UNDP-1 Lenovo® Thinkpad® X200T with Modified ACON Antenna FCC SAR Report

80-VK276-6 Rev. B

September 3, 2008

Submit technical questions to:
regulatory.support@qualcomm.com

QUALCOMM Incorporated
5775 Morehouse Drive
San Diego, CA 92121-1714
U.S.A.

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80-VK276-6 Rev. B

Revision history

Revision	Date	Description
A	August 2008	Initial release
B	September 2008	Correction to WLAN description

5775 Morehouse Dr.
San Diego CA 92121

Overview

Test Report Reference:	80-VK276-6 Rev. B
Responsible Engineer:	John Forrester
Signature:	
Test Engineer:	Mark Ortlieb
Signature:	
Date of issue:	3 September 2008
Test Laboratory:	QUALCOMM Incorporated 5775 Morehouse Dr. San Diego CA 92121 (General Telephone) 1 858 587 1121
Model Tested:	UNDP-1 with Lenovo ThinkPad X200 Tablet
Test Specification Standard(s):	*FCC CFR47 Part 2.1093: Radiofrequency radiation exposure evaluation: portable devices* *FCC/OET Bulletin 65, including Supplement C, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields* *FCC "SAR Measurement Procedures for 3G Devices" (October 2007)* *FCC "SAR Evaluation Considerations for Laptop Computers with Antennas Built-in on Display Screens" (December 2007)* *ANSI/IEEE P1528/D1.2 Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques*
Results:	The UNDP-1 embedded in a Lenovo® ThinkPad® X200 Tablet (Model: X200T) complies with the requirements of the aforementioned standards and is in compliance with the FCC Part 2.1093 RF exposure limit.

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Tables

1. Test summary

1.1 Equipment tested

A UNDP-1 WWAN mPCIe card embedded in a Lenovo ThinkPad X200T Series notebook computer with a modified ACON antenna was tested for SAR compliance with FCC regulations.

X200T computer also has embedded Bluetooth and WLAN capabilities that were not tested as part of this test report. The WLAN is categorized as a portable RF device due to the separation distance between the antenna and the user. WLAN does not transmit simultaneously with the WWAN module. Bluetooth does transmit simultaneously with the WWAN module but was not evaluated as the transmit power is less then 60/f.

1.2 Maximum (Worst Case Results)

Table 1-1 gives maximum SAR results for the two bands/modes tested.

Table 1-1 Maximum SAR

Band	Mode	Channel	1 g SAR	Result
Cell	GPRS 2 UL	High	0.390 mW/g	Pass
PCS	EV-DO	High	0.671 mW/g	Pass

1.3 Measurement Uncertainty

Table 1-2 Measurement Uncertainty

Combined Standard Uncertainty	10.0%
Extended Standard Uncertainty (k=2)	20.1%

1.4 SAR Limits

Table 1-3 gives 1 gram SAR limits for general public for the frequency range of 10 MHz to 10 GHz as called out in FCC CFR 47 Part 2.1093.

Table 1-3 1 Gram SAR Limits

Localized SAR (head and trunk)	1.6 mW/g

2. EUT Description

2.1 General

Table 2-1 WWAN Module Information

WWAN Module Model	UNDP-1
WWAN Module FCC ID	J9CUNDP-1L
WWAN Module Description	UNDP-1 is a PCI Express Mini Card with WWAN connectivity for the WCDMA/HSPA, GSM/GPRS/EDGE and CDMA2000 1x/1x-EVDO protocols, plus GPS position location.
Host(s) Tested:	ThinkPad X200 Tablet (Model: X200T)
WWAN Technologies	GSM/GPRS/EDGE CDMA 1x Rel0 CDMA EV-DO RevA WCDMA/HSPA
Equipment Categories	GPRS Category 10 EDGE Category 10 HSDPA Category 8 (Release 6) HSUPA Category 5 (Release 6)
TX Frequencies	GSM/GPRS/EDGE: 824.2 – 848.8 MHz GSM/GPRS/EDGE: 1850.2 – 1909.8 MHz CDMA 1x/EV-DO: 824.7 – 848.31 MHz CDMA 1x/EV-DO: 1851.25 – 1908.75 MHz WCDMA/HSPA: 826.4 – 846.6 MHz WCDMA/HSPA: 1852.4 – 1907.5 MHz Bands Not used in the United States: GSM/GPRS/EDGE: 880.2 – 914.8 MHz GSM/GPRS/EDGE: 1710.2 – 1784.8 MHz WCDMA/HSPA: 1922.6 – 1977.4 MHz
Duty Cycle(s)	CDMA/WCMDA: 100% GPRS 1 uplink slot: 12.5% GPRS 2 uplink slots: 25%
Power Supply	3.3Vdc supplied by host notebook computer

Table 2-2 Host Notebook Information

Host Notebook Model	ThinkPad X200 Tablet (Model: X200T)
WLAN FCC ID	N/A
Bluetooth FCC ID	N/A
UWB FCC IC	N/A
WWAN Antenna(s)	ACON P/N: 25.90673.001 (modified)
BT Antenna(s)	N/A
WLAN Antenna(s)	N/A
Minimum WWAN to user separation distance (cm)	1.2 (Secondary Portrait) 3.05 (Tablet mode) 23.8 (Notebook mode)
WLAN to user separation distance (cm)	N/A
Bluetooth to user separation distance (cm)	N/A
WWAN to WLAN antenna separation distance (cm)	N/A
WWAN to Bluetooth antenna separation distance (cm)	6.5

Table 2-3 Simultaneous Transmission Information

	WLAN	Bluetooth
WWAN	No	Yes
WLAN	N/A	Yes

2.2 Notice regarding antenna modification

The ACON antenna employed in this computer, P/N 25.90673.001, is the same as one tested previously (see Qualcomm document 80-VK276-3 *UNDP-1 Lenovo Thinkpad X200T FCC SAR Report*), except it has been modified slightly to increase overall gain by 2 dBi.

3. Conducted Transmit Power Results

Conducted transmit power was tested in accordance with FCC 3G procedures, 3GPP and 3GPP2 standards. The test procedure for configuring the EUT to transmit at maximum output power is in section 10.

All transmit power results are based on an average detector. The rationale and calculations determining the SAR configurations tested per the FCC procedure are detailed in section 4.

Other modes and bands have been measured, documented, and found to be lower than those documented here in previous SAR reports filed under J9CUNDP-1L.

Table 3-1 GPRS Maximum Transmit Power

	GSM850 Channel		
Mode	**128**	**190**	**251**
GPRS 2UL	26.9	26.7	26.9

Table 3-2 CDMA 1x/EV-DO Maximum Transmit Power

REV	CDMA BC1 (1900MHz)		
RC/TAP	**Low**	**Mid**	**High**
RTAP rate = 153.6kbps	**25.10**	**24.80**	**25.20**

4. SAR Test Matrix

Table 4-1 describes the SAR configurations tested for the EUT and host notebook described in this report per the FCC procedure "SAR Evaluation Considerations for Laptop Computers with Antennas Built-in on Display Screens" released in December of 2007.

The configurations tested are based on the calculations in Table 4-3 that are based on evaluation requirements summarized in Table 2 of the FCC procedure. The conducted powers used in the separation distance calculations is summarized in Table 4-2, which represents the highest transmit power test results from the data in section 3. Per the FCC 3G Measurement procedures, modes have been omitted from Table 4-2 for the following reasons.

- Per FCC 3G 1x procedures, all modes have been eliminated that are less than 0.25dB greater than 1x RC3 (SO55)
- Per the FCC 3G procedures EV-DO Rev A has been omitted since the maximum transmit power results are less then the 1x RC3 and EV-DO Rel 0 test results.
- Per the FCC 3G procedures, HSDPA and HSUPA have been omitted since the maximum transmit power results are less then the R99 test results.

All SAR configurations are based on calculations for an individual transmitter or antenna. Simultaneous transmitter considerations have not been completed for these reasons:

- WWAN does not transmit simultaneously with WLAN
- Bluetooth Power is $<60/f_{(GHz)}$

Table 4-1 SAR Testing Completed per FCC Laptop Procedures

Mode	Band	Channels	Rationale
GPRS 2UL	850 MHz	Low/mid/high	Test highest low/mid/high channels since the antenna-to-user separation distance provided by host notebook computer is less then the calculated antenna-to-user distance per Table 2 of FCC procedure.
EV-DO R0	1900 MHz	Low/mid/high	Test highest low/mid/high channels since the antenna-to-user separation distance provided by host notebook computer is less then the calculated antenna-to-user distance per Table 2 of FCC procedure. Note: Only EV-DO R0 is tested since the other modes have equal or less transmit power.

Table 4-2 Maximum Transmit Power Summary (dBm)

	Cell			PCS		
Mode	Low	Mid	High	Low	Mid	High
1EV-DO R0	24.24	24.23	24.51	**24.42**	**24.14**	**24.49**
GPRS 2UL	**26.12**	**26.16**	**26.23**	23.19	23.01	22.97

Table 4-3 SAR Evaluation Requirements per FCC laptop procedure (Individual transmitter requirements)

Technology	Freq (MHz)	Maximum Average Conducted Power (dBm)	Maximum Average Conducted Power (mW)	$60/F_{(GHz)}$ (mW)	1/2*n (cm) per FCC Procedure	Minimum antenna-user dist (cm)	NB1 Antenna-User Distance (cm)	SAR Test Requirement per RF Conditions and Test Reduction Procedure	SAR Measured
1x RC3	824	24.5	283.8	72.8	1	6	3.05	Full SAR test	No
1x RC3	836	24.6	285.8	71.8	1	6	3.05	Full SAR test	No
1x RC3	849	24.6	289.7	70.7	2	7	3.05	Full SAR test	No
EV_DO R0	824	24.2	265.5	72.8	1	6	3.05	Full SAR test	No
EV_DO R0	836	24.2	264.9	71.8	1	6	3.05	Full SAR test	No
EV_DO R0	849	24.5	282.5	70.7	1	6	3.05	Full SAR test	No
R99	824	24.1	257.6	72.8	1	6	3.05	Full SAR test	No
R99	836	24.1	254.7	71.8	1	6	3.05	Full SAR test	No
R99	849	24.1	259.4	70.7	1	6	3.05	Full SAR test	No
GPRS 2UL	824	26.1	409.3	72.8	2	7	3.05	Full SAR test	Yes
GPRS 2UL	836	26.2	413.0	71.8	2	7	3.05	Full SAR test	Yes
GPRS 2UL	849	26.2	419.8	70.7	2	7	3.05	Full SAR test	Yes
1x RC3	1850	24.6	287.1	32.4	4	9	3.05	Full SAR test	No
1x RC3	1880	24.4	278.0	31.9	4	9	3.05	Full SAR test	No
1x RC3	1910	24.7	297.2	31.4	4	9	3.05	Full SAR test	No
EV_DO R0	1850	24.4	276.7	32.4	4	9	3.05	Full SAR test	Yes
EV_DO R0	1880	24.1	259.4	31.9	4	9	3.05	Full SAR test	Yes
EV_DO R0	1910	24.5	281.2	31.4	4	9	3.05	Full SAR test	Yes
R99	1850	24.2	263.6	32.4	4	9	3.05	Full SAR test	No
R99	1880	24.1	255.9	31.9	4	9	3.05	Full SAR test	No
R99	1910	24.2	260.0	31.4	4	9	3.05	Full SAR test	No
GPRS 2UL	1850	23.2	208.4	32.4	3	8	3.05	Full SAR test	No
GPRS 2UL	1880	23.0	200.0	31.9	3	8	3.05	Full SAR test	No
GPRS 2UL	1910	23.0	198.2	31.4	3	8	3.05	Full SAR test	No

5. SAR Test Facility

5.1 General

Test Location	QUALCOMM Incorporated 5775 Morehouse Dr. San Diego CA 92121
Temperature Range	15-35 °C (23°C actual)
Humidity Range	25-75% (37% actual)
Pressure	860-1060 mbar (1015 mB)

All of Qualcomm's dosimetry equipment is operated within a shielded screen room manufactured by Lindgren RF Enclosures to provide isolation from external EM fields. The E-field probes of the DASY4 system are capable of detecting signals as low as 5µW/g in the liquid dielectric, and so external fields are minimized by the screen room, leaving the phone as the dominate radiation source. The floor of the screen room is reflective, so the phantom bench is placed on four ferrite panels measuring 2 ft^2 each, in order to minimize reflected energy that would otherwise re-enter the phantom and combine constructively or destructively with the desired results.

5.2 Dosimetry System

The dosimetry equipment consists of a complete state-of-the-art DASY4 dosimetry system manufactured and calibrated by Schmid & Partner Engineering AG of Zurich, Switzerland. The DASY4 system consists of a six axis robot, a robot controller, a teach pendant, automation software on a 2.4 GHz Intel Pentium4 computer, data acquisition system, isotropic E-field probe, device positioning holder, and validation kit.
Figure 3-1 shows the robot arm, controller box and device positioning holder.

Figure 5-1 DASY4 system: Robot Arm, Controller box, Device Positioning Holder

5.3 E-field probe

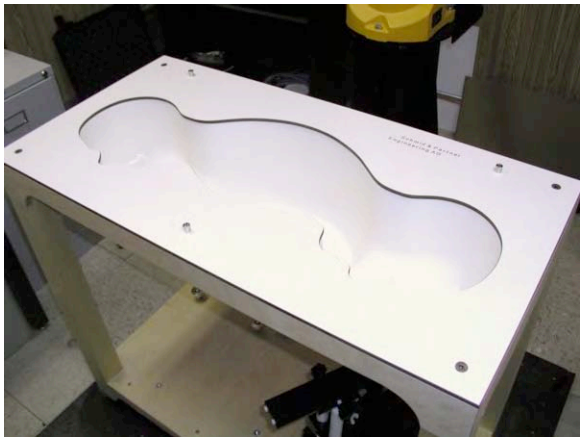
Manufactured by Schmid & Partner, Model ET3DV6. Calibrated by the manufacturer in head tissue simulating liquid at frequencies ranging from 835 MHz to 1.95 GHz. Dynamic range is said by the manufacturer to be

5 µW/gm to approx. 100 mW/g. The probe contains 3 small dipoles positioned symmetrically on a triangular core to provide for isotropic detection of the field. Each dipole contains a diode at the feed point that converts the RF signal to DC, which is conducted down a high impedance line to the data acquisition system.

5.4 Phantom

The phantom is the Standard Anthropomorphic Model ("SAM") phantom supplied by Schmid & Partner AG, and is designed for compliance to the guidelines provided in standard IEEE P1528. It consists of a left and right side head for simulating phone usage on both sides of the head, as well as a flat area for simulating phone usage against the body. The phantom is constructed of fiberglass with 2 mm ±0.1mm shell thickness. The DASY4 system uses a homogeneous tissue phantom based on studies concerning energy absorption of the human head, and the different absorption rates between adults and children. These studies indicated that a homogeneous phantom should overestimate SAR by no more than 15% for 10 g averages and should not underestimate SAR.
Figure 3-2 shows the SAM phantom.

Figure 5-2 SAM Phantom



5.5 Liquid Dielectric

The tissue-simulating liquid filling the phantom is mixed by Qualcomm staff per manufacturer instructions and regulatory standards. There are separate formulas for the various applicable frequencies. Before the test, the permittivity and conductivity were measured with an automated Hewlett-Packard 85070B dielectric probe in conjunction with a H-P 8752C network analyzer to monitor permittivity change due to evaporation and settling of ingredients. The electromagnetic parameters of the liquid were maintained as shown in Tables 3-1. The target values were obtained from the FCC OET Bulletin 65 Supplement C.

Table 5-1 Tissue Dielectric Properties at Time of Testing

			Permittivity (ε_r)				Conductivity (σ)			
	Frequency (MHz)	Section	Measured Values	Target Values	Deviation (%)	Limit	Measured Values	Target Values	Deviation (%)	Limit
08/06/08	1851.25	Body	52.16	53.30	-2.14%	5%	1.53	1.52	0.66%	5%
	1880.00	Body	52.10	53.30	-2.25%	5%	1.57	1.52	3.29%	5%
	1908.75	Body	51.99	53.30	-2.46%	5%	1.59	1.52	4.61%	5%
08/07/08	824.04	Body	56.96	55.20	3.19%	5%	0.97	0.97	0.00%	5%
	836.49	Body	56.85	55.20	2.99%	5%	0.98	0.97	1.03%	5%
	848.31	Body	56.85	55.20	2.99%	5%	0.99	0.97	2.06%	5%

25 L of each of the tissue simulating liquids were prepared using the following proportions of ingredients:

Body Liquids:
835 Mhz Body Tissue Simulating Liquid
Water – 50.8%
Salt – 9.94%
Preventol – 0.01%
Sugar – 48%
1900 Mhz Body Tissue Simulating Liquid
Water – 70.2%
Glycol Monobutyl Ether – 29.4%
Salt – 0.4%

6. SAR System Specifications and Calibration

6.1 System Specifications

Figure 6-1 shows a diagram of the Schmid & Partner DASY4 system.

Figure 6-1 Diagram of DASY4 System, from S&P Applications Notes System Description and Setup

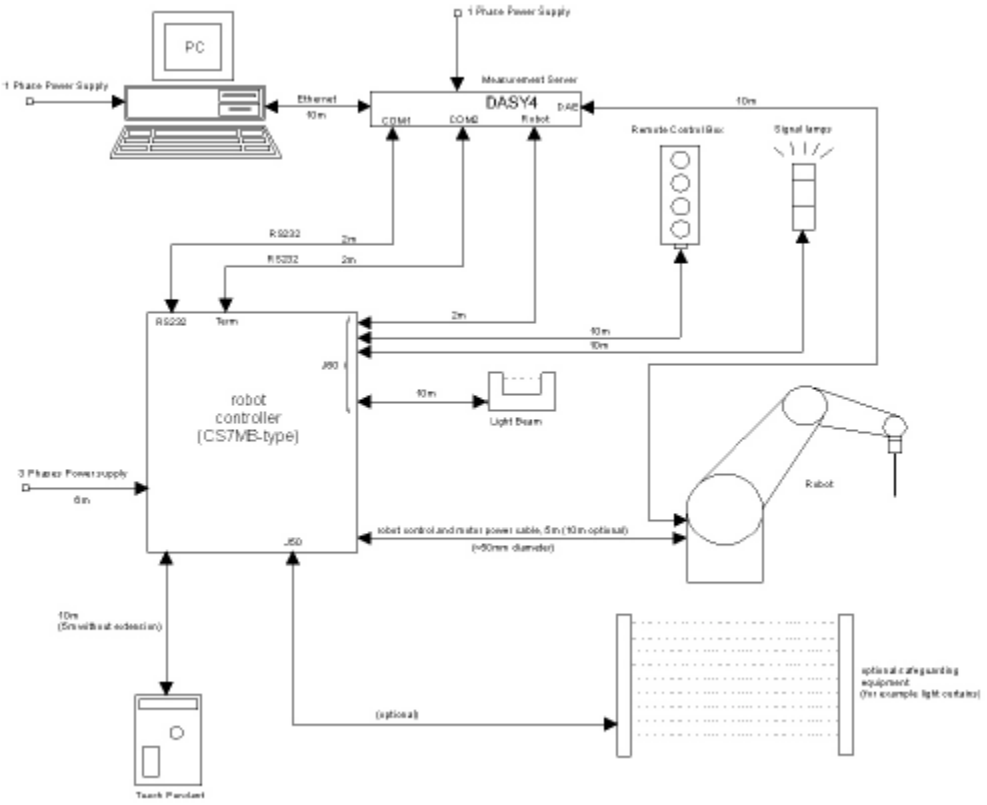


Table 6-1 Data Acquisition Information

Processor	Intel® Pentium® 4, 2.40 GHz
Operating System	Microsoft® Windows® XP
Software	DASY4 V4.7 Build 55, Schmid & Partners Eng. AG, Switzerland SEMCAD V1.8 Build 176
Surface Detection	Optical and Mechanical

Table 6-2 E-Field Probe Information

Offset tip to sensor center	2.7 mm
Offset surface to probe tip	1.8 ± 0.2
Frequency	30 MHz to 3.0 GHz
Dynamic Range	5µW/g to 100 mW/g
Isotropy	±0.15 dB (in brain liquid)

Table 6-3 Phantom Information

Dielectric	Cellular band: Homogeneous sugar/salt/cellulose liquid PCS band: Homogeneous water/glycol/salt liquid
Shell	2 mm ± 0.2 mm polyester fiber glass
Ear:	Integral model per SAM phantom specification

6.2 Calibration

Table 6-4 SAR System Calibration Information

Equipment Mfr & Type	Serial number	Last Calibrated	Next Calibration
Schmid & Partner Engineering AG Dosimetric E-field Probe, ET3DV5	1733	9/4/2007	9/4/2008
Schmid & Partner Engineering AG dipole validation kit, D1900V2	5d019	11/28/2007	11/28/2008
Schmid & Partner Engineering AG dipole validation kit, D835V2	466	11/24/2007	11/24/2008
Schmid & Partner Engineering AG Data Acquisition Electronics, DAE3 V1	400	3/5/2008	3/5/2009
Gigatronics 8541C RF Power Meter	K82228	9/21/07	9/21/08
Hewlett-Packard 8714C Vector Network Analyzer	US38171129	5/2/2007	6/30/2008
Hewlett-Packard 85070M Dielectric Probe System	N/A	N/A	N/A
835 MHz Body Tissue Simulating Liquid	N/A	August 2006	N/A
1900 MHz Body Tissue Simulating Liquid	N/A	August 2006	N/A

7. SAR Measurement Procedure

7.1 EUT Configuration

The EUT was configured into the desired transmit configuration per the procedures defined in section 10.

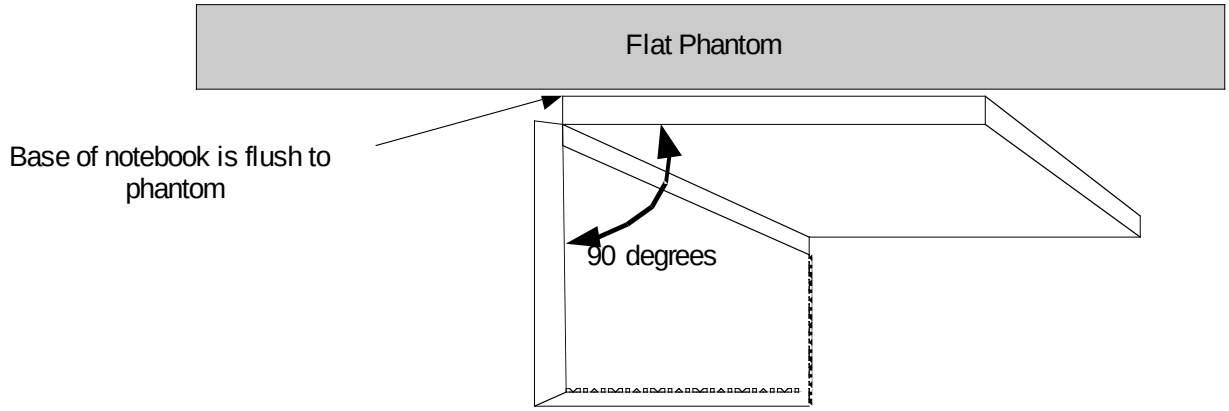
7.2 Power Verification

Prior to beginning SAR testing, conducted power was measured on the UNDP-1 module embedded in the host computer to verify functionality and the WWAN maximum transmit power values using the procedures defined in section 10. The results of the conducted power measurements are found in section 3.

7.3 Laptop Configuration

The host computer was NOT tested in the lap-held position in the laptop configuration as shown in Figure 7-1 as the WWAN antenna is >20cm from the end user.

Figure 7-1 Lap-held position with notebook configured as laptop (not used for testing)



7.3.1 Tablet Configuration

Figure 7-2 Phantom to Notebook Surface Contact Designations

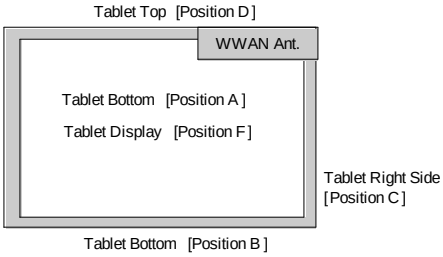
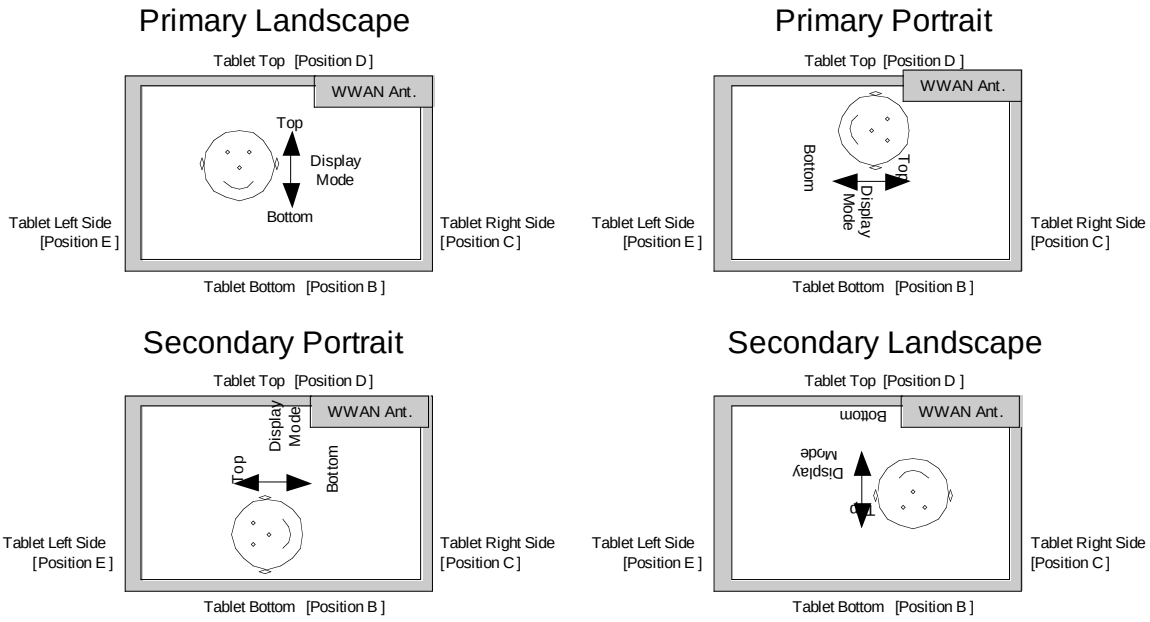


Figure 7-3 Display Orientation Configurations



7.4 Test Configurations

Table 7-4 Proposed SAR test positions

SAR Test Position (Surface Flush to Phantom)	Tablet Usage Mode	WWAN Antenna Angle	Description
A	Tablet	Fixed	**Tested** (see Figure 7-5)
B	Primary Landscape	Fixed	Not tested. WWAN antenna to user separation >20cm
C	Secondary Portrait	Fixed	**Tested** (see Figure 7-6)
D	Secondary Landscape	Fixed	Disabled via Software
E	Primary Portrait	Fixed	Not tested. WWAN antenna to user separation >20cm
F	Display Flush	Fixed	Not applicable

Figure 7-5 Lap-held position with notebook configured as tablet

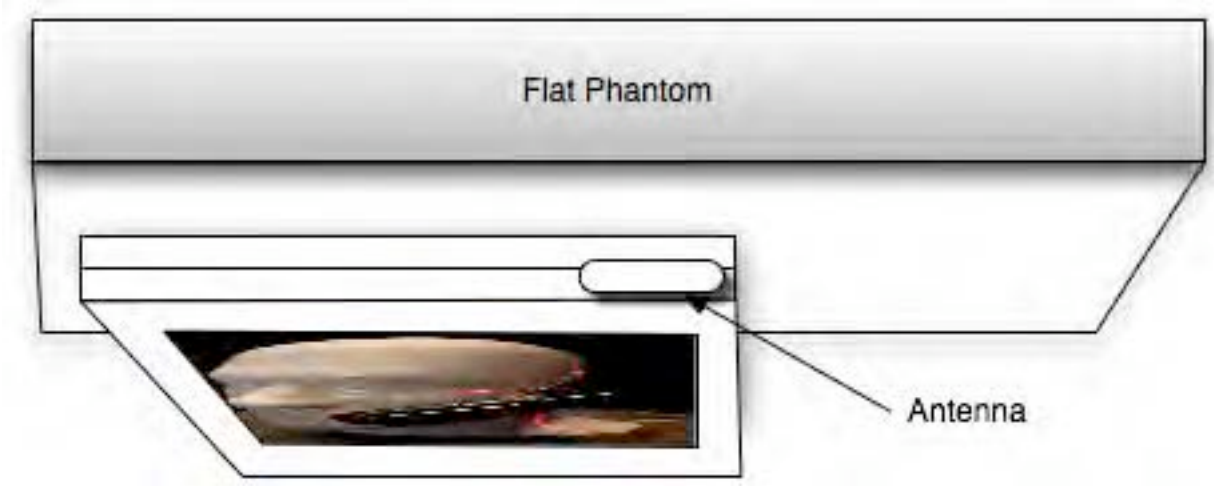
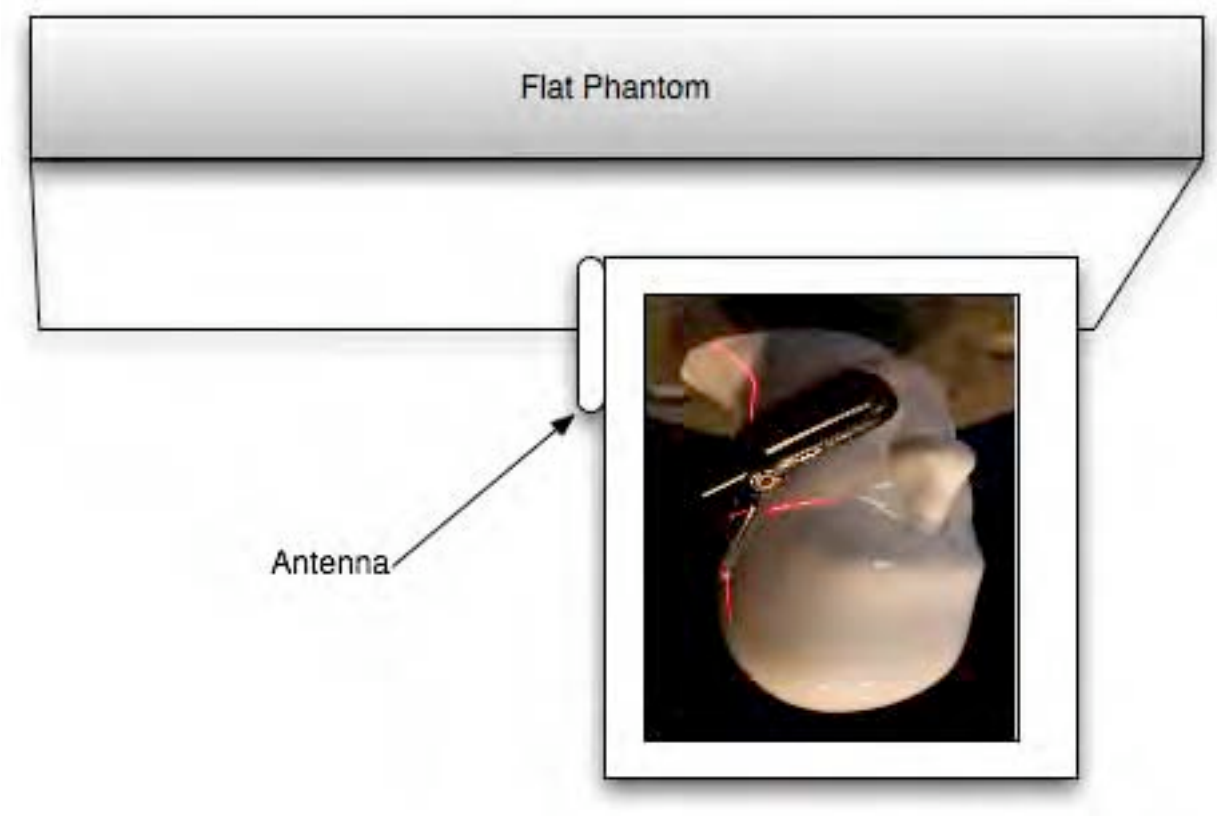


Figure 7-6 Secondary portrait position with notebook configured as tablet



7.5 Scan procedure

The scan routine is set up as follows:
- Power verification measurement
- Area scan
- 7x7x7 cube (zoom) scan
- 15 cm Z-scan located at measured maximum
- Power verification re-test (Drift)

Both 1 g and 10 g measurements are handled with the same scan process.

8. Test Result Summary

8.1 Numerical Data

Table 8-1 shows the 1 g SAR test data for the 2 frequency bands tested.

Table 8-1 Measured SAR Results

Mode	Position	Band	Channel	Freq	Drift (dB)	Measured 1g SAR (mW/g)
GPRS 2UL	Tablet	Cell	128	824.2	-0.218	0.175
GPRS 2UL	Tablet	Cell	190	836.6	0.346	0.262
GPRS 2UL	Tablet	Cell	251	848.8	-0.229	0.383
CDMA DO R0 153k	Tablet	PCS	25	1851.25	0.584	0.276
CDMA DO R0 153k	Tablet	PCS	600	1880	0.043	0.202
CDMA DO R0 153k	Tablet	PCS	1175	1908.75	0.486	0.284
GPRS 2UL	SP	Cell	128	824.2	0.692	0.161
GPRS 2UL	SP	Cell	190	836.6	0.284	0.251
GPRS 2UL	SP	Cell	251	848.8	-0.231	0.390
CDMA DO R0 153k	SP	PCS	25	1851.25	-0.307	0.478
CDMA DO R0 153k	SP	PCS	600	1880	1.01	0.544
CDMA DO R0 153k	SP	PCS	1175	1908.75	0.334	0.671

9. Measurement Uncertainty

The possible errors included in this measurement arise from device positioning uncertainty, device manufacturing uncertainty, liquid dielectric permittivity uncertainty, liquid dielectric conductivity uncertainty, and uncertainty due to disturbance of the fields by the probe.

Table 9-1 Measurement Uncertainty

	Uncertainty value (± %)	Prob. DIST	Div.	(ci) 1g	(ci) 10g	Std. Unc. (1g) (± %)	Std. Unc. (10g)	(vi) veff
Measurement System								
Probe Calibration	4.8	N	1	1	1	4.8	4.8	∞
Axial Isotropy	4.7	R	√3	0.7	0.7	1.9	1.9	∞
Hemispherical Isotropy	9.6	R	√3	0.7	0.7	3.9	3.9	∞
Boundary Effects	1	R	√3	1	1	0.6	0.6	∞
Linearity	4.7	R	√3	1	1	2.7	2.7	∞
System Detection Limits	1	R	√3	1	1	0.6	0.6	∞
Readout Electronics	1	N	1	1	1	1.0	1.0	∞
Response Time	0.8	R	√3	1	1	0.5	0.5	∞
Integration Time	2.6	R	√3	1	1	1.5	1.5	∞
RF Ambient Conditions	3	R	√3	1	1	1.7	1.7	∞
Probe Positioner	0.4	R	√3	1	1	0.2	0.2	∞
Probe Positioning	2.9	R	√3	1	1	1.7	1.7	∞
Max. SAR Eval.	1	R	√3	1	1	0.6	0.6	∞
Test Sample Related								
Device Positioning	2.9	N	1	1	1	2.9	2.9	145
Device Holder	3.6	N	1	1	1	3.6	3.6	5
Power Drift	5	R	√3	1	1	2.9	2.9	∞
Phantom and Setup								
Phantom Uncertainty	4	R	√3	1	1	2.3	2.3	∞
Liquid Conductivity (target)	5	R	√3	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (meas.)	2.5	N	1	0.64	0.43	1.6	1.1	∞
Liquid Permittivity (target)	5	R	√3	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (meas.)	2.5	N	1	0.6	0.49	1.5	1.2	∞
Combined Std. Uncertainty						10.3 %	10.0 %	330
Expanded STD Uncertainty						**20.6 %**	**20.1 %**	

10. EUT Configuration Procedure

10.1 EUT Test Frequencies

Table 10-1 Test Frequencies

	850 MHz						1900 MHz					
	Low		Mid		High		Low		Mid		High	
	Ch	Freq	Ch	Freq	Ch	Freq	Ch	Freq	Ch	Freq	Ch	Freq
GSM	128	824.2	190	836.6	251	848.8	-	-	-	-	-	-
CDMA	-	-	-	-	-	-	25	1851.25	600	1880	1175	1908.75

10.2 Call Box Simulator Information

Table 10-2 Communications Test Box Information

Make	Agilent	
Model	8960	
Cal Date	6/17/2007	
Serial Number	GB44052409	
SW Revision	GSM TA	E1968A-101
	GPRS TA	E1968A-102
	EGPRS TA	E1968A-103
	WCDMA	E1963A
	HSDPA TEST MODES	E1963A-403
	HSuPA TEST MODES	E1963A-413
	cdma 2000 TA	E1962B
	1xEV-DO TA	E1966A
	1xEV-DO FTM TA	E1976A
	1xEV-DO Release A	E1966A-102
	1xEV-DO RelA FTM	E1976A-102

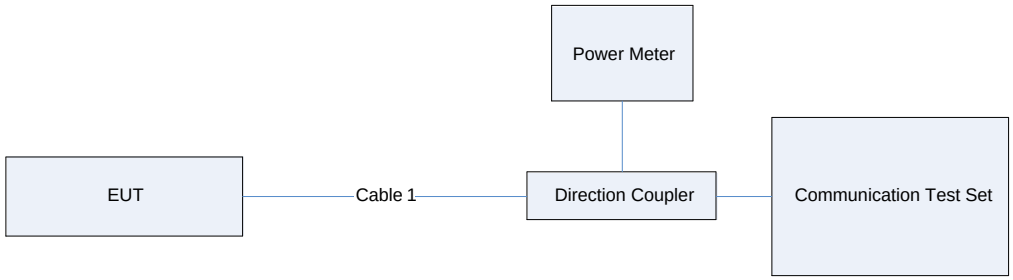
10.3 RF Power Measurement Procedure

10.3.1 Test Setup

Connect the transmitter output to communications test set as shown in Figure 10-1 and configure the EUT to operate at maximum power in a call per procedures defined in sections 10.4 . Measure the conducted transmit power at the frequencies defined in 10.1 .

Power measurements are completed using a power meter configured to measure average power. The cable loss must be measured for the specific frequencies under test and added as a correction factor for all the tests.

Figure 10-1 RF Output Power Test Setup



10.4 Base Station Emulator Settings and Test Procedures

10.4.1 For CDMA2000 1x/EVDO

Use CDMA2000 Rev 6 protocol in the call box.

1) Test for Reverse/Forward TCH RC1, Reverse/Forward TCH RC2, and RC3 Reverse FCH and demodulation of RC 3, 4 or 5.
    a. Set up a call using Fundamental Channel Test Mode 1 (RC1, SO 2) with 9600 bps data rate only.
    b. As per C.S0011 or TIA/EIA-98-F Table 4.4.5.2-1, set the test parameters as shown in Table 10-3.
    c. Send continuously ‘0’ power control bits to the UNDP-1.
    d. Measure the output power at UNDP-1 antenna connector as recorded on the power meter with values corrected for cables losses.
    e. Repeat step b through d for Fundamental Channel Test Mode:
        i. RC1, SO55
        ii. RC2, SO9
        iii. RC2, SO55
        iv. RC3, SO55
2) Test for RC 3 Reverse FCH, RC3 Reverse SCH0 and demodulation of RC 3, 4 or 5.
    a. Set up a call using Supplemental Channel Test Mode 3 (RC 3, SO 32) with 9600 bps Fundamental Channel and 9600 bps SCH0 data rate.
    b. As per C.S0011 or TIA/EIA-98-F Table 4.4.5.2-2, set the test parameters as shown in Table 10-4.
    c. Send alternating ‘0’ and ‘1’ power control bit to the UNDP-1

d. Determine the active channel configuration. If the desired channel configuration is not the active channel configuration, increase Îor by 1 dB and repeat the verification. Repeat this step until the desired channel configuration becomes active.
e. Measure the output power at the UNDP-1 antenna connector.
f. Decrease Îor by 0.5 dB.
g. Determine the active channel configuration. If the active channel configuration is the desired channel configuration, measure the output power at the UNDP-1 antenna connector.
h. Repeat step f and g until the output power no longer increases or the desired channel configuration is no longer active. Record the highest output power achieved with the desired channel configuration active.
i. Repeat step a through h ten times and average the result.

3) Test for RC3 Reverse FCH, RC 3 DCCH and demodulation of RC3, 4 or 5.

a. Use the same procedure as described in 2).

Table 10-3 Parameters for Max. Power with a single traffic code channel, SR1

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-104
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

Table 10-4 Parameters for Max. Power with multiple traffic code channel, SR1

Parameter	Units	Value
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

1xEV-DO

1) Use 1xEV-DO Rel 0 protocol in the call box.

a. RTAP

- Select Test Application Protocol to RTAP
- Set RTAP Rate to 9.6 kbps
- Generator Info -> Termination Parameters -> Max Forward Packet Duration -> 16 Slots
- Set Îor to -60 dBm/1.23 MHz
- Send continuously ‘0’ power control bits
- Measure the power at UNDP-1 antenna connector
- Repeat above steps for RTAP Rate = 19.2 kbps, 38.4 kbps, 76.8 kbps and 153.6 kbps respectively

2) Use 1xEV-DO Rev A protocol in the call box.

   a. RETAP

   - Select Test Application Protocol to RETAP
   - F-Traffic Format -> 4 (1024, 2, 128) Canonical (307.2k, QPSK)
   - Set R-Data Pkt Size to 128
   - Protocol Subtype Config -> Release A Physical Layer Subtype -> Subtype 2
     ->PL Subtype 2 Access Channel MAC Subtype -> Default (Subtype 0)
   - Generator Info -> Termination Parameters -> Max Forward Packet Duration -> 16 Slots
     ->ACK R-Data After -> Subpacket 0 (All ACK)
   - Set Îor to -60 dBm/1.23 MHz
   - Send continuously '0' power control bits
   - Measure the power at UNDP-1 antenna connector
   - Repeat above steps for R-Data Pkt Size = 256, 512, 768, 1024, 1536, 2048, 3072, 4096, 6144, 8192, 12288 respectively.
   - Repeat above steps for R-Data Pkt Size = 256, 512, 768, 1024, 1536, 2048, 3072, 4096, 6144, 8192, 12288 respectively.

10.4.2 For WCDMA/HSDPA/HSUPA

Configure the call box to support all WCDMA tests in respect to the 3GPP 34.121 (listed in Table 10-5).

Rel99

1) Set a Test Mode 1 loop back with a 12.2kbps Reference Measurement Channel (RMC)
2) Set and send continuously Up power control commands to the UNDP-1

HSDPA Rel 6

1) Establish a Test Mode 1 look back with both 1 12.2kbps RMC channel and a H-Set1 Fixed Reference Channel (FRC). With the 8820 this is accomplished by setting the signal Channel Coding to "Fixed Reference Channel" and configuring for HSET-1 QKSP.
2) Set beta values and HSDPA settings for HSDPA Sebtest1 according to Table 10-5
3) Send continuously Up power control commands to the UNDP-1
4) Measure the power at the UNDP-1 antenna connector using the power meter with modulated average detector
5) Repeat the measurement for the HSDPA Subtest2, 3 and 4 as given in Table 10-5

HSUPA Rel 6

1) Use UL RMC 12.2kbps and FRC H-Set1 QPSK, Test Mode 1 loop back. With the 8820 this is accomplished by setting the signal Channel Coding to "E-DCH Test Channel" and configuring the equipment category to Cat6_10ms.
2) Set the Absolute Grant for HSUPA Subtest1 according to Table 10-5
3) Set the UNDP power to be at least 5dB lower than the Maximum output power
4) Send power control bits to give one TPC_cmd = +1 command to the UNDP. If UNDP doesn't send any E-DPCH data with decreased E-TFCI within 500ms, then repeat this process until the decreased E-TFCI is reported.
5) Confirm that the E-TFCI transmitted by the UNDP is equal to the target E-TFCI in Table 10-5. If the E-TFCI transmitted by the UNDP is not equal to the target E-TFCI, then send power control bits to give one TPC_cmd = -1 command to the UE. If UE sends any E-DPCH data with decreased E-TFCI within 500 ms, send new power control bits to give one TPC_cmd = -1 command to the UE. Then confirm that the E-

TFCI transmitted by the UE is equal to the target E-TFCI in Table 10-5. If the E-TFCI transmitted by the UE is not equal to the target E-TFCI, then fail the UE

6) Repeat the measurement for the HSUPA Subtest2, 3, 4 and 5 as given in Table 10-5

Table 10-5 3GPP Rel99/HSPA Subtest Settings

	Mode	**Rel99**	**Rel6 HSDPA**	**Rel6 HSDPA**	**Rel6 HSDPA**	**Rel6 HSDPA**	**Rel6 HSUPA**	**Rel6 HSUPA**	**Rel6 HSUPA**	**Rel6 HSUPA**	**Rel6 HSUPA**
	Subtest	-	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**5**
WCDMA General Settings	Loopback Mode	Test Mode 1	Test Mode 1				Test Mode 1				
	Rel99 RMC	12.2kbps RMC	12.2kbps RMC				12.2kbps RMC				
	HSDPA FRC	Not Applicable	H-Set1				H-Set1				
	HSUPA Test	Not Applicable	Not Applicable				HSUPA Loopback				
	Power Control Algorithm	Algorithm2	Algorithm2				Algorithm2				
	βc	Not Applicable	2/15	12/15	15/15	15/15	11/15	6/15	15/15	2/15	15/15
	βd	Not Applicable	15/15	15/15	8/15	4/15	15/15	15/15	9/15	15/15	15/15
	βec	Not Applicable	-	-	-	-	209/225	12/15	30/15	2/15	24/15
	βc/βd	8/15	2/15	12/15	15/8	15/4	11/15	6/15	15/9	2/15	15/15
	βhs	Not Applicable	4/15	24/15	30/15	30/15	22/15	12/15	30/15	4/15	30/15
	βed	Not Applicable	Not Applicable				1309/225	94/75	47/15 47/15	56/75	134/15
HSDPA Specific Settings	DACK	Not Applicable	8				8				
	DNAK	Not Applicable	8				8				
	DCQI	Not Applicable	8				8				
	Ack-Nack repetition factor	Not Applicable	3				3				
	CQI Feedback (Table 5.2B.4)	Not Applicable	4ms				4ms				
	CQI Repetition Factor (Table 5.2B.4)	Not Applicable	2				2				
	Ahs = βhs/βc	Not Applicable	30/15				30/15				
HSUPA Specific Settings	D E-DPCCH	Not Applicable	Not Applicable				6	8	8	5	7
	DHARQ	Not Applicable	Not Applicable				0	0	0	0	0
	AG Index	Not Applicable	Not Applicable				20	12	15	17	21
	ETFCI (from 34.121 Table C.11.1.3)	Not Applicable	Not Applicable				75	67	92	71	81
	Associated Max UL Data Rate kbps	Not Applicable	Not Applicable				242.1	174.9	482.8	205.8	308.9
	Reference E_TFCIs	Not Applicable	Not Applicable				E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO 4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27	

10.4.3 For GSM/GPRS/EGDE

- Configure the call box to support GPRS test.
- Configure for desired number of uplink transmit lots.
- Set MS_TX level to 0 (850 MHz) or 2 (1900MHz) to configure EUT to transmit at maximum output power.

12. System Validation

12.1 General Validation Procedure

Validation scans were performed prior to testing of each different medium used. A validation dipole antenna was selected that roughly matched the center frequency of the band being tested. A CW sine wave with a matching frequency is then applied to the antenna from a signal generator through an amplifier for a power level of 250 mW (20 dBm). Measured data is scaled to 30 dBm and tissue parameters normalized to correspond with values provided by manufacturer's calibration data. Validation SAR has a tolerance of ±10%.

If testing of a particular frequency band took more than one day, a new validation scan was done prior to commencing with testing for the subsequent day.

12.2 Validation Data

Table 12-1 shows validation data for the respective days of the test program.

Table 12-1 SAR Validation Data UNDP-1 Test Program

				1 g SAR (mW/g)			
Date	**Frequency (MHz)**	**Permittivity (ε_r)**	**Conductivity (σ)**	**Measured (20dBm)**	**Scaled and normalized***	**Target**	**Difference (%)**
08/06/2008	1900	51.99	1.59	4.17	39.91	37.20	+7.3%
08/07/2008	1900	51.99	1.59	4.30	40.04	37.20	+7.2%
08/07/2008	835	56.90	0.98	0.976	9.88	9.27	+6.6%

*Measured data after scaling to 30 dBm and normalization to tissue parameters.

The following pages show validation plots for the respective days of the test program.

12.3 Validation Plots

Date/Time: 8/6/2008 9:24:00 AM

Test Laboratory: QUALCOMM Incorporated

20080806_Val1900_20dBm_muscle

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d019

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: MSL1800 Medium parameters used (interpolated): f = 1900 MHz; σ = 1.59 mho/m; εr = 52; ρ = 1000 kg/m3
Phantom section: Flat Section

DASY4 Configuration:

* Probe: ET3DV6 - SN1733; ConvF(4.71, 4.71, 4.71); Calibrated: 9/4/2007
* Sensor-Surface: 4mm (Mechanical Surface Detection)
* Electronics: DAE3 Sn400; Calibrated: 3/5/2008
* Phantom: SAM with CRP; Type: SAM;
* Measurement SW: DASY4, V4.7 Build 55;

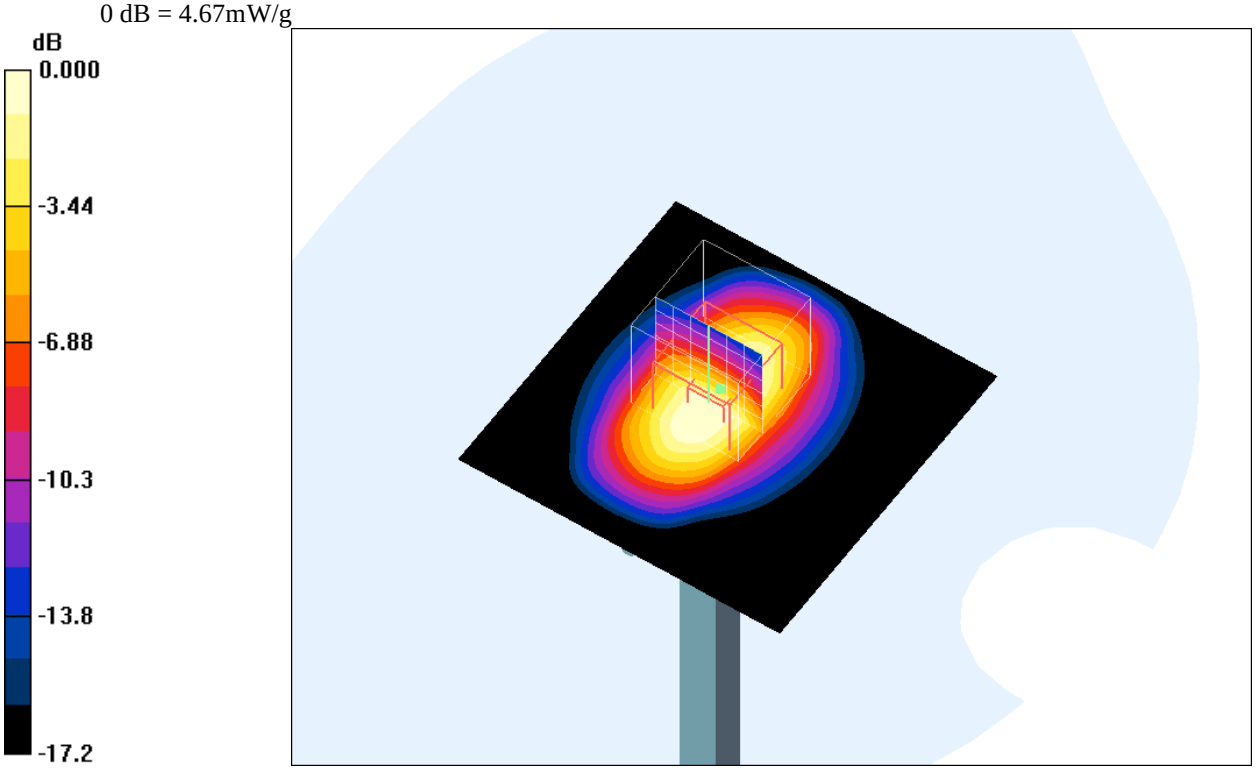
d=10mm, Pin=20 dBm/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 5.43 mW/g

d=10mm, Pin=20 dBm/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.4 V/m; Power Drift = -0.003 dB
Peak SAR (extrapolated) = 7.04 W/kg
SAR(1 g) = 4.17 mW/g; SAR(10 g) = 2.22 mW/g

Maximum value of SAR (measured) = 4.67 mW/g

0 dB = 4.67mW/g



Date/Time: 8/7/2008 1:21:34 PM

Test Laboratory: QUALCOMM Incorporated

20080807_Val835_20dBm_muscle

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:465

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1

Medium: MSL835 Medium parameters used (interpolated): f = 835 MHz; σ = 0.978 mho/m; εr = 56.9; ρ = 1000 kg/m3

Phantom section: Flat Section

DASY4 Configuration:

* Probe: ET3DV6 - SN1733; ConvF(6.57, 6.57, 6.57); Calibrated: 9/4/2007
* Sensor-Surface: 4mm (Mechanical Surface Detection)
* Electronics: DAE3 Sn400; Calibrated: 3/5/2008
* Phantom: SAM with CRP; Type: SAM;
* Measurement SW: DASY4, V4.7 Build 55;

d=15mm, Pin=20 dBm/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.07 mW/g

d=15mm, Pin=20 dBm/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

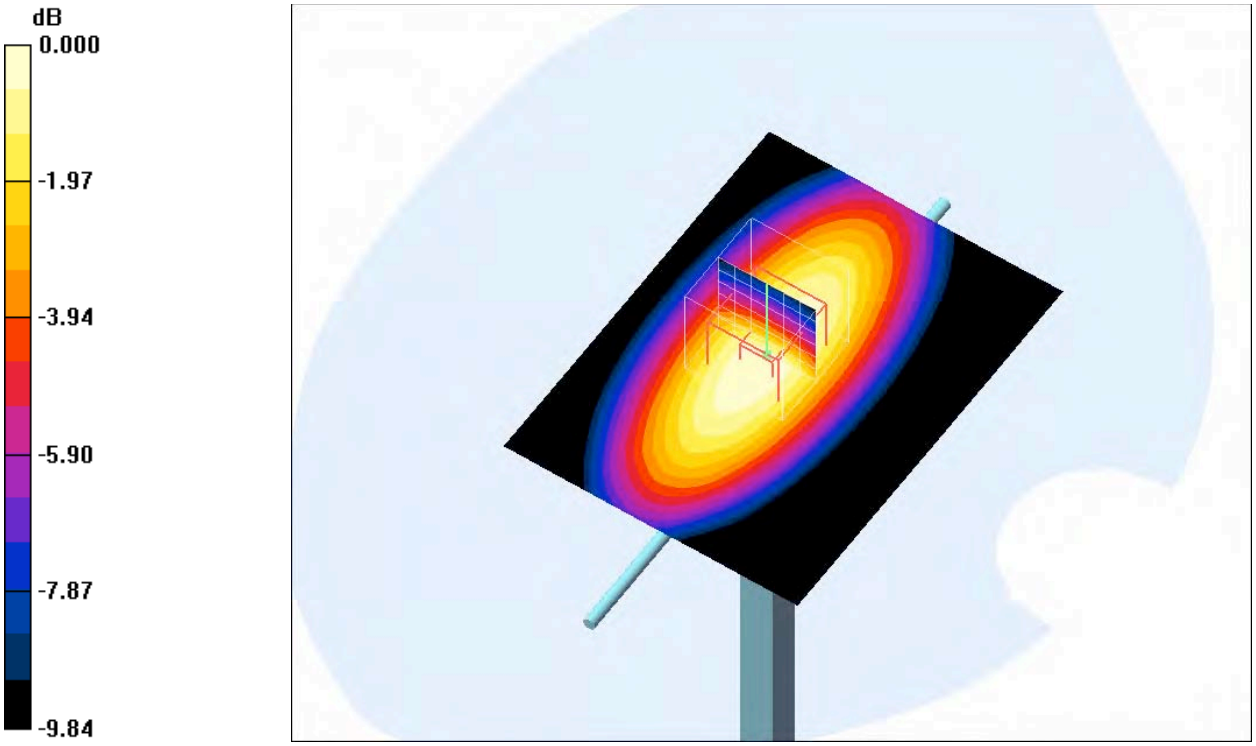
Reference Value = 34.8 V/m; Power Drift = -0.236 dB

Peak SAR (extrapolated) = 1.36 W/kg

SAR(1 g) = 0.976 mW/g; SAR(10 g) = 0.649 mW/g

Maximum value of SAR (measured) = 1.06 mW/g

0 dB = 1.06mW/g



Date/Time: 8/7/2008 10:42:45 AM

Test Laboratory: QUALCOMM Incorporated

20080807_Val1900_20dBm_muscle

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d019

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1

Medium: MSL1800 Medium parameters used (interpolated): f = 1900 MHz; σ = 1.59 mho/m; εr = 52; ρ = 1000 kg/m3

Phantom section: Flat Section

DASY4 Configuration:

* Probe: ET3DV6 - SN1733; ConvF(4.71, 4.71, 4.71); Calibrated: 9/4/2007
* Sensor-Surface: 4mm (Mechanical Surface Detection)
* Electronics: DAE3 Sn400; Calibrated: 3/5/2008
* Phantom: SAM with CRP; Type: SAM;
* Measurement SW: DASY4, V4.7 Build 55;

d=10mm, Pin=20 dBm/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 5.65 mW/g

d=10mm, Pin=20 dBm/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

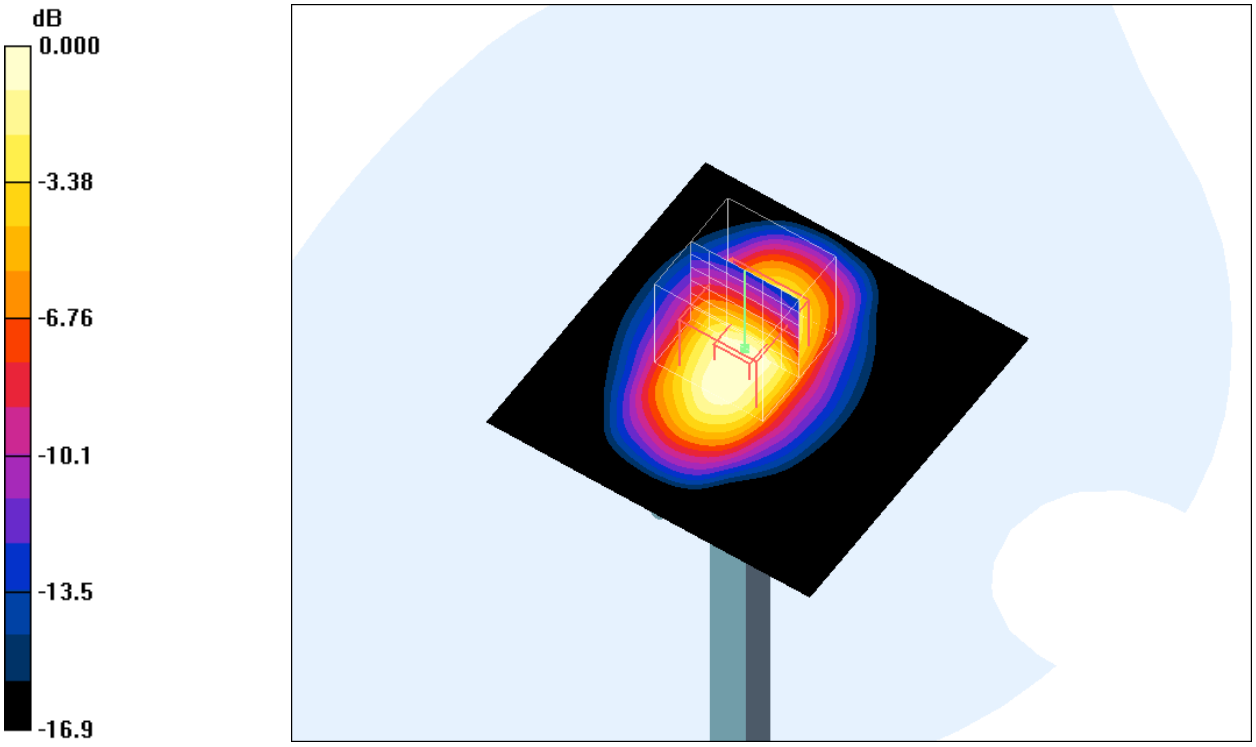
Reference Value = 58.9 V/m; Power Drift = -0.058 dB

Peak SAR (extrapolated) = 7.21 W/kg

SAR(1 g) = 4.3 mW/g; SAR(10 g) = 2.3 mW/g

Maximum value of SAR (measured) = 4.83 mW/g

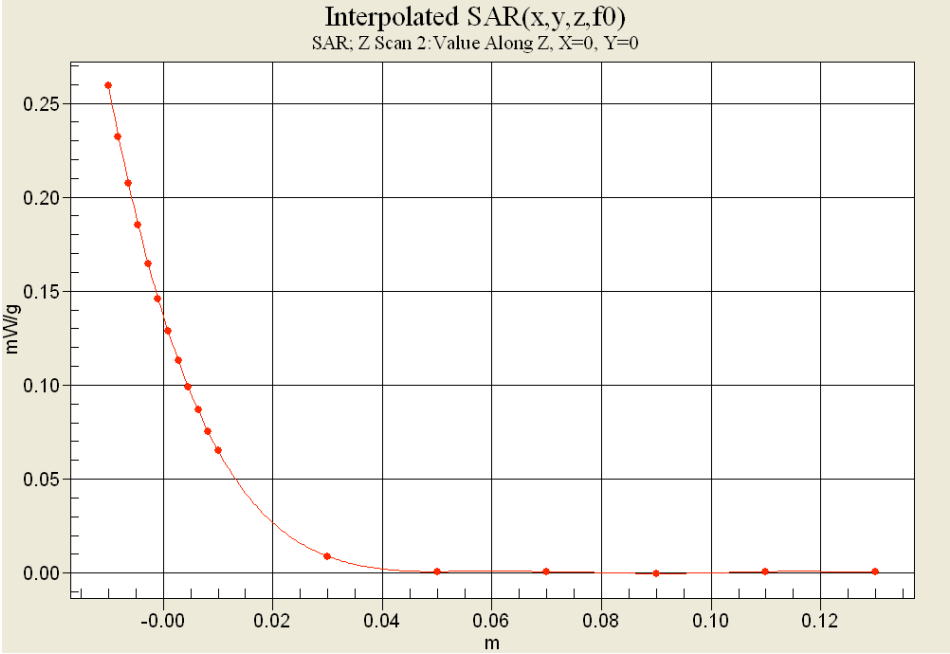
0 dB = 4.83mW/g



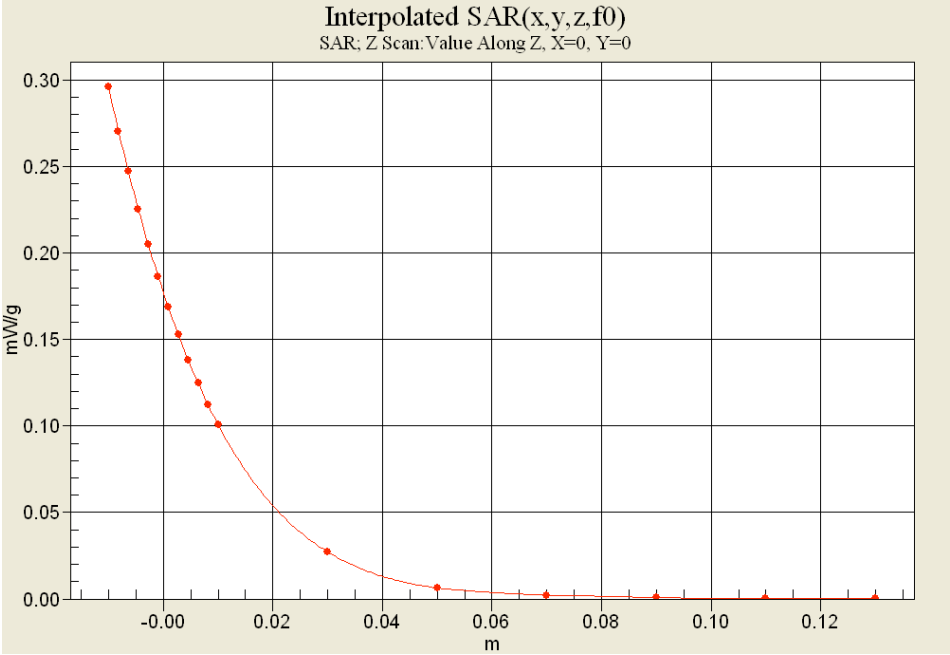
12.4 Z-Scan Plots

This section shows Z-Scan plots for the worst-case position and channel for each of the bands tested.

12.4.1 PCS band Z-Scan Plot



12.4.2 Cell band Z-Scan Plot



13. SAR Results Plots

13.1 CDMA DO PCS band Plots

13.1.1 Tablet Position

Date/Time: 8/6/2008 2:00:43 PM

Test Laboratory: QUALCOMM Incorporated

20080806_X200T-ACON_DO-PCS_Tablet

DUT: X200T; Type: Laptop; Serial: LV-002N3

Communication System: CDMA PCS; Frequency: 1851.25 MHz;Duty Cycle: 1:1

Medium: MSL1800 Medium parameters used: f = 1851.25 MHz; σ = 1.53 mho/m; εr = 52.2; ρ = 1000 kg/m3

Phantom section: Flat Section

DASY4 Configuration:

* Probe: ET3DV6 - SN1733; ConvF(4.71, 4.71, 4.71); Calibrated: 9/4/2007
* Sensor-Surface: 4mm (Mechanical Surface Detection)
* Electronics: DAE3 Sn400; Calibrated: 3/5/2008
* Phantom: SAM with CRP; Type: SAM;
* Measurement SW: DASY4, V4.7 Build 55;

Laptop - Tablet Position - Low/Area Scan (71x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.292 mW/g

Laptop - Tablet Position - Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

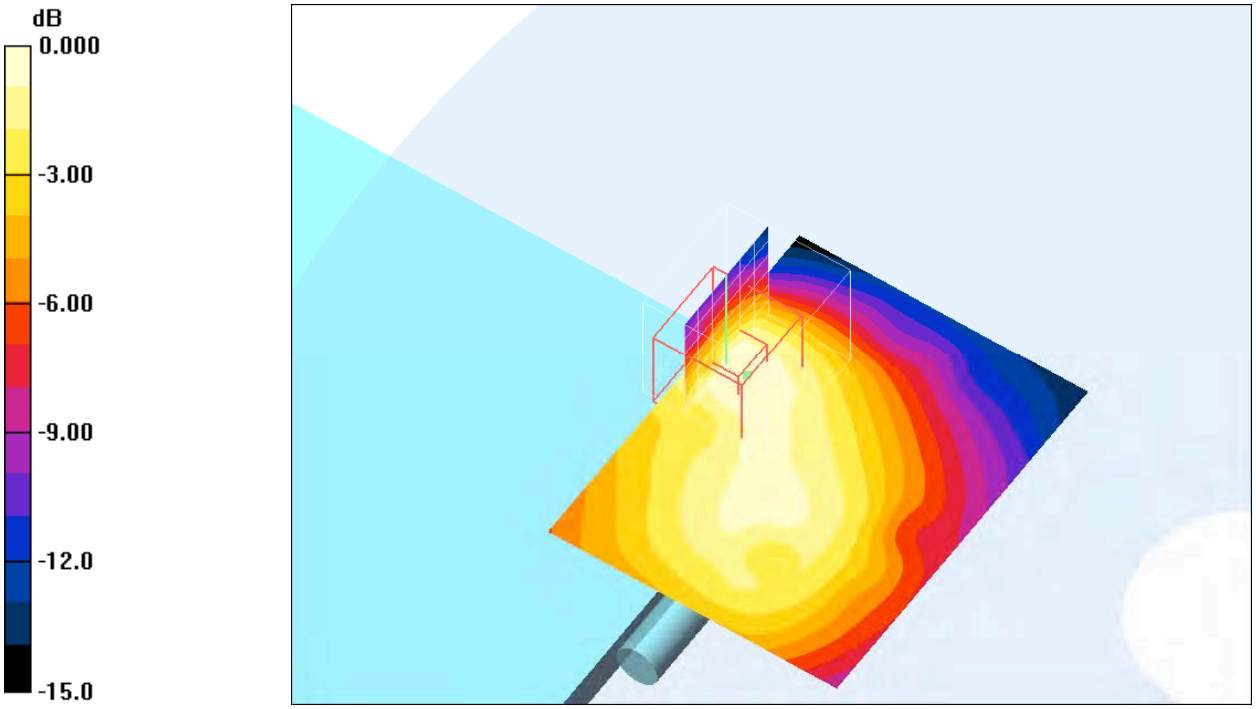
Reference Value = 9.87 V/m; Power Drift = 0.584 dB

Peak SAR (extrapolated) = 0.452 W/kg

SAR(1 g) = 0.276 mW/g; SAR(10 g) = 0.173 mW/g

Maximum value of SAR (measured) = 0.299 mW/g

0 dB = 0.299mW/g



Date/Time: 8/7/2008 11:58:09 AM

Test Laboratory: QUALCOMM Incorporated

20080806_X200T-ACON_DO-PCS_Tablet

DUT: X200T; Type: Laptop; Serial: LV-002N3

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

Medium: MSL1800 Medium parameters used: f = 1880 MHz; σ = 1.57 mho/m; εr = 52.1; ρ = 1000 kg/m3

Phantom section: Flat Section

DASY4 Configuration:

* Probe: ET3DV6 - SN1733; ConvF(4.71, 4.71, 4.71); Calibrated: 9/4/2007
* Sensor-Surface: 4mm (Mechanical Surface Detection)
* Electronics: DAE3 Sn400; Calibrated: 3/5/2008
* Phantom: SAM with CRP; Type: SAM;
* Measurement SW: DASY4, V4.7 Build 55;

Laptop - Tablet Position - Middle/Area Scan (81x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.224 mW/g

Laptop - Tablet Position - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

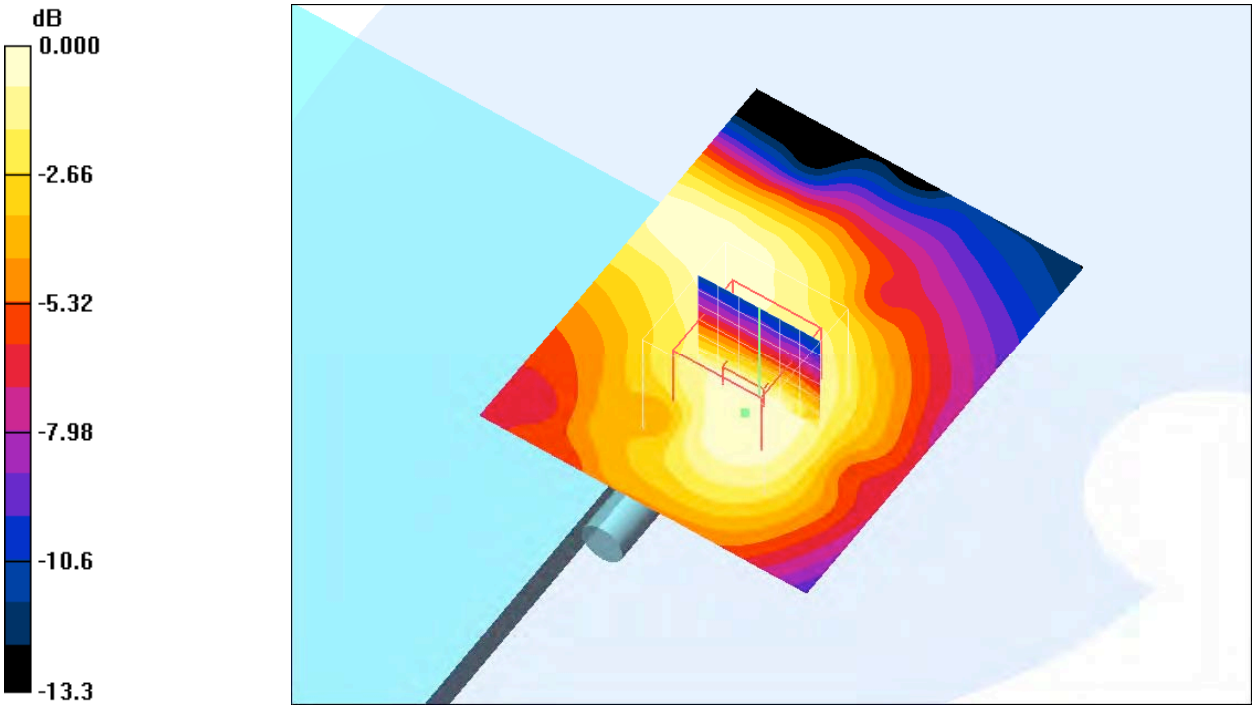
Reference Value = 10.6 V/m; Power Drift = 0.043 dB

Peak SAR (extrapolated) = 0.470 W/kg

SAR(1 g) = 0.202 mW/g; SAR(10 g) = 0.131 mW/g

Maximum value of SAR (measured) = 0.218 mW/g

0 dB = 0.218mW/g



Date/Time: 8/7/2008 12:22:41 PM

Test Laboratory: QUALCOMM Incorporated

20080806_X200T-ACON_DO-PCS_Tablet

DUT: X200T; Type: Laptop; Serial: LV-002N3

Communication System: CDMA PCS; Frequency: 1908.75 MHz;Duty Cycle: 1:1

Medium: MSL1800 Medium parameters used: f = 1908.75 MHz; σ = 1.6 mho/m; εr = 52; ρ = 1000 kg/m3

Phantom section: Flat Section

DASY4 Configuration:

* Probe: ET3DV6 - SN1733; ConvF(4.71, 4.71, 4.71); Calibrated: 9/4/2007
* Sensor-Surface: 4mm (Mechanical Surface Detection)
* Electronics: DAE3 Sn400; Calibrated: 3/5/2008
* Phantom: SAM with CRP; Type: SAM;
* Measurement SW: DASY4, V4.7 Build 55;

Laptop - Tablet Position - High/Area Scan (71x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.259 mW/g

Laptop - Tablet Position - High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

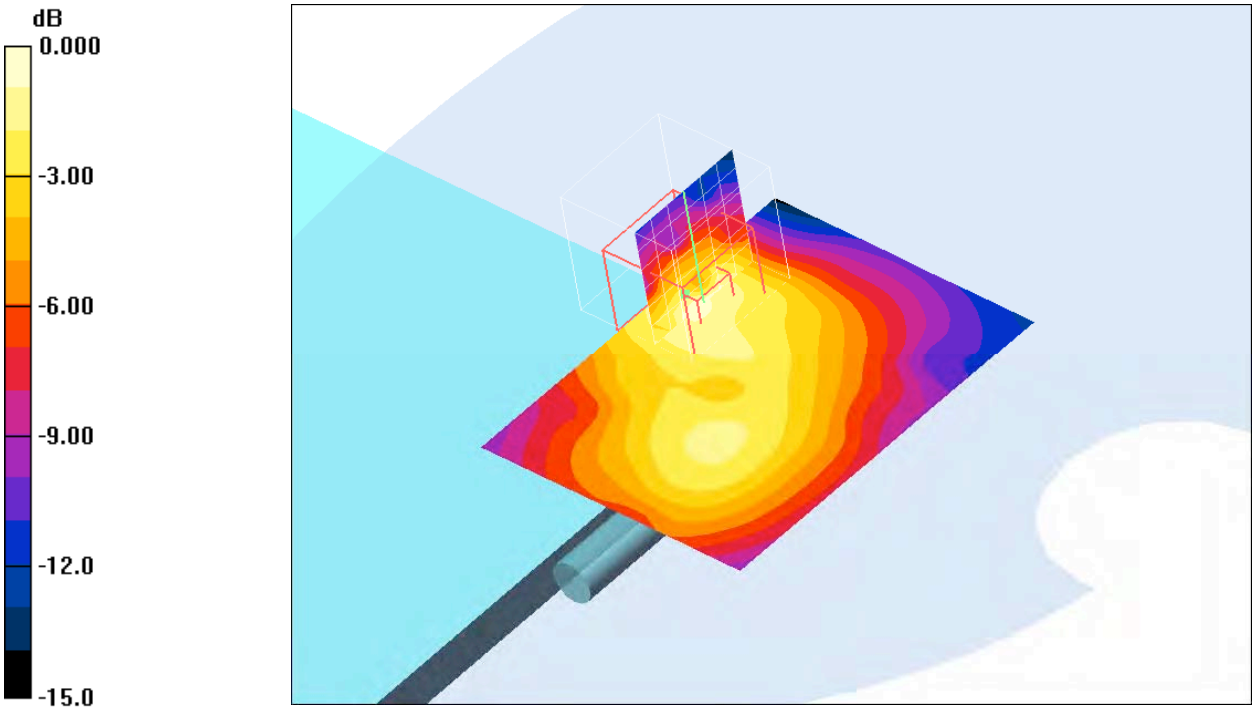
Reference Value = 11.7 V/m; Power Drift = 0.486 dB

Peak SAR (extrapolated) = 0.929 W/kg

SAR(1 g) = 0.284 mW/g; SAR(10 g) = 0.158 mW/g

Maximum value of SAR (measured) = 0.306 mW/g

0 dB = 0.306mW/g



13.1.2 Secondary Portrait Position

Date/Time: 8/6/2008 11:04:07 AM

Test Laboratory: QUALCOMM Incorporated

20080806_X200T-ACON_DO-PCS_Secondary-Portrait

DUT: X200T; Type: Laptop; Serial: LV-002N3

Communication System: CDMA PCS; Frequency: 1851.25 MHz;Duty Cycle: 1:1

Medium: MSL1800 Medium parameters used: f = 1851.25 MHz; σ = 1.53 mho/m; εr = 52.2; ρ = 1000 kg/m3

Phantom section: Flat Section

DASY4 Configuration:

* Probe: ET3DV6 - SN1733; ConvF(4.71, 4.71, 4.71); Calibrated: 9/4/2007
* Sensor-Surface: 4mm (Mechanical Surface Detection)
* Electronics: DAE3 Sn400; Calibrated: 3/5/2008
* Phantom: SAM with CRP; Type: SAM;
* Measurement SW: DASY4, V4.7 Build 55;

Laptop - Secondary Portrait - Low/Area Scan (51x81x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 0.620 mW/g

Laptop - Secondary Portrait - Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

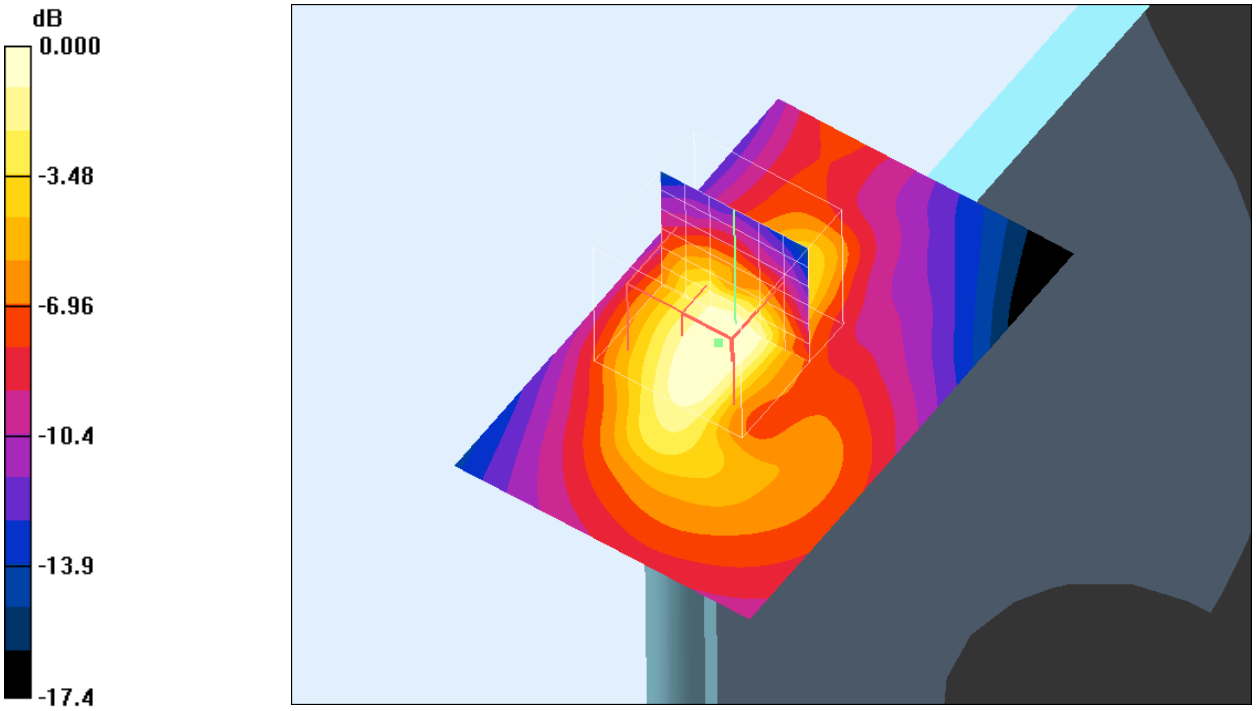
Reference Value = 8.77 V/m; Power Drift = -0.307 dB

Peak SAR (extrapolated) = 0.876 W/kg

SAR(1 g) = 0.478 mW/g; SAR(10 g) = 0.253 mW/g

Maximum value of SAR (measured) = 0.550 mW/g

0 dB = 0.550mW/g



Date/Time: 8/6/2008 11:56:48 AM

Test Laboratory: QUALCOMM Incorporated

20080806_X200T-ACON_DO-PCS_Secondary-Portrait

DUT: X200T; Type: Laptop; Serial: LV-002N3

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

Medium: MSL1800 Medium parameters used: f = 1880 MHz; σ = 1.57 mho/m; εr = 52.1; ρ = 1000 kg/m3

Phantom section: Flat Section

DASY4 Configuration:

* Probe: ET3DV6 - SN1733; ConvF(4.71, 4.71, 4.71); Calibrated: 9/4/2007
* Sensor-Surface: 4mm (Mechanical Surface Detection)
* Electronics: DAE3 Sn400; Calibrated: 3/5/2008
* Phantom: SAM with CRP; Type: SAM;
* Measurement SW: DASY4, V4.7 Build 55;

Laptop - Secondary Portrait- Middle/Area Scan (61x131x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.571 mW/g

Laptop - Secondary Portrait- Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

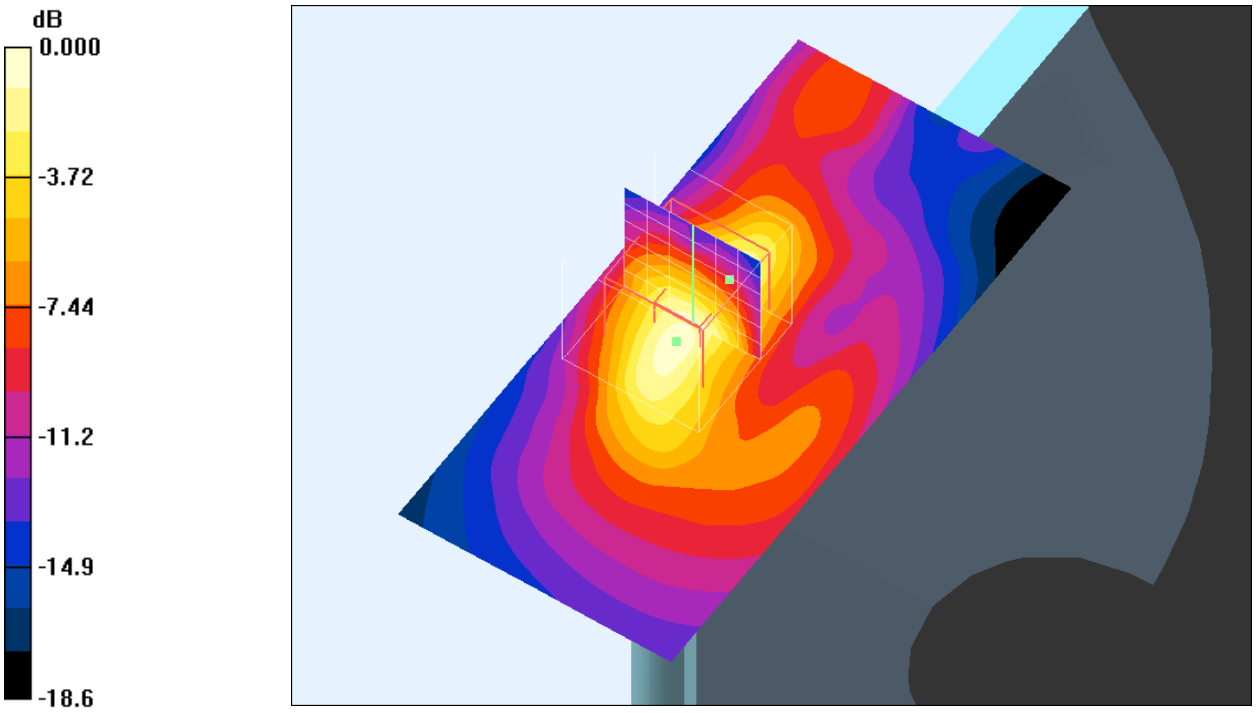
Reference Value = 8.06 V/m; Power Drift = 1.01 dB

Peak SAR (extrapolated) = 0.873 W/kg

SAR(1 g) = 0.544 mW/g; SAR(10 g) = 0.281 mW/g

Maximum value of SAR (measured) = 0.655 mW/g

0 dB = 0.655mW/g



Date/Time: 8/6/2008 1:08:16 PM

Test Laboratory: QUALCOMM Incorporated

20080806_X200T-ACON_DO-PCS_Secondary-Portrait

DUT: X200T; Type: Laptop; Serial: LV-002N3

Communication System: CDMA PCS; Frequency: 1908.75 MHz;Duty Cycle: 1:1

Medium: MSL1800 Medium parameters used: f = 1908.75 MHz; σ = 1.6 mho/m; εr = 52; ρ = 1000 kg/m3

Phantom section: Flat Section

DASY4 Configuration:

* Probe: ET3DV6 - SN1733; ConvF(4.71, 4.71, 4.71); Calibrated: 9/4/2007
* Sensor-Surface: 4mm (Mechanical Surface Detection)
* Electronics: DAE3 Sn400; Calibrated: 3/5/2008
* Phantom: SAM with CRP; Type: SAM;
* Measurement SW: DASY4, V4.7 Build 55;

Laptop - Tablet Position - High/Area Scan (51x81x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 0.795 mW/g

Laptop - Tablet Position - High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

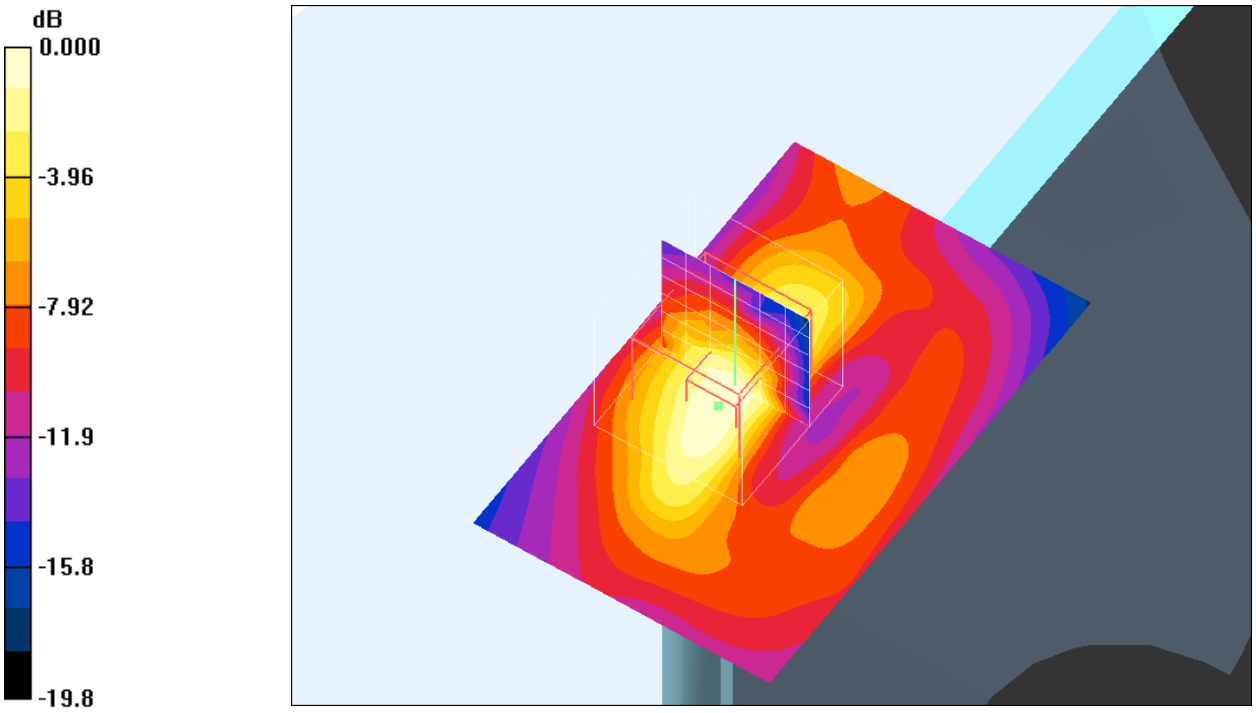
Reference Value = 10.0 V/m; Power Drift = 0.334 dB

Peak SAR (extrapolated) = 1.62 W/kg

SAR(1 g) = 0.671 mW/g; SAR(10 g) = 0.319 mW/g

Maximum value of SAR (measured) = 0.768 mW/g

0 dB = 0.768mW/g



13.2 GSM 850 (GPRS-2UL) Plots

13.2.1 Tablet Position

Date/Time: 8/7/2008 3:20:17 PM

Test Laboratory: QUALCOMM Incorporated

2008080_X200T-ACON_GPRS850-2UL_Tablet

DUT: X200T; Type: Laptop; Serial: LV-002N3

Communication System: US GSM-GPRS850-2UL; Frequency: 824.2 MHz;Duty Cycle: 1:4.3

Medium: MSL835 Medium parameters used (extrapolated): f = 824.2 MHz; σ = 0.965 mho/m; εr = 57; ρ = 1000 kg/m3

Phantom section: Flat Section

DASY4 Configuration:

* Probe: ET3DV6 - SN1733; ConvF(6.57, 6.57, 6.57); Calibrated: 9/4/2007
* Sensor-Surface: 4mm (Mechanical Surface Detection)
* Electronics: DAE3 Sn400; Calibrated: 3/5/2008
* Phantom: SAM with CRP; Type: SAM;
* Measurement SW: DASY4, V4.7 Build 55;

Laptop - Tablet Position - Low/Area Scan (71x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.195 mW/g

Laptop - Tablet Position - Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

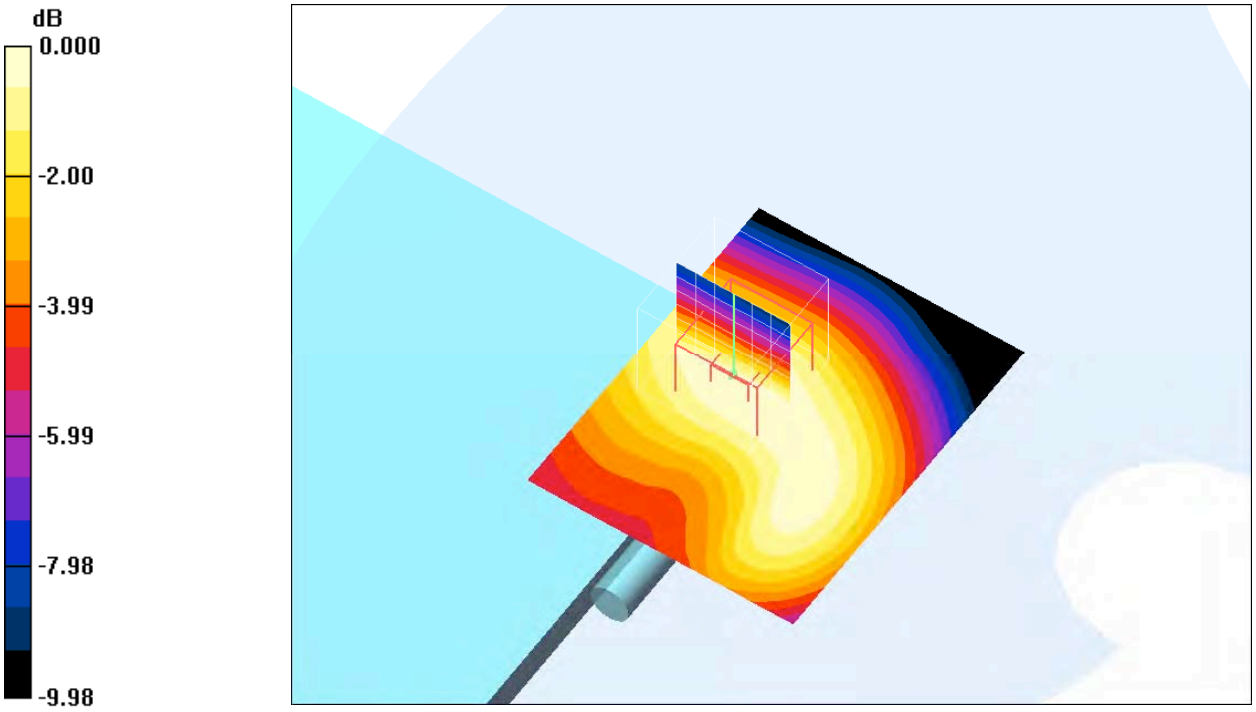
Reference Value = 12.1 V/m; Power Drift = -0.218 dB

Peak SAR (extrapolated) = 0.239 W/kg

SAR(1 g) = 0.175 mW/g; SAR(10 g) = 0.120 mW/g

Maximum value of SAR (measured) = 0.189 mW/g

0 dB = 0.189mW/g



Date/Time: 8/7/2008 4:00:30 PM

Test Laboratory: QUALCOMM Incorporated

2008080_X200T-ACON_GPRS850-2UL_Tablet

DUT: X200T; Type: Laptop; Serial: LV-002N3

Communication System: US GSM-GPRS850-2UL; Frequency: 836.6 MHz;Duty Cycle: 1:4.3

Medium: MSL835 Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.98 mho/m; εr = 56.9; ρ = 1000 kg/m3

Phantom section: Flat Section

DASY4 Configuration:

* Probe: ET3DV6 - SN1733; ConvF(6.57, 6.57, 6.57); Calibrated: 9/4/2007
* Sensor-Surface: 4mm (Mechanical Surface Detection)
* Electronics: DAE3 Sn400; Calibrated: 3/5/2008
* Phantom: SAM with CRP; Type: SAM;
* Measurement SW: DASY4, V4.7 Build 55;

Laptop - Tablet Position - Middle/Area Scan (81x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.249 mW/g

Laptop - Tablet Position - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

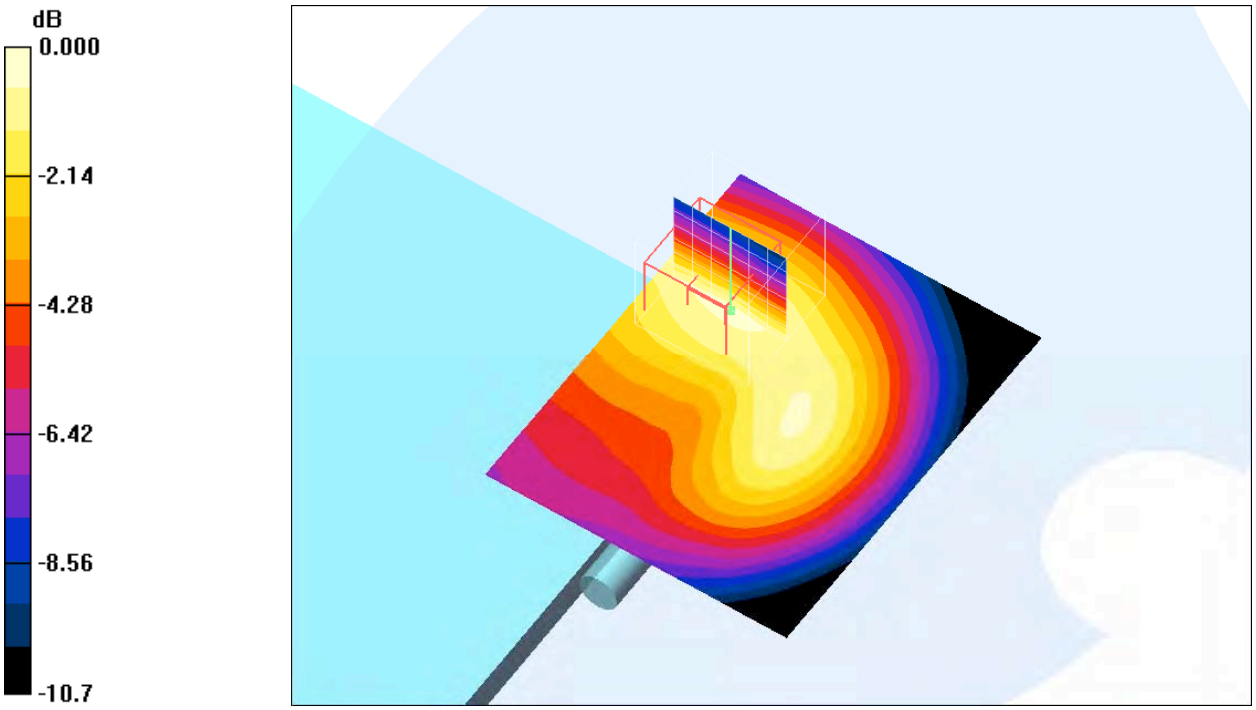
Reference Value = 16.4 V/m; Power Drift = 0.346 dB

Peak SAR (extrapolated) = 0.371 W/kg

SAR(1 g) = 0.262 mW/g; SAR(10 g) = 0.177 mW/g

Maximum value of SAR (measured) = 0.284 mW/g

0 dB = 0.284mW/g



Date/Time: 8/7/2008 4:31:17 PM

Test Laboratory: QUALCOMM Incorporated

2008080_X200T-ACON_GPRS850-2UL_Tablet

DUT: X200T; Type: Laptop; Serial: LV-002N3

Communication System: US GSM-GPRS850-2UL; Frequency: 848.8 MHz;Duty Cycle: 1:4.3

Medium: MSL835 Medium parameters used (extrapolated): f = 848.8 MHz; σ = 0.993 mho/m; εr = 56.7; ρ = 1000 kg/m3

Phantom section: Flat Section

DASY4 Configuration:

* Probe: ET3DV6 - SN1733; ConvF(6.57, 6.57, 6.57); Calibrated: 9/4/2007
* Sensor-Surface: 4mm (Mechanical Surface Detection)
* Electronics: DAE3 Sn400; Calibrated: 3/5/2008
* Phantom: SAM with CRP; Type: SAM;
* Measurement SW: DASY4, V4.7 Build 55;

Laptop - Tablet Position - High/Area Scan (71x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.426 mW/g

Laptop - Tablet Position - High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

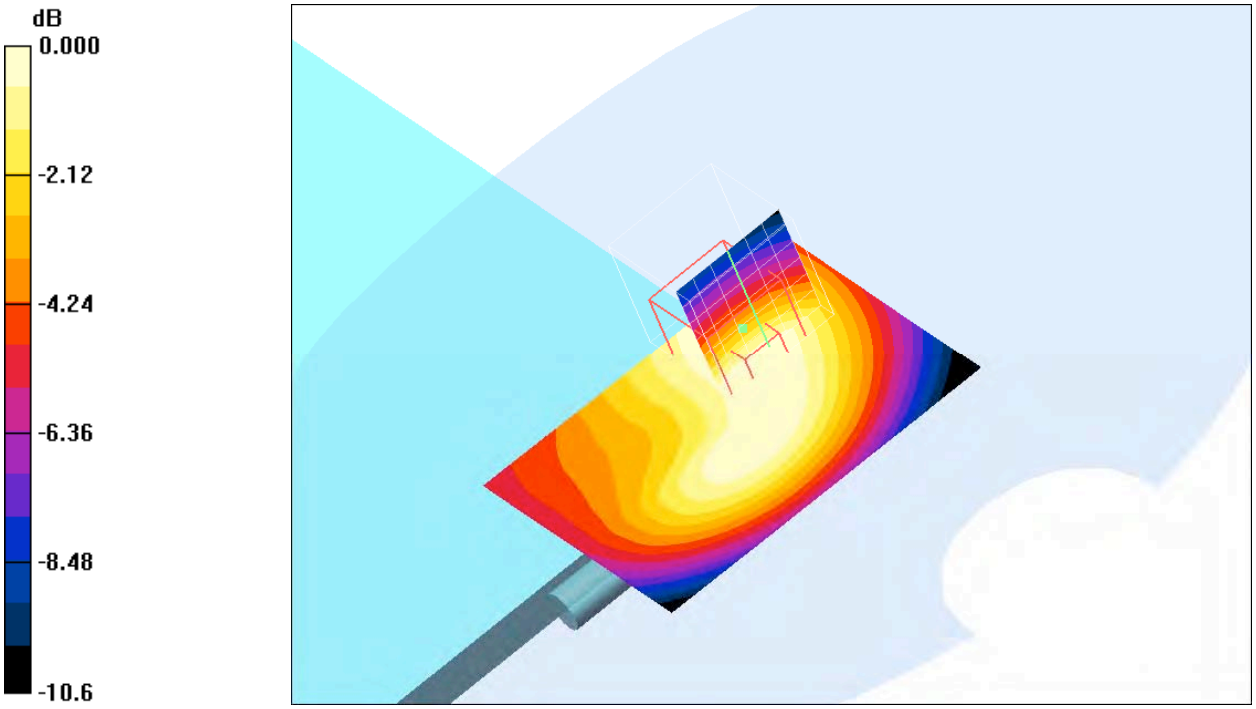
Reference Value = 21.0 V/m; Power Drift = -0.229 dB

Peak SAR (extrapolated) = 0.523 W/kg

SAR(1 g) = 0.383 mW/g; SAR(10 g) = 0.262 mW/g

Maximum value of SAR (measured) = 0.414 mW/g

0 dB = 0.414mW/g



13.2.2 Secondary Portrait Position

Date/Time: 8/7/2008 2:13:51 PM

Test Laboratory: QUALCOMM Incorporated

20080807_X200T-ACON_GPRS850-2UL-Secondary-Portrait

DUT: X200T; Type: Laptop; Serial: LV-002N3

Communication System: US GSM-GPRS850-2UL; Frequency: 824.2 MHz;Duty Cycle: 1:4.3

Medium: MSL835 Medium parameters used (extrapolated): f = 824.2 MHz; σ = 0.965 mho/m; εr = 57; ρ = 1000 kg/m3

Phantom section: Flat Section

DASY4 Configuration:

* Probe: ET3DV6 - SN1733; ConvF(6.57, 6.57, 6.57); Calibrated: 9/4/2007
* Sensor-Surface: 4mm (Mechanical Surface Detection)
* Electronics: DAE3 Sn400; Calibrated: 3/5/2008
* Phantom: SAM with CRP; Type: SAM;
* Measurement SW: DASY4, V4.7 Build 55;

Laptop - Secondary Portrait - Low/Area Scan (51x81x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 0.190 mW/g

Laptop - Secondary Portrait - Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

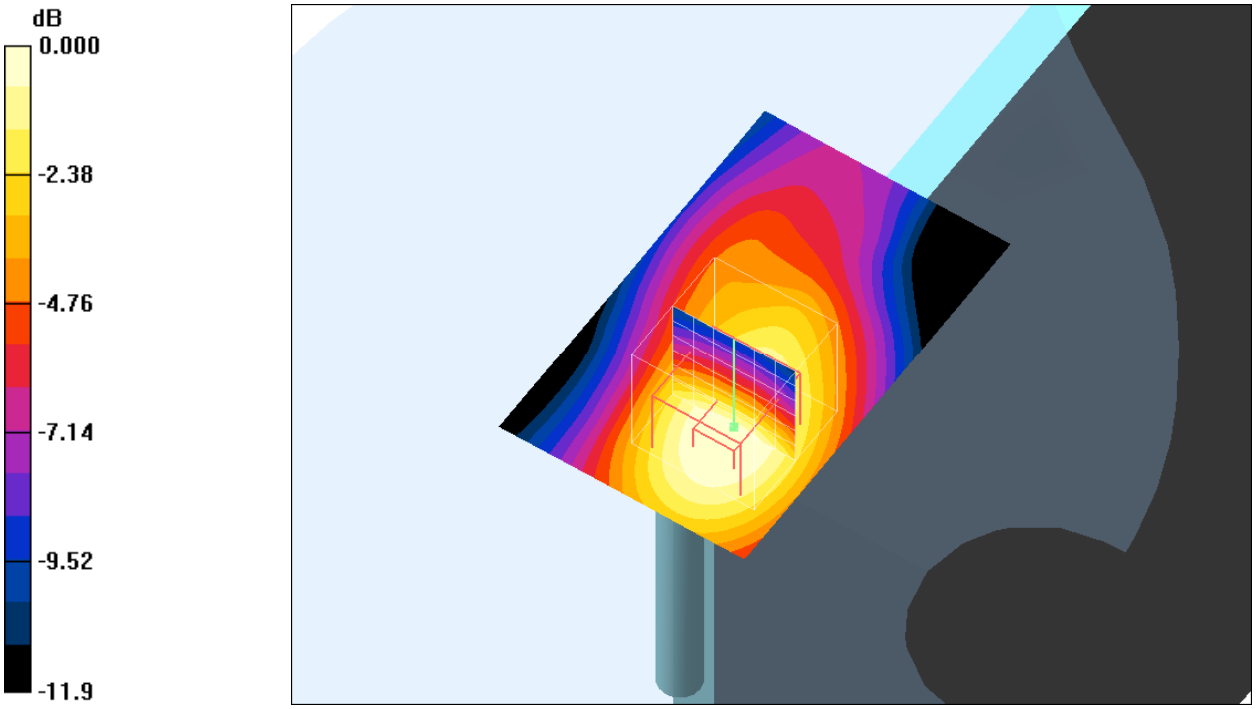
Reference Value = 6.60 V/m; Power Drift = 0.692 dB

Peak SAR (extrapolated) = 0.237 W/kg

SAR(1 g) = 0.161 mW/g; SAR(10 g) = 0.102 mW/g

Maximum value of SAR (measured) = 0.175 mW/g

0 dB = 0.175mW/g



Date/Time: 8/7/2008 2:37:32 PM

Test Laboratory: QUALCOMM Incorporated

20080807_X200T-ACON_GPRS850-2UL-Secondary-Portrait

DUT: X200T; Type: Laptop; Serial: LV-002N3

Communication System: US GSM-GPRS850-2UL; Frequency: 836.6 MHz;Duty Cycle: 1:4.3

Medium: MSL835 Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.98 mho/m; εr = 56.9; ρ = 1000 kg/m3

Phantom section: Flat Section

DASY4 Configuration:

* Probe: ET3DV6 - SN1733; ConvF(6.57, 6.57, 6.57); Calibrated: 9/4/2007
* Sensor-Surface: 4mm (Mechanical Surface Detection)
* Electronics: DAE3 Sn400; Calibrated: 3/5/2008
* Phantom: SAM with CRP; Type: SAM;
* Measurement SW: DASY4, V4.7 Build 55;

Laptop - Secondary Portrait- Middle/Area Scan (61x131x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.274 mW/g

Laptop - Secondary Portrait- Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

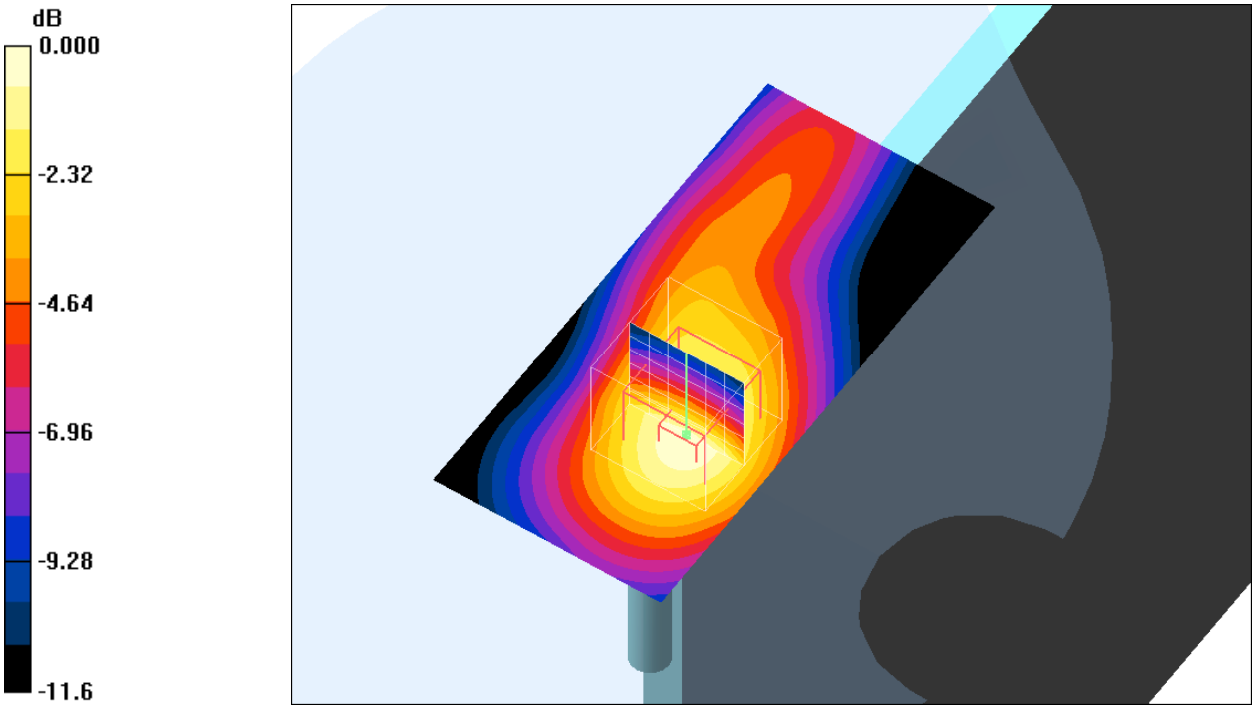
Reference Value = 8.83 V/m; Power Drift = 0.284 dB

Peak SAR (extrapolated) = 0.376 W/kg

SAR(1 g) = 0.251 mW/g; SAR(10 g) = 0.158 mW/g

Maximum value of SAR (measured) = 0.281 mW/g

0 dB = 0.281mW/g



Date/Time: 8/7/2008 2:59:55 PM

Test Laboratory: QUALCOMM Incorporated

20080807_X200T-ACON_GPRS850-2UL-Secondary-Portrait

DUT: X200T; Type: Laptop; Serial: LV-002N3

Communication System: US GSM-GPRS850-2UL; Frequency: 848.8 MHz;Duty Cycle: 1:4.3

Medium: MSL835 Medium parameters used (extrapolated): f = 848.8 MHz; σ = 0.993 mho/m; εr = 56.7; ρ = 1000 kg/m3

Phantom section: Flat Section

DASY4 Configuration:

* Probe: ET3DV6 - SN1733; ConvF(6.57, 6.57, 6.57); Calibrated: 9/4/2007
* Sensor-Surface: 4mm (Mechanical Surface Detection)
* Electronics: DAE3 Sn400; Calibrated: 3/5/2008
* Phantom: SAM with CRP; Type: SAM;
* Measurement SW: DASY4, V4.7 Build 55;

Laptop - Tablet Position - High/Area Scan (51x81x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 0.420 mW/g

Laptop - Tablet Position - High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 11.7 V/m; Power Drift = -0.231 dB

Peak SAR (extrapolated) = 0.594 W/kg

SAR(1 g) = 0.390 mW/g; SAR(10 g) = 0.244 mW/g

Maximum value of SAR (measured) = 0.427 mW/g

0 dB = 0.427mW/g