Appendix 4. Photographs

This appendix contains the following photographs:

Photo Reference Number	Title
PHT/74349JD01/001	Test configuration for the measurement of Specific Absorption Rate (SAR)
PHT/74349JD01/002	Base of Netbook Facing Phantom With Display at 90 Degrees to Keyboard
PHT/74349JD01/003	Rear of Netbook Display
PHT/74349JD01/004	Base of Netbook
PHT/74349JD01/005	Internal View of Netbook
PHT/74349JD01/006	Battery View
PHT/74349JD01/007	Fluid Level

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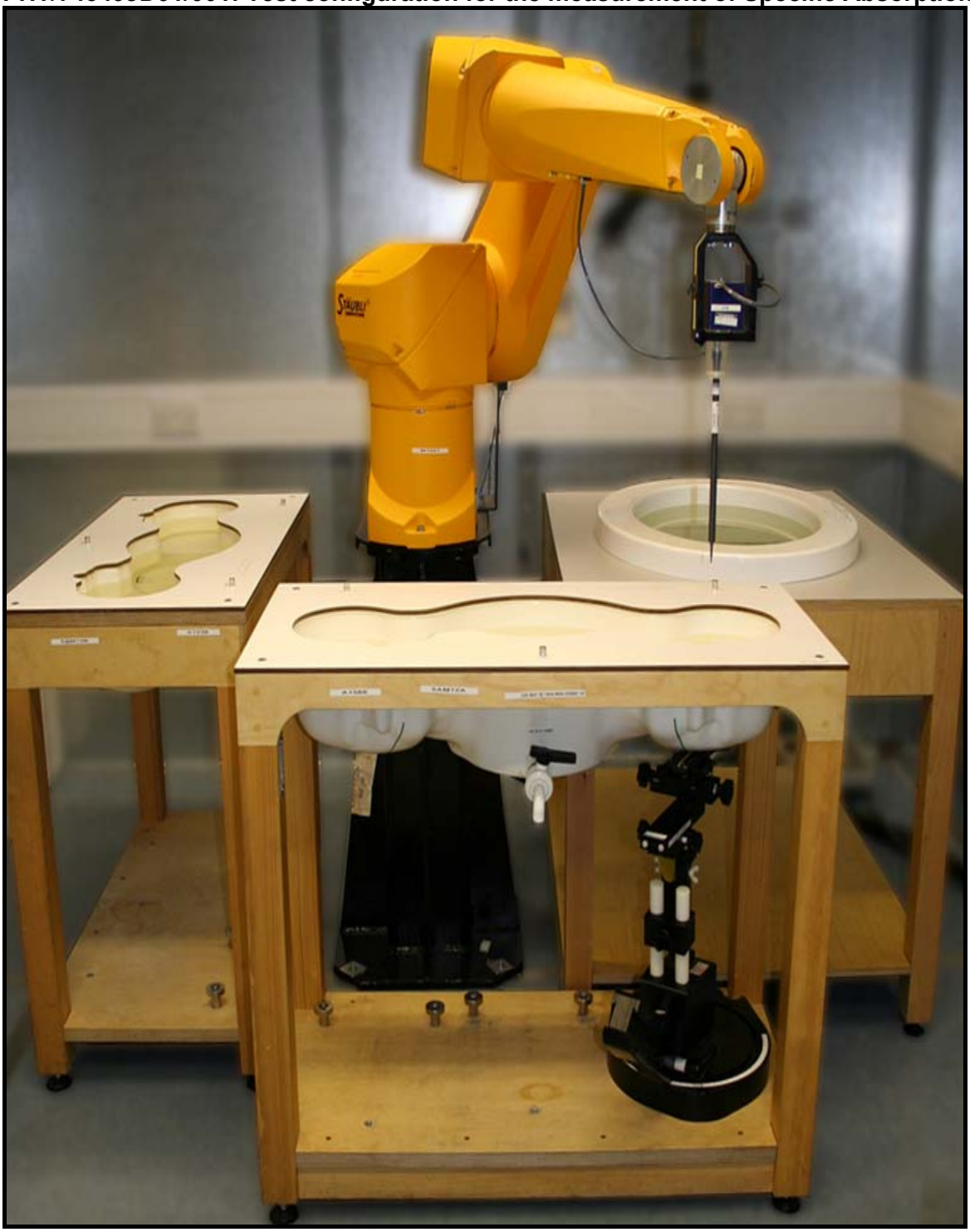
PHT/74349JD01/001: Test configuration for the measurement of Specific Absorption Rate (SAR)



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PHT/74349JD01/002: Base of Netbook Facing Phantom With Display at 90 Degrees to Keyboard

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PHT/74349JD01/003: Rear of Netbook Display

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PHT/74349JD01/004: Base of Netbook

Test of: Dell Inspiron 1010 Netbook PC

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PHT/74349JD01/005: Internal View of Netbook

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PHT/74349JD01/006: Battery View

Test of: Dell Inspiron 1010 Netbook PC

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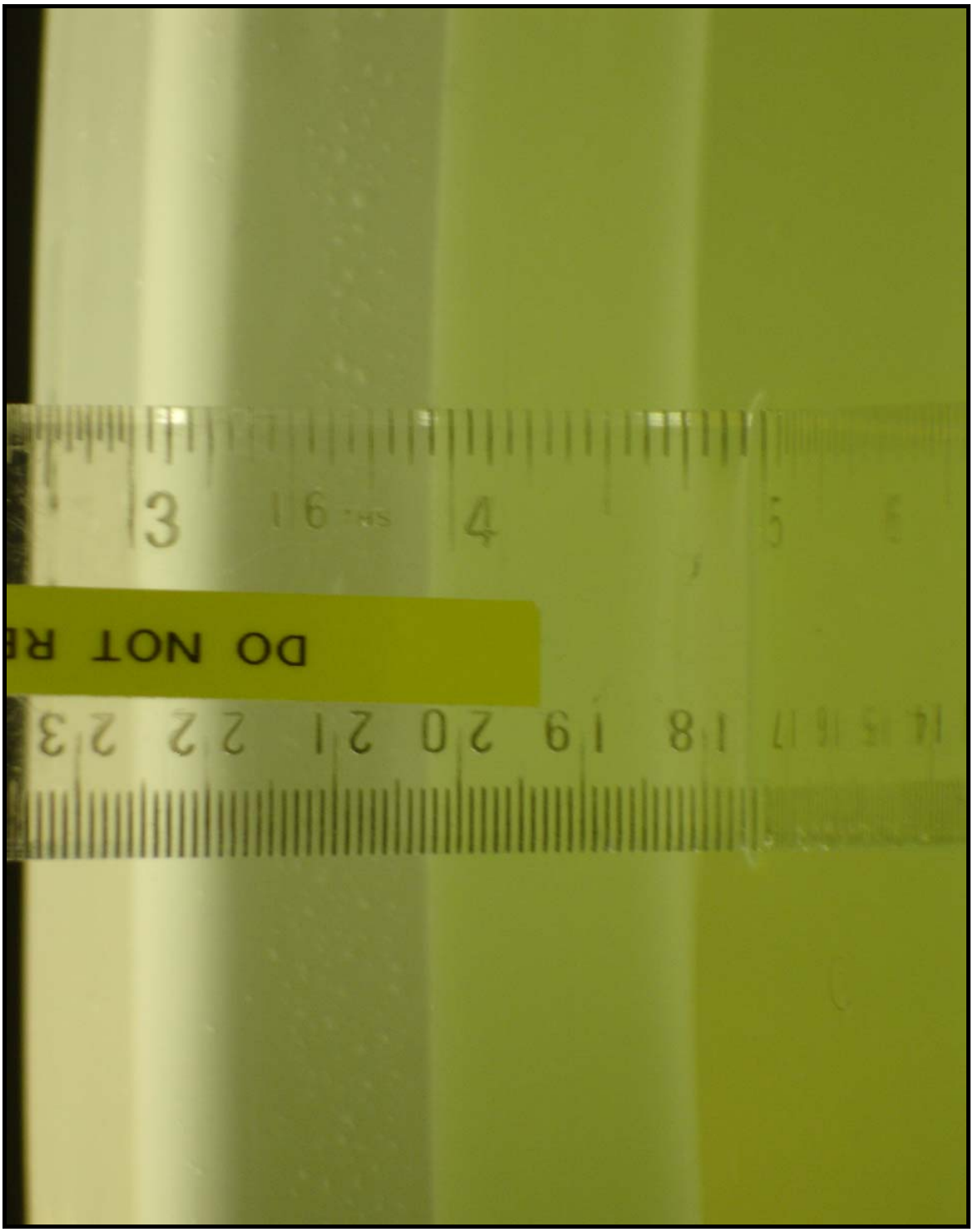
PHT/74349JD01/007: Fluid Levels



Appendix 5. Validation of System

Prior to the assessment, the system was verified in the flat region of the phantom.
A 900 MHz, 1900 MHz, 2450 MHz and 5800 MHz dipoles were used. A forward power of 250 mW was applied to the dipole and the system was verified to a tolerance of ±5% for the 900 MHz, 1900 MHz, 2450 MHz and forward power of 112 mW was applied to the dipole and the system was verified to a tolerance of ±5% for the 5800 MHz dipoles. The applicable verification (normalised to 1 Watt).

Date:08/12/2008

Validation Dipole and Serial Number:D900V2:SN:185

Simulant	Frequency (MHz)	Room Temperature	Liquid Temperature	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	900	25.0 ºC	25.0 ºC	ε_r	55.00	53.84	-2.11	5.00
				σ	1.05	1.03	-1.92	5.00
				1g SAR	10.50	10.12	-3.62	5.00
				10g SAR	6.89	6.68	-3.05	5.00

Date:19/12/2008

Validation Dipole and Serial Number:D900V2:SN:185

Simulant	Frequency (MHz)	Room Temperature	Liquid Temperature	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	900	25.0 ºC	25.0 ºC	ε_r	55.00	52.96	-3.71	5.00
				σ	1.05	1.01	-4.24	5.00
				1g SAR	10.50	10.80	2.86	5.00
				10g SAR	6.89	7.12	3.34	5.00

Date:14/12/2008

Validation Dipole and Serial Number:D1900V2:SN:540

Simulant	Frequency (MHz)	Room Temperature	Liquid Temperature	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	1900	25.0 ºC	25.0 ºC	ε_r	53.30	53.30	-0.50	5.00
				σ	1.52	1.58	3.69	5.00
				1g SAR	38.00	39.32	3.47	5.00
				10g SAR	20.70	20.16	-2.61	5.00

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Date:18/12/2008

Validation Dipole and Serial Number:D1900V2:SN:540

Simulant	Frequency (MHz)	Room Temperature	Liquid Temperature	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	1900	25.0 ºC	25.0 ºC	ε_r	53.30	51.34	-3.67	5.00
				σ	1.52	1.56	2.30	5.00
				1g SAR	38.00	38.80	210.53	5.00
				10g SAR	20.70	19.88	-396.14	5.00

Date:07/01/2009

Validation Dipole and Serial Number:D2450V2:SN:725

Simulant	Frequency (MHz)	Room Temperature	Liquid Temperature	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	2450	25.0 ºC	24.8 ºC	ε_r	52.70	51.76	-1.79	5.00
				σ	1.95	1.97	0.96	5.00
				1g SAR	53.30	50.80	-4.69	5.00
				10g SAR	24.50	23.52	-4.00	5.00

Date:08/01/2009

Validation Dipole and Serial Number:D5GHzV2:SN:1062

Simulant	Frequency (MHz)	Room Temperature	Liquid Temperature	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	5800	25.0 ºC	24.8 ºC	ε_r	48.20	48.33	0.27	5.00
				σ	6.00	6.23	3.75	5.00
				1g SAR	72.00	75.64	5.04	5.00
				10g SAR	20.20	20.72	2.57	5.00

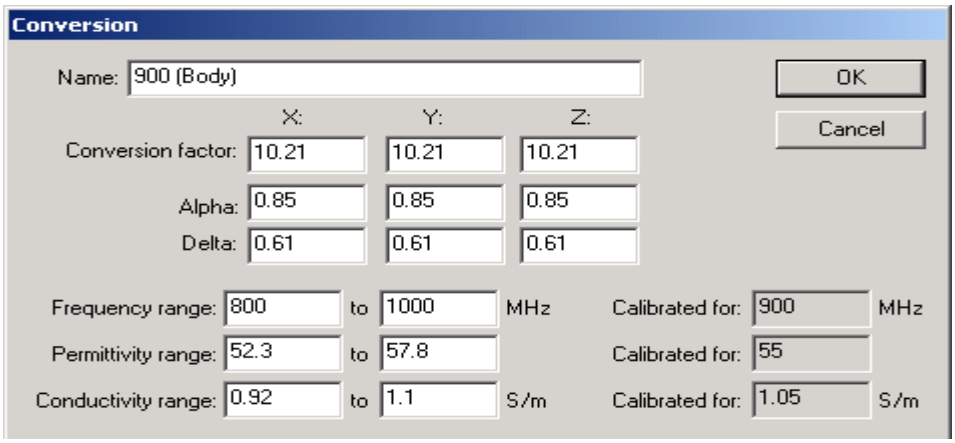
Date:09/01/2009

Validation Dipole and Serial Number:D5GHzV2:SN:1062

Simulant	Frequency (MHz)	Room Temperature	Liquid Temperature	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	5800	25.0 ºC	24.8 ºC	ε_r	48.20	48.33	0.27	5.00
				σ	6.00	6.23	3.75	5.00
				1g SAR	72.00	73.67	-2.32	5.00
				10g SAR	20.20	20.00	0.99	5.00

Statement for 900MHz Dipole validation and probe

The test frequencies are properly matched as this is a cellular band. The probe calibration for permittivity and conductivity is within +/-5%, were the probe calibrated centre frequency at 900MHz has permittivity and conductivity of 55.0 and 1.05 respectively. At the probe extreme frequencies the following are true: at 800 MHz the permittivity and conductivity are 52.3 and 0.92 respectively. At 1000 MHz the permittivity and conductivity are 57.8 and 1.1 respectively. The probe was calibrated at these parameters in order to cover the frequency range 800 MHz to 1000 MHz.



The target permittivity and conductivity at 835 MHz is 55.2 and 0.97 respectively which is within the calibrated range of the probe parameter.

The following parameters are declared in the probe calibration certificate on pare 8:

f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.37	0.78	10.89 ± 13.3% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.68	0.67	10.14 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.76	0.58	9.08 ± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.66	0.58	8.83 ± 11.0% (k=2)
2150	± 50 / ± 101	Head	39.7 ± 5%	1.53 ± 5%	0.71	0.56	8.61 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.58	0.63	8.02 ± 11.0% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.64	0.41	11.73 ± 13.3% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.85	0.61	10.21 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.58	0.70	8.80 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.62	0.68	8.29 ± 11.0% (k=2)
2150	± 50 / ± 100	Body	53.0 ± 5%	1.75 ± 5%	0.51	0.78	8.14 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.53	0.76	7.68 ± 11.0% (k=2)

[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.

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The system manufacturer has carried out addition steps as detailed on page 4 of KDB450824. This is detailed in the calibration certificates. The measured SAR values in the report are all below 10% of the SAR limit.

The measured fluid dielectric parameters for 835 MHz, performed during test values were all within +/-5% of the 835 MHz Target value.

At 900 MHz were the probe was calibrated and validation performed, the tissue dielectric parameter measured for routine measurements at 900 MHz was less than the target parameter for 835 MHz **ε** and higher than the target parameter for 835 MHz **σ**.

	Measured Fluid Parameter Date: 08/12/2008		Measured Fluid Parameter Date: 19/12/2008		Target / Nominal Fluid Parameter used by System manufacturer in cal certificate	
frequency(MHz)	**ε**	**σ**	**ε**	**σ**	**ε**	**σ**
800	54.66	0.93	53.96	0.91	52.30	0.92
805	54.62	0.94	53.91	0.92	52.71	0.93
810	54.59	0.94	53.86	0.92	53.13	0.93
815	54.56	0.95	53.81	0.93	53.54	0.94
820	54.53	0.95	53.76	0.93	53.96	0.95
825	54.50	0.96	53.70	0.94	54.37	0.96
830	54.47	0.96	53.65	0.94	54.79	0.96
835	**54.43**	**0.97**	**53.60**	**0.95**	**55.20**	**0.97**
840	54.40	0.97	53.55	0.95	55.18	0.98
845	54.37	0.98	53.50	0.96	55.17	0.98
850	54.34	0.98	53.45	0.96	55.15	0.99
900	53.84	1.03	52.96	1.01	55.00	1.05

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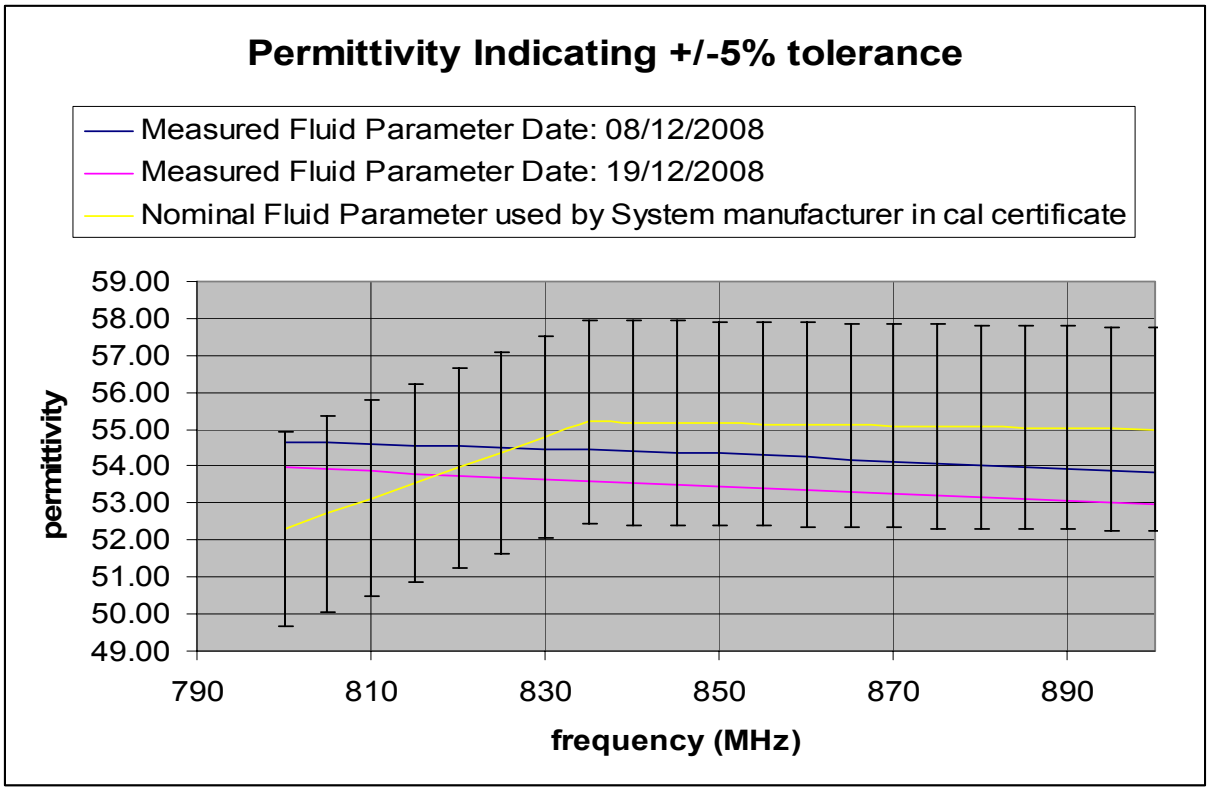

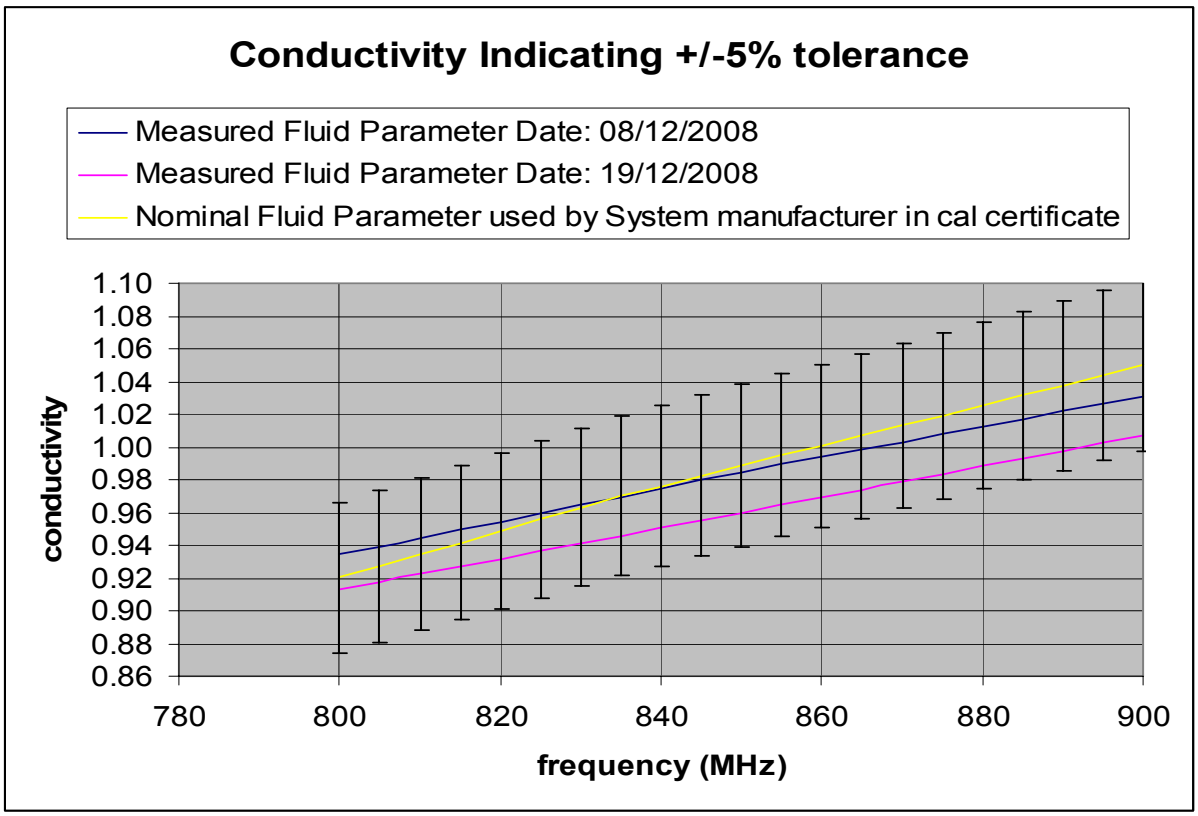

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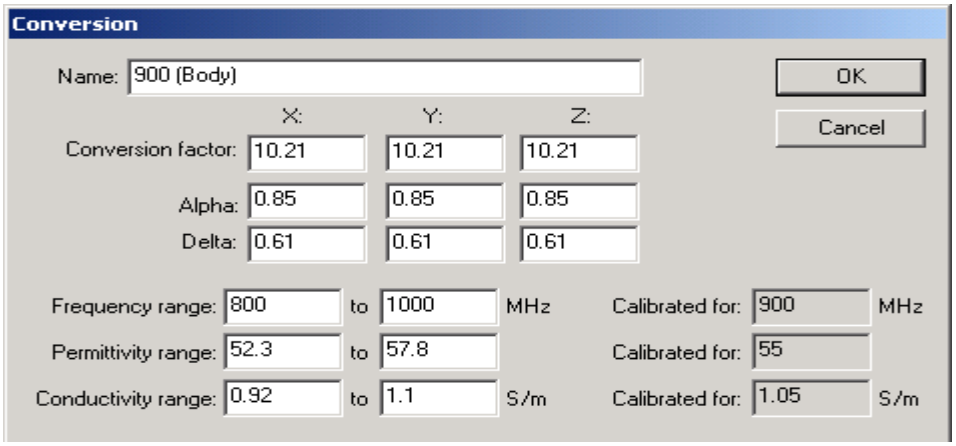
The probe conversion factor and its frequency response, with respect to the tissue dielectric media used during the probe calibration and routine measurements was examined to determine if the effective frequency interval is adequate for the intended measurements to satisfy protocol requirements. The frequency range at which the probe is calibrated for at 900 MHz covered 800 MHz to 1000 MHz and the dielectric parameters required for 824 to 840 MHz were all within the calibrated range of the probe dielectric parameters.



The measurement within the required frequency interval satisfy an expanded probe calibration uncertainty (k=2) <= 15% for all measurement conditions. Please refer to probe and dipole calibration certificates produce by the system manufacturer.

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL **900 MHz** **Typical SAR gradient: 5 % per mm**

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	8.7	5.0
SAR_{be} [%]	With Correction Algorithm	0.4	0.2

TSL **1750 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	7.4	4.0
SAR_{be} [%]	With Correction Algorithm	0.6	0.2

Sensor Offset

Probe Tip to Sensor Center	**1.0** mm

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%.

Appendix 6. Simulated Tissues

The body mixture consists of water and glycol. Visual inspection is made to ensure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the tissue.

Ingredient	Frequency
	835/850/900 MHz Body
De-Ionised Water	50.75%
Sugar	48.21%
Salt	0.94%
Kathon	0.10%

Ingredient	Frequency
	1800/1900 MHz Body
De-Ionised Water	69.79%
Diglycol Butyl Ether (DGBE)	30.00%
Salt	0.20%

Ingredient	Frequency
	2450 MHz Body
De-Ionised Water	68.64
Diglycol Butyl Ether (DGBE)	31.37

Ingredient	Frequency
	5200 - 5800 MHz Body
Diethylenglycol Monohexylether (DEME)	78.67%
De-Ionised Water	10.665%
Triton X-100	10.665%

Appendix 7. DASY4 System Details

A.7.1. DASY4 SAR Measurement System

RFI Global Services Ltd, SAR measurement facility utilises the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY4 system is comprised of the robot controller, computer, near-field probe, probe alignment sensor, and the SAM phantom containing brain or muscle equivalent material. 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. This is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. The data acquisition electronics (DAE) performs signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection etc. The DAE 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 PC plug-in card. The DAE3 utilises a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching mulitplexer, a fast 16-bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card 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. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

A.7.2. DASY4 SAR System Specifications

Robot System

Positioner:	Stäubli Unimation Corp. Robot Model: RX90L
Repeatability:	0.025 mm
No. of Axis:	6
Serial Number:	F00/SD89A1/A/01
Reach:	1185 mm
Payload:	3.5 kg
Control Unit:	CS7
Programming Language:	V+

Data Acquisition Electronic (DAE) System

Serial Number:	DAE3 SN:394

Cell Controller

PC:	Dell Precision 340
Operating System:	Windows 2000
Data Card:	DASY4 Measurement Server
Serial Number:	1080

Data Converter

Features:	Signal Amplifier, multiplexer, A/D converted and control logic.
Software:	DASY4 Software
Connecting Lines:	Optical downlink for data and status info. Optical uplink for commands and clock.

PC Interface Card

Function:	24 bit (64 MHz) DSP for real time processing Link to DAE3 16 nit A/D converter for surface detection system serial link to robot direct emergency stop output for robot.

DASY4 SAR System Specifications (Continued)

E-Field Probe

Model:	EX3DV4
Serial No:	3646
Construction:	Triangular core
Frequency:	10 MHz to >6 GHz
Linearity:	±0.2 dB (30 MHz to 6 GHz)
Probe Length (mm):	330
Probe Diameter (mm):	12
Tip Length (mm):	20
Tip Diameter (mm):	2.5
Sensor X Offset (mm):	1
Sensor Y Offset (mm):	1
Sensor Z Offset (mm):	1

Model:	ES3DV3
Serial No:	3173
Construction:	Triangular core fibre optic detection system
Frequency:	10 MHz to 3 GHz
Linearity:	±0.2 dB (30 MHz to 3 GHz)
Probe Length (mm):	337
Probe Diameter (mm):	12
Tip Length (mm):	10
Tip Diameter (mm):	6.8
Sensor X Offset (mm):	2.7
Sensor Y Offset (mm):	2.7
Sensor Z Offset (mm):	2.7

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Phantom

Phantom:	OVAL Phantom
Shell Material:	Fibreglass
Thickness:	2.0 ±0.1 mm

Phantom:	SAM Phantom
Shell Material:	Fibreglass
Thickness:	2.0 ±0.1 mm