Lab Code: 200707-0

SAR EVALUATION REPORT

For

B Mobile HK Limited

G/F., 144 UN CHAU STREET, SHAM SHUI PO, KOWLOON, HONG KONG

FCC ID: ZSW-QS810

Report Type:	Product Type:
Original Report	GSM Mobile Phone

Test Engineer:	Sandy Wang
Report Number:	RSZ120621001-20
Report Date:	2012-07-17
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* This report contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "★" (Rev.2)

<table>
<tr><th colspan="4">Attestation of Test Results</th></tr>
<tr><td rowspan="5">EUT Information</td><td>Company Name</td><td colspan="2">B Mobile HK Limited</td></tr>
<tr><td>EUT Description</td><td colspan="2">GSM Mobile Phone</td></tr>
<tr><td>FCC ID</td><td colspan="2">ZSW-QS810</td></tr>
<tr><td>Model Number</td><td colspan="2">QS810</td></tr>
<tr><td>Test Date</td><td colspan="2">2012.07.10—2012.07.11</td></tr>
<tr><td>Frequency</td><td colspan="2">Max. SAR Level(s) Measured</td><td>Limit(W/Kg)</td></tr>
<tr><td>Cellular Band</td><td colspan="2">0.395 W/kg 1g Head SAR
1.180 W/kg 1g Body SAR</td><td rowspan="3">1. 6</td></tr>
<tr><td>PCS Band</td><td colspan="2">0.652 W/kg 1g Head SAR
0.553 W/kg 1g Body SAR</td></tr>
<tr><td>WiFi(802.11b)</td><td colspan="2">0.137 W/kg 1g Head SAR
0.215 W/kg 1g Body SAR</td></tr>
<tr><td rowspan="4">Applicable Standards</td><td colspan="3">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.</td></tr>
<tr><td colspan="3">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.</td></tr>
<tr><td colspan="3">OET BULLETIN 65 SUPPLEMENT C
Evaluating Compliance with FCC Guidelines for Human Exposure To Radiofrequency Electromagnetic Fields</td></tr>
<tr><td colspan="3">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</td></tr>
<tr><td colspan="4">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.</td></tr>
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	RSZ120621001-20	Original Report	2012-07-17

EUT DESCRIPTION

This report has been prepared on behalf of B Mobile HK Limited and their product, FCC ID: ZSW-QS810 Model: QS810 or the EUT (Equipment Under Test) as referred to in the rest of this report. The EUT is a 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 12
Operation Mode :	GSM Voice , GPRS Data, Bluetooth and WiFi
Frequency Band:	Cellular Band : 824-849 MHz(TX) ; 869-894 MHz(RX) PCS Band : 1850-1910 MHz(TX) ; 1930-1990 MHz(RX) Bluetooth : 2400MHz-2483.5MHz WiFi : 2412MHz-2462MHz
Conducted RF Power:	Cellular Band : 32.35dBm PCS Band : 29.89dBm Bluetooth : 7.27dBm WiFi(802.11b) : 19.88dBm WiFi(802.11g): 19.89 dBm
Dimensions (L*W*H):	110mm (L)× 57mm (W)× 15mm (H)
Weight:	100g
Power Source:	3.7VDC/ 900mAh 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

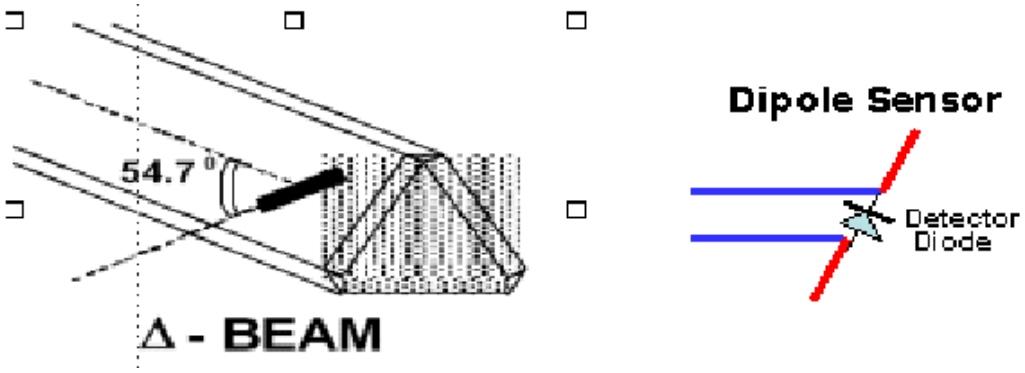
The overall uncertainty for the methodology and algorithms the used during the SAR calculation was evaluated using the data from IEEE 1528 based on the example f3 algorithm:

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

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

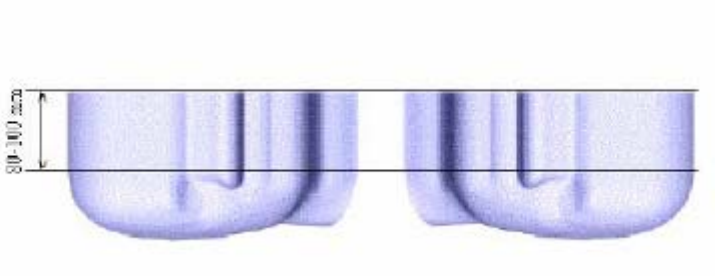
The universal device positioner allows complete freedom of movement of the EUT. Developed to hold a EUT in a free-space scenario any additional loading attributable to the material used in the construction of the positioner has been eliminated. Repeatability has been enhanced through the linear scales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

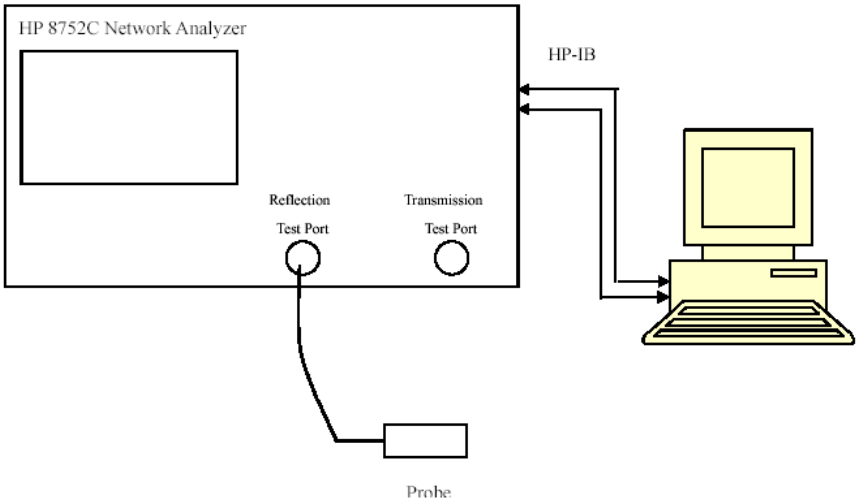
EQUIPMENT LIST AND CALIBRATION

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, 835MHz	ALS-D-835-S-2	2011-08-25	210-00558
Dipole,1900MHz	ALS-D-1900-S-2	2011-08-25	210-00710
Dipole,2450MHz	ALS-D-2450-S-2	2011-08-25	220-00758
Dipole Spacer	ALS-DS-U	N/A	250-00907
R&S, universal Radio Communication Tester	CMU200	2011-06-28	1100.0008.02
Device holder/Positioner	ALS-H-E-SET-2	N/A	170-00510
Left ear SAM phantom	ALS-P-SAM-L	N/A	130-00311
Right ear SAM phantom	ALS-P-SAM-R	N/A	140-00359
UniPhantom	ALS-P-UP-1	N/A	150-00413
Simulated Tissue 835 MHz Head	ALS-T-835-1-H	Each Time	270-01002
Simulated Tissue 835 MHz Body	ALS-T-835-1-B	Each Time	270-02101
Simulated Tissue 1900 MHz Head	ALS-T-1900-1-H	Each Time	295-01103
Simulated Tissue 1900 MHz Body	ALS-T-1900-1-B	Each Time	295-02102
Simulated Tissue 2450 MHz Head	ALS-TS-2450-H	Each Time	290-01108
Simulated Tissue 2450 MHz Body	ALS-TS-2450-B	Each Time	290-01109
Power Amplifier	5S1G4	N/A	71377
Synthesized Sweeper	HP 8341B	2012-05-17	2624A00116
UNIVERSAL RADIO COMMUNICATION TESTER	CMU 200	2011.12.16	1100.0008.02
EMI Test Receiver	ESCI	2011-11-17	101122

SAR MEASUREMENT SYSTEM VERIFICATION

Liquid Verification



Liquid Verification Setup Block Diagram

Liquid Verification Results

Frequency	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)			
824	Head	42.30	0.88	41.50	0.90	1.934	-2.224	±5
	Body	56.19	0.97	55.20	0.97	1.793	-0.954	±5
835	Head	42.25	0.89	41.50	0.90	1.807	-1.112	±5
	Body	56.26	0.98	55.20	0.97	1.921	1.031	±5
849	Head	42.02	0.94	41.50	0.90	1.253	4.445	±5
	Body	56.34	0.96	55.20	0.97	2.065	-0.309	±5
1850	Head	41.52	1.38	40.00	1.40	3.801	-1.428	±5
	Body	54.98	1.55	53.30	1.52	3.152	1.974	±5
1880	Head	41.53	1.41	40.00	1.40	3.825	0.714	±5
	Body	55.33	1.51	53.30	1.52	3.809	-0.658	±5
1910	Head	41.54	1.44	40.00	1.40	3.851	2.857	±5
	Body	55.67	1.58	53.30	1.52	4.447	3.947	±5
2412	Head	39.24	1.80	39.20	1.80	0.102	0.127	±5
	Body	51.19	1.90	52.70	1.95	-2.865	-2.564	±5
2437	Head	39.10	1.82	39.20	1.80	-0.255	1.114	±5
	Body	51.52	1.96	52.70	1.95	-2.239	0.513	±5
2462	Head	39.04	1.79	39.20	1.80	-0.408	-0.559	±5
	Body	51.82	2.01	52.70	1.95	-1.669	3.077	±5

**Liquid Verification was performed on 2012-07-10.*

Please refer to the following tables.

850 MHz Head			850 MHz Body		
Frequency (MHz)	e'	e''	Frequency (MHz)	e'	e''
824.0	42.2968375	19.124959	824.0	56.187381	21.089281
824.5	42.2657455	19.125511	824.5	56.190519	21.083014
825.0	42.2490515	19.126063	825.0	56.193652	21.084749
825.5	42.1436995	19.126615	825.5	56.196795	21.086448
826.0	42.1620945	19.127167	826.0	56.199933	21.088213
826.5	42.1840315	19.127719	826.5	56.203071	21.089946
827.0	42.1604705	19.128271	827.0	56.206209	21.091679
827.5	42.2078875	19.128823	827.5	56.209347	21.093412
828.0	42.2275325	19.129375	828.0	56.212485	21.095145
828.5	42.2339725	19.129927	828.5	56.215623	21.096878
829.0	42.2850065	19.130479	829.0	56.218761	21.098611
829.5	42.2333955	19.131031	829.5	56.221899	21.100344
830.0	42.2698365	19.131583	830.0	56.225037	21.102077
830.5	42.2297845	19.132135	830.5	56.228175	21.105381
831.0	42.2027285	19.132687	831.0	56.231313	21.105543
831.5	42.2223225	19.133239	831.5	56.234451	21.107276
832.0	42.1840635	19.133791	832.0	56.237589	21.109009
832.5	42.1588335	19.134343	832.5	56.240727	21.110742
833.0	42.1994545	19.134895	833.0	56.243865	21.112475
833.5	42.2309375	19.135447	833.5	56.247003	21.114208
834.0	42.2283575	19.135999	834.0	56.250141	21.115941
834.5	42.2269345	19.136551	834.5	56.253279	21.117674
835.0	42.2518135	19.137103	835.0	56.256417	21.119407
835.5	42.2528155	19.137955	835.5	56.259555	21.127114
836.0	42.2564225	19.138807	836.0	56.262693	21.122873
836.5	42.2414245	19.139659	836.5	56.265831	21.124606
837.0	42.2281945	19.140511	837.0	56.268969	21.126339
837.5	42.2223905	19.141363	837.5	56.272107	21.128072
838.0	42.2456085	19.142215	838.0	56.275245	21.129805
838.5	42.2040565	19.143067	838.5	56.278383	21.131538
839.0	42.1939665	19.143919	839.0	56.281521	21.133271
839.5	42.1964415	19.144771	839.5	56.284659	21.135004
840.0	42.2075315	19.145623	840.0	56.287797	21.136737
840.5	42.1968705	19.146475	840.5	56.290935	21.138547
841.0	42.1801095	19.147327	841.0	56.294073	21.130203
841.5	42.2096115	19.148179	841.5	56.297211	21.131936
842.0	42.2113165	19.149031	842.0	56.300349	21.123669
842.5	42.2150205	19.149883	842.5	56.303487	21.125402
843.0	42.2091035	19.140735	843.0	56.306625	21.127135
843.5	42.1326515	19.141587	843.5	56.309763	21.118868
844.0	42.2090585	19.142439	844.0	56.312901	21.100601
844.5	42.1632565	19.143291	844.5	56.316039	21.102334
845.0	42.0891245	19.144143	845.0	56.319177	21.104067
845.5	42.1044575	19.144995	845.5	56.322315	20.871158
846.0	42.0589485	19.135847	846.0	56.325453	20.657533
846.5	42.0999705	19.136699	846.5	56.328591	20.549266
847.0	42.0801995	19.127551	847.0	56.331729	20.240999
847.5	42.0833905	19.128403	847.5	56.334867	20.032732
848.0	42.0569385	19.109255	848.0	56.338005	20.024465
848.5	42.0615435	19.100107	848.5	56.341143	19.826198
849.0	42.0217305	19.080159	849.0	56.344281	19.607931

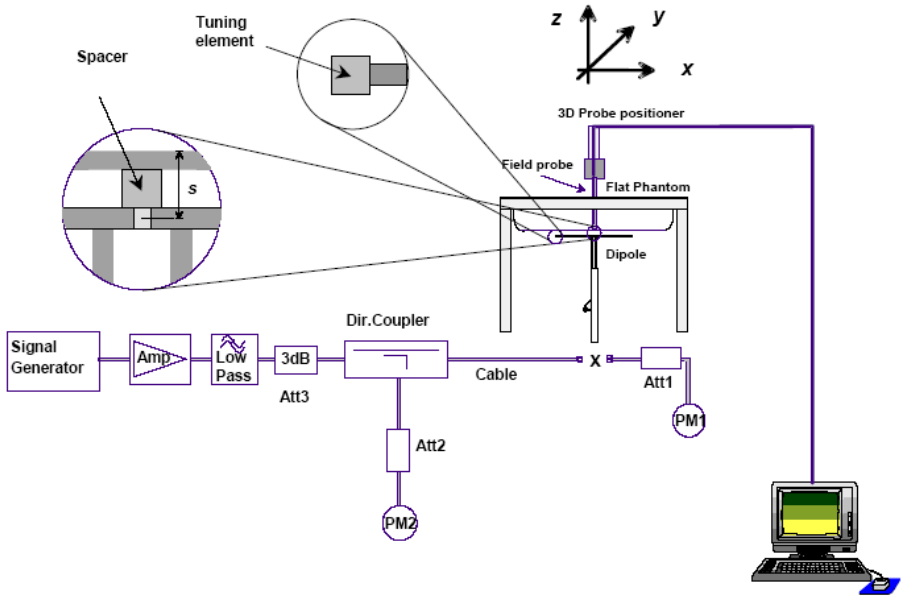
1900 MHz Head			1900 MHz Body		
Frequency (MHz)	e'	e''	Frequency (MHz)	e'	e''
1850.0	41.523856	13.429323	1850.0	54.984879	15.082366
1851.2	41.526108	13.431222	1851.2	54.998712	15.003442
1852.4	41.526362	13.433121	1852.4	55.012545	15.023224
1853.6	41.526612	13.435021	1853.6	55.026378	15.043006
1854.8	41.526864	13.436919	1854.8	55.040211	15.013435
1856.0	41.527116	13.438818	1856.0	55.054044	15.003601
1857.2	41.527368	13.440717	1857.2	55.067877	14.993775
1858.4	41.527622	13.442616	1858.4	55.081715	14.983945
1859.6	41.527872	13.444515	1859.6	55.095543	14.974115
1860.8	41.528124	13.446414	1860.8	55.109376	14.964286
1862.0	41.528376	13.448313	1862.0	55.123209	14.954456
1863.2	41.528628	13.450212	1863.2	55.137042	14.944626
1864.4	41.528881	13.452111	1864.4	55.150875	14.945796
1865.6	41.529132	13.454011	1865.6	55.164708	14.946966
1866.8	41.529384	13.455909	1866.8	55.178541	14.948137
1868.0	41.529636	13.457808	1868.0	55.192374	14.949307
1869.2	41.529888	13.459707	1869.2	55.206207	14.950477
1870.4	41.530142	13.461606	1870.4	55.220041	14.951647
1871.6	41.530392	13.463505	1871.6	55.233873	14.952817
1872.8	41.530644	13.465404	1872.8	55.247706	14.953988
1874.0	41.530896	13.467303	1874.0	55.261539	14.955158
1875.2	41.531148	13.469202	1875.2	55.275372	14.956328
1876.4	41.531411	13.471101	1876.4	55.289205	14.957498
1877.6	41.531652	13.473221	1877.6	55.303038	14.958668
1878.8	41.531904	13.474899	1878.8	55.316871	14.959839
1880.0	41.532156	13.476798	1880.0	55.330704	14.961009
1881.2	41.532408	13.478697	1881.2	55.344537	14.962179
1882.4	41.532661	13.480596	1882.4	55.358372	14.963349
1883.6	41.532912	13.482495	1883.6	55.372203	14.964519
1884.8	41.533164	13.484394	1884.8	55.386036	14.965619
1886.0	41.533416	13.486293	1886.0	55.399869	14.966860
1887.2	41.533668	13.488192	1887.2	55.413702	14.968030
1888.4	41.533922	13.490091	1888.4	55.427535	14.969200
1889.6	41.534172	13.491991	1889.6	55.441368	14.970370
1890.8	41.534424	13.493889	1890.8	55.455201	14.971541
1892.0	41.534676	13.495788	1892.0	55.469034	14.972711
1893.2	41.534928	13.497687	1893.2	55.482867	14.973881
1894.4	41.535181	13.499586	1894.4	55.496754	14.975051
1895.6	41.535432	13.501485	1895.6	55.510533	14.976221
1896.8	41.535684	13.503384	1896.8	55.524366	14.977392
1898.0	41.535936	13.505283	1898.0	55.538199	14.978562
1899.2	41.536188	13.507182	1899.2	55.552032	14.979732
1900.4	41.536442	13.509081	1900.4	55.565865	14.974902
1901.6	41.536692	13.510982	1901.6	55.579698	14.964072
1902.8	41.536944	13.512879	1902.8	55.593531	14.957243
1904.0	41.537196	13.514778	1904.0	55.607364	14.949413
1905.2	41.537448	13.516677	1905.2	55.621197	14.941583
1906.4	41.537711	13.518576	1906.4	55.635031	14.933753
1907.6	41.537952	13.520475	1907.6	55.648863	14.925923
1908.8	41.538204	13.522374	1908.8	55.662696	14.918094
1910.0	41.538456	13.524273	1910.0	55.676529	14.910264

2450 MHz Head			2450 MHz Body		
Frequency (MHz)	e'	e''	Frequency (MHz)	e'	e''
2410	39.243701	13.434660	2410	51.185475	14.179671
2411	39.221805	13.433311	2411	51.198003	14.189607
2412	39.243867	13.406125	2412	51.210531	14.199543
2413	39.196030	13.370515	2413	51.223059	14.209479
2414	39.194927	13.423079	2414	51.235587	14.219415
2415	39.197382	13.385153	2415	51.248115	14.229351
2416	39.178975	13.418143	2416	51.260643	14.239287
2417	39.167258	13.403356	2417	51.273171	14.249223
2418	39.163122	13.420319	2418	51.285699	14.259159
2419	39.132130	13.379920	2419	51.298227	14.269095
2420	39.164832	13.404093	2420	51.310755	14.279031
2421	39.153802	13.446519	2421	51.323283	14.288967
2422	39.163444	13.439049	2422	51.335811	14.298903
2423	39.109770	13.402235	2423	51.348339	14.308839
2424	39.095467	13.500332	2424	51.360867	14.318775
2425	39.121859	13.503589	2425	51.373395	14.328711
2426	39.121559	13.450975	2426	51.385923	14.338647
2427	39.116358	13.505270	2427	51.398451	14.348583
2428	39.123071	13.476684	2428	51.410979	14.358519
2429	39.117008	13.515476	2429	51.423507	14.368455
2430	39.115579	13.433497	2430	51.436035	14.378391
2431	39.130180	13.482496	2431	51.448563	14.388327
2432	39.133481	13.511023	2432	51.461091	14.398263
2433	39.074375	13.450025	2433	51.473619	14.408199
2434	39.116539	13.415580	2434	51.486147	14.418135
2435	39.015034	13.490192	2435	51.498675	14.428071
2436	39.075928	13.429712	2436	51.511203	14.438007
2437	39.102490	13.441469	2437	51.523731	14.447943
2438	39.082260	13.438462	2438	51.536259	14.457879
2440	39.120424	13.463825	2440	51.548787	14.467815
2441	39.085785	13.458180	2441	51.561315	14.477751
2442	39.117769	13.422813	2442	51.573843	14.487687
2443	39.092608	13.406871	2443	51.586371	14.497623
2444	39.063118	13.400137	2444	51.598899	14.507559
2445	39.025408	13.422397	2445	51.611427	14.517495
2446	39.082355	13.410079	2446	51.623955	14.527431
2447	39.059899	13.401945	2447	51.636483	14.537367
2448	39.040204	13.376953	2448	51.649011	14.547303
2449	39.030574	13.407797	2449	51.661539	14.557239
2450	39.016506	13.415417	2450	51.674067	14.567175
2451	39.025202	13.380189	2451	51.686595	14.577111
2452	38.998422	13.386459	2452	51.699123	14.587047
2453	39.011502	13.384899	2453	51.711651	14.596983
2454	39.035760	13.370621	2454	51.724179	14.606919
2455	39.036068	13.373986	2455	51.736707	14.616855
2456	38.997826	13.388319	2456	51.749235	14.626791
2457	39.031725	13.362616	2457	51.761763	14.636727
2458	39.024268	13.371074	2458	51.774291	14.646663
2459	39.050273	13.380592	2459	51.786819	14.656599
2460	39.031516	13.390339	2460	51.799347	14.666535
2461	39.055655	13.358928	2461	51.811875	14.676471
2462	39.040204	13.376953	2462	51.824403	14.686407

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 (835MHz)	ALS-835-S-2	180-00558	2011-08-25	2012-08-24
APREL	Dipole antenna (1900MHz)	ALS-1900-S-2	210-00710	2011-08-25	2012-08-24
APREL	Dipole antenna (2450MHz)	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 (%)
2012-07-10	835	Head	1g	9.630	9.590	0.417	±10
		Body	1g	10.084	9.684	4.131	±10
	1900	Head	1g	40.346	39.648	1.760	±10
		Body	1g	41.070	39.769	3.271	±10
	2450	Head	1g	54.220	52.667	2.949	±10

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

SAR SYSTEM VALIDATION DATA

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

System Performance Check 835MHz Head

Dipole 835 MHz; Type: ALS-D-835-S-2; S/N: 180-00558

Product Data
Device Name : Dipole 835 MHz
Serial No. : 180-00558
Type : Dipole
Model : ALS-D-835-S-2
Frequency Band : 835.00 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

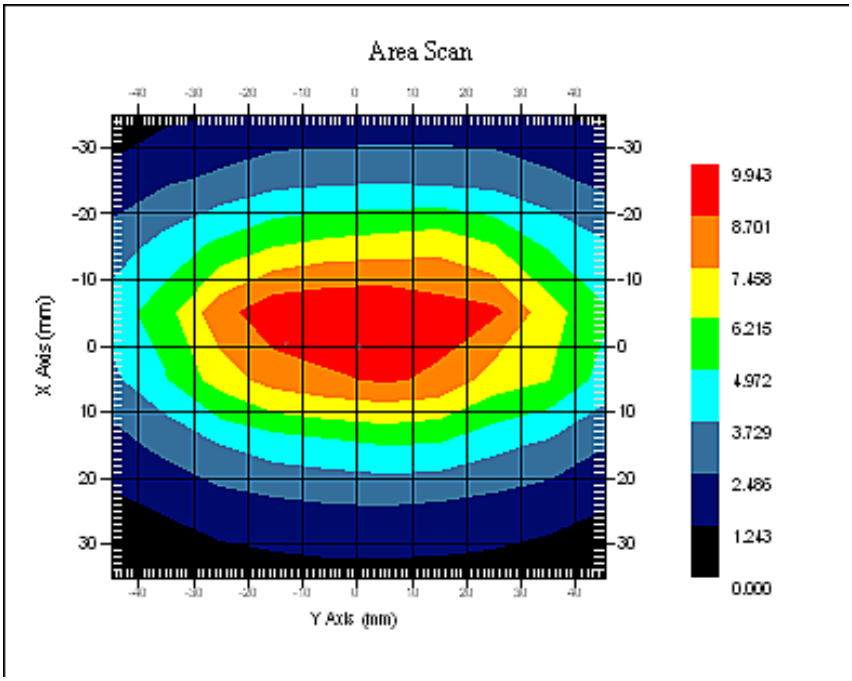
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default
Phantom Data

Tissue Data
Type : HEAD
Serial No. : 270-01002
Frequency : 835.00 MHz
Last Calib. Date : 10-Jul-2012
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 42.25 F/m
Sigma : 0.89 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 14-Jul-2011
Frequency Band : 835.00 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 835MHz Body

Dipole 835 MHz; Type: ALS-D-835-S-2; S/N: 180-00558

Product Data
Device Name : Dipole 835 MHz
Serial No. : 180-00558
Type : Dipole
Model : ALS-D-835-S-2
Frequency Band : 835.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 10.916 W/kg
Power Drift-Finish : 10.922 W/kg
Power Drift (%) : 0.045

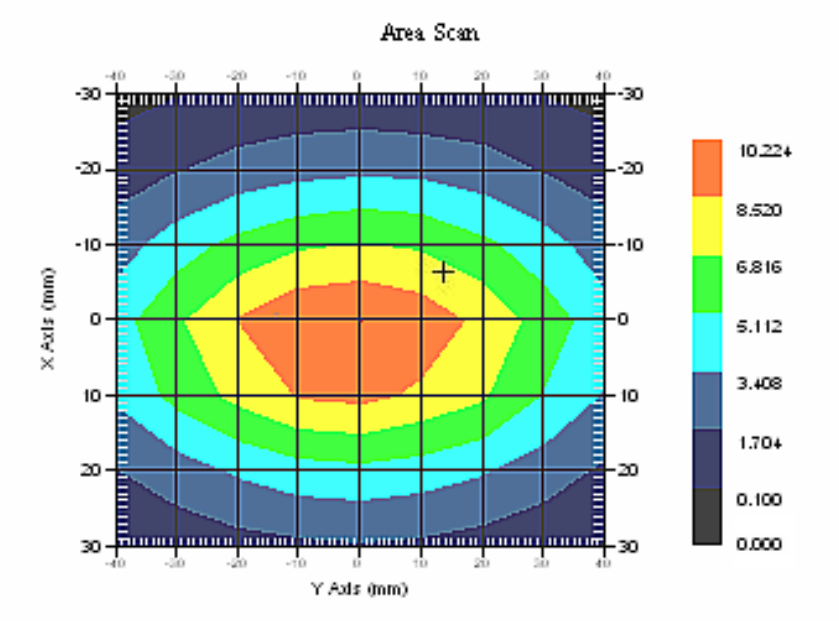
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default
Phantom Data

Tissue Data
Type : Body
Serial No. : 270-02101
Frequency : 835.00 MHz
Last Calib. Date : 10-Jul-2012
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 56.26 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 Band : 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

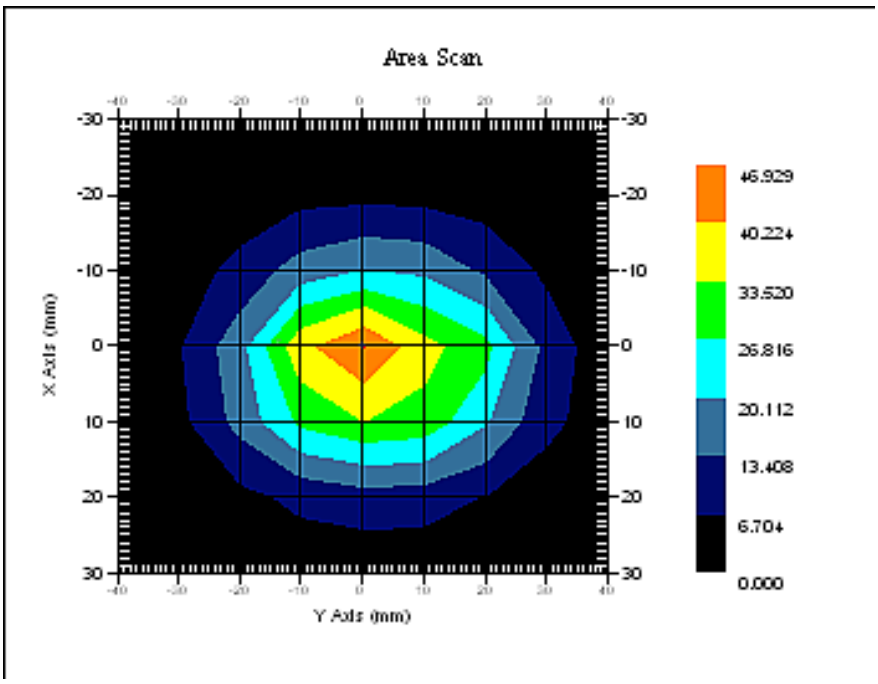
Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)

System Performance Check 1900 Head

Dipole 1900 MHz; Type: ALS-D-1900-S-2; S/N: 210-00710

Product Data	
Device Name	: Dipole 1900MHz
Serial No.	: 210-00710
Type	: Dipole
Model	: ALS-D-1900-S-2
Frequency Band	: 1900.00 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	: 1880.00 MHz
Last Calib. Date	: 10-Jul-2012
Temperature	: 20.00 °C
Ambient Temp.	: 21.00 °C
Humidity	: 56.00 RH%
Epsilon	: 41.53 F/m
Sigma	: 1.41 S/m
Density	: 1000.00 kg/cu. M
Probe Data	
Name	: E-Field
Model	: E-020
Type	: E-Field Triangle
Serial No.	: 500-00283
Last Calib. Date	: 14-Jul-2011
Frequency Band	: 1900.00 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 Body

Dipole 1900 MHz; Type: ALS-D-1900-S-2; S/N: 210-00710

Product Data
Device Name : Dipole 1900MHz
Serial No. : 210-00710
Type : Dipole
Model : ALS-D-1900-S-2
Frequency Band : 1900.00 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

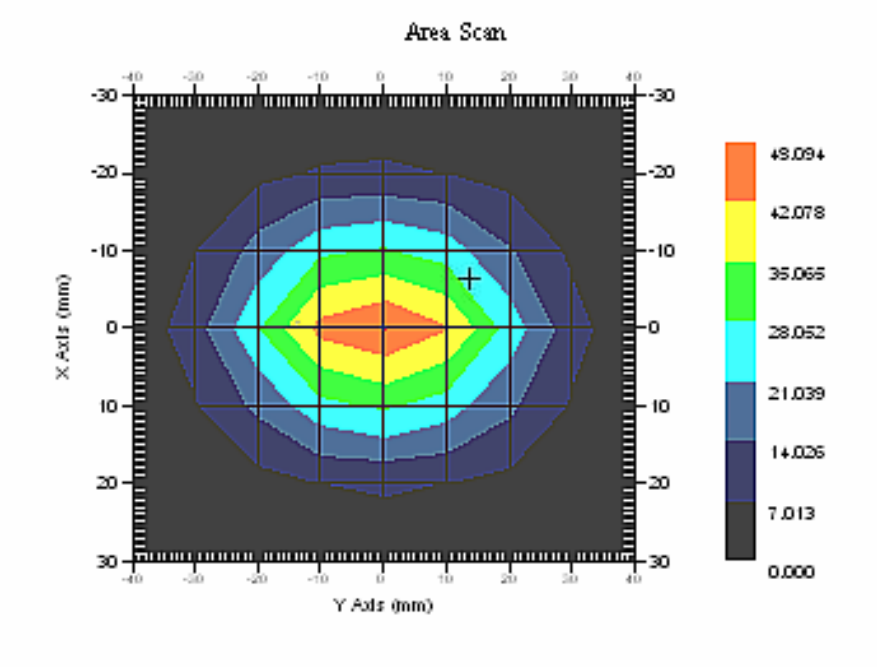
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default

Tissue Data
Type : Body
Serial No. : 295-02102
Frequency : 1880.00 MHz
Last Calib. Date : 10-Jul-2012
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 55.33 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 Band : 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 Head

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

Product Data
Device Name : Dipole 2450MHz
Serial No. : 220-00758
Type : Dipole
Model : ALS-D-2450-S-2
Frequency Band : 2450 MHz
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 50.040 W/kg
Power Drift-Finish : 51.179 W/kg
Power Drift (%) : 2.277

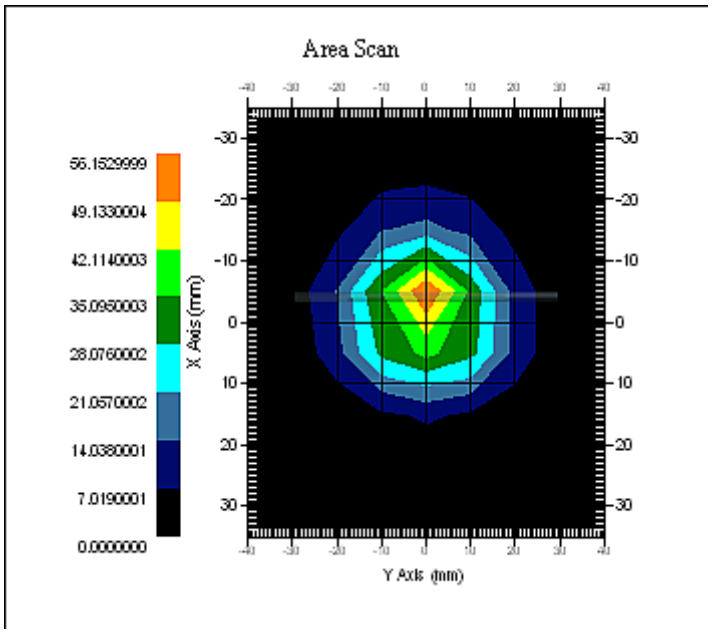
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default

Tissue Data
Type : HEAD
Serial No. : 290-01108
Frequency : 2437 MHz
Last Calib. Date : 10-Jul-2012
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 50.00 RH%
Epsilon : 39.10 F/m
Sigma : 1.82 S/m
Density : 1000.00 kg/cu. M

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

Measurement Data
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 20.00 °C
Area Scan : 8x7x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm

1 gram SAR value : 54.220 W/kg
10 gram SAR value : 27.019 W/kg
Area Scan Peak SAR : 56.148 W/kg
Zoom Scan Peak SAR : 99.321 W/kg



2450 MHz System Validation

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

System Performance Check 2450 MHz Body

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

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

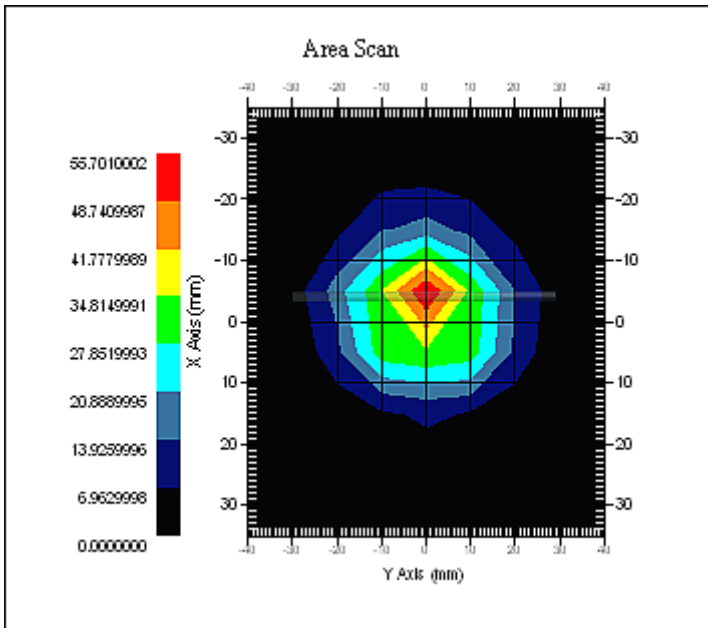
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default

Tissue Data
Type : BODY
Serial No. : 290-01109
Frequency : 2437 MHz
Last Calib. Date : 10-Jul-2012
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 50.00 RH%
Epsilon : 51.52 F/m
Sigma : 1.96 S/m
Density : 1000.00 kg/cu. M

Probe Data
Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 14-Jul-2011
Frequency Band : 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 : 8x7x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm

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



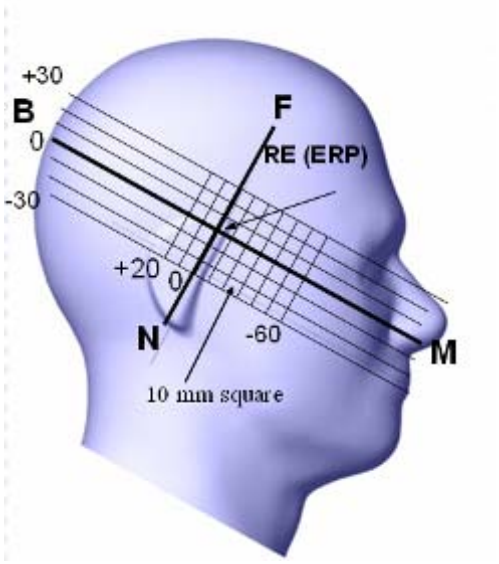
2450 MHz System Validation

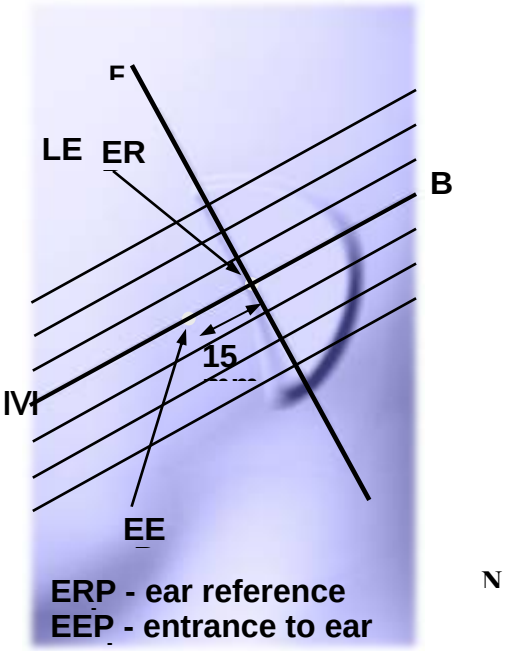
EUT TEST STRATEGY AND METHODOLOGY

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

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

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





Cheek/Touch Position

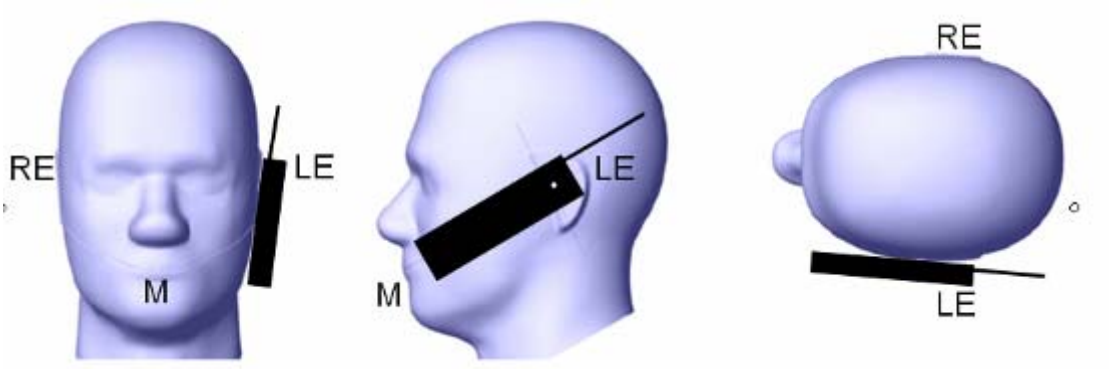
The device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line for the SCC-34/SC-2 head phantom.

This test position is established:

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

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

Cheek /Touch Position



Ear/Tilt Position

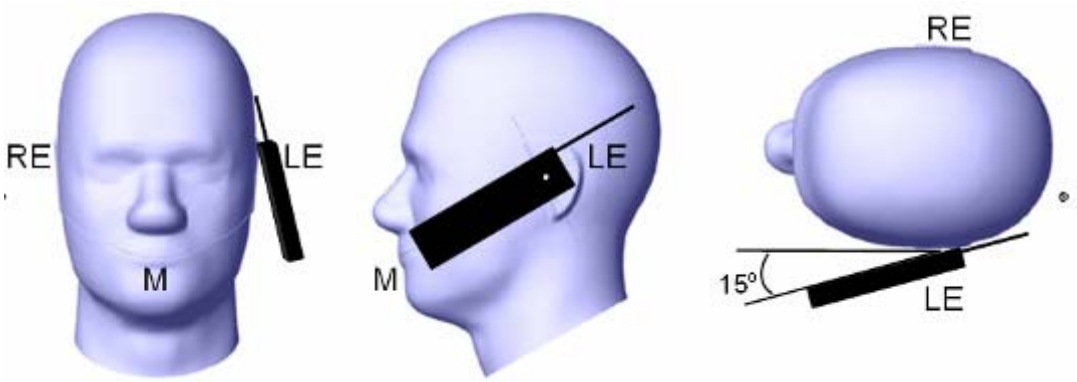
With the handset aligned in the "Cheek/Touch Position":

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

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

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

Ear /Tilt 15° Position



Test positions for body-worn and other configurations

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations. Devices with a headset output should be tested with a headset connected to the device. When multiple accessories that do not contain metallic components are supplied with the device, the device may be tested with only the accessory that dictates the closest spacing to the body. When multiple accessories that contain metallic components are supplied with the device, the device must be tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component (e.g., the same metallic belt-clip used with different holsters with no other metallic components), only the accessory that dictates the closest spacing to the body must be tested.

Body-worn accessories may not always be supplied or available as options for some devices that are intended to be authorized for body-worn use. A separation distance of 1.5 cm between the back of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances. Other separation distances may be used, but they should not exceed 2.5 cm. In these cases, the device may use body-worn accessories that provide a separation distance greater than that tested for the device provided however that the accessory contains no metallic components.

SAR Evaluation Procedure

The evaluation was performed with the following procedure:

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

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

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

1) The data at the surface were extrapolated, since the center of the dipoles is 1.2 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.3 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

2) The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed by the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one dimensional splines with the “Not a knot"-condition (in x, y and z-directions). The volume was integrated with the trapezoidal-algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the averages.

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

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

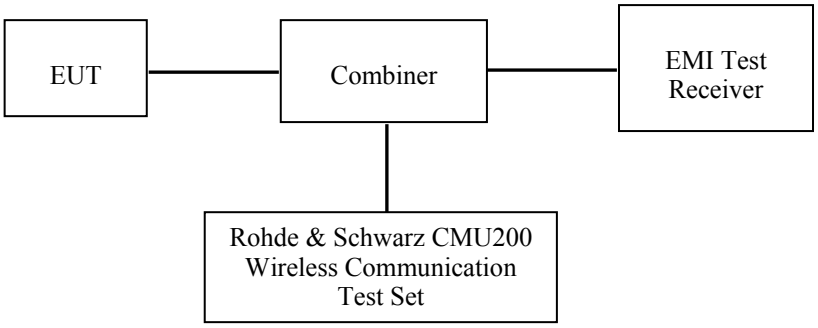
CONDUCTED OUTPUT POWER MEASUREMENT

Provision Applicable

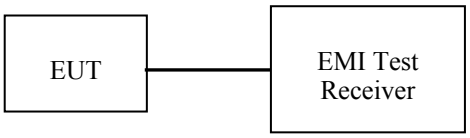
The measured peak output power should be greater and within 5% than EMI measurement.

Test Procedure

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



GSM



WiFi

Test Results:

GSM

Band	Frequency (MHz)	Conducted Output Power	
		(dBm)	(Watt)
Cellular Band	824.2	32.32	1.706
	836.6	32.35	1.718
	848.8	32.33	1.710
PCS Band	1850.2	29.89	0.975
	1880.0	29.74	0.942
	1909.8	29.62	0.916

GPRS

Mode	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
Cellular	128	824.2	32.17	31.70	30.07	29.01
	190	836.6	32.20	31.64	30.08	29.03
	251	848.8	32.17	30.62	30.02	28.97
PCS	512	1850.2	29.92	29.31	27.83	26.72
	661	1880.0	29.77	29.16	27.63	26.53
	810	1909.8	29.65	29.05	27.52	26.45

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	23.17	25.70	25.82	26.01
	190	836.6	23.20	25.64	25.83	26.03
	251	848.8	23.17	24.62	25.77	25.97
PCS	512	1850.2	20.92	23.31	23.58	23.72
	661	1880.0	20.77	23.16	23.38	23.53
	810	1909.8	20.65	23.05	23.27	23.45

Note:

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

WiFi

Band	Frequency (MHz)	Conducted Output Power	
		(dBm)	(Watt)
802.11b	2412	18.45	0.070
	2437	19.37	0.086
	2462	18.89	0.097
802.11g	2412	18.90	0.078
	2437	19.85	0.097
	2462	19.88	0.097

Note:

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

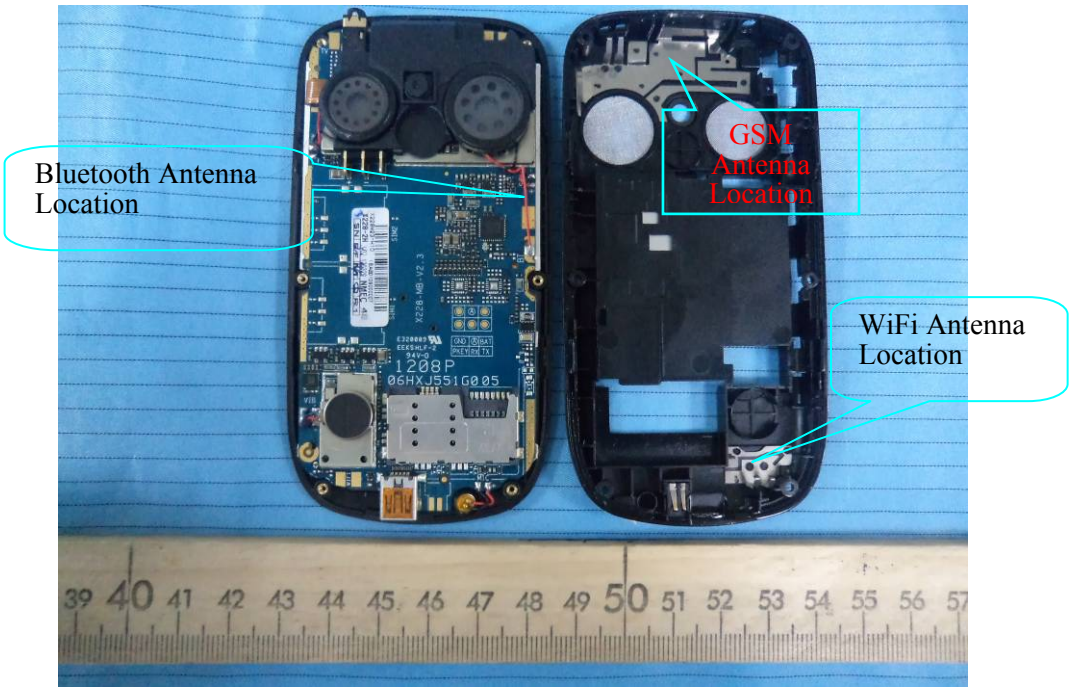
The output power was tested under data rate 1Mbps for 802.11b, 6Mbps for 802.11g.

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.

WiFi&BT and GSM Antenna Location:



Antenna Information:

Antenna-to-antenna separation distances:	7.4cm from GSM main antenna-to-WiFi antenna 1.4cm from GSM main antenna-to-BT antenna 3.9cm from BT antenna-to-WiFi antenna
Simultaneous transmission:	GSM antenna can transmit simultaneously with WiFi or BT antenna

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

Test Position	1-g SAR (W/Kg)			∑ 1-g SAR（W/Kg）
	GSM		WiFi	
Head(Touch)	GSM850	0.395	0.137	0.532
	PCS1900	0.652		0.789
Head(Tilt)	GSM850	0.330	0.111	0.441
	PCS1900	0.638		0.749
Body(1.5cm)	GSM850	1.180	0.215	1.395
	PCS1900	0.553		0.768

CONCLUSION:

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

Note:
The distance between WiFi and GSM antenna is 7.3cm > 5cm. The max output power of WiFi antenna is (19.89dBm) 97.50mW >2PRef (24mW) and for all simultaneous transmitting antennas, the sum of the 1-g SAR is 1.395 W/kg < 1.6 W/kg .

The distance between BT and GSM antenna is 1.4cm < 2.5cm. The max output power of BT antenna is(7.27dBm) 5.33mW <PRef (12mW) and the maximum SAR of GSM is 1.180 W/kg < 1.2 W/kg .

1) According to KDB648474, Stand-alone SAR evaluation for WiFi is required, for Bluetooth is not required.

2) When the sum of the 1-g SAR is <1.6W/Kg for GSM and WiFi, the simultaneous SAR is not required.

3) PRef is defined as the maximum conducted power available at the antenna according to source-based time-averaging requirements of Section 2.1093(d)(5).

SAR MEASUREMENT RESULTS

This page summarizes the results of the performed dosimetric evaluation.

SAR Test Data

Environmental Conditions

Temperature:	21 ℃
Relative Humidity:	56%
ATM Pressure:	1002 mbar

** Testing was performed by Sandy Wang on 2012.07.10-2012.07.11*

Cellular Band:

EUT Position	Frequency (MHz)		Test Mode	Antenna Type	Phantom Type	Power Drift (%)	FCC 1g SAR (W/Kg)	
	Channel	MHz					Measurement	Limit
Left Head Cheek	128(Low)	824.2	GSM	Integral	SAM	/	/	1.6
	190(Middle)	836.6	GSM	Integral	SAM	1.284	0.395	1.6
	251(High)	848.8	GSM	Integral	SAM	/	/	1.6
Left Head Tilt	128(Low)	824.2	GSM	Integral	SAM	/	/	1.6
	190(Middle)	836.6	GSM	Integral	SAM	1.197	0.330	1.6
	251(High)	848.8	GSM	Integral	SAM	/	/	1.6
Right Head Cheek	128(Low)	824.2	GSM	Integral	SAM	/	/	1.6
	190(Middle)	836.6	GSM	Integral	SAM	2.175	0.383	1.6
	251(High)	848.8	GSM	Integral	SAM	/	/	1.6
Right Head Tilt	128(Low)	824.2	GSM	Integral	SAM	/	/	1.6
	190(Middle)	836.6	GSM	Integral	SAM	2.224	0.326	1.6
	251(High)	848.8	GSM	Integral	SAM	/	/	1.6
Body-Worn-Headset (1.5cm)	128(Low)	824.2	GSM	Integral	Universal	/	/	1.6
	190(Middle)	836.6	GSM	Integral	Universal	2.768	0.604	1.6
	251(High)	848.8	GSM	Integral	Universal	/	/	1.6
Body-Worn Back (1.5cm)	128(Low)	824.2	GPRS	Integral	Universal	2.851	1.079	1.6
	190(Middle)	836.6	GPRS	Integral	Universal	2.541	1.173	1.6
	251(High)	848.8	GPRS	Integral	Universal	1.372	1. 180	1.6

Note:

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

PCS Band:

EUT Position	Frequency (MHz)		Test Mode	Antenna Type	Phantom Type	Power Drift (%)	FCC 1g SAR (W/Kg)	
	Channel	MHz					Measurement	Limit
Left Head Cheek	512(Low)	1850.2	GSM	Integral	SAM	1.516	0.652	1.6
	661(Middle)	1880.0	GSM	Integral	SAM	/	/	1.6
	810(High)	1909.8	GSM	Integral	SAM	/	/	1.6
Left Head Tilt	512(Low)	1850.2	GSM	Integral	SAM	2.308	0.638	1.6
	661(Middle)	1880.0	GSM	Integral	SAM	/	/	1.6
	810(High)	1909.8	GSM	Integral	SAM	/	/	1.6
Right Head Cheek	512(Low)	1850.2	GSM	Integral	SAM	3.317	0.651	1.6
	661(Middle)	1880.0	GSM	Integral	SAM	/	/	1.6
	810(High)	1909.8	GSM	Integral	SAM	/	/	1.6
Right Head Tilt	512(Low)	1850.2	GSM	Integral	SAM	1.457	0.629	1.6
	661(Middle)	1880.0	GSM	Integral	SAM	/	/	1.6
	810(High)	1909.8	GSM	Integral	SAM	/	/	1.6
Body-Worn-Headset (1.5cm)	512(Low)	1850.2	GSM	Integral	Universal	1.318	0.285	1.6
	661(Middle)	1880.0	GSM	Integral	Universal	/	/	1.6
	810(High)	1909.8	GSM	Integral	Universal	/	/	1.6
Body-Worn Back (1.5cm)	512(Low)	1850.2	GPRS	Integral	Universal	2.617	0.553	1.6
	661(Middle)	1880.0	GPRS	Integral	Universal	/	/	1.6
	810(High)	1909.8	GPRS	Integral	Universal	/	/	1.6

Note:

1. The EUT is a Class B mobile phone which can be attached to both GPRS and GSM services, using one service at a time.

2.The Multi-slot Classes of EUT is Class 12 which has maximum 4 Downlink slots and 4 Uplink slots, the maximum active slots is 5, when perform the multiple slots scan, 1 DL+4UL is the worse case.

3. The EUT transmit and receive through the same GSM antenna while testing SAR.

4. When the 1-g SAR is ≤ 0.8W/kg, testing for other channels are optional.

802.11b:

EUT Position	Frequency (MHz)		Antenna Type	Phantom Type	Power Drift (%)	FCC 1g SAR (W/Kg)	
	Channel	MHz				Value	Limit
Left Head Cheek	1	2412	Integral	SAM	/	/	1.6
	6	2437	Integral	SAM	/	/	1.6
	11	2462	Integral	SAM	0.924	0.137	1.6
Left Head Tilt	1	2412	Integral	SAM	/	/	1.6
	6	2437	Integral	SAM	/	/	1.6
	11	2462	Integral	SAM	3.337	0.111	1.6
Right Head Cheek	1	2412	Integral	SAM	/	/	1.6
	6	2437	Integral	SAM	/	/	1.6
	11	2462	Integral	SAM	-1.007	0.134	1.6
Right Head Tilt	1	2412	Integral	SAM	/	/	1.6
	6	2437	Integral	SAM	/	/	1.6
	11	2462	Integral	SAM	-3.037	0.107	1.6
Body-Front (1.5cm)	1	2412	Integral	Universal	/	/	1.6
	6	2437	Integral	Universal	/	/	1.6
	11	2462	Integral	Universal	1.089	0.174	1.6
Body-Back (1.5cm)	1	2412	Integral	Universal	/	/	1.6
	6	2437	Integral	Universal	/	/	1.6
	11	2462	Integral	Universal	1.002	0.215	1.6
Body-Bottom (1.5cm)	1	2412	Integral	Universal	/	/	1.6
	6	2437	Integral	Universal	/	/	1.6
	11	2462	Integral	Universal	1.857	0.128	1.6
Body-Right (1.5cm)	1	2412	Integral	Universal	/	/	1.6
	6	2437	Integral	Universal	/	/	1.6
	11	2462	Integral	Universal	1.088	0.096	1.6

Note:

1. When the 1-g SAR is ≤0.8W/Kg, testing for other channels are optional.
2. KDB248227-SAR is not required for 802.11g channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.
3. The output power was tested under data rate 1Mbps for 802.11b.
4. The antenna location is showed on the appendix E.

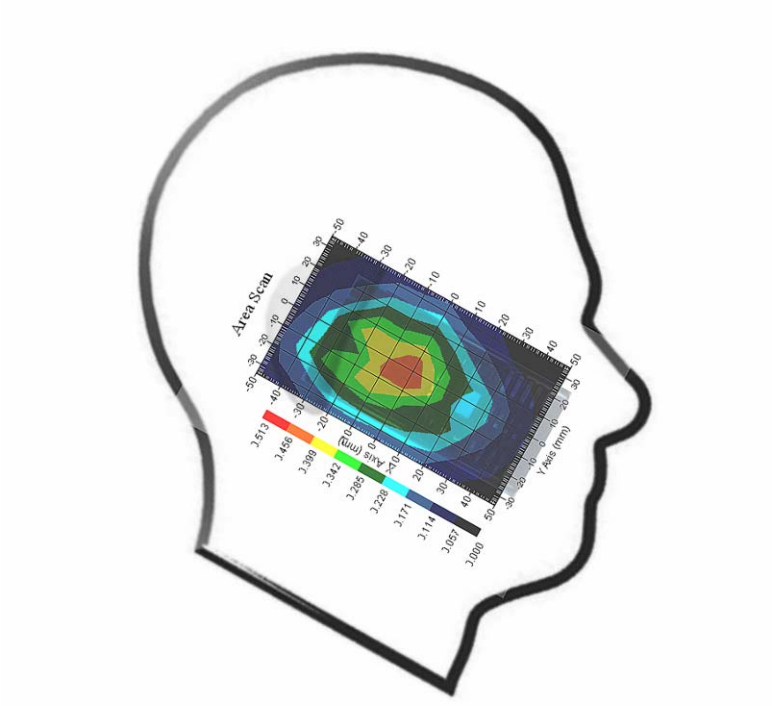
EUT SCAN RESULTS

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

Left Head Cheek (836.6 MHz Middle Channel)

Measurement Data	
Test mode	: GSM
Crest Factor	: 8
Scan Type	: Complete
Area Scan	: 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan	: 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start	: 0.234 W/kg
Power Drift-Finish	: 0.237 W/kg
Power Drift (%)	: 1.284
Tissue Data	
Type	: HEAD
Frequency	: 835.00 MHz
Epsilon	: 42.25 F/m
Sigma	: 0.89 S/m
Density	: 1000.00 kg/cu. m
Probe Data	
Serial No.	: 500-00283
Frequency Band	: 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	: 0.395 W/kg
10 gram SAR value	: 0.264 W/kg
Area Scan Peak SAR	: 0.458 W/kg
Zoom Scan Peak SAR	: 0.760 W/kg

Plot 1#



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

Left Head Tilt (836.6 MHz Middle Channel)

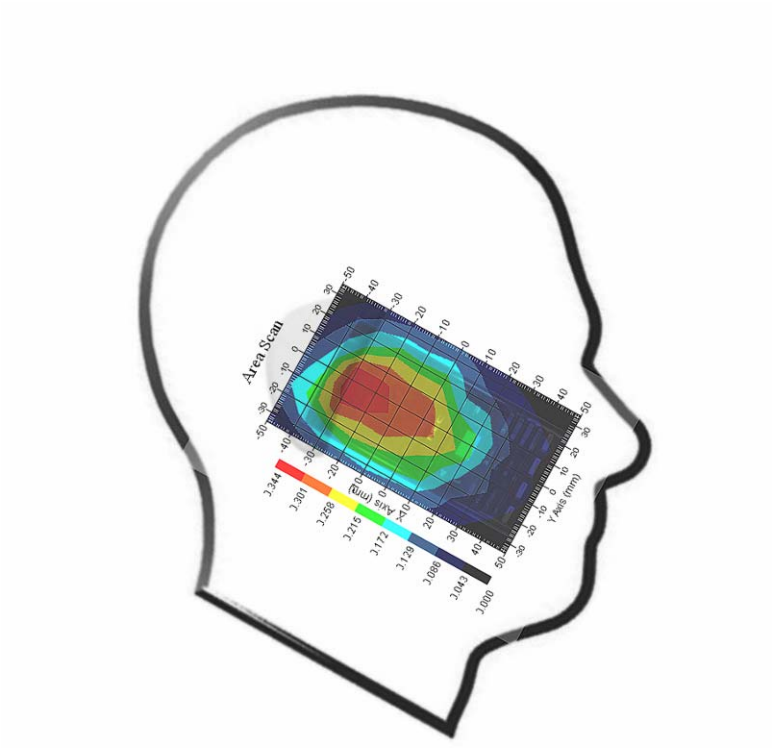
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.261 W/kg
Power Drift-Finish : 0.266 W/kg
Power Drift (%) : 1.197

Tissue Data
Type : HEAD
Frequency : 835.00 MHz
Epsilon : 42.25 F/m
Sigma : 0.89 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 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 : 0.330 W/kg
10 gram SAR value : 0.208 W/kg
Area Scan Peak SAR : 0.344 W/kg
Zoom Scan Peak SAR : 0.520 W/kg

Plot 2#



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

Right Head Cheek (836.6 MHz Middle Channel)

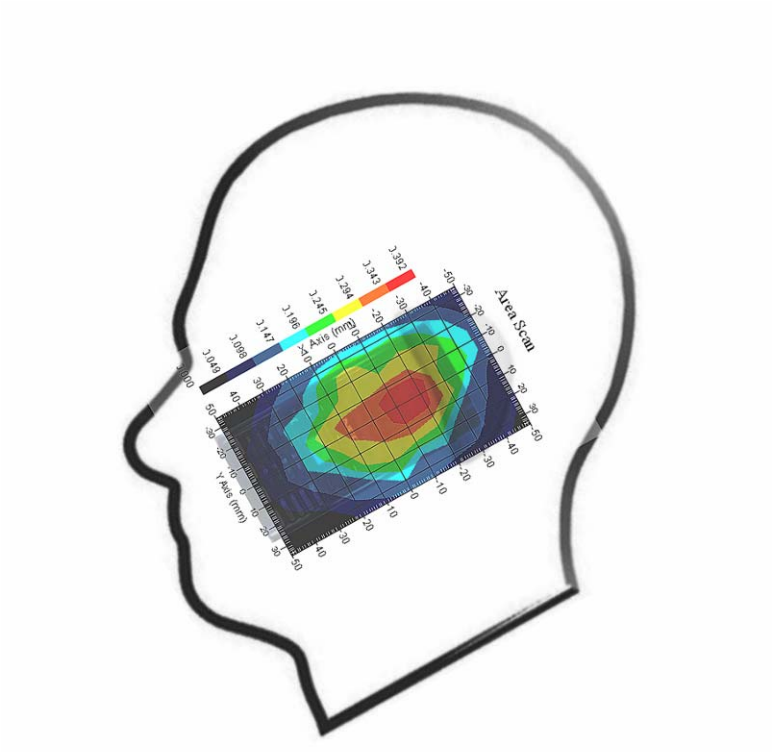
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.230 W/kg
Power Drift-Finish : 0.235 W/kg
Power Drift (%) : 2.175

Tissue Data
Type : HEAD
Frequency : 835.00 MHz
Epsilon : 42.25 F/m
Sigma : 0.89 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 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 : 0.383 W/kg
10 gram SAR value : 0.227 W/kg
Area Scan Peak SAR : 0.392 W/kg
Zoom Scan Peak SAR : 0.580 W/kg

Plot 3#



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

Right Head Tilt (836.6 MHz Middle Channel)

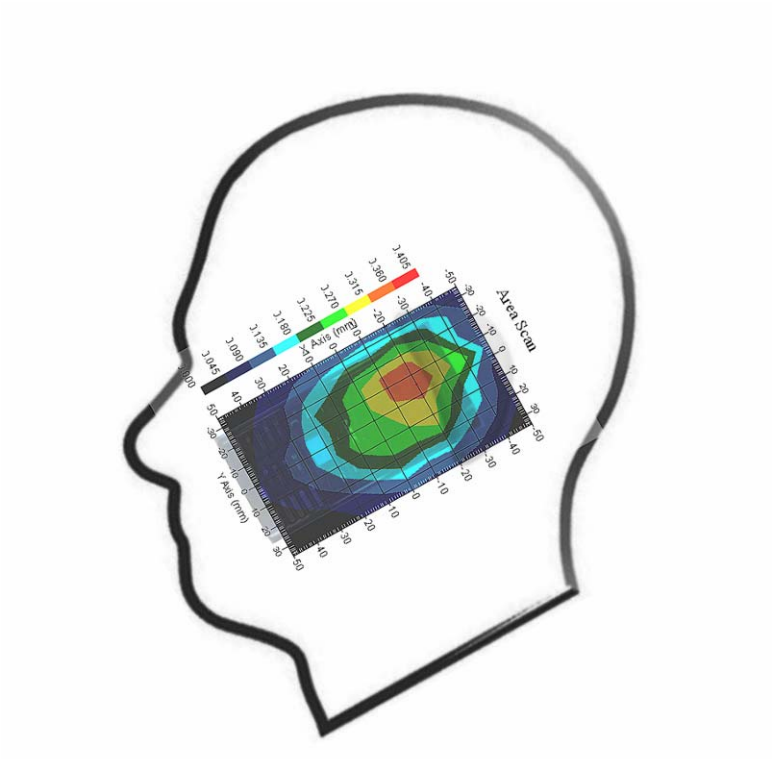
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.271 W/kg
Power Drift-Finish : 0.277 W/kg
Power Drift (%) : 2.224

Tissue Data
Type : HEAD
Frequency : 835.00 MHz
Epsilon : 42.25 F/m
Sigma : 0.89 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 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 : 0.326 W/kg
10 gram SAR value : 0.212 W/kg
Area Scan Peak SAR : 0.363 W/kg
Zoom Scan Peak SAR : 0.495 W/kg

Plot 4#



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

Body-worn Back-Headset (836.6 MHz Middle Channel)

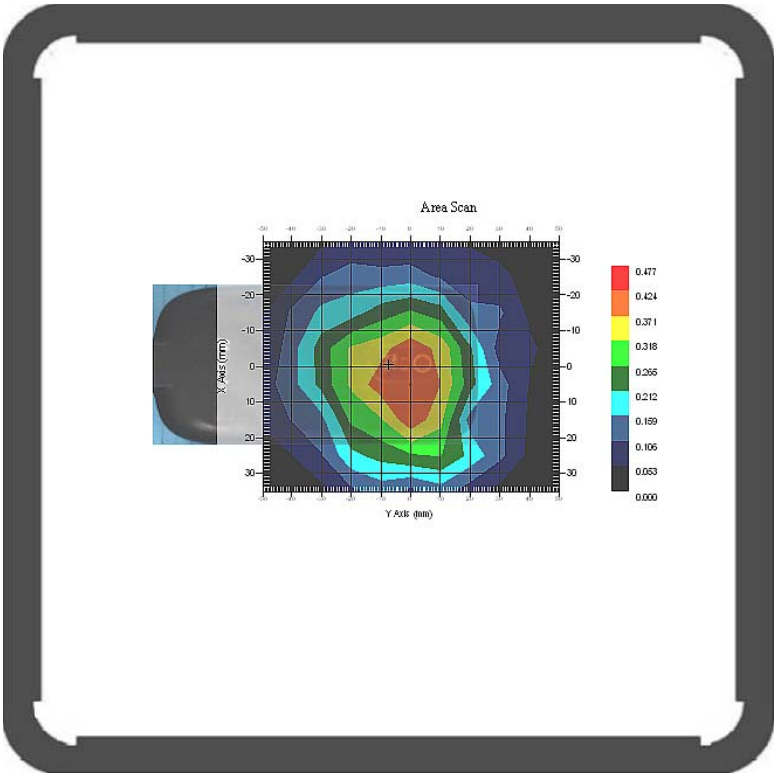
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type： : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.542 W/kg
Power Drift-Finish : 0.557 W/kg
Power Drift (%) : 2.768

Tissue Data
Type : BODY
Frequency : 835.00 MHz
Epsilon : 56.26 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 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 : 0.604 W/kg
10 gram SAR value : 0.365 W/kg
Area Scan Peak SAR : 0.615 W/kg
Zoom Scan Peak SAR : 0.938 W/kg

Plot 5#



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

Body-worn Back (824.2 MHz Low Channel)

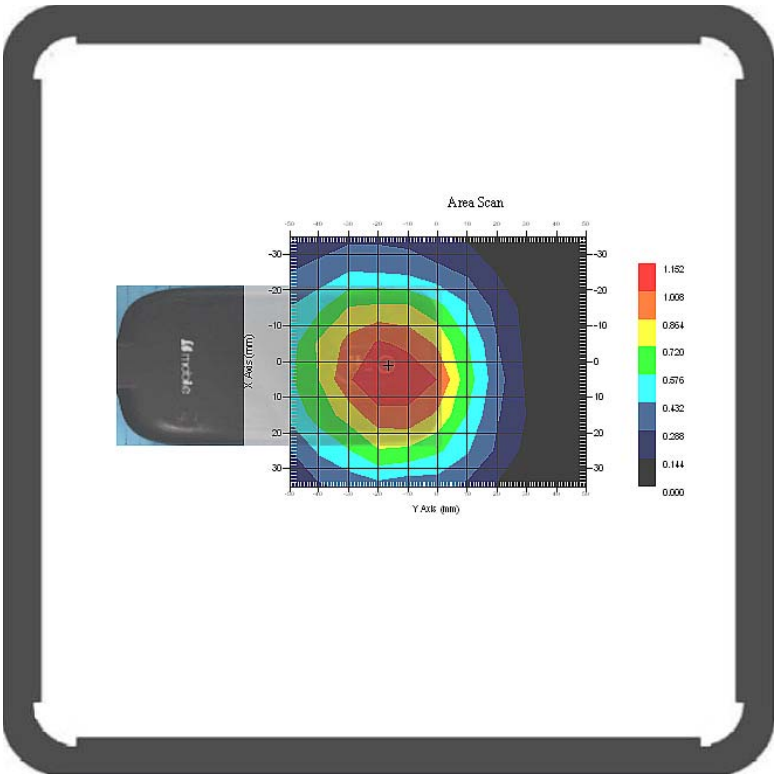
Measurement Data
Test mode : GPRS
Crest Factor : 2
Scan Type： : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 1.007 W/kg
Power Drift-Finish : 1.030 W/kg
Power Drift (%) : 2.851

Tissue Data
Type : BODY
Frequency : 824.00 MHz
Epsilon : 56.19 F/m
Sigma : 0.97 S/m
Density : 1000.00 kg/cu. m

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

1 gram SAR value : 1.079 W/kg
10 gram SAR value : 0.727 W/kg
Area Scan Peak SAR : 1.150 W/kg
Zoom Scan Peak SAR : 1.501 W/kg

Plot 6#



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

Body-worn Back (836.6 MHz Middle Channel)

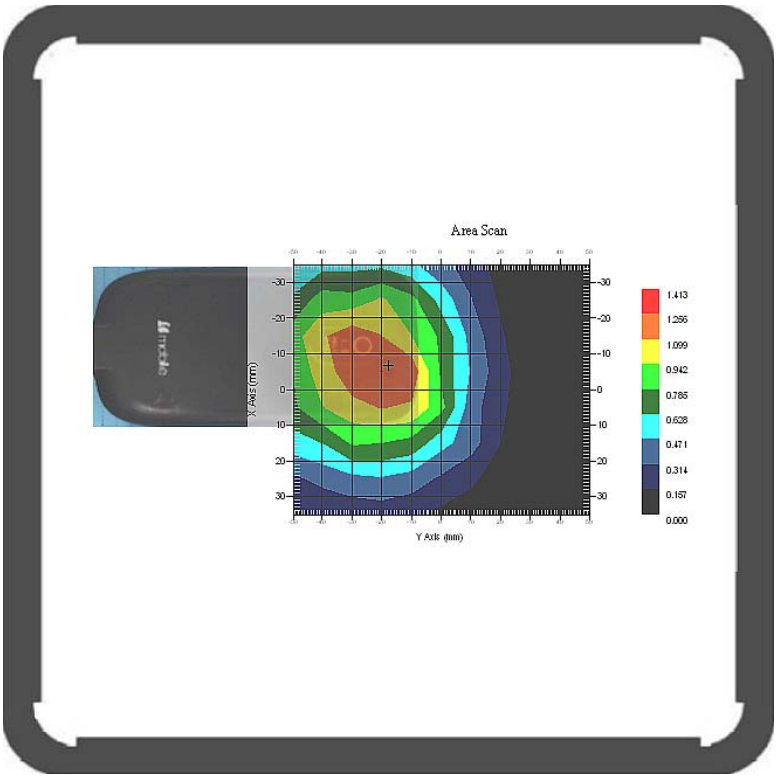
Measurement Data
Test mode : GPRS
Crest Factor : 2
Scan Type： : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 1.101 W/kg
Power Drift-Finish : 1.129 W/kg
Power Drift (%) : 2.541

Tissue Data
Type : BODY
Frequency : 835.00 MHz
Epsilon : 56.26 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

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

1 gram SAR value : 1.173 W/kg
10 gram SAR value : 0.863 W/kg
Area Scan Peak SAR : 1.158 W/kg
Zoom Scan Peak SAR : 1.491 W/kg

Plot 7#



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

Body-worn Back (848.8 MHz High Channel)

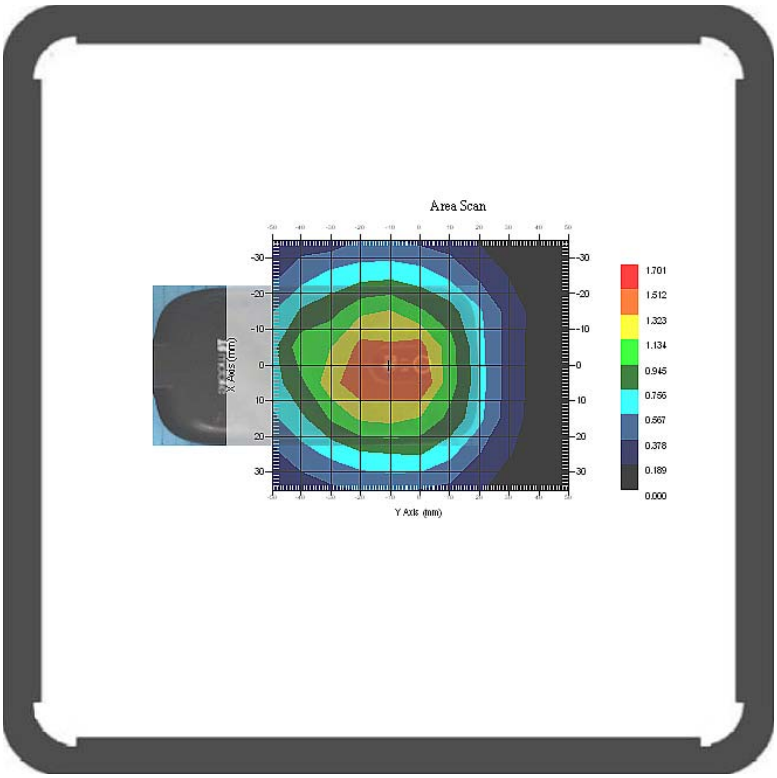
Measurement Data
Test mode : GPRS
Crest Factor : 2
Scan Type： : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 1.311 W/kg
Power Drift-Finish : 1.329 W/kg
Power Drift (%) : 1.372

Tissue Data
Type : BODY
Frequency : 849.00 MHz
Epsilon : 56.34 F/m
Sigma : 0.97 S/m
Density : 1000.00 kg/cu. m

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

1 gram SAR value : 1.180 W/kg
10 gram SAR value : 0.845 W/kg
Area Scan Peak SAR : 1.513 W/kg
Zoom Scan Peak SAR : 2.071 W/kg

Plot 8#



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

Left Head Cheek (1850.2 MHz Low Channel)

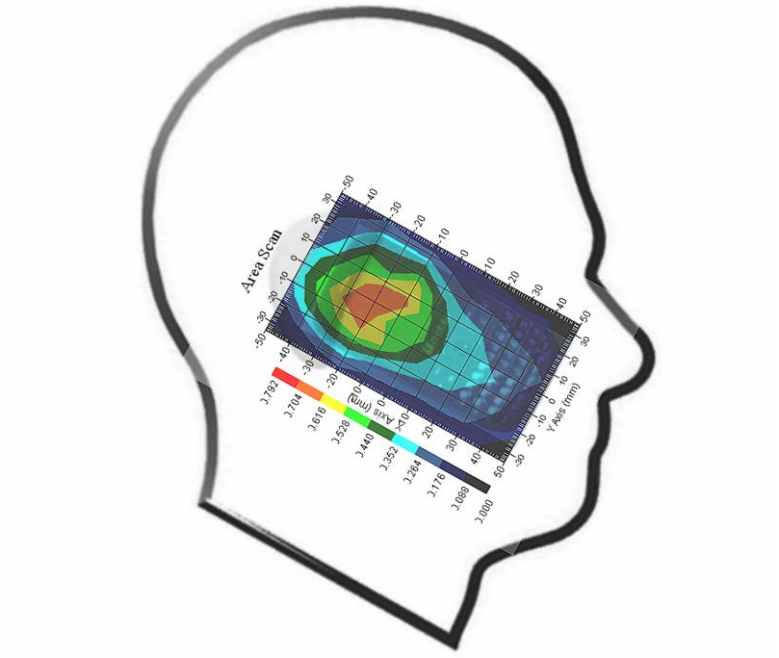
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.529 W/kg
Power Drift-Finish : 0.537 W/kg
Power Drift (%) : 1.516

Tissue Data
Type : HEAD
Frequency : 1850.20 MHz
Epsilon : 41.52 F/m
Sigma : 1.38 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 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 : 0.652 W/kg
10 gram SAR value : 0.370 W/kg
Area Scan Peak SAR : 0.705 W/kg
Zoom Scan Peak SAR : 1.080 W/kg

Plot 9#



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

Left Head Tilt (1850.2 MHz Low Channel)

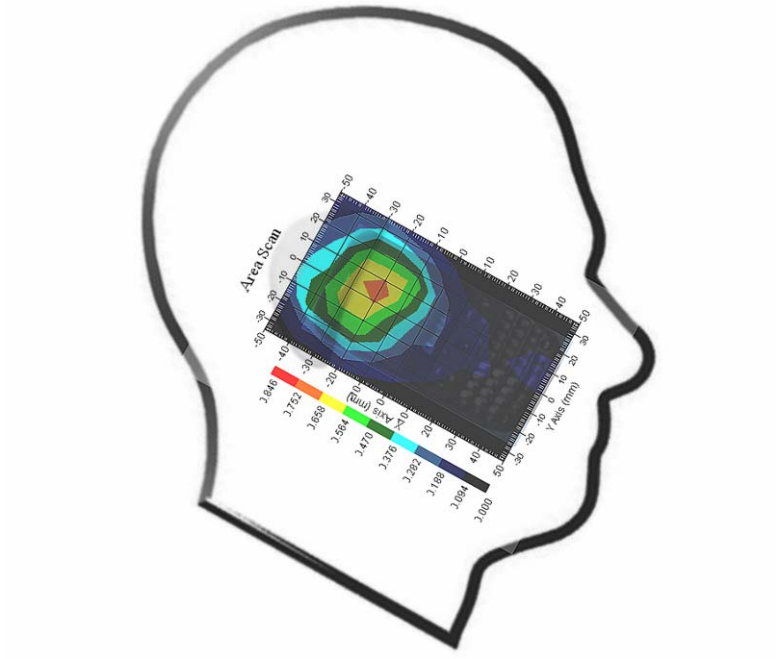
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.564 W/kg
Power Drift-Finish : 0.577 W/kg
Power Drift (%) : 2.308

Tissue Data
Type : HEAD
Frequency : 1850.20 MHz
Epsilon : 41.52 F/m
Sigma : 1.38 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 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 : 0.638 W/kg
10 gram SAR value : 0.368 W/kg
Area Scan Peak SAR : 0.754 W/kg
Zoom Scan Peak SAR : 1.511 W/kg

Plot 10#



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

Right Head Cheek (1850.2 MHz Low Channel)

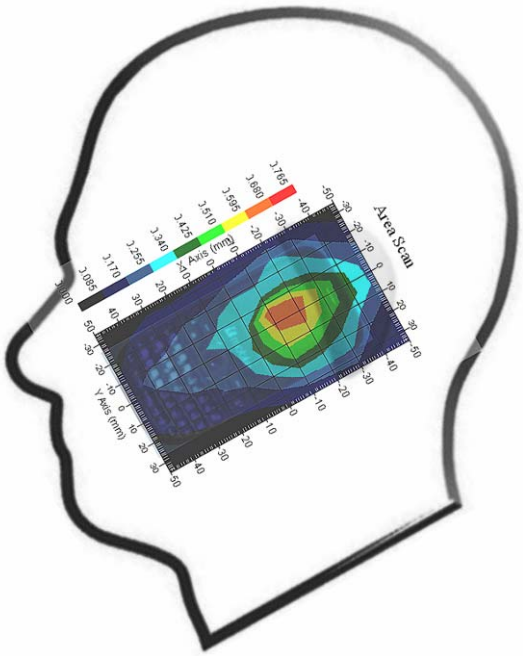
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.511 W/kg
Power Drift-Finish : 0.527 W/kg
Power Drift (%) : 3.317

Tissue Data
Type : HEAD
Frequency : 1850.20 MHz
Epsilon : 41.52 F/m
Sigma : 1.38 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 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 : 0.651 W/kg
10 gram SAR value : 0.344 W/kg
Area Scan Peak SAR : 0.682 W/kg
Zoom Scan Peak SAR : 0.968 W/kg

Plot 11#



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

Right Head Tilt (1850.2 MHz Low Channel)

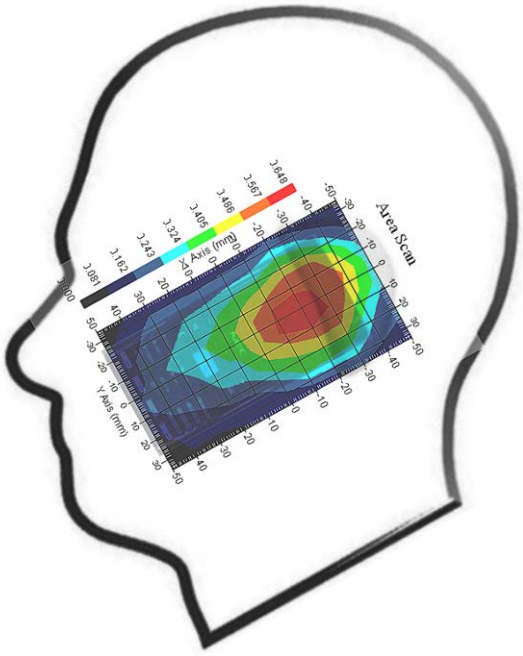
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.549 W/kg
Power Drift-Finish : 0.557 W/kg
Power Drift (%) : 1.457

Tissue Data
Type : HEAD
Frequency : 1850.20 MHz
Epsilon : 41.52 F/m
Sigma : 1.38 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 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 : 0.629 W/kg
10 gram SAR value : 0.332 W/kg
Area Scan Peak SAR : 0.645 W/kg
Zoom Scan Peak SAR : 1.201 W/kg

Plot 12#



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

Body-worn Back-Headset (1850.2 MHz Low Channel)

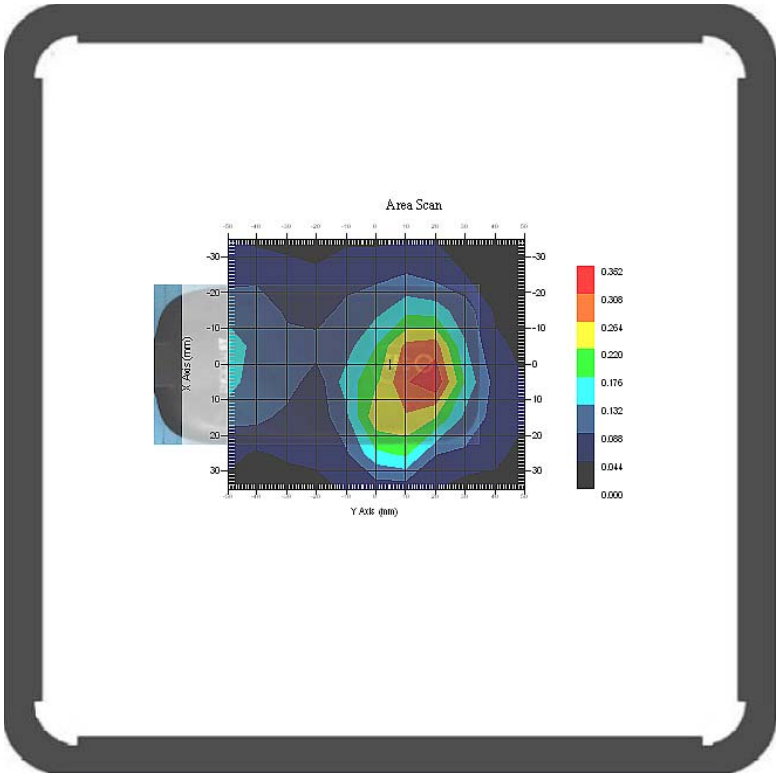
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.228 W/kg
Power Drift-Finish : 0.231 W/kg
Power Drift (%) : 1.318

Tissue Data
Type : Body
Frequency : 1850.20 MHz
Epsilon : 54.98 F/m
Sigma : 1.55 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 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 : 0.285 W/kg
10 gram SAR value : 0.205 W/kg
Area Scan Peak SAR : 0.349 W/kg
Zoom Scan Peak SAR : 0.590 W/kg

Plot 13#



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

Body-worn Back (1850.2 MHz Low Channel)

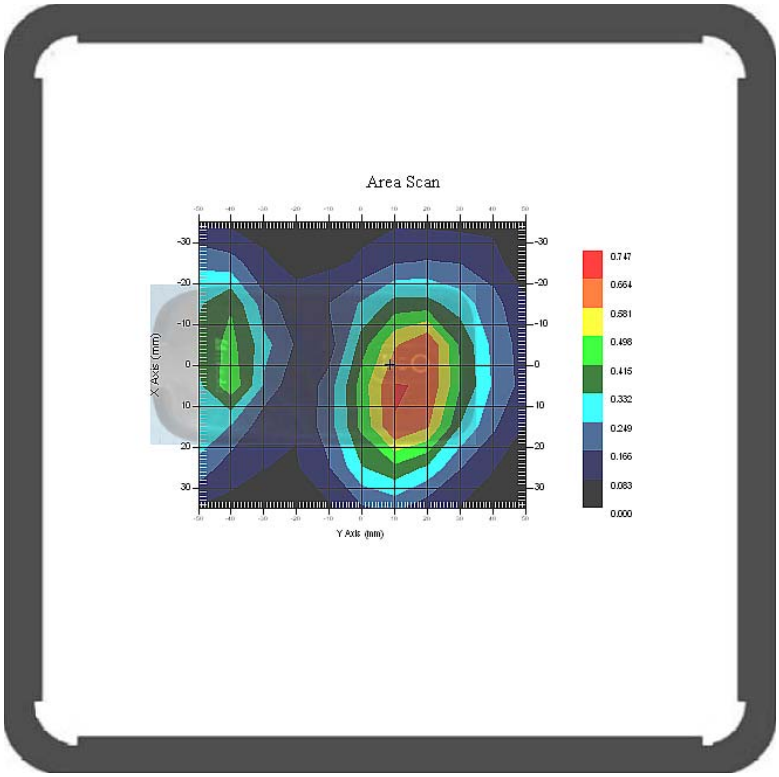
Measurement Data
Test mode : GPRS
Crest Factor : 2
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.498 W/kg
Power Drift-Finish : 0.511 W/kg
Power Drift (%) : 2.617

Tissue Data
Type : Body
Frequency : 1850.20 MHz
Epsilon : 54.98 F/m
Sigma : 1.55 S/m
Density : 1000.00 kg/cu. m

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

1 gram SAR value : 0.553 W/kg
10 gram SAR value : 0.330 W/kg
Area Scan Peak SAR : 0.666 W/kg
Zoom Scan Peak SAR : 1.070 W/kg

Plot 14#



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

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

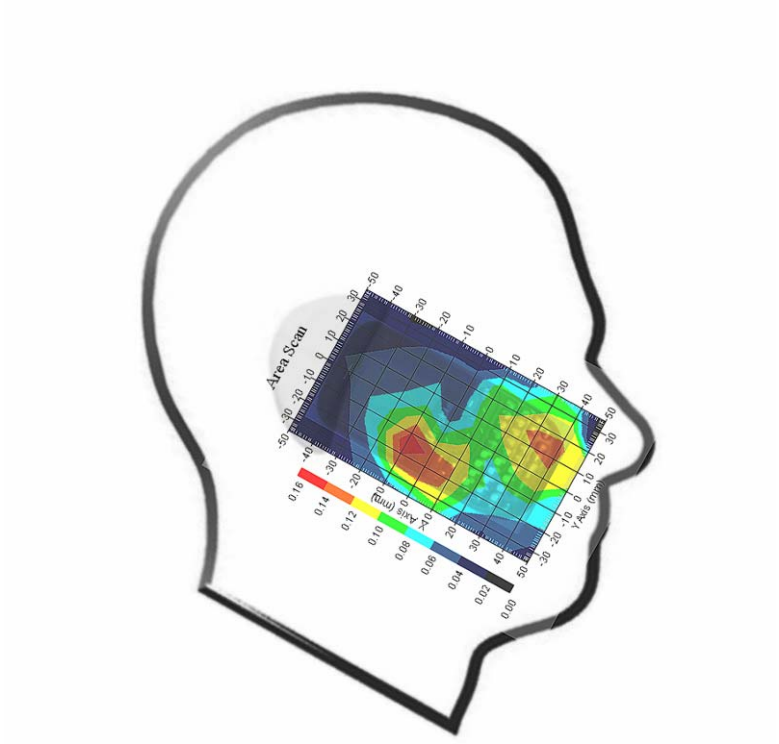
Measurement Data
Crest Factor : 1
Scan Type : Complete
Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.018 W/kg
Power Drift-Finish : 0.018 W/kg
Power Drift (%) : 0.924

Tissue Data
Type : Head
Frequency : 2462 MHz
Epsilon : 39.04 F/m
Sigma : 1.79 S/m
Density : 1000.00 kg/cu. m

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

1 gram SAR value : 0.137 W/kg
10 gram SAR value : 0.084 W/kg
Area Scan Peak SAR : 0.160 W/kg
Zoom Scan Peak SAR : 0.251 W/kg

Plot 15#



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

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

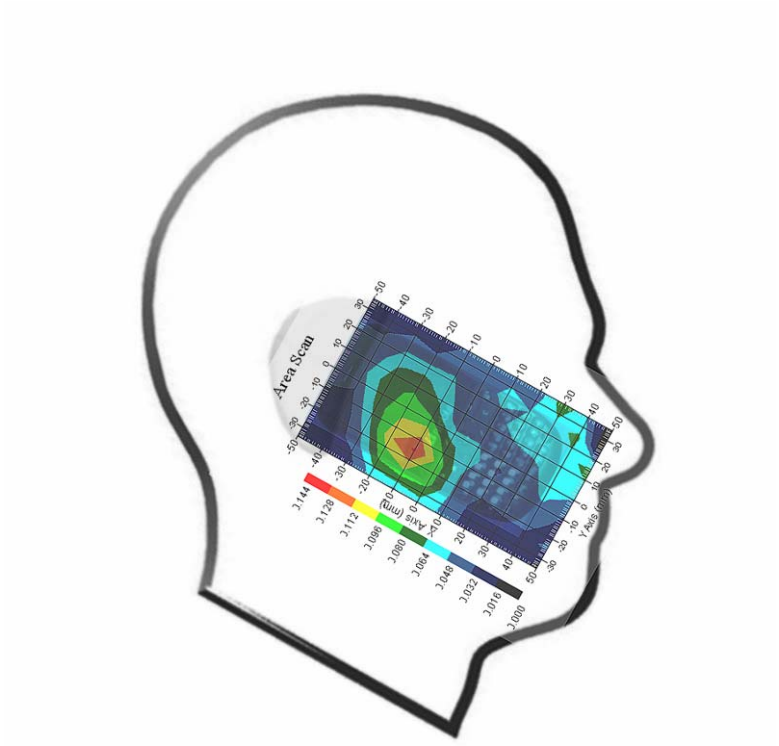
Measurement Data
Crest Factor : 1
Scan Type : Complete
Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.030 W/kg
Power Drift-Finish : 0.031 W/kg
Power Drift (%) : 3.337

Tissue Data
Type : Head
Frequency : 2462 MHz
Epsilon : 39.04 F/m
Sigma : 1.79 S/m
Density : 1000.00 kg/cu. m

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

1 gram SAR value : 0.111 W/kg
10 gram SAR value : 0.067 W/kg
Area Scan Peak SAR : 0.131 W/kg
Zoom Scan Peak SAR : 0.170 W/kg

Plot 16#



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

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

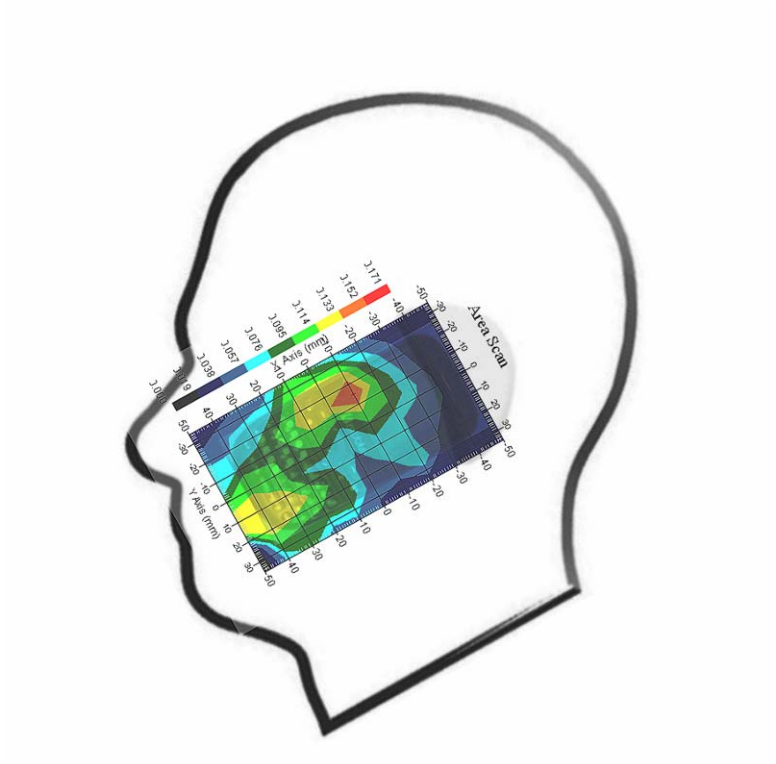
Measurement Data
Crest Factor : 1
Scan Type : Complete
Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.022 W/kg
Power Drift-Finish : 0.022 W/kg
Power Drift (%) : -1.007

Tissue Data
Type : Head
Frequency : 2462 MHz
Epsilon : 39.04 F/m
Sigma : 1.79 S/m
Density : 1000.00 kg/cu. m

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

1 gram SAR value : 0.134 W/kg
10 gram SAR value : 0.085 W/kg
Area Scan Peak SAR : 0.154 W/kg
Zoom Scan Peak SAR : 0.230 W/kg

Plot 17#



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

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

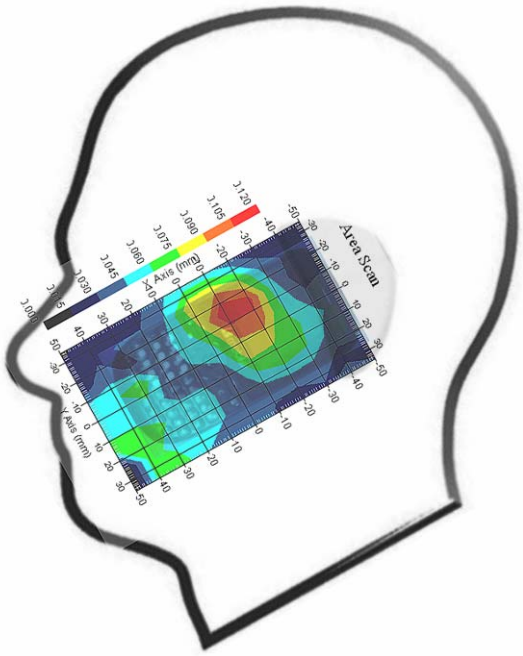
Measurement Data
Crest Factor : 1
Scan Type : Complete
Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.033 W/kg
Power Drift-Finish : 0.032 W/kg
Power Drift (%) : -3.037

Tissue Data
Type : Head
Frequency : 2462 MHz
Epsilon : 39.04 F/m
Sigma : 1.79 S/m
Density : 1000.00 kg/cu. m

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

1 gram SAR value : 0.107 W/kg
10 gram SAR value : 0.062 W/kg
Area Scan Peak SAR : 0.120 W/kg
Zoom Scan Peak SAR : 0.190 W/kg

Plot 18#



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

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

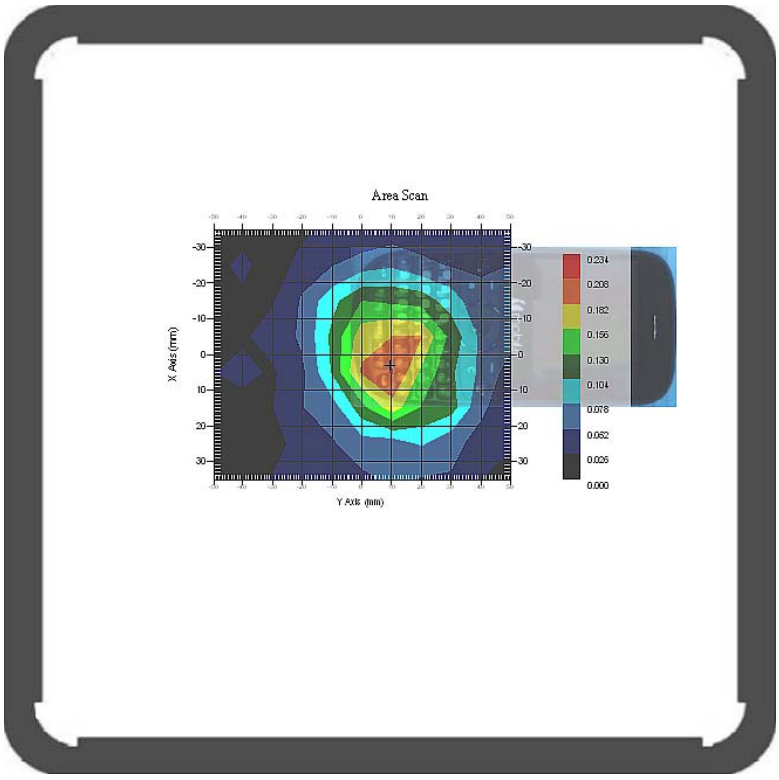
Measurement Data
Crest Factor : 1
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.182 W/kg
Power Drift-Finish : 0.184 W/kg
Power Drift (%) : 1.089

Tissue Data
Type : BODY
Frequency : 2462 MHz
Epsilon : 51.82 F/m
Sigma : 2.01 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 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 : 0.174 W/kg
10 gram SAR value : 0.098 W/kg
Area Scan Peak SAR : 0.210 W/kg
Zoom Scan Peak SAR : 0.330 W/kg

Plot 19#



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

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

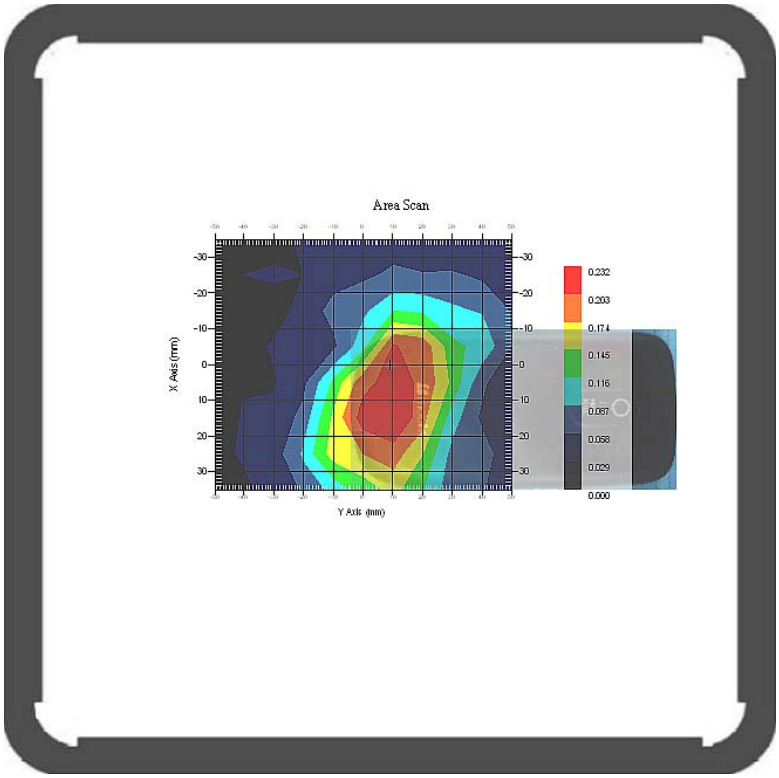
Measurement Data
Crest Factor : 1
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.202 W/kg
Power Drift-Finish : 0.204 W/kg
Power Drift (%) : 1.002

Tissue Data
Type : BODY
Frequency : 2462 MHz
Epsilon : 51.82 F/m
Sigma : 2.01 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 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 : 0.215 W/kg
10 gram SAR value : 0.115 W/kg
Area Scan Peak SAR : 0.231 W/kg
Zoom Scan Peak SAR : 0.420 W/kg

Plot 20#



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

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

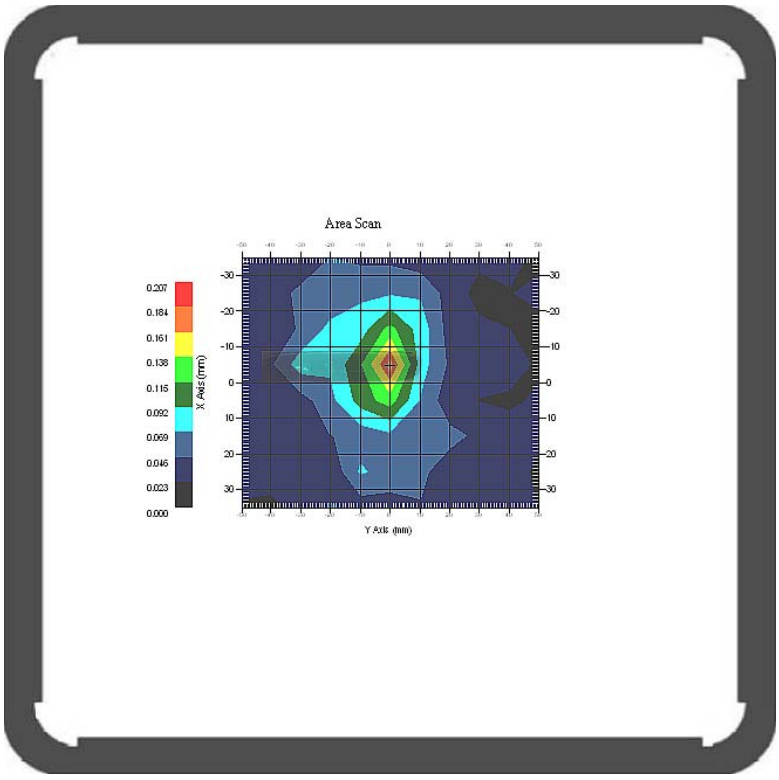
Measurement Data
Crest Factor : 1
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.162 W/kg
Power Drift-Finish : 0.165 W/kg
Power Drift (%) : 1.857

Tissue Data
Type : BODY
Frequency : 2462 MHz
Epsilon : 51.82 F/m
Sigma : 2.01 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 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 : 0.128 W/kg
10 gram SAR value : 0.073 W/kg
Area Scan Peak SAR : 0.185 W/kg
Zoom Scan Peak SAR : 0.240 W/kg

Plot 21#



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

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

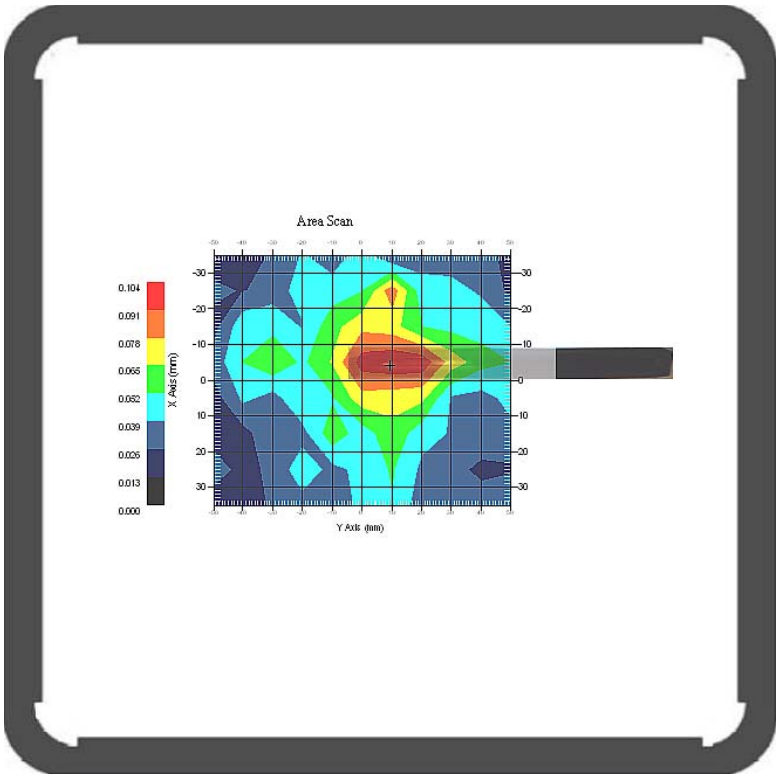
Measurement Data
Crest Factor : 1
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.092 W/kg
Power Drift-Finish : 0.093 W/kg
Power Drift (%) : 1.088

Tissue Data
Type : BODY
Frequency : 2462 MHz
Epsilon : 51.82 F/m
Sigma : 2.01 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 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 : 0.096 W/kg
10 gram SAR value : 0.054 W/kg
Area Scan Peak SAR : 0.103 W/kg
Zoom Scan Peak SAR : 0.140 W/kg

Plot 22#



APPENDIX A – MEASUREMENT UNCERTAINTY

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

Measurement Uncertainty for 300MHz to 3GHz

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	c_i^1 (1-g)	c_i^1 (10-g)	Standard Uncertainty (1-g) %	Standard Uncertainty (10-g) %
Measurement System							
Probe Calibration	3.5	normal	1	1	1	3.5	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1\text{-cp})^{1/2}$	$(1\text{-cp})^{1}_{/2}$	1.5	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	$\sqrt{cp}$	4.4	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Readout Electronics	1.0	normal	1	1	1	1.0	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0	1.0
RF Ambient Condition -Noise	0.95	rectangular	$\sqrt{3}$	1	1	0.55	0.55
RF Ambient Condition - Reflections	3.0	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Probe Positioner Mech. Restrictions	0.4	rectangular	$\sqrt{3}$	1	1	0.2	0.2
Restriction							
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	1	2.1	2.1
Test Sample Positioning	2.6	normal	1	1	1	2..6	2.6
Device Holder Uncertainty	2.0	normal	1	1	1	2.0	2.0
Drift of Output Power	0.4	rectangular	$\sqrt{3}$	1	1	0.2	0.2
Phantom and Setup							
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	1	2.0	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	0.5	2.0	1.4
Liquid Conductivity(meas.)	2.6	normal	1	0.7	0.5	1.8	1.3
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7	1.4
Liquid Permittivity(meas.)	2.7	normal	1	0.6	0.5	1.6	1.4
Combined Uncertainty		RSS				9.1	8.1
Combined Uncertainty (coverage factor=2)		Normal(k=2)				18.2	17.6

APPENDIX B – PROBE CALIBRATION CERTIFICATES

NCL CALIBRATION LABORATORIES

Calibration File No.: 1251-1258

Client.: BACL Lab

CERTIFICATE OF CALIBRATION

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

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

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

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

Approved By: Stuart Nicol

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

Released By: _____

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

NCL Calibration Laboratories
Division of APREL Inc.

Introduction

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

Calibration Method

Probes are calibrated using the following methods.

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

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

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

References

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

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Conditions

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

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

Primary Measurement Standards

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

Secondary Measurement Standards

Signal Generator Agilent E4438C -506	MY55182336	June 7, 2012

Attestation

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

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

Stuart Nicol

Jesse Hones

NCL Calibration Laboratories
Division of APREL Inc.

Probe Summary

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

*Resistive to recommended tissue recipes per IEEE-1528

Sensitivity in Air

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

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Calibration for Tissue (Head H, Body B)

Frequency	Tissue Type	Measured Epsilon	Measured Sigma	Calibration Uncertainty	Tolerance Uncertainty for 5%*	Conversion Factor
450 H	Head	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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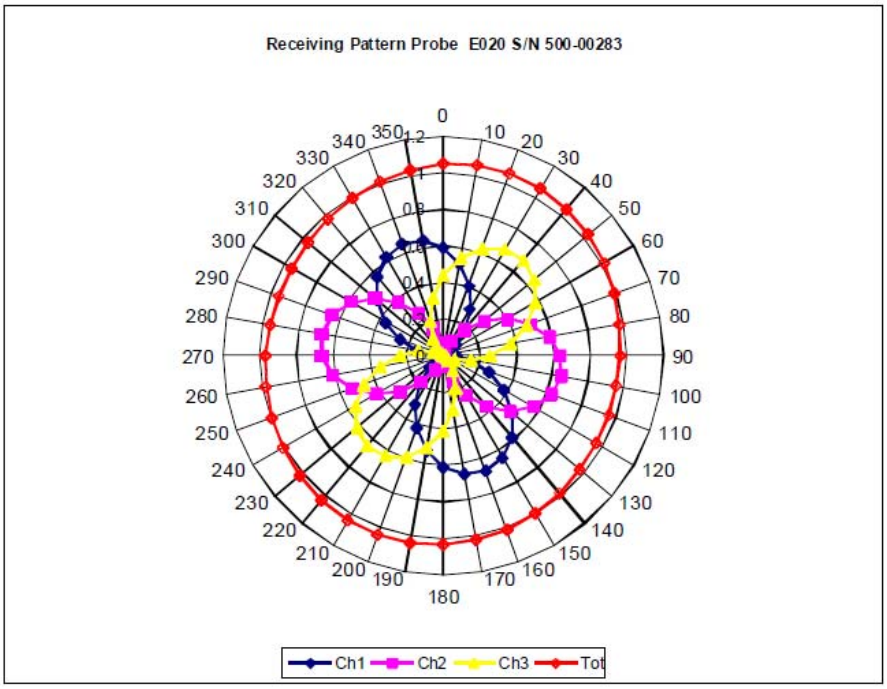
Receiving Pattern Air



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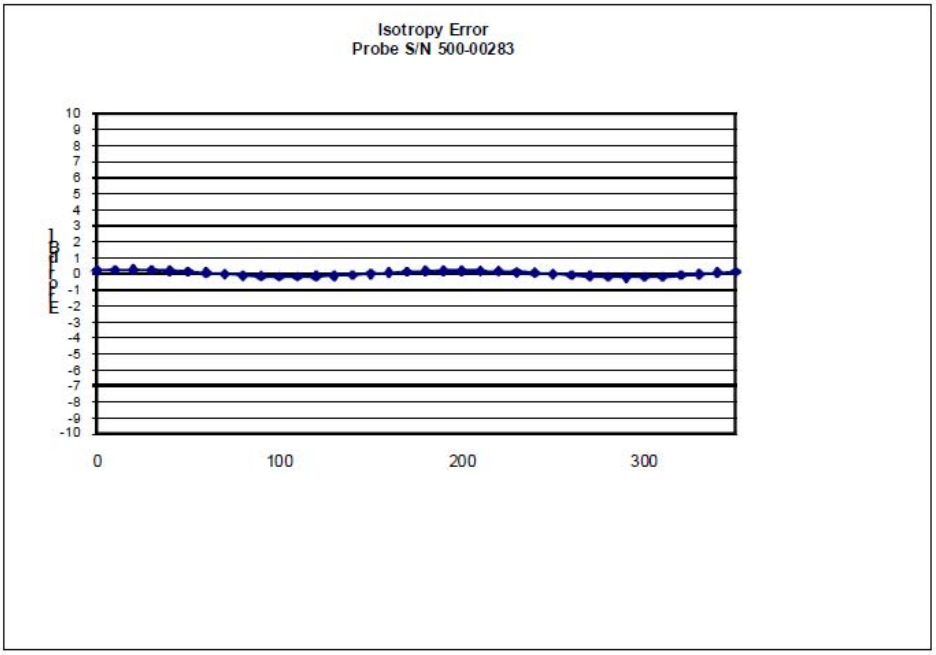
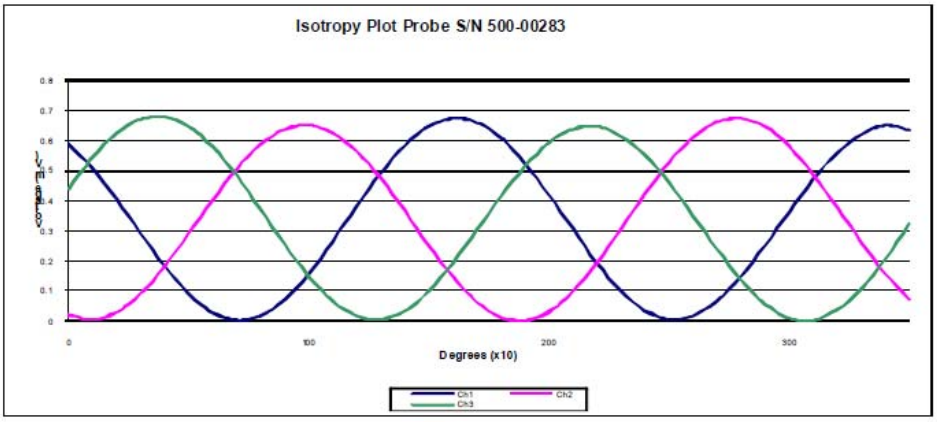
Isotropy Error Air





Isotropicity Tissue: 0.10 dB

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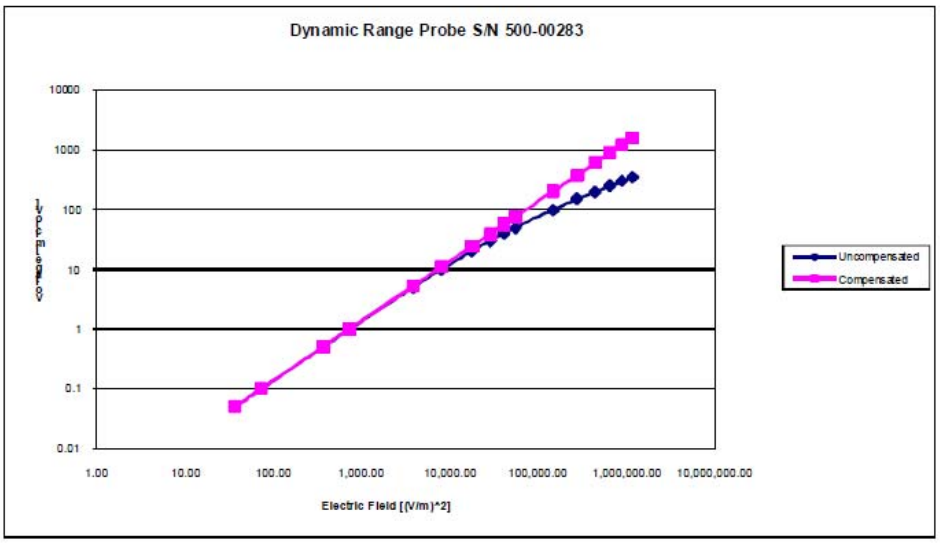
Dynamic Range



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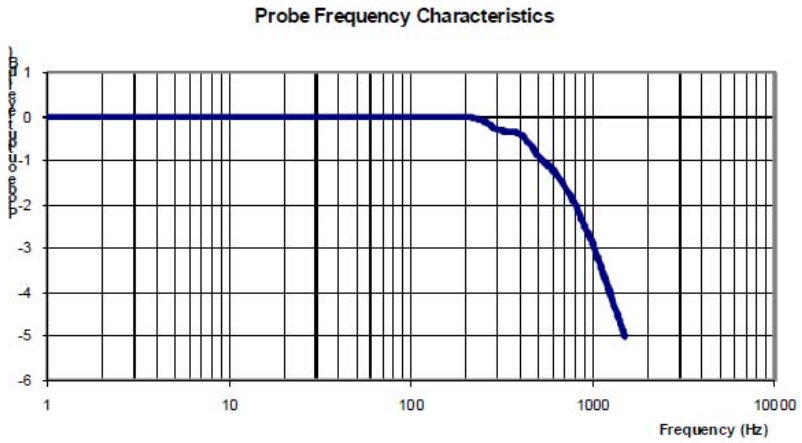
Video Bandwidth



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