Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

Client C&C Taiwan (Auden)

CALIBRATION CERTIFICATE

Object(s)	ES3DV2 - SN:3023
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	September 23, 2003
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

This calibration statement documents traceability of M&TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 international standard.

All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM E4419B	GB41293874	2-Apr-03 (METAS, No 252-0250)	Apr-04
Power sensor E4412A	MY41495277	2-Apr-03 (METAS, No 252-0250)	Apr-04
Reference 20 dB Attenuator	SN: 5086 (20b)	3-Apr-03 (METAS No. 251-0340	Apr-04
Fluke Process Calibrator Type 702	SN: 6295803	8-Sep-03 (Sintrel SCS No. E-030020)	Sep-04
Power sensor HP 8481A	MY41092180	18-Sep-02 (Agilent, No. 20020918)	In house check: Oct 03
RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug-02)	In house check: Aug-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (Agilent, No. 24BR1033101)	In house check: Oct 03

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Laboratory Director	
Approved by:	Niels Kuster	Quality Manager	

Date issued: October 5, 2003

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

Schmid & Partner Engineering AG

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Probe ES3DV2

SN:3023

Manufactured: April 15, 2003
Last calibration: September 23, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ES3DV2 SN:3023

Sensitivity in Free Space

Diode Compression

NormX	**0.85**	$\mu V/(V/m)^2$	DCP X	**96**	mV
NormY	**0.94**	$\mu V/(V/m)^2$	DCP Y	**96**	mV
NormZ	**1.01**	$\mu V/(V/m)^2$	DCP Z	**96**	mV

Sensitivity in Tissue Simulating Liquid

Head **900 MHz** ε_r **= 41.5 ± 5%** σ **= 0.97 ± 5% mho/m**

Valid for f=800-1000 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	**6.0**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.0**	± 9.5% (k=2)	Alpha	**0.33**
ConvF Z	**6.0**	± 9.5% (k=2)	Depth	**1.66**

Head **1800 MHz** ε_r **= 40.0 ± 5%** σ **= 1.40 ± 5% mho/m**

Valid for f=1710-1910 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	**0.23**
ConvF Z	**4.9**	± 9.5% (k=2)	Depth	**2.54**

Boundary Effect

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

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	5.8	2.8
SAR_{be} [%]	With Correction Algorithm	0.1	0.3

Head **1800 MHz** **Typical SAR gradient: 10 % per mm**

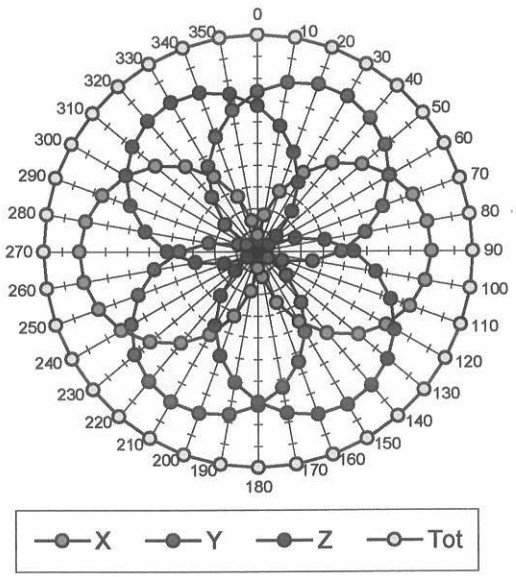
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	7.7	4.7
SAR_{be} [%]	With Correction Algorithm	0.1	0.3

Sensor Offset

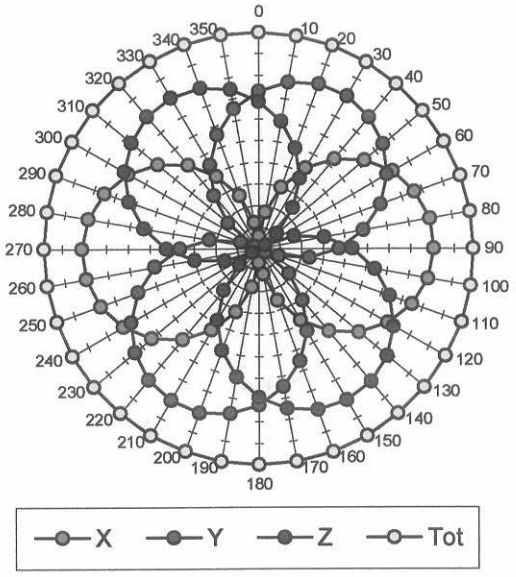
Probe Tip to Sensor Center	**2.0**	mm

Receiving Pattern (ϕ , θ = 0°

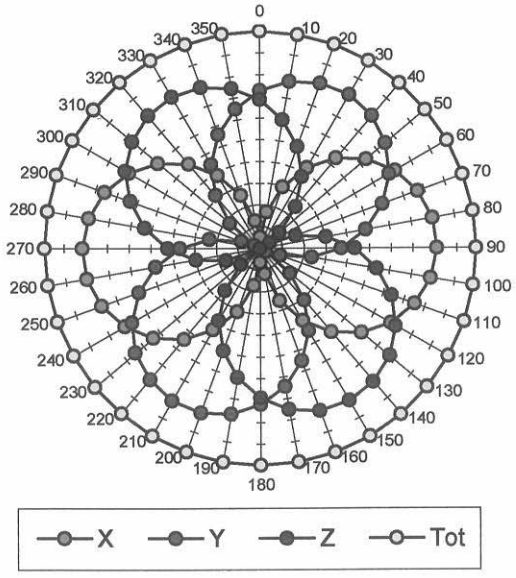
f = 30 MHz, TEM cell ifi110



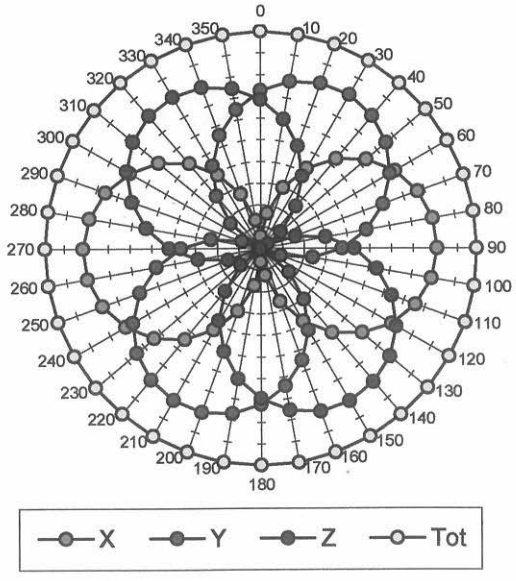
f = 100 MHz, TEM cell ifi110

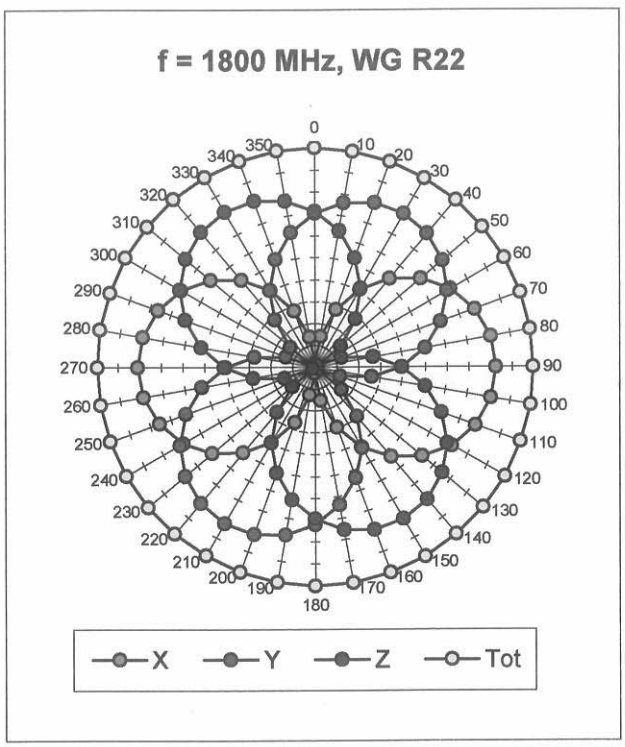


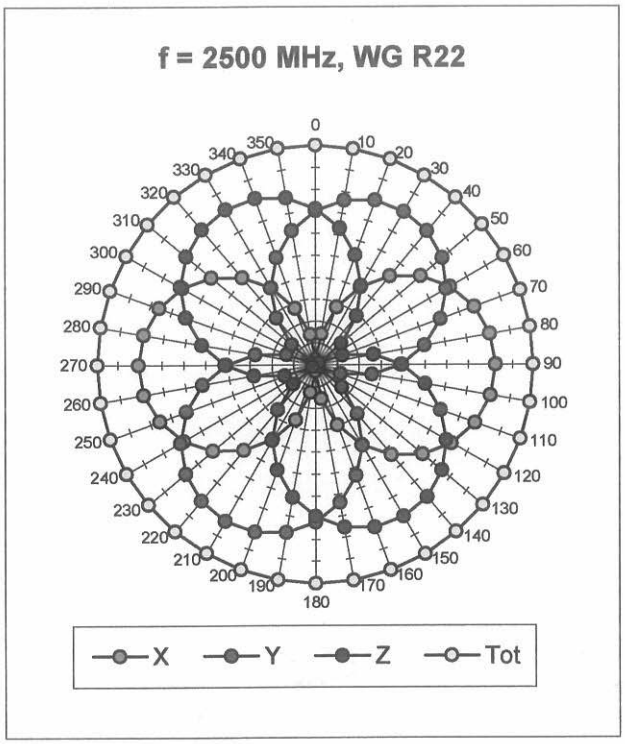
f = 300 MHz, TEM cell ifi110



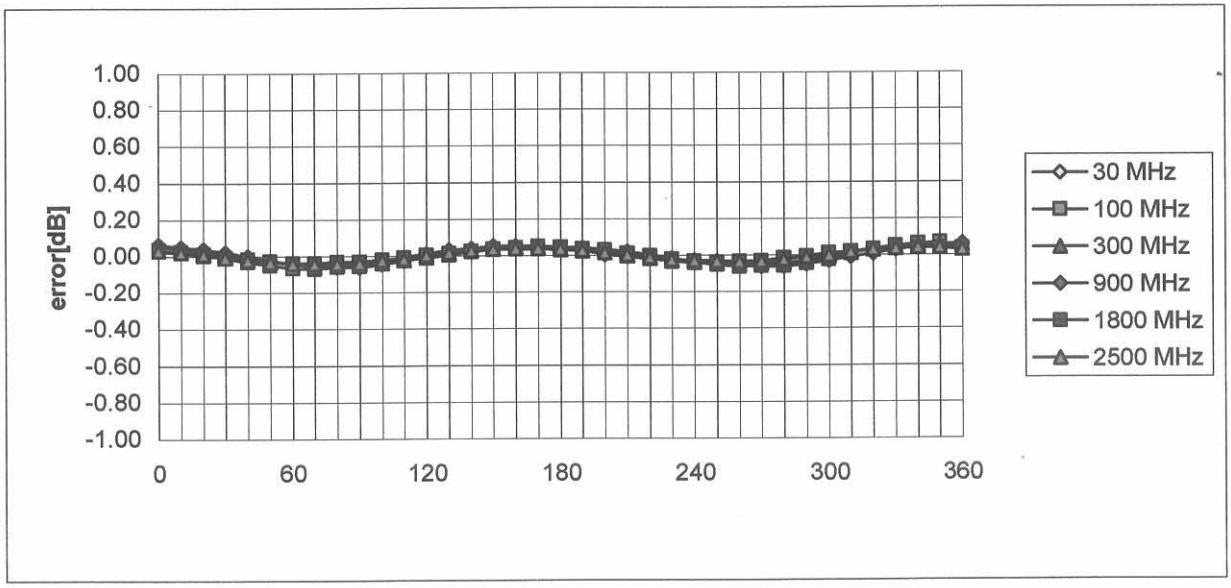
f = 900 MHz, TEM cell ifi110





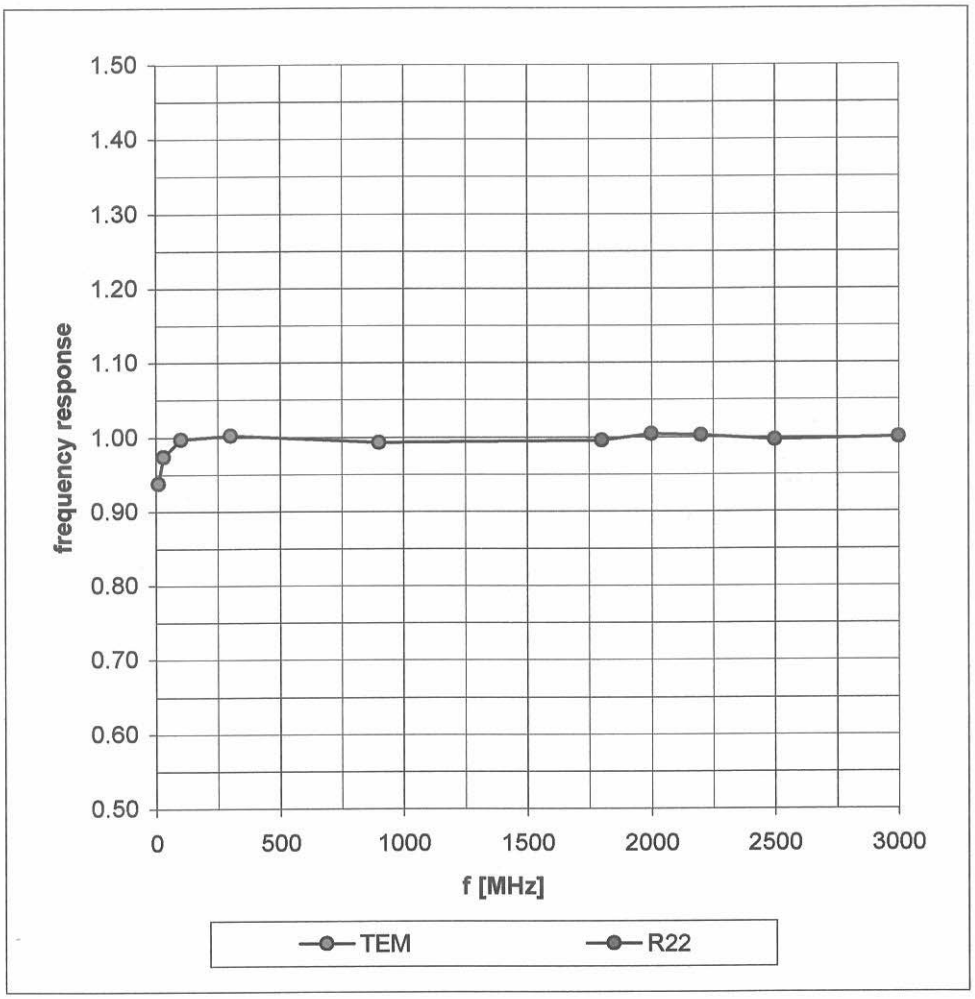


Isotropy Error (ϕ), θ = 0°



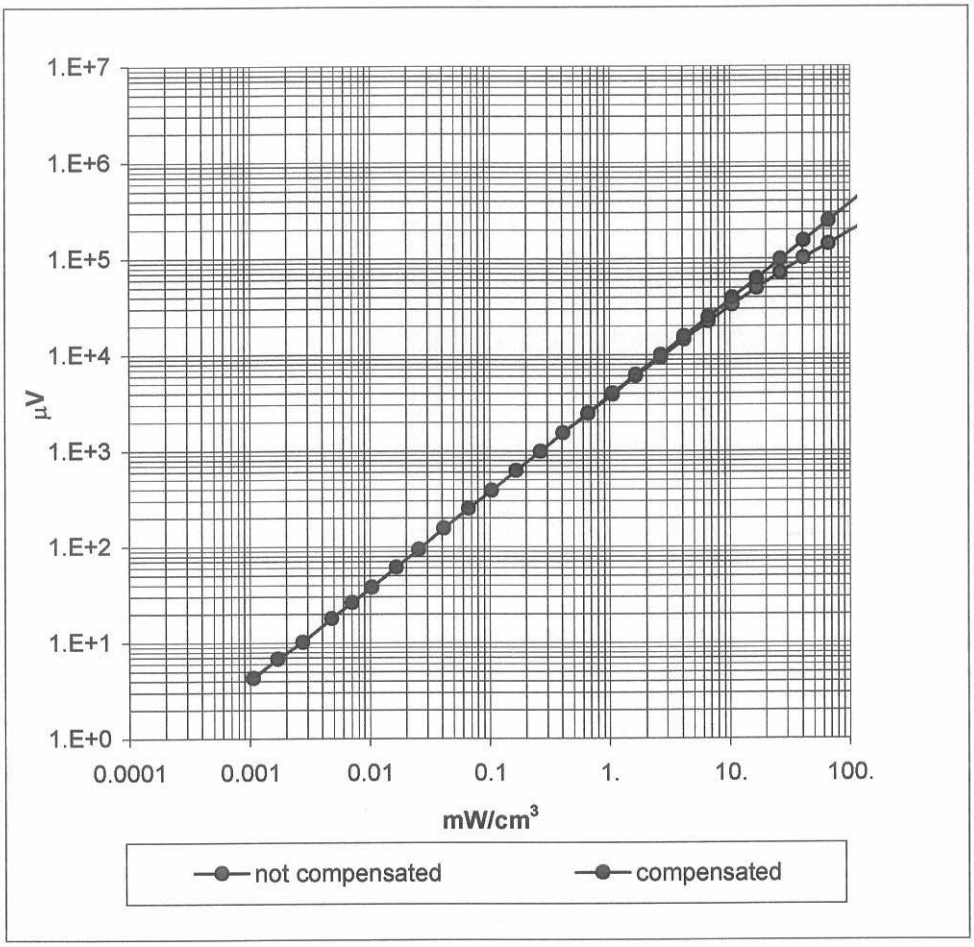
Frequency Response of E-Field

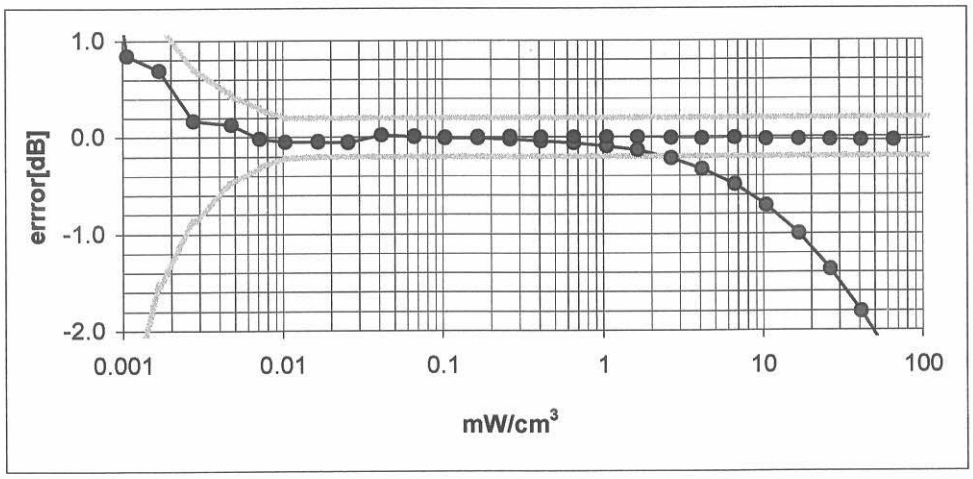
(TEM-Cell:ifi110, Waveguide R22)



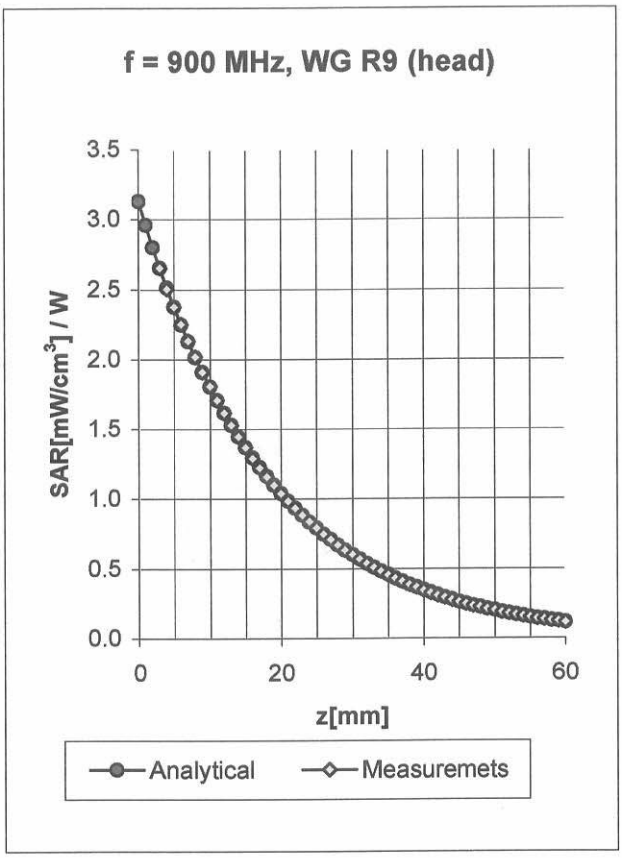
Dynamic Range f(SAR_{brain})

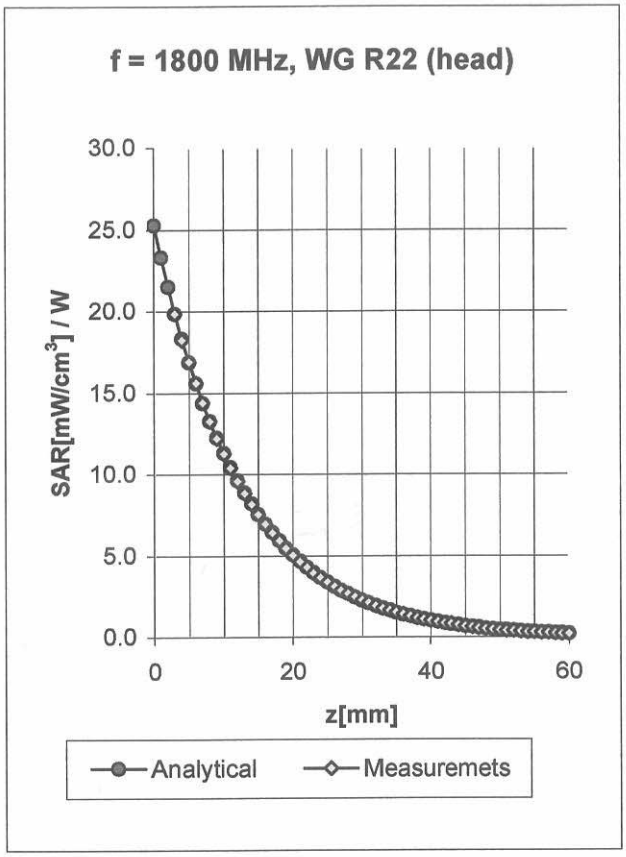
(Waveguide R22)





Conversion Factor Assessment





Head **900 MHz** ε_r **= 41.5 ± 5%** σ **= 0.97 ± 5% mho/m**

Valid for f=800-1000 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

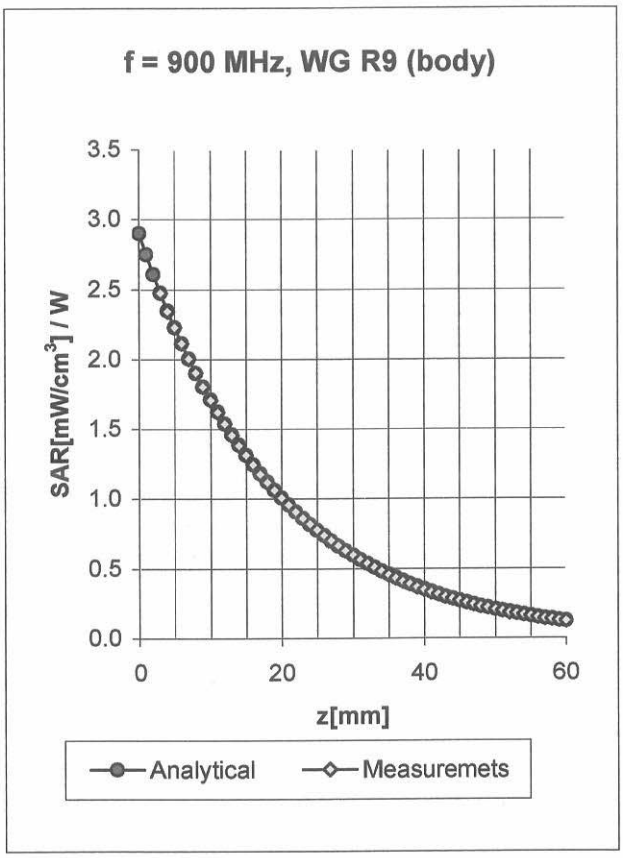
ConvF X	**6.0** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.0** ± 9.5% (k=2)	Alpha	**0.33**
ConvF Z	**6.0** ± 9.5% (k=2)	Depth	**1.66**

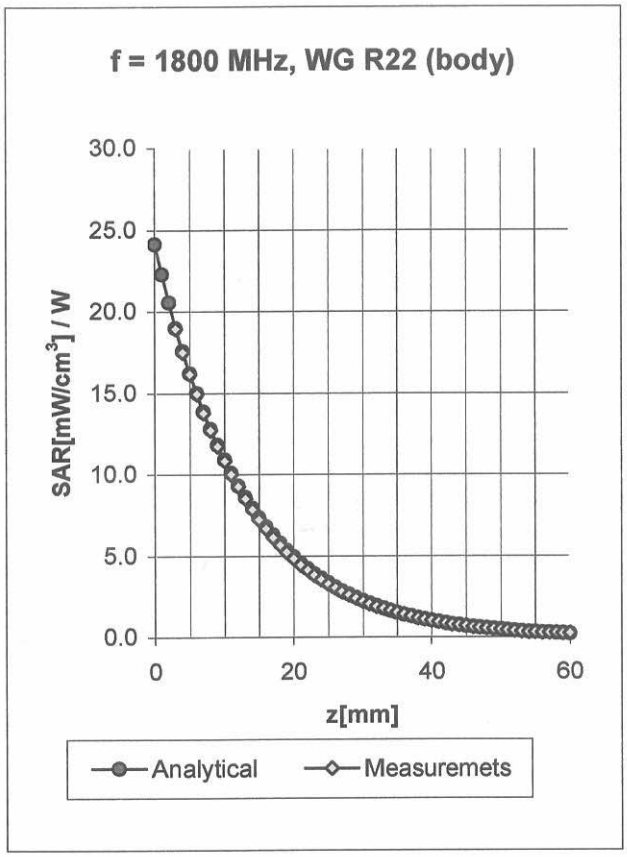
Head **1800 MHz** ε_r **= 40.0 ± 5%** σ **= 1.40 ± 5% mho/m**

Valid for f=1710-1910 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	**0.23**
ConvF Z	**4.9** ± 9.5% (k=2)	Depth	**2.54**

Conversion Factor Assessment





Body **900 MHz** ε_r **= 55.0 ± 5%** σ **= 1.05 ± 5% mho/m**

Valid for f=800-1000 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

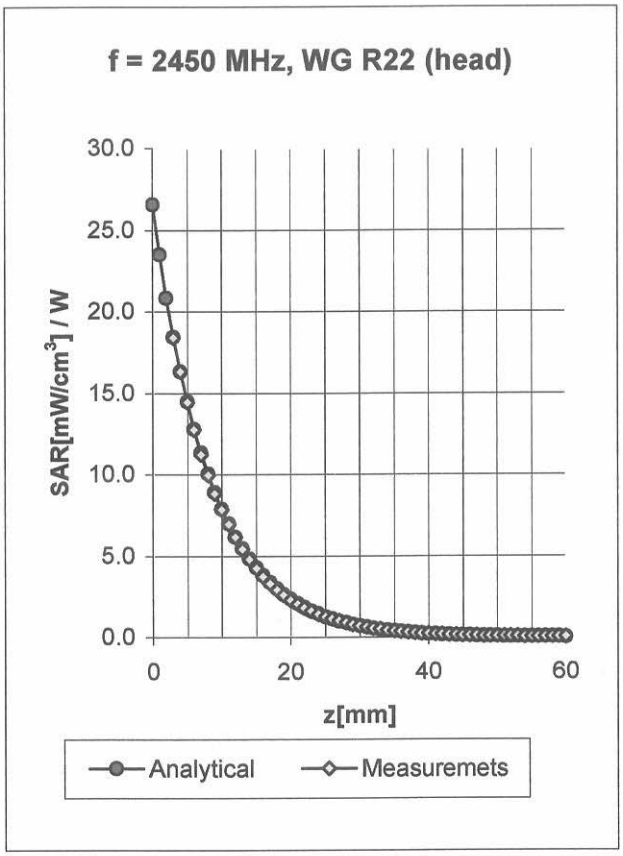
ConvF X	**6.0** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.0** ± 9.5% (k=2)	Alpha	**0.43**
ConvF Z	**6.0** ± 9.5% (k=2)	Depth	**1.44**

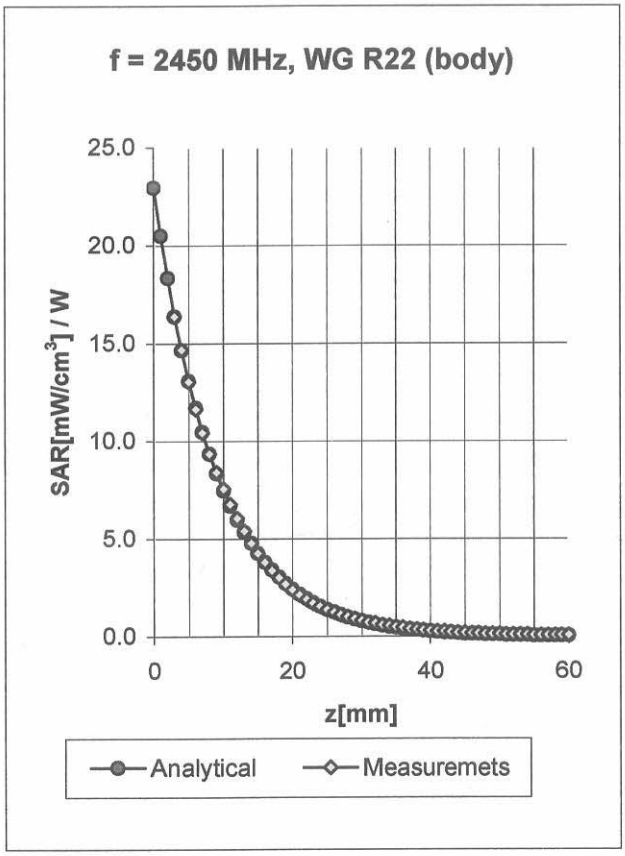
Body **1800 MHz** ε_r **= 53.3 ± 5%** σ **= 1.52 ± 5% mho/m**

Valid for f=1710-1910 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	**4.5** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**4.5** ± 9.5% (k=2)	Alpha	**0.26**
ConvF Z	**4.5** ± 9.5% (k=2)	Depth	**2.61**

Conversion Factor Assessment





Head **2450 MHz** ε_r **= 39.2 ± 5%** σ **= 1.80 ± 5% mho/m**

Valid for f=2400-2500 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

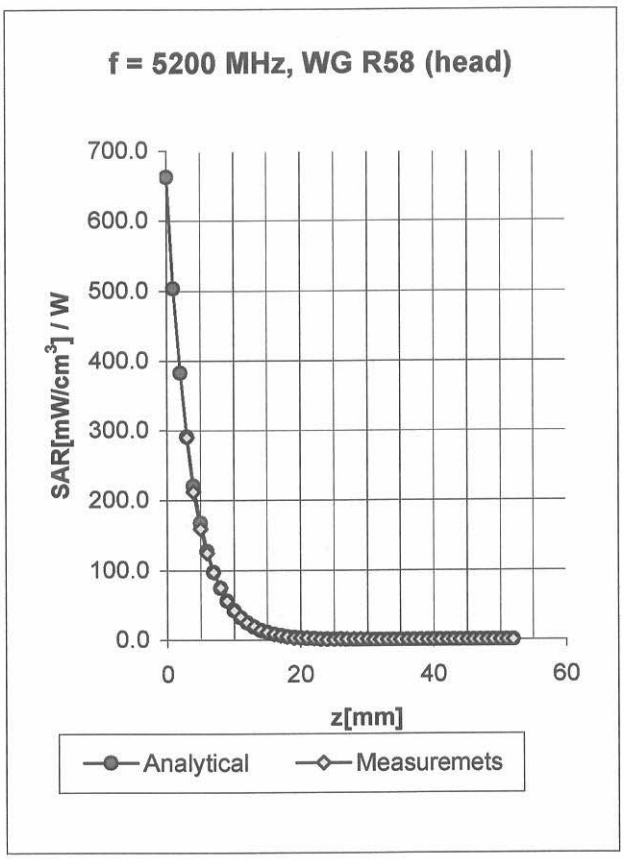
ConvF X	**4.4** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**4.4** ± 9.5% (k=2)	Alpha	**0.38**
ConvF Z	**4.4** ± 9.5% (k=2)	Depth	**1.66**

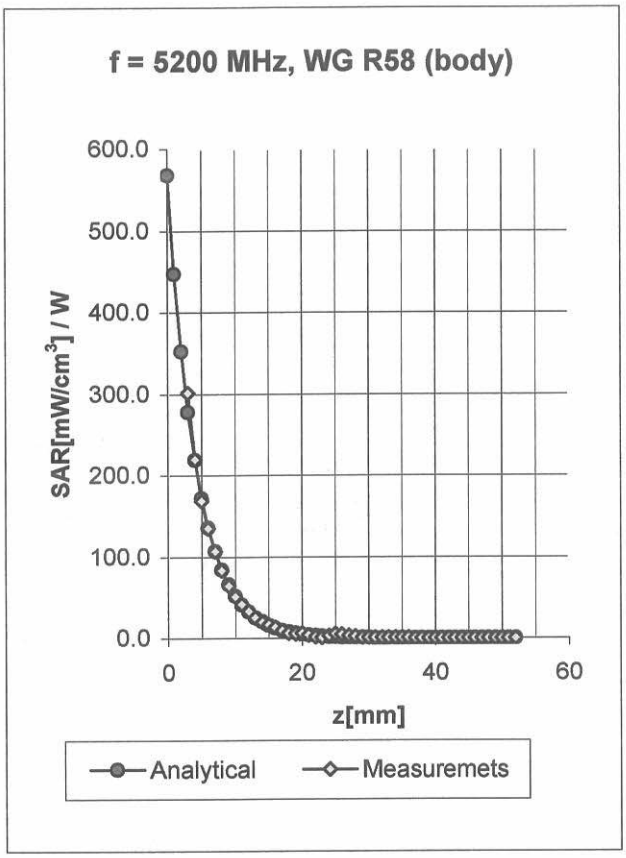
Body **2450 MHz** ε_r **= 52.7 ± 5%** σ **= 1.95 ± 5% mho/m**

Valid for f=2400-2500 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	**4.1** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**4.1** ± 9.5% (k=2)	Alpha	**0.35**
ConvF Z	**4.1** ± 9.5% (k=2)	Depth	**1.94**

Conversion Factor Assessment





Head **5200 MHz** ε_r **= 36.0 ± 5%** σ **= 4.66 ± 5% mho/m**

Valid for f=4940-5460 MHz with Head Tissue Simulating Liquid according to OET65-SuppC

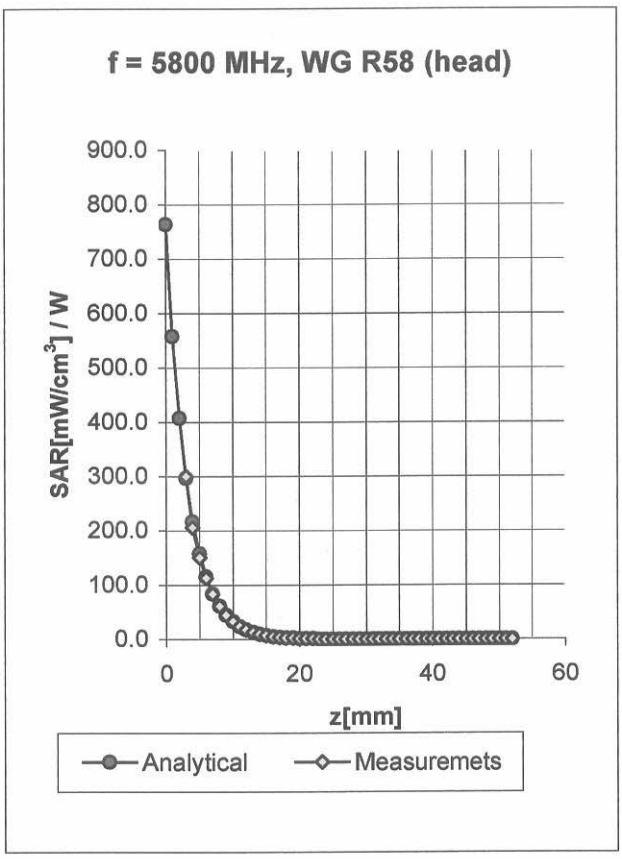
ConvF X	**2.70** ± 16.6% (k=2)	Boundary effect:	
ConvF Y	**2.70** ± 16.6% (k=2)	Alpha	**0.75**
ConvF Z	**2.70** ± 16.6% (k=2)	Depth	**1.45**

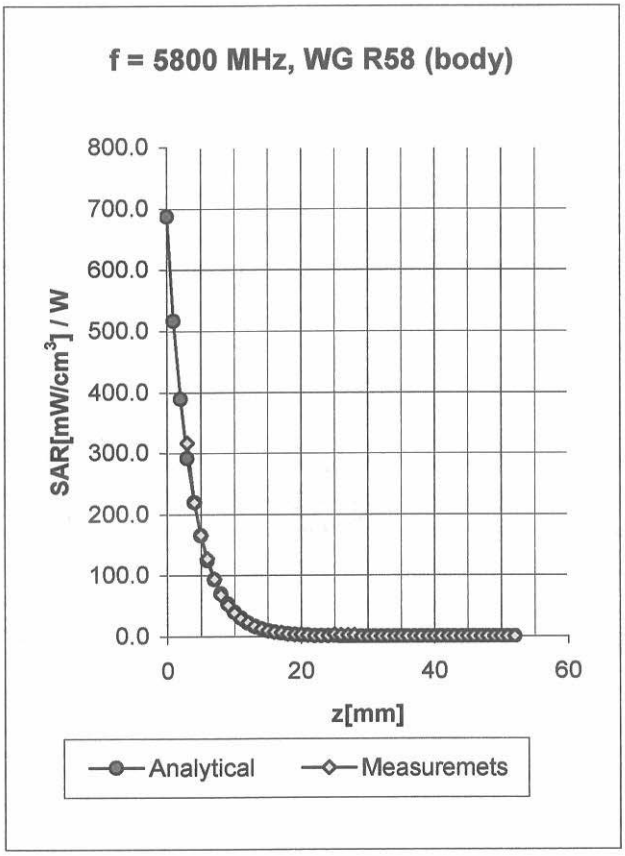
Body **5200 MHz** ε_r **= 49.0 ± 5%** σ **= 5.30 ± 5% mho/m**

Valid for f=4940-5460 MHz with Body Tissue Simulating Liquid according to OET65-SuppC

ConvF X	**1.82** ± 16.6% (k=2)	Boundary effect:	
ConvF Y	**1.82** ± 16.6% (k=2)	Alpha	**0.90**
ConvF Z	**1.82** ± 16.6% (k=2)	Depth	**1.70**

Conversion Factor Assessment





Head **5800 MHz** ε_r **= 35.3 ± 5%** σ **= 5.27 ± 5% mho/m**

Valid for f=4940-5460 MHz with Head Tissue Simulating Liquid according to OET65-SuppC

ConvF X	**2.40** ± 16.6% (k=2)	Boundary effect:	
ConvF Y	**2.40** ± 16.6% (k=2)	Alpha	**0.89**
ConvF Z	**2.40** ± 16.6% (k=2)	Depth	**1.30**

Body **5800 MHz** ε_r **= 48.2 ± 5%** σ **= 6.0 ± 5% mho/m**

Valid for f=4940-5460 MHz with Body Tissue Simulating Liquid according to OET65-SuppC

ConvF X	**1.50** ± 16.6% (k=2)	Boundary effect:	
ConvF Y	**1.50** ± 16.6% (k=2)	Alpha	**1.01**
ConvF Z	**1.50** ± 16.6% (k=2)	Depth	**1.85**

Deviation from Isotropy in HSL

Error ($\theta\phi$), f = 900 MHz