

SAR EVALUATION REPORT

For

HONG KONG IPRO TECHNOLOGY CO., LIMITED

ROOM C1D, 6/F, WING HING INDUSTRIAL BUILDING, 14 HING YIP STREET,
KWUN TONG, KOWLOON, HONG KONG

FCC ID: PQ4SUPERPAD

Report Type: Original Report	Product Type: MID
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Report Number: RSZ130916001-20	
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Note: This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

Attestation of Test Results		
EUT Information	Company Name	HONG KONG IPRO TECHNOLOGY CO., LIMITED
	EUT Description	MID
	FCC ID	PQ4SUPERPAD
	Model Number	SUPER PAD
	Test Date	2013-11-20 to 2013-11-22
Frequency	Max. SAR Level(s) Reported	Limit(W/Kg)
GSM 850	1.212 W/kg 1g Body SAR	1.6
PCS 1900	0.242 W/kg 1g Body SAR	
WCDMA 850	0.479 W/kg 1g Body SAR	
WCDMA 1900	0.134 W/kg 1g Body SAR	
Simultaneous	1.584 W/kg 1g Body SAR	
Applicable Standards	ANSI / IEEE C95.1 : 2005 IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.	
	ANSI / IEEE C95.3 : 2002 IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz—300 GHz.	
	IEEE 1528:2003 IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques	
	KDB procedures KDB 447498 D01 Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies. KDB 941225 D01 SAR Measurement Procedures for 3G Devices-CDMA 2000/EV-Do WCDMA/HSDPA/HSUPA. KDB 648474 D04 SAR Evaluation Considerations for Wireless Handsets. KDB 616217 D04 SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers	
<p>Note: This wireless device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General Population/Uncontrolled Exposure limits specified in ANSI/IEEE Standards and has been tested in accordance with the measurement procedures specified in IEEE 1528-2003 and RF exposure KDB procedures.</p> <p>The results and statements contained in this report pertain only to the device(s) evaluated.</p>		

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	RSZ130916001-20	Original Report	2013-11-25

EUT DESCRIPTION

This report has been prepared on behalf of HONG KONG IPRO TECHNOLOGY CO., LIMITED and their product, FCC ID: PQ4SUPERPAD, Model: SUPER PAD or the EUT (Equipment Under Test) as referred to in the rest of this report. The EUT is a MID.

Technical Specification

Product Type	Portable
Exposure Category:	Population / Uncontrolled
Antenna Type(s):	Internal Antenna
Body-Worn Accessories:	Headset
Face-Head Accessories:	None
Multi-slot Class:	Class12
Operation Mode :	GSM Voice GPRS Data, WCDMA , 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) WCDMA850 : 824-849 MHz(TX) ; 869-894 MHz(RX) WCDMA1900 : 1850-1910 MHz(TX) ; 1930-1990 MHz(RX) WiFi: 2412-2462 MHz Bluetooth : 2402MHz-2480MHz
Conducted RF Power:	Cellular Band: 32.04 dBm PCS Band: 28.98 dBm WCDMA850: 22.39 dBm WCDMA1900: 22.86 dBm Bluetooth: 2.18 dBm WiFi : 9.20 dBm
Dimensions (L*W*H):	200 mm (L)×138mm (W)×10mm (H)
Power Source:	3.7 VDC/2000mAh Rechargeable Battery
Normal Operation:	Body-support

REFERENCE, STANDARDS, AND GUIDELINES

FCC:

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

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

CE:

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

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

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

SAR Limits

FCC Limit (1g Tissue)

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1 g of tissue)	1.60	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

CE Limit (10g Tissue)

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 10 g of tissue)	2.0	10
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

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

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

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

FACILITIES

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

DESCRIPTION OF TEST SYSTEM

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

ALSAS-10U System Description

ALSAS-10-U is fully compliant with the technical and scientific requirements of IEEE 1528, IEC 62209, CENELEC, ARIB, ACA, and the Federal Communications Commission. The system comprises of a six axes articulated robot which utilizes a dedicated controller.

ALSAS-10U uses the latest methodologies. And FDTD modeling to provide a platform which is repeatable with minimum uncertainty.

Applications

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

Area Scans

Area scans are defined prior to the measurement process being executed with a user defined variable spacing between each measurement point (integral) allowing low uncertainty measurements to be conducted. Scans defined for FCC applications utilize a 10mm² step integral, with 1mm interpolation used to locate the peak SAR area used for zoom scan assessments.

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

Zoom Scan (Cube Scan Averaging)

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

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

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



ALSAS-10U Interpolation and Extrapolation Uncertainty

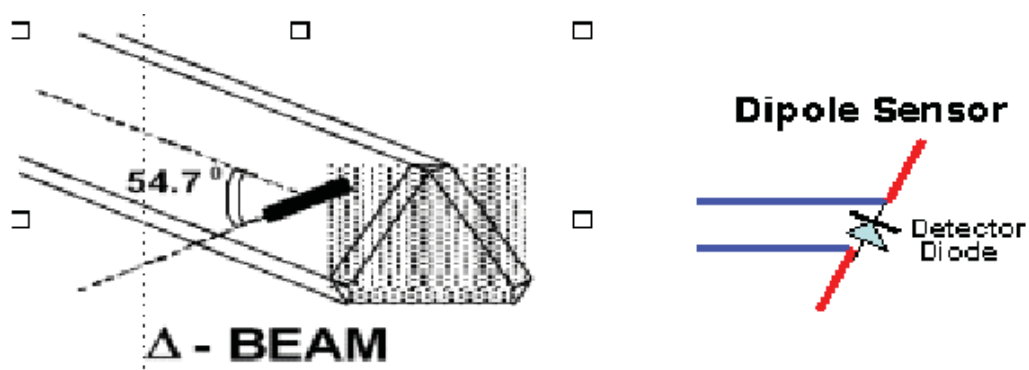
The overall uncertainty for the methodology and algorithms the used during the SAR calculation was evaluated using the data from IEEE 1528 based on the example f3 algorithm:

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

Isotropic E-Field Probe

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

The E-Field probe utilizes a triangular sensor arrangement as detailed in the diagram below:



SAR is assessed with a calibrated probe which moves at a default height of 5mm from the center of the diode, which is mounted to the sensor, to the phantom surface (in the Z Axis). The 5mm offset height has been selected so as to minimize any resultant boundary effect due to the probe being in close proximity to the phantom surface.

The following algorithm is an example of the function used by the system for linearization of the output from the probe when measuring complex modulation schemes.

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

Isotropic E-Field Probe Specification

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

Boundary Detection Unit and Probe Mounting Device

ALSAS-10U incorporates a boundary detection unit with a sensitivity of 0.05mm for detecting all types of surfaces. The robust design allows for detection during probe tilt (probe normalize) exercises, and utilizes a second stage emergency stop. The signal electronics are fed directly into the robot controller for high accuracy surface detection in lateral and axial detection modes (X, Y, & Z).

The probe is mounted directly onto the Boundary Detection unit for accurate tooling and displacement calculations controlled by the robot kinematics. The probe is connect to an isolated probe interconnect where the output stage of the probe is fed directly into the amplifier stage of the Daq-Paq.

Daq-Paq (Analog to Digital Electronics)

ALSAS-10U incorporates a fully calibrated Daq-Paq (analog to digital conversion system) which has a 4 channel input stage, sent via a 2 stage auto-set amplifier module. The input signal is amplified accordingly so as to offer a dynamic range from 5 μV to 800mV. Integration of the fields measured is carried out at board level utilizing a Co-Processor which then sends the measured fields down into the main computational module in digitized form via an RS232 communications port. Probe linearity and duty cycle compensation is carried out within the main Daq-Paq module.

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

Axis Articulated Robot

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



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

ALSAS Universal Workstation

ALSAS Universal workstation allows for repeatability and fast adaptability. It allows users to do calibration, testing and measurements using different types of phantoms with one set up, which significantly speeds up the measurement process.

Universal Device Positioner

The universal device positioner allows complete freedom of movement of the EUT. Developed to hold a EUT in a free-space scenario any additional loading attributable to the material used in the construction of the positioner has been eliminated. Repeatability has been enhanced through the linear scales which form the design used to indicate positioning for any given test scenario in all major axes. A 15° tilt indicator is included for the of aid cheek to tilt movements for head SAR analysis. Overall uncertainty for measurements have been reduced due to the design of the Universal device positioner, which allows positioning of a device in as near to a free-space scenario as possible, and by providing the means for complete repeatability.

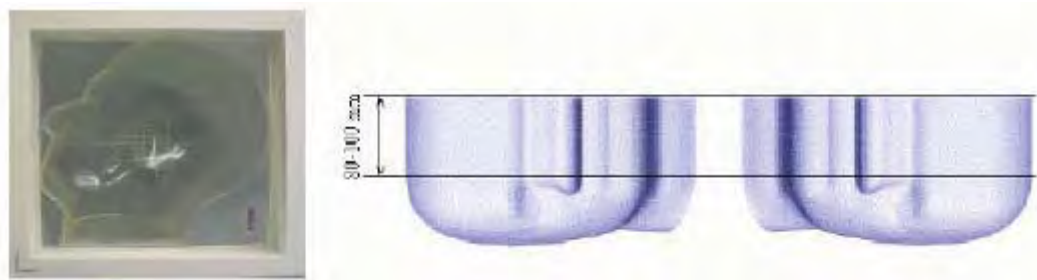


Phantom Types

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

APREL SAM Phantoms

The SAM phantoms developed using the IEEE SAM CAD file. They are fully compliant with the requirements for both IEEE 1528 and FCC Supplement C. Both the left and right SAM phantoms are interchangeable, transparent and include the IEEE 1528 grid with visible NF and MB lines.



APREL Laboratories Universal Phantom

The Universal Phantom is used on the ALSAS-10U as a system validation phantom. The Universal Phantom has been fully validated both experimentally from 800MHz to 6GHz and numerically using XFDTD numerical software.

The shell thickness is 2mm overall, with a 4mm spacer located at the NF/MB intersection providing an overall thickness of 6mm in line with the requirements of IEEE-1528.

The design allows for fast and accurate measurements, of handsets, by allowing the conservative SAR to be evaluated at on frequency for both left and right head experiments in one measurement.



Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in P1528.

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

Recommended Tissue Dielectric Parameters for Head and Body

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

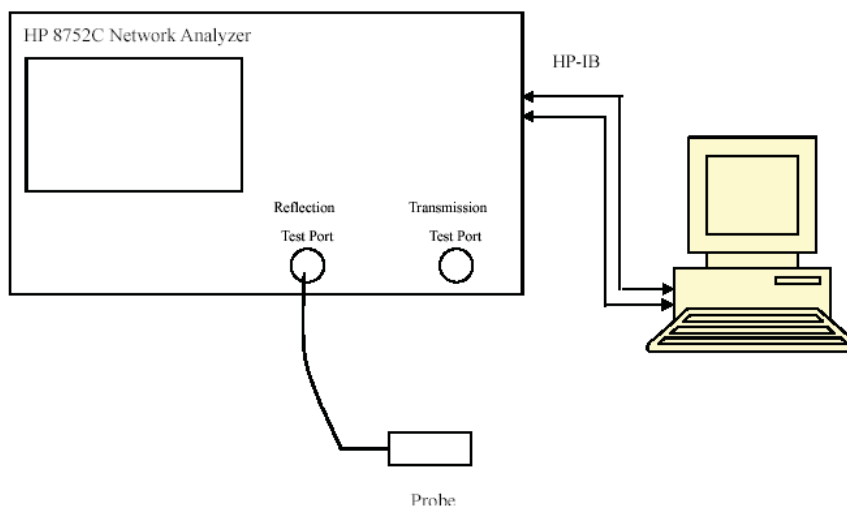
EQUIPMENT LIST AND CALIBRATION

Equipments List & Calibration Information

Equipment	Model	Calibration Date	S/N
CRS F3 robot	ALS-F3	N/A	RAF0805352
CRS F3 Software	ALS-F3-SW	N/A	N/A
CRS C500C controller	ALS-C500	N/A	RCF0805379
Probe mounting device & Boundary Detection Sensor System	ALS-PMDPS-3	N/A	120-00270
Universal Work Station	ALS-UWS	N/A	100-00157
Data Acquisition Package	ALS-DAQ-PAQ-3	2013-10-08	110-00212
Miniature E-Field Probe	ALS-E-020	2013-10-08	500-00283
Dipole, 835MHz	ALS-D-835-S-2	2011-08-25	180-00558
Dipole, 1900MHz	ALS-D-1900-S-2	2011-08-25	210-00710
Dipole Spacer	ALS-DS-U	N/A	250-00907
Device holder/Positioner	ALS-H-E-SET-2	N/A	170-00510
Left ear SAM phantom	ALS-P-SAM-L	N/A	130-00311
Right ear SAM phantom	ALS-P-SAM-R	N/A	140-00359
UniPhantom	ALS-P-UP-1	N/A	150-00413
Simulated Tissue 835 MHz Body	ALS-TS-835-B	Each Time	270-02101
Simulated Tissue 1900 MHz Body	ALS-TS-1900-B	Each Time	295-02102
Power Amplifier	5S1G4	N/A	71377
Synthesized Sweeper	HP 8341B	2013-05-16	2624A00116
UNIVERSAL RADIO COMMUNICATION TESTER	CMU 200	2012-12-06	1100.0008.02
EMI Test Receiver	ESCI	2012-11-24	101120

SAR MEASUREMENT SYSTEM VERIFICATION

Liquid Verification



Liquid Verification Setup Block Diagram

Liquid Verification Results

Frequency	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ϵ_r	σ (S/m)	ϵ_r	σ (S/m)	$\Delta \epsilon_r$	$\Delta \sigma$ (S/m)	
824.2	Body	55.34	0.95	55.2	0.97	0.259	-2.062	±5
826.4	Body	55.36	0.96	55.2	0.97	0.287	-1.031	±5
836.6	Body	55.42	0.97	55.2	0.97	0.401	0.000	±5
846.6	Body	55.48	0.99	55.2	0.97	0.514	2.062	±5
848.8	Body	55.50	1.00	55.2	0.97	0.543	3.093	±5
1850.2	Body	51.93	1.48	53.3	1.52	-2.578	-2.632	±5
1852.4	Body	51.95	1.48	53.3	1.52	-2.526	-2.632	±5
1880.0	Body	51.93	1.52	53.3	1.52	-2.574	0.000	±5
1907.6	Body	51.89	1.54	53.3	1.52	-2.646	1.316	±5
1909.8	Body	51.85	1.54	53.3	1.52	-2.717	1.316	±5

*Liquid Verification was performed on 2013-11-20.

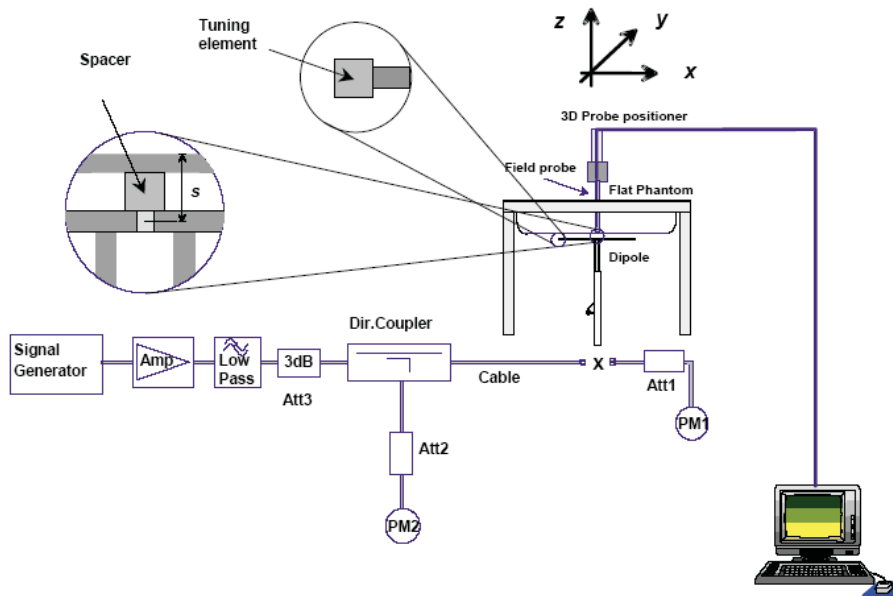
Please refer to the following tables.

850 MHz Body				1900 MHz Body		
Frequency (MHz)	e'	e''		Frequency (MHz)	e'	e''
824.0	55.3428	20.83692		1850.0	51.9259	14.5781
824.5	55.3459	20.73642		1851.2	51.9245	14.5702
825.0	55.3491	20.74892		1852.4	51.9537	14.5736
825.5	55.3522	20.76132		1853.6	51.9375	14.5936
826.0	55.3554	20.89642		1854.8	51.9251	14.6384
826.5	55.3585	20.96012		1856.0	51.9417	14.6436
827.0	55.3616	20.87462		1857.2	51.9129	14.6431
827.5	55.3648	20.75282		1858.4	51.9266	14.6902
828.0	55.3679	20.78732		1859.6	51.9284	14.6403
828.5	55.3711	20.74472		1860.8	51.9406	14.6972
829.0	55.3742	20.84892		1862.0	51.9216	14.6983
829.5	55.3773	20.79172		1863.2	51.9059	14.7404
830.0	55.3805	20.66962		1864.4	51.9076	14.751
830.5	55.3836	20.73402		1865.6	51.8719	14.6845
831.0	55.3867	20.71922		1866.8	51.8972	14.701
831.5	55.3899	20.92662		1868.0	51.8810	14.6985
832.0	55.3930	20.90432		1869.2	51.8584	14.6746
832.5	55.3962	20.68102		1870.4	51.8734	14.6672
833.0	55.3993	20.61432		1871.6	51.8901	14.7105
833.5	55.4024	20.72582		1872.8	51.9066	14.6629
834.0	55.4056	20.87772		1874.0	51.9097	14.7099
834.5	55.4087	20.77062		1875.2	51.8559	14.7405
835.0	55.4118	20.71412		1876.4	51.8739	14.7515
835.5	55.4150	20.96182		1877.6	51.9228	14.7163
836.0	55.4181	20.96872		1878.8	51.8883	14.7168
836.5	55.4213	20.82652		1880.0	51.9279	14.7131
837.0	55.4244	20.65362		1881.2	51.9332	14.7039
837.5	55.4275	20.68992		1882.4	51.9262	14.727
838.0	55.4307	20.97422		1883.6	51.9212	14.6939
838.5	55.4338	20.98942		1884.8	51.9542	14.7071
839.0	55.4370	20.91142		1886.0	51.9651	14.732
839.5	55.4401	20.84632		1887.2	51.9635	14.6714
840.0	55.4432	20.91352		1888.4	51.9828	14.6883
840.5	55.4464	20.95882		1889.6	51.9293	14.7461
841.0	55.4495	20.91402		1890.8	51.8848	14.7338
841.5	55.4526	20.85072		1892.0	51.8861	14.6615
842.0	55.4558	21.02652		1893.2	51.8839	14.7392
842.5	55.4589	20.99512		1894.4	51.8856	14.6892
843.0	55.4621	20.95552		1895.6	51.8958	14.7267
843.5	55.4652	20.91102		1896.8	51.8774	14.6896
844.0	55.4683	20.92862		1898.0	51.8500	14.7111
844.5	55.4715	20.95452		1899.2	51.8848	14.7062
845.0	55.4746	20.86392		1900.4	51.9145	14.7086
845.5	55.4777	20.81032		1901.6	51.8845	14.6958
846.0	55.4809	20.98332		1902.8	51.8557	14.7271
846.5	55.4840	21.04472		1904.0	51.9089	14.7189
847.0	55.4872	20.99362		1905.2	51.9011	14.7055
847.5	55.4903	20.91392		1906.4	51.9094	14.7304
848.0	55.4934	21.00412		1907.6	51.8896	14.7031
848.5	55.4966	21.08212		1908.8	51.8734	14.7322
849.0	55.4997	21.08232		1910.0	51.8517	14.7306

System Accuracy Verification

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

System Verification Setup Block Diagram



Probe and dipole antenna List and Detail

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
APREL	Probe	ALS-E-020	500-00283	2013-10-08	2014-10-07
APREL	Dipole antenna(850MHz)	ALS-D-835-S-2	180-00558	2011-08-25	2014-08-24
APREL	Dipole antenna(1900MHz)	ALS-D-1900-S-2	210-00710	2011-08-25	2014-08-24

System Accuracy Check Results

Date	Frequency Band	Liquid Type	Measured SAR (W/Kg)		Target Value (W/Kg)	Delta (%)	Tolerance (%)
2013-11-20	835	Body	1g	9.834	9.684	1.549	± 10
	1900	Body	1g	40.374	39.769	1.521	± 10

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

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

Product Data

Device Name : Dipole 835 MHz
 Serial No. : 180-00558
 Type : Dipole
 Model : ALS-D-835-S-2
 Frequency Band : 835
 Max. Transmit Pwr : 1 W
 Drift Time : 3 min(s)
 Power Drift-Start : 9.994 W/kg
 Power Drift-Finish : 9.982 W/kg
 Power Drift (%) : -0.120

Phantom Data

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

Tissue Data

Type : Body
 Serial No. : 270-02101
 Frequency : 835.0 MHz
 Last Calib. Date : 20-Nov-2013
 Temperature : 20.00 °C
 Ambient Temp. : 21.00 °C
 Humidity : 56.00 RH%
 Epsilon : 55.41 F/m
 Sigma : 0.97 S/m
 Density : 1000.00 kg/cu. m

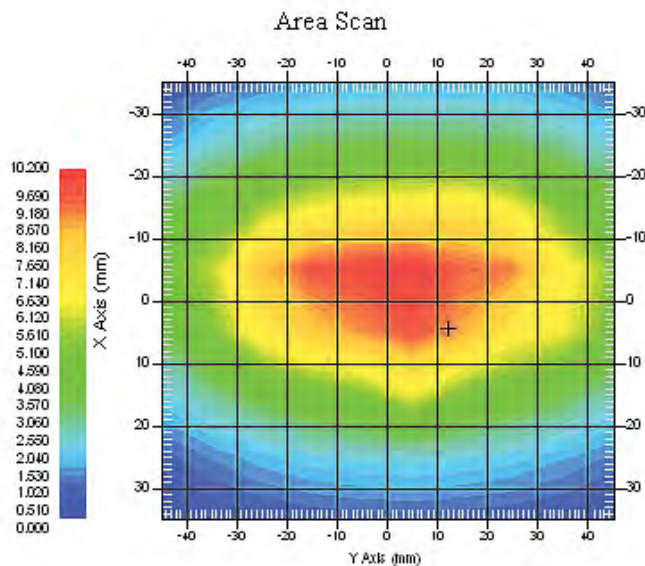
Probe Data

Name : E-Field
 Model : E-020
 Type : E-Field Triangle
 Serial No. : 500-00283
 Last Calib. Date : 08-Oct-2013
 Frequency Band : 835
 Duty Cycle Factor : 1
 Conversion Factor : 5.9
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

Measurement Data

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

1 gram SAR value : 9.834 W/kg
10 gram SAR value : 6.429 W/kg
Area Scan Peak SAR : 10.137 W/kg
Zoom Scan Peak SAR : 15.188 W/kg



835 MHz System Validation with Body Tissue

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

Product Data

Device Name : Dipole 1900MHz
Serial No. : 210-00710
Type : Dipole
Model : ALS-D-1900-S-2
Frequency Band : 1900
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 39.823 W/kg
Power Drift-Finish : 40.156 W/kg
Power Drift (%) : 0.836

Phantom Data

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

Tissue Data

Type : Body
Serial No. : 295-02102
Frequency : 1900.00 MHz
Last Calib. Date : 20-Nov -2013
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 51.91 F/m
Sigma : 1.53 S/m
Density : 1000.00 kg/cu. m

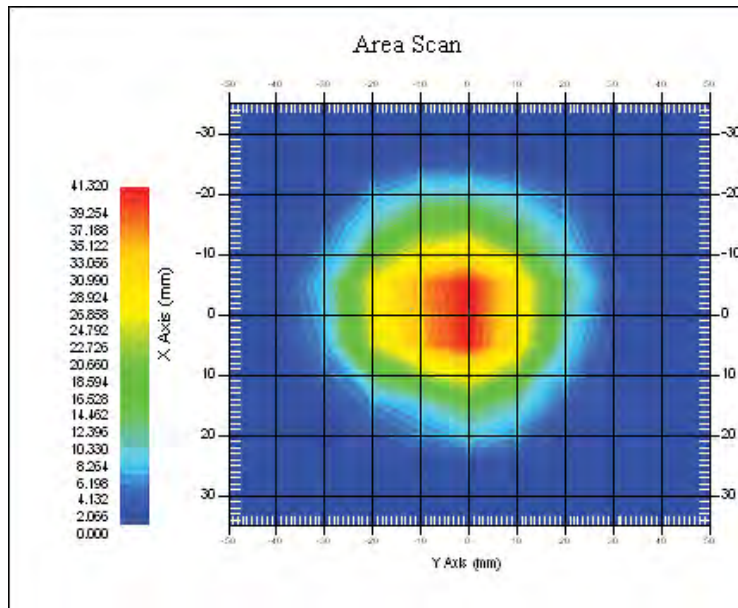
Probe Data

Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 08-Oct-2013
Frequency Band : 1900
Duty Cycle Factor : 1
Conversion Factor : 4.5
Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

Measurement Data

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

1 gram SAR value : 40.374 W/kg
 10 gram SAR value : 21.062 W/kg
 Area Scan Peak SAR : 41.191 W/kg
 Zoom Scan Peak SAR : 76.420 W/kg



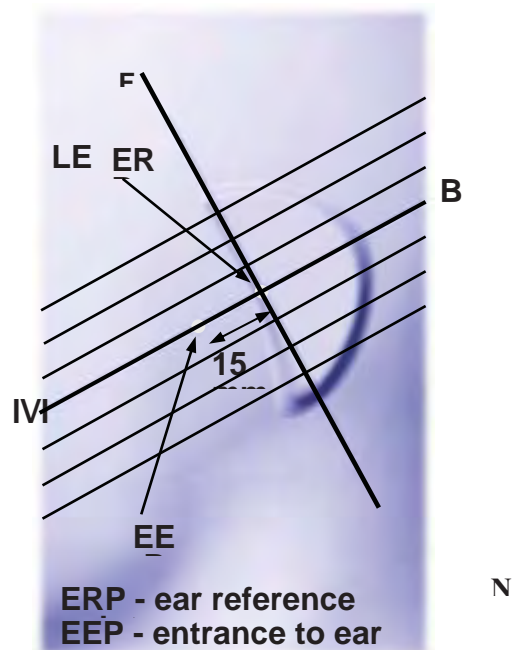
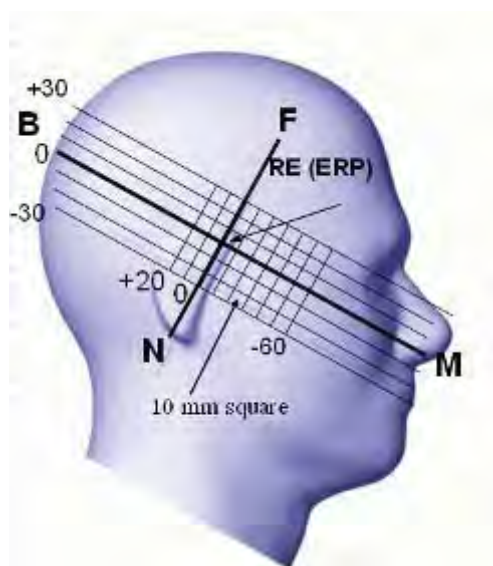
1900 MHz System Validation with Body Tissue

EUT TEST STRATEGY AND METHODOLOGY

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

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

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



Cheek/Touch Position

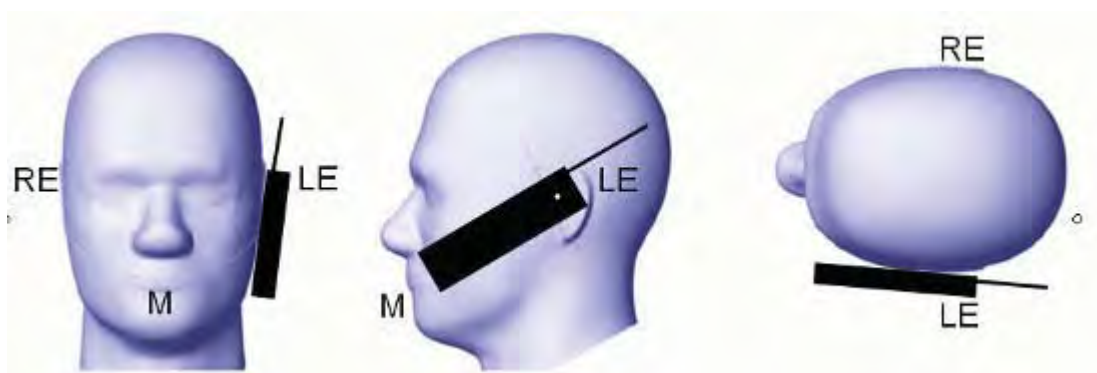
The device is brought toward the mouth of the head phantom by pivoting against the “ear reference point” or along the “N-F” line for the SCC-34/SC-2 head phantom.

This test position is established:

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

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

Cheek /Touch Position



Ear/Tilt Position

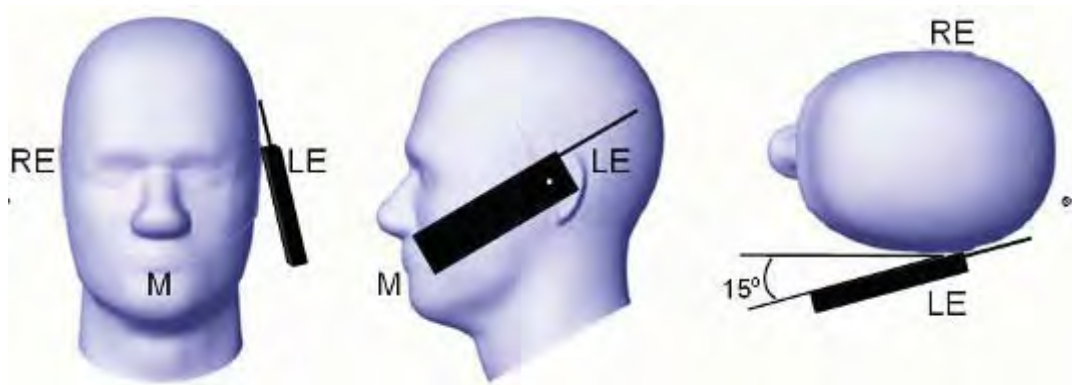
With the handset aligned in the “Cheek/Touch Position”:

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

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

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

Ear /Tilt 15° Position



Test positions for body-worn and other configurations

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

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

SAR Evaluation Procedure

The evaluation was performed with the following procedure:

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

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

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

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

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

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

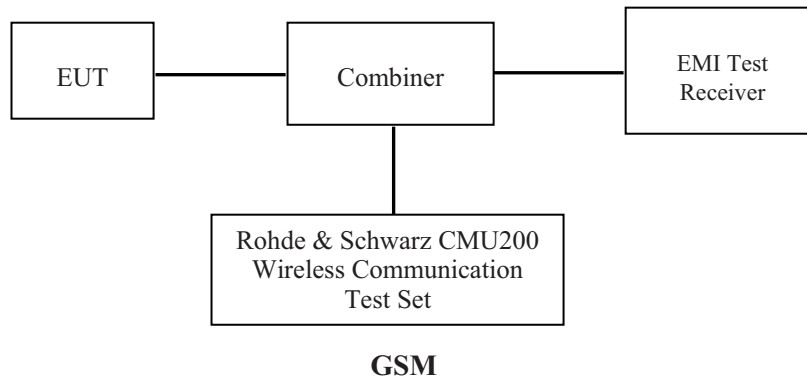
CONDUCTED OUTPUT POWER MEASUREMENT

Provision Applicable

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

Test Procedure

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



Maximum Output Power among production units

Max Target Power for Production Unit (dBm)			
Mode/Band	Channel		
	Low	Middle	High
GSM 850	32.50	32.50	32.50
GPRS 1 slot	32.50	32.50	32.50
GPRS 2 slot	31.50	31.50	31.50
GPRS 3 slot	29.50	29.50	29.50
GPRS 4 slot	28.60	28.60	28.60
EGPRS 1 slot	25.00	25.00	25.00
EGPRS 2 slot	23.50	23.50	23.50
EGPRS 3 slot	21.50	21.50	21.50
EGPRS 4 slot	20.00	20.00	20.00
PCS 1900	29.00	29.00	29.00
GPRS 1 slot	29.50	29.50	29.50
GPRS 2 slot	28.50	28.50	28.50
GPRS 3 slot	27.00	27.00	27.00
GPRS 4 slot	26.50	26.50	26.50
EGPRS 1 slot	25.50	25.50	25.50
EGPRS 2 slot	24.00	24.00	24.00
EGPRS 3 slot	22.00	22.00	22.00
EGPRS 4 slot	20.00	20.00	20.00
WCDMA 850	22.50	22.50	22.50
WCDMA 1900	23.00	23.00	23.00
Bluetooth	2.50	2.50	2.50
WiFi	9.50	9.50	9.50

Test Results:

GSM

Band	Frequency (MHz)	Conducted Peak Output Power	
		Meas. Power (dBm)	Meas. Power (W)
GSM 850	824.2	32.04	1.600
	836.6	31.92	1.556
	848.8	31.68	1.472
PCS 1900	1850.2	28.98	0.791
	1880.0	28.88	0.773
	1909.8	28.94	0.783

GPRS

Band	Channel No.	Frequency (MHz)	RF Peak Output Power (dBm)			
			1 slot	2 slot	3 slots	4 slots
GSM 850	128	824.2	32.16	31.20	29.44	28.54
	190	836.6	32.05	31.11	29.38	28.50
	251	848.8	31.87	30.91	29.19	28.39
PCS 1900	512	1850.2	29.18	28.43	26.83	25.92
	661	1880.0	29.09	28.38	26.79	25.89
	810	1909.8	29.17	28.46	26.99	26.08

EGPRS

Band	Channel No.	Frequency (MHz)	RF Peak Output Power (dBm)			
			1 slot	2 slot	3 slots	4 slots
GSM 850	128	824.2	24.49	23.06	20.92	19.93
	190	836.6	24.62	23.18	21.02	19.91
	251	848.8	24.60	23.26	21.11	19.96
PCS 1900	512	1850.2	25.22	23.85	21.53	20.00
	661	1880.0	24.84	23.43	21.17	19.69
	810	1909.8	24.53	23.08	20.81	19.44

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 slot	3 slots	4 slots
GSM 850	128	824.2	23.16	25.20	25.19	25.54
	190	836.6	23.05	25.11	25.13	25.50
	251	848.8	22.87	24.91	24.94	25.39
PCS 1900	512	1850.2	20.18	22.43	22.58	22.92
	661	1880.0	20.09	22.38	22.54	22.89
	810	1909.8	20.17	22.46	22.74	23.08

The time based average power for EGPRS

Band	Channel No.	Frequency (MHz)	Time based average Power (dBm)			
			1 slot	2 slot	3 slots	4 slots
GSM 850	128	824.2	15.49	17.06	16.67	16.93
	190	836.6	15.62	17.18	16.77	16.91
	251	848.8	15.60	17.26	16.86	16.96
PCS 1900	512	1850.2	16.22	17.85	17.28	17.00
	661	1880.0	15.84	17.43	16.92	16.69
	810	1909.8	15.53	17.08	16.56	16.44

Note:

1. Rohde & Schwarz Radio Communication Tester (CMU200) was used for the measurement of GSM peak and average output power for active timeslots.
2. For GSM voice, 1 timeslot has been activated with power level 5 (850 MHz band) and 0 (1900 MHz band).
3. For GPRS, 1, 2, 3 and 4 timeslots has been activated separately with power level 5(850 MHz band) and 0(1900 MHz band).
4. For E-GRPS, 1, 2, 3 and 4 timeslots has been activated separately with power control level 8(850 MHz band) and 2(1900 MHz band).
5. The max average output power of the GPRS mode is more than 2 dB higher than the EGPRS measured in the same frequency band, according to IEEE1528, the SAR of EGPRS mode is not required.

WCDMA-Release 99:

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification. The EUT has a nominal maximum output power of 24dBm (+1.7/-3.7).

WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	β_c / β_d	8/15

Results (12.2kbps RMC)

Band	Frequency (MHz)	Channel NO.	Conducted Output Power	
			(dBm)	(Watt)
WCDMA 850	826.4	4132	21.77	0.150
	836.6	4183	22.39	0.173
	846.6	4233	21.74	0.149
WCDMA 1900	1852.4	9262	21.08	0.128
	1880.0	9400	22.86	0.193
	1907.6	9538	21.50	0.141

WCDMA HSDPA

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification.

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subset	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm2			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	β_d (SF)	64			
	β_c/β_d	2/15	12/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
	MPR(dB)	0	0	0.5	0.5
HSDPA Specific Settings	D_{ACK}	8			
	D_{NAK}	8			
	D_{CQI}	8			
	Ack-Nack repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	$A_{hs} = \beta_{hs}/\beta_c$	30/15			

Results (HSDPA)

Band	Frequency (MHz)	Channel NO.	Conducted Output Power (dBm)			
			Subset 1	Subset 2	Subset 3	Subset 4
WCDMA 850	826.4	4132	20.32	20.19	20.06	20.29
	836.6	4183	20.14	20.00	19.72	20.02
	846.6	4233	20.60	20.47	20.27	20.62
WCDMA 1900	1852.4	9262	20.04	20.02	20.00	20.05
	1880.0	9400	21.90	21.85	21.82	21.88
	1907.6	9538	20.74	20.69	20.66	20.70

WCDMA HSUPA

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification.

	Mode	HSUPA	HSUPA	HSUPA	HSUPA	HSUPA
	Subset	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	β_c	11/15	6/15	15/15	2/15	15/15
	β_d	15/15	15/15	9/15	15/15	0
	β_{ec}	209/225	12/15	30/15	2/15	5/15
	β_c/β_d	11/15	6/15	15/9	2/15	-
	β_{hs}	22/15	12/15	30/15	4/15	5/15
	CM(dB)	1.0	3.0	2.0	3.0	1.0
MPR(dB)	0	2	1	2	0	
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback	4ms				
	CQI Repetition Factor	2				
	$A_{hs} = \beta_{hs}/\beta_c$	30/15				
HSUPA Specific Settings	DE-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_FCIs	E-TFCI 11 E E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27	E-TFCI 11 E-TFCI PO4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27		

Results (HSUPA)

Band	Frequency (MHz)	Channel NO.	Conducted Output Power (dBm)				
			Subset 1	Subset 2	Subset 3	Subset 4	Subset 5
WCDMA 850	826.4	4132	19.98	19.96	19.51	20.19	20.15
	836.6	4183	20.95	20.97	20.94	20.98	20.96
	846.6	4233	21.17	21.13	20.98	21.13	21.12
WCDMA 1900	1852.4	9262	20.10	20.09	20.03	20.08	20.07
	1880.0	9400	21.95	21.93	21.85	21.93	21.89
	1907.6	9538	20.98	20.95	20.85	20.97	20.94

Note:

1. The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2 kbps RMC (reference measurement Channel) Configured in Test Loop Model 1.
2. KDB 941225 D01-Body SAR is not required for HSDPA when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than measured without HSDPA using 12.2kbps RMC or the maximum SAR for 12.2kbps RMC is < 75% of SAR limit.
3. KDB 941225 D01-Body SAR is not required for HSUPA when the maximum average output of each RF channel with HSUPA active is less than ¼ dB higher than measured without HSUPA using 12.2kbps RMC and the maximum SAR for 12.2kbps RMC is < 75% of SAR limit.

Bluetooth

Mode	Channel frequency (MHz)	Reading power (dBm)	Power output (mw)	Limit (mw)
BDR(GFSK)	(Low)2402	2.18	1.652	1000
	(Middle)2441	1.50	1.413	1000
	(High)2480	-1.16	0.766	1000
EDR(4-DQPSK)	(Low)2402	1.86	1.535	1000
	(Middle)2441	1.17	1.309	1000
	(High)2480	-1.50	0.708	1000
EDR-8DPSK	(Low)2402	1.91	1.552	1000
	(Middle)2441	1.41	1.384	1000
	(High)2480	-1.20	0.759	1000
BT4.0	(Low)2402	0.28	1.067	1000
	(Middle)2440	0.76	1.191	1000
	(High)2480	-0.07	0.984	1000

WiFi

Band	Frequency (MHz)	Conducted Output Power	
		(dBm)	(mw)
802.11b	2412	9.20	8.318
	2437	8.51	7.096
	2462	8.30	6.761
802.11g	2412	8.82	7.621
	2437	8.24	6.668
	2462	8.07	6.412
802.11n20	2412	8.97	7.889
	2437	8.16	6.546
	2462	8.50	7.079
802.11n40	2422	6.43	4.395
	2437	6.41	4.375
	2452	6.14	4.111

Note:

1. The output power was tested under data rate 1Mbps for 802.11b, 6Mbps for 802.11g, MCS0 for 802.11n-20 and MCS0 for 802.11n-40.

SAR MEASUREMENT RESULTS

This page summarizes the results of the performed dosimetric evaluation.

SAR Test Data

Environmental Conditions

Temperature:	21-24 °C
Relative Humidity:	50-54%
ATM Pressure:	1001-1002 mbar

* Testing was performed by Sandy Wang on 2013-11-20 to 2013-11-22.

GSM 850

EUT Position	Frequency (MHz)		Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	FCC 1g SAR (W/Kg)		
	Channel	MHz					Scaled Factor	Meas. SAR	Scaled SAR
Body-Front-Headset	128(Low)	824.2	GSM	/	/	/	/	/	/
	190(Middle)	836.6	GSM	1.291	31.92	32.50	1.143	0.285	0.326
	251(High)	848.8	GSM	/	/	/	/	/	/
Body-Back-Headset	128(Low)	824.2	GSM	/	/	/	/	/	/
	190(Middle)	836.6	GSM	-4.081	31.92	32.50	1.143	0.814	0.930
	251(High)	848.8	GSM	/	/	/	/	/	/
Body-Front	128(Low)	824.2	GPRS	/	/	/	/	/	/
	190(Middle)	836.6	GPRS	4.102	28.50	28.60	1.023	0.487	0.498
	251(High)	848.8	GPRS	/	/	/	/	/	/
Body-Back	128(Low)	824.2	GPRS	-1.226	28.54	28.60	1.014	1.195	1.212
	190(Middle)	836.6	GPRS	-3.445	28.50	28.60	1.023	0.786	0.804
	251(High)	848.8	GPRS	1.868	28.39	28.60	1.050	1.015	1.065
Body-Top	128(Low)	824.2	GPRS	/	/	/	/	/	/
	190(Middle)	836.6	GPRS	-4.375	28.50	28.60	1.023	0.105	0.107
	251(High)	848.8	GPRS	/	/	/	/	/	/
Body-Left	128(Low)	824.2	GPRS	/	/	/	/	/	/
	190(Middle)	836.6	GPRS	0.063	28.50	28.60	1.023	0.002	0.002
	251(High)	848.8	GPRS	/	/	/	/	/	/

PCS 1900

EUT Position	Frequency (MHz)		Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	FCC 1g SAR (W/Kg)		
	Channel	MHz					Scaled Factor	Meas. SAR	Scaled SAR
Body-Front-Headset	512(Low)	1850.2	GSM	/	/	/	/	/	/
	661(Middle)	1880.0	GSM	0.072	28.88	29.00	1.028	0.017	0.017
	810(High)	1909.8	GSM	/	/	/	/	/	/
Body-Back-Headset	512(Low)	1850.2	GSM	/	/	/	/	/	/
	661(Middle)	1880.0	GSM	-0.692	28.88	29.00	1.028	0.055	0.057
	810(High)	1909.8	GSM	/	/	/	/	/	/
Body-Front	512(Low)	1850.2	GPRS	/	/	/	/	/	/
	661(Middle)	1880.0	GPRS	1.205	25.89	26.50	1.151	0.042	0.048
	810(High)	1909.8	GPRS	/	/	/	/	/	/
Body-Back	512(Low)	1850.2	GPRS	-1.063	25.92	26.50	1.143	0.15	0.171
	661(Middle)	1880.0	GPRS	3.752	25.89	26.50	1.151	0.131	0.151
	810(High)	1909.8	GPRS	2.869	26.08	26.50	1.102	0.22	0.242
Body-Top	512(Low)	1850.2	GPRS	/	/	/	/	/	/
	661(Middle)	1880.0	GPRS	0.000	25.89	26.50	1.151	0.003	0.003
	810(High)	1909.8	GPRS	/	/	/	/	/	/
Body-Left	512(Low)	1850.2	GPRS	/	/	/	/	/	/
	661(Middle)	1880.0	GPRS	1.742	25.89	26.50	1.151	0.005	0.006
	810(High)	1909.8	GPRS	/	/	/	/	/	/

WCDMA 850

EUT Position	Frequency (MHz)		Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	FCC 1g SAR (W/Kg)		
	Channel	MHz					Scaled Factor	Meas. SAR	Scaled SAR
Body-Front	4132	826.4	WCDMA850	/	/	/	/	/	/
	4183	836.6	WCDMA850	1.545	22.39	22.50	1.026	0.104	0.107
	4233	846.6	WCDMA850	/	/	/	/	/	/
Body-Back	4132	826.4	WCDMA850	/	/	/	/	/	/
	4183	836.6	WCDMA850	-4.628	22.39	22.50	1.026	0.467	0.479
	4233	846.6	WCDMA850	/	/	/	/	/	/
Body-Top	4132	826.4	WCDMA850	/	/	/	/	/	/
	4183	836.6	WCDMA850	-2.059	22.39	22.50	1.026	0.047	0.048
	4233	846.6	WCDMA850	/	/	/	/	/	/
Body-Left	4132	826.4	WCDMA850	/	/	/	/	/	/
	4183	836.6	WCDMA850	0.095	22.39	22.50	1.026	0.001	0.001
	4233	846.6	WCDMA850	/	/	/	/	/	/

WCDMA1900

EUT Position	Frequency (MHz)		Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	FCC 1g SAR (W/Kg)		
	Channel	MHz					Scaled Factor	Meas. SAR	Scaled SAR
Body-Front	9262	1852.4	WCDMA1900	/	/	/	/	/	/
	9400	1880.0	WCDMA1900	0.914	22.86	23.00	1.033	0.033	0.034
	9538	1907.6	WCDMA1900	/	/	/	/	/	/
Body-Back	9262	1852.4	WCDMA1900	/	/	/	/	/	/
	9400	1880.0	WCDMA1900	1.849	22.86	23.00	1.033	0.13	0.134
	9538	1907.6	WCDMA1900	/	/	/	/	/	/
Body-Top	9262	1852.4	WCDMA1900	/	/	/	/	/	/
	9400	1880.0	WCDMA1900	0.058	22.86	23.00	1.033	0.001	0.001
	9538	1907.6	WCDMA1900	/	/	/	/	/	/
Body-Left	9262	1852.4	WCDMA1900	/	/	/	/	/	/
	9400	1880.0	WCDMA1900	0.000	22.86	23.00	1.033	0.001	0.001
	9538	1907.6	WCDMA1900	/	/	/	/	/	/

Note:

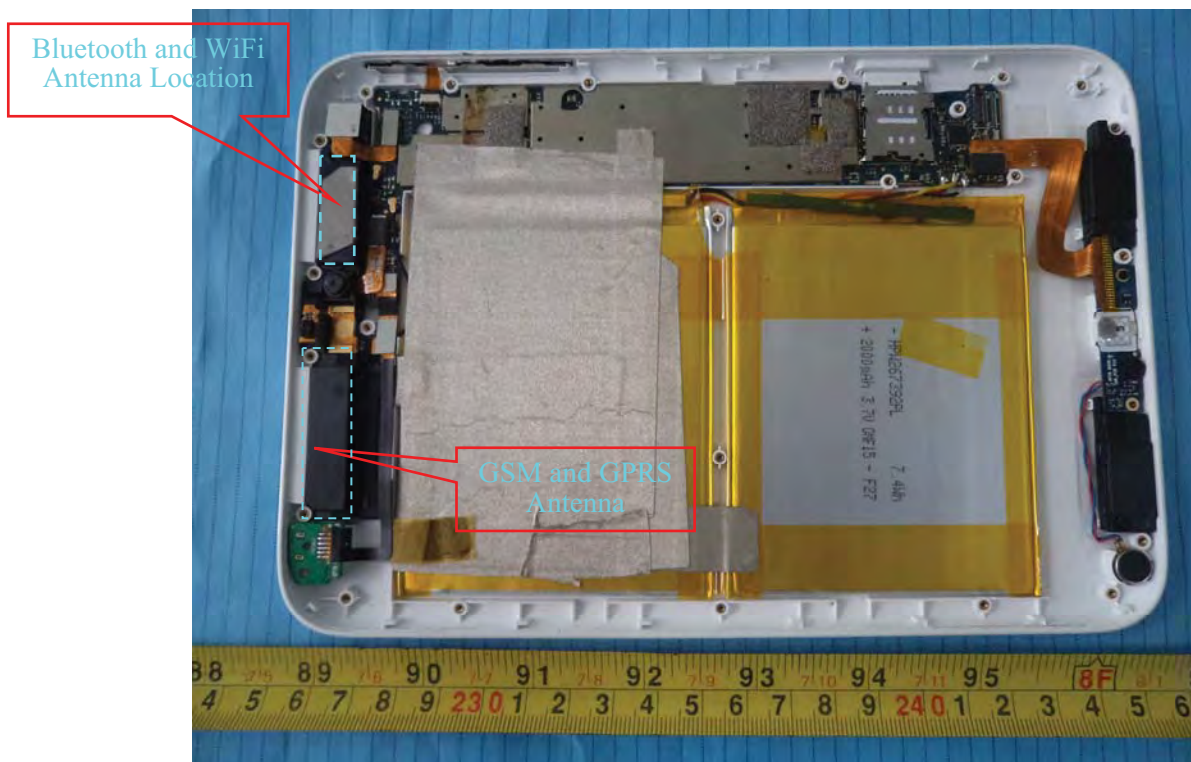
1. When the 1-g SAR is $\leq 0.8W/Kg$, testing for other channels are optional.
2. The EUT is a Capability Class B mobile phone which can be attached to both GPRS and GSM services.
3. The Multi-slot Classes of EUT is Class12 which has maximum 4 Downlink slots and 4 Uplink slots, the maximum active slots is 5, when perform the multiple slots scan, 1DL+4UL is the worst case.
4. The EUT transmit and receive through the same GSM antenna while testing SAR.
5. The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2 kbps RMC (reference measurement Channel) Configured in Test Loop Model.
6. KDB 941225 D01-Body SAR is not required for HSDPA when the maximum average output of each RF channel with HSDPA active is less than $\frac{1}{4}$ dB higher than measured without HSDPA using 12.2kbps RMC or the maximum SAR for 12.2kbps RMC is $< 75\%$ of SAR limit.
7. KDB 941225 D01-Body SAR is not required for HSUPA when the maximum average output of each RF channel with HSUPA active is less than $\frac{1}{4}$ dB higher than measured without HSUPA using 12.2kbps RMC and the maximum SAR for 12.2kbps RMC is $< 75\%$ of SAR limit.
8. The SAR testing is conducted with 100% duty cycle factor.
9. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.

SAR SIMULTANEOUS TRANSMISSION DESCRIPTION

KDB 447498D01 General RF Exposure Guidance v05

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

BT & WiFi and GSM Antenna Location:



Antenna Information:

Description of Simultaneous Transmit Capabilities			Antennas Distance (mm)
Transmitter Combination	Simultaneous?	Hotspot?	
GSM + GPRS	×	×	0.00
GSM + WCDMA	×	×	0.00
GSM + Bluetooth	√	×	55.00
GSM + WiFi	√	×	55.00
GPRS + WCDMA	×	×	0.00
GPRS + Bluetooth	√	×	55.00
GPRS + WiFi	√	√	55.00
WCDMA + Bluetooth	√	×	55.00
WCDMA + WiFi	√	√	55.00

Standalone SAR test exclusion considerations

Mode	Frequency (MHz)	P _{avg} (dBm)	P _{avg} (mW)	Distance (mm)	Calculated value	Threshold (1-g)	SAR Test Exclusion
GSM850	850	25.54	358.096	0.00	66.0	3.0	No
PCS1900	1900	23.08	203.236	0.00	56.0	3.0	No
WCDMA850	850	22.39	173.380	0.00	32.0	3.0	No
WCDMSA1900	1900	22.86	193.197	0.00	53.3	3.0	No
Bluetooth	2450	2.18	1.652	0.00	0.5	3.0	Yes
WiFi	2450	9.20	8.318	0.00	2.6	3.0	Yes

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

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

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

Simultaneous SAR test exclusion considerations:

GSM with WiFi:

Mode	Position	Reported SAR (W/kg)		ΣSAR
		GSM	WiFi	< 1.6W/kg
GSM850	Body-Front-Headset	0.326	0.372	0.698
	Body-Back-Headset	0.930	0.372	1.302
	Body-Front	0.498	0.372	0.870
	Body-Back	1.212	0.372	1.584
	Body-Top	0.107	0.372	0.479
PCS1900	Body-Front-Headset	0.017	0.372	0.389
	Body-Back-Headset	0.057	0.372	0.429
	Body-Front	0.048	0.372	0.420
	Body-Back	0.242	0.372	0.614
	Body-Top	0.003	0.372	0.375

GSM with BT:

Mode	Position	Reported SAR (W/kg)		ΣSAR
		GSM	BT	< 1.6W/kg
GSM850	Body-Front-Headset	0.326	0.074	0.400
	Body-Back-Headset	0.930	0.074	1.004
	Body-Front	0.498	0.074	0.572
	Body-Back	1.212	0.074	1.286
	Body-Top	0.107	0.074	0.181
PCS1900	Body-Front-Headset	0.017	0.074	0.091
	Body-Back-Headset	0.057	0.074	0.131
	Body-Front	0.048	0.074	0.122
	Body-Back	0.242	0.074	0.316
	Body-Top	0.003	0.074	0.077

WCDMA with WiFi:

Mode	Position	Reported SAR (W/kg)		ΣSAR
		WCDMA	WiFi	< 1.6W/kg
WCDMA 850	Body-Front	0.107	0.372	0.479
	Body-Back	0.479	0.372	0.851
	Body-Top	0.048	0.372	0.420
WCDMA 1900	Body-Front	0.034	0.372	0.406
	Body-Back	0.134	0.372	0.506
	Body-Top	0.001	0.372	0.373

WCDMA with BT:

Mode	Position	Reported SAR (W/kg)		ΣSAR
		WCDMA	BT	< 1.6W/kg
WCDMA 850	Body-Front	0.107	0.074	0.181
	Body-Back	0.479	0.074	0.553
	Body-Top	0.048	0.074	0.122
WCDMA 1900	Body-Front	0.034	0.074	0.108
	Body-Back	0.134	0.074	0.208
	Body-Top	0.001	0.074	0.075

Mode	Frequency (GHz)	Distance (mm)	P _{avg} (dBm)	P _{avg} (mW)	Estimated 1-g (W/kg)
Bluetooth	2.45	5	2.5	1.778	0.074
WiFi	2.45	5	9.5	8.913	0.372

Note:

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

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

W/kg for test separation distances ≤ 50 mm;

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

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

Hotspot mode SAR is not required when normal tablet procedures are applied.

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

Conclusion:

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

EUT SCAN RESULTS

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

Body-Front Headset (836.6 MHz Middle Channel)

Measurement Data

Test mode : GSM
 Crest Factor : 8
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.022 W/kg
 Power Drift-Finish : 0.022 W/kg
 Power Drift (%) : 1.291

Tissue Data

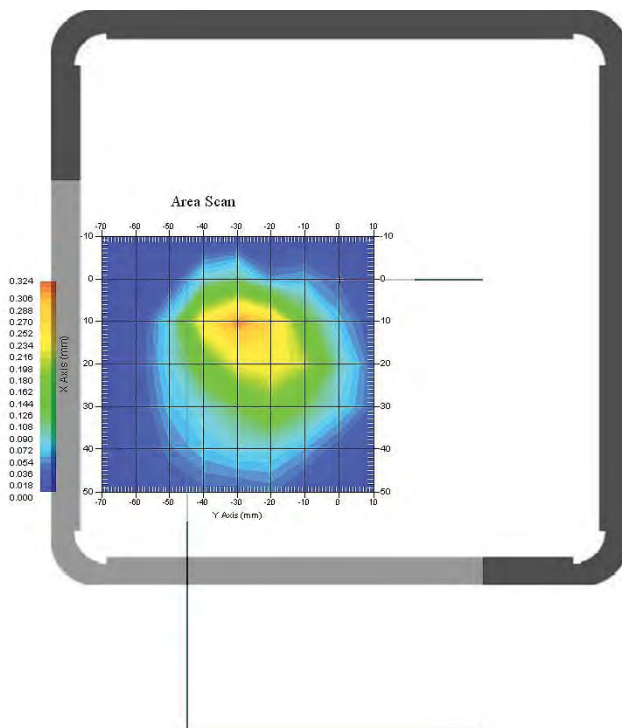
Type : Body
 Frequency : 836.6 MHz
 Epsilon : 55.42 F/m
 Sigma : 0.97 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 835
 Duty Cycle Factor : 8
 Conversion Factor : 5.9
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.285 W/kg
 10 gram SAR value : 0.125 W/kg
 Area Scan Peak SAR : 0.319 W/kg
 Zoom Scan Peak SAR : 0.500 W/kg

Plot 1#



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

Body-Back Headset (824.2 MHz Low Channel)

Measurement Data

Test mode : GSM
 Crest Factor : 8
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.030 W/kg
 Power Drift-Finish : 0.030 W/kg
 Power Drift (%) : -1.038

Tissue Data

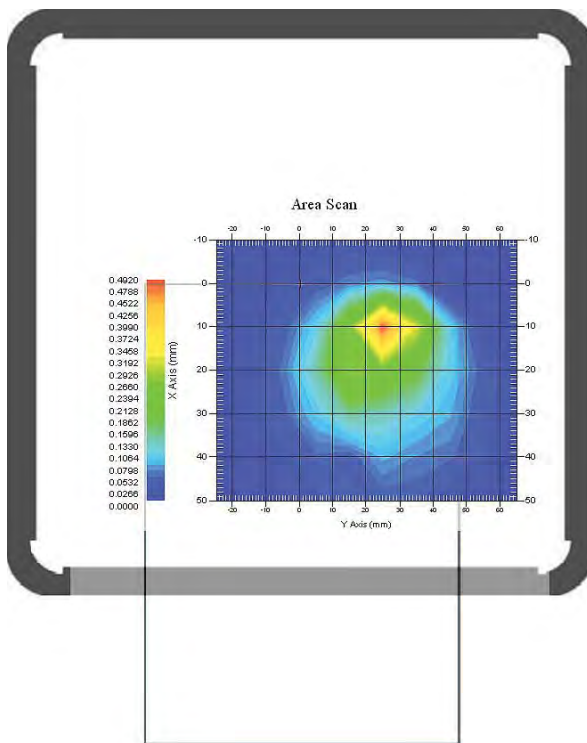
Type : Body
 Frequency : 824.2 MHz
 Epsilon : 55.34 F/m
 Sigma : 0.95 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 835
 Duty Cycle Factor : 8
 Conversion Factor : 5.9
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.485 W/kg
 10 gram SAR value : 0.265 W/kg
 Area Scan Peak SAR : 0.492 W/kg
 Zoom Scan Peak SAR : 0.920 W/kg

Plot 2#



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

Body-Back Headset (836.6 MHz Middle Channel)

Measurement Data

Test mode : GSM
 Crest Factor : 8
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.066 W/kg
 Power Drift-Finish : 0.063 W/kg
 Power Drift (%) : -4.081

Tissue Data

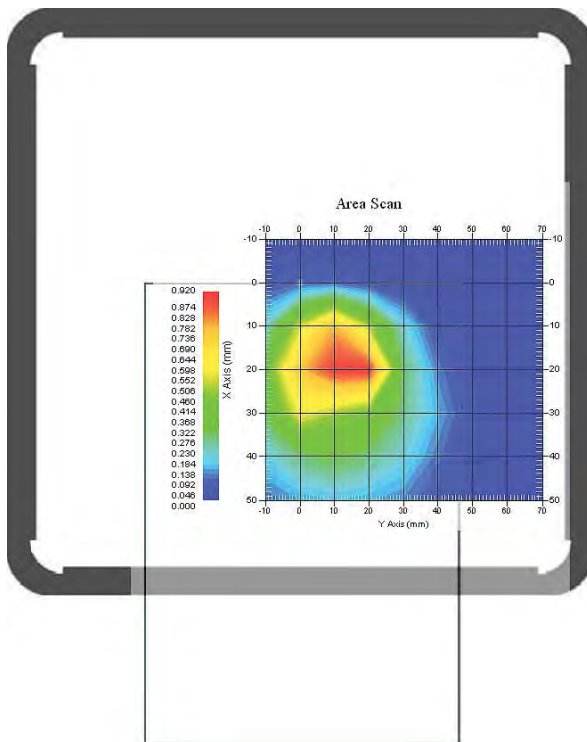
Type : Body
 Frequency : 836.6 MHz
 Epsilon : 55.42 F/m
 Sigma : 0.97 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 835
 Duty Cycle Factor : 8
 Conversion Factor : 5.9
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.814 W/kg
 10 gram SAR value : 0.410 W/kg
 Area Scan Peak SAR : 0.902 W/kg
 Zoom Scan Peak SAR : 2.171 W/kg

Plot 3#



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

Body-Back Headset (848.8 MHz High Channel)

Measurement Data

Test mode : GSM
 Crest Factor : 8
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.034 W/kg
 Power Drift-Finish : 0.034 W/kg
 Power Drift (%) : 0.336

Tissue Data

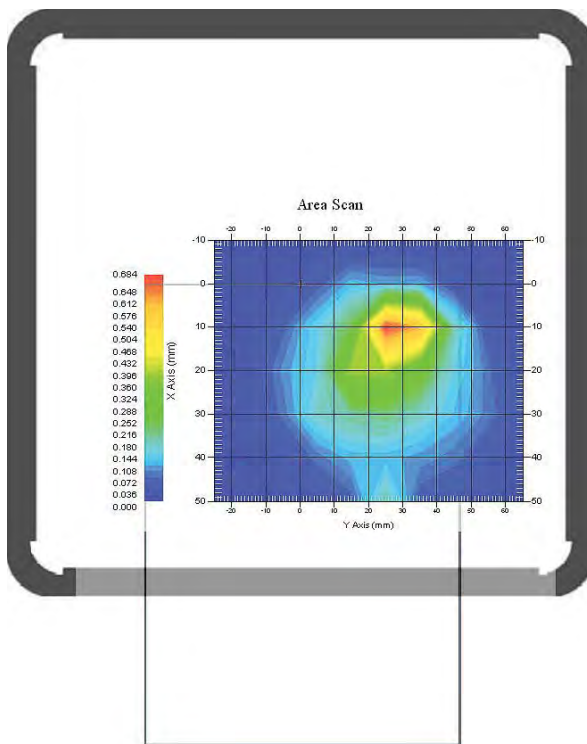
Type : Body
 Frequency : 848.8 MHz
 Epsilon : 55.50 F/m
 Sigma : 1.00 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 835
 Duty Cycle Factor : 8
 Conversion Factor : 5.9
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.619 W/kg
 10 gram SAR value : 0.360 W/kg
 Area Scan Peak SAR : 0.680 W/kg
 Zoom Scan Peak SAR : 1.171 W/kg

Plot 4#



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

Body-Front (836.6 MHz Middle Channel)

Measurement Data

Test mode : GPRS
 Crest Factor : 2
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.053 W/kg
 Power Drift-Finish : 0.055 W/kg
 Power Drift (%) : 4.102

Tissue Data

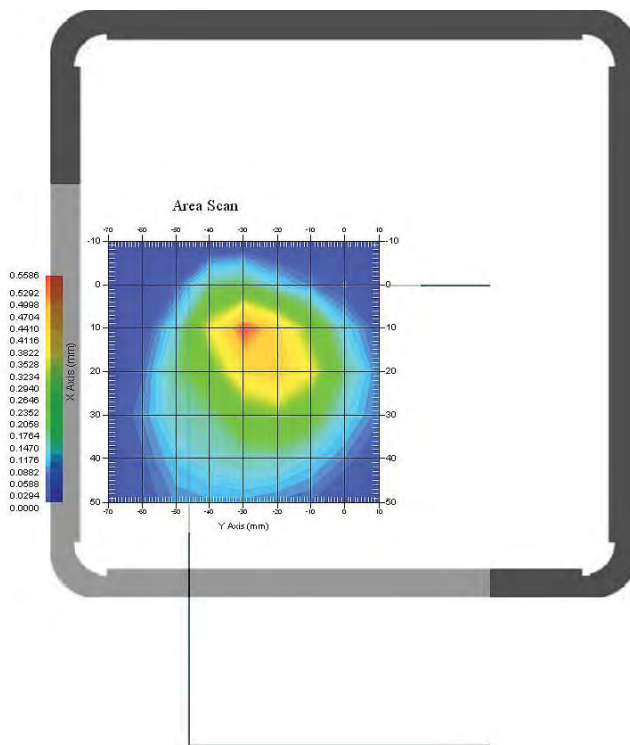
Type : Body
 Frequency : 848.8 MHz
 Epsilon : 55.42 F/m
 Sigma : 0.97 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 835
 Duty Cycle Factor : 2
 Conversion Factor : 5.9
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.487 W/kg
 10 gram SAR value : 0.217 W/kg
 Area Scan Peak SAR : 0.550 W/kg
 Zoom Scan Peak SAR : 0.970 W/kg

Plot 5#



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

Body-Back (824.2 MHz Low Channel)

Measurement Data

Test mode : GPRS
 Crest Factor : 2
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.147 W/kg
 Power Drift-Finish : 0.144 W/kg
 Power Drift (%) : -1.226

Tissue Data

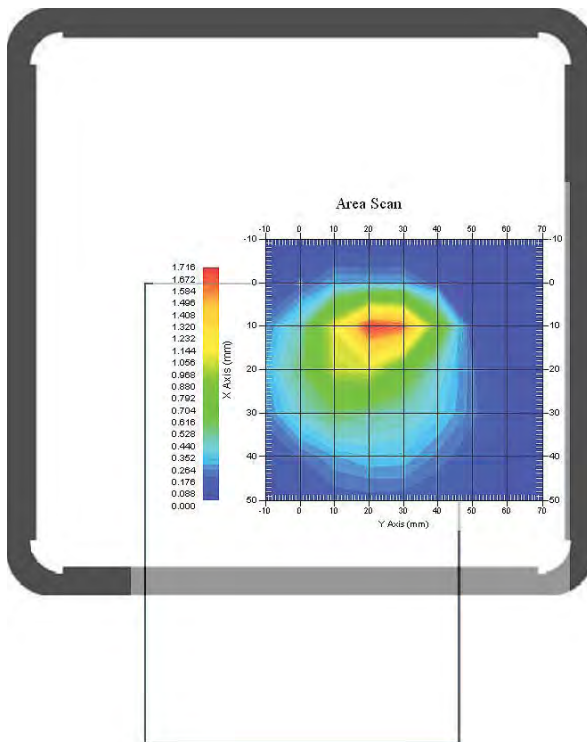
Type : Body
 Frequency : 824.2 MHz
 Epsilon : 55.34 F/m
 Sigma : 0.95 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 835
 Duty Cycle Factor : 2
 Conversion Factor : 5.9
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 1.195 W/kg
 10 gram SAR value : 0.657 W/kg
 Area Scan Peak SAR : 1.606 W/kg
 Zoom Scan Peak SAR : 3.112 W/kg

Plot 6#



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

Body-Back (836.6 MHz Middle Channel)

Measurement Data

Test mode : GPRS
 Crest Factor : 2
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.131 W/kg
 Power Drift-Finish : 0.127 W/kg
 Power Drift (%) : -3.445

Tissue Data

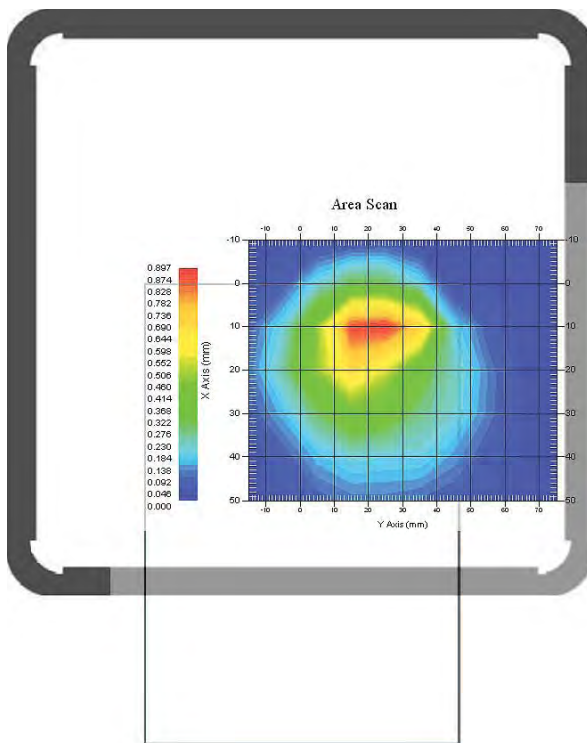
Type : Body
 Frequency : 836.6 MHz
 Epsilon : 55.42 F/m
 Sigma : 0.97 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 835
 Duty Cycle Factor : 2
 Conversion Factor : 5.9
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.886 W/kg
 10 gram SAR value : 0.465 W/kg
 Area Scan Peak SAR : 0.896 W/kg
 Zoom Scan Peak SAR : 1.921 W/kg

Plot 7#



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

Body-Back (848.8 MHz High Channel)

Measurement Data

Test mode : GPRS
 Crest Factor : 2
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.134 W/kg
 Power Drift-Finish : 0.137 W/kg
 Power Drift (%) : 1.868

Tissue Data

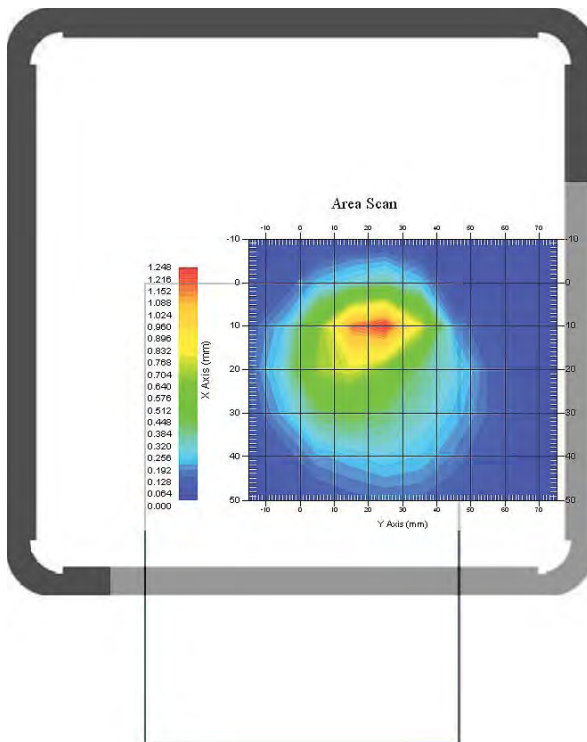
Type : Body
 Frequency : 848.8 MHz
 Epsilon : 55.50 F/m
 Sigma : 1.00 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 835
 Duty Cycle Factor : 2
 Conversion Factor : 5.9
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 1.015 W/kg
 10 gram SAR value : 0.469 W/kg
 Area Scan Peak SAR : 1.242 W/kg
 Zoom Scan Peak SAR : 2.111 W/kg

Plot 8#



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

Body-Top (836.6 MHz Middle Channel)

Measurement Data

Test mode : GPRS
 Crest Factor : 2
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.009 W/kg
 Power Drift-Finish : 0.009 W/kg
 Power Drift (%) : -4.375

Tissue Data

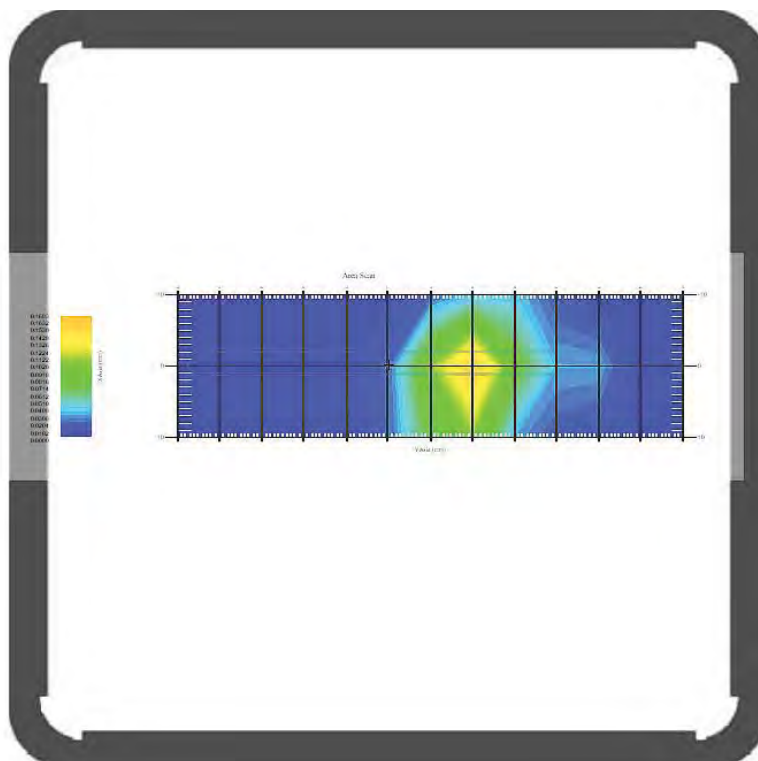
Type : Body
 Frequency : 836.6 MHz
 Epsilon : 55.42 F/m
 Sigma : 0.97 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 835
 Duty Cycle Factor : 2
 Conversion Factor : 5.9
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.105 W/kg
 10 gram SAR value : 0.035 W/kg
 Area Scan Peak SAR : 0.165 W/kg
 Zoom Scan Peak SAR : 0.370 W/kg

Plot 9#



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

Body-Left (836.6 MHz Middle Channel)

Measurement Data

Test mode : GPRS
 Crest Factor : 2
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.001 W/kg
 Power Drift-Finish : 0.001 W/kg
 Power Drift (%) : 0.063

Tissue Data

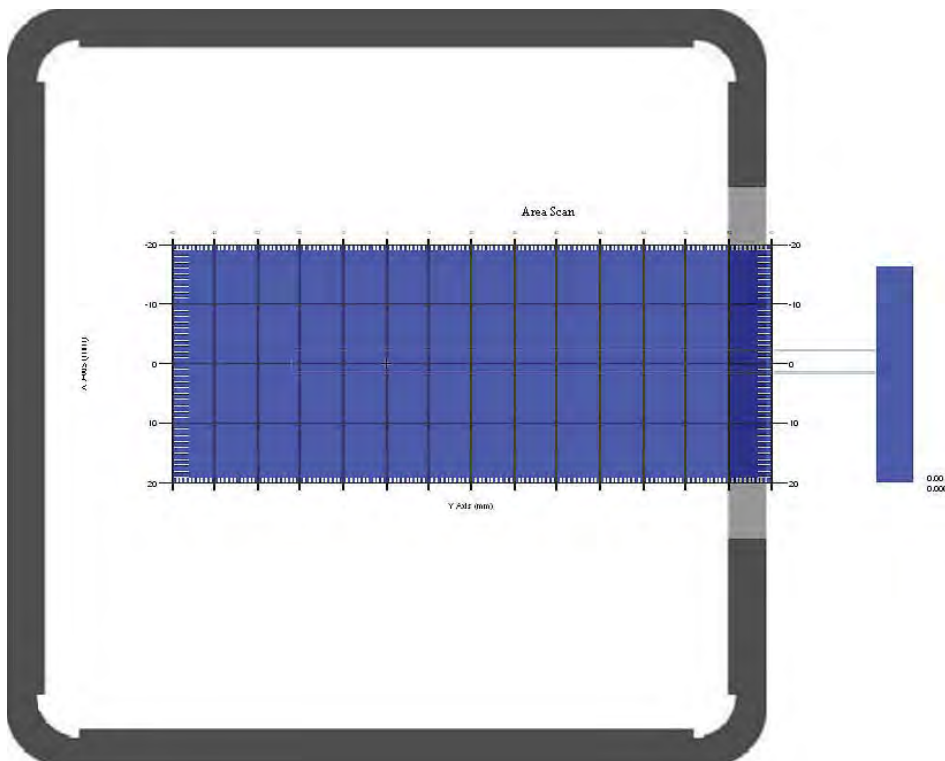
Type : Body
 Frequency : 836.6 MHz
 Epsilon : 55.42 F/m
 Sigma : 0.97 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 835
 Duty Cycle Factor : 2
 Conversion Factor : 5.9
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.002 W/kg
 10 gram SAR value : 0.001 W/kg
 Area Scan Peak SAR : 0.003 W/kg
 Zoom Scan Peak SAR : 0.005 W/kg

Plot 10#



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

Body-Front Headset (1880.0 MHz Middle Channel)

Measurement Data

Test mode : GSM
 Crest Factor : 8
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.001 W/kg
 Power Drift-Finish : 0.001 W/kg
 Power Drift (%) : 0.072

Tissue Data

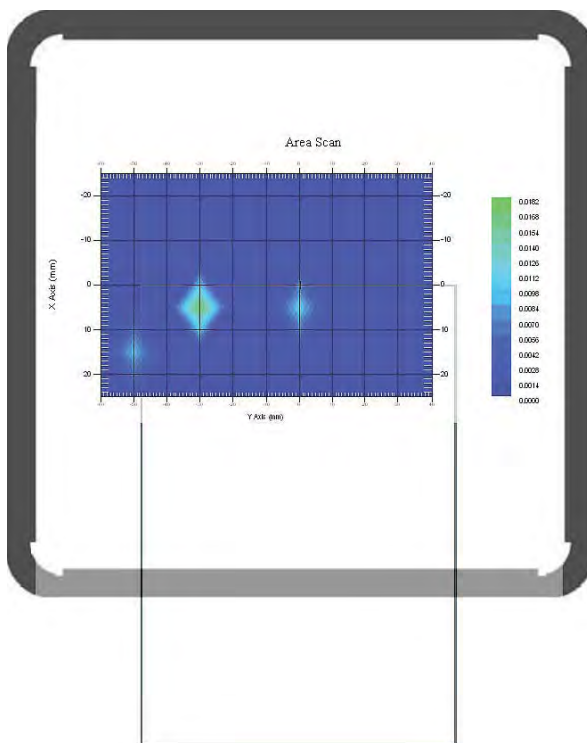
Type : Body
 Frequency : 1880.00 MHz
 Epsilon : 51.93 F/m
 Sigma : 1.52 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 1900
 Duty Cycle Factor : 8
 Conversion Factor : 4.5
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.017 W/kg
 10 gram SAR value : 0.007 W/kg
 Area Scan Peak SAR : 0.018 W/kg
 Zoom Scan Peak SAR : 0.050 W/kg

Plot 11#



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

Body-Back Headset (1880.0 MHz Middle Channel)

Measurement Data

Test mode : GSM
 Crest Factor : 8
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.004 W/kg
 Power Drift-Finish : 0.004 W/kg
 Power Drift (%) : -0.692

Tissue Data

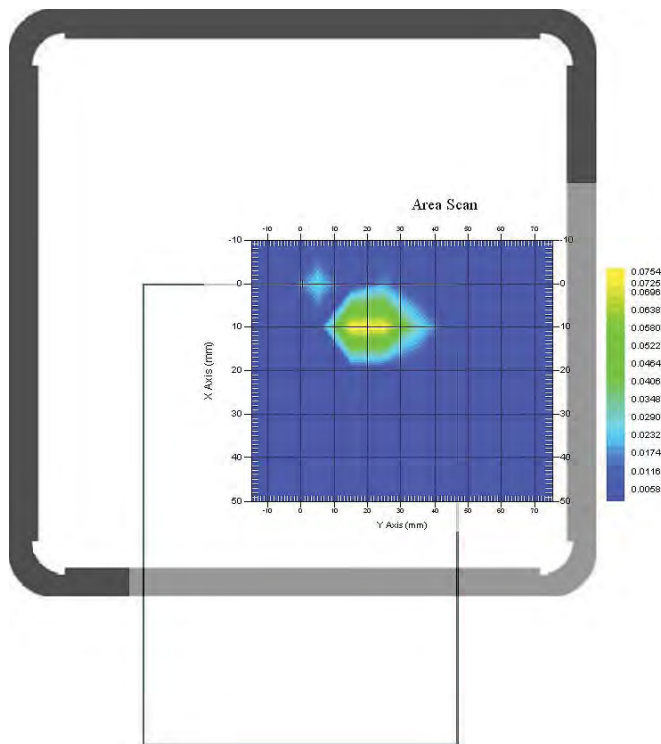
Type : Body
 Frequency : 1880.0 MHz
 Epsilon : 51.93 F/m
 Sigma : 1.52 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 1900
 Duty Cycle Factor : 8
 Conversion Factor : 4.5
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.055 W/kg
 10 gram SAR value : 0.013 W/kg
 Area Scan Peak SAR : 0.075 W/kg
 Zoom Scan Peak SAR : 0.200 W/kg

Plot 12#



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

Body-Front (1880.0 MHz Middle Channel)

Measurement Data

Test mode : GPRS
 Crest Factor : 2
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.002 W/kg
 Power Drift-Finish : 0.002 W/kg
 Power Drift (%) : 1.205

Tissue Data

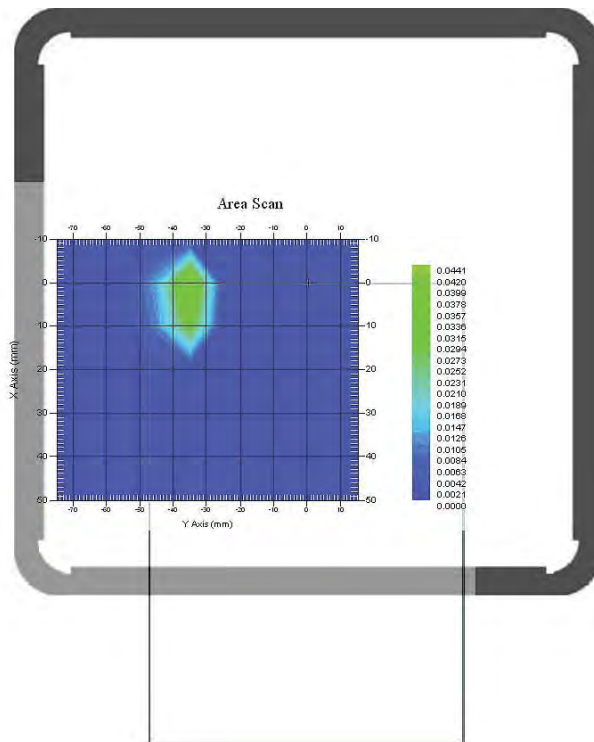
Type : Body
 Frequency : 1880.0 MHz
 Epsilon : 51.93 F/m
 Sigma : 1.52 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 1900
 Duty Cycle Factor : 2
 Conversion Factor : 4.5
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.042 W/kg
 10 gram SAR value : 0.010 W/kg
 Area Scan Peak SAR : 0.043 W/kg
 Zoom Scan Peak SAR : 0.140 W/kg

Plot 13#



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

Body-Back (1850.0 MHz Low Channel)

Measurement Data

Test mode : GPRS
 Crest Factor : 2
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.006 W/kg
 Power Drift-Finish : 0.005 W/kg
 Power Drift (%) : -1.063

Tissue Data

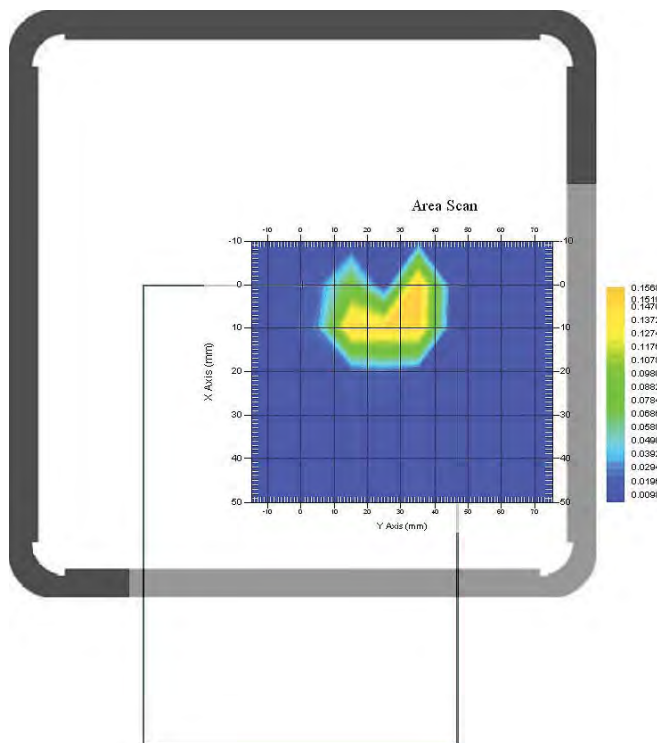
Type : Body
 Frequency : 1850.2 MHz
 Epsilon : 51.93 F/m
 Sigma : 1.48 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 1900
 Duty Cycle Factor : 2
 Conversion Factor : 4.5
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.150 W/kg
 10 gram SAR value : 0.083 W/kg
 Area Scan Peak SAR : 0.156 W/kg
 Zoom Scan Peak SAR : 0.330 W/kg

Plot 14#



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

Body-Back (1880.0 MHz Middle Channel)

Measurement Data

Test mode : GPRS
 Crest Factor : 2
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.004 W/kg
 Power Drift-Finish : 0.005 W/kg
 Power Drift (%) : 3.752

Tissue Data

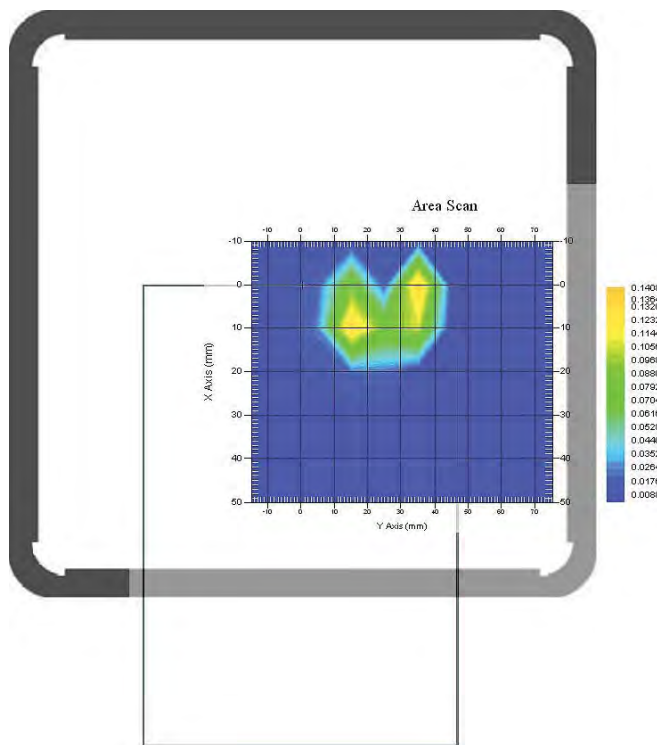
Type : Body
 Frequency : 1880.0 MHz
 Epsilon : 51.93 F/m
 Sigma : 1.52 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 1900
 Duty Cycle Factor : 2
 Conversion Factor : 4.5
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.131 W/kg
 10 gram SAR value : 0.053 W/kg
 Area Scan Peak SAR : 0.137 W/kg
 Zoom Scan Peak SAR : 0.510 W/kg

Plot 15#



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

Body-Back (1909.8 MHz High Channel)

Measurement Data

Test mode : GPRS
 Crest Factor : 2
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.008 W/kg
 Power Drift-Finish : 0.009 W/kg
 Power Drift (%) : 2.869

Tissue Data

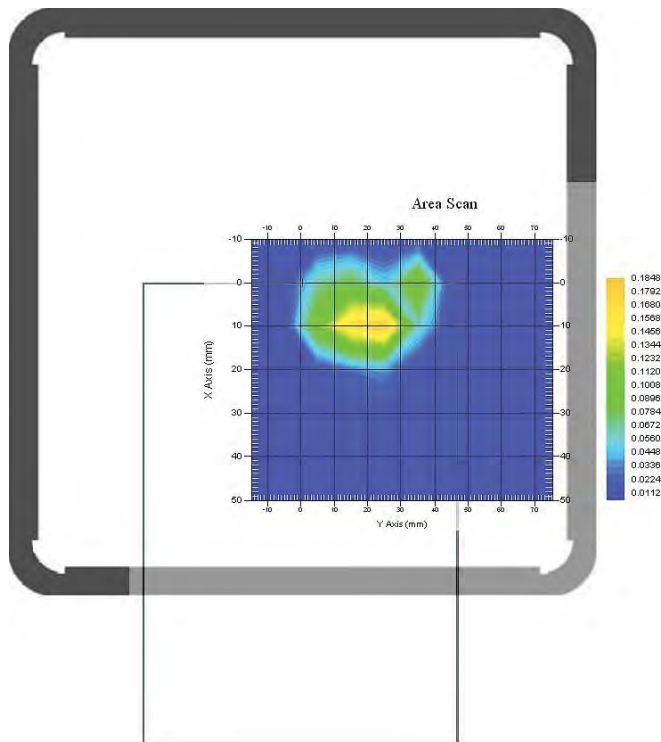
Type : Body
 Frequency : 1909.8 MHz
 Epsilon : 51.85 F/m
 Sigma : 1.54 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 1900
 Duty Cycle Factor : 2
 Conversion Factor : 4.5
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.220 W/kg
 10 gram SAR value : 0.064 W/kg
 Area Scan Peak SAR : 0.183 W/kg
 Zoom Scan Peak SAR : 0.930 W/kg

Plot 16#



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

Body-Top (1880.0 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 : 0.000 W/kg
 Power Drift-Finish : 0.000 W/kg
 Power Drift (%) : 0.000

Tissue Data

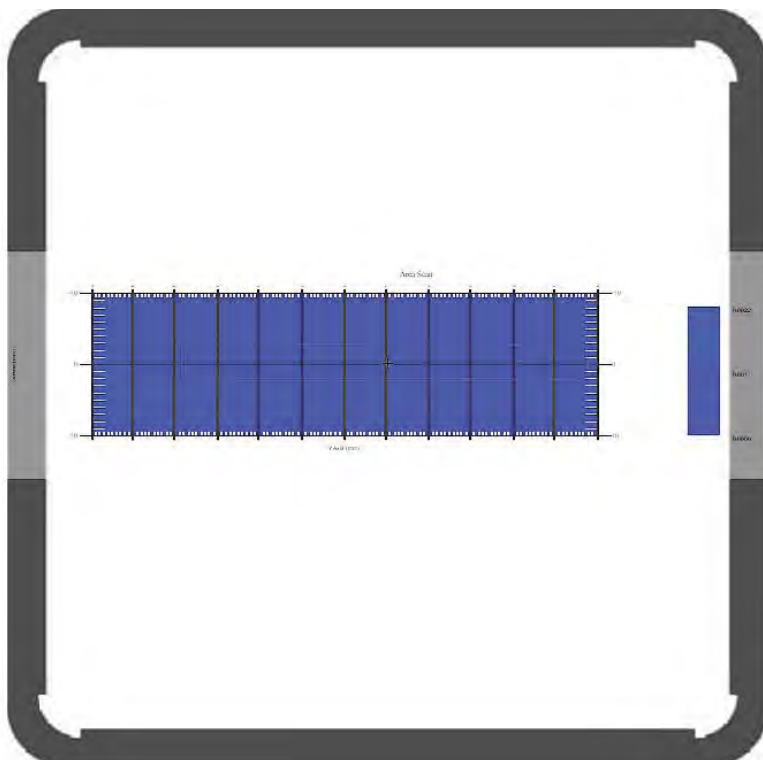
Type : Body
 Frequency : 1880.0 MHz
 Epsilon : 51.93 F/m
 Sigma : 1.52 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 1900
 Duty Cycle Factor : 2
 Conversion Factor : 4.5
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.003 W/kg
 10 gram SAR value : 0.001 W/kg
 Area Scan Peak SAR : 0.002 W/kg
 Zoom Scan Peak SAR : 0.020 W/kg

Plot 17#



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

Body-Left (1880.0 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 : 0.001 W/kg
 Power Drift-Finish : 0.001 W/kg
 Power Drift (%) : 1.742

Tissue Data

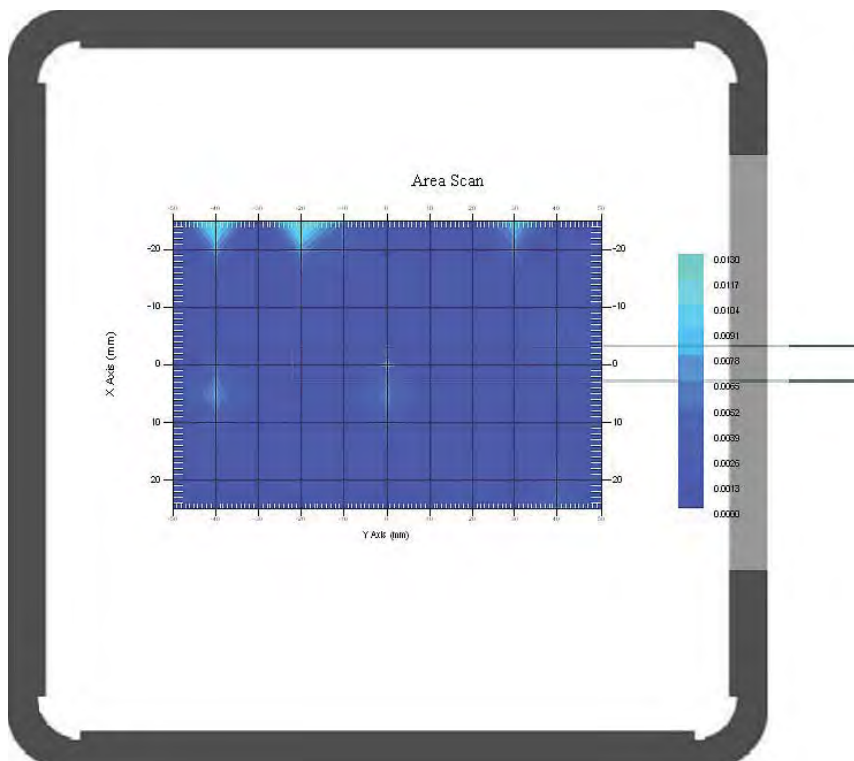
Type : Body
 Frequency : 1880.0 MHz
 Epsilon : 51.93 F/m
 Sigma : 1.52 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency Band : 1900
 Duty Cycle Factor : 2
 Conversion Factor : 4.5
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.005 W/kg
 10 gram SAR value : 0.003 W/kg
 Area Scan Peak SAR : 0.007 W/kg
 Zoom Scan Peak SAR : 0.010 W/kg

Plot 18#



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

WCDMA850; Body-Front (836.6 MHz Middle Channel)

Measurement Data

Test mode : WCDMA850
 Crest Factor : 1
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.003 W/kg
 Power Drift-Finish : 0.004 W/kg
 Power Drift (%) : 1.545

Tissue Data

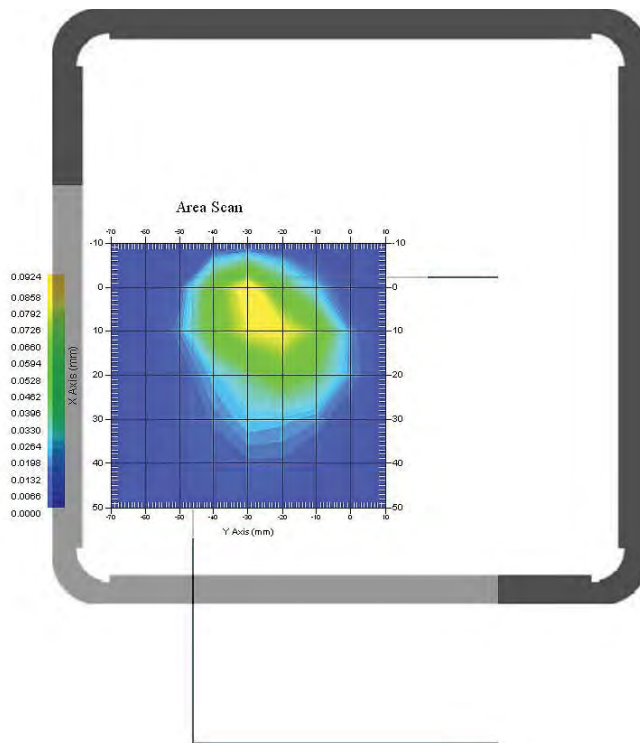
Type : Body
 Frequency : 836.6 MHz
 Epsilon : 55.42 F/m
 Sigma : 0.97 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency : 835
 Duty Cycle Factor : 1
 Conversion Factor : 5.9
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.104 W/kg
 10 gram SAR value : 0.054 W/kg
 Area Scan Peak SAR : 0.090 W/kg
 Zoom Scan Peak SAR : 0.180 W/kg

Plot 19#



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

WCDMA850; Body-Back (826.4 MHz Low Channel)

Measurement Data

Test mode : WCDMA850
 Crest Factor : 1
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.033 W/kg
 Power Drift-Finish : 0.034 W/kg
 Power Drift (%) : 1.918

Tissue Data

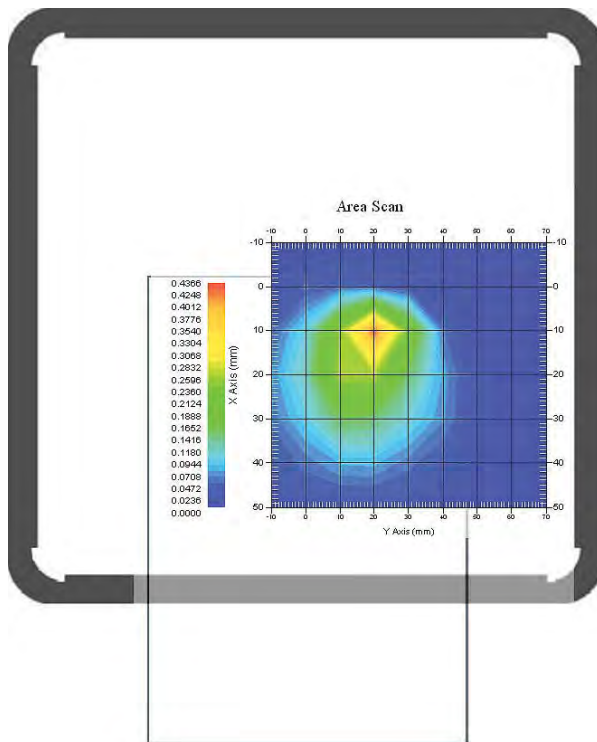
Type : Body
 Frequency : 826.4 MHz
 Epsilon : 55.36 F/m
 Sigma : 0.96 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency : 835
 Duty Cycle Factor : 1
 Conversion Factor : 5.9
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.352 W/kg
 10 gram SAR value : 0.138 W/kg
 Area Scan Peak SAR : 0.430 W/kg
 Zoom Scan Peak SAR : 0.860 W/kg

Plot 20#



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

WCDMA850; Body-Back (836.6 MHz Middle Channel)

Measurement Data

Test mode : WCDMA850
 Crest Factor : 1
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.051 W/kg
 Power Drift-Finish : 0.049 W/kg
 Power Drift (%) : -4.628

Tissue Data

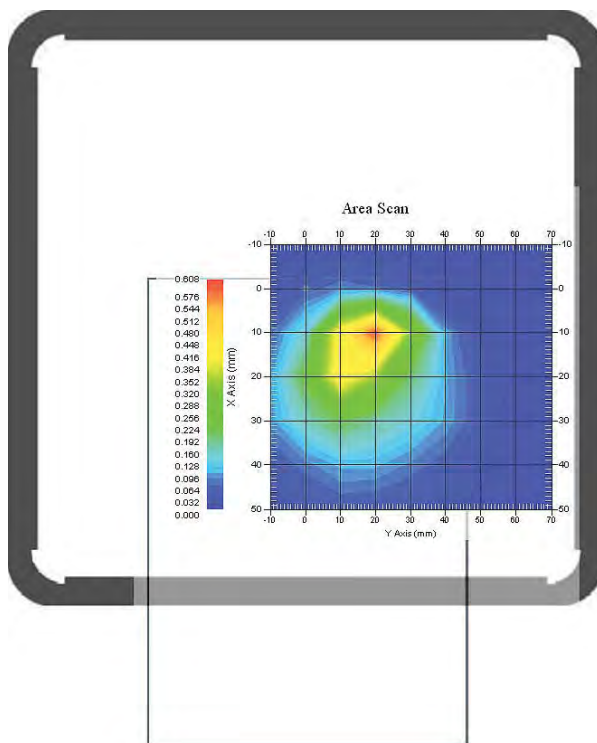
Type : Body
 Frequency : 836.6 MHz
 Epsilon : 55.42 F/m
 Sigma : 0.97 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency : 835
 Duty Cycle Factor : 1
 Conversion Factor : 5.9
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.467 W/kg
 10 gram SAR value : 0.194 W/kg
 Area Scan Peak SAR : 0.599 W/kg
 Zoom Scan Peak SAR : 1.100 W/kg

Plot 21#



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

WCDMA850; Body-Back (846.6 MHz High Channel)

Measurement Data

Test mode : WCDMA850
 Crest Factor : 1
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.035 W/kg
 Power Drift-Finish : 0.034 W/kg
 Power Drift (%) : -2.635

Tissue Data

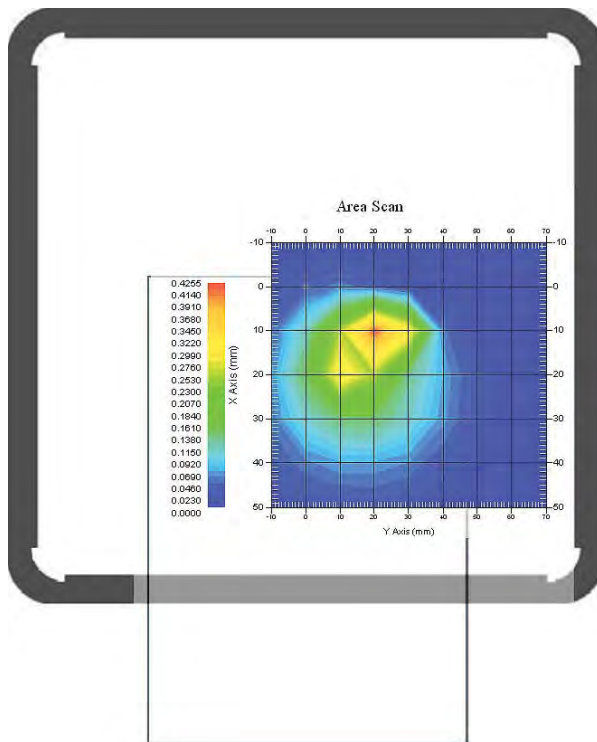
Type : Body
 Frequency : 846.6 MHz
 Epsilon : 55.48 F/m
 Sigma : 0.99 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency : 835
 Duty Cycle Factor : 1
 Conversion Factor : 5.9
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V/m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.336 W/kg
 10 gram SAR value : 0.137 W/kg
 Area Scan Peak SAR : 0.422 W/kg
 Zoom Scan Peak SAR : 0.750 W/kg

Plot 22#



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

WCDMA850; Body-Top (836.6 MHz Middle Channel)

Measurement Data

Test mode : WCDMA850
 Crest Factor : 1
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.007 W/kg
 Power Drift-Finish : 0.006 W/kg
 Power Drift (%) : -2.059

Tissue Data

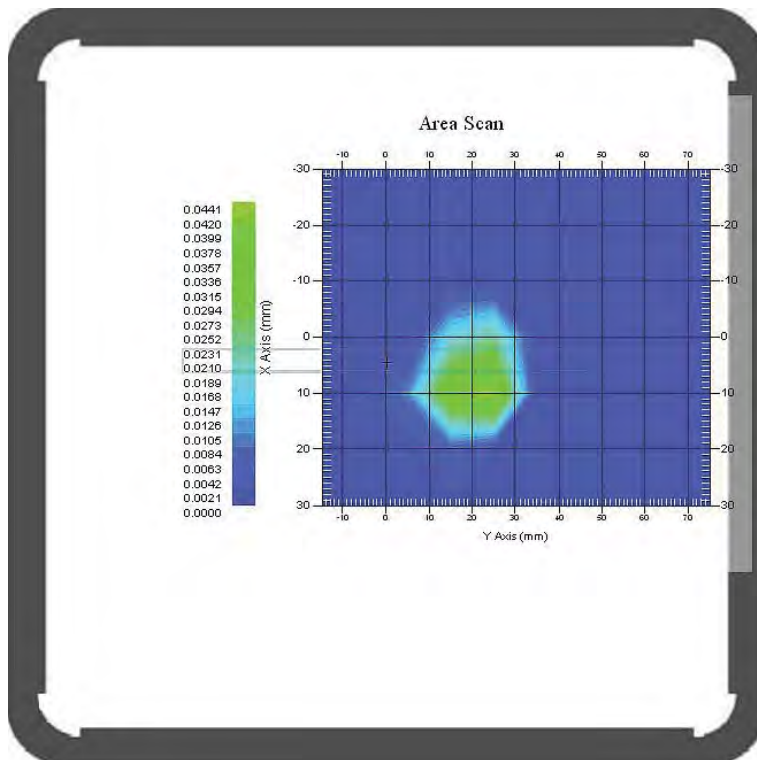
Type : Body
 Frequency : 836.6 MHz
 Epsilon : 55.42 F/m
 Sigma : 0.97 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency : 835
 Duty Cycle Factor : 1
 Conversion Factor : 5.9
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.047 W/kg
 10 gram SAR value : 0.013 W/kg
 Area Scan Peak SAR : 0.044 W/kg
 Zoom Scan Peak SAR : 0.130 W/kg

Plot 23#



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

WCDMA850; Body-Left (836.6 MHz Middle Channel)

Measurement Data

Test mode : WCDMA850
 Crest Factor : 1
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.000 W/kg
 Power Drift-Finish : 0.001 W/kg
 Power Drift (%) : 0.095

Tissue Data

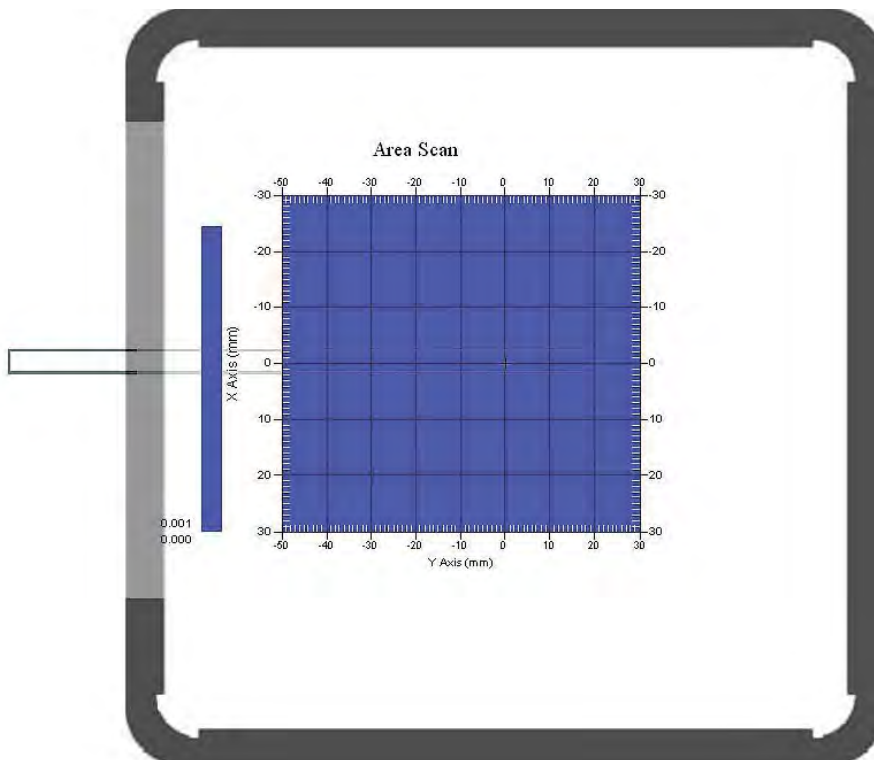
Type : Body
 Frequency : 836.6 MHz
 Epsilon : 55.42 F/m
 Sigma : 0.97 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency : 835
 Duty Cycle Factor : 1
 Conversion Factor : 5.9
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.001 W/kg
 10 gram SAR value : 0.001 W/kg
 Area Scan Peak SAR : 0.001 W/kg
 Zoom Scan Peak SAR : 0.000 W/kg

Plot 24#



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

WCDMA1900; Body-Front (1880.0 MHz Middle Channel)

Measurement Data

Test mode : WCDMA1900
 Crest Factor : 1
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.007 W/kg
 Power Drift-Finish : 0.007 W/kg
 Power Drift (%) : 0.914

Tissue Data

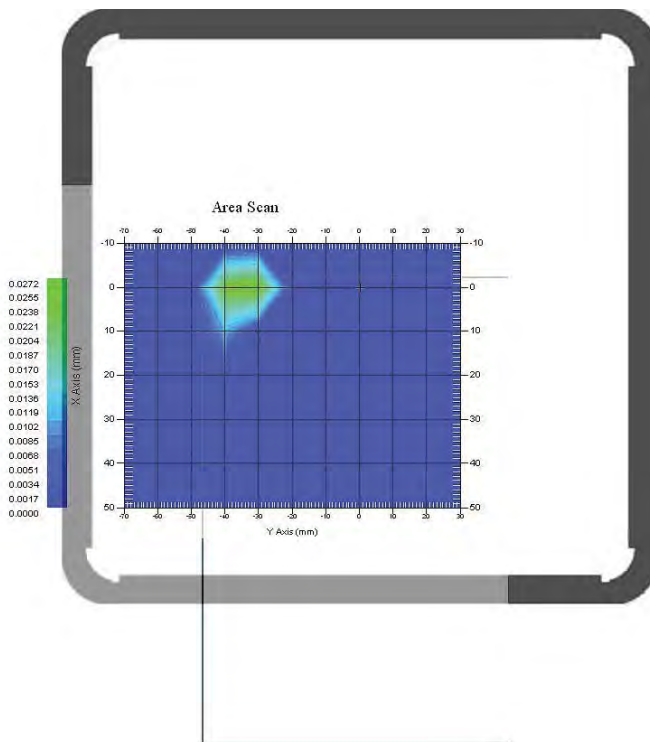
Type : Body
 Frequency : 1880.0 MHz
 Epsilon : 51.93 F/m
 Sigma : 1.52 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency : 1900
 Duty Cycle Factor : 1
 Conversion Factor : 4.5
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.033 W/kg
 10 gram SAR value : 0.008 W/kg
 Area Scan Peak SAR : 0.027 W/kg
 Zoom Scan Peak SAR : 0.110 W/kg

Plot 25#



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

WCDMA1900; Body-Back (1852.4 MHz Low Channel)

Measurement Data

Test mode : WCDMA1900
 Crest Factor : 1
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.011 W/kg
 Power Drift-Finish : 0.010 W/kg
 Power Drift (%) : -1.385

Tissue Data

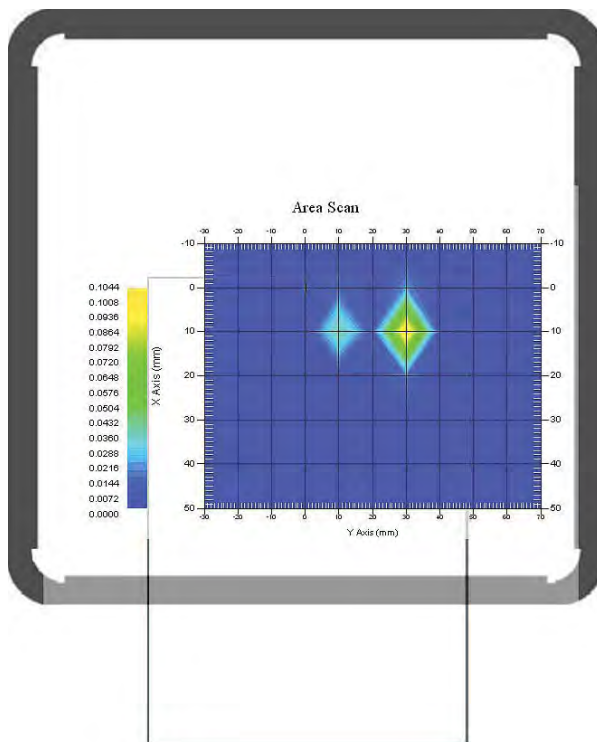
Type : Body
 Frequency : 1852.4 MHz
 Epsilon : 51.95 F/m
 Sigma : 1.48 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency : 1900
 Duty Cycle Factor : 1
 Conversion Factor : 4.5
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.092 W/kg
 10 gram SAR value : 0.049 W/kg
 Area Scan Peak SAR : 0.104 W/kg
 Zoom Scan Peak SAR : 0.240 W/kg

Plot 26#



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

WCDMA1900; Body-Back (1880.0 MHz Middle Channel)

Measurement Data

Test mode : WCDMA1900
 Crest Factor : 1
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.016 W/kg
 Power Drift-Finish : 0.016 W/kg
 Power Drift (%) : 1.849

Tissue Data

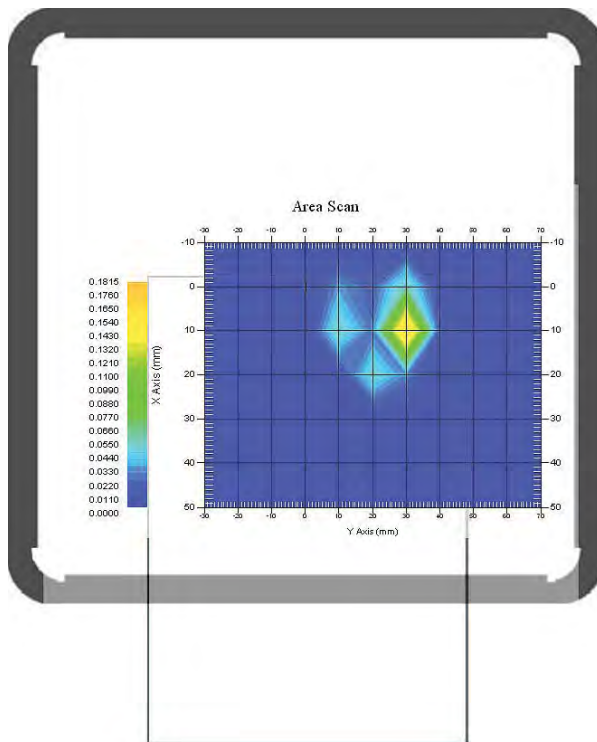
Type : Body
 Frequency : 1880.0 MHz
 Epsilon : 51.93 F/m
 Sigma : 1.52 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency : 1900
 Duty Cycle Factor : 1
 Conversion Factor : 4.5
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.130 W/kg
 10 gram SAR value : 0.065 W/kg
 Area Scan Peak SAR : 0.181 W/kg
 Zoom Scan Peak SAR : 0.470 W/kg

Plot 27#



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

WCDMA1900; Body-Back (1907.6 MHz High Channel)

Measurement Data

Test mode : WCDMA1900
 Crest Factor : 1
 Scan Type : Complete
 Area Scan : 9x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.008 W/kg
 Power Drift-Finish : 0.008 W/kg
 Power Drift (%) : -0.842

Tissue Data

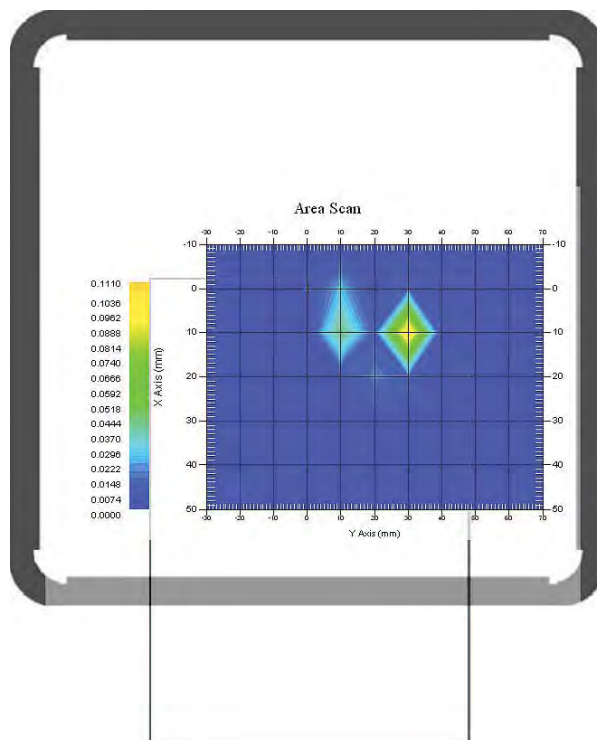
Type : Body
 Frequency : 1907.6 MHz
 Epsilon : 51.89 F/m
 Sigma : 1.54 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency : 1900
 Duty Cycle Factor : 1
 Conversion Factor : 4.5
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V/m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.097 W/kg
 10 gram SAR value : 0.042 W/kg
 Area Scan Peak SAR : 0.108 W/kg
 Zoom Scan Peak SAR : 0.180 W/kg

Plot 28#



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

WCDMA1900; Body-Top (1880.0 MHz Middle Channel)

Measurement Data

Test mode : WCDMA1900
 Crest Factor : 1
 Scan Type : Complete
 Area Scan : 7x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.001 W/kg
 Power Drift-Finish : 0.001 W/kg
 Power Drift (%) : 0.058

Tissue Data

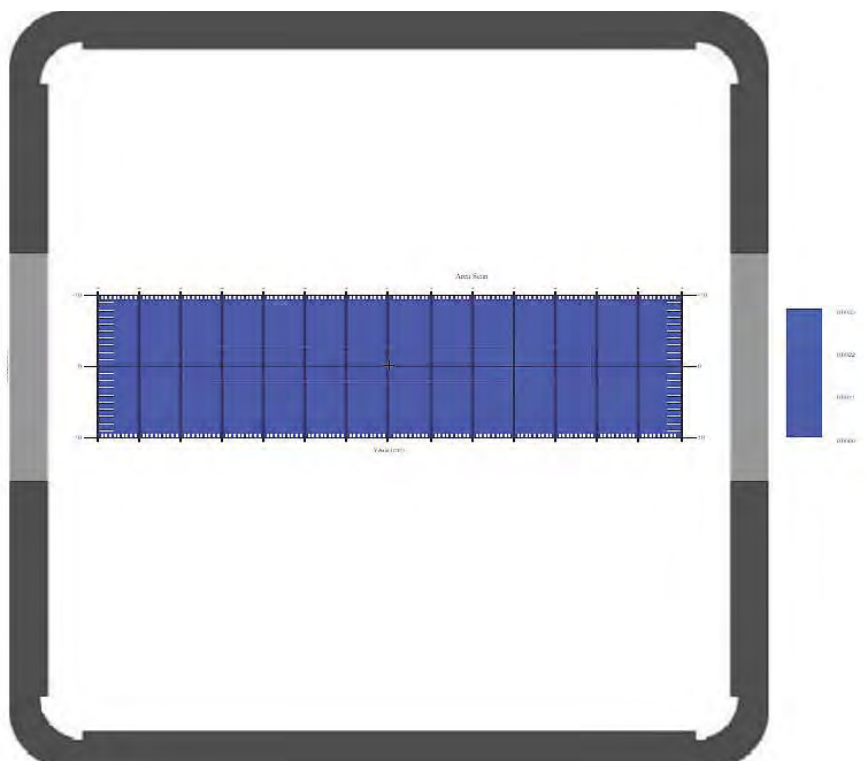
Type : Body
 Frequency : 1880.0 MHz
 Epsilon : 51.93 F/m
 Sigma : 1.52 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency : 1900
 Duty Cycle Factor : 1
 Conversion Factor : 4.5
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.001 W/kg
 10 gram SAR value : 0.001 W/kg
 Area Scan Peak SAR : 0.003 W/kg
 Zoom Scan Peak SAR : 0.004 W/kg

Plot 29#



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

WCDMA1900; Body-Left (1880.0 MHz Middle Channel)

Measurement Data

Test mode : WCDMA1900
 Crest Factor : 1
 Scan Type : Complete
 Area Scan : 7x11x1 : Measurement x=10mm, y=10mm, z=4mm
 Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
 Power Drift-Start : 0.000 W/kg
 Power Drift-Finish : 0.000 W/kg
 Power Drift (%) : 0.000

Tissue Data

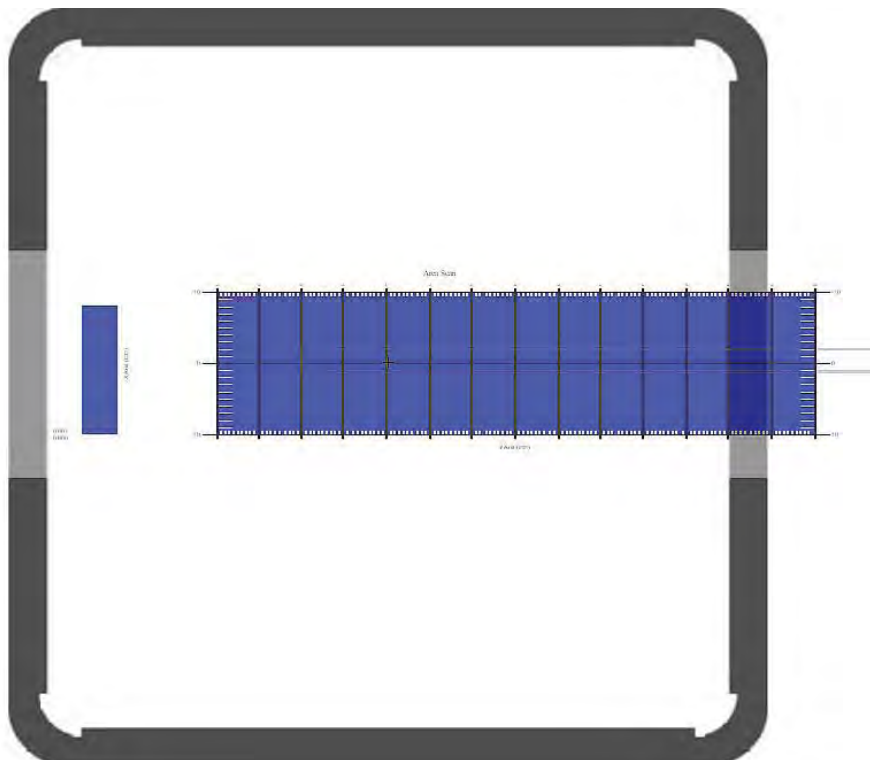
Type : Body
 Frequency : 1880.0 MHz
 Epsilon : 51.93 F/m
 Sigma : 1.52 S/m
 Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
 Frequency : 1900
 Duty Cycle Factor : 1
 Conversion Factor : 4.5
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V/m})^2$
 Compression Point : 95.00 mV
 Offset : 1.56 mm

1 gram SAR value : 0.001 W/kg
 10 gram SAR value : 0.001 W/kg
 Area Scan Peak SAR : 0.001 W/kg
 Zoom Scan Peak SAR : 0.000 W/kg

Plot 30#



APPENDIX A MEASUREMENT UNCERTAINTY

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

Measurement Uncertainty for 300MHz to 3GHz

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	c_1^1 (1-g)	c_1^1 (10-g)	Standard Uncertainty (1-g) %	Standard Uncertainty (10-g) %
Measurement System							
Probe Calibration	3.5	normal	1	1	1	3.5	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1-cp)^{1/2}$	$(\frac{1-cp}{2})^1$	1.5	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	\sqrt{cp}	\sqrt{cp}	4.4	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Readout Electronics	1.0	normal	1	1	1	1.0	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0	1.0
RF Ambient Condition -Noise	0.006	rectangular	$\sqrt{3}$	1	1	0.003	0.003
RF Ambient Condition - Reflections	3.0	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Probe Positioner Mech. Restrictions	0.4	rectangular	$\sqrt{3}$	1	1	0.2	0.2
Restriction							
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	1	2.1	2.1
Test Sample Positioning	0.023	normal	1	1	1	0.023	0.023
Device Holder Uncertainty	6.215	normal	1	1	1	6.215	6.215
Drift of Output Power	4.627	rectangular	$\sqrt{3}$	1	1	2.67	2.67
Phantom and Setup							
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	1	2.0	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	0.5	2.0	1.4
Liquid Conductivity(meas.)	1.938	normal	1	0.7	0.5	1.36	0.97
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7	1.4
Liquid Permittivity(meas.)	3.093	normal	1	0.6	0.5	1.86	1.55
Combined Uncertainty		RSS				10.78	10.55
Expanded uncertainty (coverage factor=2)		Normal(k=2)				21.56	21.10

APPENDIX B – PROBE CALIBRATION CERTIFICATES

NCL CALIBRATION LABORATORIES

Calibration File No.: PC-1537

Task No: BACL-5745

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-5745

Calibrated: 8th October 2013

Released on: 8th October 2013

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

Released By: _____



Art Brennan, Quality Manager

NCL CALIBRATION LABORATORIES

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

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

NCL Calibration Laboratories

Division of APREL Inc.

Introduction

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

Calibration Method

Probes are calibrated using the following methods.

<1000MHz

TEM Cell for sensitivity in air

Standard phantom using temperature transfer method for sensitivity in tissue

>1000MHz

Waveguide* method to determine sensitivity in air and tissue

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

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

References

- IEEE Standard 1528
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
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
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 Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9kHz to 40GHz

Page 2 of 10

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

NCL Calibration Laboratories

Division of APREL Inc.

Conditions

Probe 500-00283 was a recalibration.

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
Tektronix USB Power Meter	11C940	May 14, 2015
Signal Generator HP 83640B	3844A00689	Feb 12, 2015

Secondary Measurement Standards

Network Analyzer Anritsu 37347C	002106	Feb. 20, 2015
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Attestation

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

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



Art Brennan, Quality Manager



Dan Brooks, Test Engineer

NCL Calibration Laboratories

Division of APREL Inc.

Probe Summary

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

*Resistive to recommended tissue recipes per IEEE-1528

Sensitivity in Air

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

NCL Calibration Laboratories

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Calibration for Tissue (Head H, Body B)

Frequency	Tissue Type	Measured Epsilon	Measured Sigma	Standard Uncertainty (%)	Calibration Frequency Range (MHz)	Conversion Factor
450 H	Head	44.29	0.86	3.5	±50	5.7
450 B	Body	56.6	0.94	3.5	±50	5.8
750 H	Head	42.7	0.85	3.5	±50	5.6
750 B	Body	56.6	0.94	3.5	±50	5.5
835 H	Head	42.35	0.938	3.5	±50	5.9
835 B	Body	56.65	1.018	3.5	±50	5.9
900 H	Head	X	X	X	X	X
900 B	Body	X	X	X	X	X
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	38.51	1.36	3.5	±75	5.4
1750 B	Body	51.79	1.53	3.5	±75	5.3
1800 H	Head	38.26	1.41	3.5	±75	5.0
1800 B	Body	51.61	1.58	3.5	±75	5.0
1900 H	Head	38.03	1.36	3.5	±75	4.8
1900 B	Body	53.13	1.58	3.5	±75	4.5
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	37.64	1.88	3.5	±75	4.9
2450 B	Body	50.7	2.03	3.5	±75	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
5250 H	Head	34.65	4.8	3.5	±100	2.7
5250 B	Body	47.6	5.3	3.5	±100	2.6
5600 H	Head	33.2	5.15	3.5	±100	2.5
5600 B	Body	45.21	5.57	3.5	±100	2.2
5800 H	Head	32.72	5.38	3.5	±100	3.2
5800 B	Body	44.28	6.04	3.5	±100	2.5

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Boundary Effect:

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

Spatial Resolution:

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

DAQ-PAQ Contribution

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

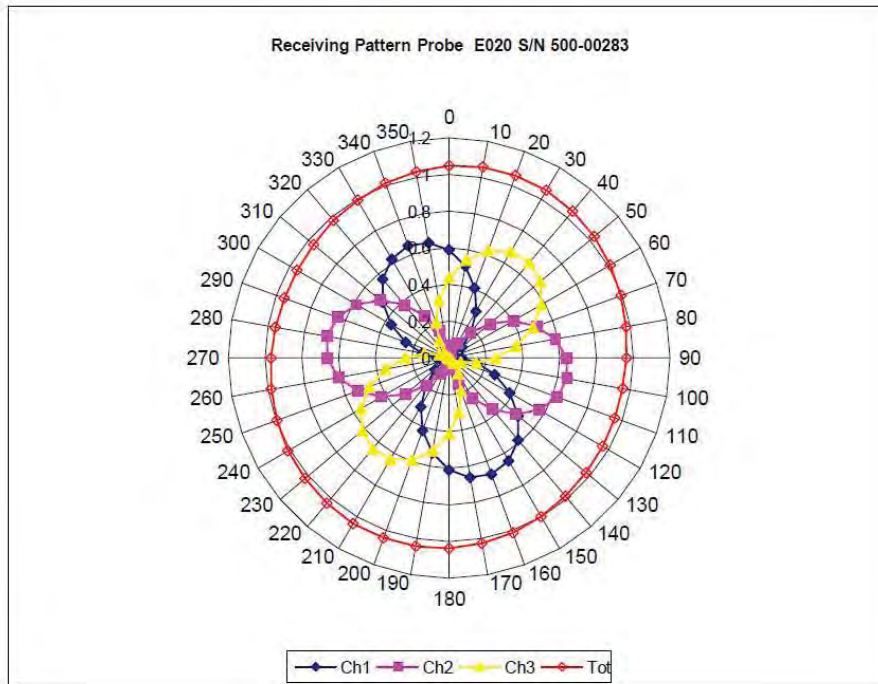
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NCL Calibration Laboratories

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Receiving Pattern Air



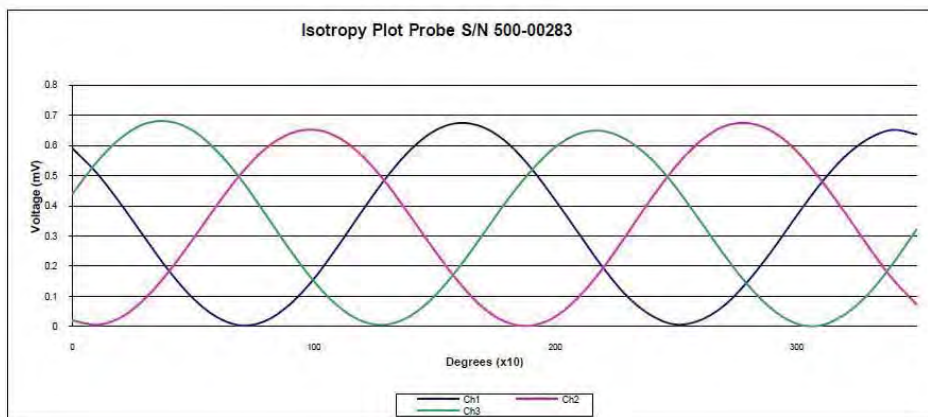
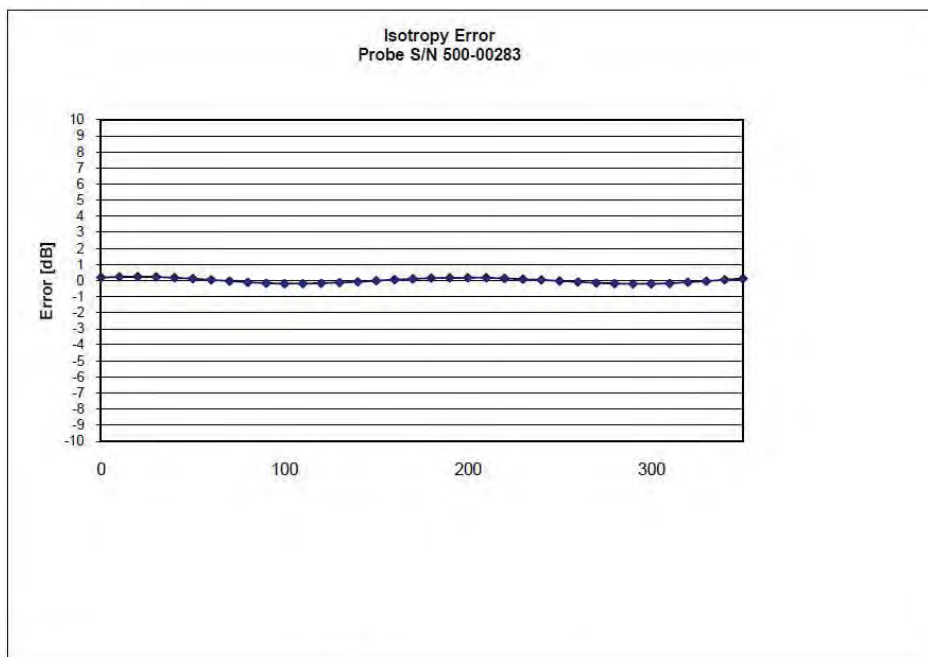
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Division of APREL Inc.

Isotropy Error Air



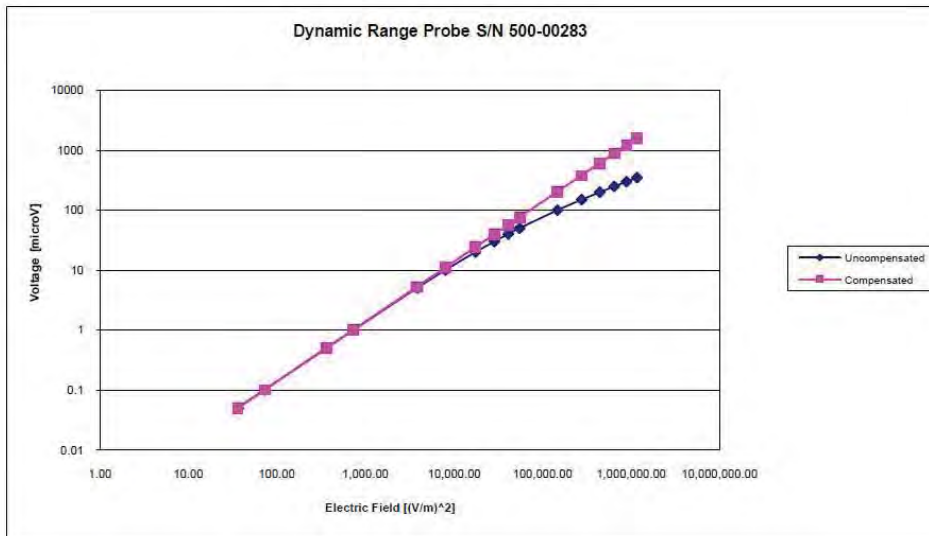
Isotropicity Tissue: 0.10 dB

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Dynamic Range

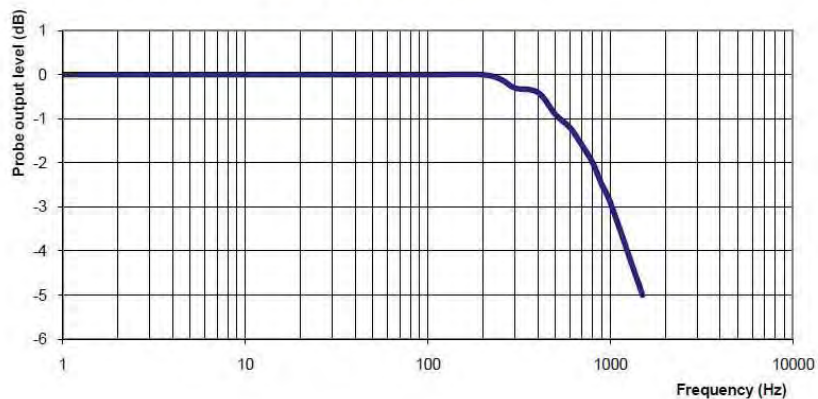


NCL Calibration Laboratories

Division of APREL Inc.

Video Bandwidth

Probe Frequency Characteristics



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

Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2013.

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

APPENDIX C DIPOLE CALIBRATION CERTIFICATES

NCL CALIBRATION LABORATORIES

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

CERTIFICATE OF CALIBRATION

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

Validation Dipole(Head and Body)

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

Customer: Bay Area Compliance Laboratory

Calibrated: 25th August 2011
Released on: 25th August 2011

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

Released By: _____

NCL CALIBRATION LABORATORIES

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

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

NCL Calibration Laboratories

Division of APREL Laboratories.

Conditions

Dipole 180-00558 was received in good condition and a re-calibration.

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

Temperature of the Tissue: 21 °C +/- 0.5°C

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



Stuart Nicol



C. Teodorian

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

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

NCL Calibration Laboratories

Division of APREL Laboratories.

Calibration Results Summary

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

Mechanical Dimensions

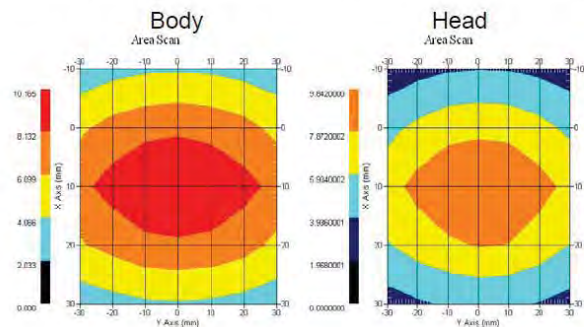
Length: 162.2 mm
Height: 89.4 mm

Electrical Specification

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

System Validation Results

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



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NCL Calibration Laboratories

Division of APREL Laboratories.

Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 180-00558. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-020 130 MHz to 26 GHz E-Field Probe Serial Number 212.

References

SSI-TP-018-ALSAS Dipole Calibration Procedure
SSI-TP-016 Tissue Calibration Procedure
IEEE 1528 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"

Conditions

Dipole 180-00558 was new taken from stock.

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

Temperature of the Tissue: 20 °C +/- 0.5°C

Dipole Calibration uncertainty

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

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

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4

NCL Calibration Laboratories

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Dipole Calibration Results

Mechanical Verification

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

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

Tissue Validation

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

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

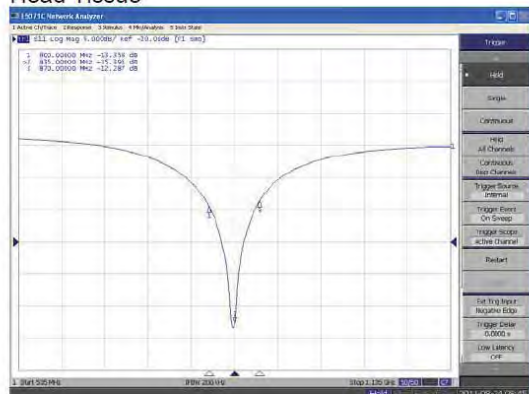
NCL Calibration Laboratories

Division of APREL Laboratories.

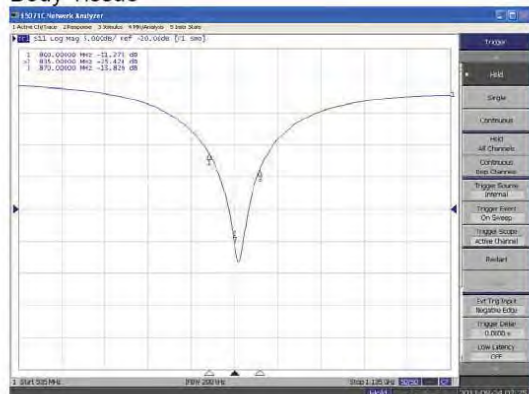
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head Tissue



Body Tissue

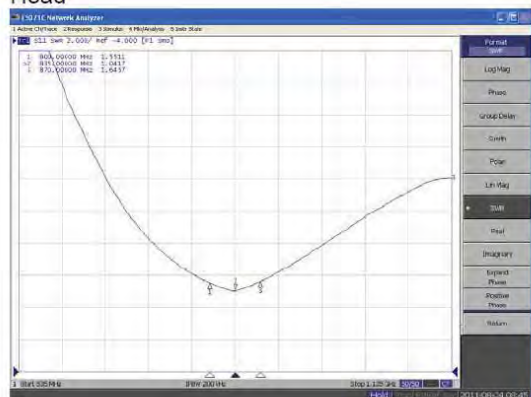


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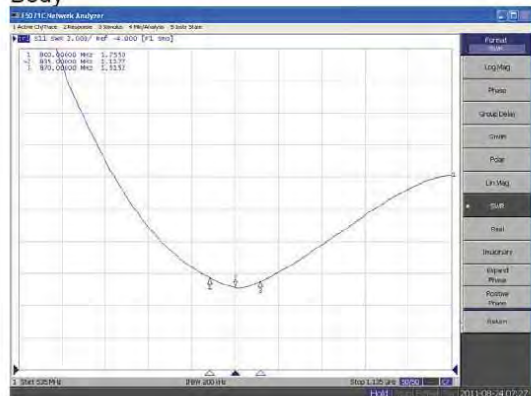
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**SWR
Head**



Body



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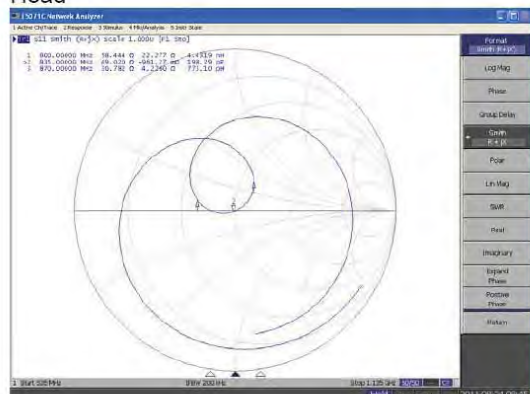
7

NCL Calibration Laboratories

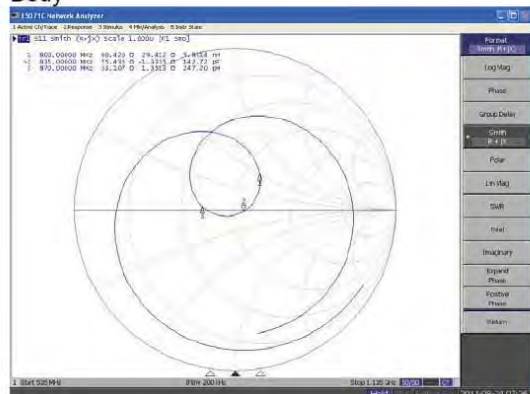
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Smith Chart Dipole Impedance

Head



Body



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Test Equipment

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

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

9

835MHz Dipole Calibration By BACL at 2012-12-12

Mechanical Verification

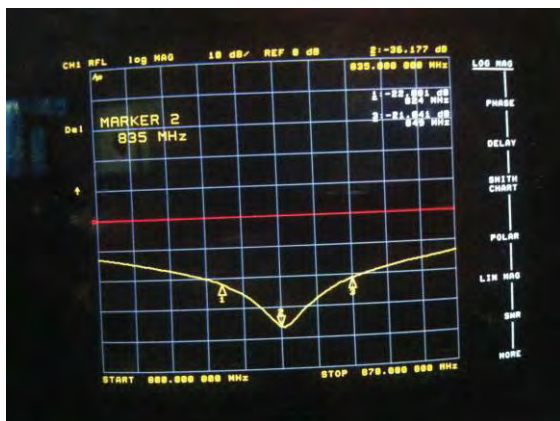
APREL Length	APREL Height	Measured Length	Measured Height
161.0 mm	89.8 mm	161.2 mm	89.5 mm

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

Test Graphs:

Head Tissue

Return Loss :

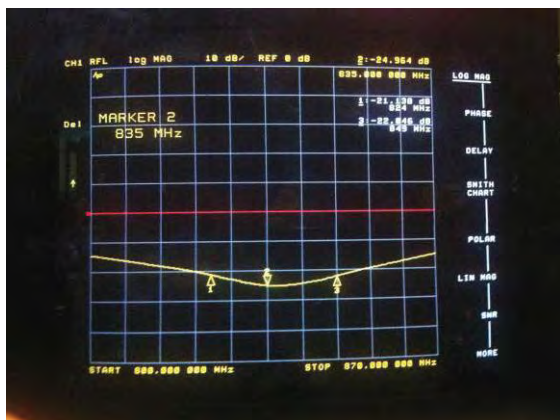


Impedance :



Body Tissue

Return Loss :



Impedance :



NCL CALIBRATION LABORATORIES

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

CERTIFICATE OF CALIBRATION

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

Validation Dipole (Head & Body)

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

Customer: Bay Area Compliance Laboratory

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

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

Released By: _____

***NCL* CALIBRATION LABORATORIES**

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

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

NCL Calibration Laboratories

Division of APREL Laboratories.

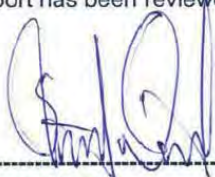
Conditions

Dipole 210-00710 was received in good condition and was a re-calibration.

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

Temperature of the Tissue: 21 °C +/- 0.5°C

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



Stuart Nicol



C. Teodorian

Primary Measurement Standards

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

Secondary Measurement Standards

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

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

Mechanical Dimensions

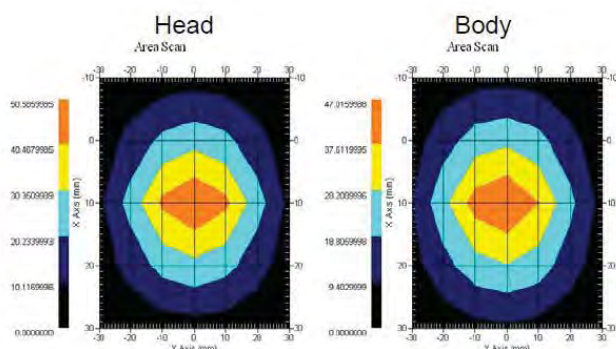
Length: 67.1 mm
Height: 38.9 mm

Electrical Specification

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

System Validation Results

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



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Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 210-00710. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-020 130 MHz to 26 GHz E-Field Probe Serial Number 212.

References

SSI-TP-018-ALSAS Dipole Calibration Procedure
 SSI-TP-016 Tissue Calibration Procedure
 IEEE 1528 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"

Conditions

Dipole 210-00710 was new taken from stock.

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

Dipole Calibration uncertainty

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

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

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Dipole Calibration Results

Mechanical Verification

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

Electrical Validation

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

Tissue Validation

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

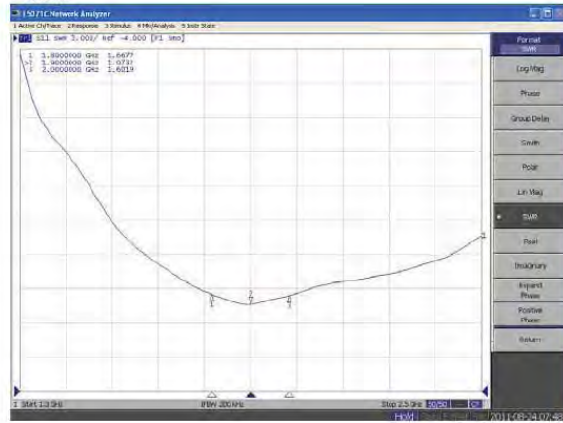
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NCL Calibration Laboratories

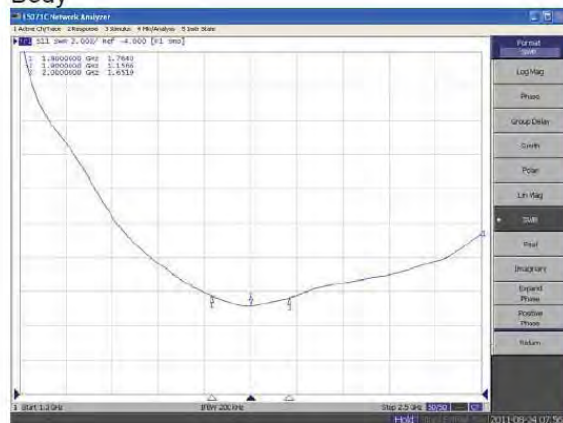
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SWR

Head



Body



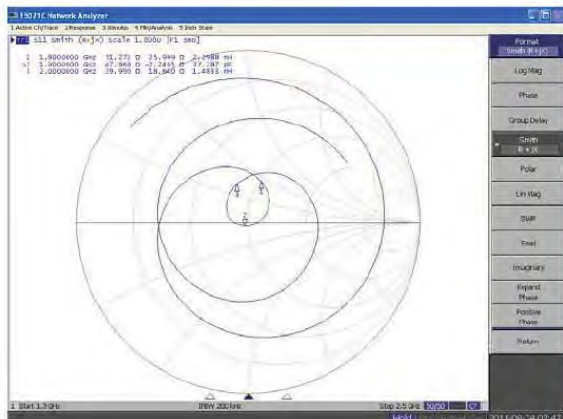
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NCL Calibration Laboratories

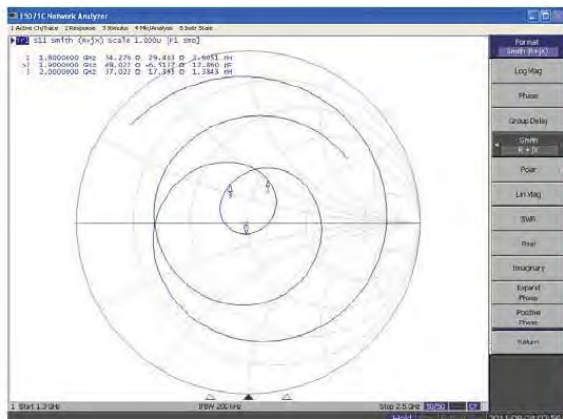
Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



Body



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NCL Calibration Laboratories

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Test Equipment

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

Mechanical Verification

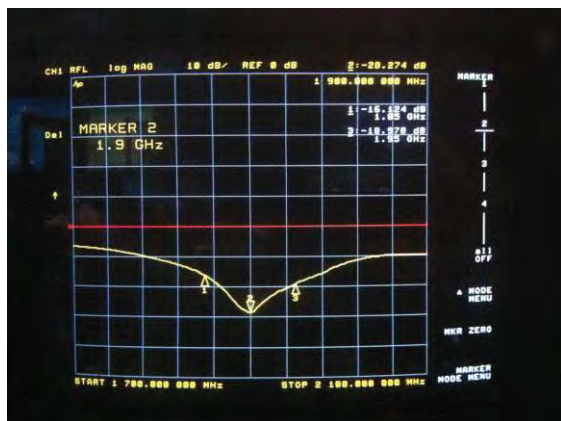
APREL Length	APREL Height	Measured Length	Measured Height
68.0 mm	39.5 mm	68.2 mm	39.2 mm

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

Test Graphs:

Head Tissue

Return Loss :



Impedance :



Body Tissue

Return Loss :

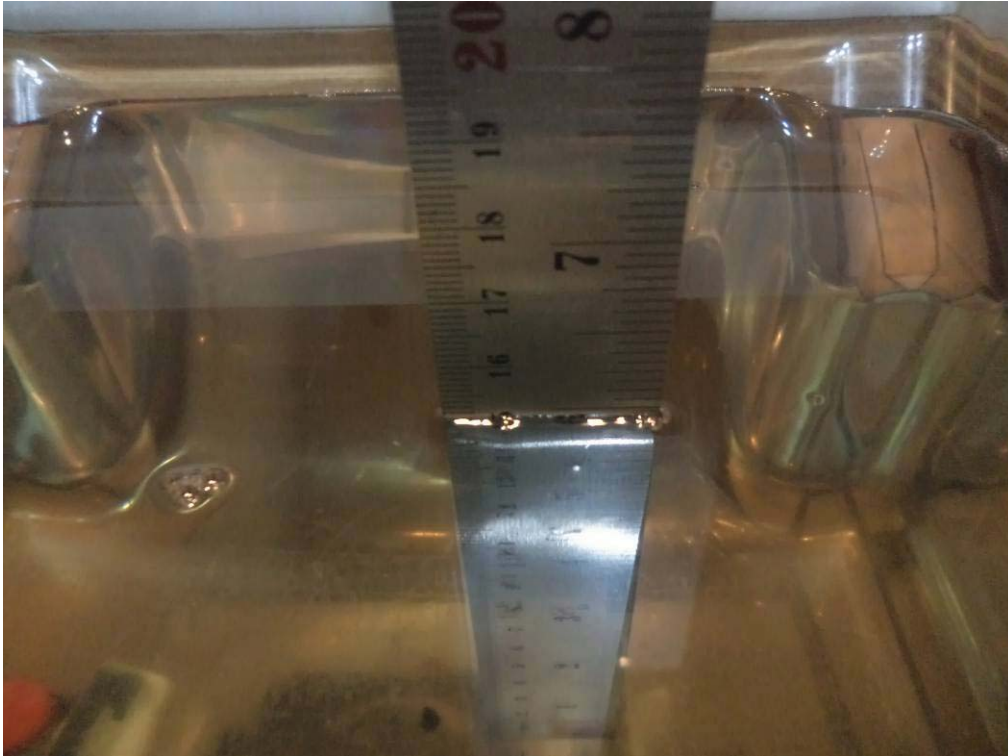


Impedance :

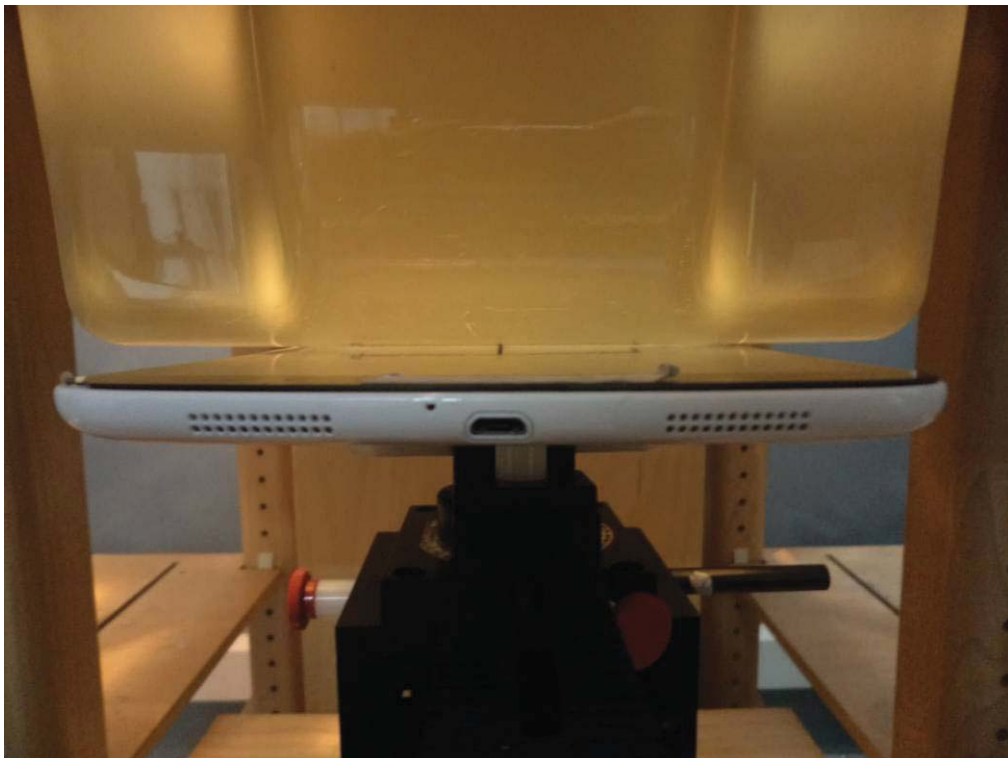


APPENDIX D EUT TEST POSITION PHOTOS

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



Body Front Setup Photo



Body Back Setup Photo



Body-Top Setup Photo



APPENDIX E EUT PHOTOS

EUT – Front View



EUT – Back View



EUT – Left Side View



EUT – Right Side View



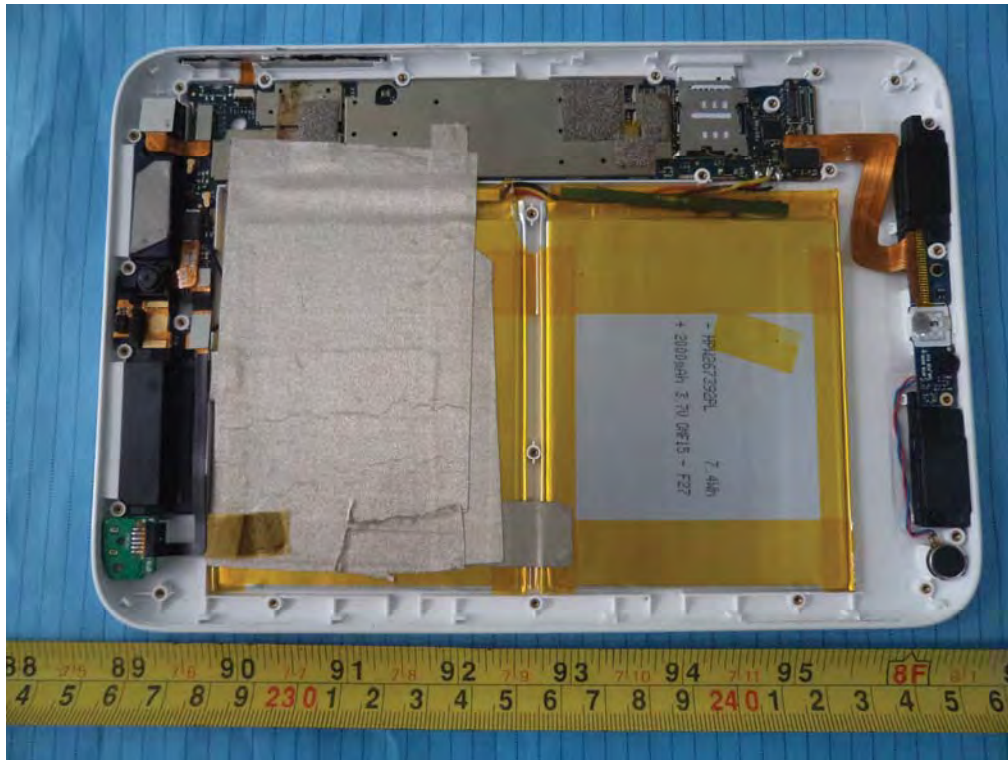
EUT – Top View



EUT – Bottom View



EUT – Uncovered View



APPENDIX F INFORMATIVE REFERENCES

- [1] Federal Communications Commission, "Report and order: Guidelines for evaluating the environmental effects of radiofrequency radiation", Tech. Rep. FCC 96-326, FCC, Washington, D.C. 20554, 1996.
- [2] David L. Means Kwok Chan, Robert F. Cleveland, "Evaluating compliance with FCC guidelines for human exposure to radiofrequency electromagnetic fields", Tech. Rep., Federal Communication Commission, Office of Engineering & Technology, Washington, DC, 1997.
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- [7] Katja Pokovic, Thomas Schmid, and Niels Kuster, "Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies", in ICECOM '97, Dubrovnik, October 15-17, 1997, pp. 120-24.
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- [13] NIS81 NAMAS, "The treatment of uncertainty in EMC measurement", Tech. Rep., NAMAS Executive, National Physical Laboratory, Teddington, Middlesex, England, 1994.
- [14] Barry N. Taylor and Christ E. Kuyatt, "Guidelines for evaluating and expressing the uncertainty of NIST measurement results", Tech. Rep., National Institute of Standards and Technology, 1994. Dosimetric Evaluation of Sample device, month 1998 10.

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