SAR EVALUATION REPORT

For

Hytera Communications Co., Ltd.

HYT Tower, Hi-Tech Industrial Park North,

Nanshan District, Shenzhen, China

FCC ID: YAMX1PU5

Report Type:	**Product Type:**
Original Report	Digital Portable Radio

Test Engineer:	Sandy Wang
Report Number:	RSZ130508001-20A
Report Date:	2013-08-08
Reviewed By:	Alvin Huang RF Leader
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<table>
<tr><th colspan="5">Attestation of Test Results</th></tr>
<tr><td colspan="2" rowspan="5">EUT Information</td><td>Company Name</td><td colspan="2">Hytera Communications Co., Ltd.</td></tr>
<tr><td>EUT Description</td><td colspan="2">Digital Portable Radio</td></tr>
<tr><td>FCC ID</td><td colspan="2">YAMX1PU5</td></tr>
<tr><td>Model Number</td><td colspan="2">X1p U(5)</td></tr>
<tr><td>Test Date</td><td colspan="2">2013-07-31 to 2013-08-02</td></tr>
<tr><td>Mode</td><td>Frequency (MHz)</td><td colspan="2">Max. SAR Level(s) Measured</td><td>Limit (W/Kg)</td></tr>
<tr><td>Digital</td><td>806-824
851-869
896-902
935-941</td><td>12.5 kHz Channel Spacing</td><td>Face up: 2.197 W/kg
Body-Back: 2.089 W/kg</td><td rowspan="4">8</td></tr>
<tr><td rowspan="2">Analog</td><td>806-824
851-869
896-902
935-941</td><td>12.5 kHz Channel Spacing</td><td>Face up: 2.758 W/kg (50% duty cycle)
Body-Back: 2.122 W/kg (50% duty cycle)</td></tr>
<tr><td>806-824
851-869</td><td>25 k Hz Channel Spacing</td><td>Face up: 2.399 W/kg (50% duty cycle)
Body-Back: 2.464 W/kg (50% duty cycle)</td></tr>
<tr><td colspan="2">Simultaneous</td><td>PTT+BT</td><td>Face up: 2.773 W/kg (50% duty cycle)
Body-Back: 2.538 W/kg (50% duty cycle)</td></tr>
<tr><td colspan="2" rowspan="5">Applicable Standards</td><td colspan="3">ANSI/IEEE C95.1: 2005
IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fileds,3 kHz to 300 GHz.</td></tr>
<tr><td colspan="3">ANSI/IEEE C95.3: 2002
IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to SuchFields,100 kHz—300 GHz.</td></tr>
<tr><td colspan="3">IEC 62209-2: 2010
Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Human models, instrumentation, and procedures – Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)</td></tr>
<tr><td colspan="3">FCC KDB 447498 D01 v05r01
Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
FCC KDB 643646 D01 v01r01
SAR Test Reduction Considerations for Occupational PTT Radios</td></tr>
<tr><td colspan="3">IEEE1528: 2003
IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques</td></tr>
<tr><td colspan="5">Note: This wireless device has been shown to be capable of compliance for localized specific absorption rate (SAR) for Occupational/Controlled Exposure limits specified in ANSI/IEEE Standards and has been tested in accordance with the measurement procedures specified in IEC 62209-2, IEEE 1528-2003,KDB447498 and KDB643646.
The results and statements contained in this report pertain only to the device(s) evaluated.</td></tr>
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	RSZ130508001-20A	Original Report	2013-08-08

EUT DESCRIPTION

This report has been prepared on behalf of Hytera Communications Co., Ltd. and their product, FCC ID: YAMX1PU5, Model: X1p U(5) or the EUT(Equipment Under Test) as referred to in the rest of this report. The EUT is a Digital Portable Radio.

Technical Specification

Product Type	Portable
Exposure Category:	Occupational/Controlled Exposure
Antenna Type(s):	External Antenna
Body-Worn Accessories:	Belt Clip and Headset Cable
Face-Head Accessories:	None
Modulation Type:	FM and 4FSK
Frequency Band:	PTT: 806-824 MHz (TX) 851-869 MHz (TX/RX) 896-902 MHz (TX) 935-941 MHz (TX/RX) BT: 2400-2483.5 MHz
Conducted RF Power:	PTT: 35.43 dBm BT: 2.03 dBm
Dimensions (L*W*H):	210mm (L)×60mm (W)×27mm (H)
Weight:	289.4 g
Power Source:	Rechargeable Li-ION Battery
Normal Operation:	Face Up and Body-worn

REFERENCE, STANDARDS, AND GUILDELINES

FCC:

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

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

CE:

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

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

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

SAR Limits

FCC Limit (1g Tissue)

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

CE Limit (10g Tissue)

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

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

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

Occupational/Controlled environments Spatial Peak limit 8.0W/kg (FCC/IC) & 10 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 32mm in the X & Y axis, and 35mm in the Z axis.

ALSAS-10U Interpolation and Extrapolation Uncertainty

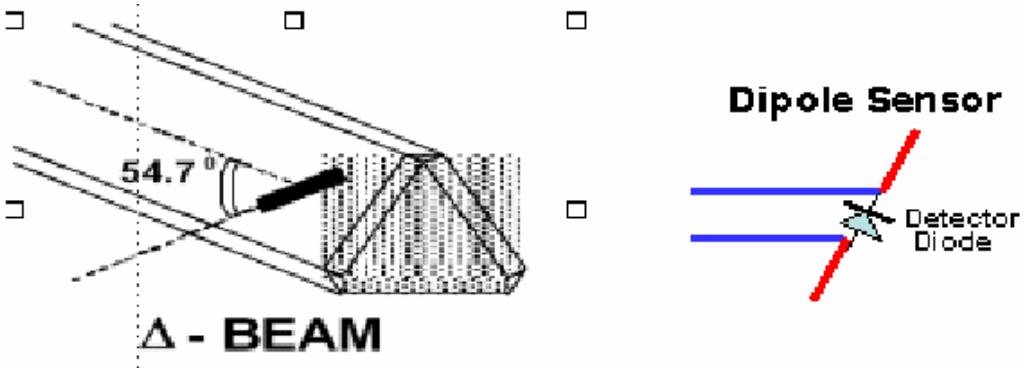
The overall uncertainty for the methodology and algorithms the used during the SAR calculation was evaluated using the data from IEEE 1528 based on the example f3 algorithm:

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

Isotropic E-Field Probe

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

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



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

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

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

Isotropic E-Field Probe Specification

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

Boundary Detection Unit and Probe Mounting Device

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

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

Daq-Paq (Analog to Digital Electronics)

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

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

Axis Articulated Robot

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

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

ALSAS Universal Workstation

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

Universal Device Positioner

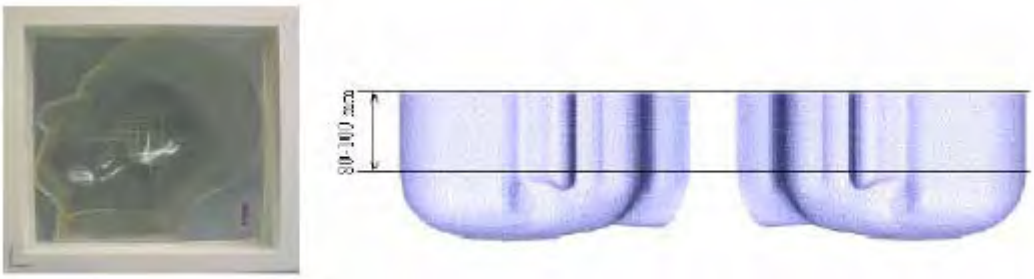
The universal device positioner allows complete freedom of movement of the EUT. Developed to hold a EUT in a free-space scenario any additional loading attributable to the material used in the construction of the positioner has been eliminated. Repeatability has been enhanced through the linear scales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

Phantom Types

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

APREL SAM Phantoms

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



APREL Laboratories Universal Phantom

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

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

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

Tissue Dielectric Parameters for Head and Body Phantoms

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

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

Recommended Tissue Dielectric Parameters for Head and Body

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

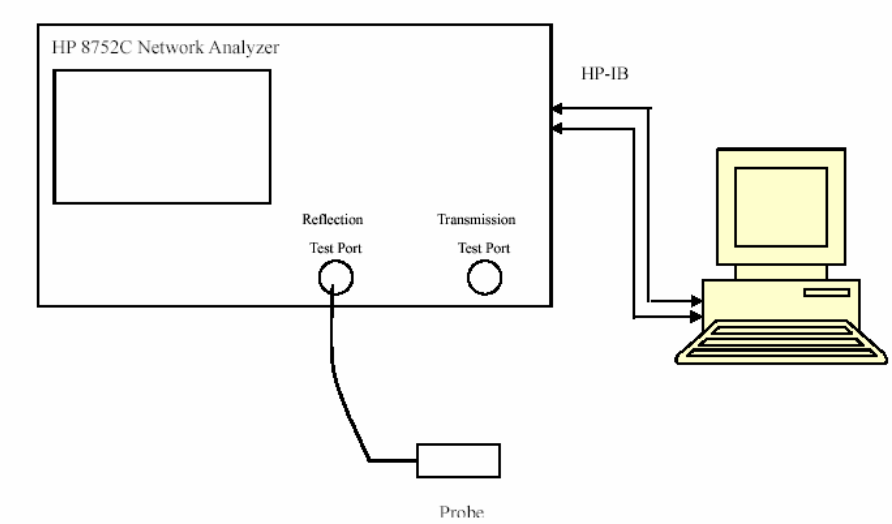
EQUIPMENT LIST AND CALIBRATION

Equipments List & Calibration Information

Equipment	Model	Calibration Date	S/N
CRS F3 robot	ALS-F3	N/A	RAF0805352
CRS F3 Software	ALS-F3-SW	N/A	N/A
CRS C500C controller	ALS-C500	N/A	RCF0805379
Probe mounting device & Boundary Detection Sensor System	ALS-PMDPS-3	N/A	120-00270
Universal Work Station	ALS-UWS	N/A	100-00157
Data Acquisition Package	ALS-DAQ-PAQ-3	2013-05-12	110-00212
Miniature E-Field Probe	E-020	2012-08-09	500-00283
Dipole, 835MHz	ALS-D-835-S-2	2011-08-25	180-00558
Dipole, 900MHz	ALS-D-900-S-2	2011-08-25	190-00609
Dipole Spacer	ALS-DS-U	N/A	250-00907
Device holder/Positioner	ALS-H-E-SET-2	N/A	170-00510
Left ear SAM phantom	ALS-P-SAM-L	N/A	130-00311
Right ear SAM phantom	ALS-P-SAM-R	N/A	140-00359
UniPhantom	ALS-P-UP-1	N/A	150-00413
Simulated Tissue 835 MHz Head	ALS-TS-835-H	Each Time	270-01002
Simulated Tissue 835 MHz Body	ALS-TS-835-B	Each Time	270-02101
Simulated Tissue 900 MHz Head	ALS-TS-900-H	Each Time	280-01054
Simulated Tissue 900 MHz Body	ALS-TS-900-B	Each Time	280-02151
Power Amplifier	5S1G4	N/A	71377
Synthesized Sweeper	HP 8341B	2013-05-16	2624A00116
Signal Analyzer	FSIQ26	2012-08-08	8386001028

SAR MEASUREMENT SYSTEM VERIFICATION

Liquid Verification



Liquid Verification Setup Block Diagram

Liquid Verification Results

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	$\Delta\sigma$ (S/m)	
806.0125	Head	41.17	0.87	41.50	0.90	-0.795	-3.333	±5
	Body	55.77	0.94	55.20	0.97	1.033	-3.093	±5
823.9875	Head	41.14	0.88	41.50	0.90	-0.867	-2.222	±5
	Body	55.81	0.95	55.20	0.97	1.105	-2.062	±5
851.0125	Head	41.20	0.90	41.50	0.90	-0.723	0.000	±5
	Body	55.87	0.96	55.20	0.97	1.214	-1.031	±5
868.9875	Head	41.05	0.91	41.50	0.90	-1.084	1.111	±5
	Body	55.91	0.97	55.20	0.97	1.286	0.000	±5
898.5000	Head & Body	40.81	0.97	40.50	0.97	0.765	0.000	±5
937.5000	Head & Body	40.64	0.99	40.50	0.97	0.346	2.062	±5

**Liquid Verification was performed on 2013-07-31.*

Please refer to the following tables.

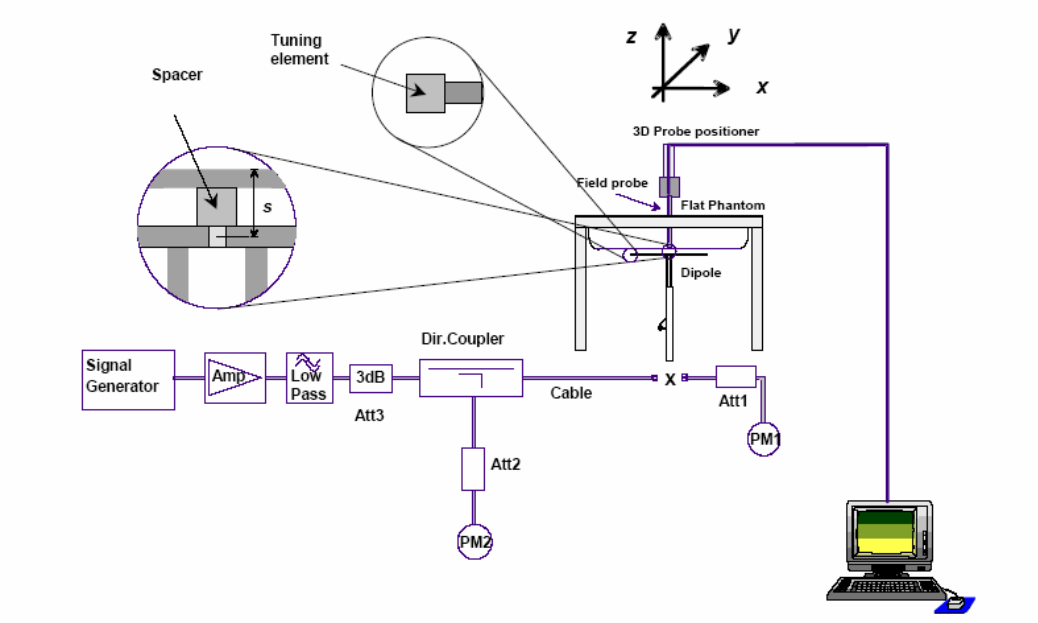
835 Head				835 Body		
Frequency (MHz)	e'	e''		Frequency (MHz)	e'	e''
800.0	41.280640	19.503832		800.0	55.753970	21.025314
801.4	41.249611	19.488967		801.4	55.757108	21.006689
802.8	41.232951	19.474101		802.8	55.760241	20.988065
804.2	41.127811	19.459236		804.2	55.763383	20.969440
805.6	41.146169	19.444370		805.6	55.766521	20.950815
807.0	41.168062	19.429505		807.0	55.769659	20.932191
808.4	41.144549	19.414640		808.4	55.772797	20.913566
809.8	41.191870	19.399774		809.8	55.775935	20.894941
811.2	41.211476	19.384909		811.2	55.779073	20.876317
812.6	41.217902	19.370043		812.6	55.782211	20.857692
814.0	41.268833	19.355178		814.0	55.785349	20.839068
815.4	41.217326	19.340313		815.4	55.788487	20.820443
816.8	41.253694	19.325447		816.8	55.791625	20.801818
818.2	41.213723	19.310582		818.2	55.794763	20.783194
819.6	41.186721	19.295716		819.6	55.797901	20.764569
821.0	41.206276	19.280851		821.0	55.801039	20.745944
822.4	41.168094	19.265986		822.4	55.804177	20.727320
823.8	41.142918	19.251120		823.8	55.807315	20.708695
825.2	41.183454	19.236255		825.2	55.810453	20.690070
826.6	41.214873	19.221389		826.6	55.813591	20.671446
828.0	41.212298	19.206524		828.0	55.816729	20.652821
829.4	41.210878	19.191659		829.4	55.819867	20.634196
830.8	41.235707	19.176793		830.8	55.823005	20.615572
832.2	41.236707	19.161928		832.2	55.826143	20.596947
833.6	41.240307	19.147062		833.6	55.829281	20.578322
835.0	41.225339	19.132197		835.0	55.832419	20.559698
836.4	41.212136	19.117332		836.4	55.835557	20.541073
837.8	41.206343	19.102466		837.8	55.838695	20.522448
839.2	41.229516	19.087601		839.2	55.841833	20.503824
840.6	41.188046	19.072735		840.6	55.844971	20.485199
842.0	41.177977	19.057870		842.0	55.848109	20.466575
843.4	41.180447	19.043005		843.4	55.851247	20.447950
844.8	41.191514	19.028139		844.8	55.854385	20.429325
846.2	41.180876	19.013274		846.2	55.857523	20.410701
847.6	41.164148	18.998408		847.6	55.860661	20.392076
849.0	41.193590	18.983543		849.0	55.863798	20.373451
850.4	41.195292	18.968678		850.4	55.866936	20.354827
851.8	41.198988	18.953812		851.8	55.870074	20.336202
853.2	41.193083	18.938947		853.2	55.873212	20.317577
854.6	41.116786	18.924081		854.6	55.876350	20.298953
856.0	41.193038	18.909216		856.0	55.879488	20.280328
857.4	41.147329	18.894351		857.4	55.882626	20.261703
858.8	41.073347	18.879485		858.8	55.885764	20.243079
860.2	41.088649	18.864620		860.2	55.888902	20.224454
861.6	41.043232	18.849754		861.6	55.892040	20.205829
863.0	41.084171	18.834889		863.0	55.895178	20.187205
864.4	41.064440	18.820024		864.4	55.898316	20.168580
865.8	41.067624	18.805158		865.8	55.901454	20.149955
867.2	41.041226	18.790293		867.2	55.904592	20.131331
868.6	41.045821	18.775427		868.6	55.907730	20.112706
870.0	41.006089	18.760562		870.0	55.910868	20.094082

900 Head and Body		
Frequency (MHz)	**e'**	**e''**
870.0	40.880617	19.705802
871.4	40.849588	19.690936
872.8	40.832928	19.676071
874.2	40.727788	19.661205
875.6	40.746146	19.646340
877.0	40.768039	19.631475
878.4	40.744526	19.616609
879.8	40.791847	19.601744
881.2	40.811453	19.586878
882.6	40.817879	19.572013
884.0	40.868810	19.557148
885.4	40.817303	19.542282
886.8	40.853671	19.527417
888.2	40.813700	19.512551
889.6	40.786698	19.497686
891.0	40.806253	19.482821
892.4	40.768071	19.467955
893.8	40.742895	19.453090
895.2	40.783431	19.438224
896.6	40.814850	19.423359
898.0	40.812275	19.408494
899.4	40.810855	19.393628
900.8	40.835684	19.378763
902.2	40.836684	19.363897
903.6	40.840284	19.349032
905.0	40.825316	19.334167
906.4	40.812113	19.319301
907.8	40.806320	19.304436
909.2	40.829493	19.289570
910.6	40.788023	19.274705
912.0	40.777954	19.259840
913.4	40.780424	19.244974
914.8	40.791491	19.230109
916.2	40.780853	19.215243
917.6	40.764125	19.200378
919.0	40.793567	19.185513
920.4	40.795269	19.170647
921.8	40.798965	19.155782
923.2	40.793060	19.140916
924.6	40.716763	19.126051
926.0	40.793015	19.111186
927.4	40.747306	19.096320
928.8	40.673324	19.081455
930.2	40.688626	19.066589
931.6	40.643209	19.051724
933.0	40.684148	19.036859
934.4	40.664417	19.021993
935.8	40.667601	19.007128
937.2	40.641203	18.992262
938.6	40.645798	18.977397
940.0	40.606066	18.962532

System Accuracy Verification

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

System Verification Setup Block Diagram



Probe and dipole antenna List and Detail

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
APREL	Probe	ALS-E-020	500-00283	2012-08-08	2013-08-07
APREL	Dipole antenna(835MHz)	ALS-D-835-S-2	180-00558	2011-08-25	2014-08-24
APREL	Dipole antenna(900MHz)	ALS-D-900-S-2	190-00609	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 (%)
2013-7-31	835	Head	1g	9.472	9.590	-1.230	±10
		Body	1g	9.921	9.684	2.447	±10
	900	Head	1g	10.329	10.944	-5.620	±10

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

SAR SYSTEM VALIDATION DATA

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

System Performance Check 835 MHz Head Liquid

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

Product Data
Device Name : Dipole 835 MHz
Serial No. : 180-00558
Type : Dipole
Model : ALS-D-835-S-2
Frequency Band : 835
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 10.006 W/kg
Power Drift-Finish : 10.079 W/kg
Power Drift (%) : 0.739

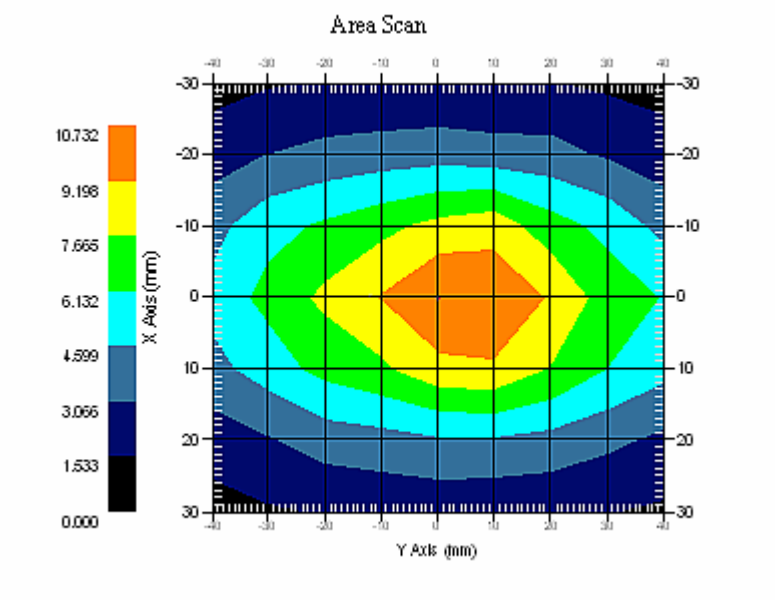
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default
Phantom Data

Tissue Data
Type : Head
Serial No. : 270-01002
Frequency : 835.0 MHz
Last Calib. Date : 31-Jul-2013
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 41.23 F/m
Sigma : 0.89 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 08-Aug-2012
Frequency Band : 835
Duty Cycle Factor : 1
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

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

1 gram SAR value : 9.472 W/kg
10 gram SAR value : 5.510 W/kg
Area Scan Peak SAR : 10.731 W/kg
Zoom Scan Peak SAR : 16.995 W/kg



835 MHz System Validation with Head Tissue

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

System Performance Check 835 MHz Body Liquid

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

Product Data
Device Name : Dipole 835 MHz
Serial No. : 180-00558
Type : Dipole
Model : ALS-D-835-S-2
Frequency Band : 835
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 9.995 W/kg
Power Drift-Finish : 10.059W/kg
Power Drift (%) : 0.642

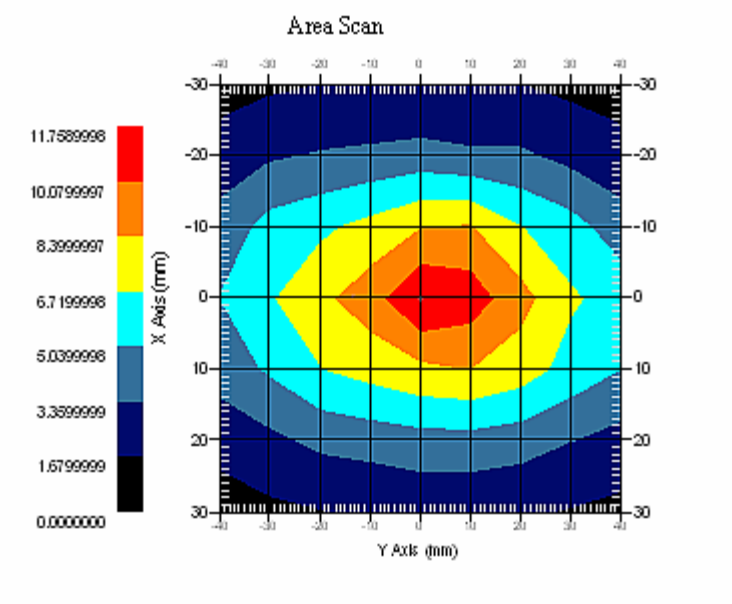
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default
Phantom Data

Tissue Data
Type : Body
Serial No. : 270-02101
Frequency : 835.0 MHz
Last Calib. Date : 31-Jul-2013
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 55.83 F/m
Sigma : 0.95 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-Aug-2012
Frequency Band : 835
Duty Cycle Factor : 1
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

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

1 gram SAR value : 9.921 W/kg
10 gram SAR value : 6.561 W/kg
Area Scan Peak SAR : 11.015 W/kg
Zoom Scan Peak SAR : 17.752 W/kg



835 MHz System Validation with Body Tissue

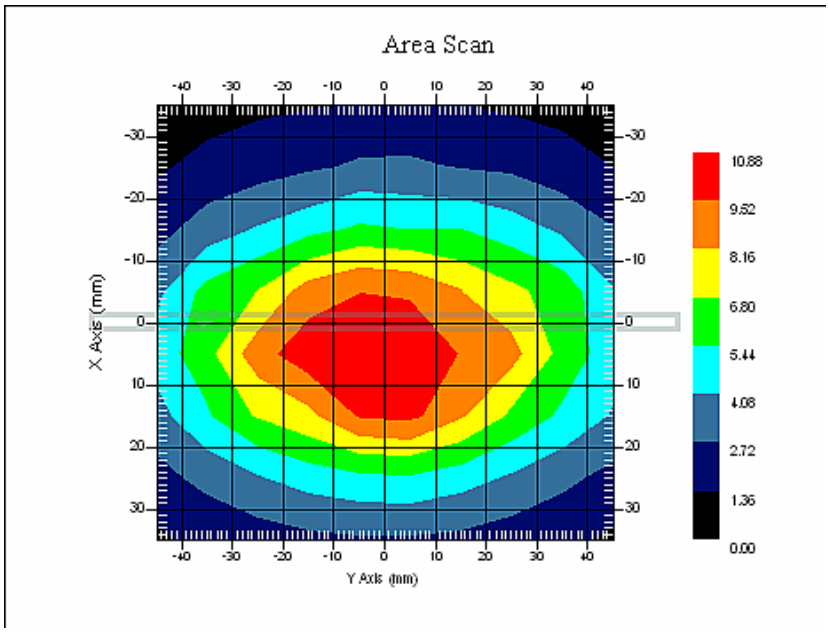
Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)

System Performance Check 900 MHz Head Liquid

Dipole 900 MHz; Type: ALS-D-900-S-2; S/N: 190-00609

Product Data	
Device Name	: Dipole 900 MHz
Serial No.	: 190-00609
Type	: Dipole
Model	: ALS-D-900-S-2
Frequency Band	: 900
Max. Transmit Pwr	: 1 W
Drift Time	: 3 min(s)
Power Drift-Start	: 10.155 W/kg
Power Drift-Finish	: 10.186 W/kg
Power Drift (%)	: 0.305
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 and Body
Serial No.	: 280-01054
Frequency	: 900.00 MHz
Last Calib. Date	: 31-Jul-2013
Temperature	: 20.00 °C
Ambient Temp.	: 21.00 °C
Humidity	: 50.00 RH%
Epsilon	: 40.81 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	: 09-Aug-2012
Frequency Band	: 900
Duty Cycle Factor	: 1
Conversion Factor	: 6
Probe Sensitivity	: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point	: 95.00 mV
Offset	: 1.56 mm
Measurement Data	
Crest Factor	: 1
Scan Type	: Complete
Tissue Temp.	: 20.00 °C
Ambient Temp.	: 20.00 °C
Area Scan	: 7x9x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan	: 7x7x7 : Measurement x=5mm, y=5mm, z=5mm

1 gram SAR value : 10.329 W/kg
10 gram SAR value : 6.894 W/kg
Area Scan Peak SAR : 10.878 W/kg
Zoom Scan Peak SAR : 20.189 W/kg



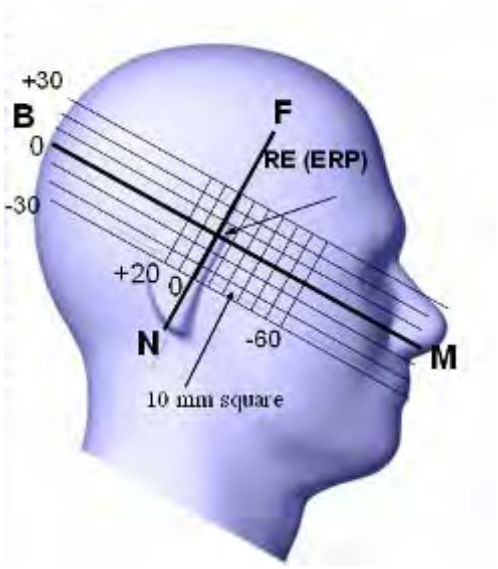
900 MHz System Validation with Head Tissue

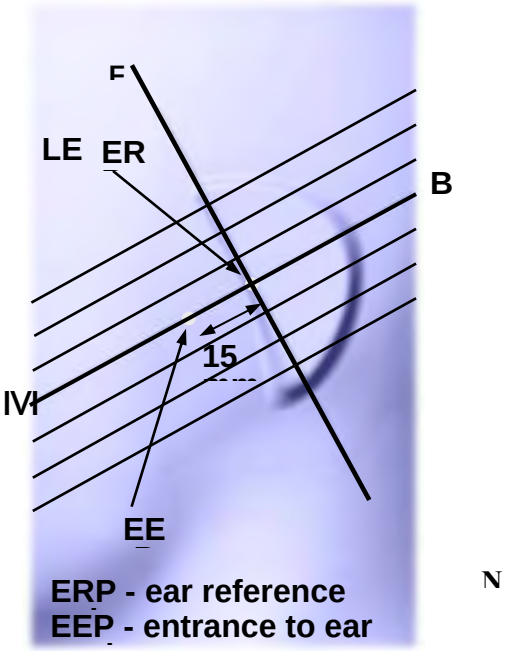
EUT TEST STRATEGY AND METHODOLOGY

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

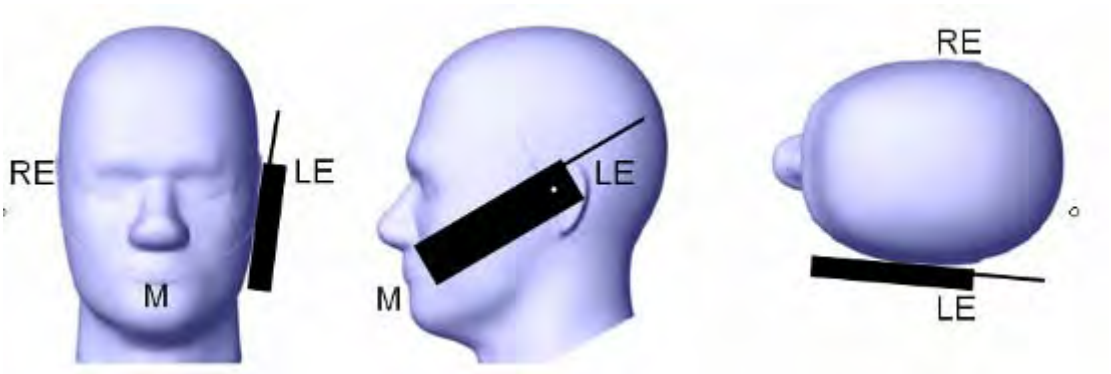
The device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line for the SCC-34/SC-2 head phantom.

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

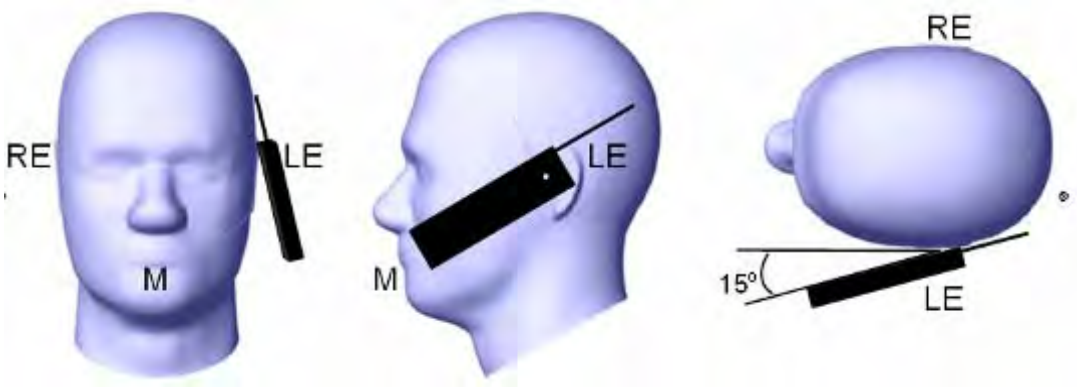
With the handset aligned in the "Cheek/Touch Position":

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 isby 15 80°. After the tilt, it is then moved (translated) back toward the head perpendicular to the line passes through both "ear reference points" until the device touches the phantom or the ear spacer. If the antenna touches the head first, the positioning process should be repeated with a tilt angle less than 15° so that the device and its antenna would touch the phantom simultaneously. This test position may require a device holder or positioner to achieve the translation and tilting with acceptable positioning repeatability.

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

Ear /Tilt 15° Position



Test positions for body-worn and other configurations

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

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

SAR Evaluation Procedure

The evaluation was performed with the following procedure:

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

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

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

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

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

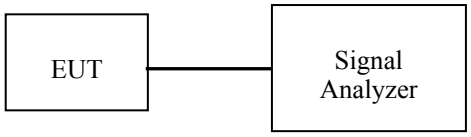
All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

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

CONDUCTED OUTPUT POWER MEASUREMENT

Test Procedure

The RF output of the transmitter was connected to the input of the Signal Analyzer through sufficient attenuation.



Maximum Output Power among production units

Max Target Power for Production Unit (dBm)				
Mode/Band	Channel			
	806-824	851-869	896-902	935-941
Digital-12.5K	35.5	35.5	34.8	33.8
Analog-12.5K	35.5	35.5	34.8	33.8
Analog-25K	35.5	35.5	/	/
Bluetooth	Low	Middle	High	/
	2.5	2.5	2.5	/

Test Results:

Mode	Frequency Spacing (kHz)	Frequency (MHz)	Channel /Frequency (MHz)	Conducted Output Power	
				(dBm)	(Watt)
Digital	12.5	806-824	Low/806.0125	35.19	3.304
			High/823.9875	35.11	3.243
		851-869	Low/851.0125	35.34	3.420
			High/868.9875	35.43	3.491
		896-902	898.5000	34.54	2.844
		935-940	937.5000	34.69	2.944
Analog	12.5	806-824	Low/806.0125	35.20	3.311
			High/823.9875	35.16	3.281
		851-869	Low/851.0125	35.16	3.281
			High/868.9875	35.41	3.475
		896-902	898.5000	34.55	2.851
		935-940	937.5000	34.68	2.938
	25	806-824	Low/806.0125	35.19	3.304
			High/823.9875	35.08	3.221
		851-869	Low/851.0125	35.19	3.304
			High/868.9875	35.34	3.420

Mode	Channel	Frequency (MHz)	Output Power (dBm)	Output Power (mw)
GFSK	Low	2402	1.92	1.556
	Middle	2441	1.70	1.479
	High	2480	0.47	1.114
π/4-DQPSK	Low	2402	1.68	1.472
	Middle	2441	1.44	1.393
	High	2480	0.21	1.050
8-DPSK	Low	2402	2.03	1.596
	Middle	2441	1.81	1.517
	High	2480	-0.02	0.995

SAR MEASUREMENT RESULTS

This page summarizes the results of the performed dosimetric evaluation.

SAR Test Data

Environmental Conditions

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

** Testing was performed by Sandy Wang on 2013-07-31 and 2013-08-02*

Associated Accessories List		
Antenna	1	806 MHz -824 MHz; 851 MHz -869 MHz; 896 MHz -902 MHz; 935 MHz -941 MHz;
Battery	1	BL1103 1100mAh
	2	**BL1809 1800mAh**
Body-worn Accessories	1	**PCN005**
	2	CH04L01
Audio Accessories	1	EWN07
	2	EWN08
	3	EAN19
	4	EAN21
	5	**ACN-02+(EH-01**/EH-02/ES-01/ES-02)

1. *When multiple default body-worn accessories are supplied with a radio, the standard body-worn accessory expected to result in the highest SAR based on its construction and exposure conditions is considered the default body-worn accessory for making body-worn SAR measurements.*
2. *When multiple standard batteries are supplied with a radio, the battery with the highest capacity is considered the default battery for making head SAR measurements.*
3. *Testing a PTT radio with the thinnest battery and a standard (default) body-worn accessory that are both supplied with the radio and, if applicable, a default audio accessory, to measure the body SAR. But, during the test, the body-worn accessory provided a same separation whether the battery you used. So we select the battery with the highest capacity for making body SAR measurement as the default battery.*
4. *For audio accessories with similar construction and operating requirements, test only the audio accessory within the group that is expected to result in the highest SAR, with respect to changes in RF characteristics and exposure conditions for the combination.*
5. *The highlight accessories combination is regard as a default one for different construction and operating requirements accessories.*

Test Result:

Digital (Modulation 4FSK; Channel Spacing 12.5 kHz):

EUT Position	Frequency (MHz)	Body-Worn Accessory	Battery Type	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1 g SAR Value (W/Kg)		
							Scaled Factor	Meas. SAR	Scaled SAR
Face up (2.5cm)	806.0125	/	BL1809	0.943	35.19	35.5	1.074	1.413	1.518
	868.9875	/		-0.920	35.43	35.5	1.016	1.956	1.987
	898.5000	/		2.277	34.54	34.8	1.062	1.138	1.209
	937.5000	/		0.786	34.69	34.8	1.026	1.577	1.618
	868.9875	/	BL1103	1.063	35.43	35.5	1.016	2.162	**2.197**
Body-Back (0.0cm)	868.9875	PCN005	BL1809	-0.869	35.43	35.5	1.016	2.056	**2.089**
	868.9875	CH04L01	BL1809	0.821	35.43	35.5	1.016	1.824	1.853
	868.9875	PCN005	BL1103	-1.139	35.43	35.5	1.016	1.675	1.702
	868.9875	CH04L01	BL1103	-0.800	35.43	35.5	1.016	1.655	1.681

Note:

1. *When the 1-g SAR tested using the default battery and default accessories is ≤ 3.5W/Kg, testing for other channels are optional.*
2. *When 1-g SAR tested using the default battery and default accessories is ≤ 4.0W/Kg, the test using additional batteries is only required for the configuration that resulted in the highest SAR among previous test. We used BL1809 (1800mAh) for SAR measurements as the default battery.*
3. *When the 1-g SAR is > 6.0 W/kg, test additional battery and antenna combination with the default body-worn and audio accessory on all required channels.*
4. *Passive body-worn and audio accessories generally do not apply to the head SAR of PTT radios.*
5. *The audio accessory ACN-02+EH-01 will result higher SAR value than other audio accessory. So all test of the body-back are testing with the audio accessory ACN-02+EH-01.*
6. *For body-Back mode, pre-scan with four frequency band and worst case is 851-869MHz band, So all the body-back mode are list with 851-869 MHz band.*

Analog (Modulation FM; Channel Spacing 12.5 kHz):

EUT Position	Frequency (MHz)	Body-Worn Accessory	battery	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1 g SAR Value (W/Kg)			
							Scaled Factor	Meas. SAR	Scaled SAR	50% Duty Cycle
Face up (2.5cm)	806.0125	/	BL1809	0.585	35.20	35.5	1.072	4.084	4.378	2.189
	868.9875	/		0.587	35.41	35.5	1.021	5.236	5.346	2.673
	898.5000	/		1.428	34.55	34.8	1.059	3.226	3.416	1.708
	937.5000	/		-1.239	34.68	34.8	1.028	2.821	2.900	1.450
	868.9875	/	BL1103	2.854	35.41	35.5	1.021	5.402	5.515	**2.758**
Body-Back (0.0cm)	868.9875	PCN005	BL1809	-1.579	35.41	35.5	1.021	4.157	4.244	**2.122**
	868.9875	CH04L01	BL1809	0.643	35.41	35.5	1.021	3.344	3.414	1.707
	868.9875	PCN005	BL1103	0.957	35.41	35.5	1.021	3.304	3.373	1.687
	868.9875	CH04L01	BL1103	-0.768	35.41	35.5	1.021	3.132	3.198	1.599

Analog (Modulation FM; Channel Spacing 25 kHz):

EUT Position	Frequency (MHz)	Body-Worn Accessory	battery	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1 g SAR Value (W/Kg)			
							Scaled Factor	Meas. SAR	Scaled SAR	50% Duty Cycle
Face up (2.5cm)	806.0125	/	BL1809	1.074	35.19	35.5	1.074	4.074	4.375	2.188
	868.9875	/		-0.471	35.34	35.5	1.038	4.623	4.799	2.380
	868.9875	/	BL1103	1.436	35.34	35.5	1.038	4.772	4.953	**2.399**
Body-Back (0.0cm)	868.9875	PCN005	BL1809	1.131	35.34	35.5	1.038	3.126	3.245	1.622
	868.9875	CH04L01	BL1809	0.797	35.34	35.5	1.038	4.748	4.928	**2.464**
	868.9875	PCN005	BL1103	1.451	35.34	35.5	1.038	2.567	2.665	1.332
	868.9875	CH04L01	BL1103	0.995	35.34	35.5	1.038	3.737	3.879	1.940

Note:

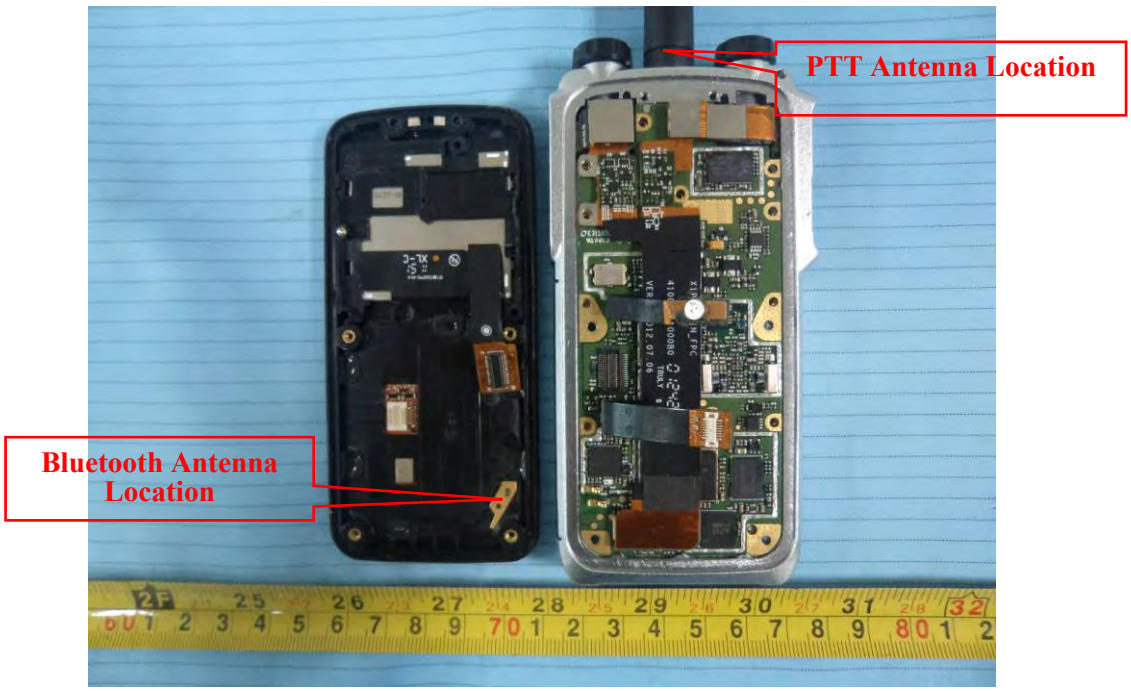
1. *When the 1-g SAR (50% duty cycle) tested using the default battery and default accessories is ≤ 3.5W/Kg, testing for other channels are optional.*
2. *When 1-g SAR (50% duty cycle) tested using the default battery and default accessories is ≤ 4.0W/Kg, the test using additional batteries is only required for the configuration that resulted in the highest SAR among previous test. We used BL1809 (1800mAh) for SAR measurements as the default battery.*
3. *When the 1-g SAR (50% duty cycle) is > 6.0 W/kg, test additional battery and antenna combination with the default body-worn and audio accessory on all required channels.*
4. *Passive body-worn and audio accessories generally do not apply to the head SAR of PTT radios.*
5. *The audio accessory ACN-02+EH-01 will result higher SAR value than other audio accessory. So all test of the body-back are testing with the audio accessory ACN-02+EH-01.*
6. *50% duty cycle applies to FM Modulation.*
7. *For body-Back mode, pre-scan with four frequency band and worst case is 851-869MHz band, So all the body-back mode are list with 851-869 MHz band.*

SAR SIMULTANEOUS TRANSMISSION DESCRIPTION

KDB 447498D01 General RF Exposure Guidance v05

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

BT and PTT Antenna Location:



Antenna Information:

Description of Simultaneous Transmit Capabilities		Antennas Distance (mm)
Transmitter Combination	Simultaneous?	
PTT + Bluetooth	√	96

Standalone SAR test exclusion considerations

Head:

Mode	Frequency (MHz)	P_{avg} (dBm)	P_{avg} (mW)	Distance (mm)	Calculated value	Threshold (1-g)	SAR Test Exclusion
PTT	850	35.43	3491.4	25	128.8	3.0	No
Bluetooth	2450	2.03	1.6	25	0.1	3.0	Yes

Body:

Mode	Frequency (MHz)	P_{avg} (dBm)	P_{avg} (mW)	Distance (mm)	Calculated value	Threshold (1-g)	SAR Test Exclusion
PTT	850	35.43	3491.4	0	644.0	3.0	No
Bluetooth	2450	2.03	1.6	0	0.5	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:
[(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 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:

Position	Reported SAR (W/kg)		ΣSAR
	PTT	BT	< 8W/kg
Face Up	2.758	0.015	2.773
Body-Back	2.464	0.074	2.538

Mode	Frequency (GHz)	Distance (mm)	P_{avg} (dBm)	P_{avg} (mW)	Estimated $_{1-g}$ (W/kg)
Bluetooth Face Up	2.45	25	2.5	1.778	0.015
Bluetooth Body-Back	2.45	0	2.5	1.778	0.074

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:
[(*max. power of channel, including* ***tune-up tolerance****, mW*)/(*min. test separation distance,mm*)]·[√f(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

Conclusion:
ΣSAR < 8.0 W/kg therefore simultaneous transmission SAR with Volume Scans is **not** required.

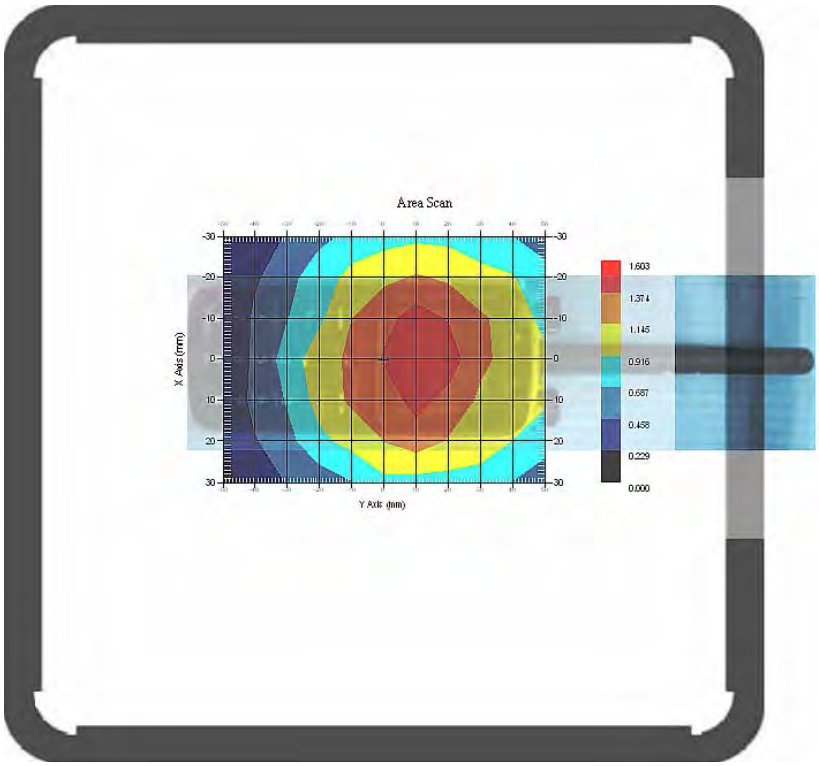
EUT SCAN RESULTS

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

Face-Up 2.5cm (Digital 12.5k-806.0125 MHz)
Battery: BL1809

Measurement Data	
Modulation mode	: 4FSK
Crest Factor	: 2
Scan Type	: Complete
Area Scan	: 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan	: 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start	: 1.378 W/kg
Power Drift-Finish	: 1.391 W/kg
Power Drift (%)	: 0.943
Tissue Data	
Type	: Head
Frequency	: 806.0125 MHz
Epsilon	: 41.17 F/m
Sigma	: 0.87 S/m
Density	: 1000.00 kg/cu. m
Probe Data	
Serial No.	: 500-00283
Frequency Band	: 835
Duty Cycle Factor	: 2
Conversion Factor	: 6.6
Probe Sensitivity	: 1.20 1.20 1.20 µV/(V/m)2
Compression Point	: 95.00 mV
Offset	: 1.56 mm
1 gram SAR value	: 1.413 W/kg
10 gram SAR value	: 0.990 W/kg
Area Scan Peak SAR	: 1.303 W/kg
Zoom Scan Peak SAR	: 2.110 W/kg

Plot 1#



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

Face-Up 2.5cm (Digital 12.5k-868.9875 MHz)
Battery: BL1809

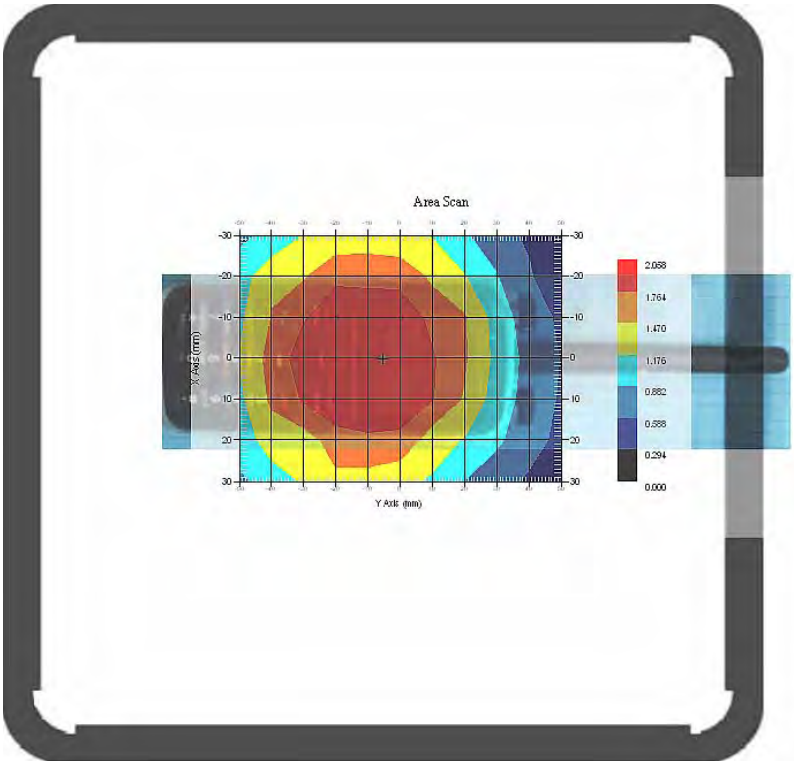
Measurement Data
Modulation mode : 4FSK
Crest Factor : 2
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 1.998 W/kg
Power Drift-Finish : 1.979 W/kg
Power Drift (%) : -0.920

Tissue Data
Type : Head
Frequency : 868.9875 MHz
Epsilon : 41.05 F/m
Sigma : 0.91 S/m
Density : 1000.00 kg/cu. m

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

1 gram SAR value : 1.956 W/kg
10 gram SAR value : 1.514 W/kg
Area Scan Peak SAR : 2.028 W/kg
Zoom Scan Peak SAR : 3.251 W/kg

Plot 2#



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

Face-Up 2.5cm (Digital 12.5k-898.5000 MHz)
Battery: BL1809

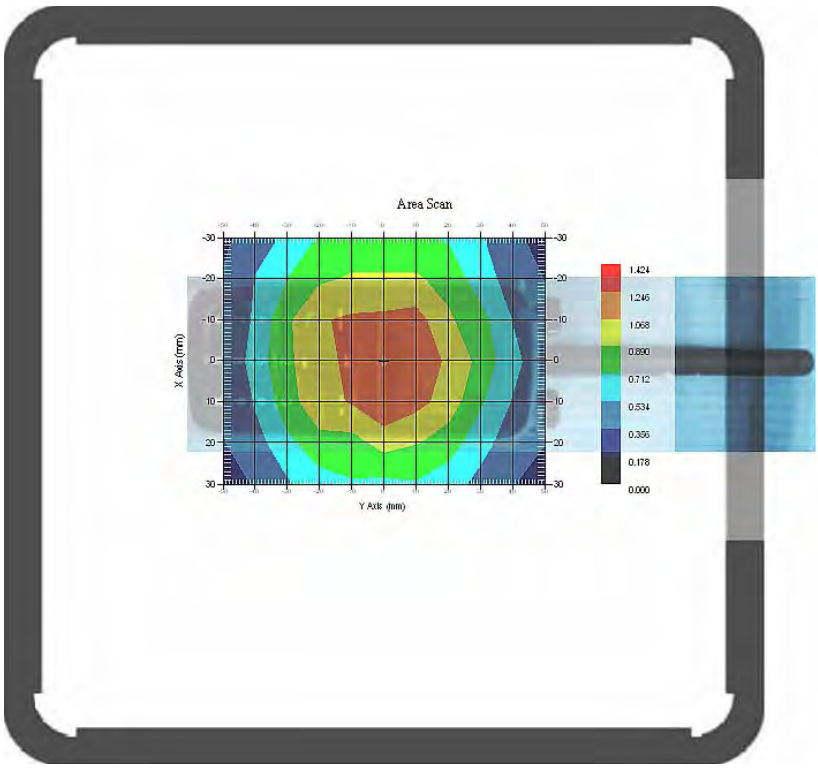
Measurement Data
Modulation mode : 4FSK
Crest Factor : 2
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 1.142 W/kg
Power Drift-Finish : 1.168 W/kg
Power Drift (%) : 2.277

Tissue Data
Type : Head
Frequency : 898.5000 MHz
Epsilon : 40.81 F/m
Sigma : 0.97 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 900
Duty Cycle Factor : 2
Conversion Factor : 6
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 1.138 W/kg
10 gram SAR value : 0.772 W/kg
Area Scan Peak SAR : 1.250 W/kg
Zoom Scan Peak SAR : 1.823 W/kg

Plot 3#

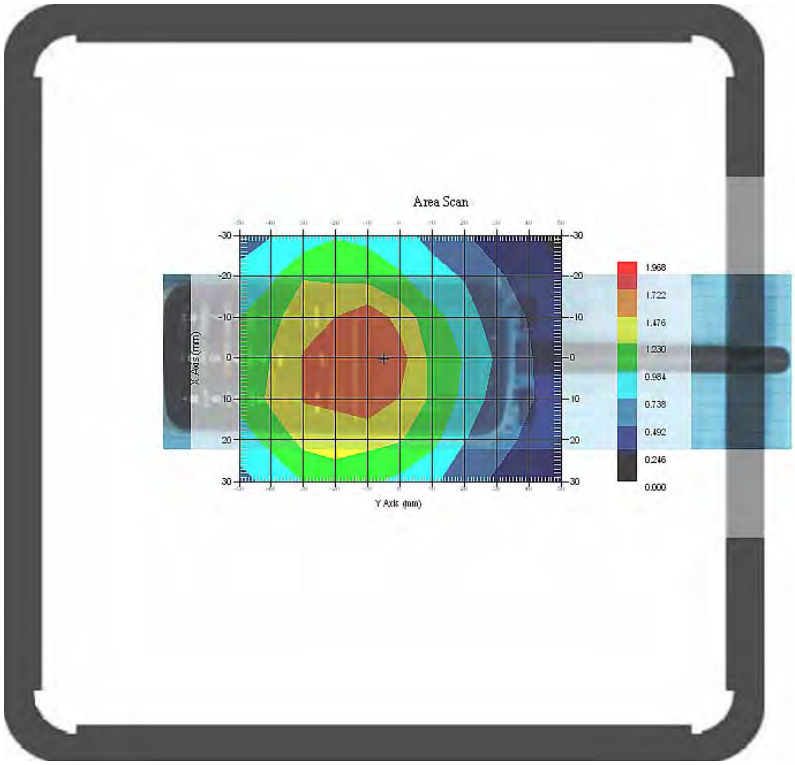


Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)

Face-Up 2.5cm (Digital 12.5k-937.5000 MHz)
Battery: BL1809

Measurement Data	
Modulation mode	: 4FSK
Crest Factor	: 2
Scan Type	: Complete
Area Scan	: 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan	: 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start	: 1.527 W/kg
Power Drift-Finish	: 1.539 W/kg
Power Drift (%)	: 0.786
Tissue Data	
Type	: Head
Frequency	: 937.5000 MHz
Epsilon	: 40.64 F/m
Sigma	: 0.99 S/m
Density	: 1000.00 kg/cu. m
Probe Data	
Serial No.	: 500-00283
Frequency Band	: 900
Duty Cycle Factor	: 2
Conversion Factor	: 6
Probe Sensitivity	: 1.20 1.20 1.20 µV/(V/m)2
Compression Point	: 95.00 mV
Offset	: 1.56 mm
1 gram SAR value	: 1.577 W/kg
10 gram SAR value	: 1.134 W/kg
Area Scan Peak SAR	: 1.810 W/kg
Zoom Scan Peak SAR	: 3.022 W/kg

Plot 4#

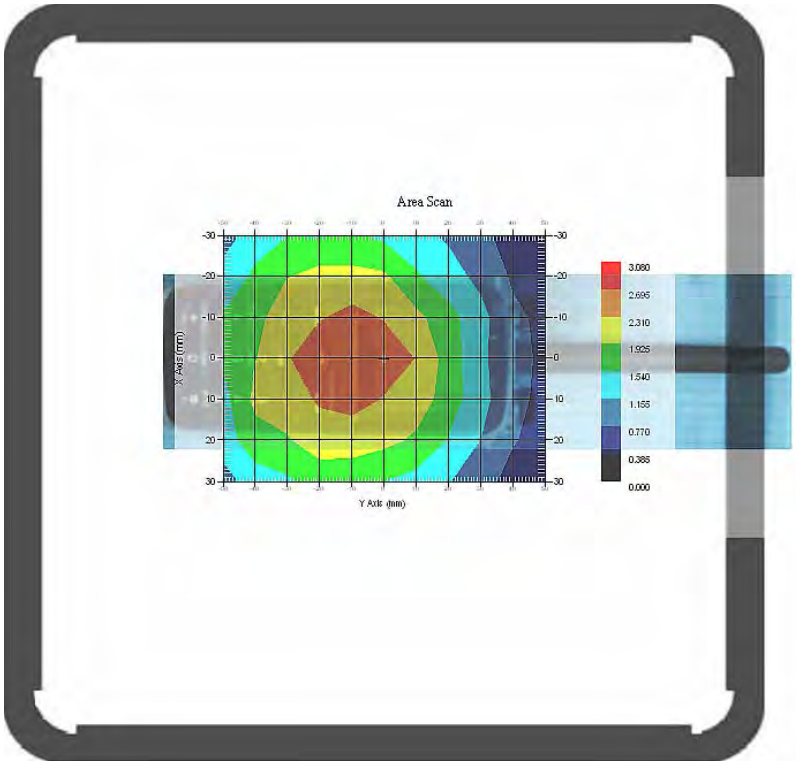


Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)

Face-Up 2.5cm (Digital 12.5k-868.9875 MHz)
Battery: BL1103

Measurement Data	
Modulation mode	: 4FSK
Crest Factor	: 2
Scan Type	: Complete
Area Scan	: 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan	: 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start	: 1.881 W/kg
Power Drift-Finish	: 1.901 W/kg
Power Drift (%)	: 1.063
Tissue Data	
Type	: Head
Frequency	: 868.9875 MHz
Epsilon	: 41.05 F/m
Sigma	: 0.91 S/m
Density	: 1000.00 kg/cu. m
Probe Data	
Serial No.	: 500-00283
Frequency Band	: 835
Duty Cycle Factor	: 2
Conversion Factor	: 6.6
Probe Sensitivity	: 1.20 1.20 1.20 µV/(V/m)2
Compression Point	: 95.00 mV
Offset	: 1.56 mm
1 gram SAR value	: 2.162 W/kg
10 gram SAR value	: 1.765 W/kg
Area Scan Peak SAR	: 2.708 W/kg
Zoom Scan Peak SAR	: 3.452 W/kg

Plot 5#



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

Body-Back 0.0cm (Digital 12.5k-868.9875 MHz);
Headset: ACN-02+EH-01; Body-worn accessory: PCN005; Battery: BL1809

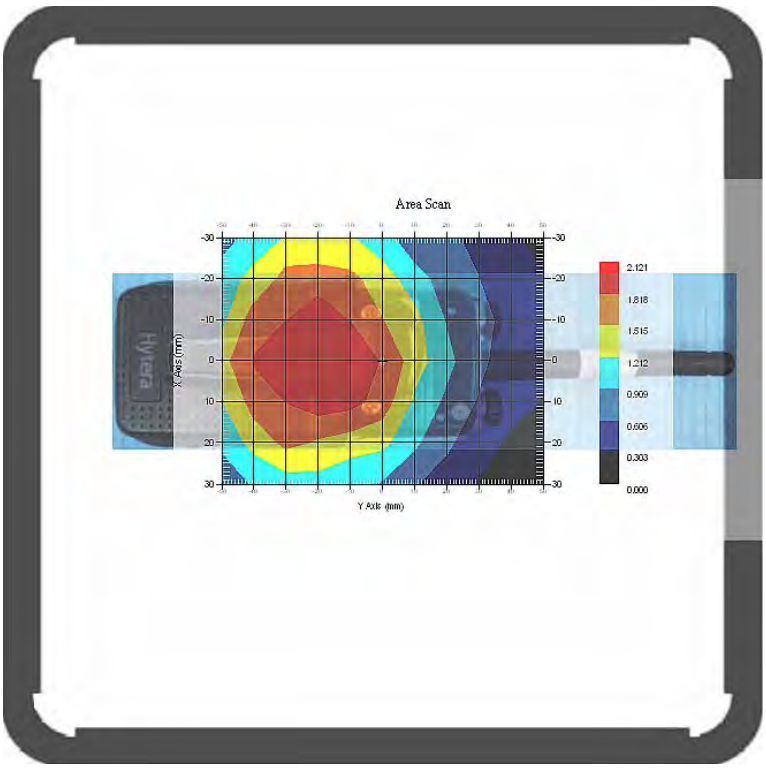
Measurement Data
Modulation mode : 4FSK
Crest Factor : 2
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 1.726 W/kg
Power Drift-Finish : 1.711 W/kg
Power Drift (%) : -0.869

Tissue Data
Type : Body
Frequency : 868.9875 MHz
Epsilon : 55.91 F/m
Sigma : 0.97 S/m
Density : 1000.00 kg/cu. m

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

1 gram SAR value : 2.056 W/kg
10 gram SAR value : 1.384 W/kg
Area Scan Peak SAR : 2.121 W/kg
Zoom Scan Peak SAR : 3.250 W/kg

Plot 6#



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

Body-Back 0.0cm (Digital 12.5k-868.9875 MHz);
Headset: ACN-02+EH-01; Body-worn accessory: CH04L01; Battery: BL1809

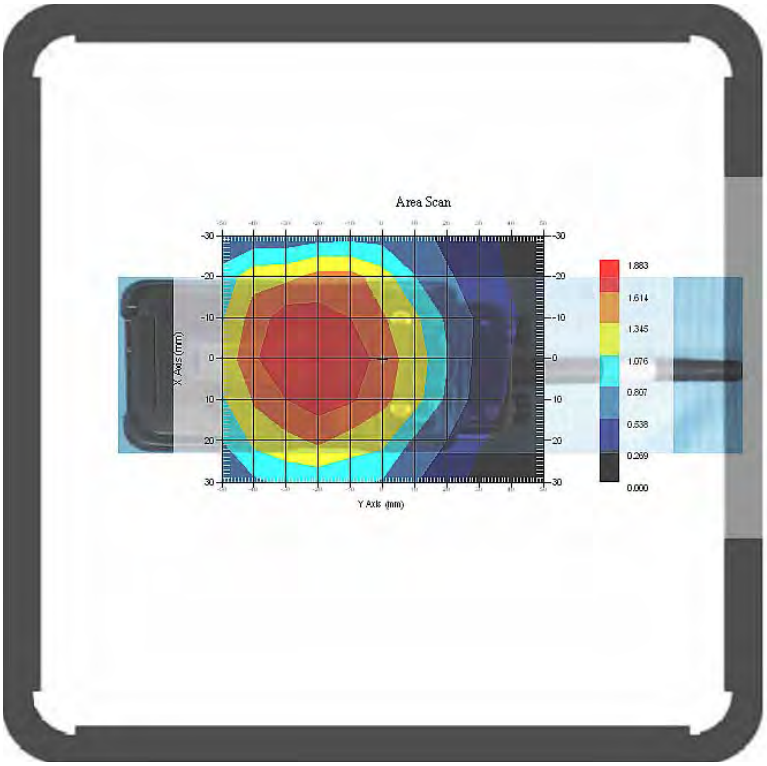
Measurement Data
Modulation mode : 4FSK
Crest Factor : 2
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 1.601 W/kg
Power Drift-Finish : 1.614 W/kg
Power Drift (%) : 0.821

Tissue Data
Type : Body
Frequency : 868.9875 MHz
Epsilon : 55.91 F/m
Sigma : 0.97 S/m
Density : 1000.00 kg/cu. m

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

1 gram SAR value : 1.824 W/kg
10 gram SAR value : 1.227 W/kg
Area Scan Peak SAR : 1.883 W/kg
Zoom Scan Peak SAR : 2.524 W/kg

Plot 7#



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

Body-Back 0.0cm (Digital 12.5k-868.9875 MHz);
Headset: ACN-02+EH-01; Body-worn accessory: PCN005; Battery: BL1103

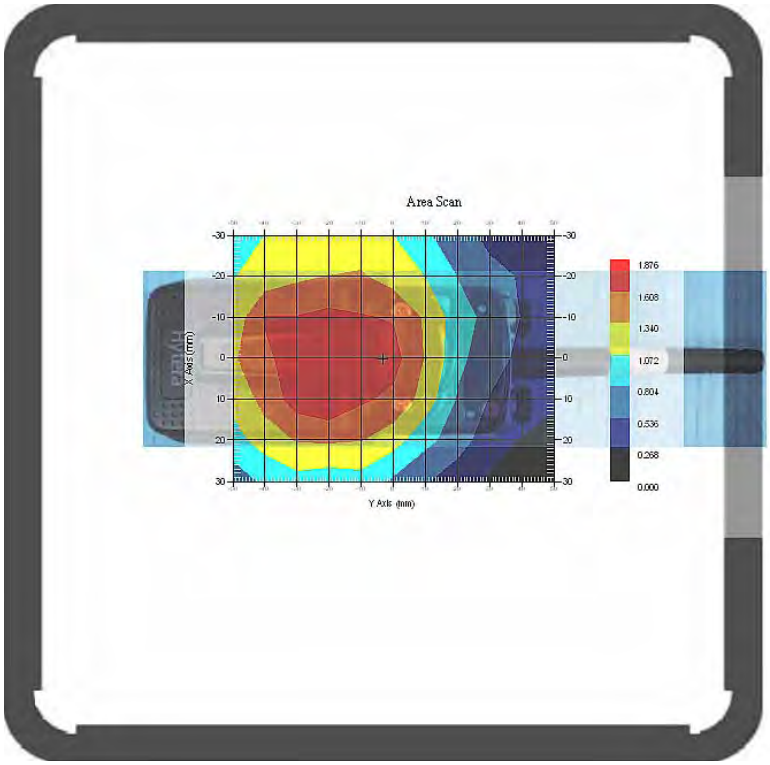
Measurement Data
Modulation mode : 4FSK
Crest Factor : 2
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 1.755 W/kg
Power Drift-Finish : 1.736 W/kg
Power Drift (%) : -1.139

Tissue Data
Type : Body
Frequency : 868.9875 MHz
Epsilon : 55.91 F/m
Sigma : 0.97 S/m
Density : 1000.00 kg/cu. m

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

1 gram SAR value : 1.675 W/kg
10 gram SAR value : 1.111 W/kg
Area Scan Peak SAR : 1.875 W/kg
Zoom Scan Peak SAR : 2.540 W/kg

Plot 8#



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

Body-Back 0.0cm (Digital 12.5k-868.9875 MHz);
Headset: ACN-02+EH-01; Body-worn accessory: CH04L01; Battery: BL1103

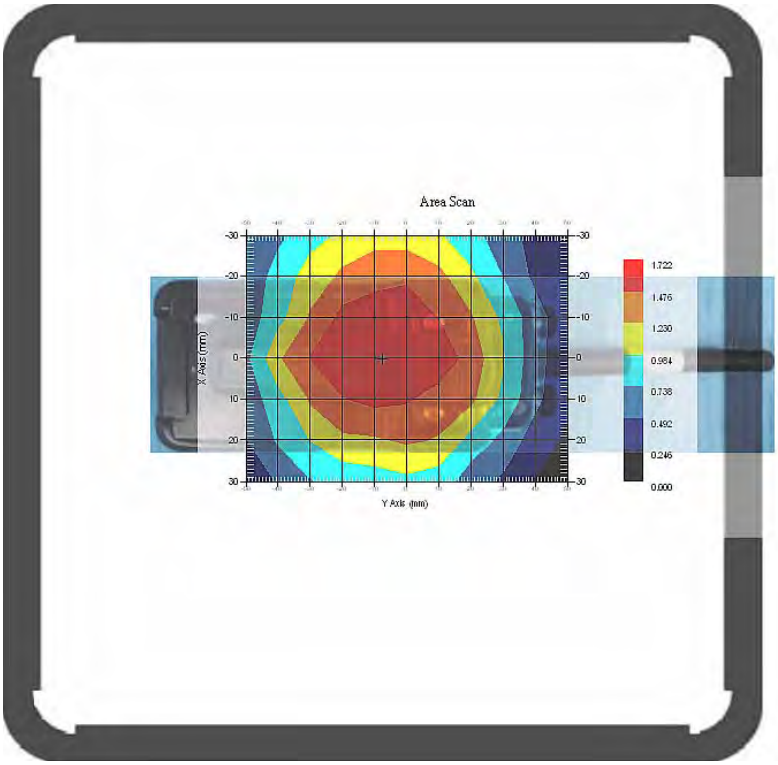
Measurement Data
Modulation mode : 4FSK
Crest Factor : 2
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 1.625 W/kg
Power Drift-Finish : 1.612 W/kg
Power Drift (%) : -0.800

Tissue Data
Type : Body
Frequency : 868.9875 MHz
Epsilon : 55.91 F/m
Sigma : 0.97 S/m
Density : 1000.00 kg/cu. m

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

1 gram SAR value : 1.655 W/kg
10 gram SAR value : 1.182 W/kg
Area Scan Peak SAR : 1.722 W/kg
Zoom Scan Peak SAR : 2.450 W/kg

Plot 9#



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

Face-Up 2.5cm (Analog 12.5k-806.0125 MHz)
Battery: BL1809

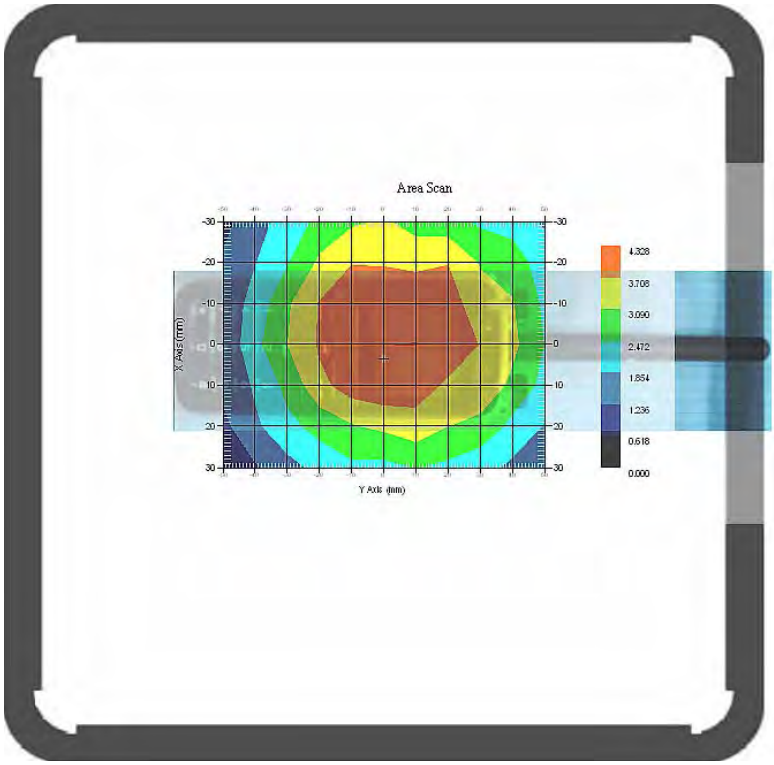
Measurement Data
Modulation mode : FM
Crest Factor : 1
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 3.931 W/kg
Power Drift-Finish : 3.954 W/kg
Power Drift (%) : 0.585

Tissue Data
Type : Head
Frequency : 806.0125 MHz
Epsilon : 41.17 F/m
Sigma : 0.87 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 1
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 4.084 W/kg
10 gram SAR value : 2.955 W/kg
Area Scan Peak SAR : 4.328 W/kg
Zoom Scan Peak SAR : 5.832 W/kg

Plot 10#

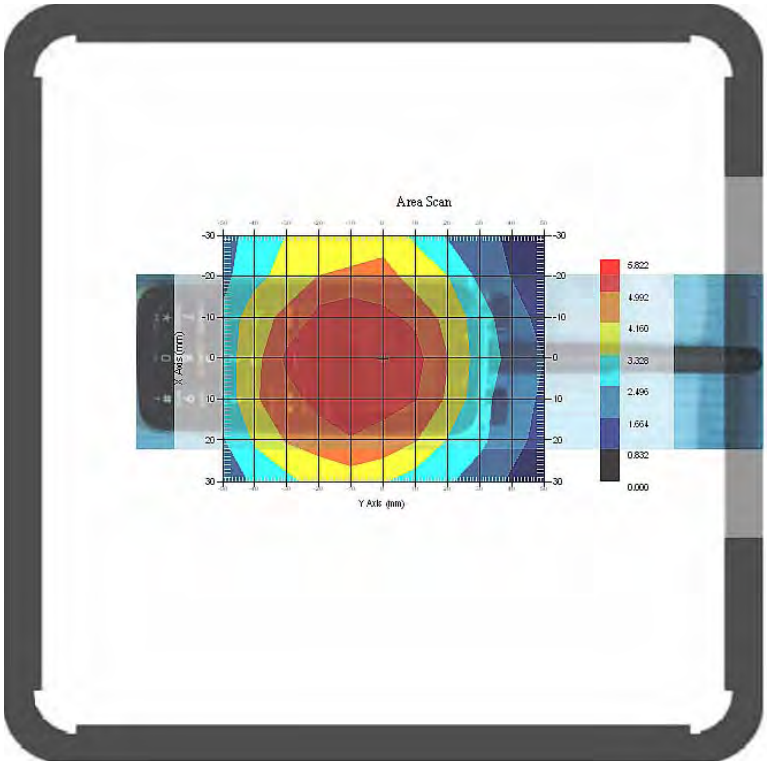


Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)

Face-Up 2.5cm (Analog 12.5k-868.9875 MHz)
Battery: BL1809

Measurement Data	
Modulation mode	: FM
Crest Factor	: 1
Scan Type	: Complete
Area Scan	: 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan	: 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start	: 5.112 W/kg
Power Drift-Finish	: 5.142 W/kg
Power Drift (%)	: 0.587
Tissue Data	
Type	: Head
Frequency	: 868.9875 MHz
Epsilon	: 41.05 F/m
Sigma	: 0.91 S/m
Density	: 1000.00 kg/cu. m
Probe Data	
Serial No.	: 500-00283
Frequency Band	: 835
Duty Cycle Factor	: 1
Conversion Factor	: 6.6
Probe Sensitivity	: 1.20 1.20 1.20 µV/(V/m)2
Compression Point	: 95.00 mV
Offset	: 1.56 mm
1 gram SAR value	: 5.236 W/kg
10 gram SAR value	: 3.530 W/kg
Area Scan Peak SAR	: 5.822 W/kg
Zoom Scan Peak SAR	: 8.150 W/kg

Plot 11#



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

Face-Up 2.5cm (Analog 12.5k-898.5000 MHz)
Battery: BL1809

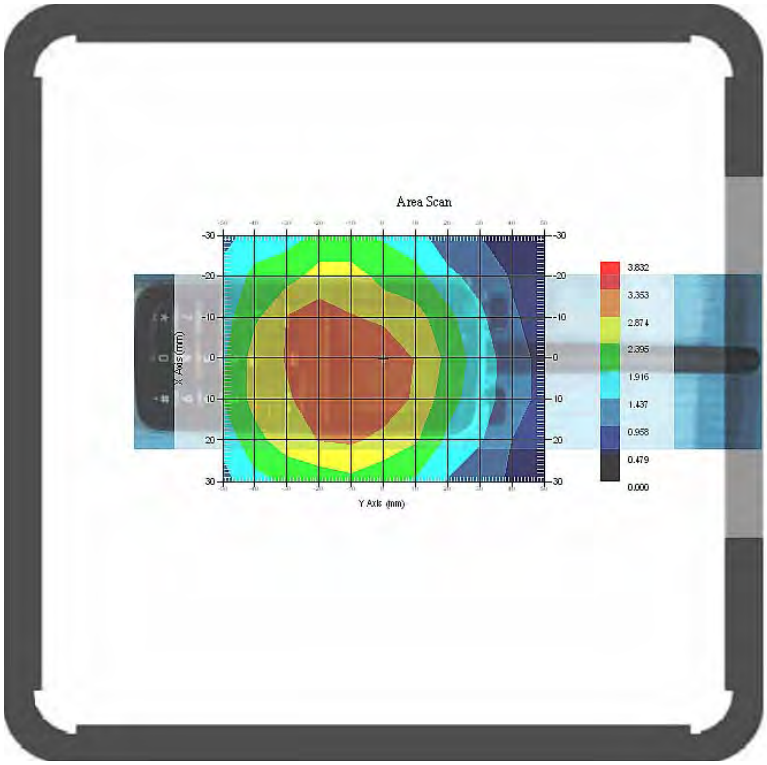
Measurement Data
Modulation mode : FM
Crest Factor : 1
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 3.152 W/kg
Power Drift-Finish : 3.197 W/kg
Power Drift (%) : 1.428

Tissue Data
Type : Head
Frequency : 898.5000 MHz
Epsilon : 40.81 F/m
Sigma : 0.97 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 900
Duty Cycle Factor : 1
Conversion Factor : 6
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 3.226 W/kg
10 gram SAR value : 2.258 W/kg
Area Scan Peak SAR : 3.507 W/kg
Zoom Scan Peak SAR : 4.689 W/kg

Plot 12#



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

Face-Up 2.5cm (Analog 12.5k-937.5000 MHz)
Battery: BL1809

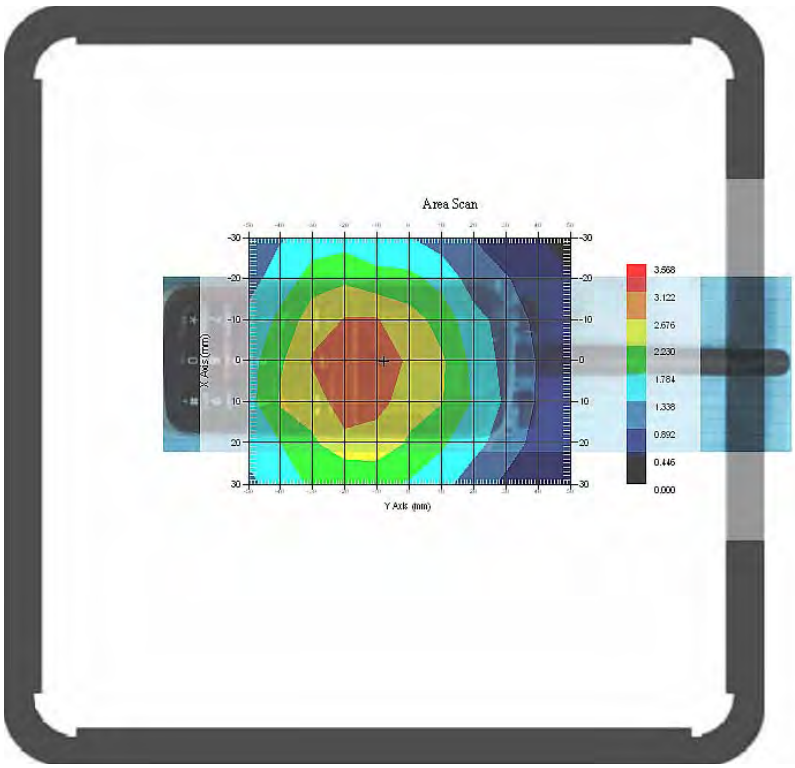
Measurement Data
Modulation mode : FM
Crest Factor : 1
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 2.745 W/kg
Power Drift-Finish : 2.711 W/kg
Power Drift (%) : -1.239

Tissue Data
Type : Head
Frequency : 937.5000 MHz
Epsilon : 40.64 F/m
Sigma : 0.99 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 900
Duty Cycle Factor : 1
Conversion Factor : 6
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 2.821 W/kg
10 gram SAR value : 1.912 W/kg
Area Scan Peak SAR : 3.119 W/kg
Zoom Scan Peak SAR : 4.283 W/kg

Plot 13#



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

Face-Up 2.5cm (Analog 12.5k-868.9875 MHz)
Battery: BL1103

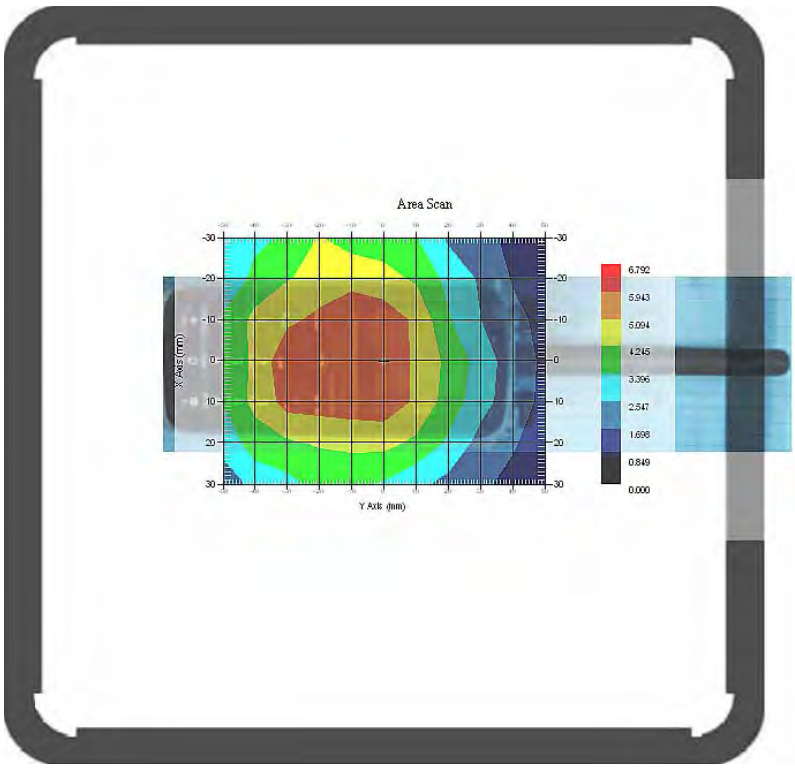
Measurement Data
Modulation mode : FM
Crest Factor : 1
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 5.011 W/kg
Power Drift-Finish : 5.154 W/kg
Power Drift (%) : 2.854

Tissue Data
Type : Head
Frequency : 868.9875 MHz
Epsilon : 41.05 F/m
Sigma : 0.91 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 1
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 5.402 W/kg
10 gram SAR value : 3.850 W/kg
Area Scan Peak SAR : 5.994 W/kg
Zoom Scan Peak SAR : 8.170 W/kg

Plot 14#



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

Body-Back 0.0cm (Analog 12.5k-868.9875 MHz);
Headset: ACN-02+EH-01; Body-worn accessory: PCN005; Battery; BL1809

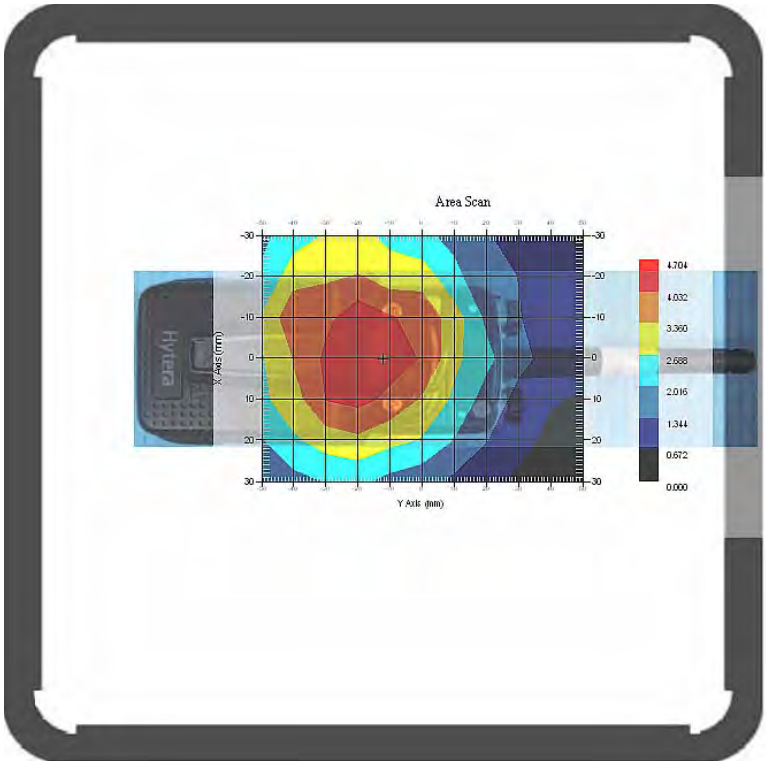
Measurement Data
Modulation mode : FM
Crest Factor : 1
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 3.989 W/kg
Power Drift-Finish : 3.926 W/kg
Power Drift (%) : -1.579

Tissue Data
Type : Body
Frequency : 868.9875 MHz
Epsilon : 55.91 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 : 1
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 4.157 W/kg
10 gram SAR value : 3.002 W/kg
Area Scan Peak SAR : 4.703 W/kg
Zoom Scan Peak SAR : 6.225 W/kg

Plot 15#

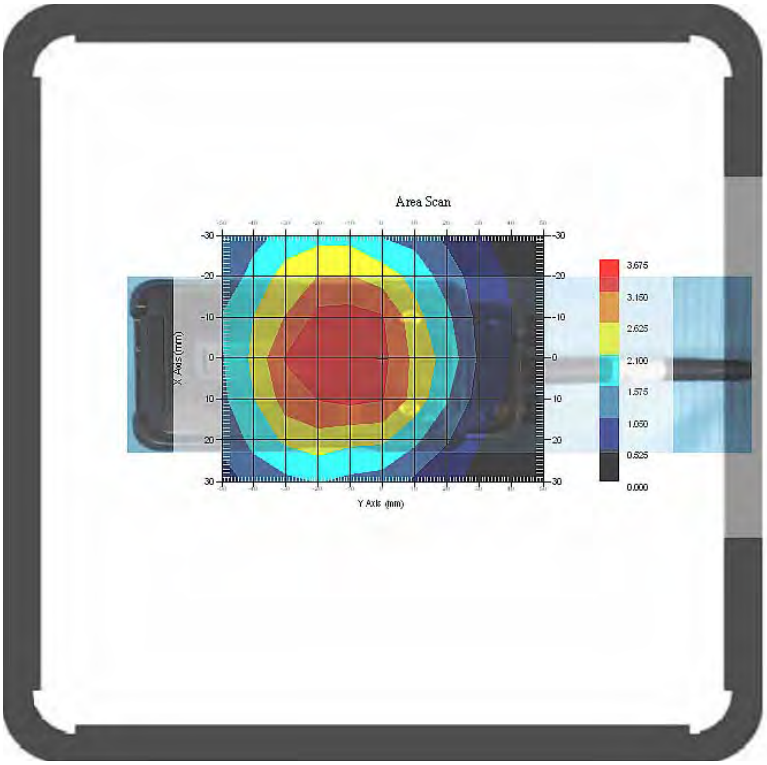


Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)

Body-Back 0.0cm (Analog 12.5k-868.9875 MHz);
Headset: ACN-02+EH-01; Body-worn accessory: CH04L01; Battery: BL1809

Measurement Data	
Modulation mode	: FM
Crest Factor	: 1
Scan Type	: Complete
Area Scan	: 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan	: 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start	: 3.423 W/kg
Power Drift-Finish	: 3.445 W/kg
Power Drift (%)	: 0.643
Tissue Data	
Type	: Body
Frequency	: 868.9875 MHz
Epsilon	: 55.91 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	: 1
Conversion Factor	: 6.6
Probe Sensitivity	: 1.20 1.20 1.20 µV/(V/m)2
Compression Point	: 95.00 mV
Offset	: 1.56 mm
1 gram SAR value	: 3.344 W/kg
10 gram SAR value	: 2.263 W/kg
Area Scan Peak SAR	: 3.675 W/kg
Zoom Scan Peak SAR	: 4.952 W/kg

Plot 16#



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

Body-Back 0.0cm (Analog 12.5k-868.9875 MHz);
Headset: ACN-02+EH-01; Body-worn accessory: PCN005; Battery: BL1103

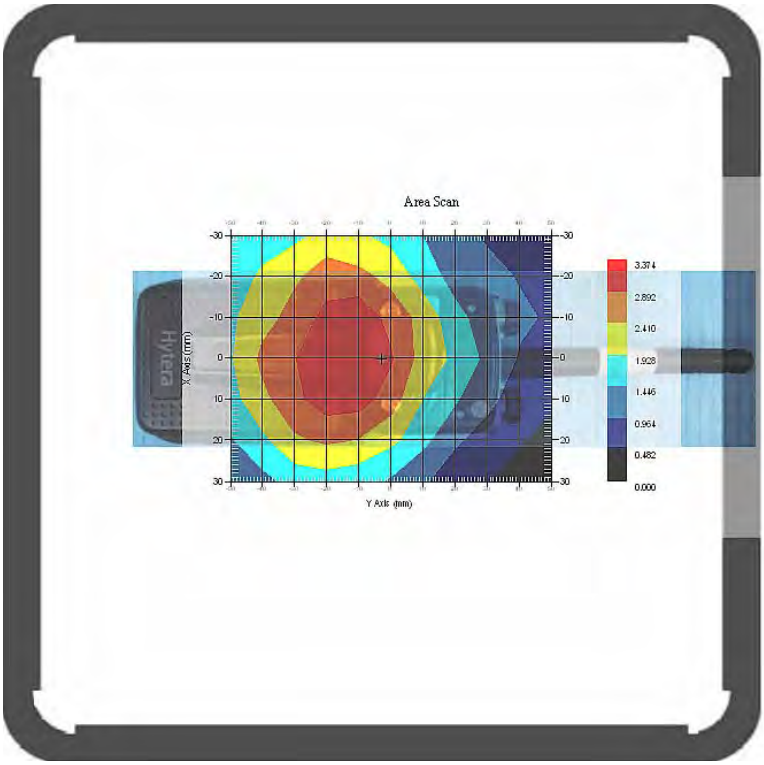
Measurement Data
Modulation mode : FM
Crest Factor : 1
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 3.122 W/kg
Power Drift-Finish : 3.153 W/kg
Power Drift (%) : 0.957

Tissue Data
Type : Body
Frequency : 868.9875 MHz
Epsilon : 55.91 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 : 1
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 3.304 W/kg
10 gram SAR value : 2.183 W/kg
Area Scan Peak SAR : 3.374 W/kg
Zoom Scan Peak SAR : 4.557 W/kg

Plot 17#



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

Body-Back 0.0cm (Analog 12.5k-868.9875 MHz);
Headset: ACN-02+EH-01; Body-worn accessory: CH04L01; Battery: BL1103

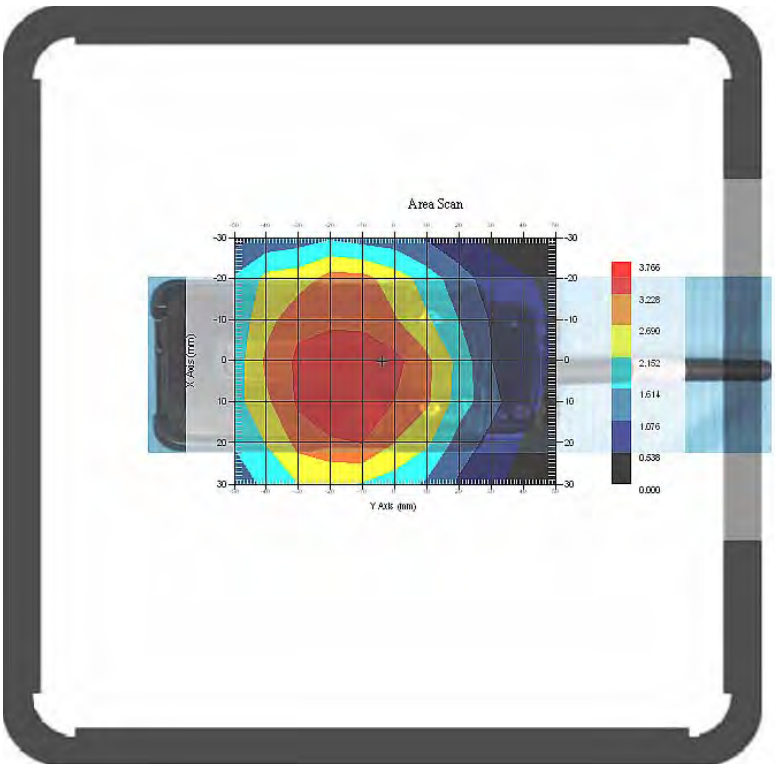
Measurement Data
Modulation mode : FM
Crest Factor : 1
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 3.387 W/kg
Power Drift-Finish : 3.361 W/kg
Power Drift (%) : -0.768

Tissue Data
Type : Body
Frequency : 868.9875 MHz
Epsilon : 55.91 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 : 1
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 3.132 W/kg
10 gram SAR value : 2.175 W/kg
Area Scan Peak SAR : 3.766 W/kg
Zoom Scan Peak SAR : 5.352 W/kg

Plot 18#

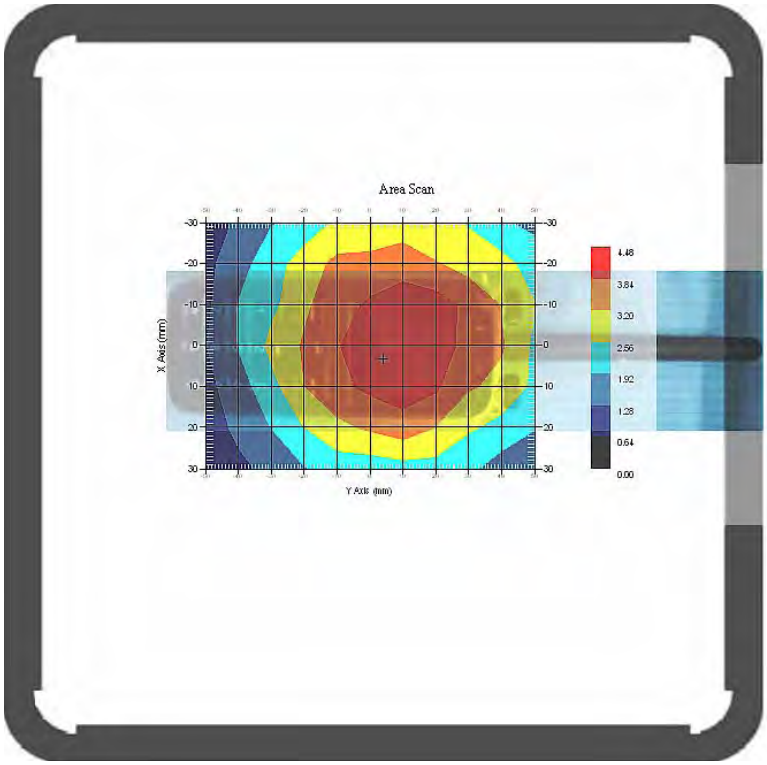


Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)

Face-Up 2.5cm (Analog 25k-806.0125 MHz)
Battery: BL1809

Measurement Data	
Modulation mode	: FM
Crest Factor	: 1
Scan Type	: Complete
Area Scan	: 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan	: 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start	: 3.968 W/kg
Power Drift-Finish	: 4.008 W/kg
Power Drift (%)	: 1.074
Tissue Data	
Type	: Head
Frequency	: 806.0125 MHz
Epsilon	: 41.17 F/m
Sigma	: 0.87 S/m
Density	: 1000.00 kg/cu. m
Probe Data	
Serial No.	: 500-00283
Frequency Band	: 835
Duty Cycle Factor	: 1
Conversion Factor	: 6.6
Probe Sensitivity	: 1.20 1.20 1.20 µV/(V/m)2
Compression Point	: 95.00 mV
Offset	: 1.56 mm
1 gram SAR value	: 4.074 W/kg
10 gram SAR value	: 2.752 W/kg
Area Scan Peak SAR	: 4.480 W/kg
Zoom Scan Peak SAR	: 5.726 W/kg

Plot 19#



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

Face-Up 2.5cm (Analog 25k-868.9875 MHz)
Battery: BL1809

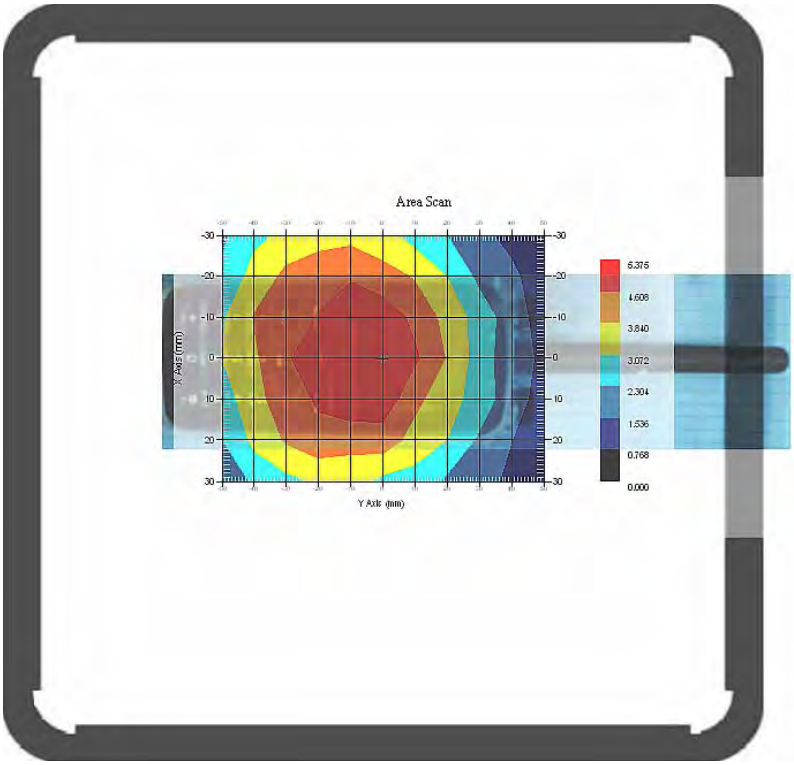
Measurement Data
Modulation mode : FM
Crest Factor : 1
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 4.673 W/kg
Power Drift-Finish : 4.651 W/kg
Power Drift (%) : -0.471

Tissue Data
Type : Head
Frequency : 868.9875 MHz
Epsilon : 41.05 F/m
Sigma : 0.91 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 1
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 4.623 W/kg
10 gram SAR value : 3.125 W/kg
Area Scan Peak SAR : 5.375 W/kg
Zoom Scan Peak SAR : 7.852 W/kg

Plot 20#



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

Face-Up 2.5cm (Analog 25k-868.9875 MHz)
Battery：BL1103

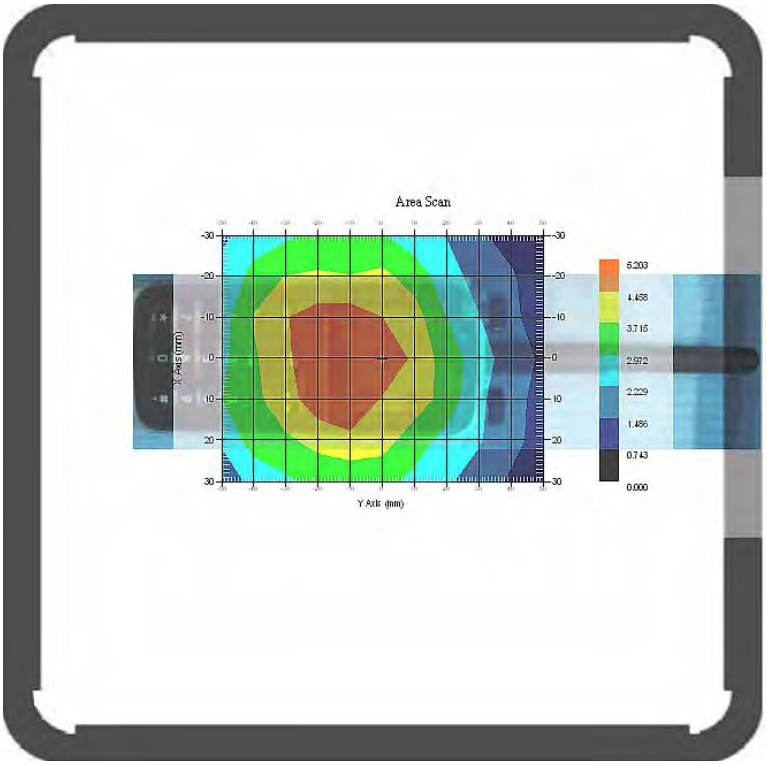
Measurement Data
Modulation mode : FM
Crest Factor : 1
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 5.005 W/kg
Power Drift-Finish : 5.077 W/kg
Power Drift (%) : 1.436

Tissue Data
Type : Head
Frequency : 868.9875 MHz
Epsilon : 41.05 F/m
Sigma : 0.91 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 1
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 4.772 W/kg
10 gram SAR value : 3.281 W/kg
Area Scan Peak SAR : 5.203 W/kg
Zoom Scan Peak SAR : 6.632 W/kg

Plot 21#



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

Body-Back 0.0cm (Analog 25k-868.9875 MHz);
Headset: ACN-02+EH-01; Body-worn accessory: PCN005; Battery: BL1809

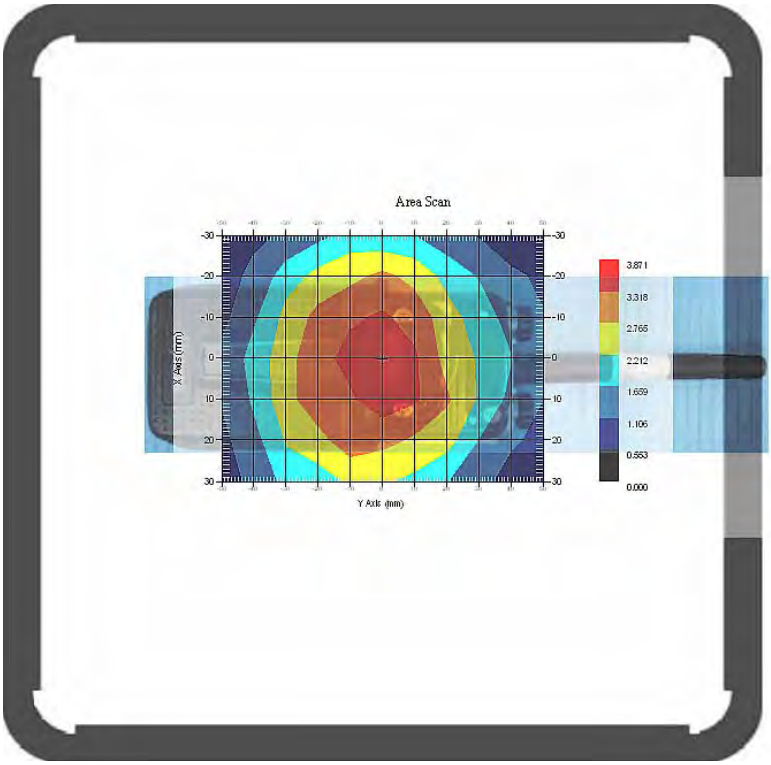
Measurement Data
Modulation mode : FM
Crest Factor : 1
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 3.624 W/kg
Power Drift-Finish : 3.665 W/kg
Power Drift (%) : 1.131

Tissue Data
Type : Body
Frequency : 868.9875 MHz
Epsilon : 55.91 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 : 1
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 3.126 W/kg
10 gram SAR value : 2.449 W/kg
Area Scan Peak SAR : 3.869 W/kg
Zoom Scan Peak SAR : 5.228 W/kg

Plot 22#

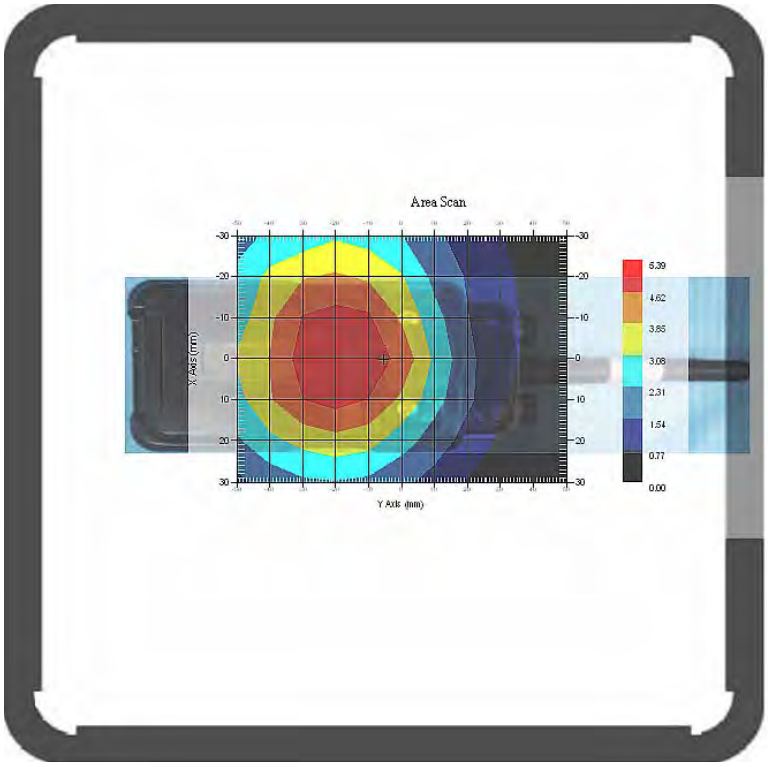


Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)

Body-Back 0.0cm (Analog 25k-868.9875 MHz);
Headset: ACN-02+EH-01; Body-worn accessory: CH04L01; Battery: BL1809

Measurement Data	
Modulation mode	: FM
Crest Factor	: 1
Scan Type	: Complete
Area Scan	: 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan	: 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start	: 4.765 W/kg
Power Drift-Finish	: 4.727 W/kg
Power Drift (%)	: 0.797
Tissue Data	
Type	: Body
Frequency	: 868.9875 MHz
Epsilon	: 55.91 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	: 1
Conversion Factor	: 6.6
Probe Sensitivity	: 1.20 1.20 1.20 µV/(V/m)2
Compression Point	: 95.00 mV
Offset	: 1.56 mm
1 gram SAR value	: 4.748 W/kg
10 gram SAR value	: 3.321 W/kg
Area Scan Peak SAR	: 5.387 W/kg
Zoom Scan Peak SAR	: 6.980 W/kg

Plot 23#



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

Body-Back 0.0cm (Analog 25k-868.9875 MHz);
Headset: ACN-02+EH-01; Body-worn accessory: PCN005; Battery: BL1103

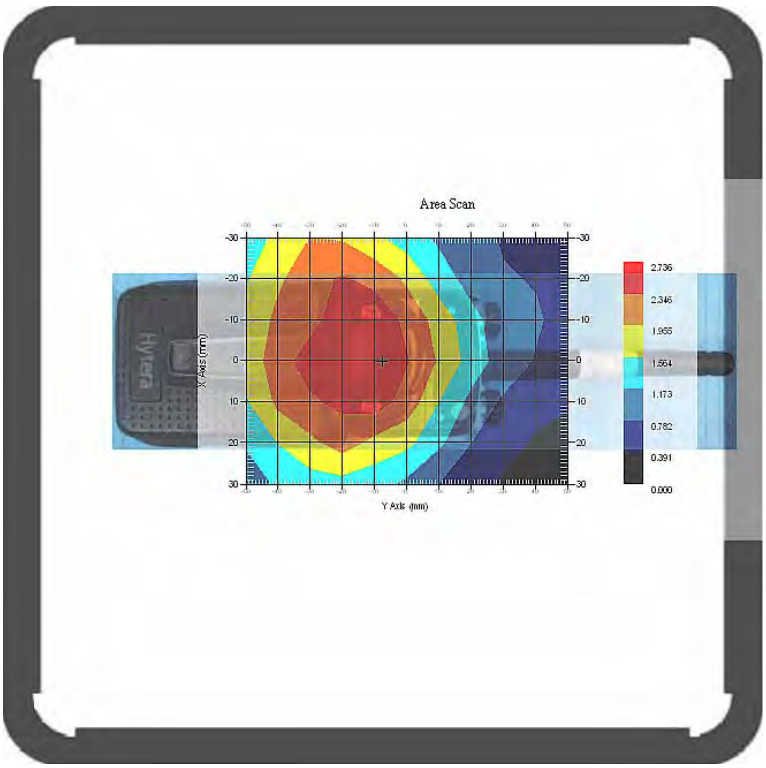
Measurement Data
Modulation mode : FM
Crest Factor : 1
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 2.412 W/kg
Power Drift-Finish : 2.447 W/kg
Power Drift (%) : 1.451

Tissue Data
Type : Body
Frequency : 868.9875 MHz
Epsilon : 55.91 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 : 1
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 2.567 W/kg
10 gram SAR value : 1.662 W/kg
Area Scan Peak SAR : 2.736 W/kg
Zoom Scan Peak SAR : 3.950 W/kg

Plot 24#



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

Body-Back 0.0cm (Analog 25k-868.9875 MHz);
Headset: ACN-02+EH-01; Body-worn accessory: CH04L01; Battery: BL1103

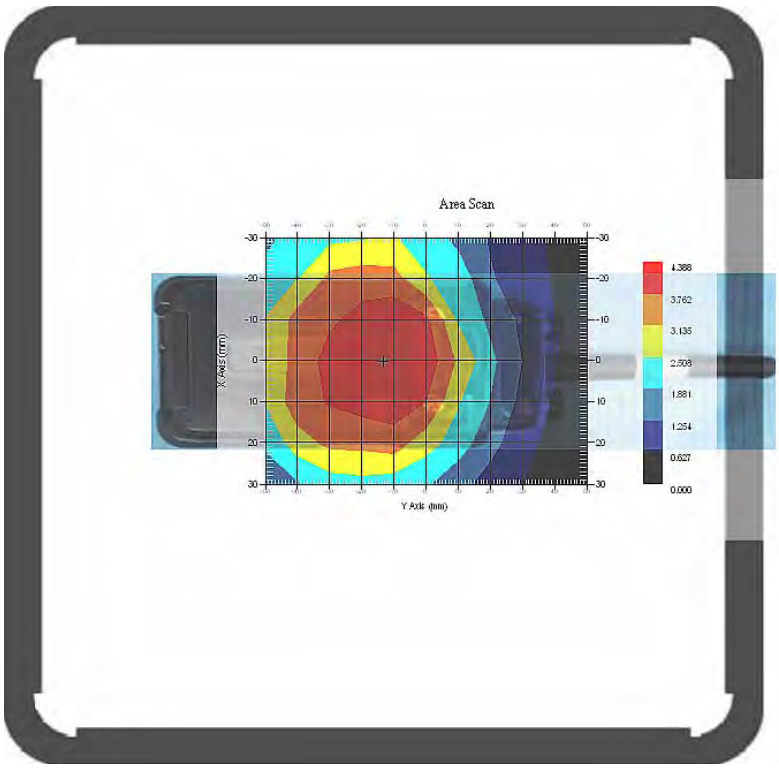
Measurement Data
Modulation mode : FM
Crest Factor : 1
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 4.102 W/kg
Power Drift-Finish : 4.143 W/kg
Power Drift (%) : 0.995

Tissue Data
Type : Body
Frequency : 868.9875 MHz
Epsilon : 55.91 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 : 1
Conversion Factor : 6.6
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 3.737 W/kg
10 gram SAR value : 2.889 W/kg
Area Scan Peak SAR : 4.388 W/kg
Zoom Scan Peak SAR : 6.860 W/kg

Plot 25#



APPENDIX A – MEASUREMENT UNCERTAINTY

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

Measurement Uncertainty for 300MHz to 3GHz

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	c_i^1 (1-g)	c_i^1 (10-g)	Standard Uncertainty (1-g) %	Standard Uncertainty (10-g) %
Measurement System							
Probe Calibration	3.5	normal	1	1	1	3.5	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1\text{-cp})^{1/2}$	$(1\text{-cp})^{1}_{/2}$	1.5	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	$\sqrt{cp}$	4.4	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Readout Electronics	1.0	normal	1	1	1	1.0	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0	1.0
RF Ambient Condition -Noise	0.006	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.: 1427-1430

Client.: BACL Lab

CERTIFICATE OF CALIBRATION

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

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

Calibration Procedure: D01-032-E020-V2, D22-012-Tissue, D28-002-Dipole
Project No: BACL-5673

Calibrated: 8th August 2012
Released on: 9th August 2012

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 meteorgical practices.

Calibration Method

Probes are calibrated using the following methods.

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

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

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

References

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

NCL Calibration Laboratories

Division of APREL Inc.

Conditions

Probe 500-00283 was a recalibration with the exception frequency of 450 MHz .which was a new calibration

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

Primary Measurement Standards

Instrument	**Serial Number**	**Cal due date**
Power meter Anritsu MA2408A	90025437	Nov.4, 2012
Power Sensor Anritsu MA2481D	103555	Nov 4, 2012
Attenuator HP 8495A (70dB)	1944A10711	Sept. 14, 2012
Network Analyzer Anritsu MT8801C	MB11855	Feb. 8, 2013

Secondary Measurement Standards

Signal Generator Agilent E4438C -506	MY55182336	June 7, 2013

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

NCL Calibration Laboratories

Division of APREL Inc.

Calibration for Tissue (Head H, Body B)

Frequency	Tissue Type	Measured Epsilon	Measured Sigma	Calibration Uncertainty	Tolerance Uncertainty for 5%*	Conversion Factor
450 H	Head	43.98	0.9	3.5	3.4	6
450 B	Body	57.07	0.92	3.5	3.4	6
750 H	Head	X	X	X	X	X
750 B	Body	X	X	X	X	X
835 H	Head	42.35	0.938	3.5	3.4	6.6
835 B	Body	56.65	1.018	3.5	3.4	6.6
900 H	Head	41.35	0.98	3.5	3.4	6
900 B	Body	56.08	1.05	3.5	3.4	6
1450 H	Head	X	X	X	X	X
1450 B	Body	X	X	X	X	X
1500 H	Head	X	X	X	X	X
1500 B	Body	X	X	X	X	X
1640 H	Head	X	X	X	X	X
1640 B	Body	X	X	X	X	X
1750 H	Head	X	X	X	X	X
1750 B	Body	X	X	X	X	X
1800 H	Head	X	X	X	X	X
1800 B	Body	X	X	X	X	X
1900 H	Head	38.72	1.35	3.5	2.7	5.2
1900 B	Body	51.62	1.48	3.5	2.7	5
2000 H	Head	X	X	X	X	X
2000 B	Body	X	X	X	X	X
2100 H	Head	X	X	X	X	X
2100 B	Body	X	X	X	X	X
2300 H	Head	X	X	X	X	X
2300 B	Body	X	X	X	X	X
2450 H	Head	38.06	1.87	3.5	3.5	4.9
2450B	Body	50.22	2.03	3.5	3.5	4.3
2600 H	Head	X	X	X	X	X
2600 B	Body	X	X	X	X	X
3000 H	Head	X	X	X	X	X
3000 B	Body	X	X	X	X	X
3600 H	Head	X	X	X	X	X
3600 B	Body	X	X	X	X	X
5200 H	Head	X	X	X	X	X
5200 B	Body	X	X	X	X	X
5600 H	Head	X	X	X	X	X
5600 B	Body	X	X	X	X	X
5800 H	Head	X	X	X	X	X
5800 B	Body	X	X	X	X	X

Boundary Effect:

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

Spatial Resolution:

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

DAQ-PAQ Contribution

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

Boundary Effect:

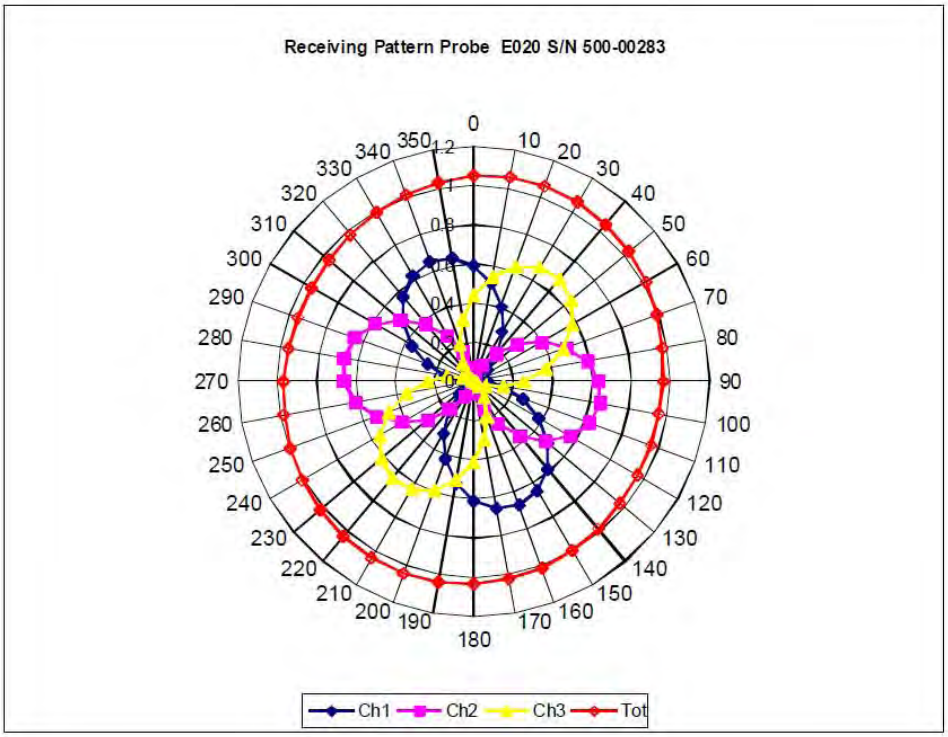
For a distance of 0.58mm the worst case evaluated uncertainty (increase in the probe sensitivity) is less than 2.1%.

NOTES:

*The maximum deviation from the centre frequency when comparing the lower to upper range is listed.

NCL Calibration Laboratories
Division of APREL Inc.

Receiving Pattern Air



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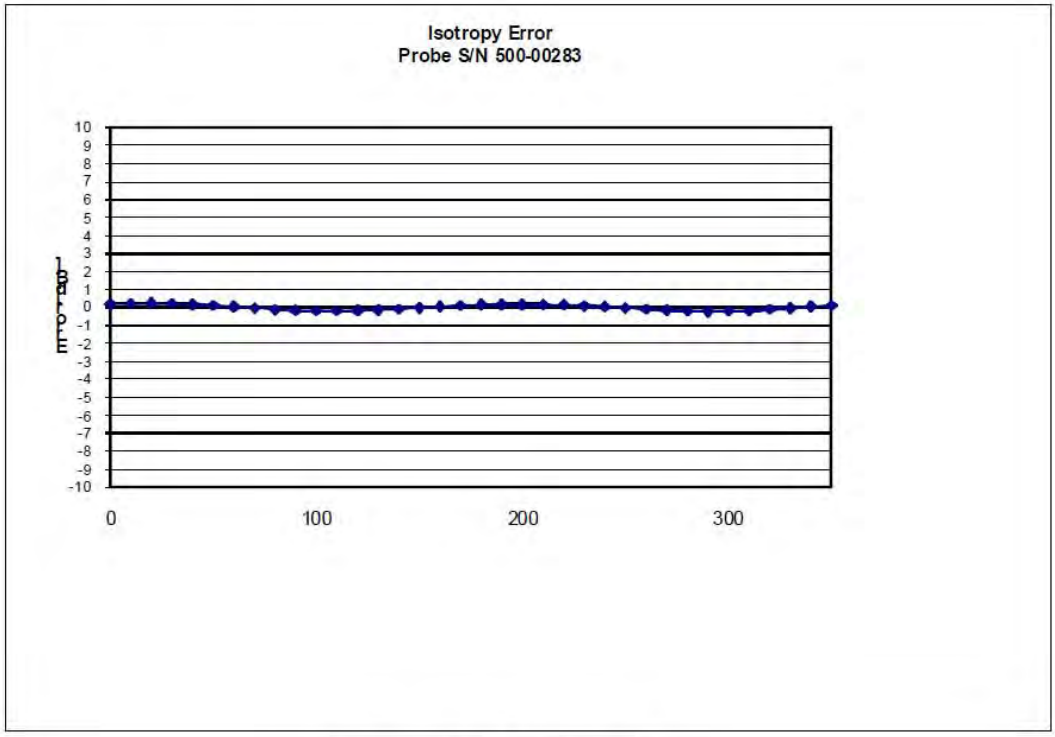
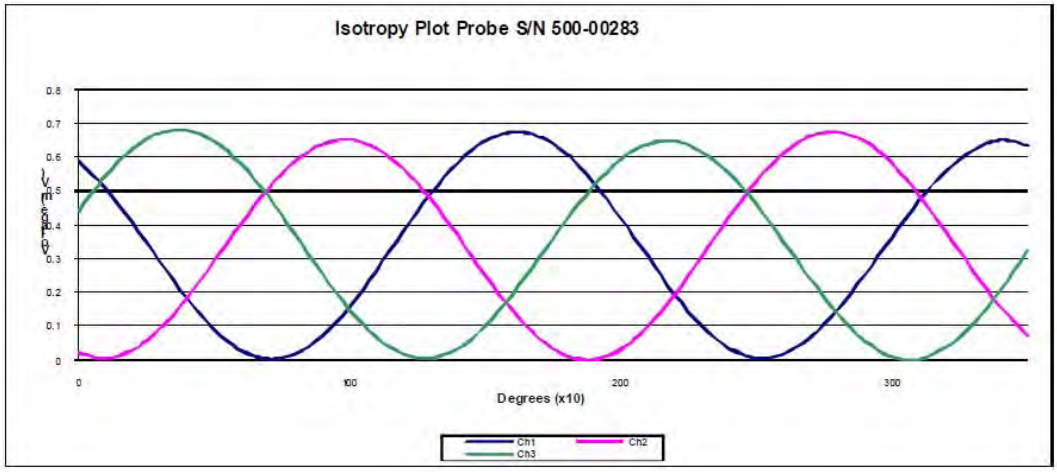
Isotropy Error Air





Isotropicity Tissue: 0.10 dB

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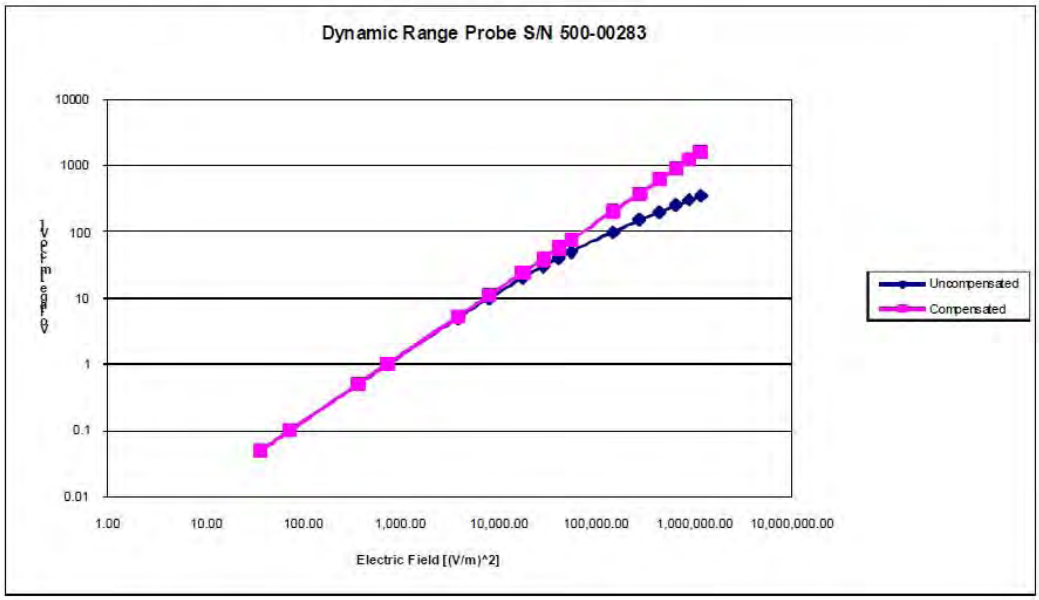
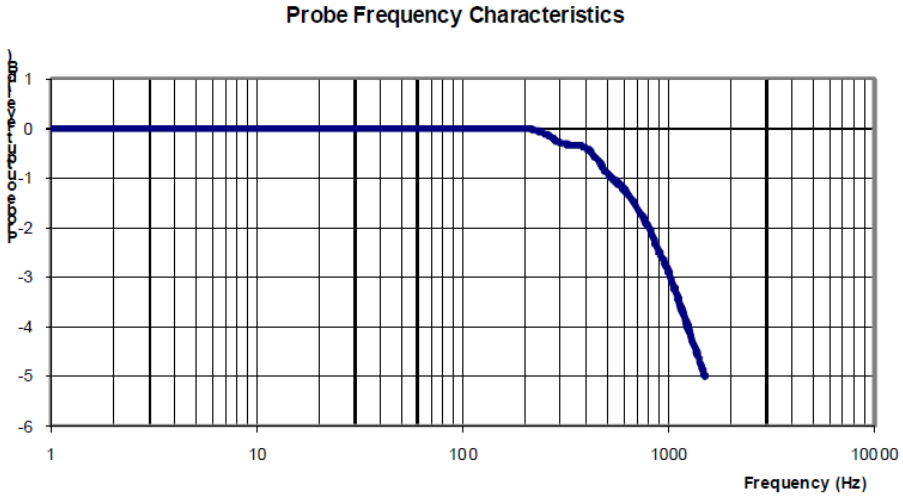
Dynamic Range



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

NCL Calibration Laboratories
Division of APREL Inc.

Video Bandwidth



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

Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2012.

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

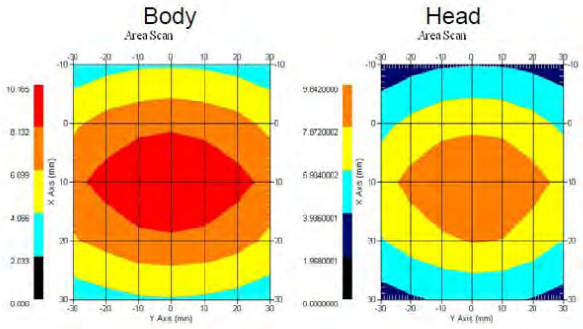
Length: 162.2 mm
Height: 89.4 mm

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Introduction

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

References

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

Conditions

Dipole 180-00558 was new taken from stock.

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

Dipole Calibration uncertainty

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

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

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NCL Calibration Laboratories
Division of APREL Laboratories.

Dipole Calibration Results

Mechanical Verification

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

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

Tissue Validation

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

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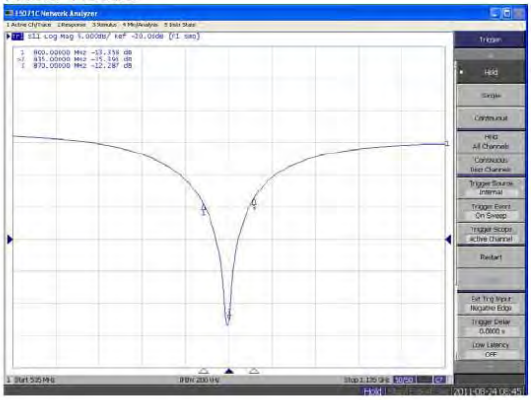
NCL Calibration Laboratories
Division of APREL Laboratories.

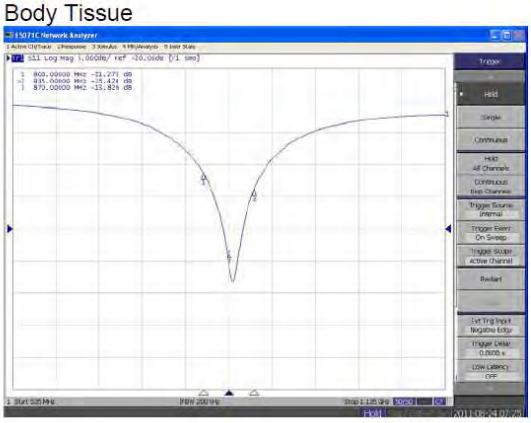
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head Tissue



Body Tissue



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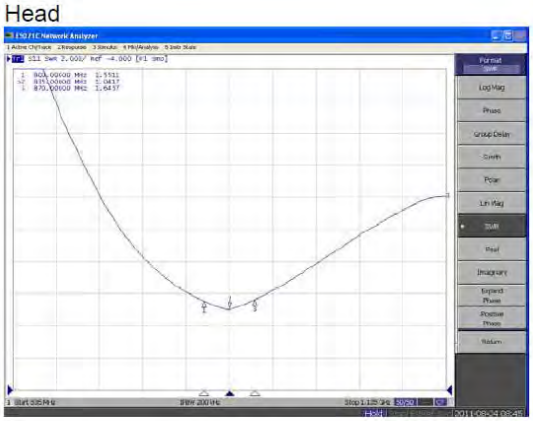
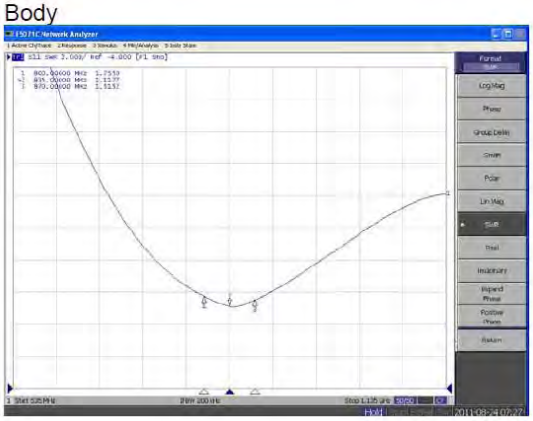
NCL Calibration Laboratories
Division of APREL Laboratories.

SWR
Head



Body



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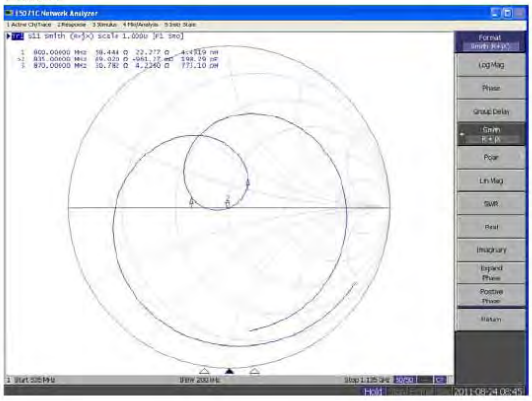
This page has been reviewed for content and attested to by signature within this document.

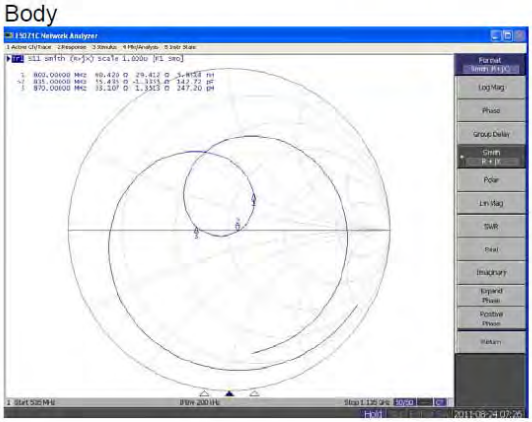
NCL Calibration Laboratories
Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



Body



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

NCL Calibration Laboratories
Division of APREL Laboratories.

Test Equipment

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

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

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

Mechanical Verification

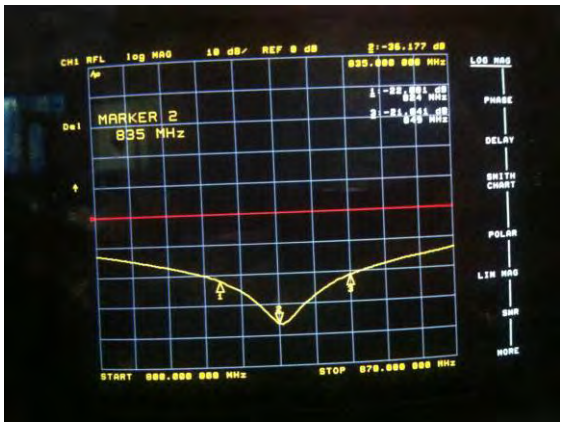
APREL Length	APREL Height	Measured Length	Measured Height
161.0 mm	89.8 mm	161.2 mm	89.5 mm

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

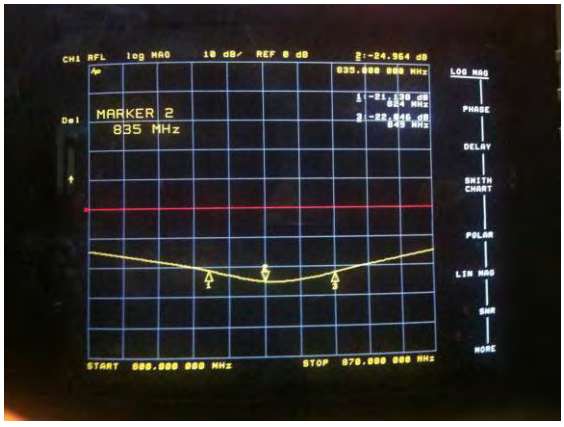
Return Loss :



Impedance :

Body Tissue

Return Loss :



Impedance :

NCL CALIBRATION LABORATORIES

Calibration File No: DC-1328
Project Number: BAC-dipole-cal-5617

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)

Manufacturer: APREL Laboratories
Part number: ALS-D-900-S-2
Frequency: 900 MHz
Serial No: 190-00609

Customer: Bay Area Compliance Laboratory

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

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

Released By: _____

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Conditions

Dipole 190-00609 was received in good condition and a recalibration.

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

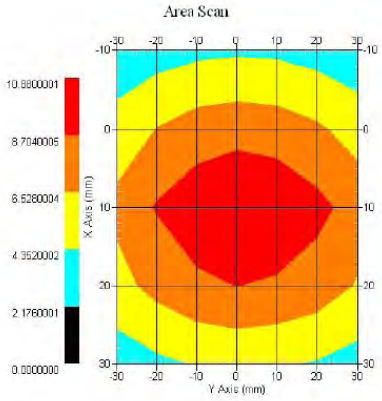
Length: 149.9 mm
Height: 82.8 mm

Electrical Specification

SWR: 1.0577 U
Return Loss: -31.598 dB
Impedance: 47.962Ω

System Validation Results

Tissue	Frequency	1 Gram	10 Gram	Peak
Head	900MHz	10.944	6.850	16.715



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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 190-00609. 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 190-00609 was a recalibration.

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

Dipole Calibration uncertainty

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

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

4

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Dipole Calibration Results

Mechanical Verification

APREL Length	APREL Height	Measured Length	Measured Height
149.0 mm	83.3 mm	149.9 mm	82.8 mm

Electrical Calibration

Test	Result
S11 R/L	-31.598 dB
SWR	1.0577 U
Impedance	47.962Ω

Tissue Validation

Head Tissue 900 MHz	Measured
Dielectric constant, ε_r	40.99
Conductivity, σ [S/m]	0.95

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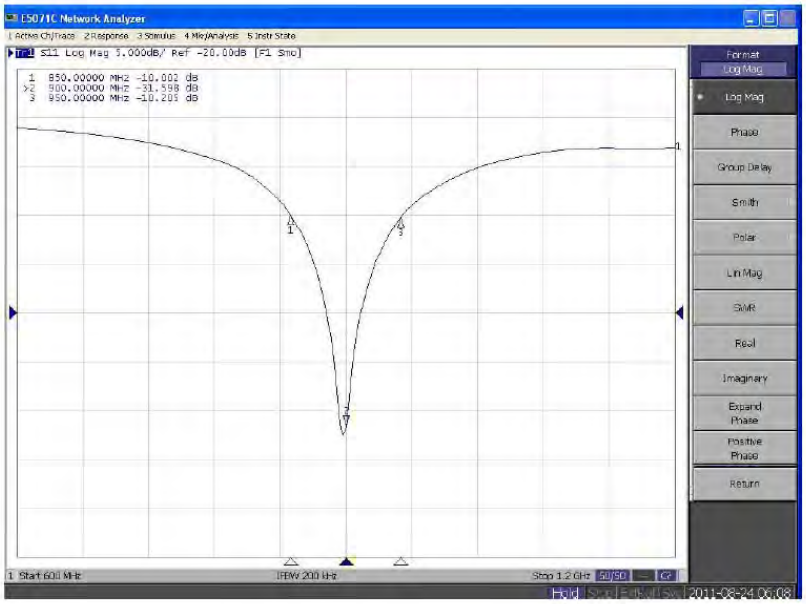
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories

Division of APREL Laboratories.

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

S11 Parameter Return Loss



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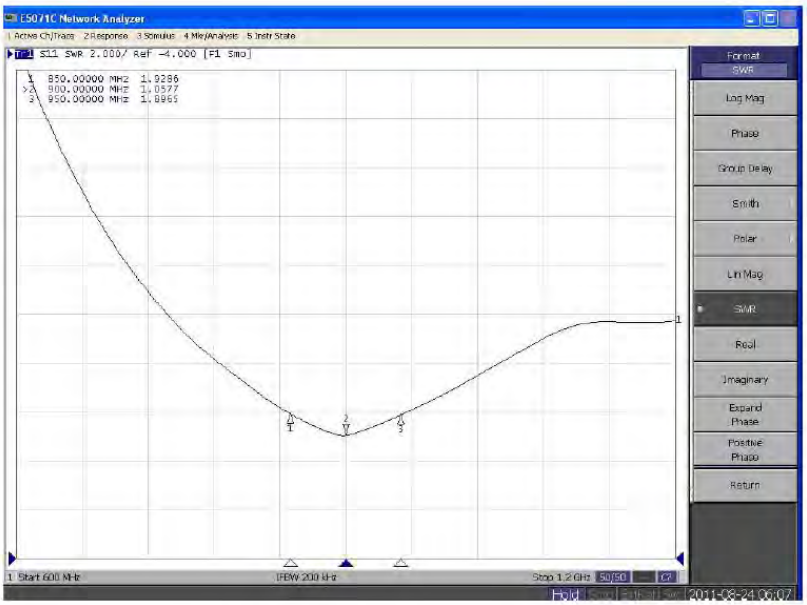
NCL Calibration Laboratories

Division of APREL Laboratories.

SWR



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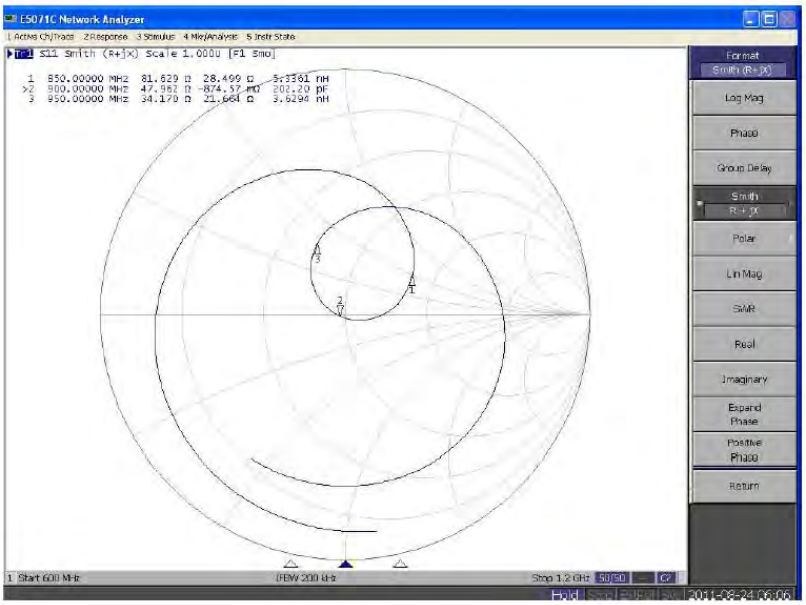
This page has been reviewed for content and attested to by signature within this document.

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.

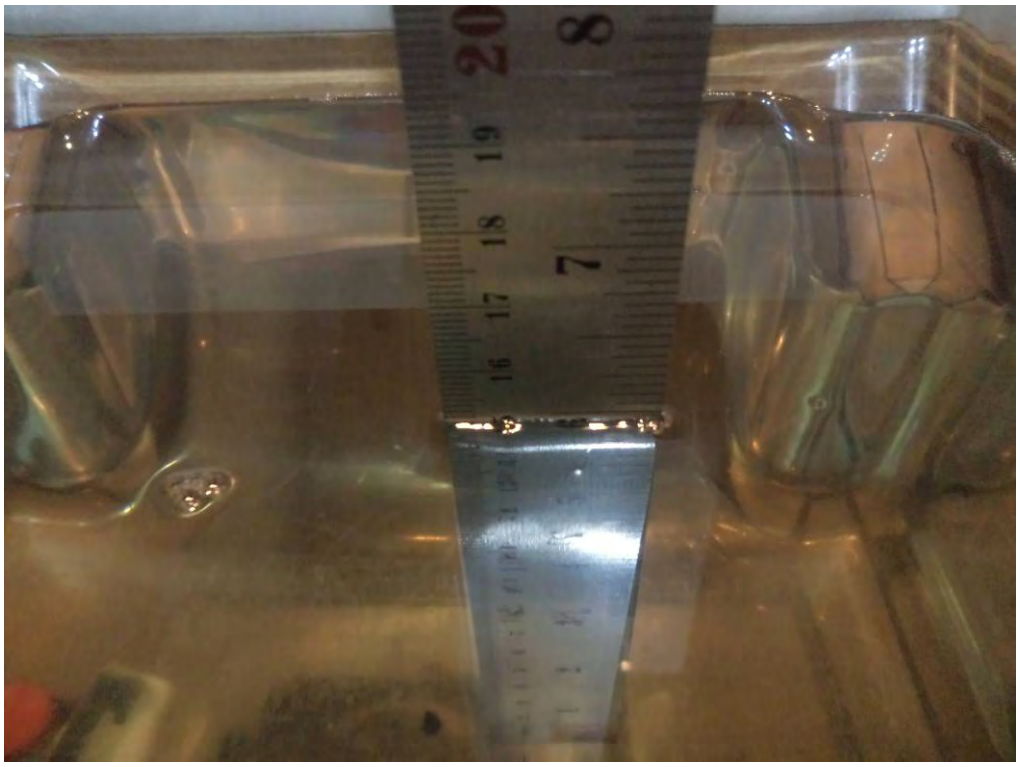
Test Equipment

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.

APPENDIX D – EUT TEST POSITION PHOTOS

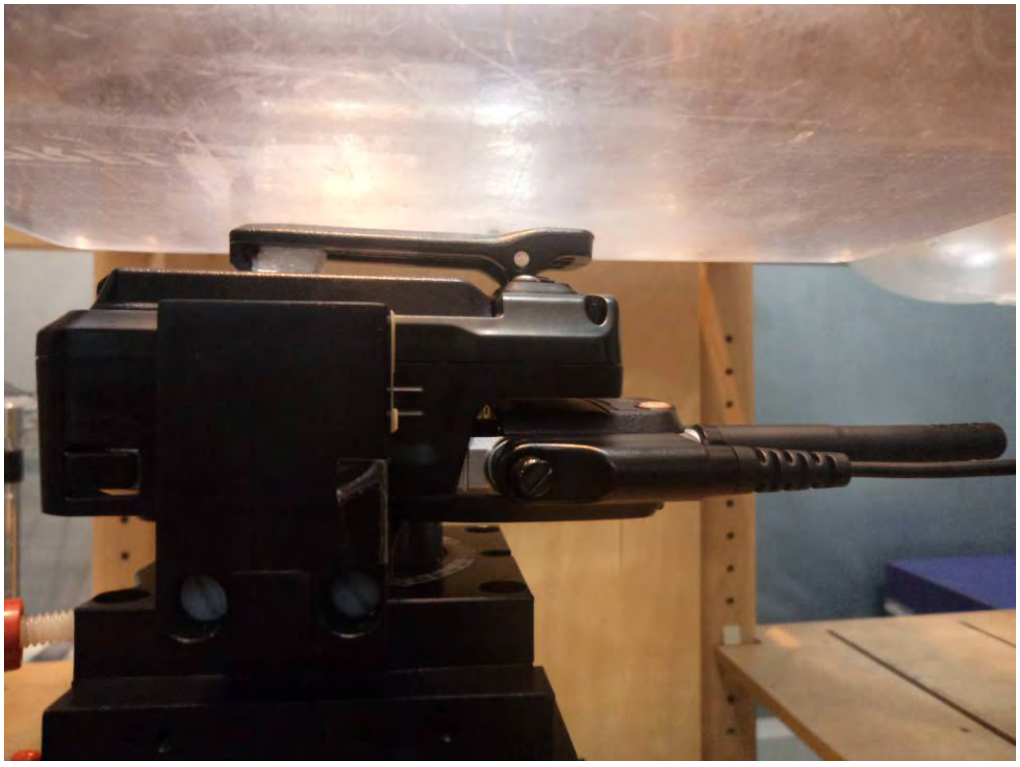
Liquid depth ≥ 15cm



Face-Up 2.5 cm Separation to Flat Phantom Setup Photo

Body-Back 0.0 cm Separation to Flat Phantom Setup Photo (PCN005)

Body-Back 0.0 cm Separation to Flat Phantom Setup Photo (CH04L01)



APPENDIX E – EUT PHOTOS

EUT – Front View

EUT – Back View

EUT – Left View

EUT – Right View

EUT – Top View

EUT – Bottom View

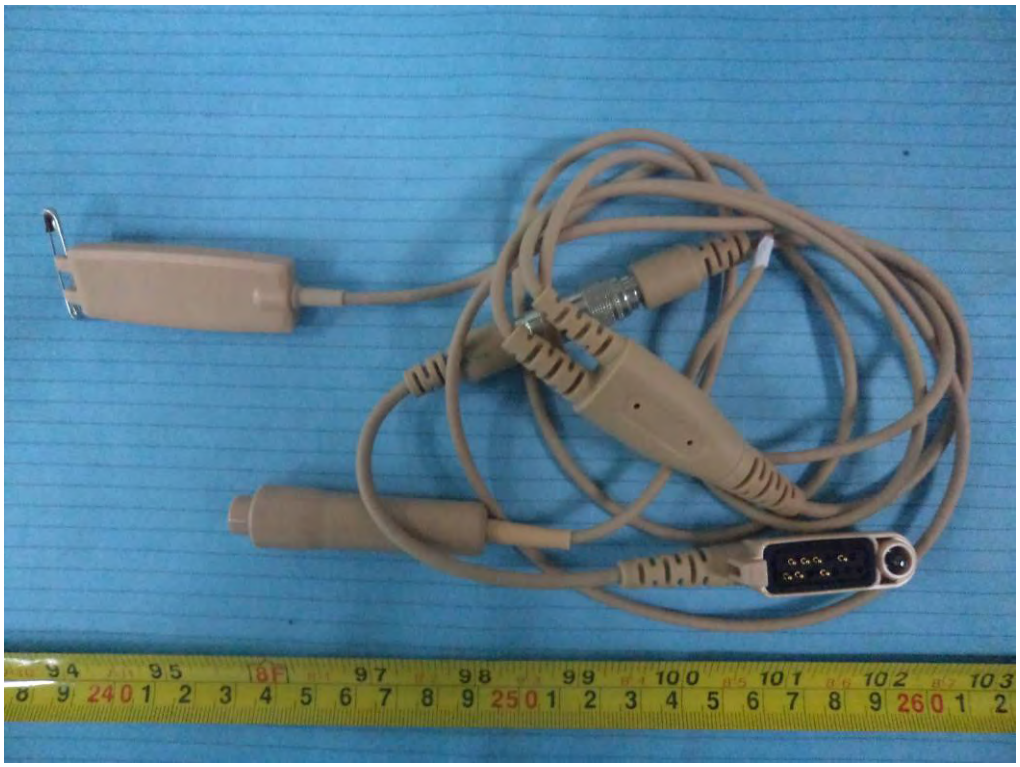
EUT – Uncovered View

EUT – Battery: BL1103 1100mAh

EUT – Battery: BL1809 1800mAh

EUT – Headset: EWN07

EUT – Headset: EWN08



EUT – Headset: EAN19

EUT – Headset: EAN21

EUT – Headset: ACN-02

EUT – Headset: EH-01

EUT – Headset: EH-02

EUT – Headset: ES-01

EUT – Headset: ES-02

EUT – Body-Worn Accessories View: PCN005

EUT – Body-Worn Accessories View: CH04L01

APPENDIX F – ACCESSORIES LIST

Accessory Name	Model		Description
Antenna	AN0873H04	806-941 MHz	/
Battery	Thicker Battery	BL1809	Battery, Li-Lon 1800MAH
	Thinner Battery	BL1103	Battery, Li-Lon 1100 MAH
Body Worn	Belt Clip	PCN005	/
	Portable Charger	CH04L01	/
Audio Accessories	Earphone 1	EWN07	Digital Wireless Covert Earpiece With in-Line Controller (Neckloop Sensor)
	Earphone 2	EWN08	Digital Wireless Covert Earpiece (Flatpack Sensor)
	Earphone 3	EAN19	3-wire Surveillance Earpiece with Transparent Acoustic Tube (Beige)
	Earphone 4	EAN21	3-wire Surveillance Earpiece with Transparent Acoustic Tube(Beige)
	Earphone 5	ESN14	Detachable Earpiece with Transparent Acoustic Tube,contains two parts,one is ACN-02,the other is ES-01
	Earphone 6	EAN22	Detachable Earpiece with Transparent Acoustic Tube,contains two parts,one is ACN-02,the other is ES-02
	Earphone 7	EHN20	Remote Swivel Earset,contains two parts,one is ACN-02,the other is EH-02
	Earphone 8	EHN21	Remote C-Earset,contains two parts,one is ACN-02,the other is EH-01
	Earphone 9	ACN-02	PTT&MIC cable(for use with Receive-Only Earpiece)
	Earphone 10	EH-01	Receive－Only C Style Earloop(for use with PTT&MIC cable)
	Earphone 11	EH-02	Receive－Only Ajustable Earhook with Swivel Speaker(for use with PTT&MIC cable)
	Earphone 12	ES-02	Receive-Only Earpiece with Transparent Acoustic Tube
	Earphone 13	ES-01	Receive－Only Earpiece(for use with PTT&MIC cable)

Note: The manufacturer is Hytera Communications Co., Ltd.

APPENDIX G – 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, O_ce of Engineering & Technology, Washington, DC, 1997.

[3] Thomas Schmid, Oliver Egger, and Niels Kuster, \Automated E-_eld scanning system for dosimetricPage 107 of 107
assessments", IEEE Transactions on Microwave Theory and Techniques, vol. 44, pp. 105{113, Jan. 1996.

[4] Niels Kuster, Ralph K.astle, and Thomas Schmid, \Dosimetric evaluation of mobile communications equipment with known precision", IEICE Transactions on Communications, vol. E80-B, no. 5, pp. 645{652, May 1997.

[5] CENELEC, \Considerations for evaluating of human exposure to electromagnetic fields (EMFs) from mobile telecommunication equipment (MTE) in the frequency range 30MHz - 6GHz", Tech. Rep., CENELEC, European Committee for Electrotechnical Standardization, Brussels, 1997.

[6] ANSI, ANSI/IEEE C95.1-1992: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz, The Institute of Electrical and Electronics Engineers, Inc., New York, NY 10017, 1992.

[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.

[8] Katja Pokovic, Thomas Schmid, and Niels Kuster, \E-field probe with improved isotropy in brain simulating liquids", in Proceedings of the ELMAR, Zadar, Croatia, 23{25 June, 1996, pp. 172-175.

[9] Volker Hombach, Klaus Meier, Michael Burkhardt, Eberhard K. uhn, and Niels Kuster, \The depen-dence of EM energy absorption upon human head modeling at 900 MHz", IEEE Transactions on Microwave Theory and Techniques, vol. 44, no. 10, pp. 1865-1873, Oct. 1996.

[10] Klaus Meier, Ralf Kastle, Volker Hombach, Roger Tay, and Niels Kuster, \The dependence of EM energy absorption upon human head modeling at 1800 MHz", IEEE Transactions on Microwave Theory and Techniques, Oct. 1997, in press.

[11] W. Gander, Computermathematik, Birkhaeuser, Basel, 1992.

[12] W. H. Press, S. A. Teukolsky,W. T. Vetterling, and B. P. Flannery, Numerical Recepies in C, The Art of Scientific Computing, Second Edition, Cambridge University Press, 1992.Dosimetric Evaluation of Sample device, month 1998 9

[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.

[15] FCC OET KDB643646 SAR Test Reduction Considerations for Occupational PTT Radios.

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