



### Appendix H - Analysis of Effective Frequency Interval of Probe

The test frequencies are properly matched as these are cellular band and PCS band. The probe calibration for permittivity and conductivity is within  $\pm 5\%$ , were the probe calibrated centre frequency at 900 MHz has permittivity and conductivity of 55.0 and 1.05 respectively. At 1950 MHz has permittivity and conductivity of 53.3 and 1.52 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. At 1850 MHz the permittivity and conductivity are 50.6 and 1.44 respectively. At 2050 MHz the permittivity and conductivity are 56 and 1.69 respectively. The probe was calibrated at these parameters in order to cover the frequency range 800 MHz to 1000 MHz and 1850 MHz to 2050 MHz.

Conversion						Conversion									
Name: 900 (Body)			OK			Name: 1950 (Body)			OK						
X: Y: Z:			Cancel			X: Y: Z:			Cancel						
Conversion factor:	6.34	6.34	6.34			Conversion factor:	4.73	4.73	4.73						
Alpha:	0.5	0.5	0.5			Alpha:	0.74	0.74	0.74						
Delta:	2.48	2.48	2.48			Delta:	1.99	1.99	1.99						
Frequency range:	800	to	1000	MHz	Calibrated for:	900	MHz	Frequency range:	1850	to	2050	MHz	Calibrated for:	1950	MHz
Permittivity range:	52.3	to	57.8		Calibrated for:	55		Permittivity range:	50.6	to	56		Calibrated for:	53.3	
Conductivity range:	0.92	to	1.1	S/m	Calibrated for:	1.05	S/m	Conductivity range:	1.44	to	1.69	S/m	Calibrated for:	1.52	S/m

The target permittivity and conductivity at 835 MHz is 55.2 and 0.97 respectively, and at 1900 MHz is 53.3 and 1.52 respectively which is within the calibrated range of the probe parameter.



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

f [MHz]	Validity [MHz] <sup>c</sup>	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.44	2.65	6.55 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.68	1.98	5.59 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.75	1.75	5.13 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.80	1.45	4.68 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.50	2.48	6.34 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.63	2.33	4.87 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.74	1.99	4.73 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.94	1.75	3.98 ± 11.0% (k=2)

<sup>c</sup> 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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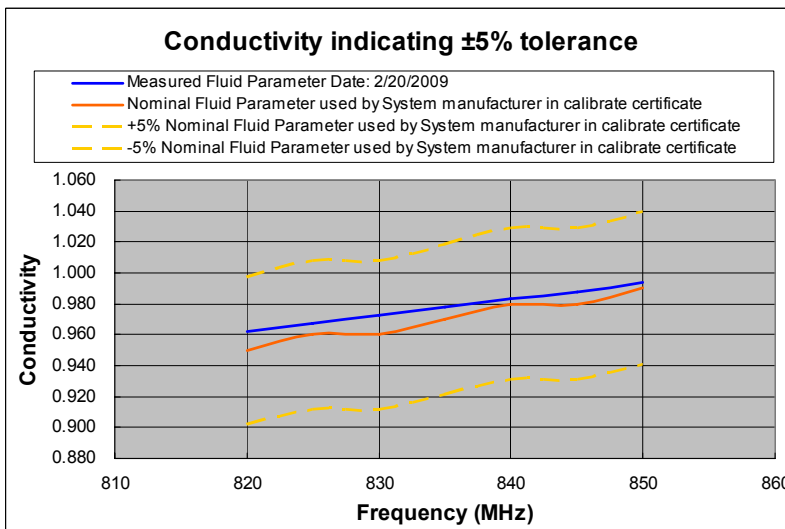
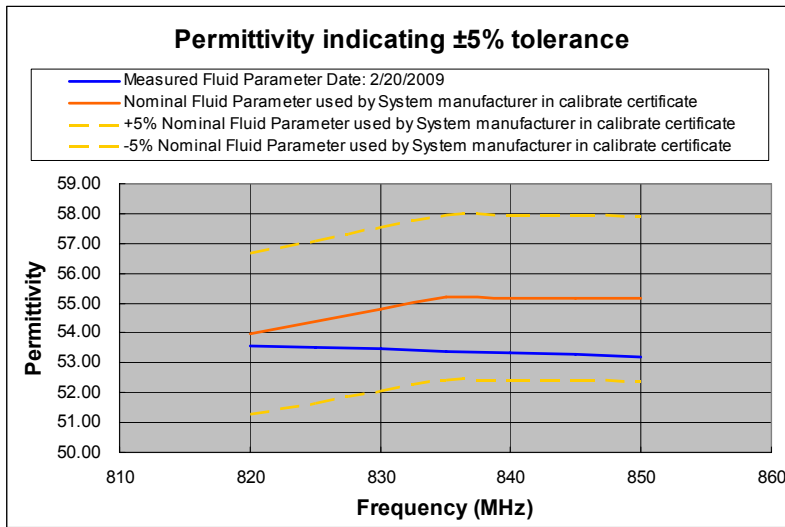
The system manufacturer has carried out addition steps as detailed on page 4 of KDB 450824. This is detailed in the calibration certificates. The measured SAR values in the report are all below 10% of the SAR limit.

The measured fluid dielectric parameters for 835 MHz and 1900 MHz, performed during test values were all within ±5% of the 835 MHz and 1900 MHz target value.

At 900 MHz, the probe was calibrated and validation performed, the tissue dielectric parameter measured for routine measurements at 900 MHz and 1950 MHz were less than the target parameter for 835 MHz and 1900 MHz  $\epsilon_r$ , and higher than the target parameter for 835 MHz and 1900 MHz  $\sigma$ .

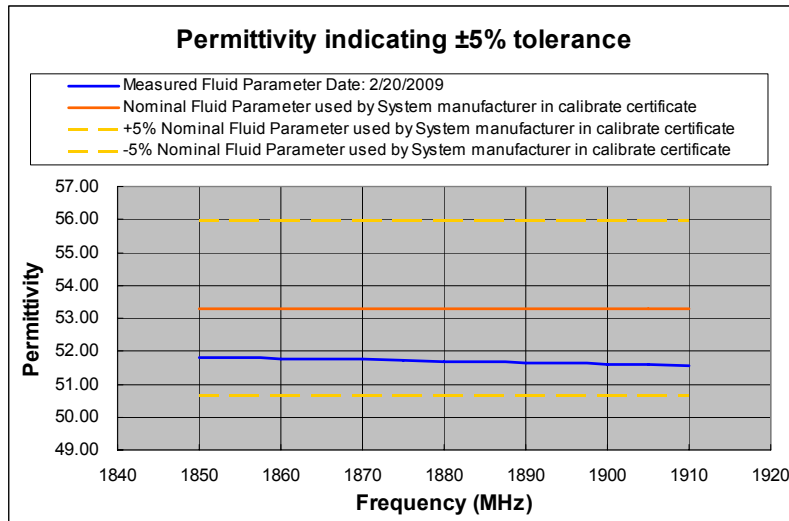


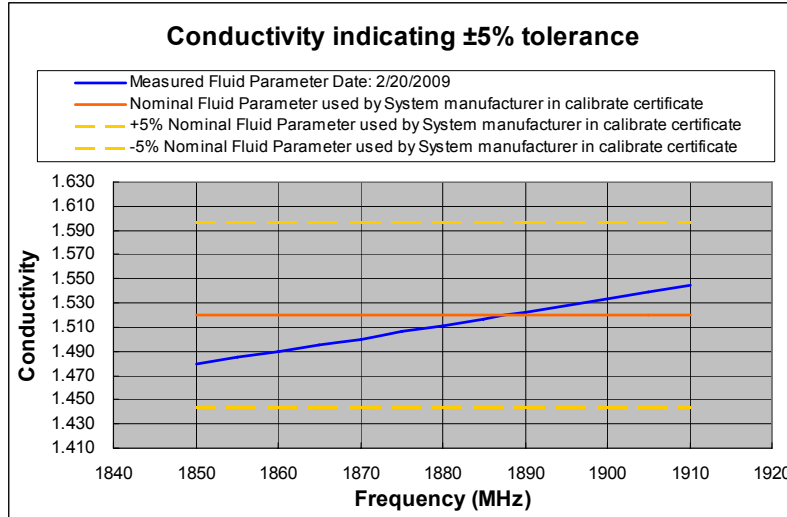
Frequency (MHz)	Measured Fluid Parameter Date: 2/20/2009		Nominal Fluid Parameter used by System manufacturer in calibrate certificate	
	$\epsilon_r$	$\sigma$	$\epsilon_r$	$\sigma$
820	53.57	0.962	53.96	0.95
825	53.51	0.967	54.37	0.96
830	53.46	0.973	54.79	0.96
835	53.39	0.978	55.20	0.97
840	53.32	0.983	55.18	0.98
845	53.27	0.988	55.17	0.98
850	53.22	0.994	55.15	0.99
900	52.68	1.051	55.00	1.05





Frequency (MHz)	Measured Fluid Parameter Date: 2/20/2009		Nominal Fluid Parameter used by System manufacturer in calibrate certificate	
	$\epsilon_r$	$\sigma$	$\epsilon_r$	$\sigma$
1850	51.82	1.480	53.30	1.52
1855	51.80	1.485	53.30	1.52
1860	51.78	1.490	53.30	1.52
1865	51.77	1.495	53.30	1.52
1870	51.75	1.500	53.30	1.52
1875	51.73	1.506	53.30	1.52
1880	51.70	1.511	53.30	1.52
1885	51.68	1.517	53.30	1.52
1890	51.65	1.522	53.30	1.52
1895	51.63	1.528	53.30	1.52
1900	51.60	1.534	53.30	1.52
1905	51.58	1.539	53.30	1.52
1910	51.55	1.545	53.30	1.52
1950	51.30	1.594	53.30	1.52





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 was calibrated for 900 MHz covered 800 MHz to 1000 MHz and 1850 MHz to 2050 MHz, and the dielectric parameters required for 824 MHz to 849 MHz and 1850 MHz to 1910 MHz were all within the calibrated range of the probe dielectric parameters.



**Conversion**

Name: 900 (Body) OK

X: Y: Z: Cancel

Conversion factor: 6.34 6.34 6.34

Alpha: 0.5 0.5 0.5

Delta: 2.48 2.48 2.48

Frequency range: 800 to 1000 MHz Calibrated for: 900 MHz

Permittivity range: 52.3 to 57.8 Calibrated for: 55

Conductivity range: 0.92 to 1.1 S/m Calibrated for: 1.05 S/m

**Conversion**

Name: 1950 (Body) OK

X: Y: Z:

Conversion factor: 4.73 4.73 4.73 Cancel

Alpha: 0.74 0.74 0.74

Delta: 1.99 1.99 1.99

Frequency range: 1850 to 2050 MHz Calibrated for: 1950 MHz

Permittivity range: 50.6 to 56 Calibrated for: 53.3

Conductivity range: 1.44 to 1.69 S/m Calibrated for: 1.52 S/m

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



ET3DV6 SN:1788

September 23, 2008

DASY - Parameters of Probe: ET3DV6 SN:1788

Sensitivity in Free Space<sup>A</sup>

Diode Compression<sup>B</sup>

NormX	1.73 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	95 mV
NormY	1.59 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	98 mV
NormZ	1.72 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	91 mV

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		3.7 mm	4.7 mm
SAR <sub>be</sub> [%]	Without Correction Algorithm	10.6	6.8
SAR <sub>be</sub> [%]	With Correction Algorithm	0.8	0.3

TSL 1750 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR <sub>be</sub> [%]	Without Correction Algorithm	8.8	4.9
SAR <sub>be</sub> [%]	With Correction Algorithm	0.7	0.6

Sensor Offset

Probe Tip to Sensor Center 2.7 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%.

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Page 8).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.