Lab Code: 200707-0

SAR EVALUATION REPORT

For

Star Computer Group

2175 NORTHWEST 115TH AVE., DORAL, FL 33172, USA

FCC ID: Q34-E350

Report Type:	Product Type:
Original Report	Smart Mobile Phone

Test Engineer:	Sandy Wang
Report Number:	RSZ120906005-20
Report Date:	2012-09-29
Reviewed By:	Alvin Huang RF Leader
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

Attestation of Test Results			
EUT Information	**Company Name**	Star Computer Group	
	EUT Description	Smart mobile phone	
	FCC ID	Q34-E350	
	Model Number	E350	
	Test Date	2012.09.19—2012.09.20	
Frequency	**Max. SAR Level(s) Measured**		**Limit (W/Kg)**
Cellular Band	0.234 W/kg, 1g Head Tissue 1.217 W/kg, 1g Body Tissue		1. 6
PCS Band	0.341 W/kg, 1g Head Tissue 0.606 W/kg, 1g Body Tissue		
Wi-Fi (802.11b)	0.174 W/kg, 1g Head Tissue 0.239 W/kg, 1g Body Tissue		
Maximum Simultaneous SAR	1.456 W/kg		
Applicable Standards	**ANSI/IEEE C95.1: 2005** IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fileds,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		

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.

The results and statements contained in this report pertain only to the device(s) evaluated.

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	RSZ120906005-20	Initial Report	2012-09-29

EUT DESCRIPTION

This report has been prepared on behalf of Star Computer Group and their product, FCC ID: Q34-E350, Model: E350 or the EUT (Equipment under Test) as referred to in the rest of this report. The EUT is a Smart Mobile 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:	Class 12
Hot-spot	Not Support
Operation Mode :	GSM Voice , GPRS Data, Bluetooth and Wi-Fi
Frequency Band:	Cellular Band: 824-849 MHz (TX); 869-894 MHz (RX) PCS Band: 1850-1910 MHz (TX); 1930-1990 MHz (RX) Bluetooth: 2402-2480 MHz Wi-Fi: 2412-2462 MHz
Conducted RF Power:	Cellular Band: 32.59 dBm PCS Band: 29.13 dBm Bluetooth: 2.14 dBm Wi-Fi (802.11b): 19.52 dBm Wi-Fi (802.11g): 17.90 dBm Wi-Fi (802.11n): 17.29 dBm
Dimensions (L*W*H):	113mm (L)× 60mm (W)× 10mm (H)
Weight:	111.8 g
Power Source:	3.7VDC
Normal Operation:	Head and Body-worn

REFERENCE, STANDARDS AND GUILDELINES

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

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

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

DESCRIPTION OF TEST SYSTEM

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

ALSAS-10U System Description

ALSAS-10-U is fully compliant with the technical and scientific requirements of IEEE 1528, IEC 62209, CENELEC, ARIB, ACA, and the Federal Communications Commission. The system comprises of a six axes articulated robot which utilizes a dedicated controller.
ALSAS-10U uses the latest methodologies. And FDTD modeling to provide a platform which is repeatable with minimum uncertainty.

Applications

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

Area Scans

Area scans are defined prior to the measurement process being executed with a user defined variable spacing between each measurement point (integral) allowing low uncertainty measurements to be conducted. Scans defined for FCC applications utilize a 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 32mm in the X & Y axis, and 35mm in the Z axis.

ALSAS-10U Interpolation and Extrapolation Uncertainty

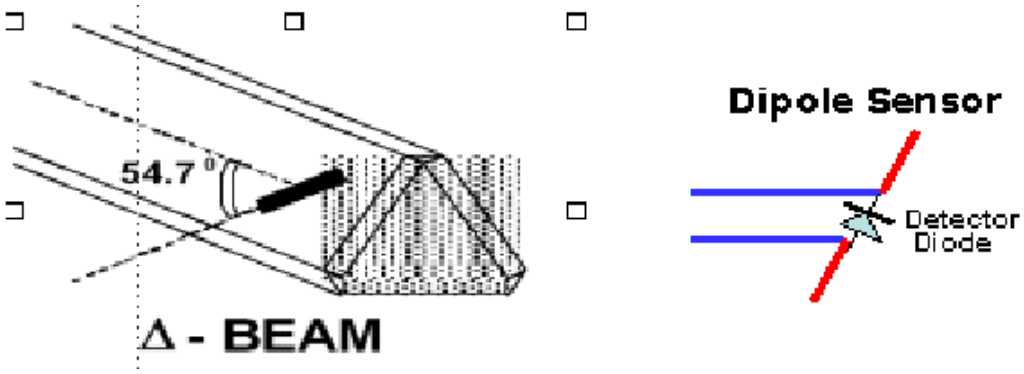
The overall uncertainty for the methodology and algorithms the used during the SAR calculation was evaluated using the data from IEEE 1528 based on the example f3 algorithm:

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

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 μV/(V/m)^2 to 0.85 μV/(V/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 5μV to 800mV. Integration of the fields measured is carried out at board level utilizing a Co-Processor which then sends the measured fields down into the main computational module in digitized form via an RS232 communications port. Probe linearity and duty cycle compensation is carried out within the main Daq-Paq module.

ADC	12 Bit
Amplifier Range	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

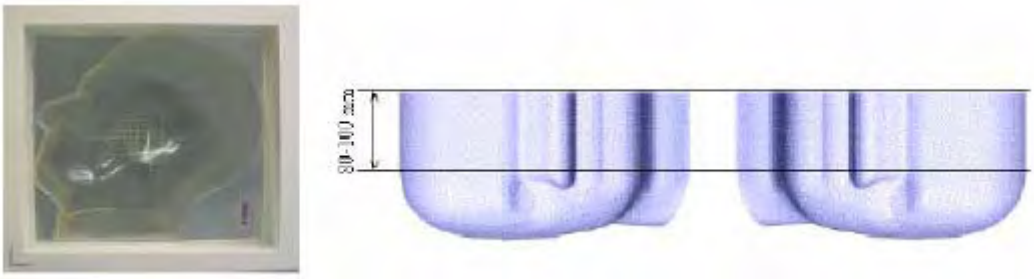
The universal device positioner allows complete freedom of movement of the EUT. Developed to hold a EUT in a free-space scenario any additional loading attributable to the material used in the construction of the positioner has been eliminated. Repeatability has been enhanced through the linear scales 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	
	εr	σ (S/m)	εr	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

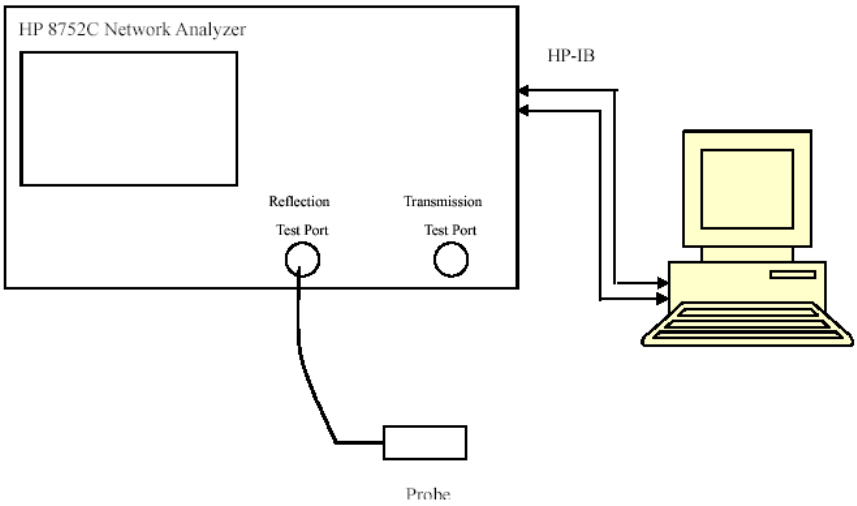
EQUIPMENT LIST AND CALIBRATION

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	2012-05-13	110-00212
Miniature E-Field Probe	ALS-E-020	2011-07-14	500-00283
Dipole, 835 MHz	ALS-D-835-S-2	2011-08-25	180-00558
Dipole, 1900 MHz	ALS-D-1900-S-2	2011-08-25	210-00710
Dipole,2450 MHz	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 835 MHz Head	ALS-TS-835-H	Each Time	270-01002
Simulated Tissue 835 MHz Body	ALS-TS-835-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 Body	ALS-TS-2450-B	Each Time	290-01109
Power Amplifier	5S1G4	N/A	71377
Synthesized Sweeper	HP 8341B	2012-05-17	2624A00116
Universal Radio Communication Tester	CMU 200	2011.12.16	1100.0008.02
EMI Test Receiver	ESCI	2011-11-17	101122

SAR MEASUREMENT SYSTEM VERIFICATION

Liquid Verification



Liquid Verification Setup Block Diagram

Liquid Verification Results

Frequency	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		εr	σ (S/m)	εr	σ (S/m)	εr	σ (S/m)	
824.2	Head	42.24	0.90	41.50	0.90	1.817	-2.460	±5
	Body	56.19	0.97	55.20	0.97	1.788	0.327	±5
836.6	Head	42.20	0.90	41.50	0.90	1.684	-0.904	±5
	Body	56.27	0.99	55.20	0.97	1.930	2.089	±5
848.8	Head	41.98	0.91	41.50	0.90	1.155	0.741	±5
	Body	56.34	1.00	55.20	0.97	2.072	3.857	±5
1850.2	Head	41.47	1.38	40.00	1.40	3.685	-0.513	±5
	Body	53.91	1.50	53.30	1.52	1.161	-1.130	±5
1880.0	Head	41.48	1.42	40.00	1.40	3.706	1.418	±5
	Body	53.77	1.53	53.30	1.52	0.879	0.664	±5
1909.8	Head	41.49	1.44	40.00	1.40	3.722	3.446	±5
	Body	53.62	1.56	53.30	1.52	0.598	2.463	±5
2412	Head	39.24	1.80	39.20	1.80	0.102	0.000	±5
	Body	53.01	1.95	52.70	1.95	0.586	0.122	±5
2437	Head	39.10	1.82	39.20	1.80	-0.255	1.111	±5
	Body	52.82	2.00	52.70	1.95	0.219	2.358	±5
2462	Head	39.04	1.83	39.20	1.80	-0.408	1.667	±5
	Body	52.65	2.03	52.70	1.95	-0.109	4.190	±5

**Liquid Verification was performed on 2012-09-19*

Please refer to the following tables

850 MHz Head				850 MHz Body		
Frequency (MHz)	e'	e''		Frequency (MHz)	e'	e''
824.0	42.254109	19.161296		824.0	56.186819	21.241738
824.5	42.223049	19.161849		824.5	56.189957	21.243734
825.0	42.206372	19.162402		825.0	56.193091	21.245732
825.5	42.101126	19.162955		825.5	56.196233	21.247725
826.0	42.119502	19.163508		826.0	56.199371	21.249721
826.5	42.141417	19.164061		826.5	56.202509	21.251716
827.0	42.117884	19.164615		827.0	56.205647	21.253712
827.5	42.165249	19.165168		827.5	56.208785	21.255707
828.0	42.184874	19.165721		828.0	56.211923	21.257703
828.5	42.191308	19.166274		828.5	56.215061	21.259698
829.0	42.242291	19.166827		829.0	56.218199	21.261694
829.5	42.190731	19.167381		829.5	56.221337	21.263691
830.0	42.227136	19.167933		830.0	56.224475	21.265685
830.5	42.187124	19.168486		830.5	56.227613	21.267681
831.0	42.160095	19.169039		831.0	56.230751	21.269676
831.5	42.179671	19.169592		831.5	56.233889	21.271672
832.0	42.141449	19.170145		832.0	56.237027	21.273667
832.5	42.116245	19.170698		832.5	56.240165	21.275663
833.0	42.156825	19.171251		833.0	56.243303	21.277659
833.5	42.188276	19.171804		833.5	56.246441	21.279654
834.0	42.185698	19.172357		834.0	56.249578	21.281651
834.5	42.184277	19.172912		834.5	56.252716	21.283645
835.0	42.209131	19.173463		835.0	56.255854	21.285641
835.5	42.210132	19.174317		835.5	56.258992	21.287636
836.0	42.213735	19.175171		836.0	56.262131	21.289632
836.5	42.198752	19.176024		836.5	56.265268	21.291627
837.0	42.185536	19.176878		837.0	56.268406	21.293623
837.5	42.179737	19.177731		837.5	56.271544	21.295619
838.0	42.202932	19.178585		838.0	56.274682	21.297614
838.5	42.161422	19.179439		838.5	56.277821	21.299611
839.0	42.151342	19.180292		839.0	56.280958	21.301605
839.5	42.153815	19.181146		839.5	56.284096	21.303601
840.0	42.164893	19.181999		840.0	56.287234	21.305596
840.5	42.154243	19.182853		840.5	56.290372	21.307592
841.0	42.137499	19.183707		841.0	56.293514	21.309587
841.5	42.166971	19.184561		841.5	56.296648	21.311583
842.0	42.168675	19.185414		842.0	56.299786	21.313579
842.5	42.172375	19.186268		842.5	56.302924	21.315574
843.0	42.166464	19.177102		843.0	56.306062	21.317571
843.5	42.090089	19.177956		843.5	56.309214	21.319565
844.0	42.166419	19.178809		844.0	56.312338	21.321561
844.5	42.120663	19.179663		844.5	56.315476	21.323556
845.0	42.046606	19.180517		845.0	56.318614	21.325552
845.5	42.061924	19.181371		845.5	56.321752	21.327548
846.0	42.016461	19.172205		846.0	56.324891	21.329543
846.5	42.057441	19.173059		846.5	56.328028	21.331539
847.0	42.037694	19.163893		847.0	56.331166	21.333534
847.5	42.040878	19.164747		847.5	56.334304	21.335531
848.0	42.014453	19.145562		848.0	56.337442	21.337525
848.5	42.019053	19.136397		848.5	56.340581	21.339521
849.0	41.979281	19.116411		849.0	56.343718	21.341516

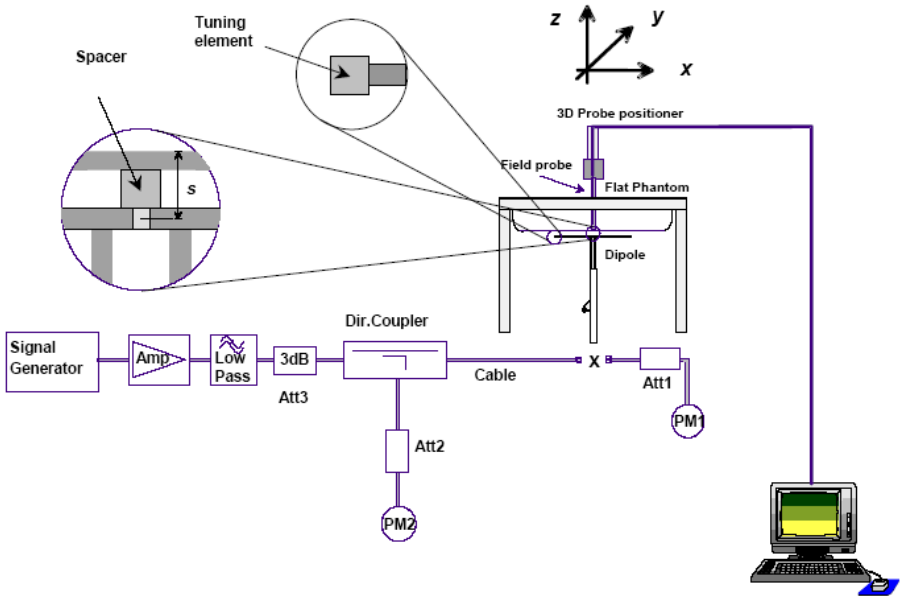
1900 MHz Head				1900 MHz Body		
Frequency (MHz)	e'	e''		Frequency (MHz)	e'	e''
1850.0	41.474027	13.444237		1850.0	53.918679	14.505955
1851.2	41.476277	13.446131		1851.2	53.912687	14.507054
1852.4	41.476532	13.448032		1852.4	53.906694	14.508157
1853.6	41.476781	13.449934		1853.6	53.900701	14.509258
1854.8	41.477032	13.451834		1854.8	53.894708	14.510359
1856.0	41.477283	13.453735		1856.0	53.888716	14.511461
1857.2	41.477535	13.455636		1857.2	53.882723	14.512563
1858.4	41.477789	13.457537		1858.4	53.876731	14.513669
1859.6	41.478039	13.459438		1859.6	53.870737	14.514764
1860.8	41.478291	13.461349		1860.8	53.864745	14.515866
1862.0	41.478542	13.463241		1862.0	53.858752	14.516967
1863.2	41.478794	13.465144		1863.2	53.852759	14.518065
1864.4	41.479046	13.467043		1864.4	53.846766	14.519169
1865.6	41.479297	13.468945		1865.6	53.840774	14.520271
1866.8	41.479549	13.470845		1866.8	53.834781	14.521372
1868.0	41.479851	13.472746		1868.0	53.828788	14.522477
1869.2	41.480052	13.474648		1869.2	53.822796	14.523574
1870.4	41.480306	13.476548		1870.4	53.816803	14.524675
1871.6	41.480556	13.478449		1871.6	53.810812	14.525777
1872.8	41.480807	13.480351		1872.8	53.804817	14.526878
1874.0	41.481059	13.482256		1874.0	53.798825	14.527977
1875.2	41.481311	13.484153		1875.2	53.792832	14.529080
1876.4	41.481573	13.486054		1876.4	53.786839	14.530182
1877.6	41.481814	13.488176		1877.6	53.780846	14.531284
1878.8	41.482066	13.489856		1878.8	53.774854	14.532384
1880.0	41.482317	13.491757		1880.0	53.768861	14.533481
1881.2	41.482569	13.493658		1881.2	53.762868	14.534586
1882.4	41.482822	13.495559		1882.4	53.756875	14.535687
1883.6	41.483073	13.497461		1883.6	53.750883	14.536789
1884.8	41.483324	13.499362		1884.8	53.744891	14.537897
1886.0	41.483576	13.501262		1886.0	53.738897	14.538991
1887.2	41.483828	13.503169		1887.2	53.732904	14.540091
1888.4	41.484081	13.505063		1888.4	53.726912	14.541194
1889.6	41.484331	13.506967		1889.6	53.720919	14.542295
1890.8	41.484583	13.508867		1890.8	53.714926	14.543396
1892.0	41.484834	13.510768		1892.0	53.708933	14.544497
1893.2	41.485086	13.512669		1893.2	53.702941	14.545599
1894.4	41.485339	13.514571		1894.4	53.696948	14.546744
1895.6	41.485589	13.516477		1895.6	53.690955	14.547801
1896.8	41.485841	13.518373		1896.8	53.684963	14.548902
1898.0	41.486093	13.520275		1898.0	53.678971	14.550004
1899.2	41.486345	13.522175		1899.2	53.672977	14.551105
1900.4	41.486598	13.524076		1900.4	53.666984	14.552206
1901.6	41.486848	13.525973		1901.6	53.660992	14.553307
1902.8	41.487121	13.527878		1902.8	53.654999	14.554408
1904.0	41.487351	13.529779		1904.0	53.649006	14.555517
1905.2	41.487603	13.531681		1905.2	53.643013	14.556611
1906.4	41.487866	13.533582		1906.4	53.637021	14.557712
1907.6	41.488106	13.535480		1907.6	53.631028	14.558814
1908.8	41.488358	13.537384		1908.8	53.625035	14.559915
1910.0	41.488611	13.539285		1910.0	53.619042	14.561019

2450 MHz Head				2450 MHz Body		
Frequency (MHz)	e'	e''		Frequency (MHz)	e'	e''
2410	39.243701	13.434660		2410	53.026923	14.541855
2411	39.221805	13.433311		2411	53.017893	14.548852
2412	39.243867	13.406125		2412	53.008881	14.553854
2413	39.196030	13.370515		2413	52.999872	14.558851
2414	39.194927	13.423079		2414	52.990861	14.563854
2415	39.197382	13.385153		2415	52.981858	14.568859
2416	39.178975	13.418143		2416	52.972849	14.573854
2417	39.167258	13.403356		2417	52.963834	14.578854
2418	39.163122	13.420319		2418	52.954826	14.583853
2419	39.132130	13.379920		2419	52.945817	14.588851
2420	39.164832	13.404093		2420	52.936822	14.593858
2421	39.153802	13.446519		2421	52.927791	14.618854
2422	39.163444	13.439049		2422	52.920782	14.625857
2423	39.109770	13.402235		2423	52.913774	14.632854
2424	39.095467	13.500332		2424	52.906766	14.639853
2425	39.121859	13.503589		2425	52.899759	14.646854
2426	39.121559	13.450975		2426	52.892751	14.653853
2427	39.116358	13.505270		2427	52.885743	14.660852
2428	39.123071	13.476684		2428	52.878735	14.667859
2429	39.117008	13.515476		2429	52.871728	14.674854
2430	39.115579	13.433497		2430	52.864724	14.681851
2431	39.130180	13.482496		2431	52.857712	14.688851
2432	39.133481	13.511023		2432	52.850704	14.695853
2433	39.074375	13.450025		2433	52.843696	14.702858
2434	39.116539	13.415580		2434	52.836689	14.709853
2435	39.015034	13.490192		2435	52.829681	14.716853
2436	39.075928	13.429712		2436	52.822673	14.723858
2437	39.102490	13.441469		2437	52.815665	14.730857
2438	39.082260	13.438462		2438	52.808657	14.737857
2440	39.120424	13.463825		2440	52.801655	14.744853
2441	39.085785	13.458180		2441	52.794642	14.751852
2442	39.117769	13.422813		2442	52.787634	14.758851
2443	39.092608	13.406871		2443	52.780626	14.762850
2444	39.063118	13.400137		2444	52.773619	14.766853
2445	39.025408	13.422397		2445	52.766611	14.770856
2446	39.082355	13.410079		2446	52.759603	14.774855
2447	39.059899	13.401945		2447	52.752595	14.778854
2448	39.040204	13.376953		2448	52.745587	14.782852
2449	39.030574	13.407797		2449	52.738584	14.786852
2450	39.016506	13.415417		2450	52.731572	14.790853
2451	39.025202	13.380189		2451	52.724564	14.794852
2452	38.998422	13.386459		2452	52.717556	14.798851
2453	39.011502	13.384899		2453	52.710548	14.802852
2454	39.035760	13.370621		2454	52.703541	14.806856
2455	39.036068	13.373986		2455	52.696533	14.810852
2456	38.997826	13.388319		2456	52.689525	14.814852
2457	39.031725	13.362616		2457	52.682517	14.818859
2458	39.024268	13.371074		2458	52.675511	14.822852
2459	39.050273	13.380592		2459	52.668502	14.826857
2460	39.031516	13.390339		2460	52.661494	14.830852
2461	39.055655	13.358928		2461	52.654486	14.834855
2462	39.040204	13.376953		2462	52.647478	14.838850

System Accuracy Verification

Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of ±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	2011-07-14	2012-07-13
APREL	Dipole antenna (835 MHz)	ALS-D-835-S-2	180-00558	2011-08-25	2012-08-24
APREL	Dipole antenna (1900 MHz)	ALS-D-1900-S-2	210-00710	2011-08-25	2012-08-24
APREL	Dipole antenna (2450 MHz)	ALS-D-2450-S-2	220-00758	2011-08-25	2012-08-24

System Accuracy Check Results

Date	Frequency (MHz)	Liquid Type	Measured SAR (W/Kg)		Target Value (W/Kg)	Delta (%)	Tolerance (%)
2012-09-19	835	Head	1g	9.630	9.590	0.417	±10
		Body	1g	10.084	9.684	4.131	±10
	1900	Head	1g	40.346	39.648	1.760	±10
		Body	1g	41.070	39.769	3.271	±10
	2450	Head	1g	54.220	52.667	2.949	±10
		Body	1g	50.916	52.561	-3.129	±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 835 MHz; Type: ALS-D-835-S-2; S/N: 180-00558

Product Data
Device Name : Dipole 835 MHz
Serial No. : 180-00558
Type : Dipole
Model : ALS-D-835-S-2
Frequency Band : 835
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 9.212 W/kg
Power Drift-Finish : 9.253 W/kg
Power Drift (%) : 1.137

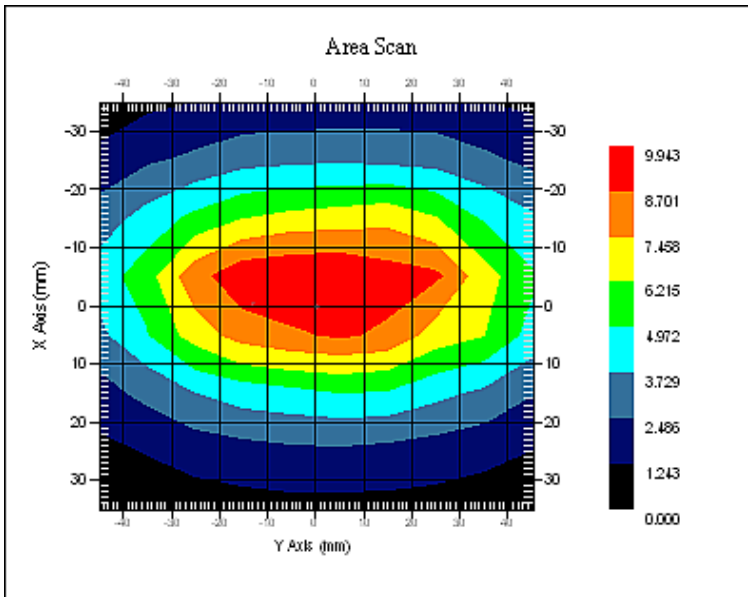
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default
Phantom Data

Tissue Data
Type : HEAD
Serial No. : 270-01002
Frequency : 835.0 MHz
Last Calib. Date : 19-Sep-2012
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 42.21 F/m
Sigma : 0.90 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 : 835
Duty Cycle Factor : 1
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/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 : 8x10x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm

1 gram SAR value : 9.630 W/kg
10 gram SAR value : 6.027 W/kg
Area Scan Peak SAR : 9.876 W/kg
Zoom Scan Peak SAR : 14.328 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 835 MHz; Type: ALS-D-835-S-2; S/N: 180-00558

Product Data
Device Name : Dipole 835 MHz
Serial No. : 180-00558
Type : Dipole
Model : ALS-D-835-S-2
Frequency Band : 835
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 10.916 W/kg
Power Drift-Finish : 10.922 W/kg
Power Drift (%) : 0.045

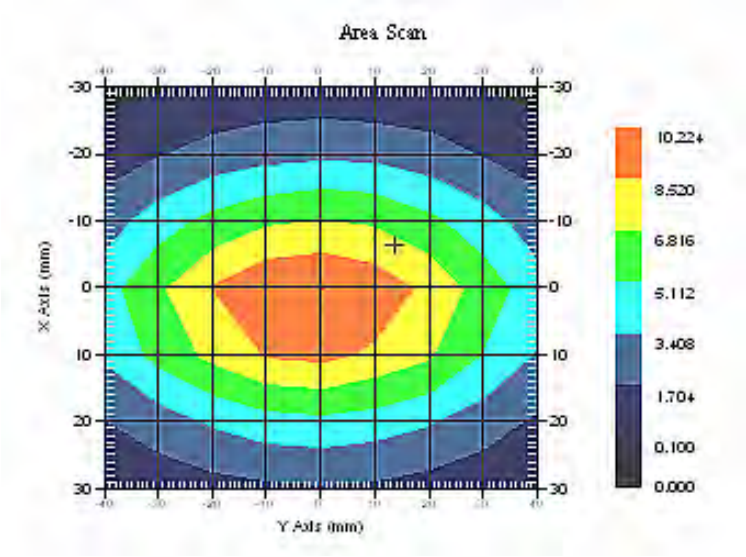
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default
Phantom Data

Tissue Data
Type : Body
Serial No. : 270-02101
Frequency : 835.0 MHz
Last Calib. Date : 19-Sep-2012
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 56.26 F/m
Sigma : 0.99 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 14-Jul-2011
Frequency Band : 835
Duty Cycle Factor : 1
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

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

1 gram SAR value : 10.084 W/kg
10 gram SAR value : 6.171 W/kg
Area Scan Peak SAR : 10.204 W/kg
Zoom Scan Peak SAR : 15.815 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 : 45.287 W/kg
Power Drift-Finish : 47.328 W/kg
Power Drift (%) : 3.637

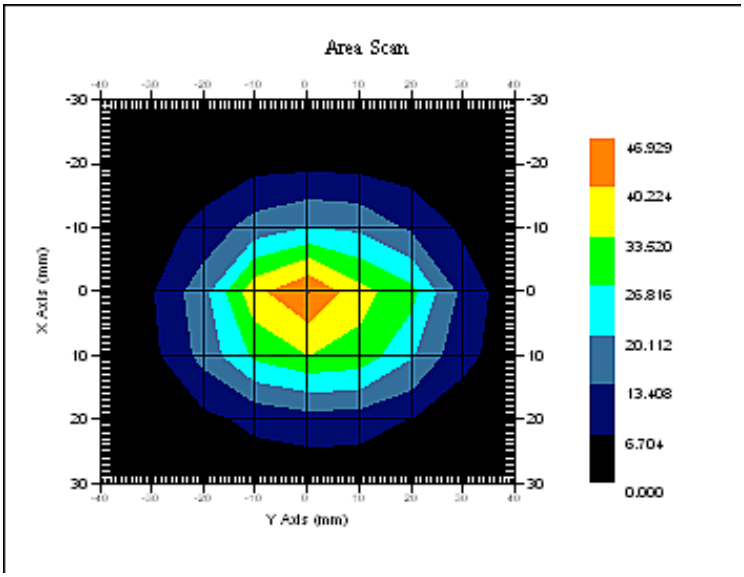
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default

Tissue Data
Type : HEAD
Serial No. : 295-01103
Frequency : 1900.00 MHz
Last Calib. Date : 19-Sep-2012
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 41.49 F/m
Sigma : 1.42 S/m
Density : 1000.00 kg/cu. M

Probe Data
Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 14-Jul-2011
Frequency Band : 1900
Duty Cycle Factor : 1
Conversion Factor : 5.20
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/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 : 40.346 W/kg
10 gram SAR value : 20.526 W/kg
Area Scan Peak SAR : 45.836 W/kg
Zoom Scan Peak SAR : 75.249 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 : 49.197 W/kg
Power Drift-Finish : 49.612 W/kg
Power Drift (%) : 0.843

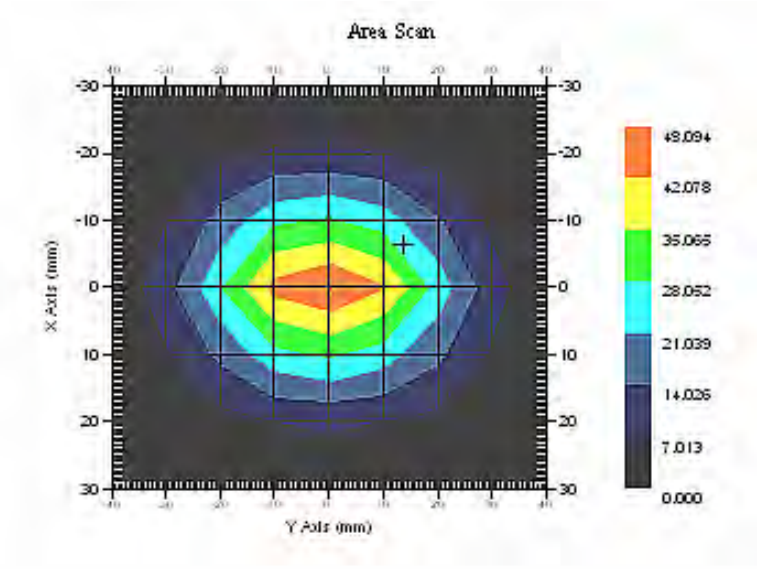
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default

Tissue Data
Type : Body
Serial No. : 295-02102
Frequency : 1880.00 MHz
Last Calib. Date : 19-Sep-2012
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 53.67 F/m
Sigma : 1.53 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 : 1900
Duty Cycle Factor : 1
Conversion Factor : 5.0
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/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 : 41.070 W/kg
10 gram SAR value : 22.019 W/kg
Area Scan Peak SAR : 48.094 W/kg
Zoom Scan Peak SAR : 76.569 W/kg



1900 MHz System Validation with Body Tissue

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

System Performance Check 2450 MHz, Head Liquid

Dipole 2450 MHz; Type: ALS-D-2450-S-2; S/N: 220-00758

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

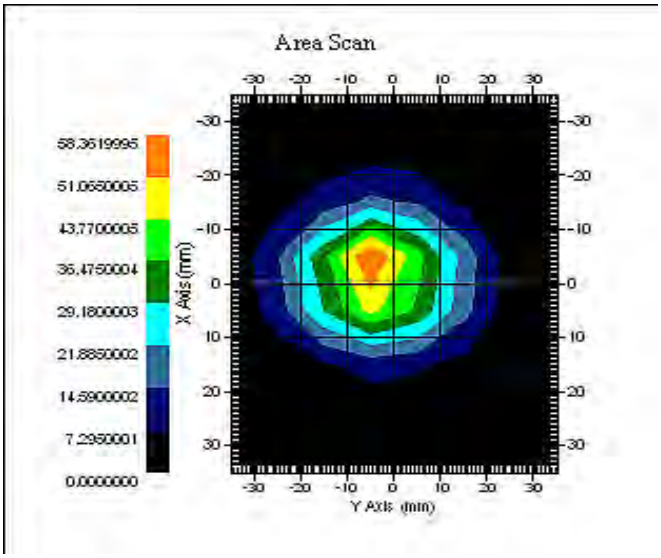
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default

Tissue Data
Type : Head
Serial No. : 290-01109
Frequency : 2450 MHz
Last Calib. Date : 19-Sep-2012
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 50.00 RH%
Epsilon : 39.02 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 : 2450
Duty Cycle Factor : 1
Conversion Factor : 4.9
Probe Sensitivity : 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

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

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



2450 MHz System Validation

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

System Performance Check 2450 MHz, Body Liquid

Dipole 2450 MHz; Type: ALS-D-2450-S-2; S/N: 220-00758

Product Data
Device Name : Dipole 2450MHz
Serial No. : 220-00758
Type : Dipole
Model : ALS-D-2450-S-2
Frequency Band : 2450
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 48.142 W/kg
Power Drift-Finish : 48.579 W/kg
Power Drift (%) : 0.907

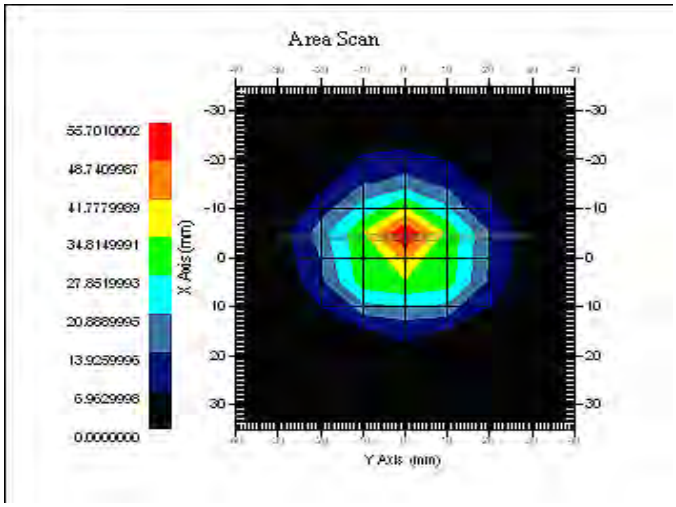
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default

Tissue Data
Type : BODY
Serial No. : 290-01109
Frequency : 2450 MHz
Last Calib. Date : 19-Sep-2012
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 50.00 RH%
Epsilon : 52.73 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
Duty Cycle Factor : 1
Conversion Factor : 4.3
Probe Sensitivity : 1.20 1.20 1.20 $\mu V/(V/m)^2$
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 : 8x7x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm

1 gram SAR value : 50.916 W/kg
10 gram SAR value : 25.333 W/kg
Area Scan Peak SAR : 54.068 W/kg
Zoom Scan Peak SAR : 98.600 W/kg



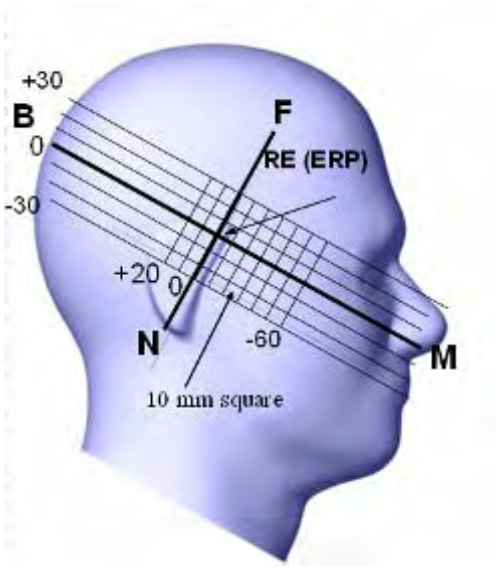
2450 MHz System Validation

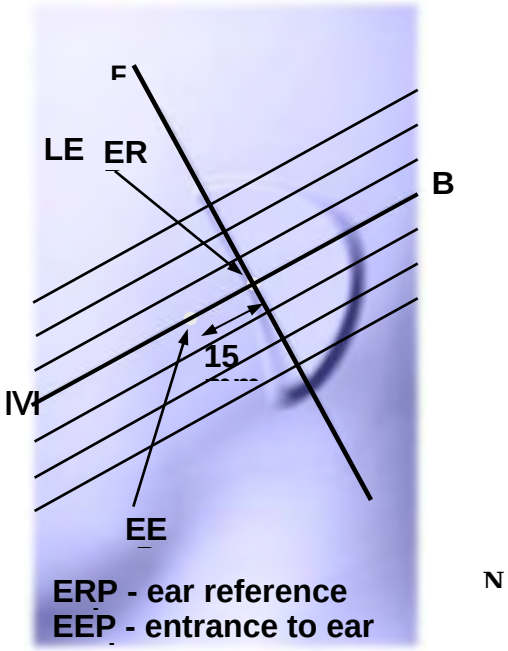
EUT TEST STRATEGY AND METHODOLOGY

Test Positions for Device Operating Next to a Person's Ear

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

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





Cheek/Touch Position

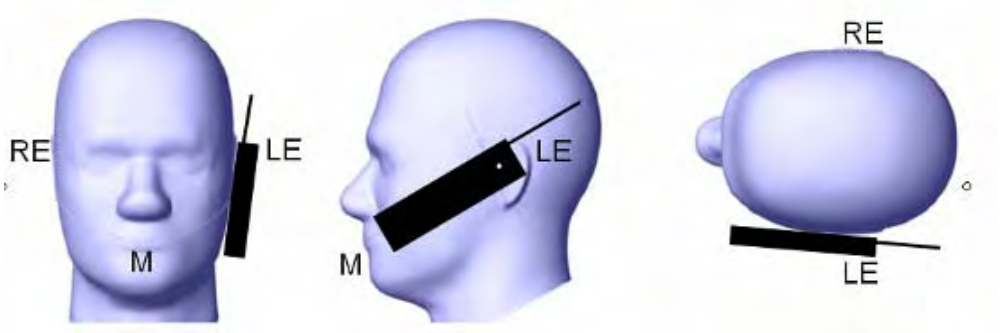
The device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line for the SCC-34/SC-2 head phantom.

This test position is established:

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

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

Cheek /Touch Position



Ear/Tilt Position

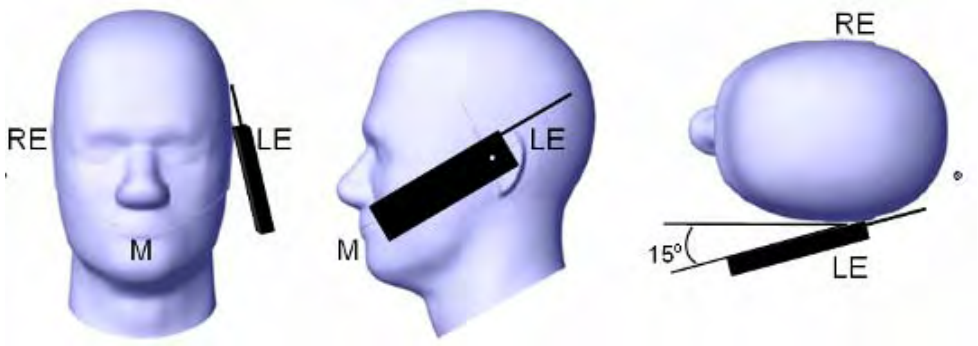
With the handset aligned in the "Cheek/Touch Position":

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

2) (otherwise) The handset should be moved (translated) away from the cheek perpendicular to the line passes through both "ear reference points" (note: one of these ear reference points may not physically exist on a split head model) for approximate 2-3 cm. While it is in this position, the device handset is tilted away from the mouth with respect to the "test device reference point" until the inside angle between the vertical centerline on the front surface of the phone and the horizontal line passing through the ear reference point isby 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.

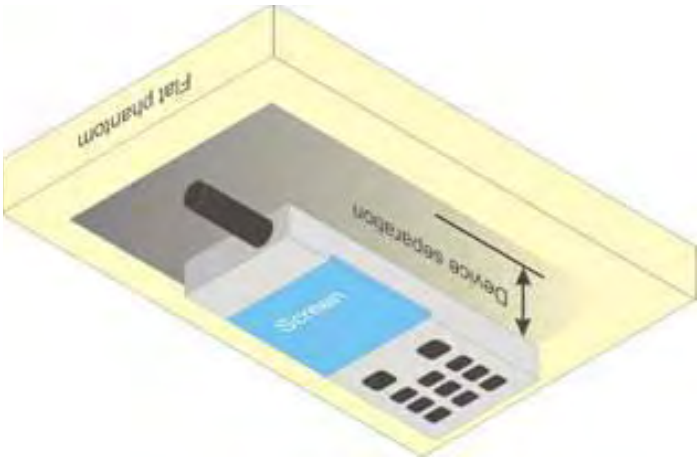
Ear /Tilt 15° Position



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.

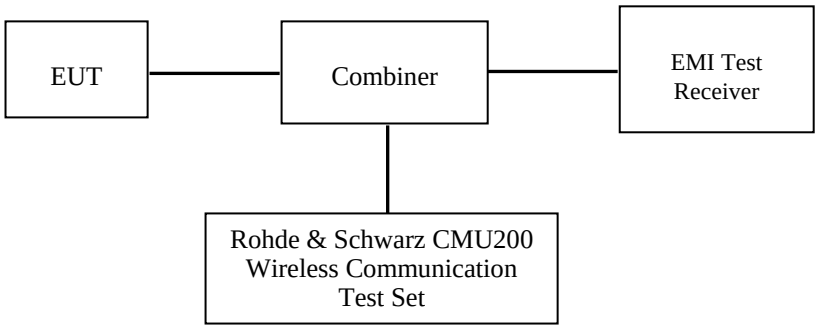
All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

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.

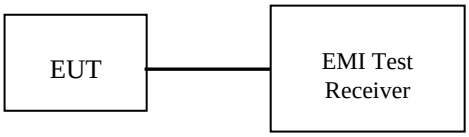
CONDUCTED OUTPUT POWER MEASUREMENT

Test Block Diagram and Procedure

The RF output of the transmitter was connected to the input of the EMI Test Receiver through sufficient attenuation.



GSM/GPRS



Wi-Fi

Test Results

GSM

Band	Frequency (MHz)	Conducted Output Power	
		(dBm)	(Watt)
Cellular	824.2	32.59	1.816
	836.6	32.15	1.641
	848.8	32.12	1.629
PCS	1850.2	29.00	0.794
	1880.0	28.99	0.793
	1909.8	29.13	0.818

GPRS

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
Cellular	128	824.2	32.14	31.63	29.95	28.92
	190	836.6	31.93	31.20	29.47	28.44
	251	848.8	31.86	31.10	29.42	28.35
PCS	512	1850.2	28.96	28.16	26.56	25.73
	661	1880.0	28.96	28.16	26.57	25.75
	810	1909.8	29.11	28.46	26.84	26.06

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

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

The time based average power for GPRS

Band	Channel No.	Frequency (MHz)	Time based average Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
Cellular	128	824.2	23.14	25.63	25.70	25.92
	190	836.6	22.93	25.20	25.22	25.44
	251	848.8	22.86	25.10	25.17	25.35
PCS	512	1850.2	19.96	22.16	22.31	22.73
	661	1880.0	19.96	22.16	22.32	22.75
	810	1909.8	20.11	22.46	22.59	23.06

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 control level 5(850 MHz band) and 0(1900 MHz band).

Wi-Fi

Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)	Limit (dBm)
802.11b mode			
Low	2412	19.29	30
Middle	2437	19.52	30
High	2462	19.43	30
802.11g mode			
Low	2412	17.83	30
Middle	2437	17.82	30
High	2462	17.90	30
802.11n-HT20 mode			
Low	2412	17.27	30
Middle	2437	17.29	30
High	2462	17.22	30

SAR MEASUREMENT RESULTS

This page summarizes the results of the performed dosimetric evaluation.

SAR Test Data

Environmental Conditions

Temperature:	21° C
Relative Humidity:	50%
ATM Pressure:	1002 mbar

** Testing was performed by Sandy Wang on 2012.09.19-2012.09.20*

Cellular Band:

EUT Position	Frequency		Test Mode	Antenna Type	Phantom Type	Power Drift (%)	FCC 1g SAR (W/Kg)	
	Channel	(MHz)					Measured	Limit
Left Head Cheek	128(Low)	824.2	GSM	Integral	SAM	1.090	**0.234**	1.6
	190(Middle)	836.6	GSM	Integral	SAM	/	/	1.6
	251(High)	848.8	GSM	Integral	SAM	/	/	1.6
Left Head Tilt	128(Low)	824.2	GSM	Integral	SAM	-2.661	0.133	1.6
	190(Middle)	836.6	GSM	Integral	SAM	/	/	1.6
	251(High)	848.8	GSM	Integral	SAM	/	/	1.6
Right Head Cheek	128(Low)	824.2	GSM	Integral	SAM	-1.537	0.221	1.6
	190(Middle)	836.6	GSM	Integral	SAM	/	/	1.6
	251(High)	848.8	GSM	Integral	SAM	/	/	1.6
Right Head Tilt	128(Low)	824.2	GSM	Integral	SAM	-2.372	0.125	1.6
	190(Middle)	836.6	GSM	Integral	SAM	/	/	1.6
	251(High)	848.8	GSM	Integral	SAM	/	/	1.6
Body-Worn-Front w/Headset	128(Low)	824.2	GSM	Integral	Universal	-2.176	0.160	1.6
	190(Middle)	836.6	GSM	Integral	Universal	/	/	1.6
	251(High)	848.8	GSM	Integral	Universal	/	/	1.6
Body-Worn-Back w/Headset	128(Low)	824.2	GSM	Integral	Universal	-1.383	0.616	1.6
	190(Middle)	836.6	GSM	Integral	Universal	/	/	1.6
	251(High)	848.8	GSM	Integral	Universal	/	/	1.6
Body-Front	128(Low)	824.2	GPRS	Integral	Universal	3.054	0.444	1.6
	190(Middle)	836.6	GPRS	Integral	Universal	/	/	1.6
	251(High)	848.8	GPRS	Integral	Universal	/	/	1.6
Body-Back	128(Low)	824.2	GPRS	Integral	Universal	2.036	**1.217**	1.6
	190(Middle)	836.6	GPRS	Integral	Universal	-3.320	1.194	1.6
	251(High)	848.8	GPRS	Integral	Universal	-1.779	1.205	1.6

PCS Band:

EUT Position	Frequency		Test Mode	Antenna Type	Phantom Type	Power Drift (%)	FCC 1g SAR (W/Kg)	
	Channel	(MHz)					Measured	Limit
Left Head Cheek	512(Low)	1850.2	GSM	Integral	SAM	/	/	1.6
	661(Middle)	1880.0	GSM	Integral	SAM	/	/	1.6
	810(High)	1909.8	GSM	Integral	SAM	-0.596	**0.341**	1.6
Left Head Tilt	512(Low)	1850.2	GSM	Integral	SAM	/	/	1.6
	661(Middle)	1880.0	GSM	Integral	SAM	/	/	1.6
	810(High)	1909.8	GSM	Integral	SAM	-3.693	0.076	1.6
Right Head Cheek	512(Low)	1850.2	GSM	Integral	SAM	/	/	1.6
	661(Middle)	1880.0	GSM	Integral	SAM	/	/	1.6
	810(High)	1909.8	GSM	Integral	SAM	3.694	0.338	1.6
Right Head Tilt	512(Low)	1850.2	GSM	Integral	SAM	/	/	1.6
	661(Middle)	1880.0	GSM	Integral	SAM	/	/	1.6
	810(High)	1909.8	GSM	Integral	SAM	1.349	0.071	1.6
Body-Worn-Front w/Headset	512(Low)	1850.2	GSM	Integral	Universal	/	/	1.6
	661(Middle)	1880.0	GSM	Integral	Universal	/	/	1.6
	810(High)	1909.8	GSM	Integral	Universal	-1.616	0.156	1.6
Body-Worn-Back w/Headset	512(Low)	1850.2	GSM	Integral	Universal	/	/	1.6
	661(Middle)	1880.0	GSM	Integral	Universal	/	/	1.6
	810(High)	1909.8	GSM	Integral	Universal	-2.587	0.333	1.6
Body-Front	512(Low)	1850.2	GPRS	Integral	Universal	/	/	1.6
	661(Middle)	1880.0	GPRS	Integral	Universal	/	/	1.6
	810(High)	1909.8	GPRS	Integral	Universal	-1.895	0.288	1.6
Body-Back	512(Low)	1850.2	GPRS	Integral	Universal	/	/	1.6
	661(Middle)	1880.0	GPRS	Integral	Universal	/	/	1.6
	810(High)	1909.8	GPRS	Integral	Universal	-0.939	**0.606**	1.6

Note: 1. When the 1-g SAR is ≤ 0.8W/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.

Wi-Fi

EUT Position	Frequency		Test Mode	Antenna Type	Phantom Type	Power Drift (%)	FCC 1g SAR (W/Kg)	
	Channel	(MHz)					Measured	Limit
Left Head Cheek	1	2412	802.11b	Integral	SAM	/	/	1.6
	6	2437	802.11b	Integral	SAM	-2.464	0.164	1.6
	11	2462	802.11b	Integral	SAM	/	/	1.6
Left Head Tilt	1	2412	802.11b	Integral	SAM	/	/	1.6
	6	2437	802.11b	Integral	SAM	3.108	0.110	1.6
	11	2462	802.11b	Integral	SAM	/	/	1.6
Right Head Cheek	1	2412	802.11b	Integral	SAM	/	/	1.6
	6	2437	802.11b	Integral	SAM	-1.498	0.174	1.6
	11	2462	802.11b	Integral	SAM	/	/	1.6
Right Head Tilt	1	2412	802.11b	Integral	SAM	/	/	1.6
	6	2437	802.11b	Integral	SAM	-1.395	0.107	1.6
	11	2462	802.11b	Integral	SAM	/	/	1.6
Body-Front	1	2412	802.11b	Integral	Universal	/	/	1.6
	6	2437	802.11b	Integral	Universal	-3.054	0.184	1.6
	11	2462	802.11b	Integral	Universal	/	/	1.6
Body-Back	1	2412	802.11b	Integral	Universal	/	/	1.6
	6	2437	802.11b	Integral	Universal	-2.940	0.239	1.6
	11	2462	802.11b	Integral	Universal	/	/	1.6
Body-Right	1	2412	802.11b	Integral	Universal	/	/	1.6
	6	2437	802.11b	Integral	Universal	-2.560	0.077	1.6
	11	2462	802.11b	Integral	Universal	/	/	1.6
Body-Bottom	1	2412	802.11b	Integral	Universal	/	/	1.6
	6	2437	802.11b	Integral	Universal	-1.054	0.069	1.6
	11	2462	802.11b	Integral	Universal	/	/	1.6

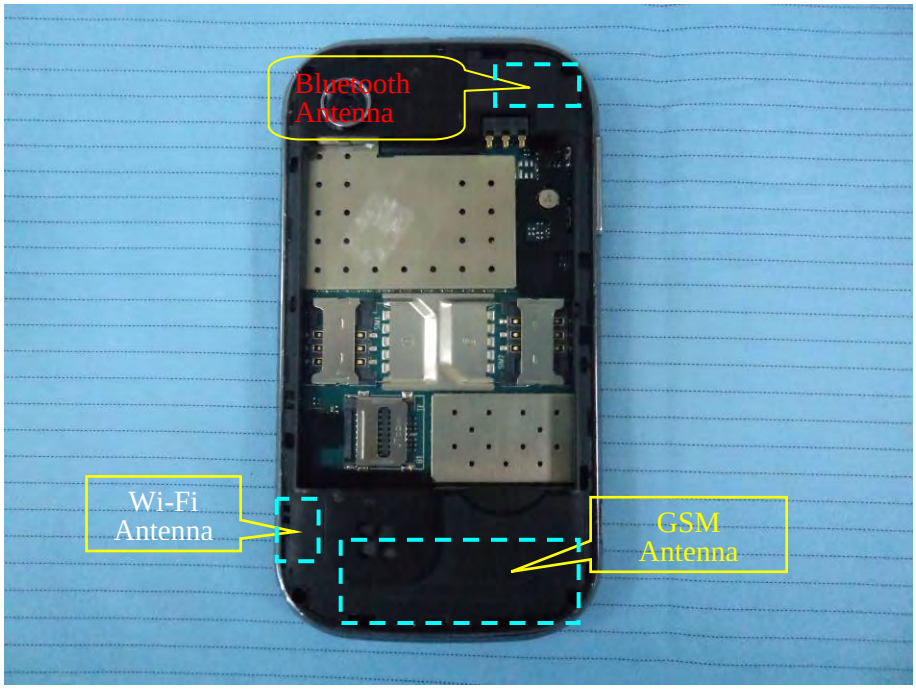
Note: 1. When the 1-g SAR is ≤ 0.8W/Kg, testing for other channels are optional.
2. The SAR testing is conducted with 100% duty cycle factor.
3. The SAR was tested under data rate 1Mbps for 802.11b.
4. KDB248227-SAR is not required for 802.11g/802.11n channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

SAR SIMULTANEOUS TRANSMISSION DESCRIPTION AND EVALUATION

KDB648474 SIMULTANEOUS TRANSMITION CONSIDERATION

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

Wi-Fi, BT and GSM Antenna Location



Antenna Information

Description of Simultaneous Transmit Capabilities			Antennas Distance (mm)
Transmitter Combination	Scenario Supported?	Supported for Mobile Hot Spot	
GSM (CS Voice) + GSM(PS Data)	×	×	0.0
GSM (CS Voice) + Wi-Fi	√	×	3.9
GSM(PS Data) + Wi-Fi	√	×	3.9
Bluetooth + GSM	√	×	77
Bluetooth + Wi-Fi	√	×	82.5

Conclusion:

Evaluations for Simultaneous SAR, Head positions					
Test Position	**Stand Alone 1-g SAR (W/Kg)**			**∑ 1-g SAR（W/Kg）**	
	GSM 850	**PCS 1900**	**Wi-Fi**	**GSM 850+Wi-Fi**	**PCS 1900+Wi-Fi**
Left Head (Touch)	0.234	0.341	0.164	0.398	0.505
Left Head (Tilt)	0.133	0.076	0.110	0.243	0.186
Right Head (Touch)	0.221	0.338	0.174	0.395	**0.512**
Right Head (Tilt)	0.125	0.071	0.107	0.232	0.178

Evaluations for Simultaneous SAR, Body Positions					
Test Position	**Stand Alone 1-g SAR (W/Kg)**			**∑ 1-g SAR（W/Kg）**	
	GSM 850	**PCS 1900**	**Wi-Fi**	**GSM 850+Wi-Fi**	**PCS 1900+Wi-Fi**
Body-Front (1.0 cm)	0.444	0.288	0.184	0.628	0.472
Body-Back (1.0 cm)	1.217	0.606	**0.239**	**1.456**	0.845
Body-Left (1.0 cm)	N/A	N/A	N/A	N/A	N/A
Body-Right (1.0 cm)	N/A	N/A	0.077	N/A	N/A
Body-Bottom (1.0 cm)	N/A	N/A	0.069	N/A	N/A

For Bluetooth:

The max output power of BT antenna is (2.14dBm) 1.637mW < $2P_{Ref}$ (24mW), and distance between BT and GSM antenna is 77mm > 50mm, According to KDB648474, stand-alone and simultaneous SAR is not required.

For Wi-Fi:

The max output power of Wi-Fi antenna is (19.52 dBm) 89.536 mW > P_{Ref} (12mW), and distance between Wi-Fi and GSM main antenna is 3.9 mm > 2.5 mm. According to KDB648474, stand-alone is required but simultaneous SAR is not required.

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.

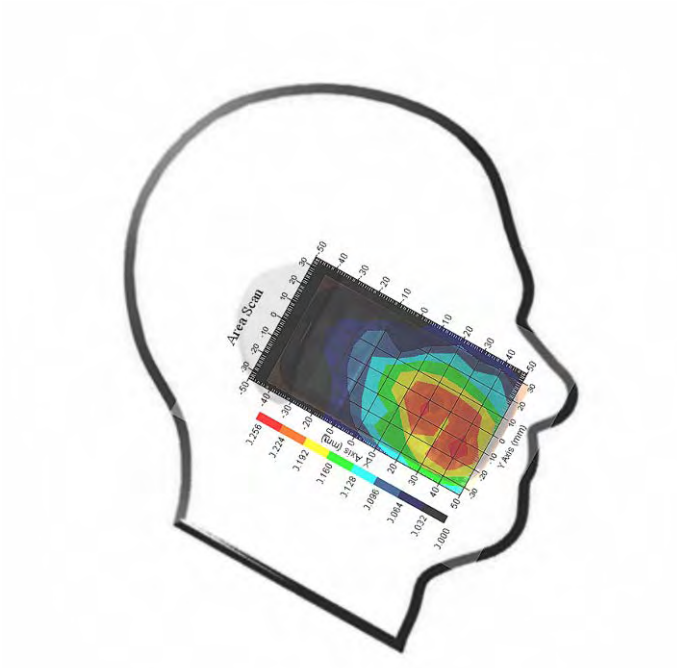
EUT SCAN PLOTS

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

Left Head Cheek (824.2 MHz 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 (%)	: 1.090
Tissue Data	
Type	: Head
Frequency	: 824.2 MHz
Epsilon	: 42.24 F/m
Sigma	: 0.90 S/m
Density	: 1000.00 kg/cu. m
Probe Data	
Serial No.	: 500-00283
Frequency Band	: 835
Duty Cycle Factor	: 8
Conversion Factor	: 6.6
Probe Sensitivity	: 1.20 1.20 1.20 µV/(V/m)2
Compression Point	: 95.00 mV
Offset	: 1.56 mm
1 gram SAR value	: 0.234 W/kg
10 gram SAR value	: 0.129 W/kg
Area Scan Peak SAR :	0.255 W/kg
Zoom Scan Peak SAR	: 0.380 W/kg

Plot 1#



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

Left Head Tilt (824.2 MHz Low Channel)

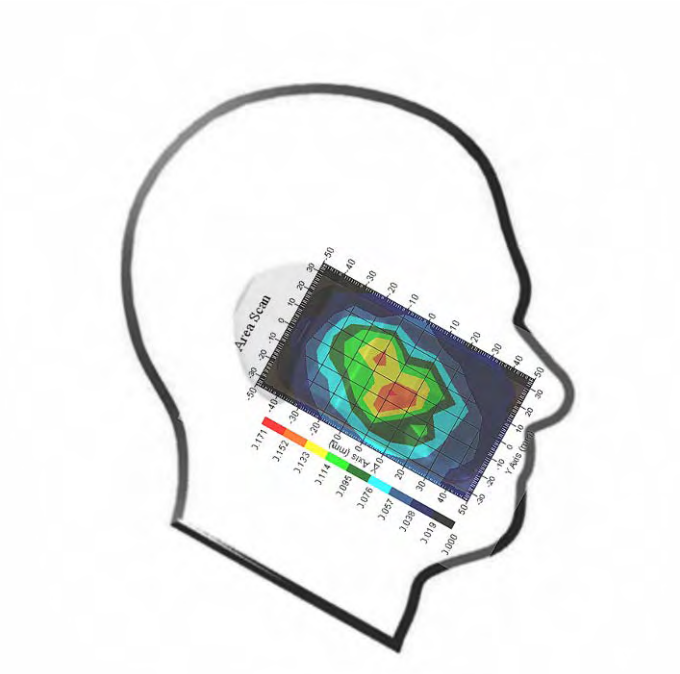
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.054 W/kg
Power Drift-Finish : 0.051 W/kg
Power Drift (%) : -2.661

Tissue Data
Type : Head
Frequency : 824.2 MHz
Epsilon : 42.24 F/m
Sigma : 0.90 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 8
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.133 W/kg
10 gram SAR value : 0.093 W/kg
Area Scan Peak SAR : 0.154 W/kg
Zoom Scan Peak SAR : 0.210 W/kg

Plot 2#

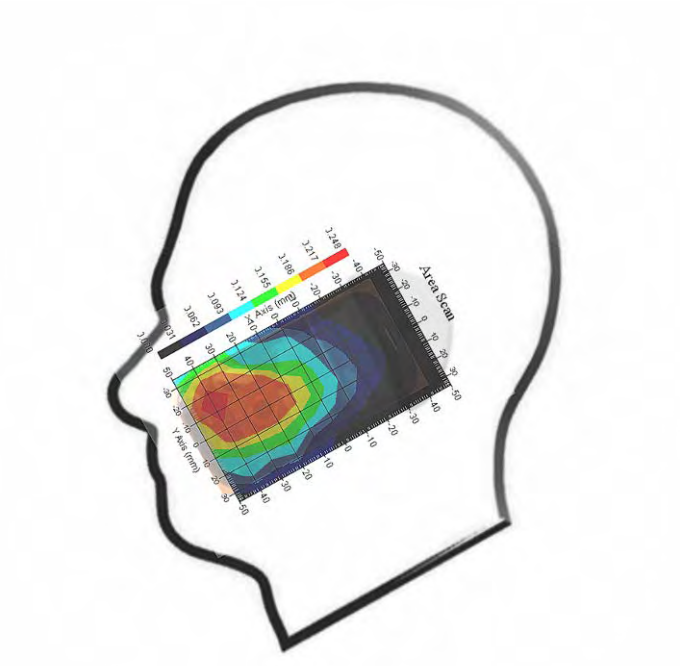


Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)

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	: 0.065 W/kg
Power Drift-Finish	: 0.064 W/kg
Power Drift (%)	: -1.537
Tissue Data	
Type	: Head
Frequency	: 824.20 MHz
Epsilon	: 42.24 F/m
Sigma	: 0.90 S/m
Density	: 1000.00 kg/cu. m
Probe Data	
Serial No.	: 500-00283
Frequency Band	: 835
Duty Cycle Factor	: 8
Conversion Factor	: 6.6
Probe Sensitivity	: 1.20 1.20 1.20 µV/(V/m)2
Compression Point	: 95.00 mV
Offset	: 1.56 mm
1 gram SAR value	: 0.221 W/kg
10 gram SAR value	: 0.115 W/kg
Area Scan Peak SAR	: 0.262 W/kg
Zoom Scan Peak SAR	: 0.387 W/kg

Plot 3#



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

Left Head Tilt (824.2 MHz Low Channel)

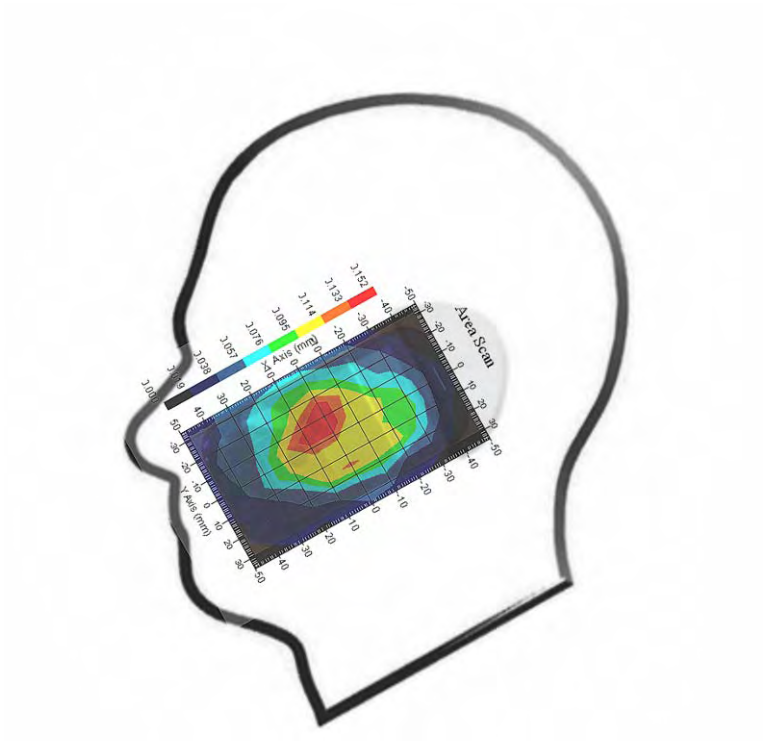
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.035 W/kg
Power Drift-Finish : 0.034 W/kg
Power Drift (%) : -2.372

Tissue Data
Type : Head
Frequency : 824.20 MHz
Epsilon : 42.24 F/m
Sigma : 0.90 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 8
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.125 W/kg
10 gram SAR value : 0.081 W/kg
Area Scan Peak SAR : 0.155 W/kg
Zoom Scan Peak SAR : 0.201 W/kg

Plot 4#



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

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

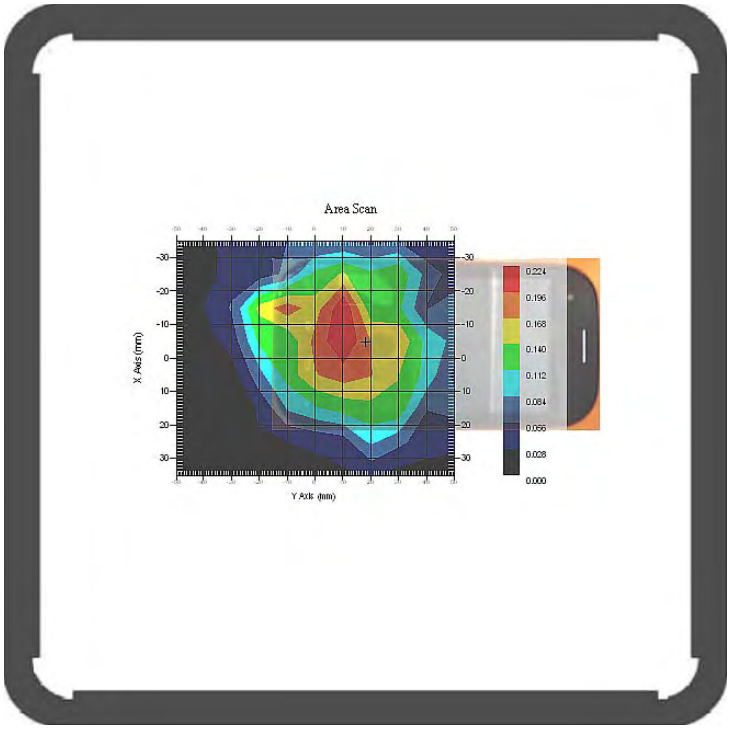
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type： : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.175 W/kg
Power Drift-Finish : 0.170 W/kg
Power Drift (%) : -2.176

Tissue Data
Type : Body
Frequency : 824.20 MHz
Epsilon : 42.24 F/m
Sigma : 0.90 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 8
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.160 W/kg
10 gram SAR value : 0.097 W/kg
Area Scan Peak SAR : 0.223 W/kg
Zoom Scan Peak SAR : 0.260 W/kg

Plot 5#



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

Body-worn-Back Headset (824.4 MHz Low Channel)

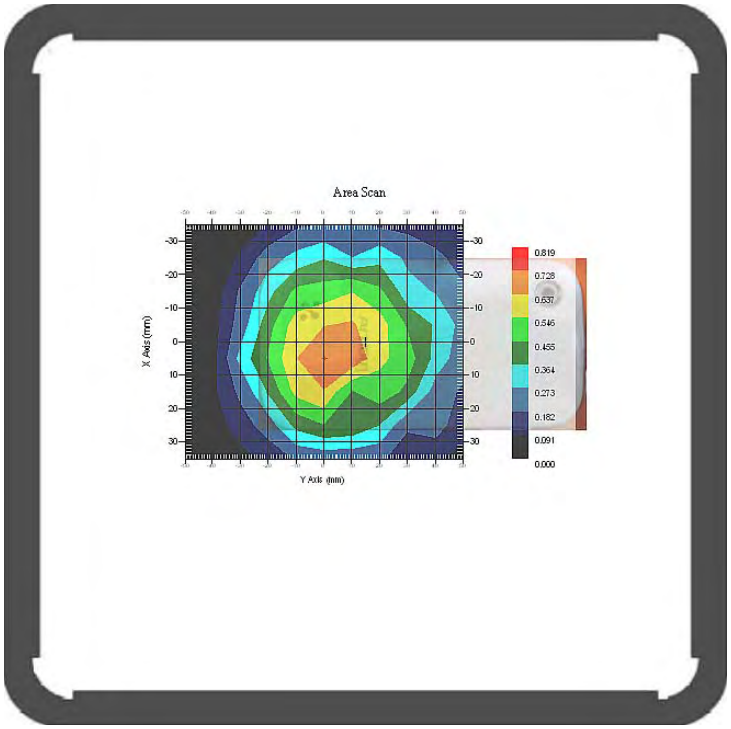
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type： : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.712 W/kg
Power Drift-Finish : 0.714 W/kg
Power Drift (%) : 1.383

Tissue Data
Type : Body
Frequency : 824.20 MHz
Epsilon : 56.19 F/m
Sigma : 0.97 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 8
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.616 W/kg
10 gram SAR value : 0.404 W/kg
Area Scan Peak SAR : 0.730 W/kg
Zoom Scan Peak SAR : 0.960 W/kg

Plot 6#



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

Body-Front (824.2 MHz Low Channel)

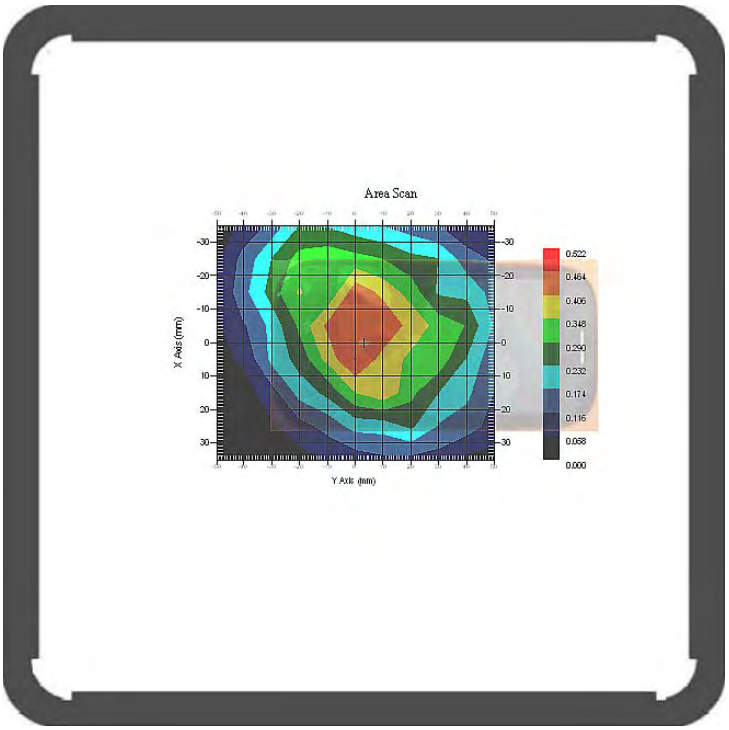
Measurement Data
Test mode : GPRS
Crest Factor : 2
Scan Type： : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.396 W/kg
Power Drift-Finish : 0.408 W/kg
Power Drift (%) : 3.054

Tissue Data
Type : Body
Frequency : 824.20 MHz
Epsilon : 56.19 F/m
Sigma : 0.97 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 2
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.444 W/kg
10 gram SAR value : 0.299 W/kg
Area Scan Peak SAR : 0.467 W/kg
Zoom Scan Peak SAR : 0.750 W/kg

Plot 7#



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

Body- Back (824.2 MHz Low Channel)

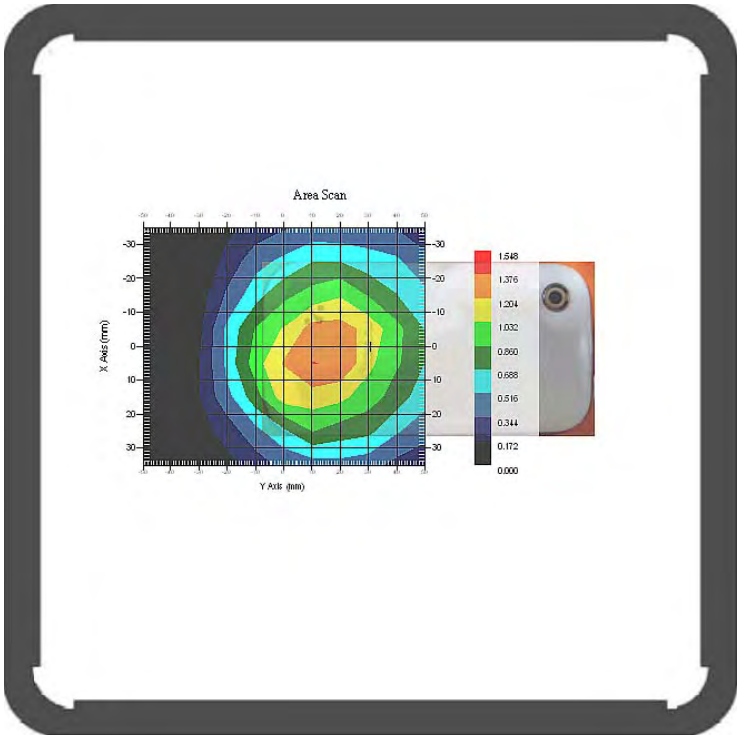
Measurement Data
Test mode : GPRS
Crest Factor : 2
Scan Type： : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 1.094 W/kg
Power Drift-Finish : 1.119 W/kg
Power Drift (%) : 2.036

Tissue Data
Type : Body
Frequency : 824.20 MHz
Epsilon : 56.19 F/m
Sigma : 0.97 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 2
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 1.217 W/kg
10 gram SAR value : 0.800 W/kg
Area Scan Peak SAR : 1.379 W/kg
Zoom Scan Peak SAR : 1.891 W/kg

Plot 8#



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

Body- Back (836.6 MHz Middle Channel)

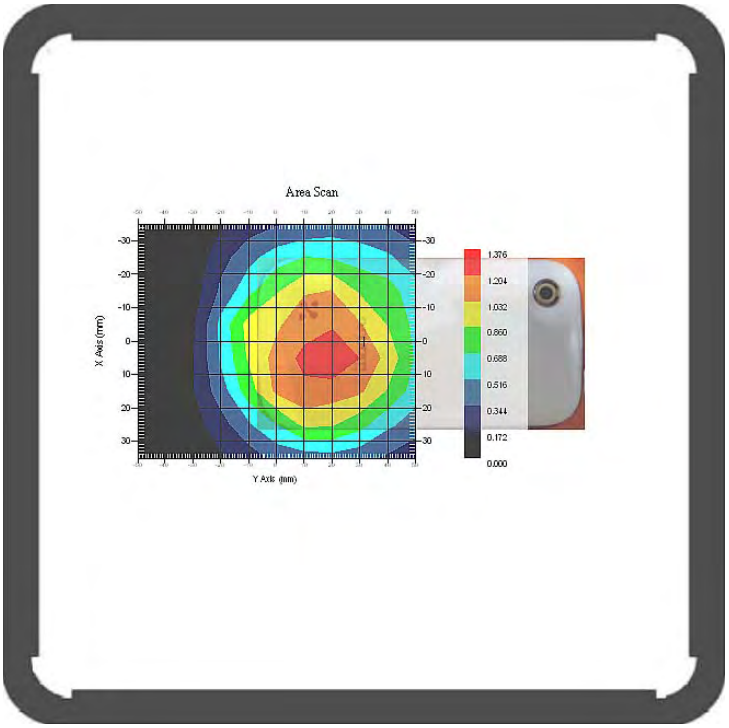
Measurement Data
Test mode : GPRS
Crest Factor : 2
Scan Type： : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 1.216 W/kg
Power Drift-Finish : 1.176 W/kg
Power Drift (%) : -3.320

Tissue Data
Type : Body
Frequency : 836.60 MHz
Epsilon : 56.27 F/m
Sigma : 0.99 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 2
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 1.194 W/kg
10 gram SAR value : 0.817 W/kg
Area Scan Peak SAR : 1.376 W/kg
Zoom Scan Peak SAR : 1.911 W/kg

Plot 9#



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

Body- Back (848.8 MHz High Channel)

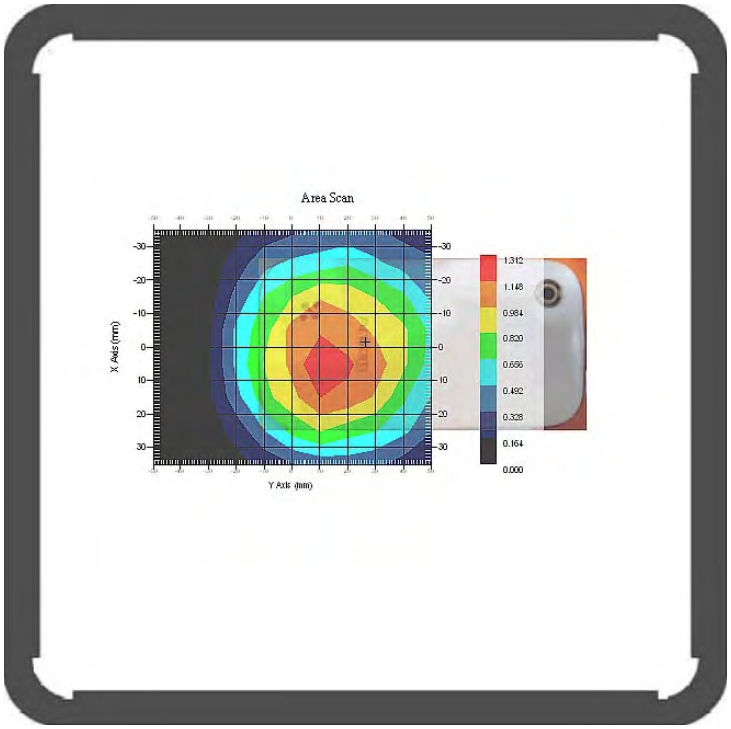
Measurement Data
Test mode : GPRS
Crest Factor : 2
Scan Type： : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 1.102 W/kg
Power Drift-Finish : 1.097 W/kg
Power Drift (%) : -1.779

Tissue Data
Type : Body
Frequency : 848.80 MHz
Epsilon : 56.34 F/m
Sigma : 1.00 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 2
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 1.205 W/kg
10 gram SAR value : 0.775 W/kg
Area Scan Peak SAR : 1.312 W/kg
Zoom Scan Peak SAR : 1.721 W/kg

Plot 10#



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

Left Head Cheek (1909.8 MHz High Channel)

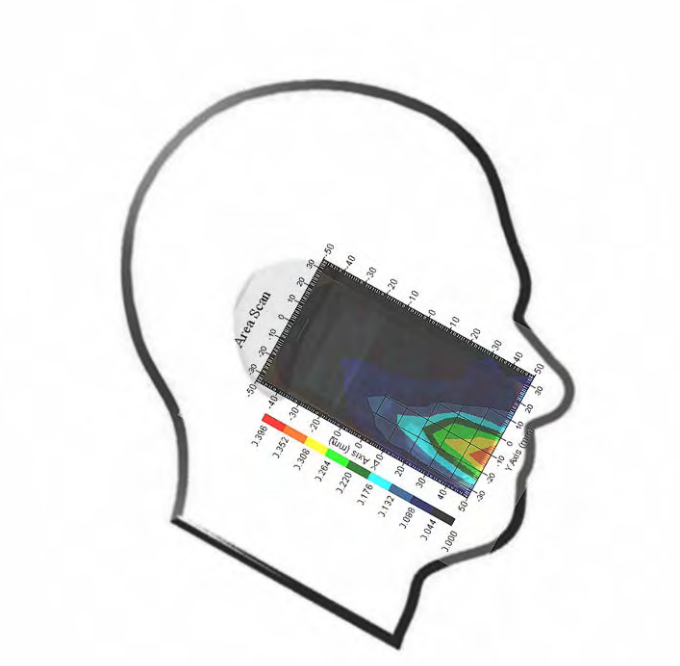
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.025 W/kg
Power Drift-Finish : 0.025 W/kg
Power Drift (%) : -0.595

Tissue Data
Type : Head
Frequency : 1909.80 MHz
Epsilon : 41.49 F/m
Sigma : 1.44 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 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.341 W/kg
10 gram SAR value : 0.190 W/kg
Area Scan Peak SAR : 0.364 W/kg
Zoom Scan Peak SAR : 0.715 W/kg

Plot 11#



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

Left Head Tilt (1909.8MHz High Channel)

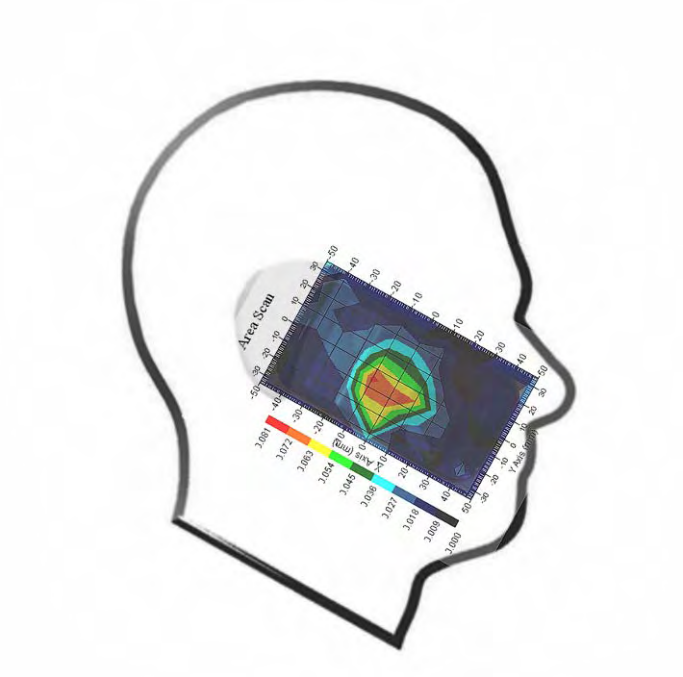
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.033 W/kg
Power Drift-Finish : 0.032 W/kg
Power Drift (%) : -3.693

Tissue Data
Type : Head
Frequency : 1909.80 MHz
Epsilon : 41.49 F/m
Sigma : 1.44 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 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.076 W/kg
10 gram SAR value : 0.035 W/kg
Area Scan Peak SAR : 0.087 W/kg
Zoom Scan Peak SAR : 0.139 W/kg

Plot 12#



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

Right Head Cheek (1909.8 MHz High Channel)

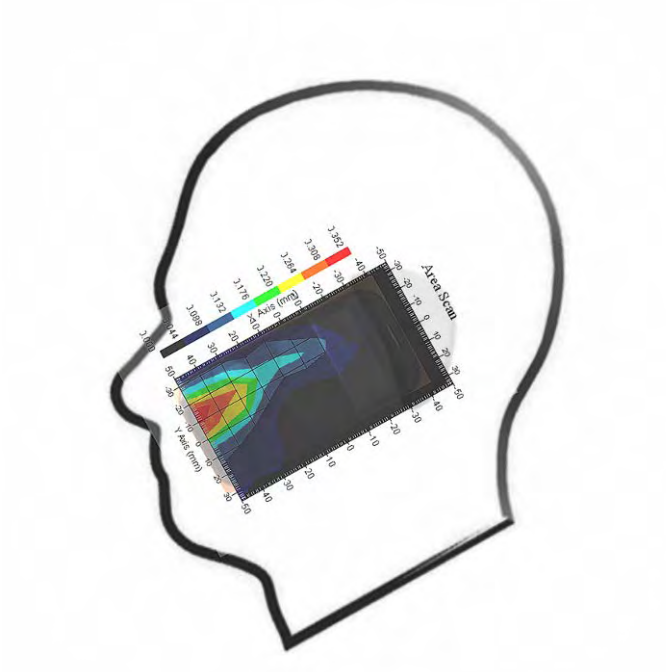
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.014 W/kg
Power Drift-Finish : 0.015 W/kg
Power Drift (%) : 3.694

Tissue Data
Type : Head
Frequency : 1909.80 MHz
Epsilon : 41.49 F/m
Sigma : 1.44 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 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.338 W/kg
10 gram SAR value : 0.183 W/kg
Area Scan Peak SAR : 0.351 W/kg
Zoom Scan Peak SAR : 0.760 W/kg

Plot 13#



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

Right Head Tilt (1909.8 MHz High Channel)

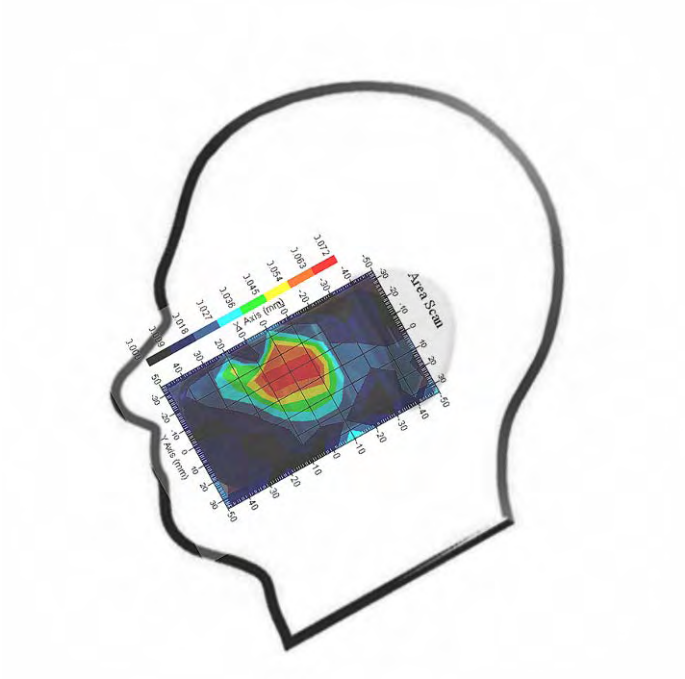
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.007 W/kg
Power Drift-Finish : 0.007 W/kg
Power Drift (%) : 1.349

Tissue Data
Type : Head
Frequency : 1909.80 MHz
Epsilon : 41.49 F/m
Sigma : 1.44 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 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.071 W/kg
10 gram SAR value : 0.043 W/kg
Area Scan Peak SAR : 0.081 W/kg
Zoom Scan Peak SAR : 0.130 W/kg

Plot 14#



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

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

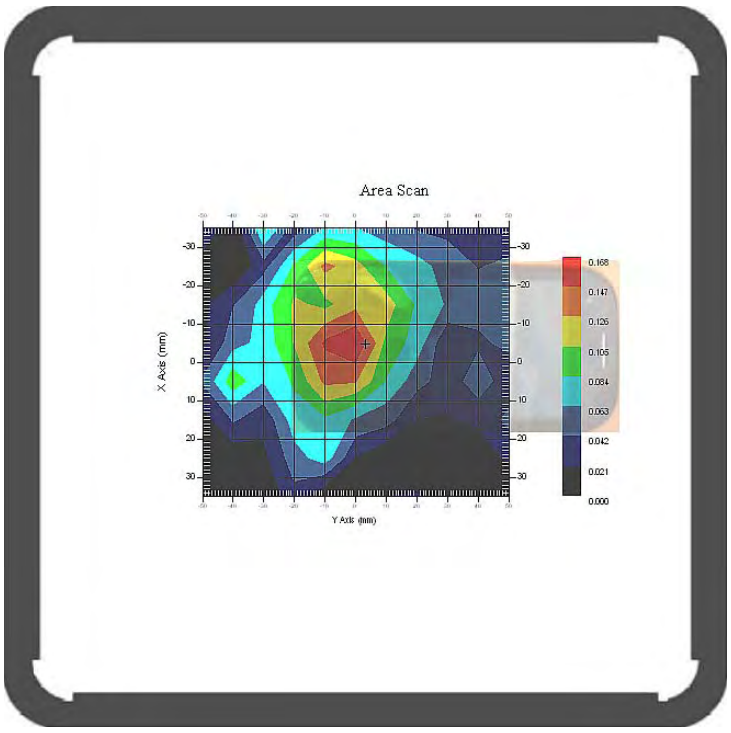
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.134 W/kg
Power Drift-Finish : 0.134 W/kg
Power Drift (%) : -1.616

Tissue Data
Type : Body
Frequency : 1909.80 MHz
Epsilon : 53.62 F/m
Sigma : 1.56 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 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.156 W/kg
10 gram SAR value : 0.085 W/kg
Area Scan Peak SAR : 0.168 W/kg
Zoom Scan Peak SAR : 0.350 W/kg

Plot 15#



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

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

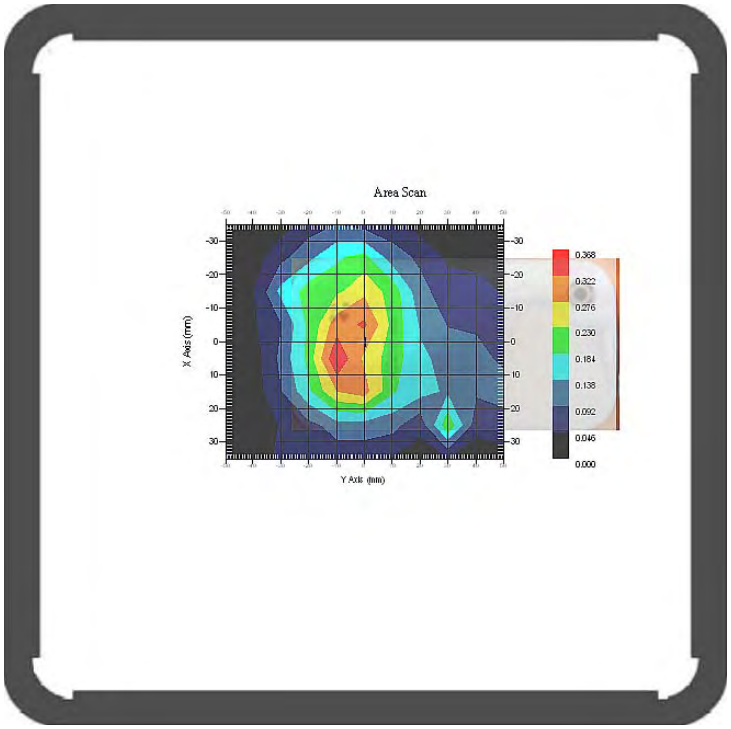
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.304 W/kg
Power Drift-Finish : 0.297 W/kg
Power Drift (%) : -2.587

Tissue Data
Type : Body
Frequency : 1909.80 MHz
Epsilon : 53.62 F/m
Sigma : 1.56 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 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.333 W/kg
10 gram SAR value : 0.166 W/kg
Area Scan Peak SAR : 0.365 W/kg
Zoom Scan Peak SAR : 0.720 W/kg

Plot 16#



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

Body-Front (1909.8 MHz High Channel)

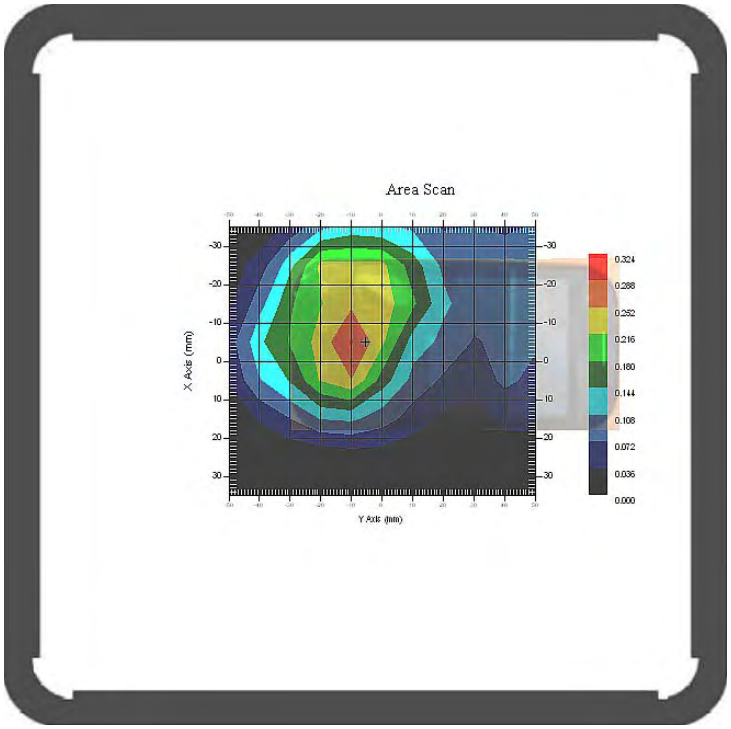
Measurement Data
Test mode : GPRS
Crest Factor : 2
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.226 W/kg
Power Drift-Finish : 0.221 W/kg
Power Drift (%) : -1.895

Tissue Data
Type : Body
Frequency : 1909.80 MHz
Epsilon : 53.62 F/m
Sigma : 1.56 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 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.288 W/kg
10 gram SAR value : 0.163 W/kg
Area Scan Peak SAR : 0.292 W/kg
Zoom Scan Peak SAR : 0.570 W/kg

Plot 17#



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

Body- Back (1909.8 MHz High Channel)

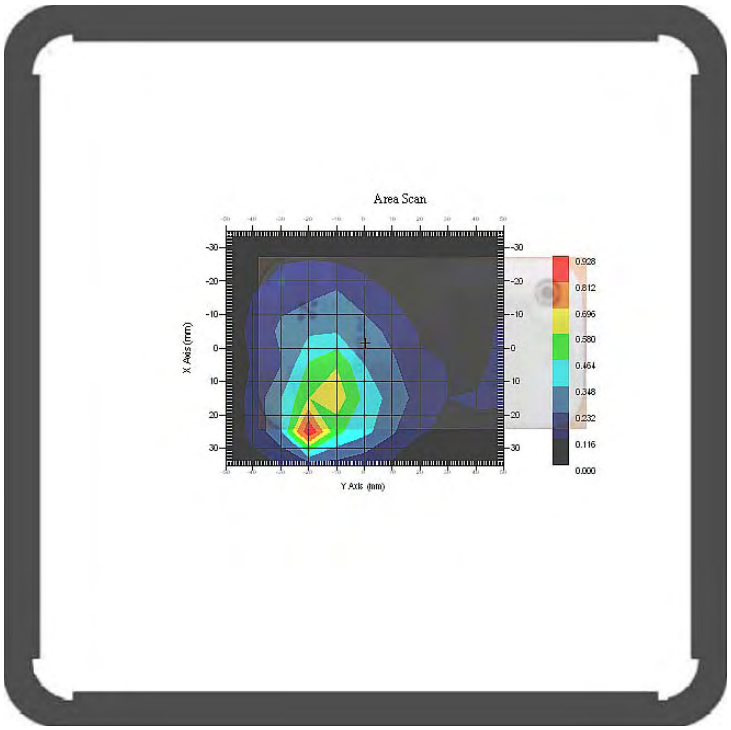
Measurement Data
Test mode : GPRS
Crest Factor : 2
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.289 W/kg
Power Drift-Finish : 0.284 W/kg
Power Drift (%) : -0.939

Tissue Data
Type : Body
Frequency : 1909.80 MHz
Epsilon : 53.62 F/m
Sigma : 1.56 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 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.606 W/kg
10 gram SAR value : 0.427 W/kg
Area Scan Peak SAR : 0.826 W/kg
Zoom Scan Peak SAR : 1.191 W/kg

Plot 18#



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

802.11b; Left Head Cheek (2437 MHz Channel 6)

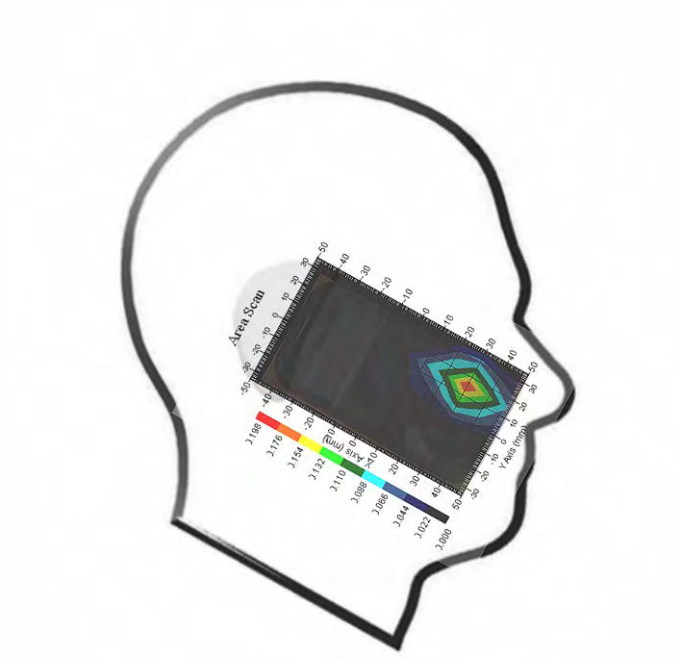
Measurement Data
Crest Factor : 1
Scan Type : Complete
Area Scan : 7x10x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.009 W/kg
Power Drift-Finish : 0.009 W/kg
Power Drift (%) : -2.464

Tissue Data
Type : Head
Frequency : 2437 MHz
Epsilon : 39.10 F/m
Sigma : 1.82 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 2450
Duty Cycle Factor : 1
Conversion Factor : 4.9
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.164 W/kg
10 gram SAR value : 0.087 W/kg
Area Scan Peak SAR : 0.196 W/kg
Zoom Scan Peak SAR : 0.347 W/kg

Plot 19#



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

802.11b; Left Head Tilt (2437 MHz Channel 6)

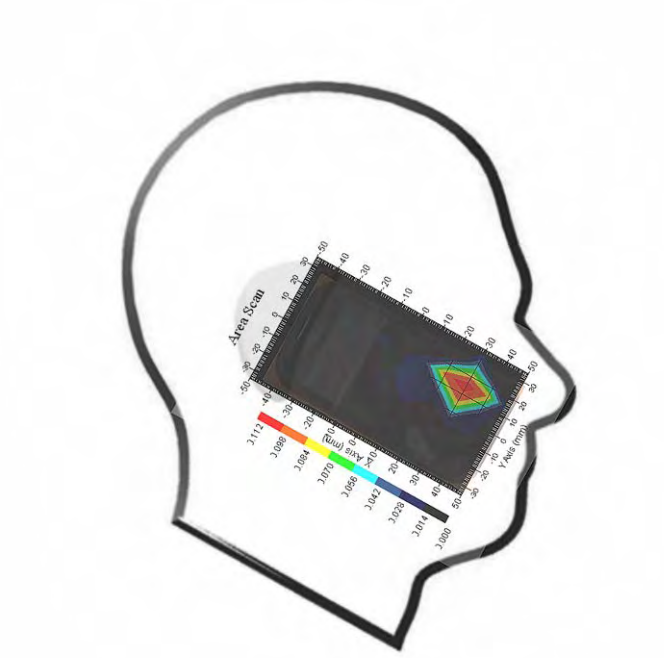
Measurement Data
Crest Factor : 1
Scan Type : Complete
Area Scan : 7x10x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.001 W/kg
Power Drift-Finish : 0.001 W/kg
Power Drift (%) : 3.108

Tissue Data
Type : Head
Frequency : 2437 MHz
Epsilon : 39.10 F/m
Sigma : 1.82 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 2450
Duty Cycle Factor : 1
Conversion Factor : 4.9
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.110 W/kg
10 gram SAR value : 0.063 W/kg
Area Scan Peak SAR : 0.118 W/kg
Zoom Scan Peak SAR : 0.207 W/kg

Plot 20#



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

802.11b; Right Head Cheek (2437 MHz Channel 6)

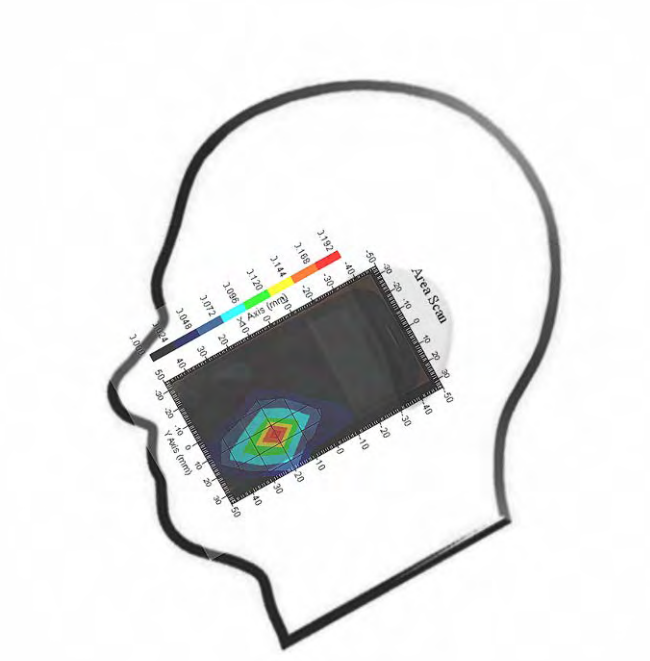
Measurement Data
Crest Factor : 1
Scan Type : Complete
Area Scan : 7x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.030 W/kg
Power Drift-Finish : 0.029 W/kg
Power Drift (%) : -1.498

Tissue Data
Type : Head
Frequency : 2437 MHz
Epsilon : 39.10 F/m
Sigma : 1.82 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 2450
Duty Cycle Factor : 1
Conversion Factor : 4.9
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.174 W/kg
10 gram SAR value : 0.091 W/kg
Area Scan Peak SAR : 0.192 W/kg
Zoom Scan Peak SAR : 0.412 W/kg

Plot 21#



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

802.11b; Right Head Tilt (2437 MHz Channel 6)

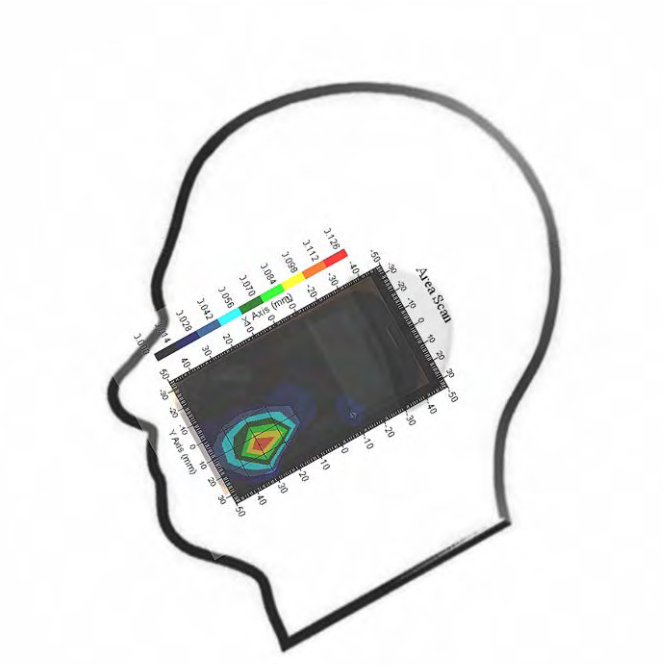
Measurement Data
Crest Factor : 1
Scan Type : Complete
Area Scan : 7x10x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.029 W/kg
Power Drift-Finish : 0.029 W/kg
Power Drift (%) : -1.395

Tissue Data
Type : Head
Frequency : 2437 MHz
Epsilon : 39.10 F/m
Sigma : 1.82 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 2450
Duty Cycle Factor : 1
Conversion Factor : 4.9
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.107 W/kg
10 gram SAR value : 0.053 W/kg
Area Scan Peak SAR : 0.122 W/kg
Zoom Scan Peak SAR : 0.219 W/kg

Plot 22#



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

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

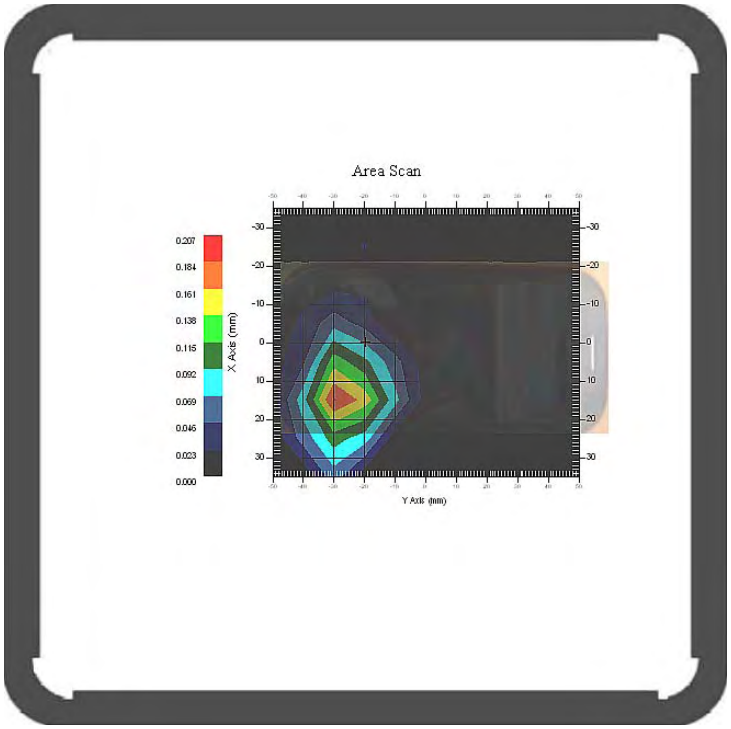
Measurement Data
Crest Factor : 1
Scan Type : Complete
Area Scan : 7x10x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.008 W/kg
Power Drift-Finish : 0.008 W/kg
Power Drift (%) : -3.054

Tissue Data
Type : BODY
Frequency : 2437 MHz
Epsilon : 52.82 F/m
Sigma : 2.00 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 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.184 W/kg
10 gram SAR value : 0.102 W/kg
Area Scan Peak SAR : 0.201 W/kg
Zoom Scan Peak SAR : 0.337 W/kg

Plot 23#



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

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

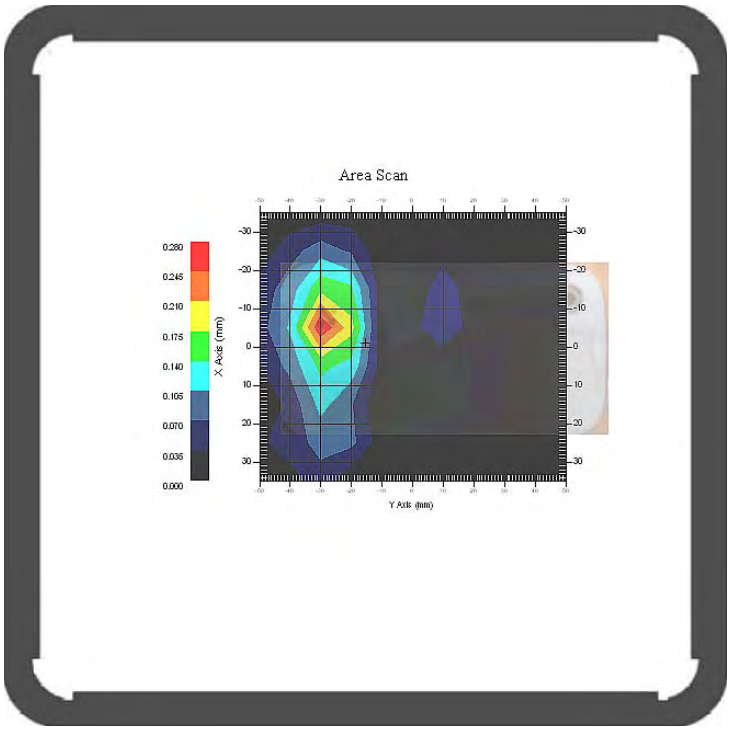
Measurement Data
Crest Factor : 1
Scan Type : Complete
Area Scan : 7x10x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.028 W/kg
Power Drift-Finish : 0.027 W/kg
Power Drift (%) : -2.940

Tissue Data
Type : BODY
Frequency : 2437 MHz
Epsilon : 52.82 F/m
Sigma : 2.00 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 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.239 W/kg
10 gram SAR value : 0.140 W/kg
Area Scan Peak SAR : 0.271 W/kg
Zoom Scan Peak SAR : 0.417 W/kg

Plot 24#



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

802.11b; Body-Right (2437 MHz Channel 6)

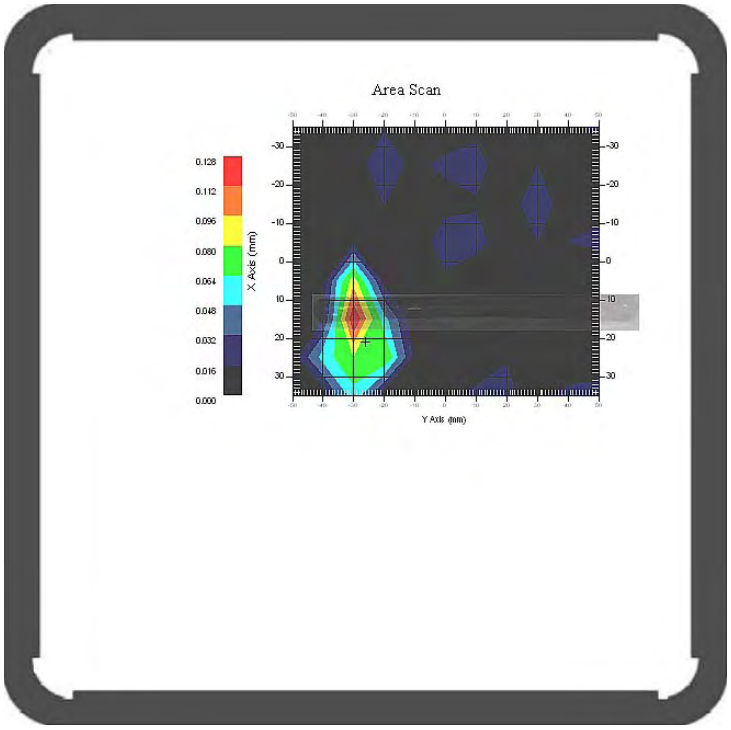
Measurement Data
Crest Factor : 1
Scan Type : Complete
Area Scan : 7x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.021 W/kg
Power Drift-Finish : 0.021 W/kg
Power Drift (%) : -2.560

Tissue Data
Type : BODY
Frequency : 2437 MHz
Epsilon : 52.82 F/m
Sigma : 2.00 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 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.077 W/kg
10 gram SAR value : 0.036 W/kg
Area Scan Peak SAR : 0.082 W/kg
Zoom Scan Peak SAR : 0.142 W/kg

Plot 25#



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

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

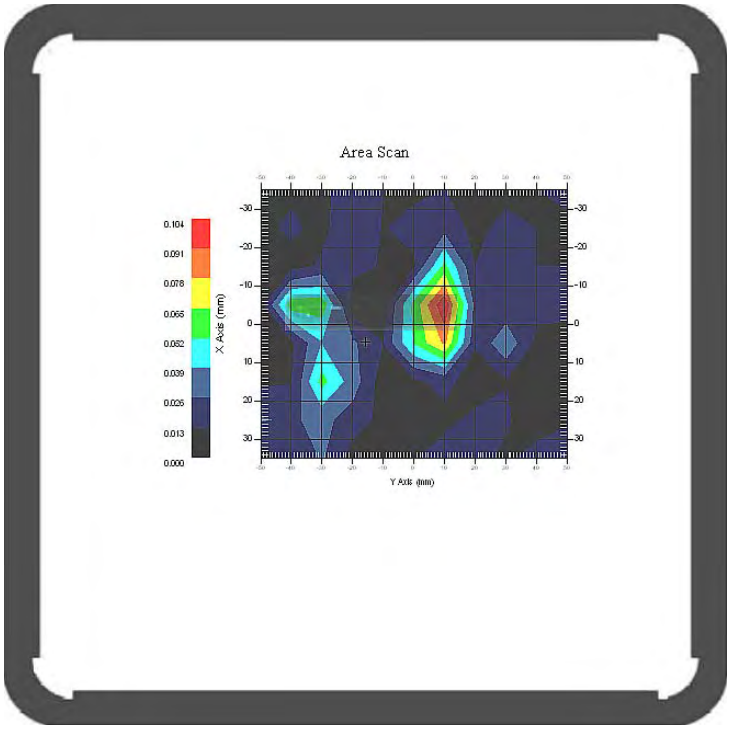
Measurement Data
Crest Factor : 1
Scan Type : Complete
Area Scan : 7x10x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.021 W/kg
Power Drift-Finish : 0.020 W/kg
Power Drift (%) : -1.054

Tissue Data
Type : BODY
Frequency : 2437 MHz
Epsilon : 52.82 F/m
Sigma : 2.00 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 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.069 W/kg
10 gram SAR value : 0.047 W/kg
Area Scan Peak SAR : 0.082 W/kg
Zoom Scan Peak SAR : 0.174 W/kg

Plot 26#



APPENDIX A – MEASUREMENT UNCERTAINTY

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

Measurement Uncertainty for 300 MHz to 3 GHz

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	$\sqrt{3}$	$(1\text{-cp})^{1/2}$	$(1\text{-cp})_{1/2}$	1.5	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	$\sqrt{cp}$	4.4	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Readout Electronics	1.0	normal	1	1	1	1.0	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0	1.0
RF Ambient Condition -Noise	0.95	rectangular	$\sqrt{3}$	1	1	0.55	0.55
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	2.6	normal	1	1	1	2.6	2.6
Device Holder Uncertainty	2.0	normal	1	1	1	2.0	2.0
Drift of Output Power	0.4	rectangular	$\sqrt{3}$	1	1	0.2	0.2
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.)	2.6	normal	1	0.7	0.5	1.8	1.3
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7	1.4
Liquid Permittivity(meas.)	2.7	normal	1	0.6	0.5	1.6	1.4
Combined Uncertainty		RSS				9.1	8.8
Combined Uncertainty (coverage factor=2)		Normal(k=2)				18.2	17.6

APPENDIX B – PROBE CALIBRATION CERTIFICATES

NCL CALIBRATION LABORATORIES

Calibration File No.: 1251-1258

Client.: BACL Lab

CERTIFICATE OF CALIBRATION

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

Equipment: Miniature Isotropic RF Probe
Record of Calibration
Head and Body
Manufacturer: APREL Laboratories
Model No.: E-020
Serial No.: 500-00283

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

Calibrated: 14th July 2011
Released on: 14th July 2011

Approved By: Stuart Nicol

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

Released By: _____

NCL CALIBRATION LABORATORIES
303 Terry Fox Drive, Suite 102
Kanata, Ontario
CANADA K2K 3J1
Division of APREL
TEL: (613) 435-8300
FAX: (613) 435-8306

NCL Calibration Laboratories
Division of APREL Inc.

Introduction

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

Calibration Method

Probes are calibrated using the following methods.

<1000MHz
TEM Cell for sensitivity in air
Standard phantom using temperature transfer method for sensitivity in tissue

>1000MHz
Waveguide* method to determine sensitivity in air and tissue
*Waveguide is numerically (simulation) assessed to determine the field distribution and power

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

References

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

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Conditions

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

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

Primary Measurement Standards

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

Secondary Measurement Standards

Signal Generator Agilent E4438C -506	MY55182336	June 7, 2012

Attestation

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

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

Stuart Nicol

Jesse Hones

NCL Calibration Laboratories
Division of APREL Inc.

Probe Summary

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

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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
2450B	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

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.

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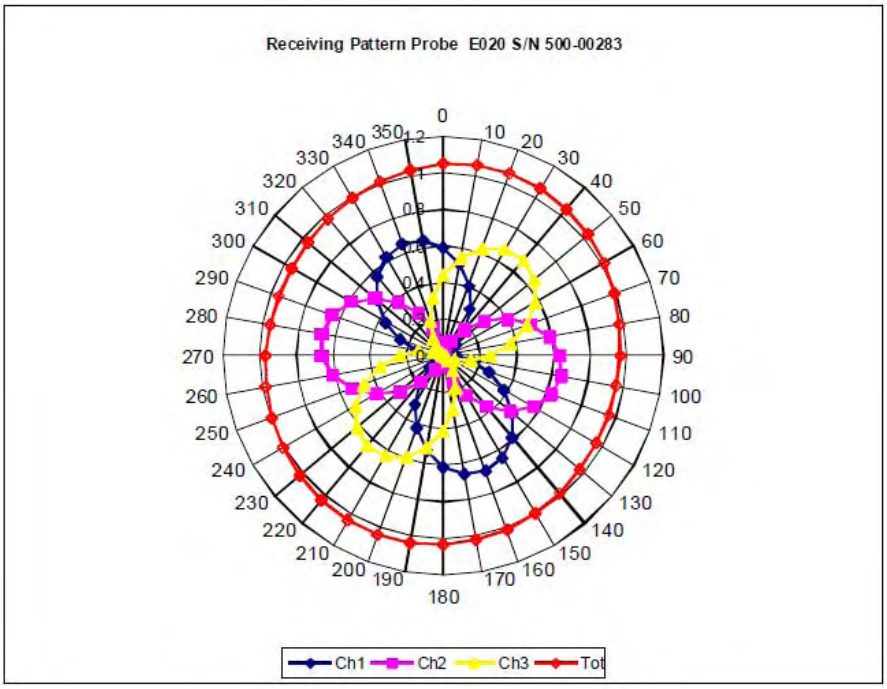
Receiving Pattern Air



Page 7 of 10
This page has been reviewed for content and attested to on Page 2 of this document.

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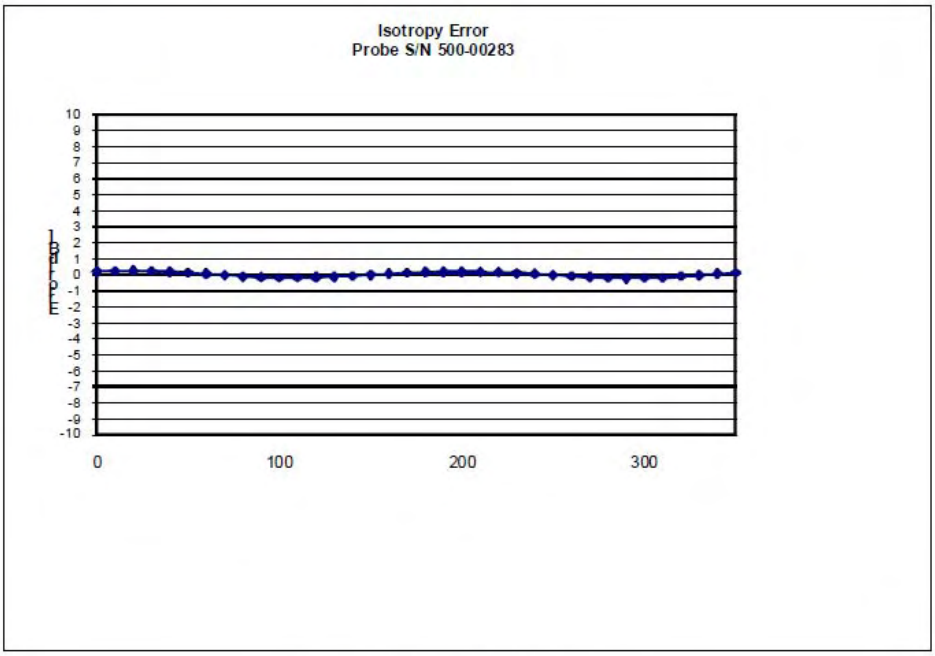
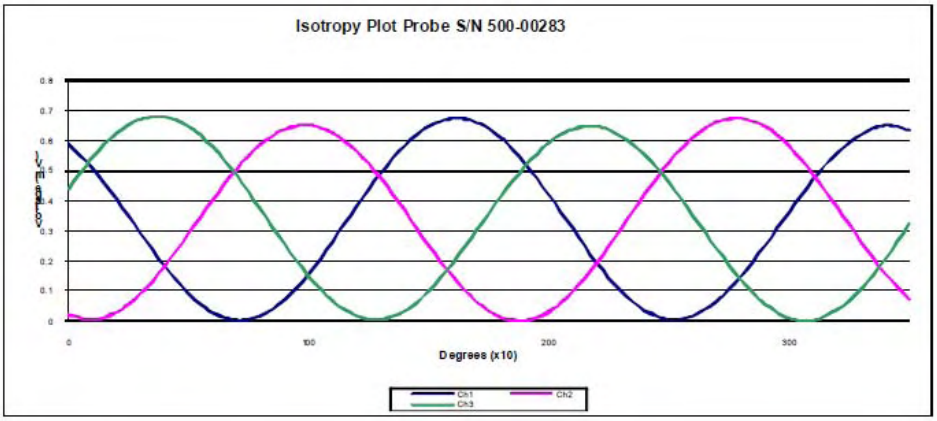
Isotropy Error Air





Isotropicity Tissue: 0.10 dB

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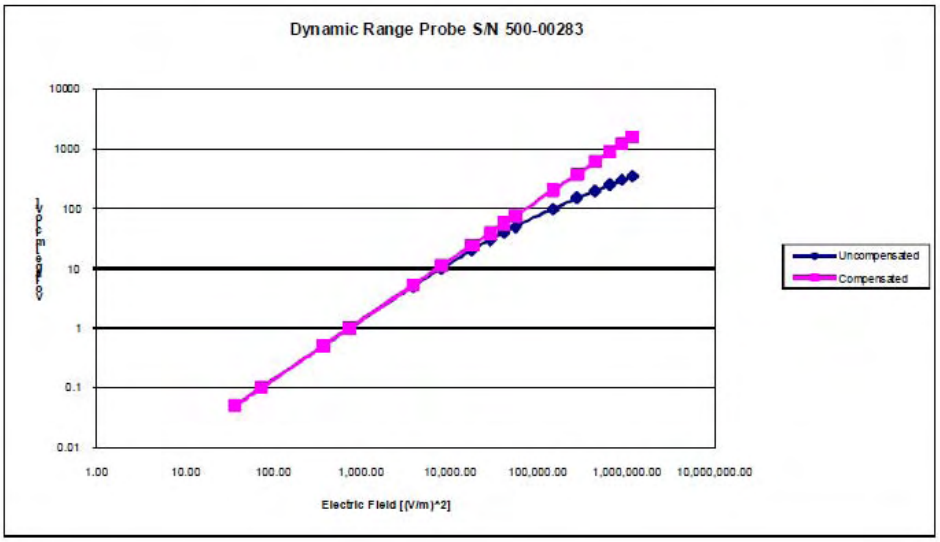
Dynamic Range



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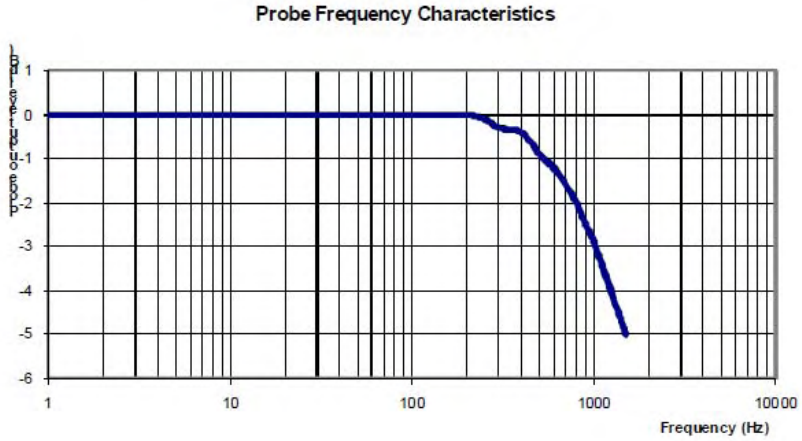
Video Bandwidth



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

Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2011.

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. Division of APREL Lab.
Kanata, ONTARIO TEL: (613) 435-8300
CANADA K2K 3J1 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

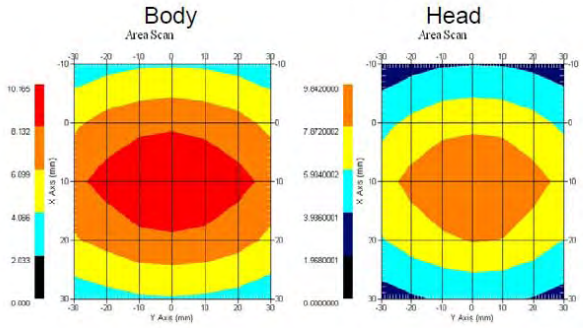
Length: 162.2 mm
Height: 89.4 mm

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



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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.

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)**

4

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

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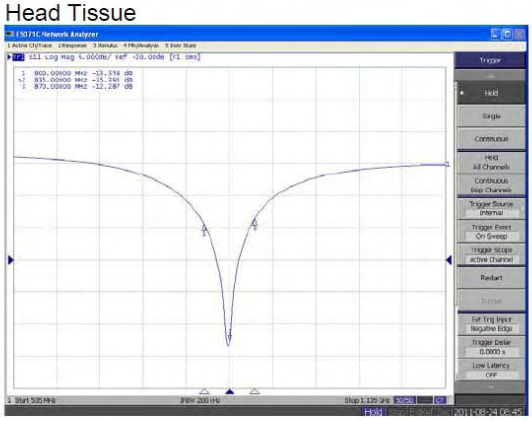
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

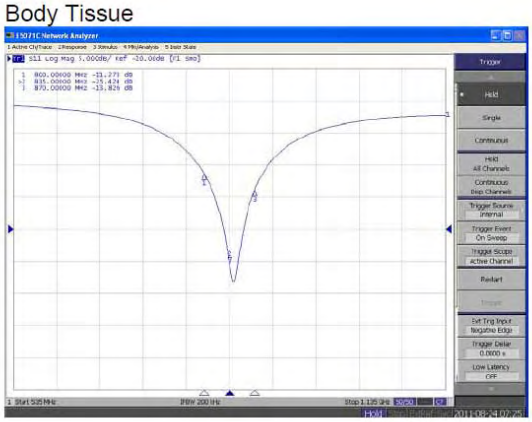
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head Tissue



Body Tissue



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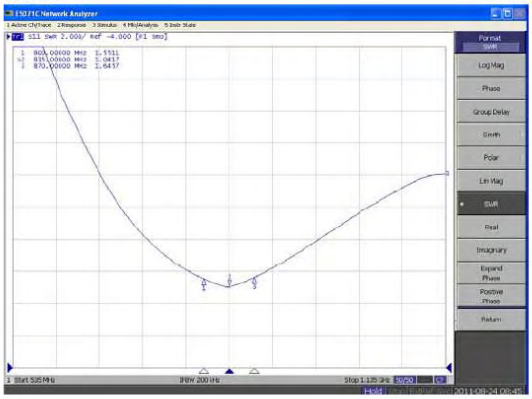
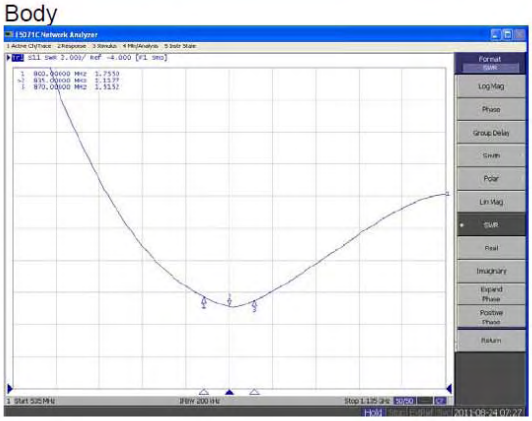
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

SWR
Head



Body



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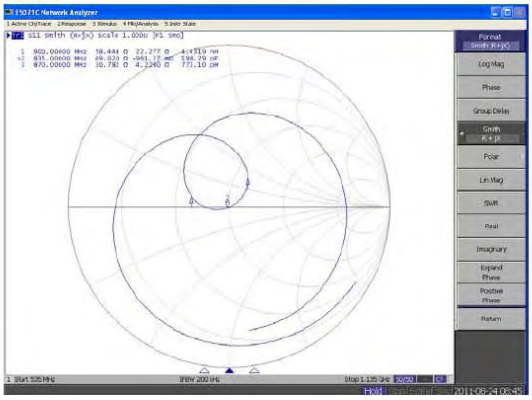
This page has been reviewed for content and attested to by signature within this document.

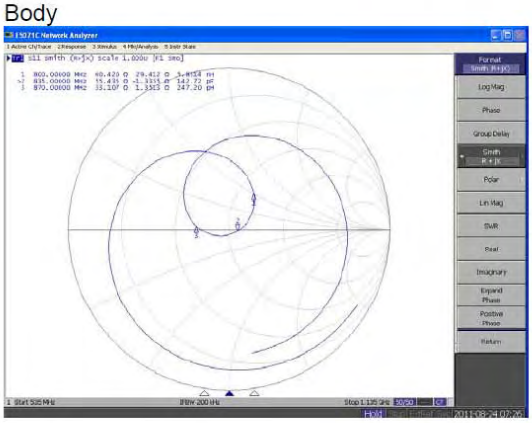
NCL Calibration Laboratories
Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



Body



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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.

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.

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. Division of APREL Lab.
Kanata, ONTARIO TEL: (613) 435-8300
CANADA K2K 3J1 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

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

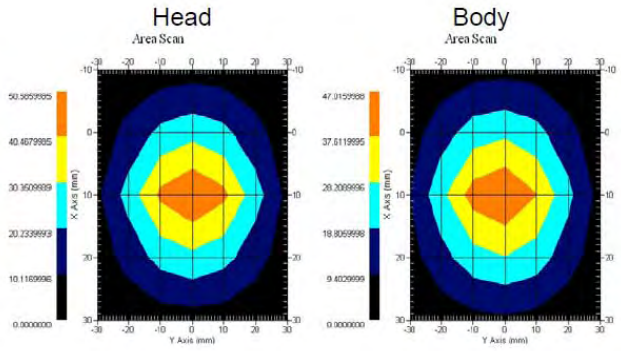
Length: 67.1 mm
Height: 38.9 mm

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



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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.

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)**

4

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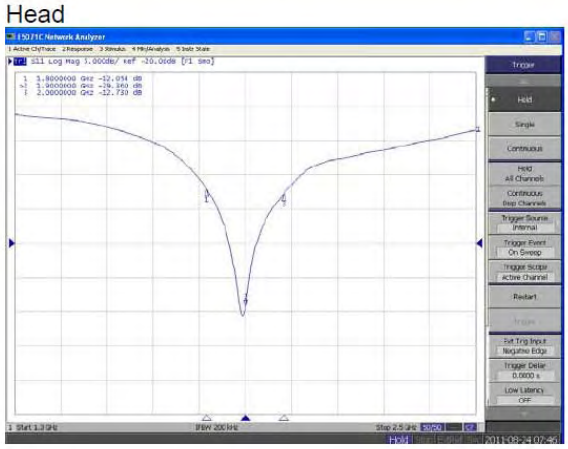
This page has been reviewed for content and attested to by signature within this document.

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



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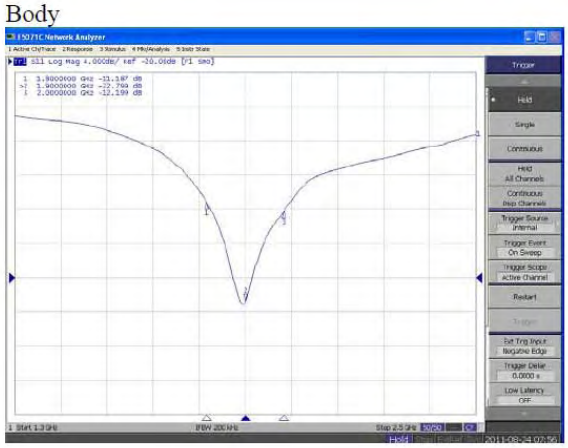

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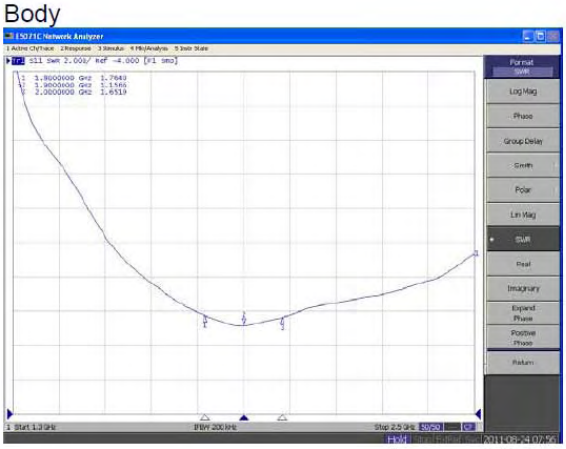
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

SWR

Head

Body



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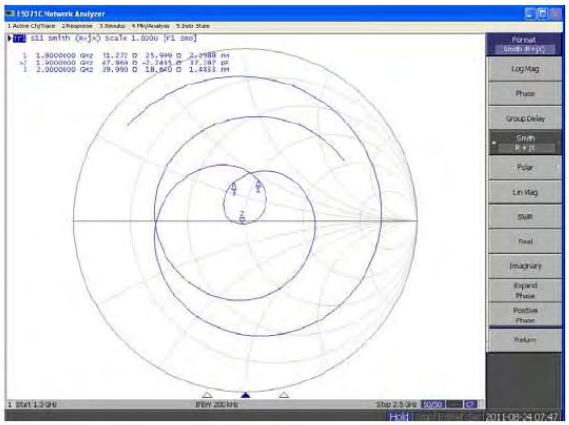
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories

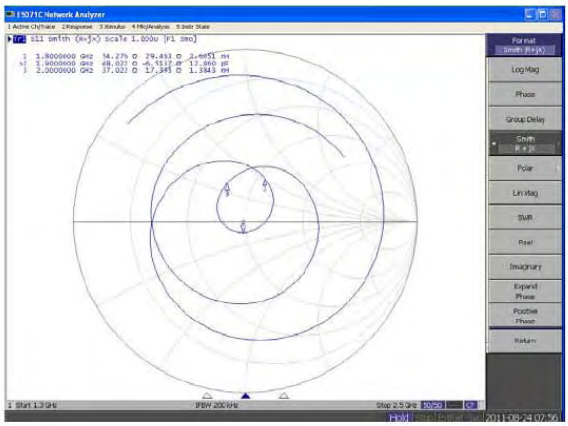
Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



Body



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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.

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.

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. Division of APREL Lab.
Kanata, ONTARIO TEL: (613) 435-8300
CANADA K2K 3J1 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

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

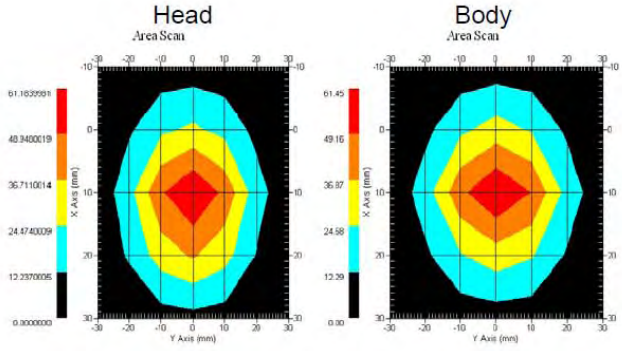
Length: 52.4 mm
Height: 30.3 mm

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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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 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)**

4

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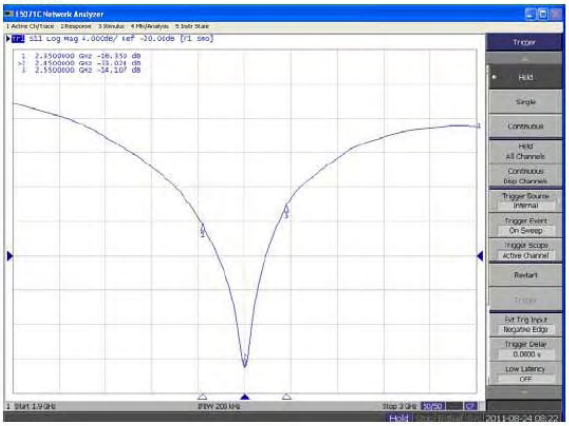
This page has been reviewed for content and attested to by signature within this document.

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



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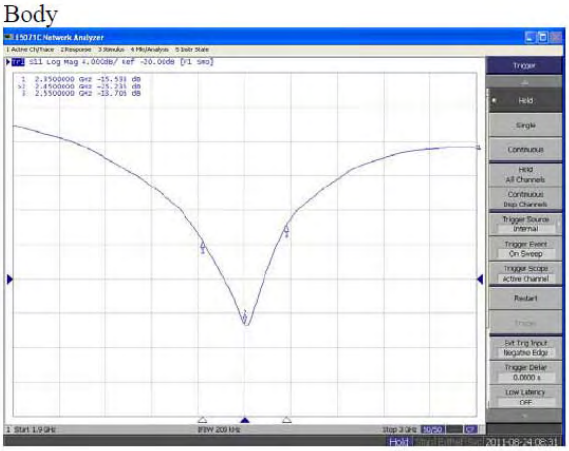

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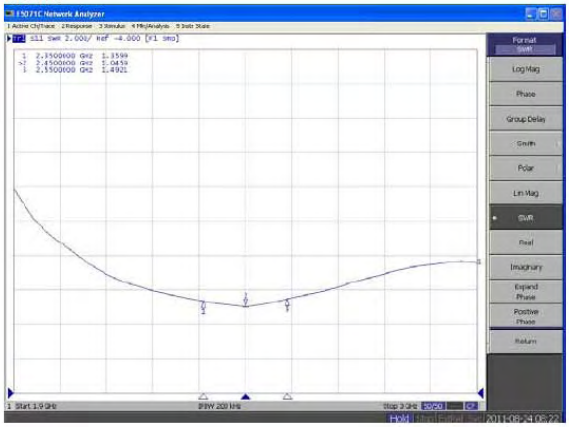
This page has been reviewed for content and attested to by signature within this document.

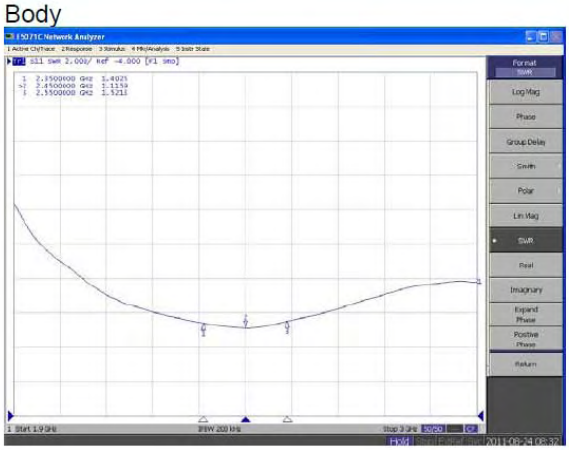
NCL Calibration Laboratories
Division of APREL Laboratories.

SWR

Head



Body



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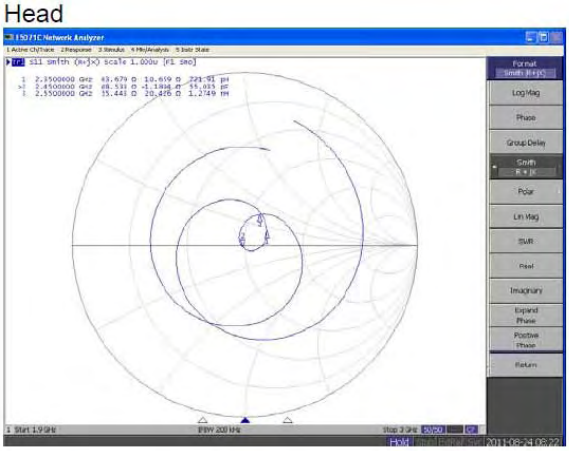
This page has been reviewed for content and attested to by signature within this document.

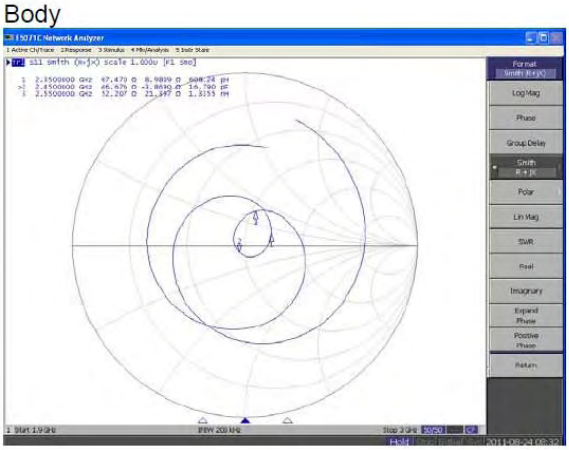
NCL Calibration Laboratories
Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



Body



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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.

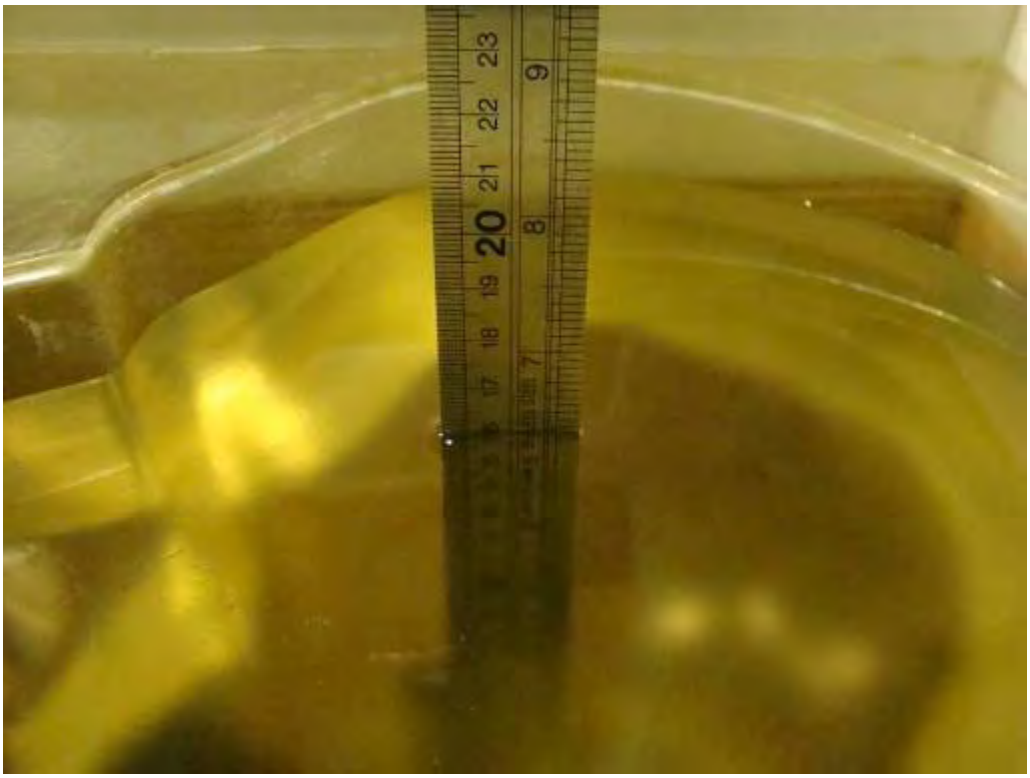
Test Equipment

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.

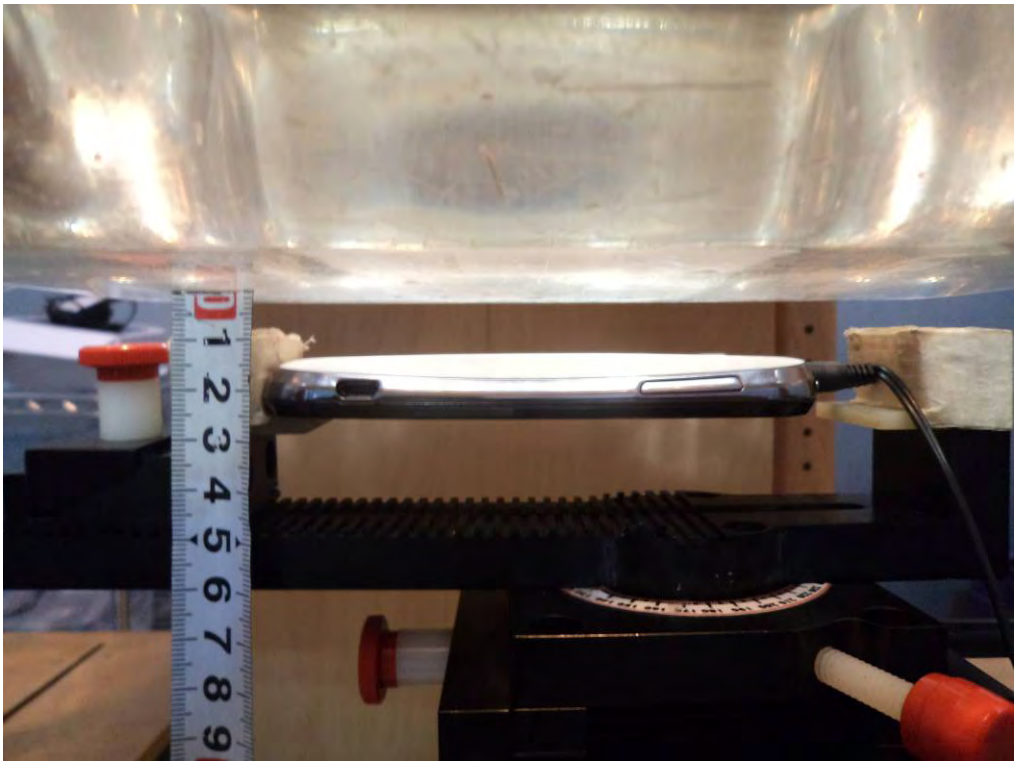
This page has been reviewed for content and attested to by signature within this document.

APPENDIX D – EUT TEST POSITION PHOTOS

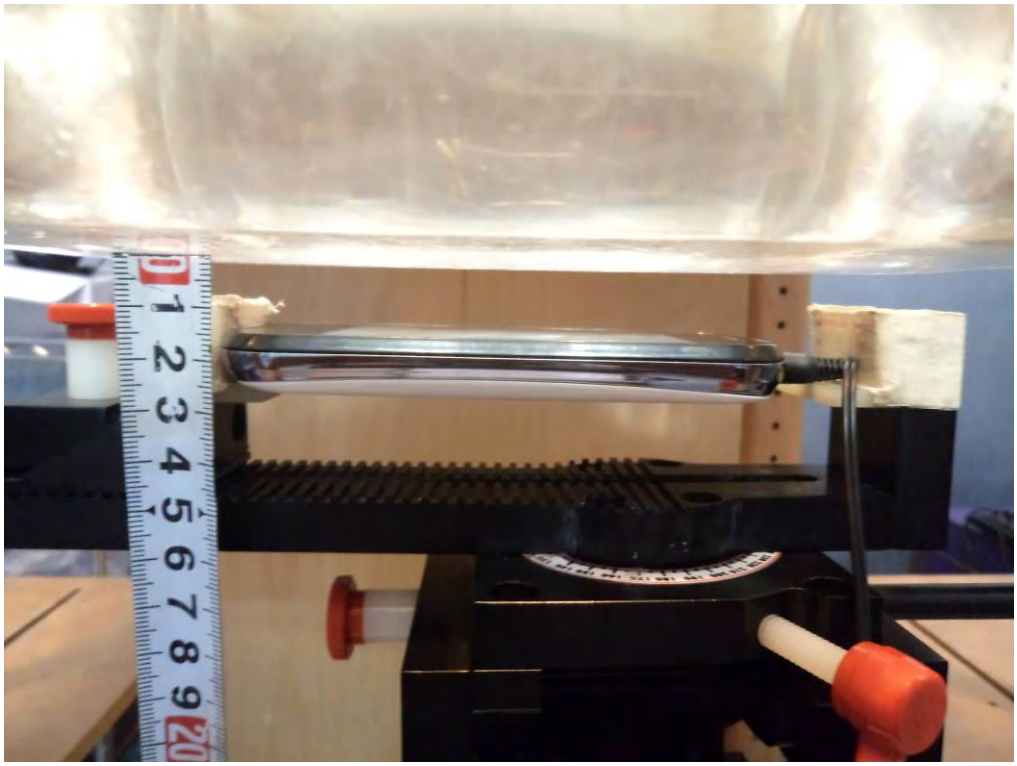
Liquid depth ≥ 15cm



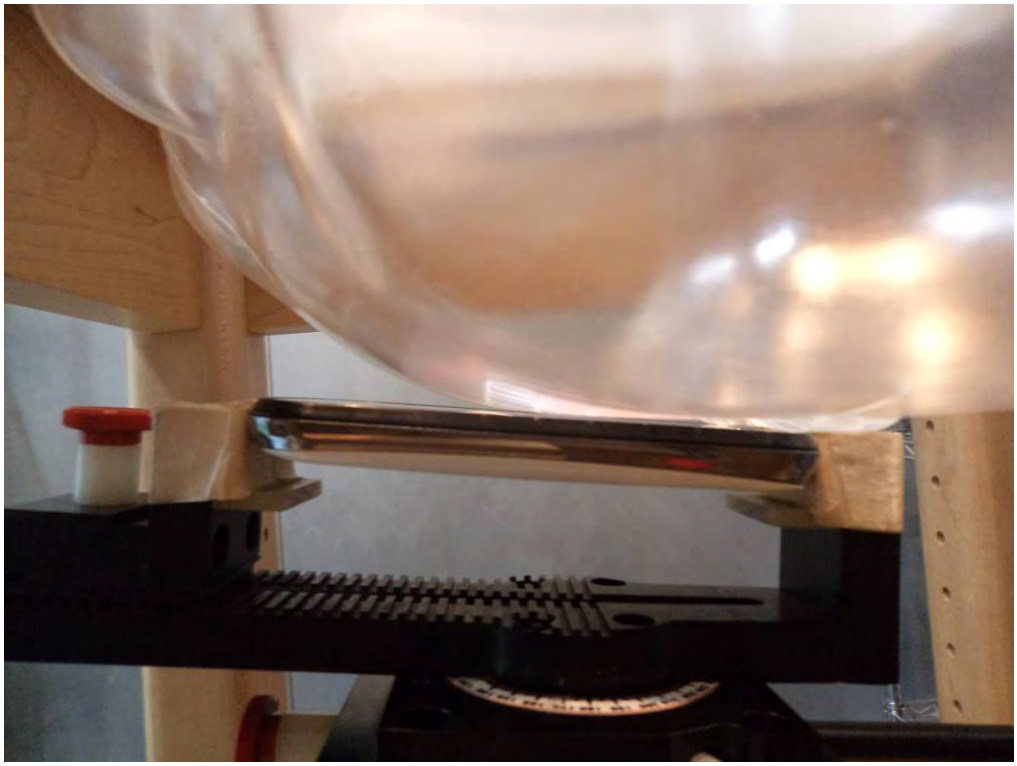
Body-worn Front-Headset Setup Photo



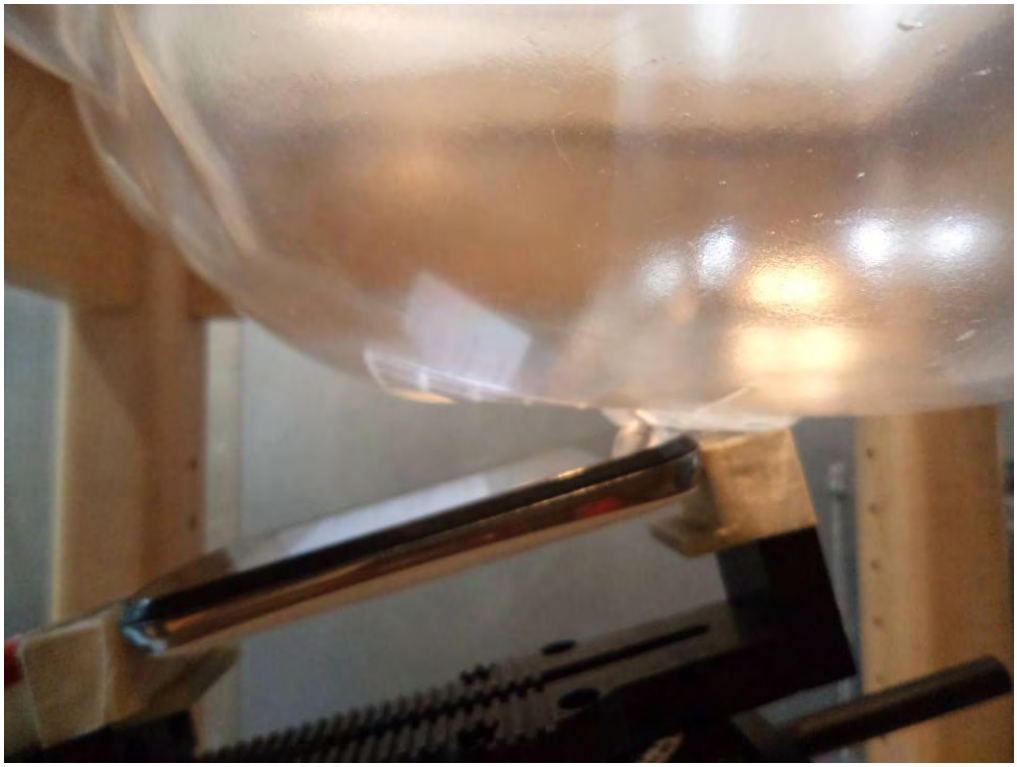
Body-worn Back-Headset Setup Photo



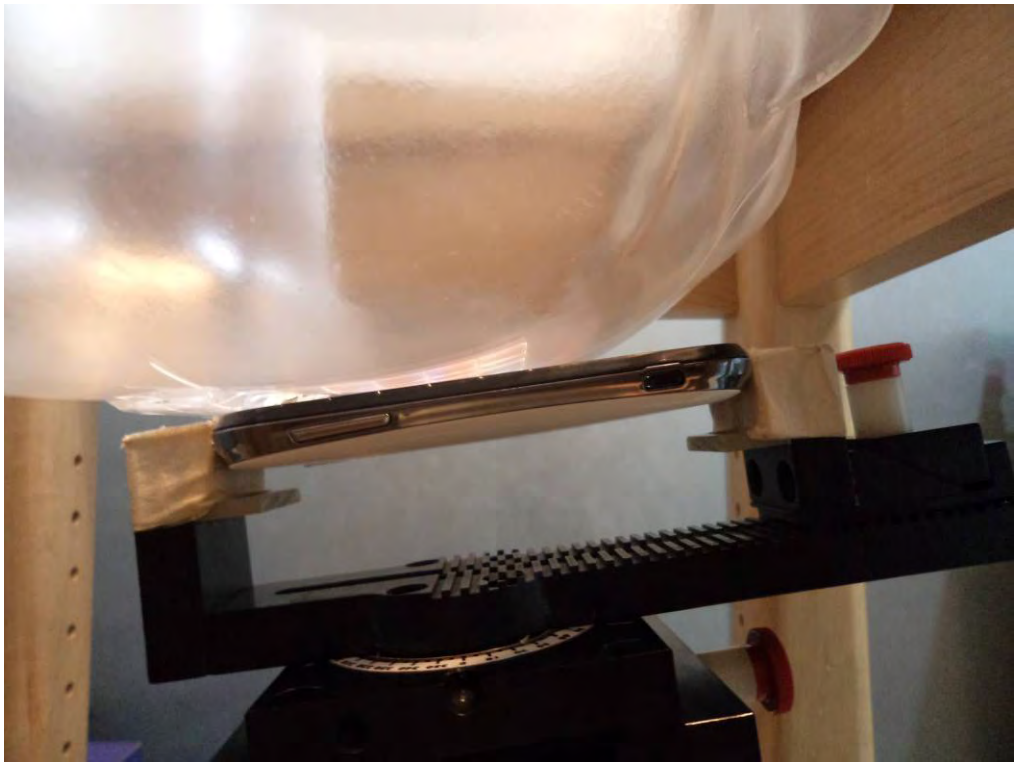
Left Head Touch Setup Photo



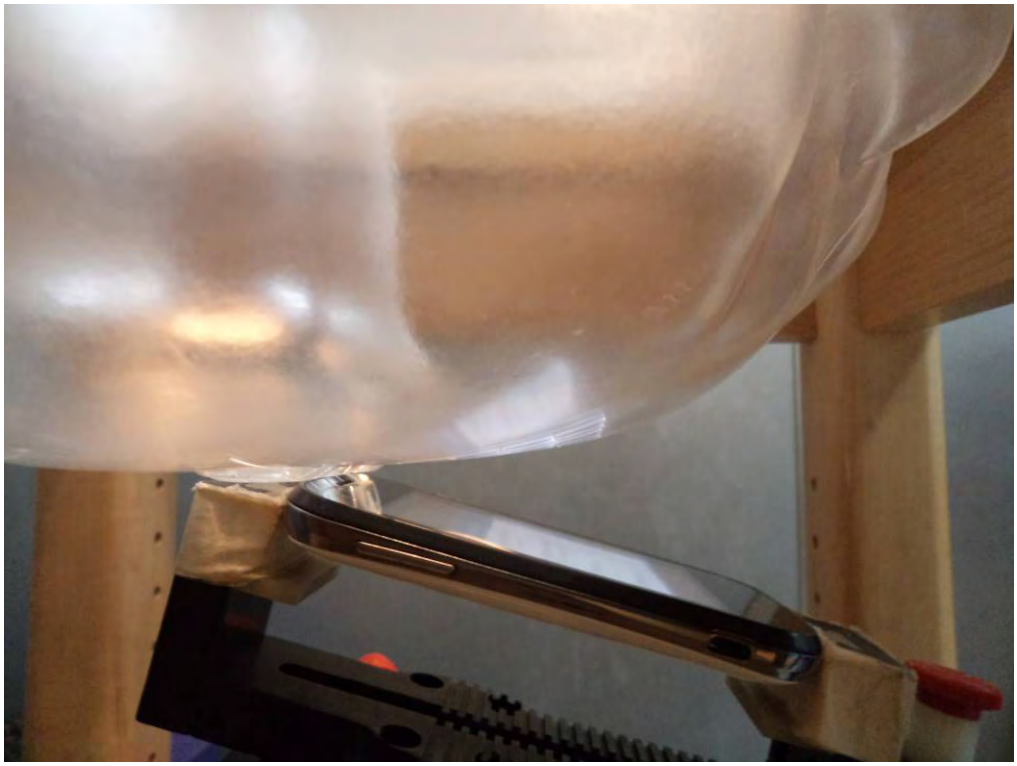
Left Head Tilt Setup Photo



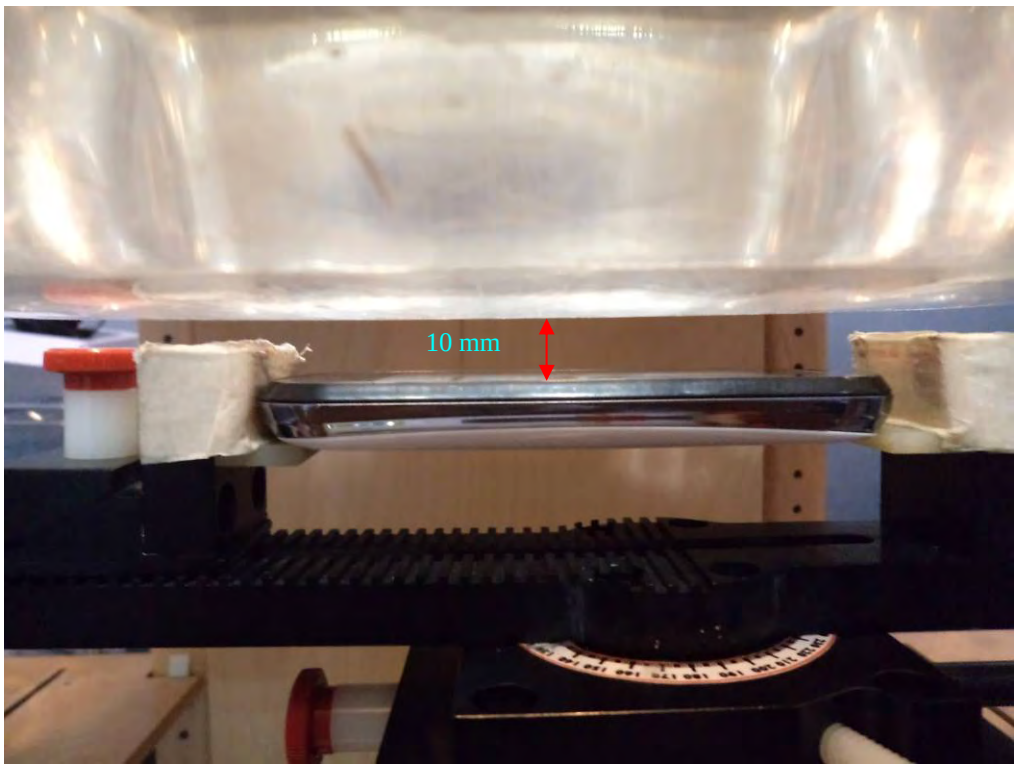
Right Head Touch Setup Photo



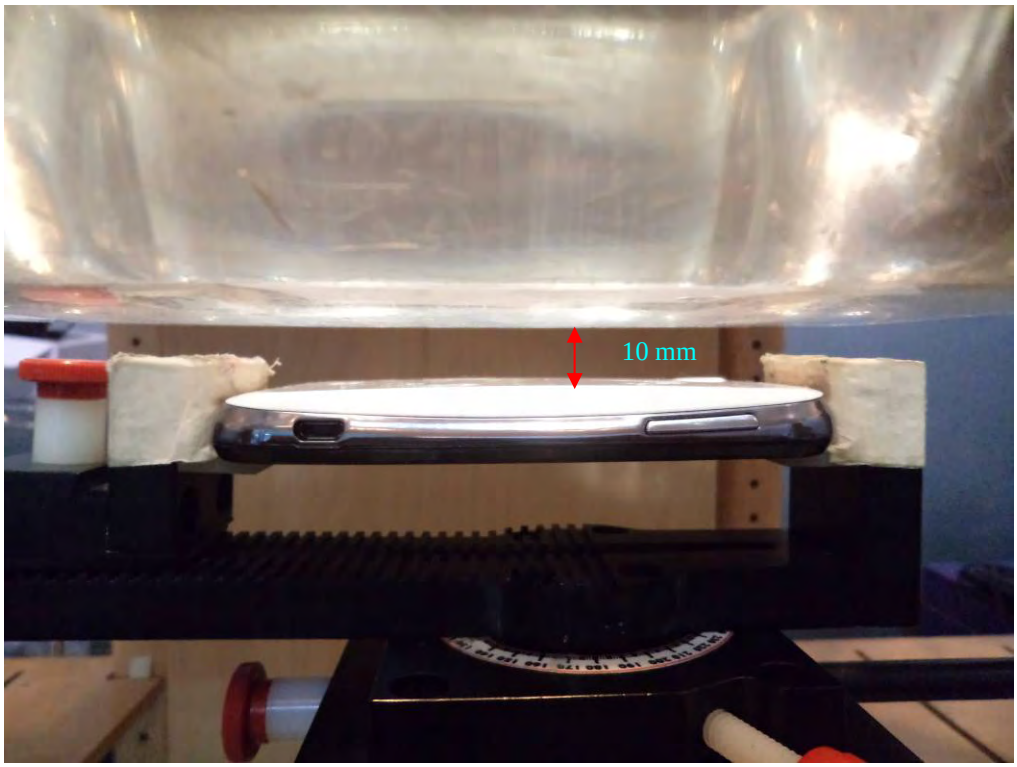
Right Head Tilt Setup Photo



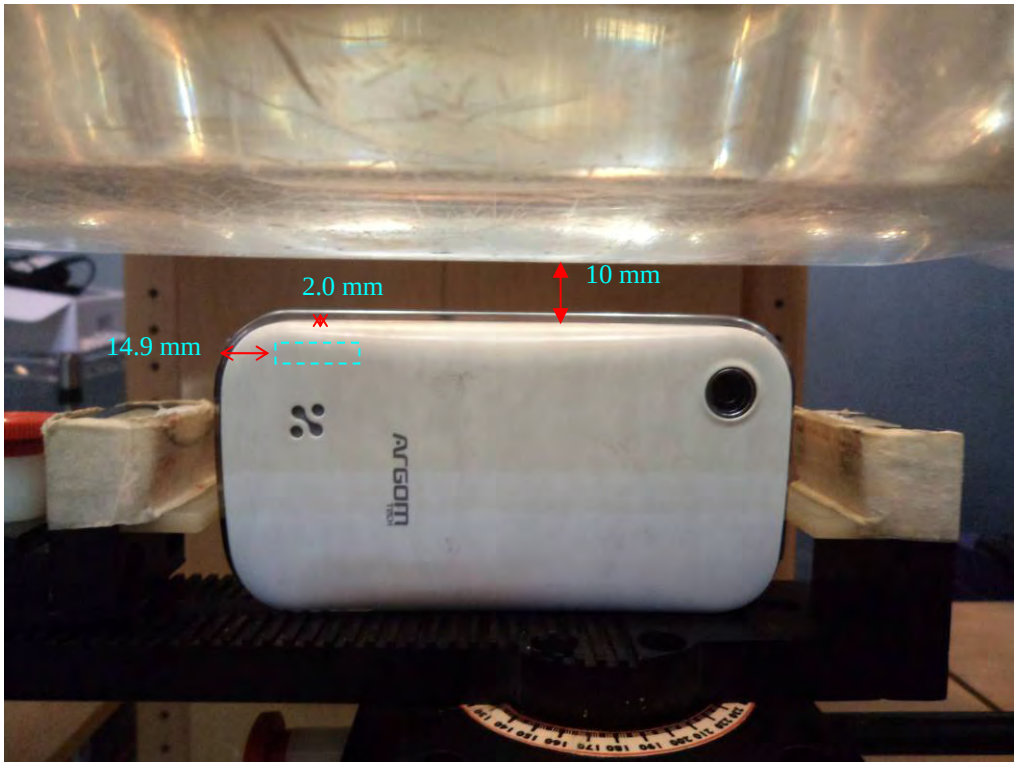
Body-Front Setup Photo



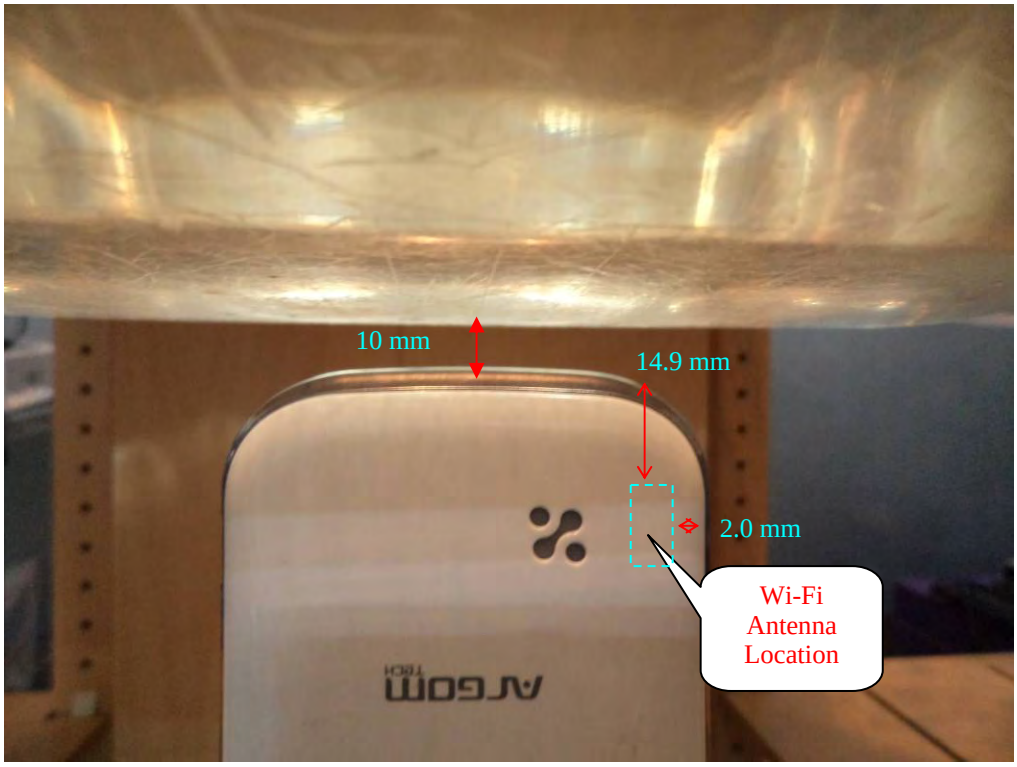
Body-Back Setup Photo



Body-Right Setup Photo



Body-Top Setup Photo



APPENDIX E – EUT PHOTOS

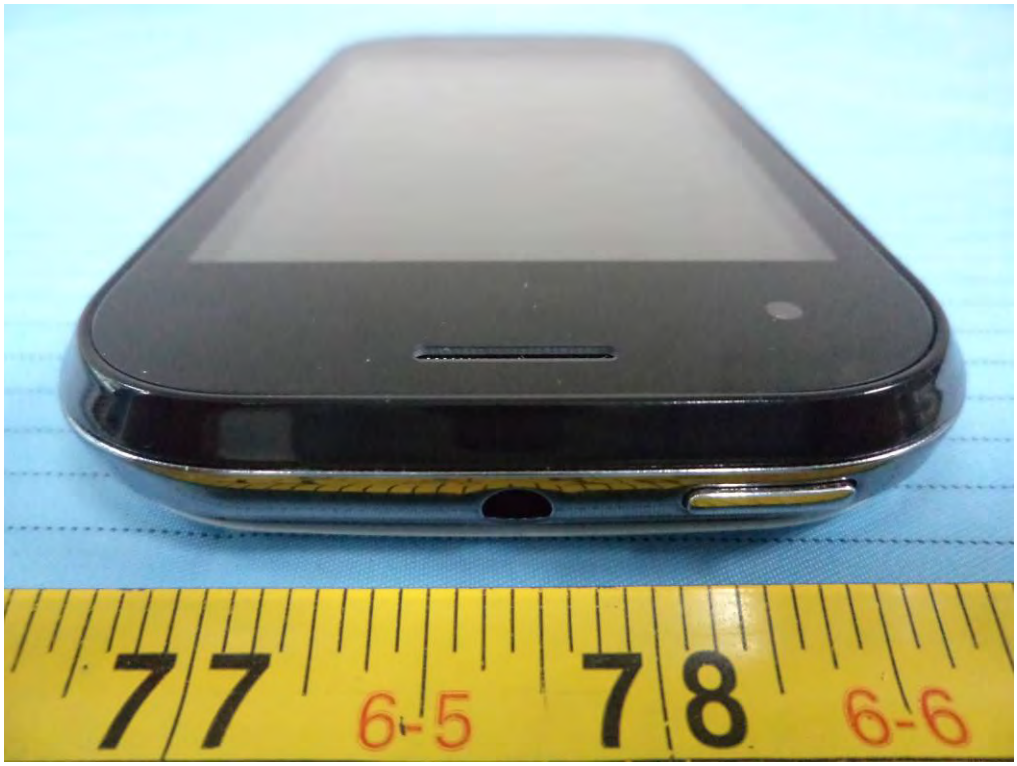
EUT – Front View

EUT – Back View

EUT – Left View

EUT – Right View

EUT – Top View



EUT – Bottom View

EUT – Uncovered View

EUT –Headset View

APPENDIX F – INFORMATIVE REFERENCES

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