QUALCOMM
CDMA Technologies

Belt Clip MPERS Device Model LC130
FCC SAR Test Report

FCC ID: ZQR-LC130

80-H1151-7 Rev. A

December 16, 2011

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Revision history

Revision	Date	Description
A		Initial release

December 16, 2011

Belt Clip MPERS Device Model LC130 FCC SAR Test Report
80-H1151-7 Rev. A

QUALCOMM

5775 Morehouse Dr.
San Diego CA 92121

Overview

Test Report Reference:	80-H1151-7 Rev. A
Responsible Engineer:	John Forrester
Signature:	
Test Engineer:	Mark Ortlieb
Signature:	
Date of issue:	16 December 2011
Test Laboratory:	QUALCOMM Incorporated 5775 Morehouse Dr. San Diego CA 92121 (General Telephone) 1 858 587 1121
Model Tested:	MPERS (Mobile Personal Emergency Response System) Belt Clip device, Model LC130
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 "Mobile and Portable Device – RF Exposure Procedures and Equipment Authorization Policies" (KDB 447498)* *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 DUT complies with the above-mentioned test specifications.

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1. Test summary

1.1 Introduction

A MPERS (Mobile Personal Emergency Response System) belt clip device, model LC130, was tested for SAR compliance with respect to FCC Part 2.1093 RF exposure limits. This test report is intended to document performance of the EUT with respect to established SAR measurement procedures and is intended to demonstrate compliance with RF exposure limits.

1.2 Equipment Usage

The MPERS LC130 is designed to be attached to the user's belt and is operated by the user pressing a call button and holding the device towards the user face during an emergency situation. The MPERS LC130 is not intended to be held to the ear as it only incorporates a far field speaker.

The device is only capable of making a voice phone call to a pre-configured emergency hotline number. Alternate phone numbers cannot be programmed into the device nor can it receive phone calls from anyone other than the call center.

During normal operation, the MPERS device also self-initiates short data burst transmissions (< 6 seconds) every 30 minutes to a monitoring service that provides information on the user's location and physical activity. Due to the low duty cycle, RF exposure evaluation was not conducted for data transmission. SAR exclusion for this normal operation mode is detailed in Section 10.

The MPERS device has only a single WWAN transmitter with a single transmit antenna and only supports CDMA 1x 850 (Band Class 0) MHz and 1900 MHz (Band Class 1) bands. There are no collocated transmitters, receive diversity antennas, or any other external connections other than for battery charging.

1.3 Compliance Standards

- **FCC OET 65** Supplement C *Evaluation Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields*
- **FCC KDB 447498** *Mobile and Portable Device – RF Exposure Procedures and Equipment Authorization Policies*
- **FCC KDB 941225** *SAR Measurement Procedures for 3G Devices – CDMA 2000/EV-DO – WCDMA/HSDPA/HSPA*
- **FCC KDB 450824** *SAR Probe Calibration and System Verification Considerations for Measurements at 150 MHz – 3 GHz*
- **FCC Part 2.1093** *Radiofrequency radiation exposure evaluation: portable devices*
- **IEEE 1528** *Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communication Devices: Measurement Techniques*

1.4 Maximum Measured SAR results (Worst Case Results)

Table 1-1 Worst-case measured 1 g SAR (head and body)

Test position	Band	Channel	1 g SAR (mW/g)	Limit
Front of device toward phantom, 1.0 cm separation	850 (BC0)	1013	1.52 mW/g	1.6 mW/g
Rear of device toward phantom, 1.0 cm separation	1900 (BC1)	25	1.35 mW/g	

Table 1-2 Worst-case measured 10 g SAR (hand)

Position	Band	Ch	10 g SAR (mW/g)	Limit
Rear of device toward flat phantom, 0 cm separation	CDMA 1x, Cellular (BC0)	384	2.15	4.0 mW/g (10 g)
Rear of device toward flat phantom, 0 cm separation	CDMA 1x, PCS (BC1)	600	2.04	

Table 1-3 Overall Measurement Uncertainty

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

1.5 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 1-4 1 Gram SAR Limits

Localized SAR (head and trunk)	1.6 mW/g (1 g)
Hands, Wrists, Feet and Ankles	4.0 mW/g (10 g)

1.6 Simultaneous Transmission

The MPERS LC130 device contains only a single transmitter, therefore simultaneous transmission consideration does not apply.

2. EUT Description

2.1 General

Table 2-1 EUT Information

EUT Model	LC130
FCC ID	ZQR-LC130
EUT Serial Number	4
EUT description	Belt clip mobile wireless personal emergency service (MPERS) device with WWAN transmit capability.
WWAN Technologies	CDMA 2000 1x
Unlicensed Technologies	None
TX Frequencies	CDMA 1x Band Class 0: 824.2 – 848.8 MHz CDMA 1x Band Class 1: 1850.2 – 1909.8 MHz
Nominal Factory Transmit Power (dBm)	Band Class 0: 24dBm Band Class 1: 24dBm
Duty Cycle(s)	CDMA: 100%
WWAN Antenna Type	PIFA
WLAN Antenna	None

3. Conducted Transmit Power

Conducted transmit power was tested in accordance with FCC 3G procedures and 3GPP2 standards. The test procedure for configuring the EUT to transmit at maximum output power for CDMA 1x is provided in Section 9.3 . All SAR testing was conducted with the test call in RC3, S055 configuration.

Table 3-1 WWAN Measured Average Transmit Power (dBm)

		US 835 MHz (BC0)			US 1900 MHz (BC1)		
Mode	**Service Option**	**1013**	**383**	**777**	**25**	**600**	**1175**
CDMA 1x	RC1 SO2	24.3	24.0	23.9	24.0	24.0	24.3
CDMA 1x	RC1, SO55	24.4	24.1	23.7	24.0	24.0	24.3
CDMA 1x	RC2, SO9	24.4	24.1	23.7	23.9	24.1	24.2
CDMA 1x	RC2, SO55	24.4	24.1	23.7	23.9	24.0	24.3
CDMA 1x	RC3, SO55	24.4	24.1	23.7	24.1	24.2	24.3
CDMA 1x	RC3, SO32	24.4	24.1	23.7	23.8	23.8	24.2

4. SAR Test Program

4.1 Test Positions

The MPERS LC130 is intended to be worn by the user on a belt, and operated by the user during a voice call by removing the device from the belt and speaking into the front face of the module. Therefore SAR was measured for the device in the position shown in Figure 4-1.

Additionally, SAR was measured from the rear of the device to determine compliance for body-worn positions and hand exposure. For body-worn position, measurements were made at a compliance distance in order to satisfy test condition requirements as provided by the FCC through direct KDB inquiry.

Figure 4-1 Front of device toward SAM phantom, 1.0 cm separation (Position 1)

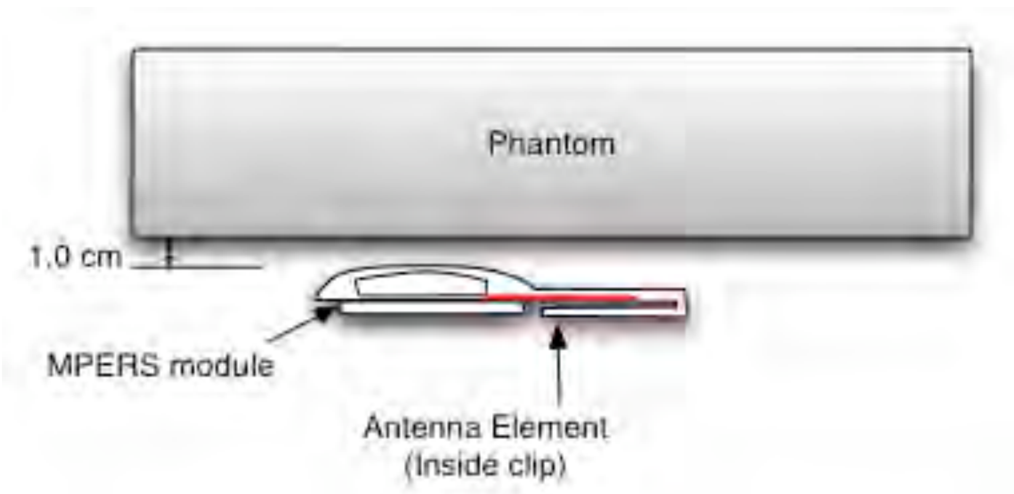


Figure 4-2 Rear of device flush to SAM phantom (1.3 cm separation) (body test position)

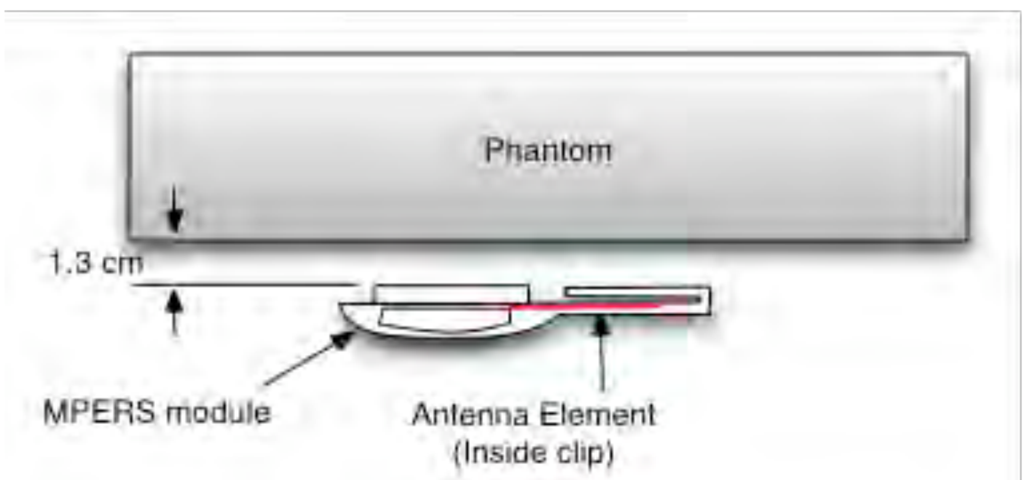
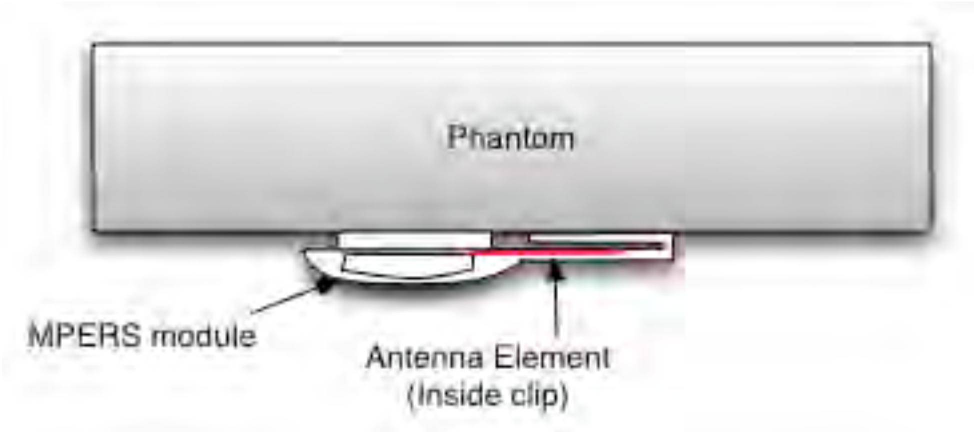


Figure 4-3 Rear of device flush to SAM phantom (0 cm separation) (hand/wrist test position)



4.2 Test Channels

Table 4-1 Test Channels

Technology	Band	Channel	Frequency
CDMA 1x	Band Class 0 (850)	1013	824.7
		383	836.49
		777	848.97
	Band Class 1 (1900)	25	1851.25
		600	1880
		1175	1908.75

4.3 Dielectric Tissue Simulating Liquids

Since the user is intended to hold the MPERS LC130 device toward the face, Head TSL was used for SAR measurements performed per Figure 4-1. For SAR measurements performed per Figure 4-3 and Figure 4-3, Body TSL was used. Liquid properties are described in Section 5.5 .

5. SAR Test Facility

5.1 General

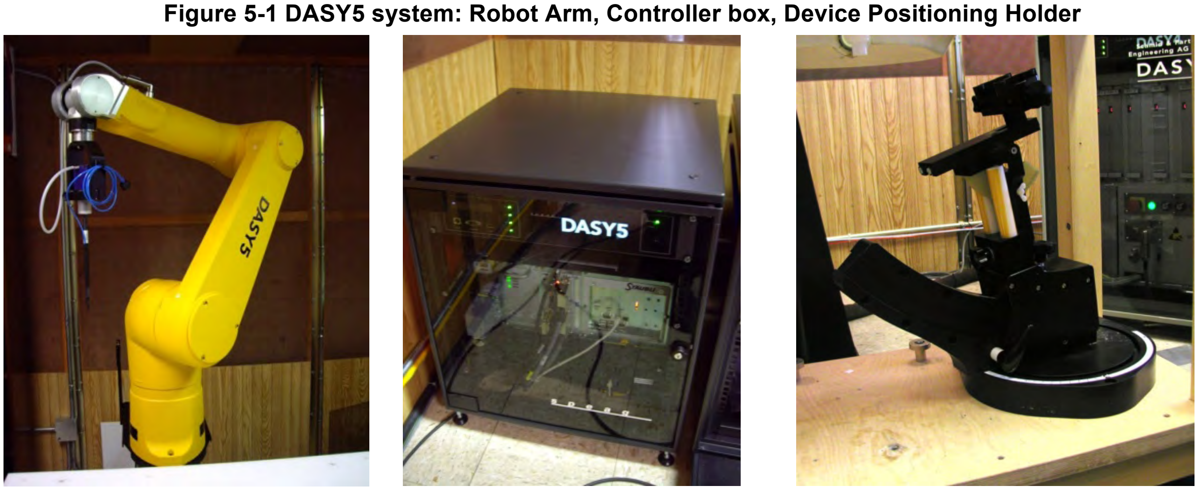
Test Location	QUALCOMM Incorporated 5775 Morehouse Dr. San Diego CA 92121
Temperature Range	15-35 °C (23°C actual)
Humidity Range	25-75% (38% actual)
Pressure	860-1060 mbar (1015 mB)

All Qualcomm 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 DASY5 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 dominant radiation source. The floor of the screen room is reflective, so the phantom bench is placed on two 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 DASY5 dosimetry system manufactured and calibrated by Schmid & Partner Engineering AG of Zurich, Switzerland. The DASY5 system consists of a six axis robot, a robot controller, a teach pendant, automation software on a 3.16 GHz Intel Core®2 Duo CPU E8500 computer, data acquisition system, isotropic E-field probe, device positioning holder, and validation kit.

Figure 5-1 DASY5 system: Robot Arm, Controller box, Device Positioning Holder



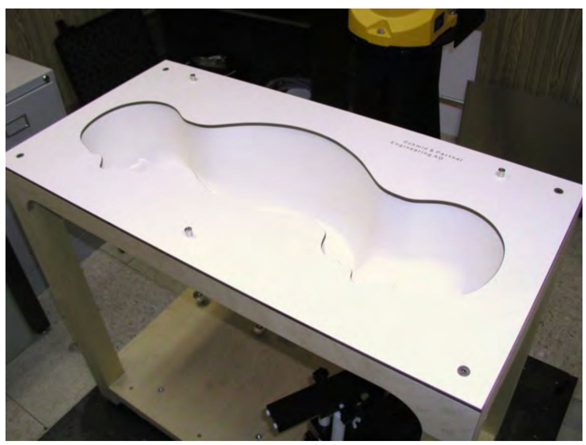
5.3 E-field probe

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 1528. 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 DASY5 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 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 HP 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 Table 5-1. The target values were obtained from the FCC OET 65 Supplement C. Lab temperature is controlled to ensure stable liquid temperatures do not vary more than ±2°C.

Table 5-1 Tissue Dielectric Properties at Time of Testing

Test Date	TSL	Frequency (MHz)	Permittivity (ε_r)				Conductivity (σ)			
			Measured Values	Target Values	Deviation (%)	Limit	Measured Values	Target Values	Deviation (%)	Limit
9/1/11	Head	1880	39.027	40	-2.43%	±5%	1.41	1.4	0.71%	±5%
9/2/11	Body	1880	52.371	53.3	-1.74%	±5%	1.54	1.52	1.32%	±5%
9/13/11	Body	836.5	55.481	55.2	0.51%	±5%	0.936	0.97	-3.51%	±5%
11/2/11	Head	836.5	40.775	41.5	-1.75%	±5%	0.874	0.9	-2.89%	±5%
11/4/11	Body	836.5	55.648	55.2	0.81%	±5%	0.954	0.97	-1.65%	±5%
11/7/11	Body	1880	51.914	53.3	-2.60%	±5%	1.509	1.52	-0.72%	±5%

25 L of each of the tissue simulating liquids were prepared using the following proportions of ingredients (percent by weight):

Head TSL:
835 MHz Head Tissue Simulating Liquid
Water – 51.07%
Cellulose – 0.23%
Sugar – 47.31%
Preventol – 0.24%
Salt – 1.15%

1900 MHz Head Tissue Simulating Liquid
Water – 55.3 %
Glycol Monobutyl Ether – 44.5%
Salt – 0.31%

Muscle TSL:
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. System Specifications and Calibration

Figure 6-1 shows a diagram of the Schmid & Partner DASY5 system.

**Figure 6-1 Diagram of DASY5 System,
from S&P Applications Notes System Description and Setup**

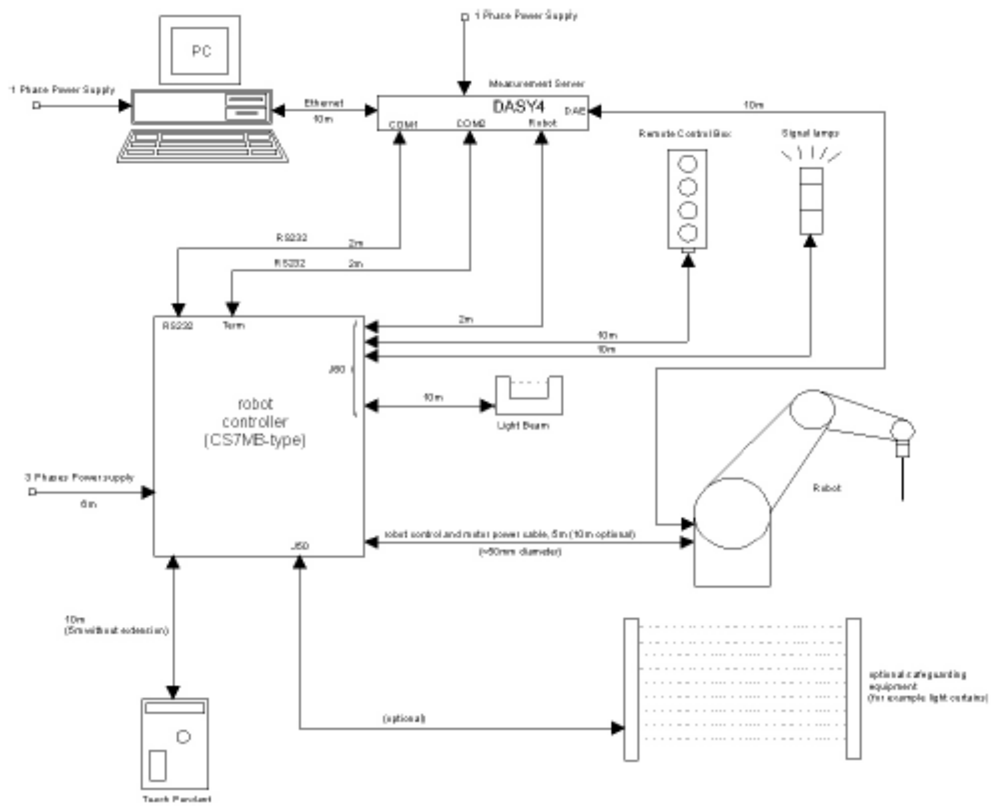


Table 6-1 Data Acquisition

Processor	Intel Core®2 Duo CPU E8500 GHz
Operating System	Microsoft® Windows® XP
Software	DASY5 V52.6.1.408, Schmid & Partners Eng. AG, Switzerland SEMCAD X V 14.4.2 Build 57
Surface Detection	Mechanical

Table 6-2 E-Field Probe

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

Dielectric	835 MHz band: homogeneous water/sugar/salt/ cellulose liquid 1900 MHz band: Homogeneous water/glycol/salt liquid
Shell	2 mm ± 0.2 mm polyester fiber glass
Ear	Integral model per SAM phantom specification

Table 6-4 Calibration

Equipment Mfr & Type	Serial number	Last Calibrated	Next Calibration
Schmid & Partner Engineering AG Dosimetric E-field Probe, ET3DV5	1733	16 February 2011	16 February 2012
Schmid & Partner Engineering AG dipole validation kit, D835V2	466	19 October 2010*	19 October 2012
Schmid & Partner Engineering AG dipole validation kit, D1900V2	5d096	21 October 2010*	21 October 2012
Schmid & Partner Engineering AG Data Acquisition Electronics, DAE3 V1	400	8 February 2011	8 February 2012
Gigatronics 8541C RF Power Meter	K81354	17 May 2011	17 May 2012
Gigatronics 80401A Power Sensor	G000517	20 January 2011	20 January 2012
Hewlett-Packard 8720E Network Analyzer	K100454	20 April 2011	20 April 2012
Hewlett-Packard 85070M Dielectric Probe System	N/A	N/A	N/A

*Some testing in this report was performed beyond the 1-year calibration date, therefore extended calibration analysis was done as described in FCC KDB 50824 D02. See Section 6.1 .

6.1 Extended calibration information

Sections 6.1.1 and 6.1.2 provide supporting documentation regarding use of test equipment that was used under the extended calibration guidelines of FCC KDB 50824 D02.

6.1.1 D835V2, Serial number 466

Validation dipole D835V2, S/N 466, has not been damaged in any way since its calibration on 19 October 2010.

No system check SAR measurements have deviated by more than ±10% from what is given in the manufacturer's calibration documentation (system check information with deviation in this report is provided in Section 15.)

Subsequent to the testing that was performed in November (beyond calibration due date), the dipole was sent to the manufacturer, Schmid & Partner AG, for calibration. Return loss and input impedance measurements in the new calibration certificate (2 December 2011) were compared to those in the previous calibration certificate and found to be within expected tolerances. Both 2010 and 2011 calibration certificates are included in Section 15. Table 6-5 and Table 6-6 give specific data and deviation values for D835V2.

Table 6-5 Return Loss Information for D835V2 (S/N 466)

Tissue Simulating Liquid	19 October 2010 calibration	2 December 2011 calibration	Difference (%)	Limit
Head TSL	-28.1 dB	-26.6 dB	5.3%	20%
Body TSL	-25.1 dB	-23.2 dB	7.6%	20%

Table 6-6 Impedance Information for D835V2 (S/N 466)

Tissue Simulating Liquid	19 October 2010 calibration	2 December 2011 calibration	Difference (Ω)	Difference Limit
Head TSL	Real: 51.9 Ω	Real: 53.2 Ω	Real: +1.3 Ω	5 Ω
	Imaginary: j3.5 Ω	Imaginary: j3.6 Ω	Imaginary: +0.1 Ω	
Body TSL	Real: 48.1 Ω	Real: 47.8 Ω	Real: -0.3 Ω	5 Ω
	Imaginary: j5.2 Ω	Imaginary: j6.4Ω	Imaginary: +1.2 Ω	

6.1.2 D1900V2, Serial number 5d096

Validation dipole D1900V2, S/N 5d096, has not been damaged in any way since its calibration on 21 October 2010.

No system check SAR measurements have deviated by more than ±10% from what is given in the manufacturer's calibration documentation (system check information with deviation in this report is provided in Section 15.)

Subsequent to the testing that was performed in November (beyond calibration due date), the dipole was sent to the manufacturer, Schmid & Partner AG, for calibration. Return loss and input impedance measurements in the new calibration certificate (6 December 2011) were compared to those in the previous calibration certificate and found to be within expected tolerances. Both 2010 and 2011 calibration certificates are included in Section 15. Table 6-7 and Table 6-8 give specific data and deviation values for D1900V2.

Table 6-7 Return Loss Information for D1900V2 (SN 5d096)

Tissue Simulating Liquid	21 October 2010 calibration	6 December 2011 calibration	Difference (%)	Limit
Head TSL	-25.4 dB	-25.0 dB	-1.5%	20%
Body TSL	-23.6 dB	-23.8 dB	-0.8%	

Table 6-8 Impedance Information for D1900V2 (SN 5d096)

Tissue Simulating Liquid	21 October 2010 calibration	6 December 2011 calibration	Difference (Ω)	Difference Limit
Head TSL	Real: 53.3 Ω	Real: 53.0 Ω	Real: -0.3 Ω	5.0 Ω
	Imaginary: j5.0 Ω	Imaginary: j5.0 Ω	Imaginary: +0.0 Ω	
Body TSL	Real: 47.1 Ω	Real: 47.4 Ω	Real: +0.3 Ω	
	Imaginary: j5.7Ω	Imaginary: j5.8Ω	Imaginary: +0.1 Ω	

7. SAR Measurement Procedure

7.1 DUT Configuration

The DUT was configured into the desired transmit configuration per the procedures defined in section 9.

7.2 Power Verification

Prior to beginning SAR testing, conducted power was measured on the MPERS device to verify functionality and the WWAN maximum transmit power values using the procedures defined in section 9. The results of the conducted power measurements are in section 3.

7.3 Test Configurations

7.3.1 DUT Position

The DUT was positioned as described in Section 4. SAR Test Program.

7.4 Scan procedure

The scan routine is set up as follows:
- Power reference measurement
- Area scan
- Power Drift measurement
- 60 second delay
- Power reference measurement
- 7x7x7 cube (zoom) scan
- Power Drift measurement
- Robot movement to maximum location
- Z-axis scan

8. 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 8-1 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 %**	

9. EUT Configuration Procedure

9.1 WWAN Transmission Setup

9.1.1 EUT Test Frequencies (WWAN)

Table 9-1 Test Frequencies

	850 MHz						1900 MHz					
	Low		Mid		High		Low		Mid		High	
	Ch	Freq	Ch	Freq	Ch	Freq	Ch	Freq	Ch	Freq	Ch	Freq
CDMA	1013	824.7	384	836.52	777	848.31	25	1851.25	600	1880	1175	1908.75

9.1.2 Call Box Simulator Information

Table 9-2 Communications Test Box Information

Make	Agilent	
Model	8960	
Cal Date	15 September 2010 (early September testing) 18 October 2011 (November testing)	
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
	Fast Switch Test App	E1987A

9.2 Duty Cycle

Duty cycle for all CDMA 1x calls was 100%.

9.3 Call set-up For CDMA2000 1x

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 9-3.
    c. Send continuously ‘0’ power control bits to the EUT.
    d. Measure the output power at EUT’s 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. RC3, SO55
        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 9-4.
    c. Send alternating ‘0’ and ‘1’ power control bits to the EUT.
    d. Determine the active channel configuration. If the desired channel configuration is not the active channel configuration, increase $\hat{I}or$ by 1 dB and repeat the verification. Repeat this step until the desired channel configuration becomes active.
    e. Measure the output power at the EUT’s antenna connector.
    f. Decrease $\hat{I}or$ 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 EUT’s 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 9-3 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 9-4 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

10. Low Duty Cycle RF Exposure Evaluation

This section provides numerical calculations justifying SAR measurement exclusion based on average power <60/*f* (*f*=frequency in GHz) for MPERS low duty cycle data transmissions.

The device transmits a burst of data approximately 6 seconds long every 30 minutes.

The calculations below are based on the nominal transmit power setting of 24 dBm for the LC130 device. The measured conducted power reported in this test report is higher/lower due to device tolerances and measurement uncertainty. Given the adjusted average power for defined duty cycle is much lower than the 60/*f* power, the transmit power tolerance does not impact the conclusion.

Table 10-1 Duty Cycle Calculation

	Duty Cycle Period		
Maximum Transmission Time within Duty Cycle Period (sec)	Min	Sec	Duty Cycle
6	30	1800	0.33%

Table 10-2 SAR Exclusion Calculation

Mode	**Frequency (MHz)**	**Duty Cycle**	**Nominal Average Conducted TX Power (dBm)**		**Adjusted Transmit Power**		**60/*f* Power**		**Result**
			dBm	**mW**	**dBm**	**mW**	**dBm**	**mW**	
CDMA 850 MHz	824	0.33%	24	251	-0.8	0.8	18.6	72.8	SAR measurement exclusion (Adjusted Avg Pwr<60/*f*)
CDMA 1900 MHz	1850	0.33%	24	251	-0.8	0.8	15.1	32.4	SAR measurement exclusion (Adjusted Avg Pwr<60/*f*)

11. Numerical SAR Data

11.1 Numerical Data

Table 11-1 1-g Measured SAR Test Data for MPERS LC130 (Head and Body SAR)

Position	TSL	Band	Ch	1 g Limit (mW/g)	1 g SAR (mW/g)
Front of device toward phantom, 1.0 cm separation	Head	CDMA 1x, Cellular (BC0)	1013	1.6 mW/g (1 g)	1.52
			383		1.49
			777		1.46
Rear of device toward flat phantom, 1.2 cm separation	Muscle		1013		1.47
Rear of device toward flat phantom, 1.3 cm separation			383		1.49
Rear of device toward flat phantom, 1.3 cm separation			777		1.58
Front of device toward phantom, 1.0 cm separation	Head	CDMA 1x, PCS (BC1)	600(1)		0.733(1)
Rear of device toward flat phantom, 1.3 cm separation	Muscle		25		0.971
			600		0.932
			1175		0.631
Rear of device toward flat phantom, 1.0 cm separation			25		1.35

(1) As permitted by KDB 447498, only the middle channel was measured since the measured data was more than 3.0 dB below the SAR limit.

Table 11-2 10-g Measured SAR Test Data for MPERS LC130 (Hand SAR)

Position	TSL	Band	Ch	10 g Limit (mW/g)	10 g SAR (mW/g)
Rear of device toward flat phantom, 0 cm separation	Muscle	CDMA 1x, Cellular (BC0)	384	4.0 mW/g (10 g)	2.15
Rear of device toward flat phantom, 0 cm separation	Muscle	CDMA 1x, PCS (BC1)	600		2.04

13. System Performance Check

13.1 General System Check Procedure

System performance check scans were performed at the beginning of testing of each test program day. A dipole antenna was selected that roughly matched the center frequency of the bands being tested (835 MHz and 1900 MHz). 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 shown in Table 13-1 (for 1-g system checks) and Table 13-2 (for 10-g system checks). Measured SAR is then scaled to 30 dBm for comparison to the dipole manufacturer's scaled SAR at 30 dBm. System performance check SAR has a tolerance of ±10%.

13.2 System Performance Check Data

Table 13-1 shows system check data.

Table 13-1 1-g SAR System Check Data MPERS Test Program

			1 g SAR (mW/g)				
Date	TSL	Frequency (MHz)	Measured	Scaled to 30 dBm	Target	Difference (%)	Tolerance (%)
9/1/2011	Head	1900	4.05	40.5	40.0	+1.3%	±10%
11/2/2011	Head	835	0.943	9.43	9.64	-2.2%	±10%
11/3/2011	Body	835	0.939	9.39	10.10	-7.0%	±10%
11/7/2011	Body	1900	4.13	41.3	40.4	+2.2%	±10%

Table 13-2 10-g SAR System Check Data MPERS Test Program

			10 g SAR (mW/g)				
Date	TSL	Frequency (MHz)	Measured	Scaled to 30 dBm	Target	Difference (%)	Tolerance (%)
9/2/2011	Body	1900	2.02	20.2	21.4	-5.6%	±10%
9/13/2011	Body	835	0.632	6.32	6.64	-4.8%	±10%

Date/Time: 11/2/2011 9:40:46 AM, Date/Time: 11/2/2011 9:47:30 AM

Test Laboratory: QUALCOMM Incorporated
20111102_Val835_Head_20dBm
DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN:466
Communication System: CW; Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz;Communication System PAR: 0 dB
Medium parameters used (interpolated): f = 835 MHz; σ = 0.899 mho/m; ε_r = 40.995; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

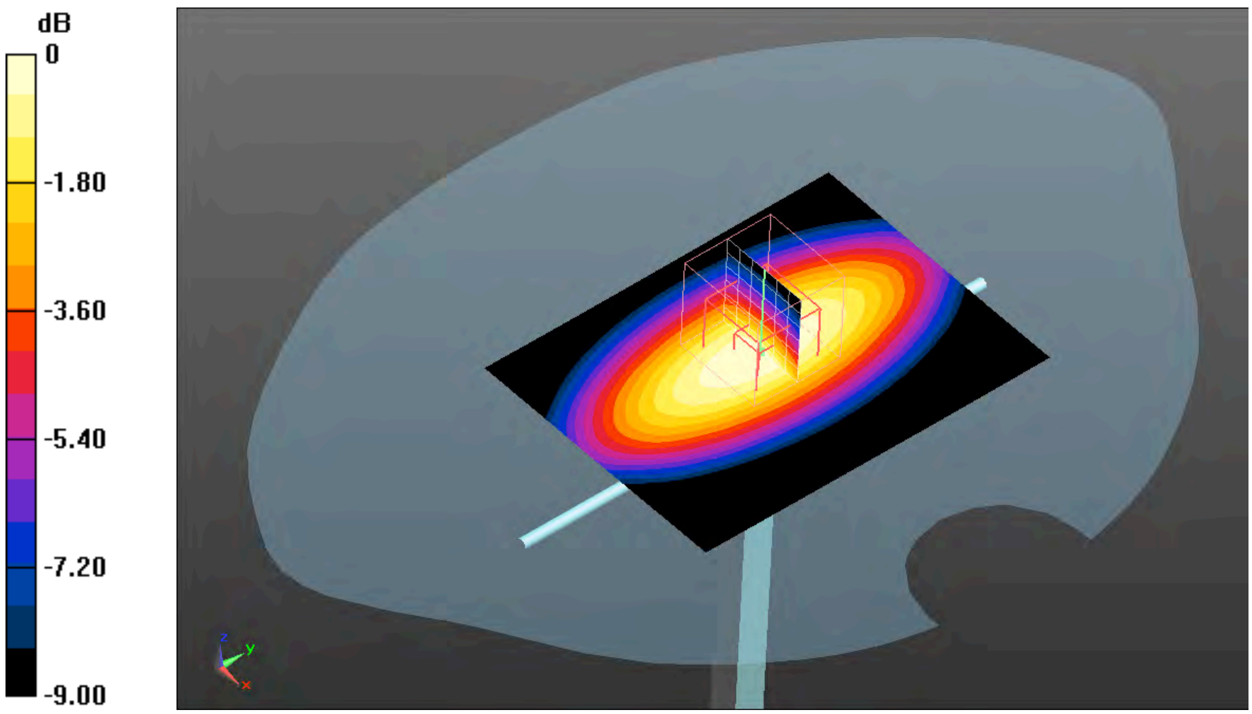
- Probe: ET3DV6 - SN1733; ConvF(6.56, 6.56, 6.56); Calibrated: 2/16/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn400; Calibrated: 2/8/2011
- Phantom: SAM with CRP; Type: SAM; Phantom Serial: 209
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/d=15mm, Pin=20dBm, dist=4.0mm (ET-Probe)/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.026 mW/g

Configuration/d=15mm, Pin=20dBm, dist=4.0mm (ET-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 35.266 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.369 W/kg
SAR(1 g) = 0.943 mW/g; SAR(10 g) = 0.620 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.020 mW/g



0 dB = 1.020mW/g

Date/Time: 11/3/2011 2:02:39 PM, Date/Time: 11/3/2011 2:09:25 PM

Test Laboratory: QUALCOMM Incorporated
20111103_Val835_Body_20dBm
DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN:466
Communication System: CW; Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz;Communication System PAR: 0 dB
Medium parameters used (interpolated): f = 835 MHz; σ = 0.956 mho/m; ε_r = 55.627; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

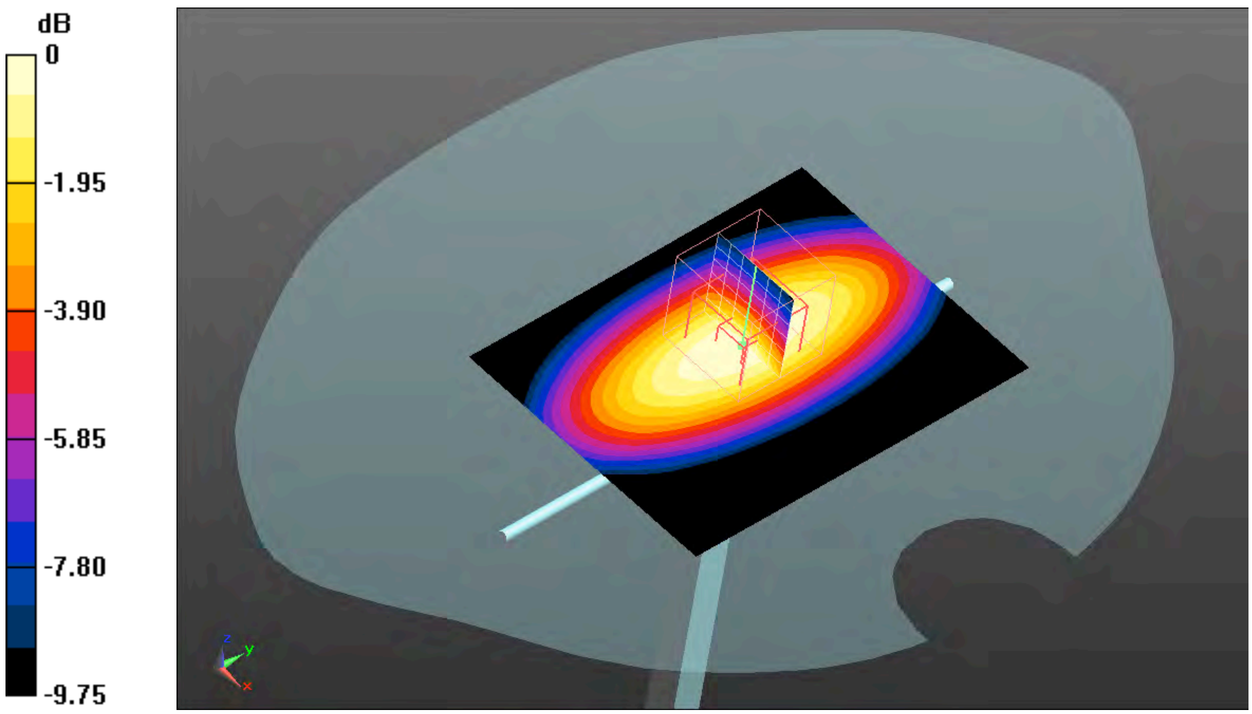
- Probe: ET3DV6 - SN1733; ConvF(6.45, 6.45, 6.45); Calibrated: 2/16/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn400; Calibrated: 2/8/2011
- Phantom: SAM with CRP; Type: SAM; Phantom Serial: 209
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/d=15mm, Pin=20dBm, dist=4.0mm (ET-Probe)/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.032 mW/g

Configuration/d=15mm, Pin=20dBm, dist=4.0mm (ET-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 34.379 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 1.310 W/kg
SAR(1 g) = 0.939 mW/g; SAR(10 g) = 0.628 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.018 mW/g



0 dB = 1.020mW/g

Date/Time: 9/1/2011 8:11:14 AM, Date/Time: 9/1/2011 8:18:00 AM

Test Laboratory: QUALCOMM Incorporated
20110901_Val1900_Head_20dBm
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d096
Communication System: CW; Communication System Band: D1900 (1900 MHz); Frequency: 1900 MHz;Communication System PAR: 0 dB
Medium parameters used (interpolated): f = 1900 MHz; σ = 1.461 mho/m; ε_r = 38.056; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

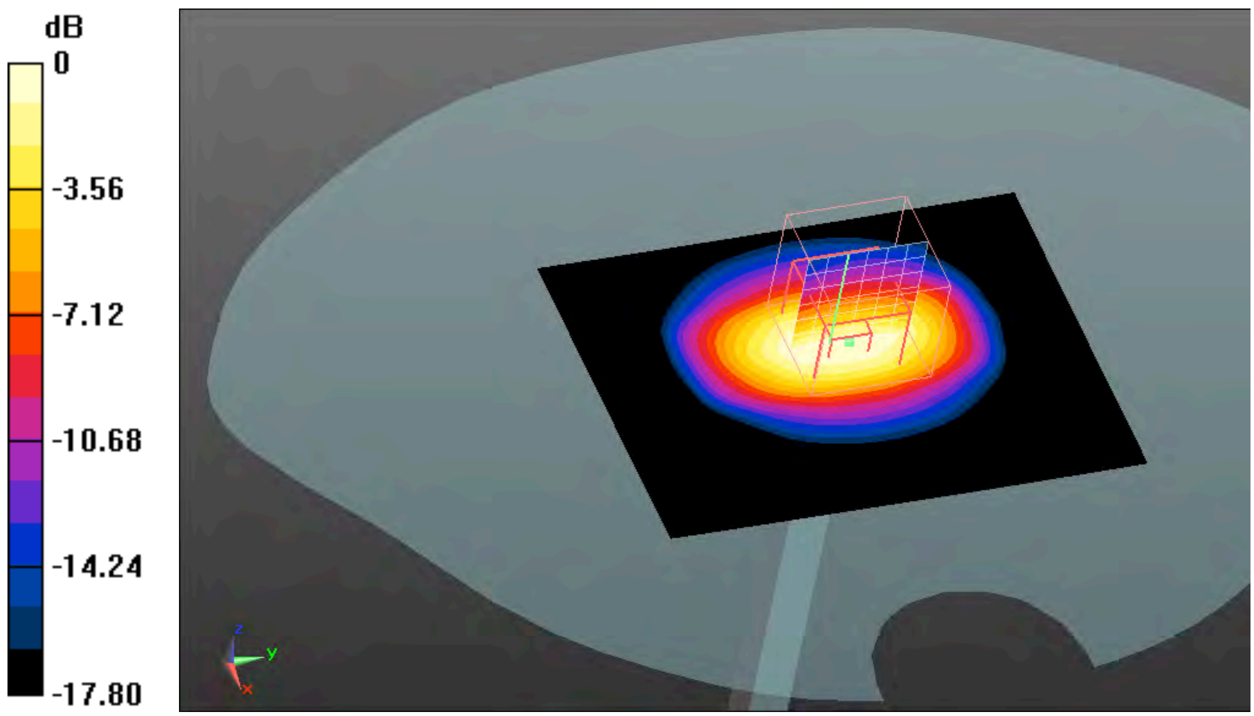
- Probe: ET3DV6 - SN1733; ConvF(5.2, 5.2, 5.2); Calibrated: 2/16/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn400; Calibrated: 2/8/2011
- Phantom: SAM with CRP; Type: SAM; Phantom Serial: 209
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/d=15mm, Pin=20dBm, dist=4.0mm (ET-Probe)/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 4.954 mW/g

Configuration/d=15mm, Pin=20dBm, dist=4.0mm (ET-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.512 V/m; Power Drift = -0.42 dB
Peak SAR (extrapolated) = 7.068 W/kg
SAR(1 g) = 4.05 mW/g; SAR(10 g) = 2.16 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 4.511 mW/g



0 dB = 4.510mW/g

Date/Time: 9/2/2011 5:17:05 PM, Date/Time: 9/2/2011 5:23:50 PM

Test Laboratory: QUALCOMM Incorporated
20110902_Val1900_Muscle_20dBm
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d096
Communication System: CW; Communication System Band: D1900 (1900 MHz); Frequency: 1900 MHz;Communication System PAR: 0 dB
Medium parameters used (interpolated): f = 1900 MHz; σ = 1.566 mho/m; ε_r = 52.274; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

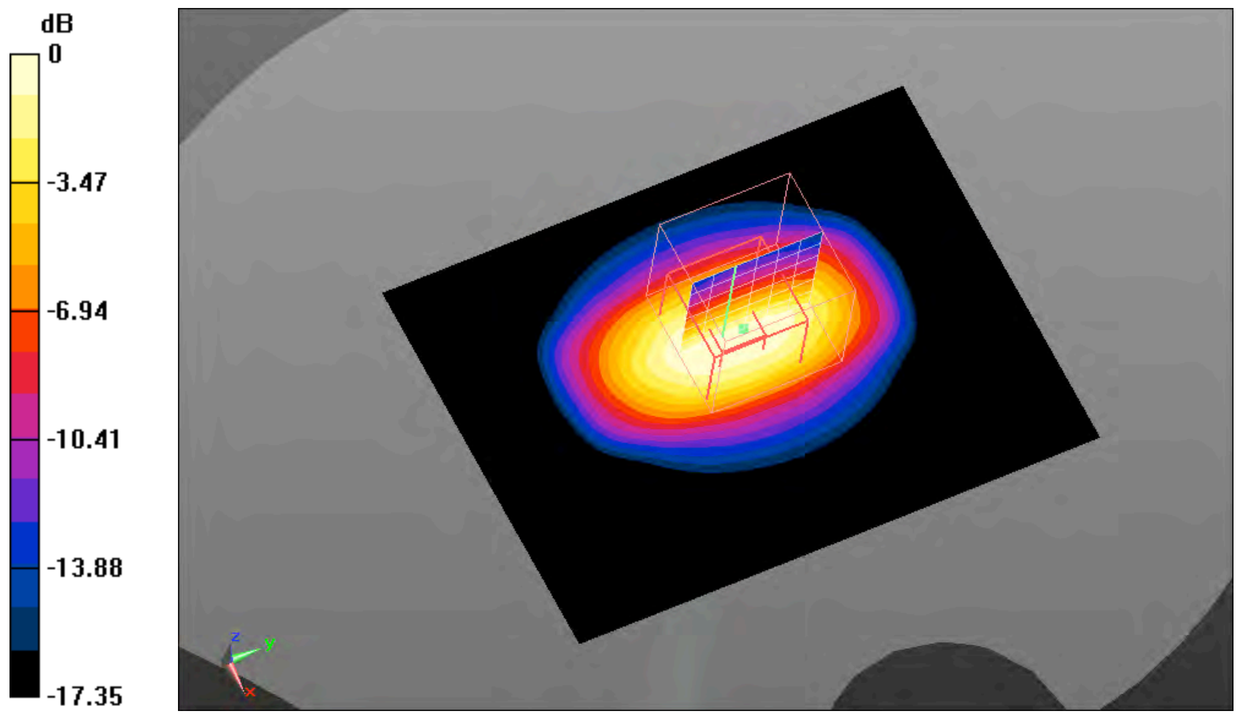
- Probe: ET3DV6 - SN1733; ConvF(4.61, 4.61, 4.61); Calibrated: 2/16/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn400; Calibrated: 2/8/2011
- Phantom: SAM with CRP; Type: SAM; Phantom Serial: 209
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/d=15mm, Pin=19.86dBm, dist=4.0mm (ET-Probe) 2/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 4.755 mW/g

Configuration/d=15mm, Pin=19.86dBm, dist=4.0mm (ET-Probe) 2/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.565 V/m; Power Drift = 0.0022 dB
Peak SAR (extrapolated) = 6.140 W/kg
SAR(1 g) = 3.76 mW/g; SAR(10 g) = 2.02 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 4.263 mW/g



0 dB = 4.260mW/g

Date/Time: 9/13/2011 10:20:24 AM, Date/Time: 9/13/2011 10:27:11 AM

Test Laboratory: QUALCOMM Incorporated
20110913_Val835_Body_20dBm
DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN:466
Communication System: CW; Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz;Communication System PAR: 0 dB
Medium parameters used (interpolated): f = 835 MHz; σ = 0.935 mho/m; ε_r = 55.485; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

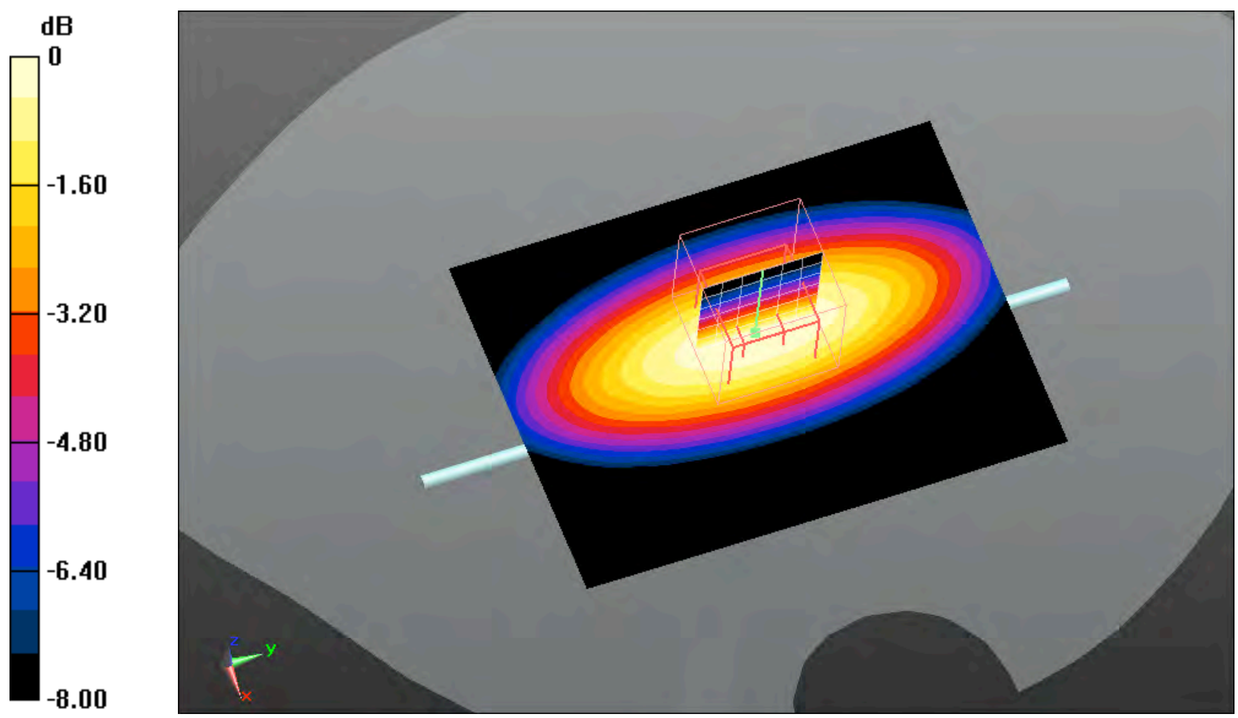
- Probe: ET3DV6 - SN1733; ConvF(6.45, 6.45, 6.45); Calibrated: 2/16/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn400; Calibrated: 2/8/2011
- Phantom: SAM with CRP; Type: SAM; Phantom Serial: 209
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/d=15mm, Pin=20dBm, dist=4.0mm (ET-Probe)/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.040 mW/g

Configuration/d=15mm, Pin=20dBm, dist=4.0mm (ET-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 34.920 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 1.317 W/kg
SAR(1 g) = 0.945 mW/g; SAR(10 g) = 0.632 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.024 mW/g



0 dB = 1.020mW/g

Date/Time: 11/6/2011 3:42:56 PM, Date/Time: 11/6/2011 3:49:42 PM

Test Laboratory: QUALCOMM Incorporated
20111107_Val1900_Body_20dBm
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d096
Communication System: CW; Communication System Band: D1900 (1900 MHz); Frequency: 1900 MHz;Communication System PAR: 0 dB
Medium parameters used (interpolated): f = 1900 MHz; σ = 1.536 mho/m; ε_r = 51.887; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

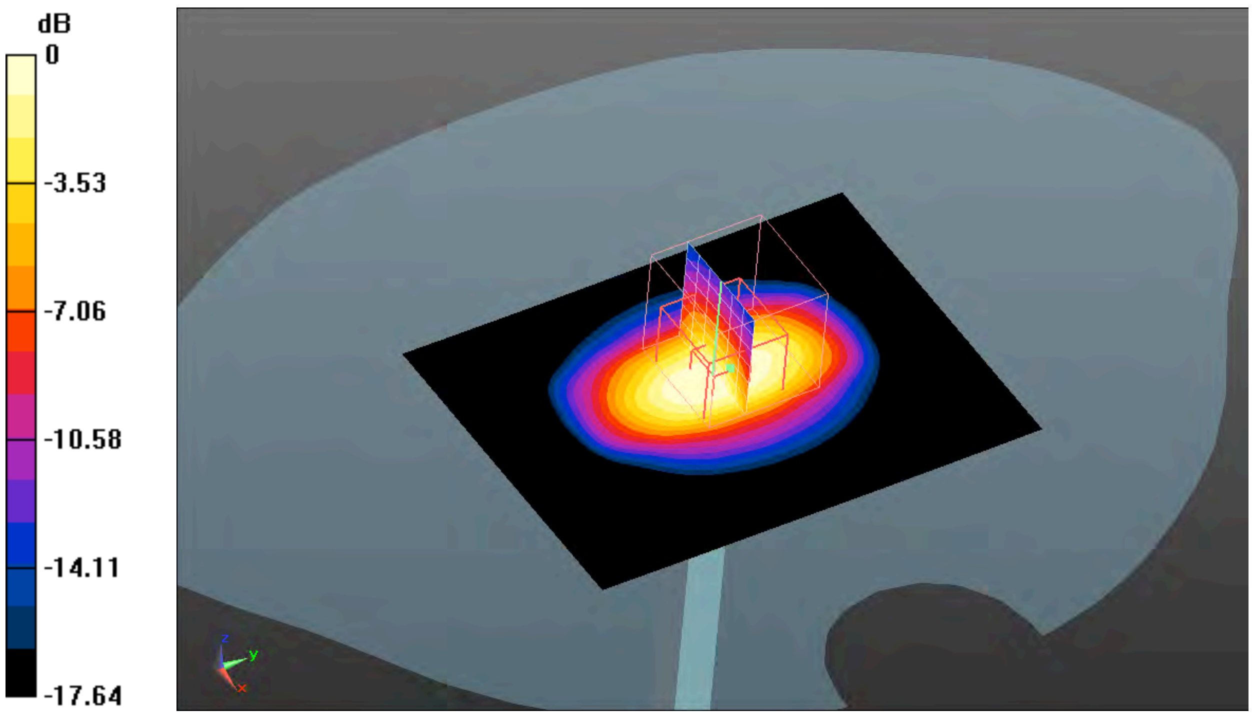
- Probe: ET3DV6 - SN1733; ConvF(4.61, 4.61, 4.61); Calibrated: 2/16/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn400; Calibrated: 2/8/2011
- Phantom: SAM with CRP; Type: SAM; Phantom Serial: 209
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/d=15mm, Pin=20dBm, dist=4.0mm (ET-Probe)/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 5.207 mW/g

Configuration/d=15mm, Pin=20dBm, dist=4.0mm (ET-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.669 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 6.842 W/kg
SAR(1 g) = 4.13 mW/g; SAR(10 g) = 2.22 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 4.664 mW/g



0 dB = 4.660mW/g

14. SAR Plots

14.1 Band Class 0 Plots

14.1.1 Front of EUT toward phantom, 1.0 cm separation

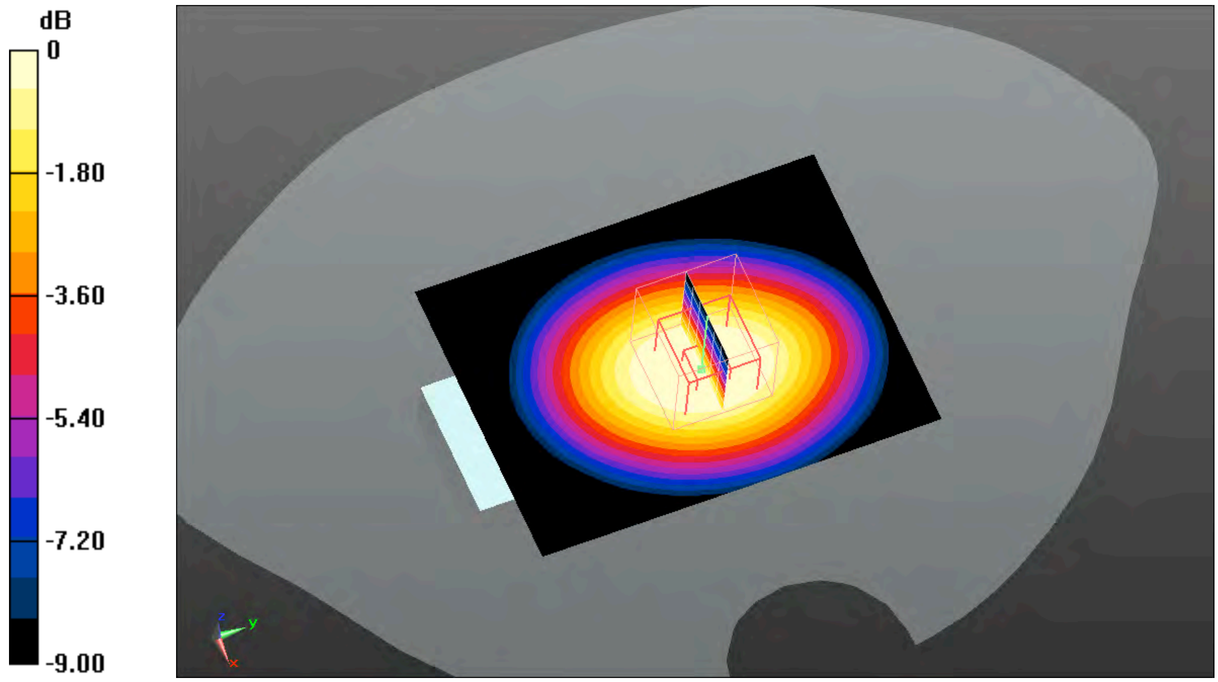
Date/Time: 11/2/2011 1:39:25 PM, Date/Time: 11/2/2011 1:47:09 PM

Test Laboratory: QUALCOMM Incorporated
20111102_MPERS_Belt_Clip_CDMA_BC0-front
DUT: MPERS Belt Clip; Type: module phone; Serial: 4
Communication System: CDMA835; Communication System Band: CDMA CELL; Frequency: 824.7 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 824.7 MHz; σ = 0.874 mho/m; ε_r = 40.775; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: ET3DV6 - SN1733; ConvF(6.56, 6.56, 6.56); Calibrated: 2/16/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn400; Calibrated: 2/8/2011
- Phantom: SAM with CRP; Type: SAM; Phantom Serial: 209
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

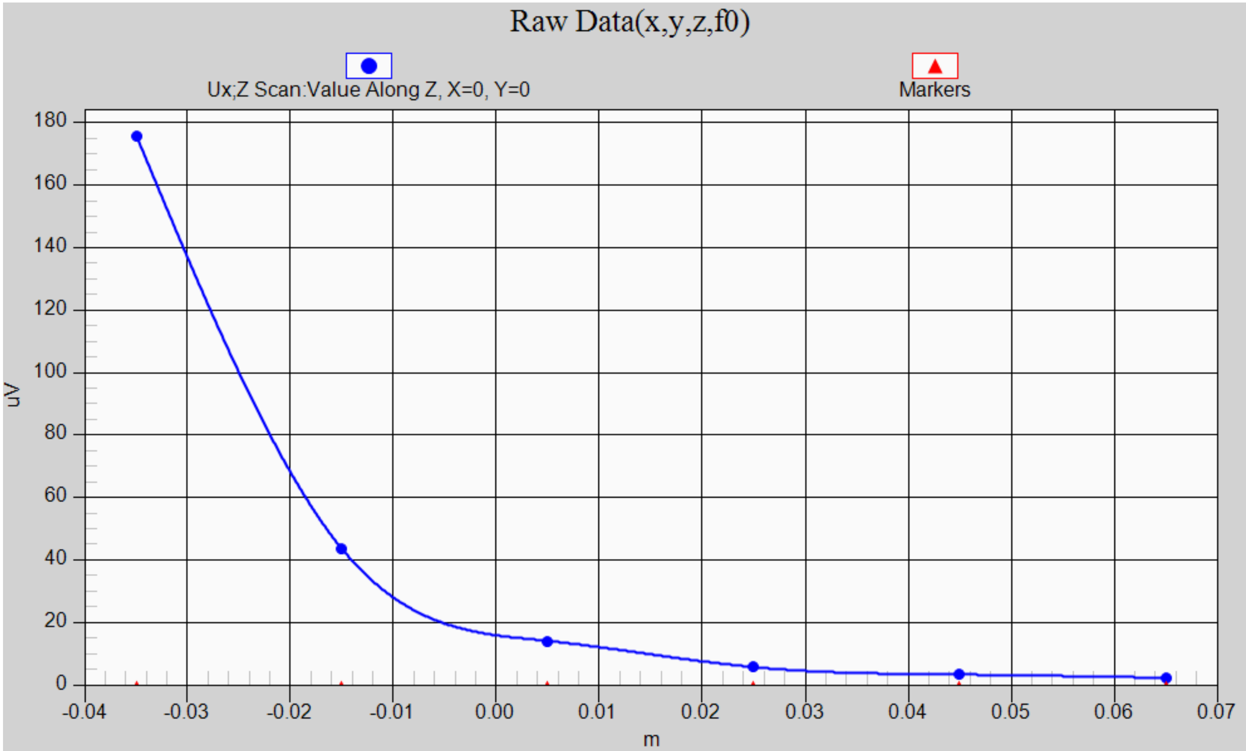
Configuration/MPERS Belt Clip, Front of device toward phantom, 1.0 cm separation, Low/Area Scan (81x61x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.951 mW/g

Configuration/MPERS Belt Clip, Front of device toward phantom, 1.0 cm separation, Low/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 45.082 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 2.137 W/kg
SAR(1 g) = 1.52 mW/g; SAR(10 g) = 1.02 mW/g
Maximum value of SAR (measured) = 1.629 mW/g



0 dB = 1.630mW/g

14.1.2 Z-axis plot



14.1.3 Rear of EUT toward phantom, 1.3 cm separation

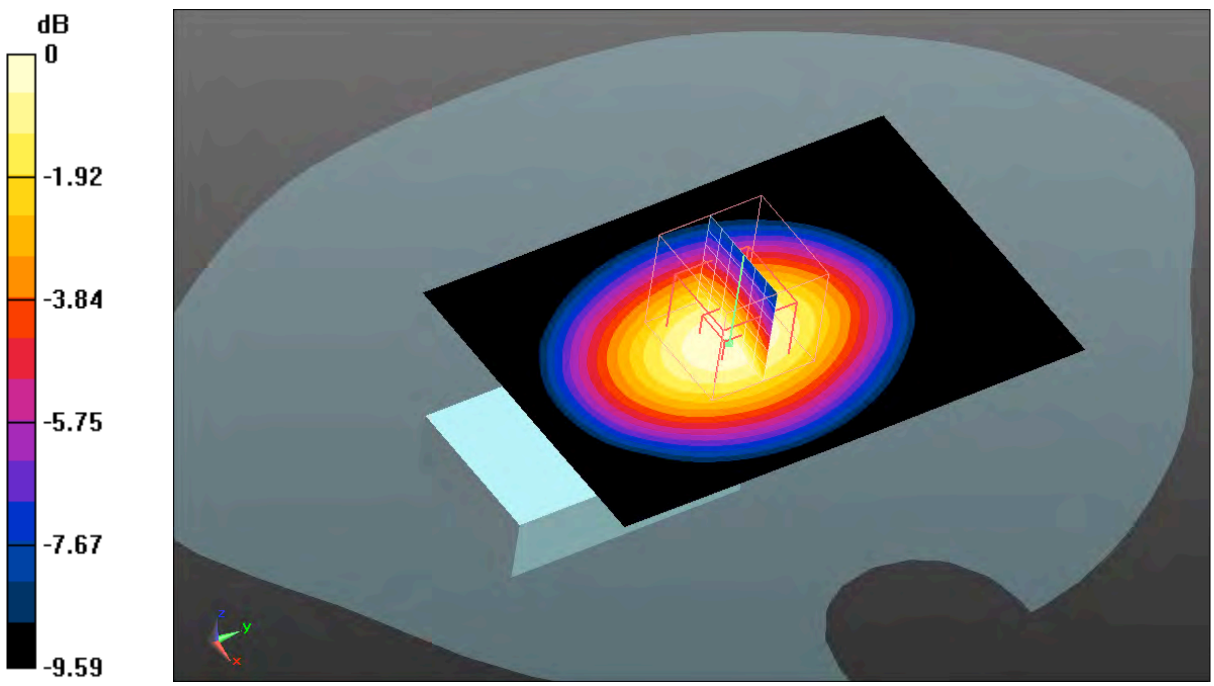
Date/Time: 11/4/2011 12:01:38 PM, Date/Time: 11/4/2011 12:09:06 PM

Test Laboratory: QUALCOMM Incorporated
20111103_MPERS_Belt_Clip_CDMA_BC0-rear
DUT: MPERS Belt Clip; Type: module phone; Serial: 4
Communication System: CDMA835; Communication System Band: CDMA CELL; Frequency: 836.49 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 836.505 MHz; σ = 0.954 mho/m; ε_r = 55.648; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: ET3DV6 - SN1733; ConvF(6.45, 6.45, 6.45); Calibrated: 2/16/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn400; Calibrated: 2/8/2011
- Phantom: SAM with CRP; Type: SAM; Phantom Serial: 209
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

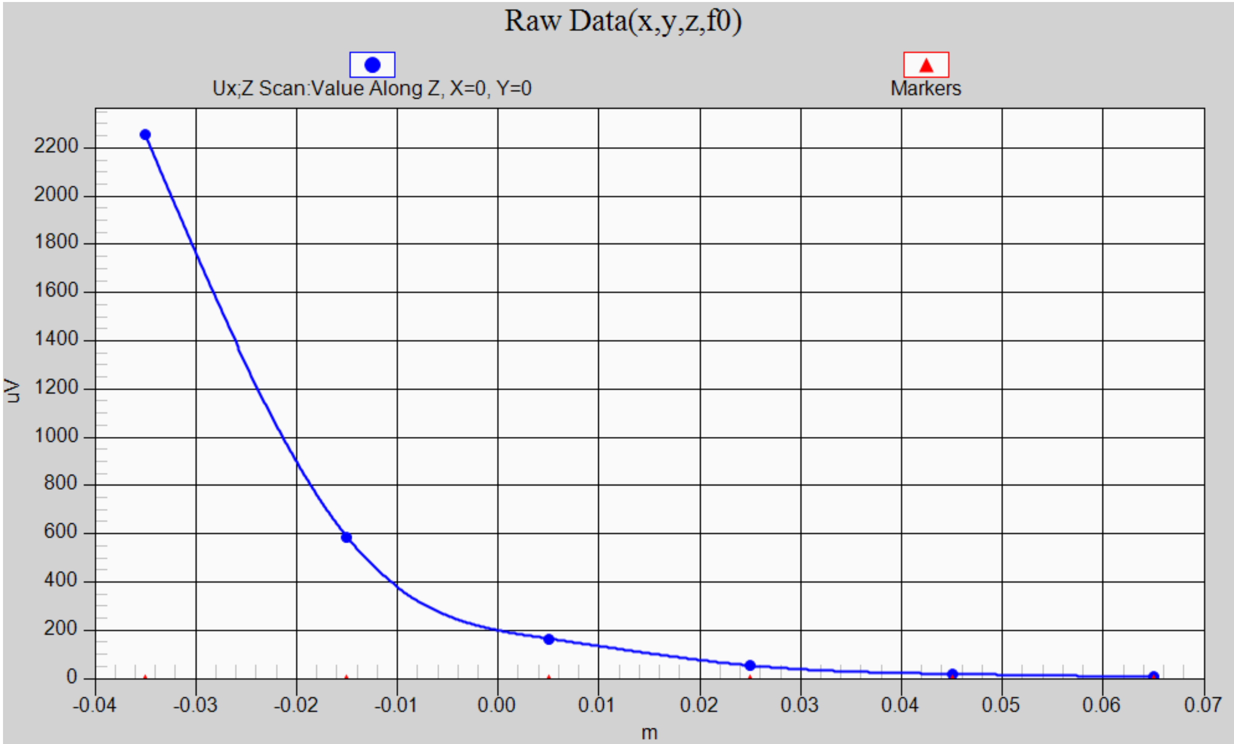
Configuration/MPERS Belt clip, Rear of device toward phantom, 1.3 cm separation, Middle/Area Scan (91x61x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.562 mW/g

Configuration/MPERS Belt clip, Rear of device toward phantom, 1.3 cm separation, Middle/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 41.519 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.987 W/kg
SAR(1 g) = 1.49 mW/g; SAR(10 g) = 1.03 mW/g
Maximum value of SAR (measured) = 1.575 mW/g



0 dB = 1.570mW/g

14.1.4 Z-axis plot



14.1.5 Rear of device toward phantom, 0 cm separation, hand/wrist SAR (10 g SAR)

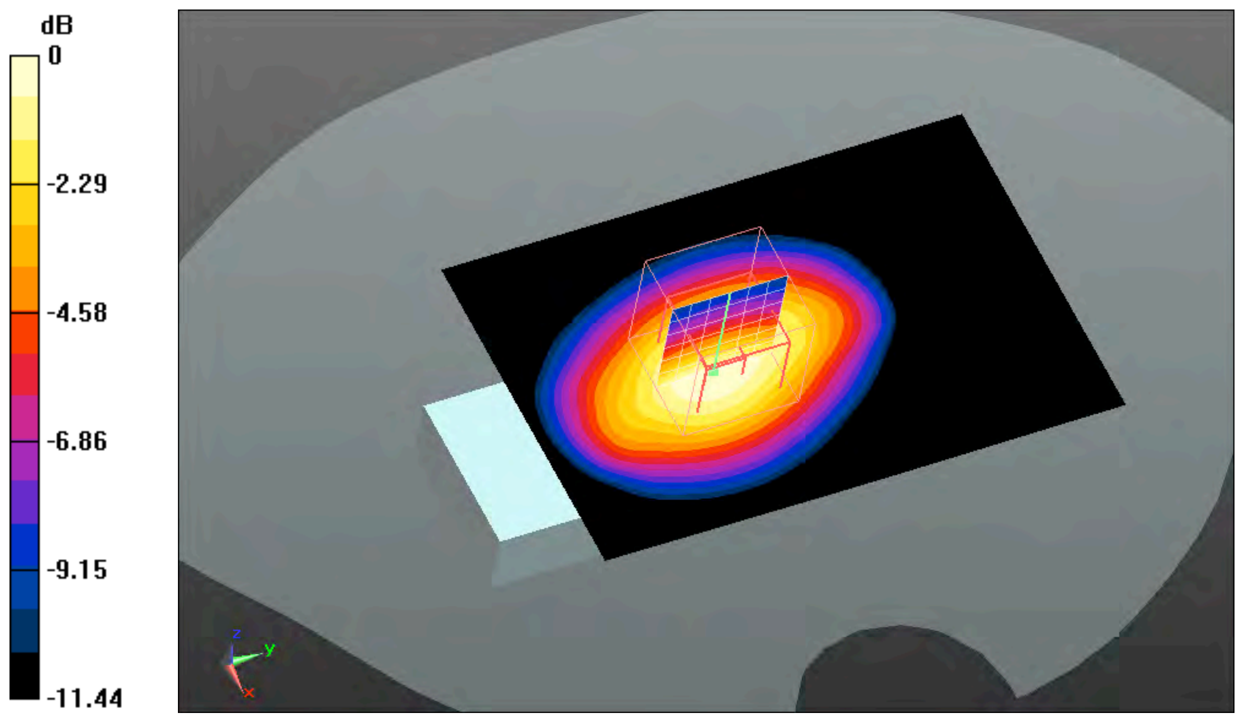
Date/Time: 9/13/2011 5:16:44 PM, Date/Time: 9/13/2011 5:24:09 PM

Test Laboratory: QUALCOMM Incorporated
20110913_MPERS_Belt_Clip_CDMA_BC0-rear
DUT: MPERS Belt Clip; Type: module phone; Serial: 4
Communication System: CDMA835; Communication System Band: CDMA CELL; Frequency: 836.49 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 836.505 MHz; σ = 0.936 mho/m; ε_r = 55.481; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: ET3DV6 - SN1733; ConvF(6.45, 6.45, 6.45); Calibrated: 2/16/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn400; Calibrated: 2/8/2011
- Phantom: SAM with CRP; Type: SAM; Phantom Serial: 209
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/MPERS Belt clip, rear of device toward phantom, 0 cm separation, Middle/Area Scan (91x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 3.821 mW/g

Configuration/MPERS Belt clip, rear of device toward phantom, 0 cm separation, Middle/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 64.773 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 5.101 W/kg
SAR(1 g) = 3.41 mW/g; SAR(10 g) = 2.15 mW/g
Maximum value of SAR (measured) = 3.730 mW/g



0 dB = 3.730mW/g

14.2 Band Class 1 Plots

14.2.1 Front of EUT toward phantom, 1.0 cm separation, head SAR (1 g SAR)

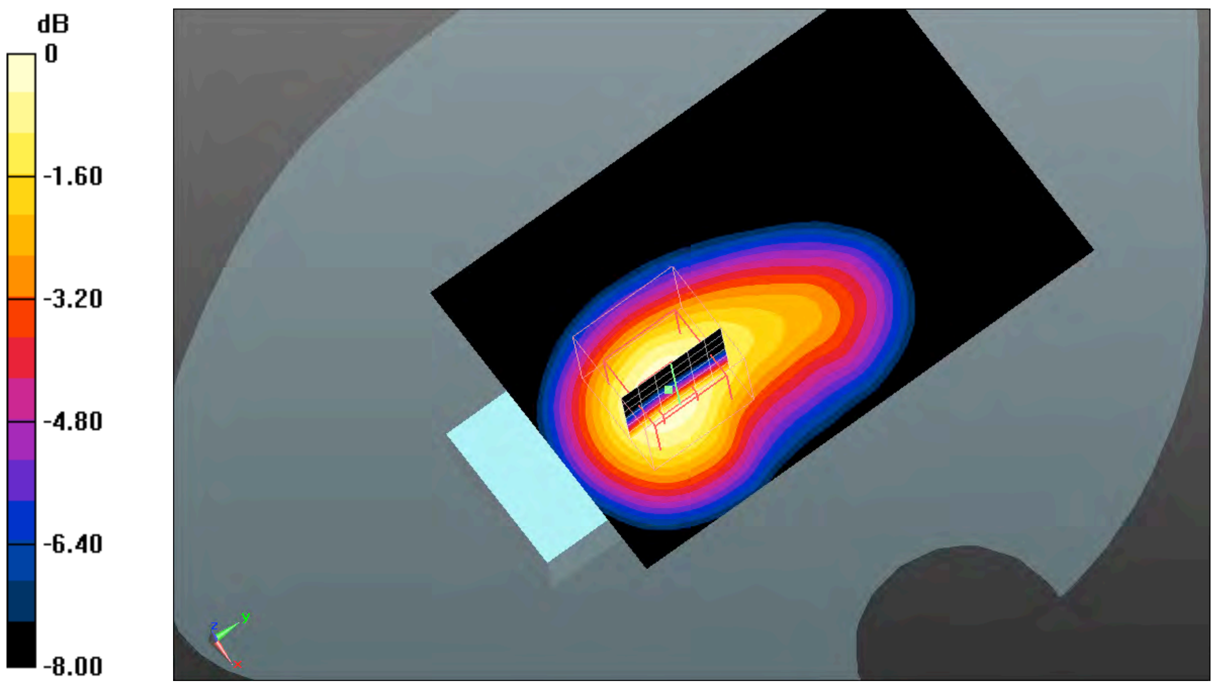
Date/Time: 9/1/2011 9:55:39 AM, Date/Time: 9/1/2011 10:04:04 AM

Test Laboratory: QUALCOMM Incorporated
20110901_MPERS_Belt_Clip_CDMA_BC1-front
DUT: MPERS Belt Clip; Type: module phone; Serial: 4
Communication System: CDMA PCS; Communication System Band: CDMA PCS; Frequency: 1880 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 1880 MHz; σ = 1.41 mho/m; ε_r = 39.027; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: ET3DV6 - SN1733; ConvF(5.2, 5.2, 5.2); Calibrated: 2/16/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn400; Calibrated: 2/8/2011
- Phantom: SAM with CRP; Type: SAM; Phantom Serial: 209
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

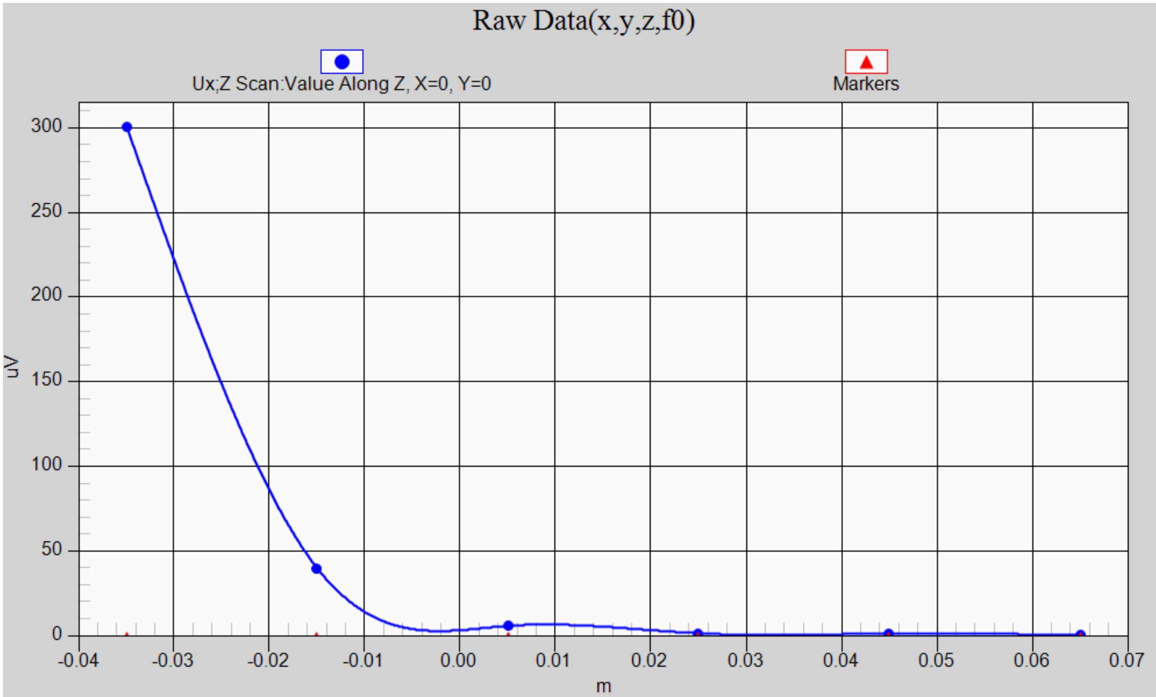
Configuration/MPERS Belt clip, Front of device toward phantom, 1.0 cm separation, Middle/Area Scan (91x61x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.793 mW/g

Configuration/MPERS Belt clip, Front of device toward phantom, 1.0 cm separation, Middle/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 21.535 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 1.137 W/kg
SAR(1 g) = 0.733 mW/g; SAR(10 g) = 0.444 mW/g
Maximum value of SAR (measured) = 0.789 mW/g



0 dB = 0.790mW/g

14.2.2 Z-axis plot



14.2.3 Rear of EUT toward neck of phantom, 1.3 cm separation, body SAR (1 g SAR)

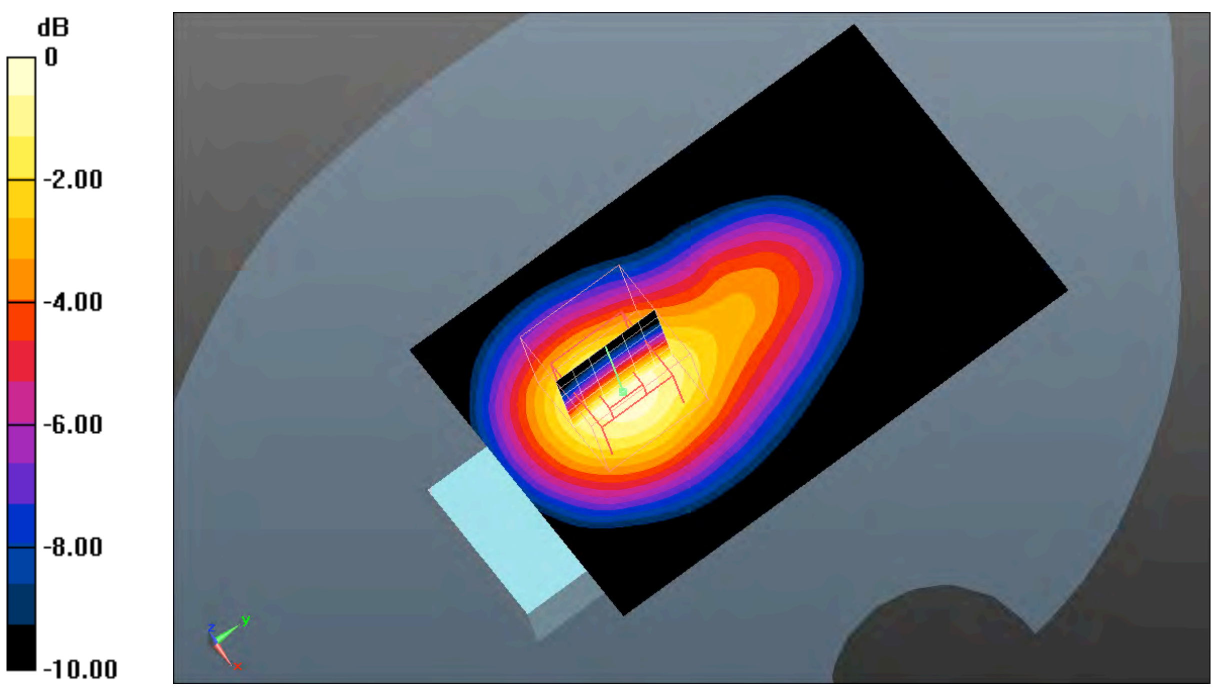
Date/Time: 11/7/2011 12:57:10 PM, Date/Time: 11/7/2011 1:04:37 PM

Test Laboratory: QUALCOMM Incorporated
20111107_MPERS_Belt_Clip_CDMA_BC1-rear
DUT: MPERS Belt clip; Type: module phone ; Serial: 4
Communication System: CDMA PCS; Communication System Band: CDMA PCS; Frequency: 1880 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 1880 MHz; σ = 1.509 mho/m; ε_r = 51.914; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

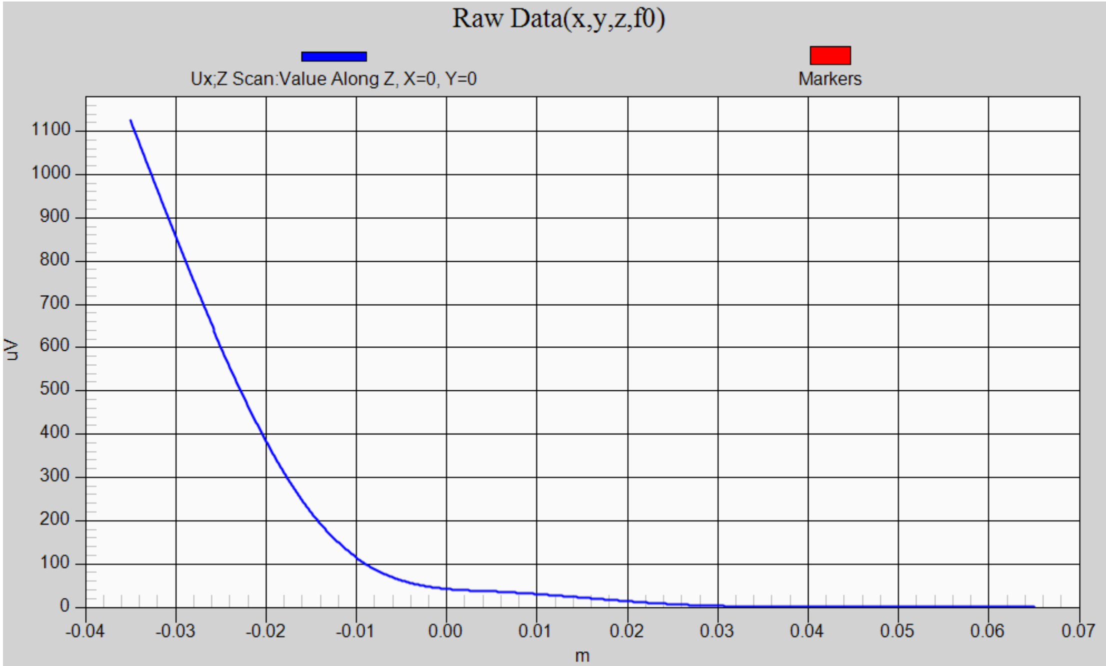
- Probe: ET3DV6 - SN1733; ConvF(4.61, 4.61, 4.61); Calibrated: 2/16/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn400; Calibrated: 2/8/2011
- Phantom: SAM with CRP; Type: SAM; Phantom Serial: 209
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/MPERS Belt clip, Rear of device toward phantom, 1.3 cm separation, Middle/Area Scan (91x61x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.007 mW/g

Configuration/MPERS Belt clip, Rear of device toward phantom, 1.3 cm separation, Middle/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.695 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.416 W/kg
SAR(1 g) = 0.932 mW/g; SAR(10 g) = 0.576 mW/g
Maximum value of SAR (measured) = 1.035 mW/g



0 dB = 1.030mW/g


Raw Data(x,y,z,f0)
Ux;Z Scan:Value Along Z, X=0, Y=0
Markers
uV
1100
1000
900
800
700
600
500
400
300
200
100
0
-0.04
-0.03
-0.02
-0.01
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
m

14.2.4 Rear of EUT toward phantom, 1.0 cm separation, body SAR (1 g SAR)

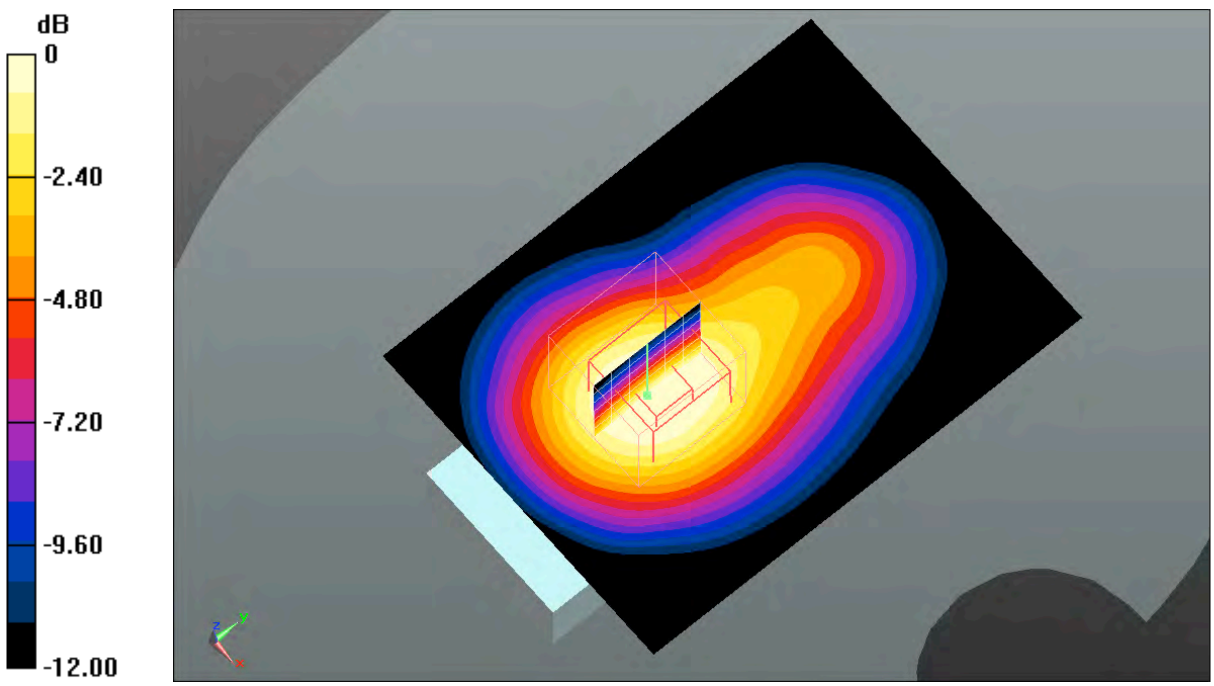
Date/Time: 11/7/2011 5:59:28 PM, Date/Time: 11/7/2011 6:06:13 PM

Test Laboratory: QUALCOMM Incorporated
20111107_MPERS_Belt_Clip_CDMA_BC1-rear
DUT: MPERS Belt clip; Type: module phone; Serial: 4
Communication System: CDMA PCS; Communication System Band: CDMA PCS; Frequency: 1851.25 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 1851.25 MHz; σ = 1.481 mho/m; ε_r = 51.998; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: ET3DV6 - SN1733; ConvF(4.61, 4.61, 4.61); Calibrated: 2/16/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn400; Calibrated: 2/8/2011
- Phantom: SAM with CRP; Type: SAM; Phantom Serial: 209
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/MPERS Belt clip, Rear of device toward phantom, 1.0 cm separation, Low 2/Area Scan (81x61x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.757 mW/g

Configuration/MPERS Belt clip, Rear of device toward phantom, 1.0 cm separation, Low 2/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 27.803 V/m; Power Drift = -0.29 dB
Peak SAR (extrapolated) = 1.977 W/kg
SAR(1 g) = 1.35 mW/g; SAR(10 g) = 0.823 mW/g
Maximum value of SAR (measured) = 1.464 mW/g



0 dB = 1.460mW/g

14.2.5 Rear of device toward phantom, 0 cm separation, hand/wrist SAR (10 g SAR)

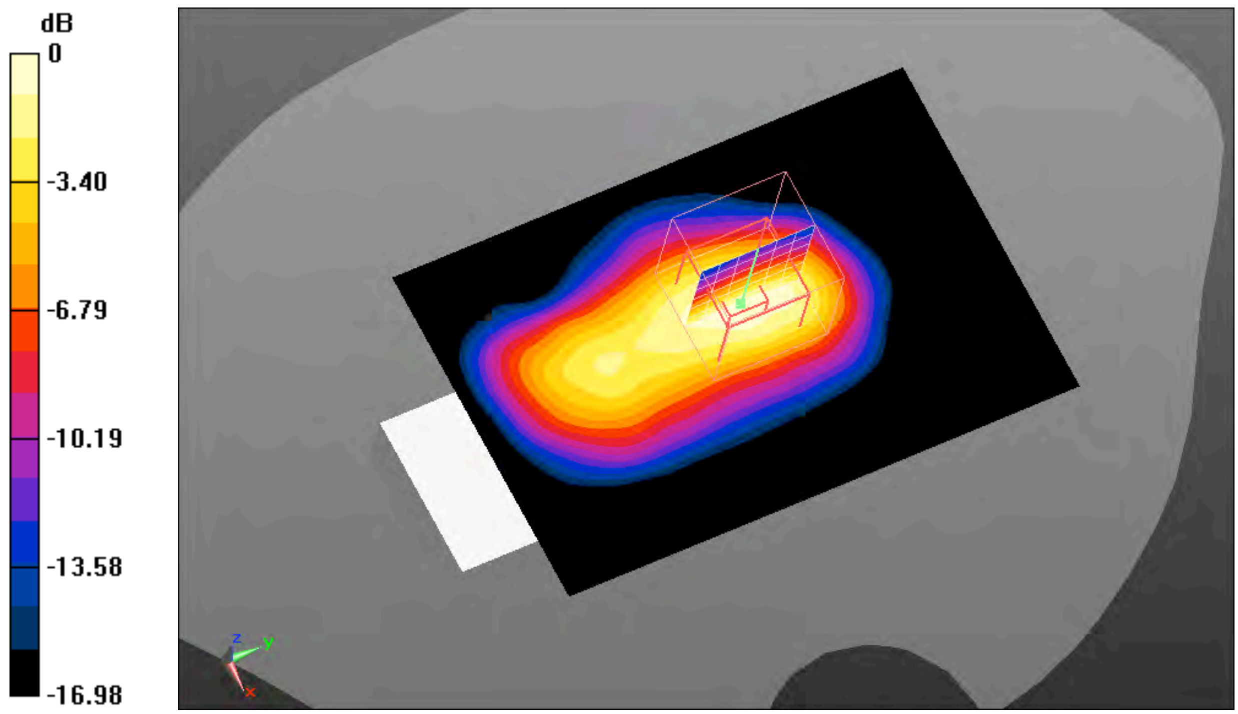
Date/Time: 9/3/2011 2:44:39 PM, Date/Time: 9/3/2011 2:53:01 PM

Test Laboratory: QUALCOMM Incorporated
20110902_MPERS_Belt_Clip_CDMA_BC1-rear
DUT: MPERS Belt Clip; Type: module phone; Serial: 4
Communication System: CDMA PCS; Communication System Band: CDMA PCS; Frequency: 1880 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 1880 MHz; σ = 1.54 mho/m; ε_r = 52.371; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: ET3DV6 - SN1733; ConvF(4.61, 4.61, 4.61); Calibrated: 2/16/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn400; Calibrated: 2/8/2011
- Phantom: SAM with CRP; Type: SAM; Phantom Serial: 209
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/MPERS Belt clip, Front of device toward phantom, 0 cm separation, Middle/Area Scan (91x61x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.348 mW/g

Configuration/MPERS Belt clip, Front of device toward phantom, 0 cm separation, Middle/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 35.347 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 6.020 W/kg
SAR(1 g) = 3.72 mW/g; SAR(10 g) = 2.04 mW/g
Maximum value of SAR (measured) = 4.226 mW/g



0 dB = 4.230mW/g

15. Calibration Data

The following pages show calibration certification data for the Schmid & Partner AG DASY5 SAR system. Also included are Schmid & Partner's calibration lab accreditation certificates for ISO 17025.

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client Qualcomm USA

Certificate No: ET3-1733_Feb11

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1733
Calibration procedure(s)	QA CAL-01.v7, QA CAL-12.v6, QA CAL-23.v4, QA CAL-25.v3 Calibration procedure for dosimetric E-field probes
Calibration date:	February 16, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	01-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	01-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	01-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	23-Apr-10 (No. DAE4-654_Apr10)	Apr-11
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Marcel Fehr	Laboratory Technician	[signature]
Approved by:	Katja Pokovic	Technical Manager	[signature]

Issued: February 17, 2011

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

S **Schweizerischer Kalibrierdienst**
C **Service suisse d'étalonnage**
S **Servizio svizzero di taratura**
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

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

Probe ET3DV6

SN:1733

Manufactured: September 27, 2002
Calibrated: February 16, 2011

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1733

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.55	1.56	1.61	± 10.1 %
DCP (mV)[B]	99.8	96.3	98.3	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	130.3	±2.5 %
			Y	0.00	0.00	1.00	131.1	
			Z	0.00	0.00	1.00	130.1	
10154	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	7.40	X	6.96	66.1	20.0	108.9	±3.0 %
			Y	7.19	67.0	20.8	110.9	
			Z	7.05	66.4	20.3	109.3	
10155	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	8.10	X	8.09	67.4	21.1	114.3	±3.8 %
			Y	8.32	68.3	21.9	116.3	
			Z	8.11	67.5	21.2	115.2	
10175	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	6.50	X	5.55	66.5	20.0	134.0	±2.2 %
			Y	5.61	67.0	20.6	135.1	
			Z	5.53	66.5	20.1	134.0	
10176	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	7.20	X	6.24	67.6	20.9	133.0	±3.3 %
			Y	6.33	68.3	21.7	134.8	
			Z	6.25	67.8	21.2	133.3	
10011	UMTS-FDD (WCDMA)	3.20	X	3.36	65.7	17.8	141.0	±0.7 %
			Y	3.37	65.8	18.1	142.6	
			Z	3.36	66.0	18.2	140.4	
10012	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	1.90	X	2.73	67.0	17.7	143.8	±0.7 %
			Y	2.55	65.8	17.5	145.4	
			Z	2.65	67.1	18.2	143.0	
10013	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	9.50	X	11.19	71.0	23.6	139.8	±5.2 %
			Y	11.52	72.0	24.2	140.8	
			Z	11.12	70.8	23.7	139.2	
10023	GPRS-FDD (TDMA, GMSK, TN 0)	9.20	X	6.15	78.3	19.4	136.8	±1.7 %
			Y	5.95	81.9	21.3	129.0	
			Z	4.50	75.8	18.4	126.5	
10024	GPRS-FDD (TDMA, GMSK, TN 0-1)	6.19	X	9.83	82.6	18.5	123.3	±1.4 %
			Y	24.60	97.3	23.2	117.4	
			Z	7.46	81.3	18.1	117.8	
10039	CDMA2000 (1xRTT, RC1)	4.60	X	4.67	66.3	18.7	139.7	±1.2 %
			Y	4.69	66.3	19.0	142.6	
			Z	4.67	66.3	18.8	140.0	

Modulation Calibration Parameters (cont.)

10081	CDMA2000 (1xRTT, RC3)	4.00	X	3.84	65.4	18.1	136.0	±0.9 %
			Y	3.91	65.8	18.5	139.2	
			Z	3.87	65.8	18.4	137.6	
10103	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	5.75	X	7.18	71.9	21.7	149.7	±1.9 %
			Y	6.10	68.7	20.5	106.4	
			Z	5.96	68.1	19.9	104.5	
10104	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	6.40	X	6.84	67.5	19.9	111.7	±2.7 %
			Y	6.93	68.1	20.6	114.1	
			Z	6.83	67.6	20.1	112.9	
10108	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	5.75	X	5.83	65.4	18.6	109.2	±1.7 %
			Y	6.07	66.3	19.4	113.2	
			Z	5.97	66.0	19.1	111.0	
10109	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	6.40	X	6.90	66.3	19.4	116.0	±2.5 %
			Y	7.08	67.0	20.0	119.6	
			Z	6.93	66.5	19.6	117.8	
10080	CDMA2000 (1xEV-DO, 153.6 kbps)	4.40	X	4.42	66.3	18.8	142.2	±0.9 %
			Y	4.40	66.2	18.9	143.8	
			Z	4.48	66.7	19.2	141.9	

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1733

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	43.5	0.87	7.31	7.31	7.31	0.18	2.13	± 13.4 %
750	41.9	0.89	6.89	6.89	6.89	0.70	1.73	± 12.0 %
835	41.5	0.90	6.56	6.56	6.56	0.61	1.88	± 12.0 %
900	41.5	0.97	6.43	6.43	6.43	0.55	2.05	± 12.0 %
1640	40.3	1.29	5.78	5.78	5.78	0.52	2.44	± 12.0 %
1750	40.1	1.37	5.46	5.46	5.46	0.54	2.31	± 12.0 %
1900	40.0	1.40	5.20	5.20	5.20	0.51	2.38	± 12.0 %
1950	40.0	1.40	5.04	5.04	5.04	0.51	2.36	± 12.0 %
2450	39.2	1.80	4.46	4.46	4.46	0.78	1.66	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: ET3DV6- SN:1733

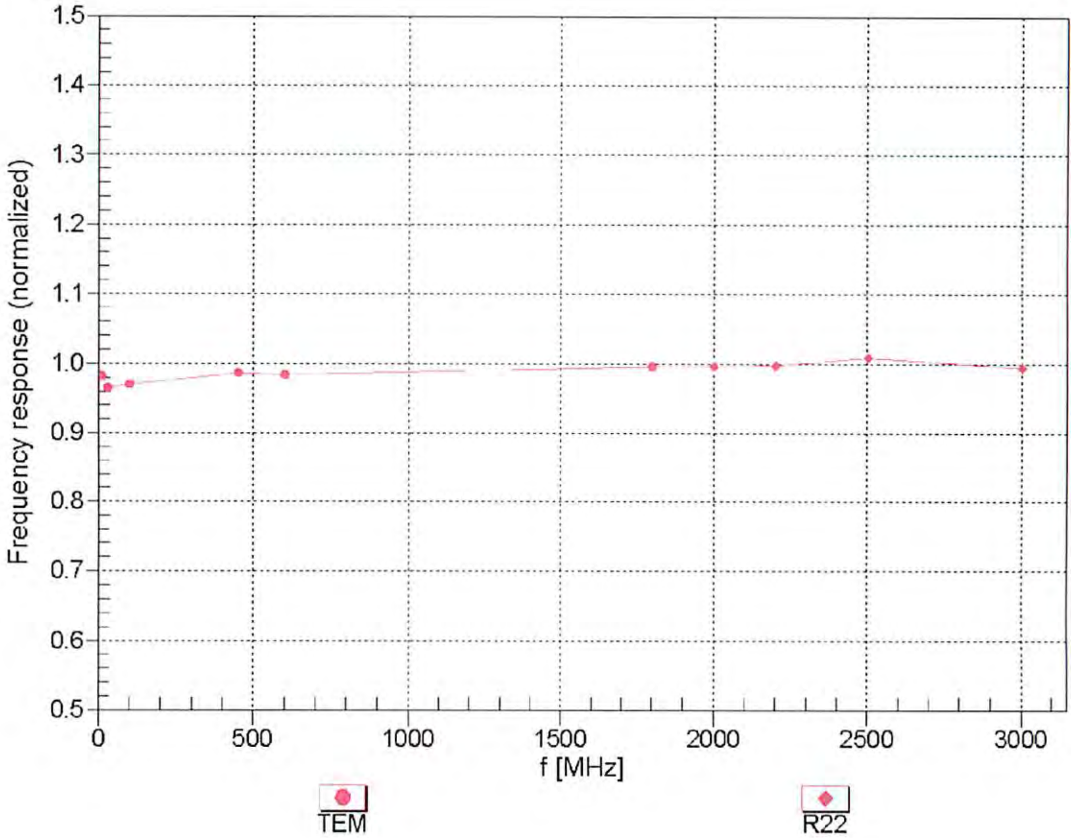
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	56.7	0.94	7.65	7.65	7.65	0.13	2.16	± 13.4 %
750	55.5	0.96	6.55	6.55	6.55	0.78	1.73	± 12.0 %
835	55.2	0.97	6.45	6.45	6.45	0.72	1.83	± 12.0 %
900	55.0	1.05	6.34	6.34	6.34	0.66	1.90	± 12.0 %
1640	53.8	1.40	5.23	5.23	5.23	0.57	2.72	± 12.0 %
1750	53.4	1.49	4.78	4.78	4.78	0.53	2.86	± 12.0 %
1900	53.3	1.52	4.61	4.61	4.61	0.55	2.79	± 12.0 %
1950	53.3	1.52	4.67	4.67	4.67	0.59	2.58	± 12.0 %
2450	52.7	1.95	4.05	4.05	4.05	0.88	1.36	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Frequency Response of E-Field

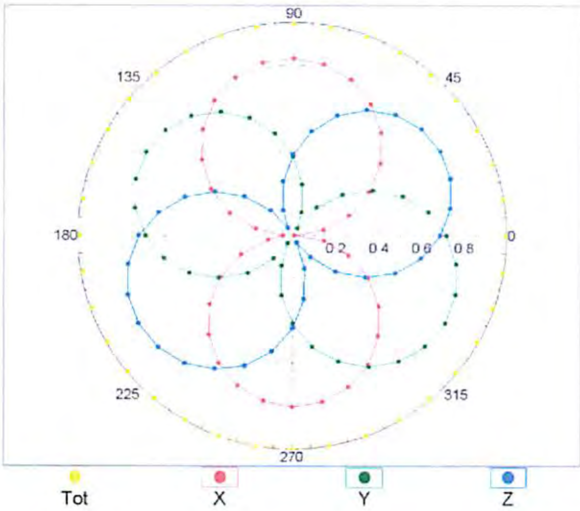
(TEM-Cell:ifi110 EXX, Waveguide: R22)



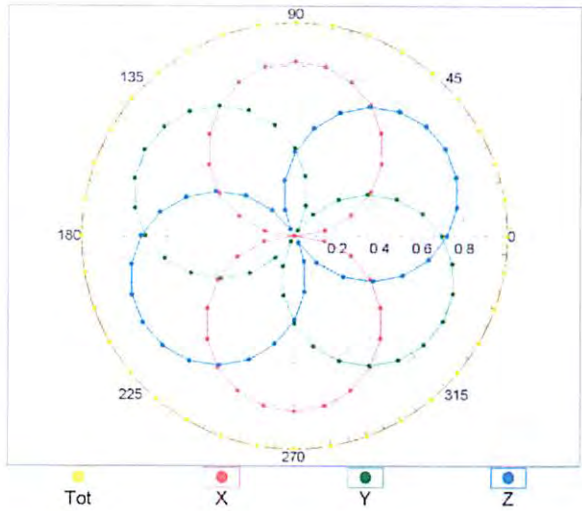
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

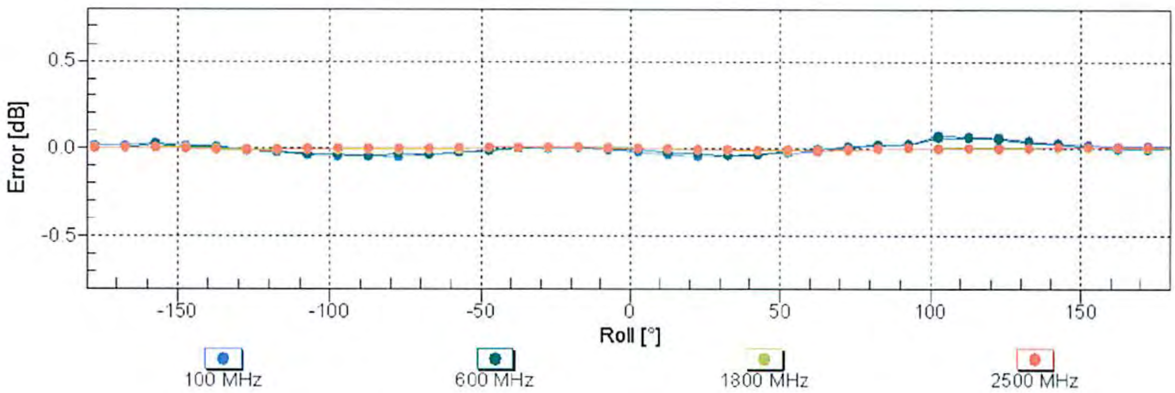
Receiving Pattern (φ), ϑ = 0°

f=600 MHz,TEM



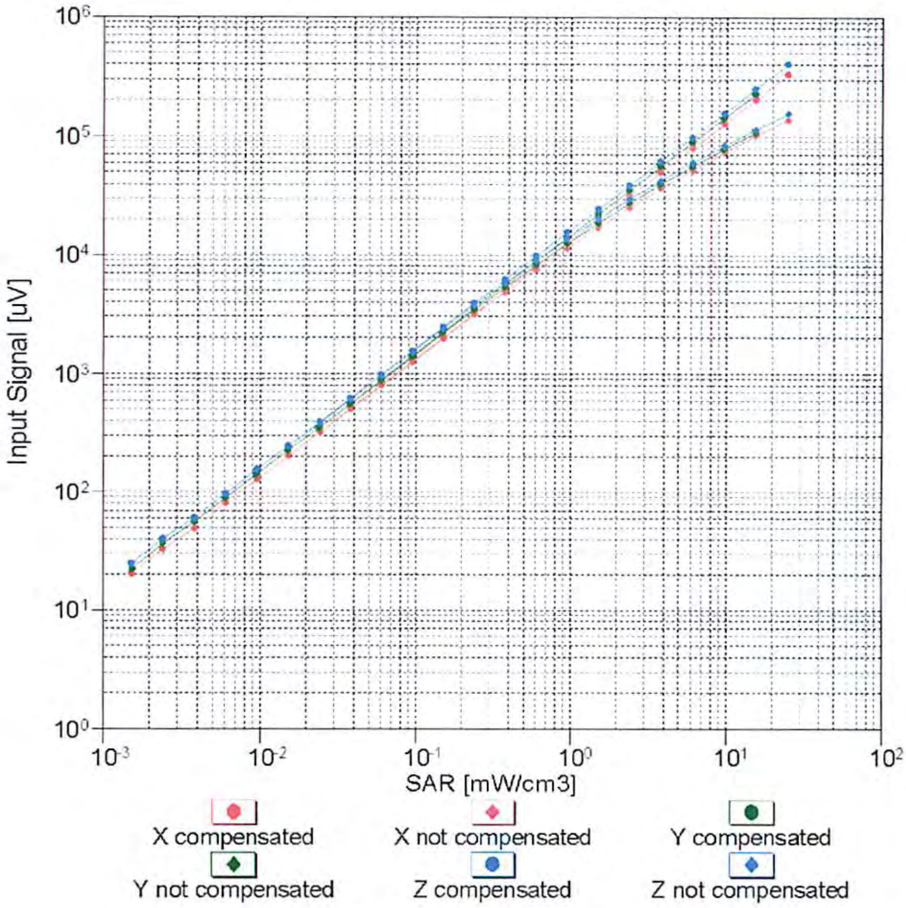
f=1800 MHz,R22

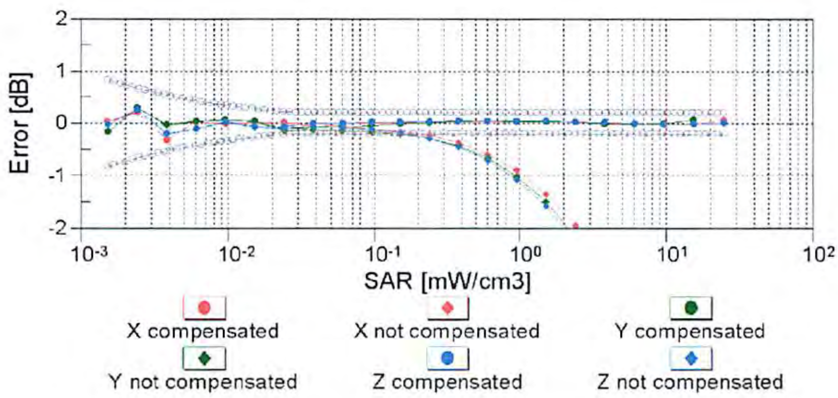




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

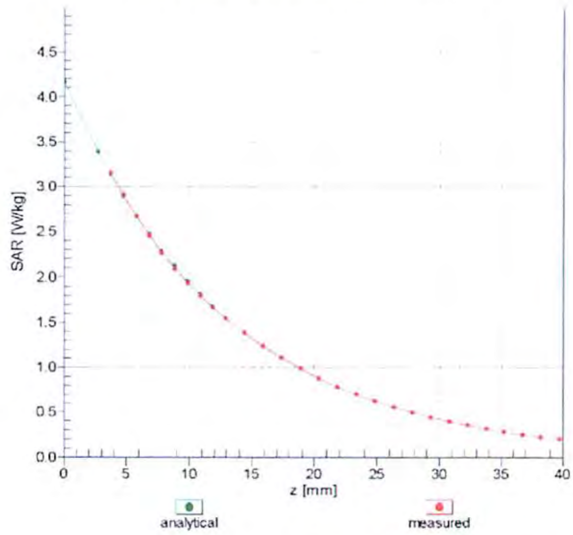




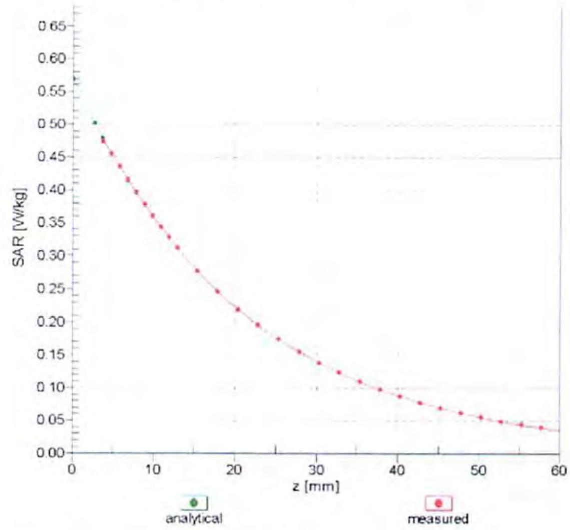
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 1750 MHz,WGLS R22 (H_convF)

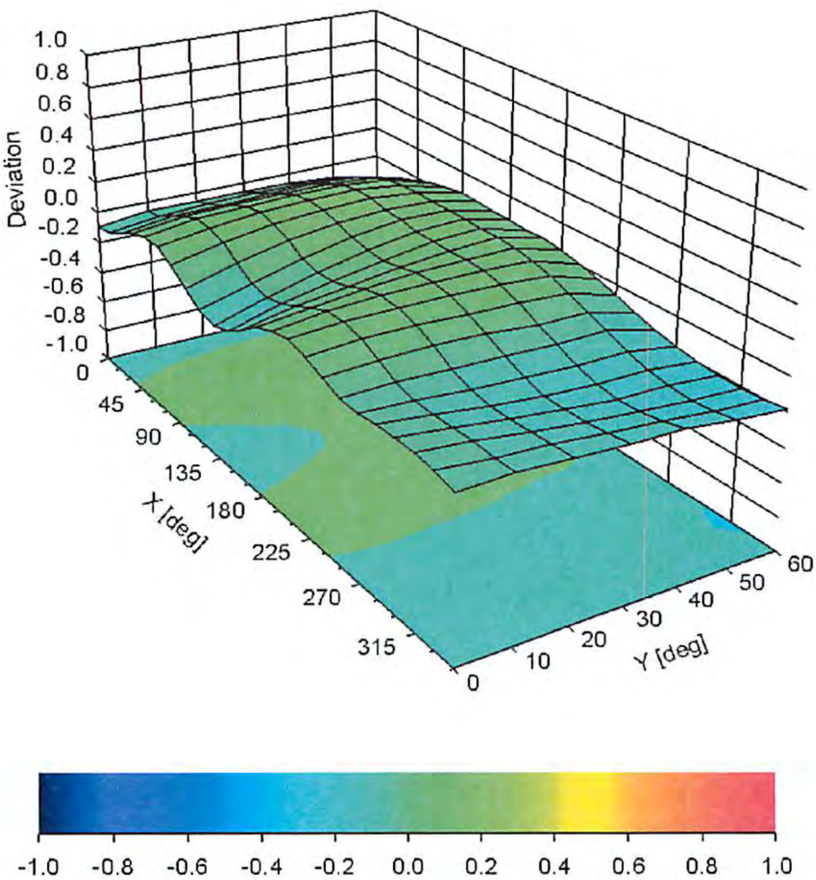


f = 750 MHz,WGLS R9 (H_convF)



Deviation from Isotropy in Air

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1733

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	enabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Qualcomm USA**

Certificate No: **D835V2-466_Oct10**

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 466
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	October 19, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

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

Issued: October 19, 2010

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Zeughausstrasse 43, 8004 Zurich, Switzerland

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.3 ± 6 %	0.90 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.41 mW / g
SAR normalized	normalized to 1W	9.64 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**9.68 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.57 mW / g
SAR normalized	normalized to 1W	6.28 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.29 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.4 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature during test	(21.8 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.53 mW / g
SAR normalized	normalized to 1W	10.1 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**9.93 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.66 mW / g
SAR normalized	normalized to 1W	6.64 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.55 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.9 Ω - 3.5 jΩ
Return Loss	- 28.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.1 Ω - 5.2 jΩ
Return Loss	- 25.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.385 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	August 27, 2002

DASY5 Validation Report for Head TSL

Date/Time: 18.10.2010 11:59:16

Test Laboratory: SPEAG, Zurich, Switzerland

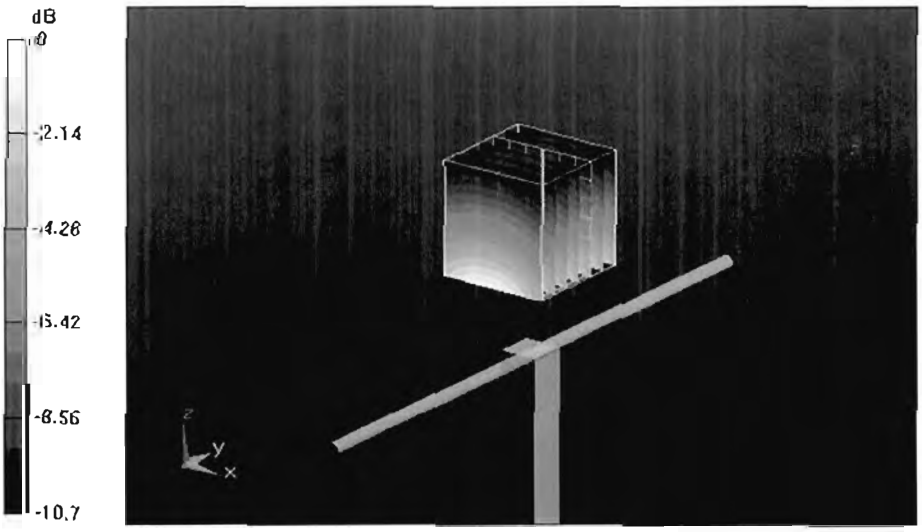
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:466

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL900
Medium parameters used: f = 835 MHz; σ = 0.9 mho/m; ε_r = 42.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

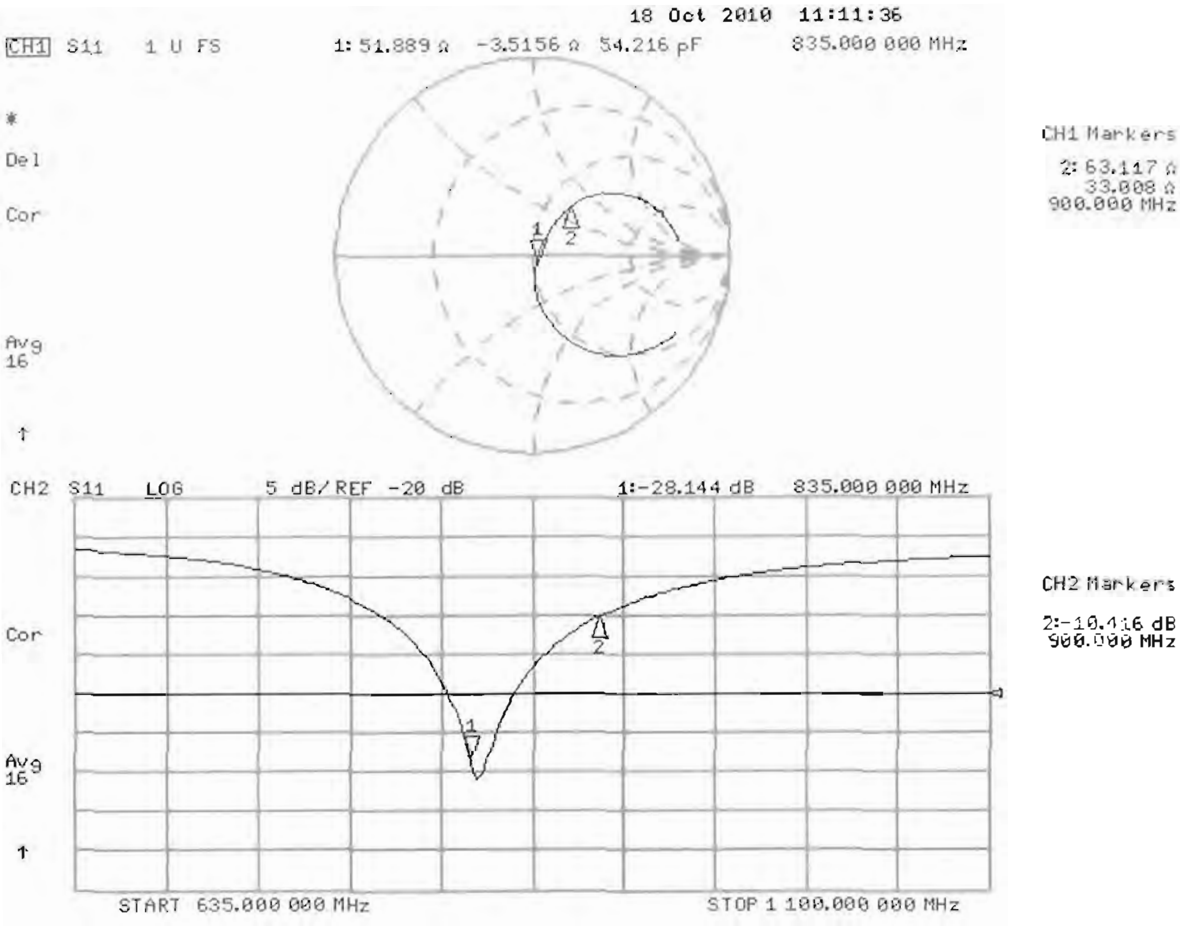
- Probe: ES3DV3 - SN3205; ConvF(6.03, 6.03, 6.03); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.3 V/m; Power Drift = 0.00578 dB
Peak SAR (extrapolated) = 3.62 W/kg
SAR(1 g) = 2.41 mW/g; SAR(10 g) = 1.57 mW/g
Maximum value of SAR (measured) = 2.79 mW/g



0 dB = 2.79mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body

Date/Time: 19.10.2010 11:39:01

Test Laboratory: SPEAG, Zurich, Switzerland

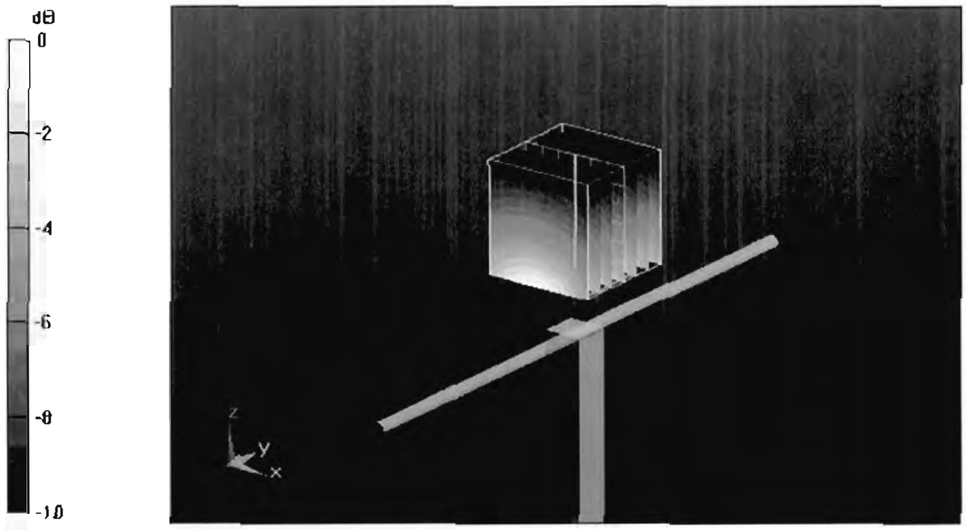
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:466

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL900
Medium parameters used: f = 835 MHz; σ = 0.99 mho/m; ε_r = 54.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

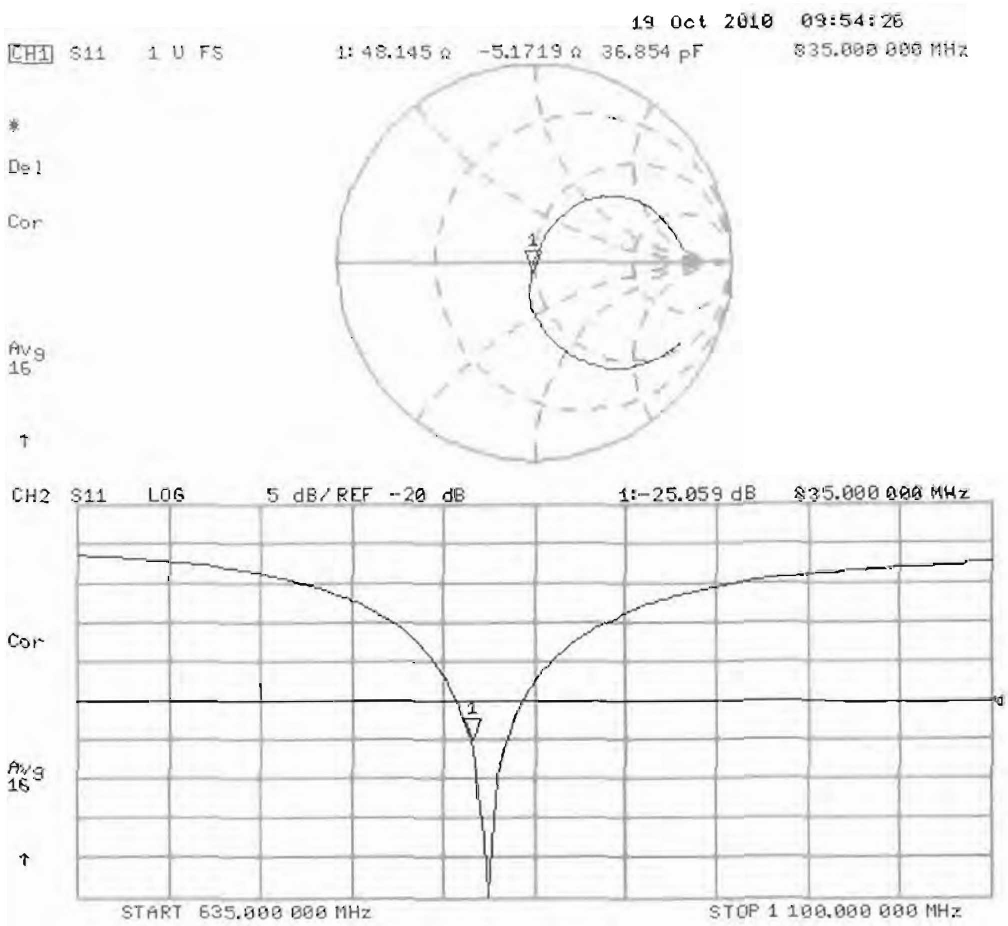
- Probe: ES3DV3 - SN3205; ConvF(5.86, 5.86, 5.86); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = 0.00907 dB
Peak SAR (extrapolated) = 3.75 W/kg
SAR(1 g) = 2.53 mW/g; SAR(10 g) = 1.66 mW/g
Maximum value of SAR (measured) = 2.94 mW/g



0 dB = 2.94mW/g

Impedance Measurement Plot for Body TSL



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s p e a g

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info@speag.com, http://www.speag.com

CUSTOMER COPY

DIPOLE REPAIR REPORT – SPEAG Production Center

PRODUCT	D835V2 DIPOLE		
SERIAL Nr.:	SN:466	IN DATE:	11-Okt-2010
CUSTOMER:	Qualcomm USA		

DIPOLE REPAIR MATERIAL	WORK DESCRIPTION			WORKING TIME (h)
Dipole Arm	fixed X	exchanged O	re-soldered X	1.00 hours
Dipole Connector	fixed O	exchanged O	cleaned X	hours
Gold Plating	fixed O	exchanged O	new gold plating O	hours
Housing	fixed O	exchanged O	new label........................ O	hours
Disassemble/clean	fixed O	exchanged O	....	hours
........................:	fixed O	exchanged O	....	hours
........................:	fixed O	exchanged O	....	hours
Analysis:				hours
Final Assembly:				0.50 hours
Total hours				1.50 hours

COMMENTS:

The dipole was returned for calibration. Receiving inspection found the dipole arms were bent and one solder joint has a crack. In order to re establish full dipole functionality, the dipole arms were straightened and resoldered. The connector was cleaned as well. The dipole will be newly calibrated after this repair.

CONDUCTED BY:	[signature]	APPROVED BY:	
DATE:	18.10.2010	DATE:	18.10.2010

REPAIR COST:

		USD	Euro
MATERIAL COST:	0.00	X	O
REPAIR:	0.00	X	O

TOTAL COST: No cost (S + M)	QUOTATION #: —

APPROVED BY: [signature]

DATE: 18.10.2010

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Qualcomm USA**

Certificate No: **D1900V2-5d096_Oct10**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d096
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	October 21, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

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

Issued: October 22, 2010

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.9 ± 6 %	1.39 mho/m ± 6 %
Head TSL temperature during test	(21.5 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.0 mW / g
SAR normalized	normalized to 1W	40.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**40.0 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.21 mW / g
SAR normalized	normalized to 1W	20.8 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**20.8 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.2 ± 6 %	1.50 mho/m ± 6 %
Body TSL temperature during test	(21.5 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.1 mW / g
SAR normalized	normalized to 1W	40.4 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**40.5 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.34 mW / g
SAR normalized	normalized to 1W	21.4 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**21.4 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.3 Ω + 5.0 jΩ
Return Loss	- 25.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.1 Ω + 5.7 jΩ
Return Loss	- 23.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.201 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 26, 2007

DASY5 Validation Report for Head TSL

Date/Time: 20.10.2010 13:46:26

Test Laboratory: SPEAG, Zurich, Switzerland

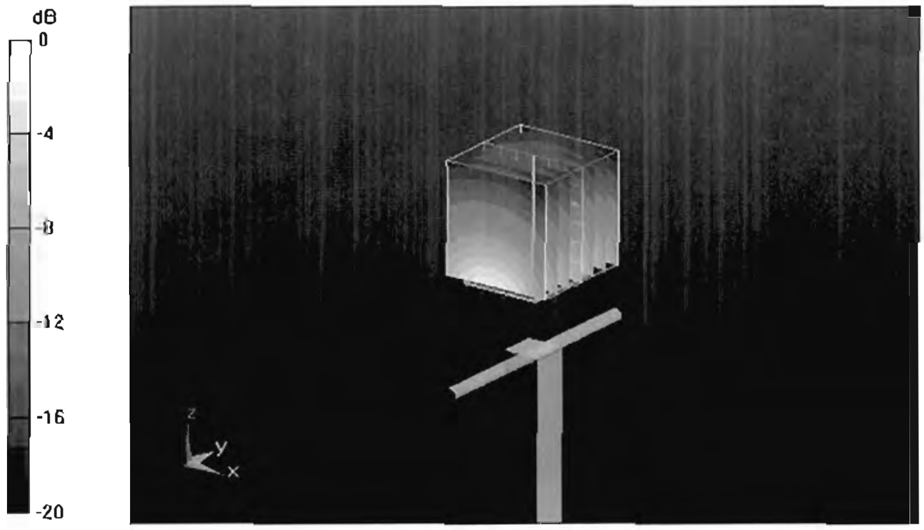
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d096

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL U12 BB
Medium parameters used: f = 1900 MHz; σ = 1.39 mho/m; ε_r = 39; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

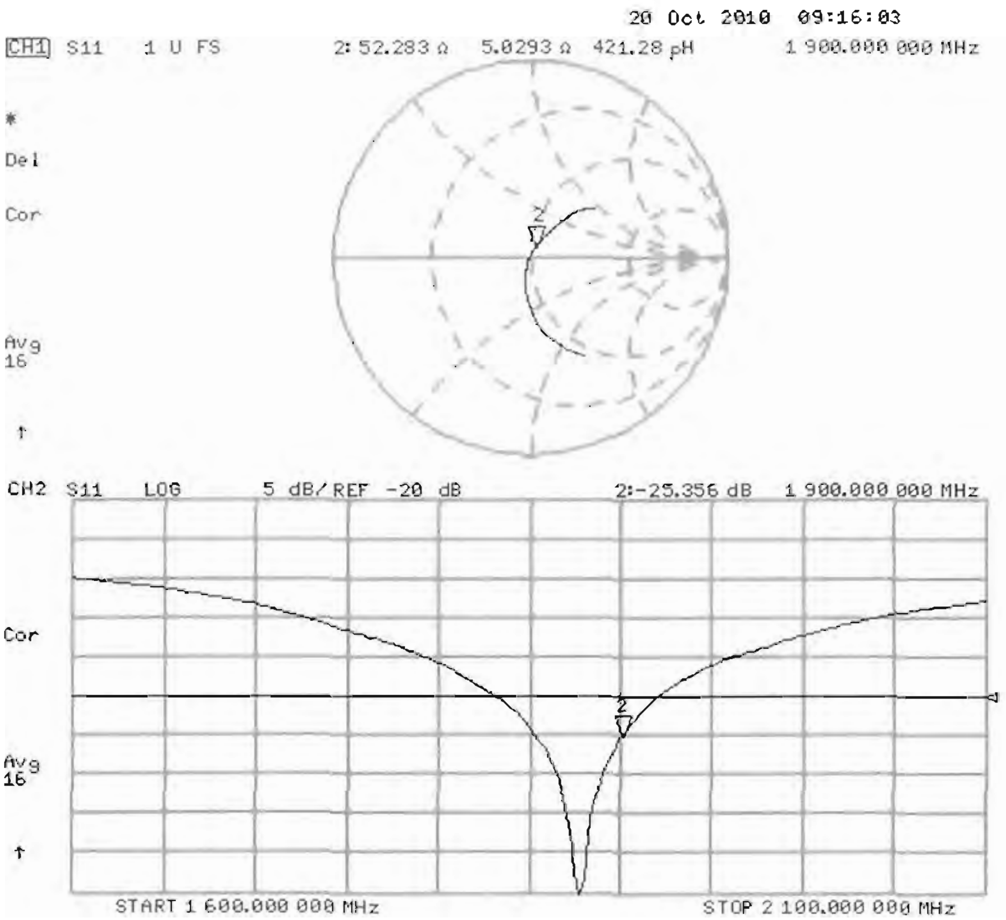
- Probe: ES3DV3 - SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 98 V/m; Power Drift = 0.043 dB
Peak SAR (extrapolated) = 18.5 W/kg
SAR(1 g) = 10 mW/g; SAR(10 g) = 5.21 mW/g
Maximum value of SAR (measured) = 12.5 mW/g



0 dB = 12.5mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body

Date/Time: 21.10.2010 15:14:04

Test Laboratory: SPEAG, Zurich, Switzerland

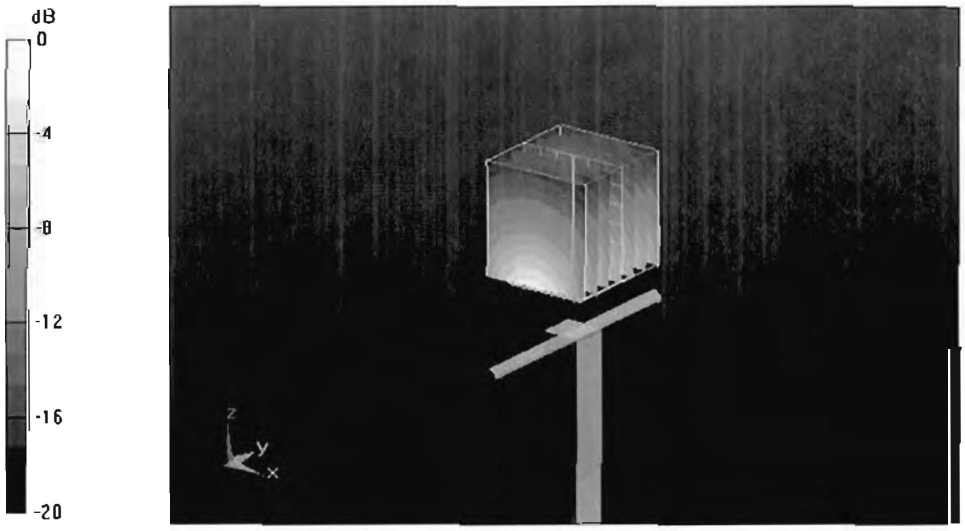
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d096

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: MSL U12 BB
Medium parameters used: f = 1900 MHz; σ = 1.5 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

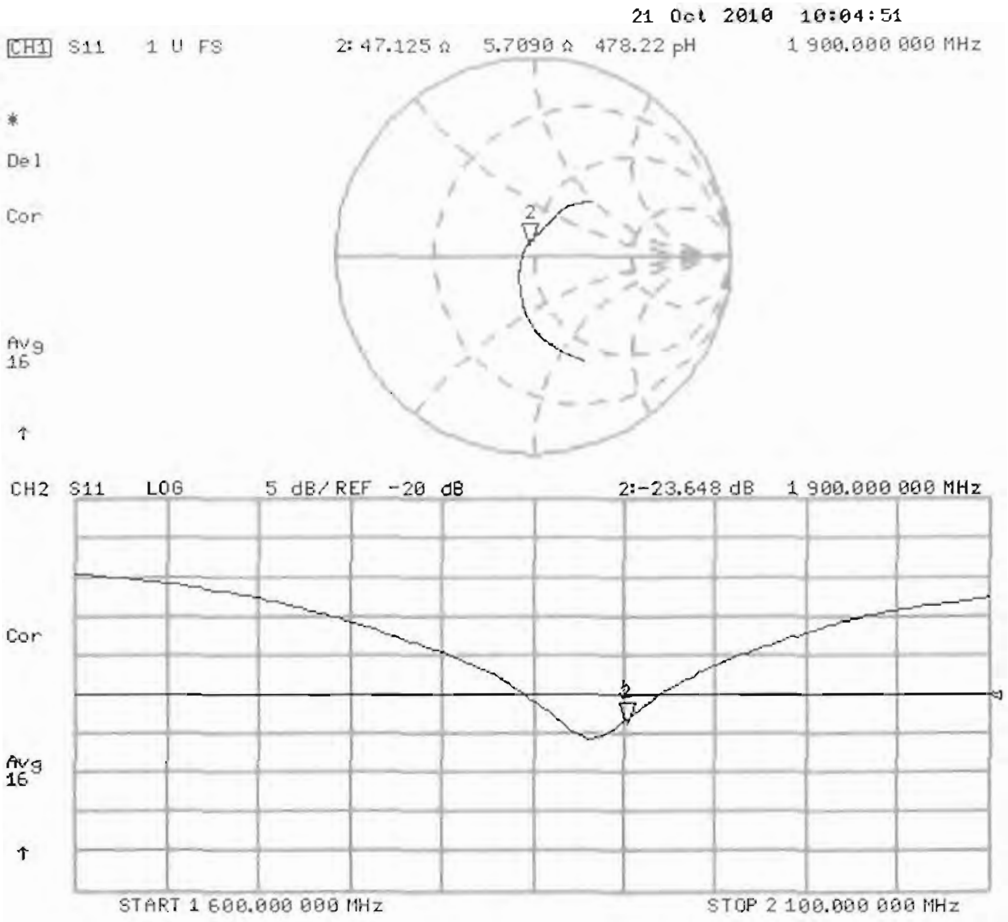
- Probe: ES3DV3 - SN3205; ConvF(4.59, 4.59, 4.59); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.4 V/m; Power Drift = 0.00634 dB
Peak SAR (extrapolated) = 17.3 W/kg
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.34 mW/g
Maximum value of SAR (measured) = 12.7 mW/g



0 dB = 12.7mW/g

Impedance Measurement Plot for Body TSL



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Client **Qualcomm USA**

Certificate No: DAE3-400_Feb11

CALIBRATION CERTIFICATE

Object	DAE3 - SD 000 D03 AA - SN: 400
Calibration procedure(s)	QA CAL-06.v22 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	February 8, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	28-Sep-10 (No:10376)	Sep-11
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V1.1	SE UMS 006 AB 1004	07-Jun-10 (in house check)	In house check: Jun-11

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Technician	[signature]
Approved by:	Fin Bomholt	R&D Director	i.V. [signature]

Issued: February 8, 2011

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Glossary

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV , full range = -100...+300 mV

Low Range: 1LSB = 61nV , full range = -1.......+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	404.600 ± 0.1% (k=2)	405.069 ± 0.1% (k=2)	403.612 ± 0.1% (k=2)
Low Range	3.96430 ± 0.7% (k=2)	3.96948 ± 0.7% (k=2)	3.94515 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	346.0 ° ± 1 °

Appendix

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	200001.3	-0.40	-0.00
Channel X	+ Input	20007.38	7.58	0.04
Channel X	- Input	-19994.88	4.62	-0.02
Channel Y	+ Input	200008.4	-1.48	-0.00
Channel Y	+ Input	20001.13	1.33	0.01
Channel Y	- Input	-19998.86	0.64	-0.00
Channel Z	+ Input	200009.8	0.91	0.00
Channel Z	+ Input	19995.02	-4.68	-0.02
Channel Z	- Input	-20005.78	-6.38	0.03

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	1999.2	-0.99	-0.05
Channel X	+ Input	200.64	0.64	0.32
Channel X	- Input	-200.02	-0.02	0.01
Channel Y	+ Input	2000.0	-0.00	-0.00
Channel Y	+ Input	198.79	-1.21	-0.60
Channel Y	- Input	-200.16	0.04	-0.02
Channel Z	+ Input	1999.8	-0.31	-0.02
Channel Z	+ Input	199.03	-0.97	-0.49
Channel Z	- Input	-200.53	-0.63	0.32

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	-3.89	-6.46
	- 200	9.06	6.88
Channel Y	200	-7.54	-7.75
	- 200	6.80	6.84
Channel Z	200	20.10	20.36
	- 200	-23.41	-23.00

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	2.65	0.26
Channel Y	200	2.10	-	4.50
Channel Z	200	2.28	-1.17	-

4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	15633	15640
Channel Y	15995	15623
Channel Z	16566	16842

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	0.53	-0.97	1.98	0.52
Channel Y	-1.24	-2.42	-0.16	0.45
Channel Z	-0.77	-2.19	0.64	0.59

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	–0.01	-8	-9

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Client **Qualcomm USA**

Certificate No: D1900V2-5d096_Dec11

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d096
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	December 06, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: December 7, 2011

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Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.5 ± 6 %	1.44 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.4 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**40.8 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.38 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**21.3 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.5 ± 6 %	1.54 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.3 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**40.9 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.44 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**21.7 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.0 Ω + 5.0 jΩ
Return Loss	- 25.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.4 Ω + 5.8 jΩ
Return Loss	- 23.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.200 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 04, 2002

DASY5 Validation Report for Head TSL

Date: 06.12.2011

Test Laboratory: SPEAG, Zurich, Switzerland

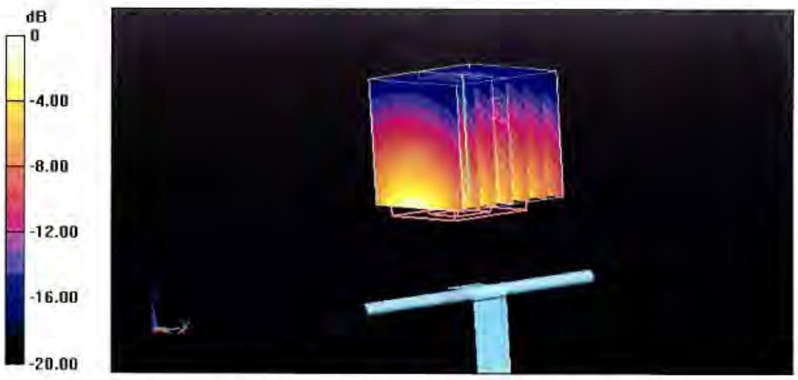
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d096

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.44 mho/m; ε_r = 39.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

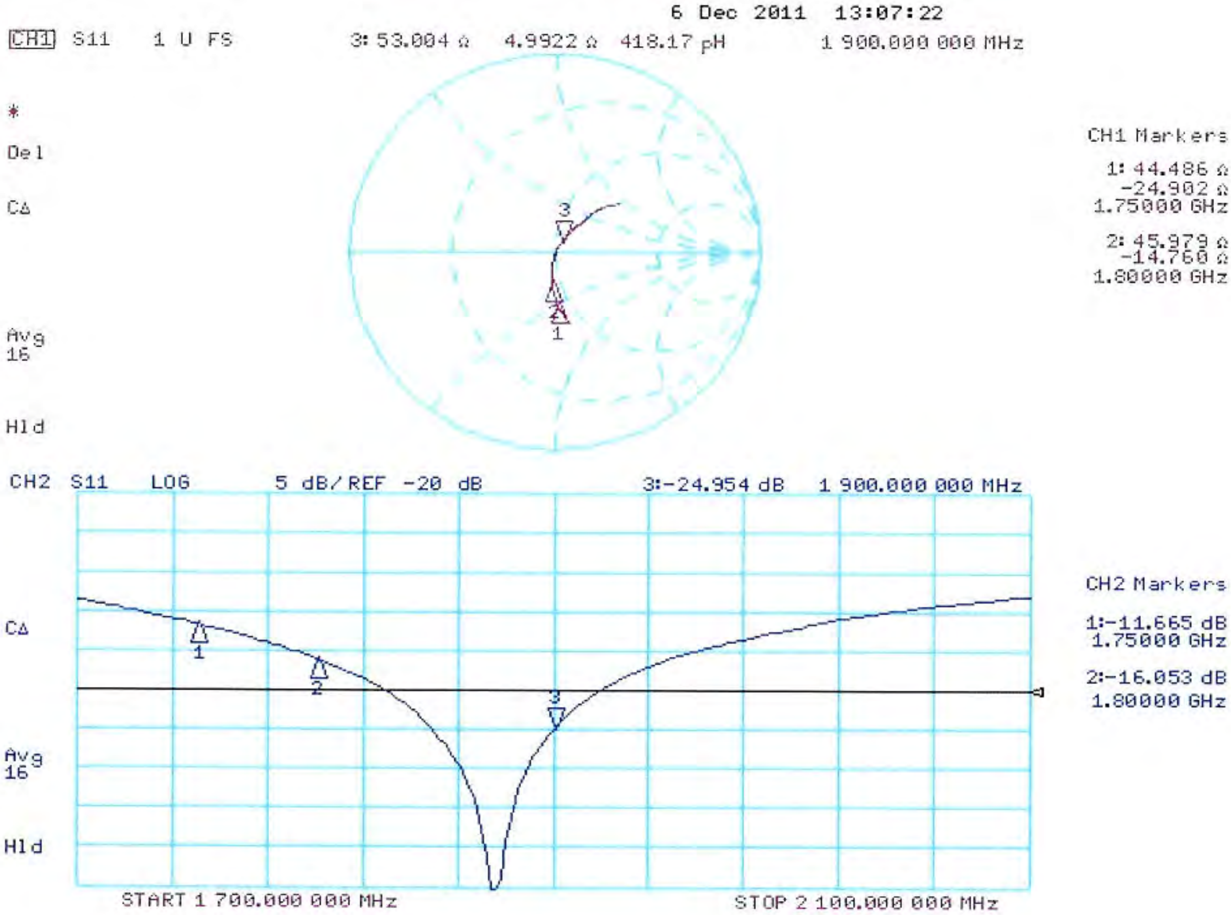
- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.647 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 19.0250
SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.38 mW/g
Maximum value of SAR (measured) = 12.737 mW/g



0 dB = 12.740mW/g = 22.10 dB mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 05.12.2011

Test Laboratory: SPEAG, Zurich, Switzerland

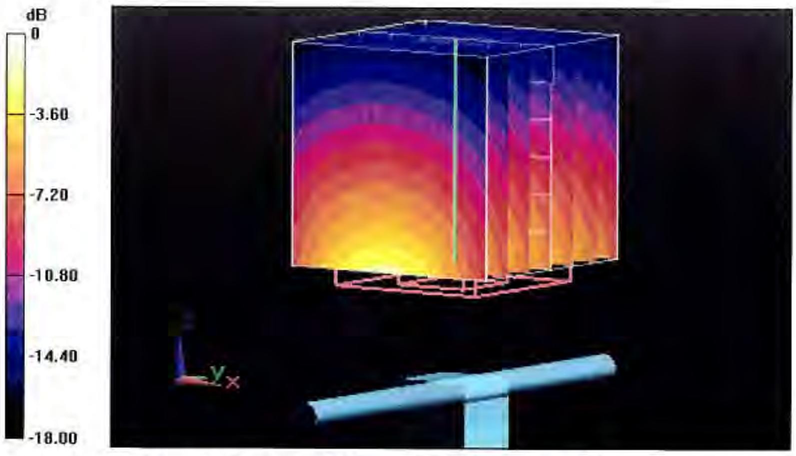
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d096

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.54 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

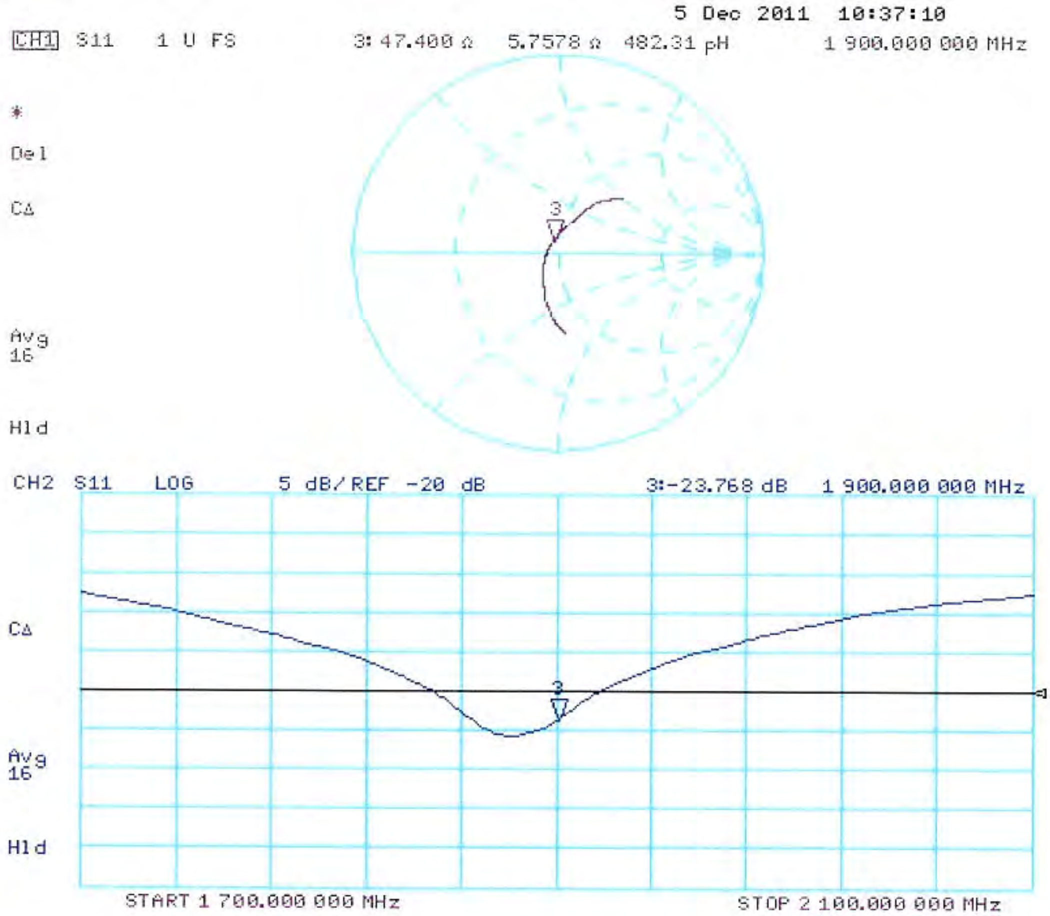
- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.766 V/m; Power Drift = 0.0031 dB
Peak SAR (extrapolated) = 18.0510
SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.44 mW/g
Maximum value of SAR (measured) = 13.020 mW/g



0 dB = 13.020mW/g = 22.29 dB mW/g

Impedance Measurement Plot for Body TSL



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Accreditation No.: **SCS 108**

Client **Qualcomm USA**

Certificate No: **D835V2-466_Dec11**

CALIBRATION CERTIFICATE

Object: D835V2 - SN: 466

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

Calibration date: December 02, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: December 5, 2011

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Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.2 Ω - 3.6 jΩ
Return Loss	- 26.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.8 Ω - 6.4 jΩ
Return Loss	- 23.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.381 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	August 27, 2002

Measurement Conditions

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

DASY Version	DASY5	V52.8.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

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

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.36 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**9.44 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.55 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.20 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.3 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.43 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**9.50 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.60 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.29 mW / g ± 16.5 % (k=2)**

DASY5 Validation Report for Head TSL

Date: 02.12.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 466

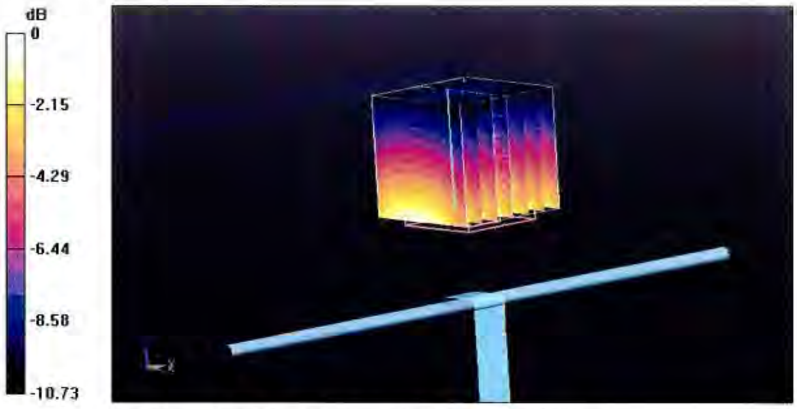
Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; $\sigma = 0.9$ mho/m; $\varepsilon_r = 41.5$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

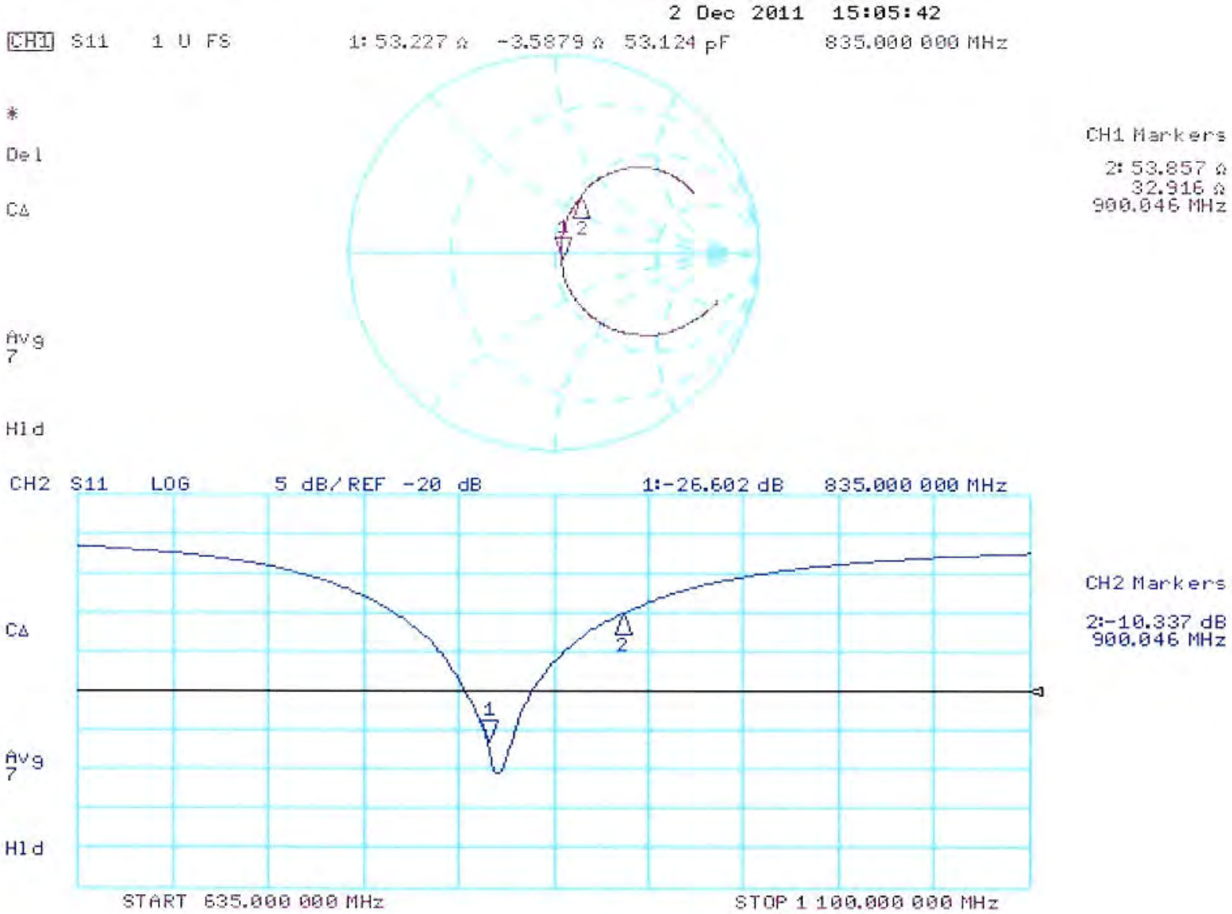
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.597 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 3.4860
SAR(1 g) = 2.36 mW/g; SAR(10 g) = 1.55 mW/g
Maximum value of SAR (measured) = 2.715 mW/g



0 dB = 2.710mW/g = 8.66 dB mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 02.12.2011

Test Laboratory: SPEAG, Zurich, Switzerland

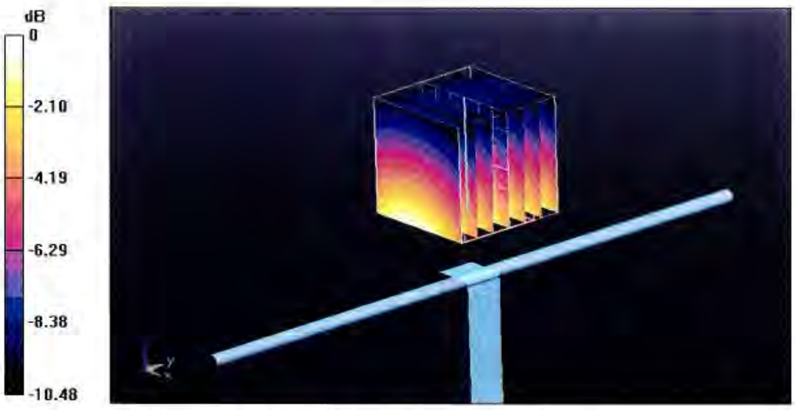
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 466

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; $\sigma = 0.99$ mho/m; $\varepsilon_r = 53.3$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.934 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.5120
SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.6 mW/g
Maximum value of SAR (measured) = 2.785 mW/g



0 dB = 2.780mW/g = 8.88 dB mW/g

Impedance Measurement Plot for Body TSL