

APPLICANT: Sony Ericsson Mobile Communications Inc.

FCC ID: **PY7AF061011**



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REPORT

58(87)

Prepared (also subject responsible if other) SEM/CV/PF/P Gerard Hayes		No. REP 2004 001 Z502A 02
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Appendix 4

Probe Calibration Certificates



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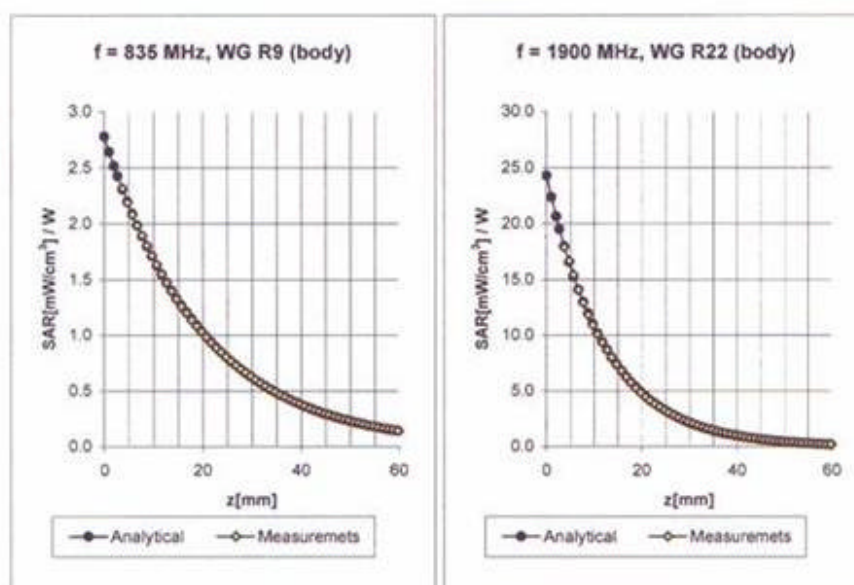
59(87)

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ET3DV6 SN:1539

December 16, 2003

Conversion Factor Assessment



Body 835 MHz $\epsilon_r = 55.2 \pm 5\%$ $\sigma = 0.97 \pm 5\%$ mho/m

Valid for f=750-950 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	6.0 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	6.0 ± 9.5% (k=2)	Alpha	0.46
ConvF Z	6.0 ± 9.5% (k=2)	Depth	2.36

Body 1900 MHz $\epsilon_r = 53.3 \pm 5\%$ $\sigma = 1.52 \pm 5\%$ mho/m

Valid for f=1800-2000 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	4.4 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	4.4 ± 9.5% (k=2)	Alpha	0.67
ConvF Z	4.4 ± 9.5% (k=2)	Depth	2.47



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REPORT

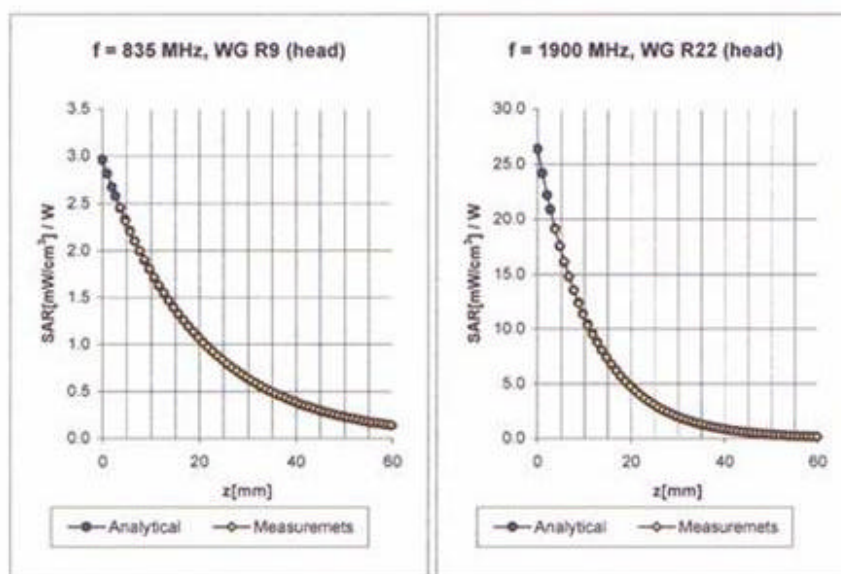
60(87)

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Approved SEM/CV/PF/P Gerard Hayes	Checked A X:\SAR Chamber\FCC reports\Z502A\Final Reports\FCCZ502A.doc

ET3DV6 SN:1539

December 16, 2003

Conversion Factor Assessment



Head	835 MHz	$\epsilon_r = 41.5 \pm 5\%$	$\sigma = 0.90 \pm 5\% \text{ mho/m}$
Valid for f=750-950 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X			
ConvF X	6.4 $\pm 9.5\%$ (k=2)	Boundary effect:	
ConvF Y	6.4 $\pm 9.5\%$ (k=2)	Alpha	0.38
ConvF Z	6.4 $\pm 9.5\%$ (k=2)	Depth	2.54
Head	1900 MHz	$\epsilon_r = 40.0 \pm 5\%$	$\sigma = 1.40 \pm 5\% \text{ mho/m}$
Valid for f=1800-2000 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X			
ConvF X	4.9 $\pm 9.5\%$ (k=2)	Boundary effect:	
ConvF Y	4.9 $\pm 9.5\%$ (k=2)	Alpha	0.53
ConvF Z	4.9 $\pm 9.5\%$ (k=2)	Depth	2.66



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REPORT

61(87)

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Approved SEM/CV/PF/P Gerard Hayes	Checked A X:\SAR Chamber\FCC reports\Z502A\Final Reports\FCCZ502A.doc

ET3DV6 SN:1539

December 16, 2003

DASY - Parameters of Probe: ET3DV6 SN:1539**Sensitivity in Free Space****Diode Compression**

NormX	1.32 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	92	mV
NormY	1.23 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	92	mV
NormZ	1.35 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	92	mV

Sensitivity in Tissue Simulating Liquid

Head 835 MHz $\epsilon_r = 41.5 \pm 5\%$ $\sigma = 0.90 \pm 5\%$ mho/m
Valid for f=750-950 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	6.4 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	6.4 ± 9.5% (k=2)	Alpha	0.38
ConvF Z	6.4 ± 9.5% (k=2)	Depth	2.54

Head 1900 MHz $\epsilon_r = 40.0 \pm 5\%$ $\sigma = 1.40 \pm 5\%$ mho/m
Valid for f=1800-2000 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	4.9 ± 9.5% (k=2)	Boundary effect	
ConvF Y	4.9 ± 9.5% (k=2)	Alpha	0.53
ConvF Z	4.9 ± 9.5% (k=2)	Depth	2.66

Boundary Effect

Head	835 MHz	Typical SAR gradient: 5 % per mm	
Probe Tip to Boundary		1 mm	2 mm
SAR _{0e} [%]	Without Correction Algorithm	10.2	5.7
SAR _{0e} [%]	With Correction Algorithm	0.4	0.6

Head	1900 MHz	Typical SAR gradient: 10 % per mm	
Probe Tip to Boundary		1 mm	2 mm
SAR _{pe} [%] Without Correction Algorithm		14.9	10.3
SAR _{pe} [%] With Correction Algorithm		0.2	0.3

Sensor Offset

Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.8 ± 0.2	mm

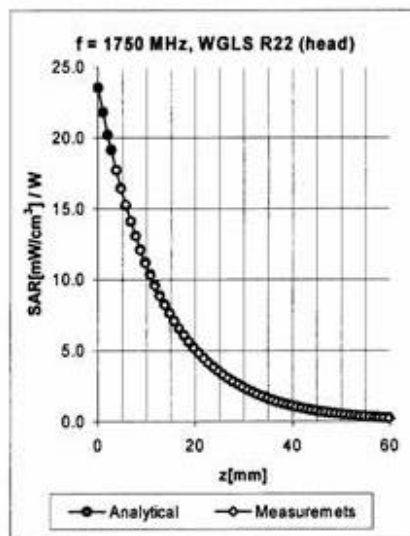
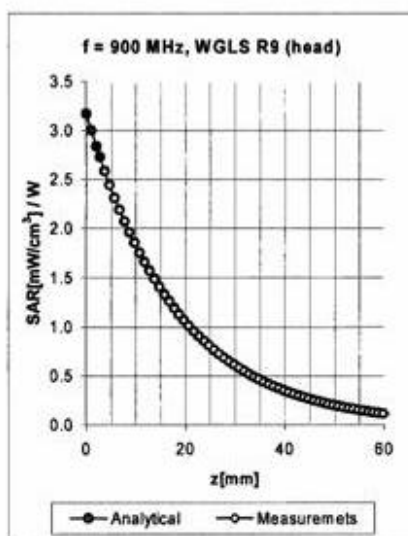


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ET3DV6 SN:1538

May 27, 2004

Conversion Factor Assessment



f [MHz]	Validity [MHz] ^a	Tissue	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
835	785-885	Head	41.5 ± 5%	0.90 ± 5%	0.69	1.82	6.27 ± 9.7% (k=2)
900	850-950	Head	41.5 ± 5%	0.97 ± 5%	0.79	1.72	6.22 ± 9.7% (k=2)
1750	1700-1800	Head	40.0 ± 5%	1.40 ± 5%	0.52	2.55	5.17 ± 9.7% (k=2)
1900	1850-1950	Head	40.0 ± 5%	1.40 ± 5%	0.54	2.64	4.95 ± 9.7% (k=2)
2450	2400-2500	Head	39.2 ± 5%	1.80 ± 5%	1.01	2.01	4.48 ± 9.7% (k=2)
835	785-885	Body	55.2 ± 5%	0.97 ± 5%	0.83	1.68	6.17 ± 9.7% (k=2)
900	850-950	Body	55.0 ± 5%	1.05 ± 5%	0.61	2.01	5.97 ± 9.7% (k=2)
1750	1700-1800	Body	54.0 ± 5%	1.30 ± 5%	0.60	2.73	4.60 ± 9.7% (k=2)
1900	1850-1950	Body	53.3 ± 5%	1.52 ± 5%	0.67	2.59	4.47 ± 9.7% (k=2)
2450	2400-2500	Body	52.7 ± 5%	1.95 ± 5%	1.51	1.42	4.38 ± 9.7% (k=2)

^a The total standard uncertainty is calculated as root-sum-square of standard uncertainty of the Conversion Factor at calibration frequency and the standard uncertainty for the indicated frequency band.



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REPORT

63(87)

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Approved SEM/CV/PF/P Gerard Hayes	Checked	A	X:\SAR Chamber\FCC reports\Z502A\Final Reports\FCCZ502A.doc

ET3DV6 SN:1538

May 27, 2004

DASY - Parameters of Probe: ET3DV6 SN:1538**Sensitivity in Free Space****Diode Compression^A**

NormX	1.34 $\mu\text{V}/(\text{V}/\text{m})^2$
NormY	1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
NormZ	1.41 $\mu\text{V}/(\text{V}/\text{m})^2$

DCP X	94	mV
DCP Y	94	mV
DCP Z	94	mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 7.

Boundary Effect**Head 900 MHz Typical SAR gradient: 5 % per mm**

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR _{oe} [%]	Without Correction Algorithm	10.2	5.4
SAR _{oe} [%]	With Correction Algorithm	0.0	0.1

Head 1800 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR _{oe} [%]	Without Correction Algorithm	14.4	9.3
SAR _{oe} [%]	With Correction Algorithm	0.1	0.1

Sensor Offset

Probe Tip to Sensor Center	2.7 mm
Optical Surface Detection	in tolerance

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 numerical linearization parameter: uncertainty not required



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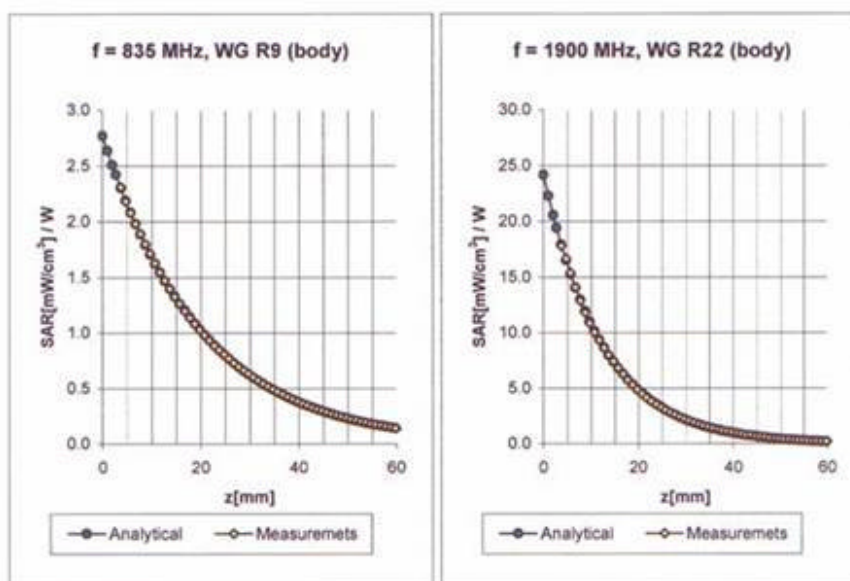
64(87)

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ET3DV6 SN:1583

December 16, 2003

Conversion Factor Assessment



Body	835 MHz	$\epsilon_r = 55.2 \pm 5\%$	$\sigma = 0.97 \pm 5\% \text{ mho/m}$
Valid for f=750-950 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C			
ConvF X	$6.7 \pm 9.5\% (k=2)$	Boundary effect:	
ConvF Y	$6.7 \pm 9.5\% (k=2)$	Alpha	0.32
ConvF Z	$6.7 \pm 9.5\% (k=2)$	Depth	2.70

Body	1900 MHz	$\epsilon_r = 53.3 \pm 5\%$	$\sigma = 1.52 \pm 5\% \text{ mho/m}$
Valid for f=1800-2000 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C			
ConvF X	$4.7 \pm 9.5\% (k=2)$	Boundary effect:	
ConvF Y	$4.7 \pm 9.5\% (k=2)$	Alpha	0.60
ConvF Z	$4.7 \pm 9.5\% (k=2)$	Depth	2.58



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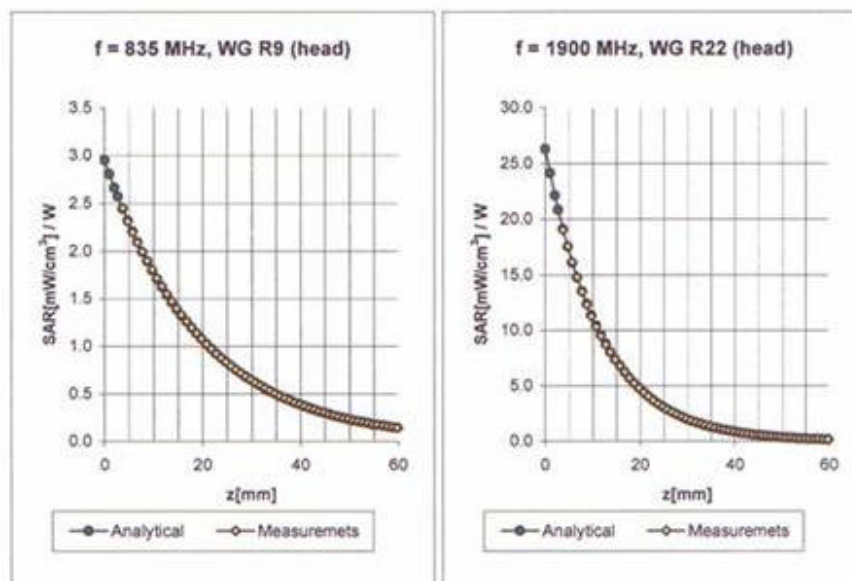
65(87)

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ET3DV6 SN:1583

December 16, 2003

Conversion Factor Assessment



Head	835 MHz	$\epsilon_r = 41.5 \pm 5\%$	$\sigma = 0.90 \pm 5\% \text{ mho/m}$
Valid for f=750-950 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X			
ConvF X	$7.1 \pm 9.5\% (k=2)$	Boundary effect:	
ConvF Y	$7.1 \pm 9.5\% (k=2)$	Alpha	0.29
ConvF Z	$7.1 \pm 9.5\% (k=2)$	Depth	2.76
Head	1900 MHz	$\epsilon_r = 40.0 \pm 5\%$	$\sigma = 1.40 \pm 5\% \text{ mho/m}$
Valid for f=1800-2000 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X			
ConvF X	$5.2 \pm 9.5\% (k=2)$	Boundary effect:	
ConvF Y	$5.2 \pm 9.5\% (k=2)$	Alpha	0.47
ConvF Z	$5.2 \pm 9.5\% (k=2)$	Depth	2.82



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REPORT

66(87)

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Approved SEM/CV/PF/P Gerard Hayes	Checked A X:\SAR Chamber\FCC reports\Z502A\Final Reports\FCCZ502A.doc

ET3DV6 SN:1583

December 16, 2003

DASY - Parameters of Probe: ET3DV6 SN:1583**Sensitivity in Free Space****Diode Compression**

NormX	$1.76 \mu V/(V/m)^2$	DCP X	95	mV
NormY	$1.95 \mu V/(V/m)^2$	DCP Y	95	mV
NormZ	$1.92 \mu V/(V/m)^2$	DCP Z	95	mV

Sensitivity in Tissue Simulating Liquid

Head	835 MHz	$\epsilon_r = 41.5 \pm 5\%$	$\sigma = 0.90 \pm 5\% \text{ mho/m}$
Valid for f=750-950 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X			
ConvF X	$7.1 \pm 9.5\% (k=2)$	Boundary effect:	
ConvF Y	$7.1 \pm 9.5\% (k=2)$	Alpha	0.29
ConvF Z	$7.1 \pm 9.5\% (k=2)$	Depth	2.76
Head	1900 MHz	$\epsilon_r = 40.0 \pm 5\%$	$\sigma = 1.40 \pm 5\% \text{ mho/m}$
Valid for f=1800-2000 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X			
ConvF X	$5.2 \pm 9.5\% (k=2)$	Boundary effect:	
ConvF Y	$5.2 \pm 9.5\% (k=2)$	Alpha	0.47
ConvF Z	$5.2 \pm 9.5\% (k=2)$	Depth	2.82

Boundary Effect

Head	835 MHz	Typical SAR gradient: 5 % per mm	
	Probe Tip to Boundary	1 mm	2 mm
	SAR _{be} [%] Without Correction Algorithm	8.8	5.1
	SAR _{be} [%] With Correction Algorithm	0.4	0.5
Head	1900 MHz	Typical SAR gradient: 10 % per mm	
	Probe Tip to Boundary	1 mm	2 mm
	SAR _{be} [%] Without Correction Algorithm	14.1	10.1
	SAR _{be} [%] With Correction Algorithm	0.3	0.3

Sensor Offset

Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.8 ± 0.2	mm



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REPORT

67(87)

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Approved SEM/CV/PF/P Gerard Hayes	Checked A X:\SAR Chamber\FCC reports\Z502A\Final Reports\FCCZ502A.doc

ET3DV6 SN:1586

May 27, 2004

DASY - Parameters of Probe: ET3DV6 SN:1586**Sensitivity in Free Space****Diode Compression^A**

NormX	1.91 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	95	mV
NormY	1.86 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	95	mV
NormZ	1.88 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	95	mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 7.

Boundary Effect**Head 900 MHz Typical SAR gradient: 5 % per mm**

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR _{0.05} [%]	Without Correction Algorithm	9.3	4.9
SAR _{0.05} [%]	With Correction Algorithm	0.1	0.3

Head 1800 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR _{0.05} [%]	Without Correction Algorithm	11.6	7.7
SAR _{0.05} [%]	With Correction Algorithm	0.2	0.1

Sensor Offset

Probe Tip to Sensor Center	2.7 mm
Optical Surface Detection	in tolerance

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 numerical linearization parameter: uncertainty not required

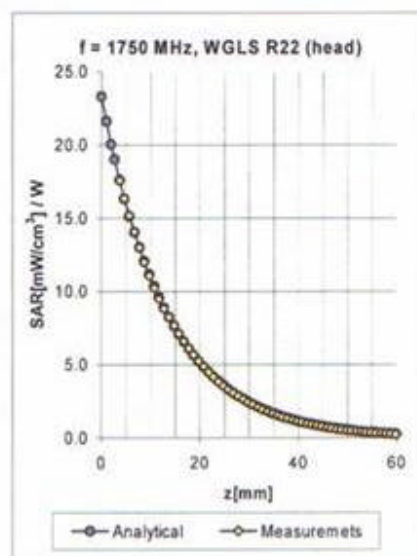
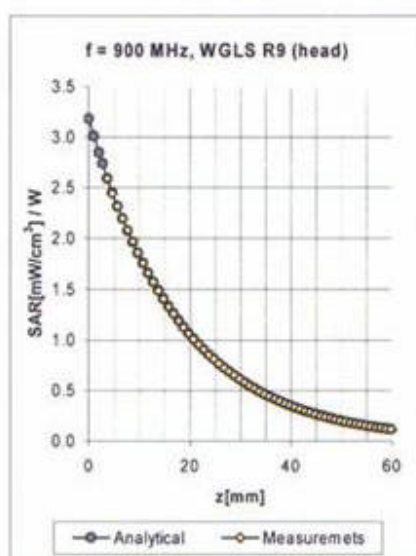


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ET3DV6 SN:1586

May 27, 2004

Conversion Factor Assessment



f [MHz]	Validity [MHz] [®]	Tissue	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
835	785-885	Head	41.5 ± 5%	0.90 ± 5%	0.77	1.63	6.62 ± 9.7% (k=2)
900	850-950	Head	41.5 ± 5%	0.97 ± 5%	0.58	1.92	6.49 ± 9.7% (k=2)
1750	1700-1800	Head	40.0 ± 5%	1.40 ± 5%	0.48	2.48	5.32 ± 9.7% (k=2)
1900	1850-1950	Head	40.0 ± 5%	1.40 ± 5%	0.50	2.64	5.14 ± 9.7% (k=2)
2450	2400-2500	Head	39.2 ± 5%	1.80 ± 5%	0.94	1.89	4.56 ± 9.7% (k=2)
835	785-885	Body	55.2 ± 5%	0.97 ± 5%	0.52	2.05	6.32 ± 9.7% (k=2)
900	850-950	Body	55.0 ± 5%	1.05 ± 5%	0.51	2.20	6.16 ± 9.7% (k=2)
1750	1700-1800	Body	53.3 ± 5%	1.52 ± 5%	0.54	2.82	4.60 ± 9.7% (k=2)
1900	1850-1950	Body	53.3 ± 5%	1.52 ± 5%	0.57	2.76	4.53 ± 9.7% (k=2)
2450	2400-2500	Body	52.7 ± 5%	1.95 ± 5%	1.21	1.56	4.36 ± 9.7% (k=2)

[®] The total standard uncertainty is calculated as root-sum-square of standard uncertainty of the Conversion Factor at calibration frequency and the standard uncertainty for the indicated frequency band.

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REPORT

69(87)

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Appendix 5

Measurement Uncertainty Budget



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REPORT

70(87)

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Table 1a. Uncertainty Budget for System Performance Check (Dipole & flat phantom) DASY3 System

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e = f(d,k)</i>	<i>f</i>	<i>g</i>	<i>h = c x f / e</i>	<i>i = c x g / e</i>	<i>k</i>
Uncertainty Component	Sec.	Tol. (± %)	Prob. Dist.	Div.	<i>c_i</i> (1-g)	<i>c_i</i> (10-g)	1-g <i>u_i</i> (±%)	10-g <i>u_i</i> (±%)	<i>v_i</i>
Measurement System									
Probe Calibration (<i>k</i> =1)	E.2.1	4.8	N	1	1	1	4.8	4.8	∞
Axial Isotropy	E.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3	8.3	R	1.73	1	1	4.8	4.8	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	1.0	N	1	1	1	1.0	1.0	∞
Response Time	E.2.7	0.0	R	1.73	1	1	0.0	0.0	∞
Integration Time	E.2.8	0.0	R	1.73	1	1	0.0	0.0	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance (corresponds to the mechanical constraints of the robot)	E.6.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	E.6.3	2.9	R	1.73	1	1	1.7	1.7	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E.5	3.9	R	1.73	1	1	2.3	2.3	∞
Dipole									
Dipole Axis to Liquid Distance	8, E.4.2	1.0	R	1.73	1	1	0.6	0.6	∞
Input Power and SAR Drift Measurement	8, 6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty - shell thickness tolerance	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity - deviation	E.3.2	4.3	R	1.73	0.64	0.43	1.59	1.07	∞

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71(87)

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from target values (5)									
Liquid Conductivity - measurement uncertainty (6)	E.3.3	6.20	R	1.73	0.64	0.43	2.29	1.54	∞
Liquid Permittivity - deviation from target values (5)	E.3.2	3.7	R	1.73	0.6	0.49	1.28	1.05	∞
Liquid Permittivity - measurement uncertainty (6)	E.3.3	6.08	R	1.73	0.6	0.49	2.11	1.72	∞
Combined Standard Uncertainty			RSS				10.61	10.31	
Expanded Uncertainty (95% C.L.)							21.22	20.62	



Sony Ericsson

REPORT

72(87)

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Approved SEM/CV/PF/P Gerard Hayes	Checked A X:\SAR Chamber\FCC reports\Z502A\Final Reports\FCCZ502A.doc

Table 1b. Uncertainty Budget for System Performance Check (Dipole & flat phantom) DASY4 System

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e = f(d,k)</i>	<i>f</i>	<i>g</i>	<i>h = c x f / e</i>	<i>i = c x g / e</i>	<i>k</i>
Uncertainty Component	Sec.	Tol. (± %)	Prob. Dist.	Div.	<i>c_i</i> (1-g)	<i>c_i</i> (10-g)	1-g <i>u_i</i> (±%)	10-g <i>u_i</i> (±%)	<i>v_i</i>
Measurement System									
Probe Calibration (<i>k</i> =1)	E2.1	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Axial Isotropy	E.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Hemispherical Isotropy	E.2.2	1.0	R	1.73	1	1	0.6	0.6	∞
Boundary Effect	E.2.3	4.7	R	1.73	1	1	2.7	2.7	∞
Linearity	E.2.4	1.0	R	1.73	1	1	0.6	0.6	∞
System Detection Limits	E.2.5	1.0	N	1	1	1	1.0	1.0	∞
Readout Electronics	E.2.6	0.8	R	1.73	1	1	0.5	0.5	∞
Response Time	E.2.7	2.6	R	1.73	1	1	1.5	1.5	∞
Integration Time	E.2.8	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance (corresponds to the mechanical constraints of the robot)	E.6.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	E.6.3	2.9	R	1.73	1	1	1.7	1.7	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E.5	1.0	R	1.73	1	1	0.6	0.6	∞
Dipole									
Dipole Axis to Liquid Distance	8, E.4.2	1.0	R	1.73	1	1	0.6	0.6	∞
Input Power and SAR Drift Measurement	8, 6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty - shell thickness tolerance	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity - deviation	E.3.2	4.3	R	1.73	0.64	0.43	1.59	1.07	∞

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73(87)

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from target values (5)									
Liquid Conductivity - measurement uncertainty (6)	E.3.3	6.20	R	1.73	0.64	0.43	2.29	1.54	∞
Liquid Permittivity - deviation from target values (5)	E.3.2	3.7	R	1.73	0.6	0.49	1.28	1.05	∞
Liquid Permittivity - measurement uncertainty (6)	E.3.3	6.08	R	1.73	0.6	0.49	2.11	1.72	∞
Combined Standard Uncertainty			RSS				9.37	9.03	
Expanded Uncertainty (95% C.L.)							18.74	18.05	



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74(87)

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Table 2a: Uncertainty Budget for the Device Under Test with DASY3 System

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	$e = f(d, k)$	<i>f</i>	<i>g</i>	$h = c \times f / e$	$i = c \times g / e$	<i>k</i>
Uncertainty Component	Sec.	Tol. (± %)	Prob. Dist.	Div.	c_i (1-g)	c_i (10-g)	1-g u_i (±%)	10-g u_i (±%)	v_i
Measurement System									
Probe Calibration ($k=1$)	E.2.1	4.8	N	1	1	1	4.8	4.8	∞
Axial Isotropy	E.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3	8.3	R	1.73	1	1	4.8	4.8	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	1.0	N	1	1	1	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1	1	0.5	0.5	∞
Integration Time	E.2.8	1.4	R	1.73	1	1	0.8	0.8	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance (corresponds to the mechanical constraints of the robot)	E.6.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	E.6.3	2.9	R	1.73	1	1	1.7	1.7	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E.5	3.9	R	1.73	1	1	2.3	2.3	∞
Test sample Related									
Test Sample Positioning	E.4.2	2.1	N	1	1	1	2.1	2.1	4
Device Holder Uncertainty	E.4.1	5.7	R	1.73	1	1	3.3	3.3	4
Output Power Variation - SAR drift measurement (4)	6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									



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REPORT

75(87)

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Phantom Uncertainty (shape and thickness tolerances)	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity - deviation from target values (5)	E.3.2	4.3	R	1.73	0.64	0.43	1.6	1.1	∞
Liquid Conductivity - measurement uncertainty (6)	E.3.3	6.20	R	1.73	0.64	0.43	2.3	1.5	∞
Liquid Permittivity - deviation from target values (5)	E.3.2	3.7	R	1.73	0.6	0.49	1.3	1.0	∞
Liquid Permittivity - measurement uncertainty (6)	E.3.3	6.08	R	1.73	0.6	0.49	2.1	1.7	∞
Combined Standard Uncertainty			RSS				11.33	11.04	
Expanded Uncertainty (95% CONFIDENCE LEVEL)			K=2				22.67	22.08	



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76(87)

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Table 2b: Uncertainty Budget for the Device Under Test with DASY4 System

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	$e = f(d, k)$	<i>f</i>	<i>g</i>	$h = c \times f / e$	$i = c \times g / e$	<i>k</i>
Uncertainty Component	Sec.	Tol. (± %)	Prob. Dist.	Div.	c_i (1-g)	c_i (10-g)	1-g u_i (±%)	10-g u_i (±%)	v_i
Measurement System									
Probe Calibration ($k=1$)	E2.1	4.8	N	1	1	1	4.8	4.8	∞
Axial Isotropy	E.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3	1.0	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	1.0	N	1	1	1	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1	1	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance (corresponds to the mechanical constraints of the robot)	E.6.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	E.6.3	2.9	R	1.73	1	1	1.7	1.7	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E.5	1.0	R	1.73	1	1	0.6	0.6	∞
Test sample Related									
Test Sample Positioning	E.4.2	2.1	N	1	1	1	2.1	2.1	4
Device Holder Uncertainty	E.4.1	5.7	R	1.73	1	1	3.3	3.3	4
Output Power Variation - SAR drift measurement (4)	6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									



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77(87)

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Phantom Uncertainty (shape and thickness tolerances)	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity - deviation from target values (5)	E.3.2	4.3	R	1.73	0.64	0.43	1.6	1.1	∞
Liquid Conductivity - measurement uncertainty (6)	E.3.3	6.20	R	1.73	0.64	0.43	2.3	1.5	∞
Liquid Permittivity - deviation from target values (5)	E.3.2	3.7	R	1.73	0.6	0.49	1.3	1.0	∞
Liquid Permittivity - measurement uncertainty (6)	E.3.3	6.08	R	1.73	0.6	0.49	2.1	1.7	∞
Combined Standard Uncertainty			RSS				10.14	9.82	
Expanded Uncertainty (95% CONFIDENCE LEVEL)			K=2				20.27	19.64	



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REPORT

78(87)

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Table 3a. Values for ϵ'

Uncertainty Component	Tolerance ($\pm\%$)	Probability Distribution	Divisor	c_i	Standard Uncertainty ($\pm\%$)	v_i or v_{eff}
Repeatability (n repeats)	0.97	N	1	1	0.97	4
Network analyzer uncertainty sources	8.38	R	1.73	1	4.83	∞
Dielectric Error Sources	5.93	R	1.73	1	3.42	∞
Combined standard uncertainty					6.08	

Table 3b. Values for σ

Uncertainty Component	Tolerance ($\pm\%$)	Probability Distribution	Divisor	c_i	Standard Uncertainty ($\pm\%$)	v_i or v_{eff}
Repeatability (n repeats)	1.85	N	1	1	1.85	4
Network analyzer uncertainty sources	8.38	R	1.73	1	4.83	∞
Dielectric Error Sources	5.93	R	1.73	1	3.42	∞
Combined standard uncertainty					6.20	

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79(87)

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Appendix 6

Photographs of the Device Under Test

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80(87)

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a. Front



b. Back



c. Side

View of Device (Open)

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81(87)

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a. Front



b. Back



c. Side

View of Device (Closed)

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82(87)

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Front View



Back View

Front and Back views of carry accessory model ICE-26.

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83(87)

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View of Hands-free Accessory HPB-20

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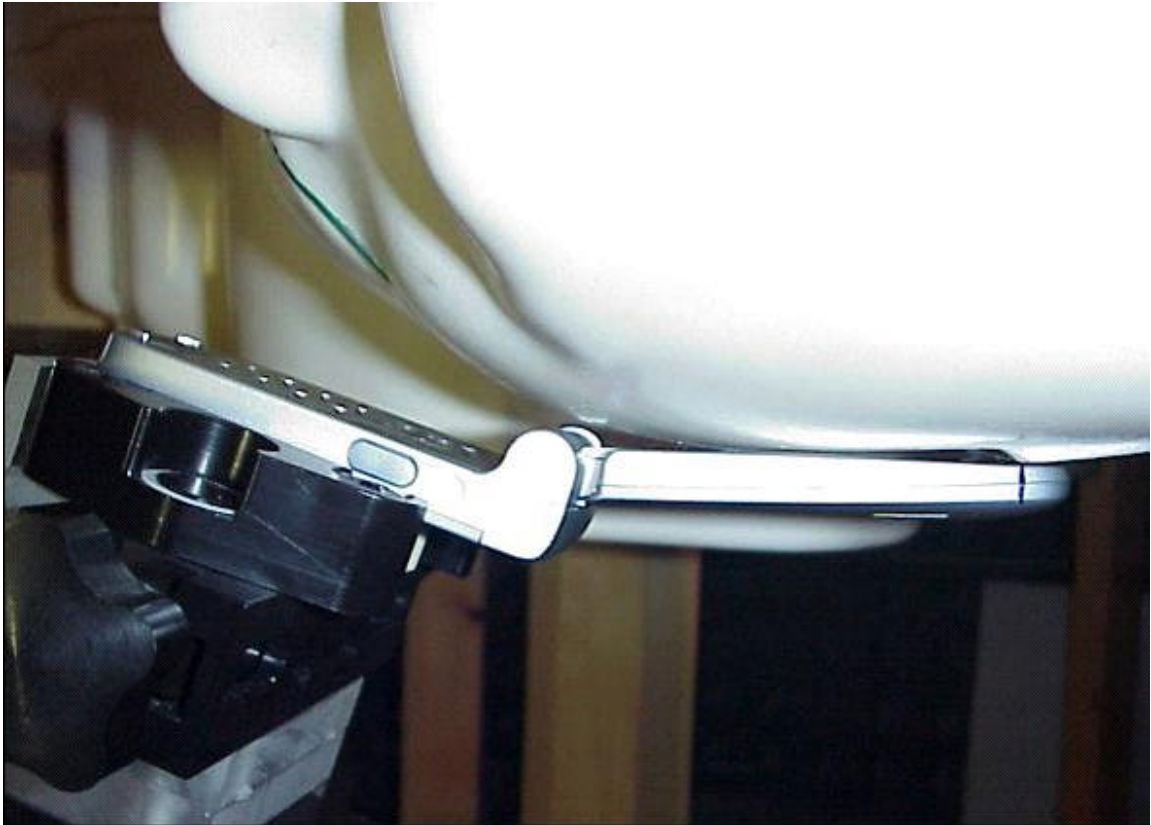


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84(87)

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Position of device against head phantom using the “cheek” position

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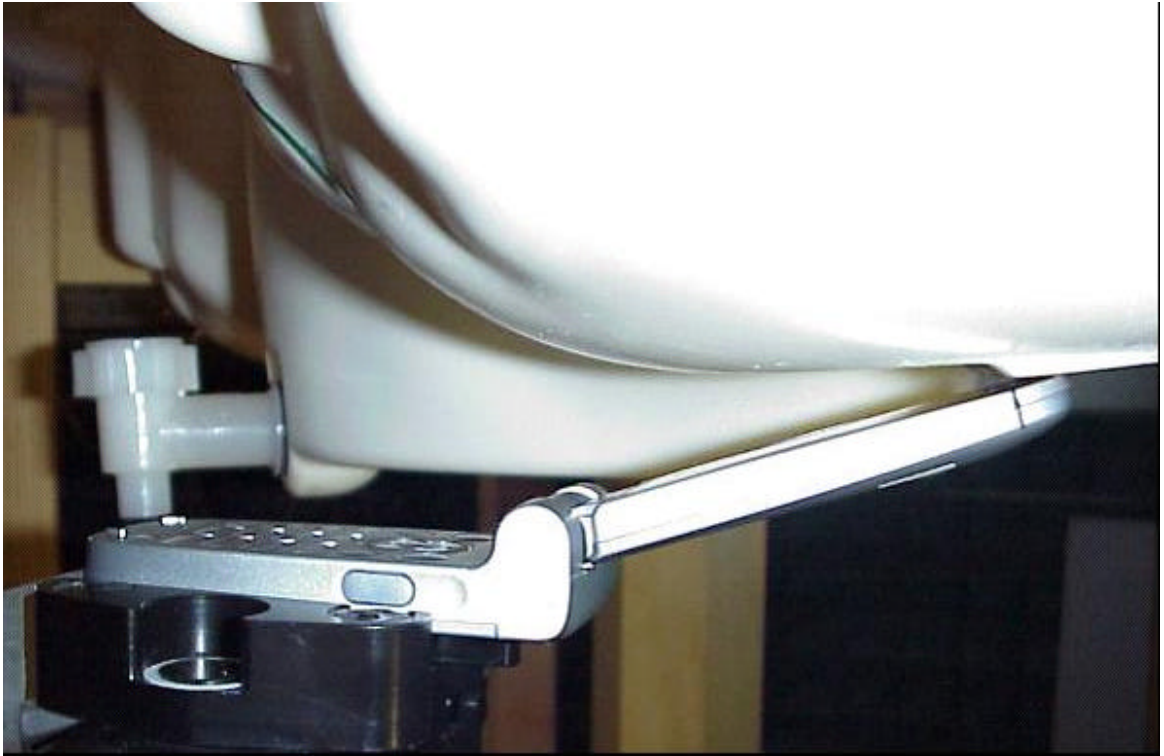


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85(87)

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Position of device against head phantom using the “tilt” position

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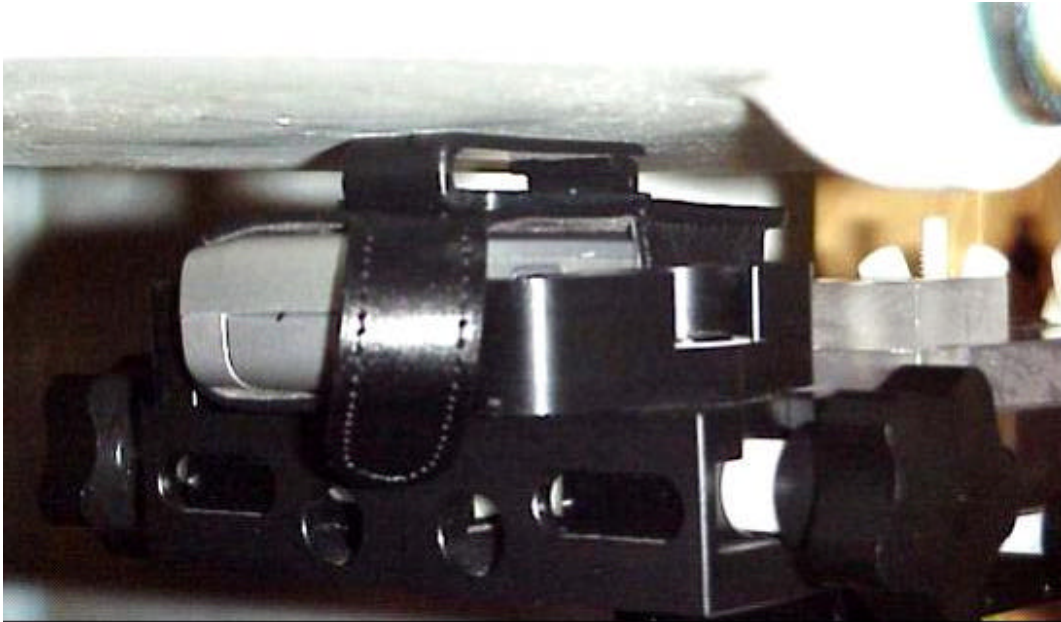


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86(87)

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Position of device against flat phantom using carry accessory ICE-26 with hands free accessory (HPB-20).

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87(87)

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Back of Device Facing Body



Front of Device Facing Body

Position of device against flat phantom using 15mm spacer with hands free accessory (HPB-20).