Lab Code: 200707-0

SAR EVALUATION REPORT

For

KINGTECH MOBILE LTD

7/F,Kin On Commercial Building 49-51 Jervois Street, Sheung Wan, Hong Kong

FCC ID: O65MAGNUM

Report Type:	**Product Type:**
Original Report	WCDMA+GSM MobilePhone

Test Engineer:	Sandy Wang
Report Number:	RSZ120621002-20
Report Date:	2012-07-11
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**	KINGTECH MOBILE LTD	
	EUT Description	WCDMA+GSM MOBILE PHONE	
	FCC ID	O65MAGNUM	
	Model Number	MAGNUM	
	Test Date	2012.07.06—2012.07.08	
Frequency	**Max. SAR Level(s) Measured**		**Limit (W/Kg)**
Cellular Band	0.034 W/kg 1g Head Tissue 0.306 W/kg 1g Body Tissue		1. 6
PCS Band	0.054 W/kg 1g Head Tissue 0.506 W/kg 1g Body Tissue		
WCDMA 850	0.030 W/kg 1g Head Tissue 0.271 W/kg 1g Body Tissue		
WCDMA 1900	0.059 W/kg 1g Head Tissue 0.562 W/kg 1g Body Tissue		
Wi-Fi (802.11b)	0.048 W/kg 1g Body Tissue		
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	RSZ120621002-20	Original Report	2012-07-11

EUT DESCRIPTION

This report has been prepared on behalf of KINGTECH MOBILE LTD and their product, FCC ID: O65MAGNUM, Model: MAGNUM or the EUT (Equipment under Test) as referred to in the rest of this report. The EUT is a WCDMA+GSM 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 10
Hot-spot	Support
Operation Mode :	GSM Voice , GPRS Data , WCDMA , 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) WCDMA850: 824-849 MHz (TX) ; 869-894 MHz (RX) WCDMA1900: 1850-1910 MHz (TX) ; 1930-1990 MHz (RX) Bluetooth: 2402-2480 MHz Wi-Fi (802.11b/11g/802.11n-20): 2412-2462 MHz
Conducted RF Power:	Cellular Band: 32.29 dBm PCS Band: 29.43 dBm WCDMA850: 22.21 dBm WCDMA1900: 22.67 dBm Bluetooth: 1.96 dBm Wi-Fi(802.11b): 13.11 dBm Wi-Fi(802.11g): 12.01 dBm Wi-Fi(80211n): 11.92 dBm
Dimensions (L*W*H):	149mm (L)× 82mm (W)× 11mm (H)
Weight:	194.7 g
Power Source:	3.7VDC/ 2500mAh Rechargeable Battery
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

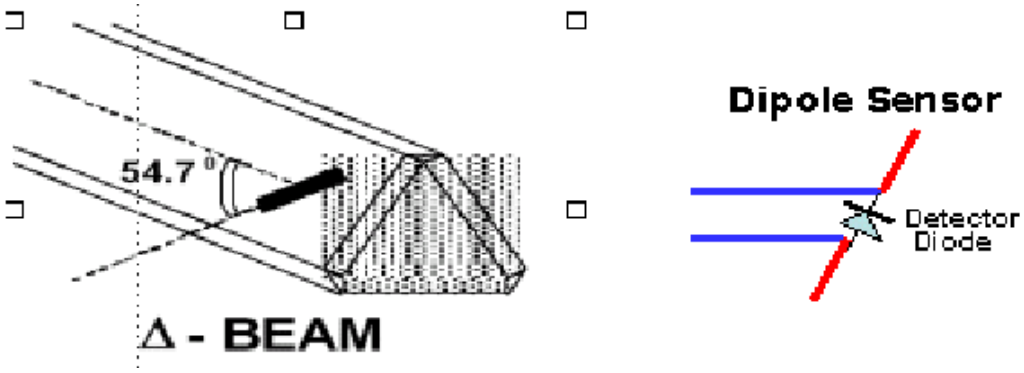
The overall uncertainty for the methodology and algorithms the used during the SAR calculation was evaluated using the data from IEEE 1528 based on the example f3 algorithm:

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

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

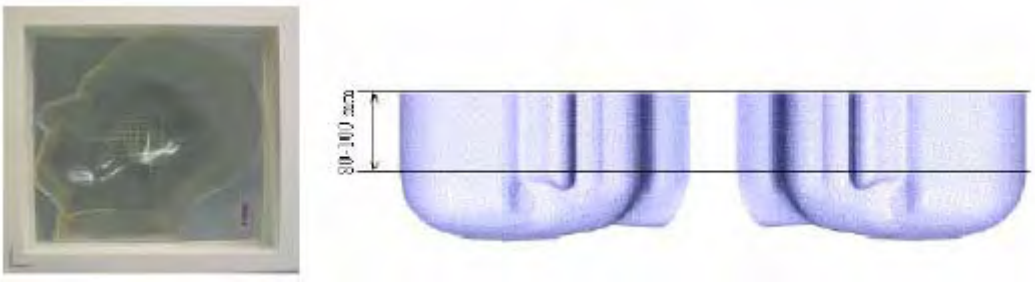
The universal device positioner allows complete freedom of movement of the EUT. Developed to hold a EUT in a free-space scenario any additional loading attributable to the material used in the construction of the positioner has been eliminated. Repeatability has been enhanced through the linear scales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

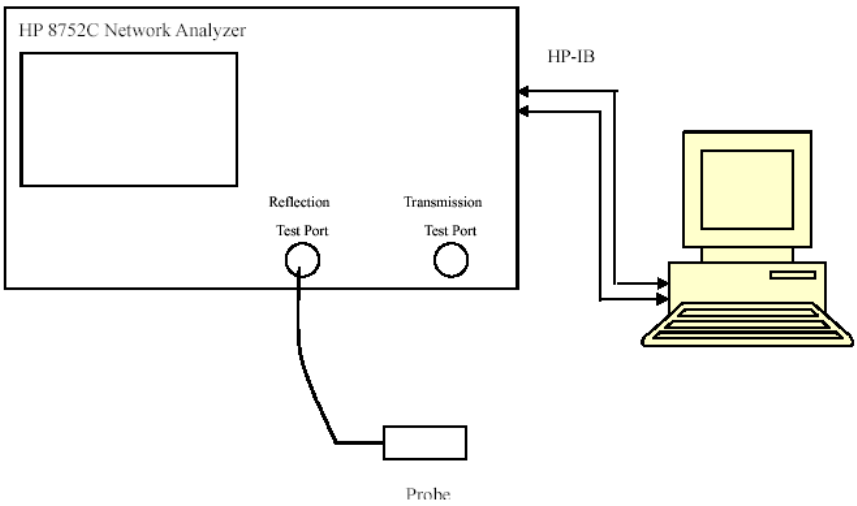
EQUIPMENT LIST AND CALIBRATION

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 Band	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	Ơ (S/m)	ε_r	Ơ (S/m)			
835	Head	42.32	0.91	41.50	0.90	1.976	1.111	± 5
835	Body	53.18	0.98	55.20	0.97	-3.659	1.031	± 5
1900	Head	40.36	1.39	40.00	1.40	0.900	-0.714	± 5
1900	Body	56.50	1.51	55.30	1.53	2.170	-1.307	± 5
2450	Body	53.13	1.98	52.70	1.95	0.816	1.538	± 5

**Liquid Verification was performed on 2012-07-06.*

Please refer to the following tables

.

850 MHz Head				850 MHz Body		
Frequency (MHz)	e'	e''		Frequency (MHz)	e'	e''
824.0	41.152586	19.602063		824.0	53.027516	20.96178
824.5	41.161621	19.602258		824.5	53.031489	20.96582
825.0	41.173698	19.602953		825.0	53.041585	20.96986
825.5	41.182584	19.603649		825.5	53.047599	20.97239
826.0	41.195458	19.604344		826.0	53.054633	20.97793
826.5	41.205874	19.605039		826.5	53.061668	20.98197
827.0	41.215796	19.605735		827.0	53.068702	20.98601
827.5	41.219698	19.611201		827.5	53.075737	20.98705
828.0	41.221245	19.616667		828.0	53.082771	20.99009
828.5	41.228689	19.622134		828.5	53.089806	20.99262
829.0	41.232593	19.627612		829.0	53.096840	20.99516
829.5	41.236475	19.633066		829.5	53.103875	20.99177
830.0	41.245663	19.638532		830.0	53.110909	21.00024
830.5	41.248453	19.643999		830.5	53.117944	21.00278
831.0	42.251654	19.649465		831.0	53.124978	21.00531
831.5	42.258958	19.654931		831.5	53.132013	21.00785
832.0	42.264689	19.660397		832.0	53.139047	21.01039
832.5	42.266844	19.665864		832.5	53.146082	21.01293
833.0	42.278455	19.671331		833.0	53.153116	21.01547
833.5	42.285247	19.676796		833.5	53.160151	21.03018
834.0	42.298565	19.682262		834.0	53.167185	21.02054
834.5	42.318526	19.687729		834.5	53.174122	21.02308
835.0	42.320586	19.693195		835.0	53.181251	21.02562
835.5	42.331795	19.698661		835.5	53.188282	21.02816
836.0	42.342564	19.704127		836.0	53.199323	21.03069
836.5	42.355344	19.709594		836.5	53.210364	21.03323
837.0	42.362545	19.715064		837.0	53.221404	21.03577
837.5	42.376845	19.720526		837.5	53.232445	21.03831
838.0	42.382654	19.725992		838.0	53.243485	21.04085
838.5	42.392574	19.731459		838.5	53.254526	21.04338
839.0	42.406248	19.736925		839.0	53.265567	21.04592
839.5	42.412147	19.742391		839.5	53.276607	21.04846
840.0	42.425895	19.747857		840.0	53.287648	21.01251
840.5	42.439545	19.753324		840.5	53.298688	21.05354
841.0	42.448745	19.758795		841.0	53.309729	21.05607
841.5	42.455456	19.764256		841.5	53.320770	21.05861
842.0	42.464556	19.769722		842.0	53.331812	21.06115
842.5	42.478654	19.775189		842.5	53.342851	21.06369
843.0	42.485245	19.780655		843.0	53.353891	21.06623
843.5	42.491547	19.786121		843.5	53.364932	21.06876
844.0	42.250596	19.791587		844.0	53.375973	21.07113
844.5	42.251597	19.797054		844.5	53.387013	21.07384
845.0	42.252987	19.802522		845.0	53.398054	21.07638
845.5	42.532587	19.807986		845.5	53.409094	21.07892
846.0	42.545221	19.813452		846.0	53.420135	21.08145
846.5	42.552051	19.818919		846.5	53.431176	21.08399
847.0	42.561423	19.824385		847.0	53.442216	21.08653
847.5	42.572587	19.829851		847.5	53.453257	21.08907
848.0	42.585587	19.835317		848.0	53.464297	21.09161
848.5	42.595896	19.840784		848.5	53.475338	21.09414
849.0	42.605253	19.846254		849.0	53.486379	21.09668

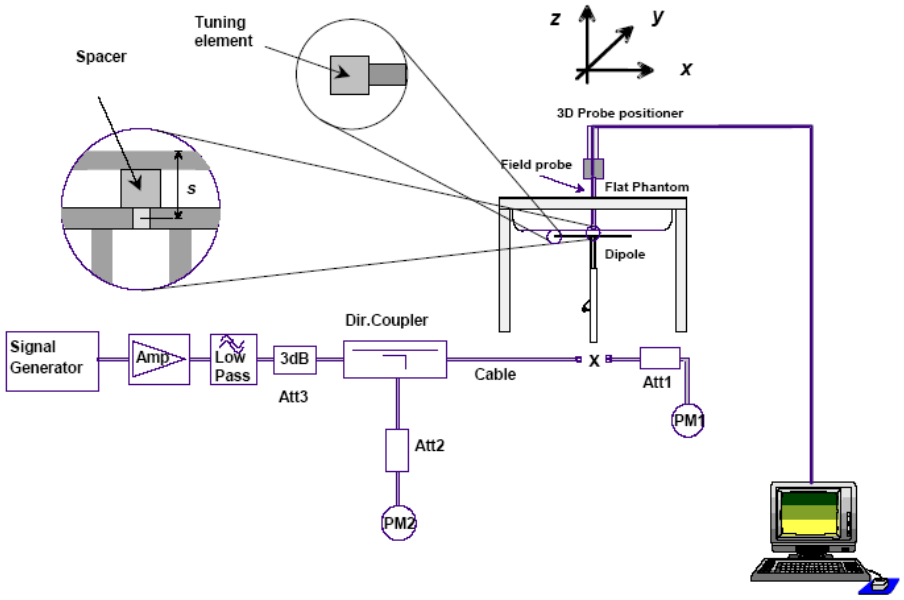
1900 MHz Head				1900 MHz Body		
Frequency (MHz)	e'	e''		Frequency (MHz)	e'	e''
1850.0	39.961472	12.984519		1850.0	56.132493	14.215372
1851.2	39.968578	12.995841		1851.2	56.147066	14.224376
1852.4	39.975684	13.007163		1852.4	56.161639	14.233138
1853.6	39.98279	13.018485		1853.6	56.176212	14.242384
1854.8	39.989896	13.029807		1854.8	56.190785	14.251388
1856.0	39.997002	13.041129		1856.0	56.205358	14.260392
1857.2	40.034108	13.052451		1857.2	56.219931	14.269396
1858.4	40.051219	13.063773		1858.4	56.234504	14.272184
1859.6	40.068331	13.075095		1859.6	56.249077	14.287404
1860.8	40.085441	13.086417		1860.8	56.263651	14.296408
1862.0	40.102552	13.097739		1862.0	56.278223	14.305412
1863.2	40.119663	13.109061		1863.2	56.292796	14.314416
1864.4	40.136774	13.120383		1864.4	56.307369	14.321342
1865.6	40.153885	13.131705		1865.6	56.321942	14.332424
1866.8	40.170996	13.143027		1866.8	56.336515	14.341428
1868.0	40.188107	13.154349		1868.0	56.351088	14.350432
1869.2	40.205218	13.165671		1869.2	56.365661	14.359436
1870.4	40.222329	13.176993		1870.4	56.380234	14.361844
1871.6	40.23944	13.188315		1871.6	56.394807	14.377444
1872.8	40.256551	13.199637		1872.8	56.409382	14.386448
1874.0	40.273662	13.210959		1874.0	56.423953	14.395452
1875.2	40.290773	13.218288		1875.2	56.438526	14.404456
1876.4	40.307884	13.2304086		1876.4	56.453099	14.413246
1877.6	40.324995	13.2401932		1877.6	56.467672	14.422464
1878.8	40.342106	13.2514554		1878.8	56.482245	14.431468
1880.0	40.359217	13.2619788		1880.0	56.496818	14.440472
1881.2	40.376328	13.2725022		1881.2	56.511391	14.449476
1882.4	40.393439	13.2830256		1882.4	56.525964	14.451848
1883.6	40.410551	13.2932549		1883.6	56.540537	14.467484
1884.8	40.427661	13.3040724		1884.8	56.555111	14.476488
1886.0	40.444772	13.3145958		1886.0	56.569683	14.485492
1887.2	40.461883	13.3251192		1887.2	56.584256	14.494496
1888.4	40.478994	13.3356426		1888.4	56.598829	14.502235
1889.6	40.496105	13.3461616		1889.6	56.613402	14.512504
1890.8	40.513216	13.3566894		1890.8	56.627975	14.521508
1892.0	40.530327	13.3672128		1892.0	56.642548	14.530512
1893.2	40.547438	13.3777362		1893.2	56.657121	14.539516
1894.4	40.564549	13.3882596		1894.4	56.671694	14.514852
1895.6	40.581665	13.3987783		1895.6	56.686267	14.557524
1896.8	40.598771	13.4093064		1896.8	56.700184	14.566528
1898.0	40.615882	13.4198298		1898.0	56.715413	14.575532
1899.2	40.632993	13.4303532		1899.2	56.729986	14.584536
1900.4	40.650104	13.4408766		1900.4	56.744559	14.591354
1901.6	40.667215	13.4514525		1901.6	56.759132	14.602544
1902.8	40.684326	13.4619234		1902.8	56.773705	14.611548
1904.0	40.701437	13.4724468		1904.0	56.788278	14.620552
1905.2	40.718548	13.4829702		1905.2	56.802851	14.629556
1906.4	40.735659	13.4934936		1906.4	56.817424	14.623856
1907.6	40.75277	13.5040171		1907.6	56.831997	14.647564
1908.8	40.769881	13.5145404		1908.8	56.841657	14.656568
1910.0	40.786992	13.5250638		1910.0	56.861143	14.665572

2450 MHz Body		
Frequency (MHz)	**e'**	**e''**
2410	53.26658	14.650436
2411	53.24475	14.623666
2412	53.26682	14.621901
2413	53.21898	14.586291
2414	53.21788	14.638855
2415	53.22033	14.600929
2416	53.20192	14.633919
2417	53.19021	14.619132
2418	53.18607	14.636095
2419	53.15508	14.595696
2420	53.18778	14.619869
2421	53.17675	14.662295
2422	53.18639	14.654825
2423	53.13272	14.618011
2424	53.11842	14.716108
2425	53.14481	14.719365
2426	53.14451	14.666751
2427	53.13931	14.721046
2428	53.14126	14.692146
2429	53.13996	14.731252
2430	53.13853	14.649273
2431	53.15313	14.698272
2432	53.15164	14.726799
2433	53.09732	14.665801
2434	53.13949	14.631356
2435	53.03798	14.705968
2436	53.09888	14.645488
2437	53.12544	14.655245
2438	53.10521	14.654238
2440	53.14337	14.679601
2441	53.10873	14.673956
2442	53.14072	14.638589
2443	53.11556	14.623333
2444	53.08607	14.615913
2445	53.04836	14.638173
2446	53.10253	14.625855
2447	53.08285	14.617721
2448	53.06315	14.592729
2449	53.05352	14.623573
2450	53.03945	14.631193
2451	53.04815	14.595965
2452	53.02137	14.602235
2453	53.03445	14.600675
2454	53.05871	14.586408
2455	53.05902	14.589762
2456	53.02077	14.604095
2457	53.05467	14.578392
2458	53.04722	14.586850
2459	53.07322	14.596368
2460	53.05446	14.606115
2461	53.07186	14.574704
2462	53.26658	14.650436

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 Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
APREL	Probe	E-020	500-00283	2011-07-14	2012-07-13
APREL	Dipole antenna (835 MHz)	ALS-835-S-2	180-00558	2011-08-25	2012-08-24
APREL	Dipole antenna (1900 MHz)	ALS-1900-S-2	210-00710	2011-08-25	2012-08-24
APREL	Dipole antenna (2450 MHz)	ALS-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 (%)
2012-07-06	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	Body	1g	50.916	52.561	5.032	± 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 : 835.00 MHz
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

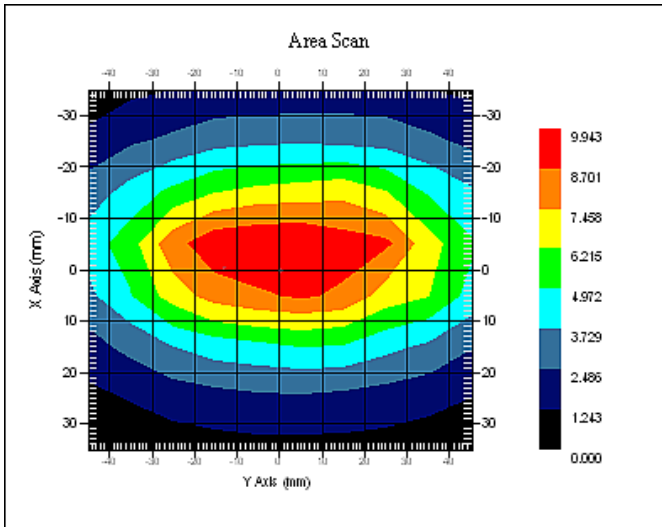
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default
Phantom Data

Tissue Data
Type : HEAD
Serial No. : 270-01002
Frequency : 835.00 MHz
Last Calib. Date : 06-Jul-2012
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 42.32 F/m
Sigma : 0.91 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 14-Jul-2011
Frequency : 835.00 MHz
Duty Cycle Factor : 1
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 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 : 835.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 10.916 W/kg
Power Drift-Finish : 10.949 W/kg
Power Drift (%) : 0.307

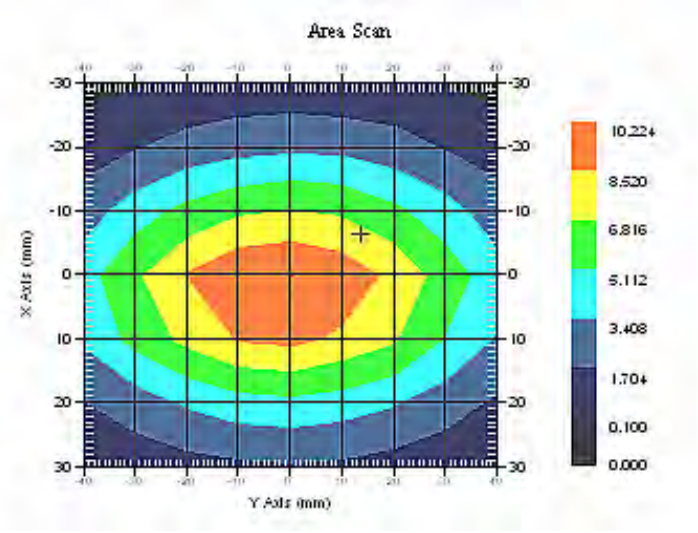
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default
Phantom Data

Tissue Data
Type : Body
Serial No. : 270-02101
Frequency : 835.00 MHz
Last Calib. Date : 06-Jul-2012
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 53.18 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 14-Jul-2011
Frequency : 835.00 MHz
Duty Cycle Factor : 1
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 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 : 1900.00 MHz
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

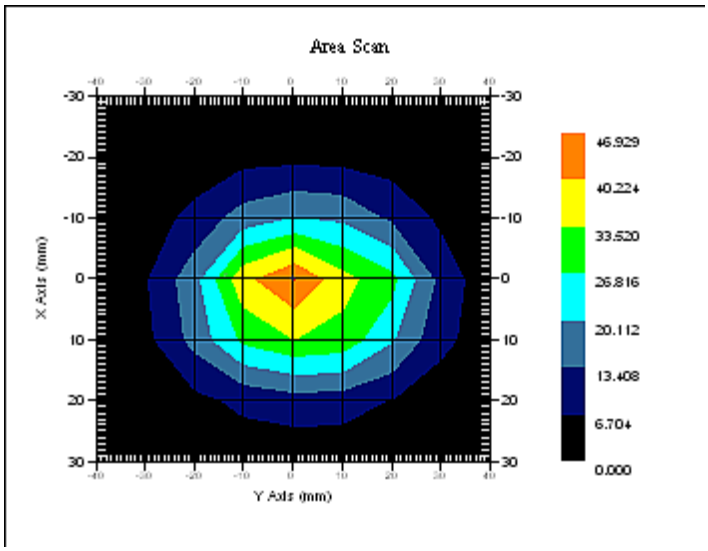
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default

Tissue Data
Type : HEAD
Serial No. : 295-01103
Frequency : 1900.00 MHz
Last Calib. Date : 06-Jul-2012
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 40.36 F/m
Sigma : 1.39 S/m
Density : 1000.00 kg/cu. M

Probe Data
Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 14-Jul-2011
Frequency : 1900.00 MHz
Duty Cycle Factor : 1
Conversion Factor : 5.20
Probe Sensitivity : 1.20 1.20 1.20 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 : 1900.00 MHz
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

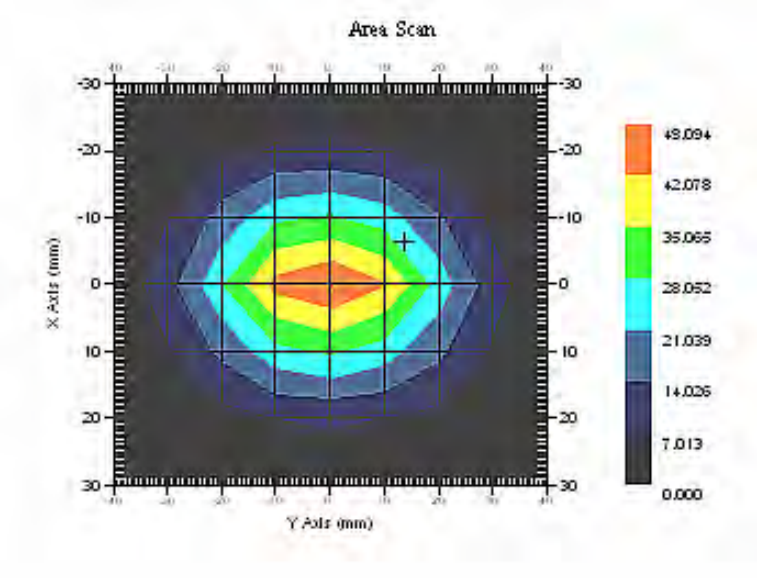
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default

Tissue Data
Type : Body
Serial No. : 295-02102
Frequency : 1900.00 MHz
Last Calib. Date : 06-Jul-2012
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 56.50 F/m
Sigma : 1.51 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 14-Jul-2011
Frequency : 1900.00 MHz
Duty Cycle Factor : 1
Conversion Factor : 5.0
Probe Sensitivity : 1.20 1.20 1.20 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 Body Liquid

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

Product Data
Device Name : Dipole 2450MHz
Serial No. : 220-00758
Type : Dipole
Model : ALS-D-2450-S-2
Frequency : 2450 MHz
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 48.642 W/kg
Power Drift-Finish : 48.979 W/kg
Power Drift (%) : 0.693Page 30 of 118

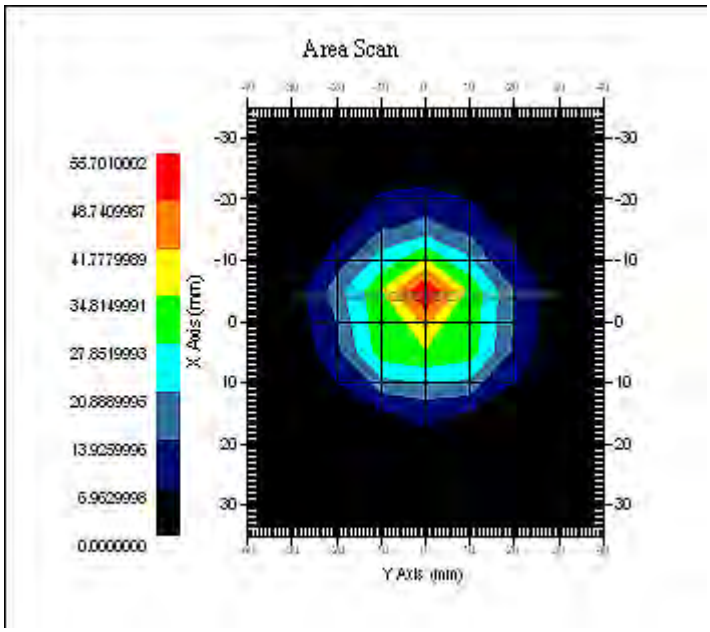
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default

Tissue Data
Type : BODY
Serial No. : 290-01109
Frequency : 2450 MHz
Last Calib. Date : 06-Jul-2012
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 50.00 RH%
Epsilon : 53.13 F/m
Sigma : 1.98 S/m
Density : 1000.00 kg/cu. M

Probe Data
Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 14-Jul-2011
Frequency : 2450 MHz
Duty Cycle Factor : 1
Conversion Factor : 4.3
Probe Sensitivity : 1.20 1.20 1.20 $\mu V/(V/m)^2$
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 : 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



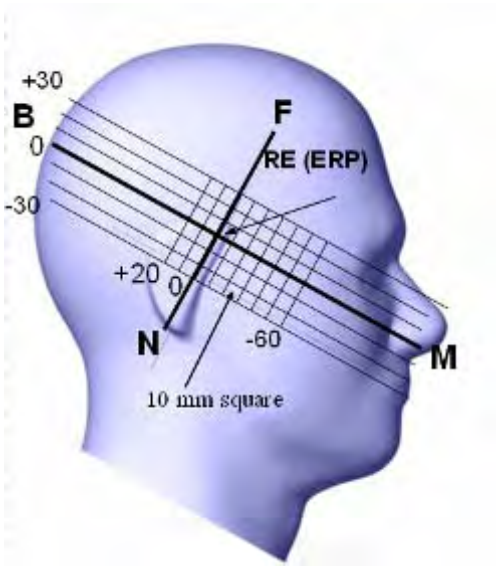
2450 MHz System Validation

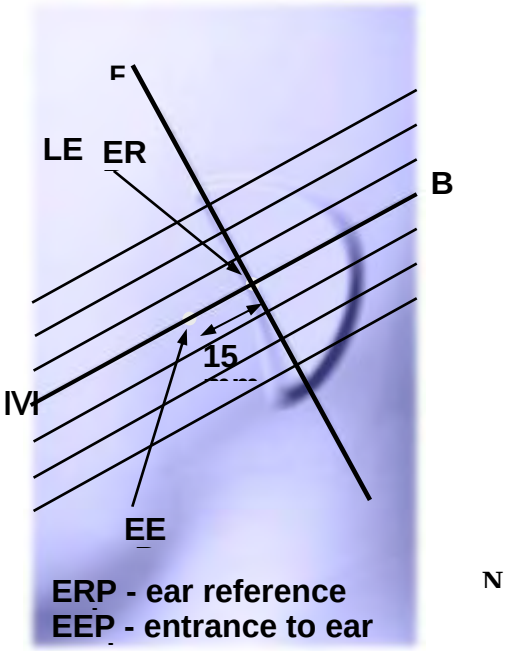
EUT TEST STRATEGY AND METHODOLOGY

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

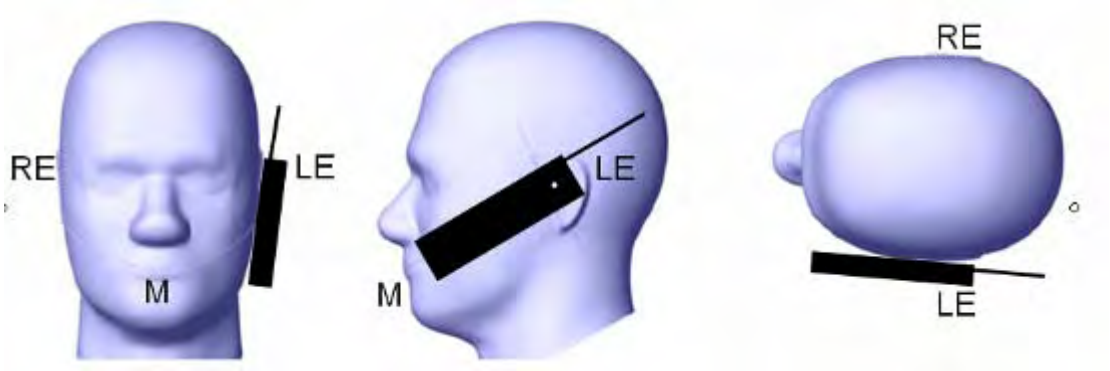
The device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line for the SCC-34/SC-2 head phantom.

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

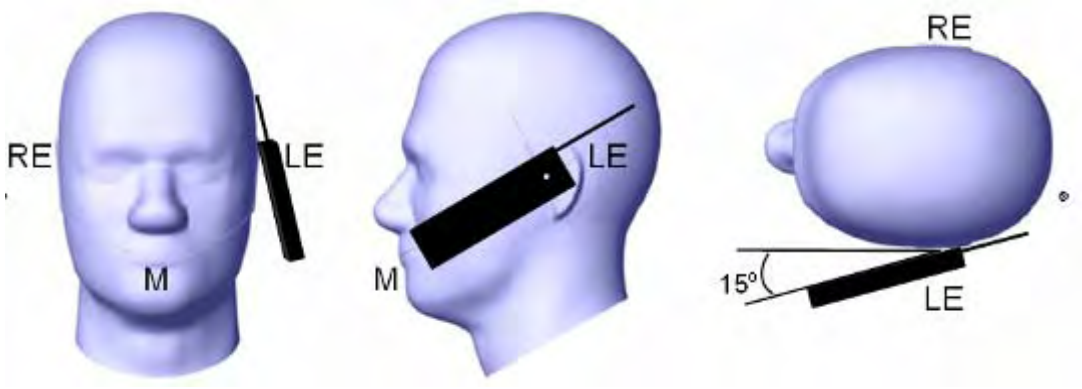
With the handset aligned in the "Cheek/Touch Position":

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.

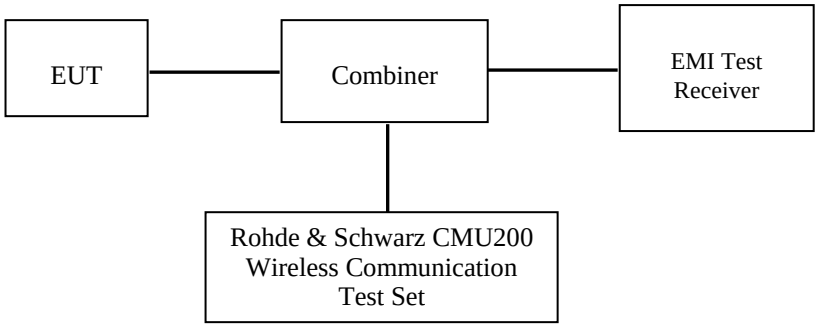
CONDUCTED OUTPUT POWER MEASUREMENT

Provision Applicable

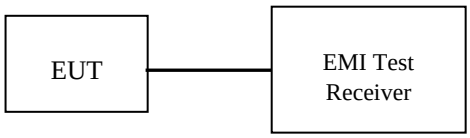
The measured peak output power should be greater and within 5% than EMI measurement.

Test Procedure

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



GSM/WCDMA



Wi-Fi

Test Results:

GSM

Band	Frequency (MHz)	Conducted Output Power	
		(dBm)	(Watt)
Cellular Band	824.2	32.23	1.671
	836.6	32.22	1.667
	848.8	32.19	1.656
PCS Band	1850.2	29.20	0.832
	1880.0	29.08	0.809
	1909.8	29.20	0.832

GPRS

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
Cellular	128	824.2	32.27	31.42	Not Support	Not Support
	190	836.6	32.29	31.48	Not Support	Not Support
	251	848.8	31.17	31.43	Not Support	Not Support
PCS	512	1850.2	29.43	28.53	Not Support	Not Support
	661	1880.0	29.31	28.44	Not Support	Not Support
	810	1909.8	29.32	28.48	Not Support	Not Support

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	23.27	25.42	Not Support	Not Support
	190	836.6	23.29	25.48	Not Support	Not Support
	251	848.8	22.17	25.43	Not Support	Not Support
PCS	512	1850.2	20.43	22.53	Not Support	Not Support
	661	1880.0	20.31	22.44	Not Support	Not Support
	810	1909.8	20.32	22.48	Not Support	Not Support

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, and 2 timeslots has been activated separately with power control level 5(850 MHz band) and 0(1900 MHz band).

WCDMA

Band	Conducted Output Power (dBm)					
	WCDMA 850			WCDMA 1900		
Tx Channel	4132	4182	4233	9262	9400	9538
Frequency (MHz)	826.4	836.4	846.6	1852.4	1880	1907.6
RMC 12.2 kbps	22.21	22.72	21.57	22.71	22.67	22.60

Note: The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2 kbps RMC (reference measurement Channel) Configured in Test Loop Model 1.

Wi-Fi

Radio Mode	Frequency (MHz)	Conducted Output Power	
		(dBm)	(Watt)
802.11b	2412	12.91	0.020
	2437	13.11	0.020
	2462	11.86	0.015
802.11g	2412	11.71	0.015
	2437	12.01	0.016
	2462	11.55	0.014
802.11n-20	2412	11.33	0.014
	2437	11.92	0.016
	2462	11.45	0.014

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

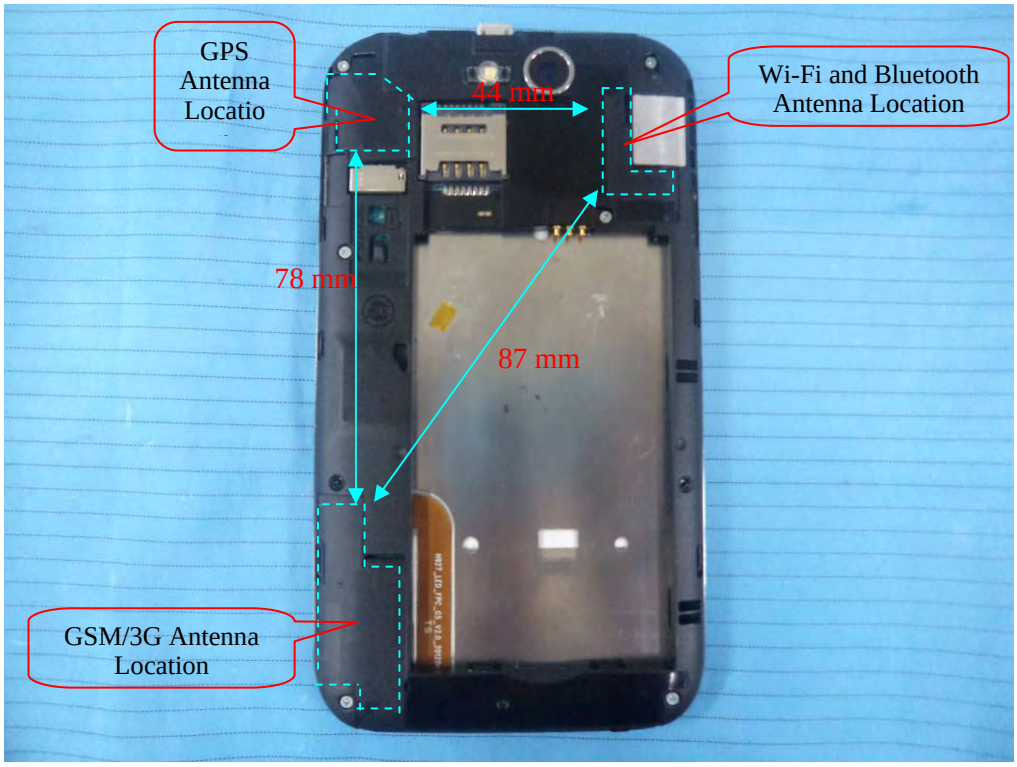
The output power was tested under data rate 1Mbps for 802.11b, 6 Mbps for 802.11g, and 6.5 Mbps for 802.11n-20.

SAR SIMULTANEOUS TRANSMISSION 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, GPS and GSM/3G Antenna Location



Antenna Information:

Antenna-to-antenna separation distances	87mm from GSM&3G main antenna to Wi-Fi&BT main antenna 78mm from GSM&3G main antenna to GPS main antenna 44mm from Wi-Fi main antenna toGPS main antenna
Simultaneous transmission	GSM voice can transmit simultaneously with Wi-Fi data. GPRS data can transmit simultaneously with Wi-Fi data. WCDMA can transmit simultaneously with Wi-Fi data

CONCLUSION:

Individual transmitter	Stand-alone SAR	Simultaneous SAR
GSM&3G	Required	Simultaneous SAR of Bluetooth and GSM is not required
WiFi& BT	Not Required	Not Required

Note:

1) The distance between Wi-Fi and GSM antenna is 8.7cm > 5cm, The max output power of Wi-Fi antenna is(13.11dBm) 20.47mW < 2PRef (24mW). According to KDB648474, stand-alone SAR is not required for Wi-Fi antenna; simultaneous SAR evaluation is not required for GSM and Wi-Fi antenna.

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 2012.07.06-2012.07.08*

GSM:

Cellular Band:

EUT Position	Frequency (MHz)		Test Mode	Antenna Type	Power Drift (%)	FCC 1g SAR (W/Kg)	
	Channel	MHz				Measured	Limit
Head Cheek	128 (Low)	824.2	GSM	Integral	1.928	0.034	1.6
	190 (Mid)	836.6	GSM	Integral	\	\	1.6
	251 (High)	848.8	GSM	Integral	\	\	1.6
Body-Back with Headset (10 mm)	128 (Low)	824.2	GSM	Integral	2.708	0.121	1.6
	190 (Mid)	836.6	GSM	Integral	\	\	1.6
	251 (High)	848.8	GSM	Integral	\	\	1.6

PCS Band:

EUT Position	Frequency (MHz)		Test Mode	Antenna Type	Power Drift (%)	FCC 1g SAR (W/Kg)	
	Channel	MHz				Measured	Limit
Head Cheek	512 (Low)	1850.2	GSM	Integral	\	\	1.6
	661 (Mid)	1880.0	GSM	Integral	\	\	1.6
	810 (High)	1909.8	GSM	Integral	0.823	0.054	1.6
Body-Back with Headset (10 mm)	512 (Low)	1850.2	GSM	Integral	\	\	1.6
	661 (Mid)	1880.0	GSM	Integral	\	\	1.6
	810 (High)	1909.8	GSM	Integral	2.357	0.297	1.6

Note: 1. When the 1-g SAR is ≤ 0.8W/Kg, testing for other channels are optional.

2. According to KDB648474, flat phantom is required when testing Head Cheek Mode and the EUT is positioned with its bottom edge positioned from the flat phantom with the same distance provided by the cheek touching position using SAM.

WCDMA 850

EUT Position	Frequency (MHz)		Test Mode	Antenna Type	Power Drift (%)	FCC 1g SAR (W/Kg)	
	Channel	MHz				Measured	Limit
Head Cheek	4132	824.2	WCDMA	Integral	\	\	1.6
	4183	836.6	WCDMA	Integral	-1.120	0.030	1.6
	4233	848.8	WCDMA	Integral	\	\	1.6

WCDMA 1900

EUT Position	Frequency (MHz)		Test Mode	Antenna Type	Power Drift (%)	FCC 1g SAR (W/Kg)	
	Channel	MHz				Measured	Limit
Head Cheek	9262	1852.4	WCDMA	Integral	1.455	0.059	1.6
	9400	1880.0	WCDMA	Integral	\	\	1.6
	9538	1907.6	WCDMA	Integral	\	\	1.6

Note: 1. When the 1-g SAR is ≤ 0.8W/Kg, testing for other channels are optional.
2. According to KDB648474, flat phantom is required when testing Head Cheek Mode and the EUT is positioned with its bottom edge positioned from the flat phantom with the same distance provided by the cheek touching position using SAM.
3. The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2 kbps RMC (reference measurement Channel) Configured in Test Loop Model.

Mobile Hot-Spot Test Result

The DUT is capable of functioning as a Wi-Fi to Cellular Mobile hotspot. Additional SAR testing was performed according to KDB 941225 D06. Testing was performed with a separation of 1cm between the DUT and the flat phantom. The DUT was positioned for SAR tests with the front and back surfaces facing the phantom, and also with the edges facing the phantom in which the transmitting antenna is <2.5 cm from the edge. Each transmit band was utilized for SAR testing. The tested mode has been selected within each band that exhibits the highest time average output power. When the overall device length and width are ≥ 9 cm x 5 cm respectively, a test separation of 10 mm is required.

Hot spot-GPRS

EUT Position	Frequency (MHz)		Test Mode	Antenna Type	Power Drift (%)	FCC 1g SAR (W/Kg)	
	Channel	MHz				Measured	Limit
Body-Front (10mm)	128	824.2	GPRS	Integral	/	/	1.6
	190	836.6	GPRS	Integral	3.329	0.052	1.6
	251	848.8	GPRS	Integral	/	/	1.6
Body-Back (10mm)	128	824.2	GPRS	Integral	/	/	1.6
	190	836.6	GPRS	Integral	0.491	0.306	1.6
	251	848.8	GPRS	Integral	/	/	1.6
Body-Right (10mm)	128	824.2	GPRS	Integral	/	/	1.6
	190	836.6	GPRS	Integral	1.209	0.038	1.6
	251	848.8	GPRS	Integral	/	/	1.6
Body-Bottom (10mm)	128	824.2	GPRS	Integral	/	/	1.6
	190	836.6	GPRS	Integral	3.024	0.023	1.6
	251	848.8	GPRS	Integral	/	/	1.6
Body-Front (10mm)	512	1850.2	GPRS	Integral	3.235	0.054	1.6
	661	1880.0	GPRS	Integral	/	/	1.6
	810	1909.8	GPRS	Integral	/	/	1.6
Body-Back (10mm)	512	1850.2	GPRS	Integral	1.159	0.506	1.6
	661	1880.0	GPRS	Integral	/	/	1.6
	810	1909.8	GPRS	Integral	/	/	1.6
Body-Right (10mm)	512	1850.2	GPRS	Integral	-2.754	0.177	1.6
	661	1880.0	GPRS	Integral	/	/	1.6
	810	1909.8	GPRS	Integral	/	/	1.6
Body-Bottom (10mm)	512	1850.2	GPRS	Integral	3.178	0.040	1.6
	661	1880.0	GPRS	Integral	/	/	1.6
	810	1909.8	GPRS	Integral	/	/	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 10 which has maximum 4 Downlink slots and 2 Uplink slots, the maximum active slots is 5, when perform the multiple slots scan, 3 DL+2UL is the worse case.
4. The EUT transmit and receive through the same GSM antenna while testing SAR.

Hot Spot-WCDMA

EUT Position	Frequency (MHz)		Test Mode	Antenna Type	Power Drift (%)	FCC 1g SAR (W/Kg)	
	Channel	MHz				Measured	Limit
Body-Front (10mm)	4132	824.2	WCDMA	Integral	/	/	1.6
	4183	836.6	WCDMA	Integral	2.708	0.054	1.6
	4233	848.8	WCDMA	Integral	/	/	1.6
Body-Back (10mm)	4132	824.2	WCDMA	Integral	/	/	1.6
	4183	836.6	WCDMA	Integral	2.256	0.271	1.6
	4233	848.8	WCDMA	Integral	/	/	1.6
Body-Right (10mm	4132	824.2	WCDMA	Integral	/	/	1.6
	4183	836.6	WCDMA	Integral	-2.254	0.047	1.6
	4233	848.8	WCDMA	Integral	/	/	1.6
Body-Bottom (10mm)	4132	824.2	WCDMA	Integral	/	/	1.6
	4183	836.6	WCDMA	Integral	2.178	0.040	1.6
	4233	848.8	WCDMA	Integral	/	/	1.6
Body-Front (10mm)	9262	1852.4	WCDMA	Integral	4.405	0.065	1.6
	9400	1880.0	WCDMA	Integral	/	/	1.6
	9538	1907.6	WCDMA	Integral	/	/	1.6
Body-Back (10mm)	9262	1852.4	WCDMA	Integral	-3.605	0.562	1.6
	9400	1880.0	WCDMA	Integral	/	/	1.6
	9538	1907.6	WCDMA	Integral	/	/	1.6
Body-Right (10mm)	9262	1852.4	WCDMA	Integral	0.961	0.087	1.6
	9400	1880.0	WCDMA	Integral	/	/	1.6
	9538	1907.6	WCDMA	Integral	/	/	1.6
Body-Bottom (10mm)	9262	1852.4	WCDMA	Integral	-3.717	0.046	1.6
	9400	1880.0	WCDMA	Integral	/	/	1.6
	9538	1907.6	WCDMA	Integral	/	/	1.6

Note: 1. When the 1-g SAR is ≤ 0.8W/Kg, testing for other channels are optional.
2. The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 1.2 kbps RMC (reference measurement Channel) Configured in Test Loop Model 1.

Hot Spot-Wi-Fi

EUT Position	Frequency (MHz)		Test Mode	Antenna Type	Power Drift (%)	FCC 1g SAR (W/Kg)	
	Channel	MHz				Measured	Limit
Body-Front (10mm)	1	2412	802.11b	Integral	/	/	1.6
	6	2437	802.11b	Integral	-2.014	0.048	1.6
	11	2462	802.11b	Integral	/	/	1.6
Body-Back (10mm)	1	2412	802.11b	Integral	/	/	1.6
	6	2437	802.11b	Integral	-0.773	0.038	1.6
	11	2462	802.11b	Integral	/	/	1.6
Body-Left (10mm	1	2412	802.11b	Integral	/	/	1.6
	6	2437	802.11b	Integral	2.940	0.029	1.6
	11	2462	802.11b	Integral	/	/	1.6
Body-Top (10mm	1	2412	802.11b	Integral	/	/	1.6
	6	2437	802.11b	Integral	-3.205	0.026	1.6
	11	2462	802.11b	Integral	/	/	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 output power was tested under data rate 1Mbps for 802.11b.

EUT SCAN RESULTS

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

Head Cheek (824.2 MHz Low Channel)

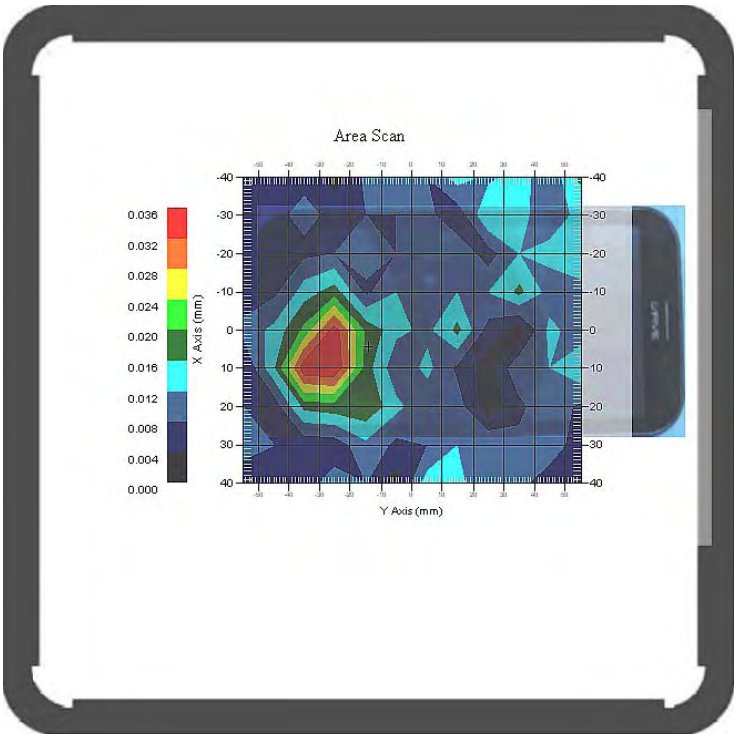
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 9x12x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.017 W/kg
Power Drift-Finish : 0.017 W/kg
Power Drift (%) : 1.928

Tissue Data
Type : HEAD
Frequency : 835.00 MHz
Epsilon : 42.32 F/m
Sigma : 0.91 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 835.00 MHz
Duty Cycle Factor : 8
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.034 W/kg
10 gram SAR value : 0.019 W/kg
Area Scan Peak SAR : 0.036 W/kg
Zoom Scan Peak SAR : 0.075 W/kg

Plot 1#



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

Back-Worn-Headset (824.2 MHz Low Channel)

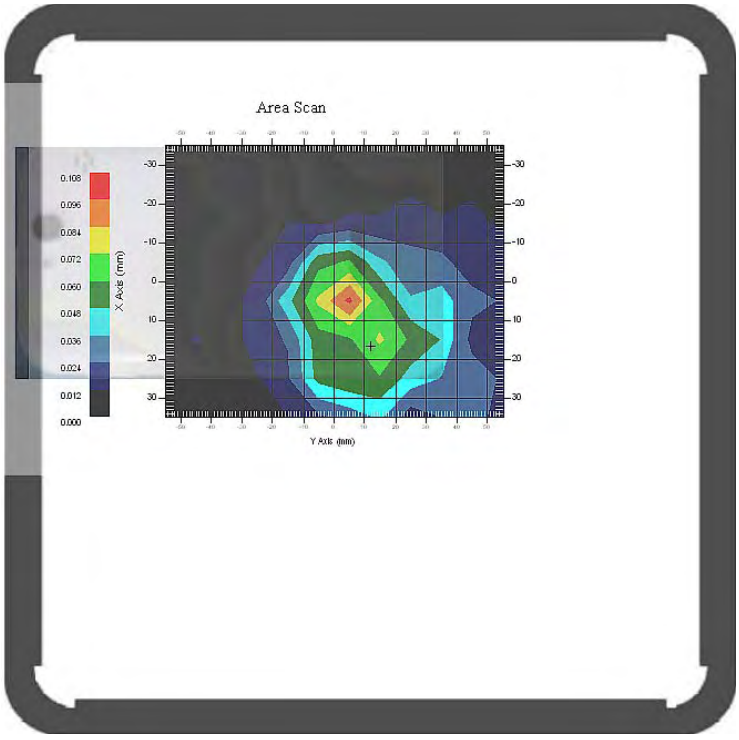
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 8x12x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.037 W/kg
Power Drift-Finish : 0.038 W/kg
Power Drift (%) : 2.708

Tissue Data
Type : BODY
Frequency : 835.00 MHz
Epsilon : 53.18 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 835.00 MHz
Duty Cycle Factor : 8
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.121 W/kg
10 gram SAR value : 0.069 W/kg
Area Scan Peak SAR : 0.101 W/kg
Zoom Scan Peak SAR : 0.370 W/kg

Plot 2#



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

Body-Front (836.6 MHz Middle Channel)

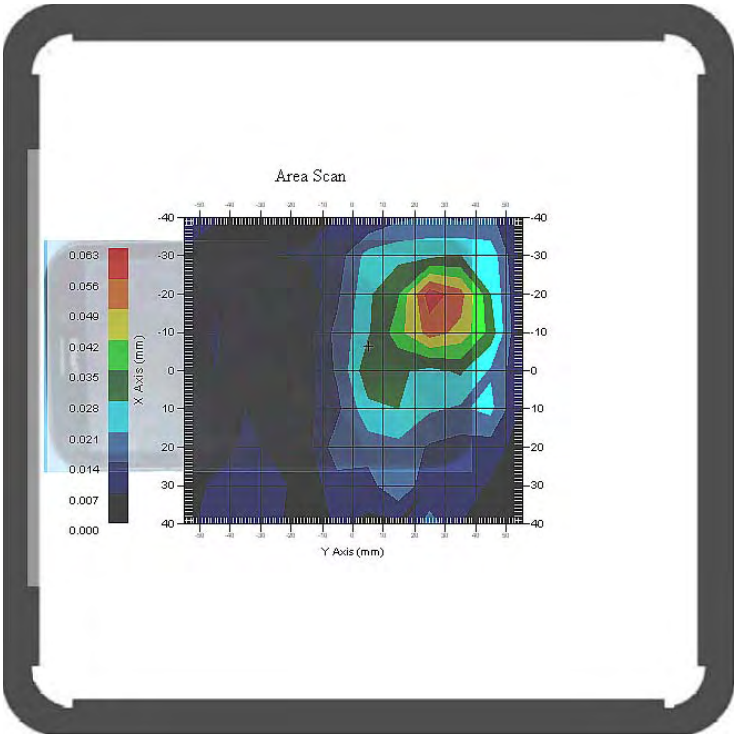
Measurement Data
Test mode : GPRS
Crest Factor : 4
Scan Type : Complete
Area Scan : 9x12x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.030 W/kg
Power Drift-Finish : 0.031 W/kg
Power Drift (%) : 3.329

Tissue Data
Type : BODY
Frequency : 835.00 MHz
Epsilon : 53.18 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 835.00 MHz
Duty Cycle Factor : 4
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 : 0.052 W/kg
10 gram SAR value : 0.027 W/kg
Area Scan Peak SAR : 0.062 W/kg
Zoom Scan Peak SAR : 0.109 W/kg

Plot 3#



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

Body-Back (836.6 MHz Middle Channel)

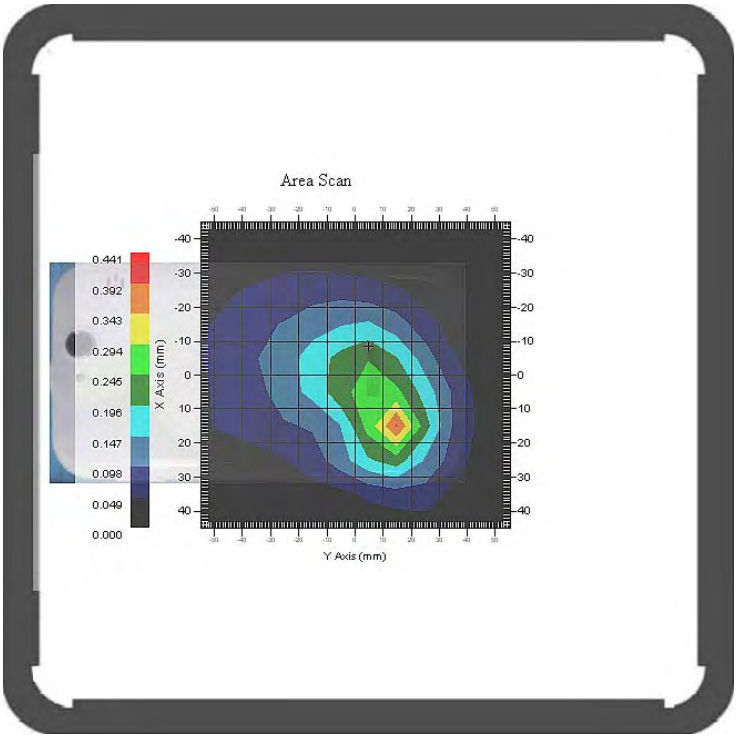
Measurement Data
Test mode : GPRS
Crest Factor : 4
Scan Type : Complete
Area Scan : 10x12x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.204 W/kg
Power Drift-Finish : 0.205 W/kg
Power Drift (%) : 0.491

Tissue Data
Type : BODY
Frequency : 835.00 MHz
Epsilon : 53.18 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 835.00 MHz
Duty Cycle Factor : 4
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 : 0.306 W/kg
10 gram SAR value : 0.154 W/kg
Area Scan Peak SAR : 0.394 W/kg
Zoom Scan Peak SAR : 0.580 W/kg

Plot 4#



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

Body-Right (836.6 MHz Middle Channel)

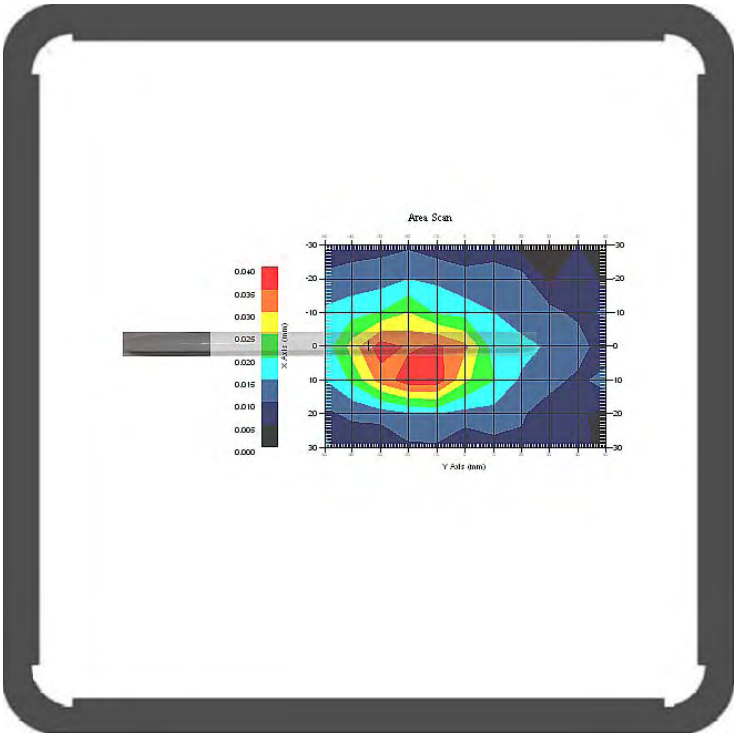
Measurement Data
Test mode : GPRS
Crest Factor : 4
Scan Type : Complete
Area Scan : 7x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.031 W/kg
Power Drift-Finish : 0.031 W/kg
Power Drift (%) : 1.209

Tissue Data
Type : BODY
Frequency : 835.00 MHz
Epsilon : 53.18 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 835.00 MHz
Duty Cycle Factor : 4
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 : 0.038 W/kg
10 gram SAR value : 0.019 W/kg
Area Scan Peak SAR : 0.038 W/kg
Zoom Scan Peak SAR : 0.080 W/kg

Plot 5#



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

Body-Bottom (836.6 MHz Middle Channel)

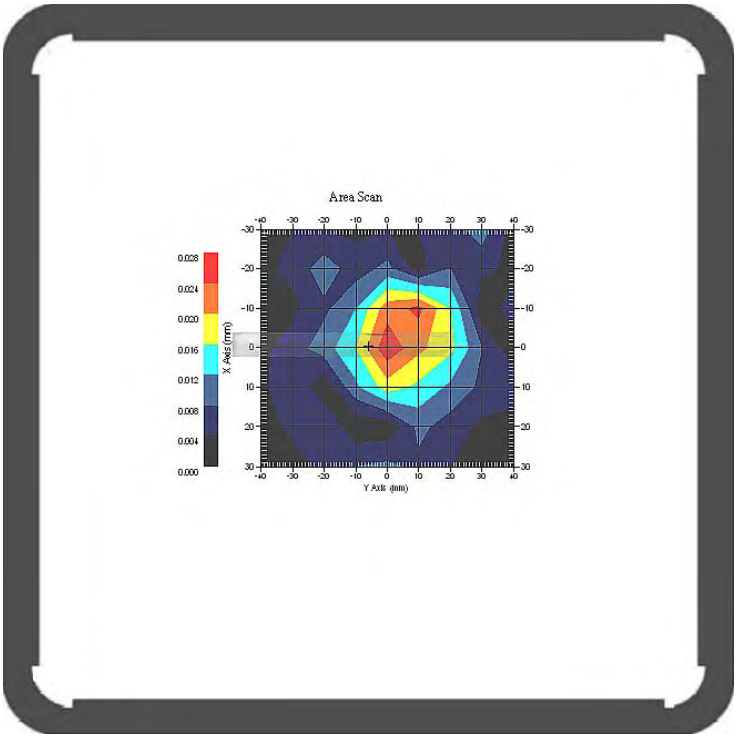
Measurement Data
Test mode : GPRS
Crest Factor : 4
Scan Type : Complete
Area Scan : 7x9x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.018 W/kg
Power Drift-Finish : 0.018 W/kg
Power Drift (%) : 3.024

Tissue Data
Type : BODY
Frequency : 835.00 MHz
Epsilon : 53.18 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 835.00 MHz
Duty Cycle Factor : 4
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 : 0.023 W/kg
10 gram SAR value : 0.014 W/kg
Area Scan Peak SAR : 0.028 W/kg
Zoom Scan Peak SAR : 0.061 W/kg

Plot 6#



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

Head Cheek (1909.8 MHz High Channel)

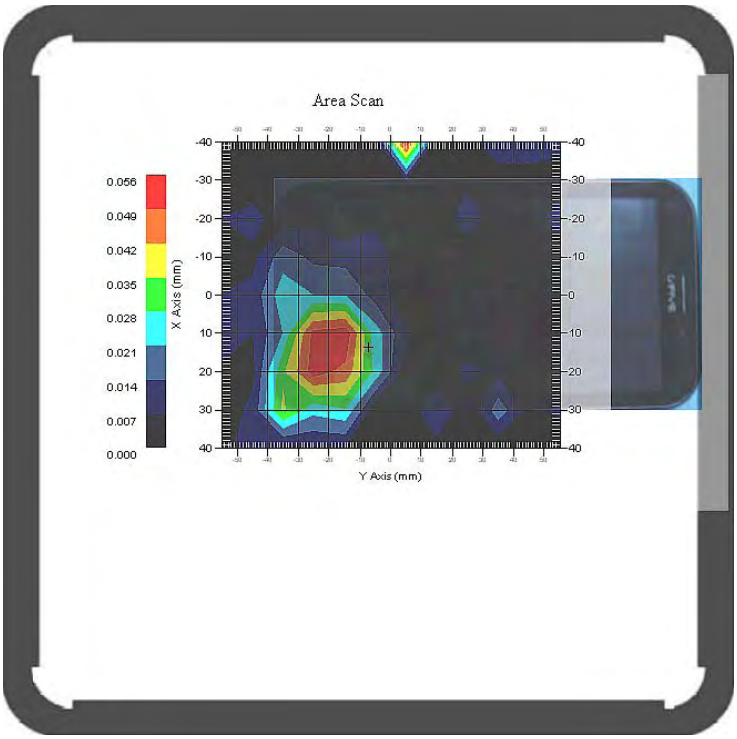
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 9x12x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.034 W/kg
Power Drift-Finish : 0.034 W/kg
Power Drift (%) : 0.823

Tissue Data
Type : HEAD
Frequency : 1900.00 MHz
Epsilon : 40.36 F/m
Sigma : 1.39 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 1900.00 MHz
Duty Cycle Factor : 8
Conversion Factor : 5.2
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.054 W/kg
10 gram SAR value : 0.032 W/kg
Area Scan Peak SAR : 0.056 W/kg
Zoom Scan Peak SAR : 0.107W/kg

Plot 7#



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

Body Back-Headset (1909.8 MHz High Channel)

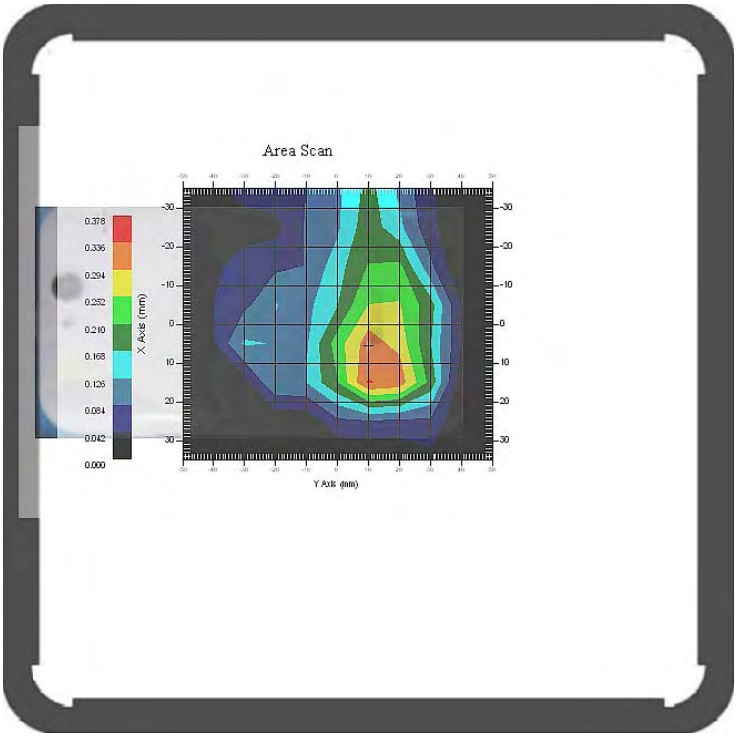
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 9x12x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.297 W/kg
Power Drift-Finish : 0.304 W/kg
Power Drift (%) : 2.357

Tissue Data
Type : BODY
Frequency : 1900.00 MHz
Epsilon : 56.50 F/m
Sigma : 1.51 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 1900.00 MHz
Duty Cycle Factor : 8
Conversion Factor : 5.0
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.297W/kg
10 gram SAR value : 0.179 W/kg
Area Scan Peak SAR : 0.338 W/kg
Zoom Scan Peak SAR : 0.693 W/kg

Plot 8#



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

Body-Front (1850.2 MHz Low Channel)

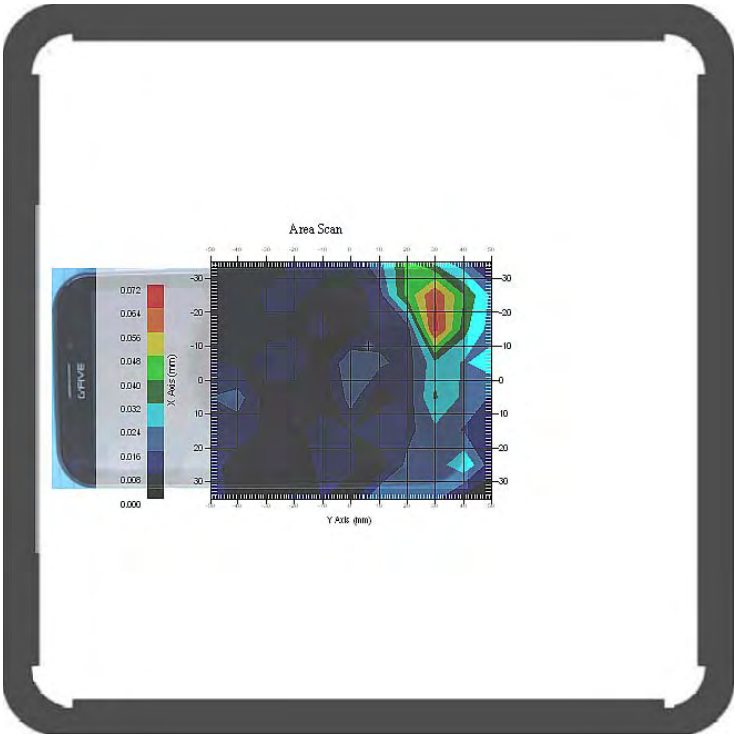
Measurement Data
Test mode : GPRS
Crest Factor : 4
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.039 W/kg
Power Drift-Finish : 0.041 W/kg
Power Drift (%) : 3.235

Tissue Data
Type : BODY
Frequency : 1900.00 MHz
Epsilon : 56.50 F/m
Sigma : 1.51 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 1900.00 MHz
Duty Cycle Factor : 4
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 : 0.054 W/kg
10 gram SAR value : 0.029 W/kg
Area Scan Peak SAR : 0.067 W/kg
Zoom Scan Peak SAR : 0.090 W/kg

Plot 9#



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

Body-Back (1850.2 MHz Low Channel)

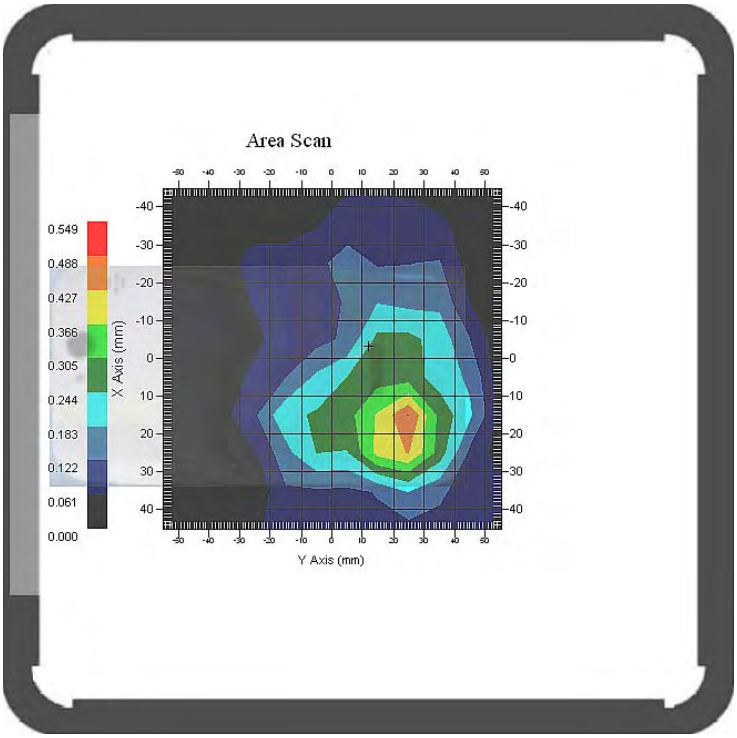
Measurement Data
Test mode : GPRS
Crest Factor : 4
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.139 W/kg
Power Drift-Finish : 0.140 W/kg
Power Drift (%) : 1.159

Tissue Data
Type : BODY
Frequency : 1900.00 MHz
Epsilon : 56.50 F/m
Sigma : 1.51 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 1900.00 MHz
Duty Cycle Factor : 4
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 : 0.506 W/kg
10 gram SAR value : 0.271 W/kg
Area Scan Peak SAR : 0.537 W/kg
Zoom Scan Peak SAR : 1.040 W/kg

Plot 10#



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

Body-Right (1850.2 MHz Low Channel)

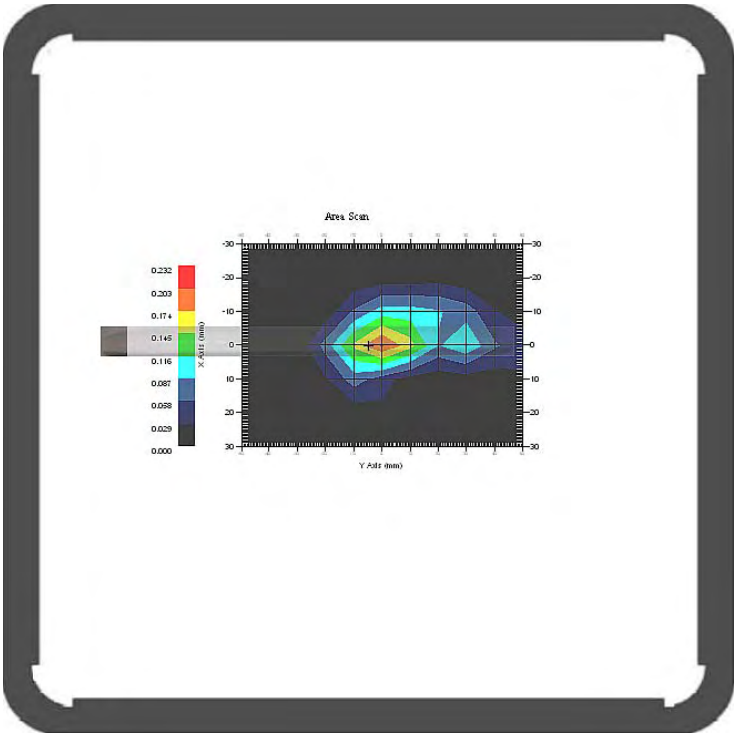
Measurement Data
Test mode : GPRS
Crest Factor : 4
Scan Type : Complete
Area Scan : 9x12x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.189 W/kg
Power Drift-Finish : 0.184 W/kg
Power Drift (%) : -2.754

Tissue Data
Type : BODY
Frequency : 1900.00 MHz
Epsilon : 56.50 F/m
Sigma : 1.51 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 1900.00 MHz
Duty Cycle Factor : 4
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 : 0.177 W/kg
10 gram SAR value : 0.069 W/kg
Area Scan Peak SAR : 0.205 W/kg
Zoom Scan Peak SAR : 0.410 W/kg

Plot 11#



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

Body-Bottom (1850.2 MHz Low Channel)

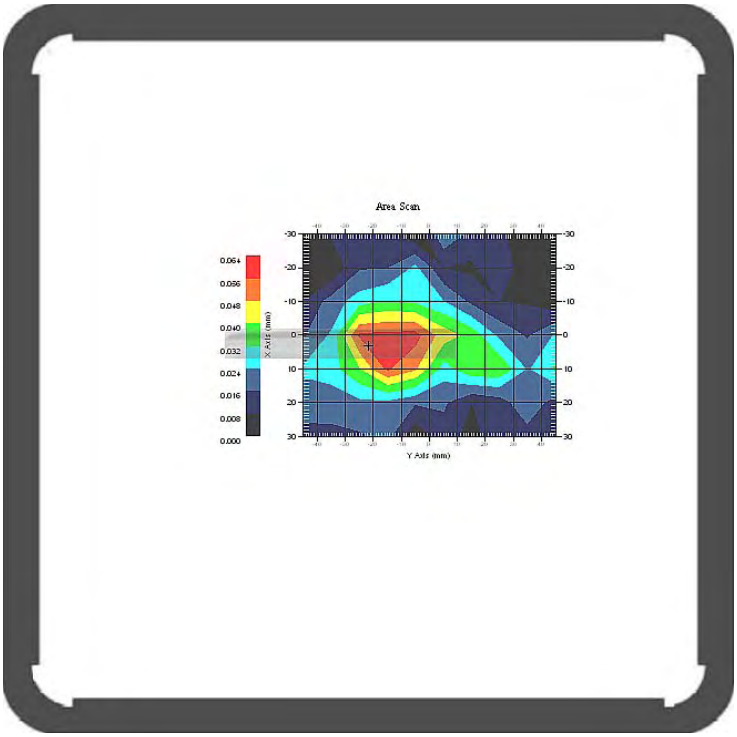
Measurement Data
Test mode : GPRS
Crest Factor : 4
Scan Type : Complete
Area Scan : 9x12x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.039 W/kg
Power Drift-Finish : 0.040 W/kg
Power Drift (%) : 3.178

Tissue Data
Type : BODY
Frequency : 1900.00 MHz
Epsilon : 56.50 F/m
Sigma : 1.51 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 1900.00 MHz
Duty Cycle Factor : 4
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 : 0.040 W/kg
10 gram SAR value : 0.025 W/kg
Area Scan Peak SAR : 0.059 W/kg
Zoom Scan Peak SAR : 0.090 W/kg

Plot 12#



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

Head Cheek (836.6 MHz Middle Channel)

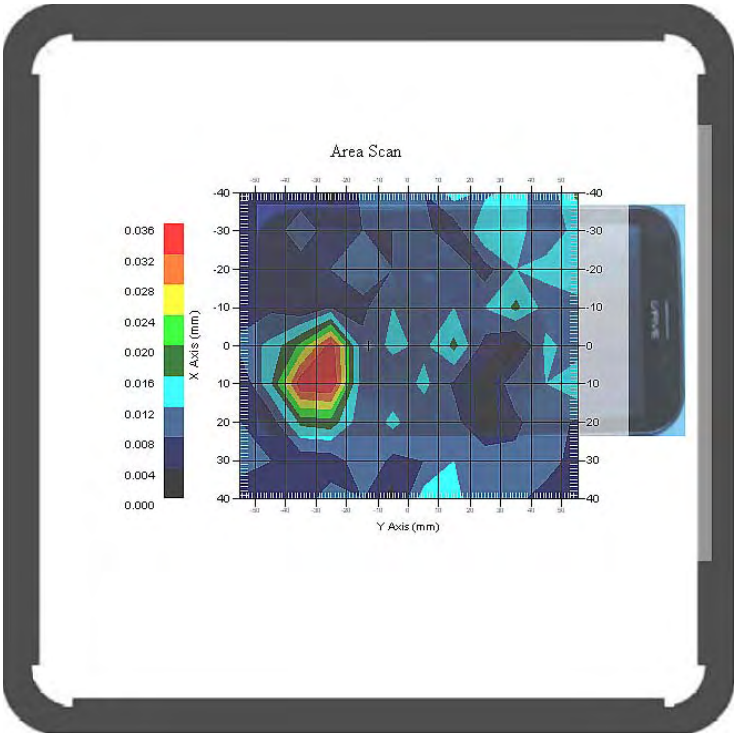
Measurement Data
Test mode : WCDMA 850
Crest Factor : 1
Scan Type : Complete
Area Scan : 8x12x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.016 W/kg
Power Drift-Finish : 0.016 W/kg
Power Drift (%) : -1.120

Tissue Data
Type : HEAD
Frequency : 835.00 MHz
Epsilon : 42.32 F/m
Sigma : 0.91 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 835.00 MHz
Duty Cycle Factor : 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

1 gram SAR value : 0.030 W/kg
10 gram SAR value : 0.044 W/kg
Area Scan Peak SAR : 0.057 W/kg
Zoom Scan Peak SAR : 0.100 W/kg

Plot 13#



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

Body-Front (836.6 MHz Middle Channel)

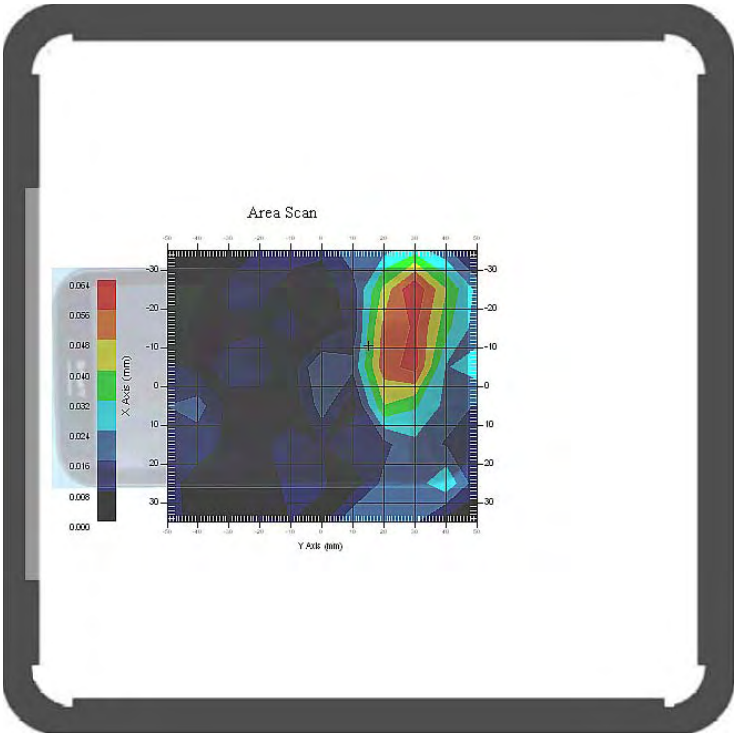
Measurement Data
Test mode : WCDMA 850
Crest Factor : 1
Scan Type : Complete
Area Scan : 8x12x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.037 W/kg
Power Drift-Finish : 0.038 W/kg
Power Drift (%) : 2.708

Tissue Data
Type : BODY
Frequency : 835.00 MHz
Epsilon : 53.18 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 835.00 MHz
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

1 gram SAR value : 0.054 W/kg
10 gram SAR value : 0.029 W/kg
Area Scan Peak SAR : 0.067 W/kg
Zoom Scan Peak SAR : 0.090 W/kg

Plot 14#



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

Body-Back (836.6 MHz Middle Channel)

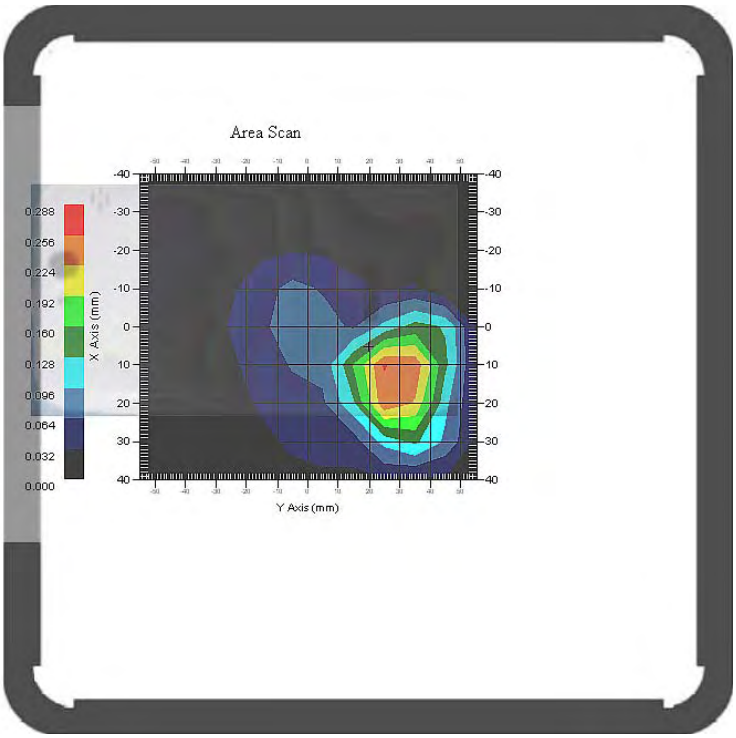
Measurement Data
Test mode : WCDMA 850
Crest Factor : 1
Scan Type : Complete
Area Scan : 8x12x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.130 W/kg
Power Drift-Finish : 0.133 W/kg
Power Drift (%) : 2.256

Tissue Data
Type : BODY
Frequency : 835.00 MHz
Epsilon : 53.18 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 835.00 MHz
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

1 gram SAR value : 0.271 W/kg
10 gram SAR value : 0.153 W/kg
Area Scan Peak SAR : 0.282 W/kg
Zoom Scan Peak SAR : 0.467 W/kg

Plot 15#



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

Body-Right (836.6 MHz Middle Channel)

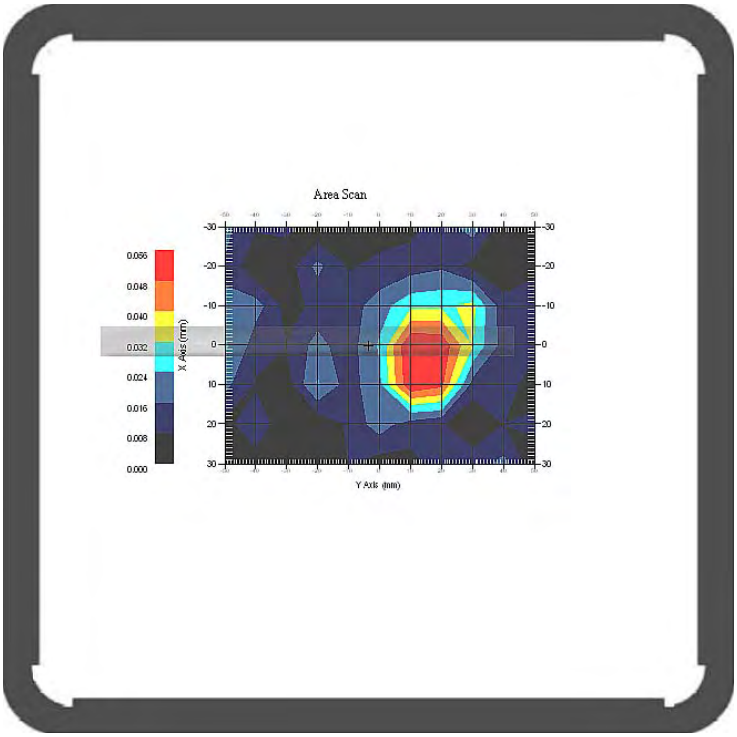
Measurement Data
Test mode : WCDMA 850
Crest Factor : 1
Scan Type : Complete
Area Scan : 8x12x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.189 W/kg
Power Drift-Finish : 0.184 W/kg
Power Drift (%) : -2.754

Tissue Data
Type : BODY
Frequency : 835.00 MHz
Epsilon : 53.18 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 835.00 MHz
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

1 gram SAR value : 0.047 W/kg
10 gram SAR value : 0.029 W/kg
Area Scan Peak SAR : 0.055 W/kg
Zoom Scan Peak SAR : 0.110 W/kg

Plot 16#



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

Body-Bottom (836.6 MHz Middle Channel)

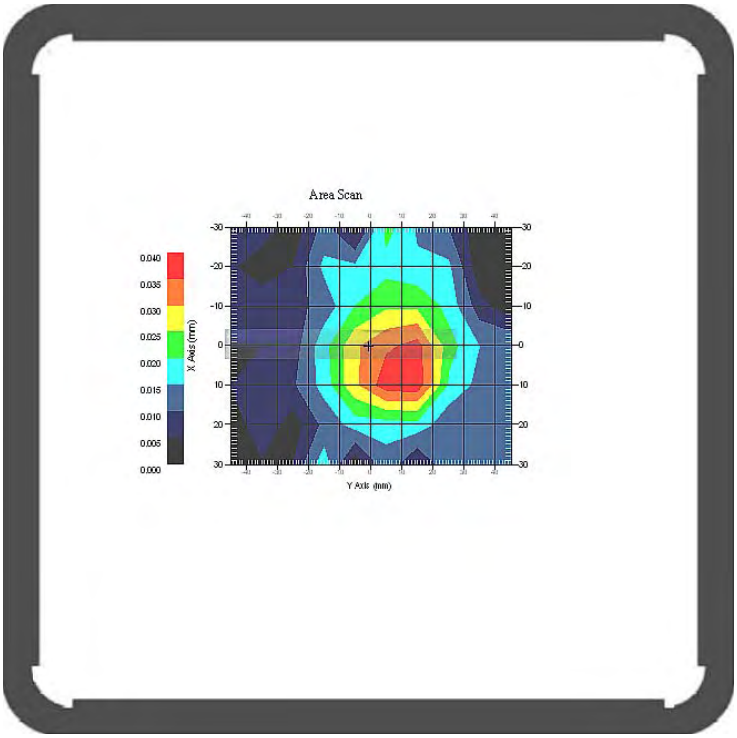
Measurement Data
Test mode : WCDMA 850
Crest Factor : 1
Scan Type : Complete
Area Scan : 8x12x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.039 W/kg
Power Drift-Finish : 0.040 W/kg
Power Drift (%) : 2.178

Tissue Data
Type : BODY
Frequency : 835.00 MHz
Epsilon : 53.18 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 835.00 MHz
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

1 gram SAR value : 0.040 W/kg
10 gram SAR value : 0.025 W/kg
Area Scan Peak SAR : 0.059 W/kg
Zoom Scan Peak SAR : 0.090 W/kg

Plot 17#



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

Head Cheek (1852.4 MHz Low Channel)

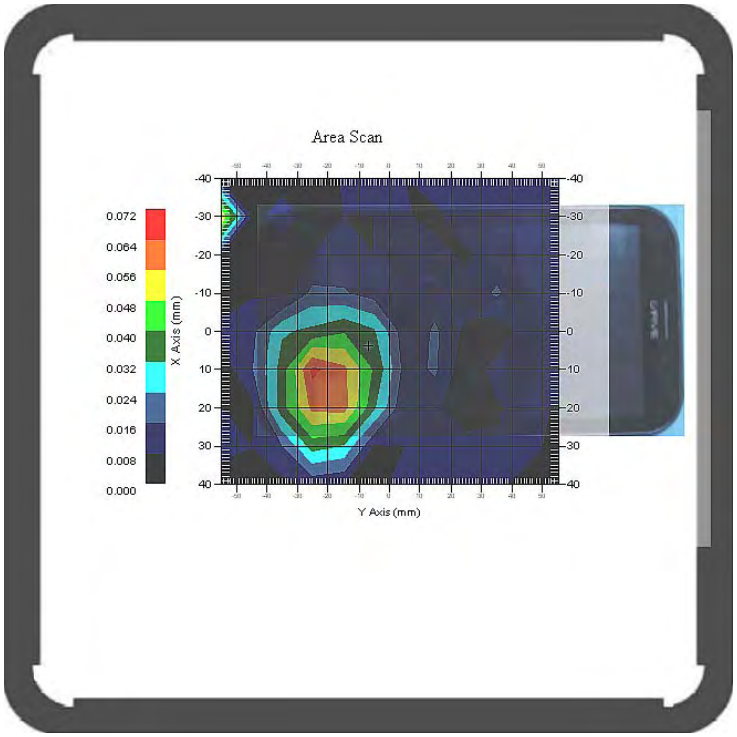
Measurement Data
Test mode : WCDMA 1900
Crest Factor : 1
Scan Type : Complete
Area Scan : 9x12x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.051 W/kg
Power Drift-Finish : 0.051 W/kg
Power Drift (%) : 1.455

Tissue Data
Type : HEAD
Frequency : 1900.00 MHz
Epsilon : 40.36 F/m
Sigma : 1.39 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 1900.00 MHz
Duty Cycle Factor : 1
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 : 0.059 W/kg
10 gram SAR value : 0.034 W/kg
Area Scan Peak SAR : 0.070 W/kg
Zoom Scan Peak SAR : 0.124 W/kg

Plot 18#



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

Body-Front (1852.4 MHz Low Channel)

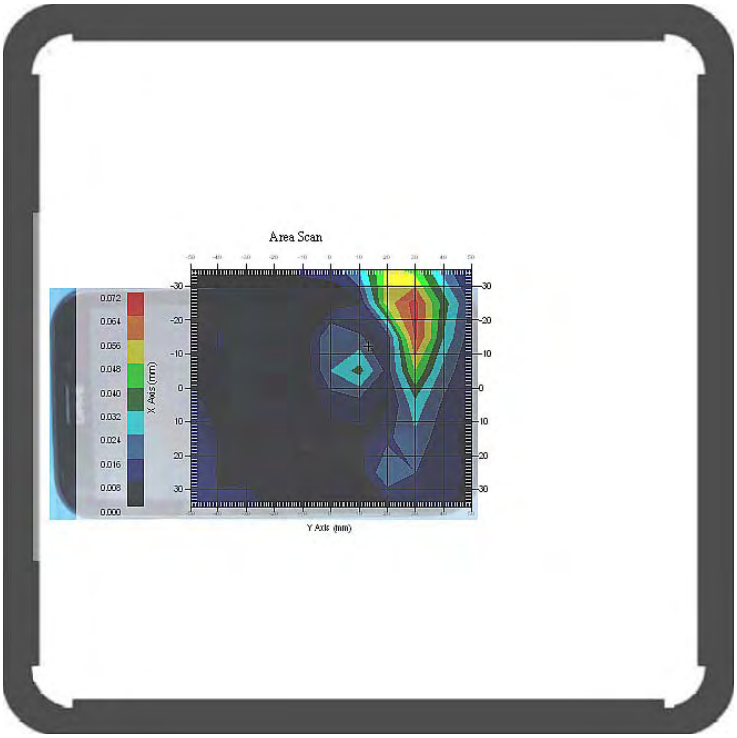
Measurement Data
Test mode : WCDMA 1900
Crest Factor : 1
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.011 W/kg
Power Drift-Finish : 0.012 W/kg
Power Drift (%) : 4.405

Tissue Data
Type : BODY
Frequency : 1900.00 MHz
Epsilon : 56.50 F/m
Sigma : 1.51 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 1900.00 MHz
Duty Cycle Factor : 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

1 gram SAR value : 0.065 W/kg
10 gram SAR value : 0.031 W/kg
Area Scan Peak SAR : 0.067 W/kg
Zoom Scan Peak SAR : 0.130 W/kg

Plot 19#



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

Body-Back (1852.4 MHz Low Channel)

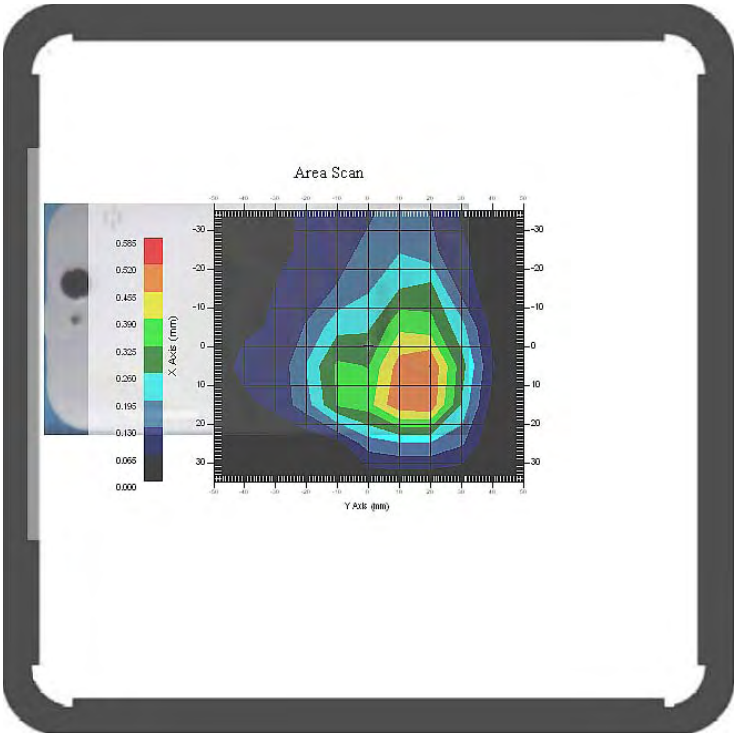
Measurement Data
Test mode : WCDMA 1900
Crest Factor : 1
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.191 W/kg
Power Drift-Finish : 0.189 W/kg
Power Drift (%) : -3.605

Tissue Data
Type : BODY
Frequency : 1900.00 MHz
Epsilon : 56.50 F/m
Sigma : 1.51 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 1900.00 MHz
Duty Cycle Factor : 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

1 gram SAR value : 0.562 W/kg
10 gram SAR value : 0.264 W/kg
Area Scan Peak SAR : 0.571 W/kg
Zoom Scan Peak SAR : 1.191 W/kg

Plot 20#



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

Body-Right (1852.4 MHz Low Channel)

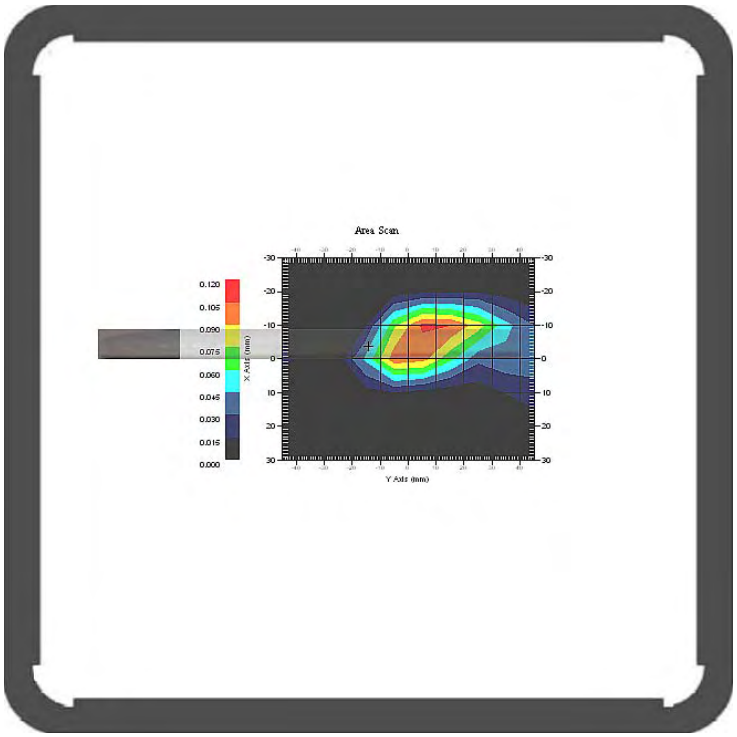
Measurement Data
Test mode : WCDMA 1900
Crest Factor : 1
Scan Type : Complete
Area Scan : 9x12x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.096 W/kg
Power Drift-Finish : 0.097 W/kg
Power Drift (%) : 0.961

Tissue Data
Type : BODY
Frequency : 1900.00 MHz
Epsilon : 56.50 F/m
Sigma : 1.51 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 1900.00 MHz
Duty Cycle Factor : 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

1 gram SAR value : 0.087 W/kg
10 gram SAR value : 0.060 W/kg
Area Scan Peak SAR : 0.107 W/kg
Zoom Scan Peak SAR : 0.250 W/kg

Plot 21#



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

Body-Bottom (1852.4 MHz Low Channel)

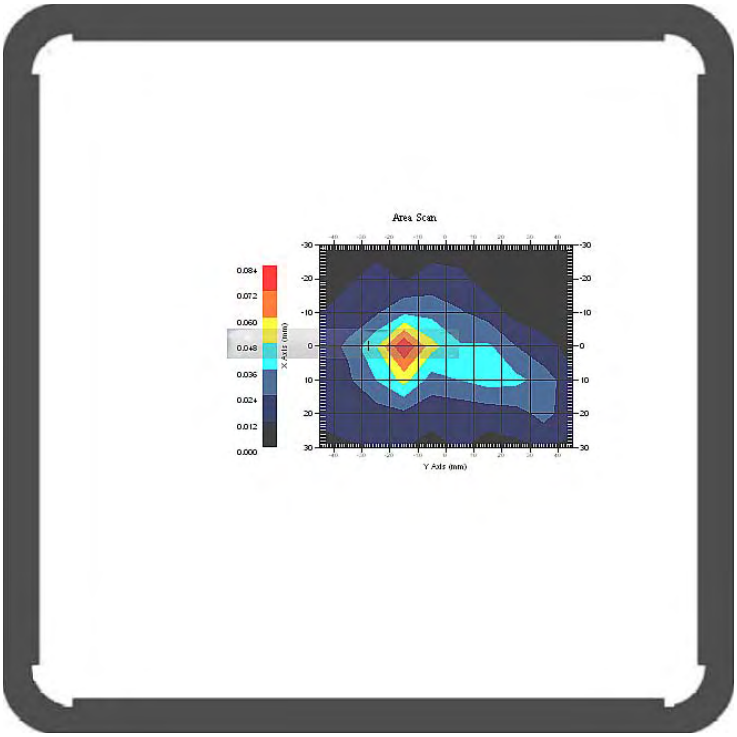
Measurement Data
Test mode : WCDMA 1900
Crest Factor : 1
Scan Type : Complete
Area Scan : 9x12x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.042 W/kg
Power Drift-Finish : 0.042 W/kg
Power Drift (%) : -3.717

Tissue Data
Type : BODY
Frequency : 1900.00 MHz
Epsilon : 56.50 F/m
Sigma : 1.51 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 1900.00 MHz
Duty Cycle Factor : 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

1 gram SAR value : 0.046 W/kg
10 gram SAR value : 0.025 W/kg
Area Scan Peak SAR : 0.083 W/kg
Zoom Scan Peak SAR : 0.120 W/kg

Plot 22#



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

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

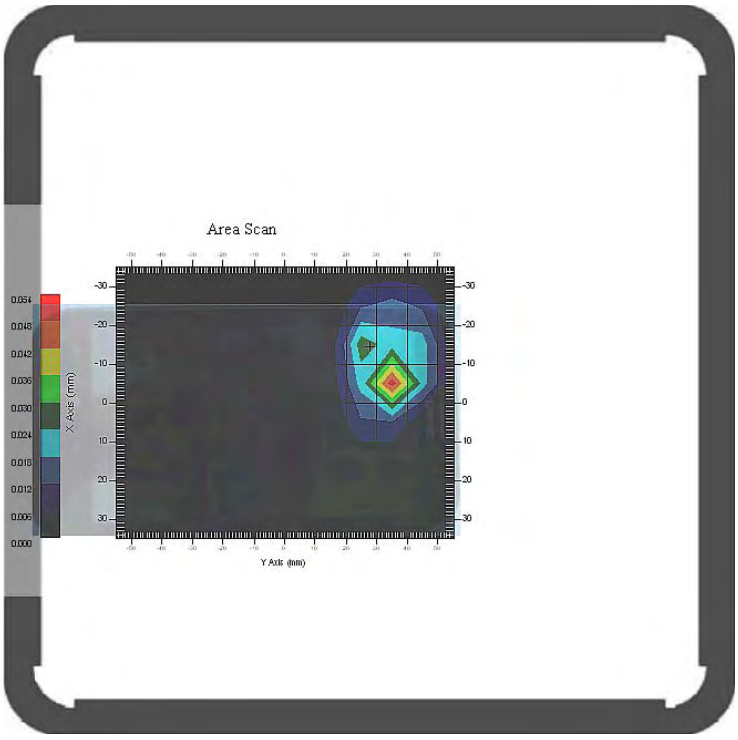
Measurement Data
Crest Factor : 1
Scan Type : Complete
Area Scan : 16x10x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.052 W/kg
Power Drift-Finish : 0.051 W/kg
Power Drift (%) : -2.014

Tissue Data
Type : BODY
Frequency : 2450 MHz
Epsilon : 53.13 F/m
Sigma : 1.98 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 2450 MHz
Duty Cycle Factor : 1
Conversion Factor : 4.3
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.048 W/kg
10 gram SAR value : 0.022 W/kg
Area Scan Peak SAR : 0.051 W/kg
Zoom Scan Peak SAR : 0.105 W/kg

Plot 23#



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

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

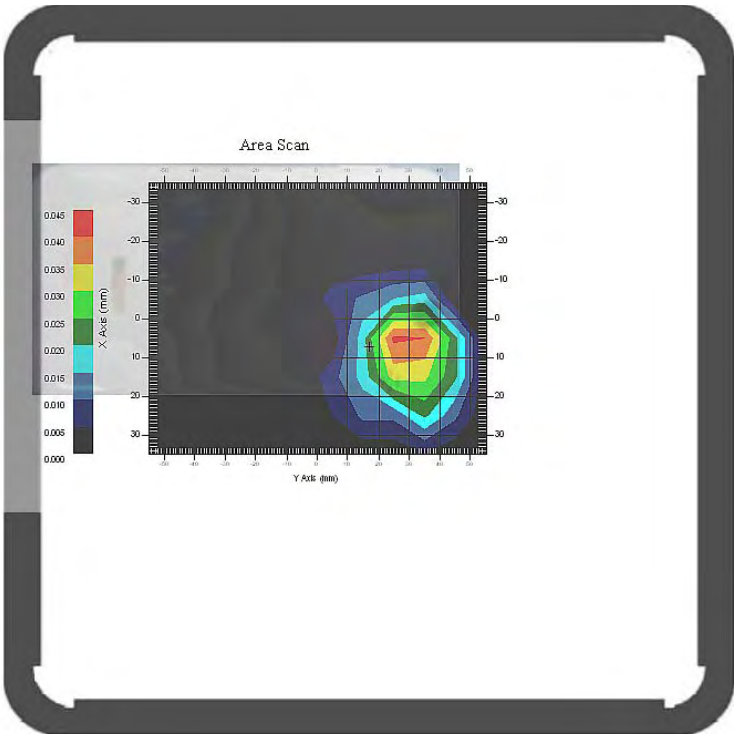
Measurement Data
Crest Factor : 1
Scan Type : Complete
Area Scan : 10x6x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.005 W/kg
Power Drift-Finish : 0.005 W/kg
Power Drift (%) : -0.773

Tissue Data
Type : BODY
Frequency : 2450 MHz
Epsilon : 53.13 F/m
Sigma : 1.98 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 2450 MHz
Duty Cycle Factor : 1
Conversion Factor : 4.3
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.038 W/kg
10 gram SAR value : 0.020 W/kg
Area Scan Peak SAR : 0.042 W/kg
Zoom Scan Peak SAR : 0.076 W/kg

Plot 24#



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

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

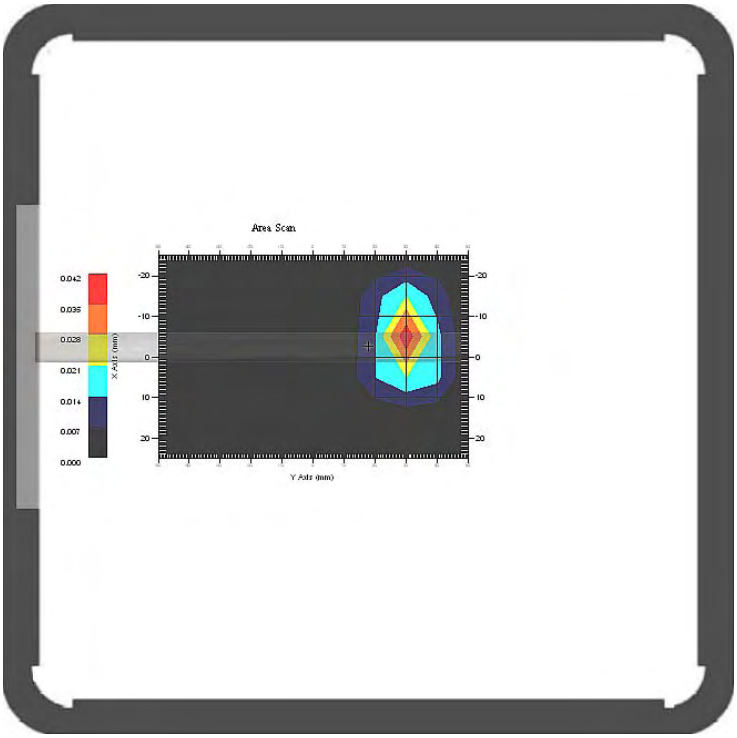
Measurement Data
Crest Factor : 1
Scan Type : Complete
Area Scan : 16x6x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.017 W/kg
Power Drift-Finish : 0.018 W/kg
Power Drift (%) : 2.940

Tissue Data
Type : BODY
Frequency : 2450 MHz
Epsilon : 53.13 F/m
Sigma : 1.98 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 2450 MHz
Duty Cycle Factor : 1
Conversion Factor : 4.3
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.029 W/kg
10 gram SAR value : 0.011 W/kg
Area Scan Peak SAR : 0.034 W/kg
Zoom Scan Peak SAR : 0.057 W/kg

Plot 25#



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

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

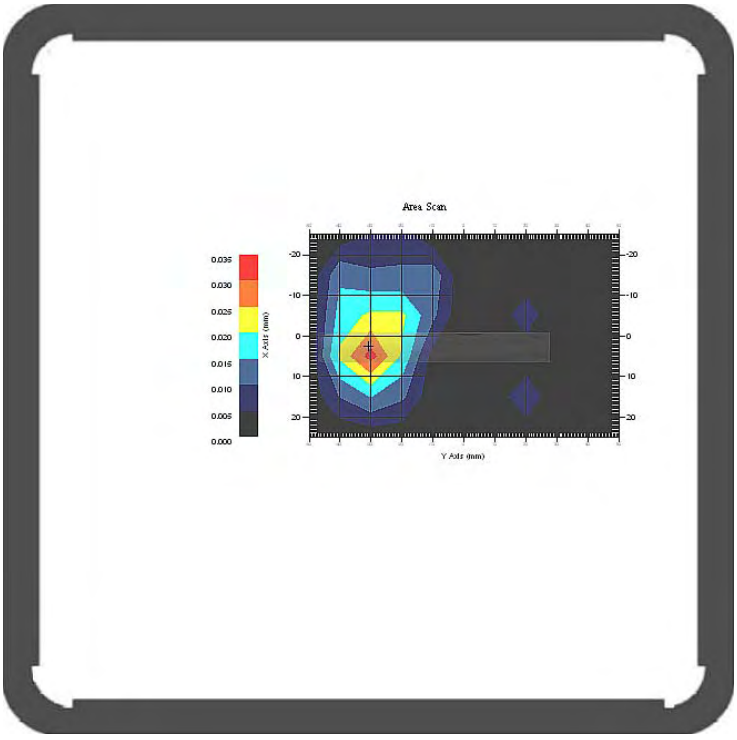
Measurement Data
Crest Factor : 1
Scan Type : Complete
Area Scan : 16x10x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.023 W/kg
Power Drift-Finish : 0.022 W/kg
Power Drift (%) : -3.205

Tissue Data
Type : BODY
Frequency : 2450 MHz
Epsilon : 53.13 F/m
Sigma : 1.98 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency : 2450 MHz
Duty Cycle Factor : 1
Conversion Factor : 4.3
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.026 W/kg
10 gram SAR value : 0.012 W/kg
Area Scan Peak SAR : 0.033 W/kg
Zoom Scan Peak SAR : 0.059 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	1.7	1.7
RF Ambient Condition - Reflections	3.0	rectangular	$\sqrt{3}$	1	1	0.55	0.55
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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Division of APREL Inc.

Conditions

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

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

Primary Measurement Standards

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

Secondary Measurement Standards

Signal Generator Agilent E4438C -506	MY55182336	June 7, 2012

Attestation

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

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

Stuart Nicol

Jesse Hones

Page 3 of 10
This page has been reviewed for content and attested to on Page 2 of this document.

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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	X	X	X	X	X
450 B	Body	X	X	X	X	X
750 H	Head	X	X	X	X	X
750 B	Body	X	X	X	X	X
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**	**38.72**	**1.35**	**3.5**	**3.4**	**5.1**
1750 B	**Body**	**51.62**	**1.48**	**3.5**	**3.4**	**4.8**
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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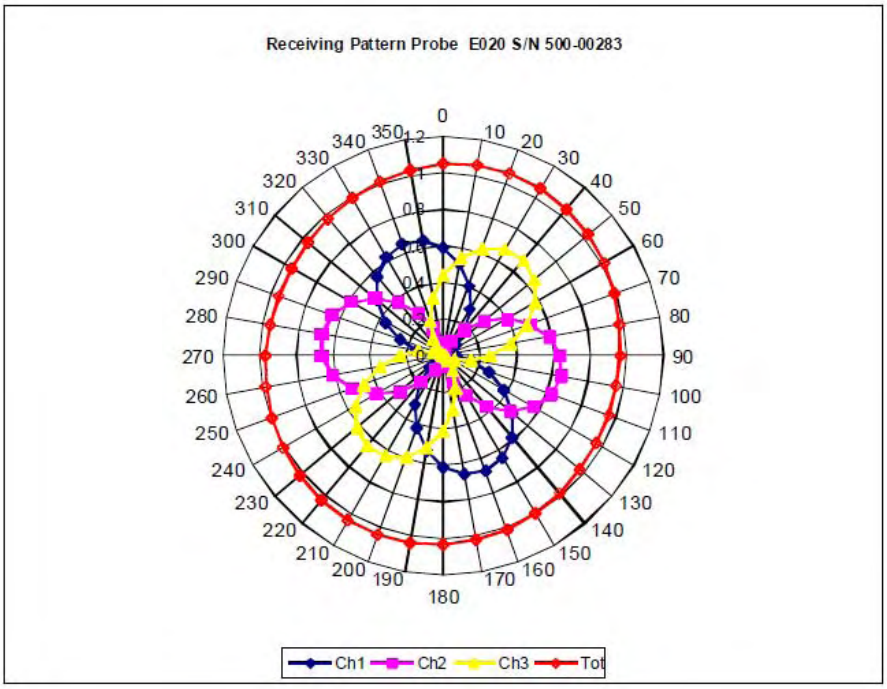
Receiving Pattern Air



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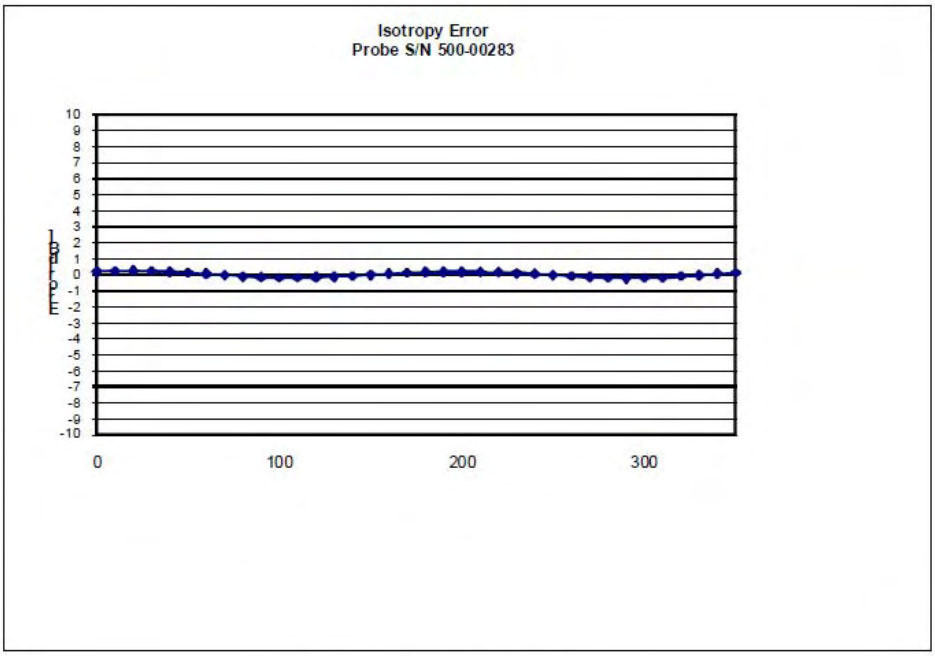
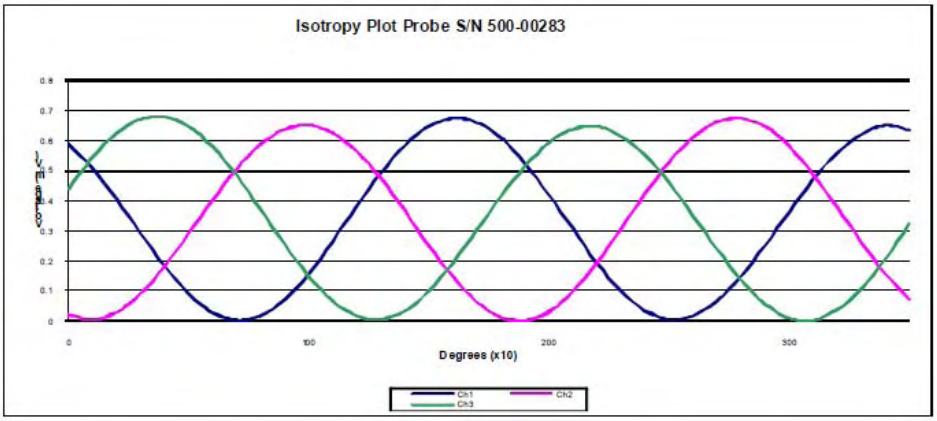
Isotropy Error Air





Isotropicity Tissue: 0.10 dB

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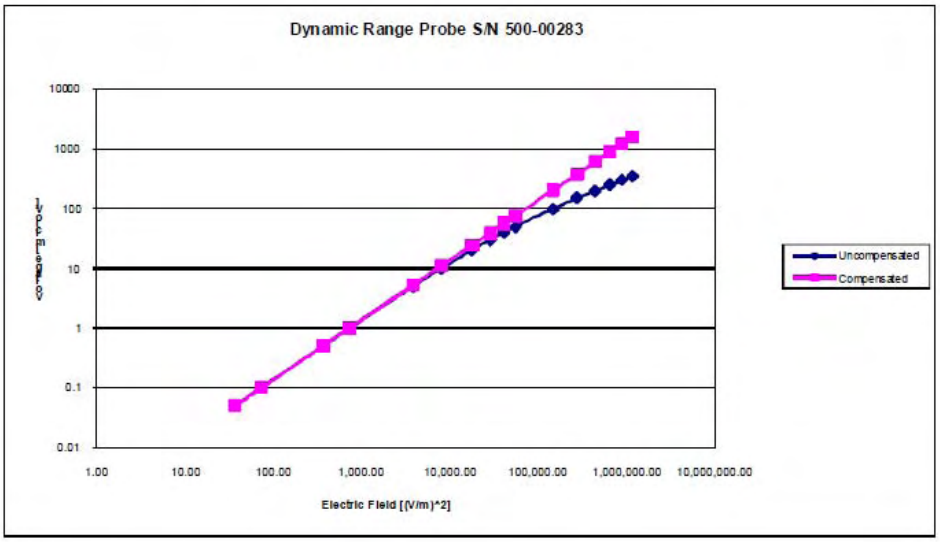
Dynamic Range



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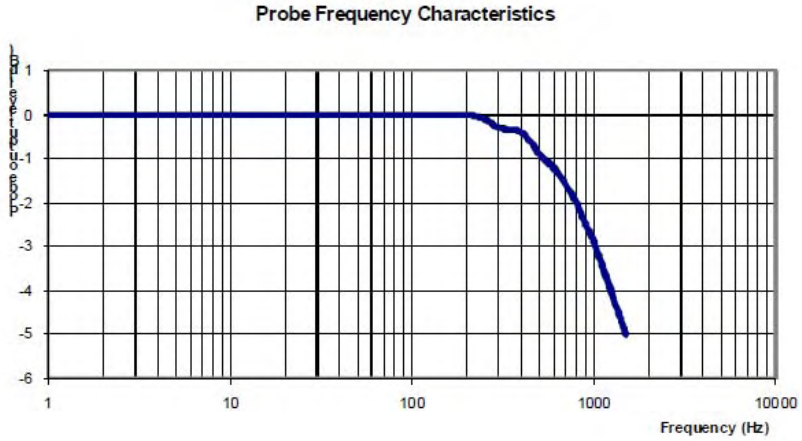
Video Bandwidth



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

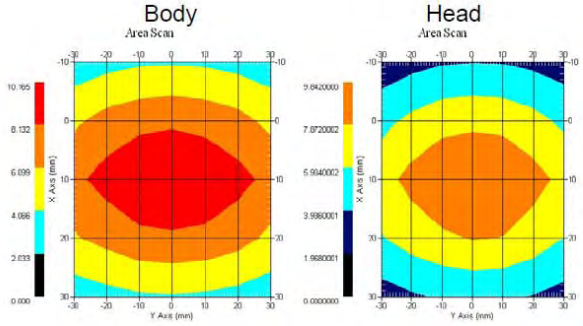
Length: 162.2 mm
Height: 89.4 mm

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



3

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)**

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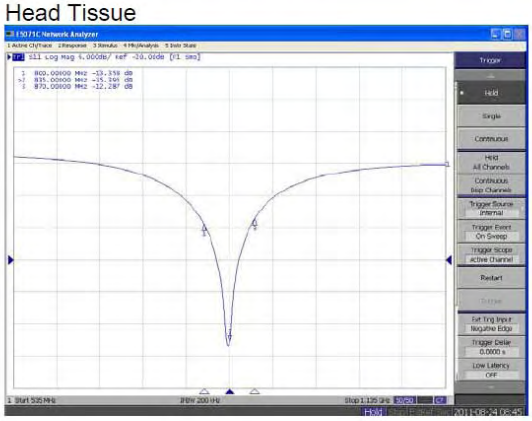
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

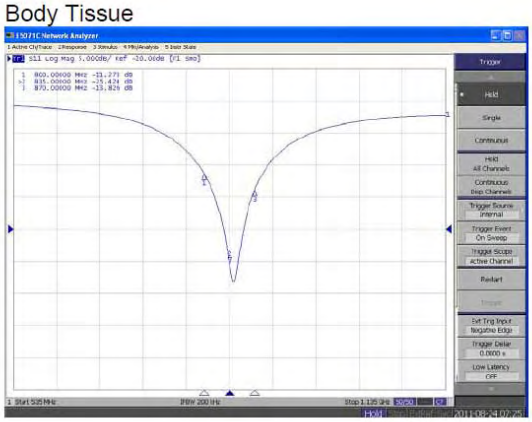
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head Tissue



Body Tissue



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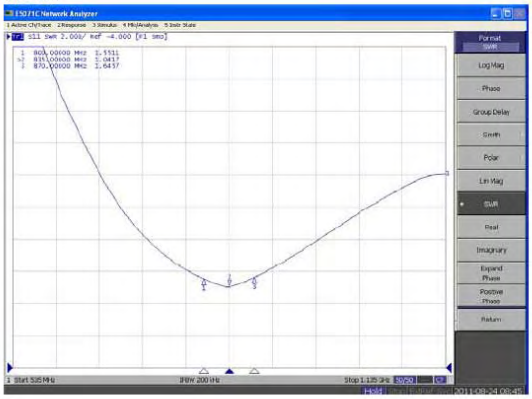
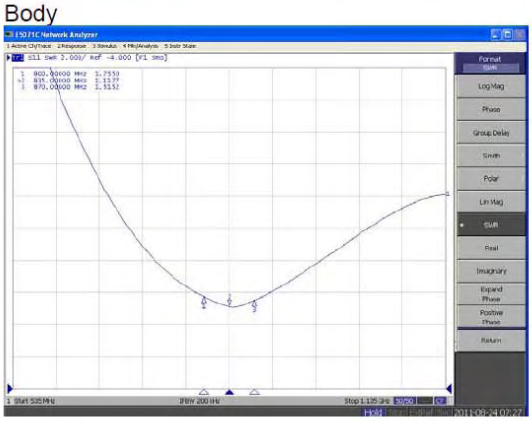
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

SWR
Head



Body



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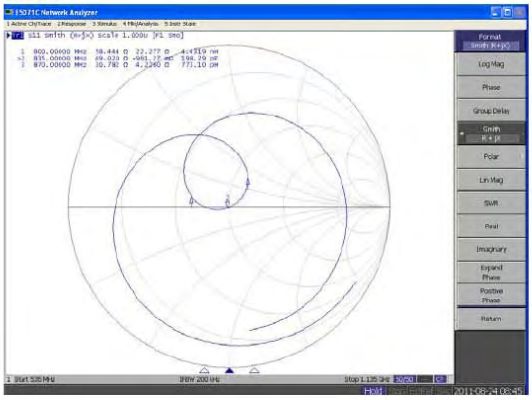
This page has been reviewed for content and attested to by signature within this document.

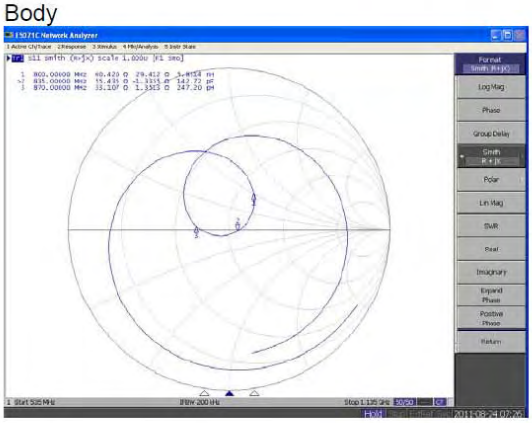
NCL Calibration Laboratories
Division of APREL Laboratories.

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

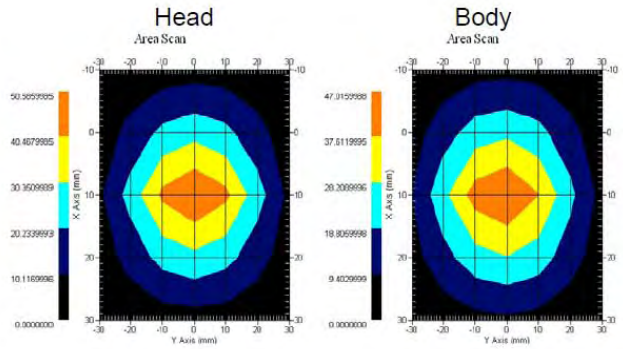
Length: 67.1 mm
Height: 38.9 mm

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)**

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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.

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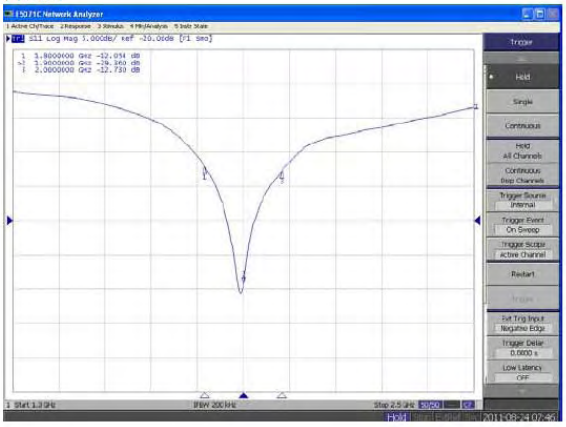
This page has been reviewed for content and attested to by signature within this document.

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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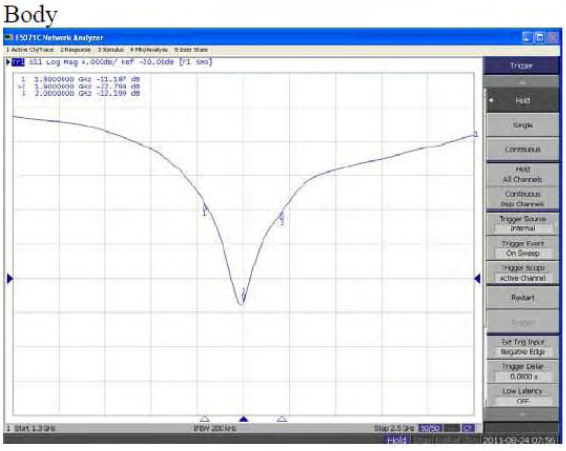

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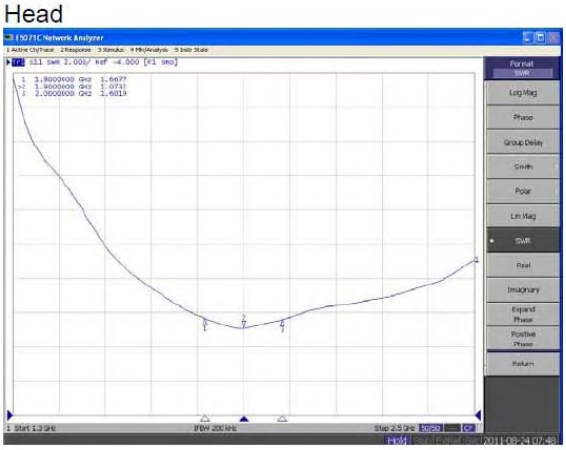
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories

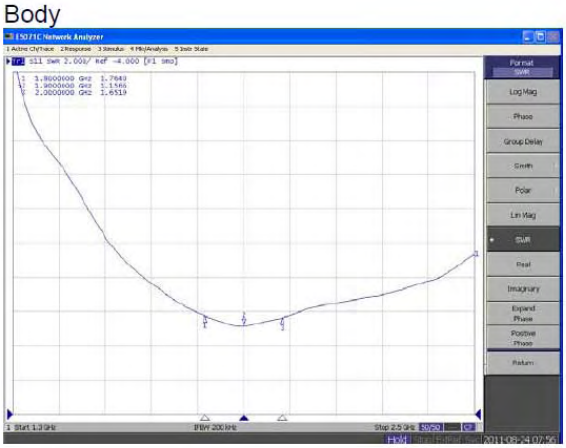
Division of APREL Laboratories.

SWR

Head



Body



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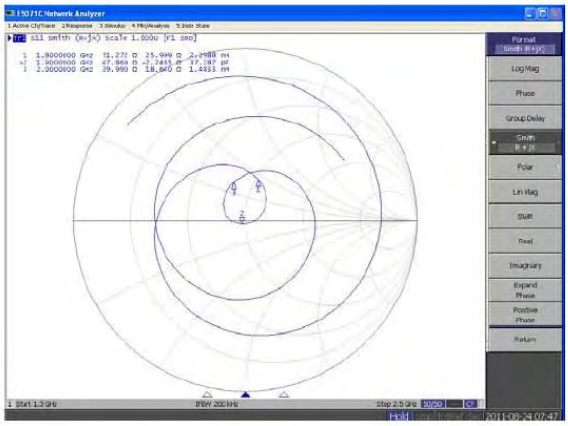
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories

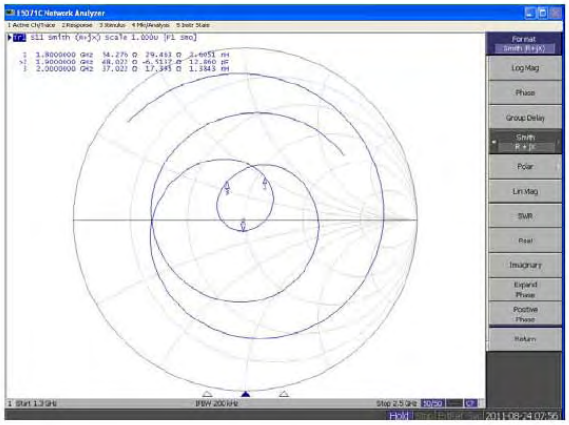
Division of APREL Laboratories.

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

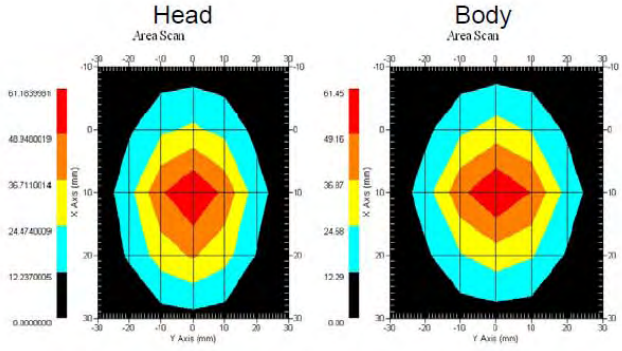
Length: 52.4 mm
Height: 30.3 mm

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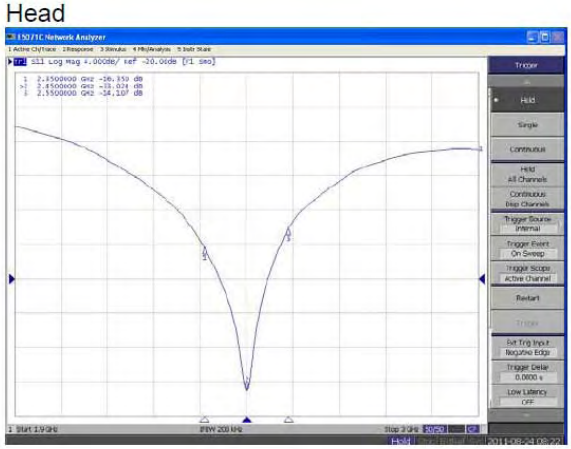
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

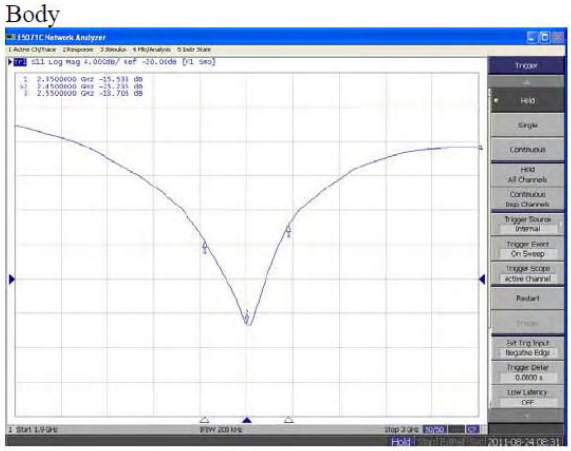
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head



Body



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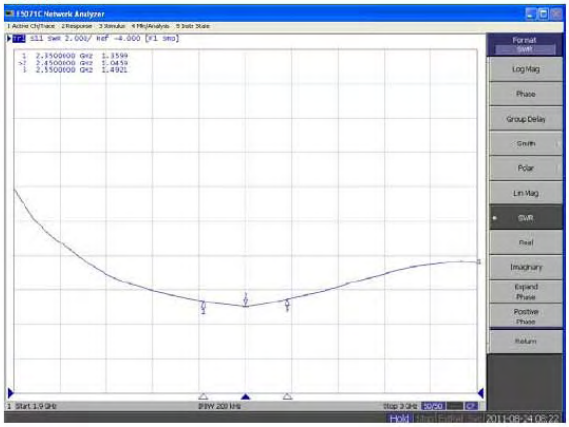
This page has been reviewed for content and attested to by signature within this document.

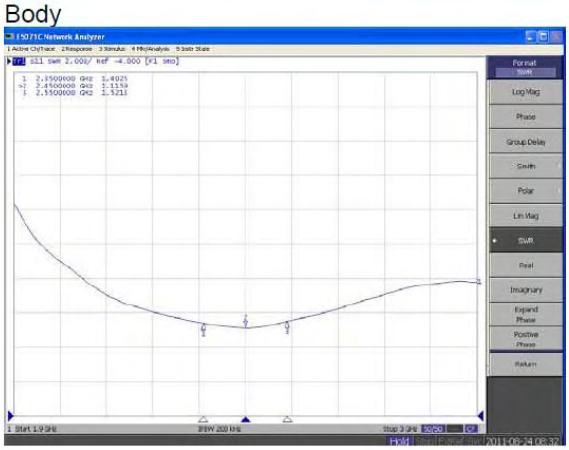
NCL Calibration Laboratories
Division of APREL Laboratories.

SWR

Head



Body



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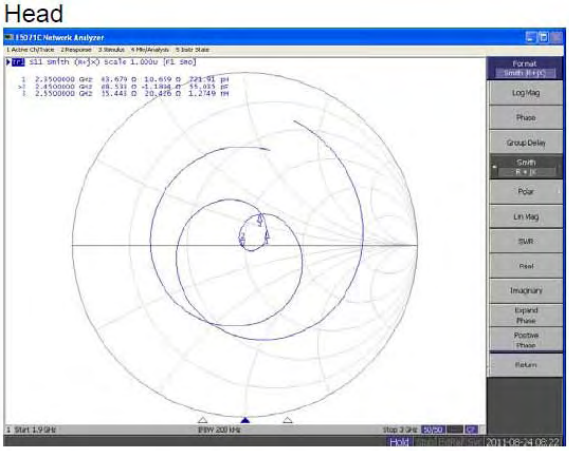
This page has been reviewed for content and attested to by signature within this document.

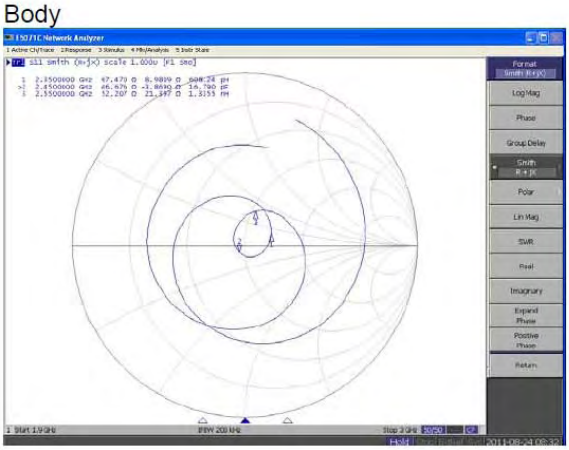
NCL Calibration Laboratories
Division of APREL Laboratories.

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.

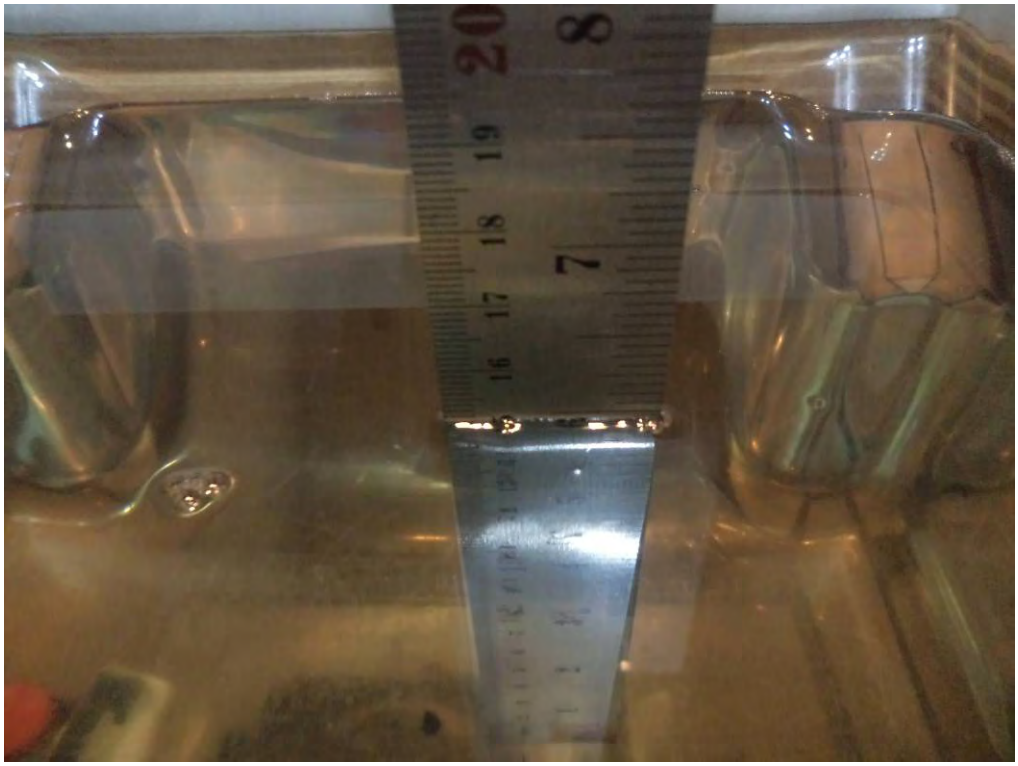
Test Equipment

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.

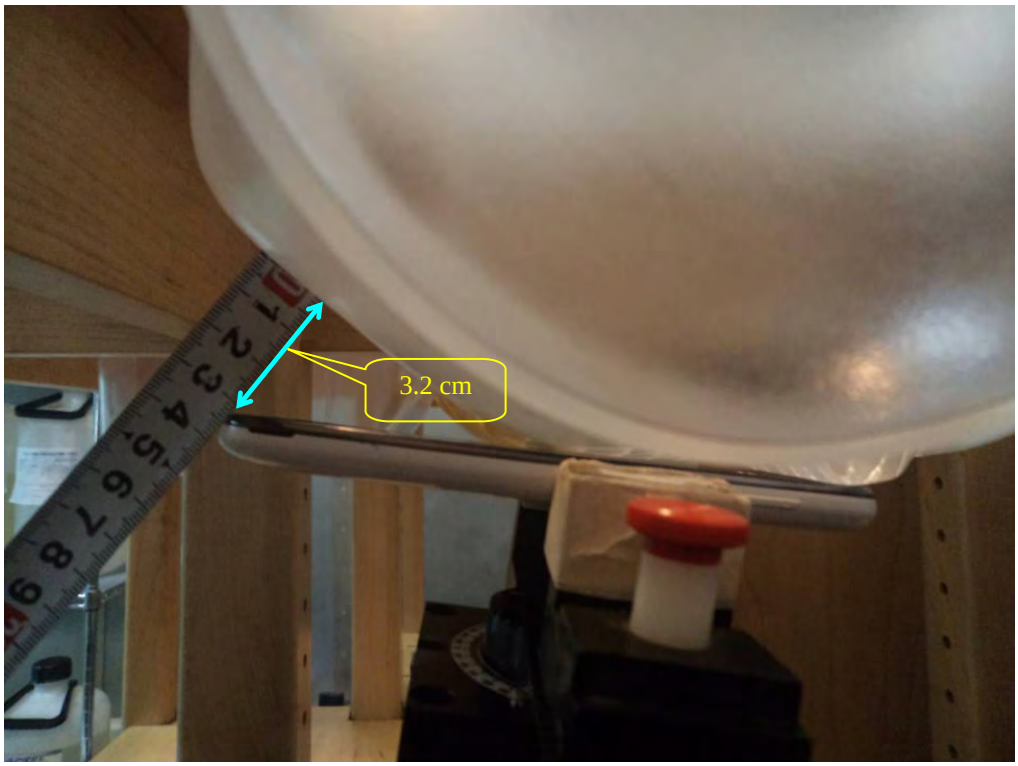
This page has been reviewed for content and attested to by signature within this document.

APPENDIX D – EUT TEST POSITION PHOTOS

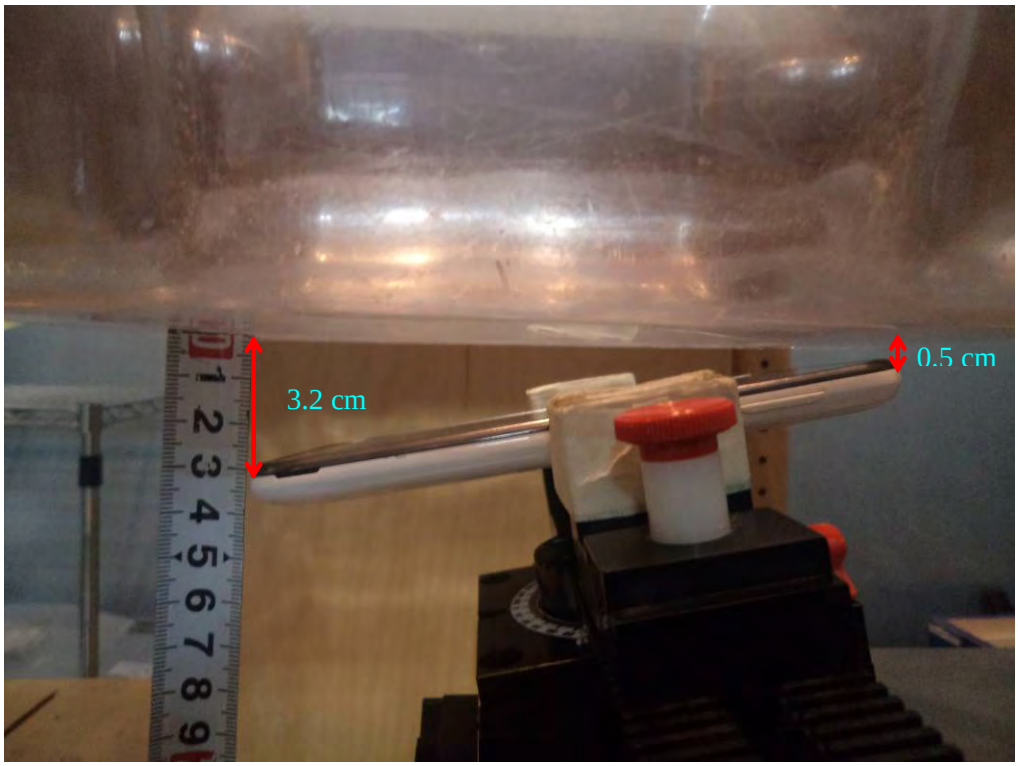
Liquid depth ≥ 15 cm



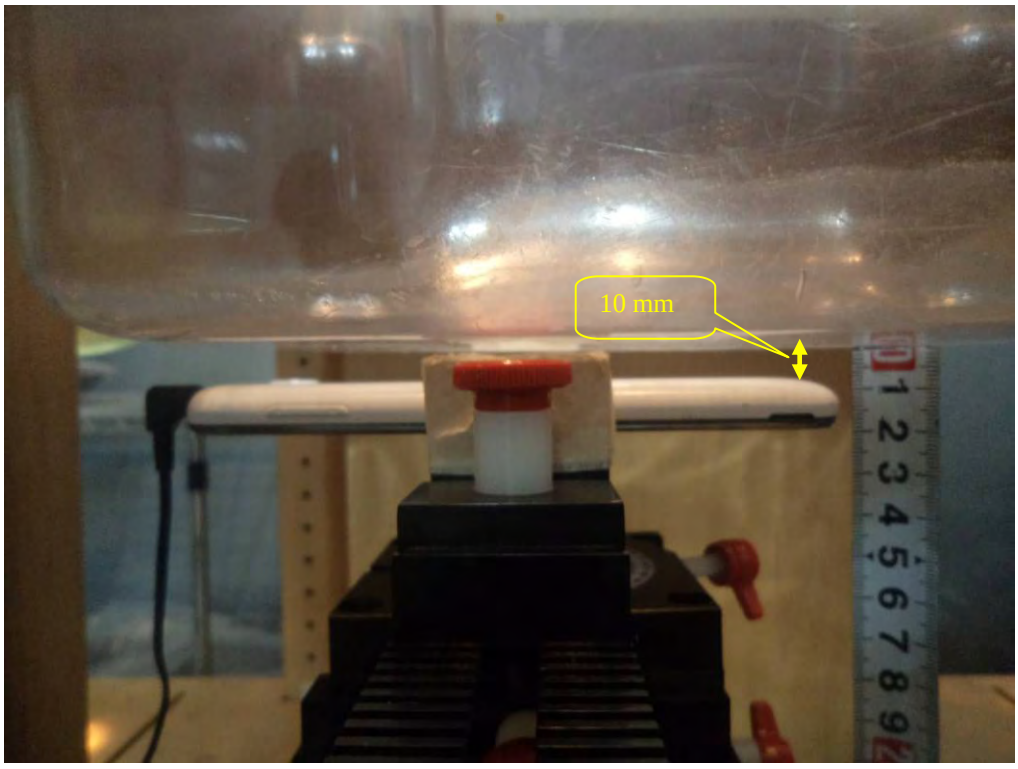
Distance between Head Phantom and EUT Bottom Edge



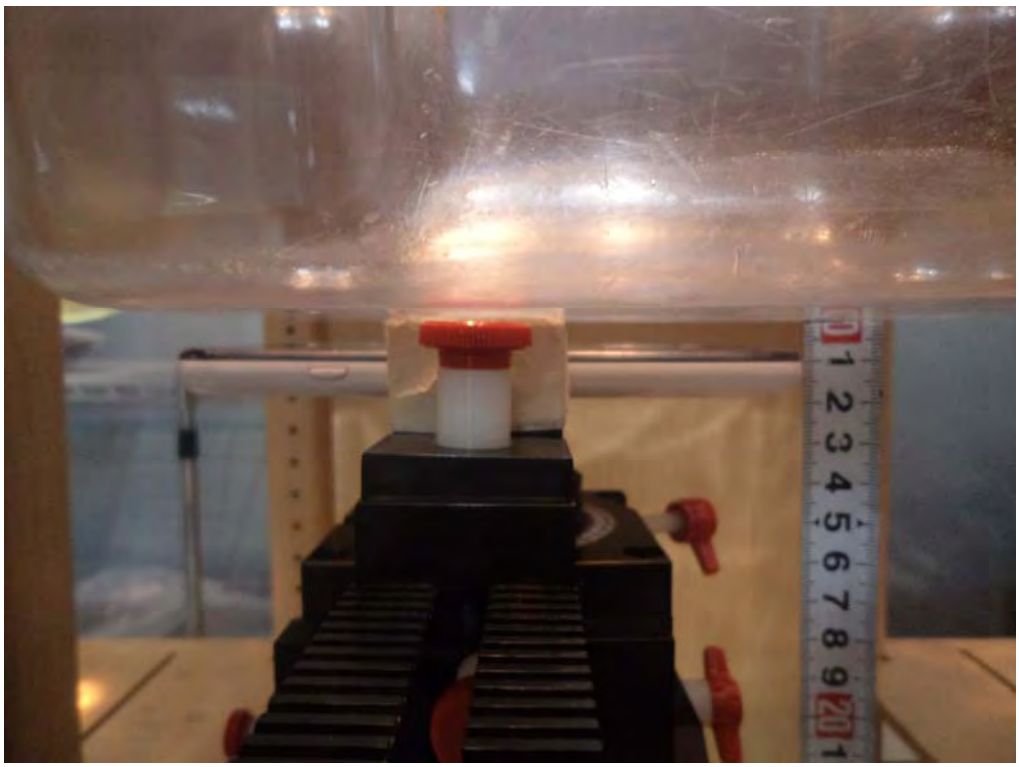
Head Test Setup Photo



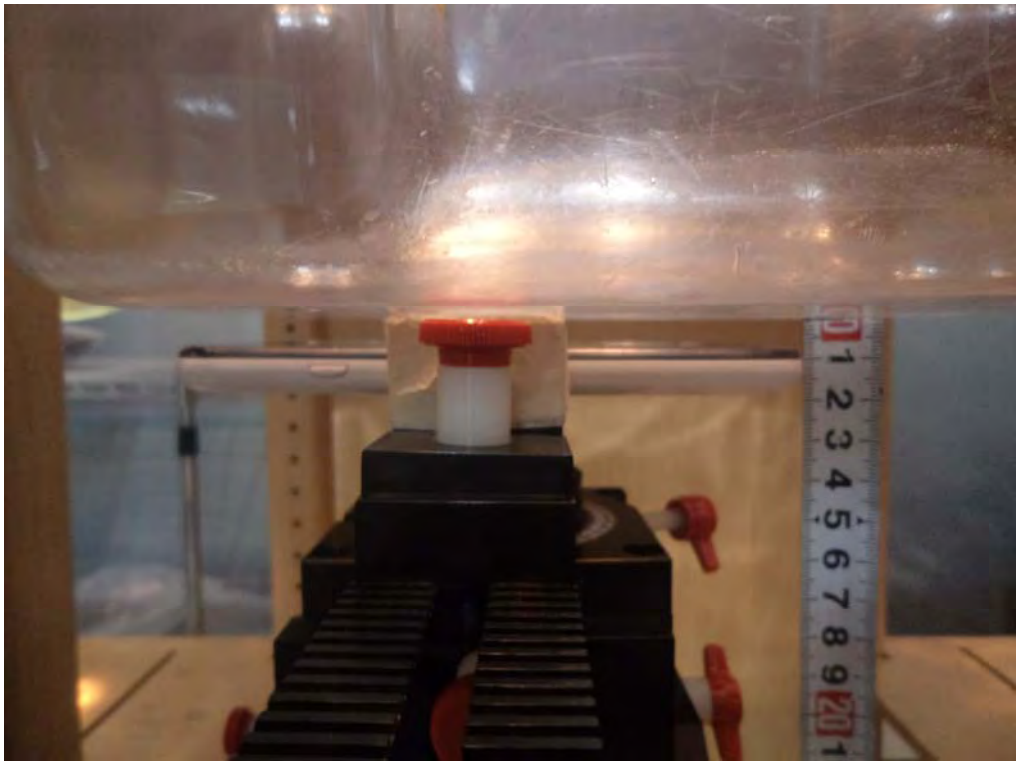
Body-Worn with Headset Setup Photo



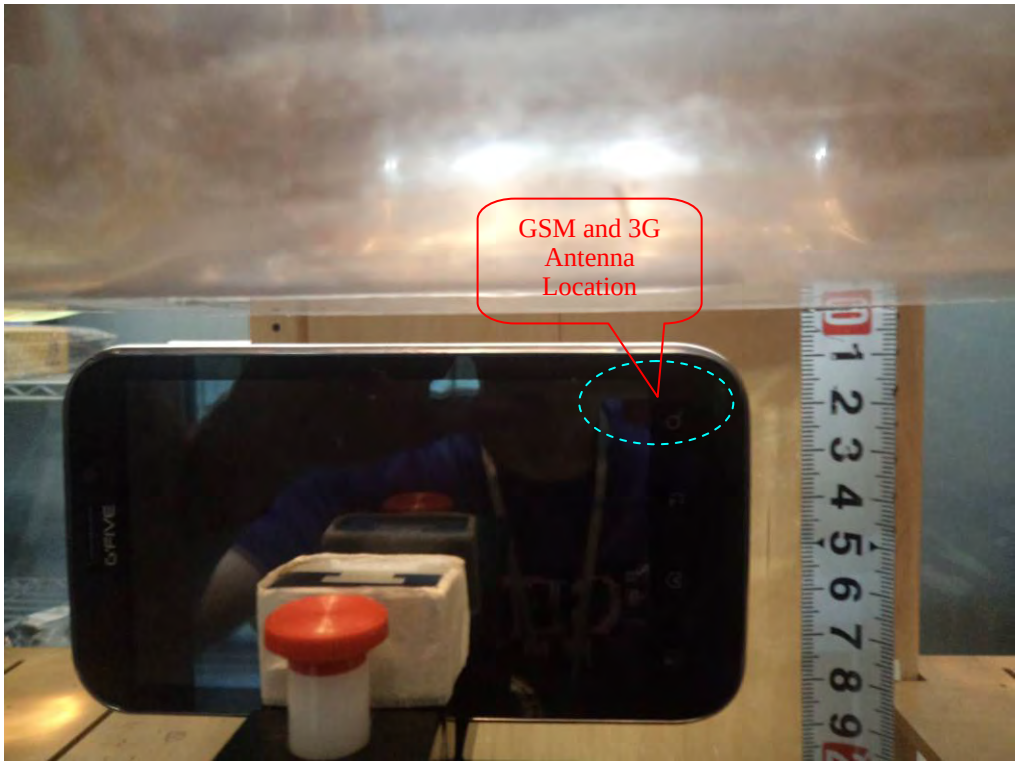
Body-Front Setup Photo (10 mm)



Body-Back Setup Photo (10 mm)

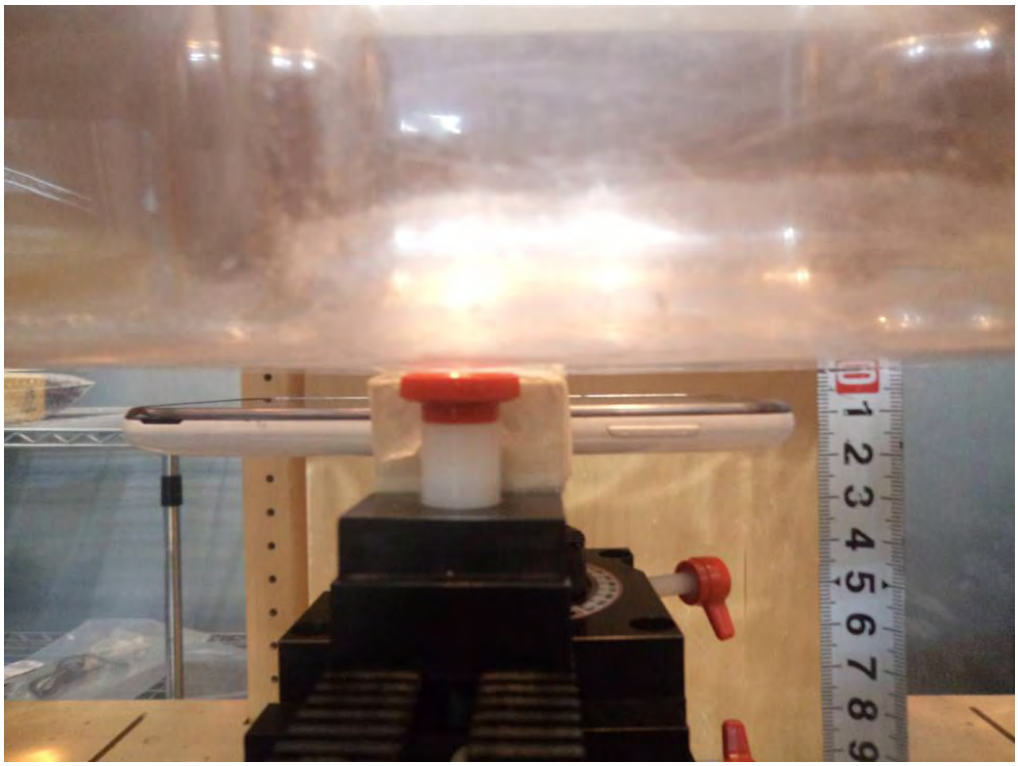


Body-Right Setup Photo (10 mm)

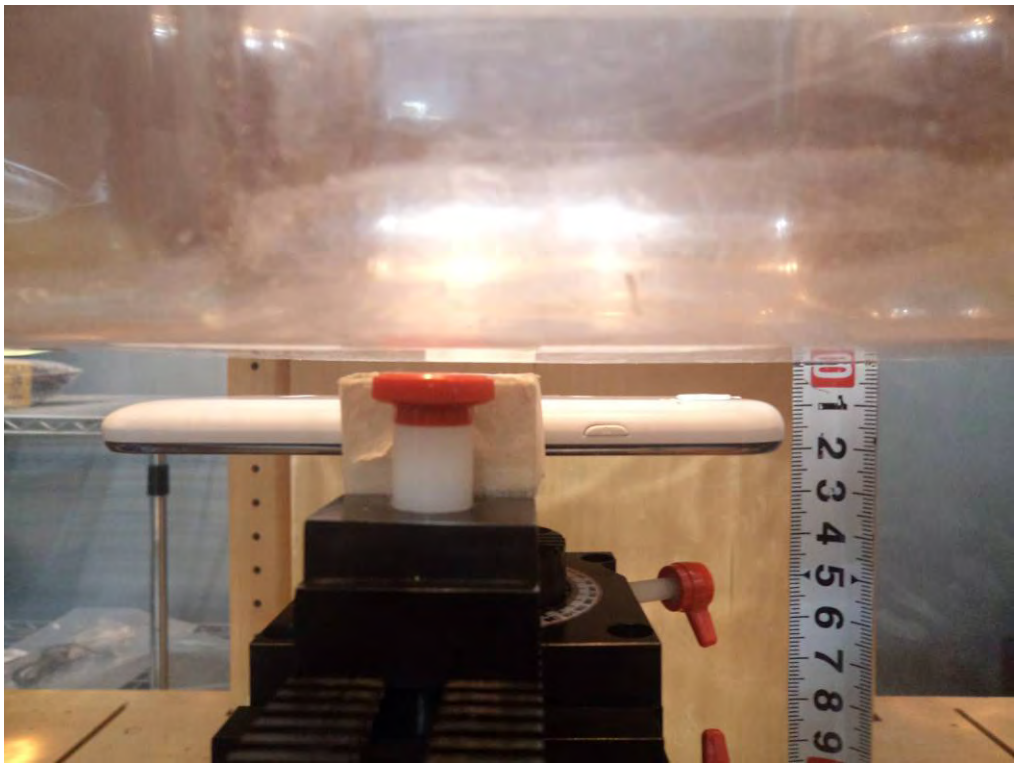


Body-Bottom Setup Photo (10 mm)

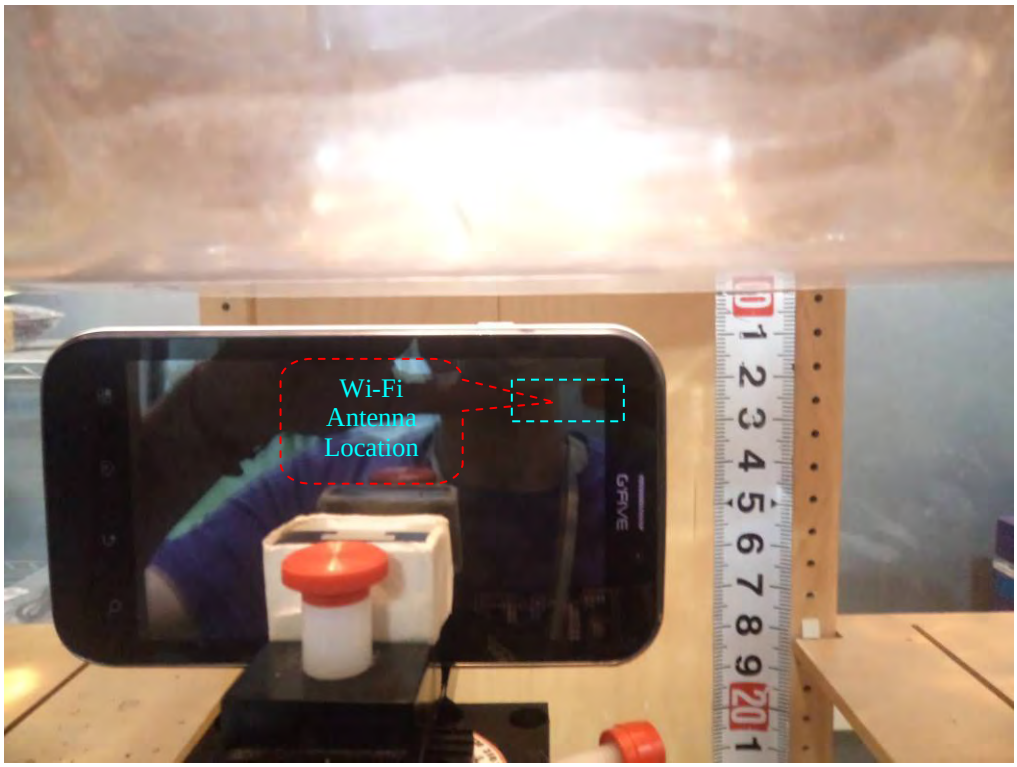
Body-Front Setup Photo (Wi-Fi 10 mm)



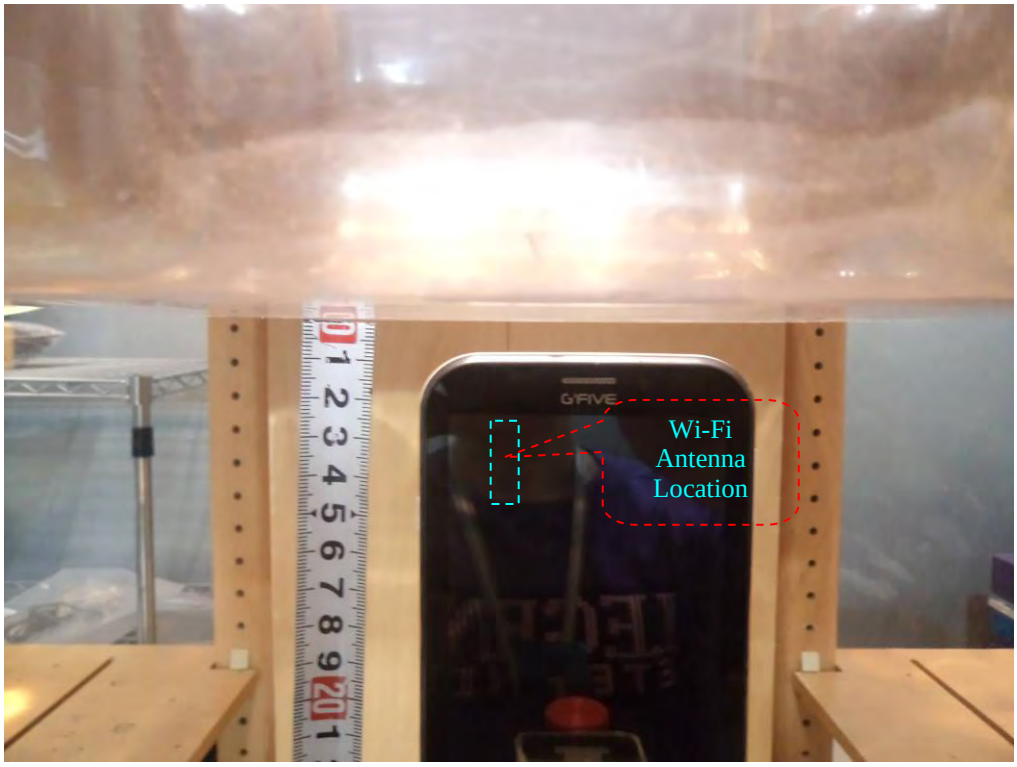
Body-Back Setup Photo (Wi-Fi 10 mm)



Body-Left Setup Photo (Wi-Fi 10 mm)

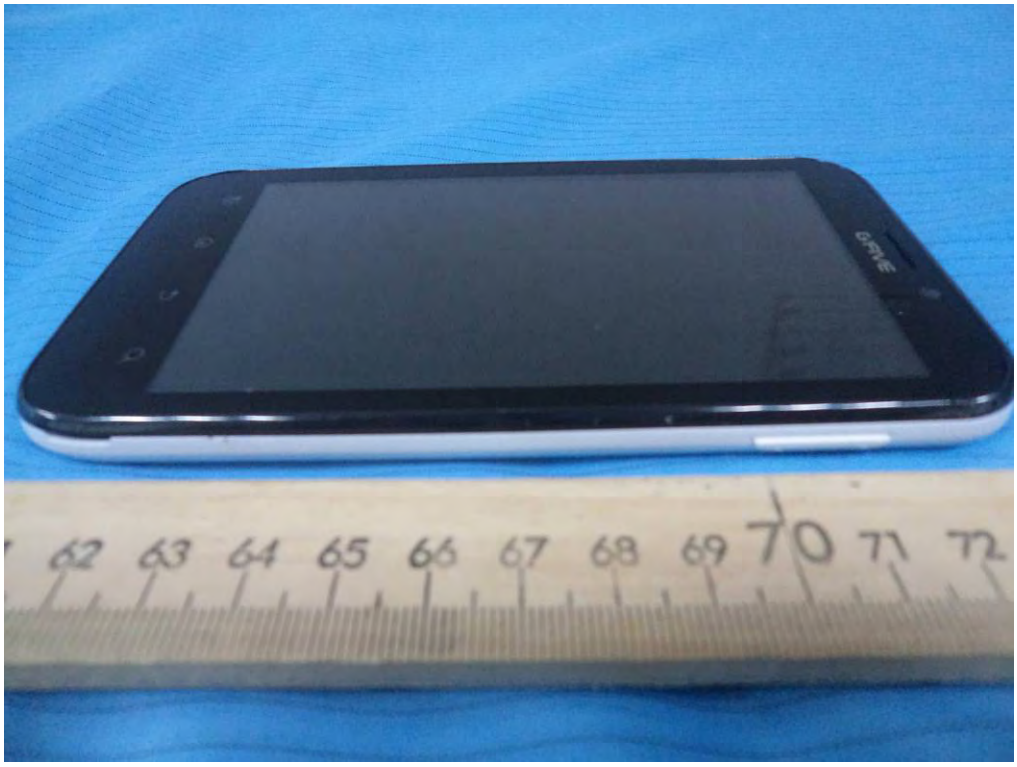


Body-Top Setup Photo (Wi-Fi 10 mm)



APPENDIX E – EUT PHOTOS

EUT – Front View



EUT – Back View

EUT–Top View

EUT –Uncovered View

EUT –Headset View

APPENDIX F – INFORMATIVE REFERENCES

[1] Federal Communications Commission, \Report and order: Guidelines for evaluating the environmental effects of radiofrequency radiation", Tech. Rep. FCC 96-326, FCC, Washington, D.C. 20554, 1996.

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