Certificate Number: 1449-01

MOTOROLA

ACCREDITED

CGISS EME Test Laboratory
8000 West Sunrise Blvd
Fort Lauderdale, FL. 33322

S.A.R. EME Compliance Test Report
Part 3 of 3

Date of Report:	March 25, 2004
Report Revision:	Rev. O
Manufacturer:	Motorola
Product Description:	XTS5000 UHF R2; 450-520MHz, 1-5 watts nominal; 6 line display; 512 channel
FCC ID:	**AZ489FT4864**
Device Model:	H18SDH9PW7AN

Test Period:	2/23/04-3/15/04
EME Tech:	Clint Miller
Responsible Eng:	Jim Fortier (Elect. Principle Staff Eng.)
Author:	Michael Sailsman (Global EME Regulatory Affairs Liaison)

Note: Based on the information and the testing results provided herein, the undersigned certifies that when used as stated in the operating instructions supplied, said product complies with the national and international reference standards and guidelines listed in section 2.0 of this report.

Signature on file — 3/25/04

Ken Enger
Senior Resource Manager, Laboratory Director, CGISS EME Lab

Date Approved

APPENDIX D

Calibration Certificates

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

Client Motorola CGISS

CALIBRATION CERTIFICATE

Object(s)	ET3DV6 - SN:1393
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	April 16, 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	Scheduled Calibration
RF generator HP 8684C	US3642U01700	4-Aug-99 (in house check Aug-02)	In house check: Aug-05
Power sensor E4412A	MY41495277	2-Apr-03	Apr-04
Power sensor HP 8481A	MY41092180	18-Sep-02	Sep-03
Power meter EPM E4419B	GB41293874	13-Sep-02	Sep-03
Network Analyzer HP 8753E	US38432426	3-May-00	In house check: May 03
Fluke Process Calibrator Type 702	SN: 6295803	3-Sep-01	Sep-03

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

Date issued: April 16, 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.

DASY - Parameters of Probe: ET3DV6 SN:1393

Sensitivity in Free Space

NormX	1.80 $\mu V/(V/m)^2$
NormY	1.49 $\mu V/(V/m)^2$
NormZ	1.80 $\mu V/(V/m)^2$

Diode Compression

DCP X	94	mV
DCP Y	94	mV
DCP Z	94	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 IEEE P1528-200X

ConvF X	**7.0** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**7.0** ± 9.5% (k=2)	Alpha	**0.31**
ConvF Z	**7.0** ± 9.5% (k=2)	Depth	**2.71**

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 IEEE P1528-200X

ConvF X	**5.5** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.5** ± 9.5% (k=2)	Alpha	**0.48**
ConvF Z	**5.5** ± 9.5% (k=2)	Depth	**2.51**

Boundary Effect

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

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	9.0	5.3
SAR_{be} [%]	With Correction Algorithm	0.3	0.5

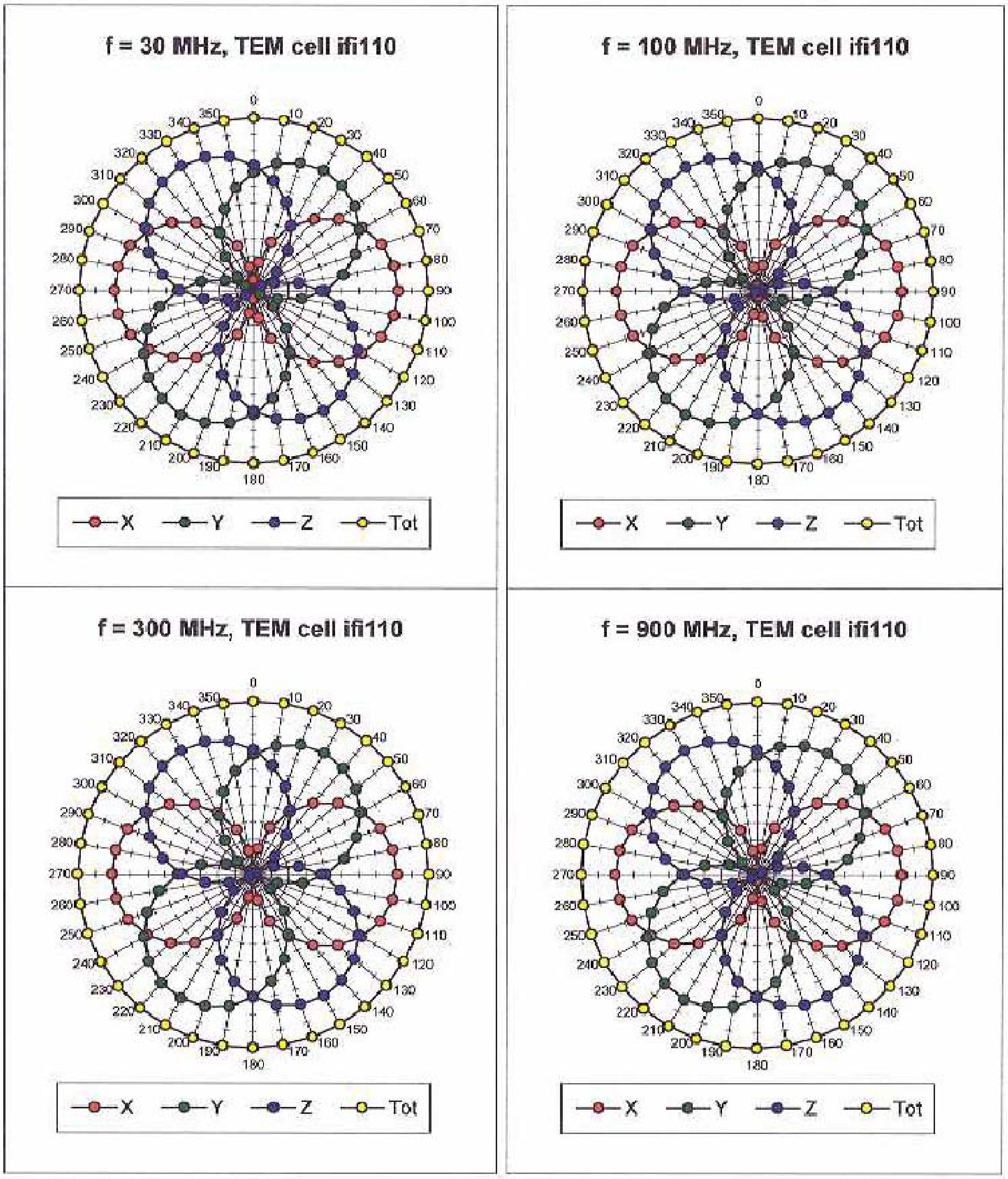
Head **1800 MHz** **Typical SAR gradient: 10 % per mm**

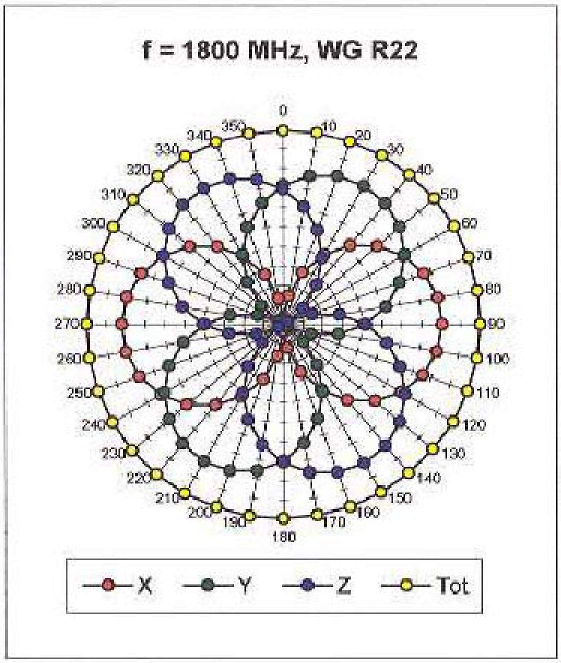
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	12.2	8.3
SAR_{be} [%]	With Correction Algorithm	0.1	0.3

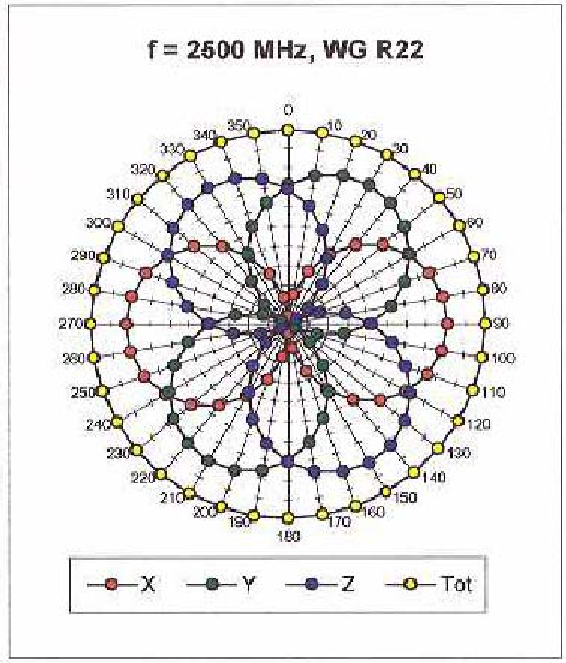
Sensor Offset

Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**0.9 ± 0.2**	mm

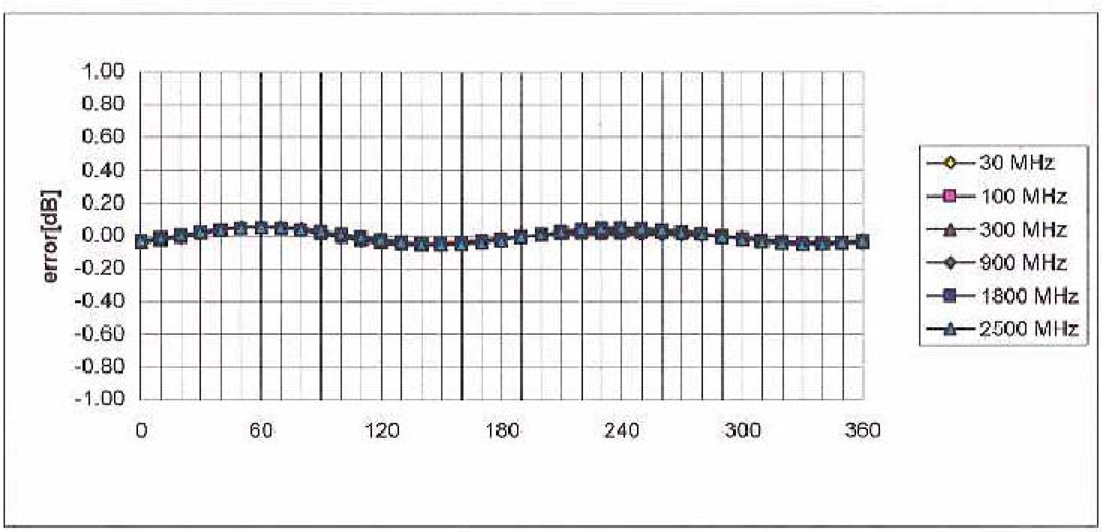
Receiving Pattern (ϕ , θ = 0°





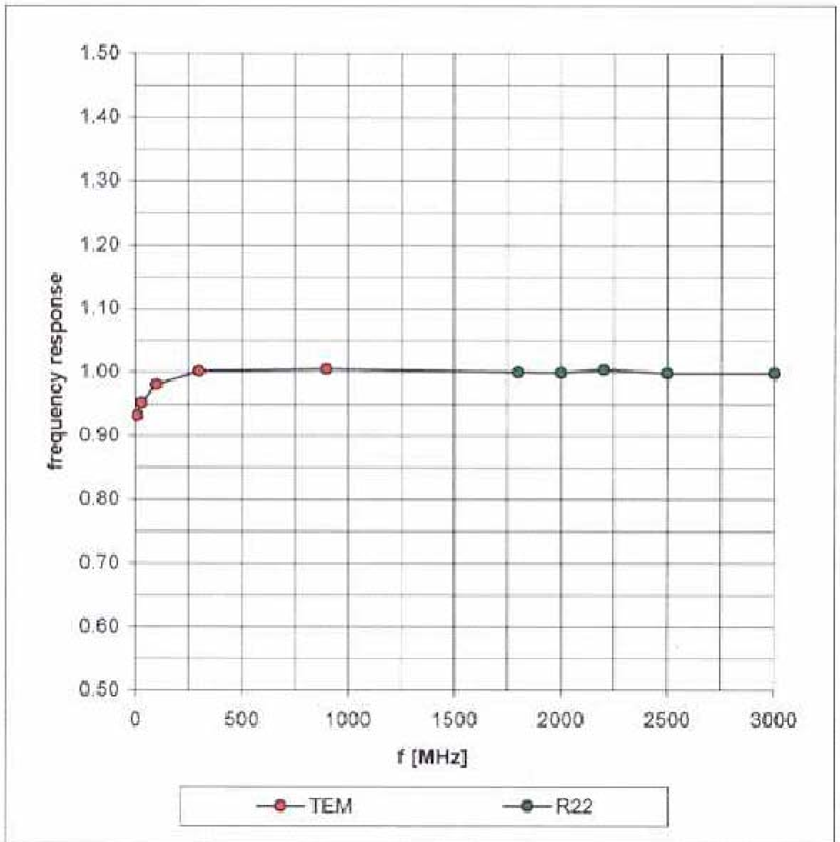


Isotropy Error (ϕ), θ = 0°



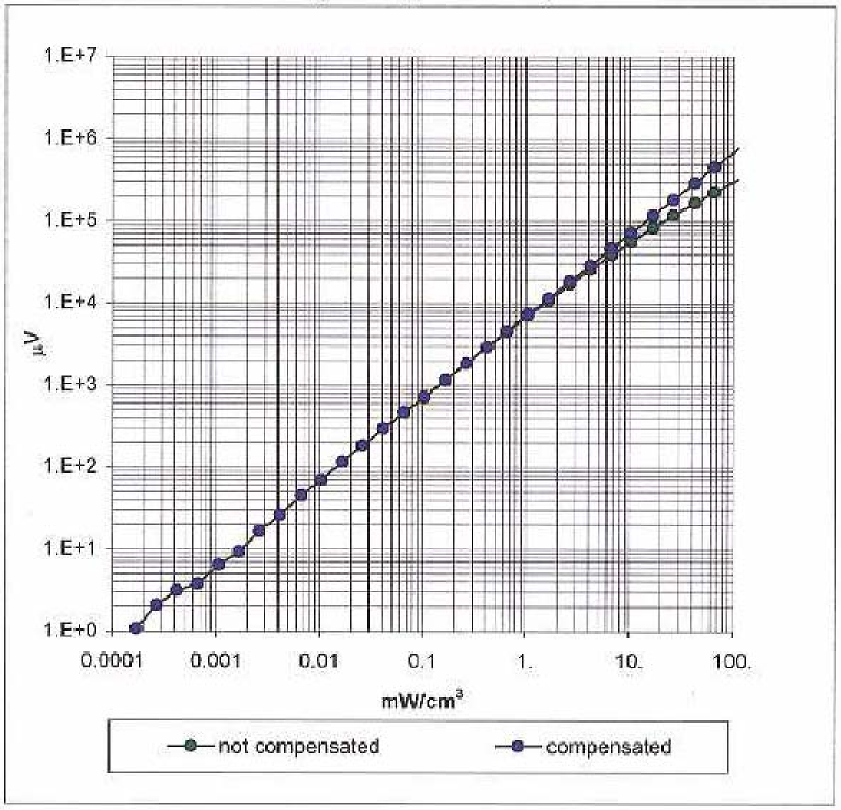
Frequency Response of E-Field

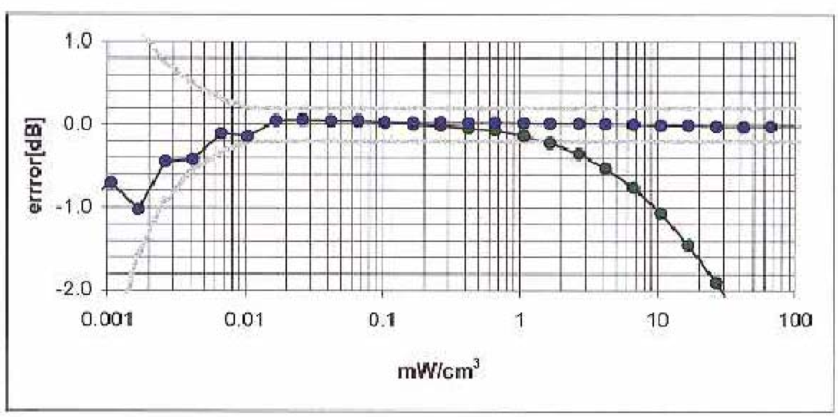
(TEM-Cell:ifi110, Waveguide R22)



Dynamic Range f(SAR_{brain})

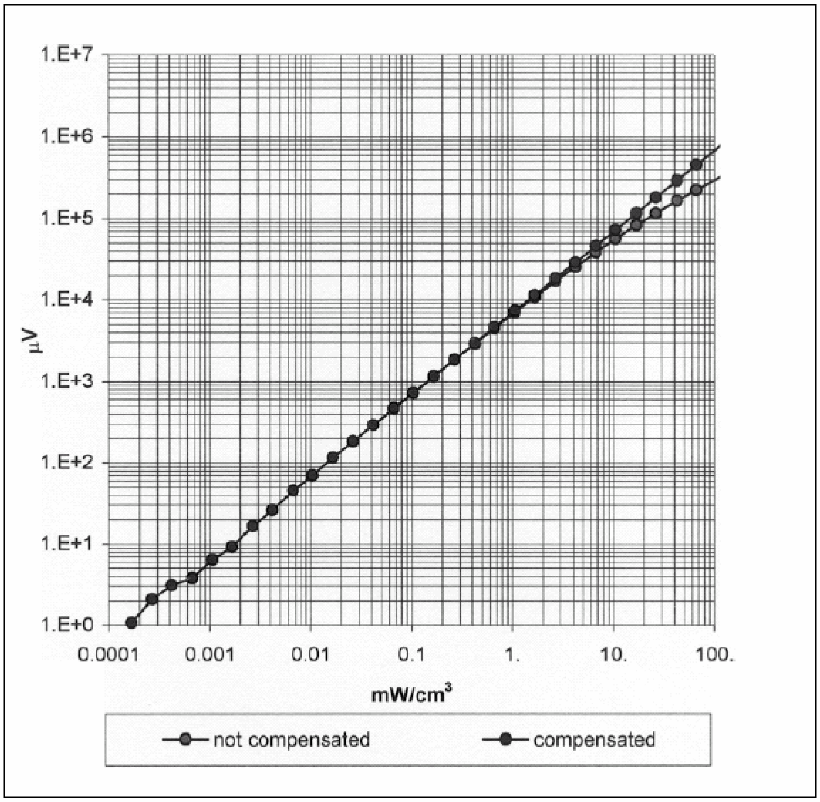
(Waveguide R22)

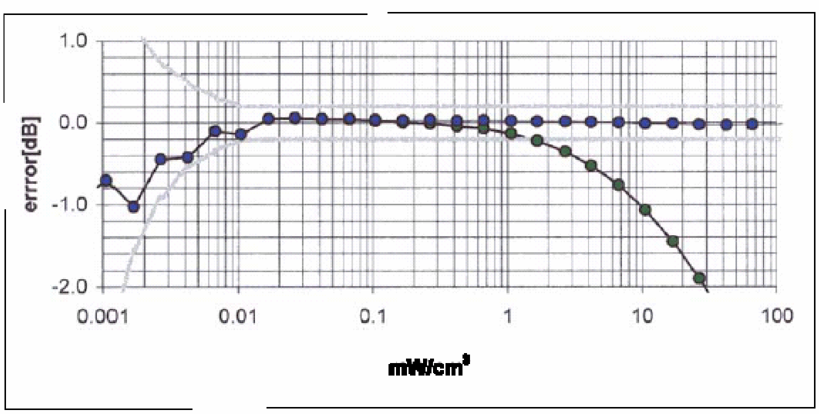




Dynamic Range f(SAR$_{brain}$)

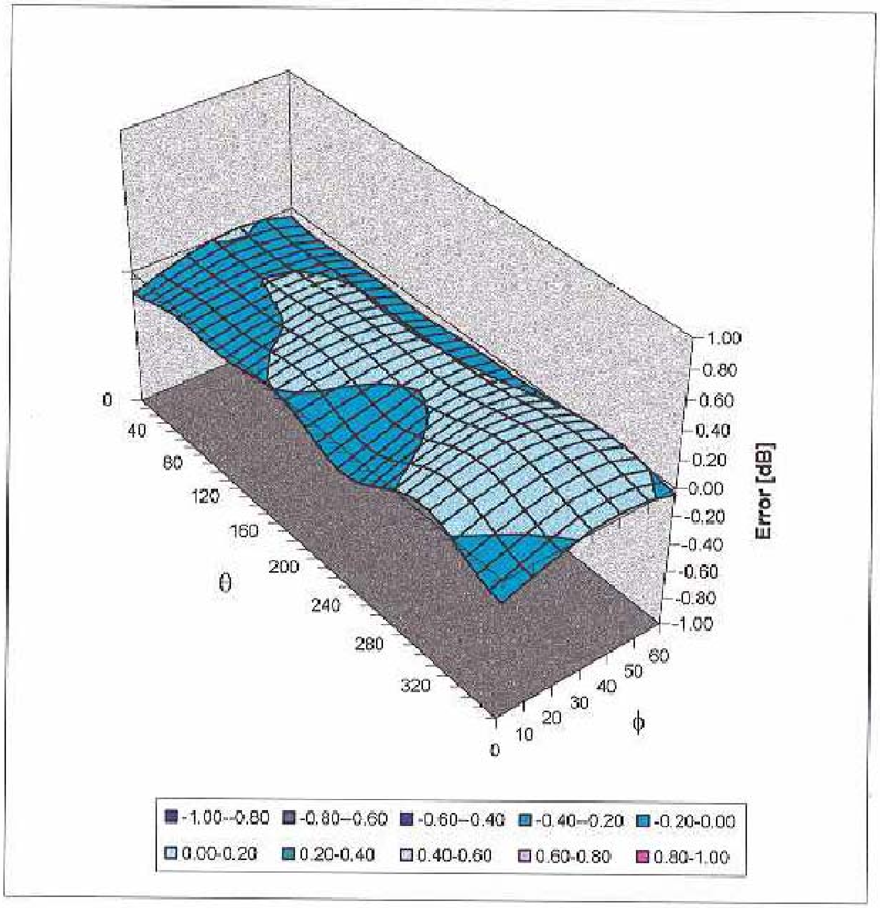
(Waveguide R22)





Deviation from Isotropy in HSL

Error (θϕ), f = 900 MHz



Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1393**
Place of Assessment:	**Zurich**
Date of Assessment:	**April 21, 2003**
Probe Calibration Date:	**April 16, 2003**

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1800 MHz.

Assessed by:

Dosimetric E-Field Probe ET3DV6 SN:1393

Conversion factor (± standard deviation)

150 MHz	ConvF	8.8 ± 8 %	ε_r = 61.9 σ = 0.80 mho/m (body tissue)
236 MHz	ConvF	8.6 ± 8 %	ε_r = 59.8 σ = 0.87 mho/m (body tissue)
300 MHz	ConvF	8.4 ± 8 %	ε_r = 58.2 σ = 0.92 mho/m (body tissue)
350 MHz	ConvF	8.4 ± 8 %	ε_r = 57.7 σ = 0.93 mho/m (body tissue)
450 MHz	ConvF	8.0 ± 8 %	ε_r = 56.7 σ = 0.94 mho/m (body tissue)
784 MHz	ConvF	7.0 ± 8 %	ε_r = 55.4 σ = 0.97 mho/m (body tissue)
1450 MHz	ConvF	5.6 ± 8 %	ε_r = 54.0 σ = 1.30 mho/m (body tissue)

Dosimetric E-Field Probe ET3DV6 SN:1393

Conversion factor (± standard deviation)

150 MHz	ConvF	9.7 ± 8%	ε_r = 52.3 σ = 0.76 mho/m (head tissue)
236 MHz	ConvF	8.8 ± 8%	ε_r = 48.3 σ = 0.82 mho/m (head tissue)
300 MHz	ConvF	8.5 ± 8%	ε_r = 45.3 σ = 0.87 mho/m (head tissue)
350 MHz	ConvF	8.5 ± 8%	ε_r = 44.7 σ = 0.87 mho/m (head tissue)
400 MHz	ConvF	8.1 ± 8%	ε_r = 44.4 σ = 0.87 mho/m (head tissue - CENELEC)
450 MHz	ConvF	8.1 ± 8%	ε_r = 43.5 σ = 0.87 mho/m (head tissue)
784 MHz	ConvF	7.3 ± 8%	ε_r = 41.8 σ = 0.90 mho/m (head tissue)

Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Calibration Certificate

450 MHz System Validation Dipole

Type:	D450V2
Serial Number:	1001
Place of Calibration:	Zurich
Date of Calibration:	April 5, 2002
Calibration Interval:	24 months

Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

Wherever applicable, the standards used in the calibration process are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:

Approved by:

1. Measurement Conditions

The measurements were performed in the flat phantom filled with head simulating liquid of the following electrical parameters at 450 MHz:

Relative Dielectricity	**44.5**	± 5%
Conductivity	**0.86 mho/m**	± 5%

The DASY3 System (Software version 3.1d) with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 7.2 at 450 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom and the dipole was oriented parallel to the longer side of the phantom. The standard measuring distance was 15mm from dipole center to the liquid surface including the 6mm thick phantom shell. The included distance holder was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 20mm was aligned with the dipole. The 5x5x7 fine cube was chosen for cube integration. Probe isotropy errors were cancelled by measuring the SAR with normal and 90° turned probe orientations and averaging.
The dipole input power (forward power) was 389 mW ± 3 %. The results are normalized to 1W input power.

2. SAR Measurement

Standard SAR-measurements were performed with the phantom according to the measurement conditions described in section 1. The results have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values are:

averaged over 1 cm^3 (1 g) of tissue: **4.77 mW/g** (Advanced Extrapolation)

averaged over 10 cm^3 (10 g) of tissue: **3.17 mW/g** (Advanced Extrapolation)

Advanced extrapolation has been applied to the measured SAR values to compensate for the probe boundary effect (see DASY User Manual for details).

Note: If the liquid parameters for validation are slightly different from the ones used for initial calibration, the SAR-values will be different as well.

3. Dipole Impedance and Return Loss

The impedance was measured at the SMA-connector with a network analyzer and numerically transformed to the dipole feedpoint. The transformation parameters from the SMA-connector to the dipole feedpoint are:

Electrical delay:	**1.342 ns**	(one direction)
Transmission factor:	**0.997**	(voltage transmission, one direction)

The dipole was positioned at the flat phantom sections according to section 1 and the distance holder was in place during impedance measurements.

Feedpoint impedance at 450 MHz:	Re{Z} = **57.9 Ω**
	Im {Z} = **-6.0 Ω**
Return Loss at 450 MHz	**-20.8 dB**

4. Handling

Do not apply excessive force to the dipole arms, because they might bend. Bending of the dipole arms stresses the soldered connections near the feedpoint leading to a damage of the dipole.

5. Design

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

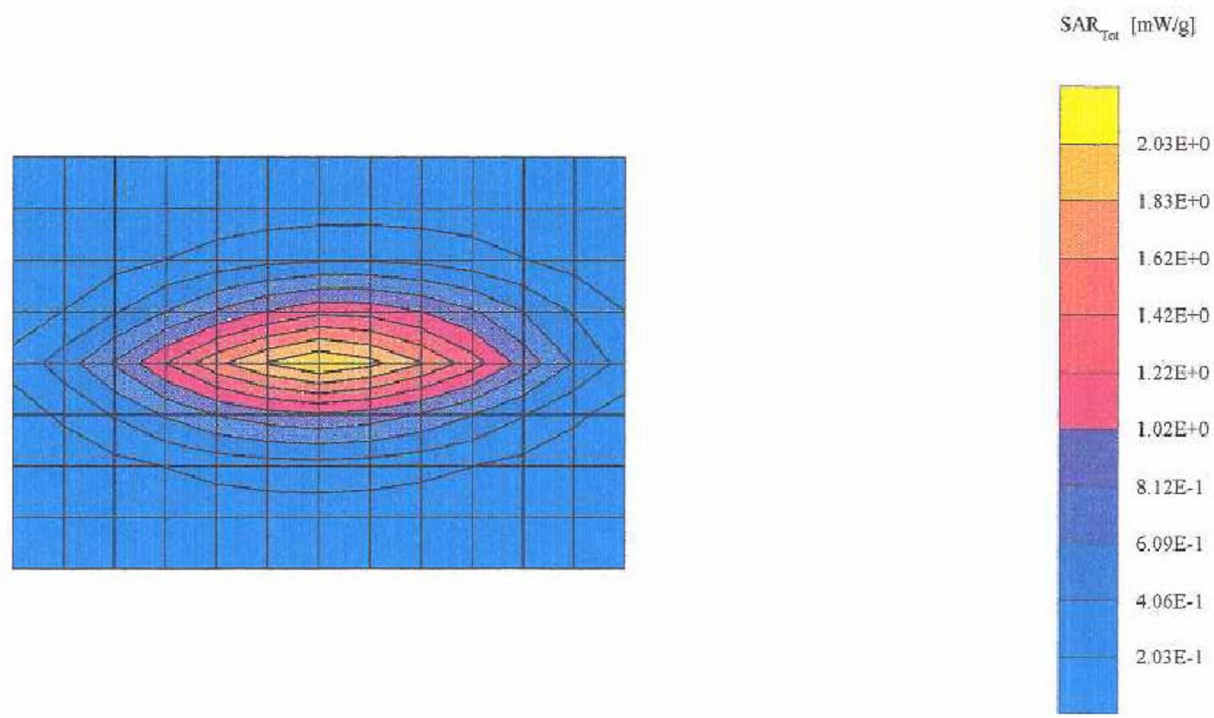
6. Power Test

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

03/27/02

Validation Dipole D450V2 SN:1001, d = 15 mm

Frequency: 450 MHz; Antenna Input Power: 388 [mW]
Phantom Name: Calibration, Grid Spacing: Dx = 20.0, Dy = 20.0, Dz = 10.0
Probe: ET3DV6 - SN1507; ConvF(7.20,7.20,7.20); Crest factor: 1.0; Head 450 MHz: σ = 0.86 mho/m ε_r = 44.5 ρ = 1.00 g/cm³
Cubes (2): Peak: 2.81 mW/g ± 0.03 dB, SAR (1g): 1.85 mW/g ± 0.03 dB, SAR (10g): 1.23 mW/g ± 0.03 dB, (Advanced extrapolation)
Penetration depth: 13.1 (12.0, 14.4) [mm]



Schmid & Partner Engineering AG, Zurich, Switzerland

APPENDIX E

Illustration of Body-Worn Accessories

The purpose of this appendix is to illustrate the body-worn carry accessories for FCC ID: AZ489FT4864. The sample that was used in the following photos represents the product used to obtain the results presented herein.

Photo 1.
Model NTN9179A
Side View

Photo 2.
Model NTN9179A
Back View

Photo 3.
Model NTN8381C
Side View

Photo 4.
Model NTN8381C
Back View

Photo 5.
Model NTN9184A
Side View

Photo 6.
Model NTN9184A
Back View

Photo 7.
Model NTN8382A
Side View

Photo 8.
Model NTN8382A
Back View

Photo 9.
Model NTN8385B
w/ 2.5"swivel
Side View

Photo 10.
Model NTN8385B
w/ 2.5"swivel
Back View

Photo 11.
Model NTN8387A
Side View

Photo 12.
Model NTN8387A
Back View

Photo 13.
Model NTN8725A
Side View

Photo 14.
Model NTN8725A
Back View

Photo 15.
Model NTN8266B
Side View

Photo 16.
Model NTN8266B
Back View

Photo 17.
Model
NTNNTN8385BA
w/ 3" swivel
Side View

Photo 18.
Model
NTNNTN8385BA
w/ 3" swivel
Side View

Photo 19.
Model NTN8380B
Side View

Photo 20.
Model NTN8380B
Back View

Appendix F
Accessories and options test status and separation distances

The following table summarizes the test status and separation distance provided by each of the body-worn accessories:

Carry Case Model	Tested ?	Separation distance between base of DUT antenna and phantom surface. (mm)	Comments
NTN8266B	Yes	23	NA
NTN8725A	Yes	29	Tested with NTN8383A
NTN9179A	Yes	49	Tested with NTN9212A&NTN9213A
NTN9184A	Yes	55	NA
NTN8387A	Yes	58	Tested with NTN5243A
NTN8380B	Yes	64	Includes NTN8039B
NTN5243A	Yes	NA	Tested with NTN8387A
NTN9212A	Yes	NA	Swivel D clip tested with NTN9179A
NTN9213A	Yes	NA	3" swivel D clip tested with NTN9179A
NTN8383A	Yes	NA	Tested with NTN8725A
NTN8382B	Yes	52	NA
NTN8039B	Yes	NA	Tested with NTN8385B
NTN8385B	Yes	NA	Tested with NTN8039B and NTN8040B
NTN8381C	Yes	63	NA
NTN8040B	Yes	NA	Tested with NTN8385B
HLN6875A	Yes	39	NA
NTN6875A	No	NA	Provides greater separation distance than tested belt clip
NTN8384A	No	NA	Similar to NTN8383A

Attachments	Tested ?	Separation distance between base of DUT antenna and phantom surface. (mm)	Comments
Audio			
BDN6676D	Yes	NA	Included with ear pieces & headsets
NTN7660B	Yes	NA	NA
0180300E83	Yes	NA	Tested with interface module BDN6708B
NTN8613A	Yes	NA	Tested with ZMN6031A
PSM			
NMN6250A	Yes	18	Includes NTN8327A
NMN6251A	Yes	18	Includes NTN8327A
NMN6247A	Yes	18	Includes NTN8327A
NTN8327A	Yes	NA	External RF switch
RSM			
NMN6191C	Yes	NA	NA
NMN6193C	Yes	NA	NA
NMN6193BSPO3	Yes	NA	NA
NMN6193BSPO4	Yes	NA	NA
RMN5023A	Yes	NA	NA
RMN5025A	Yes	NA	NA
RMN5021A	Yes	NA	NA
RMN5026A	Yes	NA	NA
Headset			
NMN6258A	Yes	NA	NA
RMN4049A	Yes	NA	NA
NMN6246B	Yes	NA	Tested with BDN6676D
BDN6645A	Yes	NA	Tested with BDN6673B
BDN6673B	Yes	NA	Tested with BDN6635B
BDN6635B	Yes	NA	Tested with BDN6673B
BDN6636B	Yes	NA	Tested with BDN6673B
NMN6245A	Yes	NA	Tested with BDN6676D
NMN6259A	Yes	NA	NA
NMN1020A	Yes	NA	Tested with BDN6676D, NKN6498A, & NKN6050A
Ear piece			
ZMN6031A	Yes	NA	Tested with NTN8613A adapter
ZMN6032A	Yes	NA	Tested with NTN8613A adapter
BDN6780A	Yes	NA	Tested with BDN6676D adapter

BDN6726A	Yes	NA	Receive only, Test with BDN6676 adapter
BDN6728A	Yes	NA	Tested with BDN6676 adapter
BDN6729A	Yes	NA	Tested with BDN6676D adapter
BDN6730A	Yes	NA	Tested with BDN6676D adapter
ZMN6038A	Yes	NA	Tested with NTN8613A
ZMN6039A	Yes	NA	Tested with NTN8613A
BDN6667A	Yes	NA	Tested with BDN6676D
BDN6668A	Yes	NA	Tested with BDN6676D
BDN6665A	No	NA	Similar to BDN6726A
BDN6666A	No	NA	Similar to BDN6728A
BDN6664A	No	NA	Similar to BDN6726A
BDN6727A	No	NA	Similar to BDN6726A
BDN6669A	No	NA	Similar to BDN6729A
BDN6731A	No	NA	Similar to BDN6729A
BDN6670A	No	NA	Similar to BDN6730A
BDN6781A	No	NA	Similar to BDN6726A
BDN6732A	No	NA	Similar to BDN6730A
Comport			
NTN1625A	Yes	NA	Tested with BDN6676D & NKN6508A
NTN1663A	Yes	NA	Tested with BDN6676D & NKN6512A
NTN1736A	Yes	NA	Tested with BDN6676D & NKN6525A
NTN1624A	Yes	NA	Tested with BDN6676D adapter
Interface module			
BDN6671B	Yes	NA	Tested with BDN6641A & 0180300E83
BDN6708B	Yes	NA	Tested with BND6678A 0180300E83
BDN6678A	Yes	NA	Tested with BDN6671B
BDN6677B	No	NA	Similar to BDN6678A (Beige)
BDN6641A	No	NA	Similar to BDN6677B