DECLARATION OF COMPLIANCE - SAR RF EXPOSURE EVALUATION (FCC) - MC8795 WWAN

Test Lab Information	**Name**	**CELLTECH LABS INC.**	**Address**	21-364 Lougheed Road, Kelowna B.C. V1X 7R8 Canada		
Test Lab Accreditation	**A2LA**	ISO/IEC 17025:2005 (A2LA Test Lab Certificate No. 2470.01)				
Applicant Information	**Name**	**MAXID CORPORATION**	**Address**	1775 Wiehle Avenue, Suite 104, Reston, VA 20190 USA		
Standard(s) Applied	**FCC**	47 CFR §2.1093	**IC**	Health Canada Safety Code 6		
Procedure(s) Applied	**FCC**	OET Bulletin 65, Supp. C (01-01)	**IEEE**	1528-2003		
	FCC	KDB Inquiry #907535	KDB 447498 D01v04	FCC KDB 941225 D01v02	FCC KDB 178919 D01v05	
	IC	RSS-102 Issue 4	**IEC**	62209-1:2005	62209-2:2010	
Application Type(s)	**FCC**	New Certification				
Device-Under-Test Sample	**Rcpt Date**	February 23, 2011		**Test Date(s)**	March 02, 2011	
Device Under Test (DUT)	**FCC ID:**	TFT-IDL750		**Description**	Rugged Handheld RFID Reader	
	Model:	iDL750		**Serial No.**	BHC00036	
	Tx Freq.	13.56 MHz		**Rated Power**	n/a (Low Power Comm. Device Transmitter)	
Co-located Transmitter 1	**FCC ID:**	TFT-MC8795		**Description**	WWAN Mini-PCI Express Card	
	Manuf.	Sierra Wireless Inc.		**Model**	MC8795V (IMEI 355310030121218)	
	Mode(s)	GPRS/EDGE/WCDMA/HSPA (Rel 6)		**Co-Transmit**	Co-transmits with WLAN, Bluetooth, RFID	
	Tx Freq.	824.2 - 848.8 MHz (GPRS/EDGE 850 Band)		**Rated Power**	32 dBm (GPRS 850)	27 dBm (EDGE 850)
		1850.2 - 1909.8 MHz (GPRS/EDGE 1900 Band)			29 dBm (GPRS 1900)	26 dBm (EDGE 1900)
		826.4 - 846.6 MHz (WCDMA/HSPA 850 Band)			23 dBm (WCDMA 850 - Band V)	
		1852.4 - 1907.5 MHz (WCDMA/HSPA 1900 Band)			23 dBm (WCDMA 1900 - Band II)	
Co-located Transmitter 2	**FCC ID:**	TFT533ANM		**Description**	WLAN Mini-PCI Express Card	
	Manuf.	Intel Corporation		**Model**	533AN_MMW	
	Mode(s)	802.11a/b/g/n		**Co-Transmit**	Co-transmits with WWAN	
	Tx Freq.	2412-2462/5180-5320/5500-5700/5745-5825 MHz		**Rated Power**	130 mW (2.4 GHz), 110 mW (5 GHz) - Conducted	
Co-located Transmitter 3	**FCC ID:**	TFTWT12		**Description**	Class 2 Bluetooth v2.0 + EDR	
	Mode(s)	GFSK (1Mbps), ∏/4 DQPSK (2Mbps, 8DQPSK (3Mbps)		**Model**	WT12A	
	Manuf.	BlueGiga Technologies Inc.		**Co-Transmit**	Co-transmits with WWAN	
	Tx Freq.	2402 - 2480 MHz		**Rated Power**	2 mW - Conducted	
Antenna-to-Antenna Distance	**WWAN**	WWAN-to-WLAN = 146 mm	WWAN-to-Bluetooth = 125 mm	WWAN-to-RFID = 4 mm		
Antenna-to-Edge Distance(s)	**WWAN**	Antenna to Keypad Side = 16 mm	Antenna to Bottom Side = 24 mm	Antenna to Right Edge = 10 mm		
Device Position(s) Tested	**iDL750 PC**	Front Keypad Side with 10 mm air-gap spacing to planar phantom (per FCC KDB Inquiry Tracking No. 907535)				
Max. Duty Cycle(s) Tested	**GPRS**	25% (2 Uplink Slots) Class 10		**WCDMA**	100%	
Antenna Type(s) Tested	**WWAN**	Penta-band SMT Antenna Model: PA-25		Manufacturer: Taoglas Limited		P/N: PA-25a
Power Source(s) Tested	**Host PC**	Lithium-ion Battery	7.4V	10000mAh		Model: 909T2021F
Max. Measured SAR Level(s)	**BODY**	**0.273 W/kg**	1g average	850 Band	**FCC/IC Spatial Peak SAR Limit**	**1.6 W/kg** 1g average
		0.459 W/kg	1g average	1900 Band		**General Population / Uncontrolled**

Celltech Labs Inc. declares under its sole responsibility that this wireless portable device is compliant with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093 and Health Canada's Safety Code 6 for the General Population / Uncontrolled Exposure environment. The device was tested in accordance with the measurement standards and procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01), Industry Canada RSS-102 Issue 4, IEEE 1528-2003, International Standard IEC 62209-1 (2005) and International Standard IEC 62209-2 (Edition 1.0 2010-03). All measurements were performed in accordance with the SAR system manufacturer recommendations.

I attest to the accuracy of data. All measurements were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

The results and statements contained in this report pertain only to the device(s) evaluated.

This test report shall not be reproduced partially, or in full, without the prior written approval of Celltech Labs Inc.

Test Report Approved By		**Sean Johnston**	**Lab Manager**	**Celltech Labs Inc.**

TABLE OF CONTENTS

REVISION HISTORY			
REVISION NO.	**DESCRIPTION**	**IMPLEMENTED BY**	**RELEASE DATE**
1.0	Initial Release	Jon Hughes	June 07, 2011
1.1	**a) Revised DUT Description b) Revised DUT FCC ID c) Revised Co-Tx FCC ID's d) Revised Grantee Address**	**Jon Hughes**	**September 28, 2011**

TEST REPORT SIGN-OFF			
DEVICE TESTED BY	**REPORT PREPARED BY**	**QA REVIEW BY**	**REPORT APPROVED BY**
Sean Johnston	Sean Johnston	Jon Hughes	Sean Johnston

1.0 INTRODUCTION

This measurement report demonstrates that the MaxID Corporation Model: iDL750 Rugged Handheld RFID Reader FCC ID: TFT-IDL750, incorporating the MC8795V WWAN Mini-PCI Express Card FCC ID: TFT-MC8795 with Taoglas PA-25 Penta-band SMT Antenna, complies with the SAR (Specific Absorption Rate) RF exposure requirements of FCC 47 CFR §2.1093 (see reference [1]) and Health Canada's Safety Code 6 (see reference [2]) for the General Population / Uncontrolled Exposure environment. The test procedures described in FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [3]), Industry Canada RSS-102 Issue 4 (see reference [4]), IEEE Standard 1528-2003 (see reference [5]), IEC International Standard 62209-1:2005 (see reference [6]) and IEC International Standard 62209-2:2010 (see reference [7]) were employed. A description of the product, operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used, and the various provisions of the rules are included within this test report.

2.0 SAR MEASUREMENT SYSTEM

Celltech Labs Inc. SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY4 measurement system is comprised of the measurement server, robot controller, computer, near-field probe, probe alignment sensor, specific anthropomorphic mannequin (SAM) phantom, and various planar phantoms for head and/or body SAR evaluations. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the DASY4 measurement server. The DAE4 utilizes a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16-bit AD-converter and a command decoder and control logic unit. Transmission to the DASY4 measurement server is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. The sensor systems are also used for mechanical surface detection and probe collision detection. The robot utilizes a controller with built in VME-bus computer.

3.0 SAR PROBE CALIBRATION & MEASUREMENT FREQUENCIES

The following procedures are recommended for measurements at 150 MHz - 3 GHz to minimize probe calibration and tissue dielectric parameter discrepancies. In general, SAR measurements below 300 MHz should be within ±50 MHz of the probe calibration frequency. At 300 MHz to 3 GHz, measurements should be within ±100 MHz of the probe calibration frequency. Measurements exceeding 50% of these intervals, ±25 MHz < 300 MHz and ±50 MHz ≥300 MHz, require additional steps (per FCC KDB 450824 D01 v01r01, SAR Probe Calibration and System Verification Considerations for Measurements at 150 MHz - 3 GHz - see reference [10]).

Probe Calibration Freq.	Device Measurement Freq.	Frequency Interval	±50 MHz ≥ 300 MHz
835 MHz	836.6 MHz	1.6 MHz	< 50 MHz
	836.4 MHz	1.4 MHz	< 50 MHz
1900 MHz	1880.0 MHz	20 MHz	< 50 MHz
The probe calibration and measurement frequency interval is < 50 MHz; therefore the additional steps were not required.			

4.0 TEST MODE & OUTPUT POWER MEASUREMENTS

Procedure used to establish test signal

The following setting was used to configure the Agilent 8960 Series E5515C wireless communications test set:

GPRS Mode

Service Selection > Test Mode A - Auto Slot Config. > off
Main Service > Packet Data
Network Support > GSM+GPRS
Slot Config > 33 dBm (GSM850) & 30 dBm (GSM1900)
BAP: Burst Average Power
Pavg: Average power over all time slots

RF CONDUCTED OUTPUT POWER MEASUREMENT RESULTS

Mode / Band	Channel	Freq. (MHz)	1 Uplink Slot		2 Uplink Slots		3 Uplink Slots		4 Uplink Slots	
			Burst-Average		Burst-Average		Burst-Average		Burst-Average	
			dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts
GPRS 850	128	824.2	32.2	1.66	32.2	1.66	29.2	0.832	26.3	0.427
	190	836.6	32.3	1.70	32.3	1.70	29.3	0.851	26.4	0.437
	251	848.8	32.2	1.66	32.3	1.70	29.3	0.851	26.3	0.427
GPRS 1900	512	1850.2	28.8	0.759	28.8	0.759	28.7	0.741	28.6	0.724
	661	1880.0	28.9	0.776	28.9	0.776	28.8	0.759	28.7	0.741
	810	1909.8	28.8	0.759	28.8	0.759	28.7	0.741	28.6	0.724

Note: The conducted power levels for EDGE mode specified by Sierra Wireless for the MC8795V WWAN card are ~ 5 dB lower in 850 band and ~ 3 dB lower in 1900 band than the conducted output power levels specified for GPRS mode within the same frequency bands; therefore EDGE mode was not evaluated.

OUTPUT POWER MEASUREMENTS (Cont.)

Procedure used to establish test signal

WCDMA Mode

This procedure assumes the Agilent 8960 Series E5515C wireless communications test set has the following applications installed and with valid license.

Application: WCDMA Mobile Test

Rev, License: A.07.13, L

Call Setup > Shift & Preset

Cell Parameters: PS Domain Information > Present
ATT (IMSI Attach) Flag State > Set

Security Parameter - System Operations > None

Channel Type: RMC - 12.2k, 64k, 144k, 384k
AMC - 12.2k UL / 64 DL AM RMC,
12.2k UL / 144 DL AM RMC,
12.2k UL / 384 DL AM RMC

Paging Service: RB Test Mode

Channel Parameters (UARFCN):
DL Channel: PCS: 9662 / 9800 / 9938
Cell: 4357 / 4407 / 4458
UL Channel: PCS: 9262 / 9400 / 9538
Cell: 4132 / 4182 / 4233

DL DTCH Data: All Ones
RLC Reestablish: Off
Call Limit State: Off
Call Drop Timer: Off
SRB Config. 13.6k DCCH
UE Target Power: 25 dBm
UL CL Pwr Ctrl Mode: All Up Bits

RF CONDUCTED OUTPUT POWER MEASUREMENT RESULTS

Channel Type: 12.2k RMC

Mode / Band	Channel	Freq. (MHz)	Channel Power		Mode / Band	Channel	Freq. (MHz)	Channel Power	
			dBm	Watts				dBm	Watts
WCDMA 850	4132	826.4	22.5	0.178	WCDMA 1900	9262	1852.4	22.4	0.174
	4180	836.4	22.7	0.186		9400	1880.0	22.6	0.182
	4233	846.6	22.4	0.174		9538	1907.6	22.3	0.170

Note: The conducted output power levels for HSPA modes specified by Sierra Wireless for the MC8795V WWAN card are lower than the conducted output power levels specified for W-CDMA mode; therefore HSPA modes were not measured.

5.0 FLUID DIELECTRIC PARAMETERS

The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluations using an HP 85070C Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C).

FLUID DIELECTRIC PARAMETERS

Date: 03/02/2011		Frequency: 835 MHz			Tissue: Body	
Freq	Test_e	Test_s	835 MHz Target_e	835 MHz Target_s	Deviation Permittivity	Deviation Conductivity
0.735	57.34	0.88	55.2	0.97	3.88%	-9.28%
0.745	57.48	0.89	55.2	0.97	4.13%	-8.25%
0.755	57.37	0.90	55.2	0.97	3.93%	-7.22%
0.765	57.32	0.91	55.2	0.97	3.84%	-6.19%
0.775	56.91	0.92	55.2	0.97	3.10%	-5.15%
0.785	56.75	0.93	55.2	0.97	2.81%	-4.12%
0.795	56.75	0.94	55.2	0.97	2.81%	-3.09%
0.805	56.57	0.95	55.2	0.97	2.48%	-2.06%
0.815	56.53	0.96	55.2	0.97	2.41%	-1.03%
0.825	56.53	0.98	55.2	0.97	2.41%	1.03%
0.835	56.55	0.98	55.2	0.97	2.45%	1.03%
0.845	56.53	0.99	55.2	0.97	2.41%	2.06%
0.855	56.24	1.00	55.2	0.97	1.88%	3.09%
0.865	56.39	1.00	55.2	0.97	2.16%	3.09%
0.875	56.11	1.02	55.2	0.97	1.65%	5.15%
0.885	55.94	1.02	55.2	0.97	1.34%	5.15%
0.895	55.82	1.04	55.2	0.97	1.12%	7.22%
0.905	55.86	1.05	55.2	0.97	1.20%	8.25%
0.915	55.80	1.06	55.2	0.97	1.09%	9.28%
0.925	55.62	1.07	55.2	0.97	0.76%	10.31%
0.935	55.60	1.08	55.2	0.97	0.72%	11.34%

FLUID DIELECTRIC PARAMETERS (Cont.)

FLUID DIELECTRIC PARAMETERS

Date: 03/02/2011		Frequency: 1900 MHz			Tissue: Body	
Freq (GHz)	Test_e	Test_s	1900 MHz Target_e	1900 MHz Target_s	Deviation Permittivity	Deviation Conductivity
1.80	52.05	1.47	53.30	1.52	2.40%	3.40%
1.81	51.88	1.47	53.30	1.52	2.74%	3.40%
1.82	51.83	1.49	53.30	1.52	2.84%	2.01%
1.83	51.62	1.50	53.30	1.52	3.25%	1.33%
1.84	51.53	1.50	53.30	1.52	3.43%	1.33%
1.85	51.45	1.52	53.30	1.52	3.60%	0.00%
1.86	51.49	1.52	53.30	1.52	3.52%	0.00%
1.87	51.35	1.52	53.30	1.52	3.80%	0.00%
1.88	51.36	1.53	53.30	1.52	3.78%	-0.65%
1.89	51.27	1.54	53.30	1.52	3.96%	-1.30%
1.90	51.23	1.54	53.30	1.52	4.04%	-1.30%
1.91	51.20	1.55	53.30	1.52	4.10%	-1.94%
1.92	51.00	1.57	53.30	1.52	4.51%	-3.18%
1.93	51.11	1.58	53.30	1.52	4.28%	-3.80%
1.94	51.00	1.58	53.30	1.52	4.51%	-3.80%
1.95	50.91	1.58	53.30	1.52	4.69%	-3.80%
1.96	50.83	1.59	53.30	1.52	4.86%	-4.40%
1.97	50.83	1.60	53.30	1.52	4.86%	-5.00%
1.98	50.88	1.62	53.30	1.52	4.76%	-6.17%
1.99	50.70	1.63	53.30	1.52	5.13%	-6.75%
2.00	50.63	1.64	53.30	1.52	5.27%	-7.32%

6.0 SAR MEASUREMENT SUMMARY

BODY SAR MEASUREMENT RESULTS - MC8795 WWAN

Test Date	Freq. Band	Test Freq.	Ch.	Test Mode		DUT Position to Planar Phantom	DUT Distance to Planar Phantom	Start Power (Conducted)		SAR Drift During Test	Measured SAR	
	MHz	MHz						dBm	Mode	dB	W/kg	1g/Pk
Mar 02	850	836.6	190	GPRS Class 10	2 Uplink Slots	Keypad Side	10 mm	32.3	BAP	-0.050	0.273	1g
		836.4	4182	WCDMA Rel99	12.2k RMC	Keypad Side	10 mm	22.7	CP	-0.126	0.164	1g
Mar 02	1900	1880.0	661	GPRS Class 12	4 Uplink Slots	Keypad Side	10 mm	28.7	BAP	-0.035	0.459	1g
		1880.0	9400	WCDMA Rel99	12.2k RMC	Keypad Side	10 mm	22.6	CP	-0.101	0.343	1g

SAR LIMIT(S)		BODY	SPATIAL PEAK	RF EXPOSURE CATEGORY
FCC 47 CFR 2.1093	Health Canada Safety Code 6	1.6 W/kg	1g average	General Population / Uncontrolled

Test Date	Fluid	ρ (Kg/m^3)	Ambient Temperature	Fluid Temperature	Fluid Depth	Relative Humidity	Atmospheric Pressure
Mar 02	835 Body	1000	22.0 °C	22.8 °C	≥15 cm	35 %	101.1 kPa
Mar 02	1900 Body	1000	22.0 °C	22.8 °C	≥15 cm	35 %	101.1 kPa

7.0 DETAILS OF SAR EVALUATION

1. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A. The test setup photographs are shown in Appendix D.
2. The DUT can be body-worn by the user utilizing a shoulder-strap accessory (does not contain metallic components). The front keypad side or the rear battery side of the DUT can be positioned facing the user's body. The DUT was tested for body SAR with the front keypad side of the Handheld RFID Reader parallel to the outer surface of the planar phantom with a 10 mm separation distance between the front keypad side of the DUT and the outer surface of the planar phantom (in accordance with the testing guidance specified in FCC KDB Inquiry Tracking No. 907535. SAR evaluation of the rear battery side of the DUT was optional and therefore not evaluated (based on the substantially larger user separation distance to antenna).
3. The measured SAR levels were < 0.8 W/kg (1g); therefore SAR evaluations for the remaining channels were not required (per FCC KDB 447498 Section 1)e)i)).
4. The SAR evaluations (3G modes) were performed in accordance with the procedures specified in FCC KDB 941225 D01v02 (see reference [9]).
5. The SAR evaluation for GPRS mode in the cellular band was performed with an air-link communication established with the Agilent 8960 Series 10 E5515C Wireless Communications Test Set with 2 uplink slots (Multi-slot Class 10).
6. The SAR evaluation for GPRS mode in the PCS band was performed with an air-link communication established with the Agilent 8960 Series 10 E5515C Wireless Communications Test Set with 4 uplink slots (Multi-slot Class 12).
7. The SAR evaluations for WCDMA mode in the cellular and PCS bands were performed with an air-link communication established with the Agilent 8960 Series 10 E5515C Wireless Communications Test Set with 12.2 kbps RMC channel and the TPC bits configured to all "1s".
8. The conducted output power levels of the DUT were measured prior to the SAR evaluations.
9. The SAR drift of the DUT during the SAR evaluations was measured by the DASY4 system.
10. The DUT battery was fully charged prior to the SAR evaluations.
11. The fluid temperature was measured prior to and after the SAR evaluations. The fluid temperature remained within +/-2°C.
12. The dielectric parameters of the simulated tissue mixtures were measured prior to the SAR evaluations using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).

8.0 SAR EVALUATION PROCEDURES

a. (i) The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For devices held to the ear during normal operation, both the left and right ear positions were evaluated using the SAM phantom.

(ii) For body-worn and face-held devices a planar phantom was used.

b. The SAR was determined by a pre-defined procedure within the DASY4 software. Upon completion of a reference and optical surface check, the exposed region of the phantom was scanned near the inner surface with a grid spacing of 15mm x 15mm.

An area scan was determined as follows:

c. Based on the defined area scan grid, a more detailed grid is created to increase the points by a factor of 10. The interpolation function then evaluates all field values between corresponding measurement points.

d. A linear search is applied to find all the candidate maxima. Subsequently, all maxima are removed that are >2 dB from the global maximum. The remaining maxima are then used to position the cube scans.

A 1g and 10g spatial peak SAR was determined as follows:

e. Extrapolation is used to determine the values between the dipole center of the probe and the surface of the phantom. For E-Field Probe EX3DV4 this data cannot be measured because the center of the dipole sensors is 1.0 mm away from the probe tip and the distance between the probe and the boundary must be larger than 25% of the probe diameter. The probe diameter is 2.4 mm (see probe calibration document in Appendix G). In the DASY4 software, the distance between the sensor center and phantom surface is set to 2.0 mm. This provides a distance of 1.0 mm between the probe tip and the surface. For E-Field Probe ET3DV6 this data cannot be measured, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.4 mm (see probe calibration document in Appendix F). The extrapolation of the values between the dipole center and the surface of the phantom was based on trivariate quadratics computed from the previously calculated 3D interpolated points nearest the phantom surface.

f. Interpolated data is used to calculate the average SAR over 1g and 10g cubes by spatially discretizing the entire measured cube. The volume used to determine the averaged SAR is a 1mm grid (42875 interpolated points).

g. A zoom scan volume of 32 mm x 32 mm x 30 mm (5 x 5 x 7 points) centered at the peak SAR location determined from the area scan is used for all zoom scans for devices with a transmit frequency < 800 MHz. Zoom scans for frequencies ≥ 800 MHz are determined with a scan volume of 30 mm x 30 mm x 30 mm (7 x 7 x 7) to ensure complete capture of the peak spatial-average SAR.

9.0 CO-LOCATED TRANSMITTER(S)

The MaxID iDL750 Handheld RFID Reader FCC ID: TFT-IDL750, incorporating the MC8795V WWAN Mini-PCI Express Card FCC ID: TFT-MC8795, can be co-located and co-transmitting with the following transmitters:

Transmitter Type	Manufacturer	FCC ID	Model	Co-Transmit with WWAN?
WLAN	Intel	TFT533ANM	533AN_MMW	Yes
Class 2 Bluetooth	Bluegiga Tech.	TFTWT12	WT12	Yes

Closest Antenna-to-Antenna Separation Distance	
WWAN-to-WLAN	146 mm
WWAN-to-Bluetooth	125 mm

10.0 SIMULTANEOUS TRANSMISSION ASSESSMENT

The provisions set forth in FCC KDB 648474 D01v01r05 Section 4 (see reference [15]) were applied (in accordance with the procedures per FCC KDB Inquiry Tracking No. 907535) to address simultaneous transmission SAR evaluation considerations as follows:

Transmitter	Max. SAR Level (1g)	Sum 1g-SAR	SAR to Peak Location Separation Ratio*	Co-Transmit SAR Eval. Required?	
WWAN	0.459 W/kg	0.728 (< 1.6 W/kg)	0.05 (< 0.3)	WWAN-WLAN	No
WLAN	0.269 W/kg				
Bluetooth	n/a (output power < P_{Ref} and the antenna is ≥ 2.5 cm from WWAN Tx antenna)			WWAN-BT	No

* Note: SAR to Peak Location Separation Ratio is calculated by dividing the sum of the individual SAR levels by the separation distance between the peak SAR locations. In this case the antenna separation distance was used for conservativeness.

11.0 SYSTEM PERFORMANCE CHECK

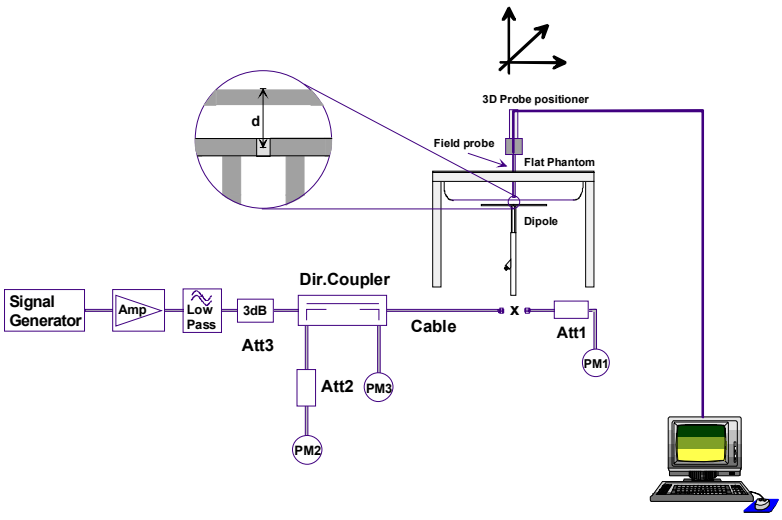
Prior to the SAR evaluations, daily system checks were performed using a planar phantom with 835 MHz and 1900 MHz SPEAG dipoles (see Appendix B for system performance check evaluation plots) in accordance with the procedures described in IEEE Standard 1528-2003 (see reference [5]). The dielectric parameters of the simulated tissue mixtures were measured prior to the system performance checks using an HP 85070C Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C). A forward power of 250 mW was applied to the dipole and the system was verified to a tolerance of ±10% from the system manufacturer's dipole calibration target SAR values (see Appendix F for system manufacturer's dipole calibration procedures).

SYSTEM PERFORMANCE CHECK EVALUATION RESULTS

Test Date	Fluid Freq.	SAR 1g (W/kg)			Dielectric Constant ε_r			Conductivity σ (mho/m)			ρ (Kg/m^3)	Amb. Temp. (°C)	Fluid Temp. (°C)	Fluid Depth (cm)	Humid. (%)	Barom. Press. (kPa)
	Body (MHz)	Target	Meas.	Dev.	Target	Meas.	Dev.	Target	Meas.	Dev.						
Mar 2	**835**	**2.49 ±10%**	**2.54**	+2.0%	**55.2 ±5%**	56.5	+2.3%	**0.97 ±5%**	0.98	+1.0%	1000	22.0	22.8	≥ 15	35	101.1
Mar 2	**1900**	**10.6 ±10%**	**10.5**	-1.0%	**53.3 ±5%**	51.2	-4.0%	**1.52 ±5%**	1.54	+1.3%	1000	22.0	22.8	≥ 15	35	101.1

Notes

1. The target SAR values are the measured values from the dipole calibration performed by SPEAG (see Appendix F).
2. The target dielectric parameters are the nominal values from the dipole calibration performed by SPEAG (see Appendix F).
3. The fluid temperature was measured prior to and after the system performance check. The temperature remained within +/-2°C.
4. The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).



System Performance Check Measurement Setup Diagram (IEEE 1528-2003)

835 MHz Validation Dipole Setup

1900 MHz Validation Dipole Setup

12.0 SIMULATED EQUIVALENT TISSUES

The simulated equivalent tissue recipes listed in the table below are derived from the SAR system manufacturer's suggested recipe in the DASY4 manual (see reference [11]) in accordance with the procedures and requirements specified in IEEE Standard 1528-2003 (see reference [5]). The ingredient percentage may have been adjusted marginally in order to achieve the appropriate target dielectric parameters within the specified tolerance.

1900 MHz TISSUE MIXTURE	
INGREDIENT	**1900 MHz BODY**
Water	69.85 %
Glycol Monobutyl	29.89 %
Salt	0.26 %

835 MHz TISSUE MIXTURE	
INGREDIENT	**835 MHz BODY**
Water	53.79 %
Sugar	45.13 %
Salt	0.98 %
Bactericide	0.10 %

13.0 SAR LIMITS

SAR RF EXPOSURE LIMITS		
FCC 47 CFR 2.1093	**(General Population / Uncontrolled Exposure)**	**(Occupational / Controlled Exposure)**
Spatial Average (averaged over the whole body)	0.08 W/kg	0.4 W/kg
Spatial Peak (averaged over any 1 g of tissue)	**1.6 W/kg**	8.0 W/kg
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0 W/kg	20.0 W/kg
The Spatial Average value of the SAR averaged over the whole body.		
The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.		
The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.		
Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.		
Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.		

14.0 ROBOT SYSTEM SPECIFICATIONS

Specifications	
Positioner	Stäubli Unimation Corp. Robot Model: RX60L
Repeatability	0.02 mm
No. of axis	6
Data Acquisition Electronic (DAE) System	
Cell Controller	
Processor	AMD Athlon XP 2400+
Clock Speed	2.0 GHz
Operating System	Windows XP Professional
Data Converter	
Features	Signal Amplifier, multiplexer, A/D converter, and control logic
Software	Measurement Software: DASY4, V4.7 Build 44
	Postprocessing Software: SEMCAD, V1.8 Build 171
Connecting Lines	Optical downlink for data and status info.; Optical uplink for commands and clock
DASY4 Measurement Server	
Function	Real-time data evaluation for field measurements and surface detection
Hardware	PC/104 166MHz Pentium CPU; 32 MB chipdisk; 64 MB RAM
Connections	COM1, COM2, DAE, Robot, Ethernet, Service Interface
E-Field Probe	
Probe (850 Band)	
Model	ET3DV6
Serial No.	1590
Construction	Triangular core fiber optic detection system
Frequency	10 MHz to 6 GHz
Linearity	±0.2 dB (30 MHz to 3 GHz)
Probe (1900 Band)	
Model	EX3DV4
Serial No.	3600
Construction	Symmetrical design with triangular core
Frequency	10 MHz to 6 GHz
Linearity	±0.2 dB (30 MHz to 3 GHz)
Phantom(s)	
Type	Barski Planar Phantom
Shell Material	Fiberglass
Thickness	2.0 ±0.1 mm
Volume	Approx. 70 liters

15.0 PROBE SPECIFICATIONS

ET3DV6 E-Field Probe

Construction:	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, glycol)
Calibration:	In air from 10 MHz to 2.5 GHz In brain simulating tissue at frequencies of 900 MHz and 1.8 GHz (accuracy ± 8%)
Frequency:	10 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz)
Directivity:	± 0.2 dB in brain tissue (rotation around probe axis) ± 0.4 dB in brain tissue (rotation normal to probe axis)
Dynamic Range:	5 μW/g to > 100 mW/g; Linearity: ± 0.2 dB
Surface Detect:	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces
Dimensions:	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm
Application:	General dosimetry up to 3 GHz Compliance tests of mobile phone

ET3DV6 E-Field Probe

EX3DV4 E-Field Probe

Construction:	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g. DGBE)
Calibration:	Basic Broadband Calibration in air: 10-3000 MHz Conversion Factors (CF) for HSL 900 and HSL 1750
Frequency:	10 MHz to >6 GHz; Linearity: ±0.2 dB (30 MHz to 3 GHz)
Directivity:	±0.3 dB in HSL (rotation around probe axis) ±0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range:	10 μW/g to >100 mW/g; Linearity: ±0.2 dB (noise: typically < 1 μW/g)
Dimensions:	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1.0 mm
Application:	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better than 30%.

EX3DV4 E-Field Probe

16.0 BARSKI PLANAR PHANTOM

The Barski planar phantom is a fiberglass shell phantom with a 2.0 mm (+/-0.2mm) thick device measurement area at the center of the phantom for SAR evaluations of devices with a larger surface area than the planar section of the SAM phantom. The planar phantom is integrated in a wooden table. The Barski planar phantom was used for the DUT SAR evaluations and the system performance check evaluations. See Appendix H for dimensions and specifications of the Barski planar phantom.

Barski Planar Phantom

17.0 DEVICE HOLDER

The DASY4 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. For evaluations of larger devices a Plexiglas platform is attached to the device holder.

Device Holder

18.0 TEST EQUIPMENT LIST

TEST EQUIPMENT		ASSET NO.	SERIAL NO.	DATE CALIBRATED	CALIBRATION INTERVAL
USED	DESCRIPTION				
x	Schmid & Partner DASY4 System	-	-	-	-
x	-DASY4 Measurement Server	00158	1078	CNR	CNR
x	-Robot	00046	599396-01	CNR	CNR
x	-DAE4	00019	353	27Apr10	Annual
x	-ET3DV6 E-Field Probe	00017	1590	15Jul10	Annual
x	-EX3DV4 E-Field Probe	00213	3600	29Apr10	Annual
x	-D835V2 Validation Dipole	00217	4d075	20Apr09	Triennial
x	-D1900V2 Validation Dipole	00218	5d107	21Apr09	Triennial
x	-Barski Planar Phantom	00155	03-01	CNR	CNR
x	HP 85070C Dielectric Probe Kit	00033	none	CNR	CNR
x	Gigatronics 8652A Power Meter	00007	1835272	04May10	Biennial
x	Gigatronics 80701A Power Sensor	00014	1833699	04May10	Biennial
x	HP 8753ET Network Analyzer	00134	US39170292	04May10	Biennial
x	Agilent 8960 Series 10 Communication Test Set	N/A	GB46311315	24Sep09	Biennial
x	Rohde & Schwarz SMR20 Signal Generator	00006	100104	CNR	CNR
x	Amplifier Research 5S1G4 Power Amplifier	00106	26235	CNR	CNR
Abbr.	CNR = Calibration Not Required; N/A = Not Applicable				

19.0 JUSTIFICATION FOR EXTENDED SAR DIPOLE CALIBRATION

SAR dipoles calibrated less than two years ago but more than one year ago were confirmed by maintaining return loss (< -20dB, within 20% of prior calibration) and impedance (within 5Ω from prior calibration) requirements per extended calibrations in FCC KDB 450824 (see reference [10]).

SPEAG VALIDATION DIPOLE D835V2 - SN: 4d075							
Freq.	TSL	Dipole	Measurement Date	Return Loss (dB)	Δ %	Impedance (Ω)	Δ Ω
835 MHz	Body	SPEAG Validation Dipole D835V2 SN: 4d075	April 20, 2009	-26.7		48.0	
			April 20, 2010	-23.3	14.5%	52.3	4.3
1900 MHz	Body	SPEAG Validation Dipole D1900V2 SN: 5d107	April 21, 2009	-22.1		45.9	
			April 20, 2010	-25.4	15.0%	45.5	0.4

20.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION

Uncertainty Component	IEEE 1528 Section	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	ci 10g	Uncertainty Value ±% (1g)	Uncertainty Value ±% (10g)	V_i or V_{eff}
Measurement System									
Probe Calibration (835 MHz)	E.2.1	5.5	Normal	1	1	1	5.5	5.5	∞
Axial Isotropy	E.2.2	4.7	Rectangular	1.732050808	0.7	0.7	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	Rectangular	1.732050808	0.7	0.7	3.9	3.9	∞
Boundary Effect	E.2.3	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	Rectangular	1.732050808	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	Normal	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0.8	Rectangular	1.732050808	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	Rectangular	1.732050808	1	1	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3	Rectangular	1.732050808	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	Rectangular	1.732050808	1	1	0.2	0.2	∞
Probe Positioning wrt Phantom Shell	E.6.3	2.9	Rectangular	1.732050808	1	1	1.7	1.7	∞
Extrapolation, interpolation & integration algorithms for max. SAR evaluation	E.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	2.9	Normal	1	1	1	2.9	2.9	12
Device Holder Uncertainty	E.4.1	3.6	Normal	1	1	1	3.6	3.6	8
SAR Drift Measurement	6.6.2	5	Rectangular	1.732050808	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4	Rectangular	1.732050808	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5	Rectangular	1.732050808	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measured)	E.3.3	1.03	Normal	1	0.64	0.43	0.7	0.4	∞
Liquid Permittivity (target)	E.3.2	5	Rectangular	1.732050808	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measured)	E.3.3	2.45	Normal	1	0.6	0.49	1.5	1.2	∞
Combined Standard Uncertainty			**RSS**				**10.48**	**10.29**	
Expanded Uncertainty (95% Confidence Interval)			**k=2**				**20.95**	**20.58**	

Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2

MEASUREMENT UNCERTAINTIES (Cont.)

UNCERTAINTY BUDGET FOR DEVICE EVALUATION

Uncertainty Component	IEEE 1528 Section	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	ci 10g	Uncertainty Value ±% (1g)	Uncertainty Value ±% (10g)	V_i or V_{eff}
Measurement System									
Probe Calibration (1900 MHz)	E.2.1	5.5	Normal	1	1	1	5.5	5.5	∞
Axial Isotropy	E.2.2	4.7	Rectangular	1.732050808	0.7	0.7	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	Rectangular	1.732050808	0.7	0.7	3.9	3.9	∞
Boundary Effect	E.2.3	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	Rectangular	1.732050808	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	Normal	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0.8	Rectangular	1.732050808	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	Rectangular	1.732050808	1	1	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3	Rectangular	1.732050808	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	Rectangular	1.732050808	1	1	0.2	0.2	∞
Probe Positioning wrt Phantom Shell	E.6.3	2.9	Rectangular	1.732050808	1	1	1.7	1.7	∞
Extrapolation, interpolation & integration algorithms for max. SAR evaluation	E.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	2.9	Normal	1	1	1	2.9	2.9	12
Device Holder Uncertainty	E.4.1	3.6	Normal	1	1	1	3.6	3.6	8
SAR Drift Measurement	6.6.2	5	Rectangular	1.732050808	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4	Rectangular	1.732050808	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5	Rectangular	1.732050808	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measured)	E.3.3	1.3	Normal	1	0.64	0.43	0.8	0.6	∞
Liquid Permittivity (target)	E.3.2	5	Rectangular	1.732050808	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measured)	E.3.3	4.04	Normal	1	0.6	0.49	2.4	2.0	∞
Combined Standard Uncertainty			**RSS**				**10.66**	**10.42**	
Expanded Uncertainty (95% Confidence Interval)			**k=2**				**21.33**	**20.83**	
Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003									

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2

21.0 REFERENCES

[1] Federal Communications Commission - “Radiofrequency radiation exposure evaluation: portable devices”, Rule Part 47 CFR §2.1093.

[2] Health Canada - “Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz”, Safety Code 6: 1999.

[3] Federal Communications Commission - “Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields”, OET Bulletin 65, Supplement C (Edition 01-01), FCC, Washington, D.C.: June 2001.

[4] Industry Canada - “Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)”, Radio Standards Specification RSS-102 Issue 4: March 2010.

[5] IEEE Standard 1528-2003 - “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”: December 2003.

[6] International Standard IEC 62209-1:2005 - “Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for handheld devices used in close proximity to the ear (300 MHz to 3 GHz)”.

[7] International Standard IEC 62209-2 Edition 1.0 2010-03 - “Human exposure to radio frequency fields from hand-held & body-mounted wireless communication devices - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)”.

[8] Federal Communications Commission, Office of Engineering and Technology - “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”; KDB 447498 D01v04: November 2009.

[9] Federal Communications Commission, Office of Engineering and Technology - “SAR Measurement Procedures for 3G Devices”; KDB 941225 D01v02: October 2007.

[10] Federal Communications Commission, Office of Engineering and Technology - “Application Note: SAR Probe Calibration and System Verification Considerations for Measurements at 150 MHz - 3 GHz”; KDB 450824 D01 v01r01: January 2007.

[11] Schmid & Partner Engineering AG - DASY4 Manual V4.6, Chapter 17 Application Note, Body Tissue Recipe: Sept. 2005.

[12] ISO/IEC 17025 - “General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005).”

[13] Federal Communications Commission - “Measurements Required: RF Power Output”; Rule Part 47 CFR §2.1046.

[14] Industry Canada - “General Requirements and Information for the Certification of Radiocommunication Equipment”, Radio Standards Specification RSS-Gen Issue 3: December 2010.

[15] Federal Communications Commission, Office of Engineering and Technology - “SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas”; KDB 648474 D01v01r05: September 2008.

APPENDIX A - SAR MEASUREMENT PLOTS

Date Tested: 03/02/2011

Body SAR - GPRS 850 - 2 Uplink Slots - 836.6 MHz - Ch. 190 - Front (Keypad) Side of DUT

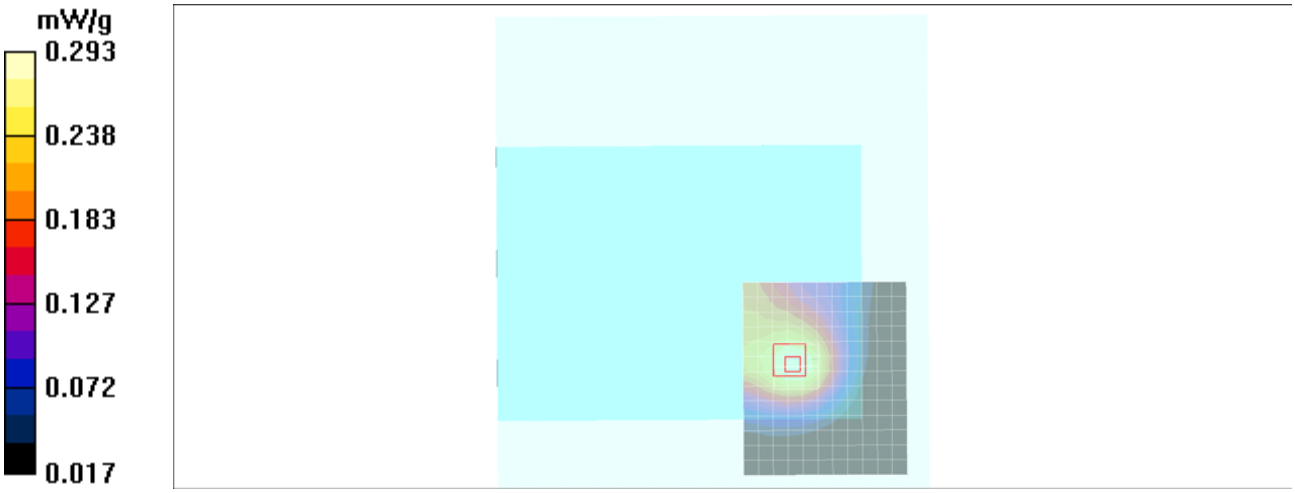
DUT: MaxID Corporation; Type: MC8795V WWAN in iDL750 Handheld RFID Reader; Serial: BHC00036

Ambient Temp: 22.0°C; Fluid Temp: 22.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

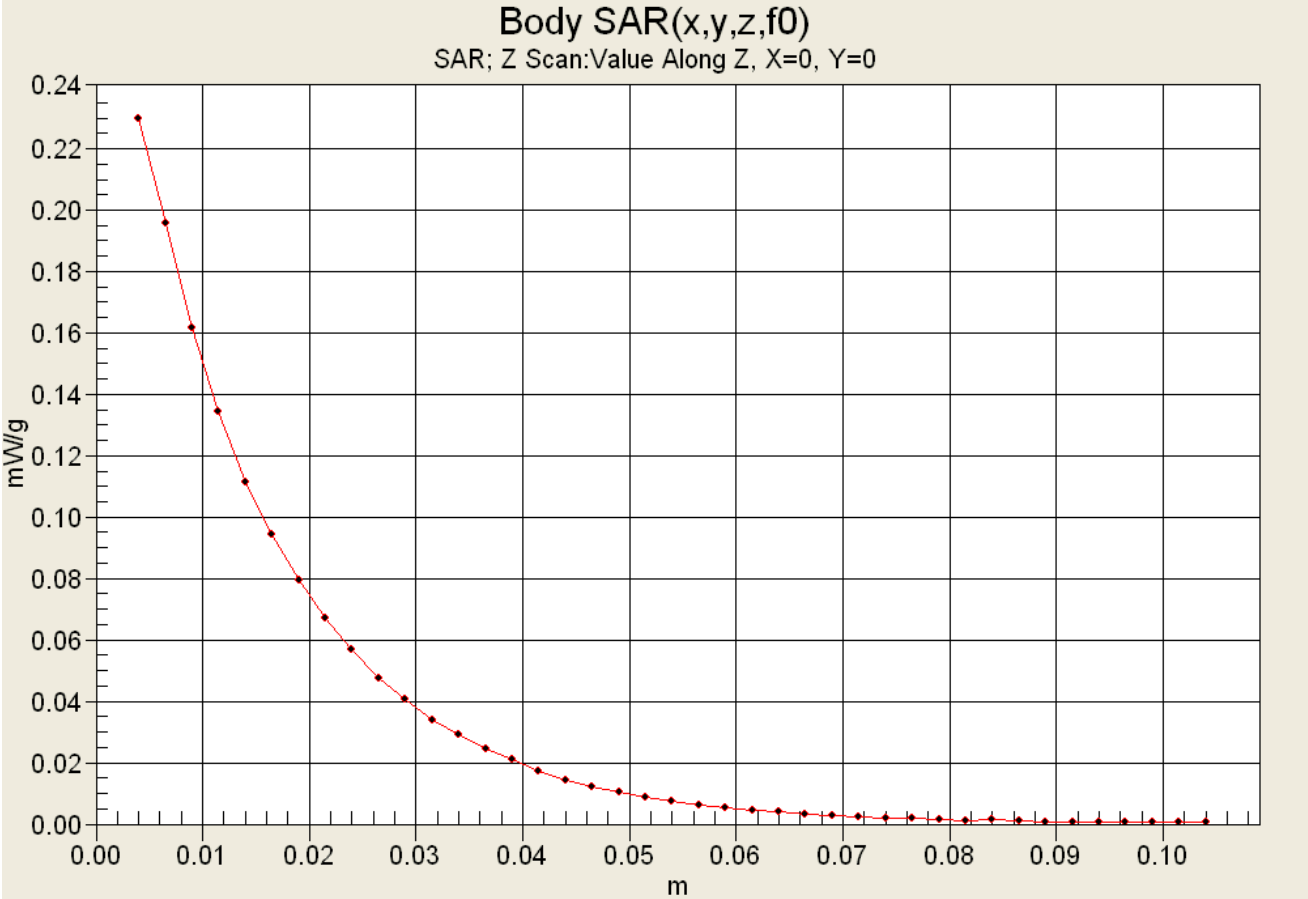
Communication System: GPRS - 2 Uplink
Frequency: 836.6 MHz; Duty Cycle: 1:4.16
Medium: M835 Medium parameters used: f = 836.6 MHz; σ = 0.98 mho/m; ε_r = 56.6; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(6.33, 6.33, 6.33); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body SAR - Front (Keypad) Side of Handheld RFID Reader - 10 mm Air-Gap Spacing to Planar Phantom
Area Scan (12x14x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.286 mW/g
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.7 V/m; Power Drift = -0.050 dB
Peak SAR (extrapolated) = 0.376 W/kg
SAR(1 g) = 0.273 mW/g; SAR(10 g) = 0.190 mW/g
Maximum value of SAR (measured) = 0.293 mW/g



Z-Axis Scan



Date Tested: 03/02/2011

Body SAR - WCDMA Rel99 (850) - 12.2kbps - 836.4 MHz - Ch. 4182 - Front (Keypad) Side of DUT

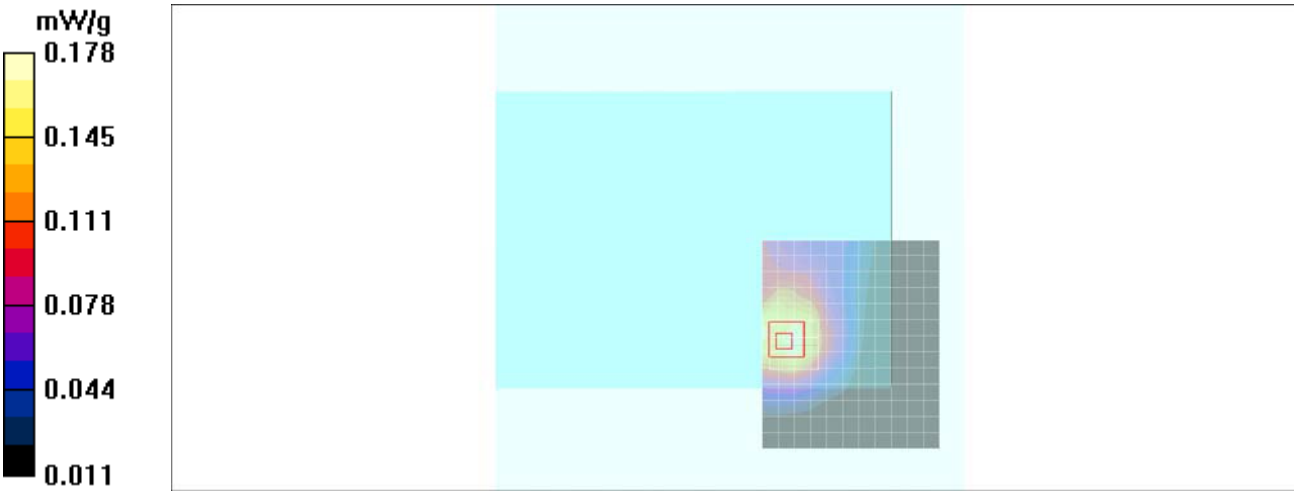
DUT: MaxID Corporation; Type: MC8795V WWAN in iDL750 Handheld RFID Reader; Serial: BHC00036

Ambient Temp: 22.0°C; Fluid Temp: 22.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: WCDMA 850
Frequency: 836.4 MHz; Duty Cycle: 1:1
Medium: M835 Medium parameters used: f = 836.4 MHz; σ = 0.98 mho/m; ε_r = 56.6; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(6.33, 6.33, 6.33); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body SAR - Front (Keypad) Side of Handheld RFID Reader - 10 mm Air-Gap Spacing to Planar Phantom
Area Scan (12x14x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.176 mW/g
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.0 V/m; Power Drift = -0.126 dB
Peak SAR (extrapolated) = 0.237 W/kg
SAR(1 g) = 0.164 mW/g; SAR(10 g) = 0.109 mW/g
Maximum value of SAR (measured) = 0.178 mW/g



Date Tested: 03/02/2011

Body SAR - GPRS 1900 - 4 Uplink Slots - 1880.0 MHz - Ch. 661 - Front (Keypad) Side of DUT

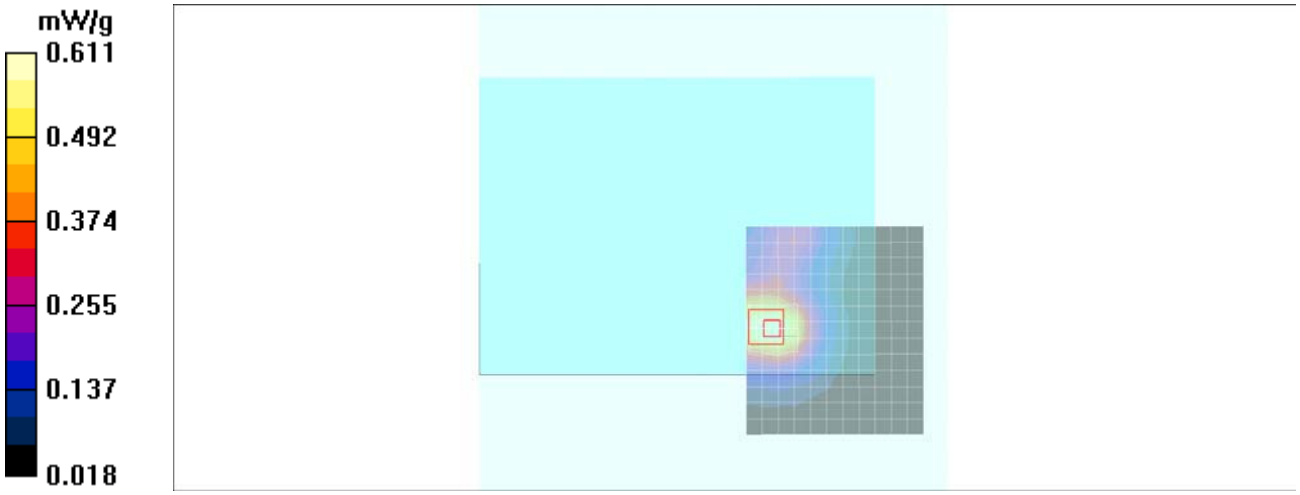
DUT: MaxID Corporation; Type: MC8795V WWAN in iDL750 Handheld RFID Reader; Serial: BHC00036

Ambient Temp: 22.0°C; Fluid Temp: 22.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

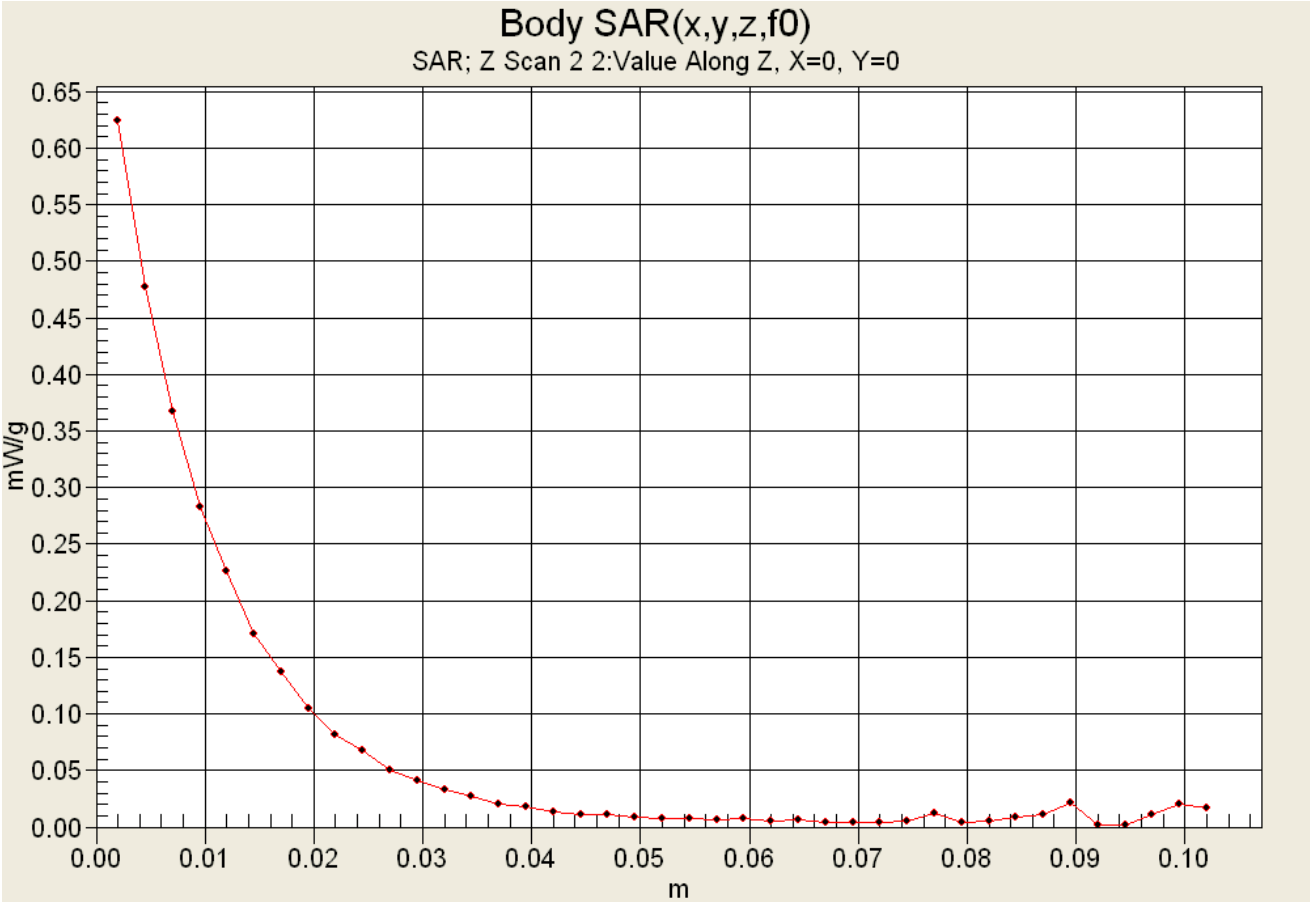
Communication System: GPRS - 4 Uplink
Frequency: 1880 MHz; Duty Cycle: 1:2.08
Medium: M1880 Medium parameters used: f = 1880 MHz; σ = 1.53 mho/m; ε_r = 51.4; ρ = 1000 kg/m^3

- Probe: EX3DV4 - SN3600; ConvF(6.47, 6.47, 6.47); Calibrated: 29/04/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body SAR - Front (Keypad) Side of Handheld RFID Reader - 10 mm Air-Gap Spacing to Planar Phantom
Area Scan (12x14x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.312 mW/g
Zoom Scan 3 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.9 V/m; Power Drift = -0.035 dB
Peak SAR (extrapolated) = 0.766 W/kg
SAR(1 g) = 0.459 mW/g; SAR(10 g) = 0.279 mW/g
Maximum value of SAR (measured) = 0.611 mW/g



Z-Axis Scan



Date Tested: 03/02/2011

Body SAR - WCDMA Rel99 (1900) - 12.2kbps - 1880.0 MHz - Ch. 9400 - Front (Keypad) Side of DUT

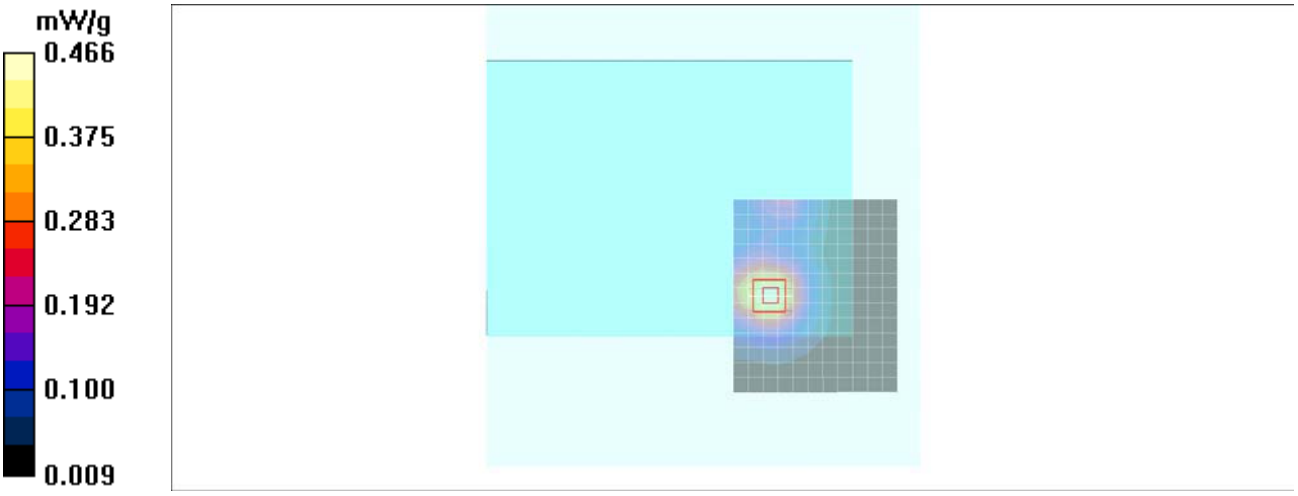
DUT: MaxID Corporation; Type: MC8795V WWAN in iDL750 Handheld RFID Reader; Serial: BHC00036

Ambient Temp: 22.0°C; Fluid Temp: 22.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: WCDMA 1900
Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: M1880 Medium parameters used: f = 1880 MHz; σ = 1.53 mho/m; ε_r = 51.4; ρ = 1000 kg/m^3

- Probe: EX3DV4 - SN3600; ConvF(6.47, 6.47, 6.47); Calibrated: 29/04/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body SAR - Front (Keypad) Side of Handheld RFID Reader - 10 mm Air-Gap Spacing to Planar Phantom
Area Scan (12x14x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.450 mW/g
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.0 V/m; Power Drift = -0.101 dB
Peak SAR (extrapolated) = 0.589 W/kg
SAR(1 g) = 0.343 mW/g; SAR(10 g) = 0.199 mW/g
Maximum value of SAR (measured) = 0.466 mW/g



APPENDIX B - SYSTEM PERFORMANCE CHECK PLOTS

Date Tested: 03/02/2011

System Performance Check - 835 MHz Dipole - Body

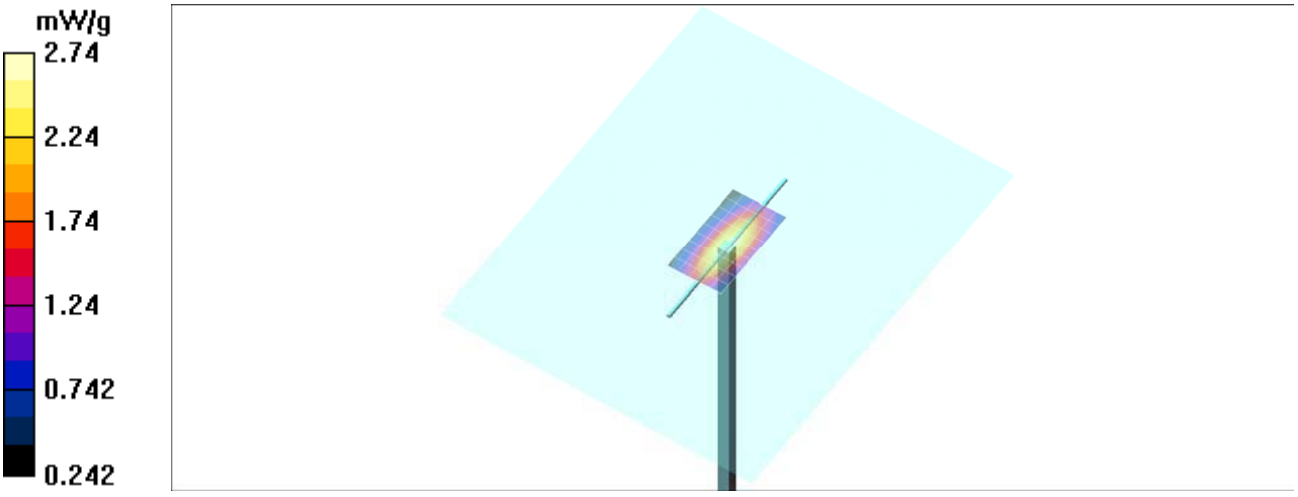
DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d075; Calibrated: 20/04/2009

Ambient Temp: 22.0°C; Fluid Temp: 22.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

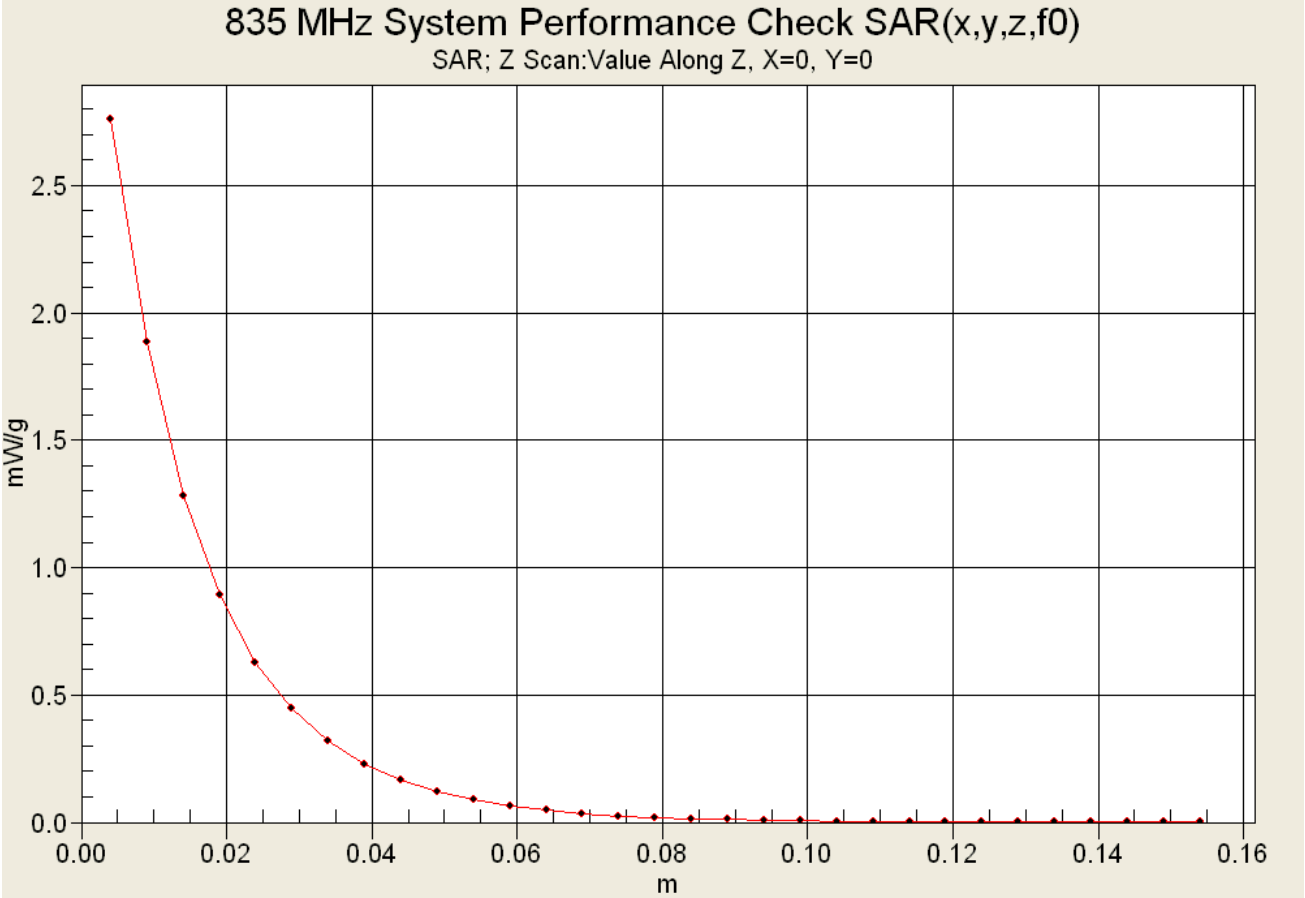
Communication System: CW
Forward Conducted Power: 250 mW
Frequency: 835 MHz; Duty Cycle: 1:1
Medium: M835 Medium parameters used: f = 835 MHz; σ = 0.98 mho/m; ε_r = 56.5; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(6.33, 6.33, 6.33); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

835 MHz System Performance Check
Area Scan (6x10x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 2.73 mW/g
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.8 V/m; Power Drift = -0.070 dB
Peak SAR (extrapolated) = 3.65 W/kg
SAR(1 g) = 2.54 mW/g; SAR(10 g) = 1.66 mW/g
Maximum value of SAR (measured) = 2.74 mW/g



Z-Axis Scan



Date Tested: 03/02/2011

System Performance Check - 1900 MHz Dipole - Body

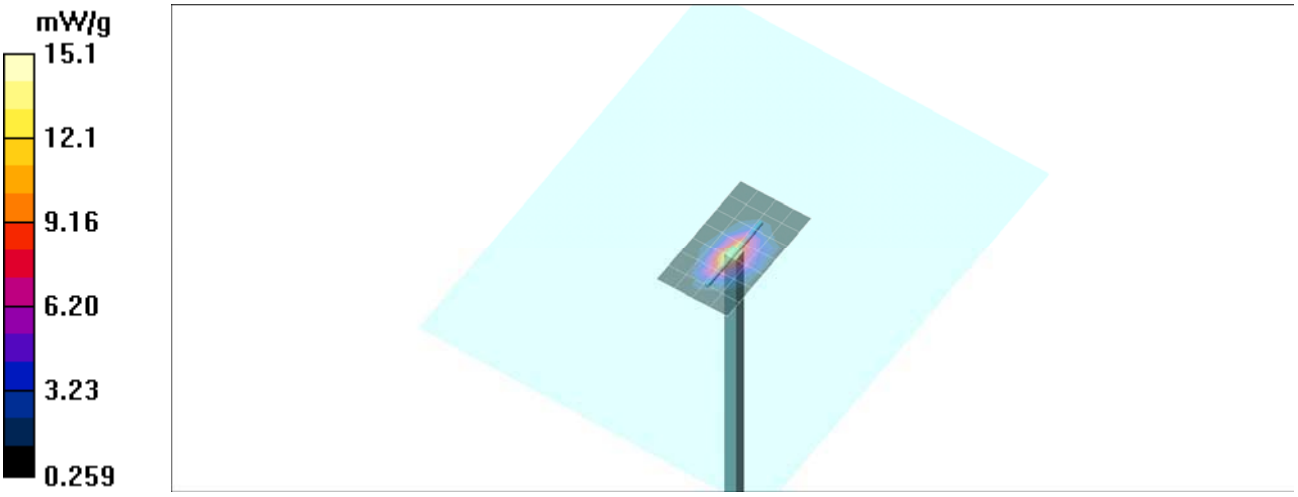
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d107; Calibrated: 21/04/2009

Ambient Temp: 22.0°C; Fluid Temp: 22.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

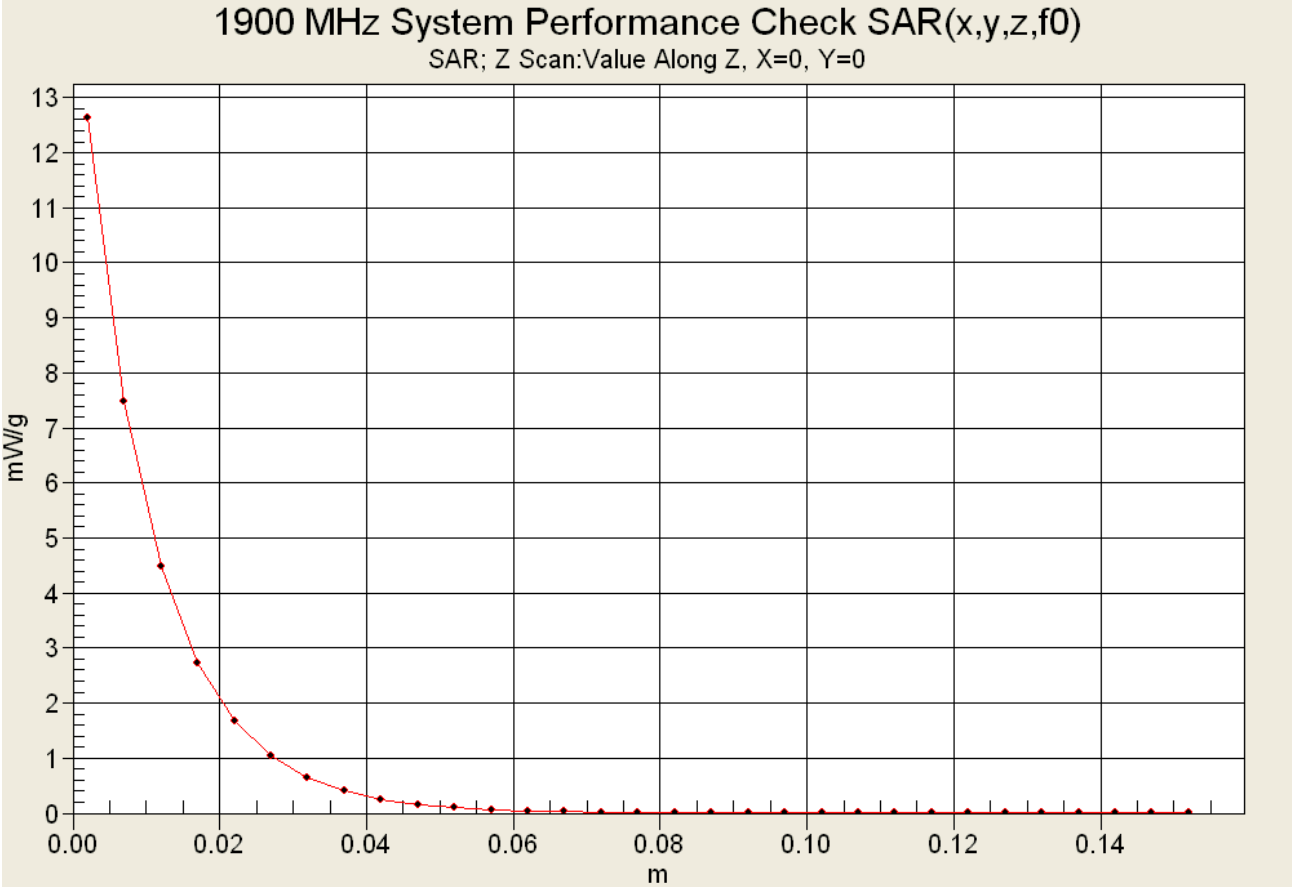
Communication System: CW
Forward Conducted Power: 250 mW
Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: M1900 Medium parameters used: f = 1900 MHz; σ = 1.54 mho/m; ε_r = 51.2; ρ = 1000 kg/m^3

- Probe: EX3DV4 - SN3600; ConvF(6.47, 6.47, 6.47); Calibrated: 29/04/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

1900 MHz System Performance Check
Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 13.1 mW/g
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 92.3 V/m; Power Drift = -0.013 dB
Peak SAR (extrapolated) = 19.4 W/kg
SAR(1 g) = 10.5 mW/g; SAR(10 g) = 5.49 mW/g
Maximum value of SAR (measured) = 15.1 mW/g



Z-Axis Scan



APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

835 MHz (Body)

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
02/Mar/2011
Frequency (GHz)
FCC_eB FCC Limits for Body Epsilon
FCC_sB FCC Limits for Body Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eB	FCC_sB	Test_e	Test_s
0.7350	55.59	0.96	57.34	0.88
0.7450	55.55	0.96	57.48	0.89
0.7550	55.51	0.96	57.37	0.90
0.7650	55.47	0.96	57.32	0.91
0.7750	55.43	0.97	56.91	0.92
0.7850	55.39	0.97	56.75	0.93
0.7950	55.36	0.97	56.75	0.94
0.8050	55.32	0.97	56.57	0.95
0.8150	55.28	0.97	56.53	0.96
0.8250	55.24	0.97	56.53	0.98
0.8350	55.20	0.97	56.55	0.98
0.8450	55.17	0.98	56.53	0.99
0.8550	55.14	0.99	56.24	1.00
0.8650	55.11	1.01	56.39	1.00
0.8750	55.08	1.02	56.11	1.02
0.8850	55.05	1.03	55.94	1.02
0.8950	55.02	1.04	55.82	1.04
0.9050	55.00	1.05	55.86	1.05
0.9150	55.00	1.06	55.80	1.06
0.9250	54.98	1.06	55.62	1.07
0.9350	54.96	1.07	55.60	1.08

1900 MHz (Body)

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
02/Mar/2011
Frequency (GHz)
FCC_eB FCC Limits for Body Epsilon
FCC_sB FCC Limits for Body Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eB	FCC_sB	Test_e	Test_s
1.8000	53.30	1.52	52.05	1.47
1.8100	53.30	1.52	51.88	1.47
1.8200	53.30	1.52	51.83	1.49
1.8300	53.30	1.52	51.62	1.50
1.8400	53.30	1.52	51.53	1.50
1.8500	53.30	1.52	51.45	1.52
1.8600	53.30	1.52	51.49	1.52
1.8700	53.30	1.52	51.35	1.52
1.8800	53.30	1.52	51.36	1.53
1.8900	53.30	1.52	51.27	1.54
1.9000	53.30	1.52	51.23	1.54
1.9100	53.30	1.52	51.20	1.55
1.9200	53.30	1.52	51.00	1.57
1.9300	53.30	1.52	51.11	1.58
1.9400	53.30	1.52	51.00	1.58
1.9500	53.30	1.52	50.91	1.58
1.9600	53.30	1.52	50.83	1.59
1.9700	53.30	1.52	50.83	1.60
1.9800	53.30	1.52	50.88	1.62
1.9900	53.30	1.52	50.70	1.63
2.0000	53.30	1.52	50.63	1.64

APPENDIX F - DIPOLE CALIBRATION

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
S 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 Celltech

Certificate No: D835V2-4d075_Apr09

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d075
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	April 20, 2009
Condition of the calibrated item	In Tolerance

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	08-Oct-08 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09
Reference 20 dB Attenuator	SN: 5086 (20g)	31-Mar-09 (No. 217-01025)	Mar-10
Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10
Reference Probe ES3DV2	SN: 3025	28-Apr-08 (No. ES3-3025_Apr08)	Apr-09
DAE4	SN: 601	07-Mar-09 (No. DAE4-601_Mar09)	Mar-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

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

Issued: April 22, 2009

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	V5.0
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	41.1 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature during test	(22.1 ± 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	2.35 mW / g
SAR normalized	normalized to 1W	9.40 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**9.46 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.54 mW / g
SAR normalized	normalized to 1W	6.16 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**6.19 mW /g ± 16.5 % (k=2)**

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

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	53.9 ± 6 %	1.01 mho/m ± 6 %
Body TSL temperature during test	(22.1 ± 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	2.49 mW / g
SAR normalized	normalized to 1W	9.96 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**9.61 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.64 mW / g
SAR normalized	normalized to 1W	6.56 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**6.39 mW / g ± 16.5 % (k=2)**

[2] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.8 Ω - 3.1 jΩ
Return Loss	- 29.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.0 Ω - 4.1 jΩ
Return Loss	- 26.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.401 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	November 09, 2007

DASY5 Validation Report for Head TSL

Date/Time: 14.04.2009 11:20:38

Test Laboratory: SPEAG, Zurich, Switzerland

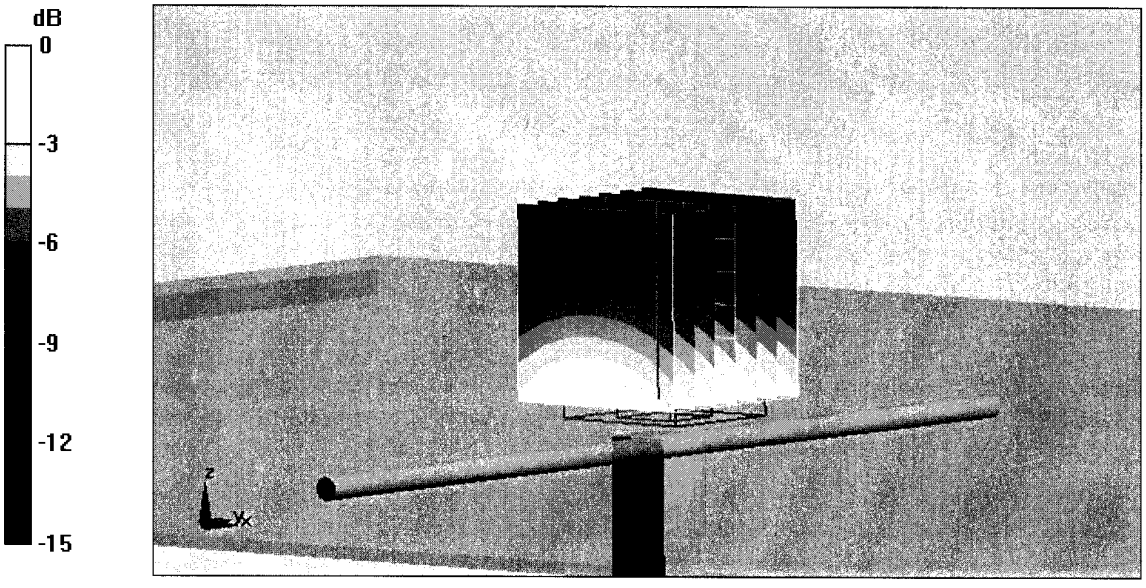
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d075

Communication System: CW-835; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL 900 MHz
Medium parameters used: f = 835 MHz; σ = 0.89 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

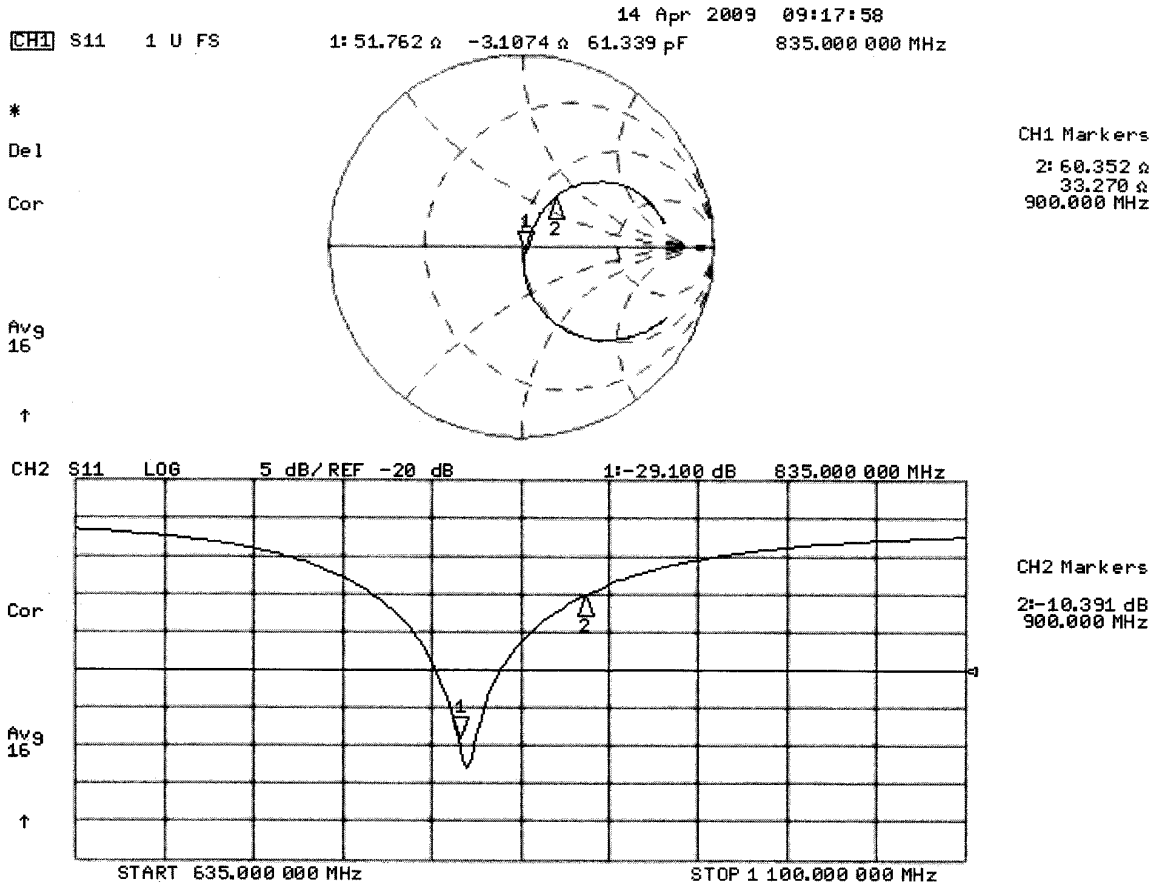
- Probe: ES3DV2 - SN3025; ConvF(5.97, 5.97, 5.97); Calibrated: 28.04.2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

Pin=250mW; dip=15mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57 V/m; Power Drift = 0.011 dB
Peak SAR (extrapolated) = 3.47 W/kg
SAR(1 g) = 2.35 mW/g; SAR(10 g) = 1.54 mW/g
Maximum value of SAR (measured) = 2.74 mW/g



0 dB = 2.74mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date/Time: 20.04.2009 09:57:39

Test Laboratory: SPEAG, Zurich, Switzerland

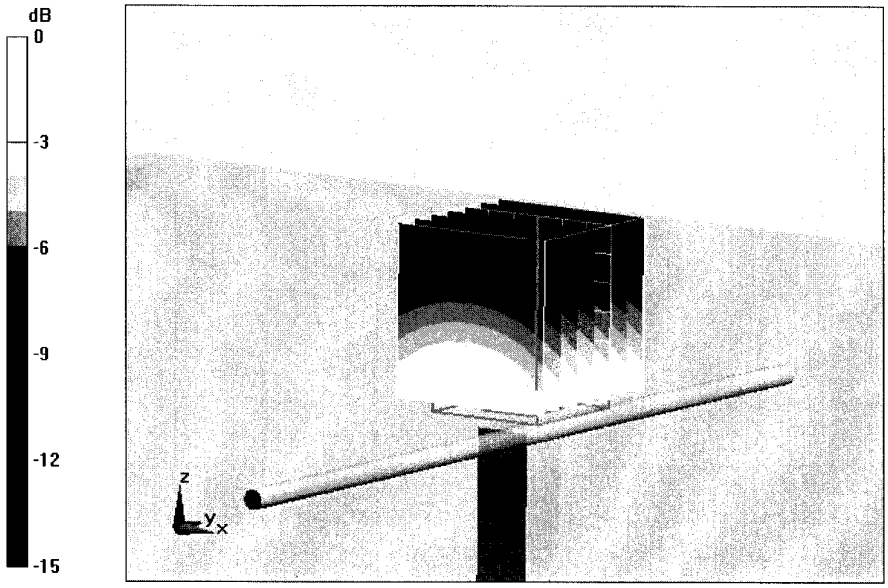
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d075

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL900
Medium parameters used: f = 835 MHz; σ = 1.01 mho/m; ε_r = 53.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

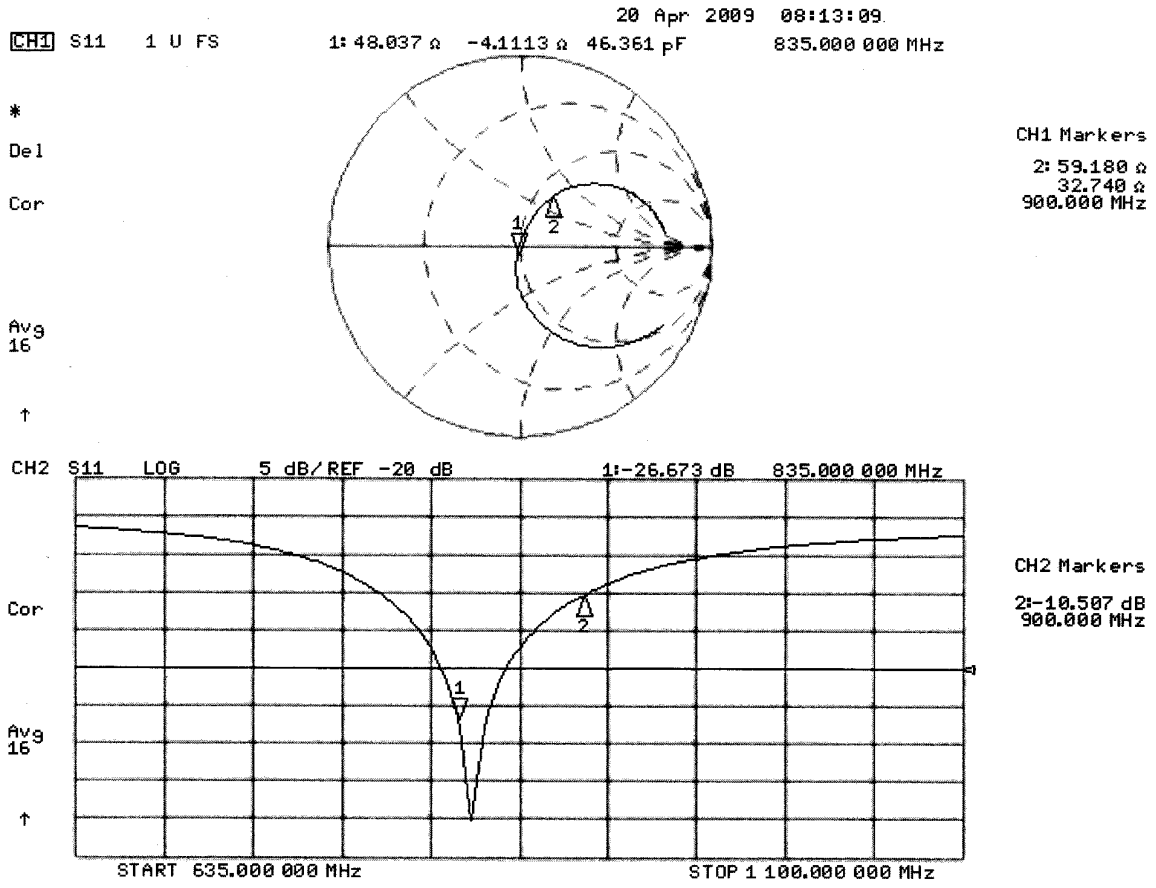
- Probe: ES3DV2 - SN3025; ConvF(5.9, 5.9, 5.9); Calibrated: 28.04.2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

Pin = 250mW, d = 15mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.4 V/m; Power Drift = -0.00173 dB
Peak SAR (extrapolated) = 3.61 W/kg
SAR(1 g) = 2.49 mW/g; SAR(10 g) = 1.64 mW/g
Maximum value of SAR (measured) = 2.9 mW/g



0 dB = 2.9mW/g

Impedance Measurement Plot for Body TSL



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
S 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 Celltech

Certificate No: D1900V2-5d107-Apr09

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d107
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	April 21, 2009
Condition of the calibrated item	In Tolerance

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 (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	08-Oct-08 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09
Reference 20 dB Attenuator	SN: 5086 (20g)	31-Mar-09 (No. 217-01025)	Mar-10
Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10
Reference Probe ES3DV2	SN: 3025	28-Apr-08 (No. ES3-3025_Apr08)	Apr-09
DAE4	SN: 601	07-Mar-09 (No. DAE4-601_Mar09)	Mar-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

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

Issued: April 24, 2009

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) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001
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	V5.0
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	38.6 ± 6 %	1.47 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	condition	
SAR measured	250 mW input power	10.6 mW / g
SAR normalized	normalized to 1W	42.4 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**40.9 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.45 mW / g
SAR normalized	normalized to 1W	21.8 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**21.4 mW / g ± 16.5 % (k=2)**

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

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	54.9 ± 6 %	1.56 mho/m ± 6 %
Body TSL temperature during test	(21.3 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.6 mW / g
SAR normalized	normalized to 1W	42.4 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**42.1 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.62 mW / g
SAR normalized	normalized to 1W	22.5 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**22.4 mW / g ± 16.5 % (k=2)**

[2] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.0 Ω + 5.5 jΩ
Return Loss	- 25.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.9 Ω + 6.3 jΩ
Return Loss	- 22.1 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.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 28, 2008

DASY5 Validation Report for Head TSL

Date/Time: 15.04.2009 15:01:47

Test Laboratory: SPEAG, Zurich, Switzerland

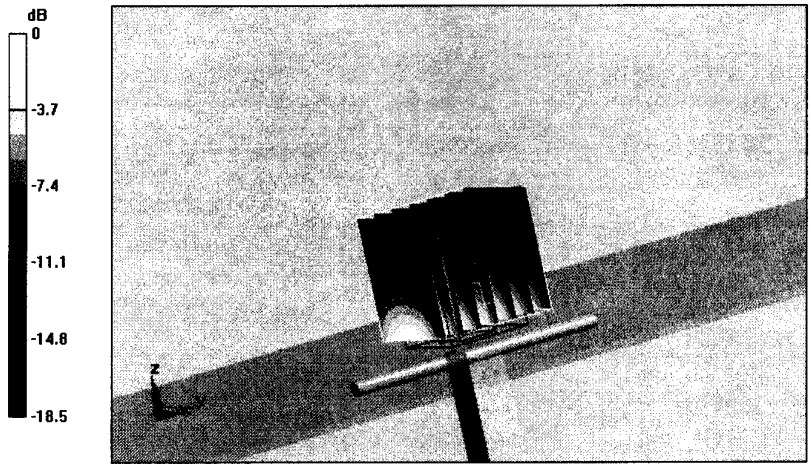
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d107

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL U10 BB
Medium parameters used: f = 1900 MHz; σ = 1.47 mho/m; ε_r = 38.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

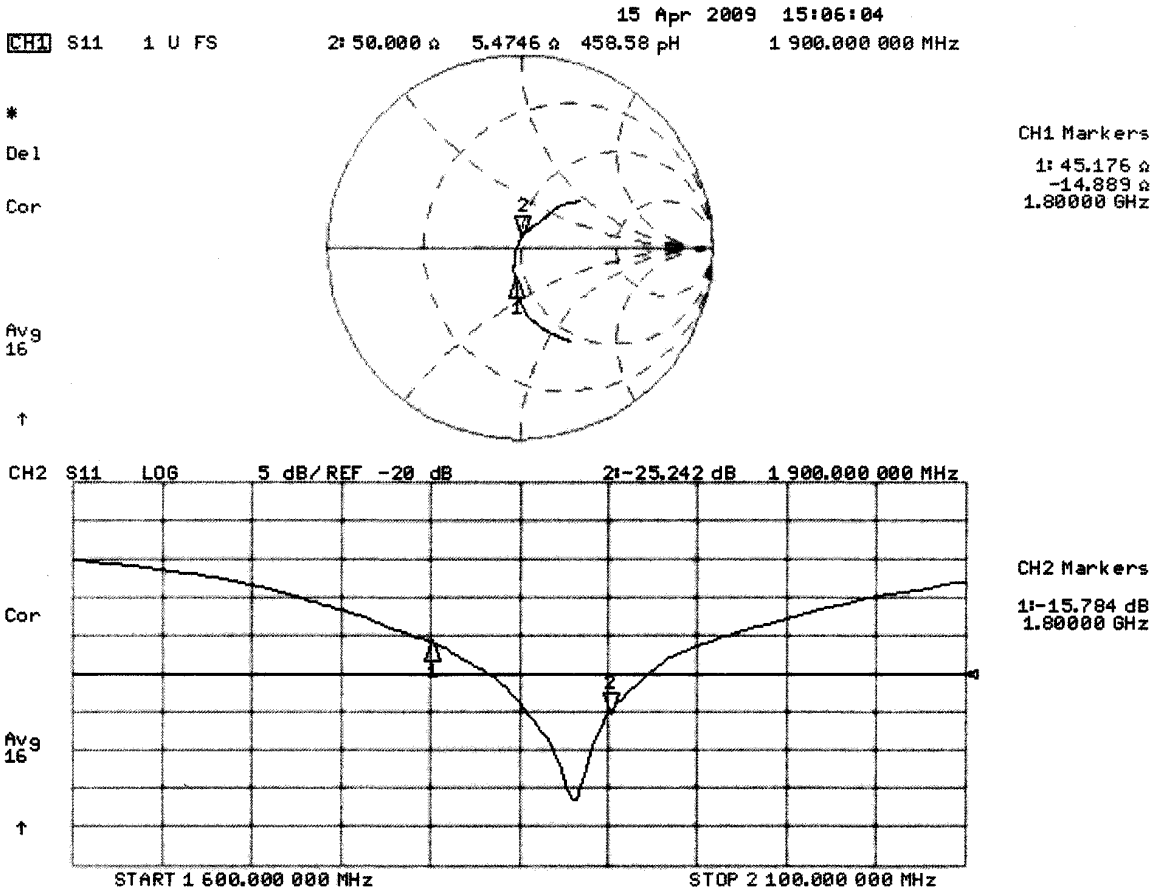
- Probe: ES3DV2 - SN3025; ConvF(4.9, 4.9, 4.9); Calibrated: 28.04.2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

Pin = 250 mW; dip = 10 mm, scan at 3.0 mm/Zoom Scan (dist=3.0 mm, probe 0deg) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.7 V/m; Power Drift = 0.031 dB
Peak SAR (extrapolated) = 20 W/kg
SAR(1 g) = 10.6 mW/g; SAR(10 g) = 5.45 mW/g
Maximum value of SAR (measured) = 13.2 mW/g



0 dB = 13.2mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date/Time: 21.04.2009 15:29:55

Test Laboratory: SPEAG, Zurich, Switzerland

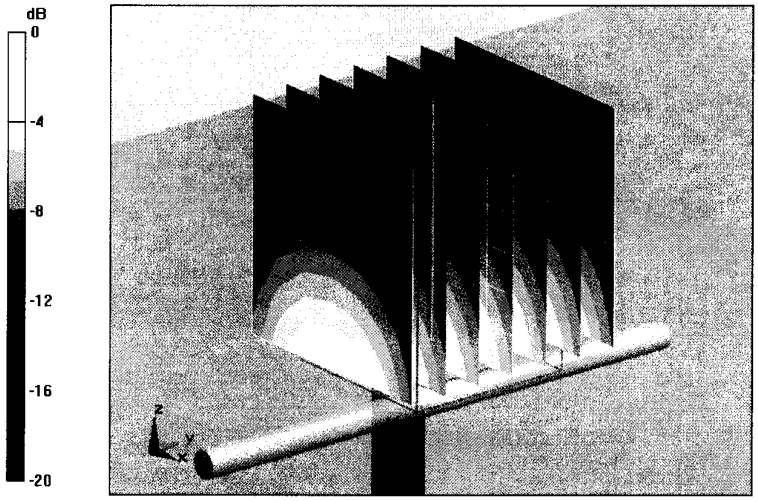
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d107

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: MSL U10 BB
Medium parameters used: f = 1900 MHz; σ = 1.56 mho/m; ε_r = 55; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

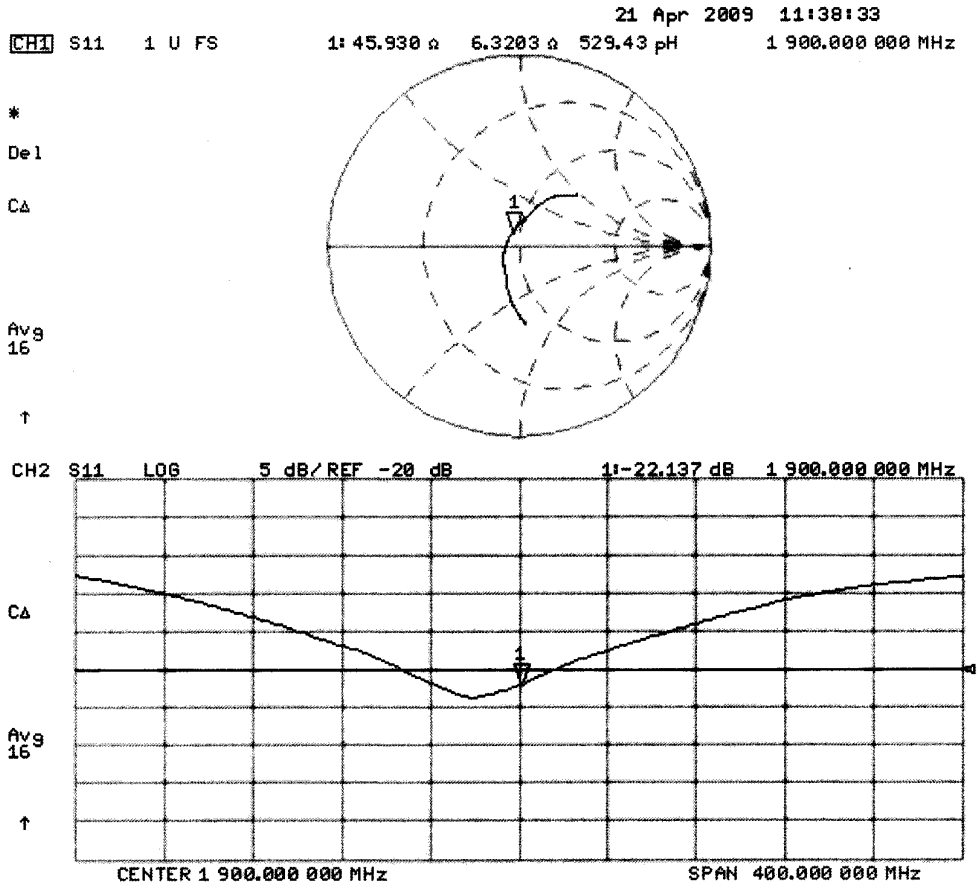
- Probe: ES3DV2 - SN3025; ConvF(4.5, 4.5, 4.5); Calibrated: 28.04.2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

Pin = 250 mW; dip = 10 mm, scan at 3.0mm/Zoom Scan (dist=3.4mm, probe 0deg) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.6 V/m; Power Drift = -0.00425 dB
Peak SAR (extrapolated) = 18.7 W/kg
SAR(1 g) = 10.6 mW/g; SAR(10 g) = 5.62 mW/g
Maximum value of SAR (measured) = 13.5 mW/g



0 dB = 13.5mW/g

Impedance Measurement Plot for Body TSL



APPENDIX G - PROBE CALIBRATION

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
S 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 **Celltech**

Certificate No: ET3-1590_Jul10

CALIBRATION CERTIFICATE

Object **ET3DV6 - SN:1590**

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

Calibration date: **July 15, 2010**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	20-Apr-10 (No. DAE4-660_Apr10)	Apr-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

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

Issued: July 15, 2010

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
S 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., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ ($f \le 900$ 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 effect 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.
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z: A, B, C* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \le 800$ 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:1590

Manufactured:	March 19, 2001
Last calibrated:	July 16, 2009
Recalibrated:	July 15, 2010

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ET3DV6 SN:1590

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.86	2.06	1.77	± 10.1%
DCP (mV)[B]	91.4	92.4	83.5	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300.0	± 1.5%
			Y	0.00	0.00	1.00	300.0	
			Z	0.00	0.00	1.00	300.0	

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 maximum deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ET3DV6 SN:1590

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
450	± 50 / ± 100	43.5 ± 5%	0.87 ± 5%	7.25	7.25	7.25	0.20	2.19 ± 13.3%
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	6.27	6.27	6.27	0.32	2.49 ± 11.0%
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	6.12	6.12	6.12	0.27	2.86 ± 11.0%

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

DASY/EASY - Parameters of Probe: ET3DV6 SN:1590

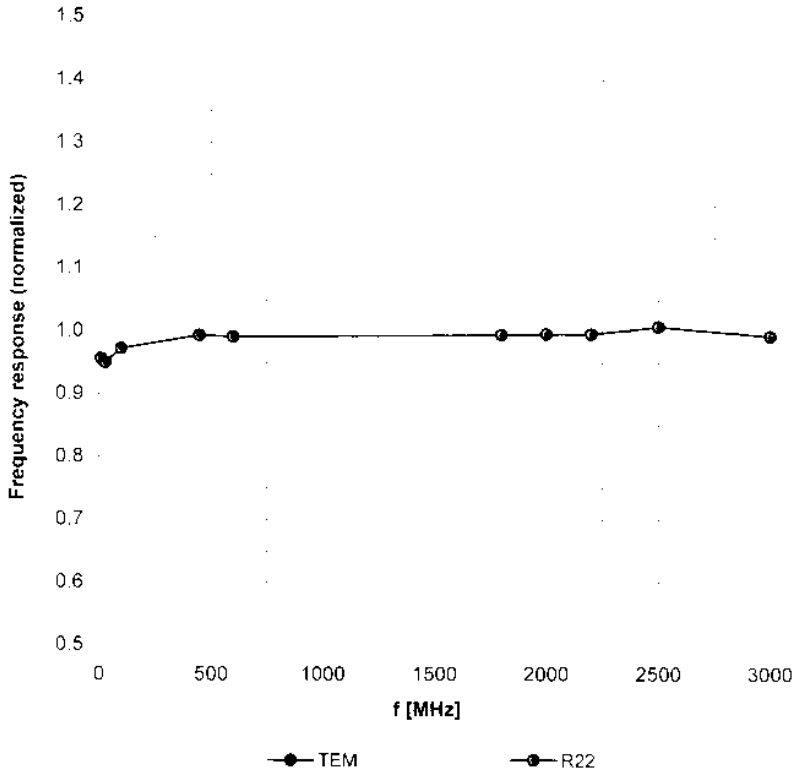
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
450	± 50 / ± 100	56.7 ± 5%	0.94 ± 5%	7.73	7.73	7.73	0.13	2.06 ± 13.3%
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	6.33	6.33	6.33	0.22	3.60 ± 11.0%
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	6.15	6.15	6.15	0.28	2.94 ± 11.0%

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

Frequency Response of E-Field

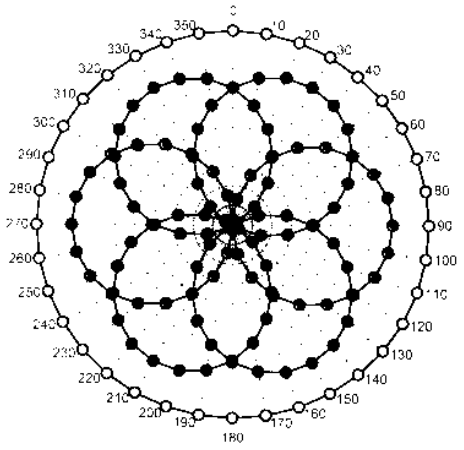
(TEM-Cell:ifi110 EXX, Waveguide: R22)



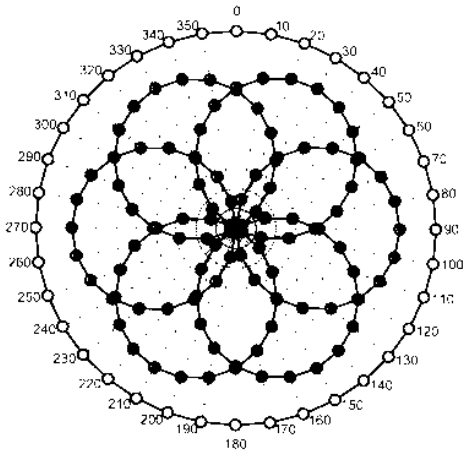
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

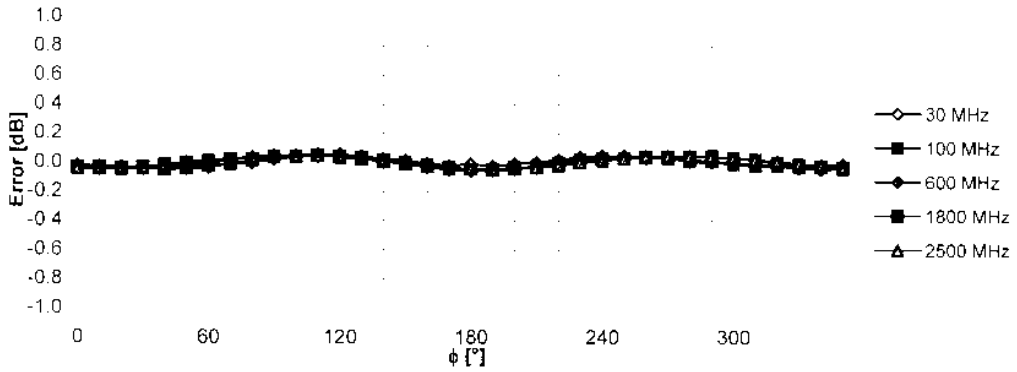
Receiving Pattern (ϕ), ϑ = 0°

f = 600 MHz, TEM ifi110EXX



f = 1800 MHz, WG R22

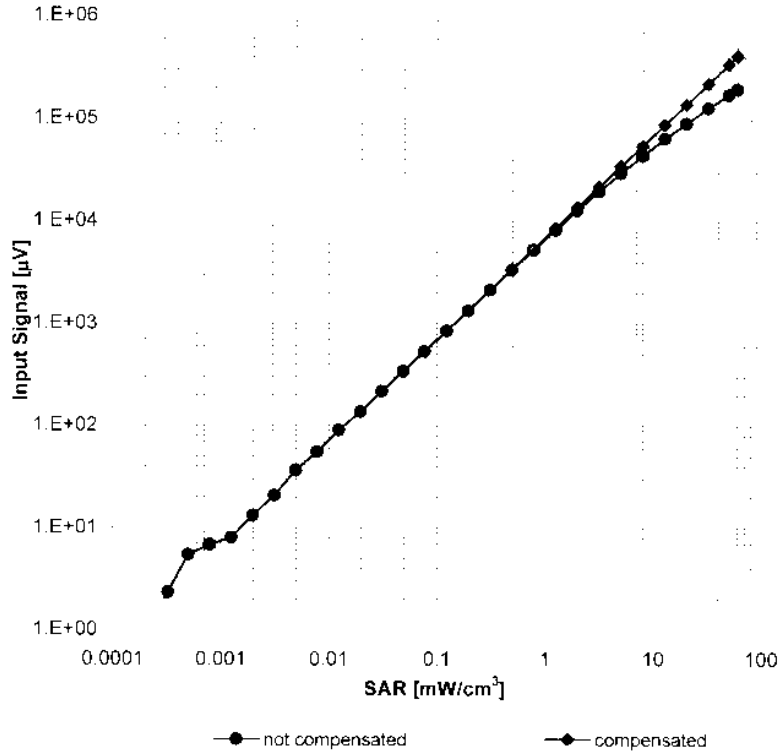


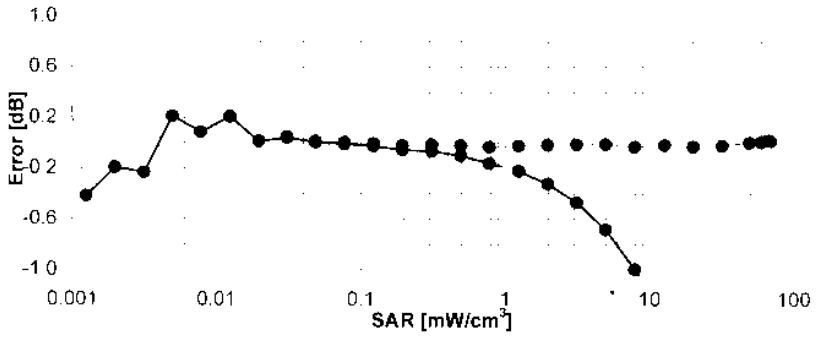


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

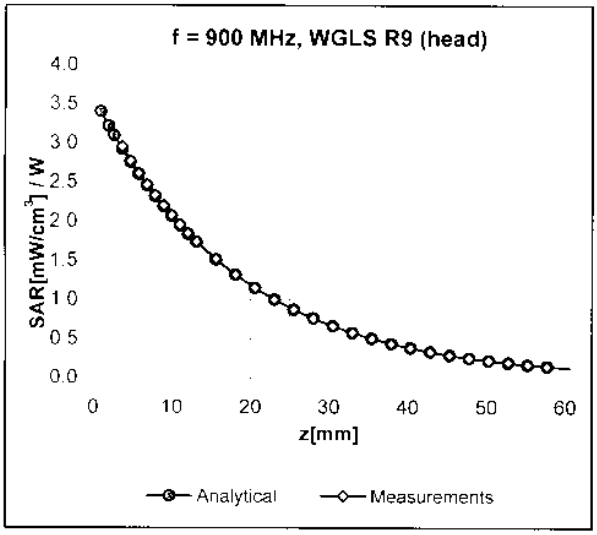
(Waveguide R22, f = 1800 MHz)

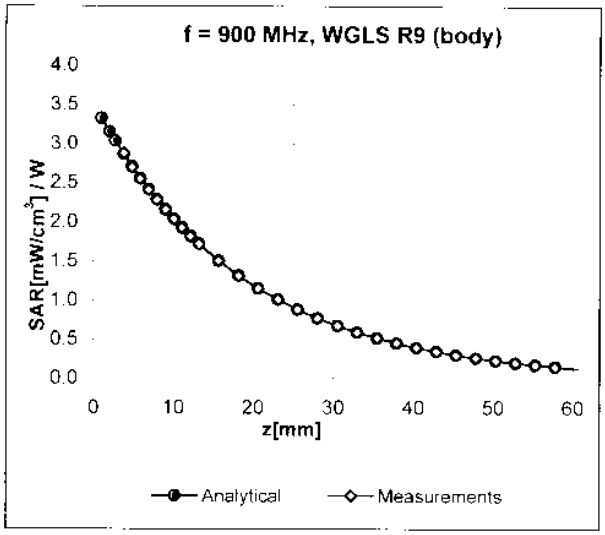




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

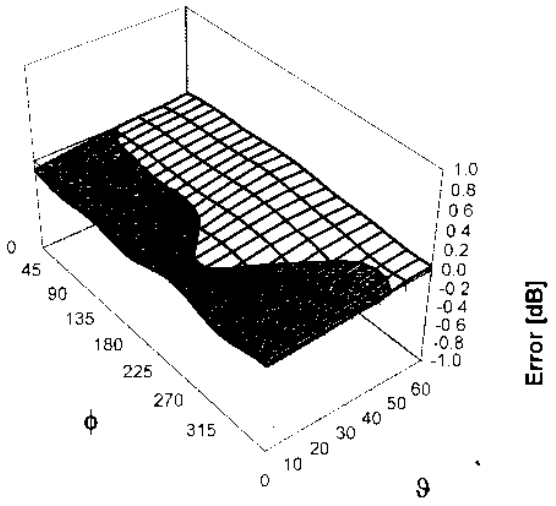
Conversion Factor Assessment





Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

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

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

S Schweizerischer Kalibrierdienst
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S 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 **Celltech**

Certificate No: EX3-3600_Apr10

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3600
Calibration procedure(s)	QA CAL-01.v6, QA CAL-14.v3, QA CAL-23.v3 and QA CAL-25.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	April 29, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	29-Sep-09 (No. DAE4-660_Sep09)	Sep-10

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-09)	In house check: Oct10

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: April 29, 2010

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., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ ($f \le 900$ 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 effect 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.
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z: A, B, C* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \le 800$ 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 EX3DV4

SN:3600

Manufactured:	January 10, 2007
Last calibrated:	April 28, 2009
Recalibrated:	April 29, 2010

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: EX3DV4 SN:3600

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.51	0.51	0.40	± 10.1%
DCP (mV)[B]	90.5	88.5	85.2	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300	± 1.5%
			Y	0.00	0.00	1.00	300	
			Z	0.00	0.00	1.00	300	

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 maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value.

DASY - Parameters of Probe: EX3DV4 SN:3600

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	7.79	7.79	7.79	0.74	0.61 ± 11.0%
1810	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	6.79	6.79	6.79	0.59	0.70 ± 11.0%
1950	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	6.46	6.46	6.46	0.57	0.72 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	6.15	6.15	6.15	0.34	0.89 ± 11.0%

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

DASY - Parameters of Probe: EX3DV4 SN:3600

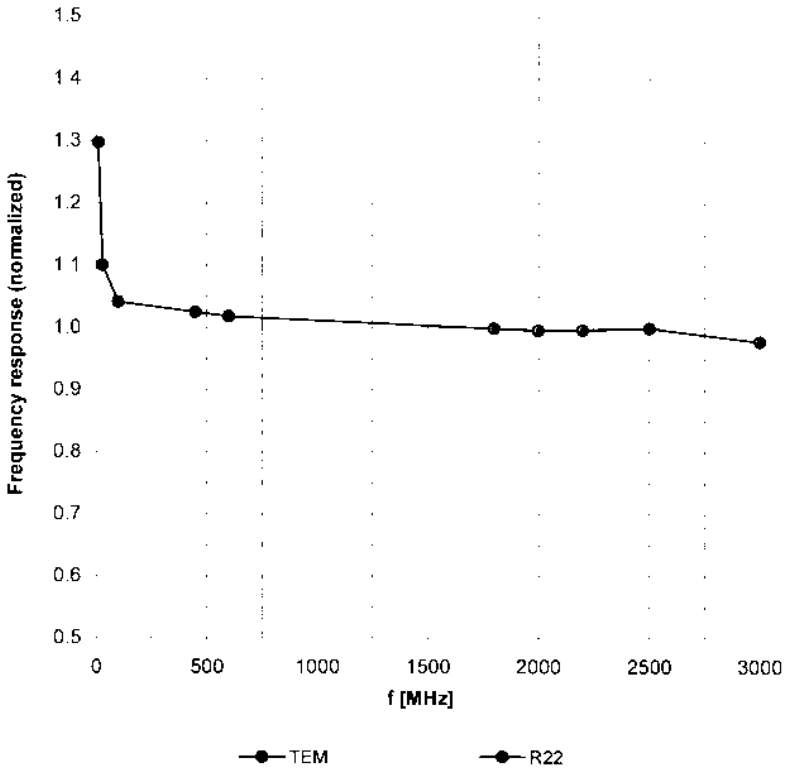
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	7.92	7.92	7.92	0.50	0.77 ± 11.0%
1810	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	6.47	6.47	6.47	0.70	0.64 ± 11.0%
1950	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	6.53	6.53	6.53	0.64	0.67 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	6.24	6.24	6.24	0.43	0.87 ± 11.0%
5200	± 50 / ± 100	49.0 ± 5%	5.30 ± 5%	3.73	3.73	3.73	0.52	1.95 ± 13.1%
5500	± 50 / ± 100	48.6 ± 5%	5.65 ± 5%	3.30	3.30	3.30	0.58	1.95 ± 13.1%
5800	± 50 / ± 100	48.2 ± 5%	6.00 ± 5%	3.44	3.44	3.44	0.63	1.95 ± 13.1%

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

Frequency Response of E-Field

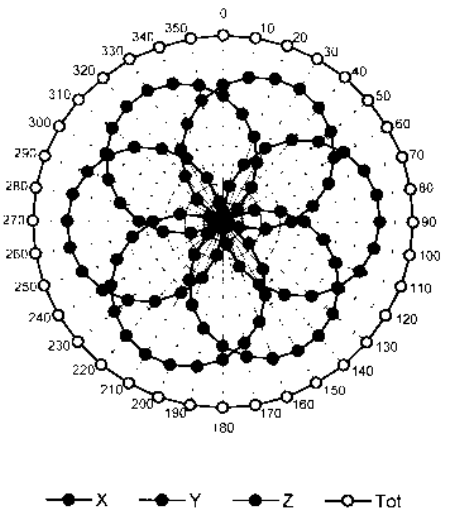
(TEM-Cell:ifi110 EXX, Waveguide: R22)



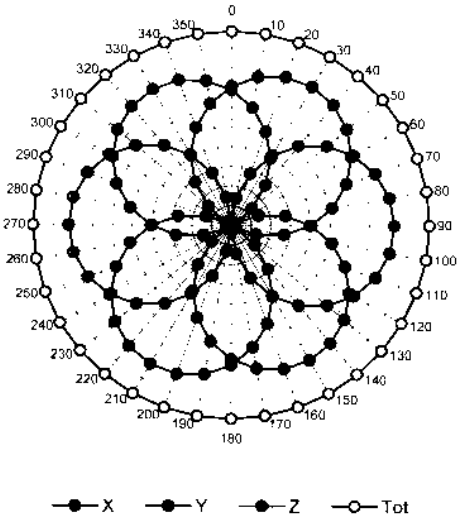
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

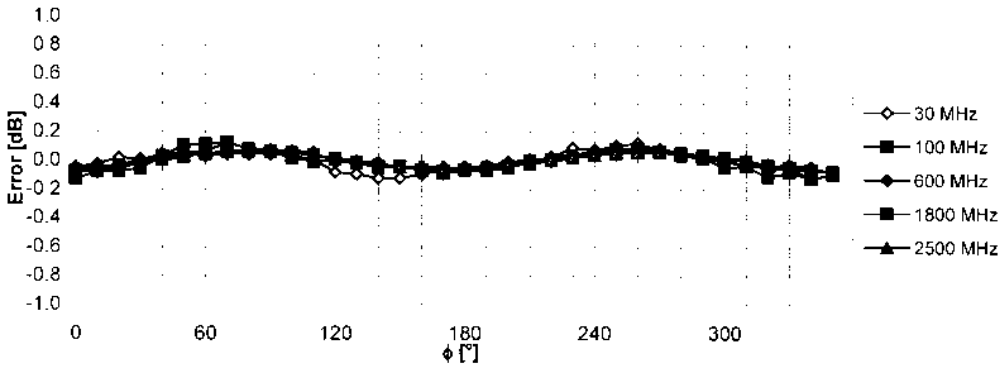
Receiving Pattern (ϕ), ϑ = 0°

f = 600 MHz, TEM ifi110EXX



f = 1800 MHz, WG R22

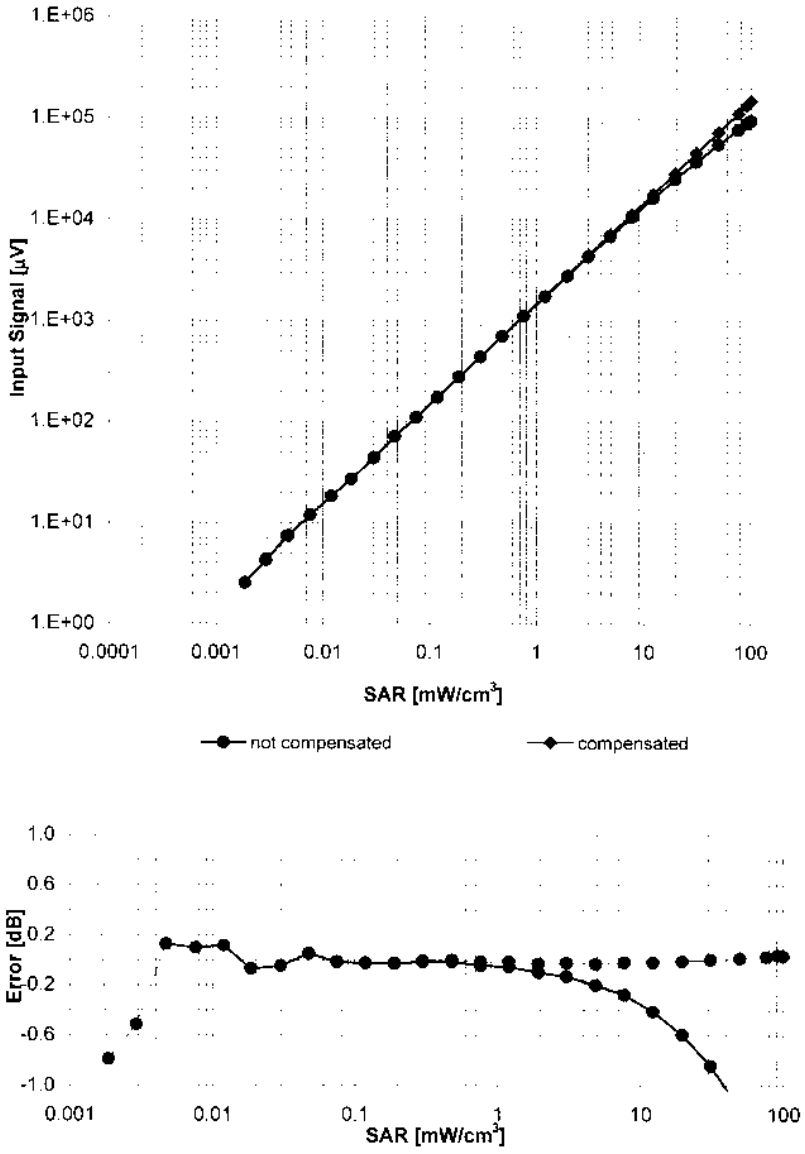




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

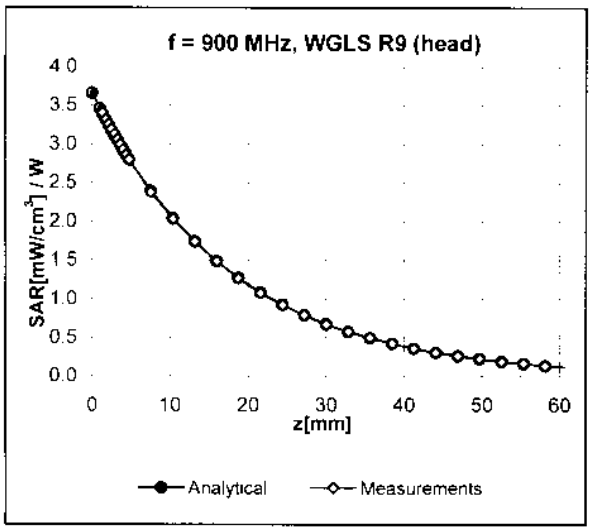
Dynamic Range f(SAR_{head})

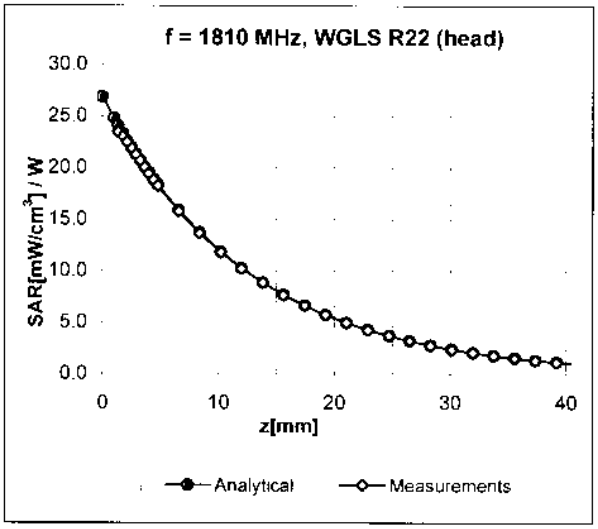
(Waveguide R22, f = 1800 MHz)



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

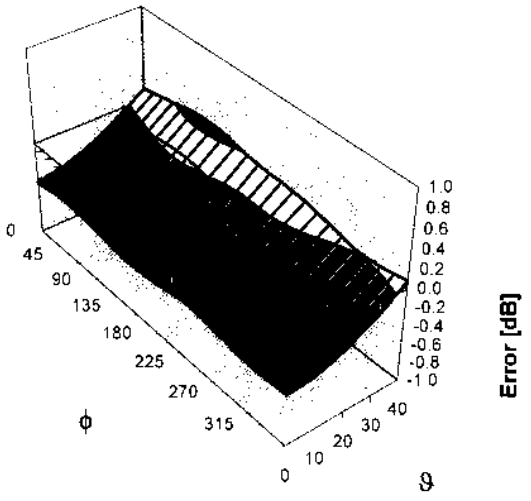
Conversion Factor Assessment





Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



■-1.00--0.80 ■-0.80--0.60 ■-0.60--0.40 ■-0.40--0.20 ■-0.20-0.00
□0.00-0.20 ■0.20-0.40 □0.40-0.60 ■0.60-0.80 ■0.80-1.00

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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

APPENDIX H - BARSKI PLANAR PHANTOM CERTIFICATE OF CONFORMITY

2378 Westlake Road
Kelowna, B.C. Canada
V1Z-2V2

BARSKI INDUSTRIES (1985) LTD.

Ph. # 250-769-6848
Fax # 250-769-6334
E-mail: barskiind@shaw.ca
Web: www.bcfiberglass.com

FIBERGLASS FABRICATORS

Certificate of Conformity

Item : Flat Planar Phantom Unit # 03-01
Date: June 16, 2003
Manufacturer: Barski Industries (1985 Ltd)

Test	Requirement	Details
Shape	Compliance to geometry according to drawing	Supplied CAD drawing
Material Thickness	Compliant with the requirements	2mm +/- 0.2mm in measurement area
Material Parameters	Dielectric parameters for required frequencies Based on Dow Chemical technical data	100 MHz-5 GHz Relative permittivity<5 Loss Tangent<0.05

Conformity

Based on the above information, we certify this product to be compliant to the requirements specified.

Signature: 

Daniel Chailler

Fiberglass Planar Phantom - Top View

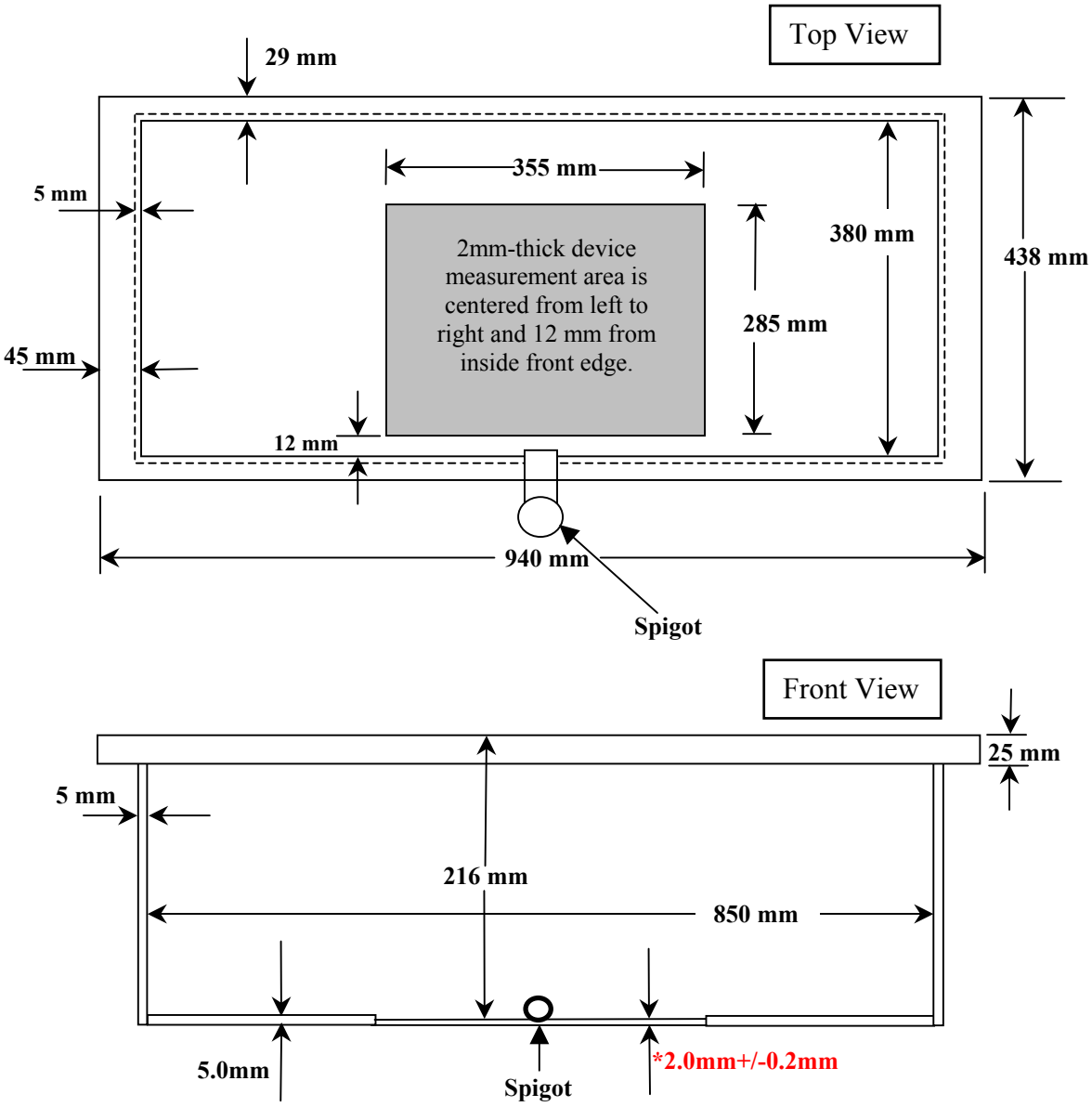
Fiberglass Planar Phantom - Front View

Fiberglass Planar Phantom - Back View

Fiberglass Planar Phantom - Bottom View

Dimensions of Fiberglass Planar Phantom

(Manufactured by Barski Industries Ltd. - Unit# 03-01)



Note: Measurements that aren't repeated for the opposite sides are the same as the side measured. This drawing is not to scale.