

**Test Date: 04 December 2007**

File Name: Edge On DSSS 2450 MHz Antenna A Side Bluetooth Off Extended Battery 04-12-07.da4

DUT: **Fujitsu Tablet Ryuga with Atheros 11abg and Bluetooth; Type: XB62; Serial: ZX7X00480**

\* Communication System: DSSS 2450 MHz; Frequency: 2462 MHz; Duty Cycle: 1:1

\* Medium parameters used:  $\sigma = 1.98919 \text{ mho/m}$ ,  $\epsilon_r = 53.5413$ ;  $\rho = 1000 \text{ kg/m}^3$

- Electronics: DAE3 Sn359; Probe: ET3DV6 - SN1377; ConvF(3.98, 3.98, 3.98)

- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

**Channel 11 Test/Area Scan (51x131x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.177 mW/g

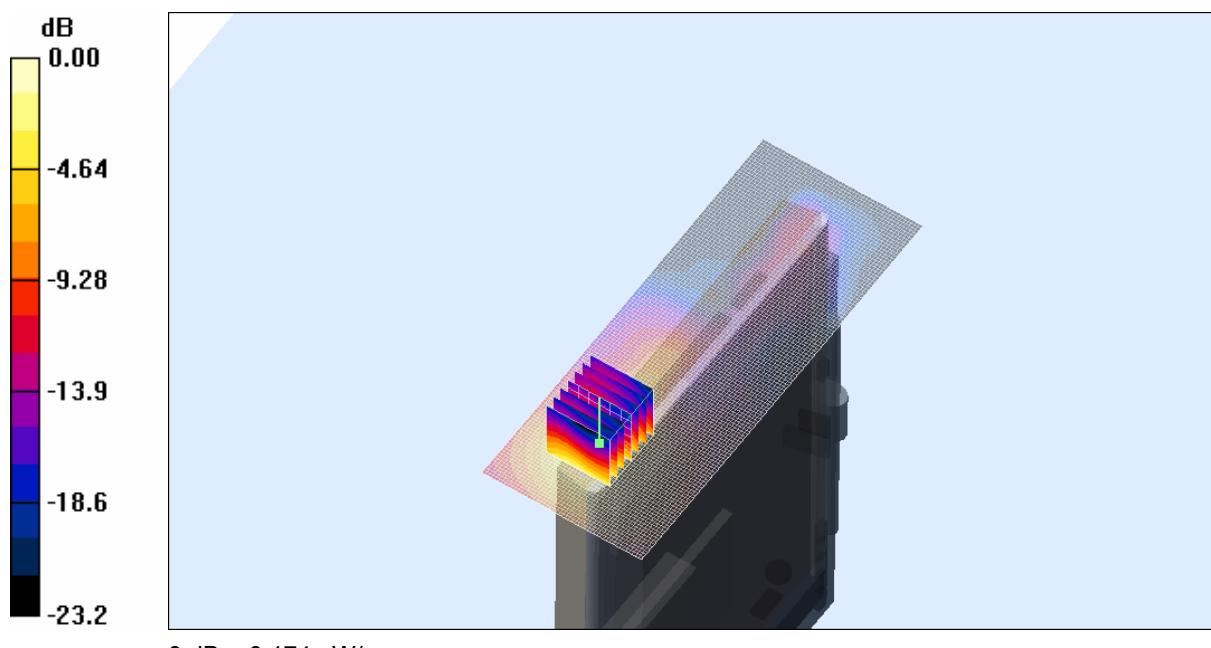
**Channel 11 Test/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.96 V/m; Power Drift = -0.154 dB

Peak SAR (extrapolated) = 0.351 W/kg

**SAR(1 g) = 0.158 mW/g; SAR(10 g) = 0.076 mW/g**

Maximum value of SAR (measured) = 0.174 mW/g



**SAR MEASUREMENT PLOT 5**

Ambient Temperature

**21.8 Degrees Celsius**

Liquid Temperature

**21.2 Degrees Celsius**

Humidity

**64.0 %**



**Test Date: 04 December 2007**

File Name: Validation 2450 MHz (DAE359 Probe1377) 04-12-07.da4

DUT: **Dipole 2450 MHz**; Type: DV2450V2; Serial: 724

\* Communication System: CW 2450 MHz; Frequency: 2450 MHz; Duty Cycle: 1:1

\* Medium parameters used:  $\sigma = 1.80998 \text{ mho/m}$ ,  $\epsilon_r = 39.9547$ ;  $\rho = 1000 \text{ kg/m}^3$

- Electronics: DAE3 Sn359; Probe: ET3DV6 - SN1377; ConvF(4.45, 4.45, 4.45)

- Phantom: SAM 22; Serial: 1260; Phantom section: Flat Section

**Channel 1 Test/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 19.2 mW/g

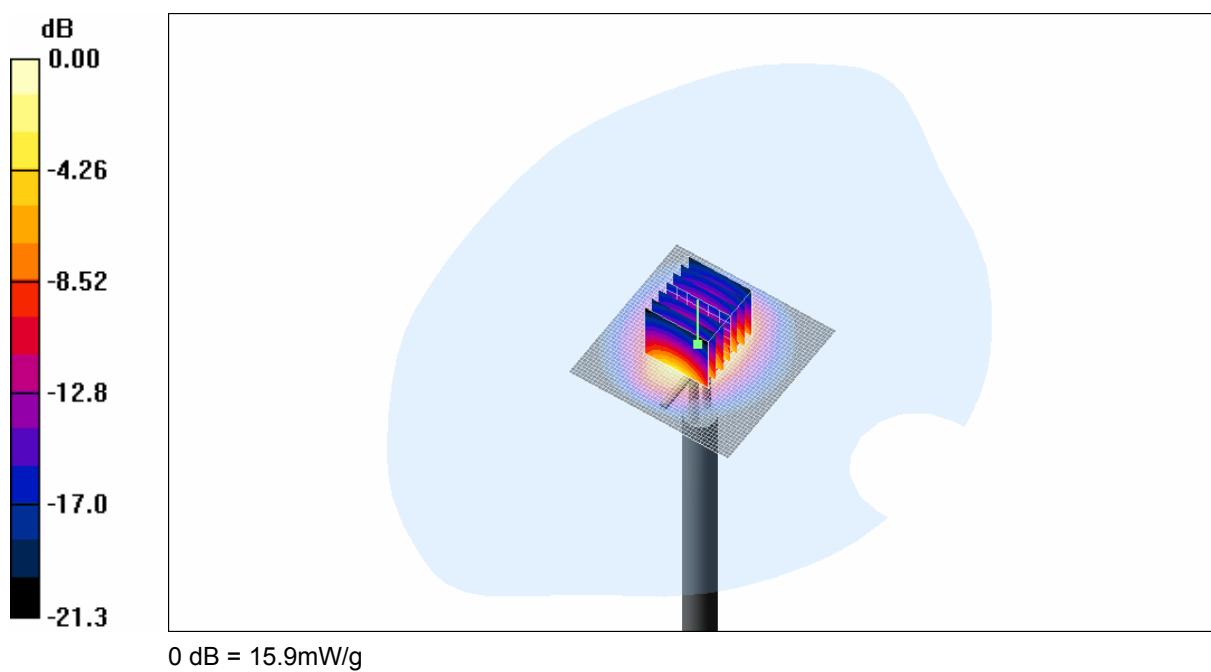
**Channel 1 Test/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.8 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 30.8 W/kg

**SAR(1 g) = 14.2 mW/g; SAR(10 g) = 6.63 mW/g**

Maximum value of SAR (measured) = 15.9 mW/g



**Ambient Temperature**

**21.8 Degrees Celsius**

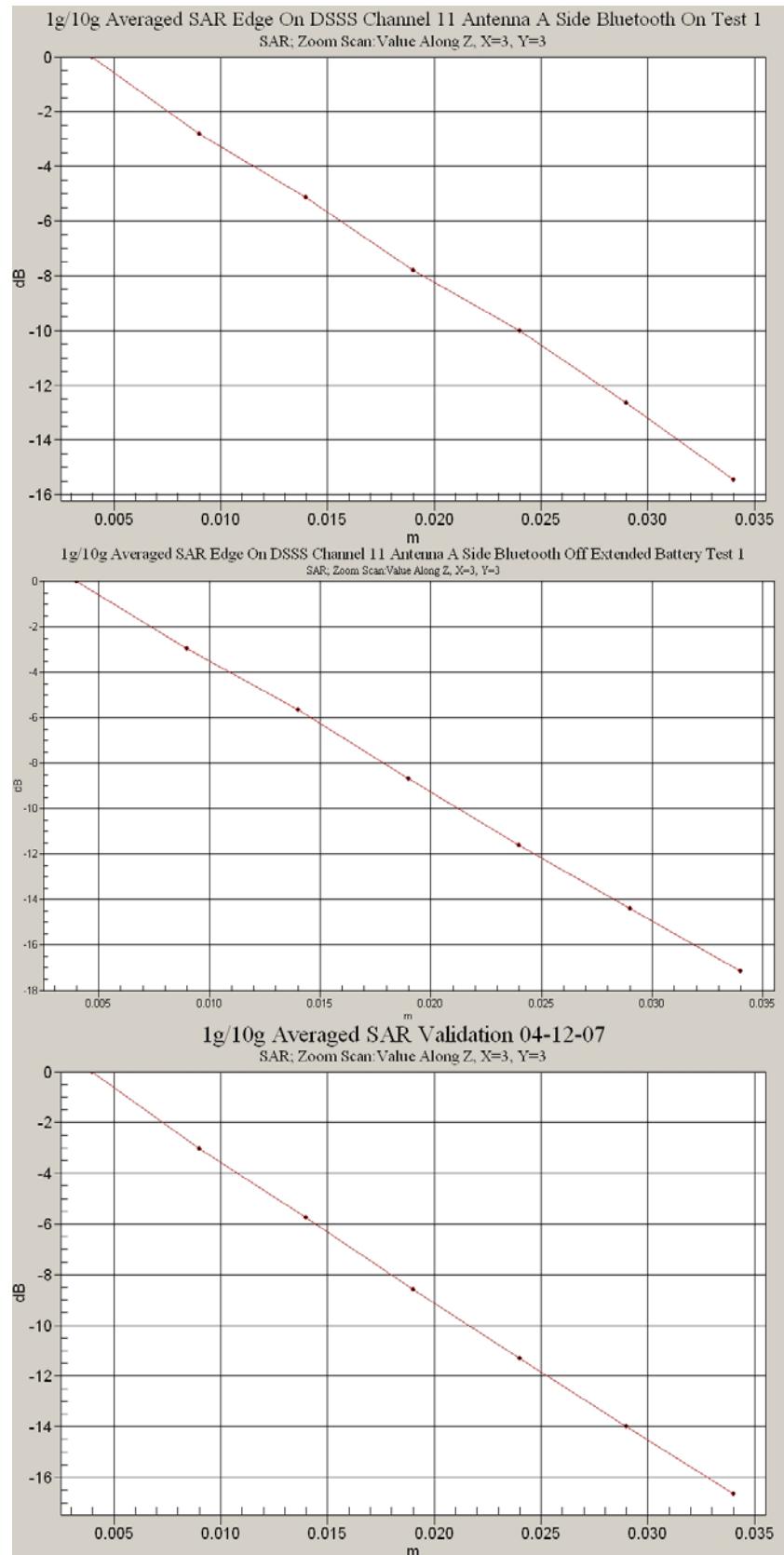
**Liquid Temperature**

**21.2 Degrees Celsius**

**Humidity**

**64.0 %**





## APPENDIX C CALIBRATION DOCUMENTS

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



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

Accredited by the Swiss Federal Office of Metrology and Accreditation  
 The Swiss Accreditation Service is one of the signatories to the EA  
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **EMC Technologies**

Certificate No: **ET3-1377\_Jul07**

### CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1377		
Calibration procedure(s)	QA CAL-01.v6 Calibration procedure for dosimetric E-field probes		
Calibration date:	July 9, 2007		
Condition of the calibrated item	In Tolerance		
<p>This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).            The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity &lt; 70%.</p> <p>Calibration Equipment used (M&amp;TE critical for calibration)</p>			
Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41495277	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41498087	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-06 (METAS, No. 217-00592)	Aug-07
Reference 20 dB Attenuator	SN: S5066 (20b)	29-Mar-07 (METAS, No. 217-00671)	Mar-08
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-06 (METAS, No. 217-00593)	Aug-07
Reference Probe ES3DV2	SN: 3013	4-Jan-07 (SPEAG, No. ES3-3013_Jan07)	Jan-08
DAE4	SN: 654	20-Apr-07 (SPEAG, No. DAE4-654_Apr07)	Apr-08
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07
Calibrated by:	Name Katja Pokovic	Function Technical Manager	Signature 
Approved by:	Niels Kuster	Quality Manager	
Issued: July 10, 2007			
<p>This calibration certificate shall not be reproduced except in full without written approval of the laboratory.</p>			

Certificate No: ET3-1377\_Jul07

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**Calibration Laboratory of**  
**Schmid & Partner**  
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**S** Schweizerischer Kalibrierdienst  
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Accreditation No.: **SCS 108**

#### Glossary:

TSI	tissue simulating liquid
NORM $x,y,z$	sensitivity in free space
ConF	sensitivity in TSI / NORM $x,y,z$
DCP	diode compression point
Polarization $\phi$	$\phi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

#### Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

#### Methods Applied and Interpretation of Parameters:

- $NORMx,y,z$ : Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide).  $NORMx,y,z$  are only intermediate values, i.e., the uncertainties of  $NORMx,y,z$  does not effect the  $E^2$ -field uncertainty inside TSL (see below  $ConvF$ ).
- $NORM(f)x,y,z = NORMx,y,z * frequency\_response$  (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of  $ConvF$ .
- $DCPx,y,z$ : DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- ConvF and Boundary Effect Parameters*: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to  $NORMx,y,z * ConvF$  whereby the uncertainty corresponds to that given for  $ConvF$ . A frequency dependent  $ConvF$  is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.



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**ET3DV6 SN:1377****July 9, 2007**

# Probe ET3DV6

## SN:1377

Manufactured:	August 16, 1999
Last calibrated:	July 14, 2006
Recalibrated:	July 9, 2007

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)



ET3DV6 SN:1377

July 9, 2007

## DASY - Parameters of Probe: ET3DV6 SN:1377

### Sensitivity in Free Space<sup>A</sup>

NormX	<b>1.93</b> $\pm$ 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$
NormY	<b>1.91</b> $\pm$ 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$
NormZ	<b>1.87</b> $\pm$ 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$

### Diode Compression<sup>B</sup>

DCP X	<b>94</b> mV
DCP Y	<b>97</b> mV
DCP Z	<b>94</b> mV

### Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

### Boundary Effect

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

Sensor Center to Phantom Surface Distance	<b>3.7 mm</b>	<b>4.7 mm</b>
SAR <sub>be</sub> [%]           Without Correction Algorithm	8.8	4.3
SAR <sub>be</sub> [%]           With Correction Algorithm	0.1	0.1

TSL                   **1810 MHz**           Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance	<b>3.7 mm</b>	<b>4.7 mm</b>
SAR <sub>be</sub> [%]           Without Correction Algorithm	13.1	8.7
SAR <sub>be</sub> [%]           With Correction Algorithm	0.2	0.1

### Sensor Offset

Probe Tip to Sensor Center                   **2.7 mm**

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%.

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the  $E^2$ -field uncertainty inside TSL (see Page 8).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

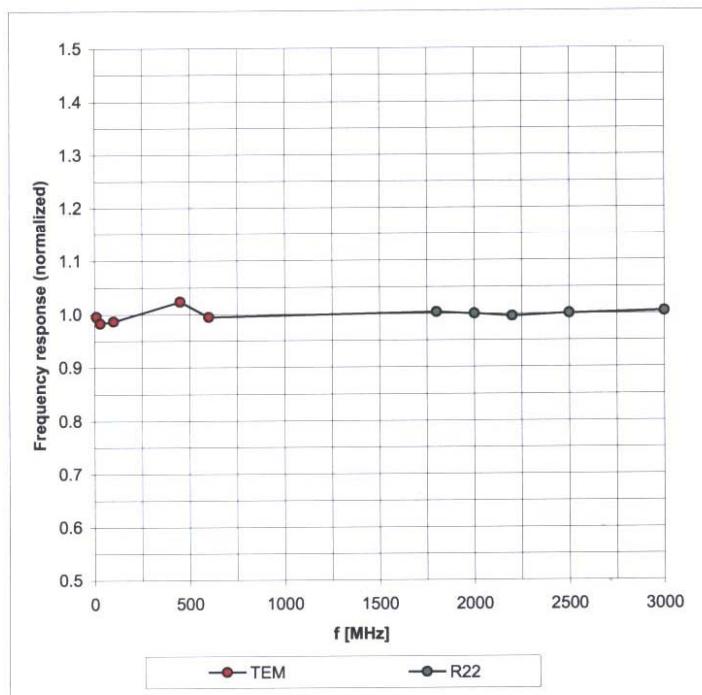


ET3DV6 SN:1377

July 9, 2007

## Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)

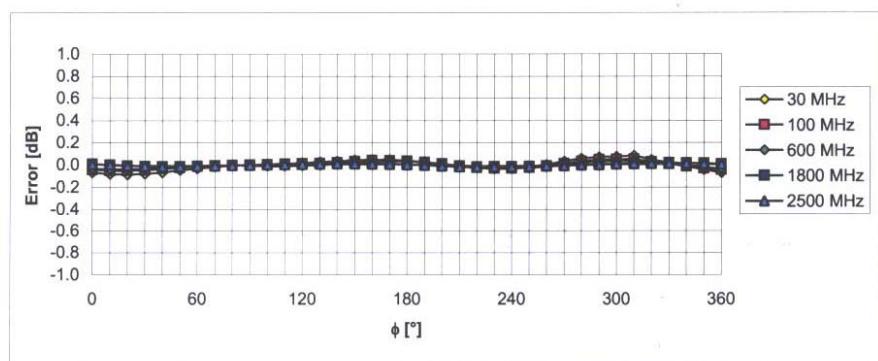
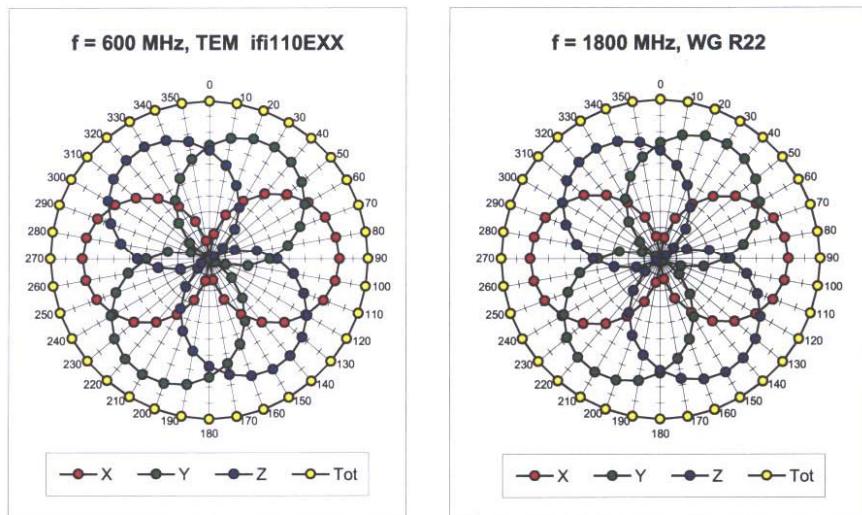


Uncertainty of Frequency Response of E-field:  $\pm 6.3\% (k=2)$



ET3DV6 SN:1377

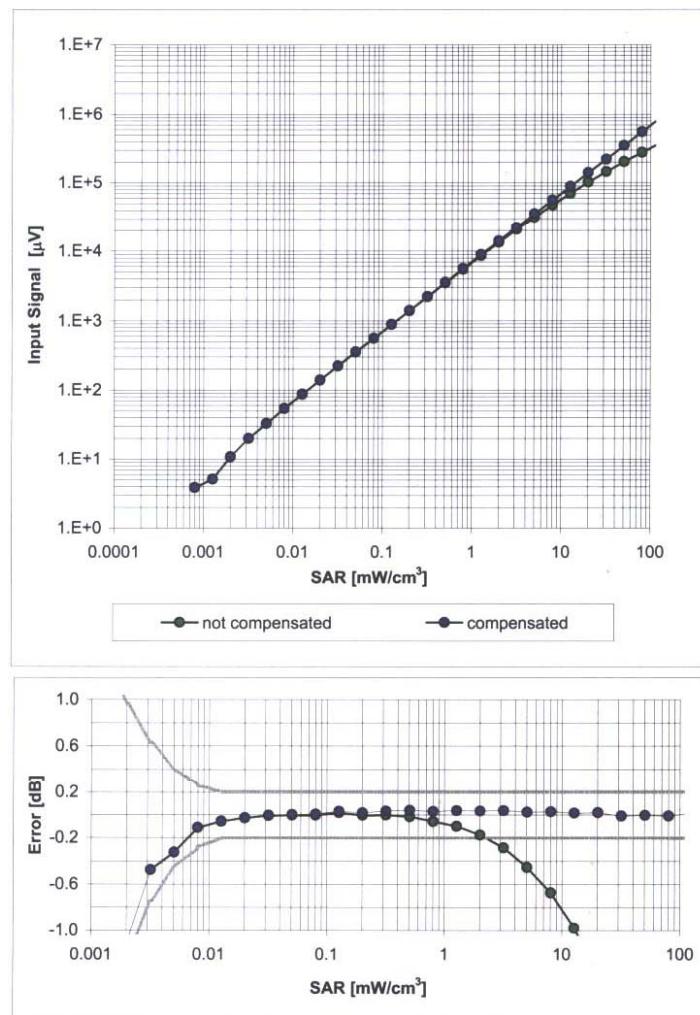
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Receiving Pattern ( $\phi$ ),  $\theta = 0^\circ$ Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  (k=2)

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**Dynamic Range f(SAR<sub>head</sub>)**  
**(Waveguide R22, f = 1800 MHz)**



Uncertainty of Linearity Assessment:  $\pm 0.6\%$  (k=2)