

SAR EVALUATION REPORT

For

DOPPIO MOBILE INTERNATIONAL LIMITED

ROOM 1708,17/F HART AVENUE PLAZA,5-9 HART AVENUE TSIM SHA
TSUI,KOWLOON, Hong Kong

FCC ID: N2GDPG500

Report Type: Original Report	Product Type: PANTHER
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Report Number: RDG150430003-20	
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Note: This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

Attestation of Test Results			
EUT Information	Company Name	DOPPIO MOBILE INTERNATIONAL LIMITED	
	Product Name	PANTHER	
	FCC ID	N2GDPG500	
	Model Number	DPG500	
	Test Date	2015-05-13	
Frequency	Max. SAR Level(s) Reported		Limit(W/Kg)
GSM 850	0.287 W/kg 1g Head SAR 1.242 W/kg 1g Body SAR		1.6
PCS 1900	0.178 W/kg 1g Head SAR 1.189 W/kg 1g Body SAR		
WCDMA850	0.153 W/kg 1g Head SAR 0.842 W/kg 1g Body SAR		
WCDMA1900	0.123 W/kg 1g Head SAR 0.887 W/kg 1g Body SAR		
LTE Band 4	0.461W/kg 1g Head SAR 0.631 W/kg 1g Body SAR		
Wi-Fi(802.11b)	0.225 W/kg 1g Head SAR 0.286 W/kg 1g Body SAR		
Simultaneous	0.650 W/kg 1g Head SAR 1.528 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.		
	IEEE1528:2013 IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques		
	KDB procedures KDB 447498 D01 Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies. KDB 648474 D04 SAR Evaluation Considerations for Wireless Handsets KDB 865664 D01SAR Measurement Requirements for 100 MHz to 6 GHz KDB 248227 D01 802.11 Wi-Fi SAR v02 KDB 616217 D04 SAR for laptop and tablets v01r01 KDB 941225 D01 3G SAR Procedures v03 KDB 941225 D05 SAR for LTE Devices v02r03		
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 1528-2013 and RF exposure KDB procedures. The results and statements contained in this report pertain only to the device(s) evaluated.			

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EVAL

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	RDG150430003-20	Original Report	2015-05-20

EUT DESCRIPTION

This report has been prepared on behalf of DOPPIO MOBILE INTERNATIONAL LIMITED and their product, FCC ID: N2GDPG500, Model: DPG500 or the EUT (Equipment under Test) as referred to in the rest of this report.

Technical Specification

Product Type	Portable
Exposure Category:	Population / Uncontrolled
Antenna Type(s):	Internal Antenna
Body-Worn Accessories:	Headset
Face-Head Accessories:	None
Multi-slot Class:	Class12
Operation Mode :	GSM Voice, GPRS/EGPRS Data, WCDMA, Wi-Fi and Bluetooth
Frequency Band:	GSM 850 : 824-849 MHz(TX) ; 869-894 MHz(RX) PCS 1900: 1850-1910 MHz(TX) ; 1930-1990 MHz(RX) WCDMA850: 824-849 MHz(TX) ; 869-894 MHz(RX) WCDMA1900: 1850-1910 MHz(TX) ; 1930-1990 MHz(RX) LTE Band 4:1710-1755MHz(TX);2110-2155MHz(RX) Wi-Fi(802.11b/g/n20): 2412MHz-2462MHz Wi-Fi(802.11n40): 2422MHz-2452MHz Bluetooth : 2402MHz-2480MHz
Conducted RF Power:	GSM 850 : 32.69 dBm PCS 1900: 30.22 dBm WCDMA 850: 22.37 dBm WCDMA 1900: 22.45 dBm LTE Band 4: 22.57 dBm Wi-Fi(802.11b/g/n20): 11.84 dBm Wi-Fi(802.11n40): 11.67 dBm Bluetooth: 4.48 dBm
Dimensions (L*W*H):	188 mm (L) × 106 mm (W) × 8 mm (H) Overall diagonal dimension:216mm
Power Source:	3.7 V _{DC} Rechargeable Battery
Normal Operation:	Head and Body-worn

Note: the overall diagonal dimension of the EUT is 216mm>200mm, so test procedures in KDB616217 should be applicable.

REFERENCE, STANDARDS, AND GUIDELINES

FCC:

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

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

CE:

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

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

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

SAR Limits**FCC Limit (1g Tissue)**

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

CE Limit (10g Tissue)

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

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

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

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

FACILITIES

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

FINAL

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

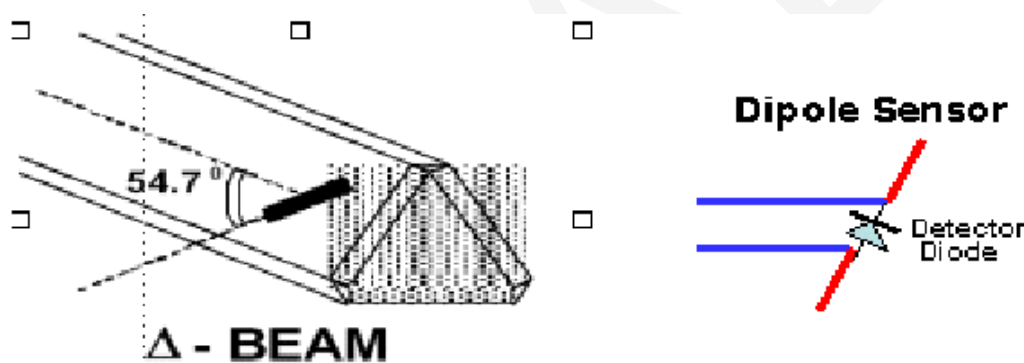
The overall uncertainty for the methodology and algorithms the used during the SAR calculation was evaluated using the data from IEEE 1528 based on the example f3 algorithm:

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

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

Boundary Detection Unit and Probe Mounting Device

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

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

Daq-Paq (Analog to Digital Electronics)

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

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

Axis Articulated Robot

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



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

ALSAS Universal Workstation

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

Universal Device Positioner

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

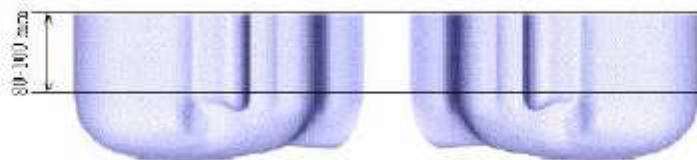


Phantom Types

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

APREL SAM Phantoms

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



APREL Laboratories Universal Phantom

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

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

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



Tissue Dielectric Parameters for Head and Body Phantoms

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

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

Recommended Tissue Dielectric Parameters for Head and Body

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

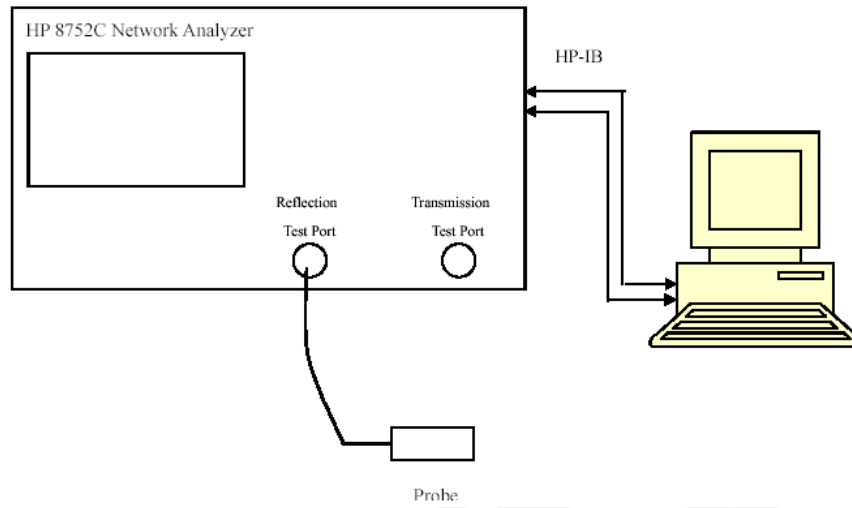
EQUIPMENT LIST AND CALIBRATION

Equipments List & Calibration Information

Equipment	Model	Calibration Date	S/N
CRS F3 robot	ALS-F3	N/A	RAF0805352
CRS F3 Software	ALS-F3-SW	N/A	N/A
CRS C500C controller	ALS-C500	N/A	RCF0805379
Probe mounting device & Boundary Detection Sensor System	ALS-PMDPS-3	N/A	120-00270
Universal Work Station	ALS-UWS	N/A	100-00157
Data Acquisition Package	ALS-DAQ-PAQ-3	2014-10-14	110-00212
Miniature E-Field Probe	ALS-E-020	2014-10-14	500-00283
Dipole, 835MHz	ALS-D-835-S-2	2014-10-08	180-00558
Dipole, 1750MHz	ALS-D-1750-S-2	2013-10-08	198-00304
Dipole, 1900MHz	ALS-D-1900-S-2	2014-10-09	210-00710
Dipole, 2450MHz	ALS-D-2450-S-2	2014-10-09	220-00758
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 1750 MHz Head	ALS-TS-1750-H	Each Time	295-01103
Simulated Tissue 1750 MHz Body	ALS-TS-1750-B	Each Time	295-02102
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
Simulated Tissue 2450 MHz Head	ALS-TS-2450-H	Each Time	290-01108
Simulated Tissue 2450 MHz Body	ALS-TS-2450-B	Each Time	290-01109
Directional couple	DC6180A	N/A	0325849
Power Amplifier	5S1G4	N/A	71377
Dielectric probe kit	HP85070B	2014-06-13	N/A
Attenuator	3dB	2014-05-08	5402
Network analyzer	8752C	2014-06-03	3410A02356
Synthesized Sweeper	HP 8341B	2014-06-03	2624A00116
UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	2014-11-23	106891
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	2014-04-19	114772
EMI Test Receiver	ESCI	2014-06-13	101746

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	O (S/m)	ϵ_r	O (S/m)	$\Delta\epsilon_r$	ΔO (S/m)	
824.2	Head	41.07	0.91	41.50	0.90	-1.036	1.111	±5
	Body	53.82	0.95	55.20	0.97	-2.500	-2.062	±5
826.4	Head	41.04	0.91	41.50	0.90	-1.108	1.111	±5
	Body	53.81	0.95	55.20	0.97	-2.518	-2.062	±5
836.6	Head	41.05	0.92	41.50	0.90	-1.084	2.222	±5
	Body	53.85	0.96	55.20	0.97	-2.446	-1.031	±5
846.6	Head	41.02	0.91	41.50	0.90	-1.157	1.111	±5
	Body	53.85	0.97	55.20	0.97	-2.446	0.000	±5
848.8	Head	41.01	0.91	41.50	0.90	-1.181	1.111	±5
	Body	53.83	0.98	55.20	0.97	-2.482	1.031	±5
1720	Head	39.39	1.37	40.08	1.37	-1.722	0.000	±5
	Body	51.99	1.50	53.43	1.49	-2.695	0.671	±5
1732.5	Head	39.40	1.36	40.08	1.37	-1.697	-0.730	±5
	Body	51.85	1.51	53.43	1.49	-2.957	1.342	±5
1745	Head	39.58	1.37	40.08	1.37	-1.248	0.000	±5
	Body	51.95	1.52	53.43	1.49	-2.770	2.013	±5
1850.2	Head	39.63	1.38	40.00	1.40	-0.925	-1.429	±5
	Body	52.01	1.49	53.30	1.52	-2.420	-1.974	±5
1852.4	Head	39.55	1.38	40.00	1.40	-1.125	-1.429	±5
	Body	51.80	1.50	53.30	1.52	-2.814	-1.316	±5
1880.0	Head	39.58	1.40	40.00	1.40	-1.050	0.000	±5
	Body	51.89	1.52	53.30	1.52	-2.645	0.000	±5
1907.6	Head	39.71	1.41	40.00	1.40	-0.725	0.714	±5
	Body	52.04	1.53	53.30	1.52	-2.364	0.658	±5
1909.8	Head	39.65	1.41	40.00	1.40	-0.875	0.714	±5
	Body	52.05	1.55	53.30	1.52	-2.345	1.974	±5
2412	Head	39.97	1.80	39.20	1.80	1.964	0.000	±5
	Body	52.81	1.91	52.70	1.95	0.209	-2.051	±5
2437	Head	39.55	1.82	39.20	1.80	0.893	1.111	±5
	Body	52.85	2.04	52.70	1.95	0.285	4.615	±5
2462	Head	39.63	1.85	39.20	1.80	1.097	2.778	±5
	Body	52.85	1.99	52.70	1.95	0.285	2.051	±5

*Liquid Verification was performed on 2015-05-13.

Please refer to the following tables.

835 MHz Head				835 MHz Body		
Frequency (MHz)	e'	e''		Frequency (MHz)	e'	e''
824.0	41.0691	19.7626		824.0	53.8166	20.6269
824.5	41.0585	19.7300		824.5	53.8701	20.6253
825.0	41.0659	19.7249		825.0	53.8135	20.6650
825.5	41.0057	19.6922		825.5	53.7634	20.6416
826.0	41.0585	19.7347		826.0	53.8703	20.6995
826.5	41.0424	19.7098		826.5	53.8105	20.6798
827.0	41.0539	19.7163		827.0	53.7772	20.6735
827.5	41.0848	19.7350		827.5	53.8613	20.6786
828.0	41.0853	19.7352		828.0	53.8030	20.6774
828.5	41.0872	19.7495		828.5	53.8003	20.6713
829.0	41.0602	19.7374		829.0	53.8166	20.6389
829.5	41.0463	19.7553		829.5	53.8451	20.6560
830.0	41.0419	19.7348		830.0	53.7940	20.6648
830.5	41.0250	19.7119		830.5	53.8722	20.7041
831.0	41.0728	19.7655		831.0	53.8272	20.6946
831.5	41.0956	19.6705		831.5	53.8085	20.6624
832.0	41.0971	19.7462		832.0	53.8679	20.6993
832.5	41.0993	19.6792		832.5	53.7861	20.7003
833.0	41.0001	19.7168		833.0	53.8484	20.6859
833.5	41.0582	19.7397		833.5	53.8171	20.6616
834.0	41.0766	19.6936		834.0	53.7893	20.6961
834.5	41.0401	19.7416		834.5	53.7726	20.6713
835.0	41.0944	19.6758		835.0	53.8007	20.7039
835.5	41.0535	19.7703		835.5	53.8508	20.6144
836.0	41.0587	19.6947		836.0	53.8586	20.7083
836.5	41.0949	19.7408		836.5	53.7724	20.6985
837.0	41.0366	19.7071		837.0	53.7938	20.6376
837.5	41.0448	19.7628		837.5	53.7763	20.6414
838.0	41.0442	19.7440		838.0	53.8007	20.6176
838.5	41.0844	19.7484		838.5	53.8637	20.6881
839.0	41.0917	19.7536		839.0	53.7784	20.6833
839.5	41.0557	19.7055		839.5	53.8181	20.6577
840.0	41.1015	19.4258		840.0	53.8048	20.6597
840.5	41.0228	19.4535		840.5	53.7699	20.6534
841.0	41.0384	19.3693		841.0	53.8451	20.6494
841.5	41.0538	19.4499		841.5	53.8624	20.7010
842.0	41.0838	19.4564		842.0	53.8431	20.6678
842.5	41.0136	19.4033		842.5	53.7963	20.7056
843.0	41.0942	19.4189		843.0	53.7784	20.6346
843.5	41.0226	19.4011		843.5	53.8039	20.6204
844.0	41.0604	19.4097		844.0	53.7757	20.6564
844.5	41.1027	19.4650		844.5	53.8005	20.6688
845.0	41.1024	19.3964		845.0	53.8596	20.7004
845.5	41.0249	19.4334		845.5	53.7716	20.6583
846.0	41.0494	19.4538		846.0	53.8223	20.6937
846.5	41.0177	19.4236		846.5	53.8519	20.6850
847.0	41.0990	19.4157		847.0	53.8475	20.6154
847.5	41.0154	19.4072		847.5	53.7969	20.6915
848.0	41.0307	19.3969		848.0	53.7890	20.7012
848.5	41.0753	19.4124		848.5	53.8026	20.6166
849.0	41.0065	19.3826		849.0	53.8303	20.7030

1750 MHz Head				1750 MHz Body		
Frequency (MHz)	e'	e''		Frequency (MHz)	e'	e''
1710.0	39.1845	14.3423		1710.0	51.9265	15.6367
1711.5	39.6297	14.4748		1711.5	51.8992	15.6472
1713.0	39.4225	14.2152		1713.0	51.9188	15.6506
1714.5	39.1640	14.4632		1714.5	51.9631	15.6410
1716.0	39.1348	14.4054		1716.0	51.8497	15.7131
1717.5	39.5377	14.4665		1717.5	51.9618	15.6343
1719.0	39.2131	14.3449		1719.0	51.9968	15.7071
1720.5	39.4435	14.2896		1720.5	51.9899	15.7065
1722.0	39.1423	14.1406		1722.0	51.8940	15.6360
1723.5	39.3939	14.5144		1723.5	51.9217	15.6001
1725.0	39.2879	14.4375		1725.0	51.9180	15.5350
1726.5	39.4486	14.4087		1726.5	51.9125	15.6693
1728.0	39.5903	14.5748		1728.0	51.9245	15.7104
1729.5	39.5010	14.1763		1729.5	51.8788	15.6790
1731.0	39.3442	14.2702		1731.0	51.8859	15.6161
1732.5	39.3953	14.1113		1732.5	51.8454	15.6703
1734.0	39.2101	14.4757		1734.0	51.9957	15.6490
1735.5	39.5498	14.1853		1735.5	51.8999	15.6644
1737.0	39.3841	14.5329		1737.0	51.8549	15.6608
1738.5	39.4663	14.2468		1738.5	51.8441	15.6890
1740.0	39.1057	14.3747		1740.0	51.8598	15.7100
1741.5	39.2779	14.3121		1741.5	51.8945	15.6744
1743.0	39.2353	14.5291		1743.0	51.8808	15.6225
1744.5	39.5768	14.1039		1744.5	51.9498	15.6851
1746.0	39.5839	14.1899		1746.0	51.9943	15.6389
1747.5	39.4073	14.5760		1747.5	51.9891	15.6441
1749.0	39.5596	14.1865		1749.0	51.9152	15.6711
1750.5	39.2708	14.2946		1750.5	51.9394	15.6355
1752.0	39.4000	14.0941		1752.0	51.9657	15.6624
1753.5	39.3150	14.3859		1753.5	51.9794	15.6279
1755.0	39.2941	14.2062		1755.0	51.8941	15.6036
1756.5	39.5386	14.4661		1756.5	51.9571	15.6949
1758.0	39.1228	14.3015		1758.0	51.9445	15.5292
1759.5	39.4066	14.2432		1759.5	51.9704	15.5573
1761.0	39.2942	14.2729		1761.0	51.8515	15.5799
1762.5	39.4808	14.3182		1762.5	51.9187	15.5233
1764.0	39.4184	14.1891		1764.0	51.9455	15.5053
1765.5	39.2294	14.3357		1765.5	51.8445	15.3550
1767.0	39.3496	14.1480		1767.0	51.9009	15.3444
1768.5	39.3609	14.2059		1768.5	51.9546	15.4688
1770.0	39.5366	14.1470		1770.0	51.9891	15.5286
1771.5	39.5526	14.0932		1771.5	51.8933	15.5303
1773.0	39.5016	14.4948		1773.0	51.9942	15.5536
1774.5	39.5147	14.0904		1774.5	51.9075	15.3314
1776.0	39.3786	14.1953		1776.0	51.9087	15.3431
1777.5	39.4744	14.4224		1777.5	51.9151	15.4928
1779.0	39.4202	14.4555		1779.0	51.8431	15.3827
1780.5	39.4242	14.4038		1780.5	51.8535	15.5932
1782.0	39.1692	14.4322		1782.0	51.9835	15.5551
1783.5	39.4726	14.5768		1783.5	51.9719	15.5859
1785.0	39.3346	14.3735		1785.0	51.9103	15.5125

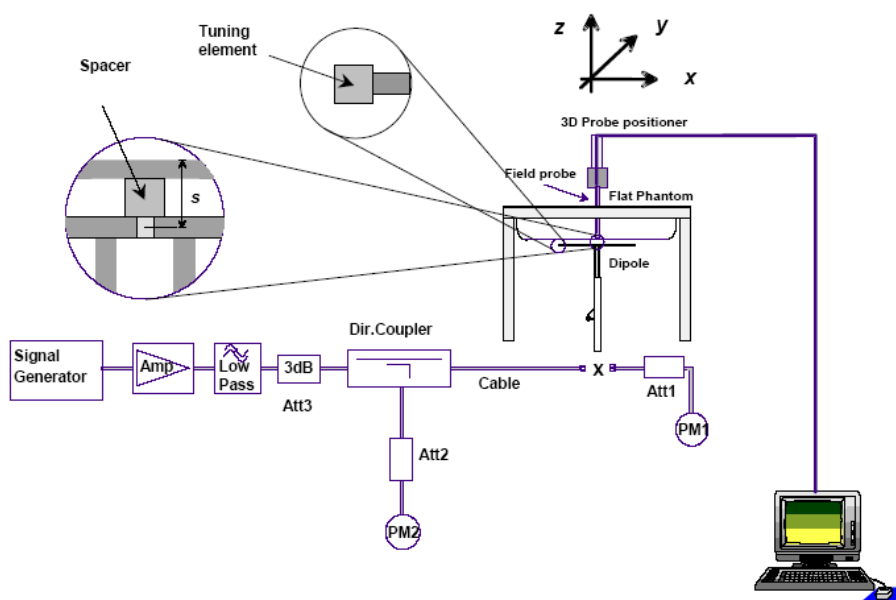
1900 MHz Head				1900 MHz Body		
Frequency (MHz)	e'	e''		Frequency (MHz)	e'	e''
1850.0	39.6265	13.3976		1850.0	52.0071	14.5025
1851.2	39.5865	13.3123		1851.2	52.0998	14.5402
1852.4	39.5497	13.4288		1852.4	51.8039	14.5522
1853.6	39.7008	13.2602		1853.6	52.0654	14.4799
1854.8	39.7164	13.2407		1854.8	51.8259	14.5379
1856.0	39.7189	13.4065		1856.0	52.0381	14.4846
1857.2	39.5772	13.3167		1857.2	51.9486	14.4863
1858.4	39.5787	13.2595		1858.4	51.9603	14.5166
1859.6	39.5578	13.4144		1859.6	51.9240	14.5279
1860.8	39.6380	13.3840		1860.8	51.8278	14.5109
1862.0	39.5895	13.3673		1862.0	51.7690	14.4754
1863.2	39.6096	13.3914		1863.2	51.8564	14.5452
1864.4	39.6472	13.2788		1864.4	52.0165	14.5282
1865.6	39.5666	13.4253		1865.6	51.8880	14.5467
1866.8	39.5447	13.2511		1866.8	52.0458	14.4703
1868.0	39.7363	13.3827		1868.0	51.9582	14.4552
1869.2	39.6802	13.3612		1869.2	51.9892	14.5699
1870.4	39.7380	13.3490		1870.4	51.9814	14.4843
1871.6	39.6888	13.2990		1871.6	52.0448	14.4419
1872.8	39.6172	13.4233		1872.8	51.9785	14.5452
1874.0	39.5922	13.2971		1874.0	51.7390	14.5315
1875.2	39.6420	13.4145		1875.2	52.0266	14.5005
1876.4	39.5774	13.3894		1876.4	51.9412	14.5025
1877.6	39.7103	13.3294		1877.6	51.8045	14.5411
1878.8	39.7364	13.3633		1878.8	51.9977	14.4810
1880.0	39.5776	13.3730		1880.0	51.8888	14.5538
1881.2	39.5608	13.2728		1881.2	52.1000	14.4169
1882.4	39.7398	13.3975		1882.4	52.0289	14.4409
1883.6	39.6738	13.2954		1883.6	52.0528	14.5162
1884.8	39.7251	13.3009		1884.8	52.0082	14.5665
1886.0	39.7366	13.2701		1886.0	52.0322	14.4540
1887.2	39.6810	13.3674		1887.2	51.8447	14.4360
1888.4	39.5808	13.3650		1888.4	51.9258	14.5348
1889.6	39.6859	13.3709		1889.6	51.8430	14.4240
1890.8	39.6883	13.3158		1890.8	51.7470	14.5735
1892.0	39.5639	13.3028		1892.0	51.9340	14.5077
1893.2	39.7248	13.2831		1893.2	51.8524	14.4592
1894.4	39.7091	13.3440		1894.4	51.7959	14.5184
1895.6	39.7334	13.2420		1895.6	51.8089	14.4507
1896.8	39.6655	13.2918		1896.8	52.0371	14.5091
1898.0	39.5848	13.2721		1898.0	51.7781	14.5131
1899.2	39.6405	13.4297		1899.2	51.8534	14.4972
1900.4	39.6447	13.4168		1900.4	52.0086	14.4494
1901.6	39.5519	13.3713		1901.6	52.0009	14.4318
1902.8	39.5696	13.3345		1902.8	51.9265	14.5446
1904.0	39.6225	13.2453		1904.0	51.7651	14.4801
1905.2	39.7233	13.3359		1905.2	51.7724	14.4285
1906.4	39.6338	13.3661		1906.4	51.9341	14.4382
1907.6	39.7075	13.2538		1907.6	52.0357	14.4474
1908.8	39.5816	13.3469		1908.8	51.9980	14.5777
1910.0	39.6517	13.2884		1910.0	52.0523	14.5690

2450 MHz Head				2450 MHz Body		
Frequency (MHz)	e'	e''		Frequency (MHz)	e'	e''
2410.0	39.7827	13.4788		2410.0	52.8486	14.3349
2411.0	39.8735	13.4230		2411.0	52.8824	14.3568
2412.0	39.9653	13.3857		2412.0	52.8094	14.2393
2413.0	39.7961	13.4269		2413.0	52.8326	14.7204
2414.0	39.4731	13.3639		2414.0	52.8024	14.7021
2415.0	39.8090	13.4615		2415.0	52.8633	14.0690
2416.0	39.9199	13.4874		2416.0	52.8465	14.6229
2417.0	39.6757	13.4422		2417.0	52.8072	14.6877
2418.0	39.4899	13.5035		2418.0	52.8607	14.7983
2419.0	39.6676	13.4129		2419.0	52.8680	14.7649
2420.0	39.9795	13.3047		2420.0	52.8393	14.0225
2421.0	39.9477	13.3719		2421.0	52.8048	14.5631
2422.0	39.9546	13.4577		2422.0	52.8633	14.7171
2423.0	39.6340	13.4706		2423.0	52.8143	14.5405
2424.0	39.9462	13.2816		2424.0	52.8789	14.1170
2425.0	39.4930	13.3309		2425.0	52.8472	14.9260
2426.0	39.8516	13.3110		2426.0	52.8670	14.3908
2427.0	39.9773	13.4885		2427.0	52.8867	14.7636
2428.0	39.6129	13.3272		2428.0	52.8357	14.5831
2429.0	39.7364	13.4461		2429.0	52.8386	14.7910
2430.0	39.7328	13.4912		2430.0	52.8597	14.9435
2431.0	39.6380	13.5286		2431.0	52.8848	14.0712
2432.0	39.6095	13.3310		2432.0	52.8809	14.5912
2433.0	39.8143	13.4210		2433.0	52.8202	15.0895
2434.0	39.8437	13.5483		2434.0	52.8021	14.8309
2435.0	39.5836	13.5877		2435.0	52.8291	14.3891
2436.0	39.6079	13.4885		2436.0	52.8342	14.2353
2437.0	39.5540	13.4684		2437.0	52.8454	15.0229
2438.0	39.9120	13.4871		2438.0	52.8908	14.6596
2440.0	39.5757	13.3942		2440.0	52.8503	14.4944
2441.0	39.6593	13.5769		2441.0	52.8418	15.0247
2442.0	39.9418	13.3400		2442.0	52.8496	14.9438
2443.0	39.9800	13.2923		2443.0	52.8901	14.9113
2444.0	39.6369	13.4479		2444.0	52.8808	14.4656
2445.0	39.6074	13.4378		2445.0	52.8556	14.3681
2446.0	39.8165	13.5021		2446.0	52.8526	14.6826
2447.0	39.8427	13.2794		2447.0	52.8111	14.3891
2448.0	39.6226	13.4898		2448.0	52.8325	14.5815
2449.0	39.9766	13.4215		2449.0	52.8112	14.5035
2450.0	39.8801	13.5317		2450.0	52.8590	14.7340
2451.0	39.4550	13.3906		2451.0	52.8557	14.5463
2452.0	39.5833	13.4792		2452.0	52.8567	14.3935
2453.0	39.8232	13.4045		2453.0	52.8797	14.5496
2454.0	39.5772	13.4709		2454.0	52.8488	14.6432
2455.0	39.9159	13.5268		2455.0	52.8055	14.5186
2456.0	39.9835	13.5335		2456.0	52.8427	14.3074
2457.0	39.5127	13.3908		2457.0	52.8820	14.7495
2458.0	39.8254	13.4674		2458.0	52.8755	14.3424
2459.0	39.7700	13.5656		2459.0	52.8317	14.6035
2460.0	39.4766	13.4165		2460.0	52.8083	15.0515
2461.0	39.5038	13.5929		2461.0	52.8686	14.0335
2462.0	39.6344	13.5264		2462.0	52.8534	14.5131

System Accuracy Verification

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

System Verification Setup Block Diagram



Probe and dipole antenna List and Detail

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
APREL	Probe	ALS-E-020	500-00283	2014-10-14	2015-10-13
APREL	Dipole antenna(835MHz)	ALS-D-835-S-2	180-00558	2014-10-08	2017-10-07
APREL	Dipole antenna(1750MHz)	ALS-D-1750-S-2	198-00304	2013-10-08	2016-10-07
APREL	Dipole antenna(1900MHz)	ALS-D-1900-S-2	210-00710	2014-10-09	2017-10-08
APREL	Dipole antenna(2450MHz)	ALS-D-2450-S-2	220-00758	2014-10-09	2017-10-08

System Accuracy Check Results

Date	Frequency Band	Liquid Type	Measured SAR (W/Kg)		Target Value (W/Kg)	Delta (%)	Tolerance (%)
2015-05-13	835	Head	1g	9.456	9.773	-3.244	± 10
		Body	1g	9.516	9.736	-2.260	± 10
	1750	Head	1g	35.812	37.020	-3.263	± 10
		Body	1g	33.730	36.650	-7.967	± 10
	1900	Head	1g	38.322	39.481	-2.936	± 10
		Body	1g	39.610	39.715	-0.264	± 10
	2450	Head	1g	50.296	54.916	-8.413	± 10
		Body	1g	52.366	52.418	-0.099	± 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 : 9.638 W/kg
Power Drift-Finish : 9.613 W/kg
Power Drift (%) : -0.283

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
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 : 13-May-2015
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 41.09 F/m
Sigma : 0.91 S/m
Density : 1000.00 kg/cu. m

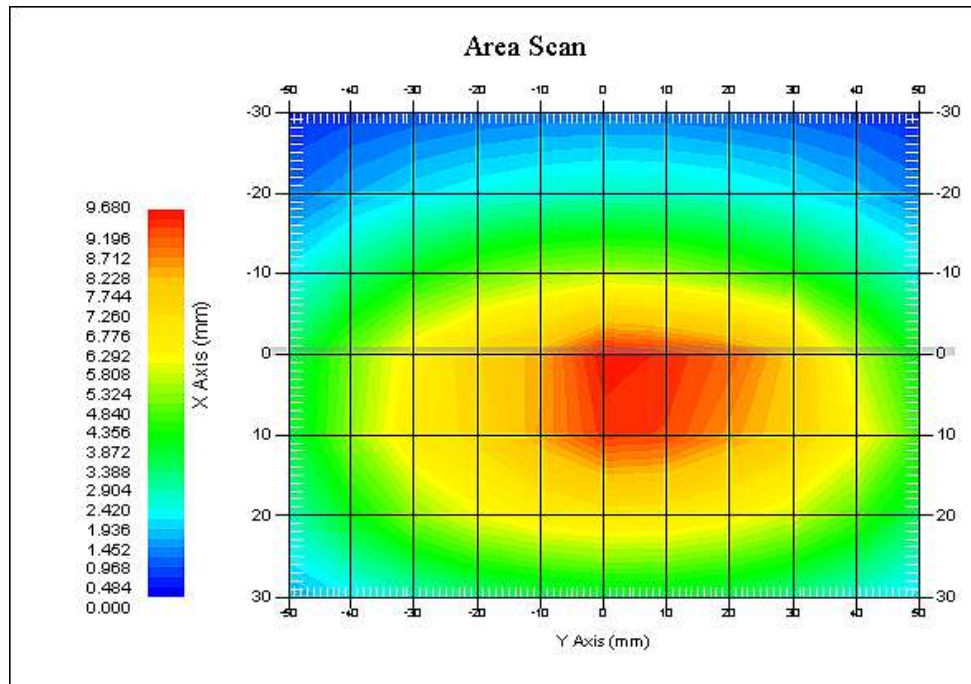
Probe Data

Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 14-Oct-2014
Frequency Band : 835
Duty Cycle Factor : 1
Conversion Factor : 5.9
Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

Measurement Data

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

1 gram SAR value : 9.456 W/kg
10 gram SAR value : 5.987 W/kg
Area Scan Peak SAR : 9.680 W/kg
Zoom Scan Peak SAR : 15.090 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 : 9.555 W/kg
Power Drift-Finish : 9.471 W/kg
Power Drift (%) : -0.879

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
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 : 13-May-2015
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 53.80 F/m
Sigma : 0.96 S/m
Density : 1000.00 kg/cu. m

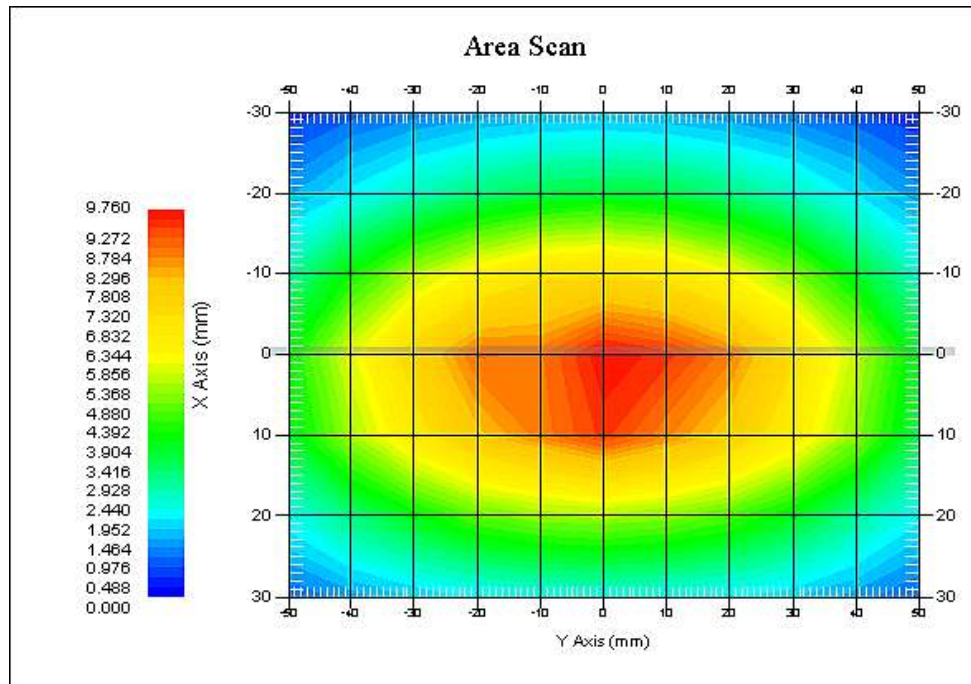
Probe Data

Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 14-Oct-2014
Frequency Band : 835
Duty Cycle Factor : 1
Conversion Factor : 5.9
Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

Measurement Data

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

1 gram SAR value : 9.516 W/kg
10 gram SAR value : 6.182 W/kg
Area Scan Peak SAR : 9.739 W/kg
Zoom Scan Peak SAR : 15.257 W/kg



835 MHz System Validation with Body Tissue

Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**System Performance Check 1750 MHz Head Liquid****Dipole 1750 MHz; Type: ALS-D-1750-S-2; S/N: 198-00304****Product Data**

Device Name : Dipole 1750MHz
Serial No. : 198-00304
Type : Dipole
Model : ALS-D-1750-S-2
Frequency Band : 1750
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 35.276 W/kg
Power Drift-Finish : 35.622 W/kg
Power Drift (%) : 1.269

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. : 285-01086
Frequency : 1750 MHz
Last Calib. Date : 13-May-2015
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 39.33 F/m
Sigma : 1.38 S/m
Density : 1000.00 kg/cu. M

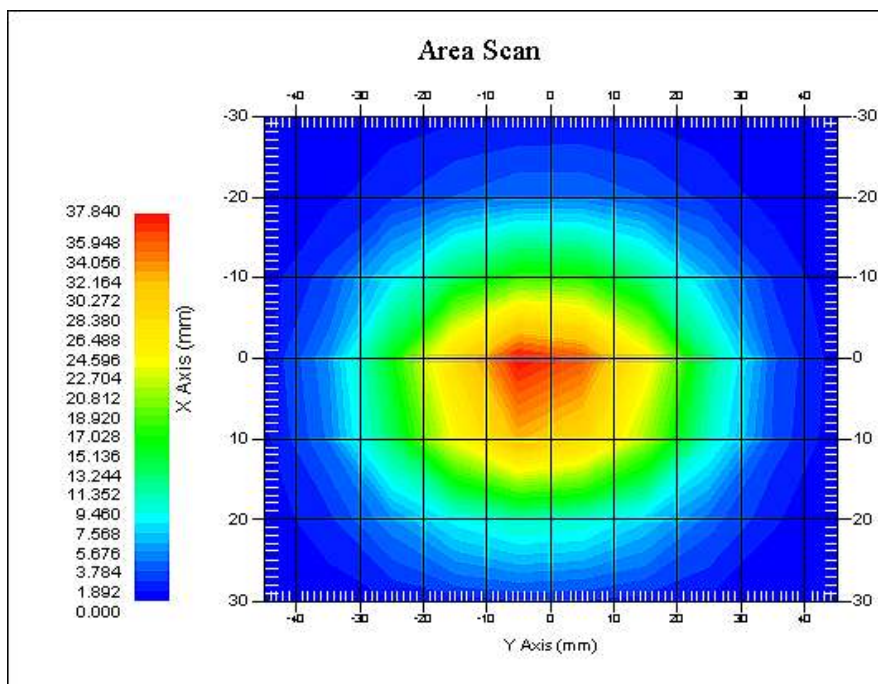
Probe Data

Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 14-Oct-2014
Frequency Band : 1750
Duty Cycle Factor : 1
Conversion Factor : 5.4
Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 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 : 35.812 W/kg
10 gram SAR value : 19.232 W/kg
Area Scan Peak SAR : 37.772 W/kg
Zoom Scan Peak SAR : 62.520 W/kg



1750 MHz System Validation with Head Tissue

Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**System Performance Check 1750 MHz Body Liquid****Dipole 1750 MHz; Type: ALS-D-1750-S-2; S/N: 198-00304****Product Data**

Device Name : Dipole 1750MHz
Serial No. : 198-00304
Type : Dipole
Model : ALS-D-1750-S-2
Frequency Band : 1750
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 35.516 W/kg
Power Drift-Finish : 34.785 W/kg
Power Drift (%) : -2.081

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. : 285-01088
Frequency : 1750.00 MHz
Last Calib. Date : 13-May-2015
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 51.93 F/m
Sigma : 1.52 S/m
Density : 1000.00 kg/cu. m

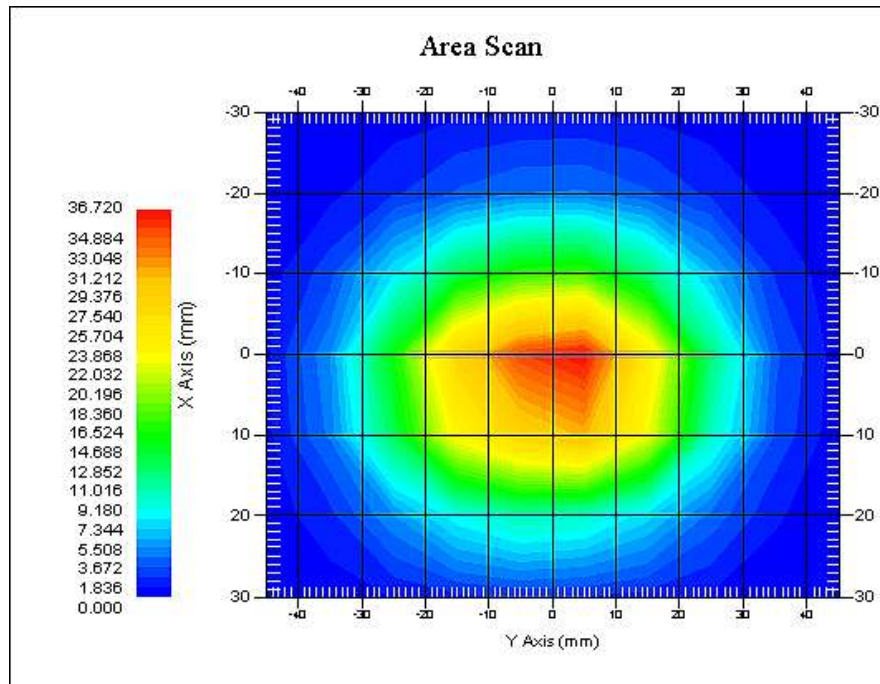
Probe Data

Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 14-Oct-2014
Frequency Band : 1750
Duty Cycle Factor : 1
Conversion Factor : 5.3
Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

Measurement Data

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

1 gram SAR value : 33.730 W/kg
10 gram SAR value : 19.377 W/kg
Area Scan Peak SAR : 36.707 W/kg
Zoom Scan Peak SAR : 65.257 W/kg



1750 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 : 41.323 W/kg
Power Drift-Finish : 41.793 W/kg
Power Drift (%) : 1.136

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Serial No. : System Default
Location : Center
Description : Default

Tissue Data

Type : Head
Serial No. : 295-01103
Frequency : 1900.00 MHz
Last Calib. Date : 13-May-2015
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 39.64 F/m
Sigma : 1.42 S/m
Density : 1000.00 kg/cu. M

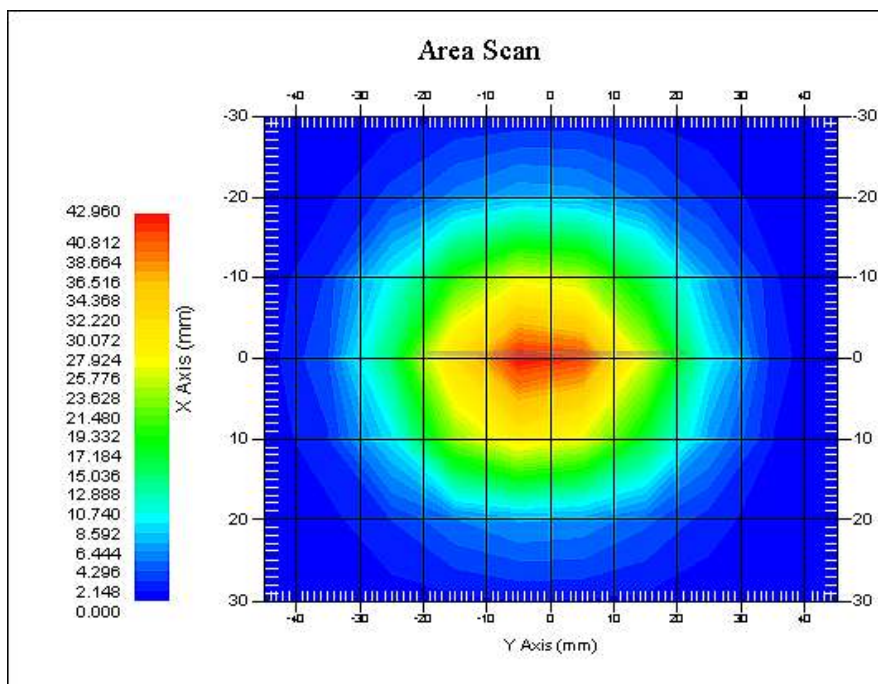
Probe Data

Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 14-Oct-2014
Frequency Band : 1900
Duty Cycle Factor : 1
Conversion Factor : 4.8
Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 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 : 38.322 W/kg
 10 gram SAR value : 20.310 W/kg
 Area Scan Peak SAR : 42.929 W/kg
 Zoom Scan Peak SAR : 71.630 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 : 43.411 W/kg
Power Drift-Finish : 43.759 W/kg
Power Drift (%) : 0.833

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Serial No. : System Default
Location : Center
Description : Default

Tissue Data

Type : Body
Serial No. : 295-02102
Frequency : 1900.00 MHz
Last Calib. Date : 13-May-2015
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 52.96 F/m
Sigma : 1.53 S/m
Density : 1000.00 kg/cu. m

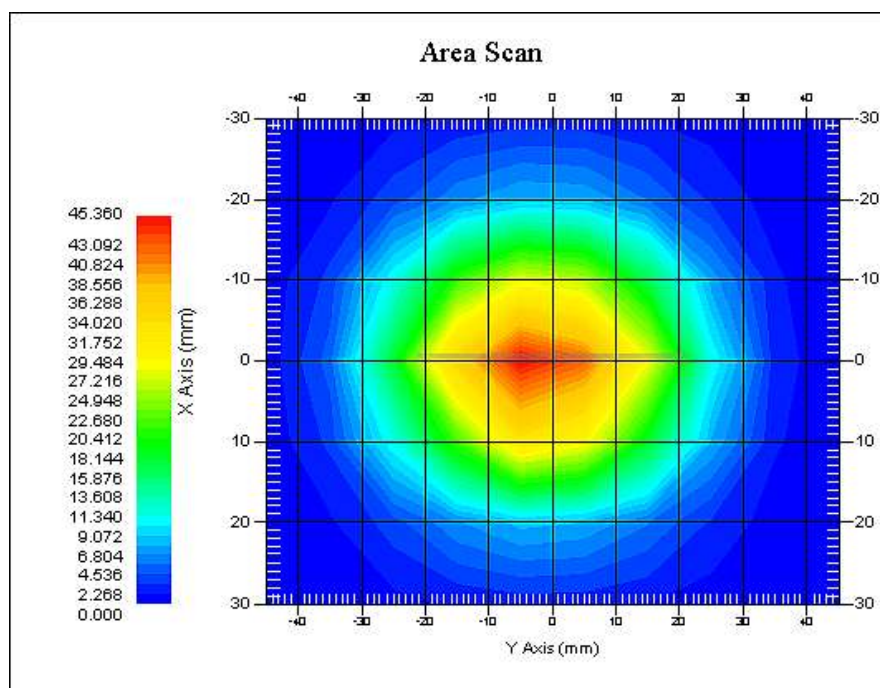
Probe Data

Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 14-Oct-2014
Frequency Band : 1900
Duty Cycle Factor : 1
Conversion Factor : 4.5
Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

Measurement Data

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

1 gram SAR value : 39.610 W/kg
10 gram SAR value : 20.732 W/kg
Area Scan Peak SAR : 45.333 W/kg
Zoom Scan Peak SAR : 72.200 W/kg



1900 MHz System Validation with Body Tissue

Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**System Performance Check 2450 MHz Head Liquid****Dipole 2450 MHz; Type: ALS-D-2450-S-2; S/N: 220-00758****Product Data**

Device Name : Dipole 2450MHz
Serial No. : 220-00758
Type : Dipole
Model : ALS-D-2450-S-2
Frequency Band : 2450 MHz
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 51.176 W/kg
Power Drift-Finish : 50.369 W/kg
Power Drift (%) : -1.567

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Serial No. : System Default
Location : Center
Description : Default

Tissue Data

Type : Head
Serial No. : 290-01109
Frequency : 2450.0 MHz
Last Calib. Date : 13-May-2015
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 50.00 RH%
Epsilon : 39.88 F/m
Sigma : 1.84 S/m
Density : 1000.00 kg/cu. M

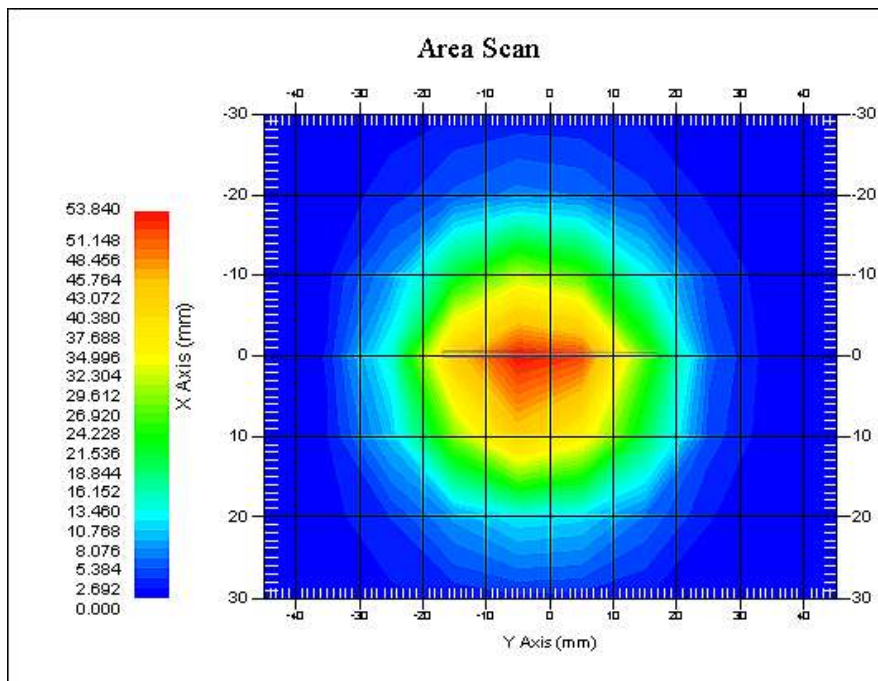
Probe Data

Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 14-Oct-2014
Frequency Band : 2450 MHz
Duty Cycle Factor : 1
Conversion Factor : 4.3
Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 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 : 50.296 W/kg
10 gram SAR value : 23.722 W/kg
Area Scan Peak SAR : 53.775 W/kg
Zoom Scan Peak SAR : 88.272 W/kg



2450 MHz System Validation with Head Tissue

Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**System Performance Check 2450 MHz Body Liquid****Dipole 2450 MHz; Type: ALS-D-2450-S-2; S/N: 220-00758****Product Data**

Device Name : Dipole 2450MHz
Serial No. : 220-00758
Type : Dipole
Model : ALS-D-2450-S-2
Frequency Band : 2450 MHz
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 55.255 W/kg
Power Drift-Finish : 53.717 W/kg
Power Drift (%) : -2.717

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Serial No. : System Default
Location : Center
Description : Default

Tissue Data

Type : BODY
Serial No. : 290-01109
Frequency : 2450.0 MHz
Last Calib. Date : 13-May-2015
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 50.00 RH%
Epsilon : 52.86 F/m
Sigma : 2.01 S/m
Density : 1000.00 kg/cu. M

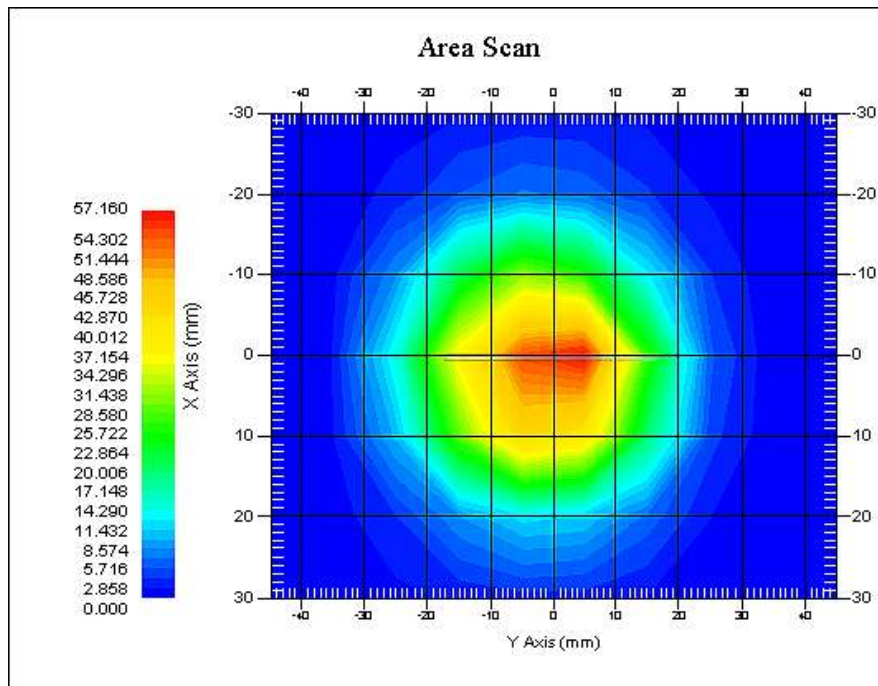
Probe Data

Name : E-Field
Model : E-020
Type : E-Field Triangle
Serial No. : 500-00283
Last Calib. Date : 14-Oct-2014
Frequency Band : 2450 MHz
Duty Cycle Factor : 1
Conversion Factor : 4.3
Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 20.00 °C
Area Scan : 8x9x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm

1 gram SAR value : 52.366 W/kg
10 gram SAR value : 24.290 W/kg
Area Scan Peak SAR : 57.125 W/kg
Zoom Scan Peak SAR : 91.566 W/kg



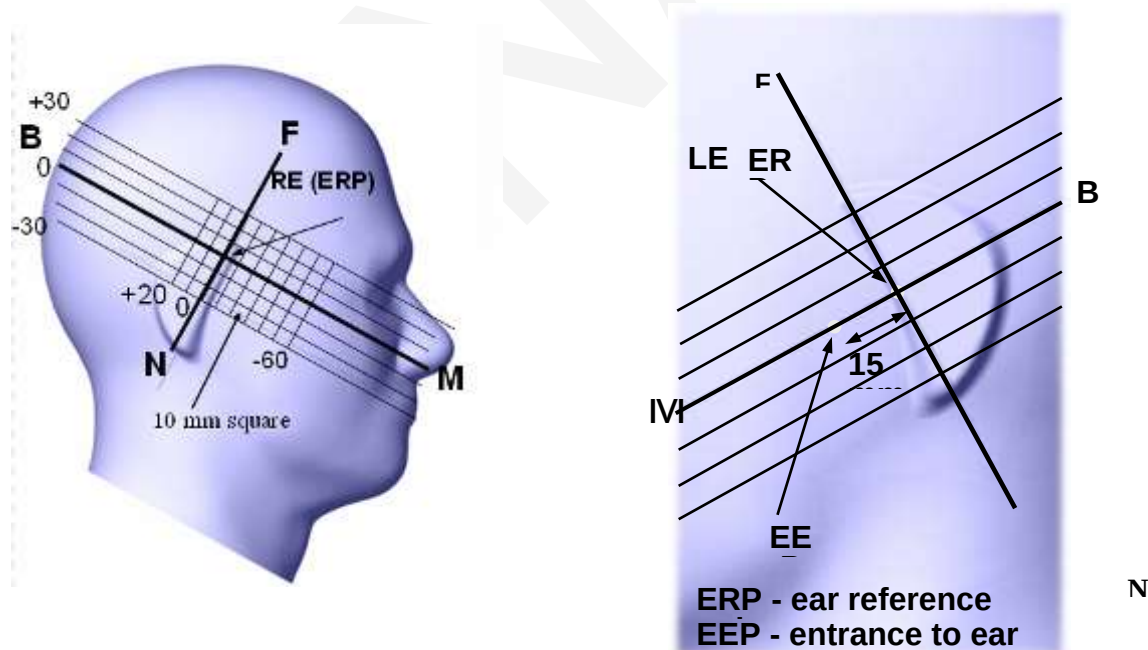
2450 MHz System Validation with Body Tissue

EUT TEST STRATEGY AND METHODOLOGY

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

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

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



Cheek/Touch Position

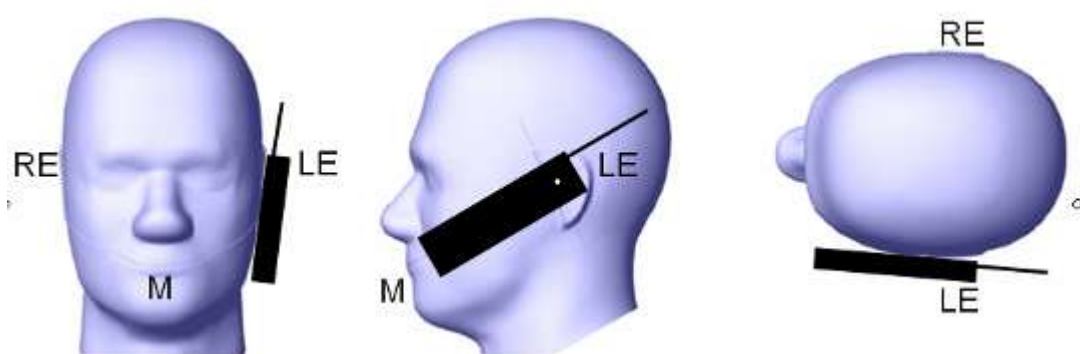
The device is brought toward the mouth of the head phantom by pivoting against the “ear reference point” or along the “N-F” line for the SCC-34/SC-2 head phantom.

This test position is established:

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

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

Cheek /Touch Position



Ear/Tilt Position

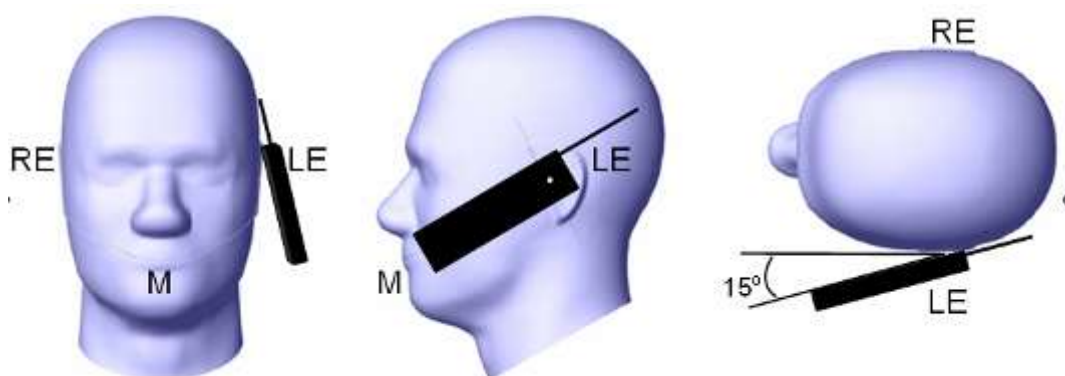
With the handset aligned in the “Cheek/Touch Position”:

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

2) (otherwise) The handset should be moved (translated) away from the cheek perpendicular to the line passes through both “ear reference points” (note: one of these ear reference points may not physically exist on a split head model) for approximate 2-3 cm. While it is in this position, the device handset is tilted away from the mouth with respect to the “test device reference point” until the inside angle between the vertical centerline on the front surface of the phone and the horizontal line passing through the ear reference point is by 15 to 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.

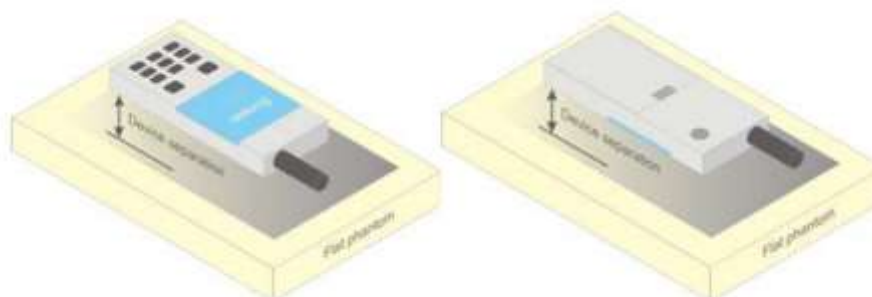


Figure 5 – Test positions for body-worn devices

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.

Test methodology

KDB447498D01 Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.
KDB 648474 D04 SAR Evaluation Considerations for Wireless Handsets
KDB 865664 D01 SAR Measurement Requirements for 100 MHz to 6 GHz
KDB 616217 D04 SAR for laptop and tablets v01r01
KDB 941225 D05 SAR for LTE Devices v02r03
KDB 941225 D01 3G SAR Procedures v03
KDB 248227 D01 802.11 Wi-Fi SAR v02

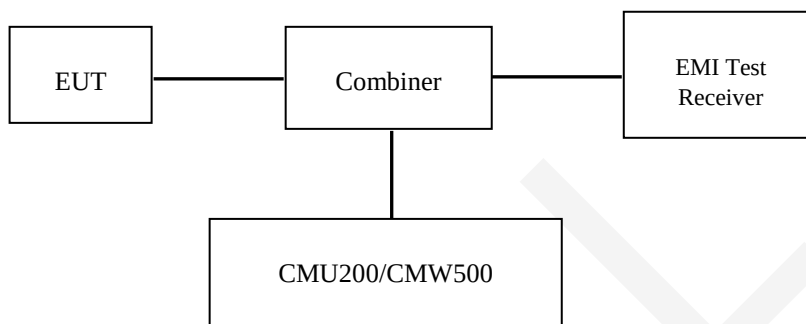
CONDUCTED OUTPUT POWER MEASUREMENT

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&3G<E

Maximum Output Power among production units

Max Target Power for Production Unit (dBm)			
Mode/Band	Channel		
	Low	Middle	High
GSM 850	32.70	32.70	32.70
GPRS 1 slot	32.50	32.50	32.50
GPRS 2 slot	31.30	31.30	31.30
GPRS 3 slot	29.70	29.70	29.70
GPRS 4 slot	28.80	28.80	28.80
EGPRS 1 slot	25.60	25.60	25.60
EGPRS 2 slot	23.70	23.70	23.70
EGPRS 3 slot	22.50	22.50	22.50
EGPRS 4 slot	21.40	21.40	21.40
PCS 1900	30.30	30.30	30.30
GPRS 1 slot	29.40	29.40	29.40
GPRS 2 slot	28.70	28.70	28.70
GPRS 3 slot	26.40	26.40	26.40
GPRS 4 slot	25.40	25.40	25.40
EGPRS 1 slot	25.40	25.40	25.40
EGPRS 2 slot	23.40	23.40	23.40
EGPRS 3 slot	22.40	22.40	22.40
EGPRS 4 slot	21.30	21.30	21.30
WCDMA850	22.40	22.40	22.40
WCDMA1900	22.50	22.50	22.50
LTE Band 4	22.60	22.60	22.60
Wi-Fi(802.11b/g/n20/n40)	11.90	11.90	11.90
Bluetooth	4.50(2424MHz)	4.50(2460 MHz)	1.00(2480 MHz)

Test Results:**GSM:**

Band	Frequency (MHz)	Conducted Output Power	
		Meas. Power (dBm)	Meas. Power (W)
GSM 850	824.2	32.57	1.807
	836.6	32.69	1.858
	848.8	32.46	1.762
PCS 1900	1850.2	30.07	1.016
	1880.0	30.22	1.052
	1909.8	29.98	0.995

GPRS:

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slot	3 slots	4 slots
GSM 850	128	824.2	32.42	31.24	29.45	28.61
	190	836.6	32.37	31.16	29.61	28.75
	251	848.8	32.19	31.11	29.32	28.42
PCS 1900	512	1850.2	29.26	28.33	26.27	25.39
	661	1880.0	26.41	28.64	26.38	25.37
	810	1909.8	29.31	28.19	26.21	25.29

EDGE:

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slot	3 slots	4 slots
GSM 850	128	824.2	25.38	23.46	22.21	21.25
	190	836.6	25.42	23.64	22.42	21.38
	251	848.8	25.53	23.51	22.32	21.16
PCS 1900	512	1850.2	25.21	23.28	22.31	21.17
	661	1880.0	25.34	23.32	22.34	21.28
	810	1909.8	25.16	23.14	22.18	21.04

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

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

The time based average power for GPRS

Band	Channel No.	Frequency (MHz)	Time based average Power (dBm)			
			1 slot	2 slot	3 slots	4 slots
GSM 850	128	824.2	23.42	25.24	25.20	25.61
	190	836.6	23.37	25.16	25.36	25.75
	251	848.8	23.19	25.11	25.07	25.42
PCS 1900	512	1850.2	20.26	22.33	22.02	22.39
	661	1880.0	17.41	22.64	22.13	22.37
	810	1909.8	20.31	22.19	21.96	22.29

The time based average power for EDGE

Band	Channel No.	Frequency (MHz)	Time based average Power (dBm)			
			1 slot	2 slot	3 slots	4 slots
GSM 850	128	824.2	16.38	17.46	17.96	18.25
	190	836.6	16.42	17.64	18.17	18.38
	251	848.8	16.53	17.51	18.07	18.16
PCS 1900	512	1850.2	16.21	17.28	18.06	18.17
	661	1880.0	16.34	17.32	18.09	18.28
	810	1909.8	16.16	17.14	17.93	18.04

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 3(850 MHz band) and 3(1900 MHz band).
4. For E-GPRS, 1, 2, 3 and 4 timeslots has been activated separately with power control level 6(850 MHz band) and 5(1900 MHz band).
5. KDB941225 D03-The max average output power of the EGPRS mode is lower than in the normal GSM voice mode, the SAR of EGPRS mode is not required.

WCDMA-Release 99:

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

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

WCDMA HSDPA

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

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

WCDMA HSUPA

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

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

HSPA+

The following tests were conducted according to the test requirements in Table C.11.1.4 of 3GPP TS 34.121-1

Sub-test	β_c (Note3)	β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	β_{ed1} : 30/15 β_{ed2} : 30/15	β_{ed3} : 24/15 β_{ed4} : 24/15	3.5	2.5	14	105	105
Note 1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$. Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0). Note 3: DPDCH is not configured, therefore the β_c is set to 1 and $\beta_d = 0$ by default. Note 4: β_{ed} can not be set directly; it is set by Absolute Grant Value. Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.											

DC-HSDPA

The following tests were conducted according to the test requirements in Table Table C.8.1.12 of 3GPP TS 34.121-1

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Processes	6
Information Bit Payload (N_{BF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK
Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table. Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.		

WCDMA Band II

Mode	3GPP Sub Test	Average Output Power (dBm)					
		Low Channel (Ave. Power)	Low Channel (PAR)	Middle Channel (Ave. Power)	Middle Channel (PAR)	High Channel (Ave. Power)	High Channel (PAR)
Rel 99	1	22.24	3.26	22.45	3.60	22.10	3.35
HSDPA	1	22.32	3.23	22.37	3.61	22.03	3.34
	2	22.21	3.24	22.26	3.57	21.97	3.29
	3	22.18	3.25	22.19	3.56	21.89	3.31
	4	22.13	3.21	22.13	3.54	21.85	3.33
DC-HSDPA	1	21.50	3.62	21.90	3.48	21.70	3.07
	2	21.52	3.63	21.81	3.45	21.65	3.06
	3	21.36	3.65	21.75	3.49	21.63	3.05
	4	21.45	3.62	21.68	3.43	21.73	3.10
HSUPA	1	22.26	3.24	22.19	3.58	21.98	3.34
	2	22.13	3.22	22.12	3.52	21.87	3.31
	3	22.16	3.19	22.15	3.56	21.74	3.29
	4	22.07	3.21	21.99	3.57	21.72	3.30
	5	21.96	3.23	21.95	3.52	21.63	3.32
HSPA+	1	20.65	3.61	20.90	3.49	20.70	3.09

WCDMA Band V

Mode	3GPP Sub Test	Average Output Power (dBm)					
		Low Channel (Ave. Power)	Low Channel (PAR)	Middle Channel (Ave. Power)	Middle Channel (PAR)	High Channel (Ave. Power)	High Channel (PAR)
Rel 99	1	22.27	3.31	22.37	3.45	22.08	3.37
HSDPA	1	22.32	3.27	22.34	3.42	21.89	3.34
	2	22.24	3.28	22.16	3.46	22.01	3.32
	3	22.16	3.32	22.25	3.48	21.94	3.29
	4	22.08	3.29	22.08	3.42	22.03	3.33
DC-HSDPA	1	22.15	3.63	22.02	3.37	21.94	3.49
	2	22.20	3.64	22.01	3.34	21.85	3.51
	3	22.11	3.62	21.93	3.40	21.86	3.52
	4	22.12	3.68	21.97	3.32	21.93	3.46
HSUPA	1	22.26	3.28	22.24	3.41	21.94	3.4
	2	22.15	3.25	22.01	3.36	21.87	3.36
	3	22.09	3.29	22.13	3.38	22.07	3.35
	4	22.11	3.31	22.19	3.37	22.04	3.38
	5	22.01	3.28	22.05	3.40	21.96	3.37
HSPA+	1	21.25	3.61	21.10	3.36	21.35	3.41

Note:

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

3. KDB 941225 D01-Body SAR is not required for HSUPA when the maximum average output of each RF channel with HSUPA active is less than ¼ dB higher than measured without HSUPA using 12.2kbps RMC and the maximum SAR for 12.2kbps RMC is < 75% of SAR limit.

LTE

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4, 10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10, 15, 20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3	13	10	Table 6.2.4-2	Table 6.2.4-2
	6.6.3.3.2				
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23 ¹	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
...					
NS_32	*	*	*	*	*

Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.

LTE Band 4:

BW	Modulation	Resource Block Size& Resource Block Offset	Ave Tx Power (dBm)			MPR
			Low Channel	Mid Channel	High Channel	
1.4M	QPSK	RB Size=1, RB Offset=0	22.17	22.24	22.14	0
		RB Size=1, RB Offset=2	22.23	22.30	22.15	0
		RB Size=1, RB Offset=5	21.96	22.18	21.95	0
		RB Size=3, RB Offset=0	22.26	22.23	22.05	1
		RB Size=3, RB Offset=1	22.02	22.26	22.06	1
		RB Size=3, RB Offset=2	22.20	22.27	22.01	1
		RB Size=6, RB Offset=0	22.14	22.21	22.18	2
	16QAM	RB Size=1, RB Offset=0	22.06	22.12	21.99	1
		RB Size=1, RB Offset=2	22.17	22.18	22.05	1
		RB Size=1, RB Offset=5	22.14	22.20	22.15	1
		RB Size=3, RB Offset=0	22.02	22.32	22.06	2
		RB Size=3, RB Offset=1	22.11	22.37	22.15	2
		RB Size=3, RB Offset=2	22.01	22.05	21.96	2
		RB Size=6, RB Offset=0	22.03	22.03	22.21	2
3M	QPSK	RB Size=1, RB Offset=0	22.14	22.35	22.27	0
		RB Size=1, RB Offset=7	22.19	22.44	22.32	0
		RB Size=1, RB Offset=14	21.99	22.59	22.30	0
		RB Size=8, RB Offset=0	21.81	22.54	22.42	1
		RB Size=8, RB Offset=4	22.07	22.51	22.33	1
		RB Size=8, RB Offset=7	21.82	22.44	22.26	1
		RB Size=15, RB Offset=0	22.00	22.44	22.38	2
	16QAM	RB Size=1, RB Offset=0	22.02	22.59	22.39	1
		RB Size=1, RB Offset=7	22.05	22.62	22.34	1
		RB Size=1, RB Offset=14	21.86	22.51	22.32	1
		RB Size=8, RB Offset=0	21.86	22.43	22.44	2
		RB Size=8, RB Offset=4	22.07	22.41	22.34	2
		RB Size=8, RB Offset=7	22.17	22.49	22.50	2
		RB Size=15, RB Offset=0	21.90	22.19	22.03	2
5M	QPSK	RB Size=1, RB Offset=0	22.23	22.34	22.17	0
		RB Size=1, RB Offset=12	22.02	22.12	22.16	0
		RB Size=1, RB Offset=24	22.08	22.26	22.32	0
		RB Size=12, RB Offset=0	21.89	22.34	22.24	1
		RB Size=12, RB Offset=6	21.97	22.24	22.15	1
		RB Size=12, RB Offset=11	21.94	22.17	22.13	1
		RB Size=25, RB Offset=0	21.98	22.14	22.12	2
	16QAM	RB Size=1, RB Offset=0	21.95	22.22	22.37	1
		RB Size=1, RB Offset=12	22.02	22.14	22.36	1
		RB Size=1, RB Offset=24	22.00	22.35	22.25	1
		RB Size=12, RB Offset=0	22.00	22.21	22.25	2
		RB Size=12, RB Offset=6	22.14	22.24	22.16	2
		RB Size=12, RB Offset=11	22.17	22.26	22.24	2
		RB Size=25, RB Offset=0	21.97	22.17	22.12	2

10M	QPSK	RB Size=1, RB Offset=0	22.01	22.14	21.97	0
		RB Size=1, RB Offset=24	22.37	22.10	21.92	0
		RB Size=1, RB Offset=49	22.28	22.04	22.00	0
		RB Size=25, RB Offset=0	22.21	22.17	22.11	1
		RB Size=25, RB Offset=12	22.19	22.16	22.07	1
		RB Size=25, RB Offset=24	22.16	22.13	21.86	1
		RB Size=50, RB Offset=0	22.29	22.08	21.95	2
	16QAM	RB Size=1, RB Offset=0	22.20	22.21	22.00	1
		RB Size=1, RB Offset=24	22.20	22.13	21.99	1
		RB Size=1, RB Offset=49	22.14	22.30	21.93	1
		RB Size=25, RB Offset=0	22.11	22.19	22.04	2
		RB Size=25, RB Offset=12	22.22	22.11	21.81	2
		RB Size=25, RB Offset=24	22.24	22.19	22.11	2
		RB Size=50, RB Offset=0	22.25	22.06	21.97	2
15M	QPSK	RB Size=1, RB Offset=0	21.89	21.97	21.84	0
		RB Size=1, RB Offset=37	21.92	21.98	21.85	0
		RB Size=1, RB Offset=74	21.84	22.01	21.85	0
		RB Size=36, RB Offset=0	21.93	21.88	21.66	1
		RB Size=36, RB Offset=18	22.04	22.01	21.71	1
		RB Size=36, RB Offset=37	21.73	22.06	21.82	1
		RB Size=75, RB Offset=0	21.82	21.99	21.67	2
	16QAM	RB Size=1, RB Offset=0	21.97	21.98	21.90	1
		RB Size=1, RB Offset=37	22.01	22.09	21.87	1
		RB Size=1, RB Offset=74	21.86	21.96	21.73	1
		RB Size=36, RB Offset=0	21.97	21.88	21.76	2
		RB Size=36, RB Offset=18	21.99	22.03	21.86	2
		RB Size=36, RB Offset=37	21.85	21.82	21.98	2
		RB Size=75, RB Offset=0	21.79	21.88	21.71	2
20M	QPSK	RB Size=1, RB Offset=0	22.57	22.46	22.37	0
		RB Size=1, RB Offset=49	22.54	22.43	22.08	0
		RB Size=1, RB Offset=99	22.49	22.43	22.18	0
		RB Size=50, RB Offset=0	22.57	22.44	22.29	1
		RB Size=50, RB Offset=24	22.30	22.32	22.27	1
		RB Size=50, RB Offset=49	22.28	22.31	22.26	1
		RB Size=100, RB Offset=0	22.37	22.56	22.36	2
	16QAM	RB Size=1, RB Offset=0	22.42	22.37	22.26	1
		RB Size=1, RB Offset=49	22.38	22.42	22.21	1
		RB Size=1, RB Offset=99	22.40	22.44	22.33	1
		RB Size=50, RB Offset=0	22.35	22.44	22.43	2
		RB Size=50, RB Offset=24	22.23	22.33	22.32	2
		RB Size=50, RB Offset=49	22.32	22.55	22.31	2
		RB Size=100, RB Offset=0	22.57	22.25	22.38	2

Note:

1. SAR for LTE band exposure configurations is measured according to the procedures of KDB 941225 D05 SAR for LTE Devices v02.
2. The CMW500 Wideband Radio Communication tester is used for LTE output power measurements and SAR testing. Closed loop power control is used to keep the radio transmitters the max output power during the test.

3. KDB941225D05v02- SAR for higher order modulation is required only when the highest maximum output power for the configuration in the higher order modulation is $> \frac{1}{2}$ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg

Bluetooth

Mode	Channel frequency (MHz)	Conducted Output Power	
		(dBm)	(mw)
BDR(GFSK)	2402	-2.74	0.532
	2424	4.48	2.805
	2441	-1.21	0.757
	2460	3.81	2.404
	2480	0.11	1.026
EDR(4-DQPSK)	2402	-3.30	0.468
	2424	3.20	2.089
	2441	-1.62	0.689
	2460	2.75	1.884
	2480	-0.31	0.931
EDR-8DPSK	2402	-3.14	0.485
	2424	3.17	2.075
	2441	-1.64	0.685
	2460	2.71	1.866
	2480	-0.19	0.957
BLE	2402	-6.27	0.236
	2440	-6.80	0.209
	2480	-6.43	0.228

Wi-Fi

Band	Frequency (MHz)	Conducted Output Power	
		(dBm)	(mw)
802.11b	2412	11.40	13.804
	2437	11.61	14.488
	2462	11.84	15.276
802.11g	2412	11.30	13.490
	2437	11.38	13.740
	2462	11.43	13.900
802.11n HT20	2412	11.59	14.421
	2437	11.35	13.646
	2462	11.48	14.060
802.11n HT40	2422	11.52	14.191
	2437	11.60	14.454
	2452	11.67	14.689

Note:

- The output power was tested under data rate 1Mbps for 802.11b, 6Mbps for 802.11g, 6.5Mbps for 802.11n HT20, 13.5Mbps for 802.11n HT40.
- KDB 248227 D01 802.11 Wi-Fi SAR v02, §5.2.2: When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

SAR MEASUREMENT RESULTS

This page summarizes the results of the performed dosimetric evaluation.

SAR Test Data

Environmental Conditions

Temperature:	21-24 °C
Relative Humidity:	50-53 %
ATM Pressure:	1001-1002 mbar

Testing was performed by Terry XiaHou on 2015-05-13

GSM 850:

EUT Position	Frequency (MHz)	Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/Kg)			
						Scaled Factor	Meas. SAR	Scaled SAR	Plot
Head-Cheek	824.2	GSM	2.945	32.57	32.70	1.030	0.223	0.230	/
	836.6	GSM	0.927	32.69	32.70	1.002	0.286	0.287	1#
	848.8	GSM	-1.396	32.46	32.70	1.057	0.257	0.272	/
Body-Back (0mm)	824.2	GSM	-3.158	32.57	32.70	1.030	0.811	0.836	/
	836.6	GSM	0.762	32.69	32.70	1.002	0.867	0.869	/
	848.8	GSM	-1.747	32.46	32.70	1.057	0.739	0.781	/
Body-worn-Back (0mm)	824.2	GPRS	1.919	28.61	28.80	1.045	1.101	1.151	/
	836.6	GPRS	1.311	28.75	28.80	1.012	1.227	1.242	2#
	848.8	GPRS	-1.197	28.42	28.80	1.091	1.066	1.163	/
Body-worn-Right (0mm)	824.2	GPRS	/	/	/	/	/	/	/
	836.6	GPRS	-0.723	28.75	28.80	1.012	0.717	0.725	/
	848.8	GPRS	/	/	/	/	/	/	/
Body-worn-Bottom (0mm)	824.2	GPRS	/	/	/	/	/	/	/
	836.6	GPRS	1.375	28.75	28.80	1.012	0.363	0.366	/
	848.8	GPRS	/	/	/	/	/	/	/

Note:

1. When the 1-g SAR is $\leq 0.8\text{W/Kg}$, testing for other channels are optional.
2. The EUT transmit and receive through the same GSM antenna while testing SAR.
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, 1DL+4UL is the worst case .
4. 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.
5. KDB648474--Since the antenna located the bottom side edge, SAR probe access is not feasible with a horizontally configured SAM phantom and a flat phantom is replaced. When using a flat phantom, rectangular shaped phones should be positioned with its bottom edge positioned from the flat phantom with the same distance provided by the cheek touching position using SAM. The ear reference point (ERP, as defined for SAM) of the phone should be positioned 0.4 cm from the flat phantom shell.

PCS Band:

EUT Position	Frequency (MHz)	Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/Kg)			
						Scaled Factor	Meas. SAR	Scaled SAR	Plot
Head-Cheek	1850.2	GSM	2.608	30.07	30.30	1.054	0.156	0.164	/
	1880.0	GSM	2.206	30.22	30.30	1.019	0.175	0.178	3#
	1909.8	GSM	-1.926	29.98	30.30	1.076	0.121	0.130	/
Body-Back (0mm)	1850.2	GSM	/	/	/	/	/	/	/
	1880.0	GSM	-0.891	30.22	30.30	1.019	0.767	0.781	/
	1909.8	GSM	/	/	/	/	/	/	/
Body-worn-Back (0mm)	1850.2	GPRS	2.948	28.33	28.70	1.089	1.068	1.163	/
	1880.0	GPRS	0.933	28.64	28.70	1.014	1.173	1.189	4#
	1909.8	GPRS	-2.235	28.19	28.70	1.125	0.925	1.040	/
Body-worn-Right (0mm)	1850.2	GPRS	/	/	/	/	/	/	/
	1880.0	GPRS	2.543	28.64	28.70	1.014	0.236	0.239	/
	1909.8	GPRS	/	/	/	/	/	/	/
Body-worn-Bottom (0mm)	1850.2	GPRS	-3.482	28.33	28.70	1.089	0.776	0.845	/
	1880.0	GPRS	-0.601	28.64	28.70	1.014	0.826	0.838	/
	1909.8	GPRS	3.521	28.19	28.70	1.125	0.713	0.802	/

Note:

1. When the 1-g SAR is $\leq 0.8\text{W/Kg}$, testing for other channels are optional.
2. The EUT transmit and receive through the same GSM antenna while testing SAR.
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 worst case.
4. 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.
5. When the maximum output power variation across the required test channels is $> \frac{1}{2}$ dB, instead of the middle channel, the highest output power channel must be used.
6. KDB648474--Since the antenna located the bottom side edge, SAR probe access is not feasible with a horizontally configured SAM phantom and a flat phantom is replaced. When using a flat phantom, rectangular shaped phones should be positioned with its bottom edge positioned from the flat phantom with the same distance provided by the cheek touching position using SAM. The ear reference point (ERP, as defined for SAM) of the phone should be positioned 0.4 cm from the flat phantom shell.

WCDMA 850

EUT Position	Frequency (MHz)	Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/Kg)			
						Scaled Factor	Meas. SAR	Scaled SAR	Plot
Head-Cheek	826.4	RMC	/	/	/	/	/	/	/
	836.6	RMC	-1.373	22.37	22.40	1.007	0.152	0.153	5#
	846.6	RMC	/	/	/	/	/	/	/
Body-worn-Back (0mm)	826.4	RMC	2.303	22.27	22.40	1.030	0.765	0.788	/
	836.6	RMC	-1.376	22.37	22.40	1.007	0.836	0.842	6#
	846.6	RMC	2.354	22.08	22.40	1.076	0.773	0.832	/
Body-worn-Right (0mm)	826.4	RMC	/	/	/	/	/	/	/
	836.6	RMC	-2.555	22.37	22.40	1.007	0.452	0.457	/
	846.6	RMC	/	/	/	/	/	/	/
Body-worn-Bottom (0mm)	826.4	RMC	/	/	/	/	/	/	/
	836.6	RMC	2.896	22.37	22.40	1.007	0.117	0.118	/
	846.6	RMC	/	/	/	/	/	/	/

WCDMA1900

EUT Position	Frequency (MHz)	Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/Kg)			
						Scaled Factor	Meas. SAR	Scaled SAR	Plot
Head-Cheek	1852.4	RMC	/	/	/	/	/	/	/
	1880.0	RMC	-1.402	22.45	22.50	1.012	0.122	0.123	7#
	1907.6	RMC	/	/	/	/	/	/	/
Body-worn-Back (0mm)	1852.4	RMC	-2.204	22.24	22.50	1.062	0.735	0.780	/
	1880.0	RMC	0.462	22.45	22.50	1.012	0.877	0.887	8#
	1907.6	RMC	-2.063	22.10	22.50	1.096	0.801	0.878	/
Body-worn-Right (0mm)	1852.4	RMC	/	/	/	/	/	/	/
	1880.0	RMC	-2.958	22.45	22.50	1.012	0.159	0.161	/
	1907.6	RMC	/	/	/	/	/	/	/
Body-worn-Bottom (0mm)	1852.4	RMC	/	/	/	/	/	/	/
	1880.0	RMC	3.019	22.45	22.50	1.012	0.727	0.735	/
	1907.6	RMC	/	/	/	/	/	/	/

Note:

1. When the 1-g SAR is $\leq 0.8\text{W/Kg}$, testing for other channels are optional.
2. The EUT transmit and receive through the same GSM antenna while testing SAR.
3. The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2 kbps RMC (reference measurement Channel) Configured in Test Loop Model.
4. KDB 941225 D01-Body SAR is not required for HSDPA when the maximum average output of each RF channel with HSDPA active is less than $\frac{1}{4}$ dB higher than measured without HSDPA using 12.2kbps RMC or the maximum SAR for 12.2kbps RMC is $< 75\%$ of SAR limit.

5. KDB 941225 D01-Body SAR is not required for HSUPA when the maximum average output of each RF channel with HSUPA active is less than ¼ dB higher than measured without HSUPA using 12.2kbps RMC and the maximum SAR for 12.2kbps RMC is < 75% of SAR limit.
6. 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.
7. KDB648474--Since the antenna located the bottom side edge, SAR probe access is not feasible with a horizontally configured SAM phantom and a flat phantom is replaced. When using a flat phantom, rectangular shaped phones should be positioned with its bottom edge positioned from the flat phantom with the same distance provided by the cheek touching position using SAM. The ear reference point (ERP, as defined for SAM) of the phone should be positioned 0.4 cm from the flat phantom shell.

LTE Band 4(20MHz Bandwidth, QPSK):

EUT Position	Frequency (MHz)	Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/Kg)			
						Scaled Factor	Meas. SAR	Scaled SAR	Plot
Left-Head-Cheek	1720	1RB	-1.257	22.57	22.60	1.007	0.458	0.461	9#
	1732.5	1RB	/	/	/	/	/	/	/
	1745	1RB	/	/	/	/	/	/	/
	1720	50% RB	-1.241	22.57	22.60	1.007	0.429	0.432	/
Left-Head-Tilt	1720	1RB	-0.858	22.57	22.60	1.007	0.322	0.324	/
	1732.5	1RB	/	/	/	/	/	/	/
	1745	1RB	/	/	/	/	/	/	/
Right-Head-Cheek	1720	1RB	2.629	22.57	22.60	1.007	0.446	0.449	/
	1732.5	1RB	/	/	/	/	/	/	/
	1745	1RB	/	/	/	/	/	/	/
Right-Head-Tilt	1720	1RB	1.629	22.57	22.60	1.007	0.313	0.315	/
	1732.5	1RB	/	/	/	/	/	/	/
	1745	1RB	/	/	/	/	/	/	/
Body-worn-Back (0mm)	1720	1RB	0.939	22.57	22.60	1.007	0.627	0.631	10#
	1732.5	1RB	/	/	/	/	/	/	/
	1745	1RB	/	/	/	/	/	/	/
	1720	50% RB	2.631	22.57	22.60	1.007	0.552	0.556	/
Body-worn-Right (0mm)	1720	1RB	-3.487	22.57	22.60	1.007	0.116	0.117	/
	1732.5	1RB	/	/	/	/	/	/	/
	1745	1RB	/	/	/	/	/	/	/
Body-worn-Top (0mm)	1720	1RB	-2.086	22.57	22.60	1.007	0.533	0.536	/
	1732.5	1RB	/	/	/	/	/	/	/
	1745	1RB	/	/	/	/	/	/	/

Note:

1. When the 1-g SAR is $\leq 0.8\text{W/Kg}$, testing for other channels are optional.
2. SAR for LTE band exposure configurations is measured according to the procedures of KDB 941225 D05 SAR for LTE Devices v02.
3. KDB 941225D05- SAR for higher order modulation is required only when the highest maximum output power for the configuration in the higher order modulation is $> \frac{1}{2}$ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is $> 1.45\text{ W/kg}$
4. KDB 941225D05- for QPSK with 100% RB allocation, when the reported SAR measured for the Highest output power channel is $< 1.45\text{ W/kg}$, tests for the remaining required test channels are optional.
5. KDB 941225D05- For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are $\leq 0.8\text{ W/kg}$.

6. KDB 941225D05- Start with the largest channel bandwidth (20M) and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offset the upper edge, middle and lower edge of each required test channel.
7. Worst case SAR for 50% RB allocation is selected to be tested.

Wi-Fi (802.11b):

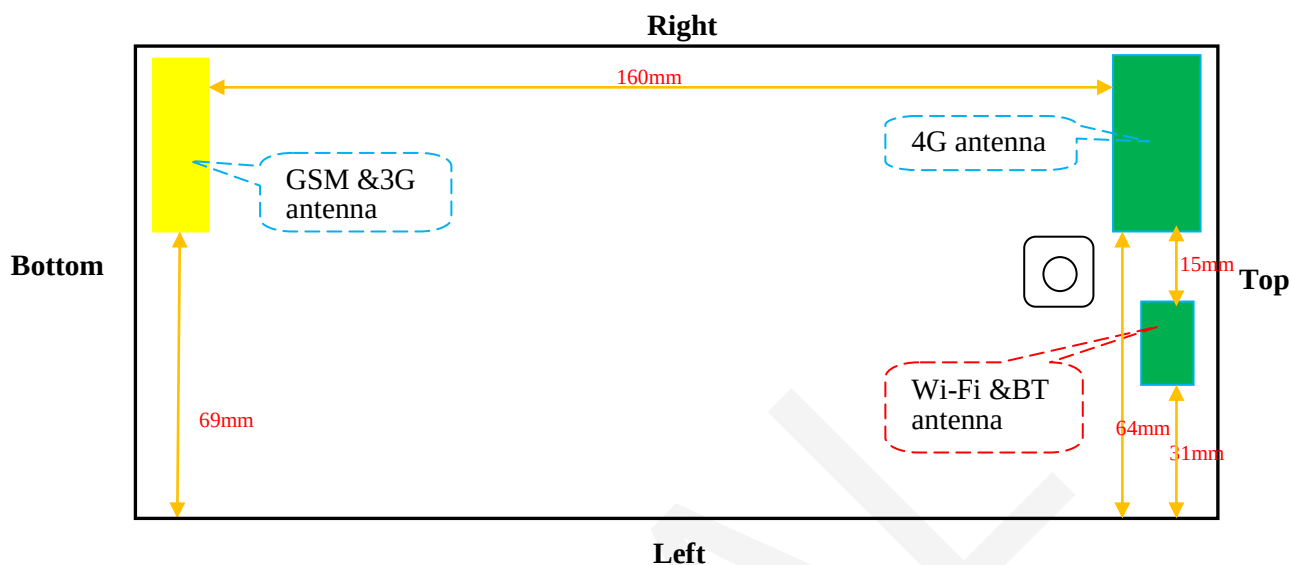
EUT Position	Frequency (MHz)	Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/Kg)			
						Scaled Factor	Meas. SAR	Scaled SAR	Plot
Left-Head-Cheek	2412	802.11b	/	/	/	/	/	/	/
	2437	802.11b	/	/	/	/	/	/	/
	2462	802.11b	-3.625	11.84	11.90	1.014	0.186	0.189	
Left-Head-Tilt	2412	802.11b	/	/	/	/	/	/	/
	2437	802.11b	/	/	/	/	/	/	/
	2462	802.11b	1.063	11.84	11.90	1.014	0.132	0.134	
Right-Head-Cheek	2412	802.11b	/	/	/	/	/	/	/
	2437	802.11b	/	/	/	/	/	/	/
	2462	802.11b	2.913	11.84	11.90	1.014	0.222	0.225	11#
Right-Head-Tilt	2412	802.11b	/	/	/	/	/	/	/
	2437	802.11b	/	/	/	/	/	/	/
	2462	802.11b	1.287	11.84	11.90	1.014	0.150	0.152	
Body-worn-Back (0mm)	2412	802.11b	/	/	/	/	/	/	/
	2437	802.11b	/	/	/	/	/	/	/
	2462	802.11b	-1.721	11.84	11.90	1.014	0.283	0.286	12#
Body-worn-Left (0mm)	2412	802.11b	/	/	/	/	/	/	/
	2437	802.11b	/	/	/	/	/	/	/
	2462	802.11b	1.503	11.84	11.90	1.014	0.028	0.028	/
Body-worn-Right (0mm)	2412	802.11b	/	/	/	/	/	/	/
	2437	802.11b	/	/	/	/	/	/	/
	2462	802.11b	1.035	11.84	11.90	1.014	0.005	0.005	/
Body-worn-Top (0mm)	2412	802.11b	/	/	/	/	/	/	/
	2437	802.11b	/	/	/	/	/	/	/
	2462	802.11b	0.677	11.84	11.90	1.014	0.217	0.220	/

Note:

1. When the 1-g SAR is $\leq 0.8\text{W/Kg}$, testing for other channel is optional.
2. 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.
3. KDB 248227 D01 802.11 Wi-Fi SAR v02, §5.2.2: When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power (in the report ratio is 1), the adjusted SAR is $\leq 1.2\text{ W/kg}$.

SAR SIMULTANEOUS TRANSMISSION DESCRIPTION

BT&WiFi and GSM&3G Antennas Location:



Simultaneous Transmission:

Description of Simultaneous Transmit Capabilities			Antennas Distance (mm)
Transmitter Combination	Simultaneous?	Hotspot?	
2G&3G+4G	×	×	160
2G&3G+ Bluetooth	√	×	170
2G&3G + Wi-Fi	√	√	170
4G + Wi-Fi	√	√	15
4G + Bluetooth	√	×	15
Wi-Fi + Bluetooth	×	×	0

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	23.70	234.42	0	43.2	3.0	No
GSM1900	1900	21.30	134.90	0	37.2	3.0	No
WCDMA850	850	22.40	173.78	0	32.0	3.0	No
WCDMA1900	1900	22.50	177.83	0	49.0	3.0	No
LTE Band 4	1750	22.60	181.97	0	48.1	3.0	No
Wi-Fi	2462	11.90	15.49	0	4.9	3.0	No
Bluetooth	2424	4.50	2.82	0	0.8	3.0	Yes

Body Position:

Mode	Frequency (MHz)	P _{avg} (dBm)	P _{avg} (mW)	Distance (mm)	Calculated value	Threshold (1-g)	SAR Test Exclusion
GPRS850	850	25.80	380.19	0	70.1	3.0	No
GPRS1900	1900	22.70	186.21	0	51.3	3.0	No
WCDMA850	850	22.40	173.78	0	32.0	3.0	No
WCDMA1900	1900	22.50	177.83	0	49.0	3.0	No
LTE Band 4	1750	22.60	181.97	0	48.1	3.0	No
Wi-Fi	2462	11.90	15.49	0	4.9	3.0	No
Bluetooth	2424	4.50	2.82	0	0.8	3.0	Yes

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

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

1. $f(\text{GHz})$ 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.

Standalone SAR estimation:

Mode	Frequency (GHz)	Distance (mm)	P _{avg} (dBm)	P _{avg} (mW)	Estimated 1-g (W/kg)
BT Head	2.424	0	4.50	2.82	0.106
BT Body	2.424	0	4.50	2.82	0.106

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

$[(\text{max. power of channel, including **tune-up tolerance**, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}/x]$
W/kg for *test separation distances* ≤ 50 mm;

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

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

Simultaneous SAR test exclusion considerations:

GSM with BT:

Mode	Position	Reported SAR (W/kg)		ΣSAR
		GSM	BT	< 1.6W/kg
GSM850	Head Cheek	0.287	0.106	0.393
	Body-worn- Back	1.242	0.106	1.348
	Body-worn-Right	0.725	0.106	0.831
	Body-worn-Bottom	0.366	0.106	0.472
PCS1900	Head Cheek	0.178	0.106	0.284
	Body-worn-Back	1.189	0.106	1.295
	Body-worn-Right	0.239	0.106	0.345
	Body-worn-Bottom	0.845	0.106	0.951

GSM with Wi-Fi:

Mode	Position	Reported SAR (W/kg)		ΣSAR
		GSM	Wi-Fi	< 1.6W/kg
GSM850	Head Cheek	0.287	0.225	0.512
	Body-worn- Back	1.242	0.286	1.528
	Body-worn-Right	0.725	0.005	0.730
	Body-worn-Bottom	0.366	/	/
PCS1900	Head Cheek	0.178	0.225	0.403
	Body-worn-Back	1.189	0.286	1.475
	Body-worn-Right	0.239	0.005	0.244
	Body-worn-Bottom	0.845	/	/

WCDMA with BT:

Mode	Position	Reported SAR (W/kg)		ΣSAR
		WCDMA	BT	< 1.6W/kg
WCDMA 850	Head Cheek	0.153	0.106	0.259
	Body-worn- Back	0.842	0.106	0.948
	Body-worn-Right	0.457	0.106	0.563
	Body-worn-Bottom	0.118	0.106	0.224
WCDMA 1900	Head Cheek	0.123	0.106	0.229
	Body-worn- Back	0.887	0.106	0.993
	Body-worn-Right	0.161	0.106	0.267
	Body-worn-Bottom	0.735	0.106	0.841

WCDMA with Wi-Fi:

Mode	Position	Reported SAR (W/kg)		ΣSAR
		WCDMA	Wi-Fi	< 1.6W/kg
WCDMA 850	Head Cheek	0.153	0.225	0.378
	Body-worn- Back	0.842	0.286	1.128
	Body-worn-Right	0.457	0.005	0.462
	Body-worn-Bottom	0.118	/	/
WCDMA 1900	Head Cheek	0.123	0.225	0.348
	Body-worn- Back	0.887	0.286	1.173
	Body-worn-Right	0.161	0.005	0.166
	Body-worn-Bottom	0.735	/	/

LTE with BT:

Mode	Position	Reported SAR (W/kg)		ΣSAR
		LTE Band4	BT	< 1.6W/kg
LTE Band 4	Left Head Cheek	0.461	0.106	0.567
	Left Head Tilt	0.324	0.106	0.43
	Right Head Cheek	0.449	0.106	0.555
	Right Head Tilt	0.315	0.106	0.421
	Body-worn- Back	0.631	0.106	0.737
	Body-worn-Right	0.117	0.106	0.223
	Body-worn-Bottom	0.536	0.106	0.642

LTE with Wi-Fi:

Mode	Position	Reported SAR (W/kg)		ΣSAR
		LTE Band4	Wi-Fi	< 1.6W/kg
LTE Band 4	Left Head Cheek	0.461	0.189	0.650
	Left Head Tilt	0.324	0.134	0.458
	Right Head Cheek	0.449	0.225	0.674
	Right Head Tilt	0.315	0.152	0.467
	Body-worn- Back	0.631	0.286	0.917
	Body-worn-Right	0.117	0.005	0.122
	Body-worn-Bottom	0.536	220	0.756

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

SAR Plots (Summary of the Highest SAR Values)**Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)****Head Cheek (836.6 MHz Middle Channel)**

Measurement Data

Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 10x13x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.223 W/kg
Power Drift-Finish : 0.225 W/kg
Power Drift (%) : 0.927

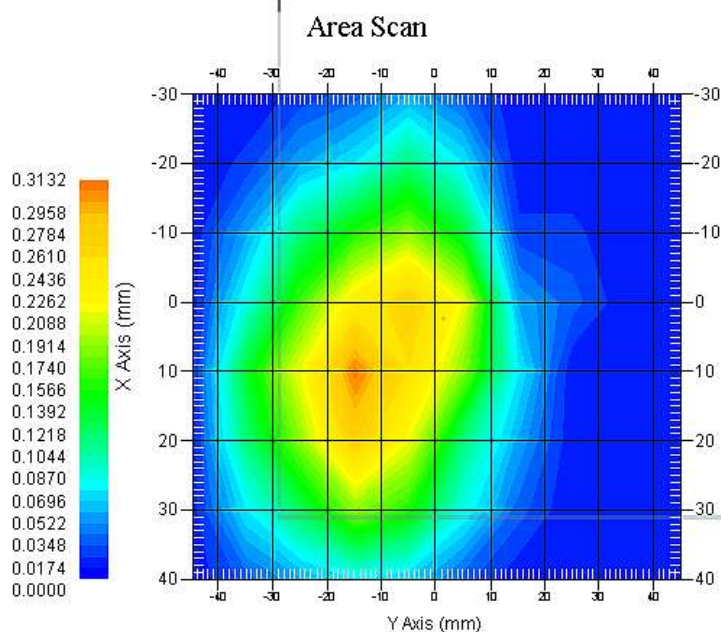
Tissue Data

Type : Head
Frequency : 836.6 MHz
Epsilon : 41.05 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 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.286 W/kg
10 gram SAR value : 0.171 W/kg
Area Scan Peak SAR : 0.310 W/kg
Zoom Scan Peak SAR : 0.451 W/kg

Plot 1#

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 : 0.913 W/kg
Power Drift-Finish : 0.925 W/kg
Power Drift (%) : 1.311

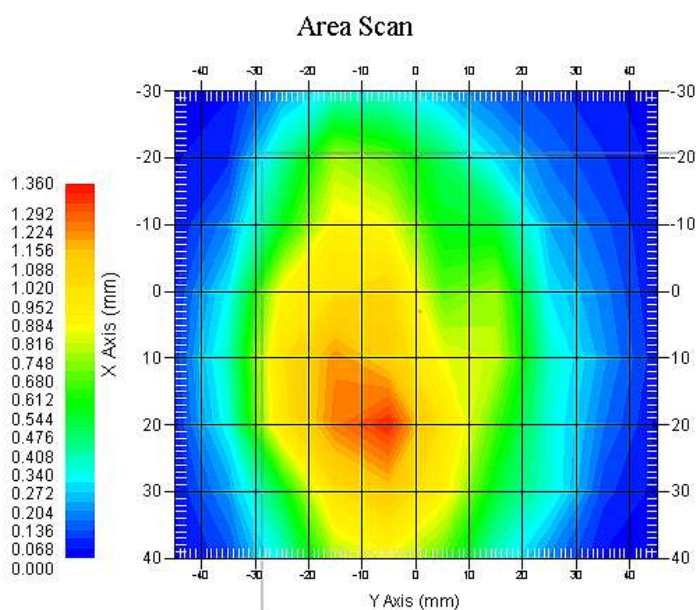
Tissue Data

Type : Body
Frequency : 836.6 MHz
Epsilon : 53.85 F/m
Sigma : 0.96 S/m
Density : 1000.00 kg/cu. m

Probe Data

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

1 gram SAR value : 1.227 W/kg
10 gram SAR value : 0.908 W/kg
Area Scan Peak SAR : 1.346 W/kg
Zoom Scan Peak SAR : 1.880 W/kg

Plot 2#

Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**Head Cheek(1880 MHz Middle Channel)**

Measurement Data

Test mode : GSM
Crest Factor : 8
Scan Type : Complete
Area Scan : 10x13x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.093 W/kg
Power Drift-Finish : 0.095W/kg
Power Drift (%) : 2.206

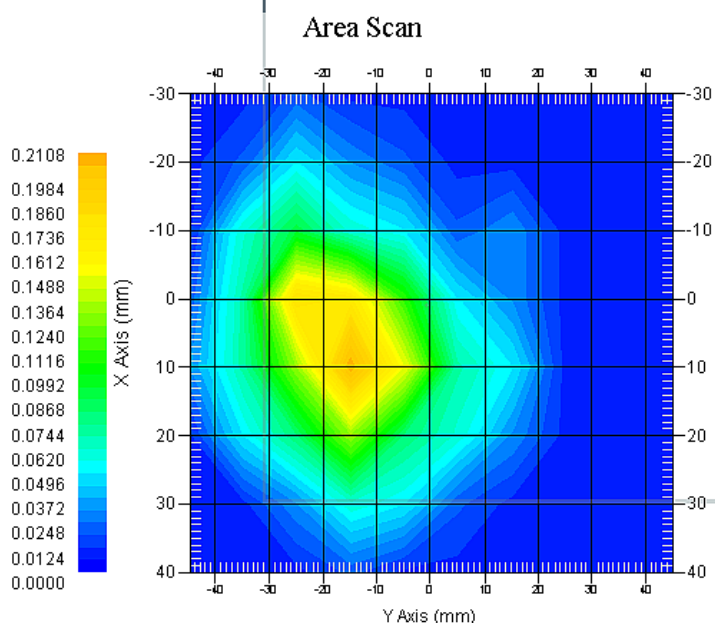
Tissue Data

Type : Head
Frequency : 1880 MHz
Epsilon : 39.58 F/m
Sigma : 1.40 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 $\mu\text{V}/(\text{V/m})^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.175 W/kg
10 gram SAR value : 0.097 W/kg
Area Scan Peak SAR : 0.207 W/kg
Zoom Scan Peak SAR : 0.272 W/kg

Plot 3#

Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**Body-worn-Back (1880 MHz Middle Channel)**

Measurement Data

Test mode : GPRS
Crest Factor : 4
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 : 0.616 W/kg
Power Drift-Finish : 0.622 W/kg
Power Drift (%) : 0.933

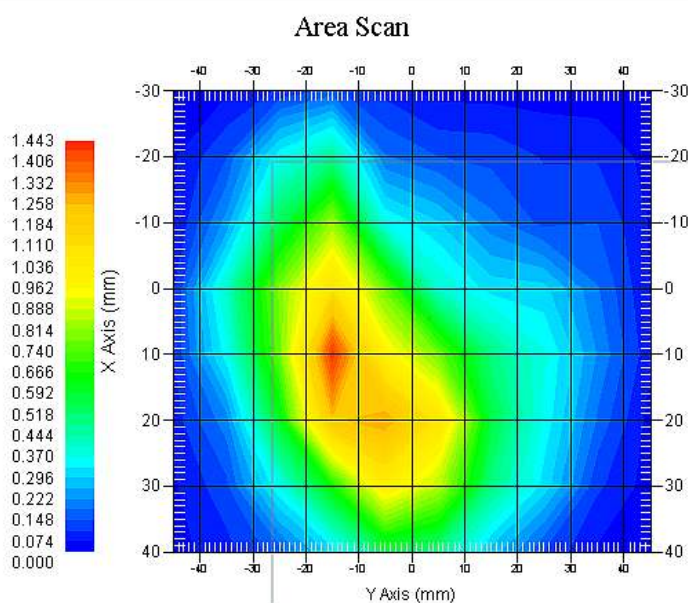
Tissue Data

Type : Body
Frequency : 1880 MHz
Epsilon : 51.89 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 : 4
Conversion Factor : 4.5
Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V/m})^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 1.173 W/kg
10 gram SAR value : 0.702 W/kg
Area Scan Peak SAR : 1.430 W/kg
Zoom Scan Peak SAR : 1.927 W/kg

Plot 4#

Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**Head Cheek (836.6 MHz Middle Channel)**

Measurement Data

Test mode : WCDMA850
Crest Factor : 1
Scan Type : Complete
Area Scan : 10x13x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.078 W/kg
Power Drift-Finish : 0.077 W/kg
Power Drift (%) : -1.373

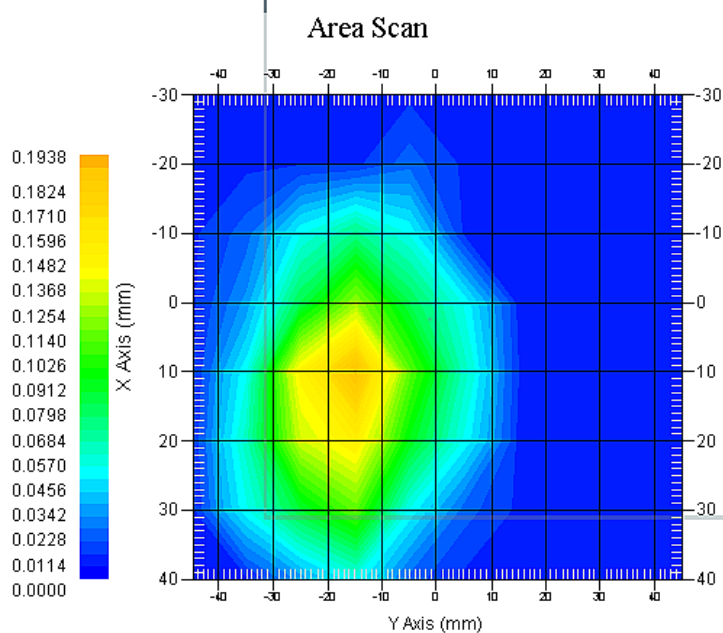
Tissue Data

Type : Head
Frequency : 836.6 MHz
Epsilon : 41.05 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 : 1
Conversion Factor : 5.9
Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V/m})^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.152 W/kg
10 gram SAR value : 0.093 W/kg
Area Scan Peak SAR : 0.193 W/kg
Zoom Scan Peak SAR : 0.244 W/kg

Plot 5#

Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**WCDMA850; Body-Worn-Back (836.6 MHz Middle Channel)**

Measurement Data

Test mode : WCDMA850
Crest Factor : 1
Scan Type : Complete
Area Scan : 11x8x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.605 W/kg
Power Drift-Finish : 0.597 W/kg
Power Drift (%) : -1.376

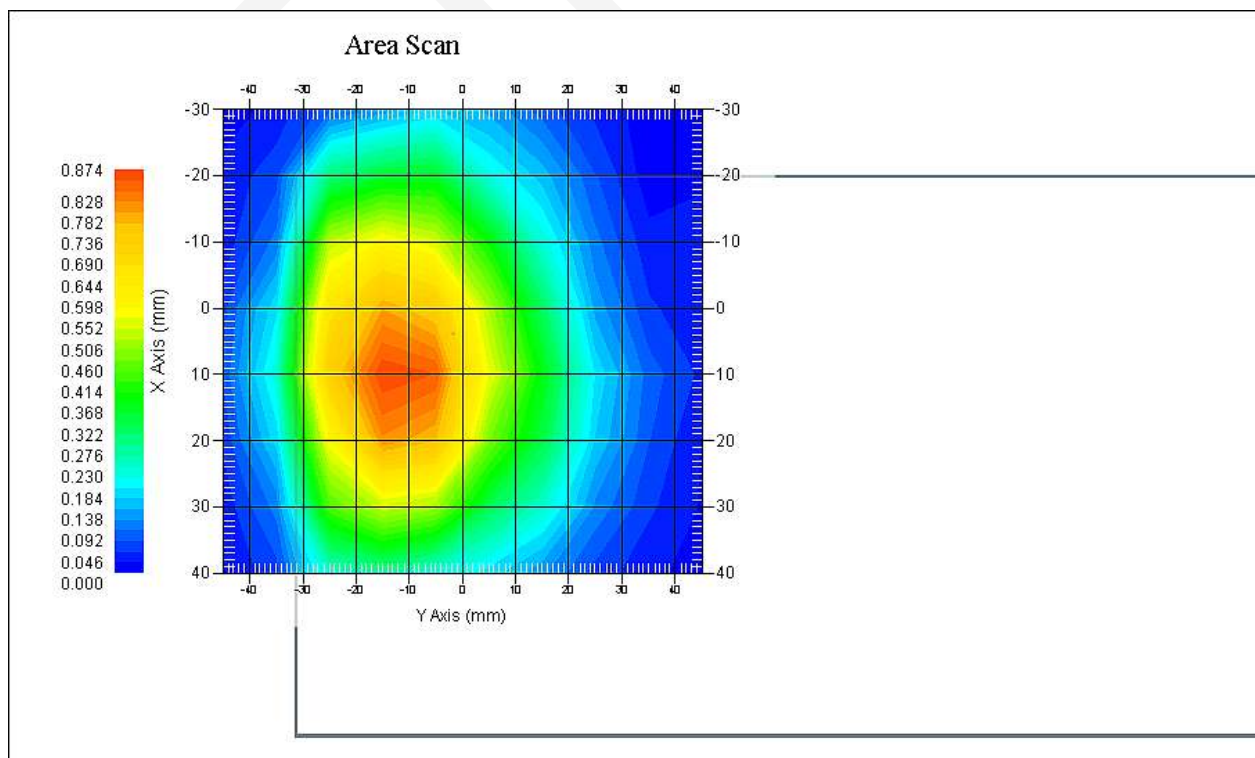
Tissue Data

Type : Body
Frequency : 836.6 MHz
Epsilon : 53.85 F/m
Sigma : 0.96 S/m
Density : 1000.00 kg/cu. m

Probe Data

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

1 gram SAR value : 0.836 W/kg
10 gram SAR value : 0.502 W/kg
Area Scan Peak SAR : 0.867 W/kg
Zoom Scan Peak SAR : 1.206 W/kg

Plot 6#

Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**Head Cheek(1880MHz Middle Channel)**

Measurement Data

Test mode : WCDMA1900
Crest Factor : 1
Scan Type : Complete
Area Scan : 10x13x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.043 W/kg
Power Drift-Finish : 0.043 W/kg
Power Drift (%) : -1.402

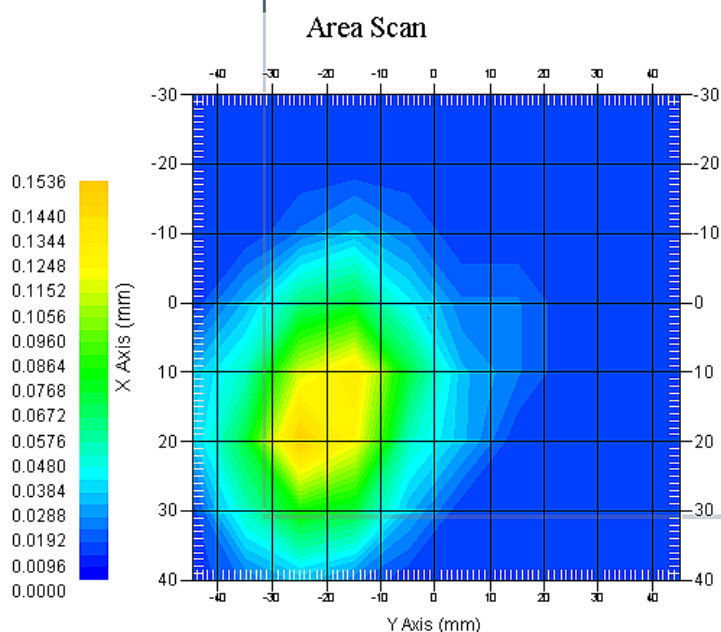
Tissue Data

Type : Head
Frequency : 1880 MHz
Epsilon : 39.58 F/m
Sigma : 1.40 S/m
Density : 1000.00 kg/cu. M

Probe Data

Serial No. : 500-00283
Frequency Band : 1900
Duty Cycle Factor : 1
Conversion Factor : 4.8
Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.122 W/kg
10 gram SAR value : 0.066 W/kg
Area Scan Peak SAR : 0.152 W/kg
Zoom Scan Peak SAR : 0.188 W/kg

Plot 7#

Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**WCDMA1900; Body-Worn-Back (1880 MHz Middle Channel)**

Measurement Data

Test mode : WCDMA1900
Crest Factor : 1
Scan Type : Complete
Area Scan : 11x9x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.453 W/kg
Power Drift-Finish : 0.455 W/kg
Power Drift (%) : 0.462

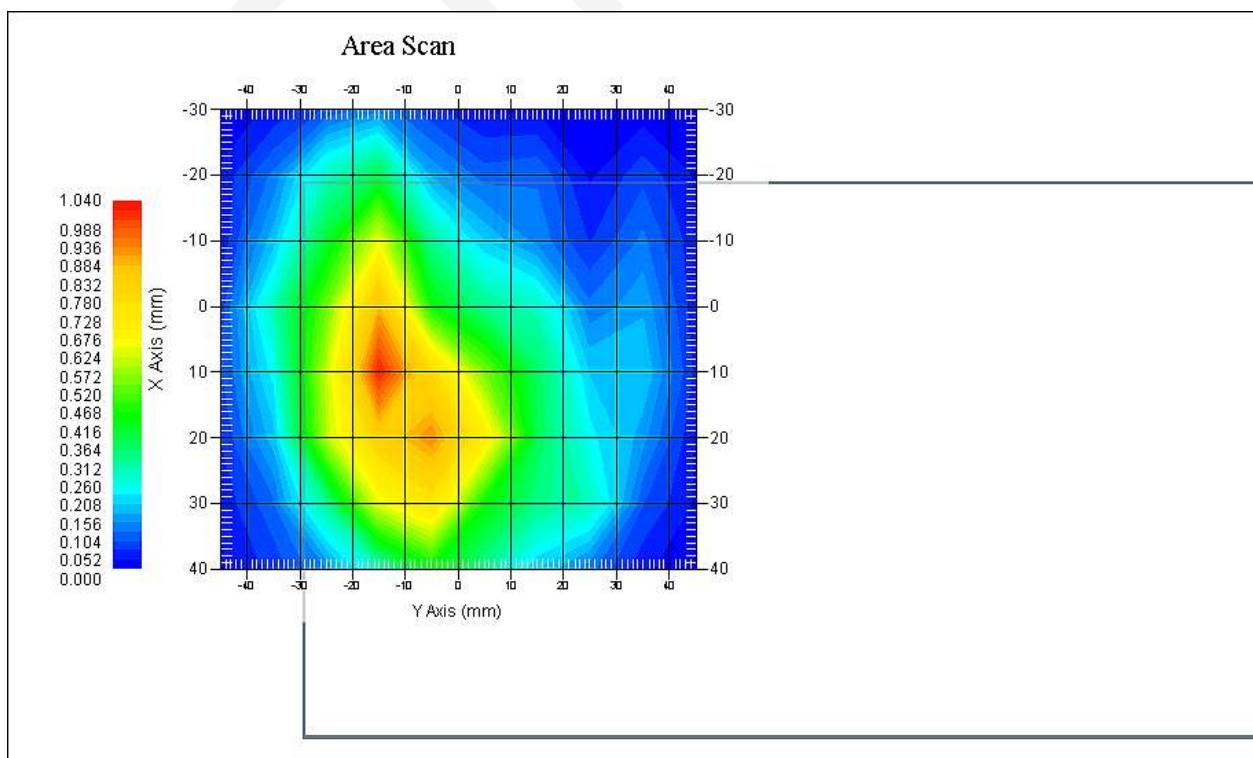
Tissue Data

Type : Body
Frequency : 1880 MHz
Epsilon : 51.89 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 : 1
Conversion Factor : 4.5
Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V/m})^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.877 W/kg
10 gram SAR value : 0.469 W/kg
Area Scan Peak SAR : 1.023 W/kg
Zoom Scan Peak SAR : 1.390 W/kg

Plot 8#

Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**Left Head Cheek(1720 MHz Low Channel)**

Measurement Data

Test mode : RB1
Crest Factor : 1
Scan Type : Complete
Area Scan : 10x13x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.323 W/kg
Power Drift-Finish : 0.319 W/kg
Power Drift (%) : -1.257

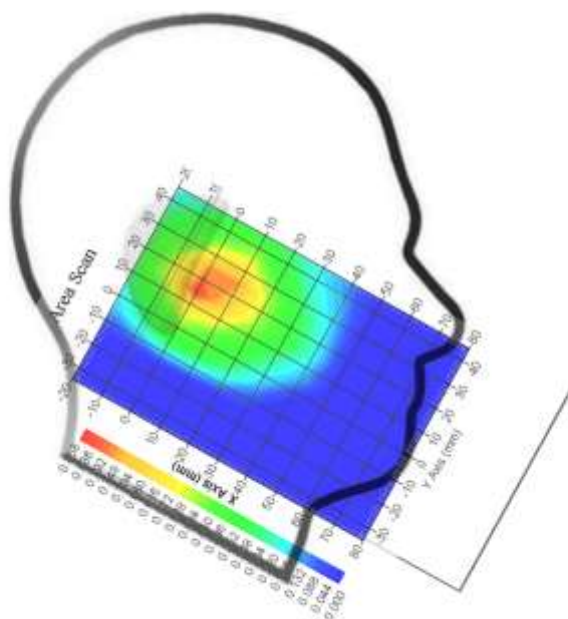
Tissue Data

Type : Head
Frequency : 1720 MHz
Epsilon : 39.39 F/m
Sigma : 1.37 S/m
Density : 1000.00 kg/cu. M

Probe Data

Serial No. : 500-00283
Frequency Band : 1750
Duty Cycle Factor : 1
Conversion Factor : 5.4
Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V/m})^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.458 W/kg
10 gram SAR value : 0.272 W/kg
Area Scan Peak SAR : 0.549 W/kg
Zoom Scan Peak SAR : 0.826 W/kg

Plot 9#

Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**LTE Band 4; Body-Worn-Back (1720 MHz Low Channel)**

Measurement Data

Test mode : RB1
Crest Factor : 1
Scan Type : Complete
Area Scan : 11x9x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.423 W/kg
Power Drift-Finish : 0.427 W/kg
Power Drift (%) : 0.939

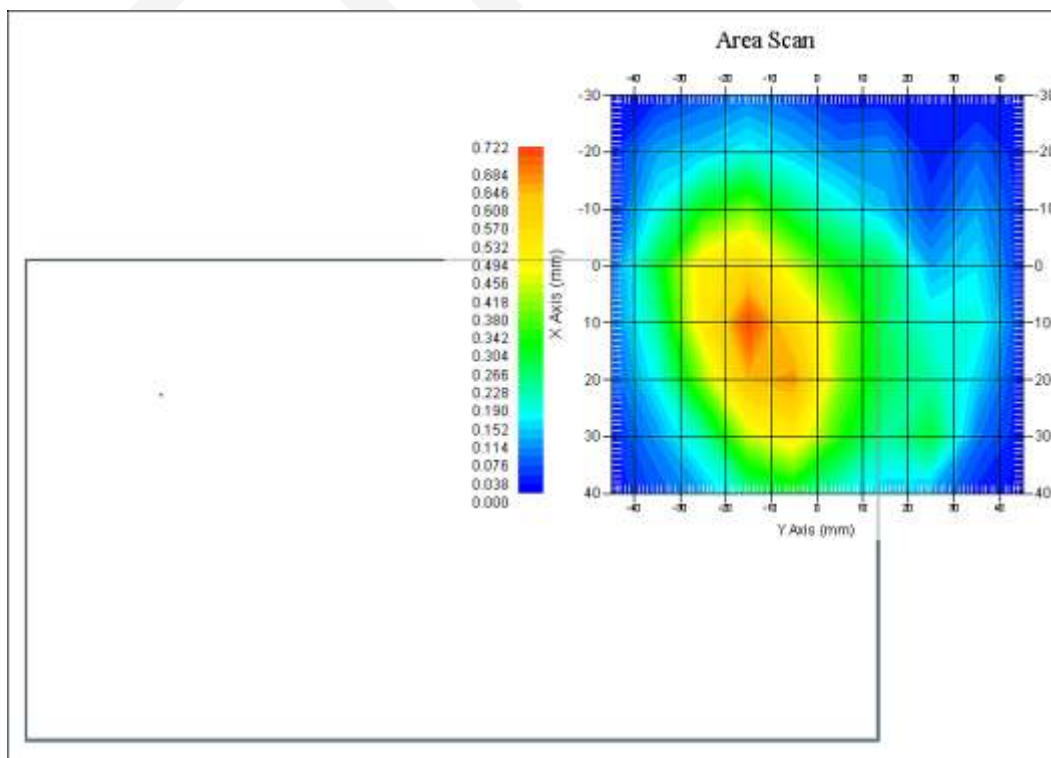
Tissue Data

Type : Body
Frequency : 1720 MHz
Epsilon : 51.99 F/m
Sigma : 1.50 S/m
Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
Frequency Band : 1750
Duty Cycle Factor : 1
Conversion Factor : 5.3
Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V/m})^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.627 W/kg
10 gram SAR value : 0.366 W/kg
Area Scan Peak SAR : 0.716 W/kg
Zoom Scan Peak SAR : 0.955 W/kg

Plot 10#

Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**802.11b; Right Head Cheek (2462 MHz Channel 11)****Measurement Data**

Test mode : 802.11b
Crest Factor : 1
Scan Type : Complete
Area Scan : 11x9x1: 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 : 0.105 W/kg
Power Drift (%) : 2.913

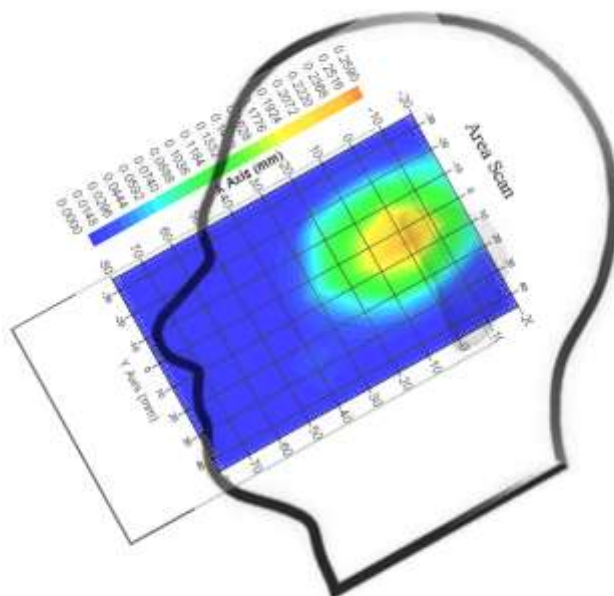
Tissue Data

Type : Head
Frequency : 2462 MHz
Epsilon : 39.63 F/m
Sigma : 1.85 S/m
Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
Frequency Band : 2450
Duty Cycle Factor : 1
Conversion Factor : 4.9
Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V/m})^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.222 W/kg
10 gram SAR value : 0.126 W/kg
Area Scan Peak SAR : 0.252 W/kg
Zoom Scan Peak SAR : 0.307 W/kg

Plot 11#

Test Laboratory: Bay Area Compliance Lab Corp. (Shenzhen)**802.11b; Body-Worn-Back (2462MHz, Channel 11)****Measurement Data**

Crest Factor : 1
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.010 W/kg
Power Drift-Finish : 0.010 W/kg
Power Drift (%) : -1.721

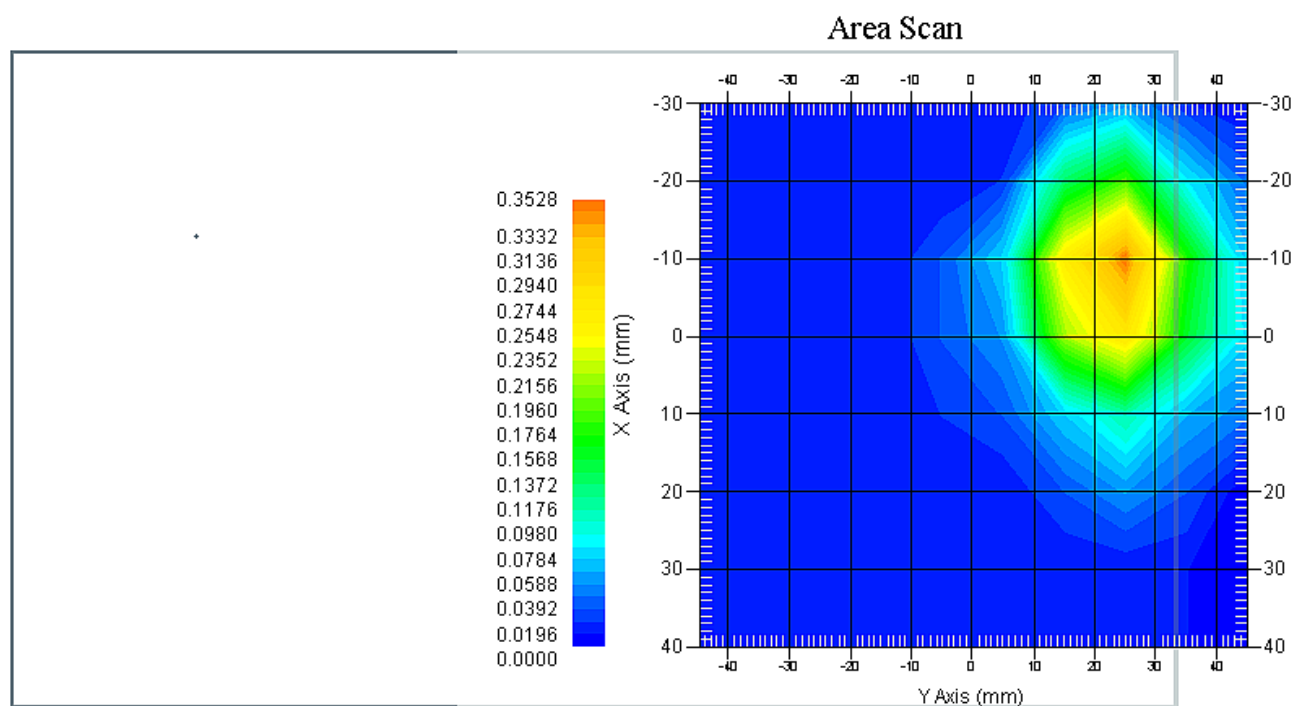
Tissue Data

Type : Body
Frequency : 2462 MHz
Epsilon : 52.85 F/m
Sigma : 1.99 S/m
Density : 1000.00 kg/cu. m

Probe Data

Serial No. : 500-00283
Frequency Band : 2450 MHz
Duty Cycle Factor : 1
Conversion Factor : 4.3
Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.283 W/kg
10 gram SAR value : 0.167 W/kg
Area Scan Peak SAR : 0.349 W/kg
Zoom Scan Peak SAR : 0.411 W/kg

Plot 12#

APPENDIX A MEASUREMENT UNCERTAINTY

According to **IEEE1528:2013**, the uncertainty budget has been determined for the Head SAR measurement system and is given in the following Table.

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	c_1^1 (1-g)	c_1^1 (10-g)	Standard Uncertainty (1-g) %	Standard Uncertainty (10-g) %
Measurement System							
Probe Calibration	3.5	normal	1	1	1	3.5	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	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	0.6	rectangular	$\sqrt{3}$	1	1	0.3	0.3
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
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 related							
Test sample positioning	2.0	normal	1	1	1	2.0	2.0
Device Holder Uncertainty	4.0	normal	1	1	1	6.215	6.215
Drift of Output Power	5.0	rectangular	$\sqrt{3}$	1	1	2.67	2.67
Phantom and Setup							
Phantom Uncertainty	3.4	rectangular	$\sqrt{3}$	1	1	2.0	2.0
SAR correction in permittivity and conductivity	1.2	normal	1	1	0.85	1.2	1.0
Liquid conductivity measurement	5.0	normal	1	0.78	0.71	3.9	3.6
Liquid permittivity measurement	5.0	normal	1	0.25	0.29	1.3	1.5
conductivity—temperature	1.1	rectangular	$\sqrt{3}$	0.78	0.71	0.5	0.5
permittivity—temperature	1.3	rectangular	$\sqrt{3}$	0.23	0.23	0.2	0.2
Combined Uncertainty		RSS				10.78	10.55
Expanded uncertainty (coverage factor=2)		Normal(k=2)				21.56	21.10

According to **IEC62209-2:2010**, the uncertainty budget has been determined for the Body SAR measurement system and is given in the following Table.

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	1	1.5	1.5
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	0.6	rectangular	$\sqrt{3}$	1	1	0.3	0.3
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
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 related							
Test sample positioning	2.0	normal	1	1	1	2.0	2.0
Device Holder Uncertainty	4.0	normal	1	1	1	6.215	6.215
Drift of Output Power	5.0	rectangular	$\sqrt{3}$	1	1	2.67	2.67
Phantom and Setup							
Phantom Uncertainty	3.4	rectangular	$\sqrt{3}$	1	1	2.0	2.0
SAR correction in permittivity and conductivity	1.2	normal	1	1	0.84	1.2	1.0
Liquid conductivity measurement	5.0	normal	1	0.78	0.71	3.9	3.6
Liquid permittivity measurement	5.0	normal	1	0.23	0.26	1.3	1.5
conductivity—temperature	1.1	rectangular	$\sqrt{3}$	0.78	0.71	0.5	0.5
permittivity—temperature	1.3	rectangular	$\sqrt{3}$	0.23	0.26	0.2	0.2
Combined Uncertainty		RSS				9.58	9.49
Expanded uncertainty (coverage factor=2)		Normal(k=2)				19.16	18.98

APPENDIX B – PROBE CALIBRATION CERTIFICATES

NCL CALIBRATION LABORATORIES

Calibration File No.: PC-1598

Task No: BACL-5778

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: 14th October 2014
Released on: 14th October 2014

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

Released By: 
Art Brennan, Quality Manager

NCL CALIBRATION LABORATORIES

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

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

NCL Calibration Laboratories

Division of APREL Inc.

Introduction

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

Calibration Method

Probes are calibrated using the following methods.

<800 MHz

TEM Cell for sensitivity in air

Standard phantom using temperature transfer method for sensitivity in tissue

>800 MHz

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

- o IEEE Standard 1528:2013
IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
- o EN 62209-1:2006
Human Exposure to RF Fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to measure the Specific Absorption Rate (SAR) for hand-held mobile wireless devices
- o IEC 62209-2:2010
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)
- o TP-D01-032-E020-V2 E-Field probe calibration procedure
- o D22-012-Tissue dielectric tissue calibration procedure
- o D28-002-Dipole procedure for validation of SAR system using a dipole
- o 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

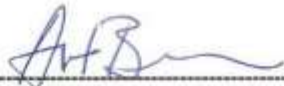
Secondary Measurement Standards

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

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

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



Art Brennan, Quality Manager



Dan Brooks, Test Engineer

Page 3 of 10

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

NCL Calibration Laboratories

Division of APREL, Inc.

Probe Summary

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

*Resistive to recommended tissue recipes per IEEE-1528

Sensitivity in Air

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

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

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	43.59	0.88	3.5	±50	5.7
450 B	Body	56.74	0.94	3.5	±50	5.8
750 H	Head	42.98	0.92	3.5	±50	6.0
750 B	Body	43.05	0.93	3.5	±50	5.5
835 H	Head	43.42	0.94	3.5	±50	5.9
835 B	Body	55.77	1.01	3.5	±50	5.9
900 H	Head	41.87	1.06	3.5	±50	6.0
900 B	Body	55.62	1.05	3.5	±50	5.9
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	38.23	1.38	3.5	±75	5.4
1750 B	Body	52.86	1.54	3.5	±75	5.3
1800 H	Head	X	X	X	X	X
1800 B	Body	X	X	X	X	X
1900 H	Head	40.20	1.38	3.5	±75	4.8
1900 B	Body	52.63	1.46	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	37.26	1.84	3.5	±75	4.9
2450 B	Body	53.61	1.9	3.5	±75	4.3
3000 H	Head	X	X	X	X	X
3000 B	Body	X	X	X	X	X
3600 H	Head	37.49	3.16	3.5	±100	4.5
3600 B	Body	49.94	3.86	3.5	±100	4.0
5250 H	Head	35.51	4.78	3.5	±100	3.0
5250 B	Body	47.54	5.11	3.5	±100	2.8
5600 H	Head	36.05	5.15	3.5	±100	2.8
5600 B	Body	46.49	5.72	3.5	±100	2.2
5800 H	Head	45.99	6.01	3.5	±100	3.2
5800 B	Body	35.6	5.37	3.5	±100	2.5

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

NCL Calibration Laboratories

Division of APREL, Inc.

Boundary Effect:

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

Spatial Resolution:

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

DAQ-PAQ Contribution

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

Probe Calibration Uncertainty

Uncertainty component	Tolerance ($\pm$ %)	Probability distribution	Divisor	Standard uncertainty ($\pm$ %)
Incident or forward power	2.5	R	$\sqrt{3}$	1.44
Reflected power	2	R	$\sqrt{3}$	1.15
Liquid conductivity measurement	1	R	$\sqrt{3}$	0.58
Liquid permittivity measurement	1	R	$\sqrt{3}$	0.58
Liquid conductivity deviation	1.5	R	$\sqrt{3}$	0.87
Liquid permittivity deviation	1.5	R	$\sqrt{3}$	0.87
Frequency deviation	2.25	R	$\sqrt{3}$	1.30
Field homogeneity	2.5	R	$\sqrt{3}$	1.44
Field-probe positioning	2.5	R	$\sqrt{3}$	1.44
Field-probe linearity	1.55	R	$\sqrt{3}$	0.89
Combined standard uncertainty		RSS		3.50

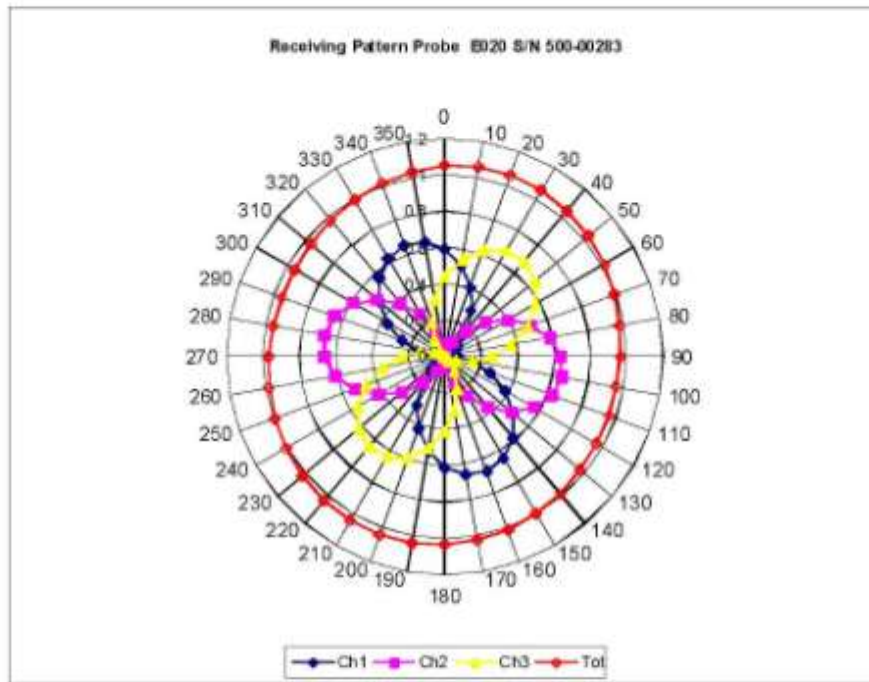
Page 6 of 10

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

NCL Calibration Laboratories

Division of APREL, Inc.

Receiving Pattern Air



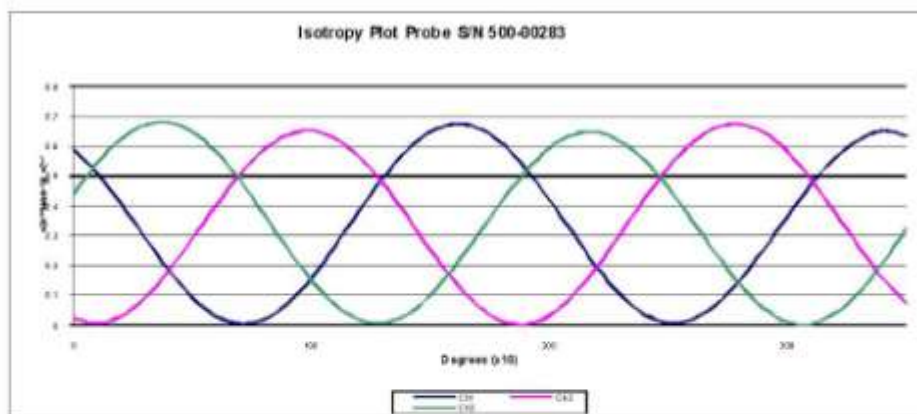
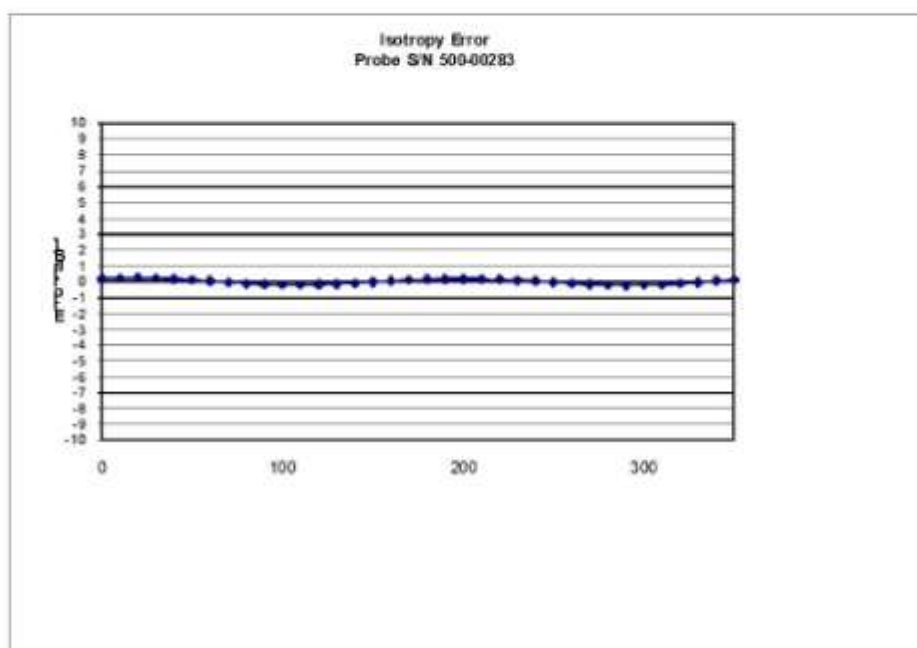
Page 7 of 10

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

NCL Calibration Laboratories

Division of APREL, Inc.

Isotropy Error Air



Isotropicity Tissue:

0.10 dB

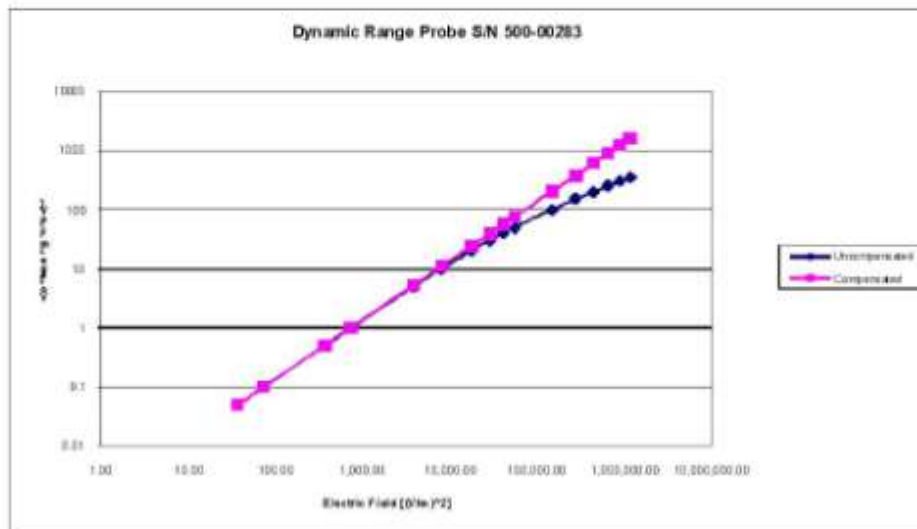
Page 8 of 10

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

NCL Calibration Laboratories

Division of APREL, Inc.

Dynamic Range

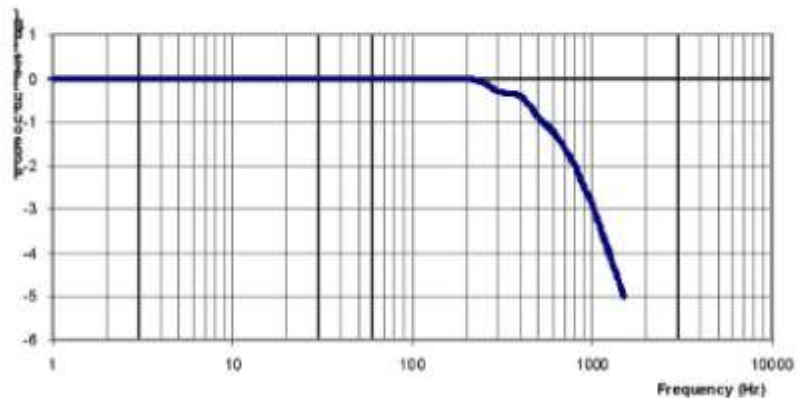


Page 9 of 10

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

NCL Calibration Laboratories

Division of APREL, Inc.

Video Bandwidth**Probe Frequency Characteristics**

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

Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2014.

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

APPENDIX C DIPOLE CALIBRATION CERTIFICATES

NCL CALIBRATION LABORATORIES

Calibration File No: DC-1599
Project Number: BAC-dipole-cal-5779

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 (China)

Calibrated: 8th October 2014
Released on: 8th October 2014

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

Released By: 
Art Brennan, Quality Manager

NCL CALIBRATION LABORATORIES

Suite 102, 303 Terry Fox Dr.
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 with a damaged connection for a re-calibration.

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

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

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



Maryna Nesterova Calibration Engineer

Primary Measurement Standards

Instrument	Serial Number	Cal due date
Tektronix USB Power Meter	11C940	May 14, 2015
Network Analyzer Anritsu 37347C	002106	Feb. 20, 2015

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

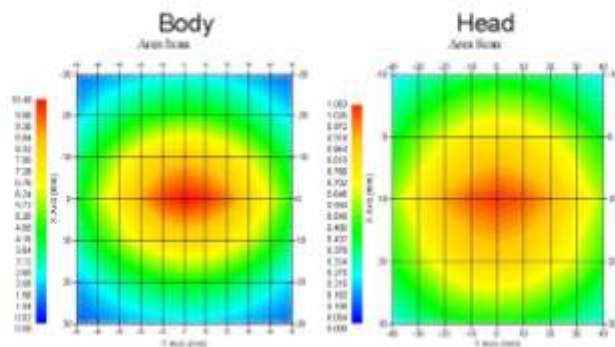
Length: 162.2 mm
Height: 89.4 mm

Electrical Specification

Tissue	Frequency	SWR:	Return Loss	Impedance
Head	835 MHz	1.066 U	-30.344 dB	49.001 Ω
Body	835 MHz	1.089 U	-28.118 dB	53.117 Ω

System Validation Results

Tissue	Frequency	1 Gram	10 Gram	Peak
Head	835 MHz	9.773	6.174	14.713
Body	835 MHz	9.736	6.297	14.513



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

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NCL Calibration Laboratories

Division of APREL Laboratories.

Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 180-00558. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-020 30 MHz to 6 GHz E-Field Probe Serial Number 225.

References

- IEC-62209 "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures"
- Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 30 MHz to 6 GHz)"
- TP-D01-032-E020-V2 E-Field probe calibration procedure
- D22-012-Tissue dielectric tissue calibration procedure
- D28-002-Dipole procedure for validation of SAR system using a dipole
- IEEE 1309 Draft Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9kHz to 40GHz

Conditions

Dipole 180-00558 was repaired prior to this calibration. The repair reliability depends upon correct usage of the dipole.

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)

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

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NCL Calibration Laboratories

Division of APREL Laboratories.

Dipole Calibration Results**Mechanical Verification**

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

Electrical Verification

Tissue Type	Return Loss:	SWR:	Impedance:
Head	-30.344 dB	1.066 U	49.001 Ω
Body	-28.118 dB	1.089 U	53.117 Ω □

Tissue Validation

	Dielectric constant, ϵ_r	Conductivity, σ [S/m]
Head Tissue 835MHz	43.42	0.94
Body Tissue 835MHz	55.77	1.01

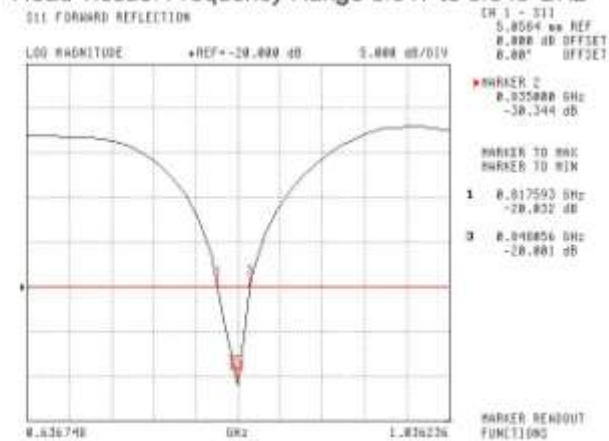
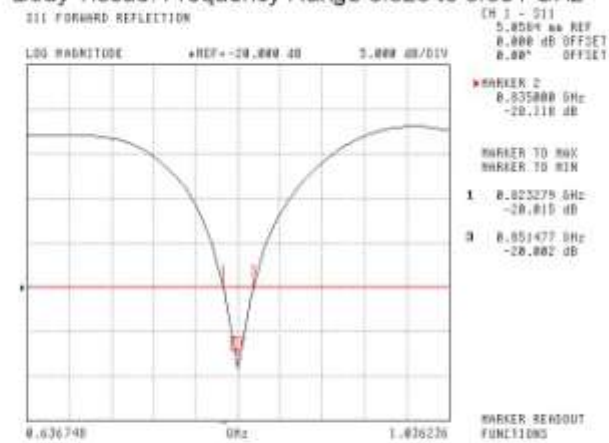
This page has been reviewed for content and attested to by signature within this document.

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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: Frequency Range 0.817 to 0.848 GHz****Body Tissue: Frequency Range 0.823 to 0.851 GHz**

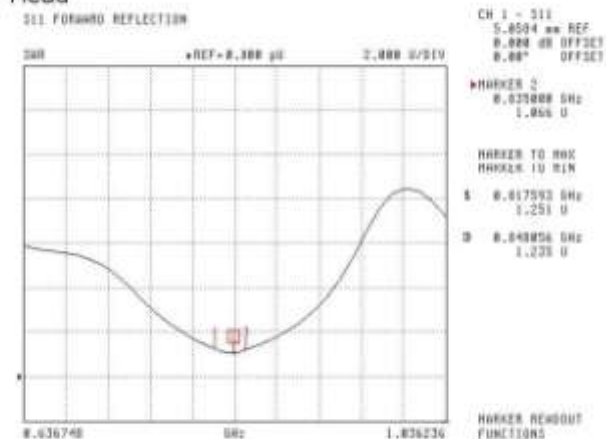
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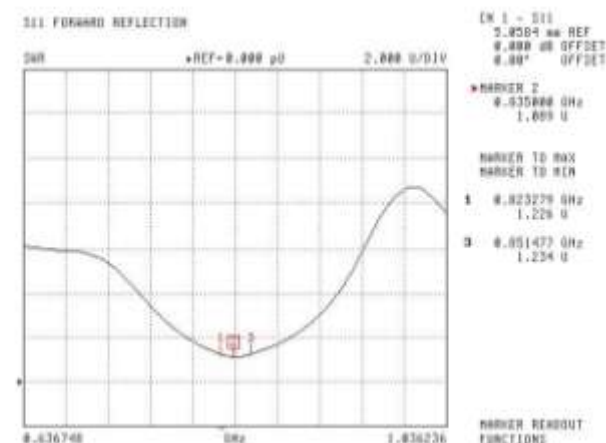
NCL Calibration Laboratories

Division of APREL Laboratories.

SWR **Head**



Body

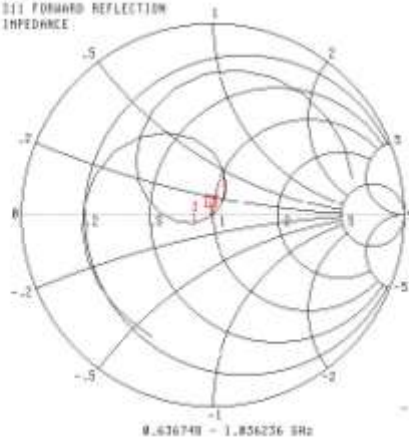
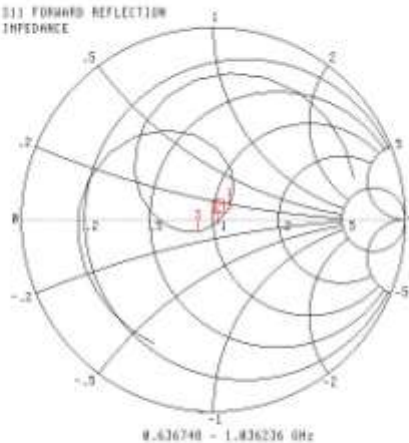


This page has been reviewed for content and attested to by signature within this document.

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NCL Calibration Laboratories

Division of APREL Laboratories.

Smith Chart Dipole Impedance**Head**S11 FORWARD REFLECTION
IMPEDANCECH 1 - S11
5.0504 mm REF
0.000 dB OFFSET
0.00° OFFSETHARKER 2
0.025000 GHz
49.001 Ω
-1.317 jΩHARKER TO MAX
HARKER TO MIN1 0.017593 GHz
55.628 Ω
18.003 jΩ
2 0.040856 GHz
41.274 Ω
-3.071 jΩHARKER READOUT
FUNCTIONS**Body**S11 FORWARD REFLECTION
IMPEDANCECH 1 - S11
5.0504 mm REF
0.000 dB OFFSET
0.00° OFFSETHARKER 2
0.025000 GHz
53.117 Ω
-1.024 jΩHARKER TO MAX
HARKER TO MIN1 0.023276 GHz
59.908 Ω
6.263 jΩ
2 0.025477 GHz
42.412 Ω
-5.301 jΩHARKER READOUT
FUNCTIONS

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

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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 2014.

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

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NCL CALIBRATION LABORATORIES

Calibration File No: DC-1531
Project Number: 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.

BACL Head & Body Validation Dipole

Manufacturer: APREL Laboratories
Part number: ALS-D-1750-S-2
Frequency: 1750 MHz
Serial No: 198-00304

Customer: ISL

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

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

Released By: _____



Art Brennan, Quality Manager

NCL CALIBRATION LABORATORIES

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

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

NCL Calibration Laboratories

Division of APREL Laboratories

Conditions

Dipole 198-00304 was an original 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 subject has been accurately conducted and that all information contained within the results pages have been reviewed for accuracy.


 Art Brennan, Quality Manager


 Constantin Teodorian, Test Engineer

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

2

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: 75 mm
Height: 42 mm

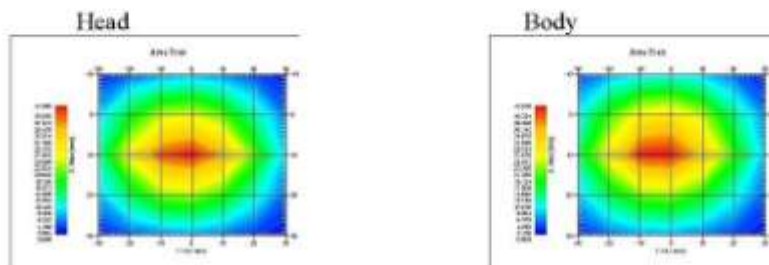
Electrical Calibration

Test	Result Head	Result Body
S11 R/L	-25.567	-20.548 dB
SWR	1.111U	1.207 U
Impedance	53.637 Ω	55.929 Ω

System Validation Results, 1750 MHz

	1g	10g
Head	37.02	18.99
Body	36.65	18.85

Type	Epsilon	Sigma
Head	38.51	1.36
Body	51.79	1.53



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

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NCL Calibration Laboratories

Division of APREL Laboratories.

Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole. 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-030 130 MHz to 26 GHz E-Field Probe Serial Number 215.

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"

IEC-62209 "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures"

Part 1: "Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 300 MHz to 3 GHz)"

IEC-62209 "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures"

Part 2 *Draft*: "Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 30 MHz to 6 GHz)"**Conditions****Ambient Temperature of the Laboratory:** 22 °C +/- 0.5°C**Temperature of the Tissue:** 20 °C +/- 0.5°C

This was an original calibration taken from stock.

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)

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

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NCL Calibration Laboratories

Division of APREL Laboratories.

Dipole Calibration Results**Mechanical Verification**

Measured Length	Measured Height
75 mm	42 mm

Tissue Validation

Frequency	Permittivity ϵ	Conductivity σ
1750 Head	38.23	1.38
1750 Body	52.86	1.54

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

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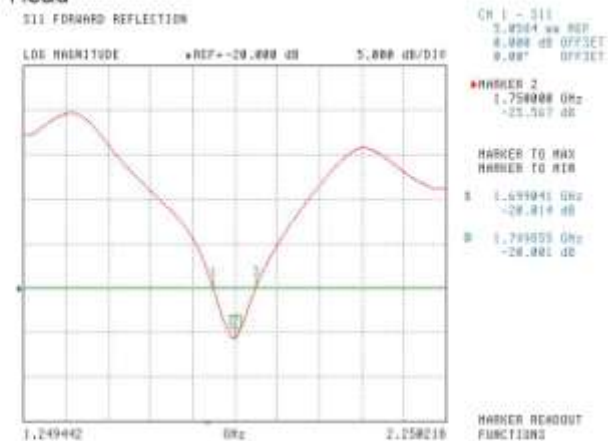
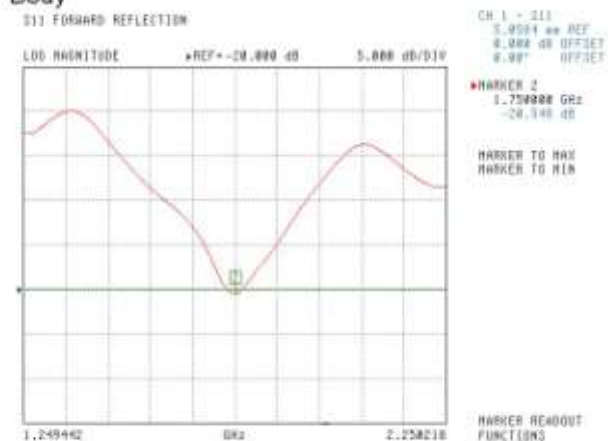
NCL Calibration Laboratories

Division of APREL Laboratories.

Electrical Calibration

Test	Result Head	Result Body
S11 R/L	-25.567	-20.548 dB
SWR	1.111U	1.207 U
Impedance	53.637 Ω	55.929 Ω

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

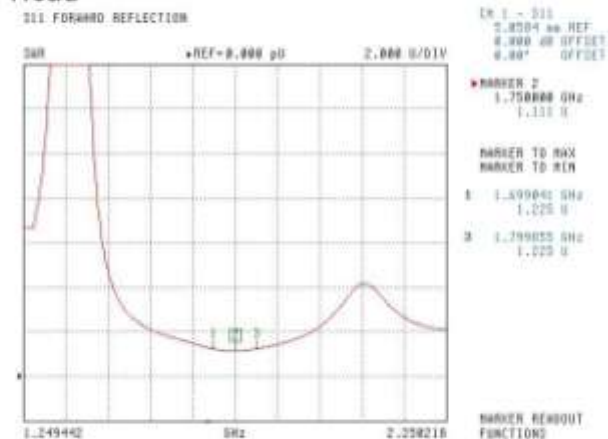
S11 Parameter Return Loss**Head****Body**

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

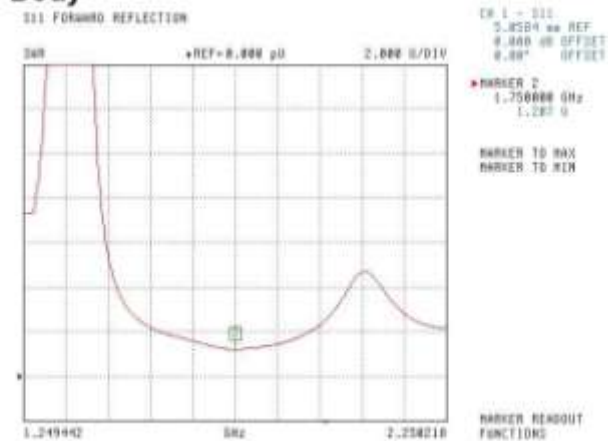
NCL Calibration Laboratories

Division of APREL Laboratories.

SWR **Head**



Body



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

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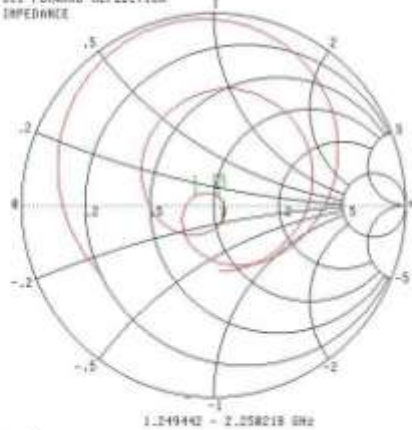
NCL Calibration Laboratories

Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head

S11 FORWARD REFLECTION
IMPEDANCE



CH 1 ~ S11
2.8504 mV REF
8.800 dB OFFSET
0.80° OFFSET

MARKER 2
1.750000 GHz
53.637 Ω
3.792 jΩ

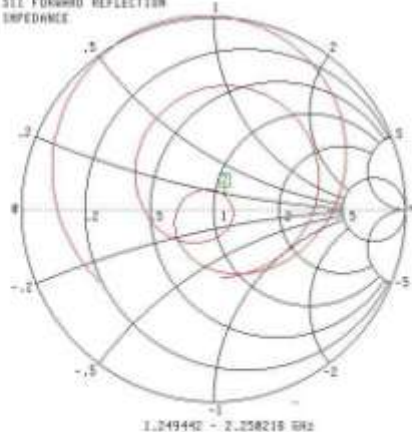
MARKER TO MAX
MARKER TO MIN

1 1.599040 GHz
41.520 Ω
3.485 jΩ
3 1.799022 GHz
54.214 Ω
-9.601 jΩ

MARKER READOUT
FUNCTIONS

Body

S11 FORWARD REFLECTION
IMPEDANCE



CH 1 ~ S11
2.8504 mV REF
8.800 dB OFFSET
0.80° OFFSET

MARKER 2
1.750000 GHz
55.929 Ω
7.818 jΩ

MARKER TO MAX
MARKER TO MIN

MARKER READOUT
FUNCTIONS

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 May 2013

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

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1750MHz Dipole Calibration By BACL at 2015-04-20**Mechanical Verification**

APREL Length	APREL Height	Measured Length	Measured Height
75.0 mm	42 mm	75.1 mm	42.2 mm

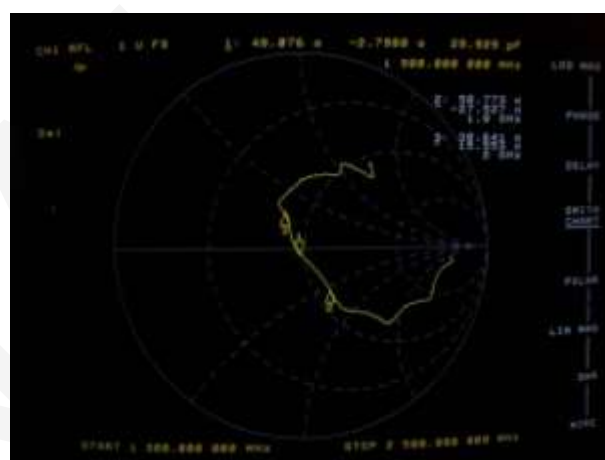
Tissue Type	Measured Return Loss	Measured Impedance
Head	-25.083 dB	53.477 Ω
Body	-21.022 dB	55.176 Ω

Test Graphs:

Head Tissue



Body Tissue



NCL CALIBRATION LABORATORIES

Calibration File No: DC-1601
Project Number: BAC-dipole -cal-5779

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 (China)

Calibrated: 9th October, 2014
Released on: 9th October, 2014

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

Released By:



Art Brennan, Quality Manager

NCL CALIBRATION LABORATORIES

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

Division of APREL Lab.
TEL: (613) 435-8300
FAX: (613) 435-8308

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

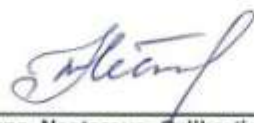
Temperature of the Tissue: 21 °C +/- 0.5°C

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

Maryna Nesterova Calibration Engineer**Primary Measurement Standards**

Instrument	Serial Number	Cal due date
Tektronix USB Power Meter	11C940	May 14, 2015
Network Analyzer Anritsu 37347C	002106	Feb. 20, 2015

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

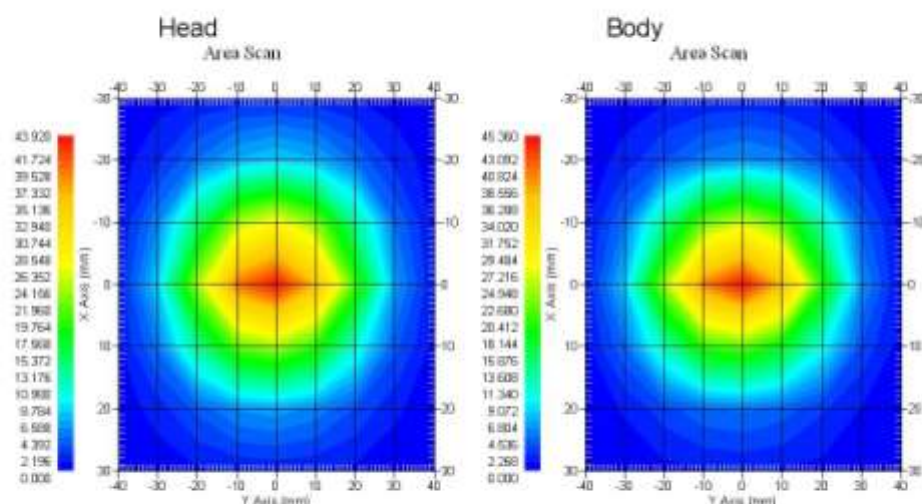
The following results relate the Calibrated Dipole and should be used as a quick reference for the user.

Mechanical Dimensions**Length:** 67.1 mm**Height:** 38.9 mm**Electrical Specification**

Tissue	Frequency	SWR:	Return Loss	Impedance
Head	1900MHz	1.084 U	-27.92 dB	52.247 Ω
Body	1900MHz	1.128 U	-24.40 dB	52.618 Ω

System Validation Results

Tissue	Frequency	1 Gram	10 Gram	Peak
Head	1900 MHz	39.481	20.44	73.364
Body	1900 MHz	39.715	20.552	73.565



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NCL Calibration Laboratories

Division of APREL Laboratories.

Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 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 30 MHz to 6 GHz E-Field Probe Serial Number 225.

References

- IEC-62209 "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures"
- Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 30 MHz to 6 GHz)"
- TP-D01-032-E020-V2 E-Field probe calibration procedure
- D22-012-Tissue dielectric tissue calibration procedure
- D28-002-Dipole procedure for validation of SAR system using a dipole
- IEEE 1309 Draft Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9kHz to 40GHz

Conditions

Dipole 210-00710 was a recalibration.

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

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

Dipole Calibration uncertainty

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

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

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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	67.1 mm	38.9 mm

Electrical Validation

Tissue	Frequency	SWR:	Return Loss	Impedance
Head	1900MHz	1.084 U	-27.92 dB	52.247 Ω
Body	1900MHz	1.128 U	-24.40 dB	52.618 Ω

Tissue Validation

	Dielectric constant, ϵ_r	Conductivity, σ [S/m]
Head Tissue 1900MHz	40.20	1.38
Body Tissue 1900MHz	52.63	1.46

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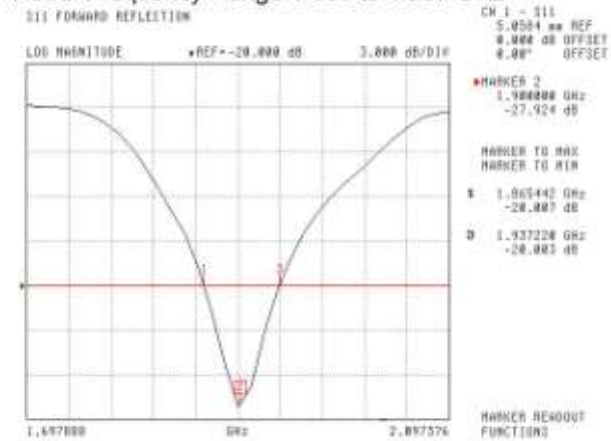
NCL Calibration Laboratories

Division of APREL Laboratories.

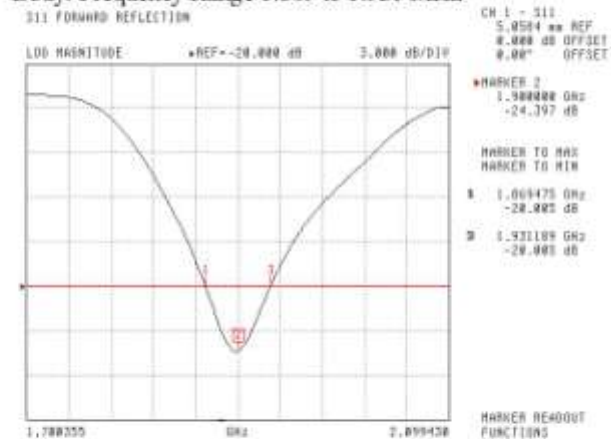
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head: Frequency Range 1.865 to 1.937 GHz



Body: Frequency Range 1.869 to 1.931 MHz

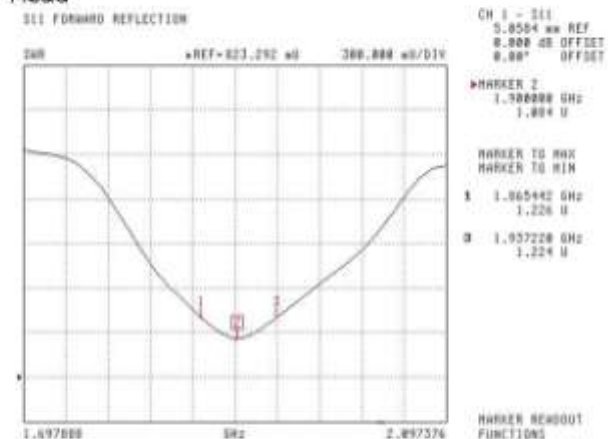
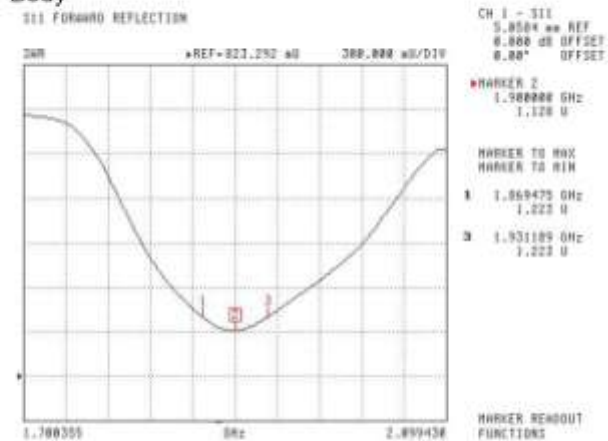


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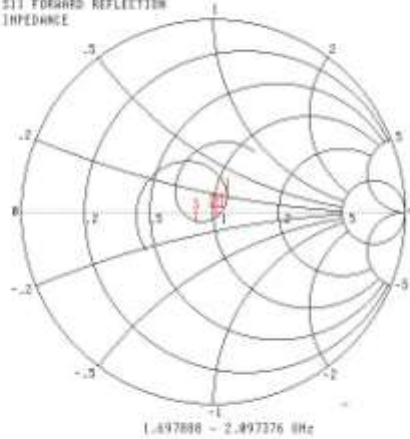
NCL Calibration Laboratories

Division of APREL Laboratories.

SWR**Head****Body**

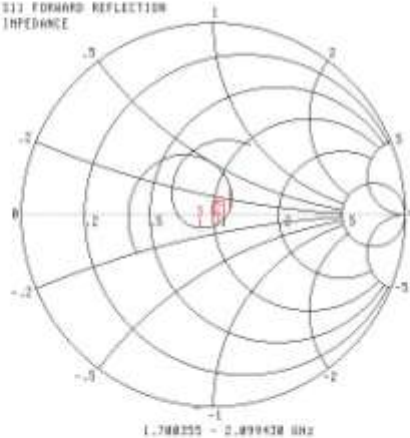
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NCL Calibration Laboratories
Division of APREL Laboratories.**Smith Chart Dipole Impedance****Head**S11 FORWARD REFLECTION
IMPEDANCECH 1 - S11
3.0284 dB REF
0.000 dB OFFSET
0.00° OFFSETMARKER 2
1.988008 GHz
52.247 Ω
-3.183 jΩ

MARKER TO MAX

MARKER TO MIN

1 1.865442 GHz
57.627 Ω
7.644 jΩ
2 1.937228 GHz
41.868 Ω
-6.272 jΩMARKER READOUT
FUNCTIONS**Body**S11 FORWARD REFLECTION
IMPEDANCECH 1 - S11
3.0284 dB REF
0.000 dB OFFSET
0.00° OFFSETMARKER 2
1.988008 GHz
52.518 Ω
-5.335 jΩ

MARKER TO MAX

MARKER TO MIN

1 1.869472 GHz
68.277 Ω
4.946 jΩ
2 1.931105 GHz
43.257 Ω
-6.475 jΩMARKER READOUT
FUNCTIONS

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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 2014

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NCL CALIBRATION LABORATORIES

Calibration File No: DC-1602
Project Number: BAC-dipole-cal-5779

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-2450-S-2
Frequency: 2450 MHz
Serial No: 220-00768

Customer: Bay Area Compliance Laboratory

Calibrated: 9th October, 2014
Released on: 9th October, 2014

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

Released By:



Art Brennan, Quality Manager

NCL CALIBRATION LABORATORIES

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

Division of APREL Lab.
TEL: (613) 435-8300
FAX: (613) 435-8308

NCL Calibration Laboratories

Division of APREL Laboratories.

Conditions

Dipole 220-00758 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

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
Maryna Nesterova Calibration Engineer**Primary Measurement Standards**

Instrument	Serial Number	Cal due date
Tektronix USB Power Meter	11C940	May 14, 2015
Network Analyzer Anritsu 37347C	002106	Feb. 20, 2015

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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

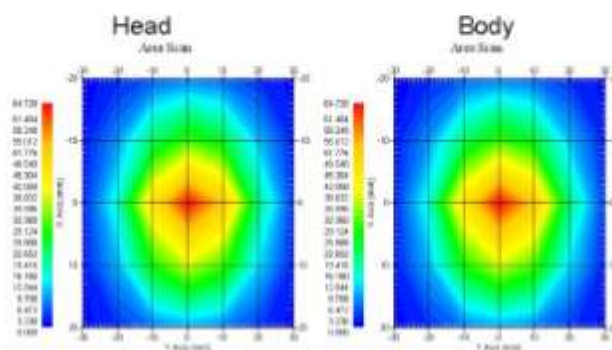
Length: 52.4 mm
Height: 30.3 mm

Electrical Specification

Tissue	Frequency	SWR:	Return Loss	Impedance
Head	2450 MHz	1.014 U	-45.184 dB	50.006Ω
Body	2450 MHz	1.070 U	-29.453 dB	50.672 Ω

System Validation Results

Tissue	Frequency	1 Gram	10 Gram	Peak
Head	2450 MHz	54.916	25.327	111.97
Body	2450 MHz	52.418	24.691	103.91



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NCL Calibration Laboratories

Division of APREL Laboratories.

Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 220-00758. 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 30 MHz to 6 GHz E-Field Probe Serial Number 225.

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"

IEC-62209 "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures"

Part 1: "Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 300 MHz to 3 GHz)"

IEC-62209 "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures"

Part 2 *Draft*: "Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 30 MHz to 6 GHz)"**Conditions**

Dipole 220-00758 was a re-calibration.

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C**Temperature of the Tissue:** 20 °C +/- 0.5°C**Dipole Calibration uncertainty**

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

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

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NCL Calibration Laboratories

Division of APREL Laboratories.

Dipole Calibration Results**Mechanical Verification**

APREL Length	APREL Height	Measured Length	Measured Height
51.5 mm	30.4 mm	52.4 mm	30.3 mm

Electrical Specification

Tissue	Frequency	SWR:	Return Loss	Impedance
Head	2450 MHz	1.014 U	-45.184 dB	50.006 Ω
Body	2450 MHz	1.070 U	-29.453 dB	50.672 Ω

Tissue Validation

	Dielectric constant, ϵ_r	Conductivity, σ [S/m]
Head Tissue 2450MHz	37.26	1.84
Body Tissue 2450MHz	53.61	1.90

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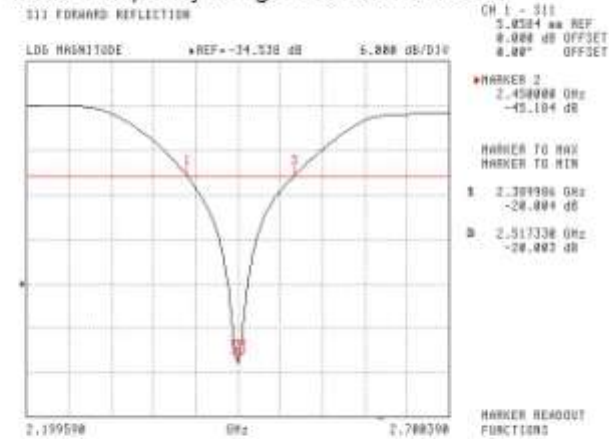
NCL Calibration Laboratories

Division of APREL Laboratories.

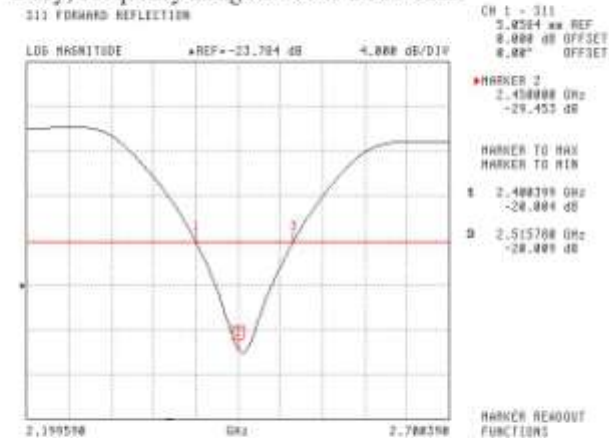
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head: Frequency Range 2.390 to 2.517 GHz



Body: Frequency Range 2.400 to 2.516 GHz



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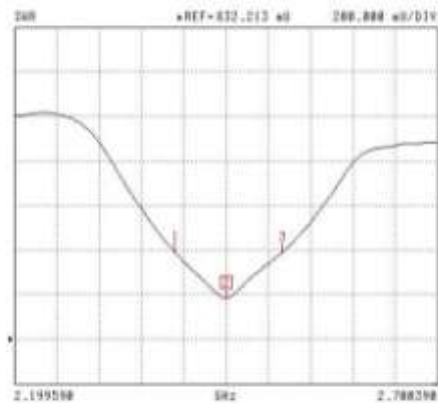
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NCL Calibration Laboratories

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SWR**Head**

S11 FORWARD REFLECTION



CH 1 - S11
5.0554 uV REF
0.000 dB OFFSET
0.00° OFFSET

*MARKER 2
2.450000 GHz
1.614 U

HARKER TO MAX
HARKER TO MIN

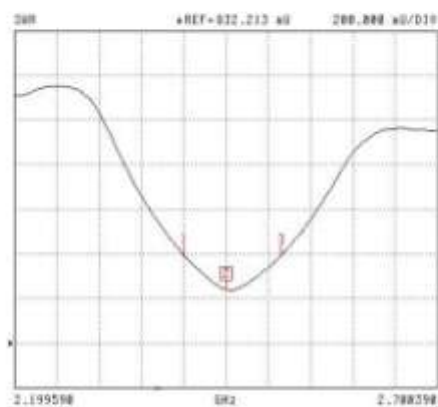
1 2.389586 GHz
1.223 U

3 2.517338 GHz
1.223 U

HARKER RESCOUT
FUNCTIONS

Body

S11 FORWARD REFLECTION



CH 1 - S11
5.0554 uV REF
0.000 dB OFFSET
0.00° OFFSET

*MARKER 2
2.450000 GHz
1.676 U

HARKER TO MAX
HARKER TO MIN

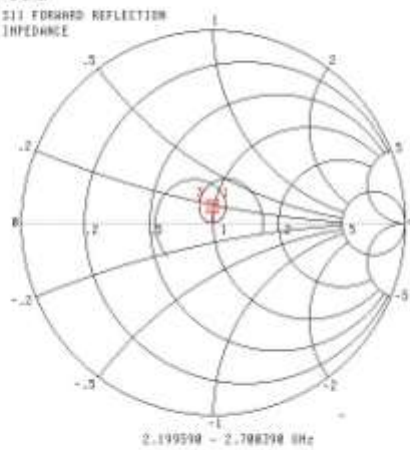
1 2.400299 GHz
1.223 U

3 2.515788 GHz
1.223 U

HARKER RESCOUT
FUNCTIONS

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NCL Calibration Laboratories
Division of APREL Laboratories.**Smith Chart Dipole Impedance****Head**S11 FORWARD REFLECTION
IMPEDANCECH 1 - S11
5.0584 mV REF
0.000 dB OFFSET
0.00° OFFSETHARBER 2
2.450000 GHz
50.000 Ω
-106.117 jΩ

HARBER TO HAR

HARBER TO HAR

1 2.309988 GHz

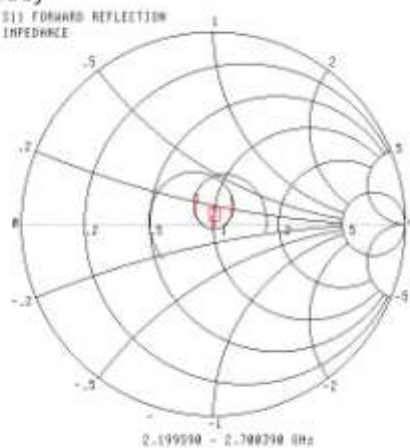
50.000 Ω

0.250 jΩ

2 2.517338 GHz

43.250 Ω

6.439 jΩ

HARBER REABOUT
FUNCTIONS**Body**S11 FORWARD REFLECTION
IMPEDANCECH 1 - S11
5.0584 mV REF
0.000 dB OFFSET
0.00° OFFSETHARBER 2
2.450000 GHz
50.072 Ω
-2.250 jΩ

HARBER TO HAR

HARBER TO HAR

1 2.400396 GHz

60.450 Ω

3.590 jΩ

2 2.513788 GHz

41.655 Ω

2.000 jΩ

HARBER REABOUT
FUNCTIONS

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NCL Calibration Laboratories

Division of APREL Laboratories.

Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2014.

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APPENDIX D EUT TEST POSITION PHOTOS

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



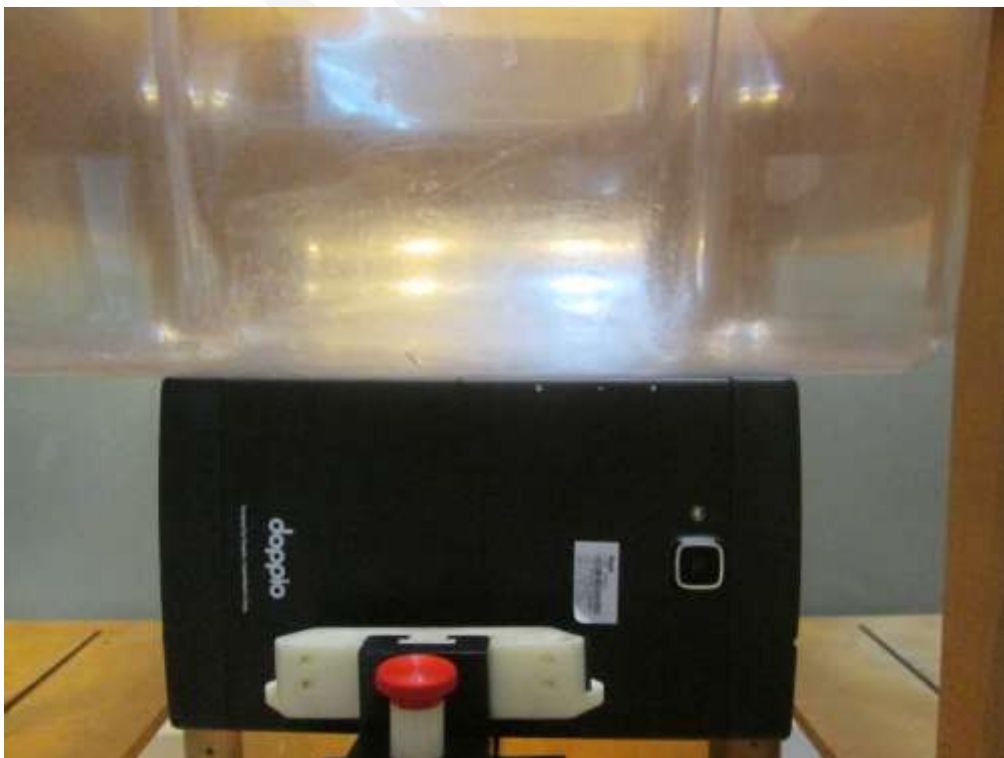
Body-worn Back Setup Photo (0mm)



Body-worn Left Setup Photo (0mm)



Body-worn Right Setup Photo (0mm)



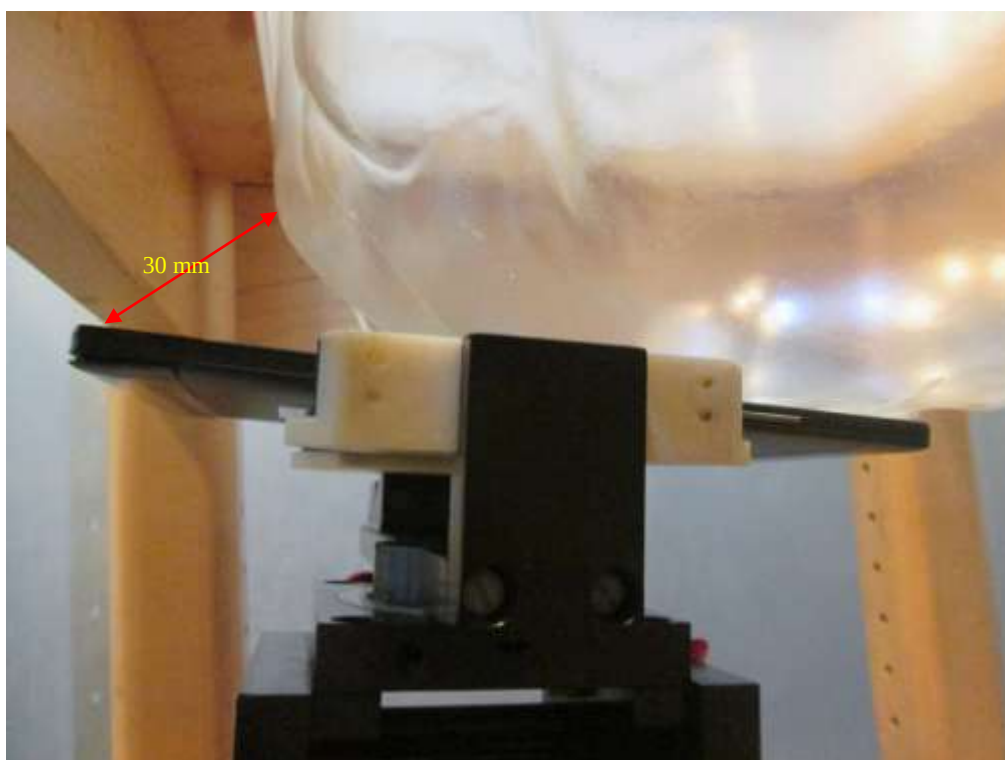
Body-worn Bottom Setup Photo (0mm)



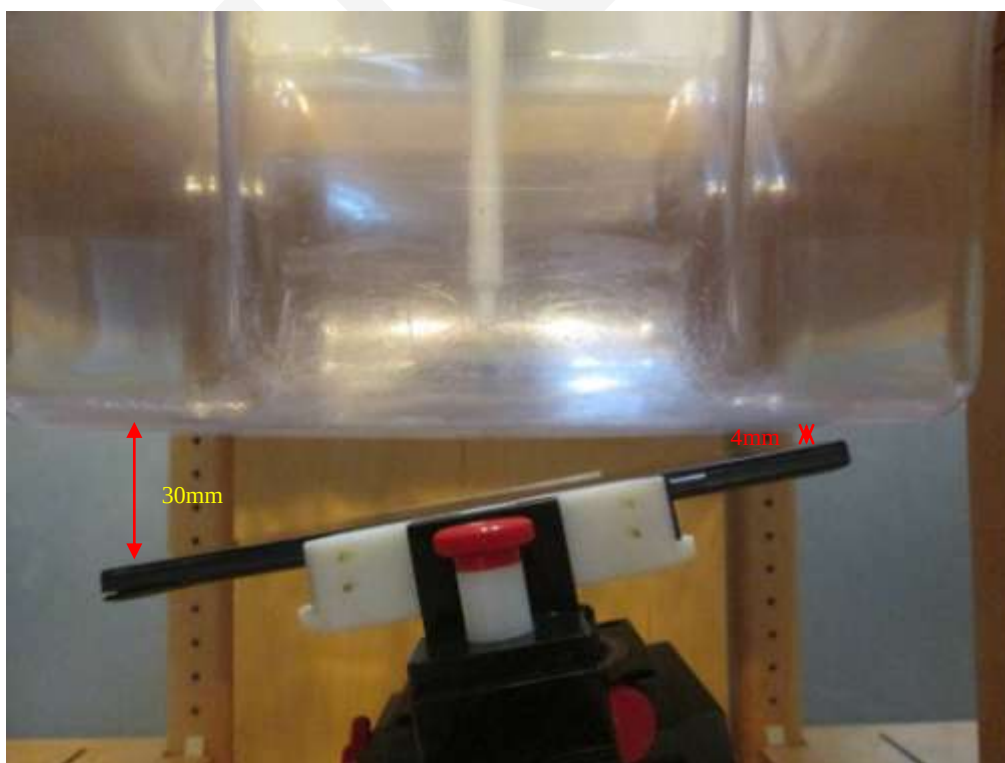
Body-worn Top Setup Photo (0mm)



Left Head Cheek Setup Photo

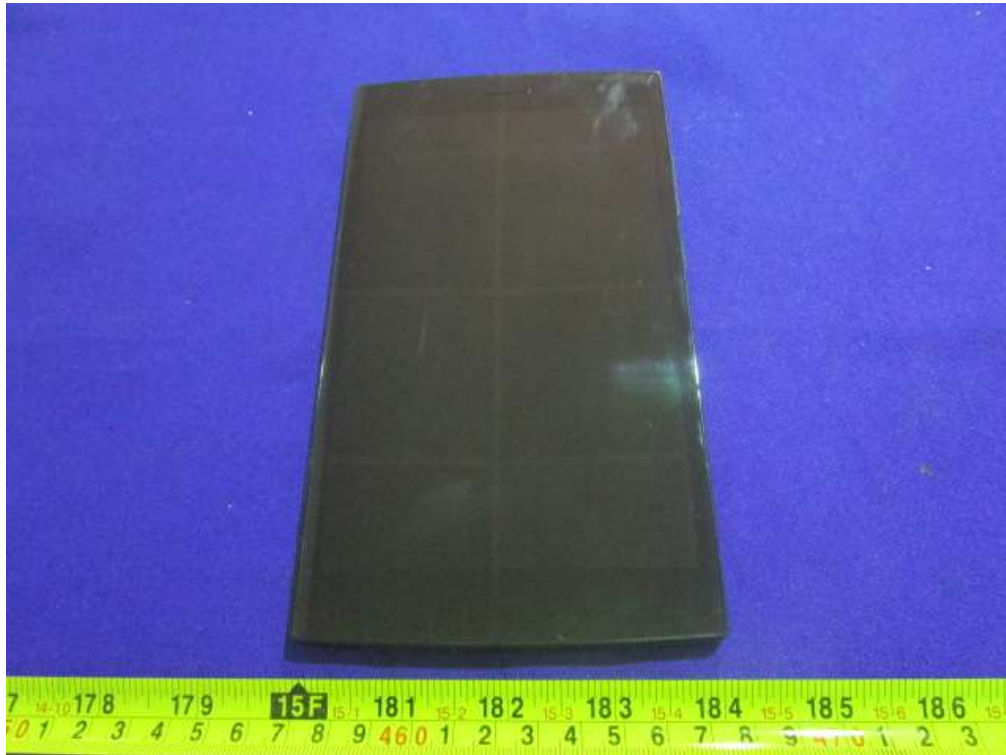


Head Cheek Setup Photo



APPENDIX E EUT PHOTOS

EUT – Front View



EUT – Back View



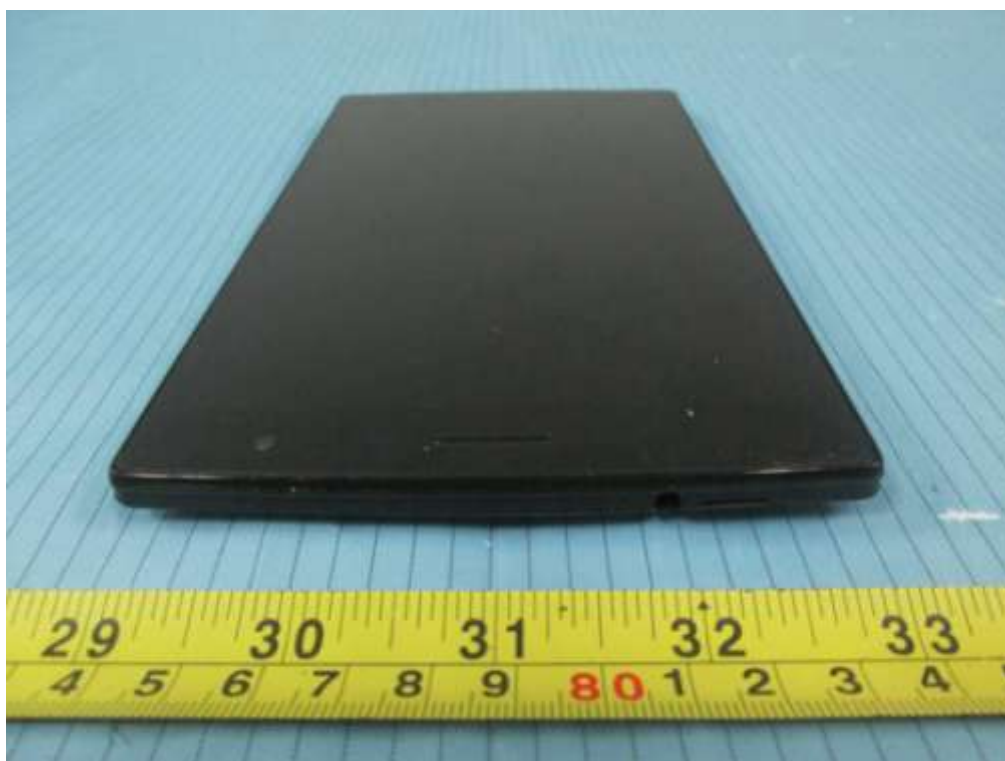
EUT –Left Side View



EUT – Right Side View



EUT – Top View



EUT – Bottom View



EUT – Uncover View

4G antenna

GSM&3G
antenna



APPENDIX F INFORMATIVE REFERENCES

- [1] Federal Communications Commission, \Report and order: Guidelines for evaluating the environmental effects of radiofrequency radiation", Tech. Rep. FCC 96-326, FCC, Washington, D.C. 20554, 1996.
- [2] David L. Means Kwok Chan, Robert F. Cleveland, \Evaluating compliance with FCC guidelines for human exposure to radiofrequency electromagnetic fields", Tech. Rep., Federal Communication Commission, Office of Engineering & Technology, Washington, DC, 1997.
- [3] Thomas Schmid, Oliver Egger, and Niels Kuster, \Automated E-field scanning system for dosimetric assessments", IEEE Transactions on Microwave Theory and Techniques, vol. 44, pp. 105{113, Jan. 1996.
- [4] Niels Kuster, Ralph Kastle, and Thomas Schmid, \Dosimetric evaluation of mobile communications equipment with known precision", IEEE 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 Kuhn, and Niels Kuster, \The dependence 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 Recipes 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 uncertainty in EMC measurement", Tech. Rep., NAMAS Executive, National Physical Laboratory, Teddington, Middlesex, England, 1994.
- [14] Barry N. Taylor and Christ E. Kuyatt, \Guidelines for evaluating and expressing the uncertainty of NIST measurement results", Tech. Rep., National Institute of Standards and Technology, 1994. Dosimetric Evaluation of Sample device, month 1998 10.

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