MOTOROLA

September 16, 2003

Supplement to SAR Test Report for Motorola portable cellular phone (FCC ID IHDT6DQ1)

Prepared by:
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Libertyville, Illinois

Summary of FCC request for additional information

There was a request for additional information regarding Motorola's SAR Test Report for Motorola portable cellular phone (FCC ID IHDT6DQ1). The requested information is addressed below in the same numbering sequence received.

13. Please verify that the Bluetooth transceiver was active during SAR testing.

RESPONSE: Per the TCB Workshop guidelines from April 04-05, 2002, an additional SAR measurement was performed with the co-located transmitter turned on in the configuration that produced the highest SAR for the dominant transmitter. Table 1 shows the SAR results with only the dominant transmitter. Table 2 shows the SAR results with both the dominant and Bluetooth transmitters on. The output plot from the additional SAR test is included in Appendix 1. The probe calibration sheet for the probe used for blue tooth testing is attached in Appendix 2.

f (MHz)	Description	Conducted Output Power (dBm)	Body Worn							
			Back of phone 1" away from phantom				Front of phone 1" away from phantom			
			Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)	Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)
Digital 1900MHz	Channel 512	30.06								
	Channel 661	29.96	0.22	-0.03	0.22	20	0.029	-0.04	0.03	20
	Channel 810	29.93								

Table 1: SAR measurement results for the portable cellular telephone FCC ID IHDT6DQ1 at highest possible output power. Measured against the body.

f (MHz)	Description	Conducted Output Power (dBm)	Additional Body Worn Tests			
			1" Separation from Back of Phone & Bluetooth Active			
			Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)
Digital 1900MHz	Channel 512	30.00				
	Channel 661	29.99	0.107	0.02	0.107	21.00
	Channel 810	30.00				

Table 2: SAR measurement results for the portable cellular telephone FCC ID IHDT6DQ1 at highest possible output power with Bluetooth Transmitting Simultaneously. Measured against the body.

14. The cal due date for the network analyzer, on p.4, is 6/18/2003, nearly 3 months ago. Please address.

15. The cal due date for the E filed probe, on p.4, is listed as 3/21/2003 (expired). However, this appears to be a typo, as the probe calibration documents indicate that the due date is 3/21/2004. If so, please correct.

RESPONSE: The tables in section 3. Test Equipment Used had two typos in them. The date of calibration was entered, instead of the due date for calibration. The due date is one year after date of the last calibration. The corrected tables are shown below.

3. Test Equipment Used

3.1 Dosimetric System

The Motorola Personal Communications Sector Product Safety & Compliance Laboratory utilizes a Dosimetric Assessment System (Dasy3™ v3.1d) manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. All the SAR measurements are taken within a shielded enclosure. The overall RSS uncertainty of the measurement system is ±11.7% (K=1) with an expanded uncertainty of ±23.0% (K=2). The measurement uncertainty budget is given in Appendix 6. Per IEEE 1528, this uncertainty budget is applicable to the SAR range of 0.4 W/kg to 10 W/kg. The list of calibrated equipment used for the measurements is shown below.

Description	Serial Number	Cal Due Date
DASY3 DAE V1	SN434	02/19/2004
E-Field Probe ET3DV6	SN1522	03/21/2004
Dipole Validation Kit, D1800V2	SN273TR	06/24/2004
S.A.M. Phantom used for 1900MHz	TP-1235	

3.2 Additional Equipment

Description	Serial Number	Cal Due Date
Signal Generator HP8648C	3847A04845	11/5/2004
Power Meter E4419B	GB39511086	2/6/2004
Power Sensor #1 - 8481A	US37296471	11/5/2003
Power Sensor #2 - 8481A	US37296473	11/5/2003
Network Analyzer HP8753ES	US39172529	6/18/2004
Dielectric Probe Kit HP85070B	US33020235	

16. It appears that different tissue parameter values are used in the validation test (1.36, 39.9) and in the SAR tests (1.45, 39.5) taken the same day. Please explain.

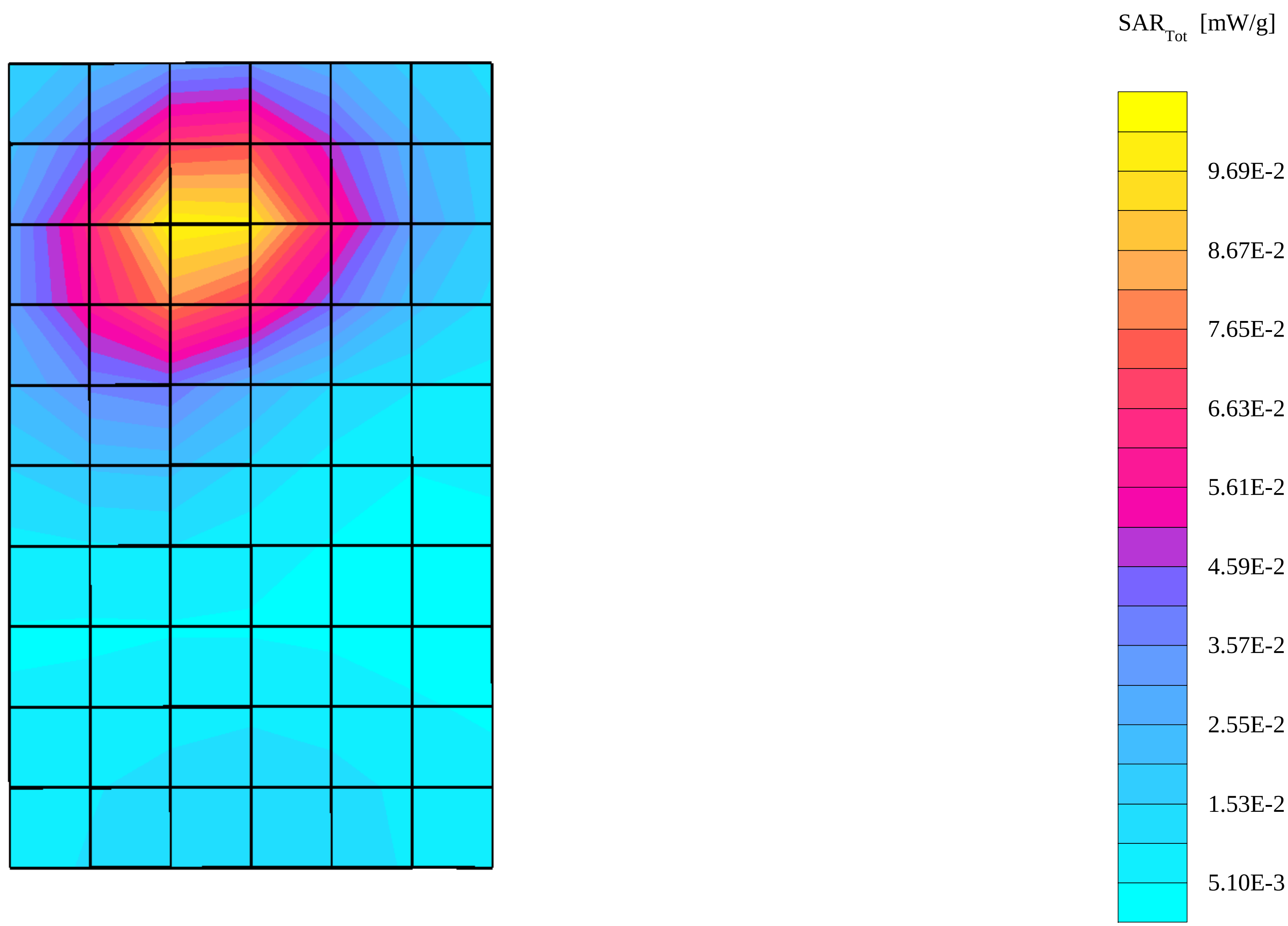
Response: The dielectric parameters measured on 08/16/03 for 1880MHz head as shown on Page 4 of the SAR report do agree with the SAR plot on page 13 of the SAR report. This represents the highest measured SAR for the GSM1900 cheek touch position. The dielectric parameters used for the daily system validation on 08/16/03 are shown in the table on page 5 of the SAR report (and the plots on pages 10). These values used for the daily system validation are slightly different than those used for the head measurements because they are physically a different setup of tissue stimulant. The 1800MHZ system accuracy verification of the DASY3 was performed using the measurement equipment listed in Section 3. The dipole was placed below a “flat” phantom. This “flat” phantom is made out of 1” thick natural High Density Polyethylene with a thickness at the bottom equal to 2.0mm. It measures 52.7cm(long) x 26.7cm(wide) x 21.2cm(tall). The measured dielectric constant of the material used is less than 2.3 and the loss tangent is less than 0.0046 all the way up to 2.184GHz.

Appendix 1

Body Worn SAR Plots with GSM and Bluetooth Transmitters Active

FCC ID: IHDT6DQ1

Ch# 661 Pwr Step: 0 (OTA) / Antenna Position: INTERNAL / Battery Model #: SNN5631A / Accessory Model #: 1" back / bluetooth enabled
R4 - Amy Twin Phantom Rev.4 (22Aug02) Phantom; section 2 Section; Position: (0°,0°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1521 - FCC Body; ConvF(4.70,4.70,4.70); Crest factor: 8.0; 1880 MHz Head & Body: σ = 1.49 mho/m ε_r = 51.7 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.107 mW/g, SAR (10g): 0.0668 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Penetration depth: 11.3 (10.0, 13.1) [mm]
Powerdrift: 0.02 dB



Appendix 2

Probe Calibration sheet

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

Client Motorola Korea

CALIBRATION CERTIFICATE

Object(s)	ET3DV6 - SN:1521
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	July 31, 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
RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug-02)	In house check: Aug-05
Power sensor E4412A	MY41495277	2-Apr-03 (METAS, No 252-0250)	Apr-04
Power sensor HP 8481A	MY41092180	18-Sep-02 (Agilent, No. 20020918)	Sep-03
Power meter EPM E4419B	GB41293874	2-Apr-03 (METAS, No 252-0250)	Apr-04
Network Analyzer HP 8753E	US37390585	18-Oct-01 (Agilent, No. 24BR1033101)	In house check: Oct 03
Fluke Process Calibrator Type 702	SN: 6295803	3-Sep-01 (ELCAL, No.2360)	Sep-03

	Name	Function	Signature
Calibrated by:	Nico Vetterli	Technician	
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: July 31, 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.

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

Probe ET3DV6

SN:1521

Manufactured:	February 1, 2000
Last calibration:	June 9, 2003
Repaired:	July 9, 2003
Recalibrated:	July 31, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1521

Sensitivity in Free Space

NormX	**1.61**	$\mu V/(V/m)^2$
NormY	**1.46**	$\mu V/(V/m)^2$
NormZ	**1.61**	$\mu V/(V/m)^2$

Diode Compression

DCP X	**95**	mV
DCP Y	**95**	mV
DCP Z	**95**	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	**6.4**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.4**	± 9.5% (k=2)	Alpha	**0.72**
ConvF Z	**6.4**	± 9.5% (k=2)	Depth	**1.65**

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	**5.1**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.1**	± 9.5% (k=2)	Alpha	**0.53**
ConvF Z	**5.1**	± 9.5% (k=2)	Depth	**2.46**

Boundary Effect

Head 900 MHz Typical SAR gradient: 5 % per mm

Probe Tip to Boundary	**1 mm**	**2 mm**
SAR_{be} [%] Without Correction Algorithm	8.3	4.1
SAR_{be} [%] With Correction Algorithm	0.1	0.2

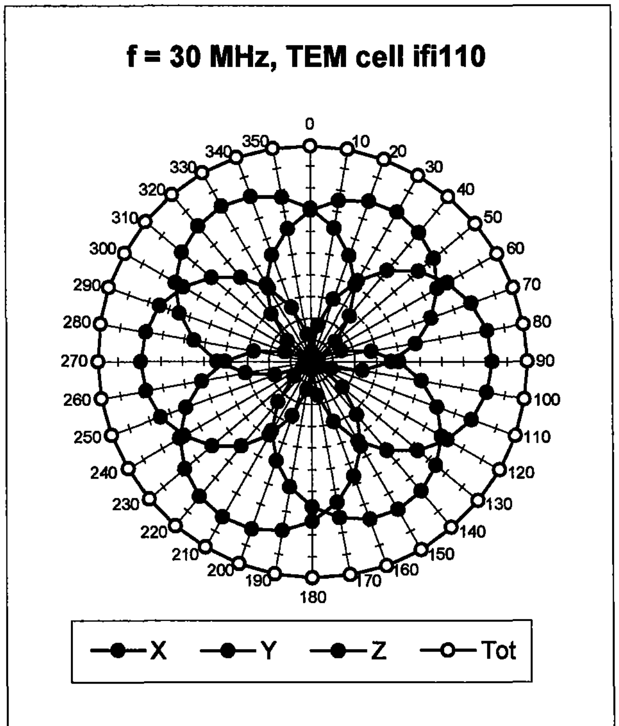
Head 1800 MHz Typical SAR gradient: 10 % per mm

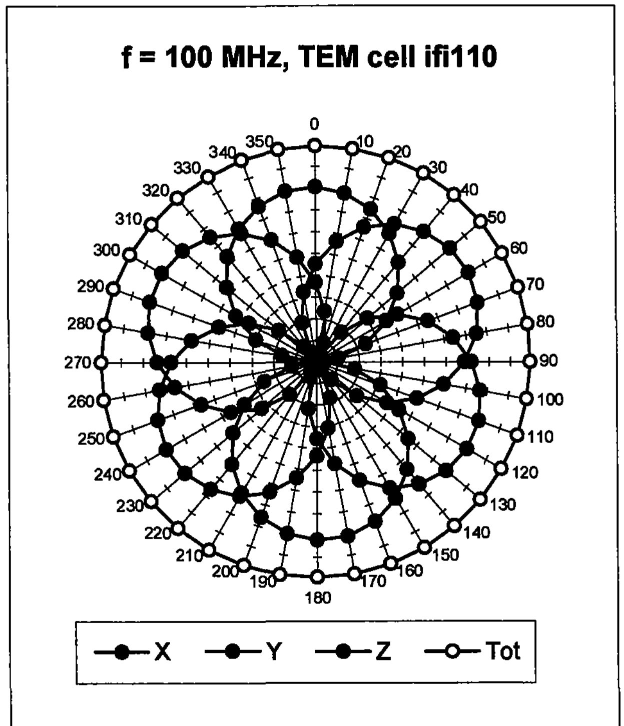
Probe Tip to Boundary	**1 mm**	**2 mm**
SAR_{be} [%] Without Correction Algorithm	13.1	8.8
SAR_{be} [%] With Correction Algorithm	0.2	0.3

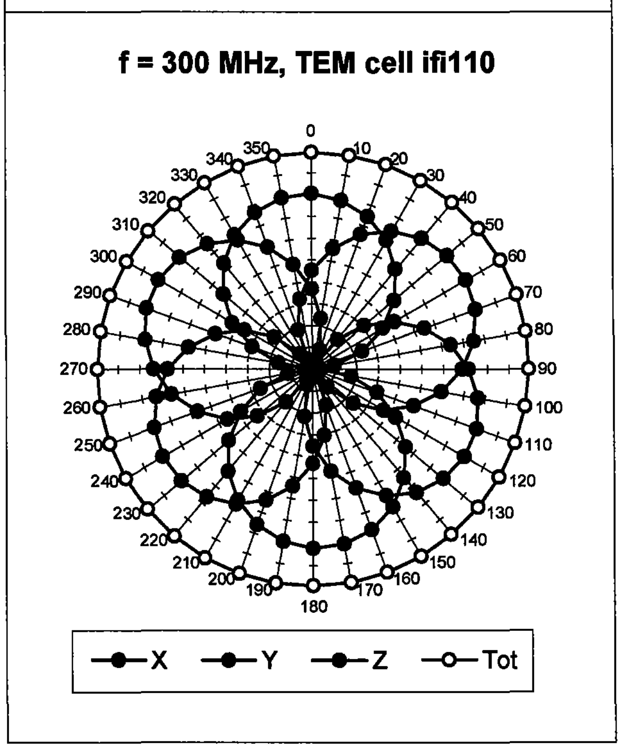
Sensor Offset

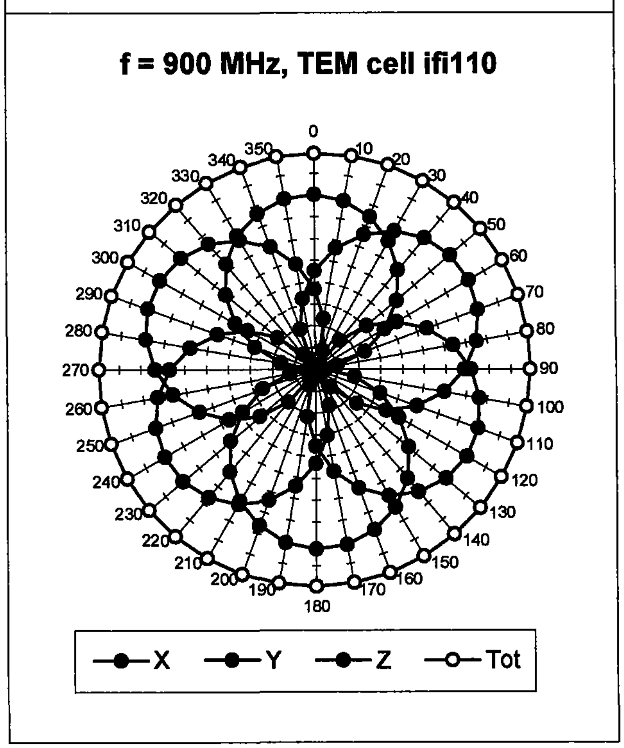
Probe Tip to Sensor Center **2.7** mm

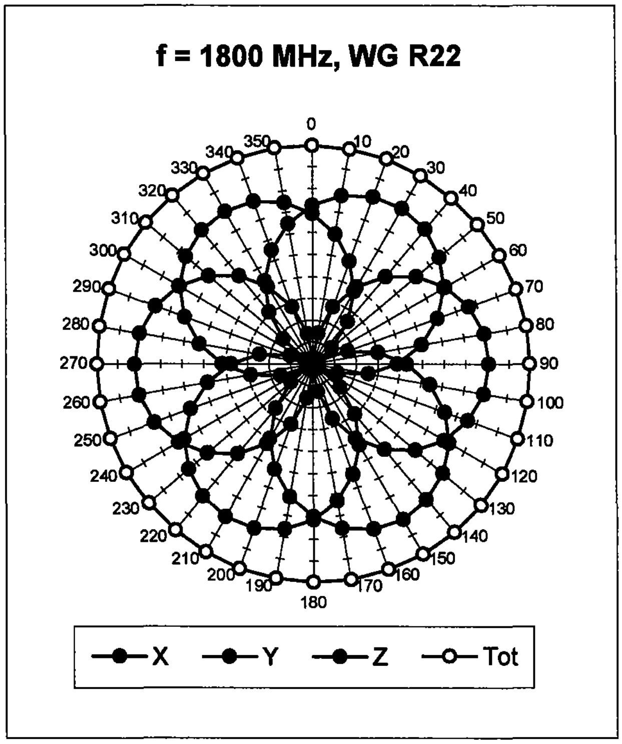
Receiving Pattern (ϕ, θ = 0°

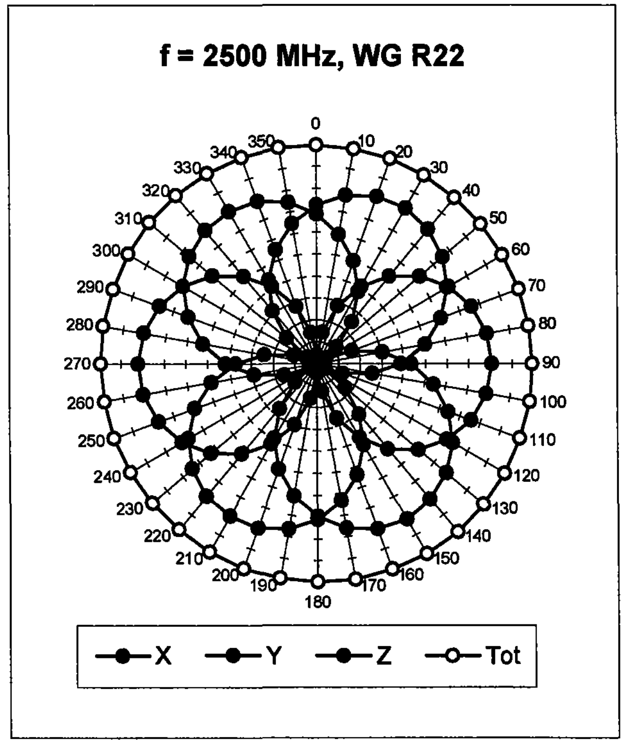




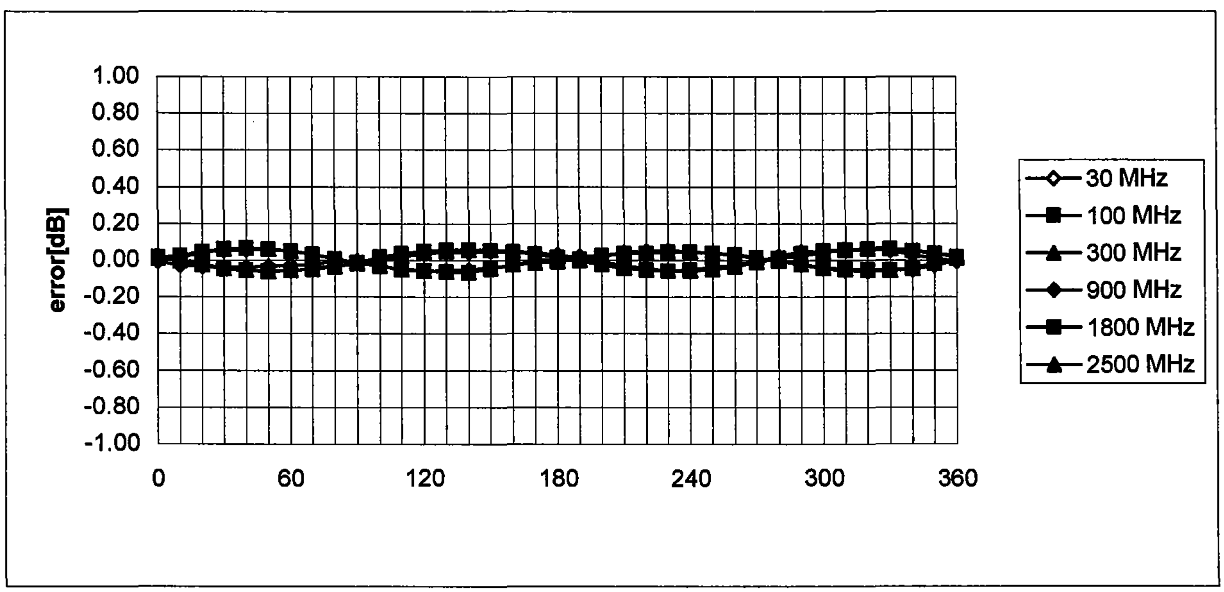






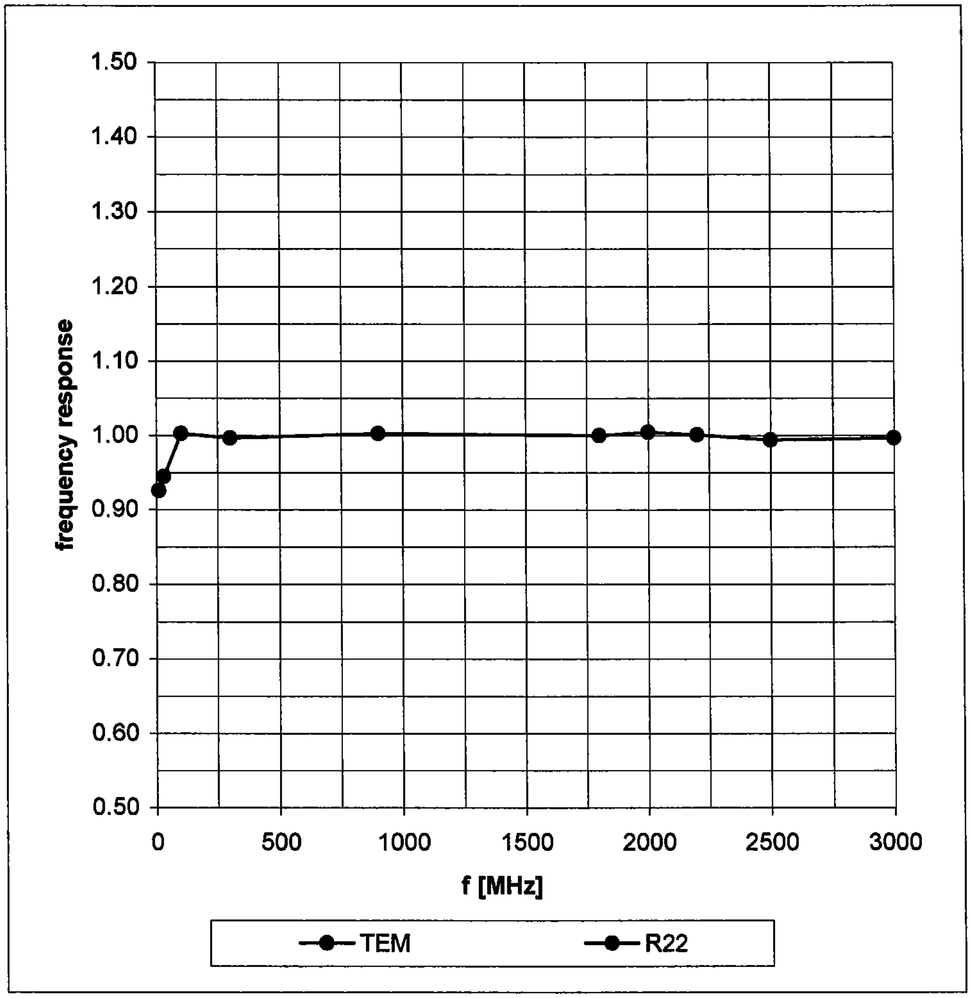


Isotropy Error (ϕ), θ = 0°



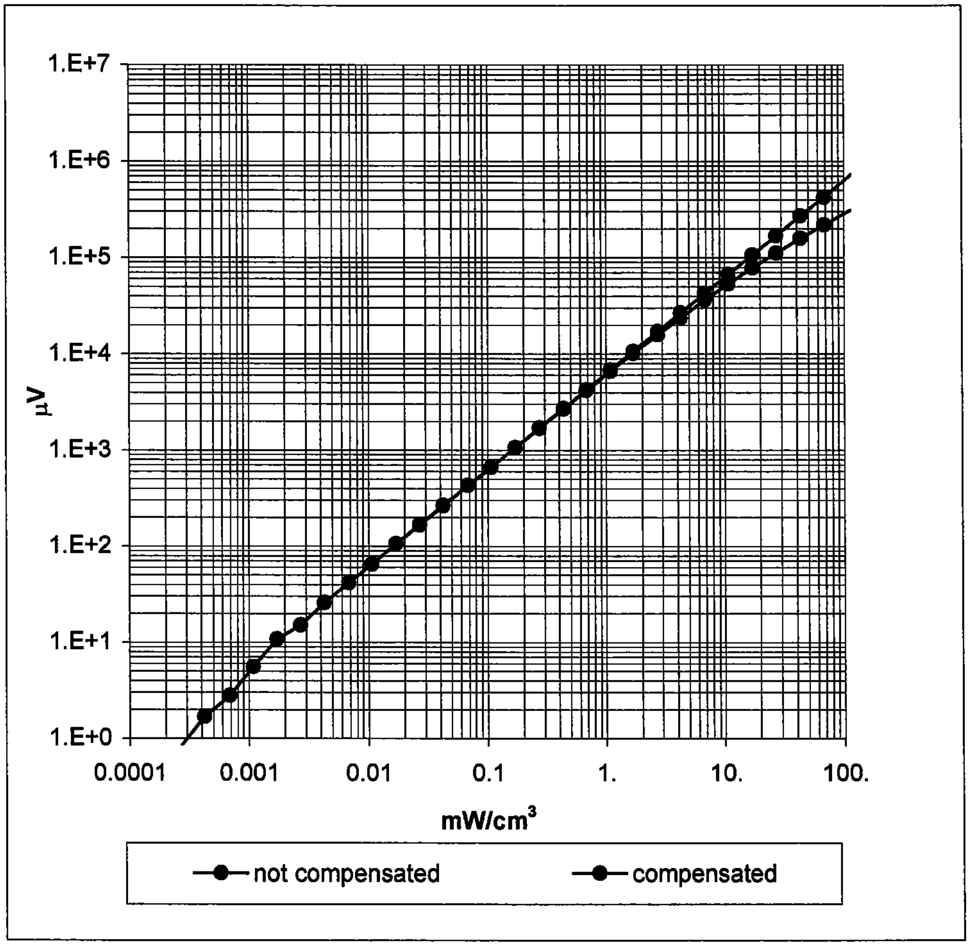
Frequency Response of E-Field

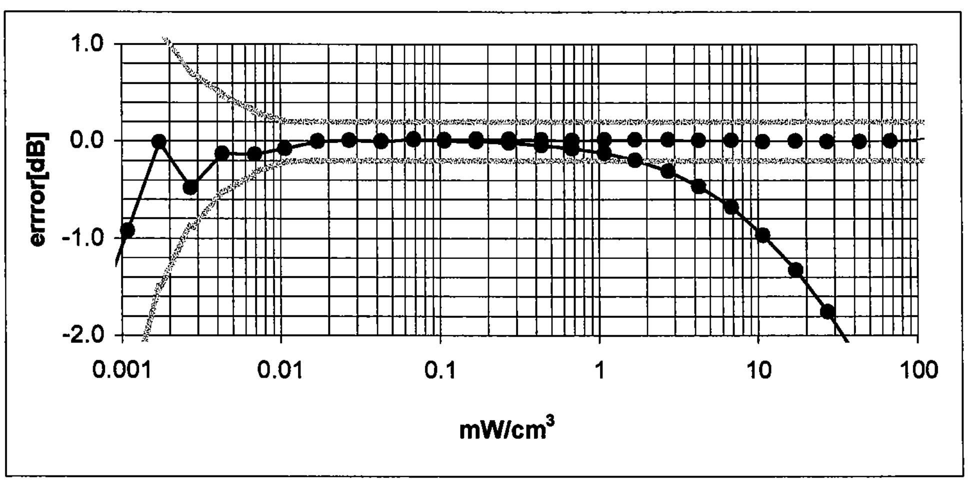
(TEM-Cell:ifi110, Waveguide R22)



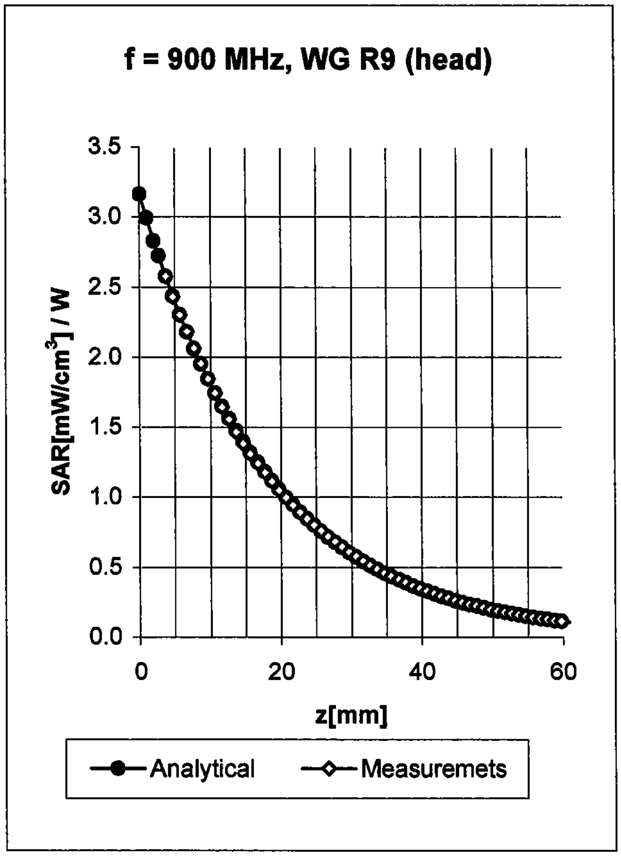
Dynamic Range f(SAR$_{brain}$)

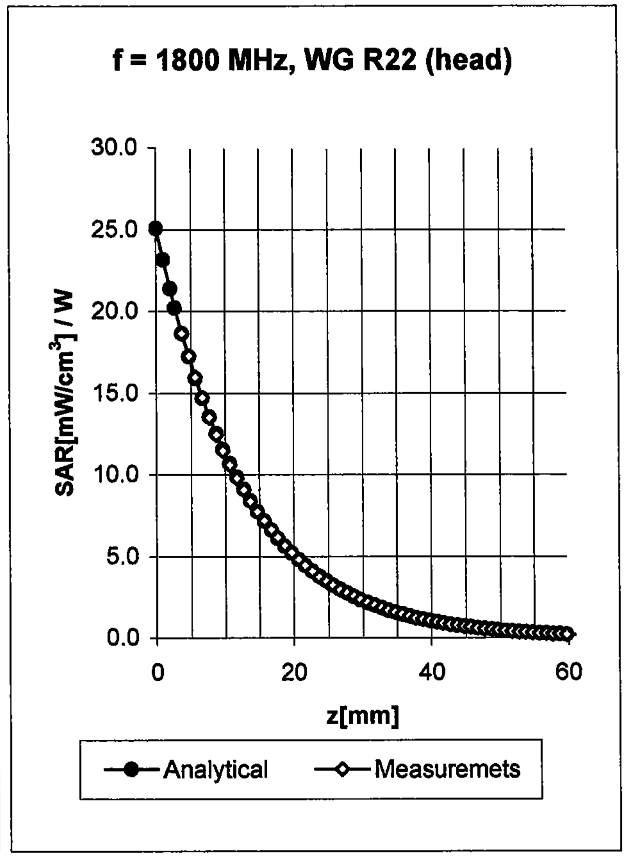
(Waveguide R22)





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

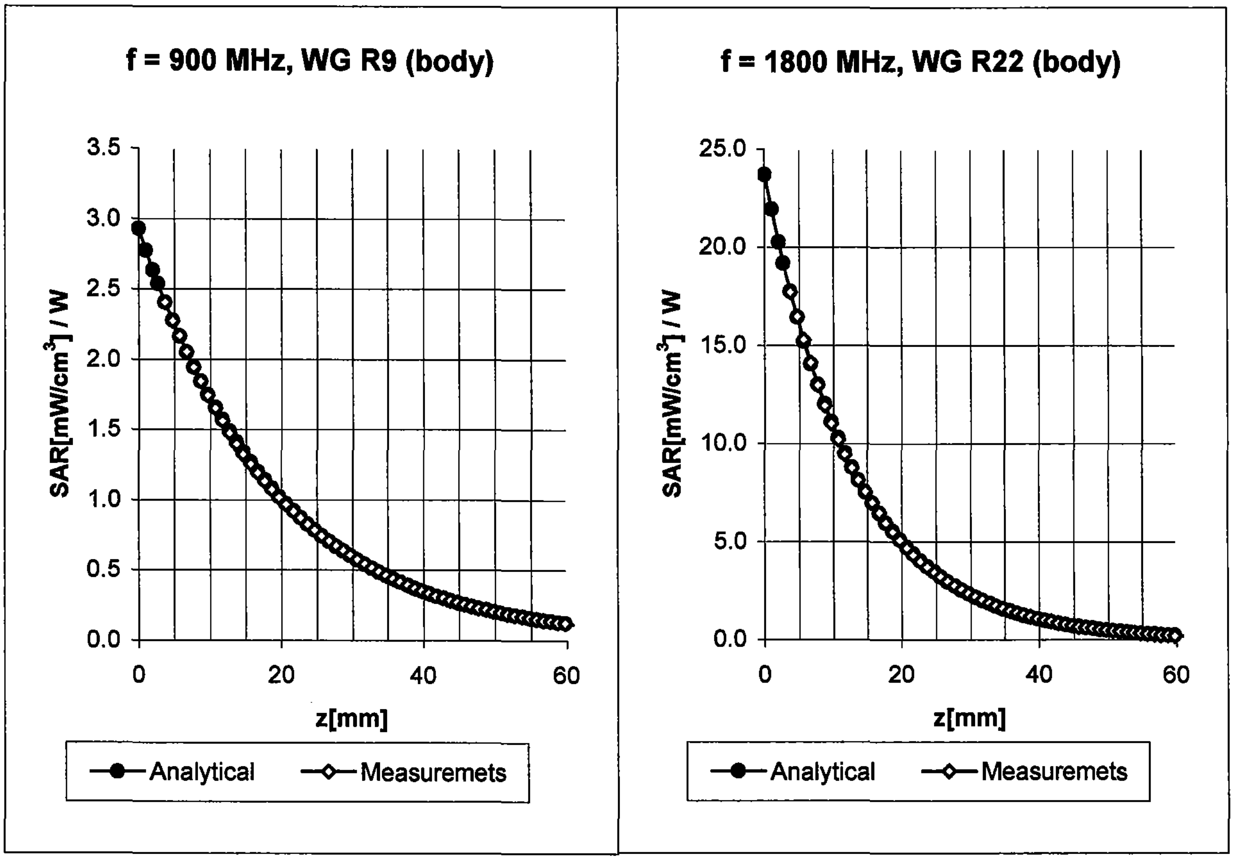
ConvF X	**6.4**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.4**	± 9.5% (k=2)	Alpha	**0.72**
ConvF Z	**6.4**	± 9.5% (k=2)	Depth	**1.65**

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	**5.1**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.1**	± 9.5% (k=2)	Alpha	**0.53**
ConvF Z	**5.1**	± 9.5% (k=2)	Depth	**2.46**

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	**6.3**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.3**	± 9.5% (k=2)	Alpha	**0.80**
ConvF Z	**6.3**	± 9.5% (k=2)	Depth	**1.62**

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	**4.7**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**4.7**	± 9.5% (k=2)	Alpha	**0.57**
ConvF Z	**4.7**	± 9.5% (k=2)	Depth	**2.71**

Deviation from Isotropy in HSL

Error (θϕ), f = 900 MHz