SAR

Test Report

For

Product Type	**:**	**GSM900/DCS1800/PCS1900 GSM/GPRS mobile phone**
Model Number	**:**	**HERC1(M580)**
Brand Name	**:**	**BenQ**
Applicant	**:**	**BenQ Corporation**
Address	**:**	**157 Shan-Ying Road, Gueishan Taoyuan 333 Taiwan, R.O.C.**

Report No.:SF-NLS00294

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Test Report Certificate

Applicant	:	**BenQ Corporation**
Address	:	**157 Shan-Ying Road, Gueishan Taoyuan 333 Taiwan, R.O.C.**
Product Type	:	**GSM900/DCS1800/PCS1900 GSM/GPRS mobile phone**
Model Number	:	**HERC1(M580)**
Brand Name	:	**BenQ**
Test Standard	:	**FCC OET65 Supplement C(Edition01-01)**
		IEEE1528:2003
Max SAR value	:	**PCS1900 Head SAR: 0.622W/Kg**
		PCS1900 Body SAR: 1.291W/Kg
Sample Received	:	**Aug. 15, 2005**
Test Date	:	**Aug. 26, 2005/ Oct. 21, 2005**

Test Engineer : Nicole Lin ; Date : Oct. 26, 2005

Documented By : Nicole Lin ; Date : Oct. 26 2005

Reviewed By : James Soong ; Date : 26, OCT, 2005

Approved By : James Soong ; Date : 26, OCT, 2005

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1. General Information

1.1 EUT Description

Product Name	GSM900/DCS1800/PCS1900 GSM/GPRS mobile phone
Trade Name	BenQ
Model No.	HERC1(M580)
IMEI No.	357032~4-00-XXXXXX
TX Frequency	1850MHz~1910MHz
RX Frequency	1930MHz~1990MHz
Max. Output Power (Conducted)	GSM Mode:29.94 dBm GPRS Mode:29.79 dBm
Antenna Type	Fixed, Internal
Device Category	Identical Prototype
RF Exposure Environment	Uncontrolled environment
Type of Modulation	GMSK
Hardware version	LPR-3-4-B
Software version	V0.18
Power Adapter / Changer	2E.11060.XXX(X=0~9, A~Z or blank) AC Input: 100V~240V, 50Hz~ 60Hz (5V/ 700mA)
Battery Pack	2C.2G0M0.101 (870Ah)
Other accessories	Earpiece:2C.43035.111
Applicant Type	ID

1.2 Test Environment

Ambient conditions refer to standard:

Items	Required
Temperature (°C)	18-25
Humidity (%RH)	30-70
Temperature deviate during the test	±2℃

1.3 Test Configuration

The Device was controlled by the base station simulator, and should be set to the maximum output power level. The communication between the device and base station should by air link.

Measurement should be performed on the lowest, middle, and highest channel for each position for HEAD SAR testing. If the SAR measured at the middle channels for each test configuration is at least 2.0dBm lower than the SAR limit, testing at the higher and lower channel is optional for such test configuration(s).

The Crest Factor should be 1 for system verification, and should be 8 for GSM link mode.

For the GPRS mode, the Crest Factor will be 4 for GPRS class 10 And should use 2 time slots to uplink.

For the peak value of each channel and position, turn the Bluetooth device on and off and confirm the highest SAR reading.

2. SAR Measurement System

2.1 ALSAS-10U System Description

ALSAS-10-U is fully compliant with the technical and scientific requirements of IEEE 1528, IEC 62209, CENELEC, ARIB, ACA, and the Federal Communications Commission. The system comprises of a six axes articulated robot which utilizes a dedicated controller.

ALSAS-10U uses the latest methodologies and FDTD ode ling to provide a platform which is repeatable with minimum uncertainty.

2.1.1 Applications

Predefined measurement procedures compliant with the guidelines of CENELEC, IEEE, IEC, FCC, etc are utilized during the assessment for the device. Automatic detection for all SAR maxima are embedded within the core architecture for the system, ensuring that peak locations used for centering the zoom scan are within a 1mm resolution and a 0.05mm repeatable position. System operation range currently available up-to 6 GHz in simulated tissue.

2.1.2 Area Scans

Area scans are defined prior to the measurement process being executed with a user defined variable spacing between each measurement point (integral) allowing low uncertainty measurements to be conducted. Scans defined for FCC applications utilize a 10mm² step integral, with 1mm interpolation used to locate the peak SAR area used for zoom scan assessments.

Where the system identifies multiple SAR peaks (which are within 25% of peak value) the system will provide the user with the option of assessing each peak location individually for zoom scan averaging.

2.1.3 Zoom Scan (Cube Scan Averaging)

The averaging zoom scan volume utilized in the ALSAS-10U software is in the shape of a cube and the side dimension of a 1 g or 10 g mass is dependent on the density of the liquid representing the simulated tissue. A density of 1000 kg/m³ is used to represent the head and body tissue density and not the phantom liquid density, in order to be consistent with the definition of the liquid dielectric properties, i.e. the side length of the 1 g cube is 10mm, with the side length of the 10 g cube 21,5mm.

When the cube intersects with the surface of the phantom, it is oriented so that 3 vertices touch the surface of the shell or the center of a face is tangent to the surface. The face of the cube closest to the surface is modified in order to conform to the tangent surface.

The zoom scan integer steps can be user defined so as to reduce uncertainty, but normal practice for typical test applications (For IEEE1528) utilize a physical step of 5X5X7, (8mmx8mmx5mm) providing a volume of 32mm in the X & Y axis, and 30mm in the Z-Axis.

2.1.4 ALSAS-10U Interpolation and Extrapolation Uncertainty

The overall uncertainty for the methodology and algorithms the used during the SAR calculation was evaluated using the data from IEEE 1528 based on the example f3 algorithm:

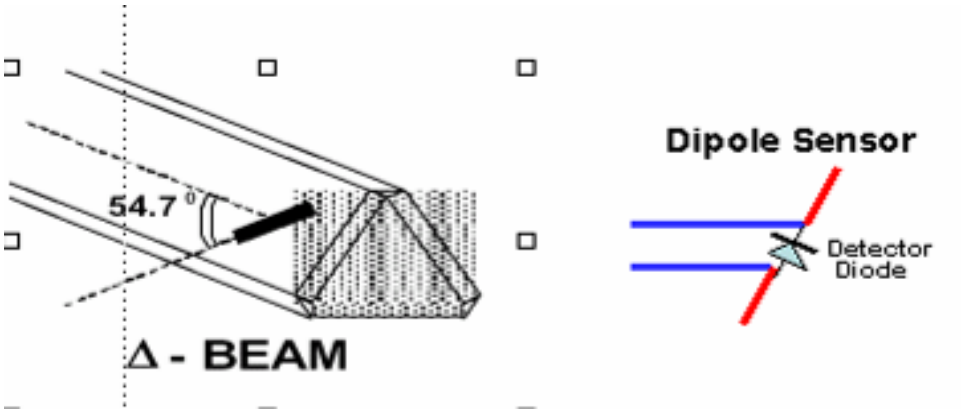
$$f_3(x,y,z) = A\frac{a^2}{\frac{a^2}{4} + x'^2 + y'^2}\cdot\left(e^{-\frac{2z}{a}} + \frac{a^2}{2(a+2z)^2}\right)$$

2.2 Isotropic E-Field Probe

The isotropic E-Field probe has been fully calibrated and assessed for isotropic, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change. A number of methods are used for calibrating probes, and these are outlined in the table below:

Calibration Frequency	Air Calibration	Tissue Calibration
1900MHz	TEM Cell	Temperature

The E-Field probe utilizes a triangular sensor arrangement as detailed in the diagram below:



SAR is assessed with a calibrated probe which moves at a default height of 5mm from the center of the diode, which is mounted to the sensor, to the phantom surface (in the Z Axis). The 5mm offset height has been selected so as to minimize any resultant boundary effect due to the probe being in close proximity to the phantom surface.

The following algorithm is an example of the function used by the system for linearization of the output from the probe when measuring complex modulation schemes.

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

2.2.1 Isotropic E-Field Probe Specification

Calibration in Air	Frequency Dependent Below 2GHz Calibration in air performed in a TEM Cell Above 2GHz Calibration in air performed in waveguide
Sensitivity	0.70 μV/(V/m)² to 0.85 μV/(V/m)²
Dynamic Range	0.0005 W/kg to 100W/kg
Isotropic Response	Better than 0.2dB
Diode Compression point (DCP)	Calibration for Specific Frequency
Probe Tip Radius	< 5mm
Sensor Offset	1.56 (+/- 0.02mm)
Probe Length	290mm
Video Bandwidth	@ 500 Hz: 1dB @1.02 KHz: 3dB
Boundary Effect	Less than 2% for distance greater than 2.4mm
Spatial Resolution	Diameter less than 5mm Compliant with Standards

2.3 Boundary Detection Unit and Probe Mounting Device

ALSAS-10U incorporates a boundary detection unit with a sensitivity of 0.05mm for detecting all types of surfaces. The robust design allows for detection during probe tilt (probe normalize) exercises, and utilizes a second stage emergency stop. The signal electronics are fed directly into the robot controller for high accuracy surface detection in lateral and axial detection modes (X, Y, & Z).

The probe is mounted directly onto the Boundary Detection unit for accurate tooling and displacement calculations controlled by the robot kinematics. The probe is connect to an isolated probe interconnect where the output stage of the probe is fed directly into the amplifier stage of the Daq-Paq

2.4 Daq-Paq (Analog to Digital Electronics)

ALSAS-10U incorporates a fully calibrated Daq-Paq (analog to digital conversion system) which has a 4 channel input stage, sent via a 2 stage auto-set amplifier module. The input signal is amplified accordingly so as to offer a dynamic range from 5μV to 800mV. Integration of the fields measured is carried out at board level utilizing a Co-Processor which then sends the measured fields down into the main computational module in digitized form via an RS232 communications port. Probe linearity and duty cycle compensation is carried out within the main Daq-Paq module.

ADC	12 Bit
Amplifier Range	20mV to 200mV and 150mV to 800mV
Field Integration	Local Co-Processor utilizing proprietary integration algorithms
Number of Input Channels	4 in total 3 dedicated and 1 spare
Communication	Packet data via RS232

2.5 Axis Articulated Robot

ALSAS-10U utilizes a six axis articulated robot, which is controlled using a Pentium based real-time movement controller. The movement kinematics engine utilizes proprietary (Thermo CRS) interpolation and extrapolation algorithms, which allow full freedom of movement for each of the six joints within the working envelope. Utilization of joint 6 allows for full probe rotation with a tolerance better than 0.05mm around the central axis.

Robot/Controller Manufacturer	Thermo CRS
Number of Axis	Six independently controlled axis
Positioning Repeatability	0.05mm
Controller Type	Single phase Pentium based C500C
Robot Reach	710mm
Communication	RS232 and LAN compatible

2.6 ALSAS Universal Workstation

ALSAS Universal workstation allows for repeatability and fast adaptability. It allows users to do calibration, testing and measurements using different types of phantoms with one set up, which significantly speeds up the measurement process.

2.7 Universal Device Positioner

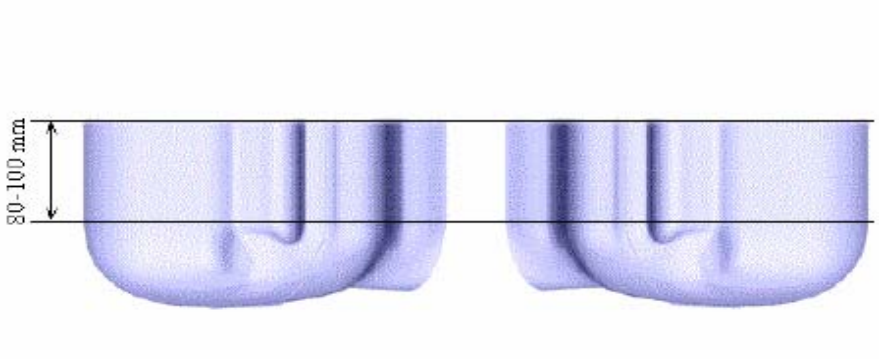
The universal device positioner allow complete freedom of movement of the EUT. Developed to hold a EUT in a free-space scenario any additional loading attributable to the material used in the construction of the positioner has been eliminated. Repeatability has been enhanced through the linear scales which form the design used to indicate positioning for any given test scenario in all major axes. A 15° tilt indicator is included for the of aid cheek to tilt movements for head SAR analysis. Overall uncertainty for measurements have been reduced due to the design of the Universal device positioner, which allows positioning of a device in as near to a free-space scenario as possible, and by providing the means for complete repeatability.

2.8 Phantom Types

The ALSAS-10U allows the integration of multiple phantom types. SAM Phantoms fully compliant with IEEE 1528, Universal Phantom, and Universal Flat.

2.8.1 APREL SAM Phantoms

The SAM phantoms developed using the IEEE SAM CAD file. They are fully compliant with the requirements for both IEEE 1528 and FCC Supplement C. Both the left and right SAM phantoms are interchangeable, transparent and include the IEEE 1528 grid with visible NF and MB lines.



2.8.2 APREL Laboratories Universal Phantom

The Universal Phantom is used on the ALSAS-10U as a system validation phantom. The Universal Phantom has been fully validated both experimentally from 800MHz to 6GHz and numerically using XFDTD numerical software. The shell thickness is 2mm overall, with a 4mm spacer located at the NF/MB intersection providing an overall thickness of 6mm in line with the requirements of IEEE-1528.

The design allows for fast and accurate measurements, of handsets, by allowing the conservative SAR to be evaluated at on frequency for both left and right head experiments in one measurement.

3. Tissue Simulating Liquid

3.1 The composition of the tissue simulating liquid

INGREDIENT (% Weight)	1900MHz Head	1900MHz Body
Water	54.9%	40.5%
Salt	0.18%	0.50%
Sugar	-	58.0%
HEC	-	0.50%
Preventol	-	0.50%
DGBE	44.92%	-

3.2 Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using APREL Dielectric Probe Kit and Anritsu MS4623B Vector Network Analyzer

Tissue Simulate Measurement				
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp. [°C]
		ε_r	σ [s/m]	
1900 MHz Head	Reference result ± 5% window	40 38 to 42	1.4 1.33 to 1.47	N/A
	Aug. 26, 2005	39.65	1.47	22.5
1850 MHz	Lowest	39.72	1.431	
1880 MHz	Middle	39.63	1.458	
1910MHz	Highest	39.65	1.470	
1900 MHz Body	Reference result ± 5% window	53.3 50.635 to 55.965	1.52 1.444 to 1.596	N/A
	Aug. 26, 2005	54.4	1.591	22.4
1850 MHz	Lowest	54.87	1.520	
1880 MHz	Middle	54.61	1.581	
1910MHz	Highest	54.34	1.593	

3.3 Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in P1528.

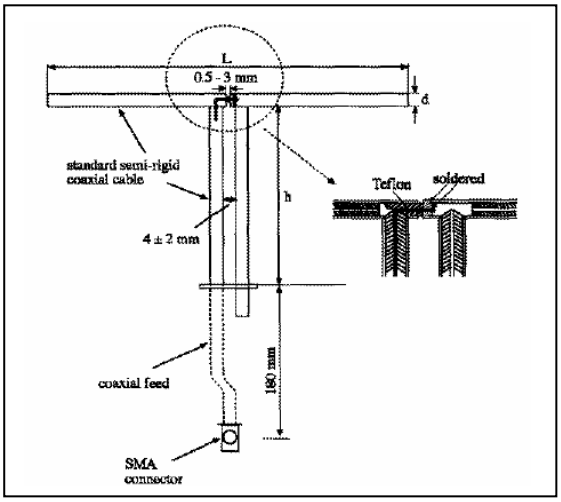
Target Frequency	Head		Body	
(MHz)	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3)

4. SAR Measurement Procedure

4.1 SAR System Validation

4.1.1 Validation Dipoles



The dipoles used is based on the IEEE-1528 standard, and is complied with mechanical and electrical specifications in line with the requirements of both IEEE and FCC Supplement C. the table below provides details for the mechanical and electrical specifications for the dipoles.

Frequency	L (mm)	h (mm)	d (mm)
1900MHz	68.0	39.5	3.6

4.1.2 Validation Result

System Performance Check at 1900MHz

Validation Kit: ASL-D-1900-S-2

Frequency [MHz]	Description	SAR [w/kg] 1g	SAR [w/kg] 10g	Tissue Temp. [°C]
1900 MHz	Reference result ± 5% window	39.7 37.715 to 41.685	20.5 19.475 to 21.525	N/A
	Aug. 26, 2005	38.219	19.597	22.5
	Oct. 21, 2005	38.387	19.982	22.5

Note: All SAR values are normalized to 1W forward power.

4.2 Arrangement Assessment Setup

4.2.1 Test Positions of Device Relative to Head

This specifies exactly two test positions for the handset against the head phantom, the "cheek" position and the "tilted" position. The handset should be tested in both positions on the left and right sides of the SAM phantom. If the handset construction is such that it cannot be positioned using the handset positioning procedures described in 4.2.2.1 and 4.2.2.2 to represent normal use conditions (e.g., asymmetric handset), alternative alignment procedures should be considered with details provided in the test report.

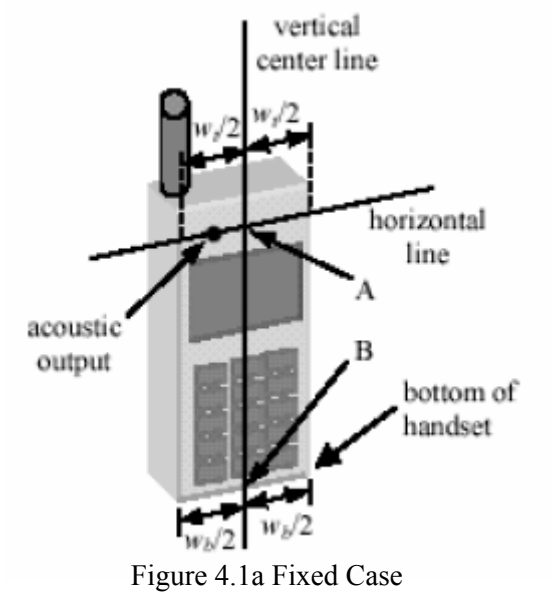


Figure 4.1a Fixed Case

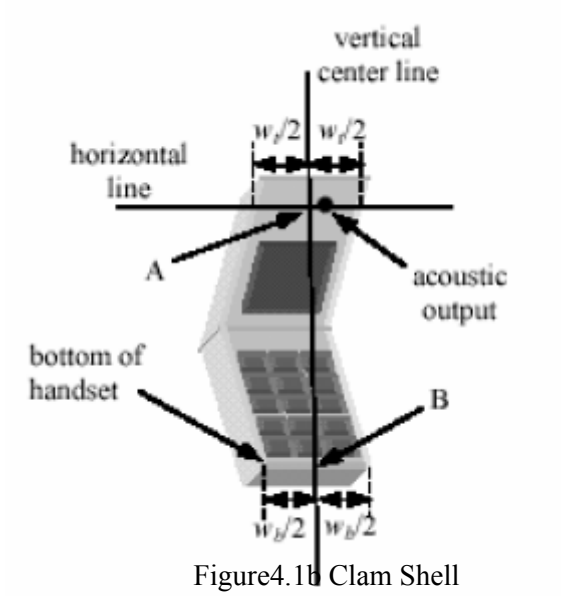


Figure4.1b Clam Shell

4.2.1.1 Definition of the "Cheek" Position

The "cheek" position is defined as follows:

a. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece, open the cover. (If the handset can also be used with the cover closed both configurations must be tested.)

b. Define two imaginary lines on the handset: the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset: the midpoint of the width *wt* of the handset at the level of the acoustic output (point A on Figures 4.1a and 4.1b), and the midpoint of the width w_b of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Figure 4.1a). The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output. However, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset (see Figure 4.1b), especially for clamshell handsets, handsets with flip pieces, and other irregularly-shaped handsets.

c. Position the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 4.2), such that the plane defined by the vertical center line and the horizontal line of the handset is approximately parallel to the sagittal plane of the phantom.
d. Translate the handset towards the phantom along the line passing through RE and LE until the handset touches the pinna.
e. While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to MB-NF including the line MB (called the reference plane).
f. Rotate the handset around the vertical centerline until the handset (horizontal line) is symmetrical with respect to the line NF.
g. While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE and maintaining the handset contact with the pinna, rotate the handset about the line NF until any point on the handset is in contact with a phantom point below the pinna (cheek). See Figure 4.2 the physical angles of rotation should be noted.

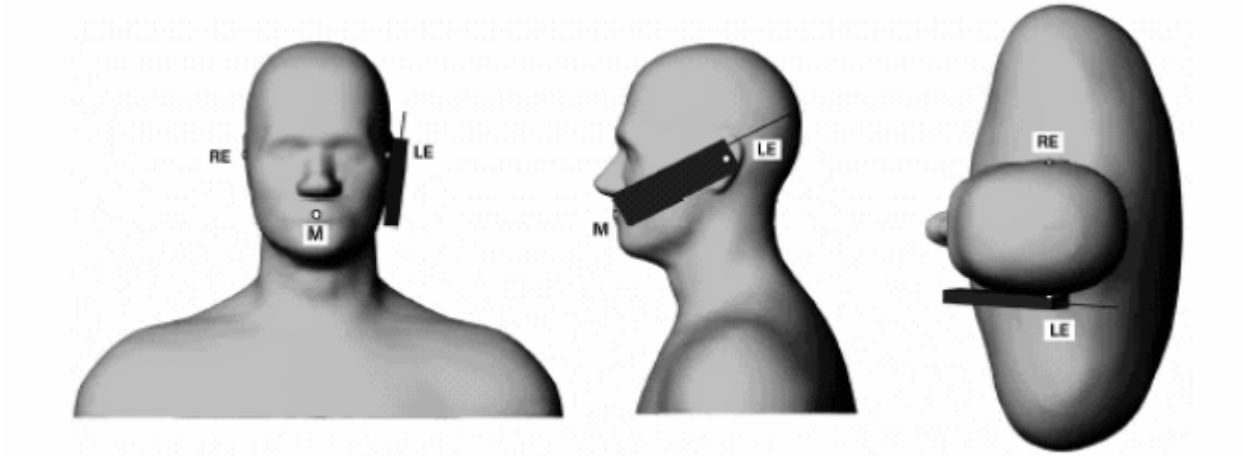


Figure 4.2 – Phone position 1, “cheek” or “touch” position.

4.2.1.2 Definition of the “Tilted” Position

The “tilted” position is defined as follows:

a. Repeat steps (a) – (g) of 4.2.1.1 to place the device in the “cheek position.”
b. While maintaining the orientation of the handset move the handset away from the pinna along the line passing through RE and LE in order to enable a rotation of the handset by 15 degrees.
c. Rotate the handset around the horizontal line by 15 degrees.

d. While maintaining the orientation of the handset, move the handset towards the phantom on a line passing through RE and LE until any part of the handset touches the ear. The tilted position is obtained when the contact is on the pinna. If the contact is at any location other than the pinna (e.g., the antenna with the back of the phantom head), the angle of the handset should be reduced. In this case, the tilted position is obtained if any part of the handset is in contact with the pinna as well as a second part of the handset is contact with the phantom (e.g., the antenna with the back of the head).

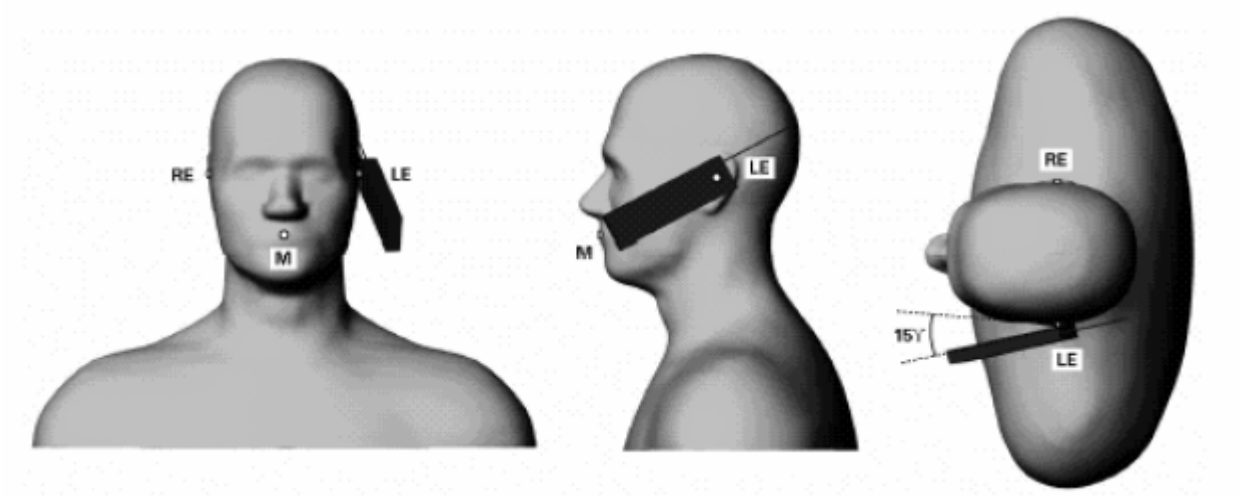


Figure 4.3 – Phone position 2, "tilted" position.

4.2.2 Test Positions for body-worn

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations. A separation distance of 1.5 cm between the back of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances. Other separation distance may be use, but not exceed 2.5 cm.

4.3 Procedure for Assessing the Spatial Peak SAR

Step 1: Power Reference Measurement:

The measurements should be taken at a reference point to monitor power changes during the testing. The reference point should be at a distance of less than 10mm from liquid-shell interface in the vicinity of the ERP 10mm.

Step2: Area scan:

If the peak is at the border of the area, the area scan should be repeated using an enlarged area when possible.

Step3: Zoom Scan:

If the Spatial peak volume touches any side wall of the zoom volume, Step 3

should be repeated with the new center of the zoom scan located at the previous determined spatial peak.

Step 4: Power Reference Measurement:

The measurement should be measured at exactly the same location as step 1. If the power has changed by more than 5%, the measurement should be repeated or the entire differences shall be added to the assessed value.

4.4 SAR Measurement Method

The ALSAS-10U calculates SAR using the following equation,

$$SAR = \frac{\sigma |E|^2}{\rho}$$

σ: represents the simulated tissue conductivity

ρ: represents the tissue density

5. SAR Exposure Limits

SAR assessments have been made in line with the requirements of IEEE-1528, FCC Supplement C, and comply with ANSI/IEEE C95.1-1992 "Uncontrolled Environments" limits. These limits apply to a location which is deemed as "Uncontrolled Environment" which can be described as a situation where the general public may be exposed to an RF source with no prior knowledge or control over their exposure.

Limits for General Population/Uncontrolled Exposure (W/kg)

Type Exposure	**Uncontrolled Environment Limit**
Spatial Peak SAR (1g cube tissue for brain or body)	**1.6 W/kg**
Spatial Peak SAR (whole body)	**0.08W/Kg**
Spatial Peak SAR (10g for hands, feet, ankles and wrist)	**4W/Kg**

6. Test Equipment List

Instrument	Manufacturer	Model No.	Serial No.	Last Calibration
Data Acquisition Package	Aprel	ALS-DAQ-PAQ-3	110-00212	Jul. 2005
Miniature E-Field Probe	Aprel	ALS-E020	260	Feb. 2005
Miniature E-Field Probe	Aprel	ALS-E020	261	Feb. 2005
Validation Dipole @ 1900Mhz	Aprel	ALS-D-1900-S-2	210-00702	Feb. 2005
Probe Mounting Device and Boundary Detection Sensor System	Aprel	ALS-PMDPS-3	120-00261	N/A
Dielectric Probe Kit	Aprel	ALS-PR-DIEL	260-00952	N/A
Universal Work Station	Aprel	ALS-UWS	100-00152	N/A
Device Holder 2.0	Aprel	ALS-H-E-SET-2	170-00502	N/A
Left Ear SAM Phantom	Aprel	ALS-P-SAM-L	130-00303 130-00304	N/A
Right Ear SAM Phantom	Aprel	ALS-P-SAM-R	140-00353 140-00354	N/A
Universal Phantom	Aprel	ALS-P-UP-1	150-00403 150-00404	N/A
Aprel Dipole Spacer	Aprel	ALS-DS-U	250-00902	N/A
SAR Software	Aprel	ALSAS-10	Ver. 2.1.0	N/A
CRS C500C Controller	Thermo	ALS-C500	RCF0432270	N/A
CRF F3 Robot	Thermo	ALS-F3	RAF0439250	N/A
Power Amplifier	Mini-Circuit	ZHL-42	D020705	N/A
Directional Coupler	Agilent	778D-012	50658	N/A
Radio Communication Analyzer	Anritsu	MT8820A	6200374504	Apr. 2005
GSM MS Tester	JRC	NJZ-917BJ	ED49581	Mar. 2004
Vector Network	Anritsu	MS4623B	050401	Mar. 2005
Signal Generator	Anritsu	MG3691A	044909	Mar. 2005
Power Meter	Anritsu	ML2487A	6K00002328	Mar. 2005
Wide Bandwidth Sensor	Anritsu	MA2491	032006	Mar. 2005

Note: All equipment's calibrated period base on the spec.

7. Measurement Uncertainty

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	c_i^1 (1-g)	c_i^1 (10-g)	Standard Uncertainty (1-g) %	Standard Uncertainty (10-g) %
Measurement System							
Probe Calibration	3.5	normal	1	1	1	3.5	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	1.5	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	$\sqrt{cp}$	4.4	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Readout Electronics	1.0	normal	1	1	1	1.0	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	1	0.2	0.2
Restriction							
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	1	2.1	2.1
Test Sample Positioning	4.0	normal	1	1	1	4.0	4.0
Device Holder Uncertainty	2.0	normal	1	1	1	2.0	2.0
Drift of Output Power	2.1	rectangular	$\sqrt{3}$	1	1	1.2	1.2
Phantom and Setup							
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	1	2.0	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	0.5	2.0	1.4
Liquid Conductivity(meas.)	5.0	normal	1	0.7	0.5	3.5	2.5
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7	1.4
Liquid Permittivity(meas.)	0.9	normal	1	0.6	0.5	0.5	0.4
Combined Uncertainty		RSS				10.0	9.5
Combined Uncertainty (coverage factor=2)		Normal(k=2)				19.9	19.0

8. Test Results

8.1.1 SAR Test Results Summary for GSM 1900MHz Head

SAR Measurement						
Ambient Temperature (°C) : 21.6±1			Relative Humidity (%): 58			
Liquid Temperature (°C) : 22.5 ±1			Depth of Liquid (cm):>15			
Product: GSM900/DCS1800/PCS1900 GSM/GPRS Mobile Phone						
Test Mode: GSM 1900						
Max. Conducted Power: 33dBm						
Test Position	Antenna	Frequency		**SAR** 1g	**SAR** 10g	Limit
Head	Position	Channel	MHz	(W/kg)	(W/kg)	(W/kg)
Right-Cheek	Internal	512	1850.2	0.505	0.372	1.6
Right-Cheek	Internal	661	1880	0.572	0.436	1.6
Right-Cheek	Internal	810	1909.8	0.611	0.413	1.6
Right-Tilted	Internal	512	1850.2	-	-	1.6
Right-Tilted	Internal	661	1880	0.267	0.241	1.6
Right-Tilted	Internal	810	1909.8	-	-	1.6
Left-Cheek	Internal	512	1850.2	0.566	0.402	1.6
Left-Cheek	Internal	661	1880	0.6	0.406	1.6
Left-Cheek	Internal	810	1909.8	0.622	0.435	1.6
Left-Tilted	Internal	512	1850.2	-	-	1.6
Left-Tilted	Internal	661	1880	0.231	0.207	1.6
Left-Tilted	Internal	810	1909.8	-	-	1.6
Actual Conducted power: 512:29.94dBm; 661:29.44dBm; 810:29.44dBm.						

Double check the Bluetooth effect for Head SAR value:

Test Position	Bluetooth	Frequency		**SAR** 1g	**SAR** 10g	Limit
Head	Status	Channel	MHz	(W/kg)	(W/kg)	(W/kg)
Right-Cheek	Off	810	1909.8	0.611	0.413	1.6
Right-Cheek	On	810	1909.8	0.585	0.406	1.6

8.1.2 SAR Test Results Summary for GSM 1900MHz Body

SAR Measurement						
Ambient Temperature (°C) : 21.6±1		Relative Humidity (%): 58				
Liquid Temperature (°C) : 22.4 ±1		Depth of Liquid (cm):>15				
Product: GSM900/DCS1800/PCS1900 GSM/GPRS Mobile Phone						
Test Mode: GSM 1900						
Max. Conducted Power: 33dBm						
Test Position	Antenna	Frequency		**SAR** 1g	**SAR** 10g	Limit
Body Worn	Position	Channel	MHz	(W/kg)	(W/kg)	(W/kg)
15mm	Internal	512	1850.2	0.586	0.436	1.6
15mm	Internal	661	1880	0.684	0.493	1.6
15mm	Internal	810	1909.8	0.707	0.49	1.6
Actual Conducted power: 512:29.94dBm; 661:29.44dBm; 810:29.44dBm.						
Test Mode: GPRS 1900						
Max. Conducted Power: 33dBm						
Test Position	Antenna	Frequency		**SAR** 1g	**SAR** 10g	Limit
Body Worn	Position	Channel	MHz	(W/kg)	(W/kg)	(W/kg)
15mm	Internal	512	1850.2	1.236	0.821	1.6
15mm	Internal	661	1880	1.261	0.913	1.6
15mm	Internal	810	1909.8	1.291	0.838	1.6
Actual Conducted power: 512:29.79dBm; 661:29.34dBm; 810:29.4dBm.						

Double check the Bluetooth effect for Body SAR value:

Test Mode	Bluetooth	Frequency		**SAR** 1g	**SAR** 10g	Limit
@15mm	Status	Channel	MHz	(W/kg)	(W/kg)	(W/kg)
GPRS	Off	661	1880	1.261	0.913	1.6
GPRS	On	661	1880	1.247	0.909	1.6

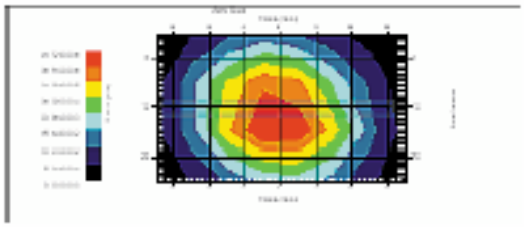
8.2 SAR System Validation Report

8.2.1 for 1900MHz Validation

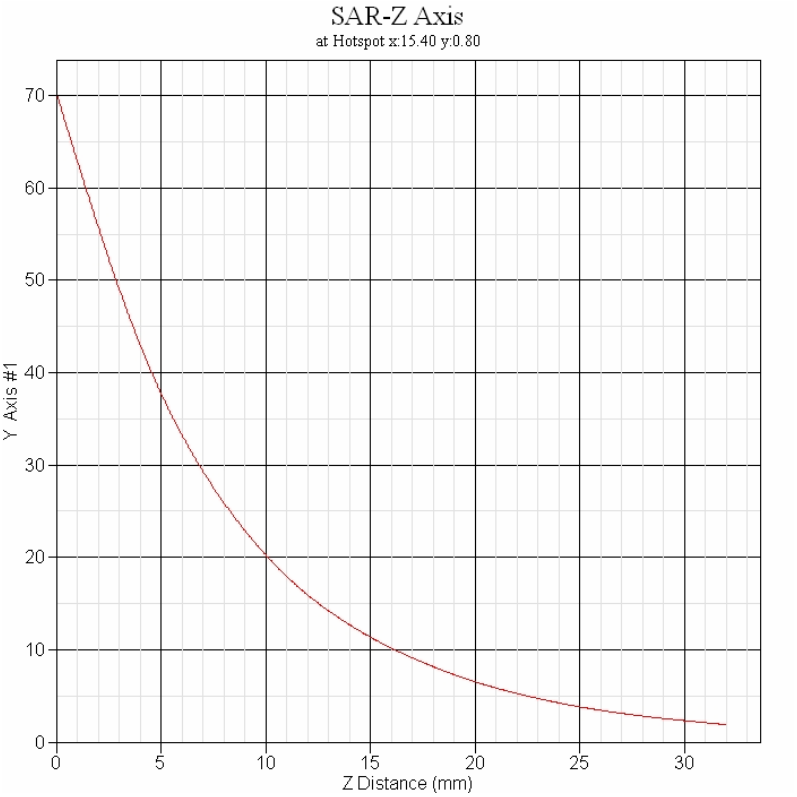
SAR Test Report

```
Report Date        : 30-Aug-2005
By Operator        : BenQ
Measurement Date   : 26-Aug-2005
Starting Time      : 26-Aug-2005  09:56:58 AM
End Time           : 26-Aug-2005  10:13:10 AM
Scanning Time      : 972 secs

Product Data
Device Name        : ALS-D-1900-S-2
Serial No.         : 210-00702
Type               : Dipole
Model              : 210-00702
Frequency          : 1900.00 MHz
Max. Transmit Pwr  : 1 W
Drift Time         : 0 min(s)
Length             : 68 mm
Width              : 3.6 mm
Depth              : 3.6 mm
Antenna Type       :  Internal
Orientation        : Touch
Power Drift-Start  : 21.230 W/kg
Power Drift-Finish: 20.795 W/kg
Power Drift (%)    : -2.052
Picture            : (No picture)

Phantom Data
Name               : APREL-Uni
Type               : Uni-Phantom
Size (mm)          : 280 x 280 x 200
Serial No.         : User Define
Location           : Center
Description        : Uni-Phantom User Define

Tissue Data
Type               : HEAD
Serial No.         : 290-01101
Frequency          : 1900.00 MHz
Last Calib. Date   : 08-Feb-2005
Temperature        : 22.50 °C
Ambient Temp.      : 21.60 °C
Humidity           : 58.00 RH%
Epsilon            : 39.650 F/m
Sigma              : 1.470 S/m
Density            : 1000.00 kg/cu. m

Probe Data
Name               : Probe 260 - BenQ
Model              : E020
Type               : E-Field Triangle
Serial No.         : 260
Last Calib. Date   : 14-Feb-2005
Frequency          : 1900.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.7
Probe Sensitivity: 1.20  1.20  1.20   µV/(V/m)²
Compression Point: 95.00 mV
Offset             : 2.44 mm

Measurement Data
Crest Factor       : 1
Scan Type          : Complete
Tissue Temp.       : 22.50 °C
Ambient Temp.      : 21.60 °C
```

```
Set-up Date          : 26-Aug-2005
Set-up Time          : 9:52:51 AM
Area Scan            : 4x8x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan            : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position         : Touch
Separation           : 0
Channel              : Mid - 1900
```



```
1 gram SAR value     : 38.219 W/kg
10 gram SAR value    : 19.597 W/kg
Area Scan Peak SAR   : 41.727 W/kg
Zoom Scan Peak SAR   : 70.362 W/kg
```



SAR Test Report

```
Report Date        : 21-Oct-2005
By Operator        : BenQ
Measurement Date   : 21-Oct-2005
Starting Time      : 21-Oct-2005  08:31:27 AM
End Time           : 21-Oct-2005  08:46:57 AM
Scanning Time      : 886 secs

Product Data
Device Name        : ALS-D-1900-S-2
Serial No.         : 210-00702
Type               : Dipole
Model              : 210-00702
Frequency          : 1900.00 MHz
Max. Transmit Pwr  : 1 W
Drift Time         : 0 min(s)
Length             : 68.2 mm
Width              : 3.6 mm
Depth              : 3.6 mm
Antenna Type       :  Internal
Orientation        : Touch
Power Drift-Start  : 24.400 W/kg
Power Drift-Finish: 23.270 W/kg
Power Drift (%)    : -4.618
Picture            : (No picture)

Phantom Data
Name               : APREL-Uni
Type               : Uni-Phantom
Size (mm)          : 280 x 280 x 200
Serial No.         : User Define
Location           : Center
Description        : Uni-Phantom User Define

Tissue Data
Type               : HEAD
Serial No.         : 290-01101
Frequency          : 1900.00 MHz
Last Calib. Date   : 10-Oct-2005
Temperature        : 22.50 °C
Ambient Temp.      : 21.60 °C
Humidity           : 58.00 RH%
Epsilon            : 39.650 F/m
Sigma              : 1.470 S/m
Density            : 1000.00 kg/cu. m

Probe Data
Name               : Probe 260 - BenQ
Model              : E020
Type               : E-Field Triangle
Serial No.         : 260
Last Calib. Date   : 14-Feb-2005
Frequency          : 1900.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.7
Probe Sensitivity: 1.20  1.20  1.20   µV/(V/m)²
Compression Point: 95.00 mV
Offset             : 2.44 mm

Measurement Data
Crest Factor       : 1
Scan Type          : Complete
Tissue Temp.       : 22.50 °C
Ambient Temp.      : 21.60 °C
Set-up Date        : 21-Oct-2005
```

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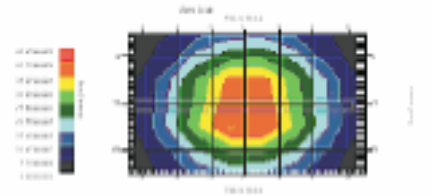
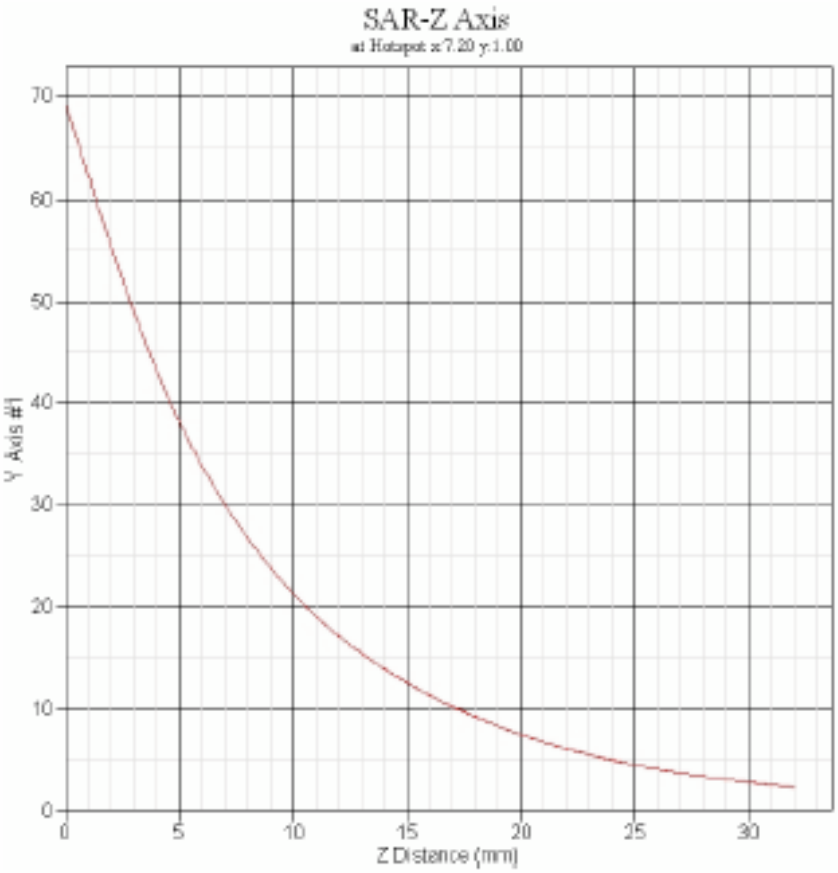
```
Set-up Time       : 08:12:51 AM
Area Scan         : 4x8x1 : Measurement x-10mm, y-10mm, z-4mm
Zoom Scan         : 5x5x8 : Measurement x-8mm, y-8mm, z-4mm

Other Data
DUT Position      : Touch
Separation        : 0
Channel           : 1900
```

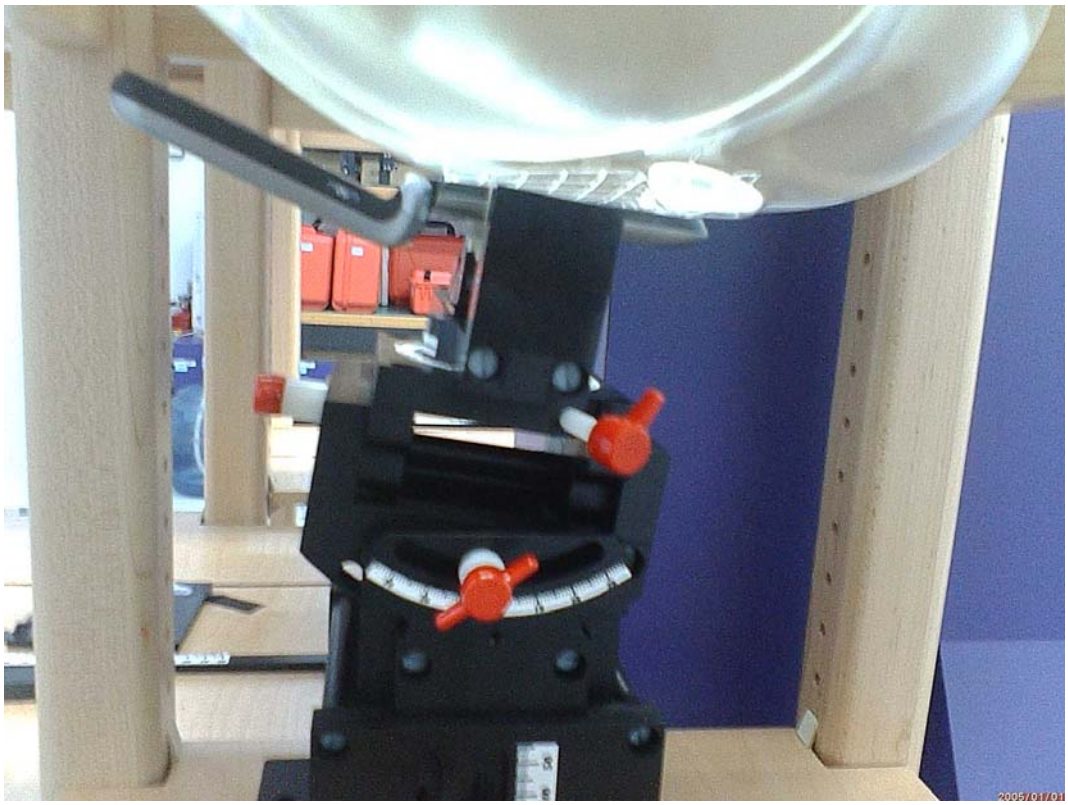


```
1 gram SAR value    : 38.387 W/kg
10 gram SAR value   : 19.982 W/kg
Area Scan Peak SAR  : 41.123 W/kg
Zoom Scan Peak SAR  : 69.361 W/kg
```



8.3 Test Setup Photographs

Right Head (EUT Cheek)

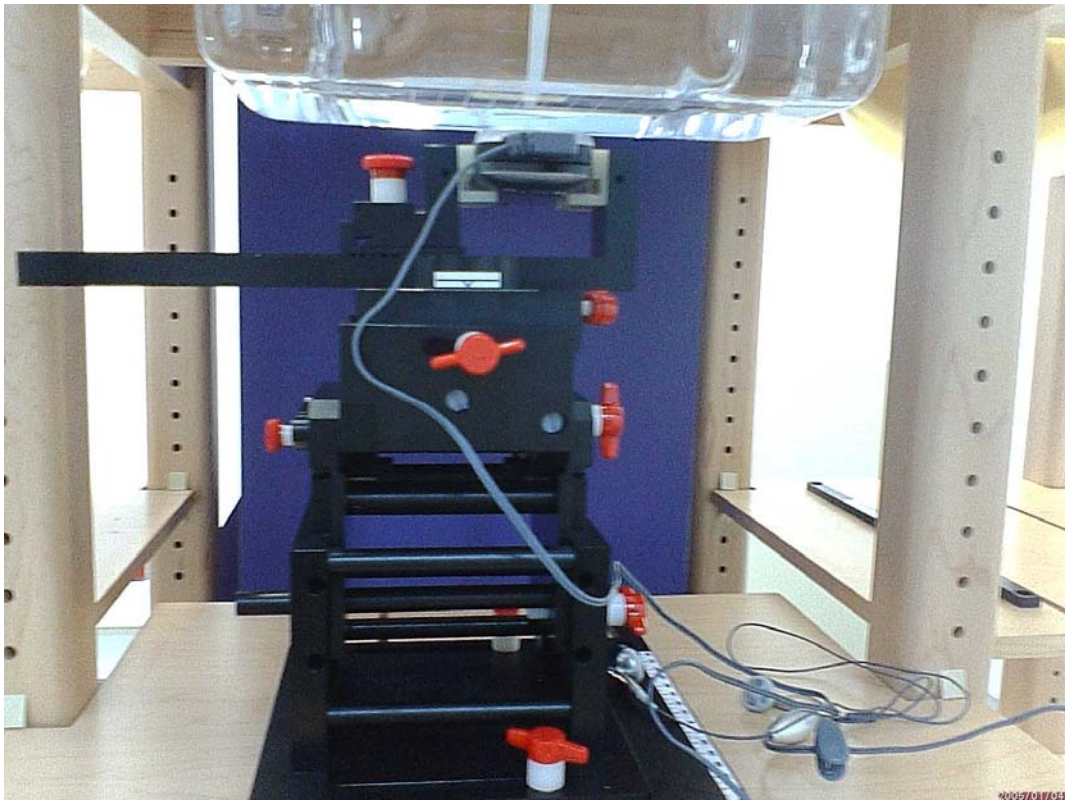


Right Head (EUT Tilted)

Left Head (EUT Cheek)

Left Head (EUT Tilted)

Body Worn



8.4 EUT Photographs

Front Open

Front Close

Rear open

Rear close

Right side

Left side

Attachment 1: Test plots and details

(Total 32 pages)

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SAR Test Report – Head Right Cheek Ch512

Report Date : 26-Oct-2005
By Operator : 123
Measurement Date : 26-Aug-2005
Starting Time : 26-Aug-2005 03:22:51 PM
End Time : 26-Aug-2005 03:37:42 PM
Scanning Time : 891 secs

Product Data
Device Name : M580
Serial No. : open front
Type : Clamshell Cell Phone
Model : M580
Frequency : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 160.48 mm
Width : 44.4 mm
Depth : 22.8 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.238 W/kg
Power Drift-Finish: 0.227 W/kg
Power Drift (%) : -4.507
Picture : C:\alsas\bitmap\M580-of.bmp

Phantom Data
Name : APREL-SAM Right Ear
Type : SAM-Right
Size (mm) : 280 x 280 x 280
Serial No. : User Define
Location : Right
Description : Right P-User Define

Tissue Data
Type : HEAD
Serial No. : 290-01101
Frequency : 1900.00 MHz
Last Calib. Date : 08-Feb-2005
Temperature : 22.50 °C
Ambient Temp. : 21.60 °C
Humidity : 58.00 RH%
Epsilon : 39.650 F/m
Sigma : 1.470 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : Probe 260 - BenQ
Model : E020
Type : E-Field Triangle
Serial No. : 260
Last Calib. Date : 14-Feb-2005
Frequency : 1900.00 MHz
Duty Cycle Factor: 8
Conversion Factor: 4.7
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 2.44 mm

Measurement Data
Crest Factor : 8
Scan Type : Complete
Tissue Temp. : 22.50 °C
Ambient Temp. : 21.60 °C
Set-up Date : 26-Aug-2005
Set-up Time : 11:17:58 AM
Area Scan : 5x5x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

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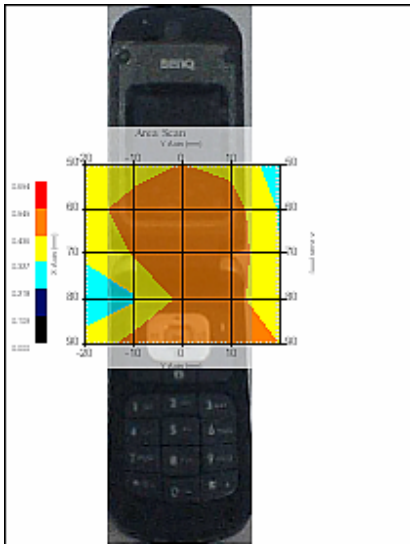
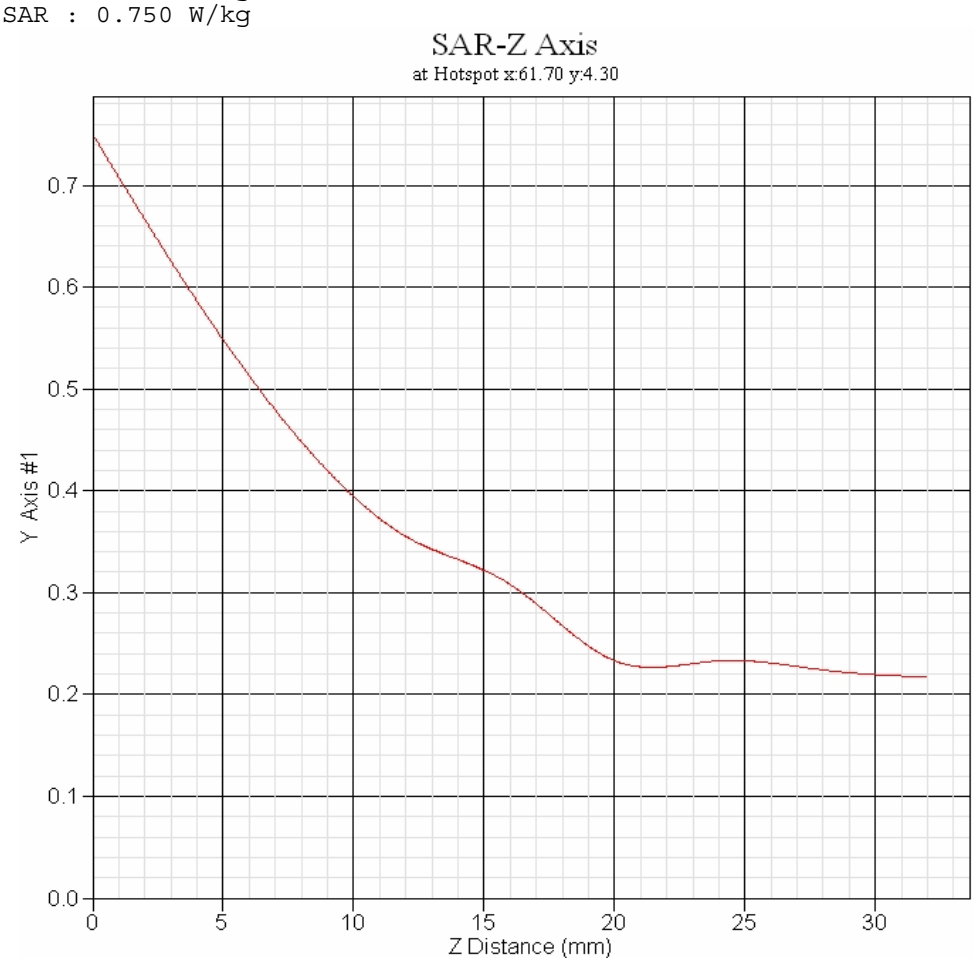
Other Data
DUT Position : Touch
Separation : 0
Channel : Low - 512



1 gram SAR value : 0.505 W/kg
10 gram SAR value : 0.372 W/kg
Area Scan Peak SAR : 0.545 W/kg
Zoom Scan Peak SAR : 0.750 W/kg



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SAR Test Report Head Right Cheek Ch661

Report Date : 26-Oct-2005
By Operator : 123
Measurement Date : 26-Aug-2005
Starting Time : 26-Aug-2005 03:05:31 PM
End Time : 26-Aug-2005 03:21:31 PM
Scanning Time : 960 secs

Product Data
Device Name : M580
Serial No. : open front
Type : Clamshell Cell Phone
Model : M580
Frequency : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 160.48 mm
Width : 44.4 mm
Depth : 22.8 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.234 W/kg
Power Drift-Finish: 0.233 W/kg
Power Drift (%) : -0.618
Picture : C:\alsas\bitmap\M580-of.bmp

Phantom Data
Name : APREL-SAM Right Ear
Type : SAM-Right
Size (mm) : 280 x 280 x 280
Serial No. : User Define
Location : Right
Description : Right P-User Define

Tissue Data
Type : HEAD
Serial No. : 290-01101
Frequency : 1900.00 MHz
Last Calib. Date : 08-Feb-2005
Temperature : 22.50 °C
Ambient Temp. : 21.60 °C
Humidity : 58.00 RH%
Epsilon : 39.650 F/m
Sigma : 1.470 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : Probe 260 - BenQ
Model : E020
Type : E-Field Triangle
Serial No. : 260
Last Calib. Date : 14-Feb-2005
Frequency : 1900.00 MHz
Duty Cycle Factor: 8
Conversion Factor: 4.7
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 2.44 mm

Measurement Data
Crest Factor : 8
Scan Type : Complete
Tissue Temp. : 22.50 °C
Ambient Temp. : 21.60 °C
Set-up Date : 26-Aug-2005
Set-up Time : 11:17:58 AM
Area Scan : 5x5x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

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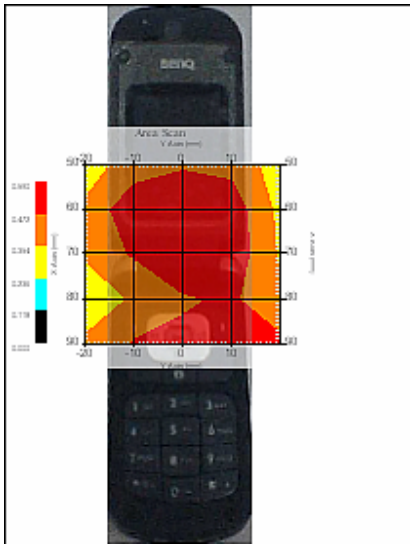
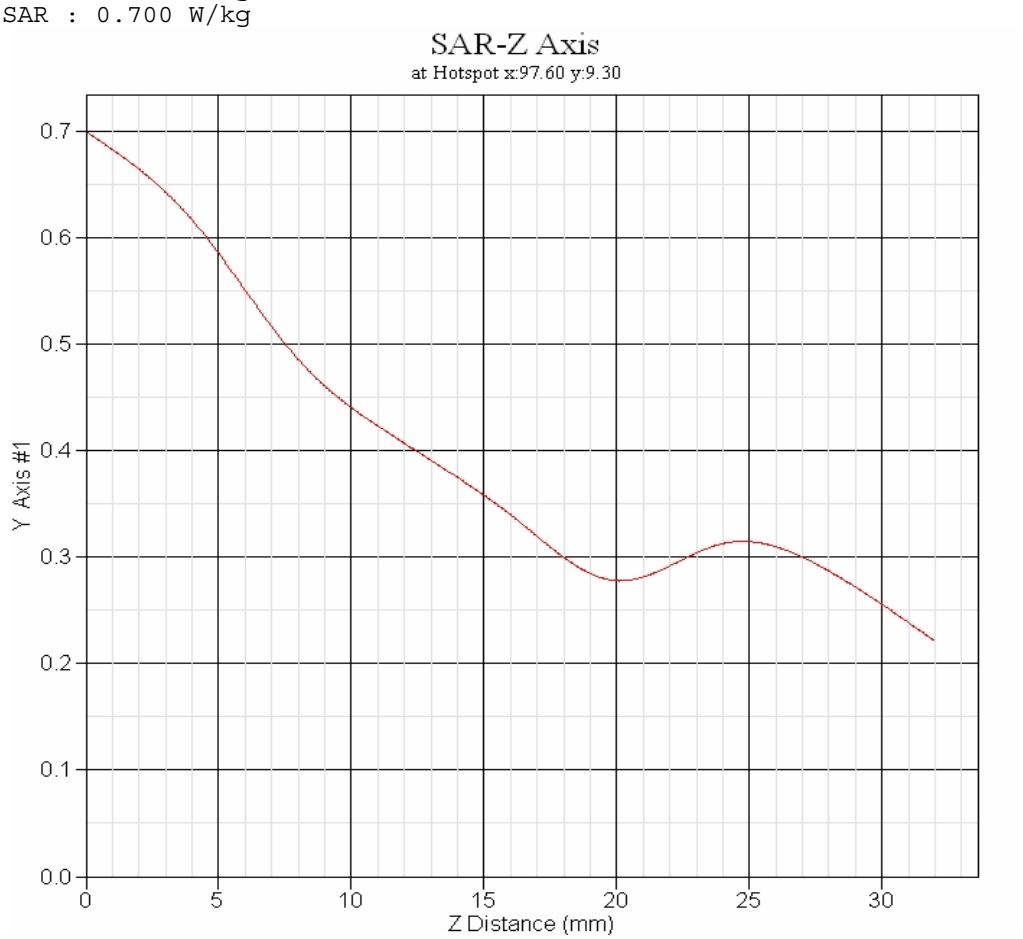
Other Data
DUT Position : Touch
Separation : 0
Channel : Mid - 661



1 gram SAR value : 0.572 W/kg
10 gram SAR value : 0.436 W/kg
Area Scan Peak SAR : 0.589 W/kg
Zoom Scan Peak SAR : 0.700 W/kg



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SAR Test Report – Head Right Cheek Ch810

Report Date : 26-Oct-2005
By Operator : 123
Measurement Date : 21-Oct-2005
Starting Time : 21-Oct-2005 11:20:34 AM
End Time : 21-Oct-2005 11:34:53 AM
Scanning Time : 859 secs

Product Data
Device Name : M580
Serial No. : open front
Type : Clamshell Cell Phone
Model : M580
Frequency : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 160.48 mm
Width : 44.4 mm
Depth : 22.8 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.206 W/kg
Power Drift-Finish: 0.198 W/kg
Power Drift (%) : -3.756
Picture : C:\alsas\bitmap\M580-of.bmp

Phantom Data
Name : APREL-SAM Right Ear
Type : SAM-Right
Size (mm) : 280 x 280 x 280
Serial No. : User Define
Location : Right
Description : Right P-User Define

Tissue Data
Type : HEAD
Serial No. : 290-01101
Frequency : 1900.00 MHz
Last Calib. Date : 10-Oct-2005
Temperature : 22.50 °C
Ambient Temp. : 21.60 °C
Humidity : 58.00 RH%
Epsilon : 39.650 F/m
Sigma : 1.470 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : Probe 260 - BenQ
Model : E020
Type : E-Field Triangle
Serial No. : 260
Last Calib. Date : 14-Feb-2005
Frequency : 1900.00 MHz
Duty Cycle Factor: 8
Conversion Factor: 4.7
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 2.44 mm

Measurement Data
Crest Factor : 8
Scan Type : Complete
Tissue Temp. : 22.50 °C
Ambient Temp. : 21.60 °C
Set-up Date : 21-Oct-2005
Set-up Time : 11:17:58 AM
Area Scan : 5x5x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

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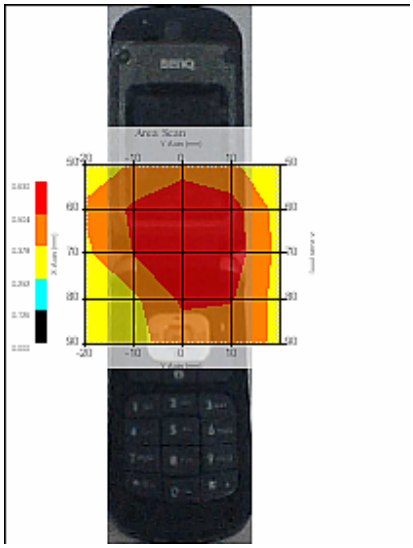
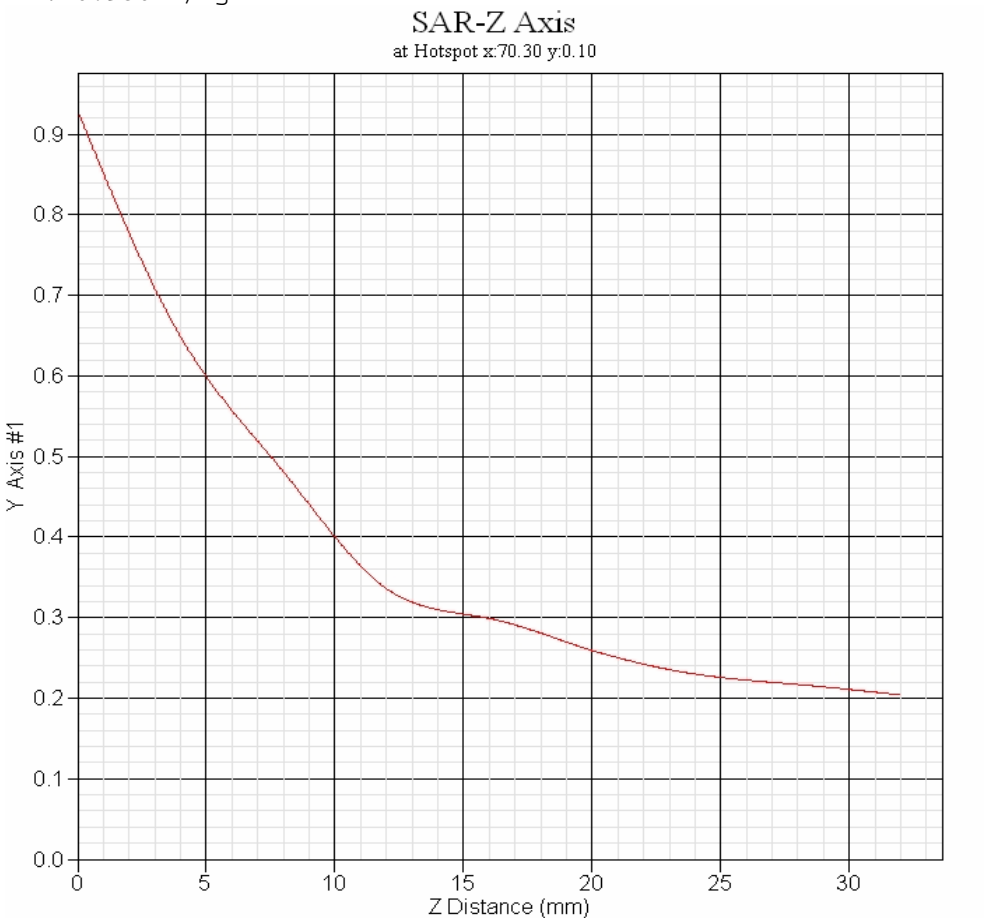
Other Data
DUT Position : Touch
Separation : 0
Channel : High - 810



1 gram SAR value : 0.611 W/kg
10 gram SAR value : 0.413 W/kg
Area Scan Peak SAR : 0.629 W/kg
Zoom Scan Peak SAR : 0.930 W/kg



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SAR Test Report Head Right Tilt Ch661

Report Date : 26-Oct-2005
By Operator : 123
Measurement Date : 26-Aug-2005
Starting Time : 26-Aug-2005 03:55:48 PM
End Time : 26-Aug-2005 04:16:17 PM
Scanning Time : 1229 secs

Product Data
Device Name : M580
Serial No. : open front
Type : Clamshell Cell Phone
Model : M580
Frequency : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 160.48 mm
Width : 44.4 mm
Depth : 22.8 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.266 W/kg
Power Drift-Finish: 0.255 W/kg
Power Drift (%) : -4.098
Picture : C:\alsas\bitmap\M580-of.bmp

Phantom Data
Name : APREL-SAM Right Ear
Type : SAM-Right
Size (mm) : 280 x 280 x 280
Serial No. : User Define
Location : Right
Description : Right P-User Define

Tissue Data
Type : HEAD
Serial No. : 290-01101
Frequency : 1900.00 MHz
Last Calib. Date : 08-Feb-2005
Temperature : 22.50 °C
Ambient Temp. : 21.60 °C
Humidity : 58.00 RH%
Epsilon : 39.650 F/m
Sigma : 1.470 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : Probe 260 - BenQ
Model : E020
Type : E-Field Triangle
Serial No. : 260
Last Calib. Date : 14-Feb-2005
Frequency : 1900.00 MHz
Duty Cycle Factor: 8
Conversion Factor: 4.7
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 2.44 mm

Measurement Data
Crest Factor : 8
Scan Type : Complete
Tissue Temp. : 22.50 °C
Ambient Temp. : 21.60 °C
Set-up Date : 26-Aug-2005
Set-up Time : 11:17:58 AM
Area Scan : 5x5x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

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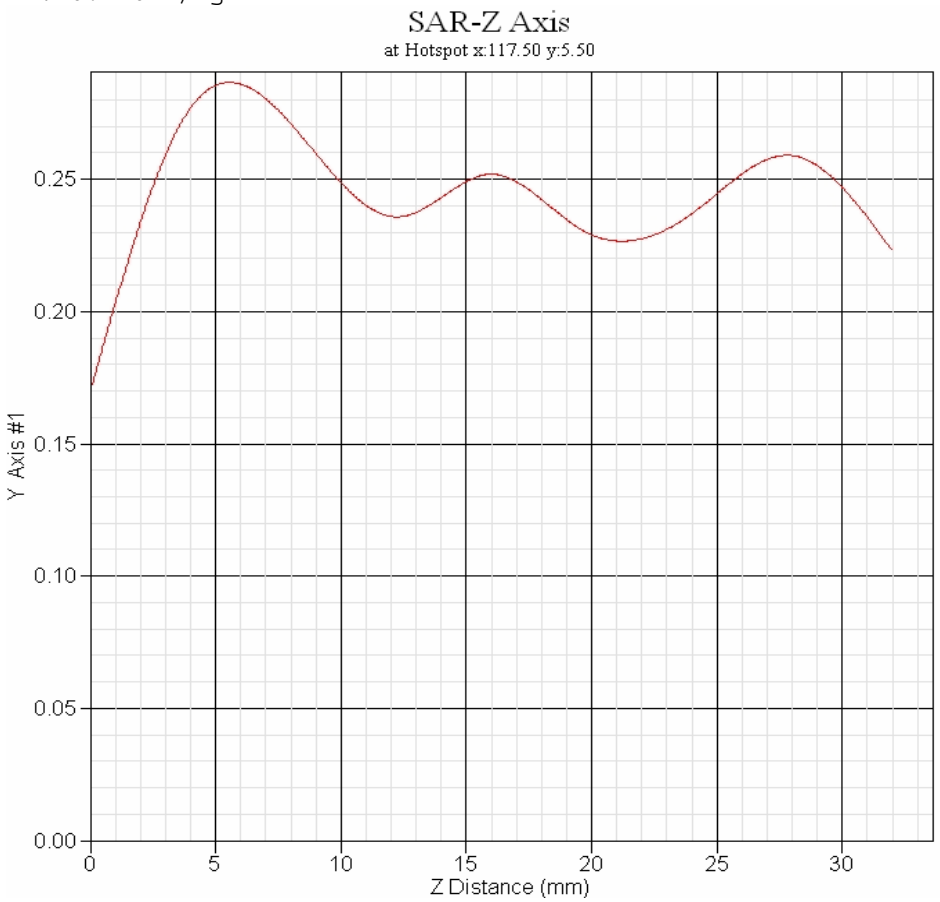
Other Data
DUT Position : Touch
Separation : 0
Channel : Mid - 661

1 gram SAR value : 0.267 W/kg
10 gram SAR value : 0.241 W/kg
Area Scan Peak SAR : 0.271 W/kg
Zoom Scan Peak SAR : 0.170 W/kg



ALSAS-10U VER 2.2.0

SAR Test Report – Head Left Cheek Ch512

Report Date : 26-Oct-2005
By Operator : 123
Measurement Date : 26-Aug-2005
Starting Time : 26-Aug-2005 10:45:18 AM
End Time : 26-Aug-2005 10:59:13 AM
Scanning Time : 835 secs

Product Data
Device Name : M580
Serial No. : open front
Type : Clamshell Cell Phone
Model : M580
Frequency : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 160.48 mm
Width : 44.4 mm
Depth : 22.8 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.219 W/kg
Power Drift-Finish: 0.211 W/kg
Power Drift (%) : -3.653
Picture : C:\alsas\bitmap\M580-of.bmp

Phantom Data
Name : APREL-SAM Left Ear
Type : SAM-Left
Size (mm) : 280 x 280 x 280
Serial No. : User Define
Location : Left
Description : SAM-Left User Define

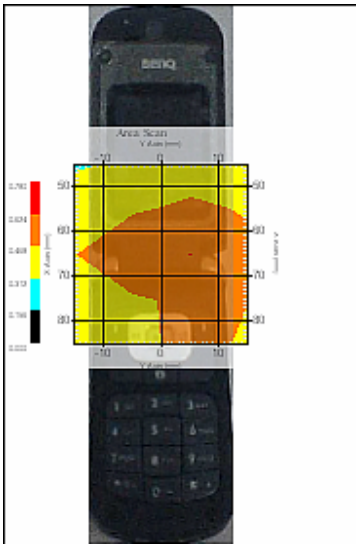
Tissue Data
Type : HEAD
Serial No. : 290-01101
Frequency : 1900.00 MHz
Last Calib. Date : 08-Feb-2005
Temperature : 22.50 °C
Ambient Temp. : 21.60 °C
Humidity : 58.00 RH%
Epsilon : 39.650 F/m
Sigma : 1.470 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : Probe 260 - BenQ
Model : E020
Type : E-Field Triangle
Serial No. : 260
Last Calib. Date : 14-Feb-2005
Frequency : 1900.00 MHz
Duty Cycle Factor: 8
Conversion Factor: 4.7
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 2.44 mm

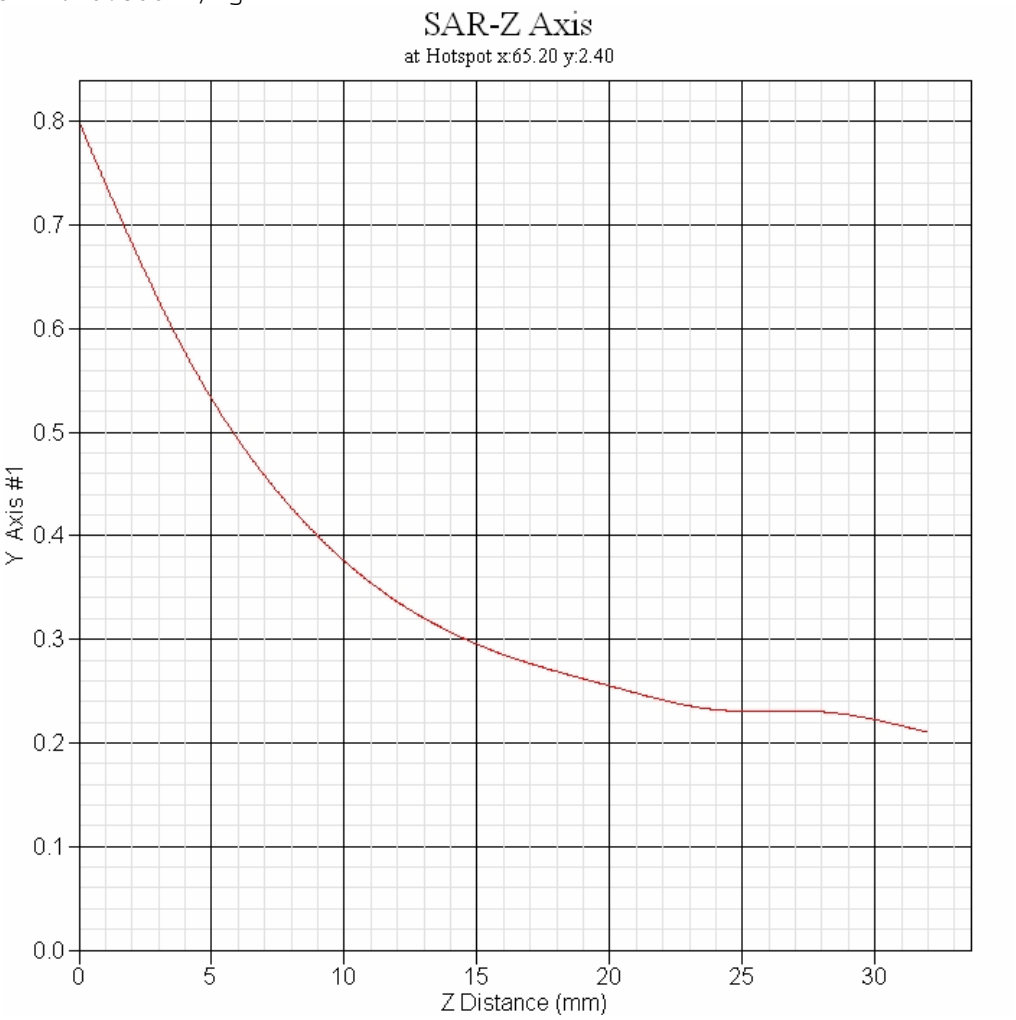
Measurement Data
Crest Factor : 8
Scan Type : Complete
Tissue Temp. : 22.50 °C
Ambient Temp. : 21.60 °C
Set-up Date : 26-Aug-2005
Set-up Time : 10:44:44 AM
Area Scan : 5x4x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

ALSAS-10U VER 2.2.0

Other Data
DUT Position : Touch
Separation : 0
Channel : Mid - 512



1 gram SAR value : 0.566 W/kg
10 gram SAR value : 0.402 W/kg
Area Scan Peak SAR : 0.625 W/kg
Zoom Scan Peak SAR : 0.800 W/kg



ALSAS-10U VER 2.2.0

SAR Test Report – Head Left Cheek Ch661

Report Date : 26-Oct-2005
By Operator : 123
Measurement Date : 26-Aug-2005
Starting Time : 26-Aug-2005 10:25:30 AM
End Time : 26-Aug-2005 10:42:26 AM
Scanning Time : 1016 secs

Product Data
Device Name : M580
Serial No. : open front
Type : Clamshell Cell Phone
Model : M580
Frequency : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 160.48 mm
Width : 44.4 mm
Depth : 22.8 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.211 W/kg
Power Drift-Finish: 0.221 W/kg
Power Drift (%) : 4.739
Picture : C:\alsas\bitmap\M580-of.bmp

Phantom Data
Name : APREL-SAM Left Ear
Type : SAM-Left
Size (mm) : 280 x 280 x 280
Serial No. : User Define
Location : Left
Description : SAM-Left User Define

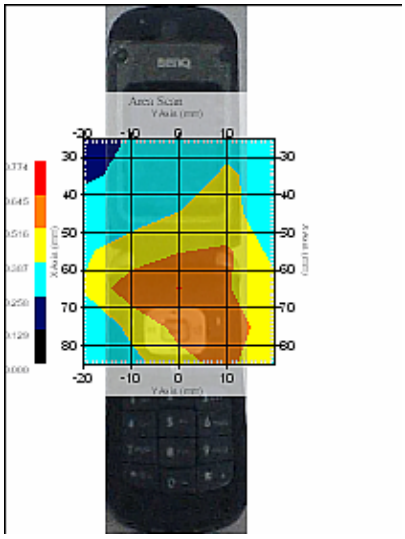
Tissue Data
Type : HEAD
Serial No. : 290-01101
Frequency : 1900.00 MHz
Last Calib. Date : 08-Feb-2005
Temperature : 22.50 °C
Ambient Temp. : 21.60 °C
Humidity : 58.00 RH%
Epsilon : 39.650 F/m
Sigma : 1.470 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : Probe 260 - BenQ
Model : E020
Type : E-Field Triangle
Serial No. : 260
Last Calib. Date : 14-Feb-2005
Frequency : 1900.00 MHz
Duty Cycle Factor: 8
Conversion Factor: 4.7
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 2.44 mm

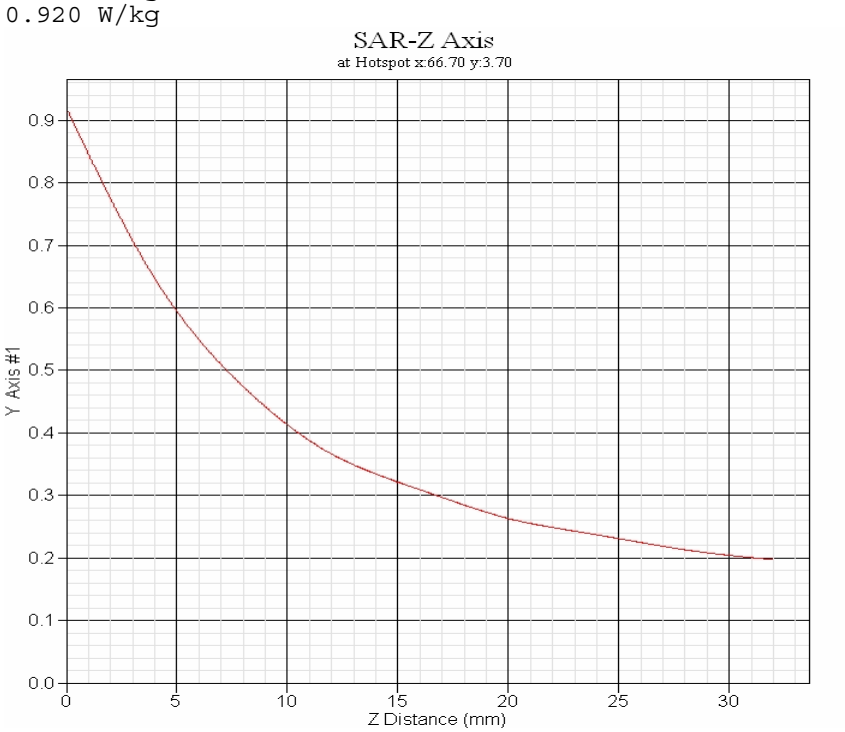
Measurement Data
Crest Factor : 8
Scan Type : Complete
Tissue Temp. : 22.50 °C
Ambient Temp. : 21.60 °C
Set-up Date : 26-Aug-2005
Set-up Time : 10:17:44 AM
Area Scan : 7x5x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

ALSAS-10U VER 2.2.0

Other Data
DUT Position : Touch
Separation : 0
Channel : Mid - 661



1 gram SAR value : 0.600 W/kg
10 gram SAR value : 0.406 W/kg
Area Scan Peak SAR : 0.647 W/kg
Zoom Scan Peak SAR : 0.920 W/kg



ALSAS-10U VER 2.2.0

SAR Test Report – Head Left Cheek Ch810

Report Date : 26-Oct-2005
By Operator : 123
Measurement Date : 26-Aug-2005
Starting Time : 26-Aug-2005 11:01:46 AM
End Time : 26-Aug-2005 11:16:21 AM
Scanning Time : 875 secs

Product Data
Device Name : M580
Serial No. : open front
Type : Clamshell Cell Phone
Model : M580
Frequency : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 160.48 mm
Width : 44.4 mm
Depth : 22.8 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.232 W/kg
Power Drift-Finish: 0.242 W/kg
Power Drift (%) : 4.484
Picture : C:\alsas\bitmap\M580-of.bmp

Phantom Data
Name : APREL-SAM Left Ear
Type : SAM-Left
Size (mm) : 280 x 280 x 280
Serial No. : User Define
Location : Left
Description : SAM-Left User Define

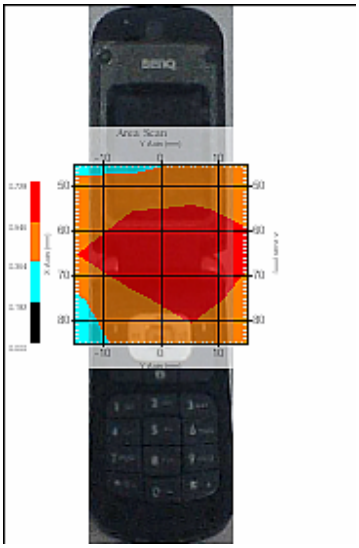
Tissue Data
Type : HEAD
Serial No. : 290-01101
Frequency : 1900.00 MHz
Last Calib. Date : 08-Feb-2005
Temperature : 22.50 °C
Ambient Temp. : 21.60 °C
Humidity : 58.00 RH%
Epsilon : 39.650 F/m
Sigma : 1.470 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : Probe 260 - BenQ
Model : E020
Type : E-Field Triangle
Serial No. : 260
Last Calib. Date : 14-Feb-2005
Frequency : 1900.00 MHz
Duty Cycle Factor: 8
Conversion Factor: 4.7
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 2.44 mm

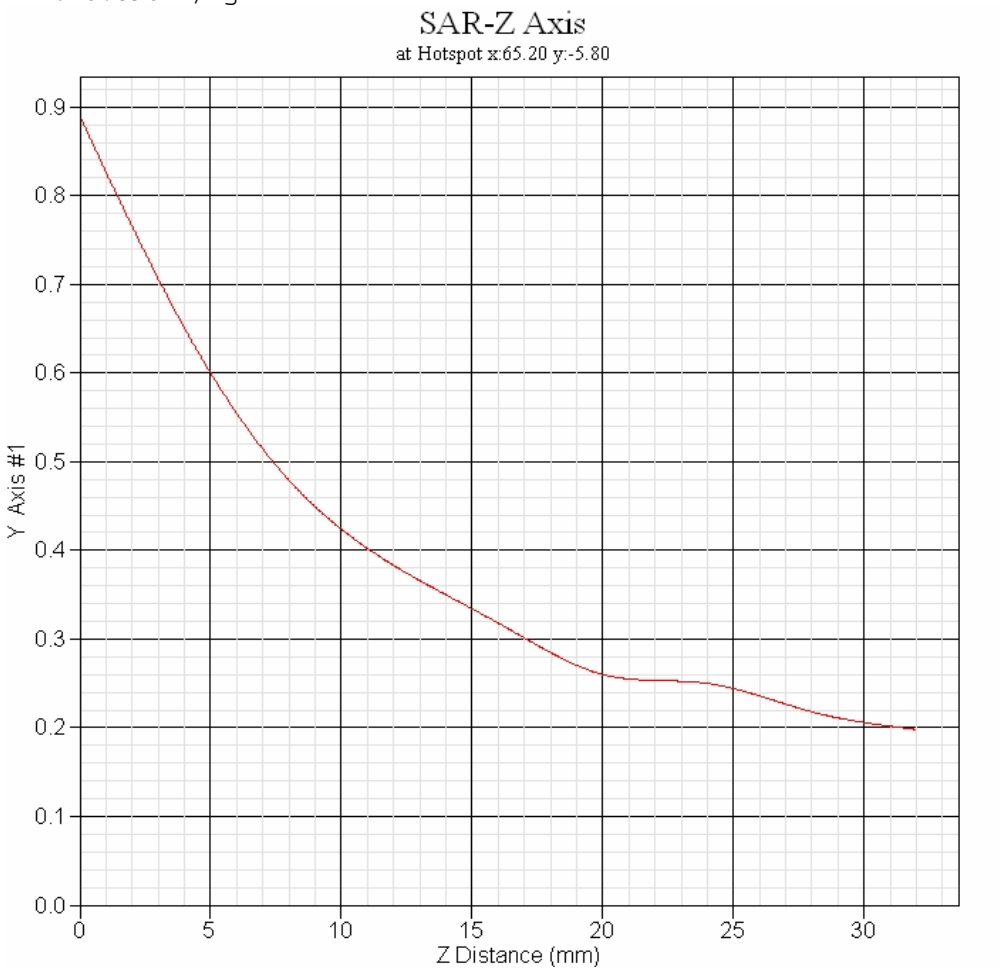
Measurement Data
Crest Factor : 8
Scan Type : Complete
Tissue Temp. : 22.50 °C
Ambient Temp. : 21.60 °C
Set-up Date : 26-Aug-2005
Set-up Time : 11:01:31 AM
Area Scan : 5x4x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

ALSAS-10U VER 2.2.0

Other Data
DUT Position : Touch
Separation : 0
Channel : High - 810



1 gram SAR value : 0.622 W/kg
10 gram SAR value : 0.435 W/kg
Area Scan Peak SAR : 0.726 W/kg
Zoom Scan Peak SAR : 0.890 W/kg



ALSAS-10U VER 2.2.0

SAR Test Report Head Left Tilt Ch661

Report Date : 26-Oct-2005
By Operator : 123
Measurement Date : 26-Aug-2005
Starting Time : 26-Aug-2005 11:18:18 AM
End Time : 26-Aug-2005 11:36:08 AM
Scanning Time : 1070 secs

Product Data
Device Name : M580
Serial No. : open front
Type : Clamshell Cell Phone
Model : M580
Frequency : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 160.48 mm
Width : 44.4 mm
Depth : 22.8 mm
Antenna Type : Internal
Orientation : 15° Tilt
Power Drift-Start : 0.255 W/kg
Power Drift-Finish: 0.270 W/kg
Power Drift (%) : 5.861
Picture : C:\alsas\bitmap\M580-of.bmp

Phantom Data
Name : APREL-SAM Left Ear
Type : SAM-Left
Size (mm) : 280 x 280 x 280
Serial No. : User Define
Location : Left
Description : SAM-Left User Define

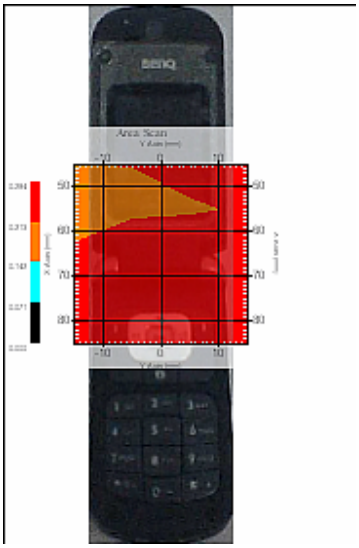
Tissue Data
Type : HEAD
Serial No. : 290-01101
Frequency : 1900.00 MHz
Last Calib. Date : 08-Feb-2005
Temperature : 22.50 °C
Ambient Temp. : 21.60 °C
Humidity : 58.00 RH%
Epsilon : 39.650 F/m
Sigma : 1.470 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : Probe 260 - BenQ
Model : E020
Type : E-Field Triangle
Serial No. : 260
Last Calib. Date : 14-Feb-2005
Frequency : 1900.00 MHz
Duty Cycle Factor: 8
Conversion Factor: 4.7
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 2.44 mm

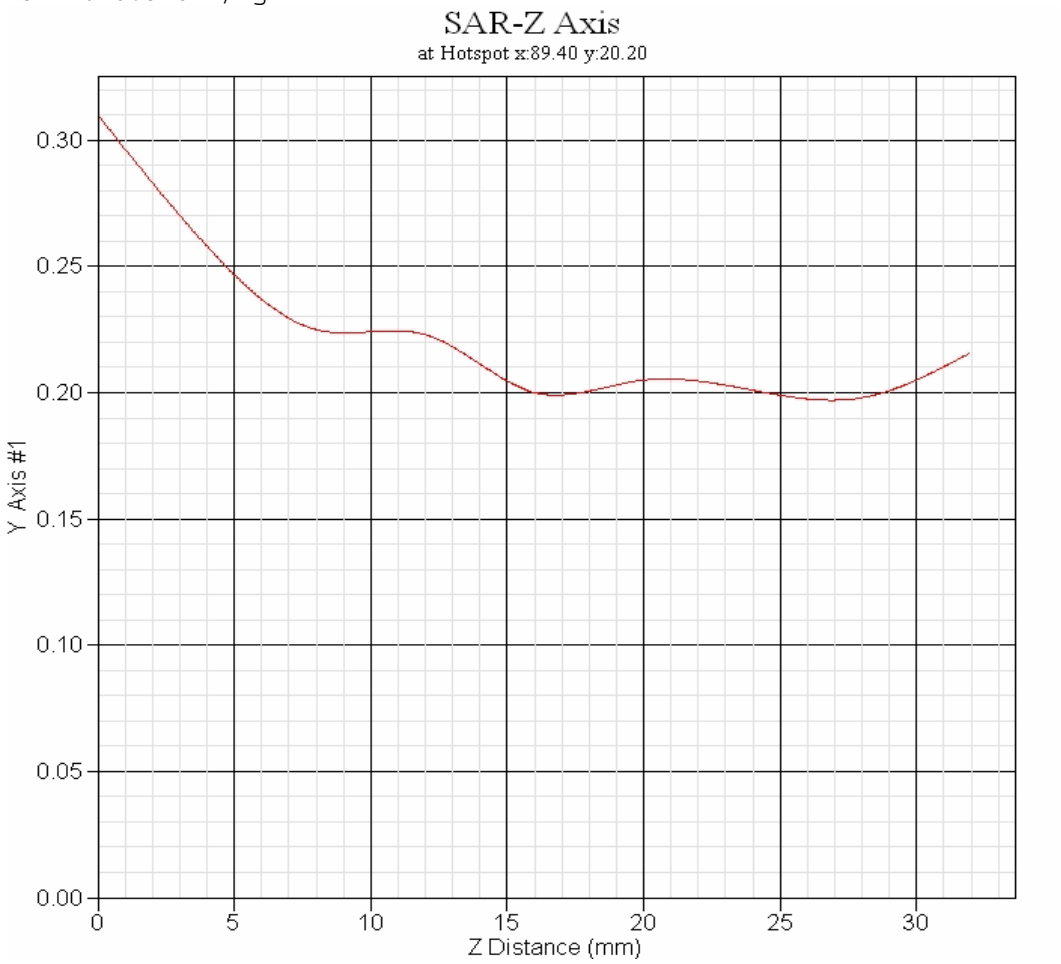
Measurement Data
Crest Factor : 8
Scan Type : Complete
Tissue Temp. : 22.50 °C
Ambient Temp. : 21.60 °C
Set-up Date : 26-Aug-2005
Set-up Time : 11:17:58 AM
Area Scan : 5x4x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

ALSAS-10U VER 2.2.0

Other Data
DUT Position : 15° Tilt
Separation : 0
Channel : Mid - 661



1 gram SAR value : 0.231 W/kg
10 gram SAR value : 0.207 W/kg
Area Scan Peak SAR : 0.282 W/kg
Zoom Scan Peak SAR : 0.310 W/kg



ALSAS-10U VER 2.2.0

SAR Test Report – Head Right Cheek Ch810 BT on

Report Date : 26-Oct-2005
By Operator : 123
Measurement Date : 21-Oct-2005
Starting Time : 21-Oct-2005 01:01:50 PM
End Time : 21-Oct-2005 01:15:54 PM
Scanning Time : 844 secs

Product Data
Device Name : M580
Serial No. : open front
Type : Clamshell Cell Phone
Model : M580
Frequency : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 160.48 mm
Width : 44.4 mm
Depth : 22.8 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.201 W/kg
Power Drift-Finish: 0.192 W/kg
Power Drift (%) : -4.615
Picture : C:\alsas\bitmap\M580-of.bmp

Phantom Data
Name : APREL-SAM Right Ear
Type : SAM-Right
Size (mm) : 280 x 280 x 280
Serial No. : User Define
Location : Right
Description : Right P-User Define

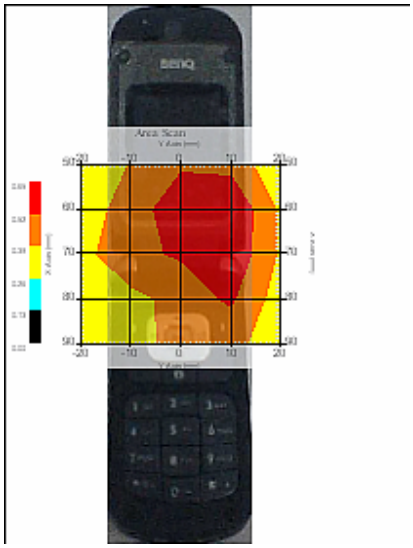
Tissue Data
Type : HEAD
Serial No. : 290-01101
Frequency : 1900.00 MHz
Last Calib. Date : 10-Oct-2005
Temperature : 22.50 °C
Ambient Temp. : 21.60 °C
Humidity : 58.00 RH%
Epsilon : 39.650 F/m
Sigma : 1.470 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : Probe 260 - BenQ
Model : E020
Type : E-Field Triangle
Serial No. : 260
Last Calib. Date : 14-Feb-2005
Frequency : 1900.00 MHz
Duty Cycle Factor: 8
Conversion Factor: 4.7
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 2.44 mm

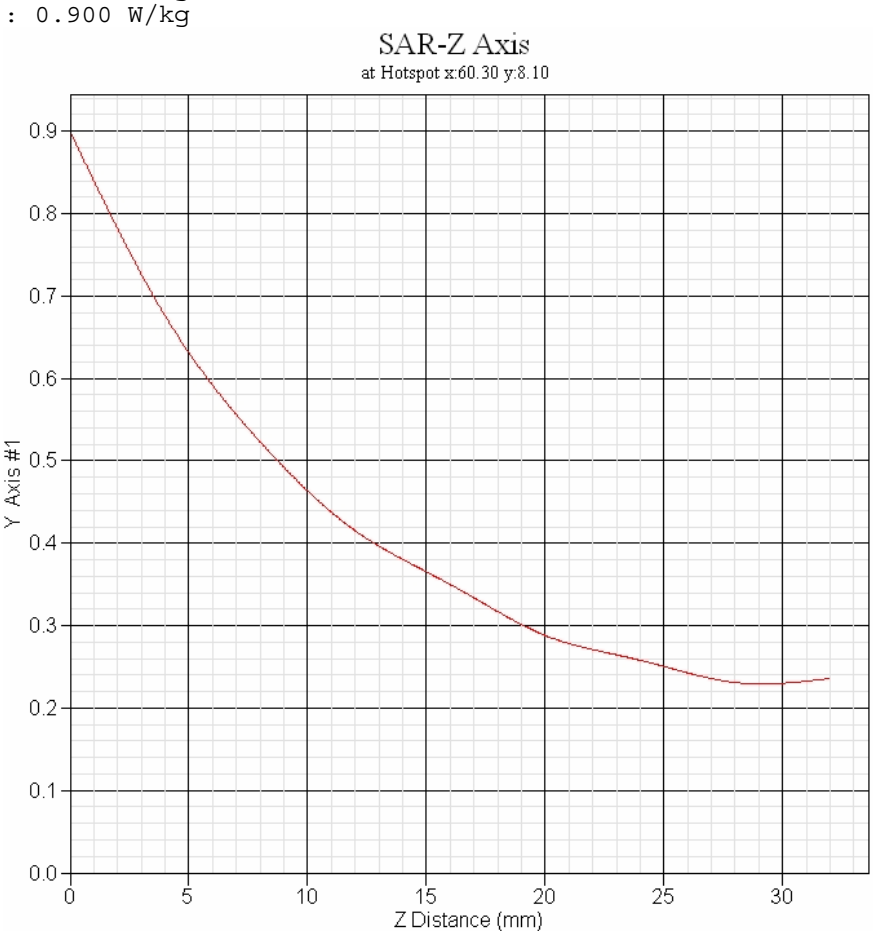
Measurement Data
Crest Factor : 8
Scan Type : Complete
Tissue Temp. : 22.50 °C
Ambient Temp. : 21.60 °C
Set-up Date : 21-Oct-2005
Set-up Time : 11:17:58 AM
Area Scan : 5x5x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

ALSAS-10U VER 2.2.0

Other Data
DUT Position : Touch
Separation : 0
Channel : High - 810



1 gram SAR value : 0.585 W/kg
10 gram SAR value : 0.406 W/kg
Area Scan Peak SAR : 0.649 W/kg
Zoom Scan Peak SAR : 0.900 W/kg



ALSAS-10U VER 2.2.0

SAR Test Report – Body GSM Ch512

```
Report Date       : 26-Oct-2005
By Operator       : 123
Measurement Date  : 26-Aug-2005
Starting Time     : 26-Aug-2005  07:03:25 PM
End Time          : 26-Aug-2005  07:14:55 PM
Scanning Time     : 690 secs

Product Data
Device Name       : M580
Serial No.        : rear
Type              : Clamshell Cell Phone
Model             : M580
Frequency         : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time        : 1 min(s)
Length            : 89.9 mm
Width             : 44.4 mm
Depth             : 22.8 mm
Antenna Type      :  Internal
Orientation       : Touch
Power Drift-Start : 0.369 W/kg
Power Drift-Finish: 0.370 W/kg
Power Drift (%)   : 0.363
Picture           : C:\alsas\bitmap\Device-3.bmp

Phantom Data
Name              : APREL-Uni
Type              : Uni-Phantom
Size (mm)         : 280 x 280 x 200
Serial No.        : User Define
Location          : Center
Description       : Uni-Phantom User Define

Tissue Data
Type              : BODY
Serial No.        : BenQ-018
Frequency         : 1900.00 MHz
Last Calib. Date  : 10-Jun-2005
Temperature       : 22.40 °C
Ambient Temp.     : 21.60 °C
Humidity          : 58.00 RH%
Epsilon           : 54.400 F/m
Sigma             : 1.590 S/m
Density           : 1000.00 kg/cu. m

Probe Data
Name              : Probe 260 - BenQ
Model             : E020
Type              : E-Field Triangle
Serial No.        : 260
Last Calib. Date  : 14-Feb-2005
Frequency         : 1900.00 MHz
Duty Cycle Factor: 8
Conversion Factor: 4.9
Probe Sensitivity: 1.20  1.20  1.20   µV/(V/m)²
Compression Point: 95.00 mV
Offset            : 2.44 mm

Measurement Data
Crest Factor      : 8
Scan Type         : Complete
Tissue Temp.      : 22.40 °C
Ambient Temp.     : 21.60 °C
Set-up Date       : 26-Aug-2005
Set-up Time       : 5:02:26 PM
Area Scan         : 4x4x1 : Measurement x=10mm, y=10mm, z=4mm
```

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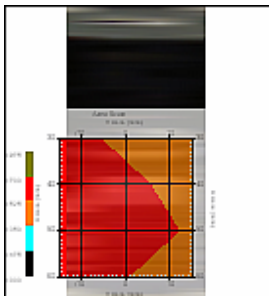
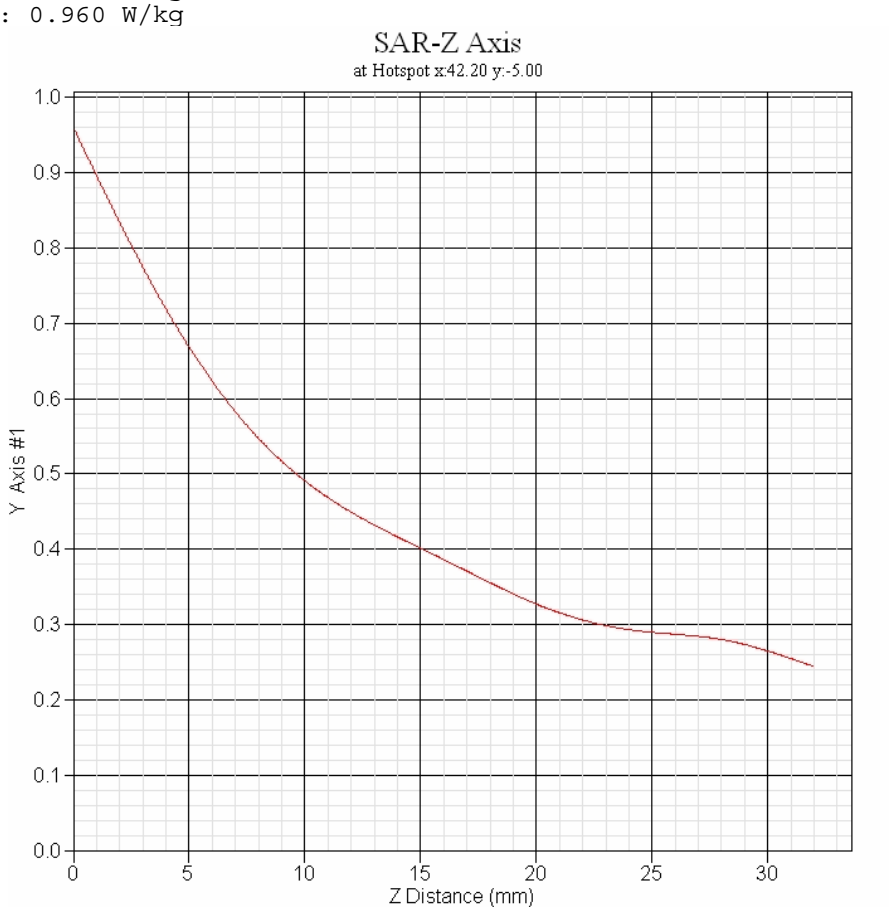
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position : Touch
Separation : 0
Channel : Mid - 512



1 gram SAR value : 0.586 W/kg
10 gram SAR value : 0.436 W/kg
Area Scan Peak SAR : 0.700 W/kg
Zoom Scan Peak SAR : 0.960 W/kg



ALSAS-10U VER 2.2.0

SAR Test Report Body GSM Ch661

Report Date : 26-Oct-2005
By Operator : 123
Measurement Date : 26-Aug-2005
Starting Time : 26-Aug-2005 06:33:59 PM
End Time : 26-Aug-2005 06:49:35 PM
Scanning Time : 936 secs

Product Data
Device Name : M580
Serial No. : rear
Type : Clamshell Cell Phone
Model : M580
Frequency : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 1 min(s)
Length : 89.9 mm
Width : 44.4 mm
Depth : 22.8 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.409 W/kg
Power Drift-Finish: 0.398 W/kg
Power Drift (%) : -2.884
Picture : C:\alsas\bitmap\Device-3.bmp

Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : User Define
Location : Center
Description : Uni-Phantom User Define

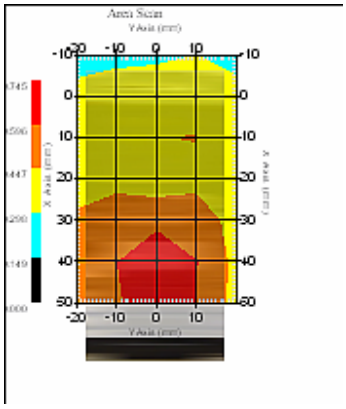
Tissue Data
Type : BODY
Serial No. : BenQ-018
Frequency : 1900.00 MHz
Last Calib. Date : 10-Jun-2005
Temperature : 22.40 °C
Ambient Temp. : 21.60 °C
Humidity : 58.00 RH%
Epsilon : 54.400 F/m
Sigma : 1.590 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : Probe 260 - BenQ
Model : E020
Type : E-Field Triangle
Serial No. : 260
Last Calib. Date : 14-Feb-2005
Frequency : 1900.00 MHz
Duty Cycle Factor: 8
Conversion Factor: 4.9
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 2.44 mm

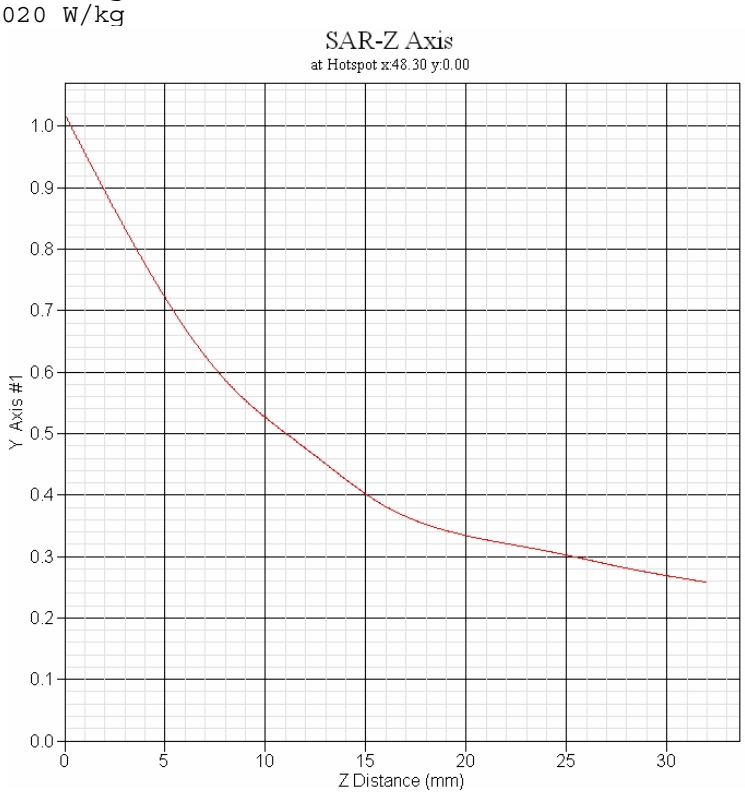
Measurement Data
Crest Factor : 8
Scan Type : Complete
Tissue Temp. : 22.40 °C
Ambient Temp. : 21.60 °C
Set-up Date : 26-Aug-2005
Set-up Time : 5:02:26 PM
Area Scan : 7x5x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

ALSAS-10U VER 2.2.0

Other Data
DUT Position : Touch
Separation : 0
Channel : Mid - 661



1 gram SAR value : 0.684 W/kg
10 gram SAR value : 0.493 W/kg
Area Scan Peak SAR : 0.743 W/kg
Zoom Scan Peak SAR : 1.020 W/kg



ALSAS-10U VER 2.2.0

SAR Test Report Body GSM Ch810

```
Report Date       : 26-Oct-2005
By Operator       : 123
Measurement Date  : 26-Aug-2005
Starting Time     : 26-Aug-2005  07:16:07 PM
End Time          : 26-Aug-2005  07:27:37 PM
Scanning Time     : 690 secs

Product Data
Device Name       : M580
Serial No.        : rear
Type              : Clamshell Cell Phone
Model             : M580
Frequency         : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time        : 1 min(s)
Length            : 89.9 mm
Width             : 44.4 mm
Depth             : 22.8 mm
Antenna Type      :  Internal
Orientation       : Touch
Power Drift-Start : 0.395 W/kg
Power Drift-Finish: 0.409 W/kg
Power Drift (%)   : 3.544
Picture           : C:\alsas\bitmap\Device-3.bmp

Phantom Data
Name              : APREL-Uni
Type              : Uni-Phantom
Size (mm)         : 280 x 280 x 200
Serial No.        : User Define
Location          : Center
Description       : Uni-Phantom User Define

Tissue Data
Type              : BODY
Serial No.        : BenQ-018
Frequency         : 1900.00 MHz
Last Calib. Date  : 10-Jun-2005
Temperature       : 22.40 °C
Ambient Temp.     : 21.60 °C
Humidity          : 58.00 RH%
Epsilon           : 54.400 F/m
Sigma             : 1.590 S/m
Density           : 1000.00 kg/cu. m

Probe Data
Name              : Probe 260 - BenQ
Model             : E020
Type              : E-Field Triangle
Serial No.        : 260
Last Calib. Date  : 14-Feb-2005
Frequency         : 1900.00 MHz
Duty Cycle Factor: 8
Conversion Factor: 4.9
Probe Sensitivity: 1.20  1.20  1.20   µV/(V/m)²
Compression Point: 95.00 mV
Offset            : 2.44 mm

Measurement Data
Crest Factor      : 8
Scan Type         : Complete
Tissue Temp.      : 22.40 °C
Ambient Temp.     : 21.60 °C
Set-up Date       : 26-Aug-2005
Set-up Time       : 5:02:26 PM
Area Scan         : 4x4x1 : Measurement x=10mm, y=10mm, z=4mm
```

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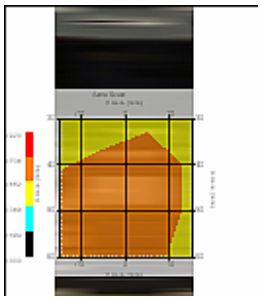
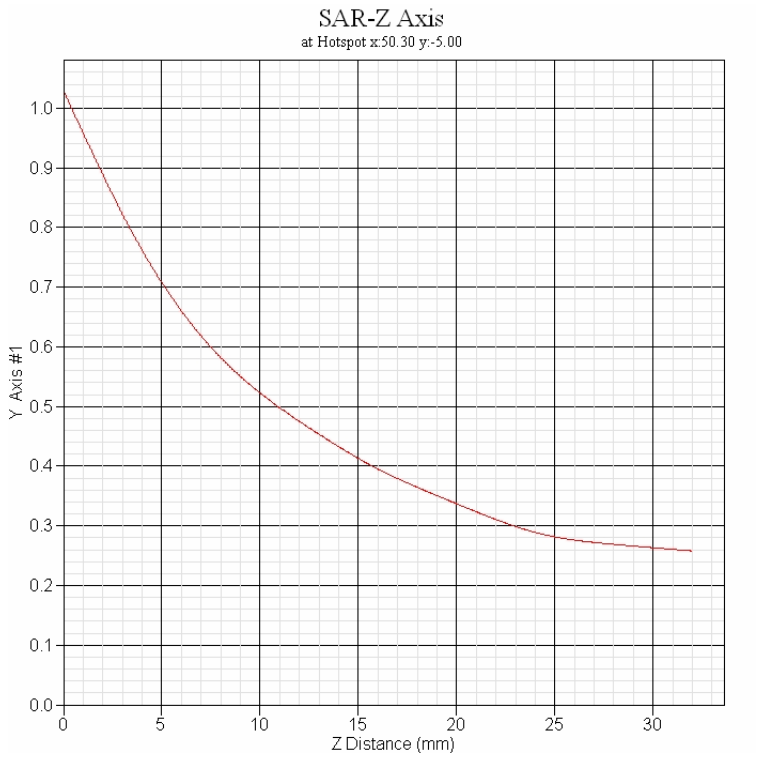
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position : Touch
Separation : 0
Channel : High - 810



1 gram SAR value : 0.707 W/kg
10 gram SAR value : 0.490 W/kg
Area Scan Peak SAR : 0.737 W/kg
Zoom Scan Peak SAR : 1.030 W/kg



ALSAS-10U VER 2.2.0

Test Report – Body GPRS CH512,

Report Date : 26-Oct-2005
By Operator : 123
Measurement Date : 26-Aug-2005
Starting Time : 26-Aug-2005 05:30:36 PM
End Time : 26-Aug-2005 05:55:04 PM
Scanning Time : 1468 secs

Product Data
Device Name : M580
Serial No. : rear
Type : Clamshell Cell Phone
Model : M580
Frequency : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 1 min(s)
Length : 89.9 mm
Width : 44.4 mm
Depth : 22.8 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.455 W/kg
Power Drift-Finish: 0.439 W/kg
Power Drift (%) : -3.540
Picture : C:\alsas\bitmap\Device-3.bmp

Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : User Define
Location : Center
Description : Uni-Phantom User Define

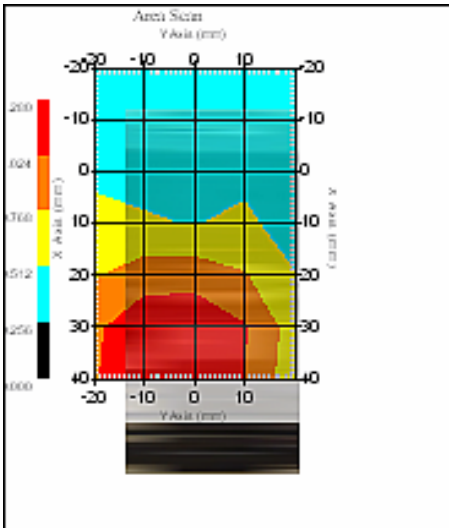
Tissue Data
Type : BODY
Serial No. : BenQ-018
Frequency : 1900.00 MHz
Last Calib. Date : 10-Jun-2005
Temperature : 22.40 °C
Ambient Temp. : 21.60 °C
Humidity : 58.00 RH%
Epsilon : 54.400 F/m
Sigma : 1.590 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : Probe 260 - BenQ
Model : E020
Type : E-Field Triangle
Serial No. : 260
Last Calib. Date : 14-Feb-2005
Frequency : 1900.00 MHz
Duty Cycle Factor: 4
Conversion Factor: 4.9
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 2.44 mm

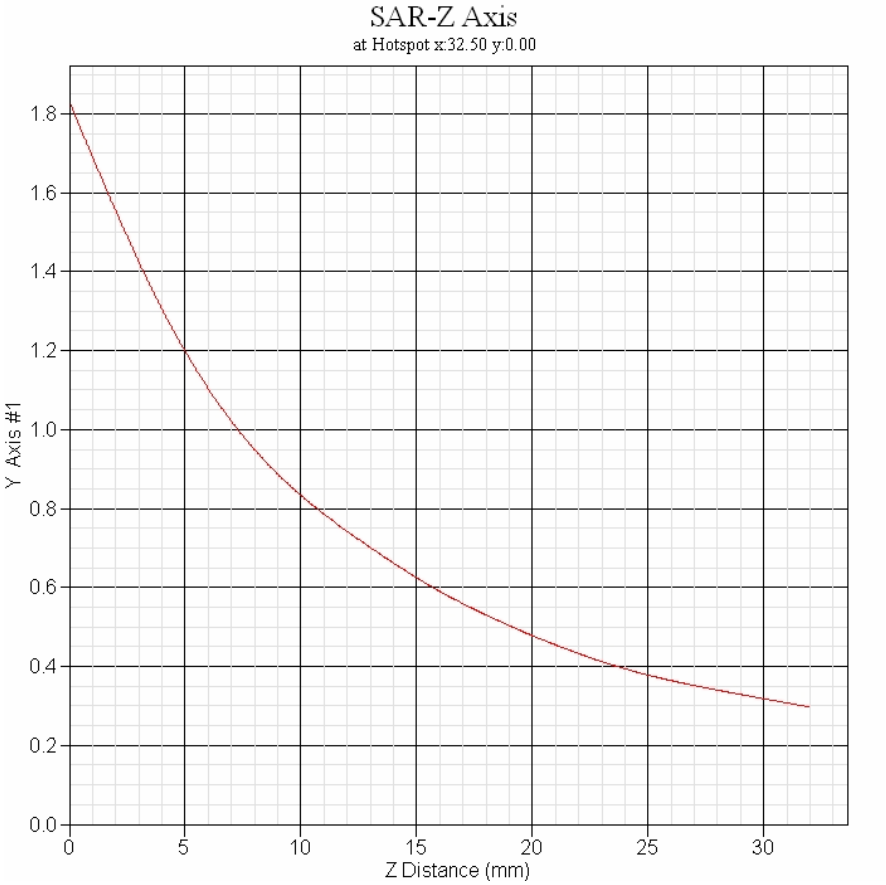
Measurement Data
Crest Factor : 4
Scan Type : Complete
Tissue Temp. : 22.40 °C
Ambient Temp. : 21.60 °C
Set-up Date : 26-Aug-2005
Set-up Time : 5:02:26 PM
Area Scan : 7x5x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

ALSAS-10U VER 2.2.0

Other Data
DUT Position : Touch
Separation : 0
Channel : Low - 512



1 gram SAR value : 1.236 W/kg
10 gram SAR value : 0.821 W/kg
Area Scan Peak SAR : 1.278 W/kg
Zoom Scan Peak SAR : 1.831 W/kg



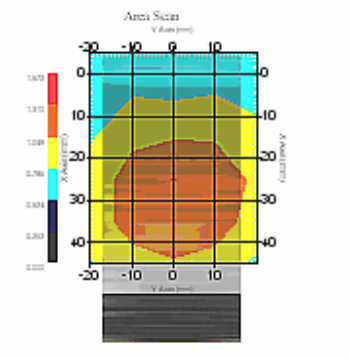
ALSAS-10U VER 2.2.0

SAR Test Report-Body GPRS Ch661

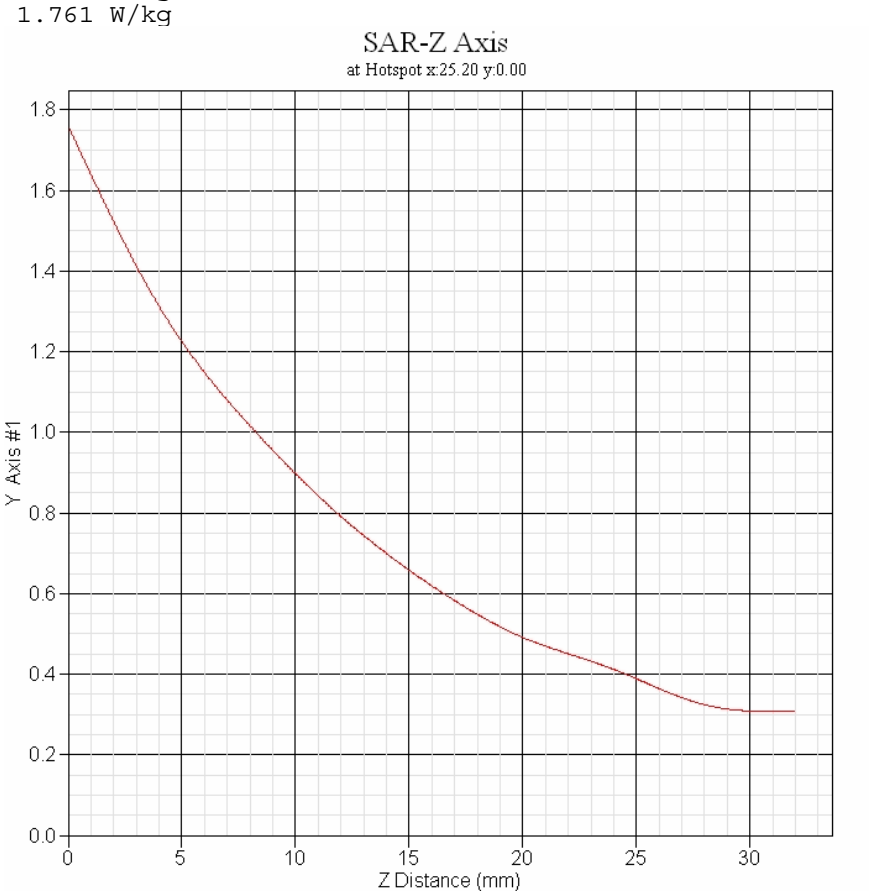
```
Report Date       : 26-Oct-2005
By Operator       : 123
Measurement Date  : 21-Oct-2005
Starting Time     : 21-Oct-2005  02:30:17 PM
End Time          : 21-Oct-2005  02:54:09 PM
Scanning Time     : 1432 secs

Product Data
Device Name       : M580
Serial No.        : rear
Type              : Clamshell Cell Phone
Model             : M580
Frequency         : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time        : 0 min(s)
Length            : 89.9 mm
Width             : 44.4 mm
Depth             : 22.8 mm
Antenna Type      :  Internal
Orientation       : Touch
Power Drift-Start : 0.493 W/kg
Power Drift-Finish: 0.495 W/kg
Power Drift (%)   : 0.398
Picture           : C:\alsas\bitmap\Device-3.bmp

Phantom Data
Name              : APREL-Uni
Type              : Uni-Phantom
Size (mm)         : 280 x 280 x 200
Serial No.        : User Define
Location          : Center
Description       : Uni-Phantom User Define

Tissue Data
Type              : BODY
Serial No.        : BenQ-018
Frequency         : 1900.00 MHz
Last Calib. Date  : 10-Jun-2005
Temperature       : 22.40 °C
Ambient Temp.     : 21.60 °C
Humidity          : 58.00 RH%
Epsilon           : 54.400 F/m
Sigma             : 1.590 S/m
Density           : 1000.00 kg/cu. m

Probe Data
Name              : Probe 260 - BenQ
Model             : E020
Type              : E-Field Triangle
Serial No.        : 260
Last Calib. Date  : 14-Feb-2005
Frequency         : 1900.00 MHz
Duty Cycle Factor: 4
Conversion Factor: 4.9
Probe Sensitivity: 1.20  1.20  1.20   μV/(V/m)²
Compression Point: 95.00 mV
Offset            : 2.44 mm

Measurement Data
Crest Factor      : 4
Scan Type         : Complete
Tissue Temp.      : 22.40 °C
Ambient Temp.     : 21.60 °C
Set-up Date       : 21-Oct-2005
Set-up Time       : 2:29:51 PM
Area Scan         : 6x5x1 : Measurement x=10mm, y=10mm, z=4mm
```

ALSAS-10U VER 2.2.0

```
Zoom Scan          : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position       : Touch
Separation         : 0
Channel            : Mid - 661
```



```
1 gram SAR value    : 1.261 W/kg
10 gram SAR value   : 0.913 W/kg
Area Scan Peak SAR  : 1.312 W/kg
Zoom Scan Peak SAR  : 1.761 W/kg
```



ALSAS-10U VER 2.2.0

SAR Test Report – Body GPRS Ch810

Report Date : 26-Oct-2005
By Operator : 123
Measurement Date : 26-Aug-2005
Starting Time : 26-Aug-2005 05:58:46 PM
End Time : 26-Aug-2005 06:23:04 PM
Scanning Time : 1458 secs

Product Data
Device Name : M580
Serial No. : rear
Type : Clamshell Cell Phone
Model : M580
Frequency : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 1 min(s)
Length : 89.9 mm
Width : 44.4 mm
Depth : 22.8 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.596 W/kg
Power Drift-Finish: 0.584 W/kg
Power Drift (%) : -2.002
Picture : C:\alsas\bitmap\Device-3.bmp

Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : User Define
Location : Center
Description : Uni-Phantom User Define

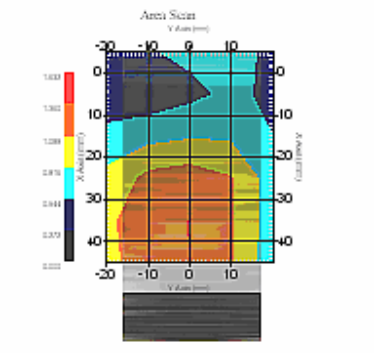
Tissue Data
Type : BODY
Serial No. : BenQ-018
Frequency : 1900.00 MHz
Last Calib. Date : 10-Jun-2005
Temperature : 22.40 °C
Ambient Temp. : 21.60 °C
Humidity : 58.00 RH%
Epsilon : 54.400 F/m
Sigma : 1.590 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : Probe 260 - BenQ
Model : E020
Type : E-Field Triangle
Serial No. : 260
Last Calib. Date : 14-Feb-2005
Frequency : 1900.00 MHz
Duty Cycle Factor: 4
Conversion Factor: 4.9
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 2.44 mm

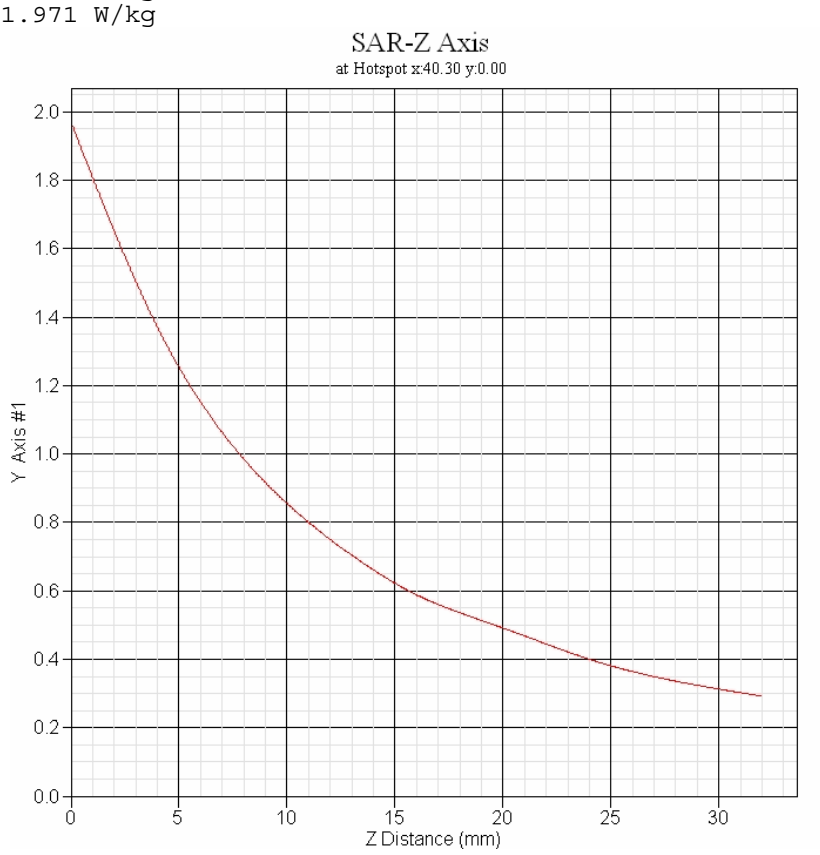
Measurement Data
Crest Factor : 4
Scan Type : Complete
Tissue Temp. : 22.40 °C
Ambient Temp. : 21.60 °C
Set-up Date : 26-Aug-2005
Set-up Time : 5:02:26 PM
Area Scan : 6x5x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

ALSAS-10U VER 2.2.0

Other Data
DUT Position : Touch
Separation : 0
Channel : High - 810



1 gram SAR value : 1.291 W/kg
10 gram SAR value : 0.838 W/kg
Area Scan Peak SAR : 1.362 W/kg
Zoom Scan Peak SAR : 1.971 W/kg



ALSAS-10U VER 2.2.0

SAR Test Report- Body GPRS CH661 BT on

Report Date : 26-Oct-2005
By Operator : 123
Measurement Date : 21-Oct-2005
Starting Time : 21-Oct-2005 02:59:27 PM
End Time : 21-Oct-2005 03:22:57 PM
Scanning Time : 1410 secs

Product Data
Device Name : M580
Serial No. : rear
Type : Clamshell Cell Phone
Model : M580
Frequency : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 89.9 mm
Width : 44.4 mm
Depth : 22.8 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.513 W/kg
Power Drift-Finish: 0.496 W/kg
Power Drift (%) : -3.314
Picture : C:\alsas\bitmap\Device-3.bmp

Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : User Define
Location : Center
Description : Uni-Phantom User Define

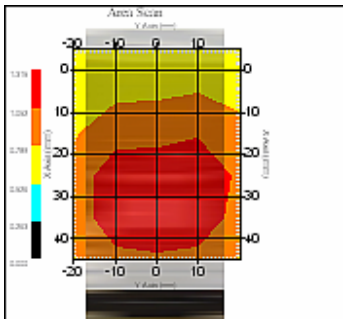
Tissue Data
Type : BODY
Serial No. : BenQ-018
Frequency : 1900.00 MHz
Last Calib. Date : 10-Jun-2005
Temperature : 22.40 °C
Ambient Temp. : 21.60 °C
Humidity : 58.00 RH%
Epsilon : 54.400 F/m
Sigma : 1.590 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : Probe 260 - BenQ
Model : E020
Type : E-Field Triangle
Serial No. : 260
Last Calib. Date : 14-Feb-2005
Frequency : 1900.00 MHz
Duty Cycle Factor: 4
Conversion Factor: 4.9
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 2.44 mm

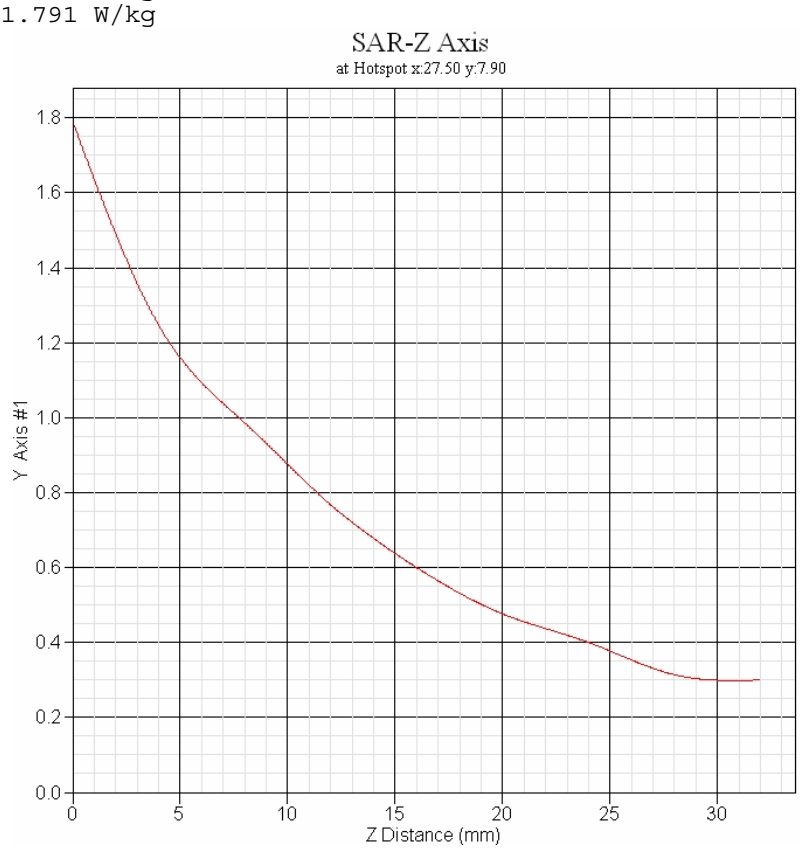
Measurement Data
Crest Factor : 4
Scan Type : Complete
Tissue Temp. : 22.40 °C
Ambient Temp. : 21.60 °C
Set-up Date : 21-Oct-2005
Set-up Time : 2:29:51 PM
Area Scan : 6x5x1 : Measurement x=10mm, y=10mm, z=4mm

ALSAS-10U VER 2.2.0

```
Zoom Scan         : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position      : Touch
Separation        : 0
Channel           : Mid - 661
```



```
1 gram SAR value    : 1.247 W/kg
10 gram SAR value   : 0.909 W/kg
Area Scan Peak SAR  : 1.313 W/kg
Zoom Scan Peak SAR  : 1.791 W/kg
```



Attachment 2: Probe Calibration & Dipole Calibration

(Total 30 pages)

NCL CALIBRATION LABORATORIES

Calibration File No: DC-509
Project Number: BENQ-ALSAS 10U-5120

CERTIFICATE OF CALIBRATION

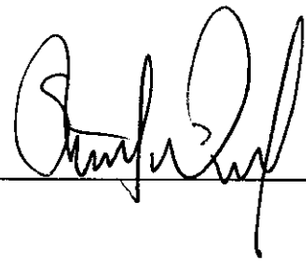
It is certified that the equipment identified below has been calibrated in the **NCL CALIBRATION LABORATORIES** by qualified personnel following recognized procedures and using transfer standards traceable to NRC/NIST.

BENQ Validation Dipole

Manufacturer: APREL Laboratories
Part number: ALS-D-1900-S-2
Frequency: 1900 MHz
Serial No: 210-00702

Customer: BENQ

Calibrated: 4th February 2005
Released on: 4th February 2005

Released By: 

NCL CALIBRATION LABORATORIES
51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E6

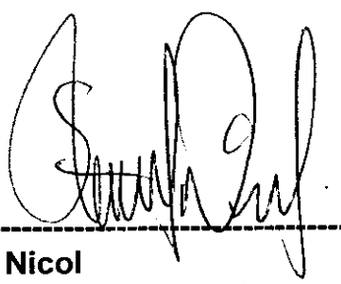
Division of APREL Lab.
TEL: (613) 820-4988
FAX: (613) 820-4162

Conditions

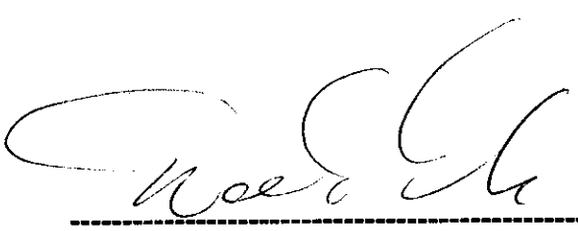
Dipole 1900-210-00702 was new and taken from stock prior to calibration.

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C
Temperature of the Tissue: 21 °C +/- 0.5°C

We the undersigned attest that to the best of our knowledge the calibration of this probe has been accurately conducted and that all information contained within this report has been reviewed for accuracy.



Stuart Nicol
Director Product Development



D. Brooks
Member of Engineering Staff
(Calibration Engineer)

This page has been reviewed for content and attested to by signature within this document.

Calibration Results Summary

The following results relate the Calibrated Dipole and should be used as a quick reference for the user.

Mechanical Dimensions

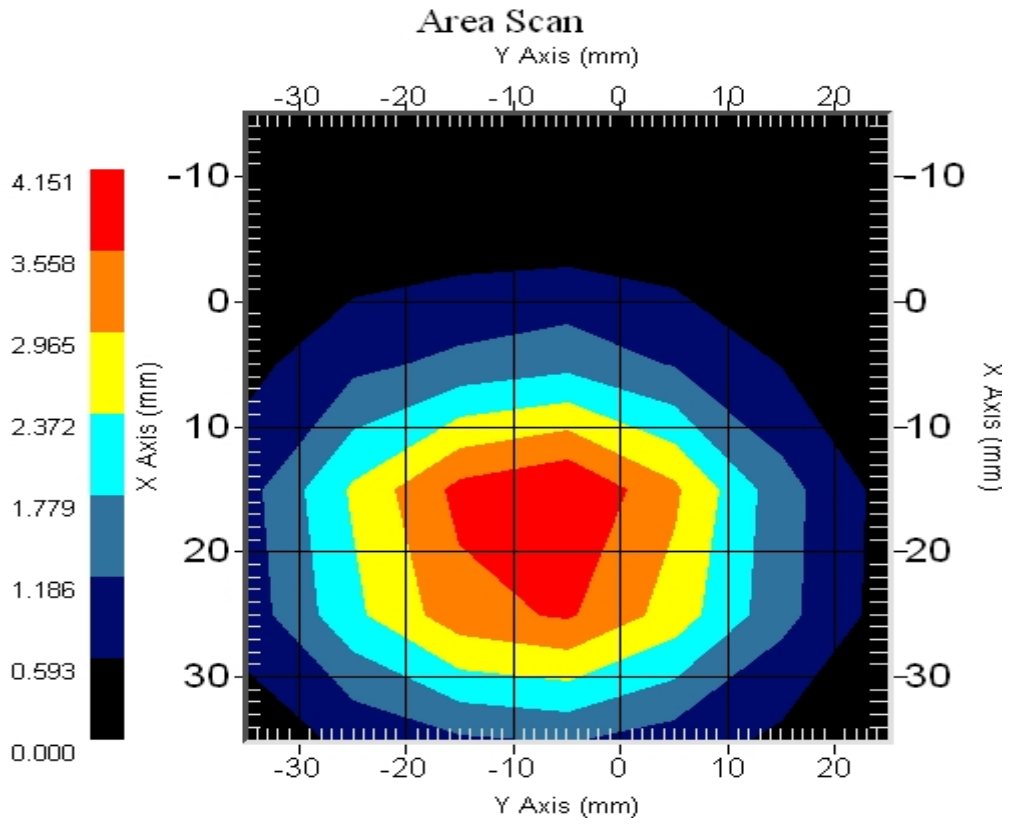
Length: 68.0 mm
Height: 39.5 mm

Electrical Specification

SWR: 1.08 U
Return Loss: -28.7 dB
Impedance: 50.7 Ω

System Validation Results

Frequency	1 Gram	10 Gram	Peak
1900 MHz	37.96	19.81	70.56



Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 1900-210-00702. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-020 130 MHz to 26 GHz E-Field Probe Serial Number 212.

References

SSI-TP-018-ALSAS Dipole Calibration Procedure
SSI-TP-016 Tissue Calibration Procedure
IEEE 1528 “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques”

Conditions

Dipole 1900-210-00702 was new taken from stock.

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C
Temperature of the Tissue: 20 °C +/- 0.5°C

Dipole Calibration Results

Mechanical Verification

APREL Length	APREL Height	Measured Length	Measured Height
68.0 mm	39.5 mm	68.2 mm	39.8 mm

Tissue Validation

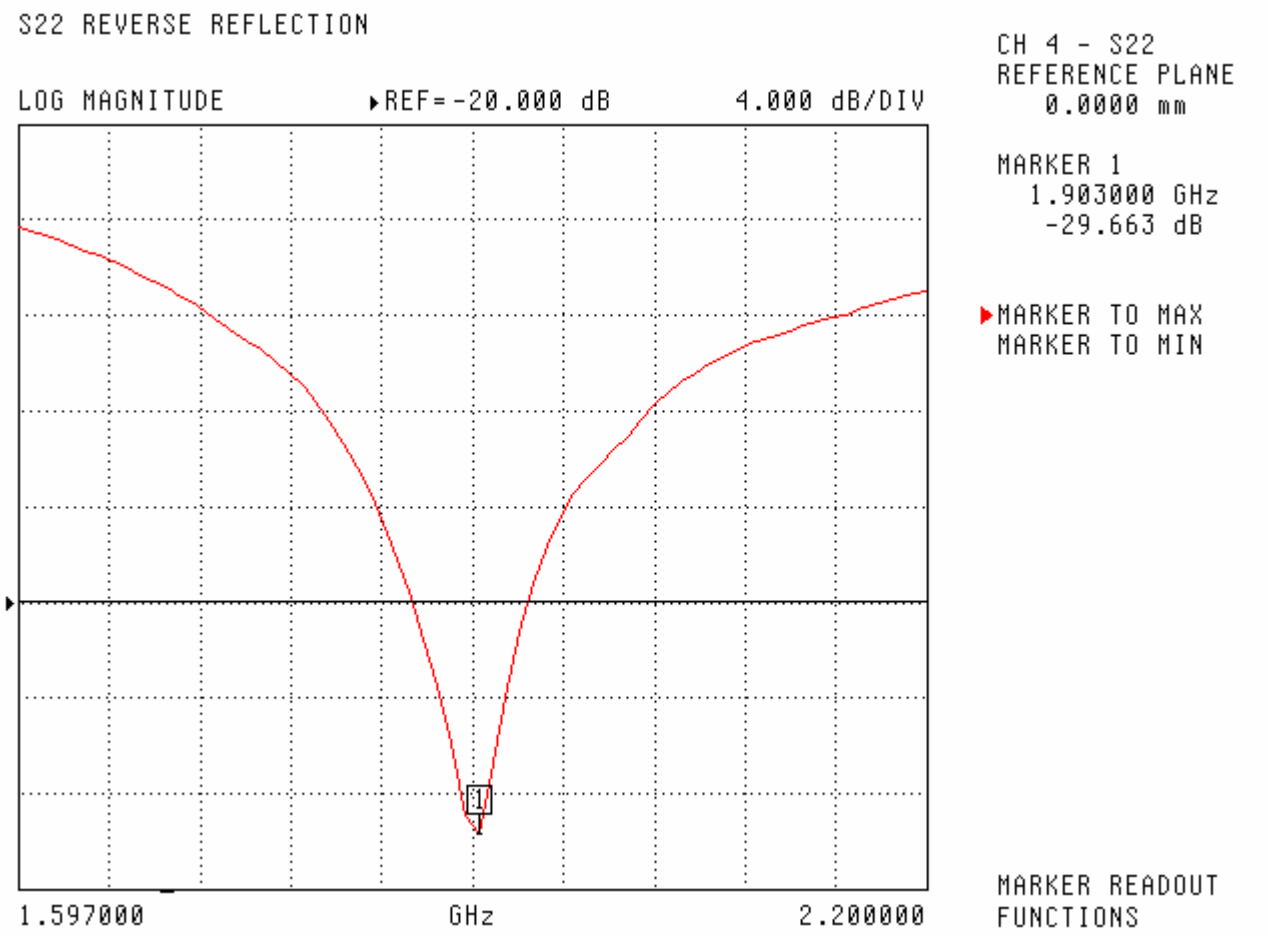
Head Tissue 1900 MHz	Measured
Dielectric constant, ε_r	40.0
Conductivity, σ [S/m]	1.40

Electrical Calibration

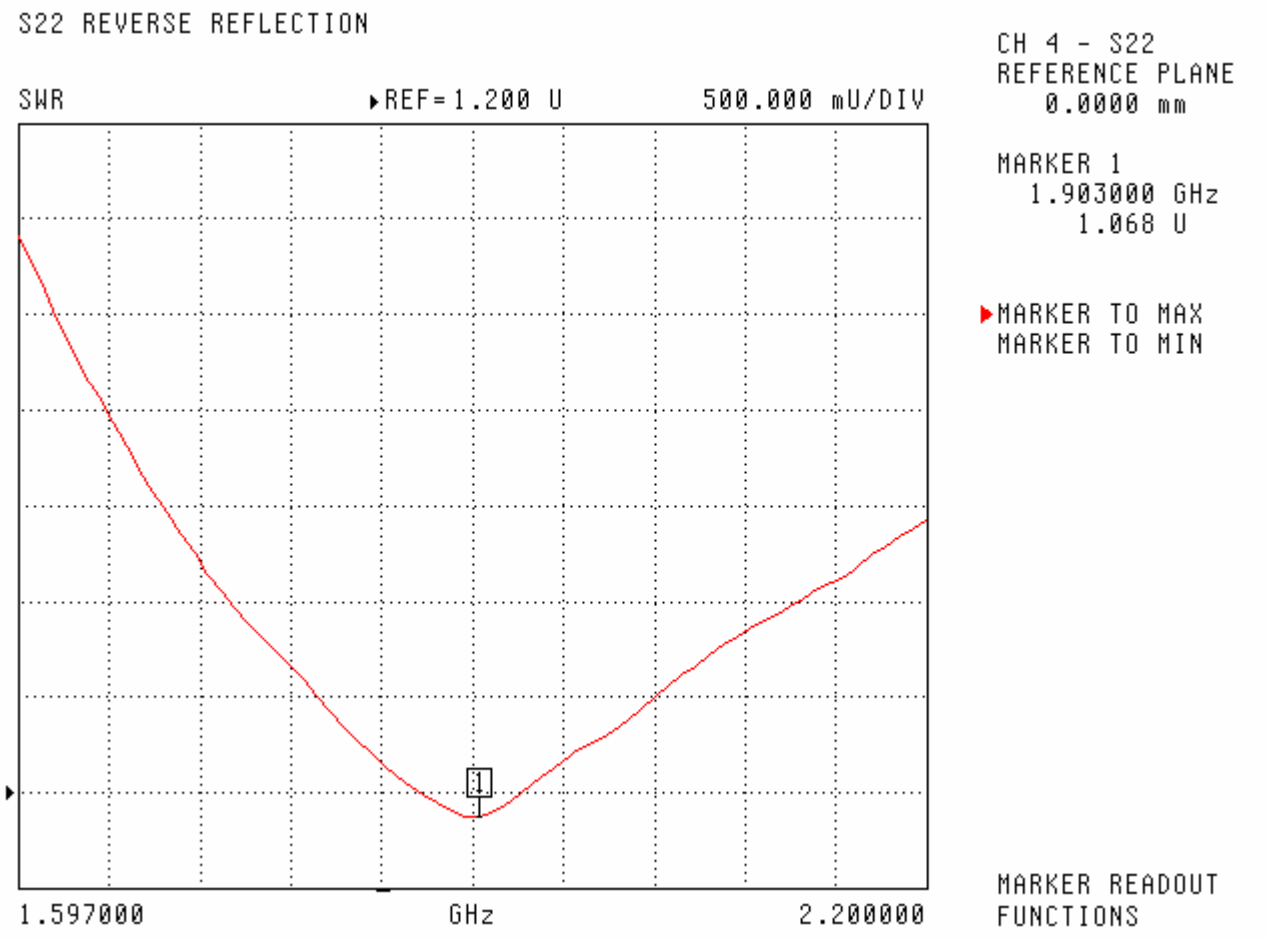
Test	Result
S11 R/L	-28.7 dB
SWR	1.08 U
Impedance	50.7 Ω

The Following Graphs are the results as displayed on the Vector Network Analyzer.

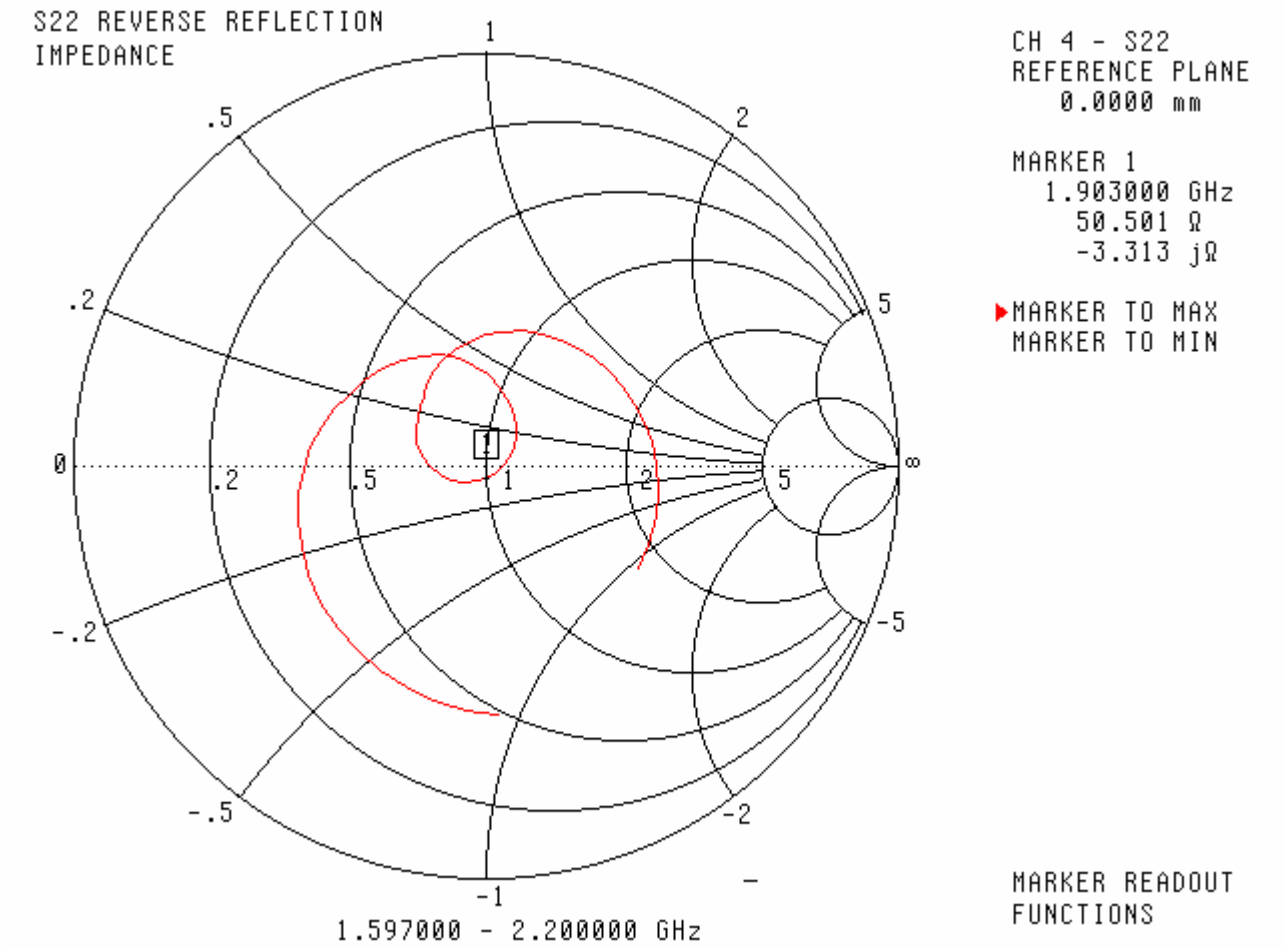
S11 Parameter Return Loss



SWR

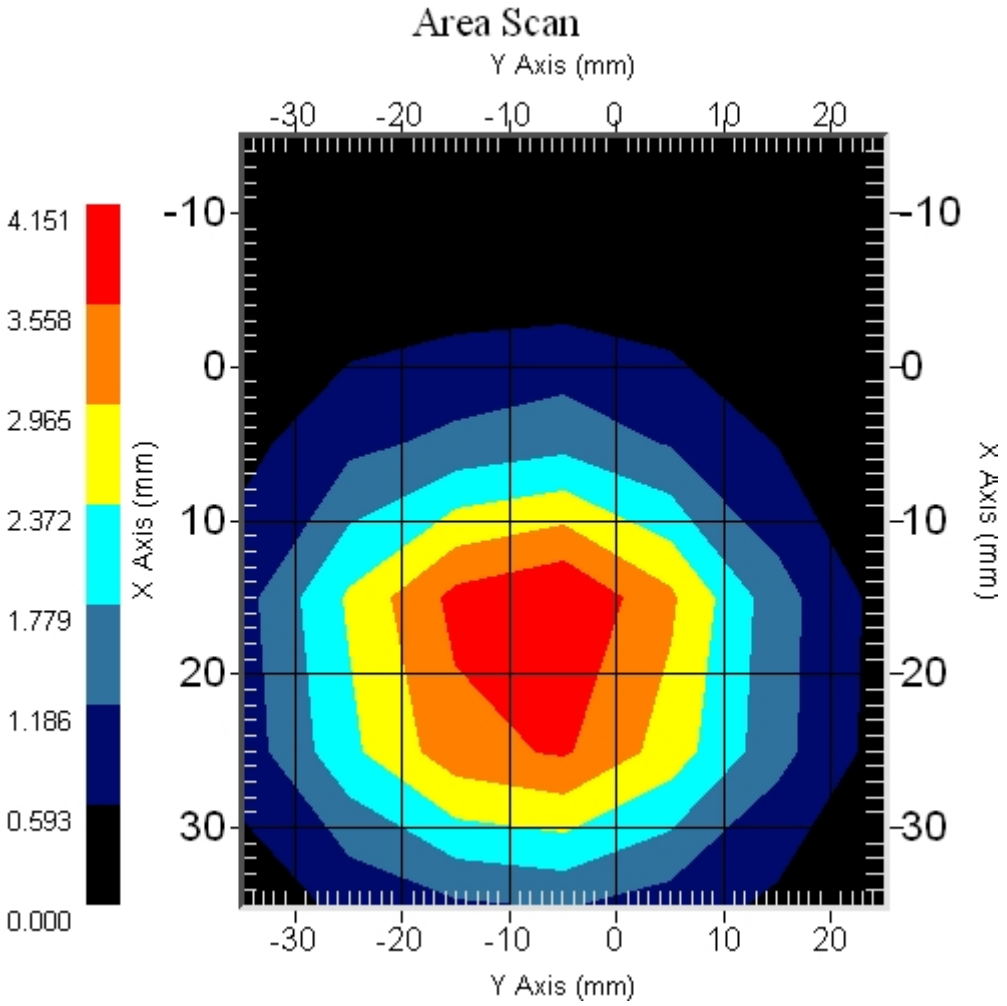


Smith Chart Dipole Impedance



System Validation Results Using the Electrically Calibrated Dipole

Head Tissue Frequency	1 Gram	10 Gram	Peak Above Feed Point
1900 MHz	37.96	19.81	70.56



Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2004

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-514

Client.: Ben-Q

CERTIFICATE OF CALIBRATION

It is certified that the equipment identified below has been calibrated in the **NCL CALIBRATION LABORATORIES** by qualified personnel following recognized procedures and using transfer standards traceable to NRC/NIST.

Equipment: Miniature Isotropic RF Probe 1900 MHz

Manufacturer: APREL Laboratories
Model No.: E-020
Serial No.: 260

Calibration Procedure: SSI/DRB-TP-D01-032-E020-V2
Project No: BEN-Q-ALSAS10U-5120

Calibrated: 14th February 2005
Released on: 14th February 2005

This Calibration Certificate is Incomplete Unless Accompanied with the Calibration Results Summary

Released By: _____

NCL CALIBRATION LABORATORIES
51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E6
Division of APREL Lab.
TEL: (613) 820-4988
FAX: (613) 820-4161

Introduction

This Calibration Report reproduces the results of the calibration performed in line with the SSI/DRB-TP-D01-032-E020-V2 E-Field Probe Calibration Procedure. The results contained within this report are for APREL E-Field Probe E-020 260.

References

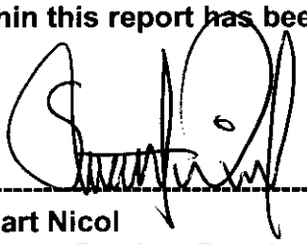
SSI/DRB-TP-D01-032-E020-V2 E-Field Probe Calibration Procedure
IEEE 1528 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"
SSI-TP-011 Tissue Calibration Procedure

Conditions

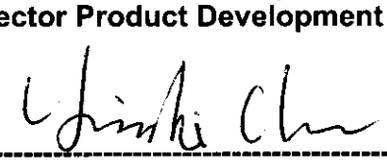
Probe 260 was a new probe taken from stock prior to calibration.

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C
Temperature of the Tissue: 21 °C +/- 0.5°C

We the undersigned attest that to the best of our knowledge the calibration of this probe has been accurately conducted and that all information contained within this report has been reviewed for accuracy.



Stuart Nicol
Director Product Development



Y. Chen
Member of Engineering Staff
(Calibration Engineer)

Calibration Results Summary

Probe Type:	E-Field Probe E-020
Serial Number:	260
Frequency:	1900 MHz
Sensor Offset:	1.56 mm
Sensor Length:	2.5 mm
Tip Enclosure:	Ertalyte*
Tip Diameter:	**<**5 mm
Tip Length:	60 mm
Total Length:	290 mm

*Resistive to recommended tissue recipes per IEEE-1528

Sensitivity in Air

Channel X:	1.2 $\mu V/(V/m)^2$
Channel Y:	1.2 $\mu V/(V/m)^2$
Channel Z:	1.2 $\mu V/(V/m)^2$
Diode Compression Point:	95 mV

Sensitivity in Head Tissue

Frequency: 1900 MHz

Epsilon: 40.0 (+/-5%) **Sigma:** 1.40 S/m (+/-10%)

ConvF

Channel X: 4.7

Channel Y: 4.7

Channel Z: 4.7

Tissue sensitivity values were calculated using the load impedance of the APREL Laboratories Daq-Paq.

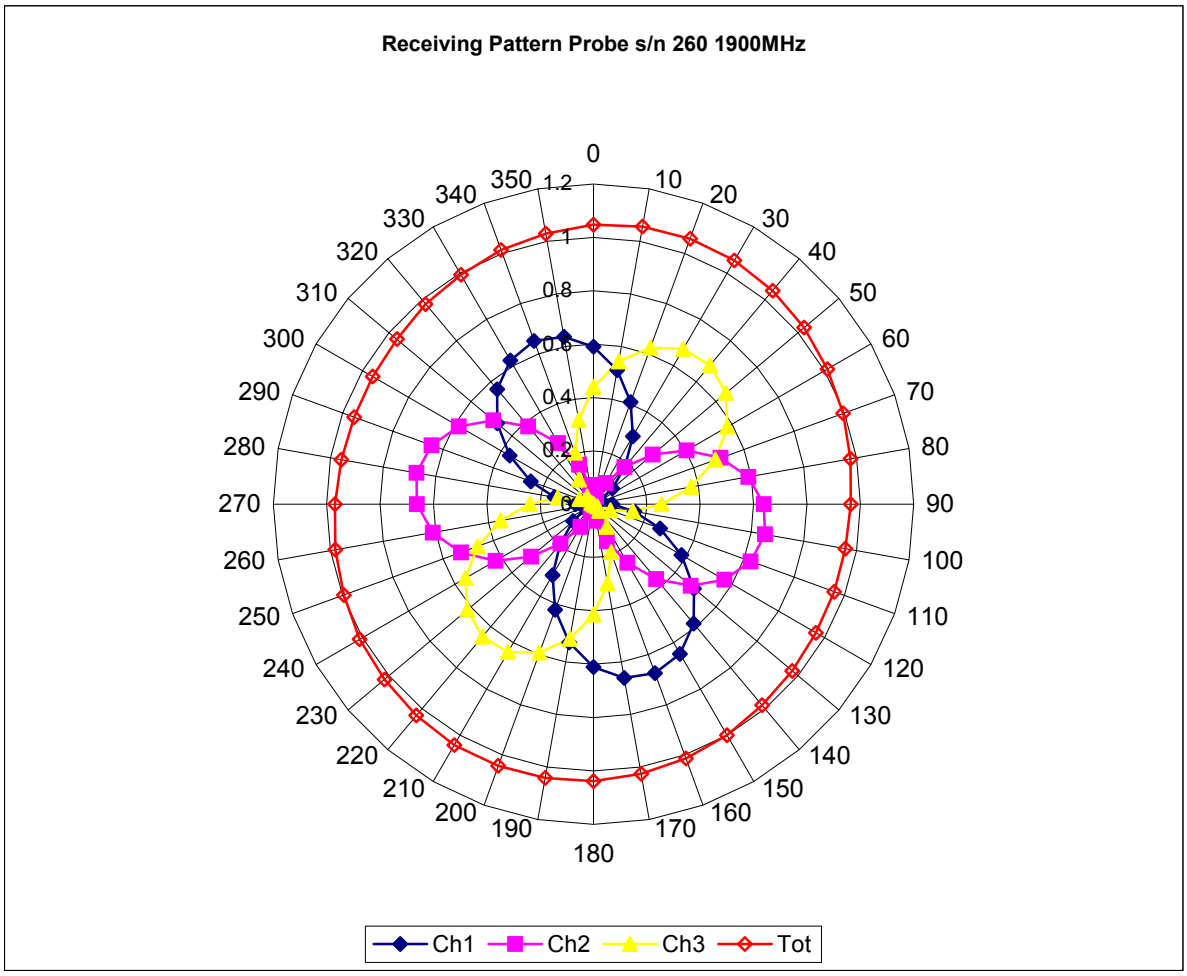
Boundary Effect:

Uncertainty resulting from the boundary effect is less than 2% for the distance between the tip of the probe and the tissue boundary, when less than 2.44mm.

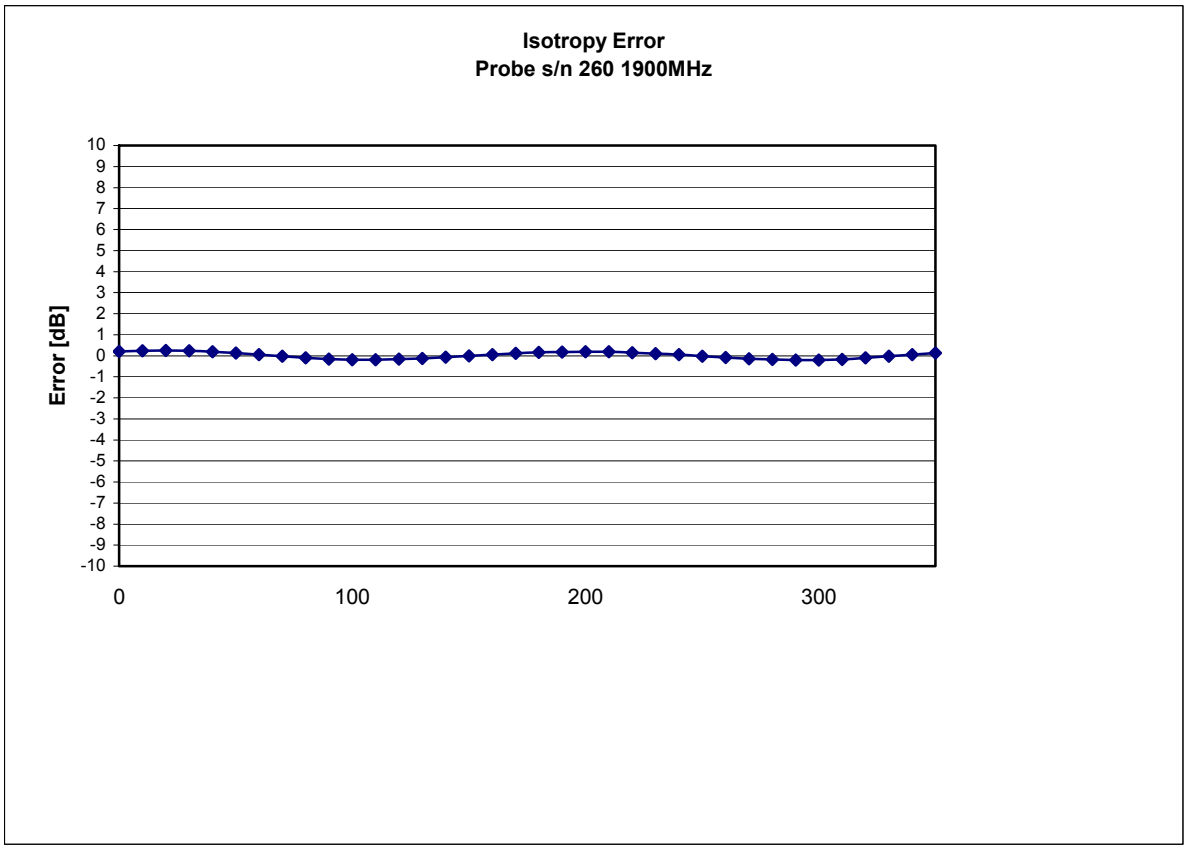
Spatial Resolution:

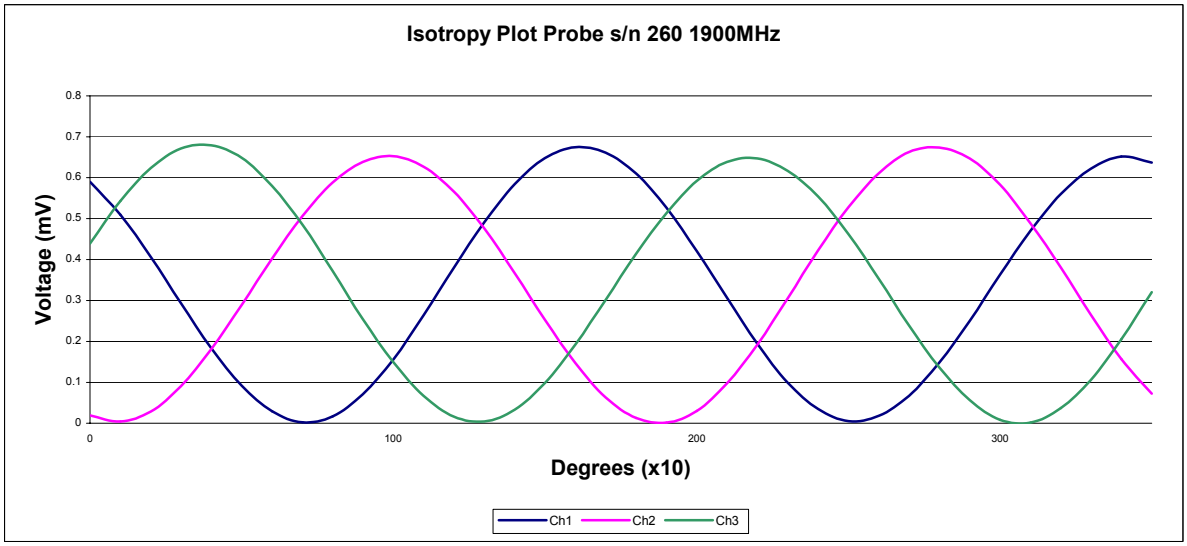
The measured probe tip diameter is 5 mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.

Receiving Pattern 1900 MHz (Air)



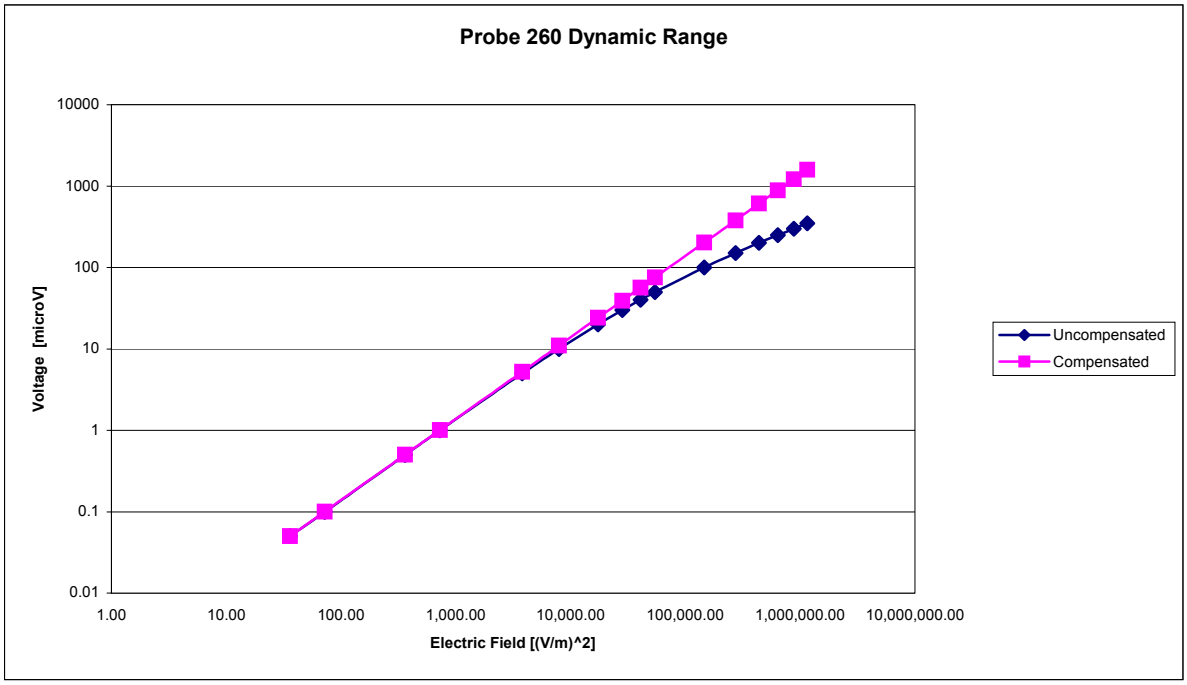
Isotropy Error 1900 MHz (Air)



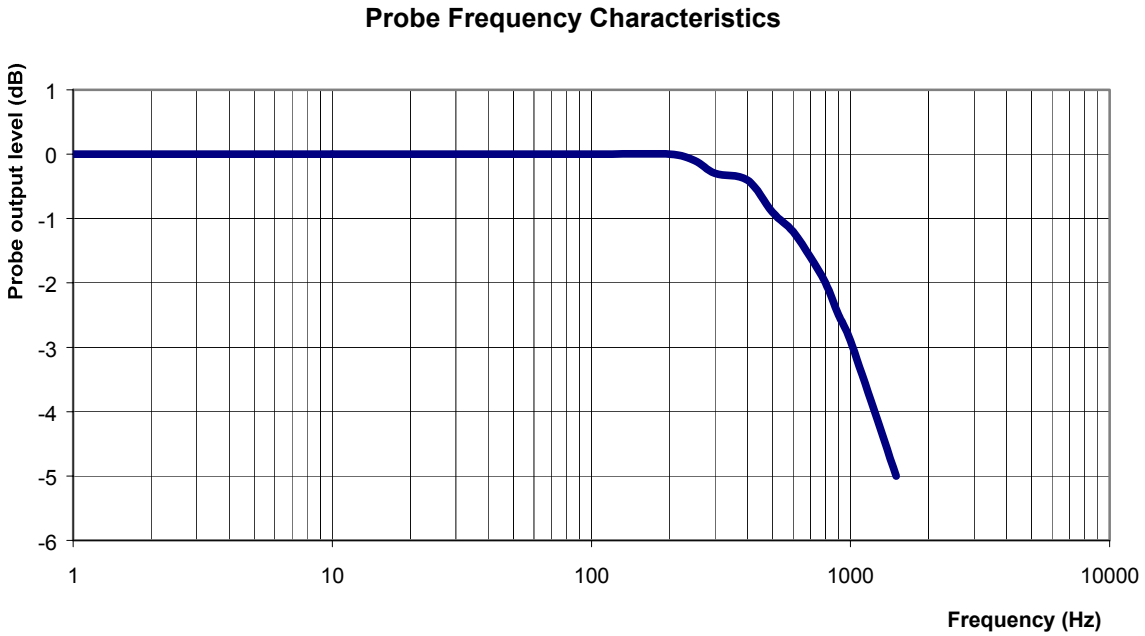


Isotropicity in Tissue: 0.10 dB

Dynamic Range



Video Bandwidth



Video Bandwidth at 500 Hz 1 dB
Video Bandwidth at 1.02 KHz: 3 dB

Conversion Factor Uncertainty Assessment

Frequency:		1900MHz	
Epsilon:	40.0 (+/-5%)	**Sigma:**	1.40 S/m (+/-10%)
ConvF			
Channel X:	4.7	7%(K=2)	
Channel Y:	4.7	7%(K=2)	
Channel Z:	4.7	7%(K=2)	

To minimize the uncertainty calculation all tissue sensitivity values were calculated using a load impedance of 5 MΩ.

Boundary Effect:

For a distance of 2.4mm the evaluated uncertainty (increase in the probe sensitivity) is less than 2%.

Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2004.

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-519

Client.: Ben-Q

CERTIFICATE OF CALIBRATION

It is certified that the equipment identified below has been calibrated in the **NCL CALIBRATION LABORATORIES** by qualified personnel following recognized procedures and using transfer standards traceable to NRC/NIST.

Equipment: Miniature Isotropic RF Probe 1900 MHz

Manufacturer: APREL Laboratories
Model No.: E-020
Serial No.: 260

Body Calibration

Calibration Procedure: SSI/DRB-TP-D01-032-E020-V2
Project No: BEN-Q-ALSAS10U-5120

Calibrated: 14th February 2005
Released on: 14th February 2005

This Calibration Certificate is Incomplete Unless Accompanied with the Calibration Results Summary

Released By: _____

NCL CALIBRATION LABORATORIES
51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E6

Division of APREL Lab.
TEL: (613) 820-4988
FAX: (613) 820-4161

Introduction

This Calibration Report reproduces the results of the calibration performed in line with the SSI/DRB-TP-D01-032-E020-V2 E-Field Probe Calibration Procedure. The results contained within this report are for APREL E-Field Probe E-020 260.

References

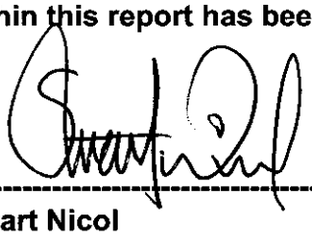
SSI/DRB-TP-D01-032-E020-V2 E-Field Probe Calibration Procedure
IEEE 1528 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"
SSI-TP-011 Tissue Calibration Procedure

Conditions

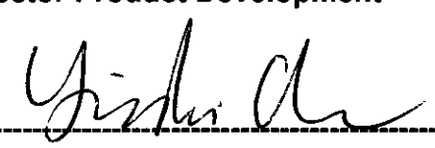
Probe 260 was a new probe taken from stock prior to calibration.

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C
Temperature of the Tissue: 21 °C +/- 0.5°C

We the undersigned attest that to the best of our knowledge the calibration of this probe has been accurately conducted and that all information contained within this report has been reviewed for accuracy.



Stuart Nicol
Director Product Development



Y. Chen
Member of Engineering Staff
(Calibration Engineer)

Calibration Results Summary

Probe Type:	E-Field Probe E-020
Serial Number:	260
Frequency:	1900 MHz
Sensor Offset:	1.56 mm
Sensor Length:	2.5 mm
Tip Enclosure:	Ertalyte*
Tip Diameter:	**<**5 mm
Tip Length:	60 mm
Total Length:	290 mm

*Resistive to recommended tissue recipes per IEEE-1528

Sensitivity in Air

Channel X:	1.2 $\mu V/(V/m)^2$
Channel Y:	1.2 $\mu V/(V/m)^2$
Channel Z:	1.2 $\mu V/(V/m)^2$
Diode Compression Point:	95 mV

Sensitivity in Body Tissue

Frequency: 1900 MHz

Epsilon: 53.3 (+/-5%) **Sigma:** 1.52 S/m (+/-10%)

ConvF

Channel X: 4.9

Channel Y: 4.9

Channel Z: 4.9

Tissue sensitivity values were calculated using the load impedance of the APREL Laboratories Daq-Paq.

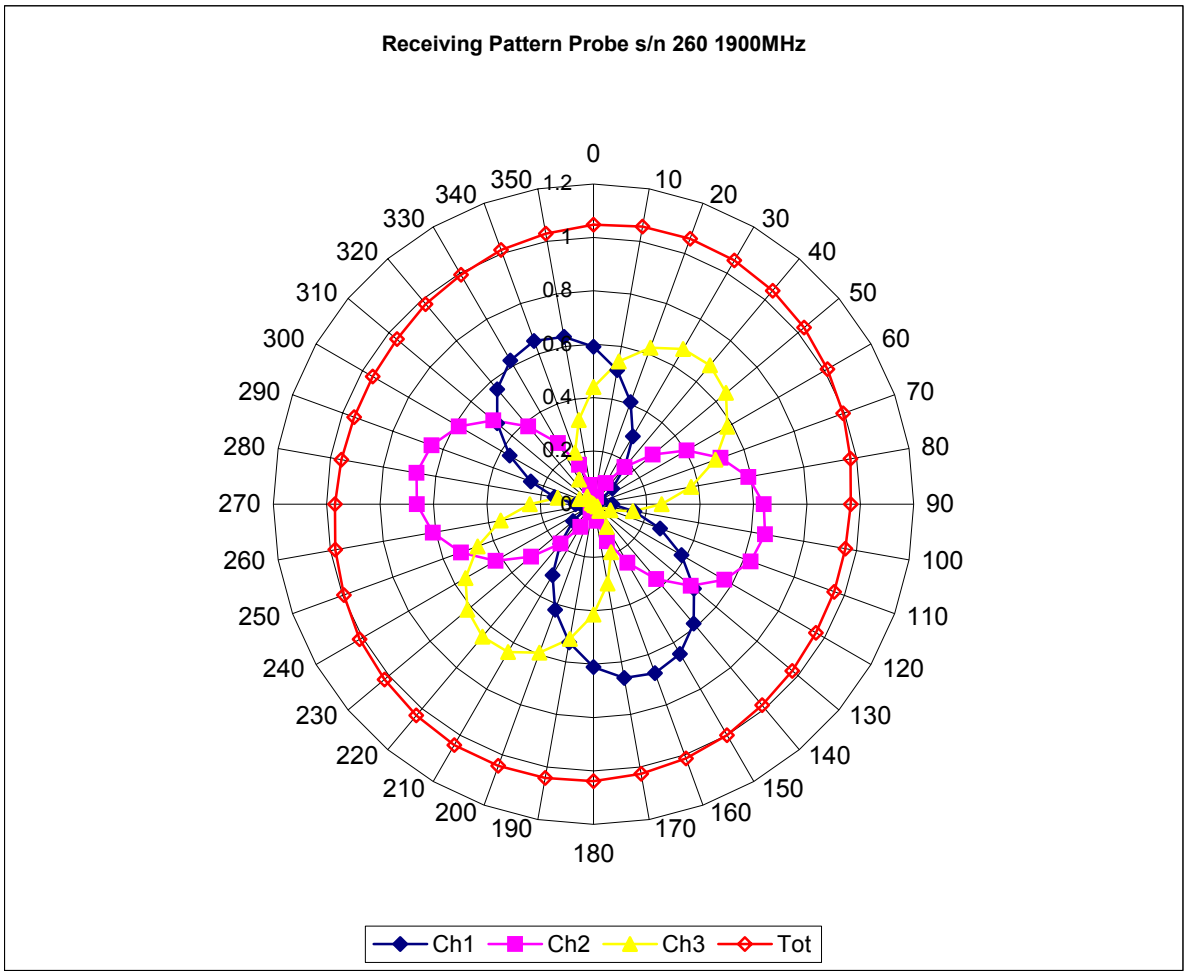
Boundary Effect:

Uncertainty resulting from the boundary effect is less than 2% for the distance between the tip of the probe and the tissue boundary, when less than 2.44mm.

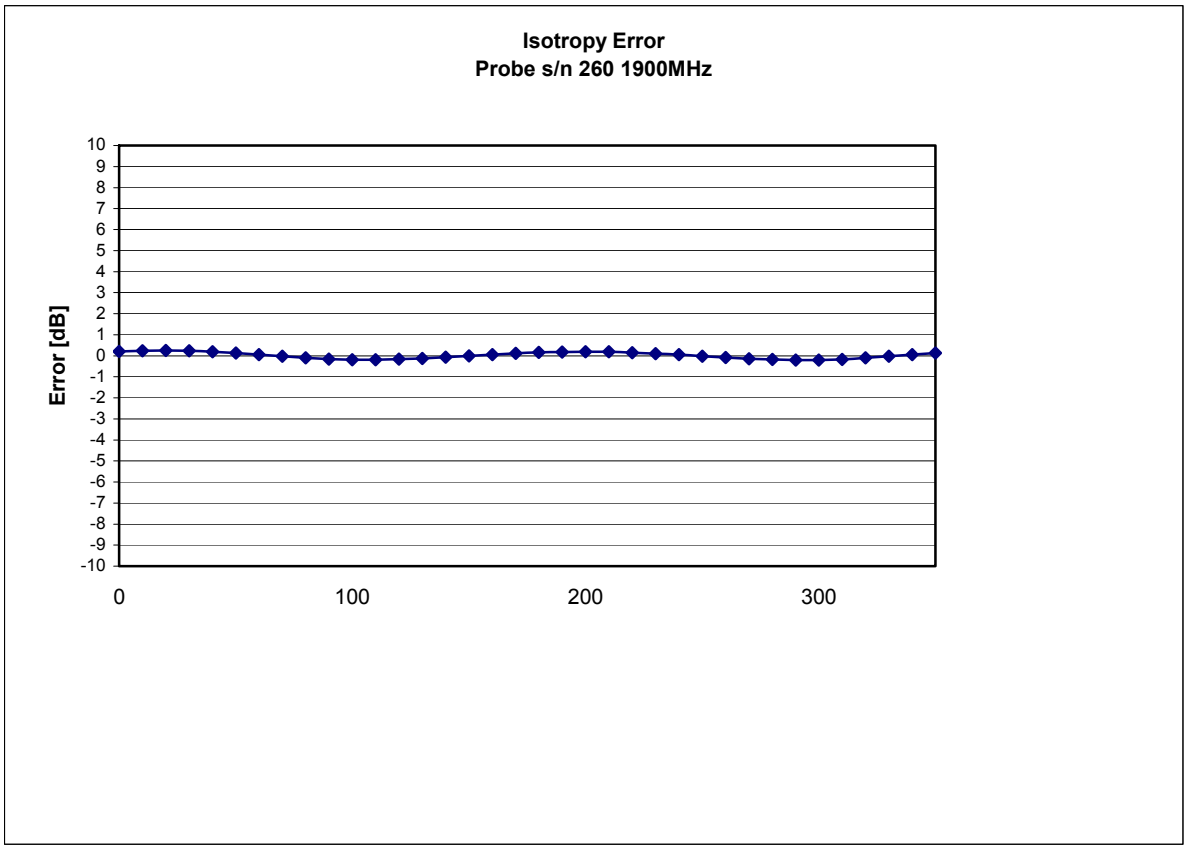
Spatial Resolution:

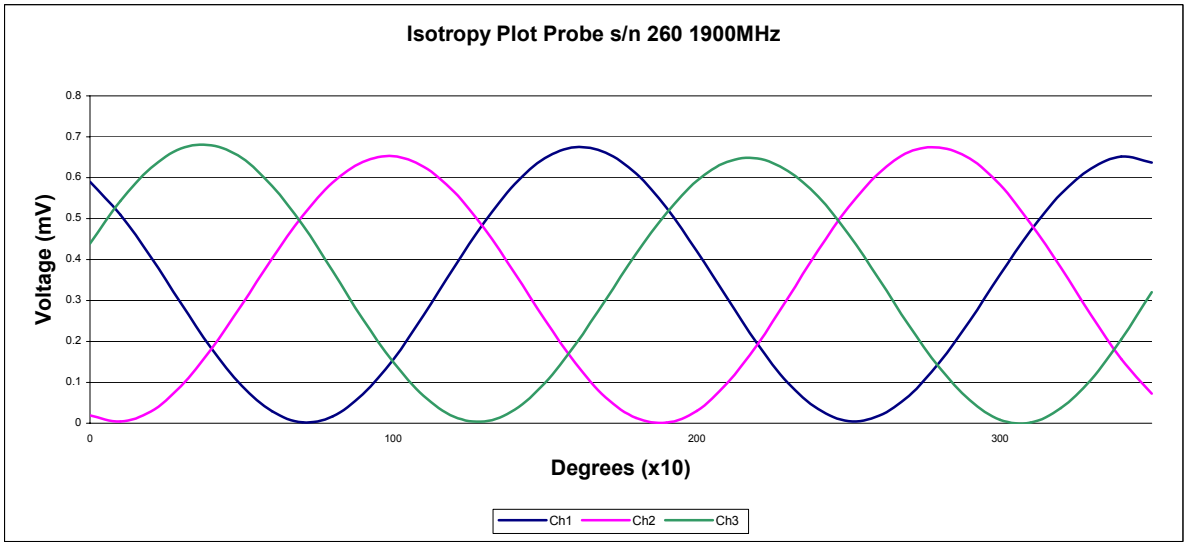
The measured probe tip diameter is 5 mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.

Receiving Pattern 1900 MHz (Air)



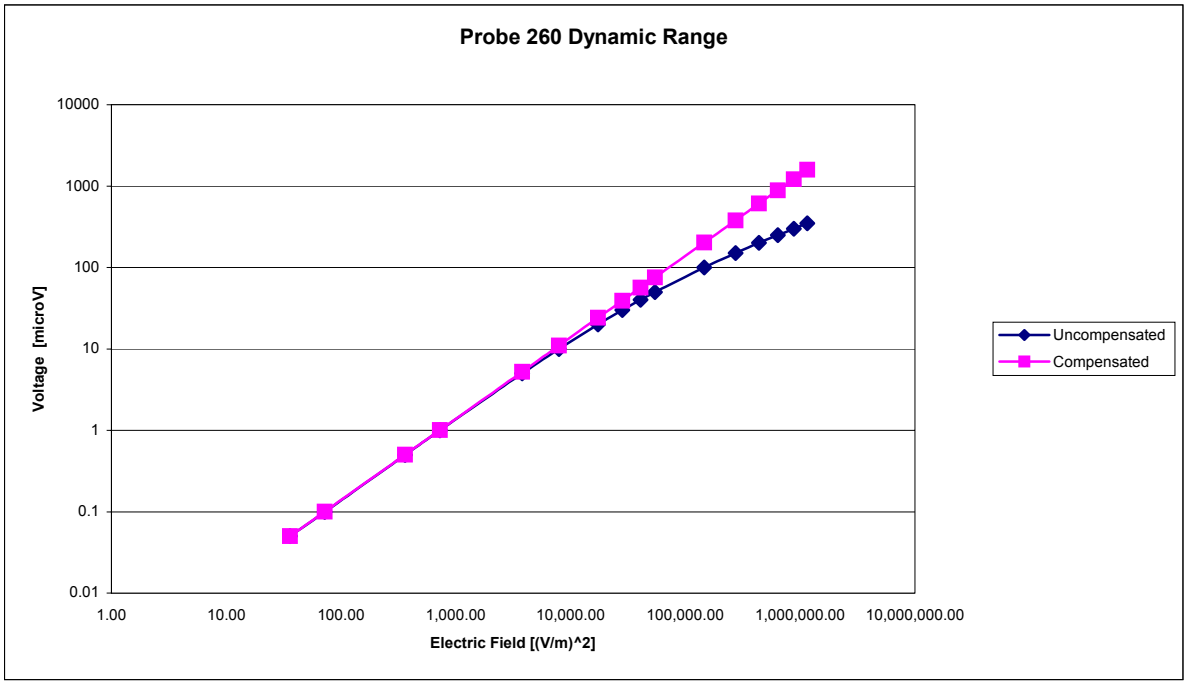
Isotropy Error 1900 MHz (Air)



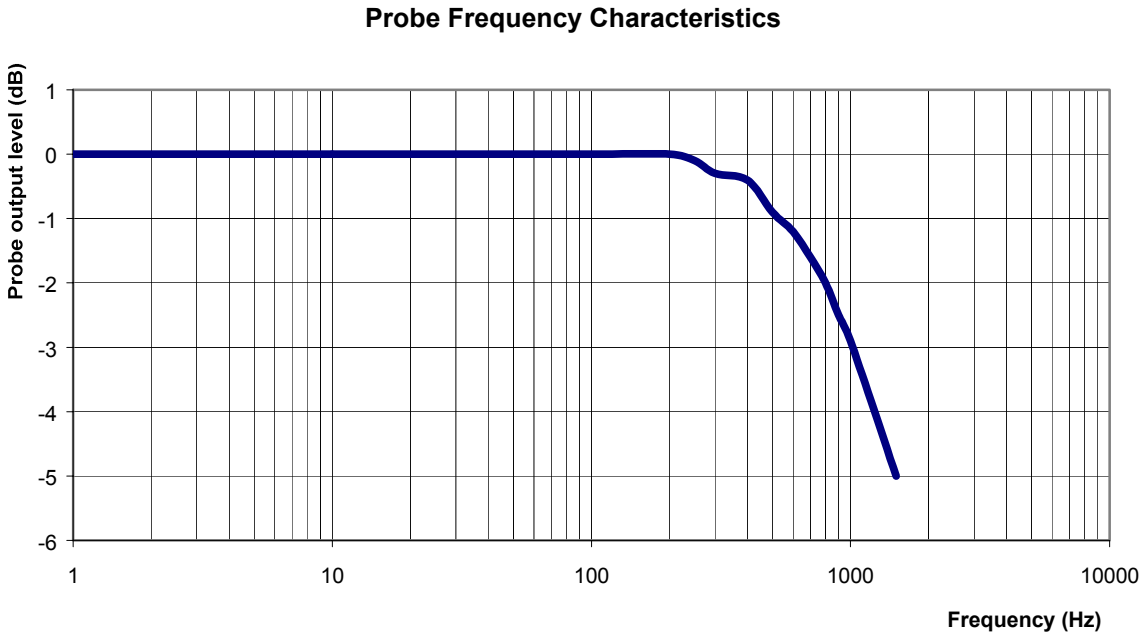


Isotropicity in Tissue: 0.10 dB

Dynamic Range



Video Bandwidth



Video Bandwidth at 500 Hz 1 dB
Video Bandwidth at 1.02 KHz: 3 dB

Conversion Factor Uncertainty Assessment

Frequency:		1900MHz	
Epsilon:	53.3 (+/-5%)	**Sigma:**	1.52 S/m (+/-10%)
ConvF			
Channel X:	4.9	7%(K=2)	
Channel Y:	4.9	7%(K=2)	
Channel Z:	4.9	7%(K=2)	

To minimize the uncertainty calculation all tissue sensitivity values were calculated using a load impedance of 5 MΩ.

Boundary Effect:

For a distance of 2.4mm the evaluated uncertainty (increase in the probe sensitivity) is less than 2%.

Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2004.