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SAR Test Report: T62u (PXITR-502-A2)
Supplement A: Results for body-worn usage

Date of test: May 24 and 30, 2002

Laboratory:
SAR Testing Laboratory
Sony Ericsson Mobile Communications, Inc.
7001 Development Drive, P.O. Box 13969,
Research Triangle Park, NC, 27709, USA

Tested by:
William Stewart
Development Engineer, Antenna Development Group

Test Responsible:
Dulce Altabella
Staff Engineer, Antenna Development Group

Accreditation:
This laboratory is accredited to ISO/IEC 17025-1999 to perform the following electromagnetic tests: Specific Absorption Rate (SAR), dielectric parameters, and RF power measurement
on the following types of products: Wireless communications devices.

A2LA certificate Number: 1650-01

Statement of Compliance:

Sony Ericsson Mobile Communications, Inc. declares under its sole responsibility that the product

T62u
FCC ID: PXITR-502-A2

to which this declaration relates, is in conformity with the appropriate RF exposure standards, recommendations and guidelines. It also declares that the product was tested using specifications that closely conform to the latest appropriate measurement standards, guidelines and recommended practices. Any deviations from these specifications or from ISO/IEC 17025-1999 are noted below:

None

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1. Introduction

This report is a supplement to the document SEM/CV/P-02:0591/REP "SAR Test Report: T62u (PXITR-502-A2)." The main document demonstrates compliance of the T62u wireless handset with RF safety guidelines while used against the head. In this report, compliance of the T62u wireless handset with RF safety guidelines is demonstrated while the device is used in body-worn configurations. The applicable RF safety guidelines and the SAR measurement specifications used for the test are described in [1].

2. Device Under Test

2.1 Antenna description

Type	Internal antenna	
Location	Inside the back cover, near the top	
Dimensions	Maximum length	38 mm
	Maximum width	51 mm
Configuration	Patch antenna	

2.2 Device description

Device model	T62u				
FCC ID	PXITR-502-A2				
Serial number	UA2020MZVQ				
Maximum Size	Length	121 mm			
	Width	54 mm			
	Thickness	25 mm			
Modes	800 AMPS	800 TDMA	800 GSM	1900 TDMA	1900 GSM
Multiple Access Scheme	FDMA	TDMA	TDMA	TDMA	TDMA
Maximum Output Power Setting	26.0 dBm	26.0 dBm	29.0 dBm	26.0 dBm	30.0 dBm
Factory Tolerance in Power Setting	± 0.25	± 0.40	± 0.60	± 0.25	± 0.60
Maximum Peak Output Power	26.25 dBm	26.40 dBm	29.60 dBm	26.25 dBm	30.60 dBm
Duty Cycle	1	3	8	3	8
Transmitting Frequency Range	824 – 849 MHz	824 – 849 MHz	824 – 849 MHz	1850 – 1910 MHz	1850 – 1910 MHz
Prototype or Production Unit	Prototype				
Device Category	Portable				
RF Exposure Environment [2]	General population / uncontrolled				

3. Test equipment

3.1 Dosimetric system

SAR measurements were made using a DASY3 professional system (software version 3.1d) with a SAM phantom, manufactured by Schmid & Partner Engineering AG (SPEAG). The measurement uncertainty of the system is given in [1]. Below is a list of the calibrated equipment.

Description	Serial Number	Due Date
DASY3 DAE V1	416	12 / 2002
E-field probe ET3DV5	1324	12 / 2002
E-field probe ET3DV6	1583	12 / 2002
Dipole Validation Kit, D835V2	428	03 / 2003
Dipole Validation Kit, D1900V2	536	03 / 2003

3.2 Additional calibrated equipment

Description	Serial Number	Due Date
Signal Generator HP8648C	3537A01598	9/2002
Dielectric probe kit HP 85070B	US33020256	10/2002
Network analyzer HP 8752C	3410A03105	8/2002
Power meter HP 437B	3125U16190	4/2003
Power sensor HP 8482H	2704A06235	3/2003
Power meter HP 437B	3125U13729	1/2003
Power sensor HP 8482H	3318A07097	5/2003
Power meter E4418B	GB40206594	9/2002
Power sensor HP 8482H	3318A09268	8/2002
Hygrometer / Thermometer	21242911	10/2002
Thermometer / Probe	350078/99172351	10/2002
Thermometer / Probe	21117674/21117824	11/2002
Spectrum Analyzer MS2623A	M07418	10/2002

4. Electrical parameters of the tissue simulating liquid

Prior to conducting SAR measurements, the relative permittivity, ε_r, and the conductivity, σ, of the tissue simulating liquids were measured with the dielectric probe kit. These are tabulated below. A mass density of $\rho = 1.00$ g/cm^3 was entered into the DASY3 program in all cases. The temperatures of the tissue simulants during measurements are also given. During the tests, the ambient temperature of the laboratory was in the range 22.5 – 23.7 °C, the relative humidity was 32.3 – 38.3% and the liquid depth was above 15 cm for all the tests. It can be seen that the measured parameters are within tolerance of the recommended limits [1].

f (MHz)	Tissue type	Date	Dielectric Parameters		Simulant Temp (°C)
			e_r	s (S/m)	
835	Body	24MAY02	55.90	0.97	23.1
1900	Body	30MAY02	52.74	1.55	23.0

5. System accuracy verification

A system accuracy verification of the DASY3 was performed using the dipole validation kits listed in Section 3.1. System verification tests were conducted on the same day as the measurement of the DUT. The obtained results are displayed in the table below (SAR values are scaled to 1 Watt power delivered to the antenna). During the tests, the ambient temperature of the laboratory was in the range 22.7– 23.6 °C, the relative humidity was 32.1 – 38.3% and the liquid depth was above 15 cm for all the tests. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values. Reference values are taken from numerical simulations for both the 835MHz and 1900MHz body simulant [5]. The SAR distributions are shown in Appendix 1.

Daily, prior to conducting tests, measurements were made with RF sources powered off to determine system noise. The highest system noise value was 0.000 W/kg, which is below the recommended limit [2].

f **MHz**	**Tissue type**	**Measured / Reference**	**SAR (W/kg) 1 g/10 g**	**Dielectric Parameters**		**Simulant Temp. (℃)**
				e_r	s (S/m)	
835	**Body**	**Measured, - 05/24/02**	9.62 / 6.32	55.90	0.97	22.9
		Reference (Simulation)	9.90 / 6.46	55.2	0.97	+/-2.0 of value in §4
1900	**Body**	**Measured, 05/30/02**	41.90 / 22.20	52.74	1.55	22.9
		Reference (Simulation)	40.50 / 20.89	53.3	1.52	+/-2.0 of value in §4

6. Test results

The measured 1- and 10-gram averaged SAR values of the device against the body, using battery BKB-193-1051 (800mAh) is presented in Tables 1 and 2. For body worn measurements, the device was tested against a flat phantom, representing the user's body, using carry accessory SXK 109 4705 and hands free accessory RLF-501-25/03. For AMPS, TDMA1900 and GSM1900 modes, the device was tested at the lowest, middle, and highest frequencies of the transmit band. For 800 TDMA and 800 GSM modes, the maximum power is significantly lower than that of AMPS mode, therefore SAR values are also lower and not included. Also shown are the measured conducted output powers and the temperature of the tissue simulant during the test. The depth of the tissue simulating liquid was at least 15 cm for all the cases. The humidity and ambient temperature of the test facility were in the ranges 30.3 – 43.8% and 22.8 – 24.3°C respectively. During the SAR measurements, test commands were used to control the device in the AMPS and TDMA1900 modes, and a base station simulator was used to control the device in the GSM1900 mode.

Mode	*f* (MHz)	Output Power (dBm)	Carry Accessory: SXK 109 4705 Rear of phone facing body		
			Simulant Temp. (°C)	SAR, 1g /10g (W/kg)	
				measured	Calculated to max. power
800 AMPS	824	25.92	22.6	1.32/0.954	1.32/0.954
	837	26.25	22.5	1.04/0.774	1.04/0.774
	849	25.25	22.5	0.781/0.556	0.781/0.556
1900 TDMA	1850	26.25	22.7	0.548/0.314	0.563/0.322
	1880	26.14	22.5	0.360/0.202	0.370/0.207
	1910	25.83	22.4	0.290/0.165	0.298/0.169
1900 GSM	1850	29.86	22.3	0.393/0.222	0.446/0.252
	1880	30.05	22.2	0.241/0.136	0.273/0.154
	1910	30.18	22.2	0.247/0.140	0.280/0.159

Table 1: SAR measurement results for the T62u telephone at highest possible output power. Measured against the body using carry accessory SXK 109 4705 with hands free accessory RLF 501 25/03. Rear of phone facing body

Mode	*f* (MHz)	Output Power (dBm)	Carry Accessory: SXK 109 4705 Front of phone facing body		
			Simulant Temp. (°C)	SAR, 1g /10g (W/kg)	
				measured	Calculated to max. power
800 AMPS	824	25.92	22.5	0.322/0.235	0.322/0.235
	837	26.25	22.5	0.579/0.416	0.579/0.416
	849	25.25	22.6	0.461/0.330	0.461/0.330
1900 TDMA	1850	26.25	22.6	0.066/0.041	0.068/0.042
	1880	26.14	22.5	0.065/0.040	0.066/0.041
	1910	25.83	22.4	0.073/0.045	0.075/0.046
1900 GSM	1850	29.86	22.0	0.072/0.044	0.081/0.050
	1880	30.05	22.1	0.051/0.032	0.057/0.036
	1910	30.18	22.2	0.047/0.029	0.053/0.033

Table 2: SAR measurement results for the T62u telephone at highest possible output power. Measured against the body using carry accessory SXK 109 4705 with hands free accessory RLF 501 25/03. Front of phone facing body

References

[1] D. Altabella, “SAR Measurement Specification of Wireless Handsets,” Sony Ericsson internal document EUS/CV/R-01:1061/REP, February 2002.

[2] FCC, “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 OET Bulletin 65 (Edition 97-01).

[3] IEEE, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques,” Std 1528-200X, Draft 6.5 – August 20, 2001.

[4] CENELEC, “Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz – 3 GHz)”, European Standard EN 50361, July 2001.

[5] D. Altabella, “Reference values for system validation using body material,” internal Sony Ericsson document EUS/CV/R-01:1118 /REP.

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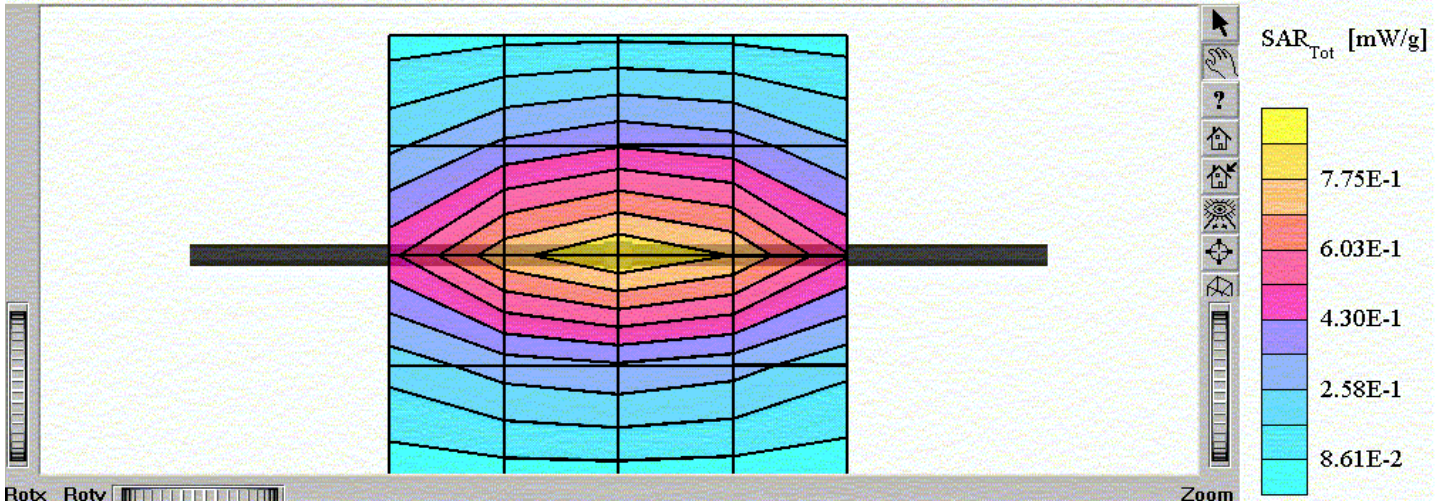
Appendix 1: SAR distribution comparison for system accuracy verification

Dipole 835 MHz
SAM 1031(R); Flat
Probe: ET3DV5 - SN1324; ConvF(4.72,4.72,4.72); Crest factor: 1.0; Body 835 MHz: $\sigma = 0.97$ mho/m $\varepsilon_r = 55.9$ $\rho = 1.00$ g/cm^3
Cubes (2): Peak: 1.43 mW/g ± 0.05 dB, SAR (1g): 0.962 mW/g ± 0.05 dB, SAR (10g): 0.632 mW/g ± 0.05 dB, (Worst-case extrapolation)
Penetration depth: 13.2 (12.6, 14.1) [mm]
Powerdrift: 0.03 dB; Measured date: 05/24/02
Validation 835BODY_SN428_SAM1031_05_24_02
Pin: before 100.0mW after 100.0mW
3.4mm surface detect/teflon caps on dipole



835 MHz SAR distribution of validation dipole antenna from system accuracy verification test on May 24, 2002. Using body tissue.

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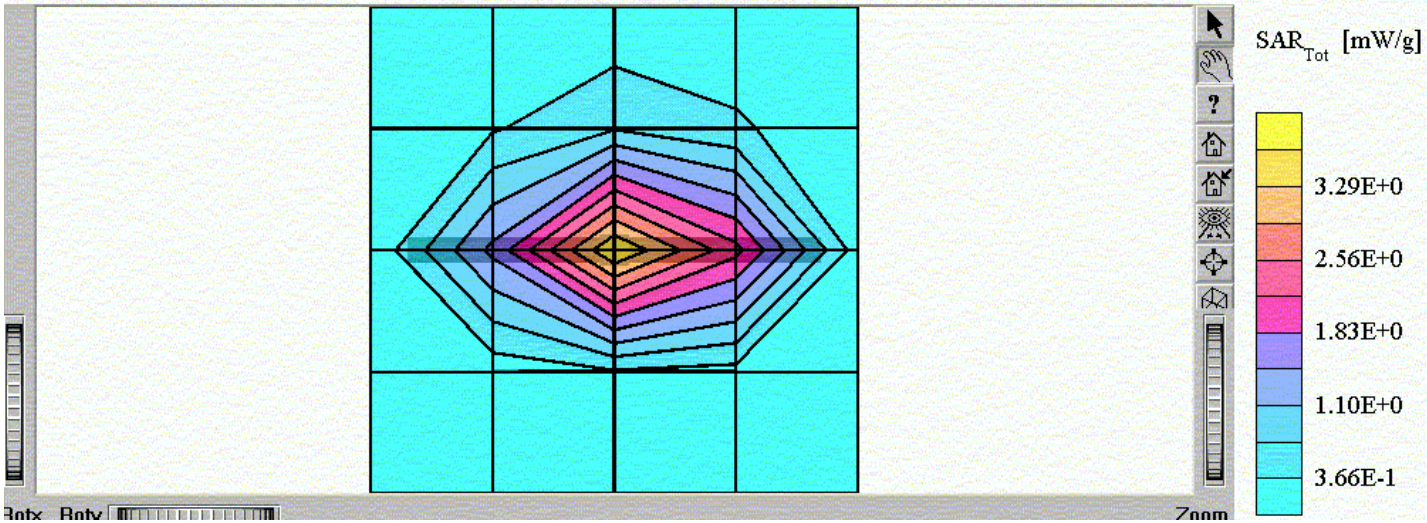
Dipole 1900 MHz
SAM 1031(R); Flat
Probe: ET3DV6 - SN1583; ConvF(4.91,4.91,4.91); Crest factor: 1.0; Body 1900 MHz: $\sigma = 1.55$ mho/m $\varepsilon_r = 52.7$ $\rho = 1.00$ g/cm^3
Cubes (2): Peak: 7.38 mW/g ± 0.04 dB, SAR (1g): 4.19 mW/g ± 0.05 dB, SAR (10g): 2.22 mW/g ± 0.06 dB, (Worst-case extrapolation)
Penetration depth: 9.1 (8.8, 9.7) [mm]
Powerdrift: -0.00 dB; Measured date: 05/30/02
Validation 1900BODY_SN536_SAM1031_05_30_02
Pin: before 100.0mW after 100.0mW
3.4mm surface detect/teflon caps on dipole



1900 MHz SAR distribution of validation dipole antenna from system accuracy verification test on May 30, 2002. Using body tissue.

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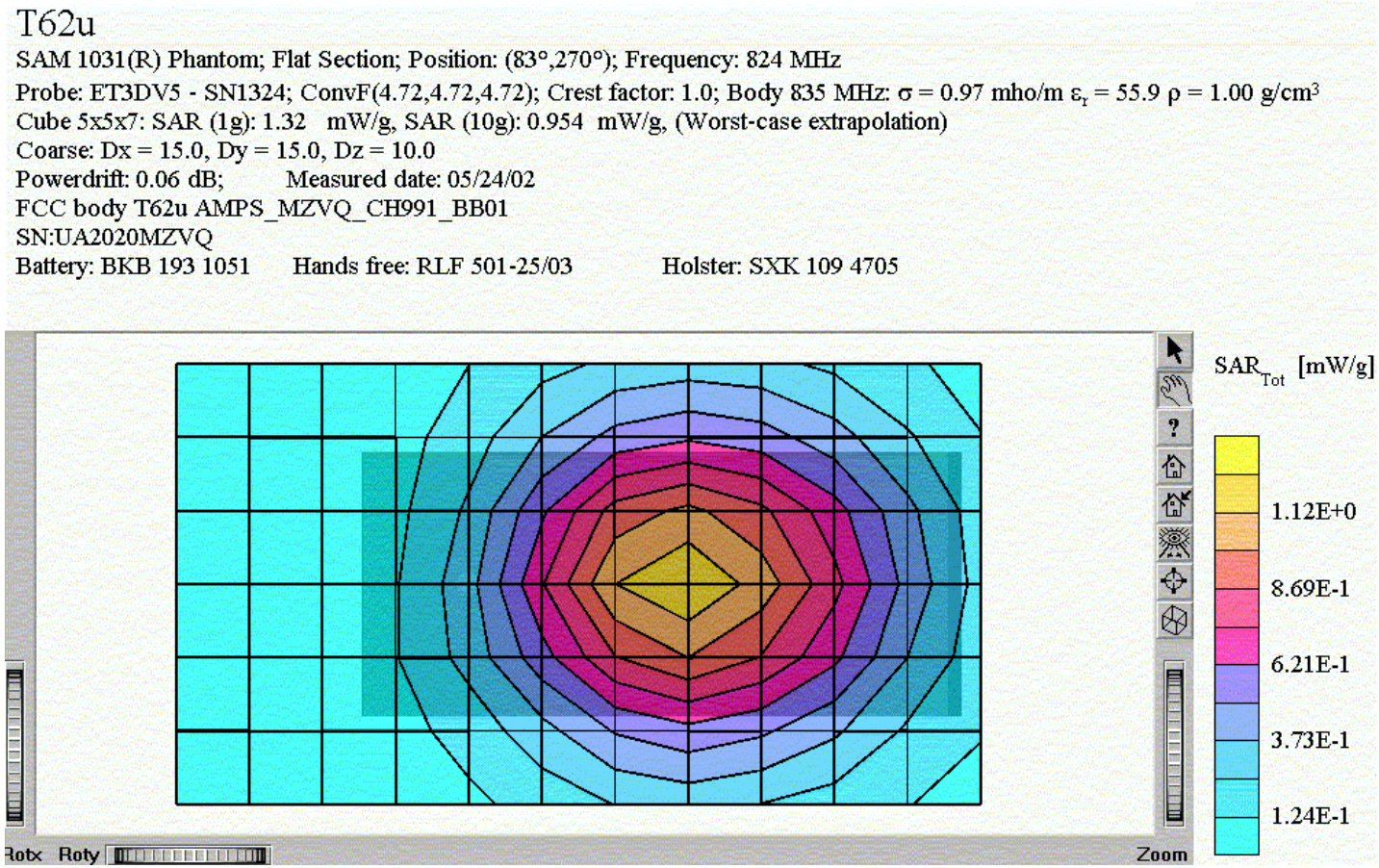
Appendix 2: SAR distribution plots



Distribution of maximum SAR in 800 AMPS band. Measured with back of device facing the body using carry accessory SXK 109 4705 and hands free accessory RLF 501 25/03.

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T62u

SAM 1031(R) Phantom; Flat Section; Position: (83°,270°); Frequency: 824 MHz

Probe: ET3DV5 - SN1324; ConvF(4.72,4.72,4.72); Crest factor: 1.0; Body 835 MHz: σ = 0.97 mho/m ε_r = 55.9 ρ = 1.00 g/cm^3

Cube 5x5x7: SAR (1g): 1.32 mW/g, SAR (10g): 0.954 mW/g, (Worst-case extrapolation)

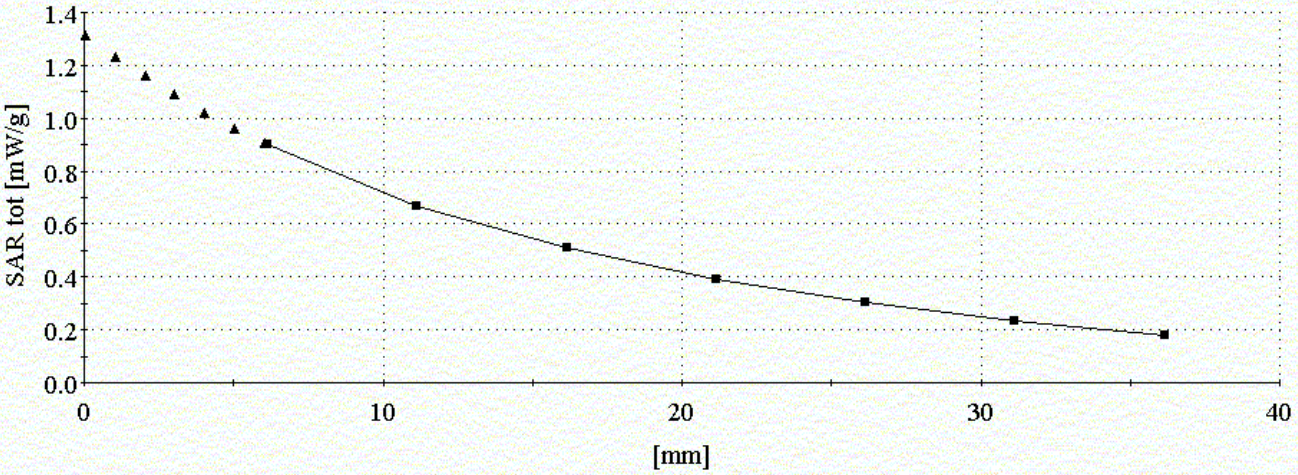
Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0

; Measured date: 05/24/02

FCC body T62u AMPS_MZVQ_CH991_BB01

SN:UA2020MZVQ

Battery: BKB 193 1051 Hands free: RLF 501-25/03 Holster: SXK 109 4705



SAR Extrapolation to the phantom inner surface. Measured for maximum SAR in 800 AMPS band, while phone is against the body using carry accessory SXK 109 4705 and hands free accessory RLF 501 25/03

T62u

SAM 1031(R) Phantom; Flat Section; Position: (83°,270°); Frequency: 1850 MHz

Probe: ET3DV6 - SN1583; ConvF(4.91,4.91,4.91); Crest factor: 3.0; Body 1900 MHz: $\sigma = 1.55$ mho/m $\varepsilon_r = 52.7$ $\rho = 1.00$ g/cm^3

Cube 5x5x7: SAR (1g): 0.548 mW/g, SAR (10g): 0.314 mW/g, (Worst-case extrapolation)

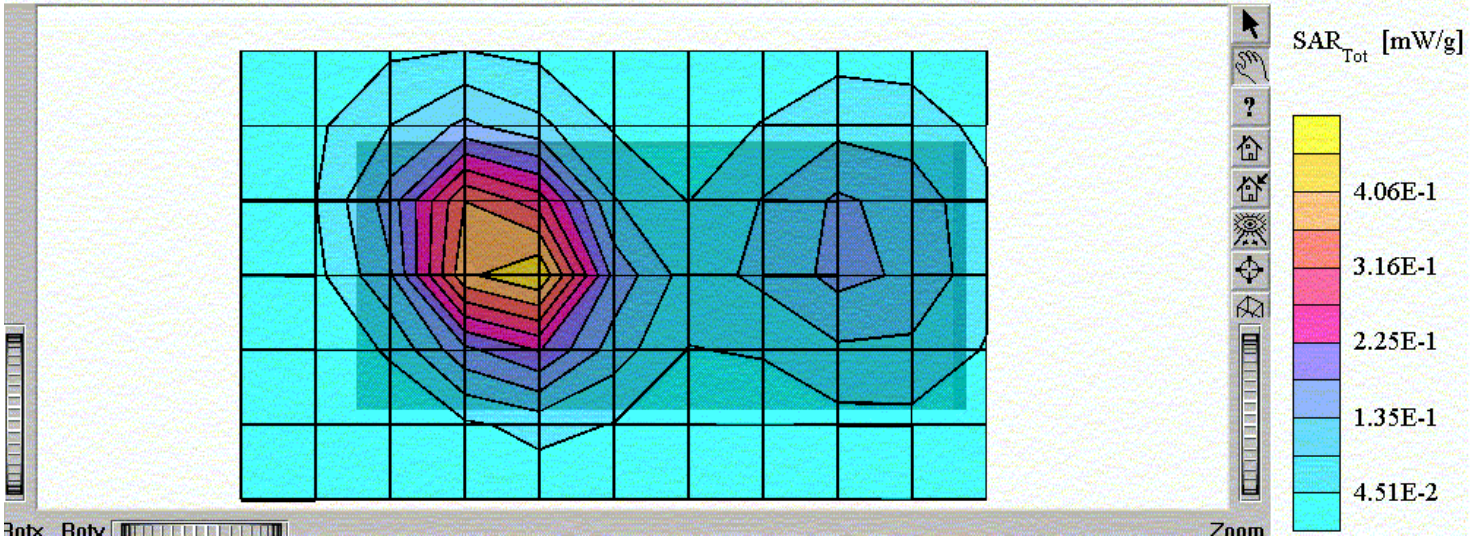
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0

Powerdrift: 0.17 dB; Measured date: 05/30/02

FCC body T62u TDMA1900_MZVQ_CH0002_BB01

SN:UA2020MZVQ

Holster: SXK 109 4705 PHF: RLF 501 25/03 Battery: BKB 193 1051



Distribution of maximum SAR in the 1900 TDMA band. Measured with back of device facing the body using carry accessory SXK 109 4705 and hands free accessory RLF 501 25/03.

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T62u

SAM 1031(R) Phantom; Flat Section; Position: (83°,270°); Frequency: 1850 MHz

Probe: ET3DV6 - SN1583; ConvF(4.91,4.91,4.91); Crest factor: 3.0; Body 1900 MHz: σ = 1.55 mho/m ε_r = 52.7 ρ = 1.00 g/cm^3

Cube 5x5x7: SAR (1g): 0.548 mW/g, SAR (10g): 0.314 mW/g, (Worst-case extrapolation)

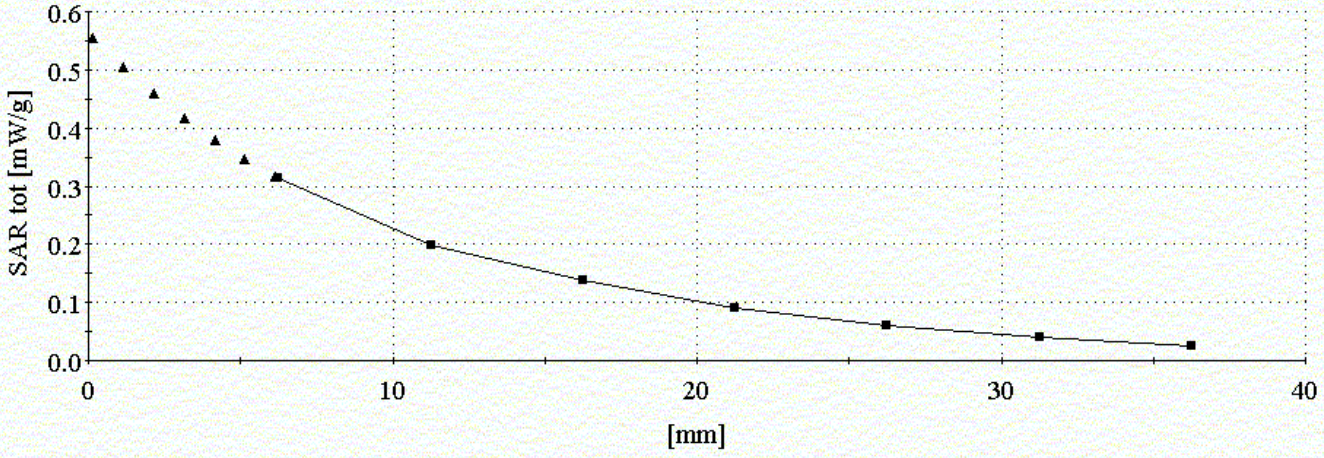
Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0

; Measured date: 05/30/02

FCC body T62u TDMA1900_MZVQ_CH0002_BB01

SN:UA2020MZVQ

Holster: SXK 109 4705 PHF: RLF 501 25/03 Battery: BKB 193 1051



SAR Extrapolation to the phantom inner surface. Measured for maximum SAR in 1900 TDMA band, while phone is against the body using carry accessory SXK 109 4705 and hands free accessory RLF 501 25/03

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T62u

SAM 1031(R) Phantom; Flat Section; Position: (83°,270°); Frequency: 1850 MHz

Probe: ET3DV6 - SN1583; ConvF(4.91,4.91,4.91); Crest factor: 8.0; Body 1900 MHz: $\sigma = 1.55$ mho/m $\varepsilon_r = 52.7$ $\rho = 1.00$ g/cm^3

Cube 5x5x7: SAR (1g): 0.393 mW/g, SAR (10g): 0.222 mW/g, (Worst-case extrapolation)

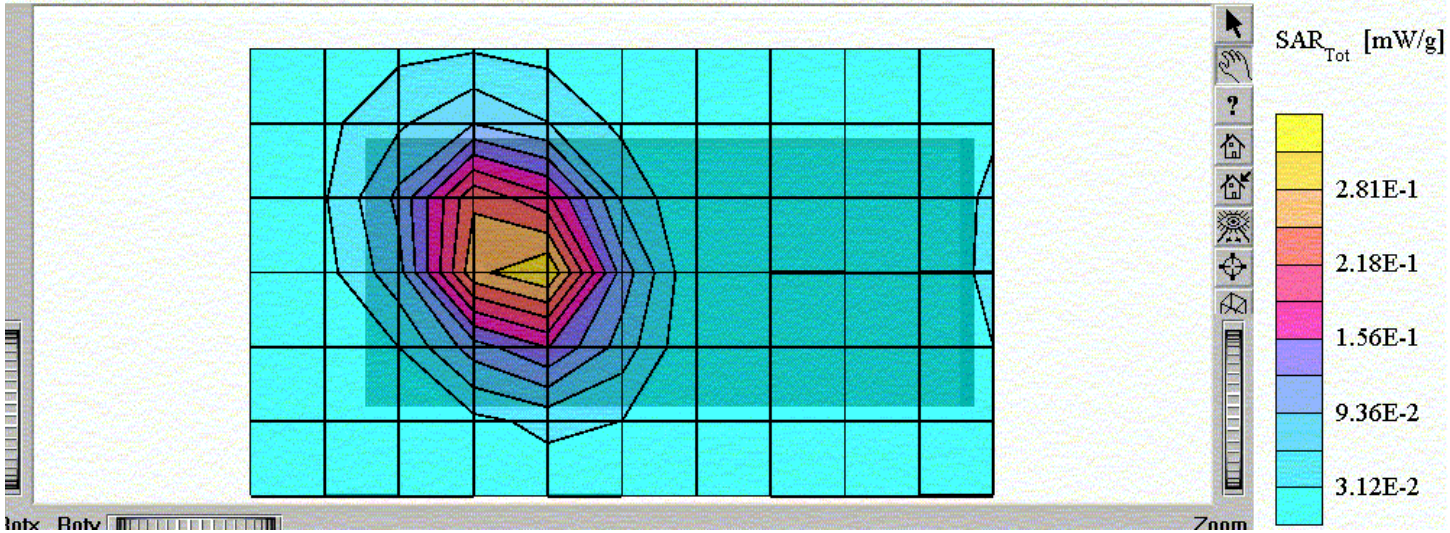
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0

Powerdrift: 0.03 dB; Measured date: 05/30/02

FCC body T62u GSM1900_MZVQ_CH512_BB01

SN:UA2020MZVQ

Holster: SXK 109 4705 PHF: RLF 501 25/03 Battery: BKB 193 1051



Distribution of maximum SAR in the 1900 GSM band. Measured with back of device facing the body using carry accessory SXK 109 4705 and hands free accessory RLF 501 25/03.

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T62u

SAM 1031(R) Phantom; Flat Section; Position: (83°,270°); Frequency: 1850 MHz

Probe: ET3DV6 - SN1583; ConvF(4.91,4.91,4.91); Crest factor: 8.0; Body 1900 MHz: $\sigma = 1.55$ mho/m $\varepsilon_r = 52.7$ $\rho = 1.00$ g/cm^3

Cube 5x5x7: SAR (1g): 0.393 mW/g, SAR (10g): 0.222 mW/g, (Worst-case extrapolation)

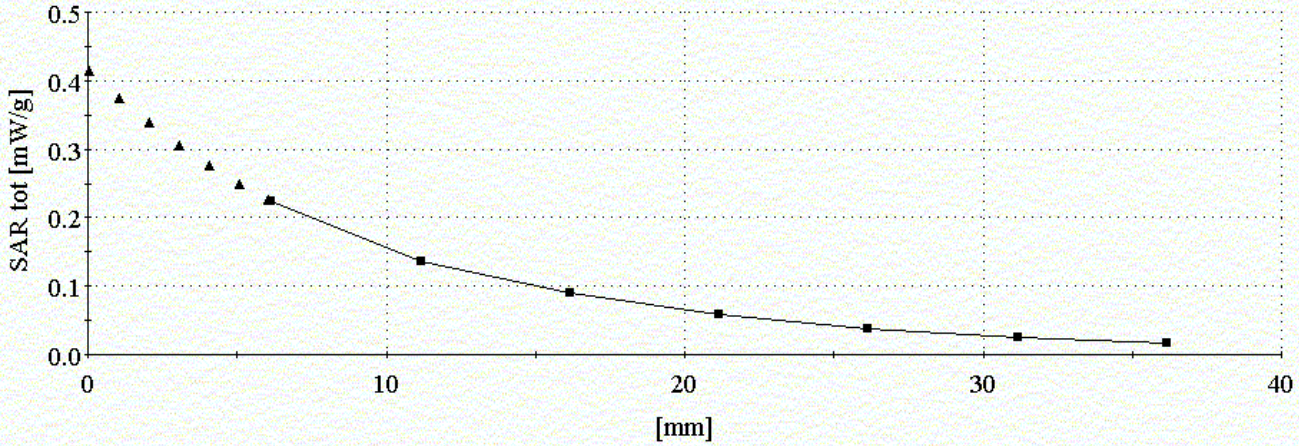
Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0

; Measured date: 05/30/02

FCC body T62u GSM1900_MZVQ_CH512_BB01

SN:UA2020MZVQ

Holster: SXK 109 4705 PHF: RLF 501 25/03 Battery: BKB 193 1051



SAR Extrapolation to the phantom inner surface. Measured for maximum SAR in 1900 GSM band, while phone is against the body using carry accessory SXK 109 4705 and hands free accessory RLF 501 25/03

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Appendix 3: Photographs of Device Under Test

Front view of device

Back view of device

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Side view of device.

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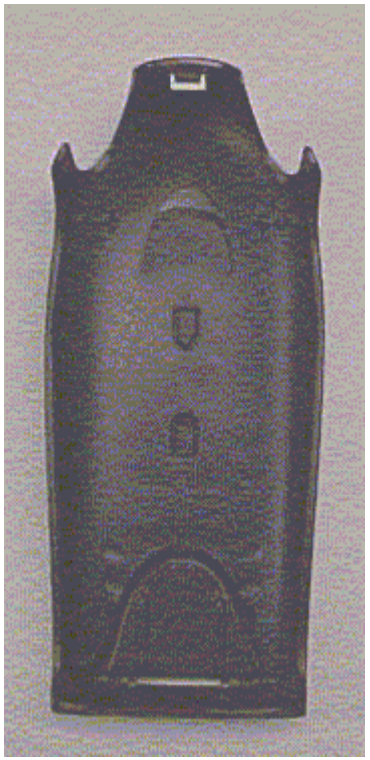

Front, back, and side views of product number SXK 109 4705. This accessory contains plastic and metal.

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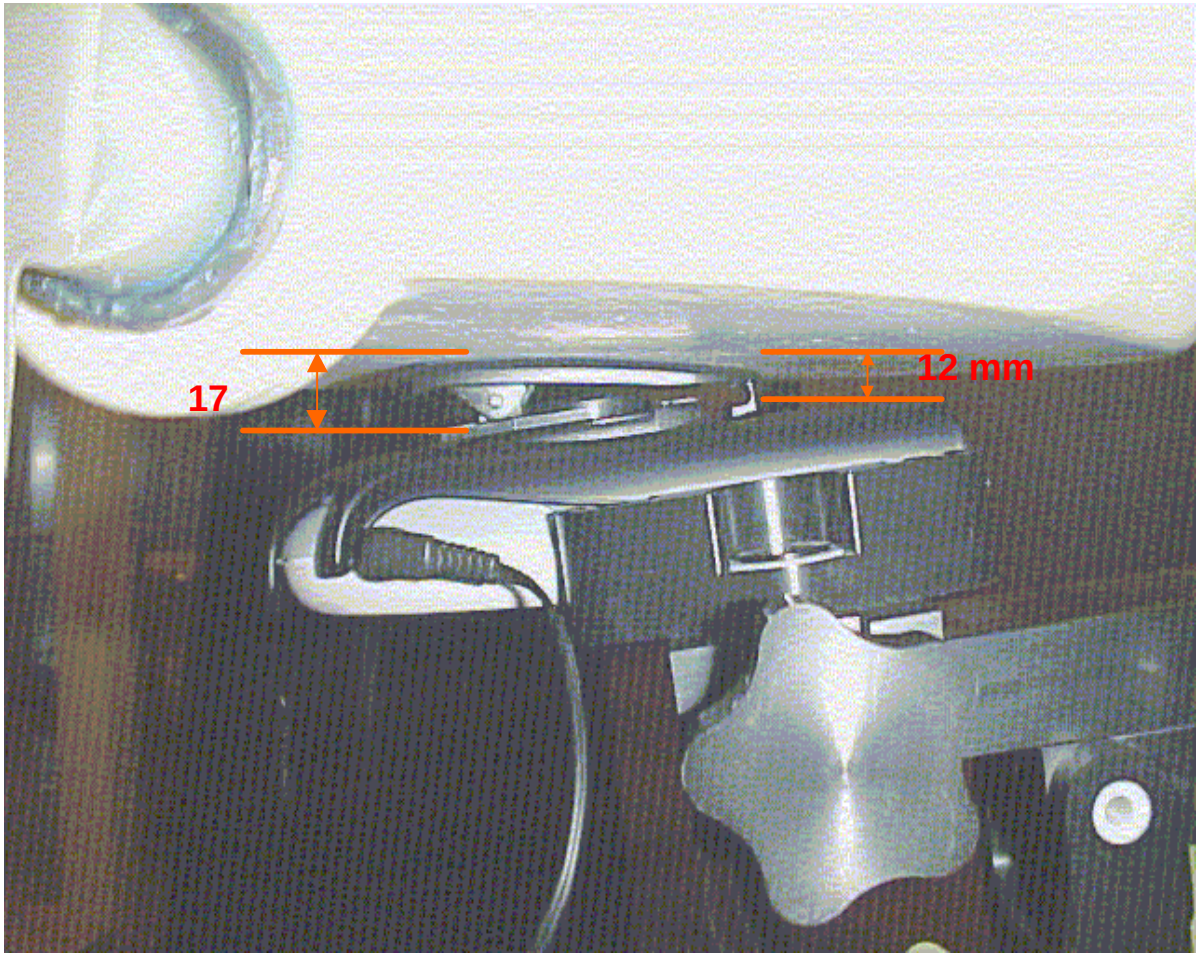
SEM/CV/PF/P Dulce Altabella	DA	2002-6-5 B	U:\FCC Submittals\Fcc_502 gerri anna nicole\XHIBIT11\Source\502-11 body.doc

Appendix 4: Position of Device on Phantom



Position of device against flat phantom using carry accessory SXK 109 4705 with hands free accessory RLF 501 25/03

Appendix 5: Probe calibration parameters

ET3DV5 SN:1324

DASY3 - Parameters of Probe: ET3DV5 SN:1324

Sensitivity in Free Space

Diode Compression

NormX	1.52 $\mu V/(V/m)^2$	DCP X	103 mV
NormY	1.73 $\mu V/(V/m)^2$	DCP Y	103 mV
NormZ	1.53 $\mu V/(V/m)^2$	DCP Z	103 mV

Sensitivity in Tissue Simulating Liquid

Head 450 MHz ε_r = 43.5 ± 5% σ = 0.87 ± 10% mho/m

ConvF X	5.23 extrapolated	Boundary effect:	
ConvF Y	5.23 extrapolated	Alpha	0.65
ConvF Z	5.23 extrapolated	Depth	1.63

Head 700 - 950 MHz ε_r = 39.4 - 43.6 σ = 0.75 - 0.99 mho/m

ConvF X	4.89 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	4.89 ± 9.5% (k=2)	Alpha	0.67
ConvF Z	4.89 ± 9.5% (k=2)	Depth	1.71

Brain 1500 MHz ε_r = 41 ± 5% σ = 1.32 ± 10% mho/m

ConvF X	4.43 interpolated	Boundary effect:	
ConvF Y	4.43 interpolated	Alpha	0.70
ConvF Z	4.43 interpolated	Depth	1.82

Brain 1700 - 1910 MHz ε_r = 39.3 - 41.6 σ = 1.53 - 1.90 mho/m

ConvF X	4.21 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	4.21 ± 9.5% (k=2)	Alpha	0.72
ConvF Z	4.21 ± 9.5% (k=2)	Depth	1.88

Sensor Offset

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

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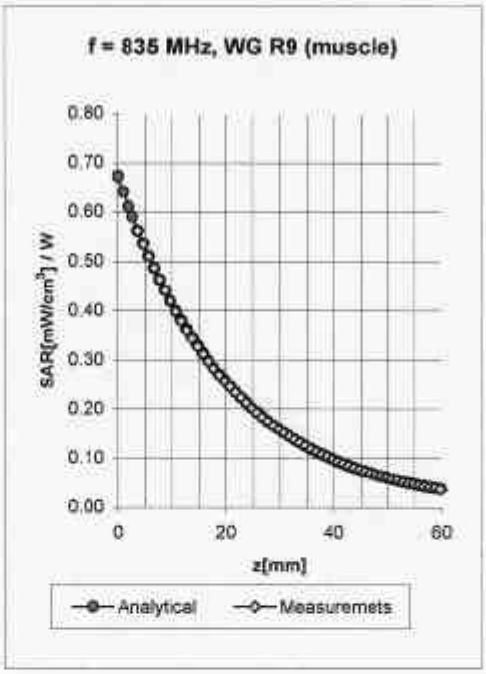
ET3DV5 SN:1324

Conversion Factor Assessment



Muscle **750 - 950** **MHz** ε_r **= 52.4 - 58.0** σ **= 0.90 - 1.05 mho/m**

ConvF X	**4.72** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**4.72** ± 9.5% (k=2)	Alpha	**0.69**
ConvF Z	**4.72** ± 9.5% (k=2)	Depth	**1.70**

ET3DV6 SN:1583

DASY3 - Parameters of Probe: ET3DV6 SN:1583

Sensitivity in Free Space

NormX	1.78 $\mu V/(V/m)^2$	DCP X	100 mV
NormY	1.96 $\mu V/(V/m)^2$	DCP Y	100 mV
NormZ	1.89 $\mu V/(V/m)^2$	DCP Z	100 mV

Sensitivity in Tissue Simulating Liquid

Head 450 MHz ε_r **= 43.5 ± 5%** σ **= 0.87 ± 10% mho/m**

ConvF X	7.77 extrapolated	Boundary effect:	
ConvF Y	7.77 extrapolated	Alpha	0.30
ConvF Z	7.77 extrapolated	Depth	2.30

Head 700 - 950 MHz ε_r **= 39.4 - 43.6** σ **= 0.75 - 0.99 mho/m**

ConvF X	6.95 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	6.95 ± 9.5% (k=2)	Alpha	0.38
ConvF Z	6.95 ± 9.5% (k=2)	Depth	2.28

Head 1500 MHz ε_r **= 40.4 ± 5%** σ **= 1.23 ± 10% mho/m**

ConvF X	5.87 interpolated	Boundary effect:	
ConvF Y	5.87 interpolated	Alpha	0.48
ConvF Z	5.87 interpolated	Depth	2.25

Head 1800 - 2000 MHz ε_r **= 38.0 - 42.0** σ **= 1.20 - 1.55 mho/m**

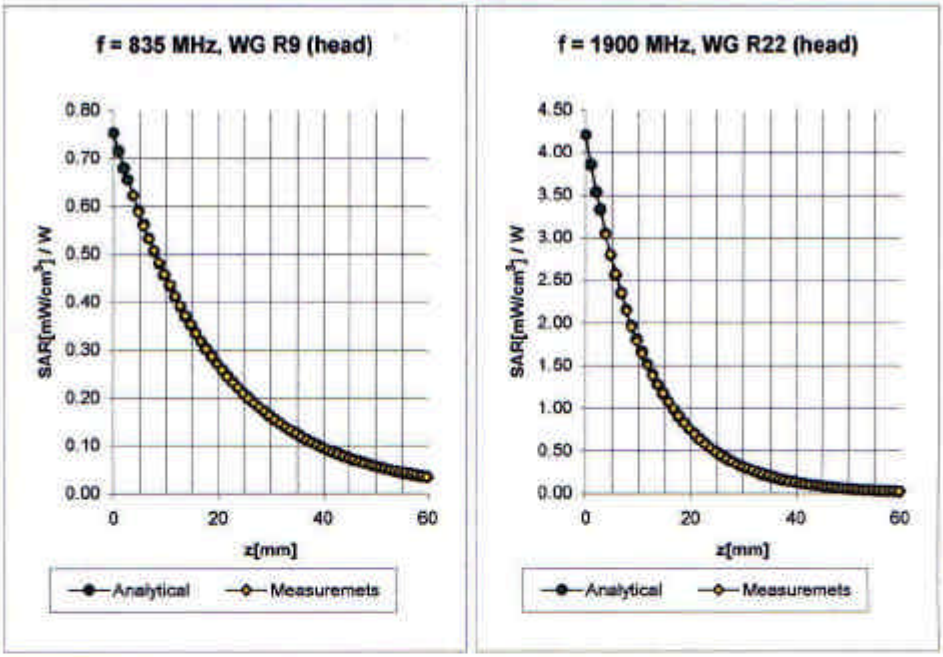
ConvF X	5.32 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	5.32 ± 9.5% (k=2)	Alpha	0.53
ConvF Z	5.32 ± 9.5% (k=2)	Depth	2.24

Sensor Offset

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

ET3DV6 SN:1583

Conversion Factor Assessment



Head **700 - 950 MHz** ε_r = 39.4 - 43.6 σ = 0.75 - 0.99 mho/m

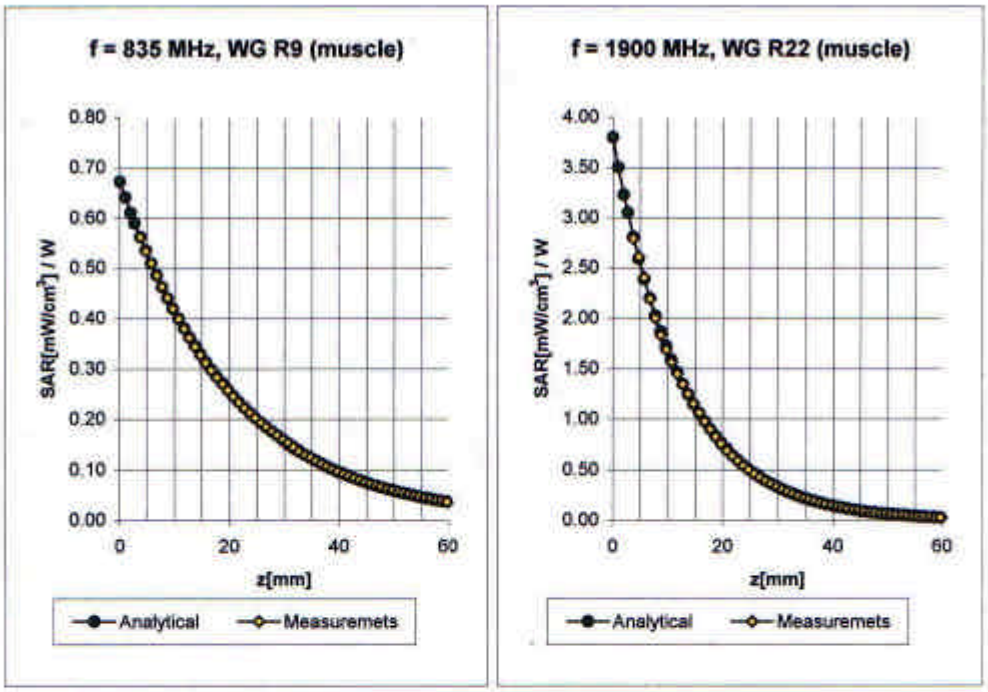
ConvF X	**6.95** ±9.5% (k=2)	Boundary effect:	
ConvF Y	**6.95** ±9.5% (k=2)	Alpha	**0.38**
ConvF Z	**6.95** ±9.5% (k=2)	Depth	**2.28**

Head **1800 - 2000 MHz** ε_r = 38.0 - 42.0 σ = 1.20 - 1.55 mho/m

ConvF X	**5.32** ±9.5% (k=2)	Boundary effect:	
ConvF Y	**5.32** ±9.5% (k=2)	Alpha	**0.53**
ConvF Z	**5.32** ±9.5% (k=2)	Depth	**2.24**

ET3DV6 SN:1583

Conversion Factor Assessment



Muscle **750 - 950 MHz** ε_r **= 52.4 - 58.0** σ **= 0.90 - 1.05 mho/m**

ConvF X	**6.65** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.65** ± 9.5% (k=2)	Alpha	**0.49**
ConvF Z	**6.65** ± 9.5% (k=2)	Depth	**1.97**

Muscle **1800 - 2050 MHz** ε_r **= 50.6 - 56.0** σ **= 1.40 - 1.60 mho/m**

ConvF X	**4.91** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**4.91** ± 9.5% (k=2)	Alpha	**0.69**
ConvF Z	**4.91** ± 9.5% (k=2)	Depth	**2.10**