Head

6. SAR Configuration ☐ Head ■ Body ☐ Hand

7. Test Signal Call Mode ☐ Manu. Test Codes ■ Base Station Simulator

8. Body SAR was tested under RC5/SO55

PCS 1900
Laptop 1 [IBM 2864]
Body SAR

Ambient Temperature (°C)	21.3
Liquid Temperature (°C)	21.6
Date	Oct. 15, 2006

Application	Position	Channel		1 g SAR
		Frequency (MHz)	Channel	
CDMA2000	Top	1880.00	600	1.34
	Top 120 degree	1880.00	600	0.27
	Top	1851.00	25	1.23
	Top	1908.75	1175	1.15
1x EV-DO	Top	1880.00	600	**1.46**
	Antenna in	1880.00	600	0.08

Notes:

1.The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration

2. All modes of operation were investigated, and the worst-case results are reported.

3. SAR Measurement System ■ DASY4

4. Liquid tissue depth is 15.3 ± 0.2cm

5. Phantom Configuration ☐ Left Head ■ Flat Phantom ☐ Right Head

6. SAR Configuration ☐ Head ■ Body ☐ Hand

7. Test Signal Call Mode ☐ Manu. Test Codes ■ Base Station Simulator

8. Body SAR was tested under RC5/SO55

PCS 1900
Laptop 2 [Nalea CY23]
Body SAR

Ambient Temperature (°C)	21.3
Liquid Temperature (°C)	21.6
Date	Oct. 15, 2006

Application	Position	Channel		1 g SAR
		Frequency (MHz)	Channel	
CDMA2000	Top	1880.00	600	0.94
	Top 90 degree	1880.00	600	0.67
	Side	1880.00	600	0.03
	Top	1851.00	25	0.68
	Top	1908.75	1175	0.74
1x EV-DO	Top	1880.00	600	**0.97**

Notes:

1.The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration

2. All modes of operation were investigated, and the worst-case results are reported.

3. SAR Measurement System ■ DASY4

4. Liquid tissue depth is 15.3 ± 0.2cm

5. Phantom Configuration ☐ Left Head ■ Flat Phantom ☐ Right Head

6. SAR Configuration ☐ Head ■ Body ☐ Hand

7. Test Signal Call Mode ☐ Manu. Test Codes ■ Base Station Simulator

8. Body SAR was tested under RC5/SO55

PCS 1900
Laptop 3 [TG]
Body SAR

Ambient Temperature (°C)	21.3
Liquid Temperature (°C)	21.6
Date	Oct. 15, 2006

Application	Position	Channel		1 g SAR
		Frequency (MHz)	Channel	
CDMA2000	Side	1880.00	600	0.87
	Side 90 degree	1880.00	600	1.05
	Side 90 degree	1851.00	25	0.43
	Side 90 degree	1908.75	1175	0.64
1x EV-DO	Side 90 degree	1908.75	600	**1.11**

Notes:

1.The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration

2. All modes of operation were investigated, and the worst-case results are reported.

3. SAR Measurement System ■ DASY4

4. Liquid tissue depth is 15.3 ± 0.2cm

5. Phantom Configuration ☐ Left Head ■ Flat Phantom ☐ Right Head

6. SAR Configuration ☐ Head ■ Body ☐ Hand

7. Test Signal Call Mode ☐ Manu. Test Codes ■ Base Station Simulator

8. Body SAR was tested under RC5/SO55

Appendix

List

Appendix A	Photographs	- EUT - Test Setup
Appendix B	Uncertainty Analysis	-
Appendix C	DASY4 Report (Plots of the SAR Measurements)	- 835 MHz Validation Test - CDMA835 SAR Test - 1900 MHz Validation Test - PCS1900 SAR Test
Appendix D	Calibration Certificate	- PROBE - DAE - DIPOLE

Appendix A

EUT Photographs

Front View of EUT

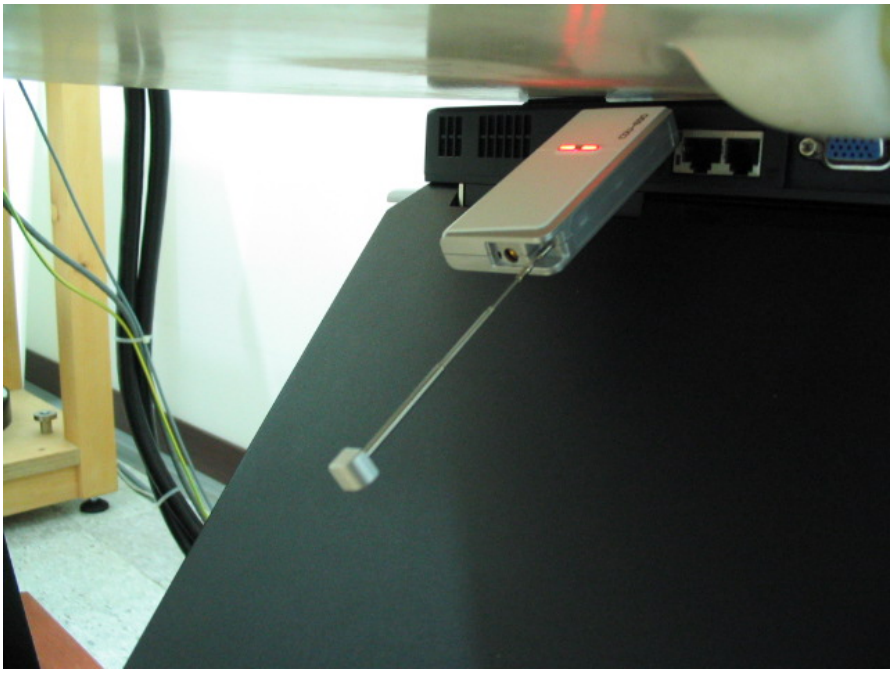
Rear View of EUT

Test Setup Photographs

1. IBM 2864

Top Position

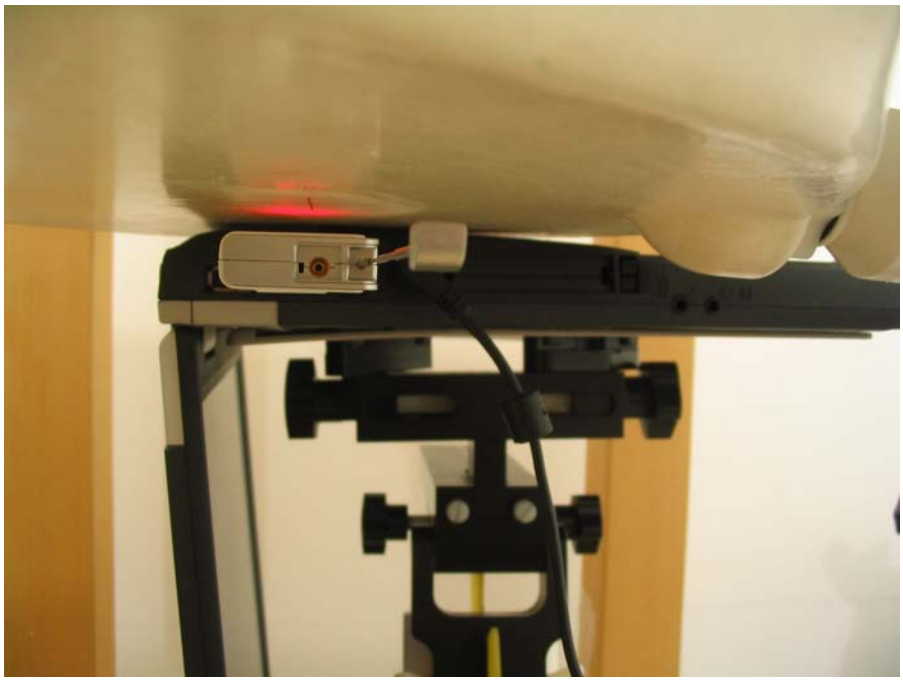
Top 120 degree Position



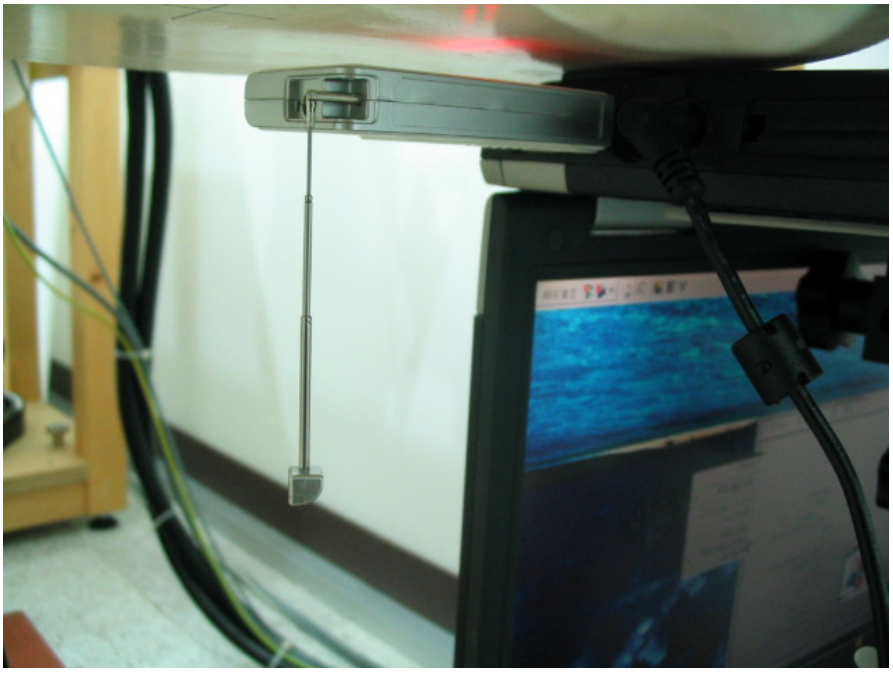
Antenna in Position

2. Nalea CY23

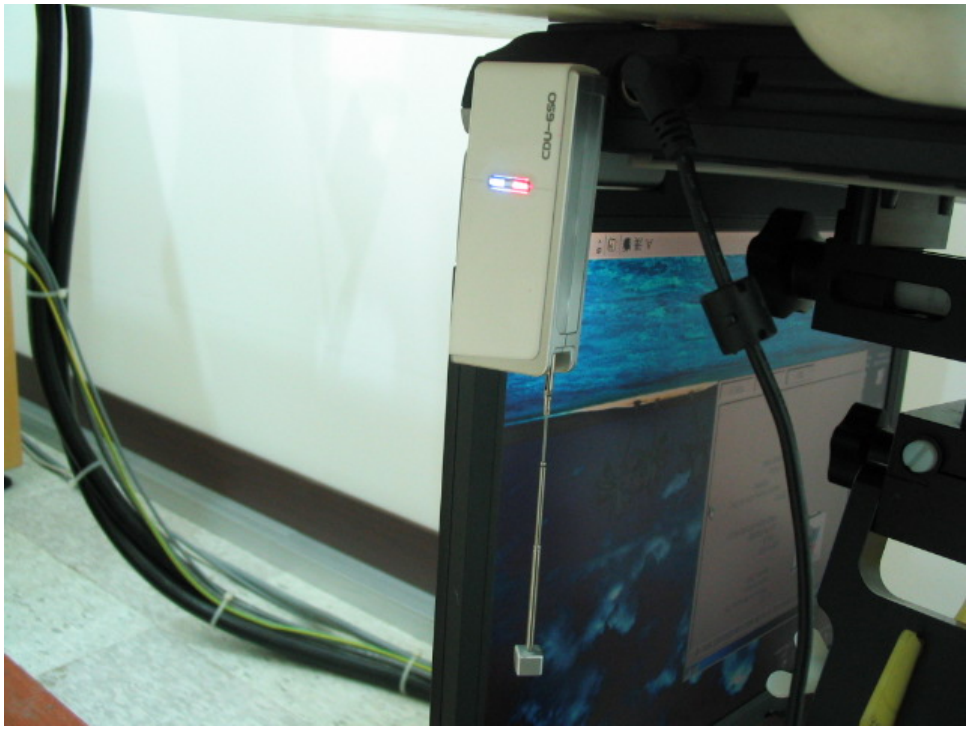
Top Position



Top 90 degree Position



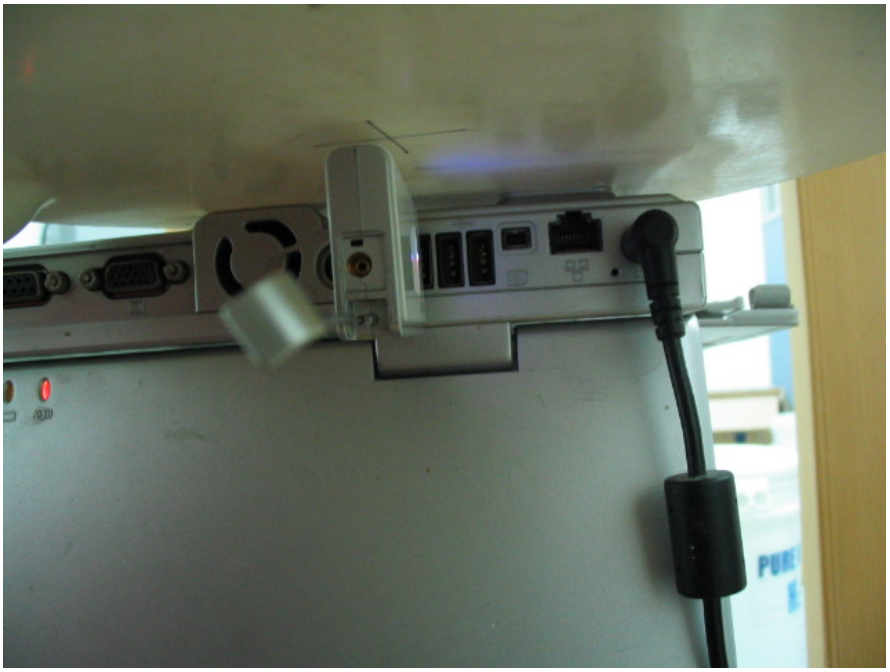
Side Position



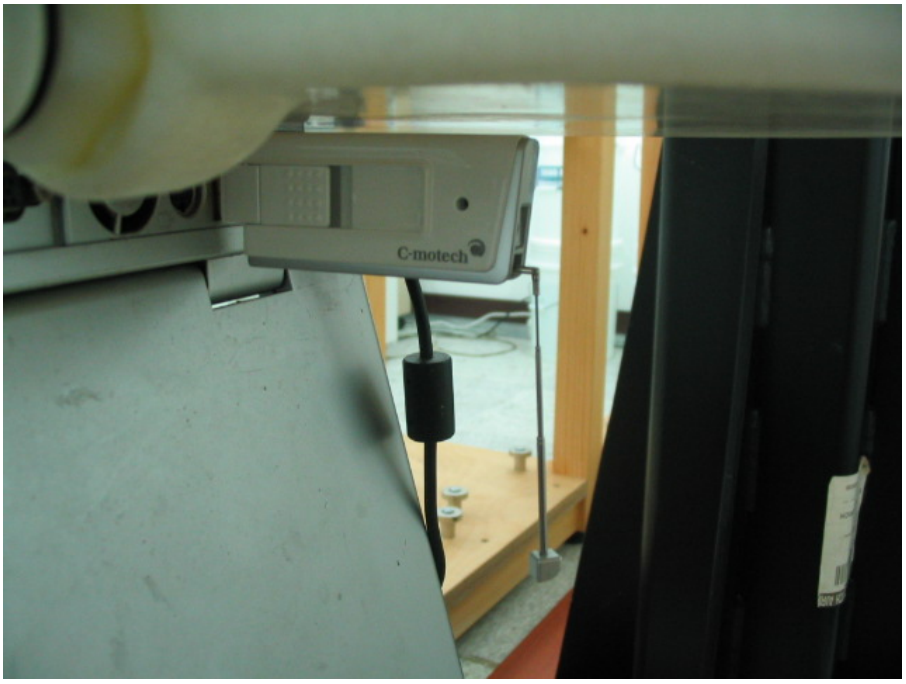
Antenna in Position

3. TG

Side Position



Side 90 degree Position



Appendix B

Uncertainty Analysis

Uncertainty of SAR equipments for measurement

Items	Uncertainty value %	Probability Distribution	Divisor	ci 1 1g	Standard unc (1g)	vi or Veff
Measurement System						
Probe calibration	4.8	normal	1	1	4.8%	∞
Axial isotropy	4.7	rectangular	√3	(1-cp)1/2	1.9%	∞
Hemispherical isotropy	9.6	rectangular	√3	(cp)1/2	3.9%	∞
Boundary effects	1.0	rectangular	√3	1	0.6%	∞
Linearity	4.7	rectangular	√3	1	2.7%	∞
System Detection limits	1.0	rectangular	√3	1	0.6%	∞
Readout Electronics	1.0	normal	1	1	1.0%	∞
Response time	0.8	rectangular	√3	1	0.5%	∞
Integration time	2.6	rectangular	√3	1	1.5%	∞
RF Ambient Conditions	3.0	rectangular	√3	1	1.7%	∞
Mech. constrains of robot	0.4	rectangular	√3	1	0.2%	∞
Probe positioning	2.9	rectangular	√3	1	1.7%	∞
Extrap. and integration	1.0	rectangular	√3	1	0.6%	∞

Uncertainty of measurements

Test Sample Related						
Device positioning	2.9	normal	1	1	2.9%	145
Device holder uncertainty	3.6	normal	1	1	3.6%	5
Power drift	5.0	rectangular	√3	1	2.9%	∞
Phantom and Setup						
Phantom uncertainty	4.0	rectangular	√3	1	2.3%	∞
Liquid conductivity(target)	5.0	rectangular	√3	0.64	1.8%	∞
Liquid conductivity(meas.)	5.0	normal	1	0.64	3.2%	∞
Liquid permittivity(target)	5.0	rectangular	√3	0.6	1.7%	∞
Liquid permittivity(meas.)	5.0	normal	1	0.6	3.0%	∞

Uncertainty of SAR system

Combined Standard Uncertainty	10.6%
Expanded Standard Uncertainty(k=2)	**21.2%**

Appendix C

Test Plot - DASY4 Report

1. IBM 3864

Date/Time: 2006-09-15 14:52:24

Test Laboratory: SGS Testing Korea
File Name: IBM_CDMA_1x.da4

DUT: C-motech; Type: CDMA terminal; Serial: Not Specified
Program Name: IBM_2864

Communication System: CDMA 835MHz; Frequency: 848.31 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 848.31 MHz; σ = 0.946 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.05, 6.05, 6.05); Calibrated: 2006-05-02
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM MIC #2000-93 with CRP_900MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

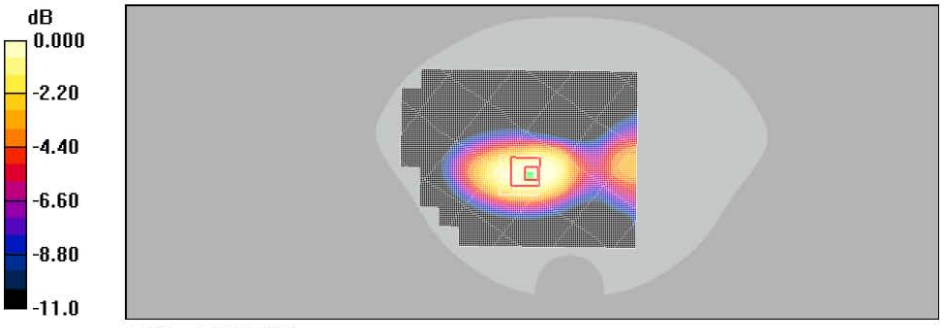
High_ procedure_Top/Area Scan (91x121x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.895 mW/g

High_ procedure_Top/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.0 V/m; Power Drift = 0.046 dB
Peak SAR (extrapolated) = 1.19 W/kg
SAR(1 g) = 0.811 mW/g; SAR(10 g) = 0.539 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.870 mW/g



0 dB = 0.870mW/g

Date/Time: 2006-09-15 13:41:12

Test Laboratory: SGS Testing Korea
File Name: IBM_CDMA_1x.da4

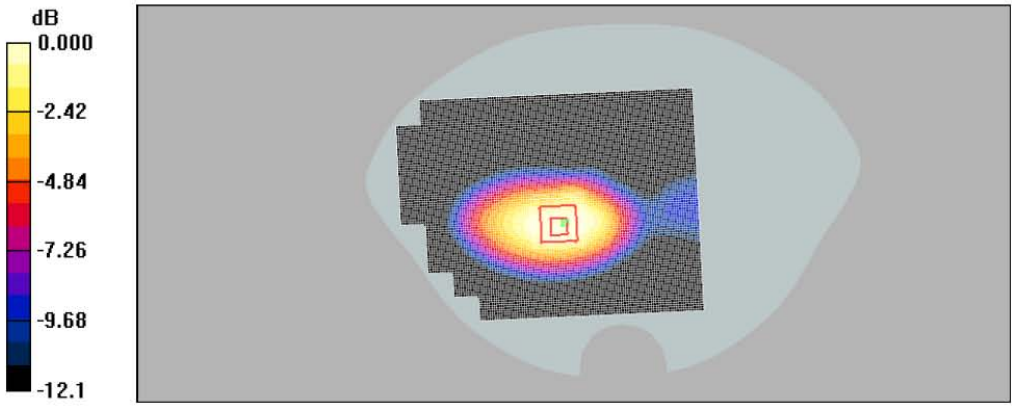
DUT: C-motech; Type: CDMA terminal; Serial: Not Specified
Program Name: IBM_2864

Communication System: CDMA 835MHz; Frequency: 824.7 MHz;Duty Cycle: 1:1
Medium parameters used: f = 825 MHz; σ = 0.923 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.05, 6.05, 6.05); Calibrated: 2006-05-02
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM MIC #2000-93 with CRP_900MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Low_ procedure_Top/Area Scan (91x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.841 mW/g

Low_ procedure_Top/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.7 V/m; Power Drift = -0.160 dB
Peak SAR (extrapolated) = 1.07 W/kg
SAR(1 g) = 0.754 mW/g; SAR(10 g) = 0.501 mW/g
Maximum value of SAR (measured) = 0.803 mW/g



0 dB = 0.803mW/g

Date/Time: 2006-10-13 13:30:37

Test Laboratory: SGS Testing Korea
File Name: IBM_CDMA_1x_1st.da4

DUT: C-motech; Type: CDMA terminal; Serial: Not Specified
Program Name: IBM_2864

Communication System: CDMA 835MHz; Frequency: 835.89 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835.89 MHz; σ = 0.938 mho/m; ε_r = 53.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

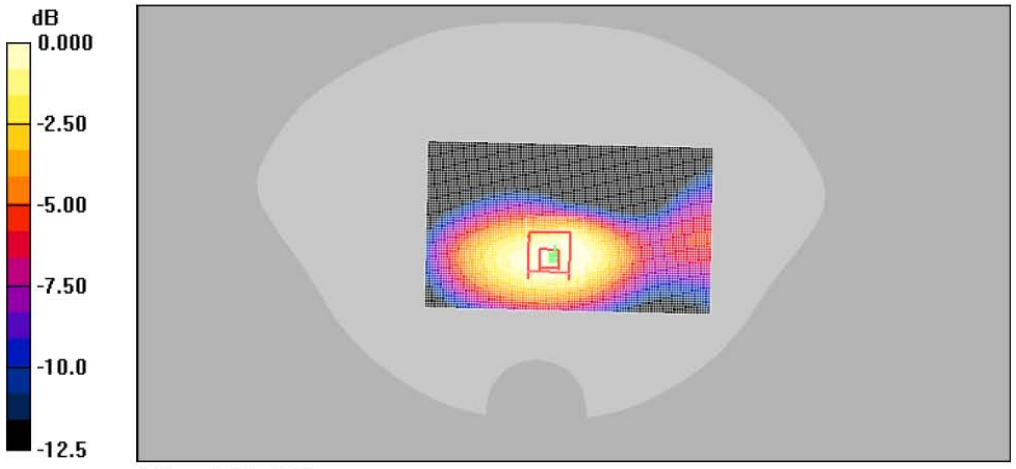
DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.05, 6.05, 6.05); Calibrated: 2006-05-02
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM MIC #2000-93 with CRP_900MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Middle_ procedure_Top/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.30 mW/g

Middle_ procedure_Top/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 21.4 V/m; Power Drift = -0.030 dB
Peak SAR (extrapolated) = 1.68 W/kg
SAR(1 g) = 1.18 mW/g; SAR(10 g) = 0.794 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.28 mW/g



0 dB = 1.28mW/g

Date/Time: 2006-10-13 15:20:45

Test Laboratory: SGS Testing Korea
File Name: IBM_CDMA_1x_1st.da4

DUT: C-motech; Type: CDMA terminal; Serial: Not Specified
Program Name: IBM_2864

Communication System: CDMA 835MHz; Frequency: 835.89 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835.89 MHz; σ = 0.938 mho/m; ε_r = 53.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

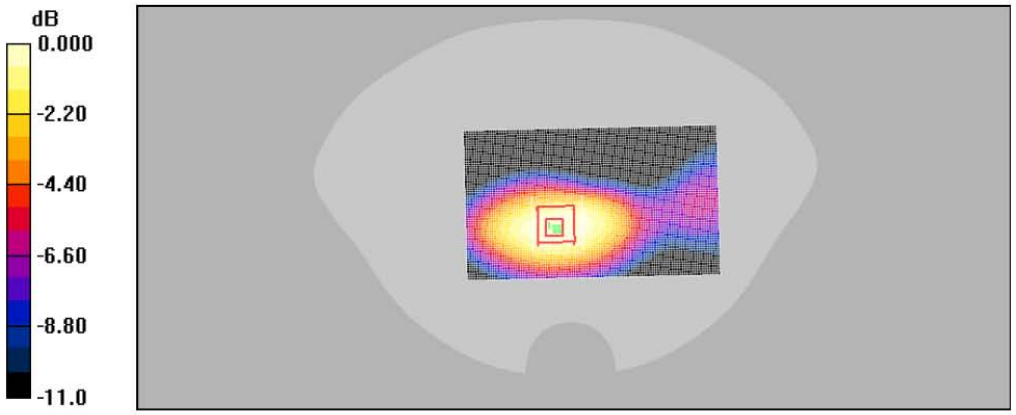
DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.05, 6.05, 6.05); Calibrated: 2006-05-02
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM MIC #2000-93 with CRP_900MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Middle_ procedure_Top_EVDO/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.809 mW/g

Middle_ procedure_Top_EVDO/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.0 V/m; Power Drift = -0.181 dB
Peak SAR (extrapolated) = 1.04 W/kg
SAR(1 g) = 0.744 mW/g; SAR(10 g) = 0.505 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.798 mW/g



0 dB = 0.798mW/g