NVLAP LAB CODE 200707-0

SAR EVALUATION REPORT

For

Arbitron Inc.

9705 Patuxent Woods Drive, Columbia, MD 21076, U.S.A

FCC ID: IGKDA113A

IC: 4213A-DA113A

Report Type:	**Product Type:**
Original Report	Gen2 Meter

Test Engineer:	Allan An
Report Number:	RSC10011851-SAR
Report Date:	2009-02-09
Reviewed By:	William Chen EMC Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008

Summary of Test Results	
Rule Part(s):	FCC §2.1093, IC RSS-102
Test Procedure(s):	FCC OET Bulletin 65C IEEE 1528-2003
Device Type:	Portable Device
Exposure Category	Population/Uncontrolled
Modulation:	GMSK
TX Frequency Range:	824-849 MHz (Cellular Band) 1850-1910 MHz (PCS Band)
Maximum Conducted Power Tested:	GPRS: 32.32 dBm (Cellular Band) 29.99 dBm (PCS Band)
Antenna Type(s):	Internal Antenna
Body-Worn Accessories:	Belt Clip
Face-Head Accessories:	None
Max. SAR Level(s) Measured:	0.881 W/Kg 1g Body Tissue (Cellular Band) 0.124 W/Kg 1g Body Tissue (PCS Band)

This wireless device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General Population/Uncontrolled Exposure limits specified in ANSI/IEEE Standards and has been tested in accordance with the measurement procedures specified in FCC OET 65 Supplement C and IEEE 1528-2003.

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

EUT Photo

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REFERENCE, STANDARDS AND GUILDELINES

FCC:

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

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

CE:

The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 2 mW/g as recommended by the EN50360 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 1 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).

EUT DESCRIPTION

This Bay Area Compliance Laboratories Corp. test report has been prepared on behalf of Arbitron Inc. and their product, Model: DA113, FCC ID: IGKDA113A, IC: 4213A-DA113A or the EUT (Equipment Under Test) as referred to in the rest of this report.

Technical Specification

Item	Content
Modulation	GMSK
Frequency Band	Cellular Band: 824-849 MHz 869-894 MHz PCS Band: 1850-1910 MHz 1930-1990 MHz
Dimensions (L*W*H)	78mm (L)× 50mm (W) × 22 mm (H)
Weight	70 g
Power Source	3.7 VDC Rechargeable Battery
Normal Operation	Body-worn

EUT Photo

Model:DA113
Please refer to Appendix H

FACILITIES AND ACCREDITATION

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect data is located at

6/F, the 3rd Phase of WanLi Industrial Building,
Shi Hua Road, Fu Tian Free Trade Zone,
Shenzhen, Guangdong, P.R. of China

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

NVLAP LAB CODE 200707-0

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

DESCRIPTION OF TEST SYSTEM

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

ALSAS-10U System Description

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

Applications

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

Area Scans

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

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

Zoom Scan (Cube Scan Averaging)

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

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

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

ALSAS-10U Interpolation and Extrapolation Uncertainty

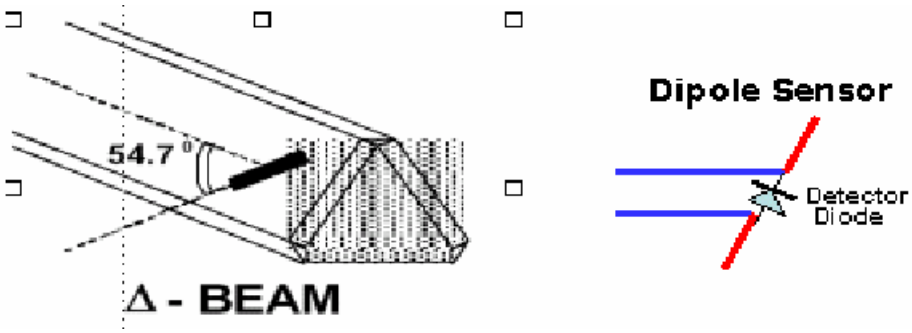
The overall uncertainty for the methodology and algorithms the used during the SAR calculation was evaluated using the data from IEEE 1528 based on the example f3 algorithm:

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

Isotropic E-Field Probe

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

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



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

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

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

Isotropic E-Field Probe Specification

Calibration in Air	Frequency Dependent Below 2 GHz Calibration in air performed in a TEM Cell Above 2 GHz Calibration in air performed in waveguide
Sensitivity	0.70 μV/(V/m)^2 to 0.85 μV/(V/m)^2
Dynamic Range	0.0005 W/kg to 100 W/kg
Isotropic Response	Better than 0.2 dB
Diode Compression Point (DCP)	Calibration for Specific Frequency
Probe Tip Radius	< 5 mm
Sensor Offset	1.56 (+/- 0.02 mm)
Probe Length	290 mm
Video Bandwidth	@ 500 Hz: 1 dB @ 1.02 kHz: 3 dB
Boundary Effect	Less than 2% for distance greater than 2.4 mm
Spatial Resolution	Diameter less than 5 mm Compliant with Standards

Boundary Detection Unit and Probe Mounting Device

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

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

Daq-Paq (Analog to Digital Electronics)

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

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

Axis Articulated Robot

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

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

ALSAS Universal Workstation

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

Universal Device Positioner

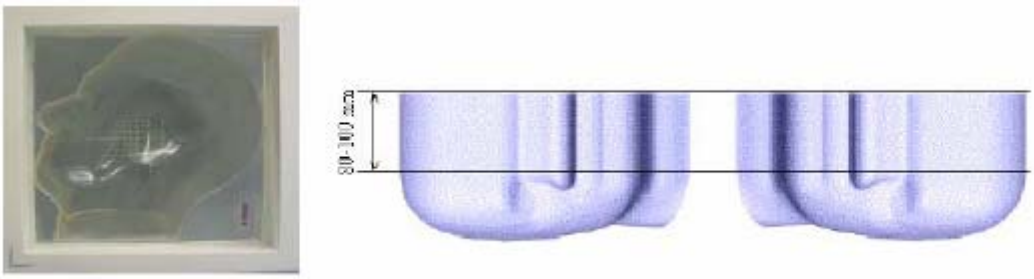
The universal device positioner allows complete freedom of movement of the EUT. Developed to hold a EUT in a free-space scenario any additional loading attributable to the material used in the construction of the positioner has been eliminated. Repeatability has been enhanced through the linear scales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

Phantom Types

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

APREL SAM Phantoms

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



APREL Laboratories Universal Phantom

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

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

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

Tissue Dielectric Parameters for Head and Body Phantoms

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

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

IEEE SCC-34/SC-2 P1528 Recommended Tissue Dielectric Parameters

Frequency (MHz)	Head Tissue		Body Tissue	
	εr	Ơ (S/m)	εr	Ơ (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

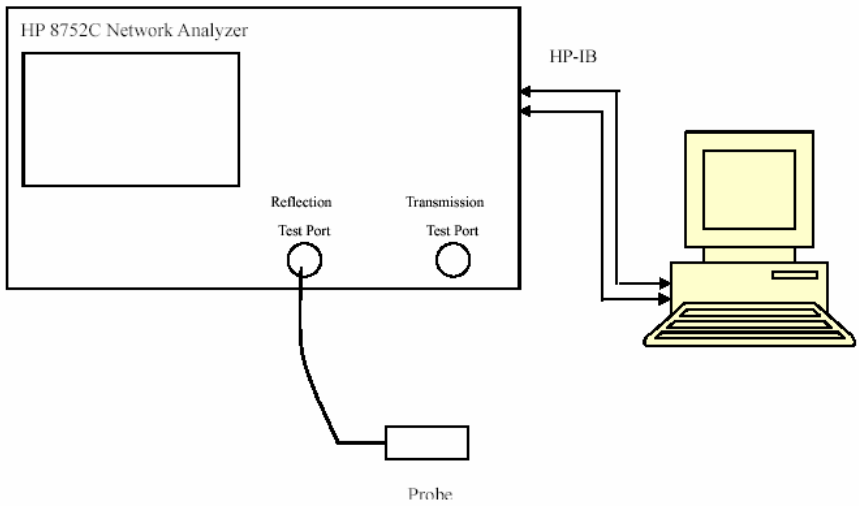
EQUIPMENT LIST AND CALIBRATION

Equipments List & Calibration Info

Equipment	Model	Calibration Due 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	N/A	110-00212
Miniature E-Field Probe	ALS-E-020	2010-09-05	273
Dipole, 835 MHz	ALS-D-835-S-2	2010-09-01	180-00558
Dipole,1900 MHz	ALS-D-1900-S-2	2010-09-01	210-00710
Dipole Spacer	ALS-DS-U	N/A	250-00907
R & S, Universal Communication Tester	CMD200	2010-09-26	1100.0008.02
Device holder/Positioner	ALS-H-E-SET-2	N/A	170-00510
Left ear SAM phantom	ALS-P-SAM-L	N/A	130-00311
Right ear SAM phantom	ALS-P-SAM-R	N/A	140-00359
UniPhantom	ALS-P-UP-1	N/A	150-00413
Simulated Tissue 835 MHz Head	ALS-T-835-1-H	Each Time	270-01002
Simulated Tissue 835 MHz Body	ALS-T-835-1-B	Each Time	270-02101
Simulated Tissue 1900 MHz Head	ALS-T-1900-1-H	Each Time	295-01103
Simulated Tissue 1900 MHz Body	ALS-T-1900-1-B	Each Time	295-02102
Signal Generator	HP8648C	2010-04-28	3426A01345
Power Amplifier	5S1G4	N/A	71377
Spectrum Analyzer	FSEM30	2010-07-08	849720/019

SAR MEASUREMENT SYSTEM VERIFICATION

Liquid Verification



Liquid Verification Setup Block Diagram

Liquid Verification Results

Frequency (MHz)	Liquid Type	Liquid Parameter		Result
		εr	σ (S/m)	
835	Head	41.26	0.90	In Tolerance
835	Body	55.44	0.99	In Tolerance
1900	Head	40.26	1.41	In Tolerance
1900	Body	54.01	1.49	In Tolerance

Please refer to the following tables

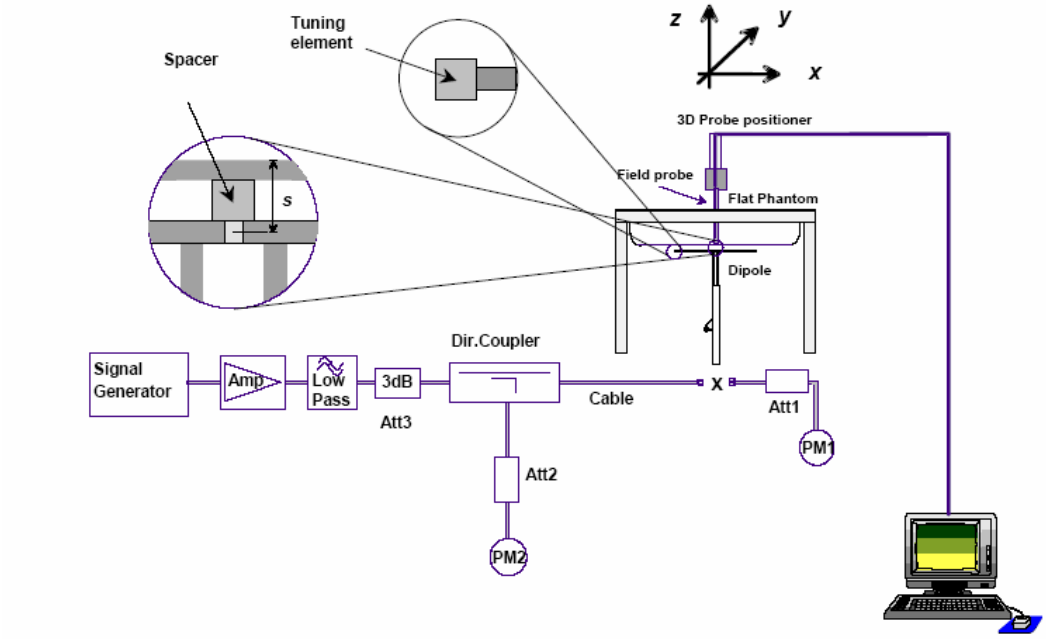
835 MHz Head				835 MHz Body		
Frequency	**e'**	**e''**		**Frequency**	**e'**	**e''**
824000000	41.295509	19.558608		824000000	55.457892	21.407274
824500000	41.264417	19.549358		824500000	55.431598	21.415891
825000000	41.247723	19.514983		825000000	55.420111	21.419013
825500000	41.142371	19.504964		825500000	55.356494	21.447084
826000000	41.160766	19.482307		826000000	55.341064	21.379125
826500000	41.182703	19.453431		826500000	55.428758	21.423475
827000000	41.159142	19.489894		827000000	55.451663	21.413793
827500000	41.206559	19.496240		827500000	55.464768	21.407714
828000000	41.226204	19.478527		828000000	55.410787	21.371048
828500000	41.232644	19.452302		828500000	55.405601	21.329776
829000000	41.283678	19.467855		829000000	55.424840	21.267981
829500000	41.232067	19.459191		829500000	55.439204	21.294726
830000000	41.268508	19.426191		830000000	55.485172	21.287339
830500000	41.228456	19.382901		830500000	55.409599	21.281243
831000000	41.201400	19.462088		831000000	55.370580	21.283588
831500000	41.220994	19.444298		831500000	55.426346	21.361049
832000000	41.182735	19.369222		832000000	55.388419	21.219182
832500000	41.157505	19.416324		832500000	55.353273	21.231233
833000000	41.198126	19.361367		833000000	55.393117	21.237091
833500000	41.229609	19.423993		833500000	55.472347	21.288706
834000000	41.227029	19.401969		834000000	55.420024	21.196956
834500000	41.225606	19.421398		834500000	55.464108	21.228579
835000000	41.257485	19.410618		835000000	55.435773	21.243583
835500000	41.284487	19.401183		835500000	55.467506	21.213723
836000000	41.215094	19.382321		836000000	55.406811	21.230039
836500000	41.210096	19.444294		836500000	55.412464	21.276045
837000000	41.226866	19.416905		837000000	55.426595	21.214449
837500000	41.221062	19.364733		837500000	55.513741	21.229257
838000000	41.244280	19.434194		838000000	55.491584	21.230918
838500000	41.202728	19.402516		838500000	55.452183	21.244632
839000000	41.192638	19.408665		839000000	55.406264	21.255374
839500000	41.195113	19.349170		839500000	55.467219	21.230652
840000000	41.206203	19.375235		840000000	55.432469	21.198916
840500000	41.195542	19.360899		840500000	55.440221	21.178210
841000000	41.178781	19.343152		841000000	55.414693	21.170332
841500000	41.208283	19.379388		841500000	55.461915	21.167181
842000000	41.209988	19.335813		842000000	55.416032	21.205332
842500000	41.213692	19.317475		842500000	55.465373	21.179474
843000000	41.207775	19.373923		843000000	55.441061	21.160312
843500000	41.131323	19.362937		843500000	55.419052	21.189189
844000000	41.207730	19.329070		844000000	55.396652	21.174744
844500000	41.161928	19.371088		844500000	55.392593	21.207529
845000000	41.087796	19.349315		845000000	55.378192	21.157476
845500000	41.103129	19.353366		845500000	55.397292	21.137872
846000000	41.057620	19.323580		846000000	55.325885	21.164247
846500000	41.098642	19.310080		846500000	55.397233	21.167642
847000000	41.078871	19.334387		847000000	55.424117	21.112539
847500000	41.082062	19.331666		847500000	55.412934	21.126343
848000000	41.055610	19.296625		848000000	55.362673	21.122953
848500000	41.060215	19.334303		848500000	55.360941	21.133043
849000000	41.020402	19.323541		849000000	55.402371	21.115478

1900 MHz Head				1900 MHz Body		
Frequency	**e'**	**e''**		**Frequency**	**e'**	**e''**
1850000000	40.381078	13.626929		1850000000	53.884644	14.367602
1851200000	40.395610	13.622014		1851200000	53.871222	14.389579
1852400000	40.392516	13.593887		1852400000	53.895499	14.370219
1853600000	40.327128	13.570536		1853600000	53.845060	14.313437
1854800000	40.317089	13.580951		1854800000	53.862121	14.356578
1856000000	40.329399	13.602293		1856000000	53.847124	14.372549
1857200000	40.354527	13.584537		1857200000	53.857144	14.324893
1858400000	40.337860	13.599187		1858400000	53.852229	14.376689
1859600000	40.313900	13.587319		1859600000	53.854593	14.362056
1860800000	40.324524	13.566206		1860800000	53.887981	14.356834
1862000000	40.304259	13.555214		1862000000	53.875548	14.325756
1863200000	40.308255	13.563088		1863200000	53.877509	14.360087
1864400000	40.308824	13.535928		1864400000	53.852516	14.344059
1865600000	40.269140	13.518618		1865600000	53.900560	14.359038
1866800000	40.247042	13.524311		1866800000	53.869669	14.344736
1868000000	40.279071	13.517648		1868000000	53.852020	14.340770
1869200000	40.269003	13.537516		1869200000	53.922014	14.388044
1870400000	40.258750	13.507953		1870400000	53.893741	14.401323
1871600000	40.257101	13.541041		1871600000	53.919455	14.391542
1872800000	40.274768	13.555749		1872800000	53.932223	14.408591
1874000000	40.282221	13.573813		1874000000	53.922856	14.438287
1875200000	40.270130	13.560901		1875200000	53.944845	14.424363
1876400000	40.252504	13.405489		1876400000	53.948986	14.268114
1877600000	40.254266	13.389994		1877600000	53.946681	14.272626
1878800000	40.249590	13.403334		1878800000	53.986687	14.294618
1880000000	40.261669	13.443144		1880000000	54.011086	14.270951
1881200000	40.226403	13.432571		1881200000	53.981260	14.326996
1882400000	40.230960	13.455472		1882400000	53.974225	14.305777
1883600000	40.246597	13.437389		1883600000	53.991411	14.314895
1884800000	40.262211	13.453299		1884800000	54.031980	14.324999
1886000000	40.248004	13.475768		1886000000	54.018873	14.358259
1887200000	40.239041	13.457820		1887200000	54.033252	14.339837
1888400000	40.227904	13.475243		1888400000	54.010126	14.333564
1889600000	40.207987	13.464294		1889600000	54.007243	14.357330
1890800000	40.203283	13.430549		1890800000	53.992520	14.313383
1892000000	40.203379	13.422814		1892000000	54.025517	14.276339
1893200000	40.167952	13.439828		1893200000	54.029082	14.329428
1894400000	40.178447	13.428077		1894400000	53.997418	14.293601
1895600000	40.184792	13.402342		1895600000	53.986910	14.241753
1896800000	40.157983	13.380481		1896800000	53.967017	14.255051
1898000000	40.138040	13.378901		1898000000	53.966152	14.280724
1899200000	40.124451	13.348681		1899200000	53.999014	14.237634
1900400000	40.141577	13.366571		1900400000	53.971826	14.242884
1901600000	40.157830	13.354252		1901600000	53.987701	14.237995
1902800000	40.150694	13.363032		1902800000	53.984347	14.228559
1904000000	40.149487	13.361842		1904000000	53.979614	14.257878
1905200000	40.135217	13.339025		1905200000	53.965568	14.190861
1906400000	40.155655	13.333189		1906400000	53.941043	14.178681
1907600000	40.157900	13.322107		1907600000	53.964838	14.150133
1908800000	40.156403	13.239544		1908800000	53.931781	14.060991
1910000000	40.205886	13.254957		1910000000	53.945150	14.073367

System Accuracy Verification

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

System Verification Setup Block Diagram



System Accuracy Check Results

Frequency (MHz)	1 g SAR (W/Kg)	10 g SAR (W/Kg)	Result
835	9.651	6.042	In Tolerance
1900	41.691	21.315	In Tolerance

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

IEEE P1528 recommended reference value for Head Tissue

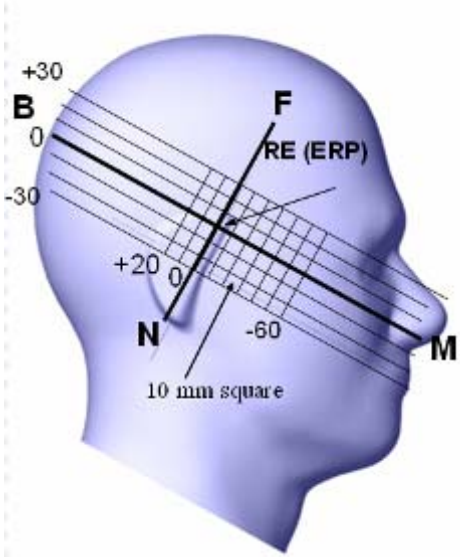
Frequency (MHz)	1 g SAR (W/Kg)	10 g SAR (W/Kg)	Local SAR at surface (above feed point)	Local SAR at surface (v=2cm offset from feed point)
300	3.0	2.0	4.4	2.1
450	4.9	3.3	7.2	3.2
835	9.5	6.2	14.1	4.9
900	10.8	6.9	16.4	5.4
1450	29.0	16.0	50.2	6.5
1800	38.1	19.8	69.5	6.8
1900	39.7	20.5	72.1	6.6
2000	41.1	21.1	74.6	6.5
2450	52.4	24.0	104.2	7.7
3000	63.8	25.7	140.2	9.5

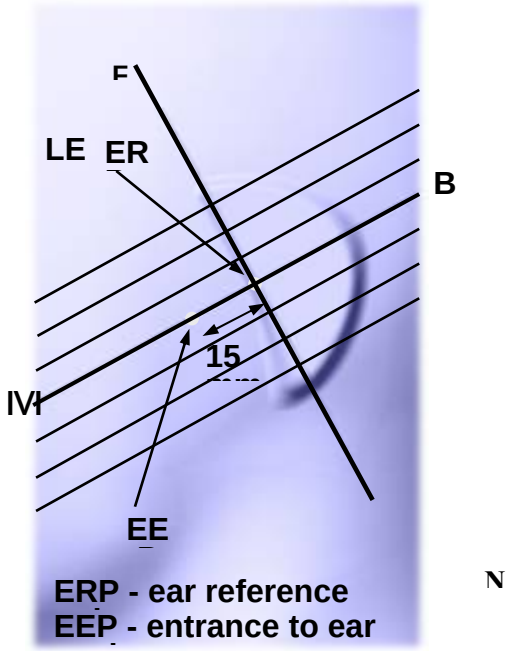
EUT TEST STRATEGY AND METHODOLOGY

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

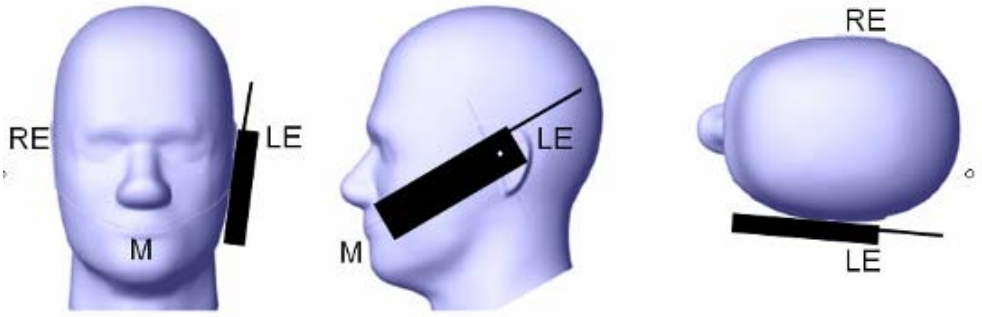
The device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line for the SCC-34/SC-2 head phantom.

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.

Check /Touch Position



Ear/Tilt Position

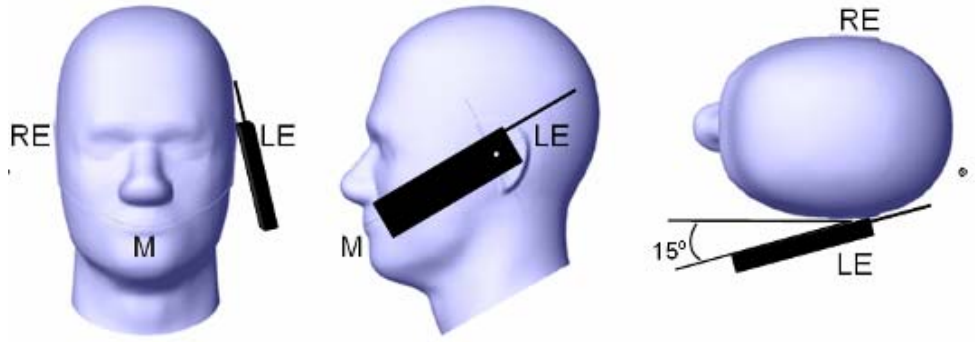
With the handset aligned in the "Cheek/Touch Position":

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

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

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

Ear /Tilt 15° Position



Test positions for body-worn and other configurations

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

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

SAR Evaluation Procedure

The evaluation was performed with the following procedure:

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

Step 2: The SAR distribution at the exposed side of the head was measured at a distance of 4 mm from the inner surface of the shell. The area covered the entire dimension of the head or EUT and the horizontal grid spacing was 15 mm x 15 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 30 mm x 30 mm x 21 mm was assessed by measuring 5 x 5 x 7 points. On the basis of this data set, the spatial peak SAR value was evaluated under the following procedure:

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

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

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

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

SAR MEASUREMENT RESULTS

This page summarizes the results of the performed dosimetric evaluation. The plots with the corresponding SAR distributions, which reveal information about the location of the maximum SAR with respect to the device, could be found in Appendix E.

SAR Test Data

Environmental Conditions

Temperature:	22° C
Relative Humidity:	51%
ATM Pressure:	1005 mbar

** Testing was performed by Allan An on 2010.02.08*

Cellular Band:

EUT Position	Frequency (MHz)	Test Type	Test Mode	Antenna Type	Liquid	Phantom	Accessories	1g SAR Value (W/Kg)	FCC Limit (W/Kg)	Ref. Plot #
Body-Worn	824.2	Body	GPRS	Integral	Body	Flat	Belt Clip	0.779	1.6	1
Body-Worn	836.6	Body	GPRS	Integral	Body	Flat	Belt Clip	0.881	1.6	2
Body-Worn	848.8	Body	GPRS	Integral	Body	Flat	Belt Clip	0.766	1.6	3

PCS Band:

EUT Position	Frequency (MHz)	Test Type	Test Mode	Antenna Type	Liquid	Phantom	Accessories	1g SAR Value (W/Kg)	FCC Limit (W/Kg)	Ref. Plot #
Body-Worn	1850.2	Body	GPRS	Integral	Body	Flat	Belt Clip	0.122	1.6	4
Body-Worn	1880.0	Body	GPRS	Integral	Body	Flat	Belt Clip	0.110	1.6	5
Body-Worn	1909.8	Body	GPRS	Integral	Body	Flat	Belt Clip	0.124	1.6	6

Note:

Two antennas are available for the EUT, one is GSM/PCS antenna, the other is Bluetooth antenna, the distance between GSM/PCS and Bluetooth is less than 2.5 cm, according to FCC KDB 648474 D01 SAR Handsets Multi Xmiter and ant, V01r05 released on September 2008, the Max coducted peak output power is 9.24 dBm, antenna gain of Bluetooth radio is 1.4 dBi, the maximum output power of BT is 9.24+1.4=10.64 dBm=11.59 mw < P_{Ref} (12 mw), stand-alone SAR is not required for Bluetooth antenna. The max SAR of licensed is 0.881 W/Kg, simultaneous transmission for SAR evaluation is not required.

APPENDIX A – MEASUREMENT UNCERTAINTY

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

Exposure Assessment Measurement Uncertainty

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	c_i^1 (1-g)	c_i^1 (10-g)	Standard Uncertainty (1-g) %	Standard Uncertainty (10-g) %
Measurement System							
Probe Calibration	3.5	normal	1	1	1	3.5	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1\text{-cp})^{1/2}$	$(1\text{-cp})^{1}_{/2}$	1.5	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	$\sqrt{cp}$	4.4	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Readout Electronics	1.0	normal	1	1	1	1.0	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Probe Positioner Mech.	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	4.0	normal	1	1	1	4.0	4.0
Device Holder Uncertainty	2.0	normal	1	1	1	2.0	2.0
Drift of Output Power	3.2	rectangular	$\sqrt{3}$	1	1	1.8	1.8
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.)	0.0	normal	1	0.7	0.5	0.0	0.0
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7	1.4
Liquid Permittivity(meas.)	0.0	normal	1	0.6	0.5	0.0	0.0
Combined Uncertainty		RSS				9.4	9.2
Combined Uncertainty (coverage factor=2)		Normal(k=2)				18.8	18.5

APPENDIX B – PROBE CALIBRATION CERTIFICATES

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-1013

Client.: BACL

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 835 MHz

Manufacturer: APREL Laboratories
Model No.: E-020
Serial No.: 273

Calibration in Head Tissue

Calibration Procedure: SSI/DRB-TP-D01-032-E020-V2
Project No: BACB-E field probe-cal-5476

Calibrated: 5th September 2009
Released on: 9th September 2009

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

Released By: 

NCL CALIBRATION LABORATORIES
51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E6
Division of APREL Lab.
TEL: (613) 820-4988
FAX: (613) 820-4161

NCL Calibration Laboratories
Division of APREL Laboratories.

Introduction

This Calibration Report reproduces the results of the calibration performed in line with the SSI/DRB-TP-D01-032-E020-V2 E-Field Probe Calibration Procedure. The results contained within this report are for APREL E-Field Probe E-020 273.

References

SSI/DRB-TP-D01-032-E020-V2 E-Field Probe 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"
SSI-TP-011 Tissue Calibration Procedure

Conditions

Probe 273 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 probe has been accurately conducted and that all information contained within this report has been reviewed for accuracy.

Stuart Nicol

Jesse Hones

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

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Division of APREL Laboratories.

Calibration Results Summary

Probe Type:	E-Field Probe E-020
Serial Number:	273
Frequency:	835 MHz
Sensor Offset:	1.56 mm
Sensor Length:	2.5 mm
Tip Enclosure:	Ertalyte*
Tip Diameter:	<5 mm
Tip Length:	60 mm
Total Length:	290 mm

*Resistive to recommended tissue recipes per IEEE-1528

Sensitivity in Air

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

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

Sensitivity in Head Tissue Measured

Frequency: 835 MHz

Epsilon: 41.24 (+/-5%) **Sigma:** 0.87 S/m (+/-5%)

ConvF

Channel X: 6.5

Channel Y: 6.5

Channel Z: 6.5

Tissue sensitivity values were calculated using the load impedance of the APREL Laboratories Daq-Paq.

Boundary Effect:

Uncertainty resulting from the boundary effect is less than 2% for the distance between the tip of the probe and the tissue boundary, when less than 2.44mm.

Spatial Resolution:

The measured probe tip diameter is 5 mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.

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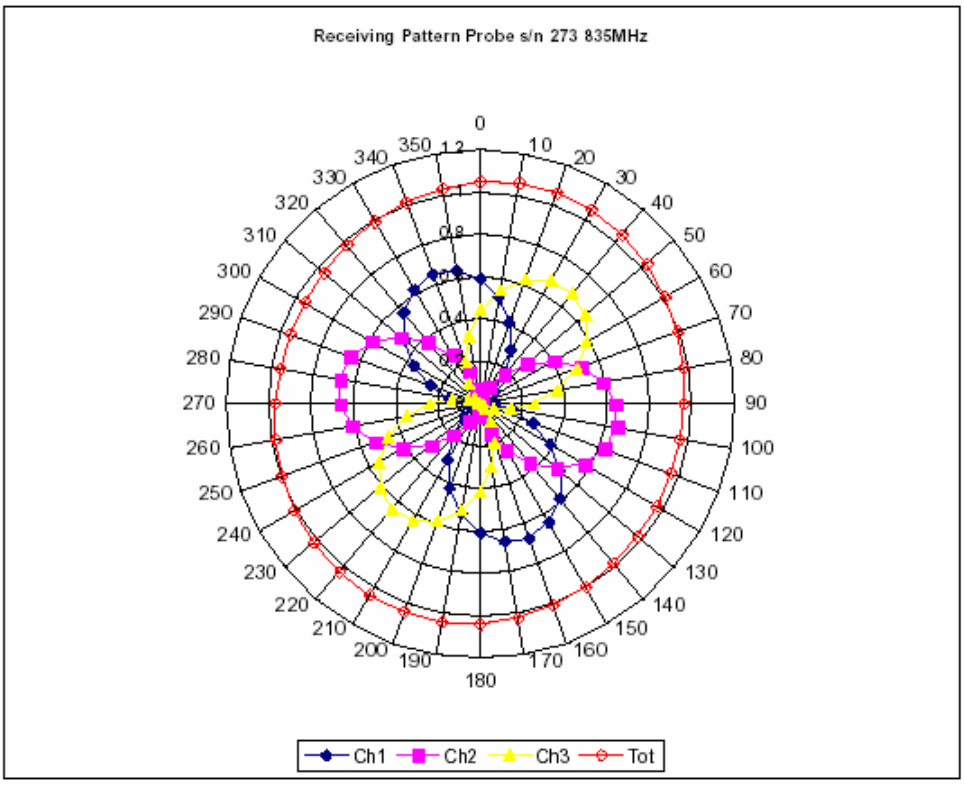
Division of APREL Laboratories.

Receiving Pattern 835 MHz (Air)



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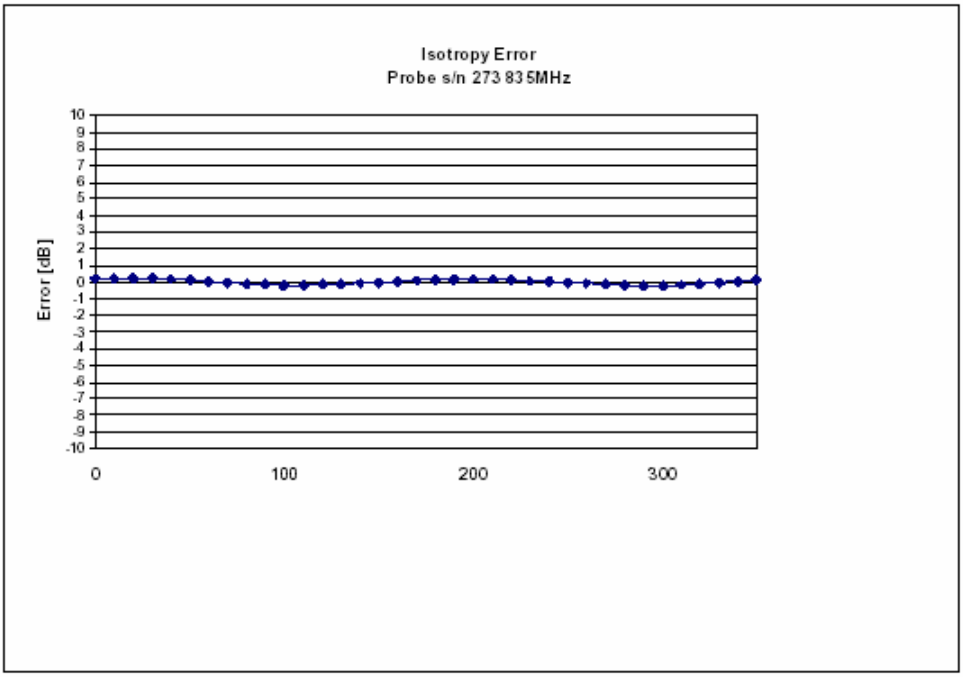
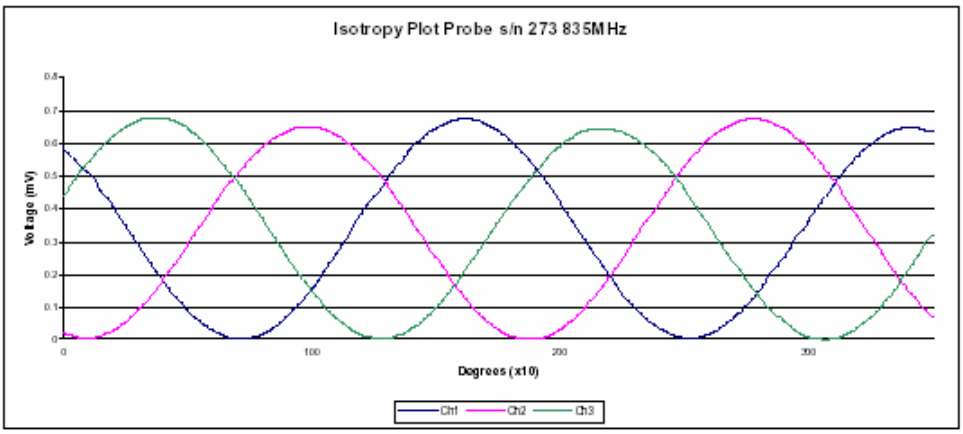
Isotropy Error 835 MHz (Air)





Isotropicity Tissue: 0.10 dB

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

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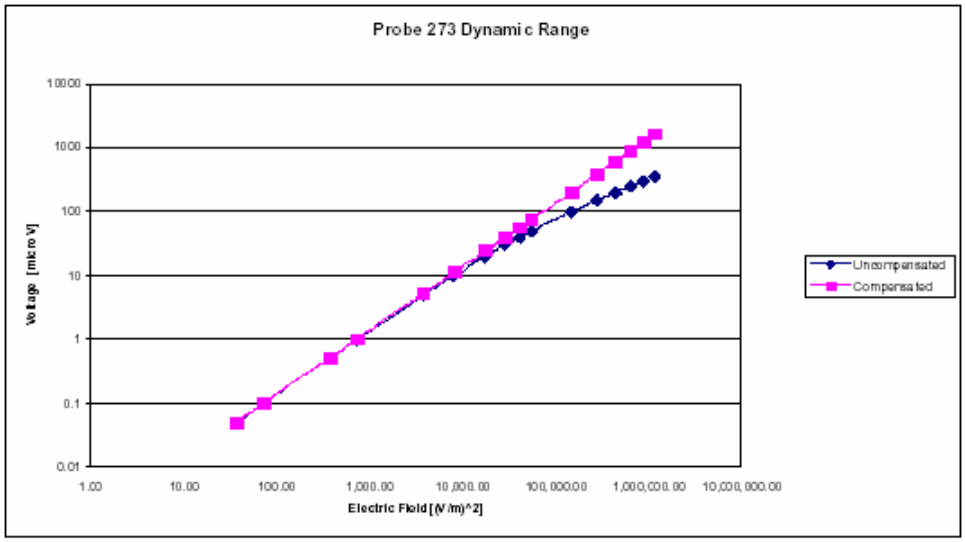
Dynamic Range



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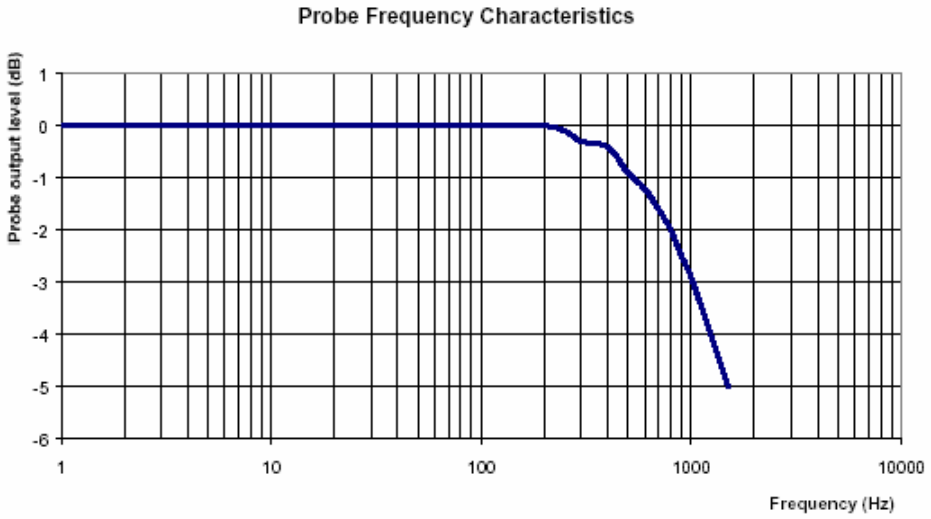
Video Bandwidth



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

NCL Calibration Laboratories
Division of APREL Laboratories.

Conversion Factor Uncertainty Assessment

Frequency:		835MHz	
Epsilon:	41.24 (+/-5%)	**Sigma:**	0.87 S/m (+/-5%)
ConvF			
Channel X:	6.5	7%(K=2)	
Channel Y:	6.5	7%(K=2)	
Channel Z:	6.5	7%(K=2)	

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

Boundary Effect:

For a distance of 2.5mm the evaluated uncertainty (increase in the probe sensitivity) is less than 2%.

NCL Calibration Laboratories
Division of APREL Laboratories.

Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2009.

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-1014

Client.: BACL

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 835 MHz

Manufacturer: APREL Laboratories
Model No.: E-020
Serial No.: 273

Calibration in Body Tissue

Calibration Procedure: SSI/DRB-TP-D01-032-E020-V2
Project No: BACB-E field probe-cal-5476

Calibrated: 5th September 2009
Released on: 9th September 2009

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

Released By: _____

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Introduction

This Calibration Report reproduces the results of the calibration performed in line with the SSI/DRB-TP-D01-032-E020-V2 E-Field Probe Calibration Procedure. The results contained within this report are for APREL E-Field Probe E-020 273.

References

SSI/DRB-TP-D01-032-E020-V2 E-Field Probe 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"
SSI-TP-011 Tissue Calibration Procedure

Conditions

Probe 273 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 probe has been accurately conducted and that all information contained within this report has been reviewed for accuracy.

Stuart Nicol

Jesse Hones

NCL Calibration Laboratories
Division of APREL Laboratories.

Calibration Results Summary

Probe Type:	E-Field Probe E-020
Serial Number:	273
Frequency:	835 MHz
Sensor Offset:	1.56 mm
Sensor Length:	2.5 mm
Tip Enclosure:	Ertalyte*
Tip Diameter:	<5 mm
Tip Length:	60 mm
Total Length:	290 mm

*Resistive to recommended tissue recipes per IEEE-1528

Sensitivity in Air

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

Sensitivity in Body Tissue Measured

Frequency: 835 MHz

Epsilon: 56.16 (+/-5%) **Sigma:** 0.99 S/m (+/-10%)

ConvF

Channel X: 6.7

Channel Y: 6.7

Channel Z: 6.7

Tissue sensitivity values were calculated using the load impedance of the APREL Laboratories Daq-Paq.

Boundary Effect:

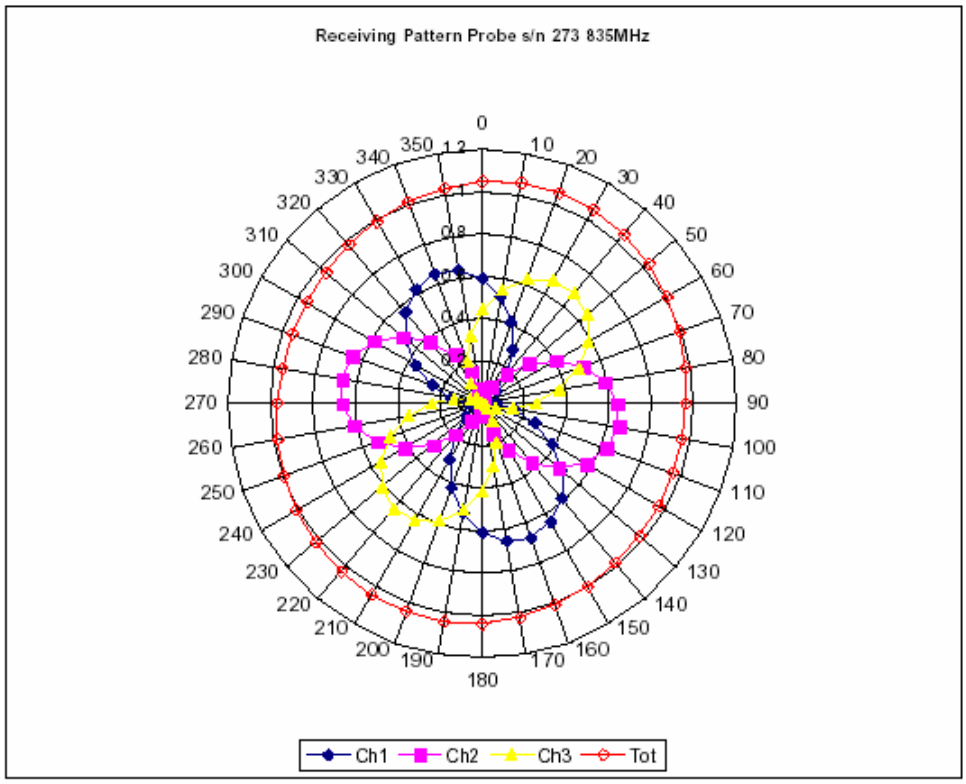
Uncertainty resulting from the boundary effect is less than 2% for the distance between the tip of the probe and the tissue boundary, when less than 2.44mm.

Spatial Resolution:

The measured probe tip diameter is 5 mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.

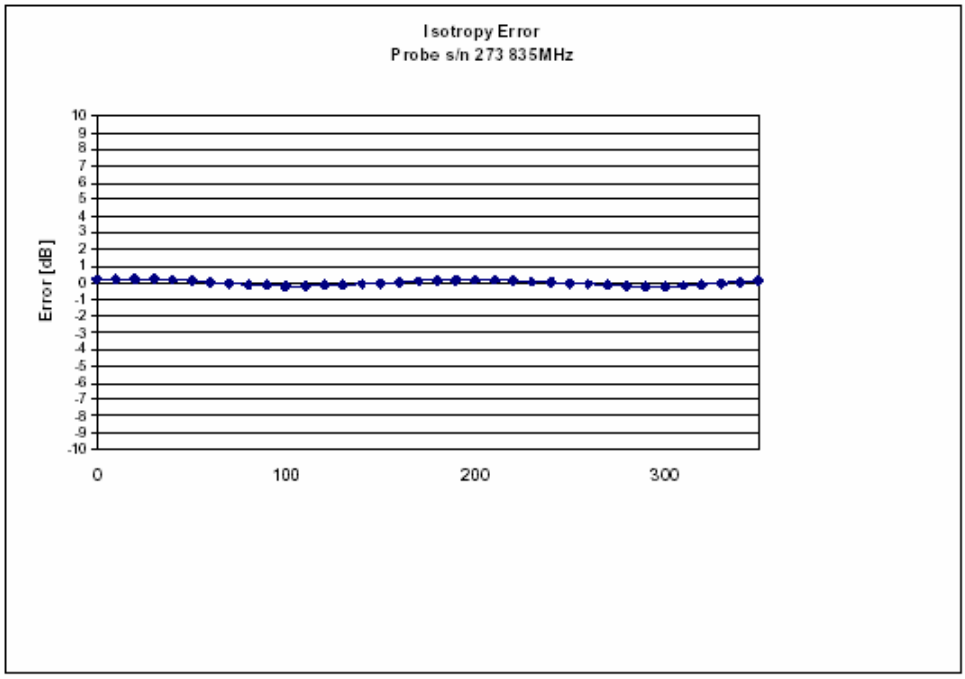
NCL Calibration Laboratories
Division of APREL Laboratories.

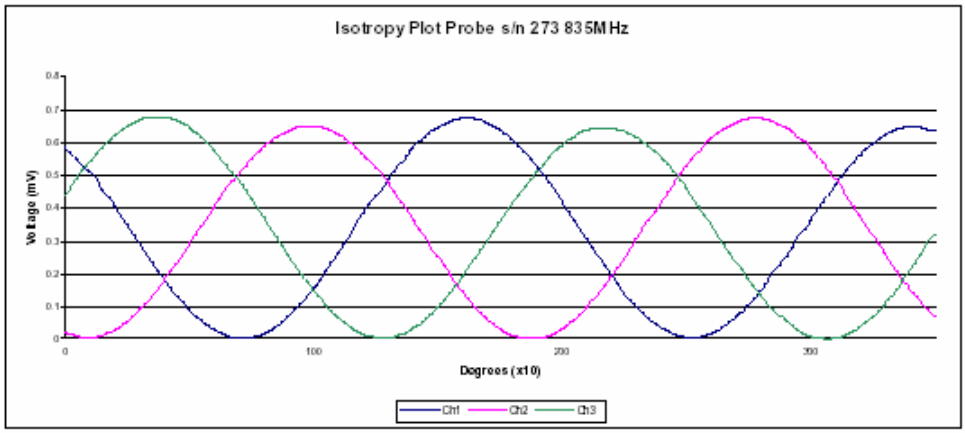
Receiving Pattern 835 MHz (Air)



NCL Calibration Laboratories
Division of APREL Laboratories.

Isotropy Error 835 MHz (Air)

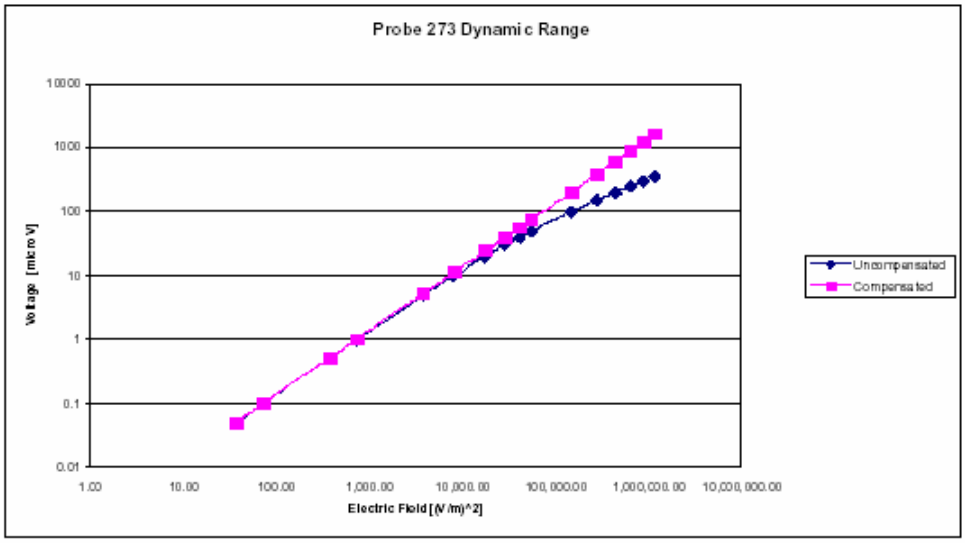




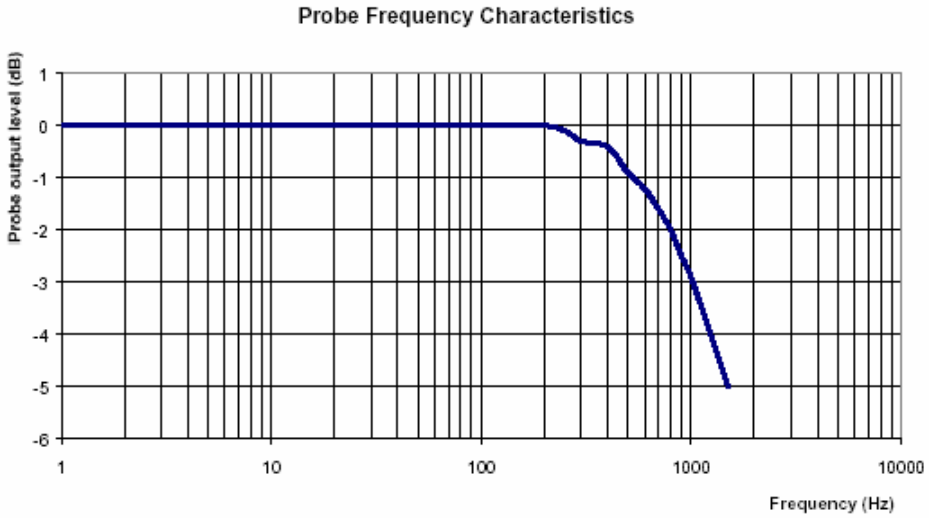
Isotropicity in Tissue: 0.10 dB

NCL Calibration Laboratories
Division of APREL Laboratories.

Dynamic Range



Video Bandwidth



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

NCL Calibration Laboratories
Division of APREL Laboratories.

Conversion Factor Uncertainty Assessment

Frequency:		835MHz	
Epsilon:	56.16 (+/-5%)	**Sigma:**	0.99 S/m (+/-10%)
ConvF			
Channel X:	6.7	7%(K=2)	
Channel Y:	6.7	7%(K=2)	
Channel Z:	6.7	7%(K=2)	

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

Boundary Effect:

For a distance of 2.4mm the evaluated uncertainty (increase in the probe sensitivity) is less than 2%.

Page 9 of 10
This page has been reviewed for content and attested to on Page 2 of this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2009.

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-1015

Client.: BACL

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 1900 MHz

Manufacturer: APREL Laboratories
Model No.: E-020
Serial No.: 273

Calibration in Head Tissue

Calibration Procedure: SSI/DRB-TP-D01-032-E020-V2
Project No: BACB-E field probe-cal-5476

Calibrated: 7th September 2009
Released on: 9th September 2009

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

Released By: _____

NCL CALIBRATION LABORATORIES
51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E6
Division of APREL Lab.
TEL: (613) 820-4988
FAX: (613) 820-4161

NCL Calibration Laboratories
Division of APREL Laboratories.

Introduction

This Calibration Report reproduces the results of the calibration performed in line with the SSI/DRB-TP-D01-032-E020-V2 E-Field Probe Calibration Procedure. The results contained within this report are for APREL E-Field Probe E-020 273.

References

SSI/DRB-TP-D01-032-E020-V2 E-Field Probe 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"
SSI-TP-011 Tissue Calibration Procedure

Conditions

Probe 273 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 probe has been accurately conducted and that all information contained within this report has been reviewed for accuracy.

Stuart Nicol

Jesse Hones

Calibration Results Summary

Probe Type:	E-Field Probe E-020
Serial Number:	273
Frequency:	1900 MHz
Sensor Offset:	1.56 mm
Sensor Length:	2.5 mm
Tip Enclosure:	Ertalyte*
Tip Diameter:	<5 mm
Tip Length:	60 mm
Total Length:	290 mm

*Resistive to recommended tissue recipes per IEEE-1528

Sensitivity in Air

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

Sensitivity in Head Tissue Measured

Frequency: 1900 MHz

Epsilon: 38.50 (+/-5%) **Sigma:** 1.40 S/m (+/-5%)

ConvF

Channel X: 5.25

Channel Y: 5.25

Channel Z: 5.25

Tissue sensitivity values were calculated using the load impedance of the APREL Laboratories Daq-Paq.

Boundary Effect:

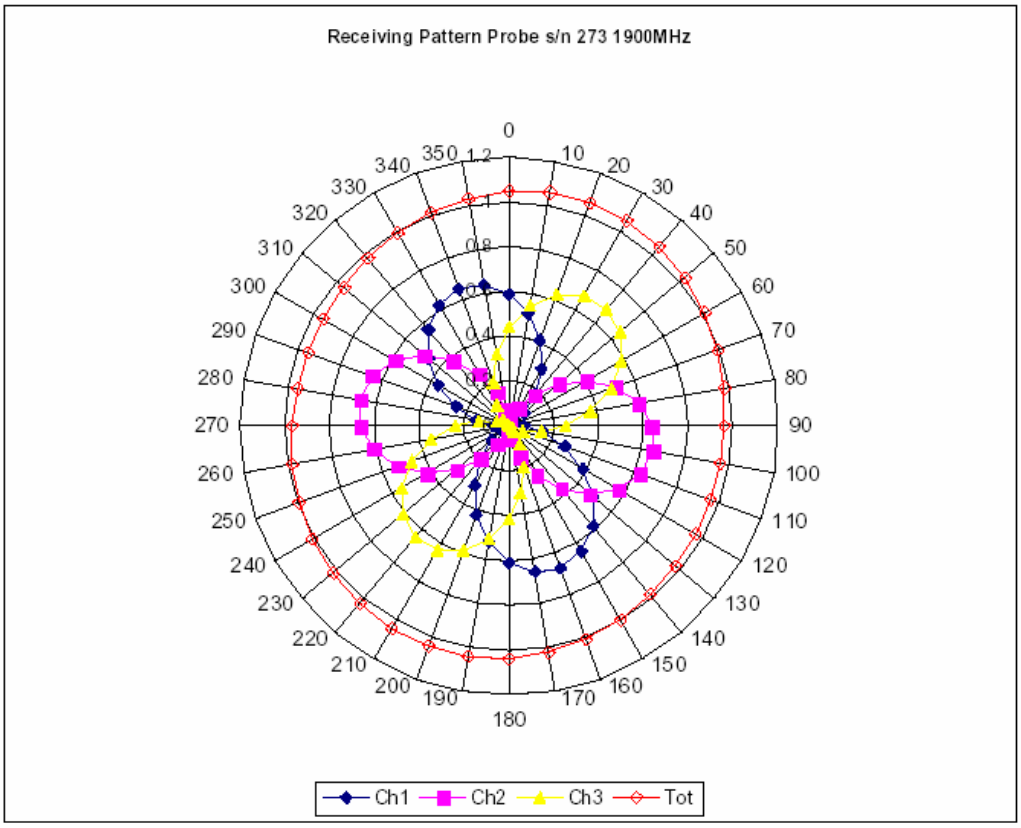
Uncertainty resulting from the boundary effect is less than 2% for the distance between the tip of the probe and the tissue boundary, when less than 2.44mm.

Spatial Resolution:

The measured probe tip diameter is 5 mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.

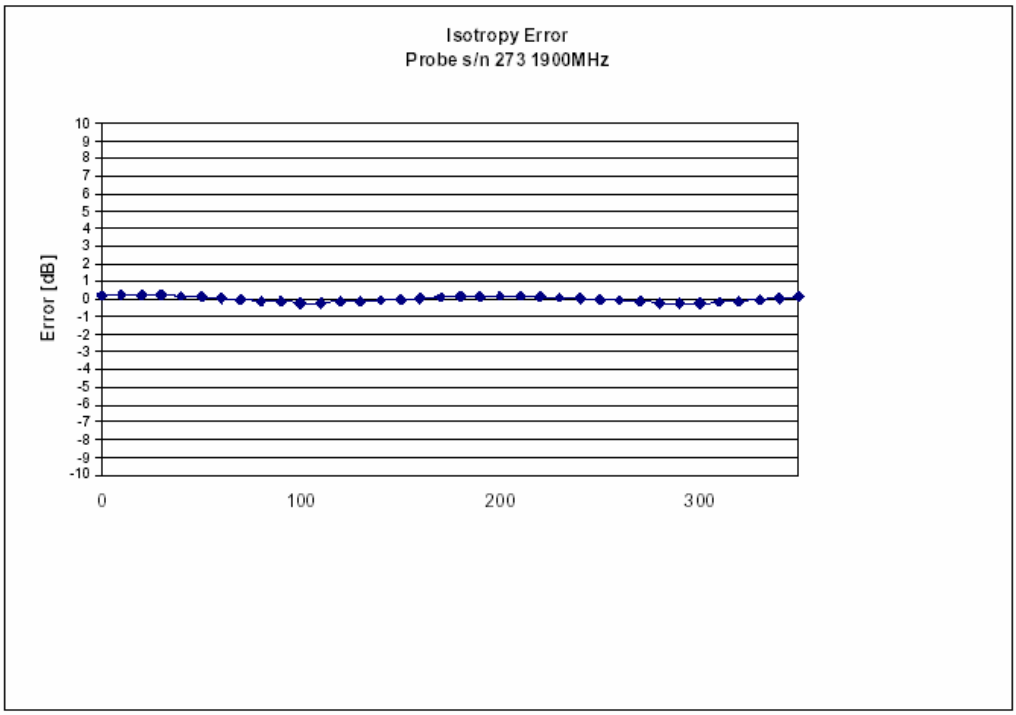
NCL Calibration Laboratories
Division of APREL Laboratories.

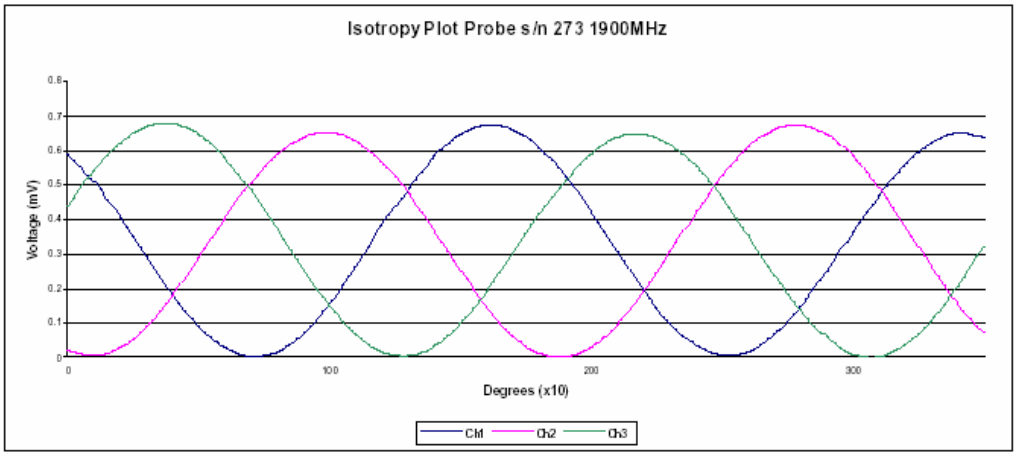
Receiving Pattern 1900 MHz (Air)



NCL Calibration Laboratories
Division of APREL Laboratories.

Isotropy Error 1900 MHz (Air)

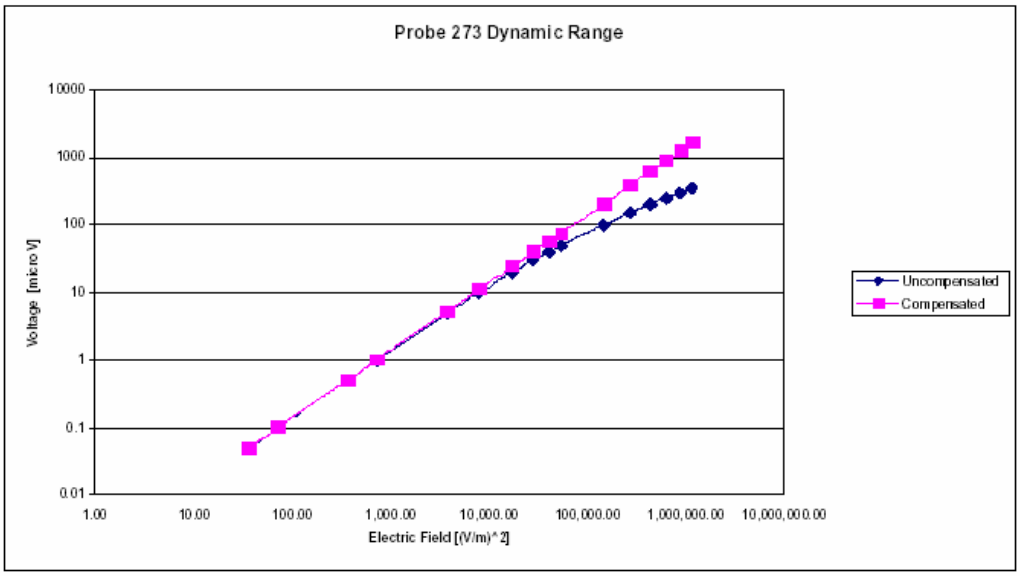




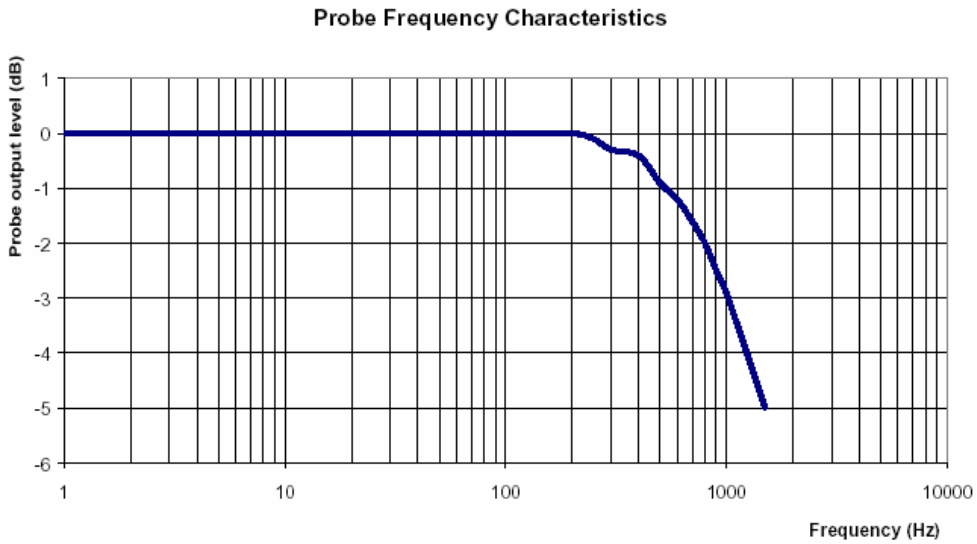
Isotropicity in Tissue: 0.10 dB

NCL Calibration Laboratories
Division of APREL Laboratories.

Dynamic Range



Video Bandwidth



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

Conversion Factor Uncertainty Assessment

Frequency:		1900MHz	
Epsilon:	38.50 (+/-5%)	**Sigma:**	1.40 S/m (+/-5%)
ConvF			
Channel X:	5.25	7%(K=2)	
Channel Y:	5.25	7%(K=2)	
Channel Z:	5.25	7%(K=2)	

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

Boundary Effect:

For a distance of 2.4mm the evaluated uncertainty (increase in the probe sensitivity) is less than 2%.

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 2009.

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-1016

Client.: BACL

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 1900 MHz

Manufacturer: APREL Laboratories
Model No.: E-020
Serial No.: 273

Calibration in Body Tissue

Calibration Procedure: SSI/DRB-TP-D01-032-E020-V2
Project No: BACB-E field probe-cal-5476

Calibrated: 7th September 2009
Released on: 9th September 2009

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

Released By: _____

NCL CALIBRATION LABORATORIES
51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E6
Division of APREL Lab.
TEL: (613) 820-4988
FAX: (613) 820-4161

NCL Calibration Laboratories
Division of APREL Laboratories.

Introduction

This Calibration Report reproduces the results of the calibration performed in line with the SSI/DRB-TP-D01-032-E020-V2 E-Field Probe Calibration Procedure. The results contained within this report are for APREL E-Field Probe E-020 273.

References

SSI/DRB-TP-D01-032-E020-V2 E-Field Probe 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"
SSI-TP-011 Tissue Calibration Procedure

Conditions

Probe 273 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 probe has been accurately conducted and that all information contained within this report has been reviewed for accuracy.

Stuart Nicol

Jesse Hones

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 Laboratories.

Calibration Results Summary

Probe Type:	E-Field Probe E-020
Serial Number:	273
Frequency:	1900 MHz
Sensor Offset:	1.56 mm
Sensor Length:	2.5 mm
Tip Enclosure:	Ertalyte*
Tip Diameter:	<5 mm
Tip Length:	60 mm
Total Length:	290 mm

*Resistive to recommended tissue recipes per IEEE-1528

Sensitivity in Air

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

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

Sensitivity in Body Tissue Measured

Frequency: 1900 MHz

Epsilon: 53.05 (+/-5%) **Sigma:** 1.58 S/m (+/-5%)

ConvF

Channel X: 5.15

Channel Y: 5.15

Channel Z: 5.15

Tissue sensitivity values were calculated using the load impedance of the APREL Laboratories Daq-Paq.

Boundary Effect:

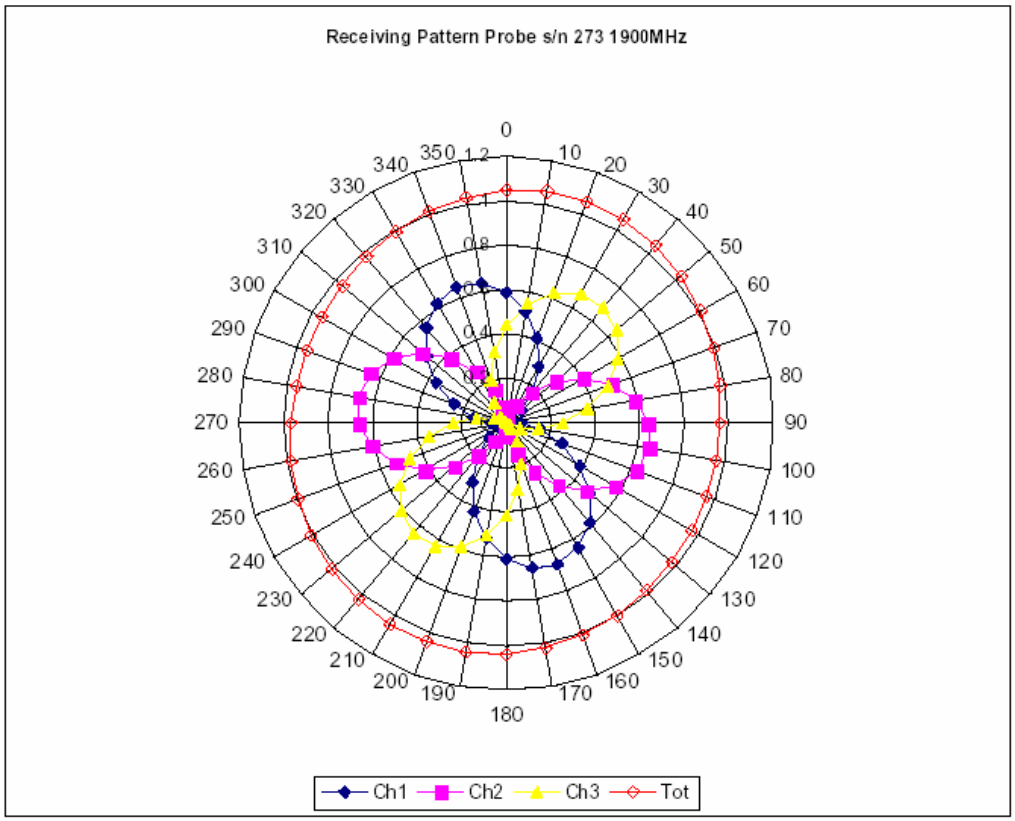
Uncertainty resulting from the boundary effect is less than 2% for the distance between the tip of the probe and the tissue boundary, when less than 2.44mm.

Spatial Resolution:

The measured probe tip diameter is 5 mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.

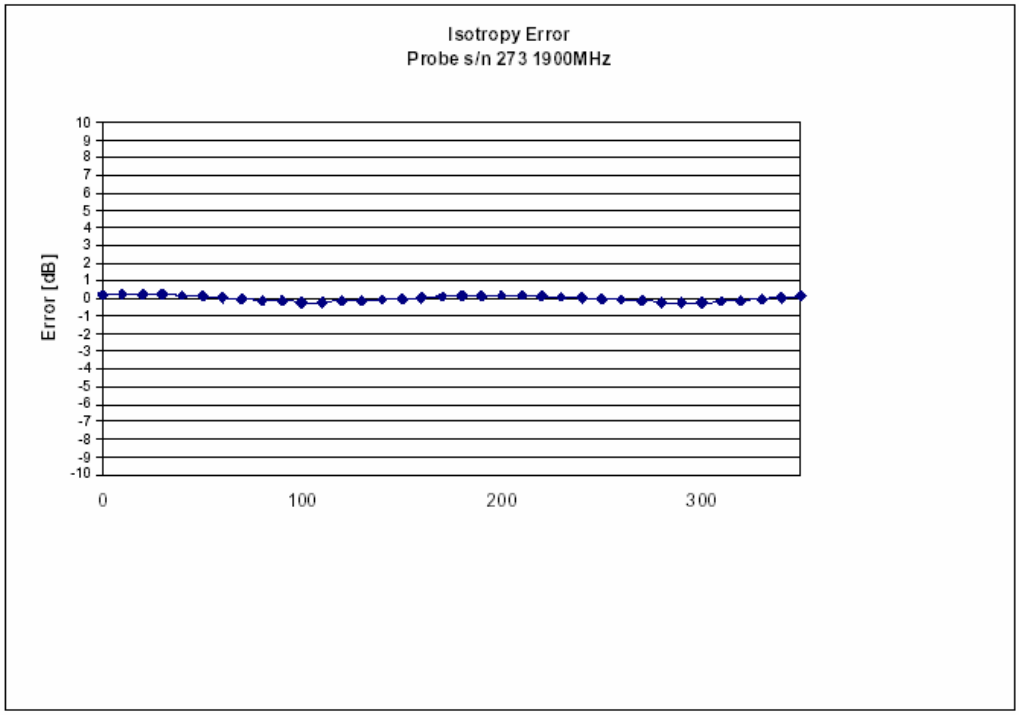
NCL Calibration Laboratories
Division of APREL Laboratories.

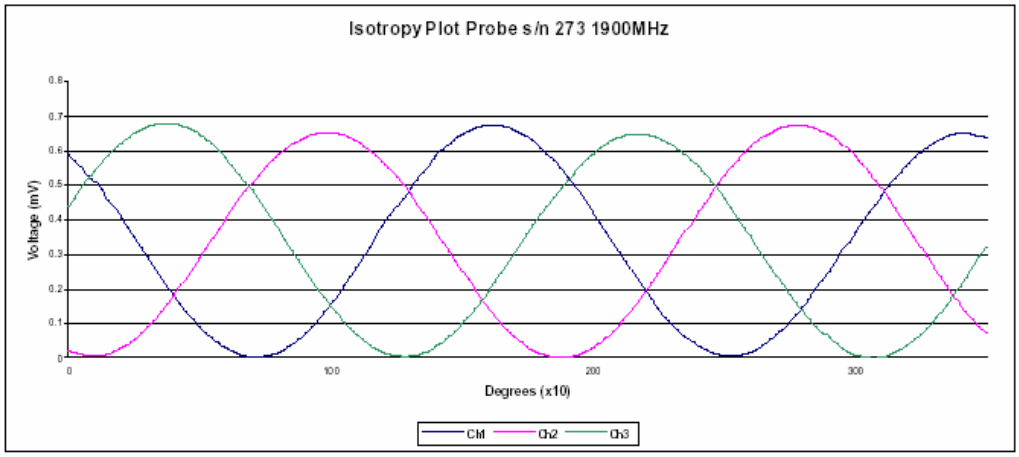
Receiving Pattern 1900 MHz (Air)



NCL Calibration Laboratories
Division of APREL Laboratories.

Isotropy Error 1900 MHz (Air)

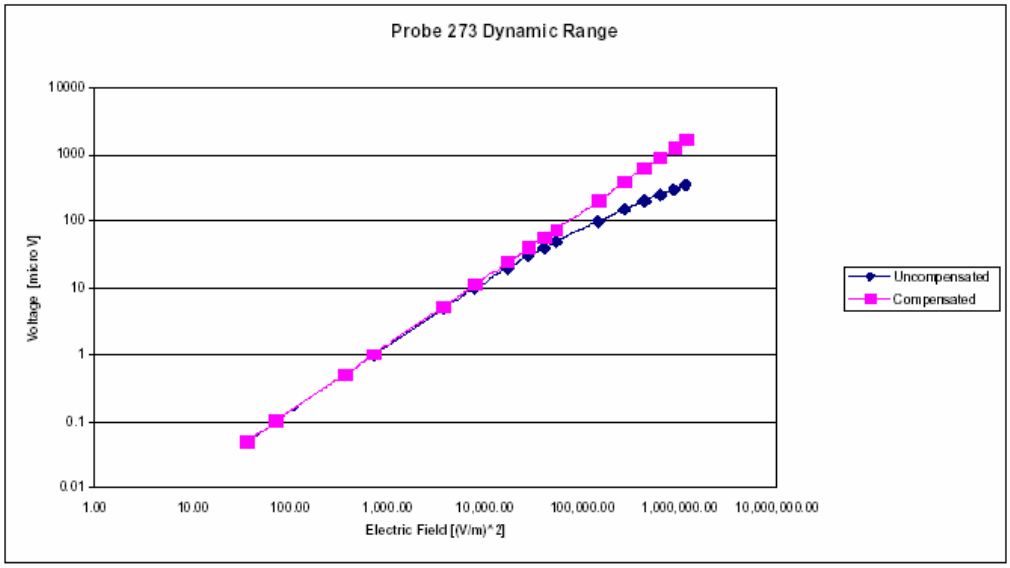




Isotropicity in Tissue: 0.10 dB

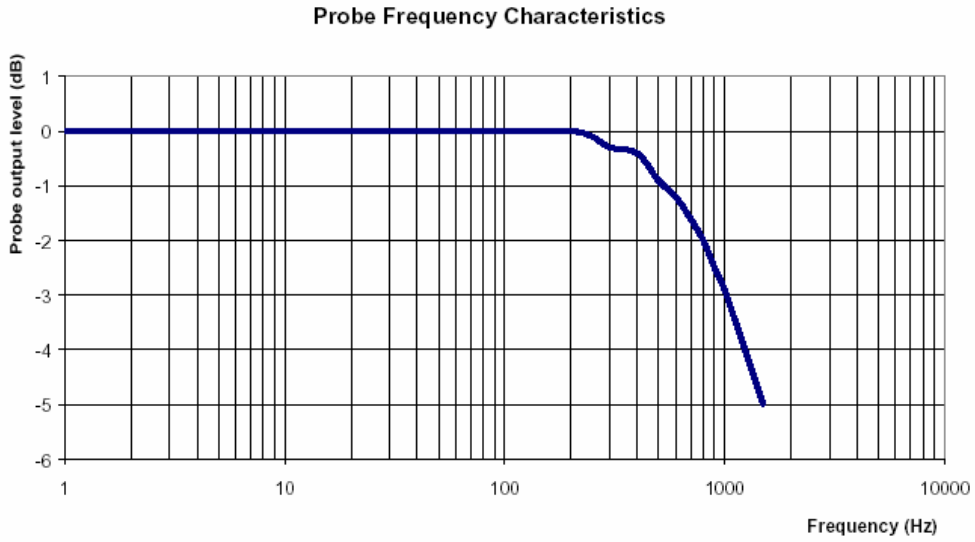
NCL Calibration Laboratories
Division of APREL Laboratories.

Dynamic Range



NCL Calibration Laboratories
Division of APREL Laboratories.

Video Bandwidth



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

Conversion Factor Uncertainty Assessment

Frequency:		1900MHz	
Epsilon:	53.05 (+/-5%)	**Sigma:**	1.58 S/m (+/-5%)
ConvF			
Channel X:	5.15	7%(K=2)	
Channel Y:	5.15	7%(K=2)	
Channel Z:	5.15	7%(K=2)	

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

Boundary Effect:

For a distance of 2.4mm the evaluated uncertainty (increase in the probe sensitivity) is less than 2%.

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 2009.

APPENDIX C – DIPOLE CALIBRATION CERTIFICATES

NCL CALIBRATION LABORATORIES

Calibration File No: DC-917
Project Number: BACL-ALSAS10U-5323

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

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

Customer: Bay Area Compliance Laboratory

Calibrated: 1st September 2008
Released on: 1st September 2008

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

Released By: _____

NCL CALIBRATION LABORATORIES
51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E6
Division of APREL Lab.
TEL: (613) 820-4988
FAX: (613) 820-4162

NCL Calibration Laboratories
Division of APREL Laboratories.

Conditions

Dipole 180-00558 was new and taken from stock prior to 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

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

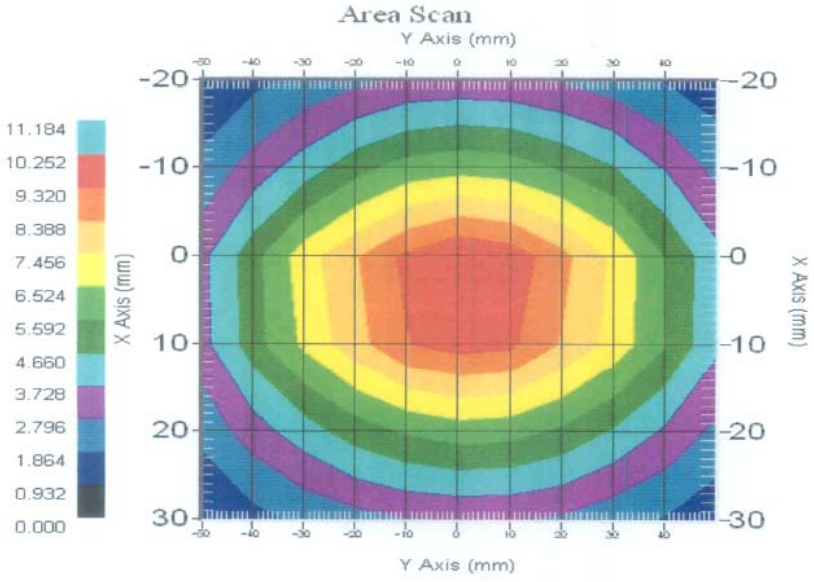
Length: 162.2 mm
Height: 89.4 mm

Electrical Specification

SWR: 1.018 U
Return Loss: -41.371 dB
Impedance: 51.739 Ω

System Validation Results

Frequency	1 Gram	10 Gram	Peak
835 MHz	9.49	6.1	14.21



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

NCL Calibration Laboratories
Division of APREL Laboratories.

Introduction

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

References

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

Conditions

Dipole 180-00558 was new taken from stock.

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

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Dipole Calibration Results

Mechanical Verification

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

Tissue Validation

Head Tissue 835MHz	Measured
Dielectric constant, ε_r	41.12
Conductivity, σ [S/m]	0.92

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

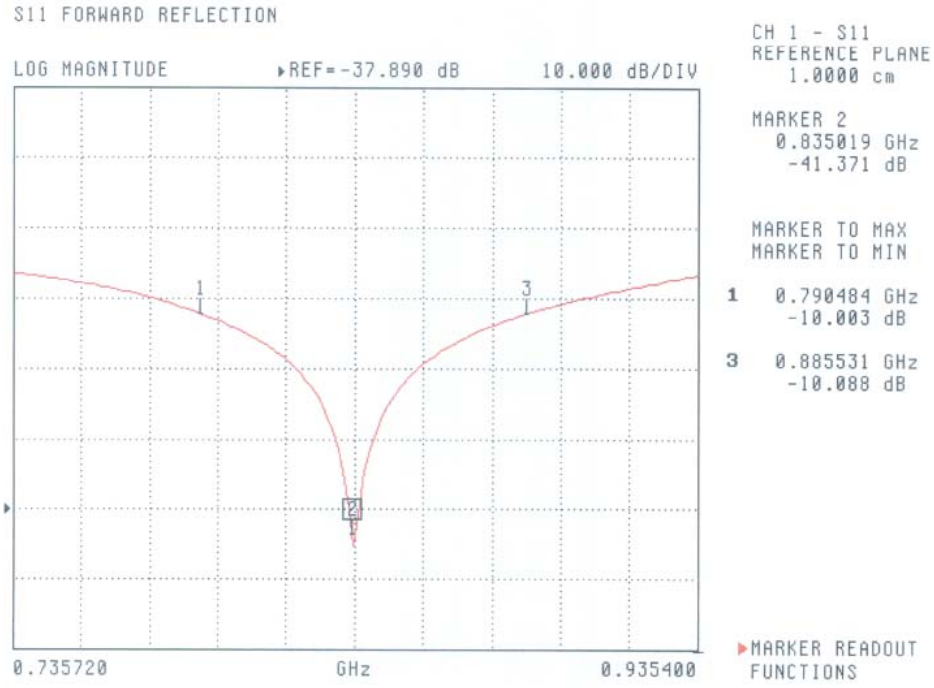
NCL Calibration Laboratories
Division of APREL Laboratories.

Electrical Calibration

Test	Result
S11 RL	-41.371 dB
SWR	1.018 U
Impedance	51.739 Ω

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

S11 Parameter Return Loss



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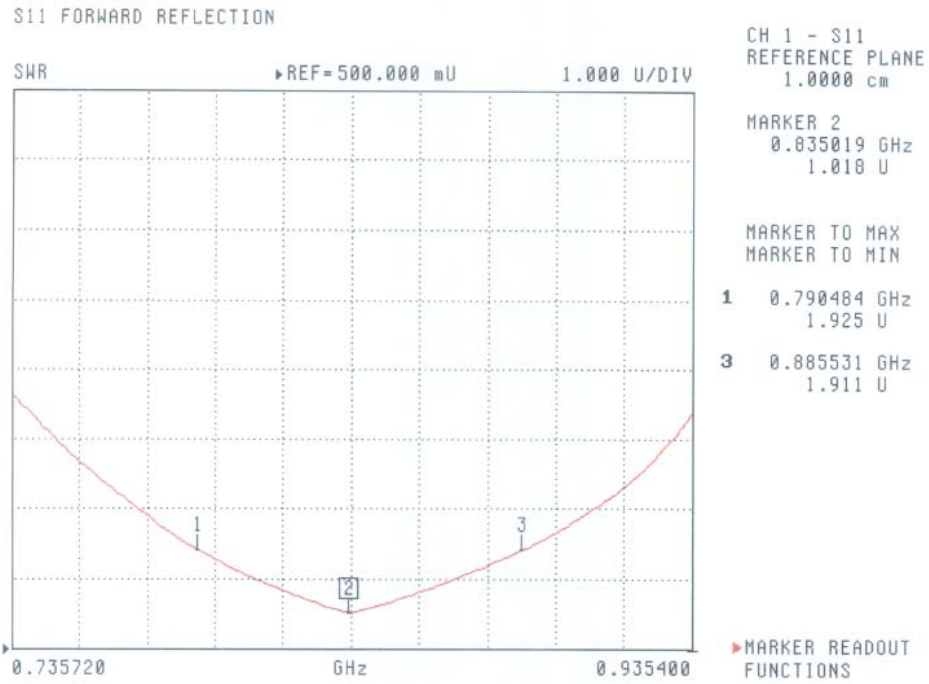
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

SWR



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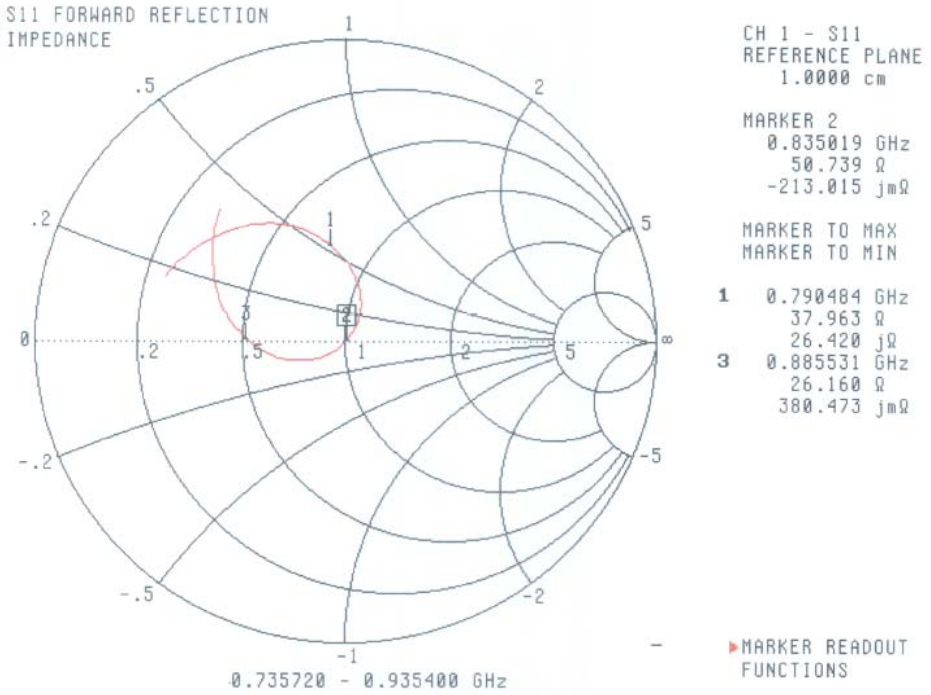
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

Smith Chart Dipole Impedance



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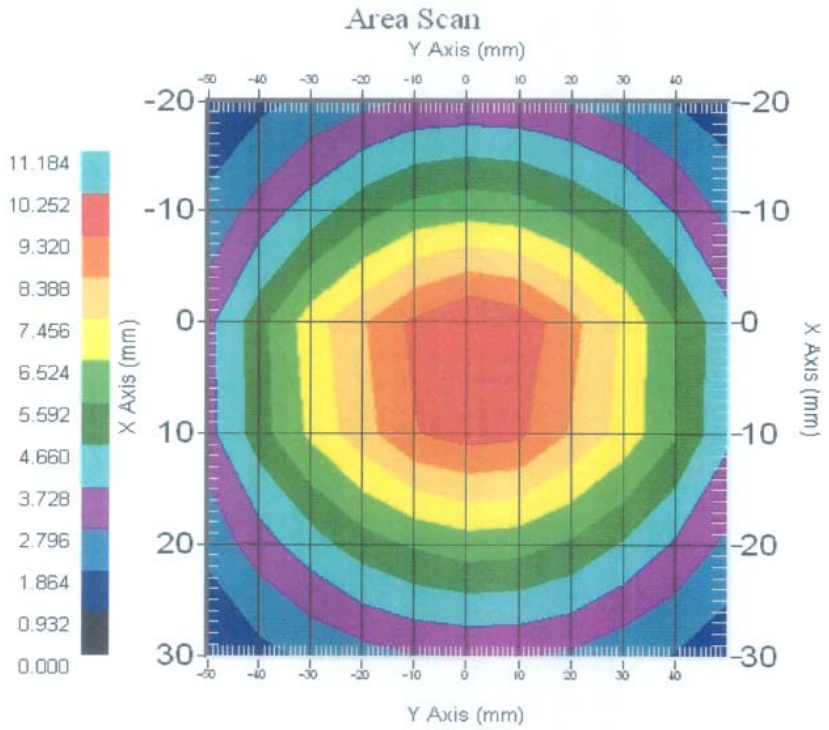
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

System Validation Results Using the Electrically Calibrated Dipole

Head Tissue Frequency	1 Gram	10 Gram	Peak Above Feed Point
835 MHz	9.49	6.1	14.21



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

9

NCL Calibration Laboratories
Division of APREL Laboratories.

Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List 2008.

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

NCL CALIBRATION LABORATORIES

Calibration File No: DC-920
Project Number: BACL-ALSAS10U-5323

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

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

Customer: Bay Area Compliance Laboratory

Calibrated: 1st September 2008
Released on: 1st September 2008

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

Released By: _____

NCL CALIBRATION LABORATORIES
51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E6
Division of APREL Lab.
TEL: (613) 820-4988
FAX: (613) 820-4162

NCL Calibration Laboratories
Division of APREL Laboratories.

Conditions

Dipole 210-00710 was new and taken from stock prior to 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

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Calibration Results Summary

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

Mechanical Dimensions

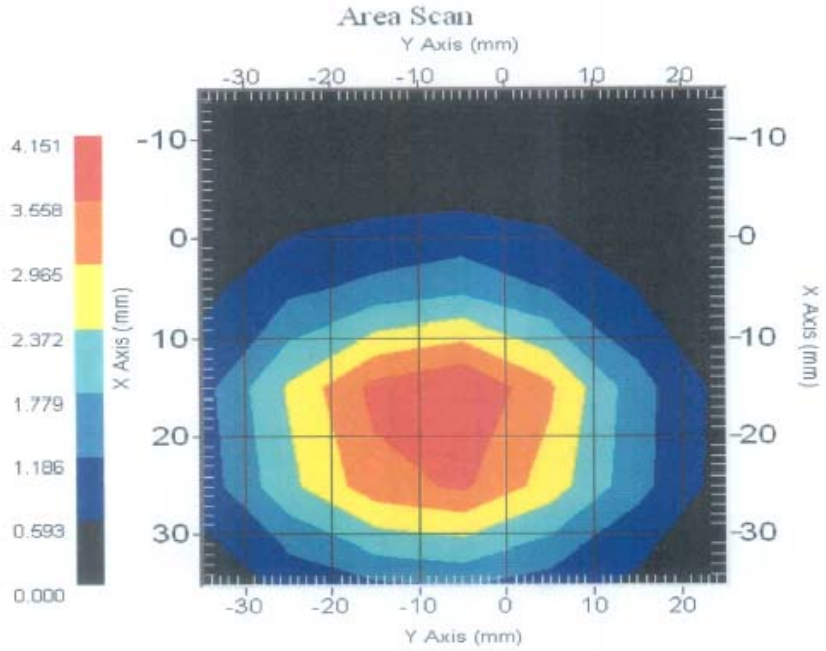
Length: 67.1 mm
Height: 38.9 mm

Electrical Specification

SWR: 1.059 U
Return Loss: -30.831 dB
Impedance: 50.914 Ω

System Validation Results

Frequency	1 Gram	10 Gram	Peak
1900 MHz	38.7	20.5	69.7



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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

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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

Tissue Validation

Head Tissue 1900 MHz	Measured
Dielectric constant, ε_r	40.03
Conductivity, σ [S/m]	1.38

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Electrical Calibration

Test	Result
S11 R/L	-30.831 dB
SWR	1.059 U
Impedance	50.914 Ω

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

S11 Parameter Return Loss

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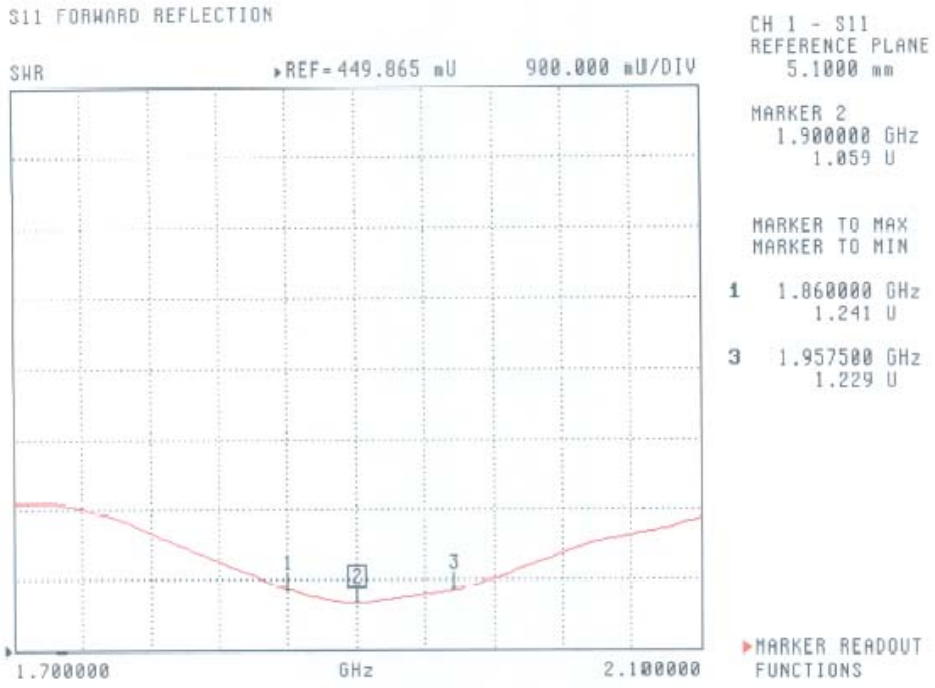
SWR



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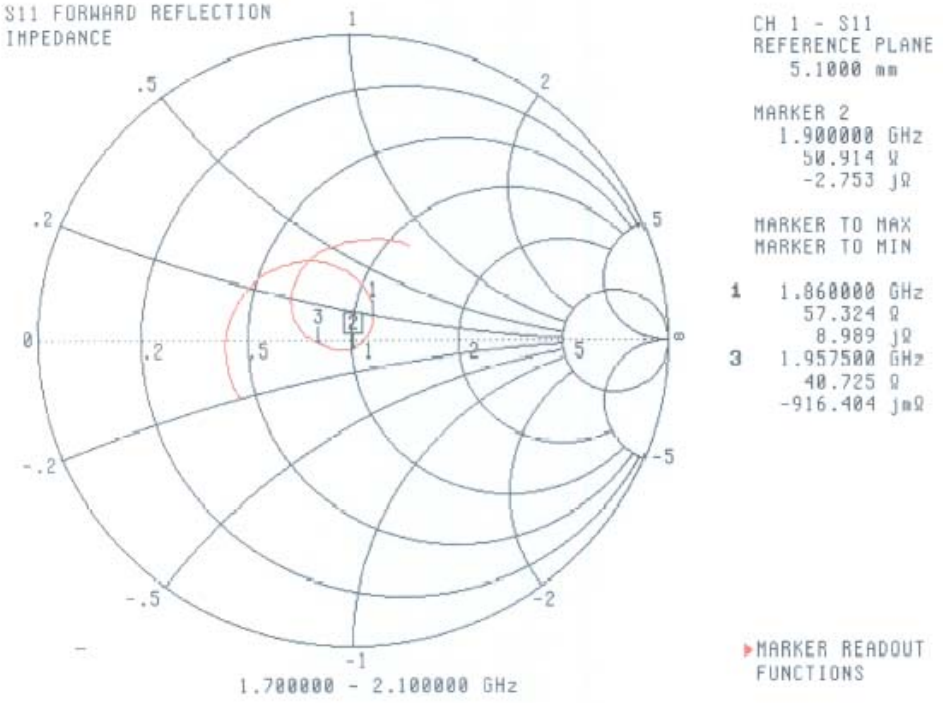
Smith Chart Dipole Impedance



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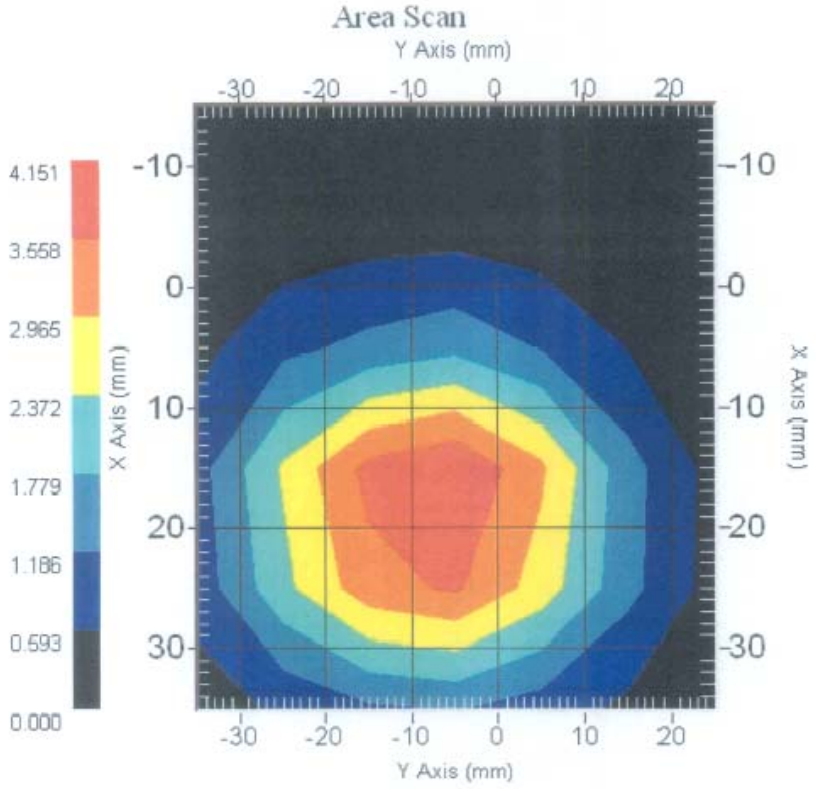
System Validation Results Using the Electrically Calibrated Dipole

Head Tissue Frequency	1 Gram	10 Gram	Peak Above Feed Point
1900 MHz	38.7	20.5	69.7



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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 2007.

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APPENDIX D – SAR SYSTEM VALIDATION DATA

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

System Performance Check 835 MHz Head Tissue

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

Product Data
Device Name : Dipole 835 MHz
Serial No. : 180-00558
Type : Dipole
Model : ALS-D-835-S-2
Frequency : 835.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 10.066 W/kg
Power Drift-Finish : 9.926 W/kg
Power Drift (%) : -1.391

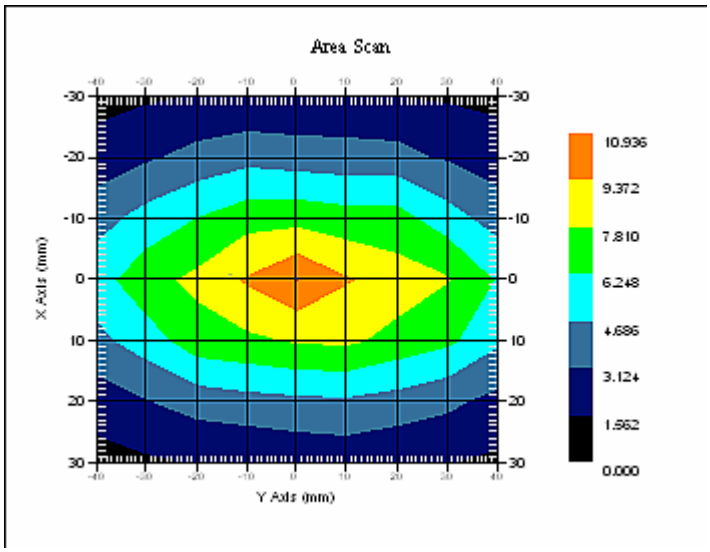
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default
Phantom Data

Tissue Data
Type : HEAD
Serial No. : 270-01002
Frequency : 835.00 MHz
Last Calib. Date : 08-Feb-2010
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 50.00 RH%
Epsilon : 41.26 F/m
Sigma : 0.90 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 273
Last Calib. Date : 07-Sep-2009
Frequency : 835.00 MHz
Duty Cycle Factor : 1
Conversion Factor : 6.5
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

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

1 gram SAR value : 9.651 W/kg
10 gram SAR value : 6.042 W/kg
Area Scan Peak SAR : 10.936 W/kg
Zoom Scan Peak SAR : 15.013 W/kg



835 MHz System Validation

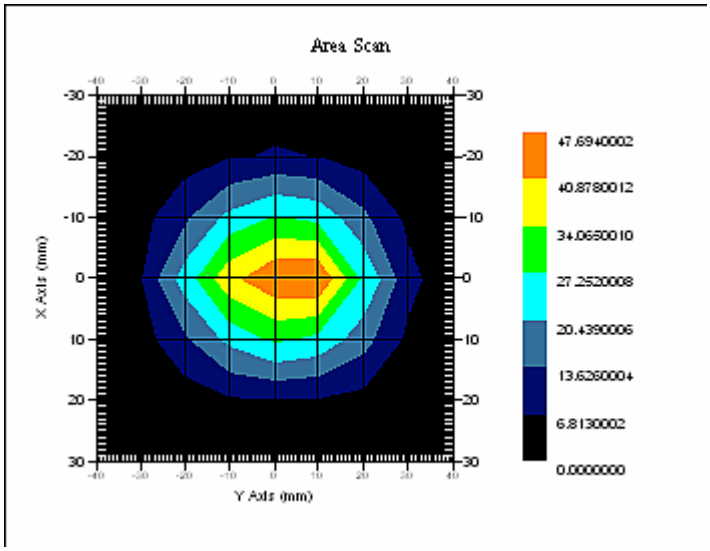
Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)

System Performance Check 1900 MHz Head Tissue

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

Product Data	
Device Name	: Dipole 1900MHz
Serial No.	: 210-00710
Type	: Dipole
Model	: ALS-D-1900-S-2
Frequency	: 1900.00 MHz
Max. Transmit Pwr	: 1 W
Drift Time	: 3 min(s)
Power Drift-Start	: 45.508 W/kg
Power Drift-Finish	: 47.121 W/kg
Power Drift (%)	: 3.545
Phantom Data	
Name	: APREL-Uni
Type	: Uni-Phantom
Size (mm)	: 280 x 280 x 200
Serial No.	: System Default
Location	: Center
Description	: Default
Tissue Data	
Type	: HEAD
Serial No.	: 295-01103
Frequency	: 1900.00 MHz
Last Calib. Date	: 08-Feb-2010
Temperature	: 20.00 °C
Ambient Temp.	: 20.00 °C
Humidity	: 56.00 RH%
Epsilon	: 40.26 F/m
Sigma	: 1.41 S/m
Density	: 1000.00 kg/cu. m
Probe Data	
Name	: E-Field
Model	: E-020
Type	: E-Field Triangle
Serial No.	: 273
Last Calib. Date	: 07-Sep-2009
Frequency	: 1900.00 MHz
Duty Cycle Factor	: 1
Conversion Factor	: 5.25
Probe Sensitivity	: 1.20 1.20 1.20 µV/(V/m)2
Compression Point	: 95.00 mV
Offset	: 1.56 mm
Measurement Data	
Crest Factor	: 1
Scan Type	: Complete
Tissue Temp.	: 20.00 °C
Ambient Temp.	: 20.00 °C
Area Scan	: 7x9x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan	: 7x7x7 : Measurement x=5mm, y=5mm, z=5mm

1 gram SAR value : 41.691 W/kg
10 gram SAR value : 21.315 W/kg
Area Scan Peak SAR : 45.694 W/kg
Zoom Scan Peak SAR : 80.675 W/kg



1900 MHz System Validation

APPENDIX E – EUT SCAN RESULTS

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

Body- worn Back (835 MHz, Low Channel)

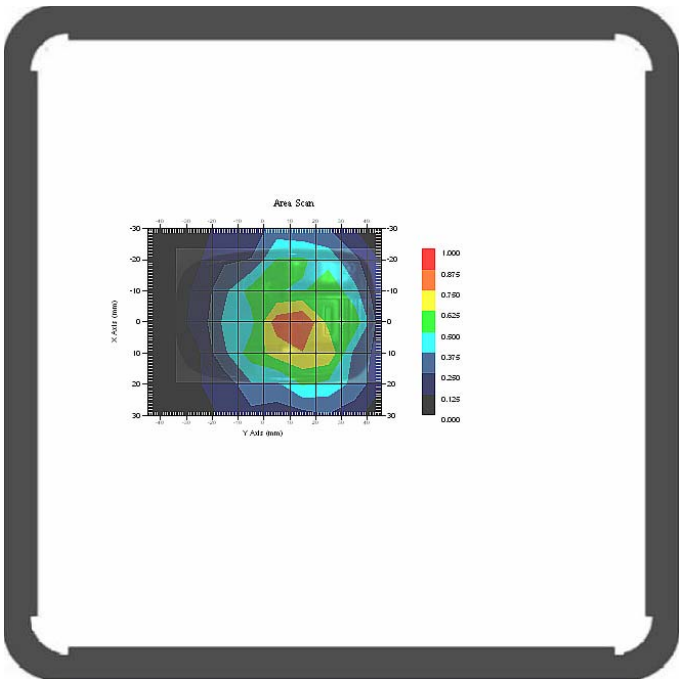
Measurement Data
Test mode : GPRS
Crest Factor : 8
Scan Type : Complete
Area Scan : 7x10x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.840 W/kg
Power Drift-Finish : 0.858 W/kg
Power Drift (%) : 2.131

Tissue Data
Type : BODY
Frequency : 835.00 MHz
Epsilon : 55.44 F/m
Sigma : 0.99 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 273
Frequency : 835.00 MHz
Duty Cycle Factor : 8
Conversion Factor : 6.7
Probe Sensitivity : 1.20 1.20 1.20 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.779 W/kg
10 gram SAR value : 0.519 W/kg
Area Scan Peak SAR : 0.876 W/kg
Zoom Scan Peak SAR : 1.131 W/kg

Plot 1#



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

Body- worn Back (835 MHz, Middle Channel)

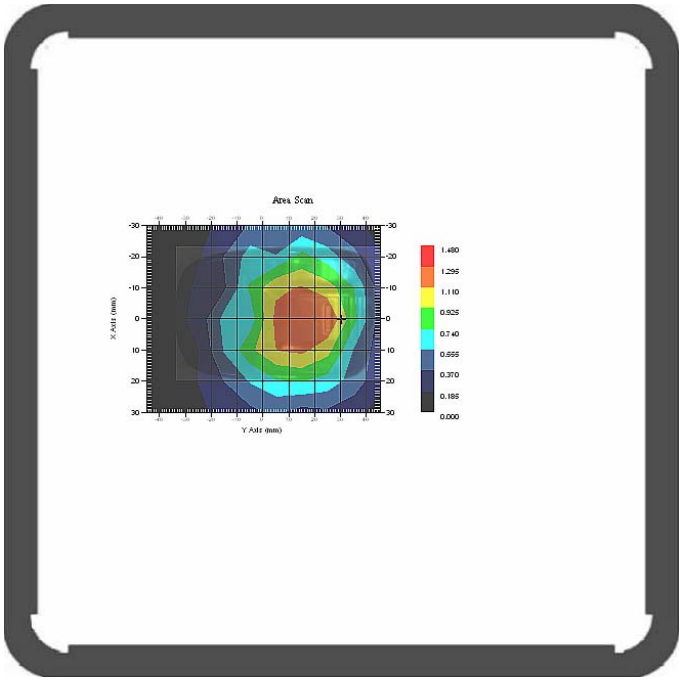
Measurement Data
Test mode : GPRS
Crest Factor : 8
Scan Type : Complete
Area Scan : 7x10x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 1.030 W/kg
Power Drift-Finish : 1.026 W/kg
Power Drift (%) : -1.147

Tissue Data
Type : BODY
Frequency : 835.00 MHz
Epsilon : 55.44 F/m
Sigma : 0.99 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 273
Frequency : 835.00 MHz
Duty Cycle Factor : 8
Conversion Factor : 6.7
Probe Sensitivity : 1.20 1.20 1.20 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.881 W/kg
10 gram SAR value : 0.634 W/kg
Area Scan Peak SAR : 1.098 W/kg
Zoom Scan Peak SAR : 1.321 W/kg

Plot 2#

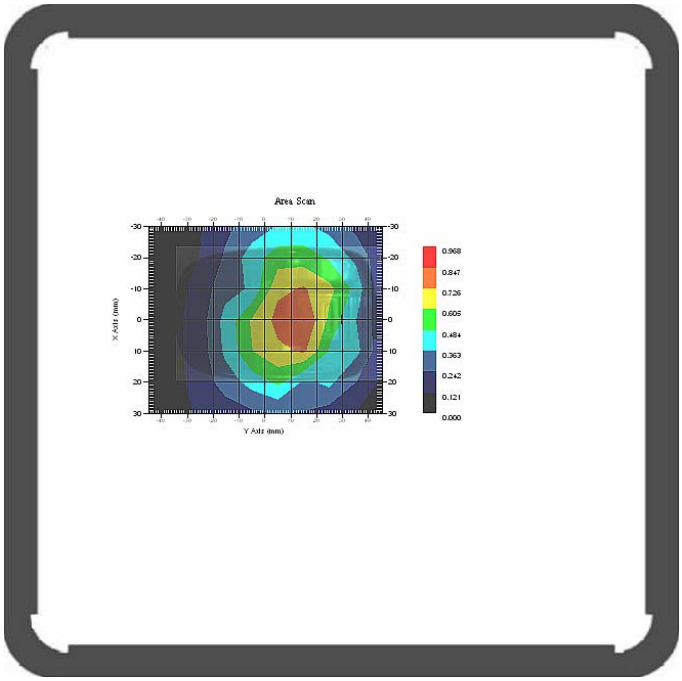


Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)

Body- worn Back (835 MHz, High Channel)

Measurement Data	
Test mode	: GPRS
Crest Factor	: 8
Scan Type：	: Complete
Area Scan	: 7x10x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan	: 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start	: 0.887 W/kg
Power Drift-Finish	: 0.871 W/kg
Power Drift (%)	: -1.987
Tissue Data	
Type	: BODY
Frequency	: 835.00 MHz
Epsilon	: 55.44 F/m
Sigma	: 0.99 S/m
Density	: 1000.00 kg/cu. m
Probe Data	
Serial No.	: 273
Frequency	: 835.00 MHz
Duty Cycle Factor	: 8
Conversion Factor	: 6.7
Probe Sensitivity	: 1.20 1.20 1.20 μV/(V/m)2
Compression Point	: 95.00 mV
Offset	: 1.56 mm
1 gram SAR value	: 0.766 W/kg
10 gram SAR value	: 0.521 W/kg
Area Scan Peak SAR	: 0.848 W/kg
Zoom Scan Peak SAR	: 1.161 W/kg

Plot 3#



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

Body- worn Back (1900 MHz, Low Channel)

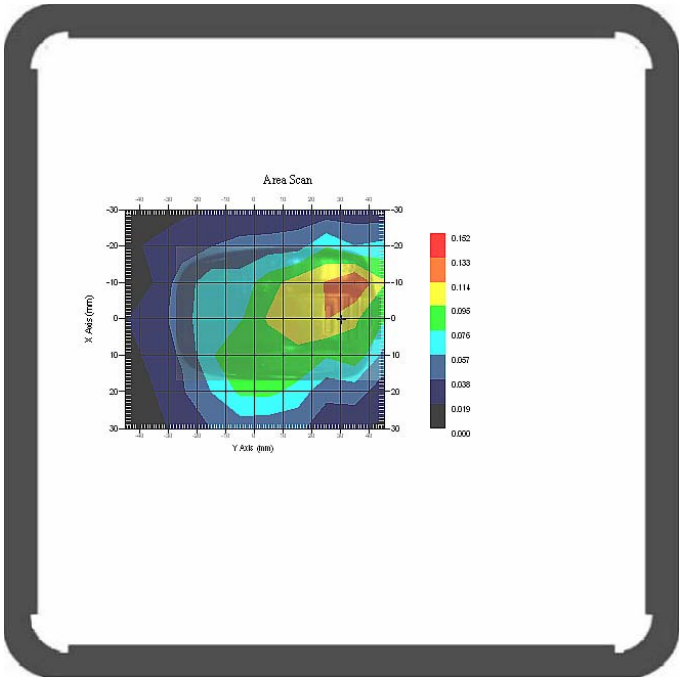
Measurement Data
Test mode : GPRS
Crest Factor : 8
Scan Type: : Complete
Area Scan : 7x10x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.119 W/kg
Power Drift-Finish : 0.116 W/kg
Power Drift (%) : -2.512

Tissue Data
Type : BODY
Frequency : 1900.00 MHz
Epsilon : 54.01 F/m
Sigma : 1.49 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 273
Frequency : 1900.00 MHz
Duty Cycle Factor : 8
Conversion Factor : 5.15
Probe Sensitivity : 1.20 1.20 1.20 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.122 W/kg
10 gram SAR value : 0.062 W/kg
Area Scan Peak SAR : 0.134 W/kg
Zoom Scan Peak SAR : 0.280 W/kg

Plot 4#



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

Body- worn Back (1900 MHz, Middle Channel)

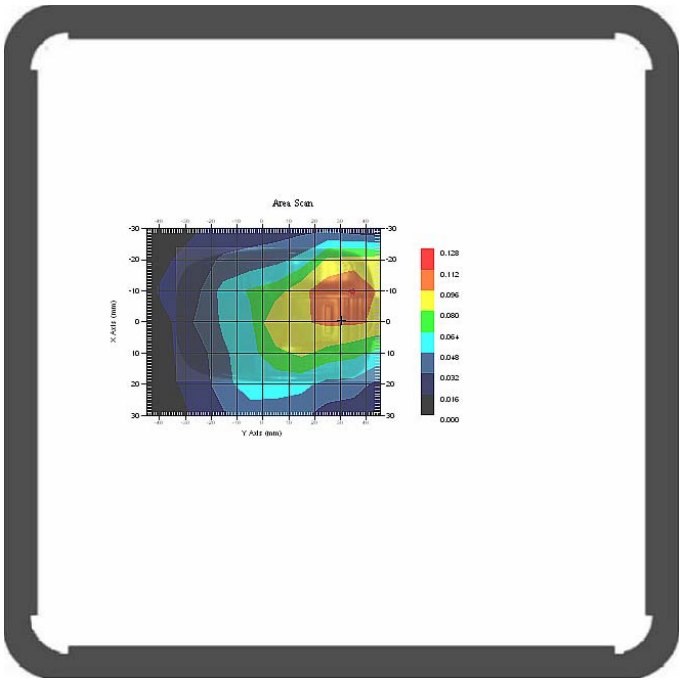
Measurement Data
Test mode : GPRS
Crest Factor : 8
Scan Type : Complete
Area Scan : 7x10x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.099 W/kg
Power Drift-Finish : 0.099 W/kg
Power Drift (%) : 0.224

Tissue Data
Type : BODY
Frequency : 1900.00 MHz
Epsilon : 54.01 F/m
Sigma : 1.49 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 273
Frequency : 1900.00 MHz
Duty Cycle Factor : 8
Conversion Factor : 5.15
Probe Sensitivity : 1.20 1.20 1.20 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.110 W/kg
10 gram SAR value : 0.060 W/kg
Area Scan Peak SAR : 0.114 W/kg
Zoom Scan Peak SAR : 0.190 W/kg

Plot 5#



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

Body- worn Back (1900 MHz, High Channel)

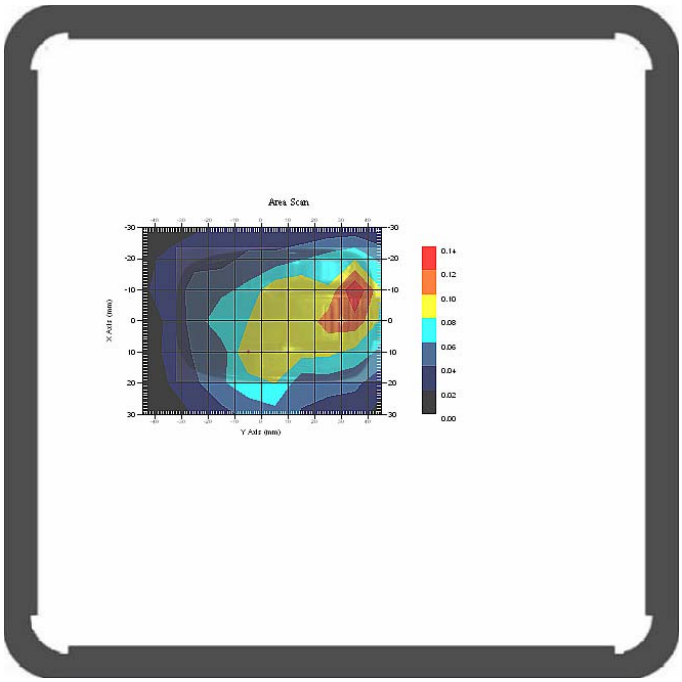
Measurement Data
Test mode : GPRS
Crest Factor : 8
Scan Type : Complete
Area Scan : 7x10x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.111 W/kg
Power Drift-Finish : 0.116 W/kg
Power Drift (%) : 1.180

Tissue Data
Type : BODY
Frequency : 1900.00 MHz
Epsilon : 54.01F/m
Sigma : 1.49 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 273
Frequency : 1900.00 MHz
Duty Cycle Factor : 8
Conversion Factor : 5.15
Probe Sensitivity : 1.20 1.20 1.20 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.124 W/kg
10 gram SAR value : 0.063 W/kg
Area Scan Peak SAR : 0.140 W/kg
Zoom Scan Peak SAR : 0.200 W/kg

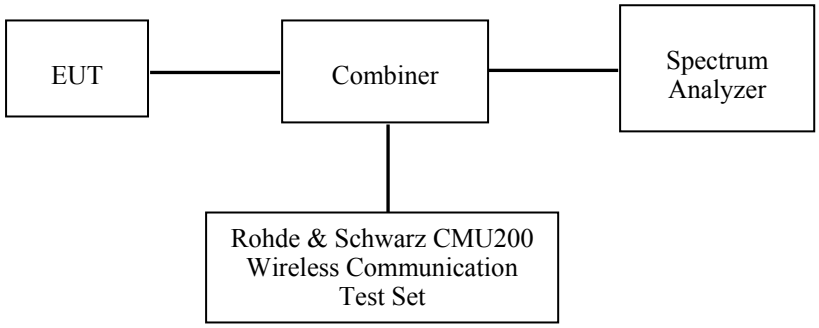
Plot 6#



APPENDIX F – CONDUCTED OUTPUT POWER MEASUREMENT

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.



Test Equipment List and Details

Manufacturer	Equipment Description	Model No.	Serial No.	Calibration Date
Rohde & Schwarz	Communication Tester	CMU200	1100.0008.02	2009-09-26
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2009-07-08

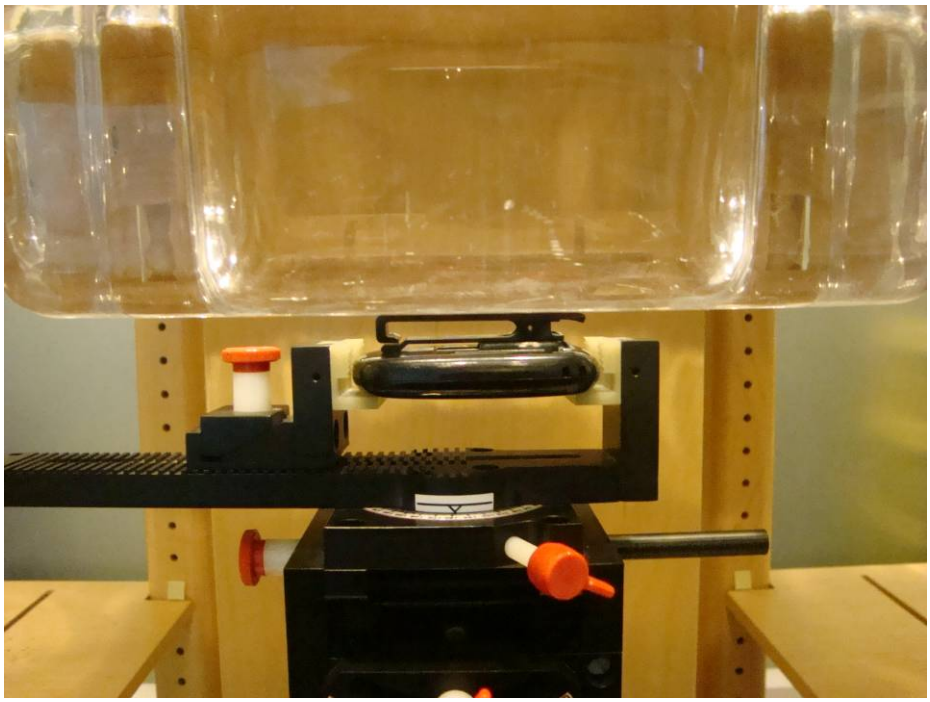
Test Results

Band	Frequency (MHz)	Conducted Output Power	
		(dBm)	(Watt)
Cellular	824.2	32.32	1.706
	836.6	32.27	1.687
	848.8	32.23	1.671
PCS	1850.2	29.50	0.891
	1880.0	29.99	0.998
	1909.8	29.50	0.891

APPENDIX G – EUT TEST POSITION PHOTOS

Body-worn Back Setup Photo

(EUT back side touch the flat phantom with Belt clip)



APPENDIX H – EUT PHOTOS

EUT - Top View

EUT - Bottom View

EUT – Side View

EUT- Uncover View

APPENDIX I - INFORMATIVE REFERENCES

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[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, O_ce of Engineering & Technology, Washington, DC, 1997.

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[4] Niels Kuster, Ralph K.astle, and Thomas Schmid, \Dosimetric evaluation of mobile communications
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[13] NIS81 NAMAS, \The treatment of uncertainity 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 *******