EN 50360:2001+A1:2012
EN 50566:2013

SAR EVALUATION REPORT

For

Vonino Electronics Limited

Miramar Tower 10F - no1010, 132 Nathan Road Tsim Sha Tsui, Kowloon, Hong Kong

Model: Magnet M1

Report Type:	**Product Type:**
Amended Report	Tablet PC

Report Number:	RSZ170504008-20A2
Report Date:	2017-05-16
Reviewed By:	Wilson Chen SAR Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Issue
0	RSZ150923003-20	Original Report	2015-10-16
1	RSZ170302003-20A1	First Amended Report	2017-03-09
2	RSZ170504008-20A2	Second Amended Report	2017-05-16

Note:

This is an amended report application based on original report, the details as below

1. Changing the applicant and manufacturer to “Vonino Electronics Limited (Miramar Tower 10F - no1010, 132 Nathan Road Tsim Sha Tsui, Kowloon, Hong Kong)”.

2. Changing the model name to “Magnet M1”.

3. Changing the trademark to “Vonino”.

Based on the above difference, it will not impact any test item, so all the test data and photos please refer to the first amended report.

BELOW IS THE REFERENCED REPORT

EN 50360:2001+A1:2012
EN 50566:2013

SAR EVALUATION REPORT

For

Shenzhen Adreamer Technology Co., Ltd

Building A2, Silicon Valley Dynamic Qinghu Garden, Dahe Rd., Longhua, Shenzhen

Tested Model: MK1012
Multiple Model: M1, M8-10A, Druid L10, Steelcore 1030, 1004, M104, G1001, G10

Report Type:	**Product Type:**
Amended Report	Tablet PC

Report Number:	RSZ170302003-20A1
Report Date:	2017-03-09
Reviewed By:	Wilson Chen SAR Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

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Revision Number	Report Number	Description of Revision	Date of Issue
0	RSZ150923003-20	Original Report	2015-10-16
1	RSZ170302003-20A1	Amended Report	2017-03-09

Note:

This is an amended report application based on original report, the details as below

1. Adding a model “M1”.

Based on the above difference, it will affect nothing, so all the data and photos please refer to the original report.

PRODUCT SIMILARITY DECLARATION LETTER

Shenzhen Adreamer Technology Co., Ltd
Add: Building A2, Silicon Valley Dynamic Qinghu Garden,Dahe Rd.,Longhua,Shenzhen
Tel: 13590164011 Fax: 0755-27474930
Email: kevinkang201212@adreamertech.com

Product Similarity Declaration

Date: 2017-3-1

To:
Bay Area Compliance Laboratories Corp.
1274 Anvilwood Avenue
Sunnyvale, CA 94089

To Whom It May Concern,

We, Shenzhen Adreamer Technology Co., Ltd, hereby declare that we have a product named as Tablet PC (Model no: MK1012) was tested by BACL, meanwhile, for our marketing purpose, we would like to list a series models（M1, M8-10A,Druid L10, Steelcore 1030,1004,M104,G1001,G10), on reports and certificate, all the models are identical schematics, except for the differences as below,

1 . Difference model No.
2. Every Model No. has trade name, please find below:

Trade name	Model No.
Adreamer	MK1012
Funship	M8-10A
Vonino	Druid L10, M1
Overmax	Steelcore 1030
Turbopad	1004
Marshal	M104
Hipstreet	G1001
NeuTab	G10

No other changes are made to them.
We confirm that all information above is true, and we'll be responsible for all the consequences. Please contact me if you have any question.

Signature: Kevin kang

Kevin kang
GM

BELOW IS THE REFERENCED REPORT

EN 50360:2001+A1:2012
EN 50566:2013

SAR EVALUATION REPORT

For

Shenzhen Adreamer Technology Co., Ltd

Building A2, Silicon Valley Dynamic Qinghu Garden,Dahe Rd.,Longhua, Shenzhen

Tested Model: MK1012
Multiple Model: M8-10A,Druid L10,Steelcore 1030,1004,M104,G1001,G10

Report Type:	**Product Type:**
Original Report	Tablet PC

Test Engineer:	Terry XiaHou
Report Number:	RSZ150923003-20
Report Date:	2015-10-16
Reviewed By:	Bell Hu SAR Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

Attestation of Test Results			
EUT Information	**Company Name**	Shenzhen Adreamer Technology Co., Ltd	
	EUT Description	Tablet PC	
	Model Number	Tested Model: MK1012 Multiple Models: M8-10A,Druid L10,Steelcore 1030,1004,M104, G1001,G10	
	Test Date	2015-09-23	
Frequency Band	**Max. SAR Level(s) Measured**		**Limit(W/Kg)**
EGSM 900	0.627 W/kg 10g Body SAR		**2.0**
DCS 1800	0.833 W/kg 10g Body SAR		
WCDMA 900	0.356 W/kg 10g Body SAR		
WCDMA 2100	1.449 W/kg 10g Body SAR		
LTE Band 3	0.322 W/kg 10g Body SAR		
LTE Band 7	0.288 W/kg 10g Body SAR		
LTE Band 20	0.227 W/kg 10g Body SAR		
Applicable Standards	**EN50360: 2001+A1:2012** Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300MHz – 3GHz)		
	EN50566: 2013 Product standard to demonstrate compliance of radio frequency fields from handheld and body-mount wireless communication devices used by the general public (30 MHz — 6 GHz)		
	EN62209-1:2006 Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures – Part1:Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3GHz)		
	EN62209-2:2010 Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures – Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)		
	EN 62479:2010 Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)		
	IEEE1528:2013 Draft Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.		

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 DIRECTIVE 1999/5/EC & EN 50360:2001+A1:2012 and has been tested in accordance with the measurement procedures specified in EN62209-1:2006 & EN62209-2:2010.

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

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	RSZ150923003-20	Original Report	2015-10-16

EUT DESCRIPTION

This report has been prepared on behalf of Shenzhen Adreamer Technology Co., Ltd and their product, Model: MK1012 or the EUT (Equipment under Test) as referred to in the rest of this report.

**Note: This series products model: MK1012, M8-10A, Druid L10, Steelcore 1030, 1004, M104, G1001 and G10, we select model: MK1012 to test, there is no electrical change has been made to the equipment, please refer to the product similarity letter.*

Technical Specification

Product Type	Portable
Exposure Category:	Population / Uncontrolled
Antenna Type(s):	Internal Antenna
Body-Worn Accessories:	Headset
Face-Head Accessories:	None
Multi-slot Class:	Class 12
Operation Mode :	GSM Voice, EGPRS/GPRS Data, WCDMA,LTE, Wi-Fi and Bluetooth
Frequency Band:	E-GSM900: 880-915 MHz(TX); 925-960 MHz(RX) DCS Band: 1710-1785 MHz(TX); 1805-1880 MHz(RX) WCDMA900: 880-915 MHz(TX); 925-960 MHz(RX) WCDMA2100: 1920-1980MHz(TX); 2110-2170MHz(RX) LTE Band 3: 1710-1785MHz(TX) ; 1805-1880MHz(RX) LTE Band 7: 2500-2570MHz(TX) ; 2620-2690MHz(RX) LTE Band 20: 832-862MHz(TX) ; 791-821MHz(RX) WIFI: 2412-2472MHz Bluetooth: 2402-2480 MHz
Conducted RF Power:	EGSM 900: 32.20 dBm DCS 1800: 28.50 dBm WCDMA 900: 21.90 dBm WCDMA 2100: 22.23 dBm LTE Band 3: 23.43 dBm LTE Band 7: 22.97 dBm LTE Band 20: 22.88 dBm Wi-Fi: 7.75 dBm Bluetooth: 5.06 dBm
Dimensions (L*W*H):	259 mm (L) × 159 mm (W) × 9 mm (H)
Power Source:	3.7V_{DC} Rechargeable Battery
Normal Operation:	Head and Body worn

REFERENCE, STANDARDS, AND GUILDELINES

FCC:

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

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

CE:

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

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

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

SAR Limits

FCC Limit (1g Tissue)

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

CE Limit (10g Tissue)

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

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

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

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

FACILITIES

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

DESCRIPTION OF TEST SYSTEM

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

ALSAS-10U System Description

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

Applications

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

Area Scans

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

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

Zoom Scan (Cube Scan Averaging)

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

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

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

ALSAS-10U Interpolation and Extrapolation Uncertainty

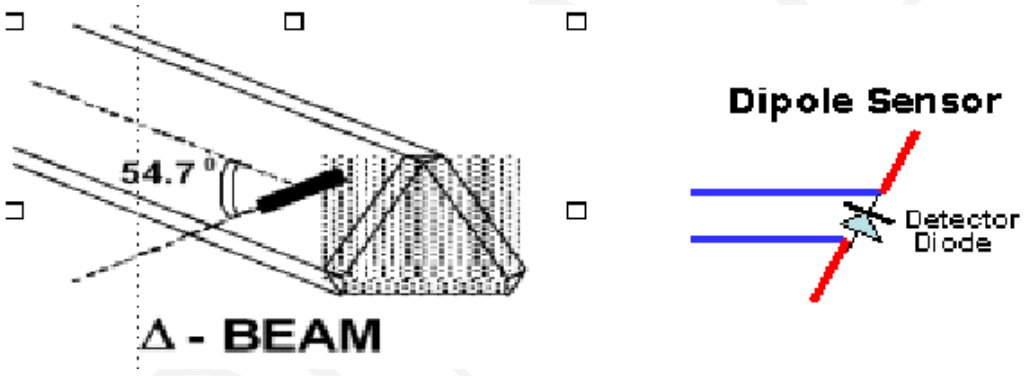
The overall uncertainty for the methodology and algorithms the used during the SAR calculation was evaluated using the data from IEEE 1528 based on the example f3 algorithm:

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

Isotropic E-Field Probe

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

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



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

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

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

Isotropic E-Field Probe Specification

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

Boundary Detection Unit and Probe Mounting Device

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

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

Daq-Paq (Analog to Digital Electronics)

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

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

Axis Articulated Robot

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

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

ALSAS Universal Workstation

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

Universal Device Positioner

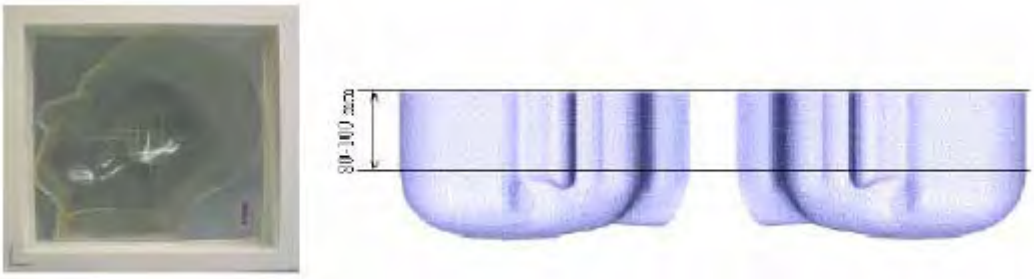
The universal device positioner allows complete freedom of movement of the EUT. Developed to hold a EUT in a free-space scenario any additional loading attributable to the material used in the construction of the positioner has been eliminated. Repeatability has been enhanced through the linear scales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

Phantom Types

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

APREL SAM Phantoms

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



APREL Laboratories Universal Phantom

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

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

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

Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the EN62209-1:2006 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 recommended in EN62209-2:2010.

EN62209-1:2006 Recommended Tissue Dielectric Parameters

Frequency (MHz)	Head Tissue	
	εr	σ (S/m)
150	52.3	0.76
300	45.3	0.87
450	43.5	0.87
835	41.5	0.90
900	41.5	0.97
915	41.5	0.98
1450	40.5	1.20
1610	40.3	1.29
1800-2000	40.0	1.40
2450	39.2	1.80
3000	38.5	2.40
5800	35.3	5.27

EN62209-2:2010 Recommended Body Tissue Dielectric Parameters

Frequency (MHz)	Body Tissue	
	εr	σ (S/m)
450	43.5	0.87
835	41.5	0.90
900	41.5	0.97
1800	40.0	1.40
1900	40.0	1.40
2450	39.2	1.80
4000	37.4	3.43
5000	36.2	4.45

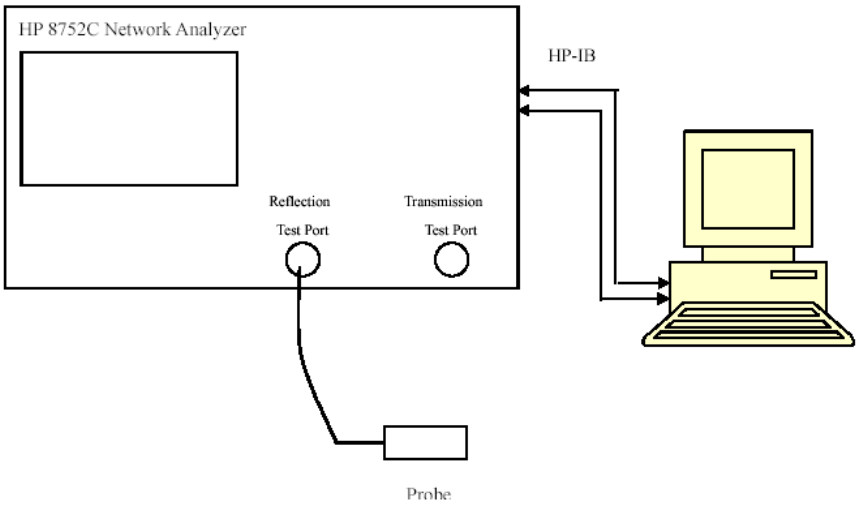
EQUIPMENT LIST AND CALIBRATION

Equipments List & Calibration Information

Equipment	Model	Calibration Date	Calibration Date	S/N
CRS F3 robot	ALS-F3	N/A	N/A	RAF0805352
CRS F3 Software	ALS-F3-SW	N/A	N/A	N/A
CRS C500C controller	ALS-C500	N/A	N/A	RCF0805379
Probe mounting device & Boundary Detection Sensor System	ALS-PMDPS-3	N/A	N/A	120-00270
Universal Work Station	ALS-UWS	N/A	N/A	100-00157
Data Acquisition Package	ALS-DAQ-PAQ-3	2014-10-14	2015-10-14	110-00212
Miniature E-Field Probe	ALS-E-020	2014-10-14	2015-10-14	500-00283
Dipole, 835MHz	ALS-D-835-S-2	2014-10-08	2017-10-08	180-00558
Dipole, 900MHz	ALS-D-900-S-2	2014-10-08	2017-10-08	190-00609
Dipole, 1750MHz	ALS-D-1750-S-2	2013-10-08	2016-10-08	198-00304
Dipole, 1900MHz	ALS-D-1900-S-2	2014-10-09	2017-10-09	210-00710
Dipole,2450MHz	ALS-D-2450-S-2	2014-10-09	2017-10-09	220-00758
Dipole Spacer	ALS-DS-U	N/A	N/A	250-00907
Device holder/Positioner	ALS-H-E-SET-2	N/A	N/A	170-00510
Left ear SAM phantom	ALS-P-SAM-L	N/A	N/A	130-00311
Right ear SAM phantom	ALS-P-SAM-R	N/A	N/A	140-00359
UniPhantom	ALS-P-UP-1	N/A	N/A	150-00413
Simulated Tissue 835 MHz Head and Body	ALS-TS-835-H	Each Time	/	270-01002
Simulated Tissue 900 MHz Head and Body	ALS-TS-900-H	Each Time	/	280-01054
Simulated Tissue 1750 MHz Head and Body	ALS-TS-1750-H	Each Time	/	290-01105
Simulated Tissue 1900 MHz Head and Body	ALS-TS-1900-H	Each Time	/	295-01103
Simulated Tissue 2450 MHz Head and Body	ALS-TS-2450-H	Each Time	/	296-01001
Directional couple	DC6180A	N/A	N/A	0325849
Power Amplifier	5S1G4	N/A	N/A	71377
Attenuator	3dB	N/A	N/A	5402
Dielectric probe kit	HP85070B	2015-06-13	2016-06-13	US33020324
Network analyzer	8752C	2015-06-03	2016-06-03	3410A02356
Synthesized Sweeper	HP 8341B	2015-06-03	2016-06-03	2624A00116
UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	2014-11-23	2015-11-23	106891
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	2015-04-19	2016-04-19	114772
EMI Test Receiver	ESCI	2015-06-13	2016-06-13	101746

SAR MEASUREMENT SYSTEM VERIFICATION

Liquid Verification



Liquid Verification Setup Block Diagram

Liquid Verification Results

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	$\Delta\sigma$	
842.0	Head and Body	41.03	0.92	41.50	0.90	-1.133	2.222	±5
847.0	Head and Body	41.01	0.93	41.50	0.90	-1.181	3.333	±5
852.0	Head and Body	41.06	0.92	41.50	0.90	-1.060	2.222	±5
880.2	Head and Body	41.42	0.97	41.50	0.97	-0.193	0.000	±5
882.4	Head and Body	41.34	0.97	41.50	0.97	-0.386	0.000	±5
897.6	Head and Body	41.41	0.98	41.50	0.97	-0.217	1.031	±5
902.0	Head and Body	41.38	0.99	41.50	0.97	-0.289	2.062	±5
912.6	Head and Body	41.24	1.00	41.50	0.97	-0.627	3.093	±5
914.8	Head and Body	41.23	1.00	41.50	0.97	-0.651	3.093	±5
1710.2	Head and Body	39.55	1.37	40.00	1.40	-1.125	-2.143	±5
1720.0	Head and Body	39.39	1.37	40.00	1.40	-1.525	-2.143	±5
1747.5	Head and Body	39.27	1.38	40.00	1.40	-1.825	-1.429	±5
1747.8	Head and Body	39.22	1.38	40.00	1.40	-1.950	-1.429	±5
1775.0	Head and Body	39.28	1.42	40.00	1.40	-1.800	1.429	±5
1784.8	Head and Body	39.34	1.41	40.00	1.40	-1.650	0.714	±5
1922.4	Head and Body	40.24	1.36	40.00	1.40	0.600	-2.857	±5
1950.0	Head and Body	40.24	1.41	40.00	1.40	0.600	0.714	±5
1977.6	Head and Body	40.37	1.40	40.00	1.40	0.925	0.000	±5
2510.0	Head and Body	39.79	1.78	39.20	1.80	1.505	-1.111	±5
2535.0	Head and Body	39.57	1.79	39.20	1.80	0.944	-0.556	±5
2560.0	Head and Body	39.67	1.82	39.20	1.80	1.199	1.111	±5

**Liquid Verification was performed on 2015-09-23*

Please refer to the following tables.

900 MHz Head and Body				835 MHz Head and Body		
Frequency (MHz)	**e'**	**e''**		**Frequency (MHz)**	**e'**	**e''**
880.0	41.4241	19.7805		835.0	41.0530	19.6826
880.7	41.3425	19.7864		835.5	41.1058	19.6990
881.4	41.3914	19.6337		836.0	41.0483	19.7159
882.1	41.3362	19.7705		836.5	41.0533	19.7626
882.8	41.3438	19.7021		837.0	41.1038	19.7638
883.5	41.2678	19.6122		837.5	41.1037	19.7616
884.2	41.4732	19.7170		838.0	41.0173	19.7637
884.9	41.2076	19.6152		838.5	41.0548	19.7296
885.6	41.4187	19.6165		839.0	41.0117	19.6800
886.3	41.4157	19.6341		839.5	41.0803	19.7165
887.0	41.4102	19.6254		840.0	41.0167	19.6818
887.7	41.2607	19.6254		840.5	41.0427	19.7071
888.4	41.4035	19.7102		841.0	41.0990	19.7299
889.1	41.2331	19.6974		841.5	41.0862	19.7093
889.8	41.3389	19.6826		842.0	41.0329	19.6902
890.5	41.3000	19.6102		842.5	41.0138	19.7608
891.2	41.2769	19.7824		843.0	41.0996	19.6949
891.9	41.2555	19.6906		843.5	41.0354	19.7655
892.6	41.3963	19.7551		844.0	41.0370	19.7502
893.3	41.2016	19.7939		844.5	41.0392	19.7425
894.0	41.2664	19.6787		845.0	41.0220	19.7653
894.7	41.2988	19.6180		845.5	41.0454	19.7016
895.4	41.4437	19.6835		846.0	41.0552	19.7063
896.1	41.3094	19.6080		846.5	41.0511	19.7355
896.8	41.2432	19.7192		847.0	41.0068	19.7222
897.5	41.4087	19.6440		847.5	41.0669	19.7047
898.2	41.3746	19.6580		848.0	41.0781	19.7536
898.9	41.3087	19.7303		848.5	41.0717	19.7700
899.6	41.1954	19.6111		849.0	41.0742	19.7561
900.3	41.4333	19.6593		849.5	41.0308	19.7057
901.0	41.2993	19.6869		850.0	41.0010	19.6790
901.7	41.3838	19.7284		850.5	40.9971	19.7202
902.4	41.2454	19.6663		851.0	40.9969	19.3980
903.1	41.2768	19.6490		851.5	41.0032	19.4555
903.8	41.4512	19.6193		852.0	41.0632	19.3659
904.5	41.4196	19.6334		852.5	41.0760	19.3724
905.2	41.4415	19.7153		853.0	41.0444	19.4681
905.9	41.1999	19.7624		853.5	41.0445	19.3912
906.6	41.2381	19.7304		854.0	41.0420	19.4312
907.3	41.2180	19.6159		854.5	41.0951	19.4430
908.0	41.2314	19.6814		855.0	41.0009	19.4265
908.7	41.3001	19.7808		855.5	41.0679	19.4127
909.4	41.2472	19.7235		856.0	41.0951	19.4177
910.1	41.2562	19.7531		856.5	41.0316	19.4353
910.8	41.3061	19.7416		857.0	41.1002	19.4144
911.5	41.3515	19.7709		857.5	41.0257	19.4446
912.2	41.2426	19.6615		858.0	41.0869	19.4134
912.9	41.3982	19.7071		858.5	41.0508	19.4178
913.6	41.3139	19.6550		859.0	41.0181	19.4696
914.3	41.4176	19.7337		859.5	40.9971	19.4281
915.0	41.2320	19.6896		860.0	41.0622	19.3893

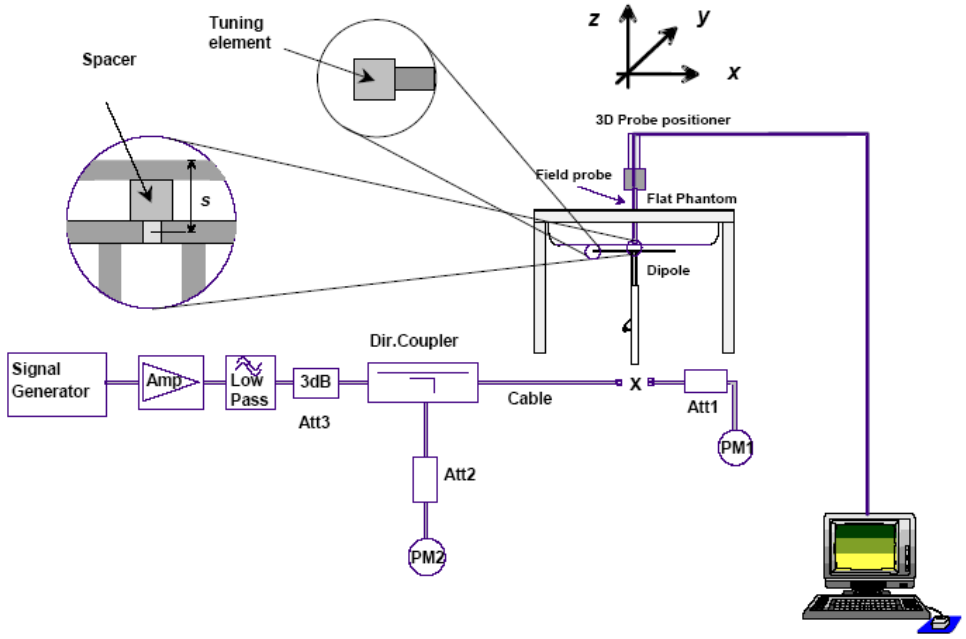
1750 MHz Head and Body				1900 MHz Head and Body		
Frequency (MHz)	**e'**	**e''**		**Frequency (MHz)**	**e'**	**e''**
1710.0	39.5492	14.3711		1920.0	40.1239	12.8134
1711.5	39.2559	14.1241		1921.2	40.1555	12.5609
1713.0	39.4807	14.4423		1922.4	40.2418	12.7252
1714.5	39.2750	14.2285		1923.6	40.2151	12.5827
1716.0	39.2820	14.1611		1924.8	40.4276	13.1766
1717.5	39.3834	14.5384		1926.0	40.1143	13.0608
1719.0	39.1855	14.2804		1927.2	40.7395	13.2663
1720.5	39.4707	14.5257		1928.4	40.6612	13.1875
1722.0	39.4769	14.4441		1929.6	40.0841	12.7180
1723.5	39.5906	14.1310		1930.8	40.5761	12.5502
1725.0	39.4309	14.0996		1932.0	40.5092	13.0011
1726.5	39.4242	14.4614		1933.2	40.6054	13.2275
1728.0	39.4681	14.5296		1934.4	40.5148	12.6581
1729.5	39.3754	14.4999		1935.6	40.0649	12.5912
1731.0	39.5267	14.5369		1936.8	40.6327	13.0632
1732.5	39.1731	14.4856		1938.0	40.4553	12.6098
1734.0	39.4636	14.2676		1939.2	40.5681	12.5666
1735.5	39.2698	14.2364		1940.4	40.6689	13.0514
1737.0	39.4707	14.2449		1941.6	40.4575	13.2370
1738.5	39.4705	14.4672		1942.8	40.5452	13.0998
1740.0	39.5593	14.5605		1944.0	40.3288	13.2401
1741.5	39.1480	14.1415		1945.2	40.7499	13.0828
1743.0	39.4831	14.5018		1946.4	40.1095	13.2637
1744.5	39.5649	14.1996		1947.6	40.7501	12.8709
1746.0	39.1005	14.1946		1948.8	40.1702	12.8650
1747.5	39.2727	14.1749		1950.0	40.2386	12.9622
1749.0	39.2243	14.1713		1951.2	40.0322	12.8473
1750.5	39.3006	14.2399		1952.4	40.2817	13.1084
1752.0	39.2984	14.4611		1953.6	39.9830	12.7609
1753.5	39.5760	14.3822		1954.8	40.7393	12.9926
1755.0	39.5939	14.1078		1956.0	40.0459	13.2439
1756.5	39.1243	14.4849		1957.2	40.2988	13.1229
1758.0	39.3891	14.3045		1958.4	40.0628	12.7827
1759.5	39.2081	14.5746		1959.6	40.1808	13.3407
1761.0	39.1711	14.5046		1960.8	40.2002	12.9729
1762.5	39.1627	14.5718		1962.0	40.3467	12.9075
1764.0	39.6297	14.3283		1963.2	40.5926	12.7268
1765.5	39.6193	14.4158		1964.4	40.3703	13.3631
1767.0	39.3369	14.1946		1965.6	40.5206	12.7091
1768.5	39.5944	14.5140		1966.8	39.9966	13.2258
1770.0	39.5015	14.4176		1968.0	40.1155	12.8871
1771.5	39.4551	14.5679		1969.2	40.0541	13.2313
1773.0	39.4094	14.5446		1970.4	39.9911	13.1806
1774.5	39.3370	14.3253		1971.6	40.7191	12.5429
1776.0	39.1949	14.5070		1972.8	40.1774	12.9997
1777.5	39.5418	14.2648		1974.0	40.2590	13.2402
1779.0	39.2669	14.4527		1975.2	40.2109	13.1506
1780.5	39.3291	14.3684		1976.4	40.3038	12.8214
1782.0	39.5209	14.4209		1977.6	40.3724	12.7355
1783.5	39.2783	14.2123		1978.8	40.6637	12.5453
1785.0	39.3355	14.2269		1980.0	40.0564	13.0879

2450 MHz Head and Body		
Frequency (MHz)	**e'**	**e''**
2510.0	39.7905	12.7489
2511.0	39.4592	12.6225
2512.0	39.4837	12.6938
2513.0	39.6890	12.4655
2514.0	39.6062	12.4772
2515.0	39.6815	12.4735
2516.0	39.6356	12.5772
2517.0	39.3506	12.7105
2518.0	39.5618	12.7660
2519.0	39.6867	12.5054
2520.0	39.5306	12.6887
2521.0	39.5270	12.5472
2522.0	39.3970	12.5700
2523.0	39.3658	12.4910
2524.0	39.7277	12.7212
2525.0	39.7395	12.5889
2526.0	39.7684	12.7154
2527.0	39.5385	12.7331
2528.0	39.5365	12.4848
2529.0	39.8693	12.6259
2530.0	39.5247	12.5783
2531.0	39.8582	12.7233
2532.0	39.3455	12.5413
2533.0	39.7953	12.5623
2534.0	39.8131	12.5720
2535.0	39.5758	12.6854
2536.0	39.4578	12.5814
2537.0	39.7646	12.5328
2538.0	39.7239	12.5995
2539.0	39.8641	12.6860
2540.0	39.6916	12.6759
2541.0	39.5875	12.5018
2542.0	39.3708	12.5785
2543.0	39.7384	12.6938
2544.0	39.6254	12.6997
2545.0	39.7082	12.5253
2546.0	39.3573	12.7416
2547.0	39.4969	12.6540
2548.0	39.4129	12.5204
2549.0	39.7651	12.5696
2550.0	39.7390	12.5507
2551.0	39.7821	12.4857
2552.0	39.3794	12.6409
2553.0	39.4846	12.7385
2554.0	39.6830	12.6245
2555.0	39.8578	12.4730
2556.0	39.4859	12.6608
2557.0	39.4711	12.6542
2558.0	39.5102	12.6722
2559.0	39.3829	12.4755
2560.0	39.6693	12.7749

System Accuracy Verification

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

System Verification Setup Block Diagram



Probe and dipole antenna List and Detail

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
APREL	Probe	ALS-E-020	500-00283	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(900MHz)	ALS-D-900-S-2	190-00609	2014-10-08	2017-10-07
APREL	Dipole antenna(1750MHz)	ALS-D-1750-S-2	200-00659	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 (%)
2015-09-23	835	Head and Body	10g	6.653	6.347	4.821	±10
	900	Head and Body	10g	7.681	7.595	1.132	±10
	1750	Head and Body	10g	19.136	18.99	0.769	±10
	1900	Head and Body	10g	18.898	20.44	-7.544	±10
	2450	Head and Body	10g	25.265	25.327	-0.245	±10

All SAR values are normalized to 1 Watt forward power.

EN62209-1:2006 recommended reference value for Head Tissue

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

EN62209-2:2010 recommended reference value for Body Tissue

Frequency (MHz)	1 g SAR (W/Kg)	10 g SAR (W/Kg)	Local SAR at surface (above feed point)	Local SAR at surface (y=2cm offset from feed point)
300	2.85	1.94	4.14	2.00
450	4.58	3.06	6.75	2.98
835	9.56	6.22	14.6	4.90
900	10.9	6.99	16.4	5.40
1450	29.0	16.0	50.2	6.50
1800	38.4	20.1	69.5	6.80
1900	39.7	20.5	72.1	6.60
2000	41.1	21.1	74.6	6.50
2450	52.4	24.0	104	7.70
3000	63.8	25.7	140	9.50

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 : 9.725 W/kg
Power Drift-Finish : 9.815 W/kg
Power Drift (%) : 0.911

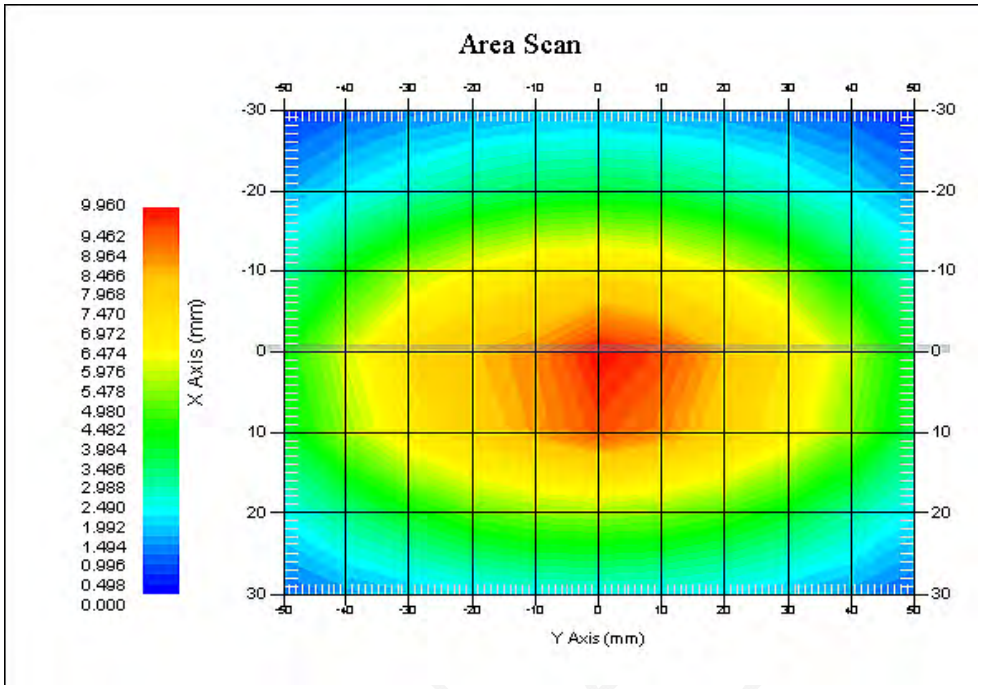
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Serial No. : System Default
Location : Center
Description : Default
Phantom Data

Tissue Data
Type : Head
Serial No. : 270-01002
Frequency : 835.0 MHz
Last Calib. Date : 23-Sep-2015
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 41.08 F/m
Sigma : 0.92 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 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

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

1 gram SAR value : 9.722 W/kg
10 gram SAR value : 6.653 W/kg
Area Scan Peak SAR : 9.885 W/kg
Zoom Scan Peak SAR : 15.610 W/kg



835 MHz System Validation Tissue

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

System Performance Check 900 MHz Liquid

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

Product Data
Device Name : Dipole 900 MHz
Serial No. : 190-00609
Type : Dipole
Model : ALS-D-900-S-2
Frequency Band : 900
Max. Transmit Pwr : 1 W
Drift Time : 3 min(s)
Power Drift-Start : 11.153 W/kg
Power Drift-Finish : 11.185 W/kg
Power Drift (%) : 0.287

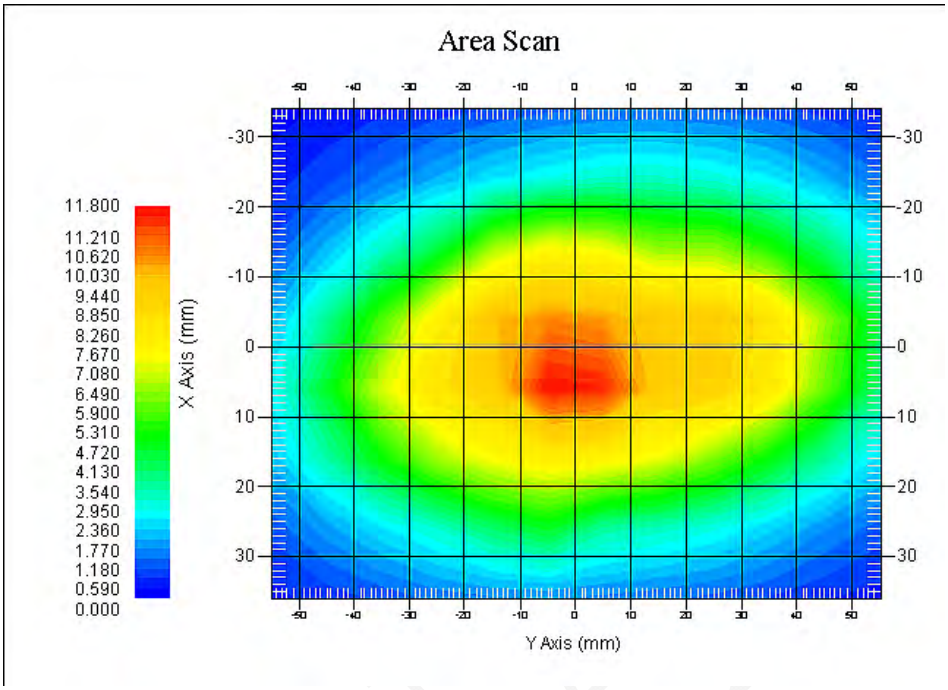
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Serial No. : System Default
Location : Center
Description : Default

Tissue Data
Type : Head and Body
Serial No. : 280-01054
Frequency : 900.00 MHz
Last Calib. Date : 23-Sep-2015
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 50.00 RH%
Epsilon : 41.43 F/m
Sigma : 0.98 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 : 900
Duty Cycle Factor : 1
Conversion Factor : 6
Probe Sensitivity : 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

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

1 gram SAR value : 11.537 W/kg
10 gram SAR value : 7.681 W/kg
Area Scan Peak SAR : 11.735 W/kg
Zoom Scan Peak SAR : 16.818 W/kg



900 MHz System Validation

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

System Performance Check 1750 MHz Liquid

Dipole 1750 MHz; Type: ALS-D-1750-S-2; S/N: 198-00304

Product Data
Device Name : Dipole 1750MHHz
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 : 26.537 W/kg
Power Drift-Finish : 26.789 W/kg
Power Drift (%) : 0.921

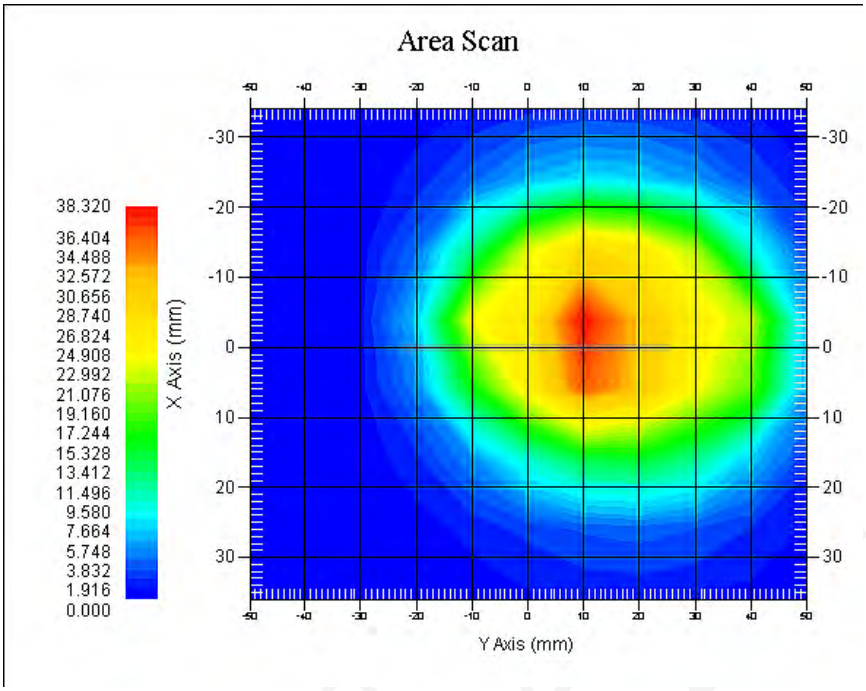
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Serial No. : System Default
Location : Center
Description : Default

Tissue Data
Type : Head and Body
Serial No. : 290-01105
Frequency : 1750 MHz
Last Calib. Date : 23-Sep-2015
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 50.00 RH%
Epsilon : 39.26 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 $\mu V/(V/m)^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

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

1 gram SAR value : 37.533 W/kg
10 gram SAR value : 19.136 W/kg
Area Scan Peak SAR : 38.275 W/kg
Zoom Scan Peak SAR : 62.200 W/kg



1750 MHz System Validation

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

System Performance Check 1900 MHz 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 : 36.553 W/kg
Power Drift-Finish : 36.021 W/kg
Power Drift (%) : -1.507

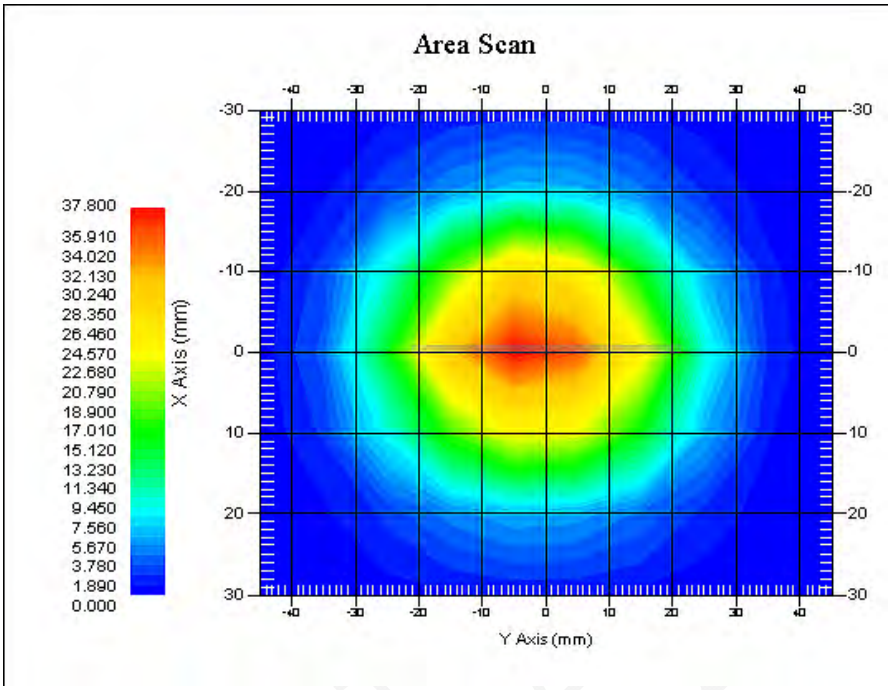
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Serial No. : System Default
Location : Center
Description : Default

Tissue Data
Type : Head and Body
Serial No. : 295-01103
Frequency : 1900.00 MHz
Last Calib. Date : 23-Sep-2015
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 56.00 RH%
Epsilon : 40.17 F/m
Sigma : 1.37 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 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

Measurement Data
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 21.00 °C
Area Scan : 8x10x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm

1 gram SAR value : 36.223 W/kg
10 gram SAR value : 18.898 W/kg
Area Scan Peak SAR : 37.669 W/kg
Zoom Scan Peak SAR : 58.660 W/kg



1900 MHz System Validation

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 : 53.739 W/kg
Power Drift-Finish : 53.024 W/kg
Power Drift (%) : -1.501

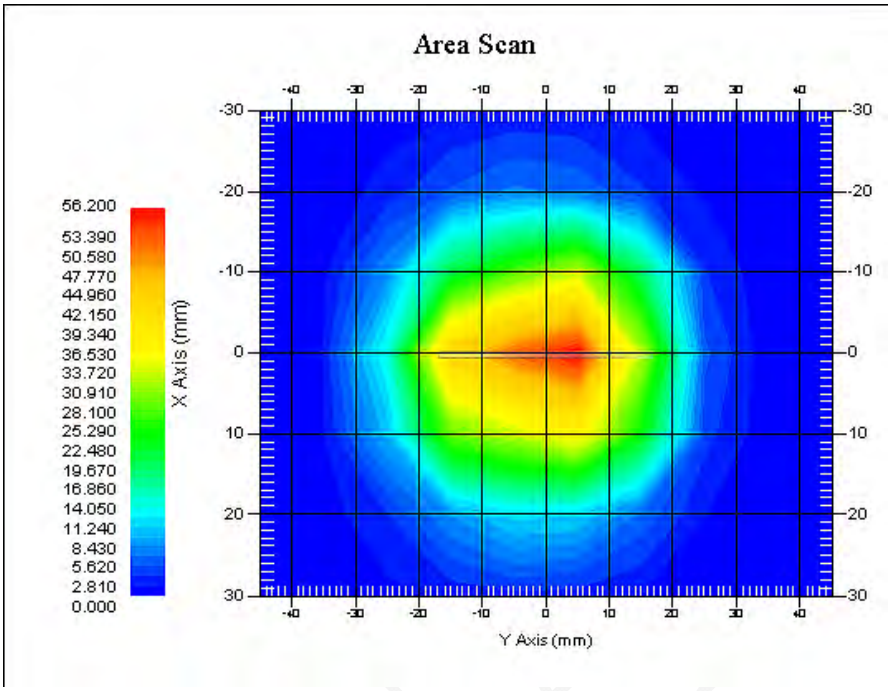
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Serial No. : System Default
Location : Center
Description : Default

Tissue Data
Type : Head and Body
Serial No. : 290-01109
Frequency : 2450.0 MHz
Last Calib. Date : 23-Sep-2015
Temperature : 20.00 °C
Ambient Temp. : 21.00 °C
Humidity : 50.00 RH%
Epsilon : 39.40 F/m
Sigma : 1.78 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 $\mu V/(V/m)^2$
Compression Point : 95.00 mV
Offset : 1.56 mm

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

1 gram SAR value : 51.208 W/kg
10 gram SAR value : 25.265 W/kg
Area Scan Peak SAR : 56.127 W/kg
Zoom Scan Peak SAR : 81.297 W/kg



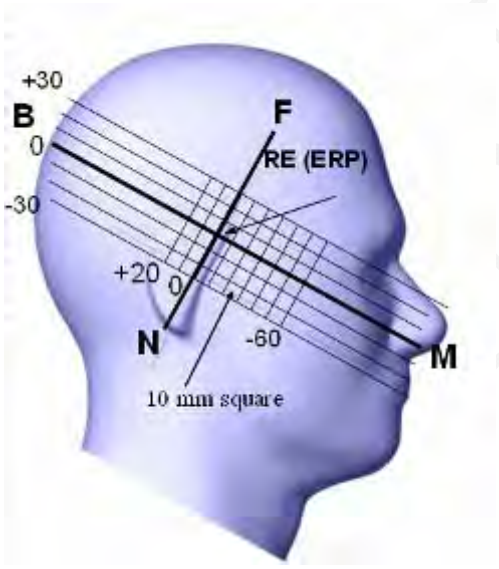
2450 MHz System Validation with Head Tissue

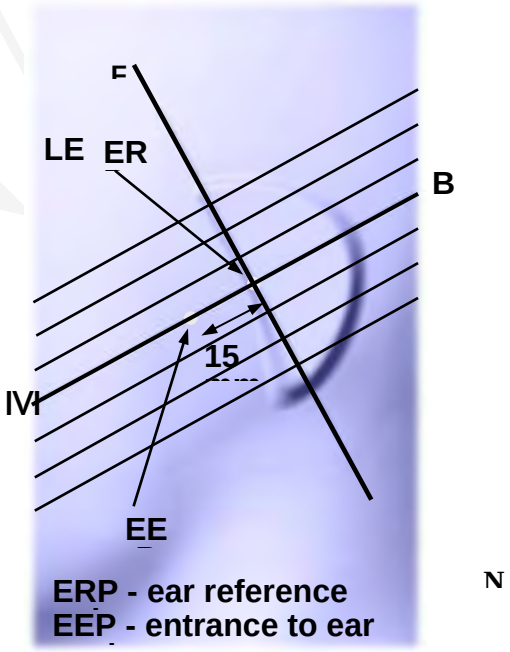
EUT TEST STRATEGY AND METHODOLOGY

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

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

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





Cheek/Touch Position

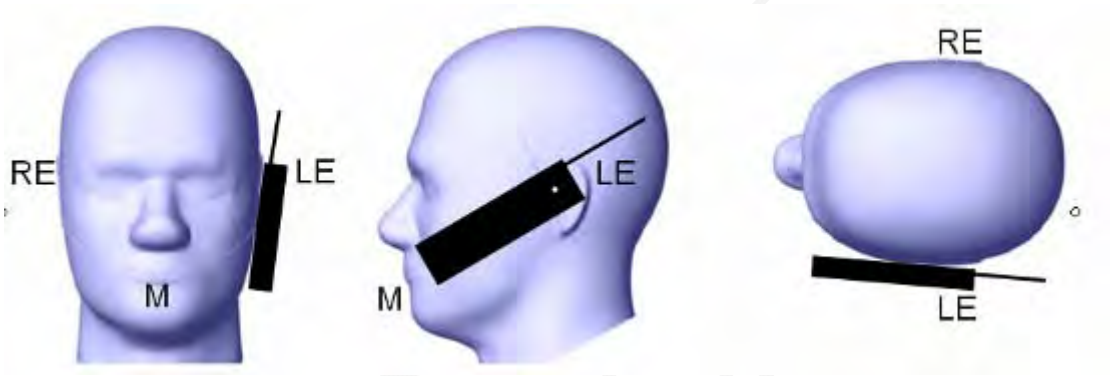
The device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line for the SCC-34/SC-2 head phantom.

This test position is established:

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

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

Cheek /Touch Position



Ear/Tilt Position

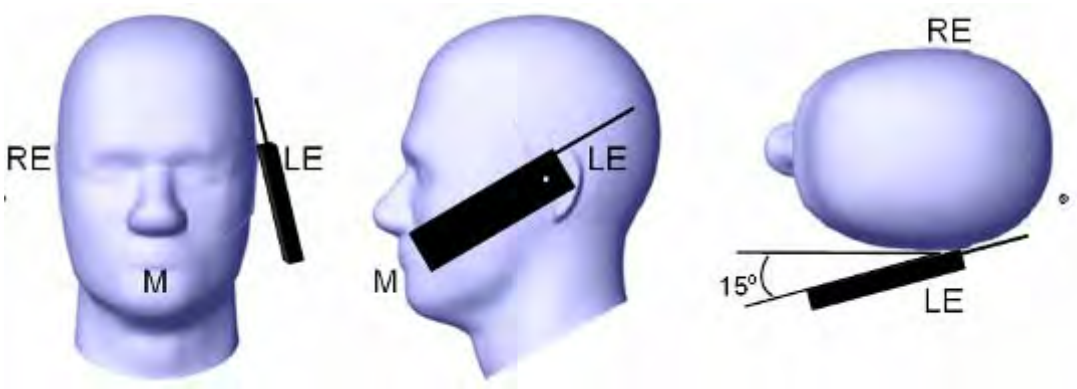
With the handset aligned in the "Cheek/Touch Position":

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

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

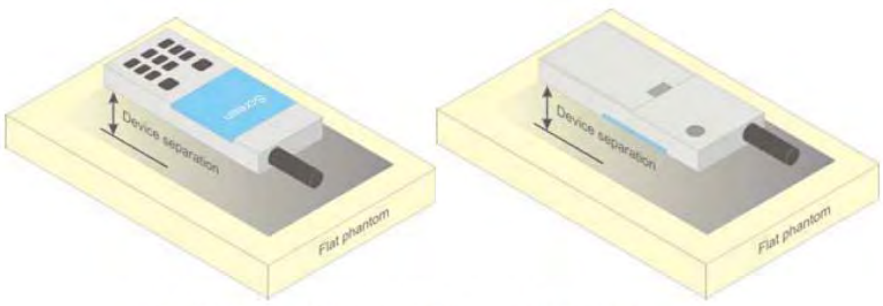


Figure 5 – Test positions for body-worn devices

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

EN62311: 2008
EN62209-1:2006
EN62209-2:2010
EN 62479:2010
IEEE1528:2013

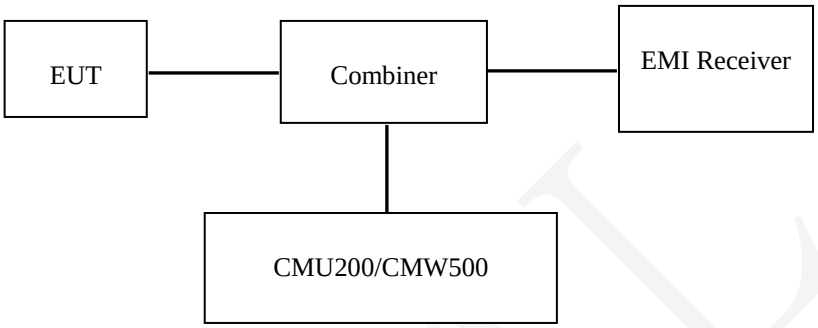
CONDUCTED OUTPUT POWER MEASUREMENT

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 Receiver through sufficient attenuation.



GSM&3G&LTE

Test Results:

GSM

Band	Frequency (MHz)	Conducted Output Power	
		(dBm)	(W)
GSM900	880.2	32.20	1.660
	902.0	**32.20**	1.660
	914.8	32.20	1.660
DCS1800	1710.2	28.20	0.661
	1747.8	28.10	0.646
	1784.8	**28.50**	0.708

GPRS

Mode	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
GSM900	975	880.2	32.01	31.23	29.46	28.39
	60	902.0	32.04	31.20	29.50	28.48
	124	914.8	32.05	31.23	29.53	28.52
DCS1800	512	1710.2	28.34	27.84	25.95	24.92
	700	1747.8	28.22	27.51	25.81	24.80
	885	1784.8	28.57	27.87	26.12	25.11

EGPRS

Mode	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
GSM900	975	880.2	27.41	26.34	24.11	22.98
	60	902.0	26.91	25.80	23.59	22.49
	124	914.8	26.62	25.51	23.25	22.17
DCS1800	512	1710.2	25.64	24.82	22.70	21.68
	700	1747.8	25.72	24.93	22.79	21.75
	885	1784.8	25.79	24.95	22.78	21.71

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 slots	3 slots	4 slots
GSM900	975	880.2	23.01	25.23	25.21	25.39
	60	902.0	23.04	25.20	25.25	25.48
	124	914.8	23.05	25.23	25.28	**25.52**
DCS1800	512	1710.2	19.34	21.84	21.70	21.92
	700	1747.8	19.22	21.51	21.56	21.80
	885	1784.8	19.57	21.87	21.87	**22.11**

The time based average power for EGPRS

Band	Channel No.	Frequency (MHz)	Time based average Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
GSM900	975	880.2	18.41	**20.34**	19.86	19.98
	60	902.0	17.91	19.80	19.34	19.49
	124	914.8	17.62	19.51	19.00	19.17
DCS1800	512	1710.2	16.64	18.82	18.45	18.68
	700	1747.8	16.72	18.93	18.54	18.75
	885	1784.8	16.79	**18.95**	18.53	18.71

Note:

1. For GSM voice, 1 timeslot has been activated with power level 5 (900 MHz band) and 0 (1800 MHz band).

2. For GPRS, 1, 2, 3 and 4 timeslots has been activated separately with power control level 3(900 MHz band) and 3(1800 MHz band).
3. For EGPRS, 1, 2, 3 and 4 timeslots has been activated separately with power control level 6(900 MHz band) and 5(1800 MHz band).

WCDMA

Band I:

Test Condition	Test Mode	3GPP Sub Test	Averaged Mean Power (dBm)		
			Low Channel	Mid Channel	High Channel
Normal	Rel 99 RMC		**21.90**	21.87	21.88
	Rel 6 HSDPA	1	21.06	21.03	21.01
		2	21.01	20.98	21.06
		3	21.02	21.00	21.01
		4	21.09	20.99	21.06
	Rel 6 HSUPA	1	21.04	21.01	21.05
		2	21.05	21.03	21.03
		3	21.03	21.06	21.52
		4	21.01	21.00	21.02
		5	21.06	21.00	21.02

Band VIII:

Test Condition	Test Mode	3GPP Sub Test	Averaged Mean Power (dBm)		
			Low Channel	Mid Channel	High Channel
Normal	Rel 99 RMC		**22.23**	22.19	22.21
	Rel 6 HSDPA	1	21.43	21.30	21.36
		2	21.34	21.35	21.38
		3	21.40	21.36	21.39
		4	21.35	21.35	21.36
	Rel 6 HSUPA	1	21.41	21.35	21.37
		2	21.40	21.37	21.37
		3	21.37	21.34	21.88
		4	21.35	21.38	21.35
		5	21.42	21.32	21.36

Note:
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.

LTE:

Test Band	Test Bandwidth	Resource Block Size	Test Channel	Power(dBm)
E-UTRA Band 3	1.4MHz	RB1	L	22.18
			M	22.63
			H	22.49
		RB5	L	22.03
			M	22.07
			H	21.76
	5MHz	RB1	L	22.38
			M	22.40
			H	22.31
		RB8	L	23.33
			M	**23.43**
			H	23.09
	20MHz	RB1	L	22.54
			M	22.47
			H	21.80
		RB18	L	22.73
			M	22.94
			H	22.09
E-UTRA Band 7	5MHz	RB1	L	22.04
			M	21.96
			H	21.12
		RB8	L	21.37
			M	21.83
			H	21.60
	20MHz	RB1	L	22.50
			M	22.75
			H	21.97
		RB18	L	22.63
			M	**22.97**
			H	22.02
E-UTRA Band 20	5MHz	RB1	L	22.87
			M	22.08
			H	21.84
		RB8	L	21.75
			M	22.33
			H	21.89
	20MHz	RB1	L	22.54
			M	**22.88**
			H	21.66
		RB18	L	22.18
			M	22.63
			H	22.49

Note:

1. 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.

Bluetooth:

Mode	Channel Frequency (MHz)	Power (dBm)	Power (mw)
BDR(GFSK)	2402	4.60	2.884
	2441	4.75	2.985
	2480	**5.06**	3.206
EDR(4-DQPSK)	2402	3.51	2.244
	2441	3.97	2.495
	2480	4.24	2.655
EDR-8DPSK	2402	3.85	2.427
	2441	4.13	2.588
	2480	4.24	2.655
BLE	2402	-2.34	0.583
	2440	-1.27	0.746
	2480	-1.42	0.721

Wi-Fi

Band	Frequency (MHz)	Conducted Output Power	
		(dBm)	(mW)
802.11b	2412	7.42	5.521
	2442	**7.75**	5.957
	2472	6.68	4.656
802.11g	2412	6.91	4.909
	2442	7.20	5.248
	2472	6.11	4.083
802.11n-HT20	2412	6.97	4.977
	2442	7.39	5.483
	2472	6.30	4.266
802.11n-HT40	2422	7.46	5.572
	2442	7.21	5.260
	2462	7.05	5.070

Note:

1. The output power was tested under data rate 1Mbps for 802.11b, 6Mbps for 802.11g, 6.5Mbps for 802.11n-HT20 and 13.5Mbps for 802.11n-HT40.
2. EN62479-SAR is not required for low-power equipment where the available antenna power and/or the average total radiated power is less than or equal to the Pmax values given in Annex A (20 mW).

SAR MEASUREMENT RESULTS

This page summarizes the results of the performed dosimetric evaluation.

Test Results:

Environmental Conditions:

Temperature:	21 ℃
Relative Humidity:	52 %
ATM Pressure:	1002 mbar

** Testing was performed by Terry XiaHou on 2015-09-23*

EGSM 900:

EUT Position	Frequency (MHz)	Test Mode	Antenna Type	Phantom Type	Power Drift (%)	10g SAR (W/Kg)		
						Measurement	Limit	Plot
Body-Headset-Back (0mm)	880.2	GSM	Integral	Universal	/	/	2.0	/
	902.0	GSM	Integral	Universal	-2.419	0.453	2.0	/
	914.8	GSM	Integral	Universal	/	/	2.0	/
Body-Back (0mm)	880.2	GPRS	Integral	Universal	-3.014	0.537	2.0	
	902.0	GPRS	Integral	Universal	0.725	**0.627**	2.0	**1#**
	914.8	GPRS	Integral	Universal	3.010	0.603	2.0	/
Body-Left (0mm)	880.2	GPRS	Integral	Universal	/	/	2.0	/
	902.0	GPRS	Integral	Universal	0.592	0.416	2.0	/
	914.8	GPRS	Integral	Universal	/	/	2.0	/
Body-Bottom (0mm)	880.2	GPRS	Integral	Universal	/	/	2.0	/
	902.0	GPRS	Integral	Universal	1.395	0.137	2.0	/
	914.8	GPRS	Integral	Universal	/	/	2.0	/

Note:
1. When the 10-g SAR is ≤ 1.0W/Kg, testing for low and high channel is optional.
2. The EUT is a Class B mobile phone which can be attached to both GPRS and GSM services, using one service at a time.
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. The EUT transmit and receive through the same GSM antenna while testing SAR.

DCS 1800:

EUT Position	Frequency (MHz)	Test Mode	Antenna Type	Phantom Type	Power Drift (%)	10g SAR (W/Kg)		
						Measurement	Limit	Plot
Body-Headset-Back (0mm)	1710.2	GSM	Integral	Universal	/	/	2.0	/
	1747.8	GSM	Integral	Universal	1.317	0.530	2.0	/
	1784.8	GSM	Integral	Universal	/	/	2.0	/
Body-Back (0mm)	1710.2	GPRS	Integral	Universal	2.462	**0.833**	2.0	**2#**
	1747.8	GPRS	Integral	Universal	-1.831	0.725	2.0	/
	1784.8	GPRS	Integral	Universal	-2.777	0.779	2.0	/
Body-Left (0mm)	1710.2	GPRS	Integral	Universal	/	/	2.0	/
	1747.8	GPRS	Integral	Universal	-2.222	0.250	2.0	/
	1784.8	GPRS	Integral	Universal	/	/	2.0	/
Body-Bottom (0mm)	1710.2	GPRS	Integral	Universal	/	/	2.0	/
	1747.8	GPRS	Integral	Universal	1.111	0.635	2.0	/
	1784.8	GPRS	Integral	Universal	/	/	2.0	/

Note:

1. When the 10-g SAR is ≤ 1.0W/Kg, testing for low and high channel is optional.
2. The EUT is a Class B mobile phone which can be attached to both GPRS and GSM services, using one service at a time.
3. The Multi-slot Classes of EUT is Class 12which has maximum 4 Downlink slots and 4 Uplink slots, the maximum active slots is 5, when perform the multiple slots scan, 1DL+4UL is the worst case.
4. The EUT transmit and receive through the same GSM antenna while testing SAR.

WCDMA900

EUT Position	Frequency (MHz)	Test Mode	Antenna Type	Phantom Type	Power Drift (%)	10g SAR (W/Kg)		
						Measurement	Limit	Plot
Body-Back (0mm)	882.4	RMC	Integral	Universal	0.651	0.311	2.0	/
	897.6	RMC	Integral	Universal	1.172	**0.356**	2.0	**3#**
	912.6	RMC	Integral	Universal	-1.752	0.352	2.0	/
Body-Left (0mm)	882.4	RMC	Integral	Universal	/	/	2.0	/
	897.6	RMC	Integral	Universal	-2.409	0.306	2.0	/
	912.6	RMC	Integral	Universal	/	/	2.0	/
Body-Bottom (0mm)	882.4	RMC	Integral	Universal	/	/	2.0	/
	897.6	RMC	Integral	Universal	-1.625	0.088	2.0	/
	912.6	RMC	Integral	Universal	/	/	2.0	/

WCDMA 2100

EUT Position	Frequency (MHz)	Test Mode	Antenna Type	Phantom Type	Power Drift (%)	10g SAR (W/Kg)		
						Measurement	Limit	Plot
Body-Back (0mm)	1922.4	RMC	Integral	Universal	2.204	1.111	2.0	/
	1950.0	RMC	Integral	Universal	1.894	1.389	2.0	/
	1977.6	RMC	Integral	Universal	2.493	**1.449**	2.0	**4#**
Body-Left (0mm)	1922.4	RMC	Integral	Universal	/	/	2.0	/
	1950.0	RMC	Integral	Universal	0.936	0.533	2.0	/
	1977.6	RMC	Integral	Universal	/	/	2.0	/
Body-Bottom (0mm)	1922.4	RMC	Integral	Universal	/	/	2.0	/
	1950.0	RMC	Integral	Universal	2.205	0.928	2.0	/
	1977.6	RMC	Integral	Universal	/	/	2.0	/

Note:
1. When the 10-g SAR is ≤ 1.0W/Kg, testing for low and high channel is optional.
2. 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 Mode.

LTE FDD Band 3

EUT Position	Frequency (MHz)	Modulation Type	RB	Phantom Type	Power Drift (%)	10g SAR (W/Kg)		
						Measurement	Limit	Plot
Body-Back (0mm)	1720.0	QPSK	1	Universal	1.550	**0.322**	2.0	**5#**
	1747.5	QPSK	1	Universal	2.123	0.305	2.0	/
	1775.0	QPSK	1	Universal	-2.178	0.269	2.0	/
	1747.5	QPSK	50	Universal	1.695	0.235	2.0	/
	1747.5	QPSK	100	Universal	1.173	0.277	2.0	/
Body-Left (0mm)	1747.5	QPSK	1	Universal	-0.676	0.108	2.0	/
Body-Bottom (0mm)	1747.5	QPSK	1	Universal	-1.236	0.185	2.0	/

LTE FDD Band 7

EUT Position	Frequency (MHz)	Modulation Type	RB	Phantom Type	Power Drift (%)	10g SAR (W/Kg)		
						Measurement	Limit	Plot
Body-Back (0mm)	2510	QPSK	1	Universal	2.894	0.253	2.0	/
	2535	QPSK	1	Universal	-1.627	**0.288**	2.0	**6#**
	2560	QPSK	1	Universal	-3.197	0.272	2.0	/
	2535	QPSK	50	Universal	1.138	0.255	2.0	/
	2535	QPSK	100	Universal	3.552	0.210	2.0	/
Body-Left (0mm)	2535	QPSK	1	Universal	-3.400	0.086	2.0	/
Body-Bottom (0mm)	2535	QPSK	1	Universal	-1.340	0.237	2.0	/

LTE FDD Band 20

EUT Position	Frequency (MHz)	Modulation Type	RB	Phantom Type	Power Drift (%)	10g SAR (W/Kg)		
						Measurement	Limit	Plot
Body-Back (0mm)	842	QPSK	1	Universal	-1.966	**0.227**	2.0	**7#**
	847	QPSK	1	Universal	1.519	0.186	2.0	**/**
	852	QPSK	1	Universal	-3.442	0.193	2.0	/
	847	QPSK	50	Universal	-2.624	0.168	2.0	/
	847	QPSK	100	Universal	2.103	0.182	2.0	/
Body-Left (0mm)	847	QPSK	1	Universal	-1.903	0.152	2.0	/
Body-Bottom (0mm)	847	QPSK	1	Universal	3.286	0.086	2.0	/

Note:

1. When the 10-g SAR is ≤ 1.0W/Kg, testing for low and high channel is optional.
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. All SAR datas are tested start with the **largest channel bandwidth** and measure SAR for QPSK with 1 RB allocation. According to the worst case, SAR datas for QPSK with 50% and 100% RB allocation are tested.

SAR Plots (Summary of the Highest SAR Values)

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

Body-worn Back (902.0 MHz Middle Channel)

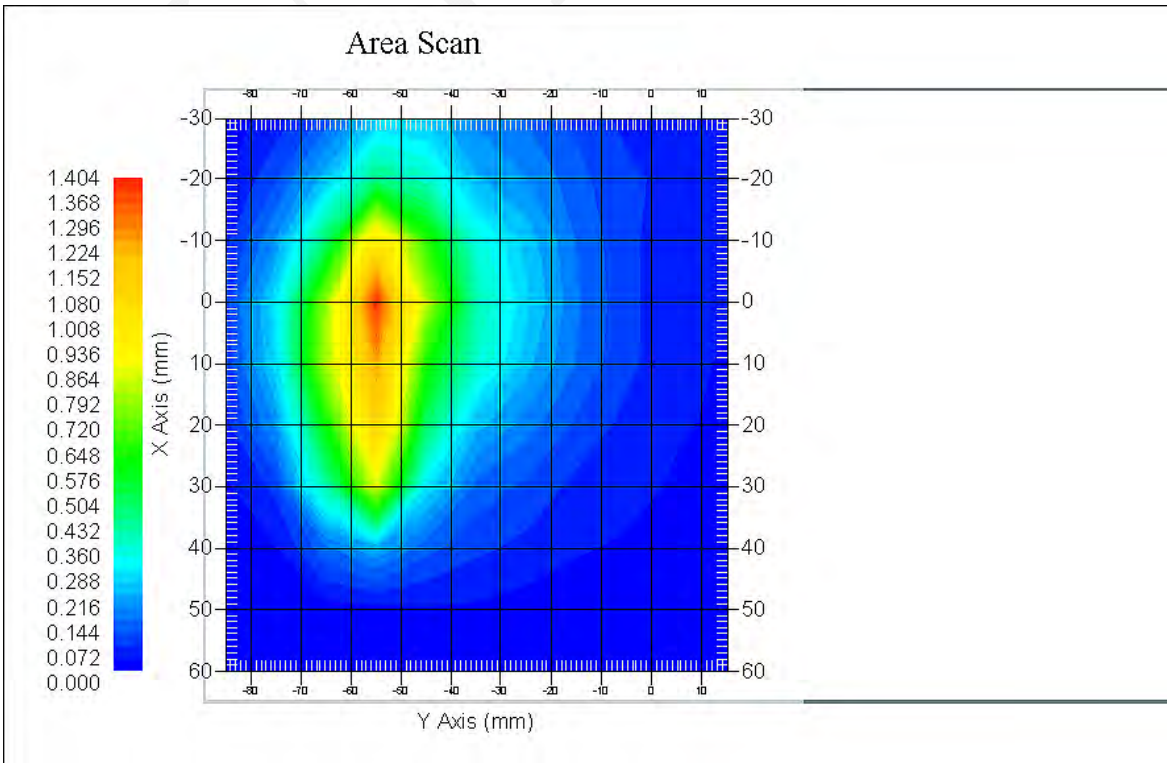
Measurement Data
Test mode : GPRS
Crest Factor : 2
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.137 W/kg
Power Drift-Finish : 0.137 W/kg
Power Drift (%) : 0.725

Tissue Data
Type : Head and Body
Frequency :902.0 MHz
Epsilon : 41.38 F/m
Sigma : 0.99 S/m
Density : 1000.00 kg/cu. m

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

1 gram SAR value : 1.170 W/kg
10 gram SAR value : 0.627 W/kg
Area Scan Peak SAR : 1.386 W/kg
Zoom Scan Peak SAR : 1.895 W/kg

Plot 1#



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

Body-worn-back (1710.2 MHz Low Channel)

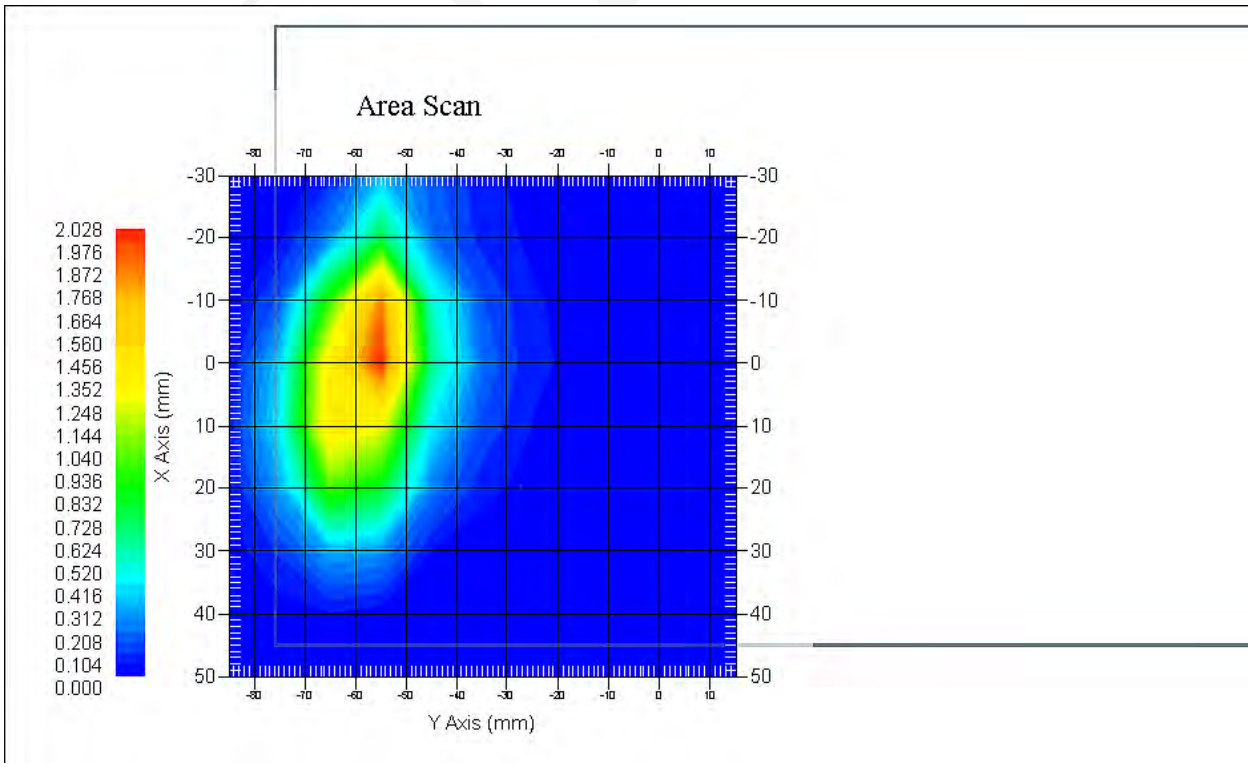
Measurement Data
Test mode : GPRS
Crest Factor : 2
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.082 W/kg
Power Drift-Finish : 0.084 W/kg
Power Drift (%) : 2.462

Tissue Data
Type : Head and Body
Frequency : 1710.2 MHz
Epsilon : 39.55 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 : 2
Conversion Factor : 5.4
Probe Sensitivity : 1.20 1.20 1.20 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 1.810 W/kg
10 gram SAR value : 0.833 W/kg
Area Scan Peak SAR : 2.005 W/kg
Zoom Scan Peak SAR : 3.268 W/kg

Plot 2#



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

WCDMA900; Body-worn-Back (897.6 MHz Middle Channel)

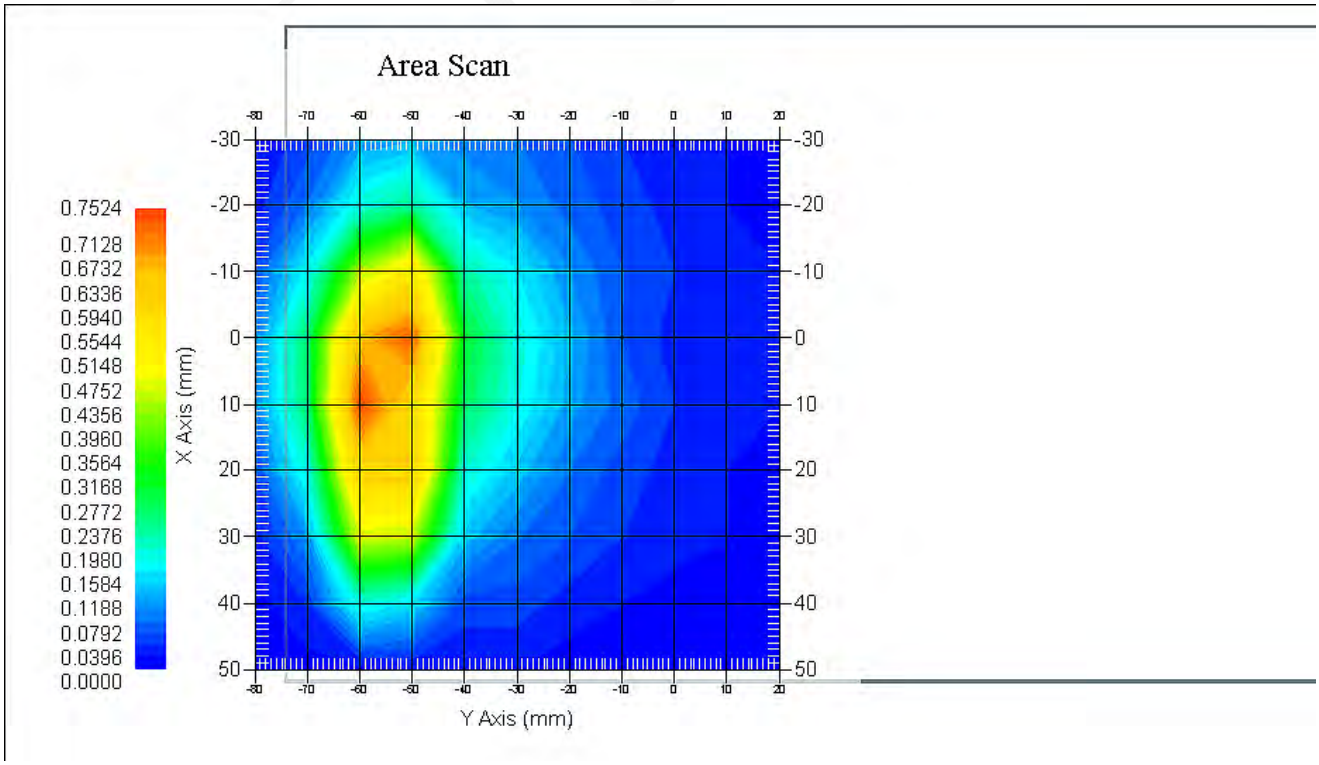
Measurement Data
Test mode : RMC
Crest Factor : 1
Scan Type : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.063 W/kg
Power Drift-Finish : 0.063 W/kg
Power Drift (%) : 1.172

Tissue Data
Type : Head and Body
Frequency : 897.6 MHz
Epsilon : 41.41 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

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

1 gram SAR value : 0.711 W/kg
10 gram SAR value : 0.356 W/kg
Area Scan Peak SAR : 0.739 W/kg
Zoom Scan Peak SAR : 0.968 W/kg

Plot 3#



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

WCDMA2100; Body-worn-Back (1977.6 High Channel)

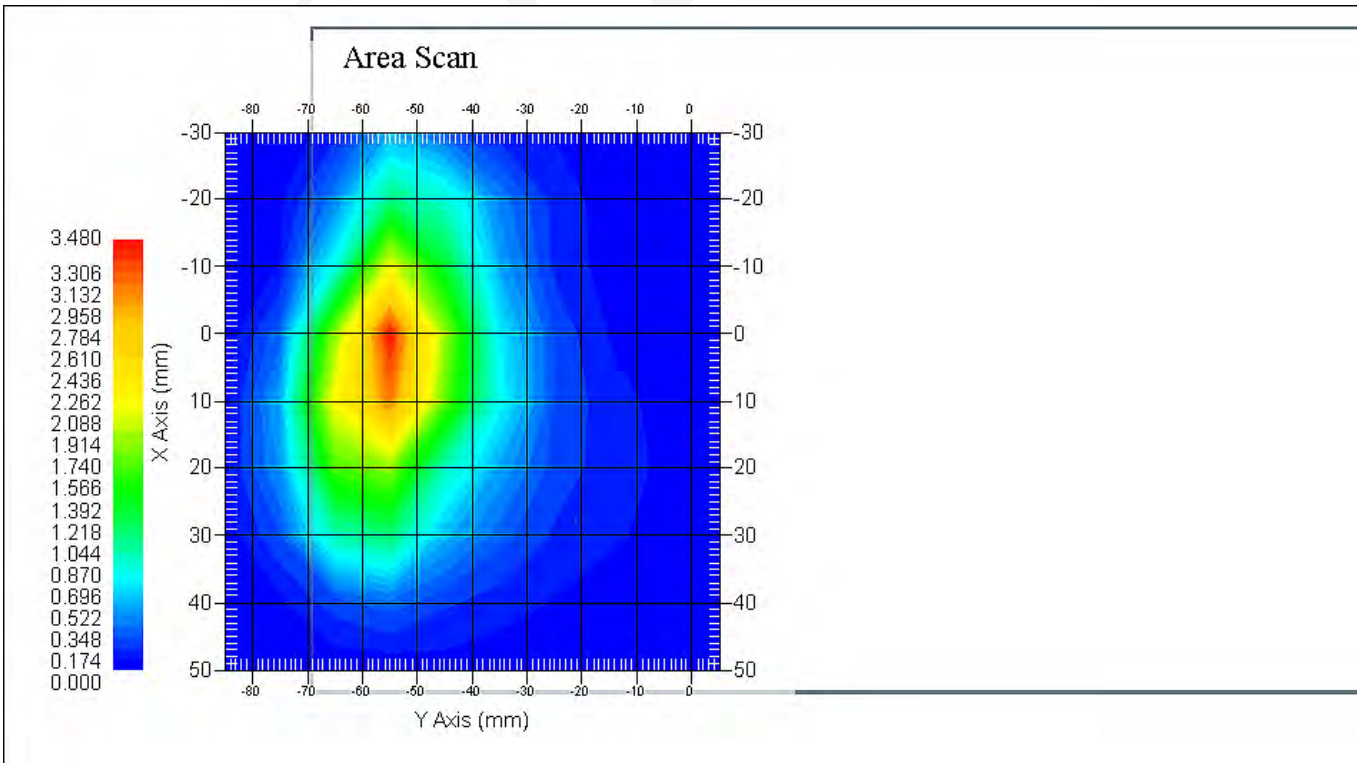
Measurement Data
Test mode : RMC
Crest Factor : 1
Scan Type : Complete
Area Scan : 8x11x1: Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7: Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.120 W/kg
Power Drift-Finish : 0.123 W/kg
Power Drift (%) : 2.493

Tissue Data
Type : Head and Body
Frequency : 1977.6 MHz
Epsilon : 40.37 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 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 2.972 W/kg
10 gram SAR value : 1.449W/kg
Area Scan Peak SAR : 3.455 W/kg
Zoom Scan Peak SAR : 5.527W/kg

Plot 4#



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

LTE FDD Band3; Body-Worn-Back (1720 MHz Low Channel);

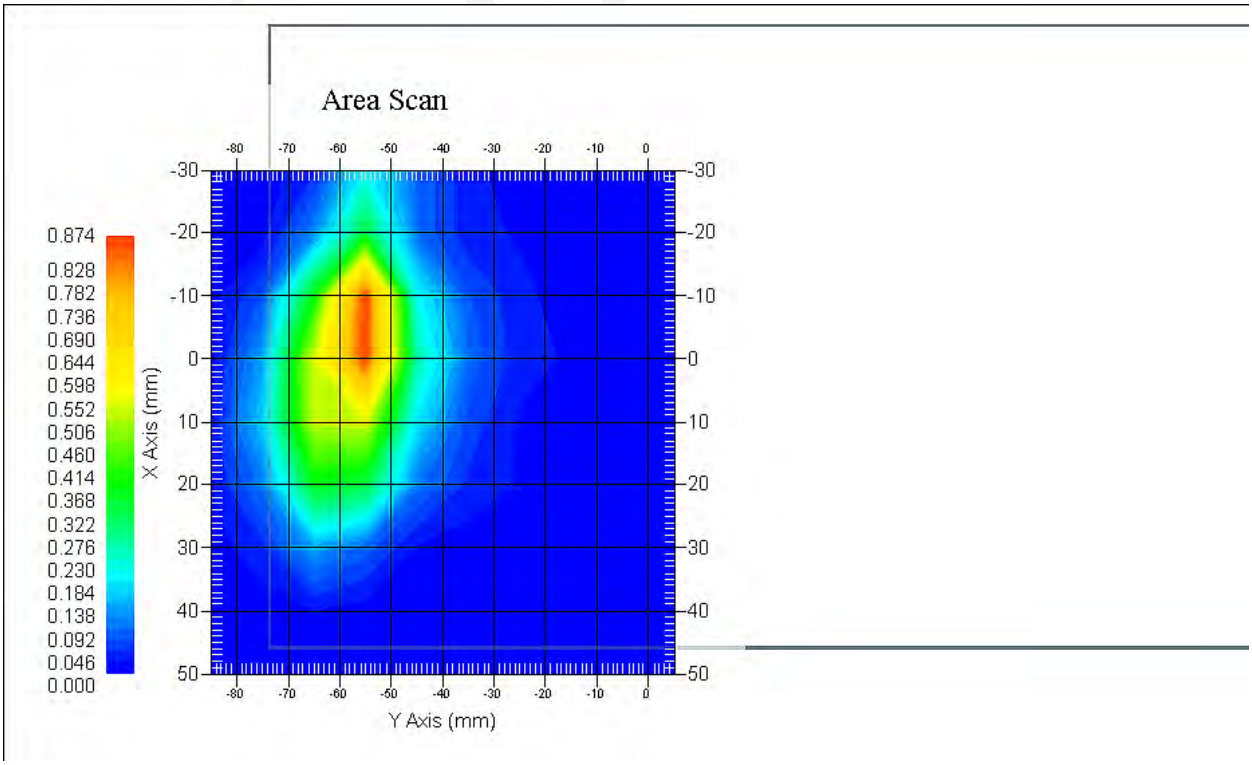
Measurement Data
Test mode : RB1
Crest Factor : 1
Scan Type： : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.036 W/kg
Power Drift-Finish : 0.036 W/kg
Power Drift (%) : 1.550

Tissue Data
Type : Head and Body
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 µV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.739 W/kg
10 gram SAR value : 0.322 W/kg
Area Scan Peak SAR : 0.870 W/kg
Zoom Scan Peak SAR : 1.386 W/kg

Plot 5#



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

LTE FDD Band7; Body-Worn-Back (2535 MHz Middle Channel);

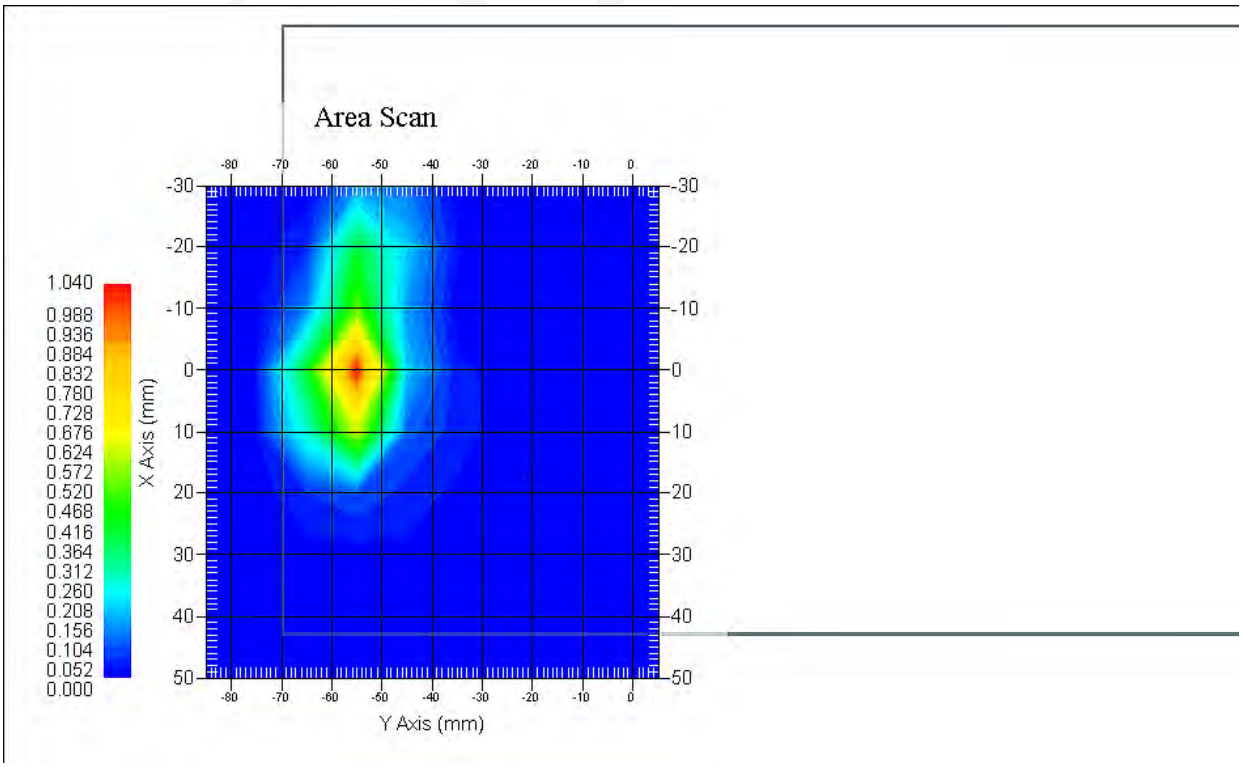
Measurement Data
Test mode : RB1
Crest Factor : 1
Scan Type： : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.010 W/kg
Power Drift-Finish : 0.010 W/kg
Power Drift (%) : -1.627

Tissue Data
Type : Head and Body
Frequency : 2535 MHz
Epsilon : 39.57 F/m
Sigma : 1.79 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 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.762 W/kg
10 gram SAR value : 0.288 W/kg
Area Scan Peak SAR : 1.022 W/kg
Zoom Scan Peak SAR : 1.855 W/kg

Plot 6#



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

LTE FDD Band 20; Body-Worn-Back (842 MHz Low Channel);

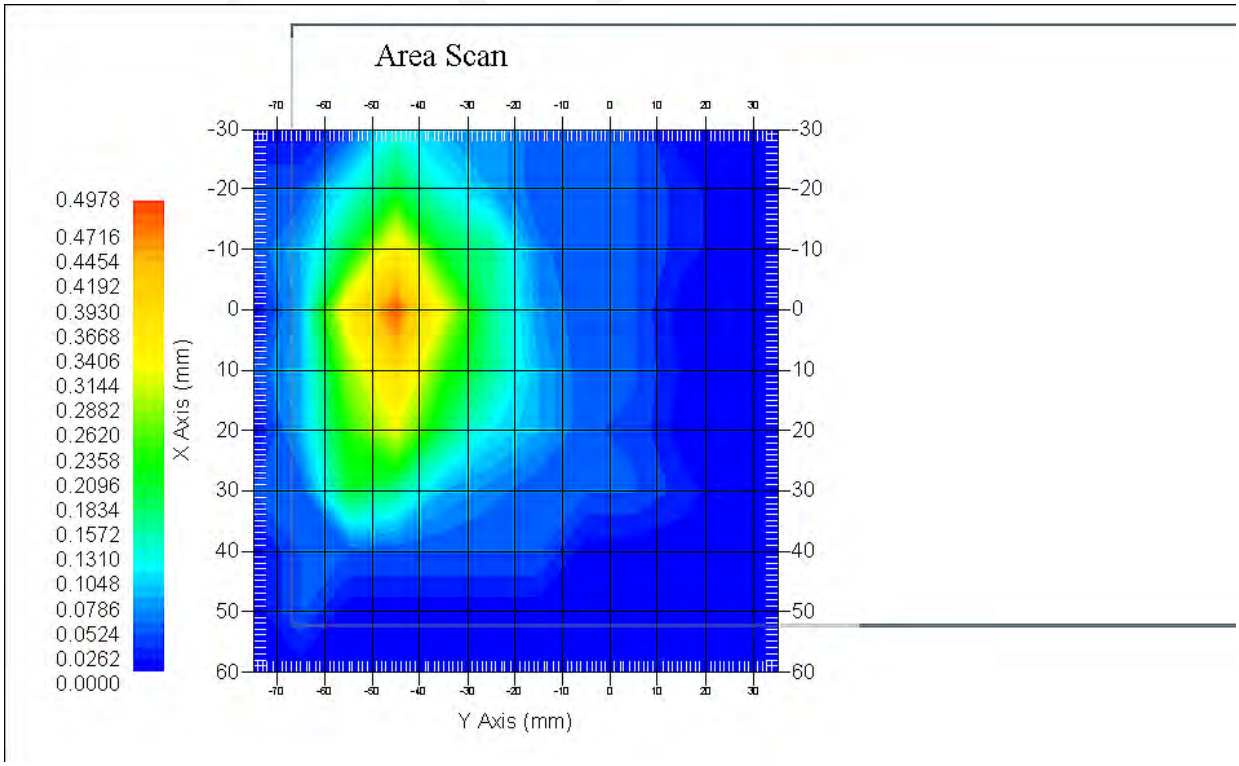
Measurement Data
Test mode : RB1
Crest Factor : 1
Scan Type： : Complete
Area Scan : 8x11x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x7 : Measurement x=5mm, y=5mm, z=5mm
Power Drift-Start : 0.052 W/kg
Power Drift-Finish : 0.051 W/kg
Power Drift (%) : -1.966

Tissue Data
Type : Head and Body
Frequency : 842.0 MHz
Epsilon : 41.03 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 μV/(V/m)2
Compression Point : 95.00 mV
Offset : 1.56 mm

1 gram SAR value : 0.432 W/kg
10 gram SAR value : 0.227 W/kg
Area Scan Peak SAR : 0.493 W/kg
Zoom Scan Peak SAR : 0.637 W/kg

Plot 7#



APPENDIX A MEASUREMENT UNCERTAINTY

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

Measurement uncertainty evaluation for IEC62209-1 SAR test

Source of uncertainty	Tolerance/ uncertainty ± %	Probability distribution	Disisor	ci (1 g)	ci (10 g)	Standard uncertainty ± %, (1 g)	Standard uncertainty ± %, (10 g)
Measurement system							
Probe calibration	6.55	N	1	1	1	6.6	6.6
Axial Isotropy	4.7	R	√3	1	1	2.7	2.7
Hemispherical Isotropy	9.6	R	√3	0	0	0.0	0.0
Boundary effect	1.0	R	√3	1	1	0.6	0.6
Linearity	4.7	R	√3	1	1	2.7	2.7
Detection limits	1.0	R	√3	1	1	0.6	0.6
Readout electronics	0.3	N	1	1	1	0.3	0.3
Response time	0.0	R	√3	1	1	0.0	0.0
Integration time	0.0	R	√3	1	1	0.0	0.0
RF ambientconditions – noise	1.0	R	√3	1	1	0.6	0.6
RF ambient conditions–reflections	1.0	R	√3	1	1	0.6	0.6
Probe positioner mech. Restrictions	0.8	R	√3	1	1	0.5	0.5
Probe positioning with respect to phantom shell	6.7	R	√3	1	1	3.9	3.9
Post-processing	2.0	R	√3	1	1	1.2	1.2
Test sample related							
Test sample positioning	2.8	N	1	1	1	2.8	2.8
Device holder uncertainty	6.3	N	1	1	1	6.3	6.3
Drift of output power	5.0	R	√3	1	1	2.9	2.9
Phantom and set-up							
Phantom uncertainty (shape and thickness tolerances)	4.0	R	√3	1	1	2.3	2.3
Liquid conductivity target)	5.0	R	√3	0.64	0.43	1.8	1.2
Liquid conductivity meas.)	2.5	N	1	0.64	0.43	1.6	1.1
Liquid permittivity target)	5.0	R	√3	0.6	0.49	1.7	1.4
Liquid permittivity meas.)	2.5	N	1	0.6	0.49	1.5	1.2
Combined standard uncertainty		RSS				12.2	12.0
Expanded uncertainty 95 % confidence interval)						24.3	23.9

Measurement uncertainty evaluation for IEC62209-2 SAR test

Source of uncertainty	Tolerance/ uncertainty ± %	Probability distribution	Disisor	ci (1 g)	ci (10 g)	Standard uncertainty ± %, (1 g)	Standard uncertainty ± %, (10 g)
Measurement system							
Probe calibration	6.55	N	1	1	1	6.6	6.6
Axial Isotropy	4.7	R	√3	1	1	2.7	2.7
Hemispherical Isotropy	9.6	R	√3	0	0	0.0	0.0
Linearity	4.7	R	√3	1	1	2.7	2.7
Modulation Response	0.0	R	√3	1	1	0.0	0.0
Detection limits	1.0	R	√3	1	1	0.6	0.6
Boundary effect	1.0	R	√3	1	1	0.6	0.6
Readout electronics	0.3	N	1	1	1	0.3	0.3
Response time	0.0	R	√3	1	1	0.0	0.0
Integration time	0.0	R	√3	1	1	0.0	0.0
RF ambientconditions – noise	1.0	R	√3	1	1	0.6	0.6
RF ambient conditions–reflections	1.0	R	√3	1	1	0.6	0.6
Probe positioner mech. Restrictions	0.8	R	√3	1	1	0.5	0.5
Probe positioning with respect to phantom shell	6.7	R	√3	1	1	3.9	3.9
Post-processing	2.0	R	√3	1	1	1.2	1.2
Test sample related							
Device holder Uncertainty	6.3	N	1	1	1	6.3	6.3
Test sample positioning	2.8	N	1	1	1	2.8	2.8
Power scaling	4.5	R	√3	1	1	2.6	2.6
Drift of output power	5.0	R	√3	1	1	2.9	2.9
Phantom and set-up							
Phantom uncertainty (shape and thickness tolerances)	4.0	R	√3	1	1	2.3	2.3
Algorithm for correcting SAR for deviations in permittivity and conductivity	1.9	N	1	1	0.84	1.1	0.9
Liquid conductivity (meas.)	2.5	N	1	0.64	0.43	1.6	1.1
Liquid permittivity (meas.)	2.5	N	1	0.6	0.49	1.5	1.2
Temp. unc. - Conductivity	1.7	R	√3	0.78	0.71	0.8	0.7
Temp. unc. - Permittivity	0.3	R	√3	0.23	0.26	0.0	0.0
Combined standard uncertainty		RSS				12.2	12.1
Expanded uncertainty 95 % confidence interval)						24.5	24.2

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 meteorgical practices.

Calibration Method

Probes are calibrated using the following methods.

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

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

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

References

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

NCL Calibration Laboratories
Division of APREL Inc.

Conditions

Probe 500-00283 was a recalibration.

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

Primary Measurement Standards

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

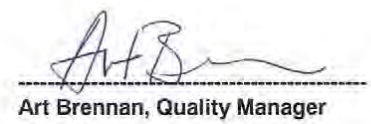
Secondary Measurement Standards

Network Analyzer Anritsu 37347C	002106	Feb. 20, 2015

Attestation

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

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



Art Brennan, Quality Manager

Dan Brooks, Test Engineer

NCL Calibration Laboratories
Division of APREL Inc.

Probe Summary

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

*Resistive to recommended tissue recipes per IEEE-1528

Sensitivity in Air

Channel X:	1.2 μV/(V/m)²
Channel Y:	1.2 μV/(V/m)²
Channel Z:	1.2 μV/(V/m)²
Diode Compression Point:	95 mV

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Calibration for Tissue (Head H, Body B)

Frequency	Tissue Type	Measured Epsilon	Measured Sigma	Standard Uncertainty (%)	Calibration Frequency Range (MHz)	Conversion Factor
450 H	Head	43.59	0.86	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
2450B	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

Page 5 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.

Boundary Effect:

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

Spatial Resolution:

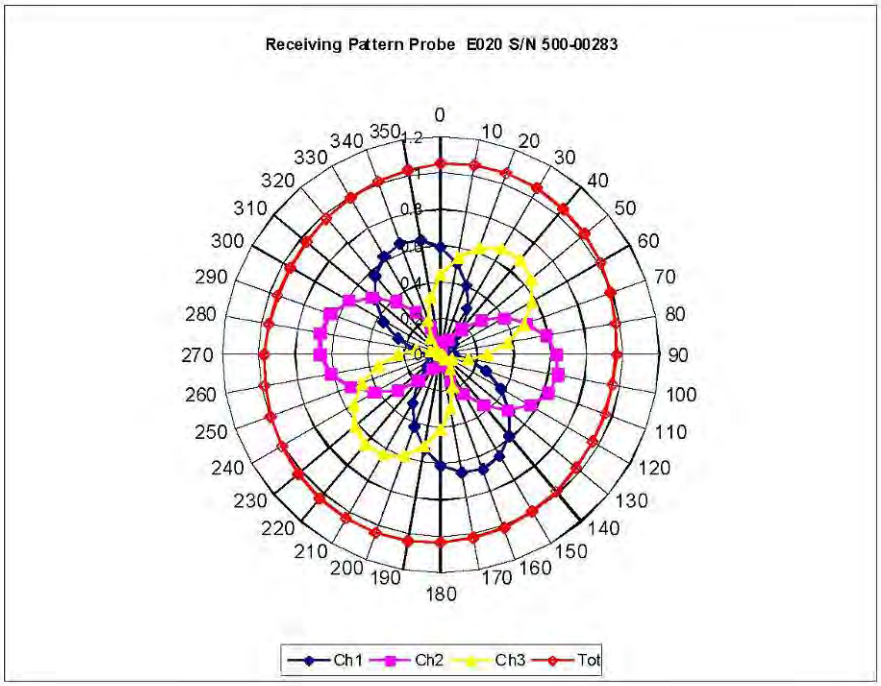
The spatial resolution uncertainty is less than 1.5% for 4.9mm diameter probe.
The spatial resolution uncertainty is less than 1.0% for 2.5mm diameter probe.

DAQ-PAQ Contribution

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

NCL Calibration Laboratories
Division of APREL Inc.

Receiving Pattern Air



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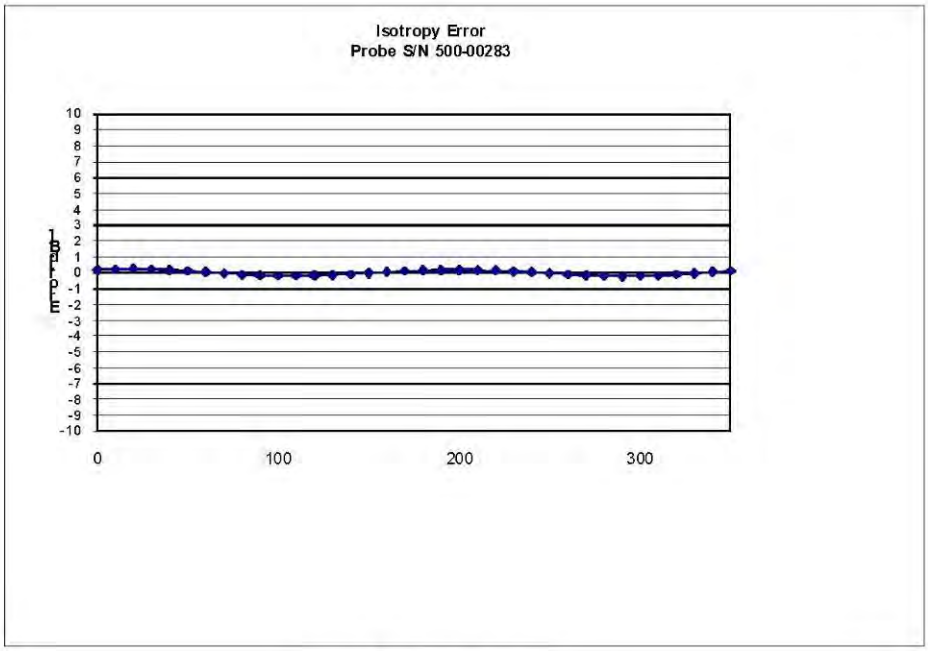
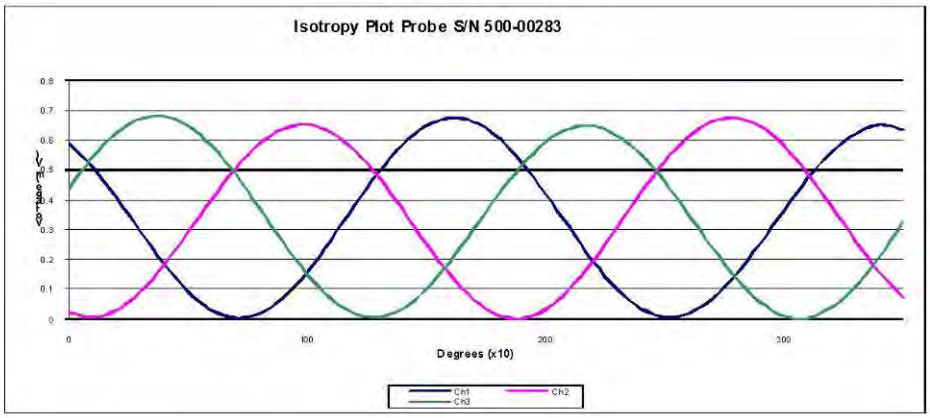
Isotropy Error Air





Isotropicity Tissue: 0.10 dB

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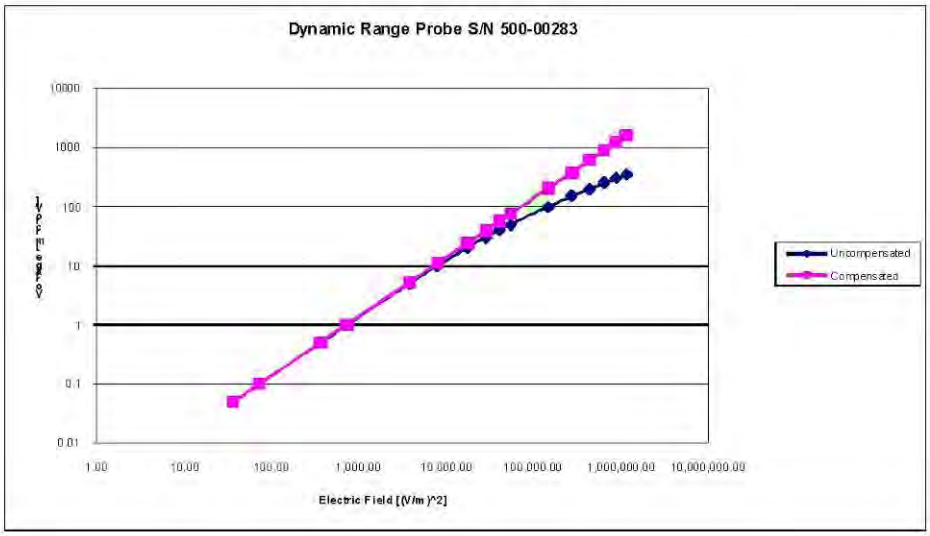
Dynamic Range



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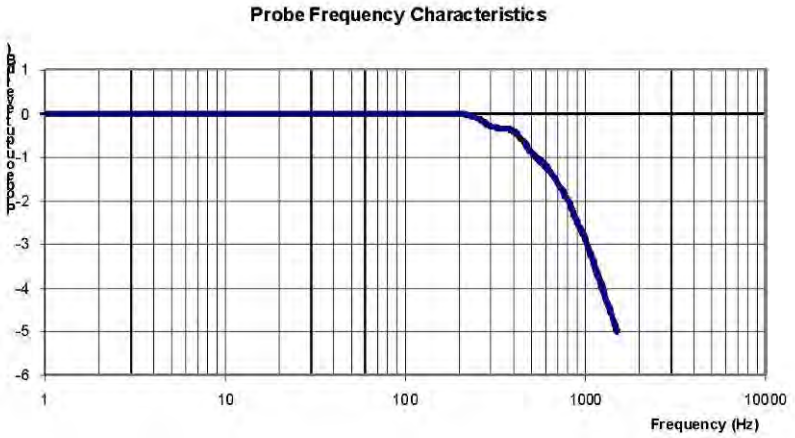
Video Bandwidth



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

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.

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

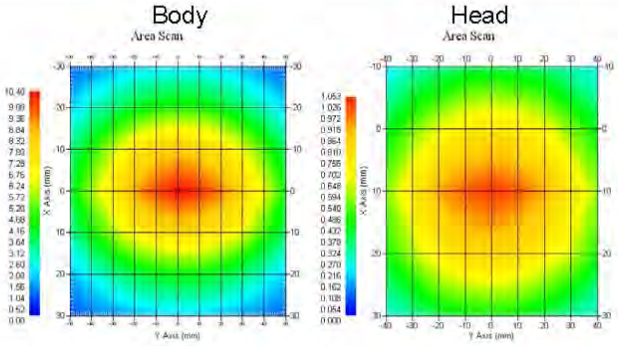
Length: 162.2 mm
Height: 89.4 mm

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



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

NCL Calibration Laboratories
Division of APREL Laboratories.

Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 180-00558. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-020 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 1528:2013 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques"
- IEC-62209-1:2006 "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-62209-2:2010 "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures"
  Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 30 MHz to 6 GHz)"
- D28-002 Procedure for validation of SAR system using a dipole

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.

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	49.001Ω
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

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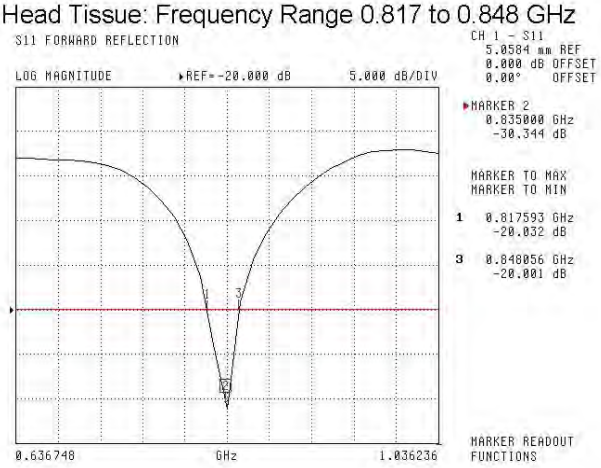
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

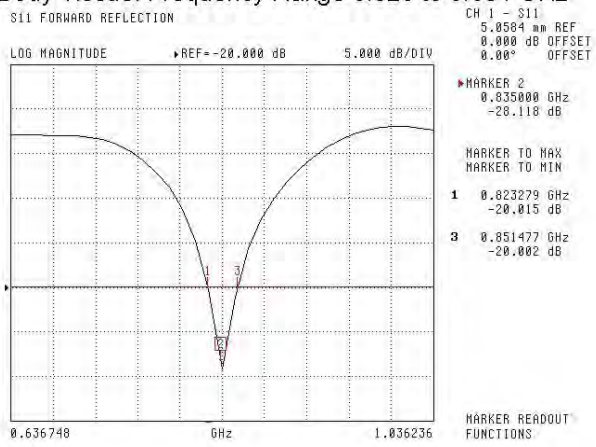
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head Tissue: Frequency Range 0.817 to 0.848 GHz



Body Tissue: Frequency Range 0.823 to 0.851 GHz



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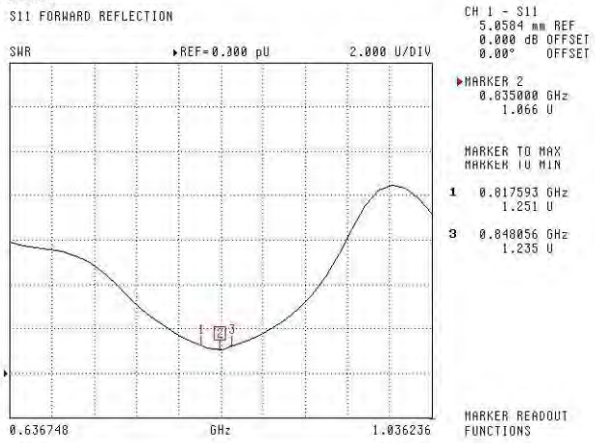
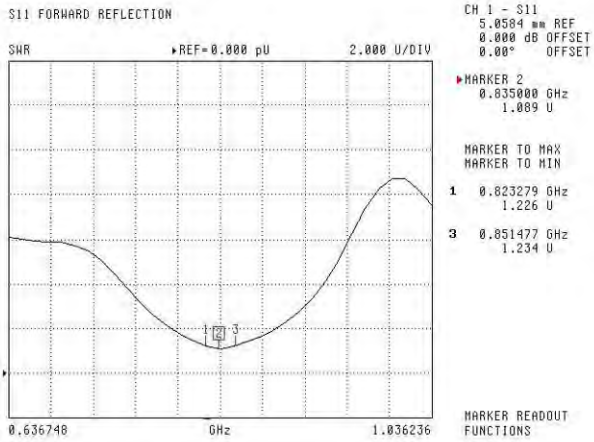
NCL Calibration Laboratories
Division of APREL Laboratories.

SWR

Head



Body



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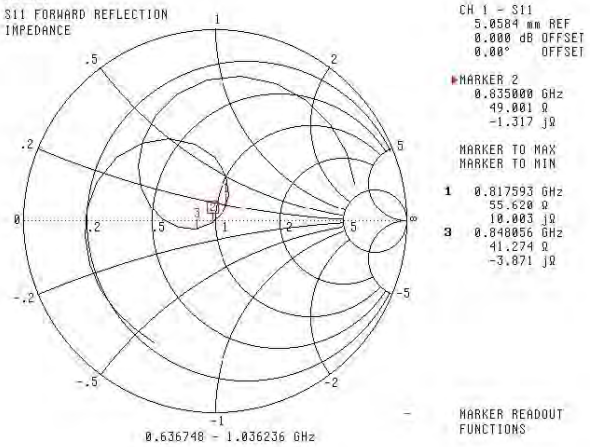
This page has been reviewed for content and attested to by signature within this document.

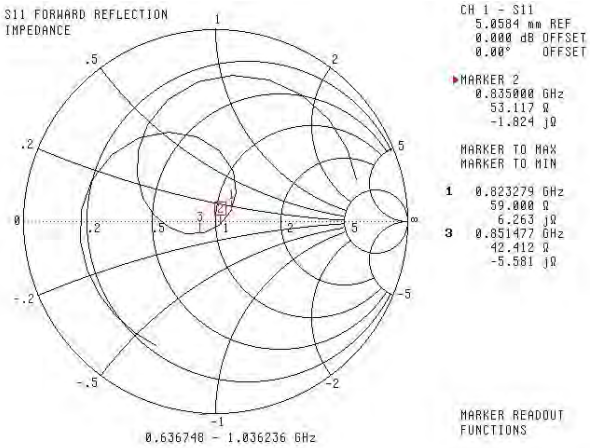
NCL Calibration Laboratories
Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



Body



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

NCL Calibration Laboratories
Division of APREL Laboratories.

Test Equipment

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

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

NCL CALIBRATION LABORATORIES

Calibration File No: DC-1600
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-900-S-2
Frequency: 900 MHz
Serial No: 190-00609

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

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: 149.9 mm
Height: 82.8 mm

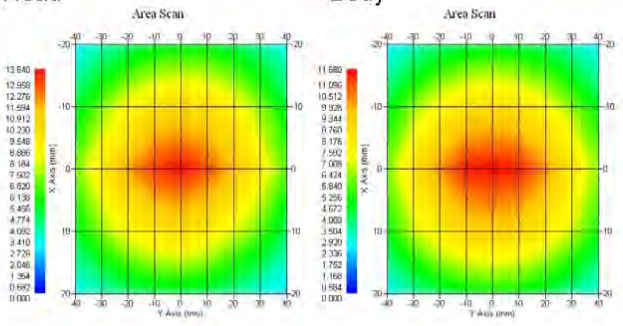
Electrical Specification

Tissue	Frequency	SWR:	Return Loss	Impedance
Head	900 MHz	1.084 U	-28.52 dB	47.029 Ω
Body	900 MHz	1.132 U	-24.34 dB	48.663 Ω

System Validation Results

Tissue	Frequency	1 Gram	10 Gram	Peak
Head	900MHz	11.828	7.595	17.616
Body	900MHz	11.072	7.07	16.715

Head Body



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

NCL Calibration Laboratories
Division of APREL Laboratories.

Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 190-00609. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-020 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 190-00609 was a recalibration.

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

Dipole Calibration uncertainty

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

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

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Dipole Calibration Results

Mechanical Verification

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

Electrical Specification

Tissue	Frequency	SWR:	Return Loss	Impedance
Head	900 MHz	1.084 U	-28.52 dB	47.029 Ω
Body	900 MHz	1.132 U	-24.34 dB	48.663 Ω

Tissue Validation

	Dielectric constant, ε_r	Conductivity, σ [S/m]
Head Tissue 900MHz	41.87	1.06
Body Tissue 900MHz	55.62	1.05

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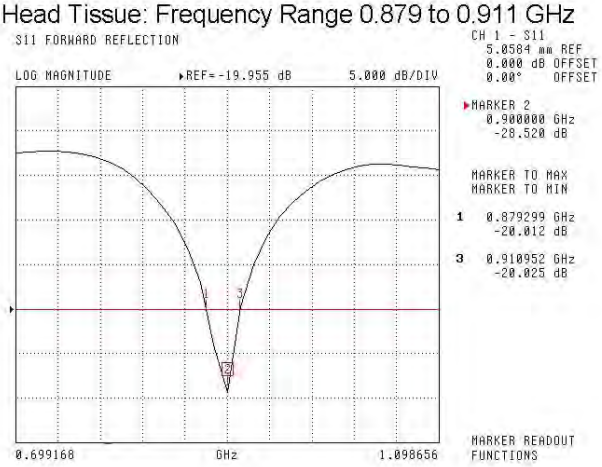
NCL Calibration Laboratories
Division of APREL Laboratories.

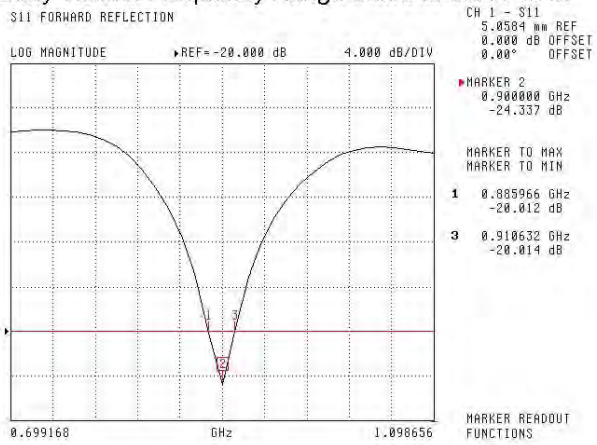
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head Tissue: Frequency Range 0.879 to 0.911 GHz



Body Tissue: Frequency Range 0.886 to 0.911 GHz



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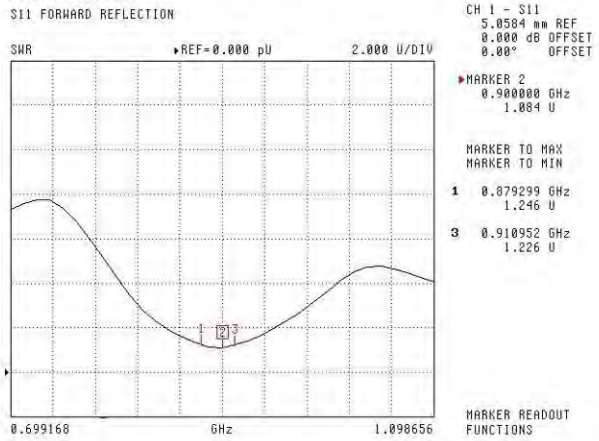
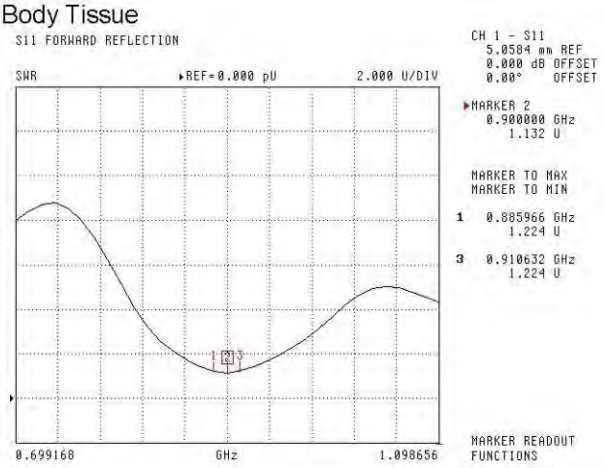
NCL Calibration Laboratories
Division of APREL Laboratories.

SWR

Head Tissue



Body Tissue



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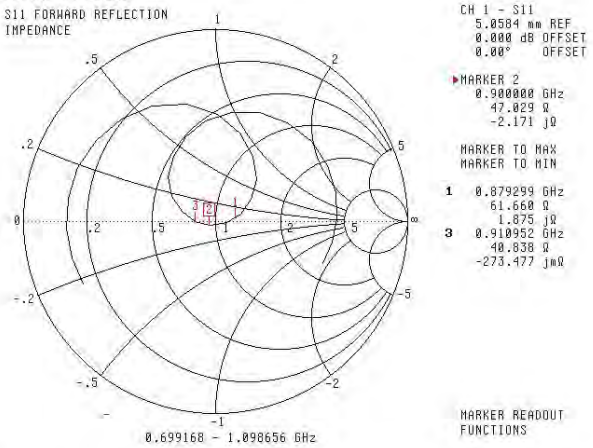
This page has been reviewed for content and attested to by signature within this document.

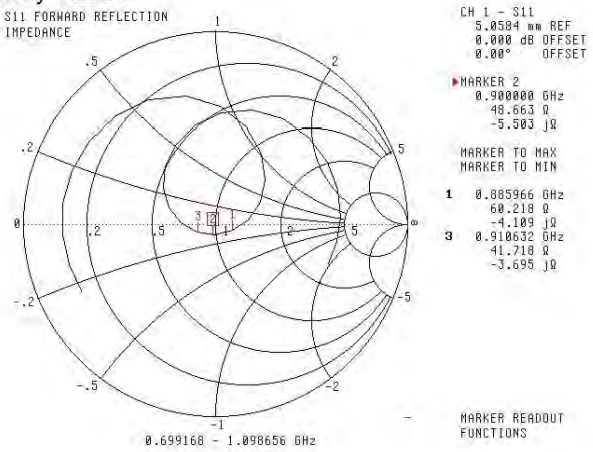
NCL Calibration Laboratories
Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head Tissue



Body Tissue



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

NCL Calibration Laboratories
Division of APREL Laboratories.

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.

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.

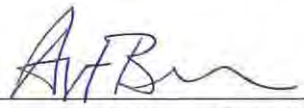
BACL Head & Body Validation Dipole

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.

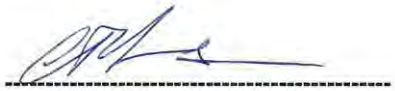
Conditions

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

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

NCL Calibration Laboratories
Division of APREL Laboratories.

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

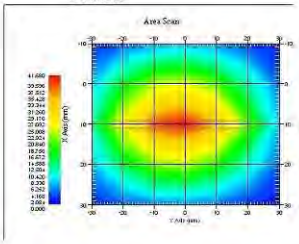
Test	Result Head	Result Body
S11 R/L	-25.567	-20.548 dB
SWR	1.111U	1.207 U
Impedance	53.637Ω	55.929 Ω

System Validation Results, 1750 MHz

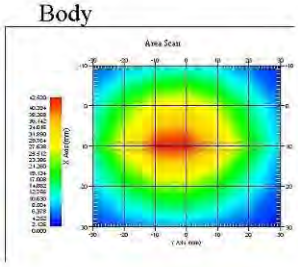
	1g	10g
Head	37.02	18.99
Body	36.65	18.85

Type	Epsilon	Sigma
Head	38.51	1.36
Body	51.79	1.53

Head



Body



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

NCL Calibration Laboratories
Division of APREL Laboratories.

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)**

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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

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NCL Calibration Laboratories
Division of APREL Laboratories.

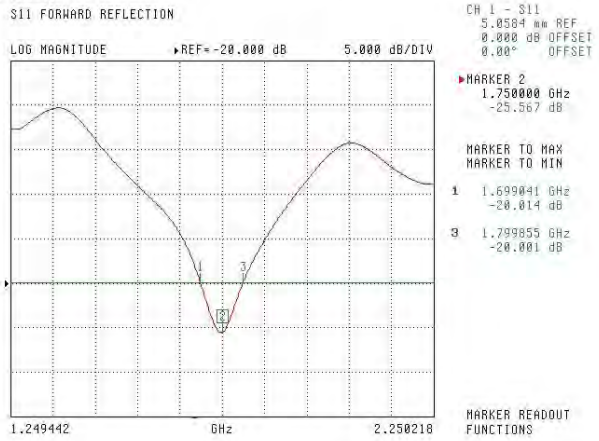
Electrical Calibration

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

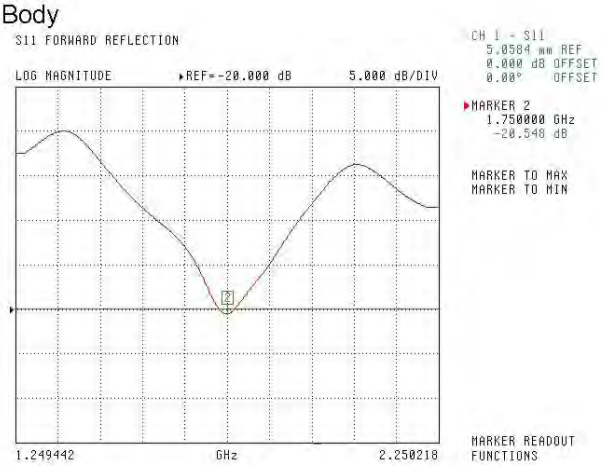
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head



Body



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NCL Calibration Laboratories
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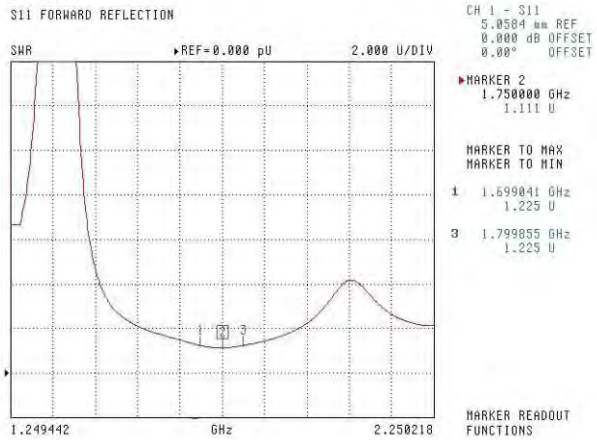
SWR

Head



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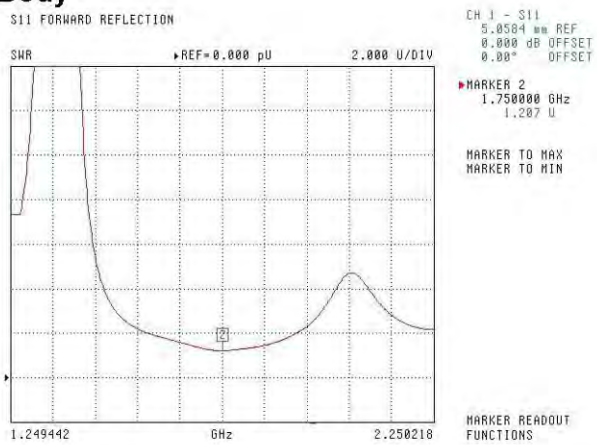

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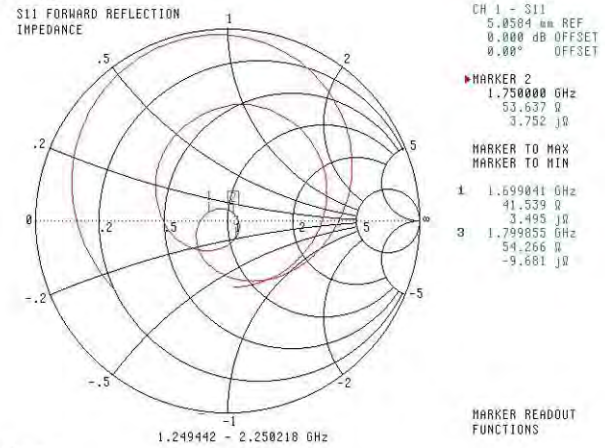
NCL Calibration Laboratories
Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



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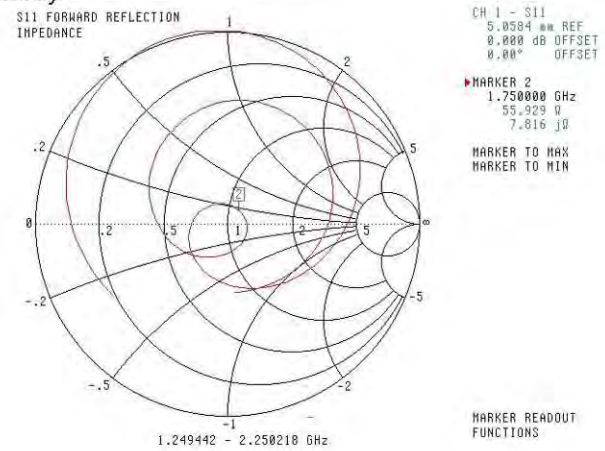

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NCL Calibration Laboratories
Division of APREL Laboratories.

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 2013

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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.
Kanata, ONTARIO
CANADA K2K 3J1
Division of APREL Lab.
TEL: (613) 435-8300
FAX: (613)435-8306

NCL Calibration Laboratories
Division of APREL Laboratories.

Conditions

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

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

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

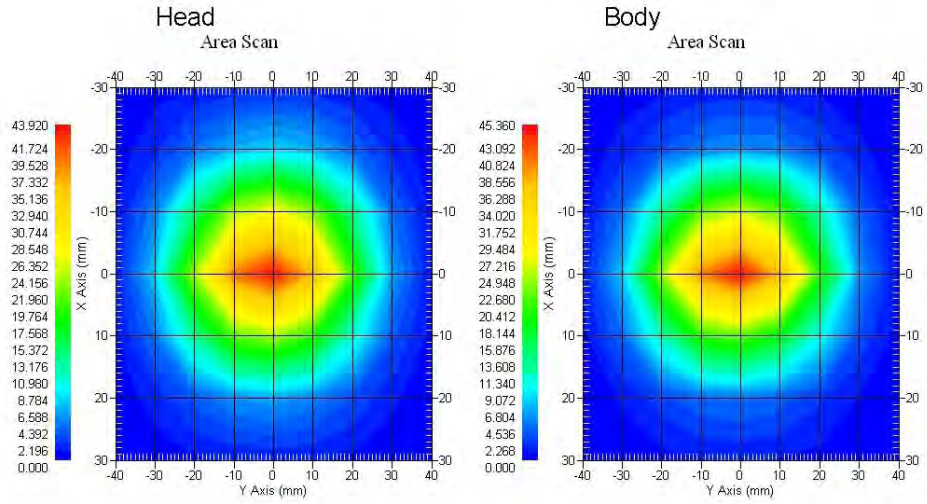
Length: 67.1 mm
Height: 38.9 mm

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)**

4

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Dipole Calibration Results

Mechanical Verification

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

Electrical Validation

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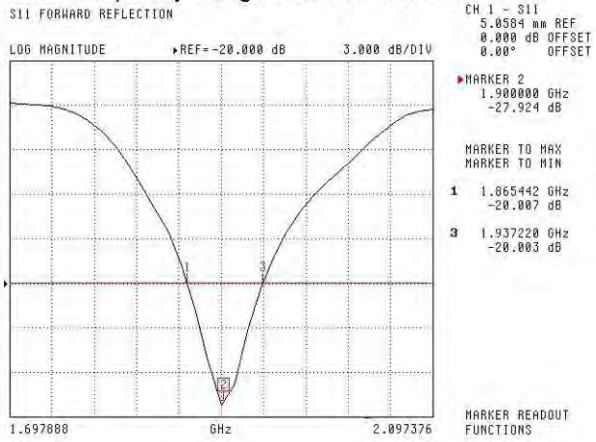
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

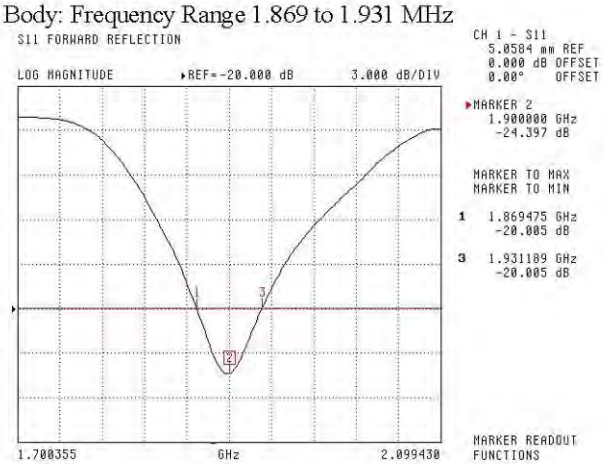
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head: Frequency Range 1.865 to 1.937 GHz



Body: Frequency Range 1.869 to 1.931 MHz



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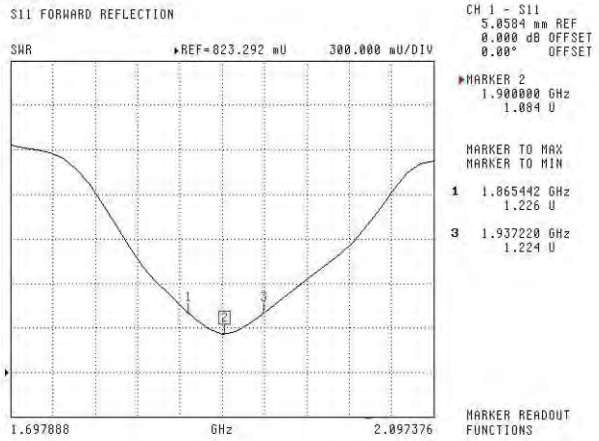
NCL Calibration Laboratories
Division of APREL Laboratories.

SWR

Head



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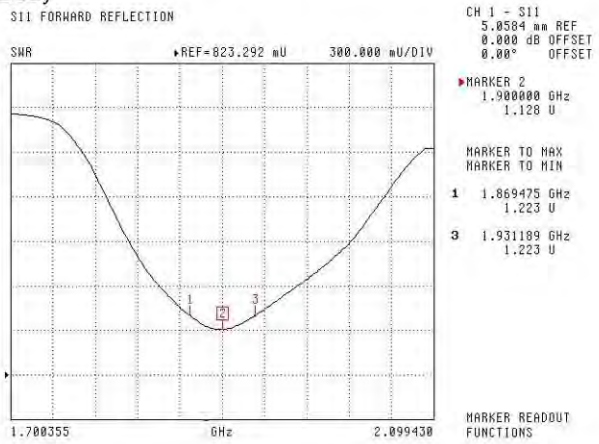

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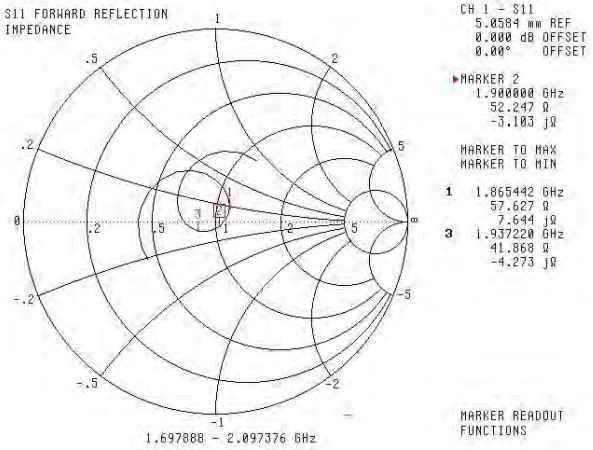
NCL Calibration Laboratories
Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



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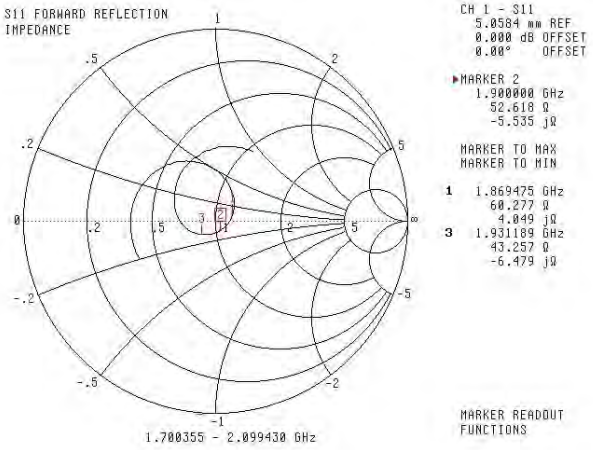

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This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

Test Equipment

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

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

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.

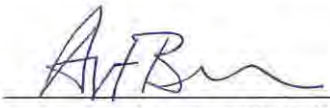
Validation Dipole (Head & Body)

Manufacturer: APREL Laboratories
Part number: ALS-D-2450-S-2
Frequency: 2450 MHz
Serial No: 220-00758

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.
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 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

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

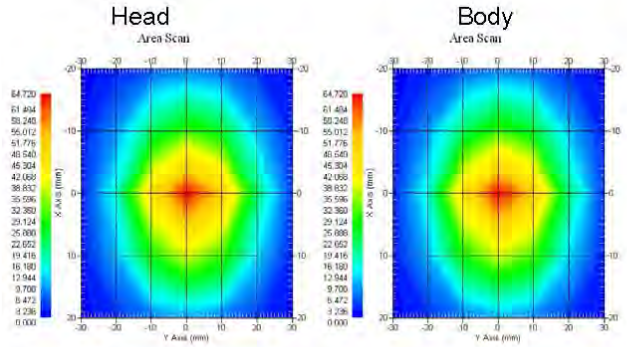
Length: 52.4 mm
Height: 30.3 mm

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)**

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Dipole Calibration Results

Mechanical Verification

APREL Length	APREL Height	Measured Length	Measured Height
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	50.006Ω
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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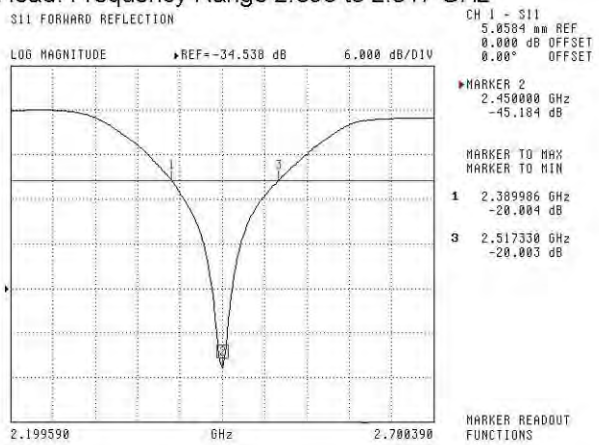
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

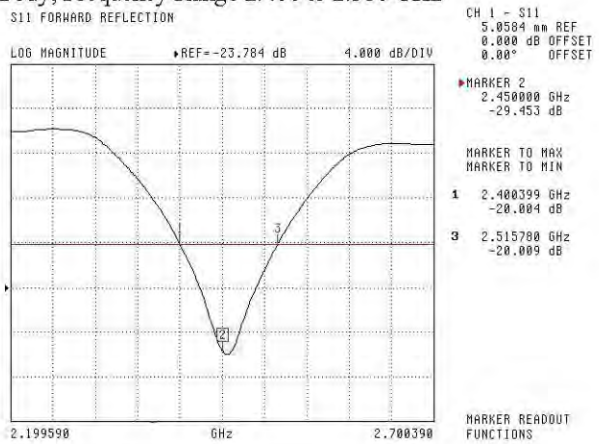
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head: Frequency Range 2.390 to 2.517 GHz



Body; Frequency Range 2.400 to 2.516 GHz



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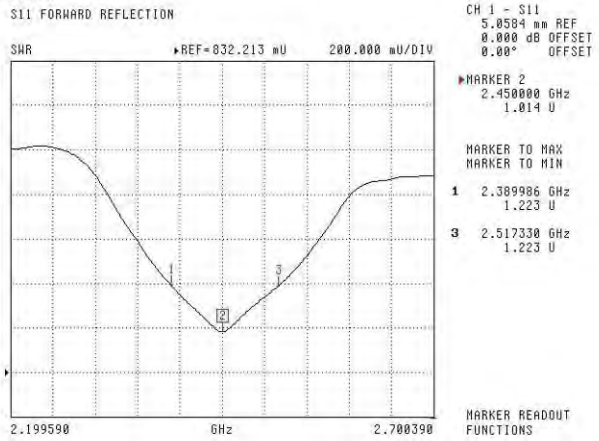
NCL Calibration Laboratories
Division of APREL Laboratories.

SWR

Head



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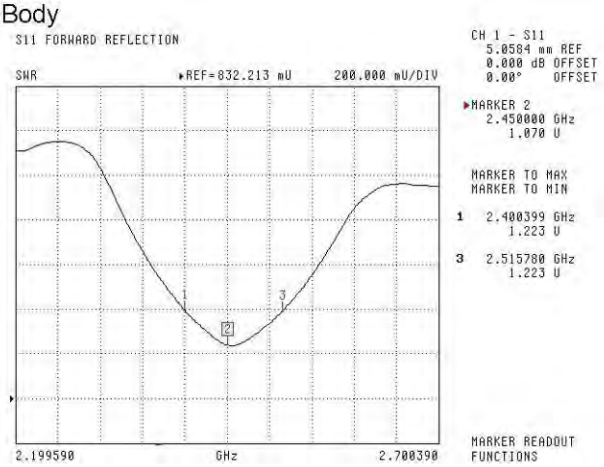

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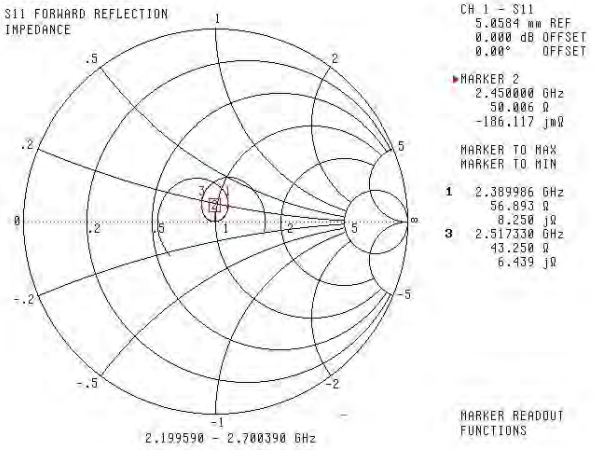
NCL Calibration Laboratories
Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



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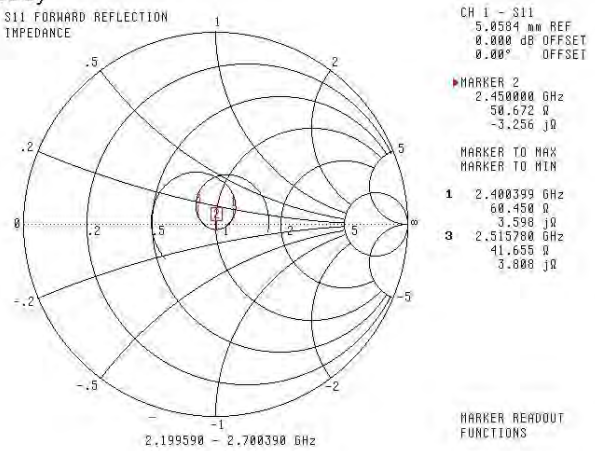

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This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

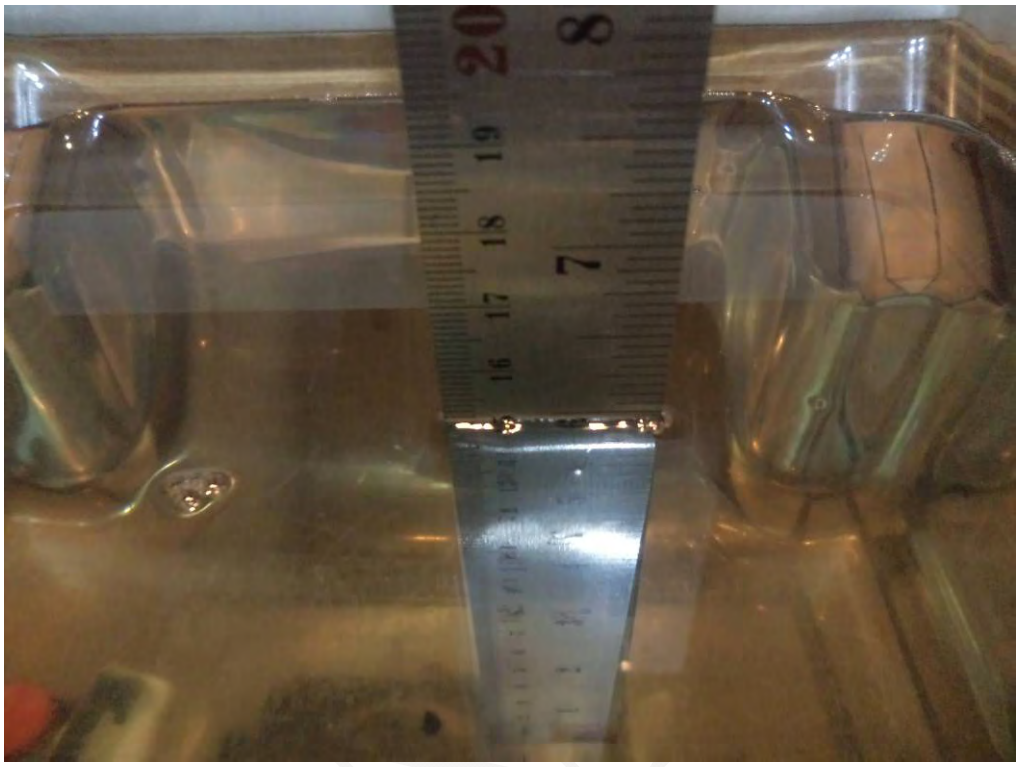
Test Equipment

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

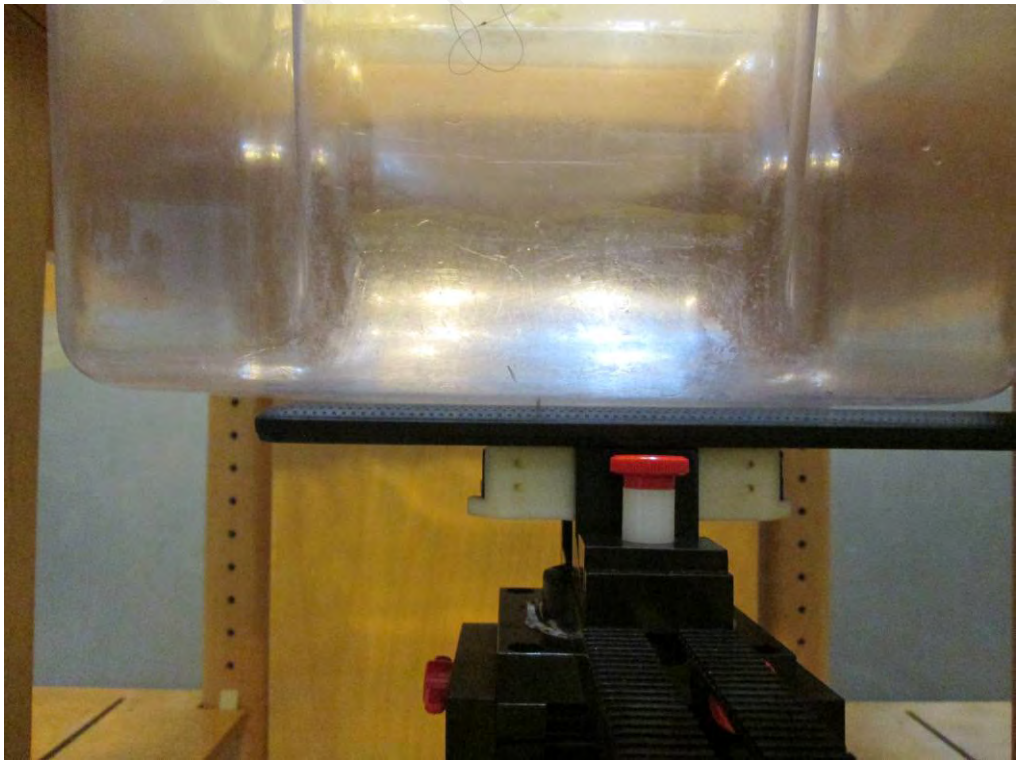
This page has been reviewed for content and attested to by signature within this document.

APPENDIX D EUT TEST POSITION PHOTOS

Liquid depth ≥ 15cm

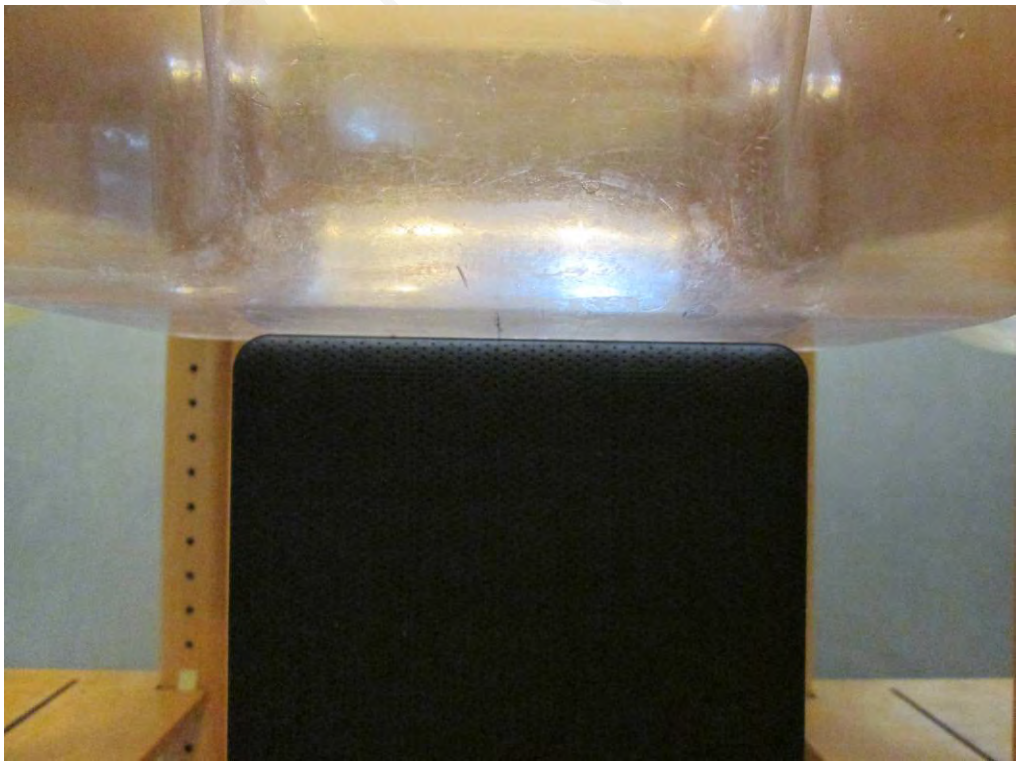


Body-Worn-Back Setup Photo



Body-Left Photo

Body-Bottom Setup Photo



APPENDIX E EUT PHOTOS

EUT – Front View

EUT –Back View

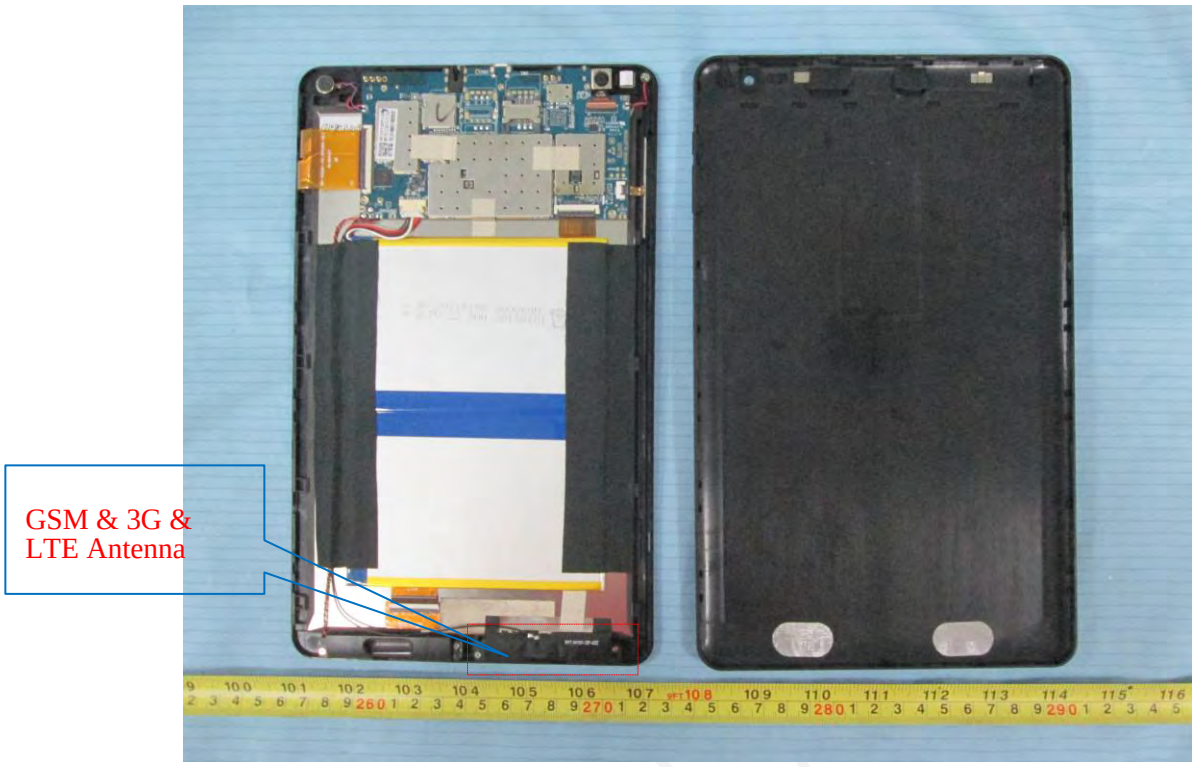
EUT – Left View

EUT – Right View

EUT – Top View

EUT – Bottom View

EUT – Cover off View



APPENDIX F INFORMATIVE REFERENCES

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

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

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

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

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PRODUCT SIMILARITY DECLARATION LETTER

Shenzhen Adreamer Technology Co., Ltd
Building A2, Silicon Valley Dynamic Qinghu Garden,Dahe Rd.,Longhua, Shenzhen
Tel:13590164011

10/15/2015

Product Similarity Declaration

To Whom It May Concern,

We, Shenzhen Adreamer Technology Co., Ltd, hereby declare that we have a product named as Tablet PC (Model no: MK1012) was tested by BACL, meanwhile, for our marketing purpose, we would like to list a series models（M8-10A,Druid L10,Steelcore 1030,1004,M104,G1001,G10), on reports and certificate, all the models are identical schematics, except for the differences as below,

1 . Difference model No.
2. Every Model No. has trade name, please find below:

Trade name	Model No.
Adreamer	MK1012
Funship	M8-10A
Vonino	Druid L10
Overmax	Steelcore 1030
Turbopad	1004
Marshal	M104
Hipstreet	G1001
NeuTab	G10

No other changes are made to them.
We confirm that all information above is true, and we'll be responsible for all the consequences. Please contact me if you have any question.

Kevin kang

Signature:

Kevin kang
GM

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