CERTIFICATE OF COMPLIANCE
SAR EVALUATION

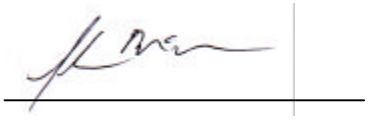
Test Lab:	**Applicant Information:**
CELLTECH RESEARCH INC. Testing and Engineering Lab 1955 Moss Court Kelowna, B.C. Canada V1Y 9L3 Phone: 250 - 860-3130 Fax: 250 - 860-3110 Toll Free: 1-877-545-6287 e-mail: info@celltechlabs.com web site: www.celltechlabs.com	**WITHUS IT CO., LTD.** 2F. DongNam Bldg. 448-16 Shingil-5Dong, YongDungPo-Ku, Seoul, Korea

FCC ID:	**POQWPE-1100**
Model(s):	**WPE-1100 (Base Model)** **WPE-1200 (Derived Model)** **(Model Difference: Front Chassis Cosmetics)**
Equipment Type:	**Single-Mode PCS CDMA Phone**
Classification:	**Part 24 Licensed Portable Transmitter Held to Ear (PCE)**
Tx Frequency Range:	**1851.25 - 1908.75 MHz**
Rx Frequency Range:	**1931.25 - 1988.75 MHz**
Max. RF Output Power:	**0.360 Watts (EIRP)**
FCC Rule Part(s):	**2.1093; ET Docket 96.326**

Celltech Research Inc. declares under its sole responsibility that this device was found to be in compliance with the Specific Absorption Rate (SAR) RF exposure requirements specified in OET Bulletin 65, Supplement C, Edition 01-01 (General Population/Uncontrolled Exposure), and was tested in accordance with the appropriate measurement standards, guidelines, and recommended practices specified in American National Standards Institute C95.1-1992.

I attest to the accuracy of data. All measurements were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

This test report shall not be reproduced partially, or in full, without the prior written approval of Celltech Research Inc. The results and statements contained in this report pertain only to the device(s) evaluated.



Shawn McMillen
General Manager
Celltech Research Inc.

TABLE OF CONTENTS

1.0 INTRODUCTION

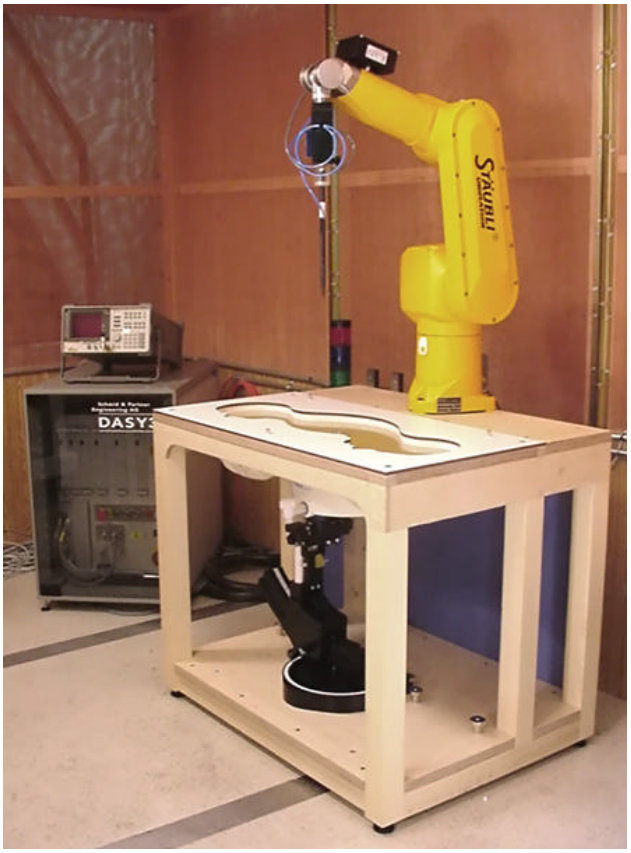
This measurement report shows that the WITHUS IT CO., LTD. Models: WPE-1100, WPE-1200 Single-Mode PCS CDMA Phone FCC ID: POQWPE-1100 complies with FCC Part 2.1093, ET Docket 96-326 Rules for mobile and portable devices. The test procedures, as described in American National Standards Institute C95.1-1992 (see reference [1]), and FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [2]) were employed. A description of the product and operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used, and the various provisions of the rules are included within this test report.

2.0 DESCRIPTION of Equipment Under Test (EUT)

EUT Type	Single-Mode PCS CDMA Phone	**FCC ID**	POQWPE-1100
Equipment Class	Licensed Portable Transmitter Held to Ear (PCE)	**Model No.(s)**	WPE-1100 (Base Model) WPE-1200 (Derived Model)
FCC Rule Part(s)	§ 2.1093, Docket 96-326	**Application Type**	FCC Part 24 Certification
Tx Frequency Range	1851.25 - 1908.75 MHz	**Serial No.**	Pre-production Unit
Rx Frequency Range	1931.25 - 1988.75 MHz	**Battery Type(s)**	3.7V 750mAh Lithium-Ion
Modulation	PCS CDMA	**Antenna Type**	Retractable Whip (1/4λ)
Rated RF Conducted Power	24.5 dBm	**Antenna Length**	68 mm

3.0 SAR MEASUREMENT SYSTEM

Celltech Research SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY system is comprised of the robot controller, computer, near-field probe, probe alignment sensor, specific anthropomorphic mannequin (SAM) phantom, and various planar phantoms for brain or body SAR evaluations. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card. The DAE3 utilizes a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16-bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.



DASY3 SAR Measurement System with SAM phantom

4.0 MEASUREMENT SUMMARY

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the EUT are reported in Appendix A.

HEAD SAR MEASUREMENT RESULTS - Left Head Section

Freq. (MHz)	Channel	Modulation	Cond. Power Before (dBm)	Cond. Power After (dBm)	Battery Type	Antenna Position	Phantom Section	Test Position	SAR 1g (w/kg)
1851.25	25	PCS CDMA	24.52	24.49	Standard	Retracted	Left Ear	Cheek/Touch	1.34
1851.25	25	PCS CDMA	24.52	24.39	Standard	Extended	Left Ear	Cheek/Touch	1.03
1880.00	600	PCS CDMA	24.53	24.34	Standard	Retracted	Left Ear	Cheek/Touch	1.24
1880.00	600	PCS CDMA	24.56	24.49	Standard	Extended	Left Ear	Cheek/Touch	1.25
1908.75	1175	PCS CDMA	24.53	24.46	Standard	Retracted	Left Ear	Cheek/Touch	1.37
1908.75	1175	PCS CDMA	24.56	24.46	Standard	Extended	Left Ear	Cheek/Touch	1.14
1851.25	25	PCS CDMA	24.50	24.36	Standard	Retracted	Left Ear	Ear/Tilt	1.25
1851.25	25	PCS CDMA	24.52	24.34	Standard	Extended	Left Ear	Ear/Tilt	1.13
1880.00	600	PCS CDMA	24.50	24.42	Standard	Retracted	Left Ear	Ear/Tilt	1.27
1880.00	600	PCS CDMA	24.51	24.48	Standard	Extended	Left Ear	Ear/Tilt	1.18
1908.75	1175	PCS CDMA	24.51	24.34	Standard	Retracted	Left Ear	Ear/Tilt	1.30
1908.75	1175	PCS CDMA	24.56	24.38	Standard	Extended	Left Ear	Ear/Tilt	1.07
Mixture Type: Brain (Measured) Dielectric Constant: 39.5 Conductivity: 1.40				**ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak - Uncontrolled Exposure / General Population BRAIN: 1.6 W/kg (averaged over 1 gram)**					

Notes:

1. The SAR values found were below the maximum limit of 1.6 w/kg (averaged over 1 gram).
2. The highest head SAR (left head section) value found was 1.37 w/kg (high channel, antenna retracted, cheek/touch position).
3. The EUT was tested using the standard battery, which is the only battery option for this phone.
4. Ambient TEMPERATURE: 23.6 °C
   Relative HUMIDITY: 31 %
   Atmospheric PRESSURE: 102.438 kPa
5. Fluid Temperature ≈ 23 °C
6. During the entire test the conducted power was maintained to within 5% of the initial conducted power.

MEASUREMENT SUMMARY (CONT.)

HEAD SAR MEASUREMENT RESULTS - Right Head Section

Freq. (MHz)	Channel	Modulation	Cond. Power Before (dBm)	Cond. Power After (dBm)	Battery Type	Antenna Position	Phantom Section	Test Position	SAR 1g (w/kg)
1851.25	25	PCS CDMA	24.53	24.49	Standard	Retracted	Right Ear	Cheek/Touch	0.774
1851.25	25	PCS CDMA	24.51	24.31	Standard	Extended	Right Ear	Cheek/Touch	0.568
1880.00	600	PCS CDMA	24.55	24.40	Standard	Retracted	Right Ear	Cheek/Touch	0.771
1880.00	600	PCS CDMA	24.54	24.42	Standard	Extended	Right Ear	Cheek/Touch	0.665
1908.75	1175	PCS CDMA	24.54	24.46	Standard	Retracted	Right Ear	Cheek/Touch	0.738
1908.75	1175	PCS CDMA	24.58	24.40	Standard	Extended	Right Ear	Cheek/Touch	0.676
1851.25	25	PCS CDMA	24.57	24.38	Standard	Retracted	Right Ear	Ear/Tilt	0.994
1851.25	25	PCS CDMA	24.53	24.44	Standard	Extended	Right Ear	Ear/Tilt	0.657
1880.00	600	PCS CDMA	24.54	24.47	Standard	Retracted	Right Ear	Ear/Tilt	1.02
1880.00	600	PCS CDMA	24.54	24.46	Standard	Extended	Right Ear	Ear/Tilt	0.864
1908.75	1175	PCS CDMA	24.57	24.42	Standard	Retracted	Right Ear	Ear/Tilt	0.900
1908.75	1175	PCS CDMA	24.52	24.34	Standard	Extended	Right Ear	Ear/Tilt	0.706
Mixture Type: Brain (Measured) Dielectric Constant: 39.5 Conductivity: 1.40				**ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak: Uncontrolled Exposure/General Population BRAIN: 1.6 W/kg (averaged over 1 gram)**					

Notes:

1. The SAR values found were below the maximum limit of 1.6 w/kg (averaged over 1 gram).
2. The highest head SAR (right head section) value found was 1.02 w/kg (mid-channel, antenna retracted, ear/tilt position).
3. The EUT was tested using the standard battery, which is the only battery option for this phone.
4. Ambient TEMPERATURE: 23.6 °C
   Relative HUMIDITY: 31 %
   Atmospheric PRESSURE: 102.438 kPa
5. Fluid Temperature ≈ 23.0 °C
6. During the entire test the conducted power was maintained to within 5% of the initial conducted power.

MEASUREMENT SUMMARY (CONT.)

BODY SAR MEASUREMENT RESULTS

Freq. (MHz)	Channel	Modulation	Cond. Power Before (dBm)	Cond. Power After (dBm)	Battery Type	Antenna Position	Phantom Section	Separation Distance (cm)	SAR 1g (w/kg)
1851.25	25	PCS CDMA	24.52	24.42	Standard	Retracted	Planar	1.5	0.493
1851.25	25	PCS CDMA	24.56	24.54	Standard	Extended	Planar	1.5	0.568
1880.00	600	PCS CDMA	24.52	24.34	Standard	Retracted	Planar	1.5	0.407
1880.00	600	PCS CDMA	24.51	24.44	Standard	Extended	Planar	1.5	0.494
1908.75	1175	PCS CDMA	24.51	24.36	Standard	Retracted	Planar	1.5	0.407
1908.75	1175	PCS CDMA	24.58	24.40	Standard	Extended	Planar	1.5	0.395
Mixture Type: Body (Measured) Dielectric Constant: 53.5 Conductivity: 1.52				**ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak - Uncontrolled Exposure / General Population BODY: 1.6 W/kg (averaged over 1 gram)**					

Notes:

1. The body SAR values found were below the maximum limit of 1.6 w/kg (averaged over 1 gram).
2. The highest body SAR value found was 0.568 w/kg (low channel, antenna extended).
3. The EUT was tested using the standard battery, which is the only battery option for this phone.
4. The EUT was tested for body SAR with an ear-microphone set connected.
5. Ambient TEMPERATURE: 23.6 °C
   Relative HUMIDITY: 31 %
   Atmospheric PRESSURE: 102.438 kPa
6. Fluid Temperature ≈ 23.0 °C
7. During the entire test the conducted power was maintained to within 5% of the initial conducted power.

5.0 DETAILS OF SAR EVALUATION

The WITHUS IT CO., LTD. Models: WPE-1100, WPE-1200 Single-Mode PCS CDMA Phone FCC ID: POQWPE-1100 was found to be compliant for localized Specific Absorption Rate (SAR) based on the following test provisions and conditions:

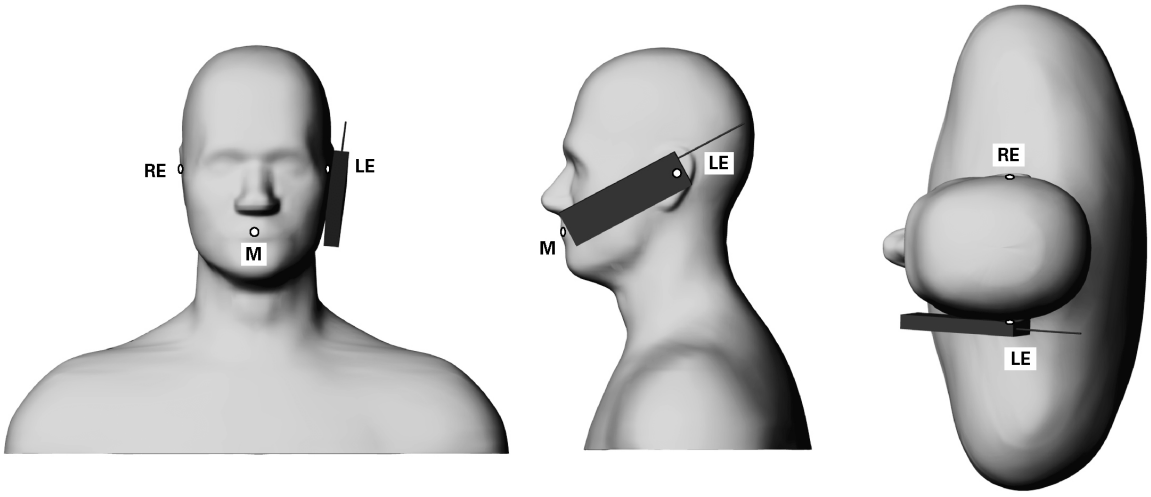
1) The EUT was tested in a ear-held configuration on both the left and right sections of the phantom with the device antenna in both the extended and retracted positions as follows:

   a) The handset was placed in the device holder in a normal operating position with the test device reference point located along the vertical centerline on the front of the device aligned to the ear reference point, with the center of the earpiece touching the center of the ear spacer of the SAM phantom.

   b) With the handset positioned parallel to the cheek, the test device reference point was aligned to the ear reference point on the head phantom, and the vertical centerline was aligned to the phantom reference plane (initial ear position).

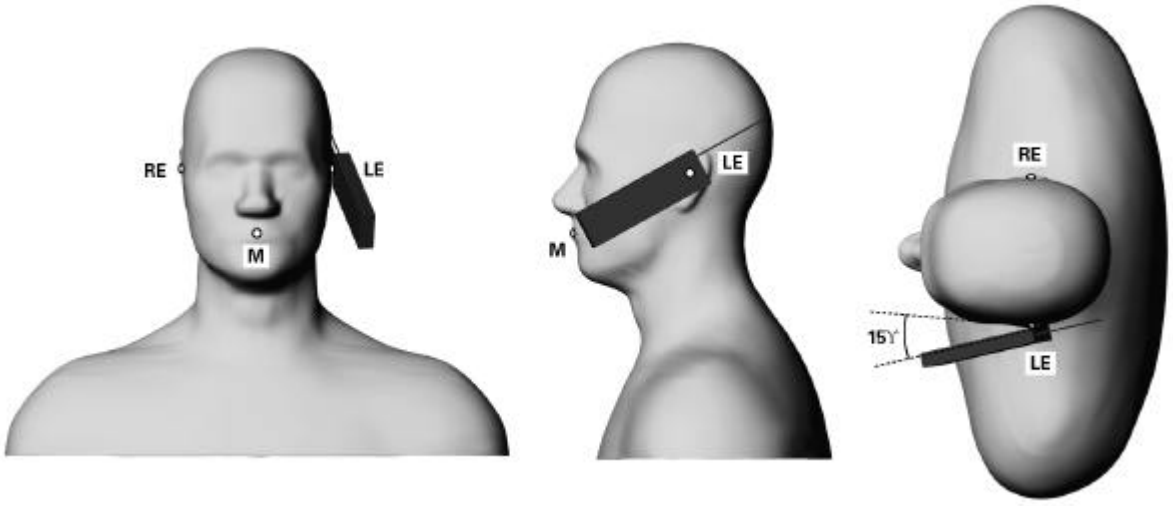
   c) While maintaining the three alignments, the body of the handset was gradually adjusted to each of the following test positions:

      • Cheek/Touch Position: The handset was brought toward the mouth of the head phantom by pivoting against the ear reference point until any point of the mouthpiece or keypad touched the phantom.



Phone position 1, "cheek" or "touch" position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning, are indicated (Shoulders are shown for illustration only).

- Ear/Tilt Position: With the phone aligned in the Cheek/Touch position, the handset was tilted away from the mouth with respect to the test device reference point by 15 degrees.



Phone position 2, "tilted position." The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning, are indicated (Shoulders are shown for illustration only).

2) The EUT was tested in a body-worn configuration with the back of the device placed parallel to the outer surface of the planar phantom at a separation distance of 1.5 cm. Both antenna extended and antenna retracted modes were tested. (Note: A body-holster or belt-clip were not available accessories at the time of evaluation)
3) The EUT was tested for body SAR with an ear-microphone set connected.
4) SAR measurements were evaluated at maximum power and the unit was operated for an appropriate period prior to the evaluation in order to minimize drift. The conducted power levels were checked before and after each test. If the conducted power level deviated more than 5% of the initial power level, then the EUT was retested. Any unusual anomalies over the course of the test also warranted a re-evaluation.
5) The conducted power was measured according to the procedures described in FCC Part 2.1046.
6) The EUT was placed into test mode via keypad access at a full data rate in the "always up" power control mode.
7) The location of the maximum spatial SAR distribution (Hot Spot) was determined relative to the handset and its antenna.
8) The EUT was tested with a fully charged battery.

6.0 EVALUATION PROCEDURES

The Specific Absorption Rate (SAR) evaluation was performed in the following manner:

a. (i) The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For devices held to the ear during normal operation both the left and right ear positions were evaluated at the low, middle, and high frequencies of the band at maximum power, and with the device antenna in both the extended and extracted positions as applicable. The positioning of the ear-held device relative to the phantom was performed in accordance with FCC OET Bulletin 65, Supplement C (Edition 01-01) using the SAM phantom.

(ii) For face-held and body-worn devices a planar phantom was used.

b. The SAR was determined by a pre-defined procedure within the DASY3 software. Upon completion of a reference and optical surface check, the exposed region of the phantom was scanned near the inner surface using a uniform grid spacing.

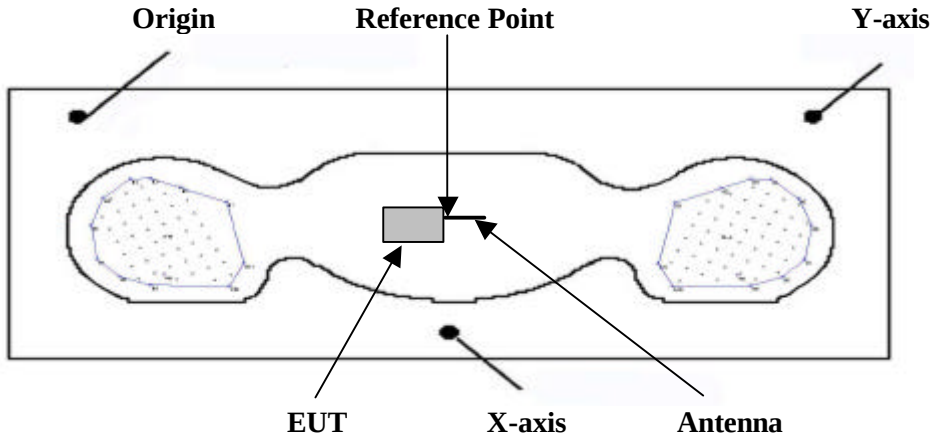
c. A 5x5x7 matrix was performed around the greatest spatial SAR distribution found during the area scan of the applicable exposed region. SAR values were then calculated using a 3-D spline interpolation algorithm and averaged over spatial volumes of 1 and 10 grams.

d. The depth of the simulating tissue in the phantom used for the SAR evaluation and system validation was no less than 15cm.

e. The E-field probe conversion factors were determined as follows:

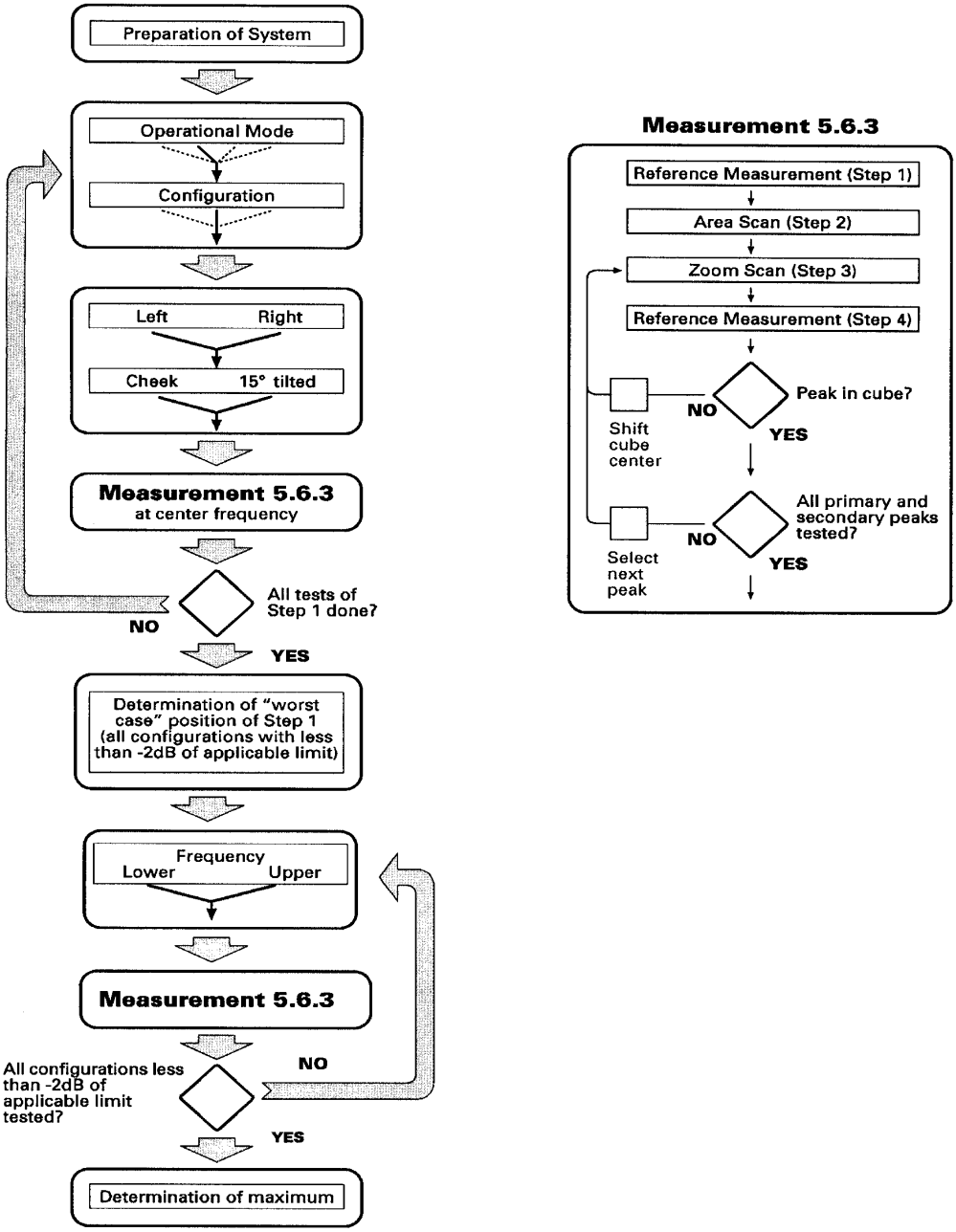
- In brain and muscle tissue between 750MHz and 1GHz, the conversion factor decreases approximately 1.3% per 100MHz frequency increase.
- In brain and muscle tissue between 1.6GHz and 2GHz, the conversion factor decreases approximately 1% per 100MHz frequency increase.

f. The 1800MHz probe conversion factors used for the SAR evaluation were 5.78 for head and 5.36 for body. The manufacturer's specified probe conversion factors at 1900MHz are 5.66 and 5.25 for head and body respectively. An evaluation of the highest SAR values for the EUT using 1900MHz probe conversion factors increases the overall SAR for head and body by approximately 2%, which is less than the uncertainty of the probe conversion factors and considerably less then the overall uncertainty of the entire system.



Device Positioning & Reference Point (Body SAR)

EVALUATION PROCEDURES (Cont.)



Flow Chart of the recommended practices and procedures per IEEE Std 1528 (Draft) [see reference 5]

7.0 SYSTEM VALIDATION

Prior to the assessment, the system was verified in the planar section of the SAM phantom using an 1800MHz dipole. A forward power of 250mW was applied to the dipole, and the system was verified to a tolerance of ±10%. The applicable verification is as follows (see Appendix B for validation test plot):

Dipole Validation Kit	Target SAR 1g (w/kg)	Measured SAR 1g (w/kg)	Fluid Temperature	Validation Date
D1800V2	9.66	9.78	≈23.0 °C	02/05/02

8.0 TISSUE PARAMETERS

The dielectric parameters of the fluids were verified prior to the SAR evaluation using an 85070C Dielectric Probe Kit and an 8753E Network Analyzer. The dielectric parameters of the fluid are as follows:

BRAIN TISSUE PARAMETERS - DIPOLE VALIDATION & EUT EVALUATION			
Equivalent Tissue	**Dielectric Constant** e_r	**Conductivity** s **(mho/m)**	r **(Kg/m^3)**
1800MHz Brain (Target)	40.0 ±5%	1.40 ±5%	1000
1800MHz Brain (Measured: 02/05/02)	39.5	1.40	1000

BODY TISSUE PARAMETERS - EUT EVALUATION			
Equivalent Tissue	**Dielectric Constant** e_r	**Conductivity** s **(mho/m)**	r **(Kg/m^3)**
1800MHz Body (Target)	53.3 ±5%	1.52 ±5%	1000
1800MHz Body (Measured: 02/05/02)	53.5	1.52	1000

9.0 SIMULATED TISSUES

The 1800MHz brain and muscle mixtures consist of Glycol-monobutyl, water, and salt. The fluid was prepared according to standardized procedures, and measured for dielectric parameters (permitivity and conductivity).

TISSUE MIXTURE - DIPOLE VALIDATION & EUT EVALUATION		
INGREDIENT	**1800 MHz Brain Mixture (Validation & EUT Evaluation)**	**1800 MHz Body Mixture (EUT Evaluation)**
Water	54.90 %	69.91 %
Glycol Monobutyl	44.92 %	29.96 %
Salt	0.18 %	0.13 %

10.0 SAR SAFETY LIMITS

EXPOSURE LIMITS	SAR (W/Kg)	
	(General Population / Uncontrolled Exposure Environment)	**(Occupational / Controlled Exposure Environment)**
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1 g of tissue)	1.60	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

Notes: 1. Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.

2. Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.

11.0 ROBOT SYSTEM SPECIFICATIONS

Specifications

POSITIONER:	Stäubli Unimation Corp. Robot Model: RX60L
Repeatability:	0.02 mm
No. of axis:	6

Data Acquisition Electronic (DAE) System

Cell Controller	
Processor:	Pentium III
Clock Speed:	450 MHz
Operating System:	Windows NT
Data Card:	DASY3 PC-Board
Data Converter	
Features:	Signal Amplifier, multiplexer, A/D converter, and control logic
Software:	DASY3 software
Connecting Lines:	Optical downlink for data and status info. Optical uplink for commands and clock

PC Interface Card

Function:	24 bit (64 MHz) DSP for real time processing Link to DAE3 16-bit A/D converter for surface detection system serial link to robot direct emergency stop output for robot

E-Field Probe

Model:	ET3DV6
Serial No.:	1590
Construction:	Triangular core fiber optic detection system
Frequency:	10 MHz to 6 GHz
Linearity:	± 0.2 dB (30 MHz to 3 GHz)

Phantom

Type:	SAM V4.0C
Configuration:	Left Head, Right Head, Planar Section
Shell Material:	Fiberglass
Thickness:	2.0 ±0.1 mm
Volume:	Approx. 20 liters

12.0 SAM PHANTOM V4.0C

The SAM phantom V4.0C is a fiberglass shell phantom with a 2.0 mm shell thickness for left and right head and flat planar area integrated in a wooden table. The shape of the fiberglass shell corresponds to the phantom defined by SCC34-SC2. The device holder positions are adjusted to the standard measurement positions in the three sections.

SAM Phantom V4.0C

13.0 DEVICE HOLDER

The DASY3 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.

Device Holder

14.0 PROBE SPECIFICATION (ET3DV6)

Construction:	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g. glycol)
Calibration:	In air from 10 MHz to 2.5 GHz In brain simulating tissue at frequencies of 900 MHz and 1.8 GHz (accuracy ± 8%)
Frequency:	10 MHz to >6 GHz; Linearity: ±0.2 dB (30 MHz to 3 GHz)
Directivity:	±0.2 dB in brain tissue (rotation around probe axis) ±0.4 dB in brain tissue (rotation normal to probe axis)
Dynam. Rnge:	5 µW/g to >100 mW/g; Linearity: ±0.2 dB
Srfce. Detect.	±0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces
Dimensions:	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm
Application:	General dosimetry up to 3 GHz Compliance tests of mobile phone

ET3DV6 E-Field Probe

15.0 TEST EQUIPMENT LIST

SAR MEASUREMENT SYSTEM		
EQUIPMENT	***SERIAL NO.***	***DATE CALIBRATED***
DASY3 System -Robot -ET3DV6 E-Field Probe -300MHz Validation Dipole -450MHz Validation Dipole -900MHz Validation Dipole -1800MHz Validation Dipole -2450MHz Validation Dipole -SAM Phantom V4.0C	 599396-01 1590 135 136 054 247 150 N/A	 N/A Mar 2001 Oct 2001 Oct 2001 June 2001 June 2001 Oct 2001 N/A
85070C Dielectric Probe Kit	N/A	N/A
Gigatronics 8652A Power Meter -Power Sensor 80701A -Power Sensor 80701A	1835272 1833535 1833542	Oct 2001 Jan 2002 Jan 2002
E4408B Spectrum Analyzer	US39240170	Nov 2001
8594E Spectrum Analyzer	3543A02721	Mar 2001
8753E Network Analyzer	US38433013	Nov 2001
8648D Signal Generator	3847A00611	Aug 2001
5S1G4 Amplifier Research Power Amplifier	26235	N/A

16.0 MEASUREMENT UNCERTAINTIES

Error Description	Uncertainty Value ±%	Probability Distribution	Divisor	c_i 1g	Standard Uncertainty ±% (1g)	v_i or v_{eff}
Measurement System						
Probe calibration	± 4.4	Normal	1	1	± 4.4	∞
Axial isotropy of the probe	± 4.7	Rectangular	√3	$(1-c_p)$	± 1.9	∞
Spherical isotropy of the probe	± 9.6	Rectangular	√3	(c_p)	± 3.9	∞
Spatial resolution	± 0.0	Rectangular	√3	1	± 0.0	∞
Boundary effects	± 5.5	Rectangular	√3	1	± 3.2	∞
Probe linearity	± 4.7	Rectangular	√3	1	± 2.7	∞
Detection limit	± 1.0	Rectangular	√3	1	± 0.6	∞
Readout electronics	± 1.0	Normal	1	1	± 1.0	∞
Response time	± 0.8	Rectangular	√3	1	± 0.5	∞
Integration time	± 1.4	Rectangular	√3	1	± 0.8	∞
RF ambient conditions	± 3.0	Rectangular	√3	1	± 1.7	∞
Mech. constraints of robot	± 0.4	Rectangular	√3	1	± 0.2	∞
Probe positioning	± 2.9	Rectangular	√3	1	± 1.7	∞
Extrap. & integration	± 3.9	Rectangular	√3	1	± 2.3	∞
Test Sample Related						
Device positioning	± 6.0	Normal	0.89	1	± 6.7	12
Device holder uncertainty	± 5.0	Normal	0.84	1	± 5.9	8
Power drift	± 5.0	Rectangular	√3		± 2.9	∞
Phantom and Setup						
Phantom uncertainty	± 4.0	Rectangular	√3	1	± 2.3	∞
Liquid conductivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid conductivity (measured)	± 10.0	Rectangular	√3	0.6	± 3.5	∞
Liquid permittivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Combined Standard Uncertainty					± **13.6**	
Expanded Uncertainty (k=2)					± **27.1**	

The divisor for device positioning uncertainty and holder uncertainty are based on the procedure defined in IEEE Std 1528 (draft) (see reference [5]), or based on the degrees of freedom for each error source.

For estimation of Device Positioning Uncertainty (divisor=0.89) 12 different devices were used (see last column - i.e. degrees of freedom). The corresponding k_p factor for v_{eff}=12 is 2.23, therefore the divisor is 2/2.23=0.89.

For estimation of Device Holder Uncertainty (divisor=0.84) 8 different devices were used (see last column - i.e. degrees of freedom). The corresponding k_p factor for v_{eff}=8 is 2.37, therefore the divisor is 2/2.37=0.84.

17.0 REFERENCES

[1] ANSI, ANSI/IEEE C95.1: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300 GHz, The Institute of Electrical and Electronics Engineers, Inc., New York, NY: 1992.

[2] Federal Communications Commission, “Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields”, OET Bulletin 65, Supplement C (Edition 01-01), FCC, Washington, D.C.: June 2001.

[3] Thomas Schmid, Oliver Egger, and Niels Kuster, “Automated E-field scanning system for dosimetric assessments”, IEEE Transaction on Microwave Theory and Techniques, Vol. 44, pp. 105 - 113: January 1996.

[4] Niels Kuster, Ralph Kastle, and Thomas Schmid, “Dosimetric evaluation of mobile communications equipment with know precision”, IEICE Transactions of Communications, vol. E80-B, no. 5, pp. 645 – 652: May 1997.

[5] IEEE Standards Coordinating Committee 34, Std 1528, DRAFT Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques: Draft, December 2001.

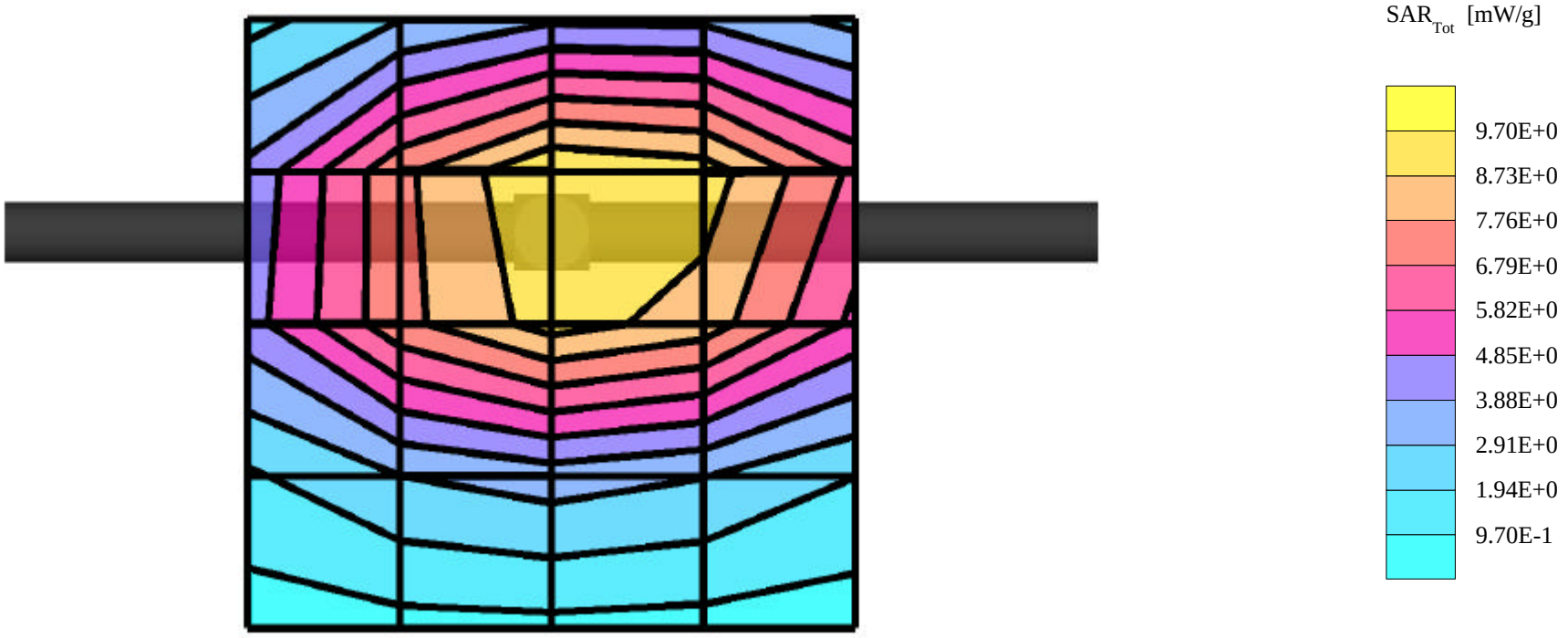
APPENDIX A - SAR MEASUREMENT DATA

APPENDIX B - DIPOLE VALIDATION

Dipole 1800 MHz

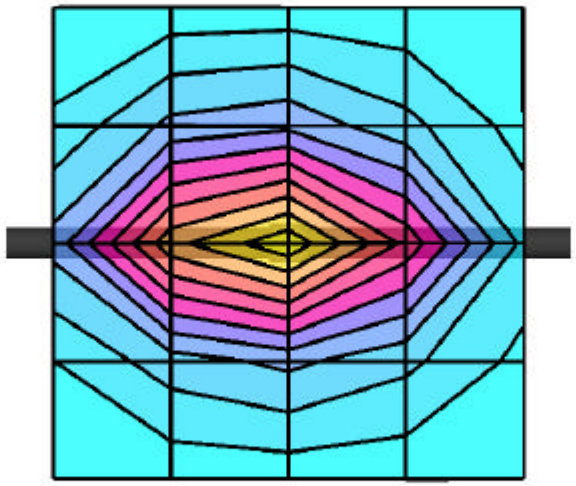
SAM Phantom; Flat Section
Probe: ET3DV6 - SN1590; ConvF(5.78,5.78,5.78); Crest factor: 1.0; 1800 MHz Brain: σ = 1.40 mho/m ε_r = 39.5 ρ = 1.00 g/cm^3
Cube 5x5x7: Peak: 18.9 mW/g, SAR (1g): 9.78 mW/g, SAR (10g): 4.95 mW/g, (Worst-case extrapolation)
Penetration depth: 7.7 (7.3, 8.6) [mm]
Powerdrift: 0.02 dB

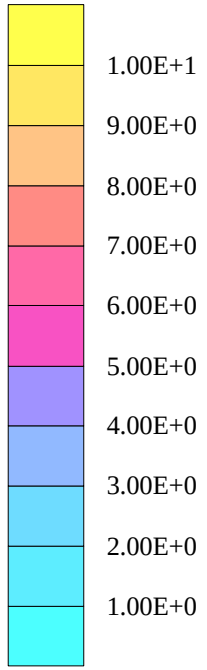
1800MHz Dipole Validation
Date: February 5, 2002
Conducted Power: 250 mW



Validation Dipole D1800V2 SN:247, d = 10 mm

Frequency: 1800 MHz; Antenna Input Power: 250 [mW]
Generic Twin Phantom; Flat Section; Grid Spacing:Dx = 15.0, Dy = 15.0, Dz = 10.0
Probe: ET3DV6 - SN1507; ConvF(5.57,5.57,5.57); Crest factor: 1.0; IEEE1528 1800 MHz : σ = 1.36 mho/m ε_r = 40.0 ρ = 1.00 g/cm^3
Cubes (2): Peak: 18.2 mW/g ± 0.04 dB, SAR (1g): 9.66 mW/g ± 0.03 dB, SAR (10g): 5.02 mW/g ± 0.03 dB, (Worst-case extrapolation)
Penetration depth: 8.2 (7.6, 9.4) [mm]
Powerdrift: -0.01 dB





APPENDIX C - PROBE CALIBRATION

Probe ET3DV6

SN:1590

Manufactured:	March 19, 2001
Calibrated:	March 26, 2001

Calibrated for System DASY3

DASY3 - Parameters of Probe: ET3DV6 SN:1590

Sensitivity in Free Space

NormX	**1.77**	$\mu V/(V/m)^2$
NormY	**1.91**	$\mu V/(V/m)^2$
NormZ	**1.67**	$\mu V/(V/m)^2$

Diode Compression

DCP X	**100**	mV
DCP Y	**100**	mV
DCP Z	**100**	mV

Sensitivity in Tissue Simulating Liquid

Head **450 MHz** e_r **= 43.5 ± 5%** s **= 0.87 ± 10% mho/m**

ConvF X	**7.36**	extrapolated	Boundary effect:	
ConvF Y	**7.36**	extrapolated	Alpha	**0.29**
ConvF Z	**7.36**	extrapolated	Depth	**2.72**

Head **900 MHz** e_r **= 42 ± 5%** s **= 0.97 ± 10% mho/m**

ConvF X	**6.83**	± 7% (k=2)	Boundary effect:	
ConvF Y	**6.83**	± 7% (k=2)	Alpha	**0.37**
ConvF Z	**6.83**	± 7% (k=2)	Depth	**2.48**

Head **1500 MHz** e_r **= 40.4 ± 5%** s **= 1.23 ± 10% mho/m**

ConvF X	**6.13**	interpolated	Boundary effect:	
ConvF Y	**6.13**	interpolated	Alpha	**0.47**
ConvF Z	**6.13**	interpolated	Depth	**2.17**

Head **1800 MHz** e_r **= 40 ± 5%** s **= 1.40 ± 10% mho/m**

ConvF X	**5.78**	± 7% (k=2)	Boundary effect:	
ConvF Y	**5.78**	± 7% (k=2)	Alpha	**0.53**
ConvF Z	**5.78**	± 7% (k=2)	Depth	**2.01**

Sensor Offset

Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.2 ± 0.2**	mm

DASY3 - Parameters of Probe: ET3DV6 SN: 1590

Body **450 MHz** e_r **= 56.7 ± 5%** σ **= 0.94 ± 10% mho/m**

ConvF X	**7.23**	extrapolated
ConvF Y	**7.23**	extrapolated
ConvF Z	**7.23**	extrapolated

Body **900 MHz** e_r **= 55.0 ± 5%** σ **= 1.05 ± 10% mho/m**

ConvF X	**6.61**	± 7% (k=2)
ConvF Y	**6.61**	± 7% (k=2)
ConvF Z	**6.61**	± 7% (k=2)

Body **1500 MHz** e_r **= 54.0 ± 5%** σ **= 1.30 ± 10% mho/m**

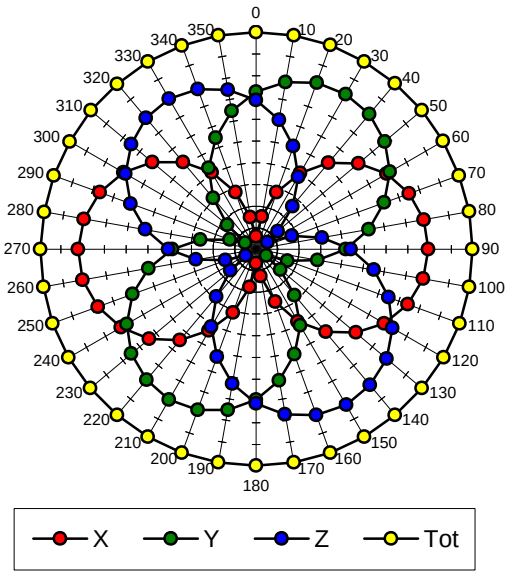
ConvF X	**5.78**	interpolated
ConvF Y	**5.78**	interpolated
ConvF Z	**5.78**	interpolated

Body **1800 MHz** e_r **= 53.3 ± 5%** σ **= 1.52 ± 10% mho/m**

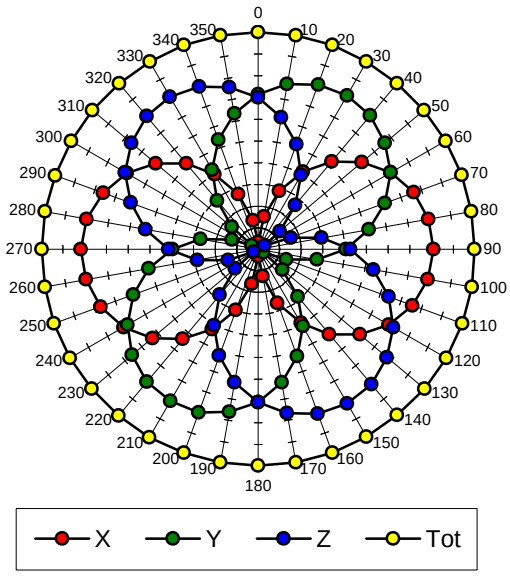
ConvF X	**5.36**	± 7% (k=2)
ConvF Y	**5.36**	± 7% (k=2)
ConvF Z	**5.36**	± 7% (k=2)

Receiving Pattern (ϕ , θ = 0°

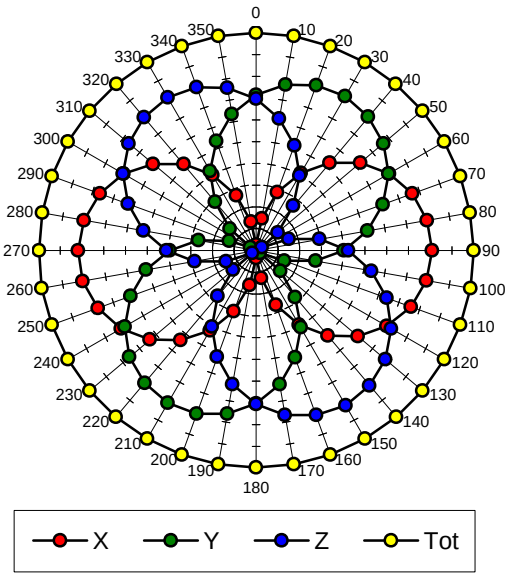
f = 30 MHz, TEM cell ifi110



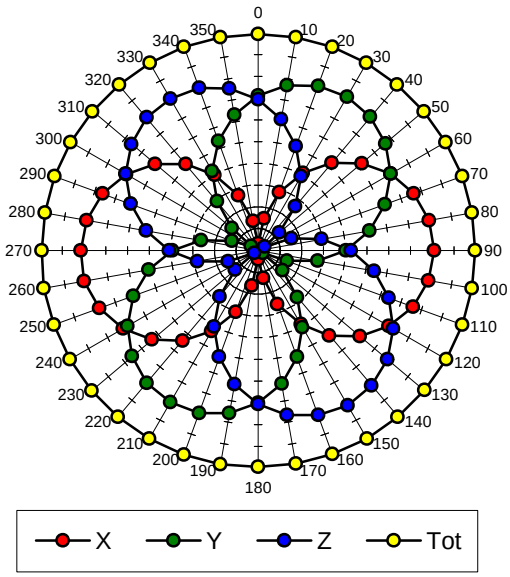
f = 100 MHz, TEM cell ifi110



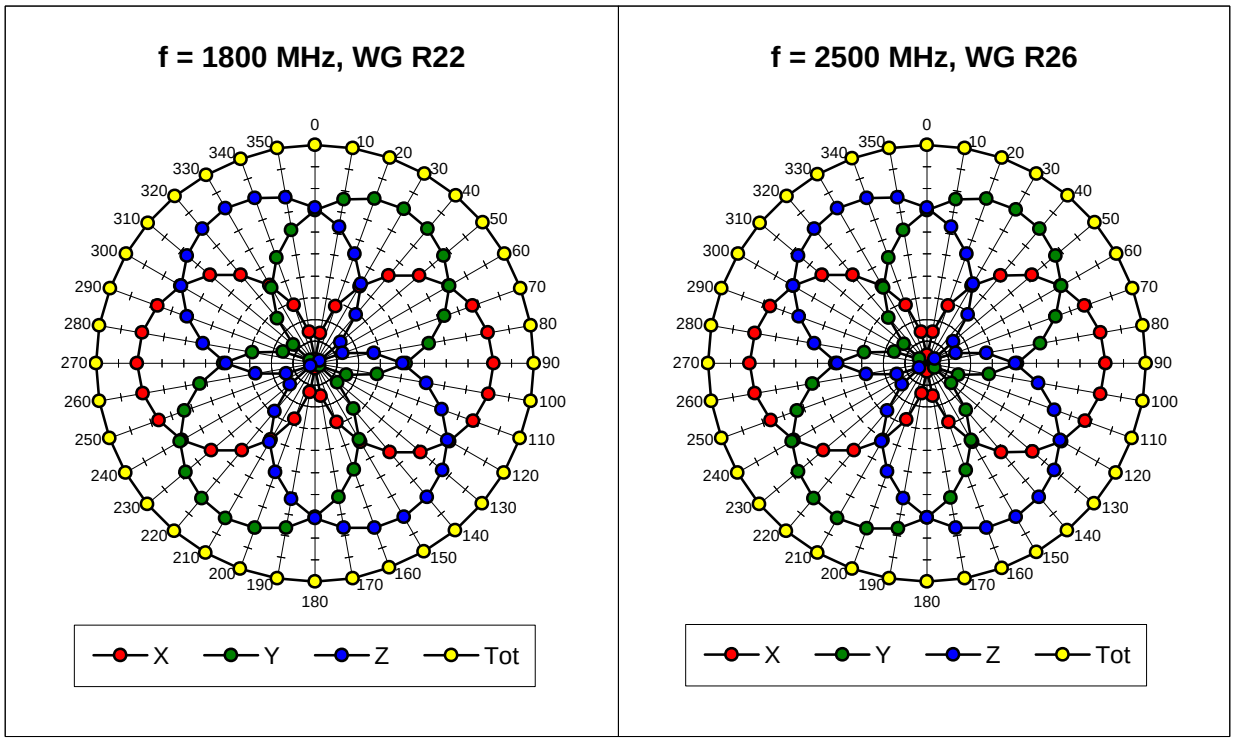
f = 300 MHz, TEM cell ifi110



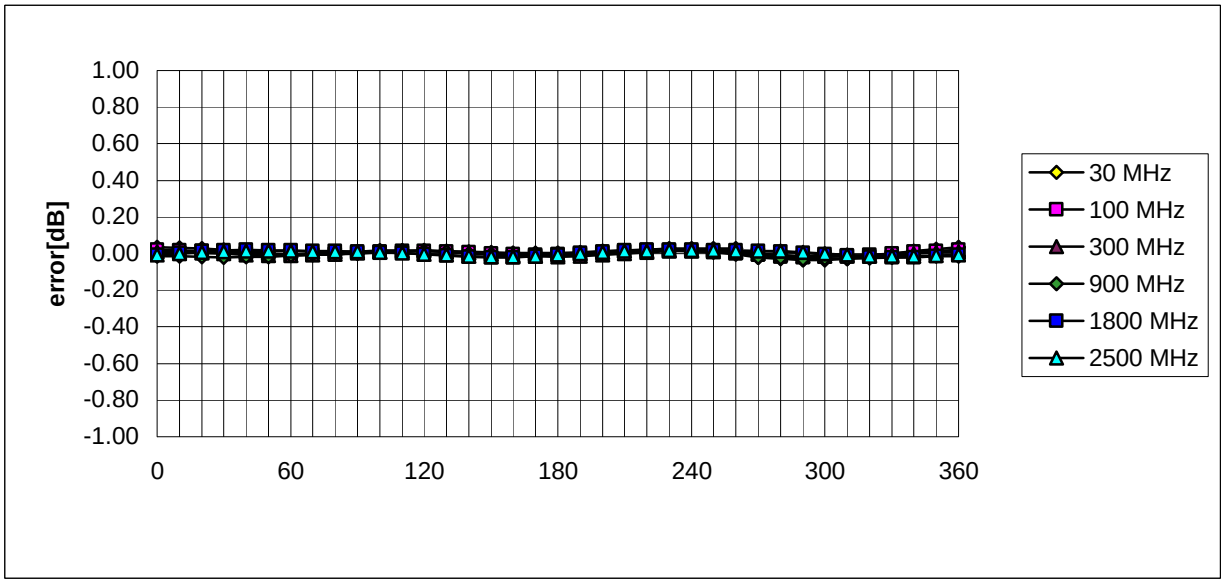
f = 900 MHz, TEM cell ifi110



ET3DV6 SN:1590

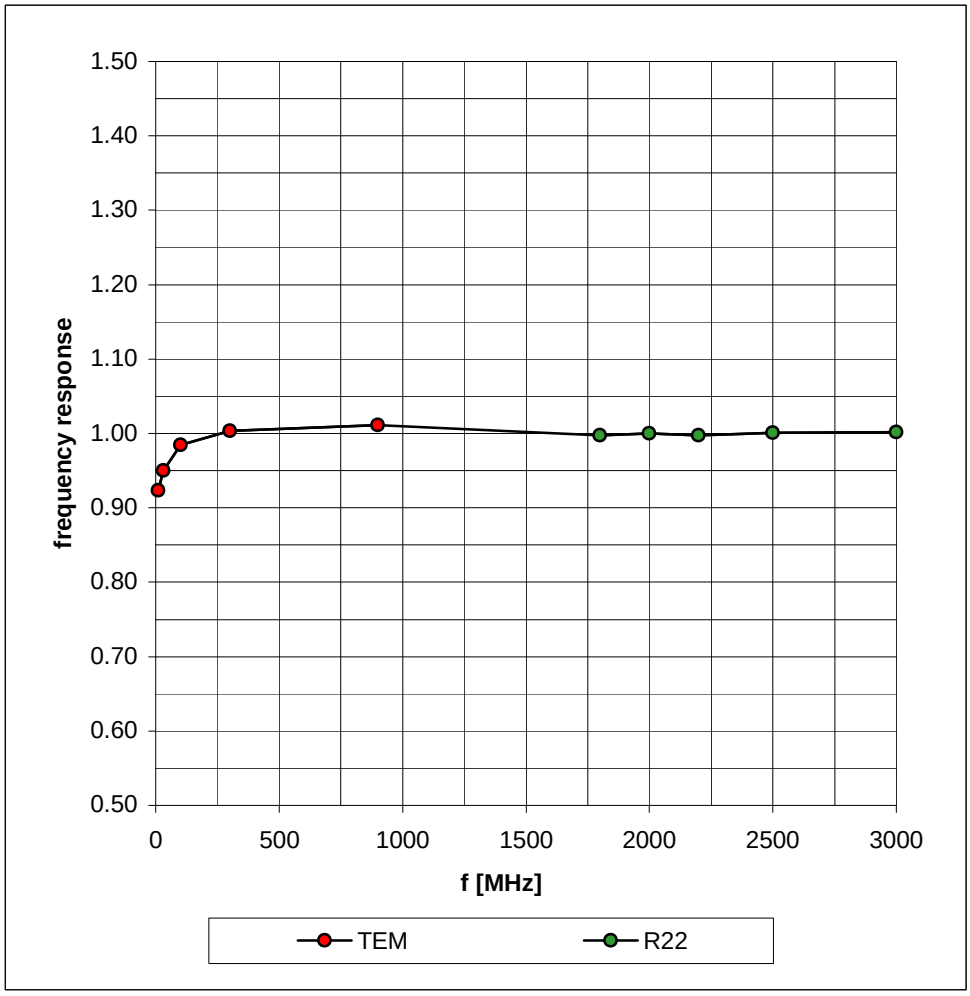


Isotropy Error (f), q = 0°



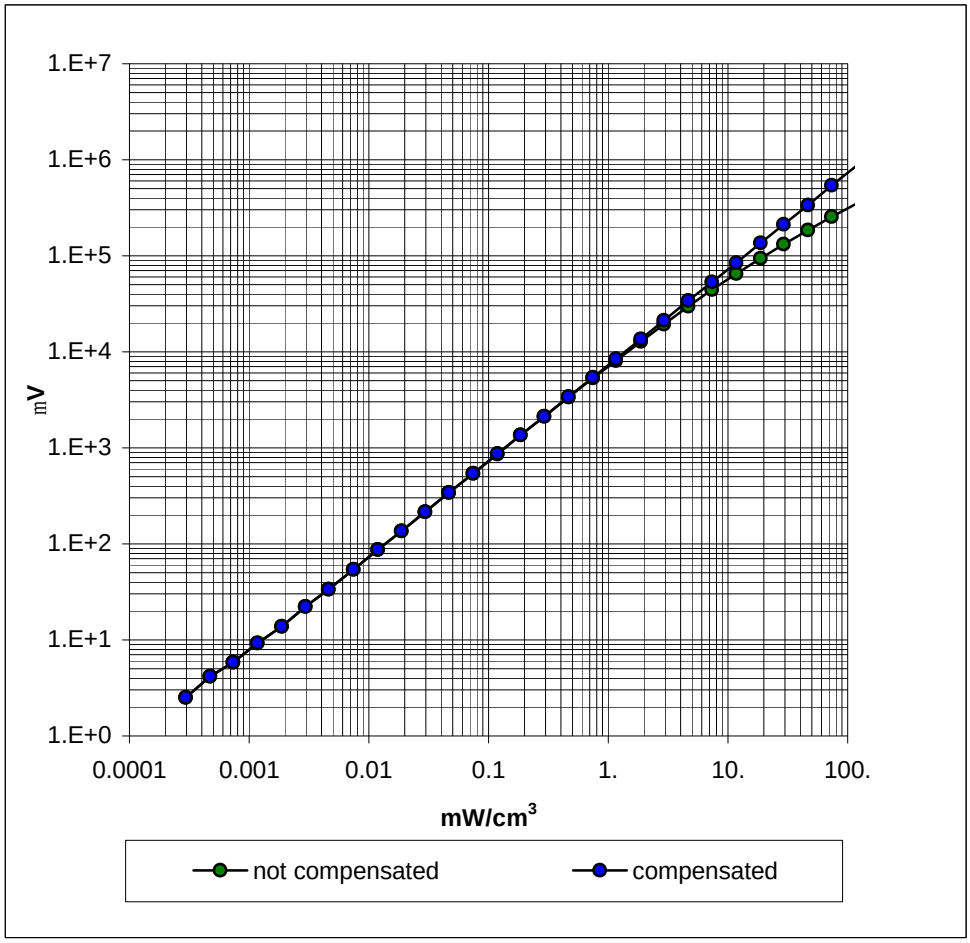
Frequency Response of E-Field

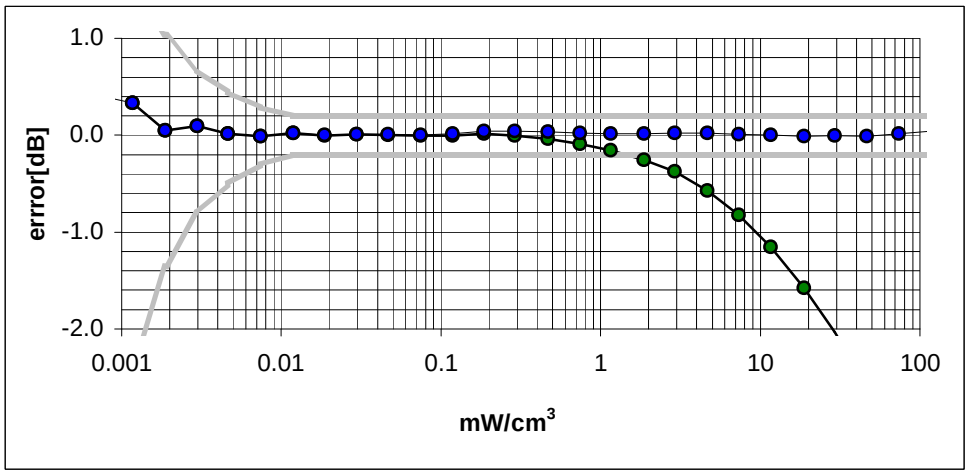
(TEM-Cell:ifi110, Waveguide R22)



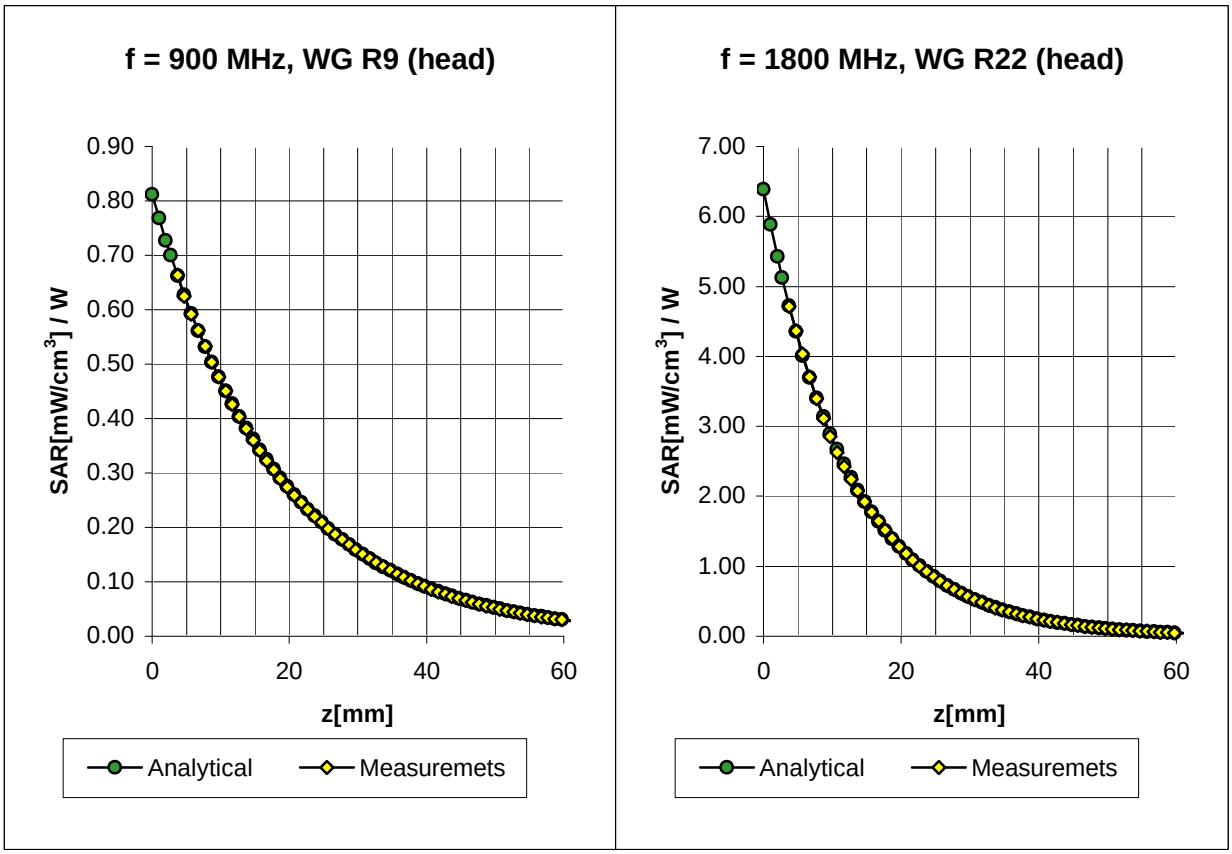
Dynamic Range f(SAR_{brain})

(TEM-Cell:ifi110)





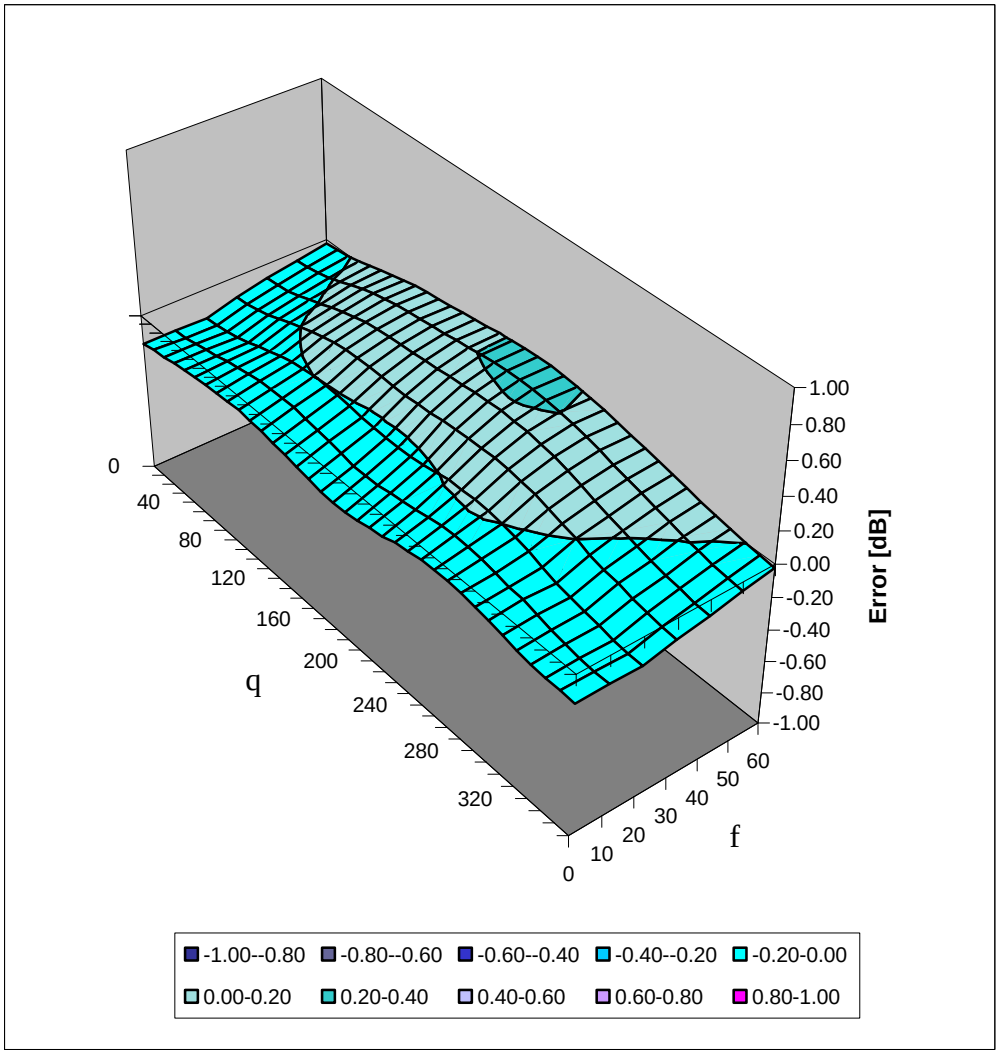
Conversion Factor Assessment



ET3DV6 SN:1590

Deviation from Isotropy in HSL

Error (q,f), f = 900 MHz



APPENDIX D - MEASURED LIQUID DIELECTRIC PARAMETERS

1800MHz System Validation & EUT Evaluation

Measured Liquid Dielectric Parameters (Brain)

February 5, 2002

Frequency	e'	e''
1.750000000 GHz	39.6735	13.9481
1.755000000 GHz	39.6442	13.9568
1.760000000 GHz	39.6271	13.9647
1.765000000 GHz	39.6110	13.9843
1.770000000 GHz	39.5871	13.9900
1.775000000 GHz	39.5725	13.9902
1.780000000 GHz	39.5522	14.0062
1.785000000 GHz	39.5317	14.0008
1.790000000 GHz	39.5164	14.0138
1.795000000 GHz	39.4972	14.0200
1.800000000 GHz	39.4783	14.0260
1.805000000 GHz	39.4650	14.0257
1.810000000 GHz	39.4363	14.0347
1.815000000 GHz	39.4145	14.0395
1.820000000 GHz	39.3898	14.0644
1.825000000 GHz	39.3632	14.0753
1.830000000 GHz	39.3519	14.0861
1.835000000 GHz	39.3507	14.1028
1.840000000 GHz	39.3399	14.1133
1.845000000 GHz	39.3177	14.1246
1.850000000 GHz	39.2980	14.1345
1.855000000 GHz	39.2826	14.1508
1.860000000 GHz	39.2549	14.1566
1.865000000 GHz	39.2438	14.1642
1.870000000 GHz	39.2142	14.1804
1.875000000 GHz	39.1996	14.1962
1.880000000 GHz	39.1756	14.2059
1.885000000 GHz	39.1486	14.2296
1.890000000 GHz	39.1278	14.2434
1.895000000 GHz	39.1188	14.2708
1.900000000 GHz	39.0945	14.2780
1.905000000 GHz	39.0682	14.2863
1.910000000 GHz	39.0472	14.2885
1.915000000 GHz	39.0231	14.3135
1.920000000 GHz	38.9949	14.3174

1800MHz EUT Evaluation

Measured Liquid Dielectric Parameters (Body)

February 5, 2002

Frequency	e'	e''
1.750000000 GHz	53.5984	15.1808
1.755000000 GHz	53.5847	15.1888
1.760000000 GHz	53.5583	15.2074
1.765000000 GHz	53.5434	15.2127
1.770000000 GHz	53.5427	15.2210
1.775000000 GHz	53.5196	15.2112
1.780000000 GHz	53.5038	15.2137
1.785000000 GHz	53.4907	15.2103
1.790000000 GHz	53.4852	15.2153
1.795000000 GHz	53.4575	15.2283
1.800000000 GHz	53.4542	15.2389
1.805000000 GHz	53.4271	15.2516
1.810000000 GHz	53.4217	15.2715
1.815000000 GHz	53.4250	15.2838
1.820000000 GHz	53.4052	15.2903
1.825000000 GHz	53.4020	15.3194
1.830000000 GHz	53.4038	15.3367
1.835000000 GHz	53.3866	15.3486
1.840000000 GHz	53.3770	15.3685
1.845000000 GHz	53.3755	15.3887
1.850000000 GHz	53.3564	15.4135
1.855000000 GHz	53.3564	15.4176
1.860000000 GHz	53.3397	15.4478
1.865000000 GHz	53.3222	15.4603
1.870000000 GHz	53.3078	15.4959
1.875000000 GHz	53.3008	15.5065
1.880000000 GHz	53.2738	15.5352
1.885000000 GHz	53.2494	15.5580
1.890000000 GHz	53.2294	15.5770
1.895000000 GHz	53.2094	15.6034
1.900000000 GHz	53.1912	15.6393
1.905000000 GHz	53.1766	15.6463
1.910000000 GHz	53.1506	15.6564
1.915000000 GHz	53.1111	15.6754
1.920000000 GHz	53.0876	15.6872

APPENDIX E - SAM PHANTOM CERTIFICATE OF CONFORMITY

Schmid & Partner
Engineering AG

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

Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 BA
Series No	TP-1002 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen Switzerland

Tests

The series production process used allows the limitation to test of first articles.
Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards	Liquid type HSL 1800 and others according to the standard.	Pre-series, First article

Standards

[1] CENELEC EN 50361
[2] IEEE P1528-200x draft 6.5
[3] IEC PT 62209 draft 0.9
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

Date 18.11.2001

Signature / Stamp Schmid & Partner Engineering AG
Zeughausstrasse 43, CH-8004 Zurich
Tel. +41 1 245 97 00, Fax +41 1 245 97 79