SAR EVALUATION REPORT

For

Binatone Electronics International Ltd.

Floor 23A, 9 Des Voeux Road West, Sheung Wan, Hong Kong, China

FCC ID: VLJ-SM800

Report Type:	Product Type:
Original Report	GSM Mobile Phone

Test Engineer:	Sandy Wang
Report Number:	R1DG130917005-20
Report Date:	2013-11-27
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Attestation of Test Results			
EUT Information	**Company Name**	Binatone Electronics International Ltd.	
	EUT Description	GSM Mobile Phone	
	FCC ID	VLJ-SM800	
	Model Number	Voxtel-SM800, SM800	
	Test Date	2013-11-20 to 2013-11-22	
Frequency	**Max. SAR Level(s) Reported**		**Limit(W/Kg)**
Cellular Band	0.478 W/kg 1g Head SAR 1.165 W/kg 1g Body SAR		**1. 6**
PCS Band	0.207 W/kg 1g Head SAR 0.215 W/kg 1g Body SAR		
Simultaneous	0.537 W/kg 1g Head SAR 1.185 W/kg 1g Body SAR		
Applicable Standards	**ANSI/IEEE C95.1: 2005** IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fileds,3 kHz to 300 GHz.		
	ANSI/IEEE C95.3: 2002 IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to SuchFields,100 kHz—300 GHz.		
	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		
	KDB procedures 447498 D01-Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies 648474 D04-SAR Evaluation Considerations for Wireless Handsets		
Note: This wireless device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General Population/Uncontrolled Exposure limits specified in ANSI/IEEE Standards and has been tested in accordance with the measurement procedures specified in IEEE 1528-2003 and RF exposure KDB procedures. **The results and statements contained in this report pertain only to the device(s) evaluated.**			

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1DG130917005-20	Original Report	2013-11-27

EUT DESCRIPTION

This report has been prepared on behalf of *Binatone Electronics International Ltd.* and their product, FCC ID: VLJ-SM800, Model: *Voxtel-SM800, SM800* or the EUT (Equipment Under Test) as referred to in the rest of this report. The EUT is a *GSM Mobile Phone*.

***Note**: This series products model: Voxtel-SM800 and SM800, they are electrically identical and the difference between them is the model number. Model SM800 was selected for fully testing, which was explained in the attached product similarity declaration letter.*

Technical Specification

Product Type	Portable
Exposure Category:	Population/Uncontrolled
Antenna Type(s):	Internal Antenna
Body-Worn Accessories:	Headset
Face-Head Accessories:	None
Multi-slot Class:	Class 12
Hotspot:	Not support
Operation Mode :	GSM Voice, GPRS Data and Bluetooth
Frequency Band:	Cellular Band: 824-849 MHz (TX); 869-894 MHz (RX) PCS Band: 1850-1910 MHz (TX); 1930-1990 MHz(RX) Bluetooth: 2402-2480 MHz
Conducted RF Power:	Cellular Band: 32.13 dBm PCS Band 29.04 dBm Bluetooth: 1.02 dBm
Dimensions (L*W*H):	122 mm (L)×64mm (W)× 14mm (H)
Power Source:	3.7VDC Rechargeable Battery
Normal Operation:	Head and Body-worn

REFERENCE, STANDARDS, AND GUILDELINES

FCC:

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

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

CE:

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

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

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

SAR Limits

FCC Limit (1g Tissue)

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

CE Limit (10g Tissue)

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

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

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

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

FACILITIES

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

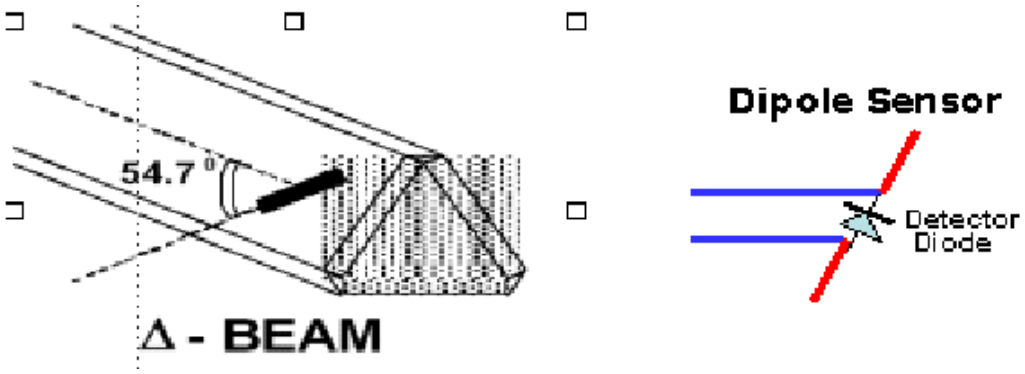
The overall uncertainty for the methodology and algorithms the used during the SAR calculation was evaluated using the data from IEEE 1528 based on the example f3 algorithm:

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

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

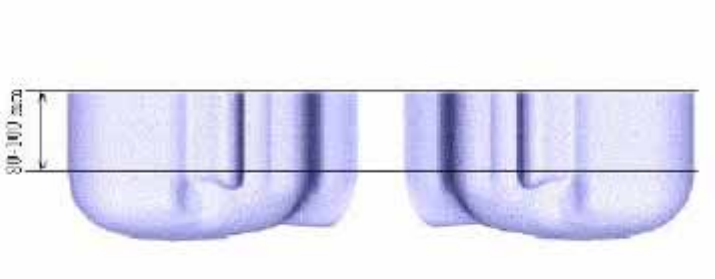
The universal device positioner allows complete freedom of movement of the EUT. Developed to hold a EUT in a free-space scenario any additional loading attributable to the material used in the construction of the positioner has been eliminated. Repeatability has been enhanced through the linear scales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

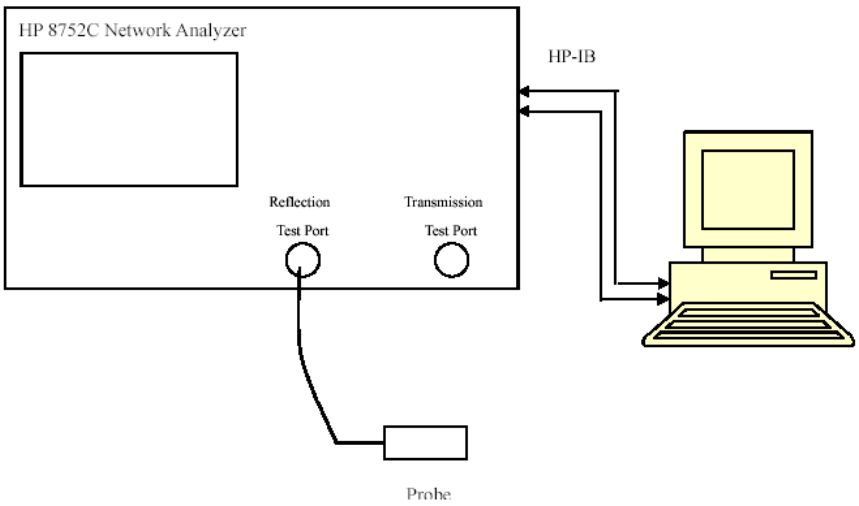
EQUIPMENT LIST AND CALIBRATION

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	2013-10-08	110-00212
Miniature E-Field Probe	ALS-E-020	2013-10-08	500-00283
Dipole, 835MHz	ALS-D-835-S-2	2011-08-25	180-00558
Dipole, 1900MHz	ALS-D-1900-S-2	2011-08-25	210-00710
Dipole Spacer	ALS-DS-U	N/A	250-00907
Device holder/Positioner	ALS-H-E-SET-2	N/A	170-00510
Left ear SAM phantom	ALS-P-SAM-L	N/A	130-00311
Right ear SAM phantom	ALS-P-SAM-R	N/A	140-00359
UniPhantom	ALS-P-UP-1	N/A	150-00413
Simulated Tissue 835 MHz Head	ALS-TS-835-H	Each Time	270-01002
Simulated Tissue 835 MHz Body	ALS-TS-835-B	Each Time	270-02101
Simulated Tissue 1900 MHz Head	ALS-TS-1900-H	Each Time	295-01103
Simulated Tissue 1900 MHz Body	ALS-TS-1900-B	Each Time	295-02102
Power Amplifier	5S1G4	N/A	71377
Synthesized Sweeper	HP 8341B	2013-05-09	2624A00116
UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	2012-12-01	106891
EMI Test Receiver	ESCI	2013-11-12	101120

SAR MEASUREMENT SYSTEM VERIFICATION

Liquid Verification



Liquid Verification Setup Block Diagram

Liquid Verification Results

Frequency	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	$\Delta\sigma$ (S/m)	
824.2	Head	41.50	0.89	41.50	0.90	0.006	-1.111	±5
	Body	55.34	0.95	55.20	0.97	0.259	-2.062	±5
836.6	Head	41.30	0.92	41.50	0.90	-0.474	2.222	±5
	Body	55.42	0.97	55.20	0.97	0.401	0.000	±5
848.8	Head	39.96	0.88	41.50	0.90	-3.708	-2.222	±5
	Body	55.50	1.00	55.20	0.97	0.543	3.093	±5
1850.2	Head	38.58	1.43	40.00	1.40	-3.549	2.143	±5
	Body	51.93	1.48	53.30	1.52	-2.578	-2.632	±5
1880.0	Head	38.60	1.46	40.00	1.40	-3.488	4.286	±5
	Body	51.93	1.52	53.30	1.52	-2.574	0.000	±5
1909.8	Head	38.44	1.44	40.00	1.40	-3.904	2.857	±5
	Body	51.85	1.54	53.30	1.52	-2.717	1.316	±5

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

Please refer to the following tables.

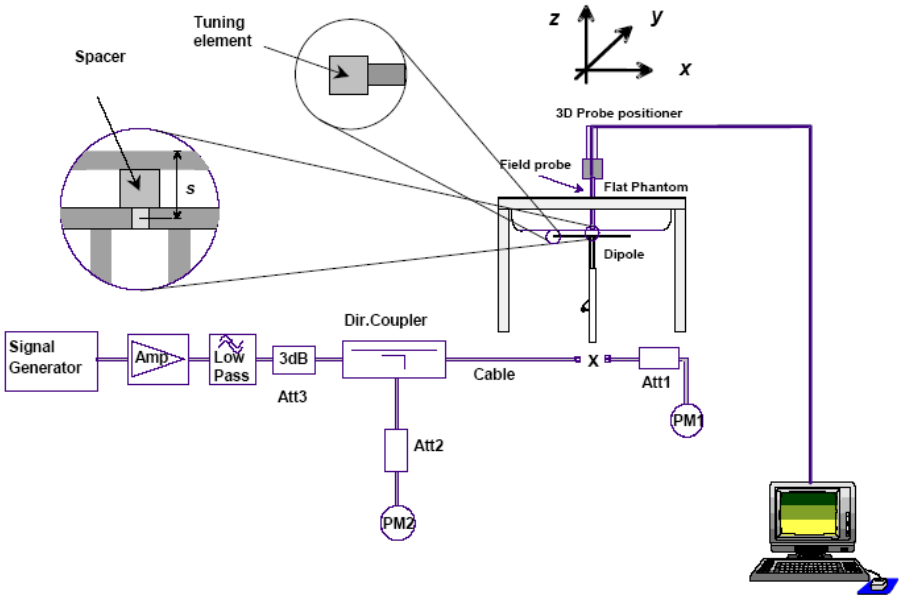
850 MHz Head				850 MHz Body		
Frequency (MHz)	e'	e''		Frequency (MHz)	e'	e''
824.0	41.5026	19.4548		824.0	55.3428	20.83692
824.5	41.4843	19.4092		824.5	55.3459	20.73642
825.0	41.4850	19.4016		825.0	55.3491	20.74892
825.5	41.5159	19.4190		825.5	55.3522	20.76132
826.0	41.4652	19.3947		826.0	55.3554	20.89642
826.5	41.4781	19.3864		826.5	55.3585	20.96012
827.0	41.5618	19.4439		827.0	55.3616	20.87462
827.5	41.6040	19.4889		827.5	55.3648	20.75282
828.0	41.6660	19.5217		828.0	55.3679	20.78732
828.5	41.6368	19.4889		828.5	55.3711	20.74472
829.0	41.6581	19.5415		829.0	55.3742	20.84892
829.5	41.7906	19.5576		829.5	55.3773	20.79172
830.0	41.7924	19.5812		830.0	55.3805	20.66962
830.5	41.8401	19.5578		830.5	55.3836	20.73402
831.0	41.7641	19.5883		831.0	55.3867	20.71922
831.5	41.7682	19.5663		831.5	55.3899	20.92662
832.0	41.7190	19.5619		832.0	55.3930	20.90432
832.5	41.6106	19.5495		832.5	55.3962	20.68102
833.0	41.4465	19.4477		833.0	55.3993	20.61432
833.5	41.4241	19.4972		833.5	55.4024	20.72582
834.0	41.3848	19.5734		834.0	55.4056	20.87772
834.5	41.4155	19.5852		834.5	55.4087	20.77062
835.0	41.3947	19.5780		835.0	55.4118	20.71412
835.5	41.3266	19.6299		835.5	55.4150	20.96182
836.0	41.2812	19.6685		836.0	55.4181	20.96872
836.5	41.3033	19.7351		836.5	55.4213	20.82652
837.0	41.3284	19.6734		837.0	55.4244	20.65362
837.5	41.2375	19.7149		837.5	55.4275	20.68992
838.0	41.1426	19.6395		838.0	55.4307	20.97422
838.5	41.0547	19.5421		838.5	55.4338	20.98942
839.0	41.0808	19.5399		839.0	55.4370	20.91142
839.5	41.0204	19.5184		839.5	55.4401	20.84632
840.0	41.0615	19.4669		840.0	55.4432	20.91352
840.5	41.0201	19.4339		840.5	55.4464	20.95882
841.0	40.9358	19.3722		841.0	55.4495	20.91402
841.5	40.9586	19.2586		841.5	55.4526	20.85072
842.0	40.8279	19.1781		842.0	55.4558	21.02652
842.5	40.7918	19.0822		842.5	55.4589	20.99512
843.0	40.7331	19.0154		843.0	55.4621	20.95552
843.5	40.7102	18.9419		843.5	55.4652	20.91102
844.0	40.6315	18.9651		844.0	55.4683	20.92862
844.5	40.6147	18.9701		844.5	55.4715	20.95452
845.0	40.5427	18.9254		845.0	55.4746	20.86392
845.5	40.4491	18.9015		845.5	55.4777	20.81032
846.0	40.3639	18.8057		846.0	55.4809	20.98332
846.5	40.2787	18.7638		846.5	55.4840	21.04472
847.0	40.1913	18.6889		847.0	55.4872	20.99362
847.5	40.1630	18.6732		847.5	55.4903	20.91392
848.0	40.0458	18.6797		848.0	55.4934	21.00412
848.5	40.0555	18.6634		848.5	55.4966	21.08212
849.0	39.9611	18.5967		849.0	55.4997	21.08232

1900 MHz Head				1900 MHz Body		
Frequency (MHz)	e'	e''		Frequency (MHz)	e'	e''
1850.0	38.5803	13.9164		1850.0	51.9259	14.5781
1851.2	38.5778	13.9581		1851.2	51.9245	14.5702
1852.4	38.6311	13.9898		1852.4	51.9537	14.5736
1853.6	38.6119	14.0244		1853.6	51.9375	14.5936
1854.8	38.6186	14.0263		1854.8	51.9251	14.6384
1856.0	38.6164	14.0303		1856.0	51.9417	14.6436
1857.2	38.6156	14.0172		1857.2	51.9129	14.6431
1858.4	38.6660	14.0514		1858.4	51.9266	14.6902
1859.6	38.6814	14.0886		1859.6	51.9284	14.6403
1860.8	38.6524	14.0674		1860.8	51.9406	14.6972
1862.0	38.6728	14.0789		1862.0	51.9216	14.6983
1863.2	38.6539	14.0758		1863.2	51.9059	14.7404
1864.4	38.6386	14.0643		1864.4	51.9076	14.7510
1865.6	38.5854	14.0960		1865.6	51.8719	14.6845
1866.8	38.5970	14.0721		1866.8	51.8972	14.7010
1868.0	38.6206	14.0809		1868.0	51.8810	14.6985
1869.2	38.6036	14.0924		1869.2	51.8584	14.6746
1870.4	38.5880	14.0492		1870.4	51.8734	14.6672
1871.6	38.5561	14.0307		1871.6	51.8901	14.7105
1872.8	38.5401	13.9933		1872.8	51.9066	14.6629
1874.0	38.5193	13.9815		1874.0	51.9097	14.7099
1875.2	38.5547	13.9854		1875.2	51.8559	14.7405
1876.4	38.5408	13.9569		1876.4	51.8739	14.7515
1877.6	38.5409	13.9911		1877.6	51.9228	14.7163
1878.8	38.5771	13.9836		1878.8	51.8883	14.7168
1880.0	38.6048	13.9940		1880.0	51.9279	14.7131
1881.2	38.6044	13.9780		1881.2	51.9332	14.7039
1882.4	38.5904	13.9710		1882.4	51.9262	14.7270
1883.6	38.5795	13.9213		1883.6	51.9212	14.6939
1884.8	38.5569	13.9165		1884.8	51.9542	14.7071
1886.0	38.535	13.8605		1886.0	51.9651	14.7320
1887.2	38.5577	13.8404		1887.2	51.9635	14.6714
1888.4	38.5497	13.8311		1888.4	51.9828	14.6883
1889.6	38.5574	13.8214		1889.6	51.9293	14.7461
1890.8	38.5350	13.7926		1890.8	51.8848	14.7338
1892.0	38.4886	13.7635		1892.0	51.8861	14.6615
1893.2	38.4946	13.7367		1893.2	51.8839	14.7392
1894.4	38.5074	13.7360		1894.4	51.8856	14.6892
1895.6	38.5088	13.7344		1895.6	51.8958	14.7267
1896.8	38.5035	13.7466		1896.8	51.8774	14.6896
1898.0	38.5217	13.7065		1898.0	51.8500	14.7111
1899.2	38.4959	13.6890		1899.2	51.8848	14.7062
1900.4	38.5231	13.7259		1900.4	51.9145	14.7086
1901.6	38.5273	13.6821		1901.6	51.8845	14.6958
1902.8	38.5308	13.6496		1902.8	51.8557	14.7271
1904.0	38.5400	13.6598		1904.0	51.9089	14.7189
1905.2	38.5426	13.6386		1905.2	51.9011	14.7055
1906.4	38.5196	13.6665		1906.4	51.9094	14.7304
1907.6	38.5238	13.6651		1907.6	51.8896	14.7031
1908.8	38.5151	13.6008		1908.8	51.8734	14.7322
1910.0	38.4386	13.5858		1910.0	51.8517	14.7306

System Accuracy Verification

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

System Verification Setup Block Diagram



Probe and dipole antenna List and Detail

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

System Accuracy Check Results

Date	Frequency Band	Liquid Type	Measured SAR (W/Kg)		Target Value (W/Kg)	Delta (%)	Tolerance (%)
2013-11-20	835	Head	1g	9.685	9.590	0.991	±10
		Body	1g	9.834	9.684	1.549	±10
	1900	Head	1g	40.065	39.648	1.052	±10
		Body	1g	40.374	39.769	1.521	±10

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

SAR SYSTEM VALIDATION DATA

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

System Performance Check 835 MHz 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 : 9.492 W/kg
Power Drift-Finish : 9.501W/kg
Power Drift (%) : 0.095

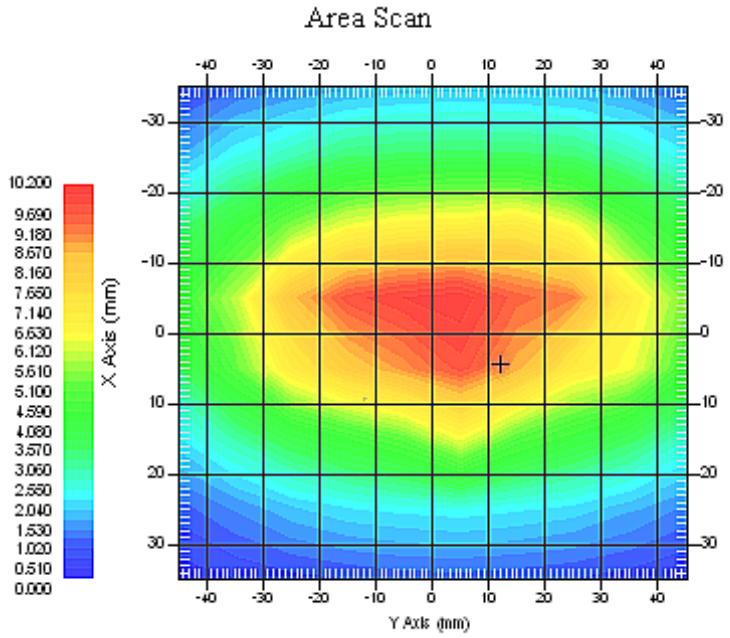
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default
Phantom Data

Tissue Data
Type : Head
Serial No. : 270-01002
Frequency : 835.0 MHz
Last Calib. Date : 20-Nov-2013
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 41.39 F/m
Sigma : 0.91 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 08-Oct-2013
Frequency Band : 835
Duty Cycle Factor : 1
Conversion Factor : 5.9
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 : 9.685 W/kg
10 gram SAR value : 5.759 W/kg
Area Scan Peak SAR : 10.108 W/kg
Zoom Scan Peak SAR : 14.982 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 : 9.994 W/kg
Power Drift-Finish : 9.982 W/kg
Power Drift (%) : -0.120

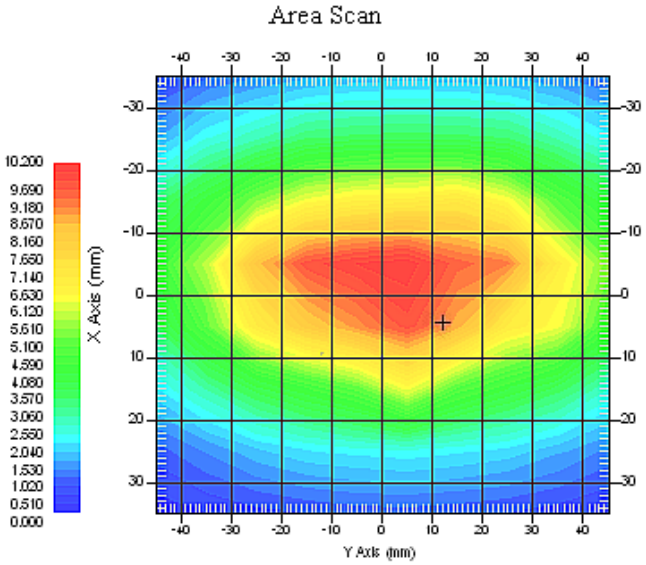
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default
Phantom Data

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

Probe Data
Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 08-Oct-2013
Frequency Band : 835
Duty Cycle Factor : 1
Conversion Factor : 5.9
Probe Sensitivity : 1.20 1.20 1.20 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 : 9.834 W/kg
10 gram SAR value : 6.429 W/kg
Area Scan Peak SAR : 10.137 W/kg
Zoom Scan Peak SAR : 15.188 W/kg



835 MHz System Validation with Body Tissue

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

System Performance Check 1900 MHz Head Liquid

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

Product Data
Device Name : Dipole 1900MHz
Serial No. : 210-00710
Type : Dipole
Model : ALS-D-1900-S-2
Frequency Band : 1900
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 41.652 W/kg
Power Drift-Finish : 40.988 W/kg
Power Drift (%) : -1.594

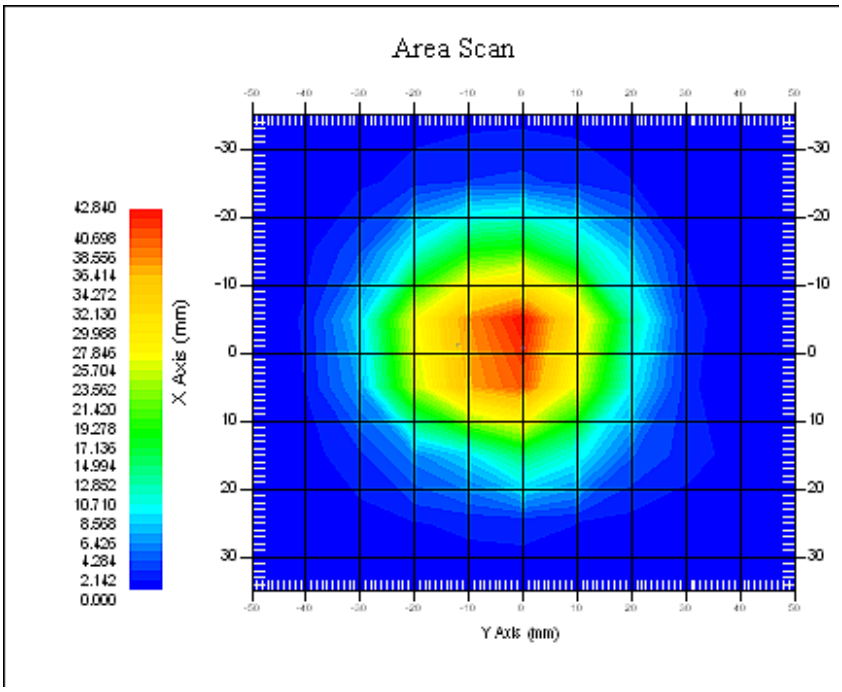
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default

Tissue Data
Type : Head
Serial No. : 295-01103
Frequency : 1900.00 MHz
Last Calib. Date : 20-Nov-2013
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 38.52 F/m
Sigma : 1.45 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 : 1900
Duty Cycle Factor : 1
Conversion Factor : 4.8
Probe Sensitivity : 1.20 1.20 1.20 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

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

1 gram SAR value : 40.065 W/kg
10 gram SAR value : 20.159 W/kg
Area Scan Peak SAR : 40.246 W/kg
Zoom Scan Peak SAR : 74.694 W/kg



1900 MHz System Validation with Head Tissue

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

System Performance Check 1900 MHz Body Liquid

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

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

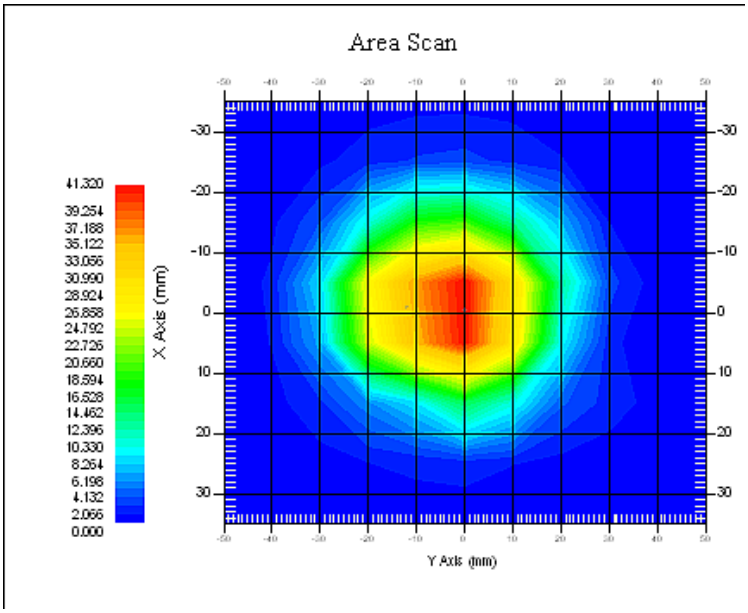
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Default

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

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

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

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



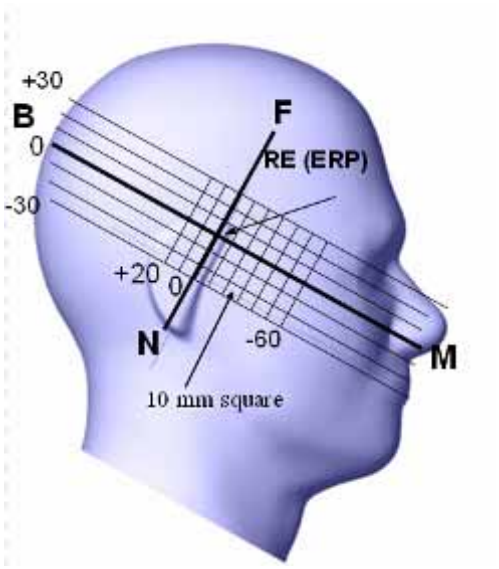
1900 MHz System Validation with Body Tissue

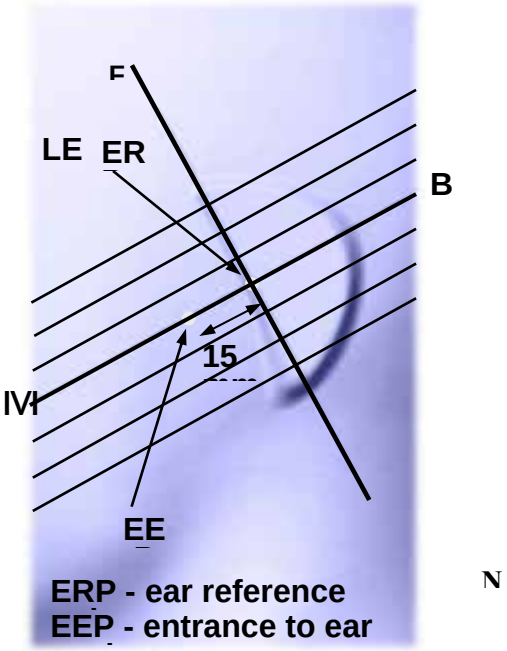
EUT TEST STRATEGY AND METHODOLOGY

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

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

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





Cheek/Touch Position

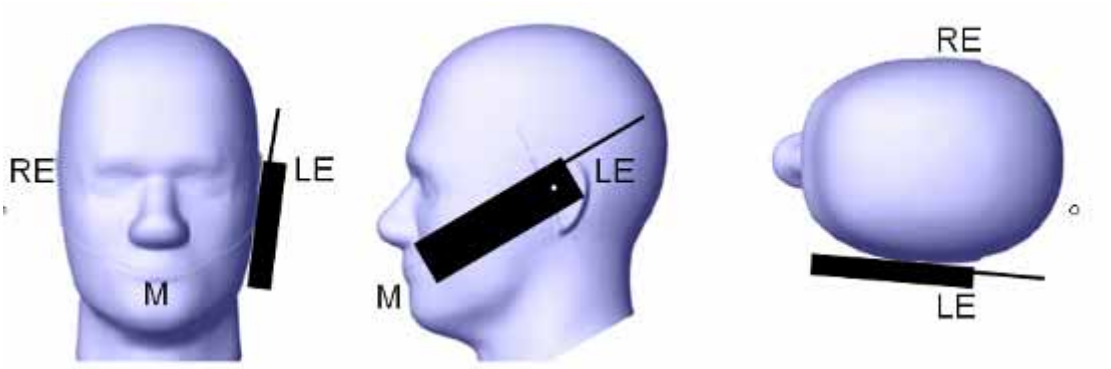
The device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line for the SCC-34/SC-2 head phantom.

This test position is established:

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

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

Cheek /Touch Position



Ear/Tilt Position

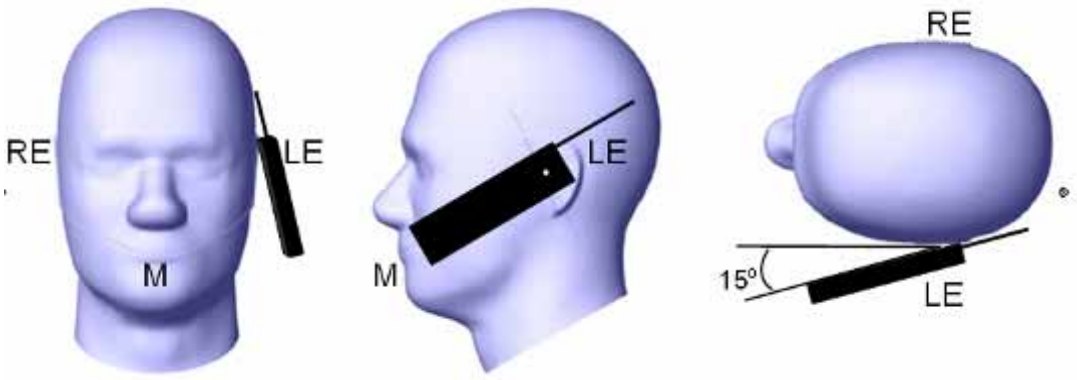
With the handset aligned in the "Cheek/Touch Position":

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

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

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

Ear /Tilt 15° Position



Test positions for body-worn and other configurations

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

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

SAR Evaluation Procedure

The evaluation was performed with the following procedure:

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

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

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

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

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

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

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

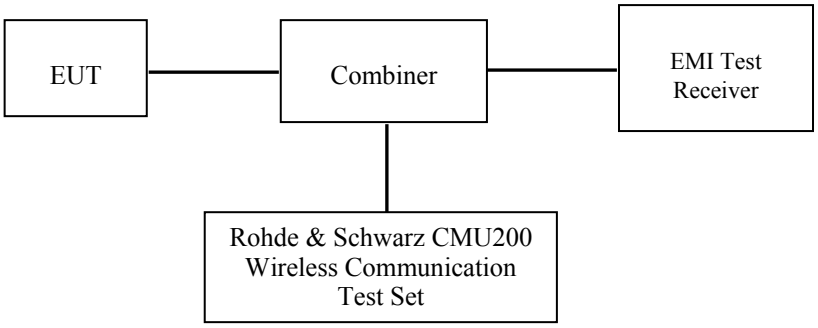
CONDUCTED OUTPUT POWER MEASUREMENT

Provision Applicable

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

Test Procedure

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



GSM

Maximum Output Power among production units

Max Target Peak Power for Production Unit (dBm)			
Mode/Band	Channel		
	Low	Middle	High
GSM 850	32.50	32.50	32.50
GPRS 1 slot	32.50	32.50	32.50
GPRS 2 slot	32.00	32.00	32.00
GPRS 3 slot	30.50	30.50	30.50
GPRS 4 slot	29.50	29.50	29.50
PCS 1900	29.50	29.50	29.50
GPRS 1 slot	29.00	29.00	29.00
GPRS 2 slot	28.50	28.50	28.50
GPRS 3 slot	27.00	27.00	27.00
GPRS 4 slot	26.50	26.50	26.50
BT	1.50	1.50	1.50

Test Results:

GSM

Band	Frequency (MHz)	Conducted Peak Output Power	
		Meas. Power (dBm)	Meas. Power (W)
GSM 850	824.2	32.07	1.611
	836.6	32.13	1.633
	848.8	32.03	1.596
PCS 1900	1850.2	29.04	0.802
	1880.0	28.81	0.760
	1909.8	28.45	0.700

GPRS

Band	Channel No.	Frequency (MHz)	RF Peak Output Power (dBm)			
			1 slot	2 slot	3 slots	4 slots
GSM 850	128	824.2	32.11	31.51	30.24	29.44
	190	836.6	32.07	31.47	30.15	29.28
	251	848.8	31.98	31.39	30.13	29.25
PCS 1900	512	1850.2	28.98	28.35	26.92	26.18
	661	1880.0	28.81	28.19	26.74	26.01
	810	1909.8	28.43	27.86	26.32	25.57

For SAR, the time based average power is relevant, the difference in between depends on the duty cycle of the TDMA signal.

Number of Time slot	1	2	3	4
Duty Cycle	1:8	1:4	1:2.66	1:2
Time based Ave. power compared to slotted Ave. power	-9 dB	-6 dB	-4.25 dB	-3 dB
Crest Factor	8	4	2.66	2

The time based average power

Band	Channel No.	Frequency (MHz)	Time based average Power (dBm)			
			1 slot	2 slot	3 slots	4 slots
GSM 850	128	824.2	23.11	25.51	25.99	26.44
	190	836.6	23.07	25.47	25.90	26.28
	251	848.8	22.98	25.39	25.88	26.25
PCS 1900	512	1850.2	19.98	22.35	22.67	23.18
	661	1880.0	19.81	22.19	22.49	23.01
	810	1909.8	19.43	21.86	22.07	22.57

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

Bluetooth

Mode	Channel frequency (MHz)	Reading power (dBm)	Power output (mw)
BDR(GFSK)	(Low)2402	1.02	1.265
	(Middle)2441	-0.66	0.859
	(High)2480	-2.16	0.608
EDR(4-DQPSK)	(Low)2402	0.59	1.146
	(Middle)2441	-1.12	0.773
	(High)2480	-2.62	0.547
EDR-8DPSK	(Low)2402	0.89	1.227
	(Middle)2441	-0.97	0.800
	(High)2480	-2.47	0.566

SAR MEASUREMENT RESULTS

This page summarizes the results of the performed dosimetric evaluation.

SAR Test Data

Environmental Conditions

Temperature:	21 – 25 ℃
Relative Humidity:	50 ~ 53 %
ATM Pressure:	1001-1002 mbar

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

GSM 850:

EUT Position	Frequency (MHz)		Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	FCC 1g SAR (W/Kg)		
	Channel	MHz					Scaled Factor	Meas. SAR	Scaled SAR
Left Head Cheek	128(Low)	824.2	GSM	2.072	32.07	32.50	1.104	0.394	0.435
	190(Middle)	836.6	GSM	0.186	32.13	32.50	1.089	0.346	0.377
	251(High)	848.8	GSM	1.680	32.03	32.50	1.114	0.429	**0.478**
Left Head Tilt	128(Low)	824.2	GSM	/	/	/	/	/	/
	190(Middle)	836.6	GSM	-2.639	32.13	32.50	1.089	0.250	0.272
	251(High)	848.8	GSM	/	/	/	/	/	/
Right Head Cheek	128(Low)	824.2	GSM	/	/	/	/	/	/
	190(Middle)	836.6	GSM	-0.346	32.13	32.50	1.089	0.328	0.357
	251(High)	848.8	GSM	/	/	/	/	/	/
Right Head Tilt	128(Low)	824.2	GSM	/	/	/	/	/	/
	190(Middle)	836.6	GSM	1.116	32.13	32.50	1.089	0.291	0.317
	251(High)	848.8	GSM	/	/	/	/	/	/
Body-Front-Headset (15mm)	128(Low)	824.2	GSM	/	/	/	/	/	/
	190(Middle)	836.6	GSM	3.410	32.13	32.50	1.089	0.349	0.380
	251(High)	848.8	GSM	/	/	/	/	/	/
Body-Back-Headset (15mm)	128(Low)	824.2	GSM	/	/	/	/	/	/
	190(Middle)	836.6	GSM	-3.002	32.13	32.50	1.089	0.542	0.590
	251(High)	848.8	GSM	/	/	/	/	/	/
Body-Front (15mm)	128(Low)	824.2	GPRS	/	/	/	/	/	/
	190(Middle)	836.6	GPRS	0.267	29.28	29.50	1.052	0.715	0.752
	251(High)	848.8	GPRS	/	/	/	/	/	/
Body-Back (15mm)	128(Low)	824.2	GPRS	-2.485	29.44	29.50	1.014	1.095	1.110
	190(Middle)	836.6	GPRS	-2.932	29.28	29.50	1.052	1.107	**1.165**
	251(High)	848.8	GPRS	1.890	29.25	29.50	1.059	0.947	1.003

PCS Band:

EUT Position	Frequency (MHz)		Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	FCC 1g SAR (W/Kg)		
	Channel	MHz					Scaled Factor	Meas. SAR	Scaled SAR
Left Head Cheek	512(Low)	1850.2	GSM	0.270	29.04	29.50	1.112	0.113	0.126
	661(Middle)	1880.0	GSM	1.760	28.81	29.50	1.172	0.177	**0.207**
	810(High)	1909.8	GSM	-1.357	28.45	29.50	1.274	0.076	0.097
Left Head Tilt	512(Low)	1850.2	GSM	/	/	/	/	/	/
	661(Middle)	1880.0	GSM	-2.079	28.81	29.50	1.172	0.080	0.094
	810(High)	1909.8	GSM	/	/	/	/	/	/
Right Head Cheek	512(Low)	1850.2	GSM	/	/	/	/	/	/
	661(Middle)	1880.0	GSM	3.483	28.81	29.50	1.172	0.097	0.114
	810(High)	1909.8	GSM	/	/	/	/	/	/
Right Head Tilt	512(Low)	1850.2	GSM	/	/	/	/	/	/
	661(Middle)	1880.0	GSM	-2.007	28.81	29.50	1.172	0.043	0.050
	810(High)	1909.8	GSM	/	/	/	/	/	/
Body-Front-Headset (15mm)	512(Low)	1850.2	GSM	/	/	/	/	/	/
	661(Middle)	1880.0	GSM	-1.699	28.81	29.50	1.172	0.067	0.079
	810(High)	1909.8	GSM	/	/	/	/	/	/
Body-Back-Headset (15mm)	512(Low)	1850.2	GSM	/	/	/	/	/	/
	661(Middle)	1880.0	GSM	1.295	28.81	29.50	1.172	0.104	0.122
	810(High)	1909.8	GSM	/	/	/	/	/	/
Body-Front (15mm)	512(Low)	1850.2	GPRS	/	/	/	/	/	/
	661(Middle)	1880.0	GPRS	-2.728	26.01	26.50	1.119	0.111	0.124
	810(High)	1909.8	GPRS	/	/	/	/	/	/
Body-Back (15mm)	512(Low)	1850.2	GPRS	/	/	/	/	/	/
	661(Middle)	1880.0	GPRS	2.872	26.01	26.50	1.119	0.192	**0.215**
	810(High)	1909.8	GPRS	/	/	/	/	/	/

Note:
1 .When the 1-g SAR is ≤ 0.8W/Kg, testing for other channels are optional.
2. The EUT is a Capability Class B mobile phone which can be attached to both GPRS and GSM services.
3.The Multi-slot Classes of EUT is Class 12 which has maximum 4 Downlink slots and 4 Uplink slots, the maximum active slots is 5, when perform the multiple slots scan, 3DL+2UL is the worse case.
4. The EUT transmit and receive through the same GSM antenna while testing SAR.
5. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.

SAR SIMULTANEOUS TRANSMISSION DESCRIPTION

KDB 447498D01 General RF Exposure Guidance v05

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

BT and GSM Antenna Location:

Antenna Information:

Description of Simultaneous Transmit Capabilities		Antennas Distance (mm)
Transmitter Combination	Scenario Supported?	
GSM + GPRS	×	0.00
GSM + Bluetooth	√	95
GPRS + Bluetooth	√	95

Standalone SAR test exclusion considerations：

Head Position:

Mode	Frequency (MHz)	P_{avg} (dBm)	P_{avg} (mW)	Distance (mm)	Calculated value	Threshold (1-g)	SAR Test Exclusion
GSM850	850	23.13	205.589	0	37.9	3.0	No
PCS1900	1900	20.04	100.925	0	27.8	3.0	No
Bluetooth	2450	1.02	1.265	0	0.2	3.0	Yes

Body Position:

Mode	Frequency (MHz)	P_{avg} (dBm)	P_{avg} (mW)	Distance (mm)	Calculated value	Threshold (1-g)	SAR Test Exclusion
GSM850	850	26.44	440.555	15	27.1	3.0	No
PCS1900	1900	23.18	207.970	15	19.1	3.0	No
Bluetooth	2450	1.02	1.265	15	0.1	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:

GSM with BT:

Mode	Position	Reported SAR (W/kg)		ΣSAR
		GSM	BT	(W/kg)
GSM850	Left Head Cheek	0.478	0.059	**0.537**
	Left Head Tile	0.272	0.059	0.331
	Right Head Cheek	0.357	0.059	0.416
	Right Head Tilt	0.317	0.059	0.376
	Body–Headset-Front	0.380	0.020	0.400
	Body–Headset-Back	0.590	0.020	0.610
	Body-Front	0.752	0.020	0.772
	Body-Back	1.165	0.020	**1.185**
PCS1900	Left Head Cheek	0.207	0.059	0.266
	Left Head Tile	0.094	0.059	0.153
	Right Head Cheek	0.114	0.059	0.173
	Right Head Tilt	0.050	0.059	0.109
	Body–Headset-Front	0.079	0.020	0.099
	Body–Headset-Back	0.122	0.020	0.142
	Body-Front	0.124	0.020	0.144
	Body-Back	0.215	0.020	0.235

Mode	Frequency (GHz)	Distance (mm)	P_{avg} (dBm)	P_{avg} (mW)	Estimated $_{1-g}$ (W/kg)
Bluetooth Head	2.45	0	1.50	1.413	0.059
Bluetooth Body	2.45	15	1.50	1.413	0.020

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 < 1.6 W/kg therefore simultaneous transmission SAR with Volume Scans is **not** required.

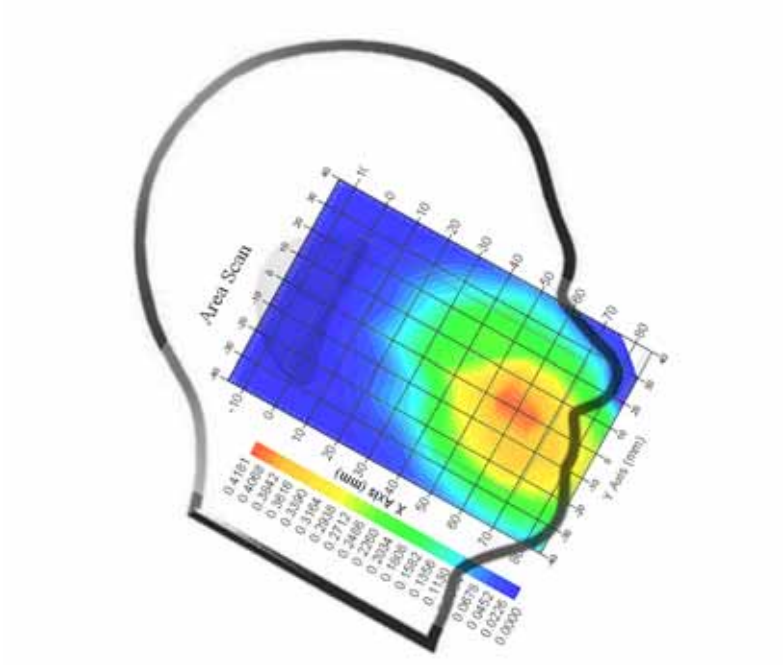
EUT SCAN RESULTS

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

Left Head Cheek (824.2 MHz Low Channel)

Measurement Data	
Test mode	: GSM
Crest Factor	: 8
Scan Type	: Complete
Area Scan	: 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan	: 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start	: 0.007 W/kg
Power Drift-Finish	: 0.007 W/kg
Power Drift (%)	: 2.072
Tissue Data	
Type	: Head
Frequency	: 824.2 MHz
Epsilon	: 41.50 F/m
Sigma	: 0.89 S/m
Density	: 1000.00 kg/cu. m
Probe Data	
Serial No.	: 500-00283
Frequency Band	: 835
Duty Cycle Factor	: 8
Conversion Factor	: 5.9
Probe Sensitivity	: 1.20 1.20 1.20 µV/(V/m)2
Compression Point	: 95.00 mV
Offset	: 1.56 mm
1 gram SAR value	: 0.394 W/kg
10 gram SAR value	: 0.281 W/kg
Area Scan Peak SAR	: 0.410 W/kg
Zoom Scan Peak SAR	: 0.730 W/kg

Plot 1#



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

Left Head Cheek (836.6 MHz Middle Channel)

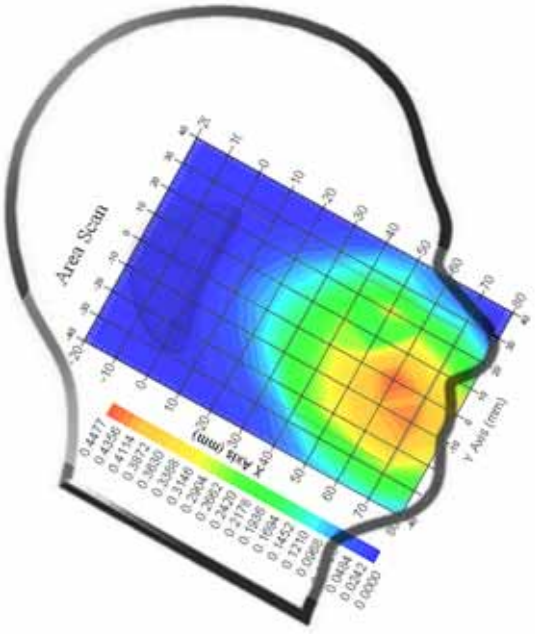
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.004 W/kg
Power Drift-Finish : 0.004 W/kg
Power Drift (%) : 0.186

Tissue Data
Type : Head
Frequency : 836.6 MHz
Epsilon : 41.30 F/m
Sigma : 0.92 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 8
Conversion Factor : 5.9
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.346 W/kg
10 gram SAR value : 0.259 W/kg
Area Scan Peak SAR : 0.443 W/kg
Zoom Scan Peak SAR : 0.390 W/kg

Plot 2#



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

Left Head Cheek (848.8 MHz High Channel)

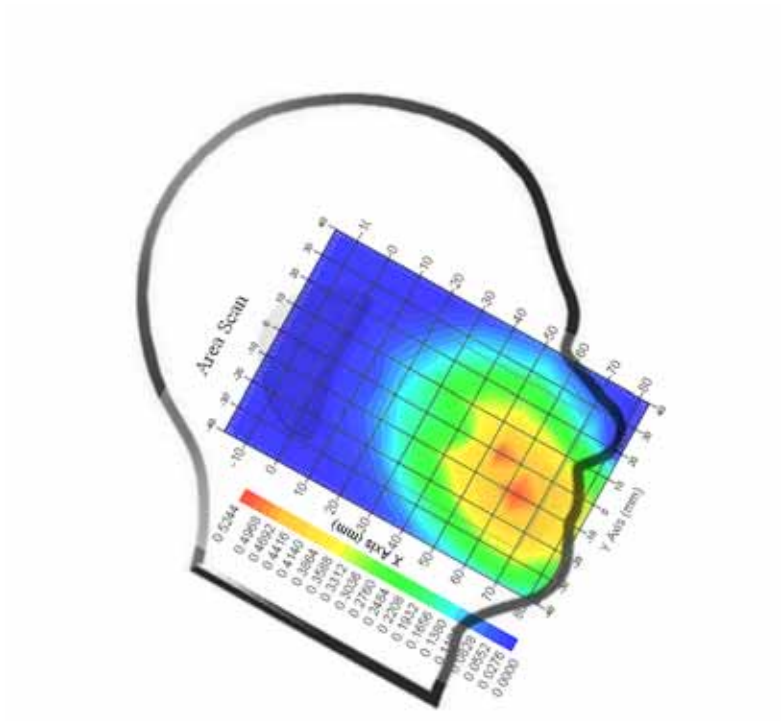
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.007 W/kg
Power Drift-Finish : 0.007 W/kg
Power Drift (%) : 1.680

Tissue Data
Type : Head
Frequency : 848.8 MHz
Epsilon : 39.96 F/m
Sigma : 0.88 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 8
Conversion Factor : 5.9
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.429 W/kg
10 gram SAR value : 0.297 W/kg
Area Scan Peak SAR : 0.511 W/kg
Zoom Scan Peak SAR : 0.660 W/kg

Plot 3#



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

Left Head Tilt (836.6 MHz Middle Channel)

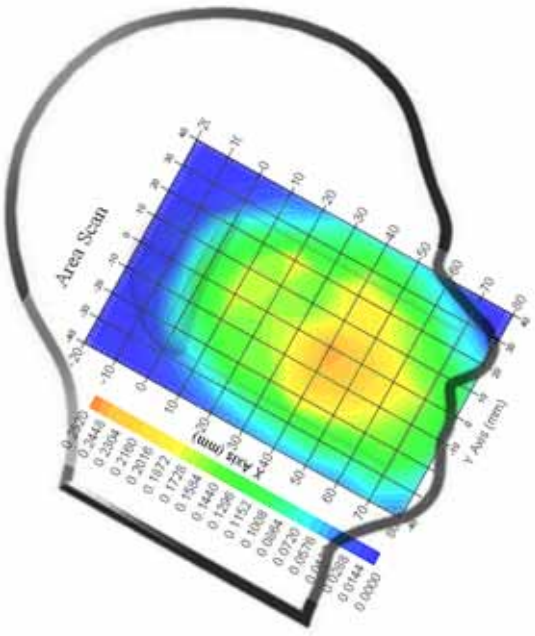
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.096 W/kg
Power Drift-Finish : 0.094 W/kg
Power Drift (%) : -2.639

Tissue Data
Type : Head
Frequency : 836.6 MHz
Epsilon : 41.30 F/m
Sigma : 0.92 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 8
Conversion Factor : 5.9
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.250 W/kg
10 gram SAR value : 0.181 W/kg
Area Scan Peak SAR : 0.248 W/kg
Zoom Scan Peak SAR : 0.430 W/kg

Plot 4#



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

Right Head Cheek (836.6 MHz Middle Channel)

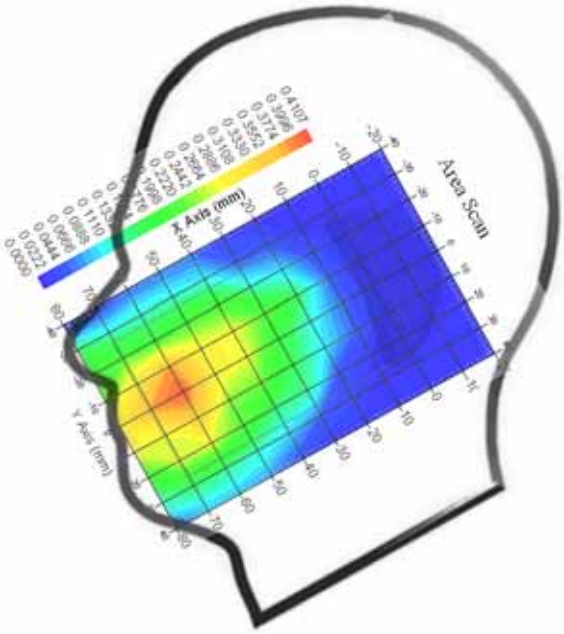
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.003 W/kg
Power Drift-Finish : 0.002 W/kg
Power Drift (%) : -0.346

Tissue Data
Type : Head
Frequency : 836.6 MHz
Epsilon : 41.30 F/m
Sigma : 0.92 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 8
Conversion Factor : 5.9
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.328 W/kg
10 gram SAR value : 0.248 W/kg
Area Scan Peak SAR : 0.405 W/kg
Zoom Scan Peak SAR : 0.700 W/kg

Plot 5#



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

Right Head Tilt (836.6 MHz Middle Channel)

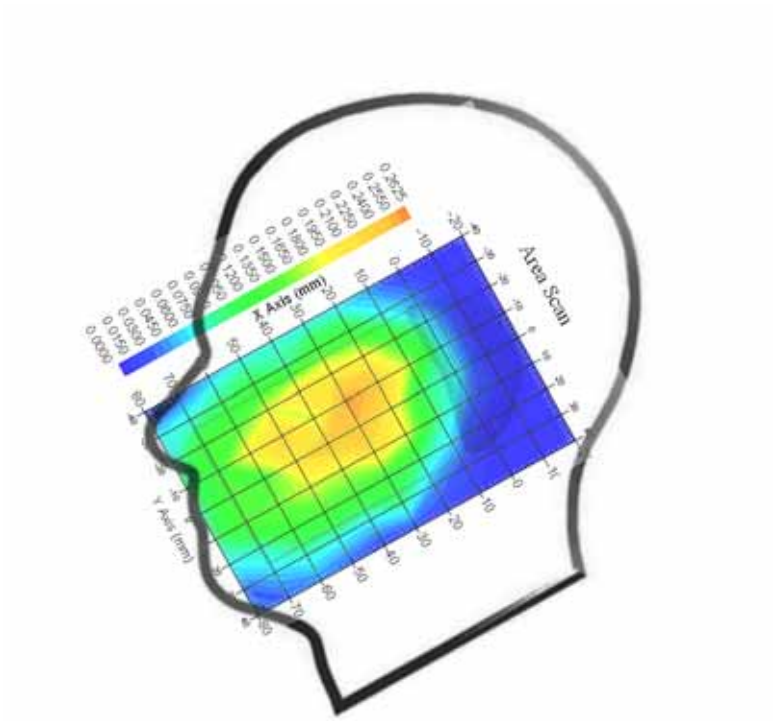
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.030 W/kg
Power Drift-Finish : 0.031 W/kg
Power Drift (%) : 1.116

Tissue Data
Type : Head
Frequency : 836.6 MHz
Epsilon : 41.30 F/m
Sigma : 0.92 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 8
Conversion Factor : 5.9
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.291 W/kg
10 gram SAR value : 0.213 W/kg
Area Scan Peak SAR : 0.259 W/kg
Zoom Scan Peak SAR : 0.410 W/kg

Plot 6#



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

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

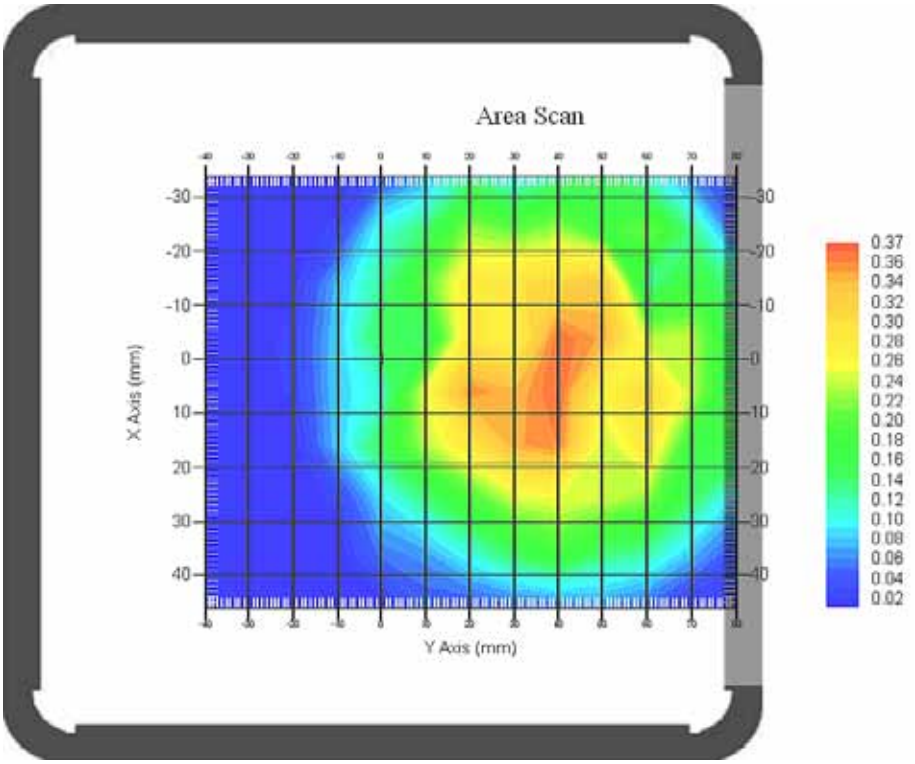
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type： : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.135 W/kg
Power Drift-Finish : 0.140 W/kg
Power Drift (%) : 3.410

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

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 8
Conversion Factor : 5.9
Probe Sensitivity : 1.20 1.20 1.20 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.349 W/kg
10 gram SAR value : 0.287 W/kg
Area Scan Peak SAR : 0.361 W/kg
Zoom Scan Peak SAR : 0.880 W/kg

Plot 7#



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

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

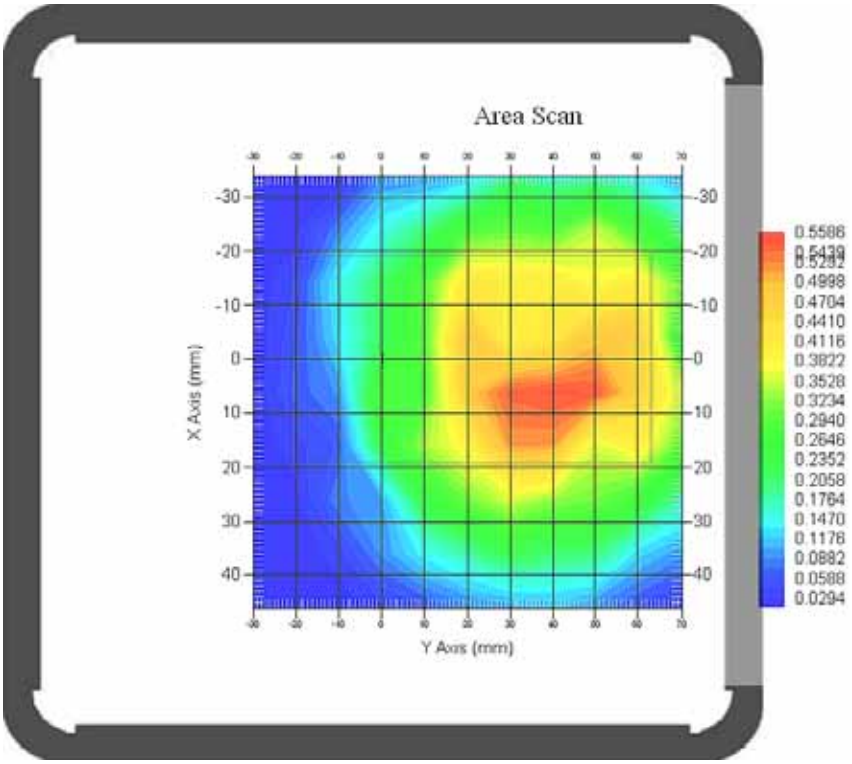
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type： : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.280 W/kg
Power Drift-Finish : 0.276 W/kg
Power Drift (%) : -3.002

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

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 8
Conversion Factor : 5.9
Probe Sensitivity : 1.20 1.20 1.20 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.542 W/kg
10 gram SAR value : 0.338 W/kg
Area Scan Peak SAR : 0.546 W/kg
Zoom Scan Peak SAR : 1.331 W/kg

Plot 8#



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

Body-worn Front (836.6 MHz Middle Channel)

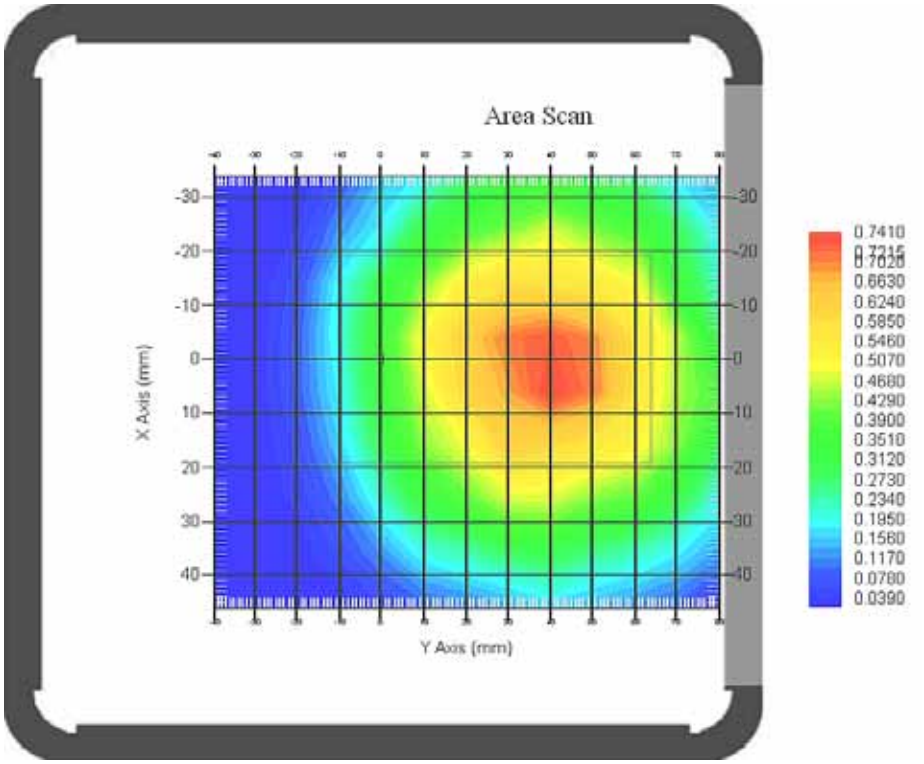
Measurement Data
Test mode : GPRS
Crest Factor : 2
Scan Type： : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.322 W/kg
Power Drift-Finish : 0.322 W/kg
Power Drift (%) : 0.267

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

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 2
Conversion Factor : 5.9
Probe Sensitivity : 1.20 1.20 1.20 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.715 W/kg
10 gram SAR value : 0.499 W/kg
Area Scan Peak SAR : 0.741 W/kg
Zoom Scan Peak SAR : 1.010 W/kg

Plot 9#



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

Body-worn Back (824.2 MHz Low Channel)

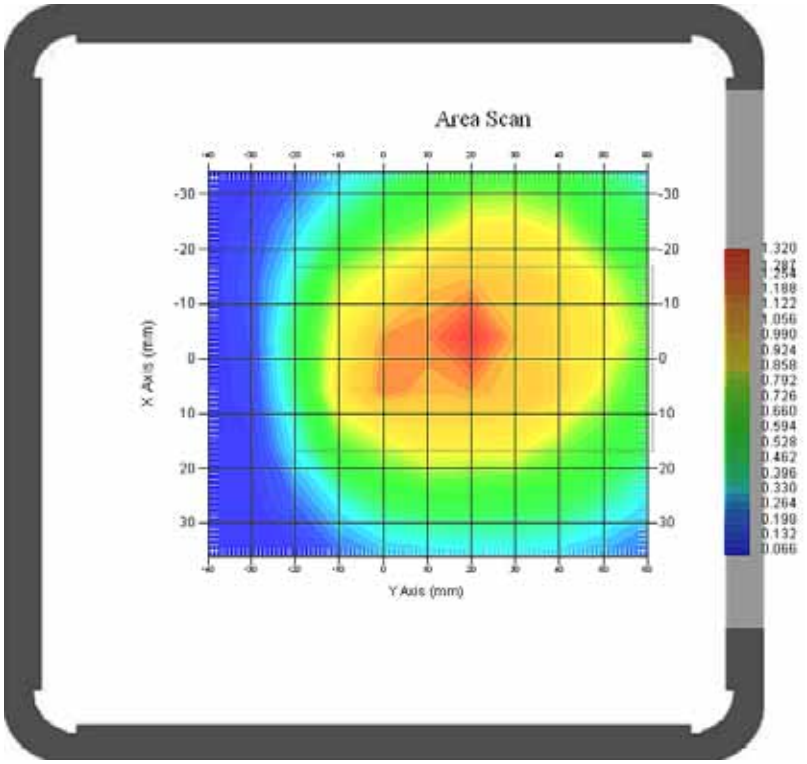
Measurement Data
Test mode : GPRS
Crest Factor : 2
Scan Type： : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 1.206 W/kg
Power Drift-Finish : 1.186 W/kg
Power Drift (%) : -2.485

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

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 2
Conversion Factor : 5.9
Probe Sensitivity : 1.20 1.20 1.20 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 1.095 W/kg
10 gram SAR value : 0.839 W/kg
Area Scan Peak SAR : 1.290 W/kg
Zoom Scan Peak SAR : 4.703 W/kg

Plot 10#



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

Body-worn Back (836.6 MHz Middle Channel)

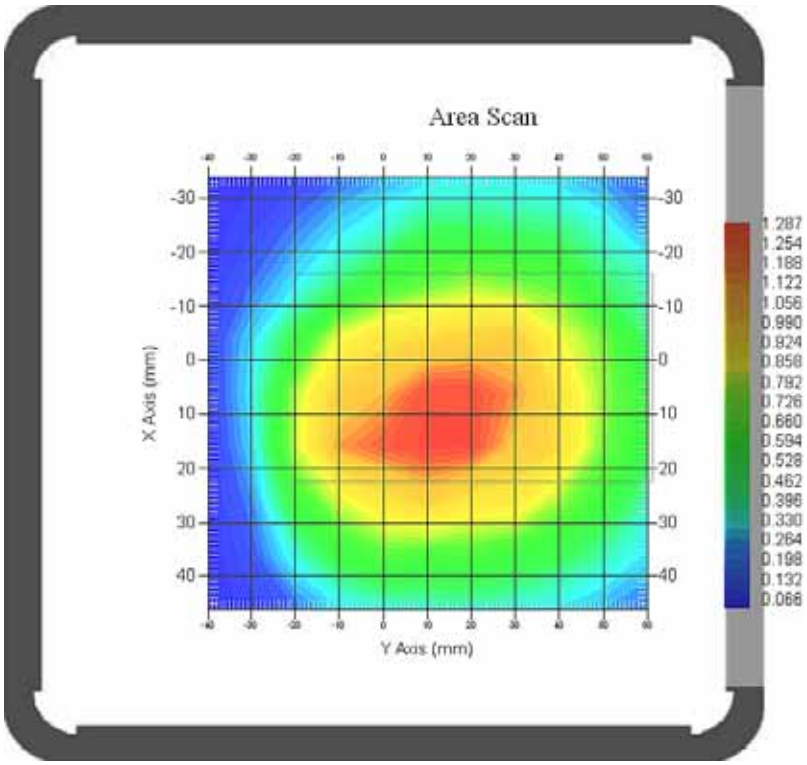
Measurement Data
Test mode : GPRS
Crest Factor : 2
Scan Type： : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 1.039 W/kg
Power Drift-Finish : 0.994 W/kg
Power Drift (%) : -2.932

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

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 2
Conversion Factor : 5.9
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 1.107 W/kg
10 gram SAR value : 0.875 W/kg
Area Scan Peak SAR : 1.265 W/kg
Zoom Scan Peak SAR : 1.701 W/kg

Plot 11#



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

Body-worn Back (848.8 MHz High Channel)

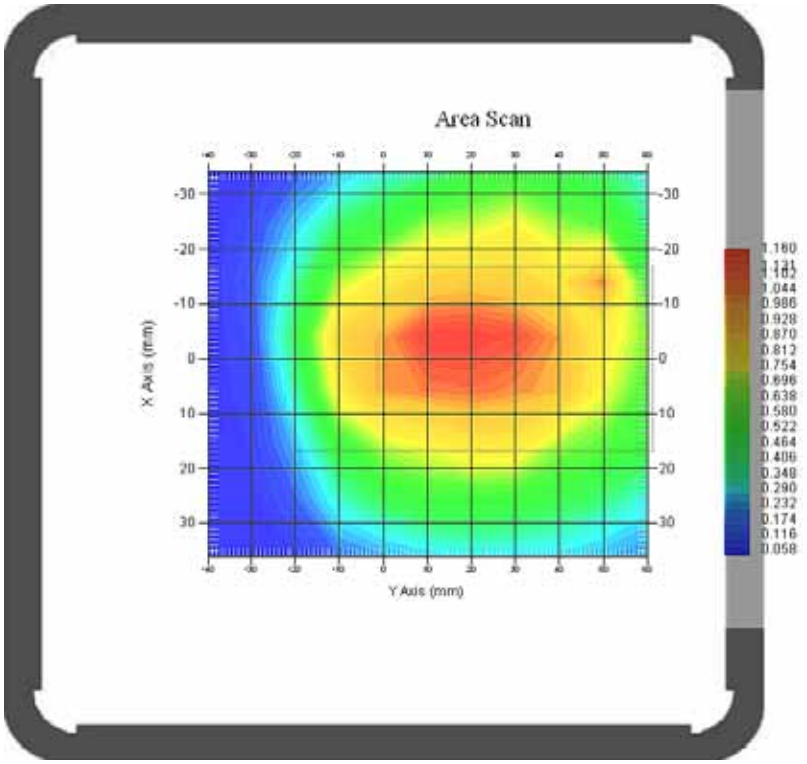
Measurement Data
Test mode : GPRS
Crest Factor : 2
Scan Type： : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 1.014 W/kg
Power Drift-Finish : 1.059 W/kg
Power Drift (%) : 1.890

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

Probe Data
Serial No. : 500-00283
Frequency Band : 835
Duty Cycle Factor : 2
Conversion Factor : 5.9
Probe Sensitivity : 1.20 1.20 1.20 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.947 W/kg
10 gram SAR value : 0.560 W/kg
Area Scan Peak SAR : 1.132 W/kg
Zoom Scan Peak SAR : 1.391 W/kg

Plot 12#



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

Left Head Cheek (1850.2 MHz Low Channel)

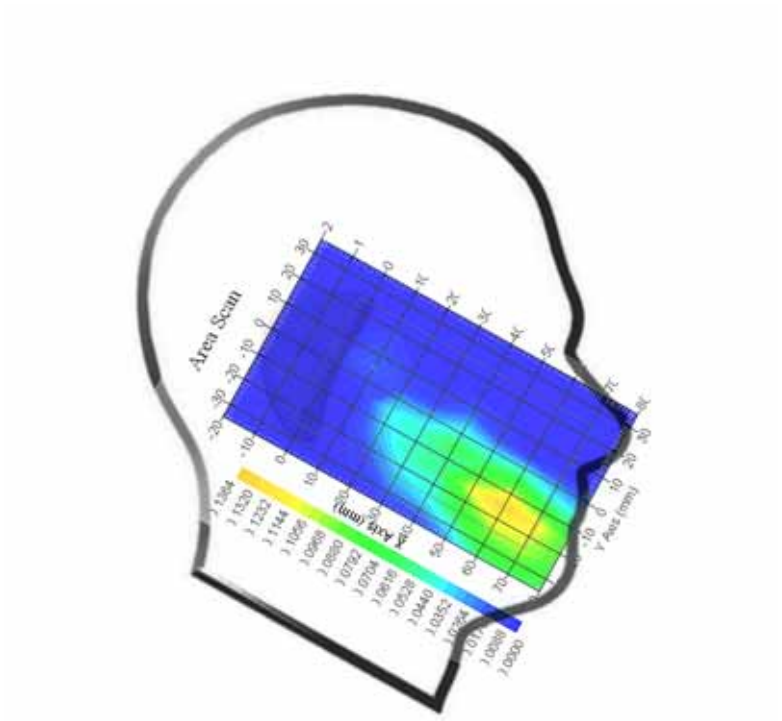
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.004 W/kg
Power Drift-Finish : 0.004 W/kg
Power Drift (%) : 0.270

Tissue Data
Type : Head
Frequency : 1850.2 MHz
Epsilon : 38.58 F/m
Sigma : 1.43 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 1900
Duty Cycle Factor : 8
Conversion Factor : 4.8
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.113 W/kg
10 gram SAR value : 0.066 W/kg
Area Scan Peak SAR : 0.136 W/kg
Zoom Scan Peak SAR : 0.210 W/kg

Plot 13#



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

Left Head Cheek (1880.0 MHz Middle Channel)

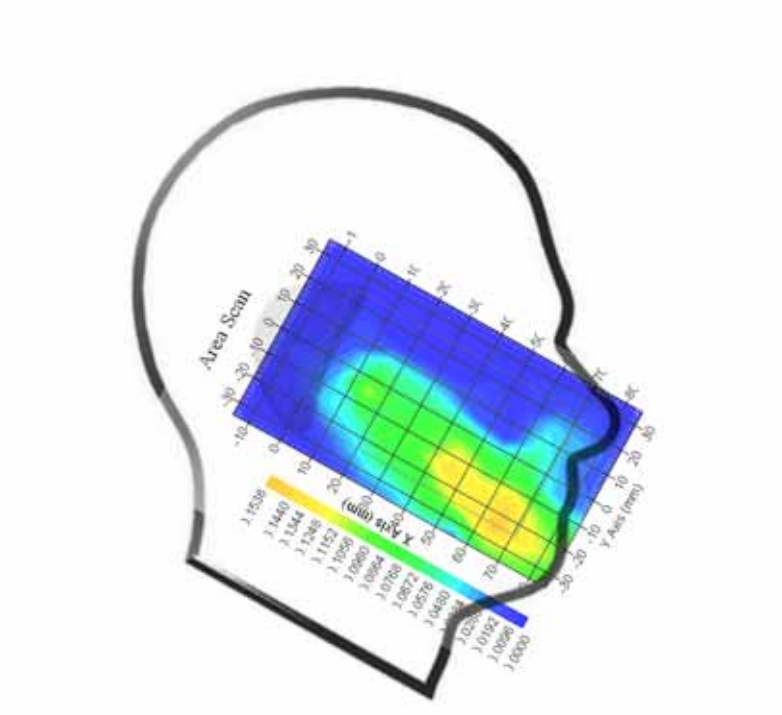
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.003 W/kg
Power Drift-Finish : 0.003 W/kg
Power Drift (%) : 1.760

Tissue Data
Type : Head
Frequency : 1880.0 MHz
Epsilon : 38.60 F/m
Sigma : 1.46 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 1900
Duty Cycle Factor : 8
Conversion Factor : 4.8
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.177 W/kg
10 gram SAR value : 0.105 W/kg
Area Scan Peak SAR : 0.150 W/kg
Zoom Scan Peak SAR : 0.280 W/kg

Plot 14#



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

Left Head Cheek (1909.8 MHz High Channel)

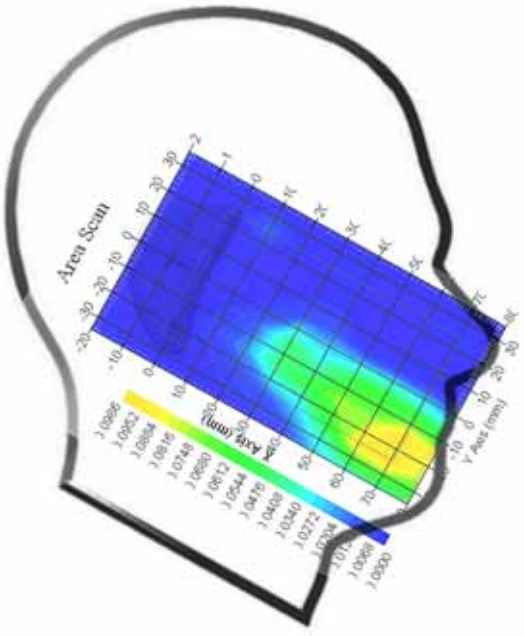
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.003 W/kg
Power Drift-Finish : 0.003 W/kg
Power Drift (%) : -1.357

Tissue Data
Type : Head
Frequency : 1909.8 MHz
Epsilon : 38.44 F/m
Sigma : 1.44 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 1900
Duty Cycle Factor : 8
Conversion Factor : 4.8
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.076 W/kg
10 gram SAR value : 0.036 W/kg
Area Scan Peak SAR : 0.097 W/kg
Zoom Scan Peak SAR : 0.210 W/kg

Plot 15#



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

Left Head Tilt (1880.0 MHz Middle Channel)

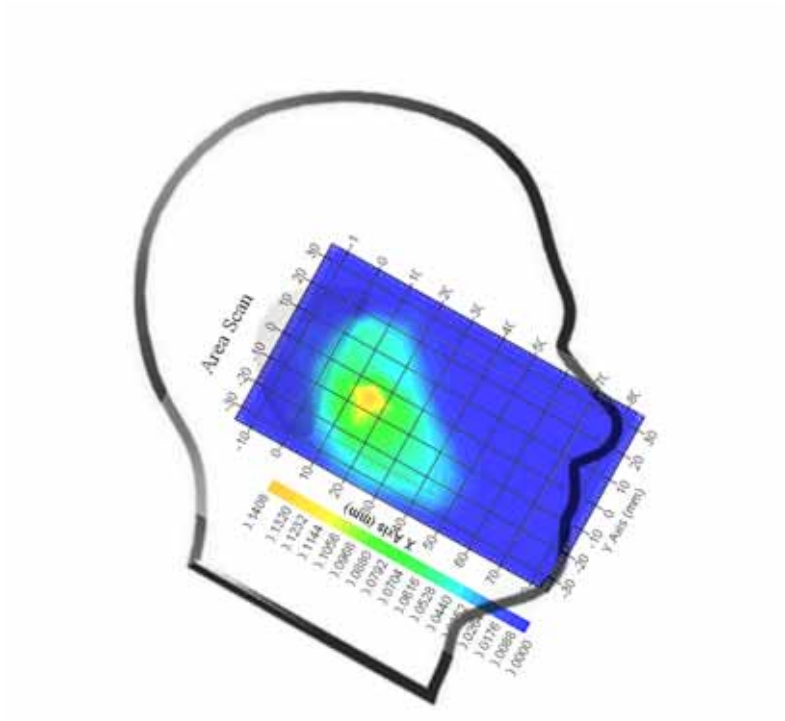
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.030 W/kg
Power Drift-Finish : 0.029 W/kg
Power Drift (%) : -2.079

Tissue Data
Type : Head
Frequency : 1880.0 MHz
Epsilon : 38.60 F/m
Sigma : 1.46 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 1900
Duty Cycle Factor : 8
Conversion Factor : 4.8
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.080 W/kg
10 gram SAR value : 0.036 W/kg
Area Scan Peak SAR : 0.138 W/kg
Zoom Scan Peak SAR : 0.250 W/kg

Plot 16#



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

Right Head Cheek (1880.0 MHz Middle Channel)

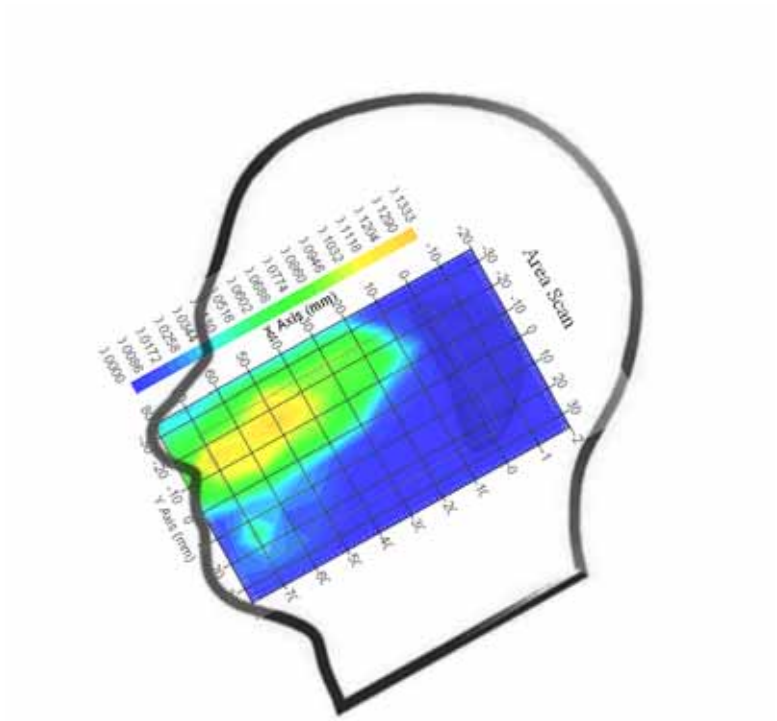
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.001 W/kg
Power Drift-Finish : 0.002 W/kg
Power Drift (%) : 3.483

Tissue Data
Type : Head
Frequency : 1880.0 MHz
Epsilon : 38.60 F/m
Sigma : 1.46 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 1900
Duty Cycle Factor : 8
Conversion Factor : 4.8
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.097 W/kg
10 gram SAR value : 0.058 W/kg
Area Scan Peak SAR : 0.132 W/kg
Zoom Scan Peak SAR : 0.270 W/kg

Plot 17#



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

Right Head Tilt (1880.0 MHz Middle Channel)

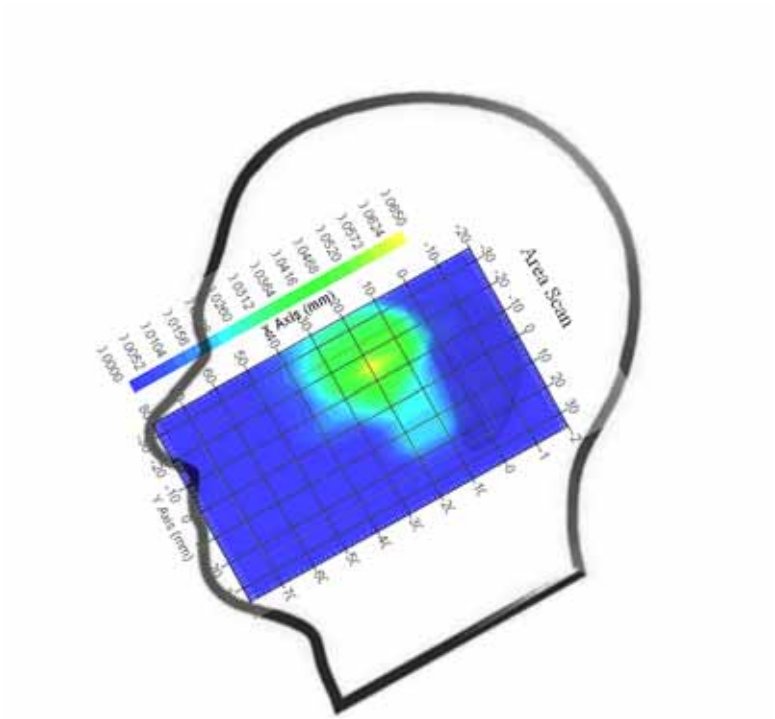
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 11x8x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.034 W/kg
Power Drift-Finish : 0.033 W/kg
Power Drift (%) : -2.007

Tissue Data
Type : Head
Frequency : 1880.0 MHz
Epsilon : 38.60 F/m
Sigma : 1.46 S/m
Density : 1000.00 kg/cu. m

Probe Data
Serial No. : 500-00283
Frequency Band : 1900
Duty Cycle Factor : 8
Conversion Factor : 4.8
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.043 W/kg
10 gram SAR value : 0.030 W/kg
Area Scan Peak SAR : 0.064 W/kg
Zoom Scan Peak SAR : 0.080 W/kg

Plot 18#



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

Body-worn Front-Headset (1880.0 MHz Middle Channel)

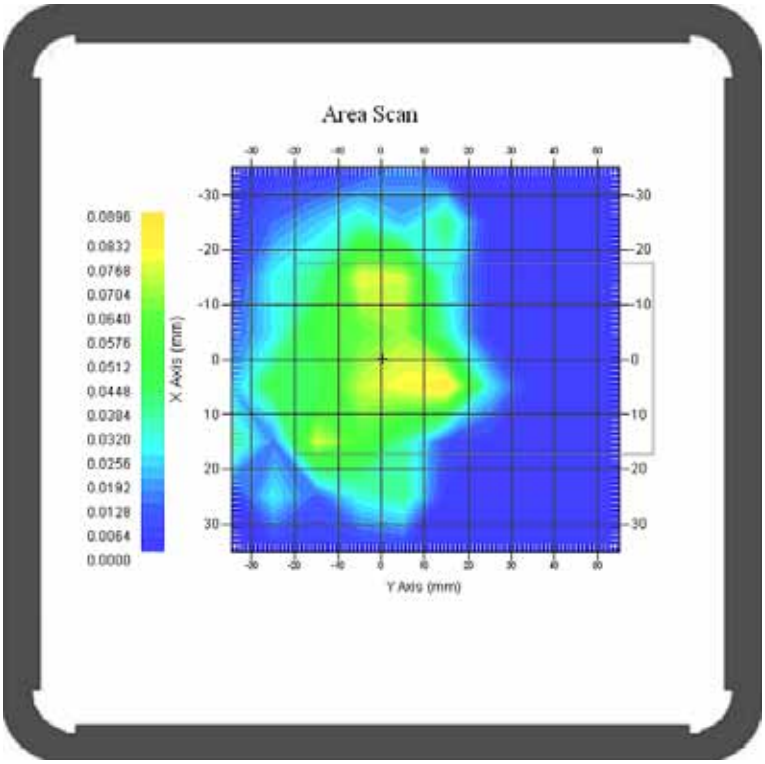
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.063 W/kg
Power Drift-Finish : 0.063 W/kg
Power Drift (%) : -1.699

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

Probe Data
Serial No. : 500-00283
Frequency Band : 1900
Duty Cycle Factor : 8
Conversion Factor : 4.5
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.067 W/kg
10 gram SAR value : 0.043 W/kg
Area Scan Peak SAR : 0.089 W/kg
Zoom Scan Peak SAR : 0.310 W/kg

Plot 19#



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

Body- worn Back- Headset (1880.0 MHz Middle Channel)

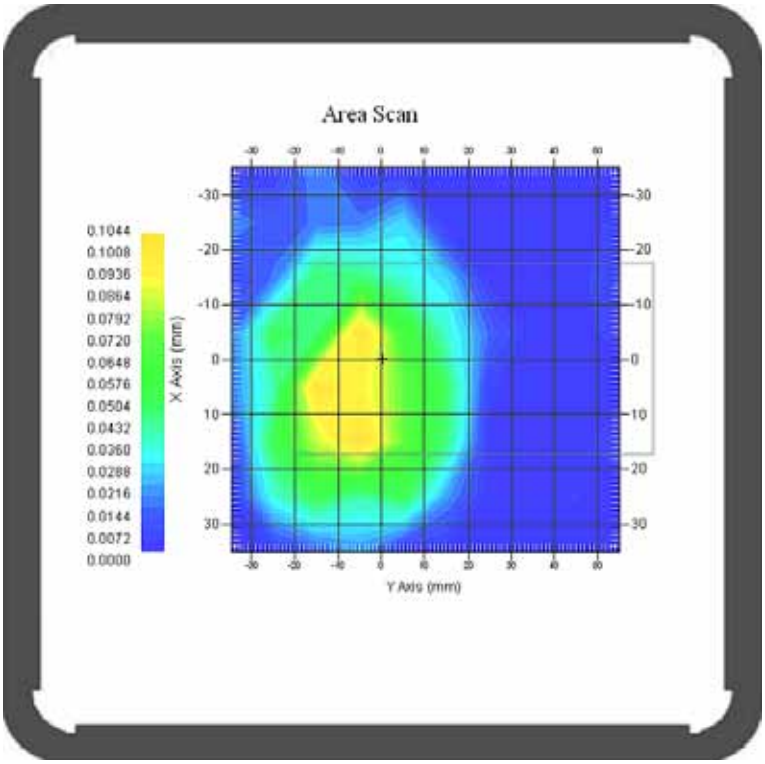
Measurement Data
Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.102 W/kg
Power Drift-Finish : 0.104 W/kg
Power Drift (%) : 1.295

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

Probe Data
Serial No. : 500-00283
Frequency Band : 1900
Duty Cycle Factor : 8
Conversion Factor : 4.5
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.104 W/kg
10 gram SAR value : 0.072 W/kg
Area Scan Peak SAR : 0.104 W/kg
Zoom Scan Peak SAR : 0.230 W/kg

Plot 20#



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

Body-worn Front (1880.0 MHz Middle Channel)

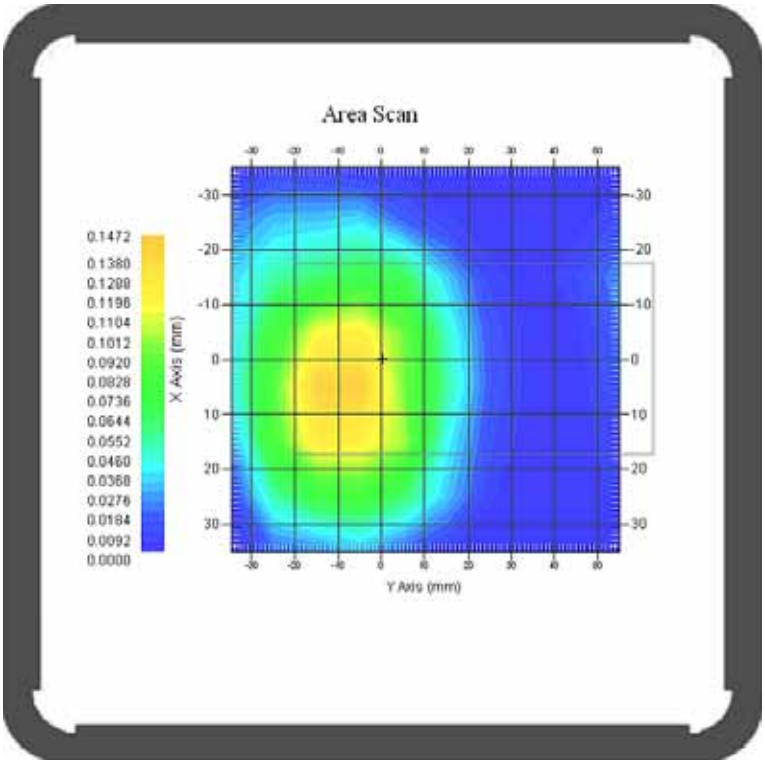
Measurement Data
Test mode : GPRS
Crest Factor : 2
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.120 W/kg
Power Drift-Finish : 0.117 W/kg
Power Drift (%) : -2.728

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

Probe Data
Serial No. : 500-00283
Frequency Band : 1900
Duty Cycle Factor : 2
Conversion Factor : 4.5
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.111 W/kg
10 gram SAR value : 0.047 W/kg
Area Scan Peak SAR : 0.145 W/kg
Zoom Scan Peak SAR : 0.220 W/kg

Plot 21#



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

Body-worn Back (1880.0 MHz Middle Channel)

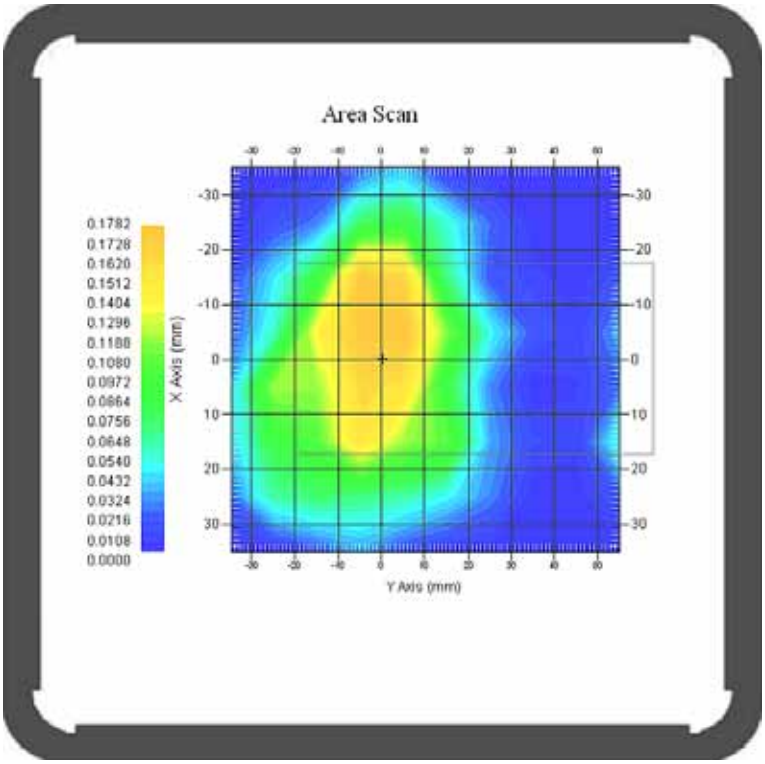
Measurement Data
Test mode : GPRS
Crest Factor : 2
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.192 W/kg
Power Drift-Finish : 0.195 W/kg
Power Drift (%) : 2.872

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

Probe Data
Serial No. : 500-00283
Frequency Band : 1900
Duty Cycle Factor : 2
Conversion Factor : 4.5
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.192 W/kg
10 gram SAR value : 0.127 W/kg
Area Scan Peak SAR : 0.177 W/kg
Zoom Scan Peak SAR : 0.490 W/kg

Plot 22#



APPENDIX A MEASUREMENT UNCERTAINTY

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

Measurement Uncertainty for 300MHz to 3GHz

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

APPENDIX B – PROBE CALIBRATION CERTIFICATES

NCL CALIBRATION LABORATORIES

Calibration File No.: PC-1537

Task No: BACL-5745

CERTIFICATE OF CALIBRATION

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

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

Calibration Procedure: D01-032-E020-V2, D22-012-Tissue, D28-002-Dipole
Project No: BACL-5745

Calibrated: 8th October 2013
Released on: 8th October 2013

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

Released By: 

Art Brennan, Quality Manager

NCL CALIBRATION LABORATORIES

Suite 103, 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
  IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
- EN 62209-1
  Human Exposure to RF Fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures-Part 1: Procedure to measure the Specific Absorption Rate (SAR) for hand-held mobile wireless devices
- IEC 62209-2
  Human exposure to RF fields from hand-held and body-mounted wireless devices - Human models, instrumentation, and procedures - Part 2: specific absorption rate (SAR) for wireless communication devices (30 MHz - 6 GHz)
- TP-D01-032-E020-V2 E-Field probe calibration procedure
- D22-012-Tissue dielectric tissue calibration procedure
- D28-002-Dipole procedure for validation of SAR system using a dipole
- IEEE 1309 Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9kHz to 40GHz

NCL Calibration Laboratories
Division of APREL Inc.

Conditions

Probe 500-00283 was a recalibration.

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

Primary Measurement Standards

Instrument	Serial Number	Cal due date
Tektronix USB Power Meter	11C940	May 14, 2015
Signal Generator HP 83640B	3844A00689	Feb 12, 2015

Secondary Measurement Standards

Network Analyzer Anritsu 37347C	002106	Feb. 20, 2015

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 μV/(V/m)^2
Channel Y:	1.2 μV/(V/m)^2
Channel Z:	1.2 μV/(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	Standard Uncertainty (%)	Calibration Frequency Range (MHz)	Conversion Factor
450 H	Head	44.29	0.86	3.5	±50	5.7
450 B	Body	56.6	0.94	3.5	±50	5.8
750 H	Head	42.7	0.85	3.5	±50	5.6
750 B	Body	56.6	0.94	3.5	±50	5.5
835 H	Head	42.35	0.938	3.5	±50	5.9
835 B	Body	56.65	1.018	3.5	±50	5.9
900 H	Head	X	X	X	X	X
900 B	Body	X	X	X	X	X
1450 H	Head	X	X	X	X	X
1450 B	Body	X	X	X	X	X
1500 H	Head	X	X	X	X	X
1500 B	Body	X	X	X	X	X
1640 H	Head	X	X	X	X	X
1640 B	Body	X	X	X	X	X
1750 H	Head	38.51	1.36	3.5	±75	5.4
1750 B	Body	51.79	1.53	3.5	±75	5.3
1800 H	Head	38.26	1.41	3.5	±75	5.0
1800 B	Body	51.61	1.58	3.5	±75	5.0
1900 H	Head	38.03	1.36	3.5	±75	4.8
1900 B	Body	53.13	1.58	3.5	±75	4.5
2000 H	Head	X	X	X	X	X
2000 B	Body	X	X	X	X	X
2100 H	Head	X	X	X	X	X
2100 B	Body	X	X	X	X	X
2300 H	Head	X	X	X	X	X
2300 B	Body	X	X	X	X	X
2450 H	Head	37.64	1.88	3.5	±75	4.9
2450B	Body	50.7	2.03	3.5	±75	4.3
2600 H	Head	X	X	X	X	X
2600 B	Body	X	X	X	X	X
3000 H	Head	X	X	X	X	X
3000 B	Body	X	X	X	X	X
3600 H	Head	X	X	X	X	X
3600 B	Body	X	X	X	X	X
5250 H	Head	34.65	4.8	3.5	±100	2.7
5250 B	Body	47.6	5.3	3.5	±100	2.6
5600 H	Head	33.2	5.15	3.5	±100	2.5
5600 B	Body	45.21	5.57	3.5	±100	2.2
5800 H	Head	32.72	5.38	3.5	±100	3.2
5800 B	Body	44.28	6.04	3.5	±100	2.5

Page 5 of 10
This page has been reviewed for content and attested to on Page 2 of this document.

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:

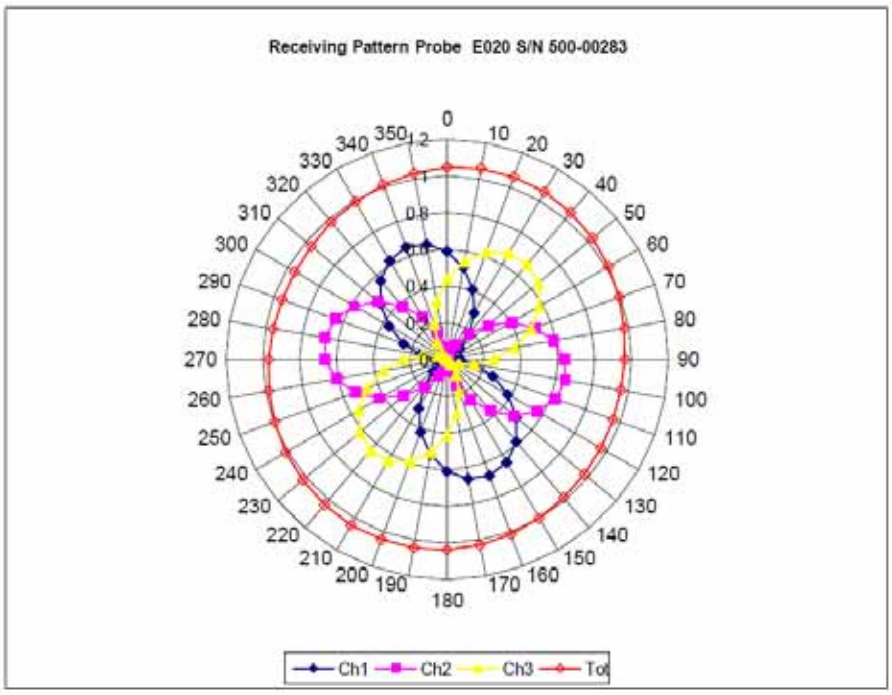
The spatial resolution uncertainty is less than 1.5% for 4.9mm diameter probe.
The spatial resolution uncertainty is less than 1.0% for 2.5mm diameter probe.

DAQ-PAQ Contribution

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

NCL Calibration Laboratories
Division of APREL Inc.

Receiving Pattern Air



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

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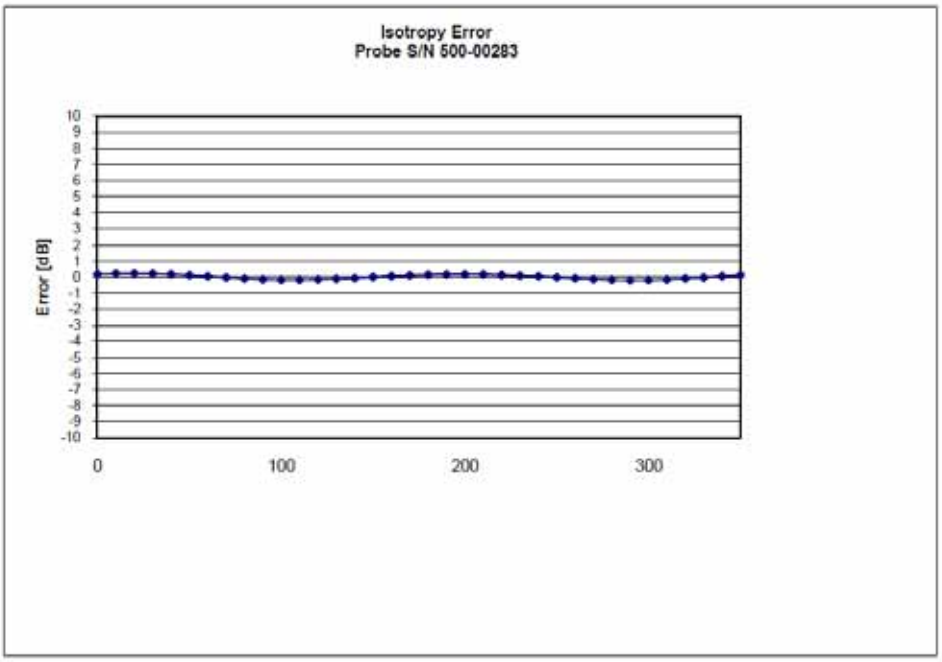
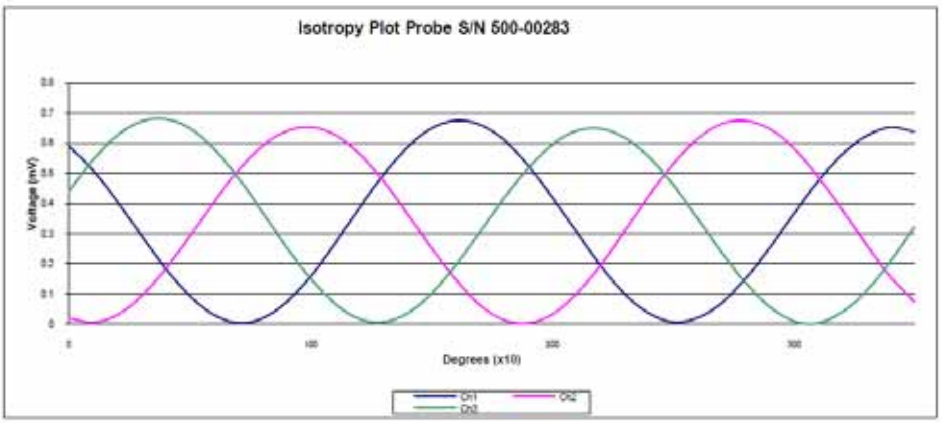
Isotropy Error Air





Isotropicity Tissue: 0.10 dB

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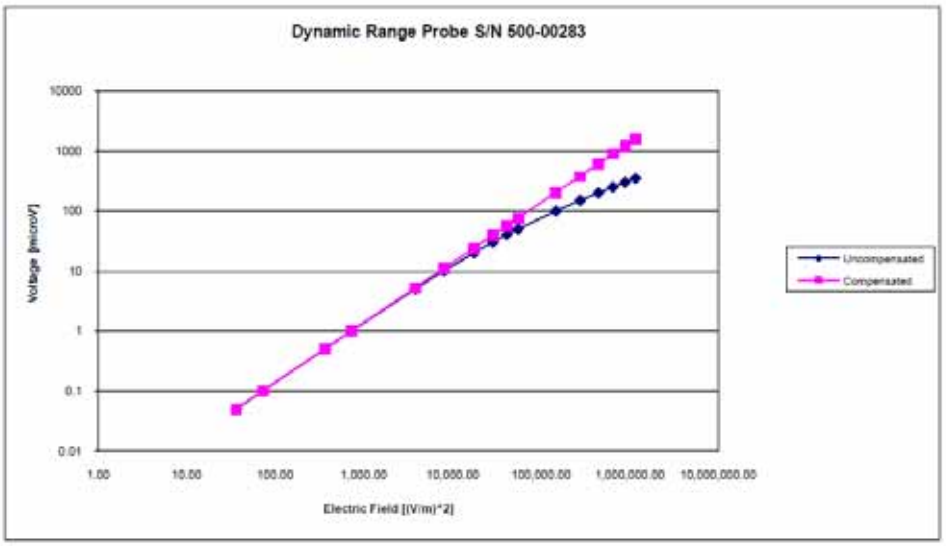
Dynamic Range



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

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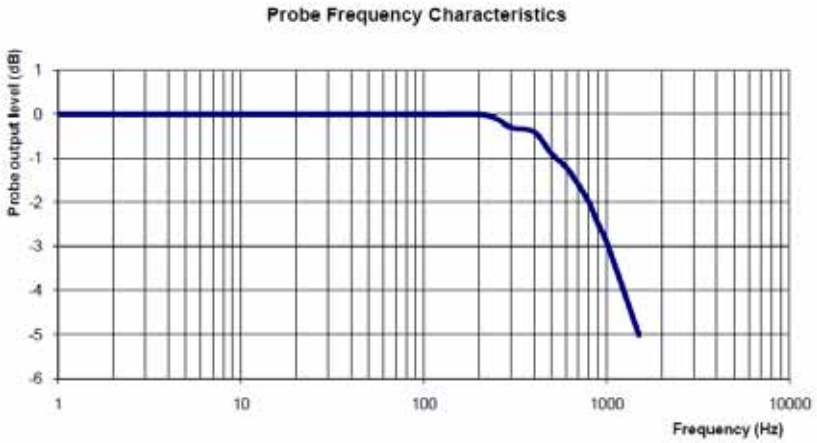
Division of APREL Inc.

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 2013.

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

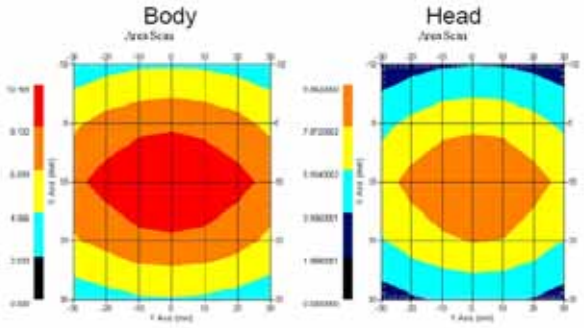
Length: 162.2 mm
Height: 89.4 mm

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Dipole Calibration Results

Mechanical Verification

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

Tissue 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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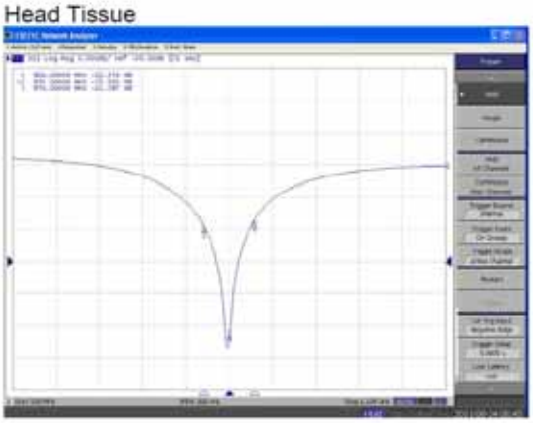
NCL Calibration Laboratories
Division of APREL Laboratories.

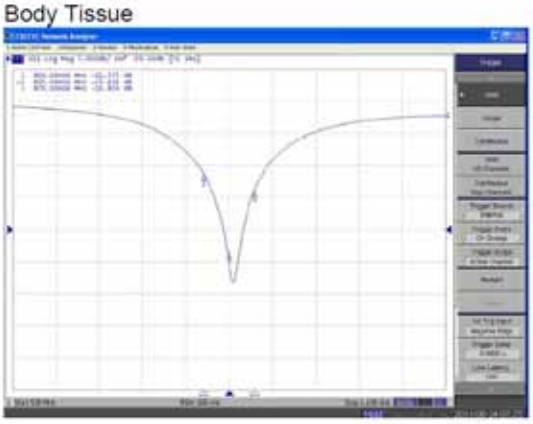
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head Tissue



Body Tissue



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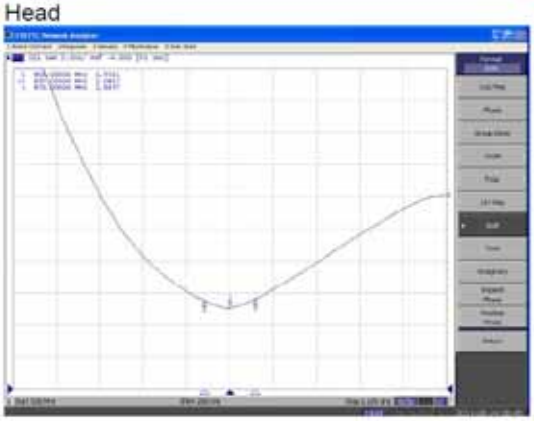
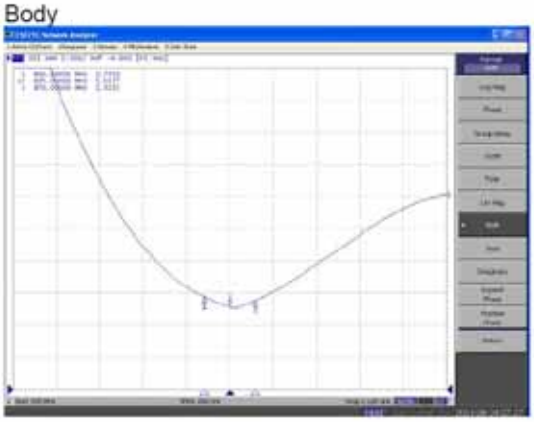
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

SWR
Head



Body



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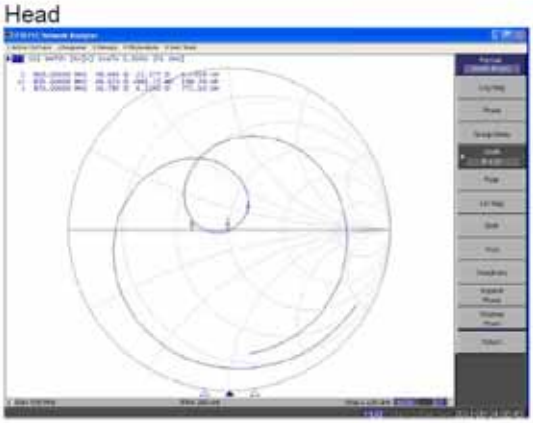
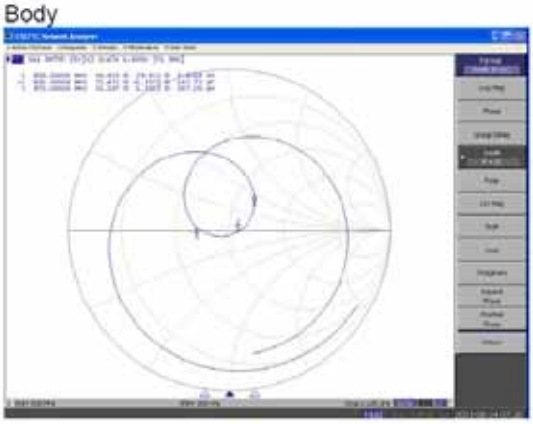
NCL Calibration Laboratories
Division of APREL Laboratories.

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

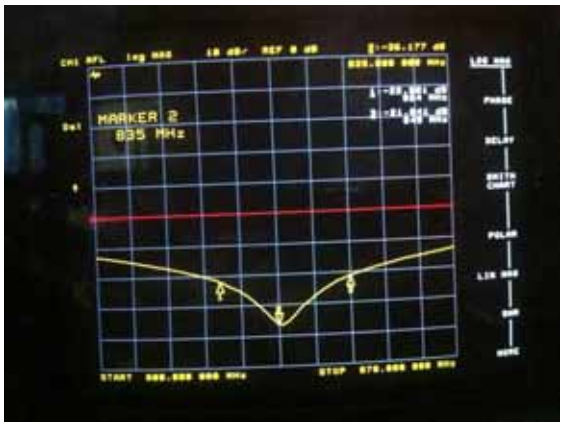
APREL Length	APREL Height	Measured Length	Measured Height
161.0 mm	89.8 mm	161.2 mm	89.5 mm

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

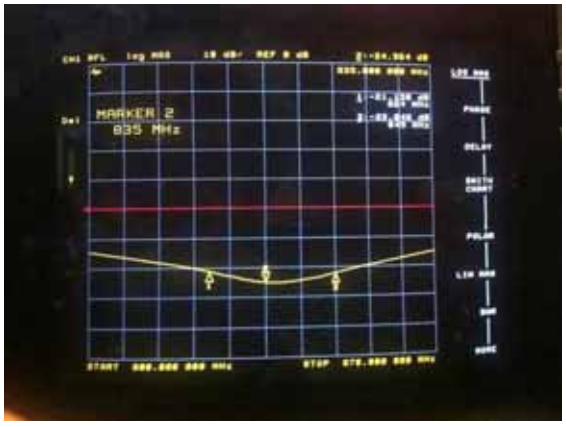
Return Loss :



Impedance :

Body Tissue

Return Loss :



Impedance :

NCL CALIBRATION LABORATORIES

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

CERTIFICATE OF CALIBRATION

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

Validation Dipole (Head & Body)

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

Customer: Bay Area Compliance Laboratory

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

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

Released By: _____

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Conditions

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

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C
Temperature of the Tissue: 21 °C +/- 0.5°C

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

Stuart Nicol

C. Teodorian

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

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Calibration Results Summary

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

Mechanical Dimensions

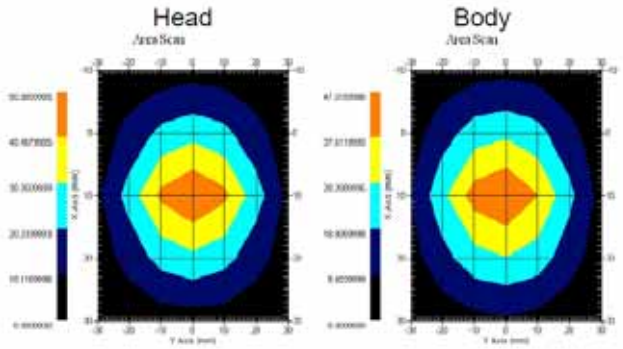
Length: 67.1 mm
Height: 38.9 mm

Electrical Specification

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

System Validation Results

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



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

NCL Calibration Laboratories
Division of APREL Laboratories.

Introduction

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

References

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

Conditions

Dipole 210-00710 was new taken from stock.

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

Dipole Calibration uncertainty

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

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

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
68.0 mm	39.5 mm	67.1mm	38.9 mm

Electrical Validation

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

Tissue Validation

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

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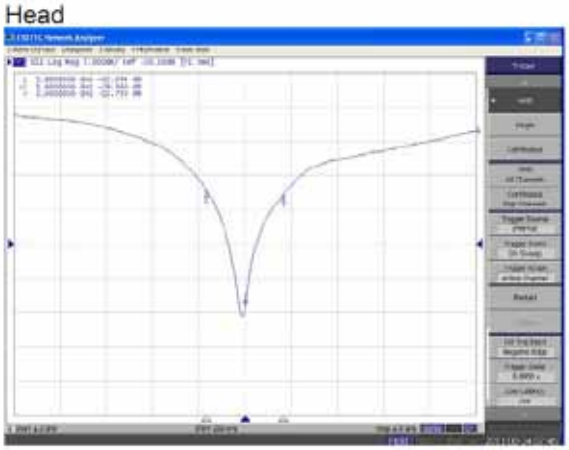
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

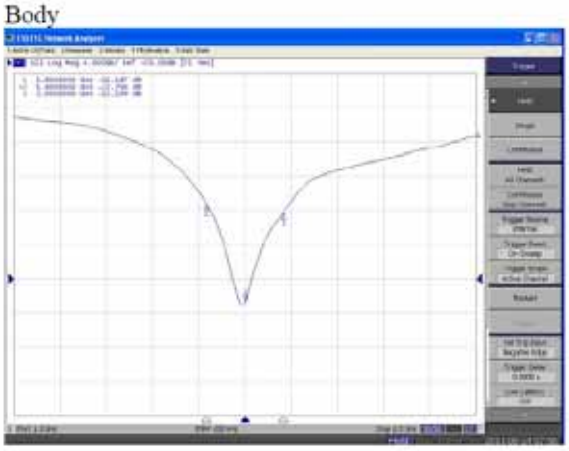
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head



Body



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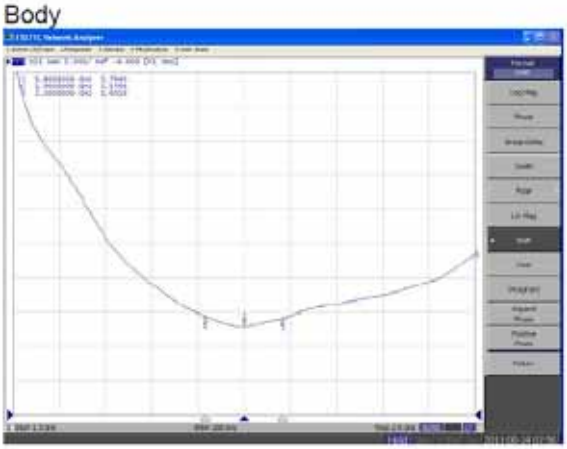
NCL Calibration Laboratories

Division of APREL Laboratories.

SWR

Head

Body



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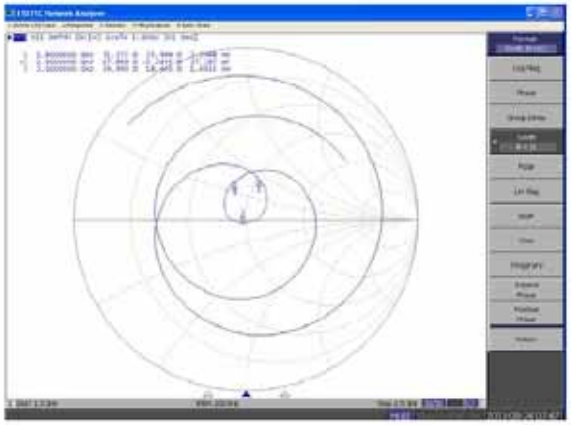
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



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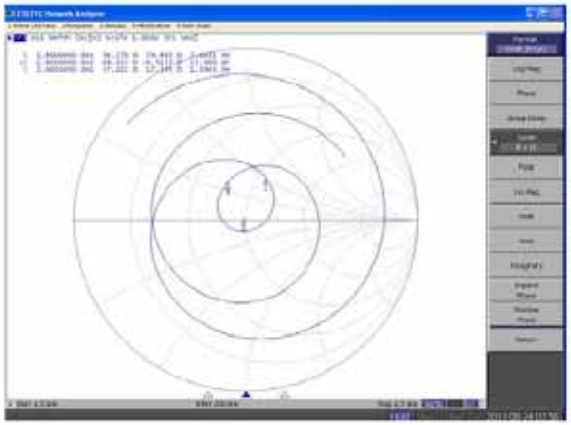


8

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.

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

Mechanical Verification

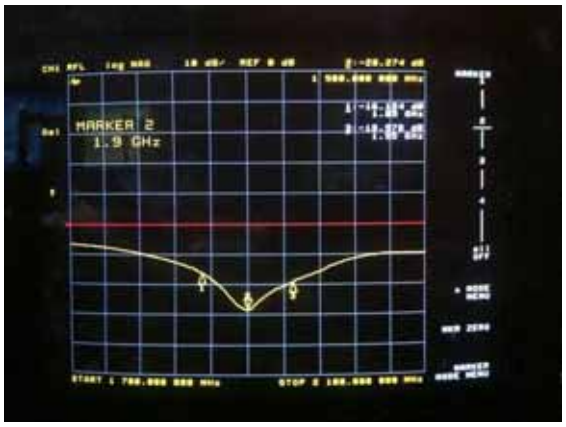
APREL Length	APREL Height	Measured Length	Measured Height
68.0 mm	39.5 mm	68.2 mm	39.2 mm

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

Test Graphs：

Head Tissue

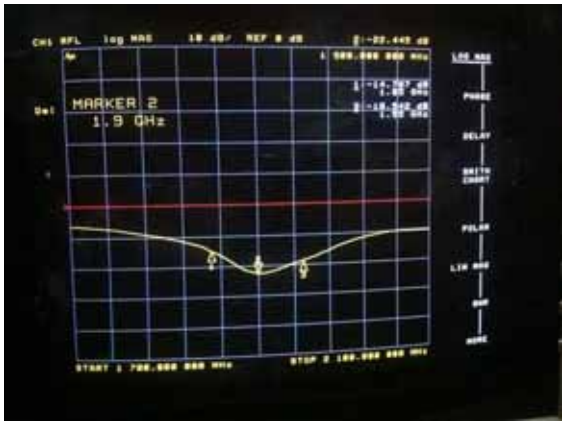
Return Loss :



Impedance :

Body Tissue

Return Loss :

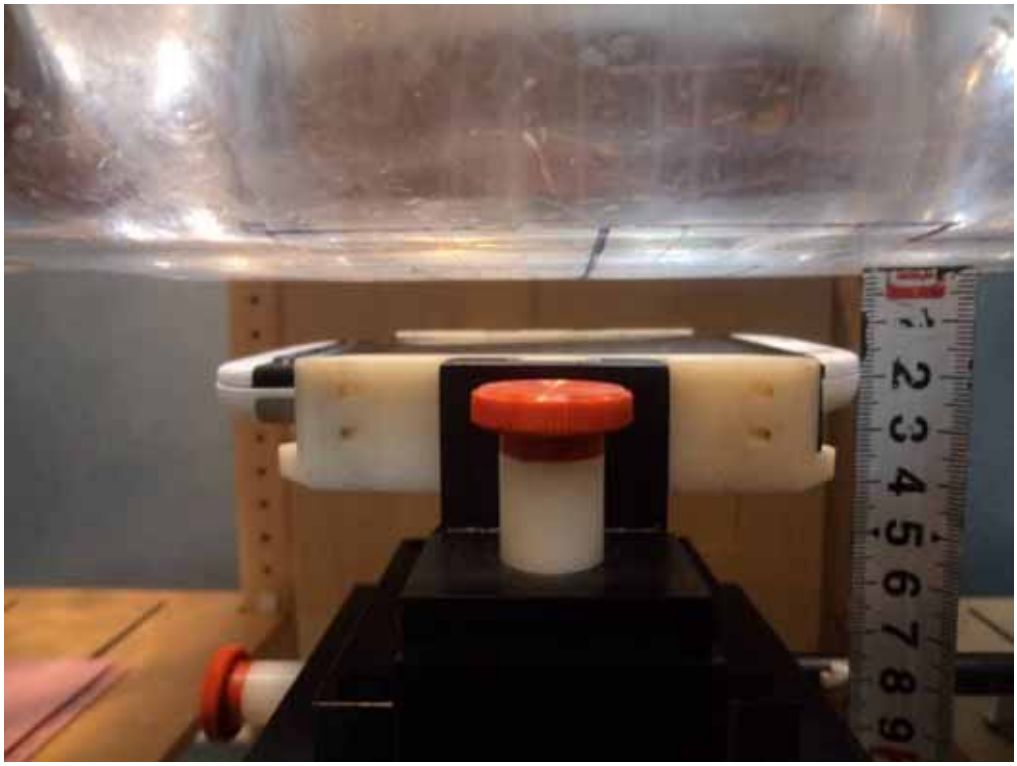


Impedance :

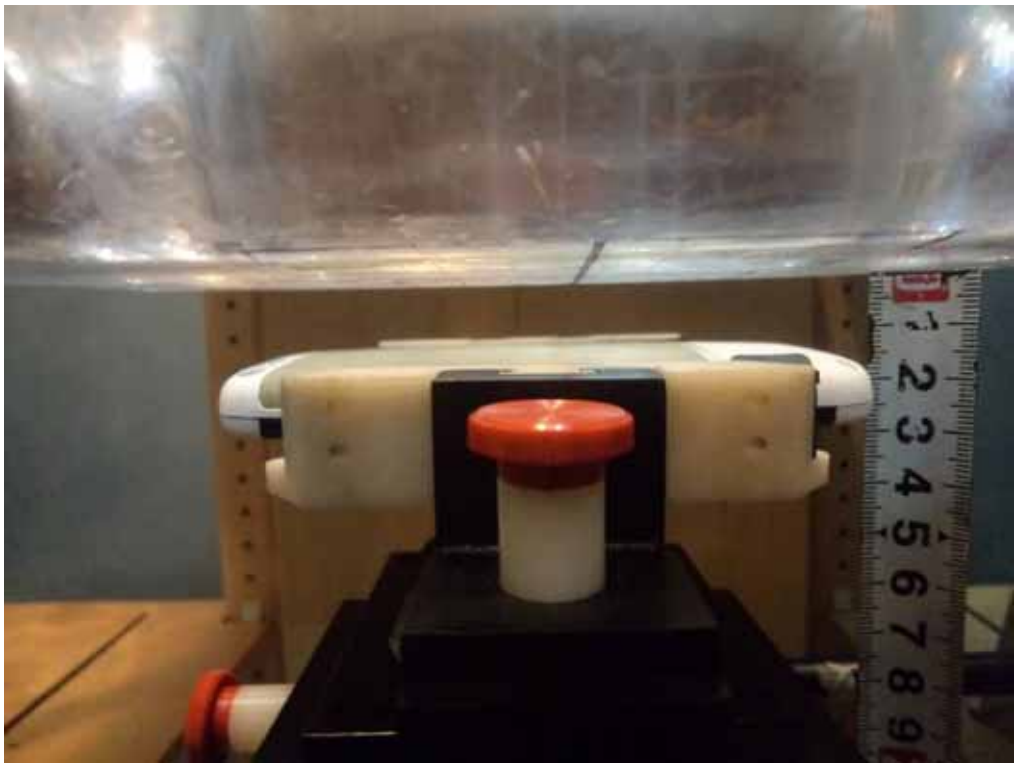
APPENDIX D EUT TEST POSITION PHOTOS

Liquid depth ≥ 15cm

Body-worn Headset Front Setup Photo



Body-worn Headset Back Setup Photo

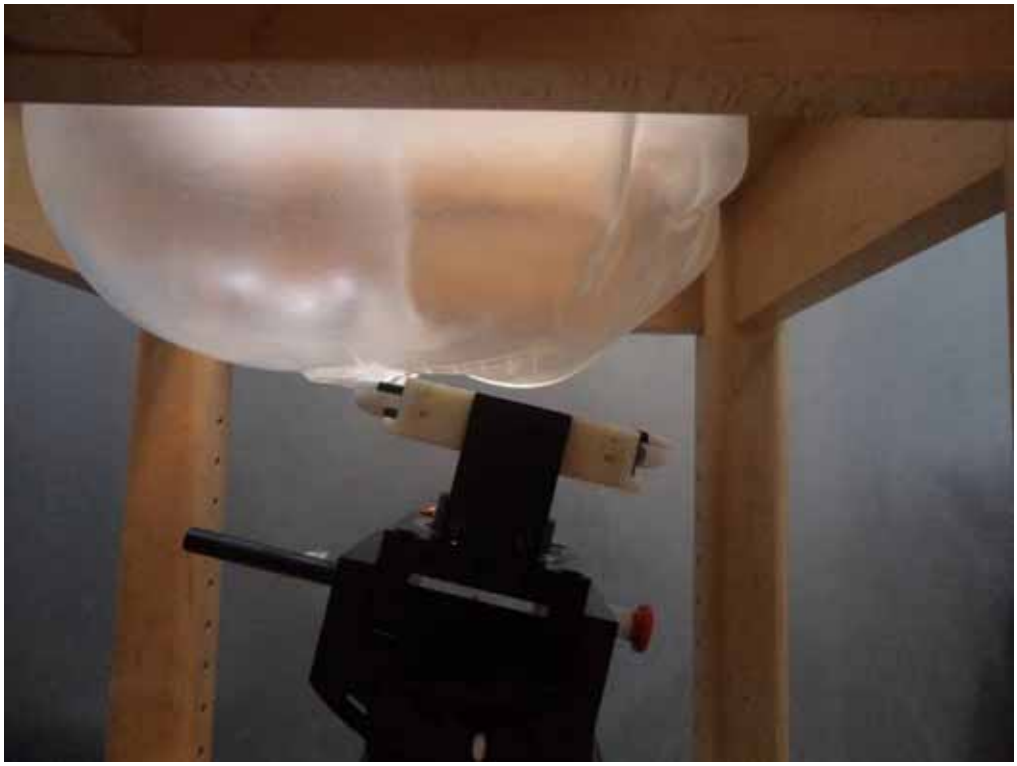


Left Head Touch Setup Photo

Left Head Tilt Setup Photo

Right Head Touch Setup Photo

Left Head Tilt Setup Photo



APPENDIX E EUT PHOTOS

EUT – Front View

EUT – Back View

EUT – Left Side View

EUT – Right Side View

EUT – Top View

EUT – Bottom View

EUT – Uncovered View

APPENDIX F INFORMATIVE REFERENCES

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

[2] David L. Means Kwok Chan, Robert F. Cleveland, \Evaluating compliance with FCC guidelines for human exposure to radiofrequency electromagnetic fields", Tech. Rep., Federal Communication Commission, O_ce of Engineering & Technology, Washington, DC, 1997.

[3] Thomas Schmid, Oliver Egger, and Niels Kuster, \Automated E-_eld scanning system for dosimetricPage 103 of 104
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.

PRODUCT SIMILARITY DECLARATION

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Tel: 00852-28027388 Fax: 00852-28028138

DECLARATION OF SIMILARITY

October 14, 2013

Dear Sir or Madam:

We, Binatone Electronics International Ltd., hereby declare that our product: GSM Mobile Phone, models: Voxtel-SM800 is electrically identical with the same electromagnetic emissions and electromagnetic compatibility characteristics as SM800 tested by BACL, the results of which are featured in BACL project.

A description of the differences between the tested model and those that are declared similar areas follows:

Models: Voxtel-SM800, SM800 the only difference is the model name.

Please contact me should there be need for any additional clarification or information.

Best Regards,

(Legally valid signature)

Patrick Cheung, Senior Product Manager

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