SAR TEST REPORT

(Mobile Phone)

REPORT NO.: SA980313L03-3
MODEL NO.: MC9598
RECEIVED: Mar. 13, 2009
TESTED: Mar. 17 ~ May 05, 2009
ISSUED: May 13, 2009

APPLICANT: Motorola, Inc.

ADDRESS: One Motorola Plaza, Holtsville, NY 11742-1300 USA

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

LAB ADDRESS: No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang, Taipei Hsien 244, Taiwan, R.O.C.

TEST LOCATION: No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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Testing Laboratory
2021

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1. CERTIFICATION

PRODUCT: Mobile Computer
MODEL: MC9598
BRAND: Motorola
APPLICANT: Motorola, Inc.
TESTED: Mar. 17 ~ May 05, 2009
TEST SAMPLE: ENGINEERING SAMPLE
STANDARDS: **FCC Part 2 (Section 2.1093)**
FCC OET Bulletin 65, Supplement C (01-01)
RSS-102
IEEE 1528-2003

The above equipment (model: MC9598) have been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Peggy Chen , **DATE:** May 13, 2009
Peggy Chen / Specialist

TECHNICAL ACCEPTANCE : Long Chen , **DATE:** May 13, 2009
Responsible for RF
Long Chen / Senior Engineer

APPROVED BY : Gary Chang , **DATE:** May 13, 2009
Gary Chang / Assistant Manager

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

<table>
<tr><td>PRODUCT</td><td colspan="3">Mobile Computer</td></tr>
<tr><td>MODEL NO.</td><td colspan="3">MC9598</td></tr>
<tr><td>FCC ID</td><td colspan="3">UZ7MC9598</td></tr>
<tr><td>POWER SUPPLY</td><td colspan="3">3.7Vdc from rechargeable lithium battery
5.4Vdc from power adapter</td></tr>
<tr><td>CLASSIFICATION</td><td colspan="3">Portable device, production unit</td></tr>
<tr><td>MODULATION TYPE</td><td colspan="3">OQPSK, HPSK</td></tr>
<tr><td>FREQUENCY RANGE</td><td colspan="3">824.7MHz ~ 848.3MHz ; 1851.25MHz ~ 1908.75MHz</td></tr>
<tr><td rowspan="2">CHANNEL FREQUENCIES UNDER TEST AND ITS CONDUCTED OUTPUT POWER</td><td>SO55
RC3</td><td colspan="2">CDMA850 band:
0.261W (24.16dBm) / 836.5MHz for channel 384
CDMA1900 band:
0.290W (24.63dBm) / 1880.0MHz for channel 600</td></tr>
<tr><td>TDSO
SO32
RC3</td><td colspan="2">CDMA850 band:
0.271W (24.33dBm) / 836.5MHz for channel 384
CDMA1900 band:
0.301W (24.78dBm) / 1880.0MHz for channel 600</td></tr>
<tr><td rowspan="2">MAX. AVERAGE SAR (1g)</td><td colspan="3">Head:
CDMA850 band: 0.338W/kg
CDMA1900 band: 0.247W/kg</td></tr>
<tr><td colspan="3">Body:
CDMA850 band: 0.169W/kg
CDMA1900 band: 0.391W/kg</td></tr>
<tr><td>ANTENNA TYPE</td><td colspan="3">Monopole antenna</td></tr>
<tr><td>MAX. ANTENNA GAIN</td><td colspan="2">850MHz: -0.4dBi</td><td>1900MHz: 2.2dBi</td></tr>
<tr><td>DATA CABLE</td><td colspan="3">Refer to NOTE</td></tr>
<tr><td>I/O PORTS</td><td colspan="3">Refer to user’s manual</td></tr>
<tr><td>ACCESSORY DEVICES</td><td colspan="3">Battery</td></tr>
</table>

NOTE:

1. The models as identified below are identical to each other except of the following options:
   - Barcode reader: 1D laser scanner / 2D Imager

BRAND	MODEL	DESCRIPTION
Motorola	MC9598	EVDO 1D Calculator Numeric
Motorola	MC9598	EVDO 2D Calculator Numeric
Motorola	MC9598	EVDO 1D Alpha Primary
Motorola	**MC9598**	**EVDO 2D Alpha Primary**
Motorola	MC9598	EVDO 1D Telephony Numeric
Motorola	MC9598	EVDO 2D Telephony Numeric
Motorola	MC9598	EVDO 1D Alpha Numeric Wide
Motorola	MC9598	EVDO 2D Alpha Numeric Wide
**the worst case had been marked by boldface.		

2. The EUT has one lithium battery listed as below:

BRAND:	MOTOROLA
MODEL:	82-111636-01
RATING:	3.7Vdc, 4800mAh, 17.7Wh

3. The EUT is a Mobile Computer. The functions of EUT listed as below:

	REFERENCE REPORT
WLAN 802.11a/b/g (15.247)	SA980313L03
WLAN 802.11a (15.407)	SA980313L03-1
Bluetooth	SA980313L03-2
CDMA 850	SA980313L03-3
CDMA 1900	

4. The communicated functions of EUT listed as below:

		850MHz	1900MHz	With Bluetooth + GPS functions
3G	**CDMA**	√	√	
	1*EVDO	√	√	

5. The EUT has one lithium battery listed as below:

BRAND:	MOTOROLA
MODEL:	82-111636-01
RATING:	3.7Vdc, 4800mAh, 17.7Wh

6. The following accessories are for support units only.

PRODUCT	BRAND	MODEL	P/N	DESCRIPTION
USB charging Y cable	Motorola	-	25-116365-01R	1.8m shielded cable with one core
Headset	Motorola	-	50-11300-050R	0.8m non-shielded cable with one core
Adapter	HIPRO	HP-O2040D43	-	Input: 100-240Vac, 50-60Hz, 1.5A Output: 12Vdc, 3.33A, MAX 40W Power line: AC 1.7m non-shielded cable without core DC1.8m non-shielded cable with one core
Holster	-	-	-	-

7. Hardware version: 1A.
8. Software version: BSP15.1.
9. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

2.2 SAR MEASUREMENT CONDITIONS FOR CDMA

The following procedures were followed according to FCC "SAR Measurement Procedures 3G Devices", Oct. 2007.

➢ **Output Power Verification**

Maximum output power is verified on the High, Middle and Low channels according to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E. Results for at least steps 3, 4 and 10 of the power measurement procedures should be tabulated in the SAR report. Steps 3 and 4 should be measured using SO55 with power control bits in "All Up" condition. TDSO / SO32 may be used instead of SO55 for step 4. Step 10 should be measured using TDSO / SO32 with power control bits in the "Bits Hold" condition (i.e. alternative Up/Down Bits). All power measurements defined in C.S0011/TIA-98-E that are inapplicable to the DUT or cannot be measured due to technical or equipment limitations should be clearly identified in the test report.6

➢ **Head SAR Measurement**

SAR for head exposure configurations is measured in RC3 with the DUT configured to transmit at full rate using Loopback Service Option SO55. SAR for RC1 is not required when the maximum average output of each channel is less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel in RC1 using the exposure configuration that results in the highest SAR for that channel in RC3.

➢ **Body SAR Measurements**

SAR for body exposure configurations is measured in RC3 with the DUT configured to transmit at full rate on FCH with all other code channels disabled using TDSO / SO32. SAR for multiple code channels (FCH + SCHn) is not required when the maximum average output of each RF channel is less than ¼ dB higher than that measured with FCH only. Otherwise, SAR is measured on the maximum output channel (FCH + SCHn) with FCH at full rate and SCH0 enabled at 9600 bps using the exposure configuration that results in the highest SAR for that channel with FCH only.

When multiple code channels are enabled, the DUT output may shift by more than 0.5 dB and lead to higher SAR drifts and SCH dropouts. Body SAR in RC1 is not required when the maximum average output of each channel is less than ¼ 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.

➢ **Handsets with Ev-Do**

For handsets with Ev-Do capabilities, when the maximum average output of each channel in Rev. 0 is less than ¼ dB higher than that measured in RC3 (1x RTT), body SAR for Ev-Do is not required. Otherwise, SAR for Rev. 0 is measured on the maximum output channel at **153.6 kbps** using the body exposure configuration that results in the highest SAR for that channel in RC3. SAR for Rev. A is not required when the maximum average output of each channel is less than that measured in Rev. 0 or less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel for Rev. A using a Reverse Data Channel payload size of 4096 bits and a Termination Target of 16 slots defined for Subtype 2 Physical Layer configurations. A Forward Traffic Channel data rate corresponding to the 2-slot version of 307.2 kbps with the ACK Channel transmitting in all slots should be configured in the downlink for both Rev. 0 and Rev. A.

CDMA 2000 CONDUCTED POWER													
CHAN.	FREQ. (MHz)	CDMA 2000	RAW VALUE (dBm)					CORR. FACTOR (dB)	OUTPUT POWER (dBm)				
		RC	SO2	SO55	TDSO SO32 (FCH)	TDSO SO32 (FCH+ SCH)	SO3		SO2	SO55	TDSO SO32 (FCH)	TDSO SO32 (FCH+ SCH)	SO3
1013	824.7	RC1	19.71	19.81	-	-	19.96	4.30	24.01	24.11	-	-	24.26
		RC3	19.75	19.75	19.93	19.95	20.20	4.30	24.05	24.05	24.23	24.25	24.50
384	836.5	RC1	19.91	19.93	-	-	19.94	4.30	24.21	24.23	-	-	24.24
		RC3	19.87	19.86	20.03	20.00	19.85	4.30	24.17	24.16	24.33	24.30	24.15
777	848.3	RC1	19.84	19.85	-	-	19.96	4.30	24.14	24.15	-	-	24.26
		RC3	19.77	19.75	20.06	20.01	19.83	4.30	24.07	24.05	24.36	24.31	24.13

CDMA 2000 CONDUCTED POWER													
CHAN.	FREQ. (MHz)	CDMA 2000	RAW VALUE (dBm)					CORR. FACTOR (dB)	OUTPUT POWER (dBm)				
		RC	SO2	SO55	TDSO SO32 (FCH)	TDSO SO32 (FCH+ SCH)	SO3		SO2	SO55	TDSO SO32 (FCH)	TDSO SO32 (FCH+ SCH)	SO3
25	1851.25	RC1	19.92	20.01	-	-	19.96	4.50	24.42	24.51	-	-	24.46
		RC3	19.81	19.90	20.24	20.15	19.93	4.50	24.31	24.40	24.74	24.65	24.43
600	1880.00	RC1	19.97	20.22	-	-	20.10	4.50	24.47	24.72	-	-	24.60
		RC3	19.92	20.13	20.28	20.17	19.99	4.50	24.42	24.63	24.78	24.67	24.49
1175	1908.75	RC1	20.19	20.21	-	-	20.14	4.50	24.69	24.71	-	-	24.64
		RC3	20.19	20.19	20.38	20.21	20.04	4.50	24.69	24.69	24.88	24.71	24.54

2.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC 47 CFR Part 2 (2.1093)

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

RSS-102

IEEE 1528-2003

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

2.4 GENERAL INOFRMATION OF THE SAR SYSTEM

DASY5 (software 5.0 Build 125) consists of high precision robot, probe alignment sensor, phantom, robot controller, controlled measurement server and near-field probe. The robot includes six axes that can move to the precision position of the DASY5 software defined. The DASY5 software can define the area that is detected by the probe. The robot is connected to controlled box. Controlled measurement server is connected to the controlled robot box. The DAE includes amplifier, signal multiplexing, AD converter, offset measurement and surface detection. It is connected to the Electro-optical coupler (ECO). The ECO performs the conversion form the optical into digital electric signal of the DAE and transfers data to the PC.

EX3DV3 ISOTROPIC E-FIELD PROBE

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

NOTE

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

TWIN SAM V4.0

CONSTRUCTION	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-2003, EN 62209-1 and IEC 62209. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.
SHELL THICKNESS	2 ± 0.2mm
FILLING VOLUME	Approx. 25liters
DIMENSIONS	Height: 810mm; Length: 1000mm; Width: 500mm

SYSTEM VALIDATION KITS:

CONSTRUCTION	Symmetrical dipole with l/4 balun enables measurement of feedpoint impedance with NWA matched for use near flat phantoms filled with brain simulating solutions. Includes distance holder and tripod adaptor
CALIBRATION	Calibrated SAR value for specified position and input power at the flat phantom in brain simulating solutions
FREQUENCY	2450MHz
RETURN LOSS	> 20dB at specified validation position
POWER CAPABILITY	> 100W (f < 1GHz); > 40W (f > 1GHz)
OPTIONS	Dipoles for other frequencies or solutions and other calibration conditions upon request

DEVICE HOLDER FOR SAM TWIN PHANTOM

CONSTRUCTION

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

DATA ACQUISITION ELECTRONICS

CONSTRUCTION

The data acquisition electronics (DAE4) consists of a highly sensitive electrometer grade preamplifier with auto-zeroing, a channel and gain-switching multiplex, a fast 16 bit AD converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock. The mechanical probe is mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection. The input impedance of the DAE4 box is 200MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

2.5 GENERAL DESCRIPTION OF THE SPATIAL PEAK SAR EVALUATION

The DASY5 post-processing software (SEMCAD) automatically executes the following procedures to calculate the field units from the micro-volt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3. DESCRIPTION OF SUPPORT UNITS

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

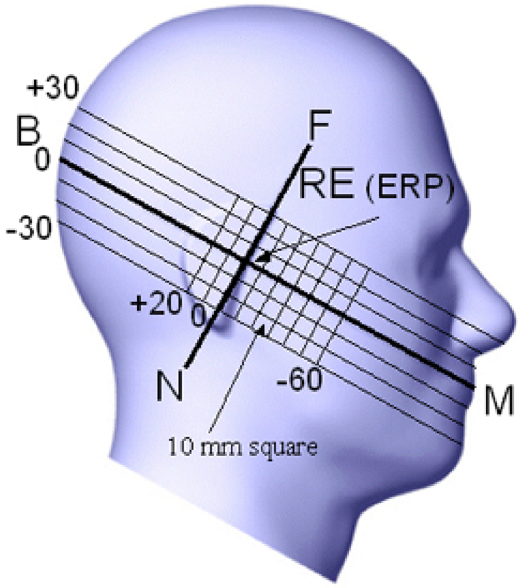
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
1	Universal Radio Communication Tester	R&S	CMU200	104958	Sep. 04, 2009

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

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

4. DESCRIPTION OF TEST POSITION

4.1 DESCRIPTION OF TEST POSITION



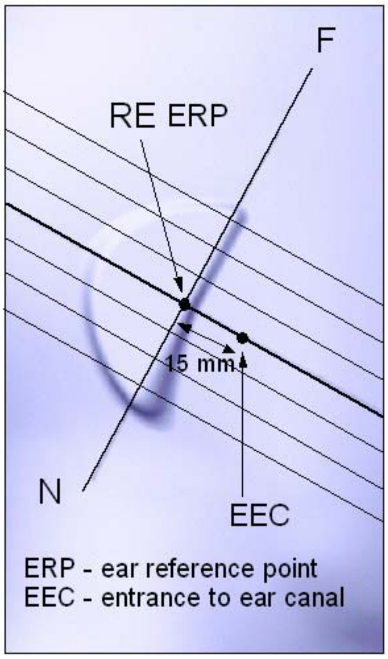


FIGURE 3.1

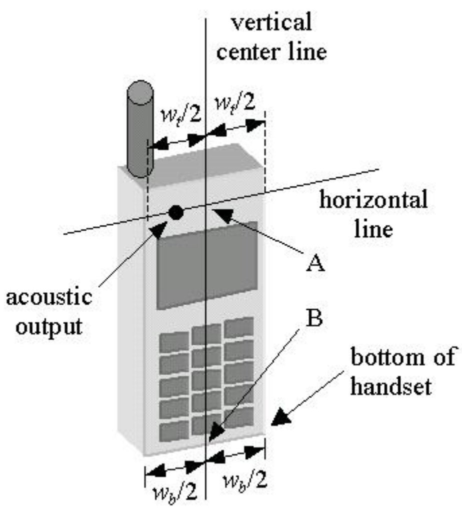


FIGURE 3.1a

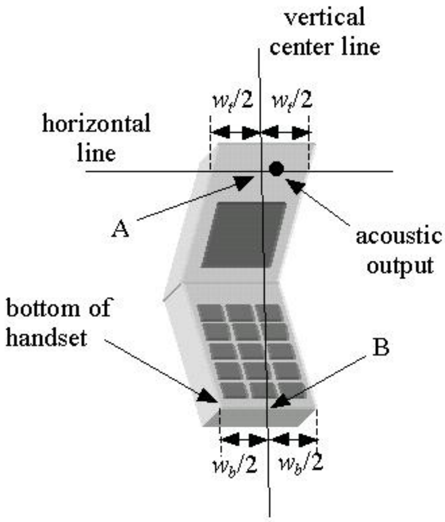
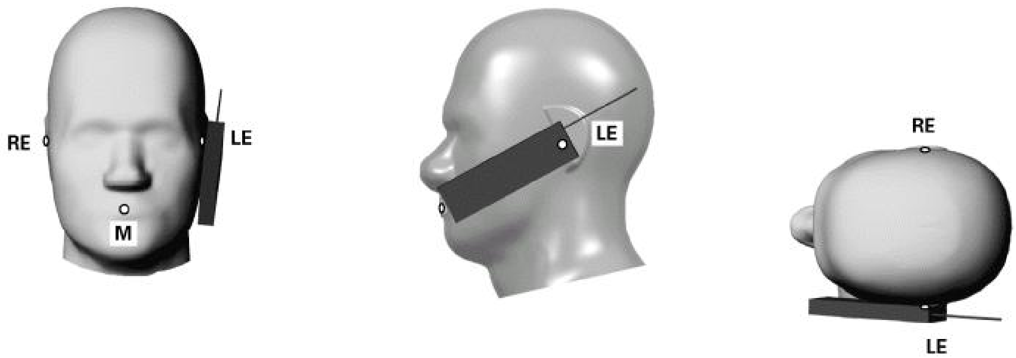


FIGURE 3.1b

4.2.1 TOUCH/CHEEK TEST POSITION

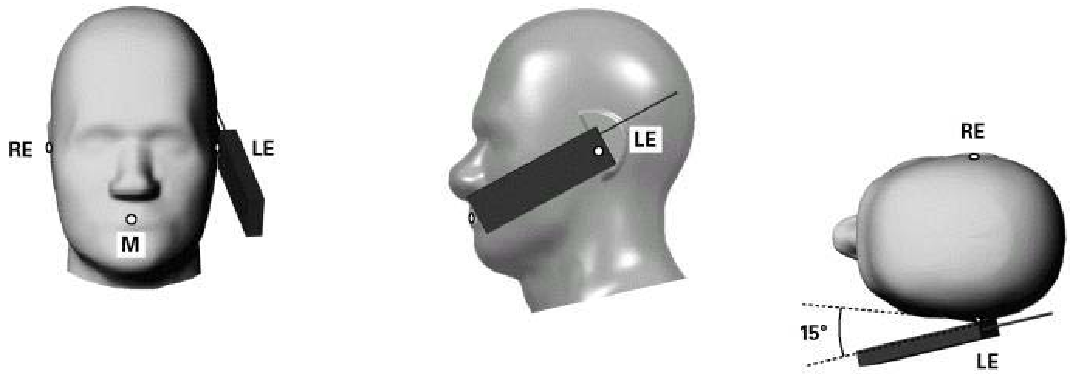
The head position in Figure 3.1, the ear reference points ERP are 15mm above entrance to ear canal along the B-M line. The line N-F (Neck-Front) is perpendicular to the B-M (Back Mouth) line. The handset device in Figure 3.1a and 3.1b,The vertical centerline pass through two points on the front side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



TOUCH/CHEEK POSITION FIGURE

4.2.2 TILT TEST POSITION

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



TILT POSITION FIGURE

4.2.3 BODY-WORN CONFIGURATION

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

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

4.2 DESCRIPTION OF TEST MODE

TEST MODE	COMMUNICATION MODE	MODULATION TYPE	ASSESSMENT POSTITION	TESTED CHANNEL
1	CDMA 850	OQPSK	A / Cheek	M
2		OQPSK	A / Tilt	M
3		OQPSK	B / Cheek	M
4		OQPSK	B / Tilt	M
5		OQPSK	C / Head in flat phantom	M
6		OQPSK	D : Body / Front	M
7	EVDO 850	HPSK	D : Body / Front	M
8	CDMA 1900	OQPSK	A / Cheek	M
9		OQPSK	A / Tilt	M
10		OQPSK	B / Cheek	M
11		OQPSK	B / Tilt	M
12		OQPSK	C / Head in flat phantom	M
13		OQPSK	D : Body / Front	M
14	EVDO 1900	HPSK	D : Body / Front	M

NOTE: 1. The combination is from the worst situation of each communication mode.
2. Assessment position A: Right head position, B: Left head position, C: Head in flat phantom, D: Body position, please refer to appendix E for the photo.
3. Since mobile phone antennas located at the bottom of EUT, SAR measurements around the mouth and jaw regions of the SAM head phantom is required. The SAR required in these regions of SAM should be measured using a flat phantom. Test setup follows KDB No.878710. Test setup show on "Head in flat phantom" of TSup_UZ7MC9598.pdf.

4.3 SUMMARY OF TEST RESULTS

PART OF ASSESSMENT	HEAD POSITION									
COMMUNICATION MODE	CDMA 850					CDMA 1900				
	MEASURED VALUE OF 1g SAR (W/kg)									
	RIGHT		LEFT		HEADIN FLAT PHAMTOM	RIGHT		LEFT		HEADIN FLAT PHAMTOM
CHANNEL	CHEEK	TILT	CHEEK	TILT		CHEEK	TILT	CHEEK	TILT	
MIDDLE	**0.338**	0.151	0.232	0.130	0.194	0.235	0.106	**0.247**	0.122	0.024

NOTE: The worst value of each communication mode has been marked by boldface.

PART OF ASSESSMENT	BODY POSITION			
COMMUNICATION MODE	CDMA 850	EVDO 850	CDMA 1900	EVDO 1900
	MEASURED VALUE OF 1g SAR (W/kg)			
CHANNEL	FRONT	FRONT	FRONT	FRONT
MIDDLE	0.163	**0.169**	**0.391**	0.256

NOTE: The worst value of each communication mode has been marked by boldface.

5. TEST RESULTS

5.1 TEST PROCEDURES

The EUT makes a phone call to the communication simulator station. Establish the simulation communication configuration rather the actual communication. Then the EUT could continuous the transmission mode. Adjust the PCL of the base station could controlled the EUT to transmitted the maximum output power. The base station also could control the transmission channel. The SAR value was calculated via the 3D spline interpolation algorithm that has been implemented in the software of DASY5 SAR measurement system manufactured and calibrated by SPEAG. According to the IEEE 1528 / EN 62209-1, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

• Power reference measurement

• Verification of the power reference measurement

• Area scan

• Zoom scan

• Power reference measurement

The area scan with 15mm x 15mm grid was performed for the highest spatial SAR location. Consist of 11 x 13 points while the scan size is the 150mm x 180mm. The zoom scan with 30mm x 30mm x 30mm volume was performed for SAR value averaged over 1g and 10g spatial volumes.

In the zoom scan, the distance between the measurement point at the probe sensor location (geometric center behind the probe tip) and the phantom surface is 4.0 mm and maintained at a constant distance of ±1.0 mm during a zoom scan to determine peak SAR locations. The distance is 4mm between the first measurement point and the bottom surface of the phantom. The secondary measurement point to the bottom surface of the phantom is with 9mm separation distance. The cube size is 7 x 7 x 7 points consist of 343 points and the grid space is 5mm.

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

In the area scan, the separation distance is 4mm between the each measurement point and the phantom surface. The scan size shall be included the transmission portion of the EUT. The measurement time is the same as the zoom scan. At last the reference power drift shall be less than ±5%.

5.2 MEASURED SAR RESULTS

CDMA 850 BAND RIGHT HEAD POSITION

ENVIRONMENTAL CONDITION	Air Temperature：23.1°C, Liquid Temperature：22.7°C Humidity：61%RH		
TESTED BY	Sam Onn	**DATE**	Mar. 17, 2009

CHAN.	FREQ. (MHz)	MODULATION TYPE	CONDUCTED POWER (W)		POWER DRIFT (%)	DEVICE TEST POSITION MODE	MEASURED 1g SAR (W/kg)
			BEGIN TEST	AFTER TEST			
384	**836.5 (Mid.)**	**OQPSK**	0.261	0.253	-3.07	1	**0.338**
384	**836.5 (Mid.)**	**OQPSK**	0.261	0.254	-2.68	2	0.151

NOTE:

1. Test configuration of each mode is described in section 4.2.
2. In this testing, the limit for General Population Spatial Peak averaged over **1g, 1.6W/kg**, is applied.
3. Please see the Appendix A for the data.
4. The variation of the EUT conducted power measured before and after SAR testing should not over 5%.

CDMA 850 BAND LEFT HEAD POSITION

ENVIRONMENTAL CONDITION	Air Temperature：23.1°C, Liquid Temperature：22.7°C Humidity：61%RH		
TESTED BY	Sam Onn	DATE	Mar. 17, 2009

CHAN.	FREQ. (MHz)	MODULATION TYPE	CONDUCTED POWER (W)		POWER DRIFT (%)	DEVICE TEST POSITION MODE	MEASURED 1g SAR (W/kg)
			BEGIN TEST	AFTER TEST			
384	**836.5 (Mid.)**	**OQPSK**	0.261	0.254	-2.68	3	0.232
384	**836.5 (Mid.)**	**OQPSK**	0.261	0.252	-3.45	4	0.130

NOTE:

1. Test configuration of each mode is described in section 4.2.
2. In this testing, the limit for General Population Spatial Peak averaged over **1g, 1.6W/kg**, is applied.
3. Please see the Appendix A for the data.
4. The variation of the EUT conducted power measured before and after SAR testing should not over 5%.

CDMA 850 BAND HEAD POSITION IN FLAT PHANTOM

ENVIRONMENTAL CONDITION	Air Temperature：23.2°C, Liquid Temperature：22.7°C Humidity：63%RH		
TESTED BY	Sam Onn	DATE	May 05, 2009

CHAN.	FREQ. (MHz)	MODULATION TYPE	CONDUCTED POWER (W)		POWER DRIFT (%)	DEVICE TEST POSITION MODE	MEASURED 1g SAR (W/kg)
			BEGIN TEST	AFTER TEST			
384	**836.5 (Mid.)**	**OQPSK**	0.261	0.254	-2.68	5	0.194

NOTE:

1. Test configuration of each mode is described in section 4.2.
2. In this testing, the limit for General Population Spatial Peak averaged over **1g, 1.6W/kg**, is applied.
3. Please see the Appendix A for the data.
4. The variation of the EUT conducted power measured before and after SAR testing should not over 5%.

CDMA 850 & EVDO 850 BAND BODY POSITION

ENVIRONMENTAL CONDITION	Air Temperature：23.3°C, Liquid Temperature：22.9°C Humidity：63%RH						
TESTED BY	Sam Onn			**DATE**	Mar. 19, 2009		

CHAN.	FREQ. (MHz)	MODULATION TYPE	CONDUCTED POWER (W)		POWER DRIFT (%)	DEVICE TEST POSITION MODE	MEASURED 1g SAR (W/kg)
			BEGIN TEST	AFTER TEST			
384	**836.5 (Mid.)**	**OQPSK**	0.271	0.264	-2.58	6	0.163
384	**836.5 (Mid.)**	**HPSK**	0.259	0.252	-2.70	7	**0.169**

NOTE:

1. Test configuration of each mode is described in section 4.2.
2. In this testing, the limit for General Population Spatial Peak averaged over **1g, 1.6W/kg**, is applied.
3. Please see the Appendix A for the data.
4. The variation of the EUT conducted power measured before and after SAR testing should not over 5%.

CDMA 1900 BAND RIGHT HEAD POSITION

ENVIRONMENTAL CONDITION	Air Temperature：22.9°C, Liquid Temperature：22.7°C Humidity：62%RH		
TESTED BY	Sam Onn	**DATE**	Mar. 18, 2009

CHAN.	FREQ. (MHz)	MODULATION TYPE	CONDUCTED POWER (W)		POWER DRIFT (%)	DEVICE TEST POSITION MODE	MEASURED 1g SAR (W/kg)
			BEGIN TEST	AFTER TEST			
600	**1880.0 (Mid.)**	**OQPSK**	0.290	0.288	-0.69	8	0.235
600	**1880.0 (Mid.)**	**OQPSK**	0.290	0.287	-1.03	9	0.106

NOTE:

1. Test configuration of each mode is described in section 4.2.
2. In this testing, the limit for General Population Spatial Peak averaged over **1g, 1.6W/kg**, is applied.
3. Please see the Appendix A for the data.
4. The variation of the EUT conducted power measured before and after SAR testing should not over 5%.

CDMA 1900 BAND LEFT HEAD POSITION

ENVIRONMENTAL CONDITION	Air Temperature：22.9°C, Liquid Temperature：22.7°C Humidity：62%RH		
TESTED BY	Sam Onn	**DATE**	Mar. 18, 2009

CHAN.	FREQ. (MHz)	MODULATION TYPE	CONDUCTED POWER (W)		POWER DRIFT (%)	DEVICE TEST POSITION MODE	MEASURED 1g SAR (W/kg)
			BEGIN TEST	AFTER TEST			
600	**1880.0 (Mid.)**	**OQPSK**	0.290	0.285	-1.72	10	**0.247**
600	**1880.0 (Mid.)**	**OQPSK**	0.290	0.282	-2.76	11	0.122

NOTE:

1. Test configuration of each mode is described in section 4.2.
2. In this testing, the limit for General Population Spatial Peak averaged over **1g, 1.6W/kg**, is applied.
3. Please see the Appendix A for the data.
4. The variation of the EUT conducted power measured before and after SAR testing should not over 5%.

CDMA 1900 BAND HEAD POSITION IN FLAT PHANTOM

ENVIRONMENTAL CONDITION	Air Temperature：23.0°C, Liquid Temperature：22.8°C Humidity：63%RH		
TESTED BY	Sam Onn	**DATE**	May 05, 2009

CHAN.	FREQ. (MHz)	MODULATION TYPE	CONDUCTED POWER (W)		POWER DRIFT (%)	DEVICE TEST POSITION MODE	MEASURED 1g SAR (W/kg)
			BEGIN TEST	AFTER TEST			
600	**1880.0 (Mid.)**	**OQPSK**	0.290	0.285	-1.72	12	0.024

NOTE:

1. Test configuration of each mode is described in section 4.2.
2. In this testing, the limit for General Population Spatial Peak averaged over **1g, 1.6W/kg**, is applied.
3. Please see the Appendix A for the data.
4. The variation of the EUT conducted power measured before and after SAR testing should not over 5%.

CDMA 1900 & EVDO 1900 BAND BODY POSITION

ENVIRONMENTAL CONDITION	Air Temperature：23.1°C, Liquid Temperature：22.8°C Humidity：64%RH		
TESTED BY	Sam Onn	DATE	Mar. 20, 2009

CHAN.	FREQ. (MHz)	MODULATION TYPE	CONDUCTED POWER (W)		POWER DRIFT (%)	DEVICE TEST POSITION MODE	MEASURED 1g SAR (W/kg)
			BEGIN TEST	AFTER TEST			
600	**1880.0 (Mid.)**	**OQPSK**	0.301	0.296	-1.66	13	**0.391**
600	**1880.0 (Mid.)**	**HPSK**	0.298	0.294	-1.34	14	0.256

NOTE:

1. Test configuration of each mode is described in section 4.2.
2. In this testing, the limit for General Population Spatial Peak averaged over **1g, 1.6W/kg**, is applied.
3. Please see the Appendix A for the data.
4. The variation of the EUT conducted power measured before and after SAR testing should not over 5%.

5.3 SAR LIMITS

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

NOTE:

1. This limits accord to 47 CFR 2.1093 – Safety Limit.
2. The EUT property been complied with the partial body exposure limit under the general population environment.

5.4 RECIPES FOR TISSUE SIMULATING LIQUIDS

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

The following ingredients are used：

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

THE RECIPES FOR 835MHz SIMULATING LIQUID TABLE

INGREDIENT	HEAD SIMULATING LIQUID 835MHz (HSL-835)	MUSCLE SIMULATING LIQUID 835MHz (MSL-835)
Water	40.28%	50.07%
Cellulose	02.41%	NA
Salt	01.38%	0.94%
Preventtol D-7	00.18%	0.09%
Sugar	57.97%	48.2%
Dielectric Parameters at 22℃	f = 835MHz ε= 41.5 ± 5% σ= 0.97 ± 5% S/m	f= 835MHz ε= 55.0 ± 5% σ= 1.05 ± 5% S/m

THE RECIPES FOR 850MHz SIMULATING LIQUID TABLE

INGREDIENT	HEAD SIMULATING LIQUID 850MHz (HSL-850)	MUSCLE SIMULATING LIQUID 850MHz (MSL-850)
Water	40.28%	50.07%
Cellulose	0.24%	NA
Salt	01.38%	0.94%
Preventol D-7	00.18%	0.09%
Sugar	57.97%	48.2%
Dielectric Parameters at 22℃	f= 835MHz ε= 41.5 ± 5% σ= 0.9 ± 5% S/m	f= 835MHz ε= 55.2 ± 5% σ= 0.97 ± 5% S/m

THE RECIPES FOR 1900MHz SIMULATING LIQUID TABLE

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

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

1. Turn Network Analyzer on and allow at least 30 min. warm up.
2. Mount dielectric probe kit so that interconnecting cable to Network Analyzer will not be moved during measurements or calibration.
3. Pour de-ionized water and measure water temperature (±1°).
4. Set water temperature in Agilent-Software (Calibration Setup).
5. Perform calibration.
6. Validate calibration with dielectric material of known properties (e.g. polished ceramic slab with >8mm thickness ε'=10.0, ε''=0.0). If measured parameters do not fit within tolerance, repeat calibration (±0.2 for ε': ±0.1 for ε'').
7. Conductivity can be calculated from ε'' by $\sigma = \omega\, \varepsilon_0\, \varepsilon'' = \varepsilon''\, f\,[GHz] / 18$.
8. Measure liquid shortly after calibration. Repeat calibration every hour.
9. Stir the liquid to be measured. Take a sample (~50ml) with a syringe from the center of the liquid container.
10. Pour the liquid into a small glass flask. Hold the syringe at the bottom of the flask to avoid air bubbles.
11. Put the dielectric probe in the glass flask. Check that there are no air bubbles in front of the opening in the dielectric probe kit.
12. Perform measurements.
13. Adjust medium parameters in DASY5 for the frequencies necessary for the measurements (‘Setup Config’, select medium (e.g. Brain 900 MHz) and press ‘Option’-button.

Select the current medium for the frequency of the validation (e.g. Setup Medium Brain 900 MHz).

FOR CDMA850 BAND SIMULATING LIQUID

LIQUID TYPE		HSL-835			MSL-835		
SIMULATING LIQUID TEMP.		22.7			22.9		
TESTED DATE		Mar. 17, 2009			Mar. 19, 2009		
TESTED BY		Sam Onn			Sam Onn		
FREQ. (MHz)	LIQUID PARAMETER	STANDARD VALUE	MEASUREMENT VALUE	ERROR PERCENTAGE (%)	STANDARD VALUE	MEASUREMENT VALUE	ERROR PERCENTAGE (%)
835.00	Permitivity (ε)	41.5	43.1	3.86	55.2	54.5	-1.27
836.50		41.5	43.1	3.86	55.2	54.5	-1.27
836.60		41.5	43.1	3.86	55.2	54.5	-1.27
835.00	Conductivity (σ) S/m	0.90	0.93	3.33	0.97	1.01	4.12
836.50		0.90	0.93	3.33	0.97	1.01	4.12
836.60		0.90	0.93	3.33	0.97	1.01	4.12
Dielectric Parameters Required at 22℃		**f= 835MHz ε= 41.5 ± 5% σ= 0.97 ± 5% S/m**			**f= 835MHz ε= 55.0 ± 5% σ= 1.05 ± 5% S/m**		

FOR CDMA850 BAND SIMULATING LIQUID

<table>
<tr><td colspan="2">LIQUID TYPE</td><td colspan="3">HSL-850</td></tr>
<tr><td colspan="2">SIMULATING LIQUID TEMP.</td><td colspan="3">22.7</td></tr>
<tr><td colspan="2">TESTED DATE</td><td colspan="3">May 05, 2009</td></tr>
<tr><td colspan="2">TESTED BY</td><td colspan="3">Dylan Chiou</td></tr>
<tr><td>FREQ. (MHz)</td><td>LIQUID PARAMETER</td><td>STANDARD VALUE</td><td>MEASUREMENT VALUE</td><td>ERROR PERCENTAGE (%)</td></tr>
<tr><td>835.00</td><td rowspan="3">Permitivity
(ε)</td><td>41.5</td><td>42.5</td><td>2.35</td></tr>
<tr><td>836.50</td><td>41.5</td><td>42.5</td><td>2.35</td></tr>
<tr><td>836.60</td><td>41.5</td><td>42.5</td><td>2.35</td></tr>
<tr><td>835.00</td><td rowspan="3">Conductivity
(σ)
S/m</td><td>0.90</td><td>0.91</td><td>1.10</td></tr>
<tr><td>836.50</td><td>0.90</td><td>0.91</td><td>1.10</td></tr>
<tr><td>836.60</td><td>0.90</td><td>0.91</td><td>1.10</td></tr>
<tr><td colspan="2">Dielectric Parameters Required at 22℃</td><td colspan="3">f= 835MHz
ε= 41.5 ± 5%
σ= 0.97 ± 5% S/m</td></tr>
</table>

FOR CDMA1900 BAND SIMULATING LIQUID

LIQUID TYPE		HSL-1900			MSL-1900		
SIMULATING LIQUID TEMP.		22.7			22.8		
TESTED DATE		Mar. 18, 2009			Mar. 20, 2009		
TESTED BY		Sam Onn			Sam Onn		
FREQ. (MHz)	LIQUID PARAMETER	STANDARD VALUE	MEASUREMENT VALUE	ERROR PERCENTAGE (%)	STANDARD VALUE	MEASUREMENT VALUE	ERROR PERCENTAGE (%)
1880.0	Permitivity (ε)	40.0	40.8	2.00	53.3	55.7	4.50
1900.0		40.0	40.7	1.75	53.3	55.6	4.32
1880.0	Conductivity (σ) S/m	1.40	1.43	2.14	1.52	1.54	1.32
1900.0		1.40	1.45	3.57	1.52	1.57	3.29
Dielectric Parameters Required at 22℃		**f= 1900MHz ε= 40.0 ± 5% σ= 1.40 ± 5% S/m**			**f= 1900MHz ε= 53.3 ± 5% σ= 1.52 ± 5% S/m**		

FOR CDMA1900 BAND SIMULATING LIQUID

LIQUID TYPE		HSL-1900		
SIMULATING LIQUID TEMP.		22.8		
TESTED DATE		May 05, 2009		
TESTED BY		Dylan Chiou		
FREQ. (MHz)	LIQUID PARAMETER	STANDARD VALUE	MEASUREMENT VALUE	ERROR PERCENTAGE (%)
1880.0	Permitivity (ε)	40.0	40.7	1.75
1900.0		40.0	40.8	2.00
1880.0	Conductivity (σ) S/m	1.40	1.41	0.71
1900.0		1.40	1.44	2.85
Dielectric Parameters Required at 22℃		f= 1900MHz ε= 40.0 ± 5% σ= 1.40 ± 5% S/m		

5.5 TEST EQUIPMENT FOR TISSUE PROPERTY

ITEM	NAME	BRAND	TYPE	SERIES NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
1	Network Analyzer	Agilent	E8358A	US41480538	Nov. 28, 2008	Nov. 27, 2009
2	Dielectric Probe	Agilent	85070D	US01440176	NA	NA

NOTE:

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

6. SYSTEM VALIDATION

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

6.1 TEST EQUIPMENT

ITEM	NAME	BRAND	TYPE	SERIES NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
1	SAM Phantom	S & P	QD000 P40 CA	TP-1150	NA	NA
2	Signal Generator	Anritsu	68247B	984703	May 27, 2008	May 26, 2009
3	E-Field Probe	S & P	EX3DV3	3504	Jan. 21, 2009	Jan. 20, 2010
4		S & P	EX3DV4	3590	Apr. 28, 2009	Apr. 27, 2010
5	DAE	S & P	DAE	861	Sep. 22, 2008	Sep. 21, 2009
6	Robot Positioner	Staubli Unimation	NA	NA	NA	NA
7	Validation Dipole	S & P	D835V2	4d021	May 19, 2008	May 18, 2009
8		S & P	D1900V2	5d036	Apr. 22, 2008	Apr. 21, 2009
9		S & P	D1900V2	5d022	Mar. 17, 2009	Mar. 16, 2010

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

6.2 TEST PROCEDURE

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

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

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

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

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

About the validation dipole positioning uncertainty, the constant and low loss dielectric spacer is used to establish the correct distance between the top surface of the dipole and the bottom surface of the phantom, the error component introduced by the uncertainty of the distance between the liquid (i.e., phantom shell) and the validation dipole in the DASY5 system is less than ±0.1mm.

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

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

6.3 VALIDATION RESULTS

SYSTEM VALIDATION TEST OF SIMULATING LIQUID					
FREQUENCY (MHz)	REQUIRED SAR (mW/g)	MEASURED SAR (mW/g)	DEVIATION (%)	SEPARATION DISTANCE	TESTED DATE
HSL 850	2.31 (1g)	2.38	3.03	15mm	Mar. 17, 2009
MSL 850	2.34 (1g)	2.39	2.14	15mm	Mar. 19, 2009
HSL 1900	10.20 (1g)	9.82	-3.73	10mm	Mar. 18, 2009
MSL 1900	10.20 (1g)	9.49	-6.96	10mm	Mar. 20, 2009
TESTED BY	Sam Onn				

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

SYSTEM VALIDATION TEST OF SIMULATING LIQUID					
FREQUENCY (MHz)	REQUIRED SAR (mW/g)	MEASURED SAR (mW/g)	DEVIATION (%)	SEPARATION DISTANCE	TESTED DATE
HSL 850	2.31 (1g)	2.40	3.90	15mm	May 05, 2009
HSL 1900	10.20 (1g)	10.23	0.29	10mm	May 05, 2009
TESTED BY	Dylan Chiou				

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

6.4 SYSTEM VALIDATION UNCERTAINTIES

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

Error Description	Tolerance (±%)	Probability Distribution	Divisor	(C_i)		Standard Uncertainty (±%)		(v_i)
				(1g)	(10g)	(1g)	(10g)	
Measurement System								
Probe Calibration	5.50	Normal	1	1	1	5.50	5.50	5.50
Axial Isotropy	4.70	Rectangular	$\sqrt{3}$	0.7	0.7	1.90	1.90	4.70
Hemispherical Isotropy	9.60	Rectangular	$\sqrt{3}$	0.7	0.7	3.88	3.88	9.60
Boundary effect	1.00	Rectangular	$\sqrt{3}$	1	1	0.58	0.58	1.00
Linearity	4.70	Rectangular	$\sqrt{3}$	1	1	2.71	2.71	4.70
System Detection Limit	1.00	Rectangular	$\sqrt{3}$	1	1	0.58	0.58	1.00
Readout Electronics	0.30	Normal	1	1	1	0.30	0.30	0.30
Response Time	0.80	Rectangular	$\sqrt{3}$	1	1	0.46	0.46	0.80
Integration Time	2.60	Rectangular	$\sqrt{3}$	1	1	1.50	1.50	2.60
RF Ambient Conditions	3.00	Rectangular	$\sqrt{3}$	1	1	1.73	1.73	3.00
Probe Positioner	3.00	Rectangular	$\sqrt{3}$	1	1	1.73	1.73	3.00
Probe positioning	0.40	Rectangular	$\sqrt{3}$	1	1	0.23	0.23	0.40
Algorithms for Max. SAR Evaluation	2.90	Rectangular	$\sqrt{3}$	1	1	1.67	1.67	2.90
Dipole								
Dipole Axis to Liquid Distance	2.00	Rectangular	$\sqrt{3}$	1	1	1.15	1.15	145
Input power and SAR drift measurement	5.00	Rectangular	$\sqrt{3}$	1	1	2.89	2.89	∞
Phantom and Tissue Parameters								
Phantom Uncertainty	4.00	Rectangular	$\sqrt{3}$	1	1	2.31	2.31	∞
Liquid Conductivity (target)	5.00	Rectangular	$\sqrt{3}$	0.64	0.43	1.85	1.24	∞
Liquid Conductivity (measurement)	4.59	Normal	1	0.64	0.43	2.94	1.97	∞
Liquid Permittivity (target)	5.00	Rectangular	$\sqrt{3}$	0.6	0.49	1.73	1.41	∞
Liquid Permittivity (measurement)	4.93	Normal	1	0.6	0.49	2.96	2.42	∞
Combined Standard Uncertainty						**10.37**	**9.85**	∞
Coverage Factor for 95%						kp=2		
Expanded Uncertainty (K=2)						**20.73**	**19.69**	

NOTE: About the system validation uncertainty assessment, please reference the section 7.

7. MEASUREMENT SAR PROCEDURE UNCERTAINTIES

The assessment of spatial peak SAR of the hand handheld devices is according to IEEE 1528. All testing situation shall be met below these requirements.

- The system is used by an experienced engineer who follows the manual and the guidelines taught during the training provided by SPEAG.
- The probe has been calibrated within the requested period and the stated uncertainty for the relevant frequency bands does not exceed 4.8% (k=1).
- The validation dipole has been calibrated within the requested period and the system performance check has been successful.
- The DAE unit has been calibrated within the within the requested period.
- The minimum distance between the probe sensor and inner phantom shell is selected to be between 4 and 5mm.
- The operational mode of the DUT is CW, CDMA, FDMA or TDMA (GSM, DCS, PCS, IS136 and PDC) and the measurement/integration time per point is >500 ms.
- The dielectric parameters of the liquid have been assessed using Agilent 85070D dielectric probe kit or a more accurate method.
- The dielectric parameters are within 5% of the target values.
- The DUT has been positioned as described in section 3.

7.1 PROBE CALIBRATION UNCERTAINTY

SPEAG conducts the probe calibration in compliance with international and national standards (e.g. IEEE 1528, EN 62209-1, IEC 62209, etc.) under ISO17025. The uncertainties are stated on the calibration certificate. For the most relevant frequency bands, these values do not exceed 4.8% (k=1). If evaluations of other bands are performed for which the uncertainty exceeds these values, the uncertainty tables given in the summary have to be revised accordingly.

7.2 ISOTROPY UNCERTAINTY

The axial isotropy tolerance accounts for probe rotation around its axis while the hemispherical isotropy error includes all probe orientations and field polarizations. These parameters are assessed by SPEAG during initial calibration. In 2001, SPEAG further tightened its quality controls and warrants that the maximal deviation from axial isotropy is ±0.20 dB, while the maximum deviation of hemispherical isotropy is ±0.40 dB, corresponding to ±4.7% and ±9.6%, respectively. A weighting factor of cp equal to 0.5 can be applied, since the axis of the probe deviates less than 30 degrees from the normal surface orientation.

7.3 BOUNDARY EFFECT UNCERTAINTY

The effect can be estimated according to the following error approximation formula

$$SAR_{tolerance}[\%] = SAR_{be}[\%] \times \frac{(d_{be} + d_{step})^2}{2d_{step}} \frac{e^{-\frac{d_{be}}{\delta/2}}}{\delta/2}$$

$$d_{be} + d_{step} < 10mm$$

The parameter d_{be} is the distance in mm between the surface and the closest measurement point used in the averaging process; d_{step} is the separation distance in mm between the first and second measurement points; δ is the minimum penetration depth in mm within the head tissue equivalent liquids (i.e., δ= 13.95 mm at 3GHz); SAR_{be} is the deviation between the measured SAR value at the distance d_{be} from the boundary and the wave-guide analytical value SAR_{ref}.DASY5 applies a boundary effect compensation algorithm according to IEEE 1528, which is possible since the axis of the probe never deviates more than 30 degrees from the normal surface orientation. SAR_{be}[%] is assessed during the calibration process and SPEAG warrants that the uncertainty at distances larger than 4mm is always less than 1%.In summary, the worst case boundary effect SAR tolerance[%] for scanning distances larger than 4mm is < ± 0.8%.

7.4 PROBE LINEARITY UNCERTAINTY

Field probe linearity uncertainty includes errors from the assessment and compensation of the diode compression effects for CW and pulsed signals with known duty cycles. This error is assessed using the procedure described in IEEE 1528. For SPEAG field probes, the measured difference between CW and pulsed signals, with pulse frequencies between 10 Hz and 1 kHz and duty cycles between 1 and 100, is < ±0.20 dB (< ±4.7%).

7.5 READOUT ELECTRONICS UNCERTAINTY

All uncertainties related to the probe readout electronics (DAE unit), including the gain and linearity of the instrumentation amplifier, its loading effect on the probe, and accuracy of the signal conversion algorithm, have been assessed accordingly to IEEE 1528.The combination (root-sum-square RSS method) of these components results in an overall maximum error of ±1.0%.

7.6 RESPONSE TIME UNCERTAINTY

The time response of the field probes is assessed by exposing the probe to a well-controlled electric field producing SAR larger than 2.0 W/kg at the tissue medium surface. The signal response time is evaluated as the time required by the system to reach 90% of the expected final value after an on/of switch of the power source. Analytically, it can be expressed as:

$$SAR_{tolerance}[\%] = 100 \times \left(\frac{T_m}{T_m + \tau e^{-T_m/\tau} - \tau} - 1\right)$$

where Tm is 500 ms, i.e., the time between measurement samples, and τ the time constant. The response time τ of SPEAG's probes is <5 ms. In the current implementation, DASY5 waits longer than 100 ms after having reached the grid point before starting a measurement, i.e., the response time uncertainty is negligible.

7.7 INTEGRATION TIME UNCERTAINTY

If the device under test does not emit a CW signal, the integration time applied to measure the electric field at a specific point may introduce additional uncertainties due to the discretization and can be assessed as follows

$$SAR_{tolerance}[\%] = 100 \times \sum_{allsub-frames} \frac{t_{frame}}{t_{integration}} \frac{slot_{idle}}{slot_{total}}$$

The tolerances for the different systems are given in Table 7.1, whereby the worst-case $SAR_{tolerance}$ is 2.6%.

System	$SAR_{tolerance}$ %
CW	0
CDMA*	0
WCDMA*	0
FDMA	0
IS-136	2.6
PDC	2.6
GSM/DCS/PCS	1.7
DECT	1.9
Worst-Case	2.6

TABLE 7.1

7.8 PROBE POSITIONER MECHANICAL TOLERANCE

The mechanical tolerance of the field probe positioner can introduce probe positioning uncertainties. The resulting SAR uncertainty is assessed by comparing the SAR obtained according to the specifications of the probe positioner with respect to the actual position defined by the geometric enter of the probe sensors. The tolerance is determined as:

$$SAR_{tolerance}[\%] = 100 \times \frac{d_{ph}}{\delta/2}$$

The specified repeatability of the RX robot family used in DASY5 systems is ±25 μm. The absolute accuracy for short distance movements is better than ±0.1mm, i.e., the $SAR_{tolerance}$[%] is better than 1.5% (rectangular).

7.9 PROBE POSITIONING

The probe positioning procedures affect the tolerance of the separation distance between the probe tip and the phantom surface as:

$$SAR_{tolerance}[\%] = 100 \times \frac{d_{ph}}{\delta/2}$$

where d_{ph} is the maximum deviation of the distance between the probe tip and the phantom surface. The optical surface detection has a precision of better than 0.2 mm, resulting in an $SAR_{tolerance}$[%] of <2.9% (rectangular distribution). Since the mechanical detection provides better accuracy, 2.9% is a worst-case figure for DASY5 system.

7.10 PHANTOM UNCERTAINTY

The SAR measurement uncertainty due to SPEAG phantom shell production tolerances has been evaluated using

$$SAR_{tolerance}[\%] \cong 100 \times \frac{2d}{a}, \qquad d << a$$

For a maximum deviation d of the inner and outer shell of the phantom from that specified in the CAD file of ±0.2 mm, and a 10mm spacing a between source and tissue liquid, the calculated phantom uncertainty is ±4.0%.

7.11 DASY5 UNCERTAINTY BUDGET

Error Description	Tolerance (±%)	Probability Distribution	Divisor	(C_i)		Standard Uncertainty (±%)		(v_i)
				(1g)	(10g)	(1g)	(10g)	
Measurement Equipment								
Probe Calibration	5.50	Normal	1	1	1	5.50	5.50	∞
Axial Isotropy	4.70	Rectangular	$\sqrt{3}$	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.60	Rectangular	$\sqrt{3}$	0.7	0.7	3.88	3.88	∞
Boundary effect	1.00	Rectangular	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	4.70	Rectangular	$\sqrt{3}$	1	1	2.71	2.71	∞
System Detection Limit	1.00	Rectangular	$\sqrt{3}$	1	1	0.58	0.58	∞
Readout Electronics	0.30	Normal	1	1	1	0.30	0.30	∞
Response Time	0.80	Rectangular	$\sqrt{3}$	1	1	0.46	0.46	∞
Integration Time	2.60	Rectangular	$\sqrt{3}$	1	1	1.50	1.50	∞
Noise	3.00	Rectangular	$\sqrt{3}$	1	1	1.73	1.73	∞
Mechanical Constraints								
Scanning System	0.89	Normal	1	1	1	0.89	0.89	9
Phantom Shell	3.60	Normal	1	1	1	3.60	3.60	5
Probe Positioning	5.00	Rectangular	$\sqrt{3}$	1	1	2.89	2.89	∞
Device Positioning	0.89	Normal	1	1	1	0.89	0.89	9
Physical Parameters								
Liquid Conductivity (target)	4.00	Rectangular	$\sqrt{3}$	1	1	2.31	2.31	4.00
Liquid Conductivity (measurement)	5.00	Rectangular	$\sqrt{3}$	0.64	0.43	1.85	1.24	5.00
Liquid Permittivity (target)	4.59	Normal	1	0.64	0.43	2.94	1.97	4.59
Liquid Permittivity (measurement)	5.00	Rectangular	$\sqrt{3}$	0.6	0.49	1.73	1.41	5.00
Power Drift	4.93	Normal	1	0.6	0.49	2.96	2.42	4.93
RF Ambient Conditions	4.00	Rectangular	$\sqrt{3}$	1	1	2.31	2.31	4.00
Combined Standard Uncertainty						**10.95**	**10.46**	
Coverage Factor for 95%						**kp=2**		
Expanded Uncertainty (K=2)						**21.90**	**20.92**	

TABLE 7.2

8. INFORMATION ON THE TESTING LABORATORIES

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

USA	FCC, NVLAP
GERMANY	TUV Rheinland
JAPAN	VCCI
NORWAY	NEMKO
CANADA	INDUSTRY CANADA , CSA
R.O.C.	TAF, BSMI, NCC
NETHERLANDS	Telefication
SINGAPORE	GOST-ASIA (MOU)
RUSSIA	CERTIS (MOU)

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

Linko EMC/RF Lab:
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF Lab:
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom Lab:
Tel: 886-3-3183232
Fax: 886-3-3185050

Web Site: www.adt.com.tw

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

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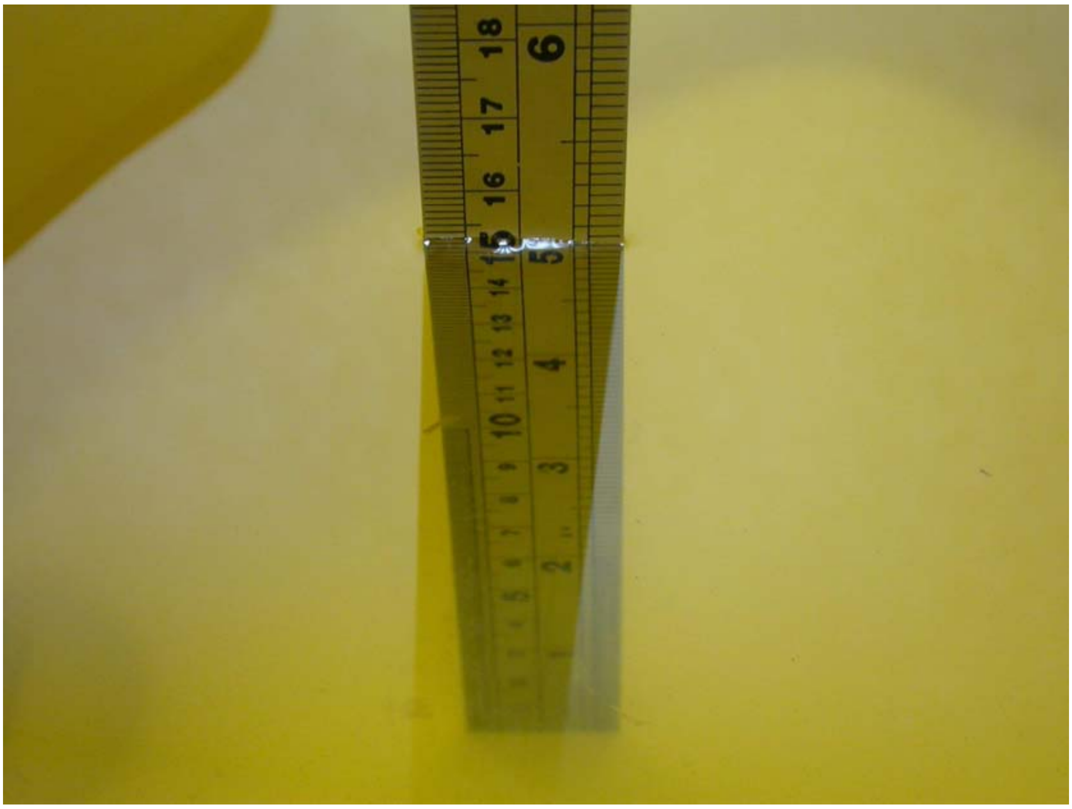
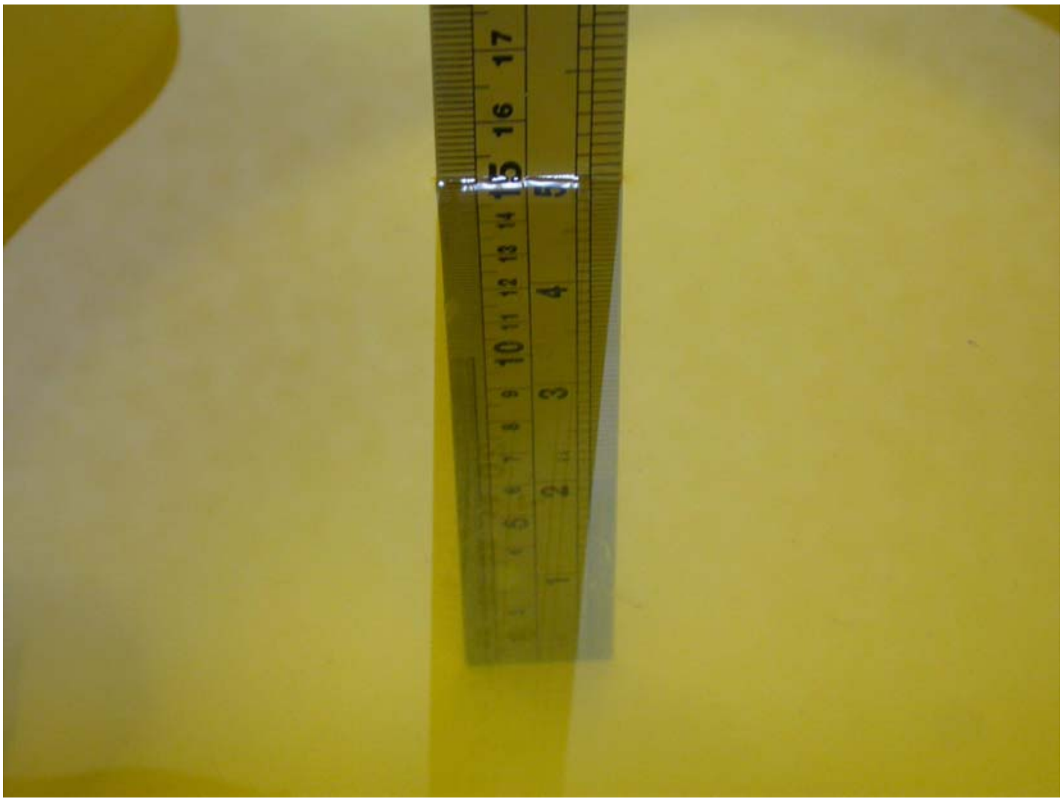
APPENDIX A: TEST DATA

Liquid Level Photo

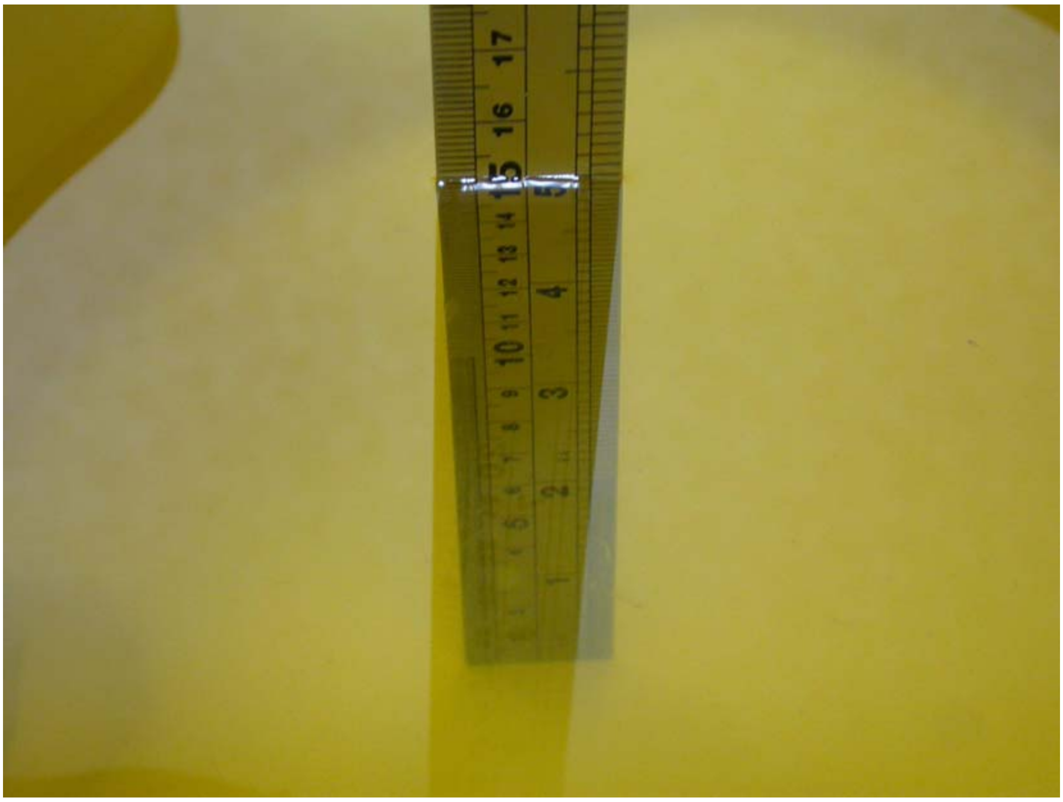
Tissue HSL835MHz D=153mm



Tissue HSL835MHz D=152mm



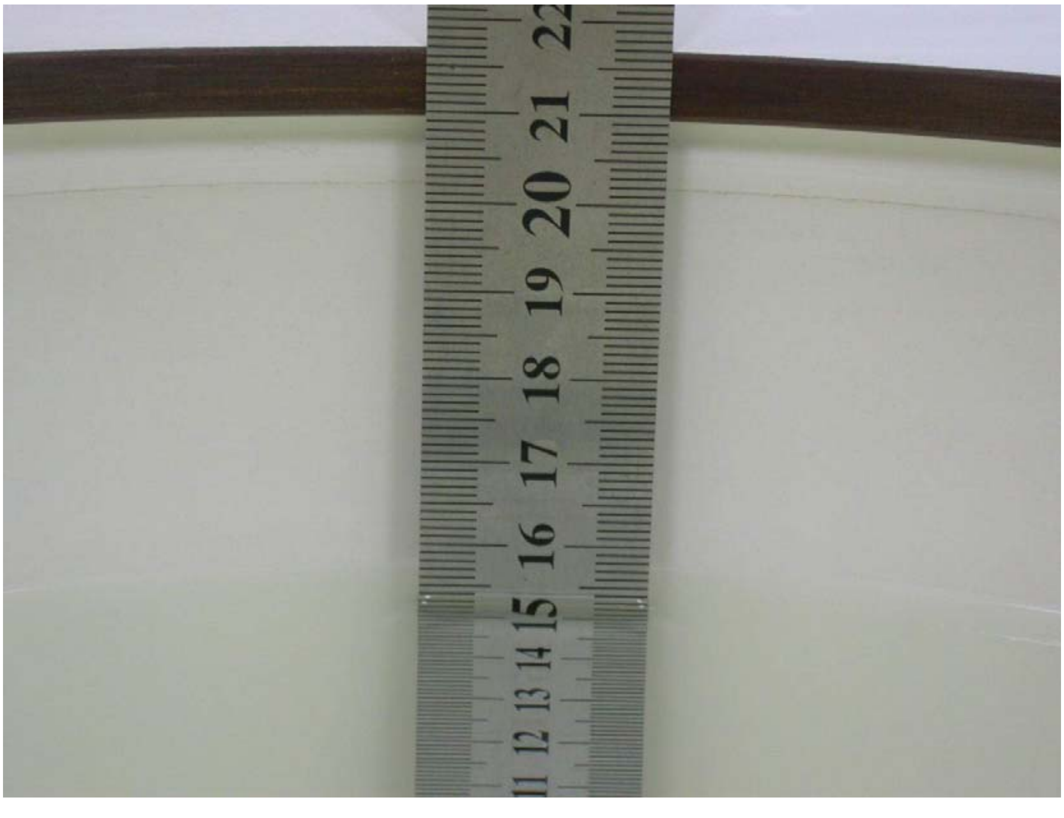
Tissue MSL835MHz D=152mm



Tissue HSL1900MHz D=151mm

Tissue HSL1900MHz D=152mm

Tissue MSL1900MHz D=154mm



Date/Time: 2009/3/17 10:05:48

Test Laboratory: Bureau Veritas ADT

M01 Right Head Cheek CDMA 850 Ch384

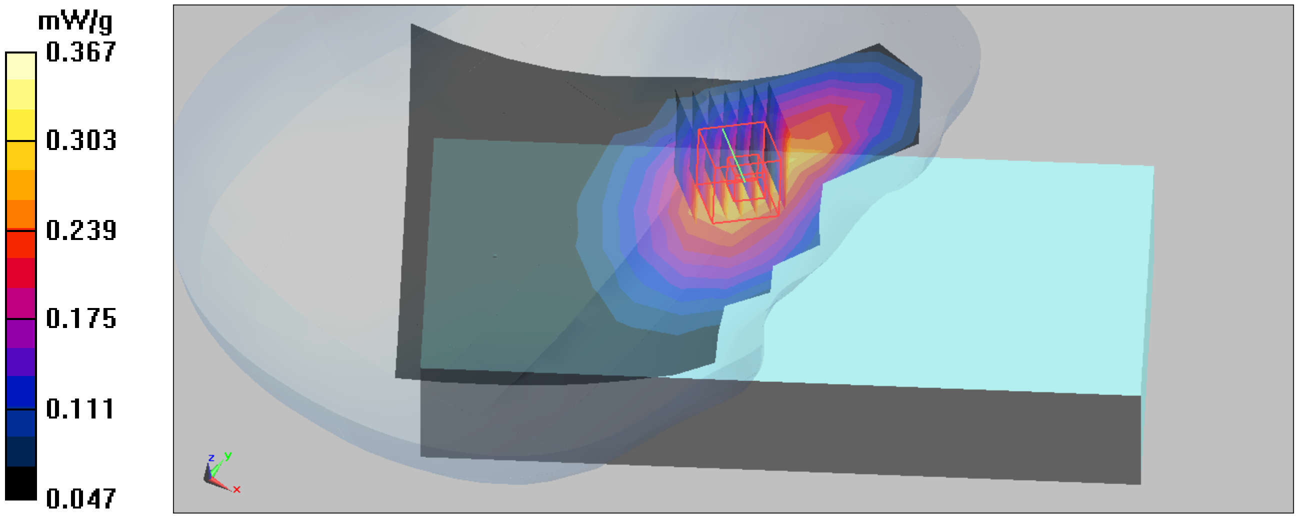
DUT: PDA ; Type: MC9598

Communication System: CDMA ; Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: HSL850 Medium parameters used: f = 836.5 MHz; σ = 0.93 mho/m; ε_r = 43.1; ρ = 1000 kg/m^3
Phantom section: Right Section ; DUT test position : Cheek ; Modulation type: OQPSK

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(9.57, 9.57, 9.57) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Touch position - Mid. Channel 384/Area Scan (9x18x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.360 mW/g

Touch position - Mid. Channel 384/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.13 V/m;
Peak SAR (extrapolated) = 0.407 W/kg
SAR(1 g) = 0.338 mW/g; SAR(10 g) = 0.264 mW/g
Maximum value of SAR (measured) = 0.367 mW/g



Date/Time: 2009/3/17 10:31:44

Test Laboratory: Bureau Veritas ADT

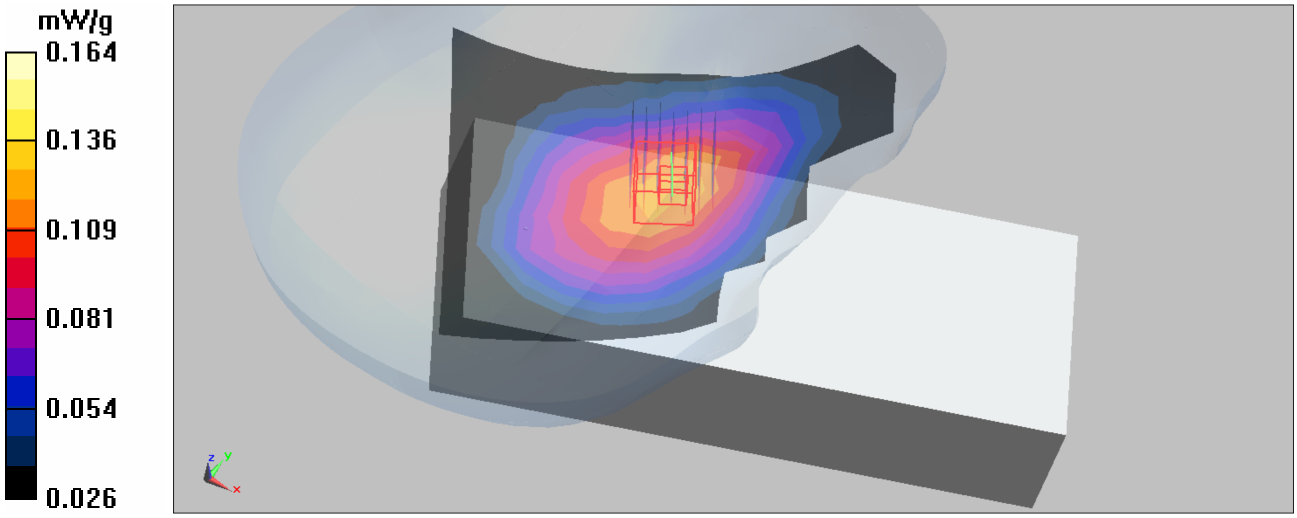
M02 Right Head Tilt CDMA 850 Ch384

DUT: PDA ; Type: MC9598
Communication System: CDMA ; Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: HSL850 Medium parameters used: f = 836.5 MHz; σ = 0.93 mho/m; ε_r = 43.1; ρ = 1000 kg/m^3
Phantom section: Right Section ; DUT test position : Tilt ; Modulation type: OQPSK

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(9.57, 9.57, 9.57) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Tilt position - Mid. Channel 384/Area Scan (9x18x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.161 mW/g

Tilt position - Mid. Channel 384/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.52 V/m;
Peak SAR (extrapolated) = 0.183 W/kg
SAR(1 g) = 0.151 mW/g; SAR(10 g) = 0.119 mW/g
Maximum value of SAR (measured) = 0.164 mW/g



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Test Laboratory: Bureau Veritas ADT

M03 Left Head Cheek CDMA 850 Ch384

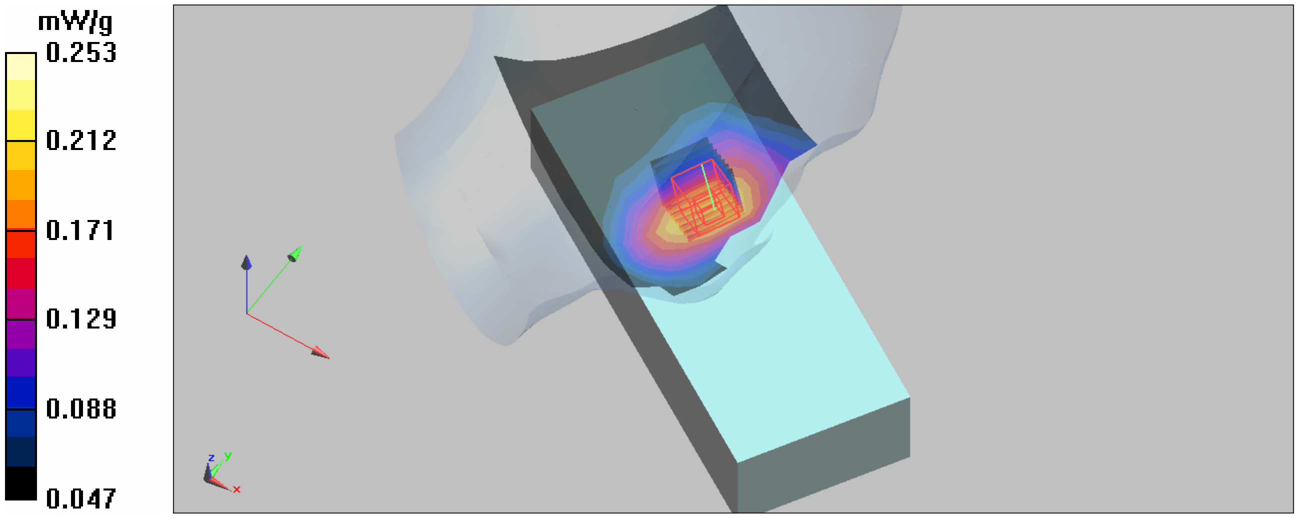
DUT: PDA ; Type: MC 9598

Communication System: CDMA ; Frequency: 836.5 MHz ; Duty Cycle: 1:1
Medium: HSL850 Medium parameters used: f = 836.5 MHz; σ = 0.93 mho/m; ε_r = 43.1; ρ = 1000 kg/m^3
Phantom section: Left Section ; DUT test position : Cheek ; Modulation type: OQPSK

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(9.57, 9.57, 9.57) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Touch position - Mid Channel 384/Area Scan (9x18x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.254 mW/g

Touch position - Mid Channel 384/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.04 V/m
Peak SAR (extrapolated) = 0.286 W/kg
SAR(1 g) = 0.232 mW/g; SAR(10 g) = 0.183 mW/g
Maximum value of SAR (measured) = 0.253 mW/g



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Test Laboratory: Bureau Veritas ADT

M04 Left Head Tilt CDMA 850 Ch384

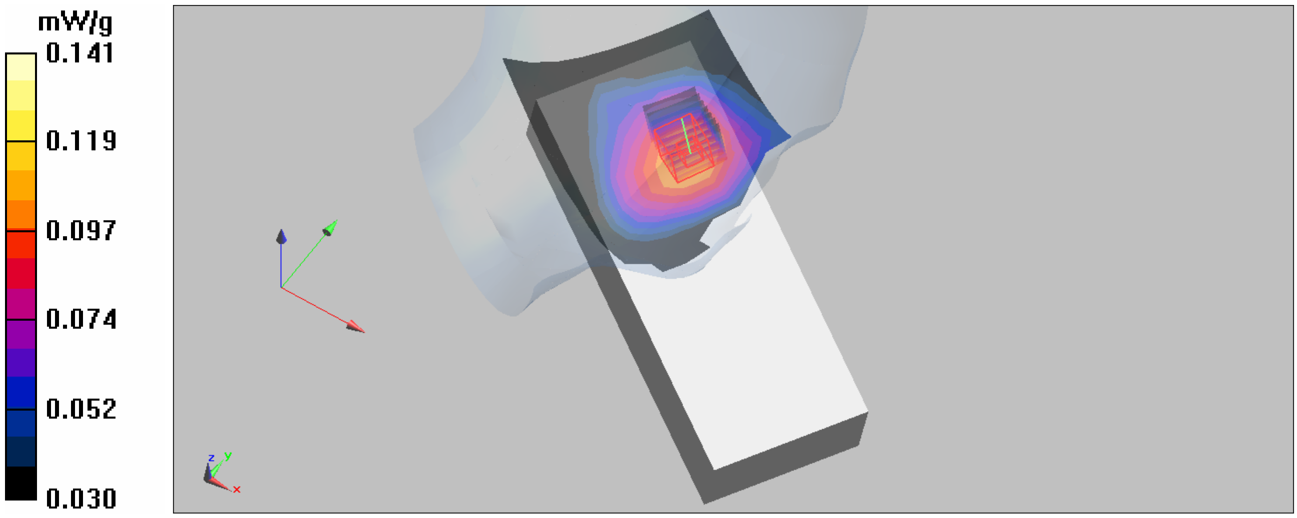
DUT: PDA ; Type: MC 9598

Communication System: CDMA ; Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: HSL850 Medium parameters used: f = 836.5 MHz; σ = 0.93 mho/m; ε_r = 43.1; ρ = 1000 kg/m^3
Phantom section: Left Section ; DUT test position : Tilt ; Modulation type: OQPSK

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(9.57, 9.57, 9.57) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Tilt position - Mid Channel 384/Area Scan (9x18x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.143 mW/g

Tilt position - Mid Channel 384/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.18 V/m
Peak SAR (extrapolated) = 0.162 W/kg
SAR(1 g) = 0.130 mW/g; SAR(10 g) = 0.103 mW/g
Maximum value of SAR (measured) = 0.141 mW/g



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Test Laboratory: Bureau Veritas ADT

M05 Head In the Plat Phantom CDMA 850 CH 384

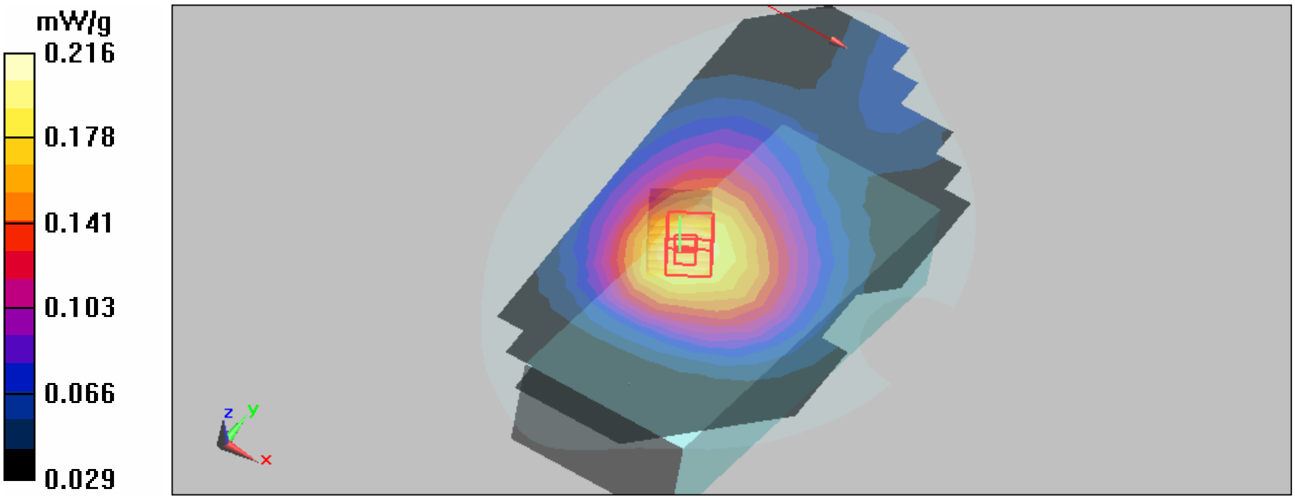
DUT: PDA ; Type: MC9598

Communication System: CDMA ; Frequency: 836.5 MHz ; Duty Cycle: 1:1
Medium: HSL850 Medium parameters used: f = 836.5 MHz; σ = 0.91 mho/m; ε_r = 42.5; ρ = 1000 kg/m^3
Phantom section: Flat Section ; DUT test position : Cheek ; Modulation type: OQPSK

DASY5 Configuration:
- Probe: EX3DV4 - SN3590 ; ConvF(9.79, 9.79, 9.79) ; Calibrated: 2009/4/28
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 45

Touch position - Mid. Channel 384/Area Scan (11x19x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.212 mW/g

Touch position - Mid. Channel 384/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.2 V/m;
Peak SAR (extrapolated) = 0.255 W/kg
SAR(1 g) = 0.194 mW/g; SAR(10 g) = 0.145 mW/g
Maximum value of SAR (measured) = 0.216 mW/g



Date/Time: 2009/3/19 10:18:54

Test Laboratory: Bureau Veritas ADT

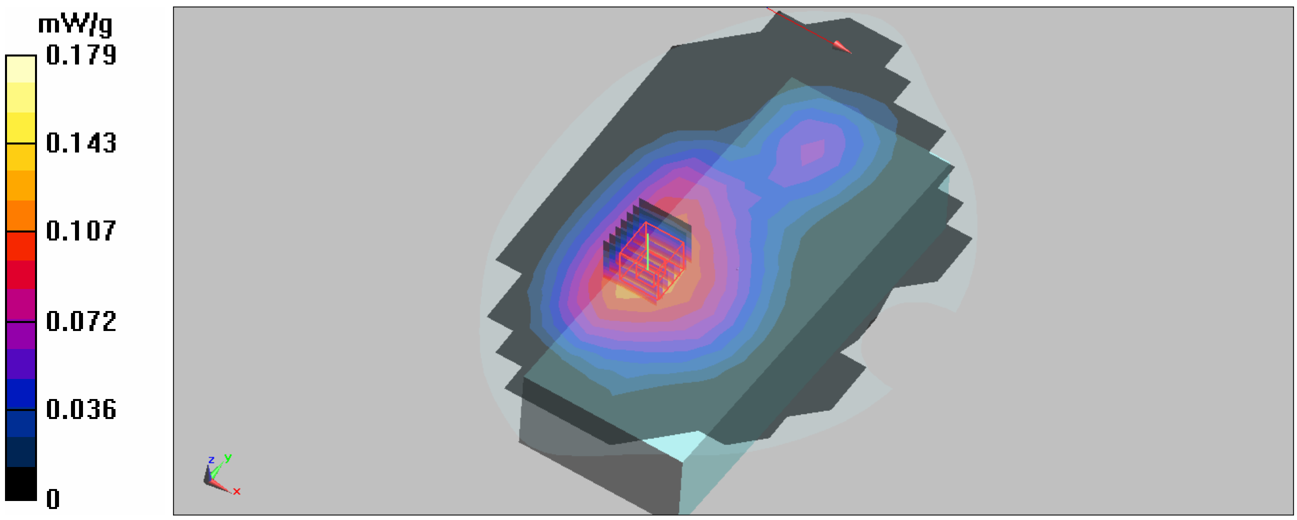
M06 Body Front CDMA850 Ch384 with sheath

DUT: PDA ; Type: MC 9598
Communication System: CDMA ; Frequency: 836.5 MHz ; Duty Cycle: 1:1 ; Modulation type: OQPSK
Medium: MSL850 Medium parameters used: f = 836.5 MHz; σ = 1.01 mho/m; ε_r = 54.5; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 0 mm (The tip side of the EUT to the Phantom)

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(9.71, 9.71, 9.71) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2008/9/22
- Phantom: SAM with CRP ; Type: SAM ; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Mid Channel 384/Area Scan (13x19x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.179 mW/g

Mid Channel 384/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.5 V/m
Peak SAR (extrapolated) = 0.213 W/kg
SAR(1 g) = 0.163 mW/g; SAR(10 g) = 0.122 mW/g
Maximum value of SAR (measured) = 0.181 mW/g



Date/Time: 2009/3/19 11:41:56

Test Laboratory: Bureau Veritas ADT

M07 Body Front 1xEVDO850 Ch384 with sheath

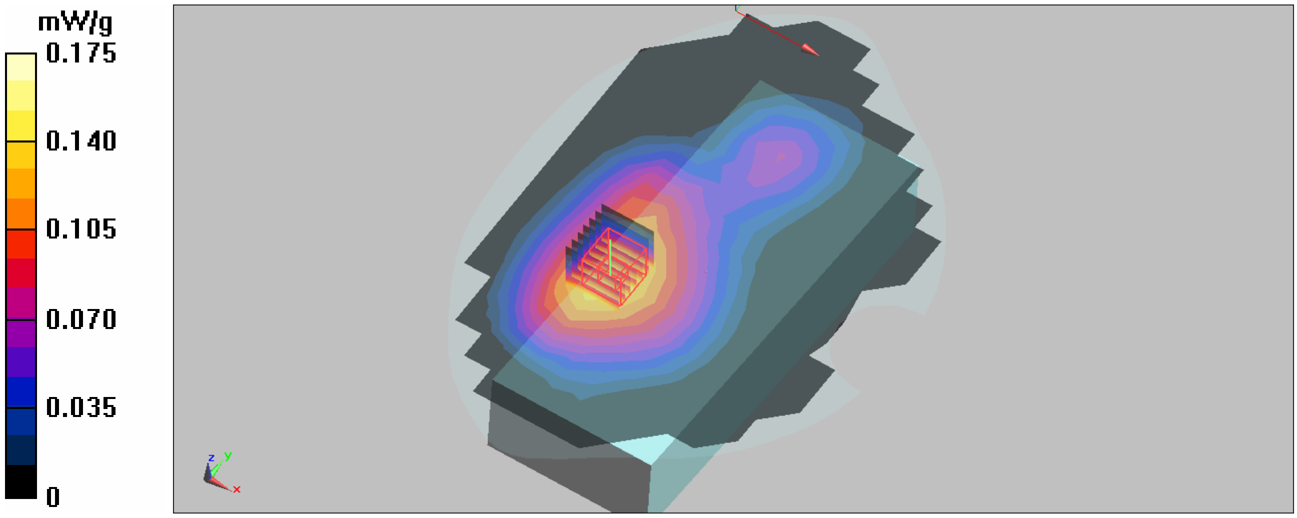
DUT: PDA ; Type: MC 9598

Communication System: CDMA ; Frequency: 836.5 MHz ; Duty Cycle: 1:1 ; Modulation type: HPSK
Medium: MSL850 Medium parameters used: f = 836.5 MHz; $\sigma = 1.01$ mho/m; $\varepsilon_r = 54.5$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section ; Separation distance : 0 mm (The tip side of the EUT to the Phantom)

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(9.71, 9.71, 9.71) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2008/9/22
- Phantom: SAM with CRP ; Type: SAM ; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Mid Channel 384 EVDO/Area Scan (13x19x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.175 mW/g

Mid Channel 384 EVDO/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.9 V/m
Peak SAR (extrapolated) = 0.223 W/kg
SAR(1 g) = 0.169 mW/g; SAR(10 g) = 0.127 mW/g
Maximum value of SAR (measured) = 0.189 mW/g



Date/Time: 2009/3/18 09:45:09

Test Laboratory: Bureau Veritas ADT

M08 Right Head Cheek CDMA 1900 Ch600

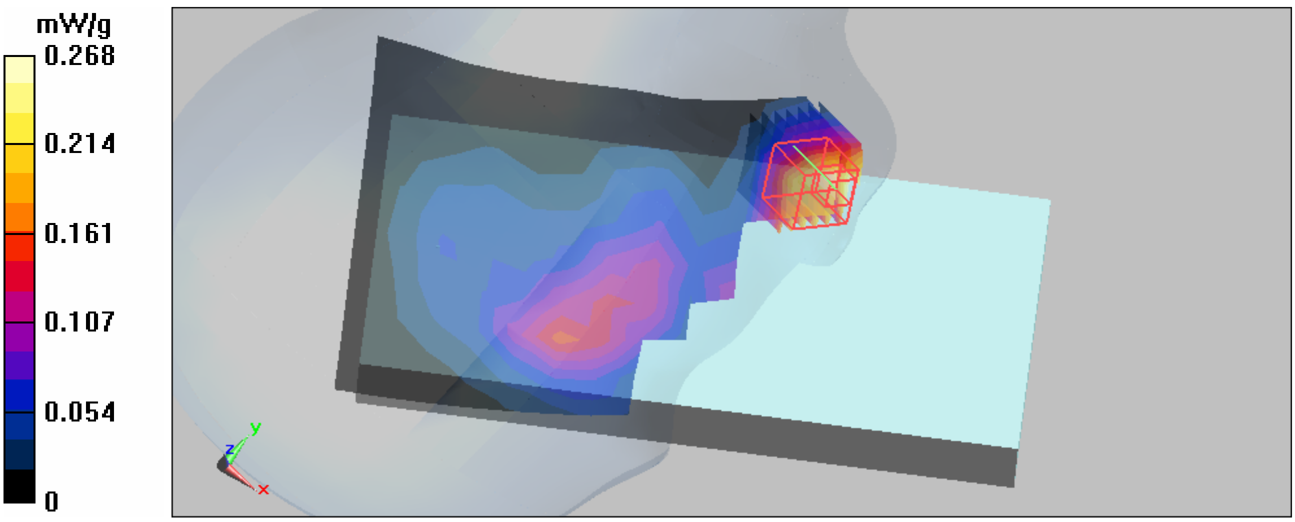
DUT: PDA ; Type: MC9598

Communication System: CDMA ; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: HSL1900 Medium parameters used: f = 1880 MHz; $\sigma = 1.43$ mho/m; $\varepsilon r = 40.8$; $\rho = 1000$ kg/m^3
Phantom section: Right Section ; DUT test position : Cheek ; Modulation type: OQPSK

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(8.08, 8.08, 8.08) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Touch position - Mid. Channel 600/Area Scan (9x18x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.271 mW/g

Touch position - Mid. Channel 600/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.31 V/m;
Peak SAR (extrapolated) = 0.326 W/kg
SAR(1 g) = 0.235 mW/g; SAR(10 g) = 0.154 mW/g
Maximum value of SAR (measured) = 0.268 mW/g



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Test Laboratory: Bureau Veritas ADT

M09 Right Head Tilt CDMA 1900 Ch600

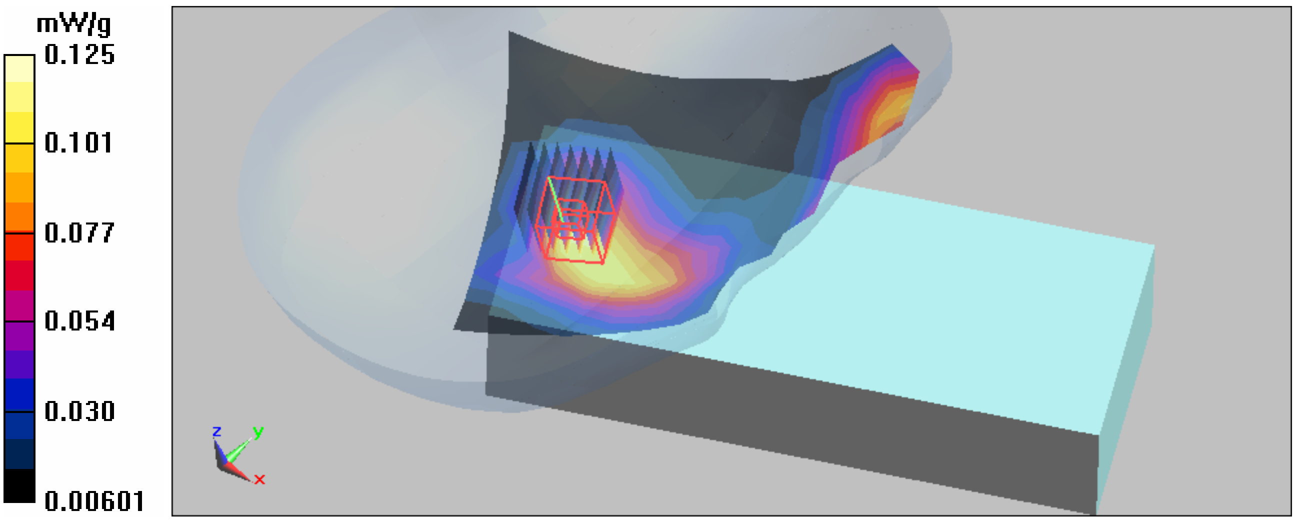
DUT: PDA ; Type: MC9598

Communication System: CDMA ; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; εr = 40.8; ρ = 1000 kg/m^3
Phantom section: Right Section ; DUT test position : Tilt ; Modulation type: OQPSK

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(8.08, 8.08, 8.08) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Tilt position - Mid. Channel 600/Area Scan (9x18x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.124 mW/g

Tilt position - Mid. Channel 600/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.37 V/m;
Peak SAR (extrapolated) = 0.169 W/kg
SAR(1 g) = 0.106 mW/g; SAR(10 g) = 0.066 mW/g
Maximum value of SAR (measured) = 0.125 mW/g



Date/Time: 2009/3/18 10:46:31

Test Laboratory: Bureau Veritas ADT

M10 Left Head Cheek CDMA 1900 Ch600

DUT: PDA ; Type: MC 9598

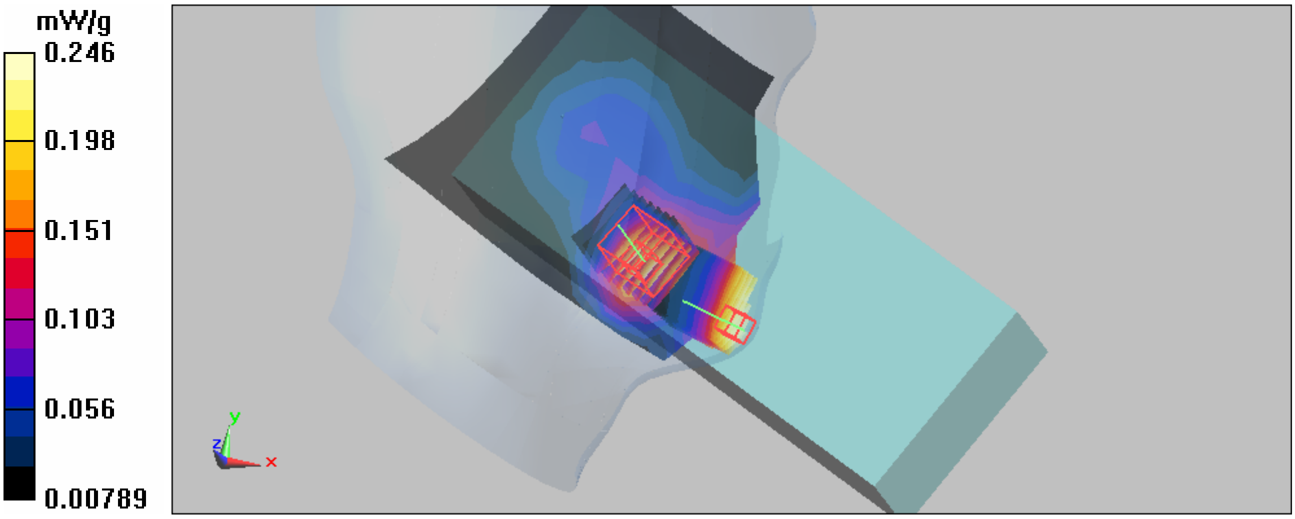
Communication System: CDMA ; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; εr = 40.8; ρ = 1000 kg/m^3
Phantom section: Left Section ; DUT test position : Cheek ; Modulation type: OQPSK

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(8.08, 8.08, 8.08) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Touch position - Mid Channel 600/Area Scan (9x18x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.260 mW/g

Touch position - Mid Channel 600/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.05 V/m;
Peak SAR (extrapolated) = 0.360 W/kg
SAR(1 g) = 0.247 mW/g; SAR(10 g) = n.a.
Maximum value of SAR (measured) = 0.292 mW/g

Touch position - Mid Channel 600/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.05 V/m; Peak SAR (extrapolated) = 0.327 W/kg
SAR(1 g) = 0.212 mW/g; SAR(10 g) = 0.134 mW/g
Maximum value of SAR (measured) = 0.246 mW/g



Date/Time: 2009/3/18 11:28:53

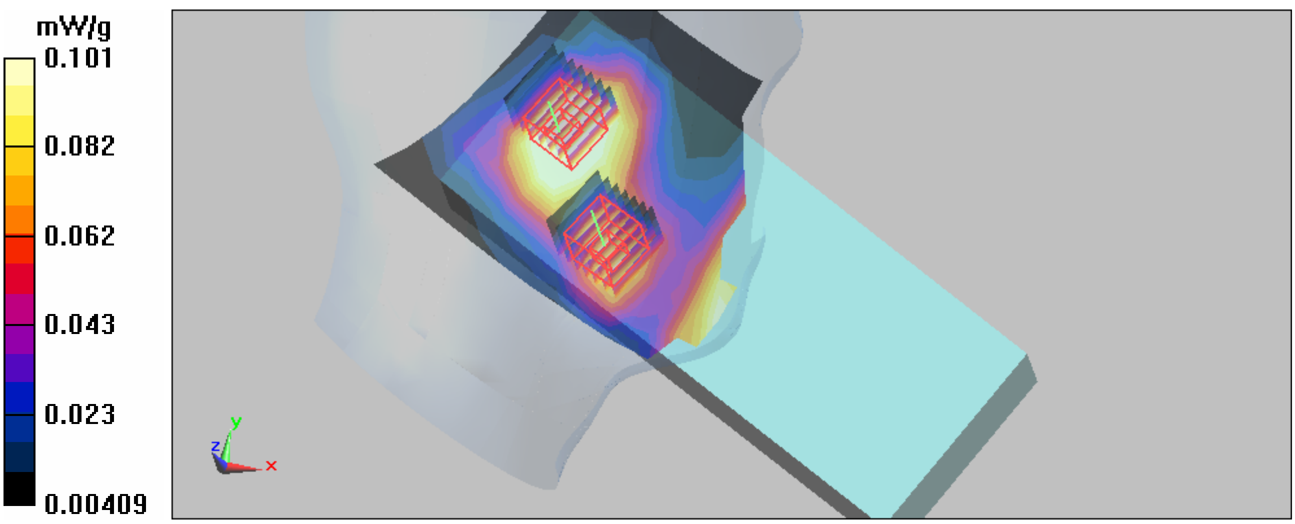
Test Laboratory: Bureau Veritas ADT

M11 Left Head Tilt CDMA 1900 Ch600

DUT: PDA ; Type: MC 9598
Communication System: CDMA ; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: HSL1900 Medium parameters used: f = 1880 MHz; $\sigma = 1.43$ mho/m; $\varepsilon r = 40.8$; $\rho = 1000$ kg/m^3
Phantom section: Left Section ; DUT test position : Tilt ; Modulation type: OQPSK

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(8.08, 8.08, 8.08) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Tilt position - Mid Channel 600/Area Scan (9x18x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.135 mW/g
Tilt position - Mid Channel 600/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.26 V/m;
Peak SAR (extrapolated) = 0.190 W/kg
SAR(1 g) = 0.122 mW/g; SAR(10 g) = 0.077 mW/g
Maximum value of SAR (measured) = 0.143 mW/g
Tilt position - Mid Channel 600/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.26 V/m;
Peak SAR (extrapolated) = 0.125 W/kg
SAR(1 g) = 0.088 mW/g; SAR(10 g) = 0.057 mW/g
Maximum value of SAR (measured) = 0.101 mW/g



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Test Laboratory: Bureau Veritas ADT

M12 Head In the Plat Phantom CDMA 1900 CH600

DUT: PDA ; Type: MC9598

Communication System: CDMA ; Frequency: 1880 MHz ; Duty Cycle: 1:1

Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.41 mho/m; ε_r = 40.7; ρ = 1000 kg/m^3

Phantom section: Flat Section ; DUT test position : Cheek ; Modulation type: OQPSK

DASY5 Configuration:

- Probe: EX3DV4 - SN3590 ; ConvF(8.39, 8.39, 8.39) ; Calibrated: 2009/4/28
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 45

Touch position - Mid. Channel 600/Area Scan (11x19x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.027 mW/g

Touch position - Mid. Channel 600/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.38 V/m;

Peak SAR (extrapolated) = 0.042 W/kg

SAR(1 g) = 0.024 mW/g; SAR(10 g) = 0.015 mW/g

Maximum value of SAR (measured) = 0.030 mW/g

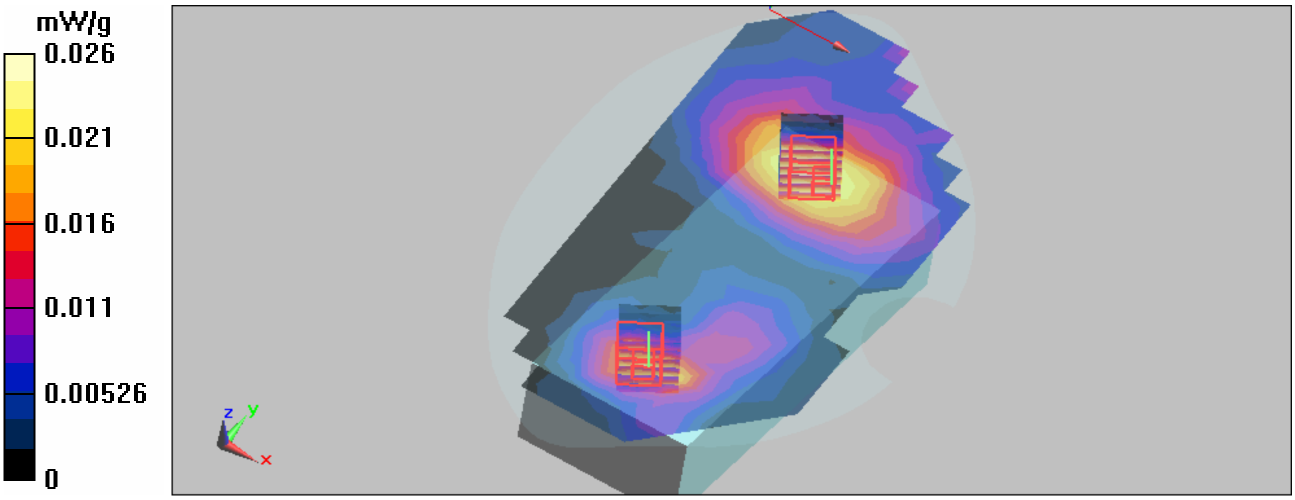
Touch position - Mid. Channel 600/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.38 V/m;

Peak SAR (extrapolated) = 0.039 W/kg

SAR(1 g) = 0.021 mW/g; SAR(10 g) = 0.013 mW/g

Maximum value of SAR (measured) = 0.026 mW/g



Date/Time: 2009/3/20 09:49:26

Test Laboratory: Bureau Veritas ADT

M13 Body Front CDMA1900 with sheath

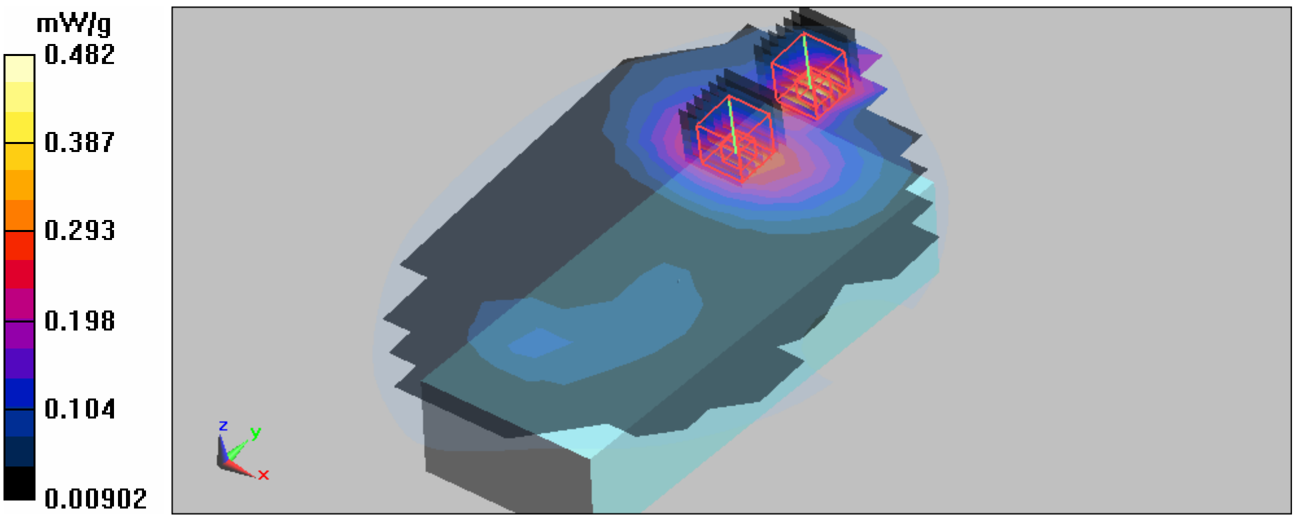
DUT: PDA ; Type: MC 9596
Communication System: CDMA ; Frequency: 1880 MHz ; Duty Cycle: 1:1 ; Modulation type: OQPSK
Medium: MSL1900 Medium parameters used: f = 1880 MHz; $\sigma = 1.54$ mho/m; $\varepsilon_r = 55.7$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section ; Separation distance : 0 mm (The tip side of the EUT to the Phantom)

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(8.21, 8.21, 8.21) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2008/9/22
- Phantom: SAM with CRP ; Type: SAM ; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Mid Channel 600/Area Scan (13x19x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.436 mW/g

Mid Channel 600/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.83 V/m
Peak SAR (extrapolated) = 0.679 W/kg
SAR(1 g) = 0.391 mW/g; SAR(10 g) = 0.215 mW/g
Maximum value of SAR (measured) = 0.482 mW/g

Mid Channel 600/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.83 V/m
Peak SAR (extrapolated) = 0.417 W/kg
SAR(1 g) = 0.276 mW/g; SAR(10 g) = 0.179 mW/g
Maximum value of SAR (measured) = 0.322 mW/g



Date/Time: 2009/3/20 10:32:44

Test Laboratory: Bureau Veritas ADT

M14 Body Front 1xEVDO1900 with sheath

DUT: PDA ; Type: MC 9596

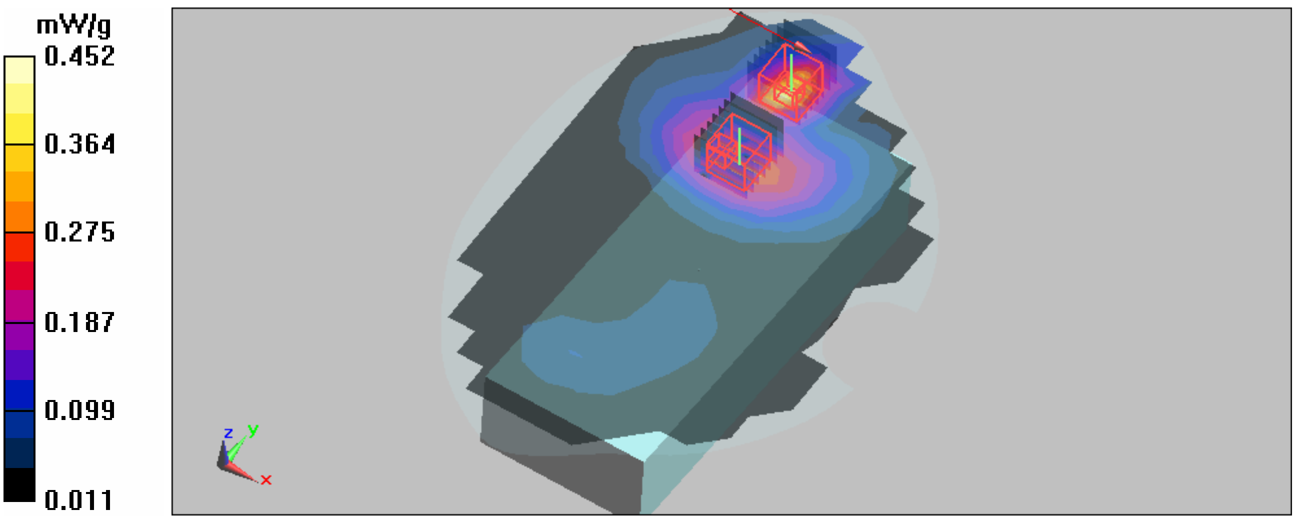
Communication System: CDMA ; Frequency: 1880 MHz ; Duty Cycle: 1:1 ; Modulation type: HPSK
Medium: MSL1900 Medium parameters used: f = 1880 MHz; σ = 1.54 mho/m; ε_r = 55.7; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 0 mm (The tip side of the EUT to the Phantom)

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(8.21, 8.21, 8.21) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2008/9/22
- Phantom: SAM with CRP ; Type: SAM ; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Mid Channel 600 EVDO/Area Scan (13x19x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.425 mW/g

Mid Channel 600 EVDO/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.23 V/m
Peak SAR (extrapolated) = 0.619 W/kg
SAR(1 g) = 0.358 mW/g; SAR(10 g) = 0.192 mW/g
Maximum value of SAR (measured) = 0.452 mW/g

Mid Channel 600 EVDO/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.23 V/m
Peak SAR (extrapolated) = 0.425 W/kg
SAR(1 g) = 0.256 mW/g; SAR(10 g) = 0.151 mW/g
Maximum value of SAR (measured) = 0.295 mW/g



Date/Time: 2009/3/17 00:39:28

Test Laboratory: Bureau Veritas ADT

System validation-HSL835

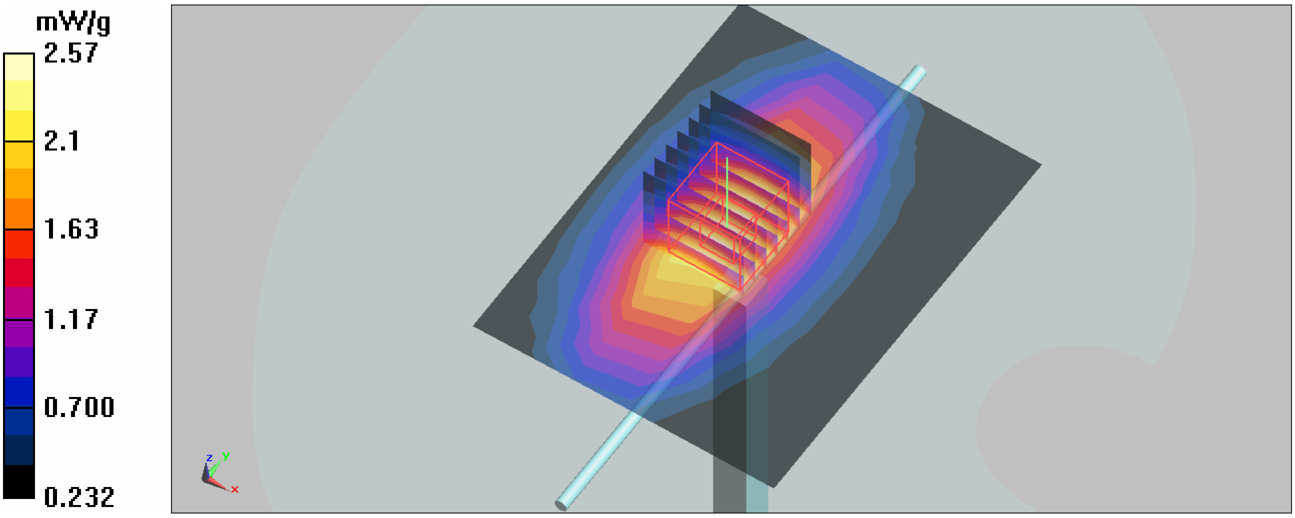
DUT: Dipole 835 MHz ; Type: D835V2 ; Serial: D835V2 - SN:4d021 ; Test Frequency: 835 MHz

Communication System: CW ; Frequency: 835 MHz; Duty Cycle: 1:1; Modulation type: CW
Medium: HSL835;Medium parameters used: f = 835 MHz; $\sigma = 0.93$ mho/m; $\varepsilon_r = 43.1$; $\rho = 1000$ kg/m^3 ;
Liquid level : 153 mm
Phantom section: Flat Section ; Separation distance : 15 mm (The feetpoint of the dipole to the Phantom)Air temp. : 23.1 degrees ; Liquid temp. : 22.7 degrees

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(9.57, 9.57, 9.57) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

d=15mm, Pin=250mW/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.31 mW/g

d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 51.9 V/m; Power Drift = -0.017 dB
Peak SAR (extrapolated) = 3.63 W/kg
SAR(1 g) = 2.38 mW/g; SAR(10 g) = 1.55 mW/g
Maximum value of SAR (measured) = 2.57 mW/g



Date/Time: 2009/5/5 11:03:25

Test Laboratory: Bureau Veritas ADT

System Vaildation HSL850

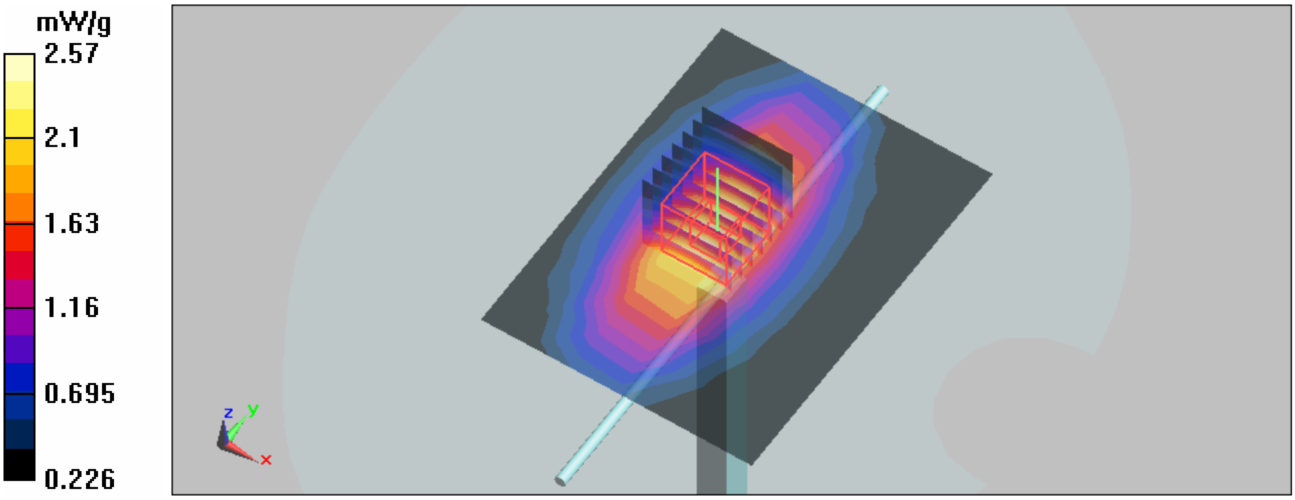
DUT: Dipole 835 MHz ; Type: D835V2 ; Serial: D835V2 - SN:4d021 ; Test Frequency: 835 MHz

Communication System: CW ; Frequency: 835 MHz; Duty Cycle: 1:1; Modulation type: CW
Medium: HSL850;Medium parameters used: f = 835 MHz; σ = 0.91 mho/m; ε_r = 42.5; ρ = 1000 kg/m^3 ;
Liquid level : 150 mm
Phantom section: Flat Section ; Separation distance : 15 mm (The feetpoint of the dipole to the Phantom)Air temp. : 23.2 degrees ; Liquid temp. : 22.7 degrees

DASY5 Configuration:
- Probe: EX3DV4 - SN3590 ; ConvF(9.79, 9.79, 9.79) ; Calibrated: 2009/4/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 45

d=15mm, Pin=250mW/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.33 mW/g

d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.3 V/m; Power Drift = 0.015 dB
Peak SAR (extrapolated) = 3.60 W/kg
SAR(1 g) = 2.40 mW/g; SAR(10 g) = 1.56 mW/g
Maximum value of SAR (measured) = 2.57 mW/g



Date/Time: 2009/3/19 00:43:23

Test Laboratory: Bureau Veritas ADT

System validation-MSL835

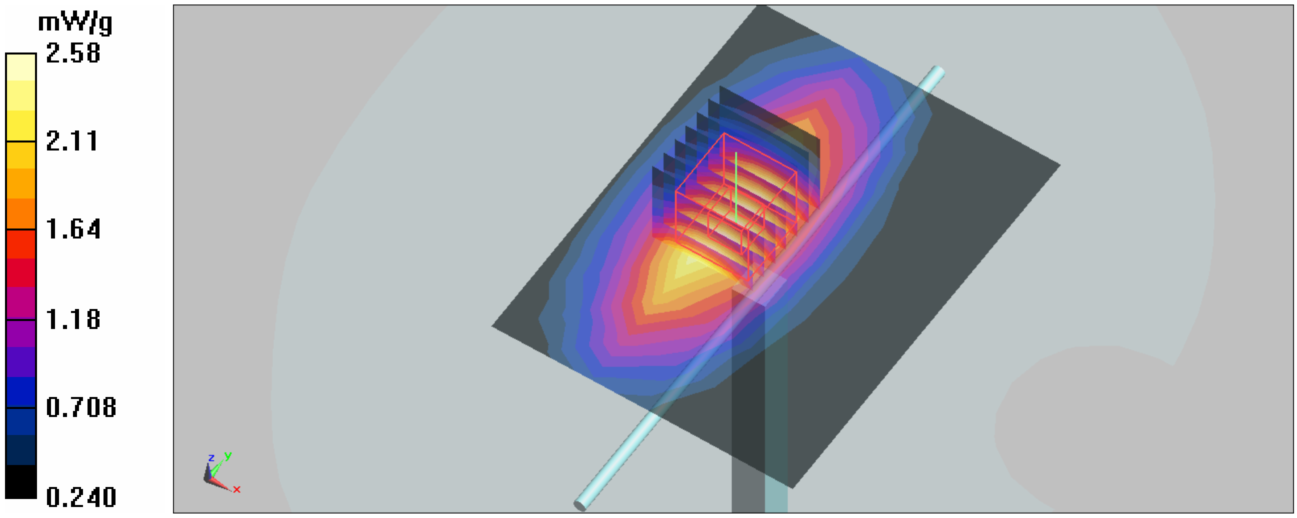
DUT: Dipole 835 MHz ; Type: D835V2 ; Serial: D835V2 - SN:4d021 ; Test Frequency: 835 MHz

Communication System: CW ; Frequency: 835 MHz; Duty Cycle: 1:1; Modulation type: CW
Medium: MSL835;Medium parameters used: f = 835 MHz; σ = 1.01 mho/m; ε_r = 54.5; ρ = 1000 kg/m^3 ;
Liquid level : 152 mm
Phantom section: Flat Section ; Separation distance : 15 mm (The feetpoint of the dipole to the Phantom)Air temp. : 23.3 degrees ; Liquid temp. : 22.9 degrees

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(9.71, 9.71, 9.71) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

d=15mm, Pin=250mW/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.54 mW/g

d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 50.9 V/m; Power Drift = 0.020 dB
Peak SAR (extrapolated) = 3.6 W/kg
SAR(1 g) = 2.39 mW/g; SAR(10 g) = 1.56 mW/g
Maximum value of SAR (measured) = 2.58 mW/g



Date/Time: 2009/3/18 00:34:26

Test Laboratory: Bureau Veritas ADT

System validation-HSL1900

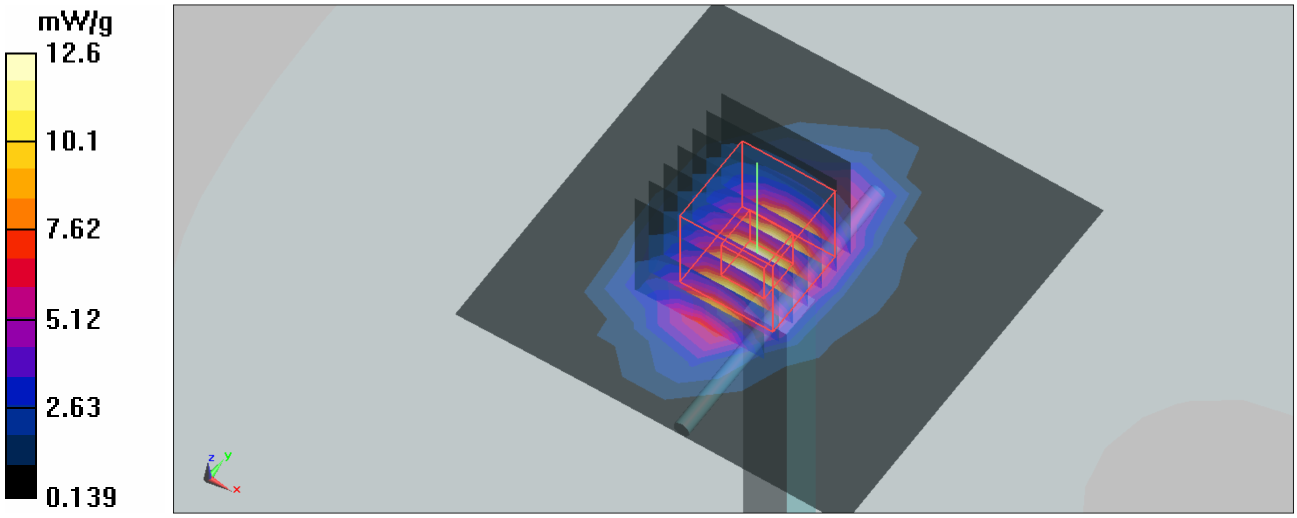
DUT: Dipole 1900 MHz ; Type: D1900V2 ; Serial: 5d036 ; Test Frequency: 1900 MHz

Communication System: CW ; Frequency: 1900 MHz; Duty Cycle: 1:1; Modulation type: CW
Medium: HSL1900;Medium parameters used: f = 1900 MHz; σ = 1.45 mho/m; ε_r = 40.7; ρ = 1000 kg/m^3 ;
Liquid level : 151 mm
Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom)Air temp. : 22.9 degrees ; Liquid temp. : 22.7 degrees

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(8.08, 8.08, 8.08) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

d=10mm, Pin=250mW/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 11.4 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88.7 V/m; Power Drift = 0.083 dB
Peak SAR (extrapolated) = 19.4 W/kg
SAR(1 g) = 9.82 mW/g; SAR(10 g) = 4.94 mW/g
Maximum value of SAR (measured) = 12.6 mW/g



Date/Time: 2009/5/5 16:45:26

Test Laboratory: Bureau Veritas ADT

System Validation HSL1900

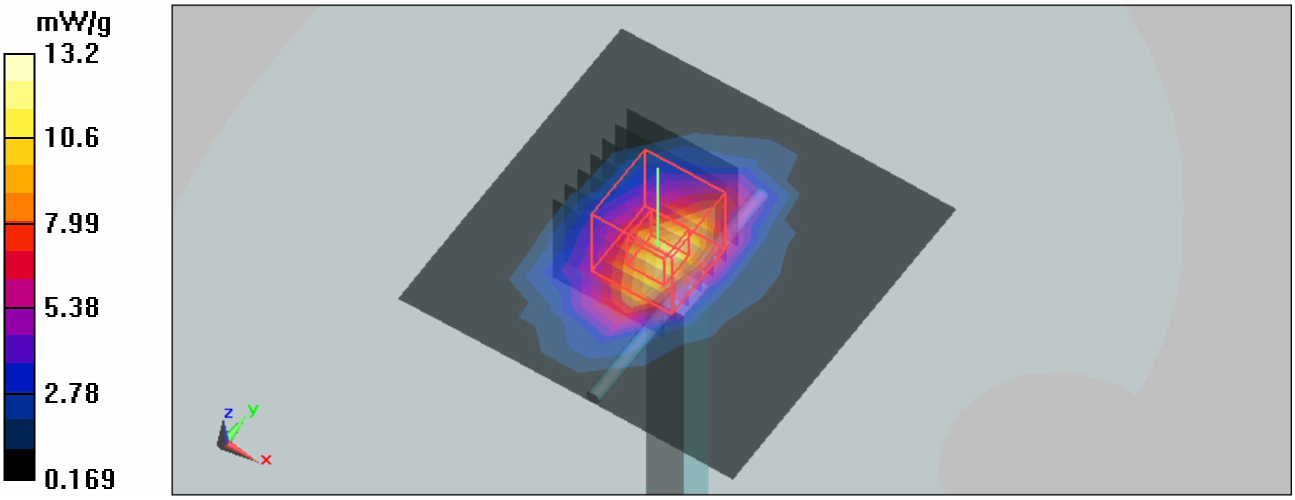
DUT: Dipole 1900 MHz ; Type: D1900V2 ; Serial: 5d022 ; Test Frequency: 1900 MHz

Communication System: CW ; Frequency: 1900 MHz; Duty Cycle: 1:1; Modulation type: CW
Medium: HSL1900;Medium parameters used (interpolated): f = 1900 MHz; σ = 1.44 mho/m; ε_r = 40.8; ρ = 1000 kg/m^3 ; Liquid level : 152 mm
Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom)Air temp. : 23.0 degrees ; Liquid temp. : 22.8 degrees

DASY5 Configuration:
- Probe: EX3DV4 - SN3590 ; ConvF(8.39, 8.39, 8.39) ; Calibrated: 2009/4/28
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 45

d=10mm, Pin=250mW/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 12.5 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 92.3 V/m; Power Drift = 0.075 dB
Peak SAR (extrapolated) = 20.9 W/kg
SAR(1 g) = 10.23 mW/g; SAR(10 g) = 5.29 mW/g
Maximum value of SAR (measured) = 13.2 mW/g



Date/Time: 2009/3/20 00:27:01

Test Laboratory: Bureau Veritas ADT

System validation-MSL1900

DUT: Dipole 1900 MHz ; Type: D1900V2 ; Serial: 5d036 ; Test Frequency: 1900 MHz

Communication System: CW ; Frequency: 1900 MHz; Duty Cycle: 1:1; Modulation type: CW
Medium: MSL1900;Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 55.6; ρ = 1000 kg/m^3 ; Liquid level : 154 mm
Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom)Air temp. : 23.1 degrees ; Liquid temp. : 22.8 degrees

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(8.21, 8.21, 8.21) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

d=10mm, Pin=250mW/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 8.31 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 87.4 V/m; Power Drift = 0.157 dB
Peak SAR (extrapolated) = 17.6 W/kg
SAR(1 g) = 9.49 mW/g; SAR(10 g) = 4.9 mW/g
Maximum value of SAR (measured) = 12.1 mW/g