

SAR EVALUATION REPORT

For

HONGKONG IPRO TECHNOLOGY CO., LIMITED

ROOM C1D,6/F, WING HING INDUSTRIAL BUILDING,14 HING YIP STREET,

KWUN TONG, KOWLOON, HONG KONG.

FCC ID: PQ4IPROU2

Report Type: Original Report	Product Type: Smart Phone
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Report Number: <u>RSZ130605001-20</u>	
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Attestation of Test Results		
EUT Information	Company Name	HONGKONG IPRO TECHNOLOGY CO., LIMITED
	EUT Description	Smart Phone
	FCC ID	PQ4IPROU2
	Model Number	U2
	Test Date	2013-7-2 to 2013-7-4
Frequency	Max. SAR Level(s) Reported	Limit(W/Kg)
Cellular Band	0.221 W/kg 1g Head SAR 0.359 W/kg 1g Body SAR	1.6
PCS Band	0.079 W/kg 1g Head SAR 0.781 W/kg 1g Body SAR	
WiFi	0.010 W/kg 1g Head SAR 0.007 W/kg 1g Body SAR	
Simultaneous	0.387 W/kg 1g Head SAR 0.788 W/kg 1g Body SAR	
Applicable Standards	ANSI / IEEE C95.1 : 2005 IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields,3 kHz to 300 GHz.	
	ANSI / IEEE C95.3 : 2002 IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to SuchFields,100 kHz—300 GHz.	
	OET BULLETIN 65 SUPPLEMENT C Evaluating Compliance with FCC Guidelines for Human Exposure To Radiofrequency Electromagnetic Fields	
	IEEE1528:2003 IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques	
<p>Note: 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>The results and statements contained in this report pertain only to the device(s) evaluated.</p>		

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	RSZ130605001-20	Original Report	2013-7-12

EUT DESCRIPTION

This report has been prepared on behalf of HONG KONG IPRO TECHNOLOGY CO., LIMITED and their product, FCC ID: PQ4IPROU2, Model: U2 or the EUT (Equipment Under Test) as referred to in the rest of this report. The EUT is a Smart Phone.

Technical Specification

Product Type	Portable
Exposure Category:	Population / Uncontrolled
Antenna Type(s):	Internal Antenna
Body-Worn Accessories:	Headset
Face-Head Accessories:	None
Multi-slot Class:	Class12
Operation Mode :	GSM Voice, GPRS Data, Bluetooth and WiFi
Frequency Band:	Cellular Band : 824-849 MHz(TX) ; 869-894 MHz(RX) PCS Band : 1850-1910 MHz(TX) ; 1930-1990 MHz(RX) WiFi: 2412-2462 MHz Bluetooth : 2402MHz-2480MHz
Conducted RF Power:	Cellular Band : 32.49dBm PCS Band : 29.68 dBm Bluetooth:5.87dBm WiFi:20.03 dBm
Dimensions (L*W*H):	120 mm(L) × 66 mm(W) × 10 mm(H)
Weight:	126.5g
Power Source:	3.7 VDC /1800mAh Rechargeable Battery
Normal Operation:	Head and Body-worn

REFERENCE, STANDARDS, AND GUIDELINES

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

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

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 10mm² step integral, with 1mm interpolation used to locate the peak SAR area used for zoom scan assessments.

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

Zoom Scan (Cube Scan Averaging)

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

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

The zoom scan integer steps can be user defined so as to reduce uncertainty, but normal practice for typical test applications (including FCC) utilize a physical step of 5x5x8 (8mmx8mmx5mm) providing a volume of 32mm³ in the X & Y axis, and 35mm in the Z axis.



ALSAS-10U Interpolation and Extrapolation Uncertainty

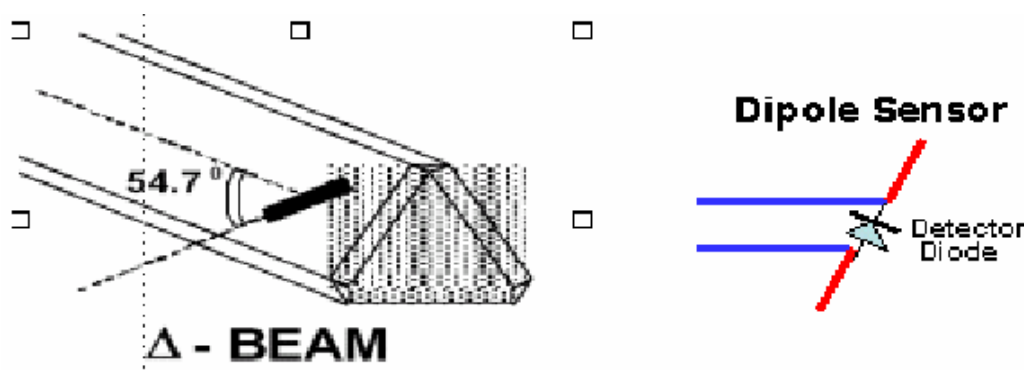
The overall uncertainty for the methodology and algorithms the used during the SAR calculation was evaluated using the data from IEEE 1528 based on the example f3 algorithm:

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

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

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

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 μV to 800mV. Integration of the fields measured is carried out at board level utilizing a Co-Processor which then sends the measured fields down into the main computational module in digitized form via an RS232 communications port. Probe linearity and duty cycle compensation is carried out within the main Daq-Paq module.

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

Axis Articulated Robot

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



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

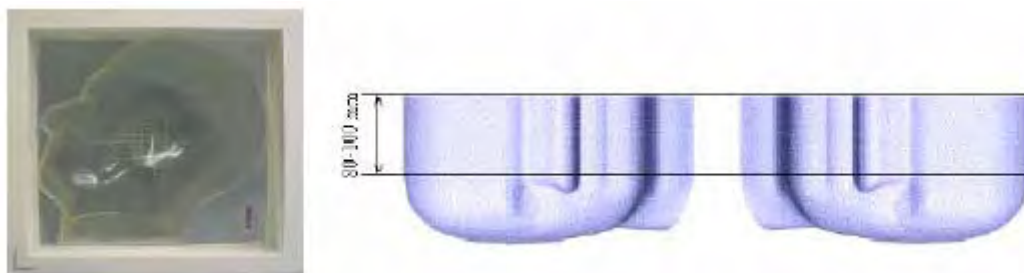


Phantom Types

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

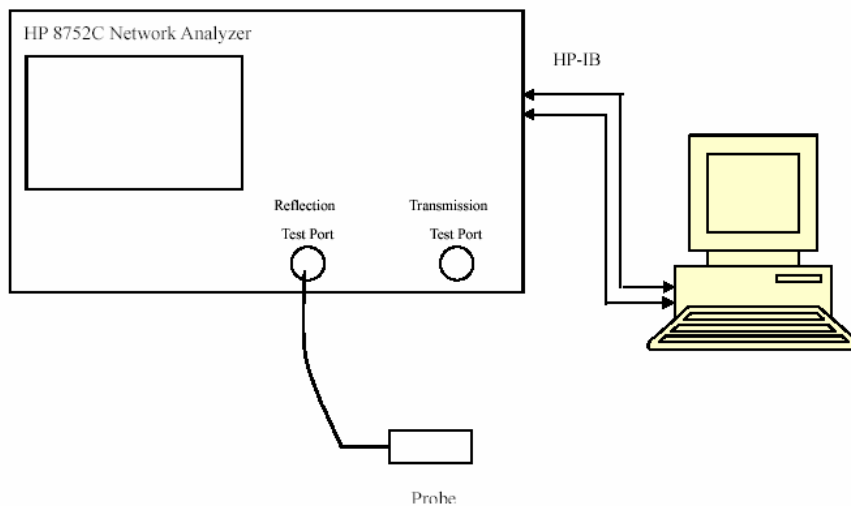
EQUIPMENT LIST AND CALIBRATION

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	2013-05-12	110-00212
Miniature E-Field Probe	ALS-E-020	2012-08-08	500-00283
Dipole, 850MHz	ALS-D-850-S-2	2011-08-25	180-00558
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
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 850 MHz Head	ALS-TS-850-H	Each Time	270-01002
Simulated Tissue 850 MHz Body	ALS-TS-850-B	Each Time	270-02101
Simulated Tissue 1900 MHz Head	ALS-TS-1900-H	Each Time	295-01103
Simulated Tissue 1900 MHz Body	ALS-TS-1900-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	2013-05-16	2624A00116
UNIVERSAL RADIO COMMUNICATION TESTER	CMU 200	2012-12-06	1100.0008.02
EMI Test Receiver	ESCI	2012-08-08	101122

SAR MEASUREMENT SYSTEM VERIFICATION

Liquid Verification



Liquid Verification Setup Block Diagram

Liquid Verification Results

Frequency	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ϵ_r	σ (S/m)	ϵ_r	σ (S/m)	$\Delta\epsilon_r$	$\Delta\sigma$ (S/m)	
824.2	Head	41.08	0.90	41.50	0.90	-1.012	0.000	± 5
	Body	55.14	0.95	55.20	0.97	-0.109	-2.062	± 5
836.6	Head	41.02	0.91	41.50	0.90	-1.133	1.031	± 5
	Body	55.22	0.96	55.20	0.97	0.018	0.000	± 5
848.8	Head	40.80	0.93	41.50	0.90	-1.687	3.333	± 5
	Body	55.29	0.99	55.20	0.97	0.163	2.062	± 5
1850.2	Head	40.38	1.40	40.00	1.40	0.950	0.000	± 5
	Body	54.01	1.49	53.30	1.52	1.332	-1.974	± 5
1880.0	Head	40.39	1.42	40.00	1.40	0.975	1.429	± 5
	Body	53.76	1.53	53.30	1.52	0.863	0.658	± 5
1909.8	Head	40.39	1.43	40.00	1.40	0.975	2.143	± 5
	Body	53.84	1.55	53.30	1.52	1.013	1.974	± 5
2412	Head	40.10	1.79	39.20	1.80	2.347	0.000	± 5
	Body	51.83	1.94	52.70	1.95	-1.651	-0.513	± 5
2437	Head	40.16	1.81	39.20	1.80	2.474	1.111	± 5
	Body	51.64	1.98	52.70	1.95	-2.011	1.538	± 5
2462	Head	40.26	1.83	39.20	1.80	2.755	2.778	± 5
	Body	51.47	2.02	52.70	1.95	-2.334	3.590	± 5

*Liquid Verification was performed on 2013-7-2.

Please refer to the following tables.

835 MHz Head				835 MHz Body		
Frequency (MHz)	e'	e''		Frequency (MHz)	e'	e''
824.0	41.075201	19.571228		824.0	55.137568	20.650912
824.5	41.044172	19.571782		824.5	55.140706	20.550423
825.0	41.027512	19.572336		825.0	55.143839	20.562941
825.5	40.922372	19.572890		825.5	55.146982	20.575375
826.0	40.940730	19.573445		826.0	55.150120	20.710437
826.5	40.962623	19.573998		826.5	55.153258	20.774168
827.0	40.939110	19.574552		827.0	55.156396	20.688667
827.5	40.986431	19.575106		827.5	55.159533	20.566803
828.0	41.006037	19.575660		828.0	55.162671	20.601365
828.5	41.012463	19.576215		828.5	55.165809	20.558788
829.0	41.063394	19.576768		829.0	55.168947	20.662943
829.5	41.011887	19.577323		829.5	55.172085	20.605772
830.0	41.048255	19.577877		830.0	55.175223	20.483669
830.5	41.008284	19.578431		830.5	55.178361	20.548057
831.0	40.981282	19.578985		831.0	55.181499	20.533232
831.5	41.000837	19.579539		831.5	55.184637	20.740656
832.0	40.962655	19.580093		832.0	55.187775	20.718320
832.5	40.937479	19.580647		832.5	55.190913	20.495019
833.0	40.978015	19.581201		833.0	55.194051	20.428383
833.5	41.009434	19.581755		833.5	55.197189	20.539850
834.0	41.006859	19.582309		834.0	55.200327	20.691707
834.5	41.005439	19.582865		834.5	55.203465	20.584669
835.0	41.030268	19.583418		835.0	55.206603	20.528128
835.5	41.031268	19.584273		835.5	55.209741	20.775835
836.0	41.034868	19.585128		836.0	55.212879	20.782758
836.5	41.019900	19.585983		836.5	55.216017	20.640565
837.0	41.006697	19.586839		837.0	55.219155	20.467648
837.5	41.000904	19.587697		837.5	55.222293	20.503914
838.0	41.024077	19.588549		838.0	55.225431	20.788197
838.5	40.982607	19.589406		838.5	55.228569	20.803401
839.0	40.972538	19.590260		839.0	55.231707	20.725413
839.5	40.975008	19.591115		839.5	55.234845	20.660371
840.0	40.986075	19.591970		840.0	55.237983	20.727514
840.5	40.975437	19.592825		840.5	55.241121	20.772878
841.0	40.958709	19.593681		841.0	55.244259	20.728006
841.5	40.988151	19.594536		841.5	55.247397	20.664743
842.0	40.989853	19.595391		842.0	55.250535	20.840583
842.5	40.993549	19.596246		842.5	55.253673	20.809096
843.0	40.987644	19.587068		843.0	55.256811	20.769494
843.5	40.911347	19.587919		843.5	55.259948	20.725005
844.0	40.987599	19.588775		844.0	55.263086	20.742663
844.5	40.941890	19.589629		844.5	55.266224	20.768570
845.0	40.867908	19.590488		845.0	55.269362	20.677988
845.5	40.883210	19.591340		845.5	55.272500	20.624374
846.0	40.837793	19.612271		846.0	55.275638	20.797375
846.5	40.878732	19.613126		846.5	55.278776	20.858779
847.0	40.859001	19.613982		847.0	55.281914	20.807638
847.5	40.862185	19.614837		847.5	55.285052	20.727939
848.0	40.835787	19.615692		848.0	55.288190	20.818096
848.5	40.840382	19.616547		848.5	55.291328	20.896180
849.0	40.800650	19.617402		849.0	55.294466	20.896362

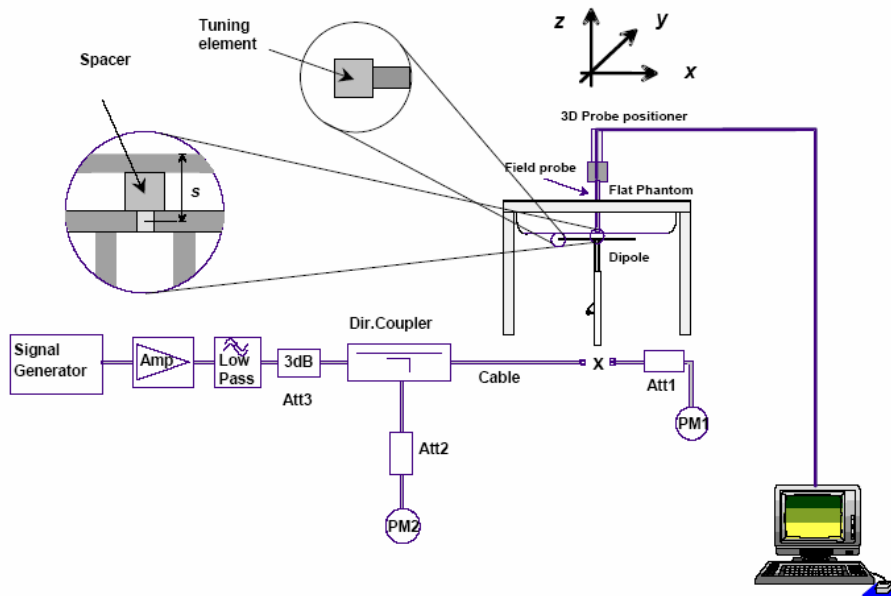
1900 MHz Head				1900 MHz Body		
Frequency (MHz)	e'	e''		Frequency (MHz)	e'	e''
1850.0	40.379447	13.575718		1850.0	54.008295	14.516760
1851.2	40.381674	13.545742		1851.2	53.940214	14.474177
1852.4	40.381927	13.513023		1852.4	53.959058	14.475281
1853.6	40.382173	13.536394		1853.6	53.935641	14.451554
1854.8	40.382422	13.530350		1854.8	53.838477	14.471037
1856.0	40.382670	13.454463		1856.0	53.941500	14.507458
1857.2	40.382920	13.594321		1857.2	53.934671	14.533443
1858.4	40.383171	13.490523		1858.4	53.916685	14.454659
1859.6	40.383419	13.544460		1859.6	53.898356	14.449002
1860.8	40.383668	13.545780		1860.8	53.794147	14.501798
1862.0	40.383917	13.562322		1862.0	53.821823	14.329001
1863.2	40.384166	13.584752		1863.2	53.767804	14.341806
1864.4	40.384416	13.619740		1864.4	53.802556	14.358889
1865.6	40.384664	13.614309		1865.6	53.809029	14.329924
1866.8	40.384914	13.603126		1866.8	53.884039	14.320494
1868.0	40.385213	13.621633		1868.0	53.952483	14.336567
1869.2	40.385412	13.682393		1869.2	53.961545	14.358993
1870.4	40.385663	13.675134		1870.4	53.875043	14.410444
1871.6	40.385911	13.649064		1871.6	53.817423	14.411153
1872.8	40.386159	13.679119		1872.8	53.855857	14.440143
1874.0	40.386409	13.621772		1874.0	53.782322	14.448452
1875.2	40.386658	13.655835		1875.2	53.845485	14.511709
1876.4	40.386917	13.653802		1876.4	53.748600	14.434490
1877.6	40.387156	13.718302		1877.6	53.850883	14.514531
1878.8	40.387406	13.613905		1878.8	53.878670	14.646367
1880.0	40.387654	13.559128		1880.0	53.760991	14.665322
1881.2	40.387904	13.607868		1881.2	53.719231	14.662358
1882.4	40.388154	13.630466		1882.4	53.814773	14.633736
1883.6	40.388402	13.599239		1883.6	53.780274	14.589759
1884.8	40.388651	13.599817		1884.8	53.805171	14.612500
1886.0	40.388900	13.599143		1886.0	53.840382	14.544694
1887.2	40.389150	13.594290		1887.2	53.821157	14.520860
1888.4	40.389400	13.589372		1888.4	53.910934	14.555169
1889.6	40.389648	13.584593		1889.6	53.841425	14.559781
1890.8	40.389897	13.579746		1890.8	53.887100	14.616610
1892.0	40.390146	13.574902		1892.0	53.875064	14.412793
1893.2	40.390395	13.570052		1893.2	53.847516	14.373714
1894.4	40.390646	13.565205		1894.4	53.820154	14.422796
1895.6	40.390893	13.560358		1895.6	53.813002	14.756597
1896.8	40.391143	13.555511		1896.8	53.802903	14.754704
1898.0	40.391392	13.550664		1898.0	53.803233	14.735264
1899.2	40.391642	13.545817		1899.2	53.880234	14.735704
1900.4	40.391892	13.540970		1900.4	53.845150	14.634361
1901.6	40.392140	13.536123		1901.6	53.848633	14.723707
1902.8	40.392410	13.531276		1902.8	53.817724	14.683729
1904.0	40.392638	13.526438		1904.0	53.899435	14.652546
1905.2	40.392887	13.521582		1905.2	53.811192	14.621067
1906.4	40.393148	13.516735		1906.4	53.801104	14.546001
1907.6	40.393385	13.511888		1907.6	53.726784	14.662792
1908.8	40.393635	13.507041		1908.8	53.811064	14.598220
1910.0	40.393885	13.502194		1910.0	53.837587	14.561842

2450 MHz Head				2450 MHz Body		
Frequency (MHz)	e'	e''		Frequency (MHz)	e'	e''
2410	40.106407	13.340990		2410	51.851799	14.431321
2411	40.105408	13.341188		2411	51.842769	14.438318
2412	40.103410	13.341386		2412	51.833757	14.443320
2413	40.101412	13.341584		2413	51.824748	14.448317
2414	40.102411	13.341782		2414	51.815737	14.453320
2415	40.103410	13.341980		2415	51.806734	14.458325
2416	40.104409	13.342178		2416	51.797725	14.463320
2417	40.105408	13.342376		2417	51.788710	14.468320
2418	40.106407	13.342574		2418	51.779702	14.473319
2419	40.110403	13.342772		2419	51.770693	14.478317
2420	40.114399	13.342970		2420	51.761698	14.483324
2421	40.118395	13.343168		2421	51.752667	14.508320
2422	40.122391	13.343366		2422	51.745658	14.515323
2423	40.126387	13.343564		2423	51.738650	14.522320
2424	40.130383	13.343762		2424	51.731642	14.529319
2425	40.134379	13.343960		2425	51.724635	14.536320
2426	40.138375	13.344158		2426	51.717627	14.543319
2427	40.142371	13.344356		2427	51.710619	14.550318
2428	40.146367	13.344554		2428	51.703611	14.557325
2429	40.150363	13.344752		2429	51.696604	14.564320
2430	40.151362	13.344950		2430	51.689600	14.571317
2431	40.152361	13.345148		2431	51.682588	14.578317
2432	40.153360	13.345346		2432	51.675580	14.585319
2433	40.154359	13.345544		2433	51.668572	14.592324
2434	40.155358	13.345742		2434	51.661565	14.599319
2435	40.156357	13.345940		2435	51.654557	14.606319
2436	40.159354	13.346138		2436	51.647549	14.613324
2437	40.162351	13.346336		2437	51.640541	14.620323
2438	40.165348	13.346534		2438	51.633533	14.627323
2440	40.168345	13.346732		2440	51.626531	14.634319
2441	40.171342	13.346930		2441	51.619518	14.641318
2442	40.174339	13.347128		2442	51.612510	14.648317
2443	40.179334	13.347326		2443	51.605502	14.652316
2444	40.184329	13.347524		2444	51.598495	14.656319
2445	40.189324	13.347722		2445	51.591487	14.660322
2446	40.194319	13.347920		2446	51.584479	14.664321
2447	40.199314	13.348118		2447	51.577471	14.668320
2448	40.204309	13.348316		2448	51.570463	14.672318
2449	40.209304	13.348514		2449	51.563460	14.676318
2450	40.214299	13.348712		2450	51.552448	14.680319
2451	40.219294	13.348910		2451	51.549440	14.684318
2452	40.224289	13.349108		2452	51.542432	14.688317
2453	40.229284	13.349306		2453	51.535424	14.692318
2454	40.234279	13.349504		2454	51.528417	14.696322
2455	40.238275	13.349702		2455	51.521409	14.700318
2456	40.242271	13.349900		2456	51.514401	14.704318
2457	40.246267	13.350098		2457	51.507393	14.708325
2458	40.250263	13.350296		2458	51.500387	14.712318
2459	40.254259	13.350494		2459	51.493378	14.716323
2460	40.258255	13.350692		2460	51.486370	14.720318
2461	40.262251	13.350890		2461	51.479362	14.724321
2462	40.264405	13.340995		2462	51.472354	14.728316

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



Probe and dipole antenna List and Detail

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
APREL	Probe	ALS-E-020	500-00283	2012-08-08	2013-08-07
APREL	Dipole antenna(850MHz)	ALS-D-835-S-2	180-00558	2011-08-25	2014-08-24
APREL	Dipole antenna(1900MHz)	ALS-D-1900-S-2	210-00710	2011-08-25	2014-08-24
APREL	Dipole antenna(2450MHz)	ALS-D-2450-S-2	220-00758	2011-08-25	2014-08-24

System Accuracy Check Results

Date	Frequency Band	Liquid Type	Measured SAR (W/Kg)		Target Value (W/Kg)	Delta (%)	Tolerance (%)
2013-7-2	835	Head	1g	9.819	9.590	2.388	± 10
		Body	1g	9.828	9.684	1.487	± 10
	1900	Head	1g	40.204	39.648	1.402	± 10
		Body	1g	40.614	39.769	2.125	± 10
	2450	Head	1g	52.857	52.667	0.361	± 10
		Body	1g	52.648	52.561	0.166	± 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 835 MHz Head Liquid****Dipole 850 MHz; Type: ALS-D-850-S-2; S/N: 180-00558**

Product Data

Device Name : Dipole 850 MHz
Serial No. : 180-00558
Type : Dipole
Model : ALS-D-835-S-2
Frequency Band : 850
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 10.208 W/kg
Power Drift-Finish : 10.414W/kg
Power Drift (%) : 2.017

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 : 835.0 MHz
Last Calib. Date : 2-Jul-2013
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 41.03 F/m
Sigma : 0.91 S/m
Density : 1000.00 kg/cu. m

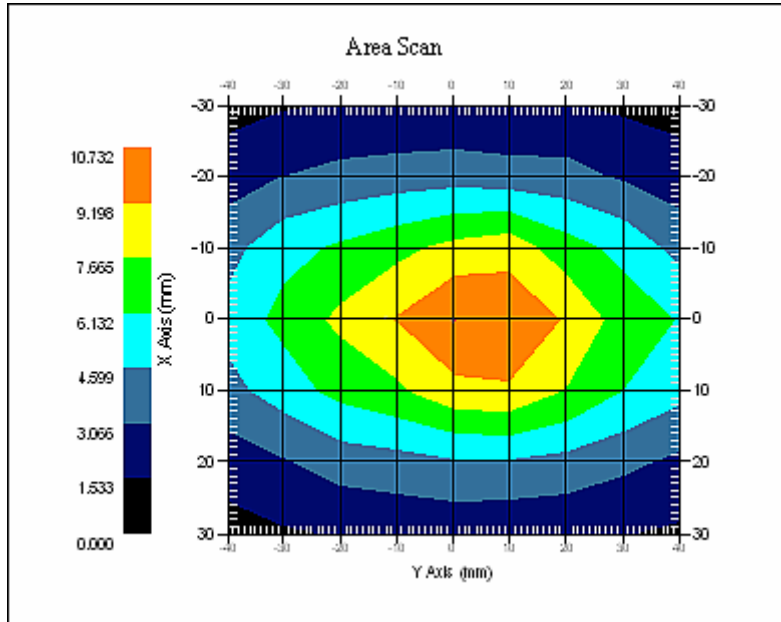
Probe Data

Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 08-Aug-2012
Frequency Band : 850
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 : 9.819 W/kg
10 gram SAR value : 5.951 W/kg
Area Scan Peak SAR : 10.731 W/kg
Zoom Scan Peak SAR : 16.082 W/kg



835 MHz System Validation with Head Tissue

Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**System Performance Check 835 MHz Body Liquid****Dipole 850 MHz; Type: ALS-D-850-S-2; S/N: 180-00558**

Product Data

Device Name : Dipole 850 MHz
Serial No. : 180-00558
Type : Dipole
Model : ALS-D-850-S-2
Frequency Band : 850
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 10.633 W/kg
Power Drift-Finish : 10.419W/kg
Power Drift (%) : -1.997

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 : 835.0 MHz
Last Calib. Date : 2-Jul-2013
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 55.21 F/m
Sigma : 0.95 S/m
Density : 1000.00 kg/cu. m

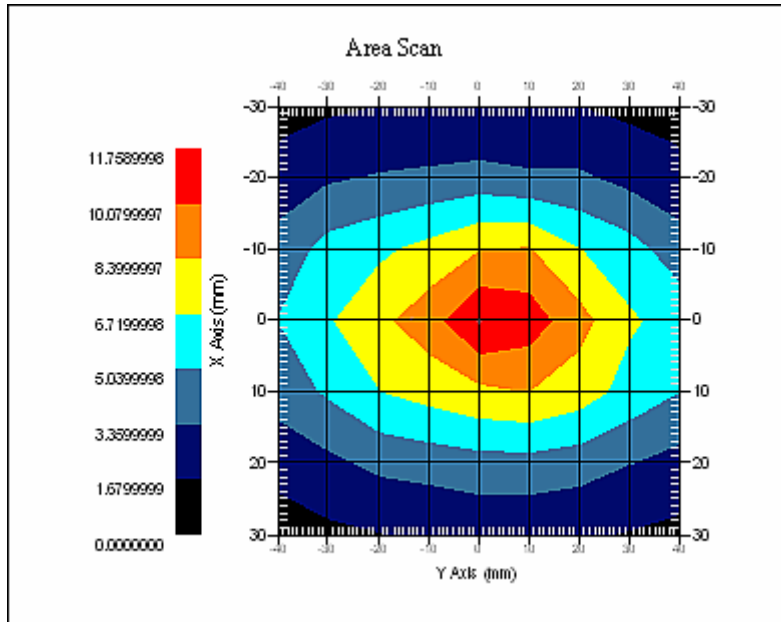
Probe Data

Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 08-Aug-2012
Frequency Band : 850
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 : 9.828 W/kg
10 gram SAR value : 6.193W/kg
Area Scan Peak SAR : 11.756 W/kg
Zoom Scan Peak SAR : 17.044 W/kg



835 MHz System Validation with Body Tissue

Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**System Performance Check 1900 MHz 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 Band : 1900
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 40.001 W/kg
Power Drift-Finish : 40.165 W/kg
Power Drift (%) : 0.412

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 : 2-Jul-2013
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 40.39 F/m
Sigma : 1.43 S/m
Density : 1000.00 kg/cu. M

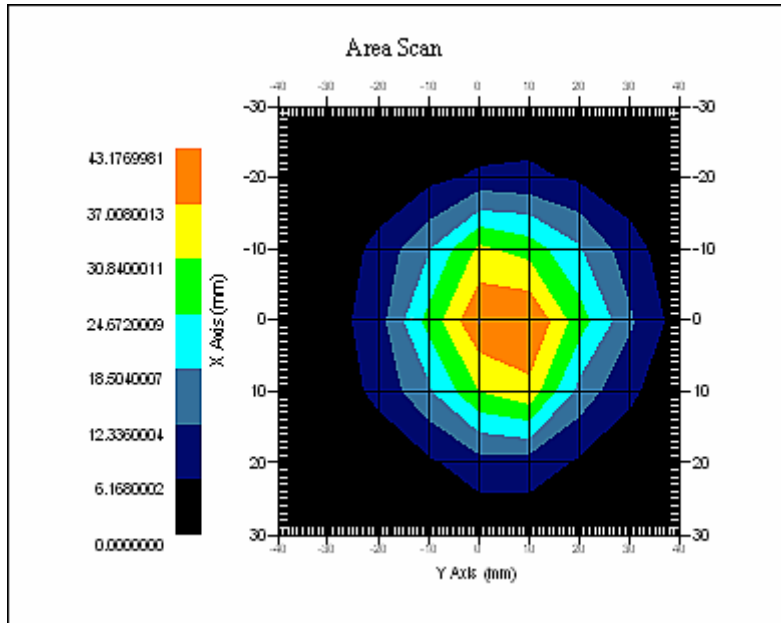
Probe Data

Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 08-Aug-2012
Frequency Band : 1900
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 : 40.204 W/kg
10 gram SAR value : 22.187 W/kg
Area Scan Peak SAR : 43.177 W/kg
Zoom Scan Peak SAR : 86.156 W/kg



1900 MHz System Validation with Head Tissue

Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**System Performance Check 1900 MHz 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 Band : 1900
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 40.014 W/kg
Power Drift-Finish : 40.334 W/kg
Power Drift (%) : 0.798

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 : 2-Jul-2013
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 53.85 F/m
Sigma : 1.55 S/m
Density : 1000.00 kg/cu. m

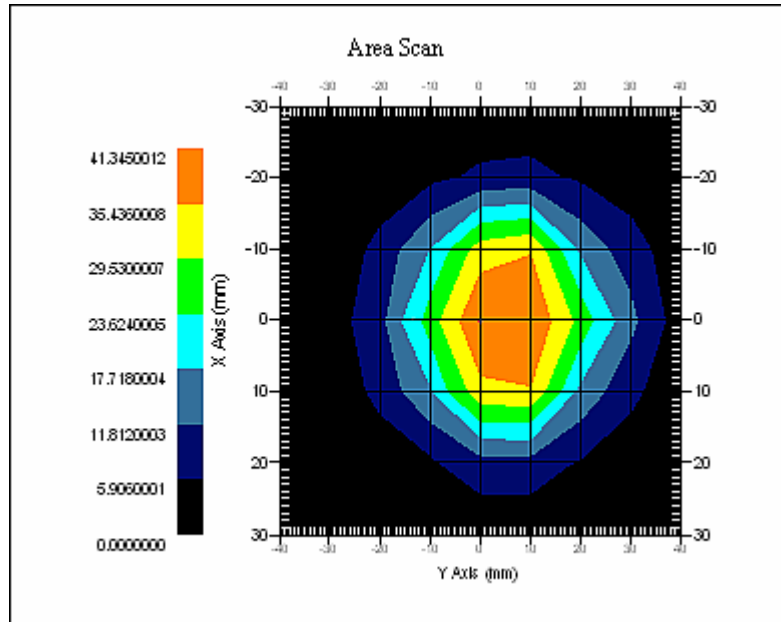
Probe Data

Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 08-Aug-2012
Frequency Band : 1900
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 : 40.614 W/kg
 10 gram SAR value : 21.969 W/kg
 Area Scan Peak SAR : 41.345 W/kg
 Zoom Scan Peak SAR : 92.240 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 Band : 2450 MHz
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 53.701 W/kg
Power Drift-Finish : 53.900 W/kg
Power Drift (%) : 0.372

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 : 2450.0 MHz
Last Calib. Date : 2-Jul-2013
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 50.00 RH%
Epsilon : 40.21 F/m
Sigma : 1.82 S/m
Density : 1000.00 kg/cu. M

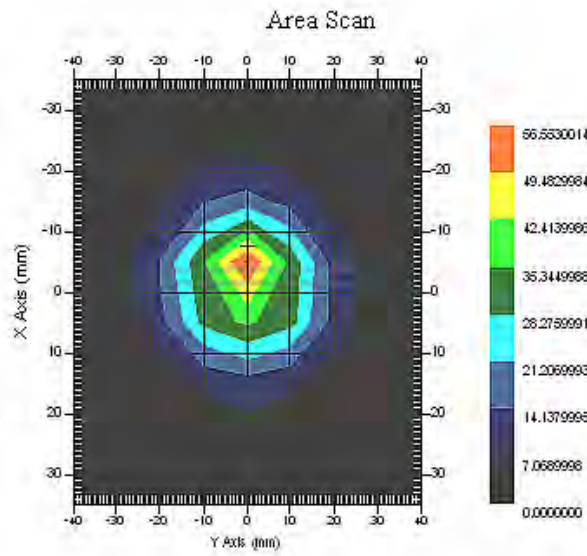
Probe Data

Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 14-Jul-2011
Frequency Band : 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 : 7x9x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm

1 gram SAR value : 52.857 W/kg
10 gram SAR value : 23.200 W/kg
Area Scan Peak SAR : 56.553 W/kg
Zoom Scan Peak SAR : 98.102 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 Band : 2450 MHz
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 53.150 W/kg
Power Drift-Finish : 53.490 W/kg
Power Drift (%) : 0.640

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 : 2450.0 MHz
Last Calib. Date : 2-Jul-2013
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 50.00 RH%
Epsilon : 51.55 F/m
Sigma : 2.00 S/m
Density : 1000.00 kg/cu. M

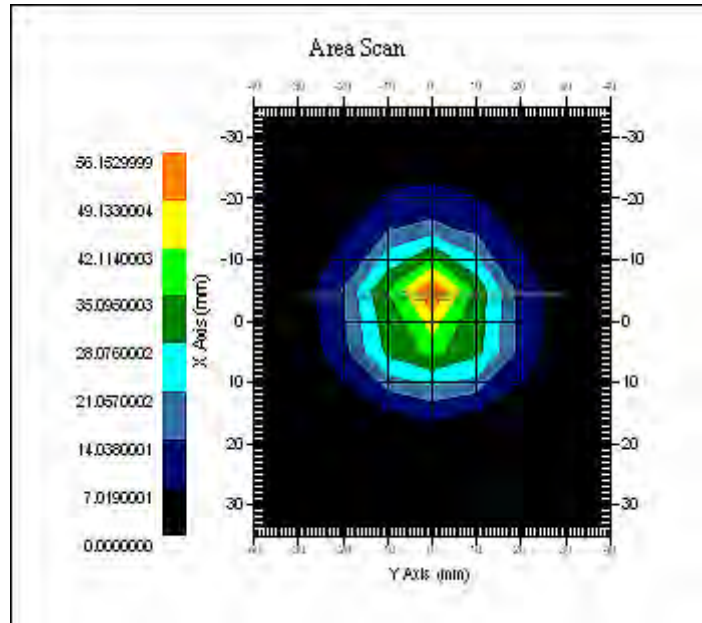
Probe Data

Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 14-Jul-2011
Frequency Band : 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 : 8x9x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm

1 gram SAR value : 52.648 W/kg
 10 gram SAR value : 24.079 W/kg
 Area Scan Peak SAR : 56.152 W/kg
 Zoom Scan Peak SAR : 95.701 W/kg



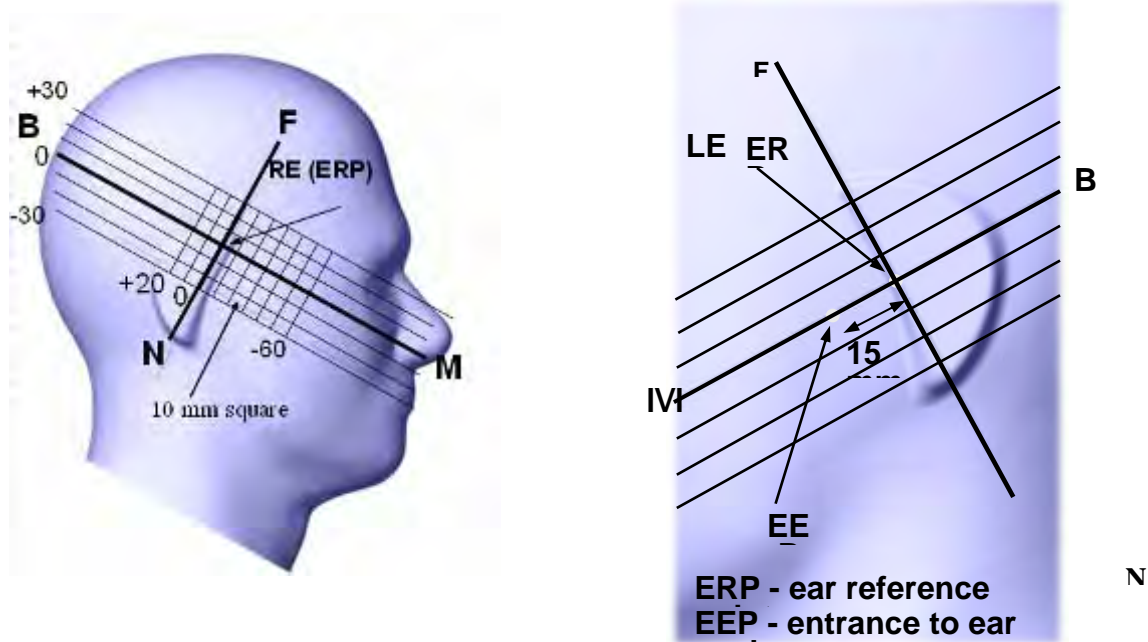
2450 MHz System Validation

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

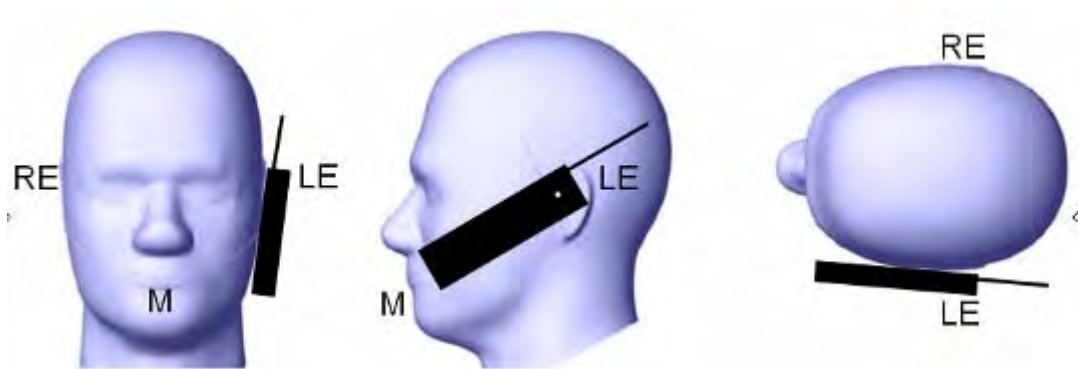
The device is brought toward the mouth of the head phantom by pivoting against the “ear reference point” or along the “N-F” line for the SCC-34/SC-2 head phantom.

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

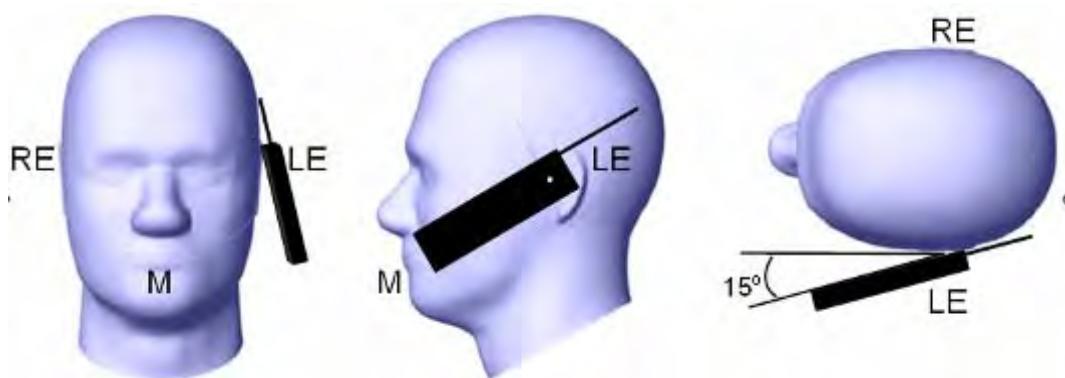
With the handset aligned in the “Cheek/Touch Position”:

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.

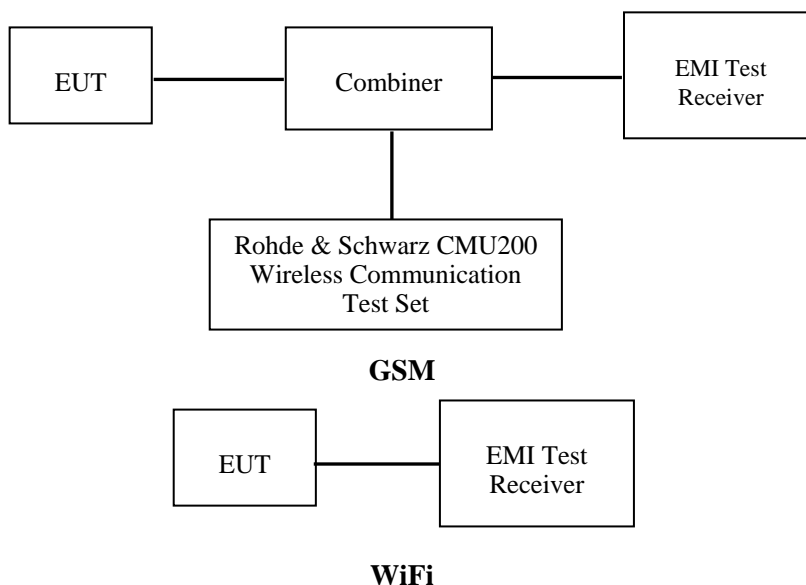
CONDUCTED OUTPUT POWER MEASUREMENT

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 EMI Test Receiver through sufficient attenuation.



Maximum Output Power among production units

Max Target Power for Production Unit (dBm)			
Mode/Band	Channel		
	Low	Middle	High
GSM 850	33.00	33.00	33.00
GPRS 1 slot	33.00	33.00	33.00
GPRS 2 slot	31.00	31.00	31.00
GPRS 3 slot	29.00	29.00	29.00
GPRS 4 slot	27.00	27.00	27.00
PCS 1900	30.00	30.00	30.00
GPRS 1 slot	30.00	30.00	30.00
GPRS 2 slot	30.00	30.00	30.00
GPRS 3 slot	30.00	30.00	30.00
GPRS 4 slot	29.50	29.50	29.50
Bluetooth	6.00	6.00	6.00
WiFi-802.11b	20.50	20.50	20.50
WiFi-802.11g	20.00	20.00	20.00
WiFi-802.11n20	20.00	20.00	20.00
WiFi-802.11n40	20.00	20.00	20.00

Test Results:

GSM

Band	Frequency (MHz)	Conducted Peak Output Power	
		Meas. Power (dBm)	Meas. Power (W)
GSM 850	824.2	32.49	1.774
	836.6	32.49	1.774
	848.8	32.40	1.738
PCS 1900	1850.2	29.28	0.847
	1880.0	29.22	0.836
	1909.8	29.68	0.929

GPRS

Band	Channel No.	Frequency (MHz)	RF Peak Output Power (dBm)			
			1 slot	2 slot	3 slots	4 slots
GSM 850	128	824.2	32.35	30.66	28.78	26.75
	190	836.6	32.26	30.60	28.76	26.73
	251	848.8	32.15	30.52	28.59	26.60
PCS 1900	512	1850.2	29.27	29.20	29.12	28.88
	661	1880.0	29.32	29.25	29.18	28.99
	810	1909.8	29.51	29.41	29.29	29.18

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

Band	Channel No.	Frequency (MHz)	Time based average Power (dBm)			
			1 slot	2 slot	3 slots	4 slots
GSM 850	128	824.2	23.35	24.66	24.53	23.75
	190	836.6	23.26	24.60	24.51	23.73
	251	848.8	23.15	24.52	24.34	23.60
PCS 1900	512	1850.2	20.27	23.20	24.87	25.88
	661	1880.0	20.32	23.25	24.93	25.99
	810	1909.8	20.51	23.41	25.04	26.18

Note:

1. Rohde & Schwarz Radio Communication Tester (CMU200) was used for the measurement of GSM peak and average output power for active timeslots.
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 level 5(850 MHz band) and 0(1900 MHz band).

Bluetooth

Mode	Channel frequency (MHz)	Reading power (dBm)	Power output (mw)
BDR(GFSK)	(Low)2402	5.82	3.819
	(Middle)2441	5.87	3.863
	(High)2480	5.66	3.681
EDR(4-DQPSK)	(Low)2402	5.78	3.784
	(Middle)2441	5.83	3.828
	(High)2480	5.70	3.715
EDR-8DPSK	(Low)2402	5.81	3.811
	(Middle)2441	5.83	3.828
	(High)2480	5.67	3.689

WiFi

Band	Frequency (MHz)	Conducted Output Power	
		(dBm)	(mw)
802.11b	2412	19.11	81.470
	2437	20.03	100.693
	2462	18.32	67.920
802.11g	2412	17.73	59.293
	2437	19.35	86.099
	2462	16.96	49.659
802.11n20	2412	18.15	65.313
	2437	19.72	93.756
	2462	17.24	52.966
802.11n40	2422	17.53	56.624
	2437	19.22	83.560
	2452	16.96	49.659

Note:

1. The output power was tested under data rate 1Mbps for 802.11b, 6Mbps for 802.11g, 6.5Mbps for 802.11n-20, 13.5 Mbps for 802.11n-40.
2. KDB248227-SAR is not required for 802.11g/n channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

SAR MEASUREMENT RESULTS

This page summarizes the results of the performed dosimetric evaluation.

SAR Test Data

Environmental Conditions

Temperature:	21-22° C
Relative Humidity:	50-53%
ATM Pressure:	1001-1002 mbar

* Testing was performed by Sandy Wang on 2013-7-2 to 2013-7-3

Cellular Band:

EUT Position	Frequency (MHz)		Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	FCC 1g SAR (W/Kg)		
	Channel	MHz					Scaled Factor	Meas. SAR	Scaled SAR
Left Head Cheek	128(Low)	824.2	GSM	1.103	32.49	33.00	1.125	0.196	0.221
	190(Middle)	836.6	GSM	/	/	/	/	/	/
	251(High)	848.8	GSM	/	/	/	/	/	/
Left Head Tilt	128(Low)	824.2	GSM	1.002	32.49	33.00	1.125	0.117	0.132
	190(Middle)	836.6	GSM	/	/	/	/	/	/
	251(High)	848.8	GSM	/	/	/	/	/	/
Right Head Cheek	128(Low)	824.2	GSM	0.718	32.49	33.00	1.125	0.190	0.214
	190(Middle)	836.6	GSM	/	/	/	/	/	/
	251(High)	848.8	GSM	/	/	/	/	/	/
Right Head Tilt	128(Low)	824.2	GSM	0.689	32.49	33.00	1.125	0.113	0.127
	190(Middle)	836.6	GSM	/	/	/	/	/	/
	251(High)	848.8	GSM	/	/	/	/	/	/
Body-Front-Headset (10mm)	128(Low)	824.2	GSM	1.993	32.49	33.00	1.125	0.165	0.186
	190(Middle)	836.6	GSM	/	/	/	/	/	/
	251(High)	848.8	GSM	/	/	/	/	/	/
Body-Back-Headset (10mm)	128(Low)	824.2	GSM	-0.800	32.49	33.00	1.125	0.277	0.312
	190(Middle)	836.6	GSM	/	/	/	/	/	/
	251(High)	848.8	GSM	/	/	/	/	/	/

PCS Band:

EUT Position	Frequency (MHz)		Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	FCC 1g SAR (W/Kg)		
	Channel	MHz					Scaled Factor	Meas. SAR	Scaled SAR
Left Head Cheek	512(Low)	1850.2	GSM	/	/	/	/	/	/
	661(Middle)	1880.0	GSM	/	/	/	/	/	/
	810(High)	1909.8	GSM	-0.754	29.68	30.00	1.076	0.073	0.079
Left Head Tilt	512(Low)	1850.2	GSM	/	/	/	/	/	/
	661(Middle)	1880.0	GSM	/	/	/	/	/	/
	810(High)	1909.8	GSM	0.957	29.68	30.00	1.076	0.047	0.051
Right Head Cheek	512(Low)	1850.2	GSM	/	/	/	/	/	/
	661(Middle)	1880.0	GSM	/	/	/	/	/	/
	810(High)	1909.8	GSM	1.062	29.68	30.00	1.076	0.069	0.074
Right Head Tilt	512(Low)	1850.2	GSM	/	/	/	/	/	/
	661(Middle)	1880.0	GSM	/	/	/	/	/	/
	810(High)	1909.8	GSM	1.091	29.68	30.00	1.076	0.046	0.049
Body-Front-Headset (10mm)	512(Low)	1850.2	GSM	/	/	/	/	/	/
	661(Middle)	1880.0	GSM	/	/	/	/	/	/
	810(High)	1909.8	GSM	-1.429	29.68	30.00	1.076	0.071	0.076
Body-Back-Headset (10mm)	512(Low)	1850.2	GSM	/	/	/	/	/	/
	661(Middle)	1880.0	GSM	/	/	/	/	/	/
	810(High)	1909.8	GSM	-0.921	29.68	30.00	1.076	0.219	0.236

Note:

1. When the 1-g SAR is $\leq 0.8\text{W/Kg}$, testing for other channels are optional.
2. The EUT transmit and receive through the same GSM antenna while testing SAR.
3. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.

WiFi:

EUT Position	Frequency (MHz)		Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	FCC 1g SAR (W/Kg)		
	Channel	MHz					Scaled Factor	Meas. SAR	Scaled SAR
Left Head Cheek	1	2412	802.11b	/	/	/	/	/	/
	6	2437	802.11b	0.311	20.03	20.50	1.114	0.007	0.008
	11	2462	802.11b	/	/	/	/	/	/
Left Head Tilt	1	2412	802.11b	/	/	/	/	/	/
	6	2437	802.11b	0.634	20.03	20.50	1.114	0.004	0.004
	11	2462	802.11b	/	/	/	/	/	/
Right Head Cheek	1	2412	802.11b	/	/	/	/	/	/
	6	2437	802.11b	-0.502	20.03	20.50	1.114	0.009	0.010
	11	2462	802.11b	/	/	/	/	/	/
Right Head Tilt	1	2412	802.11b	/	/	/	/	/	/
	6	2437	802.11b	0.964	20.03	20.50	1.114	0.003	0.003
	11	2462	802.11b	/	/	/	/	/	/

Note:

1. When the 1-g SAR is $\leq 0.8W/Kg$, testing for other channels are optional.
2. The EUT transmit and receive through the same WiFi antenna while testing SAR.
3. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.

Mobile Hot-Spot Test Result

The DUT is capable of functioning as a WiFi to Cellular Mobile hotspot. Additional SAR testing was performed according to KDB 941225 D06. Testing was performed with a separation of 1cm between the DUT and the flat phantom. The DUT was positioned for SAR tests with the front and back surfaces facing the phantom, and also with the edges facing the phantom in which the transmitting antenna is <2.5 cm from the edge. Each transmit band was utilized for SAR testing. The tested mode has been selected within each band that exhibits the highest time average output power.

Hot spot-GPRS (Frequency Band: 850)

EUT Position	Frequency (MHz)		Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	FCC 1g SAR (W/Kg)		
	Channel	MHz					Scaled Factor	Meas. SAR	Scaled SAR
Body-Front (10mm)	128(Low)	824.2	GPRS	0.997	30.66	31.00	1.081	0.209	0.226
	190(Middle)	836.6	GPRS	/	/	/	/	/	/
	251(High)	848.8	GPRS	/	/	/	/	/	/
Body-Back (10mm)	128(Low)	824.2	GPRS	1.983	30.66	31.00	1.081	0.332	0.359
	190(Middle)	836.6	GPRS	/	/	/	/	/	/
	251(High)	848.8	GPRS	/	/	/	/	/	/
Body-Left (10mm)	128(Low)	824.2	GPRS	0.747	30.66	31.00	1.081	0.017	0.018
	190(Middle)	836.6	GPRS	/	/	/	/	/	/
	251(High)	848.8	GPRS	/	/	/	/	/	/
Body-Right (10mm)	128(Low)	824.2	GPRS	0.667	30.66	31.00	1.081	0.016	0.017
	190(Middle)	836.6	GPRS	/	/	/	/	/	/
	251(High)	848.8	GPRS	/	/	/	/	/	/
Body-Bottom (10mm)	128(Low)	824.2	GPRS	0.503	30.66	31.00	1.081	0.006	0.006
	190(Middle)	836.6	GPRS	/	/	/	/	/	/
	251(High)	848.8	GPRS	/	/	/	/	/	/

Note:

1. When the 1-g SAR is $\leq 0.8\text{W/Kg}$, testing for other channels are optional.
2. The EUT is a Capability Class B mobile phone which can be attached to both GPRS and GSM services.
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, 3DL+2UL is the worse case.
4. The EUT transmit and receive through the same GSM antenna while testing SAR.
5. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.

Hot spot-GPRS (Frequency Band: 1900)

EUT Position	Frequency (MHz)		Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	FCC 1g SAR (W/Kg)		
	Channel	MHz					Scaled Factor	Meas. SAR	Scaled SAR
Body-Front (10mm)	512(Low)	1850.2	GPRS	/	/	/	/	/	/
	661(Middle)	1880.0	GPRS	/	/	/	/	/	/
	810(High)	1909.8	GPRS	1.000	29.18	29.50	1.076	0.248	0.267
Body-Back (10mm)	512(Low)	1850.2	GPRS	/	/	/	/	/	/
	661(Middle)	1880.0	GPRS	/	/	/	/	/	/
	810(High)	1909.8	GPRS	0.792	29.18	29.50	1.076	0.726	0.781
Body-Left (10mm)	512(Low)	1850.2	GPRS	/	/	/	/	/	/
	661(Middle)	1880.0	GPRS	/	/	/	/	/	/
	810(High)	1909.8	GPRS	0.994	29.18	29.50	1.076	0.025	0.027
Body-Right (10mm)	512(Low)	1850.2	GPRS	/	/	/	/	/	/
	661(Middle)	1880.0	GPRS	/	/	/	/	/	/
	810(High)	1909.8	GPRS	0.596	29.18	29.50	1.076	0.028	0.030
Body-Bottom (10mm)	512(Low)	1850.2	GPRS	/	/	/	/	/	/
	661(Middle)	1880.0	GPRS	/	/	/	/	/	/
	810(High)	1909.8	GPRS	-0.746	29.18	29.50	1.076	0.016	0.017

Note:

1. When the 1-g SAR is $\leq 0.8\text{W/Kg}$, testing for other channels are optional.
2. The EUT is a Capability Class B mobile phone which can be attached to both GPRS and GSM services.
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, 1DL+4UL is the worse case.
4. The EUT transmit and receive through the same GSM antenna while testing SAR.
5. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.

Hot Spot-WiFi

EUT Position	Frequency (MHz)		Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	FCC 1g SAR (W/Kg)		
	Channel	MHz					Scaled Factor	Meas. SAR	Scaled SAR
Body-Front (10mm)	1	2412	802.11b	/	/	/	/	/	/
	6	2437	802.11b	0.782	20.03	20.50	1.114	0.005	0.006
	11	2462	802.11b	/	/	/	/	/	/
Body-Back (10mm)	1	2412	802.11b	/	/	/	/	/	/
	6	2437	802.11b	-0.777	20.03	20.50	1.114	0.006	0.007
	11	2462	802.11b	/	/	/	/	/	/
Body-Left (10mm)	1	2412	802.11b	/	/	/	/	/	/
	6	2437	802.11b	0.519	20.03	20.50	1.114	0.004	0.004
	11	2462	802.11b	/	/	/	/	/	/
Body-Bottom (10mm)	1	2412	802.11b	/	/	/	/	/	/
	6	2437	802.11b	-0.742	20.03	20.50	1.114	0.004	0.004
	11	2462	802.11b	/	/	/	/	/	/

Note:

1. When the 1-g SAR is $\leq 0.8\text{W/Kg}$, testing for other channels are optional.
2. The SAR testing is conducted with 100% duty cycle factor.
3. The output power was tested under data rate 1Mbps for 802.11b.
4. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.

SAR SIMULTANEOUS TRANSMISSION DESCRIPTION

KDB 447498D01 General RF Exposure Guidance v05 KDB 648474 D04 SAR Handsets Multi Xmitter and Ant v01

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

BT&WiFi and GSM Antenna Location:



Antenna Information:

Description of Simultaneous Transmit Capabilities			Antennas Distance (mm)
Transmitter Combination	Simultaneous?	Hotspot?	
GSM + GPRS	×	×	0.00
GSM + Bluetooth	√	×	2
GPRS + Bluetooth	√	×	2
WiFi + Bluetooth	×	×	0.00
GSM + WiFi	√	√	2
GPRS + WiFi	√	√	2

Standalone SAR test exclusion considerations

Head Position:

Mode	Frequency (MHz)	P _{avg} (dBm)	P _{avg} (mW)	Distance (mm)	Calculated value	Threshold (1-g)	SAR Test Exclusion
GSM850	850	23.49	223.357	0	41.2	3.0	No
PCS1900	1900	20.68	116.950	0	32.2	3.0	No
Bluetooth	2450	5.87	3.864	0	1.2	3.0	Yes
WiFi	2450	20.03	100.693	0	31.5	3.0	No

Body Position:

Mode	Frequency (MHz)	P _{avg} (dBm)	P _{avg} (mW)	Distance (mm)	Calculated value	Threshold (1-g)	SAR Test Exclusion
GSM850	850	24.66	292.415	10	27.0	3.0	No
PCS1900	1900	26.18	414.954	10	57.2	3.0	No
Bluetooth	2450	5.87	3.864	10	0.6	3.0	Yes
WiFi	2450	20.03	100.693	10	15.8	3.0	No

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

1. f(GHz) is the RF channel transmit frequency in GHz.
2. Power and distance are rounded to the nearest mW and mm before calculation.
3. The result is rounded to one decimal place for comparison.
4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

Simultaneous SAR test exclusion considerations:

GSM with WiFi:

Mode	Position	Reported SAR (W/kg)		ΣSAR
		GSM	WiFi	< 1.6W/kg
GSM850	Left Head Cheek	0.221	0.008	0.229
	Left Head Tile	0.132	0.004	0.136
	Right Head Cheek	0.214	0.010	0.224
	Right Head Tilt	0.127	0.003	0.130
	Body-Headset-Front	0.186	0.006	0.192
	Body-Headset-Back	0.312	0.007	0.319
PCS1900	Left Head Cheek	0.079	0.008	0.087
	Left Head Tile	0.051	0.004	0.055
	Right Head Cheek	0.074	0.010	0.084
	Right Head Tilt	0.049	0.003	0.052
	Body-Headset-Front	0.076	0.006	0.082
	Body-Headset-Back	0.236	0.007	0.243

GSM with BT:

Mode	Position	Reported SAR (W/kg)		ΣSAR
		GSM	BT	< 1.6W/kg
GSM850	Left Head Cheek	0.221	0.166	0.387
	Left Head Tile	0.132	0.166	0.298
	Right Head Cheek	0.214	0.166	0.380
	Right Head Tilt	0.127	0.166	0.293
	Body-Headset-Front	0.186	0.083	0.269
	Body-Headset-Back	0.312	0.083	0.395
PCS1900	Left Head Cheek	0.079	0.166	0.245
	Left Head Tile	0.051	0.166	0.217
	Right Head Cheek	0.074	0.166	0.240
	Right Head Tilt	0.049	0.166	0.215
	Body-Headset-Front	0.076	0.083	0.159
	Body-Headset-Back	0.236	0.083	0.319

Mode	Frequency (GHz)	Distance (mm)	P _{avg} (dBm)	P _{avg} (mW)	Estimated 1-g (W/kg)
Bluetooth Head	2.45	0	6.00	3.981	0.166
Bluetooth Body	2.45	10	6.00	3.981	0.083

Note:

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}/x]$
W/kg for test separation distances ≤ 50 mm;

where $x = 7.5$ for 1-g SAR.

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion

Conclusion:

$\Sigma\text{SAR} < 1.6$ W/kg therefore simultaneous transmission SAR with Volume Scans is **not** required.

Hotspot:

Evaluations for Simultaneous SAR, Mobile Hot Spot Positions					
Test Position	Body-Front (1.0cm)	Body-Back (1.0cm)	Body-Left (1.0cm)	Body-Right (1.0cm)	Body-Bottom (1.0cm)
Mode	Stand Alone 1-g SAR (W/Kg)				
GSM 850	0.226	0.359	0.018	0.017	0.006
PCS 1900	0.267	0.781	0.027	0.030	0.017
WiFi	0.006	0.007	0.004	/	0.004
	Σ 1-g SAR(W/Kg)				
GSM850 + WiFi	0.232	0.366	0.022	/	0.010
PCS 1900 + WiFi	0.273	0.788	0.031	/	0.021

Note:

If the sum of the 1g SAR measured for the simultaneously transmitting antennas is less than the SAR limit, SAR measurement for simultaneous transmission is not required.

EUT SCAN RESULTS

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

Left Head Cheek (824.2MHz Low Channel)

Measurement Data

Test mode : GSM
 Crest Factor : 8
 Scan Type : Complete
 Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.020 W/kg
 Power Drift-Finish : 0.020W/kg
 Power Drift (%) : 1.013

Tissue Data

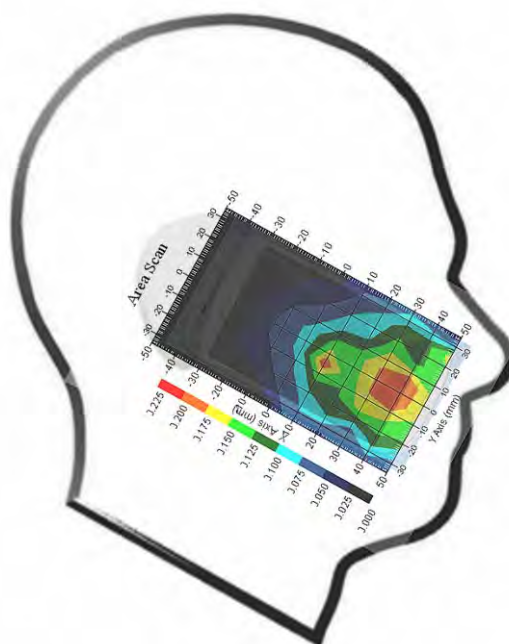
Type : Head
 Frequency : 824.2 MHz
 Epsilon : 41.08 F/m
 Sigma : 0.90 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 850
 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 : 0.196 W/kg
 10 gram SAR value : 0.149 W/kg
 Area Scan Peak SAR : 0.202 W/kg
 Zoom Scan Peak SAR : 0.360 W/kg

Plot 1#



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

Left Head Tilt (824.2MHz Low Channel)

Measurement Data

Test mode : GSM
 Crest Factor : 8
 Scan Type : Complete
 Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.033 W/kg
 Power Drift-Finish : 0.033 W/kg
 Power Drift (%) : 1.002

Tissue Data

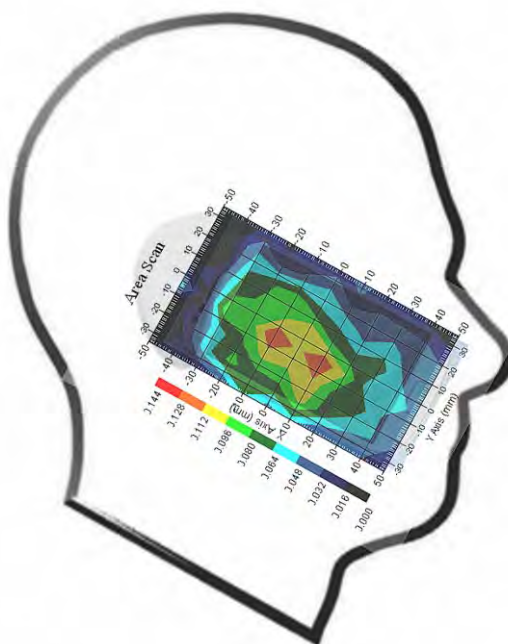
Type : Head
 Frequency : 824.2 MHz
 Epsilon : 41.08 F/m
 Sigma : 0.90 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 850
 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 : 0.117 W/kg
 10 gram SAR value : 0.066 W/kg
 Area Scan Peak SAR : 0.129 W/kg
 Zoom Scan Peak SAR : 0.250 W/kg

Plot 2#



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

Right Head Cheek (824.2MHz Low Channel)

Measurement Data

Test mode : GSM
 Crest Factor : 8
 Scan Type : Complete
 Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.026 W/kg
 Power Drift-Finish : 0.026 W/kg
 Power Drift (%) : 0.718

Tissue Data

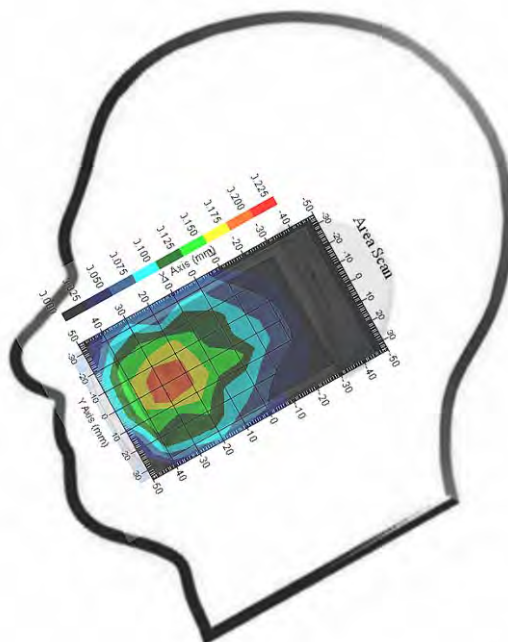
Type : Head
 Frequency : 824.2 MHz
 Epsilon : 41.08 F/m
 Sigma : 0.90 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 850
 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 : 0.190 W/kg
 10 gram SAR value : 0.145 W/kg
 Area Scan Peak SAR : 0.210 W/kg
 Zoom Scan Peak SAR : 0.360 W/kg

Plot 3#



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

Right Head Tilt (824.2MHz Low Channel)

Measurement Data

Test mode : GSM
 Crest Factor : 8
 Scan Type : Complete
 Area Scan : 11x8x1: 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 (%) : 0.689

Tissue Data

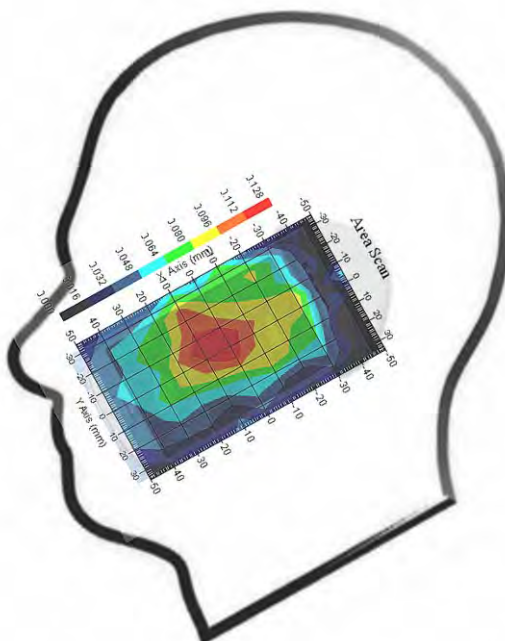
Type : Head
 Frequency : 824.2 MHz
 Epsilon : 41.08 F/m
 Sigma : 0.90 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 850
 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 : 0.113 W/kg
 10 gram SAR value : 0.064 W/kg
 Area Scan Peak SAR : 0.126 W/kg
 Zoom Scan Peak SAR : 0.250 W/kg

Plot 4#



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

Body-worn Front-Headset (824.2MHz Low Channel)

Measurement Data

Test mode : GSM
 Crest Factor : 8
 Scan Type : Complete
 Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.151 W/kg
 Power Drift-Finish : 0.154 W/kg
 Power Drift (%) : 1.993

Tissue Data

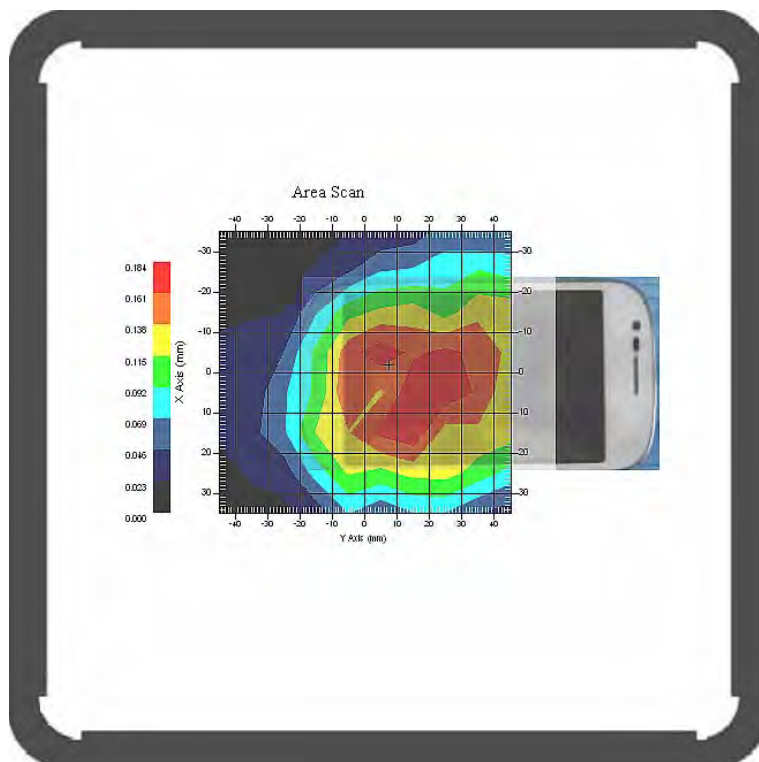
Type : Body
 Frequency : 824.2 MHz
 Epsilon : 55.14 F/m
 Sigma : 0.95 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 850
 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 : 0.165 W/kg
 10 gram SAR value : 0.134 W/kg
 Area Scan Peak SAR : 0.180 W/kg
 Zoom Scan Peak SAR : 0.220 W/kg

Plot 5#



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

Body-worn Back-Headset (824.2MHz Low Channel)

Measurement Data

Test mode : GSM
 Crest Factor : 8
 Scan Type : Complete
 Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.250 W/kg
 Power Drift-Finish : 0.248 W/kg
 Power Drift (%) : -0.800

Tissue Data

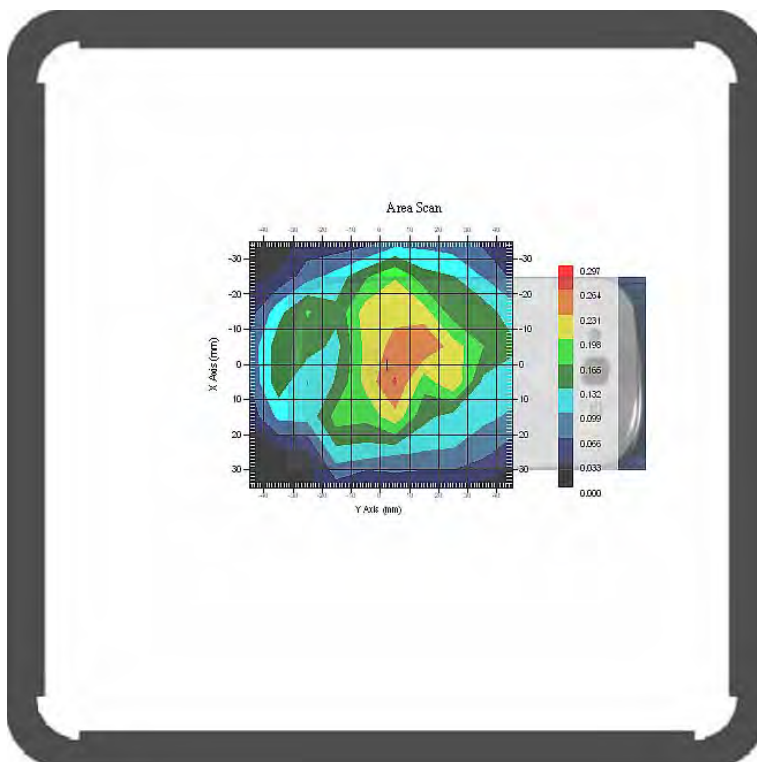
Type : Body
 Frequency : 824.2 MHz
 Epsilon : 55.14 F/m
 Sigma : 0.95 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 850
 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 : 0.277 W/kg
 10 gram SAR value : 0.147 W/kg
 Area Scan Peak SAR : 0.297 W/kg
 Zoom Scan Peak SAR : 0.450 W/kg

Plot 6#



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

Left Head Cheek (1909.8 MHz High Channel)

Measurement Data

Test mode : GSM
 Crest Factor : 8
 Scan Type : Complete
 Area Scan : 11x8x1 : 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 (%) : -0.754

Tissue Data

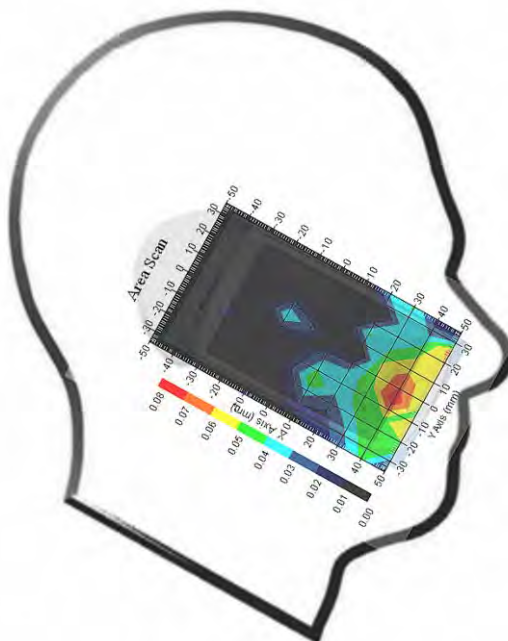
Type : Head
 Frequency : 1909.8 MHz
 Epsilon : 40.39 F/m
 Sigma : 1.43 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 1900
 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 : 0.073 W/kg
 10 gram SAR value : 0.038 W/kg
 Area Scan Peak SAR : 0.080 W/kg
 Zoom Scan Peak SAR : 0.160 W/kg

Plot 7#



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

Left Head Tilt (1909.8 MHz High Channel)

Measurement Data

Test mode : GSM
 Crest Factor : 8
 Scan Type : Complete
 Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.002 W/kg
 Power Drift-Finish : 0.002 W/kg
 Power Drift (%) : 0.957

Tissue Data

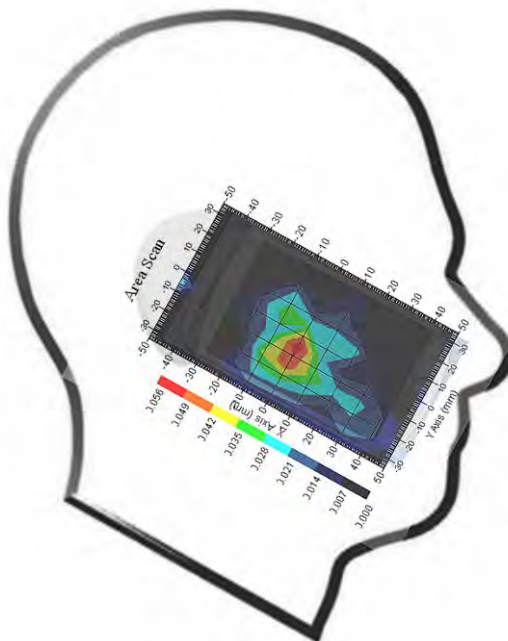
Type : Head
 Frequency : 1909.8 MHz
 Epsilon : 40.39 F/m
 Sigma : 1.43 S/m
 Density : 1000.00 kg/cu. M

Probe Data

Serial No. : 500-00283
 Frequency Band : 1900
 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 : 0.047 W/kg
 10 gram SAR value : 0.023 W/kg
 Area Scan Peak SAR : 0.054 W/kg
 Zoom Scan Peak SAR : 0.100 W/kg

Plot 8#



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

Right Head Cheek (1909.8 MHz High Channel)

Measurement Data

Test mode : GSM
 Crest Factor : 8
 Scan Type : Complete
 Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.004 W/kg
 Power Drift-Finish : 0.004W/kg
 Power Drift (%) : 1.062

Tissue Data

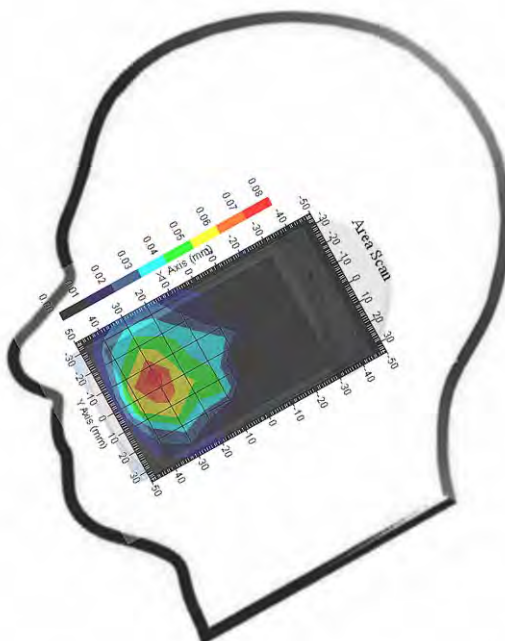
Type : Head
 Frequency : 1909.8 MHz
 Epsilon : 40.39 F/m
 Sigma : 1.43 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 1900
 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 : 0.069 W/kg
 10 gram SAR value : 0.036 W/kg
 Area Scan Peak SAR : 0.080 W/kg
 Zoom Scan Peak SAR : 0.160 W/kg

Plot 9#



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

Right Head Tilt (1909.8 MHz High Channel)

Measurement Data

Test mode : GSM
 Crest Factor : 8
 Scan Type : Complete
 Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.006 W/kg
 Power Drift-Finish : 0.006 W/kg
 Power Drift (%) : 1.091

Tissue Data

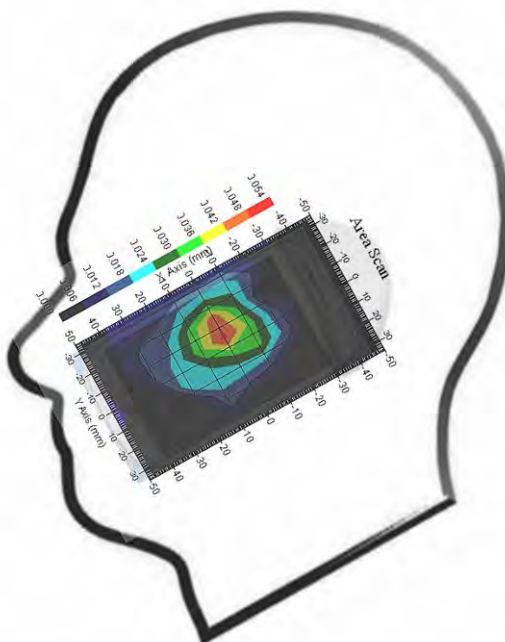
Type : Head
 Frequency : 1909.8 MHz
 Epsilon : 40.39 F/m
 Sigma : 1.43 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 1900
 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 : 0.046 W/kg
 10 gram SAR value : 0.021 W/kg
 Area Scan Peak SAR : 0.052 W/kg
 Zoom Scan Peak SAR : 0.100 W/kg

Plot 10#



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

Body- worn Front-Headset (1909.8 MHz High Channel)

Measurement Data

Test mode : GSM
 Crest Factor : 8
 Scan Type : Complete
 Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.070 W/kg
 Power Drift-Finish : 0.069 W/kg
 Power Drift (%) : -1.429

Tissue Data

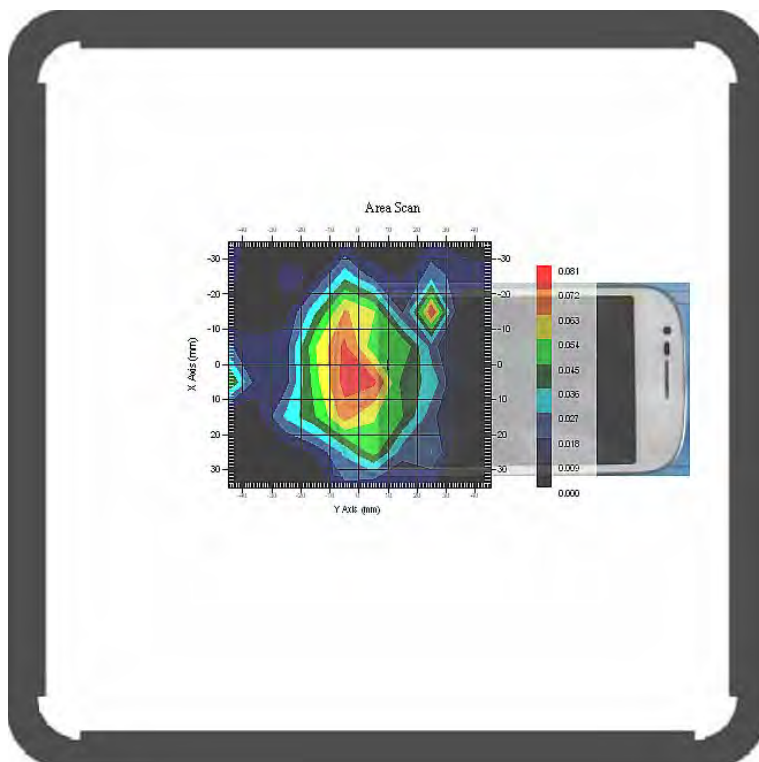
Type : Body
 Frequency : 1909.8 MHz
 Epsilon : 53.84 F/m
 Sigma : 1.55 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 1900
 Duty Cycle Factor : 8
 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 : 0.071 W/kg
 10 gram SAR value : 0.035 W/kg
 Area Scan Peak SAR : 0.076 W/kg
 Zoom Scan Peak SAR : 0.140 W/kg

Plot 11#



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

Body- worn Back- Headset (1909.8 MHz High Channel)

Measurement Data

Test mode : GSM
 Crest Factor : 8
 Scan Type : Complete
 Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.328 W/kg
 Power Drift-Finish : 0.325 W/kg
 Power Drift (%) : -0.921

Tissue Data

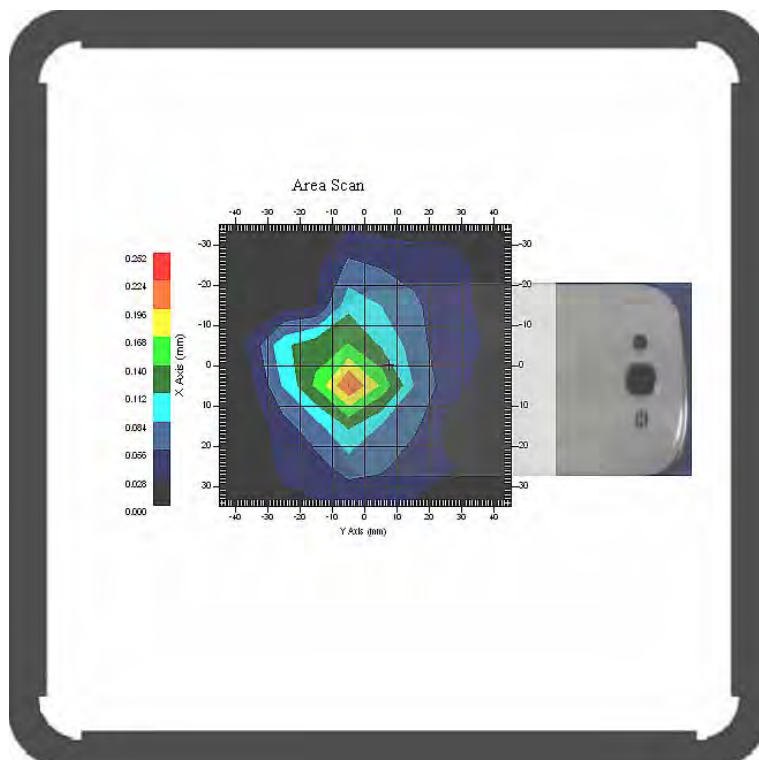
Type : Body
 Frequency : 1909.8 MHz
 Epsilon : 53.84 F/m
 Sigma : 1.55 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 1900
 Duty Cycle Factor : 8
 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 : 0.219 W/kg
 10 gram SAR value : 0.127 W/kg
 Area Scan Peak SAR : 0.275 W/kg
 Zoom Scan Peak SAR : 0.528 W/kg

Plot 12#



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

802.11b; Left Head Cheek (2437 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 : 0.001 W/kg
 Power Drift-Finish : 0.001 W/kg
 Power Drift (%) : 0.311

Tissue Data

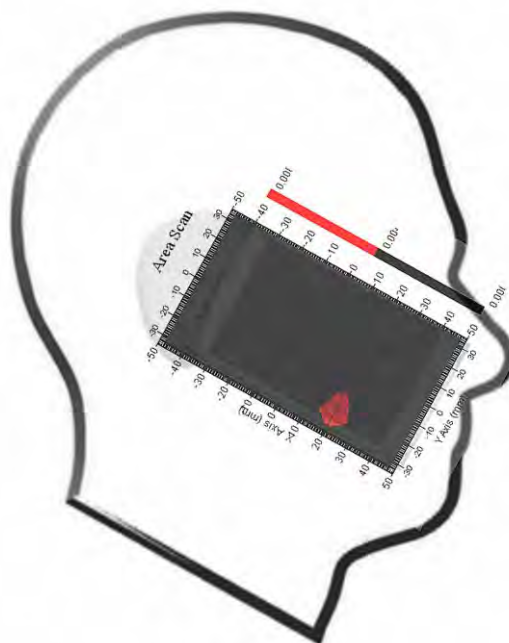
Type : Head
 Frequency : 2437.00 MHz
 Epsilon : 40.16 F/m
 Sigma : 1.81 S/m
 Density : 1000.00 kg/cu. m

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 : 0.007 W/kg
 10 gram SAR value : 0.003 W/kg
 Area Scan Peak SAR : 0.010 W/kg
 Zoom Scan Peak SAR : 0.016 W/kg

Plot 13#



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

802.11b; Left Head Cheek Tilt (2437 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 : 0.001 W/kg
 Power Drift-Finish : 0.001 W/kg
 Power Drift (%) : 0.634

Tissue Data

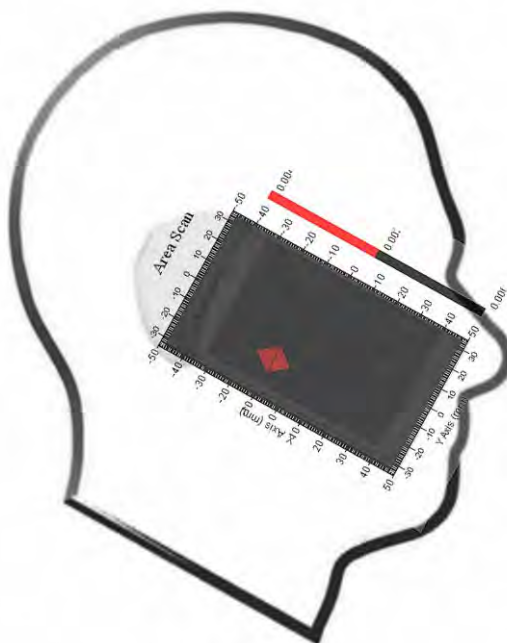
Type : Head
 Frequency : 2437 MHz
 Epsilon : 40.16 F/m
 Sigma : 1.81 S/m
 Density : 1000.00 kg/cu. m

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 : 0.004 W/kg
 10 gram SAR value : 0.002 W/kg
 Area Scan Peak SAR : 0.005 W/kg
 Zoom Scan Peak SAR : 0.007 W/kg

Plot 14#



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

802.11b; Right Head Cheek (2437 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 : 0.001 W/kg
 Power Drift-Finish : 0.001 W/kg
 Power Drift (%) : -0.502

Tissue Data

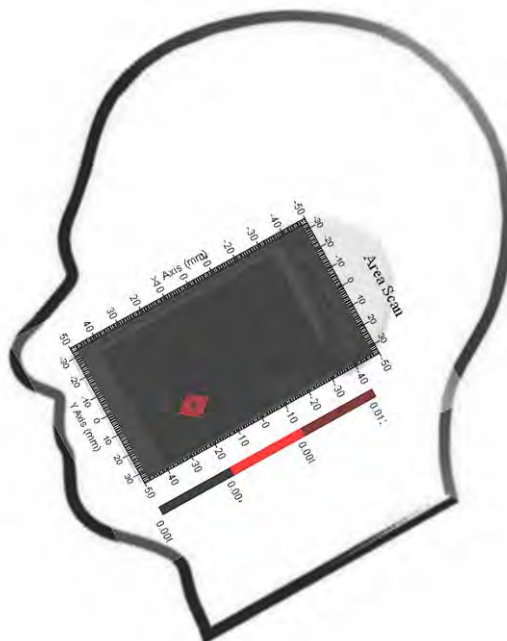
Type : Head
 Frequency : 2437 MHz
 Epsilon : 40.16 F/m
 Sigma : 1.81 S/m
 Density : 1000.00 kg/cu. m

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 : 0.009 W/kg
 10 gram SAR value : 0.004 W/kg
 Area Scan Peak SAR : 0.011 W/kg
 Zoom Scan Peak SAR : 0.020 W/kg

Plot 15#



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

802.11b; Right Head Cheek Tilt (2437 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 : 0.001 W/kg
 Power Drift-Finish : 0.001 W/kg
 Power Drift (%) : 0.964

Tissue Data

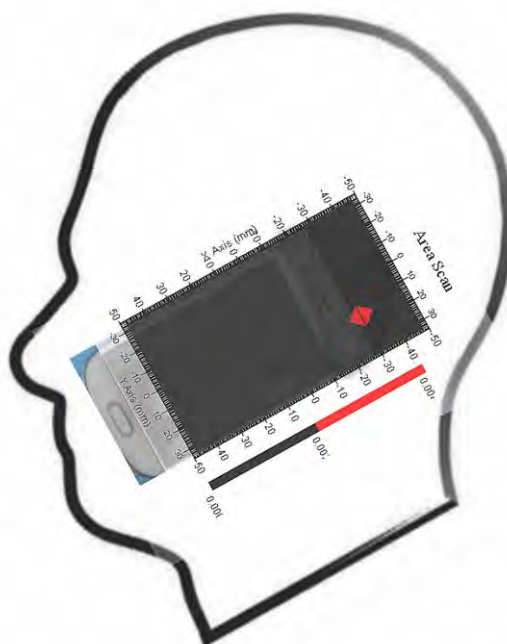
Type : Head
 Frequency : 2437 MHz
 Epsilon : 40.16 F/m
 Sigma : 1.81 S/m
 Density : 1000.00 kg/cu. m

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 : 0.003 W/kg
 10 gram SAR value : 0.002 W/kg
 Area Scan Peak SAR : 0.005 W/kg
 Zoom Scan Peak SAR : 0.006 W/kg

Plot 16#



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

Hot Spot: Body-Front (824.2 MHz Low Channel)

Measurement Data

Test mode : GPRS
 Crest Factor : 4
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.102 W/kg
 Power Drift-Finish : 0.103 W/kg
 Power Drift (%) : 0.997

Tissue Data

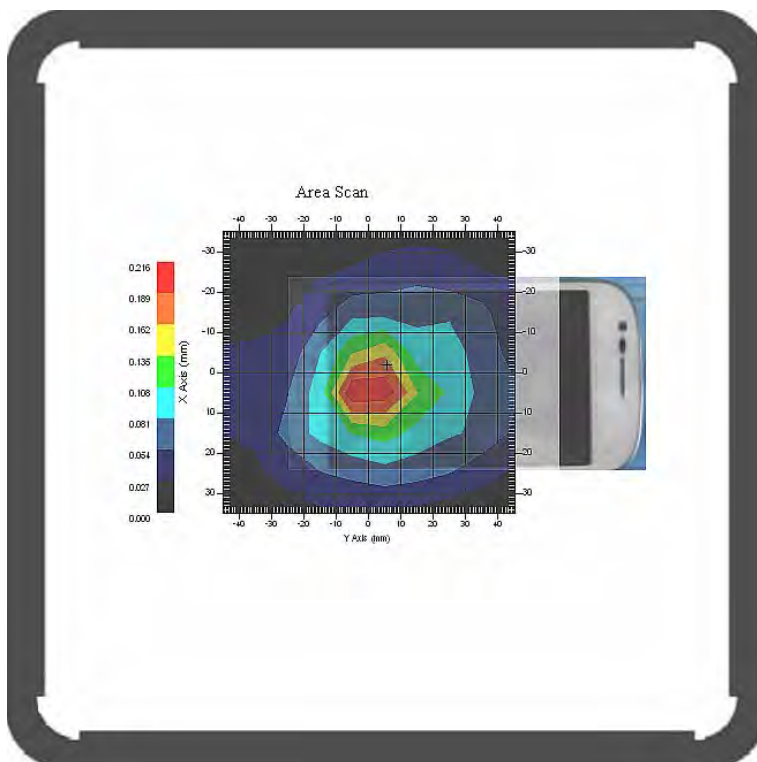
Type : Body
 Frequency : 824.2 MHz
 Epsilon : 55.14 F/m
 Sigma : 0.95 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 850
 Duty Cycle Factor : 4
 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 : 0.209 W/kg
 10 gram SAR value : 0.157 W/kg
 Area Scan Peak SAR : 0.238 W/kg
 Zoom Scan Peak SAR : 0.440 W/kg

Plot 17#



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

Hot Spot: Body-Back (824.2 MHz Low Channel)

Measurement Data

Test mode : GPRS
 Crest Factor : 4
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.101 W/kg
 Power Drift-Finish : 0.103 W/kg
 Power Drift (%) : 1.983

Tissue Data

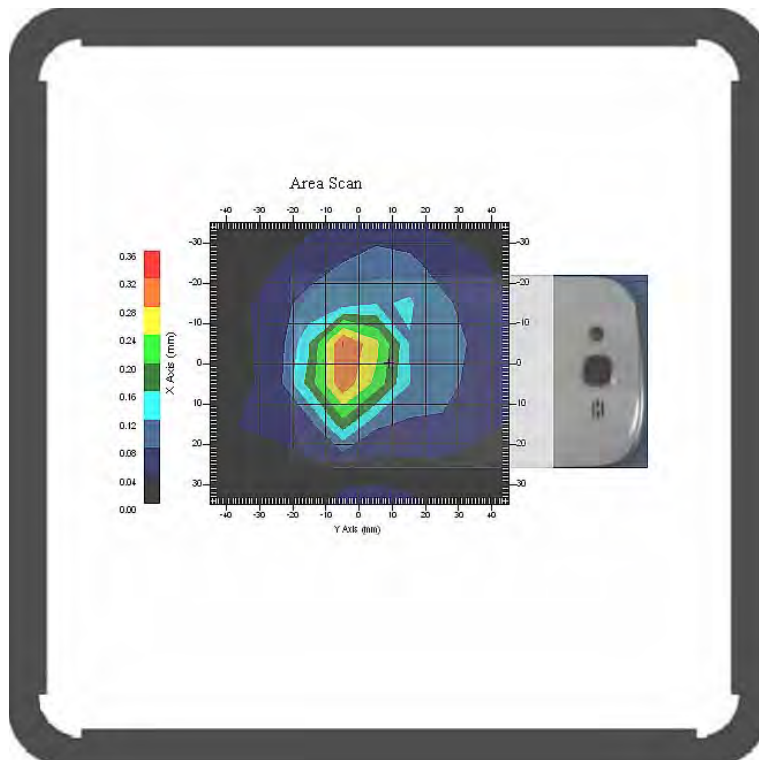
Type : Body
 Frequency : 824.2 MHz
 Epsilon : 55.14 F/m
 Sigma : 0.95 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 850
 Duty Cycle Factor : 4
 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 : 0.332 W/kg
 10 gram SAR value : 0.177 W/kg
 Area Scan Peak SAR : 0.352 W/kg
 Zoom Scan Peak SAR : 0.510 W/kg

Plot 18#



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

Hot Spot: Body-Left (824.2 MHz Low Channel)

Measurement Data

Test mode : GPRS
Crest Factor : 4
Scan Type : Complete
Area Scan : 7x11x1 : 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 (%) : 0.747

Tissue Data

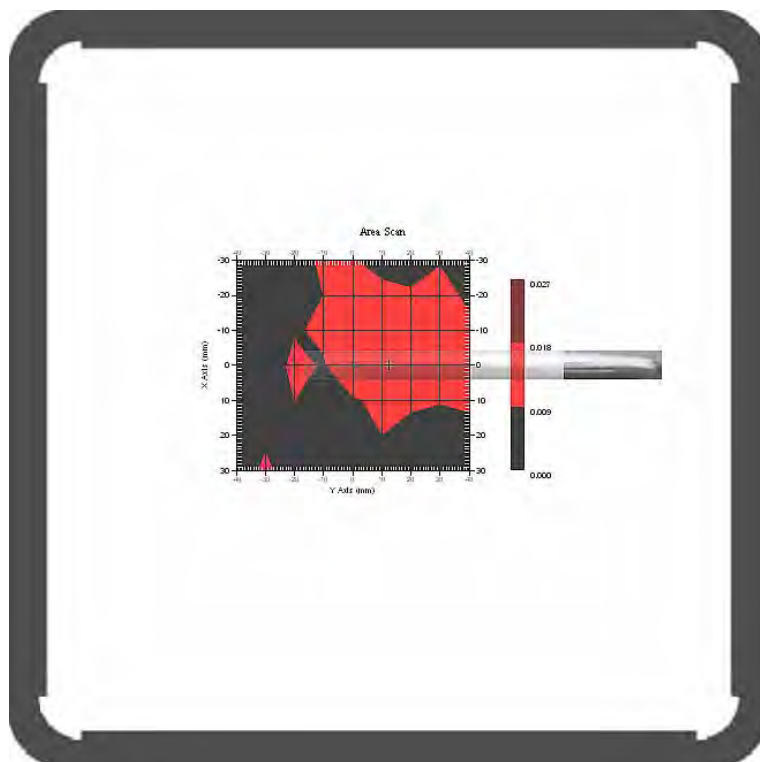
Type : Body
Frequency : 824.2 MHz
Epsilon : 55.14 F/m
Sigma : 0.95 S/m
Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
Frequency Band : 850
Duty Cycle Factor : 4
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 : 0.017 W/kg
10 gram SAR value : 0.009 W/kg
Area Scan Peak SAR : 0.026 W/kg
Zoom Scan Peak SAR : 0.050 W/kg

Plot 19#



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

Hot Spot: Body-Right (824.2 MHz Low Channel)

Measurement Data

Test mode : GPRS
 Crest Factor : 4
 Scan Type : Complete
 Area Scan : 7x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.010 W/kg
 Power Drift-Finish : 0.010 W/kg
 Power Drift (%) : 0.667

Tissue Data

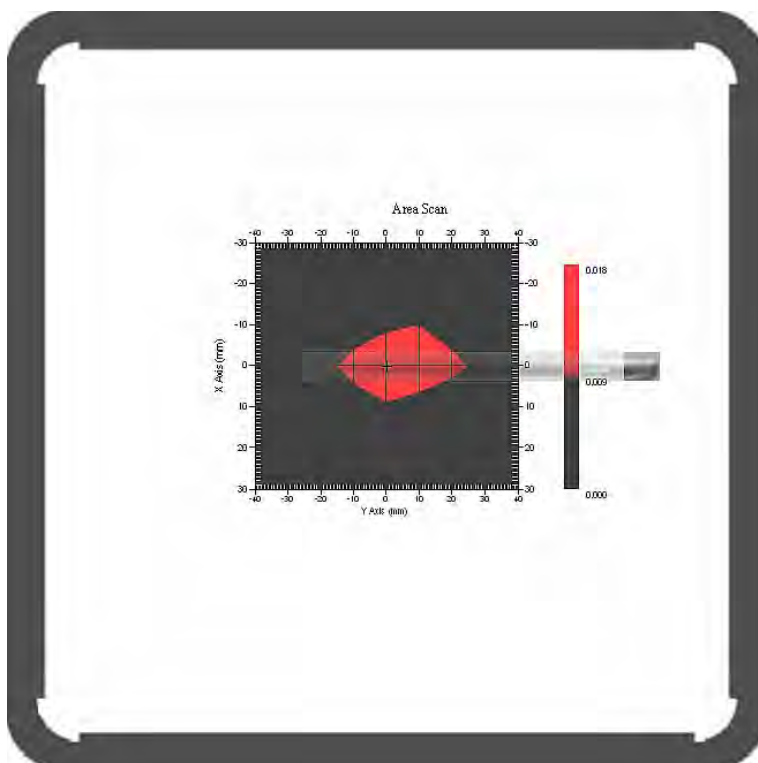
Type : Body
 Frequency : 824.2 MHz
 Epsilon : 55.14 F/m
 Sigma : 0.95 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 850
 Duty Cycle Factor : 4
 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 : 0.016 W/kg
 10 gram SAR value : 0.008 W/kg
 Area Scan Peak SAR : 0.017 W/kg
 Zoom Scan Peak SAR : 0.030 W/kg

Plot 20#



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

Hot Spot: Body-Bottom (824.2 MHz Low Channel)

Measurement Data

Test mode : GPRS
 Crest Factor : 4
 Scan Type : Complete
 Area Scan : 7x9x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.002 W/kg
 Power Drift-Finish : 0.002 W/kg
 Power Drift (%) : 0.503

Tissue Data

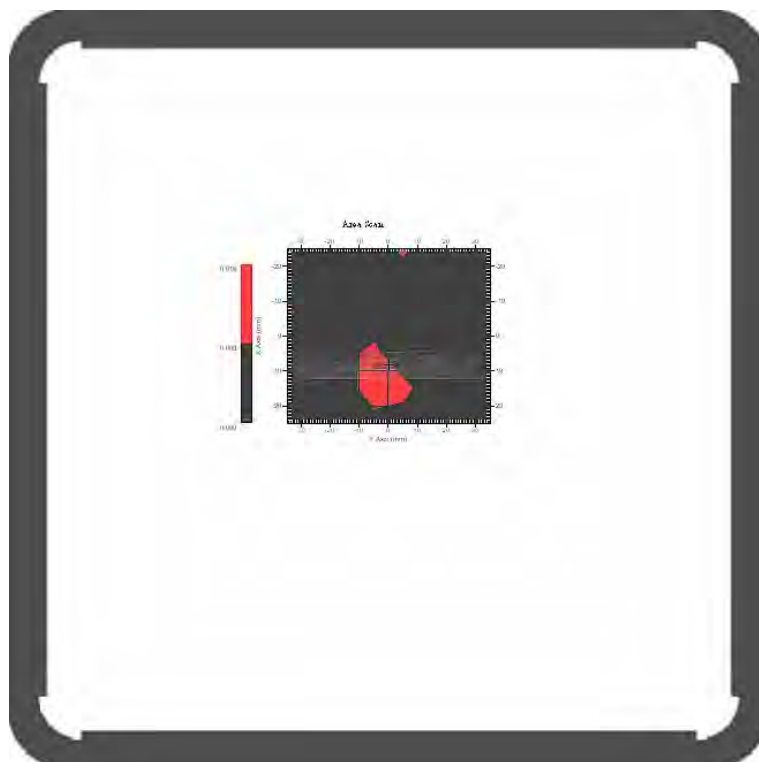
Type : Body
 Frequency : 824.2 MHz
 Epsilon : 55.14 F/m
 Sigma : 0.95 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 850
 Duty Cycle Factor : 4
 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 : 0.006 W/kg
 10 gram SAR value : 0.004 W/kg
 Area Scan Peak SAR : 0.006 W/kg
 Zoom Scan Peak SAR : 0.010 W/kg

Plot 21#



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

Hot Spot: Body-Front (1909.8 MHz High Channel)

Measurement Data

Test mode : GPRS
 Crest Factor : 2
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.100 W/kg
 Power Drift-Finish : 0.101 W/kg
 Power Drift (%) : 1.000

Tissue Data

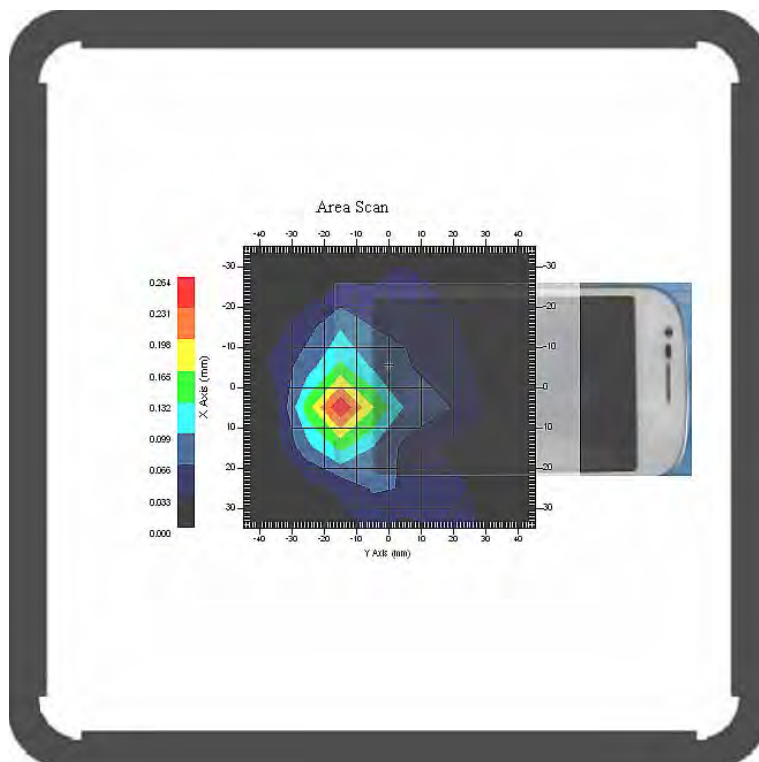
Type : Body
 Frequency : 1909.80 MHz
 Epsilon : 53.84 F/m
 Sigma : 1.55 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 1900
 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 : 0.248 W/kg
 10 gram SAR value : 0.137 W/kg
 Area Scan Peak SAR : 0.262 W/kg
 Zoom Scan Peak SAR : 0.310 W/kg

Plot 22#



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

Hot Spot: Body-Back (1909.8 MHz High Channel)

Measurement Data

Test mode : GPRS
 Crest Factor : 2
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.528 W/kg
 Power Drift-Finish : 0.532 W/kg
 Power Drift (%) : 0.792

Tissue Data

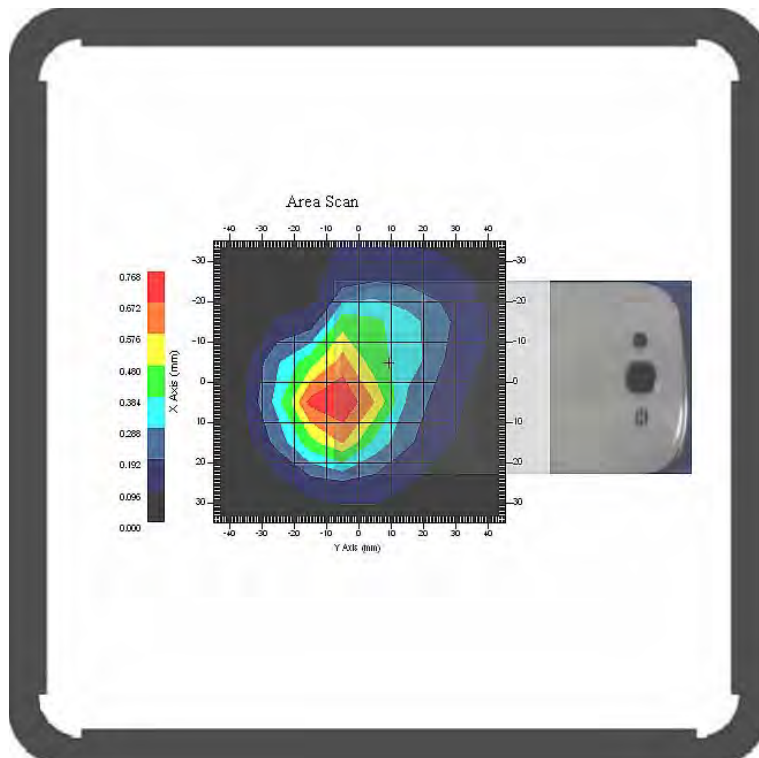
Type : Body
 Frequency : 1909.80 MHz
 Epsilon : 53.84 F/m
 Sigma : 1.55 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 1900
 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 : 0.726 W/kg
 10 gram SAR value : 0.397 W/kg
 Area Scan Peak SAR : 0.754 W/kg
 Zoom Scan Peak SAR : 1.100 W/kg

Plot 23#



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

Hot Spot: Body-Left (1909.8 MHz High Channel)

Measurement Data

Test mode : GPRS
 Crest Factor : 2
 Scan Type : Complete
 Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.022 W/kg
 Power Drift-Finish : 0.022 W/kg
 Power Drift (%) : 0.994

Tissue Data

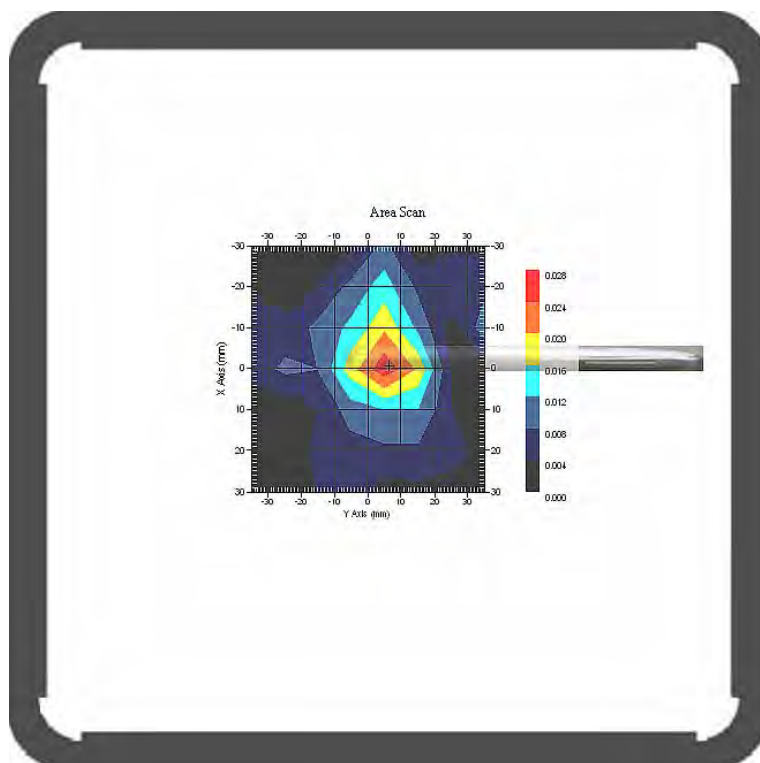
Type : Body
 Frequency : 1909.80 MHz
 Epsilon : 53.84 F/m
 Sigma : 1.55 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 1900
 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 : 0.025 W/kg
 10 gram SAR value : 0.014 W/kg
 Area Scan Peak SAR : 0.027 W/kg
 Zoom Scan Peak SAR : 0.070 W/kg

Plot 24#



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

Hot Spot: Body-Right (1909.8 MHz High Channel)

Measurement Data

Test mode : GPRS
 Crest Factor : 2
 Scan Type : Complete
 Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.020 W/kg
 Power Drift-Finish : 0.020 W/kg
 Power Drift (%) : 0.596

Tissue Data

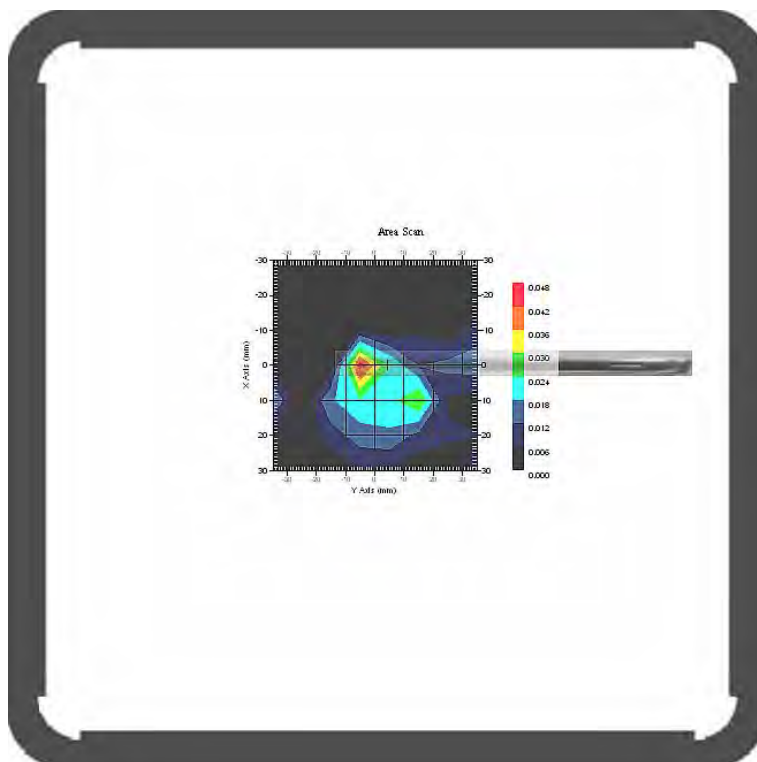
Type : Body
 Frequency : 1909.80 MHz
 Epsilon : 53.84 F/m
 Sigma : 1.55 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 1900
 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 : 0.028 W/kg
 10 gram SAR value : 0.016 W/kg
 Area Scan Peak SAR : 0.045 W/kg
 Zoom Scan Peak SAR : 0.030 W/kg

Plot 25#



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

Hot Spot: Body-Bottom (1909.8 MHz High Channel)

Measurement Data

Test mode : GPRS
 Crest Factor : 2
 Scan Type : Complete
 Area Scan : 8x11x1 : 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 (%) : -0.746

Tissue Data

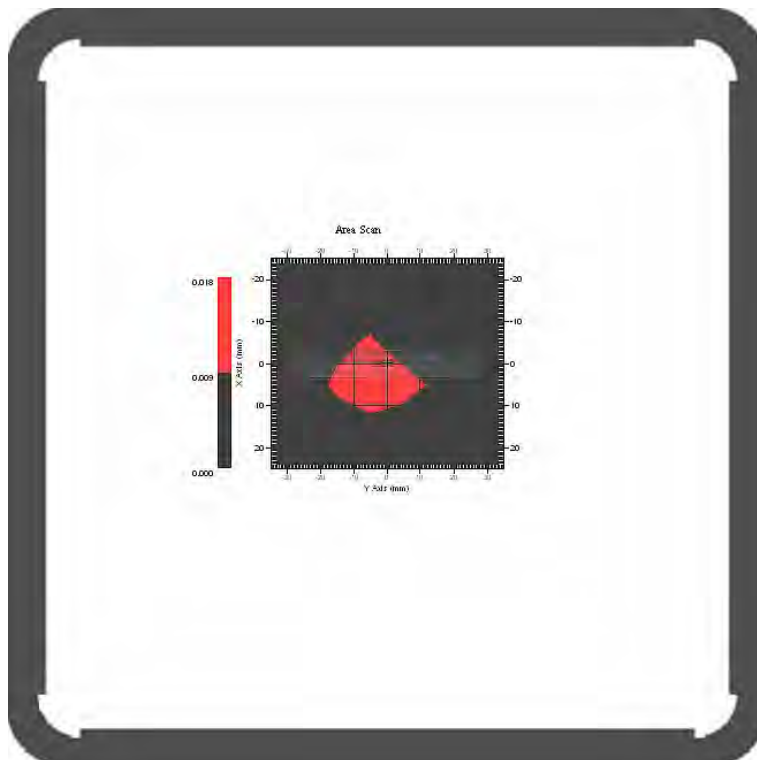
Type : Body
 Frequency : 1909.80 MHz
 Epsilon : 53.84 F/m
 Sigma : 1.55 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 1900
 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 : 0.016 W/kg
 10 gram SAR value : 0.008 W/kg
 Area Scan Peak SAR : 0.018 W/kg
 Zoom Scan Peak SAR : 0.030 W/kg

Plot 26#



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

Hot Spot: 802.11b; Body-Front (2437 MHz Channel 6)

Measurement Data

Crest Factor : 1
 Scan Type : Complete
 Area Scan : 7x9x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.001 W/kg
 Power Drift-Finish : 0.001 W/kg
 Power Drift (%) : 0.782

Tissue Data

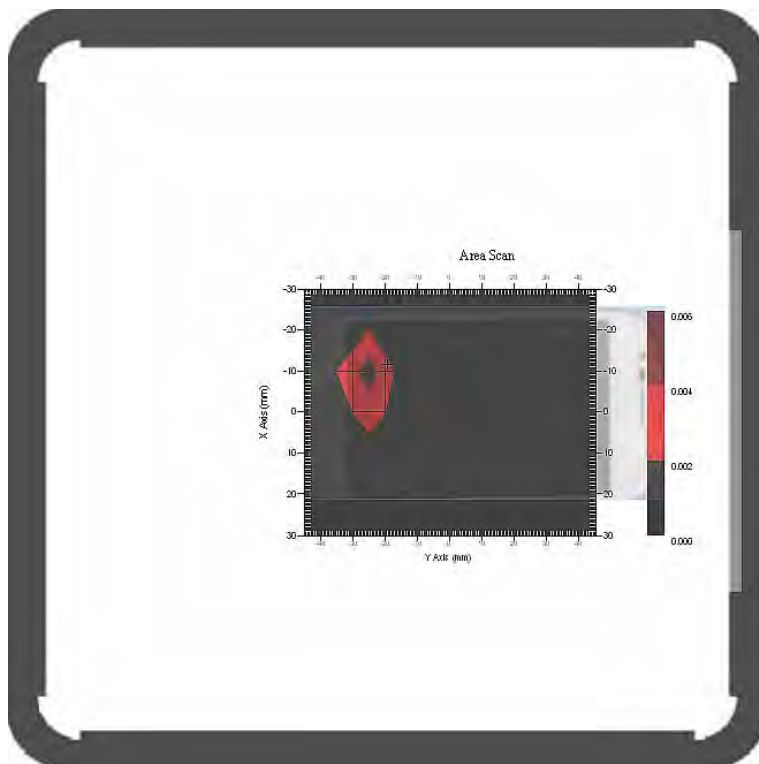
Type : Body
 Frequency : 2437 MHz
 Epsilon : 51.64 F/m
 Sigma : 1.98 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 2450
 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 : 0.005 W/kg
 10 gram SAR value : 0.002 W/kg
 Area Scan Peak SAR : 0.007 W/kg
 Zoom Scan Peak SAR : 0.010 W/kg

Plot 27#



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

Hot Spot: 802.11b; Body-Back (2437 MHz Channel 6)

Measurement Data

Crest Factor : 1
 Scan Type : Complete
 Area Scan : 7x9x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.001 W/kg
 Power Drift-Finish : 0.001 W/kg
 Power Drift (%) : -0.777

Tissue Data

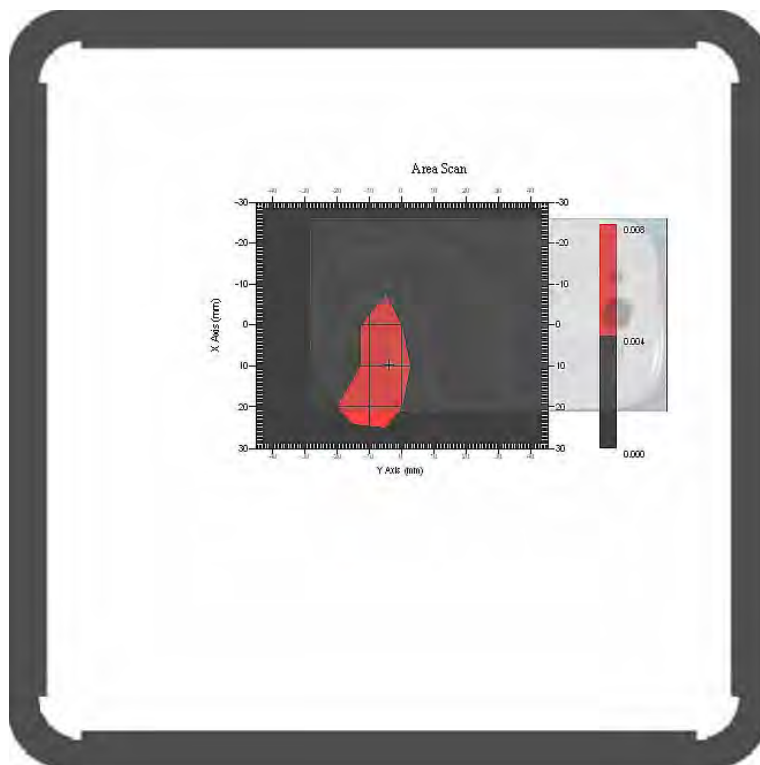
Type : Body
 Frequency : 2437 MHz
 Epsilon : 51.64 F/m
 Sigma : 1.98 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 2450
 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 : 0.006 W/kg
 10 gram SAR value : 0.003 W/kg
 Area Scan Peak SAR : 0.007 W/kg
 Zoom Scan Peak SAR : 0.012 W/kg

Plot 28#



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

Hot Spot: 802.11b; Body-Left (2437 MHz Channel 6)

Measurement Data

Crest Factor : 1
 Scan Type : Complete
 Area Scan : 7x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.001 W/kg
 Power Drift-Finish : 0.001 W/kg
 Power Drift (%) : 0.519

Tissue Data

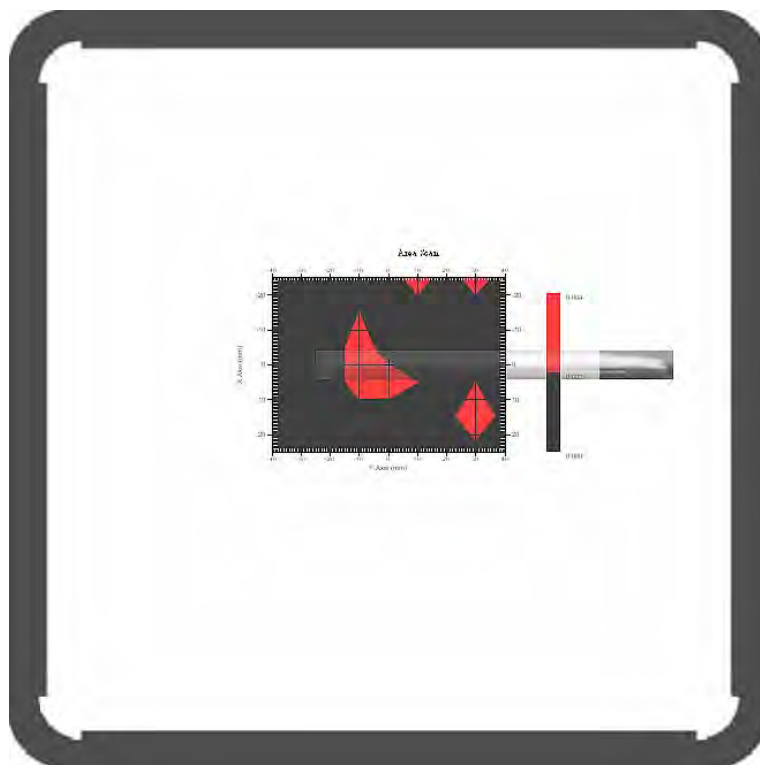
Type : Body
 Frequency : 2437 MHz
 Epsilon : 51.64 F/m
 Sigma : 1.98 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 2450
 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 : 0.004 W/kg
 10 gram SAR value : 0.002 W/kg
 Area Scan Peak SAR : 0.004 W/kg
 Zoom Scan Peak SAR : 0.007 W/kg

Plot 29#



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

Hot Spot: 802.11b; Body-Bottom (2437 MHz Channel 6)

Measurement Data

Crest Factor : 1
 Scan Type : Complete
 Area Scan : 7x9x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.001 W/kg
 Power Drift-Finish : 0.001 W/kg
 Power Drift (%) : -0.742

Tissue Data

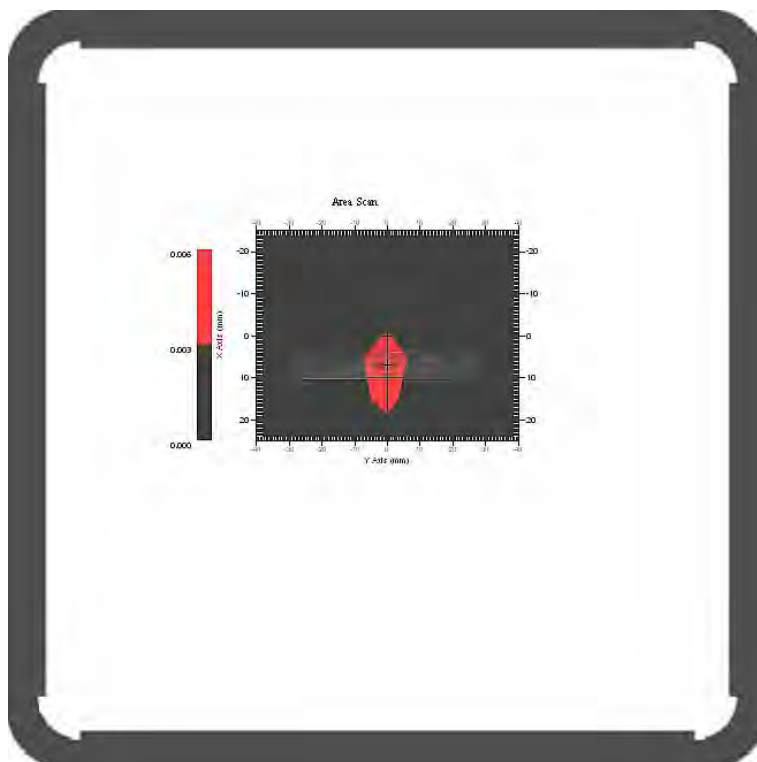
Type : Body
 Frequency : 2437 MHz
 Epsilon : 51.64 F/m
 Sigma : 1.98 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 2450
 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 : 0.004 W/kg
 10 gram SAR value : 0.002 W/kg
 Area Scan Peak SAR : 0.006 W/kg
 Zoom Scan Peak SAR : 0.012 W/kg

Plot 30#



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_i^1 (1-g)	c_i^1 (10-g)	Standard Uncertainty (1-g) %	Standard Uncertainty (10-g) %
Measurement System							
Probe Calibration	3.5	normal	1	1	1	3.5	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1-cp)^{1/2}$	$(\frac{1-cp}{2})^{1/2}$	1.5	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	\sqrt{cp}	\sqrt{cp}	4.4	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Readout Electronics	1.0	normal	1	1	1	1.0	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0	1.0
RF Ambient Condition -Noise	0.006	rectangular	$\sqrt{3}$	1	1	0.003	0.003
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
Restriction							
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	1	2.1	2.1
Test Sample Positioning	0.023	normal	1	1	1	0.023	0.023
Device Holder Uncertainty	6.215	normal	1	1	1	6.215	6.215
Drift of Output Power	4.627	rectangular	$\sqrt{3}$	1	1	2.67	2.67
Phantom and Setup							
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	1	2.0	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	0.5	2.0	1.4
Liquid Conductivity(meas.)	1.938	normal	1	0.7	0.5	1.36	0.97
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7	1.4
Liquid Permittivity(meas.)	3.093	normal	1	0.6	0.5	1.86	1.55
Combined Uncertainty		RSS				10.78	10.55
Expanded uncertainty (coverage factor=2)		Normal(k=2)				21.56	21.10

APPENDIX B PROBE CALIBRATION CERTIFICATES

NCL CALIBRATION LABORATORIES

Calibration File No.: 1427-1430

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-5673

Calibrated: 8th August 2012
Released on: 9th August 2012

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

Released By: _____



Art Brennan, Quality Manager

NCL CALIBRATION LABORATORIES

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

Division of APREL Lab.
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 meteorological 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

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 recalibration with the exception frequency of 450 MHz which was a new calibration

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, 2012
Power Sensor Anritsu MA2481D	103555	Nov 4, 2012
Attenuator HP 8495A (70dB)	1944A10711	Sept. 14, 2012
Network Analyzer Anritsu MT8801C	MB11855	Feb. 8, 2013


Secondary Measurement Standards

Signal Generator Agilent E4438C -506 MY55182336 June 7, 2013

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 subject has been accurately conducted and that all information contained within the results pages have been reviewed for accuracy.



Art Brennan, Quality Manager



Dan Brooks, Test Engineer

Page 3 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.

Probe Summary

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

*Resistive to recommended tissue recipes per IEEE-1528

Sensitivity in Air

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

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	43.98	0.9	3.5	3.4	6
450 B	Body	57.07	0.92	3.5	3.4	6
750 H	Head	X	X	X	X	X
750 B	Body	X	X	X	X	X
835 H	Head	42.35	0.938	3.5	3.4	6.6
835 B	Body	56.65	1.018	3.5	3.4	6.6
900 H	Head	41.35	0.98	3.5	3.4	6
900 B	Body	56.08	1.05	3.5	3.4	6
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
1750 H	Head	X	X	X	X	X
1750 B	Body	X	X	X	X	X
1800 H	Head	X	X	X	X	X
1800 B	Body	X	X	X	X	X
1900 H	Head	38.72	1.35	3.5	2.7	5.2
1900 B	Body	51.62	1.48	3.5	2.7	5
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
2450 H	Head	38.06	1.87	3.5	3.5	4.9
2450 B	Body	50.22	2.03	3.5	3.5	4.3
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

NCL Calibration Laboratories

Division of APREL Inc.

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 MΩ.

Boundary Effect:

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

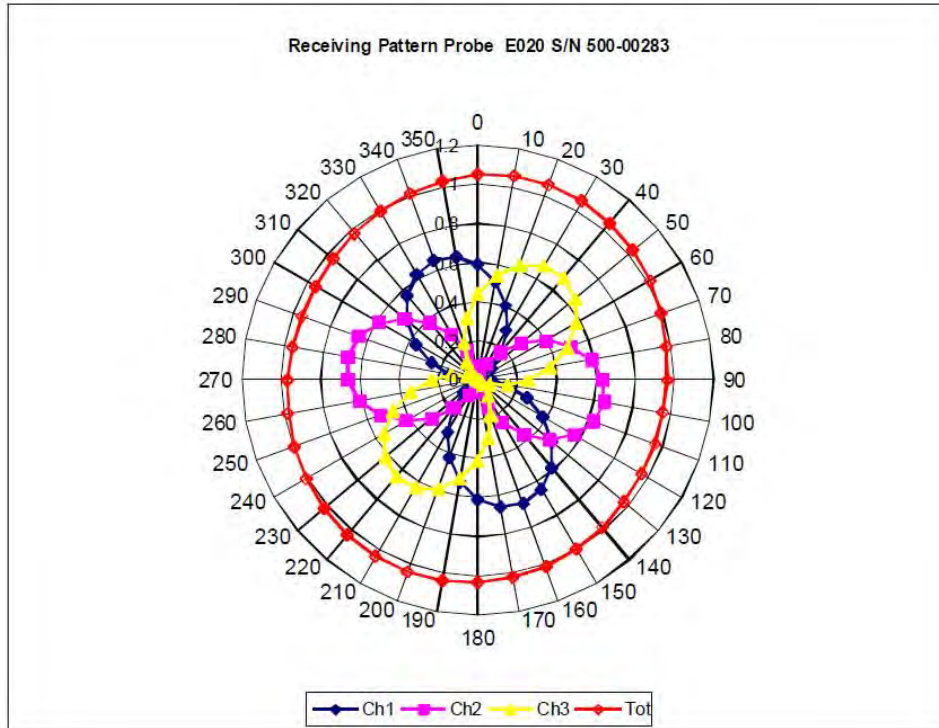
NOTES:

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

NCL Calibration Laboratories

Division of APREL Inc.

Receiving Pattern Air



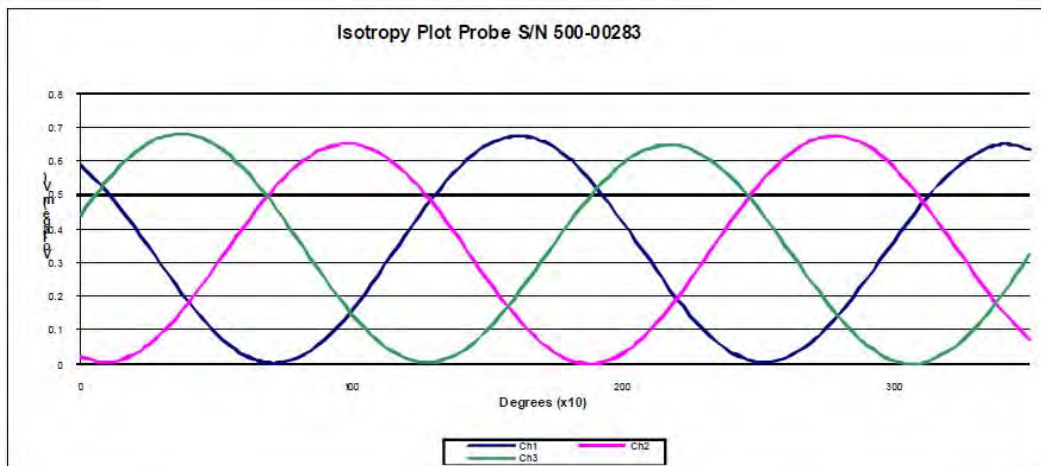
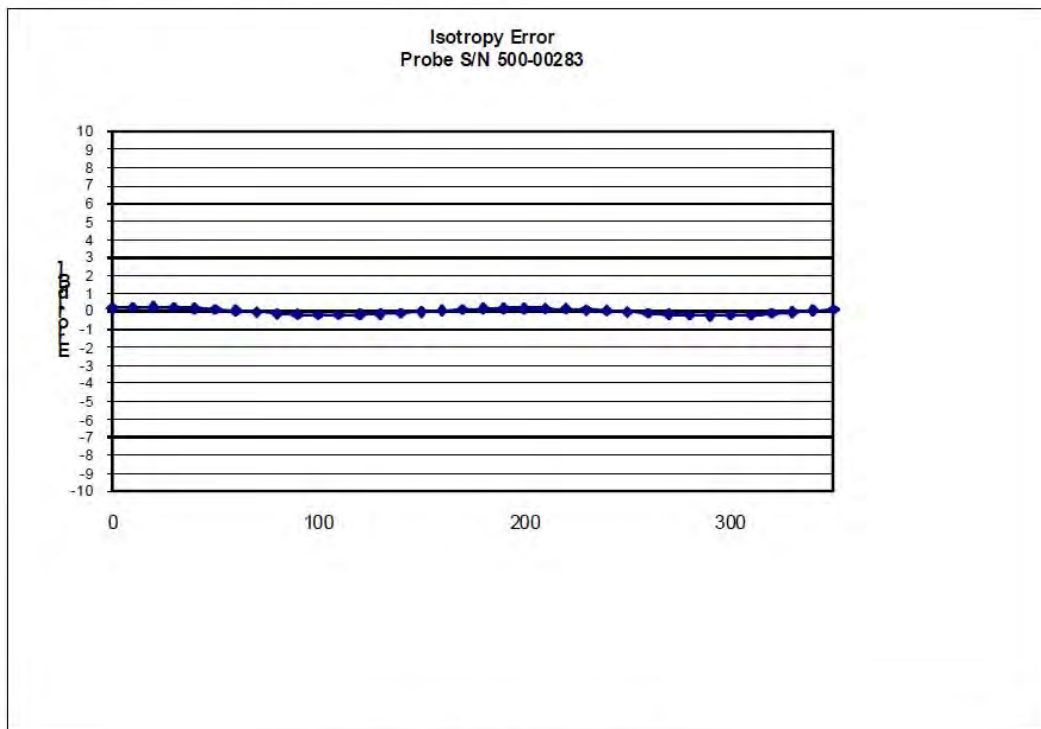
Page 7 of 10

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NCL Calibration Laboratories

Division of APREL Inc.

Isotropy Error Air



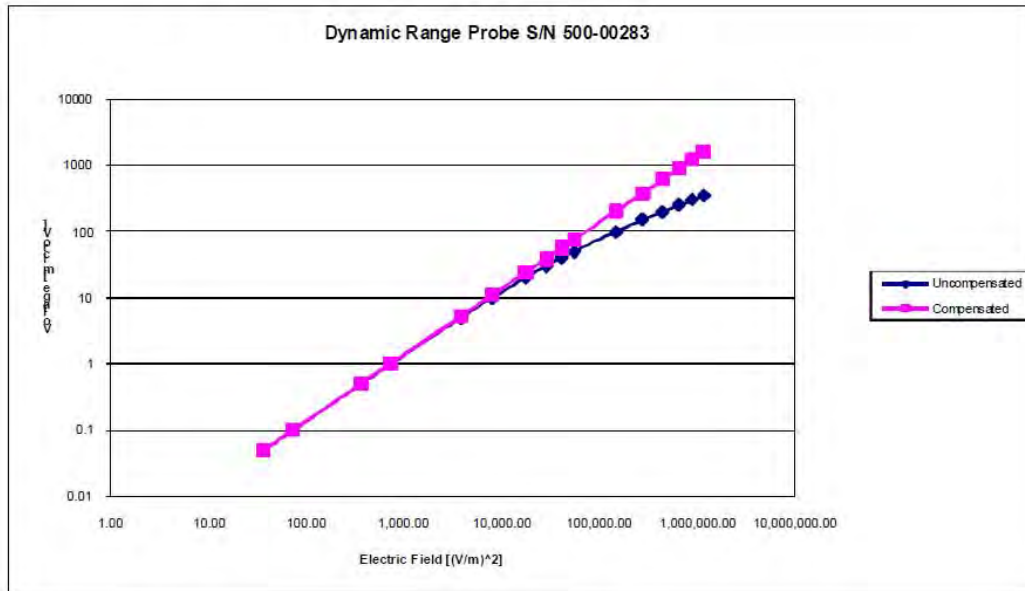
Isotropicity Tissue:

0.10 dB

NCL Calibration Laboratories

Division of APREL Inc.

Dynamic Range

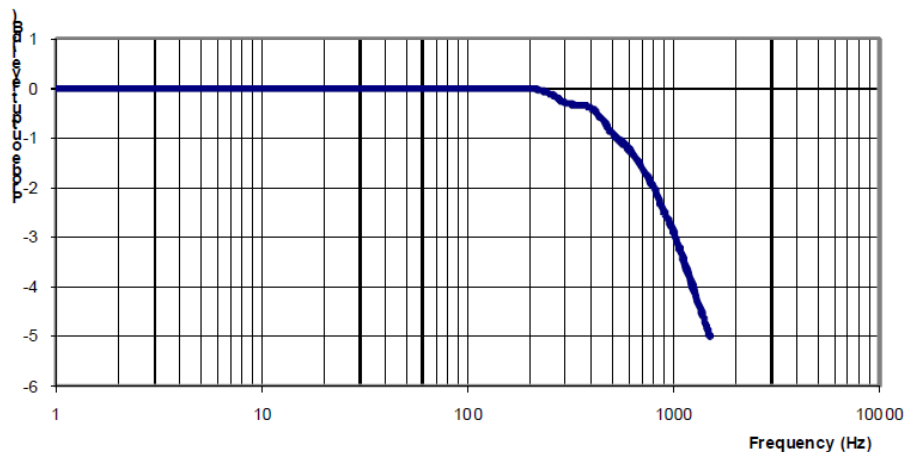


NCL Calibration Laboratories

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 2012.

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: 25th August 2011
Released on: 25th 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.

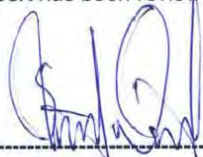
Conditions

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

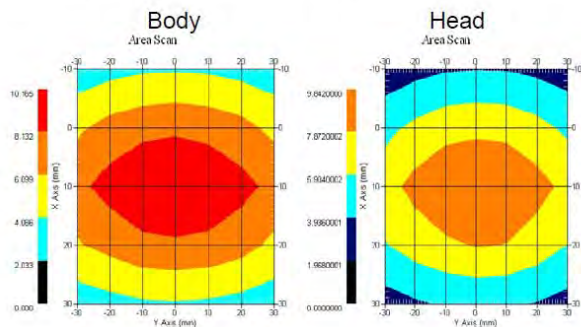
Length: 162.2 mm
Height: 89.4 mm

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.

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

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, ϵ_r	Conductivity, σ [S/m]
Head Tissue 835MHz	41.78	0.92
Body Tissue 835MHz	56.37	0.95

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

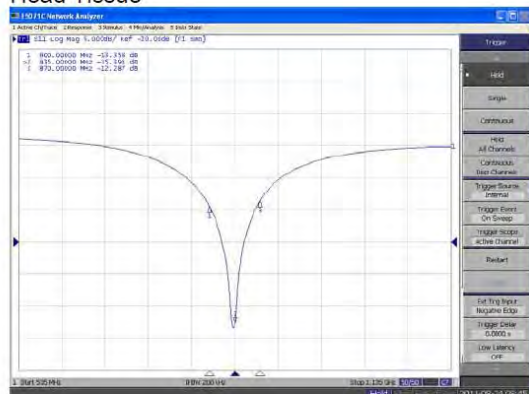
NCL Calibration Laboratories

Division of APREL Laboratories.

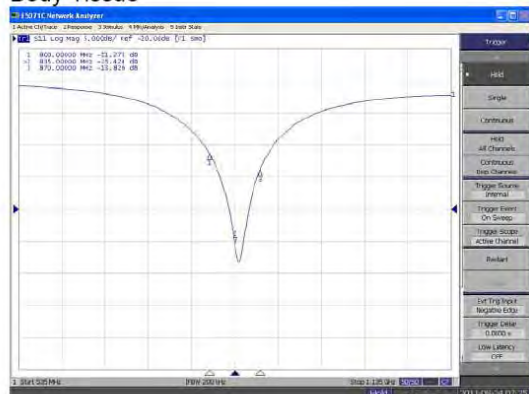
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head Tissue



Body Tissue

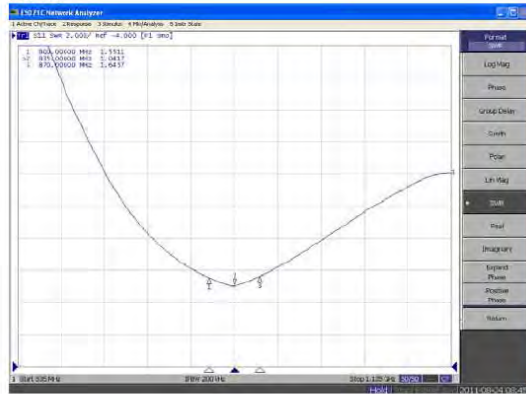


This page has been reviewed for content and attested to by signature within this document.

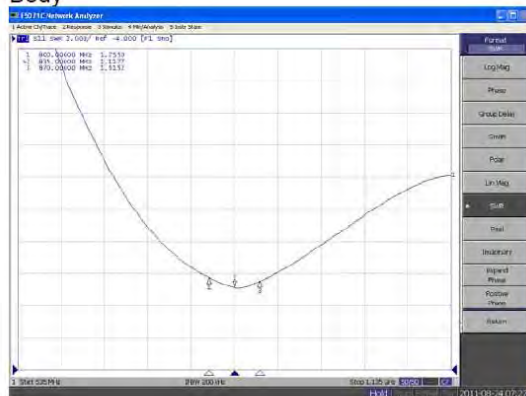
NCL Calibration Laboratories

Division of APREL Laboratories.

**SWR
Head**



Body

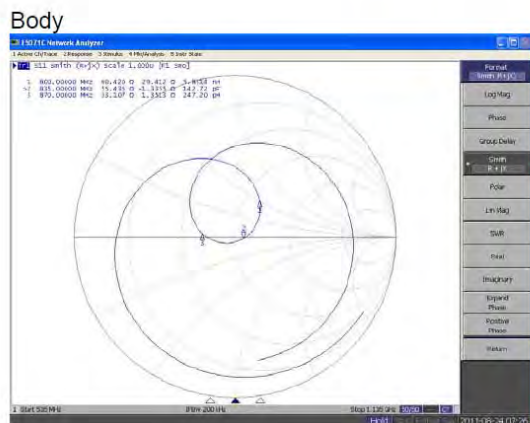
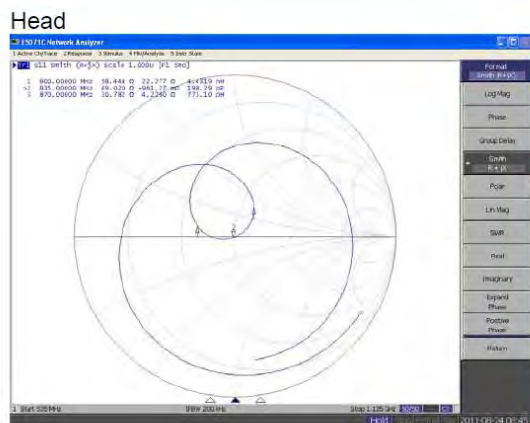


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NCL Calibration Laboratories

Division of APREL Laboratories.

Smith Chart Dipole Impedance



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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

850MHz Dipole Calibration by BACL at 2012-12-12

Mechanical Verification

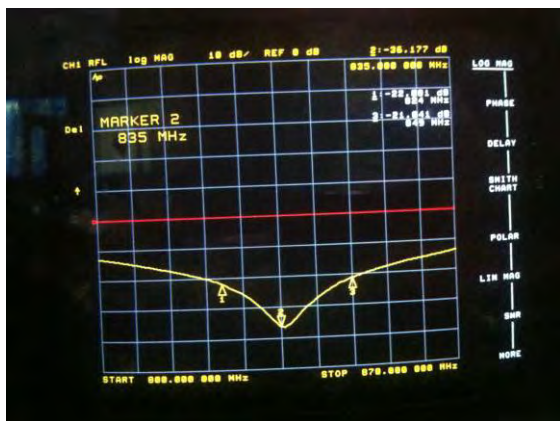
APREL Length	APREL Height	Measured Length	Measured Height
161.0 mm	89.8 mm	161.2 mm	89.5 mm

Tissue Type	Measured Return Loss	Measured Impedance
Head	-36.177 dB	50.207 Ω
Body	-24.964 dB	49.594 Ω

Test Graphs:

Head Tissue

Return Loss :

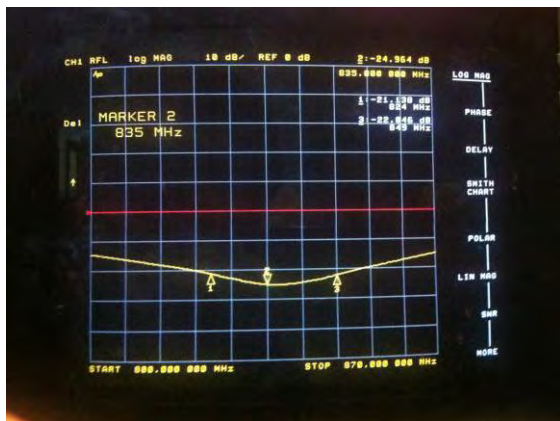


Impedance :



Body Tissue

Return Loss :



Impedance :



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: 25th August, 2011
Released on: 25th 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.

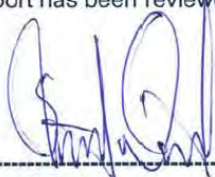
Conditions

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

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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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

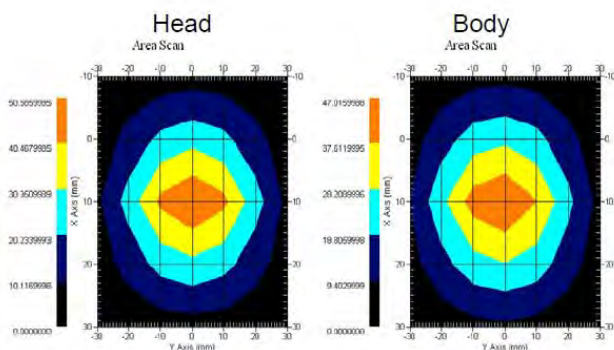
Length: 67.1 mm
Height: 38.9 mm

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.

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

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, ϵ_r	Conductivity, σ [S/m]
Head Tissue 1900MHz	38.4	1.43
Body Tissue 1900MHz	51.87	1.59

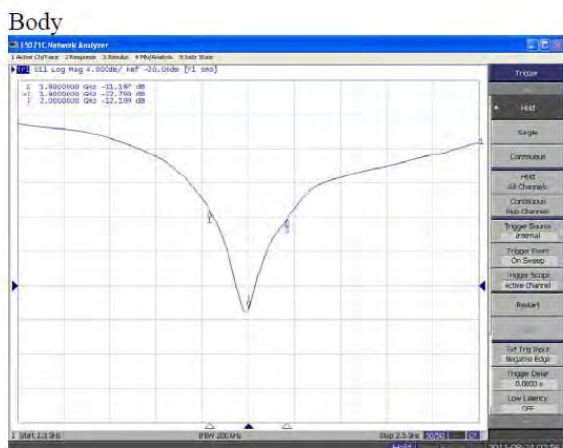
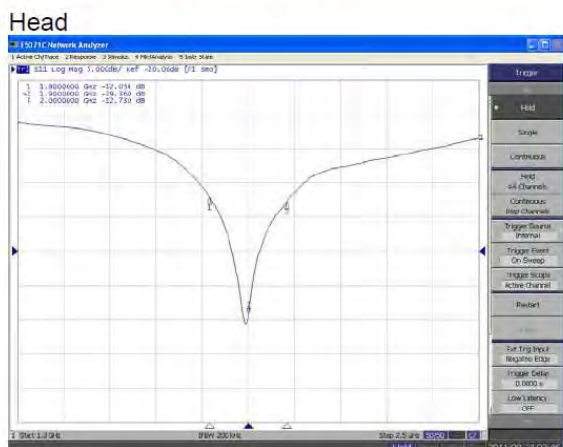
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NCL Calibration Laboratories

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

S11 Parameter Return Loss



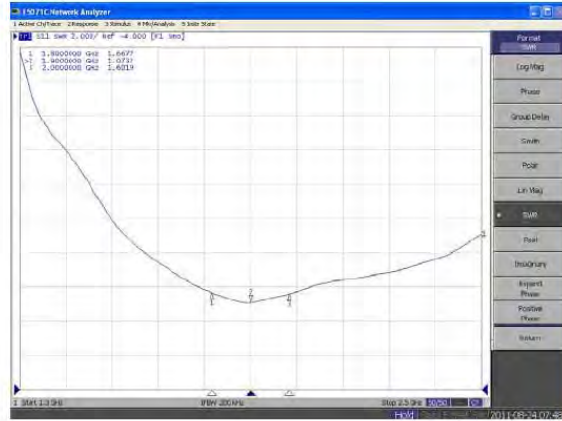
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NCL Calibration Laboratories

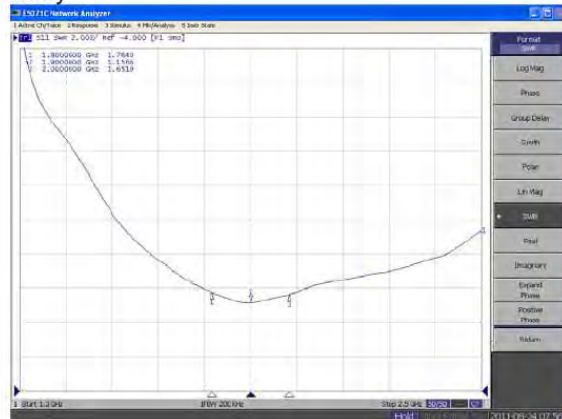
Division of APREL Laboratories.

SWR

Head



Body



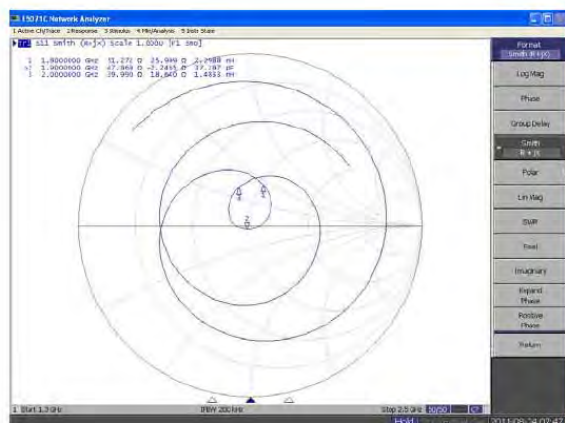
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NCL Calibration Laboratories

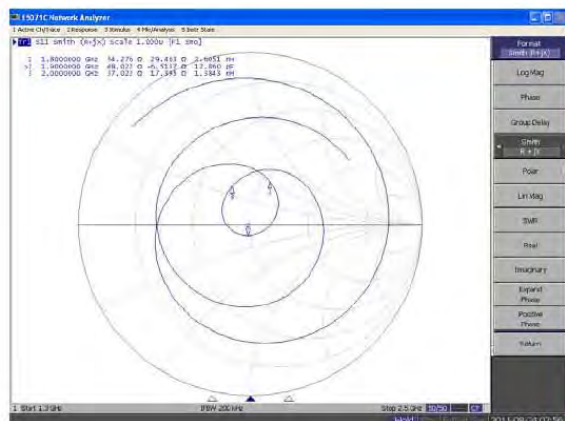
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Smith Chart Dipole Impedance

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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1900MHz Dipole Calibration By BACL at 2012-12-12

Mechanical Verification

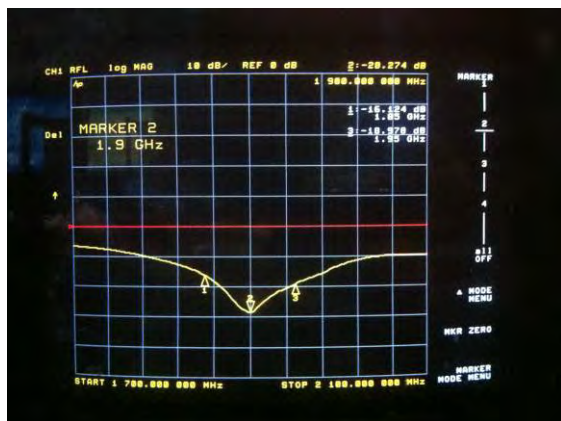
APREL Length	APREL Height	Measured Length	Measured Height
68.0 mm	39.5 mm	68.2 mm	39.2 mm

Tissue Type	Measured Return Loss	Measured Impedance
Head	-28.284 dB	49.471 Ω
Body	-22.445 dB	51.588 Ω

Test Graphs:

Head Tissue

Return Loss :

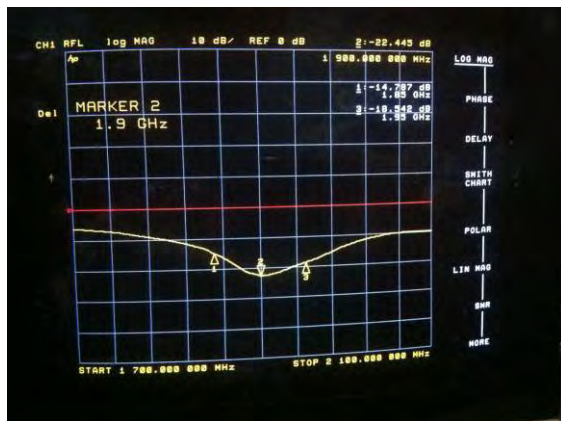


Impedance :



Body Tissue

Return Loss :



Impedance :



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: 25th August, 2011
Released on: 25th 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

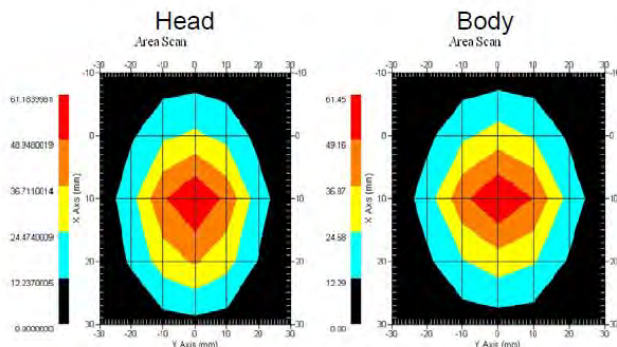
Length: 52.4 mm
Height: 30.3 mm

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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NCL Calibration Laboratories

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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.

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

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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, ϵ_r	Conductivity, σ [S/m]
Head Tissue 2450MHz	38.2	1.82
Body Tissue 2450MHz	51.74	1.96

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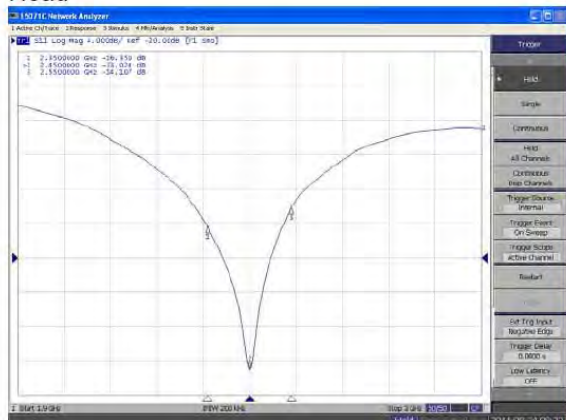
NCL Calibration Laboratories

Division of APREL Laboratories.

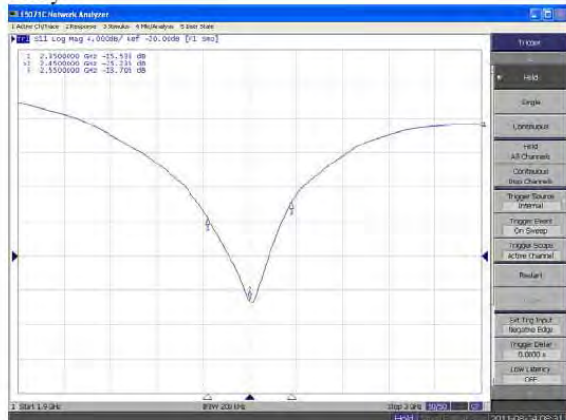
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head



Body



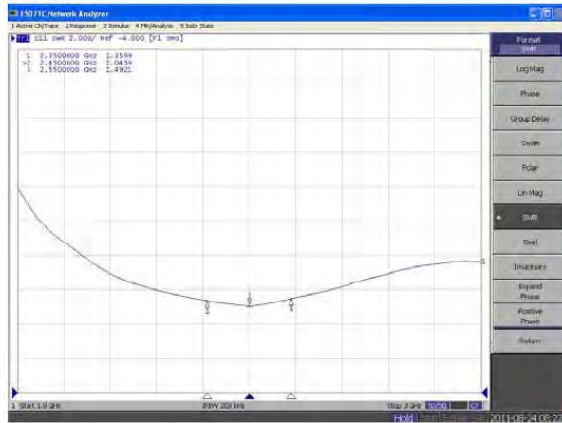
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NCL Calibration Laboratories

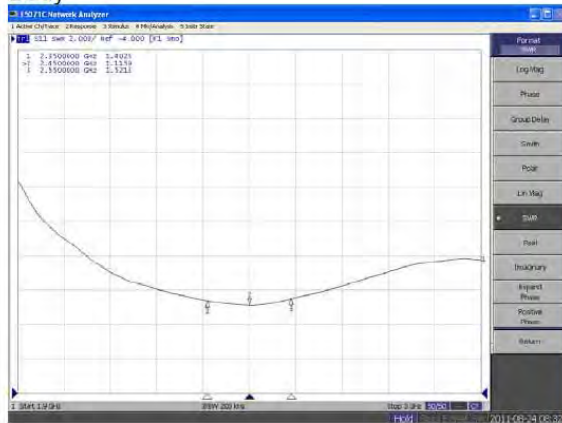
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SWR

Head



Body



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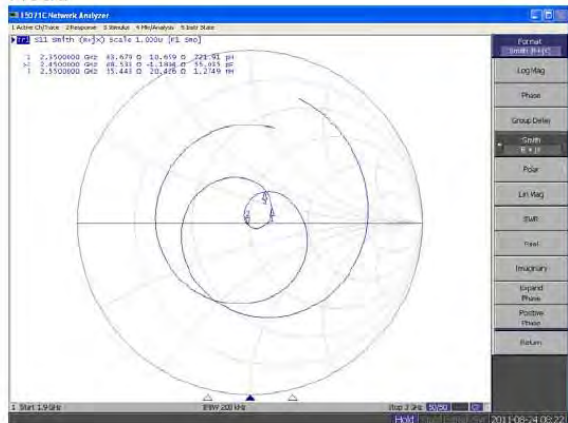
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NCL Calibration Laboratories

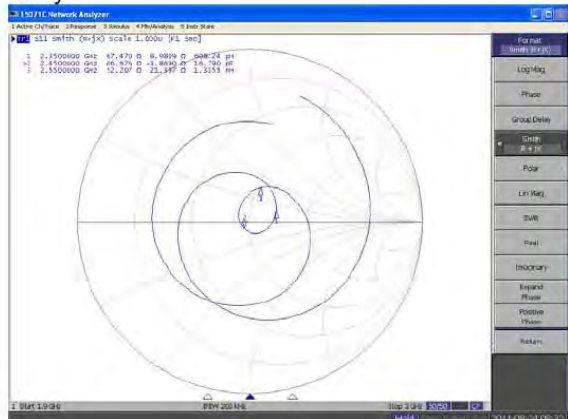
Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



Body



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NCL Calibration Laboratories

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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 May 2011.

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9

2450MHz Dipole Calibration By BACL at 2012-12-12

Mechanical Verification

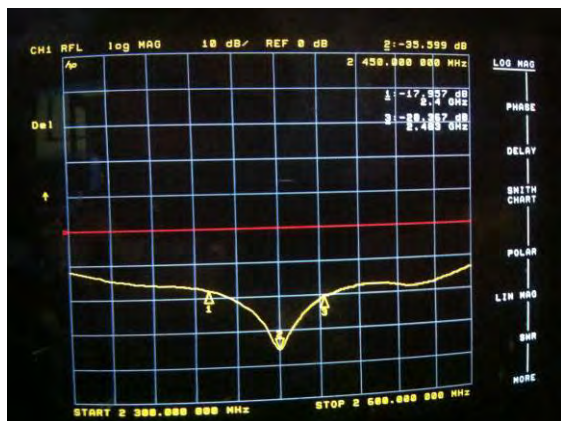
APREL Length	APREL Height	Measured Length	Measured Height
51.5mm	30.4 mm	51.6 mm	30.2 mm

Tissue Type	Measured Return Loss	Measured Impedance
Head	-35.559 dB	49.627 Ω
Body	-27.477 dB	48.238 Ω

Test Graphs:

Head Tissue

Return Loss :

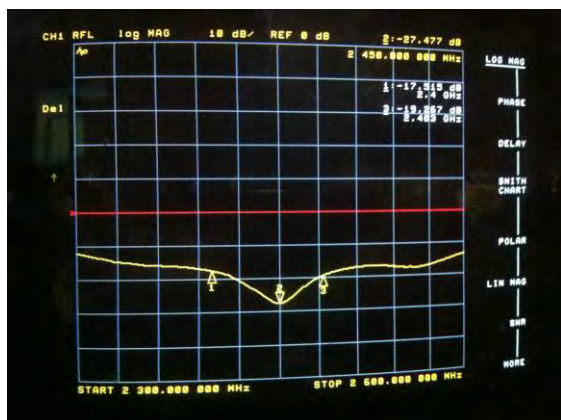


Impedance :



Body Tissue

Return Loss :

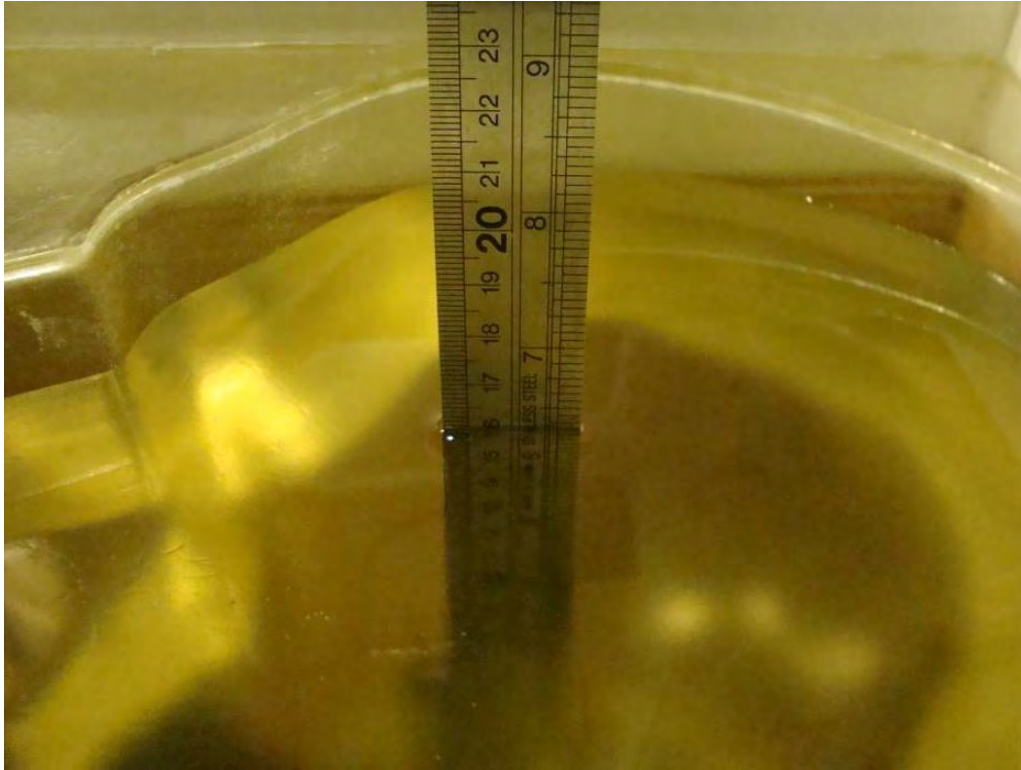


Impedance :

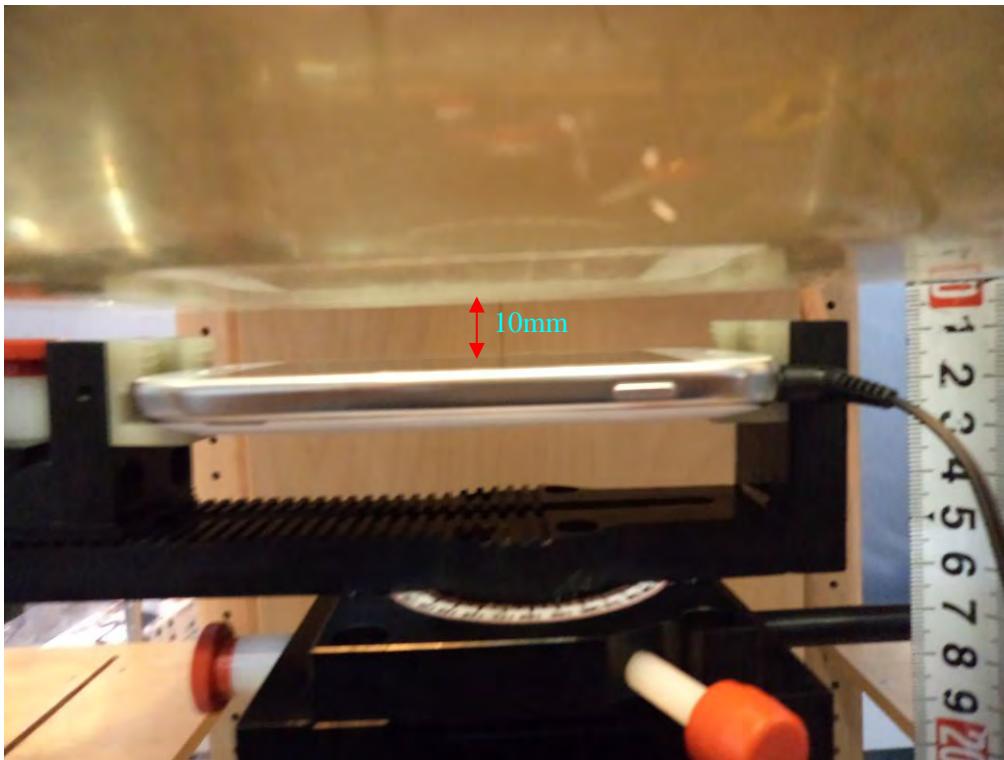


APPENDIX D EUT TEST POSITION PHOTOS

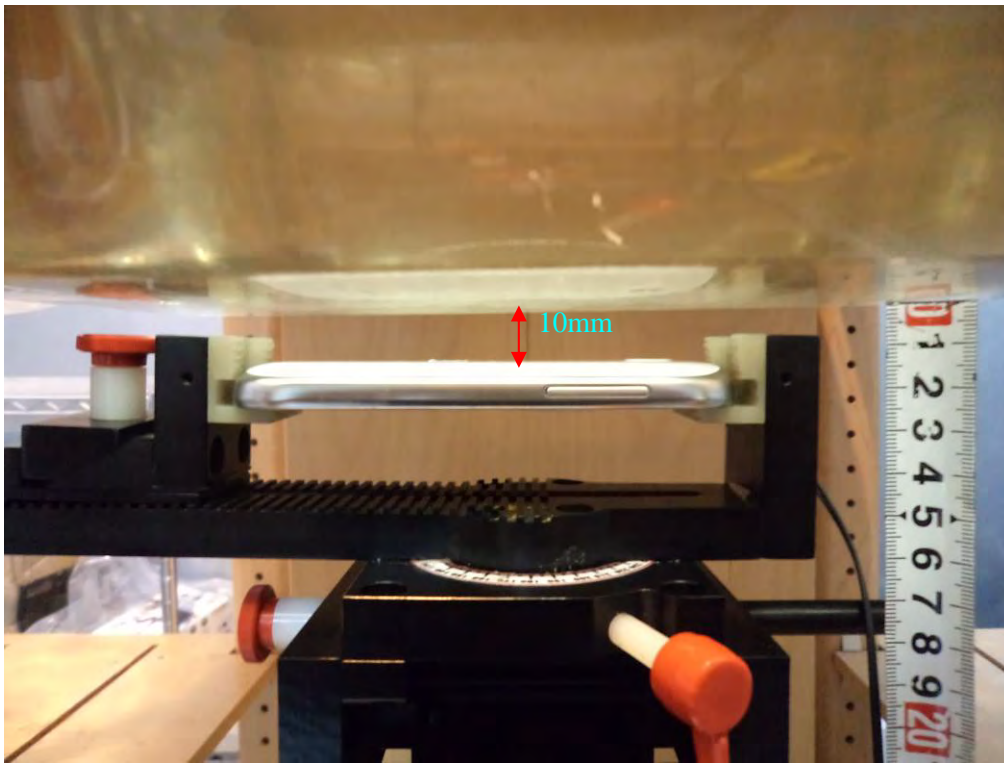
Liquid depth $\geq 15\text{cm}$



Body-worn-Headset Front Setup Photo



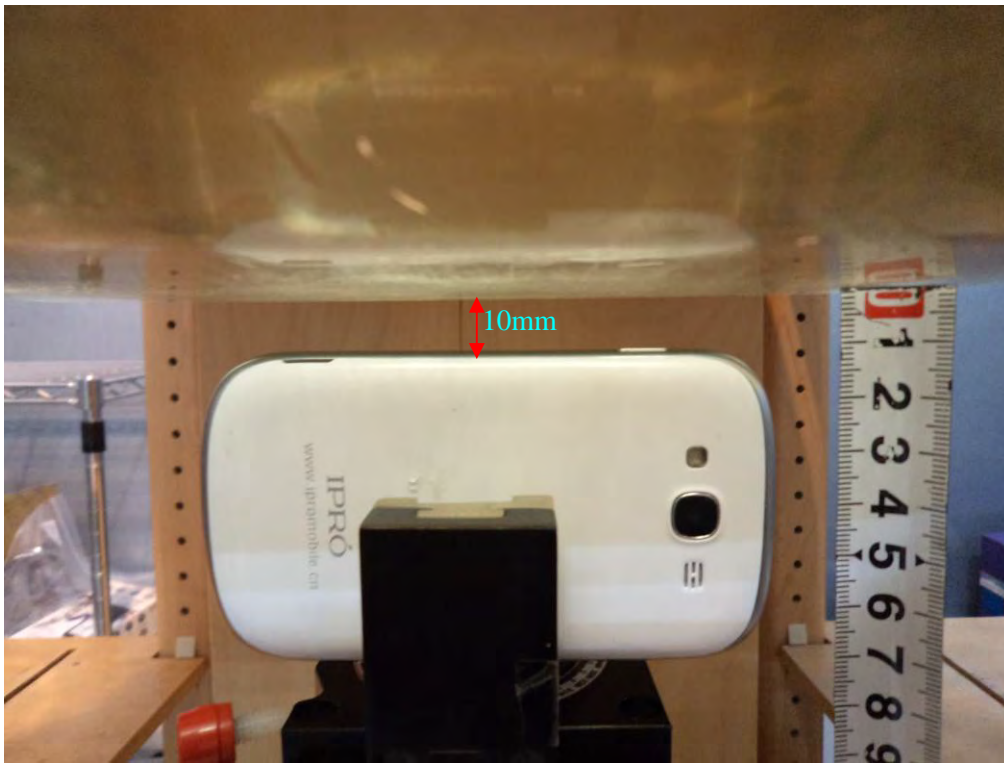
Body-worn-Headset Back Setup Photo



Body-Left Setup Photo



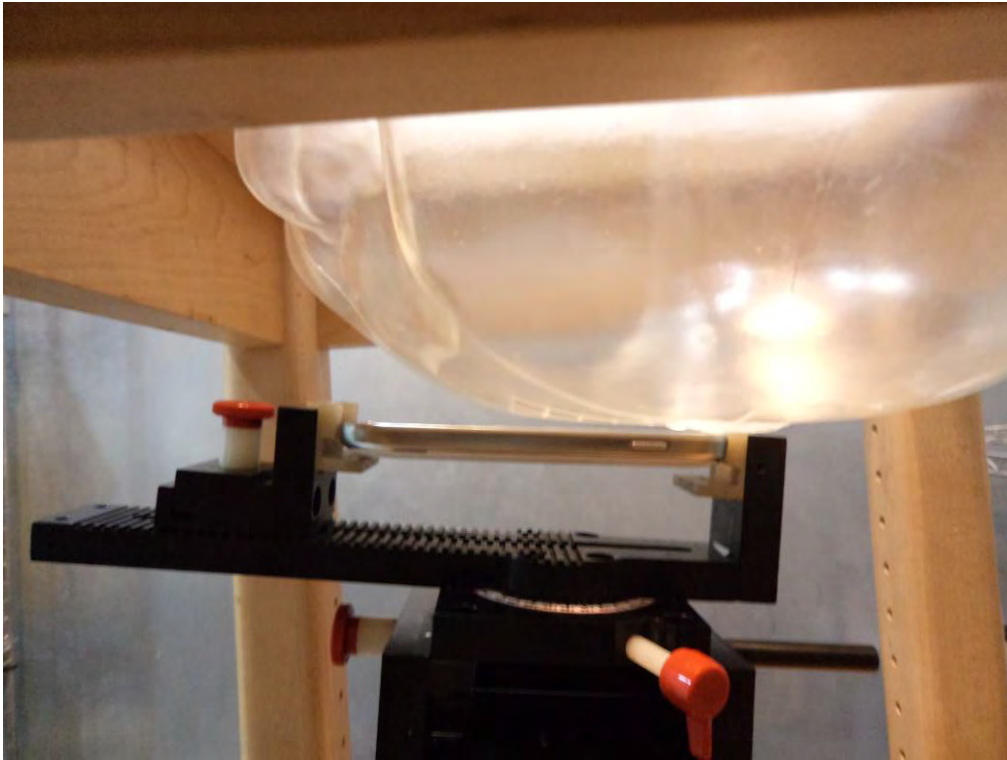
Body-Right Setup Photo



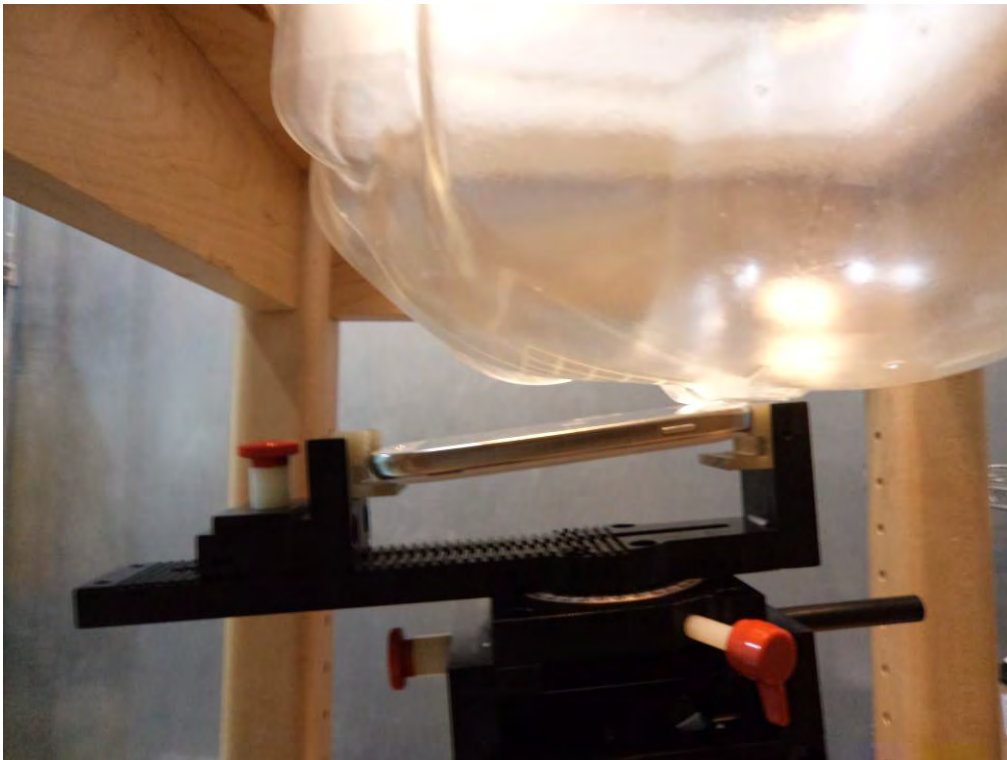
Body-Bottom Setup Photo



Left Head Touch Setup Photo



Left Head Tilt Setup Photo



Right Head Touch Setup Photo



Right Head Tilt Setup Photo



APPENDIX E EUT PHOTOS

EUT- Front View



EUT-Back View



EUT-Right Side View



EUT-Left Side View



EUT-Top View



EUT-Bottom View



EUT-Uncovered View



EUT- Headset View



APPENDIX F INFORMATIVE REFERENCES

- [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", IEICE 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.
- [12] W. H. Press, S. A. Teukolsky, W. T. Vetterling, and B. P. Flannery, Numerical Recipes in C, The Art of Scientific Computing, Second Edition, Cambridge University Press, 1992. Dosimetric Evaluation of Sample device, month 1998 9
- [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 *****