March 12, 2001

Federal Communications Commission
Equipment Approval Services
7435 Oakland Mills Road
Columbia, MD 21046
Attn: Errol Chang / Kwok Chan

SUBJECT: Vertex Standard Co., Ltd.
FCC ID: K66VX-900V
731 Confirmation No.: EA99480
Correspondence Ref. No.: 17884

Dear Errol / Kwok:

On behalf of Vertex Standard Co., Ltd. is an amendment in response to your e-mail dated January 29, 2001 (Items 1 & 2) requesting additional information for the above-referenced application.

1. Attached is the remeasured SAR test plot for mid-channel 161MHz body-worn configuration. The previously submitted test plot showed an abrupt discontinuity in the SAR distribution.
2. Attached is our dipole validation summary confirming system measurement accuracy and E-field probe calibration for 150MHz.

If you have any further questions regarding the above, please do not hesitate to contact me.

Sincerely,

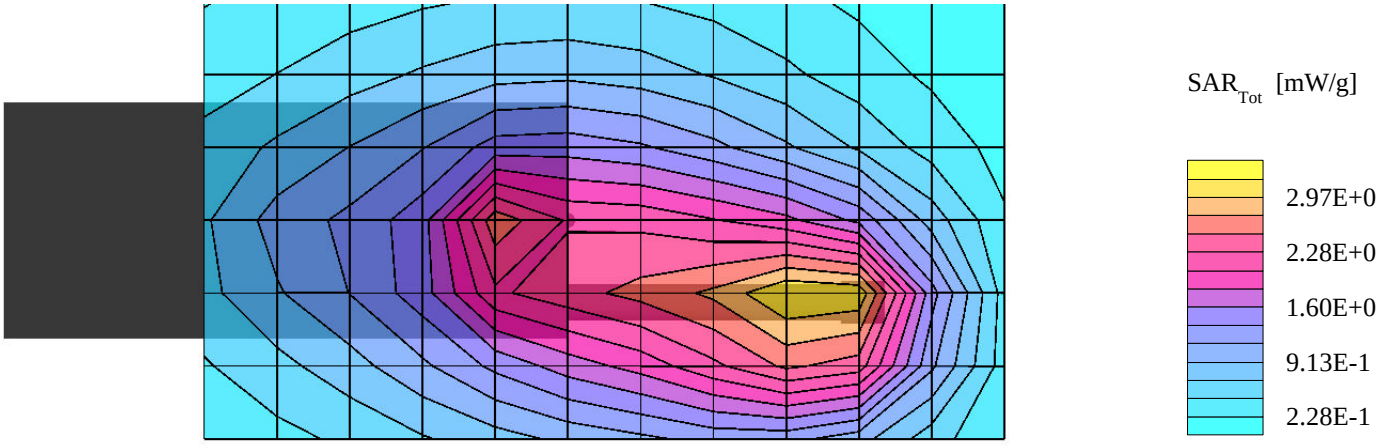
Shawn McMillen
General Manager
Celltech Research Inc.
Testing & Engineering Lab

cc: Vertex Standard Co., Ltd.
Rhein Tech Laboratories, Inc.

VERTEX STANDARD Co., Ltd FCC ID: K66VX-900V

Generic Twin Phantom; Flat Section; Position: (270°,270°)
Probe: ET3DV6 - SN1387; ConvF(7.04,7.04,7.04); Crest factor: 1.0
150MHz Muscle: σ = 0.75 mho/m ε_r = 65.7 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 4x4x7
SAR (1g): 3.06 mW/g, SAR (10g): 2.02 mW/g

Body SAR With 1.0cm Belt Clip
Vertex Standard Model: VX-900V
Unmodulated Carrier
Mid Channel [161.000MHz]
Conducted Power: 5.0 Watts
Date Tested: Jan. 30, 2001



Dipole Validation Summary (150MHz)

In order to ensure the accuracy of the DASY3 calibration and the validity of the probe's conversion factors for 150MHz, a system performance test was carried out. The probe used for the test was calibrated by the manufacturer at two test frequencies in fluids with well-known electrical properties. Similar fluids to those used in the calibration process were also used in the performance test to ensure accuracy of the probe's conversion factors at the calibrated frequencies. The recipes and electrical parameters of the manufacturer's fluids and the fluids used in the performance test are given in the tables below. Since the ingredients vary between the test fluids and manufacturer's fluids, the volume percentages were altered slightly in order to achieve similar electrical properties.

A system validation routine was carried out as per the manufacturer's instructions. Validation dipoles used for the tests were at the same frequencies as the calibration frequencies. Each calibrated validation dipole was supplied with normalized target values. The fluids used by the manufacturer in determining these target values were made with the same ingredients as the calibration fluid and had similar electrical properties to within measurement error. Each validation dipole's normalized target values and the resulting validation measurements are listed below as well as the internal field distribution plots.

The accuracy of the total system was determined by the results obtained in the validation process. Other factors that contribute to the system's uncertainty are given in a table below. At the time the system was installed, all of these potential sources of measurement error were investigated. In order for the validation to be accurate within the allowable limits, all other sources of errors had to be within the given tolerances.

The conversion factors for the probe at 150MHz were supplied by the manufacturer but were not derived by experimental methods, but rather numerical simulations using Finite Difference Time Domain (FDTD) and Multiple Multipole (MMP) code. The 150MHz conversion factors determined by the manufacturer were based on a particular fluid with well-known electrical properties. The manufacturer supplied the recipes and target electrical parameters for this fluid. The fluid used for testing the DUT was of different ingredients. In order to be within the manufacturer's specified limits, the percentage volumes were altered slightly. The ingredients, volume percentages, and electrical properties for both the test fluid and the manufacturer's fluid are given below.

After a validation of the system at the two calibration frequencies fell within +-5% of the typical deviation expected by the manufacturer, and since all the fluids used in the validation tests were within the manufacturer's specification limit, it was safe to assume that the system was operating within the manufacturer's measurement tolerances. Also, since the fluid used in measuring the DUT had similar electrical properties as prescribed by the manufacturer, and by using the correct conversion factors supplied by the manufacturer for 150MHz, it was also safe to assume that the accuracy of the system at 150MHz was within the manufacturer's uncertainty estimation of +-15%.

SPEAG'S BRAIN TISSUE RECIPES (900MHz & 1800MHz)

INGREDIENT	BRAIN MIXTURE	
	900 MHz	1800 MHz
Water	40.47 %	45.32 %
Cellulose	0.25 %	0.25 %
Salt	0.70 %	-
Preventol	0.10 %	0.10 %
Sugar	58.48 %	54.33 %

CELLTECH'S BRAIN TISSUE RECIPES (900MHz & 1800MHz)

INGREDIENT	BRAIN MIXTURE	
	900 MHz	1800 MHz
Water	40.10 %	45.00 %
Sugar	58.00%	53.90%
Salt	0.70 %	-
HEC	1.00%	0.10 %
Bactericide	0.20 %	1.00 %

SPEAG'S BRAIN TISSUE ELECTRICAL PARAMETERS (900MHz & 1800MHz)

Frequency	Dielectric Constant e_r	Conductivity s (mho/m)	r (Kg/m^3)
900 MHz	42.5 ± 5%	0.85 ± 10%	1000
1800 MHz	41.0 ± 5%	1.65 ± 10%	1000

CELLTECH'S BRAIN TISSUE ELECTRICAL PARAMETERS (900MHz & 1800MHz)

Frequency	Dielectric Constant e_r	Conductivity s (mho/m)	r (Kg/m^3)
900 MHz	43.6 ± 5%	0.86 ± 10%	1000
1800 MHz	41.2 ± 5%	1.68 ± 10%	1000

DIPOLE VALIDATIONS RESULTS

Dipole Validation Kit	SPEAG'S Target SAR 1g (w/kg)	CELLTECH'S Measured SAR 1g (w/kg)
D900V2	2.29 ε_r = 43.6, σ = 0.86	2.35 ε_r = 43.6, σ = 0.86
D1800V2	9.32 ε_r = 41.2, σ = 1.68	9.61 ε_r = 41.2, σ = 1.68

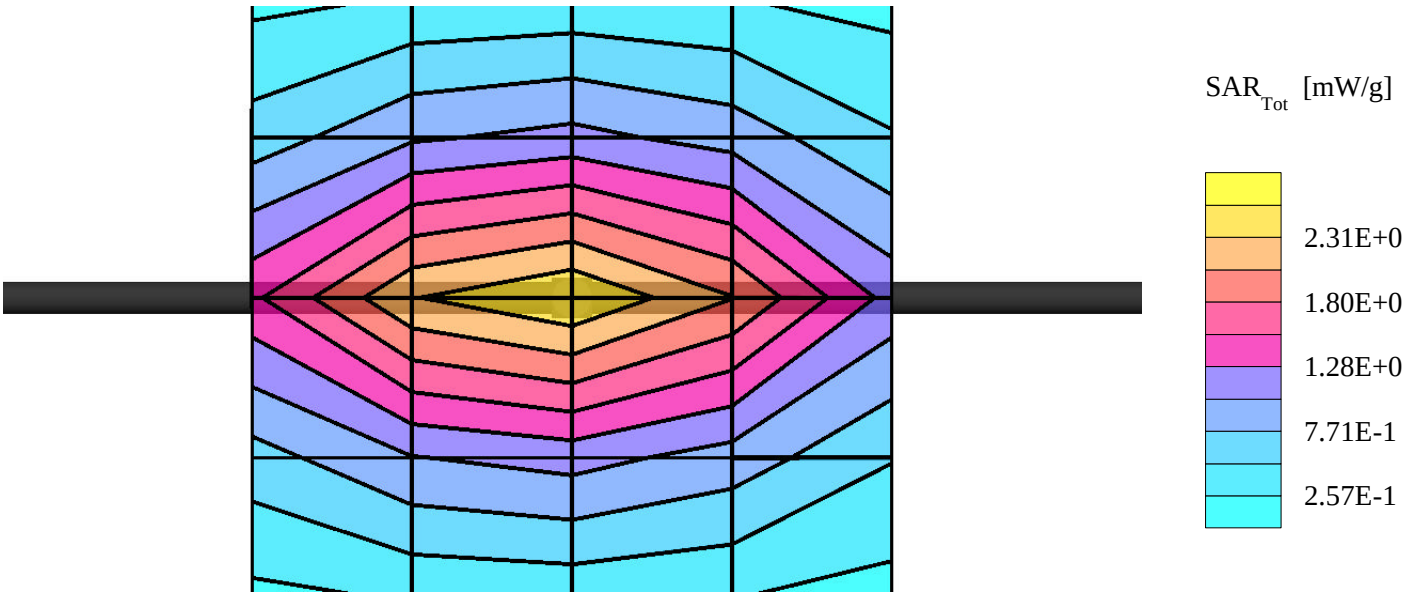
ELECTRICAL PARAMETERS OF FLUID THAT CELLTECH'S DASY3 PROBE ET3DV6 SN: 1387 WAS CALIBRATED IN

Frequency (Brain)	Dielectric Constant e_r	Conductivity s (mho/m)
900 MHz	42.5 ± 5%	0.86 ± 10%
1800 MHz	41.0 ± 5%	1.69 ± 10%

Dipole 900 MHz

Generic Twin Phantom; Flat Section; Position: (90°,90°);
Probe: ET3DV6 - SN1387; ConvF(6.34,6.34,6.34); Crest factor: 1.0;
Brain 900 MHz: σ = 0.83 mho/m ε_r = 43.6 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cubes (2)
SAR (1g): 2.35 mW/g ± 0.03 dB, SAR (10g): 1.52 mW/g ± 0.02 dB

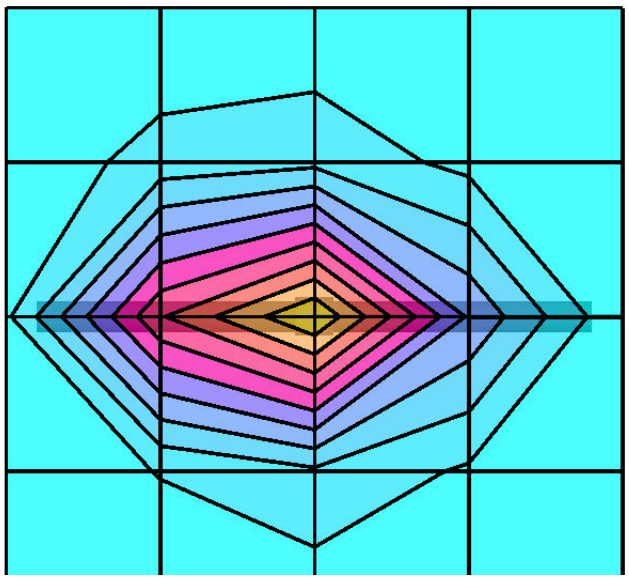
Date Tested: March 8, 2001

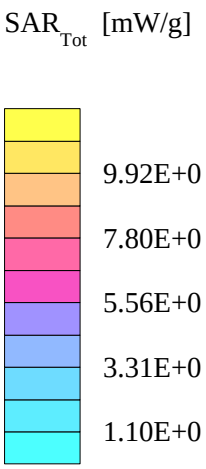


Dipole 1800 MHz

Generic Twin Phantom; Flat Section; Position: (90°,90°);
Probe: ET3DV6 - SN1387; ConvF(5.50,5.50,5.50); Crest factor: 1.0;
1800MHz Brain: σ = 1.68 mho/m ε_r = 41.2 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 9.61 mW/g, SAR (10g): 4.82 mW/g

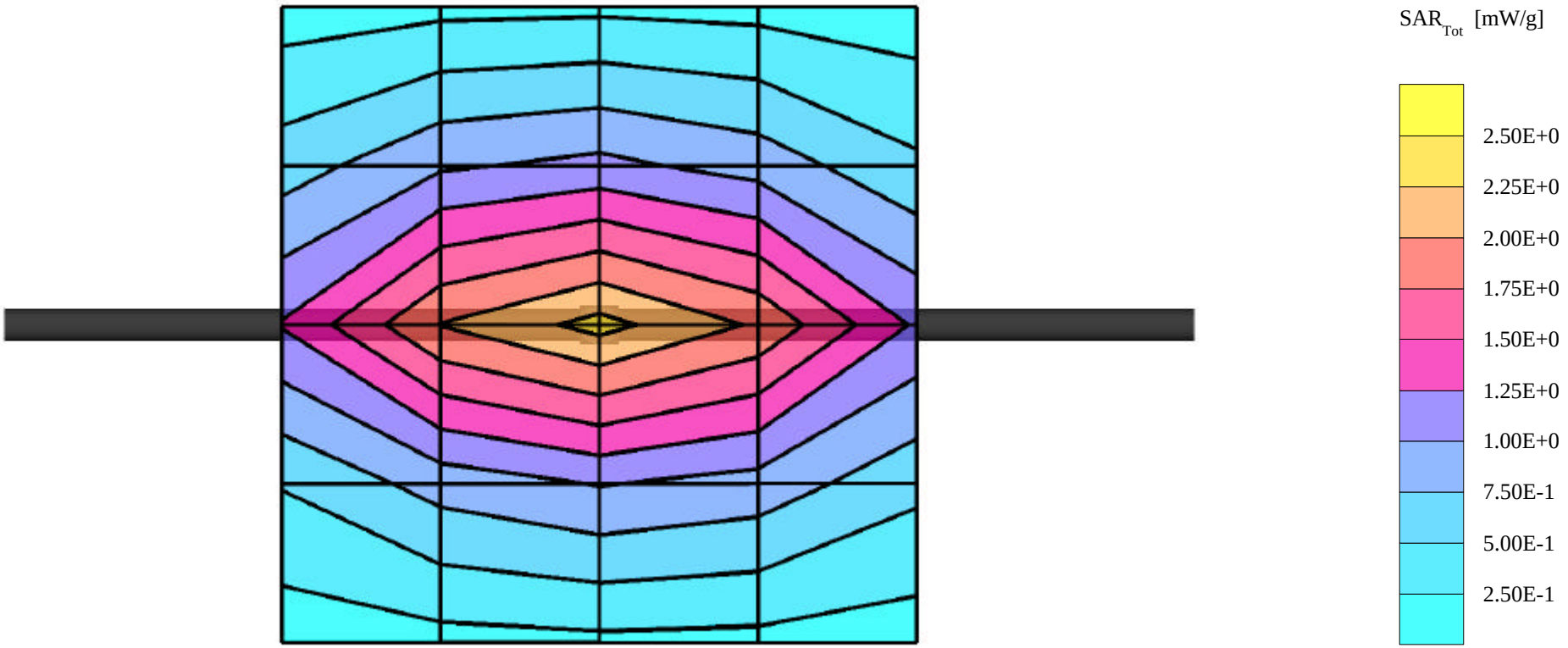
Date Tested: March 8, 2001





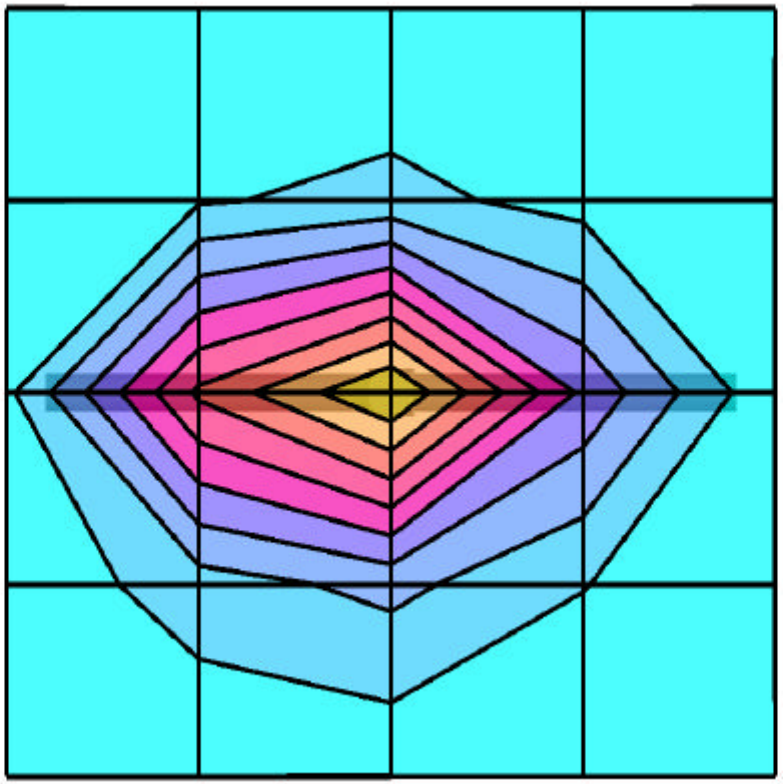
Validation Dipole D900V2 SN:052, d = 15mm

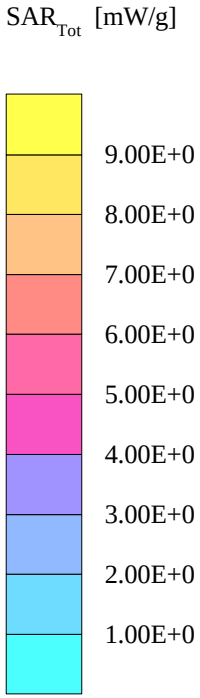
Frequency: 900 MHz; Antenna Input Power: 250 [mW]
Generic Twin Phantom; Flat Section; Grid Spacing: Dx = 20.0, Dy = 20.0, Dz = 10.0
Probe: ET3DV5 - SN1342/DAE3; ConvF(5.71,5.71,5.71); Brain 900 MHz: σ = 0.86 mho/m ε_r = 43.6 ρ = 1.00 g/cm^3
Cubes (2): Peak: 3.44 mW/g ± 0.05 dB, SAR (1g): 2.29 mW/g ± 0.05 dB, SAR (10g): 1.51 mW/g ± 0.05 dB, (Worst-case extrapolation)
Penetration depth: 13.0 (12.3, 14.0) [mm]
Powerdrift: 0.00 dB



Validation Dipole D1800V2 SN:247, d = 10mm

Frequency: 1800 MHz; Antenna Input Power: 250 [mW]
Generic Twin Phantom; Flat Section; Grid Spacing: Dx = 20.0, Dy = 20.0, Dz = 10.0
Probe: ET3DV5 - SN1342/DAE3; ConvF(4.84,4.84,4.84); Brain 1800 MHz: σ = 1.68 mho/m ε_r = 41.2 ρ = 1.00 g/cm^3
Cubes (2): Peak: 17.6 mW/g ± 0.02 dB, SAR (1g): 9.32 mW/g ± 0.04 dB, SAR (10g): 4.76 mW/g ± 0.06 dB, (Worst-case extrapolation)
Penetration depth: 7.5 (7.4, 8.0) [mm]
Powerdrift: -0.00 dB





SPEAG'S 150MHz BRAIN TISSUE RECIPE

INGREDIENT	BRAIN MIXTURE 150 MHz
Water	45.45 %
Cellulose	0.34 %
Salt	1.63 %
Preventol	0.10 %
Sugar	52.48 %

CELLTECH'S 150MHz BRAIN TISSUE RECIPE

INGREDIENT	BRAIN MIXTURE 150 MHz
Water	45.45 %
Sugar	52.48 %
Salt	1.62 %
HEC	0.20 %
Bactericide	0.25 %

SPEAG'S BRAIN TISSUE DIELECTRIC PARAMETERS (150MHz)

Frequency	Dielectric Constant ε_r	Conductivity σ (mho/m)	ρ (Kg/m^3)
150 MHz	59.9 ± 5%	0.48 ± 10%	1000

CELLTECH'S BRAIN TISSUE DIELECTRIC PARAMETERS (150MHz)

Frequency	Dielectric Constant ε_r	Conductivity σ (mho/m)	ρ (Kg/m^3)
150 MHz	59.9 ± 5%	0.48 ± 10%	1000

ET3DV6 SN:1387

DASY3 - Parameters of Probe: ET3DV6 SN:1387

Sensitivity in Free Space

NormX	**1.55**	$\mu V/(V/m)^2$
NormY	**1.65**	$\mu V/(V/m)^2$
NormZ	**1.64**	$\mu V/(V/m)^2$

Diode Compression

DCP X	**98**	mV
DCP Y	**98**	mV
DCP Z	**98**	mV

Sensitivity in Tissue Simulating Liquid

Brain 450 MHz e_r = 48 ± 5% s = 0.50 ± 10% mho/m

ConvF X	**6.76**	extrapolated	Boundary effect:	
ConvF Y	**6.76**	extrapolated	Alpha	**0.30**
ConvF Z	**6.76**	extrapolated	Depth	**2.52**

Brain 900 MHz e_r = 42.5 ± 5% s = 0.86 ± 10% mho/m

ConvF X	**6.34**	± 7% (k=2)	Boundary effect:	
ConvF Y	**6.34**	± 7% (k=2)	Alpha	**0.47**
ConvF Z	**6.34**	± 7% (k=2)	Depth	**2.25**

Brain 1500 MHz e_r = 41 ± 5% s = 1.32 ± 10% mho/m

ConvF X	**5.78**	interpolated	Boundary effect:	
ConvF Y	**5.78**	interpolated	Alpha	**0.69**
ConvF Z	**5.78**	interpolated	Depth	**1.88**

Brain 1800 MHz e_r = 41 ± 5% s = 1.69 ± 10% mho/m

ConvF X	**5.50**	± 7% (k=2)	Boundary effect:	
ConvF Y	**5.50**	± 7% (k=2)	Alpha	**0.81**
ConvF Z	**5.50**	± 7% (k=2)	Depth	**1.70**

Sensor Offset

Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.6 ± 0.2**	mm

SPEAG'S 150MHz Conversion No.s: ET3DV6 SN:1387

Sensitivity in Free Space

NormX	**1.55** $\mu V/(V/m)^2$
NormY	**1.65** $\mu V/(V/m)^2$
NormZ	**1.64** $\mu V/(V/m)^2$

Diode Compression

DCP X	**98** mV
DCP Y	**98** mV
DCP Z	**98** mV

Sensitivity in Tissue Simulating Liquid

Brain **150 MHz** e_r **= 59.9 ± 5%** **s = 0.48 ± 10% mho/m**

ConvF X	**7.04** extrapolated
ConvF Y	**7.04** extrapolated
ConvF Z	**7.04** extrapolated

Boundary effect:

Alpha	**0.18**
Depth	**2.70**

ABSOLUTE UNCERTAINTY

	Error	Error Distribution	SAR Error Standard Deviation	
			TYPICAL SETUP	STATE-OF-THE-ART SETUP
Probe isotropy			± 0.5 %	=
Probe linearity	± 0.1 dB	rectangular	± 1.4 %	=
Probe calibration	± 3.3 %	normal	± 3.3 %	=
Electronics	± 1 %	rectangular	± 0.6 %	=
Drift	± 1 %	normal	± 1 %	=
1g peak SAR evaluation	± 3 %	normal	± 3 %	=
Source to liquid separation	± 0.1 mm	rectangular	± 0.6 %	=
Liquid conductivity	± 5 %	rectangular	± 2.9 %	± 1.5 %
Source power	± 0.2 dB	normal	± 4.8 %	± 2.4 %
Laboratory reflections	± 3 %	normal	± 3 %	± 1 %
Total	K=1		± 8 %	± 5.75 %
Total expanded uncertainty	K=2		± 16 %	± 11.5 %