

## SAR EVALUATION REPORT

For

### Nexpro International Limitada

San Jose-Goicoechea, Guadalupe, Barrio Tournon, frente Al Hotel Villas Tournon,  
Oficinas Del Bufete Facio Y Canas, Costa Rica

**FCC ID: ZYPQ28**

<b>Report Type:</b> Original Report	<b>Product Type:</b> GSM Mobile Phone
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<b>Report Number:</b> R1DG120206001-20	
<b>Report Date:</b> 2012-03-14	
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\* This report contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "★" (Rev.2)

Attestation of Test Results		
<b>EUT Information</b>	<b>Company Name</b>	Nexpro International Limitada
	<b>EUT Description</b>	GSM Mobile Phone
	<b>FCC ID</b>	ZYPQ28
	<b>Model Number</b>	Q28
	<b>Test Date</b>	2012.03.10—2012.03.11
<b>Frequency</b>	<b>Max. SAR Level(s) Measured</b>	<b>Limit(W/Kg)</b>
<b>Cellular Band</b>	0.628 W/kg 1g Head Tissue 1.320 W/kg 1g Body Tissue	<b>1.6</b>
<b>PCS Band</b>	1.043 W/kg 1g Head Tissue 1.341 W/kg 1g Body Tissue	
<b>WiFi(802.11b)</b>	0.074 W/kg 1g Head Tissue 0.155 W/kg 1g Body Tissue	
<b>Applicable Standards</b>	<b>ANSI / IEEE C95.1 : 2005</b> IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields,3 kHz to 300 GHz.	
	<b>ANSI / IEEE C95.3 : 2002</b> IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields,100 kHz—300 GHz.	
	<b>OET BULLETIN 65 SUPPLEMENT C</b> Evaluating Compliance with FCC Guidelines for Human Exposure To Radiofrequency Electromagnetic Fields	
	<b>IEEE1528:2003</b> IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques	
<p><b>Note:</b> This wireless device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General Population/Uncontrolled Exposure limits specified in ANSI/IEEE Standards and has been tested in accordance with the measurement procedures specified in FCC OET 65 Supplement C and IEEE 1528-2003.</p> <p><b>The results and statements contained in this report pertain only to the device(s) evaluated.</b></p>		

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**DOCUMENT REVISION HISTORY**

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<b>Revision Number</b>	<b>Report Number</b>	<b>Description of Revision</b>	<b>Date of Revision</b>
0	R1DG120206001-20	Original Report	2012-03-14

## EUT DESCRIPTION

This report has been prepared on behalf of Nexpro International Limitada and their product, FCC ID: ZYPQ28, Model: Q28 or the EUT (Equipment Under Test) as referred to in the rest of this report. The EUT is a GSM Mobile phone.

### Technical Specification

<b>Product Type</b>	Portable
<b>Exposure Category:</b>	Population / Uncontrolled
<b>Antenna Type(s):</b>	Internal Antenna
<b>Body-Worn Accessories:</b>	Headset
<b>Face-Head Accessories:</b>	None
<b>Multi-slot Class:</b>	Class 12
<b>Operation Mode :</b>	GSM Voice , GPRS Data , E-GPRS Data , Bluetooth and WiFi
<b>Frequency Band:</b>	Cellular Band : 824-849 MHz(TX) ; 869-894 MHz(RX) PCS Band : 1850-1910 MHz(TX) ; 1930-1990 MHz(RX) Bluetooth : 2400MHz-2483.5MHz WiFi(802.11b/11g/802.11n-20/802.11n-40) : 2412MHz-2462MHz
<b>Conducted RF Power:</b>	Cellular Band : 32.45dBm PCS Band : 30.50dBm Bluetooth : 7.63dBm WiFi(802.11b) : 19.30dBm WiFi(802.11g): 16.24 dBm WiFi(80211n-20): 16.41dBm WiFi(802.11n-40):14.28dBm
<b>Dimensions (L*W*H):</b>	118mm (L)× 58mm (W)× 13mm (H)
<b>Weight:</b>	102.4g
<b>Power Source:</b>	3.7VDC/ 1000mAh Rechargeable Battery
<b>Normal Operation:</b>	Head and Body-worn

Note: The device does not support as wireless router hotspot function.

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## REFERENCE, STANDARDS, AND GUIDELINES

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### **FCC:**

The Report and Order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 1.6 mW/g as recommended by the ANSI/IEEE standard C95.1-1992 [6] for an uncontrolled environment (Paragraph 65). According to the Supplement C of OET Bulletin 65 "Evaluating Compliance with FCC Guide-lines for Human Exposure to Radio frequency Electromagnetic Fields", released on Jun 29, 2001 by the FCC, the device should be evaluated at maximum output power (radiated from the antenna) under "worst-case" conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

This report describes the methodology and results of experiments performed on wireless data terminal. The objective was to determine if there is RF radiation and if radiation is found, what is the extent of radiation with respect to safety limits. SAR (Specific Absorption Rate) is the measure of RF exposure determined by the amount of RF energy absorbed by human body (or its parts) – to determine how the RF energy couples to the body or head which is a primary health concern for body worn devices. The limit below which the exposure to RF is considered safe by regulatory bodies in North America is 1.6 mW/g average over 1 gram of tissue mass.

### **CE:**

The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 2 mW/g as recommended by EN62209-1 for an uncontrolled environment. According to the Standard, the device should be evaluated at maximum output power (radiated from the antenna) under "worst-case" conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

This report describes the methodology and results of experiments performed on wireless data terminal. The objective was to determine if there is RF radiation and if radiation is found, what is the extent of radiation with respect to safety limits. SAR (Specific Absorption Rate) is the measure of RF exposure determined by the amount of RF energy absorbed by human body (or its parts) – to determine how the RF energy couples to the body or head which is a primary health concern for body worn devices. The limit below which the exposure to RF is considered safe by regulatory bodies in Europe is 2 mW/g average over 10 gram of tissue mass.

The test configurations were laid out on a specially designed test fixture to ensure the reproducibility of measurements. Each configuration was scanned for SAR. Analysis of each scan was carried out to characterize the above effects in the device.

**SAR Limits**

FCC Limit (1g Tissue)

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

CE Limit (10g Tissue)

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 10 g of tissue)	2.0	10
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

Population/Uncontrolled Environments are defined as locations where there is the exposure of individual who have no knowledge or control of their exposure.

Occupational/Controlled Environments are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure (i.e. as a result of employment or occupation).

General Population/Uncontrolled environments Spatial Peak limit 1.6W/kg (FCC) & 2 W/kg (CE) applied to the EUT.

## FACILITIES AND ACCREDITATION

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The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect data is located at 6/F, the 3rd Phase of WanLi Industrial Building, Shi Hua Road, Fu Tian Free Trade Zone, Shenzhen, Guangdong, P.R. of China

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



The current scope of accreditations can be found at <http://ts.nist.gov/Standards/scopes/2007070.htm>



## DESCRIPTION OF TEST SYSTEM

These measurements were performed with ALSAS 10 Universal Integrated SAR Measurement system from APREL Laboratories.

### 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 modeling to provide a platform which is repeatable with minimum uncertainty.

### 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.

### 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 10mm<sup>2</sup> 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.

### 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/m<sup>3</sup> 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 (including FCC) utilize a physical step of 5x5x8 (8mmx8mmx5mm) providing a volume of 32mm<sup>3</sup> in the X & Y axis, and 35mm in the Z axis.



**ALSAS-10U Interpolation and Extrapolation Uncertainty**

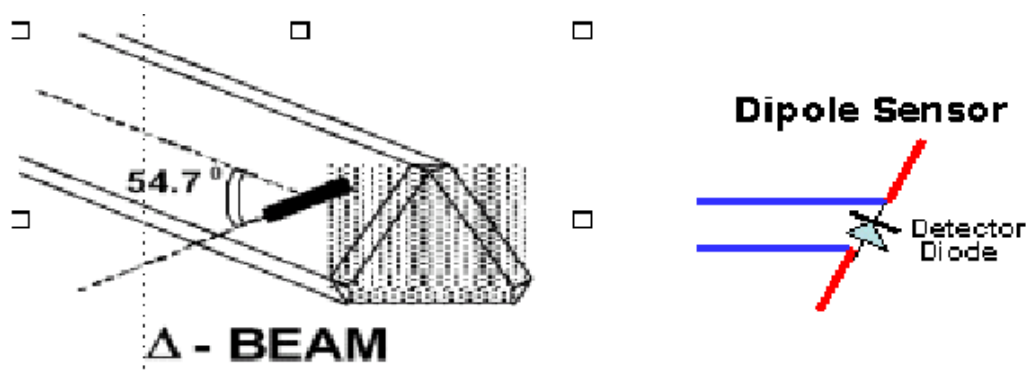
The overall uncertainty for the methodology and algorithms the used during the SAR calculation was evaluated using the data from IEEE 1528 based on the example f3 algorithm:

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

**Isotropic E-Field Probe**

The isotropic E-Field probe has been fully calibrated and assessed for isotropicity, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change.

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.

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

## Isotropic E-Field Probe Specification

<b>Calibration Method</b>	Frequency Dependent Below 1 GHz Calibration in air performed in a TEM Cell Above 1 GHz Calibration in air performed in waveguide
<b>Sensitivity</b>	0.70 $\mu\text{V}/(\text{V}/\text{m})^2$ to 0.85 $\mu\text{V}/(\text{V}/\text{m})^2$
<b>Dynamic Range</b>	0.0005 W/kg to 100 W/kg
<b>Isotropic Response</b>	Better than 0.1 dB
<b>Diode Compression Point (DCP)</b>	Calibration for Specific Frequency
<b>Probe Tip Diameter</b>	< 2.9 mm
<b>Sensor Offset</b>	1.56 (+/- 0.02 mm)
<b>Probe Length</b>	289 mm
<b>Video Bandwidth</b>	@ 500 Hz: 1 dB @ 1.02 kHz: 3 dB
<b>Boundary Effect</b>	Less than 2.1% for distance greater than 0.58 mm
<b>Spatial Resolution</b>	The spatial resolution uncertainty is less than 1.5% for 4.9mm diameter probe. The spatial resolution uncertainty is less than 1.0% for 2.5mm diameter probe

## 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.

## 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 5 $\mu\text{V}$  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.

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

## 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.



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

## 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.

### Universal Device Positioner

The universal device positioner allows 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.

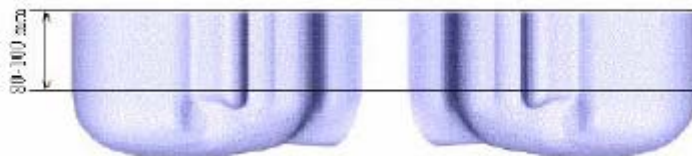


**Phantom Types**

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

**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.



### 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.



### 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.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (Nacl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton x-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (s/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

### Recommended Tissue Dielectric Parameters for Head and Body

Frequency (MHz)	Head Tissue		Body Tissue	
	$\epsilon_r$	$\sigma$ (S/m)	$\epsilon_r$	$\sigma$ (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

## EQUIPMENT LIST AND CALIBRATION

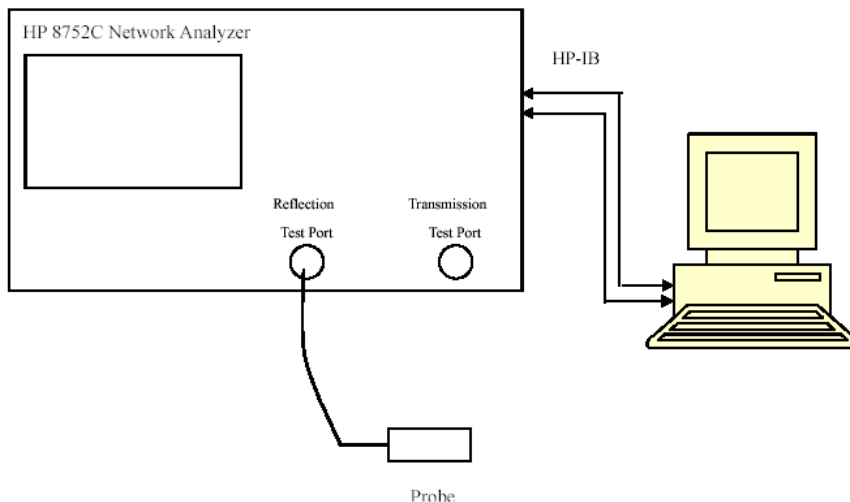
### Equipments List & Calibration Information

Equipment	Model	Calibration Date	S/N
CRS F3 robot	ALS-F3	N/A	RAF0805352
CRS F3 Software	ALS-F3-SW	N/A	N/A
CRS C500C controller	ALS-C500	N/A	RCF0805379
Probe mounting device & Boundary Detection Sensor System	ALS-PMDPS-3	N/A	120-00270
Universal Work Station	ALS-UWS	N/A	100-00157
Data Acquisition Package	ALS-DAQ-PAQ-3	2011-05-13	110-00212
Miniature E-Field Probe	ALS-E-020	2011-07-14	500-00283
Dipole, 835MHz	ALS-D-835-S-2	2011-08-25	210-00558
Dipole,1900MHz	ALS-D-1900-S-2	2011-08-25	210-00710
Dipole,2450MHz	ALS-D-2450-S-2	2011-08-25	220-00758
Dipole Spacer	ALS-DS-U	N/A	250-00907
R&S, universal Radio Communication Tester	CMU200	2011-06-28	1100.0008.02
Device holder/Positioner	ALS-H-E-SET-2	N/A	170-00510
Left ear SAM phantom	ALS-P-SAM-L	N/A	130-00311
Right ear SAM phantom	ALS-P-SAM-R	N/A	140-00359
UniPhantom	ALS-P-UP-1	N/A	150-00413
Simulated Tissue 835 MHz Head	ALS-T-835-1-H	Each Time	270-01002
Simulated Tissue 835 MHz Body	ALS-T-835-1-B	Each Time	270-02101
Simulated Tissue 1900 MHz Head	ALS-T-1900-1-H	Each Time	295-01103
Simulated Tissue 1900 MHz Body	ALS-T-1900-1-B	Each Time	295-02102
Simulated Tissue 2450 MHz Head	ALS-TS-2450-H	Each Time	290-01108
Simulated Tissue 2450 MHz Body	ALS-TS-2450-B	Each Time	290-01109
Power Amplifier	5S1G4	N/A	71377
Synthesized Sweeper	HP 8341B	2011-04-11	2624A00116
Spectrum Analyzer	FSEM30	2011-07-05	849720/019



# SAR MEASUREMENT SYSTEM VERIFICATION

## Liquid Verification



Liquid Verification Setup Block Diagram

## Liquid Verification Results

Frequency (MHz)	Liquid Type	Liquid Parameter		Result
		$\epsilon_r$	$\sigma$ (S/m)	
835	Head	42.40	0.91	In Tolerance
835	Body	56.19	0.99	In Tolerance
1900	Head	40.52	1.42	In Tolerance
1900	Body	53.07	1.51	In Tolerance

\*Liquid Verification was performed on 2012-03-10.

Frequency (MHz)	Liquid Type	Liquid Parameter		Result
		$\epsilon_r$	$\sigma$ (S/m)	
2450	Head	39.10	1.81	In Tolerance
2450	Body	51.70	1.96	In Tolerance

\*Liquid Verification was performed on 2012-03-11.

Please refer to the following tables.

850 MHz Head			850 MHz Body		
Frequency (MHz)	e'	e''	Frequency (MHz)	e'	e''
824.0	42.4433555	19.59867265	824.0	56.19384	21.87767
824.5	42.4122635	19.58942265	824.5	56.16754	21.88629
825.0	42.3955695	19.55504765	825.0	56.15606	21.88941
825.5	42.2902175	19.54502865	825.5	56.09244	21.91748
826.0	42.3086125	19.52237165	826.0	56.07701	21.84953
826.5	42.3305495	19.49349565	826.5	56.1647	21.89388
827.0	42.3069885	19.52995865	827.0	56.18761	21.88419
827.5	42.3544055	19.53630465	827.5	56.20071	21.87811
828.0	42.3740505	19.51859165	828.0	56.14673	21.84145
828.5	42.3804905	19.56776665	828.5	56.14155	21.87558
829.0	42.4315245	19.62561965	829.0	56.16079	21.85608
829.5	42.3799135	19.61695565	829.5	56.17515	21.88283
830.0	42.4163545	19.58395565	830.0	56.22112	21.87544
830.5	42.3763025	19.54066565	830.5	56.14555	21.86934
831.0	42.3492465	19.61985265	831.0	56.10653	21.87169
831.5	42.3688405	19.60206265	831.5	56.16229	21.94915
832.0	42.3305815	19.52698665	832.0	56.12437	21.80728
832.5	42.3053515	19.57408865	832.5	56.08922	21.81933
833.0	42.3459725	19.51913165	833.0	56.12906	21.82519
833.5	42.3774555	19.58175765	833.5	56.20829	21.87681
834.0	42.3748755	19.55973365	834.0	56.15597	21.78506
834.5	42.3734525	19.57916265	834.5	56.19005	21.81668
835.0	42.3983315	19.56838265	835.0	56.18872	21.83168
835.5	42.3993335	19.55894765	835.5	56.18345	21.80182
836.0	42.4029405	19.54008565	836.0	56.14276	21.81814
836.5	42.3879425	19.60205865	836.5	56.14841	21.86415
837.0	42.3747125	19.57466965	837.0	56.16254	21.80255
837.5	42.3689085	19.52249765	837.5	56.24969	21.81736
838.0	42.3921265	19.59195865	838.0	56.22753	21.81902
838.5	42.3505745	19.56028065	838.5	56.18813	21.83273
839.0	42.3404845	19.56642965	839.0	56.14221	21.84347
839.5	42.3429595	19.50693465	839.5	56.20317	21.81875
840.0	42.3540495	19.53299965	840.0	56.16842	21.78702
840.5	42.3433885	19.51866365	840.5	56.17617	21.76631
841.0	42.3266275	19.50091665	841.0	56.15064	21.75843
841.5	42.3561295	19.53715265	841.5	56.19786	21.75528
842.0	42.3578345	19.49357765	842.0	56.15198	21.79343
842.5	42.3615385	19.47523965	842.5	56.20132	21.76757
843.0	42.3556215	19.53168765	843.0	56.17701	21.74840
843.5	42.2791695	19.52070165	843.5	56.15500	21.77729
844.0	42.3555765	19.48683465	844.0	56.13260	21.76284
844.5	42.3097745	19.52885265	844.5	56.12854	21.79563
845.0	42.2356425	19.50707965	845.0	56.11414	21.74558
845.5	42.2509755	19.51113065	845.5	56.13324	21.72597
846.0	42.2054665	19.48134465	846.0	56.06183	21.75235
846.5	42.2464885	19.46784465	846.5	56.13318	21.75574
847.0	42.2267175	19.49215165	847.0	56.16006	21.70064
847.5	42.2299085	19.48943065	847.5	56.14888	21.71444
848.0	42.2034565	19.45438965	848.0	56.09862	21.71105
848.5	42.2080615	19.49206765	848.5	56.09689	21.72114
849.0	42.1682485	19.48130565	849.0	56.13832	21.70358

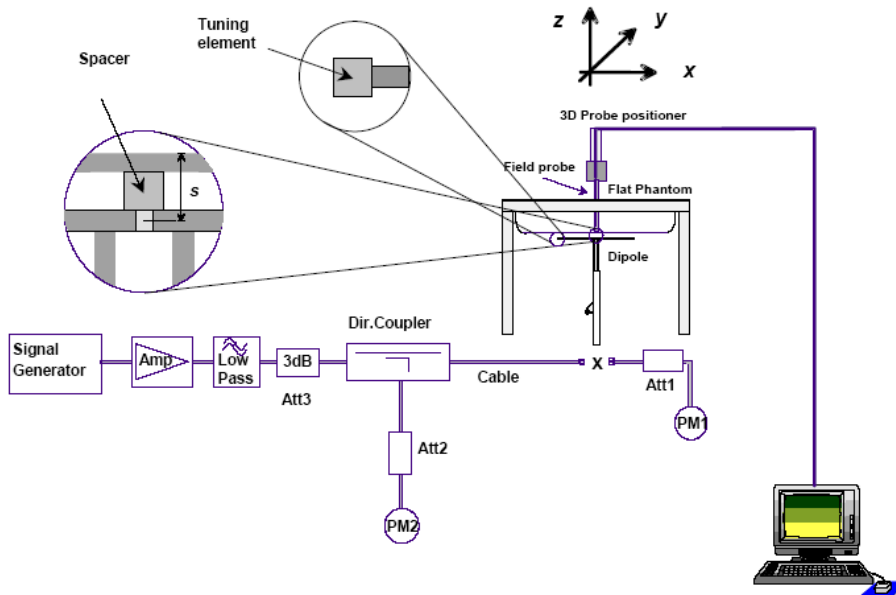
1900 MHz Head			1900 MHz Body		
Frequency (MHz)	e'	e''	Frequency (MHz)	e'	e''
1850.0	40.636988	13.460499	1850.0	52.94310	14.53740
1851.2	40.651520	13.455584	1851.2	52.92968	14.55938
1852.4	40.648426	13.427457	1852.4	52.95396	14.54002
1853.6	40.583038	13.404106	1853.6	52.90352	14.48324
1854.8	40.572999	13.414521	1854.8	52.92058	14.52638
1856.0	40.585309	13.435863	1856.0	52.90558	14.54235
1857.2	40.610437	13.418107	1857.2	52.91560	14.49469
1858.4	40.593770	13.432757	1858.4	52.91069	14.54649
1859.6	40.569810	13.420889	1859.6	52.91305	14.53186
1860.8	40.580434	13.399776	1860.8	52.94644	14.52663
1862.0	40.560169	13.388784	1862.0	52.93401	14.49556
1863.2	40.564165	13.396658	1863.2	52.93597	14.52989
1864.4	40.564734	13.369498	1864.4	52.91098	14.51386
1865.6	40.525050	13.352188	1865.6	52.95902	14.52884
1866.8	40.502952	13.357881	1866.8	52.92813	14.51454
1868.0	40.534981	13.351218	1868.0	52.91048	14.51057
1869.2	40.524913	13.371086	1869.2	52.98047	14.55784
1870.4	40.514660	13.341523	1870.4	52.95220	14.57112
1871.6	40.513011	13.374611	1871.6	52.97792	14.56134
1872.8	40.530678	13.389319	1872.8	52.99068	14.57839
1874.0	40.538131	13.407383	1874.0	52.98132	14.60809
1875.2	40.526040	13.394471	1875.2	53.00331	14.59416
1876.4	40.508414	13.431439	1876.4	53.00745	14.63029
1877.6	40.510176	13.415944	1877.6	53.00514	14.63481
1878.8	40.505500	13.429284	1878.8	53.04515	14.65680
1880.0	40.517579	13.469094	1880.0	53.06955	14.63313
1881.2	40.482313	13.458521	1881.2	53.03972	14.68918
1882.4	40.486870	13.481422	1882.4	53.03269	14.66796
1883.6	40.502507	13.463339	1883.6	53.04987	14.67708
1884.8	40.518121	13.479249	1884.8	53.09044	14.68718
1886.0	40.503914	13.501718	1886.0	53.07733	14.72044
1887.2	40.494951	13.483770	1887.2	53.09171	14.70202
1888.4	40.483814	13.501193	1888.4	53.06859	14.69574
1889.6	40.463897	13.490244	1889.6	53.06570	14.71951
1890.8	40.459193	13.478899	1890.8	53.05098	14.69796
1892.0	40.459289	13.513864	1892.0	53.08398	14.70362
1893.2	40.443862	13.488178	1893.2	53.08754	14.71401
1894.4	40.434357	13.476427	1894.4	53.05588	14.67818
1895.6	40.440702	13.525892	1895.6	53.04537	14.70153
1896.8	40.413893	13.504031	1896.8	53.02548	14.71483
1898.0	40.433950	13.502451	1898.0	53.02461	14.74050
1899.2	40.450361	13.472231	1899.2	53.05747	14.69741
1900.4	40.447487	13.490121	1900.4	53.06029	14.70266
1901.6	40.433740	13.477802	1901.6	53.04616	14.69778
1902.8	40.406604	13.486582	1902.8	53.04281	14.68834
1904.0	40.405397	13.485392	1904.0	53.03807	14.71766
1905.2	40.391127	13.492575	1905.2	53.02403	14.68064
1906.4	40.411565	13.486739	1906.4	52.99950	14.66846
1907.6	40.413810	13.495657	1907.6	53.02330	14.65991
1908.8	40.412313	13.513094	1908.8	52.99024	14.67077
1910.0	40.461796	13.528507	1910.0	53.00361	14.68315

2450 MHz Head			2450 MHz Body		
Frequency (MHz)	e'	e''	Frequency (MHz)	e'	e''
2410	39.243701	13.434660	2410	51.872750	14.35510
2411	39.221805	13.433311	2411	51.886679	14.396238
2412	39.243867	13.406125	2412	51.901734	14.355985
2413	39.196030	13.370515	2413	51.869692	14.395549
2414	39.194927	13.423079	2414	51.830889	14.361244
2415	39.197382	13.385153	2415	51.907081	14.373592
2416	39.178975	13.418143	2416	51.914606	14.376067
2417	39.167258	13.403356	2417	51.861952	14.346011
2418	39.163122	13.420319	2418	51.853261	14.378530
2419	39.132130	13.379920	2419	51.876561	14.366186
2420	39.164832	13.404093	2420	51.834152	14.403718
2421	39.153802	13.446519	2421	51.846351	14.404743
2422	39.163444	13.439049	2422	51.800365	14.413113
2423	39.109770	13.402235	2423	51.855049	14.421525
2424	39.095467	13.500332	2424	51.805438	14.451111
2425	39.121859	13.503589	2425	51.828738	14.388473
2426	39.121559	13.450975	2426	51.739640	14.419858
2427	39.116358	13.505270	2427	51.700350	14.416219
2428	39.123071	13.476684	2428	51.779799	14.407093
2429	39.117008	13.515476	2429	51.760808	14.437523
2430	39.115579	13.433497	2430	51.761116	14.432052
2431	39.130180	13.482496	2431	51.652177	14.429379
2432	39.133481	13.511023	2432	51.688361	14.443167
2433	39.074375	13.450025	2433	51.676823	14.431303
2434	39.116539	13.415580	2434	51.685493	14.453332
2435	39.015034	13.490192	2435	51.674864	14.411245
2436	39.075928	13.429712	2436	51.702719	14.397523
2437	39.102490	13.441469	2437	51.699493	14.413125
2438	39.082260	13.438462	2438	51.620868	14.426532
2440	39.120424	13.463825	2440	51.633280	14.444326
2441	39.085785	13.458180	2441	51.621804	14.448509
2442	39.117769	13.422813	2442	51.658827	14.448877
2443	39.092608	13.406871	2443	51.592665	14.403905
2444	39.063118	13.400137	2444	51.611067	14.457628
2445	39.025408	13.422397	2445	51.606057	14.433969
2446	39.082355	13.410079	2446	51.673918	14.468173
2447	39.059899	13.401945	2447	51.658073	14.457734
2448	39.040204	13.376953	2448	51.650517	14.474551
2449	39.030574	13.407797	2449	51.697676	14.410357
2450	39.016506	13.415417	2450	51.549500	14.489026
2451	39.025202	13.380189	2451	51.616819	14.439193
2452	38.998422	13.386459	2452	51.531588	14.464046
2453	39.011502	13.384899	2453	51.442101	14.471106
2454	39.035760	13.370621	2454	51.471674	14.446973
2455	39.036068	13.373986	2455	51.456043	14.436610
2456	38.997826	13.388319	2456	51.483802	14.422924
2457	39.031725	13.362616	2457	51.437194	14.456522
2458	39.024268	13.371074	2458	51.422005	14.431261
2459	39.050273	13.380592	2459	51.408225	14.410543
2460	39.031516	13.390339	2460	51.427942	14.419008
2461	39.055655	13.358928	2461	51.429876	14.482062
2462	39.040204	13.376953	2462	51.650517	14.474551

### System Accuracy Verification

Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of  $\pm 10\%$ . The validation results are tabulated below. And also the corresponding SAR plot is attached as well in the SAR plots files.

### System Verification Setup Block Diagram



### System Accuracy Check Results

Date	Frequency (MHz)	Liquid Type	Measured SAR (W/Kg)	Target Value (W/Kg)	Delta (%)	Tolerance (%)
2012-03-10	835	Head	1g 10.031	9.590	4.599	$\pm 10$
		Body	1g 9.483	9.684	-2.076	$\pm 10$
	1900	Head	1g 40.364	39.648	1.806	$\pm 10$
		Body	1g 39.592	39.769	-0.445	$\pm 10$
2012-03-11	2450	Head	1g 54.220	52.667	2.949	$\pm 10$
		Body	1g 52.916	52.561	0.675	$\pm 10$

\*All SAR values are normalized to 1 Watt forward power.

**SAR SYSTEM VALIDATION DATA****Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)****System Performance Check 835MHz Head Liquid****Dipole 835 MHz; Type: ALS-D-835-S-2; S/N: 180-00558**

## Product Data

Device Name : Dipole 835 MHz  
Serial No. : 180-00558  
Type : Dipole  
Model : ALS-D-835-S-2  
Frequency : 835.00 MHz  
Max. Transmit Pwr : 1 W  
Drift Time : 3 min(s)  
Power Drift-Start : 10.868 W/kg  
Power Drift-Finish : 11.100 W/kg  
Power Drift (%) : 3.815

## Phantom Data

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

## Tissue Data

Type : HEAD  
Serial No. : 270-01002  
Frequency : 835.00 MHz  
Last Calib. Date : 10-Mar-2012  
Temperature : 20.00 °C  
Ambient Temp. : 21.00 °C  
Humidity : 56.00 RH%  
Epsilon : 42.40 F/m  
Sigma : 0.91 S/m  
Density : 1000.00 kg/cu. m

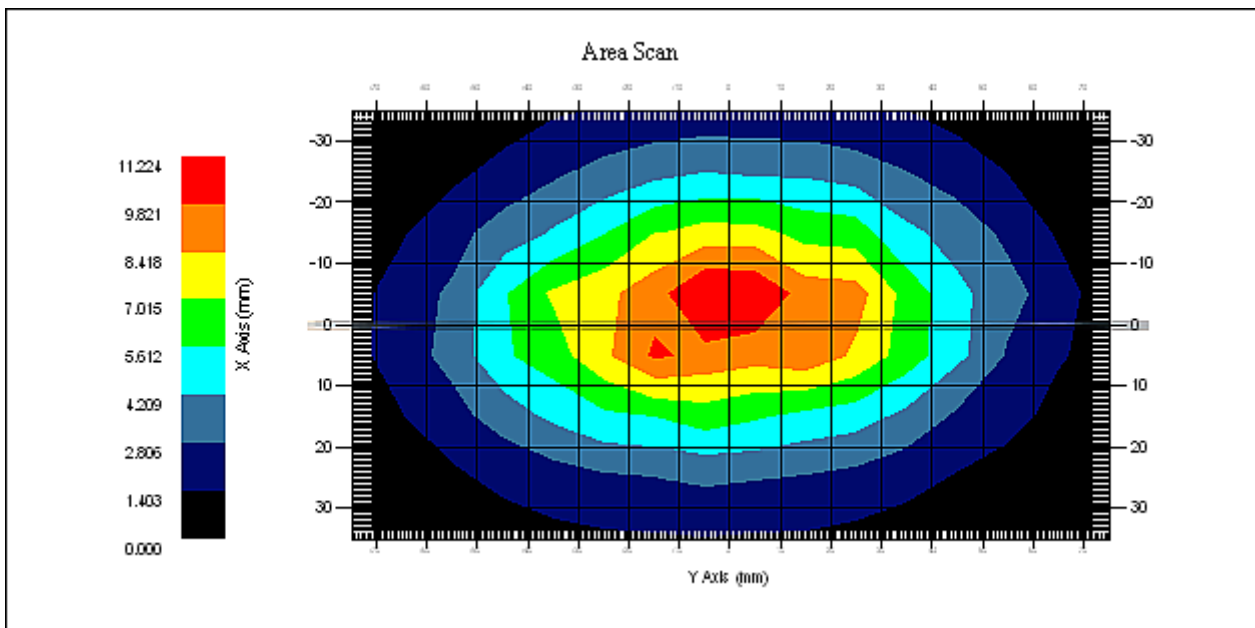
## Probe Data

Name : E-Field  
Model : E-020  
Type : E-Field Triangle  
Serial No. : 500-00283  
Last Calib. Date : 14-Jul-2011  
Frequency : 835.00 MHz  
Duty Cycle Factor : 1  
Conversion Factor : 6.6  
Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point : 95.00 mV  
Offset : 1.56 mm

## Measurement Data

Crest Factor : 1  
Scan Type : Complete  
Tissue Temp. : 21.00 °C  
Ambient Temp. : 21.00 °C  
Area Scan : 7x9x1 : Measurement x=10mm, y=10mm, z=4mm  
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm

1 gram SAR value : 10.031 W/kg  
10 gram SAR value : 6.079 W/kg  
Area Scan Peak SAR : 11.224 W/kg  
Zoom Scan Peak SAR : 16.314 W/kg



**835 MHz System Validation with Head Tissue**

**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)****System Performance Check 835MHz Body Liquid****Dipole 835 MHz; Type: ALS-D-835-S-2; S/N: 180-00558**

## Product Data

Device Name : Dipole 835 MHz  
Serial No. : 180-00558  
Type : Dipole  
Model : ALS-D-835-S-2  
Frequency : 835.00 MHz  
Max. Transmit Pwr : 1 W  
Drift Time : 3 min(s)  
Power Drift-Start : 10.742 W/kg  
Power Drift-Finish : 10.539 W/kg  
Power Drift (%) : -3.285

## Phantom Data

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

## Tissue Data

Type : Body  
Serial No. : 270-02101  
Frequency : 835.00 MHz  
Last Calib. Date : 10-Mar-2012  
Temperature : 20.00 °C  
Ambient Temp. : 21.00 °C  
Humidity : 56.00 RH%  
Epsilon : 56.19 F/m  
Sigma : 0.99 S/m  
Density : 1000.00 kg/cu. m

## Probe Data

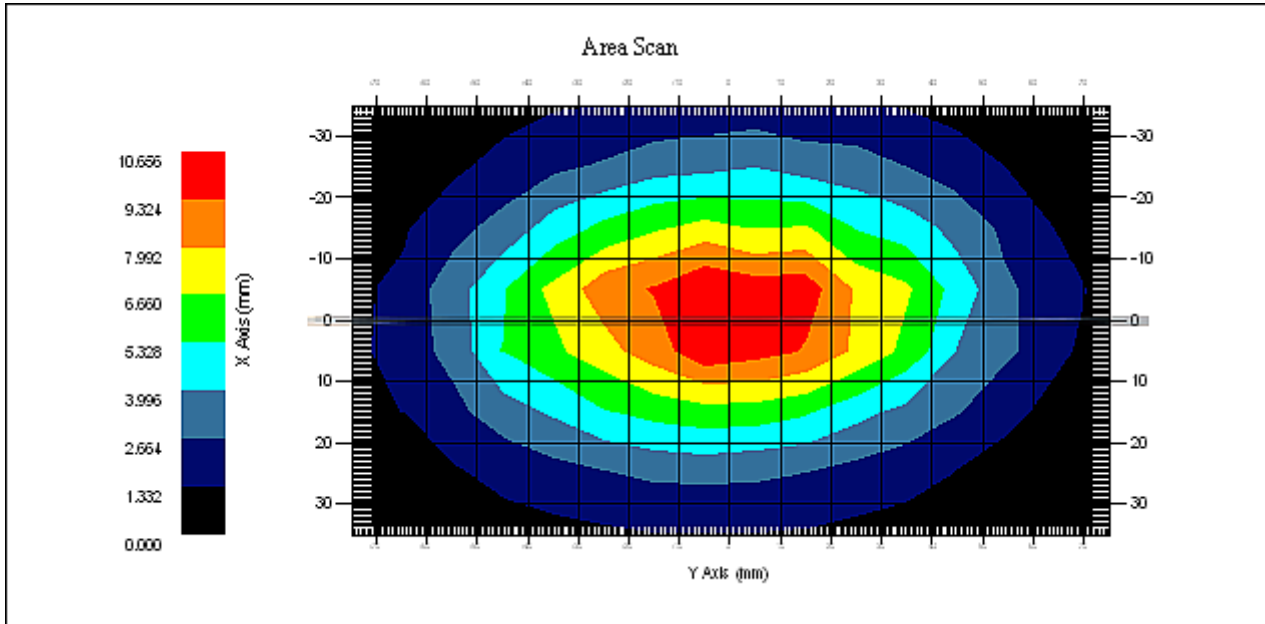
Name : E-Field  
Model : E-020  
Type : E-Field Triangle  
Serial No. : 500-00283  
Last Calib. Date : 14-Jul-2011  
Frequency : 835.00 MHz  
Duty Cycle Factor : 1  
Conversion Factor : 6.6  
Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point : 95.00 mV  
Offset : 1.56 mm

## Measurement Data

Crest Factor : 1  
Scan Type : Complete  
Tissue Temp. : 21.00 °C  
Ambient Temp. : 21.00 °C  
Area Scan : 7x9x1 : Measurement x=10mm, y=10mm, z=4mm  
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm



1 gram SAR value : 9.483 W/kg  
10 gram SAR value : 5.933 W/kg  
Area Scan Peak SAR : 10.656 W/kg  
Zoom Scan Peak SAR : 15.113 W/kg



**835 MHz System Validation with Body Tissue**

**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)****System Performance Check 1900 Head Liquid****Dipole 1900 MHz; Type: ALS-D-1900-S-2; S/N: 210-00710**

## Product Data

Device Name : Dipole 1900MHz  
Serial No. : 210-00710  
Type : Dipole  
Model : ALS-D-1900-S-2  
Frequency : 1900.00 MHz  
Max. Transmit Pwr : 1 W  
Drift Time : 3 min(s)  
Power Drift-Start : 40.489 W/kg  
Power Drift-Finish : 41.316 W/kg  
Power Drift (%) : 1.920

## Phantom Data

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

## Tissue Data

Type : HEAD  
Serial No. : 295-01103  
Frequency : 1900.00 MHz  
Last Calib. Date : 10-Mar-2012  
Temperature : 20.00 °C  
Ambient Temp. : 21.00 °C  
Humidity : 56.00 RH%  
Epsilon : 40.52 F/m  
Sigma : 1.42 S/m  
Density : 1000.00 kg/cu. M

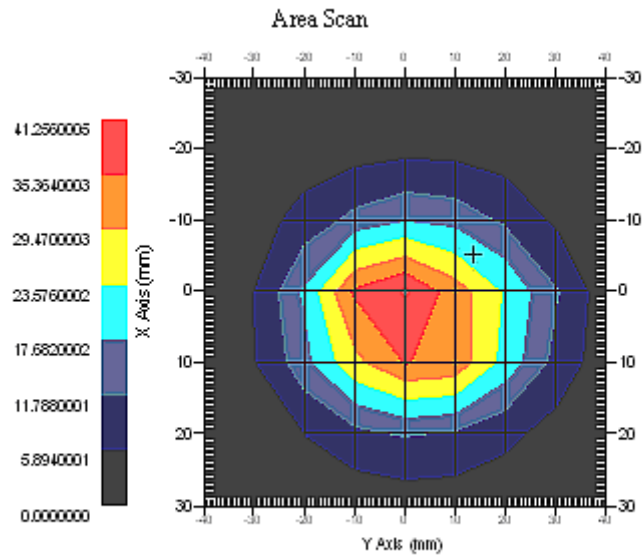
## Probe Data

Name : E-Field  
Model : E-020  
Type : E-Field Triangle  
Serial No. : 500-00283  
Last Calib. Date : 14-Jul-2011  
Frequency : 1900.00 MHz  
Duty Cycle Factor : 1  
Conversion Factor : 5.20  
Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point : 95.00 mV  
Offset : 1.56 mm

## Measurement Data

Crest Factor : 1  
Scan Type : Complete  
Tissue Temp. : 20.00 °C  
Ambient Temp. : 20.00 °C  
Area Scan : 7x9x1 : Measurement x=10mm, y=10mm, z=4mm  
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm

1 gram SAR value : 40.364 W/kg  
 10 gram SAR value : 20.512 W/kg  
 Area Scan Peak SAR : 41.256 W/kg  
 Zoom Scan Peak SAR : 72.841 W/kg



**1900 MHz System Validation with Head Tissue**

**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)****System Performance Check 1900 Body Liquid****Dipole 1900 MHz; Type: ALS-D-1900-S-2; S/N: 210-00710**

## Product Data

Device Name : Dipole 1900MHz  
Serial No. : 210-00710  
Type : Dipole  
Model : ALS-D-1900-S-2  
Frequency : 1900.00 MHz  
Max. Transmit Pwr : 1 W  
Drift Time : 3 min(s)  
Power Drift-Start : 39.652 W/kg  
Power Drift-Finish : 40.078 W/kg  
Power Drift (%) : 0.910

## Phantom Data

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

## Tissue Data

Type : Body  
Serial No. : 295-02102  
Frequency : 1900.00 MHz  
Last Calib. Date : 10-Mar-2012  
Temperature : 20.00 °C  
Ambient Temp. : 21.00 °C  
Humidity : 56.00 RH%  
Epsilon : 53.07 F/m  
Sigma : 1.51 S/m  
Density : 1000.00 kg/cu. m

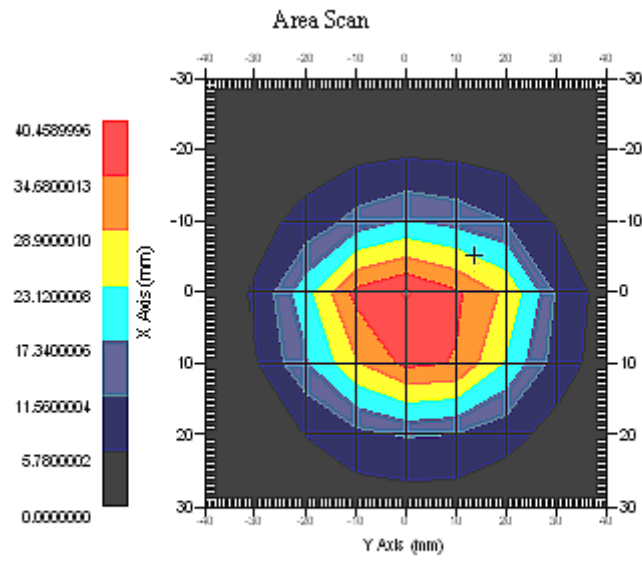
## Probe Data

Name : E-Field  
Model : E-020  
Type : E-Field Triangle  
Serial No. : 500-00283  
Last Calib. Date : 14-Jul-2011  
Frequency : 1900.00 MHz  
Duty Cycle Factor : 1  
Conversion Factor : 5.0  
Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point : 95.00 mV  
Offset : 1.56 mm

## Measurement Data

Crest Factor : 1  
Scan Type : Complete  
Tissue Temp. : 20.00 °C  
Ambient Temp. : 21.00 °C  
Area Scan : 7x9x1 : Measurement x=10mm, y=10mm, z=4mm  
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm

1 gram SAR value : 39.592 W/kg  
 10 gram SAR value : 20.058 W/kg  
 Area Scan Peak SAR : 40.459 W/kg  
 Zoom Scan Peak SAR : 79.268 W/kg



**1900 MHz System Validation with Body Tissue**

**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)****System Performance Check 2450 MHz Head Liquid****Dipole 2450 MHz; Type: ALS-D-2450-S-2; S/N: 220-00758**

## Product Data

Device Name : Dipole 2450MHz  
Serial No. : 220-00758  
Type : Dipole  
Model : ALS-D-2450-S-2  
Frequency : 2450 MHz  
Max. Transmit Pwr : 1 W  
Drift Time : 3 min(s)  
Power Drift-Start : 65.387 W/kg  
Power Drift-Finish : 67.808 W/kg  
Power Drift (%) : 3.702

## Phantom Data

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

## Tissue Data

Type : Head  
Serial No. : 290-01109  
Frequency : 2450 MHz  
Last Calib. Date : 11-Mar-2012  
Temperature : 20.00 °C  
Ambient Temp. : 21.00 °C  
Humidity : 50.00 RH%  
Epsilon : 39.10 F/m  
Sigma : 1.81 S/m  
Density : 1000.00 kg/cu. M

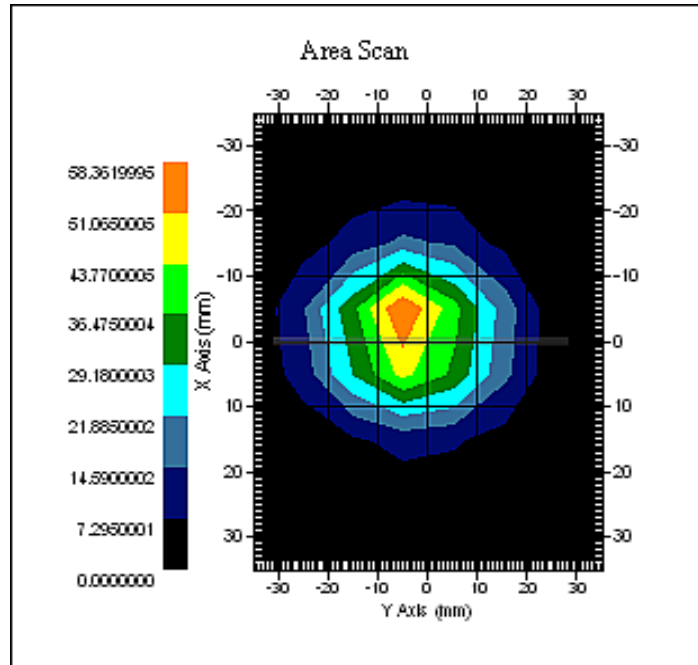
## Probe Data

Name : E-Field  
Model : E-020  
Type : E-Field Triangle  
Serial No. : 500-00283  
Last Calib. Date : 14-Jul-2011  
Frequency : 2450 MHz  
Duty Cycle Factor : 1  
Conversion Factor : 4.9  
Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point : 95.00 mV  
Offset : 1.56 mm

## Measurement Data

Crest Factor : 1  
Scan Type : Complete  
Tissue Temp. : 20.00 °C  
Ambient Temp. : 20.00 °C  
Area Scan : 7x7x1 : Measurement x=10mm, y=10mm, z=4mm  
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm

1 gram SAR value : 54.220 W/kg  
10 gram SAR value : 22.003 W/kg  
Area Scan Peak SAR : 58.362 W/kg  
Zoom Scan Peak SAR : 122.105 W/kg



2450 MHz System Validation

**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)****System Performance Check 2450 MHz Body Liquid****Dipole 2450 MHz; Type: ALS-D-2450-S-2; S/N: 220-00758**

## Product Data

Device Name : Dipole 2450MHz  
Serial No. : 220-00758  
Type : Dipole  
Model : ALS-D-2450-S-2  
Frequency : 2450 MHz  
Max. Transmit Pwr : 1 W  
Drift Time : 3 min(s)  
Power Drift-Start : 18.642 W/kg  
Power Drift-Finish : 18.579 W/kg  
Power Drift (%) : -1.154

## Phantom Data

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

## Tissue Data

Type : BODY  
Serial No. : 290-01109  
Frequency : 2450 MHz  
Last Calib. Date : 11-Mar-2012  
Temperature : 20.00 °C  
Ambient Temp. : 21.00 °C  
Humidity : 50.00 RH%  
Epsilon : 51.70 F/m  
Sigma : 1.96 S/m  
Density : 1000.00 kg/cu. M

## Probe Data

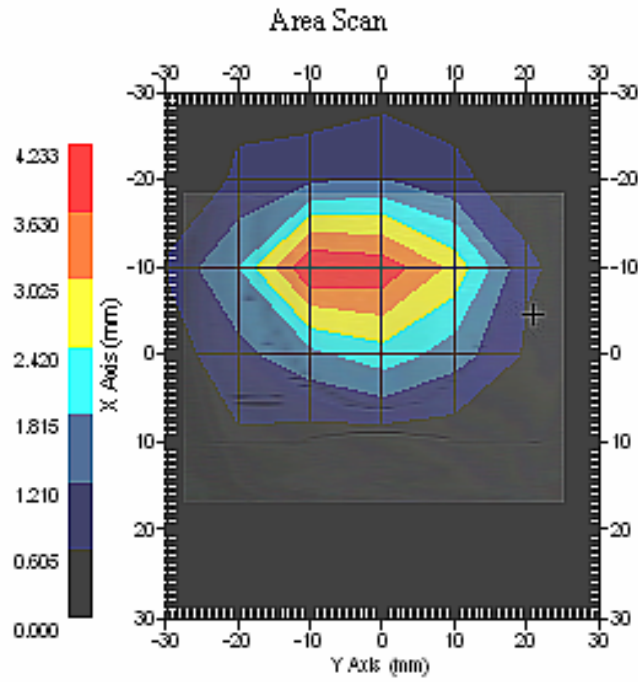
Name : E-Field  
Model : E-020  
Type : E-Field Triangle  
Serial No. : 500-00283  
Last Calib. Date : 14-Jul-2011  
Frequency : 2450 MHz  
Duty Cycle Factor : 1  
Conversion Factor : 4.3  
Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point : 95.00 mV  
Offset : 1.56 mm

## Measurement Data

Crest Factor : 1  
Scan Type : Complete  
Tissue Temp. : 20.00 °C  
Ambient Temp. : 20.00 °C  
Area Scan : 7x7x1 : Measurement x=10mm, y=10mm, z=4mm  
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm



1 gram SAR value : 52.916 W/kg  
10 gram SAR value : 25.333 W/kg  
Area Scan Peak SAR : 54.068 W/kg  
Zoom Scan Peak SAR : 98.600 W/kg



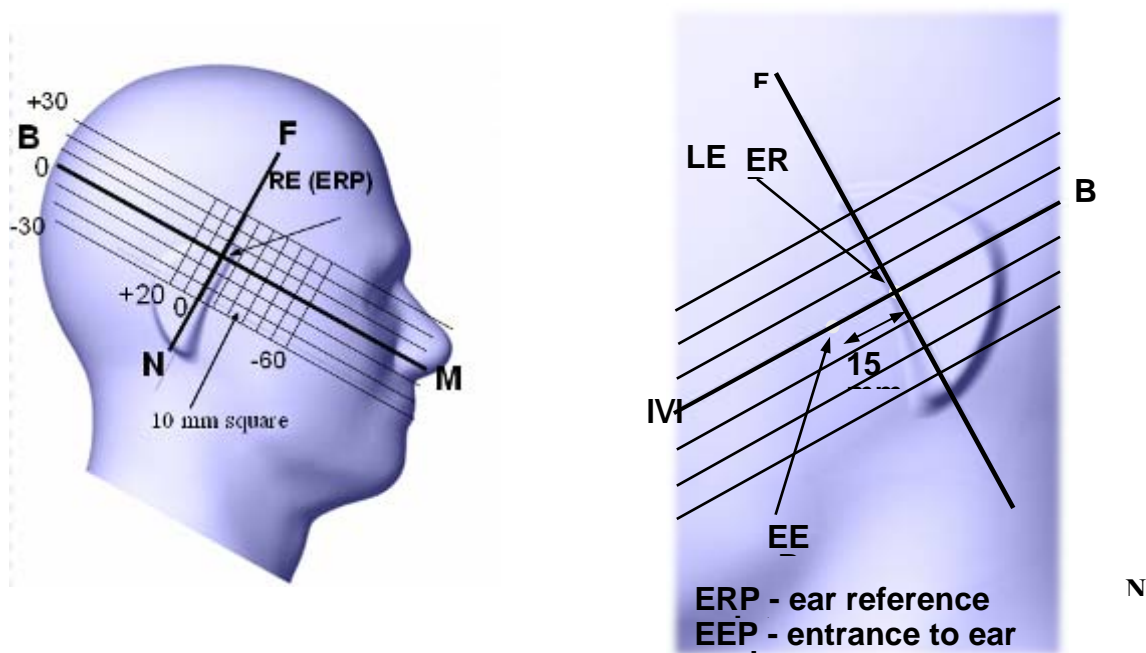
**2450 MHz System Validation**

## EUT TEST STRATEGY AND METHODOLOGY

### Test Positions for Device Operating Next to a Person’s Ear

This category includes most wireless handsets with fixed, retractable or internal antennas located toward the top half of the device, with or without a foldout, sliding or similar keypad cover. The handset should have its earpiece located within the upper ¼ of the device, either along the centerline or off-centered, as perceived by its users. This type of handset should be positioned 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”. The “test device reference point” should be located at the same level as the center of the earpiece region. The “vertical centerline” should bisect the front surface of the handset at its top and bottom edges. A “ear reference point” is located on the outer surface of the head phantom on each ear spacer. It is located 1.5 cm above the center of the ear canal entrance in the “phantom reference plane” defined by the three lines joining the center of each “ear reference point” (left and right) and the tip of the mouth.

A handset should be initially positioned with the earpiece region pressed against the ear spacer of a head phantom. For the SCC-34/SC-2 head phantom, the device should be positioned parallel to the “N-F” line defined along the base of the ear spacer that contains the “ear reference point”. For interim head phantoms, the device should be positioned parallel to the cheek for maximum RF energy coupling. The “test device reference point” is aligned to the “ear reference point” on the head phantom and the “vertical centerline” is aligned to the “phantom reference plane”. This is called the “initial ear position”. While maintaining these three alignments, the body of the handset is gradually adjusted to each of the following positions for evaluating SAR:



## Cheek/Touch Position

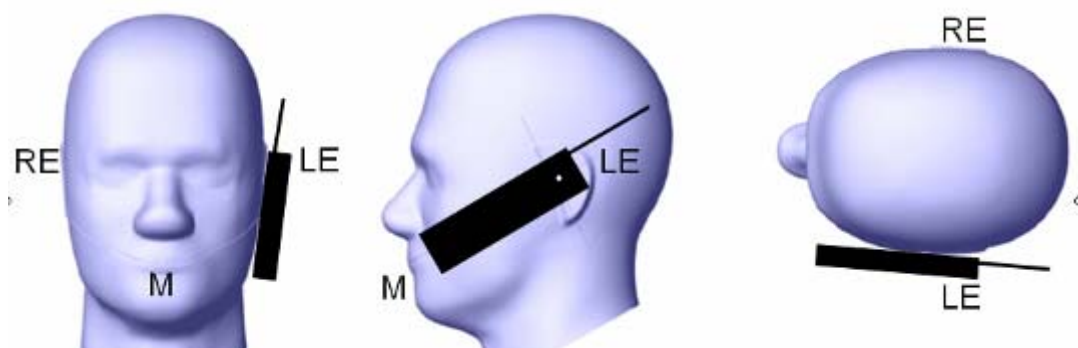
The device is brought toward the mouth of the head phantom by pivoting against the “ear reference point” or along the “N-F” line for the SCC-34/SC-2 head phantom.

This test position is established:

- When any point on the display, keypad or mouthpiece portions of the handset is in contact with the phantom.
- (or) When any portion of a foldout, sliding or similar keypad cover opened to its intended self-adjusting normal use position is in contact with the cheek or mouth of the phantom.

For existing head phantoms – when the handset loses contact with the phantom at the pivoting point, rotation should continue until the device touches the cheek of the phantom or breaks its last contact from the ear spacer.

### Cheek /Touch Position



## Ear/Tilt Position

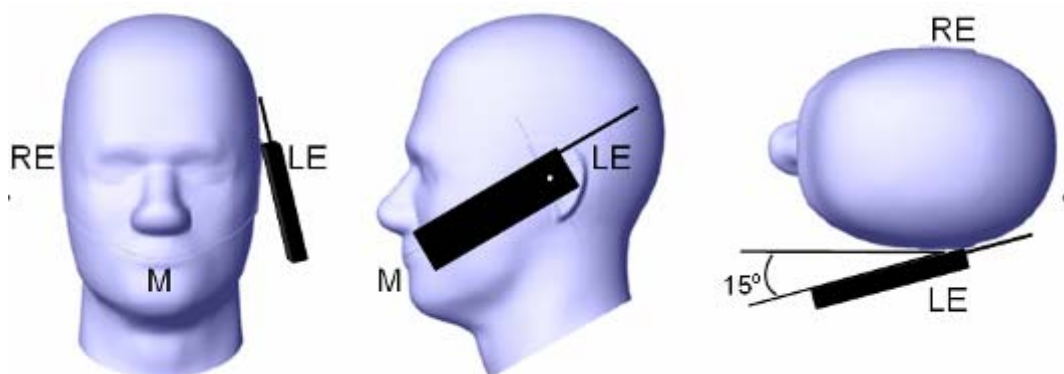
With the handset aligned in the “Cheek/Touch Position”:

1) If the earpiece of the handset is not in full contact with the phantom’s ear spacer (in the “Cheek/Touch position”) and the peak SAR location for the “Cheek/Touch” position is located at the ear spacer region or corresponds to the earpiece region of the handset, the device should be returned to the “initial ear position” by rotating it away from the mouth until the earpiece is in full contact with the ear spacer.

2) (otherwise) The handset should be moved (translated) away from the cheek perpendicular to the line passes through both “ear reference points” (note: one of these ear reference points may not physically exist on a split head model) for approximate 2-3 cm. While it is in this position, the device handset is tilted away from the mouth with respect to the “test device reference point” until the inside angle between the vertical centerline on the front surface of the phone and the horizontal line passing through the ear reference point is by 15 80°. After the tilt, it is then moved (translated) back toward the head perpendicular to the line passes through both “ear reference points” until the device touches the phantom or the ear spacer. If the antenna touches the head first, the positioning process should be repeated with a tilt angle less than 15° so that the device and its antenna would touch the phantom simultaneously. This test position may require a device holder or positioner to achieve the translation and tilting with acceptable positioning repeatability.

If a device is also designed to transmit with its keypad cover closed for operating in the head position, such positions should also be considered in the SAR evaluation. The device should be tested on the left and right side of the head phantom in the “Cheek/Touch” and “Ear/Tilt” positions. When applicable, each configuration should be tested with the antenna in its fully extended and fully retracted positions. These test configurations should be tested at the high, middle and low frequency channels of each operating mode; for example, AMPS, CDMA, and TDMA. If the SAR measured at the middle channel for each test configuration (left, right, Cheek/Touch, Tile/Ear, extended and retracted) is at least 2.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s). If the transmission band of the test device is less than 10 MHz, testing at the high and low frequency channels is optional.

### Ear /Tilt 15° Position



### **Test positions for body-worn and other configurations**

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. Devices with a headset output should be tested with a headset connected to the device. When multiple accessories that do not contain metallic components are supplied with the device, the device may be tested with only the accessory that dictates the closest spacing to the body. When multiple accessories that contain metallic components are supplied with the device, the device must be tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component (e.g., the same metallic belt-clip used with different holsters with no other metallic components), only the accessory that dictates the closest spacing to the body must be tested.

Body-worn accessories may not always be supplied or available as options for some devices that are intended to be authorized for body-worn use. 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 distances may be used, but they should not exceed 2.5 cm. In these cases, the device may use body-worn accessories that provide a separation distance greater than that tested for the device provided however that the accessory contains no metallic components.

## SAR Evaluation Procedure

The evaluation was performed with the following procedure:

Step 1: Measurement of the SAR value at a fixed location above the ear point or central position was used as a reference value for assessing the power drop. The SAR at this point is measured at the start of the test and then again at the end of the testing.

Step 2: The SAR distribution at the exposed side of the head was measured at a distance of 4 mm from the inner surface of the shell. The area covered the entire dimension of the head or EUT and the horizontal grid spacing was 10 mm x 10 mm. Based on these data, the area of the maximum absorption was determined by spline interpolation. The first Area Scan covers the entire dimension of the EUT to ensure that the hotspot was correctly identified.

Step 3: Around this point, a volume of 35 mm x 35 mm x 35 mm was assessed by measuring 7x 7 x 7 points. On the basis of this data set, the spatial peak SAR value was evaluated under the following procedure:

- 1) The data at the surface were extrapolated, since the center of the dipoles is 1.2 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.3 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.
- 2) The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed by the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one dimensional splines with the "Not a knot"-condition (in x, y and z-directions). The volume was integrated with the trapezoidal-algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the averages.

All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

Step 4: Re-measurement of the SAR value at the same location as in Step 1. If the value changed by more than 5%, the evaluation was repeated.

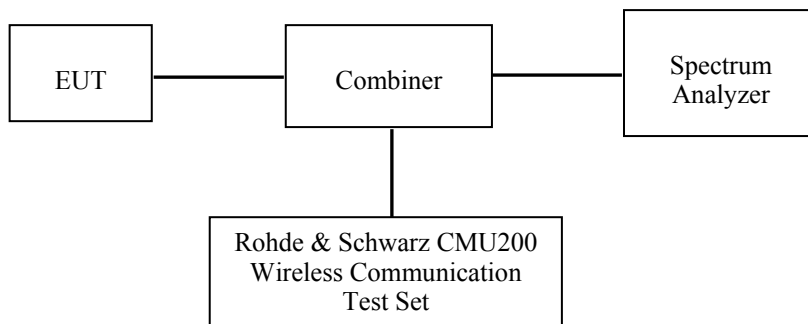
## CONDUCTED OUTPUT POWER MEASUREMENT

### Provision Applicable

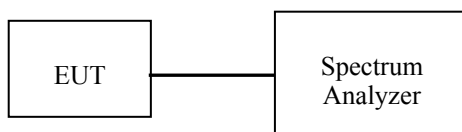
The measured peak output power should be greater and within 5% than EMI measurement.

### Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.



**GSM**



**WiFi**

### Test Results:

#### GSM

Band	Frequency (MHz)	Conducted Output Power	
		(dBm)	(Watt)
Cellular Band	824.2	32.41	1.742
	836.6	32.45	1.758
	848.8	32.44	1.754
PCS Band	1850.2	30.50	1.122
	1880.0	30.50	1.122
	1909.8	30.31	1.074

**GPRS**

Mode	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
Cellular	128	824.2	32.12	31.19	29.10	28.24
	190	836.6	32.05	31.06	28.97	28.12
	251	848.8	31.99	30.90	29.77	27.97
PCS	512	1850.2	30.36	29.49	27.90	27.04
	661	1880.0	30.26	29.36	27.78	26.92
	810	1909.8	30.00	29.20	27.60	26.74

**E-GPRS**

Mode	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
Cellular	128	824.2	26.48	26.74	26.71	26.69
	190	836.6	26.67	26.65	26.65	26.57
	251	848.8	26.48	26.49	26.51	26.41
PCS	512	1850.2	25.31	25.28	25.29	25.21
	661	1880.0	25.23	25.25	25.23	25.17
	810	1909.8	25.16	25.11	25.09	25.09

For SAR, the time based average power is relevant, the difference in between depends on the duty cycle of the TDMA signal.

Number of Time slot	1	2	3	4
Duty Cycle	1:8	1:4	1:2.66	1:2
Time based Ave. power compared to slotted Ave. power	-9 dB	-6 dB	-4.25 dB	-3 dB
Crest Factor	8	4	2.66	2

**The time based average power for GPRS**

Band	Channel No.	Frequency (MHz)	Time based average Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
Cellular	128	824.2	23.12	25.19	24.85	25.24
	190	836.6	23.05	25.06	24.72	25.12
	251	848.8	22.99	24.90	25.52	24.97
PCS	512	1850.2	21.36	23.49	23.65	24.04
	661	1880.0	21.26	23.36	23.53	23.92
	810	1909.8	21.00	23.20	23.35	23.74

**The time based average power for E-GPRS**

Band	Channel No.	Frequency (MHz)	Time based average Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
Cellular	128	824.2	17.48	20.74	22.46	23.69
	190	836.6	17.67	20.65	22.40	23.57
	251	848.8	17.48	20.49	22.26	23.41
PCS	512	1850.2	16.31	19.28	21.04	22.21
	661	1880.0	16.23	19.25	20.98	22.17
	810	1909.8	16.16	19.11	20.84	22.09

**Note:**

1. Rohde & Schwarz Radio Communication Tester (CMU200) was used for the measurement of GSM peak and average output power for active timeslots. And spectrum Analyzer was used for the measurement of WiFi peak and average output power.
2. For GSM voice, 1 timeslot has been activated with power level 5 (850 MHz band) and 0 (1900 MHz band).
3. For GPRS, 1, 2, 3 and 4 timeslots has been activated separately with power control level 5(850 MHz band) and 0(1900 MHz band).
4. For E-GRPS, 1, 2, 3 and 4 timeslots has been activated separately with power control level 8(850 MHz band) and 2(1900 MHz band).



**WiFi**

Band	Frequency (MHz)	Conducted Output Power	
		(dBm)	(Watt)
802.11b	2412	19.00	0.079
	2437	19.30	0.085
	2462	19.29	0.085
802.11g	2412	15.91	0.039
	2437	16.16	0.041
	2462	16.24	0.042
802.11n-20	2412	16.04	0.040
	2437	16.14	0.041
	2462	16.41	0.044
802.11n-40	2412	13.87	0.024
	2437	14.10	0.026
	2462	14.28	0.027

**Note:**

KDB248227-SAR is not required for 802.11g/802.11n channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

The output power was tested under data rate 1Mbps for 802.11b.

The output power was tested under data rate 6Mbps for 802.11g.

The output power was tested under data rate 6.5Mbps for 802.11n20.

The output power was tested under data rate 13.5Mbps for 802.11n40.

## SAR SIMULTANEOUS TRANSMISSION EVALUATION

### KDB648474 SIMULTANEOUS TRANSMISSION CONSIDERATION

Stand-alone and simultaneous SAR evaluation for a cell phone with multiple transmitters is base on the antennas distance of each radio.

#### WiFi, BT and GSM Antenna Location:



#### Antenna Information:

<b>Antenna-to-antenna separation distances:</b>	9.3cm from GSM main antenna-to-WiFi main antenna 1.1cm from GSM main antenna-to-BT main antenna 7.6cm from WiFi main antenna-to-BT main antenna
<b>Simultaneous transmission:</b>	GSM voice can transmit simultaneously with WiFi data. GPRS,EGPRS data can transmit simultaneously with WiFi data. GSM can transmit simultaneously with Bluetooth WiFi can not transmit simultaneously with Bluetooth

**Highest SAR value and the sum of the 1-g SAR for GSM & WiFi**

Test Position	1-g SAR (W/Kg)		Σ 1-g SAR (W/Kg)	
	GSM	WiFi		
Head(Touch)	GSM850	0.628	0.074	0.702
	PCS1900	1.043		1.117
Head(Tilt)	GSM850	0.405	0.042	0.447
	PCS1900	0.690		0.732
Body(1.5cm)	GSM850	1.320	0.155	1.475
	PCS1900	1.341		1.496

**CONCLUSION:**

Individual transmitter	Stand-alone SAR	Simultaneous SAR
Bluetooth	Not required	Not required
GSM	Required	Simultaneous SAR of Bluetooth and GSM is not required
WiFi	Required	Simultaneous SAR of WiFi and GSM is not required

**Note:**

- 1) The distance between BT and GSM antenna is 7.6cm > 5cm, BT and WiFi antenna is 1.1cm < 2.5cm. The max output power of Bluetooth antenna is (7.63dBm) 5.794mW < P<sub>Ref</sub>(12mW) and the maximum SAR of WiFi is 0.155W/kg < 1.2W/kg. According to KDB648474, stand-alone SAR is not required for BT antenna and simultaneous SAR evaluation is not required for Bluetooth with GSM or WiFi antenna.
- 2) The distance between WiFi and GSM antenna is 9.3cm > 2.5cm. The max output power of WiFi antenna is (19.30dBm) 85.11mW > 2P<sub>Ref</sub>(24mW). The max body SAR of GSM is 1.341W/kg, the max body SAR of WiFi is 0.155W/Kg. According to KDB648474, stand-alone body SAR is required for WiFi antenna and simultaneous SAR evaluation is not required for WiFi with GSM antenna. The max head SAR of GSM is 0.628W/Kg, the max head SAR of WiFi is 0.074W/Kg. According to KDB648474, simultaneous head SAR evaluation is not required for WiFi with GSM antenna.
- 3) When the sum of the 1-g SAR is < 1.6W/Kg for GSM and WiFi, the simultaneous SAR is not required.
- 4) P<sub>Ref</sub> is defined as the maximum conducted power available at the antenna according to source-based time-averaging requirements of Section 2.1093(d)(5).

## SAR MEASUREMENT RESULTS

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This page summarizes the results of the performed dosimetric evaluation.

### SAR Test Data

#### Environmental Conditions

<b>Temperature:</b>	21° C
<b>Relative Humidity:</b>	50%
<b>ATM Pressure:</b>	1002 mbar

\* Testing was performed by Sandy Wang on 2012-03-10---2012-03-11.

**Cellular Band:**

EUT Position	Frequency (MHz)		Test Mode	Antenna Type	FCC 1g SAR (W/Kg)	
	Channel	MHz			Measurement	Limit
Left Head Cheek	128(Low)	824.2	GSM	Integral	\	1.6
	190(Middle)	836.6	GSM	Integral	0.580	1.6
	251(High)	848.8	GSM	Integral	\	1.6
Left Head Tilt	128(Low)	824.2	GSM	Integral	\	1.6
	190(Middle)	836.6	GSM	Integral	0.405	1.6
	251(High)	848.8	GSM	Integral	\	1.6
Right Head Cheek	128(Low)	824.2	GSM	Integral	\	1.6
	190(Middle)	836.6	GSM	Integral	0.628	1.6
	251(High)	848.8	GSM	Integral	\	1.6
Right Head Tilt	128(Low)	824.2	GSM	Integral	\	1.6
	190(Middle)	836.6	GSM	Integral	0.435	1.6
	251(High)	848.8	GSM	Integral	\	1.6
Body-Worn Back (1.5cm)	251(High)	848.8	GSM	Integral	0.616	1.6
	128(Low)	824.2	GPRS	Integral	1.195	1.6
	190(Middle)	836.6	GPRS	Integral	1.320	1.6
	251(High)	848.8	GPRS	Integral	1.276	1.6
	128(Low)	824.2	E-GPRS	Integral	0.947	1.6
	190(Middle)	836.6	E-GPRS	Integral	1.055	1.6
	251(High)	848.8	E-GPRS	Integral	0.976	1.6

**Note:**

1. Right Head Cheek is the worst case mode.
2. When the 1-g SAR is  $\leq 0.8$ W/Kg, testing for other channels are optional.

**PCS Band:**

EUT Position	Frequency (MHz)		Test Mode	Antenna Type	FCC 1g SAR (W/Kg)	
	Channel	MHz			Measurement	Limit
Left Head Cheek	512(Low)	1850.2	GSM	Integral	0.952	1.6
	661(Middle)	1880.0	GSM	Integral	0.886	1.6
	810(High)	1909.8	GSM	Integral	0.893	1.6
Left Head Tilt	512(Low)	1850.2	GSM	Integral	0.654	1.6
	661(Middle)	1880.0	GSM	Integral	\	1.6
	810(High)	1909.8	GSM	Integral	\	1.6
Right Head Cheek	512(Low)	1850.2	GSM	Integral	1.043	1.6
	661(Middle)	1880.0	GSM	Integral	0.932	1.6
	810(High)	1909.8	GSM	Integral	0.955	1.6
Right Head Tilt	512(Low)	1850.2	GSM	Integral	0.690	1.6
	661(Middle)	1880.0	GSM	Integral	\	1.6
	810(High)	1909.8	GSM	Integral	\	1.6
Body-Worn Back (1.5cm)	512(Low)	1850.2	GSM	Integral	0.482	1.6
	512(Low)	1850.2	GPRS	Integral	1.253	1.6
	661(Middle)	1880.0	GPRS	Integral	1.341	1.6
	810(High)	1909.8	GPRS	Integral	1.275	1.6
	512(Low)	1850.2	E-GPRS	Integral	0.904	1.6
	661(Middle)	1880.0	E-GPRS	Integral	0.966	1.6
	810(High)	1909.8	E-GPRS	Integral	1.068	1.6

**Note:**

1. Right Head Cheek is the worst case mode.
2. The EUT is a Capability Class B mobile phone which can be attached to both GPRS and GSM services, and can support E-GPRS.
3. The Multi-slot Classes of EUT is Class 12 which has maximum 4 Downlink slots and 4 Uplink slots, the maximum active slots is 5, when perform the multiple slots scan, 1 DL+4UL is the worse case.
4. The EUT transmit and receive through the same GSM antenna while testing SAR.
5. When the 1-g SAR is  $\leq 0.8$ W/Kg, testing for other channels are optional.

**802.11b:**

EUT Position	Frequency (MHz)		Antenna Type	FCC 1g SAR (W/Kg)	
	Channel	MHz		Value	Limit
Left Head Cheek	6	2437	Integral	0.074	1.6
Left Head Tilt	6	2437	Integral	0.035	1.6
Right Head Cheek	6	2437	Integral	0.069	1.6
Right Head Tilt	6	2437	Integral	0.042	1.6
Position A	6	2437	Integral	0.020	1.6
Position B	6	2437	Integral	0.075	1.6
Position C (1.5cm)	6	2437	Integral	0.155	1.6
Position D (1.5cm)	6	2437	Integral	0.102	1.6

- Note:**
1. Position C is the worst case mode.
  2. Position A: EUT left side touch the flat phantom.
  3. Position B: EUT bottom touch the flat phantom.
  4. Position C: EUT back touch the flat phantom with 1.5cm.
  5. Position D: EUT front touch the flat phantom with 1.5cm.
  6. The antenna location is showed on the appendix E.
  7. When the 1-g SAR is  $\leq 0.8W/Kg$ , testing for other channels are optional.
  8. The SAR testing is conducted with 100% duty cycle factor.
  9. KDB248227-SAR is not required for 802.11g/802.11n channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.
  10. The output power was tested under data rate 1Mbps for 802.11b.

**EUT SCAN RESULTS**

**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Left Head Cheek (835 MHz High Channel)**

Measurement Data

Test mode : GSM  
 Crest Factor : 8  
 Scan Type : Complete  
 Area Scan : 13x9x1: Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.501 W/kg  
 Power Drift-Finish : 0.490 W/kg  
 Power Drift (%) : -2.160

Tissue Data

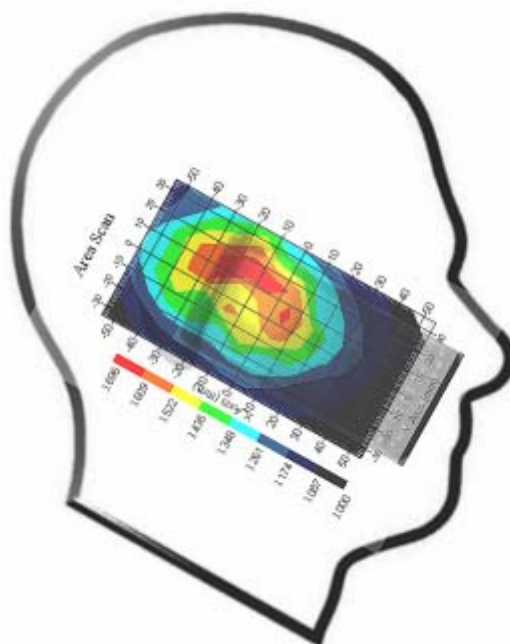
Type : HEAD  
 Frequency : 835.00 MHz  
 Epsilon : 42.40 F/m  
 Sigma : 0.91 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 835.00 MHz  
 Duty Cycle Factor : 8  
 Conversion Factor : 6.6  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.580 W/kg  
 10 gram SAR value : 0.336 W/kg  
 Area Scan Peak SAR : 0.693 W/kg  
 Zoom Scan Peak SAR : 0.930 W/kg

**Plot 1#**





**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Left Head Tilt (835 MHz High Channel)**

Measurement Data

Test mode : GSM  
 Crest Factor : 8  
 Scan Type : Complete  
 Area Scan : 13x9x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.334 W/kg  
 Power Drift-Finish : 0.330 W/kg  
 Power Drift (%) : -2.837

Tissue Data

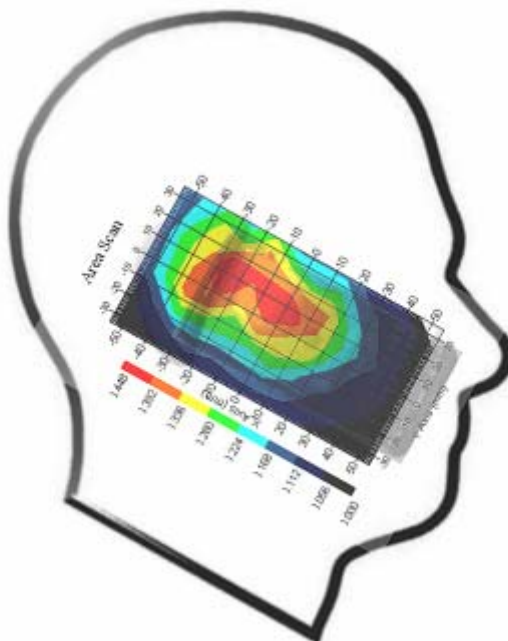
Type : HEAD  
 Frequency : 835.00 MHz  
 Epsilon : 42.40 F/m  
 Sigma : 0.91 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 835.00 MHz  
 Duty Cycle Factor : 8  
 Conversion Factor : 6.6  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.405 W/kg  
 10 gram SAR value : 0.223 W/kg  
 Area Scan Peak SAR : 0.447 W/kg  
 Zoom Scan Peak SAR : 0.560 W/kg

**Plot 2#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Right Head Cheek (835 MHz High Channel)**

Measurement Data

Test mode : GSM  
 Crest Factor : 8  
 Scan Type : Complete  
 Area Scan : 13x9x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.457 W/kg  
 Power Drift-Finish : 0.453 W/kg  
 Power Drift (%) : -2.535

Tissue Data

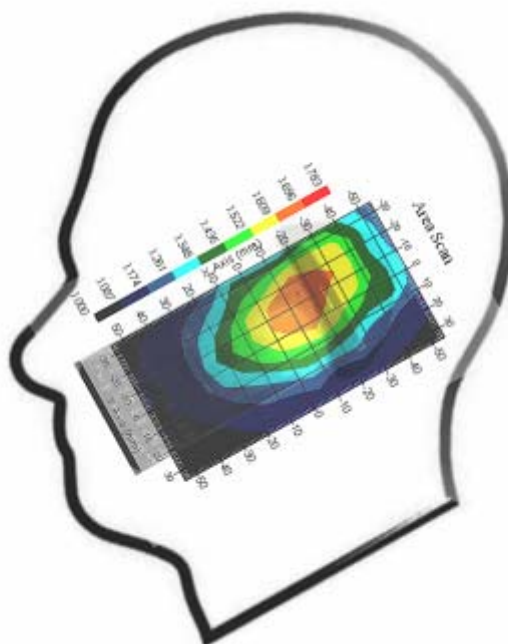
Type : HEAD  
 Frequency : 835.00 MHz  
 Epsilon : 42.40 F/m  
 Sigma : 0.91 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 835.00 MHz  
 Duty Cycle Factor : 8  
 Conversion Factor : 6.6  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V/m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.628 W/kg  
 10 gram SAR value : 0.453 W/kg  
 Area Scan Peak SAR : 0.698 W/kg  
 Zoom Scan Peak SAR : 0.930 W/kg

**Plot 3#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Right Head Tilt (835 MHz High Channel)**

Measurement Data

Test mode : GSM  
Crest Factor : 8  
Scan Type : Complete  
Area Scan : 13x9x1 : Measurement x=10mm, y=10mm, z=4mm  
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
Power Drift-Start : 0.405 W/kg  
Power Drift-Finish : 0.410 W/kg  
Power Drift (%) : 1.278

Tissue Data

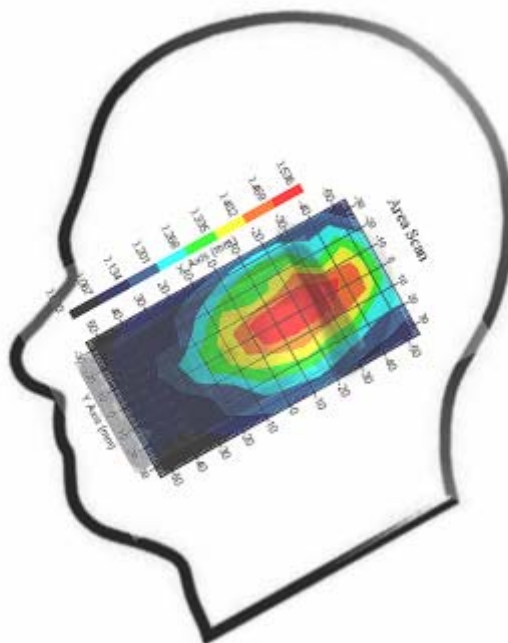
Type : HEAD  
Frequency : 835.00 MHz  
Epsilon : 42.40 F/m  
Sigma : 0.91 S/m  
Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
Frequency : 835.00 MHz  
Duty Cycle Factor : 8  
Conversion Factor : 6.6  
Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V/m})^2$   
Compression Point : 95.00 mV  
Offset : 1.56 mm

1 gram SAR value : 0.435 W/kg  
10 gram SAR value : 0.388 W/kg  
Area Scan Peak SAR : 0.533 W/kg  
Zoom Scan Peak SAR : 0.750 W/kg

**Plot 4#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Body-worn Back-Headset (835 MHz High Channel)**

Measurement Data

Test mode : GSM  
 Crest Factor : 8  
 Scan Type : Complete  
 Area Scan : 13x9x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.555 W/kg  
 Power Drift-Finish : 0.562 W/kg  
 Power Drift (%) : 4.228

Tissue Data

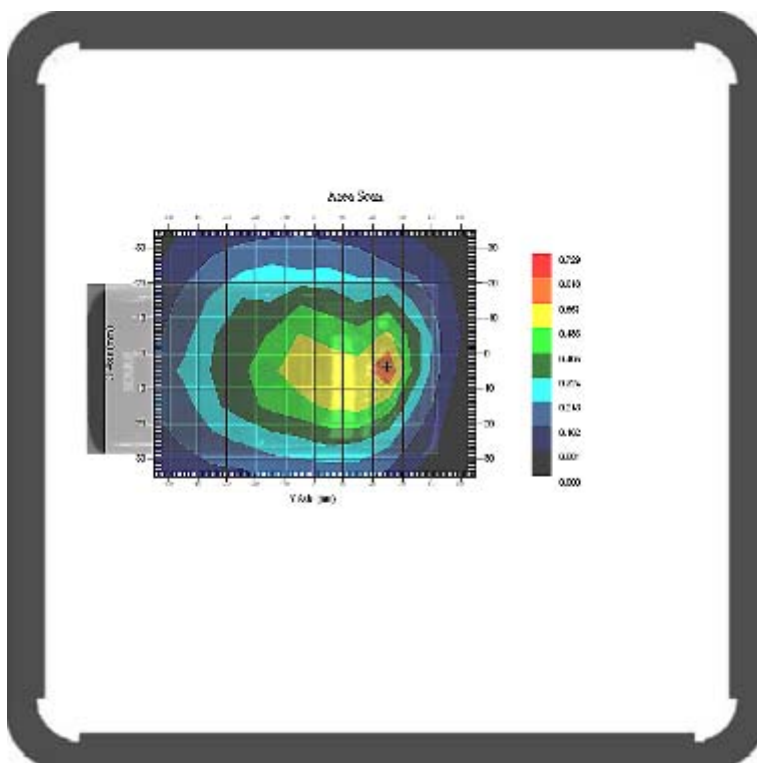
Type : BODY  
 Frequency : 835.00 MHz  
 Epsilon : 55.19 F/m  
 Sigma : 0.99 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 835.00 MHz  
 Duty Cycle Factor : 8  
 Conversion Factor : 6.6  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.616 W/kg  
 10 gram SAR value : 0.298 W/kg  
 Area Scan Peak SAR : 0.649 W/kg  
 Zoom Scan Peak SAR : 0.810 W/kg

**Plot 5#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Body-worn Back (835 MHz Low Channel)**

Measurement Data

Test mode : GPRS  
 Crest Factor : 2  
 Scan Type : Complete  
 Area Scan : 13x9x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 1.207 W/kg  
 Power Drift-Finish : 1.173 W/kg  
 Power Drift (%) : -2.119

Tissue Data

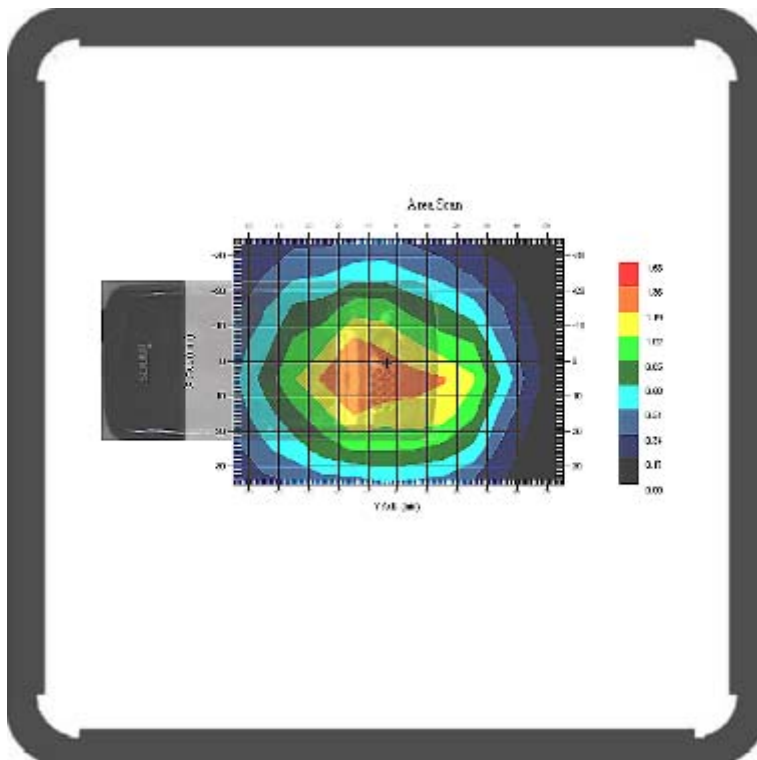
Type : BODY  
 Frequency : 835.00 MHz  
 Epsilon : 55.19 F/m  
 Sigma : 0.99 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 835.00 MHz  
 Duty Cycle Factor : 2  
 Conversion Factor : 6.6  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 1.195 W/kg  
 10 gram SAR value : 0.728 W/kg  
 Area Scan Peak SAR : 1.364 W/kg  
 Zoom Scan Peak SAR : 2.001 W/kg

**Plot 6#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Body-worn Back (835 MHz Middle Channel)**

Measurement Data

Test mode : GPRS  
 Crest Factor : 2  
 Scan Type : Complete  
 Area Scan : 9x13x1: Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.948 W/kg  
 Power Drift-Finish : 0.939 W/kg  
 Power Drift (%) : -1.197

Tissue Data

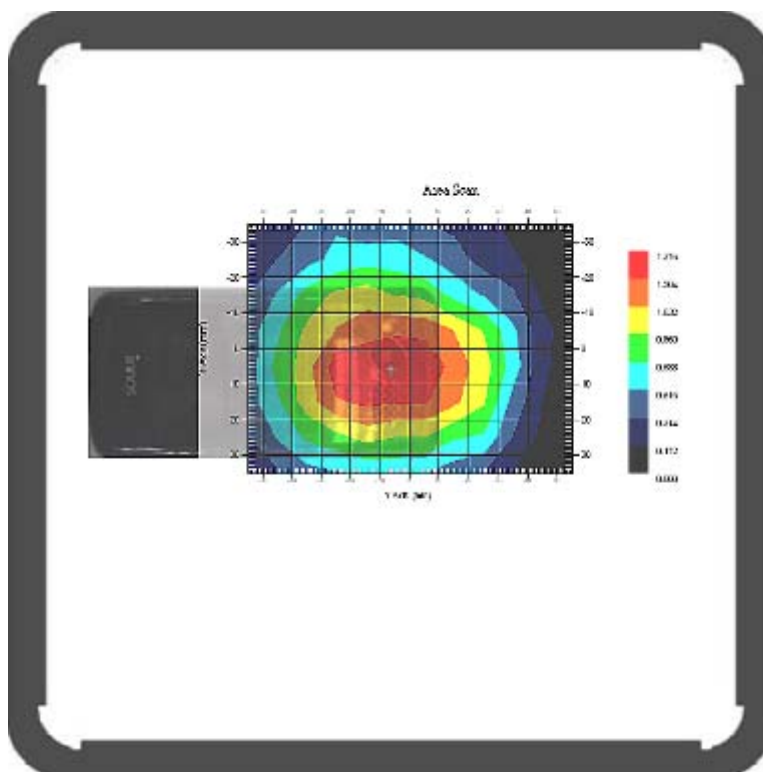
Type : BODY  
 Frequency : 835.00 MHz  
 Epsilon : 55.19 F/m  
 Sigma : 0.99 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 835.00 MHz  
 Duty Cycle Factor : 2  
 Conversion Factor : 6.6  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 1.320 W/kg  
 10 gram SAR value : 0.861 W/kg  
 Area Scan Peak SAR : 1.376 W/kg  
 Zoom Scan Peak SAR : 1.961 W/kg

**Plot 7#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Body-worn Back (835 MHz High Channel)**

Measurement Data

Test mode : GPRS  
 Crest Factor : 2  
 Scan Type : Complete  
 Area Scan : 9x13x1: Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 1.117 W/kg  
 Power Drift-Finish : 1.155 W/kg  
 Power Drift (%) : 3.617

Tissue Data

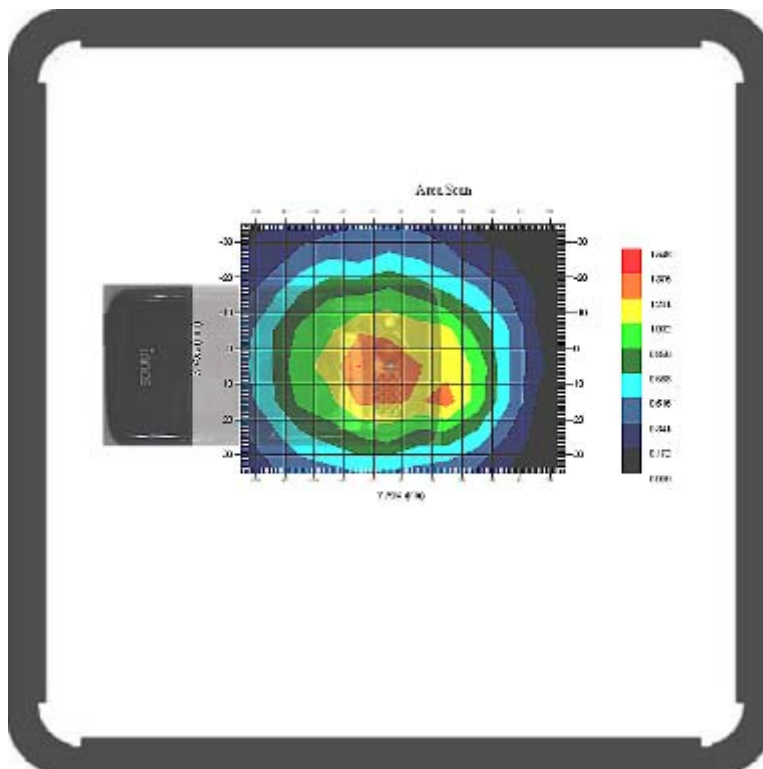
Type : BODY  
 Frequency : 835.00 MHz  
 Epsilon : 55.19 F/m  
 Sigma : 0.99 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 835.00 MHz  
 Duty Cycle Factor : 2  
 Conversion Factor : 6.6  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mmd

1 gram SAR value : 1.276 W/kg  
 10 gram SAR value : 0.860 W/kg  
 Area Scan Peak SAR : 1.378 W/kg  
 Zoom Scan Peak SAR : 1.931 W/kg

**Plot 8#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Body-worn Back (835 MHz Low Channel)**

Measurement Data

Test mode : E-GPRS  
 Crest Factor : 2  
 Scan Type : Complete  
 Area Scan : 13x9x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.953 W/kg  
 Power Drift-Finish : 0.954 W/kg  
 Power Drift (%) : 0.024

Tissue Data

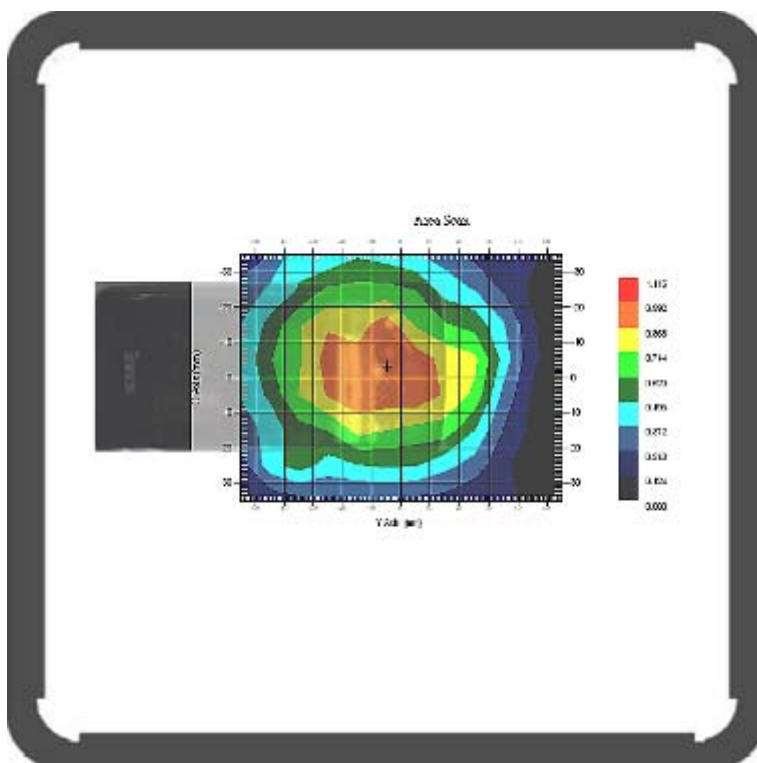
Type : BODY  
 Frequency : 835.00 MHz  
 Epsilon : 55.19 F/m  
 Sigma : 0.99 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 835.00 MHz  
 Duty Cycle Factor : 2  
 Conversion Factor : 6.6  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.947 W/kg  
 10 gram SAR value : 0.630 W/kg  
 Area Scan Peak SAR : 0.995 W/kg  
 Zoom Scan Peak SAR : 1.631 W/kg

**Plot 9#**





**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Body-worn Back (835 MHz Middle Channel)**

Measurement Data

Test mode : E-GPRS  
 Crest Factor : 2  
 Scan Type : Complete  
 Area Scan : 9x13x1: Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.905 W/kg  
 Power Drift-Finish : 0.901 W/kg  
 Power Drift (%) : -0.501

Tissue Data

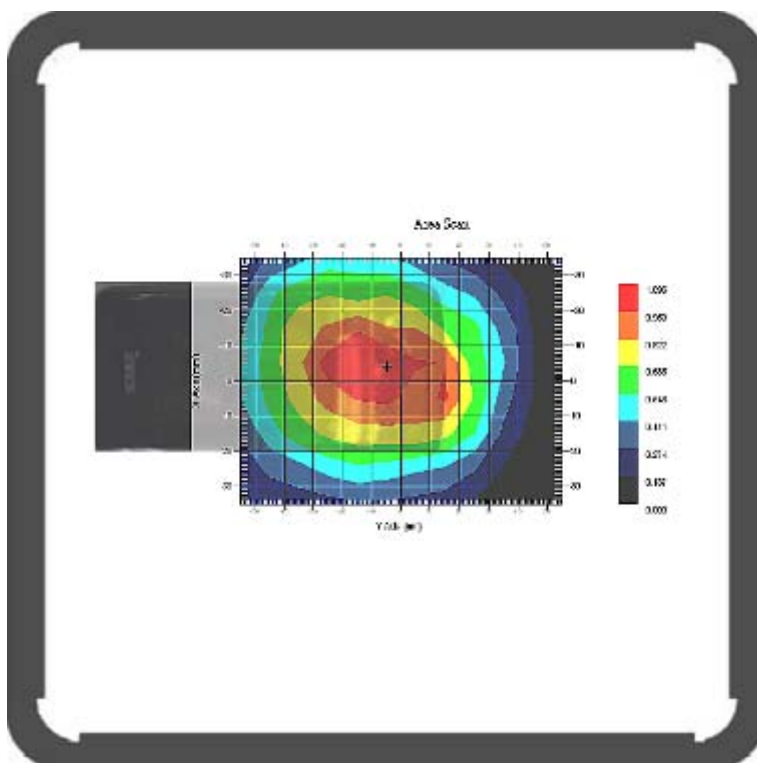
Type : BODY  
 Frequency : 835.00 MHz  
 Epsilon : 55.19 F/m  
 Sigma : 0.99 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 835.00 MHz  
 Duty Cycle Factor : 2  
 Conversion Factor : 6.6  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 1.055 W/kg  
 10 gram SAR value : 0.758 W/kg  
 Area Scan Peak SAR : 1.096 W/kg  
 Zoom Scan Peak SAR : 1.541 W/kg

**Plot 10#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Body-worn Back (835 MHz High Channel)**

Measurement Data

Test mode : E-GPRS  
 Crest Factor : 2  
 Scan Type : Complete  
 Area Scan : 9x13x1: Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 1.117 W/kg  
 Power Drift-Finish : 1.155 W/kg  
 Power Drift (%) : 3.617

Tissue Data

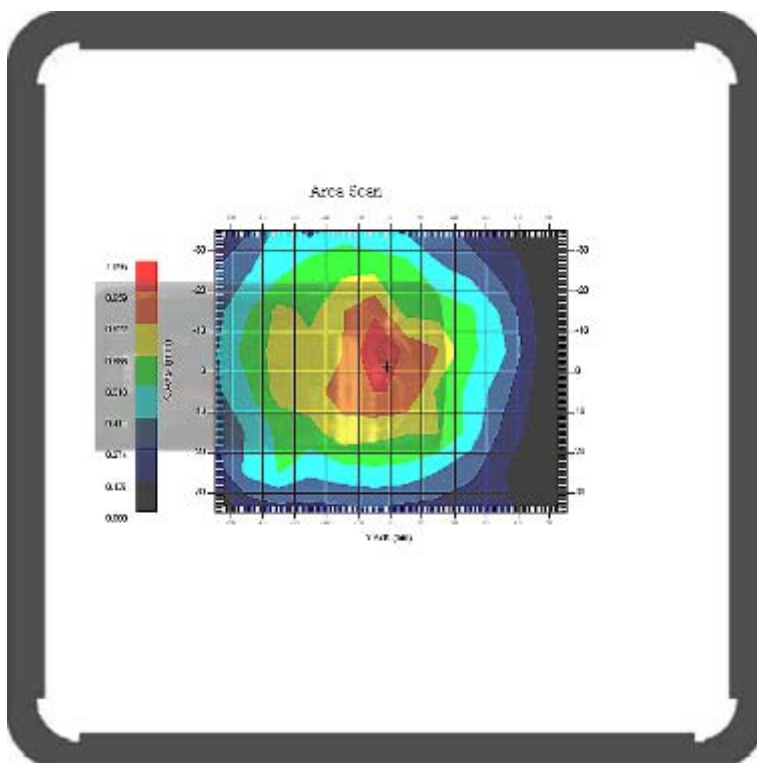
Type : BODY  
 Frequency : 835.00 MHz  
 Epsilon : 55.19 F/m  
 Sigma : 0.99 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 835.00 MHz  
 Duty Cycle Factor : 2  
 Conversion Factor : 6.6  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mmd

1 gram SAR value : 0.976 W/kg  
 10 gram SAR value : 0.760 W/kg  
 Area Scan Peak SAR : 1.008 W/kg  
 Zoom Scan Peak SAR : 1.931 W/kg

**Plot 11#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Left Head Cheek (1900 MHz Low Channel)**

Measurement Data

Test mode : GSM  
 Crest Factor : 8  
 Scan Type : Complete  
 Area Scan : 13x9x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.044 W/kg  
 Power Drift-Finish : 0.045 W/kg  
 Power Drift (%) : -2.673

Tissue Data

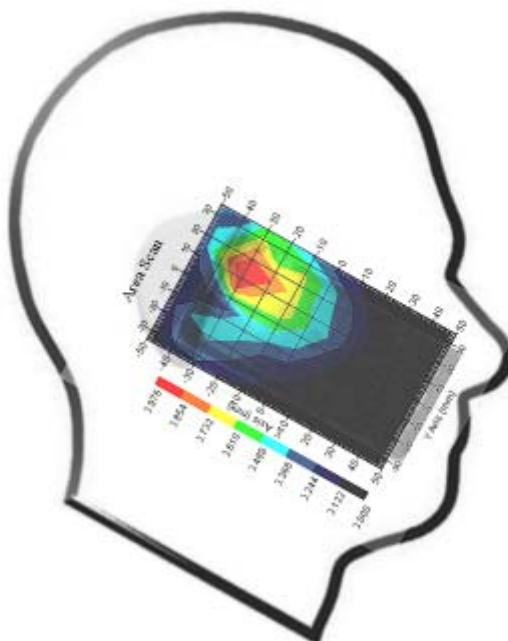
Type : HEAD  
 Frequency : 1900.00 MHz  
 Epsilon : 40.52 F/m  
 Sigma : 1.42 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 1900.00 MHz  
 Duty Cycle Factor : 8  
 Conversion Factor : 5.2  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.952 W/kg  
 10 gram SAR value : 0.420 W/kg  
 Area Scan Peak SAR : 0.970 W/kg  
 Zoom Scan Peak SAR : 1.671 W/kg

**Plot 12#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Left Head Cheek (1900 MHz Middle Channel)**

Measurement Data

Test mode : GSM  
 Crest Factor : 8  
 Scan Type : Complete  
 Area Scan : 13x9x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.031 W/kg  
 Power Drift-Finish : 0.031 W/kg  
 Power Drift (%) : -1.117

Tissue Data

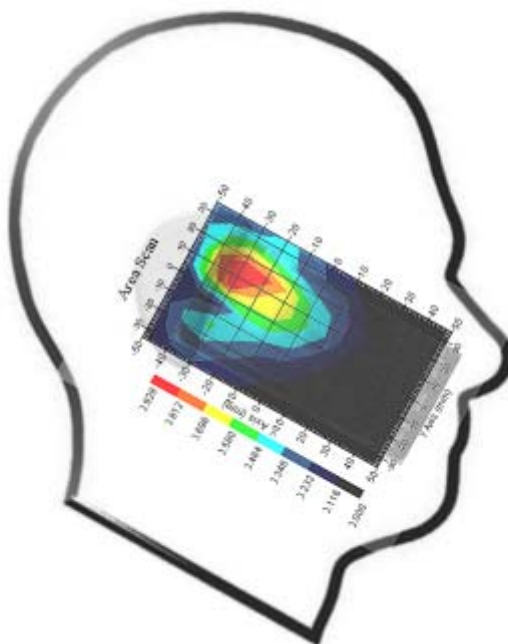
Type : HEAD  
 Frequency : 1900.00 MHz  
 Epsilon : 40.52 F/m  
 Sigma : 1.42 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 1900.00 MHz  
 Duty Cycle Factor : 8  
 Conversion Factor : 5.2  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V/m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.886 W/kg  
 10 gram SAR value : 0.395 W/kg  
 Area Scan Peak SAR : 0.911 W/kg  
 Zoom Scan Peak SAR : 1.612 W/kg

**Plot 13#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Left Head Cheek (1900 MHz High Channel)**

Measurement Data

Test mode : GSM  
 Crest Factor : 8  
 Scan Type : Complete  
 Area Scan : 13x9x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.241 W/kg  
 Power Drift-Finish : 0.231 W/kg  
 Power Drift (%) : -4.117

Tissue Data

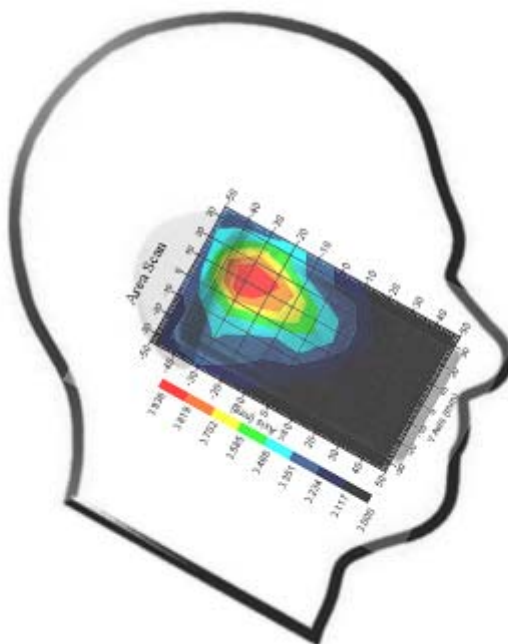
Type : HEAD  
 Frequency : 1900.00 MHz  
 Epsilon : 40.52 F/m  
 Sigma : 1.42 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 1900.00 MHz  
 Duty Cycle Factor : 8  
 Conversion Factor : 5.2  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.893 W/kg  
 10 gram SAR value : 0.401 W/kg  
 Area Scan Peak SAR : 0.927 W/kg  
 Zoom Scan Peak SAR : 1.567 W/kg

**Plot 14#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Left Head Tilt (1900 MHz Low Channel)**

Measurement Data

Test mode : GSM  
 Crest Factor : 8  
 Scan Type : Complete  
 Area Scan : 13x9x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.075 W/kg  
 Power Drift-Finish : 0.077 W/kg  
 Power Drift (%) : 4.862

Tissue Data

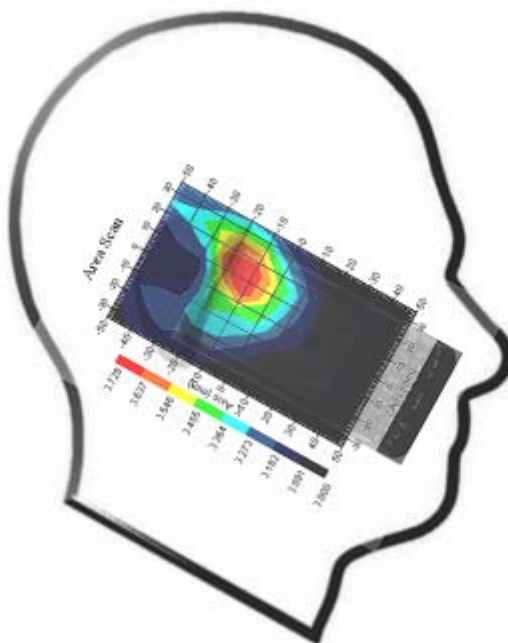
Type : HEAD  
 Frequency : 1900.00 MHz  
 Epsilon : 40.52 F/m  
 Sigma : 1.42 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 1900.00 MHz  
 Duty Cycle Factor : 8  
 Conversion Factor : 5.2  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.654 W/kg  
 10 gram SAR value : 0.352 W/kg  
 Area Scan Peak SAR : 0.725 W/kg  
 Zoom Scan Peak SAR : 1.141 W/kg

**Plot 15#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Right Head Cheek (1900 MHz Low Channel)**

Measurement Data

Test mode : GSM  
 Crest Factor : 8  
 Scan Type : Complete  
 Area Scan : 13x9x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.317 W/kg  
 Power Drift-Finish : 0.321 W/kg  
 Power Drift (%) : 2.389

Tissue Data

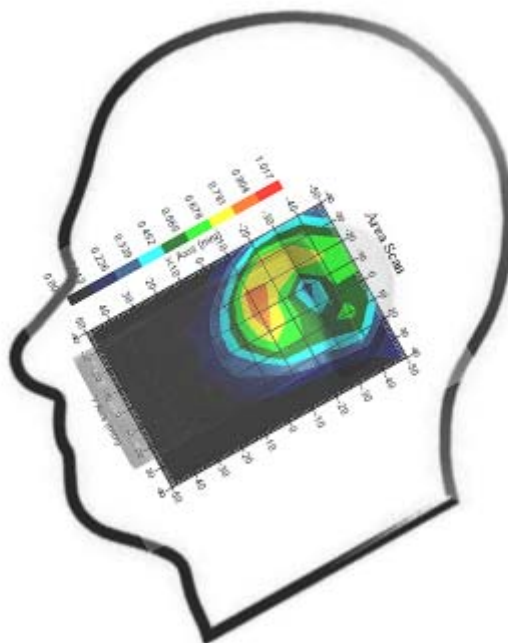
Type : HEAD  
 Frequency : 1900.00 MHz  
 Epsilon : 40.52 F/m  
 Sigma : 1.42 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 1900.00 MHz  
 Duty Cycle Factor : 8  
 Conversion Factor : 5.2  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 1.043 W/kg  
 10 gram SAR value : 0.501 W/kg  
 Area Scan Peak SAR : 0.906 W/kg  
 Zoom Scan Peak SAR : 1.781 W/kg

**Plot 16#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Right Head Cheek (1900 MHz Middle Channel)**

Measurement Data

Test mode : GSM  
 Crest Factor : 8  
 Scan Type : Complete  
 Area Scan : 13x9x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.383 W/kg  
 Power Drift-Finish : 0.377 W/kg  
 Power Drift (%) : -1.596

Tissue Data

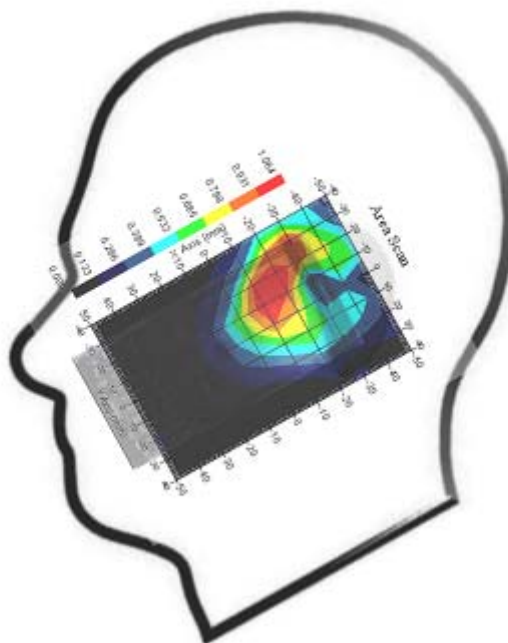
Type : HEAD  
 Frequency : 1900.00 MHz  
 Epsilon : 40.52 F/m  
 Sigma : 1.42 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 1900.00 MHz  
 Duty Cycle Factor : 8  
 Conversion Factor : 5.2  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.932 W/kg  
 10 gram SAR value : 0.464 W/kg  
 Area Scan Peak SAR : 1.062 W/kg  
 Zoom Scan Peak SAR : 2.261 W/kg

**Plot 17#**





**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Right Head Cheek (1900 MHz High Channel)**

Measurement Data

Test mode : GSM  
 Crest Factor : 8  
 Scan Type : Complete  
 Area Scan : 13x9x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.379 W/kg  
 Power Drift-Finish : 0.372 W/kg  
 Power Drift (%) : -3.990

Tissue Data

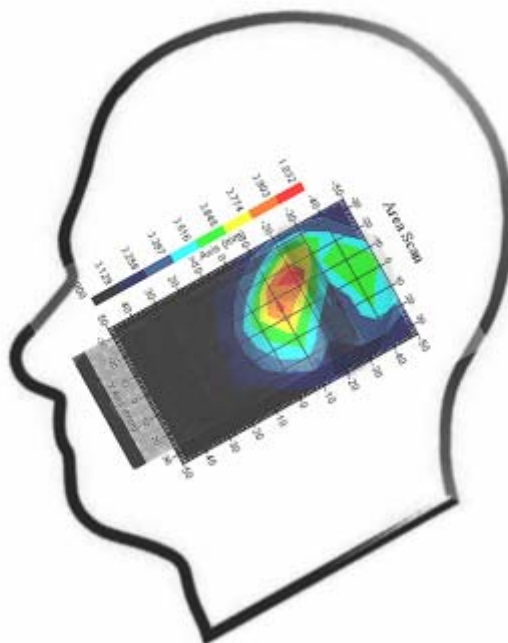
Type : HEAD  
 Frequency : 1900.00 MHz  
 Epsilon : 40.52 F/m  
 Sigma : 1.42 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 1900.00 MHz  
 Duty Cycle Factor : 8  
 Conversion Factor : 5.2  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V/m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.955 W/kg  
 10 gram SAR value : 0.467 W/kg  
 Area Scan Peak SAR : 1.030 W/kg  
 Zoom Scan Peak SAR : 1.941 W/kg

**Plot 18#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Right Head Tilt (1900 MHz Low Channel)**

Measurement Data

Test mode : GSM  
 Crest Factor : 8  
 Scan Type : Complete  
 Area Scan : 13x9x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.345 W/kg  
 Power Drift-Finish : 0.339 W/kg  
 Power Drift (%) : -4.202

Tissue Data

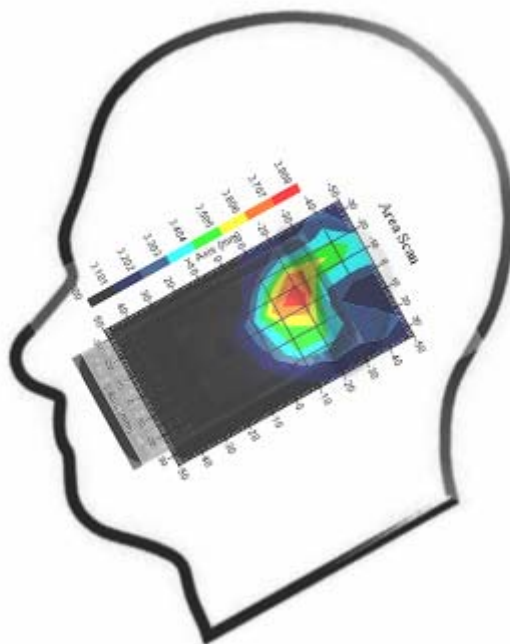
Type : HEAD  
 Frequency : 1900.00 MHz  
 Epsilon : 40.52 F/m  
 Sigma : 1.42 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 1900.00 MHz  
 Duty Cycle Factor : 8  
 Conversion Factor : 5.2  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V/m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.690 W/kg  
 10 gram SAR value : 0.372 W/kg  
 Area Scan Peak SAR : 0.804 W/kg  
 Zoom Scan Peak SAR : 1.291 W/kg

**Plot 19#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Body-worn Back-Headset (1900 MHz Low Channel)**

Measurement Data

Test mode : GSM  
 Crest Factor : 8  
 Scan Type : Complete  
 Area Scan : 13x9x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.453 W/kg  
 Power Drift-Finish : 0.447 W/kg  
 Power Drift (%) : -2.031

Tissue Data

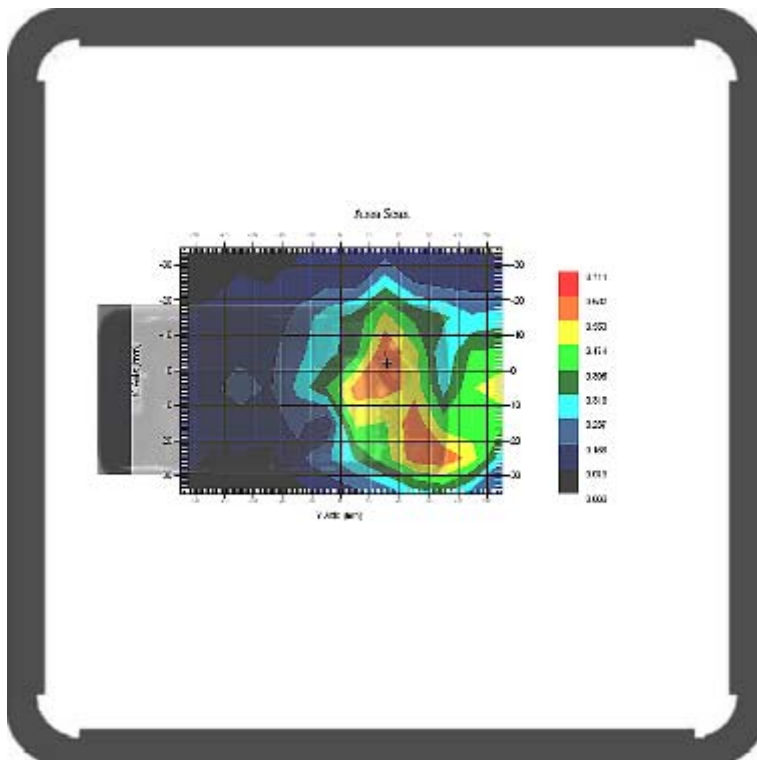
Type : Body  
 Frequency : 1900.00 MHz  
 Epsilon : 53.07 F/m  
 Sigma : 1.51 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 1900.00 MHz  
 Duty Cycle Factor : 8  
 Conversion Factor : 5.0  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.482 W/kg  
 10 gram SAR value : 0.266 W/kg  
 Area Scan Peak SAR : 0.636 W/kg  
 Zoom Scan Peak SAR : 1.291 W/kg

**Plot 20#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Body-worn Back (1900 MHz Low Channel)**

Measurement Data

Test mode : GPRS  
 Crest Factor : 2  
 Scan Type : Complete  
 Area Scan : 13x9x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 1.041 W/kg  
 Power Drift-Finish : 1.086 W/kg  
 Power Drift (%) : 4.299

Tissue Data

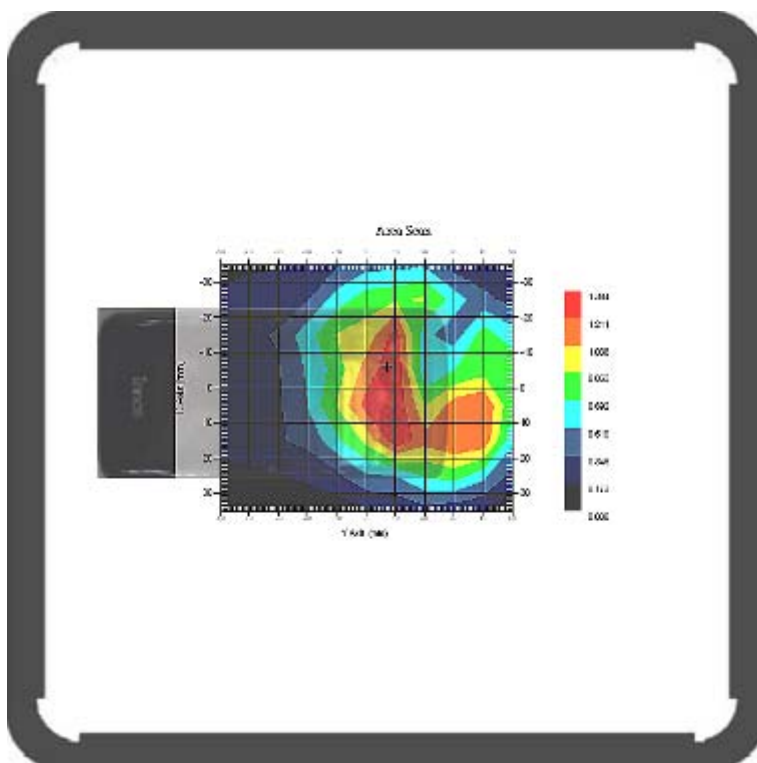
Type : Body  
 Frequency : 1900.00 MHz  
 Epsilon : 53.07 F/m  
 Sigma : 1.51 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 1900.00 MHz  
 Duty Cycle Factor : 2  
 Conversion Factor : 5.0  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V/m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 1.253 W/kg  
 10 gram SAR value : 0.793 W/kg  
 Area Scan Peak SAR : 1.383 W/kg  
 Zoom Scan Peak SAR : 2.992 W/kg

**Plot 21#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Body-worn Back (1900 MHz Middle Channel)**

Measurement Data

Test mode : GPRS  
 Crest Factor : 2  
 Scan Type : Complete  
 Area Scan : 9x13x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 1.006 W/kg  
 Power Drift-Finish : 0.986 W/kg  
 Power Drift (%) : -3.087

Tissue Data

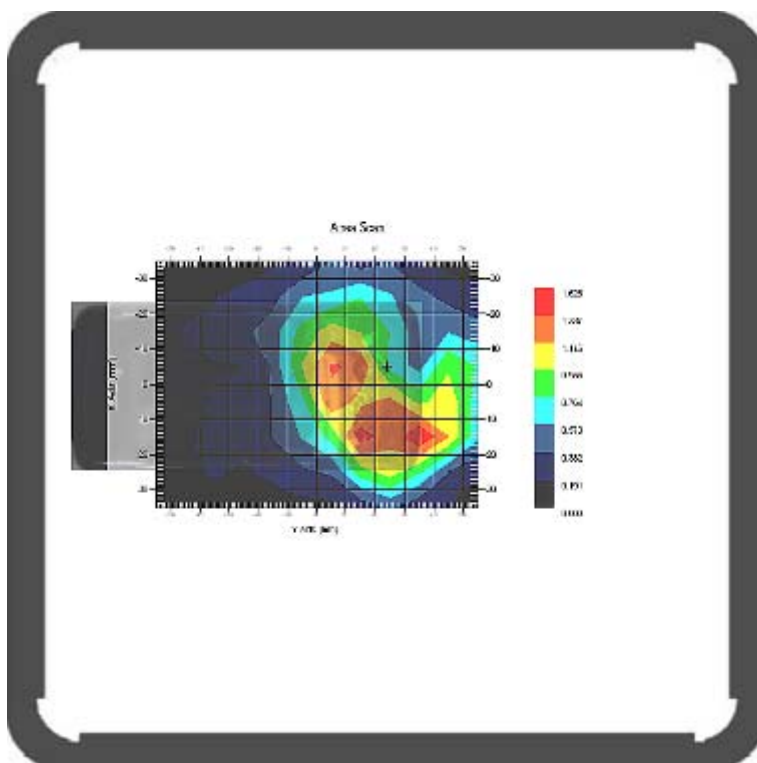
Type : BODY  
 Frequency : 1900.00 MHz  
 Epsilon : 53.07 F/m  
 Sigma : 1.51 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 1900.00 MHz  
 Duty Cycle Factor : 2  
 Conversion Factor : 5.0  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 1.341 W/kg  
 10 gram SAR value : 0.756 W/kg  
 Area Scan Peak SAR : 1.526 W/kg  
 Zoom Scan Peak SAR : 2.722 W/kg

**Plot 22#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Body-worn Back (1900 MHz High Channel)**

Measurement Data

Test mode : GPRS  
 Crest Factor : 2  
 Scan Type : Complete  
 Area Scan : 9x13x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.987 W/kg  
 Power Drift-Finish : 0.998 W/kg  
 Power Drift (%) : 3.541

Tissue Data

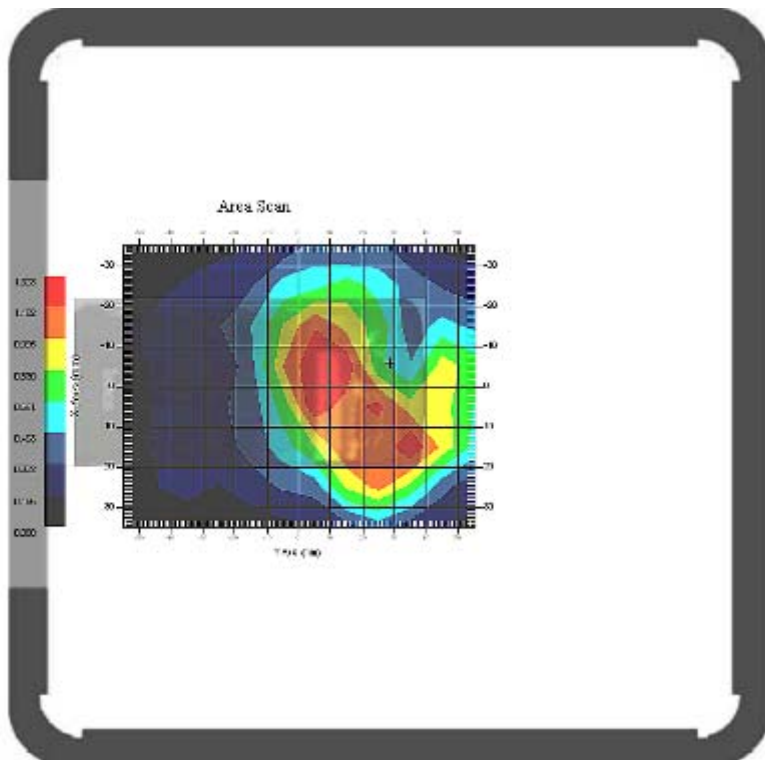
Type : BODY  
 Frequency : 1900.00 MHz  
 Epsilon : 53.07 F/m  
 Sigma : 1.51 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 1900.00 MHz  
 Duty Cycle Factor : 2  
 Conversion Factor : 5.0  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V/m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 1.275 W/kg  
 10 gram SAR value : 0.649 W/kg  
 Area Scan Peak SAR : 1.318 W/kg  
 Zoom Scan Peak SAR : 2.456 W/kg

**Plot 23#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Body-worn Back (1900 MHz Low Channel)**

Measurement Data

Test mode : E-GPRS  
 Crest Factor : 2  
 Scan Type : Complete  
 Area Scan : 13x9x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.589 W/kg  
 Power Drift-Finish : 0.601 W/kg  
 Power Drift (%) : 4.032

Tissue Data

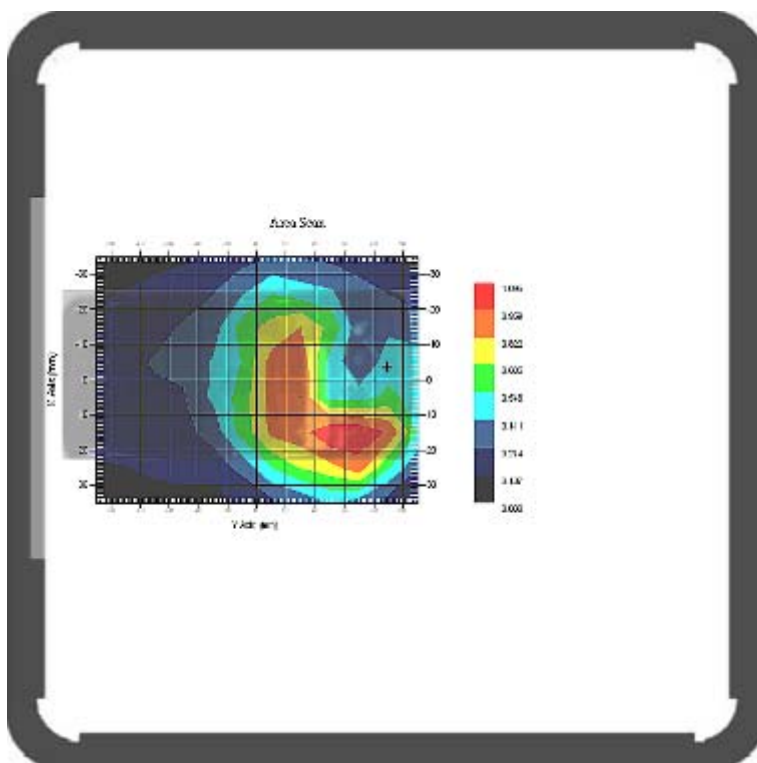
Type : Body  
 Frequency : 1900.00 MHz  
 Epsilon : 53.07 F/m  
 Sigma : 1.51 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 1900.00 MHz  
 Duty Cycle Factor : 2  
 Conversion Factor : 5.0  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.904 W/kg  
 10 gram SAR value : 0.489 W/kg  
 Area Scan Peak SAR : 1.095 W/kg  
 Zoom Scan Peak SAR : 1.781 W/kg

**Plot 24#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Body-worn Back (1900 MHz Middle Channel)**

Measurement Data

Test mode : E-GPRS  
 Crest Factor : 2  
 Scan Type : Complete  
 Area Scan : 9x13x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.610 W/kg  
 Power Drift-Finish : 0.586 W/kg  
 Power Drift (%) : -3.896

Tissue Data

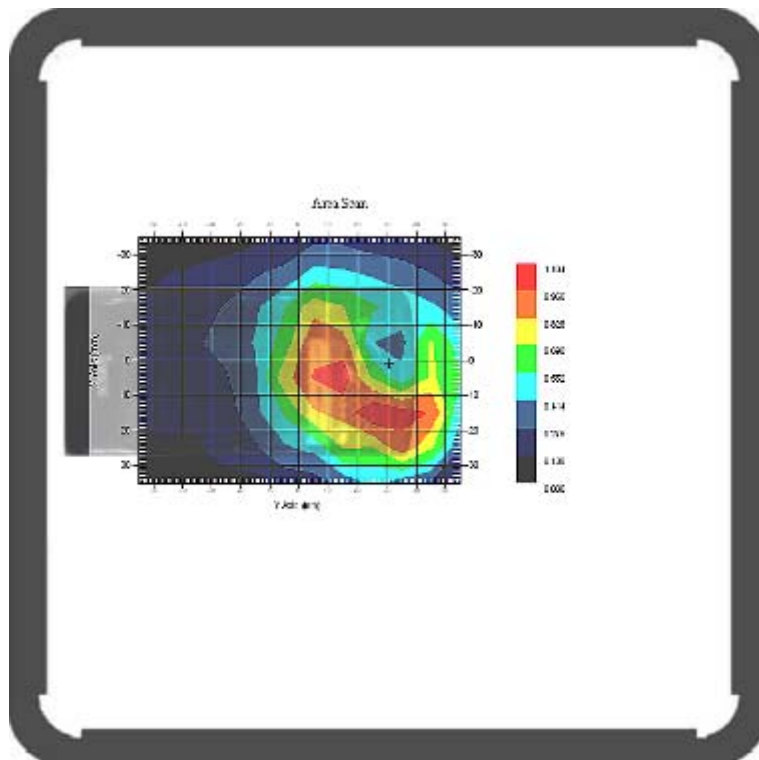
Type : BODY  
 Frequency : 1900.00 MHz  
 Epsilon : 53.07 F/m  
 Sigma : 1.51 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 1900.00 MHz  
 Duty Cycle Factor : 2  
 Conversion Factor : 5.0  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V/m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.966 W/kg  
 10 gram SAR value : 0.522 W/kg  
 Area Scan Peak SAR : 1.104 W/kg  
 Zoom Scan Peak SAR : 1.781 W/kg

**Plot 25#**





**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**Body-worn Back (1900 MHz High Channel)**

Measurement Data

Test mode : E-GPRS  
Crest Factor : 2  
Scan Type : Complete  
Area Scan : 9x13x1 : Measurement x=10mm, y=10mm, z=4mm  
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
Power Drift-Start : 0.665 W/kg  
Power Drift-Finish : 0.677 W/kg  
Power Drift (%) : 2.355

Tissue Data

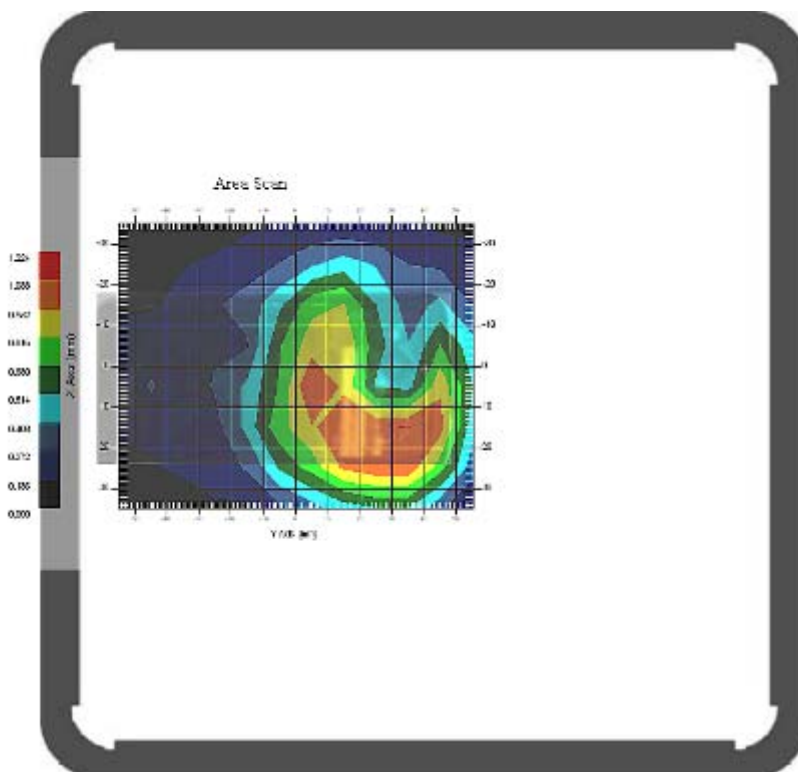
Type : BODY  
Frequency : 1900.00 MHz  
Epsilon : 53.07 F/m  
Sigma : 1.51 S/m  
Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
Frequency : 1900.00 MHz  
Duty Cycle Factor : 2  
Conversion Factor : 5.0  
Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point : 95.00 mV  
Offset : 1.56 mm

1 gram SAR value : 1.068 W/kg  
10 gram SAR value : 0.471 W/kg  
Area Scan Peak SAR : 1.091 W/kg  
Zoom Scan Peak SAR : 1.951 W/kg

**Plot 26#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**802.11b; Left Head Cheek (2450 MHz Channel 6)**

Measurement Data

Crest Factor : 1  
 Scan Type : Complete  
 Area Scan : 10x6x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.008 W/kg  
 Power Drift-Finish : 0.008 W/kg  
 Power Drift (%) : 0.655

Tissue Data

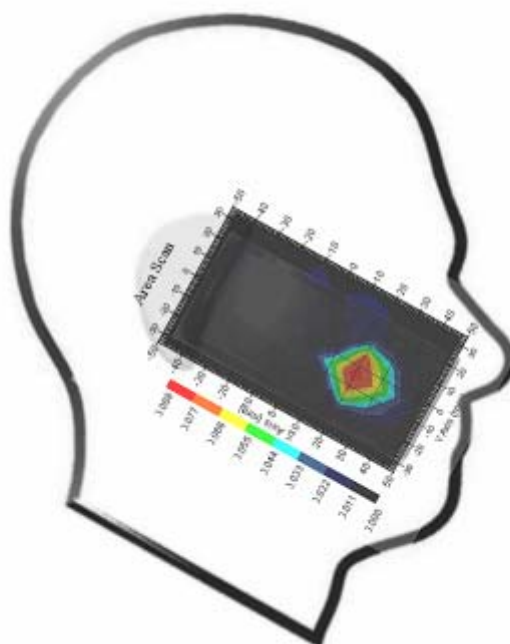
Type : Head  
 Frequency : 2450 MHz  
 Epsilon : 39.10 F/m  
 Sigma : 1.81 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 2450 MHz  
 Duty Cycle Factor : 1  
 Conversion Factor : 4.9  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.074 W/kg  
 10 gram SAR value : 0.033 W/kg  
 Area Scan Peak SAR : 0.086 W/kg  
 Zoom Scan Peak SAR : 0.157 W/kg

**Plot 27#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**802.11b; Left Head Cheek Tilt (2450 MHz Channel 6)**

Measurement Data

Crest Factor : 1  
 Scan Type : Complete  
 Area Scan : 10x6x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.012 W/kg  
 Power Drift-Finish : 0.012 W/kg  
 Power Drift (%) : 1.566

Tissue Data

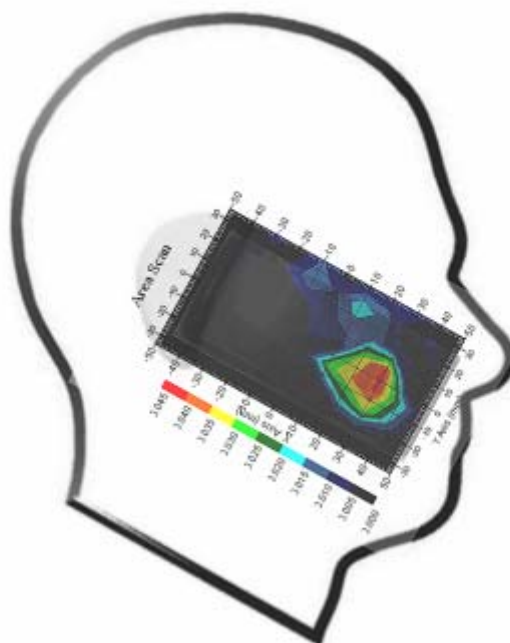
Type : Head  
 Frequency : 2450 MHz  
 Epsilon : 39.10 F/m  
 Sigma : 1.81 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 2450 MHz  
 Duty Cycle Factor : 1  
 Conversion Factor : 4.9  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.035 W/kg  
 10 gram SAR value : 0.013 W/kg  
 Area Scan Peak SAR : 0.038 W/kg  
 Zoom Scan Peak SAR : 0.072 W/kg

**Plot 28#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**802.11b; Right Head Cheek (2450 MHz Channel 6)**

Measurement Data

Crest Factor : 1  
 Scan Type : Complete  
 Area Scan : 10x6x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.011 W/kg  
 Power Drift-Finish : 0.011 W/kg  
 Power Drift (%) : -0.210

Tissue Data

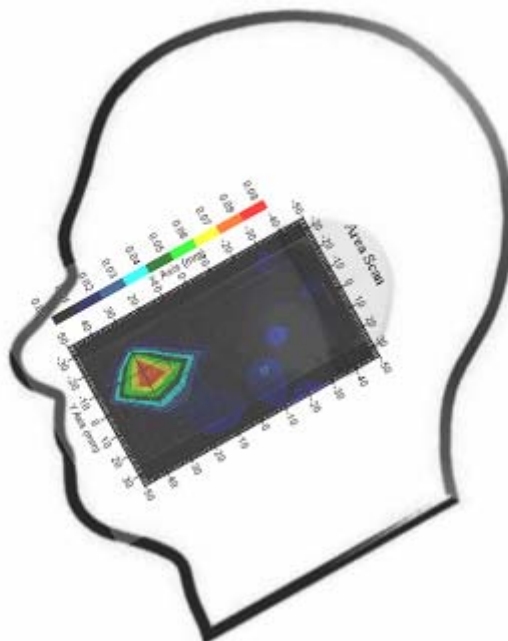
Type : Head  
 Frequency : 2450 MHz  
 Epsilon : 39.10 F/m  
 Sigma : 1.81 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 2450 MHz  
 Duty Cycle Factor : 1  
 Conversion Factor : 4.9  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.069 W/kg  
 10 gram SAR value : 0.038 W/kg  
 Area Scan Peak SAR : 0.084 W/kg  
 Zoom Scan Peak SAR : 0.169 W/kg

**Plot 29#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**802.11b; Right Head Cheek Tilt (2450 MHz Channel 6)**

Measurement Data

Crest Factor : 1  
 Scan Type : Complete  
 Area Scan : 10x6x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.013 W/kg  
 Power Drift-Finish : 0.012 W/kg  
 Power Drift (%) : -0.654

Tissue Data

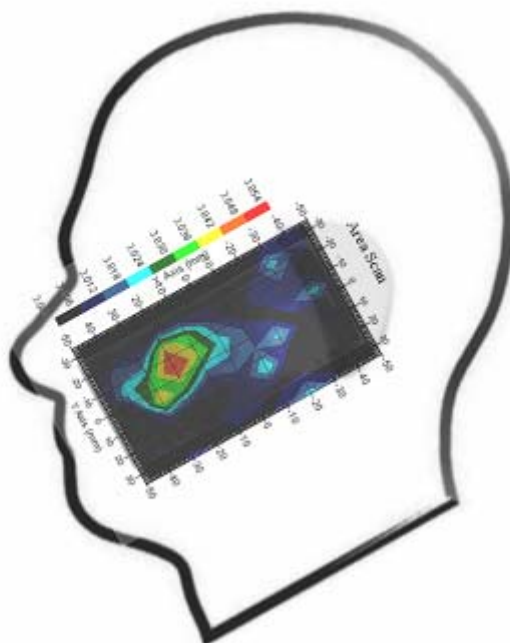
Type : Head  
 Frequency : 2450 MHz  
 Epsilon : 39.10 F/m  
 Sigma : 1.81 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 2450 MHz  
 Duty Cycle Factor : 1  
 Conversion Factor : 4.9  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.042 W/kg  
 10 gram SAR value : 0.031 W/kg  
 Area Scan Peak SAR : 0.052 W/kg  
 Zoom Scan Peak SAR : 0.114 W/kg

**Plot 30#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**802.11b; Position A (2450 MHz Channel 6)**

Measurement Data

Crest Factor : 1  
 Scan Type : Complete  
 Area Scan : 16x10x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.052 W/kg  
 Power Drift-Finish : 0.051 W/kg  
 Power Drift (%) : -2.014

Tissue Data

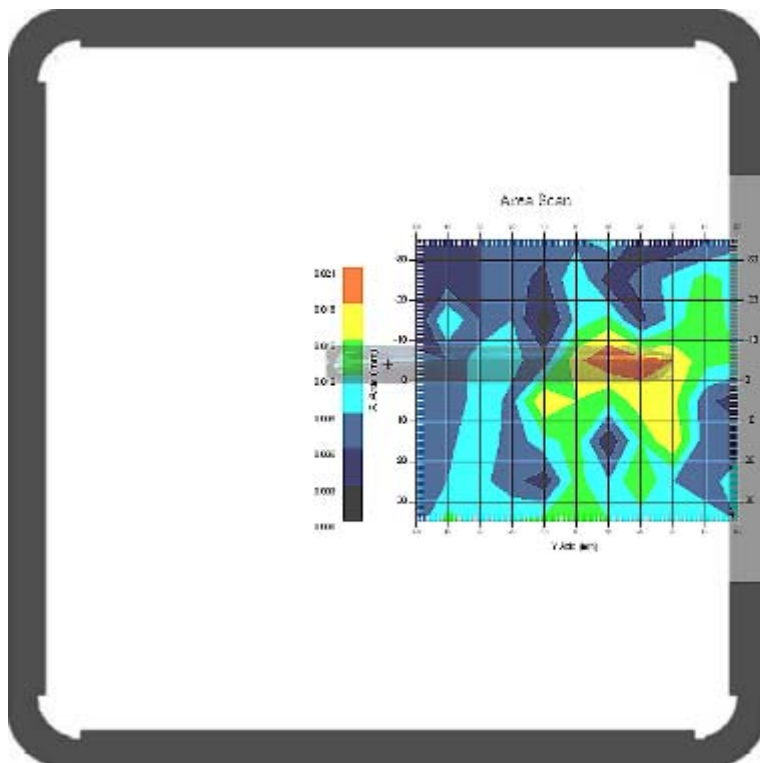
Type : BODY  
 Frequency : 2450 MHz  
 Epsilon : 51.70 F/m  
 Sigma : 1.96 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 2450 MHz  
 Duty Cycle Factor : 1  
 Conversion Factor : 4.3  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.020 W/kg  
 10 gram SAR value : 0.011 W/kg  
 Area Scan Peak SAR : 0.021 W/kg  
 Zoom Scan Peak SAR : 0.040 W/kg

**Plot 31#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**802.11b; Position B (2450 MHz Channel 6)**

Measurement Data

Crest Factor : 1  
Scan Type : Complete  
Area Scan : 10x6x1 : Measurement x=10mm, y=10mm, z=4mm  
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
Power Drift-Start : 0.005 W/kg  
Power Drift-Finish : 0.005 W/kg  
Power Drift (%) : -0.773

Tissue Data

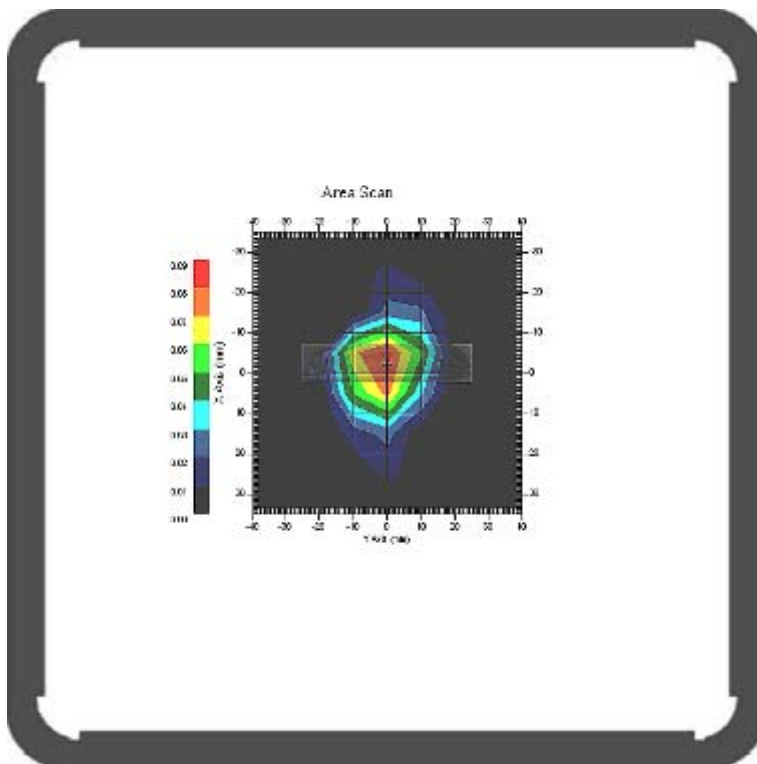
Type : BODY  
Frequency : 2450 MHz  
Epsilon : 51.70 F/m  
Sigma : 1.96 S/m  
Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
Frequency : 2450 MHz  
Duty Cycle Factor : 1  
Conversion Factor : 4.3  
Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point : 95.00 mV  
Offset : 1.56 mm

1 gram SAR value : 0.075 W/kg  
10 gram SAR value : 0.049 W/kg  
Area Scan Peak SAR : 0.092 W/kg  
Zoom Scan Peak SAR : 0.134 W/kg

**Plot 32#**



**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**802.11b; Position C (2450 MHz Channel 6)**

Measurement Data

Crest Factor : 1  
 Scan Type : Complete  
 Area Scan : 16x6x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.017 W/kg  
 Power Drift-Finish : 0.018 W/kg  
 Power Drift (%) : 2.940

Tissue Data

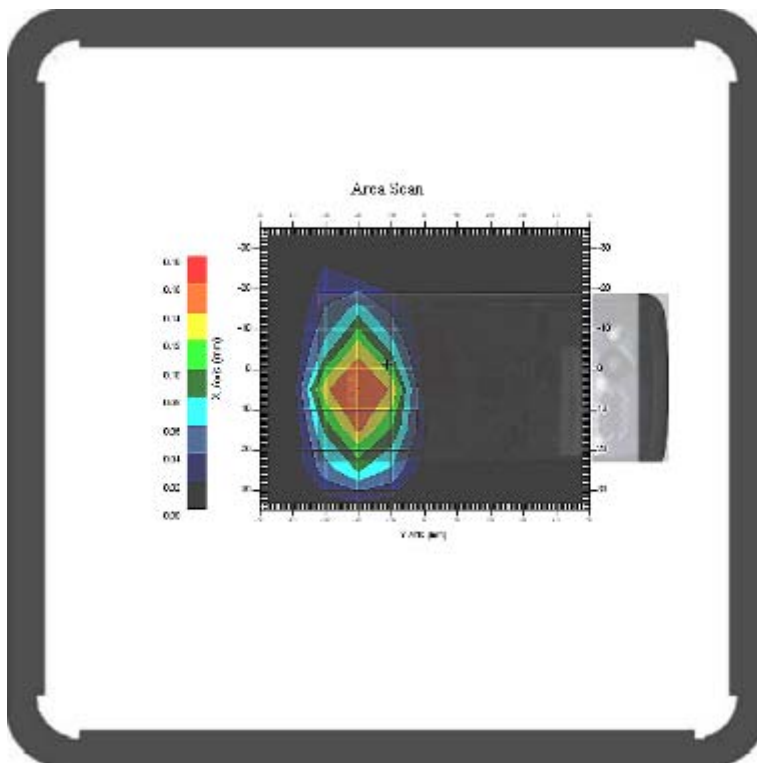
Type : BODY  
 Frequency : 2450 MHz  
 Epsilon : 51.70 F/m  
 Sigma : 1.96 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 2450 MHz  
 Duty Cycle Factor : 1  
 Conversion Factor : 4.3  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.155 W/kg  
 10 gram SAR value : 0.084 W/kg  
 Area Scan Peak SAR : 0.171 W/kg  
 Zoom Scan Peak SAR : 0.360 W/kg

**Plot 33#**





**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**

**802.11b; Position D (2450 MHz Channel 6)**

Measurement Data

Crest Factor : 1  
 Scan Type : Complete  
 Area Scan : 16x10x1 : Measurement x=10mm, y=10mm, z=4mm  
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm  
 Power Drift-Start : 0.023 W/kg  
 Power Drift-Finish : 0.022 W/kg  
 Power Drift (%) : -3.205

Tissue Data

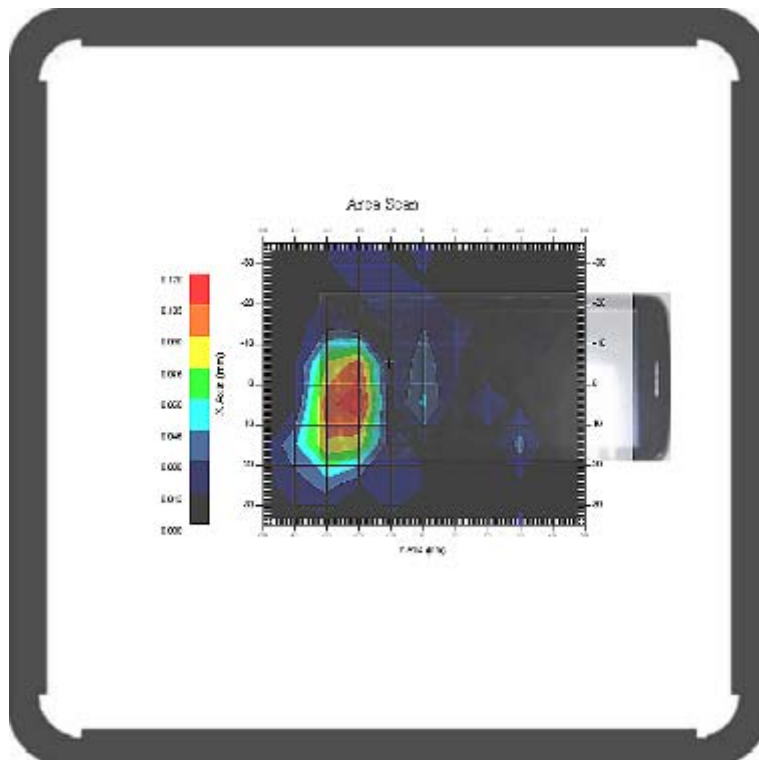
Type : BODY  
 Frequency : 2450 MHz  
 Epsilon : 51.70 F/m  
 Sigma : 1.96 S/m  
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283  
 Frequency : 2450 MHz  
 Duty Cycle Factor : 1  
 Conversion Factor : 4.3  
 Probe Sensitivity : 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point : 95.00 mV  
 Offset : 1.56 mm

1 gram SAR value : 0.102 W/kg  
 10 gram SAR value : 0.066 W/kg  
 Area Scan Peak SAR : 0.115 W/kg  
 Zoom Scan Peak SAR : 0.221 W/kg

**Plot 34#**



### APPENDIX A – MEASUREMENT UNCERTAINTY

The uncertainty budget has been determined for the measurement system and is given in the following Table.

**Measurement Uncertainty for 300MHz to 3GHz**

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	c <sub>i</sub> <sup>1</sup> (1-g)	c <sub>i</sub> <sup>1</sup> (10-g)	Standard Uncertainty (1-g) %	Standard Uncertainty (10-g) %
<b>Measurement System</b>							
Probe Calibration	3.5	normal	1	1	1	3.5	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	(1-cp) <sup>1/2</sup>	$(\frac{1-cp}{2})^1$	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 -Noise	3.0	rectangular	$\sqrt{3}$	1	1	1.7	1.7
RF Ambient Condition - Reflections	3.0	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Probe Positioner Mech. Restrictions	0.4	rectangular	$\sqrt{3}$	1	1	0.2	0.2
<b>Restriction</b>							
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	0.4	rectangular	$\sqrt{3}$	1	1	0.2	0.2
<b>Phantom and Setup</b>							
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.)	2.6	normal	1	0.7	0.5	1.8	1.3
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7	1.4
Liquid Permittivity(meas.)	2.7	normal	1	0.6	0.5	1.6	1.4
Combined Uncertainty		RSS				9.7	9.4
Combined Uncertainty (coverage factor=2)		Normal(k=2)				19.4	18.8

## APPENDIX B – PROBE CALIBRATION CERTIFICATES

### NCL CALIBRATION LABORATORIES

Calibration File No.: 1251-1258

Client.: BACL Lab

## 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

Record of Calibration

Head and Body

Manufacturer: APREL Laboratories

Model No.: E-020

Serial No.: 500-00283

Calibration Procedure: D01-032-E020-V2, D22-012-Tissue, D28-002-Dipole  
Project No: BACL-5607

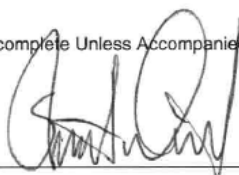
Calibrated: 14<sup>th</sup> July 2011

Released on: 14<sup>th</sup> July 2011

Approved By: Stuart Nicol

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

Released By: \_\_\_\_\_



### **NCL** CALIBRATION LABORATORIES

303 Terry Fox Drive, Suite 102  
Kanata, Ontario  
CANADA K2K 3J1

Division of APREL  
TEL: (613) 435-8300  
FAX: (613) 435-8306

**NCL Calibration Laboratories**

Division of APREL Inc.

**Introduction**

This Calibration Report reproduces the results of the calibration performed in line with the references listed below. Calibration is performed using accepted methodologies as per the references listed below. Probes are calibrated for air, and tissue and the values reported are the results from the physical quantification of the probe through metrological practices.

**Calibration Method**

Probes are calibrated using the following methods.

<1000MHz

TEM Cell for sensitivity in air

Standard phantom using temperature transfer method for sensitivity in tissue

>1000MHz

Waveguide\* method to determine sensitivity in air and tissue

\*Waveguide is numerically (simulation) assessed to determine the field distribution and power

The boundary effect for the probe is assessed using a standard flat phantom where the probe output is compared against a numerically simulated series of data points

**References**

- IEEE Standard 1528 (2003) including Amendment 1  
IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
- EN 62209-1 (2006)  
Human Exposure to RF Fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures-Part 1: Procedure to measure the Specific Absorption Rate (SAR) for hand-held mobile wireless devices
- IEC 62209-2 Ed. 1.0 (2010-03)  
Human exposure to RF fields from hand-held and body-mounted wireless devices - Human models, instrumentation, and procedures - Part 2: specific absorption rate (SAR) for wireless communication devices (30 MHz - 6 GHz)
- TP-D01-032-E020-V2 E-Field probe calibration procedure
- D22-012-Tissue dielectric tissue calibration procedure
- D28-002-Dipole procedure for validation of SAR system using a dipole
- IEEE 1309 Draft Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9kHz to 40GHz

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Page 2 of 10

This page has been reviewed for content and attested to on Page 2 of this document.

**NCL Calibration Laboratories**

Division of APREL Inc.

**Conditions**

Probe 500-00283 was a new probe taken from stock.

**Ambient Temperature of the Laboratory:** 22 °C +/- 1.5°C  
**Temperature of the Tissue:** 21 °C +/- 1.5°C  
**Relative Humidity:** < 60%

**Primary Measurement Standards**

Instrument	Serial Number	Cal due date
Power meter Anritsu MA2408A	90025437	Nov.4, 2011
Power Sensor Anritsu MA2481D	103555	Nov 4, 2011
Attenuator HP 8495A (70dB)	1944A10711	Sept. 14, 2011
Network Analyzer Anritsu MT8801C	MB11855	Feb. 8, 2012

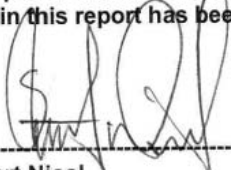
**Secondary Measurement Standards**

Signal Generator Agilent E4438C -506 MY55182336 June 7, 2012

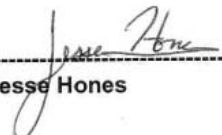
**Attestation**

The below named signatories have conducted the calibration and review of the data which is presented in this calibration report.

**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**



-----  
**Jesse Hones**

**NCL Calibration Laboratories**

Division of APREL Inc.

**Probe Summary**

<b>Probe Type:</b>	E-Field Probe E020
<b>Serial Number:</b>	500-00283
<b>Frequency:</b>	As presented on page 5
<b>Sensor Offset:</b>	1.56
<b>Sensor Length:</b>	2.5
<b>Tip Enclosure:</b>	Composite*
<b>Tip Diameter:</b>	< 2.9 mm
<b>Tip Length:</b>	55 mm
<b>Total Length:</b>	289 mm

\*Resistive to recommended tissue recipes per IEEE-1528

**Sensitivity in Air**

<b>Channel X:</b>	$1.2 \mu\text{V}/(\text{V}/\text{m})^2$
<b>Channel Y:</b>	$1.2 \mu\text{V}/(\text{V}/\text{m})^2$
<b>Channel Z:</b>	$1.2 \mu\text{V}/(\text{V}/\text{m})^2$
<b>Diode Compression Point:</b>	95 mV

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This page has been reviewed for content and attested to on Page 2 of this document.



**NCL Calibration Laboratories**

Division of APREL Inc.

Calibration for Tissue (Head H, Body B)

Frequency	Tissue Type	Measured Epsilon	Measured Sigma	Calibration Uncertainty	Tolerance Uncertainty for 5%*	Conversion Factor
450 H	Head	X	X	X	X	X
450 B	Body	X	X	X	X	X
750 H	Head	X	X	X	X	X
750 B	Body	X	X	X	X	X
<b>835 H</b>	<b>Head</b>	<b>42.35</b>	<b>0.938</b>	<b>3.5</b>	<b>3.4</b>	<b>6.6</b>
<b>835 B</b>	<b>Body</b>	<b>56.65</b>	<b>1.018</b>	<b>3.5</b>	<b>3.4</b>	<b>6.6</b>
<b>900 H</b>	<b>Head</b>	<b>41.35</b>	<b>0.98</b>	<b>3.5</b>	<b>3.4</b>	<b>6</b>
<b>900 B</b>	<b>Body</b>	<b>56.08</b>	<b>1.05</b>	<b>3.5</b>	<b>3.4</b>	<b>6</b>
1450 H	Head	X	X	X	X	X
1450 B	Body	X	X	X	X	X
1500 H	Head	X	X	X	X	X
1500 B	Body	X	X	X	X	X
1640 H	Head	X	X	X	X	X
1640 B	Body	X	X	X	X	X
<b>1750 H</b>	<b>Head</b>	<b>38.72</b>	<b>1.35</b>	<b>3.5</b>	<b>3.4</b>	<b>5.1</b>
<b>1750 B</b>	<b>Body</b>	<b>51.62</b>	<b>1.48</b>	<b>3.5</b>	<b>3.4</b>	<b>4.8</b>
1800 H	Head	X	X	X	X	X
1800 B	Body	X	X	X	X	X
<b>1900 H</b>	<b>Head</b>	<b>38.72</b>	<b>1.35</b>	<b>3.5</b>	<b>2.7</b>	<b>5.2</b>
<b>1900 B</b>	<b>Body</b>	<b>51.62</b>	<b>1.48</b>	<b>3.5</b>	<b>2.7</b>	<b>5</b>
2000 H	Head	X	X	X	X	X
2000 B	Body	X	X	X	X	X
2100 H	Head	X	X	X	X	X
2100 B	Body	X	X	X	X	X
2300 H	Head	X	X	X	X	X
2300 B	Body	X	X	X	X	X
<b>2450 H</b>	<b>Head</b>	<b>38.06</b>	<b>1.87</b>	<b>3.5</b>	<b>3.5</b>	<b>4.9</b>
<b>2450 B</b>	<b>Body</b>	<b>50.22</b>	<b>2.03</b>	<b>3.5</b>	<b>3.5</b>	<b>4.3</b>
2600 H	Head	X	X	X	X	X
2600 B	Body	X	X	X	X	X
3000 H	Head	X	X	X	X	X
3000 B	Body	X	X	X	X	X
3600 H	Head	X	X	X	X	X
3600 B	Body	X	X	X	X	X
5200 H	Head	X	X	X	X	X
5200 B	Body	X	X	X	X	X
5600 H	Head	X	X	X	X	X
5600 B	Body	X	X	X	X	X
5800 H	Head	X	X	X	X	X
5800 B	Body	X	X	X	X	X

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**Boundary Effect:**

Uncertainty resulting from the boundary effect is less than 2.1% for the distance between the tip of the probe and the tissue boundary, when less than 0.58mm.

**Spatial Resolution:**

The spatial resolution uncertainty is less than 1.5% for 4.9mm diameter probe.  
The spatial resolution uncertainty is less than 1.0% for 2.5mm diameter probe.

**DAQ-PAQ Contribution**

To minimize the uncertainty calculation all tissue sensitivity values were calculated using a load impedance of 5 M $\Omega$ .

**Boundary Effect:**

For a distance of 0.58mm the worst case evaluated uncertainty (increase in the probe sensitivity) is less than 2.1%.

**NOTES:**

\*The maximum deviation from the centre frequency when comparing the lower to upper range is listed.

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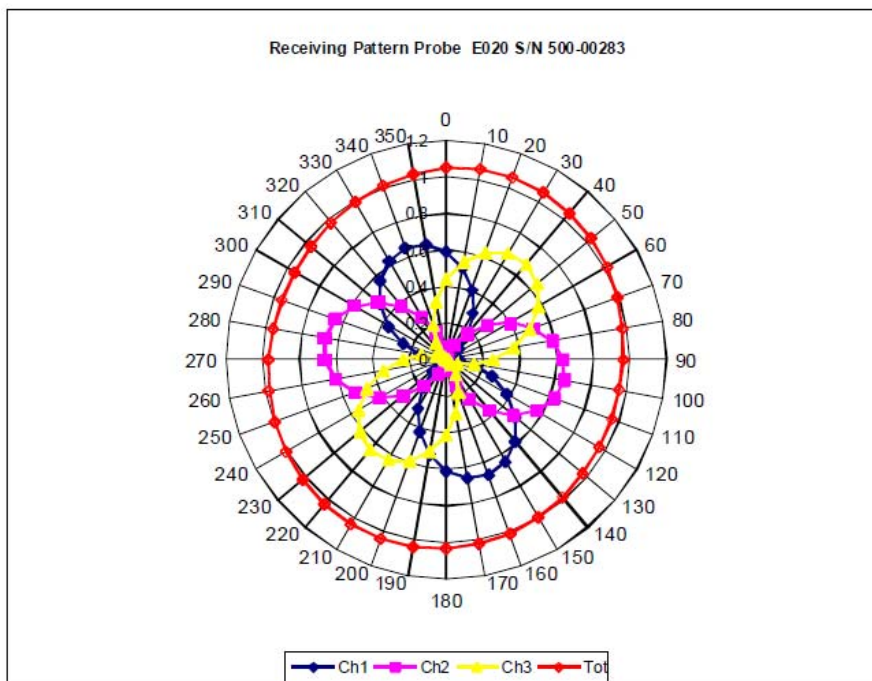
This page has been reviewed for content and attested to on Page 2 of this document.



**NCL Calibration Laboratories**

Division of APREL Inc.

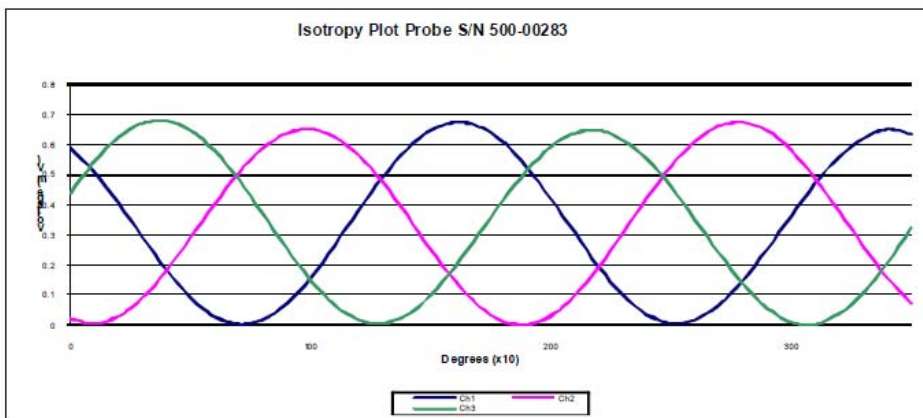
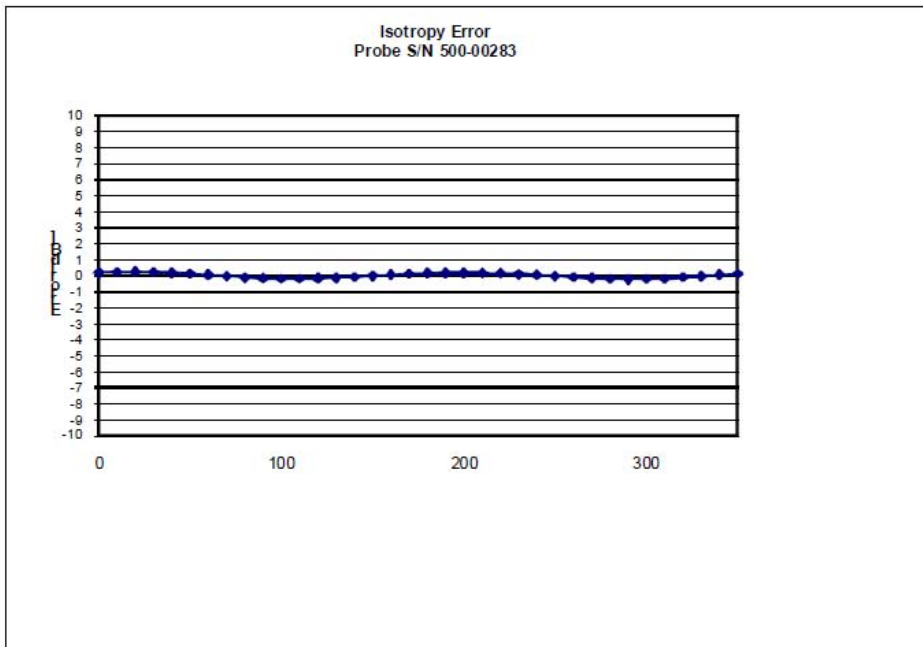
**Receiving Pattern Air**



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Division of APREL Inc.

**Isotropy Error Air**

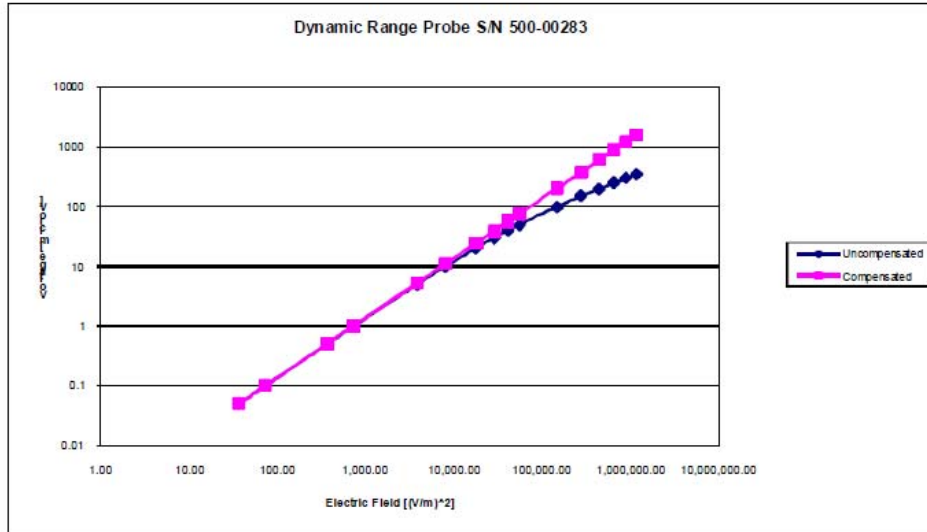


**Isotropicity Tissue:** 0.10 dB

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**Dynamic Range**

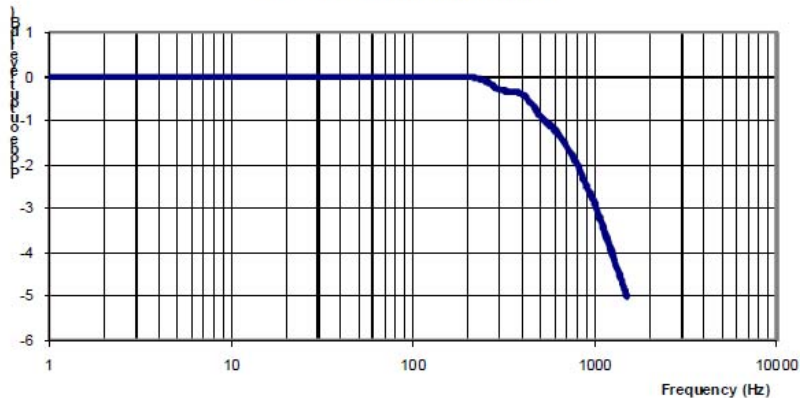


**NCL Calibration Laboratories**

Division of APREL Inc.

**Video Bandwidth**

Probe Frequency Characteristics



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

**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 2011.

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Page 10 of 10  
This page has been reviewed for content and attested to on Page 2 of this document.

## APPENDIX C – DIPOLE CALIBRATION CERTIFICATES

### NCL CALIBRATION LABORATORIES

Calibration File No: DC-1327  
Project Number: BAC-dipole-cal-5618

## 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.

Validation Dipole(Head and Body)

Manufacturer: APREL Laboratories  
Part number: ALS-D-835-S-2  
Frequency: 835 MHz  
Serial No: 180-00558

Customer: Bay Area Compliance Laboratory

Calibrated: 25<sup>th</sup> August 2011  
Released on: 25<sup>th</sup> August 2011

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

Released By: \_\_\_\_\_

### **NCL** CALIBRATION LABORATORIES

Suite 102, 303 Terry Fox Dr.  
Kanata, ONTARIO  
CANADA K2K 3J1

Division of APREL Lab.  
TEL: (613) 435-8300  
FAX: (613)435-8306

**NCL Calibration Laboratories**

Division of APREL Laboratories.

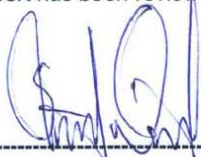
**Conditions**

Dipole 180-00558 was received in good condition and a re-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 device has been accurately conducted and that all information contained within this report has been reviewed for accuracy.



-----  
Stuart Nicol



-----  
C. Teodorian

Primary Measurement Standards Instrument	Serial Number	Cal due date
Power meter Anritsu MA2408A	245025437	Nov.4, 2011
Power Sensor Anritsu MA2481D	103555	Nov 4, 2011
Attenuator HP 8495A (70dB) 1	944A10711	Aug.8, 2012
Network Analyzer Agilent E5071C	1334746J	Feb. 8, 2012
Secondary Measurement Standards		
Signal Generator Agilent E4438C	-506 MY55182336	June 7, 2012

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

**NCL Calibration Laboratories**

Division of APREL Laboratories.

**Calibration Results Summary**

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

**Mechanical Dimensions**

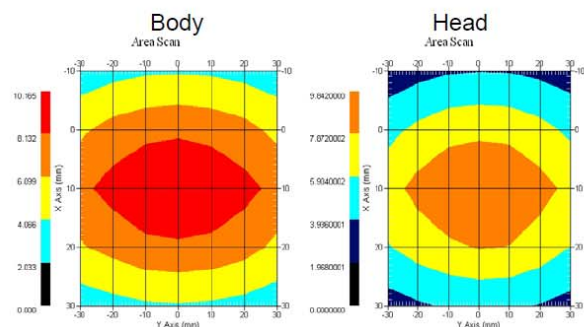
**Length:** 162.2 mm  
**Height:** 89.4 mm

**Electrical Specification**

Tissue	Frequency	SWR:	Return Loss	Impedance
Head	835 MHz	1.0417 U	-35.395dB	49.020 Ω
Body	835 MHz	1.1177 U	-25.424dB	55.435 Ω

**System Validation Results**

Tissue	Frequency	1 Gram	10 Gram	Peak
Head	835 MHz	9.590	6.003	15.013
Body	835 MHz	9.684	6.263	14.23



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



**NCL Calibration Laboratories**

Division of APREL Laboratories.

**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 180-00558. 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 180-00558 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 uncertainty**

The calibration uncertainty for the dipole is made up of various parameters presented below.

<b>Mechanical</b>	1%
<b>Positioning Error</b>	1.22%
<b>Electrical</b>	1.7%
<b>Tissue</b>	2.2%
<b>Dipole Validation</b>	2.2%
<b>TOTAL</b>	<b>8.32% (16.64% K=2)</b>

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



**NCL Calibration Laboratories**

Division of APREL Laboratories.

**Dipole Calibration Results**

**Mechanical Verification**

APREL Length	APREL Height	Measured Length	Measured Height
161.0 mm	89.8 mm	162.2 mm	89.4 mm

Tissue Type	Return Loss:	SWR:	Impedance:
Head	-35.395 dB	1.0417 U	49.020Ω
Body	-25.454 dB	1.1177 U	55.435Ω

**Tissue Validation**

	Dielectric constant, $\epsilon_r$	Conductivity, $\sigma$ [S/m]
Head Tissue 835MHz	41.78	0.92
Body Tissue 835MHz	56.37	0.95

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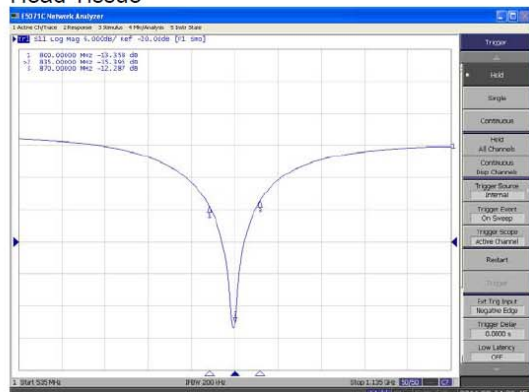
**NCL Calibration Laboratories**

Division of APREL Laboratories.

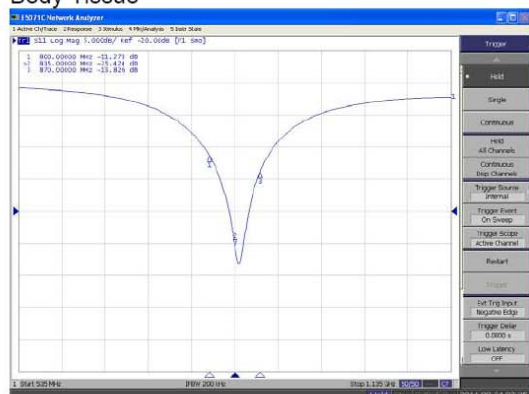
The Following Graphs are the results as displayed on the Vector Network Analyzer.

**S11 Parameter Return Loss**

**Head Tissue**



**Body Tissue**

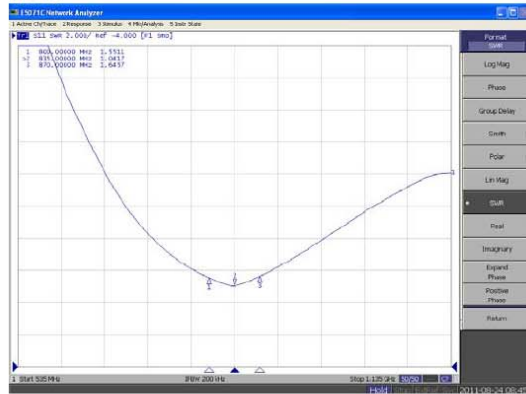


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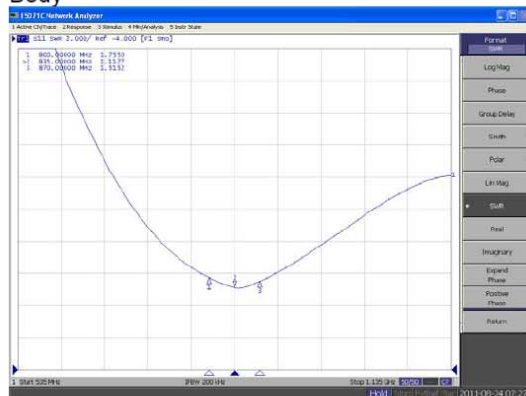
**NCL Calibration Laboratories**

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**SWR  
Head**



**Body**



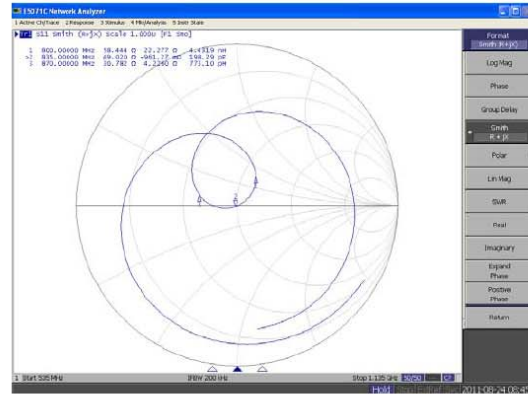
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**NCL Calibration Laboratories**

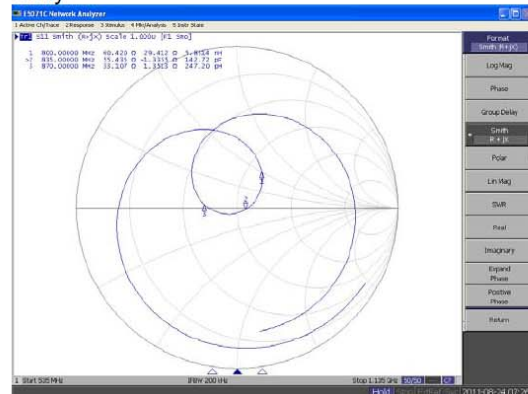
Division of APREL Laboratories.

**Smith Chart Dipole Impedance**

Head



Body



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**NCL Calibration Laboratories**

Division of APREL Laboratories.

**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 2011.

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

9

**NCL CALIBRATION LABORATORIES**

Calibration File No: DC-1331  
Project Number: BAC-dipole –cal-5615

**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.

Validation Dipole (Head & Body)

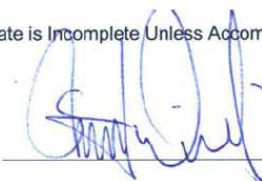
Manufacturer: APREL Laboratories  
Part number: ALS-D-1900-S-2  
Frequency: 1900 MHz  
Serial No: 210-00710

Customer: Bay Area Compliance Laboratory

Calibrated: 25<sup>th</sup> August, 2011  
Released on: 25<sup>th</sup> August, 2011

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

Released By: \_\_\_\_\_



**NCL CALIBRATION LABORATORIES**

Suite 102, 303 Terry Fox Dr.  
Kanata, ONTARIO  
CANADA K2K 3J1

Division of APREL Lab.  
TEL: (613) 435-8300  
FAX: (613)435-8306

**NCL Calibration Laboratories**

Division of APREL Laboratories.

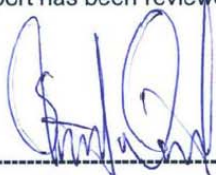
**Conditions**

Dipole 210-00710 was received in good condition and was a re-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 device has been accurately conducted and that all information contained within this report has been reviewed for accuracy.



-----  
**Stuart Nicol**



-----  
**C. Teodorian**

**Primary Measurement Standards**

<b>Instrument</b>	<b>Serial Number</b>	<b>Cal due date</b>
Power meter Anritsu MA2408A	245025437	Nov.4, 2011
Power Sensor Anritsu MA2481D	103555	Nov 4, 2011
Attenuator HP 8495A (70dB) 1	944A10711	Aug.8, 2012
Network Analyzer Agilent E5071C	1334746J	Feb. 8, 2012

**Secondary Measurement Standards**

Signal Generator Agilent E4438C	-506 MY55182336	June 7, 2012
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This page has been reviewed for content and attested to by signature within this document.

**NCL Calibration Laboratories**

Division of APREL Laboratories.

**Calibration Results Summary**

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

**Mechanical Dimensions**

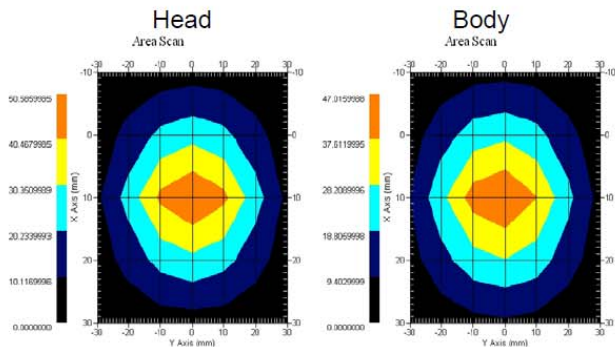
**Length:** 67.1 mm  
**Height:** 38.9 mm

**Electrical Specification**

Tissue	Frequency	SWR:	Return Loss	Impedance
Head	1900MHz	1.0417 U	-35.395dB	49.020 Ω
Body	1900MHz	1.1177 U	-25.424dB	55.435 Ω

**System Validation Results**

Tissue	Frequency	1 Gram	10 Gram	Peak
Head	1900 MHz	39.648	20.311	73.365
Body	1900 MHz	39.769	20.176	75.866



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



**NCL Calibration Laboratories**

Division of APREL Laboratories.

**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 210-00710. 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 210-00710 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 uncertainty**

The calibration uncertainty for the dipole is made up of various parameters presented below.

<b>Mechanical</b>	1%
<b>Positioning Error</b>	1.22%
<b>Electrical</b>	1.7%
<b>Tissue</b>	2.2%
<b>Dipole Validation</b>	2.2%
<b>TOTAL</b>	<b>8.32% (16.64% K=2)</b>

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

**NCL Calibration Laboratories**

Division of APREL Laboratories.

**Dipole Calibration Results**

**Mechanical Verification**

APREL Length	APREL Height	Measured Length	Measured Height
68.0 mm	39.5 mm	67.1mm	38.9 mm

**Electrical Validation**

Tissue Type	Return Loss:	SWR:	Impedance:
Head	-29.360 dB	1.0732 U	47.869 Ω
Body	-22.799 dB	1.1566 U	48.022 Ω

**Tissue Validation**

	Dielectric constant, $\epsilon_r$	Conductivity, $\sigma$ [S/m]
Head Tissue 1900MHz	38.4	1.43
Body Tissue 1900MHz	51.87	1.59

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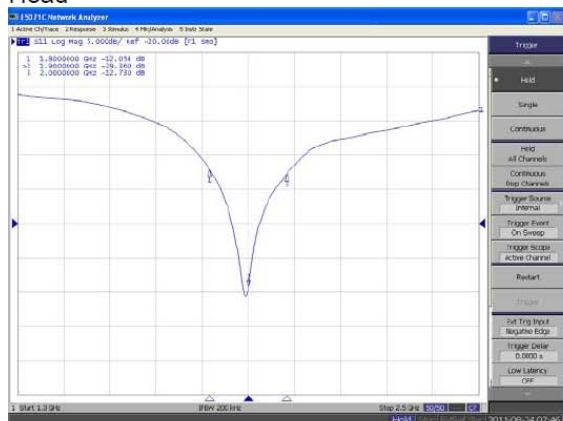
**NCL Calibration Laboratories**

Division of APREL Laboratories.

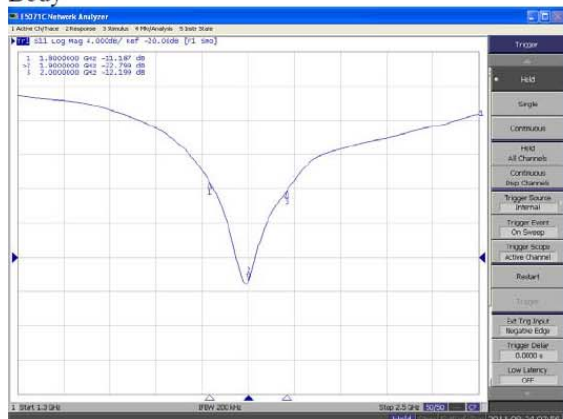
The Following Graphs are the results as displayed on the Vector Network Analyzer.

**S11 Parameter Return Loss**

Head



Body



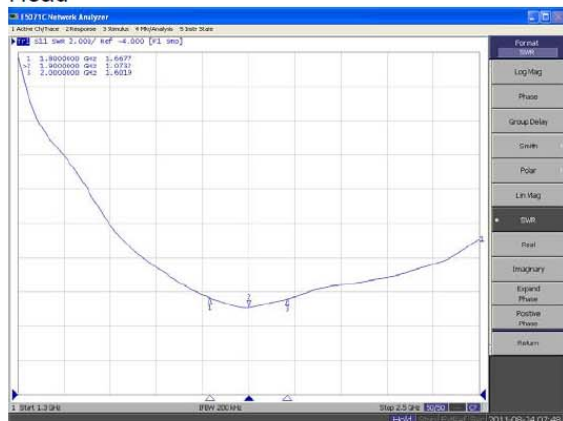
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### NCL Calibration Laboratories

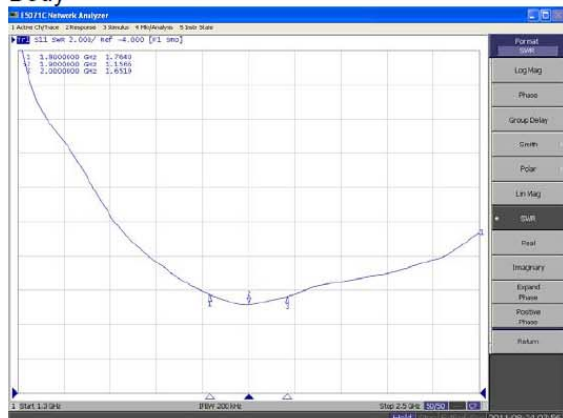
Division of APREL Laboratories.

### SWR

#### Head



#### Body



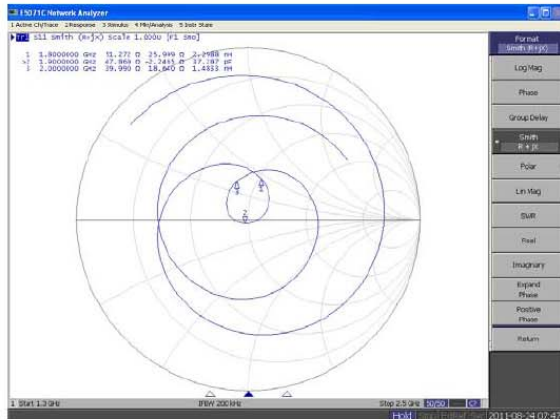
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### NCL Calibration Laboratories

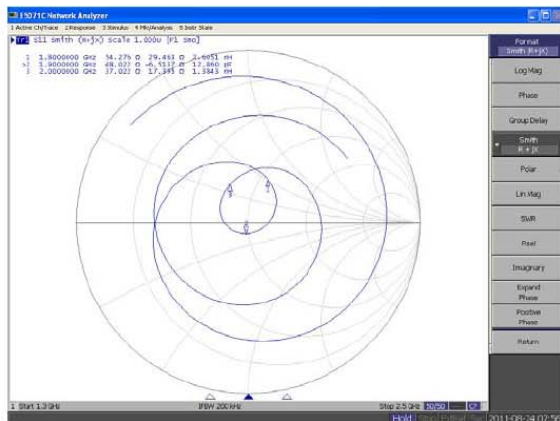
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## Smith Chart Dipole Impedance

Head



Body



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**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 2011

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**NCL CALIBRATION LABORATORIES**

Calibration File No: DC-1330  
Project Number: BAC-dipole-cal-5619

**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.

Validation Dipole (Head & Body)

Manufacturer: APREL Laboratories  
Part number: ALS-D-2450-S-2  
Frequency: 2450 MHz  
Serial No: 220-00758

Customer: Bay Area Compliance Laboratory

Calibrated: 25<sup>th</sup> August, 2011  
Released on: 25<sup>th</sup> August, 2011

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

Released By: \_\_\_\_\_

**NCL CALIBRATION LABORATORIES**

Suite 102, 303 Terry Fox Dr.  
Kanata, ONTARIO  
CANADA K2K 3J1

Division of APREL Lab.  
TEL: (613) 435-8300  
FAX: (613)435-8306



**NCL Calibration Laboratories**

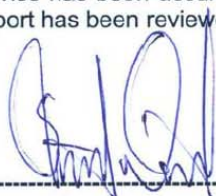
Division of APREL Laboratories.

**Conditions**

Dipole 220-00758 was received in good condition and was a re-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 device has been accurately conducted and that all information contained within this report has been reviewed for accuracy.



-----  
**Stuart Nicol**



-----  
**C. Teodorian**

**Primary Measurement Standards**

Instrument	Serial Number	Cal due date
Power meter Anritsu MA2408A	245025437	Nov.4, 2011
Power Sensor Anritsu MA2481D	103555	Nov 4, 2011
Attenuator HP 8495A (70dB) 1	944A10711	Aug.8, 2012
Network Analyzer Agilent E5071C	1334746J	Feb. 8, 2012

**Secondary Measurement Standards**

Signal Generator Agilent E4438C	-506 MY55182336	June 7, 2012
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**Calibration Results Summary**

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

**Mechanical Dimensions**

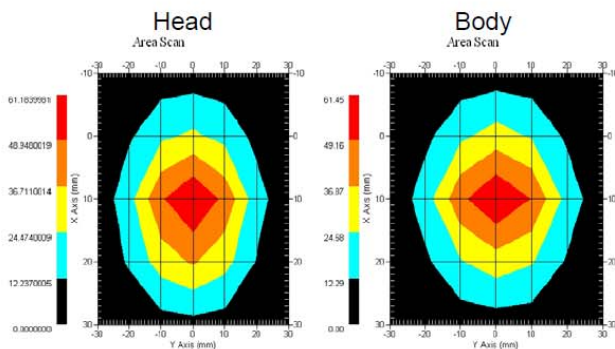
**Length:** 52.4 mm  
**Height:** 30.3 mm

**Electrical Specification**

Tissue	Frequency	SWR:	Return Loss	Impedance
Head	2450 MHz	1.0459 U	-33.024 dB	48.533 Ω
Body	2450 MHz	1.1159 U	-25.235 dB	46.676 Ω

**System Validation Results**

Tissue	Frequency	1 Gram	10 Gram	Peak
Head	2450 MHz	52.667	24.518	105.920
Body	2450 MHz	52.561	24.104	108.940



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**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 220-00758. 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"
- IEC-62209 "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures"
- Part 1: "Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 300 MHz to 3 GHz)"
- IEC-62209 "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures"
- Part 2 *Draft*: "Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 30 MHz to 6 GHz)"

**Conditions**

Dipole 220-00758 was a re-calibration.

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

**Dipole Calibration uncertainty**

The calibration uncertainty for the dipole is made up of various parameters presented below.

<b>Mechanical</b>	1%
<b>Positioning Error</b>	1.22%
<b>Electrical</b>	1.7%
<b>Tissue</b>	2.2%
<b>Dipole Validation</b>	2.2%
<b>TOTAL</b>	<b>8.32% (16.64% K=2)</b>

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**Dipole Calibration Results**

**Mechanical Verification**

APREL Length	APREL Height	Measured Length	Measured Height
51.5 mm	30.4 mm	52.4 mm	30.3 mm

**Electrical Calibration**

Tissue Type	Return Loss:	SWR:	Impedance:
Head	-33.024 dB	1.0459 U	48.533 Ω
Body	-25.235 dB	1.1159 U	46.676 Ω

**Tissue Validation**

	Dielectric constant, $\epsilon_r$	Conductivity, $\sigma$ [S/m]
Head Tissue 2450MHz	38.2	1.82
Body Tissue 2450MHz	51.74	1.96

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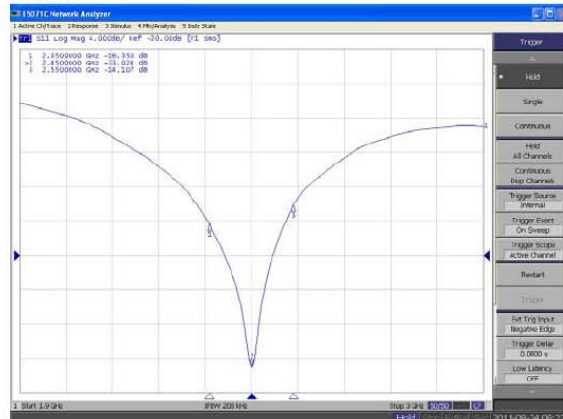
**NCL Calibration Laboratories**

Division of APREL Laboratories.

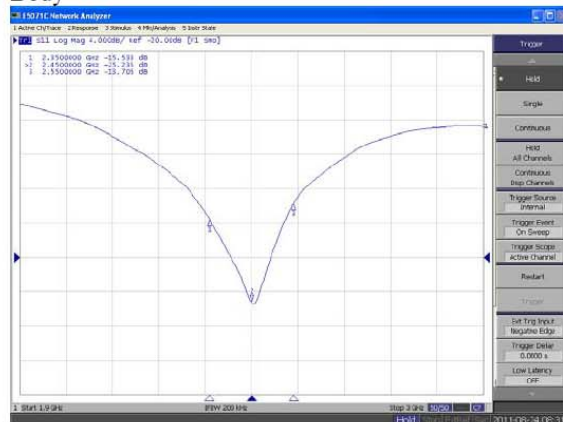
The Following Graphs are the results as displayed on the Vector Network Analyzer.

**S11 Parameter Return Loss**

Head



Body



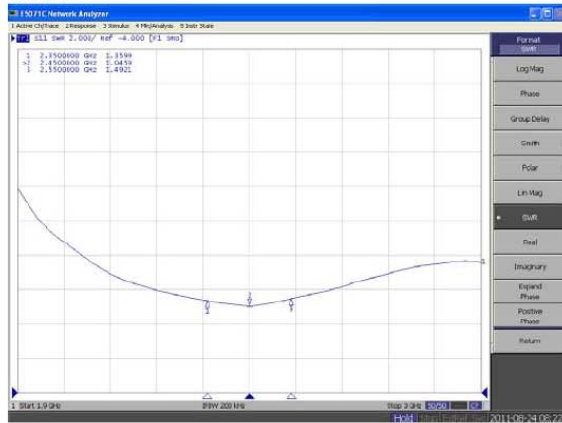
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**NCL Calibration Laboratories**

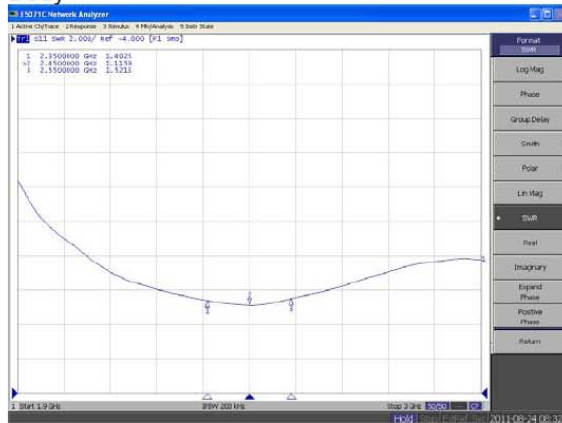
Division of APREL Laboratories.

**SWR**

**Head**



**Body**



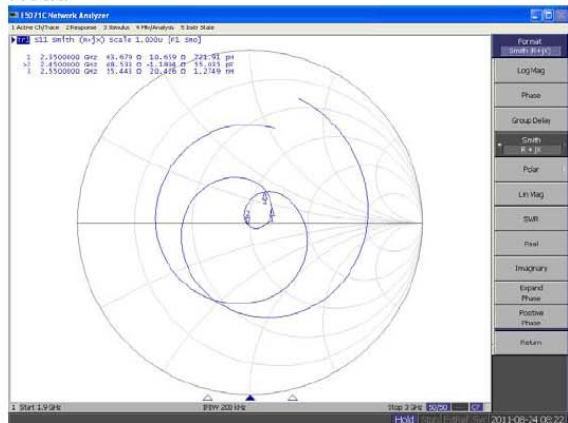
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**NCL Calibration Laboratories**

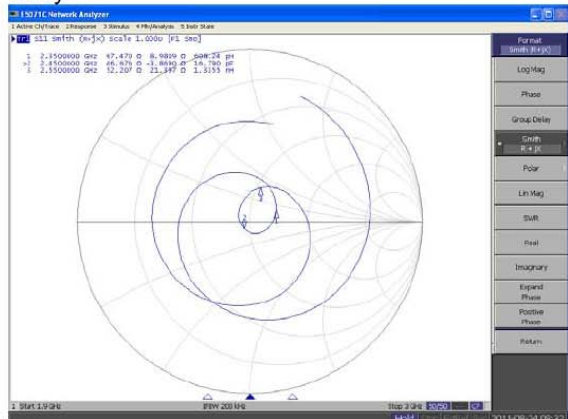
Division of APREL Laboratories.

**Smith Chart Dipole Impedance**

Head



Body



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Division of APREL Laboratories.

**Test Equipment**

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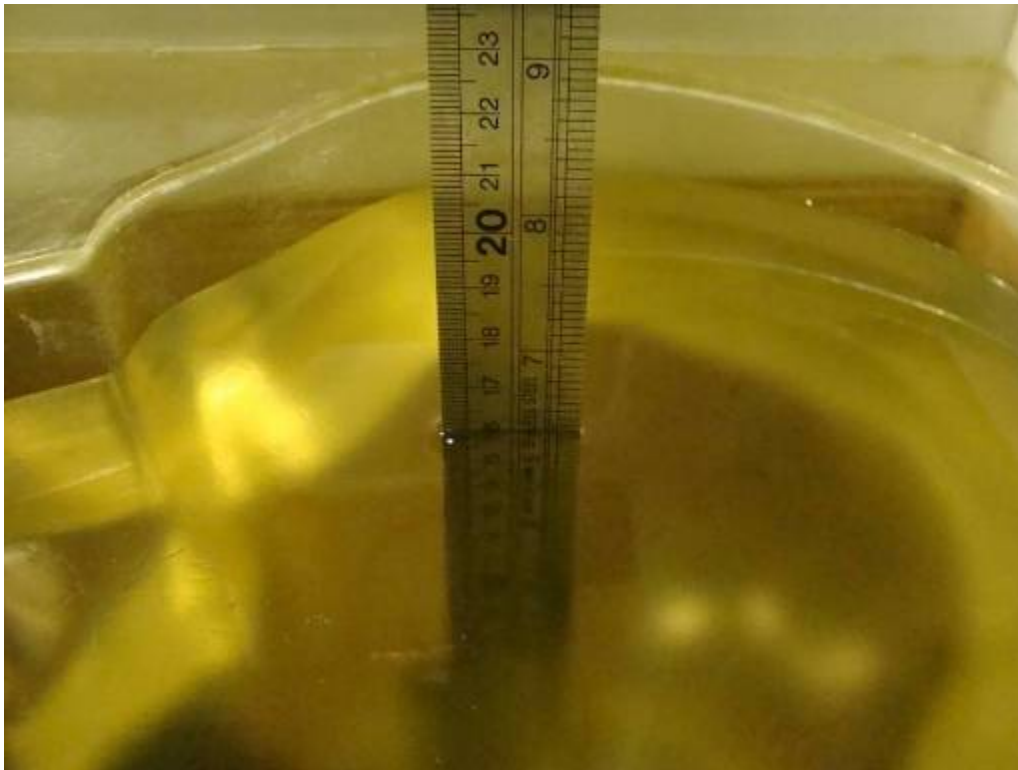
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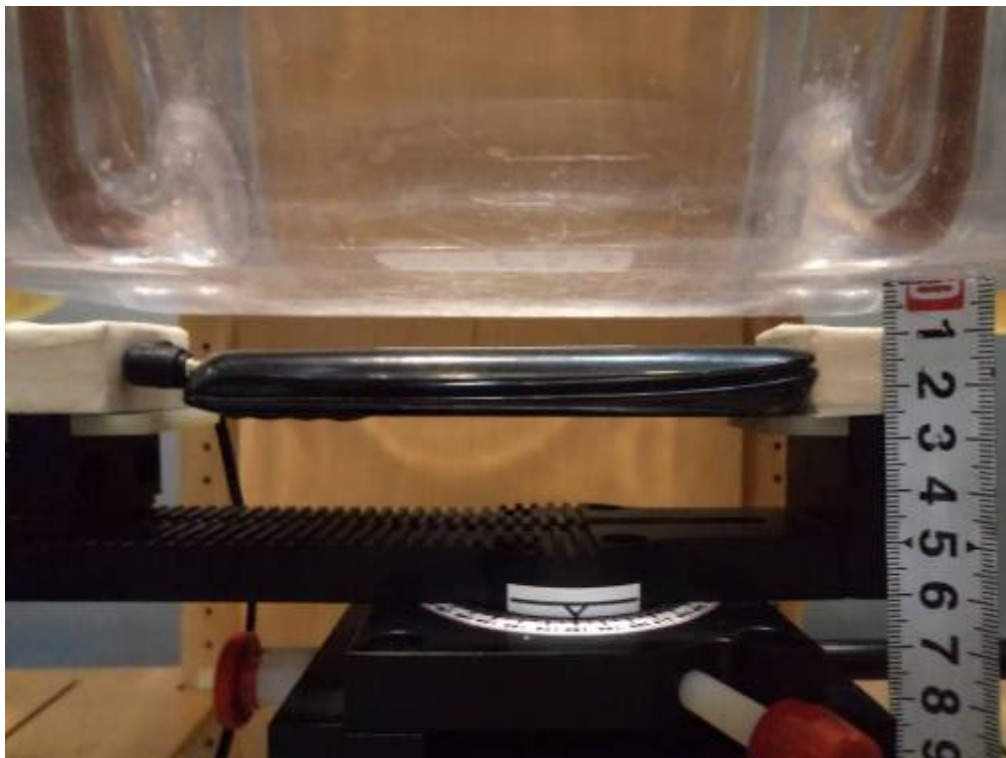
## APPENDIX D – EUT TEST POSITION PHOTOS

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Liquid depth  $\geq 15\text{cm}$

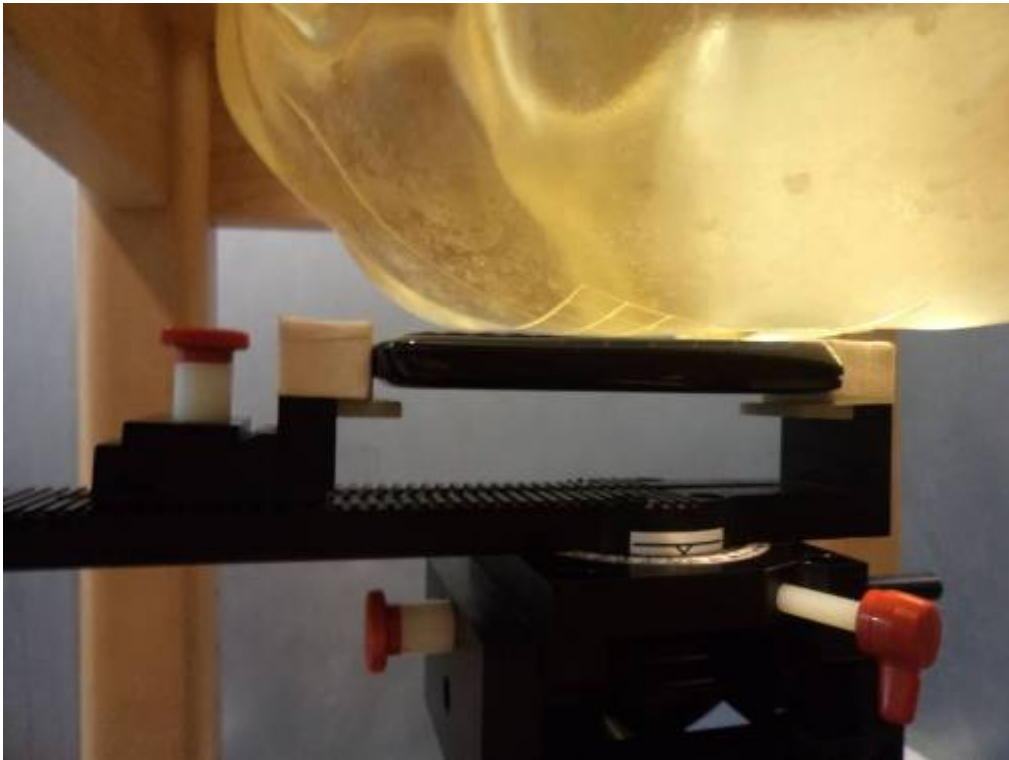


Body-worn Back-Headset Setup Photo

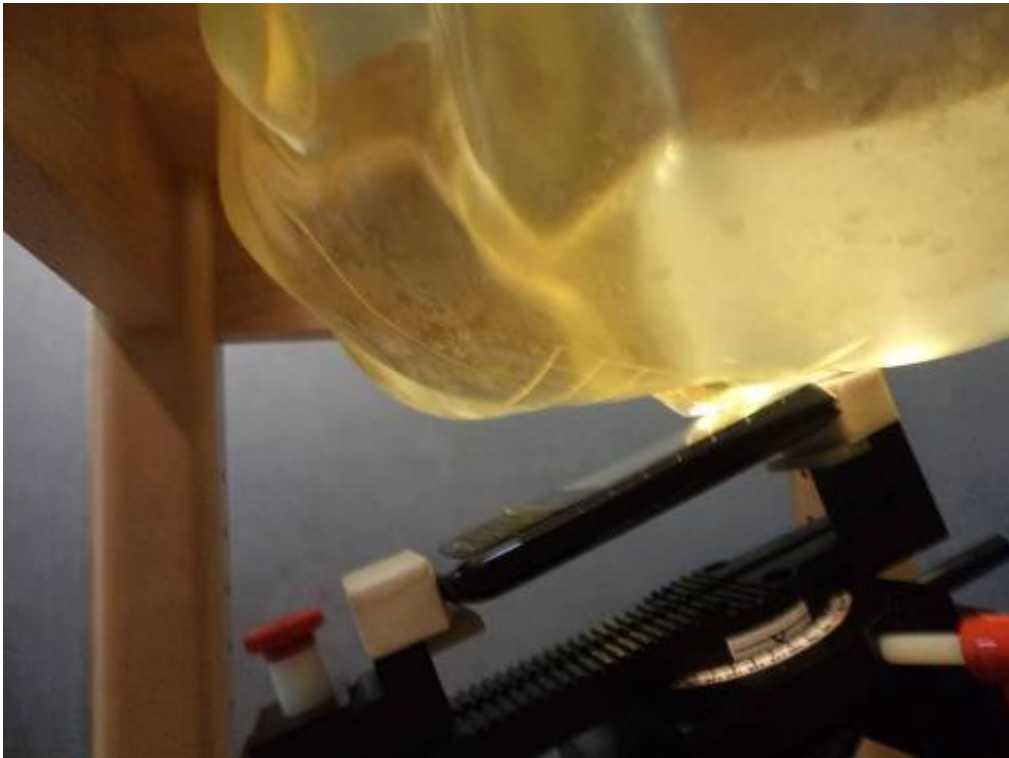




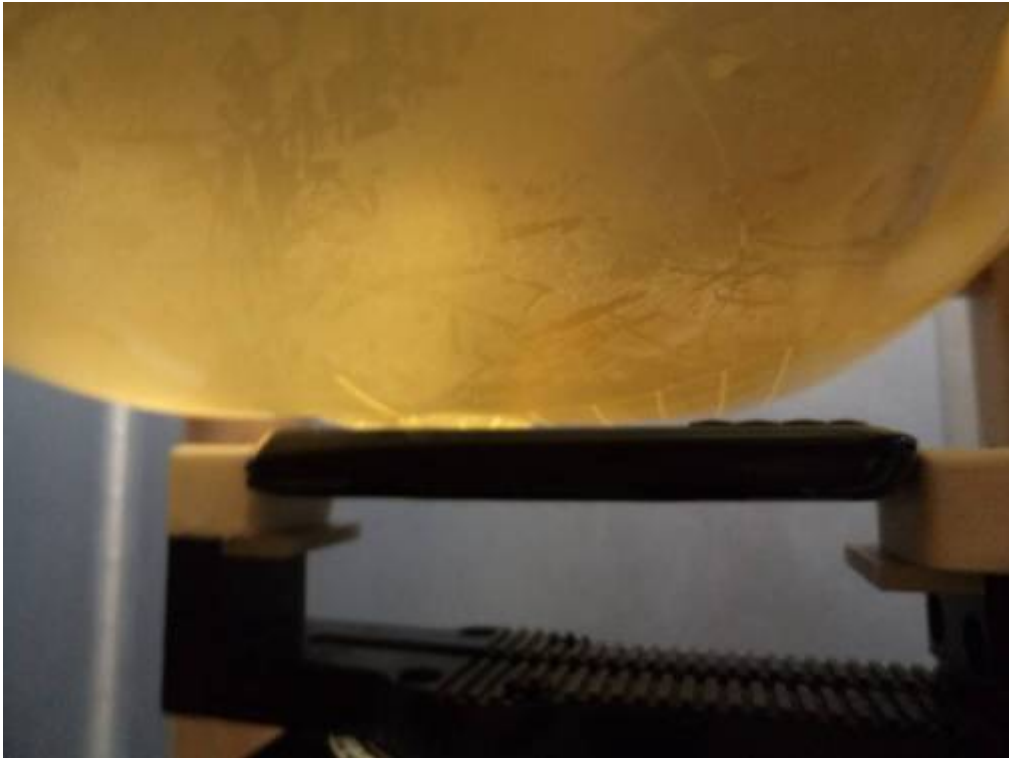
**Left Head Touch Setup Photo**



**Left Head Tilt Setup Photo**



**Right Head Touch Setup Photo**



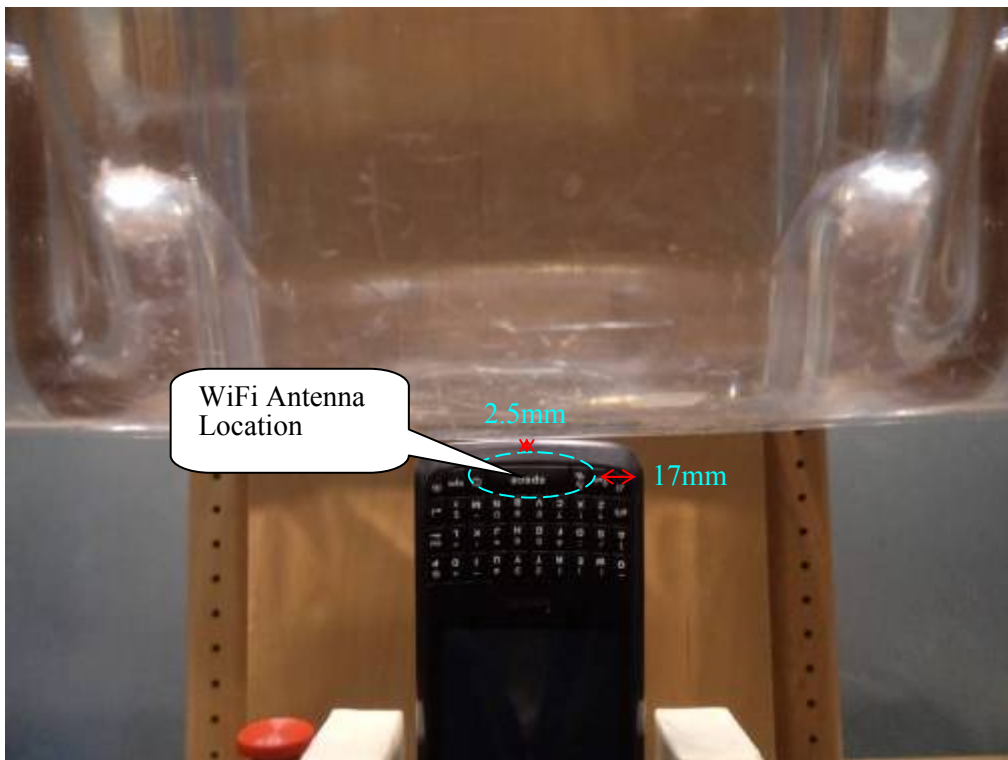
**Right Head Tilt Setup Photo**



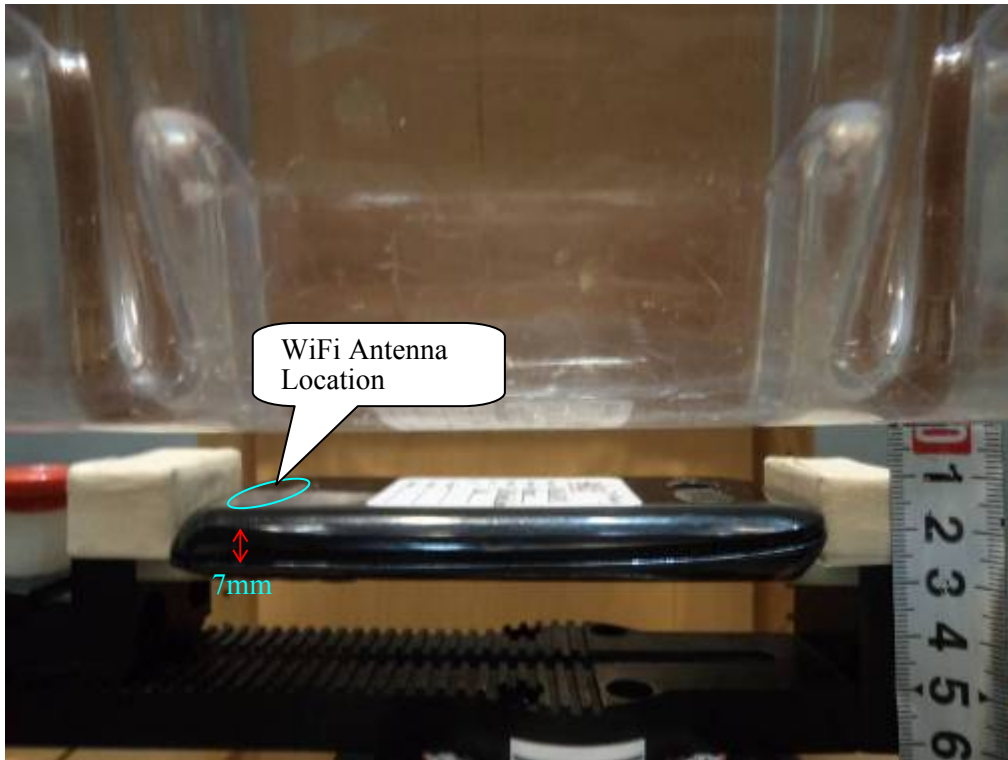
**Position A Setup Photo**



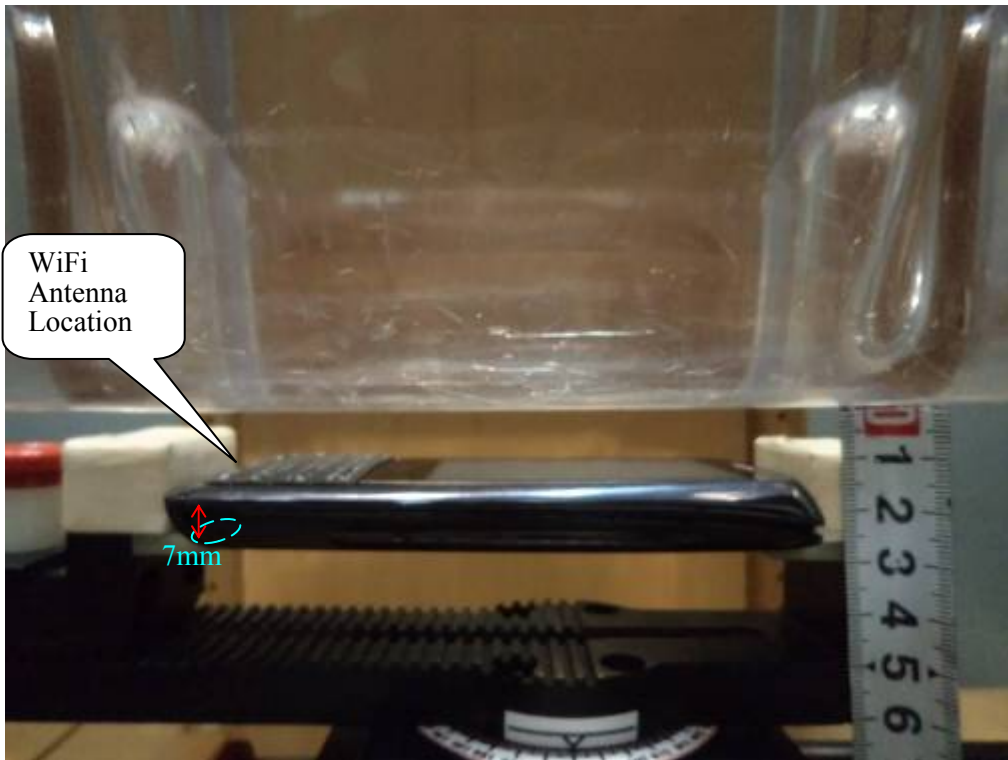
**Position B Setup Photo**



**Position C Setup Photo**



**Position D Setup Photo**



## APPENDIX E – EUT PHOTOS

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**EUT – Front View**



**EUT – Back View**





**EUT – Uncovered View**



**EUT –Battery View**



## APPENDIX F – INFORMATIVE REFERENCES

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- [1] Federal Communications Commission, \Report and order: Guidelines for evaluating the environmental effects of radiofrequency radiation", Tech. Rep. FCC 96-326, FCC, Washington, D.C. 20554, 1996.
- [2] David L. Means Kwok Chan, Robert F. Cleveland, \Evaluating compliance with FCC guidelines for human exposure to radiofrequency electromagnetic fields", Tech. Rep., Federal Communication Commission, Office of Engineering & Technology, Washington, DC, 1997.
- [3] Thomas Schmid, Oliver Egger, and Niels Kuster, \Automated E-field scanning system for dosimetric assessments", IEEE Transactions on Microwave Theory and Techniques, vol. 44, pp. 105-113, Jan. 1996.
- [4] Niels Kuster, Ralph Kastle, and Thomas Schmid, \Dosimetric evaluation of mobile communications equipment with known precision", IEEE Transactions on Communications, vol. E80-B, no. 5, pp. 645-652, May 1997.
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- [6] ANSI, ANSI/IEEE C95.1-1992: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz, The Institute of Electrical and Electronics Engineers, Inc., New York, NY 10017, 1992.
- [7] Katja Pokovic, Thomas Schmid, and Niels Kuster, \Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies", in ICECOM '97, Dubrovnik, October 15-17, 1997, pp. 120-24.
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- [9] Volker Hombach, Klaus Meier, Michael Burkhardt, Eberhard Kuhn, and Niels Kuster, \The dependence of EM energy absorption upon human head modeling at 900 MHz", IEEE Transactions on Microwave Theory and Techniques, vol. 44, no. 10, pp. 1865-1873, Oct. 1996.
- [10] Klaus Meier, Ralf Kastle, Volker Hombach, Roger Tay, and Niels Kuster, \The dependence of EM energy absorption upon human head modeling at 1800 MHz", IEEE Transactions on Microwave Theory and Techniques, Oct. 1997, in press.
- [11] W. Gander, Computermathematik, Birkhaeuser, Basel, 1992.
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- [13] NIS81 NAMAS, \The treatment of uncertainty in EMC measurement", Tech. Rep., NAMAS Executive, National Physical Laboratory, Teddington, Middlesex, England, 1994.
- [14] Barry N. Taylor and Christ E. Kuyatt, \Guidelines for evaluating and expressing the uncertainty of NIST measurement results", Tech. Rep., National Institute of Standards and Technology, 1994. Dosimetric Evaluation of Sample device, month 1998 10.
- [15] FCC OET KDB648474 Do1 SAR Evaluation Considerations for Handsets with Multiple transmitters and Antennas.

\*\*\*\*\* END OF REPORT \*\*\*\*\*